

fine tuning's PROCEEDINGS 1989

The 1989 front cover was designed by Proceedings Senior Editor Guy Atkins. The individual images themselves were created by ancient artists of the pre-Inca cultures of Andean South America. The central figure is playing a set of pipes known as the **sampoña**. This instrument, though similar to the early European panpipe, more closely parallels those of the Orient in size, shape and tuning. This instrument remains central to the creation of the traditional Andean **huayno** music which is admired by most SWBC DXers.

The images of the cover were created entirely with an Atari ST computer using with Publisher ST desktop publishing software by Time Works and Easy-Draw software by Migraph. The images were scanned into the CPU using IMG Scanner by Seymor-Radix. The finished images were printed out with a H-P DeskJet printer.

The text on the cover were created using WordPerfect 5.0 and a NEC LC-890 laser printer.

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International Standard Book Number application has been filed.

fine tuning

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introduction

introduction

Welcome to the 1989 Edition of **fine tuning's** PROCEEDINGS, the second annual volume of articles written by and for experienced shortwave DXers. The first edition of PROCEEDINGS, published in 1988, was well received by shortwave radio enthusiasts. It appears that PROCEEDINGS is filling a need for indepth articles that neither radio club bulletins nor the commercial hobby press can meet. We wish to stress that we are not attempting to compete with any other form of journalistic support for our hobby. Indeed, most PROCEEDINGS authors and editors are heavily involved with major radio club publications and many also write for the commercial hobby press. We are pleased to note, in fact, that PROCEEDINGS has received very significant support from other organizations involved in radio journalism.

After the success of PROCEEDINGS 1988, we wondered if authors would be forthcoming in 1989 who could match the level of that first volume. We also were concerned that too few would willingly submit to a process of rough drafting, rigorous treatment by the Editorial Review Board and final drafting which is modeled after the process used in the most prestigious scholarly and professional journals. In the Review process a number of articles were rejected outright as being inappropriate for PROCEEDINGS. Others were "recycled" with specific suggestions from the Review Board for more work by the author and resubmission in following years. All accepted articles were also edited by Senior Editor Mellberg to improve style, ease and conciseness of expression and clarity of thought. Senior Editor Mellberg has become known among us as Fritz the Chopper! Would there be enough willing authors and articles worthy of publication in 1989?

The answer was a resounding **YES.** In fact, so much superb material was submitted that we had many agonizing editorial decisions to make. Enough excellent material was submitted that this book could have been over 400 pages (and cost $40/copy). After a good deal of discussion and consultation, we decided to use photo reduction to compress as much information on to as few pages as possible. We also recycled several very worthy articles to the 1990 volume. The result of this complex process is **fine tuning's** PROCEEDINGS 1989. What remains, we believe, is the best that the hobby has to offer at this point. Due to the photo-reduction, there are 300 pages in information on 220 pages of print. We hope that you enjoy the reading and that the articles herein will heighten your enjoyment of this avocation we all love so much!

● FINANCES AND SUCH

As far as we know, our financial structure is unique. No one involved in PROCEEDINGS--authors, Editorial Review Board members or Senior Editors--is compensated financially. Further, every one of us purchased, at full price, our own copies of PROCEEDINGS. The people involved did so to insure that this book could continue to act as an intellectual base for the furtherance of the hobby. The financial concerns of modern publishing, particularly of books structured as this one, are merciless. The wide-ranging review process is very expensive,costing several thousand dollars of photocopying, mailing and long distance telephone charges. Further, since our hobby is so small and the number in our hobby able to afford PROCEEDINGS smaller yet, low volume (and expensive) print runs are required. Consequently, PROCEEDINGS 1988 lost almost $1000. We hope and believe that the modest increase in price this year will allow PROCEEDINGS to continue to serve the hobby in the future.

● WHO DID WHAT...

The staff of PROCEEDINGS' Senior Editors doubled this year. Fritz Mellberg and John Bryant were overjoyed to find Guy Atkins and David Clark as willing "volunteers" in the task of guiding PROCEEDINGS 1989. As with the 1988 volume, John Bryant was the quarterback of the operation. Guy Atkins edited a number of the most technical articles, as well as supplying his talent and taste to the graphics of this volume. David Clark organized and edited the two extraordinary "tips" compendiums (F13 and F14) which are a new feature this year. Finally, Fritz "The Chopper" Mellberg enabled us all to bring our thoughts to you in a reasonably articulate and concise manner.

● A PLEASURE

One of the original goals of PROCEEDINGS was to reach across the artificial barriers between amateur radio, SWBC DXing and MW DXing to compile the best of all three worlds for the SWBC DXer. We believe that this goal is being achieved. About one-third of the Review Board comes from the world of medium wave and about half are amateur radio operators. An equal distribution of backgrounds is found among the authors of 1989 articles. Our biggest pleasure as editors has been being actively involved in the creation of the 1989 articles. It is a rare privilege to watch some of "the finest minds in the business" at work for us all. Further, it is a great pleasure to come to know so many fine DXers from such diverse ages and backgrounds. As you will note in "**about the authors and editors**," our ages range from late 20's to early 70's and we come from such fields as the bar, the clergy, the military and academia. Among the authors are bankers, salesmen, people in insurance, professional journalists, people involved in radio professionally and yes, even a few electrical engineers. We are all brought together in this hobby by a common love of radio. It has been a genuine pleasure for the editors!

● AN INVITATION

As mentioned previously, a number of articles submitted this year have been held for the 1990 volume of PROCEEDINGS. Further, a number of articles have been promised for 1990 from authors who were unable to meet the 1989 production schedule. However, about half of the pages of PROCEEDINGS 1990 remain empty at this point. Would you like to join our merry crew of mis-treated and uncompensated authors? Is there a subject that you would like to see covered IN DEPTH and would you like to nominate an author? Contact us at **fine tuning** Special Publications. The due date for rough drafts will be in March of 1990.

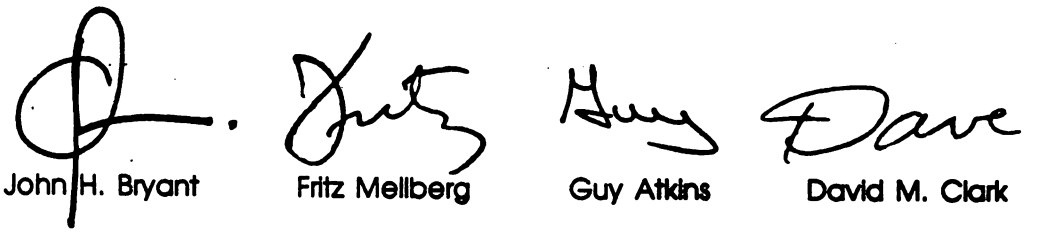
● IN APPRECIATION

First and most of all, we would like to thank the readers of the 1988 Edition for their enthusiastic praise of our initial efforts. We would also like to express our thanks for the unusual degree of support and encouragement given us by prominent hobby organizations and individuals throughout the world. We would especially like to thank SPEEDX, NU, ODXA, and NASWA for their support of our efforts. During the writing and production process of this volume, we received letters of encouragement from NASWA and ODXA which were shared with everyone involved. Those letters, reproduced here, meant a great deal. At critical times, we also received support and/or advice from some of the most public figures in the hobby including Jonathan Marks of R. Nederland, Ian McFarland of R. Canada International, Brent Allred of HCJB, Bob Brown of the ANARC SWL Net, Glenn Hauser, Larry Magne and, of course, Don Jensen and Gerry Dexter. Thank you each very much.

Lastly, we owe a great debt to each of the authors who gave time--hobby time--away from their radios to share their insights with the rest of us!

WELCOME TO fine tuning's PROCEEDINGS 1989!

The Senior Editors



John H. Bryant Fritz Mellberg Guy Atkins David M. Clark

NASWA

NORTH AMERICAN SHORT WAVE ASSOCIATION

R. CHARLES RIPPEL
Executive Director
1272 Parkside Place
Virginia Beach, VA 23454

May 2, 1989

Mr. John Bryant
Fine Turning Special Publications
RRT #5 Box 14
Stillwater, OK 74074

Dear Mr. Bryant:

On behalf of the organized Short Wave Broadcast Listening hobby as represented by The North American Short Wave Association, I would like to recognize Fine Tuning for assembling what will perhaps be the finest compendium of hobby related resource material available today.

The staff of volunteer editors, graphic designers, and behind the scenes logistic coordinators could well provide many commercial publications a goal to strive for. Having served on the Editorial Review Staff for technical subjects myself this second year, I would like to convey a sense of the quality standards the material appearing in Proceedings must meet. This is surely a publication any hobby enthusiast can be proud to own.

There are some who would say our hobby is not enjoying a period of popularity. Certainly, the success of Proceedings, 1988 points to other conclusions. Proceedings, 1989 will no doubt prove more successful and valuable to our hobby.

Unquestionably, any active participant in the Listening Hobby, no matter what their focus, will benefit from having a copy of either Proceedings available to enhance their interaction and understanding of many facets of Shortwave Listening.

Again, congratulations from The North American Short Wave Association on your efforts and best of luck with future endeavors.

Cordially

R. Charles Rippel
Executive Director

ONTARIO DX ASSOCIATION

P.O. BOX 161, STATION -A- WILLOWDALE, ONTARIO M2N 5S8
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30 May 1989

Mr. John H. Bryant
Editor, FT Special Publications
RRT 5, Box 14
Stillwater, OK
74074
United States of America

RE : PROCEEDINGS 1989

Dear John :

It is with pleasure that I write to you on behalf of the Board of Directors of the Ontario DX Association and our membership of almost 1000 SWL's and DXers worldwide. I would like to extend to you and your associates our encouragement and hearty endorsement with respect to your initiative in publishing Proceedings 1988 and now, the soon to be published Proceedings 1989 .

David Clark, one of our Directors, has of course been quite actively involved in "Proceedings" these past two years, and through him, we are well aware of the many hundreds of voluntary hours of authoring and editorial review that has transpired in making "Proceedings" an unqualified success...not to mention the sheer logistics associated with a non-profit undertaking of this magnitude!

"Proceedings" is providing a unique service in the furtherance of the hobby, especially-so for both the experienced and the aspiring DXer. We wish you every success with Proceedings 1989 and of course many of us are looking forward to acquiring our personal copies.

In this regard, I am pleased to advise that the ODXA is again ready to facilitate Canadian distribution of the publication and to that end I confirm our pre-publication order for 50 copies. We trust that pre-payment of our order (to be forthcoming at the end of June) will be of some "up-front" assistance as you prepare to go to press.

Again, congratulations and let us hope that the publication of this year's "Proceedings" will firmly establish it as an annual tradition.

Sincerely,

Harold Sellers
Chairman
Ontario DX Association

editorial review board

editorial review board

Guy Atkins
Issaquah, WA

Charles Bolland
Lake Worth, FL

John H. Bryant
Stillwater, OK

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Mark Connelly
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Nick Hall-Patch
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Fritz Mellberg
Hawarden, IA

R. Charles Rippel
Virginia Beach, VA

Mitchell S. Sams
Wichita, KS

about fine tuning

about fine tuning

fine tuning is an organization dedicated to supporting the hobby of Shortwave Broadcast DX. Founded in 1977 by well known DXer Dan Ferguson, FT originally published a bi-weekly newsletter of rare and difficult DX heard by leading shortwave enthusiasts throughout North America. To shorten the time between reception and publication, and to keep the work load manageable, membership in **fine tuning** was kept small and "by invitation." After a number of years, Dan turned over the editing and publishing chores to Larry Yamron who continues to serve in that capacity.

In 1986, FT merged with the Ozark Mountain DX Club, a fully public DX newsletter founded and published by Mitch Sams. Mitch is now the Managing Editor of **fine tuning**. With the merger, FT adopted the "open organization" philosophy of OMDXC and today welcomes all radio enthusiasts interested in rare and difficult DX. Also in 1986, FT established its Special Publications arm led by John Bryant.

The newsletter portion of **fine tuning**'s services is published weekly during the DX season and bi-weekly during the North American summer. The bulletin, also called **fine tuning**, is a journal emphasizing rare and difficult DX. The bulletins focus on SWBC news, but also contain news of unusual merit from the medium wave, long wave, ham, utility, or TV DX communities.

There are eight people currently involved in the production of the weekly issues of **fine tuning**. Four outstanding DXers serve as editors, each being responsible for two issues before handing off to the next editor. The weekly editors are: Dave Valco, Kirk Allen, Kevin Atkins and Alan Laves. They are supported by Back-up Editors Dan Sheedy and John Wilkens. Managing Editor Mitch Sams maintains FT subscriptions, finances, the subscriber list, mailing labels and responds to sample requests. Publication of FT is handled by Larry Yamron. Each completed issue of FT is mailed from the current editor to Larry for publication and mailing. The staff of **fine tuning**'s Special Publications consists of John Bryant and Guy Atkins. Larry Yamron also joins this part of FT overseeing production of DXer's Guide to Latin America. Jon Williams serves this arm of FT as well, as manager of the FT/OZDX Indonesian Database.

Cost (US) per issue of the **fine tuning** bulletin is 60 cents in North America and 75 cents elsewhere (airmail). Minimum order of 20 issues ($12) is payable to:

FINE TUNING
PO Box 780075
Wichita, KS 67278 USA

Sample copies of the **fine tuning** bulletin may be obtained for an SASE.

fine tuning

propagation

DXING ASIANS ON THE TROPICAL BANDS
The Auroral Factor

David Clark

● INTRODUCTION

The excitement and challenge of logging domestic Asians on the Tropical Bands is alluring to many DXers. For those of us in North America, the northern auroral absorption zone straddling the polar region can present a formidable wall between ourselves and the elusive Asian DX signals.

But that proverbial wall is not impenetrable. There are ways around and especially through it, given a knowledge of great circle paths and darkness/near darkness (including Grayline) paths. Those factors can be exploited more successfully with an appreciation of the characteristics of the auroral zone and how it is affected by solar activity. In particular, one should be aware of the so-called "donut-hole" centred on the North Magnetic Pole and the manner in which, at times, it appears to usher the Asian signals to our receivers at enhanced levels.

The purpose of this article is to examine the auroral factor so the DXer will be better equiped to recognize and even anticipate those infrequent but extraordinary openings when rare Asians are waiting to be snagged.

● THE TRANSPOLAR SIGNAL PATH AND THE AURORAL ZONE

(A) The Solar Factor:

We should recognize that North American reception of Tropical Band Asian signals following the great circle path is essentially impossible via the long path during September to April, the prime DX season. Signals coming "long way around" would first be directed soutward where eventually they would be subject to "solar blanking" - 'D' layer absorption due to the perpetual daylight of the Antarctic summer.

This means that Asian reception will depend on the short path route. We must therefore look at the auroral absorption zone in the northern polar region. After all, conventional wisdom says that signals crossing this region would be typically subject to auroral absorption and distortion (flutter fading), except possibly when the geomagnetic field has been very quiet for an extended period of time.

This is not necessarily the case. Depending on the Asian target area, relative to the DXer's geographic location on the North American continent, enhanced signals will often be found when the geomagnetic field is unsettled or even active. This will be the result of some prior solar event: solar flare activity being the most common. These solar terrestial events disrupt the the earth's magnetic field with a consequent increase in the intensity of the absorptive characteristics of the ionosphere in the auroral zone. And yet, certain signals do manage to propagate through (and sometimes even around) the auroral zone, at times with greatly enhanced reception quality.

It is very useful to know how and when the Tropical Band signals from Asia may reach us via a darkness path. A "near darkness" (ideally Grayline) signal path would be preferred. But simply tuning in "at the right time" offers no assurance of reception - conditions do vary greatly from day to day. It is also important to recognize that the subject signal path passes through or near the northern auroral zone where, as mentioned, ionospheric propagation is very much influenced by the state of the geomagnetic field and by activity originating on the sun.

Solar activity, primarily associated with the extent of sunspot occurrences, tends to by cyclic and thus somewhat predictable. While the long term (11 year) cycle cannot be ignored, day-to-day reception is patterned after the 27 day solar cycle. When DX conditions are favourable, you should be prepared for recurring conditions about 27 days later - the time it takes for the sun to complete one full rotation on its axis. One should learn to recognize when conditions may offer up the chance of rare DX, based on WWV solar/geomagnetic data that is broadcast at 18 minutes past the

hour (updated every three hours) and by the "feel" of the band, based on whether "indicator" stations are audible at above average strength.

In the case of the Tropical Band Asians, experience shows that there is a chance that DX signals will be rolling in just when you least expect it - when a solar disturbance has recently taken place and geomagnetic conditions are described as unsettled or active. The initial transitional period when geomagnetic conditions are migrating from quiet-unsettled to unsettled-active seems to be the optimal period.

(B) Asian Great Circle Paths and The Auroral Donut:

Assuming a great circle path, the particular Asian signals which will intersect the auroral region will depend on the DXer's location at the receiving end here in North America. Since the auroral zone is centred around the North Magnetic Pole, it is not difficult using an azimuthal equidistant map centred on your location to line up which region of Asia lies directly opposite the heart of the auroral region. A straight line drawn from the centre of the map to any other point on the earth's surface indicates the shortest (great circle) path most likely to be followed by a signal reaching your receiver. Refer to maps identified as Figures 1, 2 and 3.

An azimuthal equidistant map should only be considered accurate enough if your receiver location lies within a hundred miles or so of the centre reference point. This is especially important if you wish to plot Grayline (sunrise/sunset) lines on the map. The three maps following are sufficient, however, to illustrate the text as it applies to the DXer situate in eastern, central or western continental North America.

Each map shows the great circle signal path which passes through the position of the North Magnetic Pole or the "donut-hole", from the reference point in North America to the Asian side. The approximate position of the surrounding auroral ring or "donut" is also shown. Great circle signal paths between Asia and the North American reference point which intersect the ring lying 10 to 15 degrees on either side of the geomagnetic pole are more likely to incur severe auroral absorption.

Fig. 1 - ASIAN GREAT CIRCLE PATH INTERSECTING NORTH MAGNETIC POLE FROM TORONTO, ONTARIO

For example, using my location at Newmarket, Ontario as representative for Eastern North America (Figure 1), the geomagnetic pole is intersected on a line about 350 degrees west of true North. The Asian extension of the path reaches the central region of S.E. Asia, passes in the vicinity of the Chinese island of Hainan (and Hong Kong), along the coast of Vietnam, and practically runs through downtown Jakarta.

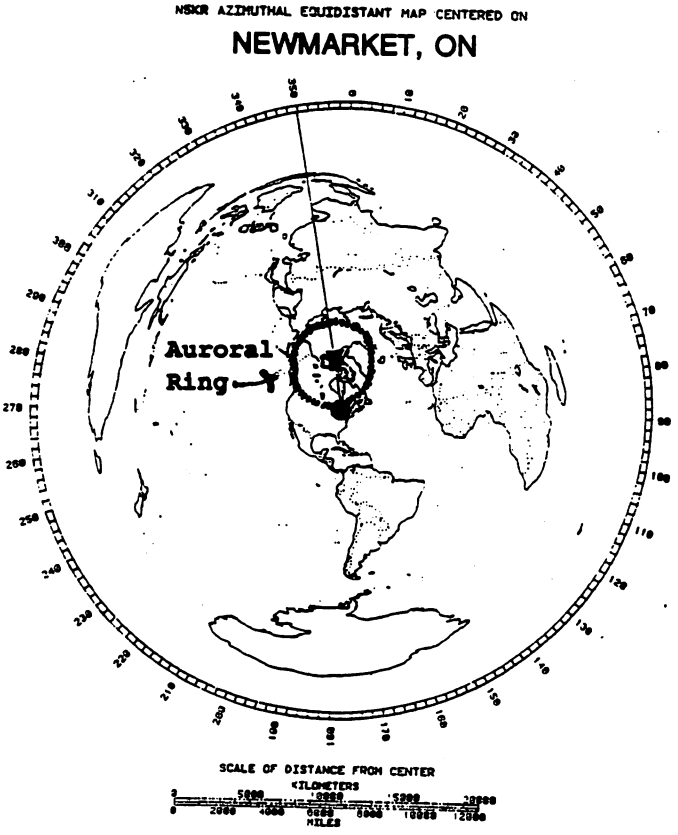
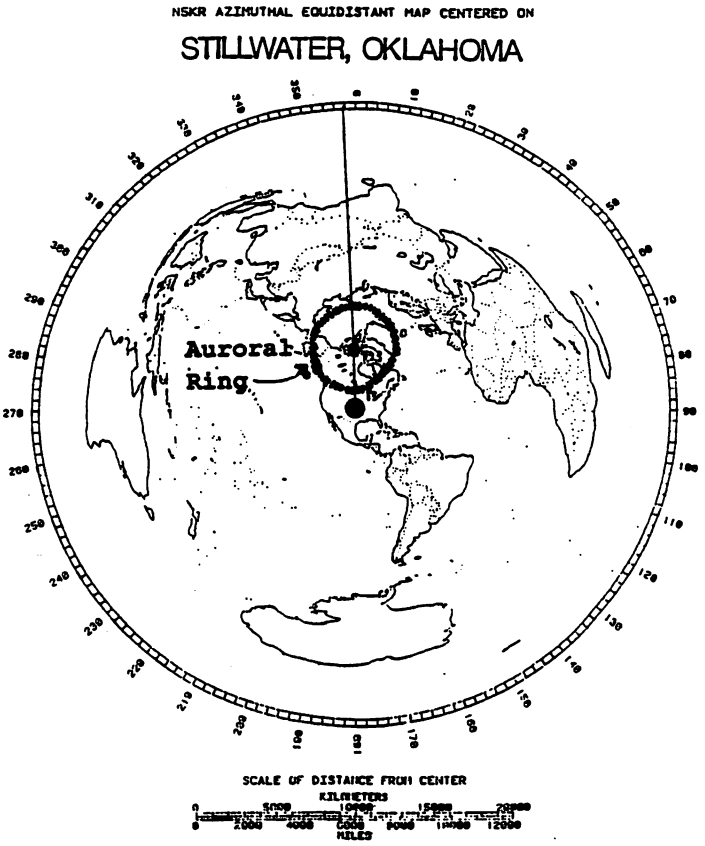
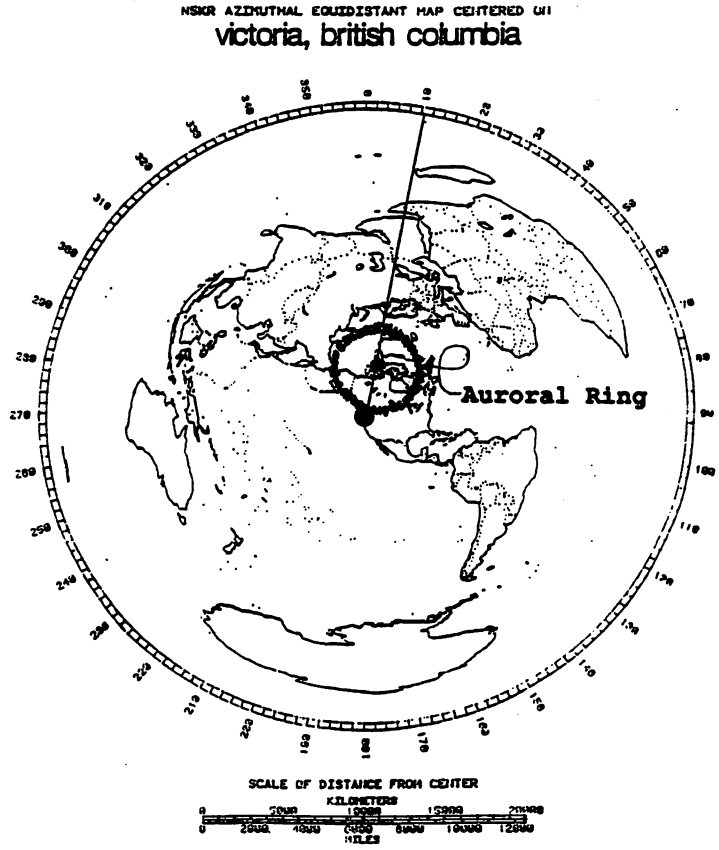


Fig. 2 - ASIAN GREAT CIRCLE PATH INTERSECTING NORTH MAGNETIC POLE FROM STILLWATER, OKLAHOMA



To the DXer living in mid-continental North America, however, the path to the magnetic pole shifts some 10 degrees in an easterly direction and lies in an almost True North plane over the geographic pole. You can see, using the Stillwater example (Figure 2), that we are virtually slicing continental Asia in half. The path skirts the western extremity of Mongolia, continues through Tibet and Nepal, extending southward through the eastern side of India to Sri Lanka.

Fig. 3 - ASIAN GREAT CIRCLE PATH INTERSECTING NORTH MAGNETIC POLE FROM VICTORIA, BRITISH COLOMBIA



For westcoast DXers, using Victoria, British Colombia as the example (Figure 3), the path to the magnetic pole has shifted eastward a further 10 degrees, that is, on a line about 10 degrees east of true North. In this case, the Asian polar path tracks past the Caspian Sea, through Iran and into Saudi Arabia. This is a significant advantage when it comes to Asian DXing. The great circle signal path for the sought-after targets in Southeastern and Southern Asia does not rely at all on the donut-hole: the path is comfortably clear of the auroral zone altogether!

It is important to note that I referred to paths extending through the heart of the auroral zone, for it is here, in the vicinity of the geomagnetic pole that one encounters a gaping hole in the auroral zone, colloquially known as the "donut-hole". It is through this interior hole that Asian signals can, under some propagational circumstances, find their way to our hemisphere along their great circle path. That is why it is important to be aware of the Asian path which intersects the magnetic pole based on one's own locale. As we shall see, Asian sites in line with the general direction of that path should be prime DX targets for us: Southeast Asia for eastern listeners, South-Central Asia for mid-continent listeners and South-west Asia for the western listeners.

This is not to suggest that mid-continental or westcoast reception of signals from the Southeast Asia is likely to be any less favourable than for easterners who enjoy that particular donut-hole path. In reality, were it not for the donut-hole, easterners would probably have a tough time logging low frequency Southeast Asians, period!

As we move west across continental North America, the Southeast Asian path swings around from the north to a more westerly plane (refer again to Figures 1, 2 and 3). Thus, unless conditions are unduly disturbed and the breadth of the auroral zone has greatly expanded, the Asians will propagate unimpeded past the outer perimeter of the zone. In addition (at least for westcoasters) signal levels will benefit greatly from the "all-water" path. Because of this bit of geographical mechanics, DXers in eastern North America are generally more dependant on the donut-hole for reception of Southeast Asians than are westcoasters who, even with average conditions, have the advantage of a non-polar and virtually all-water propagation path.

For those in central parts of the continent, it's a mixed bag. The donut-hole becomes important with respect to Southern Asia (essentially the Indian sub-continent), whereas most Southeast Asian signals may skirt around the western extremity of the auroral zone, except when conditions are more disturbed.

No matter where we live in North America, our Asian catches are influenced by the donut-hole as far as reception from one region or another is concerned. Further, we will all find certain paths are especially difficult. Typically this means signals are propagating (in great circle terms) directly at (or near the outer periphery of) the zone of greatest absorption...the "donut" itself. Again, please refer to the three maps and notice which Asian paths for your location are likely to be more severely influenced by the absorption zones on either (west/east) side of the donut-hole.

Finally, we are still left with the fact that the donut-hole is surrounded by an auroral ring. The Asian signals must find their way past this absorption ring. This leads us to a closer examination of the characteristics of the auroral zone, followed by a consideration of how signals might propagate (in a north-south direction) through the donut-hole itself.

●CHARACTERISTICS OF THE AURORAL DONUT-HOLE

(A) The Physical Situation:

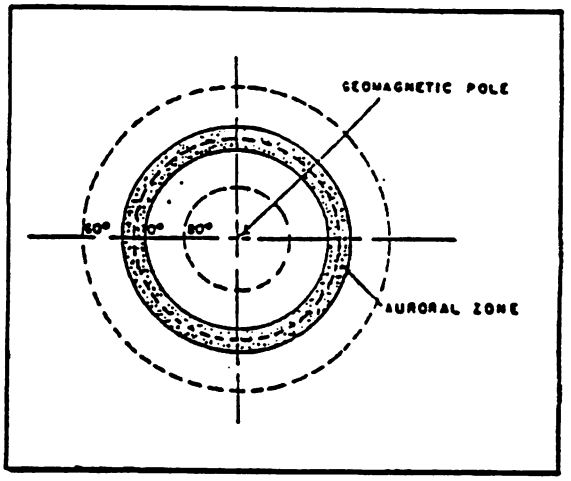
Our discussion in the preceding section has alluded to a common misconception, unfortunately fostered by some SWL and amateur radio publications, which suggests that the auroral zones in the vicinity of the geographic poles totally blanket both the northern and southern polar regions.

Due to the intensity and distribution of the earth's magnetic lines of force, the auroral zones are centred on the magnetic poles and take the shape of a circle of about 5 degrees in latitudinal width (although the northern auroral zone is rather more oblong in shape).

The ring of greatest absorption is centred about 20 degrees latitude away from the geomagnetic pole. Refer to Figure 4 - next page. Visually, we can appreciate how apt terminology like "auroral donut" and "donut-hole" were derived.

The North Magnetic Pole is presently located in a southwesterly direction from the geographic North Pole, at a position of about 77 degrees North; 105 degrees West. It's position is governed by electro-magnetic forces within the earth's core and is not constant over time. For many years, the magnetic pole has been drifting slowly in a westerly direction.

Fig. 4 - Structure and Position of the Auroral Ring



Source: The Canadian Amateur (September, 1988)

Actually, the polar projection outlining the position of the auroral ring (Figure 5 below) dates about 1960, and at that time the geomagnetic pole was deemed to be positioned near the northwest tip of Greenland. But a very recent map from the National Geographic Society shows the pole now positioned northwest of Bathurst Island in the Canadian Arctic. I have marked that position. Think of the shaded position of the ring as having shifted a bit to the west and south of that shown in Figure 5.

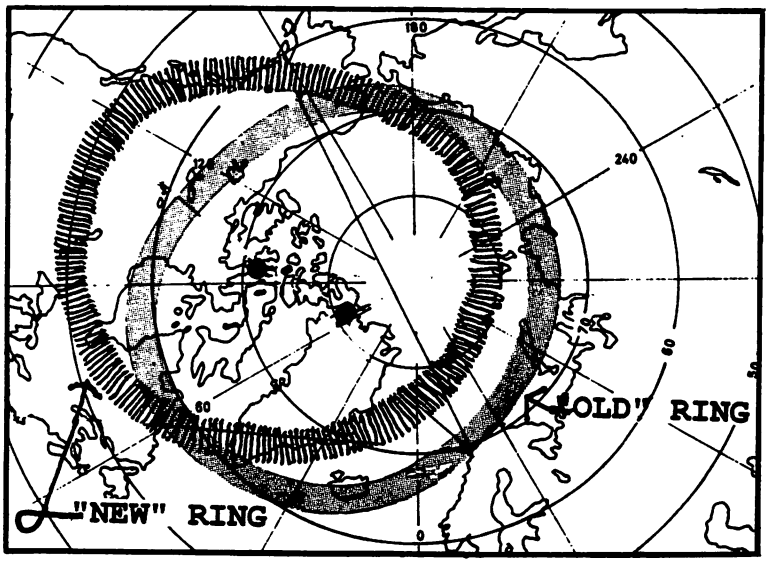


Fig. 5 -

Position of North Magnetic Pole and Auroral Ring

Source: Ionospheric Radio Communications (Plenum Press-1968)

The position of the auroral ring (or "donut") has been scientifically determined by the annual number of magnetically "quiet" and "disturbed" days.

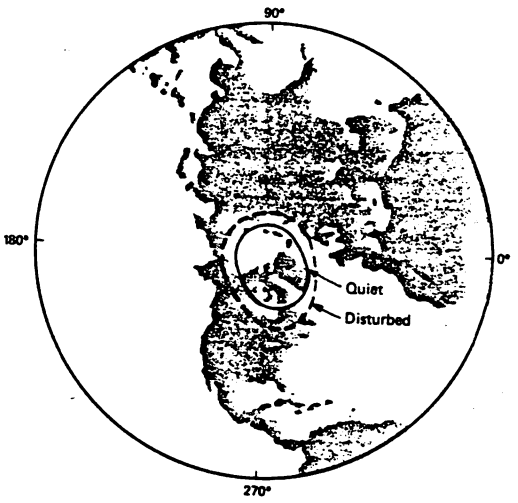
Examining Figure 6 (next page), we again see the approximate location of the auroral ring (that 5 degrees of bandwidth of maximum absorption) as indicated by the thick solid line. This is as close to the magnetic pole (some 20 degrees distant) as the ring will retract during an extended period of "quiet" geomagnetic conditions. (This source also dates back to 1960, so attribute the comment applicable to Figure 5.)

(B) Effect of A Solar Storm:

When a strong solar flare flare or other significant solar disturbance occurs, the geomagnetic field usually becomes destablized (progressively described as "unsettled", "active", "disturbed" or at "storm" level). The auroral ring expands outwardly in all directions, into the sub-auroral zone as indicated by the broken line in Figure 6. During more intense geomagnetic storms, the auroral effect on the ionosphere may even extend well-southward into the temperate zone.

Many readers will recall the almost constantly disturbed conditions for two weeks back in March, 1989. At that point in Cycle 22, Sunspot Region #5395 first appeared on the visible disc of the sun and was particularly violent. Numerous strong solar flares precipitated severe shortwave fadeouts, a couple of Polar Cap Absorption Events and strong Auroral Borealis displays, signifying a severe ionospheric storm, were reported as far south as the Caribbean!

Fig. 6 - Location of Auroral Ring During Magnetically "Quiet" and "Disturbed" Periods



Source: Ionospheric Radio Propagation (U.S. Government Printing Office, 1965)

The principle characteristic of an auroral disturbance is that it causes absorption of medium and shortwave signals reaching the zone, rather like the effect of an unusually concentrated 'D' layer. Skywave signals are thus generally inhibited from reaching (or returning to earth from) the refractive 'E' or 'F' layers. This does not mean the ionosphere associated with the auroral zone is totally homogeneous; inconsistencies in the concentration of charged particles within the zone can give rise to signal distortion commonly known as "polar flutter" or "flutter fading", if not outright absorption. Signal "bending" along non great circle paths may also result.

The "Polar Cap" (or "donut-hole") in the immediate vicinity of the North Magnetic Pole has a diameter of some 3000 miles or about 20 degrees latitude (greater diameter along the north-south bias). As contrasted with the auroral ring, this region exhibits relatively modest absorption and the ionosphere there is quite capable of supporting skywave propagation. This has been reported, even when a solar-originated geomagnetic disturbance is causing an outward expansion of the auroral zone.

But there is one significant exception. A particular kind of disturbance called a Polar Cap Absorption Event, while quite infrequent except during solar maxima (refer to Figure 7), will severely limit even donut-hole propagation. Proton streams orignating with the sun are directed towards the poles by the earth's magnetic field and penetrate the region within the auroral ring. Increased density in the lower layers of the ionosphere results in greater signal absorption, thus inhibiting 'F' layer refraction that would be otherwise possible.

Such was the situation in March of '89 when, for a number of days (at least in eastern North America) Asian signals coming over the top simply weren't making it at all.

Fig. 7 - Frequency of PCA Events (Cycle 21)

Recorded PCA Events		
Year	PCA Events	Remarks
1978	5	
1979	8	
1980	9	
1981	14	Solar
1982	14	Maximum
1983	3	
1984	4	
1985	2	
1986	5	Solar Minimum
1987	3	

Source: The Canadian Amateur (September, 1988)

If a PCA Event should materialize, you can be sure that an auroral disturbance will soon follow. On the other hand, there are many cases when a flare-induced disturbance may suddenly commence without a prior PCA Event.

Except for the occasional incidence of a PCA Event, it seems quite plausible that Asian signals can be propagated directly across the magnetic pole, provided they are not unduly absorbed by the surrounding auroral ring. If that is the case, the simplistic view which says the entire polar expanse is blanketed by a massive zone of auroral absorption is inaccurate and quite misleading to shortwave listeners.

Now, the question to be addressed is how signals originating on the Asian side can be propagated, sometimes at enhanced levels, on a great circle north-south axis through the donut-hole (given that it is surrounded on all sides by the signal-absorbing auroral ring). Alternatively, Asian signals that would otherwise intersect the auroral ring sometimes seem to be diverted from their normal great circle path and are bent around the outer periphery on the west or east sides of the absorption zone. It seems unlikely, however, that a signal will propagate through the donut-hole and around the outer fringes of the donut at the same time.

●THEORIZING ABOUT DONUT-HOLE PROPAGATION

(A) Background:

Surprisingly, scant written attention has been given to this subject over the years by the SWL community. This is still the case, even though senior Tropical Bands specialists recognize that such propagation can and does happen.

A good deal of original work on this subject has been published by BCB DXers specializing in foreign reception. Although most of this research is now somewhat dated and in some respects subject to more recent refinement, I am quite convinced that much of it has essentially equal application to the Tropical Bands.

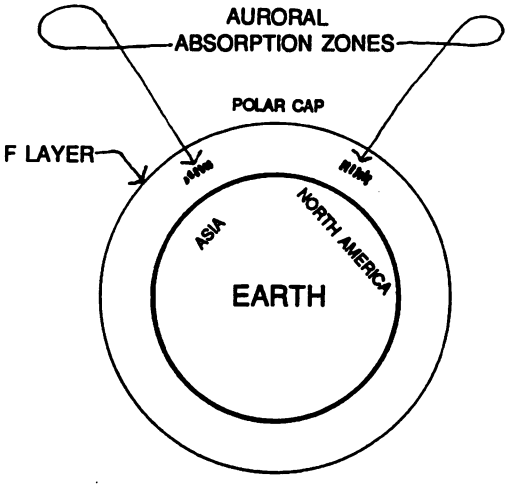
Some years ago, the Chinese government installed a powerful MW transmitter said to be located at Urumchi which operated on 1525 kHz. A number of DXers located in the northeastern United States were able to log the station, usually at sunset. Clearly its great circle path crossed the northern polar region (although rather removed from the "donut-hole" in this case) and the signal should have been absorbed in the auroral zone. The Urumchi loggings were perhaps one catalyst for a proliferation of research to explain the phenomenon by such well-known BCB DXers as Gordon Nelson, Russ Edmunds and Page Taylor.

(B) Potential Trans-Polar Modes:

The key to the mystery of donut-hole propagation begins when we recognize that we are dealing with an auroral zone concentrated in a relatively narrow-banded ring. We have noted that the Polar Cap (donut-hole) contained within the circumference of the ring is relatively free of absorption, as is the sub-auroral zone beyond the outer extremities of the ring (with due allowance for the fact the diameter of the ring itself will broaden outwardly in the event of a geomagnetic disturbance).

To envisage how skywave signals might propagate on a north-south route from the Asian side, through the donut-hole and thus reach the North American side, it is useful to view the auroral ring in cross-section (see Figure 8).

FIGURE 8
NORTHERN AURORAL ABSORPTION ZONE
CROSS-SECTIONAL VIEW



This illustration shows the two auroral absorption zones on the Soviet and Canadian sides, separated on their interior extremities (ie. within the circumference of the auroral ring) by the polar cap where skywave refraction is usually possible. The signal should not intersect either of the absorption zones on opposite sides of the auroral ring.

One article entitled 'Trans-Polar DX: An Analysis of the Prospects of DX Thru the Twilight Zone', authored by Edmunds, provided a number of hypotheses of how the Urumchi signal might make it into the eastern United States. Conventional multiple hop 'F' layer refraction (called F-2 mode - Figure 9), as well as more exotic ducting modes such as "Chordal Skip" and "Whispering Gallery" paths were all considered propagationally viable, provided the skywave signal could in some way travel to avoid the auroral ring.

The "Chordal Skip" mode suggests that a signal launched in a dawn or dusk period will reach the 'F' layer in such a way that it is not immediately refracted back towards the earth. The trajectory of the skywave signal would follow the curvature of the earth, resulting in an extended skip distance. Eventually, the signal is returned to earth when it encounters a corresponding twilight "tilt" condition at the receiving end (refer to Figure 10). Since several intermediate hops are eliminated, absorption is greatly reduced and the signal is unusually strong.

In the "Whispering Gallery" mode, the transmitted signal is again tilted (during the twilight period) towards the 'F' layer where it is refracted and then undergoes a series of hops (without returning to earth) by travelling an extended distance between the topside of the 'E' layer and the underside of the 'F' layer. This process of multiple "reflections' between the ionospheric layers would seem to occur with minimal absorption. Eventually, with a twilight ionospheric tilt condition again occuring, an unusually strong signal is returned to earth at the receiving end (see Figure 11).

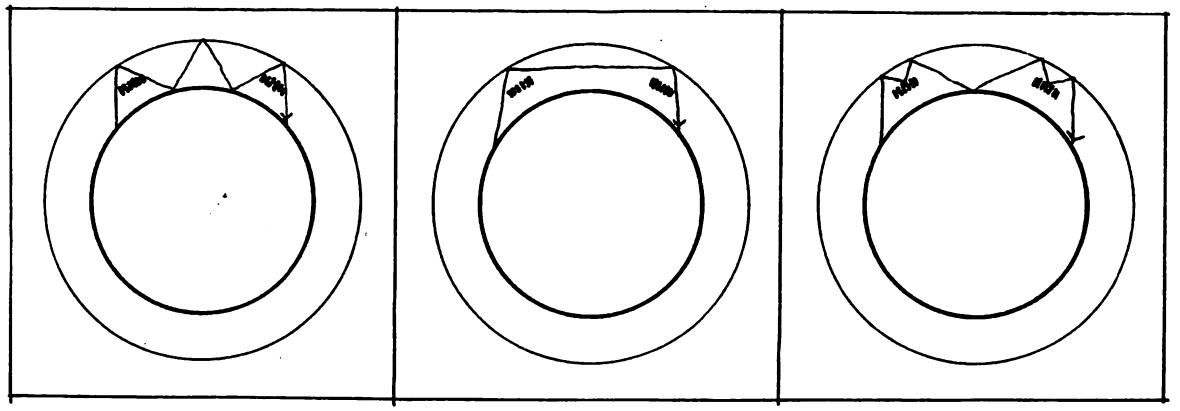
Notice that "near darkness" at both ends of the path is desirable to support the signal-enhancing "tilt' scenario (applicable to F-2 mode as well for the initial and final refractions). This works out nicely for Asian reception at dawn in North America (and at dusk for those living in the eastern part of the continent). In addition, since the Asian path through the donut-hole is essentially on a north-south axis, a Grayline condition can be expected during the Equinoctial periods! Both of these are important factors which in turn are complemented at times by the solar-geomagnetic disturbance factor.

Let's look at some of those propagational scenarios supporting a viable trans-polar route (with some fortuitous signal path geometry thrown in for good measure!):

FIGURE 9
CONVENTIONAL F-2 SKIP

FIGURE 10
CHORDAL SKIP MODE

FIGURE 11
F-2 & WHISPERING GALLERY



Source of each of the above illustrations: NRC Reprint # P17

●FACTORS CONTRIBUTING TO DONUT-HOLE RECEPTION

The confluence of three fortuitous factors would seem to improve the odds of reception significantly: (a) geography, in terms of both signal launching and receiving location; (b) a near-darkess path, ideally at both ends, and best of all if a Grayline is incident; and (c) solar activity

governing the state of the geomagnetic field and its effect on the ionosphere in the auroral zone.

(A) Donut-Hole Reception - Geographical Considerations:

In terms of geographical criteria, we have already noted that for great circle paths, the origin of signals on the Asian side would ideally be within +/- 10 degrees of 350 degrees W for DXing in eastern North America, +/- 10 degrees of True North for mid-continent locations and within +/- 10 degrees of 10 degrees E for the western part of North America. This would equate to signal sources in Southeast, South-central and Southwest Asia respectively. In addition, the fact that the origin of many Asian signals is in the Equatorial Zone is advantageous. As we shall see when discussing solar "enhancement" of signals propagating across the polar cap, I believe this is an important consideration.

At the receiving end, the latitude at which the DXer is situated can also make a difference. Applying simple geometry it becomes apparent that as you move south (away from the donut-hole), the gap within the auroral ring to "shoot through" becomes narrower. The breadth of the Asian donut-hole "window" is wider for a DXer like myself at 44 degrees North than it would be for John Bryant at Stillwater: about 36 degrees N. While that window is more narrowly focussed at the southerly latitude, in that situation, signals from a larger area across the east-west breadth of Asia can be propagated on a great circle path which lies beyond the outer extremities of the auroral ring, thus affording more reliable reception in those cases.

The combination of latitude and longitude of each DXer's location (in eastern and central parts of the continent) will determine which great circle paths intersect the auroral ring itself. The particular Asian signals which would normally propagate along that path will be subject to greater absorption and thus will be "toughies", except under unusual circumstances.

By comparison, we have observed that those living anywhere near the west coast need not be concerned about the auroral zone or the donut-hole at all, except when they are DXing the western extremity of continental Asia.

(B) Donut-Hole Reception with a Complementary Near-Darkness Path:

DXers know that long distance propagation on the Tropical Bands can be especially enhanced during a "near-darkness" situation - either at one end, with the opposite end of the signal path being in full darkness; or, better yet, if both transmitter and receiver are in a sunrise/sunset twilight period.

For E-W paths, near-darkness at both ends means the intervening path is in full darkness. For N-S paths, however, there will be times when the entire signal path traces the dividing line between the dark and sunlit sides of the earth. In that case, we have the optimal Grayline signal path.

For Eastern North America, the sunrise Grayline is focussed on a 350 degree W path a week or so after the Vernal Equinox (March 21) and again about a week prior to the Autumnal Equinox (September 21). There is also a sunset Grayline, which occurs along the 350 degree W path about three weeks prior to the Vernal Equinox and three weeks following the Autumnal Equinox. Grayline propagation through the donut-hole brackets the equinoctial periods and affords easterners both a dawn and dusk window to Southeast Asia.

Here in the east, the signal-enhancing effects of Grayline propagation generally seem to be more pronounced at these times of the year when a mutually complementary donut-hole and Grayline path situation are happening at the same time. As one might expect, the equinoctial period is generally "prime time" for Indonesians (donut-hole and Grayline path co-incide) at both dawn and dusk. The sunset window is not available to DXers who are located west of the Eastern Time Zone because Southeast Asia will be in full morning daylight by the time sunset approaches in the Central Time Zone.

But the Equinox is the optimum time for Indo's elsewhere in North America too, based on dawn enhancement (not Grayline), and the signal path (in great circle terms) is not through the donut-hole.

For central parts of North America during the equinoctial period, the co-incident donut-hole and Grayline path is focussed on the Indian sub-continent, yet reception is unreliable.

Mid-winter donut-hole (but not Grayline) propagation from the Indian sub-continent is especially good for DXers living in the mid-west. But here

in the east, sunrise Grayline reception (centred on mid-December to late January) from South-Central Asia can be excellent at times too. The difference in this case is that the great circle path is quite removed from the donut-hole. Whereas Indonesians seem to peak near the Equinox, signals from the Indian sub-continent seem to peak in mid-winter, regardless of the DXer's location in North America.

Based on these observations, is it reasonable to conclude that the co-incident Donut-hole/Grayline path is really only significant to DXers located in the eastern parts of North America? For that matter, whether for your location or mine, why is that the Indonesians are predominant in spring and fall and the sub-continentals are limited to a short "season" in mid-winter? As DXers, I think we should to continue to research these patterns but reconcile ourselves to the fact that there will likely never be a set of "pat" answers when it comes to propagation over the polar regions.

(C) Donut-Hole Reception - The Solar/Geomagnetic Influence:

For all I've said about "donut-hole" and/or "near-darkness" enhancement of Asian signal paths (especially with regards to Eastern and Central North America), reliable reception on a day by day basis is not in the cards. The third and sometimes most important consideration is the fact that donut-hole propagation is almost always more pronounced (in particular on the Tropical Bands) when geomagnetic conditions are in transition from "quiet" to "unsettled" or "active". At times, enhanced N-S paths may even be evident when conditions have reached "major storm" levels! Figure 12 shows the qualitative descriptions for the condition of the geomagnetic field and the corresponding 'A' and 'K' values that you will hear on WWV's solar/geo-physical alerts:

Condition	A Value	K Value
* Quiet	00-07	0-2
* Unsettled	08-15	2-3
* Active	16-29	3-4
* Minor Storm	30-49	4-5
* Major Storm	50-99	5-6
* Disturbed	100-400	6-8

Fig. 12 - Relationship of 'A' and 'K' Geomagnetic Indices As Broadcast by WWV

Were it not for the great circle path through the donut-hole (or "bending" of signals along non great circle paths), one might conclude that the auroral absorption effect deriving from a geomagnetic disturbance would preclude efficient propagation over the polar region. Furtunately, such is not always the case!

(i) Comparison of E-W and N-S Signal Paths

Shortwave propagation conditions are conventionally described as good-excellent when there are no significant solar terrestrial events and the geomagnetic field is described as "quiet". Under such circumstances I have found that dawn reception from the South Pacific, including PNG and maybe even the Indonesians from adjacent Irian Jaya, could be satisfactory. This is essentially an E-W signal path for all North American DXers and does not intersect the auroral zone, except when the zone has expanded due to a geomagnetic disturbance.

Concurrently, signals from most of Southeast and South-Central Asia will be generally very poor if not absent. By themselves, the "donut-hole" and/or "near-darkness" (sometimes Grayline) paths don't usually get the job done along a N-S polar path, even when the field is "quiet".

Experience on the BCB tends to reinforce these tendancies. BCB DXers know that several consecutive days of very quiet geomagnetic conditions (daily 'A' index ranging from 0 to 5) are usually a necessary pre-requisite for good Trans-Atlantic (or Trans-Pacific) DX. The signal path from eastern North America to Southern Europe/Africa (or to the South Pacific) is essentially an E-W path and of course by-passes the auroral zone. As a general rule, good reception from the Africans and those few Europeans on the Tropical Bands would tend to reflect the possibility of a TA opening on the BCB, especially above 1400 kHz. Correspondingly, good reception from the Tropical Band PNG's and Australians suggests the possibility of a high-end BCB TP opening.

A case in point: on the morning of December 30th, 1988, from 1200 until 1300 sunrise, I encountered unusually good reception from the three 120 meter Australians, as well as most of the 90 meter PNG's. At this time I was able to tentatively log both of the Australian print-handicapped stations (500 watts each), co-channel on 1629 kHz! In the face of this E-W preferred path, the Indonesians and continental Asians were distinguished by their absence.

Let's compare reception experience along E-W paths with typical signal performance on N-S paths. Referring again to the BCB, it is a well-established fact that "auroral" conditions associated with a geomagnetic disturbance are the best opportunity for enhanced LAm signals from Central & South America (sometimes even "deep south" reception from the likes of Chile and Argentina). Skywave signals from the big NAm stations are typically weakened due to increased absorption, making the apparent strength of the Latins that much stronger. I believe, however, that the actual strength of the Latins is greatly enhanced under such conditions. Other BCB DXers have made the same suggestion.

An analogous situation has been experienced on the Tropical Bands. On several occasions within the past few years I have recorded absolutely "armchair copy" signals from the Falklands station on 3958 kHz (apparently off the air at present) in the early stages and even at the height of a major geomagnetic disturbance. Many other DXers have had a similar experience.

This is an example of "deep south" reception. The signal has travelled from the Southern Temperate Zone, across the Equatorial Zone and into the Northern Temperate Zone. Similar if less dramatic results can often be encountered from Tropical Band Latin signals originating within the Equatorial Zone.

For DXers like myself located in the eastern part of the continent, the short path to Southeast Asia is right through the donut-hole. All the other factors I have addressed are in place too: the great circle path is essentially oriented N-S and signals are originating from within or near the Equatorial Zone. The early phase of a geomagnetic storm more often than not brings enhanced reception, nothwithstanding the trans-polar path across the auroral zone.

I made reference to one of the better examples I can cite in an article which appeared in Proceedings 1988. On the morning of April 4th, 1988, I logged Radio-Television Hong Kong on 3940 kHz with a truly outstanding signal at maximum dawn - thirty plus minutes after sunrise. Some DXers in other parts of North America reported hearing RTVH that morning but with considerably greater difficulty. Other Southeast Asians in line with the donut-hole (eg. RRI, Jakarta - 4774.7 kHz) were audible as late as 1300, two hours past sunrise!

On that date, a major geomagnetic storm was in progress and the 'K' index at 1200 was 6.

I also mentioned the short mid-winter period when easterners and those living in the mid-west can at times enjoy excellent reception along N-S paths from South-Central Asia. In the east, a sunrise Grayline path is beneficial but a glance back to Figure 1 indicates that signals from Indian regionals, Nepal, etc., barely skirt by the eastern boundary of the auroral zone. This suggests that reception is most likely when the geomagnetic field is quiet, yet from my location, reception has usually been best when the field was unsettled to moderately active. If the signals were to be bent around the outer edge of auroral zone they would be lost to daylight absorption. So, either they are propagating across a widened auroral zone (and so maintaining a great circle/Grayline path), or they are being bent into the region of darkness and propagating on a non great circle path through the donut-hole. While you ponder that one, consider this:

From the mid-west, many South-Central Asian signals are directly in line with the donut-hole (check Figure 2) so one might expect enhanced conditions during the commencement of a geomagnetic disturbance. Wrong again! Don Jensen advises that from his Wisconson location, sub-continentals are consistently heard best following an extended period of very quiet conditions.

In terms of a great circle path through the donut-hole, enhanced mid-winter reception of sub-continentals from Don's location just doesn't seem to fit the mould. So much for the auroral factor in this situation!

(ii) Effects of a Solar Disturbance

A major solar flare is the most violent kind of solar disturbance and is generally considered to be one of the prime causes of geomagnetic storms and associated auroral disturbances. The effects of a solar flare are two-fold and I believe it is important to make the distinction.

When the eruption first takes place (usually associated with an active sunspot region) large quantities of ultraviolent energy and X-rays are

immediately discharged and reach our ionosphere in about 8 minutes, since they are travelling at the speed of light. The lower regions (especially the 'D' layer) of the ionosphere are affected such that signal absorption is increased dramatically, beginning with the lower frequencies.

The common result of this "Sudden Ionospheric Disturbance" (SID) is a fairly brief shortwave fadeout (on the daylight side of the Earth). The 'D' layer then returns to normal quite quickly due to rapid recombination.

It seems obvious that when that burst of strong ultraviolet radiation first reaches the ionosphere, it must also affect the F2 layer whose signal refracting qualities would thus be increased. Since the process of recombination is much slower in the F2 layer, the increased levels of ionization should endure, at least for the succeeding nighttime period.

The proposition, then, is that the F2 layer (especially in the Equatorial Zone where the ionizing effect is likely to be greatest because it is most directly in line with the sun) will exhibit much stronger than normal refracting properties for a subsequent 12-24 hour period. And so, skywave signals originating in (or passing through) the zone should be refracted more efficiently by the nighttime F layer. The result would be stronger than usual signals eventually arriving at our receivers.

I believe this could be a viable explanation for the effect that many of us have noted. For it is in these particular circumstances, signals originating in or on the opposite side of the equatorial zone and which reach us on a N-S path, are oftimes much better than the "norm" (or indeed may only be audible under such circumstances), at least for a <u>brief period</u> of time. During this short initial stage following a flare, the geomagnetic field remains <u>quiet</u> and an auroral effect is not underway. So I am suggesting that signals arriving with an extra "kick" are doing so primarly because of more efficient skywave refraction (ie. less absorption) at source in the equatorial region. (I should mention that scientific studies do indicate that as a geomagnetic disturbance subsequently develops, the F layer is actually weakened, at least within the auroral zone).

The second effect of the flare, which happens to be called a "sudden commencement", occurs on a delayed basis, 18-36 hours later (sometimes preceded by a PCA Event as previously outlined). Unusually large quantities of charged particles (electrons and protons), which are also emitted at the time of the disturbance on the sun, are carried towards the earth by the solar wind. Upon reaching the "magnetosphere" (the outer limits of earth's atmosphere above the F layer), the shock wave disrupts the earth's magnetic field and many of these charged particles eventually become trapped in the field and gravitate towards the magnetic poles. Here, the almost vertical lines of force draw these particles into the lower regions of the ionosphere, thereby causing increased absorption. This "precipitation event" is compounded by the release of other charged particles which are dislodged from their trapped state in the Van Allen radiation belts due to the sudden change in the state of the magnetic field (see Figure 13).

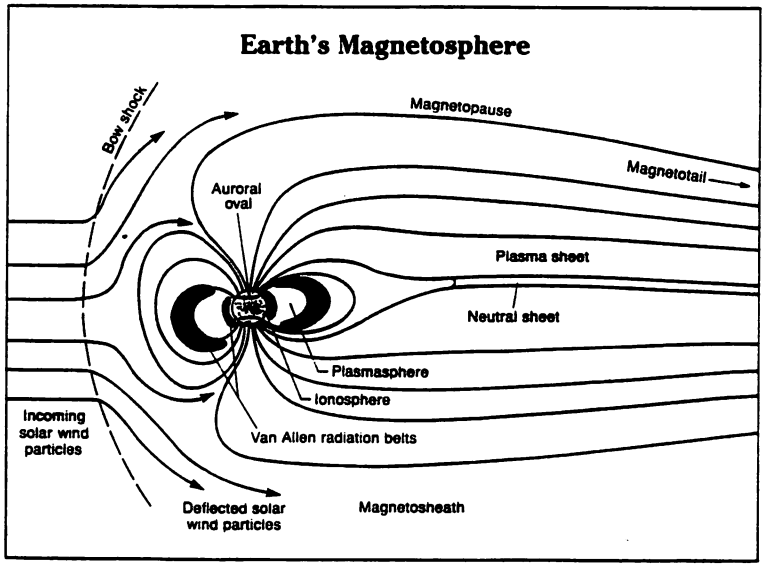


Fig. 13 - Structure of Earth's Magnetosphere

Source: Sky & Telescope (October, 1988)

The auroral effect has its origins in the geomagnetic disturbance and takes place as a result of the interaction of the charged particles with the ionosphere around (though some distance removed from) the magnetic poles. This is called an Ionospheric Storm. As contrasted with the effect of an SID, it is interesting to note that in this case it is the higher shortwave frequencies that are first-affected.

At this stage, I suspect the auroral ring itself may actually prove to be of benefit, at least in the initial stages of a disturbance. It is generally accepted that under some circumstances, signals reaching the auroral zone can be bent around the zone (or perhaps through the donut-hole) and in that sense deviate from their normal great circle path. If we remember that every signal is not just a narrow beam but a widely dispersed rush of energy, it follows that a certain proportion of an Asian signal source is already focused on the donut-hole, while other elements of the signal energy are actually propagating towards the (east/west) sides of the ring.

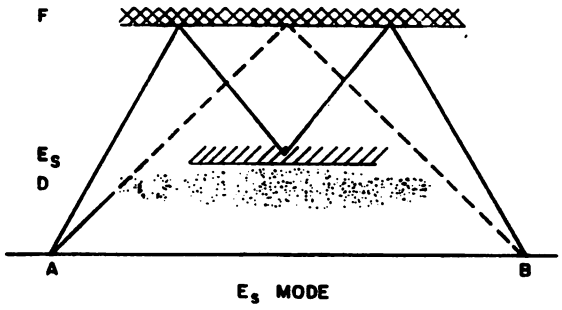
It would seem that one or another (or both) of the following effects then take place. A portion of the signal energy might be bent around the perimeter of the auroral zone (at least before it expands outwardly as the disturbance intensifies) and thus reach us via a "crooked" (non great circle) path. One problem with this idea would be that the arrival time of the signal components propagating through the donut-hole and those elements arriving in a roundabout fashion would be different. In this case, one would expect multi-path distortion to occur and this is rarely noticable.

Perhaps in situations where a signal is bent around the ring, conditions are such that very little energy propagates through the donut-hole. Don Jensen offers an observation that would tend to support this. He notes that from his mid-west location, reception from eastern Java and points east skirts the donut-hole and reception is often definitely enhanced by the start of active geomagnetic conditions. Don surmises that this would likely be a case of signal energy being bent outward, away from the perimeter of the auroral ring.

Alternately, let us suppose that a certain proportion of the signal energy which was propagating towards the sides of the auroral ring is actually bent inwards, rather than towards the perimeter. In this case, the amount of signal energy passing through the donut-hole would be increased. This complementary "ray focusing" effect would be somewhat analogous to the unusual signal strengths sometimes experienced with "antipodal" reception.

Skywave propagation through the donut-hole might be possible by conventional "F2" mode, or could also be supported by a version of the "Whispering Gallery" mode called "Auroral Sporadic E". The "Es" layer, which can be thought of as a cloud of charged particles, often develops at night (and we are dealing with darkness or near-darkness paths!) during the latter stages of a geomagnetic storm. It could serve as a 'reflector' to inhibit the refracted signal from returning to earth until it has traversed both sides of the auroral absorption ring. Refer to Figure 14 (solid line).

Fig. 14 - "Es" Propagation



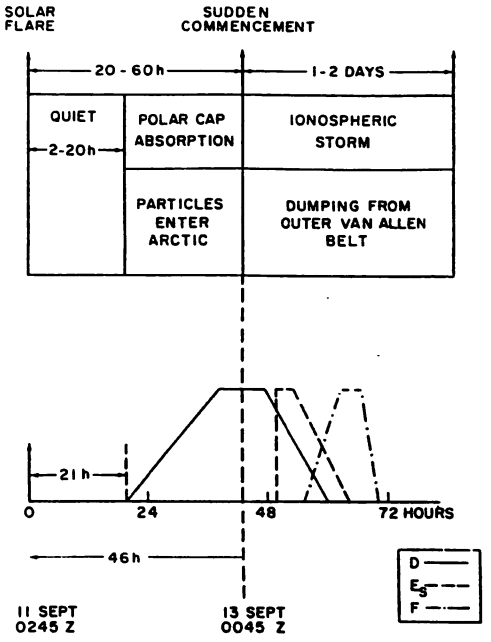
Source: 'Arctic Communications Following Solar Disturbances' in The Effect of Disturbances Of Solar Origin On Communications (The MacMillan Company, 1963)

Figure 15 (next page) graphically captures the sequence of ionospheric events following a solar flare over a typical time scale. Variations in the pattern and time sequence will depend on the intensity of the flare.

In the Legend, 'D' characterizes the pattern of increased absorption in the D layer; 'Es' characterizes the later formation of a pronounced sporadic Es layer, lasting for a short time; and 'F' characterizes the eventual weakening of the F layer in the latter stages of the geomagnetic disturbance.

Fig. 15 -

Sequence of Ionospheric Events In The Polar Region After A Solar Flare



Source:

(as for Fig. 14)

In summary, we as DXers we are faced with the reality that significantly enhanced trans-polar reception through and/or around that auroral wall is almost invariably associated with the onset of a solar disturbance. That said, Jensen's experience of optimal sub-continental propagation through the donut-hole after an extended period of very quiet geomagnetic conditions remains as a significant discrepancy to challenge our thinking.

●WRAP-UP

To conclude, I would like extend special thanks my friend John Bryant who was of great assistance to me in the preparation of this article. Thanks also to Don Jensen for sharing the benefit of his experience and to other members of the 'Review Panel' for their valuable comments and suggestions. Finally, a tip of the hat to my DXing buddy, Cedric Marshall of the ODXA, who got me into this Asian game in the first place! I hope that other DXers will be encouraged to "come out of the closet" and contribute their knowledge and experience. Feedback is welcome!

DXing Asian signals on the Tropical Bands, dependent as it is on the anomolies of trans-polar propagation, continues to be a source of fascination and is perhaps the "last frontier" for many North American DXers. We should be glad that the unpredictable ionosphere will always keep the rabbit out in front of us so that one day, you or I could log Azad Kashmir Radio at Muzzaffarabad, Radio Kashmir at Jammu or the lowliest of the slowly disappearing Indonesians on 120 meters. Keepin' the dream alive! Good DX.

● PRINCIPAL REFERENCES

Davies, Kenneth. Ionospheric Radio Propagation. N.B.S. Monograph 80, U.S. Government Printing Office, 1965

Devoldere, John. Low-Band DXing. ARRL, 1987

Edmunds, R.J. 'Trans-Polar DX: An Analysis of the Prospects of DX Thru The Twilight Zone'. National Radio Club (Reprint #17)

Folkestad, Kristen, ed. Ionospheric Radio Communications. Plenum Press, New York, 1968

Gassmann, G.J., ed. The Effect of Disturbances of Solar Origin on Communication. The MacMillan Company, New York, 1963

Jacobs, George, ed. and T.J. Cowan. The Shortwave Propagation Handbook. Cowan Publishing, Port Washington, N.Y., 1979

antennas

A COIL LOADED DELTA LOOP
For The 60 Meter Band

Guy Atkins

The excellent article by David Clark on delta antennas in last year's *Proceedings* thoroughly examined the benefits of this full wavelength, closed loop design. For those DXers with enough real estate, the full wavelength delta is a superb antenna. It provides lower noise levels, good performance at low heights, and good low angle DX reception.

However, at 68 ft. per side, even a full wave 60 meter version is out of the question for many. After the publication of Clark's article, Seattle DXer Craig Siegenthaler and I wondered if there was a way to incorporate the benefits of the delta loop in a physically smaller design.

Craig looked into antenna design texts and the only formulas he located for loaded (shortened) antennas were for types other than loop antennas. Craig decided it was time for Plan B: "trial and error". At a ham radio supply house he found a coil that looked promising, an air-core type (model 3022, $5.12 plus shipping) made by Barker & Williamson of 10 Canal St., Bristol, PA 19007 (215) 788-5581.

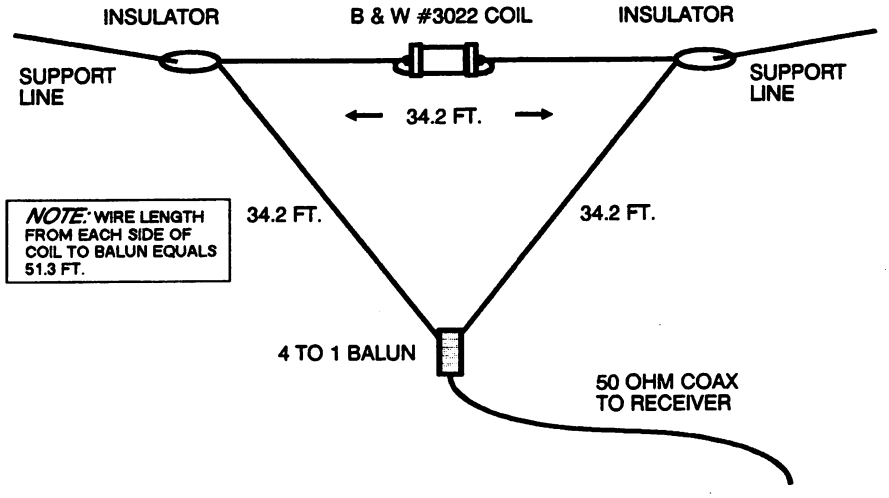
With the coil in the center of a 100 ft. loop of wire, Craig was amazed to find that the antenna was resonant at 5.15 Mhz when checked with an RF noise bridge. Success at the first try! Sometimes life is like that. He also found that the feedpoint impedance was 220 ohms so he added a 4:1 balun between the antenna and 50 ohm coaxial feedline. His antenna is mounted in an apex down, bottom feed arrangement, with the feedpoint nine feet above the ground. Listening sessions showed good reception around 5 Mhz extending down into the 60 meter band, with the low noise characteristics that loop antennas are known for. After hearing the results, and seeing how easily the shortened delta fit Craig's small city lot, I knew I had to try one. Using the same model of coil, I erected a similar shortened delta loop at my location. Due to the arrangement of antenna supports (my wife calls them trees), the delta is erected in an apex down, upper corner feedpoint arrangement. However, this happens to be one of the preferred configurations for vertical polarization, low angle DX. (See *Proceedings 1988* for further information).

The 100 ft. length of antenna wire used by Craig is commonly available ready-to-go on wire spools, and when used with the loading coil creates a resonant, half wave loop near 5 Mhz. I wanted additional wire for resonance in the center of the 60 meter band. Using the formula

$$L \text{ (feet)} = 1005/f \text{ (Mhz)}$$

indicates 205.1 ft. as the proper full wave loop dimension at 4.9 Mhz (center of 60 meters), or 102.5 ft. for a half wavelength loop. Each leg is only 34.2 ft. long, quite small overall for an antenna resonant on the 60 meter band.

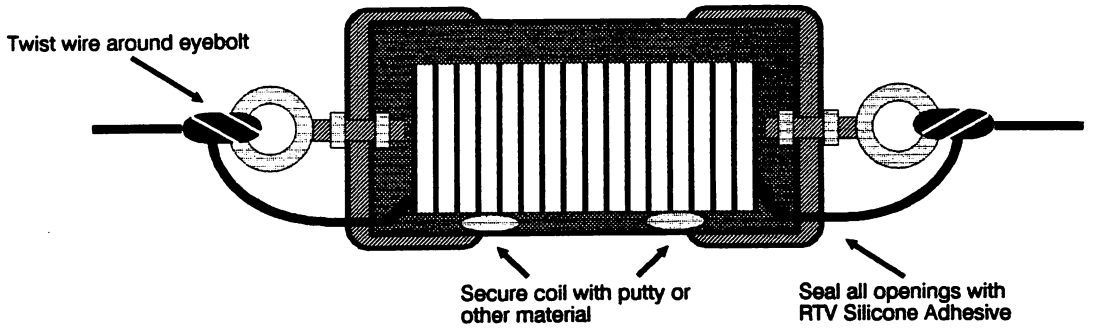
The illustration below shows this antenna fed at the point of an inverted apex, the arrangement that most DXers would use:



● CONSTRUCTION DETAILS

The key to this shortened delta loop is the loading coil. B & W's #3022 coil has just the right amount of inductance. It is a 1-3/4" dia., 4" long coil, with 8 turns per inch of 14 gauge wire, 32 turns total. The turns are spaced 1/8" apart. Measured on a calibrated LCR meter, the coil's inductance is 19 uH (even though B & W product literature states 16.5 uH). If you cannot find this coil you might contact Barker & Williamson directly. Alternatively, you could wind your own coil using a 1-3/4" dia. form. Follow the dimensions and turn-spacing exactly, and check inductance with a meter, if possible.

Make a weatherproof housing for the coil from a 5" length of ABS plastic pipe with an O.D. of 2-3/8" two eyebolts with two nuts each, and two end caps to fit the pipe. The plastic pipe, caps and eyebolts are available at hardware stores. See illustration below. Holes drilled in the center of each cap allow the mounting of the eyebolts which take the strain off the coil. A short loop of wire runs from the eyebolts through another hole in each cap, and is soldered directly to the ends of the coil. Secure the coil to the inside of the pipe with putty for a shock-absorbing effect and seal all holes and joints with silicone sealant. The end caps fit so snugly that no permanent glue is needed; this allows future access to the coil.



You may wind your own 4:1 balun following details in a guide such as *The Amateur Radio Handbook,* or purchase a ready-made unit with integral SO239 connector for mating with a PL259 plug.

You might want to vary coax feedpoints for good low angle DX reception or try an offset feedpoint for optimized vertical polarization (.08 wavelength from corner on a vertical leg). See illustration 10 in Clark's article for details.

● PERFORMANCE

Craig and I have done little comparison testing due to restricted space for antennas. However, we're pleased with the loaded delta's tropical band performance, especially considering the 35 ft. per side dimensions.

Craig uses his shortened delta as his only antenna for the 60 meter band on up. He finds it sufficient for SWLing on the major SW broadcast bands. On a DXpedition last year, Craig erected his loaded coil delta to compare it with a 60 meter dipole and found that it was a quieter antenna and gave equal signal strengths in that band.

My antenna has been used along with a 67 ft. inverted L for comparison, and the shortened delta is always the quieter antenna, often by a substantial margin. The shortened delta exhibits reasonable 60 meter band performance and outperforms the inverted L there. The inverted L usually gives a stronger S-meter reading on WWV down at 2.5 MHz, but that may be due to its higher noise level.

Obviously much more work remains to be done regarding loaded coil delta loops. Craig and I spent quite a few fruitless hours with different B & W coils trying for resonance on other tropical bands. If anyone knows of the calculations for *designing* loaded loops, please share your information with us.

Perhaps this article has inspired others to try our approach to compact delta loop antennas. Comparison of this design to a full size delta antenna is sorely needed! Hopefully the next *Proceedings* will include construction data and test results of the loaded delta loop's performance on the other tropical bands as well.

A REMOTELY TUNED LOOP ANTENNA
For The Tropical Bands

Joe Farley

This article describes the construction of a remotely tuned, amplified loop antenna which has been found suitable for DXing the Tropical Bands. The tuning range of the loop is typically 1850-5200 kHz without bandchanging. Since it is tuned remotely, the loop may be sited outdoors for enhanced reception. A single coaxial cable is used to power the loop amplifier, tune the resonant loop, and return the signal to the shack. The loop system consists of three elements: the loop windings and support frame, an amplifier/tuner, and a variable DC power supply to power the loop amp and provide a means of tuning. The construction of each element will be described in the following sections.

●LOOP

The loop I built is pictured in Fig. 1. The windings consist of 6 turns of #20 AWG center-tapped, forming a square 18" on a side (approximately 25" diagonally). Spacing between turns is 0.5", and a 3" gap is maintained in the middle of the winding between turns 3 and 4. In earlier versions, I was using "abrupt junction" varactors before I acquired the MVAM115 "hyper-abrupt" devices. The gap in the winding was found to be more effective in reducing parasitic capacitance than was spreading the turns "radially." This being so, the gap could probably be eliminated with only minimal effect on the top-end tuning range.

The frame I used has arms made from 0.75 x 1" hard maple stock, cross-lapped and epoxied at the joint. 4 x 4 x 0.25" maple plates were used to reinforce the center joint. A 2.25 x 6.25" maple plate with holes drilled to accept the windings was screwed and epoxied to the end of each arm.

I milled a 2 x 2 x 10" block of oak to mate with the lower arm as pictured, and the other end was bored to accept a 1.25" heavy-duty broomstick as a mast; the joints were then screwed for rigidity. The oak block serves also as a place to mount the loop amp.

For weather protection, all wooden parts were given a coat of external-grade polyurethane. Marine varnish would also have sufficed.

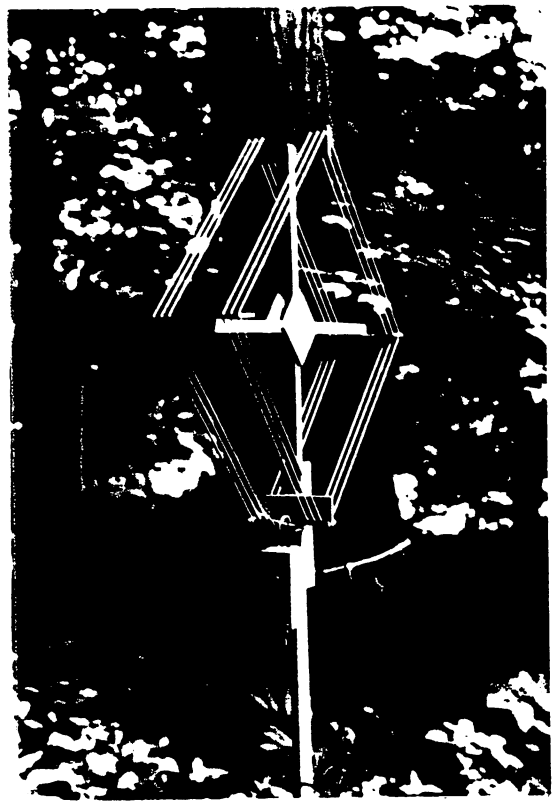


FIG. 1 REMOTE LOOP

For brevity's sake, no other frame construction details or dimensions will be given; the reader can refer to various excellent publications such as the NRC Antenna Reference Manuals for very helpful construction hints. Besides, your preferences and your imagination should help considerably. Make it strong, make it light.

Another method of construction using 0.75" Schedule 40 PVC pipe and fittings may be more suitable for exterior loops. Four 12" lengths of the pipe could serve as the support arms. One end of each could be cemented into the four ports of a standard cross fitting. At the other end of three of these arms, the perpendicular port of a tee fitting could be cemented, and short stubs of pipe then cemented into each inline port. These stubs would serve as wire supports. At the fourth (bottom) arm, another cross fitting with stubs could similarly be used. Here, the extra port could be mated to a companion flange

(or whatever) as a means of mounting.

Holes can be drilled through the stubs (or slots cut in them) to hold the windings in place, or they could simply be wound around the stubs and fixed in place with RTV or similar adhesive.

●AMPLIFIER/TUNER

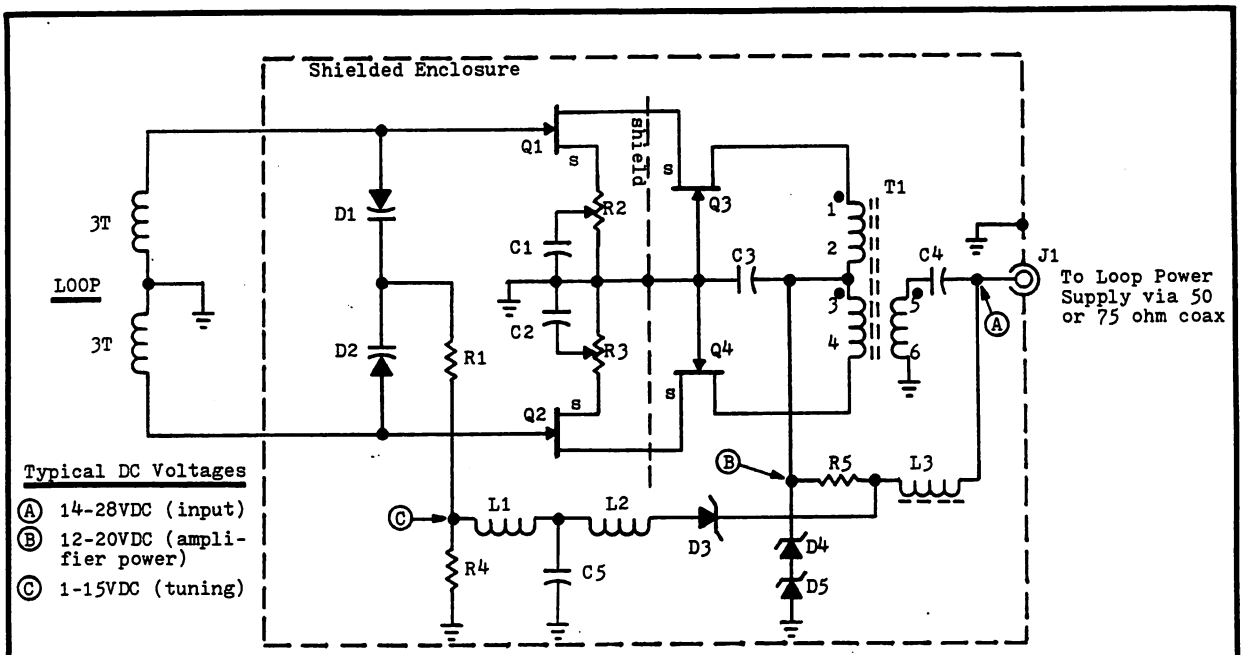
In the prototypes, parallel resonance was chosen, and an amplifier was necessary to match the high impedance of the resonant loop to coaxial cable. This also increased the relatively low output of the small loop.

The prototype amps were built on small (1.5 x 4") PC boards, and were enclosed in 2.25 x 2.25 x 5" aluminum miniboxes. Connections to the loop were made through three box-mounted tip jacks, with mating connectors on the loop ends and center-tap. The coaxial connection was made by a BNC jack.

The loop schematic diagram and parts list are presented in Fig. 2 and I will only make a few comments. A variable DC voltage of 14-28 volts is available at the BNC jack, and the network L3-R5-D4-D5-C3 is used to supply a filtered and clamped drain voltage for the balanced cascode amp Q1 through Q4. The cascode configuration was chosen for its predictable performance as a loop amplifier; it is tried and tested. This version has proven to be unconditionally stable over the entire frequency range.

The network D3-L1-L2-C5-R4-R1 strips and filters a portion of the input voltage for use as varactor reverse bias; this effects loop tuning. The typical range of voltages present at this and other important circuit nodes is noted on the schematic.

The MPF102 or equivalent JFETs should be selected and reasonably well matched for zero-gate drain current (Idss) to ensure proper biasing of the cascode pairs. A suitable simple test circuit is shown in Fig. 3. The Idss of Q3 and Q4 should be matched (to within 2 mA) and an ideal target value would lie



C1-4	.05 uF, 50V, disc	Q1-4	MPF102 JFET (see text)
C5	.01 uF, 50V, disc	R1	22KΩ, ¼W, 5%
D1,2	MVAM115 tuning diode	R2,3	200Ω trimpot
D3	13V, 500mW Zener (1N5243B)	R4	10KΩ, ¼W, 5%
D4,5	10V, 1W Zener (1N4740A)	R5	240Ω, 1W, 5% (see text)
J1	BNC bulkhead jack	T1	10T #32AWG trifilar on Amidon FT-50A-77
L1,2	270 uH molded inductor		
L3	270 uH inductor (15T on Amidon FT-50A-77)		

FIG. 2 LOOP AMPLIFIER SCHEMATIC

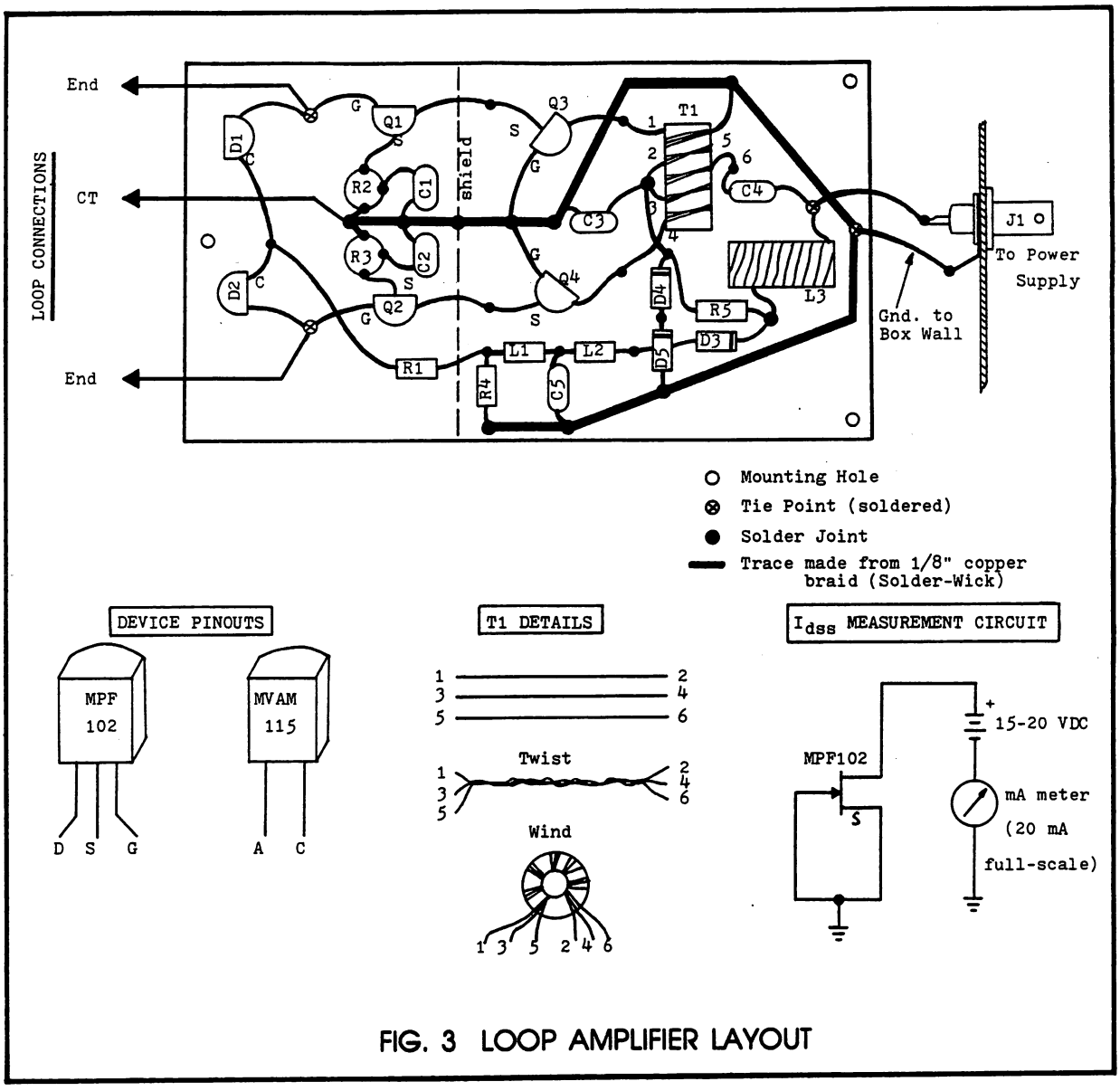


FIG. 3 LOOP AMPLIFIER LAYOUT

between 12 and 15 mA. Q1 and Q2 should be similarly matched, and an acceptable Idss would fall between 6 and 9 mA. It would be a very wise idea to buy about ten of the JFETs (MPF102s are 10/$4.30 from Digi-Key) to ensure that matching can be done.

Construction of the amp should be fairly straightforward for a builder with some experience. PCB construction would be ideal, but point-to-point assembly on perf board should work fine also. Fig. 3 gives one suggested layout for PTP wiring.

The trimpots R2 and R3 in Fig. 2 are used to adjust the gain of the loop amplifier. 8-10 dB of gain adjustment is typically available across the tuning range. Adjusting the pot wipers towards the FET source terminals increases gain and vice versa. You should initially set these pots at mid-rotation. If you desire, you may match the wiper-to-ground resistances in each half of the amp at 100 ohms.

The MVAM115 tuning diode is a very critical component in this design. It has a maximum to minimum capacitance ratio of 15 (typical) which allows this loop to be tuned over a very wide frequency range. Although it is inexpensive (about $0.90) it may be very difficult for the hobbyist to obtain. One approach which generally works is to call a local Motorola Semiconductor Products distributor such as Newark, Hall-Mark, or Kierulff Electronics. They will be VERY reluctant (even with a corporate account) to sell this device in small quantities. If you are clever (and marginally ethical) you should be able to get the salesperson to "sample-out" a few parts to you without charge.

Alternatively, you may contact me (5252 Lee Avenue, Downers Grove, IL

60515) if you have difficulty in procuring the parts. I hope to acquire a small stock of the MVAM115 for further experiments, and I would be happy to supply them if I am able. An SASE would be appreciated.

●POWER SUPPLY

The power supply I used is a variable regulated DC supply whose output can be adjusted over the nominal range of 14 to 28 volts by the 10-turn pot R3. This pot is the loop tuning control, and with the amp described, resonance between 1850 and 5200 kHz was achieved. The two loops I made had measured Qs of 90 and 110 at 5000 kHz, and tuning is rather sharp. I strongly suggest that you use a 10-turn pot and a turns-counting skirt for this control. The schematic diagram for the power supply is shown in Fig. 4.

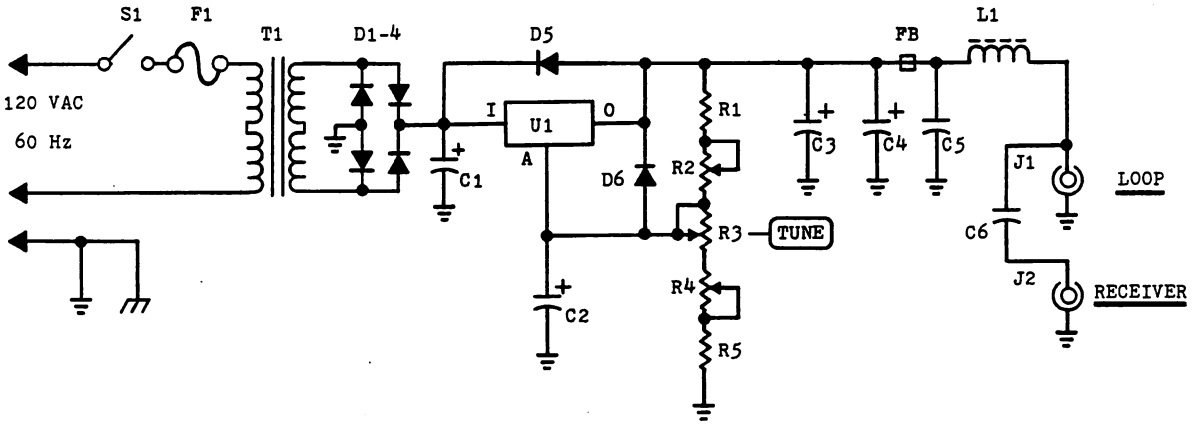
The noise output of a 317 type regulator typically shows a spectral peak below 100 kHz. However, a bit of additional filtering (C3-C4-C5-FB-L1) was necessary to remove higher frequency noise components and keep them below audibility.

As with the amp, this circuit should not pose any great construction problems. The circuit can be built per the layout in Fig. 5 and housed in an enclosure or minibox of your choosing. The power switch and fuseholder can be box mounted, as well as the two BNC jacks.

Just a couple of quick notes to aid construction: the heavy traces shown on the Fig. 5 layout are fashioned from 1/8" solder wick or cooper braid. These help to keep noise to a minimum. The transformer I used is a PC mount, low-profile, split-bobbin type; this was a junkbox item. Radio Shack and others offer suitable lug-mount transformers which would be entirely adequate. The use of BNC jacks is not mandatory; should other connector types be more suitable for you, use 'em.

●SET-UP AND CALIBRATION

Prior to firing up, the power supply should be checked for proper operation and it must also be calibrated. With power off, connect a 1000 ohm, 1 watt resistor between J1 center conductor and ground. Connect an accurate DC



C1,3	1000 uF, 50V, electrolytic	R1	910Ω, ¼W, 5%
C2	10 uF, 50V, electrolytic	R2	200Ω trimpot
C4	1 uF, 50V, tantalum	R3	10KΩ, 10-turn pot with turns-counting dial
C5,6	.05 uF, 50V, disc	R4	1KΩ trimpot
D1-6	1N4002 or equivalent	R5	9.1KΩ, ¼W, 5%
F1	3AG, ½ Amp	S1	suitable line switch
FB	Ferrite bead (Amidon FB-43-801 or equivalent)	T1	Stancor SW-328 or equiv. (28 VAC, 85 mA secondary)
J1,2	BNC bulkhead jack	U1	LM317T voltage regulator
L1	270 uH inductor (15T on Amidon FT-50A-77)		

FIG. 4 POWER SUPPLY SCHEMATIC

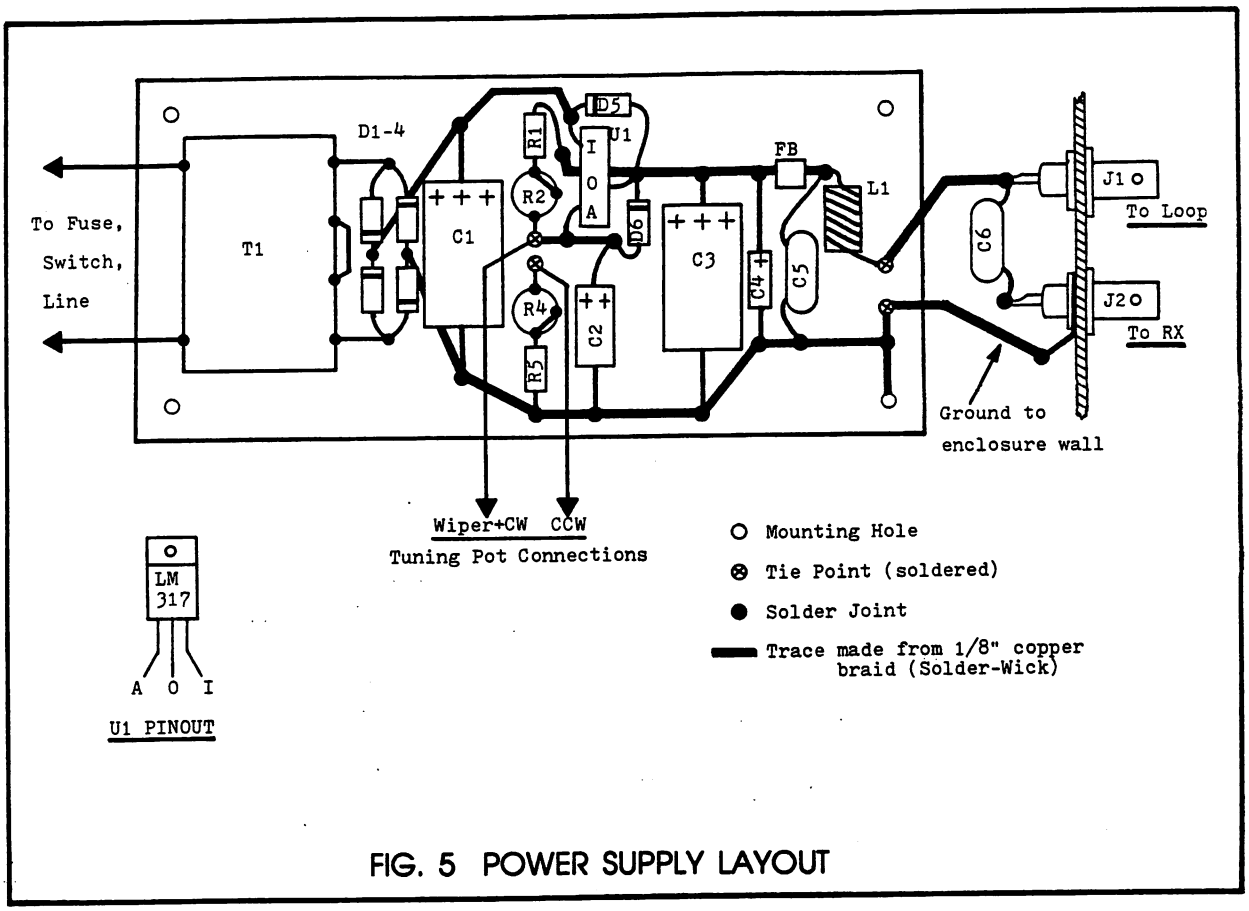


FIG. 5 POWER SUPPLY LAYOUT

voltmeter across this resistor. With the tuning control (R3) set at minimum (full CCW) turn the power on. The voltmeter should now read 14 volts. With the tuning control at maximum (full CW) the meter should read about 28 volts. Your initial readings probably will not agree with these values, and the trimpots R2 and R4 must be adjusted to calibrate the supply. R2 is used to adjust the supply minimum voltage and R4 sets the maximum. These adjustments are interactive, and several iterations may be necessary.

Between minimum and maximum tuning pot rotation, the output should be a smooth linear function of knob rotation (about 1.4 volts/turn.)

The length of the coaxial cable between the power supply and the loop should be kept to a minimum for several obvious reasons. In addition to losses, noise, and shield pick-up, the resistance of the coax will affect the tuning range due to voltage drops. This will show up as reduced top-end tuning range. You must compensate for this. (The loops I made have been used with up to 80 meters of coax. The tuning range mentioned earlier was maintained at this length once the loop was calibrated.) Connect (with the power off and the tuning at minimum) the coax length you'll need between the power supply and the loop amp while it is still indoors. Connect the loop to the amp. Connect a high impedance (10 Megohm) DC voltmeter between the junction of the amplifier varactor cathodes and ground. (A lower impedance meter connected to the junction of R1-R4-L1 in the amp would also be OK.) R2 and R4 may now be adjusted in the manner previously described to obtain 1 volt at tuning minimum and 15 volts at tuning maximum as observed on the voltmeter. This accomplished, you're ready to go.

A note of caution: the MVAM115 is specified for 15 volts reverse bias operating and 18 volts MAX. It would be wise to make adjustments in small increments.

The loop may now be mounted outdoors according to your preferences. If you used connectors (e.g. BNC) be certain that mating surfaces are clean and securely mated, as the maximum load current will be on the order of 30 mA. It is advisable to use a bit of Coax Seal to protect the connection.

Because this antenna is a loop, there is a general depression in reception sensitivity in directions perpendicular to the plane of the loop. Since the loop is rather "wide" and not optimized for balance between loop halves, these depressions (especially pattern nulls) are not pronounced. For best reception you should align the plane of the loop with the azimuth of the area which you

wish to DX.

I made no special attempt to protect components from the environment. Instead, a 30 gallon trash liner was placed over the loop and amp and was sealed with duct tape. This has been effective in protecting the loops against wind, rain, snow, fog, sleet, severe fog, sunlight, dust, snowballs, kids, and birds. Two loops have made it through three winter months here without a breakdown or change of calibration. In future versions, I hope to address this issue with a bit more elegance. The idea here is to protect the amplifier absolutely against rain while still allowing some venting so that condensation cannot take place.

The RF output from the power supply should be connected to the low (50 ohm) unbalanced input of the receiver via coax and suitable connectors.

●OPERATION

Operation is very simple. Turn the power on and peak the signal with the tuning control. Even with a 10-turn pot the signal will peak sharply, but this should be a blessing rather than a handicap.

It will be found that with a Q of about 100, it will be necessary to re-peak tuning every 30-40 kHz as you scan a band. The response is not so sharp, however, that you will lose stations between peaks.

A typical tuning curve is shown in Fig. 6. The two loops I made (when calibrated at the endpoints) tracked to within 50 kHz of each other across the entire range. You might consider making such a curve for yourself while you get accustomed to the tuning; within a short time you will find that you won't need it.

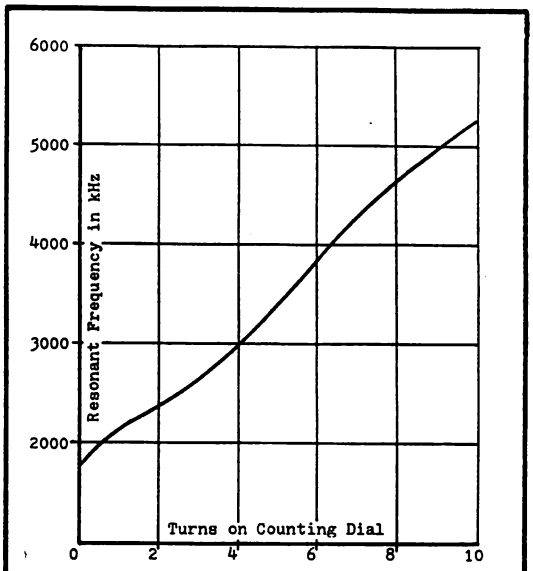


FIG. 6 TYPICAL TUNING CURVE

●SOME PERSONAL COMMENTS

While this loop was primarily designed as an element for array use, I have been very pleasantly surprised by its stand-alone DX capabilities. I have not been able to compare it against a "long" (75-100') longwire, but I have used it in conjunction with a T2FD cut for 40 meters. In nearly every listening comparison in the Tropical Bands, the loop had equal or better sensitivity than the T2FD. On difficult signals, the edge went to the loop more often than not.

This is primarily due to the fact that the loop is generally the quieter antenna, although I previously thought that the folded dipole was the quietest antenna I had ever built. The loop seems far more immune to noise from power line leakage, which is an occasional problem at my location in humid conditions. Noise coming from other neighborhood sources also seems to bother the loop to a lesser degree. In this respect, I have been most impressed and my expectations have been exceeded.

A very important caveat: whenever semiconductors are used in the RF signal path ahead of the receiver, there exists the possibility of generating various distortion products. The capacity of the varactors can be modulated by high levels of RF energy, generating some really nasty mixing products. Distortion can be generated in the cascode pairs, also.

Your success with a loop will depend on many factors, the most important being your location. Your receiver may also be a factor. In some locations an amplified loop may be virtually useless due to excessive signal levels from nearby BCB stations. Try to judge this for yourself before you build, or you may be in for a big disappointment.

My location is in very far southwest suburban Chicago, and I am well out of the main metropolitan RF corridor. I do live within 3 miles of 50kW WLUP-1000. Even so, I have not noted a single spurious signal over and above those noted on the passive T2FD.

In the event that you encounter spurious signals, it is most probably due to excessive loop output. The following actions should be taken as required:

1) Drop the loop gain. The amp trimpot wipers should be rotated towards ground so that the FET source resistances are not bypassed.

2) Use an attenuator between the power supply RF output and the receiver.

Every shack should have one, anyway.

3) Drop the loop output by spoiling the loop Q. This can be accomplished by putting a 100K resistor across the varactor anodes in the loop amp. Use less resistance if the problem persists.

Hopefully the first action will clear the problem. The second remedy should be effective in those cases which require more gain reduction than is available in the amp. The last action may be necessary for very stubborn cases in which the varactors are possibly being modulated by excessive RF levels. The overall philosophy is to tailor the gain so that the loop presents signal powers to your receiver which are comparable to an antenna with which your receiver has consistently worked well.

In the event that the initial loop operation is satisfactory, don't be shy about experimenting with higher gain settings. Using an R7 receiver, I have been able to run the loop at full gain (typically 6-12 dB "hotter" than a T2FD) with no problems.

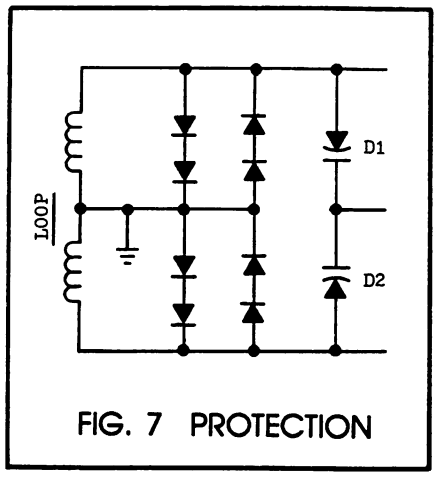


FIG. 7 PROTECTION

A second caveat which must be mentioned concerns protecting the front end of the loop (varactors and JFETs) against possible damage from static or nearby electrical storms. The MPF102 JFET seems to be a surprisingly rugged device, far more so than insulated-gate types. I do not have any basis on which to judge the MVAM115. I prefer to run without protection and, luckily, I have no failures to date. Protection may be an important consideration in some geographical areas, especially if you intend to mount the loop at a considerable height above ground.

The protection scheme illustrated in Fig. 7 should provide a measure of protection against nuisance failures, although it will probably not be very effective against direct or nearby lightning strikes. 1N914 or 1N4148 signal diodes are suitable. Two diodes are used in series in each path to minimize the possibility of generating distortion products and to lessen the amount of capacitance added to the loop. Even so, expect to lose 75-100 kHz at the top end with this scheme. If you are making a PVC pipe frame, you might want to hold off on cementing the arms until you verify the tuning range. Should you want more top-end range, the arms can be shortened incrementally to drop the loop inductance and recapture the design tuning range.

●REFERENCES AND RECOMMENDED READING

Connelly, Mark, WA1ION, "RT-1 Remotely Controlled Antenna Tuner", I.R.C.A. Reprint A66, 1984, International Radio Club of America.

Edmunds, R.J., ed. N.R.C. Antenna Reference Manual, Vol. 1 and 11, 1982, National Radio Club.

Hayward, Wes, W7ZOI, and DeMaw, Doug, W1FB, Solid State Design for the Radio Amateur, 1986, American Radio Relay League.

Knitter, Michael G., ed. Loop Antennas Design and Theory, 1983, National Radio Club.

Wilson, Mark J., ed. The 1988 ARRL Handbook, 1988, American Radio Relay League.

Some Thoughts On
DIRECTIONAL ANTENNAS FOR SHORTWAVE

Mitch Sams

I've often been envious of the extreme antenna beam precision available at microwave frequencies (such as radar). At these frequencies the antenna main beam can be shaped, molded, manipulated and scanned electronically in a very effective manner. While dealing with this level of performance professionally, I've often wondered what SWBC DX would be like with this type of antenna. Wouldn't it be nice to steer a narrow beam around in azimuth and elevation quickly and easily while watching stations fade in and out with respect to each other?

The purpose of this discussion is to look at a few common antenna types and their directional properties, then finish with a discussion on an array of elements and the resulting directionality. The goal is to stimulate further discussion and experimentation with directional antenna systems for shortwave DX, a somewhat neglected area of our hobby.

What amount of directionality is useful to DXers? A rough estimate can be made by visualizing the scenarios that a DXer is faced with. This is made easier with a graphical presentation, such as the azimuthal equidistant maps, included in the PROCEEDINGS 1988 article "Terminator Mechanics and Trans Polar Blanking" by John Bryant, which show the Central United States at the center of the globe. Bearings to all locations on the globe can easily be determined with a straight line. From this map, for example, we can see that Latin America occupies about 90 degrees in azimuth if viewed from the central United States. During the evenings in North America stations from Latin America frequently crowd one another on the 90, 60 and 49 meter bands. If we wanted to null a co-channel Guatemalan from a Brazilian and simultaneously avoid any US-based utility stations or African SWBCers that may be present, an azimuth beam width of approximately 50 degree, null-to-null, should do.

If we turn our attention to the case of African DX on 49 meters, a 50 degree main lobe beam width should null European and Latin American signals simultaneously. From this quick study it appears that an antenna main lobe beam width, null-to-null, of 50 degrees would meet our requirements. See figure 1. There may be less common situations where a beam width of less than 50 degrees would be useful. As far as the hobbyist is concerned, at shortwave frequencies, a 50 degree beam width should be considered as narrow.

The overcrowding and interference problem on shortwave today is something we are all painfully aware of, and this problem seems to be getting worse. That fact underscores the need for a high performance directional shortwave antenna system. There is only so much that can be done inside the receiver to combat interference. It would be best to "filter out" most of this interference at the antenna before it gets into the receiver. As a matter of fact, the antenna can be regarded as a spatial filter tacked on to the front end of the receiver. The term interference in this discussion includes not only other SWBC stations but also utilities, jammers, man-made noise or any other RF source that is not desirable.

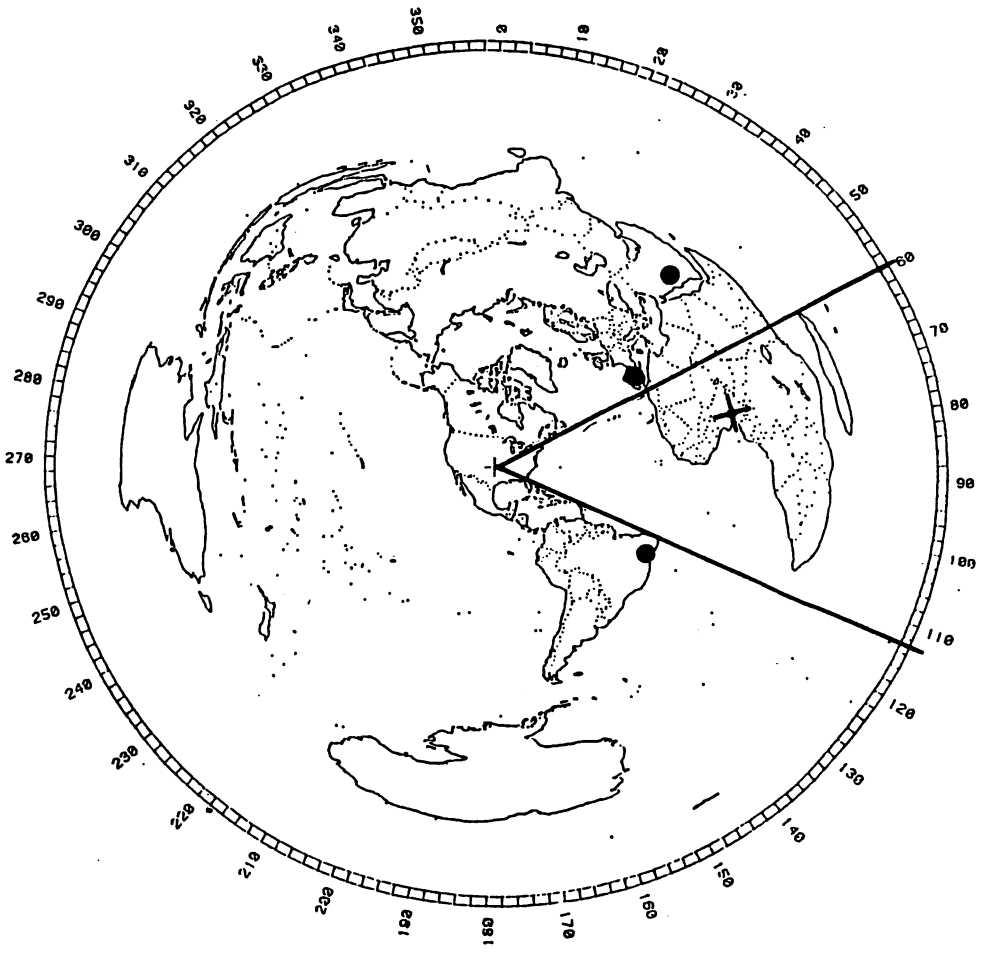


Figure 1. Azimuthal equidistant map showing angular relationships to target station in Nigeria vs "interference" signals in South America , Europe and Mid East. Placing the "interference" in a null would require app. 50 deg. main lobe beam width over Africa with the first nulls falling on South America and Europe/Mid East. ***From Bryant, PROCEEDINGS 1988.***

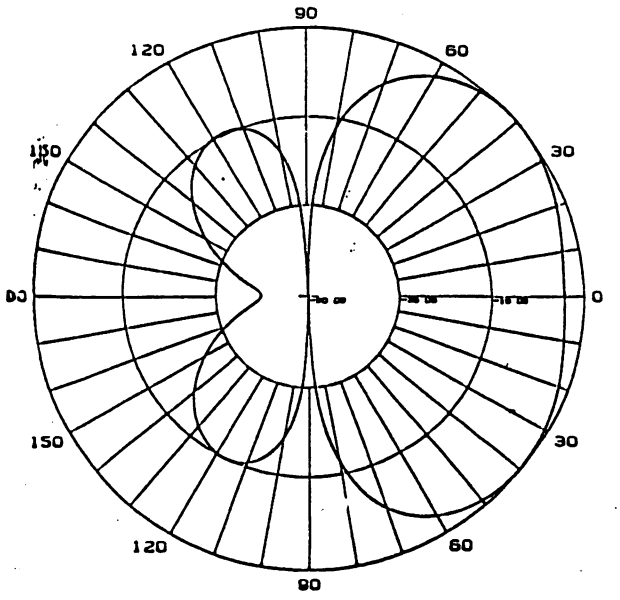


Figure 2. Typical antenna pattern showing broad main lobe beam and the associated first nulls at +/- 90 degrees azimuth. ***From Misek.***

These problems are well known and have been tackled with various directional antenna configurations such as the beverage, the loop, the dipole and with variations of these. Generally the antenna system consists of one element which is fixed in orientation so that the mainbeam is always pointing in one direction. The loop is an exception; it can be mechanically steered so as to change the directionality; this is not easily accomplished with other antennas. Another approach to directionality is to erect two or more elements with different orientations. This allows the operator to change the pointing angle of the antenna by selecting from the different elements. This of course takes quite a bit of area for antenna construction and does not allow the operator to fine tune the pointing angle of the antenna since he or she would be limited to discrete angular positions.

An approach which offers real promise in terms of high performance is the combining of elements to create an array. This allows the beam width to be narrowed beyond what the individual element could achieve. The inputs from these elements can be combined in various ways to create nulls or steer the beam.

Let's first look at three common antenna types which offer directional characteristics at shortwave frequencies:

●THE BEVERAGE ANTENNA The beverage is probably one of the best single-element antenna solutions to directionality. With increasing length, this horizontal longwire's mainbeam sharpens, and assumes a lower profile with respect to the horizon providing good directionality. and optimum long distance reception The antenna is directional from both ends of the wire if the "free" end is not grounded. If the "free" end is grounded then the beverage is directional toward the "free" end direction. See Figure 3.

The extreme length of the antenna (usually 3-4 wavelengths) can have an averaging, or smoothing, affect on the random phase differences in the arriving signal, helping reduce somewhat the difficulty in steering a null when phasing is used. If the length of the beverage extends past approximately 4 wavelengths the phase smoothing essentially becomes phase interference resulting in some degradation to the gain pattern. The gain of an antenna is a function of the physical area of the antenna, and as you can guess, the beverage has very good gain characteristics (after all, you have a very large aperture area to present to the incoming wave front). The beverage is not complex to construct, save for important impedance matching considerations (see the PROCEEDINGS 1988 article - "Impedance Matching A Beverage Antenna To A Receiver" by Nicholas Hall-Patch and John Bryant).

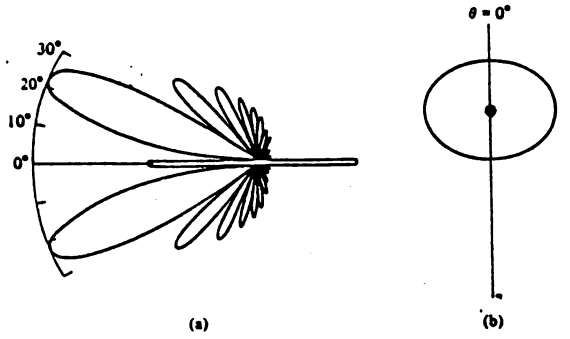


Figure 3. Beverage antenna elevation pattern in free space, viewed from the side of the wire (a) and from the end of the wire. *From Elliot.*

Achieving high performance with the beverage antenna is exacted at the price of real estate. A 3 to 4 wavelength beverage on the tropical bands could be as long as 1200 feet.

The field strength pattern of a beverage antenna of length, L , at wavelength, W, can be found from the following equation:

$$f(\phi,\beta) = \frac{SIN(X)}{X}$$

where X = ((PI*L)/W)*(1-SIN(ø)*COS(ß))

ß is the angle in azimuth being considered, while ø is the angle in elevation being considered. ø is equal to 90 degrees when an elevation tilt angle of 0 is used. If, for example, an elevation angle of 20 degrees above flat earth were being evaluated, ø would be 90-20 = 70 degrees. This equation basically defines a blob centered over the end(s) of the wire. At short lengths the blob is large and broad in both azimuth and elevation. At longer lengths both beam widths narrow and the peak gain in elevation moves down towards horizon. See figure 4. Table 1 lists the length of the beverage in portions of a wavelength;,then the angular location in elevation of the peak of the beam; the elevation beam width at that point; then finally the azimuth beam width at that point in elevation.

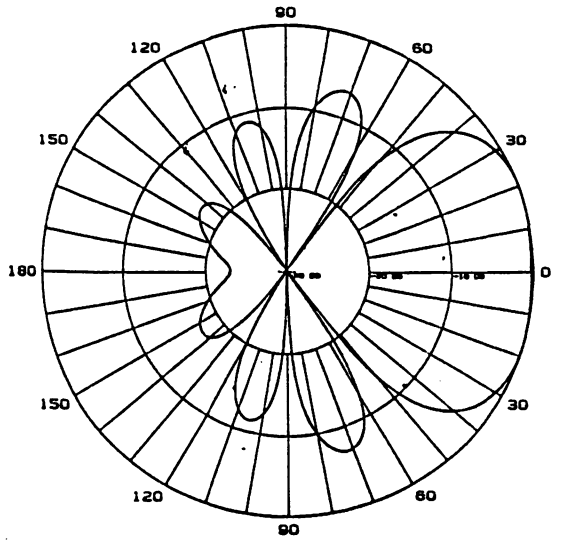


Figure 4. Beverage antenna azimuth pattern for length = 2 wavelengths. *From Misek*

LENGTH wavelengths	EL. PEAK degrees	EL BEAMWIDTH degrees	AZ BEAMWIDTH degrees
0.25	85	160	360
0.5	80	135	360
1.0	54	82	180
1.5	45	60	124
2.0	38	50	100
2.5	33	48	88
3.0	30	44	80
3.5	28	40	72
4.0	26	36	68
4.5	24	34	64
5.0	22	32	60

Table 1. Antenna length versus elevation peak location, elevation beam width , and azimuth beam width. Azimuth peak location is always 0 degrees in azimuth (at the end of the wire). beam widths are null-to-null.

●THE LOOP The loop antenna has been used with great success on the broadcast or mediumwave band, but has seen little hobby use on shortwave. The loop antenna is directional parallel to the plane of the loop, or edgewise. See figure 5. The antenna creates a very broad beam with sharp nulls. The operator can steer the null into the interference by physically rotating the loop. Due to the typically smaller aperture size two problems exist. Smaller aperture area means less gain, sometimes much less. This can quickly become the limiting factor in DXing weak signals. One solution would be to add a

preamp; however, that can create new problems with preamp-generated noise, intermodulation and loss in dynamic range. (These problems are not insurmountable if the preamp is designed correctly.) Another solution would be to increase the diameter of the loop in order to increase the area but then it becomes increasingly difficult to physically steer the loop. Another problem is the random phase changes that occur in the incoming shortwave signal. The small physical size of the antenna will not allow phase averaging as would be possible with the beverage. This makes phasing of multiple elements difficult at shortwave frequencies. (See Joe Farley's work elsewhere in PROCEEDINGS 1989).

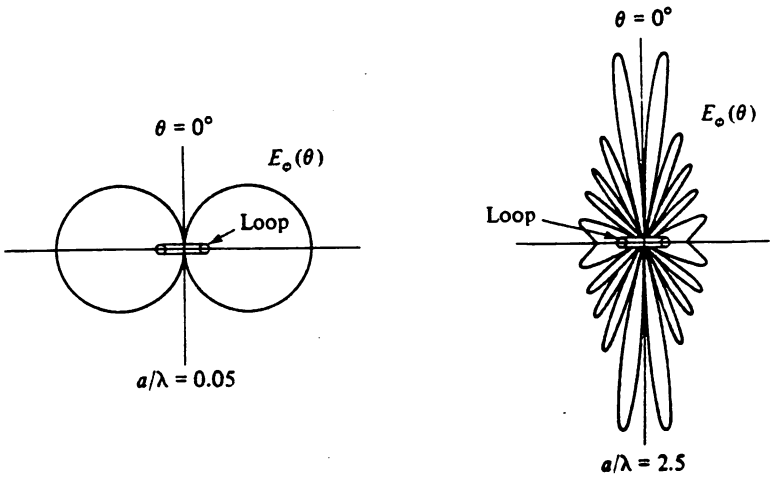


Figure 5. Typical loop antenna patterns. ***From Elliot***

● **THE DIPOLE.** The dipole is an antenna which combines good gain with a fair amount of main-beam directionality. Peak response is broadside to the element (front and back) with nulls at the ends of the dipole. See figure 6. The dipole has nearly as much gain as a short beverage and a beam width similar to the loop. The physical size of the dipole falls between the two extremes of the loop and the beverage. This antenna is commonly used in array configuration.

The field strength pattern in azimuth of a dipole of length,L, at a wavelength, W, can be found from the following equation:

$$f(\phi) = \frac{\text{COS}((\text{PI}*L/W)*\text{SIN}(\phi))-\text{COS}(\text{PI}*L/W)}{\text{COS}(\phi)}$$

L is the total length of the dipole. The optimum length for a dipole is one half of a wavelength. The gain pattern for this length is donut shaped with about a 150 degree null-to-null beamwidth. If L exceeds a half wavelength then additional "grating" sidelobes appear in the pattern and tend to take away from a "clean" directional pattern.

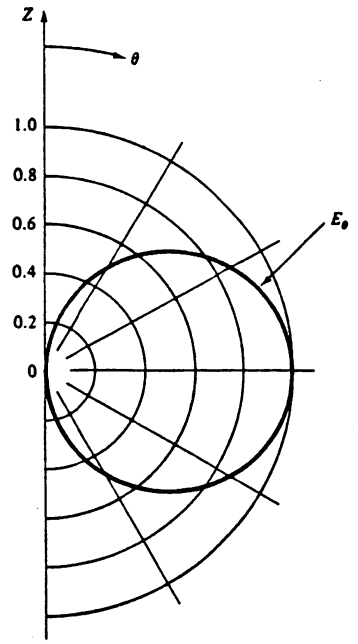


Figure 6. Dipole antenna pattern. ***From Elliot***

●THE PHASED ARRAY - - All of the above antennas can be used alone but they need not be. When two or more elements are used together it is called an "array" (your TV antenna is an array). In most practical applications, the elements will be of a common type, equi-spaced, and oriented along the same axis. The relative physical positioning of the elements, the number of elements and the size of the individual elements are three parameters that can be used to exercise control over the shape of the gain pattern of an array.

The benefits of using both or several antenna simultaneously can be realized through the use of "phasing". Phase is the degree to which the individual cycles of a wave or signal coincide with those of another wave or signal. Phase is commonly defined in terms of the points in time at which the amplitude of a signal goes through zero in a positive direction. The signal's phase, then, is the amount that these zero-crossings lead or lag the corresponding points in the reference signal. This amount can be expressed in several ways. Perhaps the simplest is as a fraction of a wavelength or cycle. Remember, a wavelength is the physical distance required for the intensity of the transmitted field to go from zero intensity to maximum intensity, reverse direction, and pass through zero intensity, maximum intensity, and return to zero. Simply put: one cycle of a sinusoidal wave. See figure 7. Phase is generally expressed in degrees - 360 degrees corresponding to a complete cycle. If, for instance, a wave is lagging a quarter of a wavelength behind a reference signal, its phase is 360 X 1/4 = 90 degrees.

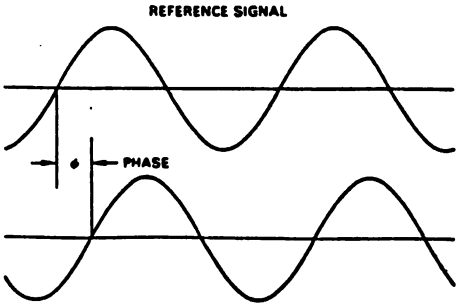


Figure 7. Phase is the degree to which the cycles of a wave or signal coincide with those of a reference signal of the same frequency

Phasing can be used to cancel out incoming signals present on two or more antenna at a given angular bearing. This particular approach is known as "null steering", in which case the width of the mainbeam is not that important. By introducing a lag or lead in the phase of one signal until a phase value is achieved which is just the opposite (180 degrees out) of the other, and then summing the two to zero, a null can be created at this point on the antenna. See figure 8. One way to introduce a lag in phase is to switch in a path length difference in one antenna element feedline. This will require the traveling wave in that element to propagate further, thus rotating through an additional portion of a wavelength and producing a phase differential with respect to the other antenna.Victor Misek has written an excellent book on the subject of null steering a two beverage system (short and long lengths) called THE BEVERAGE ANTENNA HANDBOOK. He has investigated the null steering of two parallel beverages, both short and long lengths, and results are promising. Nulls are between 15 and 20 degrees wide and are steerable primarily in elevation, not azimuth. Azimuth directionality may be more important to the DXer than is elevation directionality (however, the importance of elevation beamwidth should not be ignored completely). He doesn't say much at all about actual performance but he does note that it is difficult to create a null with skywave, multi-hop propagation, which is dominant on shortwave.

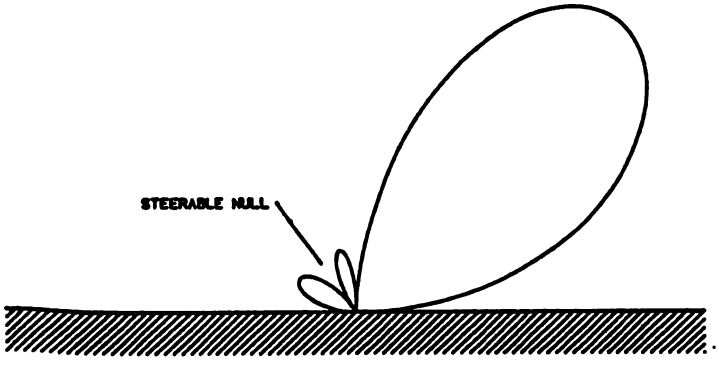


Figure 8. Pattern with steerable null resulting from combining two patterns. *From Misek*

There are some basic problems which exist at the shortwave frequencies that make it difficult to develop a relatively simple, highly directional and steerable antenna for the hobbyist. The extreme random nature of the incoming wave front after multiple reflections off the ionosphere result in unpredictable phase; the signal arrives at the receiver in unpredictable angles; presence of multiple path lengths (usually a result of the different number of hops taken by individual components of the wave front). Some or all of these shortcomings are not prevalent at medium or microwave frequencies. This randomness present in the phase of the signal makes null steering difficult at shortwave frequencies since the null is generally very narrow.

I'm not sure if the attenuation outside of the mainbeam (i.e. max level of the sidelobes) would be more than that possible from null steering.

In an array, a relationship between the number of individual elements - N, spacing - d, and wavelength - L can be shown. See figures 9 and 10. This represents the gain pattern for an array:

$$G(\phi) = \frac{\text{SIN}\,[N*\text{pi}*(d/L)*\text{SIN}(\phi)]}{N * \text{SIN}[\text{pi}*(d/L)*\text{SIN}(\phi)]}$$

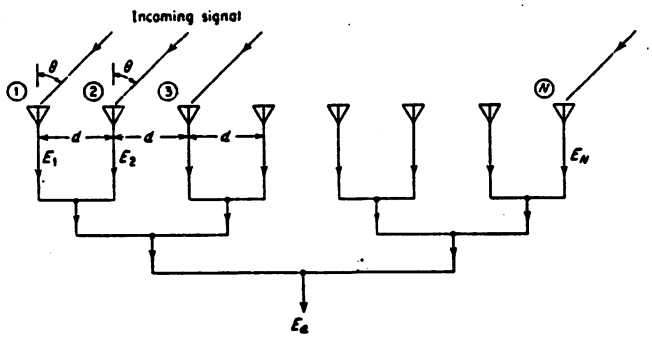


Figure 9. N-element array. *From Skolnik*

ø is the angle in the gain pattern being considered. This equation calculates only the gain due to the array (also known as the array factor). To include the effects due to the gain pattern of the individual elements (called Ge(ø)) you simply multiply G(ø) by Ge(ø). This equation, however, is a rough approximation and does not take into consideration the effects due to mutual coupling between the individual elements.

The half-power beam width is approximately:

$$\text{Beam width} = \frac{0.886*L}{N*d}$$

Of more importance to the user is the null-to-null beam width which can be calculated by finding the value for ø which causes G(ø) to go to zero.

We should be able to create an approximately 120 degree null-to-null azimuth beam width with 2 half-wave dipoles spaced horizontally a half-wavelength apart. At 49 meters (6 MHz), that would result in 2 dipoles of individual length 80 feet spaced 80 feet center-to-center for a total array length tip-to-tip of about 160 feet. We have now narrowed the half-power beam width of a single half-wave dipole from approximately 150 degrees to a resultant 120 degrees using two elements. If we add a third element, which increases the overall array length to 250 feet, we can now achieve a beam width of approximately 80 degrees. That's comparable to the azimuth beam width possible with a 3 wavelength beverage (480 feet at 49 meters).

The following table shows the resultant null-to-null beam width possible with an array of half wavelength dipoles spaced at half wavelength intervals, and the associated total array lengths for several of the SWBC bands. Number of elements in the array is listed at the far left of the table.

#	AZ B.W..	16m	19m	25m	31m	41m	49m	60m	90m
2	120	56	65	83	102	137	163	200	297
3	80	83	97	125	154	205	250	301	447
4	60	111	130	166	205	274	333	402	596
5	40	139	163	208	256	342	407	502	745

Table 2. Array lengths, in feet, as a function of number of elements, #, azimuth null-to-null beam width in degrees, AZ B.W., for several shortwave bands.

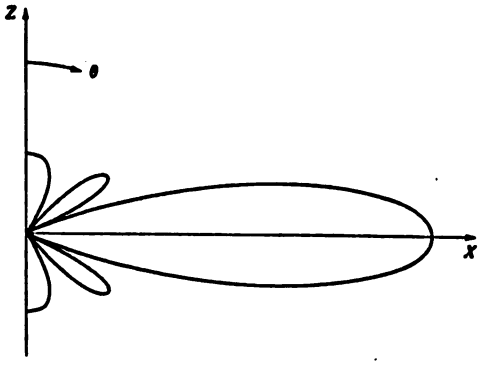


Figure 10. Broadside array pattern, 5 element.

This configuration produces a fixed beam on both sides broadside to the array , which means that any signals outside of the mainbeam, front and back of the array, would be attenuated. This would limit somewhat the station bearings we could DX. If we are interested in a particular bearing and frequency range then this fixed array might be a very satisfactory answer. But, after going to this much trouble to erect an array, it would be desirable to add some flexibility to the system so that we might change direction of the mainbeam ("scan"). This scanning can be accomplished electronically by introducing an equal phase lag, P, between each element of the array. The resulting gain pattern will produce a mainbeam which is directed at some angle, ß, off of broadside. The equation for an array gain pattern discussed earlier can be modified to show this effect. The SIN(ø) term is replaced with a SIN(ø)-SIN(ß) term in both the numerator and denominator:

$$G(\phi) = \frac{\text{SIN}\,[N*\text{pi}*(d/L)*(\text{SIN}(\phi)-\text{SIN}(\beta))]}{N*\text{SIN}[\text{pi}*(d/L)*(\text{SIN}(\phi)-\text{SIN}(\beta))]}$$

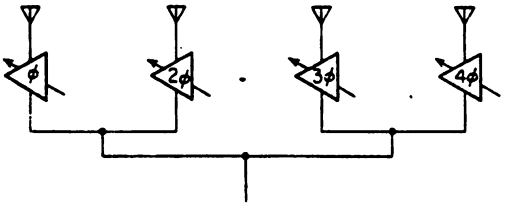


Figure 11. N element phased array. Phase shift P = ø.
From Skolnik

The amount of phase shift, P, required to produce a main beam angle, ß is:

P = 2*pi*(d/WAV)*SIN(ß) , where WAV=wavelength.

By changing this phase shift value, P, the mainbeam can be scanned back and forth in azimuth at an angle, ß. See figure 12. As the mainbeam is scanned further off of broadside it begins to distort and broaden. This change in beam width is found by modifying the original beam width equation:

$$\text{Beam width} = \frac{0.886*L}{N*d*COS(ß)}$$

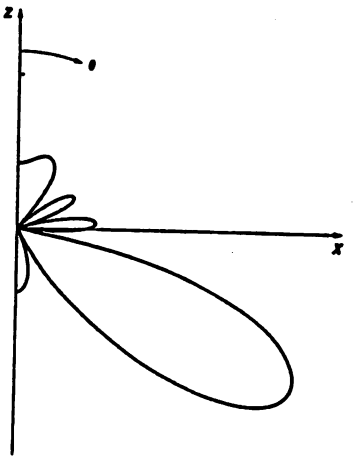


Figure 12. Phased array scanned off-broadside.

Taking this approach one step further, a computer could be used to control this scan. The beam could automatically be scanned 180 degrees in azimuth, or operator selectable sectors of some amount less than 180, to peak detect the strongest signal level and then position the mainbeam at that optimum angle. With a computer controlled receiver, the frequency would be stepped through a band. At each frequency interval the antenna beam would be scanned between two preset limits. For example, the computer could be commanded to scan the receiver between 3.4 and 4.0 MHz while scanning the antenna between 285 and 345 degrees azimuth in an attempt to locate out-of-band Indonesians. The computer would be used to peak detect the incoming signal. This would allow the operator to set the signal strength threshold which the signal would have to exceed before a detection would be noted. In addition, a threshold maximum could be set which would reject any signals that exceeded this upper limit thus eliminating extremely strong (and possibly common) stations. There are several unknowns here that we do not have a good answer for at this point. Such as, what are the statistical characteristics of typical signal angles-of-arrival from shortwave stations? The beam width needs to be wide enough to capture the angle fluctuations of a signal, that requirement will dictate how narrow a beam width we can tolerate. How

easily can we control phase in this system? Will we have the same difficulties in this area that are encountered with null-steering?

When electronically steering the beam in azimuth, the beam width will widen as it is scanned off of broadside. It effectively doubles by the time it is off the ends of the array. See figure 13.

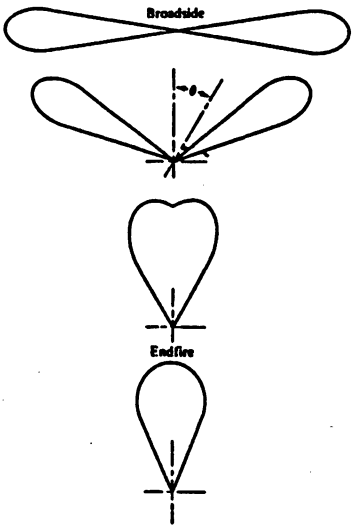


Figure 13. Change in beam width vs scan angle

At this point, the discussion has been limited to a horizontal linear array which allows the beam to be steered only in azimuth (horizontally). If we were able to place another array of elements above this array we could then phase elements vertically to control the scan in elevation as well as azimuth (this is exactly what "phased curtain array" SWBC transmitting antennas do!). See figure 14. This of course becomes physically impossible for just about any hobbyist. A possible solution is the use of vertical wires, which are directional in elevation (vertically) phased with horizontal wires directional in azimuth (horizontally).

It would be beneficial to steer the beam of the antenna in elevation since we could then discriminate against short distance versus long distance signals. Long distance (multi-hop) signals arrive at much lower elevation angles, which are closer to horizon, than do single-hop short range stations. From central North America, for example, a DXer might be able to attenuate somewhat the Radio Rebelde, Cuba outlet on 5025 kHz enough to DX a South American propagating at a greater distance on or near this channel.

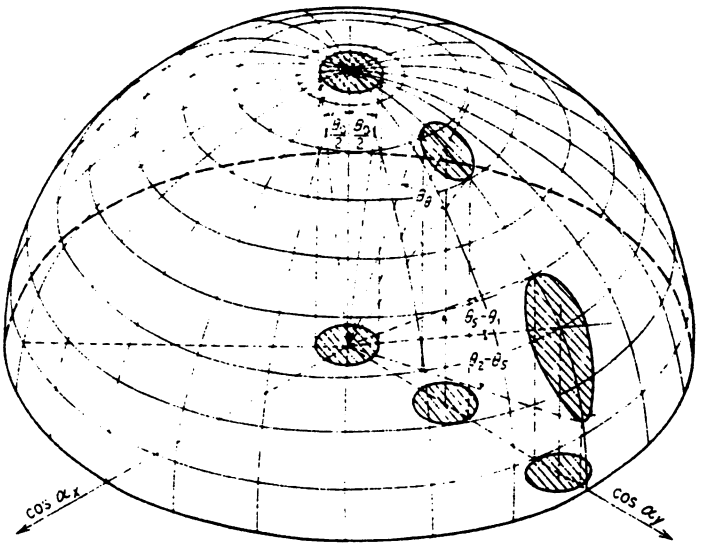
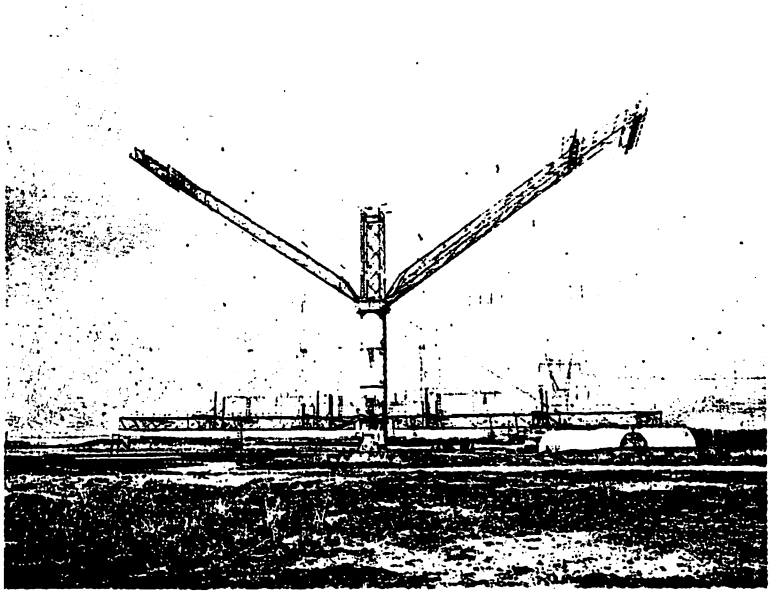


Figure 14. beam width and eccentricity of the scanned beam. ***From Skolnik, Von Aulock, Proc. IRE.***

One nice fallout of a directional antenna is, of course, it's ability to determine the bearing of a station to within basically the beam width of the antenna. If two or more people, who are geographically separated at some distance from one another measured their relative bearing to the same station then the two bearings obtained could be plotted on a map to determine the probable location of the station. This would of course be a tremendous help when attempting to identify an unidentified station.

We may be dreaming, but I do think that some very exciting and useful progress could be made by the shortwave hobby community in the area of multi-element phased array antennas. The basic computer controlled electronically steerable phased array antenna concept just described is commonly used in today's fire control radar systems. The use of phasing presents a challenge and the overall array lengths can get cumbersome,. That is still a major drawback to high performance antennas at shortwave frequencies. Null steering with two parallel beverage antennas, as described by Misek in THE BEVERAGE ANTENNA HANDBOOK, is promising and can alleviate the array size problem somewhat, but this configuration steers the null in elevation, not azimuth. A broadside array of phased dipoles provides excellent directivity in azimuth, but can get lengthy.

The ultimate antenna? How about one that is owned by the Voice of Turkey - a 170 ton mechanically revolving antenna measuring about 80 meters in diameter and 46 meters high. This antenna will complete a 180 degree turn in just 3 minutes!



●REFERENCES●

1. Elliot, R. S.: Antenna Theory and Design. Prentice-Hall, Inc., Englewood Cliffs, NJ, 1981.

2. Bryant, J. B.: Proceedings 1988. Fine Tuning Special Publications, 1988.

3. Misek, V. A.: The Beverage Antenna Handbook, 142 Wason Road, Hudson, NH 03051 ($14.95), 1987.

4. Westman, H. P.: Reference Data For Radio Engineers, Howard W. Sams & Co, New York, 1970.

5. Fink, D. G.: Electronics Engineers' Handbook, McGraw Hill, NY, 1975.

6. Skolnik, M. E.: Introduction To Radar Systems, McGraw Hill, NY 1980.

7. Kerr, D.E.: "Propagation of Short Radio Waves", MIT Radiation Laboratory Series, vol 13, McGraw Hill, NY 1951.

8. Beynon: "Some notes on absorption of radio waves reflected from the ionosphere at oblique incidence",Proc. IEE, Part III, 69, Jan 1954, 15-20.

9. Hallborg and Goldman: "Radiation angle variations from ionospheric measurements", RCA Review 8, 1947, 342-351.

10. Utlaut: "Effect of antenna radiation angles upon HF radio signals propagated over long distances", J. Res. NBS 65D, Mar-Apr 1961, 167-173.

11. Wilkins and Kift: "Characteristics of HF signals", Electronic & Radio Engineer, Sept 1957, 335-341.

12. Wilkins and Minnis: "Arrival angle of HF waves", Wireless Engineer 33, Feb 1956, 47-53.

AN ANTENNA PHASING UNIT FOR SHORTWAVE

Mark Connelly

I've done quite a bit of work in the area of phasing, primarily on medium wave (500-2000 kHz). Most of my units use simple circuit elements and antenna of uncritical lengths: performance of these systems has been adequate for most of my DX applications. The purpose of phasing is to combine the signals from two antennas in such a manner that a dominant station is nulled, thereby enabling other co-channel signals to be heard. I haven't found phasing to be quite as beneficial on shortwave as it is on longwave and mediumwave. On the higher frequencies vertical angle-of-arrival (and even sometimes horizontal bearing-of-arrival) can vary rapidly for a given station. Several skip modes (e.g. 2-hop and 3-hop) may be simultaneously operative. Still, at least on the tropical bands, useful nulls can often be obtained.

Active devices, at least at the front end of the phasing unit, can be troublesome in that strong signals will make them act like spur-generating mixers instead of amplifiers/buffers. Unless your antenna is very short (e.g. whips), stick to passive devices. The output of the phasing unit (generally a lower level signal than the input) can then be amplified, preferably by a tunable preamp/preselector rather than by broadband means.

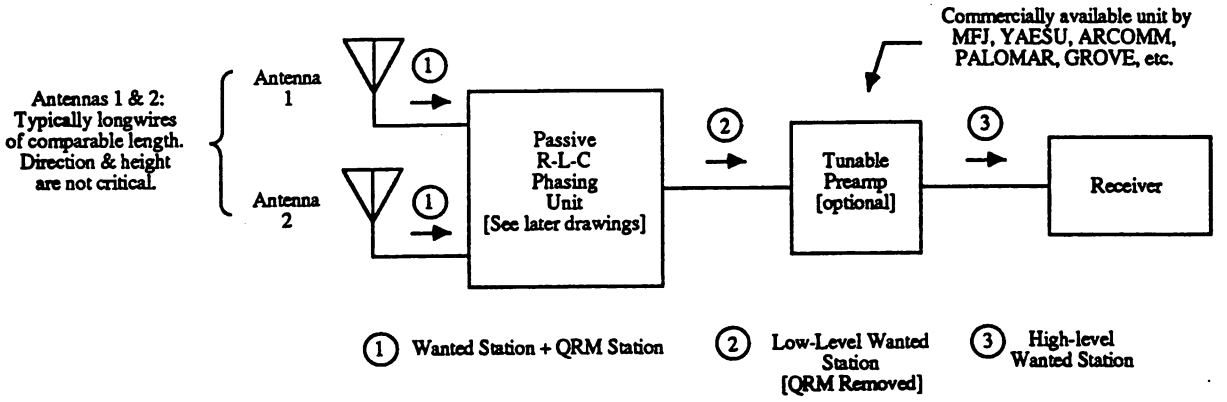


FIGURE 1. TYPICAL BLOCK DIAGRAM

Antenna 1 and 2 should be of similar length, they should be at least 50 feet/15 meters long, and separated either by a distance of 20 feet/6 meters minimum (if parallel) or by an angle of at least 60 degrees if originating at the same point. I find two wires at a right angle (90 degrees) to be quite effective; this is true whether one wire is vertical and the other is horizontal, or both are horizontal (e.g. on east, one south). Two broadband active whips mounted on the roof at least 20 feet/6 meters apart may be an alternative to the longwires for the city dweller (as long as they can be operated in the RF-intense urban environment without overload). Indoor antennas are not recommended because of (1) excessive noise pick-up and (2) insufficient diversity in pick-up. An exception to this rule would be with regards to loops. If you're limited to indoor antenna, just go

with a loop such as that made by Palomar (rather than using phasing). The loop should give some nulling capability (unless you're in a steel frame building).

Well, assuming you can put up two outdoor longwires, let's look into the particulars of phasing unit design using passive components. Each wire is routed to an L-C tank shunted by a "Q-spoiling" potentiometer. The output of one of the 2 tanks goes through a switchable 0 degree/180 degree (phase-reversal) transformer and is combined with the output of the other tank. The phase-angle fine-variation is accomplished by adjustment of the tuning capacitors (slightly) off of their peak-signal settings. The pots are used for amplitude-equalization and to "spoil" the Q of the tanks somewhat: this is necessary so that change-in-phase per change-in-capacitance (and per change in frequency) is not too rapid/too "touchy". Too high a tank Q would make it difficult to null out an undesired "pest" station completely: the carrier should be removed, but not necessarily both sidebands. Of course, reducing Q reduces system gain (increases system loss), hence the need, in most cases, for the tunable active preselector between the phasing unit's output and the receiver's input. A basic phasing unit is depicted schematically in Figure 2.

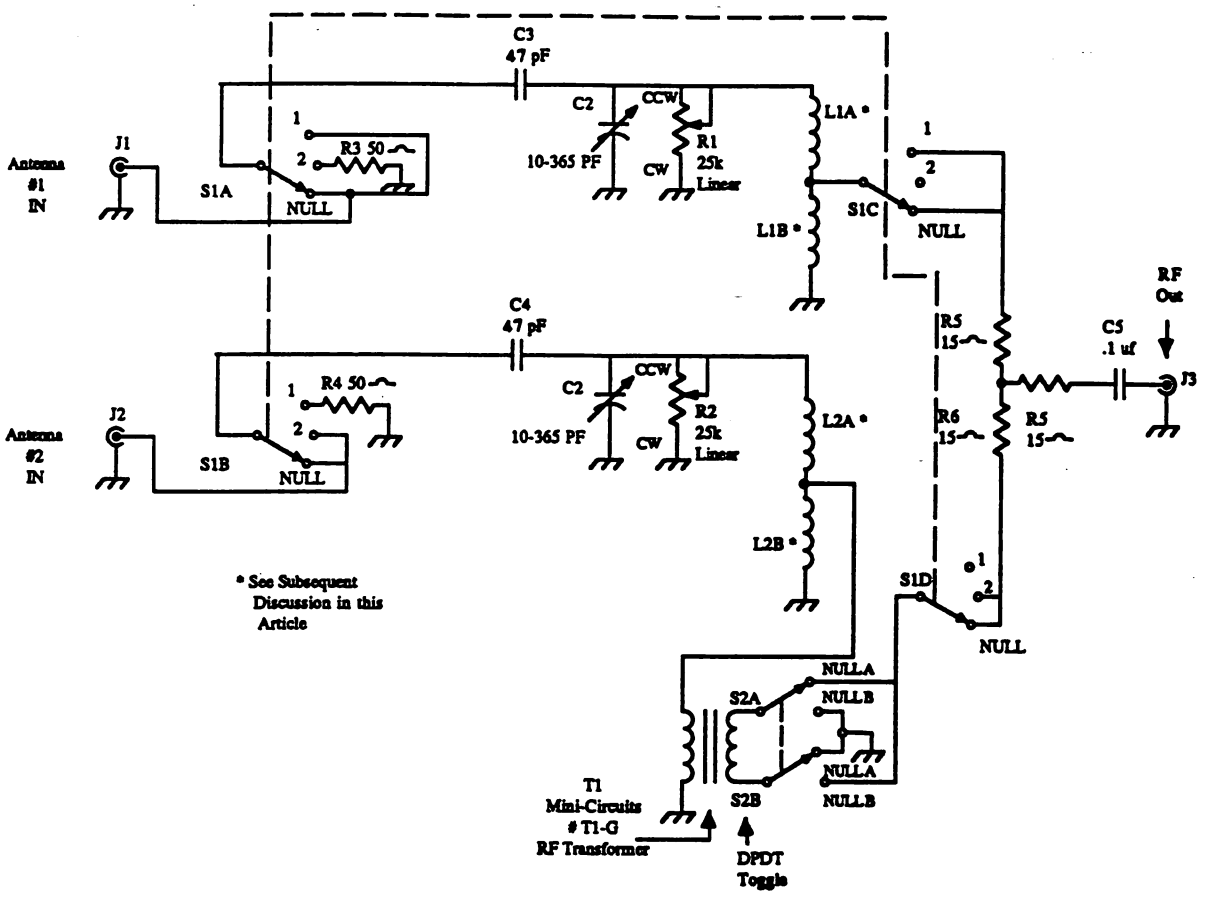


FIGURE 2. PHASING UNIT SCHEMATIC

For a single band (maximum to minimum frequency range ratio of about 2, e.g. 2.7 MHz to 5.4 MHz), a toroidal inductor for tank 1 and a second toroidal inductor of identical characteristics for

tank 2 should be fabricated. ARRL publications (Radio Amateur's Handbook, Doug DeMaw's books, etc) go into the particulars of toroidal inductor design. Basically you've got to select the appropriate core material and physical size for the frequency range and inductance desired, and then determine the number of windings of thin magnet wire that will be required to get the proper inductance (that's where the ARRL books come in handy). Amidon, Ferroxcube, Fair-Rite, Palomar, Indiana General, Coil-Craft, and J.W. Miller all make toroids. Amidon and Palomar have the most reasonable prices; the others deal more with big-spending defense contractors and computer companies rather than with hobbyists. The toroids should each be wound so that the 'B' tap is approximately 1/8 as many turns from ground as the 'A' end:

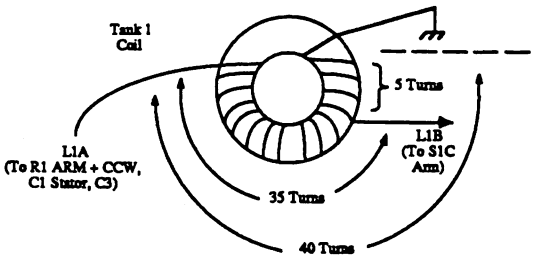


FIGURE 3. TOROID CONSTRUCTION
Amidon T-106-1 or T-130-2 powdered iron cores
should work on the Tropical Bands (2-6 MHz)
Number of turns varies with desired freq. range

If more than a 2:1 frequency range is to be covered, switchable inductors are necessary. Either multiple toroids (of the above style) or molded miniature inductors may be used. A switchable frequency-range design using molded miniature inductors is shown below (ranges listed in table next to schematic).

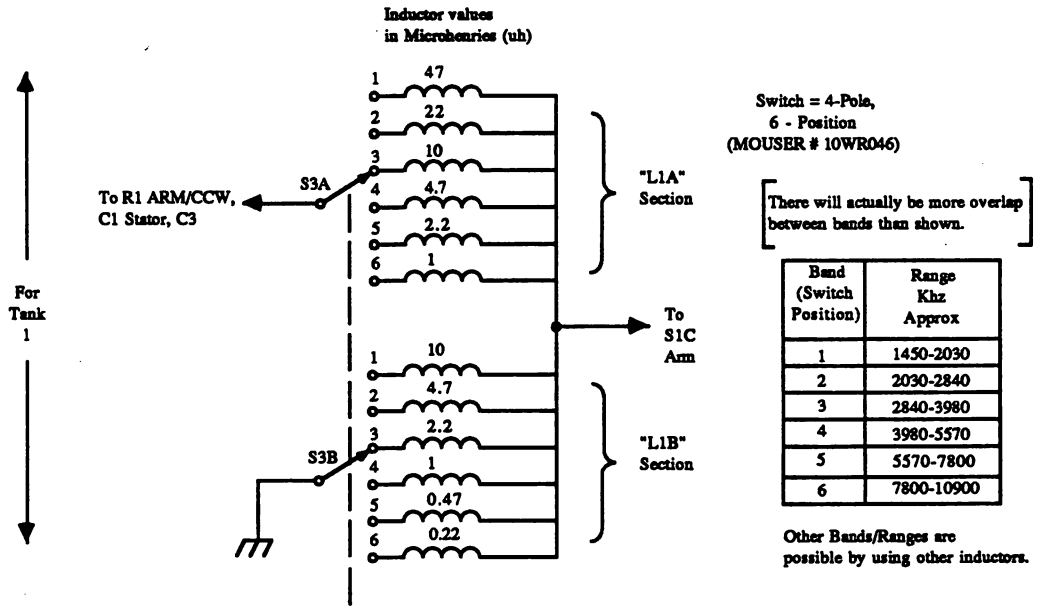


FIGURE 4a. SWITCHABLE FREQUENCY DESIGN

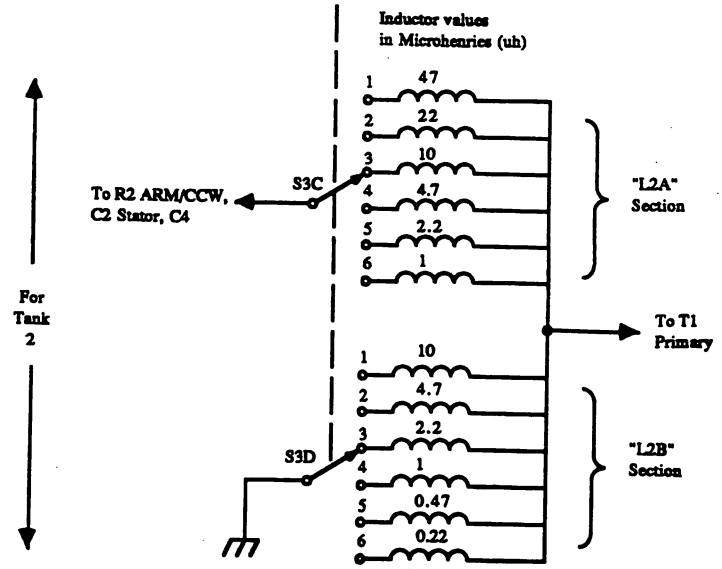
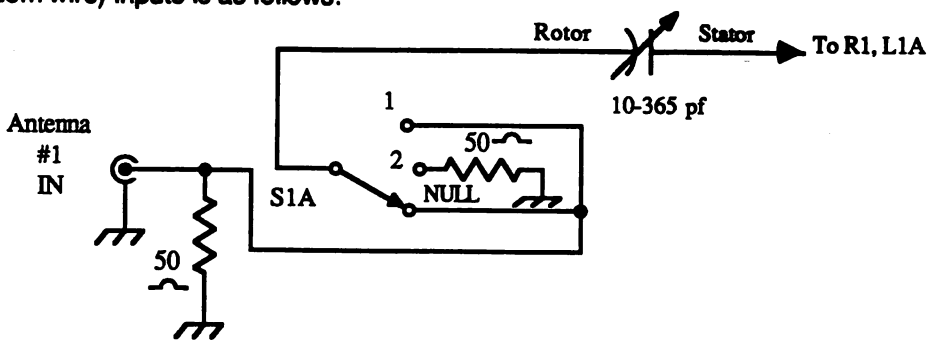


FIGURE 4b.

A variation on the tank design for better operation with 50-ohm (rather than "unknown-ohm" random wire) inputs is as follows:



If broadband active whips are used, this is the recommended set-up.

FIGURE 5a. VARIATION ON TANK DESIGN

Better termination for the 50-ohm antenna source and more efficient coupling of low-impedance inputs (than using the 47 pf input capacitor of the other design) is the result. The antenna #2 circuit should be configured similarly/S1B would be:

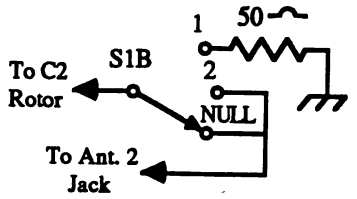


FIGURE 5b.

This style tuner/phaser would be a bit more difficult to build because C1 and C2 would have to be "floated" from chassis ground.

All of these circuits are fine, but up until this point I haven't discussed how you use them.

● PHASING UNIT OPERATION ●

Refer to figure 2: (Note: Standard lettering in #7-13 refer to the case after step #6 where antenna #1 is stronger than #2, or there is no difference. Bold lettering refers to the case wher antenna #2 is stronger than #1.)

Put preselector in bypass mode until done. If a bandswitch (S3) is used, set it to the appropriate frequency range.

1. Set R1 and R2 to max Q = fully counterclockwise.

2. Set S1 to 1 (antenna 1); S2 position doesn't matter.

3. Adjust C1 for maximum signal at desired frequency

4. Set S1 to 2 (antenna 2).

5. Adjust C2 for maximum signal.

6. Switch S1 between position 1 and position 2; note which position yields the stronger signal to be nulled.

7. Adjust R1 to make S1 position 1 strength equal S1 position 2 strength.
   Adjust R2 to make S1 position 2 strength equal S1 position 1 strength.

8. Set S1 to "null".
   Set S1 to "null".

9. Switch S2 from "null A" to "null B", leave it on position causing greater reduction in dominant station or noise to be nulled.
   Same.

10. Adjust C2 for null.
    Adjust C1 for null.

11. Adjust R1 for more null.
    Adjust R2 for more null.

12. Repeat steps 10 & 11 in a "looped" fashion until maximum null is obtained.
    Same.

13. Use tunable preamp (between phasing unit and receiver) as required, to bring up level of desired DX station(s) left after nulling out "pest" station or noise source. One more iteration of steps 10 and 11 may be needed to "nail-down" the best null now that more sensitivity is available.
    Same.

Results on nulling groundwave and low-angle skip stations are generally better than on high-angle/multiple-angle skip.

Many articles on phasing unit design and construction have been written and published in the medium-wave DX press. Send an SASE and a couple of extra stamps to each of the following (in both cases ask for a "reprint list"):

International Radio Club of America (IRCA)
"Goodie Factory"
PO Box 21074
Seattle, WA 98111

National Radio Club (NRC)
Publication Center c/o Ken Chatterton
PO Box 164
Mansville, NY 13661

Good luck and good DX!

A DXER'S PRACTICAL GUIDE TO BEVERAGE ANTENNAS

John H. Bryant

● INTRODUCTION

From my earliest years as a radio enthusiast, I heard rumors of a fabled, almost magic, "signal grabber" known as the Beverage antenna. It was purported to be a single, very long wire (1,000 to 10,000') mounted relatively low to the ground. It was supposed to be a poor man's radio telescope and allowed a DXer to hear virtually any station in the world on almost any frequency, if the monster were pointed precisely at the far away transmitter. In the 1950's, I made one attempt to find information on the Beverage antenna, but met with no success. I did not know then that Dr. Harold Beverage of RCA had published all of the basic research in an article in QST in the early 1920's.

In recent years, many have written extensively on the basic theory and electrical design of these remarkable antennas. The two basic sources of Beverage or "wave antenna" information are recommended: **Beverage and Longwire Antenna Design and Theory**, an extensive booklet published by the National Radio Club (see bibliography), and **The Beverage Antenna Handbook**, Second Edition, written and published by Victor Misek, PE W1WCR. The NRC booklet contains several excellent articles and the best bibliography that I've ever found on Beverages, compiled by Chuck Hutton. Misek's work has all been on shortwave, up to 7 megaHertz, and has especially believable antenna pattern diagrams, as well as excellent descriptions of designs for the electrical components of wave antennas. Misek also describes his extensive experiments on electrically steering wave antennas by phasing two identical parallel antenna elements.

My own "hands on" experience with Beverage began about three years ago. After 4 or 5 years of reading everything I could find about wave antennas, I found that no one addressed several practical concerns such as how to handle several thousand feet (!) of wire, or how to hold it in place easily and cheaply. While on a trip to the Pacific Northwest, I met two of the more knowledgeable Beveragers in North America (Don Moman, CIDX, Edmonton, and Nick Hall-Patch, IRCA, Victoria). They helped me with loads of practical advice. Since that trip, I have been able to DX almost constantly on a 1200 foot long Beverage. (See "The Okie Beverage," Proceedings 1988), and have put up numerous DXpedition Beverages varying in length from 1000' to 4800'!

The purpose of this article is to deal with some of the misconceptions surrounding this fabled antenna, to provide a practical guide to putting up and taking down Beverages, and to describe what DXing with one of these wonders is like.

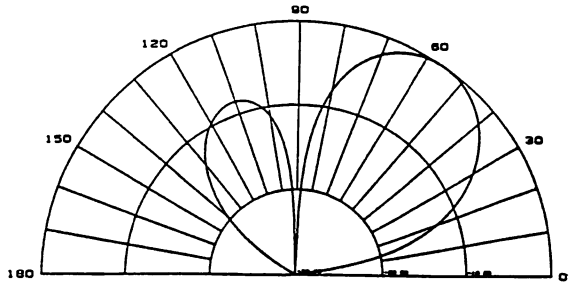
● SOME MISCONCEPTIONS

1. Get a long enough Beverage and we could hear Canadian medium wave stations at noon here in North Texas.

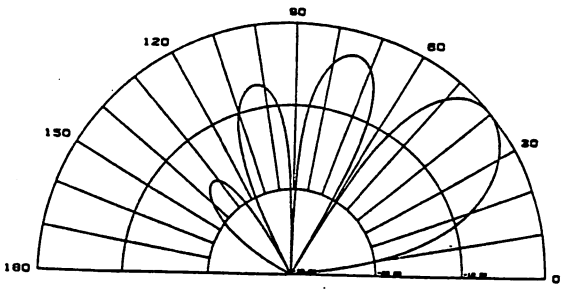
Nothing is impossible I suppose, but my experience is that no antenna, including the Beverage, can overcome propagation conditions. Beverage antennas are not THAT good. They are very quiet antennas with fairly good gain. Their effectiveness is due, at least in part to their directional nature; they are directional enough to only "see" part of the sky, thus reducing pickup of both man-made and natural noise. I believe that at least some of the legends which have built up around this antenna derive from urban-based DXers using Beverages only on DXpeditions where the improved rural RF environment itself was responsible for a significant part of their improved reception. Beverage antennas are good, maybe the very best, directional MW and low frequency SW antenna, but they are not magic.

2. **Beverage antennas are highly directional.**

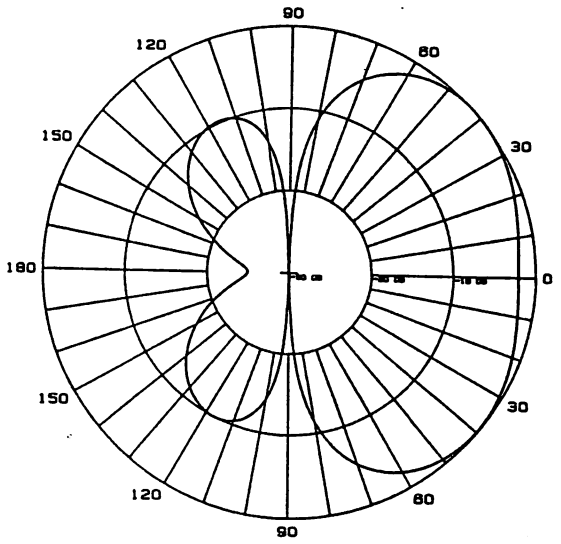
By this most people mean that the forward lobe or "beam" of the antenna is quite narrow (10 or 20 degrees). This is not true in my experience. Figure 1 and Figure 2 are azimuthal and elevation patterns of one wave length and two wave length long terminated Beverage antennas. I am aware that many authorities have drawn similar diagrams which indicate a much sharper lobe in the forward direction. However, on SW, Misek's diagrams (as shown here) most closely match my experience.



ELEVATION PATTERN

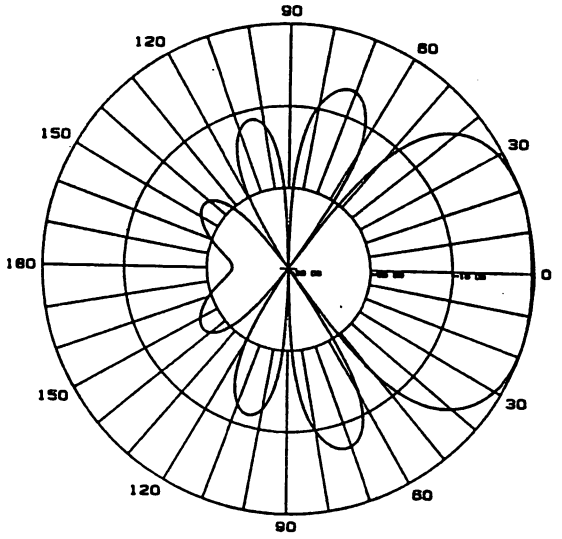


ELEVATION PATTERN



AZIMUTHAL PATTERN

FIGURE 1
One wavelength long
Beverage antenna
(Terminated)



AZIMUTHAL PATTERN

FIGURE 2
Two wavelength long
Beverage antenna
(Terminated)

What may be of very great interest to all Tropical Band DXers is the presence of extremely deep and sharp nulls, particularly at lengths of 2 wave lengths long and above. I should also note that some of my more formal experiments operating three Beverages simultaneously spaced 30 degrees of azimuth apart, indicates a decided "sweet spot" right down the length of the wire on MW frequencies. I am not sure whether this would happen at Tropical Band frequencies.

3. **Beverage antennas will not operate on SW frequencies.**

This myth is promoted by some senior MW DXers and some of Mr. Beverage's former associates. It simply is not true. I believe that the genesis of this myth is that most research (until the past generation) on wave antennas was done at medium and low frequencies. It is true that wave antennas of maximum performance on MW (above 1500' long) do not work well on the Tropical Bands. THEY ARE TOO LONG! Not too many authorities deal with wave antennas being too long for a particular frequency, and those that do differ on the maximum effective length for a particular frequency. However, all state the length limiting factor to be "phase cancellation." As the radio wave travels toward the receiver in the air, it induces a wave in the wire, which travels more slowly (velocity factor) than the airborne wave. The longer the antenna, the more the wavefront in the wire lags behind the one in the air. When a 90 degree phase difference is passed, the airborne wave begins to cancel out the one in the wire. If they arrive at the feed point 180 degrees out of phase, theoretically there is no signal left in the wire.

Just how long a Tropical Band Beverage should be is still somewhat confusing to me. Over an extended period, I have learned the following things about performance vs. length:

PHYS. LENGTH FEET (meters)	ABOVE 60 METERS	BAND 60 METER	BAND 90 METER	BAND 120 METERS	MEDIUM WAVE
1600'(560m)	poor	poor	fair	excellent	excellent
1200'(366m)	poor	fair	excellent	excellent	excellent
1000'(300m)	fair	excellent	excellent	excellent	very good

This would indicate that around six wave lengths (electrical) or five wave lengths (physical) is the appropriate length. Misek favors Beverage antennas which are about 2 wavelengths long. We obviously need much more information about the performance of Beverage antennas which are under 1000'long.

●TO THE FIELD

There are probably as many ways to erect a Beverage antenna as there are serious DXers using them. However, I have collected suggestions into three broad categories which relate to the three types of Beverages which I have used. The first of these is the semi-permanent (and most expensive) Okie Beverage. The second is the temporary but inexpensive QC Beverage, and the last is the ultimate in fast and portable versions, the Beverage Onna Bush.

●THE OKIE BEVERAGE

The Okie Beverage is my semi-permanent 1200' wave antenna which runs over my rural lot and across two adjacent fenced horse pastures. It runs under two power lines with residential transformers and is within 500 yards of at least 15 homes.

When dealing with 1000 or more feet of wire, it is essential to have some form of mechanized help. The thought of hand wrapping that much wire around a spool is staggering. By far the most popular aid is one of the many models of metal or plastic reels meant to store garden hose.

Photo 1 is a picture of my original Beverage wire reel, a $25 plastic model purchased from Sears. It will easily hold up to 5000' of insulated 16 gauge wire. Rewinding 1000' of wire is about a 5 minute task. For 5000', you need a good friend to help and about 20 minutes of hard work.

Photo 2 features my Beverage mentor, Nick Hall-Patch. His hose reel is mounted to a detachable wooden axle which is in turn, mounted to his DXing pick-up. This arrangement is more satisfactory than my hose reel, since it may be operated while standing and is a more secure foundation for vigorous winding.

A more sophisticated approach developed by Don Moman, the Executive Secretary of CIDX and a rabid Beverager, uses a re-winding mechanism fabricated from an old 12 volt gear reduced DC motor. This may be over-kill at lengths of less than 1000' (unless it's raining) but some form of automated take-up seems almost essential at lengths beyond 1000'.

Photo 3 depicts Proceedings 1989 co-editor Guy Atkins, operating his Beverage reel. It is powered by a rechargeable 3/8" electric drill! The reel, obtained from a local electrical supply house, sits directly atop a lazy-susan plate fabricated by Guy from hardware store parts. Guy reports no problems with this arrangement. The fully charged drill is capable of re-winding several 1000' reels of wire. Further ideas concerning "wire management" are discussed in the remainder of this article.

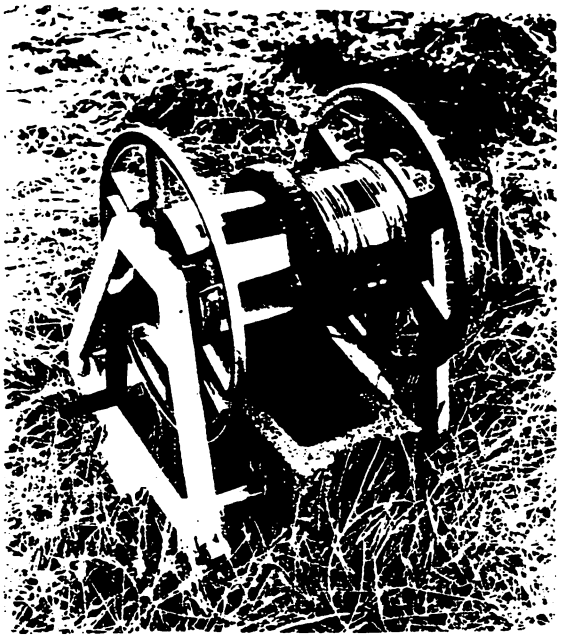


PHOTO 1
HOSE REEL
as
Beverage Winder

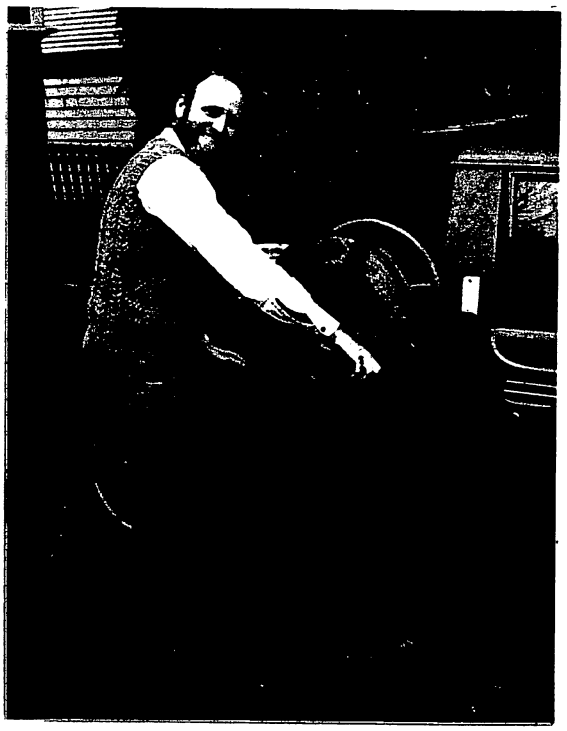


PHOTO 2
NICK HALL-PATCH
Winding His Wire



PHOTO 3
GUY ATKINS
Drilling His Wire

The second major element of the Okie Beverage, and its distinguishing characteristic, is the system of poles used to support the wire from 6-10' off the ground. Most DXers using this type of Beverage tend to use 2" X 2" stock lumber. Eight foot lengths of good quality material generally cost about $2.00 per pole in 1989. People just erecting DXpedition Beverages often use 1" X 2" lumber instead. Using light gauge insulated wire, you can count on a pole placed every 100-150', so 10 poles are adequate for a 1000 footer. The wire is held in the top of the pole in a vertical saw cut 2" or so deep or by a small bent nail.

One major challenge, whether erecting a permanent or temporary Beverage is how to plant the poles. Don Moman made pole sockets by cutting light gauge 1 1/2" diameter pipe into foot-long lengths and welding foot long, 1/4" diameter, "railroad nails" to them. He pushes the spike in the ground and the pipe forms a socket for the shaped 1 X 2 poles.

Photo 4 shows Nick Hall-Patch's version of the same idea. He used a railroad nail, 2" plastic pipe and two large hose clamps. Nick reports that the cost of his pole base is about $2.50 each.

Since I knew that the Okie Beverage would be semi-permanent and have to stand up to some pretty rugged weather, I designed the pole base shown in Photo 5 and Figure 3 to be fabricated in a local welding shop. It is made from 2" X 2" steel tubing and 5/8" diameter reinforcing bar. It is important to let the shop know that the INSIDE dimensions of the square tubing MUST be at least 1 3/4" X 1 3/4". My welder makes these things up for me in lots of 10 at $5.00 per unit.

You should note that, with these pole systems, the poles at each end of the line must have support ropes to transfer the tension from the wire to the ground. I usually use 1/8" nylon rope.

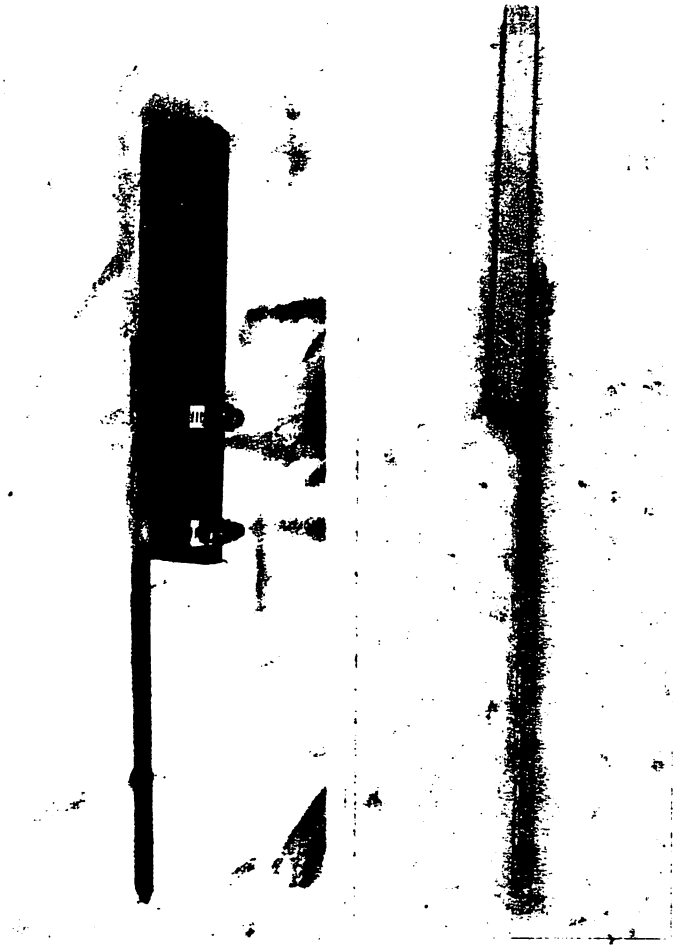


PHOTO 4
POLE SOCKET
(Hall-Patch)

PHOTO 5
POLE SOCKET
(Bryant)

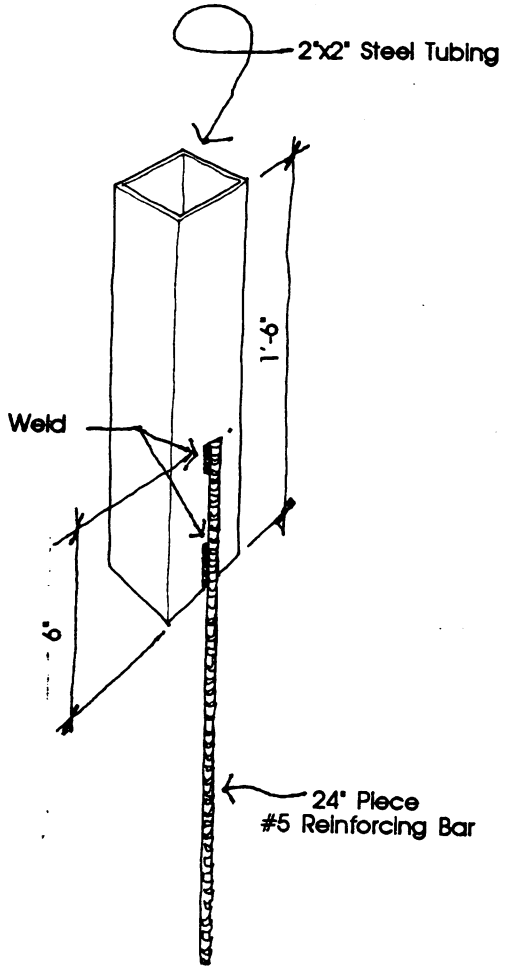


FIGURE 3
SHOP DRAWING
Pole Socket

● TERMINATION AND IMPEDANCE MATCHING

If you wish any Beverage to be omni-directional (as shown in Figure 1 and 2), rather than bi-directional, you will need to terminate the far end of the Beverage by grounding it through a resistor equal to its characteristic impedance, usually 500-600 ohms. The better the ground and the more accurate the match, the more nearly omni-directional the antenna becomes. For single wire non-steered Beverages, both Hall-Patch and I are fairly relaxed about termination. We use 560 ohm carbon resistors and 3' smooth steel ground rods, 1/4" diameter. We only install one rod per Beverage. However, to maximize directivity and nulling, more elaborate termination is usually necessary. Refer to Misek's Beverage Handbook.

If you are going to use coax as a lead in, or if your receiver has only a 50 ohm antenna input port, you really should fabricate an impedance transformer. These are covered in Misek's book and in the Proceedings 1988 article by Hall-Patch and Bryant. You are cautioned that running a 500-600 ohm Beverage into 50 ohm impedance causes signal loss of about 10 db.

● ERECTION

Erecting the Okie Beverage is rather simple, with one small trick. Lay out and erect the poles first, then haul the wire from the receiver end to the far end. Arrange to have someone tie off the wire when you reach the far end. THEN PUT THE WIRE UNDER ABOUT 15-30 POUNDS OF TENSION WHILE IT IS ON THE GROUND. Tie it, under tension, to the top of the far post, fix the termination arrangements and walk back along the wire lifting it to the top of the poles. It is much easier to pre-tension the wire in this manner, rather than walking back trying to hold the tension in the wire as you go.

One final caution: If you haul the wire out from the receiver end with it tied to your belt as I do, remember to go OVER any fence you encounter. Going under it, as I have done, wire attached, can ruin your afternoon when you discover your mistake. The Okie Beverage with the welded steel pole bases has withstood winds of over 60 mph and numerous storms without a problem. Twice in three years we have had major ice storms, breaking the wire in 2-3 places, and causing me to field solder with a propane hand torch. The Okie Beverage is between 6-10' off the ground and, therefore, is relatively safe to install where people/animals must pass under it.

● THE QC BEVERAGE

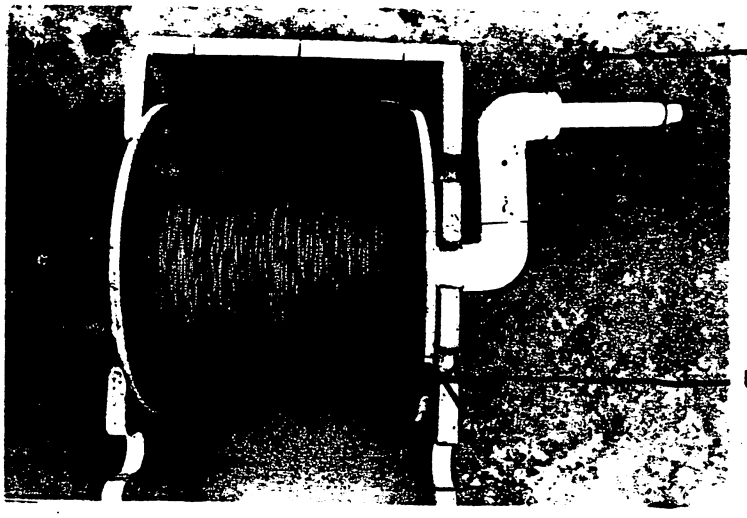
The Quick and Cheap(QC) Beverage is my own invention for DXpeditioning with multiple Beverages. I was fortunate enough to find over 12,000' of insulated 20 gauge wire at almost no cost, and began to dream of a "wagon wheel array" of Beverages for DXing and experimentation. At $70 per Beverage for the poles and holders of the Okie Beverage, I could not afford multiple wire arrays, even with "free" wire. Further, the thought of erecting 4-12 Okie Beverages for a weekend day DXpedition sounded like more than my soon-to-be 50 year old legs could handle. So, I began to think of a new approach.

The first challenge was the wire management system. I went to the electrical supply store and obtained several 18" wide cable reels that were 12" in outer diameter and had 4" diameter cores. I then fabricated fixed axles and turning cranks for 3 of these reels from standard 1 1/2" PVC pipe and fittings. Refer to Photo 6. This shows one of the reels holding about 10,000' of 24 gauge insulated wire. I also built a cable reel rack from scrap 5/8" particle board. The reel rack was made with enough length and multiple notches to hold at least 2 cable reels at once, thus allowing easy transfer of wire from one reel to another. (See Photo 7 which shows FT editor Kirk Allen with the rack and reels). The system was also designed so that the reel rack could be placed in my truck. We also developed a 2 X 2 arm extending beyond the rider's side of the truck rear. The cantilevered arm holds 2 good grade pulleys. When paying out antenna wire, we can drive slowly, with one DXer riding the tailgate as reel minder, and another as driver. The wire can either be paid out directly behind the truck, or can be run through the pulleys and will fall in the roadside ditch. See Photo 8.

Two cautions:

A. We have found that it takes a person minding the reel as we drive along. The heavy wire-laden reel can build up momentum as it turns and, if the truck slows but the reel doesn't, a monumental wire snarl develops.

B. No matter how smooth the face of the reel box is where it holds the PVC axle, IT MUST BE LUBRICATED! We didn't do so the first time and wore through an axle in less than 1000'. A good layer of petroleum jelly solved that problem. Friction can be a problem at every point when you are driving at 5-10 mph and paying out thousands of feet of wire.



New Internal Axle and Removable Crank From 1 1/4" PVC Pipe

Used Cable Reel

12" Outer Diameter
4" Inner Diameter

PHOTO 6
THE QC BEVERAGE WIRE REEL
Holding 10,000 of
24 Guage Insulated Wire



PHOTO 7
REEL RACK AND 2 REELS
and The Ever-Handsome Kirk Allen



PHOTO 8
INTO ACTION
Note Reel Rack in Rear of Truck
and 2x2 Cantilevered Pole Across
Rear of Truck Used to Lay Wire

The "wire management" problem was solved. That left the problem of stakes or poles to hold up all of these Beverages. I remembered an article by a medium wave DXer who used aluminum tomato stakes for antenna supports with no noticeable ill effects. That got me to thinking about metal stakes and rods. Photo 9 and Figure 4 both illustrate an antenna stake made from a scrap 2 X 4 block and a 4' long piece of 1/2" diameter reinforcing rod. The reinforcing rod is stocked, pre-cut, at most concrete plants. Ask for "#4 bar dowel rods X 4'-0" long" and they should know what you want. Mine cost $.60 each in 1988.

That did it--the Quick and Cheap Beverage. Every 1000' of Beverage cost me $6.00 for stakes and a small share of the $10 cost for reels. And IT IS VERY QUICK. We temporarily tie the receiver end of the Beverage to a reinforcing bar driven into the ground at the future receiving site, and head the truck toward the appropriate point on the horizon paying out the 1000 or so feet of wire behind us with me riding the tailgate. When we get to the end, I hop off, drive a ground rod and stretch the QC Beverage tight. I then walk back down the Beverage with the truck proceeding beside me. Every 100' or so, I get a "re-bar" stake off the tailgate, drive it with a couple of blows from a hand sledge, drop the block on the top, place the wire in the saw cut and proceed on. This technique allows two of us to erect one 1000' Beverage every 15 minutes and not hurry while doing so. When they are all laid out, the truck sits in the middle as the DX shack. Taking up this wagon wheel of Beverages is also very fast, for it is done entirely from the tailgate in even less time.

The only negative aspect of the QC is that, being a thin waist-high wire, it will not work in a field occupied by other folks or (more likely in Oklahoma) cows wandering around. Luckily, there are plenty of fields in this part of the country just crying for a bunch of Beverages.

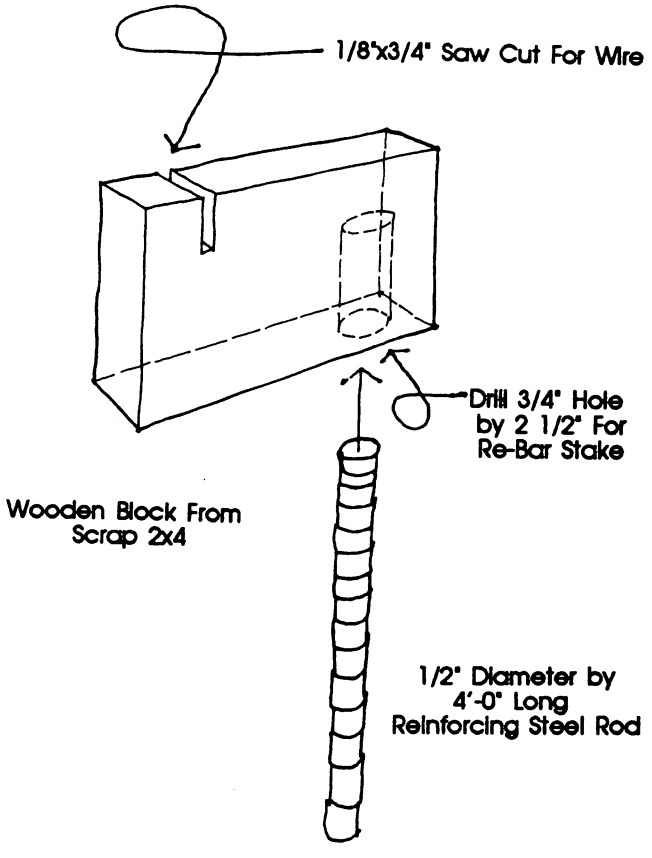


FIGURE 4
QC BEVERAGE STAKE



PHOTO 9
THE QC BEVERAGE STAKE
From Re-bar and Wooden Block

● BEVERAGE ONNA BUSH

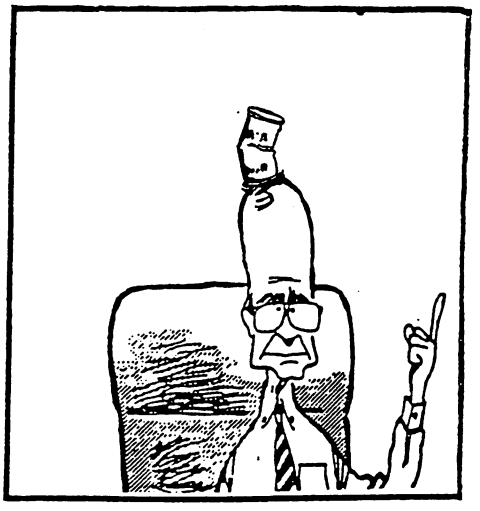
The Okie and QC models solved all of my Beverage problems save one. When I traveled by air, I was limited to a meager 100' Travel'n L antenna. This was particularly irksome when we headed for our favorite haunts in the San Juan Islands near Victoria, BC. A Beverage in the San Juans pointed down the Pacific at Jakarta is as near heaven as I plan to get for a while. I got to thinking about how my two Canadian Beverage mentors, Moman and Hall-Patch, really do most of their Beveraging. More often than not, they tend to ignore the formal thing with metal sockets, spikes and 1 X 2 poles. Many times, they just string wire in the brush along side a conveniently pointed roadway, put a ground rod in the roadside ditch and DX away. It seems to work for them.

That is where my thinking stopped until I saw one of the new "cord wheel" orange plastic wheels sold for storing extension cords. The "cord wheel" is a giant bobbin-shaped wheel with a turning crank on one outer edge and a sliding handle on the inner edge. See Photo 10. My unit (10 1/2" diameter outer rim, 6" diameter inner rim) is just perfect for holding 1000' of twin conductor, 24 gauge, insulated speaker wire. For air travel, I take along a shortened 2' long ground rod. Both it and the Beverage Onna Bush fit neatly among my shorts and socks in my folding carry-on suit bag.

● ERECTING THE BEVERAGE ONNA BUSH

1. Find a 1000' of straight road pointed within plus or minus 20 degrees of the Great Circle Route to your DX target area. The road needs to be lined with weeds ranging from knee to waist high or with trees with fairly low branches or a combination of both.
2. Park your car/truck/van/armored personnel carrier where you want to use it as a portable DX shack. Attach the antenna FIRMLY to the car/shack, get the ground rod and cable reel and head out down the road on foot. When you get the antenna fully unwound, you'll know it (careful here!)
3. Put the antenna wire under a moderate amount of tension - about 15 pounds worth or so. Put the ground rod in the ground and tie the antenna mechanically to the base of the rod. Make sure that the electrical connection to the rod is through the resistor.
4. You now have the Beverage on the ground stretched between the car/shack and the ground rod. Walk back to the car picking the wire up and tossing it on top of the road side bushes. It's best if the wire doesn't touch the ground, but mine often touches in a couple of places between clumps of sunflowers. That's one of the reasons that I prefer insulated Beverage wire.
5. When you get back to the car/shack, clip your antenna lead on to the near end of the Beverage and DX away. (See impedance matching note earlier in this article.)

I know that this system sounds way too easy, but it works magnificently. The Beverage Onna Bush receives DX signals at least as well as my much more sophisticated Beverages. The set-up time and the simplicity of this system cannot be beaten. Using a modified version, Kirk Allen and I put up three Beverage Onna Bush antennas in less than 1 1/2 hours. Their total length was just over 11,500 feet!!!



Another Kinda
BEVERAGE ONNA BUSH



PHOTO 10
AUTHOR WITH CORDWHEEL

● COSTS AND SUCH

The only item mentioned in this article not locally available to most people is the insulated antenna wire. Shopping around for wire is very important because prices vary radically. The best place I've found for insulated speaker wire is: Omnitron Electronics, 700 Amsterdam Ave.,New York, NY 10025. Phone is 800-223-0826 (local 212-865-5580). In the spring of 1989, their prices for 1000' of dual conductor speaker wire were: $24.95 (24 gauge), $54.95 (18 gauge) and $89.95 (16 gauge). Shipping is extra, of course. Fair Radio Sales, 1016 East Eureka Street, P.O. Box 1105, Lima, Ohio 45802 (419-223-2196) often has even more reasonable prices on government surplus wire of all sorts.

Using the Omnitron wire prices and the other costs quoted in this article, the semi-permanent 1000' Okie Beverage cost $99.50. A single 1000' waist high Quick and Cheap Beverage cost $20.50 and a portable Beverage Onna Bush using insulated twin conductor 24 gauge speaker wire cost~~s~~ $32.00, including the plastic "Cord Wheel" storage reel.

● PROOF OF THE PUDDING

What's it like listening to one of these Beverages? Well first, it is usually the quietest antenna I have available. The only time this is not true is when there is a major noise source centered in the front lobe of the antenna. It matters not whether it's man-made noise a mile down range or a thunderstorm mass 500 miles away--if the noise source is in the center of the major lobe, the Beverage is VERY noisy.

Secondly, the Beverage has a superb signal-to-noise ratio, much better than anything else I've used. The easiest way to describe this is an example: most of the 80 and 90 meter Ecuadorians come in here on my highest inverted L antenna at about S-7 or 8. With a moderate width IF filter, I hear good audio, but quite a bit of background noise, as well. Flip the switch to the Okie Beverage and the S-meter doesn't move much, but the noise goes away entirely. Or, take a well modulated transpolar Indonesian on 90 meters--on an average day, the S-meter might read S-3, and the audio would be noticeable but not understandable. At least half of that S-3 is noise. Flip to the Okie Beverage and the syllables of Bahasa Indonesian seem to rise out of the mud SIGNIFICANTLY.

I have never been able to get audio out of a weak DX signal with the Beverage when the signal was so weak that I could not even detect it as a het using my other antennas. However, there have been innumerable instances of having a het on another antenna and having DX-able audio on the Beverage. There have also been many occasions of hets on the Beverage when nothing was detectable on any other antenna. This kind of information is invaluable when planning for the next good opening.

All in all, I figure that about 30% of last year's DX catches were directly attributable to using a Beverage.

If you don't have room for a Beverage at home, what can you do between DXpeditions? Well, I've had up a 90 meter full wave Delta loop sloper (Clark, Proceedings 1988) for several months now and there are times when it out-performs the Okie Beverage on 90 meters, and equals it on 60.

If you do not have the space for a full wave horizontal quad or Delta sloper either, you might give the loaded Deltas is this book a try.

● FURTHER AREAS OF RESEARCH AND DEVELOPMENT

Short Beverages

Both Misek and several of the senior MW DXers have reported very good sucoess with Beverages of around 500'. However, published results of these efforts are relatively slim, especially as related to Tropical Band DXing.

Null Steering with Phased Beverages

The most excitement in recent years in MW DXing has been phasing various antennas to achieve either beam steering or null steering. The possibilities of null steering to reduce or eliminate co-channel or adjacent channel interference on the Tropical Bands is equally as exciting. As far as is known, only Misek in the hobby community has explored this concept on Tropical Bands.

FINAL CAUTION: THE BEVERAGE IS A VERITABLE ELECTROSTATIC SPONGE.

I have blown one solid state RF circuit by leaving the Beverage attached when thunderstorms were more than 3 miles away. Be very careful with this stuff--it can bite. In the spring storm season, I disconnect the Okie Beverage from the house except when I'm actually DXing.

● CONCLUSION

Don Moman commented early on is this affair: "Our hobby is listening to radios, not putting up antennas." There for about a year, I was doing both as a hobby. I hope that this article will encourage others to start experimenting with these wonderful antennas. I hope that our collective experience has shown that serious Beveraging is both easy and cheap. You can maximize your time listening to super DX with a minimum of time spent wandering around trying to hang wire.

● BIBLIOGRAPHY

The Beverage Antenna Handbook
Victor Misek, W1WCR
142 Wason Road
Hudson, NH 03051

Beverage & Longwire Design & Theory
from: NRC Publication Center
PO Box 164
Mannsville, NY 13661

receivers

THE COLLINS 51J-4 RECEIVER

Dallas Lankford

In this era of small, light weight, synthesized, high dynamic range, all solid state, microprocessor controlled communications receivers with hundreds of memories, why would anyone want a 30 year old, big, heavy, mechanically tuned, all tube receiver? If outstanding immunity from overloading (due to multiple tuned circuits before and after the RF amplifier), a wide choice of suitable AM bandwidths (approximately 6, 3.5, 3.1, and 2.5 KHz at 6 dB down), bandwidth filters with shape factors of better than 1:2 and ultimate rejection of better than 60 dB (typically better than 80 dB), and excellent audio are important considerations to you, or even if you just want to own a classic piece of history, then the Collins 51J-4 might be the receiver for you.

The Collins 51J series of communications receivers (51J-1, J-2, J-3, and J-4) were designed in the late 1940's and built from about 1949 until the early 1960's. The 51J-4 was the fourth and last model of the 51J series, and was produced from about 1952 to 1962. It was the only one with provision for mechanical filters as standard equipment, although the others could be retrofitted with mechanical filters. In fact, a J-4 is essentially a J-3 with a mechanical filter conversion kit (and an internal IF gain control potentiometer R187). There were also military versions of the J-3 and J-4, namely the R–388 and R–388A respectively. Because of the similarity of the 51J series and R–388 series receivers, I have structured this review of the 51J-4 so that it can serve as a review of them all. In other words, this is actually a generic review of the 51J series of communications receivers, with additional information specific to each of the models, including my hands-on experiences with the J-4.

The 51J series receivers tune 0.5 to 30.5 MHz in 30 bands of 1 MHz each with about 30 KHz of over range at each end, beginning with band 1, 0.5–1.5 MHz, and ending with band 30, 29.5–30.5 MHz. The tuning rate is 100 KHz per turn of the KILOCYCLE TUNING knob, or 10 turns per MHz. The front panel controls are RF GAIN, AUDIO GAIN, BFO ON–OFF, CALIBRATE ON–OFF, BFO PITCH, AVC ON–OFF, LIMITER IN–OUT, ANT. TRIM, CRYSTAL FILTER SELECTIVITY 0(off)–1–2–3–4, CRYSTAL FILTER PHASING, OFF–ON–STANDBY, BAND CHANGE, KILOCYCLE TUNING, ZERO ADJ., METER INPUT(signal level)–OUTPUT(audio level), CAL.(100 KHz calibrator screwdriver adjust), and in the J-4 a mechanical filter selector 1–3–6 (1.4, 3.1, and 6.0 KHz bandwidths) for optional mechanical filters. A J-4 could be purchased with 3, 2, 1, or no mechanical filters. When no mechanical filters were used, a J-4 was equipped with a plug-in IF transformer and the 5-position crystal filter was used for selectivity. The J-1 did not have an antenna trimmer or front panel calibrator screwdriver adjustment. I do not know about the J-2. The J-3 and R–388 controls are identical to the J-4 except for the mechanical filter selector and R187 IF GAIN adjustment, a slotted shaft pot with lock nut mounted on the chassis beside the BFO shaft. The J-4 tubes are (2) 6AK5, (3) 6BE6, (8) 6BA6, (2) 12AX7, 12AU7, 6AQ5, 5V4, and OA2. The 51J series receivers weigh about 43 pounds without a cabinet, and require 10.5" high and 13.5" deep mounting space. The width is standard 19" rack mount. A front panel artist's sketch, front panel line drawing, and block diagram are provided in Figures 1, 2, and 3.

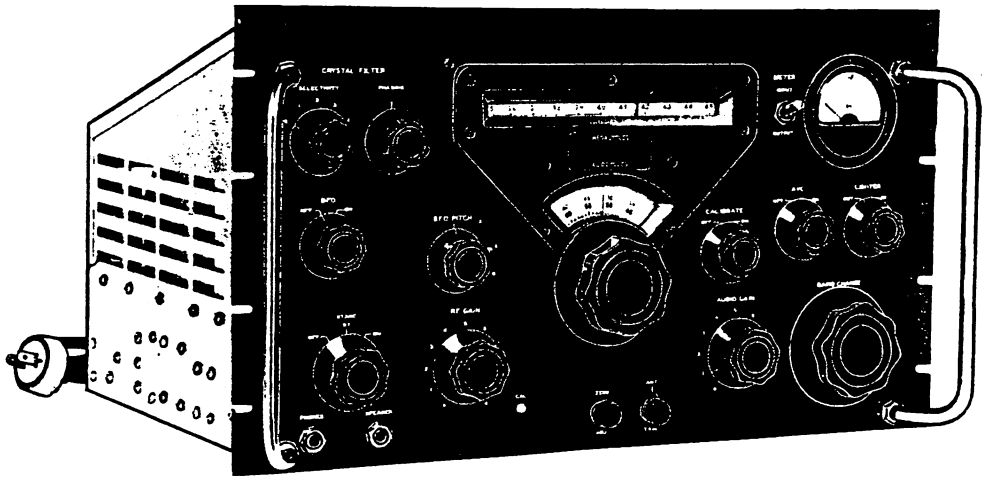


FIG. 1 SKETCH OF THE 51-J4

The front panel artist's sketch, taken from a J-4 manual, does not show the front tag. I modified the line drawing, taken from a R-388 manual, to show the position of the front tag above the escutcheon, and to show the mechanical filter selector lever. Mechanical filter selection is accomplished with a leaver and hollow shaft arrangement. The BFO pitch shaft passes through the hollow mechanical filter selector shaft, and the mechanical filter selector lever is partly behind the BFO knob. The antenna trimmer was also added as an afterthought (the J-1 had none); note the small knob and poor placement. Otherwise, the controls are well placed and easy to use. The dual function S-meter reads both signal level (0 to 100 dB) and audio level (−10 to +6 dB relative to 6 mW). The meter switch is a momentary toggle switch which normally selects signal level.

The block diagram shows the general circuit features of the J-4. It is triple conversion on band 1, with crystal controlled first and second oscillators, single conversion on bands 2 and 3, and double conversion on bands 4 – 30 with crystal controlled first oscillator. The crystal controlled oscillator(s) and temperature compensated PTO (VFO) make the 51J series receivers exceptionally stable after they have warmed up for about an hour. When used in a centrally heated and cooled house or apartment, drift is typically no more than a few Hz per day.

How does the J-4 stack up against our favorite boat anchor, the R-390A? Quite well, and in some cases slightly ahead. The J-4 has no expensive and difficult to find ballast tube. Based on my experience with a sample of two J-4's, they seem to have somewhat less warm up drift than 390A's I have used. Once warmed up, both are rock solid. The 43 pound J-4 weight is a definite plus, about half that of a 390A. J-4 audio output is 4 ohms for speakers or 600 ohms for line output, and J-4 audio quality seems better than 390A audio quality. One J-4 I have used has annoying spurs which seem to be IF feedthrough and harmonics at 0.5, 1.0, 1.5 MHz, and so on, with decreasing intensity up to about 4.5 MHz. The 500 KHz harmonic spurs are caused by missing top and bottom dust covers (because the spurs go away when I use dust covers borrowed from another J-4). So I recommend that you avoid any 51J series receiver without dust covers.

Neither the J-4 nor the 390A has a clear win with regard to selectivity bandwidths. The 6.0 KHz J-4 filter seems optimal for pleasure listening on the SW bands or when there is little or no adjacent channel interference. (I wish the 390A had a 6 KHz filter in place of its 8 KHz filter.) The 3.1 KHz J-4 filter is adequate for difficult DX situations. The J-4 crystal filter may be switched off (position 0) or set to bandwidths of approximately 3–4 KHz, 1.25–1.6 KHz, 0.5–0.7 KHz, or 0.3–0.5 KHz (positions 1–4) in conjunction with the 6.0 KHz mechanical filter. Narrower bandwidths are obtained with the 3.1 KHz and 1.4 KHz mechanical filters. For example, with the 3.1 KHz mechanical filter, The J-4 manual specifies the crystal filter position 1 selectivity as 2.25–2.75 KHz. So you have a wider choice of selectivity options than you might think. There is one big advantage to the J-4 mechanical filters. They are plug-in style, as opposed to the solder-in style of 390A mechanical filters. So it is much easier to replace a J-4 mechanical filter if one goes bad. The J-4 crystal phasing control is the best I have used. It is better than the standard Hammarlund crystal filter, and functions just like a notch filter, which gives the J-4 an edge over the 390A in some situations.

The J-4 has only one AGC attack and release time, and it is difficult to convert it to a SSB receiver and retain its AM capabilities. The J-4 does not have a narrow audio filter, though one could be added outboard. The J-4 BFO pitch knob is not calibrated, as it is on the 390A, so it is not as easy to set the BFO frequency at the edge of the filter bandpass. Thus, a 390A with Cornelius SSB mod is a clear winner in the CW and SSB categories. The single AGC attack and release times may make the J-4 less attractive to some SWL's because to obtain acceptable reception quality for strongly fading signals, either the RF gain must be reduced or the AGC must be turned off and manual RF gain control used. In fact, the 0.05 second attack and release time is not satisfactory for even moderately fading SW signals. So a 390A is a clear winner with its 3 attack and release times. However, I don't consider the J-4 AGC problem to be a serious defect. It doesn't bother me to reduce the RF gain or use manual gain control.

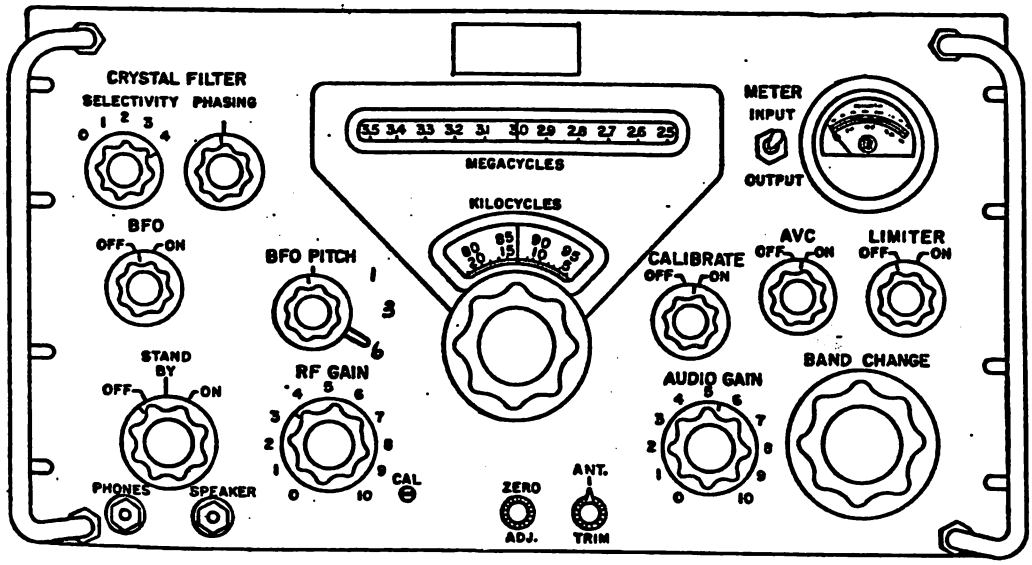


FIG. 2 51J-4 FRONT PANEL

Both J-4's I have used have a slight amount of backlash in the KILOCYCLE tuning which I believe is due to the coupler which connects the KCS and PTO shaft. The coupler resembles a 390A Oldham coupler, but without anti-backlash spring (or spring shafts in case you wanted to add a spring), and with set screws rather than non-mar clamps. For ease of PTO adjustment with no backlash, the 390A comes out ahead.

The PTO end points are adjustable for both J-4's and 390A's. This feature is important because as some PTO's aged, the 1 MHz tuning range expanded, resulting in inaccurate frequency readings. For reasons which I will not discuss here, 390A PTO end point alignment is much easier than J-4 PTO end point alignment. In addition, I have never encountered a 390A PTO which could not be aligned, and initially some of them had end points expanded by as much as 12 KHz. While I was writing this review, I had the opportunity to work on a third J-4 with a PTO which had end points spread 15 KHz, and which could not be aligned. Some library research revealed that this is a common problem with 51J series PTO's. For example, a December 1969 *Ham Radio* article, "New Life For The Collins 51J Receiver VFO," stated that many 51J PTO's had spread beyond the ability of the end point adjustment inductor to bring back into alignment, and discussed a difficult procedure for modifying some 51J PTO's to extend the end point adjustment range. Because the end points of the PTO's in my two J-4's are within 0.5 KHz of exact alignment, and have plenty of range left in their end point adjustments, I have concluded that there are two kinds of 51J series PTO's, "good" and "bad." Consequently, I would advise against buying a 51J series receiver with a PTO which has end points spread more than 2 or 3 KHz.

Both have IF outputs, 455 KHz for a 390A and 500 KHz for a J-4. So you can add external IF processing, like a Hammarlund HC–10 converter which would give you more bandwidths and SSB with a product detector. The J-4 has plastic knobs, plactic KCS dial, and a bakelite drum covered with a decal for the MCS dial. The J-4 MCS dial is difficult to read because of poor bulb positioning and glare reflected from the glass window. Also, the J-4 MCs dial decal commonly flakes off. For viewing ease and dial durability the 390A is by far the winner.

Most J-4 front panels are St. James gray (it looks black to me) with white silk screened lettering. The paint is finely textured, somewhat like black wrinkle varnish which the military used on much of its gear. The J-4 was also available in a light gray, "FAA green," and perhaps other special order colors. I have not seen any of the other colors, but I doubt they are as appealing to the eye as the St. James gray. A St. James gray J-4 is a black beauty.

Collins made a matching cabinet for the J-4, but apparently few J-4's were originally purchased with one. I liked my first J-4 so much that I bought it a new Bud cabinet. Unfortunately, the cabinet required modifications (which I will not describe here) to provide adequate ventillation and proper alignment of the rack mount screws. Because of the cost, about $150 for a new Bud cabinet, and the labor involved to modify the cabinet, you are better off getting a J-4 with a matching cabinet even if it means a lengthy search and paying a premium price.

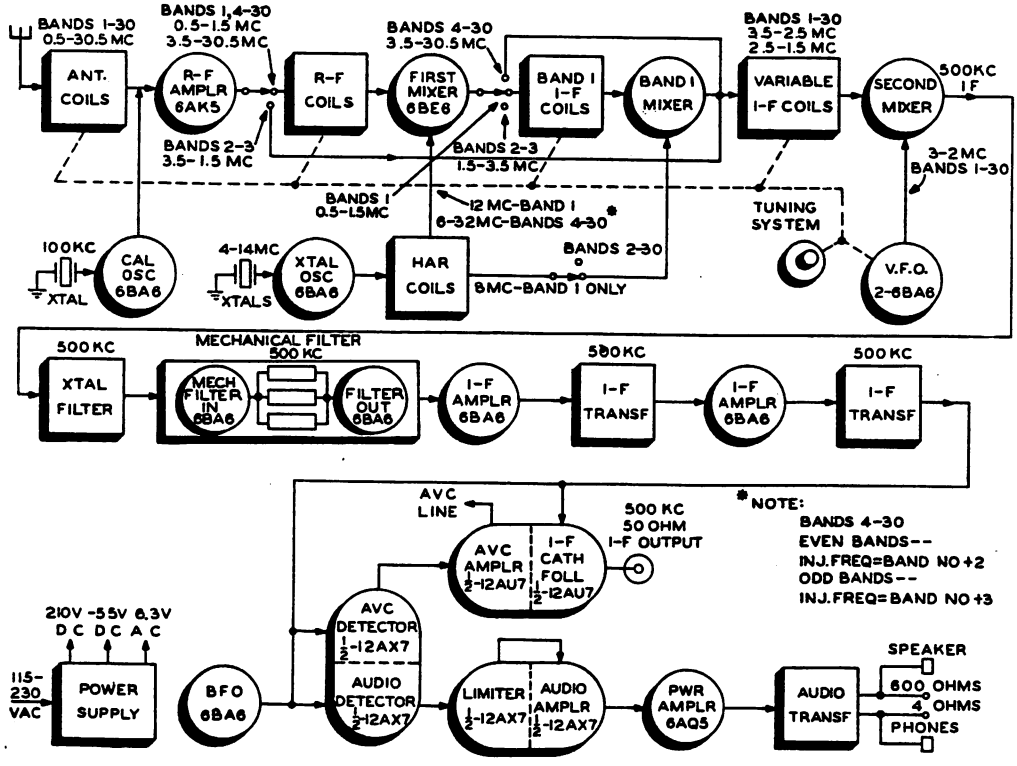


FIG. 3 51J-4 BLOCK DIAGRAM

DXers generally use headphones. But nowadays most headphones are low impedance, while most tube receivers have high impedance headphone outputs. The J-4 manual rates the headphone output at 4 ohms. That is probably a mistake, because in the same sentence the manual rates the speaker impedance as 600 ohms. You can use low impedance headphones directly with a J-4, but you will hear annoying 60 Hz hum with no antenna connected and the audio gain set at minimum. At normal listening levels there will be enough residual 60 Hz hum to cause fatigue after long DX sessions. To eliminate this residual hum, I match audio impedances with a Calectro D1-740 Universal Tube Type Output Transformer which has primary taps of 1000 or 4500 ohms, and secondary taps of 4 or 8 ohms, and is rated at 50 – 10,000 Hz, 4 watts. Any audio transformer with similar specifications could be used. The transformer is mounted in a small metal box, with the 1000 ohm primary and 8 ohm secondary wired to standard 1/4" mono headphone jacks. Radio Shack 6' audio cable with standard 1/4" headphone plugs are used to connect my home made impedance matching adapter to my receivers. I currently use Radio Shack Lightweight Monaural Headphones, catalog no. 20-210A, 80 milliwatt, 20 – 20,000 Hz, 16 ohms. With the impedance matching adapter I get hum-free, near hi-fi quality audio using the 6 KHz bandwidth filter. Audio quality for narrower bandwidths is as good as any I have heard. The headphone impedance problem is not unique to the J-4. I have used an impedance matching transformer with many tube type receivers, and it has always improved audio quality, sometimes dramatically.

An excellent speaker for use with a J-4 is the Collins Type 312-A, Model 109. It measures 14.75" by 12" by 9.625" (W by H by D), is all metal, is painted St. James gray, and has a 10" speaker. The resulting audio quality is as good as any I have ever heard from a communications receiver speaker, with the exception of a R–390A driving an AMSD-1 phase locked loop synchronous product detector followed by a hi-fi amplifier and hi-fi speakers. In fairness to other receivers, much of the audio quality is due to the 312-A speaker. For example, with the 312-A speaker an HQ–180A sounds almost as good as a J-4. And the same is true for a 390A using the 312-A and an impedance matching audio transformer connected to the local audio output. If you can't find a 312-A speaker, I would recommend a Radio Shack speaker, one rated at 8 ohms and about 10 watts. I have used an ugly Radio Shack # 40-1227A Indoor/Outdoor Speaker in a plastic case for about 8 years. It sounds almost as good as a 312-A.

The J-4 was not designed as a SSB or CW receiver, but rather as a premier AM receiver, which it still is. Nevertheless, the J-4 can be used effectively for SSB or CW reception if you are willing to turn down the RF gain, turn up the audio gain, and use the RF gain control to adjust the signal levels of SSB or CW signals. For best SSB reception you should adjust the BFO pitch so that the BFO frequency is at one or the other edge of the mechanical filter skirt depending on whether you are listening to USB or LSB.

Tuning SSB and CW signals with a J-4 is inconvenient because you must constantly adjust controls as you tune around. Or is it? The J-4 has a 500 KHz IF output jack which can be used to feed SSB converters, such as the Hammarlund HC–10. Because the IF output of a J-4 is a whopping 12 volts peak to peak you will need to add a 2.7 K ohm half watt resistor in series with the J-4 output and HC–10 input to pervent overloading the HC–10. With the dropping resistor, a J-4 and HC–10 combination is excellent for SSB and CW, and enhances AM reception. For those of you who are not familiar with the HC–10, it is essentially the IF strip and audio circuitry of a Hammarlund HQ–180, and includes a notch filter, bandwidths of 6, 4, 3, 2, 1, and 0.5 KHz, three AGC release times, IF vernier fine tuning, and a product detector.

A tube type receiver like the 51J-4 often beats a solid state receiver in two DXing situations: DXing signals which are at or in the background noise (on all bands), and DXing the MW band. For example, John Tow said in his *Proceedings 88* review of the R–390A, "An in-the-noise signal on another radio will have a slightly improved signal-to-noise ratio on the '390; the audio is cleaner, making reception of difficult signals less tiring." I agree with John. I don't know why the R–390A is better than all other receivers in this regard, but it is. I'll take John's remark one step farther. Good tube receivers, such as the J-4, generally produce slightly better audio for signals at or in the noise than good solid state receivers. I am told that the NRD–525 is the equal of any tube type receiver in this regard, but I'll have to hear it to believe it (excuse me, 525 owners).

To illustrate how a tube type receiver can beat a solid state receiver for MW DXing, let me quote from Chuck Hutton's Drake R7 Review in *DX News* 47, 1 (Oct. 8, 1979). "The second criticism is their choice in broadbanding the input stage at MW frequencies. While this is OK at HF where no practical, attainable amount of input selectivity will protect the receiver from strong signals only 10 or 20 KHz away, this is not the case at MW freqs. A good preselector has enough selectivity to be of great help to the urban MW DX'er. In practical terms, this means that the R7 was able to defeat the 390A between 720 and 800 KHz where super-local WSB is a terror, if and only if the R7 was tuned so close to WSB that the 390A's input selectivity was of no use. That is, 740 was DXable on the R7 but not on the 390A but 720, 730, 770, and 780 were generally better on the 390A. The broadbanded RF input on the R7 also led to a handful of spurs from locals that were totally unheard on other receivers. This was true only on the Beverages, so it is possible that under less severe conditions the problem may disappear." The other receivers mentioned above included a SPR–4, a FRG–7 with 3 KHz filter, a HQ–129X with 2 mechanical filters, a HQ–180A, and a RF–4800. A J-4 has three tuned circuits before the first mixer, just like a 390A, so a J-4 can be expected to perform similarly in high RF urban environments on the BCB.

Another category where a J-4 often beats a solid state receiver (at least an unmodified one) is IF filtering, including number of AM bandwidths, appropriate bandwidths, and skirt selectivity. For example, I was flabbergasted when I read John Bryant's criticism of the stock filters in a draft of his NRD–525 review. I think I might explode if I fired up my new $1200 receiver and discovered that the 6 KHz wide filter let all sorts of QRM under the filter skirts on both sides, and the 2 KHz narrow filter was unacceptably mushy with ECSS techniques. I have not measured stopband (ultimate) rejection for the J-4 mechanical filters, but I can assure you that a J-4 front end will wilt long before adjacent channel interference makes it through the skirts.

The dynamic range of a receiver is an important measure of its ability to handle strong signals. However, the dynamic range values given by manufacturers and reviewers often do not tell the complete story. For example, several years ago as part of their catalog, Sherwood Engineering included a number of laboratory measurements for many top receivers. There it was pointed out that receiver manufacturers typically measure dynamic range with two signals spaced 20 KHz or more apart. However, in difficult AM listening situations, carriers are much closer together, sometimes as little as 2 KHz apart. So Sherwood measured the dynamic range twice for each receiver, once at 20 KHz, and a second time at 2 KHz test signal separations, and called these measurements wide and narrow dynamic ranges. The results were revealing. For an R–390A the wide and narrow dynamic ranges were 81 dB and 79 dB respectively, while for an NRD–515 they were 95 dB (wide) and 77 dB (narrow). Both an R–70 and an R–71A measured 86 dB (wide) and 62 dB (narrow). A Drake R-7 measured 97 dB (at 100 KHz spacing) and 75 dB (narrow). The J-4 was not included in Sherwood's list.

To determine the dynamic range my of J-4's and other receivers, I built a hybrid coupler and measured their dynamic ranges. One J-4 measured 80 dB (wide), and the other measured 83 dB (wide) at 1200 KHz. Strangely, I got much lower narrow dynamic range measurements for my 390A than reported by Sherwood, and lower wide dynamic range measurements on the higher (SW) bands for all of my receivers. Perhaps my home made hybrid coupler does not have the high port isolation required for narrow dynamic range measurements or for wide dynamic range measurements at higher frequencies. But in any case, with regard to overloading, a J-4 is generally the equal of any solid state receiver, and perhaps slightly superior for DXing in some difficult situations, such as for MW splits.

If you hear it, it's there. That's what Kevin Atkins said about the R–390A in *Proceedings 88*, referring to immunity from overloading. A J-4 has a dynamic range virtually identical to a 390A, and consequently is similarly free from overloading. However, excellent strong signal handling performance is not sufficient to guarantee that if you hear it, it's there. Images, IF feedthrough, IF harmonics, spurious mixing products, and other phenomena can produce a phantom signal where there should be none. A cryptic line in the J-4 manual (Section 1.3, Reference Data), "Spurious Frequency Response: down at least 40 dB," prompted me to measure J-4 spurious frequency responses.

With a J-4 tuned to various frequencies in band 1 (.5 – 1.5 MHz), spurious responses varying from 55 to 75 dB down were found in the 2.5 – 3.5 MHz frequency range. Study of the J-4 conversion scheme suggested that band 1 spurs are IF feedthrough to the variable second IF (3.5 – 2.5 MHz), or images of the variable first IF (11.5 – 10.5 MHz) due to a spurious 8 MHz oscillator injection, or both. A loop antenna, which is used by most serious MW DXers, would eliminate any such spurs. Except when using precision equipment to generate and measure them, I have never heard any band 1 spurs, even with a long wire antenna. For bands 2 – 7, all spurs were down about 95 dB or more. This means you should never hear a signal on a J-4 between 1.5 and 7.5 MHz which is not really there, except with a signal generator in a laboratory setting. For bands 8 – 15, all spurs were down about 70 dB or more. This means it is unlikely that you would ever hear a signal on a J-4 between 7.5 and 15.5 MHz which is not really there. The spurs for bands 4 – 15 are all images of the variable first IF (even bands: 2.5 – 1.5 MHz, odd bands: 3.5 – 2.5 MHz). In my opinion, the 31 meter band is the only international SW broadcast band where images might be a problem, and then only if you lived next door to a ham who operated a kilowatt transmitter in the 20 meter ham band. I have searched for 20 meter images in the 31 meter band, but have never found any. For bands 16 – 30, the spurs are stronger and more numerous. Not only are there images, like those for bands 4 – 15, but also there are other strong spurs closer to the fundamental frequency. I did not attempt to determine the causes of the additional spurs, or to measure the levels of all spurs for bands 16 – 30. Although some were no more than 45 dB down, I doubt that they would be a problem for DXers in most listening situations because there are few S-meter pinning signals above 15.5 MHz. However, if total freedom from spurious responses in the 15.5 – 30.5 MHz frequency range is an important consideration for you, then a J-4 may not be adequate for your needs.

It is curious that 51J-4's have not been more popular with BCB and SW DXers. One reason may be price. In Ray Moore's book, *Communications Receivers*, a price of $1099 is stated, but no year is given. Ray told me that the $1099 price is for 1955, and that his records show J-4's sold for $1208 in 1958 and $1464 in 1962. Those prices are well over twice the price of an HQ–180A during the period both were produced. Even today a 51J-4 often commands a premium price, especially if it is complete and in excellent physical and electrical condition. East coast hamfest prices are typically $300 – $400 for a J-4 in good condition with all three mechanical filters, but without the matching cabinet. Hamfest prices tend to be less in some other regions, and considerably less for J-4's in below average condition or missing some of the mechanical filters. In addition to hamfests, J-4's are bought and sold through the Ham Trader Yellow Sheets; send a SASE to P.O. Box 15142, Seattle, WA 98115 for subscription information.

Some of the information in this review was taken from my "Collins 51J-4 Review" which appeared in *DX News* **56**, 1 (Oct. 3, 1988), revised version in *The Hollow State Newsletter* **20** (Fall 1988), from my "Collins 51J-4 Technical Notes" which appeared in *DX News* **56**, 13 (Dec. 26, 1988), and from my "More Collins 51J-4 Technical Notes," which has been submitted to *DX News* for publication. Reprints of my *DX News* articles are available from the National Radio Club, Publications Center, P.O. Box 164, Mannsville, NY 13661; send them a SASE for ordering information.

Owning a classic tube receiver like the J-4 is not for everyone. For openers, *you* will probably have to overhaul, repair, align, and maintain it because there is virtually no one who does this type of work any more as a business. Before you rush out and buy a J-4, I strongly urge you to get copies of my longer reviews mentioned above. They include detailed descriptions of special tools (such as spline wrenches, which are needed to do even minor maintenance and repairs and without which you can strip set screw sockets), RF (front end) alignment, IF alignment, dial cord replacement, PTO end point adjustment, replacement of mechanical filters (including types, availability, and prices), additional information on dynamic range, Bud CR-1740 cabinet modifications, and more.

THE FRG-8800
Some Second Thoughts

Gerry Bishop

The Yaesu FRG-8800 entered the market in 1985, shortly after the Icom R-71A. Apparently designed to compete with the Icom, and to outperform the Kenwood models then available, the -8800 came equipped with a sufficient number of bells and whistles to attract both the DXer and the casual SWL.

Before buying my -8800, I made an in-store comparison with the R-71A. Daytime conditions in downtown Tokyo are not the best for testing, but both radios suffered equal disadvantage. The Yaesu was marginally better than the Icom, based upon what I could hear. The overall features seemed acceptable.

The design of the -8800 indicates that Yaesu meant it to be simple to operate, yet versatile. The receiver has five modes of operation, 12 channel memory, dual signal strength meter, keypad and dial tuning, AF/RF gain, tone control, AGC, a noise blanking circuit, phone and record output jacks, and several clock functions.

The five modes are AM, LSB, USB, CW, and FM. AM, CW, and FM are all user selectable for "narrow" or "wide" using a momentary contact switch on the front of the unit. Unmodified, this is 15 kHz and 6 kHz for AM, much too wide for serious DXing, but adequate for program listening. The FM wide mode does not work unless the optional VHF converter is installed. Narrow FM and both CW bandwidths perform very well.

Touching the "MR" button will activate the 12 channel memory. Besides the channel selection, the memory circuits also allow the user to scan some or all of the 12 channels or scan a bank of frequencies between two adjacent channels. While this scan feature is of minimal use in DXing, it may have some applicationin monitoring multi-channel broadcasters such as the BBC. Placing the proper frequencies for, say, the BBC into the memory, and using the scan mode, the listener would have the best possible reception at all times with a "hands off" operation. The receiver should do all the work. This is possible in practice, though not with 100% success.

The signal strength meter is unique. It is a bar graph, each bar taller than the one left of it, until the tallest bar reflects a strength of 60 over 9. This scale is at the base of the meter. Up the left side, graduated from 1 to 5, is a scale marked "SINPO" and does indeed approximate the rating for signal strength which I use. This is a stingy meter; I've only had it to its maximum using a 100' antenna and receiving a local station's ground wave.

The tuning system, employing both the keypad and a tuning knob, has another feature which has proven useful. This is the speed control for the VFO. It can be set to "FAST", tuning through 125 Khz per revolution of the dial, "SLOW" allows about 6 Khz/revolution. A third setting is "D. LOCK", to lock the display. This last disables the knob, preventing inadvertant tuning. The keypad is not affected by D. LOCK.

In addition to a dual time clock, the -8800 has a timer circuit which will automatically turn the radio on and off. Additionally, through output jacks on the back of the cabinet, the user can employ this timer to control other equipment. I use this to control a tape recorder, allowing "remote" listening for those times when I can't be at the radio.

I have had second thoughts about this radio. It has performed to specifications, but the specifications don't allow it to perform as a first class DX machine. The stock bandwidths are not suitable for DXing using the AM mode. The noise blanking circuit was designed to limit the interference of over the horizon radar, the so-called "woodpecker"; it is not for reducing QRN. This is a serious limitation, and not the stuff of which great radios are made. The DX-160 had a better noise reducing circuit.

With the inherent problems using the AM mode, ECSSB using the USB and LSB modes is the only way to go. This will generally answer for all but the most demanding DXing, but the DXer compromises the excellent audio found using AM. A solution is to modify the AM bandwidths; that is beyond the scope of this article. The stock -8800 is, overall, poor to fair in the all important area of selectivity.

Sensitivity on shortwave is adequate. MW sensitivity is poor. This latter is due to a designed attenuation of all signals below 1600 kHz. Such design



THE YAESU FRG-8800

is puzzling in a communications receiver which features an attenuation control.

Overloading is a rare problem, but still possible. The attenuator will correct it when it happens on SW. The MW attenuation, welcome perhaps at some locations, has certainly proven to be an annoyance to me. MW DX is typically just at the threshold, and there is nothing built into this radio to allow the DXer to correct that. A simple modification for this may exist.

The circuitry in my -8800 appears to be overly sensitive to humidity and dust. I've had the cabinet open several times to fix troubles caused from humidity and dust. None of the other equipment in this shack, exposed to the same conditions, has failed for similar reasons. It seems that the FRG-8800 was not "built to take it" as was the FRG-7.

I've used this radio at two locations (Clark Air Base, Republic of the Philippines, and northwest Florida) with a variety of antennas. All the wires were 100' or longer. I don't use a preamp or tuner with this receiver.

I don't recommend the Yaesu FRG-8800 as a DX receiver for SW or MW. The DXer will be better served using the R-71A, NRD-5x5 receivers, or a vintage model such as the Collins R-390A. Yaesu should go back to the basics for their next communications receiver or leave this market. Their advances since the FRG-7 have become disappointments in the long term. The -8800 solidly continues this questionable tradition.

THE KENWOOD R-2000
A Short Examination

Dave Valko

The Kenwood R-2000 is a continuous coverage digital readout communications receiver offering reception of AM, FM, SSB, and CW signals. Like most communications receivers, the R-2000 has its share of "bells and Whistles"; however it is fairly simple to operate while providing many of the features the DXer is looking for. The R-2000 sells for about $700 US, and is within the limits of most serious DXers.

The R-2000 can be tuned from any of the frequencies set in its 10 memories. The R-2000 has 3 tuning speeds; fast in 5 khz steps, medium in 500 hz steps, and slow in 50 hz steps. You can also change frequency in 1 mhz steps using the up and down "Band" switches. When the "Band" switches are held down, the frequency increases or decreases (depending which is pressed) continuously in 1 mhz steps. A frequency lock is also provided.

The R-2000 is capable of receiving 5 different transmission modes. Shortwave broadcast DXers will use the AM and SSB modes most often. Because AM selectivity isn't narrow enough for many DX situations, SSB will become the favored DX mode. If the interference is on the high side, use LSB, and if its on the low side, use USB. There are very few situations where this method of DXing won't separate two nearby stations. Unfortunately, when using SSB, the audio quality is somewhat degraded, especially during music. This is only a minor nuisance though, and something the DXer should be able to live with.

Besides the clock/timer and memories, other features include AF Gain, Tone, Squelch, RF Attenuator, AGC, Noise Blanker, and a switch to dim the digital readout. With congested conditions on the 49 meterband, the RF Attenuator will help reduce unwanted signals. The Squelch Control, AGC, Noise Blanker, and dimmer switch are rarely used. The AGC response time is too slow, and as a result is left in the fast position. The owners manual mentions that the Noise Blanker will reduce "pulsating ignition type noise"; however, personal experience has found it doesn't do the job. The only time when one needs the dimmer in the bright position is when the receiver is in direct Sunlight; otherwise it can be left in the soft position.

As for the memories, both the frequency and mode is stored. Entering a frequency/mode in memory can be done in 2 ways; either by depressing the selected memory channel, then depressing the "Memory In" button, or by selecting the desired memory channel, then depressing the "Auto Memory" button twice. "Memory Scan" scans the memory channels at 1.5 second intervals. "Program Scan" scans the frequency range between the frequencies set in memory channels 9 and 0 at a rate dependant on the tuning speed setting. Depressing the "Hold" button stops the scanning process. Depressing the "Hold" button a second time releases the hold and scanning continues. Scan doesn't stop at a signal unless one is willing to get inside the radio and make a simple modification outlined in the owner's manual.

The R-2000 has two 24-hour clocks which can be set to UTC or any time zone desired. Since the Timer uses Clock 1, its best to set at UTC. The Timer turns the radio on and off and allows unattended recording of the last frequency/mode displayed. Absent DXing requires the use of two separate patch cords to connect the radio to a tape recorder. One cord connects the "record output" jack on the front of the R-2000 to the "audio in" or "auxiliary" jack on a tape recorder. The other cord connects the 8 pin jack located in the back of the R-2000 to the remote jack on a tape recorder. Kenwood was kind enough to include the special 8 pin plug needed for the receiver side of the remote patch cord. Only pins 1 and 4 are used to connect (solder) the patch cord to the 8 pin plug. The other pins are used in connecting a transmitter to the R-2000.

Kenwood offers several accessories for the R-2000. One can tune the VHF portion of the spectrum (118-174 mhz) with the VC-10 VHF converter. The converter fits conveniently inside the back of the receiver. If you like DXpeditions where AC power isn't available, the DCK-1 12 volt DC power cable kit will help. Like most recently menufactured receivers, the R-2000 can connect easily to a car battery with the use of the cable kit. A 500 hz filter for more selective CW reception can be obtained direct from Kenwood. Universal Amateur/Shortwave Radio Inc. in Reynoldsburg Ohio will replace the stock 6 khz wide filter with a 4 khz filter for $39.95 when the receiver is bought. Universal also has Collins 1.9 khz

filters available for $159.95 for improved CW and SSB selectivity. Since I haven't had any filter modifications done to my own R-2000, I don't know how the narrower selectivity will affect the overall audio quality.

●Disadvantages: As a left hander, I find the controls backward. I had difficulty operating some of the controls at first. This was only a minor inconvenience however. Another disadvantage is the poor selectivity in the AM mode. The Wide position (a 6 khz IF filter) is too wide. The Narrow position (a 2.7 khz IF filter) is adequate in most cases but the audio suffers from an annoying hiss. As a result, I personally operate the receiver exclusively in either USB or LSB. The R-2000 automatically switches internally to the 2.7 khz filter when in SSB. Use a graphic equalizer to help make the audio more understandable.

Besides entering the frequencies of your target stations in the memories, you may find it easier to enter the middle frequency of the most listened to bands. You'll then be able to move up and down the shortwave spectrum quickly. Tuning to a specific frequency with the R-2000 is only slightly slower than the key-pad tuning system. Unlike some receivers, the R-2000 doesn't move off frequency when switching between side-bands.

Overloading is a slight problem. There are a few rare occasions where one would have a problem with overloading, but the RF attenuator will easily take care of the problem.

●Advantages: Simplicity of operation. There are only a few controls that will be used regularly. This rig is not for those who like to "tweek" a dozen controls constantly. But if you're lazy and would rather listen than fiddle, you'll enjoy the R-2000. Most receivers manufactured today are portable and the R-2000 is no exception. One can quickly and easily disconnect the receiver from the "shack" and take it on vacation. Weighing only 12 lbs, it doesn't take a fork-lift to move it. Price is another advantage. For those who don't want to spend $1000+ for a receiver, you'll want to consider the R-2000. After nearly 4 years of operation, I haven't had any troubles with mine.

●Final Word: Despite the R-2000's slight disadvantages, its definately a serious DX rig. Personal experience has shown that one can hear just about any rare DX station with the R-2000 that can be heard on any other receiver.



THE KENWOOD R-2000

THE ICOM IC-R70

A DXers Review, Technical Description and Modifications

Kevin Atkins John Tow Jerry Strawman

●OVERVIEW AND OPERATION by Kevin Atkins

Life with an R70 is a love-hate relationship. The whispered condemnations you've heard about its tuning scheme are deserved, and the selectivity of the stock version is only fair. Still, with a few mods and a lot of practice, you can overcome Icom's design flaws and hear anything that's hearable.

This receiver is the "point of diminishing return" in terms of receiver-dollar ratio. In the last year I've seen R70s selling at hamfests for $300-400 U.S., and it's difficult to imagine more receiver for the money. More expensive receivers, with features like memory, inboard clocks, and timers, certainly contribute to more efficient operation. But in terms of ultimate "hearability," the R70 compares favorably with the most expensive rigs on the market, and thus merits serious consideration by the DXer whose budget won't allow any extra-cost conveniences.

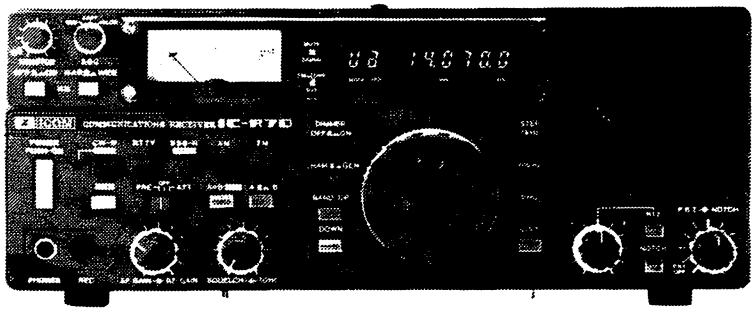
SENSITIVITY AND DYNAMIC RANGE

A three-position slide switch and a continuously-variable gain adjustment provide control of the R70's RF section. The 3-position switch controls the preamp and attenuator, with "off," "on," and "attenuate" positions. With the 10 db preamp on, there's plenty of sensitivity for detecting the weakest tropical band signals. Near very strong signals (i.e. Mayak 4766, Rebelde 5025) the front end tends to overload unless the preamp is turned off. In the international bands—particularly 49 meters at night, or near WYFR anywhere/anytime—overloading can be a real problem. It involves stations within 20-30kHz of the tuned frequency, so a broad-banded antenna tuner or similar preselecting device is not much help unless carefully peaked. Fortunately, the 20db attenuator eliminates most overloading.

The stock R70 automatically disables the preamp when mediumwave frequencies are tuned. There is a simple mod to alter this well-intentioned but ill-advised default in the "Modifications" section of this review.

SELECTIVITY

The stock R70 has two 2nd IF bandwidth filters of 2.3kHz and 6kHz for CW-wide/SSB and AM respectively. The filter choice is *not* independent of mode, so there is no "narrow" AM filter. The 6kHz filter is too wide for most DXing applications, leaving ECSSB as the only choice for a narrow bandwidth. These are crystal filters with good skirt selectivity—a good thing, since the 2nd IF is in the 9MHz range, and substitute filters are not common (though some are available; see "Modifications").



Instead of a narrow filter, the R70 offers a "passband tuning" arrangement to tighten selectivity. The circuit is incorporated in the 3rd IF, and includes another 6kHz AM filter and a 2.3kHz SSB filter. These may be shifted through the passband of the 2nd IF filters via the front panel "PBT" control. The passband can thus be effectively "narrowed." According to Icom's specs, AM is continuously variable to 2.7kHz (an optimistic figure), and SSB to 500 Hz (Figure 1).

The choice of filters in the 3rd IF stage is disappointing. Instead of crystal filters like those in the 2nd IF, Icom saved money by using cheap ceramic filters. The skirt selectivity of the 6kHz filter is so poor that the circuit is of limited use in AM. At best, it will remove minor adjacent-channel splatter or a weak het. At worst, its effect is unnoticeable. The SSB filter is somewhat better; you can adjust the circuit for just the amount of selectivity you need while losing a minimum of audio clarity.

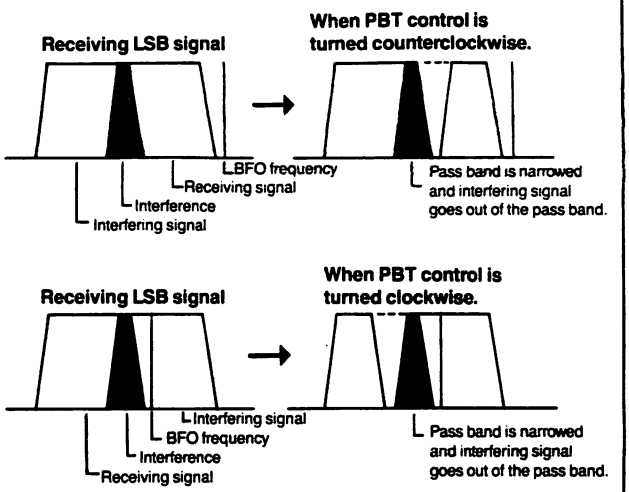
Given the less-than-satisfactory selectivity performance of the stock R70, it's not surprising that many of the publicized modifications for this receiver have to do with improving selectivity. Most Icom dealers who marketed this receiver to to the SWL/DX community offered these modifications as extra-cost options, so there's a good chance that a used R70 is more than it seems.

The simplest modification allows the use of the 3rd IF SSB PBT filter in AM mode for a true "narrow AM" bandwidth. This is really a "must have" mod for any AM DX work. The AM performance of the PBT circuit is greatly enhanced (Figure 2).

Don Moman of Shortwave Horizons offers a 4kHz replacement for the AM PBT filter. I haven't tried it, but it would have to be an improvement over what's there. The 3rd IF is 455kHz, so there are probably many alternative filter possibilities for the experimenter.

While the SSB PBT filter seems to have a better shape factor than its AM counterpart, it could stand considerable improvement. Such improvement is available in the form of the Icom FL-44A, a 2.4kHz eight-pole crystal filter with a diamond price tag (current list is around $180 U.S.). It is an outstanding filter, and quite worth the investment. Thus configured, the R70 is a joy to use in SSB, and the "narrow AM" mod is similarly enhanced. The FL-44A is still available from Icom dealers, as it is also the SSB "upgrade" filter for the R71A.

FIGURE 1. R70 (stock) passband tuning.



Several dealers offer mechanical filters as a less-expensive SSB upgrade option. While I have not tried one, a good mechanical filter seems a viable and less costly alternative to the FL-44A.

STABILITY

Quite simply, the R70 is as solid as a rock. There is no measurable drift after the first few minutes of operation. The only exception I have noted is a susceptibility to extreme cold. During a recent outdoor DXpedition, with temperatures in the high 'teens and a zealous wind whipping the chill factor well below zero, I observed a 300Hz readout error. Fortunately, the cure is simple. There is an adjustment accessed via a "trap door" on top of the receiver; simply tune and zero-beat WWV. At home, where radio and related activities have been relegated to the basement, I've occasionally had to tweak the adjustment on particularly cold mornings.

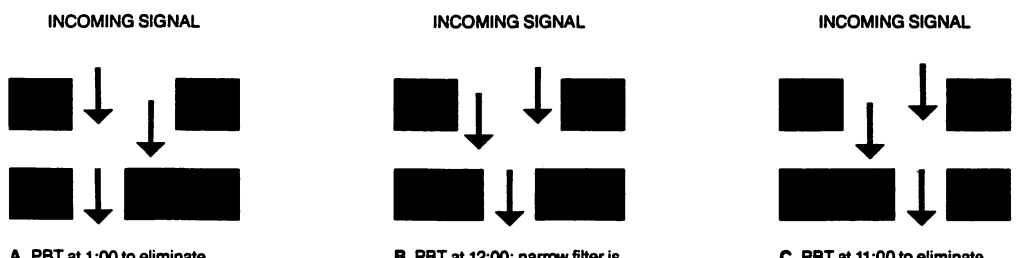
TUNING

The R70's greatest strengths and worst flaws are in its tuning scheme. Its ham transceiver ancestry is evident here, and apparently the designers felt there was no room in the budget (or perhaps no demand from the marketplace) to correct the problems.

Coverage is in 1Mhz band segments, with "up" and "down" pushbuttons to select the desired range. One minor annoyance is that you cannot hold the button in and "run;" you must press the button for each 1MHz increment. For the ham, there's a handy switch that allows one to bypass all but the ham bands. With the switch in the "GEN" position, each push of the button steps the MHz counter by one; in the "HAM" position, it skips to the next ham band.

Kilohertz change is via the main tuning dial. Tuning rate is selectable, with three pushbuttons controlling the options: 1kHz steps for rapid movement, 100Hz for fast bandscanning, and 10Hz for fine tuning. One knob revolution is equal to 100 steps. The 10Hz rate gives all the resolution required for ECSSB. The slow, lazy feel of the dial is perfect for zero-beating a carrier, allowing more physical

FIGURE 2. R70 passband tuning (PBT) using narrow AM modification.



A. PBT at 1:00 to eliminate highside QRM.

B. PBT at 12:00; narrow filter is centered in passband.

C. PBT at 11:00 to eliminate lowside QRM.

control over tuning than the smaller, more critical RIT controls on some receivers. As a bonus, there are analog tick marks around the outer dial ring for reference. The R70's readout displays the frequency to the nearest 100Hz, but readout within 10Hz is possible with practice by using these marks. The manual implies that each mark is equivalent to 10Hz, but 20 kHz is the correct figure.

The R70 does have an analog RIT circuit, but the tuning is very critical. In addition to the tuning knob, there is a switch for turning the circuit on and off. If you try it and don't like your results, just turn off the circuit and you're back where you began. Any shift in tuned frequency is reversed when the circuit is turned off.

RIT shifts are not displayed on the main dial; the only non-audio indication that RIT is in effect is a small red light near the frequency display. A slide switch under the bottom panel allows the option of manual control of the RIT via the front panel switch, or "auto-off" of the RIT whenever the main tuning dial is moved. The circuit's range is +/- 800Hz in SSB, and +/- 3kHz in AM.

When tuning with the main dial, there's a readout glitch at the end of each MHz range (or the beginning of the next range). In AM mode, for example, tuning upward through 60 meters in 100Hz steps and approaching WWV, the readout displays 4999.8, 4999.9... then 4000.0. The received frequency, however, is 5000.0. Continue tuning, and while the readout shows 4000.1, you're receiving 5000.1. When you reach 4001.5, the synthesizer catches up with the readout; WWV disappears, and you receive 4001.5. In LSB, the effect is the same, but in USB, the anomoly shifts to the lower side of the MHz change. If, for example, you want to hear Greenland on 3999.0 in USB, you must tune 4999.0. The received frequency shifts 1.5kHz *before* the displayed frequency.

Aside from the readout quirk, tuning the R70 in AM is straightforward. But in sideband, mannerisms that don't adversely affect hams are a plague on the broadcast DXer. Most of these are related to the sideband default—USB above 10MHz, and LSB below.

A single pushbutton puts the R70 in SSB mode; the receiver chooses upper or lower sideband based on the tuned frequency. If the 10MHz threshold is crossed in either direction, the sideband default will switch automatically. To override the default (i.e., to use USB in the 60-meter band), you must press a "function" button, then the sideband button—and *manually retune the signal.* Switching sidebands offsets the tuned frequency by 3kHz. AM is treated like LSB when determining the frequency offset. Thus switching from AM to sideband below 10MHz causes no offset, since the default in this range is LSB. Above 10MHz, the AM-to-SSB shift leaves you in USB, 3kHz below where you started from.

The R70 has a dual VFO arrangement that amounts to a one-channel memory. It is useful for checking parallels, or for "watching" one frequency while logging a station on another. Unfortunately, it does not remember mode or tuning rate, and is therefore subject to the same SSB defaults and frequency offsets as manual tuning. AM operation is simple, but effective use in SSB requires a great deal of practice.

Most of the R70 owners I've met agree that with such practice (and some wailing and gnashing of teeth), the procedures become second nature and aren't a serious liability. The key is to supplement the R70's memory with your own. For example, if you tune a 60 meter band frequency in USB (where the default is LSB), return to LSB before switching to the second VFO. When you return to the first VFO, you need only switch to USB again to return to your stored frequency. If you switch VFO's without first switching to LSB, the R70 will do it for you—and offset the frequency by 3kHz—when you try to return to it.

Similarly, if you carefully tune a SSB signal in 10Hz steps, then switch to the second VFO and do some rapid bandscanning in 1kHz steps, remember to switch back to 10Hz steps before returning to the first VFO. If you don't, the R70 will truncate your carefully tuned frequency.

OTHER FEATURES

The R70 is equipped with an effective notch filter. Like its successor in the R71, it works only on the selected sideband. Unlike the R71, it does work in AM, but only in half of the passband. There's a pushbutton to turn the circuit on and off, so you can adjust the notch for intermittent utes, then switch it in or out as needed without readjustment. The notch adjustment is on the outer ring of the "PBT" knob, which makes critical notching physically more difficult than it should be, but it is an effective het-killer. Still, the R70 is improved by the addition of an outboard AF notch filter such as the Autek QF-1A; not only because of the effectiveness of the unit's notch against a wide range of hets, but because it helps overcome another of the R70's shortcomings—boomy, bassy audio.

The R70's single tone control should be welded into the maximum treble position. Even then, it's bassy. The addition of an audio filter is one solution; another possibility is a graphic EQ. A particularly effective setup is a combination of the two, taking the R70's signal from the front-panel record-out jack (thereby bypassing the audio amp altogether), feeding it into a graphic equalizer with a gain control, and then into the Autek. The Autek's amp is suitable for driving headphones or a small speaker, and the EQ gain becomes your volume control. For taping, connect your recorder between the R70 and the EQ.

The R70's noise blanker is the best I've used. It is effective against many types of noise, including the power line variety. It is subject to the normal limitations of such circuits; it is most

effective when the signal is weaker than the noise level, and marginally effective when signal and noise are equal. A nearby strong signal not only limits the effectiveness of the blanking action, but can actually overload the circuit and introduce splatter. Still, it is capable of lifting a weak and isolated signal (such as RRI Serui) out of a nasty mess of power line noise.

The AGC circuit may be set for fast, slow, or defeated entirely. There is a slight boost in apparent sensitivity with the AGC off, but proximity to a strong signal will cause overloading.

A squelch control is included, presumably for use with the FM option (though it works in all modes). There's no real DX application for this, but it might be useful for casual SWLing.

A dial lock is provided to allow the operator to electronically disengage the main tuning dial. On a receiver that's not exactly easy to retune, this is a valuable feature. My only complaint about the R70's dial lock is that it's uncomfortably close to the main dial. It's just too easy to bump the dial while attempting to lock it, especially when hampered by a late-night static hangover.

The R70's readout and S-meter light are painfully bright. Fortunately there is a dimmer switch which cuts the intensity roughly in half. I suspect component life expectancy is improved by using the "dim" (though still plenty bright) setting. Conversely, the vision-impaired might find the bright lights to be an advantage.

●TECHNICAL DESCRIPTION by John R. Tow

The R70 is a quadruple conversion superhetrodyne receiver utilizing up-conversion. The first IF of 70.4515 MHz is followed by a 9.010/9.01115 MHz IF, a 455 kHz passband IF, and finally a return to the 9 MHz IF. This is followed either by a diode AM detector or a product detector for SSB/CW/RTTY. An optional FM board is available to permit FM detection. It takes its signal off at the third IF. AGC circuitry, a noise blanker, and the frequency synthesizer are also provided.

Signals above 1.6 MHz are coupled into the selectable RF bandpass filters through the Lo-Z antenna input (50 Ohms). Below this frequency, a back panel switch permits the selection of either the Lo-Z input or a 1k Ohm Hi-Z input. Eight separate 3- to 5-pole bandpass filters cover the LF to HF range quite adequately with no need for preselector "tweaking" as in earlier receivers. The RF bandpass filter is selected by switching diodes driven by logic signals. Most modern receivers do not have the larger number of filters or the physical isolation and shielding (which offer more isolation and out of band attenuation) that the R70 has.

The RF bandpass filter is followed by a diode-switched selection of either a grounded gate balanced jFet wideband RF amplifier, a straight through connection, or a 20db attenuator. The RF amplifier, labeled a "Preamp" on the receiver, seems to offer an honest +10 db gain from 30 MHz down to about 350 kHz, where its gain continues to roll off to unity by 200kHz or so. The ability to use the pre-amp below 1.6 MHz is inhibited in the stock R70 by a logic signal—a "fault" easily remedied by snipping a wire. The signal next flows to the first mixer, a packaged doubly balanced diode mixer. The RF bandpass filter followed by the higher sensitivity combination of a grounded gate balanced jFet mixer followed by a diode DBM yields a zero net gain but quite stout front end. It's quite crunch-proof by today's standards.

The first mixer is followed by what appears to be a 4-pole crystal filter at 70.4515 MHz. A better quality and narrower filter at this point would have aided in IM/CM distortion reduction. This design trade-off was made to enable a more useful noise blanker circuit—and to save money. (A narrower selectivity before the blanker lengthens the width or time of the noise pulse, making the pulse more difficult to blank.) The minute signal level at this point is amplified by a dual gate MOSFET 70 MHz AGC-controlled IF amplifier. In comparison, the R71A utilizes a balanced jFET mixer in lieu of the diode DBM and IF amplifier. The signal then exits the front end board and travels via coax cable to the main board.

The first stage on the main board is a discrete diode DBM beating the 70.4515 MHz IF with the 60.44 MHz 2nd local oscillator signal to bring the 70 MHz IF down to 9.0115/9.015 MHz, the 2nd IF. This is followed by a balanced diode switch or gate controled by the blanker IF amplifier, peak detector, and pulse width selecting circuitry comprising the noise blanker circuit. The relatively low level signal is then amplified by another AGC-controlled dual gate MOSFET before being applied to one of the diode-selected 9 MHz IF crystal filters. These filters have different center frequencies, making it difficult to replace them as well as making it difficult for the notch filter in the fourth IF (the same frequency) cover the entire width of each filter's bandpass. The signal is amplified by another AGC-controlled MOSFET stage before being applied to the third mixer.

The third mixer, a dual gate MOSFET, mixes a 9.4665 MHz +/- 1.8 kHz LO signal on SSB/CW or a 9.465 MHz +/- 3.3 kHz LO signal on AM with the 9 MHz IF to produce the third IF of 455 kHz. This signal is then fed to either a very poor quality 6 kHz ceramic filter on AM or a fair 2.3 kHz ceramic filter (or the optional and excellent FL-44A crystal filter) and then to the fourth mixer, a linear integrated circuit balanced mixer, a uPC1037. This mixer uses the same LO injection as the third mixer, permitting the IF passband of the third IF filter (455 kHz ceramic) to be 'tuned' through the passband of the earlier 9 MHz crystal filter. The common LO is a variable crystal oscillator (VXO), a crystal oscillator whose output frequency can be rubbered over a narrow range without losing the

inherent stability of the crystal oscillator. The LO frequency is varied by a varactor diode whose variable voltage is supplied by a voltage divider including the PBT potentiometer. The fourth IF is 9 MHz, the same frequency as the second IF.

The signal then passes through a 9.0115 MHz crystal remotely tuned by a varactor diode, controlled by the variable voltage supplied by the notch potentiometer and associated circuitry. Unfortunately, the parallel resonant frequency of the crystal cannot be rubbered enough to enable it to effectively notch the lower sideband of the 9.010 MHz AM IF; i.e., it covers only the USB of the IF on AM and both SBs on SSB. This, when combined with the poor quality 3rd IF AM filter, leads one to believe that AM was an afterthought in the minds of the R70 (and R71A) engineers. From here, the signal passes through an additional two stages of AGC-controlled dual gate MOSFET 9 MHz IF amplifiers and thence to the uPC1037 IC product detector for SSB/CW, the diode AM detector, and the diode AGC detector.

The product detector is fed a BFO signal of 9.010 for LSB, 9.0098 for CW, 9.08475 MHz for RTTY, or 9.013 MHz for USB; all crystal controlled. The detected AM signal or SSB/CW signal is then gain adjusted for the signal path and supplied to a remotely gain-controlled audio amplifier including a rather crude tone control circuit via a squelch switch and then to a follower circuit to the record output. The poor audio response and heavy distortion of the audio power amplifier lead one to wonder where the R70's engineers were at lunch when they designed it. (The committee was still out to lunch when the R71A was designed—it's nearly identical!) The AGC circuit has its basic cut-off voltage adjustable on the front panel RF gain control. The 'action' can be switched from "off" to "fast" or "slow" with a moderately fast attack time being constant. The S meter is driven from an IC voltmeter circuit from the AGC line.

The PLL circuit which produces the 61.44 MHz 2nd LO injection signal as well as the 70.4515-100.4514 MHz 1st LO signal is quite complex. Let it suffice to say that it only contains two crystal oscillators—a 20.48 MHz oscillator which can be rubbered by a trimmer capacitor, and a 10.24 MHz VXO controlled by the RIT control. Step wise (MHz) control is logic controlled as is the up-down vernier tuning. The main tuning knob is actually an optically encoded wheel and a photo detector/logic circuit. The steps can be adjusted to 10, 100, or 1,000 Hz per slot yeilding 1, 10, or 100 kHz per revolution. Backlash is adjustable on this knob for a customized feel. Only one memory is provided. The rather 'dumb' 4 bit microprocessor in the R70 does not know to offset the 1st LO signal when changing from USB to LSB or reverse. (The engineers didn't let progress get in the way of tradition—the R71A doesn't switch either.) At least the dedicated program in the R70's micro is hard—no backup lithium cell to die and take with it the operating system for the whole receiver like the R71A.

The power supply includes a 'memory' backup power supply (remember—a 'memory' of 2!) as well as the main AC power supply. The entire receiver is operable at 13.6V for emergency or field use. The construction of the receiver is quite commendable, being sturdy and well compartmented for stage shielding and isolation. The front panel is actually cast, and has a nicer main tuning knob than its newer sibling.

Aside from some obvious design flaws, the R70 is a well-built performer that excels at pulling in weak, QRMed DX signals, particularly in ECSSB.

●R70 MODIFICATIONS by Jerry Strawman

Over the past several years, a number of worthwhile modifications have been devised that can enhance the performance of the Icom IC-R70. The following is a summary and brief description of these modifications.

POST PURCHASE QUALITY CONTROL. The Japanese have produced many fine radios for the shortwave hobbyist, but their track record on quality control is certainly less than perfect. With the many complex circuits employed in today's electronic equipment, it is vital that proper electrical grounds be employed. It is a known fact that Icom equipment can come from the factory with circuit board screws that are not fully tightened. All R70/R71 owners should remove the top and bottom covers of their rigs and carefully tighten down all circuit board screws. Problems such as interference and intermittent operation have been linked to loose screws.

ENABLING PREAMP ON MEDIUMWAVE FREQUENCIES. Look at your parts layout diagram; specifically at the RF unit board diagram. Locate a small G and an arrow at grid coordinates D-E 1 (above bottom edge of board). Then locate a corresponding G and arrow at coordinates F2 (just above part L80). On the radio RF unit board, there is a red wire running between these two points. Cutting the red wire will enable the 10 dB preamp below 1600 kHz. By putting a small jumper between resistors R18 and R19, and clipping the top of R20 (these resistors to left of L57), about one S-unit of sensitivity is gained. This mod is easily reversed if desired.

ALIGNMENT. Icom radios sometimes come from the factory with less than optimum alignment. Locate IF transformers L2, L3, L4, L10, L14, L15, L23, and L24 on the main board. Use a non-conductive alignment tool and peak these transformers for highest S-meter reading when tuned to a stable signal source. These transformers have broad peaks, so a slip of the tool does not mean you

will spend the rest of your life trying to set them correctly. On all three R70's I have owned, at least two of the transformers were not peaked. A noticeably higher S-meter reading resulted from this alignment.

AM DETECTOR MODIFICATION. AM fidelity can be enhanced by replacing the half-wave detector with a full wave AM detector. Locate resistor R126 on the main board (4.7k ohm; location 2G on layout diagram). Cut the very top of R126 and scrape away paint from each lead. Solder a 1N60 type diode cathode to the free-standing lead. Solder the diode anode to R126. This mod results in a higher volume level for the same setting, and is easily reversed.

HIGH PERFORMANCE CRYSTAL FILTERS. I was lucky to acquire a new FL-44A filter for $90 some years ago. I can attest to the improvement it yields, but the current $178 (U.S.) list price would discourage me from adding it to my current R70. There is, however, good news—International Radio and Computers, Inc. (757 S. Macedo Blvd., Port St. Lucie, FL 34983, 407-879-6868) has imported and sold drop-in replacement crystal filters for Icom equipment for a number of years. Replacements are available for both the 9011.5 kHz 2nd IF and the 455 kHz 3rd IF filters. They are narrower (2.1 kHz) than the originals, and have a better shape factor of 1:6. They are priced at $60 and $99 respectively, or $150 when purchased as a pair. Installation is straightforward, requiring only removal of the existing filters and soldering in the new. I have not used these filters, but have heard numerous hams extol their virtues.

IMPROVED AM SELECTIVITY. This modification allows the use of the SSB PBT filter in the AM mode. Refer to your parts layout diagram. Locate filters FI4 and FI5 on the main board. Further locate R81/R79 and R75/R72. R72 and R79 are near the filters, while the other two resistors are some distance away. They are joined by wires. Cut the SSB (R75/R72) control wire near R72, and install a 1N914 diode between R72 and R75 (cathode end to R72). A second 1N914 diode (cathode end) is joined at this same junction point. Cut the other wire (AM control wire) between R81 and R79. The anode end of the second diode goes to one side of a SPDT switch. The wire from R81 goes to the center lug of the switch, while the wire from R79 is soldered to the other end lug. The new switch can be mounted on the rear panel. Others have used an unused section of the existing noise blanker wide/narrow switch. I never seemed to use the dial lock switch, and have used it for this mod on my rigs.

ADJUSTABLE NOISE BLANKER. While the R70 noise blanker performs well in many situations, its action can be improved. Locate resistor R13 on the main board (lower left hand corner). By chaning R13 from 180k ohm to 150k, the blanker threshold is improved to the point where RF signals can be detected by the blanker. The monitor control is unused by shortwave listeners, and may be employed to control the blanker threshold. The monitor pot is attached to a small board at the upper left corner of the front panel. Do not ground the end of R13 (when replacing with the 150k value) but connect a small diameter wire to the free end. Locate a blue wire going to the board on which the monitor control is attached. Strip away some insulation on the blue wire and attach the other wire (from R13). With the monitor control set at 9 o'clock, adjust noise blanker pot R204 (sometimes labeled R104 on diagram of layout) so that you hear distortion and garble on a crowded ham band. Check for garble at other frequencies. The distortion means that the noise blanker is detecting RF signals. Adjust the monitor control for best performance without distortion. This modification was devised by WA9FVP.

TRUE PASSBAND TUNING. Icom's version of passband tuning doesn't tune the passband but widens or narrows it. In the 9 May 1986 edition of *Enjoying Radio,* editor David Newkirk describes a simple revision that allows the user to switch between the variable band pass tuning and true passband tuning. A miniature SPDT switch and small diameter wire is needed. Locate components D45 and R42. R42 is standing on end. Scrape the brown paint from the top lead of R42. Cut the top lead carefully, and separate leads one-half inch apart. Solder a wire from the center lug of the small switch to R42. Extend a second wire from one end lug of the switch to the R42 wire (that goes to the circuit board). The third wire is attached between the remaining switch lug and the exposed lead of D45 where it passes into the circuit board. While soldering to D45, put a heat sink on the diode to prevent heat damage. When the switch is set so that R42 is connected to D45 you have true passband tuning. Reversing the switch gives you the variable passband scheme. Regardless of the selection of USB or LSB, the "PBT" control will now select USB when turned to the left, and LSB when moved to the right. There is a catch to this good fortune—switching from VBT to true PBT removes the better 9 MHz filter from the I.F. chain. This leaves only the 455 kHz filter to provide selectivity. Under high signal conditions this arrangement can lead to filter leakage as you tune away from a strong signal; it can also lead to degraded dynamic range. The mod is easily reversible, and I found it useful to have this added capability.

PBT WIDTH MODIFICATION. This mod was devised by the folks at International Radio and requires the use of a frequency counter. No parts are needed. The mod involves retuning several potentiometers and one inductor. I have not performed this modification, but the procedure appears

to be easy. When going to one of the pots that are to be adjusted, I found that it was sealed with wax and did not want to risk damage to the pot. Anyone desiring procedure details may feel free to contact me.

IMPROVED VLF PERFORMANCE. This is another modification that I have not tried. It was developed by an Austrian ham. It is a fairly involved procedure that includes removing a number of components that limit VLF sensitivity. I simply did not want to risk getting in over my head, but I will provide details on request.

REDUCING DIGITAL NOISE. I came across another modification that was designed to reduce digital noise that is generated within the radio and picked up by diodes D1, D2, D3, and D4. The remedy was to fabricate a small aluminum bracket and solder it to IF transformer cans L1 and L3 (all on main board). I tried this modification and could detect no difference, so I leave it to you to try and see. Also described was a procedure by which a thin metal cap was soldered in place over the top of components enclosed by metal shields. These component groups include X1/Q9/Q10/L13 and X3/X4/L18/L20. This also yielded no noticeable change.

After digesting these modification descriptions, you may be saying to yourself, "There's no way I'm gonna do surgery on *my* R70!" Never fear—great technical expertise and a full laboratory of test equipment is not needed. What is required is a willingness to take the time to carefully study the radio and its parts layout. When dealing with small parts located in cramped spaces, the best way to procede is to take your time and be patient.

For those with an interest in the technical aspects of radio operation/repair/improvement, ham radio operators who use Icom equipment get together Sunday mornings at 1700 UTC on 14317 kHz, plus or minus interference, to discuss repairs and improvements of Icom gear. Similar groups of Kenwood and Yaesu users meet later on Sunday afternoons on the same frequency. Much valuable information has been gleaned from listening to these nets over the years.

● IN CONCLUSION by Kevin Atkins

What makes a receiver a "classic"? The ability to flush out DX—at least relative to other receivers of its day—is one requirement, and the R70 certainly meets it. Availability is another; there must be enough in circulation to gain broad appeal, and there's no shortage of R70s. Ease of operation? I'm not so sure about that one. If anything, the Icom's outlaw tuning scheme may actually add to its mystique.

While wandering amongst the fleamarket tables at numerous hamfests, I've noticed an involuntary reflex that draws my hand to my wallet when I spot Hammerlunds, Drakes and the like. The ability of a receiver to trigger that reflex is my own definition of "classic." I don't believe I'll ever experience that reflex over an R70, though—mainly because I don't think I'll ever part with the one I have. I may relegate it to a secondary role, but it doesn't make much sense to sell such a receiver for $300-400.

Fortunately for would-be owners, there are those who will. As with any piece of used gear, check it out carefully; don't take ANYONE's word for its condition. If it has stock PBT filters, plan on spending another $100-200 for an upgrade. And take some time to get to know it. Your investment and your patience will be rewarded.

● BIBLIOGRAPHY

Engel, Laurens, Icom R70 Mods, *DX Monitor* 9/85, order reprint M41. A number of mods including enabling the preamp below 1600 kHz.

Lichte, Rainer, Icom IC-R70 Review, *Radio Receiver—Chance or Choice,* pp. 32-36.

Magne, Lawrence, Icom IC-R70 Review, *WRTH* 1983, Equipment Section, pp. 564-567.

Magne, Lawrence, Icom IC-R70 Update, *WRTH* 1984, Equipment Section, pp. 592-593.

Moman, Don, Icom IC-R70 Review, *DX Monitor* 2/83, order reprint R44.

Moman, Don, Icom R70 Modifications, *DX Monitor* 8/83, order reprint M37. Allowing use of SSB PBT filter in AM; enabling preamp below 1600 kHz.

Pinto, Vincent J., Icom IC-R70 Review, *Frendx* 1/83, pp. 6-10; also in *The Lowdown* 5/83, pp. 8-12.

THE DRAKE R4B AND R4C
Two Receivers From the Past

Jon Williams

●INTRODUCTION

It is not without mixed emotions that one suggests that DXers take a serious look at the Drake R4B/R4C duo of receivers. On the one hand, these receivers pale when compared with the digital readout, excellent selectivity, stability, and memories on the R7A, NRD 515/ 525, and Kenwood R5000. On the other hand, the R4B and R4C were excellent DX receivers in the seventies and are still capable of very good DX when their very effective notch filter and passband tuning features are employed. This article will discuss the two most popular models in Drake's R4 series in the hope that they might meet a need for some DXers looking for a quality receiver. I have used them for twelve years, and have grown to respect them.

I do not suggest that one should forego a new Kenwood or Yaesu and buy a 20 year old Drake, no matter how good it might be. Instead, let the R4B/R4C show that one does not need the latest receiver to hear rare DX.

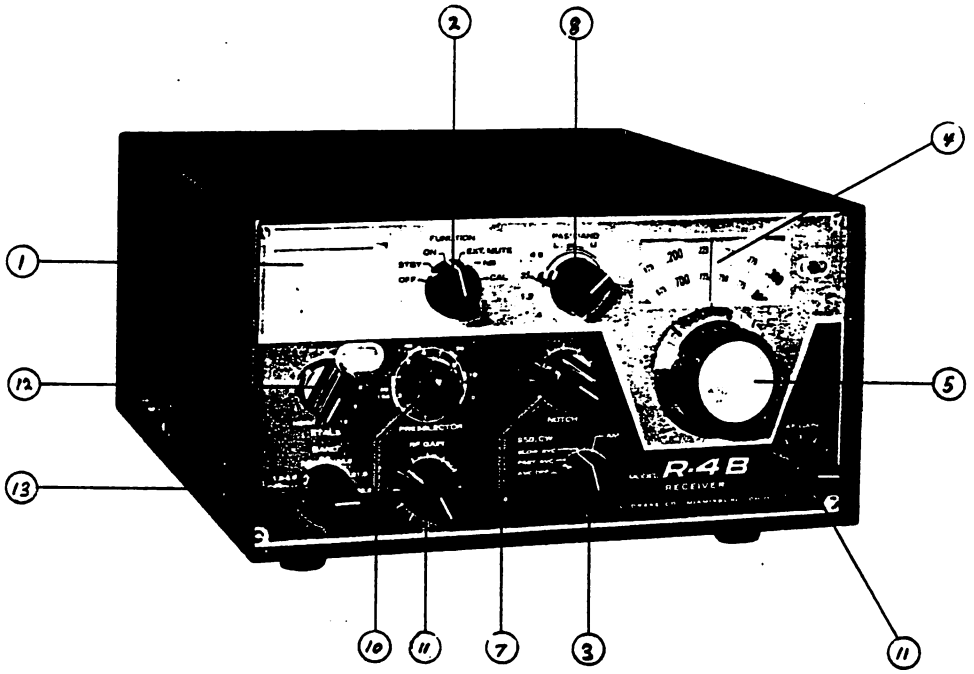
What makes a receiver a DX rig? One standard is that offered by Ace DXer, Al Niblack, who once wrote that a quality DX receiver has "the three S's: selectivity, sensitivity, and stability." These qualities are common in today's solid-state receivers, but at a price. However, a well cared for Drake R4B/R4C offers those three S's at a price well below that of current receivers. The R4B was manufactured by Drake from 1968 to about 1973, and the R4C from 1973 to about 1976. The "B" has ten tubes and the "C" six, and is partly solid state. Both were designed as ham receivers and came equipped with crystals covering the ham bands. With auxiliary crystals, they will cover any ten (fifteen in the "C") additional ranges in 500 kHz segments from 1.5 to 30 mHz (except for the IF hole between the 5-6 mHz). This makes them a natural for those interested in DXing the tropical broadcast bands. For the serious DXer, their strength is in the three "S's" along with the tremendous flexibility afforded by passband tuning, direct frequency readout to one kHz, and notch filter.

●TUNING THE R4 SERIES

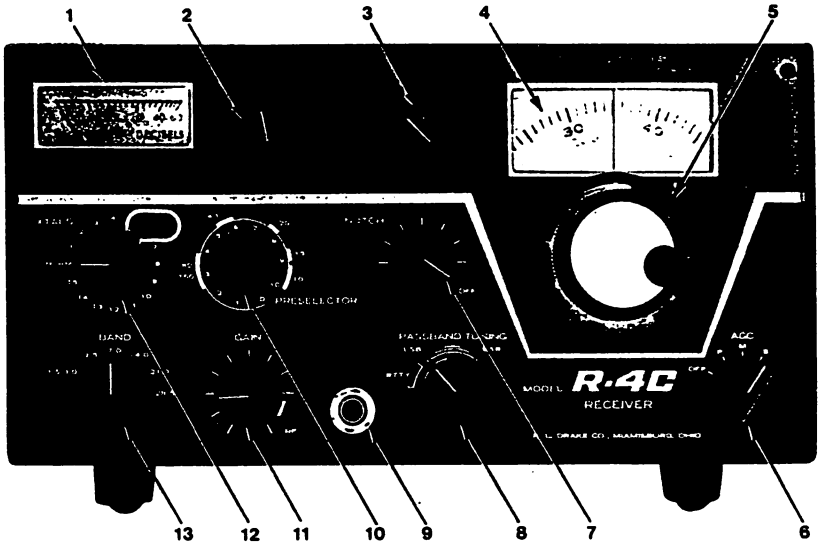
With the exception of a few quirks, tuning the R4 series of receivers is fairly straightforward. Let's take a tour of the front control panels of each receiver, noting the diagram accompanying this article.

The "S" meters (1) on both receivers are in "S" units and decibels, and are very easy to read. They are sensitive and can be calibrated for optimum accuracy. The function switch (2), provides for on/off, standby, noise blanker, and calibrate selections. The noise blanker on the "B" is really a noise limiter, whereas on the "C", it is the more sophisticated IF gate-type blanker which is effective for pulse-type interference such as auto ignition noise. However, I have not found either blanker particularly effective for the electrical hash I encounter. The crystal calibrator emits a signal every 25 kHz for very accurate calibration of the dial (4).

Tuning is accomplished by a permeability-tuned VFO with a range of 500 kHz and 50 kHz overtravel on either end (100 kHz for the "C"). The dial on the "B" is one-piece plastic with marks every 25 kHz. The skirt on the knob (5) is calibrated in one kHz segments and is rotated to the exact calibration point in conjunction with the crystal calibrator marker to achieve precise calibration. The "B" knob, however, lacks a finger detent for fast excursions across the band. The solution is to obtain a "C" knob which has such a detent. The "C" dial consists of two concentrically rotating plastic dials in the same fashion as the SPR4, with readout to one kHz. The skirt on the knob is rotated for calibration by holding the knob



THE MODEL R4-B



THE MODEL R4-C

and rotating the skirt to one of the 25 kHz dial markers on the dial. Linearity of the PTO seems to suffer somewhat with age, as the "B" needs to be recalibrated about every 50 to 75 kHz, whereas the "C" requires it one or two times for the entire 500 kHz range.

Tuning the R4 series of receivers is very similar to tuning the SPR4. The desired non-amateur frequency range is determined by the corresponding 500 kHz crystals installed in the auxiliary crystal bank at the rear of the receiver, the "B" having 10 slots and the "C" fifteen. The auxiliary crystal selection knob (12) has a small window in which can be written the frequency range of each crystal. After selecting the desired crystal, the matching band range must then be selected (13). The band ranges correspond to the amateur bands, so you must select a band which is closest in frequency to your desired range. The preselector (10) is then tuned for maximum signal strength. This is where one of the quirks in Drake receivers appears, including the SPR4. For example, if one desires to use the crystal for the 25 meter band, one would normally choose the 7 mHz band range since it is closer in frequency than 14 mHz, the next position on the band switch. However, sensitivity is much better using the 14 mHz position. A general rule to follow, therefore, is to select that band which allows the preselector to achieve maximum signal strength at the lowest end of the preselector range. In practice, this means the band frequency should be higher than the crystal frequency. I found it helpful to write in the band and preselector positions in the crystal selection window until I became familiar with the proper positions.

Tuning one of the amateur bands is much simpler; set the crystal selection knob to "normal" (no auxiliary crystal selected), choose the amateur band desired, and tune the preselector within the marked amateur band ranges for maximum signal strength. While tuning within a band, it is necessary to peak the preselector occasionally. For one unfamiliar with Drake receivers, this may sound complicated, but is easy to get used to.

Selection of mode (3) with the "B" is rather straightforward; select "AM" or "SSB" in the slow, fast, or off AGC positions. The selection of mode is independent from selectivity. The "C" takes a departure from this approach, as mode is either "AM", "SSB", "CW 1.5", "CW .5", or "CW .25". Thus, on the "C", as with an unmodified SPR4, mode is not independent of selectivity. What is independent is the selection of "off" and three different AGC positions (6).

Having selected the mode for the stations being tuned, AF and RF levels are selected on the "B" with two knobs (11). On the "C", AF level is selected with a knob and RF level with a small metal tab on the same shaft; an inconvenience, as the tab tends to move inadvertently through use, and you suddenly find why your sensitivity is reduced.

Two additional controls contribute to the versatility of these receivers. The first is the IF notch filter (7), the notch depth of which is quite deep (approximately 50 db), operative in all modes, and quite effective if tuned very carefully. The second is passband tuning (8). On the "B", the passband tuning is mechanical and independent of mode, with a metal tab on the same shaft for selecting one of four selectivity positions (4.8, 2.4, 1.2 and .4). This control is extremely effective, especially when tuning in the 2.4 selectivity position either in ECSS or AM. Moreover, any position within the control's range may be selected without retuning the receiver. Passband tuning on the "C" is electronic and is disabled in the "AM" mode.

The "B" has a small red tab to the right of the dial window to move a red vertical dial marker for use in calibration. The headphone jack on the "B" is on the right side of the chassis (inconvenient), the "C"'s on the front panel. Both receivers have external mute for use when tranceiving with a transmitter.

●THE THREE "S's"

In the important criteria of sensitivity, stability, and sensitivity, both receivers perform quite well. Sensitivity is claimed at less than .25 microvolts at a 10db signal-plus-noise to noise ratio on all bands for the "B", and from less than .25 to less than .5 microvolts, depending upon frequency, for the "C". After recent realignments, my "B" measured .21 microvolts, and the "C" better than .2 microvolts. However, I have never found either receiver to be particularly sensitive on 120 meters. I have

also found the "B" to be quieter than the "C", but there is a reason for this as I will discuss later.

Drake claims stability for both receivers to be not more than ± or 100hz drift after warm up. I have found this to be generally true, however, I have heard reports from other owners of varying amounts of drift. Such drift may well be indicative of the condition of the PTO. Thus, it is important to check the PTO's linearity and drift prior to purchase.

The means of achieving selectivity evidences the major difference between these two receivers. The IF system in the "B" is double conversion using a crystal lattice filter in the first IF, and a tuned LC circuit in the 50kHz second IF to achieve each of the four selectivity positions. This results in shape factors ranging from 3.4 to 1 (2.4 kHz filter) to 6.0 to 1 (.4 kHz filter). As result, the 4.8 kHz position is essentially useless (4.8 at 6db and 20 kHz at 60db). For DXing purposes, the 2.4 and 1.2 kHz positions are the only useful ones (2.4 and 1.2 kHz at 6db and 8.2 and 4.8, respectively, at 60db), especially when used in conjunction with passband tuning and the notch filter and ECSS.

The IF system in the "C" is triple conversion, utilizing the same wide crystal lattice filter in the first IF as in the "B". However, the additional IF frequency was employed to accommodate the use of 8 pole crystal filters in the second IF for each of the selectivity values. The result is that one has the factory choice of either a 6 or 4 kHz AM filter with shape factors of less than 2.0 to 1; certainly an improvement over the "B", but unusable with passband tuning. Unfortunately, the excellent 2.4 and 1.5 kHz filters (shape factors of 2.0 to 1 or less) can only be used in ECSS, albeit with passband tuning. Thus, despite the improved selectivity, the "C" is less versatile for DX purposes unless one employs the ECSS means of tuning. One can cut the mode shaft to allow filter selection separate from mode. This was a frequent modification on the SPR4 and presumably would be performed cautiously in the same manner on the "C". However, the passband tuning would still be unusable in the AM mode.

WEAKNESSES AND DISADVANTAGES

There are some disadvantages to owning an R4B or R4C, alleviated in part by accessories and modifications. First and foremost would be the limited frequency coverage which is heir to the PTO method of tuning in combination with the fixed frequency crystals. However, in the sixties, this appeared to be the only cost-effective means of achieving accurate frequency readout. To one whose interest is in tuning the tropical bands, this is not a disadvantage when the necessary crystals for all the desired tropical band and adjacent frequencies are installed, provided however, that one can tolerate the reduced sensitivity on 120 meters. Secondly, the somewhat complex tuning requirements might dampen a prospective purchaser's enthusiasm. Thirdly, because there are a number of tubes, not only do both receivers get quite warm during use, but require periodic alignment and tube replacement. Tubes can be purchased for reasonable prices at hamfests, and an alignment at Drake will cost about $100- plus parts. Finally, the solid state audio in the "C" is quite poor in my judgment. I would characterize it as distorted, muffled, and transparent. The tube-based audio in the "B" is much better, particularly when modified.

ACCESSORIES AND MODIFICATIONS

As neither the "B" nor "C" have built-in speakers (thankfully!), the matching MS4 speaker is a necessary purchase. You do not need to look any further, as it is excellent. Be sure that you can purchase the speaker with the receiver, as it is also the speaker of choice for many R7 owners, so there may not be many stray ones available.

Two notable accessories requiring no modifications, however, were available for these receivers. The first was a digital readout which plugged directly into the injection socket on the rear panel. One unit was made by Torrestronics which read from 100 kHz down to 100 Hz in four digits. Another was the FR-4 made by E-Tek which read the complete frequency down to 100 Hz

in six digits, also serving as a frequency counter. I own the latter, and have been very pleased with it, except for a burned-out nixie tube segment and the high amount of heat the unit generates. Not only does this provide more accurate frequency readout, but with it, recalibration is no longer necessary.

The second accessory is the FS4 frequency synthesizer manufactured by Drake which converted any of the pre-R7 Drake receivers to a general coverage receiver. These are reported to have operated quite well, but very few were made, and when found on the used market, are about as costly as a used "B" or "C" receiver. Ham Radio published an article on how to build one in its August, 1982 issue. Radiokit Company, Pelham, NH offers a kit for $69.95 based on a design featured in May, 1981 QST.

Both receivers, especially the "C", have been the subject of numerous modifications. However, I cannot overemphasize that the modification of any receiver must be carefully evaluated and approached with great caution.

My "B" modifications include the relocation of the headphone jack to the front panel, installation of a "tape-out" jack on the back panel, and improvement of the distorted audio in the "AM" mode by converting the half-wave AM detector to full-wave rectification. For more information and instructions on the latter two modifications, as well as other maintenance and operating tips, see Larry Magne's excellent article in the September 1973 issue of FRENDX. I had one other modification performed on the "B", and that was the replacement of the marginally selective 8 kHz wide 1st IF filter with a more selective 8 pole 5 kHz Sherwood filter. The result is better performance of the four filter positions, including a now usable 4.8 filter with a shape factor similar to the 4.8 kHz filter on the SPR4, but at the expense of the resulting reduction in audio quality that comes with tighter selectivity skirts. In my judgment, the modification was worthwhile.

Modifications to the "C" abound, most of which have resulted from the work of Sherwood Engineering, Inc., Denver, Colorado. These modifications relate to the audio amplifier, product detector, power supply, refeeding of the 6EJ7 third mixer, as well as numerous filter options and the switches to select the various filters. About six years ago, I had the notion that the R4C could be an ultimate DX receiver with the above modifications performed. Thus began a saga fraught with extreme expense, dissatisfaction and frustration, as the modifications were performed, apparently improperly, by an individual recommended by Sherwood. The receiver never operated properly after the modifications, even after being returned to the individual for reworking. The "C" sat in its box for about four years until I met "Doc" Sheller at the 1988 Dayton Hamfest. After discussing the problem with him, I had him check the receiver. He was able to redo the modifications properly. In addition to the circuit modifications mentioned above, the 5 kHz 1st IF filter was installed, as well as an AM 2 kHz filter with switch to supplement the 4 kHz stock AM filter. At this date, the receiver operates quite well, although it is still somewhat noisy in all modes and the audio poor in AM, such that there is very little enjoyment when using it in anything but ECSS. In my judgment, the strength of the modified "C" is on the amateur bands, both on SSB and CW, where its performance and selectivity is outstanding, not as a tropical band DX receiver.

In conclusion, if anyone desires to have any of the Sherwood modifications performed on any Drake receiver, I would strongly urge that they be performed only by either Rob Sherwood, Sherwood Engineering, Inc., 1268 South Ogden Street, Denver, Colorado, or "Doc" Sheller, Design Electronics Ohio, 4925 South Hamilton Road, Groveport, Ohio.

●ON THE AIR WITH THE R4B/R4C

Now let's tune both modified receivers to see how they perform under adverse conditions of interference. As I tune across the 49 meter band with the "B", I note the BBC World Service with a strong signal on 6005. Tuning slightly higher, I note a very weak R. Reloj on 6005.6 with much splatter from the BBC as well as an interfering carrier. By tuning the "B" in ECSS in the 2.4 kHz selectivity position, and then slightly detuning the passband control from the USB position, I am able to get a marginally readable signal from Reloj. However, I still have the interfering carrier from 6005. By tuning the notch filter very carefully, I am able to notch out the carrier, leaving Reloj readable, but with quite a bit of splatter from the BBC.

I then tune the "C" to the same frequency using the 2.4 kHz filter in ECSS, and adjust the passband tuning and notch filter as above. The result is that the splatter is less because of the tighter skirts on the 2.4 kHz filter of the "C", but the readability is less because of the muffled audio.

I compared the "B" and "C" with my NRD 515. My conclusion is that the signal-handling capability of the '515, using the 2.2 kHz filter, is somewhat better than the "B", but not as good as the "C", the '515 suffering from lack of an IF notch filter. The audio quality of the '515 is not as good as the "B", but better than the "C".

The two Drake receivers were also compared with a modified HQ180A with Q Multiplier about which John Bryant wrote in Proceedings 1988. The 180A in the 4 kHz AM selectivity position was the most effective receiver in handling the BBC splatter, provided the Q multiplier was used. The superb slot filter was very effective in eliminating the carrier. However, in my judgment, the audio quality of the 180A lacks crispness and clarity.

My R4B has received much more use than the R4C, and has done an excellent job for my DXing. Using just a 75 foot longwire, I logged Comoros Islands and Fiji Islands in the early seventies. However, the "B" and "C" are now semi-retired, as the '515 is my main DX receiver.

● CONCLUSIONS AND RECOMMENDATIONS

From the foregoing, one can easily see why the R4 series of receivers were popular as DX receivers during the 1970's. In fact, many senior Dxers owned a "B" as a backup receiver to an HQ 180A. Where else could one find a receiver with good selectivity, sensitivity, and stability; passband tuning, a notch filter, and one kHz resolution--all for under $500.00!

At present, used "B's" and "C's" can be found in local trade papers, ham magazines, and radio stores such as Amateur Electronic Supply in Wisconsin. Average prices range anywhere from $135.00 to about $250.00 for a well-equipped "C" in good condition. There were a fair number of these receivers at the 1988 Dayton Hamfest, but very few at Dayton in 1989. A friend of mine purchased a Sherwood-modified "C" in excellent condition with extra tubes and 15 auxiliary crystals for $400.00. He has since purchased an FS-4 for $250-. After you find a receiver in good condition, and after checking it out to make sure it works properly, I recommend that you return it to Drake for a complete alignment to factory specifications for about $100.00 in labor, not including parts.

I have a decided personal preference for the "B". Although it does not have the tight selectivity skirts of the "C", it is more versatile, the audio is much better, and in my judgment, the quality control is better.

Nevertheless, either receiver does a creditable job as a DX receiver, and they are really the last of the tube receivers.

WASTEGUNNER ON A 525

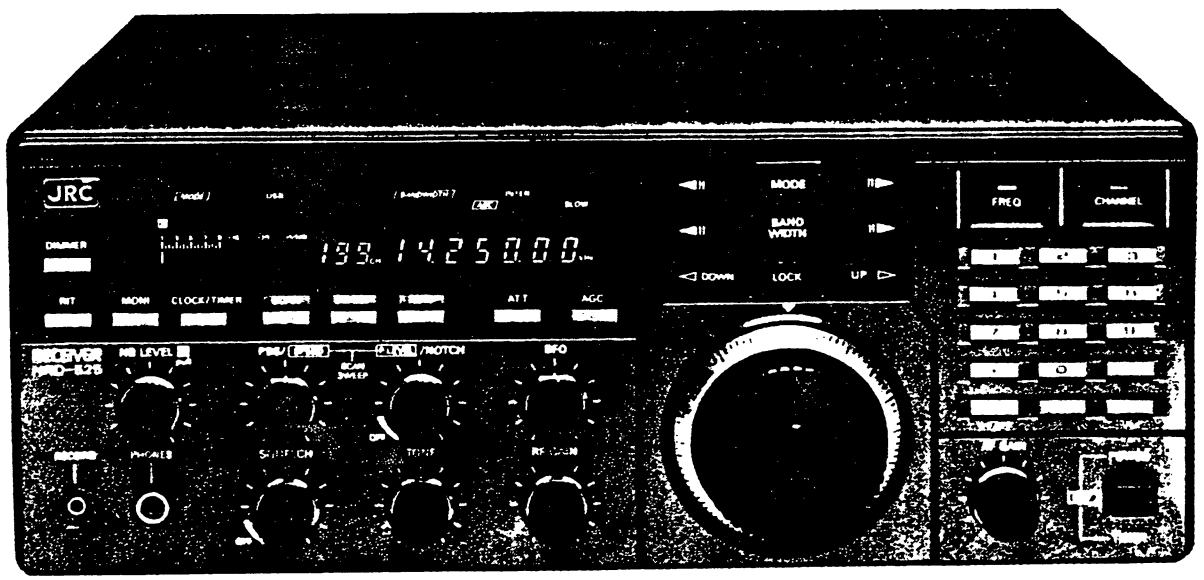
A Dirty Elbows DX'ers View of Japan's Current Best DX Machine

John H. Bryant

How well I remember the day.... I had some spare cash at the same time that the Japanese Radio Corporation was bringing out their long awaited successor to the vaunted NRD 515. Did I hesitate? Heck, no! Before the unexpected windfall check had even cleared the bank, I had that sucker on order! Ended up having to wait almost six nail-biting months before "my" 525 made it across the Big Water, but it was worth it.

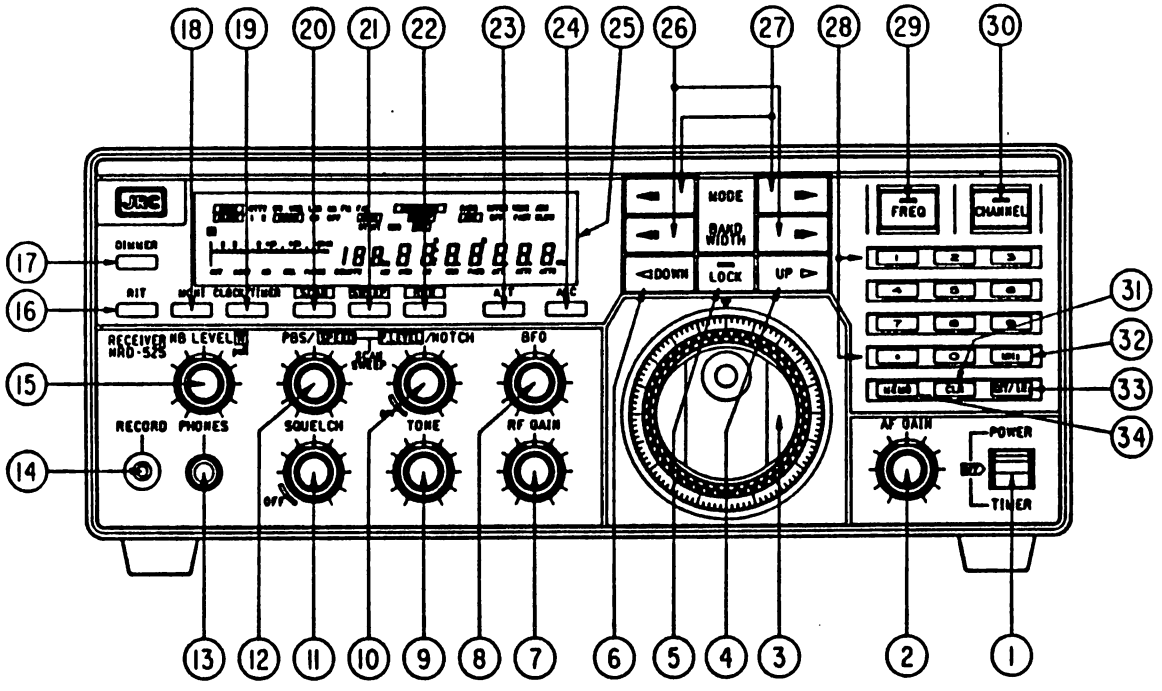
Let me say right now that if you are considering the 525 and haven't yet read Larry Magne's full White Paper review, get one immediately. I am a great admirer of Mr. Magne and of his contributions to the shortwave scene. I would never purchase a radio without knowing, in detail, what Larry has to say about it. With that out of the way, I must confess that, after operating the 525 for close to 1000 hours of pedal-to-the-metal DXing, I differ with Larry over many points, some of them fairly major. Larry's White Papers are available through most of the hobby outlets.

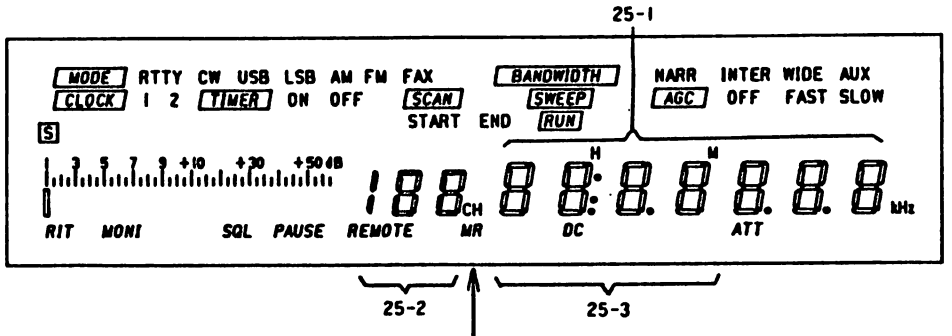
My own credentials: I started DXing while in high school in the 1950's, using a WWII rig - BC something or other. I soon moved up to a Hallicrafters SX-99, and split my time between SW and MW for about five years of serious DXing. When I hit college in 1959 (architecture), DX went out the window. Between 1960 and 1980, I passively kept up with the hobby. In 1980, I got back into SWBC DX in a serious way, using a Sony 2001 and a Yaesu FRG 7700 with Collins mechanical IF filters. The 7700 was my main rig until the 525 came out of its carton. In DXing SWBC since 1981, I have 200 Countries Heard and 184 Countries Verified on SWBC. For several years now, I have specialized in the Pacific, Southeast Asia, and China, with special emphasis on Papua New Guinea and most of all, Indonesia. All of that means that I spend a lot of time crawling around on my knees on the noise floor of my receiver looking under rocks to see what crawls out. It also means that all of the DXing that I really care about is compressed into the 45 to 60 minutes of "dawn enhancement" conditions each morning. Therefore, I care a lot about efficiency of operation - on the few times a season that the Sumatrans make it to Oklahoma, I DON'T WANT TO MISS EVEN A SINGLE ONE. Finally, I am a relatively non-technical DX'er.



☐ Nomenclature

(While reading the text, you may refer to this page for identification of parts from time to time.)





(25) Vacuum Fluorescent Display (VFD)

Front panel

(1) POWER/TIMER ON-OFF switch
(2) AF GAIN control
(3) TUNING control (This control also works as RIT control when characters "RIT" are on.)
(4) UP switch
(5) LOCK switch
(6) DOWN switch
(7) RF GAIN control
(8) BFO control
(9) TONE control
(10) NOTCH control (It also works as P LEVEL (pause level) control during scan or sweep reception.)
(11) SQUELCH control
(12) PBS (pass band shift) (It also works as the SPEED control during scan or sweep reception.)
(13) PHONES jack
(14) RECORD jack
(15) NB LEVEL (noise blanker level) control
(16) RIT switch
(17) DIMMER switch
(18) MONI (monitor) switch
(19) CLOCK/TIMER switch
(20) SCAN switch
(21) SWEEP switch
(22) RUN switch
(23) ATT (attenuator) switch
(24) AGC control
(25) Vacuum Fluorescent Display (VFD)
(26) BANDWIDTH switch
(27) MODE switch
(28) Numerical keys
(29) FREQ (frequency) switch
(30) CHANNEL switch
(31) CLR (clear) switch
(32) MHz switch
(33) ENT/kHz switch
(34) MEMO (memory) switch

● THE DOWN SIDE

When the great day arrived, and IT came out of the box, my first reaction was **"Oh darn! I just paid $1200 for a Bearcat!"** The now "outdated" 515 has a wonderful, no-nonsense, solid professional look about it. The 525 has that somewhat plastic look of most current mid-priced shortwave receivers. I understand the designer's desire to save money on aesthetics and spend them inside the case, but do we really need six colors on the operator's panel? Decor by the worlds oldest profession!

The next disappointment, this time a very major one, was the Owner's Manual. As is happens, I have some insight into this situation since I speak some Japanese. This manual was poorly written in the original Japanese. It was then given one of the least professional translation jobs that I have ever seen. Very unprofessional all around. It makes operating a very complex receiver even more difficult.

The less than mediocre manual is really a serious complaint in some instances. For example: The design engineers thoughtfully provided a shaped female plug for the 12 v DC power input, so that we wouldn't zap the rig by reversing DC polarity. Out of the plug come red and black wires. The designers even provided an integral fuse on the red leg. If I was guessing, I'd guess that red was positive. NONE OF THIS IS DISCUSSED IN THE AWFUL MANUAL. When I went on my first DXpedition with the 525, I had to GUESS that red was positive. (IT IS!!!)

The Manual left me unsure about many things, including how to operate the PBS control and other aspects of the radio. Based on the manual, I'm not even sure whether the 525 employs synchronous detection OR NOT!!! There is just no excuse for this and I do not know why our major vendors and our major reviewers don't address things like this publically.

Well, to get past the Manual, lets fire the thing up. In his original White Paper, Larry spent quite a while lauding the audio quality of the 525, (since modified in the 2.0 version of the Paper) especially when compared to the R-70 and R-71. Boy, the ICOM drivers must be in deep trouble! All in all, using the 525 in the AM mode with the matching speaker, or any other that I own, the audio is mediocre. Too bassy, but not as much as most rigs from Japan seem to be. There is also a good deal of high pitch wide band hiss of the sort usually associated with the cheapest audio amplifiers, Beyond that, things seem to be very muffled on anything but the strongest signals, when using the AM mode. This is a particular problem when you deal a lot with weak Indo's, since the Malay languages are muffled to begin with. Don't misunderstand, I'm judging audio quality while using a first-rate external speaker. The internal so-called "speaker" gives poorer performance than whatever is in Texas Instruments "Speak and Spell" toy! Thank goodness, when I'm SWLing rather than DXing, I've got a SONY ICF - 2010. It provides far superior audio in three different detection modes at 1/3 the price. This is really a serious fault if you care about actually hearing the ID on those weak stations which mostly operate with old studio and transmitter equipment. JRC could do much better, and at very little extra cost!

To report the whole audio truth, though, the story is very different when using suppressed carrier SSB mode. The 525 must have truly superior SSB circuitry. I've never heard audio of this quality from the duck-talk bunch! When I was following the Voyager I flight, it was like I was in the cockpit with Dick and Jeana! Course, the quality of avionics may have had something to do with that, too. However, serious DXers should note that many 525 owners find the receiver most sensitive to weak signals in the AM mode, the reverse of the situation with the 515.... thus making audio quality in the AM mode even more important.

After six months of gritting my teeth about the audio, I bought a set of $70.00 JRC ST-3 headphones. Wow! They made night and day difference! These particular headphones improved speech intelligibility significantly. I wish that I could be as complimentary about the matching speaker. No way! It's a cheap little speaker in a matching case with the same awful audio!

The ergonomics of the 525 also leave much to be desired. Ergonomics, in this case, are taken to mean how well the front panel and the general receiving system are designed to interface with us human beings. This is something that I know a good deal about as an architect and some-time industrial designer. It is true, on the grossest level that the major controls are in the locations that you would expect. The keypad is on the far right side. The numerical frequency read-out is more or less near the center of the receiver, the knobs are large enough and far enough apart to grab, and the main power switch is on the

lower right. Beyond that, the ergonomics of this rig are absolutely ABOMINABLE.

To wit: First, I **do not** think that any machine, other than a true portable (THIS IS A TRUE TABLE MODEL RADIO, GANG) should have a keypad on the front panel. It's simply unnatural for the human hand to punch something in to a vertical surface. If this were not so, all typewriters and computer keyboards would have vertical rather than horizontal keyboards. Put the keypad on as a remote hooked by cable to the front face, or step into the mid-1980's and remote it with infra-red. Pulling the keypad off the front face would give the designers enough room to do some other things which badly need attention, as well.

If JRC designers must put the bloody keypad on the front face, at least they should have had enough regard for their customers to provide either soft keys or rounded off hard ones. Instead JRC carefully selected hard, sharp-edged keys with front faces sloping about 15° from vertical. If your hand happens to hit the key at the correct angle, it's fine. However, most of the time, my fingers hit wrong and its about like punching slightly dull knives. Is this a serious design flaw? Putting the keypad on the front face at all certainly is. The shape and hardness of the keys is merely a pain in an already sore posterior.

Next, let me complain bitterly about the general design of the 525's information output to the system operator. This is the area of receiver design where the project team is supposed to be concerned about letting the operator (customer) know about the general conditions of the receiver - what frequency it is on, what mode of detection, etc.This area of concern is absolutely critical for the successful design of a DX receiver, especially one which is so ultimately flexible. It is essential that the operator know - in a flash - the status of every controllable aspect of the receiver. In those rare "super" conditions, or after literally waiting for years for one special signal, two seconds is 8 to 10 words missed, if you are in the wrong mode. With the 525, this happens far too often. What's more, even under normal conditions, the operator is left with eyes wandering around all over the place with unsure fingers following. If JRC is involved in any work for the Self Defense Force, I hope that this design team does not design the avionics for the next generation of Japanese fighter aircraft. Blown out of the sky 'cause the poor guy couldn't find out what was happening in any reasonable amount of time!

I know one of the things that happened to the design team, because it happens to me as an architectural designer. I sometimes wait for years wanting to do something - some new wrinkle - and its just not yet technically feasible. Then, suddenly, it is technically feasible, but it - this new widget - is still way outside any possible project budget. Tremendous frustration! When the widget's price finally drops so that the thing is suddenly economically feasible, too, IT DOESN'T MAKE THE LEAST DIFFERENCE WHETHER THE CURRENT PROJECT REALLY NEEDS THIS WIDGET OR NOT, I USE IT! I've waited too long, the pressures are too great and besides, its FUN. (Boy! Look what we can do, now!) That is exactly what is wrong with the basic information transfer design of the 525.

The vacuum fluorescent display allowed the design team to "transfer" a lot of information in new ways. Designing the layout must have been fun. Unfortunately, the thing just doesn't communicate well visually. A case in point is the Detection Mode which is controlled by a pair of rectangular touch pads. The information on detection mode is read in the upper right portion of the "screen." To change mode, your eye first roves across the upper right portion of the fluorescent display until you figure out what mode you are currently in, then you shift your eyes 3" to the right, decide which of two switches (up or down) to hit and how many times to hit it, then you perform the operation, then move your eyes back to the screen and search around until you figure out what mode you are now in. Come on fellows! Quit having fun at our expense! Give us one button, not two, to take the thing through the choices. Give us inexpensive little lights right over the button to tell us the story. One eye movement, one hand movement and a more efficient operation. The same argument can be made about filter selection controls, as well. Too many eye movements, too much confusion. BAD DESIGN! This design flaw is particularly serious because the 525 memories carry filter selection and mode along with frequency memory. Great, but when you go to a new memory channel, you have to decipher the screen every time! The inefficiency of this thoughtless design multiplies and cannot be defeated by "learning the receiver."

I have three other complaints about the fluorescent screen - one minor, two major. First, the "minor" complaint: Sony gave us a real clock that we could see at the same time as the frequency readout in a $250.00 receiver. Others have done it for even less. If the design team hadn't been doing mental gymnastics with fluorescent displays, they could have given us one in a $1200 receiver, surely. A very major complaint in this same

general area is the S-meter, also an integral part of the fluorescent display. What they gave us was a 2" row of white and red vertical stripes and another row below the first, one of which turns yellow as it "moves" across the field of vertical lines. The yellow stripe acts as the S-Meter arm. (Zowee! Takeshita-san, look at what we can do now!) The problem is, this thing is digital and seems to respond to any QRN within 3000 kilometers by jumping all over the dial! The darn thing looks like a cricket dropped on a red-hot plate. It is absolutely useless as a meter, at least when using fast AGC in the AM mode.. A normal old-fashioned analog meter damps out most of the effect of distant QRN and, because it is electro-mechanical, gives us an average reading that means something. Anyone who is even nearly crazy enough to consider paying a JRC dealer $1200 for this pile of aluminum and plastic knows that S-units are virtually meaningless. However, any design team assigned this task by a reputable manufacturer should know that using a working S meter is the only way to peak up the receiver's systems for a particular signal. Even more importantly, it is the only way short of test bench equipment, to peak up peripheral equipment like antenna tuners and such for a particular frequency and signal. Your excitement over fluorescent displays has robbed us of one of the essential pieces of gear to run the receiver. Thanks a lot fellows!

This flaw should cause JRC to offer their project manager the chance to apologize in the traditional fashion. You simply do not offer the public a $1200 receiver without a working S-meter - a piece of gear that is essential to its operation. At least you don't at the top end of the market and maintain any customer base.

The last items on information transfer: The two most common operator errors are leaving the PBS tuning control off-center while tuning to a new signal and then forgetting that it is not in the normal position. Boy, that would knock a few units off the S-meter, if you could read it! The second most common error is doing the same thing with the IF notch filter. Have you ever tried to DX on the noise floor with your IF notch centered and the PBS shifted clear to one side? You can hardly hear a thing down there under those conditions! I've committed one or both of these operator errors plenty of times. JRC: Give us a knob that makes it very obvious where the control is positioned on these two functions or put a cheap little light over the knob which lights up when the control is NOT in the default position. This one was easy to predict and solve during design.

Just a three more major complaints: First, the IF filters are very mediocre! Two things are wrong (the two main parameters of filters, of course): Filter Width and Shape Factor. As it comes from the factory, the 525 provides a 4khz filter (@ 6db, 10khz @ 60db down) in the WIDE position and a 2khz filter (@ 6db, 6khz @ 60db) in the INTER position. The intermediate filter is marginally acceptable in true SSB, but it is too narrow and at the same time, too mushy with ECSS techniques. It is almost useless in AM mode. The WIDE filter is, of course, useless in SSB and is so wide that it is only useable in AM mode with the VERY strongest signals. With any thing less than the strongest signals, the wide filter lets all sorts of QRM under the filter skirts from both sides. Customers have every right to expect at least one filter which is sized properly for standard AM reception with normal level signals. Either a 3khz filter with the same shape factor or a better filter at 4khz would have been appropriate. The filter width selection indicates a shocking lack of knowledge of general DX and SWL use of a receiver. Selecting the proper width has nothing to do with manufacturing budget constraints.

The Shape Factors of the filters are pedestrian, at best. I will admit being absolutely spoiled by the Collins mechanical filters in my previous rig. However, these now retail for about $150 each, so I am sure that the design team could not afford them in their budget. However, what we have in the 525 is Ford filters in a radio that purports to be a Bentley or a Lamborgini. Come on JRC! At least you could have provided us a choice of filters at the time of purchase.

Sherwood and Magne attribute the pedestrian ultimate rejection figure not to poor IF filters, but to "cross coupling of the matching networks of the IF stage..." My own feeling is that both factors contribute to the degradation of ultimate rejection. My Collins filters, now installed in the 525, make a clear and noticeable improvement in this area of performance. Some recent experiments, by ESKAB/EDVIS among others, suggests that simple add-on shielding of some components can also add significantly to ultimate rejection. This leads credulity both to the Sherwood/Magne statement and to the idea that both the filters themselves and the shielding are less than optimum.

Another serious complaint concerns the design of the SWEEP function: The design team thoughtfully gave us the ability to define a lower and an upper frequency limit and then sweep between them automatically. You can fully control the speed of this sweep

from a few kilohertz per minute to blindingly fast, and you can stop the sweep manually or with a fully adjustable squelch control. Marvelous, stupendous! Just what I always dreamed about! What most MW & SWBC DXers would want to use this function for is to throw the thing in USB, turn the squelch off, control it manually, watch the frequency counter and listen for unusual whistles. This is particularly useful when wanting to search quickly when a band is fading in or out or when looking for "split" frequency signals on MW. The only problem is that in the SWEEP mode, the receiver only tunes in one KHZ increments. Many carriers are too weak and narrow to even appear in a one khz sweep! This thing may work very well for marine radio uses -- JRC's real forte. The tragedy is, there are plenty of other modes of this receiver which tune in either .1khz or .01 khz increments - meaning that the 1.0 khz increment probably is a simple wiring decision by the designers. This decision more than any other convinces me that no one on the design team has ever been a serious DX'er. After a season of using the SWEEP function, I must admit that I've never missed a signal which was strong enough to give me audio. However, I have missed a bunch of "carrier hetrodynes" - the very weak signals which I would like to know about to make all sorts of DXing judgement. This wiring decision seriously flawed what would have been a superb DXing attribute of this receiver. What a shame.

The final complaint is only of major concern to some MW DXers. As has been reported in the MW press, some 525s (most???) do emit some Radio Frequency Interference (RFI). I rush to point out that this interference in detectable under very special circumstances: at least one MW DXer has reported picking up serious levels of RFI when using an amplified ferrite core loop antenna which was sitting directly atop his 525. Although I don't own such a loop, I was able to trace the RFI using the meter long whip of a highly amplified active antenna. I found the noise by placing the whip directly against the fluorescent screen of the 525's front panel. The digital circuit noise, running from MW to 5 MHz, was not detectable even one foot away from the front panel. The noise appears to come from a single integrated circuit located on the circuit board directly behind the front panel. Possibly additional shielding could be added around the offending component and solve the problem quite nicely. In fairness, let me re-emphasize that I have NEVER detected this noise when DXing even with bare wire antennas running directly to the rear of the receiver. This is true even on medium wave where I only DX with Beverages.

So that's about it on the "down-side". Do I like my $1200 aluminum and plastic Bearcat? Can you read English - I hate the darn thing! But just a minute....ask me if I love it! Is the sky blue? If my beloved wife of 25 years were held and the 525 was the ransom demand, would I swap? I'm not real sure. I know that I'd negotiate like crazy and stall as long as possible, but ultimately I'd probably give up the 525 to recover the spouse. Why do I love this awkward, semi - useful, screwed-up excuse for a top of the market receiver? Well, let me tell you!

● THE UPSIDE

A) GENERAL CONCEPT OF THE RECEIVER.

JRC deserves real accolades for being courageous enough to adapt the "plug-in" modular circuit board concept long used in military and computer gear to the shortwave receiver market. The advantages of this approach to the OWNER/OPERATOR are numerous and rather obvious. The most obvious advantage is that the concept, and the provision of extra board slots, allows us each to partly design our own receiver, rather than relying on sometimes questionable "after-market" modifications. JRC has already provided boards to give us a super UHF scanner, if we wish, and has also given us the first internally mounted RTTY demodulator in receiver history, if we are into UTES. They have also thoughtfully provided a computer interface for true automated reception, if someone would develope the software. The plug-in modular board concept also allows JRC, if they wish, to bring out up-dated replacement boards - at a tidy profit - to keep the rig up to the state of the art of receiver design. Finally, the modular concept also allows smaller, specialized manufactures to bring out after-market boards, as well. ESKAB-EDVIS from Denmark brought a PLAM board out for the 525 in 1988. This board, already available in a non-modular fashion for a few other receivers, offers PLL synchronous detection and

several other important circuit improvements and is reviewed elsewhere in Proceedings 1989 by Chuck Bolland.

B) RECEIVER STABILITY

JRC is known throughout the industry for producing rock steady receivers. The frequency drift of the receiver is rated at 3 parts per million. I don't know what that means in useful terms. What I do know is frequency drift, always a worry in even the most recent generation of solid state gear, is a thing of the past with the 525. Even reading down to the .01 kilohertz (as in 4973.07 khz), I simply flip the rig on, set the dial and FORGET IT! This degree of frequency stability is super for timed and tape recorded reception, when I'm not around. It must be really super for the UTE gang. I'll bet that this is the first receiver that they can use to monitor RTTY on a crowded band in the timer mode. THANK YOU VERY MUCH, JRC!

C) CONTROLLABILITY

The HQ - 180A is still a highly prized receiver, even though it is "hollow - state" and has not been produced since 1970. The main reason for the level of reverence given these HQ's is the fact that an operator can almost redesign the circuits of the receiver from the front panel to fit the particular reception needs of the moment. The NRD-525 is the first "modern" receiver to attain this same level of controllability. The operator can modify just about every single important parameter of the receiver's circuits right from the front panel. It is even possible to change the output level of the "Record" output without having to open the case. WOW! This level of controllability is very thoughtful and very useful to the serious DX'er!

There is a negative aspect to all of this flexibility, however. There are so many knobs and buttons and so many configurations of the receiver possible that "operator error" becomes a serious factor, as does the long learning curve that most of us have to go through before we can get the very best out of the 525.

I might add that this thing is so flexible that it is even possible to confuse the 525's own microprocessor. There is some sequence of knob twisting and button pushing that freezes EVERY control on the front panel except (THANK GOD!) the main power switch. It is **not** the LOCK button. The sequence is complex enough that I have only hit it about once a month or so. JRC's designers have even provided for this eventuality. If you confuse the thing so badly that it "goes on strike," all you need to do is cycle the power switch off and back on! The receiver then defaults into a normal reception mode and you are back in business. A bit scary, to say the least!

In the general area of Controllability, the JRC design team and management also deserve real credit for providing total control of the AGC (Fast, Slow and OFF) as well as providing the IF notch filter. I only wish that they had also provided an AF notch, as well. There are many conditions where the IF notch will just not get rid of a het, but an AF notch would.

D) EXTENT, DESIGN AND SCOPE OF THE MEMORIES

Two hundred memories may seem like overkill to folks who haven't been exposed to a receiver with any memories at all. Let me tell you, after using this thing for three years, I'd really like to have 1000 memories set up like the 525's.

Unlike the first generation of receivers with memories, the 525's memories store much more than just the frequency when you input to Memory. Each channel records frequency, mode (AM, FM, USB, LSB, etc) IF filter width (Narrow Intermediate, Wide and Auxiliary), AGC and attenuator settings. Further, when you access a different memory channel, you basically "pole vault" the entire receiver to the new frequency. All controls including the main VFO, driven by the tuning knob, are brought to and are active on the new frequency.

This memory ability can increase operator efficiency enormously. For example, I have a band scanning pattern which I use at the beginning of dawn enhancement each morning, looking for Indo's. I start at 2360 (hit memory 100 to get there) and band scan manually to 2500. I then hit 1 up on the memory button to check 2582 khz, which is stored on memory 101. I then almost immediately hit memory up again several times to check each of several scattered out of banders "located" on memories 102, 103, and 104. Memory

105 remembers 2900 khz for a scan continuously to 3405. Then I hit 1 up in memory to skip on up the band. Basically, using ten memories I can link together just those parts of the tropical bands that I know to contain potential Indo's which I am after. I tune continuously with one hand and punch the memories with the other. With the 525, I can cover the Indo zones in less than a minute during peak conditions. If I hit something which might be interesting, I **do not stop.** I simply pause long enough to store the frequency in my "active file" (memories 1 to 10). When I have completed the scan, I then evaluate the three or four hot prospects now filed in the active file and get down to serious Indo hunting. The point is that, at peak conditions, I can evaluate the entire situation in less than 2 minutes and then go for the best! I don't know of another receiver that would enable me to do this...

When I decided to also go for the active Bolivians last spring, I used the memories in a completely different way. I programmed each of forty - odd Bolivian stations into memories 150 to 193. When looking for the Bolivians, I simply started at memory 150 and went up the memories one at a time, manually. Over the weeks, as I heard/reported various Bolivians, I would simply mark that memory off my chart and "punch through" that position as I went up the memories. Of course, I could scan those memories using the SCAN function, but heck, a fella has to do some work or he feels like he's not even DXing!!!

E)TUNING RATES AND INCREMENTS

Although it may seem a minor point, I really like the tuning rates - both of them! As far as I know, no one has mentioned, in print, that changing the Tuning Rate changes the Tuning INCREMENT. At the 20 khz per revolution Rate, the Increment is .1 kilohertz - plenty fine enough for most general uses, and on SSB you get that "bagpiping" that many of us love. At the 2 kilohertz per revolution rate, the Increment is .0l kilohertz - must be super for the UTE guys! Besides, in SSB, it sounds just like an analog receiver!

With all of what I consider to be very serious complaints about operator efficiency, serious design flaws in information display and input/output efficiency, this darn thing is almost a miracle in getting me around a lot of band in a very flexible and sophisticated way and, most of all, in a heck of a HURRY! The Operator efficiency of the 525 is truly very high compared to any other receiver with which I am even marginally familiar.

F) HEARABILITY

The engineers and manufacturers have co-opted the word "sensitivity" to mean a specific set of measurements which are really only part of the story of how well you can hear weak signals with a receiver. Some well meaning folks suggest that we make up our own word "hearability." Instead, I'd suggest that the engineers give Mr. Webster and the rest of us our word back. (I contend that "gay" means happy and joyous, too!)

Thus having defined terms, I am very pleased with the "useable sensitivity" of the NRD 525. I have not measured it against the highly modified versions of the R-70 (a'la Don Moman) but I did operate my 525 for a season in parallel with the HQ - 180A (a'la Steve Bohac), and the 525 tied or won every sensitivity battle. It is far more sensitive than any of the other receivers that I have used. Except for the noted audio hiss, it is an inordinately quiet set. The ratio between QRN and signal level seems excellent and, bluntly, I can hear things with the 525 that most other radios can't touch and thanks to all the automation, I can hear more of them - and the best of them - in those few fleeting minutes of truly exceptional conditions.

Am I sorry I bought this $1,200 Bearcat? No Way!! Would I recommend it to other "general" SWBC DX'ers. Yes, but only if they clearly understand that the rig has serious design flaws as well as tremendous capabilities.

Aw well, I suppose most Bentley or Lamborgini owners have things that they gripe to each other about, too.

●POST SCRIPT:

In the two years since I began this review, I have managed several modifications to the NRD-525 which have addressed many of the complaints voiced in the first part of this review:

A. The continual errors of DXing with the PBS and IF Notch controls misplaced was largely solved very simply. I got some two small bottles of modelers enamel, one bright yellow, one "fluorescent orange". The NRD knobs have a small part cylindrical valley at the "top" of the barrel of the knob to denote where the knob is pointed. The PBS knob valley is now bright yellow, matching some of the rest of the front panel... it draws my attention, each time I visually sweep the front panel. The IF Notch knob valley is now glowing, vibrating orange. Thankfully, it is normally out of sight, being rotated down unless I am actively notching something. No more operator errors in this area.

B. The resident genius with a soldering iron at Universal Shortwave, Dwayne Jones, was kind enough to tap into the AGC board. He grabbed off the AGC current and ran it out the back to an outboard 3" diameter milliamp meter. VOILA, a working signal strength meter!!! I would caution the reader that this modification ought only be done at Universal, since they are an official North American repair center for JRC. Even when done at Universal, this mod may void the Warranty.

C. While the 525 was at Universal, Dwayne pirated a 1.9 khz and a 2.9 khz Collins top-of-the-line filters from my old FRG-7700. Oh my, what a difference! Absolutely wonderful! 'Course, at $150 per filter, they ought to work. I recommend this modification very highly.

D. The AGC mod developed by Craig Seigenthaler of KIWA Electronics and described by G. Atkins in this volume has really improved the performance of my 525.

E. Just as this review was going through final editing, I received my MAP unit. My, what a difference!!! Audio like the angels must hear and a smidgen more useable sensitivity or hearability or what ever, too. I understand that Chuck Bolland feels the same was about the ESKAB/EDVIS board, as well. Both are reviewed elsewhere in Proceedings 1989.

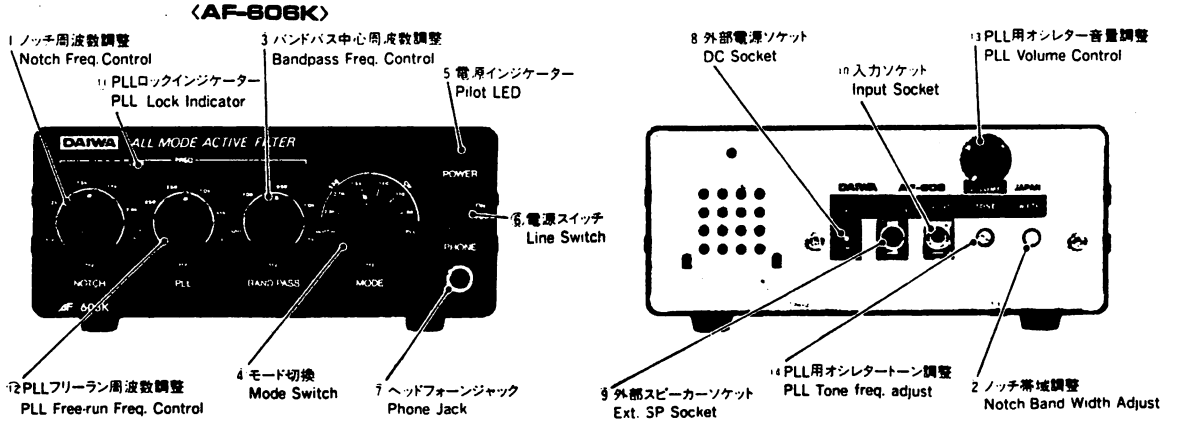
peripheral equipment

THE DAIWA AF-606 AUDIO FILTER

Chuck Mitchell

When reading any review of the stately NRD-515, one is not likely to find many critical comments on this fine receiver. Even after the Japan Radio Corporation discontinued production in 1986, the 515 remains a preferred receiver for the DXer today. While quick to tout the rig's strong attributes, most 515 owners will also list a couple of problem areas: "woolly" audio and the absence of a notch filter. The Daiwa AF-606K active audio filter is a help for both of these situations.

Audio filters can be useful for serious DXing, assuming your receiver already has good IF selectivity. It is often possible to clean up the audio portion of a signal well enough to lift an elusive ID from the noise. By notching an offensive hetrodyne or rolling off low and high frequency noise, the filter will decrease listening fatigue while it increases readability in an intense QRM situation.



(Fig.1) The Daiwa audio filter provides a notch filter with hi-lo roll off. The speaker is top mounted and angled slightly towards the listener.

I began my search to improve the 515 by looking for a notch filter. When a friend John Williams introduced me to the AF-606K, I knew that I had more than just a notch! The AF-606K exhibited an immediate benefit when used in the "notch only" mode. The receiver's excessive medium-low audio emphasis was reduced when using the 606K and the audio was brighter and more transparent. The notch frequency control, while set to @ 300 Hz, blocked out the "woollies"! Even when the notch is set to a different frequency to eliminate a het, a reduction in the 515's warm low end audio is still noticeable. Unless the mode control is switched to an SSB position, the audio bandwidth of the receiver is not narrowed significantly. You can leave the Daiwa in line constantly with the notch set to @ 300 Hz and enjoy improved intelligibility and fidelity.

I have experimented with the acclaimed Datong FL-3, which provides two notch filters and a passband filter with very steep curves. It did not exhibit the quality of processing I heard from the Daiwa however. The FL-3 limits the audio quite a lot when you choose to use it only as a notch filter. If it is in line it will limit audio bandwidth. Even when QRM problems require a narrow audio passband, I found the FL-3's audio quality to be lacking. The Fl-3's specs and design are impressive, but I clearly prefer the Daiwa in actual use.

The Daiwa has been used consistently in this past year with very satisfying results. Not only has it helped me extract vital information from a station in heavy interference, but it has also allowed for higher fidelity program listening.

Turkiye Polis Radyosu made an appearance this past winter on 6340 KHz. Both sidebands were cluttered with CW/RTTY QRM even when using the JRC 1.8 KHz filter. The AF-606K really helped to clarify the catch. I notched the CW in the USB and selected the 2.0 KHz audio bandwidth on the filter's mode control. Figure 4 will show you the band pass curves for all three "SSB" positions. Noise present above and below the roll off points was reduced. As a result, the signal appeared to be lifted out of the noise. Copy was easier now and a positive ID was made.

Program listening can also be enhanced. Take for example Radio Tahiti on 15170.7 KHz. During the summer months I enjoy tuning into this frequency for

Polynesian music. The signal is usually strong but is often disturbed by a het from 15170 KHz. Switching from the stock 6 KHz filter to the stock 2.4 KHz eliminates the het as well as the pleasant audio bandwidth afforded by the wide filter in AM. When the Daiwa's power is switched on and it's mode control is set to the "notch" position, the AF-606K will function as a notch filter only. The het can now be attenuated by adjusting the "notch frequency" control. Audio shaping is minimal in this mode except for the 700 Hz notch point. Practically all of the audio from the 515 in AM-wide is preserved as well as enhanced by the filter!

定格 SPECIFICATIONS

			AF-606K	AF-406K
MODE	NOTCH	Center Frequency	300~3,000Hz	
		Width	50~600Hz at Fo=750Hz -20dB	
	SSB	High Pass	500Hz - 6dB	12dB/OCT
		Low Pass 2.5kHz	2.500Hz -10dB	12dB/OCT
		2.0kHz	2.000Hz -10dB	24dB/OCT
		1.5kHz	1.500Hz -10dB	36dB/OCT
	CW	(Band Pass) Center Frequency	500~1.200Hz	
		Width	-	170Hz -3dB
			140Hz -3dB	140Hz -3dB
			110Hz -3dB	110Hz -3dB
			80Hz -3dB	80Hz -3dB
	PLL	Center Frequency	500~1.200Hz	-
		Lock Range	70Hz	-
		Input Voltage	0.1~2V	-
		Tone Frequency	500~2.500Hz	-
Input		Max	4V(2W)	
		Nominal	2V(0.5W)	
Power Output		Max	1.7W/8Ω	
Power Source		Voltage	DC13.8V(12~15V)	
		Consumpsion	200mA	
Dimensions			150W×62H×150Dmm	
Net Weight			1kg	

CONNECTION:

Power Supply – A power supply of 13.8 VDC (200 ma. min.) is required for the operation of the All Mode Filter. Connect your power supply to the external DC socket with the DC power cord supplied.

When using an AC adapter, make sure the maximum output voltage (with no load connected) is below 15 VDC.

External Speaker – An external speaker (8 ohms) can be connected to the socket with a RCA pin plug. The built-in speaker is disabled whenever the external speaker is connected.

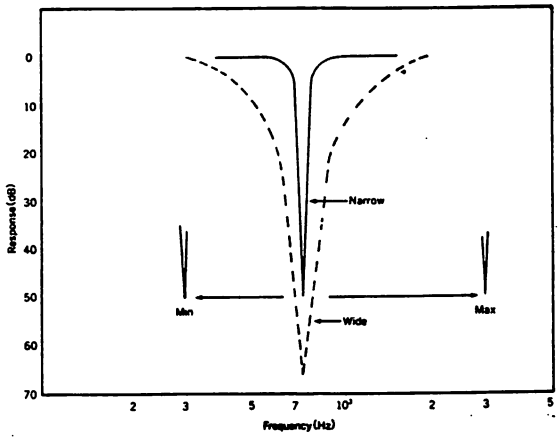
Input Signal – Connect a shielded cable with a RCA pin plug to the input socket and to the speaker terminals of your transceiver/receiver.

The headphone socket of your transceiver/receiver can be used as a signal source, but the normal speaker of your transceiver/receiver will be disabled. The output signal level from the built-in speaker of the AF406K/AF606K may be somewhat low when the power switch of the filter is in the OFF position.

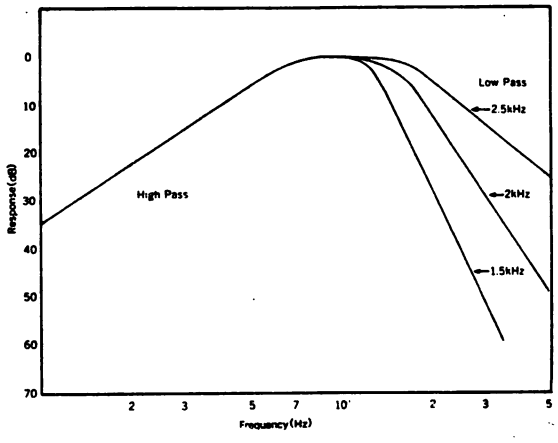
Headphones – Connect a stereo or mono headphone to the Phone Jack. The built-in speaker of the AF406K/AF606K is disabled whenever a headphone is used.

(Fig. 2) Please note that Daiwa does not include a power supply with the unit. A 13.8 VDC regulated supply or a battery pack of 12 VDC will power the AF-606K.

The Daiwa is esthetically pleasing and it's controls have a solid feel. The power switch is also the line in/out switch and there is a slight but annoying thump heard in the speaker each time the filter is switched on. The mode control adds a choice of one bandpass filter to accommodate a voice or CW signal troubled by QRM or QRN. The frequency control is on the front left while it's width control is on the back panel. My width control is usually set to slightly less than full narrow. The notch filter curve in figure 3 will indicate it's potential for nulling an offensive het.



(Fig. 3) Notch Filter Curve



(Fig. 4) SSB Bandpass Curves

The only front panel control that may appear to be peculiar is the PLL function on the mode switch and it's frequency control to the left. This feature is intended for CW use only. When a CW station is tuned, the mode switch can be set to "PLL". The audio from the receiver will then vanish. When the PLL pot is set to the audio frequency of the CW station, the Daiwa's oscillator will activate and duplicate the CW from the sending station. This results in noise free copy as long as the station remains strong enough to trigger the oscillator.

The internal speaker is a feature worthy of note. While rarely used at home, it does become useful while portable. The filter/speaker combination works well with my DX-pedition rig: a Yaesu FT-70G. The 70G is a small general coverage field transceiver with no internal speaker.

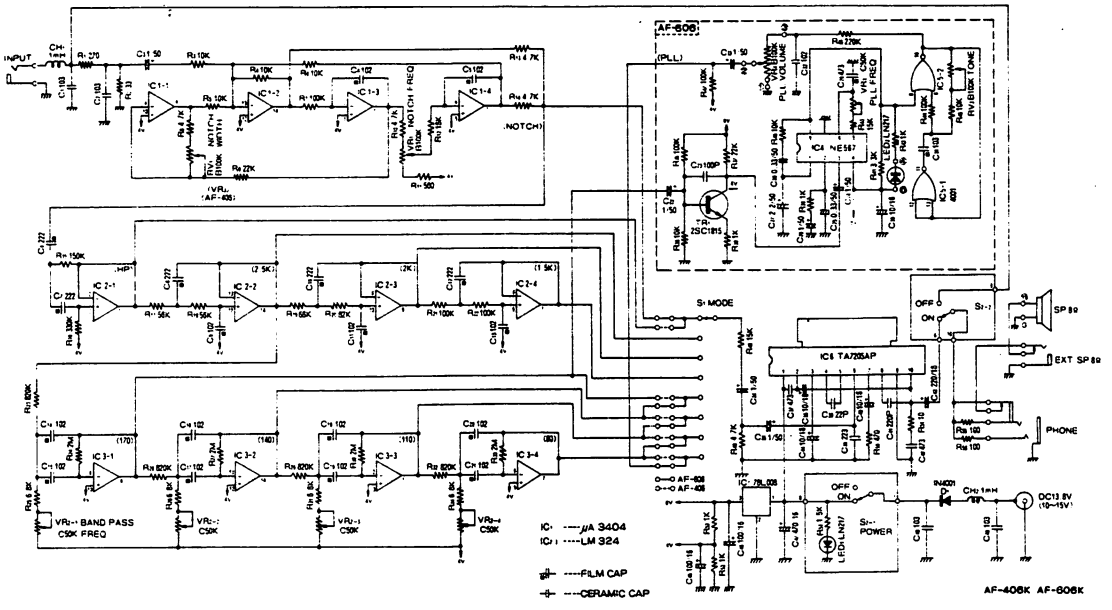
Processing recordings of your DX is possible with the filter. I use a Sony Walkman Professional (WM-D6C), the JRC speaker, and the AF-606K to clean up my

recorded DX. (A deck with a volume control on the headphone jack will be the most versatile.) Simply connect a patch cable from your deck's headphone out to the back panel audio input of the Daiwa. The taped signal can then be monitored via filter's internal speaker, headphone jack or and external speaker. I prefer to process the audio after recording it. Recording the audio output of the Daiwa is possible from the filter's speaker output to your cassette line input. Experiment to see which method works well for your receiver/recording system.

There are a few features that could make the AF-606K a more versatile device. A separate power and line in/out switch would be an easy modification. More involved design could give the DXer fully adjustable hi and low cut off frequencies with variable shape factors. (The AF-606K only has three fixed roll off points for high frequencies in the SSB mode.) A second notch would also be nice. Aside from this, the AF-606K remains a functional device for it's current level of development and cost.

Daiwa produces numerous devices for amateur radio use. There are many shops across the country that stock their tuners, amplifiers, meters and other related gear. The problem you may encounter is finding a dealer that stocks the AF-606K. I purchased my filter from R&L Electronics in Hamilton Ohio. This is the only shop I have located that actually stocks the unit.

The AF-606K lists at about $140.00. That's a fair price for the audio enhancing qualities and notching ability it will add to your 515.



- All mode active filtering removes interference on the desired signal and improves readability in CW, SSB, or AM modes.
- The All Mode Active Filter consists of four active circuit stages as well as low pass and high pass filters for clear reception.
- For CW reception, a four stage, low Q variable frequency bandpass circuit is included to provide clear CW reception with high S/N ratio.
- A PLL (Phase Locked Loop) Tone Decoder for noise-free reception.
- A 9 cm diameter speaker is also included.

(Fig. 5) Schematic of the AF-606K. The AF-406K is no longer is production.

DAIWA INDUSTRY CO., LTD

THE ESKAB/EDVIS PLAM BOARD
For The NRD-525 Receiver

Chuck Bolland

How do you turn "good" into better? When you are the proud owner of Japan Radio Company NRD525 General Coverage Receiver, what can you do to improve it? One very good answer - install an ESKAB/EDVIS Synchronous Phase Locked AM and IF Filter Board.

When the NRD525 receiver was first introduced, many reviewers felt that it was lacking because it could not receive in the Synchronous Phase Locked Mode. At the time I didn't pay much attention. After all, I had spent a thousand dollars on my NRD525 which meant that I had the best and there wasn't any need for modifications to improve it.

After the newness had worn off, I began to notice flaws in my NRD525. The first was the continual wideband hissing noise that was present all the time. The only way the hiss could be eliminated was to hook up an RF amplifier and reduce the RF gain on the receiver. This of course, defeated the receiver's excellent dynamic range.

The second problem was the erratic AGC performance. The NRD525 is equipped with a digital "S" meter. In the fast position, the digital meter's indicator bounced all over the place from zero to 10 for a signal which should have been only five or six "S" units. This became very frustrating when comparing antennas or adjusting tuners. I always had trouble. Eventually, I ignored the "S" meter altogether.

Part of the problem with the erratic AGC performance was the distortion that occurred in the receiver when the received signal would peak to a level high enough to put a strain on the AGC. I observed this often. I found I could eliminate this problem by reducing the RF gain a few notches, but com'on, I paid a thousand dollars for this rig!

Finally, even though the NRD525 has Synchronous AM detection, this does not eliminate the distortion that occurs during selective fading periods either in the AM mode or in the Single Sideband Modes (selective fading has been described as when the carrier of an AM signal drops in strength in respect to the side bands).

Comparing these problems with the many positive qualities of the NRD525 should make them insignificant. Even so, there was a group who felt that eliminating them was worth the trouble. That group was ESKAB/EDVIS of Sweden. ESKAB/EDVIS developed an AGC modification kit and a Synchronous Phase Locked AM and IF Filter Board for the NRD525.

●THE AGC KIT●

Installing the AGC kit eliminated the following shortcomings

1. According to ESKAB the AGC attack time is much too fast on the stock NRD525 to be of any benefit in the fast mode for either AM or SSB. Short, strong electrical noises - static - causes the AGC to

react drastically and deafen the receiver momentarily. ESKAB claims that with the kit the attack time is changed to 5 milliseconds instead of 0.2 milliseconds in both the fast and slow modes. In this way the AGC does not react on electrical noise pulses anymore.

2. The "S" meter continually overshoots before it settles to its final value. This can be very annoying when trying to judge a signal strength. The overshooting has been reduced by changing the value of R107 (slow mode) and R103 (fast mode) of the AGC circuitry.

3. In the fast mode the AGC is not adequate for either AM or SSB because the response time is too fast. The AGC in the slow mode is more suited for AM and SSB. Therefore, the fast mode has been changed to a "Medium" mode by changing the value of C77 of the AGC circuitry which gives a fall time of approximately two seconds. The slow mode is marginally slower to approximately four seconds. These speeds can be adjusted to personal preference by reducing the values of the components replaced in the AGC circuit which is explain in the AGC kit manual.

4. The AGC voltage in the stock NRD525 is not clean. The cleaning of the AGC voltage has been accomplished with the AGC Kit circuit. This circuit is installed between IC9 Pin 1 and IC9 Pin 5 while in series with R112. Distortion and voltage noise has thus been eliminated.

●THE PHASED LOCKED AM CIRCUIT●

Even though I have owned quality receivers such as the ICOM/R70 and the ICOM/R71A, the Synchronous Phase Locked AM feature in USB and LSB is a new feature that I hadn't experienced before. Some may feel that it is a frivolous addition to a receiver; I used to think that way too: However, since I have modified my NRD525 with the Synchronous Phase Locked AM circuit board, I have come to feel that this feature should have been part of the original design of the NRD525. It greatly improves the over all performance of the receiver.

There may be those who do not entirely understand what Synchronous Phase Locked AM does in the USB or LSB modes. I know I had trouble understanding that from the different descriptions which had circulated around the hobby. In lay terms, this is how I understand it to work: First, when tuning in an AM broadcast signal using the USB or LSB modes (some have referred to this as exalted-carrier selectable-sideband or ECSSB), it is necessary to tune precisely to the center of the signal between the sideband carriers. If this is not done, one will be listening to distorted audio. The audio sounds like "Donald Duck" talking. Sometimes the distortion isn't terribly obvious unless the program is music. Then it sounds as if someone was playing the tune at a slower than normal speed on the turntable. This gives the music a "wobblier" effect. Even with the NRD525, it was necessary to be within a few hertz of the signals center frequency to hear the audio correctly.

Synchronous Phase Locked AM detection eliminates this problem in the receiver. This circuit with it's locking feature gives the receiver the capability of tuning a signal in the USB or LSB modes correctly while actually being off tuned by thirty or forty Hertz (ESKAB/EDVIS says thirty to forty hertz, but my receiver locks in at 85 Hertz on either side). So what? Well, in the DX'ers world, the

majority of the stations that are of interest are really quite weak signals. Many times, the stations are so weak while simultaneously being interfered with by other stations, that tuning into the center of their frequency is impossible. So, the DX'er must tune off the center frequency. The Synchronous Phased Locked AM detection system allows us to do this and still hear undistorted audio.

Try this experiment with your receiver. First, imagine an AM signal consisting of three parts. They are the carrier and the two sideband signals which contain the information. The carrier transports the sideband signals. The sideband signals are identical but opposite reflection of each other. To hear the information contained in either of the sidebands using either USB or LSB, it is necessary to tune the receiver to exactly the frequency of the carrier. Now find a signal and tune it as described. After getting it tuned in where it is clear, tune up 20 or down 20 Hertz depending on whether you are in LSB or USB. Notice the distortion? With this detector you do not have that distortion. The ESKAB/EDVIS Synchronous Phase Locked AM circuit produces its own carrier frequency and locks onto the AM signal when you tune within 30 to 40 Hertz of the carrier frequency of the AM signal that is being tuned with LSB or USB. This is a very real advantage when DXing.

For example: suppose two stations are almost on the same frequency. The weaker station is the one you want to log, but because it is being covered by the other station, there is no way of hearing it using ECSSB techniques. With the ESKAB/EDVIS Synchronous Phase Locked AM circuit, tuning off the center frequency a few hertz is possible without losing the weaker station to distortion. Now the two stations should be far enough apart to allow you to notch the stronger station without losing the weaker station. This is not as easy without the ESKAB/EDVIS Synchronous Phase Locked AM Circuit in the receiver.

Besides the Synchronous Phase Locked AM capabilities of this modification, the circuit comes with three options. The first is the basic Option for Listeners. This option is fitted with two filters which are the same band width as the stock filters in the NRD525. The second option is the Broadcast Listeners version. This option has three filters mounted, two the same as the NRD525 stock filters and another of your choice. Finally the last option is the DXers Option. This is the option that comes with four filters; two are the same as the NRD525 stock filters and two are filters of your choice. All these filter additions are in conjunction with the filters already in the NRD525. Therefore, when ordering the board, it is necessary to provide the number of filters in your NRD525, the width of each and in which position each is placed.

The ESKAB/EDVIS Synchronous Phase Locked AM detector circuit board and the AGC kit for the NRD525 is produced by ESKAB & EDVIS, P.O. BOX 32001, S-200 64 MALMOE, SWEDEN. It would be best to write for current prices since it has been over a year since I purchased my board for $200.

You may wonder how the circuit board gets into the receiver and if soldering is necessary? Yes, you must heat your iron; but with clear instructions and illustrations to aid in installation, it is not difficult. The entire process can be completed in three hours.

I feel that the cost of this modification is very reasonable considering the improvement over the stock NRD525. ESKAB also includes a number of circuit modifications in their correspondence which are easy to make with parts bought at your local Radio Shack Store.

I am very content with my NRD525 now. I feel that I have the ultimate DXing and shortwave listening machine available today, now that it has been upgraded with the ESKAB/EDVIS integrated Synchronous Phase Locked AM and IF Filter Board. I am sure if you install it in your NRD525, You'll feel the same.

CHUCK BOLLAND
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WEST PALM BEACH, FL 33416-8402

THE AMSD-1 SYNCHRONOUS DETECTOR

Dallas Lankford

The AMSD–1 is an AM synchronous product detector which was developed specifically for use with R–390A communications receivers by Richard V. Burnes (KE5GZ), head of Burnes Electronics, and me. At present the AMSD–1 exists only in several prototype forms, but a production model may be marketed later this year.

Before we consider circuit and performance details of the AMSD–1, it seems appropriate to give a simplified description of AM synchronous detectors. Almost all AM synchronous detectors use a collection of circuits called a phase locked loop (PLL). A PLL consists of a phase detector and a voltage controlled oscillator (VCO). A phase detector has two inputs, two signals of frequencies f_c and f_{osc}, and one output, an error voltage V_{err}, which is proportional to the difference between f_c and f_{osc}. For our purposes the phase detector input of frequency f_c may be regarded as an AM signal carrier, say from the IF of a communications receiver. The other detector input of frequency f_{osc} is obtained from the VCO output. A VCO has one input, a voltage which changes the VCO oscillator frequency f_{osc}, and one output, the oscillator signal. For PLL operation, a phase detector and VCO are connected together as follows. The VCO output is connected to one of the phase detector inputs. The phase detector output is connected to the VCO input. In other words, V_{err} is both the phase detector output error voltage and the VCO input voltage. Thus, a feedback loop is formed between the phase detector and VCO which permits f_c to control f_{osc}.

To illustrate how a PLL works with a communications receiver, let us suppose that the receiver IF center frequency is 455 KHz, the receiver bandwidth is 6 KHz, and the free running VCO frequency (with no error voltage applied) is $f_{osc} = 455$ KHz. As an AM signal is tuned by the receiver, the carrier enters the passband, say at $f_c = 452$ KHz, and an error voltage is produced by the phase detector. The error voltage causes the the VCO frequency f_{osc} to vary around 455 KHz. For the sake of discussion, let us say that f_{osc} varies from 453 to 457 KHz. Now suppose that the receiver is tuned again so that f_c moves towards 455 KHz. At some frequency, the VCO will *lock* onto the AM carrier signal, say at 453.5 KHz. The difference between the free running VCO frequency and the frequency at which the VCO first locks onto the AM carrier is called the capture range, in this case 1.5 KHz. As the receiver is tuned so that f_c increases in frequency, the AM carrier and VCO signal remain locked until they reach a frequency at which circuit parameters can no longer keep them locked, say at 457.25 KHz. If the receiver is tuned beyond that frequency, then f_c and f_{osc} *unlock*; the AM carrier frequency f_c continues to increase and the VCO oscillator frequency f_{osc} returns to varying between 453 and 457 KHz. The difference between the free running VCO frequency and the frequency at which the AM carrier signal and VCO signal unlock is called the lock range, in this case 2.25 KHz. If the AM signal is tuned in the opposite direction, entering the bandpass at 458 KHz and exiting the bandpass at 453 KHz, then we would observe similar, but not necessarily identical, values for capture and lock ranges. For example, when tuning from high to low we might find that the capture range is 2 KHz and the lock range is 1.75 KHz. These observations can be summarized by saying that the capture range is -1.5 or $+2$ KHz and the lock range is -1.75 or $+2.25$ KHz. To simplify terminology, we will define *the lock range* to be the minimum of the magnitudes of the positive and negative lock range values, and *the capture range* to be the minimum of the magnitudes of the positive and negative capture range values. Thus, for this example the capture range is 1.5 KHz and the lock range is 2 KHz.

Most AM synchronous detectors contain another circuit component, a product detector. The VCO output is also connected to the product detector where it functions as a BFO. The signal from the IF of the communications receiver is split into two paths. One path goes to the phase detector as discussed above. The second path goes to the product detector. If the receiver is tuned so that the VCO is locked onto the AM carrier, then the BFO (which is the VCO) is also locked onto the AM carrier. While the BFO (VCO) is locked onto the AM carrier, the BFO is identical in frequency and phase to the AM carrier, and nearly perfect AM detection takes place.

It is not possible to obtain AM synchronous detection for an extended period of time with a conventional receiver due to instabilities in the receiver high frequency oscillator(s), the BFO, and the received signal. Brief periods of AM synchronous detection can be obtained with a stable tube receiver, such as an R–390A, by turning on the BFO and carefully tuning to zero beat. At one and only one setting of the BFO or KCS tuning, you should hear an improvement in clarity and fidelity which usually lasts for at most a few seconds. What you heard was AM synchronous detection.

Many recent top of the line solid state receivers are not capable of AM synchronous detection because in SSB mode the BFO is fixed tuned, and the BFO frequency normally corresponds to about 20 dB down on the filter skirt. The term ECSS, an abbreviation for exalted carrier selectable (or single) sideband, is often used to describe tuning an AM signal using the SSB mode. However, this is quite different from AM synchronous detection because the BFO is not phase locked to the AM carrier when ECSS is used. Furthermore, in receivers with fixed tuned BFO's the AM carrier is usually attenuated about 20 dB by the receiver bandpass filter when ECSS is used. In that case ECSS does not describe the reception mode correctly because the AM carrier is not exalted, but rather attenuated.

An AM synchronous detector does not require a product detector. The essential ingredient in AM synchronous detection is a BFO which is phase locked to an AM carrier. An AM synchronous detector does not even require a phase detector and VCO. A wonderfully simple AM synchronous detector for most R–390A's was described by

Graham Maynard in *The Hollow State Newsletter*, No. 17, Fall 1987, with additional comments by me, and additional information in *HSN*'s **18** and **19**. Graham's AM synchronous detector is an injection locked oscillator (ILO). In breadboard form his ILO circuit uses two resistors and a trimmer capacitor. A little 455 KHz IF signal is stolen from the R–390A AGC IF amplifier, phase shifted by a low pass filter, and injected at the BFO oscillator tube grid. When the BFO frequency is within about 100 Hz of an AM carrier, it is phase locked to the AM carrier. Graham's first ILO circuit does not work with all R–390A's, in particular those with Collins BFO PTO's. If you have an R–390A with an IF strip which is not manufactured by Collins, then Graham's ILO is the least expensive way to experience AM synchronous detection.

There are several other ways to experience AM synchronous detection, including Sony's 2010 receiver, Sherwood Engineering's SE-3 PLL AM synchronous product detector, Kiwa's MAP unit, and ESKAB's PLAM board. It is beyond the scope of this article to compare these and other approaches to AM synchronous detection.

The AMSD–1 has a wide input dynamic range, from 300 microvolts to 3 volts. A graph in Figure 1 of the input signal level at the unbalanced antenna terminal of an R–390A versus the IF output level at the BNC connector on an R–390A rear panel shows that the R–390A IF output voltage ranges from about 10 to 110 millivolts, well within the AMSD–1 input dynamic range.

One feature of the AMSD–1 sets it apart from all the others. It has an extremely wide lock range as shown in Figure 2. The AMSD–1 capture range is virtually identical to the lock range, and so is not given. As can be seen from Figures 1 and 2, under normal operating conditions, the AMSD–1 lock range is about 120 KHz for all signal levels, even as the signal vanishes into the R–390A noise floor.

Most other AM synchronous detectors have narrow lock ranges, varying from about 100 Hz to as little as about 30 Hz, except for the Kiwa MAP unit which has a lock range of about 3 KHz. This means that in contrast to the others, you never hear the AMSD–1 lock and unlock during normal use. We have found only two ways to unlock the AMSD–1. One way is to use a signal generator to vary the input frequency and signal level widely, as was done to produce Figure 2. The other way is to reduce the RF gain control of the R–390A to near 0 which reduces the R–390A IF output signal level enough so that the AMSD–1 can unlock inside the R–390A bandpass. Because of the extremely wide capture and lock ranges, AMSD–1 operation is completely automatic . There is no BFO (VCO) tuning control or offset switch. The wide capture and lock ranges have one potential disadvantage. You cannot use the AMSD–1 to hunt for weak hets in the noise, a favorite trick which many of us use to locate potential DX, because it produces no hets during normal use.

The AMSD–1 can be adjusted for a wide range of input frequencies. In one AMSD–1 prototype, C_0 was a fixed 380 pF capacitor in parallel with a variable 100 pF capacitor (see the schematic in Figure 3), which permitted it to be set up for any IF frequency between about 445 KHz and 560 KHz. With different values for C_0, the AMSD–1 input frequency can be adjusted to any value from audio frequencies to about 5 MHz, and by changing a few other circuit values, the AMSD–1 input frequency can be extended to beyond 20 MHz. The audio output level of the AMSD–1 is about 60 millivolts maximum, which is suitable for the AUX or TUNER input of a hi-fi amplifier.

The audio quality produced by any AM synchronous detector depends on the audio amplifier and speaker with which it is used. During AMSD–1 development we tried several simple and inexpensive IC audio amplifiers, but we did not find any which approached the performance of even an inexpensive hi-fi amp, such as the $59.95 Radio Shack SA-150. One obviously does not include an inferior audio amplifier and speaker with a low distortion, hi-fi, AM synchronous detector. So we did not include an audio amp and speaker with the AMSD–1.

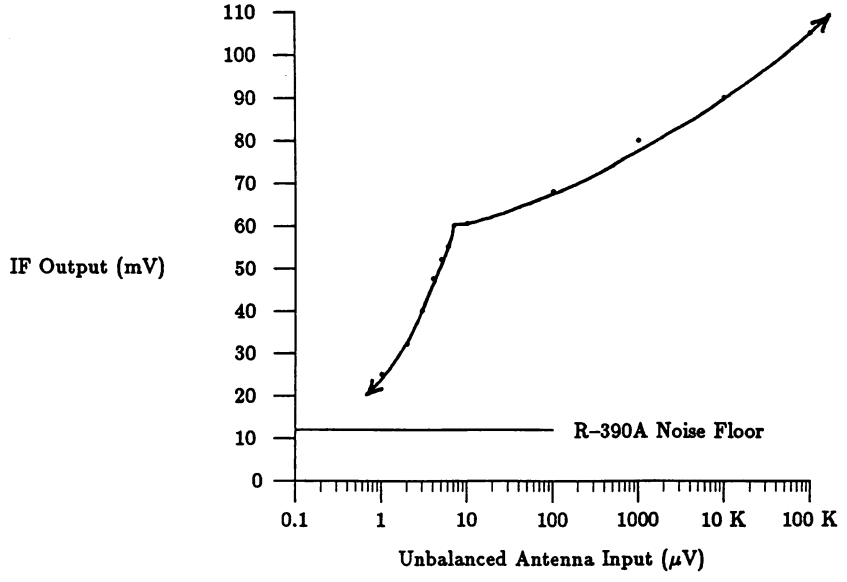


FIG. 1 R-390A UNBALANCED ANTENNA INPUT VERSUS IF OUTPUT

If time, complexity, development costs, and production costs were not considerations, we could have designed and developed a low distortion, hi-fi, audio amplifier as an integral part of the AMSD–1. But it is clearly more cost effective to use a separate hi-fi amp. This also permits the user to customize the audio amplifier and speaker parts of his AM synchronous detector system. In addition, it is easy to add an audio equalizer between the AMSD–1 audio output and the AUX or TUNER input of a hi-fi amp and preprocess the audio in whatever way one desires.

What are the theoretical advantages of an AM synchronous detector over a conventional diode detector? There is really only one. An AM synchronous detector virtually eliminates distortion which results from selective fading of an AM carrier. To understand how an AM synchronous detector sometimes improves the audio quality of fading AM signals, let us consider the three fundamental ways an AM signal fades: (1) the carrier and both sidebands fade by about the same amount, (2) one or both sidebands fade while the carrier remains relatively constant, and (3) the carrier fades while one or both sidebands remain relatively constant. In case (1) the audio level decreases, and the signal to noise ratio decreases. Audio quality cannot be improved in this case. In case (2) the audio level decreases. The signal to noise ratio also decreases, but the decrease is slight and may hardly be noticed. Audio quality cannot be improved in this case. In case (3) the audio is distorted, where the amount of distortion depends on the depth of the fade. Audio quality can be improved in this case. The faded carrier can be augmented or replaced by the VCO output of a PLL which is locked to the original carrier. It is tempting to say that an AM synchronous detector completely eliminates distortion which results from selective fading of an AM carrier. But it is possible that the carrier could fade completely in which case the VCO would not be phase locked to the carrier and some distortion could occur.

How much improvement in audio quality does an AM synchronous detector provide? The answer is subjective. Some will hear no improvement and conclude that the claims made for AM synchronous detectors are a lot of hype. Others will hear much improvement and praise AM synchronous detectors. However, most people will hear modest improvement and conclude that an AM synchronous detector is a luxury rather than a necessity. I am in this last category. The various opinions regarding the improvement provided by AM synchronous detection probably are not a consequence of performance differences among AM synchronous detectors, but rather individual responses to the amount of improvement in audio quality.

However, let me add the following. I am not a SWL, so I don't normally listen to strongly fading signals in the SW broadcast bands. An avid SW DXer may find that the modest amount of audio quality improvement results in significantly reduced listener fatigue after long hours of DXing. And I must say that the AMSD–1 connected to the IF output of my R–390A and driving a bottom of the line Radio Shack hi-fi amp with inexpensive speakers produced such good audio that for the first time I found myself DXing BCB splits without headphones. However, my wife complained about the loud QRM and QRN coming from the speakers in my radio room, so freedom from headphones is an AMSD–1 advantage that I can seldom enjoy. While testing the AMSD–1 with my inexpensive stereo amp, I was amazed at the fidelity of our local MW top 40 station, KRUS 1490 KHz. During the day with the R–390A tuned to 1497 KHz and using the 16 KHz mechanical filter, KRUS 1490 sounded like an FM station. At night adjacent channel QRM is stronger and audio quality is not nearly as good. The 16 KHz bandwidth is almost never useable for SW signals, but the 8 KHz bandwidth frequently provides near hi-fi SW reception.

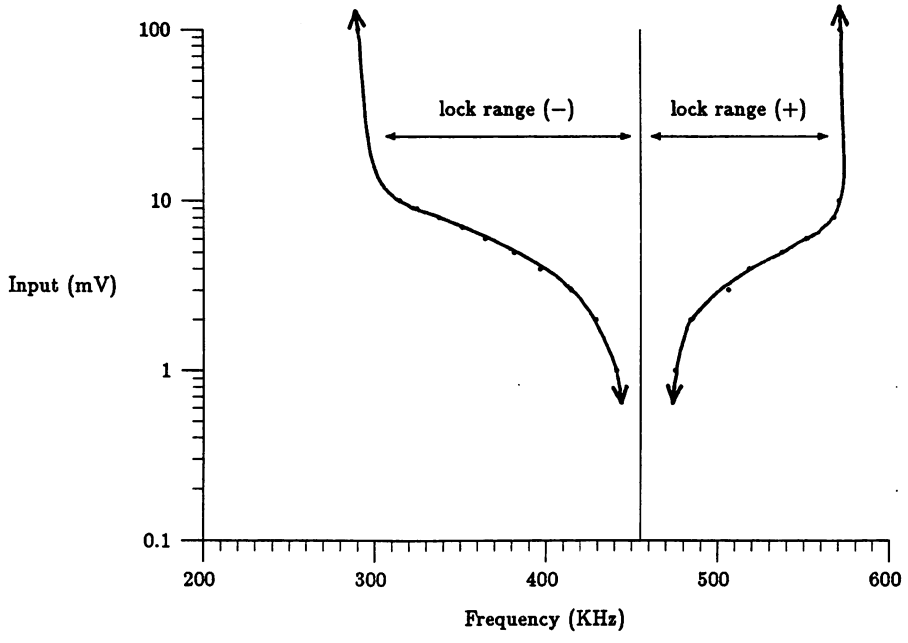
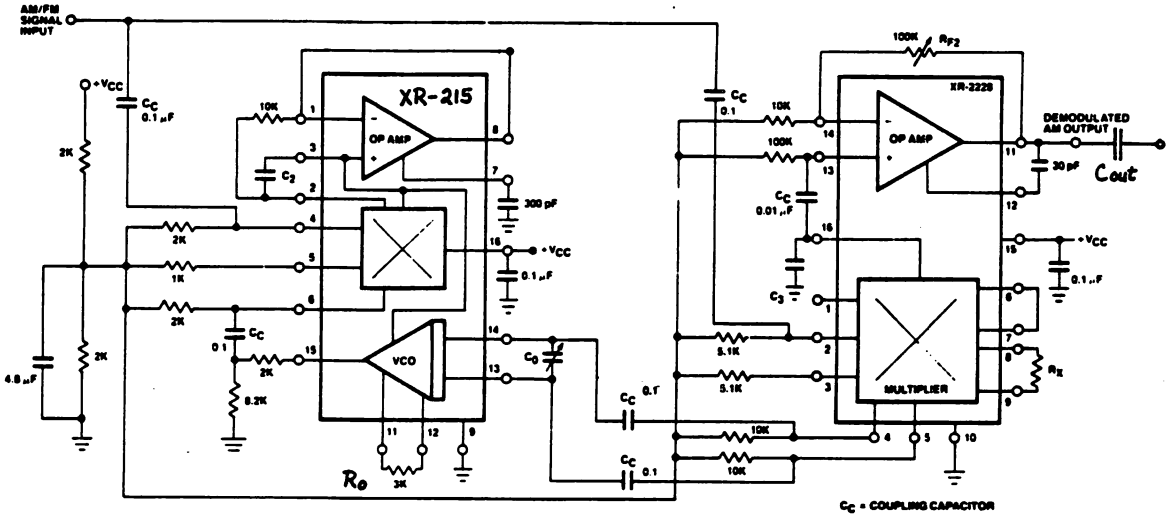


FIG. 2 AMSD-1 LOCK RANGE

After using both an ILO and an AMSD–1 for many hours, I have concluded that both improve the audio quality of most strongly fading AM signals by about the same amount (ignoring the superior audio produced by the hi-fi amp connected to the AMSD–1). But the amount of improvement is not as large as I had expected based on some articles about AM synchronous detection that I have read. With an R–390A the amount of improvement depends on AGC release time, with greatest improvement for fast AGC release and least improvement for slow AGC release. This suggests that some receivers, especially some recent solid state receivers which do not have suitable AGC release times, would have greater audio quality improvement than other receivers when used with an AM synchronous detector. Perhaps this explains much of the variability of opinions regarding AM synchronous detectors.

A schematic of the AMSD–1 is given in Figure 3. The AMSD–1 uses two EXAR integrated circuits, a XR-215 and XR-2228. The input signal is split into two paths. One path goes to pin 4 of the XR-215 chip which is the input of the phase detector. The other path goes to pin 2 of the XR-2228 chip which is the input of the product detector (designated as the multiplier on the schematic). The VCO output is applied both to the phase detector in the XR-215 chip and to the product detector in the XR-2228 chip at pins 4 and 5. The XR-215 chip contains an op amp which is not used. The output of the product detector in the XR-2228 chip goes through a low pass filter consisting of C_3 and a 5 K ohm resistor (the resistor is an internal part of the XR-215 chip, and is not shown). This low pass filter determines the audio bandwidth of the AMSD–1. The audio bandwidth can be made wider (up to 100 KHz) or narrower by changing the value of C_3 according to the formula in footnote 4 of the schematic notes. From the low pass filter, the audio goes to the op amp in the XR-2228 chip for audio amplification. R_{F2} sets the gain of the op amp. Capacitor C_{out} blocks DC from the audio output.

For information about the price and availability of the AMSD–1 you should write to Burnes Electronics, P. O. Box 906, Ruston, LA 71273, and include a SASE. Back issues of *The Hollow State Newsletter* are available for $1.25 each; send Chris Hansen a SASE for current prices and availability at P.O. Box 1226, New York, NY 10159.



$+V_{CC}$ — 10 to 20 VDC
R_0 — 4.7 K ohms[1]
R_1 — 4.7 K ohms
R_x — 4.7 K ohms
C_0 — 470 pF at 455 KHz[2]
C_1 — 0.002 μF
C_2 — 100 pF[3]
C_3 — 0.002 μF[4]
C_{out} — 4.7 μF non-polarized

Notes: The 5.1 K resistors at XR-2228 pins 2 and 3 were changed to 4.7 K. The 8.2 K resistor in the impedance matching network at XR-215 pin 15 was changed to 10 K.

[1] R_0 and C_0 determine the lock range $\Delta f_l \approx 700{,}000/(\pi R_0 C_0)$ KHz, where R_0 is in K ohms and C_0 is in pF. $R_0 = 3$ K is shown on the schematic, but 4.7 K seems to give the widest lock range at 455 KHz based on experience with a prototype. $\Delta f_l = 100$ KHz for $R_0 = 4.7$ K and $C_0 = 470$ pF.

[2] $C_0 \approx 213{,}850/f_0$, where C_0 is in pF, f_0 is in KHz, and $f_0 < 5$ MHz.

[3] C_2 determines the capture range $\Delta f_c \approx \sqrt{\Delta f_L/(24\pi C_2)}$ MHz, where C_2 is in pF and Δf_l is in KHz. The formula predicts $\Delta f_c = 115$ KHz for $\Delta f_l = 100$ KHz and $C_2 = 100$ pF.

[4] C_3 is part of an RC low pass filter which determines AM audio bandwidth. The internal resistance at pin 16 of the XR-2228 is 5 K ohms. For $C_3 = 0.002\mu$F the cutoff frequency is about 16 KHz. The low pass filter bandwidth was determined from the cutoff frequency formula $f = 1/(2\pi RC)$ Hz, where R is in ohms and C is in farads.

FIG. 3 AMSD-1 SCHEMATIC

THE SHERWOOD ENGINEERING SE-3A PLL DETECTOR

Gene Pearson

The SE-3 is advertized as a "high fidelity phase locked AM product detector designed for use with a high quality communications receiver for vastly improved AM reception." It sells for $399 and may be ordered from Sherwood Engineering, Inc., 1268 South Ogden St., Denver, CO 80210. The quality of materials and construction is superb. The price includes four features, now standard, which were previously offered as options when the unit sold for $299: an audio notch filter factory set for 5 kHz (or set at 9 or 10 kHz for an additional $15); a synchro-phase detector for conventional operation and band scanning; a 3-position high frequency roll-off tone control; and a 3-position high frequency boost at 5 kHz. When ordering the SE-3 one specifies the receiver with which it is to be used, the receiver's final IF, and the 6 db bandwidths of the IF filters. SE-3's are manufactured only for IFs of 50, 100, and 455 kHz.

The SE-3's input requirement from a receiver is an IF signal level between 30 mV and 2V RMS. Its power requirement is 20-24 V AC at .75 A fed through a Jones connector on the back panel. A wall transformer (120 V primary, 24 V secondary), power cable, and mating Jones socket may be had from Sherwood for $15.

The SE-3 provides up to 5 W audio (30 Hz to 15kHz at -3db) through a rear panel RCA jack to drive a low impedance ($\geq$2 ohms) speaker. Robert Sherwood recommends the Radio Shack Minimus-7 speaker to take advantage of the higher fidelity afforded by synchronous detection. A buffered auxiliary audio output at 300 mV (25K ohms) is also provided through a rear panel RCA jack to drive a recorder or external amplifier. A low impedance headphone jack is provided on the front panel.

Sent with the SE-3 is an installation and instruction manual but no schematic diagram. Special instructions are included for adapting certain receivers for use with the SE-3, namely the NRD-515 and -525, and the Drake R-4C and R-7A. To summarize: with the NRD-525 and the R-7A, existing jacks on the rear panels of these receivers must be wired as IF output jacks to provide the input for the SE-3; with the NRD-515, either a lead to the AM diode detector must be clipped or a buffer-amplifier PC board manufactured by Sherwood for $20 must be installed ($20 more if he does it); with the R-4C, an optional interface must be ordered ($10) with the SE-3 which replaces the synchro-phase detector in the standard model, and Sherwood's PD-4 product detector ($35) should be installed in the R-4C.

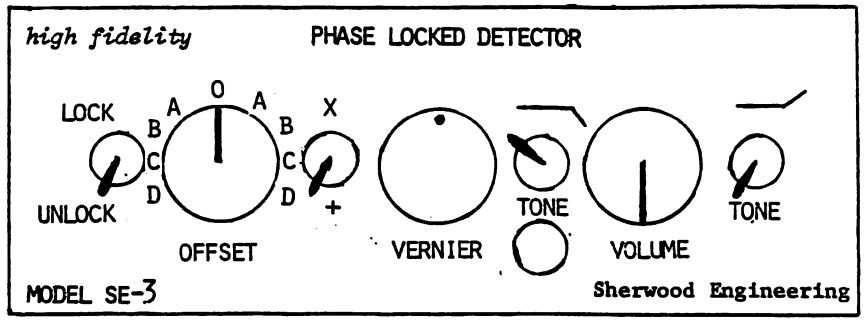
I would recommend to anyone considering the purchase of an SE-3 for any receiver other than the R-390A or one of the sets just mentioned that he or she call Robert Sherwood and ask about its compatibility with the SE-3. I found him extremely helpful by phone, though not by mail. He can be reached at 303-722-2257, 9 AM - 5 PM, Mon. - Fri.

The SE-3's narrow locking range of 30 or 40 Hz requires high frequency stablility in the receiver. Therefore the drifty Drakes are best used with the SE-3 after their warm up period is complete. The same holds for the R-390A, the receiver for which the SE-3 was originally designed.

On the front panel are seven controls: the two 3-position tone control toggle switches, one for the high frequency boost (flat, 3 db, or 6 db at 5kHz) and the other for the high frequency roll off (flat, medium, or full roll off); the 2-position toggle switch used to select either the synchro-phase detector or the product detector; the 2-position toggle switch used to lock or unlock the BFO signal onto the transmitted carrier for synchronous detection of AM signals; the on/off-volume control; the offset control used to select one of nine possible BFO frequencies (one at IF center, 4 lower, 4 higher); and the vernier control used to fine tune the BFO frequency to the center of the audible zero beat region.

The 8 BFO frequencies above and below IF center are set at the factory to achieve the highest possible audio fidelity with the particular receiver's IF bandwidths. (However, these preset frequencies may be adjusted $\pm$ 500 Hz by the user via timmers easily accessed inside the unit.) Two BFO frequencies are allotted for each bandwidth, one for LSB reception, and one for USB reception. Thus optimal LSB and USB offsets are selectable for up to four IF bandwidths. The vernier control varies the BFO frequency through a range approximately $\pm$60 Hz from the frequency selected by the offset control.

DRAWN APPROX. 2/3 ACTUAL SIZE



HWD = 3" x 8 1/8" x 5 3/4"

Using the SE-3 is fun for confirmed knob twisters. One begins by turning the receiver's AF gain to its minimum and the SE-3's volume up to a comfortable level. For non-synchronous reception and band scanning one selects the synchro-phase detector, or if one prefers the hets, one selects the product detector and the appropriate LSB or USB offset for the IF filter in use. To receive an AM signal in the phase locked synchronous mode one selects the IF bandwidth and corresponding LSB or USB offset one wants in light of QRM conditions. Then, with the SE-3's product detector on, the receiver is tuned to attain zero beat condition between the signal's carrier and and the BFO. The vernier control is then tuned to the center of the zero beat range, and the "lock-unlock" toggle is switched to "lock". That's it. With the flip of that toggle on most arm chair signals, a considerable (and yes, sometimes "vast") improvement in audio fidelity is experienced.

Non-synchronous ECSS reception of AM signals with my barefoot NRD-525 or my barefoot R-390A's is a great improvement over ordinary AM diode detection. The distortions caused by selective fades to the transmitted carrier are reduced by virtue of the steady BFO signal near synchronously superimposed on the carrier. Also, twice the range of audio frequencies get through the IF bandpass than get through when center tuned to the transmitted carrier using the same IF filter. However, the fact that the BFO cannot be perfectly and continuously synchronized with the transmitted carrier means that a new distortion is introduced which destroys true reproduction of the harmonic overtones contained in the selected sideband. The synchronous product detection of AM signals, either offset or center tuned, afforded by the SE-3 decisively eliminates this latter type of distortion. To my and my wife's ears, eliminating this distortion makes a considerable difference in program listening. She, who had never listened to more than a few minutes of SWBC programming at a time, was aurally captivated for an hour by a concert over the BBC via my R-390A/SE-3 combo.

The hard core DXer considering the prospect of acquiring an accessory for synchronous product detection of AM, whether it be the SE-3 or some other unit, will want to know: will it enable me to make out an ID I might not otherwise get? It is my opinion that the SE-3 used with the R-390A gives me a slight edge over the barefoot R-390A tuned in the non-synchronous ECSS mode on some signals due to the enhanced fidelity. However, it is not in squeezing out weak signal IDs that the SE-3 justifies its cost, but in general SWBC program listening.

I have only two suggestions for improvement of the SE-3. 1) If Mr. Sherwood could be persuaded to make the notch filter in the SE-3 tuneable, it would be a smashing addition. 2) For the DXer interested in having a maximum degree of control over each receiver function, a continuously variable BFO would be preferable to the step tuned one: it would allow the DXer to tailor his ECSS reception more finely for each situation for maximum QRM rejection. While the offsets provided by Sherwood, which place the transmitted carrier at one or the other edge of each filter's 6 db bandpass, do insure the highest possible audio fidelity attainable with the receiver's IF filters, DXers are willing to sacrifice fidelity to fight QRM in tight places. In such circumstances, I revert to non-synchronous ECSS reception with the barefoot R-390A.

I have yet to rewire the DC output jack on the back of my NRD-525 as an IF output, so I can't evaluate the SE-3's performance with that receiver. However, the rewiring would appear to be easy, judging from the instructions provided in the manual.

In my telephone conversation with Robert Sherwood before I bought the SE-3, he said I would love it. I do.

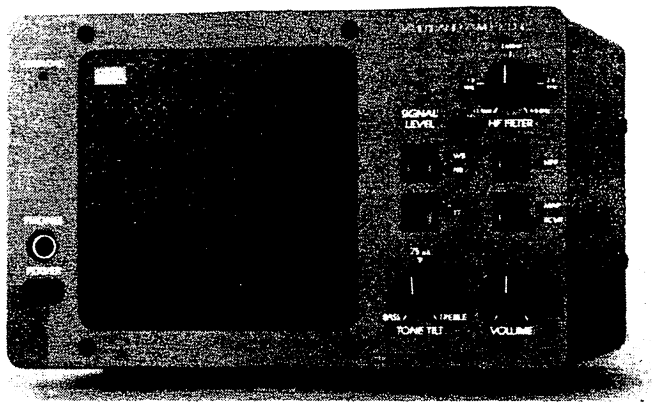
For further reading:

"Sherwood SE-3", 1983 World Radio TV Handbook, pp. 590 - 592.
"Shortwave's Best Fidelity System - For a Price", 1984 World Radio TV Handbook, pp. 594 - 596.
"General Catalog", Sherwood Engineering, Inc., 1988.

THE KIWA ELECTRONICS' MULTIBAND AM PICKUP

Guy Atkins

Any traveler knows that a map is a great help in reaching his destination. For the radio enthusiast, the recent introduction of the "MAP" by Kiwa Electronics promises to be a similar advantage for enjoyable listening.



The Multiband AM Pickup (MAP) is an unusual receiver accessory that provides synchronous detection, improved audio fidelity and selectivity, and other features for AM reception on many receivers. The MAP was designed by Craig Siegenthaler, the "one man band" behind Kiwa Electronics in Seattle, Washington.

●THE AUDIO QUALITY DILEMMA

A reading of *A DXer's Technical Guide, Second Edition* (IRCA), and last year's *Proceedings* reveals numerous references to the audio quality of all types and vintages of receivers. These two books were written by experienced mediumwave and shortwave enthusiasts, a cross-section of DXers. Their comments are often negative, and it's clear that the ranks of both tube and solid state radios have their share of clinkers in the audio department.

Signals struggling through an unpredictable ionosphere are already distorted before they reach the antenna. Most shortwave receivers available today do little or nothing to hold this distortion to reasonable levels. The 1985 WRTH reported that the ICOM R71A exhibits up to 30% audio distortion at 80 Hz! Listening over a long period can be very tiring. Not only does the program listener miss out on pleasant reception, the DXer is left wondering if his receiver is adding to his struggle to hear and identify stations.

The technology to accurately reproduce the audio in a received signal has existed for some time. However, manufacturers understandably make compromises; selectivity, stability, image rejection, etc. need to come first. Yet even the best receivers are normally optimized for single sideband reception, not AM.

What could the listener expect if factors such as signal detection, AGC, tone control, and IF/AF filtering were chosen specifically for the reproduction of AM signals.

●DEVELOPMENT HISTORY

Enter Kiwa Electronics. Craig Siegenthaler's background as a broadcast station engineer led him to look for a way to improve the quality of AM reception. Craig has worked at leading AM/FM stations in Seattle and with NBC in Washington DC seeking to maintain transmitted signal quality and in turn, help his stations win the all-important ratings war. He has also worked with PJZ-86 Radio Curom in the Netherland Antilles and with other stations in the Caribbean.

While living in Curacao, he began to look for ways to improve AM reception on his ICOM R71A. His experimentation began with a simple synchronous detector, and gradually expanded into other areas of reception enhancement. Many techniques were tried over a two year period. The result of his work is the Multi-band AM Pickup, a new twist in a receiver acccessory.

Craig believes there is a need in the marketplace for an "all in one" type of audio enhancing unit like the MAP. Synchronous detector add-on boards such as ESKAB's have their place, but they only address one aspect of the problem. Kiwa's MAP accessory bypasses many of the receiver's distortion-inducing stages and processes the signal in a manner specifically designed for the AM transmissions. The MAP's signal processing is completely analog, with no digital filtering. The signal exits the radio at the 455 KHz I.F. stage and does not return to the receiver.

The MAP is essentially the second half of a communications receiver optimized for AM listening. It will not work with SSB signals or CW.

All tuning while using the MAP is normally done with the receiver in AM. Because the I.F. signal is picked up ahead of the receiver's detector, changing to LSB or USB has no effect except to shift reception away from the carrier frequency by the LSB/USB offset amount (usually 1.5 kHz).

My participation in the MAP's development involved the front panel design, graphics layout, and field testing. I'll strive to review the unit objectively, detailing how it can improve both your SWLing and DXing.

●DESCRIPTION & FEATURES

A self contained unit (including speaker), the MAP works with any receiver employing the common I.F. frequency of 455 KHz. (The MAP will not work with any other I.F.) By use of either a direct or inductive pickup the 455 KHz signal is intercepted and reconditioned to provide lower noise & distortion, improved selectivity and a flatter frequency response. The MAP is composed of 21 integrated circuits and 19 transistors specifically chosen for low noise and distortion.

The MAP's chassis is sturdily constructed of 20 gauge steel with a .030" aluminum front panel. The entire chassis is produced on a computerized metal forming machine that allows professional touches like rounded corners and a precise fit of all parts. This is definitely *not* a homebrew piece of electronics.

The chassis and front panel are two shades of gray in a "powder coat" paint applied for durability. Knobs and pushbuttons are black. Labels for all controls are silkscreened white for good visibility. The Kiwa logo and MAP name are in blue. The overall effect is a professional, slightly "military" look that fits in well with modern communications receivers. Dimensions are 8.2 x 5.1 x 7.5 inches.

Circuit boards are made of durable glass epoxy, with high quality components well-spaced for serviceability. All switches except the power switch are electronic FET types for long life. The MAP is powered by an AC adapter (provided) or can be battery powered from 12.5 to 15.5 volts.

PICKUPS: A direct connection "pickup" or an optional inductive pickup couples the receiver's 455 KHz I.F. signal to the MAP. The MAP is normally supplied with a direct pickup which easily attaches to the proper point (before or after the radio's I.F. filters, depending on type of receiver and/or selectivity desired) by use of a spring-loaded microclip. *No receiver modification or internal rewiring is required,* and the pickup is removable so that the MAP may be used with other 455 KHz I.F. radios.

For tube and portable receivers the indirect (inductive) pickup is recommended. This device "sniffs" out the I.F. signal near I.F. transformers or coils. Both pickups are housed in a small plastic box and use a low noise preamplifier and a thin coax cable that transfers the signal and DC power. The MAP instruction manual contains detailed information for installing pickups in the receiver. Generally, the pickup housing is secured with Velcro (provided) to the inside of the receiver. A small alligator clip wired to the pickup attaches to a convenient receiver chassis ground point, and a micro-clip attaches to a location where the 455 I.F. signal is available (often the cathode of a switching diode before or after the receiver's filters). The thin coax exits under the edge of the receiver's cover, and delivers the signal to a 455 kHz input jack on MAP's rear panel.

SYNCHRONOUS DETECTOR: The heart of the MAP is its synchronous AM detection, a mode pioneered in consumer-grade receivers by the Sony ICF-2010. The synchronous detector in the MAP is a non-PLL type. Employing an enhanced-carrier technique, the MAP's detector is able to extract audio even from very weak AM signals while providing low audio distortion (<1.0% THD). The diode (envelope) detector found in most receivers is by its nature threshold sensitive, meaning detection cannot happen until the signal is higher than the forward voltage drop of the diode. The MAP's detector is not limited in this way, and a more complete and accurate rendition of audio information is the result.

Perhaps the main advantage of the MAP's detector is the ability to tune further off the carrier frequency to favor reception of either sideband *with less distortion* than diode detectors. It also has an edge over most other synchronous detectors in this respect; the majority of PLL-type synchronous detectors require that the receiver be tuned to the center of the carrier. For example, the Sherwood SE-3 and ESKAB's PLAM board for the R71A employ a PLL-type synchronous detector that loses signal "lock" if the receiver is tuned more than 35-40 Hz away from the carrier. The Kiwa MAP in wideband mode allows tuning as much as 3 Khz either side of carrier before significant distortion arises. As with other synchronous detectors, selective sideband distortion is reduced with the MAP if the receiver is tuned to fully capture a single sideband.

The diode detector normally found in receivers requires a proper carrier-to-sideband energy ratio for low distortion audio, a condition that is upset when tuning away from the carrier.

FILTER BANDWIDTHS: Using up to six cascaded ceramic filters which are followed by AF filtering, Craig has tailored the selectivity of the MAP for excellent adjacent channel rejection and a very flat passband. The narrowband position is 2.9 KHz at -6 dB and 4.6 KHz at -60 dB; the wideband position gives 6.9 KHz at -6 dB and 9.2 KHz at -60 dB.

Advertised shape factors for the narrow and wide bandwidths are conservatively rated at "better than 1 : 1.8" and "better than 1 : 1.45", respectively. Actual measured values are given in a custom *Certificate of Performance* supplied with each MAP. My particular unit has shape factors of 1 : 1.54 and 1 : 1.32, with total IF/AF ultimate rejection of -111 dB (narrowband) and -103 dB (wideband). Each MAP's actual parameters will vary, but will be within advertised limits.

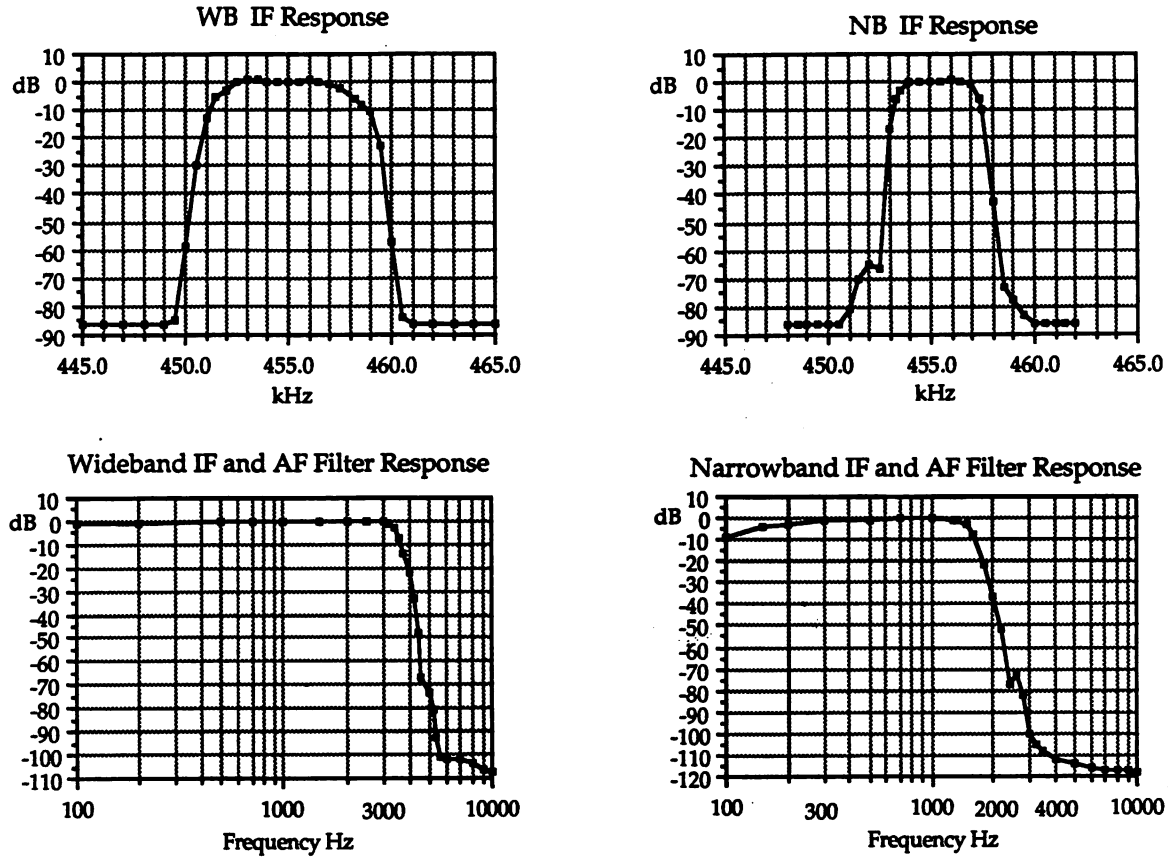
The specifications for Collins F455FD series mechanical filters suggest that the MAP's combined IF/AF bandwidths perform as well or better. I studied data sheets and found two interesting comparisions. According to Collins literature, the filters in the F455FD series typically have an ultimate rejection of 90 dB and 1 : 2.0 shape factors. The MAP's 2.9 KHz bandwidth is significantly narrower at -60 dB (4.6 kHz compared to 7.0 kHz for the Collins). A Collins F455FD 3.8 KHz filter is 9 KHz wide at -60 dB; the MAP's wideband position achieves nearly the same deep skirt selectivity (9.2 kHz at -60 dB) while providing 80% more useful audio at -6 dB (6.9 KHz for the MAP compared to 3.8 kHz).

Depending on your radio, more selectivity combinations may be available by attaching the pickup after the receiver's filters. For example, a stock NRD-525 used with a MAP unit provides five bandwidths when

the pickup is placed post-filter; two bandwidths result when the pickup is located before the receiver's filters. The owner's manual gives details on this option for current receivers.

If 2.9 and 6.9 KHz seem rather wide compared to the usual 2 and 4 KHz widths found in good receivers, remember that the MAP's bandwidths have excellent shape factors and ultimate rejection. The non-PLL synchronous detector also allows more latitude in tuning before the point where distortion sets in. However, there are times when I wish the MAP included an intermediate width such as 4.5 KHz at -6 dB. Fortunately the "post filter" hookup with my NRD-525 gives other combinations, permitting signals to pass through filters in both receiver and MAP.

By the use of good quality, cascaded ceramic filters, certain distortion products that may occur with mechanical filters are avoided. Listening sessions confirm that Craig has found a combination of ceramic filters that function very well indeed. Considering that two Collins filters (plus installation) cost nearly as much as the entire MAP unit, this is quite an accomplishment. The following charts show selectivity curves of the bandwidths:



AGC: Automatic Gain Control circuitry in the MAP is designed for proper reception of AM signals. The MAP attaches to the receiver ahead of its AGC stage (in most cases), but some AGC action can occur before the MAP intercepts the signal. In the case of the NRD-525, it appears that significant AGC occurs before the pickup point. On signals with rapid flutter, reception can be improved by lowering the receiver's RF gain and turning the AGC off, which permits the MAP to control the signal.

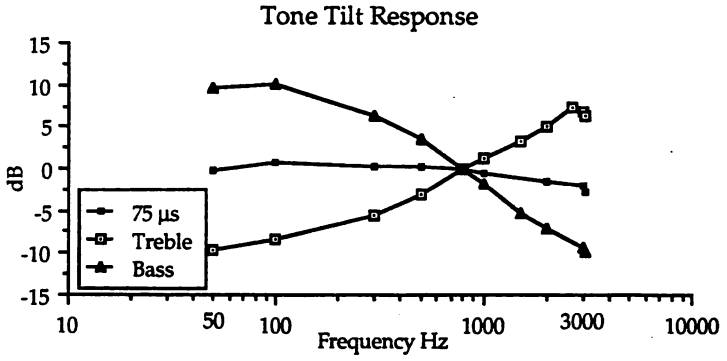
MONITOR AMPLIFIER & SPEAKER: A low distortion audio amplifier provides over six watts of drive to a polypropylene treated speaker which was chosen for its low "coloration". After extensive tests of many samples, this speaker was found to have the cleanest reproduction. It's a true hi-fi model and sounds excellent. The audio amplifier and speaker combination can fill a room with impressive volume.

A standard 1/4" phone jack disables the speaker, and works with either stereo or mono headphones. A nice touch in keeping with the MAP's approach to clean audio is a front panel "overload" LED that flashes if the amplifier is driven into distortion with excessive levels.

HIGH FREQUENCY FILTER (HFF): This control is basically an A.F. notch filter, calibrated and tunable from 1.1 KHz to 4.5 KHz. It operates to best advantage in the MAP's wideband position. The *Certificate of Performance* for my MAP indicates a -35 dB depth capability at 2.4 kHz. The HFF is not strictly for hetrodynes. It's main purpose is for audio tailoring and noise attenuation, and the HFF's notch width is wider than usual for this reason.

SIGNAL INPUT LEDs: Yellow, green, and red light-emitting diodes on the front panel give a visual

indication of the signal strength provided by the pickup. The LEDs do *not* function as an S-meter, but instead are a guide to signal level for optimum synchronous detection. Synchronous detection occurs even with low signal pickup (yellow LED), but the best signal-to-noise ratio and the lowest distortion occurs when the green LED is lit. This stage of the MAP incorporates an automatic level control which keeps the green LED glowing with most signals; a rear panel control allows adjustment of this range if necessary.



TONE TILT: I know of no other communications receiver or accessory that employs this type of tone control. This device is found in professional audio equipment and allows a wide range of tone adjustment by operating in a "teeter totter" fashion. As the bass is boosted, the treble is cut (or vice versa). The tone tilt provides over 16 dB of variation throughout its range. The center position of the tone tilt will be particularly interesting to mediumwave listeners, as it gives a flat frequency response for MW stations using a 75 microseconds pre-emphasis. This is becoming a standard for MW stations in the USA and the MAP compensates for the boost when the control is centered. Response curves are shown above.

MAP/RECEIVER CONTROL: A quick tap on this button gives an instant "A/B" comparision between the MAP audio and the original receiver audio. The receiver's headphone output is connected to the MAP with a supplied cable. The "receiver" position also allows any other audio source such as a tape recorder to take advantage of the good amplifier and speaker in the MAP.

Switching between MAP audio and original receiver audio with this control DOES NOT interrupt the processed MAP audio you may be sending to a tape recorder.

REAR PANEL CONNECTIONS: The following connectors and controls are found on the back of the Kiwa Multi-band AM Pickup: 455 KHz INPUT (I.F. signal from the direct or indirect pickup mounted in the receiver); INPUT LEVEL (adjusts with a small screwdriver for a green LED signal level on most signals); 455 KHz OUTPUT (a post-filtering I.F. signal useful for spectrum displays, panadapters, etc.); RECORD OUTPUT (synchronous detection audio output for tape recorders and measurement purposes); RECORD LEVEL (adjustable for both portable cassette recorders and tape decks); RECEIVER INPUT (audio from receiver's headphone jack, external speaker output, or other audio source); GROUND (a supplied ground wire & alligator clip connects this terminal to the receiver's ground terminal for proper operation of the MAP); DC POWER (supplied DC adapter plugs into this jack, which is wired in series with an internal fuse); + BATTERY (12.5 to 15.5 volts).



OWNERS MANUAL: Tired of vague, incomplete, poorly produced owners manuals? I suspect Craig Siegenthaler has struggled through sloppy manuals, too, because he has put many hours into an excellent guide. This manual contains descriptive text and graphics; performance charts (including a certification letter from the independent testing lab Hatfield & Dawson, and a detailed *Certificate of Performance* for each serialized MAP unit); clear hookup instructions with schematics and pictoral diagrams for the R1000, R2000, R70, R71A, NRD-515 and NRD-525 receivers; guidelines for hookup to other 455 KHz I.F. receivers; specifications; operating instructions; alignment information; MAP circuit schematics; and customer service information. The MAP's manual was produced on a Apple Macintosh SE computer and laserprinter, resulting in an attractive publication.

●OPERATION

The MAP is quite simple to use. With the MAP hooked up properly, the receiver's AF Gain is adjusted so the volume level with the MAP in *RCVR* position is equal to the volume heard through the *MAP* position. This permits a fair comparison of audio quality.

Stations are normally tuned with the receiver in AM mode. Adjustments to the audio quality are made

with a combination of receiver tuning (i.e. tuning off carrier or using Passband Tuning control), receiver bandwidth, MAP bandwidths, MAP Tone Tilt, and MAP High Frequency Filter.

Usually, I like to tune the receiver while listening to the MAP's synchronous detection audio with no other controls engaged. When I settle on a station I try various settings of other controls to see if any improvements can be made. I particularly like the combination of MAP wideband, +/- 1 kHz offset tuning from carrier, and Tone Tilt enabled in the 8 o'clock to 9 o'clock position. This seems to provide a bandpass effect that sometimes improves the signal-to-noise ratio. The MAP manual describes other useful tuning techniques.

● LISTENING IMPRESSIONS

As you would expect from a product offering so much flexibility, sufficient time at the controls is required to learn how to use the MAP to best advantage. It took me a few days to really master the controls and understand how to use them with various signal situations on the SW bands. Also, I wasn't accustomed to scrutinizing the audio quality of signals. As a typical DXer I had become accustomed to ignoring noise, fading, distortion, and other distractions. The Kiwa Multi-band AM Pickup made me expect more in audio quality.

The difference that the MAP can make in the fidelity and intelligibility of signals ranges from subtle to amazing. The effects are as varied as the signals found on the MW and SW bands. Clearer speech is the norm, due in part to improved reproduction of consonants such as Cs, Ks, and Ts which contribute to speech clarity. Voices seem to lift up out of the "mud", and station IDs are usually easier to catch. I have found that I begin to understand words and phrases in DX signals with the MAP in operation, when only the language was discernable through my NRD-525 alone. If you can imagine an announcer talking through a scarf or handkerchief, and then removing it, you will have an idea of how the MAP adds clarity to a signal. The MAP's low distortion also reduces listener fatigue during long DX sessions. Your ears will thank you for the relief.

John Bryant, an experienced Indo chaser from Stillwater, Oklahoma, was one of the first DXers to put Kiwa's Multiband AM Pickup to the test. He comments that *"the first morning I used my MAP, I heard a full ID on 'Radio Pemerintah Daerah Tingkat Dua Sumbawa' for the first time in my life. In fact, it was the first time I have clearly heard the 5 or 6 words of an RPD indentification all at the same time on any RPD reception from the Central USA. The additional clarity, especially on muffled languages, is startling!"*

Music is likewise improved. Local MW stations sound *excellent* in wideband (post-I.F. filter hookup on a NRD-525, "AUX" position). If you're a fan of the wide variety of music heard on shortwave, you will appreciate the MAP's fidelity. Stronger, interference-free signals are very impressive— the Afro-pops heard on *Africa Number One* (15475 KHz) seem to jump out of the speaker. Music from stations with marginal reception through the NRD-525 alone often becomes very listenable when processed by the Kiwa MAP.

I have heard the MAP in operation with an Icom R70 and R71A, Kenwood R1000, JRC NRD-515 and a NRD-525 (the NRD-525 sounds even better with the MAP when its AGC is modified; see article elsewhere in *Proceedings 1989).* Particularly impressive to me is the MAP's ability to greatly reduce receiver-generated "hiss". The NRD-525 has this problem which is not phase (synthesizer) noise, but reportedly is caused by interaction of stages or components on the I.F. board. When the MAP is switched in, the hiss totally disappears. This solves a major complaint I had about the NRD-525.

I have also heard the background noise level on the NRD-515 and R71A drop with the MAP attached.

In some ways the MAP accentuates the normal aural shortcomings of SW communication and studio environments. Previously inaudible chair squeaks, shuffling papers, and other background noises are occasionally audible to the careful listener. It's as if the sound of a broadcast is put under an "audio magnifying glass". A 1984 WRTH article describes the same peculiarities when using the Sherwood SE-3 synchronous detector. John Bryant mentions that his first reception with the MAP was an open-air interview on the BBC, and he could tell the announcers were in a train station. Without the MAP the background sounds were unnoticed.

The MAP provides sufficient controls for the radio enthusiast to tweak the sound to his liking. When interference and other problems cannot be reduced sufficiently, the overall fidelity and intelligibility is usually enhanced enough to warrant using the MAP.

Noise and static occasionally seem louder or stronger through the MAP because the MAP reproduces *all* signals better. There seems to be a greater high frequency (treble) component to noise that isn't audible in similar filter bandwidths with a diode detector.

There are two reasons for this. First, the MAP's IF/AF filter combination provides a flatter passband than many filters that experience a roll-off in treble response. Second, the MAP's synchronous detector reproduces high frequency information not normally heard through a threshold-sensitive envelope detector.

The NRD-525 is one of the more sensitive receivers around, but it improves significantly when hooked up to the MAP. (The NRD-525 does not use an envelope (diode) detector, but a "Synchro Phase" type of synchronous detector roughly similar to the MAP's.) I was pleasantly surprised to discover that the NRD-525/MAP combination occasionally pulls audio out of signals that only present a hetrodyne on the NRD-525. The improvement is sometimes dramatic.

In rare instances, problems in reception are masked by the receiver's own detector to a degree that listening to the receiver alone is preferred. As my skill in operating the MAP increased, these "receiver only"

situations became less frequent. I learned to quickly recognize which signals needed a certain combination of MAP settings for best reception.

It is possible to set up a signal processing "loop" using the MAP and another device like a active audio filter or graphic equalizer. The MAPs *Record Output* jack feeds synchronous detection audio to the input of another accessory. That unit's processed output goes to the MAP's *Receiver Input*. The *RCVR* setting of the *MAP/RCVR* control is then used to listen to the fully processed audio. If you enjoy knob twiddling, this is the set-up for you. Note however that the MAP cannot alter the audio that returns through the *Receiver Input* (audio) jack; it simply passes it on to the high-quality speaker. The same is true for audio from a tape recorder or other source.

There are a few things that I do not like about the MAP. When the unit is powered up, a brief, sharp "thump" is heard from the speaker, and pressing the *MAP/RCVR* or *WB/NB* buttons at any time creates a "pop" sound over the speaker. These are fairly minor complaints, however.

A little more bothersome is audio leakage around the volume control. Even with the volume control turned down completely, some audio gets through to the speaker and is faintly heard. I often tape record programs for later listening, and I don't want to hear audio from the MAP when I'm reading, etc. in a quiet room. Craig Siegenthaler has spent quite some time troubleshooting these problems, but so far no satisfactory solutions have been found.

●THE BOTTOM LINE

As a new accessory, it will take time to see whether this concept in audio enhancement catches on. As SWLs and DXers become more aware of the importance of clean audio, I hope we'll see manufacturers respond with better sounding receivers. Until these new rigs arrive, the Kiwa Multi-band AM Pickup can give a sizeable boost to fidelity and intelligibility.

That this unit is able to work with more than one receiver is a plus, too. Kiwa Electronics has plans to offer a junction box unit for those who own multiple receivers. This accessory will use FET electronic switching for quick and easy selection between four receiver inputs to the MAP.

In all, I've found the Multiband AM Pickup to be a worthwhile and flexible addition to my receivers.

●PRICE AND ORDERING INFORMATION

The MAP costs $340.00 (U.S), and it comes with a 30-day trial period during which the unit may be returned for a full refund. The MAP is also covered by a one year warranty. The MAP is shipped with an owner's manual, a direct pickup, AC power adapter, and various connectors and cables for hookup.

The optional indirect (inductive) pickup and additional direct pickups cost $40.00 each. Purchasing the indirect pickup is strongly recommended if you plan to use the MAP with a tube receiver.

The MAP and available accessories may be ordered direct from Kiwa Electronics. For complete ordering and shipping information, or for more details on the MAP, contact: Kiwa Electronics, 9815 61st South, Seattle, WA 98118. Phone: (206) 722-KIWA.

●SPECIFICATIONS

The following specifications are conservative, and they are the figures which Kiwa Electronics uses in their literature. Actual measured values (noted in the *Certificate of Performance)* typically are superior.

DC POWER REQUIREMENTS: 24 vdc at 400 ma DC adapter; current drain 220-250 ma at avg. listening levels; battery 12.5-15.5 vdc

NARROWBAND: (combined IF/AF filtering) +/- 1.5 dB bandwidth: 2.6 kHz +/- 200 Hz. -6 dB bandwidth: 2.9 kHz +/- 200 Hz. -60 dB bandwidth: 4.6 kHz +/- 200 Hz. Shape factor: better than 1 to 1.8. Ultimate rejection: 90 dB or better.

WIDEBAND: (combined IF/AF filtering) +/- 1.5 dB bandwidth: 6.2 kHz +/- 200 Hz. -6 dB bandwidth: 6.9 kHz +/- 200 Hz. -60 dB bandwidth: 9.2 kHz +/- 200 Hz. Shape factor: better than 1 to 1.45. Ultimate rejection: 90 dB or better.

AUDIO PERFORMANCE— WIDEBAND. Frequency response: +/- 1.5 dB 50 Hz to 3.1 kHz, +/- 100 Hz. Harmonic distortion: <1% THD (500 Hz, 60% mod.)

AUDIO PERFORMANCE— NARROWBAND. Frequency response: +/- 1.5 dB 50 Hz to 1.3 kHz, +/- 100 Hz. Harmonic distortion: <1% THD (500 Hz, 60% mod.)

HFF— HIGH FREQUENCY FILTER: tuneable from 1.1 kHz to 4.5 kHz, minimum 25 dB depth

TONE TILT: minimum 16 dB tilt 50 Hz to 2.7 kHz

DIRECT PICKUP: useable input range >70 dB (200 uV to 1.0 Vrms)

455 KHZ OUTPUT: 0.05 Vrms nominal output level

RECORD OUTPUT: -50 dB to +4 dBV adjustable, unbalanced

RECEIVER INPUT: balanced differential input

MONITOR AMPLIFIER: bridge amp. with 6 watts RMS output at 8 ohms

HEADPHONE AMPLIFIER: 3 watts RMS output at 8 ohms

OPTIONS: indirect I.F. pickup for tube and portable receivers

PHYSICAL: 8.2" x 5.1" x 7.5" (208mm x 130mm x 190mm)

features

A JAVAN FANTASY
The DXers View of Java

Bill Sparks

Java is a logical starting point for any Indonesian DX survey. It is not the largest island in the Indonesian archipelago by far, but it has the largest population. It was the center of government during the colonial period and has remained so since independence.

Java is a beautiful tropical island with many towering active volcanos. Geographers claim that 35% of the approximately 100 volcanos are active. Java is about 700 miles long from east to west and is 45 to 165 miles from north to south with high volcanic mountains in the center for the full length of the island. It is located between 6 degrees and 8 degrees south of the equator. My map shows the distanc by road between Merak on the west coast on the Sunda Strait to Banyuwangi on the east coast Bali Strait to be 1170 kilometers or about 727 miles.

Jakarta, the national capital, is a separate administrative area similar to the District of Columbia in the U.S.A. It is known as Khusus Jakarta Raya.

The large administrative divisions of the island are Propinsi Jawa Barat (West Java); Propinsi Jawa Tengah (Central Java); Daerah Istimewa Yogyakarta, an area carved out of Jawa Tengah; and Propinsi Jawa Timur (East Java). The satellite island of Madura, just off of the north east coast of Java is an administrative part of Jawa Timur.

It is important to determine in which of these administrative provinces any Javan station that you log is located. When writing a reception report to the station, the province is normally included in the address.

Java's location is in both the western and central Indonesian time zones, but the line between western and central time has been stretched out to the east around the eastern end of Java and Bali so that all of Java is in the G.M.T. +7 hours western time zone. In Indonesian this time zone is called waktu Indonesia Bagian Barat. The 24 hour clock is in use throughout Indonesia.

For many centuries this island has attracted traders, migrants, and frequently colonial masters from India, Portugal, England, Islamic nations, and finally, the Dutch. We could also include the invading Japanese during World War II. The influence of these can be noted in the great variety of programs and music that DXers can enjoy over the short wave stations on the island of Java. Most often heard will be the Islamic call to prayers and Koranic recitals, Arabic-style music, the keroncong music brought in by the Portuguese, and, of course, the gamelan.

The importance of Java in Indonesian DXing is due to the numbers game which is so dear to the heart of most DXers. Over the years Java has been the center of short wave broadcasting in Indonesia. I have checked my records going back to 1934 and find that Java has been the source of 42% of my Indonesian stations logged. It has accounted for 38% of my Indonesian stations QSLed.

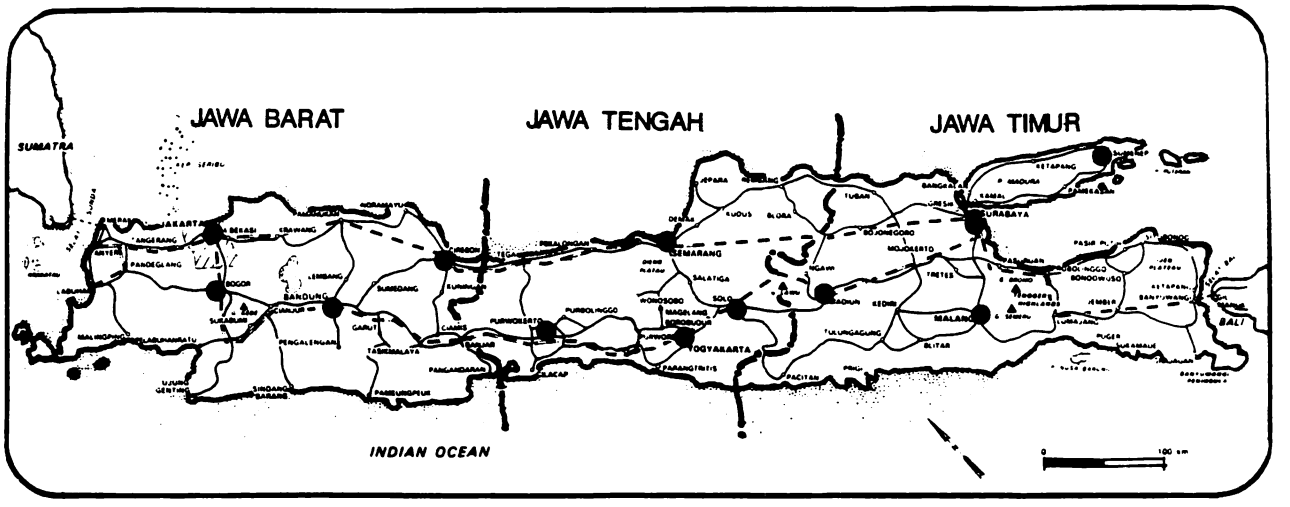
It is ironic that although Java leads other islands in the number of active short wave stations in recent years, at the present there are only three or four Javan stations that provide consistent reception in North America. They are the Radio Republik Indonesia stations in Jakarta, Yogyakarta, Surakarta and perhaps Bandung. There are many other RRI stations and unknown numbers of Radio Pemerinta Daerah (RPD) and other non-RRI stations that provide targets of moderate to very great difficulty for the dedicated Indonesian DXer.

In the beginning

Short wave broadcasting began during the late Dutch colonial period before World War II. All of the early stationswere located on Java. NIROM, the Netherlands Indies Broadcasting Company Limited, started broadcasting on March 31, 1934. It soon had high frequency stations located in Batavia (now Jakarta), Surabaya and Bandung that were to provide reception for listener throughout all of Indonesia. These broadcasts were mostly in Dutch. There were some very low power stations providing local language service to the Indonesian population. This type of broadcasting service has been replaced by today's RPD's.

Short Wave Today

At the present time, as all Indonesian DXers know, the nationwide Radio Republic Indonesia system provides the signals most often heard from Java. But there are several RRI stations in Java that are extremely rare and difficult DX. In fact it is a problem to determine whether some of the stations are on the air. Transmitter and antenna breakdown is a frequent problem causing stations to go off the air for extended periods.



THE ISLAND OF JAVA

Broadcasting in a hot, moist, tropical climate creates maintenance difficulties for even the more prosperous RRI stations. The smaller RPD stations in many cases are home brew and operating on a financial shoestring. So it is no wonder that there is constant change in these stations. Many operate with such low power or poor equipment that DXers located several thousand miles away have no way of determining if the station is off the air or if reception conditions are so poor that they are not coming through.

Attempting to draw up a definitive list of short wave broadcasters presently operating in Java which would include all of the RPD's is virtually impossible. Any such list would probably be out of date by the time thatit was printed. Stations drop off the air and others return is rapid succession. Ace Indonesian Dxer Ralph Perry and the Australians Geoff Cosier and Dave Foster have visited many of the stations in Java and listened to them close to the transmitter sites. They have reported that many of the RPD's simply do not know their exact frequency of operation. The wrong gelombang (wave length) is announced over the air or is quoted in their correspondence. These visiting DXers and others have attempted to obtain an "official" list of RPD and Kotamadya stations from the RRI headquarters in Jakarta only to be informed that no such list exists and that no attempt has been made to assign frequencies to these low power local stations.

Therefore in lieu of a complete listing of stations definitely known to be broadcasting from Java today, (which would be very short), I decided to make a complete review of my rather voluminous Indonesian files and to show what towns and cities in Java have had short wave broadcasters in operation during the last ten years or so. A statement of the present status of each will be provided if it can be determined.

One reason for such an approach to the problem is that many Indonesian stations are off the air for several years only to return at close to their former frequency after repairs or the installation of a new transmitter.

In describing the stations in Java, I have drawn upon the many reports that Ralph Perry made to the private DX club Numero Uno (NU) during his Indonesian travels and on the reports appearing in several back issues of Down Under DX Survey (DUDXS) issued in the early 1980's by Geoff Cosier and Dave Foster in Australia. Dave consumed much time and money in correspondence with known RPD's and suspected RPD's, the results of which were published in DUDXS #19 in 1982. I believe that Dave and Geoff will agree that seeing some of their past efforts on behalf of Indonesian DXers reprinted in Proceedings 1989 will be of more use to present DXers than having than having them remain in my files. So let us look at the many short wave broadcasters operating in Java during the 1980's.

Fortunately, Fine Tuning (FT) has had some recent reports from Indonesian DXer Aboe Thaliep of the Radio Listeners club of Indonesia. These reports have provided current information on some of the RPD stations and the more difficult RRI's.

Instead of an alphabetical arrangement or a listing by frequency, I will make a tour of Java with stops at each station. The map that I am using is a beautiful large color map of Java, Madura and Bali. 40 by 19½ inches with the west half of Java on one side and the east half, Madura and Bali on the other side. It is a Nelles Maps, Indonesia #5 by Nelles Verlag purchased at a Rand McNally map store.

For a detailed description of the cities and towns that we are visiting, I recommend the 1988, 4th edition of the Indonesian Handbook by Bill Dalton published by Moon Publications, a book that every Indonesian DXer will want.

My tour will be the story of the Javan RPD stations, which far out number the better heard RRI stations. Unfortunately the history of most of these favorite DX targets will be repetitious. When I completed my research, I was shocked at the large number of Javan RPD's that are now on medium wave only or appear to be inactive on SW. The RPD's should be classified as an endagered species! Fortunately, some of them that deserted short wave have returned. We can only hope that more will eventually return.

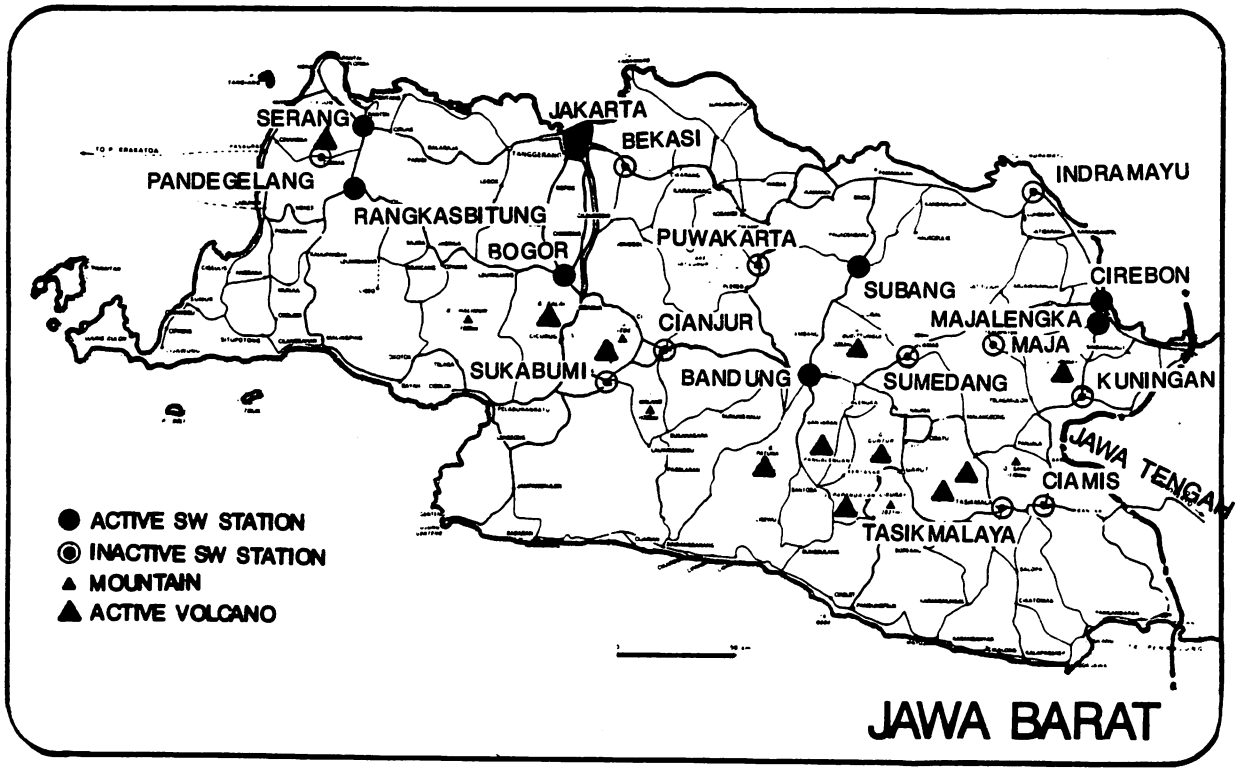
DAERAH KHUSUS JAKARTA RAYA

JAKARTA

As our Garuda Air line flight approaches the Jakarta airport, we can see the capital city of Indonesia, a sprawling city of over 8 million people. Here are the head offices and studios where the Program National of RRI originates, with the often heard Jakarta berita berita. The programs of the international service, Voice of Indonesia, also originate in Jakarta, but the transmitter locations aren't always on Java. RRI Jakarta has several high power transmitters on the high frequency bands as well as some lower power transmitters on the tropical bands. This is one station that DXers should have no problems hearing. The schedule and frequencies listed in WRTH are accurate except possibly for 6045. The most consistent reception of Program National in California has been during the 1000 - 1705 segment with 7270, 9680, 11770 and 11865 all heard well at times. There is usually some co-channel QRM. The strongest frequency seems to be 11865. The tropical band frequencies of 3277 and 4774 can be heard on mornings of good propagation. The listed 120 meter band frequency is sometimes heard in Australia, but the 120 meter Indonesians have not been making it to my QTH in California. The listed frequency is 2307. I have heard RRI Jakarta on 6045 only three or four times. I believe that this frequency is not active at present. There is no signal there even when the frequency is clear of QRM.

Aboe Thaliep has reported some Jakarta stations between 2340 and 2600 which apparently have not been heard outside of Java and could be amatir or unofficial stations. Several years ago there was an Indonesian Air Force station, Radio Angkatan Udara, on 11903. It was a good verifier with replies in English. However, the military stations appear to have closed down.

JAWA BARAT



BEKASI

Before we start our trip around Jawa Barat by going to the west coast, we make a short detour a few miles to the east of Jakarta to Bekasi. There was a 120 meter band station here, RKPDT2 Bekasi on 2405 in 1983. It is no longer active.

SERANG

Our tour now takes us west along highway 25 toward the ferry across the Sunda Strait to Sumatra. We arrive at the small town of Serang which had an active station until quite recently. It is RDK Serang on 3101.7. I have heard it through QRM a few times in 1983. It is still listed in the DSWCI Tropical Bands Survey (TBS),

but I haven't seen any recent loggings. This is a good frequency to watch.

PANDEGELANG

Our next stop a short distance from Serang south on highway 2 is at the foot of Mt. Karang. It is the small town of Pandegelang, said to be one of the neatest towns on Java. RDK Pandegelang was heard on 3347 several years ago, but its present status is unknown.

RANGKASBITUNG

The trip to Rangkasbitung takes us due west from Pandegelang to the upper reaches of the Ujung River and through the territory of the Badui people. RPKDT2 Lebak (named for the Kabupaten of Lebak) was heard fairly well and verified on 3421 about ten years ago. Then it left this frequency and hasn't been reported since. FT very recently had a report from Aboe Thaliep that a RDK Lebak is now on 3385, from 0800 to 1700 UTC. Sad to say, this is an impossible frequency for North America reception due to heavy QRM. It is nice to hear that some of the RPD's are returning to SW even if we can't hear them all. I note that TBS 1988 lists this station on 3458.2, nominal 3385.

BOGOR

We continue east on highway 2 along the edge of the central volcanic range to Bogor, a city of 250,000 due south of Jakarta and much cooler than Jakarta. Here is the former official residence of the Dutch governors during the colonial period and a world renouned botanical garden. As for SW broadcasting, Bogor has an "on again" "off again" history, and at present it may be off. RRI Bogor has broadcast on various spots in the 80 meter band for years. It was off for a long time, then returned in the early 1980's to 3960 (a miserable frequency for a low power station). Then it shifted down to 3953, where it was reported several times, and I finally heard it for a period of about 15 minutes on May 31, 1987, during the dawn peak. Unfortunately, I have not heard it since and it is reported to be inactive now. Let us hope it will be "on again" some time soon.

Two very recent reports indicate that Bogor may be on the air with irregular schedules on two low power RPD stations. RDK Bogor is reported on 2653.4. Radio STI de Bogor 2465v has been reported. No additional information is available now.

SUKABUMI

A trip over the mountains south from Bogor brings us to the town of Sukabumi, where there have been at least two active stations in recent years. There was considerable confusion among DXers as to the identity of these two stations until the Australians finally verified both of them. RDK Sukabumi, 3330 is the one most often heard in North America and may still be active. The other station eventually verified as RPKDT2 Sukabumi on 2522, but this station appears to be inactive now.

CIANJUR

Now we swing northeast through the mountains to the town of Cianjur. RKPDK Cianjur, 2325 was heard in Australia in the early 1980's, but not recently.

PURWAKARTA

A lengthy trip next takes us due east and then north through the mountains past Lake Jatiluhur to Purwakarta. Here RDK Purwakarta was once heard on 2466. Unfortunately, there have been no recent reports. Thaliep reports a Fox Radio, a new commercial station on 3170.

SUBANG

Our tour now takes us on a back country road east to Subang. Studio RDK Subang has been heard in Australia most recently on 2374 - 2376. In a QSL letter to Dave Foster for reception several years ago on 2370, V/S Deddy Hendartono said that improvements were being made on the station. An ID slogan is Studio Radio Benpas. The last word is a shortening of Benteng Pancasila or a Fortress of the Pancasila.

BANDUNG

From Subang, a hard trip through the central volcanic range brings us to Indonesia's third largest city, Bandung, with 1.7 million people and at least 50 universities and colleges. It is said to have been the favorite city of the colonial Dutch. In keeping with its size and importance, Bandung has had a long history of short wave broadcasting. NIROM had high power transmitters here in the 1930's. RRI Bandung 3204.4 is now the key RRI station for Jawa Barat. It is heard frequently in North America on this frequency. I used to hear it also on 2420. The Australians are still hearing it on 2420. There have been several other Bandung stations that appear to have deserted SW for MW. RKPDT2 Kotamadya Bandung was last reported on 3302 but apparently has been on MW since 1982. Another low power station, RDK Bandung was heard on 2503 but appears to be inactive on SW. We can't leave Bandung without mentioning Radio Institut Teknologi Bandung. The Bandung Institute of Technology is said to be the oldest, largest, and the most prestigious Indonesian technical universities. The university broadcast for several years on 6012 with a listed power of 1800 watts. The split frequency made it possible to hear this station in North America inspite of stations on 6010 and 6015. Unfortunately, this station seems to have left the air completely. It is not even listed in the current WRTH on the MW frequency quoted in my QSL letter.

SUMEDANG

Our trip now takes us east to Sumedang, surrounded by volcanic peaks. RKPDT2 Sumedang was heard on 2725-2728 and verified in North America, but may be inactive now.

MAJALENKA

From Sumedang it is a short trip to Majalenka. Here we look for RPKDT2 Majalenka and find that it was another of the super difficult 120 meter stations on 2345. Like so many others, it is now apparently only on MW.

INDRAMAYU

From Majalenka we travel down the Manuk River Valley to the north coast of Java to the Java Sea. Indramayu is a town said to have been influenced by a long Chinese presence. RPDKT2 Indramayu is another of the tough 120 meter DX targets. It has been heard on 2527 for several years and verified in Australia. The present status of the station is uncertain. Dave Foster reports correspondence from the station leading him to believe that it is only on MW. Thaliep has reported RPD Sutrada on 2630 located in Indramayu.

CIREBON

Back on highway 25 again, we travel southeast along the north coast to Cirebon. Here we find a costal town that also has a long history of Chinese influence in the local art and architecture. There are nice beaches and the fishing is great. Cirebon's RRI station is more difficult for North American DXers than some of the Javan RPD's.It is on 120 meters, of course. RRI Cirebon has been on 2390 for years where it is sometimes heard in Australia. It is currently reported by Thaliep, so we can all hope for that morning when we have a nice quiet location with a lot of wire outside the window and a lot of luck inside by the receiver.

KUNINGAN

Now from Cirebon we move south to Kuningan at the base of lofty Mt. Ceremay where there are stone-age relics from peoples who lived near the mountain for thousands of years. RDK Kuningan was on 2485 and active in 1982. There are no recent reports.

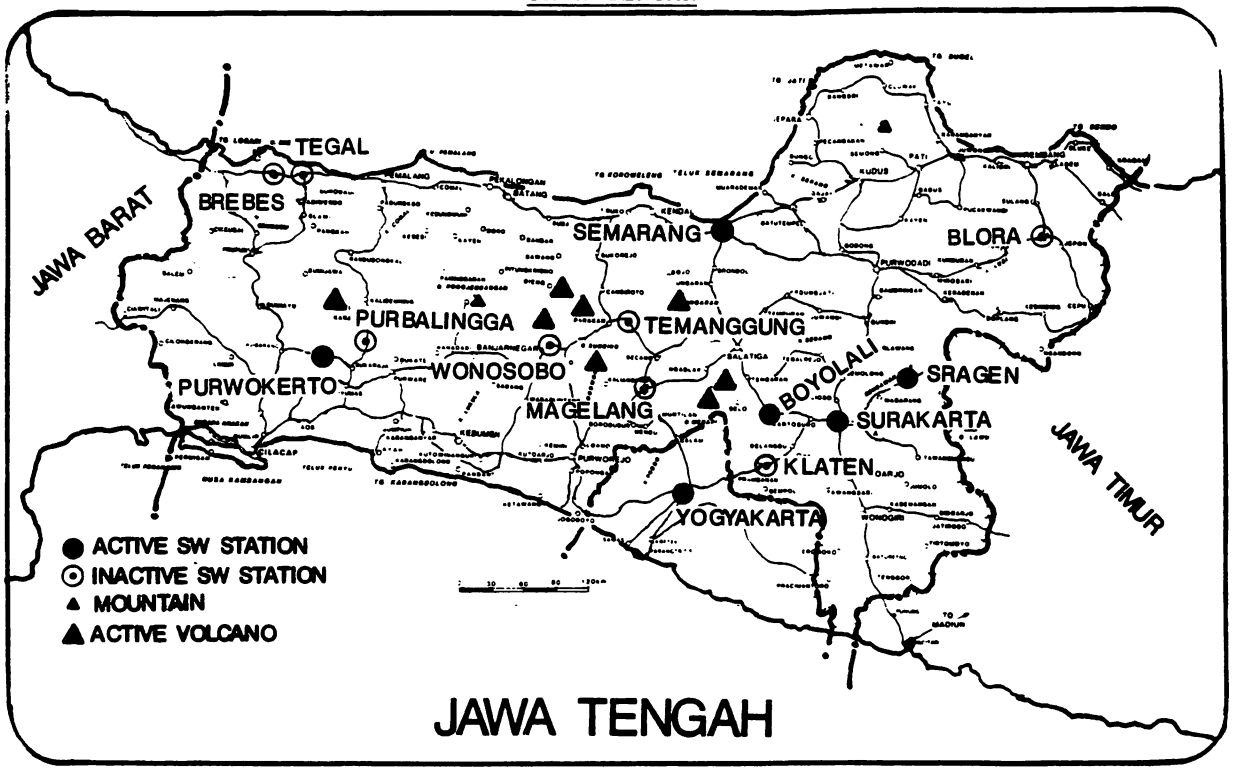
TASIKMALAYA

Continuing south through the mountains, we eventually arrive at the volcanic area of Tasikmalaya, surrounded by hot springs for any of us that need a mineral water cure. There are many art shops and woven rattan and pandanus articles for sale. RPDT2 Tasikmalaya has been reported on both 2336 and 3911 in the past but like so many other RPD's, it seems to be inactive now.

CIAMIS

Back on highway 2, we turn east for the short trip to Ciamis. This is our last stop in Jawa Barat before we cross the line into Jawa Tengah. It appears to be the same old story on RPDKT2 Ciamis. It has been reported in Australia on 4053 in the early 1980's but no recent reports are available.

JAWA TENGAH



BREBES and TEGAL

From Ciamis we return to the north coast, then east along the Java Sea on route 25 into the province of Jawa Tengah. First stop is Brebes. Here RPDT2 Brebes was on 3105, but reportedly left SW for MW in the early 1980's. Continuing easterly along the Java Sea, it is only 15 Km. from Brebes to Tegal. Here too we find that RSPD Kotamadya Tegal deserted 2690 for MW.

PURWOKERTO

In the hope of finding an active SWBC station, we turn south from Tegal through the mountains. After a long trip we enter Purwokerto, where our luck changes. To the north is 3,428 m. high Mt. Slamet. The scenery is great, but more importantly, we have found an active RRI here! It is not heard outside of Indonesia very often becuase of its frequency. RRI Purwokerto is now being heard on 2470 where it has recently been reported by Aboe Thaliep. It was formerly on 2270.

PURBALINGGA

It is about 21 Km. east to Purbalingga. RSPDT2 K Purbalingga was on 2893, but it too appears to have deserted SW for MW.

WONOSOBO

Our route now returns to highway 2 in the central part of the island and up the Serayu River Valley. As we move up into the mountains, our next stop is Wonosobo where RSPKDT2 Wonosobo has been heard on 3312 and was still listed in TBS until about two years ago.

TEMANGGUNG

Continuing on highway 2 up the Serayu River Valley we go through a high mountain pass to Temanggung. RPDT2 Temanggung has been logged and verified in North America on 3155 but not reported recently. It is possibly inactive.

MAGELANG

We circle the east side of Mt. Sumbing for the short trip to Magelang. Once again we find that RSPDKDT2 Magelang, 2942 has deserted SW for MW.

SEMARANG

From Magelang we go back up to the north coast to Semarang, the administrative capital of Jawa Tengah. It is a busy harbor city and commercial center of 1.2 million with a large Chinese population. Here we find an RRI outlet that can be heard in North America. RRI Semarang is best heard on 3935 on mornings when the ham activity is low. It is heard at times in Australia on 2490 where there is less QRM from the Chinese station.

BLORA

We head east again from Semarang for the long trip to Blora. RSPDT2 Blora was active on 2624 until recently. Reports from Australia indicate that it is now only on MW.

SURAKARTA

Turning south from Blora, we climb through the mountains to Surakarta. It is called Solo by the local population of 500,000 and has been described as the least Westernized city in Java. It is a center of many tourist attractions. Surprise! One of the tourist attractions listed in Bill Dalton's Indonesia Handbook is RRI Surakarta! Page 325 of the 4th Edition of the Handbook has the following paragraph:

"Wayang shows are put on at RRI Bldg. near the R.R. station. **** Broadcast live all over C. Java, wayang orang performances are staged approx. two times per month on every other Wed., and wayang kulit every third Sat. of each month. Keep your eyes and ears open and always check with the tourist office about these excellent performances; don't believe anybody else. At RRI's entrance the month's upcoming events are posted. Performances at the RRI are at least as good as those put on in Tarman Sriwedari, better acoustics, and the dancers are generally younger."

As all Indonesian DXers know, RRI Surakarta is now a regular on 4931.6. It operates on a somewhat irregular schedule. For many years it alternated between 4931.6 and 4900v. A schedule is still listed for 4900 during times when North American reception is not likely. It is also reported on 2439 by Australian DX'ers.

Ace DXer Ralph Perry visited the station during his 1979 trip through Indonesia and confirms Bill Dalton's opinion of the station's wayang performances. Here is his most interesting description of RRI Surakarta.

"Upon a visit to this station, I learned that the 4900 local afternoon and A.M. (morning) transmitter runs 500 watts and is actually the second harmonic, intentionally generated, on an old Japanese transmitter as big as a small refrigerator. They suppress the 2450 fundamental. RRI "Solo" is huge by local standards. Big old trees shade a large yard in front of a high, wide, yellow stone building. Meter high letters, "RRI" are mounted along the roof line and light up at night. Originally the station started out in 1945 with a few hundred watts and a studio now deep inside the present building.The site grew, room by room, according to teknisi Setyoko. There are 250 employees, of which 30 are technical personnel. Four studios, a large auditorium (angkasa theater) with, amazingly, padded seats. Once a month, on a Saturday night, from about 8 P.M. to 5 A.M., this is the site of a wayang kulit performance. We stayed an extra night in Solo to attend the per-

formance put on by dalang from Magelang. We even tried our hands at whacking a gamelan instrument. Appropriately, the studio is within walking distance from the train station and is just off of Jalan Marconi. It is surrounded by typical Javanese standard hotels with rates at $2.50 a night." (This was 1979 rates, remember.)

BOYOLALI

Next we go 19 Km. west to visit the small town of Boyolali where RSPDT2 Boyolali has been on 2878 where it has been logged and verified in North America. I have not noted any recent loggings, but it could still be active.

KLATEN

We back track a bit from Boyolali and turn southwest where we stop at Klaten. RSPDK Klaten was heard for years on 3175 and in the early 1980's on 2919. Possibly it is now inactive. Ralph Perry's amusing story of his visit to Klaten is worth repeating:

"IS THAT THE STATION? (Dropping in on RSPDT2 Kab. Klaten).

"Sometimes local government stations in Indonesia are as difficult to locate, in person, as they are to tune in a crowded band.

"My helpful host in Klaten, Jawa Tengah, directed me up the main road toward R. Siran Kabupatan Dati II Klaten. 'It is very near,' Tjang said. Near or not, I was soon asking and following pantomimed directions from Klaten townspeople. Eventually, I'd zeroed-in on a small courtyard fronting the local family planning clinic. This can't be it, I thought.

"But it was. An old Javanese woman directed me through a doorway at the end of a path next to the clinic. As quick as you could say warta berita, I was in the station.

'A few years ago there was a road widening and improvement project in Klaten', explained the teknisi, Mr. Daryoko, who'd built the homebrew station in an admirable solo effort. 'Many stores had their fronts chopped off because they were so close to the road. For us, the sign was temporarily removed. That was two years ago,' he said capsulizing why the station has no sign and why most of Klaten's main drag looks so brand new.

"Radio Siran Pemerintah Daerah Tingkat II Kab. Klaten, to use the entire name, was born on January 25, 1969. The station currently employs 40 persons - 10 operator/announcers (two of which are female), 20 administrative staff, and the rest for production of rural programs and news.

"Daryoko, a rotund and pleasant fellow who knows enough English slang to amuse a foreign visitor, made his entrance as I was examining the station's transmitters. 'Hello, DX Club, homebrew, hello, yes?' We all laughed. Fortunately, my Bahasa Indonesia (which is sparce) was better than his English. He explained that the two transmitters, each no bigger than a television console, ran 100 and 200 watts input, or 80 and 150 watts output. The smaller rig serves as a backup. He built the 'pemancers', the studio consoles and strung the dipole antenna in the courtyard all through selfteaching methods. The antenna is about 30 yards high with many radial guywires.

"We visited the studio auditorium. The room, measuring perhaps 12 feet by 25, the next morning would house 30 singing and dancing preschoolers for the early kiddie show, 15 gamelan musicians and a chorale of 7 singers.

"We retired to Daryoko's small office off the back side of the inner courtyard. There, over glasses of tea, we exchanged stories about DXing, Indonesia, propagation. Sitting on the desk was a report from Bob Yeo, of Australia. From the cover letter, I could quickly surmise it was a follow-up. With a smile, the teknisi promised me he would answer my esteemed colleague.

"Daryoko is an active ham, operating 10 watts in the 14mHz band daily around 1200 GMT. He belongs to Organisasi Amatir Radio Indonesia (ORARI), which has 29 members in Klaten alone. His call sign is YB2OQ."

DAERAH ISTIMEWA YOGYAKARTA

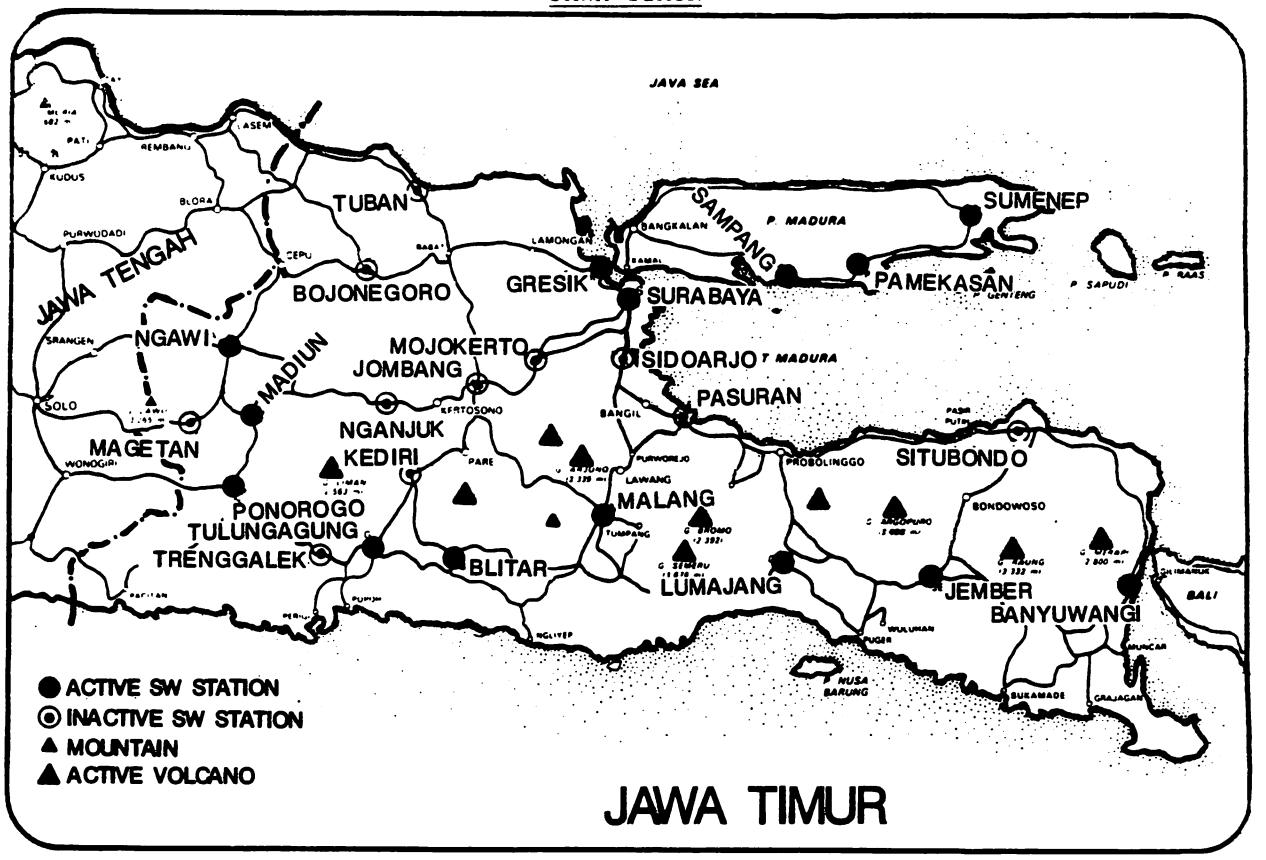
YOGYAKARTA

From Klaten we travel out of the hills to Yogyakarta, often called Yogya by the locals. Yogya is a separate administrative disrict, not a part of propinsi Jawa Tengah. RRI Yogyakarta, 5046 is the key RRI station for Nusantara Dua, the RRI network covering the whole of Java. It has been one of the more consistent Javan stations for North American DXers. There is an English news broadcast for tourists at 1130 UTC. The strong accent of the YL announcer makes it difficult to understand. Australian DXers also report the station on 2350. Ralph Perry also visited this station in 1979: "Yogya, 5047, visited this one, perhaps the most familiar of Indo stations. It sits squarely in front of the Yogya city dump, mounds and mounds of trash nearly obscure the building when viewed from across the river. RRI Yogya was inferior to RRI Surakarta in size, but had shinier floors".

SRAGEN

We leave Yogya and back track through Klaten and Solo and heading for our last stop in Jawa Tengah, Sragen. Here we find RSPDKDT2 Sragen, formerly heard on 2988. In QSL letters to Dave Foster and Geoff Cosier, the station operator, Fran's Soeradi, complained about the age of their transmitter at 250 watts and moved to 2970, where Dave says it has not been heard.

JAWA TIMUR



NGAWI

We now cross over into Jawa Timur, where we will find many stations spread out all over the province. Our route takes us north of magnificent Mt. Lawu to Ngawi. RKPDKDT2 Ngawi is heard on 2985. I believe that it is still active on this frequency. Ralph Perry visited this station in 1979 and described it as "a dandy little station on Ngawi's main street. The antenna towers directly over a small square building. All employees wear snappy little uniforms. Power quoted was about 300 watts and never received any outside reports, although it has been operating since about 1970".

MAGETAN and MADIUN

Leaving Ngawi, we turn south between Mt. Lawu and magnificent Mt. Wilis. We pass near Magetan. RKPDKDT2 Magetan was heard regularly on 3484, but now apparently is only on MW. We continue down the mountain easterly to Madiun, the home of one of the Jawa Timur RRI stations. It is not an easy catch, however. RRI Madiun is on 3286, where it is bothered by powerful utility QRM. It does not have a very powerful signal. Recent loggings by Thaliep is evidence that the station is still active. Even more interesting is a report in FT of RKPDK Madiun on 3242.6, apparently a new RPD. The teknik who signed my QSL letter for RRI Madiun in 1982, Eko Budi Sutoyo, is also a ham operator. He included one of his ham QSL cards showing that his call is YC3MU. For a number of years, he has been the station manager at the rarest of the Irian Jaya stations, RRI Merauke.

PONOROGO

The route takes us south and eventually a circle around Mt. Wilis. The first stop is Ponorogo where RKPDT2 Ponorogo is reported to be irregular on 2645.

TRENGGALEK and TULUNGAGUNG

Turning easterly on highway 2 and heading for Blitar, we pass Trenggalek. RKPKDT2 Trenggalek was heard regularly in North America on 4601v quite a few years ago and was a difficult QSL. Around 1981, it too moved to MW. Rounding a rather steep curve, we see the whole range of magnificent active volcanoes which make up the eastern peninsula of Jawa Timur. Mt. Wilis (2200 m.) begins a string of active volcanoes rising steeply from the sea. They continue eastward, forming Bali and most of the islands of Nusa Tenggara. We note that towns and radio stations surround this dense line of volcanoes like pearls on a necklace. Although we could cut across the chain at several points, we decide to proceed along the south coast on highway 2 and return along the north. Now we pass Tulungagung and look for RKPKDT2 Tulungagung on about 4195. Ralph Perry said that they announced 71 meters (4225) but were actually heard on about 4195. Nothing has been heard of it lately.

BLITAR

Continuing another 31 Km. brings us to Blitar, the birth place of Sukarno, Indonesia's first president. It is a small town with one main street, but it is very popular with Indonesian DXers since it has an active RPD. RKPDT2 Blitar is currently being reported on 4087.5 by FTers. It is a good verifier, and often runs programs and ad strings which sound strangely Latin American.

MALANG

Now the trip takes us back into the mountains past mountain vacation resorts to Malang. Here is the home of another RRI station that is not often reported. It is the home of 270,000 Indonesians and is considered a resort city where it is always spring because it has a cooler climate than the rest of Jawa Timur. It was the center of ancient Hindu culture and still has many well preserved temples. RRI Malang's main frequency is 3381, but it is also listed for 2430, 2450 and 3836. It is a low power operation that makes reception in North America difficult. FT'er Thalieo reports recent reception on 3381, so it is currently active.

LUMAJANG

From Malang it is east on highway 2 again to Lumajang, where the happy DXer can find a live RPD on shortwave for a change. RKPDT2 Lumajang was first heard on 3097, then it moved up to 3137. It is currently heard in North America on 3239.7, and it is also sending out QSLs. For a while a Programa Dua was reported on 3418-3423.

JEMBER

Jember is the next stop east on Highway 2. RRI Jember was listed for years on 3321 where the overpowering Pyongyang on 3320 made reception in North America impossible. It has been inactive on this frequency for some time. A report from the station states that it is no longer on SW. There was an RPD on the air for a while. RKPDT2 Jember was reported in 1981 on 3171, but there is no recent information on this one. An unidentified station in Jember has recently been reported on 2382

BANYUWANGI

Continuing east on highway 2, we finally reach the east coast of Java with a view out over the straits to the island of Bali. Banyuwani (meaning nice fragrance) is a town located directly across the Strait of Bali from that fabled isle. RPDT2 Banyuwangi, 3504 certainly was a nice fragrance for many North American DXers as it was widely reported here and a good verifier. However, it has been one of the champion drifters among the Indonesians. It was most ofted heard around 3504 but drifted between 3485 and 3510. I don't know if it is still active.

SITUBONDO

As we continue to circle the very active Mt. Merapi, the highway turns west and becomes #25. It swings around the smoking cone and follows the north coast back westward to Situbondo. This is a town renowned for its bull fighting (bull against bull). RPDT2 Situbondo, 3444 was reported a few years ago but not recently.

PASURUAN

Highway 25 goes westward along the north coast by the Strait of Madura for a long distance passing Mt. Bromo to the city of Pasuruan. Once again we find a RPD station that is now only on MW. In 1980 RKPDT2K Pasuruan was on 3464.

SIDOARJO

Up north to Sidoarjo, we find a sea port and commercial fishing area. RPDT2 Sidoarjo, 3893 was heard in North America a few times but is now inactive on SW.

MOJOKERTO, JOMBANG, NGANJUK & KEDIRI

Sidoarjo is a great place to pause for a bit and take stock before finishing out our Javan Fantasy. There is much yet to see but little time and less money left. We begin to cut our losses. The remaining "pearls on the necklace" around the mighty mountain chain are now all black. To complete the loop, along the north slope of the range, we would pass through Mojokerto, Jombang, Nganjuk and Kediri all former sites of RPD stations. We have no time and just record the particulars in our journal:

RKPKDT2 Mojokerto, 2527; probably inactive.
RKPDK Jombang, 3472; MW only now.
RPDT2 Nganjuk, 4163; probably inactive.
RKPKMDT2 Kediri, 4141; MW only now.

We note that RPDT2 Nganjuk was well heard in North America (tough QSL) and is still listed in TBS. However, we have heard no recent reports of this station. While resting here in Sidoarjo, we also note that the only two stations to broadcast from the northwest of Jawa Timur have also moved to MW. Their particulars:

RKPDT2 Bojonegoro, 3074 and 2412; MW only now.
RKPDK Tuban, 3762, MW only now.

SURABAYA

With the center and northwest of the province now silent on SW, we travel 23 Km north of Sidoarjo to the second largest city in Indonesia: Surabaya. It is the home of several SW stations heard regularly in North America. Bill Dalton describes the metropolitan area with a population of 3.6 million as a hot, dirty, and

noisy industrial hub on Java's swampy NE coast. It is the provincial capital of Jawa Timur and has the key RRI station for the province. The climate is hot and humid with a rainy season from Novemer through April. It was founded on a spot where a legendary battle between a shark (sura) and a crocodile (buaya) took place. Bill Dalton's Indonesian Handbook has a long description of Surabaya, and one of the city maps very nicely marks the location of the RRI station on Jalan Pemuda. RRI Surabaya's main frequency is 3976, where ham QRM can cause problems. The Australian DXers report this station on 2377 also.

Probably the most consistently heard non-RRI station throughout North America is RKIP Surabaya on 4699 (Radio Khusus Informasi Pertanian), the Agricultural Information Radio. The station is located in Wonocolo on the southern approach to Surabaya. It is a good verifier.

RKPDT1 Jawa Timur, 3000 is being heard and verified regularly in North America. Ralph Perry visited this station and notes as follows: "3000 R. Kh. PDTK1 Jawa Timur (also variously as Jatim and Jatimur) on the air since the late 1960's. The station is located in the government complex for the province. A stately pillared ediface of stone with a green courtyard and fountain. SW antenna is stretched from one side to the other, hovering over the grass. The Teknisi says the power was upped to 1 Kw and that they have been adjusting and improving the transmitter."

Another Kotamadya (municipal station) from Surabaya that was heard and verified frequently in North America was RKPDT2 Kotamadya Surabaya, also known as Radio Galora Surabaya, 3164. Unfortunately, this one apparently is only on MW now.

GRESIK

Before crossing the Eastern Narrows the short distance to Madura Island, the tour moves 16 Km. to the north for our last stop on the main island at Gresik. RSPKDT2 Gresik was heard on 2907 in 1982. I have not noted any recent reports on Gresik and can't tell if it is still active.

MADURA ISLAND

Madura is geologically a part of Jawa Timur. Bill Dalton states that the strait between the two islands flooded over only during the last ice age. It is an island said to be free of tourists and is famous for its women, its salt, and its bull races. Cattle raising is a big business there.

SAMPANG

After the short ferry ride from Surabaya to the west coast of Madura, the trip takes us along the Strait of Madura on the south coast of the island to Sampang. RKPDKT2 Sampang has been heard in the early 1980's on 3053-3055. I was never able to get an answer to my reception reports, however. It is no longer listed in TBS and is probably inactive.

PAMEKASAN

Continuing easterly along the south coast brings us to the capital of Madura. It is a small, quiet, undeveloped town. RKPDT2 Pamekasan, 3452 is another RPD that appears to have deserted SW for MW.

SUMENEP

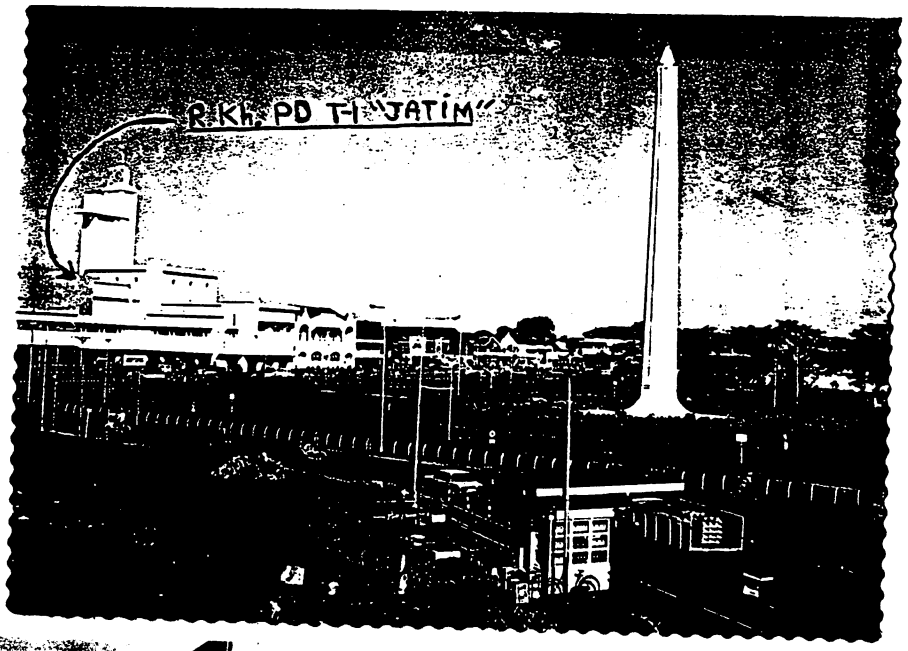
Sumenep, on the east coast of Madura ends our Javan fantasy on a positive note. Here is the only RRI station on this island. RRI Sumenep has been on 3355 for years. It is a tough log in North America due to heavy QRM from both utes and other broadcasters. Thaliep reports that it is business as usual for RRI Sumenep even if we are not hearing it on this side of the Pacific.

We go down to the docks in Sumenep and are able to rent space on one of the famous sailing prahus of the great seafaring Bugi tribe from Sulawesi. The beautiful blue and white prahu, a direct descendant of the 16th century corsairs of the Portuguese in these waters, is joining the monsoon fleet heading for fabled Nusa Tenggara. As we crowd on the deck among the chickens, the pigs and the pet boa constrictor, we are somewhat sorry that we filled our journal with notes only on the radio stations of Java, one of the most crowded and yet exotic islands on the planet.

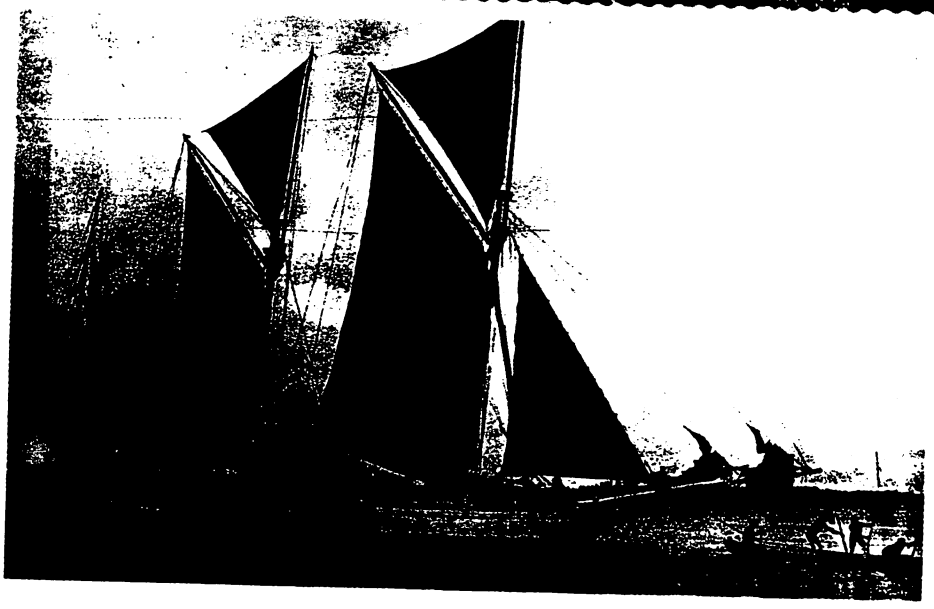




PARA PENGASUH RKPD TK. I Jatim: Depan (dari kiri ke kanan): Suhardjono, Hariyanto IS, Nyoto Suharso, Tunik, Soehartono (Penanggung Jawab), Sumarsih, Mursid Masykur, Tris Wadono dan Suhardjo Bagus Tanto; Belakang (dari kiri ke kanan): Waluyo Subagiyo, Muntholip, Agus Suprijono dan Sulas Seputro



RKPDT1 Jawa Timur
Thanks to Ralph Perry



Bugi prahu



RRI Surabaya
Thanks to Kirk Allen



Personnel at RKIP Surabaya
Thanks to Kirk Allen

Dear Mr. William S Sperks.

We gratefully acknowledge your report on
station : YDJ of Radio Republik Indonesia.
frequency : 5047 k.c.
date : June 12, 1967.
time : 20/8 Java time.

Direktorat Radio RRI NUSANTARA II YOGYAKARTA Departemen Penerangan

Remarks :
Your report is correct. Further news from you will be highly appreciated.

Director,
(Abdul Hamid).

Radio Republik Indonesia
Studio J O G J A K A R T A .

RADIO SIARAN PEMERINTAH KABUPATEN
DAERAH TINGKAT II GRESIK
Jalan K.H. Wakhid Hasyim No. 9 Gresik.
Telpon 81002

Gelombang 103,6 Meter

Getaran 3151 KHZ



Bandung Institute
of Technology

R.K.P.D.
SEJAHTI HURUB HAMBANGUN PRAJA
KABUPATEN DATI II BLITAR
Jl. Sudanco Supriyadi 40 Blitar
Gel. 73,17 m. & 122 m.

RADIO SIARAN PEMERINTAH DAERAH TINGKAT II
BOYOLALI
(Studio Cabang)

Indonesia

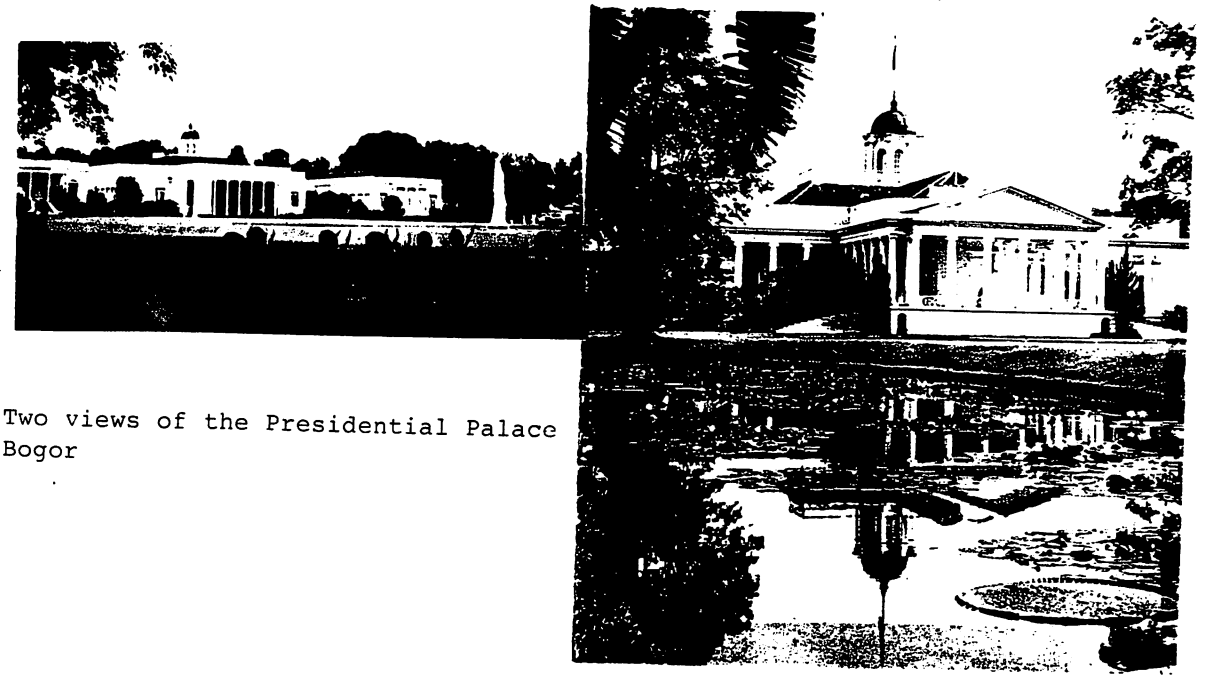
R. S. P. K. BOYOLALI

Ini membenarkan laporan tuan dari siaran pemancar kami pada gelombang 104.24 meter atau frekwensi 2878 kHz. pada 27 Juni 1980 dari 18,52 sampai 20,00 waktu Indonesia Bagian Barat. Pemancar kami ada RSPK Boyolali dikuasai oleh pemerintah dari Kab. Dati II Boyolali
(kota, propinsi atau daerah)

Kuasa pemancar studio kami 0,2 kw. dengar horizontal antena. Banyak terima kasih untuk laporan tuan.

SOELISTYARSO BA.
Pimpinan atau Kepala Studio

Maaf atas keterlambatan jawaban kami



Two views of the Presidential Palace
Bogor

swbc survey of jawa island

● the decade of the 1980's

bill sparks

● FREQ	STATUS	STATION	CITY	PROPINSI	COMMENTS
2307	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705 Rarely Heard in NAm.
2325	Inacti	RKPDK Cianjur	Cianjur	Jawa Barat	Inactive in 1989
2336	Inacti	RPDT2 T'kmalaya	Tasikmalaya	Jawa Barat	Inactive in 1989 Previously also on 3911
2345	MWonly	RPKDT2 M'lenka	Majalenka	Jawa Barat	Inactive on SW, but on MW in 1989
2350	Active	RRI Yogyakarta	Yogyakarta	DI Yogya	Key RRI station for Jawa Tengah //4931.6
2375v	Active	RDK Subang	Subang	Jawa Barat	
2377	Active	RRI Surabaya	Surabaya	Jawa Timur	// main freq of 3976
2382	Activ?	RPD?? Jember	Jember??	Jawa Timur	Reported from Australia 1989
2390	Active	RRI Cirebon	Cirebon	Jawa Barat	Rarely heard in NAm
2405	Inact?	RDK Bekasi	Bekasi	Jawa Barat	Inactive in 1989?
2412	MWonly	RKPDT2 B'negoro	Bojonegoro	Jawa Timur	MW only now Former freq is 3074
2420	Active	RRI Bandung	Bandung	Jawa Barat	RRI key station for Propinsi Jawa Barat. // to 3204.4 Rarely heard in NAm
2430	active	RRI Malang	Malang	Jawa Timur	Alt. freq. Others inc:2450, 3836, 3381(main)
2439	Active	RRI Surakarta	Surakarta	Jawa Tengah	//4931.6 This rarely heard in NAm
2450	active	RRI Malang	Malang	Jawa Timur	Alt. freq. Others inc:2430, 3836, 3381(main)
2465v	Active	STI Bogor	Bogor	Jawa Barat	Very irregular in 1989
2466	Inact?	RDK Puwakarta	Puwakarta	Jawa Barat	Inactive in 1989?
2470	Active	RRI Puwokerto	Puwokerto	Jawa Tengah	Active. Rarely heard in NAm. Formerly on 2270
2485	Inact	RDK Kuningan	Kuningan	Jawa Barat	Inactive on SW in 1989
2490	Active	RRI Semarang	Semarang	Jawa Tengah	//3935 This rarely heard in NAm
2522	Inacti	RPKDT2 Sukabumi	Sukabumi	Jawa Barat	Inactive in 1989
2527	MWonly	RPDKT2 I'ramayu	Indramayu	Jawa Barat	Inactive on SW?, on MW in 1989
2527	Inacti	RKPKDT2 M'kerto	Mojokerto	Jawa Timur	
2624	MWonly	RSPDT2 Blora	Blora	Jawa Tengah	MW only now
2630	active	RPD Sutrada	Indramayu	Jawa Barat	89 report from Jawa
2645	Active	RKPDT2 Ponorogo	Ponorogo	Jawa Timur	Very irr. schedule
2653.4	Active	RDK Bogor	Bogor	Jawa Barat	Very irregular in 1989
2690	MWonly	RSPD Kotamadya Tegal	Tegal	Jawa Tengah	Inactive on SW since early 1980's. Now on MW
2725+	Inact?	RKPDT2 Sumedang	Sumedang	Jawa Barat	Inactive(?) on SW in 1989
2878	Activ?	RSPDT2 Boyolali	Boyolali	Jawa Tengah	Unsure if active in 1989
2893	MWonly	RSPDT2K Purbalingga	Purbalingga	Jawa Tengah	Believe this now MW only
2907	Inact?	RSPKDT2 Gresik	Gresik	Jawa Timur	Believe inactive
2919	Inacti	RSPDK Klaten	Klaten	Jawa Tengah	Inactive
2942	MWonly	RSPDKDT2 M'lang	Magelang	Jawa Tengah	MW only now
2985	Active	RKPDKDT2 Ngawi	Ngawi	Jawa Timur	
2988	Activ?	RSPDKDT2 Sragen	Sragen	Jawa Tengah	Station claims 2970 now. Unheard
3000	Active	RKPDT1 Surabaya	Surabaya	Jawa Timur	Rumored to leave SW. Rept'd. here in 1989
3054v	Inact?	RKPDKT2 Sampang	Sampang, Madur	Jawa Timur	Believe inactive
3101.7	Activ?	RDK Serang	Serang	Jawa Barat	Active in 1989?
3105	MWonly	RPDT2 Brebes	Brebes	Jawa Tengah	Inactive on SW since early 1980's. Now on MW
3155	Inact?	RPDT2 T'gqung	Temanggung	Jawa Tengah	Believe inactive in late 1980's
3164	MWonly	RKPDT2 Kota'dya Surabaya	Surabaya	Jawa Timur	MW only now. AKA: Radio Galora Surabaya
3170	active	Fox Radio	Puwakarta	Jawa Barat	89 report from Jawa
3171	Inacti	RKPDT2 Jember	Jember	Jawa Timur	Not reported since 1981
3204.4	Active	RRI Bandung	Bandung	Jawa Barat	RRI key station for Propinsi Jawa Barat. Heard widely in NAm
3239.7	active	RKPDT2 Lumajang	Lumajang	Jawa Timur	Former freq inc:3097,3137,3420
3242.6	Active	RKPDK Madiun	Madiun	Jawa Timur	New in 88/89
3277	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
3286	Active	RRI Madiun	Madiun	Jawa Timur	
3302	MWonly	RPDT2 Kotamadya Bandung	Bandung	Jawa Barat	Inactive of SW since 1982. Now on MW
3312	Inact?	RSPKDT2 W'sobo	Wonosobo	Jawa Tengah	Believe Inactive since mid-1980's
3321	Inacti	RRI Jember	Jember	Jawa Timur	Not on SW now
3330	Activ?	RDK Sukabumi	Sukabumi	Jawa Barat	Active in 1989?
3347	Inact?	RDK Pandeqelang	Pandeqelang	Jawa Barat	Inactive in 1989?
3355	Active	RRI Sumenep	Sumenep, Madur	Jawa Timur	Active, but rarely heard in NAm. Co-chan QRM!!!
3381	active	RRI Malang	Malang	Jawa Timur	Main freq. Others inc:2430, 2450, 3836
3421	Inact?	RPKDT2 Lebak	Rangkasbitung	Jawa Barat	Inactive? Also on 3385(?), 3458.2(?) in '89
3444	Inacti	RPDT2 Situbondo	Situbondo	Jawa Timur	No reports in recent years
3452	MWonly	RKPDT2 P'kasan	Pamekasan, Mad	Jawa Timur	MW only now
3472	MWonly	RKPDK Jombang	Jombang	Jawa Timur	MW only now
3472	MWonly	RKPDK Jombang	Jombang	Jawa Timur	MW only now
3484	MWonly	RKPDKDT2 M'tan	Magetan	Jawa Timur	MW only now
3504vv	Activ?	RPDT2 B'uwangi	Banyuwangi	Jawa Timur	May still be active. Var. 3485-3510!
3762	MWonly	RKPDK Tuban	Tuban	Jawa Timur	MW only now
3836	active	RRI Malang	Malang	Jawa Timur	Alt. freq. Others inc:2430, 2450, 3381(main)
3893	Inacti	RPDT2 Sidoarjo	Sidoarjo	Jawa Timur	Inactive now
3911	Inacti	RPDT2 T'kmalaya	Tasikmalaya	Jawa Barat	Inactive in 1989 Previously also on 2336
3935	Active	RRI Semarang	Semarang	Jawa Tengah	//2490
3953	Inact?	RRI Bogor	Bogor	Jawa Barat	Inactive since 1987???
3976	Active	RRI Surabaya	Surabaya	Jawa Timur	// rarely heard 2377
4053	Inacti	RPDKT2 Ciamis	Ciamis	Jawa Barat	Inactive since early 1980's
4087.5	Active	RKPDT2 Blitar	Blitar	Jawa Timur	
4141	MWonly	RKPKMDT2 Kediri	Kediri	Jawa Timur	

FREQ	STATUS	STATION	CITY	PROPINSI	COMMENTS
4163	Activ?	RPDT2 Nganjuk	Nganjuk	Jawa Timur	Unsure if active now
4195	Inact?	RKPKDT2 T'gung	Tulungagung	Jawa Timur	Inactive in late 1980's???
4601v	MWonly	RKPKDT2 T'galek	Trenggalek	Jawa Timur	MW only since early '80's
4699v	Active	RKIP Surabaya	Surabaya	Jawa Timur	R. Khusus Informasi Pertanian
4774	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
4900	Active	RRI Surakarta	Surakarta	Jawa Tengah	Low power in mornings
4931.6	Active	RRI Surakarta	Surakarta	Jawa Tengah	//rarely heard 2439
5047	Active	RRI Yogyakarta	Yogyakarta	DI Yogya	Key RRI station for Jawa Tengah // rarely heard 2350
6012	Inacti	R. ITB Bandung	Bandung	Jawa Barat	Inactive university station
6045	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Believed Inactive
7270	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
9680	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
11770	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
11865	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705 Usually best freq for Prog. Nas.
11903	Inacti	R.AngkatanUdara	Jakarta	DKI Jakarta	Indonesian Air Force station. Inactive in 1989

● only stations believed active in 1989

2307	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705 Rarely Heard in NAm.
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2490	Active	RRI Semarang	Semarang	Jawa Tengah	//3935 This rarely heard in NAm
2630	active	RPD Sutrada	Indramayu	Jawa Barat	89 report from Jawa
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2878	Activ?	RSPDT2 Boyolali	Boyolali	Jawa Tengah	Unsure if active in 1989
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3242.6	Active	RKPDK Madiun	Madiun	Jawa Timur	New in 88/89
3277	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Best from 1000 - 1705
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3330	Activ?	RDK Sukabumi	Sukabumi	Jawa Barat	Active in 1989?
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3504vv	Activ?	RPDT2 B'uwangi	Banyuwangi	Jawa Timur	May still be active. Var. 3485-3510!
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4087.5	Active	RKPDT2 Blitar	Blitar	Jawa Timur	
4163	Activ?	RPDT2 Nganjuk	Nganjuk	Jawa Timur	Unsure if active now
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5047	Active	RRI Yogyakarta	Yogyakarta	DI Yogya	Key RRI station for Jawa Tengah // rarely heard 2350
6045	Active	RRI Jakarta	Jakarta	DKI Jakarta	Programa Nasional Believed Inactive
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DXING THE ARAB WORLD
A Few Tips

Hans Johnson

● INTRODUCTION

Who is an Arab? Who is a Moslem? Without knowing, country lists are inaccurate and awards are discontinued. There are a few misconceptions people have about the Arab world. The first involves the religion of Islam. While Islam had it's origins in the Arabian peninsula during the 7th century, one must understand that the borders of the Islamic world today are much larger than those of the Arab world. The Arabs, once confined to the Arabian peninsula, took their new religion and conquered other lands at a rapid pace. Persia fell and the Arabs not only converted the inhabitants, but influenced the Persian language. The Iberian Peninsula also fell to the Arabs and became known as Andalusia. The Arabs remained until 1492 and left their mark. Some of it is expressed in the beautiful architecture of the city of Cordoba. A better known expression of their influence is the Spanish "El" which came from the Arabic "Al". Even more impressive than the rapid pace of the Arab conquests was the spread of Islam, as it's boundaries came to encompass lands far beyond the Arab conquests. Therefore, one who is a believer in Islam is a Moslem(Muslim means the same thing, it is simply another transliteration.) Being a Moslem rests on five pillars, the first of which is Shahadah (Witness)1. In order to become a Moslem you simply have to state and believe the following: That there is no God but God and Mohammad is his messenger. (Incidentally, this is the inscription on the Saudi Arabian flag.) But to go back on this belief after you have become a Moslem is apostasy. Second of the pillars is Salat(Worship). Moslems pray five times a day. The most important prayers are at noon on Friday because a sermon follows the prayers(Witness the many policy pronouncements that come out of Iran during these sermons on Fridays.) The third pillar is Sawm(Fasting). All Moslems are suppose to fast during the month of Ramadan. The Moslem calender is a lunar one so Ramadan is going to come a little earlier each year. The hours of fasting are from sunrise to sunset. There are many banquets to make up for it once the sun sets. The fourth pillar is Zakat(Tithing). Moslems should donate some of their income to help out the needy. The final pillar is Haj(Pilgrimage). Moslems who are able to afford it should make a pilgrimage to Mecca during their lifetime. The final month of the year is the time to make this pilgrimage.

But not all Moslems are Arabs, and not every Arab is a Moslem. It is true, however, that the language of Islam is Arabic. Therefore, the Arab world is part of the larger Islamic world. What criteria do we use then in determining whether a country is part of the Arab world or not? How about the countries with substantial Arab populations? It is not quite that easy though. Literally entire volumes have been written on the question: Who is an Arab? The most widely accepted definition is that an Arab is one who speaks Arabic as a native language. However, I am using a slightly different, but widely accepted , criteria. An Arab is a resident of those countries which are members of the Arab league, a body of "Arab " states formed in 1945. (See Appendix 1). While this criteria is not in complete agreement with the first criteria listed above(Sudan, Djibouti, and Somalia being exceptions of varying degrees), it is a format that is accepted by the Arabs themselves. Having determined which states are Arab, let us examine some that are often thought to be Arab, but are not.

The most notable of these states is the nation of Iran. Iran is part of the Islamic world and a member of OPEC. As previously stated, It's language is Farsi and uses many Arabic script and it has many words derived from Arabic. But Farsi is an Indo-European language whereas Arabic is a Semitic one. Iranians were in some minds lumped together with the Arabs in the 1970's and 80's: As Kufiyah headed, greedy oil sheiks and terrorists. Yet to consider Iranians as Arabs was almost as ignorant and inaccurate as the caricature itself. The current rivalry between the Iranians and Arabs goes back many centuries. In the end however, the vast majority of Iranians consider themselves Iranians, not Arabs. While there are some similarities, the differences are much greater. Therefore, the eastern border of the Arab world is the Shatt Al-Arab waterway. Does a similar situation exist in other directions?

Turkey is also part of the Islamic world. The precusor of modern Turkey, the Ottoman Empire, ruled much of the Arab world for 300 years until the end of World War One. This all changed with the rise to power of the founder of modern Turkey, Ataturk. With the Old Ottoman Empire in ruin, Ataturk deceided that closer ties with Europe were in order. What was once considered part of the East now wanted to become part of the West. While the physical ties of the Ottoman Empire were no longer there, Turkish was still greatly influenced by Arabic. Ataturk promptly did away with Arabic script and adopted Roman letters and he purged Turkish of all it's Arabic words. Although there are many historical links between Turkey and the Arab world, the people of Turkey consider themselves Turks and not Arabs. Having determined the geographical limits of our survey, the second most important factor in Arab stations will be dealt with.

In order to understand Arabic as a language, one must know something of it's relationship with Islam. When the Angel Gabriel revealed the Koran to Mohammad, he spoke to Him in Arabic. Arabic became the language of the Koran and it is blasphemous to recite it in any other language. With the advent of Islam, Arabic became more than just the language of some tribes in the Arabian peninsula. It became the language of a world religion that was rapidly spreading in all directions. Islam is an all-encompassing religion: Islam not only instructs Moslems in matters of worship, but also in matters of daily life. With millions of believers following the precise instructions of the Koran, a new precision was needed in the language of the Koran and Fusha Arabic was born. When you hear Koranic recitations, be they from Kaduna, Hargeisa, or Jakarta, they are in Fusha(Modern Standard) Arabic. The Koranic recitations that you hear are recited by a man trained in the art of Tajwid. Only those trained in this art are allowed to recite the Koran for others. The Koran is not read like a book over the air; it is only recited. The term a "reading" of the Koran refers to an acceptable version/interpretation of the text of the Koran. Permitting only trained reciters to recite the Koran in public helped preserve uniformity in the text before the advent of modern Arabic printing presses in this century. Despite this effort, at one time there were as many as ten different orthodox readings of the Koran.2 Over time, most of these have fallen by the wayside, and now there is a single reading that has virtual universal acceptance in the Islamic world. Before modern time pieces, the muzzein(pray leader) would call people to prayer with a "call to prayer" from the top of the minaret(tower) of the mosque. Now the call to prayer is on tape and loudspeakers are used. The times of prayer are also printed in newspapers. In spite of the fact of pray times being known, listeners can still hear an occasional call to prayer proceeding the Koranic recitations. The muzzein will let the people know that prayers are about to begin and he will extol the virtues of prayer over other activities such as sleeping. In summary, keep in mind the following. Arabs are residents of the states of the Arab League, whereas Moslems are believers in the Islamic faith. Not all Arabs are Muslims. Arabic is the language of the Arabs as well as the language of Islam.

1 Goldschmidt, Arthur Jr. "A concise history of the Middle East" (Westview Press Boulder, Colorado 1983) p. 39 A good one volume treatment.

2 Gibb, H.A.R. "Mohammedanism" (Oxford University Press, London 1980) p. 34

●SUGGESTED READING●

"The Middle East, a gegraphical study" Peter Beaumont (John Wiley and son 1980) An excellent volume on the geography of the Middle East.

"Anthology of Islamic Literature" James Kritzeck (New American Library, New York 1975) Good selection of Arabic poetry.

"Islam" Fazlur Rahman (University of Chicago, Chicago 1966) This one deals with the history of Islam.

"The Arabs" David Lamb (Random House, New York 1987) Some light reading on the Arabs by an American.

Members of the League of Arab States(courtesy of John Bryant)

Algeria	Lebanon	Saudi Arabia
Bahraini	Libya	Somalia
Djibouti	Mauritania	Sudan
Egypt	Morocco	Syria
Iraq	Oman	Tunisia
Jordan	Palestine	United Arab Emirates
Kuwait	Qatar	Yemen(Democratic Republic)
		Yemen(Republic)

●THE ARAB WORLD ON SHORTWAVE●

●ALGERIA This station suffers from a highly irregular schedule as well as transmitter problems. Try 6160 khz in the North American evening. Short newscasts are on the hour but otherwise the programming is Arabic music without interruption. The Sowt Al-Filistine service can be found at 1700UTC on 15215khz. Be patient as this is not a daily catch. The program of the Sowt Al-Sahara Al-Hurriya consists of speeches in front of cheering crowds with numerous mentions of the "Sahara" and commentaries on the deeds of the Moroccan government with an occasional interlude of Arabic music.

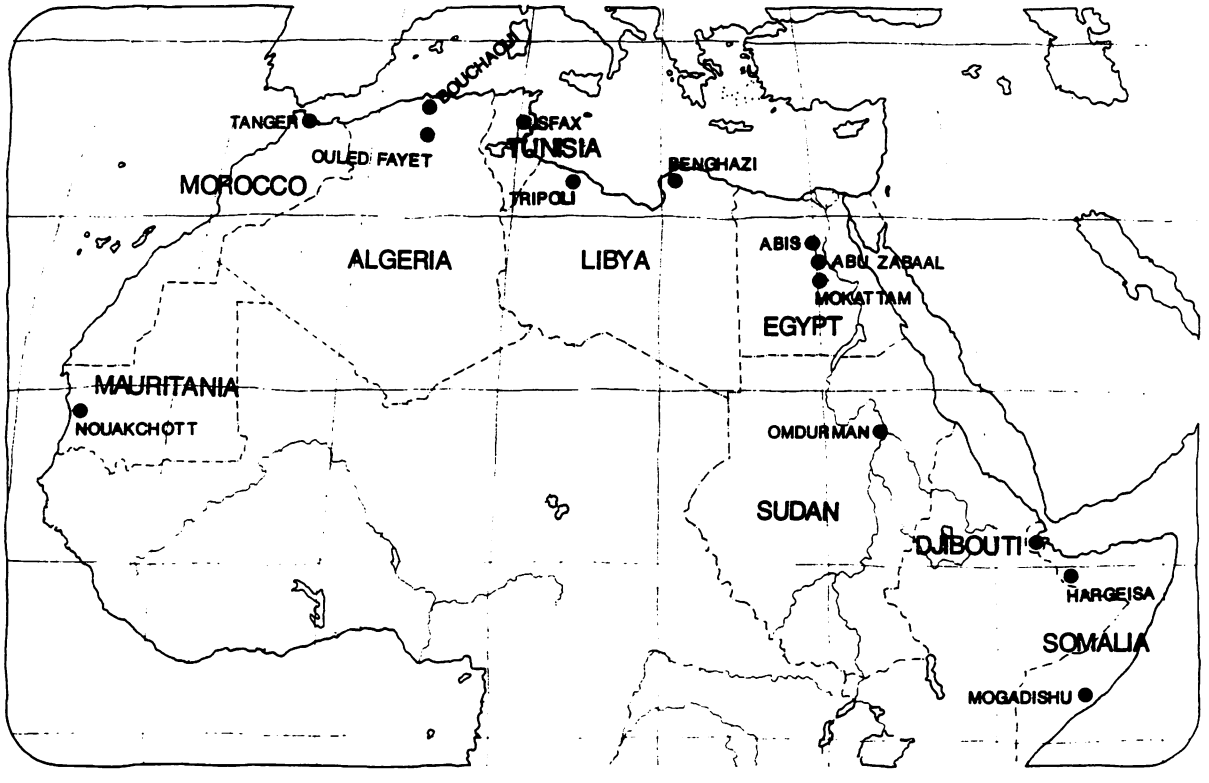
Identifications	Frequencies
Huna Jaza'r Itha'at Al-jumhuriya Al-jazziriya	6160khz(app.)(Home)-0100UTC
Sowt Al-Filistine	15215khz-1700UTC(Palestine)
Sowt Al-sahara Al-hurriya	15215khz-2200UTC(Sahara)

●BAHRAIN Perhaps the most exciting development of Arab world broadcasting in 1988 was the "addition" of Bahrain to the Arab countries heard on shortwave. Although Bahrain has no shortwave transmitters of it's own, it is heard via Radio Kuwait for 1 hour a day. The relay is from 1130-1230 daily. There is plenty of music as well as news at 1200UTC. A weather broadcast is often heard at 1155UTC.

Identification Huna Bahrain — Frequency 15505khz(via Kuwait)

●DJIBOUTI The best shot to hear Djibouti is on 4780khz at 0300UTC sign on. Koranic recitations will be heard in Arabic, but the remaining programming is either in Somali or Afar. My own logs of this station, which are old, noted the following: 0300UTC sign on with local music following the Koranic recitations. News was heard at 0330UTC with the station fading out shortly afterward. (This differs from the current schedule published in the World Radio and Television Handbook.)

Identification Radio Djibouti — Frequency 4780khz



MAJOR SWBC TRANSMITTER SITES IN ARABIC AFRICA

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●EGYPT The Voice of the Arabs is the most famous of all Arab radio stations. It was a vehicle for the speeches of Gamel Abdul Nasser which brought Arab nationalism and Arab unity to an all time high in the 1950's and 60's. Now only a shadow of it's former self, Sowt Al-arab is still a lively station. The station's progamming is evidently aimed at a Pan-Arab audience rather than a glorified home service. Some sound effects are heard and at times it has an almost commercial sound. Although the newscasts are not parellel to any other Arab service, the clock chimes characteristic of all Egyptian stations proceed the news. Identifications are frequent, but it is not the easiest one to hear, at least in North America.
Identification Sowt Al-arab Frequencies 11665khz after 2100UTC 11905khz at 0300UT

The Holy Koran program is similar in format and programming to that of Kuwait. Programming consists of Koranic recitations and other religious programming.
Identification Idtha' Al-koran Al-karim Frequency 9755khz after 2100UTC

The General Arabic service is the Egyptian government's station for communicating with the Egyptian people. The schedule is extensive and is on almost 24 hours a day. Look for newscasts on the hour. Egyptian news is sometimes heard on the half hour. There is also a program of economic news. Citizens are kept well informed through a number of interview programs. Dramas and Arabic music provide the bulk of the entertainment.
Identifications Itha'at Al-gumhuriya Misr Al-arabiya Huna Al-Qahira
Frequencies 9455khz at 0350UTC sign on 17670khz-1400UTC 12050khz until 2350UTC sign off

The Sowt Al-Wadi A-Neal program is heard on shortwave. The program features programs of particular interest to people of the Nile Valley, Sudanese as well as Egyptian. There is also a Palestinian service with similar type programming.
Identification Sowt Al-wadi A-neal Frequency 11785khz at 0500UTC

The Arabic foreign service of Radio Cairo is transmitted to many regions of the world with specialized programming for each region. The stations also use a number of identification but all will eventually broadcast a "Huna Al-Qahira" identification. Radio Cairo service beamed to North America is known as Sowt Al-misr. The news and features are designed for expatriates. News is on the hour and the signal is strong. There is also a service directed to South America with similar specialized programming. Radio Cario's service to Africa begins with dictation speed news. The features are also spoken at slow speed. While I have been able to log Radio Cario's service to Australia and South East Asia, reception has never been good enough for me to listen to the programs.
Identification-Ith'at Al-arabiya mao-ga-ha ela Al-america Al-ganobiya(Latin America)
Sowt Al-Misr(North America) Qahira, min Al-Qahira(Africa) Huna Al-Qahira(AusAs)

Frequencies-North America 9900khz-0030 to 0330UTC 6194khz-0300 to 0430UTC South America 17720khz, 15220khz-2345 to 0040UTC Africa 17800khz-1100 to 1130UTC

●IRAQ Although the Iraqi station "Voice of the Masses" is confined to medium wave now, Iraq can still be heard in Arabic through a relay of it's Home Service. Offered on a variety of frequencies with a single schedule, this station will go right through the half hour without a break. On occasion the station has also been heard signing on with news rather than with Koranic recitations. Features consist of interviews with doctors or history programs. Surprisingly little in the way of propaganda is heard. Sign on is at 0400UTC and Iraq signs off at 2310UTC.
Identification Itha'at Al-jumhuriya Al-iraqiya min Baghdad
Frequencies 7210,7280,9660,9730,11825, and 15430khz at 2200UTC 15430khz-1130UTC 11970khz-1900UTC 11925khz-0400UTC

●JORDAN When it commissioned three 500KW transmitters late in 1988, Jordan became a much easier country to hear. The domestic service is broadcast on a number of frequencies and times. The programming is equally balanced between short features and Arabic music. Newscast are on the hour and weather forecasts and correspondent's reports are sometimes heard. Listeners tuning in at the 0330UTC sign on should be prepared to listen up to half an hour of Koranic recitations before the news at 0400UTC.
Identifications Itha'at Al-mamlakatu Al-urdiniya Al-hashimiya Huna Amman
Frequencies 11955khz-0330UTC 9835khz-1910UTC 11820khz-2100UTC

●KUWAIT Using a number of high powered transmitters, Kuwait puts out a number of services. Premminent among these is the Main Arabic Program. This is actually an extension of the Home Service. I have heard information on which pharmacies are going to be open all night as well as arrival and departure times of the various flights at the airport. These "Home Service" items are carried in along with features, news and dramas. Station identifications are frequent and there is usually a news summary if not a complete newscast on the hour. A "special" Arabic program is broadcast (currently 15505khz at 0700-1300UTC) to Europe and North America. This service operates in parallel with the Main Arabic news program. It broadcasts a lot of sports, especially soccer, at other times. The Holy Koran service features recitations from the Koran and other religious programming. Signal stregths and modualation are of a very high quality. While Kuwait demonstrates it's solidarity with the Arab world(For instance, referring to Israel as the "enemy" in it's newscasts.) it is by no means as radical in it's tone and rhetoric as say, Libya.
Identifications Huna Kuwait Itha'at Koran Al-karim min Kuwait
Frequencies 15505,9840khz for Home Service 15505khz-Special(0700-1300UTC only) 15345khz-Holy Koran(0200-0500UTC)

●LEBANON Control for Lebanon is contested on the airwaves as well as the streets. A few of the factions broadcast on shortwave and each represents a different viewpoint.

Sowt Al-Lubnan is the voice of the Christian community in Lebanon. Programming is music, equally divided between Western and Arabic music. The only station break is at quarter past the hour when there is a newscast, usually read by a woman. Be prepared for a few advertisements in French around news time. Identification Sowt Al-Lubnan Frequency 6549.6khz-0300UTC

The King of Hope/Voice of Hope station has recently returned to the air after being bombed. Always under the protection of the Israeli army, the station has now moved very close to the Israeli border. The Israelis have extended their border fence to enclose the station behind the fence. The station draws it's powrer from the Israeli city of Metullah. The Arabic programming is Christian religious programs with English identifications inserted around the hour. Identifications King of Hope, Voice of Hope Frequencies 6280, 6215khz

Sowt Al-Jabel is the voice of the Druze community in Lebanon. It is listed in the WRTH operating on 6052khz from 0400 to 2200UTC.

●LIBYA The most widely heard Libyan service is Sowt Al-watan Al-arabiya kabir, Sowt Al-lejan thowra. This station is radical to say the least and virtually all the programs are politicized. One recent drama dealt with the 1986 American bombing of Libya. With the continuing "intifada"(uprising) on the West Bank and Gaza, the program Sowt Al-Thowra As-Shabi fi Filistine is heard at a number of times. Another feature to watch for is"Muhadara Al-Leeoum"(Today's Lecture), which is a speech(often rambling) from Mua'mar Qaddafi. Short readings from the "Kitab Al-Akhdar"(Green Book), are heard around the news time. News, when it is broadcast, is a 15 minutes past the hour and is the best chance the listener will have for a station identification. (Consequently, the station will often run through the hour without a station break.) One thing you will hear very little of on this station is Koranic recitations or religious programming.
Identification Sowt Al-watan Al-arabiya kabir, Sowt Al-lejan thowra
Frequencies 15415khz-mornings 15450khz, 15235khz-evenings

To listen to the Libyan Home service after listening to propaganda is a breath of fresh air. Much more music is played and the programs are entertaining. Try the suggestion below but note that there is co-channel Tunisia here as well. Identification-Itha'at Al-jumahere Al-othma Frequency-15450khz-1230UTC

● MAURITANIA In listening to Mauritania, I realize how large the Arab world is. Not only is the music different but Mauritananian Arabic is vastly different than, let us say, Syrian Arabic. This station plays a lot of beautiful stringed music and there is a newscast at 2300UTC. Frequency-4845khz-2300UTC Identification Huna Nuahchot, Itha'at Al-jumhuriya Al-islamiya Al-mauritaniya

● MOROCCO Medi 1 is a commercial station that divides it's broadcast time between French and Arabic. The Arabic segments are from the half hour to the hour. Commercials are heard and the programming is pop music with a few newscasts. Identification Medi 1 Frequency 9575khz-2030UTC

The Home service of Morocco is relayed on shortwave with 15335khz as the main frequency. Reception is good and this is one of better stations to listen for if you like Arabic music. Identification Huna Rabat, Itha'at Al-mamlekatun Al-magribiya Frequencies 15335khz-1100-0100UTC 11920khz-afternoons

● OMAN With transmitters of only 50KW and 100KW, Oman is not heard quite as easily. Their schedule is quite extensive and the listener will have many opportunities throughout the day. The service is the Home Service. Not as strident in tone as some other stations, Oman does offer some interesting programs. History and plenty of Arabic music are the usual fare. Oman presents the listener with an opportunity to hear one of the few remaining Sultanates in this world. Identification Itha'at Al-omaniya min Muscat Frequencies 6085,17770khz-0200UTC 17735khz-1400UTC 11890khz-2030UTC

● QATAR With perhaps more money than some of their Arab brothers, the Qataris are broadcasting a very professional relay of their Domestic Service. Readings from Arab literary masters such as Taha Hussein are featured as well as different types of music, including jazz. This station broadcasts more Western music than most Arab stations. Reception used to be excellent on 17800khz at 1430UTC, but this channel is now blocked. If you wish to hear Qatar when it signs on at 0245UTC, try 7170khz.
Identification Itha'at Al-qatar min Doha Frequencies 17800khz-1330UTC

● SAUDI ARABIA While operating some 350KW transmitters, Saudi Arabia is one of the most difficult countries to hear on the Arabian peninsula. The First program of the Home Service is the most widely heard service from Saudi Arabia and it has an extensive schedule. Newscasts are on the hour and half hour. Features consist of correspondent's reports and interviews. There is a Second program of the Home Service broadcast from Jeddah. I suspect that the programming is similar to the First program. The Call of Islam program offers Koranic recitations and other religious programming.
Identifications Itha'at Al-mamlakatu Al-arabiya As-saudiya min Riyadh Da' Islam Frequencies 15060khz-1400UTC,9870khz-2100UTC,15060khz- 1600UTCIslam

● SOMALIA One of our fringe countries, Somalia has 2 stations and 3 services. Radio Mogadishu has an external service and Arabic programming is offered among other languages. Listeners usually hear Somalia's Home Service, especially around the 0300UTC sign on. After Koranic recitations the rest of the 0300UTC hour is taken up with Somali programming. There is an Arabic newscast at 0400UTC. Identification Huna Mogadishu Frequency 7199.6khz

Radio Hargeisa is a station I have not heard, although not from lack of trying. Some Fters have heard the station around the 1230UTC sign off. I have also seen reports indicating that this station signs on at 0300UTC.

● SUDAN The General Service program is irregular at best. Most listeners log it at the 0400UTC sign on at 5039khz. Recent reports indicate that the station has moved to 6150khz.

National Unity Radio is a station run by the Sudanese Aramed Forces. The objective of the station is to unify the country. Arabic is heard from 1430UTC to 1500UTC on 9435khz. Speeches and impassioned pleas for unity are among the fare of this station. Identification Itha'at wahada al-wataniya

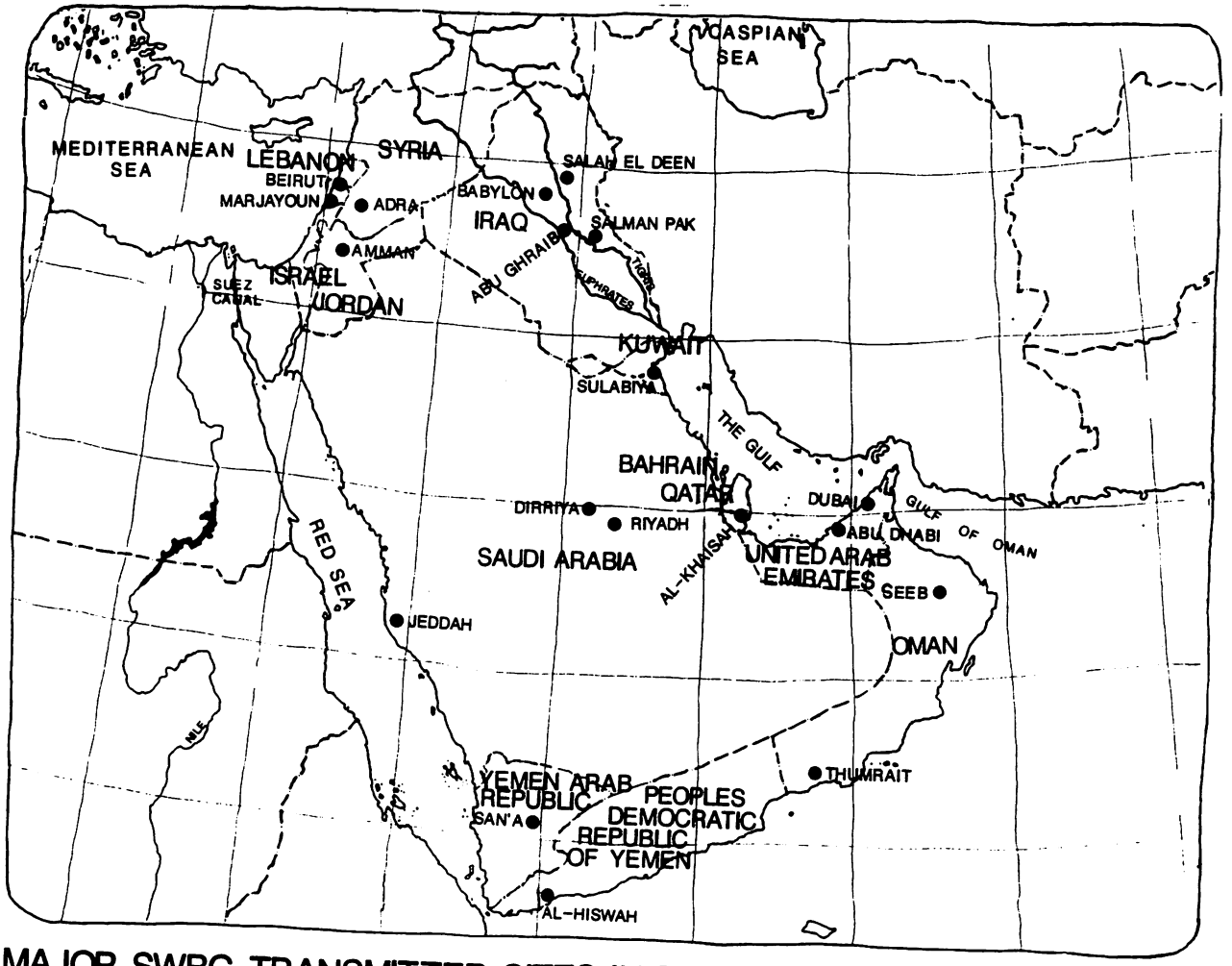
● SYRIA Syria has three services which the listener can hear with varying degrees of success. The most frequently heard is directed to Latin America from 2215 to 2315UTC. This program strives to keep Syrians living in Latin America up to date with events at home. News is at 2230 and a number of short features are broadcast. Identification Huna Dimasq Frequencies 9950,12085khz

Syria also relays it's Home Service on shortwave. The schedule is longer but the station is more difficult to hear. Newscasts are on the hour and long blocks of Arabic music are transmitted. Identification Itha'at Al-jumhuriya As-syriya min Dimasq Frequency 15095khz-1135UTC

Iraq and Syria are rivals in a number of spheres. For instance, both claim to be the legitimate representative of the Baath party. Extending the rivlary to shortwave, Syria broadcasts a program directed to Iraq which is an hour long. The programming is anti-Saddam Hussein commentaries with little or no music. This service is usually jammed. Identification Sowt Al-Iraq
Frequecny 9470khz-0400-0500UTC(usually jammed by Iraq)

●TUNISIA Like most Arab countries, Tunisia broadcasts it's Home Service on shortwave. This station features lectures and poetry readings. If you hear an Arabic newscast in which the first 5 minutes are spent talking about the Tunisian president, then you probably have Tunisia.
Identification Itha'at Al-jumhuriya A-tunisiya
Frequencies 15450khz-1300UTC, 7245khz-2200UTC, 12005-0430UTC(sign on)

●UNITED ARAB EMIRATES While there are seven states that make up the UAE, the states of Abu Dhabi and Dubai are perhaps the best known. Both of these states boast a shortwave transmitter complex. Dubai is home to five shortwave transmitters: three 300KW and two 500KW. Up to four have been heard simultaneously. A General Arabic program goes out on a number of frequencies and times to different regions. Those familar with Dubai's English service will have an idea what their Arabic service is like. The newscasts usually have a weather forecast. There are many Arab history programs and I fancy this station as soret of the "PBS" of the Arab world. Reception is generally possible any time the station is on the air, between 0230 and 2050UTC.
Identification Itha'at Al-immirat Al-arabiya Al-muttahida min Dubay
Frequencies 11940,9640khz-0230UTC 15435,17865khz-1430UTC 15300khz-2000UTC



MAJOR SWBC TRANSMITTER SITES IN THE ARAB MIDDLE EAST

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● ABU DHABI The other powerhouse of the UAE is Abu Dhabi, which boasts at least six 500KW transmitters. The domestic serivce is extensively relayed throughout the day on a number of frequencies. Like many of the other stations in the Gulf, feature programs and plenty of Arabic music are the fare. Depending on the time of day, newscasts can begin on the hour or half hour. The ones on the half hour will last until the beginning of the next hour. If you are trying to catch this station at sign on or sign off time; give yourself plenty of time. Both signing on and off can be very abrupt. The same abruptness is sometimes observed at the time of frequency changes.
Identification Itha'at Al-immirat Al-arabiya Al-muttahida min Dubay
Frequencies 11940khz-0230UTC 15435khz-1430UTC 15300,11730khz-2000UTC

● YEMEN (SAN'A) In the past Yemen operated shortwave transmitters in the 60, 49 and 31 meter bands. Although they still announce 6135khz,4851(heard on 4853), only 9780khz is still heard(heard on 9779.3). While reception is possible in the afternoon around 2100, the best time to hear Yemen is when they sign on at 0300UTC. Identifications are frequent and there is plenty of Arabic music after the Koranic recitations at the beginning of the transmission. PSA's with tips for a good life are also heard. Frequency 9780khz
Identification Itha'at Al-jumhuriya Al-arabiya Al-yemaniya min San'a

● PEOPLES DEMOCRATIC REPUBLIC OF YEMEN(PDRY)-The PDRY broadcasts a Home Service on shortwave. While this is a Marxist country, you would never know it from the broadcasts. A lot of Arabic music is broadcast and the news is tilted toward the factual rather than the rhetorical. The best opportunity to hear it is at it's 0300UTC sign in. Incidentally, local sunrise will never be more than half an hour from sign on. The national anthem and opening announcements will be heard followed by Koranic recitations. The first newscast is at 0330UTC and best frequency is 7190khz.
Identification Itha'at Al-jumhuriya Al-yaman Al-dimogratiya Ah-shabiya min Aden Frequencies 7190, 5970khz

● ARABIC NUMERALS

one	wahid	١	25	hamsa wa ash-reen	٢٥
two	ithnan	٢	30	tha-la-theen	٣٠
three	tha-la-tha	٣	40	ar-ba-een	٤٠
four	ar-ba-a'	٤	50	kham-seen	٥٠
five	kham-sa	٥	60	sitteen	٦٠
six	sit-ta	٦	70	sa-ba-een	٧٠
seven	sa-ba-a'	٧	80	tha-ma-neen	٨٠
eight	thamaniya	٨	90	this-sa-een	٩٠
nine	tisha'	٩	100	miya	١٠٠
ten	'asher	١٠	200	miyatan	٢٠٠
zero	siffer	٠	300	thalat-miya	٣٠٠
15	khamis-tasher	١٥	500	khamsa-miya	٥٠٠
20	ashreen	٢٠	1,000	elf	١٠٠٠

While Arabic script is read from right to left, numbers are read from left to right. Thus: ١٥٢٣٥ is 15235

Khamis-tasher elf wa miyatan wa khamsa wa thalatheen
15,000 and 200 and 5 and 30

٥٩٧٠ is 5970

Khamis-ta elfeen wa tish-sa miya wa saba-een
5,000 and 900 and 70

A station broadcasting on 17865khz from 1500 to 2050 would read:

١٧٨٦٥ ١٥٠ - ٢٠٥٠

DXING BRAZIL
A North American Perspective

John Fisher

After reading all of these excellent technical articles, I'll bet you are ready for a break. Well, take your shoes off and relax, because we are going to go on a radio travelogue to the 5th largest country in the world, Brazil.

DX'ing Brazil is a study in contrasts; it offers challenges as varied as the country itself. There are low powered stations from the jungles of the Amazon on 120 and 90 metres and there are higher powered stations from the major cities on 16 and 19 metres. There are some stations that have been on the air since the 1920's and there are new stations coming on the air this year on the Brazilian "frontier". These extremes and contrasts, as we shall see, will be a constant feature as we discover Brazil and its radio scene.

I don't intend this to be the definitive article on the shortwave radio scene in Brazil. DX'ers in Brazil are the experts, but, I will describe the features of Brazilian shortwave stations from a North American viewpoint and I will also discuss why DX'ing these stations from North America does not seem to be as popular as DX'ing other parts of the world.

● AN INTRODUCTION TO BRAZIL

For a country that stretches over 4200 km from north of the equator to south of the 30th parallel, and over 4200 km from the watershed of the Andes to the Atlantic Ocean, it is not surprising that Brazil is a diverse country. The steamy Amazon jungle is miles (and years away) from the cosmopolitan cities of São Paulo and Rio de Janeiro, but the people in both places are Brazilians.

Because of its size and the variety of terrain, it is almost impossible to define what is typically "Brazilian" much in the same way as it is hard to define what is typically American or typically Canadian. Brazil is a country of extremes and contrasts. There is the industrial might and wealth found in the big cities of the south, living next door to the poverty of the favelas or urban slums. Third World poverty and hunger exist in the northeast. There are vast tracts of natural preserves in the Pantanal and Amazonia regions. Brazil is a nation of coexisting inconsistencies and this has an impact on the type of programs heard on Brazilian stations.

A Portuguese sea captain Pedro Alvares Cabral was the first European to discover Brazil in 1500. Since the Portuguese were in a landgrab race for new colonies with the Spanish, they quickly colonized the eastern coast from Recife to Rio. To work the agriculturally rich lands, the native peoples and black slaves from Africa were used. As a result, there is a largely Negro or mulatto population in the northeast of the country. Contact with the colonizers has proven fatal to the natives though. Between 2 and 5 million were thought to have lived on the lands that constitute present day Brazil when the Portuguese arrived in 1500. Now their numbers are estimated at around 200,000, located mostly in the remote interior.

Brazil, like the United States and Canada, owes a great deal to the waves of immigrants who have helped build the country. The largest group of immigrants arrived between 1884 and 1914 with the majority being Italian. In 1908 the Japanese began to arrive. Both groups helped develop a strong agricultural base in the temperate south of the country.

Following World War II, refugees from Europe thronged to Brazil and between 1974 and 1975, approximately 50,000 Portuguese from the former colonies of Angola and Mozambique arrived. As a result, the area from São Paulo to the south has a heavy European make-up, with large concentrations of Slavs, Polish, German, Italian, Swiss, Spanish and Japanese.

Brazil's independence was proclaimed by King Dom Pedro I on Sept. 7, 1822, (September 7 is celebrated as Brazilian independence day) but, it was during the reign of his son Dom Pedro II during the middle of the 19th century, that Brazil began to prosper. However, Emperor Dom Pedro was deposed in 1889 in an uprising led by the army. On November 15, 1889 (another national holiday), the Republic of Brazil was born.

A military junta took control in 1930 and power was assumed by strongman

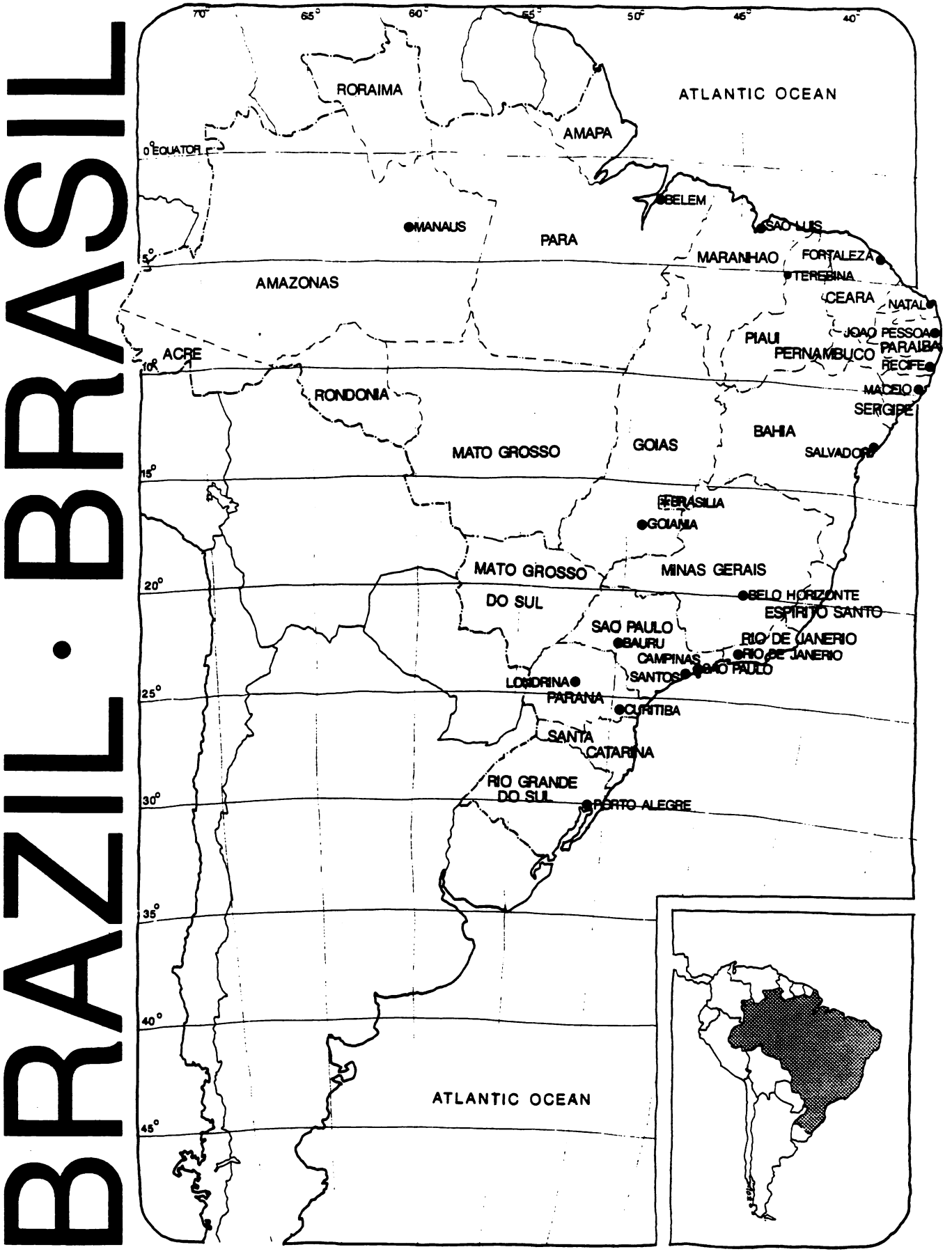


FIG. 1 MAJOR SWBC SITES IN BRAZIL BRYANT '89

Getulio Vargas, who alternated with military coups until finally being forced out in 1945 by the military. A series of short lived democratic regimes existed from 1945-1964. A highlight of this period was the building of the present capital of Brasilia by the dynamic president Juscelino Kubitschek. The next 5 presidents until 1985 were all military leaders. In 1985, Tancredo Neves was chosen to be President by the Electoral College made up of the Congress and representatives from the State Legislatures. Neves is generally regarded as being the first popularly elected President in the nations history. However, Neves fell ill and died before he could assume office. The reigns of power were then passed to José Sarney who remains as President today.

Brazil's economy has expanded dramatically in the last generation. In the past 25 years, it has embarked on an industrialization program that has produced the world's 8th largest economy, just slightly smaller than Canada's. This expansion has enabled Brazil to become the most self-sufficient country in the Western Hemisphere. With the exception of petroleum products, Brazil produces almost everything it needs from cars and computers to agricultural products. Even in the field of energy, Brazil is a world leader in the production of alcohol for automobile use.

●THE NEGLECTED GIANT

Brazil has never been one of the DX "hot spots". Many DX'ers avoid Brazil, or if they don't avoid it, they at least monitor it with less enthusiasm than they reserve for other targets. Why is this ? Why is Brazil, "The Last DX Frontier"?

The lack of enthusiasm can't be due to the lack of Brazilian DX targets. A quick scan of the 1989 WRTH indicates that Brazil has 136 frequencies used by 108 stations and ranks behind only Peru (141 frequencies used by 137 stations) and more than Indonesia 127 frequencies (Source: fine tuning's 1988 Indo survey). DX abounds with many low powered stations (5 to 10 kW) in the 31, 25 and 19 meter International Bands, very low powered stations using 1 kW or less from small towns in the Amazon jungle and even experimental stations, broadcasting on frequencies outside of the normal shortwave bands.

Although some Brazilian stations have left the air in recent years (primarily in the larger cities that can also be served by AM or FM), a number of new stations have appeared. These new stations tend to be located in the Brazilian interior, where there has been an influx of population in search of cheap land. Due to the vast distances involved in the frontier, shortwave broadcasting has become an important part of the communication scene.

I believe that there are probably 4 reasons why DX'ers tend to neglect Brazil. All of these difficulties can be overcome, if the DXer has the interest and desire.

1. Language

Probably the biggest reason that many DX'ers avoid Brazil is the Portuguese language. Although Spanish and Portuguese have similar origins, their sound patterns are significantly different. Portuguese tends to be a much more "nasal" language, sounding closer to the Nordic languages and Russian than to Spanish. It is also a sweetly flowing language, one word tends to flow into the next, making identification of individual words difficult.

Portuguese is tough to copy even on stations in the clear and it just doesn't cut through the noise and QRM the way a sharper language like Spanish or Chinese can. This makes a weak tropical band Brazilian signal sounds like it is buried in 10 feet of mud!

In his chapter "Recognizing Languages" in "Shortwave Listening With The Experts", Richard Wood says that Portuguese has been described as "Spanish spoken with marbles in the mouth" or "Spanish spoken by a Russian". As a result, many DX'ers comfortable with Spanish have shied away from learning to hear Portuguese. But for a Brazilian DX'er, a working knowledge of Portuguese develops in just the same way as it does for Spanish - by frequent listening!

One of the easiset ways to develop an understanding of Brazilian Portuguese (quite different from Lisbon Portuguese), is to listen to some of the stronger Brazilian outlets. Programming from Radio Guiaba 11780, Radio Nacional Manaus 4845, Radio Difusora de Amazonas 4805 and of course, Radio Bras can help DX'ers recognize key Brazilian phrases and programming styles.

This "language barrier" can be converted to a benefit by the alert DX'er. There are currently only 3 active DX countries (Portugal not included) where Portuguese is spoken, Brazil, Angola and Mozambique. Because of propagation, Brazilian stations are normally not audible in North America at the same time as the Africans. When you recognize Portuguese on a tropical band frequency you can

usually determine whether it is Brazilian or African in origin.

2. Transmission Times

Since Brazil is located to the east of the rest of Latin America, local sign-on and sign-off times are earlier. The peak time to hear Brazilians tend to be in the morning when they sign-on, although there is also a period of good evening reception around 2300 to 0100 GMT. Unfortunately, this sign-on is at 0700 to 0900 GMT! DX'ers are a hardy breed, coping with late night and early morning DX sessions, but 0700 to 0900 GMT is a DX "no-mans land", neither late night or early morning; it is middle of the night, when many DX'ers would rather sleep.

3. Programming

The third factor that contributes to Brazilian stations not being popular DX targets relates to the type of programs typically heard on Brazilian shortwave outlets. Unlike Andean stations where a listener can hear a variety of local music types and special announcements, many Brazilian stations broadcast programming similar to North American medium wave stations. Many shortwave outlets simulcast the programming of their AM outlets and consequently, you will often hear typical pop music and commercial announcements. This can seem boring, especially to the QSL hunter who is looking for details for reception reports.

However, once you have become accustomed to these programs you begin to appreciate the beauty and diversity of Brazilian popular music. Brazil is one of the worlds most musical countries and it has a very developed homegrown music industry. If you listen carefully, you can detect traces of the many different cultures that make up Brazil as well as those two forms of music that Brazil has given to the world, the samba and the bossa nova. For those who appreciate ethnic music, Brazil is a treat. Rarely will you hear North American top 40 music. This is a dramatic contrast to those stations of Venezuela and Colombia who feed the listener a steady diet of North American music.

4. Frequencies

Brazilian stations tend to pile up on certain frequencies. There are many shortwave frequencies, especially in the 90 and 60 metre bands where two or more stations can be found. Fortunately, the Brazilian authorities practice some frequency management. The stations that cohabit shortwave channels are usually well separated geographically. By understanding the propagation of Brazilian stations to North America and knowing when to listen, it is often possible to hear more than one station on the same channel.

Several times in the past 10 years the Brazilian authorities have developed frequency plans for their shortwave stations. These plans have typically been implemented on a band by band basis. Now almost all 90 and 60 metre stations operate on frequencies ending in 5 kHz and 120 and 49 metre stations operate on frequencies ending in 10 kHz. By keeping stations at least 10 kHz apart, interference is reduced.

All of these "barriers" to DX'ing Brazil are easily surmountable if the DX'er has the desire and perseverance. The difficulty of the Portuguese language and the sometimes monotonous pop music programming that produces little verifiable details, can be overcome by listening often and becoming experienced enough to identify those features inherent in programs that seem to be featureless. The Brazilian DX'er needs to be dedicated though, to shake the cobwebs out the mind at 0730 UTC and stumble to the receiver, fully aware that there may not be anything to hear that morning.

●REGIONS OF BRAZIL

To appreciate the shortwave stations of Brazil we will tour the eight (8) geographic regions of the country, stopping to describe the stations on the way. Appendix 1 provides a listing of shortwave outlets in each of the 24 states with their current frequencies as provided by Brazilian DX'er Antonio Ribeiro da Motta. The regions are :

1. Rio de Janeiro
2. São Paulo
3. South
4. Central South
5. Central West
6. Bahia
7. Northeast
8. Amazonia



RIO DE JANEIRO

The city of Rio de Janeiro is probably the best known city in Brazil and possibly all of Latin America. It is South America's tourist capital and has been called by many, the most beautiful city in the world. There are many sights here that are familiar to North Americans including the beaches and Sugarloaf Mountain. Carnaval is celebrated here most enthusiastically each February or March. In contrast to this view of a tourist city that is constantly at play, Rio is also home to a large and growing slum called "favelas". Populated by people from the countryside who have come to the big city in search of work, these ramshackle buildings fill the hills surrounding the city in dramatic contrast to the wealth found in and around the beaches below.

Although the shortwave scene in Rio is not as active as it once was (there were 12 outlets active here in 1976), there are still 8 stations in Rio and one in the city of Campos in Rio de Janeiro state. Probably the easiest heard of these stations is Radio Globo on 11805 and 6030 kHz, part of the huge Globo radio and TV network. Don Moore indicates that the Globo TV network is the fourth largest in the world.



SÃO PAULO

Although shortwave stations have closed down in the larger metropolitan areas in recent years, the state of Sao Paulo has the largest number of shortwave stations in Brazil with 23 currently active SWBC stations according to the 1989 WRTH.

The city of São Paulo is the fastest growing and the richest area in Brazil. It is the cultural,industrial and commercial center for the nation with multinational corporate headquarters located in its many skyscrapers. In many aspects it is similar to New York City right down to the way that Paulistanos flee their city on the weekend for Guarujá on the coast or Campos do Jordão in the mountains. The city's work ethic is built on its immigrant background. Seventy percent of São Paulo's inhabitants are decendants of immigrants, most of whom arrived between 1885 and 1914. For them and their descendants, São Paulo is Brazil's "big apple".

The city of São Paulo is located the state of São Paulo. The residents of the state called "Paulistas", inhabit a region about the size of Great Britain. This state contains everything from sandy beaches in Santos and the island of Guarujá, to lofty mountain plateaus, from colonial architecture to ultra modern resorts. The region contains some of Brazil's richest farmland. From this area comes almost half of the nation's coffee, cotton, fruit and vegetables.

From a DXer's perspective the area is as equally rich. There are 250 watt stations in the 120 metre band from towns like Limeira and Descalvado in the mountains which represent good DX challenges. At the other end of the spectrum,

there are the 10 kW stations in the 25, 31 and 49 metre international bands from São Paulo such as easily heard Radio Bandeirantes 6090, 9645 and 11925 kHz and Radio Excelsior on 6120 and 9585 kHz. The state of São Paulo, especially for the DX'er, offers something for everyone.



SOUTH

Moving south from São Paulo, one encounters the states of Rio Grande do Sul, Paraná and Santa Catarina. These states have maintained a very strong ethnic character from their large European immigrant population. The state of Rio Grande do Sul, on the borders of Uruguay and Argentina, in the far south of the country, is the home of Brazil's gauchos with their vast cattle ranches on the pampas. This ranching background is reflected in the names of some of the shortwave outlets in the state; Radio Gaúcha and Radio Pampa both in Porto Alegre. The city of Porto Alegre, with 2,250,000 people, is one of the most modern and fastest growing cities south of São Paulo. Standing at the junction of five rivers, it is also an important port.

The state of Santa Catarina is noted for its fine beaches and the German influence found in its architecture and food. The capital city of the state, Florianópolis, an island city with beaches on the ocean, is represented on the shortwave bands by 2 stations, Radio Guarujá on 5980 kHz and Radio Marumby on 6080 kHz.

Paraná state is home to the magnificent Iguaçu Falls. Located on the border with Argentina, these falls are probably Brazil's most spectacular natural wonder. In the last few years a new shortwave station opened up here, Radio Cultura in Foz de Iguaçu on 6105 kHz. The capital of the state is Curitiba, the site of Radio Clube Paranaense on 6040, 9725 and 11935 kHz.

By looking at an atlas, one can see that all of these three states, except for the northern portion of Paraná, lies south of the tropic of Capricorn. As a result, all of the stations in these states except for Radio Difusora and Radio Alvorada in Londrina operate on frequencies in the 49, 31 and 25 meter international bands.



CENTRAL SOUTH

The Central South region of Brazil contains the nation's modern capital city, Brasilia. This city was built literally in the middle of scrub trees, dust and jaguars in the late 1950's to encourage the development of the country's vast interior. If the migration of population since then is any indication, this move was successful. The city now acts as a transportation hub, with roads branching out to all parts of the country.

In addition to the modern capital, this region also contains historical Minas Gerais. The colonial towns of the mountains of the Minas region were built by Portuguese colonists who came to the region in the early 18th century to explore the area's gold fields, diamond and gem stone mines. In fact, the hills around the town of Ouro Preto (Black Gold) contained so much gold, that the region was called "minas gerais" or general mines. Because of this wealth, the region contains some beautiful 18th century architecture.

Brazil's national radio service originates from Brasilia. Radio Nacional's shortwave is designed to cover the Amazon region using 250 kW transmitters on 49, 25 and 19 meters. Because of this high power it can often be heard during our daytime, when the frequencies are clear of interference.

There are a number of shortwave outlets in Minas Gerais, with Radio Inconfidência best heard on 6010 kHz during the morning hours. Most of the other stations in this state are difficult catches.

The third state in this region, Espirito Santo located on the Atlantic coast, is represented by only one shortwave station, Radio Vitória on 4935 kHz, which can often be heard around 2300 UTC.



CENTRAL WEST

We now move into an area of geographical contrasts. The central west region of Brazil contains the Pantanal, a vast flood plain in the basin of the Paraguay River. The Pantanal is one of the last ecological frontiers on earth. Because of its low elevation, it floods during the rainy season, with only a few areas remaining above water level. Because of this it is home to a very wide range of animals, birds and fish. The area is bounded by the city of Cuiabá in the state of Mato Grosso to the north, and by Curumba in Mato Grosso do Sul in the south.

Moving north into the state of Goiás, the change in geography becomes evident. The elevated plateau of Goiás is home to gold mines and cattle ranches as it stretches from Brasilia in the south to the edge of the Amazon in the north. It was gold that first attracted settlers, the "Bandeirantes" from São Paulo who came into the interior. However they were more interested in plunder than in settling. It was the construction of Brasilia, that sparked a boom in the growth of Goias.

In the last year a new state, Tocantins has been carved out of the state of Goiás. Unfortunately you will not find Tocantins on the map of Brazil. To date I have not been able to locate it on a map.

Since we are moving into the interior of Brazil where distances between towns are greater, there are increasing numbers of shortwave stations in the three states of the central west. Of these stations, the easiest to hear in North America are those from Goiás. Best bests are Radio Araguaia on 4905, Radio Anhanguera on 4915 and Radio Brasil Central on 4985.



BAHIA

The capital of the state of Bahia, Salvador, shows a blend of African, European and Indian influences. It was the first city that the Portuguese built up after they established their colony in Brazil in the 1500's. It was Brazil's capital city for a time. Fortunately, the city has been able to save many of its historical buildings and there are presently 25,000 buildings over 250 years old.

It is hard to enjoy the flavour of this interesting region on shortwave. There are at present only two shortwave stations from Bahia on the air. Radio Educadora de Bahia on 6020 and 9540 kHz. Neither frequency is an easy catch as both are heavily QRM'ed in both our mornings and evenings. The best time to catch this station is in the early morning after 0900 sign-on. The 9540 frequency is the best bet however, due to co-channel interference from the stronger Radio Gaúcha on 6020 kHz. The second station from Bahia is the rarely heard Radio Sociedade de Feira from Feira da Santana on 4865 kHz.



NORTHEAST

The states of Sergipe, Alagoas, Pernambuco, Paraiba, Rio Grande do Norte, Ceará, Piaui and Maranhão make up the northeastern region of Brazil. This region comprises the "bulge" that sticks out into the Atlantic Ocean. This region differs from Bahia in that there is little of the African influence here.

Due to the relatively small sizes of these states, there is little shortwave activity in this region. The states of Sergipe and Alagoas are the only two Brazilian states with no current shortwave activity. Hearing the other states of the northeast is quite a DX challenge.

From the state of Pernambuco, Emisora Rural A Voz de São Francisco operates on 4945 kHz, although I have not seen any recent reports of it. Radio Pioneira in Piaui state is occasionally heard on 5015 kHz. Rio Grande do Norte's sole shortwave representative is Radio Poti on 4965 kHz. I have not seen any recent North American reports of any of the three stations in Ceara state, so it is hard to say which of these represent the best bet. According to Antonio Ribeiro da Motta, only Radio Educadora Cariri on 3255 kHz is active. Maranhão is probably the easiest state in the North east to hear. Radio Timbara on 4975 kHz is often audible in the morning.



AMAZONIA

As we move into the Amazon region, we enter an exotic area for both traveller and DX'er. This is truly the last frontier for the Brazilian DX'er and with the boom in population, there has also been an increase in shortwave activity.

The Amazonia regions includes the states of Para, Amapá, Roraima, Rondônia, Amazonas and Acre. Radio Nacional operates a network of stations on 60 and 90 metres to cover this area from Boa Vista, Cruzeiro do Sul, São Gabriel de Cachoeira, Tabatinga, Porto Velho, Manaus and Macapá.

It is within this region that an future growth in Brazilian shortwave will occur. The area to be covered is vast, distances between towns are too far to cover with medium wave, so shortwave appears to be the logical choice. New stations are planned for Rio Branco, Acre on 2460 and Rolim de Moura, Rondônia on 4775.

There are also several experimental stations operating from Acre state on out-of-band frequencies between the 90 and 60 metre bands. These stations represent real DX challenges in North America.

● PROPAGATION

In a country as large as Brazil, an understanding of the propagation between the various parts of Brazil and North America is essential to the DX'er. The differences in sunrise times across the country can provide the opportunity to hear two different stations from different parts of the country, operating on the same frequency.

Since Brazil is so large, a DX'er needs to know where the individual stations are located so that when reception conditions are good from one region, the DX'er can go after other rare stations in that same general area. This is important since propagation from one Brazilian region can be significantly different than that from another.

Reception conditions of Brazilian broadcasters on the international bands above 49 metres, does not appear to be strongly affected by the seasons. Conditions in the local evening hours may be slightly better during our local winter and reception in the morning may be slightly better in summer, but in general, good reception on these bands is possible all year round. The prime times on the international bands are 0700 to 1000 GMT and 2200 to 0100 GMT.

However, as with most DX targets, it is in the tropical bands that the real action occurs. The effect of sunrise and sunset conditions are important when DX'ing Brazilian stations below 49 metres.

Because the "bulge" of Brazil's northeast (which receives the country's first sunrise) lies on the equator, the sunrise time in this region does not vary more than half an hour from season to season. As a result, except for a couple of weeks near the winter solstice when the far eastern tip of Brazil receives an early wake-up call, Brazil is always in complete darkness at 0800 GMT.

With the increased ionization occurring from the local Brazilian sunrise onwards, the Brazilian signals on the tropical bands fade out when most of North America is still in darkness. The stations in Brazil's northeast always are the first ones to fade out in the mornings. Similarly, the stations at the western end of Amazonia, in Acre, Rondônia, Amazonas and Roraima will be the last ones to fade out. During the summer time in North America, our sunrise in the eastern part of the continent, will preceed that of the Amazonia region.

At the equinoxes, the slope of the daylight/darkness terminator is essentially vertical (Figures 2 to 5), and stations fade out from east to west. However by the solstices, the slope of the terminator changes. In December, it runs from northeast to southwest and in June it runs from northwest to southeast. This does not significantly alter the fade out times of those stations near the equator, but it does affect those in the south of the country.

In December, stations along the eastern coast fade out between 0800 and 0830 GMT. For those stations which sign-on at 0700 GMT this does not represent much of a problem, but for those stations which come on at 0800 GMT, it means that there is a very short window before the tropical band stations fade out.

By June the situation has changed. Reception of tropical band signals from the south of Brazil are dictated by our local sunrise. Stations in Rio and São Paulo are in darkness until 0930 GMT, which is approximately local sunrise at my QTH. People listening from locations west of mine, will obviously have longer openings than I do. The slope of this terminator can be used to separate stations on the same frequency. As an example, there are two stations operating on 4825, Radio Braganca in the state of Pará and Radio Canção Nova in the state of São Paulo. In December, sunrise at Canção Nova occurs around 0830 GMT, while it does not reach Radio Bragança until 0900 GMT. There is therefore a window of about 30 minutes after the fadeout of Canção Nova during which Bragança can be heard.

A second tropical band opening to Brazil occurs during the early evening hours after Brazil is in darkness. The opening occurs between 2300 and 0100 GMT

during our winter and from 0000 to 0100 GMT in our summer and tends to produce good reception from southern Brazil on 120 and 90 metres. This peak in reception does not seem to be as pronounced for stations from Amazonia, which tend to be heard at the same level throughout the evening until their sign-off. The stations from the south tend to peak up and then fade out by 0100 GMT.

Unlike Indonesian DX'ing, I have not noted enhanced reception conditions during grey lines between my Ontario QTH and Brazil. As I mentioned before, reception conditions to southern Brazil will often be enhanced for up to 1 hour after my local sunset, but by this time the Brazilian stations have been in darkness for several hours. Similarly, in the morning hours, stations will pick up slighty at Brazilian sunrise, but my QTH is still in darkness. I do not know the reason for the lack of enhancement during greylines. While greylines to Southeast Asia are becoming better known and understood, the greyline phenomena to South America appears to be an area in need of study.

●VERIFYING THE BRAZILIAN STATIONS

Since Brazilian stations tend to be ignored by listeners, it would follow that they are also ignored by QSL hunters. I'm pleased to report that in general, Brazilian stations are better verifiers than most of other stations in South America. They do not receive as many reports and have not yet become overwhelmed with reports like stations in the Andes region.

Obviously, a Portuguese report is a must. Sure, a few stations send out English/Portuguese or multilingual cards, but it is hit or miss as to whether the one or two people at the station who might understand English will be the ones who get your report. So make that reception report in the language that will be understood at the station. The best Portuguese reporting guide that I have found is Gerry Dexter's "Portuguese Language Lab". If you are serious about QSL'ing Brazilians, you will need a copy.

It also helps to address your report to the person at the station who actually signs the QSLs. The Brazilian station summary in Fine Tuning's "DX'ers Guide To Latin America" and Radio Nuevo Mundo's "LA DX'ing" are good sources of verie signers.

Brazil has been experiencing astronomical inflation, leading to the creation of a new units of currency twice in the past couple of years. If you are going to to use mint stamps for return postage, use them quickly before they become worthless. A much safer form of return postage is the United States "Greenstamp" (US $1.00). IRC's are too pricey and lead to inevitable exchange problems at the station's end.

In order to keep the rate of reply from Brazilian stations high, please do your part and send them a thank-you note. As Don Moore has observed, many Latin American stations have stopped verifying because they never hear from DX'ers after they received their QSL. "The Thank You Lab" in Fine Tunings "DX'ers Guide To Latin America", 1989 edition can provide you with the necessary phrases to thank the station. This will help all of us.

●SUMMARY

Brazil has long been ignored by DX'ers in their quest for rare DX. This is unfortunate since Brazil presents a large number of DX targets that range from the easy to the very difficult. Give them a try and enjoy the fun of DX'ing Brazil.

●REFERENCES

1. Sizer, Al., Brazil, FRENDX, October, 1983
2. Moore, Don, Brazil:Don't Ignore It - DX It, FRENDX, March 1989
3. Wood, Dr. Richard E., Recognizing Languages, Shortwave Listening With The Experts, Howard W. Sams & Co., Indianapolis, IN, 1986.
4. Fodor's Brazil 1988, Fodor's Travel Publications, New York, NY, 1987.
5. DX'ers Guide To Latin America, Fine Tuning, 1989
6. da Motta, Antonio Ribeiro, Brazilian Shortwave, Medium Wave and FM Stations List No. 9, Sao José dos Campos, Brazil, 1988
7. LA DX'ing, 4th Edition, Radio Nuevo Mundo, Tokyo, Japan, 1987
8. Insight Guides Brazil, APA Publications (HK) Ltd., Singapore, 1989

APPENDIX 1

BRAZILIAN SHORTWAVE STATIONS - **BY STATE**

STATION	FREQ	CITY	STATE	S/ON	S/OFF	POWER (KW)	// FREQS
R.Transamazônica	2410	Senador Guiomard	AC	1000	0100	1	
R.Progresso do Acre	2460	Rio Branco	AC			1	on air 88 ?
R.Educadora 6 de Agosto	3400	Xapuri	AC	1000	0200	2	
R.Educadora 3 de Julho	3570	Brasiléia	AC	0900	0300	1.5	
R.Difusora	4115	Sena Madureira	AC	1000	0230	0.25	
R.Nacional	4765	Cruzeiro do Sul	AC	0900	0400	10	
R.Verdes Florestas	4865	Cruzeiro do Sul	AC	1000	0300	5	
R.Diffusora Acreana	4880	Rio Branco	AC	0900	0530	5	
R.Vale do Rio Madeira	3205	Humaitá	AM	0900	0300	5	on air 88
R.Nacional	3375	São Gab da Cachoeira	AM	0800	0300	5	
R.Educação Rural	3385	Tefé	AM	0900	0200	1	
R.Difusora do Amazonas	4805	Manaus	AM	0900	0300	5	
R.Nacional	4815	Tabatinga	AM	0800	0400	10	
R.Nacional	4845	Manaus	AM	0800	0430	250	
R.Baré	4895	Manaus	AM	0800	0300	1	
R. A. Crítica	4935	Manaus	AM	2200	0200	5	
R.Alvorada	4965	Parintins	AM	0900	0300	5	
R.Educacão Rural	5035	Coari	AM	0830	0230	1	
R.A Critica	5055	Manaus	AM	1100	0200	5	
R.Rio Mar	6160	Manaus	AM	0900	2200	7.5	//9695
R.Equatorial	3375	Macapá	AP	2100	1000	1	
R.Nacional	4915	Macapá	AP	0800	0300	10	
R.Sociedade de Feira	4865	Feira da Santana	BA	0730	0300	1	
R.Educadora da Bahia	6020	Salvador	BA	0900	0200	10	//9540
R.Educadora Cariri	3255	Crato	CE	0900	0200	1	
R.Dragão del Mar	4925	Fortaleza	CE			5	inactive
R.Nac da Amazonia	6180	Brasilia	DF	0800	0300	250	//11780
R.Capixaba	4935	Vitória	ES	24 hrs		1	
R.Carajás	4885	Anápolis	GO	0800	0300	0.5	
R.Araguaía	4905	Araguaía	GO	0800	0300	1	
R.Anhanguera	4915	Goiânia	GO	0700	0400	10	
R.Difusora	4935	Jataí	GO	0900	0200	2.5	
R.Brasil Central	4985	Goiânia	GO	24 hrs		10	
R.Diffusora do Maranhão	4755	São Luis	MA	24 hrs		2	inactive ?
R.Ribamar	4785	São Luiz	MA	0800	0300	5	
R.Timbira	4975	São Luiz	MA	0800	0300	2.5	
R.Boas Novas	6000	São Luis	MA			5	construction permit
R.Clube de Varginha	3245	Varginha	MG	0900	0100	1	
R.Congonhas	4775	Congonhas	MG	0900	0100	1	
R.Itatiaia	4805	Belo Horizonte	MG	0800	0300	0.5	// 5970
R.Por Um Mundo Melor	4855	Governador Valadares	MG	0800	0300	1	inactive
R.Difusora	4945	Poços de Caldas	MG	0800 -	0300	1	
R.Inconfidência	6010	Belo Horizonte	MG	24 hrs		25	//15190
R.Guarani	6050	Belo Horizonte	MG	0800	0300	10	
R.Dourados	3375	Dourados	MS	0800	0400	5	inactive
R.Educação Rural	4755	Campo Grande	MS	0800	0500	10	
R.Difusora	4795	Aquidauana	MS	0800	0300	1	
R.Atalaia	4835	Corumbá	MS	1000	0315	5	inactive
R.Clube Campograndense	4895	Campo Grande	MS			5	construction permit
R.Diffusora	3275	Cáceres	MT	0800	0400	1	inactive
R.Portal da Amazônia	4775	Cuiabá	MT	0800	0300	1	
R.Aruanã	4855	Barra do Garça	MT	0800	0300	1	
R.Clube	4955	Rondonópolis	MT	0800	0300	2.5	
R.Cultura	5015	Cuiabá	MT	24 hrs		5	
R.TV Sentinela	3285	Obidos	PA			1	construction permit
R.Liberal	3325	Belém	PA	24 hrs		5	
R.Rural	4765	Santarém	PA	0800	0300	10	
R.Educadora	4825	Bragança	PA	0830	0200	5	
R.Clube do Pará	4885	Belém	PA	0800	0300	5	
R.Marajoara	4955	Belém	PA	0830	0300	10	
R.Jornal da Transamazônic	5025	Altamira	PA	0800	0200	5	
R.Cultura do Pará	5045	Belém	PA	24 hrs		10	
R.Borborema	5025	Campina Grande	PB	0830	0300	1	
Em.Rural A Voz do S.Fran	4945	Petrolina	PE	0755	0300	1	
R.Pioneria	5015	Teresina	PI	0700	0300	1	
R.Alvorada	3335	Londrina	PR	0800	0300	5	
R.Difusora	4815	Londrina	PR	0800	0400	10	
R.Clube Paranaense	6040	Curitiba	PR	0800	0300	7.5	//9725; 11935
R.Universo	6060	Curitiba	PR	24 hrs		10	//9565; 11905

BRAZILIAN SHORTWAVE STATIONS - **BY STATE** - CON'T

STATION	FREQ	CITY	STATE	S/ON	S/OFF	POWER (KW)	// FREQS
R.Cultura	6105	Foz de Iguacu	PR	0800	2400	5	//9530; 11745
R.Novas de Paz	9515	Curitiba	PR	0800	0300	10	//6080 (construction)
R.Jornal do Brasil	4875	Rio de Janeiro	RJ	0800	0500	10	
R.Relógio Federal	4905	Rio de Janeiro	RJ	0730	0330	5	
R.Cultura	4955	Campos	RJ	0700	0330	2.5	
R.Copacabana	5015	Rio de Janeiro	RJ	24 hrs		1	
R.Continental	5055	Rio de Janeiro	RJ	0800	0300	5	inactive
R.MEC	5990	Rio de Janeiro	RJ	1500	0300	7.5	//9600;11950;17875 (all irregular)
R.Globo	6030	Rio de Janeiro	RJ	0900	0300	10	//11805
R.Capital	6070	Rio de Janeiro	RJ	0800	0300	7.5	
R.Nacional	9705	Rio de Janeiro	RJ	0800	0315	7.5	
R.Poti	4965	Natal	RN	0700	0300	1	
R.Educadora	3375	Guajará Mirim	RO	0900	0200	5	
R.Amarela	4775	Rolim Moura	RO			5	construction permit
R.Caiari	4785	Porto Velho	RO	0800	0500	1	
R.Nacional	4945	Porto Velho	RO	0900	0200	50	
R.Marimoto	5025	Ji-Paraná	RO	0700		5	
R.Nacional	4875	Boa Vista	RR	0900	0430	10	
Fund. Bras. de Comun.	5965	Santa Maria	RS			10	//11705 construction
R.Guaíba	6000	Porto Alegre	RS	0830	0400	7.5	
R.Gaúcha	6020	Porto Alegre	RS	24 hrs		7.5	//11915
R.Pampa	6160	Porto Alegre	RS	0800	0300	10	//9550; 11890 (all inactive)
R.Guarujá	5980	Florianópolis	SC	0800	0300	10	
R.Marumby	9665	Florianópolis	SC	0900	2400	10	
R.Educadora	2380	Limeira	SP	24 hrs		0.25	
R.São Carlos	2420	São Carlos	SP	0800	0300	1	
R.Cacique	2470	Sorocaba	SP	1700	0400	1	inactive
R.Dito do Setembro	2490	Descalvado	SP	0900	0200	0.25	
R.Ribeirão Preto	3205	Ribeirao Preto	SP	0700	0400	1	
R.Clube de Marília	3235	Marília	SP	0800	0400	0.5	
R.Dif Universitária	3325	Guarulhos	SP	0800	0330	2.5	
R.Cultura	3365	Araraquara	SP	0730	0300	1	
R.Brasil	4785	Campinas	SP	0700	0500	1	
R.Canção Nova	4825	Cachoeira Paulista	SP	0800	0300	10	//6105
R.Meteorologia Paulista	4845	Ibitinga	SP	0830	2200	1	
R.Difusora	4925	Taubaté	SP	0730	0300	1	
R.Iguatemi	4975	Osasco	SP	0900	0300	1	
R.Tupi	4975	Sao Paulo	SP	0900	0300	1	
R.Aparecida	5035	Aparecida	SP	0800	0300	10	//6135; 9630
R.Difusora	5045	Presidente Prudente	SP	0800	0400	1	
R.Gazeta	5955	São Paulo	SP	0700	0300	5	//9685
R.Bandeirantes	6090	São Paulo	SP	0700	0500	10	//9645; 11925
R.Globo	6120	São Paulo	SP	0900	0200	7.5	//15265
R.Record	6150	São Paulo	SP	1000	2200	7.5	//9505; 11965; 15135
R.Cultura	6170	São Paulo	SP	24 hrs		7.5	//17815;9615
R.Difusora Possense	6250	Sto Antonio de Possen.	SP	0800	0200		unofficial
R.Excelsior(Globo)	9585	São Paulo	SP	0900	2200	10	
R.Clube	15415	Ribeiro Preto	SP	0800	0300	1	

STATES NOT ON THE AIR

Alagoas
Sergipe

STATE ABBREVIATIONS

AC = Acre
AM = Amazonas
AP = Amapa
BA = Bahia
CE = Ceara
DF = Distrito Federal
ES = Espirito Santo
GO = Goiás
MA = Maranhão
MG = Minas Gerais
MS = Mato Grosso do Sul
MT = Mato Grosso
PA = Pará
PB = Paraíba
PE = Pernambuco
PI = Piauí
PR = Paraná
RJ = Rio de Janeiro
RN = Rio Grande do Norte
RO = Rondônia
RR = Roraima
RS = Rio Grande do Sul
SC = Santa Catarina
SP = São Paulo

QSLING THE LATINS
A View From Both Sides

Don Moore

So many articles have already been written on how to verify the Latin American stations that it's hard to imagine a new perspective on the topic.

So, what's the purpose of this article? Basically, to add some insider perspectives to Latin American QSLing. I have lived and traveled extensively in Latin America, getting a good feel for the culture. In those travels, I visited over a hundred shortwave stations, plus a number of medium wave broadcasters. In visting stations, I talked with dozens of station managers, announcers, engineers, and secretaries, and looked at over a thousand reception reports mailed in by DXers and SWLs. I even had the opportunity to serve as the volunteer veri-signer for La Voz del Junco while I was in Honduras. So, let me share some observations from both sides of the radio signal!

●DO THE STATIONS APPRECIATE OUR REPORTS?

When you get down to the barebones, Latin American stations would get along fine without our reports. For the most part, we provide them with no necessary technical data - after all they're really only interested in being received locally or regionally.

But, there is more to reception reports than technical details. A report is written by one person and usually opened by another. It is interpersonal communication, and it's on that basis that our reports are judged. Latin Americans are a very social people. How can a station not be impressed to know that someone thousands of miles away struggled through static to hear their signal and then went to the time and expense to write and tell them about it?

Stations are impressed, and value our reception reports. Often reports, and the trinkets we send with them become part of the station itself. Rare is the station that doesn't have a few overseas postcards, pictures of DXers, or bumperstickers from US or European MW stations stuck on the wall someplace. Sometimes an entire wall is covered with our stuff.

Some stations really put an effort into displaying our stuff. Peru's Radio Nuevo Continente built two locked glass showcases to display DX reports. During my '85 visit, their display included reports from Don Jensen, Gerry Dexter, Dave Valko, Jack Perolo, and Olle Alm, plus DXers in Italy, Japan, and Argentina. Other stations, such as Radio Tezulutlan, La Voz de Nahuala, Radio Quito, and Radio Ancash buy looseleaf notebooks to keep reports in. When one fills up, they go buy a new one. All the reports are there, in chronological order, just waiting some future DX historian.

If any station can demonstrate the value which is often placed on our reception reports, it's a small and rarely heard station in Banos del Inca, just outside Cajamarca, Peru. The station is named Radio Inca del Peru, and shouldn't be confused with the more powerful Lima station of the same name. It's located in a decaying colonial style building, with a courtyard in the middle. A very small handpainted wooden sign hangs under the eave over the front door. The co-owner and manager of the station during my '85 visit was Manuel Graciano Terrones. Manuel was horribly crippled; his legs were puny, twisted and deformed, so he walks on his hands. Usually in Peru the only job for the handicapped is begging in the street. Manuel scrapes by with a small radio station.

Radio Inca was simple, even by the makeshift standards of Northern Peru. It occupied two second story rooms in the back of the building. The first room was the office - unpainted, rotting, wooden floor; a homemade wooden desk and chair; two shelves above the desk. The next room was the studio - a wooden table with a homemade console in a rough wooden cabinet, two turntables, a cheap cassette deck, a microphone. The record collection was about three hundred forty-fives and a maybe a dozen LPs.

This Radio Inca del Peru was so rare, that, as of my visit, it had received only two overseas reports, one from Gerry Dexter, and one from a

New Zealand DXer. Manuel was proud that his station could be heard so far away. Above his desk was a certificate, sent by Gerry, congratulating the station for being heard so far away. Manuel had bought an imported picture frame with a glass cover to put the certificate in. Knowing what I know of Peruvian radio and the size of Manuel's station, I would guess on a good day he might net three or four dollars. An imported frame would cost at least twice that amount. The cost of the frame would have feed his family for a week, or bought two more LPs for the station's miniscule record collection. Yet he valued that certificate enough to buy a frame for it.

Probably there are a few stations that do throw our reports in the garbage. It's interesting that at a few rarely-verified stations, there were no signs of foreign reports, e.g. Ecuador's Radio Popular and Radio Centinela del Sur/. Although other such stations, such as La Voz de las Caras and Radio Celendin were plastered with DX souvenirs.

Despite the possibility of horrible exceptions, I believe most stations really do appreciate our reports. The level of appreciation will of course vary depending on the individuals at the station and the number of reports they receive. Still, even the large number of reports some stations receive isn't a drawback. While on one hand, receiving five or ten reports a week may make the reports commonplace and boring, on the other hand, the intensity of this international audience may motivate the station all the more. For example, Radio Quito told me they average about three or four reports a day. That's about a thousand a year. Yet they still neatly file each report in a binder, and each one gets answered with a (unfortunately no data) QSL card and pennant. Yet, some stations, however much they may appreciate those care packages of international goodwill we call reception reports, still don't answer.

●HOW COME THEY DON'T REPLY?

This is a complex issue. To some extent it can be related to the report itself, and what is enclosed with the report.

Sometimes in the DX press I see comments to the effect that the people at these stations don't really understand that we want a written reply. One fact which might support that view is that some stations (probably more than we imagine) read DXers' names over the air, sometimes in a special 'international friendship' program. This can be seen as an extension of the practice where local listeners write in to have messages or their names read on the air, with no expectation of a written reply.

However, considering the clearness to which the desire for a written reply is stated in most Spanish (and Portuguese) reporting guides, plus the usual enclosure of return postage, I think the people at the stations are intelligent enough to figure things out. I think reading DXers' names on the air is just another way of expressing appreciation for our reports, and more importantly, a great way to impress local listeners.

Look at the issue from this angle. Reception reports to Latin American stations are unsolicited. If you were receiving six or eight unsolicited letters a month - how many would you answer? Especially if they were written in either very mechanical, formulaic English, or grammatically mediocre English. Very few of us would answer them all. For lack of time, some of us might not answer any. Still, each of us would probably continue opening each letter. A few of them might be interesting enough to prompt an answer.

Reception reports can be seen the same way. It's easy to open them, look at the contents, and put them aside until there's time to answer them. Some reports which get put aside obviously do get answered. I believe this is a function of available time versus how interesting the report is.

Another variable is how many reports the station actually receives. Perhaps a station that only receives one a month, for example, might be more likely to reply than the one that receives one a day. However, I suspect that if there is any connection, it is minimal. Manuel's Radio Inca del Peru had only received two reports - yet had not answered either of them. Several other small stations I visited had only received a dozen or so reports in the previous year - but had not verified any. Yet, there are stations like Radio Quito that recieve four reports a day and answer them all. Radio Jesus del Gran Poder told me they received about eight to ten reports a week, and tried to answer them all. An order of five hundred pennants was gone in less than a year, with most of those going to DXers.

I believe that it has become more difficult to verify Latins in recent years. A number of factors can be at work here. First, most of the new stations coming on the air are in remote areas. They are far smaller and simpler than the stations which were on the air in the 1960s and 1970s.

Many of those older stations, located in principal cities, are now inactive on SW. The staffs at the new stations are smaller, and often hold other jobs. The stations often don't have the funds to hire a secretary, or to have fancy stationery and envelopes. They are less equipped to answer any letter.

I believe Latin America's economic problems are having a great effect on verification policies. Most Latin Americans, including the stations, aren't as prosperous as they were in the 60s and 70s when the Latin economies were booming. Thanks to its oil industry and diversified agriculture, Ecuador is the one country in South America which has a stable economy. This seems to be reflected in the verification practices of Ecuadorian stations. During my travels, I was given more pennants by Ecuadorian stations, than by those in all the other countries combined. On the other hand, Peru and Bolivia are among the most difficult countries to verify. Their economies have been depressed throughout most of the 1980s.

●ANTI-AMERICAN?

One of the more interesting questions which I've been asked is whether or not anti-American sentiment contributes to Latin American stations failing to respond to reports from US DXers.

There is a considerable amount of negative feeling in Latin America towards the United States. Latin Americans in general do not like the way the United States dominates them. Too often, in their view, the US government has put political stability and the interests of American business before democratic rights. Even if some of that has changed, many still are not willing to trust the US.

However, Latin Americans separate the people from the government. Probably because the people themselves in Latin America have so often lived under governments they don't respect or agree with, Latin Americans do not automatically assume that a person agrees with, and is responsible for, the actions of his government.

I can't imagine any Latin American radio station would adopt a policy of not verifying American reception reports because they don't like US political policy. They will look at reports non-politically, unless you give them reason to think of politics. So, I certainly don't advocate discussing politics in reports! Nor do I recommend using stationery or envelopes with U.S. flags imprinted on them. Avoid red-white-and-blue mania. You could be interpreted as the jingoistic American which Latin Americans don't like. No point in missing out on a QSL just because of politics.

●BLAME THE POST OFFICE?

Quite often, Latin American post offices are given the blame for reports not being answered - the reports or replies being either lost or stolen in the mails. Although I don't doubt it happens, I believe the Latin post offices, like their American counterpart, are much better than they are given credit for. During my three years living in Honduras, to my knowledge, only one thing mailed to me never arrived, and only one letter written home didn't make it. In my travels in South America, to the best of my knowledge, all my letters made it to their destinations, and everything mailed to me at various maildrops made it, except a few things lost in Peru due to a mail strike.

●GETTING DOWN TO BUSINESS

It's time to get down to the basics - the actual reception report. It is my observation, having seen many reports at stations I visited, that the people who are willing to put in that extra effort into reception reporting are, by and large, the ones who receive those fine QSLs. The only real secret behind Latin American QSLing is lots of effort.

Politeness is more important than most DXers imagine. Latin Americans are in general more polite than Americans. To the DXer, this means stating things in an indirect and roundabout manner. Don't say "Please verify my reception report with your QSL card or letter". Instead say something like "If it is at all possible, I would be very grateful to receive a letter from your station verifying that my report is correct." The latter is how a Latin American would likely word a similar request. We do the same thing in English - think of how you would handle making a request of a subordinate versus making one of your boss. I think the differance is that in English our normal level of politeness is much lower than it is in Spanish. When

writing reports to the Latins (especially when making requests) be on your best, and most polite, behavior.

Obviously, reports should be written in Spanish (Brazilians in Portugese) unless the station is known to accept reports in another language (e.g. certian US missionary stations). That can be a problem if you don't speak the language. There are several ways of getting around this problem.

One method of reporting is the fill-in-the-blank report form. Usually these are trilingual (English, Spanish & French), and the DXer simply needs fill in the appropritate data. When asked, station personnel all said these were very cold and impersonal, and they didn't like them.

Many clubs, including NASWA, have four or five page guides to writing reports in other languages. Those are fine except the reports end up sounding alike. Chilean DXer Carlos Toledo Verdugo, who serves as veri-signer of Radio Agricultura and Radio Nacional de Chile, told me how after he had received a number of reports he noticed that many of them seemed to have been written by the same person - because they were almost word for word identical. I brought this up with personnel at several stations and received similar responses.

There are really only two acceptable ways of writing Spanish reception reports: either learn to speak the language with near-fluency, or use Gerry Dexter's Language Lab. Language Lab has so many different ways of saying things, that reports tailor-made with it won't look just like three other ones the station has received this week. It's something that should have been done years ago.

However, there should be more to a reception report than just telling a station that you heard them and asking for a veri. Our writings reflect our cultural values, but we must be aware that they may be very different from those of Latin America. To give an example, a Latin American who wants to succeed in the US soon learns the value of promptness in American culture, a situation quite different from that of his own culture. DXers tend to be like the immigrant latino who hasn't yet discovered that he better be prompt if he wants to hold a job. We apply our cultural standards to reception reports, even though the readers have different standards.

As Americans, we like to get to the point. Our society values "getting down to business". This is reflected in DX reports. All the reporting guides that I've seen, and almost all of the reports I've seen at stations, start out in the same way - by saying some variation of "Hi, I heard your station on XX date, please verify." It's a good American to-the-point approach.

However, Latin Americans are a very social people. For Latin Americans, getting right to the point in a business situation or meeting is considered very rude. Before business can be done, the participants chat a while. Some pleasant flatteries and personal information is exchanged. Some of the topics may seem highly personal to an American, especially if the participants don't know each other well. But, this is the Latin way of doing business.

Unfortunately, reporting guides do not allow for flattery or personal information. Language Lab took a step in the right direction, with sections on personal information and questions for the station. Those are a great beginning, but it would be impossible to come up with enough such sentences, in book form, to fit the wide variety of individuals in the hobby. Something more is needed.

First, let's take a look at flattery. Consider the letters you have received from Latin stations. Note that it often takes at least a paragraph before they say anything. The letters start out with a bunch of flattering phrases which do not convey any real information. Similarly, reception reports should start out with some flowery phrases for the station - something like this:

"Esteemed Sir: My most sincere and heartfelt greetings to you and the entire staff of your great station, Radio Lapequena, voice of the illustrious city/province of Pina Azul. I know you have all worked very hard to make Radio Lapequena such an excellent and enjoyable station to listen to. I wish you continued the continued success which your labors have earned you."

Can you imagine starting out a report to a MW station in Des Moines this way? They would probably look at your return address to see which institution you were living in. But, this is typical of Latin American letters.

After a bit of flattery, tell something about yourself. A report to a Latin American station should be chatty and personal. A good rule of thumb is to tell about yourself as you would in your first letter to a new foreign penpal. For Latin American stations, it's probably impossible to tell too

much about yourself. The restriction is how much postage you're willing to pay!

Reports embedded in a chatty, personal letter are more likely to be answered than short and to-the-point reception reports. I've looked at over a thousand reception reports, and it's not just coincidence that those DXers best known for receiving Latin American veris tend to write long chatty personal letters with the reception report coming towards the end. That does not mean you have to take a lot of time to write reports, either. For the most part, these DXers send the same stock formulaic paragraphs to every station.

To put this into practice, I highly recommend that you compose a couple of stock sentences of flattery to have translated into Spanish. Make up your own - don't use my example above, because probably everybody else will, and then you'll just all sound the same. Yes, I know it's hard it you're not used to writing that way. Also, write up a page or two about yourself, your family, and your community - any kind of personal information. If you don't speak good Spanish yourself, get someone who does to translate it.

Connected with the idea of personal information, is the role of titles. Like most of us, Latin Americans find titles impressive. In English we don't use them that much - for the most part, just for doctors, clergy, and politicians. Fortunately for some of us, Latin Americans are more liberal with the use of titles than we are in English - and if one of these fit you, you certainly should use it in your return address on LAm reports. Latin American lawyers usually preface their name with "abogado" (e.g. Abogado Jaime Castillo). Similary, if you are an engineer of any type, you can use "ingeniero" (Ingeniero Ana Fernandez), and if you are a teacher (any grade, kindergarten to adult ed), you can use "profesor" (Profesor Tomas Valencia).

●VERIE SIGNERS

Addressing reports to specific veri-signers has often been very useful. At some stations a specific person is designated to answer reports, at others one person just happens to be inclined to answer them. Generally, I recommend addressing letters to specific veri-signers whenever possible. However, if the v/s is a secretary or announcer, and the QSL report that names the v/s is over a year old, I might hesitate before using that name, unless there is a long history of that person issuing veris from that particular station. Staff members do change jobs and move on. If the v/s is an owner or manager, they are less likely to have changed.

One thing to keep in mind, regarding veri-signers, is that Latin Americans are more status conscious than Americans. In several instances, I was unable to verify a station during a visit because the person in charge, a director, or a manager was absent. At Radio Nacional de Mendoza, in Argentina, for example, a secretary refused to verify my report in the manager's absence. He was due back from a meeting, but although I stopped by the station five times that day and the next, he had still not arrived by the time I left town.

At other stations I was more fortunate. Although the secretary or announcer would not verify my report - it being far too important for her to take care of, I was able to see the manager and get my report verified. However, what usually happened in these situations, is that the secretary verified my report in the end. I would have a nice chat with the manager, and then when the topic of verifying reports came up, the manager would have the secretary or an announcer take care of it. There were only a few cases where the manager actually did the verifiying. There, in fact, were a few isolated cases where secretaries went ahead and verified reports on their own, without consulting the manager, but at most stations they would not.

It can be deduced, therefore, that sometimes even though a secretary or announcer signs a veri, they do not do so because they wanted to verify our report, but rather because the manager told them to (although in some cases, the manager would probably have the secretary type up the letter, and then sign it himself). In this case, a letter addressed to the veri-signer would not likely get a reply. Therefore, while I would send the first report to any known veri-signer, if the v/s is a secretary or announcer (or other non-administrative staff), I would probably address at least some of my follow-ups to the manager. After all, he might still be the one calling the shots, as to which reports do or do not get answered.

An alternative approach is to address your report to a particular program. Most Latin American stations, especially those in the smaller cities and towns, do not have set formats, but have programs of different types of music throughout the day. For example, the first program after sign-on for most stations is one of folk music aimed at the campesinos or

peasant farmers. Later in the day the station will have programs of romantic music for housewives, and rock or pop music for teenagers, with a radio soap opera thrown in for good measure. A Central American station may have seperate programs of ranchera and tropical music, a Peruvian of huaynos and pasillos.

Each of these programs has a name. A morning program may be called something like "Mananitas Campesinas" or "Buenos Dias Campesino". Usually the same announcer does the program daily, so addressing a report to the specific program name is as good as addressing it to the announcer. Of course, this requires having good enough Spanish to pick out the program name, usually given at the beginning of the program.

Check the log sections of hobby publications to see if other DXers have reported a program name at that particular time. As stations very rarely change program names, taking one out of a log column two or three years old is probably not a problem. However, be sure to check the day of the week. Programs on Saturday and Sunday are usually different from the Monday to Friday ones. (On a very few occasions, I have actually heard announcers give their names on the air - obviously if you can pick one out, that can also be helpful, even if all you have is the first name. You could try addressing your report to "Rafael, el locutor de Mananitas Campesinas".)

●PROGRAM DETAILS

While v/s at La Voz del Junco, I verified about twenty reports for the station. Since La Voz del Junco was my local station, I was familiar enough with the station's programming, the canned ID announcements, the advertisers, etc, that for most of the reports I received, simply reading the DXer's program details was enough to convince me that they had heard the station. There were a few reports I wasn't sure of, and I showed those to owner/manager Antonio Hasbun. He read them and nodded his head. He didn't check any program log - to my knowledge, they didn't even have one.

I think this pattern is true of most Latin American stations - no one compares our reports to detailed station logs to see if they are accurate. Instead, they read the details, and if the details seem to agree with what they know the station airs at that time, they assume you heard them. Because of this, logging minute by minute accounts, telling them the exact minutes they played "musica tropical" and the exact minutes there was a man talking, are probably a waste of time. General program details will probably do the trick. Specific things which will be useful are ID texts, time announcement texts (if there is a consistent pattern), and details about ads or other announcements. All of these impress stations - possibly because they require some knowledge of Spanish and are rather rare in DX reports.

Unless your details are clearly contradictory to their programming (e.g. you say they play huaynos when they really had on Julio Iglesias), they will probably assume you heard them. It's sort of like innocent until proven guilty. However, because of this, LAm QSLs seriously can not be taken as absolute proof that the station was heard.

Remember that small Latin American stations do not understand UTC and SINPO. Time should be given in their local time (if in doubt for multiple time zone countries, give time of capital city and clearly mark it as such). Comments on reception quality should be written in clear concise sentences. I was always amazed by how many reports that I saw used UTC and SINPO.

While at La Voz del Junco, the only report I never verified was a one page letter/report printed on a word processor. The only details given were "station ID and folk music". The DXer, whom I had never heard of before, enclosed three IRCs. Less than a week later, an identical report arrived from the same person, also with three IRCs. A few days later I received a third copy, again with three IRCs. I responded, explaining that I couldn't verify the report due to insufficient details, and suggested that he send a tape or another report with better details. Within another week, before he could have received my reply, I received two more copies of the report, again with three IRCs each.

I never heard from him again, although I did see several copies of the same report, identical except for station name, frequency, time, and date at several stations I visited in South America. I feel that his reports were probably fakes, he had a lot of money to throw around. With all those IRCs, he spent about $15 on La Voz del Junco in just three weeks. If I had not written back, I wonder how many more he would have sent. This is not the only case of faked reports that I know of. At Honduras's Radio Luz y Vida and Ecuador's Radio Bahai, I had station staff point out to me obviously faked reports they had received.

●RETURN POSTAGE

DXers probably differ in attitude more on return postage than any other aspect of QSLing the Latins. Some DXers claim that including return postage is of utmost necessity, while others claim to get just as many replies by not including it. There is disagreement as to what type of return postage to include - IRCS, mint stamps, or a US dollar bill.

The necessity of enclosing return postage is more a function of the size of the station than anything else. Large prosperous stations, such as most of the stations in Venezuela, Colombia, and Ecuador, probably should not need return postage. Sending a few letters or cards overseas each week is not a drain on their finances. What is more important is just getting someone on the staff interested in answering your letter. For that, other enclosures are more important.

Yet, even though I have received QSLs from many of these stations without enclosing return postage, I hesitate to say that return postage should always be skipped for larger stations. Enclosure of a SASE may make it easier for an announcer or engineer to respond to your report. Unlike the secretary, people in these positions may not have easy access to the station's petty cash. Replying may require extra effort on their part. Also, the economic crisis in Latin American is probably affecting the large stations too. If the manager wants to cut corners, he may prohibit un-neccesary expenditures - such as buying stamps to answer reception reports.

What kind of return postage to include? Surely not IRCs. On my station visits I saw dozens of reception reports with IRCs stapled or paperclipped to them. Even some otherwise authoritative articles reccomend the use of them. Yet sending IRCs to Latin America is like throwing your money away.

In most Latin American countries, exchanging IRCs for postage stamps is nearly impossible. In many countries, such as Guatemala, Ecuador, Peru, and Honduras, they can only be exchanged in the main post office in the capital city, making them virtually worthless in communities elsewhere in the country. In at least two countries, Ecuador and Honduras, one has to go to the philately office in the main post office and fill out some official forms first. In Ecuador, the post office only accepts a certain quota each month. If one arrives after the monthly quota has been filled, they are rejected. One small station in Quito told me that HCJB takes IRCs to the main post office for redemption on the first of every month, and accounts for a sizeable share of the quota. I have heard of difficulties in exchanging IRCs in Bolivia, Chile, and Brazil also.

There are a few exceptions to the "No IRCs" rule. Some stations, especially a few missionary stations, are willing to go to the extra trouble to exchange IRCs. At least one, HRVC in Honduras, sends IRCs to its main office in the USA to be exchanged there (which, they say, is easier than trying to exchange them at the main national post office, just six blocks away). Additionally, there are a few stations where the veri-signers are DXers, and they appreciate IRCs, since they can then enclose the IRCs in their reports to other radio stations. But, unless it is known for certain that a particular Latin American station accepts IRCs, they should not be included. Knowing for certain does not mean that another DXer received a QSL from Radio La Pequena in Peru for 2 IRCs. Those IRCs are probably still clipped to his report. Something else prompted them to answer.

Mint (unused) stamps from the country to which your report is headed - or better yet, a SASE - should be the preferred form of return postage. If you put the stamps on an envelope, not only does it save the station from having to address an envelope to you, but, it makes it more difficult to use them on another letter. This means, of course, that you won't receive your reply in an official embossed station envelope. However if writing to most of the small stations in the Peruvian hinterlands, that won't be a problem. These stations often have a difficult time just scraping up enough money for a rubber stamp and ink pad. Embossed envelopes? Dream on! In fact, these stations may not even want to spend the two cents it costs to buy an airmail envelope, if you don't include one.

For larger stations, such as most of those in Venezuela and Colombia, it's probably ok to put the stamps in loose. Still, I personally prefer using a SASE even for the larger stations.

The main problem with mint stamps is the relative cost. There are two organizations in the US which sell mint stamps (Bill Plum, 12 Glenn Road, Flemington, NJ 08822 and DX Stamp Service, 7661 Roder Parkway, Ontario, NY 14519). They do a good job, and I believe they sell at fair prices. When one realizes that the entire stock for a particular country can become worthless overnight due to a currency devaluation and rise in postage.

However, buying mint stamps from them has the same problem as buying IRCs - vastly inflated prices over real terms. Mint stamps for a particular country may cost the DXer anywhere from $1.00 to $1.50, yet be worth U.S. 20 to 40 cents. Additionally, there is the problem that if you buy the stamps too far ahead, you may be stuck with worthless stamps.

Sending a dollar bill seems to be growing in popularity. It has several advantages. First, at least for American DXers, they are easily obtainable. Also, they have a fixed value - unlike mint stamps and IRCs which cost more than they are actually worth. For the station, dollar bills are nice, in that not only will they pay for verifying the report, but there's enough left over that the v/s can go out and have a beer afterwards. However he could decide to forego the verifying and have two beers. There's also the possibility that enclosing a dollar bill might make your report more likely to be stolen in the post office.

I have heard rumors that some DXers have begun including $5 bills with their reports. I firmly believe that this will be bad for our hobby. Sending out or promising such sums only promotes a negative image of the greedy, rich American and encourages "selling" verifications. Those DXers who are willing and can afford it, may wish to offer financial assistance to a small station after it has QSLed.

●ENCLOSURES

It is often useful to include a small gift, a picture postcard or two, cancelled stamps for collectors a the stations, local tourist-site pamphlets, or a Chirstmas card at the appropriate time of year.

For other enclosures, clip from any good (and positive) article about the station's country from newspapers and magazines. Even if no one there can read English, it may impress them. Send a picture of yourself and your radio equipment, or your family. Some stations do hang those up. Of course if you have ever been in that country send a picture from the trip. For example, all my Peruvian reports now include a copy of a picture of Theresa and I with Macchu Picchu in the background.

If one is really serious about QSLing a particular station, and cost isn't a factor, there are all kinds of things to try. At times I have sent university pennants, 45 rpm records, and on one occasion a Pennsylvania Dutch Hex sign. My reply was apparently hexed; I never received one!.

A taped report is one way to combine a gift and the reception data. A letter should still be included, but for program details about five minutes of the reception, preferably including an ID, is recorded on the cassette. If reception is not of a quality that your non-DXing friends or spouse can understand, it is likely that the station staff can't either. A quality recording is necessary. You might complete the cassette with some recorded music, possibly the latest rock.

I'm not particularly fond of prepared card veris, preferring a letter or card that originates with the station. Based on my experience in Latin America, my view changed. I now believe a prepared card should go with every report, with the exception of those stations known to issue their own cards, e.g. Ecos del Torbes, Radio Quito.

So many stations include letters, their own cards, etc, along with the ppc that I can't imagine any station decides to verify with the ppc in lieu of sending its own veri. I think in the cases where the returned ppc is all that is received, then the station decided to verify with the ppc in lieu of not verifying at all. Basically, a SASE and ppc make it quick and easy to issue a veri if the station likes you, but doesn't have time to do more. I know that some DXers send blank ppcs, but, to make things easy for the station, I suggest typing in relevant data on the card, so that all the station has to do is sign and seal it and maybe write in the power.

For LAm stations, I recommend using a standard no frills card. I don't believe picture postcards will work as well in Latin America. My experience using viewcards as ppc QSLs, with rare exceptions, has been poor.

●FOLLOW-UPS

No matter how good your reports, there are always a number of stations that don't answer. The key to verifying them is followups. I used to try to hear the station again and type up a brand new report each time. That is probably the best way, but it is time consuming. Later I started making a photocopy of each report and filing it, for follow-up use if needed. Now I use a word processor for reporting, with separate disks for reports to stations in different areas and regions.

Even if you give up on trying to QSL a station after several tries, keep some record of the report. You never know when an opportunity to QSL the station might come up. I've had some luck with sending old reports to stations long after they've left shortwave. Also, there's always the chance of having a veri picked up in person either by yourself or a third party.

Once that sought for QSL arrives, there is still one more step, although way too many DXers ignore it. That is a thank you. It is an extra expense, yet there are many reasons for doing so. Some stations, such as Radio Popular have even stopped QSLing because they never received thanks and assumed that no one appreciated their efforts. All the Spanish and Portuguese sentences you need to thank a station with, are in "The Thank You Lab" in Fine Tunings 1989 Guide to Latin American DXing. These and other language editions of "The Thank You Lab" will become widely available in the upcoming months, thanks to cooperation between Fine Tuning, Tiare Publications, NASWA, and other radio clubs.

●CONCLUSION

As noted above, there is no magic answer to Latin American QSLing. Hopefully this article has put things into some perspective. However, taking local cultures, economic factors, and day-to-day living patterns into account in sending reception reports should help edge return rates up in the short run. But, more important, in the long run it should improve the perception stations have of DXers. This article has dealt only with Latin America, but the principals should hold true for most of the "Third World". John Bryant says everything here applies equally to Southeast Asia, except that reports needn't be quite as flowerly. Based on discussions I've had with non-DXers familiar with Africa, much of this article could easily transfer to that region too.

A final bit of advice: Be a bit of a gambler. No matter how hard you try, you're going to win some and you're going to lose some. Just when you're ready to say "No more!", some little Peruvian you've long given up on will come through with a veri that'll have you riding in the clouds for weeks. But, if it was predicatable, it wouldn't be fun, would it?

●ADDITIONAL RECOMMENDED READING

Berg, Jerry. "Latin American QSLing Made Easy (?)". FRENDX, September, 1985.

Dexter, Gerry. Secrets of Successful QSLing.

Moore, Don. "Peru: Radio Where Foreigners Never Go" in Passport to World Band Radio, 1989 edition.

Perry, Ralph. "Domestic Shortwave Broadcasting in the Andes", in Shortwave Radio Listening with the Experts, Gerry Dexter, ed.

CARING FOR YOUR QSL'S
And Still Having Lunch Money Left

Jerry Berg

There are two reasons why I feel qualified to write on this topic. First, when it comes to my own collection, I have made the full range of mistakes, and suffered the consequences.

Second, as Chairman of ANARC's Committee to Preserve Radio Verifications, I have handled about 20,000 QSL's belonging to others, including some of the hobby greats. Having compared their mistakes with my own, I am content in knowing that they weren't any smarter than I was.

Although wind, rain and fire are definitely to be avoided, the biggest obstacle to keeping QSL's in good condition is usually their owners. Our QSL's are in much greater danger from what you and I are likely to do to them than from any force of nature. We are, in short, our own worst enemies.

You would be surprised how QSL's, even those from the 20's and 30's, hold up when they are not abused. A card that has enjoyed ordinary care won't look much different from the one you found in the mailbox yesterday. Preserving QSL's so that they will look good and bring you enjoyment for many years is really quite easy. All it takes is modest foresight and a little common sense.

The concept of "preserving" anything, including QSL's, will mean different things to different people. To the professional archivist, some of the ideas presented here may not seem the best advice. If your goal is museum quality preservation, be prepared to spend a lot of money on archival quality storage materials.

But most of us are more interested in enjoying our QSL's today than worrying about their afterlives. Thus I write not as an archivist, but as someone who wants to keep his QSL's in good shape and maybe have a little money left over for lunch. My apologies to those wishing a stricter approach.

● A FRAMEWORK FOR DISCUSSION

We will need to consider storage, display, preservation and accessibility.

1. Storage. Where you store your collection is most important. The basic rule is to avoid extremes of light and temperature. Constant exposure to bright sunlight will cause almost any printed material to discolor and fade, and dampness or dryness can do serious damage to paper products. So it is best to avoid locations where there are wide swings of temperature or dampness. A good rule of thumb is that conditions that are uncomfortable to people will also be harmful to paper.

How to store your QSL's is also important. If you don't care about display, you may want to just keep them in a box. Those who toss their veries in a box might seem a bit reckless, but leaving cards and letters in their natural state and stacking them up someplace safe is probably doing them more of a favor than you think. Some well preserved collections I have seen consist of letters just placed one behind another in a cardboard box. The aesthetics aren't much, but the cards and letters hold up well, provided they are kept in a dry, stable environment.

It is good to remove letters from envelopes before storing them, however. The CPRV has handled many QSL letters that have been stored in their original envelopes. They were in excellent shape, but if they had been unfolded early they would have avoided stress on the creases when they were eventually opened up.

2. Display. Album mounting is the easiest and most practical way to display QSL's. The album provides a measure of protection, and facilitates transportation.

Some DXers mount their QSL's on the wall. We have all seen pictures of shacks "papered" with QSL's. But how have those QSL's been attached? If they are mounted with pins, they are probably okay, but if they have a cellophane tape loop on the back there will surely be problems removing the tape later.

Wall display can be attractive, but it is not a good approach to long term care of one's QSL's. They will get dusty and dirty, and will eventually curl and discolor. If you want to mount your QSL's on the wall, mat or frame them, or cover them with plastic.

Finally, some collectors just put their QSL's in folders and file them away. QSL's can be displayed quite easily when filed in folders and arranged by state or country. Just pull out "Tristan" and gaze away.

3. Preservation. This is an area where things can get pretty esoteric (and pretty expensive). You may, for example, decide to use acid free storage and mounting materials, or special tapes, photo corners or other supplies. Or you may wish to mount your QSL's so as to minimize damage from handling, and use plastic covered album pages.

Let me briefly discuss a related issue, the composition of paper and the affects of chemical impurities on the survivability of QSL's.

Paper is made from cellulose, which is constructed of ribbon-like glucose molecules bonded together into long chains and then built up into sheets that are held together in layers. These cellulose units, called microfibrils, crystalize into bundles and then into fibers. Water and other chemicals are added to the fibers and the whole is then processed into sheets of paper.

It is the additives, along with impurities and unstable plant products, that are the culprits. They have a deleterious effect on the paper and lead to its eventual deterioration. Environmental and atmospheric acids and pollutants have a like effect.

These additives are referred to collectively as acids. The bonds which hold the cellulose chains, microfibrils, bundles and fibers together are attacked by these forces, and the deterioration process is on. The underlying chemical reactions are the main cause of the deterioration. If only one-half of one percent of the bonds holding the cellulose chains together are broken, the paper will be virtually useless.

There are all kinds of acids that affect paper--impurities; the alum-rosin sizing that is used in the manufacturing process; acidic gases and pollutants from the atmosphere, like sulfuric acid and sulfur dioxide, both of which have a high attraction to lignin; and acids from adjacent acidic materials. Typically during the deterioration process, brown discoloration occurs and the paper becomes brittle.

Lignin is particularly harmful. It is the large molecule which binds the cellulose together in trees. The paper yield per tree is increased to 95% by using the lignin. It is only 35% if the lignin is not used. Lignin hastens the demise of paper by breaking down into many different acids and peroxides. (The brown color of shipping and packing containers comes from the lignin in the paper.)

Some high-quality (and high priced) archival papers are denoted as "lig free." Others contain alkaline buffers to neutralize acids. Some papers are commonly referred to as "acid free," although this nomenclature, without more, can be deceiving.

If all of this makes you want to place your QSL's in a hermetically sealed container and never look at them for fear of poisoning them forever, relax. These forces are largely beyond our control, and can be stemmed only with a level of effort that is beyond most of us. The point is that paper products, including the QSL's in your mailbox, are under attack by unseen gremlins all the time, and it behooves us not to make the process any <u>worse</u> by our own carelessness.

4. Access. How conveniently do you want to get to a particular QSL? If you don't care, you could just toss your veries into a bag and rummage whenever the urge strikes you. On the other hand, if you like everything in order you might have separate albums for QSL's from different parts of the world, groupings of QSL's from the same station, etc.

●MOUNTING TECHNIQUES

1. **The album itself.** How large an album page should you use? My suggestion is to use pages larger than 8-1/2 x 11". This will permit you to mount letters without having to fold them, and still leave a border area. It will often permit you to mount both a letter and accompanying card on the same page.

There are many, many different kinds of album pages. You should use pages with plastic covers, both to protect the QSL and help keep it in place. The plastic cover also provides a convenient place on which to mount a station sticker.

The primary hazards associated with plastics in archival work are from the chemical composition of the material itself (the plastic should be chemically inert), and from any additives or coatings that have been added in the manufacturing process. A plastic that is chemically safe by itself can be rendered unsafe by the introduction of a deleterious additive or coating. Many different plastic materials are used in the manufacture of mounting supplies--cellulose acetate, polyesters, polyethylene, polypropylene, polyvinyl chloride (PVC), etc.

Just as "acid free" is the password for safety in paper products, "Mylar" is the standard in archival plastics. Mylar is the brand name of DuPont's polyster film. It is strong, uniform, stable and inert. The latter quality is the reason for Mylar's acceptance in conservation work. Mylar contains no plasticizers that can migrate into adjacent materials, so there is no reaction with inks, adhesives, paper ingredients, etc. It will also withstand extremes of heat and cold.

There is one type of album that you definitely should NOT use, at least not without special precautions: albums with so-called "magnetic pages." These are the commonly available pages that have narrow ribs of adhesive to hold the card or photo in place. If you use such pages as they come out of the package, I suggest that you RUN, DON'T WALK, to your QSL albums and carefully remove all your QSL's, praying while you work. You may be lucky and still have time before these QSL eaters grab your veries for good.

Magnetic pages may be useful for photographs, which are on sturdy stock and have no information on the back. But they can be deadly to QSL's, particularly letters and particularly if the QSL has been mounted on the pages for a while. Those little ribs grip more firmly as time passes. Eventually you may reach the point where the QSL cannot be removed without damaging it, quite the opposite of the "easy in, easy out" approach you thought you were getting. Also, to the extent that storage deficiencies, like dampness, affect your QSL's, the damage is compounded by the use of magnetic pages. A letter that is a little weak from dampness may not survive the trauma of removal from a magnetic page.

One way around the dangers of magnetic pages is to use a piece of plain paper as a backing to the QSL. Cut the paper to the same size as the QSL, place the paper on the ribs, put the QSL on top of the paper and then lay the plastic face sheet over the QSL.

2. **Affixing the QSL's.** Avoid the use of cellophane tape (or "Scotch," "invisible" or "magic" tape, as it is variously known). The adhesive used with such tape is very corrosive, leaves a residue and eventually turns yellow and brittle. Most of us have probably used cellophane tape on our QSL's at some point, and have later learned the unfortunate results the hard way.

There are alternative tapes available, but tape of any kind should be avoided whenever possible. For mounting QSL's on album pages, use mounting corners. The ordinary type that are available at any stationery store are inexpensive and come in black, white and sometimes other colors. I use two for each card, four for a letter.

Do you want to mount the QSL's so that one or both sides are visible? If you are using album pages with paper inserts, as I do, you will be able to see only one side of the card. Many hobbyists like to display both sides, however, using the plastic page cover without any paper insert. The problem is how to affix the card to the plastic cover. Paper corners are not suitable because the back part of the corner, when viewed from the back of the page, is unattractive. Some DXers have used staples, but that is not fully satisfactory either.

One solution is to use see-through plastic corners. Another is the use of Gudy-O stickers, which are transfer tabs of adhesive. Or you could make a small hinge or loop out of a removable (not cellophane) tape. These products are described below under "Supplies."

● SOME DO's AND DON'Ts

1. **DON'T** use magnetic pages unless you use "backing" paper to protect the QSL from the adhesive ribs.
2. **DON'T** use cellophane tape. It looks good at first, but over the long haul it won't stand up and it will damage the QSL.
3. **DON'T** deface the QSL. This may seem pretty basic, but you'd be surprised at the fate that has befallen some QSL's. Don't fold them, punch holes in them, staple them, stick things on them or write on them.

But a P.S. here. I must acknowledge one example of "defacing" that was actually rather nice. In a collection donated to CPRV, the DXer used a mechanical numbering device to place on each QSL a small number which corresponded to an entry in a book containing the details of the logging--date, time, frequency, etc. I have to admit that it worked well and it didn't really detract from the appearance of the QSL's. So much for hard and fast rules.

4. **DON'T** remove the stamps, and DO save interesting envelopes.
5. **DON'T** use metal paper clips. They rust. Use the plastic kind.

●SPECIALIZED SUPPLIES AND TECHNIQUES

1. Where to look. There is an entire industry out there providing supplies to professional and amateur archivists. You will find some of these items in your local stationery store, but the extent of the products available from specialty houses surprised me.

There are companies that supply all kinds of storage and preservation items to stamp collectors, postcard collectors and other hobbyists, as well as libraries and museums. They often advertise in stamp, postcard and other "collector" magazines. I am going to mention three who produce informative catalogs which are available for the asking. Looking through the catalogs will tell you more than you ever wanted to know about archival supplies.

Light Impressions, 439 Monroe Avenue, Rochester, NY 14607-3717, 1-800-828-6216 (in NY, 1-800-828-9629). Ask for their illustrated "Archival Supplies Catalog." They also produce an interesting brochure, "Mounting Techniques," covering procedures and materials for organizing photos and documents in albums. The brochure is free for the asking. Light Impressions will also provide free copies of their catalogs and brochures for workshops and conferences.

University Products, Inc., P.O. Box 101, Holyoke, MA 01041, 1-800-628-1912 (in MA, 413-532-3372). Ask for their illustrated "Library and Media Center Supplies and Equipment Catalog," which contains a large section on archival and preservation materials.

Conservation Resources International, Inc., 8000-H Forbes Place, Springfield, VA 22151, 703-321-7730 [in Canada, Archival Conservation Resources (CANADA) Ltd., P.O. Box 2506, Ottawa Station D, Ottawa, Ontario, Canada K1P 5W6]. CRI also has offices in England and Australia. This catalog is less extensive than the others, but it contains a detailed article about what paper is, how it is made, how and why it deteriorates and what you can do about it. Some of the above discussion of these topics is based on the CRI article.

2. Supplies. The following is a brief description of some of the more interesting supplies for the amateur archivist. Some of these items can be found in local stores. All are available from one or more of the suppliers listed above, and all tend to be priced on the high side.

Containers. Even if you just toss your QSL's in a box you can still go first class. All kinds of archival-quality storage boxes are available, constructed of acid free and lig free materials. Envelopes, portfolio boxes, file folders, etc. that are made of such materials are also available, as are plastic envelopes, sleeves and bags.

Albums. A number of manufacturers offer albums with acid free coverings--overkill, in my opinion, but available to those who are so inclined. Some also come with slipcases, which is a nice touch.

If you prefer an album that will hold 50 or 75 pages rather than 25 or 30, keep in mind the desirability of D-ring construction. The main advantage of D-rings is that they let you flip pages easily, without bending them, and they allow the already-turned pages to lie neat and flat. D-rings make the handling of large albums much easier.

A category of albums that is not always found in the "album" section of stationery catalogs is the so-called display binder. They look like regular albums but they have "multo-rings," a row of 30 or so metal rings running the length of the spine (as opposed to the two or three rings usually found on regular albums). These binders will hold only 25 or 30 usually plastic covered pages, but the pages are commonly available in larger than usual sizes, like 11 x 14", 14 x 17" (the size I prefer) or even 18 x 24". The large page size makes them especially handy for displaying letters or putting together a display of station ephemera that cannot fit on an 8-1/2 x 11" page. Display binders come in both soft and hard cover designs.

Plastic covered pages. The variety of plastic covered pages is almost limitless. Be careful, though, because the plastic sheet protector and the paper insert that goes inside it do not invariably come as a single unit--sometimes you buy them separately. As noted earlier, if you use the paper inserts you will be able to see only one side of the QSL.

A quick check at your local stationer's will familiarize you with what is available, but the archival catalogs have some interesting specialty products, including such things as sheet protectors with plastic insert tabs attached, nice for indexing the contents of the page.

Also available are plastic pages with "pockets" for cards or photos of approximately postcard size. These often permit you to see both sides of the item inserted. You are out of luck if your QSL is a little oversize, however.

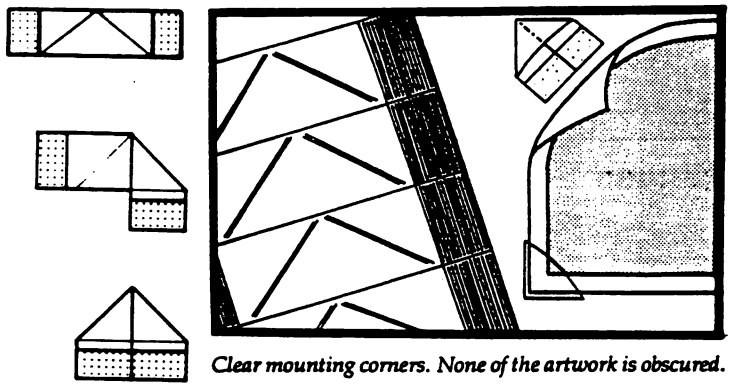
Corners. The usual paper variety are available at any stationery store. You moisten the back, press it in place and you're all set.

There are also two other types commonly available on the archival scene. One is a regular paper photo corner that contains no adhesive. I am not sure why one would use these except that they are made from special acid free paper and they are very professional in appearance. They must, however, be attached to the page with a piece of tape or an adhesive, too much of a chore for most of us.

The other special type of corner is the clear plastic variety shown in Figure 1. They are made of clear polyester. When you take them from the box the "corner" is actually a scored plastic strip which you fold into a corner. On the back of each "foot" of the corner is a self-sticking 3M adhesive that has been approved by the Library of Congress as a non-yellowing permanent adhesive for conservation use. Remove the paper covering from the adhesive and press the corner into place. The adhesive does not come into contact with the material mounted.

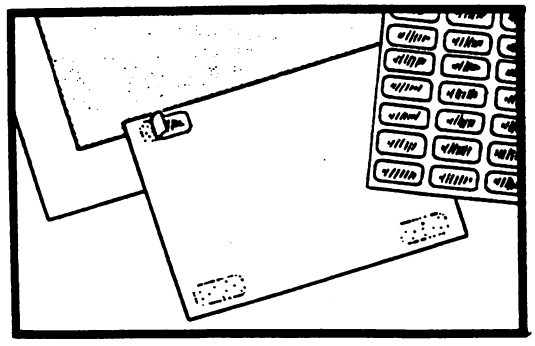
These see-through corners are a little awkward to work with at first, but they are probably your best bet if you want to mount your QSL's so as to see both sides. Affix the corners directly to the sheet protector, without using a paper insert. Two corners per card is plenty.

Mounting corners should not be used with brittle or fragile papers because they may place too much stress on one section of the paper and tear it. For ordinary cards and letters, however, they work fine.



Clear mounting corners. None of the artwork is obscured.

Figure 1



Gudy-O-Stickers. Transfer tabs leave a neat square of adhesive on the album page.

Figure 2

Tapes. If you can't get along without tape, what are the alternatives? One is removable tape, commonly available as "Scotch Removable Magic Tape" (No. 811). It is available in 1/2", 3/4" and 1" widths. I do not know what the long term properties of this tape are, but it is certainly preferable to cellophane.

Another interesting approach is to use removable correction cover-up tape. This white tape is intended to be applied to typed work in order to cover up mistakes, block out lines, etc. It is now available with the light weight 3M "Post-It" adhesive which permits you to lift the tape and reposition it without doing damage. It is sold as "3M Post-It Removable Correction and Cover-Up Tape." It comes in 1/6" (one typewriter line), 1/3" (two lines) and 1" (six lines) sizes, and is packaged in a 700" cutter dispenser. It is intended to mask, not hold things together, but at least one DXer uses it succesfully. What the long term holding power of this material is remains to be seen, but at worst you will just have to replace it.

If you must use tape and you want to go first class, use one of the very thin mending tapes available from the archival suppliers (Neschen "Filmoplast P" or Lineco Archival Quality "Document Repair Tape"). These tapes consist of very thin, strong, acid free tissue coated with an acid free adhesive. These are slow tacking tapes, which means that the tape can be lifted and repositioned easily during initial application. It increases its holding power after 15-20 hours.

Finally, take note of something called Neschen Gudy-O transfer tabs. While they are not an archival device, they are handy, and even yours truly, who is dead set against attaching any kind of adhesive to QSL's, has used these little guys when no one was looking. A package of Gudy-O transfers consists of five sheets of orange paper tabs--340 in all. Each tab is 15/16 x 3/8". You lift the paper tab, place the adhesive side at the point on the paper where you want the adhesive applied, press down, lift the tab and--voila!--the adhesive has

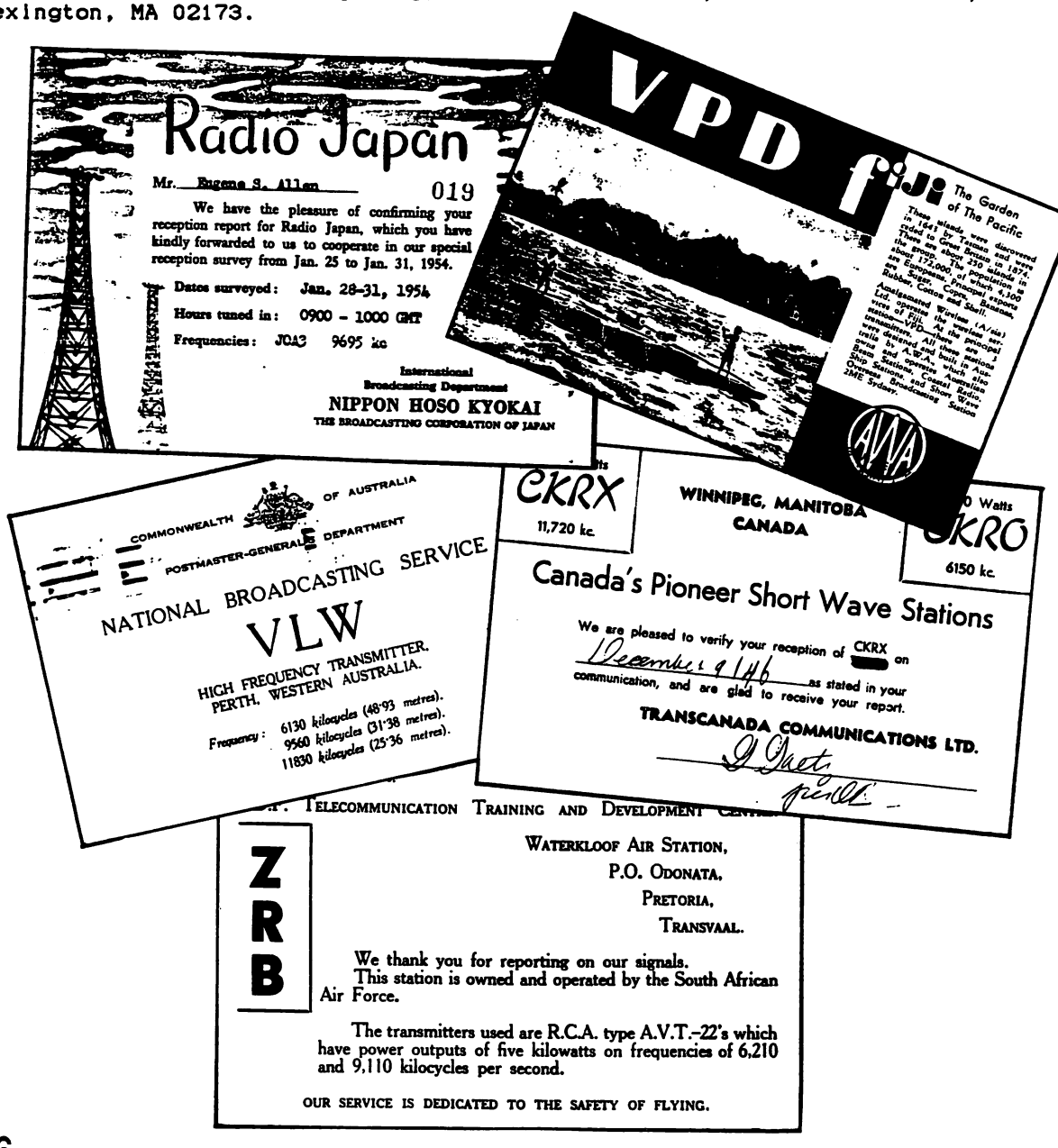
been transferred from the tab to the paper. (See Figure 2.) Very handy, and, of course, you can cut the tab to a smaller size in order to minimize the amount of adhesive used. These are good for very light jobs where you would like to use a piece of double stick Scotch tape but your conscience gets the better of you.

A final product of some interest: Document cleaning pads, recommended for cleaning dirty, dusty or moldy paper items. This isn't something that most of us will need, but it's worth knowing about. It is a pad containing a soft, grit-free powder which absorbs and cleans surface dirt. You twist the pad lightly over the item to be cleaned, producing a thin layer of white cleaning powder. Then you rub gently with the pad, causing the dust and dirt to be absorbed by the cleaning powder. Brush the residue away and you are left with a clean, renewed surface.

All of these archival products are nice, but most of them are in the non-essential category. Remember: common sense, steady temperature, and no dampness. With those basic points in mind, your QSL's will have a long life and you will get maximum enjoyment from them.

* * * * * *

The Committee to Preserve Radio Verifications exists to save QSL's from loss or destruction after their owners have left the hobby or passed away. Here, from among the QSL's that have been donated to the committee, are a few that have survived through the years. For more information about CPRV, send a business size SASE to Jerry Berg, Committee Chairman, 38 Eastern Avenue, Lexington, MA 02173.



COUNTING COUNTRIES
An In Depth Look

Don Jensen

INTRODUCTION

Despite claims to the contrary, radio's first listeners were more interested in logging large numbers of DX targets than hearing farm reports or opera.

Program listening? Who cared? Was there anyone who tuned in to hear an amateur soprano violate Verdi, or a technician-cum-announcer render a dramatic reading of "Casey at the Bat"? Early programming, at least until the first networks were established, was awful!

What really brought Americans to their crystal sets was the novelty of hearing distant radio stations. Common questions of the day: How many stations have you heard? How far away?

When shortwave broadcasting began a few years later, pioneer SWBC DXers began asking the same questions of each other. With the international dimension there was another question asked: How many countries have you heard?

The answer, at first, was easy. There weren't that many countries on the air. Even in the early 1950s, I recall it only took about 60 or 70 countries verified to attain a reasonably prominent spot on a "countries verified" scoreboard. Major names in the hobby, Arthur Cushen and Sydney Pearce, tallied about 120 verified countries.

I don't know if shortwave clubs in the 1930s maintained country lists. Probably not, but if they did, surely it was no big deal. For the most part, a DXer didn't need a special list to know that Germany was Germany, Holland was Holland, Japan was Japan, and they were all, indisputably, countries. The few question marks that existed were resolved by tacit agreement in the DXer's favor.

It was the radio amateurs, with many more stations operating and an increasingly competitive DXing spirit, who developed the first widely used radio country list.

Maximizing DX targets was the goal. That led, in time, to a philosophy which one unsympathetic DXer later described as "counting rocks in the ocean that are dry only at low tide." But for the hams' purposes, apparently, the ARRL Country List has served well for many years.

The most prominent U.S. all-band listener's organization in the post-WWII era was the Newark News Radio Club. Its monthly bulletin regularly contained scoreboard listings of members' countries "heard" and "verified." The now-common terms, HIC and VIC, abbreviations for "Heard Individual Countries" and "Verified Individual Countries," apparently originated in this NNRC column.

In fact, NNRC had separate scoreboard tallies. One was for those SWL members who tuned the ham bands. The other, titled, "Shortwave Except Amateur," counted everything else.

It was a traditional approach that had existed in the shortwave hobby since the 1930s. Virtually no hobby distinction was made between broadcast and utility transmissions as long as they operated in the shortwave frequency range.

And the stations themselves, particularly during and immediately after WWII, often tended to make no distinction. Point-to-point services would switch to broadcasts, clearly intended for direct reception by listeners, and then back to carrying PTP traffic again. Military transmitters, particularly on the Pacific islands, could be heard airing Voice of America or armed forces programs.

A slow transition to today's hobby concept of shortwave broadcast, separate and distinct from utility transmissions, began in the late 1940s and probably culminated in the switch by the North American SW Association (then abbreviated NASA) to "All Shortwave Broadcast" in July 1966.

But this different way of looking at the hobby, specialization and separation of shortwave broadcast from other non-ham transmissions, was quite well established by the late 1950s and early '60s. A growing number of SWBC specialists were becomming increasingly dissatisfied with the ARRL-based NNRC country list. It had then nearly 300 countries listed, a substantial number of which had no operating SWBC stations. It was a list which seemed alien to the needs of those who had become SWBC specialists. SWBC listeners could never match the HIC/VIC totals of utility DXers, with whom we inevitably were

compared in a scoreboard such as NNRC's "Shortwave Except Amateur."

Additionally, the members of a small round-robin correspondence group, DXplorers, which included, at the time, Gerry Dexter and this writer, felt that there were other unsatisfactory aspects to the NNRC Country List.

In the early 1960s, DXplorer members studied the shortcomings of the NNRC and other lists and sought ways to improve upon them. A general philosophy was formulated and, ultimately, a list was created. It was used and tested internally within the DXplorer group for about a year.

Then, at my instigation as an advisor to then-publisher, Bill Eddings, this list was adopted by the newly "all-SWBC" NASA/NASWA. A committee was established to maintain and periodically update the country list. I was appointed chairman of that committee, a post I retain today.

The rest of the committee now consists of Gerry Dexter, Jerry Berg, Robert Wilkner and John Bryant. Past committee members have included Ralph Perry, Dan Ferguson and Gregg Calkin.

Other country lists have been created and used by various radio clubs or organizations over the years. On two occasions, Association of North American Radio Clubs committees were established to draft a master country list which would be used by all-ANARC clubs. An ANARC list, in fact, was compiled, approved and adopted by the organization's representatives. But no ANARC club, to my knowledge, ever made use of it and, except, perhaps in the ANARC archives, there may be no copies extant.

There are several country lists in use overseas, probably the best known being those of the European DX Council (EDXC) and, to a lesser extent, the Australian Radio DX Club (ARDXC). Each enjoys reasonably widespread use in its region of the world.

These all have followed or follow today a basic approach which I call the "on-or-before/after" philosophy. The NASWA list, on the other hand, is based on the theory of "once-a-country, always-a-country." Both will be discussed further.

In 1981, New Zealand DXer Cecil Symmes, after examining all the above lists and one used by some DXers in his own country, concluded that the NASWA approach offered the most logic and benefits. He attempted to interest radio hobby clubs in the Pacific area and around the world in supporting a universal list, patterned largely on the North American model. As with most other attempts to impose use of a particular country list by decree from "on high," this attempt failed.

The use of any country list, it seems, comes from the grassroots up. It becomes the hobby's standard ONLY when DXers, voluntarily, accept and adopt it as their own, as the list best suited to their interests and needs.

To a very great extent, the North American Shortwave Country List has reached that point today. If not in universal use, it is, at least, the most widely used country list among shortwave broadcast DXers.

●UNDERLYING PHILOSOPHIES AND PRACTICAL REALITIES

Why is there such a thing as a radio country list? Who needs it?

A substantial number of today's shortwave listeners and a lesser number of hardcore DXers have no need for such a list. They do not participate in the NASWA or other scoreboards. They do not seek awards. They may not even be particularly interested in the number of different countries they hear or verify.

But probably a greater number follow the long tradition of the shortwave listening hobby and count the number of countries heard and/or verified. Some do it to measure their own accomplishments against those of other DXers in a scoreboard setting. Others, caring less about competitive aspects, simply want to measure their own DXing progress over a period of months or years, or to qualify for awards.

Clearly, no club or outside authority can insist that anyone use or support a particular country list. It is only if the individual decides to enter the "game" -- become involved in either scoreboard or awards programs -- that he or she need accept the established standards.

A standard is the base line against which measurements are made. It must be easily understood, conveniently usable and unchanging.

A country list is not, contrary to popular assumption, a simple thing to create. As someone, in all apparent seriousness, once commented to me, "What's so hard? You just write down the names of all the countries."

A key problem, of course, is determining what, for radio hobby purposes, is a country. There is no workable definition. So anyone who hopes to create a standard radio country list must first define the unit to be counted.

Certainly we could avoid the dilemma by letting somebody else, a disinterested party, define country for us. We could, for instance, use some existing country list, such as the United Nations membership, the countries of the Universal Postal Union, or even the index of a certain atlas.

Such a list would be easy to manage, easy to use and the hard decisions would be avoided. But it would be unacceptable to most shortwave DXers. For another important purpose of a country list is to serve as an incentive to keep alive the interest in hearing new catches. A list should offer enough listening targets to keep a person interested in the hobby for many years.

The sorts of outside lists mentioned above are just too restricted. They have too few countries to sustain a DXer's interest for long. After logging a fairly limited number of countries, the DXer would reach the end of the line. The incentive, like the list, is too limited.

Also, these lists would have nothing to do with radio, including countries which have no shortwave facilities and excluding some places which do.

At the other end of the scale, SWBC DXers could -- and once did -- simply use the radio amateur list, which includes well over 300 "country" entries. This large number is largely the result of amateur radio operators seeking out uninhabited rocks-in-the-sea to which DXpeditions journey merely to put a new "country" on the list. Many DXers who are not hams see this approach as carrying the incentive idea so far as to make a total mockery of any rational concept of a country.

Years ago, NASWA, with its country list, chose a middle ground. The list that resulted provides a large number of target "countries" -- around 240 -- to give sufficient long term listening incentives while avoiding the other extreme of counting every sandbar and islet as a country.

The major flaw in most other lists, as I see it, is that they are based on a false assumption that there can be developed a set of fully logical and non-arbitrary fixed criteria to define a radio country.

The NASWA list, on the other hand, begins with the basic premise that there are three factors that combine to determine country status. They sometimes conflict and only an arbitrary decision by the list-making committee can resolve the irresolvable.

Those three factors are politics, geography and hobby traditions:

●POLITICS

The role of politics in determining country status is important, but not all important. It defines many countries on the NASWA list. Portugal, Brazil, Japan, etc., are considered countries because they are, in fact, independent, sovereign political entities that the world commonly calls countries. If only they were all so simply determined.

But political situations change and standards must remain fixed. The country list must remain reasonably constant. A DXer who has counted 100 countries today should not have only 99 tomorrow, if, overnight a country is annexed by its neighbor and ceases to be a sovereign nation.

The map of today is not the map of five years go. So to give at least some reference point, NASWA's Country List committee arbitrarily fixed the approximate end of WWII -- actually, Sept. 1, 1945 -- as the starting point. As new political developments have occurred since then, real countries have been created by independence, revolution or partition. And others have disappeared for political reasons.

How should a list handle these political changes in a supposedly fixed standard? virtually every other radio country list has opted for what I call the "on-or-before/after" method.

Example 1: Country B invades neighboring C on Jan. 1, 1989. A DXer on Dec. 1, 1988, hears a shortwave broadcaster in the capital cities of both B and C and can legitimately count both countries. Another listener hearing the same stations on Feb. 1, 1989, merely hears two outlets in Country B, which has absorbed C into its national identity. What becomes critical to a listener in counting his countries is whether he has heard C on or before Jan. 1 (the "on-or-before" date).

Example 2: A certain colonial power grants independence to two provinces of an African protectorate known as D. These two areas become the new independent nations of E and F on Jan. 1, 1989. A listener hears shortwave outlets in the major cities of both provinces on Dec. 1, 1988. He can, of course, count both receptions as only one country, colonial D. Another DXer hears the same two transmitters on Feb. 1, 1989, each now being the national voice of its respective country, E and F. The first listener can count only one country; the second, two. Whether a DXer can count one or two countries depends on the Jan. 1, 1989 "on-or-after" date.

Different country lists handle this situation differently. One approach is to have a single alphabetical listing of countries, with parenthetical "on-or-before" and "on-or-after" dates to guide the user in what he can and cannot count. Another approach is to have a main list of current countries, plus a separate and distinct listing of no-longer countable "on-or-before" countries.

The NASWA list takes a different, "once-a-country, always-a-country"

approach. As political changes occur, the list makes parenthetical note of the new/current name but does not discard the old. Newly created countries are added to the list as well.

The "on-or-before/after" approach is unfair to both the newcomer to the hobby and the longtime DXer. The former is precluded from counting countries which politically ceased to exist before he began in the hobby, even though the same station/transmitter can be heard afterward. The veteran DXer loses, or at least must demote to some "asterisk" special category, a country he once counted just because some political change has occurred.

The NASWA list approach avoids both aspects of that unfairness. Consideration is given to the experienced DXer who can count countries which no longer exist politically in the real world or whose stations are no longer on the air. And the newcomer can count countries which ceased to exist, politically, but within whose former borders there still are active shortwave broadcasters. No countries, therefore, are lost, even though from a political standpoint they no longer exist.

What is surrendered to political reality is made up in fairness to both new and veteran listener.

●GEOGRAPHY

The second criterion in determining country status is geography. This is rather obvious since distance is often, although not always, a factor in shortwave reception. It is, by definition, the basis of the term, "DX."

There are considerable differences in reception patterns and conditions, for example, between Irian Jaya and the western tip of Sumatra -- both parts of the same nation, Indonesia -- and between Magadan and Moscow -- widely separated cities in the Soviet Union.

Even when the separations are not so extreme, geographical considerations regularly are an important part of determining country status.

●TRADITION

The third factor is hobby history or tradition. It is not enough for a country list comittee to sit in an ivory tower and hand down decrees. A standard country list must recognize traditional practices in the hobby or it will be rejected by DXers.

As noted earlier, ANARC attempted to create a list acceptable to all clubs, be their members interested in shortwave broadcasting, medium wave listening, utility DXing, etc. Creating that list involved much effort by volunteers with the best of intentions. But it was not accepted by American DXers, largely because it ignored or was unsuccessful in resolving differences among the various listening interests. The counting of certain countries was unacceptable to one group, not counting other countries was equally unacceptable to another group.

SWBC DXers, years ago, began using a country list which had been created for hams. While eventually rejecting that list as a whole, many listeners clung to some of its aspects. Certain of those traditional counting practices were folded into the NASWA list, even though the political or geographic logic may have been lacking. These traditions legitimatized, for example, the separation of the United Kingdom into its several parts, the USSR into its union republics, Indonesia into its main island groupings but not the partition of the U.S. into individual states, except for the non-contiguous Alaska and Hawaii. These decisions represent a continuation of long accepted hobby traditions among DXers.

●CREATING A LIST

Theory is one thing; putting it into practice is another. For one thing, a format is required. Even something as basic as alphabetizing a country list for easy use is not the simple matter it would seem.

Countries once placed on the NASWA list are not removed despite political changes. And in certain parts of the world, country names seem to change only somewhat less frequently than their governments. A country list must reflect such name changes.

The NASWA list responds by adding the new designations parenthetically after the earlier name.

Example: Belgian Congo, after independence, became the Republic of the Congo and, still later, Zaire. It appears in the NASWA list as Belgian Congo (Rep. of the Congo)(Zaire). A glance through the list will show that there have been a good many other changes during the past four decades or more.

Why, some have asked, does the list not alphabetize by the current popular name, e.g., Zaire (Rep. of the Congo)(Belgian Congo)? This approach, the questioners point out, quite logically, would make it easier to find particular entries since most users will be more familiar with present country names than with those used decades ago.

The answer is that to reverse the order with the current name first would require the entire list to be realphabetized each time any country changes its name, or, less satisfactorily, to scratch out the old and pen in the new in the appropriate place. However the order remains relatively stable if the countries are alphabetized by the names under which they originally entered the list.

Now this does, admittedly, present a minor inconvenience to the user, who must, therefore, acquaint himself with the history of some of these nations, at least to the extent of knowing past commonly used country names.

To make it easier to use, the NASWA list is presented in two parallel formats. The main list is broken down by continents. Assuming that one knows Zaire is in Africa but is unaware that in 1945 it was called the Belgian Congo, it is no great task to skim though the shorter list of African countries.

The secondary list, known as the gazetteer, is arranged alphabetically on a worldwide basis and contains a variety of supplemental data, such as the locations of some of the major stations, dates when political changes occurred, and when shortwave broadcasting activity began or ended.

Not much time passed after the creation of the NASWA Country List before users began asking for additional guidance. In response, the committee created a series of station counting rules.

In some cases, these rules have proved to be controversial. But the committee believes that they represent a concensus of the SWBC DX community.

An SWBC station is defined in those rules as one whose fundamental frequency lies in the radio spectrum range between 2,000 and 30,000 kHz, whose broadcasts are intended for reception by the general public.

The "fundamental frequency" clause eliminates harmonics of medium wave stations which fall within the shortwave frequencies as defined. Those objecting to this say that any sort of broadcast within that range should be fair game. They point to the goal of maximizing country "targets".

The committee has rejected this argument consistently, believing that there is a point at which attempting to maximize targets tends to damage the list's credibility. A more middle-of-the-road approach is to raise the issue of station intent. With rare exception, medium wave stations do not intend to radiate harmonics for shortwave listeners. The committee believes that most SWBC DXers do not consider such harmonics as "real" shortwave stations.

The "between 2,000 and 30,000 kHz" clause was amended from an original 1,605-30,000 kHz. Both lower limits expand upon the scientific definition of High Frequency (HF) as 3,000-30,000 kHz, because that unacceptably excludes the 120 meter band.

Originally the 1,605 kHz lower limit was chosen because it marked the traditional boundary with the medium waves. But in time it became unsatisfactory because of pirate stations, which considered themselves to be operating in an extension of the MW band, using frequencies in the 1,610-1,620 kHz range. So the lower limit was modified by the committee to exclude these out-of-band MW pirates, but include the 120 m.b. shortwave stations.

The definition phrase, "broadcasts...intended for reception by the general public" fits the concept of a listening hobby which evolved between about 1945-1960, that shortwave broadcasters are different from point-to-point communications transmissions.

"Broadcasts" are educational, informational or entertaining and are directed to a general audience. A useful synonym is "programs." But a "program" which is merely beamed from point A to point B, where it is destined to be retransmitted to a broad listening audience, is not a broadcast. Nor are radiotelephone conversations, ham QSOs or weather forecasts directed to mariners, pilots or other specialized groups.

Several specific exemptions have been made in response to widespread user requests. Countable as SWBC stations are standard time/frequency stations which have voice announcements, satellite stations in space which transmit intelligible material (Examples, in practice, are rare, but include the early orbiting Chinese satellites and perhaps some Soviet space shots), and utility stations which on rare occasion air genuine broadcast programming intended for general audiences (Also rather uncommon these days, except for special DXer test transmissions, e.g., Radio Syd, Gambia).

Incidentally, while a satellite transmission may be considered an SWBC station, outer space is not a country.

The committee also granted country status to Monaco for hobby tradition reasons. The tiny principality has no shortwave transmitters inside its borders. The stations' sites are actually a few miles outside Monaco in neighboring France.

Most, though not all Vatican SW signals come from transmitters outside the Papal City, although on territory which is decreed to be part of the Vatican State.

Azad Kashmir is not the same case. It has a single SW transmitter within its boundaries. The rest of the outlets relaying Azad Kashmir Radio are plainly on Pakistani territory. Reception of those signals should be counted as Pakistan, not Azad Kashmir.

Such cases are handled by the committee on a case-by-case basis.

●THE NASWA COUNTRY COMMITTEE AND ITS WORK

The NASWA committee is made up of five members. Membership turnover has been limited over the years. Thus the committee is composed of veteran, active SWBC DXers with considerable interest and knowledge of worldwide political and geographical matters and experience in the SWBC listening hobby.

Although it remains an NASWA committee, the influence and use of the the country list has spread beyond NASWA membership. The committee, therefore, is mindful that it has something of a trustee's duty to maintain the list for SWBC DXers regardless of club affiliation.

The committee meets on call, through correspondence, round-robin letters and, occasionally, phone conversations and in person. Significant additions were made to the list in early 1988, after about six months' deliberations. Since that time two other countries have been added as new stations came on the air.

Periodically the chairman presents to the members a series of possible changes/additions to the list. These suggestions may have originated from committee members or DXers at large.

Some proposals will be routine housekeeping chores, e.g., Country A has changed its name to AA and that parenthetical addition should be made in the list. Others are more substantive or controversial.

Two full rounds of round-robin discussions follow in which members discuss and argue the merits of each proposal. Then a vote is taken. A country is added or the proposal rejected by a majority vote.

In the 1987-1988 actions, about half of the proposals were accepted, with votes ranging from 5-0 to 3-2.

As in most deliberative bodies, some members tend to be more conservative, others more liberal, and those viewpoints may vary with the particular proposal.

All sides of the issues are fully discussed prior to a vote.

The discussions often involve various informal guidelines which committee members have adopted over the years. Questions commonly asked and answered would include, typically: "Is there a substantial mileage separation between A and B to warrant considering the latter a separate country?" "Has A been functioning autonomously for at least a year after its revolutionary split from B?" "Is A really independent or is its supposed sovereignty just a sham?"

And, often, the bottom line that members cite in deciding if a certain territory should be considered a radio country: "Is there that undefinable sense that this is a 'country;' does it have the right 'feel'?"

The new countries admitted to the list in 1988 included Katanga, which had been rejected by the committee in several previous considerations. This time the majority was willing to take a fresh look at the situation.

One member noted: "My conclusion...is that the Katanga situation is not really different in kind or degree from that of Biafra. They were both major 'breakaway' efforts that has some visible viability and that lasted for an appreciable period. I think they should both be treated the same in the country list."

The committee, however, declined to alter its 1980 rejection of Transkei as a country. The majority, again, concluded that the South African "homelands" have no history of separate status and are not recognized by any country, apart from South Africa, as independent or semi-independent entities. The committee indicated its decision was not based on anti-apartheid reasons, although one member did suggest that the committee might be "subconsciously influenced by the political situation." That may or may not be true, but the majority felt there were ample other reasons not to count Transkei.

The committee decided to split off Bali from Indonesia's Lesser Sunda Islands, creating another country. After discussion, the majority was convinced by one member's argument that "the original decision to lump Bali and the Lesser Sunda Islands together as one unit was wrong or ill informed."

He reasoned that "If there is any island in Indonesia that is singular, it is Bali!"

These examples may shed some light on the sort of reasoning and discussion which go into the committee's decisions.

I am confident that the process we use to create and maintain the NASWA Country List is as democratic as possible. Input from all DXers is always welcomed.

Clearly no country list can satisfy all SWBC DXers. But I think the present list, by its widespread acceptance, has become and will remain the basic standard in the hobby.

INTERNATIONAL DXING ON THE MEDIUM WAVES FROM THE MIDWEST

Fritz Mellberg

If things are getting a little boring on the tropical bands lately,you might want to tune down to the standard broadcast band for some of the most challenging international DX in the radio spectrum! There are plenty of thrills lurking on the medium wave and some of the rarest DX awaits those willing to wade through the clutter of truck driving music,Larry King and those golden oldies.

I'd like to share a few tips and strategies on international BCB DX for those of you unfamiliar with medium wave DX from the center of the continent. Tropical band DXers are usually "content to listen to the static between stations" as my wife likes to say. Because we are conditioned,by nature perhaps, to actually enjoy static crashes and sideband splash,teransferring our ears to the broadcast band will be an easy move.. In the process,we will be able to hear Europe,Africa,Latin America and South Pacific stations,even from Iowa or Oklahoma.

●GETTING STARTED

If you live near one of the coasts,you probably know about international BCB DX,since its rather easy to hear foreign MW stations across your local ocean.If you want to qualify for real bragging rights,however,you must move to the midwest. From the very center of North America, a diligent DXer has a theoretical shot at hearing the entire world on medium wave. With miles of land attenuating distant signals and with over 5,000 domestics in the way,the task is difficult but it is possible.

As a moderately fanatical DXer,I have been alternating between the tropicals and BCB for about 8 years now. In that time,with a few good seasons in my log books, I have managed to snare 18 countries with my R71A,a homebrew loop and a random wire. Barry Wasylik,Dave McBride and George McLachlan up in Winnepeg,Manitoba have room for a good antenna farm and have snagged over 48 countries in the same period. Karl Forth is representative of DXers in Chicago and he has heard over 200 stations in 38 countries. Ron Purdue and Bill Marvin in Minnesota,John Bryant in Oklahoma,John Wilkins in Colorado and Mitch Sams in Kansas as well as the members of DX Mid-America are others who have logged similar numbers over the years.

Changing to BCB for an evening is easy. Basic propogation and receiver skills remain quite similar. The peculiarities of BCB propogation,such as sunrise and sunset skip are well documented in articles available from the medium wave clubs. But the first real mental change necessary to BCB DX from the midwest involves readjusting your numbers attitude. Forty eight SWBC countries is kids' stuff. But on medium wave and from the midwest,even 25 countries is an achievement!

●THE RECEIVER

Most of you,I assume, have a "modern" Japanese solid state receiver.For most DX,it will do the trick. The key factor in receiver selection for MW DX is selectivity,not sensitivity as you might suspect. Razor sharp selectivity is required to zero in on those stations operating on split frequencies or those operating a single kilohertz away from a domestic. The better receivers such as the major sets by Kenwood,Icom and JRC will do well enough,especially if they have been modified for tropical band DXing. Tube rigs,such as the venerable R390A,the HQ 180 series and the Collins 51J series,with their excellent mechanical or crystal filters and notch filters are excellent MW DXing receivers.

Whereas sensitivity is not that crucial on medium waves,most modern solid state receivers have their medium wave circuits attenuated to prevent local MW broadcasters from interfering on the higher bands. Medium ave DXers usually modify their receivers to enable full sensitivity on medium wave. However,many "switch hitters" log alot of internationals before they get around to it,so don't worry about receiver modification before you even start.

●ANTENNAS

Assuming you have a decent radio with good selectivity,your antenna system is the next consideration. A simple random wire is the basic requirement and MW DXers used nothing else for years. In the late 1960's,the medium wave hobby rediscovered the loop antenna technology of the 1930's and began building souped up models. DX totals escalated. The 4 foot air core loop described in the National Radio Club's Antenna Reference Manual is a standard against which others are often judged. The loop allows you to null out unwanted stations to the sides of your DX target. These loops are often,but not always,coupled to the receiver through a small homebrew RF amplifier.

Air core loops come in all sizes and shapes. A popular version developed by Ralph Sanserino is 2 feet square. Another popular model is the wedge which is shaped like a 2 foot by 5 foot Christmas tree. The larger the surface area of the wire,the greater the gain will be. If space is a major factor,an amplified ferrite rod loop like those sold by Radio West or Palomar are well regarded. They offer almost equal sensitivity,but usually they are not as sharp in their ability to null out unwanted signals.

Although it is sometimes possible to hear the strongest trans-Atlantic (TA) and Trans-Pacific(TP) signals with a loop or short wire,if you are really serious ,you will need to put up a Beverage antenna. The Beverage provides more gain and most importantly,more directionality and will provide better loggings throughout the DX season.

The MW trio up in Winnepeg have an old school bus fifty miles outside of town and spend weekends there for international DX.People like John Bryant who live out in large cow pastures can run 1200 feet of wire right to their shack. Your situation will vary and if nothing else, DXpeditions are recommended. Plans and theory on Beverages are available from the radio clubs and in articles elsewhere in Proceedings 89.

The latest development in DXing technology for MW uses antenna phasing theory. With a little box packed with a tangle of inductors and potentiometers,the signals from two antennas can be combined with incredible results. It is often possible to null out signals from three directions and focus on your target without interference ! Manufactured phasing units are hard to come by and unless you want to struggle with the construction articles available from the clubs, you may have to do without.

●REFERENCE MATERIAL

At the top of the MW DXers reference list is the trusty World Radio-Television Handbook. This is the only listing of worldwide MW stations readily available.The next most important is the foreign logging columns in the NRC and IRCA club magazines. IRCA has recently published a listing of all international logs in recent years.(Available for $5 from the IRCA Goodie Factory) Lastly,the listing with this article will give you an idea what has been audible from the midwest in the last several years. This list includes NRC loggings,a few special reports sent to me and the loggins from a nice publication Pan AM Plus,published by a now defunct(but hopefully resurrectable) club known as DX MidAmerica,led by Milwaukean John Reigers. (Pan Am Plus is available from John for $2: 801 Sherman Avenue,South Milwaukee,WI 53172)

●DX TIMING

When is the best time to DX? For latins,the best time seems to be from local sunset to mid-night,although many stations are reported after midnight when domestic stations sign off. Monday mornings,when some domestics sign off for a few hours,is a traditional time for DX activity. For Africans and Europeans,your local sunset and midnight when dawn enhancement is occuring in Europe are best. Early morning around local sunrise seems to be best for those rare trans-Pacific targets. Sometimes TP loggings occur when the sun is setting at the transmitter site--around 2 AM to 5 AM CST.

The MW DX season is traditionally September through April,but latins are possible throughout the year. New Zealand was also heard in July in Colorado. All this sounds quite familiar to tropical Band Dxers. The patter is roughly the same.

The most interesting time to DX on MW is local sunset or local sunrise.At these times the ionosphere is changing in character as the darkne-s path crosses the globe.Little windows pass over the land allowing for brief openings to various areas. At sunset,it is possible to follow sign offs from Eastern to Western stations while listening on one frequency. This time period also yields some suprising Latin American loggings. Detailed studies of sunset skip(SSS) and Sunrise skip(SRS) and helpful DX techniques are found in the NRC booklet "Getting Started in Medium Wave," available from the NRC Publications Center, Box 164,Mannsville,N.Y. 13661.

●AURORAS

Latin Dxers cherish those special conditions known as Auroras. When sunspot activity is high ionospheric particles block propogation at the north pole,sometimes settling a blanket as far south as Kansas City. This allows weaker stations to the south to emerge from beneath the normally much stronger northerly locals.There is some evidence that propogation from the tropical zone is enhanced at auroral periods also. On nights when there is an aurora in play,you will likely hear Spanish on a third of the BCB frequencies. Listen to WWV for the A index to go over 40. Many of us also use a few index stations such as 750 Sandino in a null of WSB. If we hear Sandino,we know there are openings to the south.

●GOING LATIN

We'll start our international foray with Latin America;its the easiest and most tropical band DX skills come into play.

My first hunting technique on any given night is to scan the band for Spanish. All you have to do is eliminate the domestics broadcasting in Spanish. These domestics will invariably identify themselves at the top of the hour according to FCC rules. Ads are also clues.

After years of listening to Latins on the tropicals,we have learned to identify countries by the music the stations are playing. Most of us can tell the difference between Columbian, Mexican,Guatamalan and Cuban music. This helps alot. But foremost in our mind is hearing the station's identifying name. Unlike domestics which identify themselves with call letters,Latin stations are very proud of their name or slogan. Call letter announcements are rare. Another clue will come from network names such as RCN or Caracol for Columbians.

Once and awhile you might run into a North American university station broadcasting ethnic music. Before I knew better,I thought I was onto a big catch from Algeria when I learned it was just a Toronto station broadcasting a program in Arabic. What a letdown!

Once you have made a scan for Spanish and have locateda and logged a few,you may want to be more thorough and flip into USB and start,say at 530 KHz and scan up the band listening for hets. Or start at 1630 going down in LSB. Make note of the hets on odd frequencies because many internationals operate on these splits (666 Portugal, 1314 Norway or 660.4 Honduras) Follow these throughout the evening and keep tabs on them throughout the season for they indicate likely

candidates when conditions are better. Here is where your selectivity becomes important. If you can hear a weak station on 770.3 (columbia) when you must contend with country-western music on 770,you are using a real radio. Your loop will help you narrow the field of interference.

Using SSB also allows you to find those stations you might have missed if you merely scanned in the AM mode,for many times,the audio is lost in sideband splash in AM but is audible in SSB.

●HOW ABOUT NORWAY OR DAKAR?

When you are scanning for Spanish in SSB,you will often come across hets that sound like they are speaking Norwegian.The European stations (TAs) are set up 9 KHz apart and run from 529 to 1602 KHz While hets don't speak Norwegian,you are likely to hear o het from the Norwegian on 1314 if conditions are good. Its the best bet for TA reception from the midwest. Also common is 765 Dakar,Senegal. Conditions are good for long haul high latitude DX when WWV announces an A index below 10 for at least two days in a row. McLachlan,Wayslik and McBride in Winnepeg find that Europe is audible from early fall through late spring around local sunset.Conditions often allow 1314 Norway to emerge also at 0300 GMT or later.

The Manitoba Trio also note that for Europeans,IDs are scaree on the hour and most programming is endless music without announcements.Sometimes the audio is so good that you can guarantee an ID only to find the ID buried in the noise at the hour. Such is DX!

Veteran DXers Karl Forth finds that midwinter--December through February seems to be best for TA reception. The tradionally poor reception in January(called the Midwinter Anomaly) notwithstanding,Karl has had luck in the first week in January on a number of occasions.He finds the best time to DX is near midnight.He also observes that he has heard few stations below 1200 but usually has loud signals from such frequencies as 1557 and 1593.

TA reception from the Midwest is tough,but not impossible as the list of 24 countries heard from the Midwest attests.

●FIJI ANYONE?

For Midwesterners,TP reception is most exotic of all.New Zealand,Japan,Australia and yes, Fiji have been heard. Like with tropical band DX,early morning is the best time to hear them, although some emerge late in the night.

McLachlan,McBride and Wayslik say that fall and spring near the equinoxes seem best for Australia and New Zealand. From 3 AM until an hour after local dawn are optimal times. Mitch Sams and John Bryant have enjoyed some dandy TP loggings on John's Indonesian Beverage. John Wilkins has also had good TP loggings from Colorado. Its not impossible,its DX!

●GOODBYE

That about wraps up the introductions. For those of you who look to the tropicals as your first love,let me offer a suggestion. Tear yourself away from the 60 meter band and enjoy a new phase of the hobby--try some international MW Dx!

●●●●●THE LOGGING●

Times,locations and other facts are not listed to save space.What is most important is that the station was heard.Most Latins were heard from local sunset through midnight and September through April are common months for reception. Best Bets are underlined,however these vary depending on your domestic locals. Information not listed,such as call or station name was either not included in the source of information or was unsure and therefore eliminated so as not to be misleading. DXers states are listed in the DXer Directory to save space in the listings.

●THE LATINS●

Anguilla				
1610	The Caribbean Beacon		Common	
Antigua				
1100	ZOK English		MP,BM,JJR	
1165	R. Lighthouse	1-86	RP,NW,BW,JB	
1580	VOA		TS MP,MK,JJR	
Argentina				
1170	LV4	9-82	BM	
Bahamas				
1540	ZNS (rare)	12-85	JJR	
Belize				
830	R. Belize	1-86on	Common	
Cayman Islands				
1205	in English	winter	Common	
1555	R Cayman		Common	
Columbia				
590	HJCR Sutatenza	10-85	HF	
600	HJHJ R Libertad	83 on	Common	
620	HJBP	12-83	FM	
640	HJBJ Rare	1-82	CAC,TN,JJR	
650	HJJX Rare	2-84	BM	
700	HJCX Sutatenza(//5095)		FM,TN,JJR	
720	HJAN	1-82	FM	
750	HJHJ	3-83	JJR	
760	HJAC RCN	81-83	FM,JJR	
770	HJHK R Tequemada(770.3)		FM,CR,BW,GM	

Columbia,Continued				
780	HJZG	R Sonarama	2-86	FM
810	HJCY	Caracol	Common	
820	HJED	Caracol Cali	12-84	FM
840		Rare	9-83	JJR,GM,BW
870	HJSB	Mar Caribe	84-87	JJR,CAC,PK,FM
890			9-81	PK
895	HJPM	R Galeon	12-84	FM
910	HJDD		10-86	RK
	HJMY	RCN	10-87	FM
960		Sutatenza	9-87	GM.BW,DM,JJR
1000	HJHF	R Nacional		JJR,RG
1010	HJCC	La Tropico Oro	6-88	JB
	HJOP		8-82	CAC,FM
1020		RCN	12-78	GM,BW,DM
1040	HJAI	Caracol	8-82	JA,JJR,FM
	HJGX	R Progresso	9-82	MP,BM
1070	HJAG	Em Atlantico	1-85	JJR,TS,FM
1090			10-85	CAC
1100	HJAT	Reloj	11-84	FM,JJR,JA,SP
	HJCN	Reloj	2-84	RG,JB(88)
1110		Reloj	10-88	GM,BW,DM
1130	HJAC	Em Rio Mar	9-82	CAC
1160				GM,BW,DM

Columbia,Continued

1170	HJNW	Caracol	12-85	JJR,FM
1190	HJCT		82	Common
1210	HJFR	Reloj	11-86	CR
1220	HJVF	Reloj	10-85	Common
1280	HJSO		11-83	RK
1310	HJAK		12-86	CR
1360	HJTU	Reloj	9-82	TS
1370	HJBO		10-82	CAC
1410	HJOV		11-82	PK,CAC
1420	HJAW		11-82	RK
1520	HJLQ		11-84	CAC,JJR
1550	HJCB	R Exitos	Common,Rare now	
1580	HJOZ		11-82	TS,CAC

Costa Rica

530	TICAL	R Rumbos	83 On	Common
670	TIBAS	R Monumental	83	FM
700	TICN		83	FM
730	TIHB	Reloj(//4832)		FM,CR,PK
970	(//6160)		12-86	CR
980	TIASF	R Cima	11-84	CAC

Cuba

Call letters rarely used and only clue on location is provided by ever changing network designations. Good Luck!

550	CMAA	Rebelde	2-86	CR
570	CMEA	Reloj	10-85	HF,JJR
580	CMMF	Rebelde	2-86	CR
590	CMCA	Rebelde	87-89	TN
		Now Reloj		JB,FM,CR
600	CMKA	Rebelde		RG
620	CMOA	Rebelde		JJR
630		Rebelde	1-84	FM
640	CMBB	Progresso	85-87	HF,JH,JB
660		Progresso	11-87	JH
670	CMBC	Rebelde	87-88	FM,JH,RG,JB
690	CMEC	Rebelde Now Progresso		Common
710		Rebelde	85-88	Common
730		Liberacion		JJR
740		Progresso	3-86	NW,FM
760	CMBD	Reloj	11-87	Common
790		Reloj	12-85	BM,JB(88)
820	CMBV	R Iuidad	2-82	JJR
830		R Taino(English)		Common
860	CMBM		82 on	CAC
880		Progresso	86 on	Common
900		Progresso	11-84	FM
920		Reloj	2-84	RG
940		Reloj		BM,SP
990	CMAL		10-82	JJR
1000	CMAO	R Guama	9-82	FM
1010		R Guama	3-86	NW
1020		R Guama	to 88	JJR,TN,JB
1040		R Taino(English)		Common
1050	CMLL	R Victoria	10-82	CAC
1080	CMCU		10-85	CAC,JJR
1090		R Guama	2-82	JJR
1120	CMCW	Cadena Habana	2-86	FM
1140	CMBW	Cadena Habana	8-88	JB
1160	CMCV	R Havana(English)		Common
1180	CMOD	Reloj	11-82	PK
1270		Reloj	9-82	JL
1520	CMJV	R Baragua	12-83	JJR

Dominica

595		(*4 a.m)	2-82	HS

Dominican Republic

790	HIL	LV del Tropica		PK
830	HIJB		1-81	JJR(rare)
1010	HIJB	R Commercial	82	WM
1180			11-82	PK
1574.2		R Amancer	89	JB

Ecuador

640	HCXY	Quito Radio	2-82	JJR (MM at SRS)
892		R Superior		WM (Pre SRS)
905		R Espectaculo	11-82	JJR
915	HCRO3		10-82	WM
925	HCVL2		11-82	WM
995	HCEW2	Frequencia Mil	1-80	KF,JJR
1295	HCNS1	R Popular	10-82	WM

El Salvador

540	YSHV		1-83	JA
655	YSS		Common	
720	YSR		83 on	FM
765	YSKL	R Universidad		JJR,BM
770	YSKL		2-86	BM,CR

Greneda

535	R Greneda			Common
990			83	JA,JJR

Guadaloupe

640			10-82	JA (Rare)

Guatamala

640	TGW	LV Guatamala	85	FM
670	TGRT	Fabulosa	83	FM
700	TGHR	Mundial	83	FM
730	TGN	R Cultural	1-82	FM,HS
1090	TCZ	R Cadena	2-82	JJR
1180	TGT	R Sonan	9-82	BM
1613			11-86	HS,BM,RG,PK

Haiti

1030	4VEF		1-87	NW
1080	HVRO	R Nacional	82-86	HS,CR
1170	4VRS	R Soliel	11-85	FM (SSS)

Honduras

600		R Centro,R Libertad	3-83	FM
610	HRLP	R America	11-84	CR,BM,FM
650	HRVW	LV Centro Am.	2-86	CAC,JJR,FM
670	HRN5	LV Honduras	12-82	FM
750	HRTV	R Trujillo	1-86	RP
880	HRH	R Honduras	4-83	FM
890	HRH	(ex HRGLL)	83-84	RG,FM
1110	HRPL	Progresso	3-83	BM
1353	HRME	R Patio		WM

Jamaica

580	RJR	R Jamaica	83 on	KF,RK,JJR
700			12-88	GM,DM,BW,FM

Mexico

540	XEWA	LV Latina America		BH,JJR,FM,JB
570	XEBJB	"BJB"	1-85	FM,JB
580	XEMU	Rancherita Del Aire		JW,CR,RG,FM
	XEFI	R Mexicana	9-87	BH,FM,JB
590	XEPH	Rare	9-82	JJR
610	XEBX		BM,CR,JB	
630	XEFB		11-87	BH,FM,JB
650	XETNT	R Dinamita	9-84	FM
660	XERPM	Tropico d Oro/Infantil		82 on FM
670	XETOR	R Ranchito	9-84	FM
690	XETRA	Mighty 690 (English)	7-87	JW
710	XEDP	R.Cuahutemoc	10-83	FM,JB
730	XEX	R Festival		Common
760	XENY		1-88	JW
	XEABC	R Internacional	2-83	FM
790	XERPC	R Ranchito	82-87	JW,FM
	XERC	R Exitos	2-86	FM
800	XEROK	R Canon		Common
810	XERSV	R Alegria	11-87	JW
	XEFW	Rare	1-83	BM
820	XEYX	La Gigante	10-86	JW
830	XEVQ	La Fiera Musical		11-87 JW

Mexico,Continued

850	XEM	R Exitos	9-84	RG,JB
	XETQ		8-82	MP
	XEZR	Canal 85	12-82	FM
860	XEMO	R 86 (Rare)	-81	TN,JJR
	XEUN	R Universidad	83 on	TN,JJR,FM
	XEZOL	R ZOL(Top 40)		FM
	XENLR	R Recuerdo	10-83	FM
880	XEPNK	Canal 88	11-84	FM
890	XEYQ	R Fesnillo	11-87	JW
900	XEW	LaLatina America		Common
940	XEQ	La Q	11-87	BH,FM
950	XEGM	R Todo		Common
	XEYJ	R 95	3-83	FM
960	XEK		11-87	BH,JB,FM
970	XEJ	R Mexicana		Common
980	XEER	off	8-82	FM
	XENR		3-83	FM
990	XET	La T de Monterrey		Common
1000	XEFV	R Rancherita	4-83	FM
1010	XEKD	La Nortena	5-85	FM
	XEHL	La Poderosa HL	1-86	NW,CAC,FM
	XEVK	R Felicidad	2-83	FM
1030	XEQR	R Centro		RG,JJR,FM,JB
1050	XEG	La Ranchera		Common
1060	XEEP	R Educacion		Common
1070	XEOB	Canal 1080(sic.)	7-87	JW
1090	XEPRS			TN
1110	XERED	R Rojo		Common
1130	XEHN		8-87	JW
1140	XEMR	La Nueva MR	11-87	BH,JB
1170	XERB	La Onda Musical	11-84	FM
1190	XEPZ	R Nortena	10-87	FM
1220	XEB	R Mexico	2-86	CR,FM,JB
1260	XEOG	R Rancerito	8-87	JW
1300	XEP	Radio 13	4-83	FM
1320	XECMQ	R Sensacion	11-82	CAC
1420	XEF	La Romantica	8-87	JW
1560	XEJPV	R Fama	2-83	FM
1570	XERF	R Amistad		Common
1580	XEDM	La Grande DeSonora	9-82	PK
1590	XEACH		9-82	FM
1600	XEAE	R Variedades	11-82	FM

Netherlands Antilles

800	PJB (English)			Common

Nicaragua

540	HTA540			JJR,RG
555	HTA	19th de Julio	83-88	FM
620	HTA620		2-83	MK
720	HTA720	Catolica		FM
750	HTA750	Sandino		Common
780	HTA?	LV Nicaragua(off)		FM
840	HTA840		9-82	CAC(Rare)

Panama

650	HOS22	R Mia	2-82	JJR
740	HON26	R Crystal	82	PK
770	HOL47	R Nacional	2-82	JJR,PK,CAC
840	HOL80		82-84	TN,MP,RG,
860		R Reforma	80 on	KF
890				PK,JL,MP
1197		Ondas Tropical	2-78	GM,BW,DM

Puerto Rico

580	WKAQ	R Reloj		Common
630	WQBS	Salsa 63	summer	RK,ETH

St Kitts

825	R Paradise			Common
895	R Nevis		3-89	JB
1265	R Paradise			Common

St Lucia

840	R Caraibes		5-89	JB

Trinidad and Tobago

610	R Trinidad			JB
730			83	RK

Turcs and Caicos

1570	Atlantic Beacon(English)			Common

Virgin Islands

970			12-85	JA

Venezuela

540	YVOV	R Perija	11-83	CAC
550	YVKE	R Mundial	9-82	CAC
570	YVMZ	R Rumbos	9-82	JJR
580	YVMJ	LV de la Fe	11-84	CAC
670	YVLL	R Rumbos	9-82	CAC
710	YVKY	R Caracas	9-82	TN
720	YVQL	R Vision Oriente	3-87	CR,JJR
740		R Maracaibo		JJR,CAC,TS,TN
750	YVKS	R Caracas		JJR
910	YVRQ		10-82	CAC
940	YVNW	R Punto Fijo		BM,MP
1000	YVOA	R Munial		CAC JJR
1020	YVMX	Rare	9-82	CAC,JJR
YVRS	YVRS	R Mundial Margarita	summer 82	MP,BM
1080		R Barcelona	10-85	CAC
1090			12-82	JJR
1150	YVMM	(rare)	9-82	JJR
1200	YVOZ	R Tempo	82	TN,MP,PK,CAC
1210	YVQZ	R Anzoatequi(rare)	9-82	TN

Last Minute Info Sept.

Brazil.

1180 R Globo heard by Karl Forth,but not recently
1280 It has been reported that Frank Merrill of McComb,Ill heard this during 1988.

●TRANS ATLANTIC LOGGINGS●

531	Algeria	83 on	CAC
567	Ireland	12-87	KR
666	Portugal	12-86	RP,JB,MS
684	Spain	11-86	RP
747	Holland	10-87	GM,DM,BW
756	Germany	10-87	GM,DM,BW
765	Senegal		Common
774	Spain(//684)	11-85	RA,RP
846	Italy	2-87	RP
864	France	10-87	GM,DM,BW
882	United Kingdom	10-87	GM,DM,BW
891	Algeria	83-87	PK,JA
963	Finland(// 9560)	12-87	KR
1017	Germany	10-87	GM,DM,BW
1035	Portugal	85-89	Common
1062	Denmark	10-87	GM,DM,BW
1107	Egypt	10-87	GM,DM,BW
1125	Belgium	10-87	GM.DM.BW
1134	Yugoslavia	10-87	GM,DM,BW,JB
	Spain	2- 87	RP
1143	USSR	10-87	GM,DM,BW
1179	Sweden	10-87	GM,DM,BW
1197	Germany(VOA)	10-87	GM,DM,BW
1206	Poland	10-87	GM,DM,BW
	France	10-87	GM,DM,BW
1215	United Kingdom	10-87	GM,DM,BW,JB
1269	Germany	10-87	GM,DM,BW
1314	Norway	86 on	Common
1323	E Germany	10-87	GM,DM,BW
1341	Hungary	10-87	GM,DM,BW
1377	France	87	JB

Trans Atlantic Logs,Continued

1395	Albania	86 on	GM,DM,BW
1467	Monaco	85-87	GM,DM,BW,JB,MS,NW
1404	Guinea	85 on	GM,DM,BW
1467	Monaco	4-87	JB
1476	Austria	10-87	GM,DM,BW
1485	Spain	10-87	GM,DM,BW
1494	USSR	3 -86	NW
1503	Poland	12-87	JB
1512	Belgium	86	NW
1593	Germany	1-87	PK

●TRANS PACIFIC LOGGINGS●

594	JOAK Japan	4-87	JB
650	KORL Hawaii		GM,DM,BW
702	Australia		GM,DM,BW
747	JOIB Japan	85-88	WH,JB,MS
756	New Zealand	6-86	WH,GM,DM,BW,WM
774	JOUB Japan	85-88	RA,JB,MS
	Fiji	1-86	WM,GM,DM,BW
800	1YZ New Zealand		JB
828	JOBB Japan	11-85	RA,JB
873	Australia	10-87	GM,DM,BW
1008	New Zealand	2-87	GM,DM,BW
1017	Australia	10-87	GM,DM,BW
1026	New Zealand	2-86	WM
1035	New Zealand(// 1008,1026)		WM
1575	Australia	10-87	GM,DM,BW
1620	RPH Australia	1-88	JB
1629	Australia		GM,DM,BW,JB

Many Thanks to All who provided logs and information for this article!

●DXers REPORTING IN THIS LIST

Logs listed here are drawn from National Radio Club's DX News over the last few years, from DX MidAmerica's Pan Am Plus and from lists submitted in personal correspondence.

JA	Jim Albrecht	Milwaukee,Wi
CAC	Craig Cook	Milwaukee,Wi
RG	Rob Gerardi	Benton,Ill.
JL	John Lentz	Hales Corners,Wi
MK	Mike Knitter	Cambridge,Wi
PK	Paul Kowalski	St Francis,Wi
RK	Robert Kramer	Chicago,Ill
BM	Bob Mielcarek	Milwaukee,Wi
WM	Bill Marvin	Waseca,Min.
SP	Sheryl Paszkiewicz	Manitowoc,Wi.
JJR	John Rieger	South Milwauke,Wi
CR	Christos Rigas	Chicago,Ill
NW	Niel Wolfish	Winnepeg,Manitoba
TN	Tim Noonan	Milwaukee,Wi
FM	Fritz Mellberg,	Hawarden,Ia
MS	Mitch Sams	Topeka Kansas
JB	John Bryant	Stillwater,Ok
HF	Harold Frodge	Midland,Mich
KF	Karl Forth	Chicago,Ill
GM	George McLachlan	Winnepeg,Man
BW	Barry Wasylik	Winnepeg,Man
DM	Dave McBride	Winnepeg,Man
TS	Tom Steele	Milwaukee,Wi
HS	Herb Scarpelli	Milwaukee,Wi
MP	Mike Pering	Kenosha,Wi
ETH	Earl Higgins	Riverside,Ill
WH	Wayne Heinan	Aurora,Colo
RA	Richard Allen	Billings,Ok
RP	Ron Purdue	Byron,Min
KR	Ken Romstadt	Ottawa Lake,Mich
BH	John Herman	Vinita Ok

TIPS AND TECHNIQUES FOR THE ADVANCED DXER

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compiled and edited by David Clark

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RECEIVER RELATED

● JAPAN RADIO NRD - 515 UPDATER - By: Jon Williams

After reading the review in Proceedings 1988, some may have discovered it is not necessary to adjust the mode switch between LSB and USB to change from one sideband to the other when using the PBT. This is very useful in avoiding hets or splatter from adjacent stations without having to change the mode setting.

When the mode is set for USB, the PBT will tune upper sideband between the 12:30 and 2:30 positions on the control. By tuning between the 3:00 o'clock and 5:30 positions, you will be covering the LSB.

The same is true when in LSB mode. Lower sideband is covered between 9:30 and 11:30 and USM falls between 7:30 and 9:00.

I have noted two PBT anomolies. First, my passband tuning range on USB (12:30 to 2:30) is greater than it is when the mode is set for LSB (9:30 to 11:30). Secondly, I must slightly tweek the RIT when tuning into the opposite sideband (without changing mode switch). I suspect that an alignment would overcome these minor problems.

I DX exclusively using ECSSB and I have been frustrated with the very critical tuning necessary to "zero-beat" a station with the RIT because the RIT pot tuning ratio is too coarse. To solve this problem, I had Universal Shortwave replace the RIT pot with a Bournes Pot. The original uses about eight-tenths of a turn to tune through its 2 kHz range, but while the Bournes Pot results in a broader 5.9 kHz tuning range, this requires a full ten rotations.

As a result, it is easier to zero-beat a station carrier. It can almost be done visually, as the tuning knob has a built-in dial on its face with the dial marked in 50 equal increments, with hands like a clock moving around the dial. Thus, one can divide 5.9 kHz into 500 separate and equal increments - visually, about 12 Hz each.

A second frustration is the choice of IF filters. The review in Proceedings 1988 mentioned the 1.8 kHz filter as a narrow ECSSB or normal SSB filter. As with the reviewers, I have found this filter to be excellent for DXing. But to solve the problem of a wider filter, I selected the Collins 2.9 (nominal 3.05) kHz mechanical filter which fills the gap quite well as a narrow AM or wide ECSSB filter. The skirts are steep (shape factor about 2 to 1) and the audio quality is very good with only a slight insertion loss which I do not find objectionable. I highly recommend this particular filter as a compromise between the 6 and 2.4 kHz stock filters for either narrow AM or wide ECSSB.

* * *

● JAPAN RADIO NRD - 525: AN EFFECTIVE AGC UPGRADE - By: Guy Atkins

Manufacturers of modern communications receivers often design automatic gain control (AGC) circuits with reception of single sideband signals in mind, rather than AM signals. The Japan Radio NRD-525 is no exception.

The culprit here is the slow attack time and very slow release time of the AGC. The release time of the NRD-525's stock SLOW AGC is really dismal; audio can be blanked out for two to three seconds while the receiver gain recovers from a strong burst of static. The stock FAST AGC is better, but not by much.

Generally speaking, the modified AGC FAST value provides an improvement in speech intelligibility (particularly on weaker signals). All propagation anomolies are heard, such as flutter, etc., but more details within the signal are also noted. I prefer this setting when DXing, for capturing as much speech detail as possible while avoiding excessive audio "blanking" during noise bursts. I prefer the modified AGC SLOW when listening to music on stronger signals.

I am indebted to Craig Siegenthaler of Kiwa Electronics for designing the circuit changes. He drew upon his broadcast engineering background and NRD-525 listening tests to determine new component values that would improve AGC response for AM reception. Craig also tested the stock and modified circuit to verify the changes to the AGC attack and release.

During testing, the NRD-525 was pulsed with a 20 dB variation RF signal of 4.5 MHz. A separate, simulated NRD-525 AGC circuit was also built for analysis. The following stock and modified AGC responses were noted on an oscilloscope:

	STOCK FAST	MOD. FAST	STOCK SLOW	MOD. SLOW
(Attack)	8 ms	3 ms	- not measured -	
(Release)	400 ms	200 ms	2+ sec.	600 ms

This modification involves changing four capacitors that speed up AGC attack and release times by approximately 50%. The capacitors work in unison on both fast and slow AGC; it is not possible to change just the FAST or SLOW AGC.

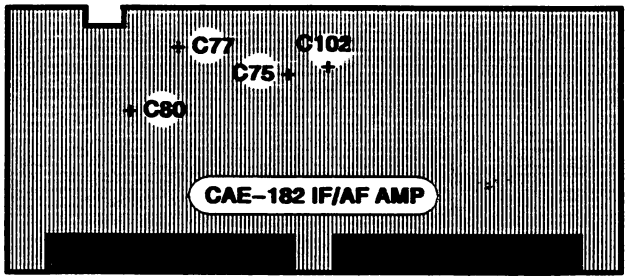
Of course, any warranty covering your receiver will be voided by this modification and you perform this work at your own risk. This change is not particularly difficult. However, it is assumed that you have electronics assembly experience and are able to solder and desolder components carefully. [check out Dallas Langford's article /dmc]

This modification is intended for stock receivers. Do not perform this modification if your receiver has the ESKAB PLAM board installed, or has other changes affecting the AGC circuit. The PLAM board changes the NRD-525's AGC in a different manner to work properly with ESKAB'S synchronous detector.

To make the modification, remove the receiver's cover and speaker jack J1, and pull the IF/AF AMP board (CAE-182). Awls or similar tools inserted into the small holes at the ends of the board assist in removal.

Using a low wattage soldering iron and solder wick, carefully remove capacitors C75, C77, C80 and C102 (see diagram for locations). Replace these four with the following new values: C75 1.0 uf; C77 0.1 uf; C80 .22 uf; C102 .22 uf (all polarized tantalum caps). Observe proper polarity during installation.

Replace the circuit board by pushing it firmly into its slot. Re-install speaker jack J1 and replace the NRD-525's cover. That's it! The AGC circuit can easily be returned to stock should you ever wish to do so.



* * *

● USING THE DRAKE R-7A AS A FREQUENCY COUNTER - By: Cedric J. Marshall

One of the interesting features of the Drake R7/R-7A is that this receiver can be used as an outboard digital frequency display up to 150 MHz. Drake included this feature to aid in alignment jobs and other test-bench projects. However, I have been using it to provide digital readout for my Hammarlund HQ-180A and RCA CR-91A.

The most important part of the hookup procedure is to install a frequency-sensitive output on the receiver to drive the counter. This is accomplished by installing a "pickup loop", a length of insulated wire wound around all of the oscillator coils. The wire should be reasonably thin and flexible, as it will have to be wound in close proximity to the receiver circuitry.

One end of the wire is secured where convenient inside the receiver, and the other is connected to the centre conductor of a piece of small guage coax which is then fed out from the receiver. Note that there is no direct electrical contact between the hookup wire and the receiver circuitry; the signal is generated in the pickup loop by induction.

Ground the shield of the coax to the receiver chassis and feed the centre wire directly into the "Count" port on the Drake's rear panel via a phono plug.

If one has two or more tube receivers, the coax leads from each one can be fed to a rotary switch which selects the signal to be fed to the Drake.

When the "Count" switch on the Drake's front panel is depressed, the digital readout displays the frequency of the incoming frequency, which is the tube rig's tuned frequency plus its IF (735 kHz for the CR-91A and 455 or 3035 kHz for the HQ-180A, depending on the band selected. Subtract the IF and presto, you have digital readout!

Incidently, this operation does not alter the frequency to which the Drake itself is tuned; it permits the display to be temporarily slaved to another signal. When the "Count" button is depressed again, the display is released back to the Drake's own frequency.

For those who are not in the mood for the mental gymnastics during DX sessions at five o'clock in the morning, you can make a table of IF compensating figures for quick reference.

* * *

● THE $50.00 R-390A...OR RACAL...OR HARRIS! - By: Gerry Bishop

For the American DXer hunting for the ultimate bargain in receivers, look no further than the nearest Department of Defense (DoD) base, fort or office charged with disposing excess or obsolete DoD equipment.

Disposal is through auction or direct sale. Auctions happen in one of two ways: the items are offered for sealed bid, and the bidder need not be present at bid opening; or alternatively, at a floor auction sale. Direct sale, by comparison, means a set price, usually quite low.

My Collins R-390A came from a local auction for the princely sum of $50. It needed a little work but nothing major. It was clean, free of any signs of abuse and complete.

There will be some Racal and Harris receivers coming on the market in the next couple of years, probably at bargain prices. It will pay to watch out for them.

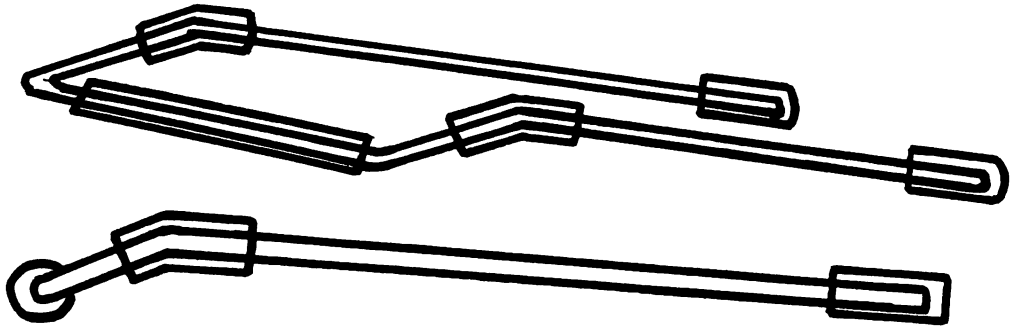
For more information, call your nearest DoD base operator and ask for the Defense Re-utilization and Management Office (DRMO). They'll have all the information on sales and when the public can inspect any items up for current sale.

* * *

● A SIMPLE ELEVATION BAR FOR RECEIVERS - By: Guy Atkins

If you're like me, you hate to operate a receiver that sits flat on the desk. It's gotta have TILT!

For a couple of dollars you can fashion an adjustable elevation bar that looks far better than stuffing a book under the receiver. The elevation bar is nothing more than a two foot length of 3/16" mild steel rod stock, covered with plastic tubing and bent into shape. The drawings below show a three-quarters view and a side view:



The lengths of the bent rod segments will depend on your radio's size, and the amount of tilt desired. Cover the rod with short pieces of tubing where shown (for table top and receiver protection) or cover the rod with a continuous length of tubing. Start your bends from the centre section (that lays on the table) and work outwards. The best bends are made by carefully bending the metal by hand with the rod/tube gripped in a bench vise. Cut the rod ends to equal lengths after bending, if needed.

This elevation bar is sufficient to lift the front of modern solid state receivers. To increase the tilt, just slide the bar to the rear of the receiver.

* * *

ANTENNA RELATED

● A SIMPLE EFFECTIVE ANTENNA SPLITTER - By: Nick Hall-Patch

Most of us have the occasion to use two receivers on the same antenna. Just hooking them both up to a common antenna sometimes seems to work, sometimes not. Most of the standard references discourage this practice altogether.

There are several problems which occur when receivers share the same antenna. The most common problem happens when harnessing together a late model tube receiver with a modern solid state rig. The narrow tuned circuit front end of the older receiver is 50 ohms impedance, as is the broad banded antenna input of the newer receiver. However, the receiver with the narrow front end is only 50 ohms impedance at the tuned frequency. At all other frequencies, its impedance is much lower. It enables the older receiver to literally suck the signal away from the newer one.

One could put a 50 ohm resistor in series between the older receiver and the antenna to provide a "more level playing field", but that would attenuate signals to that receiver by at least 6 dB. About five years ago, Sam Dellitt of DX Australia developed an antenna splitter based on a ferrite "balun core". The article was reprinted in the July 1984 issue of CIDX Messenger. I built this splitter and, although it worked reasonably well, it did produce noticable signal attenuation, especially on the lower Tropical Bands and MW.

I rebuilt the splitter with redesigned windings on the core and am now very sa tisfied with it. The signal attenuation is around 3 dB at MW and Tropical Band frequencies. Three dB loss is not really noticable by ear, but there may be DX situations where 3 dB loss will mean losing an ID while using a quiet Beverage antenna. The quick solution is to use just one receiver on those occasions, and not use the splitter. A really professional set-up would use a low-noise, broadbanded preamplifier between the antenna and the splitter to make up the loss.

Winding a balun core is not too difficult. In Figure B, for simplicity, only one turn is shown for the input winding, two turns are shown for the output winding, and the holes shown are wider than they really are in relation to the core. The core used is a BLN-73-202 from Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607. The cost around $.65 each with a minimum shipping charge of $2. Write to Amidon for recent prices. The core specified in Dellitt's aricle hasn't been available, but this seems like a good substitute. The wire used was #30 or #32 varnished magnet wire, which requires a bit of a delicate touch, but larger sizes won't fit through the holes when more than a few turns are used.

Also note that the splitter DOES NOT make a transformation of impedance. A Beverage antenna's impedance is around 500 ohms and most wire antennas are in the 200 ohm range. For maximum signal strength, an impedance matching transformer should be used. Refer to Proceedings 1988, pp. A-3, 1-10.

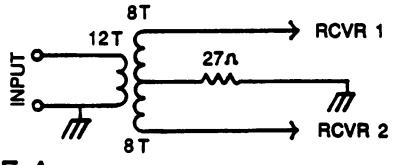


FIGURE A.

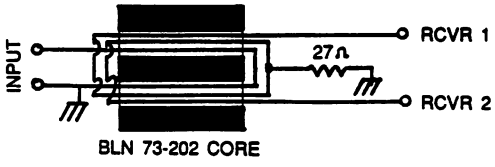


FIGURE B.

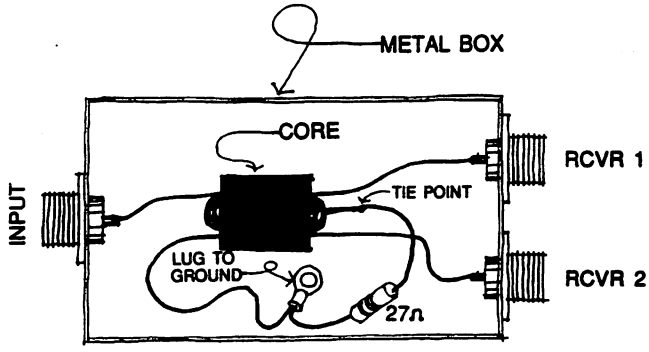


FIGURE C.

Finally, where you mount your splitter transformer depends on what you have available. For permanent use, a splitter transformer must be securely mounted, as the wire used is easily broken when flexed. I prefer metal boxes for such devices, as they are strong and provide shielding. A small aluminum mini-box should be fine, though I used a little "tin" box formerly containing mustard powder; no wonder it is such a hot performer! The core itself was set in a big glob of silicone seal, and the transformer leads were run to either solder lugs or BNC connectors (see Figure C). Mounting isn't critical but just make sure it is solid.

Good DX to both of you!

* * *

● ADD AN ANTENNA COUPLER...OR TWO...OR FOUR - By: David M. Clark

The ideal DX shack would allow you to use all of your receivers and antennas at the same time, instead of having to switch any antenna from one receiver to another. This can be done with an antenna coupler or "distribution amplifier" which feeds one antenna to several receivers without loss of signal.

An effective model is the Antenna Coupler CU-872A/U available from Fair Radio Sales in Lima, Ohio, for $49.50 U.S. (A partial reproduction of the operating manual costs an additional $8.50.) Apparently these couplers were made under contract for the navy around 1967. As one would expect, they are built like a battleship. Mine were made by Munston Electronics Mfg Corp.

Fair's catalog describes the unit:

> "Handles up to eight receivers in the 2-32 MHz range. Gain: 0-3 db. Noise figure: 6 db or better. Has 0-50 microammeter test indicator and circuit selector switch on front. 70 ohms input; type N connections. With tubes 20/6922, OB2. Requires 115/230 VAC 50-60Hz. 7 X 19 X 16.5; 40 lbs shipping weight."

With a gray enamel front panel and glowing red power indicator, I think the units look very sharp, especially if you have other tube equipment.

The frequency coverage is determined by front-end high and low pass filters. The high pass filter inhibits breakthrough of BCB images, especially on 120 meters. It can be readily by-passed if you happen to be a BCB DXer, although I have not determined the low frequency cut-off where the unit ceases to maintain "unity gain".

An important feature is the high degree of isolation provided at each of the eight outputs. This prevents inter-action between receivers. Unused outputs do not have to be "shunted".

Tedious replacement of the N type connectors can be avoided by using short barrel PL-259 connectors which mate perfectly to the input/output jacks. The appropriate coaxial connector is #83-58FCP ('58' referring to the fact they are intended for use with RG-58 coaxial cable), also available from Fair Radio for .50 cents.

As for tubes, the '6922' RF amplifier is a common industrial tube (in a pinch you can substitute a '6DJ8'). The 'OB2' voltage regulator has no substitutes but is readily available too.

My experience with Fair Radio has been good; all units shipped to me were "clean" and the tubes all tested out well.

Each coupler allows you to connect an antenna to up to eight receivers. If you have several antennas, the ideal solution is to purchase one coupler for each antenna. Provide coaxial connections from each coupler to a multi-position rotary switch in front of each of your receivers. Consider using a switch with enough positions that allows for future expansion of your "antenna farm". Each receiver can be independently operated with any one of the switch-selectable antennas.

For an investment of $200. you can employ up to eight receivers, and independently select any one of four different antennas! The "ultimate" in shack flexibility for the fanatic DXer!

* * *

● UP A TREE... THE EASY WAY? - By: John H. Bryant

I never really studied methods of antenna erection seriously until I began to combine travel to Washington State and British Columbia with serious DXpeditioning. I suddenly had reason to spend time and money to do things "the easy way".

THE TRIDENT III ANTENNA LAUNCHER

Frankly, the old bola approach using some #50 test fishing line and a 6 oz. lead spherical sinker just wasn't working well enough. Sometimes 8-10 throws were necessary. There were times when even the strongest arm couldn't throw it high or far enough. I began to remember that other DXers had written about using both bow and arrow and crossbow. ODXA's Cedric Marshall uses a rod and reel! None of those ideas seemed suitable for I did not need another hobby. I just wanted something that was small, accurate, portable, had a minimum of 100'range, and was CHEAP.

THE MARKSMAN SLING SHOT

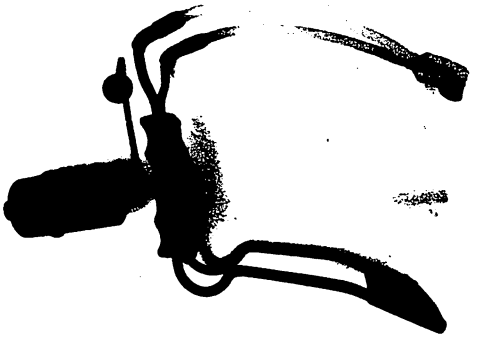


Photo 1

I also remembered someone writing years ago about using a sling shot. After several rather elaborate and expensive attempts to design and build my own heavy-duty sling shot. I stumbled across the Marksman line of sling shots at a local discount store. The marksman is available in both fixed and folding models and sports a great sling (surgical tubing) and leather pouch. The folding model seemed perfect and cost less that $6.00. See Photo 1.

The other major problem in developing the Trident III was discovering a method of playing out the line - whatever line it was - behind the lead weight so as not to slow or deflect the flight of the weight. A bow hunters' display at the store gave me THE answer. It is a little 4' X 1 1/2" cylinder containing a specially wound 2500' coil of 15 pound test "dental floss". The $10. Game Tracker, Model 2500 (Game Tracker, Inc., 3476 Eastman Dr., Flushing MI) is intended to mount with a threaded stud (provided) to the front of a hunting bow. The dental floss is attached to the arrow and is played out behind the arrow in flight. Its primary use is to track wounded big game in the forest. The Tracker was my answer. I drilled a hole in the handle of the Marksman sling shot, let the threaded stud cut its own threads in the hole, and had THE TRIDENT III ANTENNA LAUNCHER. (Photo 2)

FULLY CONFIGURED TRIDENT III SIGNAL LAUNCHER

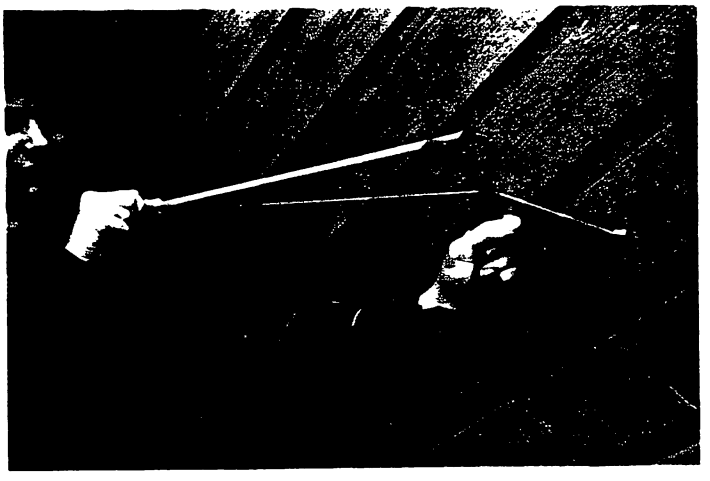


Photo 2

I've found that a 2 oz. lead fishing sinker is just about perfect to use as "ammunition". I practice with the sling shot a few times using small rocks before I launch the antenna. The Trident III is easy, fast and accurate. I can virtually pick out a specific limb 80' off the ground and put a line over it on the first try!

Some cautions:

1. The sling shot with the lead weight is a lethal weapon! Be careful! If you don't have the "dental floss" from the Tracker arranged perfectly, the weight can end up flying back AT YOU.
2. Be sure that you know where the thing is going to land. Again, I have found that painting the weight florescent orange is very helpful.

I have also found that the sling shot is almost useless when trying to put a line over a close range limb 10-20' away. Actually, I still use the bola approach for near-range limbs and the Trident III for long range work.

* * *

● A TRAVELLER'S PORTABLE OUTDOOR ANTENNA - By: William S. Sparks

Here's a solution which I have found to be useful in getting a portable antenna out the hotel window when on vacation with my Sony 2010.

I have used a method as old as radio itself that may not be known to some of the younger DXers. In the 1930's, all radios had to use an outdoor antenna. One of the common methods of bringing wire inside the house was the use of a window strip, available in all radio supply houses. It was a flat, insulated copper strip about ten inches in length and with a copper spring clip attached to each end. The strip was thin and flexible enough so that most windows could be closed over it. The antenna wire is attached to the clip protruding outside and a short lead to the receiver is attached to the inside clip.

I made good use of one of these strips when my wife and I spent a holiday at a motel in Carmel, California. I found that the motel window opened with a crank and there was a screen over the window on the inside. The screen was removable, so I was able to put the strip in place, crank the window shut and then replace the screen.

* * *

AUDIO ENHANCEMENT

●POOR MAN'S SIGNAL PROCESSING - By: Kevin Atkins

If your receiver has a Record-Out jack, consider this arrangement: Feed the signal from the jack into your tape recorder, from the tape recorder into a graphic equalizer with a gain control and from there, into an audio filter (such as the Autek QF-1A). Plug your headphones into the phones output jack on the audio filter.

Since the audio amplifier of the receiver has been bypassed, you avoid the unduly "bassy" voice response of most modern communications receivers.

Capturing the unprocessed audio on tape allows playback with various settings on the equalizer and audio filter. This is a particularly effective technique against the QRM of multiple utes. You can even copy the processed signal back to another tape deck for a clean library tape of your loggings.

* * *

●SATURATED SOLUTIONS - By: David Walcutt

In making recordings of DX stations, it often seems that the recording sounds better than the original heard through your headphones or speaker. It seems as if some kind of filtering is done in the process. Although there may be some shaping of the audio response by the recorder itself, the greater part of the improvement is probably due to "tape saturation" which limits QRN.

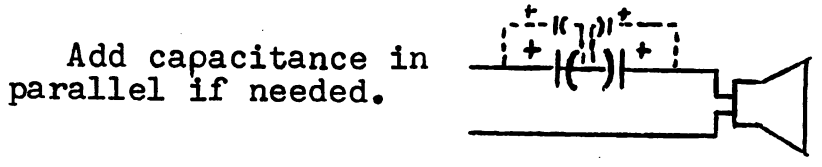
I recommend making recordings at as loud a volume as possible; just below the distortion level. Use thinner, 90 minute cassette tapes; they are more critical than 60 minute tapes. When a loud burst of static crashes through, the intensity of the recorded noise is limited to that of the "average" volume level. This does wonders for one's ears!

* * *

●A SIMPLE (AND CHEAP) HI-PASS AF FILTER - By: Jerry Strawman

One of the handiest "gadgets" that I have employed in my listening shack is a simple, hi-pass AF filter. While purists might insist that headphones be used when DXing, I have never found them comfortable. Consequently, I use a speaker exclusively, with the sound tailored by the filter.

The schematic shows how deceptively simple this filter is:



Start with two 47 microfarad, electrolytic capacitors. Don't stop there; experiment with other values. Greater capacitance adds bass response, while less capacitance reduces the bass response.

Excessive bass frequencies accentuate such unwanted interference as AC line noise, thunderstorm static and low frequency rumble encountered with multiple stations on the same channel. The filter reduces these types of interference. Your ears may be different than mine, so try different capacitance values in order to find your "perfect audio".

For those who prefer to listen with headphones, small voltage caps can be fitted inside many of the larger headphones. For smaller 'phones, you might be able to squeeze the caps inside a 1/4" phone jack, or install the filter in a small box with in & out jacks.

In my situation, I employ a SPDT switch to move the filter in and out of the circuit as desired.

* * *

HOW TO....

● SOLVING LIGHT DIMMER QRM - By: John H. Bryant

The sudden intrusion of my wife's dressing room light dimmers (S-8) on 90 meters during dawn enhancement had deafened me many a morning and caused heavy QRM at our breakfast table. I tried every published remedy using small capacitors across the switches and used coaxial leads to ground all antennas. No luck

Finally, I discovered the Nutone Model DC-35 dimmer switch sold as a "suppressed RF" switch for incandescent lights only. It works like a charm; not a whisper of RF, even on a portable near the switch. Unfortunately, each switch is priced around $30 U.S. in 1989.

[If you are unable to locate this particular brand/model, ask for a "studio quality" dimmer. /dmc]

* * *

● FIGHTING QRM... THE ULTIMATE SOLUTION! - By: George Zeller

In 1987, my DX situation was simply awful. My location forced me to use an AN-1 for an antenna. My R-70 got local MW intermodulation in frustrating places. Worst of all, I had horrible local RF pollution. The neighbours' TV's gave me oscillator buzz and a city fire alarm box aften put out S-6 to 7 level hash. Things were grim.

All of these annoyances were solved in 1988 - I MOVED!!

* * *

● SOLDERING AND UNSOLDERING TECHNIQUES - By: Dallas Langford

If you don't know how to make correct solder joints, I suggest that you go to a hamfest, buy some inexpensive gear (something with tubes, lugs and other components, along with a PC board full of components like you will find in good receivers) and unsolder enough components and wires until you understand how they are put together.

A soldering iron with a 45 watt, 900 degree element and copper tip is best for working on most tube gear. A 27 watt element is about right for solid state gear. I use fine sandpaper, usually #400 and #600 wet-dry variety; also a small file to re-form and clean the copper tip on a regular basis.

I form my iron tips to the shape of a blunt pencil with rounded end, or like a blunt wedge. To prepare a tip for use, I file the end to the shape I desire, sand the entire tip until smooth and shiny, plug in the iron, and touch some solder to the tip until solder flows onto the tip and tins it (covering the tip with a shiny coating). The iron is now ready for use. I use a holder for the hot iron when it is not in use.

Some soldering and unsoldering jobs require more heat than a 45 watt iron provides. In that case I use a 100 watt soldering gun, but only as a last resort. If you are inclined to use a 100 watt soldering gun because it will save you a few seconds, you will never learn to solder well and you will almost certainly damage some of the equipment you work on.

A desoldering braid is essential for unsoldering wires and components in tube gear and PC boards. I use a Chem-Wick Lite 0.1" desoldering braid. It is the only kind that really works well. I know - I've tried them all. The current Radio Shack desoldering braid is satisfactory for emergencies but I would not use it on a regular basis.

There are two ways to desolder - destructive and non-destructive. If you are replacing a component, then it doesn't much matter how you remove it, as long as you don't destroy the lugs to which it is soldered or separate the PC board traces from the board itself. You can cut leads close to the solder joint, remove the solder, and pry or cut the leads with a diagonal cutter blade to remove the remaining wire on the lug. But if you must re-use the component or wire, you must unsolder the wire and remove it without damaging it. That requires a different approach.

Useful tools for non-destructive removal of wires and components from tube gear are a small curved tip hemostat and a dental probe which I filed and sanded to a thin, sharp blade on the end. If you're on friendly terms with your doctor and dentist you may be able to get them to order these for

you. But don't flinch when you're told the price: between $20 and $30 for the hemostat.

The dental probe is used to pry wires away from lugs, while the hemostat is used to unbend and remove wires after they have been pried from the lugs. The hemostat is also used to crimp wires to lugs. For larger wires, such as half-watt resister leads, a large hemostat is better. Since the hemostats and probes are stainless steel, solder does not stick to them (well, almost never). This means that you can work on a solder joint with the soldering tip applied to the joint, which is often necessary when the desoldering braid does not remove all the solder residue.

Stranded wire is the most difficult to re-use because solder adheres to the strands. It is usually undesirable to cut off the end of a stranded wire and strip additional insulation to get clean strands because there is seldom much excess wire. The best approach is to use a wood tongue depressor as a support, place the bare wire end on the tongue depressor, place desoldering braid on top of the stranded wire, and apply the hot soldering iron tip to remove as much solder residue as possible. Hold the stranded wire in one hand and use the tip of the hot iron to separate the strands. The strands can then be straightened without breaking them, twisted together, and recrimped at the lug from which the wire was removed.

It is generally much easier to remove components from PC boards, but also but easier to damage a PC board trace. Use the desoldering braid to remove all solder from around the cut lead where it pokes through the PC board. Do not leave the hot iron tip applied to the braid (and hence the PC board) any longer than necessary. Excessive heat will cause a copper trace to separate from the board. With small needle nose pliers or a small screwdriver, straighten the lead. Do not pull down or push up or you may separate the trace from the board. Push and pull from side to side. Straightening the lead will usually break any small solder bridge with the PC board trace. If not, look closely to see where the remaining solder is, use more desoldering braid and then straightern the lead again.

To summarize, here is a list of don't's and do's:

Don't:

* lay the end of a wire on an existing solder joint and dribble more solder onto the joint
* heat an existing solder joint and stick the end of a wire into the melted solder
* flow solder onto a joint by applying the solder directly to the hot soldering iron or gun tip
* apply solder to a joint with mechanically unstable wires; if anything moves except flowing solder, it is not a good solder joint
* cut leads at a lug and leave the cut ends crimped to the lug; if you must cut leads, then you must remove the cut ends
* burn nearby insulation or components

Do:

* crimp all wires firmly and securely to a lug before soldering them
* apply a small amount of solder directly to the soldering iron or gun tip to help conduct heat to the joint when necessary, especially for joints with multiple wires
* apply most or all of the solder to a joint without making direct contact with the soldering iron or gun tip
* protect nearby insulation and components from your hot soldering iron or gun tip with pieces of wood or metal

* * *

● MEDIA NOTEBOOK - By: Kevin Atkins

If you have a particular geographic area of interest such as Peru and Bolivia, you probably scan the media for items pertaining to that area. To make more effective use of such information, you can compose a "Media Notebook".

Clip the articles, tape or paste them onto 11 X 17" paper and photo-copy the pages at 64% of original size onto 8 1/2 X 11" paper (just like FT!). Allow a wide margin on the left for easy binding. Then use a marker to highlight names of cities, government officials, companies, products and the like.

The result is a handy reference for identification clues and reception reports. It's important to highlight after photocoping, as certain colours like orange and red will reproduce black on the copier.

* * *

● BINDING NEWPAPERS, ARTICLES, ETC... - By: Don Moore

After a few year in this hobby, most of us end up with huge piles of papers that we want to keep. Those DX newletters, technical articles and background information that stations usually wind up in manila folders but these soon become a nusiance. I tried storing mine in loose-leaf binders but the binders are hard to store and pages tend to rip out easily.

What I've ended up doing is taking papers to a copy place and having them comb-bound - just like Proceedings. It's cheaper than buying loose-leafs, flatter for storage and the pages don't rip out nearly as easily. If you're binding a lot of miscellaneous papers, it's a good idea to make an index to put in the front of the "book". On the fun side, you can even custom design your own covers!

* * *

● FINDING THE "NEWS" WHILE IT'S STILL NEWS - By: Kirk Allen

Searching out the newsworthy DX, such as first-time loggings of new stations, reactivations and so on, is a special interest to me in my DXing hobby. By trial and error, I've found the best way to find the "news" is by becoming familiar with any given band.

It takes a fair amount of time, but frequent bandscans are a necessity. One can soon learn which stations deserve the most attention by making notes on the regular/usual stations that can be heard. On occasion, taking note of an unfamiliar carrier may eventually net an out-of-the-ordinary logging. Patience is another key to the uncovering of "news". It takes dedication to listen to an unknown station for hours on end to hear that clear ID!

Personally, I can't always DX in that "search" mode. However, switching into the "searching" mode has added enjoyment to my DXing.

* * *

REALLY UNIQUE GEMS

● MOUNTING DECALS - By: Don Moore

If you collect QSL's and all the paraphenalia that comes with them, you may cringe a bit when a station sends a decal. A sticker is easy to display in an album, but what do you do with a decals? There is a cheap, easy way to display them and it may make you prefer decals over standard stickers.

Get some transparent non-adhesive vinyl. It is available by the yard at a fabric store. If there is more than one type, get one of medium thickness. Next, find transparent "contact paper" - decorative shelf-liner with an adhesive backing. Rubbermaid is the most common brand.

Cut out a piece of vinyl a bit bigger than the decal you wish to mount. Wipe off one side with a lint-free cloth to remove dust particles. Slowly attach the decal to the vinyl, being careful not to make any wrinkles. After it is secure, cut out a piece of contact paper, about the same size, and stick it on the back of the decal. Trim the edges and you should now have an attractive momento. Moreover, it's protected front and back.

I've been doing this for ten years now and people comment on how colourful and shiny the "stickers" are. I suspect the vinyl may eventually have some effect on the colours in the decal - but then, the ones I made up ten years ago still look as good as the day I put them together.

* * *

● NEON TELEPHONE ALERT FOR NIGHT-OWL DXERS - By: Don Jensen

What if you and fellow DXers in your area want to exchange some real-time tips during a good Indonesian opening early in the morning? You're up and listening, of course. Your friends know that; but they'd like to alert you that special RPDK is coming through.

They would call you but they know that you've got your headphones on and would likely not hear the phone; or if they let it ring and ring, surely they will wake the rest of your household first.

A solution is to make a small modification to the phone near your listening location. By installing a small jack across the ringer you can disconnect the bell and pass the current through the jack to light up a small neon bulb.

Mount a neon bulb on a small metal or plastic box. Locate it near your receiver so you can see it while you DX. Connect it with zip chord and plug to the jack on the phone. When the phone rings, the bell is temporarily silenced and the current will cause the bulb to flicker, thereby attracting your attention. Be sure to disconnect or set the bell volume to minimum on other phones while you are DXing.

Because the neon does not give off a lot of light, your surroundings should be dimly lit. It will help to mount the bulb in a reflective housing (such as a boat running light or the cowl of an old flashlight) to intensify the light.

When noted DXer Ralph Perry lived nearby we both did a lot of early morning Indo/Peruvian hunting and often called each other at ungodly hours of the morning. We both made use of the light/ringing technique and both of our spouses were able to sleep without being disturbed. It worked really well for us!

* * *

● A DIFFERENT APPROACH TO A DXER'S 'HIT LIST' - By: John H. Bryant

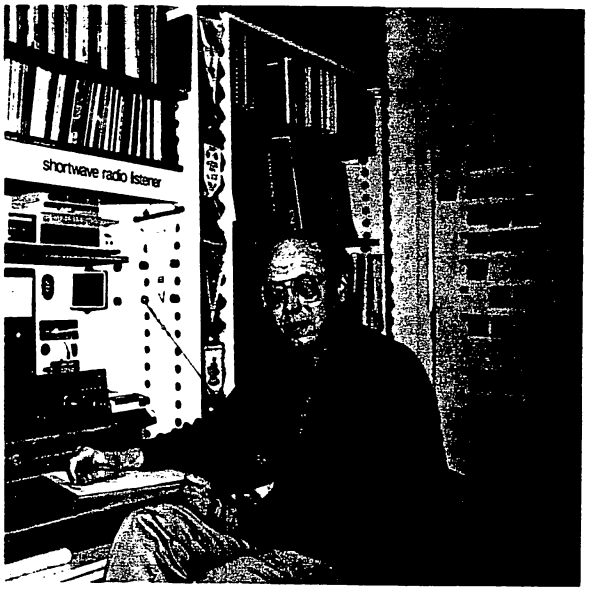
I have tried most of the common methods of keeping a DXer's "Hit List" of stations, frequencies and times of maximum DX interest. I've tried notebooks, a 3 X 5 file card system and in a fit of insanity, my PC with a sophisticated data base program.

Each system was either too difficult to update or too cumbersome to use. Instead, I put my notes on 3" X 3" Scotch brand 'Post-Its'. I stuck the Post-It notes on the wall above my receiver and things got a lot easier!

But then I looked four feet to the right of my radios where the white door stood, just waiting to be useful. Using a sharp pencil, I gridded off the back of the door (lightly) with rectangles measuring 4" high by 16" wide. I then purchased a sheet of one-inch-high pre-punched vinyl letters at the local hardware store and labeled the rectangles "00", "01, "02", etc., for each of the twenty-four hourly periods. I also bought a lifetime supply of the Post-It pads.

I note a new hit list station in large letters on a Post-It and stick it on the appropriate hourly rectangle on the door. There is space-enough for five notes per hourly period. Total cost: $1.75. One glance at the clock, one glance at the door and I'm ready to DX. It's also a great feeling to eventually rip those suckers off the door and slam-dunk them in the round file!

The Photo Shows
The Perpetual
Hit List
Close At Hand
On The Door
Of My Shack



REFERENCE SOURCES FOR THE ADVANCED DXER

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compiled and edited by David Clark

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SPECIALIZED ATLAS / GAZETTEER

● THE TIMES ATLAS OF THE WORLD - By: Jerry Berg

There are many atlases on the market but most are not adequate for the serious DXer who is often in search of an obscure place-name, or interested in surveying a piece of territory for a name that might match something heard over the air. Standard atlases generally lack the necessary detail.

The answer to this problem, and the definitive leader among atlases, is The Times Atlas of the World, published in England by Times Books, the book publishing division of Times Newspapers Limited (not to be confused with The New York Times) in collaboration with John Bartholomew & Son, cartographers and printers.

This is the best commercially available atlas I have ever seen. It is particularly strong on Asia and Africa but virtually every part of the world is covered in a level of detail that meets the most stringent DX needs. The maps are so well done that you almost have the sense of flying over the territories while looking at the place names below! It's a fun book to look through, too.

The Times Atlas is a volume of 225 pages, including 125 map plates on pages 12 X 18" in size. The Index-Gazetteer at the back contains more than 200,000 place names. The index follows the traditional approach: for each place name the map co-ordinates are listed. In addition, the longitude and latitude are listed with accuracy to a half-mile. [Great data source for input into computer programs which calculate great circle distances, grayline paths, etc. too! /dmc]

The current 7th Edition is avaiable at larger book stores for $149.95 U.S. The 1985 edition is $10. cheaper and discount book-sellers sometimes have it for less. That's a lot of money but it is a far better investment than mid-priced volumes such as the $79.95 Rand McNally Illustrated Atlas of The World. There's just no comparison.

(Late Flash: Fritz Mellberg has discovered that The Times Atlas can be had for $29.95 as an incentive for joining the Book of the Month Club. Check for the right ad in the New York Times Book Review or other literary magazines. /dmc)

* * *

● INDONESIA DAN DUNIA (ATLAS OF INDONESIA AND THE WORLD) - By: David M. Clark

Published by PT Pembina in Jakarta, this has to be the atlas for the Indo specialist. Beginning with a two-page relief map of the country, the book includes full-page (9.5" X 11.5") maps of Sumatera and each of its eight provinces. The same coverage is provided for the remainder of the country (samples of the provincial maps appear in Bill Sparks' feature elsewhere). These maps cover 39 pages. Eight more pages of maps cover historical and socio-economic data about the country.

Coverage continues with detailed maps of the other member countries of the Association of South-East Asian Nations, then the remainder of Asia and so on for the other continents/countries of world for a total of seventy-six map pages. More than half the atlas section is devoted solely to Indonesia!

The index covers Indonesia and the rest of the world separately There are the usual cross-references to the appropriate pages and map co-ordinates.

Within the extensive Indonesian section, there are separate alphabetical listings for cities & towns (but regretably no geographical co-ordinates), mountains/mountain ranges, islands & archipelagoes, lakes & reservoirs, straits, seas & oceans, headlands and finally, airfields!

Similarly categorized but much less detailed listings follow for the rest of the world. The concluding pages are in chart format, showing for each Indonesian province, the respective regencies, municipalities, their respective capital cities/towns, and lastly, the population of each province according to a 1985 census. This listing (from an earlier edition of the atlas) appeared in Appendix 'A' of FT's special publication A DXers Handbook...Indonesia.

The atlas is available from Jl. Raya D.I. Panjaitan 45, Jakarta 13350. The cost should be about $10. U.S. plus shipping but I suggest you write for details first. No Indonesian DXer should be without it!

* * *

● CIA MAPS AND GAZETTEER FOR THE CHINA SPECIALIST - By: William S. Sparks

A few years ago on one of my visits to the Government book store, in the San Francisco Federal Building, I picked up a set of maps published by the Central Intelligence Agency entitled: Peoples Republic of China, Administrative Atlas. The 68 page atlas is 9 3/4" X 14 1/2".

Each province has its own color map with an excellent Gazetteer. Of particular interest is a Romanization Conversion Table. This is helpful for determining the correct pronunciation of words in the new Pinyin spelling. On one page the Wade-Giles spelling is compared to Pinyin. The next page cross-references the Pinyin spelling to Wade-Giles. Most of us are used to the Wade-Giles format (eg. Peking) whereas the recent Pinyin verson (eg. Beijing) is still unfamiliar.

The maps will be of value to those interested in DXing Chinese regionals and the pronounciation table will solve many problems.

I'm not certain of present price/availability but the following information is printed on the title page:

> "For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $3.46. Stock number 041-015-00076-4."

* * *

MAPS, MAPS AND MORE MAPS

● DEFENSE MAPPING AGENCY TOPOGRAPHIC MAPS - By: Dave Valko

Last year I decided to do a little detective work and see if it was possible to obtain topographic maps of my favourite shortwave target countries, Peru and Indonesia. After a few phone calls to the Defense Mapping Agency, I was given a list of map stock numbers and was assured that these would cover Indonesia and central Peru. I was advised that certain maps of Peru were not available to the public - reasons not given.

As it turned out, the areas covered were rather small. The four maps ordered for Indonesia covered only Celebes, while the one map I specified for Peru covered only one-eighth of the country!

Scale is 1" = 8 statute miles for a map size of 4'9'' X 3'5''. The maps are tremendously detailed with the usual elevation markings scaled in feet with color, and sea-depth in fathoms is also provided. Included are cities & towns and streams & rivers, as well as landmark symbols representing castles, churches, factories, mines, monuments, prominent buildings slag piles, towers, lighthouses, railroads, swamps, snow-capped mountains, water tanks, etc. Typical boundaries are also shown. My Peruvian map is centred on Huaraz, the home of the well-known 60 meter band station, Radio Ancash.

The major disadvantage of these maps is the scale. One would need to buy about twenty maps to cover the entire country of Indonesia! The maps are, however, detailed to the extreme and only cost $ 3.50 U.S. each.

Unfortunately, it takes a long time for the D.M.A. to process your order. Once an order is received at the Washington, D.C. headquarters, it's then sent to the proper distribution centre to be filled.Keep in mind that since yours is a public order, it tends to be well down on the priority list. Total turnaround time before you receive your maps is about two months.

To find out what maps are available and their corresponding stock numbers, call (301)-227-2495. The address is: DMACSC, Washington, D.C. 20315-0020.

* * *

● HALLWAG-VERLAG TOURIST MAPS - By: Dave Valko

An excellent series of fold-out maps are those printed in Berne, Switzerland by Hallwag-Verlag. These maps are difficult to obtain in the United States but are available at book stores in some major cities. Especially helpful is the map of South-East Asia which includes all of Indonesia and most of China.

These maps are useful to the DXer because they cover a large area but with a great deal of detail. Towns with a population as low as 10,000 are plotted. Scale is 1" = 100 miles and map size is a generous 2'4'' X 3'8''. Symbols are provided to represent tunnels, canals, seaports, airports, historic ruins, variable shorelines, lakes, swamps, reservoirs, coral reefs, peak elevations. The maps come with an alphabetical list of all cities and towns, together with their geographical co-ordinates.

* * *

● SOURCE FOR NELLES TOURIST MAPS OF INDONESIA - By: Richard D'Angelo

I recently came across a good source for maps in Baltimore, Maryland: "Geostat Map & Travel Center", located at The Gallery, Harborplace #418, 200 East Pratt Street, Baltimore, MD 21202. Its corporate headquarters is in Somerville, NJ, and they have a toll-free number: 800-828-6277.

Geostat has a complete selection of maps covering the entire world. Write for the first edition of their soon-to-be-published catalogue to check for availability and prices.

Of specific interest to DXers is the excellent Nelles line of fold-out tourist maps. Included in the series is seven maps covering Indonesia at a price of $ 7.50 U.S. each. They are:

* No. 1 - Sumatra (with city maps of Medan, Padang, and Palembang)
* No. 2 - Java & West Nusa Tenggara (with city maps of Yogykarata, Jakarta, Bandung, Semarong and Surabaya)
* No. 3 - Bali (with city maps of Denpasar, Kuta and Sanur)

* No. 4 - Kalimantan - including Sabah, Sarawak and Brunei
* No. 5 - Java and Bali
* No. 6 - Sulawesi - maps of Palu and Manado
* No. 7 - Irian Jaya & Maluku - maps of Banda Islands, Ambon, Haruku and Saparua

* * *

●INDONESIA WALL MAP - By: David M. Clark

PT Pembina (Jakarta) publishes a spectacular wall map of the Indonesian Archipelago measuring an oversize 35" X 48.5". The bottom third of the map has a chart of the political organization of the country, listing the 27 provinces, 242 regencies and their capitals.

Although the map is printed on glossy stock paper with no folds, it would be well-worth the additional investment to have it laminated for permanent protection. If you're an Indo DXer, this map makes a great showpiece.

It is available for $10. U.S. from The George F. Cram Company, 301 South LaSalle Street, Indianapolis, IN 46201. Add $ 1. for tube shipping.

* * *

●GREAT CIRLE MAPS - By: Richard D'Angelo

The February/89 edition of Free Air, published by A*C*E, contained an item about Azimuth-Equidistant Wall Maps, available from the Great Circle Map Company.

These computer-generated maps of the world will be drawn with your location at the exact center, and the rest of the world spread out around you. At a glance you can tell the correct great circle path and approximate distance to your DX targets.

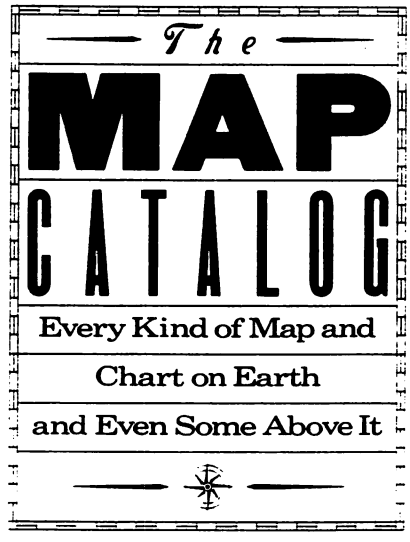
These maps are multi-colored and printed on high quality poster stock which is suitable for framing. Cost of the 23" X 35" map is $39. U.S. from Great Circle Map Company, P.O. Box 691401, San Antonio, Texas 78269.

The article also made brief reference to the N5KR maps (as were utilized in John Bryant's propagation article which appeared in Proceedings 1988). These were said to be available at $ 16. U.S. but no other details were provided. Bryant's article, however, states they are about 9.5" in diameter and available from Bill Johnson, N5KR, 1808 Pomona Drive, Las Cruces, New Mexico 88001.

* * *

●THE MAP CATALOGUE - By: David M. Clark

I finally found a terrific source book to help DXers locate those hard-to-find maps of obscure regions of the world.



The Map Catalogue, published by Random House Vintage Books in 1986 for # 15. U.S. is a 252 page volume listing sources for virtually any type of map that is available worldwide. It consists of four main chapters: Land Maps (which is of primary interest), Sky Maps, Water Maps and Map Products. Land Maps contains 35 sections - listings for categories such as Boundary Maps, CIA Maps, Foreign Country Maps, History Maps, Land Use Maps, Military Maps, Natural Resource Maps, Political Maps, Topographic Maps, Tourism Maps, U.S. Maps and World Maps.

In addition to short descriptions of each product, the publisher or agency source names and addresses are all listed, together with pricing information.

The section devoted to CIA Maps has a list of maps published since 1980, available from The National Technical Information Service in Springfield, Virginia. We also find that a catalog, CIA Maps and Publications Released to the Public is available from the CIA's Public Affairs Office, Washington D.C. 20505; or phone: (703)-351-2053.

Maps and atlases published before 1980 are available from the Government Printing Office. One interesting item is the Peoples Republic of China, Administrative Atlas ($8.00). The atlas "includes detailed maps of each Chinese province, along with lists of administrative divisions, illustrating the political changes the country has seen since its conversion to communism in 1949. Includes pronunciation guides".

The section on Foreign Country Maps tells us about topographic maps available from the Defense Mapping Agency.

The section on Tourism Maps tells us that American Map Corporation in Maspeth, NY is the American distributor for the useful Hallwag-Verlag maps.

The book concludes with an Index and a number of Appendices; State, Federal & International map agencies, selected map libraries, map stores, and a glossary of cartographic terms.

As an example of the depth of sources outlined in the International Map Agencies appendix, I found there are many government ministries and divisions of the military in Indonesia which can be contacted for maps of one sort or another. You might like to start with 'Badan Koordinasi Survai Dan Pemetaan Nasional' (National Coordinating Body for Survey and Mapping) at Jalan Raya Jakarta km 46, Cibinong, Bogor. I think you get the idea! Maps, anyone?

* * *

TRAVEL GUIDEBOOKS

● MOON PUBLICATIONS (INDONESIA HANDBOOK) - By: Jon Williams

I consider Indonesia Handbook by Bill Dalton to be the best overall source of information on Indonesia that I have seen.

It is not only a travel book on "where to stay", "where to eat", and "what to do for entertainment", but also it covers history, fauna & flora, religion, language variations and cultural characteristics. For example, the section on Jawa has an extensive discussion of the differences among the plays of Wayang Kulit, Wayang Golsk, Wayany Topeng and Gayang Orang.

My 1980 edition has 490 pages but the 1988 edition has been expanded to 1,058 pages. It includes a 15 page language guide (primarly for travellers), a thirteen page glossary of terms, an extensive, topically-arranged booklist of 12 pages and finally, a 20 page index. It is published by Moon Publications (P.O. Box 1696-1, Chico, California 95927) for $19. U.S. Truly a "must have" for all Indonesian DXers!

Moon also publishes South Pacific Handbook (3rd Edition, 1986) and Japan Handbook (reprinted 1988). The latter provides a superb study of Japanese culture, economics, way of doing business, language and religion.

* * *

● INSIGHT GUIDES - By: David M. Clark

While Bill Dalton's Indonesia Handbook is liberally illustrated with black & white photos and sketches, along with over 200 maps, the principal characteristic of the "Insight Guides" series of travel books from APA Productions of Singapore is that they are extensively graced with color plates. Indonesia (2nd edition, 1986) contains over 300 colour pages with 10 colour maps and more than 250 colour reproductions. For visual impact, the Insight Guides are hard to beat. So I consider the two guidebooks to be a natural compliment to one-another.

The main body of the book - 320 pages - includes feature articles on "Indonesia's Incredible Wildlife", "Gamelan: The Sound of Moonlight", "The Dance and Drama of Indonesia" and other topics. A separate 90 page supplement, "Guide-In-Brief" is a quick-reference section for travellers.

A predecessor edition, Java, then under the logo "Apa Photo Guides", was last printed in 1978 but is now out of print. The guide focussed on Bali, first-published in 1970 as Guide To Bali, is now in its 13th(!) edition.

The Insight Guides Series is especially strong on Asia. Others in the 'Country' series include Burma, India, Malaysia Nepal, Singapore, Sri Lanka and Thailand. There is also a 'Great Adventure' guidebook devoted entirely on Indian Wildlife.

Two first edition (1988) releases in the 'Grand Tours' series are regional compendiums which are a cost-effective alternative to buying all the individual books, although every one of these quality publications is hard to resist. South Asia covers India, Nepal, Bhutan, Tibet, Pakistan, Sri Lanka and Bangladesh. East Asia covers Burma, Hong Kong, Japan, South Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, and of course Indonesia.

The coverage provided by these two guides, together with the Indonesia guide and Indonesia Handbook, should be just about right for most Asian DXers' libraries...unless you really want to go all out!

Insight Guides are widely available in the travel section of better bookstores for $24.95 to 25.95 Cdn (approximately $17. U.S.). The United States and Canadian distributor is Prentice Hall.

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TECHNICAL PUBLICATIONS

● BEVERAGE ANTENNA HANDBOOK - By: Guy Atkins

I recently noticed an ad in Ham Radio magazine for the Beverage Antenna Handbook by Vic Misek, W1WCR. This 80 page publication is available from the Ham Radio Bookstore, Greenville (no street address required), New Hampshire 03048 [(603)-878-1441] for $ 14.95 U.S. plus $ 3.50 shipping & handling (Visa/MC are accepted).

The ad copy says:

> "W1WCR has spent countless hours developing new antenna ideas and optimizing the SWA (Steerable Wave Antenna). Misek delves deep into the secrets of the single wire beverage with helpful hints and tips on how to maximize performance based on wire size, height above ground, as well as length and impedence matching. Also includes information on center-fed Beverages constructed out of several wire types. SMALL LOT OWNERS - Beverage for you too! Called the Micro-SWA, it is just 60 feet long. You get excellent directivity and null steering capabilities. Transformer design information for both termination and feedline matching is completely revised."

I could not locate this title in any of my shortwave supply house catalogs so I assume you must order direct. The Beverage Antenna Handbook sounds like a good addition to any antenna experimenter's library.

* * *

● MAKING USE OF AMATEUR RADIO PUBLICATIONS - By: Nick Hall-Patch

Amateur Radio publications are a good resource for those of us who like to build our own equipment - receivers, accesories, well as antennas. Naturally, many of these publications contain a good deal of information about tranasmitting and amateur radio communications techniques so they will not be "bibles" to the SWL/DXer. But they often contain clear explanations of basic radio technology. They are usually available at libraries so you can look before you buy.

American Radio Relay League (ARRL) publications are available at better electronics outlets and some bookstores with a technical section. To inquire direct, the mailing address is: ARRL Publications, 225 Main Street, Newington, CT 06111.

The ARRL Handbook -- although a lot of it is irrelevant to the average DXer, the experimenter will find items of interest in the sections concerning electronics and propagation fundamentals, as well as those chapters covering receiving principles and construction. Most of it is clear and well-written so you don't need an engineering degree to get into it. For most of us, it is better to browse in the library and pick out tips. rather than buying it outright. A new edition comes out annually and the current price is $ 21. U.S. Older volumes are often available at used book stores or ham flea markets.

QST -- the monthly magazine of the ARRL is usually worth a quick browse, especially for the "first principles" articles written by Doug DeMaw.

The ARRL Antenna Handbook -- all serious antenna fans probably have this on their shelf, but again, much of it is not immediately relevant to the shortwave DXer. It is not quite as easy to understand as the Handbook, but once you've started to find your way around antenna theory at bit, there will probably be nuggets here for you to build on. Browse before buying.

Low band DXing -- by John Devoldere and a better value for the shortwave DXer at $ 10. U.S. from the ARRL. Ostensibly for the the radio amateur using 160 through 40 meters, this book has a wealth of information related to these frequencies and is written for the DXer who wants to work weak ones half-way round the world. A large part of it is therefore directly relevant to the Tropical Bands DXer. It places heavy emphasis on antenna design and has a good section on propagation at these frequencies. High school math is required. There is also a fine chapter on what goes into a good receiver. A massive bibliography rounds out the book and will send the ardent experimenter scurrying in all directions.

There are several publications of the Radio Society of Great Britain (RSGB), the British equivalent of the ARRL. Their mailing address is: 35 Doughty Street, London WC1, England.

Radio Communication -- the magazine of the RSGB, "RadCom" is their equivalent of QST. Pat Hawker's 'Technical Topics' column is a melange of different ideas, circuits, and min-reviews garnered from many sources - some of which are unfamiliar to North Americans. Hawker's skepticism concerning the "bells and whistles" on most modern gear is a joy to hear after all the hype. While his column is oriented toward the Ham, he is a staunch believer in "do-it-yourself", so the technically-minded DXer will find much of interest.

Amateur Radio Techniques -- several editions based on Hawker's column have been published by the RSGB. The fourth edition is the most recent but when I inquired a year ago, it was out of print and there are no present plans for an update so you will have to hunt a used bookstore for a copy. At the time of release of this edition, most circuits were solid state by then but computers were not yet all the rage.

[RSGB also publishes HF Antennas For All Locations, by L.A. Moxon. First-published in 1982 and reprinted in 1984, the book offers information on the practical side of putting together various antenna systems. It is possibly of more interest to shortwave DXers than its ARRL cousin. /dmc]

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NRC Article Reprints of Interest to Shortwave DXers
A BIBLIOGRAPHY

Jerry Strawman

FT's **PROCEEDINGS 1988** contained a compilation of articles previously published in the pages of **DX Monitor**, the weekly publication of the International Radio Club of America. John Bryant selected 183 articles deemed relevant to SWBC DXing for inclusion in that 1988 Bibliography.

The National Radio Club, the pioneer MW DX club, began in York, PA in 1933. The and has published its weekly bulletin, **DX News** for over 55 years. It currently offers 209 reprinted articles, along with six special subject group manuals which collect the main articles of a particular interest area (receivers, etc) together. The manuals contain currently available articles, as well as reprints of older articles no longer available individually.

In preparing this compilation, I had the opportunity to examine a number of the reprints. I eliminated articles solely applicable to medium wave DXing. Where the NRC and IRCA reprints are actually duplicates of each other, the relevant IRCA reprint number is also noted. The number in parenthesis is the number of pages in that reprinted article.

●ANTENNAS●

A7 THE FLORIDA BEVERAGE (3) Jerry Conrad. Discussion of results obtained from the use of a Beverage antenna, and a comparison to other antennas used by the author.

A8 THE CARE AND FEEDING OF A WAVE ANTENNA (3) Jerry Starr. Practical construction hints for a Beverage antenna.

A9 DOWN TO EARTH GROUNDS (2) Gordon P. Nelson. An explanation of making low resistance ground connections for terminating a Beverage antenna.

A10 A CALIFORNIA BEVERAGE (2) Fr. Jack Pejza. An article similar to reprint A7.

A11 THE SUPER SIGNAL SNATCHER (14) Dave Fisher. A detailed article concerning the theory, set-up, and operation of a Beverage antenna. It includes tables, graphs, and diagrams, including proper values for terminating resistors. Same as IRCA reprint A11.

A16 MORE ON BEVERAGE ANTENNAS (2) Wes Boyd. An update on antenna theory and its practical application.

A19 NEBE: THE NEBRASKA BEVERAGE (7) Dave Fisher, Carl Dabelstein, Robert Mitchell. A discussion of necessary materials, construction methods, termination, and results obtained from a Beverage antenna erected in October, 1972.

A21 THE APT-2 ACTIVE ANTENNA TUNER (9) Mark Connelly. Complete construction details and use of an active parallel tuner with regeneration capability. Designed for use with antennas in the range of 150 khz to 8 Mhz. Same as IRCA reprint A50.

A22 THE APT-3: AN IMPROVED DESIGN ACTIVE PARALLEL L-C TUNER (9) Mark Connelly. A companion article to reprint A21 that describes improvements to the APT-2 that simplify its use.

A27 SEVEN PASSIVE TUNERS (11) Mark Connelly. Details the construction and use of seven tuners, two of which are designed for use at tropical band frequencies.

A28 ANALYSIS OF THE BEVERAGE ANTENNA (26) Chuck Hutton. A lengthy article divided into two sections, 1) Basic theory; 2) Two-wire phased antennas. Filled with calculations, 35 diagrams, and a two page bibliography.

A34 SOME ANTENNA EXPERIMENTS (3) W.R. McIntosh. A description of a "helical longwire" designed for use when space for a full-sized antenna is limited.Results of use with several differnt tuners is given. Same as IRCA reprint A60.

A37 LOOP ANTENNAS-THEORY AND PRACTICE (9) Dallas Lankford.

A technical discussion of loop antennas used at MW frequencies. Full of formulas and principles that can be applied to other frequencies.

A43 REMOTELY-CONTROLLED ANTENNA TUNER RT-1 (7) Mark Connelly.

Schematics, assembly instructions, and use of a remotely-controlled tuner for 140 khz to 6300 khz. Designed to use long and short wires, or loop antennas.

A44 THE MINI MWDX-3, A SIMPLE, EFFECTIVE PHASING UNIT (21) Mark Connelly. Description and construction of a one-box antenna phasing unit.Information is included allowing the builder to adapt the unit to frequencies up to 6300 khz.

A45 THE MWDX-4 FAMILY OF PHASING UNITS (25) Mark Connelly. Similar to reprint A44, offering units of improved operation.

A47 TEST OF THE MITCHELL LEE LOOP AMPLIFIER (6) Mark Connelly. Construction and implementation of a low-impedance, three transistor, broadband amplifier, usable at lower shortwave frequencies.

A48 YAD ANTENNA GIZMO (1) Jerry Starr. A simple two-antenna switch that allows the unused antenna to be grounded.

●RECEIVING EQUIPMENT●

R2 SINGLE SIDEBAND RECEPTION ON THE BCB WITH MECHANICAL FILTERS (22) Gordon P. Nelson. Explains how to fit mechanical filters to an existing receiver, for the ultimate in adjacent channel rejection.

R4 THE IC-R70 PBT & PREAMP MODIFICATIONS (2) Don Moman. Instructions for increasing the performance of Icom's version of pass band tuning. The second modification enables the onboard preamp below 1600 khz. Same as IRCA reprint M37.

R6 ELECTRONIC VERNIER TUNING (4) Ray Moore. Detailed instructions on how to fit a varactor to a receiver, to provide a fine bandspread control.

R7 MECHANICAL FILTERS FOR THE HQ-180 (6) Jerry Starr. Detailed description of the conversion of this popular receiver to mechanical filter operation. Reprint R2 offers valuable background information.

R9 RECEIVER/ACCESSORY INTERFACES MADE SIMPLE AND CHEAP (6) Russell J. Edmunds. How to interface various Dx equipment.

R11 PRECISION FREQUENCY MEASUREMENT (3) Ron Schatz. How to use the frequency counter in frequency measurement.

R15 REVIEW OF THE HEATH SB-620 SPECTRUM ANALYZER (32) Robert Foxworth. A comprehensive analysis of the unit and its use in displaying received signals on a cathode ray tube.

R17 BUILD YOUR OWN AUDIO FILTERS (6) P. Sullivan. A technical theory and construction article about homebrew audio filters for the DXer.

R19 A BRIEF REVIEW OF THE AUTEK QF-1 AUDIO FILTER (2) Chuck Hutton. A non-technical review of this noise and interference filter.

R20 A FREQUENCY COUNTER FOR RECEIVER TUNING (13) Robert Foxworth. A thorough article on digital readouts. The article discusses technical theory and provides circuitry to enable the experimenter to build a counter for use as a "digital dial."

R23 DIVERSITY RECEPTION (1) Chuck Hutton. How to use more than one antenna and receiver to reduce fading and interference on one frequency.

R24 TIPS ON REMOTE TAPING (2) Russell J. Edmunds. This article explains several ways to turn on your receiver and recorder, while you are otherwise occupied. Useful with reprint R9.

R25 STRONG SIGNAL HANDLING (6) Chuck Hutton. A technical article that explains that sensitivity and selectivity are not the only specifications to be considered in a receiver. Same as IRCA reprint T50.

R26 RECORDING JACKS FOR RECEIVERS (1) Dave Arbogast. A step-by-step procedure is outlined for adding a recorder jack to almost any receiver.

R27 TAPE RECORDING HINTS (4) Mark Connelly. A complete method of radio-to-tape interfacing for portable radios is outlined. Schematics and parts lists are inluded in the article.

R28 COVERTING THE R-390A POWER SUPPLY TO SOLID STATE (7) Charles Taylor. Outlines the conversion process from tubes to diodes. Includes numerous diagrams to aid the constructor. Same as IRCA M23.

R29 R-390A ALIGNMENT CHART (5) Charles Taylor. Optimize your R-390A performance. Same as IRCA reprint M9.

R30 MC KAY-DYMEK DP-40 PRESELECTOR (2) Robert Foxworth. A non-technical review of this accessory with modifications to improve its performance.

R31 THE SUPER HQ-180 (4) Dallas Lankford. A discussion of results obtained by adding a mechanical filter to this receiver.

R32 HQ-180 ALIGNMENT WITHOUT A 60 khz SOURCE (4) Dallas Lankford. How to align the HQ-180's 60 khz IF strip with a 455 khz RF source.

R33 R-390A/URR PTO ALIGNMENT (3) Dallas Lankford. The alignment procedure to achieve exact end-point alignment in the R-390A PTO is detailed. See reprints R28, R29, R34, & R35.

R34 INSIDE THE R-390A PTO (4) Dallas Lankford. An in-depth article that explains the R-390A PTO tuning system and shows how to improve its performance. See reprints R28, R29, R33, & R35.

R35 THE R-390A ON LONGWAVE (2) Craig Healy. A simple and inexpensive method to modify this receiver to tune below 500 khz.

R36 THE BBA-1 BROADBAND AMPLIFIER (11) Mark Connelly. A construction project suitable for beginners which is used to increase the output from a loop antenna to your receiver. Same as IRCA reprint A55.

R37 THE GENERIC HQ-180 IF ALIGNMENT (4) William Marvin. The non-technical DXer can peak HQ-180 performance without the use of test equipment

R38 VARACTOR DIODE APPLICATIONS FOR DXERS (10) Mark Connelly. Covers the advantages and disadvantages of substituting a varactor diode for the variable capacitor in various DX projects.

R39 A "KNOCK-YOUR-SOCKS -OFF " REGENERATIVE PREAMP (1) Ray Cole. A simple-to-build project adaptable to frequencies from longwave tc shortwave.

R43 CERAMIC FILTERS (9) Marc Bergman. A listing and description of commonly available ceramic filters, with test data from the author. Same as IRCA reprint T60.

R44 THE HQ-180 SERIES RECEIVER SENSITIVITY TEST (1) Dallas Lankford. A simple test to pinpoint weak or bad tubes.

R45 REPLACING THE R70's PBT FILTER (3) Gerry Thomas. Step-by-step instructions to install an improved cermic filter in the PB tuning circuit. Same as IRCA reprint M46.

●DOMESTIC DX●

D6 MAKING THE BEST OUT OF PREPARED-CARD VERIES (3) Kelly Andrews. Ideas to show how to obtain verification card by using imaginative prepared cards. Examples are included.

D19 DXING: HOW TO "UP" YOUR TOTALS (3) John J. Rieger. An antedote for "DX burnout." Tips to help the experienced and good advice for the novice.

●FOREIGN DX●

F3 PORTUGESE FOR DXERS (2) Ron Schatz. Enumerates important and unusual features of this language.

F5 HUNTING LATINS BY MUSIC (5) Ron Schatz. Covers LA music indigenous to various countries, and how to ID stations with this information.

F8 STATION IDENTIFICATION (2) Author not listed. Tips on how to identify stations in nearly 50 languages.

●MISCELLANEOUS ARTICLES●

M4 RF INTERFERENCE AND THE HOME COMPUTER (2) Bill Krause. Several solutions to computer-generated interference are discussed.

M6 RF POLLUTION (2) Glenn Hauser. General article concerning radio interference and steps that can be taken to control it.

M8 RETAIL ELECTRONIC PARTS SUPPLIERS (5) Compiled by Mark Connelly. A comprehensive listing of parts suppliers who sell in small quantities to the general public. Lists addresses, telephone numbers, and specialties of each outlet. Same as IRCA reprint G42.

M10 SUPERMODULATION AND EFFECTS ON DXING (3) Steve Kennedy. Explains why there is overmodulation and why it will affect the DXing hobby for some time to come.

M11 TERRAIN CHARTS FOR PROPAGATION PREDICTIONS (3) Mark Connelly. This article outlines a way to compose a chart of a DXer's surrounding terrain which may enhance or diminish reception. Same as IRCA reprint T48.

M12 NOISE LEVELS AND USABLE RECEIVER SENSITIVITY (5) Chuck Hutton. A technical discussion of the effect of noise on receiver sensitivity.

M13 GREAT CIRCLE CALCULATIONS REVISITED (4) Mike Tuggle. Explanation of how to figure distance and direction of stations. Richard Allen has written a computer program for use in calculating Great Circle paths.

M14 HOME COMPUTERS AND DXING (5) Mark Connelly. An introduction to the use of computers as an aid to DX record-keeping and calculations, with programs for most popular computers.

M17 SOME THOUGHTS ON INTERFERENCE (1) Skip Arey. A simple modification to light dimmers is outlined. This will help reduce the noise interference produced by the dimmer.

M18 MANMADE INTERFERENCE ON THE BCB (3) Dallas Lankford. The author presents a method for evaluating a present or proposed DXing location from the perspective of man-made noise levels.

●PROPAGATION●

P1 MEDIUM WAVE SIGNAL PATHS, PARTS I, II, III, AND IV (29) Gordon P. Nelson. Covers Great Circle Paths, seasonal absorption patterns, auroral effects, and the Mid-Winter Anomaly.

P8 COMPARATIVE MEASUREMENTS OF GEOMAGNETIC INDICES (3) Russell J. Edmunds. A daily comparison, for three months, of various A-index measurements from several major observatories. Article explains how the indices are related.

P10 A BEGINNER'S GUIDE TO THE IONOSPHERE (10) Fr. Jack Pejza. An explanation of how the ionosphere changes and the resulting affects on radio propagation. Same as IRCA reprint T2.

P12 LIMITATION ON THE USE OF THE A-INDEX (3) Gordon P. Nelson. The article explains why the A-index can be misinterpreted.

P14 SKYLINE BLOCKAGE (10) Fr. Jack Pejza. The technical information needed to determine the effect that terrain has on signal reception is presented in this article. Same as IRCA reprint T3.

P15 SKYLINE BLOCKAGE, SOURCES OF UNCERTAINTY (9) Gordon P. Nelson. Discusses less common modes of radio signal propagation that can be blocked by the horizon.

P16 HORIZON BLOCKAGE: CAN FRESNEL DIFFRACTION BE IGNORED? (10) Gordon P. Nelson. Tells why signals that should be blocked by the horizon can sometimes be heard.

P26 ATMOSPHERIC AND GALACTIC NOISE ON THE BCB (3) Dallas Lankford. A technical article relating certain levels of noise to receiver sensitivity.

P32 RELATIONSHIPS BETWEEN SOLAR ACTIVITY, THE EARTH'S MAGNETIC FIELD, AND MW DXING (15) Randy Seaver. The characteristic of these phenomena are examined using solar and ionosheric data gathered over a thirty year period. Applicable to SWBC. Same as IRCA reprint T64.

P33 SEA GAIN (11) Randy Seaver. Discusses why Dxers living at a coastal location can have enhanced reception at LW, MW, and Tropical Band frequencies. Same as IRCA reprint T62.

●RECEIVER REVIEWS●

RR1 RECEIVER COMPARISONS-WHAT DO THEY MEAN? (2) Russell J. Edmunds. Author explains how to compare product summaries and receiver reviews.

RR2 QUALITATIVE REVIEW OF THE YAESU FRG-7 RECEIVER (3) Glenn Hauser. A non-technical review.

RR3 DRAKE R7-A REVISITED (2) Craig Healy. General comments from a satisfied user. Contained in IRCA reprint R31.

RR4 HEATH GR-78 (2) Ron Schatz. Review.

RR6 SONY ICF-6500W-THE PERFECT PORTABLE? (4) Gerry Thomas. A comparison is made between this radio, the Realistic TRF, and the GE Superadio. See also reprint R8, Same as IRCA reprint R43.

RR8 MC KAY-DYMEK DR-22 (3) John Clements. A detailed, non-technical preproduction review.

RR9 ICOM IC-R70 COMMUNICATIONS RECEIVER (11) Vincent Pinto. A thorough and technical review. See reprints R4 and R45 for modifications.

RR11 ESKA RX 12 PL (2) Rafael Calabulg(DSCWI). Review.

RR12 REALISTIC DX-400 TEST REPORT (3) Bruce A. Conti. Receiver is compared to the TRF.

RR14 THE ICOM IC-R71A RECEIVER (7) From "DX Calling" magazine. Thourough and technical review.

RR15 UNIDEN CR-2021 VS. SONY ICF-6500W: A COMPARISON (3) Gerry Thomas. Comparison of performance of these under $100 portables. A simple high-pass AF filter for the Sony is described. Same as IRCA reprint R51

RR16 NRD-515 REVIEW (7) Bob Foxworth. A detailed review and commentary.

RR18 SURVEY OF HAMMARLUND RECEIVERS (8) Dallas Lankford. Comparisons of the full line of receivers, modifications, and hints to consider when purchasing one. See also NRC Receiver Reference Manuals I and II.

RR19 KENWOOD R-5000 (5) Don Moman. A complete review with a comparison to the Icom R71 and Sony ICF-2010. Same as IRCA reprint R56.

ARM1 ANTENNA REFERENCE MANUAL-VOLUME 1 A compilation of articles on the subject of antennas for MW DXers which have appeared in the pages of DX News from 1969 through 1974. It includes data on air-core and ferrite-core loops, tuners for longwire and Beverage antennas, and coupling devices.

ARM2 ANTENNA REFERENCE MANUAL-VOLUME 2 A booklet similar to Volume 1 containing articles published from 1974 through 1981.

RRM1 RECEIVER REFERENCE MANUAL-VOLUME 1 Similar to the antenna manuals, but covers articles about receiver reviews, modifications, and accessories from DX News, originally published from 1969 through 1974.

RRM2 RECEIVER REFERENCE MANUAL-VOLUME 2 A continuation of Volume 1, containing articles from 1974 through 1981.

BLA BEVERAGE & LONGWIRE ANTENNAS-DESIGN & THEORY A compilation of DX News articles on this topic. All articles are available as reprints A-28, A-7, A-8, and A-11.

LA LOOP ANTENNAS-DESIGN & THEORY A compilation of reprints A-37, A-4, A-5, A-6, A-1, A-24, and two others no longer available. Covers direction finding, open-core loops, and ferrite-core loops.

●PRODUCT SUMMARY●

PS1 DRAKE SSR-1 RECEIVER (1) Bob Foxworth.

●MANUALS●

The National Radio Club has produced six book publications in 5½ x 8½ inch booklet format. While the contents of these manuals are geared toward MW DXers, much is pertinant to other radio hobbyists.

To order any reprint, booklet, or other product offered by the National Radio Club, please do the following. 1) Make a list of desired reprints on a piece of paper with page counts for each item. 2) Total the number of pages wanted. 3) Multiply the total number of pages by the following rates:

15¢ per page for US and Canada NRC members
20¢ per page for US and Canada non-members
16¢ per page worldwide by surface rate
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A complete National Radio Club product catalog is avaiable for US$1.00. NRC antenna and receiver booklets are priced at US$3.00 for members and $4.00 for non-members in the US and Canada. Contact the NRC for rates applicable to other countries. 4) Send your order in US funds or an International Money Order to:

National Radio Club, Inc.
Publication Center
P.O. Box 164
Mannsville, New York 13661
USA

Please allow several weeks for delivery. This service is manned by a volunteer.

authors and editors

about the authors and editors

● KIRK ALLEN — PONCA CITY, OKLAHOMA

Kirk is 33 and single. He has 1 son, Michael. He's employed by the Conoco Oil Company in the Building Operations Division. His main interests (outside radio) are family and friends but he is also an avid fisherman with emphasis on Black Bass.

Kirk was first introduced to radio by building a crystal set in junior high school back in 1969. He did a little SWLing shortly thereafter but developed no real co.mmitment to DXing then. He held radio amateur novice ticket (WN5FNT) from 1972-74. Kirk took a total hiatus from radio from 1974-81, primarily related to school, dating and hard partying. He got back into SWBC DXing in Dec 1981 and has been more seriously involved since about Sept 1982 when he bought his NRD 515. Kirk especially enjoys DXing Indonesians and Latins. He has been a co-editor for Fine Tuning since its merger with OMDXC in '86. He is currently using a 125' random wire antenna into a homebrew tuner. Kirk's totals are HIC 203, VIC 190 (NASWA). He welcomes correspondence from other DXers: PO Box 1242, Ponca City, OK 74602.

● RICHARD ARLAND — WILKES-BARRE, PENNSYLVANIA

Rich is 43 years old and married to Tricia. They have 4 children. Currently he is working for the Student Loan Marketing Association in Wilkes-Barre, PA, as head of their technical services department. In 1987 he retired from the USAF after 20 years active duty in longhaul land tactical communications. Out of his 20 years in the Air Force, 15 were spent in exotic overseas locations including Japan, Azores and England.

He has been licensed as a ham radio operator (K7YHA) since 1963, and holds an Extra Class License. As a father of 4, he had high hopes that his children would eventually obtain their ham licenses, but, alas, only Wendy (KB4UNT) has humored her father thus far. In addition to low power (QRP) ham radio, he also enjoys SW Listening and DXing, and is a dedicated scanner fanatic. His faithful DX hound (a Golden Retriever pup named Ozzie) is a dependable alarm clock who awakens him around 4 AM every morning. Ozzie needs to make his morning constitutional around the yard which allows Rich time to check the SW bands for interesting DX.

● GUY ATKINS — ISSAQUAH, WASHINGTON

Guy is 33 and married to Rochelle. He is employed by Zetec Inc., a manufacturer of nuclear power plant safety inspection systems used worldwide. Previous to Zetec, Guy spent 9 years in graphic arts and advertising. His wife currently works part-time for an advertising agency specializing in high technology accounts.

A battered Sears Silvertone portable was responsible for Guy's first enthusiasm in radio at age 13. His DXing interests began in 1982 when he met other SWBC hobbyists in the Seattle area. Guy enjoys combining DXing and graphic arts; he has promoted the DXing hobby in the Pacific NW through publication of the Cascade Mountain DX Club newsletter and DX/Northwest's Grayline Report. He has also hosted social activities for Seattle area DXers and organized DXpeditions. Guy currently is on staff with Fine Tuning, assisting with Special Publications. His receiving equipment includes a JRC NRD 525 with a Kiwa Electronics' Multiband AM Pickup (MAP), and a Uniden CR-2021 portable. Guy enjoys building receiver modifications and has come up with a unique design for an effective, remote keypad for the NRD 525 (details in the next Proceedings). His favorite DX targets are the South Pacific and Africa. Both Guy and his wife are big fans of Afro-pop music, an interest that grew from the challenge of DXing Africa from the Northwest.

● KEVIN ATKINS — PINSON, ALABAMA

Kevin is 30 years old, has 1 wife, 1 son, 1 daughter, 5 radios, and no desire to add to those totals, thank you! He supports these dependents by managing Communication Arts, Inc., a typography studio serving the Birmingham advertising community. He majored in journalism at Auburn Univ and the Univ of Ala at Birmingham.

Kevin is a Fine Tuning co-editor and a NASWA member. His first love is Indonesia, but he uses the time between Indonesian openings to pursue stations in Andean South America. He also enjoys reliving his childhood at the dials of his son's Lafayette HE-10. His NASWA country totals are 204 HIC, 174 VIC.

● JERRY BERG — LEXINGTON, MASSACHUSETTS

Jerry is 45 years old, married and has two children, Evan 18, and Laurie 15. He is a graduate of Temple Univ. and Georgetown Univ. Law School, and is the court administrator for the statewide Massachusetts District Court System.

Jerry has been a SWBC DXer since 1958. He is a member of the NASWA Executive Council, author of various articles, and chairman of ANARC's Committee to Preserve Radio Verifications, a project designed to archive QSLs belonging to former DXers and save such material from loss or destruction. Jerry currently lists over 220 countries Heard and Verified on the NASWA Scoreboard.

● GERRY BISHOP — NICEVILLE, FLORIDA

Capt. Gerry Bishop, USAF, is a navigator on C-130 transport aircraft when not involved in being Jean's husband, 2 year-old Allen's Dad, or DXing. Gerry has a BA in Political Science. Other interests include baseball, philately, and gardening, all shared with Jean.

DXing for Gerry began in 1973, with the gift of a Lafayette Globepacer. Thanks to Uncle Sam, he's had the opportunity to DX in some uncommon places, such as the Philippines, Korea, Guam, western Europe, and airborne over both the Atlantic and Pacific Oceans. Gerry's no longer an all night DX hound, but still enjoys the thrill of a new one. Gerry is also a licensed amateur (KA3KJH) though inactive. He is a member of NASWA, NRC, and FT.

● CHUCK BOLLAND — LAKE WORTH, FLORIDA

Chuck Bolland is married and the father of 4 children. He and his wife Julie have been married 18 years. They met while Chuck was serving in the Navy as a Communications Technician in San Vito, Italy. Julie is from nearly Brindisi. After getting out of the Navy in 1977, the Bollands settled in Lake Worth, FL. At that time they had just 2 children, Carol and Charles, Jr. Their second pair of children, Jessica and Stephen, were born shortly thereafter. Chuck has worked for the US Postal Service since 1977. His present title is Superintendent of Building Services. He manages to crew of 59 men and enjoys the challenge of his job.

Having such a large family, Chuck finds time to DX only in the mornings before everyone else gets up. His evening hours are usually spent answering questions for Stephen, his 5 year-old, and with other family affairs. Chuck is an amateur radio operator with a General class license, KA4PRF. He gave up QSL card hunting a few years ago, but occasionally sends off a reception report to stations like Hong Kong Radio and Falkland Islands Broadcasting Service, whenever he hears them. He enjoys experimenting with antenna configurations and gadgets to improve his DXing capabilities. Chuck says he has "stumbled" upon a couple of unique methods of building receiving equipment gadgets that might help other SW listeners and he enjoys writing articles about these developments. He recently purchased an IBM PC compatible computer and has found that, rather than interfering with his DXing, it is contributing to it in a big way. His receiving equipment consists of a Hallicrafters DX100 and a NRD 525, recently modified with the ESKAB Synchrono Phase Locked IF modification.

● JOHN H. BRYANT STILLWATER, OKLAHOMA

John is 48 years old, a native Okie, and has been married to his nurse/wife Linda for 25 years. They have one child, Mary Ellen, who is currently a senior in college. Although John's home town is Stillwater, OK (their current QTH), John and Linda lived in Arizona, Illinois and Alabama before returning home a decade ago. John is Professor and former Head of the School of Architecture at Okla. State Univ. Besides architectural design instruction, John is widely known as an expert on the traditional architecture of East and Southeast Asia. In the mid-1970's, the Bryants spent a year in Japan where John was a Senior Fulbright Research Scholar. John has traveled extensively in China, both as a member of official US delegations and as a lecturer at a number of Chinese universities.

John has had 2 careers in the DX hobby. The first was as a teenager throughout the 1950's. John began in 1952 as a SW DXer but spent most of that era as a "medium waver." His best catch was 1YZ, Rotorua, New Zealand on 800 KHz in the winter of 1959. His second career, mostly SW this time, began in 1979-80 with the purchase of a Sony 2001. He currently operates a highly modified NRD-525 coupled with a semipermanent 1200' Beverage pointed at the China coast and Sumatøra. Although he is enthusiastic about DX from anywhere, John couples his "real world" interests with his DX interests by being absolutely obsessed by DX from East and Southeast Asia. His other radio interest include antenna and propagation experiments. His current total are 200 countries heard/185 countries verified from the "modern era." John is the Editor of Special Publications for Fine Tuning.

● DAVID M. CLARK NEWMARKET, ONTARIO

David is 43 years old, a university graduate in history and geography and works is a Director of Systems Development for a major trust company. He and his wife Elena have 4 children and reside on a 10 acre wooded property in the country, site of Clark's infamous "DX Barn" and antenna farm.

With an interest in DXing since age 12, David has gone through phases of specialization in foreign and domestic medium wave, the ham bands, and SWBC--primarily on the Tropical Bands since 1982. Current SWBC-HIC total is about 200, supported in recent years by an extensive tape collection which he enjoys in lieu of QSLing. David is especially interested in the technical aspects of propagation in terms of co-relating solar and geomagnetic data and grayline criteria to actual reception experience. Within that area of interest, he focuses on transpolar routes to Asia. David is a Director of the Ontario DX Association and Editor of 'World Radio Report' for the DX Ontario bulletin. He is also a member of CIDX, NASWA, NU, and FT.

● MARK CONNELLY BILLERICA,MASSACHUSETTS

Mark primarily DX's MW with some occasional SW and LW activity. His early interests in radio and electronics led to a BSEE degree from Northeastern Univ. and to a career in the field of computer-controlled automatic test equipment (ATE) used to verify performance of RF, AF, digital, and power circuit cards. Besides DXing, Mark is an active radio amateur (WA1ION) and enjoys photography, many kinds of music, computer "hacking," architecture, gardening, botanical research, travel, and various exercise-related activities. Mark maintains a large tape library of radio DJ shows from the rock era: these are exchanged for other people's tapes. Mark's DXing is done from the home QTH (near Boston) and, approximately one weekend a month, from his parents' house on Cape Cod. The Cape Cod site, near the ocean, provides excellent foreign DX opportunities. Although the Sony ICF 2010 receiver and the Yaesu FT757GX transceiver are used most often, several other pieces of gear (including an old R390A) perform back-up duty. Mark had designed and built many antenna-related accessories such as phasing units and high-gain/high-Q regenerative preselectors. These have been amply documented in the pages of NRC's DX News and IRCA's DX Monitor. Mark has heard about 90 countries on MW (about 50 QSL'd) and has worked about 150 countries on the ham bands.

● RICHARD A. D'ANGELO — WYOMISSING, PENNSYLVANIA

Rich is 39 years old, a native of Brooklyn NY, and has been married to Susan for 16 years. They have 2 children, Adam and Jennifer, ages 9 and 6 respectively. Rich received a BS in Economics from Brooklyn College in 1972 and his MBA in Finance from Pace Univ. in 1976. Currently, he is employed by Metropolitan Edison Company, an electric utility, as a Manager in the Rate Department.

Rich began DXing in 1964 when he discovered his brother's Hallicrafters S-85 in the basement. His current receiver is an Icom R-70 which is used with an Alpha Delta DX SWL Sloper antenna. Rich has been an active member of many DX clubs over the years and has been a member of NASWA since the first all-SWBC issue in August 1966. Other club/hobby affiliations include SPEEDX (currently serving on the Board of Directors), ODXA, NRC, A*C*E, DSWCI, World DX Club (North American Representative), OZ DX, NZDXL, the DX Spread, FT and NU. He was the Chairman of the Administrative Committee for the first 2 North American DX Championships (1987 and 1988) and is currently chairman of the recently formed joint NU/FT Special Transmissions Committee.

● GERRY L. DEXTER — LAKE GENEAVA, WISCONSIN

Gerry has been a SW enthusiast for 37 years. His main areas of interest are Latins, clandestines and QSLing. He just recently passed 1400 SWBC stations QSL'd (using NASWA guidelines). Dexter writes the "Listening Post" and "Clandestine Confidential" columns monthly in Popular Communications as well as feature articles for that and other magazines. He operates Tiare Publications which has published nearly two dozen books on SW listening, ham radio and scanner monitoring.

● JOE FARLEY — DOWNERS GROVE, ILLINOIS

Joe is 36 years old. He and his wife Susan reside in the Chicago suburb of Downers Grove with their children Andy (3) and Juli (1). Joe received a BSEE from Northwestern Univ. in 1977, and is currently a self-employed manufacturer of medical and industrial X-ray tubes. He holds one patent (pending) in the field.

Joe has been DXing on and off since 1967, and has current HIC/VIC of 195/153. He is not firmly committed to any one aspect of the hobby, but interests generally include the Trop Bands, utilities (Maritime Mobile CW), and pirates/clandestines. He currently serves and president of the Chicago Area DX Club. Other than radio, Joe's other interest are cabinetmaking, fiction and hockey.

An interesting job responsibility involves the design, construction and maintenance of HF RF induction-heating equipment. Joe's current arsenal includes 1.5kW @ 400 kHz, 5 kW @ 2-5 MHz, and 30 kW @ 10 kHz. The temptation to stick some wire out of the shop back door and QSO submarines is a daily occurrence!

● JOHN FISHER — AMHERSTVIEW, ONTARIO

John is 32 years old and has been married for 8 years to his wife Catherine. They have 2 daughters, Allison (4) and Stephanie (2). After graduating in chemical engineering from the Univ. of Waterloo, he worked in Alberta and New Zealand before returning to his old stomping ground of Eastern Ontario. He is a professional engineer and is employed as a Research Engineer in the field of plastics for DuPont Canada in Kingston, Ontario.

He discovered DXing in 1970 when he began listening on an old Westinghouse floor console radio. Since that time he has maintained a relatively steady interest in the hobby, with some less active times during university. His main areas of interest have always been Latin American stations, and propagation to this area. An unabashed QSL collector, his country totals are HIC 216, VIC 200, with over 450 stations verified.

John is currently the QSL column editor for the Ontario DX Assoc. and is part of the "Ontario Connection" in FT. He enjoys DXpeditions for the chance to meet his fellow DXers and chew the fat. John values the friends he has made in the hobby and says that no matter where he travels in the course of his job, there is always a DX friend nearby.

●NICK HALL-PATCH — VICTORIA, BRITISH COLUMBIA

Nick is starting to push middle age, is married to Susan, and has 2 daughters, aged 10 and 7, who have been known to assist in Beverage expeditions under the guise of "camping trips." He is a self-employed gardener in Victoria, the City of Gardens, and what with raising plants and children, has little spare time.

However, Nick has an ongoing interest in improving his MW DX reception. He DX'ed MW in the mid-60's, and then again since the early 70's. He has indulged in a good deal of experimentation with receivers and antennas since then. Nick has been Technical Editor of the International Radio Club of America since 1978, and was editor of IRCA's A DXer's Technical Guide, published in 1980 and 1983, and in German translation in 1987. He is also a member of CIDX, LWCA and Medium Wave Circle, and recently became a radio amateur. Mongolia and Bulgaria are among the better MW catches from his QTH, but most good DX is now heard using Beverage antennas on expeditions to the Pacific coast. He prides himself on never having seriously DX'd with a stock receiver, and presently uses a receiver of his own design and construction.

●DON JENSEN — KENOSHA, WISCONSIN

Don has been an active DXer since 1947, when, at the age of 11, he was introduced to the hobby by his father, a sometimes bootleg "ham." While he has dabbled in different aspects of the hobby over the years, his primary interest has been SWBC. He has been active in the hobby in numerous ways. In 1964, he founded and was first executive secretary of the Association of North American Radio Clubs (ANARC). He has held editorial and administrative posts in a number of radio clubs, including NASWA during the past 25 years. Since 1969, he has published and co-edited the Numero Uno DX weekly. He formerly was the editor of Communications World magazine and has been a freelance magazine writer since 1963. He has written feature articles and regular columns for radio magazines over the years. He also has had regular SW features aired on various DX programs around the world.

Don is a newspaperman by profession, working for the daily Kenosha News as a general assignment reporter and courts specialist. He is married to Arlene, also a journalist, and they have 3 children, ages 20 to 32. They live in Kenosha, WI.

●HANS JOHNSON — SAVANNAH, GEORGIA

Born in 1963, Hans began listening to SW in 1976. A keen student of Arab affairs, he graduated with a BA in Middle Eastern Studies from Univ. of Texas (Austin) in 1985. Hans entered the Army after graduation and spent his first 2 years in the military studying Arabic at the Defense Language Institute in Monterey, CA. Upon completing training in the MOS 98G (signal voice intercept), the author spent the last 2 years of his enlistment with the 124th Military Intelligence Battalion. Hans is currently in search for a nice piece of land suitable for growing antennas.

●DALLAS LANKFORD — RUSTON, LOUISANA

Dallas is a professor of mathematics at Louisiana Tech Univ. Since earning his Ph.D. from the Univ. of Texas at Austin in 1972, he has been an active researcher in automated deduction, a branch of artificial intelligence, and has become internationally recognized for his contributions to computational logic. He is an accomplished computer programmer, especially in FORTRAN, Pascal, and LISP programming languages, and is regarded as a wizard in the use of the mathematical typesetting language TEX. He is 47, and has been married to his wife Susan for 11 years. She has a Ph.D. in folklore, and is active in teaching, research and consulting.

Dallas has been a MW DXer since his early teens. He was inactive in the hobby from the mid-60's to the mid-70's because of the demands of college and starting a teaching and research career. After rejoining The National Radio Club in 1975, he obtained a Hammarlund HQ-180A which is still one of his primary receivers. The warm

glow of tubes must have been addictive because he now has a Hammarlund HQ-150, Motorola and Electronics Assistance Corporation R-390A's, and a Collins 51J-4. His best BCB DX in recent years was a 1982 verified reception of 3LO, Melbourne, Australia, on 774 KHz, using a HQ-150 and a homemade loop antenna. He has been a regular contributor of technical and general interest articles to DX News, the bulletin of The National Radio Club. For the past 3 years, he has been editor of The Hollow State Newsletter, a quarterly publication devoted primarily to communications receivers which use vacuum tubes.

● CEDRIC MARSHALL — TORONTO, ONTARIO

Cedric is a resident of Toronto, Ontario, where he teaches mathematics and chemistry at Forest Hill Collegiate. He has been interested in SW since the late 60's, and through much of that time has concentrated on ferreting out Latin, African and Asian stations on the Tropical Bands. For several years, he relied on wilderness camping expeditions to provide a DX venue away from city noise, but a variety of experiences ranging from attacks by cows to spending January weekends in an uninsulated tent in -25 degree weather convinced him there must be a better way. Now, most weekend mornings see him heading north before dawn to join Dave Clark at his Newmarket listening post, which the 2 of them have assembled in the course of 3 years of hard work.

● FRITZ MELLBERG — HAWARDEN, IOWA

Fritz is 44 and is a pastor of the United Church of Christ congregation in Hawarden, Iowa, a small town north of Sioux City. He is married and has 2 teenage girls. He grew up in Menasha, WI and worked for the Appleton (WI) Post Crescent while in college at the Univ. of Wisconsin. He worked as a writer and PR person for his denomination's office of communication in New York City where he learned how to edit by being so ruthlessly edited by others on the staff.

Among his current hobbies are woodworking, sculpting, and collecting old radios, parts and literature. He has a large collection of old tubes as well as a few working Atwater Kents and Philcos, and enjoys learning to repair these old classics. Fritz also works as a therapist for a local substance abuse clinic and, to keep sane, collects classic jazz and rock albums.

He bought his first SW radio to keep up with the Green Bay Packers while in India back in 1968, but it wasn't until 1979 that he began to DX seriously. He has been a member of the major DX clubs and currently spends his time DXing on the broadcast band. He advocates tape collecting as an alternative to QSLing, but admits he is not a purist and proudly displays his 3 QSLs!

● CHUCK MITCHELL — INDIANAPOLIS, INDIANA

Chuck is a soon to be 30(!!!) year old audio engineer now working for an independent production company in Indianapolis. Chuck graduated from Bethel College Indiana with a BA in Communications in 1983. Professionally, Chuck has worked on both the technical and performance sides of the aisle in both radio and television. Along withy service at several state-side stations, he spent almost a year at Transworld Radio in Monte Carlo.

Besides being a longtime SWBC DXer, Chuck holds an Advanced Class Radio Amateur License (licensed since 1974).

● DON MOORE — BIG RAPIDS, MICHIGAN

Don is 31 years old. Originally from PA, he received a BS from Penn State in 1980. From 1982-84 he worked with the Peace Corps in a rural Honduran high school. While there, Don made several trips to Guatemala and Mexico, and met his wife, Theresa Bries, also a Peace Corps worker. In 1985 they spent 6 months traveling in South America. Having just completed MA's in Linguistics/TEFL at Ohio Univ. they recently began teaching

English to international students (mainly Latin American and Japanese) at Ferris State Univ. in Michigan. Don doubles as Activities Director for the program.

Don began DXing in 1971, and has been more or less active ever since. Although he dabbles in just about everything, his main interests are SWBC and MW, especially Latin American stations. During his Latin American travels, he visited over 100 radio stations. He enjoys QSL collecting from both big and small stations, and is especially proud of his collection of over 120 different HCJB QSLs. He is currently counting down towards 1000 SWBC stations heard and 500 verified. Other interests include folk music of all types, history, science-fiction, gardening and camping.

● GENE PEARSON — PERRYSBURG, OHIO

Gene is 43 years old, married, and has 2 daughter aged 21 and 15. He is a priest in the Episcopal Church with 16 years service.

Gene began DXing in 1958 as a 12 year old in Birmingham, AL with a Knight Kit Space Spanner. In 1963, he left his receiver at home when he entered the Univ. of Virginia. However, he had his receiver with him during graduate school in philosophy (Ann Arbor, MI) and theological seminary (Chicago, IL) between the years 1967-72. Then, after 15 years inactivity as a DXer, he became active again in 1987.

The Pearson listening post includes an NRD-525, two R-390A's (plus 1 1/2 R-390A's for parts), an LF Engineering L-101 Converter and an L-201 VLF Preamplifier. A Sherwood Engineering SE-3 PLL Detector augments whichever R-390A is in use. His main interests include Tropical Band SWBC, LWBC, long and MW Non-Directional Beacons, and the informal study of propagation and antennas. His newest love is the restoration of homeless R-390's to their full potential. During his first period as a DXer, Gene was a member of the Newark News Radio Club and the Universal Radio DX Club, and he reported also to Hank Bennett's column in Popular Electronics as WPE4AIX. Today he is a member of NASWA, ODXA, LWCA, and FT.

● R. CHARLES RIPPEL — VIRGINIA BEACH, VIRGINIA

Chuck is 35 years old and is married to Beth and has one 6 year-old daughter, Ashley. After a period of employment with Northrup-Page Communications Engineers, Inc. assigned to the Saudi Naval Expansion Project, Chuck became and currently holds the position of CEO for Great Atlantic Information Systems, Inc. in Virginia Beach, VA. He also consults to the commercial broadcasting industry among other business interests.

Chuck began DXing in 1972 with a Realistic DX-150 and was introduced to NASWA in 1973 by Ed Shaw. He was one of the founding members of ODDX, the Old Dominion DXer's Assoc, based in Tidewater, VA. In 1974, he edited the CIDX column At Random and in 1987, he created DXer's Forum for NASWA. Chuck was Chairman of the NASWA Editorial Committee till Sept. 1988, till his appointment as Executive Director of NASWA. Over the years, he has contributed several articles to FRENDX including papers on Antenna Noise Bridges and Delta Loop Antenna theory and construction techniques. This is Chuck's second effort with Proceedings, the prior year contributing to the Papua New Guinea articles and writing the engineering review of the Marantz tape recorder. This is also Chuck's second year serving on the Proceedings Editorial Review Committee where he edited the technical articles.

Chuck currently uses an Icom 761, a Sony 2010 and is in the process of restoring a Hammarlund HQ-145 and an HQ-180. Antennas include a 130' Inverted Vee fed with open wire and matched with a Nye-Viking tuner. His main DX interests include SWBC from the South Pacific, Asia and Africa. Chuck holds a number of NASWA awards including: Senior Papua New Guinea DXer (007), European Senior DXer (019), Ecclesiastic DXer (003), Emissora Nacional DXer (003), All Continent QRP DXer (001), and Senior Nigerian DXer (002)

●MITCHELL A. SAMS — WICHITA, KANSAS

Mitch is 29 years old, married and the father of Matthew (2) and Molly (2 mo.). His wife Sherri is a kindergarten teacher. Mitch received a BSEE from the Univ. of Arkansas in 1983 and works as a Radar Systems Analyst for Boeing Military Airplane Company in Wichita, KS. When not DXing, Mitch and Sherri enjoy fishing, snow skiing and travel.

Mitch began DXing in 1972 when, as a Florida 5th grader, he was given a Revell SW radio kit as a birthday present. He's been fascinated ever since! Currently, he uses a modified FRG-7 and a modified HQ-180A. Mitch founded Ozark Mountain DX Club in 1980. OMDXC merged with Fine Tuning in 1986. Mitch now serves as Managing Editor of Fine Tuning. Using the NASWA radio country list, Mitch's totals stand at 217 heard and 170 verified. He especially enjoys DXing Indonesia and Asia. However, as his loggings show, Mitch enthusiastically DXes all areas of the world, occasionally spending time of MW, as well.

As this document went to press, we were all pleased to learn that ANARC had chosen Mitch as the ANARC DXer of The Year for 1989!!

●WILLIAM S. SPARKS — SAN FRANCISCO, CALIFORNIA

Bill is the senior member of our Proceedings 1989 team at 70 years old. He was born in San Luis Obispo, CA and has been a resident of San Francisco since 1923. Bill has been an attorney since 1948, but now limits practice to probate work. He is married to Winnie and has one daughter and 2 grandchildren.

Bill began DXing in 1933 when in high school with 2 tube regenerative receiver built from a kit. He graduated soon to a commercially built tuned rf regenerative and super-regenerative receiver. His DXing dropped off after 1939 due to college work and start of law school and it ceased completely in July, 1941 when he entered the army for over 4 years. Bill's DXing picked up again in 1962, and he has been active continuously since then. His present receivers consist of a modified Icom IC-R70, a Radio West modified Yaesu FRG 7700 and a Sony 2010. Over the years he has used a National NC-190, HQ-180A, Drake R-4B and an R-390A. His NASWA country count is now at HIC 221, VIC 216. His greatest effort in DXing and QSLing has resulted from his fascination with Indonesian stations since the 1930's, resulting in a present total of 70 stations QSLed from that area.

●JERRY STRAWMAN — CEDAR RAPIDS, IOWA

Jerry was born in Des Moines, Iowa in 1948. He has been married to Ardith for nearly 19 years. The family consists of a son (14) and daughter (17). Several birds and a guinea pig round out the Strawman household. Jerry taught instrumental music for five years. However, for the past 13 years he has been an insurance inspector for Eqifax Services of Atlanta, GA. In addition to the radio hobby, he enjoys music, stamp collecting and photography.

The radio hobby first bit Jerry in the late 50's when he began to listen to faraway broadcast stations on a small 6-transistor portable. He received his first SW radio, a Hallicrafters S-120 receiver for Christmas in 1962. His current shack includes a Sony ICF-4920 portable, a restored Hammarlund HQ-150, and an Icom R-70 receiver. Signals slide into his shack via 41 and 60 meter inverted Vee dipoles at 40'. Jerry considers himself more of a radio listener than a DXer, but has an interest in Russian and Chinese regional stations, and broadcasters from the Middle East. He doesn't QSL, but has on tape more than half of the 268 radio countries he has heard on the broadcasting, amateur radio and utility bands. Jerry is a member of the Canadian International DX Club and FT, and is always happy to correspond with or talk to others about the radio hobby.

●JOHN TOW — BIRMINGHAM, ALABAMA

John is 40 years old and has a BS and graduate work in physics. He has just started his 15th year of teaching electronics, telecommunications and photography at Jefferson State College in Birmingham, AL. He is also the faculty advisor/engineer for WJSR (91.1 MHz mono 100 watts). He has held a First Class/General Radiotelephone License for 20 years.

John began SWLing in the winter of 61-62 on a homebrew two transistor regenerative receiver. He progressed to his first DXing receiver, a Lafayette HE-10 that summer. His first QSL was the "Boy on a Llama" card from HCJB, followed very shortly by the P.E. registration "WPE9EWY." He amassed 46 countries verified by his 1966-77 DXing hiatus for college, Navy, marriage, etc. This improved to 66 by 1978 when he skyrocketed his stats to their present plateau: 163 VIC/189 HIC (NASWA); 158/181 (EDXC). John has been a member of DSWCI, NASWA, LWCA, and FT. His favorite pastime is SWLing, with photography, woodworking, sailing and electronics following in that order.

●JON L. WILLIAMS — INDIANAPOLIS, INDIANA

Jon is 45 years old and was born in Cleveland, OH. He and his wife Marjorie, an English teacher, have no children, but enjoy spending time with Herly, their Indonesian exchange student, and Muffin, their Samoyed. Jon is presently an attorney in general private practice with a concentration in litigation. In addition to DXing, Jon enjoys bicycling, canoeing, flyfishing, flytying, and photography, when time permits.

Jon's first contact with SW radio occurred while listening to a friend's Knight Kit Ocean Hopper in 1955. A few months later, he built a Knight Kit Span Master on which he logged such stations as Radio Brazzaville and Radio Leopoldville. He later graduated to a 1938 4-band Philco which belonged to his grandfather who was also a DXer in the 20's and 30's. With time out for college and law school, Jon returned to DXing in 1972 and became a member of NASWA. Jon's activity in the hobby has varied from active to inactive, primarily in response to career demands. He currently operates an NRD-515, an HQ-180A and a modified Drake R4B and R4C, with Indonesia, the South Pacific and Southeast Asia as his main DX interests.

●GEORGE ZELLER — CLEVELAND, OHIO

George is 39, and he reports that his single status since 1984 has greatly reduced in-house QRM. He holds a Sociology BA from Wittenberg Univ, and did his graduate work at Ohio State Univ. After 12 years as a sociology college professor, he switched to full-time research. George is currently the Senior Researcher at the Council for Economic Opportunities in Greater Cleveland, where he writes detailed annual poverty reports covering greater Cleveland and the state of Ohio. Among his other flaws, he is a diehard Cleveland Indians fan, and a member of the Society for American Baseball Research.

George started DXing in 1963, but was inactive 1968-78 while in college. An avid pirate and clandestine DXer, George has heard more than 106 different pirates, with a QSL rate of over 50%. He writes a monthly "Clandestine Profile" column for the Assoc of Clandestine Radio Enthusiasts, and he wrote "The 1989 Pirate Radio Directory" for Tiare Publications. He also regularly tunes his NRD-525 to SWBC and utility DX, and is an active contributor to the weekly ANARC 7240 SW Listeners' Net.