N.E.W.S. LETTER

The Publication of the North East Weak Signal Group

JANUARY 1999 VOLUME SEVEN ISSUE ONE

NEXT MEETING

THE NEXT MEETING IS ON JANUARY, 2ND, 1:00 PM AT THE HARLEY INN
ALL ARE WELCOME TO THE DIRECTORS MEETING AT 11:00 AM
DUCT TAPE BOAT ANCHOR AUCTION SEE KB1VC'S "FELLOW NEWS GROUP MEMBERS"

IN THIS ISSUE

1999 JANUARY VHF SWEEPSTAKES
OPERATE FOR OUR CLUB SCORE!!

DATE AND CONTEST PERIOD THE WEEKEND BEFORE THE NFL SUPER BOWL.
BEGINS 1900 UTC SATURDAY, ENDS 0400 UTC MONDAY (JANUARY 23-25, 1999).

N.E.W.S. GROUP NET EVERY THURSDAY
8:30 PM LOCAL 144.250

K1UHF NET CONTROL, WZ1V AND W1COT AS ALTERNATES
STARTS EAST THROUGH NORTH THEN SOUTH FOR DIRECTIONAL CHECKINS
THEN BACK AROUND AGAIN FOR COMMENTS AND GRID HUNTING

MEMBERSHIP in the N.E.W.S. Group is $10 per year. Apply to Fred Stefanik, N1DPM, 50 Witheridge St., Feeding Hills , MA 01030 (413) 786-7943 You may download an application from our web page http://uhavax.hartford.edu/~newsvhf

FELLOW NEWS GROUP MEMBERS MATT REILLY, KB1VC

The days have grown shorter and the year is coming to a close. So, now many of us turn to indoor tasks.

Like digging through all the junk we've accumulated in the shack.

The other night I got to wondering: "what color is the floor around here?" So I started digging. Then this idea popped up: we ought to try what I'll call a "Duct Tape Auction".

"What?" I can hear you say, "auction off duct tape? One of the most useful elements in human experience?" (The ancient Greeks believed there were five elements that made up all of nature: air, fire, water, earth, and duct tape.) Of course, I wouldn't suggest auctioning off raw rolls of duct tape. We've all got scads of the stuff.

But my guess is that you've got a boat anchor somewhere in your shack. You know, one of those widgets that you acquired quite some time ago and then decided that maybe you shouldn't buy stuff at Deerchester after the third beer. You've been stubbing your toe on it for years now, but can't bring yourself to toss it in a dumpster.

Well, chances are that nobody else wants that hunk of junk either. Then again, if you are like me, you've probably bought some interesting stuff that is really useful, but you've found that you won't ever use it. One of those widgets that you bought two of (assuming that you were going to fry one of them while trying to figure out what it was) and never found a use for. Maybe you are up to your ears in 10GHz LNAs? Somebody might buy one of those.

Here's where the duct tape comes in. Take that useful widget and duct tape it to the boat anchor. Then bring it to the NEWS meeting on January 2. Decide on a "reasonable" minimum bid, and I'll auction it off. You take the whole bid price -- the club won't take anything off the top this time.

If the auction works out, maybe we can make it a regular event. Maybe we can have the club take a cut in the future. (Not this first time though...)

In other news.... Stan (KA1ZE) tells me that he won't be able to make the January meeting. He's accumulating heat in his heat reservoir to prepare for his January Jaunt in the contest. (Stan's going to Florida.) He'll be "very active from two roving sites. One in FN21 and the other FN20. All bands through 5.7 GHz."

Stan also says: "You might want to tell the group that ND3F is planning a super rove with Terry, WD8ISK, starting in our backyard FN31,32,41,and 42. He will head south ending up in FM07.

He will also operate from FN20,21,30,FM16,17,18,19,26,27,28 and 29. That's 16 grids! They will be on all bands through 24 GHz."

In conclusion, happy holidays, keep warm, and I'll see you at the January 2 meeting.

73, Matt KB1VC

25TH ANNUAL EASTERN VHF/UHF CONFERENCE DE N2LIV

1999 brings us the 25th annual Eastern VHF/UHF Conference. The conference will be held once again at the end of August at the Harley Hotel in Enfield, CT where it has been for the past several years. We will be offering a hospitality suite on Friday night for early arrivals and on Saturday we will be provided with technical talks, our famous band sessions and an open lab complete with the latest test equipment (and someone who will help you use it) and finally a Dinner banquet with a world renouned TRIVIA quizz and a door prize raffle. Noise figure measurements will be made thru 10 GHz for preamps and converters. Sunday we will have antenna measurements and a flea market devoted almost entirely to Vhf and above equipment. It's not the size that counts but the quality of the equipment sold.

Once again we will be publishing a Conference Proceeding in conjunction with the ARRL's support and help. Therefore, we are requesting PAPERS be submitted by June 1, 1999 for inclusion in the Proceedings. If you are interested in writing one please contact Bruce - N2LIV with information on the topics. Many thanks and see you in August, exact dates will be sent soon.

Bruce N2LIV
Conference Chairman & Proceedings Editor.

WA8WZG MULTI OP SKEDS FOR JAN TEST DE N2CEI

WA8WZG multi-op for Jan contest. We will operate on .155 and be looking East during the first half of every activity hour on 6M through 23 cm.

We will accept 10 min. skeds for any band 6M through 3cm except the first 2 hours of the contest.

We will be operating EME on 70, 33, 23, and 13 CM

Skeds can be made by E-mail wa8wzgcontest@usa.net

Sked forms can be found at www.downeastmicrowave.com

73, Steve, N2CEI

TRANSVERTER MODIFICATION FOR THE YAESU FT-301 BY GEORGE JONES N1GJ

To use the FT-301 as a driver for a transverter requires very little in the way of modification. As supplied, the rig comes with a separate solid state brick amplifier attached to the rear of the unit. This "brick" normally boosts the transmitted signal from 10 to 100 watts across the full 1.8-30 MHz band. You simply remove the "brick" from the transceiver by undoing the four screws that hold it in place and removing the two BNC connectors from their mating connectors. The "brick" pulls out leaving the two BNC connectors and the male Jones power plug exposed. The Jones plug is not used with the transverter. Not using the Jones plug means that the meter will not indicate collector current on transmit. Insert a home brew or commercial attenuator between the two BNC connectors using short lengths of RG-58 cable terminated with BNC male connectors. The other ends of the cables will have to have connectors that mate with the attenuator. The value of the attenuator can be calculated by starting with 5 watts and working back to the level of RF drive required by the transverter. (The basic FT-301 without the brick amplifier puts out about 10 watts, but you want to leave a little margin in case the particular unit you have does not put out a full 10 watts at 28 MHz.) The modifications are now done. Use the normal FT-301 tune-up procedure.

The 28 MHz output is now taken from the UHF antenna connector on the back of the FT-301 and applied to the 28 MHz input of the transverter. The setup works OK on receive since the attenuator is not in the receive line. Power for the transverter can be taken from the FT-301 companion power supply. If you have one of the FP-301D power supplies, 12 VDC is available at the binding posts on the rear of the unit. If you have the basic FP-301 power supply, you can mount and wire up two binding posts on the back of the power supply chassis. There is plenty of current available since you are no longer using the 100 watt "brick" amplifier.

Control for an external VHF or UHF power amplifier can be taken from pins 5 and 6 of the ACC socket on the rear of the FT-301. A small problem may exist in that these pins supply +12VDC on transmit, rather than the usual ground. This can be worked, if you need a ground, by using the +12 VDC signal to drive a small external 12 volt relay. Control the drive level to the transverter with the DRIVE control on the FT-301.

That's all there is to it. My own setup has worked well for many years now and FT-301s are fairly inexpensive to come by. Since the mods are minimal, it's fairly simple to put the FT-301 back into its' original condition if you should want to sell it.

73 George
N1GJ

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CALCULATIONS FOR THE W2IMU DUAL-MODE FEEDHORN

PAUL WADE W1GHZ
(ex-N1BWT)

Simple cylindrical feedhorns for dishes, like the "coffee-can" type, usually have radiation patterns with poor front-to-back ratio. The backward radiation misses the reflector, resulting in a decrease in efficiency and thus gain. An example of the radiation pattern of a coffee-can feed is shown in Figure 1, as well as the calculated dish efficiency this feed would produce with reflectors of various ***f*/D** ratios. The unwanted backward radiation is a result of currents in the rim of the horn. A number of techniques to improve this front-to-back ratio have been described; one of the more elegant is the W2IMU dual-mode feedhorn.

Dual-mode horn operation

The dual-mode horn eliminates undesired currents in the rim of the horn which produce sidelobes and backlobes. In the words of Dick Turrin, W2IMU 1 , "The basic notion involved is to excite a circular aperture with both the TE11 and TM11 modes with their relative phases and amplitudes adjusted to cancel the electric field at the aperture boundary."

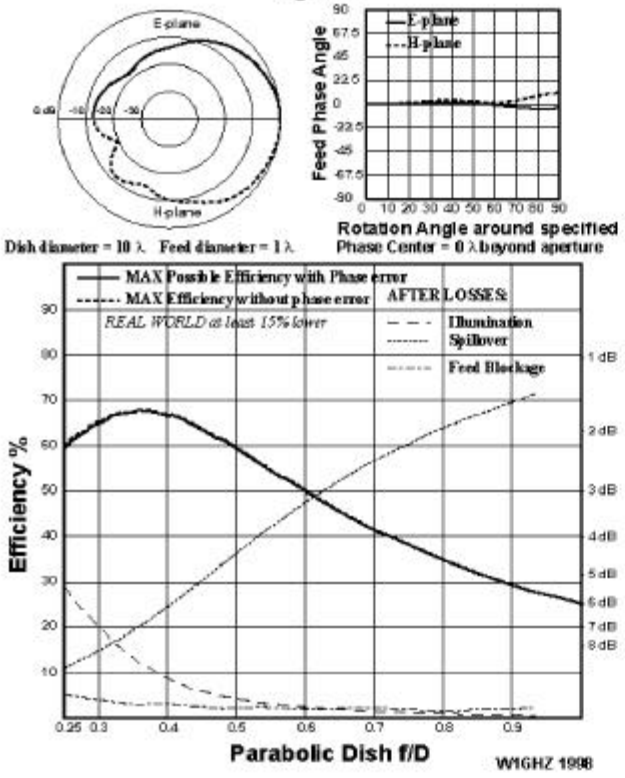
I used the **NEC2** computer program 2 to calculate the radiation pattern for several versions of the dual-mode feedhorn, starting with an input file model of the antenna originally developed by PA3AEF. Then I calculated the potential dish performance provided by the calculated feed patterns using software I developed 3 . The pattern shown in Figure 2 is very clean, with low side and back lobe levels. The calculated efficiency is best for a reflector ***f*/D** around 0.5 to 0.6. This version 4 , with an output diameter of 1.31**l**, is popularly known as the W2IMU feed, and has been used from 432 MHz to 24 GHz with good results on both conventional and offset dishes.

The original Turrin article 1 also described a larger version with an output diameter of 1.86 **l**. The graph for this larger version in Figure 3 shows that the ***f*/D** for best efficiency is about 0.8, a better match for some offset dishes. We could further optimize by choosing the appropriate output diameter for the ***f*/D** of our reflector, then calculating the other dimensions for a dual-mode feed.

We have found that DSS offset-fed dishes work well at 10 GHz. These dishes require a feed pattern equivalent to the feed for a conventional dish with an ***f*/D** of about 0.7. The appropriate aperture for this ***f*/D** is close to 1.5 inches, so I picked up a copper plumbing adapter which flares out from ¾ inch pipe, the input waveguide, to 1½ inch pipe – it looks like a dual-mode feed. To see how well it would work as a dual-mode feed, I measured the dimensions and used **NEC2** to calculate the radiation pattern. The result, shown in Figure 4, is terrible; large sidelobes result in poor spillover efficiency, and phase errors make the total efficiency low.

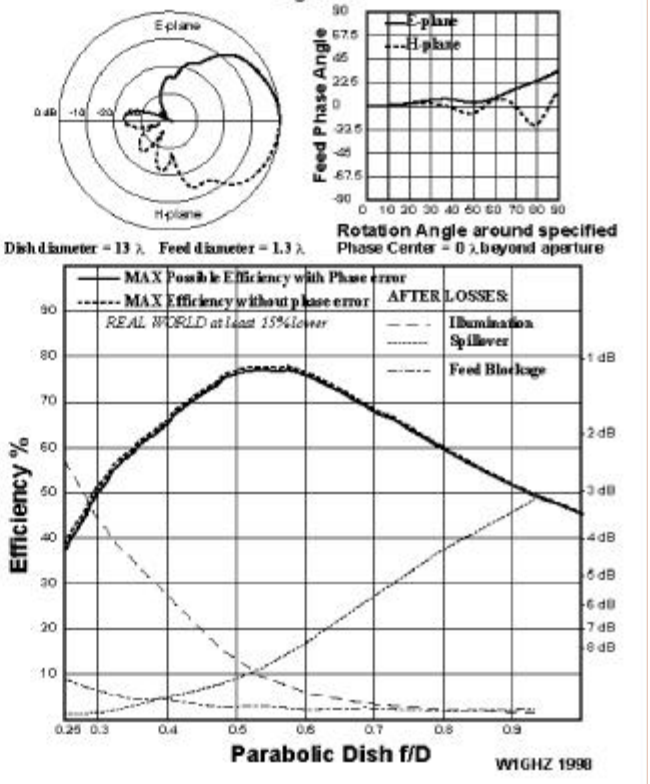
Coffee can feed 0.76 λ diameter, by NEC2

Figure 1



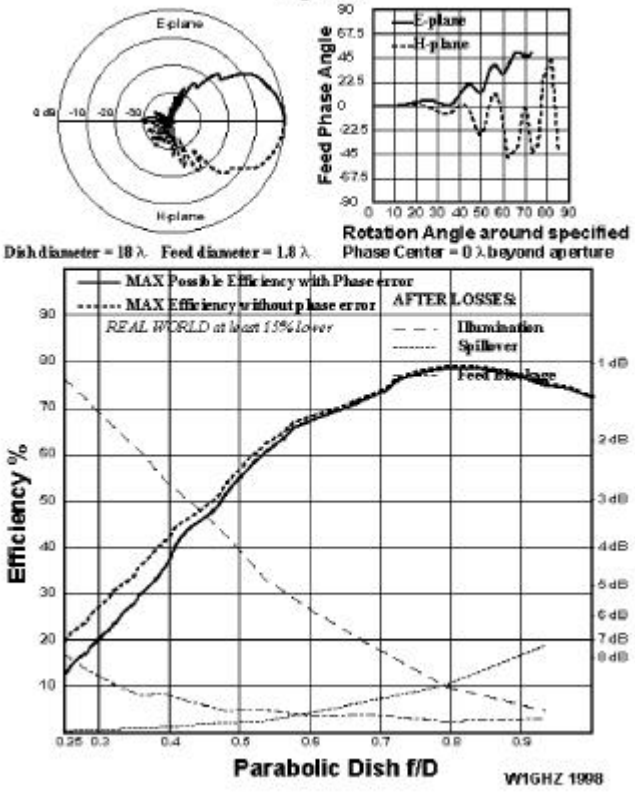
W2IMU dual-mode feedhorn, 1.31λ diameter, by NEC2

Figure 2



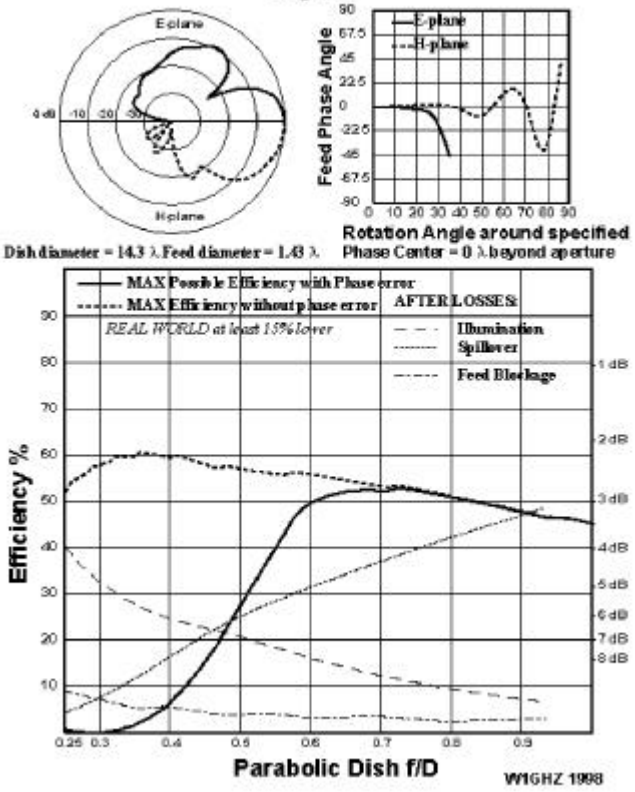
Large W2IMU dual-mode feed, 1.88λ diameter, by NEC2

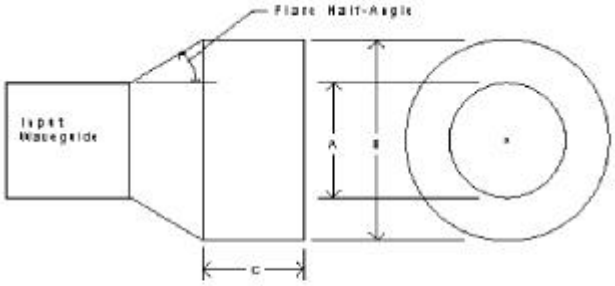
Figure 3



W2IMU feed - bad imitation, by NEC2

Figure 4



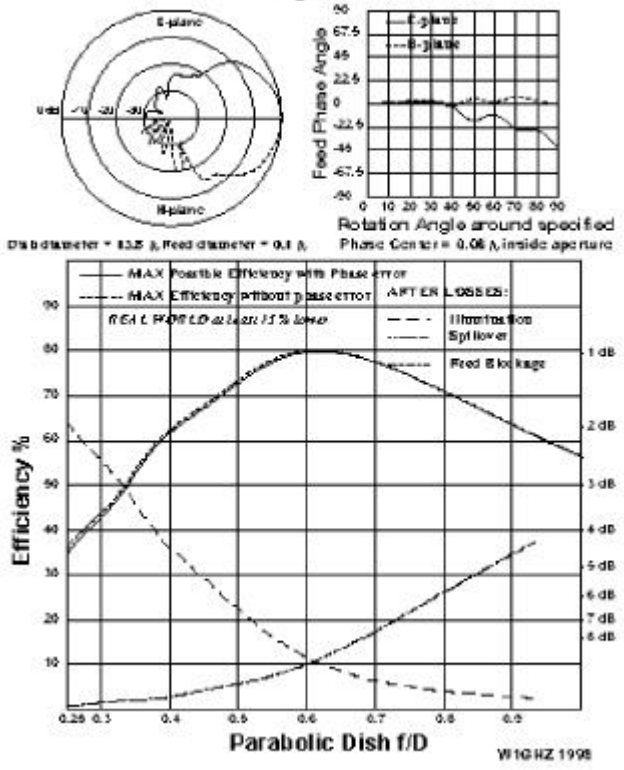


W2IMU DUAL-MODE HORN

Figure 5

G3PHO 10 GHz dual-mode feedhorn, by NEC2

Figure 6



MODIFYING THE RCA DSS DISH FOR 10 GHZ BY KEN SCHOFIELD - W1RIL

The 18" offset RCA dish made for digital satellite system (DSS) reception is an excellent candidate for modification to Amateur Radio 10 Ghz use. It is compact, light, has the advantage of an offset feed (no feed blockage) and is readily changed to 10 Ghz operation. N1BWT (now W1GHZ) used this dish with a tailored homemade horn feed 1 whereas I am using the original RCA horn with modifications.

The first RCA feed I modified in 1996 was done by removing the LNA board at the rear of the horn and placing a short across the opening. The raised rib inside the horn was removed using a milling cutter and an SMA connector was mounted on the side of the horn at the appropriate spot. A saddle fitted to the curvature of the horn under the SMA made a flat mounting surface for the connector. Both were secured to the side of the horn with 2-56 machine screws the innards of which were finished flush with the inside horn surface. For added insurance of a good joint, silver bearing epoxy was used between the saddle and horn and SMA and saddle on final assembly. The trick of using a ball bearing and magnet to locate the "sweet spot" for tuning was used and a 2-56 hole was drilled and tapped in the horn wall to accept the tuning screw and locking nut. Oddly enough this lined up with the previously removed rib - obviously RCA knew more about this than I did!!

The following equipment setup was used for tuning the horn for

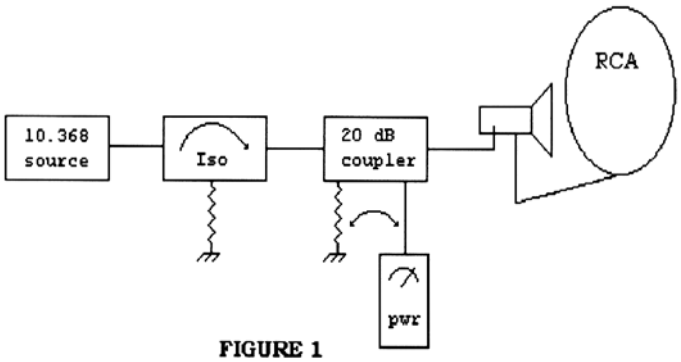


FIGURE 1

best return loss which was measured at 15.4 dB. (VSWR 1.4:1) At the time this return loss was deemed acceptable - 97% of the power was getting to the load. The dish tested well at the NEWS meeting at Enfield, CT on July 12, 1997. Sun noise was 1.4 dB and dish efficiency 65%. It also gave a good account of itself in the 10 Ghz contest in l997.

During the Fall-Winter of 97/98 it was decided to put an LNA and an amplifier as close to the feed as possible. With this in mind a 4 watt solid state amplifier and a 1 dB noise figure LNA, of KH6CP (now W1VT) design2 along with an SMA relay were mounted around and CLOSE to the horn assembly feed. The key word here is CLOSE! An immediate improvement on receive was noticed. I could now hear the antenna picking up noise from trees, ground etc. Even in the confines of my basement, covering the horn with my hand dropped the received noise level by a perceptible amount. A gallant effort was made to improve the return loss but despite my best efforts it remained in the 15 to 16 dB region. Interestingly enough it was found that putting the plastic cover on the horn caused a 0.5 to 0.6 dB reduction in the return loss. I would, however, expect this trade off to be more acceptable than a feed full of rain water!

MODIFYING THE FEED.

Step by step details on the modification of the feed is as follows:

1. Remove nut/bolt assembly from dish strut and remove feed. Retain hardware.
2. Remove two screws - one on each side at base of horn flare. Retain hardware.
3. Carefully separate and remove plastic housing. Spread at flared area and carefully remove each section. Small ears at the mounting end hold them together along with a larger tab at the backside of the horn. The tabs can be disengaged by pressing and or lifting the opposite section of the plastic housing.
4. Remove eight Philips screws with intragal washers securing an aluminum plate to the back of the feed. Remove the plate. This plate and hardware will not be reused.
5. Working in a static free area - remove eight Philips screws/ washers holding metal casting and metal plate covering the printed circuit board. This casting and hardware will also not be reused.
6. Clip the metal tab connecting the pc board to the F connector and carefully remove the pc board. Wrap the board in aluminum foil to prevent damage from static and put aside for future use. There are some excellent gaAsfets and other surface mount parts available on the board .
7. At the back of the white plastic cover locate 4 retaining ears. These are about 5/8 inch long and hold the cover to the horn. Using a pair of medium size diagonal cutters gently grip and bend the plastic at each of these protrusions outward. Put pressure on one to get it started over the metal rim and push with your thumb and fingers around the others to pop the cover off. Retain the cover and rubber gasket. If you were unlucky and destroyed the cover during removal a suitable substitute is readily available - see later text on testing.
8. Looking inside the horn, locate the metal protruding rib. Remove this rib using a milling cutter - file - small Dremel grinding wheel - drill - or whatever method best works for you. I found it easier using a 1/2 inch mill end cutter and making very small cuts.

1 Wade, P., N1BWT, " More on Parabolic Dish Antennas" QEX Dec. 1995/ARRL UHF Microwave Projects Manual VOL 2
1 Lau, Z., KH6CP, "The Quest for 1 dB on 10 Ghz" QEX Dec. 1992

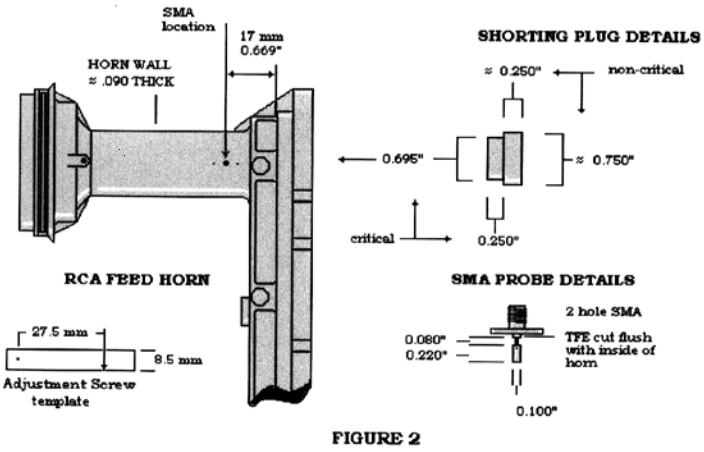


FIGURE 2

MODIFYING THE RCA DSS DISH PART B

1. Fabricate the shorting plug for the rear of the horn using 3/4 inch or slightly larger aluminum rod stock. Cut to the dimensions shown in the drawing. Note the two critical dimensions - the 0.697 inch insert diameter and the 0.250 inch insert length. The rod can be cut to 0.700 initially and then finished to 0.697 to get a tight pressed fit into the rear of the horn.1
2. Accurately locate and mark with a scribe or prick punch the location for the SMA connector. See figure 2 for dimensions.
3. Using the adjusting screw template as shown in figure 2 - align the SMA location on the template to that on the horn and wrap the paper around the horn with the arrow pointed toward the flared open end. The arrow will indicate the point at which a hole will be drilled and tapped for the 2-56 matching adjustment screw. Note that this falls in line with the previously removed rib - if it doesn't you went the wrong way around the horn.
4. Fabricate the SMA probe per the drawing. You can make this adjustable if you like by using brass tubing - sliding it up and down on the 0.080 inch post. Gently dimple one side with a prick punch to cause the tubing to bind on the post. Once the proper placement is made, solder in place.
5. Drill and tap the necessary holes for the SMA and adjustment screw. File a flat area under the SMA connector. The horn wall is approximately 0.090 inch thick. Don't remove any more wall material than is necessary so as not to weaken the 2-56 mounting area for the SMA connector.
6. Mount the SMA connector using conductive epoxy under the connector flange and around the edges. The mounting screws should be finished flush with the inside wall of the horn.
7. Put a nut on a 1/2 inch brass 2-56 machine screw and insert into the adjusting screw hole. When adjusted this screw will protrude into the horn approximately 5.5 mm.
8. Insert and press into place the shorting plug at the rear of the horn. This should fit tightly and the shoulder should be flush against the rear of the horn.
9. Drill and cut away the necessary material on the gray plastic covers for access to the SMA and adjustment screw when the covers are in place.
10. Re-assemble the gray covers on the horn. Use previously saved hardware.
11. Re-assemble the horn on the dish. Use previously saved hardware.

TESTING THE MODIFIED FEED:

Set up to measure return loss and adjust the matching adjustment screw for minimum reflected power. Adjust the probe length also at this time if you chose to use the adjustable type. Replace the gasket and white cover removed in step 7. If it broke on removal replace it with the plastic frosting container found in a package of Pillsbury Cinnamon Rolls. Use tape around the bottom edge to hold it on. It is a perfect replacement and has the added advantage of being able to be taken off easily. The RTL changes the same using either cover, -0.5 to -0.6 dB. Another advantage - undoubtedly
the most important - ***the cinnamon rolls are delicious!!***

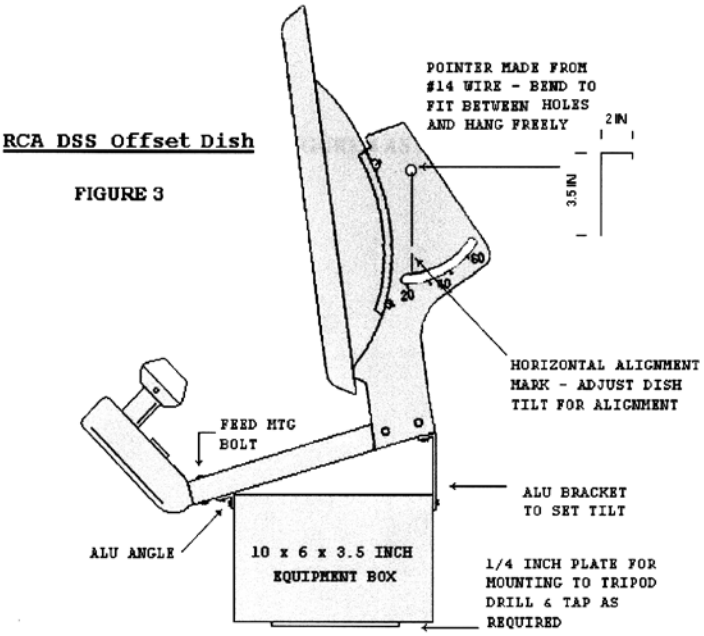


FIGURE 3

SETTING UP THE OFFSET DISH:

Getting the correct tilt angle on the dish so it is looking at the horizon is quite simple. Fabricate a piece of #14 wire and hang between the two holes behind the dish - see figure 3. Tilt the dish to the position where the pointer lines up with the alignment mark (22.6 degrees) on the frame. I used an aluminum bracket to set the tilt angle - others have used a wooden wedge. You can use whichever method works the best for your circumstances. Figure 3 also shows the equipment box under the dish. This mounts to the top of the tripod with a 1/4-20 bolt arrangement similar to that found on many tripods. The newly added amplifier, LNA and SMA relay (not shown in the drawing) are located at the feed. The amplifier is below and in line with the horn and the LNA and relay are on the side of the horn housing. The total length of the UT-141 feedline is less than 1.5 inches.

Paul, W1GHZ was kind enough to model the dimensions of the RCA feed using Physical Optics Techniques. The results are shown in Figure 4 and give an overall picture of the feeds possible performance.

1 Realizing that everyone does not have access to a lathe, I will make this plug available to any NEWS member who needs one.

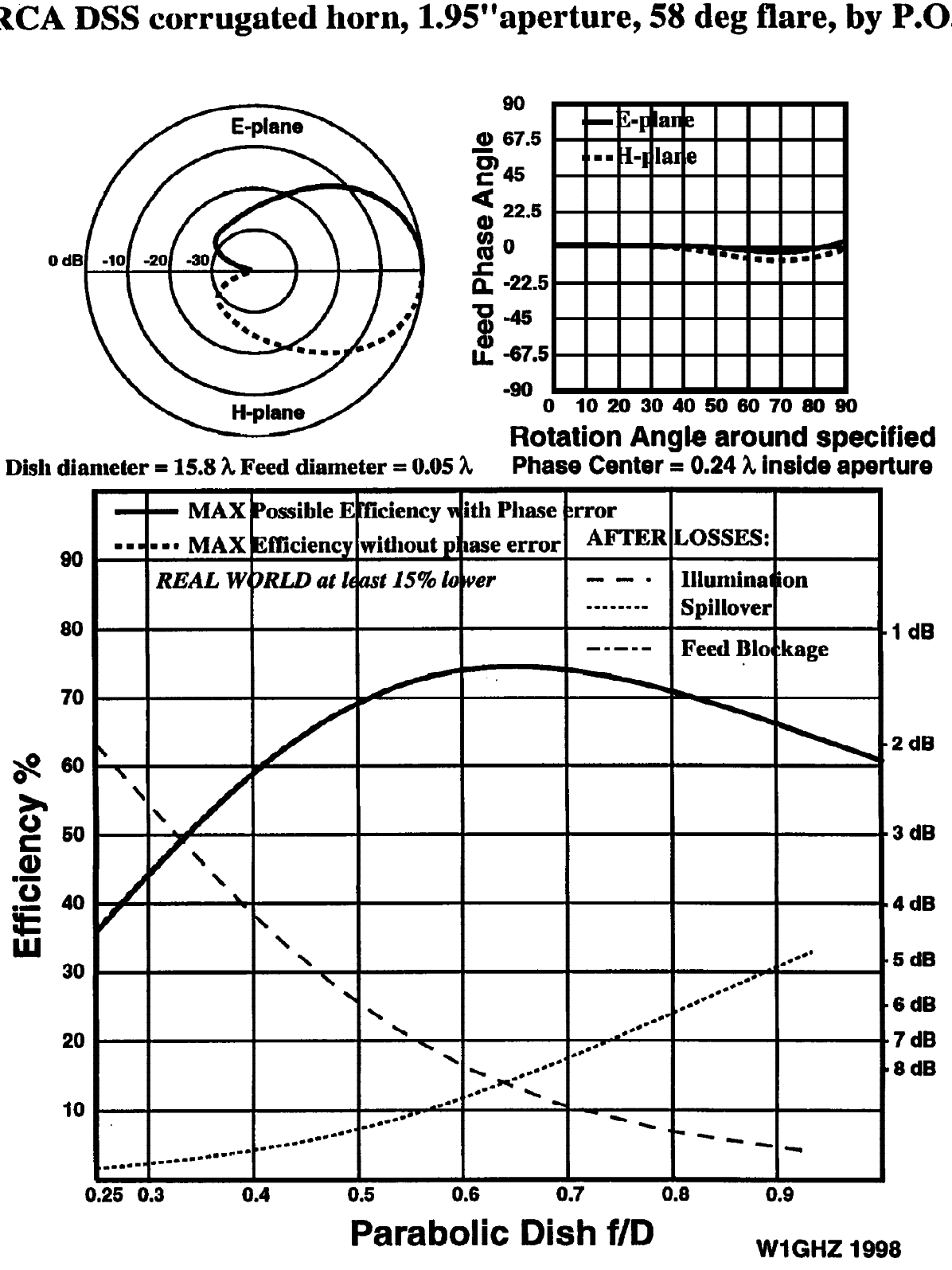


FIGURE 4

FOR SALE OR SWAP

LOOKING FOR SOMEONE WITH A GENERAL MICROWAVE POWER METER to check some bolometer heads, Model N402, N430A, Coritron #440 and FXR N218A.

STRUTHERS RF DIRECTIONAL WATTMETER 502-120-G3, 2-30 MHz 1000W, 25-250 MHz 500W and 200-1000 MHz 500W, with manual $225 plus shipping.

HP VARIABLE ATTENUATOR #X382B, WR90 0-50dB, $50 plus shipping.

(2) 4218XL 2 METER BOOMERS @$75 each or 2 for $160 with power divider plus shipping.
Bruce N2LIV bdwood@erols.com or (516) 254-1015 nights.

WANTED TO BUY/TRADE: a 1st call area 1x2 Connecticut ham plate pair from 1956 or before, the old style plate. This will be used as trading material to get back the original W1RJA plate for our club.
wz1v@ntplx.net or 860-589-0528.

NEXT N.E.W.S. GROUP MEETING SATURDAY JAN. 2ND AT THE HARLEY HOTEL 1:00 PM AT THE HARLEY INN

ALL ARE WELCOME TO THE DIRECTORS MEETING 11:00 AM
DUCT TAPE BOAT ANCHOR AUCTION
SEE KB1VC'S FELLOW NEWS GROUP MEMBERS

BOARD MEETING - From 11 AM to noon - open to all.
LUNCH BUFFET - At noon in the hotel restaurant.
MEETING - From 1 PM to 4 PM.

Harley Hotel of Enfield, CT (FN31qx) (15 miles north of Hartford, I-91 to exit 49, if Southbound left off exit - 1st right / if Northbound right off exit - 1st right).

North East Weak Signal Group

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