The VHF Journal ON THE WEB

http:vhfgroup.rochesterny.org
Club Memorial Call: **W2UTH**

July 2001

OK, so this IS the WWW version of the VHF JOURNAL- you've got to expect a little Internet content. Here are two reasons it takes so long to download the Journal no matter what kind of line you have for the Internet. Read `em and weep.

1) Dark Fibre

"In the past two years, 100 million miles of optical fibre- enough to reach the sun- were laid around the world as companies built Internet-inspired comunications networks, says the New York Times. Following the dot-com collapse, only FIVE PERCENT of that fibre is "lit," or made commercially available."

"Some of it may never be. Lighting fibre can cost large corporate clients as much as $500 million (U.S.) and take fifteen months to aquire capacity on a network, according to Solomon Smith Barney Inc."

2)More Convergence

"Robin Southgate, a senior design student at Brunel University, in London, has developed a toaster that, with the help of the World Wide Web, can stencil the day's meteorological outlook onto slices of toast," says The Chronocle of Higher Education. "Shortly before the toast is ready to pop, the appliance logs on to a British Website and downloads the weather forecast for the next six hours. Depending on the prediction, the toaster then imprints the shape of a sun, a cloud, or raindrops on the toast."

MISSED OUT ON THE VHF GROUP BOOTH AT THE ROCHESTER HAMFEST? WANT TO KEEP GETTING THE JOURNAL? YOU NEED TO RENEW ! (form on back page) !
SEND $10USD FOR WEB, $15 USD FOR MAIL DELIVERY RIGHT NOW TO:
RVHFG
PO BOX 92122
ROCHESTER, NY 14692 USA

The Ontario VHF Association, VE3VHF

The VHF DO in Toronto is over... and now the fun really starts! Well- you missed out. **50 Years of Canadian VHF, UHF and Microwave DX** hosted at Humber College on 16 June 2001 was one of those rare events where you get to be a part of history- and a fun one at that.

The conference, began with lots of ragchewing and gear setup for the presentations. The happy hour was pretty happy, there being a preference toward certain beverages that will remain nameless :^). The munchies, meal and desset were first rate. And then there were the tech presenations- all inspiring and enthusiastically received. The proceedings covered each of the talks, and copies can be had from VE3DSS at his callbook address. Attendees were (in no particular order): VE3ROQ; VE3SMA; VE3OIL; VE3BFM; VE3DSS; VE3KZ; VE3IEY; VE3NPB; VA3SFA; VE3TBV; VA3DH; VA3ST; VA3FIN; VE3DHL; VE3HBG; VE3AX; VE3LBZ; VE3AL; VA3WSB; VE3VGP; VE3TFU; VA3TO; VA3MOD; VE3SYK plus two folks without callsigns (we used to call them SWL's but somehow that doesn't seem appropriate in this case... maybe uWL's ???) **IT WAS NOTED THAT THE RVHFG WAS IMPORTANT IN THE ORIGINAL FORMATION OF THE OVHFA MANY YEARS AGO, AND TODAY HAS PLAYED A PART IN ITS RENEWAL.**

The last subject on the adjenda was the formation of a regular group, to have annual meetings like this one plus maybe one or two other informal sessions per year. The renewal of the Ontario VHF Association, which holds the callsign VE3VHF, was suggested and met with great enthusiasm. A newsletter may be created a few times a year. The listserver has already been created, and a website for information purposes can be found at:
http://www.geocities.com/ve3iey/OntarioVHFAssociation.html

There seemed to be an especially great interest in both 50 MHz and the 10 / 24 GHz Microwave bands within the group. A picnic may be held in mid-late September in the FN02 area. Know anyone who might be interested? See the website or send a note to VE3IEY@rac.ca and he'll forward you any info he has.

VHFBILL

Welcome to the July 2001 WEB ONLY edition of the VHF Journal.

The JOURNAL is now readable with Acrobat 5.0 ONLY (if you are reading this, then you figured that out aleady, eh!) I think you will be QUITE pleased with the new reader... and the new Journals that flow from it.

Well, an eventful month it was in June... and more to come in July and August. I'm actually woring seriously on getting the 1296 gear fired up... just built a GaAs fet preamp kit that I've had in the box for about 5 years, and have mounted everything in an old MDS uW link cast box to go on the tower... by the time mid-July comes along I should be back on that band. And 903 comes after that, with a rebuild for tower mounting there too. Projects, projects... and they all have to take place between 9:00PM and 12 Midnite when the lil-ones are sawing wood. I might start drinking coffee in the AM.

I got a request from AXX to reprint some of the RVHFG archives in the future- will do! We'll start with some miscelaneous articles on subjects that are the same today as they were 10 or 15+ years ago when they were written. We'll have the series of articles written by Ken Evans on the early history of the Group starting in September.

After reading thru the old Jounrals, it became evident that people were a lot more interested in writing up EACH MONTH what was going on in their particular field of interest (about 10+ years ago) than they are now. It sure would be nice to have a monthly Q+A or 903 or 144 band report column, rover tips, construction, etc, etc... K2AXX has begun this trend- who will be the next to step up to the plate? **Or SHOULD I start reprinting band reports from 1991 ?**

...CU es DXOM Tom VE3IEY FN14pd

To Subscribe: Send your address, call, e-mail address and $15 US funds for mailed copies(or $10 US for Web downloaded copies) to: The Rochester VHF Group, PO Box 92122, Rochester, NY, 14692. You may elect WEB or MAIL delivery for the same price. You will be notified **the very day** it is available for download. If you elect delivery by mail, copies are in Black and White- sorry!

-Commentary and articles: via e-mail to editor VE3IEY: tantonr@kingston.net. Use standard ASCII text, Corel's Word Perfect or send as regular e-mail.

-Photos and drawings: via e-mail, and can be sent in any format that is available (JPG, GIF and TIFF are most common). **EXCEPTION:** We don't like MS PowerPoint (*.PPT) files!

-Assistant Editor, Printer, Membership & Data-Magician: Judy, N2KXS

-Production Czar and Supreme Downloader of the Word: Fred, WO2P

-Advertising space is now available in the Journal. Contact the editor for One thru Twelve month rates. **Layout services are free of charge.**

-This publication is Copyrighted by the Rochester VHF Group. It has been created using Corel's Word Perfect 2000, Adobe Photoshop 6.0, Adobe Pagemaker 6.52, Adobe Image Ready 3.0, and Adobe Acrobat Distiller 5.0. **It is designed to be read with Acrobat 5.0 Other NFP publications may excerpt articles herein provided subscription information (or www address) to the Journal is reprinted with it.**

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The World's Image Capital

The Rochester VHF Group

*** Club memorial call: W2UTH ***

Club website @ **http://vhfgroup.rochesterny.org**

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Jeff, KB2VGH sez: "There is only *one* mailing list [you'll ever need...]"
Rvhfg@vhfgroup.rochesterny.org
It is set up to broadcast to all RVHFG members

July 2001 Chairman's Rant

I would have NEVER expected it! WHAT AN AMAZING TURN-OUT! I'm of course referring to the Rochester Hamfest. 76 of you signed up at that event – which I believe is a recent record! THANK YOU FOR BEING SO FIRED UP ABOUT THE CLUB! That's what we've been trying to do for a long, long time!

All weekend, I heard nothing but positive praise from our fellow hams, fellow clubs, it was WONDERFUL. Our booth was FANTASTIC. The rovers in the flea market were HUGE PUBLICITY! Setting up next to the RDXA, sharing their towers for the banner – what a great thing. I'm feeling really good about this year coming up. . . please help me share in the excitement by attending at least 2 meetings this fall. Get on 10GHz or go with someone who owns it during the Cumulative Contest this August/September. Get on 50MHz, work some grids and DX. Play with your radios. Put up new antennas. . . you get my drift yet?

As the Chairman, I feel it necessary to let you know what I've been up to on behalf of the RVHFG – perhaps to give you an idea of what it takes to keep this group running, alive, and growing. Just some bullet points for you to consider:

- Arranging programs – last couple years we've had some major events. VE3AX talking about the BIG DISH in Ontario. WA8WZG talking about winning it all from EN81. N2CEI & Sandra talking about what Downeast Microwave is doing. That takes time, as you may well imagine! Some arranged many months in advance.
- Arranging a club project order. Actually, the Treasurer does most of it – but keeping it on track,etc – tons of time.
- Hamfest – MAN, can you imagine doing this by the "seat of your pants"? We had a 2-hour presentation (thanks K2OS, K2DH, NQ2O and N2UIO/N2WVK) to do, memberships inside, and rovers outside- what a big event. I started working on it in January…
- Taking our message to other clubs. N2JMH and I have so far visited RARA, Xerox ARC, and I've visited WNYDXA in Buffalo to tell what we do. We're planning on doing this as often as we can to spread the word. Hoping to get to LARC, RRRA, BARK, RAWNY, etc.
- Picnic – last year was a HOOT. August 11 at 2PM for this year at the humble K2AXX QTH (map and more details in the AUGUST JOURNAL).

Just a few things I've been involved with. It takes a good amount of time to do this thing called Chairman. BUT I LOVE IT. Hopefully the effort is worthwhile – as I've always said "If you don't notice the effort it takes, then it's working". As long as it's working – so is the RVHFG. We don't ever hear about the stuff that works – only that which is broken. PLEASE, if you think we're doing a good job – PLEASE LET US KNOW. That's the only means we have to gauge how we're doing.

"Here be da pitnit' announcement"

QST, QST !!

THE ANNUAL ROCHESTER VHF GROUP PICNIC WILL BE HELD ON AUGUST 11, 2001 AT THE HUMBLE BUT SUPER VHF DX LOCATION OF K2AXX.

THE PROCEEDINGS WILL BEGIN LOOSELY AT 2PM !!!!!!!

Please bring a dish to pass....hot's, burgers, condiments and soft drinks will be provided.

For those needing to test their 10 ghz. narrow and wide band equipment, we will hopefully have working radio's on hand for test QSO's. We will also try to be set_up to do 5ghz stuff as well.

Please RSVP to Scott Ballou via e_mail: aa2w@monroe.edu .....ASAP.

Last years picnic was a real fun time so.....don't miss out !! More details and directions will follow.

TNX es 73

AA2W Scott C. Ballou

Ministry of Pitnit's

N2JMH "PSYCHO ROVER WEBSITE"

I put together a limited knowledge web site at http://home.rochester.rr.com/n2jmh/ about roving. A lot of pictures, total of 5 pages is 3mbTake a peek if you are so inclined.

Any of you web techies know how to get a counter on there? Thanks, Jim n2jmh

...AND THE WINNER IS:

As you know, we held a drawing for all the sign_ups at the hamfest, for a $75 credit at DEMI, which was graciously donated by Steve and Sandy. Witnesses present included n2opw, k2axx and myself. The first drawing resulted in W2EV, who was nearby and insisted we redraw considering his lack of activity due to his twin children. So, the Official Winner is AA2GF, Dave Borkowski. Thanks to all who signed-up or renewed at the hamfest, about 75 total. Jim n2jmh

Even MORE Winners!

The RVHFG provided three one-year subscriptions to the RVHFG Journal as awards at the Toronto VHF DO on June 16. Welcome aboard to: VA3SFA, VE3OIK, VE3MXS

"I ALREADY KNOW THE TRUTH.
WHAT I WANT NOW ARE THE ANSWERS"

DANA SCULLY

TREASURERS REPORT by: N2OPW 6/20/01

CHECKING ACCOUNT
Previous Balance.....$1321.18
INCOME:
Banquet tickets..... 380.00
Awards income..... 150.00
Mug income..... 40.00
PHEMT sales..... 50.00
Dues..... 902.00
EXPENSES:
Newsletter Supplies... 108.15
DEMI order(final)..... 263.25
Parma Awards..... 566.31
Hamfest tickets..... 20.00
Banner..... 97.20
Expenses N2OPW..... 35.66
CURRENT BALANCE.....$1174.74

SAVINGS ACCOUNT
Previous Balance.....$1275.90
INCOME:
Interest..... 0.00
EXPENSES:
Transfer to checking.. 0.00
CURRENT BALANCE.....$1275.90

TOTAL: $2450.64

HAMFEST BOOTH SIGN-UP NUMBERS:

The numbers from the sign ups during hamfest weekend:
Total of 77 re-ups or renewals
People taking journal in hard copy 24
People taking journal from the web 53
(Tnx. Makes distribution a lot cheaper and easier)
States/provinces: CT 2; OH 2; PA 1; Ontario 3
The rest are from NYS

73 ! Judy N2KXS
Membership Manager & Subscription Services Czarina

VE3NPB/R June Contest Report

Russ VE3OIL and Murray VE3NPB (me!) ran rover in the June contest under the callsign VE3NPB/R. We operated from FN13, FN14, FN04, FN03, EN94, and EN93 this time out.

The N1MU/R team had a crushing signal into FN04 early Saturday evening ... turns out they were on the next hilltop, just down the road from us! They stopped on their way past, and we enjoyed a quick "eyeball QSO":

Left: Jeff W2FU, Murray VE3NPB, and Tom N1MU pose by the vehicle belonging to Russ VE3OIL, one half of the VE3NPB/R team:

Here's a shot of Russ's truck deployed in FN13. Yagis for 144 and 222 are on the high tower, loopers for 903, 1296, and 2304 are on the short mast, mounted on the trailer hitch:

And finally, a pretty sunset Saturday night, as we point toward Rochester from our favourite hilltop in FN14 (below)

Don't know our final score yet. We use paper logs in the rover, so I still have some number crunching to do! Preliminary analysis suggests we could be in the 90 - 100K range.

Many thanks to all the Rochester area ops who pointed their antennas north across the lake!

Cheers,
Murray, VE3NPB

The unfairly maligned UHF Connector

Read. Learn. Stop being an elitest snob.

By Dick, K2RIW

There are many misinformed engineers and amateurs who have been led to believe that a UHF connector is the worst thing ever invented in the RF world ...due to it's lower internal impedance. They believe that each UHF connector causes a 1/2 dB insertion loss and a whole lot of VSWR at 432 MHz. I've heard quite a few amateurs claim that their 432 MHz brick amplifier will now have 1 dB greater gain since they just replaced the two chassis mounted UHF connectors with Type N connectors. This "Old Wive's Tale" has been propagated for decades. Everyone believes it. No one challenges it. Few people have ever make the measurement.

A High Power "Calorimetry" Test- Here is my observation. I took a 432 MHz Stripline Parallel Kilowatt Amplifier and applied 700 watts through a UHF female and a UHF male connector, and then into my antenna feed line. After 10 minutes of 700 watts throughput power the UHF connectors were mildly warm. If I estimate that "mildly warm" represents a dissipation of 3 watts out of 700 watts, that's an estimated insertion loss of 0.019 dB for the pair of connectors. You're about to ask, "how can this be, the internal dimensions are approximately a 35 ohm impedance, it's got to cause a 1.43:1 VSWR?" Well, it doesn't.

Very Little Total System VSWR- The mated UHF connector has an internal connector length of less than 0.9 inches. A free space wavelength at 432 MHz is 27.3 inches. The 0.9 inches represents a phase length of 11.9 degrees. If I plot this up on a Smith Chart (or use the mathematical equivalent) I find the following. A 50 ohm antenna with an 11.9 degree long section of 35 ohm line causes an input impedance of (47.9 -j7) ohms. That's an input VSWR of 1.16:1, which gives a worse case reflected_power_caused transmission loss of 0.024 dB. To me that's insignificant. Now, I'll admit that at 10 GHz, where the wavelength is 1.1 inches, that 0.9 inch electrical length connector would be much harder to tolerate.

Power Tolerance. A Type N connector can tolerate low_duty pulses of over 20 kilowatts without a voltage break down. However, steady state power of more than 1 kW could cause the connector to fail from the RF current overheating the center pin. Most connectors have a very similar failure mechanism when steady state high RF power is applied. The UHF connector has an oversized center pin that can more easily tolerate high steady state RF currents. Moreno said that 30 ohms impedance maximizes the power handling, and the UHF connector has an impedance of about 35 ohms.

Each EME'er who is using those expensive type SC connectors on his kW amplifier could probably use UHF connectors for his indoor cable attachments, if he desired to save money. The UHF connector has a larger center pin than an SC connector, it might actually have a larger power tolerance than the SC - this will require testing. But, remember that the Fluoroloy-H dielectric on the SC connector is designed to be a good heat sync that cools the center pin.

Its User Friendly Assembly .There are probably twice as many amateurs who can do a good job of installing a UHF connector on an RF cable, as compared to a Type N connector. The proper installation and WX proofing of a Type N connector requires considerable finesse and experience. It's almost an art form.

UHF Connector Faults . There are two major faults I can find with a UHF connector when it is being used on 432 and below: (1) the lack of weather proofing; (2) the lack of outer conductor finger contactors. With a proper tape wrapping job, I believe the weather proofing can be accommodated. However, the user must be sure that the internal "teeth" are properly seated, and that the outer nut is kept tight; otherwise the outer conductor can develop a considerable growth in electrical length, with the associated "scratch contacting" noise. For this reason the connector is probably inappropriate for a high vibration environment, unless an auxiliary nut-retaining mechanism is employed.

So, maybe it's time we stop saying such bad things about the poor, orphaned UHF connector. For our purposes, it doesn't deserve all that flak. Properly used by a savvy engineer, who understands the idiosyncracies, it can give you a lot of bang for the dollar. It's been around for 60 years, that's no coincidence.

I welcome alternate opinions on all of the above. Please feel free to correct the mistakes. 73 es Good VHF/UHF/SHF DX, Dick, k2RIW. Grid: FN30HT84DC27.

(forwarded by W2EV)

Nothing for sale this month! Must be some kind of post-hamfest slump.

ONLY 11 WEEKS TO GO UNTIL SEPTEMBER CONTEST!

Introducing: 50MHz IS...

This will be a routine column for the RVHFG Journal, covering any and all topics about 50MHz. I welcome any questions, comments, etc at k2axx@arrl.net. Please let me know if there's anything I can help answer.

Activity Reports – June VHF Contest & after

For those of you who operated the June VHF Contest, persistence was really key to success. During the first few hours, there were sporadic openings – not much to report. An Aurora Saturday afternoon helped out a bit – some enhanced propagation around the northern states as far west as EN13 (W7XU). However – if you went to bed before midnight, you really blew it! 6 was open from around midnight to shortly after 5:00am – EXTREMELY RARE. During this time, I worked 89 Grids in all areas except W6 (didn't stay up long enough!). Sunday AM was OK – worked EH7KW and CT1DYX for new contest grids (IM87 and IN51 look nice in ANY LOG). Later Sunday 6 opened to the Northeast, getting a few more grids from VO1, VE1 and VE9. I ended up scoring 185 QSOs and 102 Grids - VUCC in one weekend, in less than 8 hours! Not bad – 120w and 7 elements @ 28'.

Since then, 6 has opened almost every day in a somewhat repetitious manner – starting in W0 sliding south to W4. Each day, there's dozens of signals on the band calling CQ, etc. Even some DX to be had – if you've not been on, get on now! We're at the peak.

Tech Tips

N2RD recently wrote to the RVHFG email reflector, asking about stacking a pair of 6m yagis. Guess lots of you are starting to consider new summer antenna projects – here's a taste of what I suggested to Raj:

He's planning on erecting 2 6m yagis, one at ~50', one at 34'. The top was to be a 12' boom Force12 yagi, the 2nd an M2 6M5X 17' boom yagi. He wondered about a fixed phasing harness, and what advantages it would have. He had a Stackmatch unit (http://www.arraysolutions.com) which allows him to select top, bottom, or both antennas from the shack.

Having the longest antenna up the highest, it would take advantage of a lower-angle signal than the shorter antenna. This is a big consideration for F2 and Groundwave signals. The shorter antenna will likely be a GREAT performer for Eskip at the lower height, since the wave angle of the incoming signals tends to be much higher. I suggested the 6M5X at 50', and the F12 yagi at 34' for these reasons.

Also, with the Stackmatch unit he can then pick which antenna has the better incoming signal for the conditions. What's really nice about this arrangement, is that during an Eskip opening, you can still take advantage of working the local grid squares with Groundwave by simply switching to the top antenna and working W3CCX, W2SZ, etc. Also, you're not wasting power like in a fixed phasing harness – unless you can rotate both antennas. Most of the time, the lower antenna is fixed to a tower leg in one direction. Most promising, is you can select BOTH antennas, thus increasing your capture area and can even SPRAY your signal in 2 different directions. How COOL is that? Good luck, Raj. Let us know how it turns out!

Remember – ASK ANY QUESTIONS. I can't guarantee an answer – but I CAN guarantee an opinion! (The editor concurrs on that last point!) See you on the bands! Mark, K2AXX

And 10 GHz IS...

For those of you wondering, "what can I do on 10GHz from home?" Well, let this answer your question. K2DH and I have been running frequent skeds on 10,368.100 the past few nights with AMAZING results. Dave, running ~30w out to a 2' dish in FN12fo, is routinely well over S-9 at my house in FN12cs.

Actually, probably louder than that since I'm running an almost-stock DEMI transverter! I've got a borrowed amp from W2DRZ (Thanks, Tom!) which is making around 50mW in the shack, and my 3.5db NF ...he's telling me I'm 559 or better. We chat there on SSB for hours! IT'S GREAT!

Now, remember: MANY of you purchased the 1w Qualcomm amps, and quality Preamps. You should be able to hear one of us (if not both) on any given night. I don't care if you have to take it into your backyard (with a good southern view, BTW) or whatever ... let's start breaking these puppies out again and START USING EM. Contests are fun, but being able to play toys on 10GHz ANYTIME is even MORE FUN.

NOW, with that in mind, the ARRL 10GHz + Cumulative contests are coming soon. August 18-19 and September 15-16 are this years dates. I'll be on from home for sure! It would be GREAT if we can get a big turnout from the local GHz gang. Let's talk it up! If you're intent on playing either (or both) weekends, send a message to the RVHFG Reflector (rvhfg@vhfgroup.rochesterny.org) telling us what you've got & what your plans are. I'm thinking enough interest might get our friends in VE3 land to go north (FN03/04/14) or higher and give us all new grids! Maybe even help them get their VUCC in a weekend (Not to mention distance points)! C'mon - let's talk it up!

If we're doing it, look for us on 144.210 _ that's our unofficial gathering spot. Or, call one of us on the phone to set up a sked. JUST DO IT!

TWT High Power Connector Experience.

From Dick, K2RIW

Introduction :The following experience contains a story with a very pleasant outcome (so far) that could be educational to others who are curious about the maximum power capability of an SMA RF connector, and a suggestion for curing a wrong frequency, Wave Guide band pass filter problem.

The Amplifier: Bruce, N2LIV and I have been restoring a Varian 50 watt VSTAR "Hub Amplifier" model VZU6991V1. It contains a Varian VTU_6195M4 TWT tube that is capable of 50 watts output at 14 GHz, as well as 10 GHz. Some reports state that this amplifier can put out 70 watts.

The Problem : When the amplifier arrived, the TWT tube had an SMA female output connector that was completely charred from a previous RF misuse. The rest of the RF output circuitry within the weather proofed box consists of a male SMA to WR-75 Wave Guide (WG) adapter (1/2 inch long and very thick, that was a clue), that feeds a piece of flex WR-75, that feeds a WR-75 60 degree mitered joint, that feeds a 7 pole WR-75 WG filter, that feeds a WR-75 60 degree mitered joint, that feeds a WR-75 pressurized window that exits the amplifier housing.

All evidence suggests that the TWT tube survived this onslaught. The friendly folks at CPI (Varian's successor) supplied us the parts to re-construct the TWT's output SMA female connector. The remaining problems were that:

(1) the internal piece of WR-75 flexible guide was damaged.
(2) The WR-75 WG filter had a carefully tailored pass band of 14 to 14.5 GHz. We desire to use the amplifier on 10.368 GHz.
(3) We still need a schematic of the amplifier's power supply, so that it can be repaired.

The First Choice: The problems with the complication of the RF output circuitry (the band pass filter) and the damage to the flex guide, would have made it seem prudent to simply bypass all the circuitry, and to place a SMA feed-through connector through the wall of the weather proof box, and connect it within with an SMA to SMA cable. Had this simple approach been chosen, it probably would have caused a repeat of the female SMA connector failure at the TWT output. At first we didn't know this.

The Second Choice: As you will see, we probably did the right thing, but we did it for the wrong reasons. I had developed an affection for the mechanical arrangement of the output circuitry, and it's weather proofing, and decided to attempt a restoration and frequency modification (or elimination) of the band pass filter.

The Disassembly : We began by using a Zona saw to saw apart the first 60 degree mitered WG joint. We could then look down into the WG filter, and see the 7 sets of irises that protruded through the narrow walls of the WG. By placing a properly-shaped chisel down the guide and tapping it with a hammer, it was quite easy to remove the soft copper, gold plated, irises. What remained was a piece of gold plated WG with some slight roughness at the locations of each of the iris pairs. My experience with the ridges of low-loss Ellipto-flex WG told me not to worry about any insertion loss caused by the slight roughness of the WG walls.

Next we sawed away the damaged flex guide section, to replaced it with a new piece of flex guide. While the male SMA to WG adapter was opened I noticed four curious things. (1) The WG launching probe was very fat in diameter; (2) that short section of WG had very thick silver plated copper walls; (3)
The SMA male pin had Fluoroloy-H insulation; (4) and the outside of the thick-walled WG launcher had a very thick black painted, copper grounding braid that was capable of carrying 400 amperes! The conduction cooled TWT body is screwed down to the chassis for heat syncing, therefore it had no need for that kind of auxiliary grounding.

The High Powered Revelation : These four characteristics have a common thread that we did not recognize at first. They are all designed to be a male SMA connector cooling process. It is now more obvious to us why the TWT's female output connector could be charred, while the Male SMA connector that was mated to it survived with only some slight staining, that was easily cleaned up. The male pin had four techniques that were cooling it. That thick copper braid "grounding strap" was really a flexible heat sink to the nearest chassis wall.

At X-band I would barely trust an SMA connector to be capable of conveying 10 watts, and maybe 20 watts. This particular SMA connector is expected to convey at least 50 continuous watts, with high reliability in satellite uplink service. It is now obvious to Bruce and me that the Varian designers did a number of crafty things to make this possible.

Testing the Result: We next used a 30 dB X-band directional coupler that had 30 dB of directivity, a Kruse Stork sweeper, and a Spectrum Analyzer as a precision reflectometer (CW

return loss detector) set up. We first tested our terminations to confirm their > 30 dB of return loss. Then we tested the repaired and modified WG output circuitry, with a termination at the TWT end. It started out with 18 dB of return loss. When we replaced two of the tuning screws that used to be part of the WG band pass filter, the return loss went to > 30 dB. Next we connected the WG circuitry to the TWT output connector. The return loss dropped to 22 dB. After a touch up of the tuning screws, the return loss went back to > 30 dB.

Matching the TWT Tube: Most TWT's contains an "aquadag" lossy section in the center of it's Helix as a method of establishing amplifier stability. A TWT would be unconditionally stable, if that reflective loss was greater than the tube's gain - many tubes meet that requirement, particularly with an input circulator (this tube has one). When a TWT isn't fired up, the Helix and lossy section constitutes a very good 50 ohm dummy load. Our measurement of > 30 dB of return loss suggests that we now have a very good impedance match between the center of the TWT's Helix and the amplifiers ultimate output connector. When we finally fire up the TWT, it is likely that only a minor impedance touch up will be required to maximize the tube's output power.

The Probable Failure Cause: When we first received the amplifier, we were told that an inexperienced operator had forgotten to attach the WR-75 WG to the amplifier, and that had caused the burn up of the tube's output connector. When we were testing the modified WG output circuitry, we noticed that if we measured the return loss from the tube end, while the pressurized window (ultimate output) was aimed into open air, the return loss was 18 db. That says that an opened ended piece of WG is a rather good antenna, and that amount of reflected energy would not have caused an amplifier failure.

We now believe that the inexperienced operator had made the mistake of attaching the WR-75 WG at right angles (cross polarized it). If you force the mounting screws, this mistake is possible on WR-75 and WR-90. The WG cross polarization causes the amplifier to see a perfect short circuit, unless the frequency is above 16.04 GHz, the first frequency that will support the TE01 and TE20 modes in WR-75. The amplifier was being used at 14 to 14.5 GHz (below crossed WG cut off).

What's Next? Our only remaining task is to find a schematic of the TWTA's power supply. Then we will be able to restore that section and fire up the complete TWTA. We'll keep you posted.

If anyone knows how to procure a schematic of this amplifier's power supply, Bruce and I will pay you well! Some new 10 GHz distance records on the East Coast of the US are waiting for this tower-mountable amplifier to become operational.

THE MEANING OF LIFE...
an old story retold with a new twist

A philosophy professor stood before his class and had some items in front of him. When the class began, wordlessly he picked up a large empty mayonnaise jar and proceeded to fill it with rocks, rocks about 2" in diameter. He then asked the students if the jar was full? They agreed that it was.

So the professor then picked up a box of pebbles and poured them into the jar. He shook the jar lightly. The pebbles, of course, rolled into the open areas between the rocks. He then asked the students again if the jar was full. They agreed it was.

The students laughed. The professor picked up a box of sand and poured it into the jar. Of course, the sand filled up everything else. "Now," said the professor, "I want you to recognize that this is your life. The rocks are the important things _ your family, your partner, your health, your children _ things that if everything else was lost and only they remained, your life would still be full.

The pebbles are the other things that matter like your job, your house, your car. The sand is everything else. The small stuff." "If you put the sand into the jar first, there is no room for the pebbles or the rocks. The same goes for your life. If you spend all your time and energy on the small stuff, you will never have room for the things that are important to you.

Pay attention to the things that are critical to your happiness. Play with your children. Take time to get medical checkups. Take your partner out dancing. There will always be time to go to work, clean the house, give a dinner party and fix the disposal." "Take care of the rocks first _ the things that really matter. Set your priorities. The rest is just sand."

But then...A student took the jar which the other students and the professor agreed was full, and proceeded to pour in a glass of beer. Of course the beer filled the remaining spaces within the jar making the jar truly full.

Which proves either:
- that no matter how full your life is, there is always room for a beer;
or
- your life will not be completely full without a beer.

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