April 1st/May 2009 **Membership 296** **Volume 23 Issue 2**

FEED POINT

WWW.NTMS.ORG

Next Meeting April 4th at the QTH of K9MK

The technical program for April 4th NTMS meeting is as follows.

Army Curtis AE5P	Talk about his new role as West Gulf VUAC representative
Army Curtis AE5P	Show and tell on his 3456 transverter
Dave Robinson WW2R	Presentation on Dave's 3456 MHz system
Wes Atchison WA5TKU	Presentation on images that Wes took with his telescope

April Meeting Direction Update Our April 4th meeting is also NASCAR weekend here at Texas Motor Speedway. Since the time of our meeting here is prior to race start, I would strongly recommend any members planning to attend driving in from the north using I-35W, SH114, or FM156 consider alternate routes or expect travel delays. Also, coming from the north end of DFW on SH121/SH114 I would recommend diverting onto SH170 at Roanoke-Trophy Club and take that to I-35W south. Coming from all other directions should have minimal race traffic impacts. Well as minimal as they can be. Talk in will be on 444.325/R with 110.9 access. Or call my cell: 817-691-8371 73's Mike K9MK/5

Next Next Meeting May 2nd is Richardson

The May NTMS meeting will be held on May 2nd at the St.Barnabas Church in Richardson.

The tentative technical program is as follows.

Chuck Clark AF8Z	High Performance Software Defined Radio (HPSDR)
Jim Hudson WA5JAT	"Mini Mill"

From the President: Wow. Hard to believe the 1st quarter of 2009 is over already. So much on my to-do list for this year has not even been started, and here we are 25% time expended. Guess I'd better get to it, eh? I was very impressed with the turn-out we had for the March meeting in Denton, and enjoyed our 902 theme. I know once we're through the push to HamCom here over the next month or so, Al intends to continue with the band-themed sessions. I always enjoy seeing others' work - it is both inspiring to me and provided hints-and-kinks that I can apply to my own construction projects. It always amazes me when I see the vast differences between how people solve the same problem. We're still continuing on in our busy year. HamCom planning is well underway, and is the planning for Microwave Update in October. If you are interested in volunteering, see Bob Gormley, WA5YWC, for HamCom and Steve Hicks, N5AC, for MUD. Good help is always welcomed! Until next time, de KA5BOU. 73!

From the Vice President As announced last month, Microwave Update 2009 is being held October 22nd through the 24th at the Westin Hotel at the DFW airport. The next step is to begin putting together the technical program. I have several folks already "on board" who have volunteered to speak. We are always looking for talks and papers on all aspects of microwave operating, propagation, equipment design and system integration. If you would like to present a talk, please email me at w5lua@sbcglobal.net. Kent WA5VJB is collecting papers for the proceedings. Please contact Kent at wa5vjb@flash.net

I hope that everyone enjoyed the last NTMS meeting. It appears that periodically having a "band" as a "theme for the month" is probably a good idea. In April, the band will be 3456 MHz plus a couple of other items as we will talk about shortly. Having short talks from folks discussing their approach to a band is a good way to get more volunteer speakers and is also a good way to share ideas. We will try to pick up the band theme again in August and September.

I was quite surprised and very pleased to see a father and very young son show up at the March meeting. The young man was Nathan KE5LWF who is 11 years old. He was accompanied by his father Steve WD5EAE. It seems that Nathan enjoys AO-51, PSK31 and 6 M. Maybe we can interest Nathan and Steve in microwaves. Thanks Dad!

Since April 4th is the date of the Weatherford hamfest, see http://www.w5pc.org/ , we were trying to have our meeting at the Richland Hills Church of Christ. As it turns out the church is now holding church school classes on all Saturdays throughout 2009 at the community center. We were fortunate enough to have a generous offer from Mike K9MK for April 4th. Therefore, the next meeting of the NTMS will be on 4th of April at the home of K9MK in Haslet, Texas north of Ft..Worth. Mike's home is located about 10 minutes north of the I35 and I820 interchange in Haslet. Mike has a very nice large shop adjacent to his house which is more than large enough to handle our meeting. We plan to also have test equipment and refreshments available. The tentative start time at Mike's is going to be noon. That should give us all enough time to see the fleamarket, get some lunch and be ready to go at Mike's place by noon. Stay tuned to the NTMS reflector for more information and directions. A big Thank You to Mike and your wife for your generosity.

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Several of us plan to attend the Belton hamfest which is scheduled for April 17th and 18th. The RMG group is planning a luncheon on Saturday for a way for the RMG and NTMS guys to get together. Keep an eye on the RMG and NTMS reflectors for further updates.

The May NTMS meeting will be held on May 2nd at the St.Barnabas Church in Richardson.

The tentative technical program is as follows.

Chuck Clark AF8Z	High Performance Software Defined Radio (HPSDR)
Jim Hudson WA5JAT	"Mini Mill"

Bob Gormley, WA5YWC, is coordinating the VHF and above program for Hamcom. Bob is seeking programs for VHF and above that are oriented towards the beginner as well as the seasoned VHFer. If you would like to present, please give Bob a call or an email.

Joe N5PYK has installed a new 432.370 MHz beacon at the National Weather Service in Lubbock, TX in DM93bm. So far WW2R and I have copied it quite well at times at 300 miles. This should be a great beacon for studying propagation out to West Texas. See details on the beacon elsewhere in this issue.

See you at the Weatherford hamfest and the NTMS meeting at K9MK's
Best Regards Al Ward W5LUA NTMS VP March 22, 2009

Future Meeting Dates

Looking to June and beyond, we are working towards the following meeting dates.
Please realize that some are tentative as noted.

June 13th	Hamcom
July	no meeting - officers and presenters are on vacation
August 8th	St.Barnabas Church in Richardson - confirmed (change from Aug15th)
Sept 19	UNT Denton (tentative)
Oct 23/24	MUD In Irving
Nov 14th	Trying for Richardson but we are too far out for their date book as church activities take priority – this is a date change
Dec 5th	UNT Denton (tentative)

Thanks and 73 Al W5LUA March 22, 2009

N5PYK/B 432.370 MHz Beacon from Lubbock, TX DM93bm

Hello everyone.... I wanted to pass along that the N5PYK beacon antenna in Lubbock has been reoriented toward the DFW area and is also now using horizontal polarization thanks to fellow NWS ham Bruce Haynie NW5S. The beacon is a WW2R custom built which probably delivers about 5W to the feedpoint

NTMS Meeting January 2009 Chuck Clark AF8Z

Called to order by Craig Young at the Ft. Worth Hamfest, January 10, 2009.
Craig KA5BOU and Al W5LUA presented Introduction to Microwaves.
Interesting Software.
Weather radar for rain scatter program. K0SM
http://www.frontiernet.net/~aflowers/rainscatter/
NTMS Beacons. Showed several beacons used at TWU (NTMS) and KM5PO beacons which are in Arlington Tx.
SoftRock RXTXv6.2 for 10 Meters by W5LUA. This is a new Softrock which makes a lowcost SDR IF radio Impressive demo used as 10 GHz IF.
A new 2 M softrock is available.

Business Meeting
We approved $300 for beacon 5.7 GHz and an additional $300 for the 10 GHz PA. The current 10 GHz PA will be returned to the donor.
Meeting Concluded 2:30

NTMS Meeting Minutes : February 7, 2009

Keith Berglund ,WB5ZDP Using the RFMD2360 amplifier in amateur applications.
NTMS Beacon Update. Craig KA5BOU
Slotted Waveguide Antenna. Vertical slots for horizontal polarization. Each slot is a dipole antenna. Detail from W1GHZ online Antenna Handbook. Target antenna gain is 10-12 dB. Measure about 9 dB for the 24slot antennas
Constructed new beacons from 2304, 3456, 5760 and 10 GHz, all in a single package. New package has large heatsink with a convection shroud to encourage convection and reduce sun loading.

Contest Seminar
Contest Rack N5AC Structural Fiberglass Rover rack for many bands. Stronger than PVC and about the same cost. Fiber board gusset plates to attach the pieces together. Paint with textured plastic paint to make it look like powder coated paint. Available from McMaster Carr

January VHF SS 2009 N5AC first 24 GHz contest.
N5AC/W5LUA Rainscatter on 24 GHz…..Failed at 100 miles, heard at 200 miles but didn't work. Tops were at 20kft.
Next Month 900 MHz Amplifiers
VSG Television.
W5LUA trying to get more presentations.

Emailing Feedpoint has reduced printing by about 90%

HamCom Still Needs programs.
Microwave Update. Westin Hotel at 114 near the airport. Oct 23,24 $89/night. Surplus tour on Thursday.
Spring Operating Event. Date not picked yet.
Business Meeting
UNT next month Rm 411
Meeting adjourned at 3:30

March 2009 NTMS Meeting 3/7/09 Chuck Clark AF8Z

900 MHz Theme Meeting.
Getting Started on 902 by W5LUA Al showed examples of different transverters.
Paralleling high power 900 amplifiers by W5LUA. There are two preferred models, the STF2520A Motorola SSPA $25 150 watt 5 watts drive, and the SGTF1038 $65 300 W SSPA both obtainable from RDR Electronics . More information at www.vhfsouth.com. You don't want the STF2540
Review of the W1GHZ Transverters by Steve N5AC
The WB5ZDP 902 Transverter
The KA5BOU Transverter
The W0PW EIA Dual Dipole Feed W5LUA and WW2R
The New W5HN Beacon Keyer. By WW2R.
Old Design. Uses 16C711 programmable PIC contains telemetry, power output, for each band, temperature, beacon supply volts.
The new design, 4 bands, 4 RF outputs, 4 beacon temperature, power supply current, power supply voltage.
New Pic 16F866 $3, 28 pins, and a low cost programmer.
Army, AE5P has been selected as our VUAC representative. Army is a rover and a member of the K5QE contest effort.

The next meeting is April 4th. .
Weatherford Tx hamfest in the morning. The meeting location is at K9MK's shop.
Programs: WW2R Simple 3456 Transverter WA5TKU Telescope Images.

Sidelobes

5 GHz Beacon: Dave WW2R reports that our DB6NT board has arrived for the new 5 GHz Beacon.

432 MHz Beacon: Hello everyone.... I wanted to pass along that the N5PYK beacon antenna in Lubbock has been reoriented toward the DFW area and is also now using horizontal polarization thanks to fellow NWS ham Bruce Haynie NW5S. The beacon is a WW2R custom built which probably delivers about 5W to the feedpoint of the 6 element Yagi pointed at DFW from Lubbock (DM93bm). The antenna is about 80' up on the National Weather Service communications tower in south Lubbock with a clear view of the horizon.

We also have a webcam on our tower around the 50' level if you'd like to see what things look like around here. For purposes of orientation, a highway (Loop 289) runs East/West on the north side of our building. If you see a half-pyramid looking building in the distance, the camera is facing westerly. As you will see, no matter which way you go, the horizon is pretty far off which is the beauty of West Texas. http://www.srh.noaa.gov/lub/images/webcam/lubwebcam.jpg

Please send reception reports to n5pyk@arrl.net
Who will be the first NTMS member to hear the beacon....you won't win a prize, but it might make you feel good about your station.

Frequency 432.370 CW

Best 73,Joe- N5PYK

From: Dick, K2RIW 2/22/09
The Problems of Using the Sun and an External Attenuator in System Noise Figure Measurements, and Some Solutions.

INTRODUCTION -- Accurate System Noise Figure measurement by the use of Sun Noise can be troublesome, because there are many errors we often make due to a misunderstand of the principles of physics that are involved. Here are some of the major errors, and some possible solutions.

PROBLEM #1 -- It is logical to assume that you can place a Step Attenuator in front of a receiver system as a method of evaluating the magnitude of the Sun Noise that is being sensed by the receiver, and thus calculate the system's Noise Figure. In most cases this is not so. You COULD make this kind of laboratory Noise measurement if all of the instrumentation was at room temperature, and all of the components were 50 ohms resistive. However, in that case you would really be measuring the Excess Noise of the Noise Source, not the Noise Figure of the receiver system. And, even that measurement will produce a significant error if a mathematical adjustment is not being made (explained below).

-- HERE ARE A FEW EXAMPLES TO ILLUSTRATE THE PRINCIPLES INVOLVED --

(1) ROOM TEMPERATURE MEASUREMENTS -- If I place a high quality Step Attenuator between a high quality (room temperature) 50 Ohm Termination and a receiver system, there will be essentially no change in the Noise Power Output of the RCVR as I run through the steps of the attenuator. The only thing that will change is where the External Noise Power is coming from. A room temperature Termination (that is impedance matched to the RCVR) will generate a Noise Power Density of -114 dBm per MHz of RCVR bandwidth. As the Step Attenuator is dialed to high attenuation values it will become the new 50 Ohm Termination. At a 3 dB attenuation setting, 1/2 of the Noise Power will be coming from the Termination and 1/2 of the Noise Power will be coming from the Step Attenuator. The RCVR will continuously see 50 Ohms, and it will continuously see -114 dBm per MHz of external Noise Power as I run through the steps the attenuator.

(2) A CRYOGENIC TERMINATION -- If I cryogenically cool the Termination to 77.2 Kelvin's (liquid Nitrogen boiling temperature), it will produce the weaker Noise Power of -119.75 dBm per MHz. A perfect RCVR (0.0 dB Noise Figure) will see a 5.75 dB Noise Power decrease when the cryogenic Termination is compared to a room temperature Termination (at 290 Kelvin's) with a Noise Power of -114 dBm per MHz. At a 3 dB Step Attenuator setting the RCVR input will get -116 dBm per MHz of Noise Power. As I step the attenuator to higher values, the Noise Power will approach -114 dBm per MHz from the weaker Noise Power direction, because the Step Attenuator will be making more Noise than the Termination. But, the Noise Power will never get all the way back up to -114 dBm per MHz (my "reference" Power), because the cryogenic Termination will always be slightly "cooling" the total system. Therefore, I will not be able to get back to the "reference" Noise Power unless there also is a VSWR error in the setup that is being changed by the Step Attenuator settings.

(3) A HOT TERMINATION -- If I heat the Termination to 100 degrees Centigrade (373.15 Kelvin's) it will produce -112.9 dBm per MHz of Noise Power (1.1 dB louder than at room temperature). As I step the attenuator to higher values the Noise Power will approach -114 dBm per MHz from the higher Noise Power direction, but (again) it will never get all the way back down to -114 dBm per MHz, because the hot Termination will always be slightly "heating" the total system.

(4) A SUN NOISE MEASUREMENT PROBLEM -- When a good antenna is looking at Cold Sky it acts like a cryogenic Termination to the RCVR, and this is where the "reference" Noise Power is usually measured. Then when the antenna is moved to the Sun it will act like a hot Termination. As the Step Attenuator in front of the RCVR is increased it will be adding noise to the system (compared to Cold Sky), and the "hot" Sun will also be continuously adding its "heat" to the system. Therefore, there will be no reasonable setting of the Step Attenuator in front of the RCVR that will bring you back to the Cold Sky Noise Power output of the RCVR -- the "reference" Noise Power. Also, a Step Attenuator placed between the antenna and the RCVR will not behave in a linear manner (in decibels) when making low Noise Power measurements.

(5) THE IMPEDANCE PROBLEM -- Very few antennas present an impedance that is exactly 50 Ohms Resistive, and particularly not on a rainy day. Therefore, as the Step Attenuator is used in various steps, the impedance that is presented to the LNA will be continuously changing. The exact Noise Figure that a LNA produces is usually quite dependant on the impedance it sees. This means that the RCVR System NF will be changing at the same time that you

are attempting to measure the Noise Power that is being presented to the RCVR. For the above reasons I strongly recommend that no changes be made between the LNA and the antenna during the measurement of Sun Noise versus Cold Sky.

CONCLUSION #1 -- When you are measuring an external Noise Power Density, a step attenuator that is placed in front of the RCVR will not behave in a linear manner (in decibels), for a number of reasons. You can not use it to directly measure the strength of an External Noise Source because, the Step Attenuator is simultaneously changing the amount of Noise it generates for at least two reasons. You could only directly make that kind of measurement if the antenna was exactly 50 ohms, and the step attenuator was cryogenically cooled to stop it from making Noise Power -- in most situations that is not practical. Even then you will not be able to get down to the Cold Sky "reference" reading unless the cryogenically cooled Step Attenuator is colder than the Sky Temperature. I'll admit that a smart mathematician could recognize the "slope" of the RCVR Noise Power changes as the Step Attenuator was being changed, and he could re-calculate the RCVR NF if he knows the true temperature of his Step Attenuator, but that will involve some unconventional math that will be subject to errors.

-- SOME SOLUTIONS --

(1) DOWN RANGE ATTENUATION INSERTION -- I say the Step Attenuator must be inserted between two of the later stages of the RCVR, preferably as far down range as possible. In this manner it will not be affecting the Front End Noise Figure, or the LNA impedance match. Also, in this manner it will always be possible to get back to the Cold Sky "reference" Noise Power measurement, because the total RCVR Noise Power in that location will be so large (in terms of kTB [-114 dBm/MHz]) that the excess Noise Power made by the Step Attenuator will be negligible -- this is almost equivalent to using a cryogenically cooled Step Attenuator at the RCVR Front End.

(2) INTER-STAGE IMPEDANCE MATCHING -- Be concerned about the impedance between the two stages where the Step Attenuator is being inserted. If the output impedance of the first stage, and the input impedance of the second stage do not (both) match the impedance of the Step Attenuator that is being placed between them, then the first few attenuator steps will not behave in a linear manner. This is because the Step Attenuator will be changing the transfer characteristics as the inter-stage VSWR is being changed. This problem can be mitigated by making sure the Step Attenuator is never used at less than say, 10 dB. Or, by forcing a near-perfect impedance match by using good Balanced Amplifiers, or the right kind of Operational Amplifier circuits for those stages.

(3) AGC CONTROL -- When a RCVR system is designed for the best compromise between Cascaded Noise Figure (high total Gain), and High Dynamic Range (low total Gain), usually the AGC is operational, and the S-meter will show some deflection. If the stages preceding the AGC stage are Gain Starved to the point where the S-meter doesn't move (no AGC action, which has been suggested in this forum) then frequently the over all (cascaded) RCVR Noise Figure will be compromised.

I believe it would be better to "Cage the AGC and S-meter". Here is how it can be accomplished. Most RCVRs have an AGC circuit that has a very high operating impedance -- frequently close to a megohm. It should be a simple matter to notice the S-meter setting under normal RCVR operation, and then flip a switch that will connect the AGC line to a potentiometer that has a regulated voltage applied to it. Then adjust the potentiometer until the S-meter is returned to the normal setting. If the impedance of the potentiometer circuit is low by comparison to the AGC circuit impedance, then the AGC voltage will be "caged" or "clamped" to a fixed operating state, and Cold Sky to Sun Noise measurements can be accurately made, as long as the Sun Noise increase isn't so large that the RCVR system is being pushed into the saturation region. If so, select a higher "clamped" AGC voltage, and repeat the Sun Noise measurement.

There are many RCVRs that are already using this kind of circuit. The so-called RF Gain control is really a potentiometer and diode circuit that forces a minimum voltage onto the AGC line. This type of RCVR is recognizable by the fact that the S-meter moves up-scale when the RF Gain control is rotated.

I hope this information is helpful.
Please feel free to correct the mistakes.

73 es Good VHF/UHF/SHF/EHF/EME DX,
Dick, K2RIW

RE: Some Stripline Parallel KW Amplifier Additional Information.

Dear Jordan, Jerry, Bob, Gerald, Dexter, et al.,

INTRODUCTION -- Here is some additional information about Stripline Parallel KW Amplifiers that builders and users may find useful.

COPPER CLAD PCB -- My original Stripline Parallel KW Amplifier (which is still operational since 1971), with a pair of 4CX250B tubes, uses double sided copper-clad PCB for the Plate Resonator, L1. A few builders told me their particular brand of double sided PCB material displayed a kind of resonance between the two layers -- this caused a "hot spot" in the Resonator. They solved the problem by soldering copper foil around the edges between the layers. I believe their situation was aggravated by not soldering the Tube Anode Finger Stock to both sides of the PCB.

PLATE RESONATOR MATERIALS -- The Resonator is 5" wide, 9" long, and double sided, therefore the current density on the Resonator should be very low. Successful builders have used many different materials -- including brass. I did not place any soldered copper foil around the edges of the double-sided PCB on my Plate Resonator. Some builders applied a silver coating to the Resonator and tried to measure the difference in performance; I don't believe there was any difference.

CORNER ROUNDING & TUNING -- The article did not included the dimension for the rounding radius of the plate resonator in the vicinity of the tube anodes -- its about 1.2 inch. Many constructors rounded all corners to 5/16 inch. This change in the design adds extra capacitance to the tube end of the resonator; as a result some resonators will not tune as high as 432 MHz. There is no real "magic" about the exact length of the Plate Resonator (or the Grid Resonator). Don't be afraid to remove 1/8" or 1/4" from the 9" length. When it is the correct length for the Anode Capacitance of your particular tubes (and your corner rounding), the Flapper Tuning Capacitor, C5, will tune in the center of it's range -- which is midway between the Resonator and the chassis. Do not allow the Flapper Tuning Capacitor, C5, to touch the Plate Resonator (a B+ short circuit will occur), or the chassis (RF arcing will occur).

THE GRID RESONATOR -- Many builders used different tuning capacitors, or a slightly different layout of the Grid Resonator circuit. Sometimes the Grid Resonator will not tune as high as 432 MHz. When this happens the high Q of the Grid circuit will not allow the drive signal to get to the Grid. Under this condition not even 50 watts of Drive will excite the tubes. Again, don't be afraid to shorten the length of the Grid Resonator to the point that the Tuning Capacitor, C1, tunes in the center of it's range. Do not remove plates from the C1 Tuning Capacitor; this will limit the tuning range. Some builders were not able to find the suggested capacitors, and they substituted Flapper Capacitors in the Grid Resonator circuit. This worked very well. If the amplifier is giving you poor output power, be sure that none of the Grid or Plate Tuning Controls are running out of range.

POSSIBLE PLATE TUNING DRIFT -- When the amplifier is operating properly the Plate Resonator, L1, and it's associated components run quite cold, only slightly heated by the leakage of hot air from the tubes. This suggests that tuning drift is not being caused by the amplifier circuits. Most 4CX250B tube amplifiers will experience some tuning drift as the amplifier heats up under high duty-factor usage. This seems to be caused within the tubes themselves. It is likely that the Screen Grid experiences heating and expands in the direction of the Anode, which increase the Anode Capacitance. This effect can be mitigated by starting out with the amplifier tuned slightly on the high side by minimize the C1 Plate Tuning Capacitor.

GRID BIAS STABILITY -- Be sure your Control Grid bias network can tolerate 15 ma (2 tube total) of current flow in either direction without loosing Control Grid voltage regulation. Under certain loading conditions that Control Grids could either draw or supply a total of ~ 15 mA of current.

THE TUBE SOCKET -- The most important part of the 4CX250B Tube Socket is the Screen Grid Bypassing Capacitor, and the health of the socket's Screen Ring Finger Stock. Each tube has 4.4 picofarad of Plate Capacitance. Almost all of that capacitance is between the Plate and the Screen Grid. When the amplifier is cranking out full power, there is about 3,800 volts of RF peak-to-peak, or 1,345 volts RMS on the Plate (between the Plate and the Screen). The 4.4 picofarad has a capacitive reactance of 83.7 ohms at 432 MHz. That reactance and the 1,345 volts RMS on the Plate means that 16 amps RMS (at 432 MHz) flows into each Screen Grid, and ultimately into each socket's bypass capacitor. If

all the sockets Screen Ring Fingers are not making very good contact, you can run into the problem where the tube will become welded into the socket, and the remaining fingers may become damaged the next time you attempt to remove the tube from the socket. Be careful about removing the tubes from the sockets a large number of times; you will eventually wear away the silver plating that is needed for good RF grounding of the Screen Grid.

SCREEN VOLTAGE -- The peak Plate Current capability of a tetrode tube, like a 4CX250B, is primarily caused by the Screen Voltage raised to the 3/2 power. The article recommended a Screen Voltage of 300 volts. The tube specified maximum Screen Voltage is 400 volts. You will find that the amplifier's Gain, and the Maximum Power Output will raise considerable as the Screen Voltage is raised to 350, or possible 400 volts.

SCREEN POWER SUPPLY SUGGESTIONS -- Be sure that the Screen Power Supply has a 15k (or lower), 15 watt (or greater) Bleeder Resistor to ground; also a in-line (series) 2k, 20 watt Screen Protection Resistor that feeds the amplifier's Screen Grids.

WHY THE BLEEDER RESISTOR? -- Under certain Tuning and Loading conditions the Screen Current can be as high as 15 milli amps, in either direction. Without the Bleeder Resistor the Screen PS Voltage could increase (maybe beyond 400 volts), it will back bias the PS rectifying diodes, and the amplifier will go into a Plate Current Runaway condition. By all indications, this condition will look like an Amplifier Runaway Oscillation, but it is merely a Runaway Bias condition. It is OK to put a 10 or 20 micro farad capacitor at the Screen Grid to ground, in order to momentarily hold the Screen Voltage, so as to increase the Amplifier linearity during SSB peak power demands.

WHY THE 2k PROTECTION RESISTOR? -- The Screen Grid of each tube can only tolerate 12 watts of dissipation. If the loading is set extremely light (with full drive), or if the drive is applied without the Plate Voltage being present, then the Screen Grid Current could easily exceed 34 milli amps (per tube) at 350 volts (12 watts), if the 2k resistor was not present. This could destroy the tube's Screen Grid in seconds.

With the series 2k resistor present, the combined Screen Dissipation can not exceed 15.3 watts (7.15 watts per tube, if they're balanced). This would occur at 87.5 mils of combined Screen Current, when there is 175 volts on the Screens and 175 volts across the 2k resistor. At a greater or lesser Screen Current, the Screen Dissipation will be less -- it's rather fool proof.

ONE WATT OUTPUT OPERATION -- Once the 2k Screen Grid Protection Resistor is in place it becomes quite safe to drive the amplifier with the Plate Voltage turned off. In this mode, with the convenient flip of a switch, the kW amplifier will put out about one watt. I would not use this mode if you are using a very heavy amount of Drive Power -- the Control Grid dissipation could be at risk. Monitor the Control Grid Current, and do not let it exceed 6 mA, or 2 watts of dissipation (per tube).

ARC-OVER -- There is a rare condition to be concerned about. If the Plate circuit is resonated, with extremely light Plate loading, the Plate circuit RF voltage swing could be so large as to cause an arc-over within a tube. An arcing tube will draw extremely high current. A very fast-acting fusing network in series with the Plate voltage wiring will limit the tube's internal damage. You do not want the full energy storage of the Plate voltage PS capacitors to be discharged within the arcing tube. That would increase the internal damage. I did not use such a network, and I believe this caused some of my tubes to be partially damaged during an arc-over of newly-used tubes. This was before I found out about the tube wake-up procedure (see below).

TUBE WAKE-UP PROCEDURE -- If your 4CX250B tubes have not been used during the last few months, you should first use a tube "wake-up procedure" before applying Plate voltage (B+) to them. Unless your tubes were built under the most ideal conditions, all the elements within the tube are slowly out-gassing materials into the tube's vacuum space. You want to avoid a tube internal arc-over because of that gas accumulation. The wake-up procedure consists of applying air, and only the Filament voltage to the tubes for a couple of hours. In that way the internal Gettering Material can collect the internal gasses, and thus avoid the possible arc-over when the B+ is applied. Every arc-over is potentially damaging. Try to avoid them.

NEGATIVE SCREEN CURRENT EXPLAINED -- The screen current (positive, negative, and how much) is the strongest indicator of proper Plate Loading (when the Plate is resonated). Most tubes put out maximum RF when the Screen Current is near zero.

When the Plate Circuit is resonated and lightly loaded, the instantaneous Plate Voltage can easily be less positive than the Screen Voltage, at the instant that the peak of the cloud of electrons comes roaring past the Screen, and is heading for the Plate. If the Screen Grid is more positive, a substantial number of the electrons will "stick" to the Screen, and create positive Screen Current -- an indication of light loading.

If the Plate circuit is resonated and very heavily loaded, then the Plate Voltage Swing will be greatly decreased. Now, the instantaneous Plate Voltage will be more positive. The electrons that now hit the Screen will free up secondary electrons, that will be drawn to the Plate. Those secondary electrons leaving the Screen, will be sensed as Negative Screen Current -- an indication of heavy loading.

COMBINING MULTIPLE KW AMPLIFIERS -- There are quite a few amateurs who just love the Gain, Efficiency and low cost of 4CX250B tubes, and they ask me for the best way to combine multiple kW amplifiers. For decades the solid state people have been combining pairs of amplifiers while obtaining great VSWR performance, total inter-amplifier isolation, and "Graceful Degradation" by the use of the Balanced Amplifier technique -- it's also called a Kurokawa Amplifier. To implement this technique you will require a pair of Quadrature Hybrids. In this very high power version of a Balanced Amplifier assembly the Hybrids will insure that each amplifier is completely isolated from each other, thus you will have maximum stability and ease of tuning. Otherwise, there could be a lot of interaction of the input tuning and output tuning, as well as the possibility of oscillations between the amplifiers.

THE OUTPUT HYBRID -- The high power lossless output Hybrid could be constructed in air-suspended strip line, similar to the Plate Resonator. The 432 MHz Parallel KW Amplifier's Strip Line ground plane spacing of 3 inches was used primarily to accommodate the height of the tubes. The Hybrid will not require that much height since it will be running at close to a 1:1 VSWR. In Class C service the amplifier's Plate Resonator runs with a loaded Q of 39, thus there is close to 27 KW of RF energy bouncing back and forth in the box. The output Loading Flapper Capacitor draws out almost 700 watts on each pass (for instance). The output Hybrid will not have to accommodate more than about 2,000 watts.

DUMMY LOAD & HYBRID HOOK UP -- The 350 watt 50 ohm dummy load for the output Hybrid (worse case dissipation = one dead amplifier) can be constructed from a length of lossy coax. When hooking up a pair of Quadrature Hybrids for this service, the correct connections will look reversed. In the Balanced Amplifier block diagram, merely take a picture of the input Hybrid (with it's dummy load), rotate it 180 degrees and connect it to the amplifier outputs. Then, the input connector of the input hybrid will become the output connector of the output hybrid, and you will have the proper connections. If you get it backwards, all your output
power will appear at the 50 ohm dummy load.

SOME REFERENCES --
1. The original article, "A Strip-Line Kilowatt Amplifier for 432 MHz" was published in the April and May issues of QST in 1972 (way back in the dark ages -- Hi). The articles are available in the QST Archives to ARRL members.

2. The W1JR/W1JAA, W6FZJ/1 modifications and notes can be found at: "More on the 432-MHz KW Strip-Line Amplifier", (Technical Correspondence), QST Jul 1975, page 47.

3. The W2GN amplifier versions for 6M, 2M and 222 MHz can be found at:
http://www.newsvhf.com/w2gn.html

CONCLUSION -- There probably are a quite a few more helpful hints that the builders have discovered. These are the ones I could think of at this time.
I hope this information is helpful.
Please feel free to correct the mistakes.

73 es Good VHF/UHF/SHF/EHF/EME DX,
Dick, K2RIW

HALF WAVE RESONANCE -- The beauty of an amplifier with 1/2 wave Stripline Resonators is that it can resonate the Anode and Grid of any tube, no matter how much Plate or Grid Capacitance, or physical size, it may have. Whereas with a 1/4 wave Resonator circuit, the first Null Point (of the Anode or

Grid) may fall inside the tube, and resonating one or both may be impossible.

BUT, DOES THE TUBE HAVE THE CAPABILITY? -- Once the Anode and Grid are at Resonance and properly loaded, then the only remaining question is, "does the tube really have the Gain, and a significant Power Output capability at 432 MHz"? Those questions then become "a conversation" between you and your tube manufacturer. There may be no amplifier circuit technique that can perform any further magic if the tube is truly being operated far beyond its maximum frequency of operation.

TRANSIT TIME LOADING -- For instance, no known amplifier circuit is going to give you any reasonable performance if you are trying to use a 4CX250B at 1296 MHz. That tube simply has too much Transit Time Loading at that frequency. It has a maximum frequency of full power output of 500 MHz. Higher frequency tubes are designed for operation with much higher voltages, and/or with much smaller inter-electrode spacings, so as to lower the Transit Time Loading.

DIELECTRIC LOSS -- Similarly, you can't get full power output from a 4X150 at 432 MHz because of the Dielectric Loss of the glass -- it has a maximum frequency of full power output of 150 MHz. Overly enthusiastic amateurs have melted the glass near the Anode of a 4X150 while attempting to get full power output on 432 MHz.

73 es Good UHF DX,
Dick, K2RIW
Grid FN30HT84DC27

A sign on the lawn at a drug rehab center said: 'Keep off the Grass.'

THE NEED FOR THE WAKE-UP PROCEDURE -- If your high vacuum microwave tubes have not been used for more than a few months, they should first be subjected to a "Tube Wake-up Procedure" before applying high voltage to them. This is to give greater assurance that an arc will not form within a tube when a worse case condition occurs, which is: a High B+ Voltage, and a Light Plate Loading. This situation creates a large Plate Voltage Swing. Each arc is destructive, so try to avoid them.

THE WAKE-UP PROCEDURE -- The Wake-up Procedure consists of applying only Filament Voltage and air for "a few hours" before putting the tubes in service. This gives the Gettering Material (that is within the tube) the opportunity to collect the stray particles that have been "out-gassing" into the vacuum during the time the tube was not being used. There are various opinions as to what is the proper length of time for "a few hours". I think some tube users believe 3 hours is sufficient, and others believe 24 hours is required if the tube has been unused for a very long period -- such as years.

FILAMENT VOLTAGE AIR COOLING -- During the Wake-up Procedure of a Forced-Air Cooled Tube, there should be some air flowing to cool the tube base. Otherwise, the tube seals might become overstressed thermally. Each 4CX250B filament is dissipating 15.5 watts; each GS-36B filament is dissipating 19.8 watts. It is likely that a considerably decreased air flow would be sufficient during the Wake-up Procedure since the total tube dissipation is much lower than during normal tube service.

REMOVE THE AIR COOLING? -- I do not believe that allowing the tube seals to get hotter (with no air flow) will help the Gettering Process very much, and I do not think this method is worth the extra risk. The tube data sheet says the following, "Useful life can be extended by maintaining the flow of cooling air to the tube during standby periods (i.e., those periods when only heater voltage is applied.)"

AIR FLOW AREAS: 4CX250B, SOCKET & AIR INLET -- Each 4CX250B Anode Cooling Structure has an internal area of about 1.28 square inches by 3/4 inch high, that the cooling air must flow through, and this area is slightly blocked by the internal fins. If a Parallel Air Cooling Arrangement is being used (upper chassis is being pressurized) then the Anodes of the two tubes will have a total air flow area of 2.5 square inches, and the two tube sockets will have a total air flow area of 1.0 square inch that the air must flow through to cool the bases of the tubes -- for a total of 3.5 square inches of air exiting area for the upper chassis. A chassis air inlet diameter of 2-1/8 inches also has an area of 3.5 square inches; therefore, it is more than adequate for proper air flow through the system.

THE REQUIRED AIR FLOW THROUGH 4CX250B ANODES -- The data sheet recommends a

minimum air flow through each tube of 6.5 CFM (0.527 lbs per minute), at an air pressure drop of 0.87 inches of water, when the Anode is dissipating 250 watts; these readings are at sea level. At a higher altitude, a greater air flow in CFM is required to keep the total pounds of air per minute (the air cooling capability) to be the same.

BLOWER BACK PRESSURE REQUIREMENT -- Don't be fooled by the big CFM rating of many blowers -- this is usually a free-air rating. The 4CX250B data sheet back pressure requirement of 0.87 inches of water is the major factor that limits the CFM that a blower can deliver to the Anodes if a traditional air cooling arrangement is being used (that's with only the lower chassis being pressurized). The approximately 0.5 square inch area of each tube socket aperture is actually creating the greatest portion of the back pressure in that air cooling arrangement.

PARALLEL AIR COOLING ADVANTAGE -- If instead, the upper chassis is being pressurized (this is the "Parallel Air Cooling" arrangement), then the back pressure requirement is lowered by almost a 3:1 ratio. To be on the safe side the selected blower should be capable of supplying a pressure of about 0.75 inches of water, when it is supplying a volume of 18 CFM (13 CFM through the two Anodes, and 5 CFM through the two tube sockets).

MAXIMUM TUBE TEMPERATURE -- Each tube seal should be kept below 200 C degrees. When in doubt, place a thermometer into the air that is exiting each tube Anode. The exiting air temperature and the Anode Temperature are usually related within a few degrees, as long as most of that air has flowed through the Anode Cooling Fins.

AIR FLOW AREA & AIR FLOW VOLUME THROUGH A GS-36B ANODE -- Each GS-36B/4CX400A
Anode Cooling Structure has an internal area of about 1.75 square inches by 3/4 inch high that the cooling air must flow through, and this area is partially blocked by the internal fins. It is likely that each tube Anode requires a minimum of 10.4 CFM (0.84 lbs per minute) at sea level when it is dissipating 400 watts. I believe the Anode back pressure requirement is 17% greater for this tube (than for a 4CX250B), if a Parallel Air Cooling arrangement is being used for each tube type. If the GS-36B Anode air had to first flow through the tube socket, then the back pressure requirement would be about 4 times greater.

AN APPROXIMATE AIR-FLOW VOLUME MEASUREMENT -- There are instruments that can measure the air flow rate in CFM. I did a quick "ball park" measurement by carefully taping a thin polyethylene bag from the dry cleaner over the two air exhaust ports of the amplifier and timing how long it took to fill the bag. The dimensions of the inflated bag allowed me to estimate how many CFM it can hold.

AIR INLET & EXIT SCREENING ATTACHMENTS -- To achieve the best RF Shielding within the upper chassis the screening should first be soldered to a stiff 2.9" x 3" square of brass or copper (for instance) sheet that has a 2-1/8" diameter hole in it. The brass or copper sheet should be tinned on both sides to avoid the aluminum to copper-bearing dissimilar metal interface problem. Then the smooth, non-screening side of the brass sheet should be held against the inside wall of the upper chassis with machine screws in at least the four corners. Four of the screws can be the same ones that hold the air-inlet flange to the outer wall of the chassis. Then the chassis wall will be sandwiched between the two assemblies.

An alternate would be to aluminum solder the screening to the inside wall of the chassis. But, aluminum soldering can be quite difficult unless the correct solder, flux, and iron are being used. The screening shield of the Anode air exhaust holes on the upper chassis cover plate could be fabricated in a similar manner. A single, wider and longer piece of stiff brass or copper sheet can accommodate the screening of both of the Anode air exhaust holes. This sheet should be attached to the cover plate with about 8 or more machine screws, if the aluminum soldering technique is not being used.

73 es Good VHF/UHF/SHF/EME DX,
Dick, K2RIW Grid FN30HT84DC27

No matter how much you push the envelope, it'll still be stationery.

THE NEED FOR THE WAKE-UP PROCEDURE

FWIW: Back in the late '90's when I was doing a LOT of experimenting and building of 13cm amps with 7289's, I found (really, by accident) that the "standard" tube I used for "standard" test squence (to insure that the results were because of the cavity, not

the tube) started to behave in an interesting fashion... whereas I considered it an expendable mule, I realized that it actually got better (higher gain) with time. The reference tube was always treated well, in that it was cooled adequately (water on the anode, air through the cavity), fuse protected (it's really exciting when one blows; think "shotgun") and heavily loaded, but really flogged with RF and DC. I have no idea how many test sequences it survived, but I was obsessed with these things for several years. To try to expand the experience, I first tested other tubes in amps, then started to "cook" the tubes with first filament only for 24 hours, then with HV (maybe 600V) biased DC (to draw maybe 50-100mA) for 24 hours, always fan cooled, then run with mid to high - level RF under actual operating conditions (loaded into 500 feet of RG-213) for maybe 12 hours. The tubes, if they survived, invariably performed better after cooking than before. I fried very few tubes. My homebrew 23cm dual-7289 amp also performed better as I used it more, as did a couple of 4CX250 amps. On the other hand, I also experimented with Gs9b's and did NOT find them to get noticeably better as they got older. Interesting.
73 and keep experimenting!
Ed K9EK Columbus, Indiana EM69xd

She was only a whisky maker, but he loved her still.

Grid Circuit, 432 MHz Parallel KW Amplifier.

Dear Jordan, et al.,

GRID PROBLEMS -- Many builders of the "Strip-Line Kilowatt Amplifier for 432 MHz" (QST, April and May, 1972) have had trouble with proper RF tuning and loading of the Grid Circuit. There are about five reasons. This information may help:

1. CAPACITOR MOUNTING -- The QST article did not make it clear that the C1 and C2 Grid Tuning and Loading capacitors are Dual Stator Butterfly types that have a "Hot Rotor" and a "Hot Shaft" and they must be mounted in such a way that the Rotor, and the normal Capacitor Mounting Structure MUST NOT BE GROUNDED. I did this by mechanically floating the capacitors in mid air; some builders mounted them to Home Brew fiber glass "L" brackets. On the C1 tuning capacitor, one Stator is grounded to a Ground Lug, the other Stator connects to the Grid Resonator L2; the Rotor and Capacitor Shaft connects to nothing but the insulated tuning rod to the front panel.

1.1 SHAFT COUPLERS -- Be aware that the metallic Shaft Coupling Mechanisms are each a stray capacitance from the Rotors to L2. Their stray capacitance is in parallel with one of the Stators, and increasing the capacitance. Try to space the Couplers from L2. A Home Brew Insulated Coupling Mechanism would help. The metallic shaft Coupling Mechanism is creating a stray capacitance coupling, not a stray inductance coupling.

1.2 LOADING CAPACITOR -- The C2 Butterfly-type Loading Capacitor is more critical in the way it is "Floated" in order to avoid stray capacitance to L2. One Stator connects to a porcelain stand-off insulator (and C3), the other Stator connects to the L2 Grid Resonator.

2. GRID RESONATOR LENGTH -- There is nothing "magic" about the exact length of the Grid Resonator L2. If it doesn't tune as high as 432 MHz with the minimum setting of the Tuning Capacitor C1, it is OK to shorten the length of L2 until it does. Do not remove plates from the Tuning Capacitor C1, this will decrease its tuning range. Be sure that the variable capacitors are not running out of tuning range (Grid side and Plate side of the amplifier) when you are using various Drive Levels, Center Frequencies, etc. of the amplifier. This can be a subtle error that will lower the amplifier efficiency.

3. LOADING CAPACITOR POSITION -- There is nothing "Magic" about the exact position of the Loading Capacitor C2 along the length of the Grid resonator L2. As the C2 Loading Capacitor is moved closer to the Tube Grids, the value of C2 (in pf) will increase, when it is providing the proper Loading. In any case, it might be OK to eliminate Series Variable Capacitor C3 (or convert it to a small, fixed, transmitting type) -- it has been troublesome for many builders. I only put C3 there to make the total Loading Capacitance smaller, and to set the center tuning range of C2. If C3 is not mounted with really short leads, with local chassis grounding of the Drive Input shielded line, then the Loading Network Capacitors can approach Series Resonance, and thus, the equivalent capacitance will actually increase (instead of decreasing, as desired) -- ain't that a kicker!

3.1 MOVE C2 IN OR OUT -- The Loading Capacitor C2 connection point to L2 can also be moved left and right (of the longitudinal line of the Grid Resonator) without creating a problem. The stray capacitance of

the metallic shaft Coupling Mechanism will almost disappear if C2 is moved closer to the front panel, and the length of the input transmission line is extended, and the shield locally grounded to the chassis. In this way the metallic shaft Coupling Mechanism will no longer be under L2.

4. FLAPPERS CAPACITORS -- Quite a few builders successfully made Flapper Tuning Capacitors for C1 (Tuning) and C2 (Loading), and used no C3 capacitor.

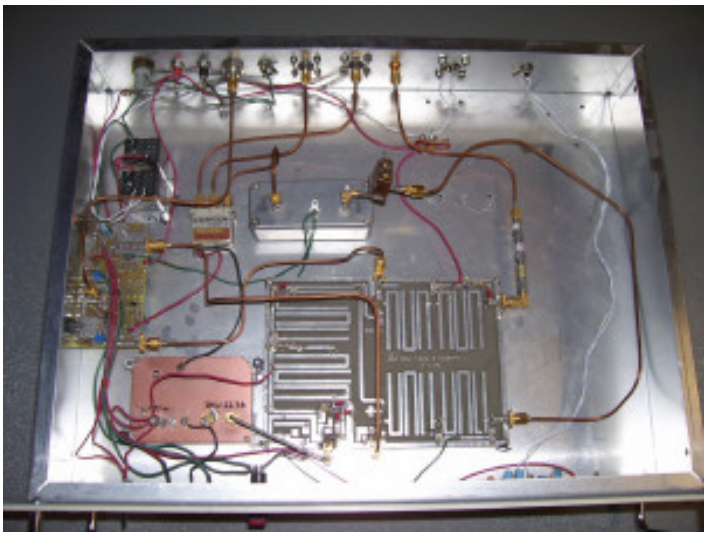
5. SYMMETRY -- There is nothing "magic" about the Symmetry (left side and right side) of the Grid resonator L2. The real Resonant Current flows along the length of L2, and the lack of symmetry will not affect the drive power, or Resonance, that arrives at each Tube Grid, unless there is something non-symmetric at the "T" portion of the Resonator, at the Tube Grids.

6. CHASSIS SPACING -- The Grid Resonator sheet metal can be bent up and down in various ways so that it comes closer or further from the chassis along its length without affecting its performance or resonance, significantly. This extra freedom may make it possible to do a better mechanical job of mounting the Grid Resonator components, and providing a greater spacing that lowers the stray capacitance of the metallic shaft Coupling Mechanism.

I hope this information is helpful.
Feel free to correct the mistakes.

73 es Good VHF/UHF/EME DX,
Dick, K2RIW Grid FN30HT84DC27

Some photos from WA5JAT of KA5BOU's 902 MHz Xverter



From your editor: Yea, I like to have the newletter out about a week before the meeting, but I've had this little hole in the middle of my living room. A leaking pipe under the concrete slab was creating some structural issues. The hole is just over 4 feet deep. That pipe was way down there. But I mixed and poured 6 bags of concrete yesterday and while the living room is a mess, the pipe is fixed and the pit is filled. WA5VJB

More of WA5JAT's Photos from the March Meeting

W5LUA's Vintage 902 MHz Xverter

The new USB powered

Power meter from MiniCirucits

USB 2.0 Power, How Much?

Wes Atchison
WA5TKU

As computers take over more of the operation of things in the Ham Shack and USB 2.0 ports replaces RS-232 and parallel port interfaces. The USB 2.0 (in this paper USB and USB 2.0 will used to mean the same thing) is fast becoming the standard serial interface for computers. My laptop has 3 USB ports and no serial or parallel ports. USB is capable of high speed bit rate of 480 Mb/s. Another neat feature is USB is external devices can be powered from a USB port. This eliminates a hoard of wall warts and power strips to clutter up the shack.

What is the power limit of a USB port? In the USB 2.0 specifications there are 2 power load devices defined, a low-power device or a high-power device. A unit load is defined to be 100mA. The number of unit loads a device can draw is an absolute maximum, not an average overtime. A low- power device is a 1 unit load, 100 mA. A high-power device is up to 5 unit loads, 500 mA. All devices default of low-power. It is up to software to make the transition high power.

USB supports a range of power sourcing and power consuming agents, these include the following:

- **Root port hubs**: Are directly attached to the USB Host Controller. Hub power is derived from the same source as the Host Controller. Systems that obtain operating power externally, either AC or DC, must supply at least five unit loads to each port. Such ports are called high-power ports. Battery-powered systems may supply either one or five unit loads. Ports that can supply only one unit load are termed low-power ports.
- **Bus-powered hubs**: Draw all of their power for any internal functions and downstream facing ports from VBUS on the hub's upstream facing port. Bus-powered hubs may only draw up to one unit load upon power-up and five unit loads after configuration. The configuration power is split between allocations to the hub, any non-removable functions and the external ports. External ports in a bus-powered hub can supply only one unit load per port regardless of the current draw on the other ports of that hub. The hub must be able to supply this port current when the hub is in the Active or Suspend state.
- **Self-powered hubs**: Power for the internal functions and downstream facing ports does not come from VBUS. However, the USB interface of the hub may draw up to one unit load from VBUS on its upstream facing port to allow the interface to function when the remainder of the hub is powered down. Hubs that obtain operating power externally (from the USB) must supply five unit loads to each port. Battery-powered hubs may supply either one or five unit loads per port.
- **Low-power bus-powered functions**: All power to these devices comes from VBUS. They may draw no more than one unit load at any time.
- **High-power bus-powered functions**: All power to these devices comes from VBUS. They must draw no more than one unit load upon power-up and may draw up to five unit loads after being configured.
- **Self-powered functions**: May draw up to one unit load from VBUS to allow the USB interface to function when the remainder of the function is powered down. All other power comes from an external (to the USB) source.

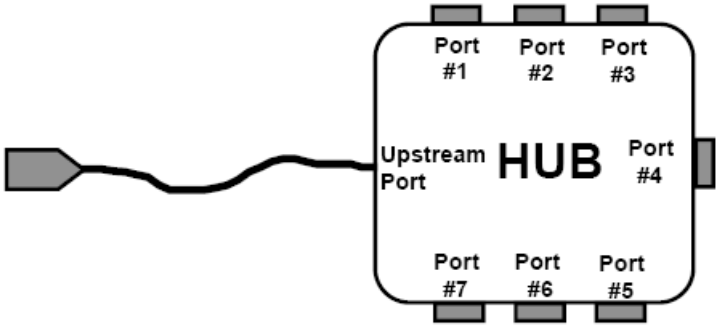


Figure 1: Typical Hub

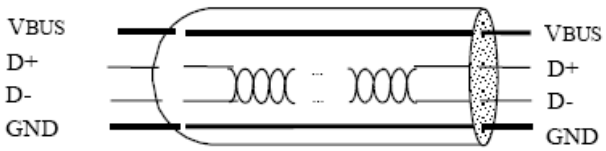


Figure 2: USB Cable

No device shall supply (source) current on the V_{BUS} at its upstream facing port at any time. This prevents 2 sources from being connected to each other.

When looking to purchase a powered hub one should pay attention to the current capacity of the power supply that comes with the hub. Not all power supplies are rated to the maximum of 500ma on all ports of the hub. I experienced this while searching for a hub that could handle multiple 500ma load devices and a mixture of other smaller load devices. I found 4 port hubs packaged with power supplies as small as 500 ma capacity rating. The lower priced hubs tended to have the lower rated capacity power supplies. So buyer be ware when purchasing a USB hub.

So how much current is a device drawing on a given USB port? To view the current being supplied by your USB ports got to the Control Panel, System, Hardware, Device Manager, Universal Serial Bus Controllers, USB Root Hub, Power and the current being drawn by the device on that port will be displayed. O the USB devices I have I has seen as low as 60ma, a mini-mouse to the 500ma of my digital imaging cameras. My DYNEX USB to serial adapter draws 170ma. Do not know how accurate the displayed current measurements are but it will help you size up the required power. The current requirements of a port on a powered hub can be determined the same was as a port resident in a PC.

FOR IMMEDIATE RELEASE:
In an announcement that has stunned the computer industry, Ken Thompson, Dennis Ritchie and Brian Kernighan admitted that the Unix operating system and C programming language created by them is an elaborate April Fools prank kept alive for over 20 years. Speaking at the recent UnixWorld Software Development Forum, Thompson revealed the following:

In 1969, AT&T had just terminated their work with the GE/AT&T Multics project. Brian and I had just started working with an early release of Pascal from Professor Nichlaus Wirth's ETH labs in Switzerland and we were impressed with its elegant simplicity and power. Dennis had just finished reading Bored of the Rings, a hilarious National Lampoon parody of the great Tolkien Lord of the Rings trilogy. As a lark, we decided to do parodies of the Multics environment and Pascal. Dennis and I were responsible for the operating environment. We looked at Multics and designed the new system to be as complex and cryptic as possible to maximize casual users' frustration levels, calling it Unix as a parody of Multics, as well as other more risqué allusions.

Then Dennis and Brian worked on a truly warped version of Pascal, called "A." When we found others were actually trying to create real programs with A, we quickly added additional cryptic features and evolved into B, BCPL and finally C. We stopped when we got a clean compile on the following syntax:

```
for(;P("\n"),R=;P("|"))for(e=C;e=P("_"+(*u++/8)%2))
P("|"+(*u/4)%2);
```

To think that modern programmers would try to use a language that allowed such a statement was beyond our comprehension! We actually thought of selling this to the Soviets to set their computer science progress back 20 or more years. Imagine our surprise when AT&T and other US corporations actually began trying to use Unix and C! It has taken them 20 years to develop enough expertise to generate even marginally useful applications using this 1960's technological parody, but we are impressed with the tenacity (if not common sense) of the general Unix and C programmer.

In any event, Brian, Dennis and I have been working exclusively in Pascal on the Apple Macintosh for the past few years and feel really guilty about the chaos, confusion and truly bad programming that has resulted from our silly prank so long ago.

Major Unix and C vendors and customers, including AT&T, Microsoft, Hewlett-Packard, GTE, NCR, and

DEC have refused comment at this time.
Borland International, a leading vendor of Pascal and C tools, including the popular Turbo Pascal, Turbo C and Turbo C++, stated they had suspected this for a number of years and would continue to enhance their Pascal products and halt further efforts to develop C. An IBM spokesman broke into uncontrolled laughter and had to postpone a hastely convened news conference concerning the fate of the RS-6000, merely stating "VM will be available Real Soon Now." In a cryptic statement, Professor Wirth of the ETH institute and father of the Pascal, Modula 2 and Oberon structured languages, merely stated that P. T. Barnum was correct.

New VHF Contest Rules:
Here's a clip from the future….

June Intergalactic VHF sweepstakes review QST 2032

An unnamed California group bought a surplus ICBM from the dilapidated US Air force and launched it to the moon. On board was a missile platform that drops 10 warheads, or in this case , eleven band mobile lunch box stations. With the exception of melting the picture of Ferrah Faucet off the cover of the pink Charlie's Angels lunch box, all 10 lunch boxes arrived unharmed.

This new effort was on account of key VUAC members pushing through a rule change the new rule allows the use of remote control stations to activate rare grids. This was done in the name of driver safety, saving the environment, eliminating wasted gas from rovers and portable stations with generators, leveling the playing field in the fly/talk over states and rf safety for all citizens on the highways.

However the ARRL overlooked the possibility of extraterrestrial grid circling via remote stations mounted on remote control vehicles. The lunchbox lunar rovers are interfaced to tie wrapped IC 02s and are connected to solar powered segways. The lunchboxes are designed to receive commands from earth stations are deployed in adjacent lunar grids grid. However the Lunchbox coordinator's plans for interstellar victory were foiled. None of the earth bound stations in his club had equipment or antennas powerful enough to work the moon at their home QTHs. So while conditions for ripe for contacts on the lunar surface, all ten lunar lunch box rovers (LLBRs) sat idol for the June contest.

However this is only a minor set back as the lunchbox coordinator vows to build ten, 11 band EME stations and place them strategically throughout the southwestern desert. Ironically none of these stations are intended to work stations on earth, but will surely become a powerhouse in the portable category as well as the other new and old rover categories: QRP rovers, dummy load rovers, traditional rovers, Limited rovers, Really limited rovers, honest rovers. Impoverished rovers, rovers with angry wives, school bus rovers and unlimited rovers.

Meanwhile a vhf group in New England is vowing not to be outscored on the lunar surface. They are immediately contracting with Virgin intergalactic supply INC. to set up an exclusive colony on the moon. They plan on colonizing the Peary Crater of the Moon. It is 73km across and contains approx. 25 grid squares within the confines of it's deep crater walls. (grids are about 6 x 12 miles on the > moon). An unnamed source was quoted as saying. "by ensuring that we are the first hams on the moon and making sure we are all located in the confines of the mile deep crater, we will be able to contain our QSOs to our selves, spread out across several grids in the crater for multipliers, while ensuring we maintain the population density contest advantage on the lunar surface by being the only hams there!

However while New England Hams gleam with joy in thoughts of Lunar VHF dominations, they may meet stiff opposition from Mrs. Hendrickson, the president Peary Crater Neighborhood association who maintains that external antennas and foreign structures have always clashed with the natural beauty of the Lunar surface since the days of Neil Armstrong. While not currently inhabiting the Crater, or the Moon, Mrs Hendrickson was quick to form a home owners association and draft a set of CC&Rs when she bought her deed for lunar property off of EBay in 1998.

When it was brought to the attention of both the California group and the New England group that they would be both on the moon they were asked if they intended on working each other. Both said no, its not the spirit of the contest.

The ARRL is vowing to get it right by the time the Martian surface is gridded. They are reaching out to NASA on rover rules , citing their success with some mars rovers in the distant past. They still decline to use any judgment in the future, citing that they are saving their resources for intergalactic BPL interference.

North Texas Microwave Society - NTMS

Dedicated to promoting Activity, the state of the art in equipment design and the exchange of ideas and technology for the amateur bands above 902 MHz

Feedpoint is a bimonthly publication of the North Texas Microwave Society. NTMS dues are $12 per year, add $1 for a family membership. The family membership includes all family ham members. Please fill out a membership form for each member and mail to WA5TKU. One *Feedpoint* per family. In the interest of Amateur Radio, all original material appearing in this newsletter may be reprinted provided credit is given where credit is due. Redistribution of this information is highly encouraged!!! Issues are mailed for arrival preceding the December, February, April, June, August and October meetings.

Deadline for Articles and Classifieds is the 15th of February, April, June, August, October, December

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Name _____ EMail _____

Address _____ Grid _____

_____ Telephone (H) _____

_____ (W)_____

MW Bands Operational (9) 902☐ (E) 1296 ☐ (F) 2304 ☐ (G) 3456 ☐
(H) 5760 ☐ (I) 10 GHz ☐ (J) 24GHz ☐ (K) 47 GHz ☐
Other ☐ _____

Interest Above 900 MHz _____

_____

Comments on projects you would like to see the NTMS undertake or topics to present at meetings.

_____

_____

Dues $12.00/Year + $1 for Family Cash or Check Payable to: "North Texas Microwave Society"

Mail to the Treasurer: Wes Atchison WA5TKU
9618 Indian Trail Rd.
Sanger, TX 76266 USA