

PACK RATS'



PACK RATS

CLUB CALL: W3CCX

MT. AIRY VHF RADIO CLUB, INC.

CHEESE BITS



MT. AIRY VHF RADIO CLUB, "THE PACK RATS", PHILADELPHIA, PA. W3CCX
NET FREQUENCIES: 50.150, 144.150, 222.125, 224.58/222.98, 432.110, 903.100, 1296.100 MHz
AFFILIATED CLUB: AMERICAN RADIO RELAY LEAGUE ARNS

Meetings: Third Thursday of each month at 8:00 PM
Southampton Free Library, 947 E. Street Road
Southampton, Pennsylvania 18966

SCANNED TO PDF BY BERT, K3IUV, 2013

VOLUME XXXVII

July 1995

Number 7

THE PREZ SEZ

Twenty years ago I attended my first Packrat meeting, I was a student who barely new what VHF was, in fact, my entire station fit on a card table. Shortly thereafter I was invited to join the club. Today my attic, basement, and crawl-space are crammed with parts, cable, and aluminum, and now I'm trying to figure out how to snake 40 foot of waveguide down to the shack without punching another hole in the wall!... It has been a pleasure to be a Packrat member for all these years and now it is a greater honor to have been nominated and elected as the President of this great organization.

I would first like to thank the out going board members especially Paul, WB3JYO, and Gary ,WA2OMY, for the terrific leadership they have provided to the club over the past two years. It will be hard to exceed the renewed energy that Paul and Gary created within the club. Next, I would like to invite you the club members to join in any of the many activities sponsored by the club; whether it' a building session, Monday night net, or directors meeting you l discover it's more fun being in the game than standing on the sideline. By the same token, if there is an activity that you think the club should start to sponsor, please let me know about it.

July marks the start of the outdoor club meeting season beginning with our annual White Elephant Sale at the QTH of Gary, WA2OMY. Wrap some of those rare unused items you've been storing since the last Apollo mission into a plain brown box and have fun watching as the Packrat bidding frenzy commences.

See you there!

73, Phil Migulez, WA3NUF

Pack Rats **CHEESE BITS** is a publication of the **Mt. AIRY VHF RADIO CLUB, INC.** Philadelphia, PA. and is published monthly.

SUBSCRIPTION RATE: \$10.00 PER YEAR (USA)
 \$12.00 PER YEAR (CANADA)
 \$15.00 PER YEAR (ELSEWHERE)

We operate on an exchange basis with other publications. Anything that is printed in **CHEESE BITS** may be reprinted, unless otherwise stated, provided proper credit is given.

DEADLINE FOR ARTICLES AND SWAP SHOP IS THE MONTHLY MEETING DATE. NON-COMMERCIAL SWAP SHOP ITEMS-FREE OF CHARGE.

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 (215) 355-5730

PACKRAT 222 MHz REPEATER - W3CCX/RPTR

222.98/224.58 MHz, Churchville, PA


OFFICERS: 1993-1994

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	N3OZO,	Don Schwartzkopf (2 YR)
	WB3KRW,	Steve Dallas (2 YR)

TIME	<u>MONDAY NIGHT NETS</u>		
	FREQ.	NET CONTROL	
7:30 PM	50.150 MHz	K3EOD	
8:00 PM	144.150 MHz	W2EIF	
8:30 PM	222.125 MHz	WB2YEH	
8:30 PM	224.58R MHz	K3ACR	
9:00 PM	432.110 MHz	WA3AXV	
9:30 PM	1296.100 MHz	WA3NUF	
10:00 PM	903.100 MHz	N3AOG	

COMMITTEE CHAIRMEN

LADIES' NIGHT: WA3YUE 610-630-1875
 JUNE CONTEST: WB3DNI 215-672-5289
 HAMARAMA: WB3JYO 609-538-1687
 VHF CONFERENCE: KB3XG 610-584-2489




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G. B. WALLS 3208 CONCORD PIKE (RT. 202)
 WILMINGTON, DEL. 19803

Graphic Design

Illustration

Production



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 215 355-5730

Calendar of Coming Events - July 1995

July

2

16th Annual Wilkes-Barre Murgas ARC K3YTL Hamfest will be held at the Luzerne County Fair Grounds on Rte 118 in Dallas, PA. TI on 146.61R and .52. VE Exams.

4

Independence Day

4

Harrisburg Hamfest at the Bressler Picnic Grounds, take exit 1 off I 283, follow PA 441 and signs. Admission: \$3. Talk-in on 146.76/R and .52.

8-9

CQ Worldwide VHF QPX Contest. See May CQ Magazine page 60 for rules or June QST page 113. Contest runs from 1800 UTC, 8 July to 2100 UTC on 9 July (27 hours). All bands from 50 MHz up.

9

Maryland Hamfest, Timonium, Md. at the Maryland State Fairgrounds, located on York Rd. adjacent to I-83 near I-695 Talk-in on 147.63/.03, 146.16/.76, and 146.52.

13

Packrat Board of Directors meeting will be held at the QTH of Ron, WA3AXV, at 8:00 PM. All interested parties welcome. Call 215355-5730 for directions.

19

VHF/UHF All-Band Sprint sponsored by the Northern Lights Radio Society. 7 PM to 10 PM local time. See June QST, page 113 for rules.

20

July meeting of the Packrats will be the Annual White Elephants Sale at Gary's Glen (WA2OMY's QTH) on Mt. Kirk Road in Eagleville, Pa. Starts promptly at 8:00 PM. Bring Chairs. For directions call 215-539-6409. See the enclosed map.

23

Mid Atlantic Sweatfest '95 will be held at the MARC Train station in Historic Brunswick, Frederick Co., MD. TI on 147.060-.

28-29

The 30th Annual Central States VHF Conference will be held in Colorado Springs, Colorado at the Sheridan Colorado Springs Hotel. For further information, contact Hal Gergeson, W0MXY, 809 East Vermijo Ave., Colorado Springs, CO. 80903.

29

BERWICK, PA Hamfest/ Computerfest will be held at the Nescopeck Township Firehall Grounds, 5.2 miles south of Berwick on Rte. 93. TI on 147.225+

1995-96 ELECTION RESULTS

President: Phil, WA3NUF

Vice President: Bob, WB2YEH

Recording Secretary: Walt, WA3AQA

Corresponding Secretary: Dick, N3AOG

Treasurer: Dave, WA3JUF

Director: Don, N3OZO, Steve, WB3KRW and John N3DQZ

VISITORS AT THE MAY MEETING

Warren Burtis, AG2S, Marlton, NJ

CHEESEBITS SUBSCRIPTIONS

Cheesebits subscriptions are available to everyone interested in activities and information from the VHF through the microwave frequencies. Subscriptions are for 1 year of 12 issues. For a subscription, send the following information:

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July 1995 Send to: SUBSCRIPTION/ADVERTISING MANAGER:

Bob Fischer, WB2YEH

7258 Walnut Avenue

Pennsauken, NJ 08110

TID BITS

Herb, K2LNS, reports that his new house will be completed in August. It will be on the same mountain at 2100 ft. elevation.

VE8 Beacon ! The VE8SIX beacon was finally activated today at 0500Z. It is currently running 85 watts into a 4 element yagi beaming 35 degrees (Europe) from 1400-0000Z and 160 degrees (USA midwest) from 0000-1400Z. Frequency of operation is 50.008 MHz and mode is A1A CW. It is operating 30 sec on / 20 sec off cycle. Grid here is CP38di. Reception reports welcome. If you hear the beacon and wish a 2 way I can be reached at 403-979-7107 (1400-0000z) (NA weekdays) and at 403-979-2595 the rest of the time. Thanks to Dave Phillips W7GZ for procuring the transmitter and preparing it for beacon service. 73 John - VE8EV

New Jersey X-Band Beacon

de Dave, N3AHF via the VHF mailing list

Just a note to let you know about X-Band activity in New Jersey. Myself and Bob, KS2D, have installed an X-Band beacon at N2NU's QTH (FN20ok, 650' ASL). The beacon is on 10368.275 and runs 2.5W to a 13 dBi horizontal omni antenna. The keying is 100 Hz FSK Morse and sends "KS2D FN20ok". It went on the air on June 3 and we hope to have it running for the June contest. Bob and I will be active from K3UZY at FN11jw for the contest with 2 meters and 10 GHz (2.5W and 2 foot dish, 2200' ASL) and we will be looking for X-Band contacts. BTW, we heard the beacon on June 3 from K3UZY (about 165 miles). VE8SIX Beacon QRV

VHF+ PROPAGATION & ACTIVITY REPORT

By Jerome Byrd, K3GNC

The bands were pretty dead all winter, but June has had enough good openings to raise our hopes for a good summer season. The followings have been noted by this author:

Date	Band	Comments
5/28/95	144 MHz	Enhanced conditions to the SW. K3GNC worked K4HJE (EM95), N4BG (EM97). AA2UK worked N4BG and AA4H (EM86).
6/5/95	144 MHz	KE8FD (EM89) was rolling in as was NG4C and others from FM16.
	1296 MHz	AA2UK worked KE8FD (EM86) !
6/6/95	50 MHz	6 Meters was wide open to the Caribbean and southern Florida, then skip got shorter, until FM16 was heard in this area on E skip. WB9JUL worked a Florida station on 144 MHz, and we all thought that we were in for a major 144 MHz E opening. Unfortunately, the hour long 144 MHz E was worked by 1's but skipped over us.
6/15/95	50 MHz	Double hop 6 meter opening to 7 land.
	144 MHz	Coastal opening. N1NLX/MM was worked in FM24, with strong signals.
6/16/95	222...1296	Coastal opening - Beacons from Sable Island was blasting in at AA2UK, K2TXB and others near the coast. Many calls were made via radio and phone, but no activity could be generated from the VE1 or VE2 land.
6/17-19/95	50 MHz	EUROPEANS BY THE BUSHEL, ON AN ON OFF DAY AND DURING EARLY EVENING HOURS. THERE WAS ALSO A CT3, CU3... THROWN IN FOR GOOD MEASURE.

Please let me know about any openings, nets, propagation, etc.

CU on the Bands, Jerome Bryd, 1530 Locust Street, #20, Philadelphia, PA, 19102, (215) 226-1418.

SWAP SHOP

(send all ads to the editor)

WANTED: Good 8877 and socket, 7289's, 903 and 2304 transverters. Call Ron, KB3QM at 1-302-875-5257.

FOR SALE: 1296 Power Amps, 250 watts to 750 watts, 2, 4, and 6 tube cavities using water cooled 7289, 8907 or single tube cavities using TH308, 328, 338 or water cooled Y730. Call or write to Tom Dinyovszky, KB2AH, 405 Union Lane, Brielle, NJ, 08730, 908-223-5067.

FOR FREE: 40 ft. Brand X Self Supporting Tower, free delivery. Contact John, KB3XG, at 610-584-2489.

FOR SALE: Icom PS 35 Internal Power Supply, never used, \$130.00. Contact Ron, KB3QM at 1-302-875-5257.

FOR SALE: Gel Cell Batteries, 12 volt, 57 Amp Hour. Removed from equipment, excellent condition, \$20.00 each. Contact: Bob, W3GXB at 610-346-8698.

For Sale: 144 MHz Antenna System. 4 Jr Boomers with Cushcraft H Frame. Contact Herb, K2LNS, at 1-717-829-2695.

SOME JUNE '95 ARRL VHF CONTEST RUMORED SCORES

by :Ron, WZ1V

CALL	N2WK	W2SZ/1	AA9D	N8FMD	W3CCX	K3YTL	W4IY	WD3R/2
GRID	FN03	FN32	EN52	FM08	FN21	FN11	FMO8	FN21
CLASS	M/U	M/U	M/U	M/U	M/U	M/U	M/U	M/U
6	474/126	576/110	341/130	350/81	341/60	368/65	376/93	387/63
-2	497/61	769/52	372/58	577/73	523/61	654/62	467/60	497/54
222	194/45	173/31	96/41	103/42	114/36	92/30	83/32	76/26
432	258/45	297/37	177/45	227/44	179/40	167/41	154/37	144/34
903	102/28	69/23	22/14	19/14	35/16	28/17	12/9	14/9
1296	123/28	99/27	35/14	43/21	53/20	39/16	40/15	24/10
2304	67/18	56/18	8/8		16/10	5/3	1/1	7/6
3456	45/13	45/13	10/8		8/7			
5760	25/7	25/8	12/8		5/5			
10G	37/5	28/8	9/7		9/6			
24G	8/2	11/6	2/2		2/2			
Light	14/2	0/0	3/2	12/1				
TOTAL	1844/380	2148/333	1087/337	1331/276	1285/263	1353/234	1133/247	1149/202
Score	1266920	1148517	541,222	502,596	492,862	412,074	363,831	296,132

CALL	W0UC/9	WBOGGM	KD0DW	K1TR	K3MQH	KB5IUA	W1QK	WA2TEO	K1R2
GRID	EN44	EN34	DN70	FN44	FM19	EL29	FN31	FN31	FM19
CLAS	M/U	M/U	M/U	M/U	M/L	M/L	M/L	S	S
6	273/136	219/119	292/98	228/50	423/90	408/151	168/31	272/81	234/69
2	264/56	194/56	110/32	227/34	839/64	121/39	347/35	398/50	293/52
222	24/14	35/21	17/10	40/18	143/43	11/9	56/19	86/30	66/32
432	63/25	63/25	56/13	75/24	280/40	40/18	81/23	122/36	116/33
903	3/3		2/1	7/4				29/17	21/16
1296	17/11	24/12	15/5	11/7				39/14	38/17
2304		8/5	2/1	6/3					
3456			2/1						
5760									
10G		1/1	4/2						
TOT	644/245	544/239	498/163	594/140	1685/243	580/217	651/108	952/232	768/219
Scor	188,895	171,363	112,000	106,820	520,676	136,927	85,212	304,000	233,000

CALL	WD8ISK	AA2UK	KN5S	N1DPM	K2UOP/8	WB2DNE	W5KFT	KD1DU	KE6CP/1
GRID	EM98	FM29	DM62	FN32	FM09	FM19	EM00	FN31	FN33
CLAS	S	S	S	S	S	S	S	S	ORP/P
6	179/72	99/36	558/208	84/32	109/41	104/35	421/165	123/29	60/17
2	174/54	249/43	19/12	173/28	165/42	205/47	39/19	276/29	111/18
222	63/37	56/23		58/23	45/23	48/22		56/18	42/14
432	97/45	98/28		83/26	82/31	108/34	7/6	71/23	66/21
903	18/13	19/10		29/14	20/14			13/8	17/9
1296	31/18	39/14		42/17	32/15	32/15		26/11	27/14
2304	6/6	4/2		10/8	1/1				10/8
3456				5/3					7/5
5760									4/3
10G					1/1				5/4
24G									1/1
TOT	568/245	564/156	577/220	484/151	455/168	497/153	468/193	565/118	350/114
Scor	206,780	131,976	126,940	122,612	116,256	109,701	91,675	90,860	71,478

K9JK/R 514/298 20,465 12 GRIDS ABCD9E | ALSO W1TKZ FN33 M/U:
 ND3F/R 513/251 20,100 12 GRIDS ABCD9E | BANDS ABCD9EFGHIJ
 NGOX/R ???/??? 13,453 6 GRIDS ABDE | A=177/31 B=258/31 C=56/21
 KA1ZE/R 349/211 12,396 11 GRIDS ABCD9E | D=92/25 F=4/4 OTHERS=1/1
 KE9QT/R 239/192 12,173 6 GRIDS ABCD9EF | TOT: 593/118 = 90,742

New Member

Mark Adams, WB2JHG, 24 Branin Road Medford, New Jersey, 08055 , 609-654-4441

JULY WHITE ELEPHANT SALE

By Gary, WA2OMY

The July meeting will be the annual White Elephant Sale at the QTH of Gary, WA2OMY. Pack up the box under the operating bench and bring a few dollars on the 20th. Even if you happen to be one of the few who are not into the latest surplus, you will enjoy the refreshments and camaraderie of the evening!

Remember, parking on the grass in the front and side of my place and along the front only on the adjacent lot where the trees are. Excess parking at the pharmacy on the corner is only a 6 house walk away. See the map somewhere (hopefully) in this issue.

CU there.

1995 JUNE CONTEST ROVING REPORT

de: John, KB3XG

The Pack Rat roving station had a great time this year despite the rain and mud. Bands on board were 903, 1296, 2304, 3456, 5760, and 10,368 MHz. Single loopers were used on 903 through 3456 MHz. A 2 foot dish was outfitted with replaceable feeds (de: N3AOG) for 5.7 and 10.4 GHz.

W3IIT arrived at my QTH at 8 am to load microwave gear in his car. We drove to the RAT mountain to work FN21 and get a good frequency correlation. It took about 1 hour to work the RATS on all bands. This was my first opportunity to test my equipment under high humidity (heavy rain) conditions. I left my plastic tool box outside under W3IIT's car. I thought it was waterproof, but my camera and aircraft band HT were found lying in 1/4" of water. Everything seems to be working OK. W3IIT had to make his descent from the RAT mountain in instrument conditions.

We arrived at the FN10 site around 4 P.M.. Sometime within the last year, the electric company dumped 4 to 5 truck loads of dirt and rocks at the entrance to the site. W3IIT backed up his Ford as far as possible and we set the tripod on top of the dirt (mud) pile. This site in the past has been a 20 over 9 location, but the pile of dirt forced us to shoot through a few trees. We made contact on every band but 10 GHz. My 10 GHz rig was indicating that everything was OK. I don't understand why we made it on 5.7 GHz but not on 10? Next year I'll bring along a 250' roll of #12-2 romex to extend the range of the car battery and avoid the trees.

I had planned for W3IIT to drop me off at the Hazelton airport and have Celeste pick me up to fly to Clearfield airport. The bad weather at Hazelton (400 foot ceiling) prevented Celeste from making the trip. After a pizza and a pitcher of beer, a muddy W3IIT and KB3XG returned home.

We arrived at Perkiomen airport at 8 am on Sunday to load the gear in the plane and were airborne by 9 am. The trip to Clearfield took an hour and 15 minutes. A rental car was waiting for us and we headed off for the old RAT site in FN01. We started out on 903 with much QSB. The signals seemed to improve as we went up in frequency to 5.7 GHz. My 10 GHz control panel told me that my VCO had become unlocked. I removed the rig from the tripod and re-tweaked the VCO. I heard the RATS on 10 but my panel indicated that I was not putting out any power. As I was tearing down my setup, I noticed a bad 10 meter IF cable. After a few quick checks and a cell phone conversation, we made the 2-way contact (157 miles) on 10 GHz.

We drove west to the FN00 site around 4:30 P.M. and into a cell of heavy precipitation with a little lightning thrown in for excitement. We considered high tailing it back to the airport but the weather briefer told us to stay on the ground for at least 4 hours. The rain let up by the time we arrived in Punxsutawney. By now, the \$15/day Dodge Aires-K looked like it had been in one of those 4-wheelin' Ram tough commercials. We worked 903 thru 10.4 GHz with solid CW signals despite a heavy cloud layer obscuring the mountain tops. I couldn't believe the strength of the signals and how easily it was to make the contacts. I plugged the coordinates into my loran which calculated a straight line distance of 179 miles. My tripod allows me to adjust the elevation of the antenna. I noticed an increase in signal strength on all the high bands by increasing the elevation by 3 or 4 degrees. W3IIT suggested that I mount a level to the mast to eliminate the possibility that the uneven terrain was giving my body a false sense of being level.

We were back at Clearfield airport by 10 P.M. but were advised to wait another hour since there was severe thunder storm activity reported over the Wilkes Barre/Scranton airport. I found a hose on the side of the hanger and used the time to remove the mud, bugs, grass, and branches from the car's under carriage. We were airborne by 12 am and touched down at Perkiomen 1 hour later.

The self test features I have built into my rigs have proven to be an invaluable aid while in the roving mode. The tripod with indicated azimuth and elevation markings reduced the seek and find time considerably. Visiting the RAT mountain to get a last minute frequency correlation practically eliminated the frequency uncertainty. Our new Mooney worked well as an amateur radio cargo plane. Hopefully the weather will be better next year and I will have time to make it to the FN22 site.

10 GHz TRANSVERTER, "All the Boring Details" Part 2 1/2"

By John, KB3XG

The 1 Watt 10 GHz amplifier board is the most difficult to tune up. I suggest that you gain experience with circuits at this frequency by playing with the lower power (lower cost) receiver amplifier first.

POWER SUPPLY:

Check the power supply before applying DC to the PA. (see part 1) Exercise the PTT line to make sure the +10 volt transmit and receive lines are being alternately switched on and off. Make sure both the receive and transmit -5 volt gate bias lines are always on. Before spending countless hours tuning and modifying the PA board, make sure the FET's are all alive. Clean any corrosion from the board, devices, or heat sink. I had a white powdery substance (not from Columbia) insulating the PA from the heat sink. Mount the PA board in the heat sink assembly. After you are certain that the power supply is operating properly, apply DC to the PA and ground the PTT line. Measure all gate and drain voltages at the DC (cold) end of the printed stripline chokes. A voltmeter probe right at the device lead may cause the FET's to oscillate themselves to death. You may need to buy a pair of those needle point voltmeter probes. A standard probe is wide enough to short the gate or drain to ground.

DEVICE	Vg volts	Vd volts	Current ma.
MGF 1302	-0.26	+3.14	14.4
MGF 1423	-0.982	+3.48	21.5
MGF K25	-1.17	+8.00	165.7
MGF K30	-1.63	+8.09	375.8
MGF K30	-0.982	+8.02	463.4

Solder an external ground wire from the PA board to the power supply. During the RF tuning process, I smoked all of my power GaAs FET's. The PA board comes with a DC connector which mates with the power supply board. The connector does not include a ground wire. I had a single #22 ground wire attached, but the wire broke after many hours of back and forth tuning, moving, and soldering. If the system had been mounted in a common chassis, this catastrophe would not have occurred, but having the board removed from the chassis makes tuning easier. I strongly suggest soldering 2 ground wires (1 for safety) between the power supply and both RF boards.

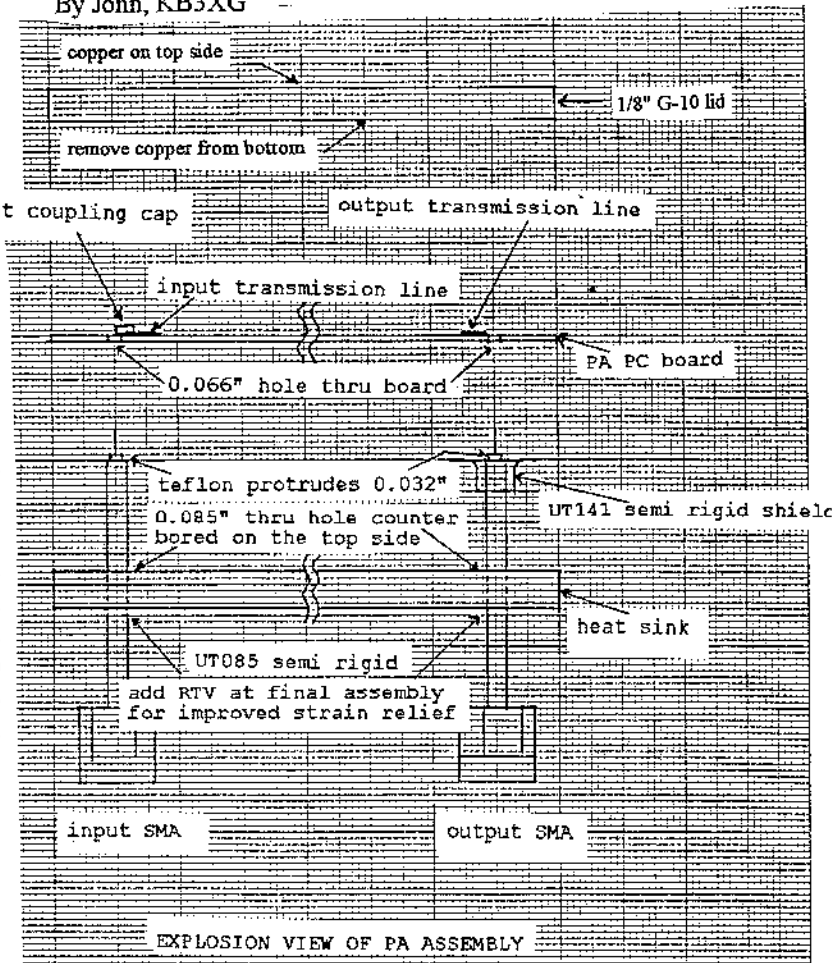
MECHANICAL:

Use your modules as puzzle pieces to get an idea how to best assemble the system in your chassis of choice. Arrange the input of the LNA and the output of the PA right next to the coaxial relay. I was a little shy in drive power, so I mounted the transmit mixer next to the PA input. Modules such as the LO and receive mixer have power to burn so mount these items wherever you have the room. Each module should be firmly attached to the chassis with appropriate brackets to form a common ground point. Ty-wrapping a filter or mixer to a nearby piece of 0.085" semi-rigid may promote intermittent performance characteristics.

RF CONNECTORS:

None of the articles address how to launch a signal in and out of the PA board. I had a difficult time trying to decide how to mount

input coupling cap



the input and output connectors to the heat sink. WA1MBA built his 1st PA by machining a heat sink out of a solid piece of brass. This makes mounting SMA's to the side wall an easy task. MBA built a 2nd PA using the original pot metal heat sink. He used the hole through the heat sink at the PA output port to mount a SMA connector. This hole was originally used as a coaxial transition between 2 PC boards. A SMA connector with an extended teflon sleeve will fit snugly in this hole. Tom drilled and tapped #2-56 holes to securely attach the flange to the heat sink. (The pot metal machines quite nicely.)

I did not feel good about this method since there would be no intimate ground contact between the output connector and the PC board ground plane near the RF output port. I elected to drill a hole through the heat sink and solder a piece of 0.085" semi-rigid perpendicular to the PA ground plane. (see XG sketch) This turned out to be a project in itself. The ground plane has been cleared around the feed thru point. The diameter of the clearance hole is greater than the diameter of the 0.085" semi rigid. I had to use the shield of short piece of 0.141" semi rigid and flare the end to make contact with the ground plane. I had to counter bore the 0.085" hole on the top surface of the heat sink to allow the board to sit flush against the heat sink. Make sure the hole you drill through the heat sink is just slightly larger than the 0.085" semi rigid. You'll need all the strain relief you can get. I get slight gain and power changes by pushing on the output connector due to mechanical flexing of the PC board.

Use 3 or 4" of 085 semirigid so the board can be removed from the heat sink for service without having to unsolder the semirigid. Don't worry about the loss through short pieces of semi rigid. UT141 = 0.035 dB/inch and UT085 = 0.056 dB/ inch. NOTE: Don't use the square 90° SMA elbows at 10 GHz. N3AOG says they look like a RF cork. The swept 90° SMA elbows work good.

I considered attaching the input connector to the heat sink in a similar manner to the receive amplifier, (see figure 4A of part 1) but there is a 0.25" spacing between the edge of the ground plane and the input transmission line. This spacing represents a 1/4 wave at 10 GHz. The 1/4" of ungrounded semi rigid shield would look like a 1:1 balun. I decided to mount the input connector perpendicular to the heat sink just like the output connector. There was no clearance hole at the input port to deal with. I drilled a 0.066" hole next to the input transmission line (see WIRIL sketch) so the teflon of the 085 semi rigid would be held tightly in place. The teflon was cut to be flush with the component side of the board. Leave enough excess center conductor to connect to the coupling cap. I soldered a bead completely around the semi rigid shield to the PC board ground plane. The top side of the heat sink must be counter bored to allow room for the solder bead.

TUNING:

I started the tuning of my PA using WIRIL's "Modification of Qualcomm Omnitrac PA Board." Compare your board to WIRIL's BEFORE tuning picture (A) and remove any pieces of

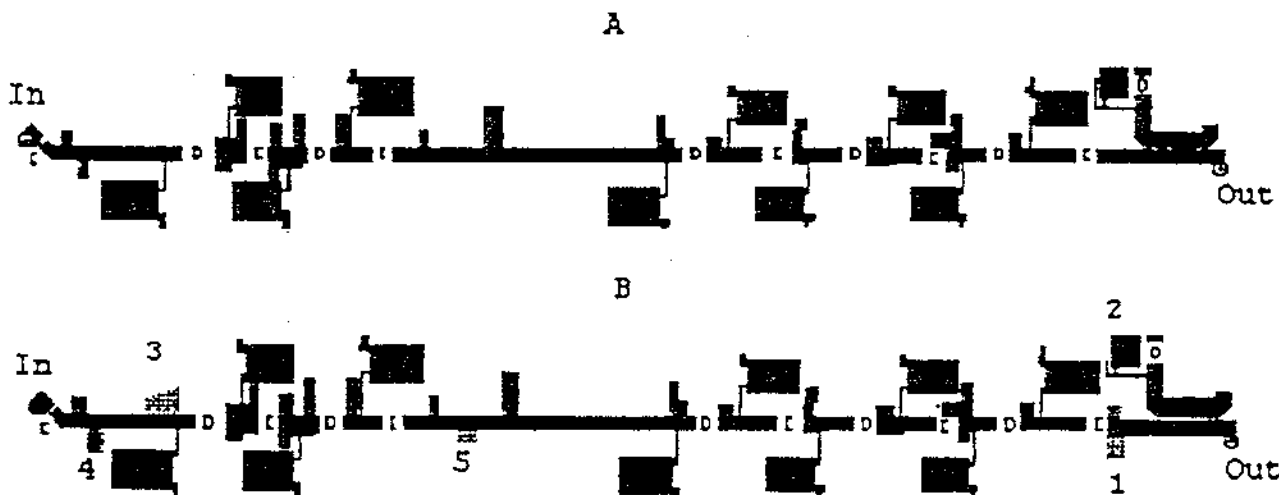
copper tape QualComm has added. RIL's BEFORE picture (A) shows the circuit board AFTER some stubs and circuit traces have been removed. I initially sliced the stubs with an Xacto knife, but found that the amputated stub was coupling into the transmission line and reducing the gain and power out. I had to completely remove all stubs and traces shown on the WIRIL sketch. You must add a small 1-2 pF (ATC "A" series) input coupling cap. Add copper tape to the 5 shaded locations noted in the WIRIL AFTER tuning (B) sketch. This is a 1:1 sketch. Use it to approximate the size of the pieces of copper tape.

Performing these pre-tuning steps as accurately as possible only got me to an output power of +10 dBm. I used the "snowflake" tuning method outlined in part 1 to get increased gain and power. I found that each of the high power GaAs FET's needed a little more shunt "C" (copper tape) at each gate and drain. Be very careful! It is easy to short the FET leads to ground while probing around. I smoked another power FET during this part of the tuning process. I had to buy 3 PA boards before I got 1 on the air. Review the precautions I listed in part 1 and remember the following while tuning:

- Be mentally alert.
- Remove input signal to test for oscillations.
- Place lid on amplifier to test for oscillations.
- Turn DC off after each test and before soldering.

After many hours of careful snowflake tuning, I reached the +20

- A: Board traces as stripped prior to tuning. -15dBm in equals +5 to +10 dBm out. 10 volt DC buss current is approximately 1 Amp.
- B: Board traces after tuning. Shaded tabs were added and tuned in the sequence shown. Results vary slightly from board to board with the following 3 as typical.
 - 10 dBm input = 30.8 dBm (1.2 watts) output
 - 9.6 dBm input = 31.4 dBm (1.38 watts) output
 - 14.5 dBm input = 31.4 dBm (1.38 watts) output
 C are coupling caps. Added input cap 2pf.
 D are devices.



dBm output level. Placing the top cover on the amplifier gave me a 6 dB increase in gain and power but I could see some instability on the spectrum analyzer. There were pieces of RF absorbing material glued to the inside of the cover. Moving these pieces of material to different locations on the lid only moved the oscillation spurs to a different frequency. I solved this problem by cutting a piece of 1/8" G-10 fiberglass board using the metal PA lid as a template. I removed the copper from one side of the board. I drilled holes in the lid so the fiberglass would face the circuit. I added a standoff near the input port since there was no existing threaded hole on the heat sink. The 1/8" G-10 separates the lid from the circuit with a lossy material 1/4 wave thick. Getting a stable 1 Watt out of the amp was much less frustrating using the G-10 lid.

PERFORMANCE:

During the tuning process I was able to achieve the gain and power out listed on the sheet published by WIRIL. As with the receiver board, the input return loss was terrible. (-2 dB) I was told that input return loss was not critical, but I noticed that the gain and power out changed by touching certain parts of the semi rigid or heat sink. I played with the input stage to try to improve the return loss. As the return loss improved the gain decreased. I

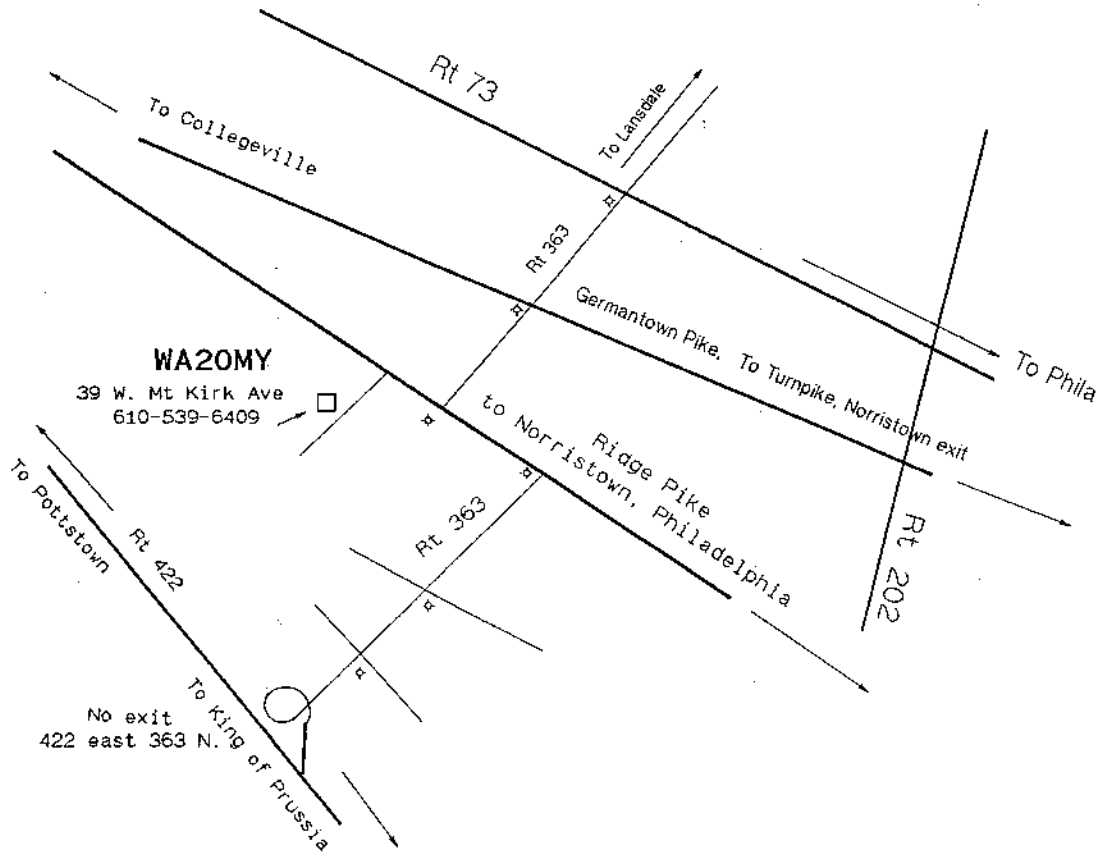
wound up with a return loss of -7 dB and an input drive level of -9 dBm required to achieve 1 Watt out. I still noticed some slight gain and power changes but the January contest was only days away. I would like to further improve the input return loss by either more tuning or adding an isolator to the input port.

I used the directional coupler and detector diode on the PA board to give me an indication of power out. (1 volt = 1 Watt) This feature must be hardwired to the PA board. It is not part of the PA DC connector. This gives you confidence that the rig is working if you have a bouncing meter to watch. Even though I burnt up a few FET's, this is still a cheap way to get on 10 GHz. I have used the rig in 2 contests with exciting results. 73, KB3XG

REFERENCES:

- 1) Ken Schofield, W1RIL - Modification of QualComm Omnitrac PA Board for 10 GHz Operation.
- 2) Bruce Wood, N2LIV - Up, Up & Away to 10 GHz or 10 GHz Semi-Commercial Style.
- 3) WA1MBA - telephone conversation
- 4) W1RIL - telephone conversation
- 5) N2LIV - telephone conversation

MAP TO JULY WHITE ELEPHANT SALE (GARY'S GULCH)



10 GHz EME Components Price List
 From: Simon Lewis, GM4PLM, via MOON-NET

In response to many messages I have received over the 10 GHz eme message I sent to MOON-NET - here is the latest price list from the components service a 10 GHz NB transverter would comprise G4DDK004 - WDG002/003/004/006 dependent on what type of system you require. I'm happy to advise if required

MICROWAVE COMMITTEE COMPONENTS SERVICE PRICE LIST FEB 95

NOTE: PRICES ARE IN ENGLISH POUNDS

<u>DESCRIPTION</u>	<u>RSCG MEMBER PRICE</u>	<u>NON MEMBER</u>
1152 MHz LO PCB G4DDK001B	5.74	6.77
PHOTOCOPY OF G4DDK001B ARTICLE	1.00	1.18
TRIMMERS FOR G4DDK001B (5X5PF)	3.66	4.30
1152 MHz AMP PCB G4DDK002	5.47	6.45
2-2.6 GHz LO PCB G4DDK004	6.86	8.09
PHOTOCOPY OF G4DDK004 ARTICLE	1.00	1.18
TRIMMERS FOR G4DDK004 (8X5PF)	5.55	6.52
ATC DECOUPLING CAPS FOR G4DDK004 (2)	3.26	3.85
CRYSTAL HEATER	3.52	4.14
UHF SOURCE PCB	6.52	7.66
REGULATOR PCB (LOW VOLTAGE DROP FOR 12V)	2.38	2.80
BEACON KEYER PCB G4FRE008	7.14	8.42
144 MHz 5 mW SOURCE (G4JNT005) INC PIN DIODES	5.84	6.89
144 MHz WIDEBAND NOISE AMP PCB G3WDG008	9.38	11.06
1.3 GHz LOW POWER TRANSVERTER G4JNT004	68.66	81.02
5.7 GHz DB6NT 8W PA PCB (DUBUS 3.92)	10.50	12.39
10 GHz X4 MULTIPLIER/PA G3WDG001	29.83	35.20
10 GHz RECEIVE CONVERTER G3WDG002	42.70	50.38
10 GHz TRANSMIT CONVERTER G3WDG003	49.03	57.86
10 GHz 1 dB NF HEMT PREAMP G3WDG004	35.48	41.86
10 GHz 300 mW PA (60mW DRIVE) G3WDG006	58.93	69.53
10 GHz 1W PA (200 mW DRIVE) G3WDG007	131.68	155.38
10 GHz DB6NT 4W PA PCB 2-STAGE (DUBUS 4.91)	10.50	12.39
10 GHz DB6NT 4W PA PCB 1-STAGE (DUBUS 4.91)	10.50	2.39
12/24 GHz DB6NT DOUBLER PCB (DUBUS 1-2.92)	7.00	8.26
24 GHz DB6NT HEMT AMP PCB (DUBUS 4.93)	10.00	11.80
24 GHz DB6NT PA PCB (DUBUS 4.93)	10.00	11.80
24 GHz DB6NT HEPA PCB (DORSTEN 2.95)	11.00	12.98
24 GHz DB6NT Mk2 TRANSV. PCB (DUBUS 1.93)	12.50	14.75
KIT FOR ABOVE (2 X BAT15 DIODES & 1 pF CAP)	10.00	11.80
47 GHz DB6NT MIXER PCB (DUBUS 1.94)	10.00	11.80
47 GHz DB6NT IF PCB (DUBUS 1.94)	4.00	4.72
23/47 GHz DB6NT DOUBLER PCB (DUBUS 4.93)	10.00	11.80
76 GHz DB6NT MIXER X4 PCB (DUBUS 2.92)	10.00	11.80
76 GHz DB6NT IF PCB (DUBUS 1.94)	4.00	4.72
76 GHz DB6NT MIXER X2 PCB (DUBUS 1.94)	10.00	11.80
25.3/76 GHz DB6NT TRIPLER PCB (DUBUS 1.94)	10.00	11.80
19/38 GHz DB6NT DOUBLER PCB (DUBUS 1.94)	12.50	14.75
145 GHz DB6NT MIXER PCB (DUBUS 2.94)	10.00	11.80
241 GHz DB6NT MIXER PCB (DUBUS 2.94)	10.00	11.80
HYBRID MKU55 (DUBUS 1.91)	9.50	11.21
WAVEGUIDE 16 TO SMA TRANSITION (NO FLANGE)	15.00	17.70
TRANSVERTER SWITCHING UNIT G4JNT001	24.88	29.36
2SK1844 HEMT (0.7 dB NF/12 GHz)	13.78	16.26
MGF1302 (use in place of "Black Dot" FET)	3.50	4.13
MGF1801 GaAsFET (250 mW - 10 GHz)	38.27	45.16
MAR1 MODAMP	2.46	2.90
MAR3 MODAMP	3.02	3.56
MAR6 MODAMP	2.92	3.44
MAV11 / MSA1104 MODAMP	4.75	5.57
UPB582C 2.6 GHz PRESCALER (DIVIDE BY 4)	7.43	8.73
100 OHM CHIP RESISTORS (10)	0.50	0.60
2.2 PF ATC CHIP CAP (GOOD TO 10 GHz)	1.32	1.5
84.7 PF CHIP CAPACITORS (10)	1.00	1.18
10 PF CHIP CAPACITORS (10)	1.00	1.18
22 PF CHIP CAPACITOR (10)	1.00	1.18
470 PF CHIP CAPACITOR (10)	1.00	1.18
10 NF CHIP CAPACITOR (10)	1.00	1.18
100 NF CHIP CAPACITOR (10)	1.00	1.18
CUCLAD 233 0.79 MM PCB (TEFLON) 2X1 INCH	2.32	2.74
*LOSSY RUBBER (2X1 INCH PIECE)	1.50	1.77
*WG20 WAVEGUIDE (PER FOOT)	10.46	12.34

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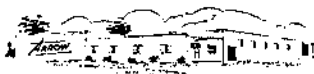
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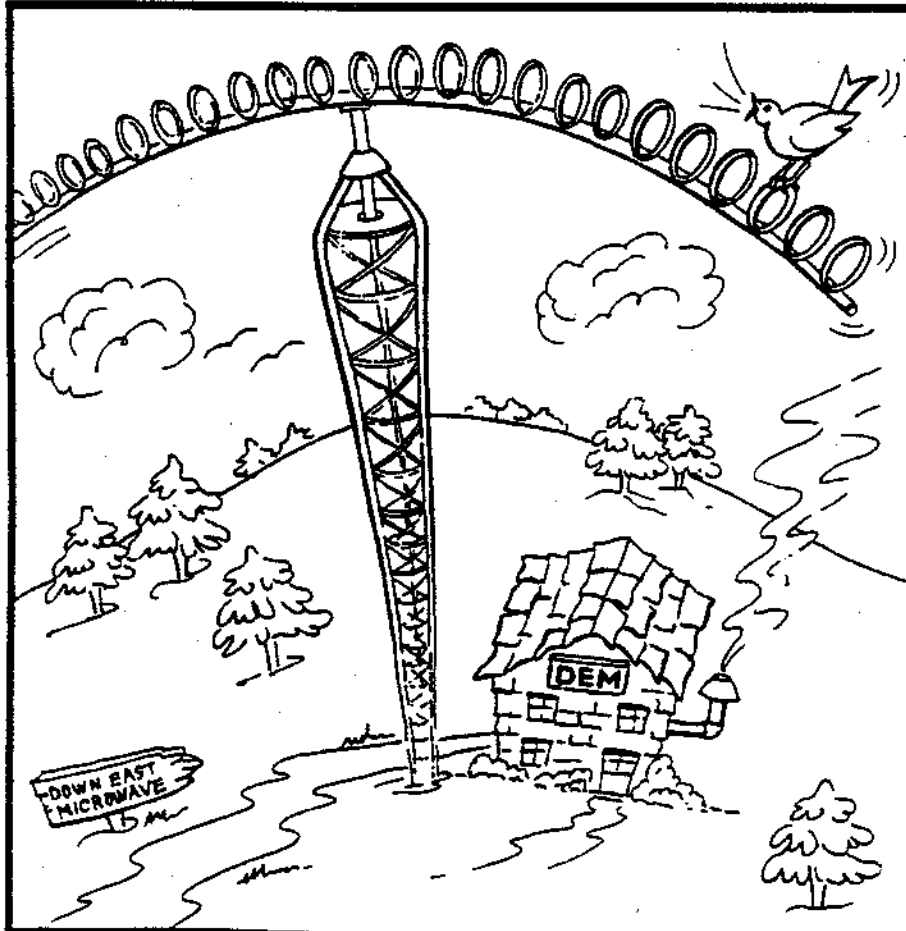


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