

THE LOCAL OSCILLATOR

THE PUBLICATION OF THE PANHANDLE AMATEUR RADIO CLUB

LOW COST PL TONE GENERATOR

ADAPTED FROM AN ARTICLE BY RAY ISENSEN N6UE PUBLISHED
IN 73 MAGAZINE AUGUST 1989

This article was submitted by Brett, N5SQK and would make an excellent project. It will work on any radio.

What Is PL?

Some years ago Motorola introduced "private listening (PL)" to the commercial radio community. In one implementation, a tone, generally a subaudible frequency (67-210 Hz), is impressed on the transmitter's carrier along with the audio intelligence. A companion, single-frequency demodulator at the receiver enables the audio circuits only in the presence of this tone. The results in a form of selective calling. Using PL helps combat intermodulation and other interference problems

How PL Works

In the normal scheme of things, the repeater receives an FM signal and the detected carrier switches in the transmitter through a COR, or Carrier Operated Relay. The typical PL operating repeater uses the detected sub-audible frequency tone, as opposed to the detected carrier

frequency, to pull in the transmit relay. In some cases the operation requires a continuous subaudible tone to maintain contact. In others the tone serves only to pull in the relay; the carrier or some other signal holds it in. In the latter case the system generally will function even if the tone is continuous. To work through the protected machine, we only need to provide a tone at the right frequency and amplitude to satisfy the repeater. Figure 1 is a schematic of a very simple circuit designed to do just that.

Use Common Parts

There are no high cost or hard-to-find parts in the circuit. Your local electronic parts store is a good source. The total cost for the unit, assuming that you have none of the parts on hand, is less than \$7. The only critical parts are C2 and C3, two 0.1 uF Mylar™ capacitors. These must be Mylar, polystyrene, or a similar material, to minimize temperature sensitivity and assure frequency stability. The common RF bypass type

disc cap will not work. They are too temperature-sensitive! Although a well equipped hobbyist could make a custom PC board for the project, the predrilled Multipurpose Board (RS 276-150) for 99c is not only adequate, it's probably preferable. The R(T) and VR(T) resistors connected in series, and the previously noted 0.1 PF capacitors, let you tune to the desired PL frequency. The commonly

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Radio Club PO BOX 10221
Amarillo TX 79116

accepted range of subaudible frequencies extends from 67Hz to 210Hz. The unit that you assemble will not be able to tune in this entire range, but it won't need to. The computer or electronics technician will have picked the frequency for your machine. Your board will have to be able to set that frequency within a Hertz. This circuit offers this capability.

Setting the Right Tone

Examining the circuit diagram, you will notice a resistor identified as R(T); a variable resistor. VR(T); and a 47kohm resistor between pins 1 and 2 of the dual operational amplifier. The three resistors and the 0.1uF capacitors are the basic frequency-determining components of the circuit.

To give you the freedom to pick among a wide range of frequencies, and set your machine precisely, the circuit uses the two resistors in series. Your task is to select a fixed resistor of a value yielding a tone in the desired range. The variable resistor is used for fine-tuning.

RESISTANCE VALUES

FREQUENCY	RESISTANCE
82.8HZ	11.5K
88.5HZ	9.4K
97.4HZ	7.16K
103.5HZ	6.1K

In the place of the graph given in the article I substituted a table of popular frequencies around 88.5HZ. Use it to make the initial selection of the fixed resistor, R(T), as you design your CTCSS board.

Why the initial Setting? As previously noted, the curve was generated with 1% tolerance for the 0.1 capacitors and the timing resistors a most unlikely thing to realize. Expect values more like +or- 5% resistors

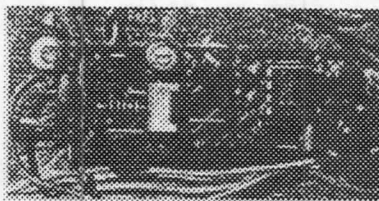


PHOTO A

and capacitors. So we'll select a resistor that is somewhat smaller than the curve calls for, and use the variable resistor, VR(T), to make up the difference and allow for some tuning flexibility. The value of the variable resistor should be slightly greater than the difference between the value of the fixed resistor and the value of the next Larger one. Why not just use a potentiometer in the first place? The smaller the total value of variable resistor the more precise the setting you can make. The variance in resistance per degree of rotation of the potentiometer is less! Now, if you find that your initial choice won't let you tune down to the desired frequency, you can replace the fixed resistor with the next higher value

Ares meeting

The next ARES meeting will be held at the picnic area on the west side of Thompson park at 7:30 pm May 14th. It is picnic area #9, the same place we had the Oct Picnic. Just an informal get together to hope for a call out.

With curve-fitting analysis, we find that the Resistance/Frequency curve can be closely approximated by the equation;

$$\text{frequency} = 3896 \times ((R \times 47000) / (R + 47000))^{0.4122}$$

Where R is the sum of the fixed and variable tuning resistors. I note this equation to emphasize that if you replace the feedback resistor across

the first part of the dual operational amplifier with something other than the 5% device, you may not be able to use the curve in Figure 2 to select your tuning resistor. In other words, change that resistor and you're on your own!

PARTS LIST FOR THE TONE BOARD

FIXED RESISTORS 1/4 WATT
R9,R10 1000 OHM
R3, R3 33K
R1,R4,R5,R6,R7,R8 47K
R(T) SEE ARTICLE
MYLAR CAPACITORS 50WVDC
C2,C3 .1 uF
BYPASS CAPACITORS
C1 .001uF
POTENTIOMETERS 1/8 WATT
VR1 25 OHM
VR(T) SEE ARTICLE
INTEGRATED CIRCUITS
U1 LM1458
PROJECT BOARD
TOTAL COST IN 1989 \$6.39

Choosing the Resistor Combo

This project was originally undertaken to build PL tone generating boards for members of a 2 meter repeater group in the California Central Coast area. Their repeater was subjected to some intermodulation from two commercial paging service machines situated on the same hilltop. The offending RF frequencies, unfortunately, were exactly 600 KHZ apart! These two frequencies, beating with the repeater amplifier output, resulted in an annoying "grunch" at the repeater's input frequency. The trustees demonstrated that the PL technique circumvented the problem, and he opted to put his machine on PL. He selected a frequency of 103.5 Hz for the PL tone. Using that frequency as an example, and referring to the curve in Figure 2. (I did not reproduce the graph. The calculated value for 88.5 HZ is 9400 ohms total resistance.) the dashed line that intersects the

abscissa at 103.5 Hz represents the selected design line. A horizontal line drawn from the intersection of the vertical line and the curve to an intersection with the vertical scale, suggests the need for total timing resistance of approximately 5.5K. (The calculated value came out to 6100 Ohms.) The closest 5 % 1/4-watt resistor offered by Radio Shack is 4700 ohms. The next higher value of 1/4-watt resistor is 10k. The closest variable to the 5.3k unit we need to get the tunability is Radio Shack's 5K PC board potentiometer. This combination worked well. If you have access to a more complete selection of electronic components, a 1 or 2k potentiometer and a 5100 ohm fixed resistor might be even better for increasing the setting sensitivity. If, because most of your component tolerances stack up on the high side, the highest achievable frequency is just slightly low, shunt the fixed resistor with a large value (perhaps one of the 47k resistors still in the bubble pack) If that doesn't work you'll have to go to a higher value resistor, but we have not encountered this problem.

From an examination of the curve in Figure 2, it is clear that a significant change in the tuning resistor is needed for a given change in frequency at the lower frequency end of the curve. And a very slight change at the higher frequency end. Because of this, I would be leery of using the circuit for tones above 120Hz. At that end, even slight temperature variations could throw the circuit outside of the 0.1 to 1.0 Hz tolerance that most PL systems accommodate. In regions subject to wide temperature variations, it would be wise to stay with tones under 100 Hz if you are selecting the PL frequency. The unit in my car operates from the low 30s to slightly over 100 degrees Fahrenheit. It has never failed to access the repeater. Ambient temperature may never be a

problem for you.

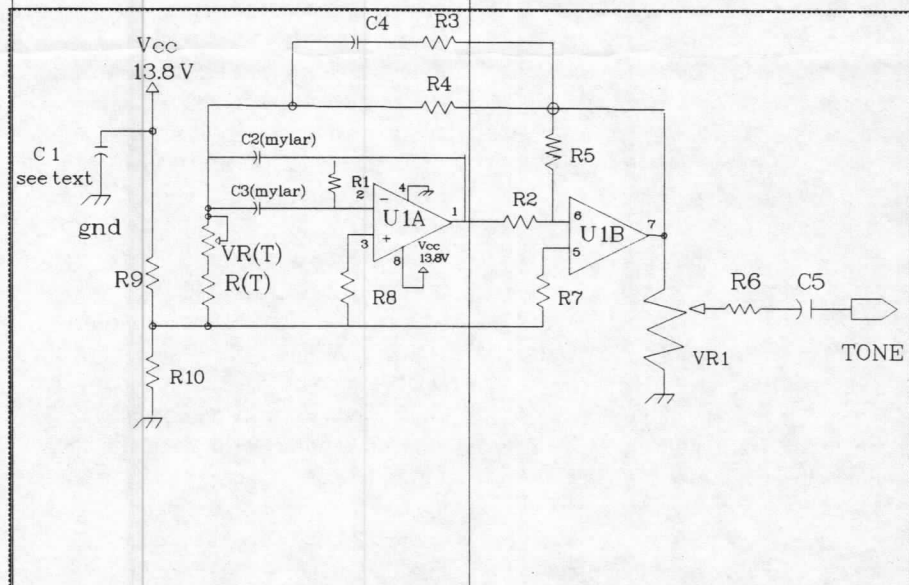
In Praise of Pre drilled Boards

If this is your first experience with a pre drilled board you're in for a pleasant surprise. Except for the fact that you have to be very careful to avoid solder bridges, pre drilled boards simplify small project assembly. Radio Shack offers several variations of these boards. You could use either the RS 276-149 or 276-150 board to make two of these CTCSS tone boards. I prefer the 150 board because it has strings of connected pads, to simplify construction. You may prefer the flexibility of the other. For group projects it'll be cheaper to cut up one of the larger boards into suitably sized pieces.

Make the board as small as possible, to fit inside the transceiver. The largest components are the

uF RF bypass capacitor was used on The power lead, as shown on the circuit diagram, and all Leads were kept short.

Once all of the components are in hand, it's a good idea to make a sketch showing the physical layout. If you use a board with connected pads, such as the RS 276-150, make sure that all items entering or leaving each "node" are connected—even if you have to jumper strips together to do it. If you use the separate pads, as on the RS 276-149, remember that you'll have to "wire" the pads together after soldering the components to the pre drilled board. Show these wires on your sketch. (Note: I use very fine wire to connect the pads and create "solder bridges" between those pads that I want to connect.)



potentiometers and the Mylar capacitors. You can get it as small as 0.8 x 1.5 inches. Photo A shows the completed board. You'll find space to mount the unit inside most mobile 2 meter transceivers, but for ran HT, you will probably have to resort to external mounting. This has been done without trouble as long as the 0.001

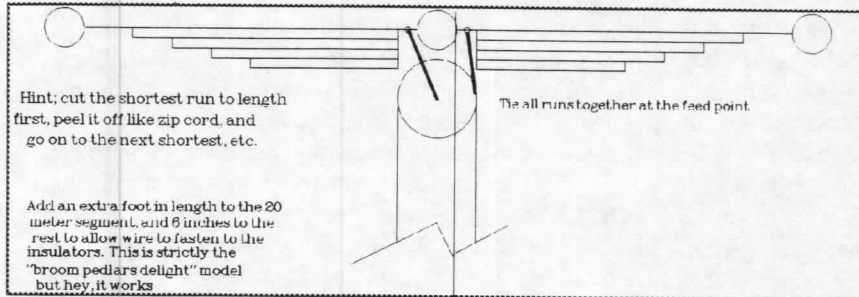
Check to make sure that you make all of the connections called for in the schematic. If the circuit doesn't oscillate at the desired frequency, you can bet that the diagram didn't support the circuit. It is a good idea to try a few different layouts to find the one that fits your transceiver the best; it's better to do it at this time than after the

cutouts are useful for sizing.

Having the right connections

DO NOT--REPEAT--DO NOT try to insert the tone into the microphone circuit. Signal shaping in that area is almost guaranteed to attenuate and distort the tone to oblivion. User manuals for many fairly new 2 meter rigs suggest a connection point for the PL generator. Read your manual before taking someone else's advice! If the manufacturer didn't offer a solution, use the schematic to locate the deviation adjust potentiometer. Tone input at the tip end (preferably), or center tap of that potentiometer, will generally be satisfactory. In one or two cases, with older synthesized transceivers using the Motorola . Some also offer a front panel switch-controlled power source. Such was the case with the Kenwood and the Azden models. If so, by all means take advantage of it. Even though this CTCSS hoard uses very little current, it's preferable to take it from the transmitter source. The circuit diagram of Figure 1 suggests a Vcc of 13.8 volts, but any voltage from 6 to 13.8 works, as long as that is the voltage applied when tuning the oscillator. The current requirement varies from about a low of 7.4 mA at 8 volts to about 9.5 mA or 12 volts. It should not pose a problem for even a small battery.

If you use a mechanical relay to switch power to the transmitter finals, you can usually find a switched positive 8-12 volt source at one of the relay terminals. To get the tone when you want it, put a wire from that point to a mechanical switch at some accessible place on the cabinet, and from there to the CTCSS supply terminal. The switch lets you disable the tone when you don't want it. When you use a transistor switch, rather than a relay to key on the transmitter finals you have a couple of choices. If you're sure about what you're doing, pick up the 8-12 volts your rig uses at the same point that the transmitter final uses it.



Bring the ground wire of the CTCSS board to the collector (or the emitter, as the case may be) of the transistor that actually keys on the power transistors. If you're not comfortable doing that, go to the same source point, but take groundwire from the CTCSS board to the open side of the Ptt (Push-to-Talk) switch in the microphone circuit. You will probably still want to use a mechanical Switch to disable the CTCSS board when you're not operating PL.

If you're not using a voltage source provided by the manufacturer, it's a good idea to Protect the CTCSS circuit--and your audio signal--against unwanted RF. Use the 0.001 uF bypass capacitor as shown on the schematic.

With these examples and your imagination, you should have very little trouble adapting the circuit to your rig. Although the design is for a single tone, you can readily modify it to offer two tones by adding another tuning potentiometer, a fixed resistor, and if necessary, a switch. If you have to use an external power switch, as we did for the Conarc 452, you could make it a double-pole-double-throw center-off switch to do double duty for on/off and frequency select.

Think Big

This easy, one- or two-evening project is full of possibilities. Since it's at audio frequency layout is not at all critical. Admittedly you will need a good low frequency counter to adjust the tone, but if a repeater is near, that shouldn't be a problem. Just contact the trustee. With any luck, you'll find

one close at hand, and you'll have the pleasure of home-brewing as it used to be--at minimum
submitted by Brett, N5SQK

A CHEAP AND EASY MULTI-BAND ANTENNA

submitted by Dick, N5AE

This is a very old trick, but it is so old some of the newer hams may not have seen it, and might find it useful. Also, some older hams might like to try it as a cheap and dirty way to try out some new different bands without putting any serious money in an antenna until they know if they liked them.

The one I have on the air now covers 20, 17, 15, 12, and 10 meters. All that is needed is 50 ft. of 5 conductor flat antenna rotor cable, and insulators for the center and ends. If you have to buy everything, it's still less than a ten spot.

The approximate lengths each side of center are: 20 meters 17' 5", 17 meters 13' 7", 15 meters 11' 8", 12 meters 9' 10", and 10 meters 8' 6". Because of the intercoupling these numbers will not be exact, however, they are close enough that a mere tweak with any kind of antenna tuner brings it right in. Not worth the time and effort to cut and prune.

APRIL PARC

MEETING MINUTES

by Monty KC5OMK

* Meeting opened by Don Bristow in Joe Mayfields absence.

* All present introduced themselves. We had one guest..... Mark who is David's KK5FK friend. Treasurers report presented and approved.

* B. Sims announced the Digital Voice Recorder has been ordered and will arrive soon.

* George WA5CBS ask that club records be changed to reflect his correct call. Not W5CBS.

* Minutes of the March meeting were read and approved.

* The club recognizes Chip Andrews N5LTZ for donating the Hardline placed on the 146.94 machine.

* A tape from the ARRL has arrived and will be shown at a future club meeting.

* Currently no major overhauls are recommended for the 146.66 machine but it may need some tuning.

* Wally suggests we consider putting the Oscillator on a Web page. The club could save money on postage if the members who have Internet service would get their Oscillator online. Brett Sims reported that Ron Mashburn at ATC will give us space for our Web Page on their Web page.

* The key chains that Robert KC5DKQ ordered have arrived and some of them were passed out.

* Chip Andrews reported that there is a problem with crossbanding on the S.W. Link. Chip requested that if you are going to crossband please advise him if possible prior to use. Also if used be sure to turn it off after using it. * 94 update.... Speed dials are programmed. Get a speed dial number from Brett if you want. DVM should arrive in the next few days. The phone patch no longer repeats the phone number when it is dialed.

* Field Day.... Request for awnings/tents/and alternate sites were made by Dick N5AE. The club will also provide a portable potty.

*Don encouraged us to purchase a banner with the club logo. Chip suggested we ask W5IUZ in Liberal Kansas to help with art work. He makes the S.W. Links art work. Ronnie N5LTZ also has a patch that was used by PARC that he could send to W5IUZ for a pattern.

* Maury gave an excellent talk about APRS.

* Meeting then adjourned.

SIX METER PROPOGATION PROGRAM AVAILABLE

by Brian K6STI submitted by Ben WS5R

I'd like to alert six-meter ops to the fabulous VOACAP propagation-prediction program available for free at ftp.voa.gov. This is a version of the professional IONCAP program that has been substantially enhanced for use by the Voice of America. Most VOACAP calculations are restricted to HF, but the program does calculate MUFs above 50 MHz.

Here's what you can do with VOACAP: Specify the month of the year, the sunspot number, your QTH, antenna type, height above ground, and many other station parameters. Define an area of interest (Europe and Africa, for example). VOACAP then draws a map of the area with the MUF overlaid as continuous color regions. You can see at a glance where six meters is likely to open. You can change any parameter and see how it affects the opening. The graphics are stunning and the information fascinating.

I checked VOACAP for the long-path opening to Okinawa that occurred from Southern California one morning during the last sunspot cycle. A small color patch for MUF > 50 MHz overlaid Okinawa but did not extend into mainland Japan--just as actually

occurred. Other known paths for the last cycle, including openings to VK after 2100 local time, check out as well.

VOACAP is a tremendous tool for investigating possible six-meter propagation paths. Get the Windows version--the DOS version lacks certain features and will not be developed further.

To increase the accuracy of VOACAP predictions, I've written a little utility to convert elevation patterns generated by the TA 1.0 Terrain Analyzer program to VOACAP antenna files. This utility lets you generate VOACAP maps using the elevation pattern of your specific six-meter antenna as sited in your local terrain. If you have TA and would like a copy of this utility, I'll be happy to e-mail it to you. Please specify uuencode, MIME, or BinHex format.

73--Brian,

K6STI

k6sti@n2.net

P. A. R. C.

MEMBERSHIP LIST

04/15/96

MEMBER EXPIRATION DATE

KC5JC 05/01/97

STAN ADELMAN

W5PSZ 01/01/97

LUTHER ADKINS

N5LRH 12/01/97

VERNON ALEXANDER

N5LTZ 4/01/96

CHIP ANDREWS

KB5ZRK 12/15/96

G. T. AWALT

N5UPC 03/01/97

RANDY BAKER

WB5RSN 05/01/96

PAUL BEAUCHAMP

KC5JIF 10/01/96

REDDY BIGGS

N5YOX 11/01/96

V.A. BRAUCHI

N5DJG 07/01/96

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may 1996

THOMAS BREIDEGAN
 KC5EZO 11/15/96
 DONALD BRISTOW
 KB5WIO 04/01/96
 JIMMY BURKHALTER
 W5ILJ 12/31/96
 JOE BUTLER
 N5VRN 08/01/96
 LELAND CARPENTER
 KC5CGT 01/01/96
 MATT CARPENTER
 KB5DNT 12/06/96
 RALPH CHEEK
 KE4UGV 03/05/97
 BERRY COLLYER
 AB5ZA 03/01/97
 MARSHALL COOK
 WD5IKZ 05/01/96
 LEE DAVIS
 KC5OMK 05/01/96
 MONTY DENNY
 K5IS 01/01/99
 JEROME DOERRIE
 KA5PHU 08/01/96
 LEE ESTEVEZ
 W5CKR 12/01/96
 JIM FOWLER
 KL7IYP 09/15/96
 GEORGE GASPAROVICH, JR
 W6TQD 09/15/96
 GEORGE GASPAROVICH, SR
 W5PIP 01/01/96
 FRED GILBERT
 N1CSD 10/01/96
 GENE GLOVER
 KI5VR 04/01/96
 DALE HALL
 WB5WCD 06/01/96
 RICHARD HAMILTON
 WB5QLI 02/01/96
 KEN HANSON
 KB5VLV 05/01/97
 CHARLIE HARRIS
 KA5VID 01/01/97
 BILLY HARRISON
 W5FBQ 10/01/96
 BOB HILL
 N5YXN 03/03/96
 CARL JEANS
 KA5TEY 11/01/96
 MURLE JONES
 N5ZLU 04/01/97
 RONNIE KERR

KA5BYB 03/15/96
 CLEON LIGON
 K5WZF 12/31/99
 JOHN LISMAN
 K5KNA 02/01/96
 JACK LOVE
 N5SXJ 06/01/96
 ROBERT MACMILLIAN
 WB5IZH 06/01/96
 ED MANN
 WA5UUS 01/01/99
 RON MASHBURN
 KA0YOS 11/01/96
 GARY MAYFIELD
 KC5DTA 01/01/96
 DAN MCCABE
 N5MGU 05/01/96
 JEROLD MCCOWN
 KC5DKQ 10/01/96
 ROBERT MCKEE
 KK5MB 03/15/97
 KEITH MONSON
 W5SFW 08/01/96
 PHIL PATTERSON
 KB5RQV 02/01/96
 KENNETH PAYTON
 WB5ORP 06/06/96
 WILLIAM PETERS
 WZ5C 08/01/96
 GUY PIGG
 NZ5P 11/01/96
 TIM PILLSBURY
 KC5OMI 08/01/96
 JERRY POLLARD
 KD5WJJ 01/01/97
 O E PRICE
 N4BZ 02/05/97
 WALLACE PROVOST
 WB5MEX 02/06/97
 HURSHIEL PRUITT
 W5MJD 08/01/96
 JOE PRYOR
 KC5QVU 02/03/97
 LARRY QUEBEDEAUX
 N5AE 10/01/96
 DICK REIMUND
 N5WTW 10/01/96
 GEORGE RILEY
 WD5FOI 03/01/96
 JOHN ROBINSON
 KK5FK 03/05/97
 DAVID ROWE

KC5HKT 03/01/97
 LALON SAVAGE
 KC5KCA 09/15/96
 DENNIS SCHLEGEL
 WA5PEO 02/01/97
 CHARLES SEITZ
 N5SQK 10/01/96
 BRETT SIMS
 W5UGQ 06/06/96
 MAURICE SPROUL
 WY5B 03/01/96
 B .M .STEVENSON
 KE5XR 08/01/98
 DAVE THOMPSON
 WB2UZT 01/01/97
 JERRY VANNOTE
 KB5EY 05/01/96
 BRAIN W.F
 KB5ZJO 03/05/97
 DAN WALTERSCHEID
 W5CBS 03/05/97
 GEORGE WEST
 W5IJQ 09/01/96
 HERMAN WHATLEY
 KB5VJW 07/10/96
 TERRY WHITAKER
 W5RXC 12/30/99
 JIM WILHITE
 KK5KK 07/01/96
 DAVID WILLIAMS
 KK5IH 01/01/97
 LONNIE WILLIAMS
 N5TOY 05/01/96
 JOHN YOST

W5WX REPEATER 146.94 USER COMMAND SUMMARY

Please note some of the 94 commands have changed with the new controller software.

This will make things a little more consistent when we implement voice-mail.

Note the public service speed dial numbers are two digit. If any other members are interested in speed dial numbers, just let me know. We'll set

you up. The autopatch now does not announce the phone number over the air.

Speed dials are announced with callsign.

Notice the use of the astrisk is not required.

401 TIME
402 DATE
403 BATTERY VOLTAGE
404 DTMF TEST

410 PL ACCESS MODE (88.5)
411 REMOVE PL ACCESS MODE
NOTE: IF YOU GO TO PL
ACCESS YOU WILL NEED
PL TO REMOVE PL ACCESS

AUTOPATCH
301XXXXXXX DIAL NUMBER
XXXXXXX ON AUTOPATCH
302 HANGUP AUTPPATCH
303 REDIAL
304 XX CHECK A SPEED DIAL
ASSIGNMENT

USER SPEED DIAL NUMBERS
50 - KC5OMK
51 - KB5WIO
52 - KC5DKQ
53 - N5SQK
54 - KB5VLV
55 - KC5EZO
56 - KK5FK

EMERGENCY 911
note: autopatch 911 will ALWAYS
ring Potter County S.O.

AMARILLO PD 80
AMARILLO FIRE 81
AMBULANCE 82
CANYON PD 85
CANYON FIRE 86
DPS 90
POTTER CO S.O. AND FIRE 95
RANDALL CO S.O. 96

President's Letter

Field Day is looming nearer all of the time! I hope you have planned to make the extravaganza! I would like

to make a special invitation to the senior members of the club to come and enjoy the fun. Chip tells me there is unlimited RV parking (Sorry no hook ups) so bring your camper and be prepared to have a good time! A very large tent has been made available and will be used this year thanks to Don. Plans are coming together nicely so plan on being there. Of course Dick is still looking for you to volunteer to help with the effort. Since spring has sprung the club may want to consider another "Through your Junk in the Trunk meeting". I think everyone who has gone to one of these in the past has enjoyed it. My garage tells me we are about due to have another one.

For many the pilgrimage to Arlington (Ham-Com '96) is rapidly approaching. If your heading that way have a good time! The new speed limit should shorten the time needed for the trip, but be careful I've heard some of the local enforcement is still rather tight.

In conclusion it looks like we have some busy time in front of us. Let's make the most of it.

73 for now!

Joe ka0yos

FOR SALE

N5SQK has the following for sale,
call 359-0890, ask for Brett.
ICOM 211 TWO METER ALL
MODE with ICRM-2 REMOTE
CONTROLLER \$350.00
ICOM IC-290A TWO METER
ALL MODE \$400.00
YAESU 747GX H.F.
TRANSCEIVER Remote mount
head option 10 Meter FM option
TCXO option, power 100watts
xmit/recv from 100KHZ to
30MHZ all solid state with digital
display \$625.00

Satellite Roundup!!!

Here is the first installment of the history of amateur satellites I promised last month. This is taken directly from the AMSAT world wide webpage (<http://www.amsat.org>).

A Brief History of Amateur Satellites Orbiting Satellites Carrying Amateur Radio (OSCAR) series of small satellites was initiated for radio amateurs to experience satellite tracking and participate in radio propagation experiments.

The World Administrative Radio Conference (WARC) allocated frequencies for the Amateur Satellite Service, including 29 MHz (10m), 145 MHz (2m), 435 MHz (70cm), 1270 MHz (24cm) and 2400 MHz (13cm). Transmitting low-powered signals, initially battery operated and offering short lives, the satellites have become increasingly sophisticated. More recently, they have served school science groups, provided emergency communications for disaster relief, acted as technology demonstrators, and transmitted Earth imagery.

PANHANDLE NET SCHEDULE
P.A.I.N. 146.94 8:00PM SUN
CLOUD CHASERS 145.92 8:00
PM MON
SIDEWINDERS 144.2 USB 8:00
PM MON
A R E S 146.52 8:00 PM THURS
PANHANDLE TRAFIC AND
EMERGENCY NET
3933 KHZ LSB 00:00 UTC
DAILY
A M S A T 3940 KHZ 9:00
THURS
S W LYNX NET 147.56 6:00 PM
THUR
PAMPA TOP OF TEXAS NET
146.90 WED 8:00P,
FRITCH SIDEWINDERS NET
147.30 TUES 8:00PM

Here is a brief history of the amateur

satellites that have and are presently circling the globe. They are listed in chronological order by launch date.

General References - For an excellent coverage on the history of amateur satellites, please refer to:

* Jan King, et al, "OSCAR at 25: The Amateur Space Program Comes of Age," QST, Dec 1986.

* Martin Davidoff, The Satellite Experimenter's Handbook, 2nd edition, The American Radio Relay League, Newington, CT., 1990.

* Keith Baker and Dick Jansson, "Space Satellites from the World's Garage -- The Story of AMSAT," National Aerospace and Electronics Conference, Dayton, Ohio, 23-27 May 1994.

OSCAR I

The first amateur satellite, OSCAR I was launched December 12, 1961 by a Thor Agena B launcher from Vandenberg Air Force Base, Lompoc, California. OSCAR I was launched piggyback with Discover 36, a United States Air Force satellite. Orbit 372 x 211 km. Inclination 81.2 degrees. Period 91.8 minutes. OSCAR I was the first of the phase I satellites.

A group of enthusiasts in California formed Project OSCAR and persuaded the United States Air Force to replace ballast on the Agena upper stage with the 4.5 kg OSCAR I package. The satellite was box shaped with a single monopole antenna and battery powered. The 140 mW transmitter onboard discharged its batteries after three weeks. 570 Amateurs in 28 countries reported receiving its simple "HI-HI" morse code signals on the VHF 2 meter band (144.983 MHz) until January 1, 1962. The speed of the HI-HI message was controlled by a temperature sensor inside the spacecraft. OSCAR I re-entered the atmosphere January 31, 1962 after 312 revolutions.

From The Satellite Experimenter's Handbook, Martin Davidoff writes: "OSCAR I was an overwhelming

success. More than 570 amateurs in 28 countries forwarded observations to the Project OSCAR data reduction center. The observations provided important information on radio propagation through the ionosphere, the spacecraft's orbit and thermal satellite design. The OSCAR I mission clearly demonstrated that amateurs are capable of (1) designing and constructing reliable spacecraft, (2) tracking satellites and (3) collecting and processing related scientific and engineering information. Because of its low altitude, OSCAR I only remained in orbit for 22 days before burning up as it re-entered the earth's atmosphere."

OSCAR I led to the creation of The Amateur Satellite Corporation (AMSAT) in 1969.

Listen to OSCAR I's "HI-HI" from the Sounds from the First Satellites page.

References:

* William Orr, "Sixty Years of Radio Amateur Communications," QST, Feb 1962, pp 11-15, 130, 132.

* H. Gabrielson, "The OSCAR Satellite," QST, Feb 1962, pp 21-24, 132, 134. * William Orr, "OSCAR

I: A Summary of the World's First Radio-Amateur Satellite," QST, Sep 1962, pp 46-52, 140.

Next month we continue on with this series. We'll take a break for a Field Day column in June.

73, See you on the Birds!

Joe ka0yos

VOLUNTEER EXAMINER SCHEDULE.

All examinations will be held at the Southwest Brance of the Amarillo Public Library.

May 7 6 PM
June 1 11 AM
July 2 6 PM
Aug 10 11 AM
Sep 3 6 PM
Oct 5 11 AM
Nov 5 6 PM
Dec 7 11 AM

RACES

Potter County May 28 at EOC
Randall CTY. May 21 at Fire Station

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