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Heath's GR-88 Gets Religion!

—convert it to 2 meters

It appears that, due to the increase in popularity of "scanning" type VHF receivers, the Heathkit® GR-88 tunable receiver has become available at modest sale prices. The GR-88 is a completely solid state receiver that tunes from about 152 to 174 MHz and has provisions for one crystal-controlled channel. With the self-contained battery pack, it is completely portable. Full squelch circuitry is also a fine feature of this receiver. It doesn't have a 30-pole crystal filter for the ultimate in selectivity, but the 10.7 MHz i-f is quite good for a general-purpose monitor receiver.

The front end or tuner portion of the GR-88 is factory assembled and prealigned. The 10.7 MHz i-f, squelch, and audio board must be constructed as a typical Heathkit. The 10.7 MHz i-f transformers have also been factory aligned for ease in the final tune-up procedures.

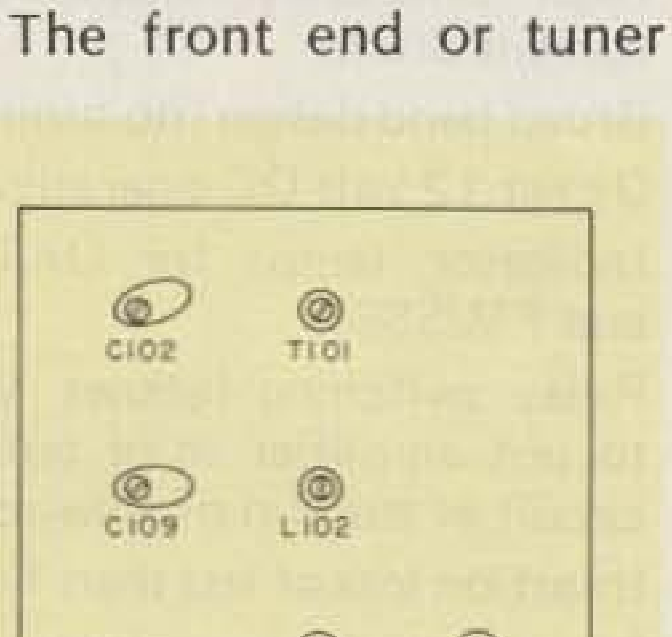

Fig. 1. GR-88 tuner, top view.

Although the GR-88 has a factory prealigned front end, it can be quite easily retuned to cover 142-160 MHz with no additional components. This 142-160 MHz frequency span allows reception of MARS channels below and above two meters and most of the public service frequencies above two meters.

The GR-88 can be realigned for two meters with a minimal amount of test gear. All that is necessary is a simple grid-dip meter or signal generator that covers two meters and below. The plastic alignment tools provided by Heath in the original kit are adequate for tune-up. Do not use metal tune-up tools as their resultant capacity can make alignment pretty tough.

Fig. 1 illustrates the positions of the coils and capacitors that will have to be adjusted during alignment. The first step is to couple the test generator to the GR-88 receiver. Of course, if you are fortunate enough to have a signal generator, it can be coupled directly to the antenna input. If you are using a grid-dip meter, a small piece of hookup wire inserted in the GR-88 antenna jack will couple the signal into the receiver.

The main tuning dial of the receiver should be set at 152 MHz or its lowest frequency setting. The dial should remain in this position during the entire tune-up procedure. With power on and the squelch off, adjust your signal source until this frequency (about 152 MHz) is detected by the receiver.

C112 is the metal screw (older models) or ceramic capacitor (newer models) that trims the frequency of the oscillator stage. C112 should be tuned in small increments and the received signal followed *down* the band with your signal source. You will eventually reach a point where this trimmer (C112) will no longer cause a decrease in frequency. With the screw-type trimmer, it probably will be all the way in. Leave the trimmer at this setting. L102 is now tuned clockwise until you detect a frequency of 142 MHz.

We must mention at this point that T102 (10.7 MHz mixer coil) should not be adjusted at any time during the realignment.

The rf amplifier and mixer stages are next in the alignment procedure. With the same signal source at 142 MHz, adjust both C102 and C109 fully clockwise to increase their capacity. T101 and L101 are now adjusted clockwise for a maximum increase in signal strength.

If you are using a grid dipper as the signal source, back it as far away from the receiver as possible and retune T101 and L101 for maximum signal. C102 and C109 can also be adjusted for maximum.

When you can no longer detect an increase in signal from the test source, attach your two meter antenna and tune around a bit. At this point, some two meter activity should be detected. Select a weak station and once again adjust T101, L101, C102, and C109 for maximum. This completes the front end alignment. If you so desire, the 10.7 MHz i-fs may also be tweaked up a bit. With a weak two meter station, carefully adjust T1, T2, T3, and T4 for optimum signal and clarity of FM reception.

Although we have not tried crystal-controlled operation on two meters with the GR-88, it should be entirely possible. For a frequency of 146.000 MHz, the crystal frequency would be determined as follows: 146.000 (desired receive frequency) − 10.700 (i-f frequency) = 135.300 (oscillator output frequency). 135.300 (oscillator output frequency) ÷ 3 = 45.100 (crystal frequency).

Therefore the crystal frequency would be 45.100 MHz.

When ordering a crystal for a specific frequency, it should be of the following type:
Holder: HC-18/U
Load capacitance: 32 pF
Mode: Parallel resonance on the third mechanical mode of oscillation
Frequency tolerance: .0025% at 25 degrees C.
Maximum drive level: 1.2 mW
Effective resistance: 25 Ohms

C44 will have to be retuned for a resonance of L3 at 135.300 MHz for reception at 146.000 MHz. It is possible that a small amount of capacitance may have to be added to C44 (in parallel with). Use a high-quality silver mica for this application should it be necessary.

Upon completion of this conversion, the GR-88 serves well as a general-purpose receiver for both two meters and the additional frequencies up to 162 MHz. ■

DX

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posal to reserve 10 kHz in each amateur band for worldwide communications during natural disasters have been invited. Last-chance comments closed on August 31, after which the CIC will prepare the Canadian position for WARC '79.

QSL INFORMATION

A2CED to K4EBY
A51PN to H.N. Pradhan, Amateur Radio Station, Post Office, Thimpu, Bhutan
D68AF to K5YY
FG7TD to W5RU
FR7BV to Michael Di Orio, LEP, Route Des Makes, 97450 Saint Louis, Reunion Island
GU5CIA/GU4EON/GU3YIZ to K5YY to PO Box 5299, Little Rock AR 72215
KA1IW to K8DYZ
KM6BI to W5RU
Box 100, Guernsey, Channel Islands, UK
H44CD to W4BAA
HF0POL to SP2BBD
HZ1BS/8Z4 to PO Box 31, Gratz, Austria
Northern California DX Foundation—see text
PJ8USA to W1CDC
S8ABC to Box 900, Secunda, 2302 Republic of South Africa
ST0RK—see text
SV0WY to S/Sgt Mike Woolverton, PO Box 3078, 7122 Broadcasting Sqdn, APO NY 09223
SV0WTT to Box 722, APO NY 09223
SV1JG—see text
TA1ZB to Metin Kutlu, Box 188, Istanbul, Turkey
VE1MTA—see text
VR3AH to WB4PRU
4AAFR to Box 642, Saltillo, Mexico
4U1UN—see text

Many thanks to the *West Coast DX Bulletin* and the *Long Island DX Assn. Bulletin* for much of the preceding information.

OSCAR Orbits

The listed data tells you the time and place that OSCAR 7 and OSCAR 8 cross the equator in an ascending orbit for the first time each day. To calculate successive OSCAR 7 orbits, make a list of the first orbit number and the next twelve orbits for that day. List the time of the first orbit. Each successive orbit is 115 minutes later (two hours less five minutes). The chart gives the longitude of the day's first ascending (northbound) equatorial crossing. Add 29° for each succeeding orbit. When OSCAR is ascending on the other side of the world from you, it will descend over you. To find the equatorial descending longitude, subtract 166° from the ascending longitude. To find the time OSCAR 7 passes the North Pole, add 29 minutes to the time it passes the equator. You should be able to hear OSCAR 7 when it is within 45 degrees of you. The easiest way to determine if OSCAR is above the horizon (and thus within range) at your location is to take a globe and draw a circle with a radius of 2450 miles (4000 kilometers) from your QTH. If OSCAR passes above that circle, you should be able to hear it. If it passes right overhead, you should hear it for about 24 minutes total. OSCAR 7 will pass an imaginary line drawn from San Francisco to Norfolk about 12 minutes after passing the equator. Add about a minute for each 200 miles that you live north of this line. If OSCAR passes 15° east or west of you, add another minute; at 30°, three minutes; at 45°, ten minutes. Mode A: 145.85-.95 MHz uplink, 29.4-29.5 MHz downlink, beacon at 29.502 MHz. Mode B: 432.125-.175 MHz uplink, 145.975-.925 MHz downlink, beacon at 145.972 MHz.

OSCAR 8 calculations are similar to those for OSCAR 7, with some important exceptions. Instead of making 13 orbits each day, OSCAR 8 makes 14 orbits during each 24-hour period. The orbital period of OSCAR 8 is therefore somewhat shorter: 103 minutes.

To calculate successive OSCAR 8 orbits, make a list of the first orbit number (from the OSCAR 8 chart) and the next thirteen orbits for that day. List the time of the first orbit. Each successive orbit is then 103 minutes later. Due to incorrect tracking information obtained during the early days of OSCAR 8, the equator crossing times contained in most published charts are in error. To correct this error, multiply the orbit number by 0.00205 minutes and add the result to the equator crossing time as printed in the chart. For example, the published time for orbit number 3352, the first equatorial crossing on November 1, 1978, is 0018:50 UTC. Thus, for orbit number 3352, the corrected equatorial crossing time would be:

Corrected time = 0018:50 + (3352 × 0.00205 minutes)
= 0018:50 + (6.8716 minutes)
= 0025:42.3

The longitude figures contained in the OSCAR 8 chart are virtually unaffected by this tracking error. The chart gives the longitude of the day's first ascending equatorial crossing. Add 26° for each succeeding orbit. To find the time OSCAR 8 passes the North Pole, add 26 minutes to the time it crosses the equator. OSCAR 8 will cross the imaginary San Francisco-to-Norfolk line about 11 minutes after crossing the equator. Mode A: 145.85-.95 MHz uplink, 29.4-29.50 MHz downlink, beacon at 29.40 MHz. Mode J: 145.90-146.00 MHz uplink, 435.20-435.10 MHz downlink, beacon at 435.090 MHz.

Oscar 7 Orbital Information

Orbit	Date (Nov)	Time (GMT)	Longitude of Eq. Crossing °W
18120 Bbn	1	0144:47	86.1
18132 Abn	2	0044:08	71.0
18145 Bbn	3	0138:25	84.6
18157 Bbn	4	0037:45	69.4
18170 Abn	5	0132:03	83.0
18182 Bbn	6	0031:23	67.9
18195 Bbn	7	0125:41	81.4
18207 Abn	8	0025:01	66.3
18220 Bbn	9	0119:18	79.9
18232 Bbn	10	0018:39	64.7
18245 Abn	11	0112:56	78.3
18257 Bbn	12	0012:17	63.2
18270 Bbn	13	0106:34	76.8
18282 Abn	14	0005:55	61.6
18295 Bbn	15	0100:12	75.2
18308 Bbn	16	0154:29	88.8
18320 Abn	17	0053:50	73.6
18333 Bbn	18	0148:07	87.2
18345 Bbn	19	0047:28	72.1
18358 Abn	20	0141:45	85.7
18370 Bbn	21	0041:06	70.5
18383 Bbn	22	0135:23	84.1
18395 Abn	23	0034:43	69.0
18408 Bbn	24	0129:01	82.6
18420 Bbn	25	0028:21	67.4
18433 Abn	26	0122:39	81.0
18445 Bbn	27	0021:59	65.8
18458 Bbn	28	0116:17	79.4
18470 Abn	29	0015:37	64.3
18484 Bbn	30	0109:54	77.9

Oscar 8 Orbital Information

Orbit	Date (Nov)	Time (GMT)	Longitude of Eq. Crossing °W
3352X	1	0018:50	46.0
3366 Abn	2	0024:02	47.4
3380 Abn	3	0029:13	48.7
3394 Jbn	4	0034:25	50.0
3408 Jbn	5	0039:36	51.3
3422 Abn	6	0044:48	52.6
3436 Abn	7	0049:59	53.9
3450X	8	0055:11	55.2
3464 Abn	9	0100:22	56.5
3478 Abn	10	0105:33	57.8
3492 Jbn	11	0110:45	59.2
3506 Jbn	12	0115:56	60.5
3520 Abn	13	0121:08	61.8
3534 Abn	14	0126:19	63.1
3548X	15	0131:30	64.4
3562 Abn	16	0136:42	65.7
3576 Abn	17	0141:53	67.0
3589 Jbn	18	0003:51	42.5
3603 Jbn	19	0009:02	43.8
3617 Abn	20	0014:13	45.1
3631 Abn	21	0019:25	46.5
3645X	22	0024:36	47.8
3659 Abn	23	0029:47	49.1
3673 Abn	24	0034:58	50.4
3687 Jbn	25	0040:10	51.7
3701 Jbn	26	0045:21	53.0
3715 Abn	27	0050:32	54.3
3729 Abn	28	0055:43	55.6
3743X	29	0100:55	56.9
3757 Abn	30	0106:06	58.2