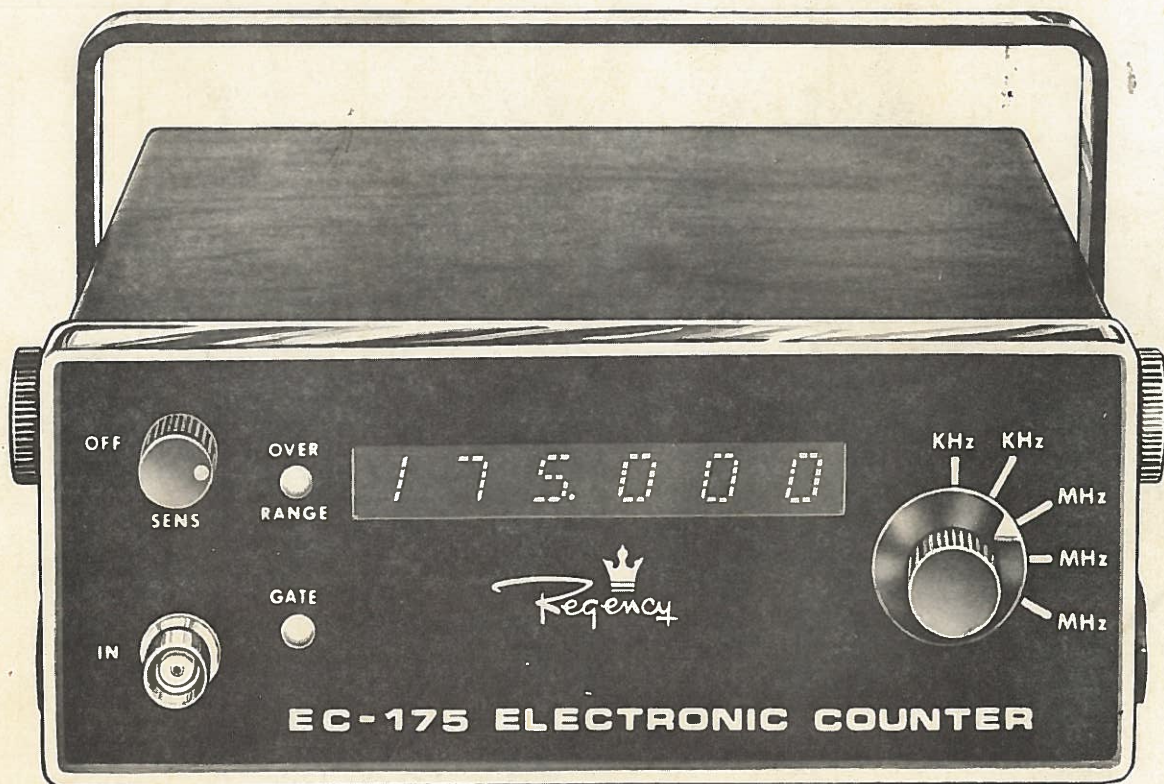


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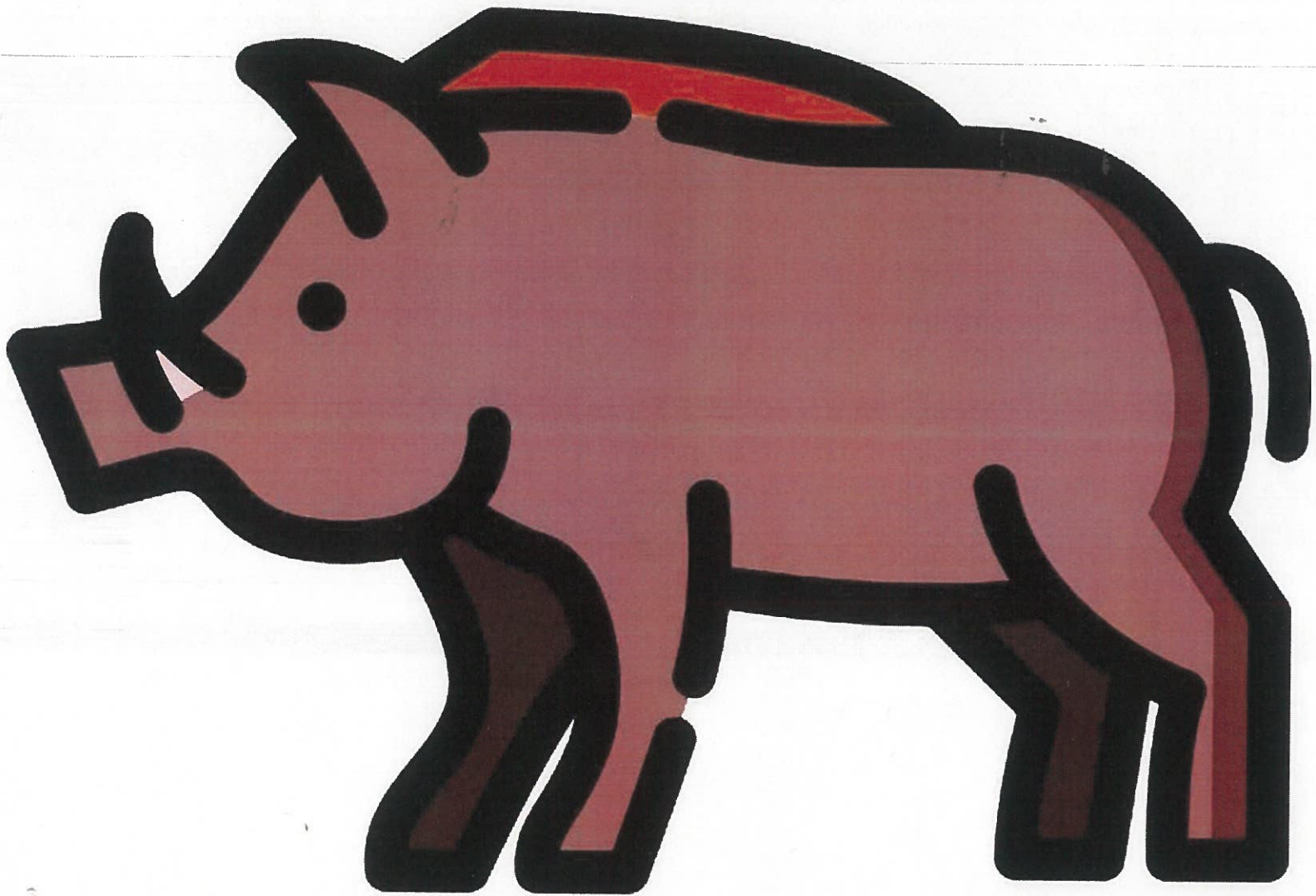
 **Regency** ELECTRONICS INC.

OWNER'S MANUAL



MODEL EC-175 ELECTRONIC COUNTER

manual courtesy of wereboar.com



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SECTION 1 GENERAL INFORMATION

1-1 DESCRIPTION

The EC-175 is an all solid-state Frequency Counter that can accurately count frequencies from 5 Hertz up to at least 175 MHz. The six digit displays (readouts) are Light-Emitting Diode (LED) arrays. The Gate and Over Range Indicators are also LED's. The various number of semi-conductors in the EC-175 are 11 diodes, 21 transistors and 24 integrated circuits.

The unit will operate on either 120 VAC or 12 VDC. The built-in power supply is fully voltage regulated and current limited. In addition, the regulated voltage is also temperature stabilized. Whenever the unit is connected to a power source, the reference oscillator and its oven are always on, even though the front panel control (sensitivity) is turned to the OFF position.

A single selector switch (Range) has five positions that facilitates readings from 0.1 Hertz to 175 MHz. The decimal point is automatically positioned with each setting of the Range switch. In conjunction with this, all non-significant leading zeros are suppressed, except for the first zero to the left of the decimal point.

The Sensitivity control, in addition to being an ON-OFF switch, varies the gain of the input amplifier, a dual-gate MOSFET. The input amplifier is broadbanded and permits readings of low level signals over a very wide range of frequencies. Maximum sensitivity is achieved when the control is set to its full clockwise position.

The Time Base Reference is an oven-controlled, precision crystal oscillator that features exceptional stability over a wide variation in ambient temperature and over a long period of time. The oscillator oven temperature is proportionally controlled and responds smoothly to abrupt ambient conditions. Warm-up time is only 15 minutes, or less, for the oscillator and its oven to reach their basic operational stability, even if the unit had not been previously connected to a power source.

Field calibration of the time base reference is provided for by the inclusion of a 100 KHz calibrator signal. Full details are presented in paragraph 4-5 of Section 4. In addition to the calibration signal, an alignment signal is also available. This alignment signal is a crystal-controlled 10.7 MHz signal that can be used for aligning IF Sections and for adjusting the AFC circuitry in Regency's UHF Monitoradios.

1-2 SPECIFICATIONS

Input Impedance.....	1 megohm
Frequency Range.....	5 Hz to 175 MHz (min.)
Sensitivity.....	100 millivolts (max.) @ 100 MHz
Resolution (least significant digit)	
KHz (Range pos. 1).....	0.1 Hz
KHz (Range pos. 2).....	1 Hz
MHz (Range pos. 3).....	10 Hz
MHz (Range pos. 4).....	100 Hz
MHz (Range pos. 5).....	1 KHz
Gate (count) Time	
KHz (Range pos. 1).....	10 sec.
KHz (Range pos. 2).....	1 sec.
MHz (Range pos. 3).....	100 ms.
MHz (Range pos. 4).....	10 ms.
MHz (Range pos. 5).....	1 ms.
Time Base Stability (after 24 hour warm-up)	
Short Term (24 hours).....	2 parts in 10^{-8}
Long Term (6 months).....	1 part in 10^{-6}
0°C to 50°C (ambient).....	3 parts in 10^{-9} per deg. C
Oven Power.....	0.6 Watts (nom.) 3.5 Watts (max.)
Power Requirements.....	110-130 VAC, 60 Hz; 30 Watts (max.) 11-15 VDC, 2.2 Amps (max.)
Connectors	
Counter Input.....	BNC
10.7 MHz Alignment Signal (J2).....	Phono
100 KHz Calibration Signal (J3).....	Phono
Power.....	4-pin; polarized
Size.....	2 5/8" H x 6 1/2" W x 9 1/2" D
Weight.....	4 1/2 lbs.

1-3 ACCESSORIES

A number of accessories are available for the EC-175. These accessories facilitate making measurements or using the counter in portable type situations. The Frequency Measurement Accessory, MA-60, provides the necessary cables and pick-up loops for measuring the various frequencies encountered in all Regency products. Section 2-2 gives detailed information, in regards to specific product lines, in the usage of this accessory.

There are two DC power cable accessories for use with the EC-175. The MA-62 provides for easy connection to 12 VDC by merely inserting the plug end into a cigarette lighter receptacle. Since most vehicles or marine craft have a cigarette lighter installed, this provides for an easy connection to

their power source. The MA -62 is properly fused and has the necessary mating power receptacle for connecting directly to the EC-175. The other DC power cable, the MA -61, is for wiring directly into the vehicle's power distributing wiring. An example of this type of installation is a permanent DC power cable installed in the repair area of a service van or truck. The MA -61 is also properly fused (in-line type holder) and has the proper mating power connector.

1-4 SERVICE AND WARRANTY

Service or repairs are to be performed only by the factory. Only those field adjustments as described in Section 4 should be performed by non-factory personnel. The EC-175 is covered by a one year warranty as follows:

WARRANTY

This Counter is sold under a one (1) year warranty, which warrants it to be free from defects in material and workmanship. We agree to repair or replace at the point of manufacture, without charge, all parts showing such defects, provided the unit is delivered to us intact for our examination, with all transportation charges prepaid to our factory, within one (1) year from the date of sale to the original purchaser, and provided such examination discloses in our final judgement that it is thus defective. Fuses, transistors, diodes and integrated circuits shall be covered by the manufacturer's standard EIA warranty and such items shall be excluded from the provisions of this warranty.

This warranty does not apply if the Counter has been subjected to misuse, neglect, accidents, incorrect wiring, not our own, improper installation, or put to use in violation of instructions furnished by us, nor to the Counter that has been damaged by lightning, excess current, repaired or altered outside our factory, nor to the Counter that has had its serial number altered or removed.

CHANGES

The Company reserves the right to modify or change the equipment, in whole or in part, at any time prior to delivery in order to include refinements deemed appropriate by the Company, but without incurring any liability to modify or change any equipment previously delivered, or to supply new equipment in accordance with earlier specifications.

WARNING

The oven temperature adjustment is sealed at the factory. If this seal is broken or tampered with, in our judgement, the warranty on all Time Base Reference Oscillator components is voided.

SECTION 2 OPERATION

2-1 GENERAL OPERATING PROCEDURES

When the unit is first connected to a power source (120 VAC or 12 VDC) and the Sensitivity control has already been turned on, the display may indicate a random number for a short period of time. The length of time for this condition to exist will depend upon the position of the Range Switch. It usually takes only two Gate Indications (LED blinking) for this meaningless number to be replaced by all zeros. For example, if the Range Switch is in the second KHz position, the display will indicate all zeros within two seconds. If the Range Switch is in the first KHz position, it will take approximately 20 seconds for the display to be cleared (indicating all zeros). However, this interval can easily be shorted by momentarily placing the Range Switch to another position and then back again to the first KHz position.

For most measurements, such as L.O. frequencies, the EC-175 requires a warm-up period of only 15 minutes prior to usage. For highly critical measurements, such as transmitter frequencies or tone encoding frequencies, it is recommended that the EC-175 have a warm-up period of at least one hour. If the EC-175 has been connected to a power source, but turned off, it is recommended that it be turned on at least 5 minutes before making a measurement.

The Sensitivity control can be placed in the full clockwise position for most measurements. If the signal being measured is extremely large, either the coupling to the signal should be reduced, or the Sensitivity control should be turned counter-clockwise to reduce the input amplifier's gain. The correct setting of the Sensitivity control can be readily found by starting in the full counter-clockwise position and slowly turning it clockwise until a stable reading is obtained. Then turn the control just slightly past this point to ensure adequate sensitivity over normal signal condition variations.

The Range Selector has five switchable positions. The five positions are arranged, starting with the first KHz position, so that as the Range Selector is turned CLOCKWISE, a higher frequency signal can be displayed. For example, a signal whose frequency is 9 KHz can be read with the Range Switch in the first KHz position, while a 90 KHz signal can be displayed with the Range Selector switched to the second KHz position. In all cases, the first digit to the left of the decimal point in the display has a significant value equivalent to the indicated range position. Thus, this digit's value is either a unit of Kilohertz or Megahertz.

The Range Selector should be switched to the position that either displays the full frequency, or reads out at least one more digit than required for adjustment purposes. For example, if an encoding tone (not sub-audible) is being adjusted, place the Range Switch in the second KHz position. This permits reading the tone's normal full frequency of Kilohertz down to Hertz.

If the encoding tone is sub-audible, the Range Switch should be set to the first KHz position in order to read tenths of a Hertz as would be required. It should be pointed out that since the count Gate time in this position (first KHz) is 10 seconds, it may require taking readings in the second KHz position until the adjustment is very near its correct setting, then using the first KHz position for finalizing the adjustment.

The Over Range Indicator is lighted whenever the number being displayed does not include the most significant digit. In other words, there is at least one higher order digit of the frequency being counted that is not being displayed. To display all of the leading significant digits, turn the Range Switch clockwise until the Over Range Indicator goes out. Once it is determined that the most significant digits are correct, the Range Switch may be returned to the position that displays the least significant digit of interest. This usually is the procedure to follow when checking out a high frequency signal (greater than six digits) or when netting a transmitter's crystal.

When using the EC-175 with the Range Selector switched to the first KHz position, a reading should be considered proper only after the Gate Indicator has blinked at least twice. This precaution ensures that a full count was obtained. Because the Count Gate time is relatively long (10 seconds) when in this Range position, it is possible to start a signal count at a time other than at the start of the Gate time, especially when first applying the signal to the counter's input.

2-2 MEASUREMENT PROCEDURES - REGENCY PRODUCTS

To facilitate making proper frequency measurements for the various product lines of Regency, Table 2-3 lists each line's crystal specifications. The crystal specifications include the Part Number, the Frequency Formula and the Tolerance. In conjunction with these specifications, Tables 2-4 through 2-11 list most of the RECEIVE crystal frequencies used in each product. Marine Band TRANSMIT frequencies are also listed (Table 2-10) because only the channel number designation is normally stamped on the crystal. The Frequency Formula is included so that any unlisted crystal frequency can be readily calculated.

The Upper and Lower Limits listed for each Receive crystal takes into account the allowable tolerance from the crystal's theoretical or calculated frequency. If the frequency being displayed is within these limits, the crystal can be considered to be "on frequency". If the readout indicates a frequency outside of either of these two limits, the crystal should be considered as "out of tolerance" and it should be replaced.

The specific Measuring Loop for each product line is also listed in Table 2-3. These loops, part of Regency's Accessory MA-60, are color-coded for easy identification. In addition, there is a Oscillator Coil Location

Diagram (2-12 through 2-17) that is listed in the Table. These diagrams specifically indicate over which coil on the various RF boards the Receive Measuring Loop is to be placed.

When measuring a RECEIVE crystal's frequency, the Range Switch should be placed in the second MHz position. This will allow a direct comparison of the display with the crystal frequency listed in the table. The last digit on the right (least significant digit) will be indicating hundreds of Hertz.

To measure the crystal's frequency, place the appropriate measuring loop over the indicated oscillator coil (except for Low VHF Band) and move the loop toward the printed circuit board until a stable reading is obtained. Proper placement of the loop for the Low VHF Band (Diagram 2-12) is in line with the small coil and at one end, preferably the end that has no other component adjacent to it. The short coax cable (approximately 20 inches long) should be used with the two Low VHF Band Measuring Loops while the long (57 inches) coax is used with all of the other loops.

If the last three, or more, digits are indicating erratically, the reading should be considered improper or unsuitable. Slowly move the loop up or down until the reading has stabilized, with only the last one or two digits changing by one number. If a stable reading can not be obtained, make certain that the Sensitivity control is set for maximum sensitivity. Also, try a different loop if more than one loop is listed for that particular band. The first loop listed (by color) covers approximately the lower segment of the crystal's Frequency Range while the second one listed covers the upper segment. A "weak" crystal or oscillator will make it difficult to get a stable reading. A "dead" crystal will result in no reading at all.

To measure a TRANSMIT frequency of one of Regency's transceiver's, the first step is to determine which Measuring Loop to use. Table 2-3 lists the transceiver's by product line and indicates the appropriate measuring loop to use for each one. The proper loop is to be used with the long (approximately 57 inches) coax cable. Next, set the Range Selector switch to the third MHz position and set the Sensitivity control for maximum sensitivity (full clockwise). Then, place the Measuring Loop near the antenna connector on the rear of the unit and briefly transmit (preferably into a dummy load or wattmeter). Slowly move the loop around in the general area of the connector until a readout is obtained.

If all digits being displayed are stable, the reading should be considered proper. If the last two or three right side digits are indicating erratically, the reading should be considered improper, as a result of insufficient signal being applied to the counter. To obtain an adequate input signal level, the transceiver may have to be removed from its case or cabinet and the measuring loop placed near the transmitter section of the unit. In all units, the loop should be positioned near the transmitter's output circuitry. The output circuitry is at the point where the coaxial cable is connected to the transmitter board. Do not hold the

loop in place, but arrange the cable and loop so that it will remain in proper position.

When a stable transmit frequency reading is obtained, compare the reading to the frequency required. Marine transmit frequencies are listed in Table 2-10. In all other transceivers, the transmit frequency is stamped onto the top of the crystal. If the last two digits do not correspond to the required frequency, the crystal should be netted (put on frequency). Detailed netting instructions are found in each transceiver's Owner's Instruction Manual or Service Manual.

NOTE: In regards to Marine and Business Band transceivers, FCC Regulations require that transmitter crystals be INSTALLED and ADJUSTED on frequency (netted) under the supervision of a technician holding either a First or Second Class FCC Operator's License.



TABLE 2-3 CRYSTAL FREQUENCY MEASUREMENT GUIDE

Product Line	Crystal Part No.	Crystal Formula (MHz)	Crystal Frequency Range (MHz)	Allowable * Tolerance (Hz)	Crystal Frequency Table	Coil Location Diagram	Receive Measuring Loop	Transmit Measuring Loop (1 turn)
TMR/TME-L	301-542	$RX + 10.7$	41-59	1000	2-4	2-12	Orange, Green	-----
TMR/TME-H	301-532	$\frac{RX - 10.7}{3}$	46-53	800	2-5	2-13	Yellow	-----
TMR/TME-H/L	See Above	See Above	41-59	See Above	2-4 2-5	2-14	Red, Yellow	-----
TMR/TME-U	301-603	$\frac{RX - 10.7}{9}$	49-51	600	2-6	2-15	Yellow	-----
TMR/TME-A	301-616	$\frac{RX + 10.5}{2}$	64-70	800	2-7	2-13	Blue	-----
RE-CAP 2	301-532	$\frac{RX - 10.7}{3}$	44-46	800	2-8	2-16	Yellow	Black
HR-2 Series	301-617	$\frac{RX - 10.7}{3}$	44-46	800	2-8	2-16	Yellow	Black
HR-6 Series	301-915	$RX - 10.7$	41-43	1000	2-8	2-17	Red	Yellow (3 turn)
Marine Series	301-655	$\frac{RX - 10.7}{3}$	48-51	600	2-9 (RX) 2-10 (TX)	2-16	Yellow	Red
BTH Series	301-740	$\frac{RX - 10.7}{3}$	46-50	500	2-11	2-16	Yellow	Red

* - Allowable tolerance may exceed the value specified on the Crystal Drawing, but it is a permissible tolerance as measured in a unit.

L - Low Band VHF (30-50 MHz)

H - High Band VHF (150-174 MHz)

U - UHF Band (450-470 MHz)

A - Aircraft Band (118-129 MHz)

RX - Receive Frequency

TX - Transmit Frequency

TABLE 2-4 LOW BAND VHF FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
33.42	44.1190	44.1210	37.30	47.9990	48.0010
33.44	44.1390	44.1410	37.32	48.0190	48.0210
33.46	44.1590	44.1610	37.34	48.0390	48.0410
33.48	44.1790	44.1810	37.36	48.0590	48.0610
33.50	44.1990	44.2010	37.38	48.0790	48.0810
33.52	44.2190	44.2210	37.40	48.0990	48.1010
33.54	44.2390	44.2410	37.42	48.1190	48.1210
33.56	44.2590	44.2610	39.02	49.7190	49.7210
33.58	44.2790	44.2810	39.04	49.7390	49.7410
33.60	44.2990	44.3010	39.06	49.7590	49.7610
33.62	44.3190	44.3210	39.08	49.7790	49.7810
33.64	44.3390	44.3410	39.10	49.7990	49.8010
33.66	44.3590	44.3610	39.12	49.8190	49.8210
33.68	44.3790	44.3810	39.14	49.8390	49.8410
33.70	44.3990	44.4010	39.16	49.8590	49.8610
33.72	44.4190	44.4210	39.18	49.8790	49.8810
33.74	44.4390	44.4410	39.20	49.8990	49.9010
33.76	44.4590	44.4610	39.22	49.9190	49.9210
33.78	44.4790	44.4810	39.24	49.9390	49.9410
33.80	44.4990	44.5010	39.26	49.9590	49.9610
33.82	44.5190	44.5210	39.28	49.9790	49.9810
33.84	44.5390	44.5410	39.30	49.9990	50.0010
33.86	44.5590	44.5610	39.32	50.0190	50.0210
33.88	44.5790	44.5810	39.34	50.0390	50.0410
33.90	44.5990	44.6010	39.36	50.0590	50.0610
33.92	44.6190	44.6210	39.38	50.0790	50.0810
33.94	44.6390	44.6410	39.40	50.0990	50.1010
33.96	44.6590	44.6610	39.42	50.1190	50.1210
33.98	44.6790	44.6810	39.44	50.1390	50.1410
37.02	47.7190	47.7210	39.46	50.1590	50.1610
37.04	47.7390	47.7410	39.48	50.1790	50.1890
37.06	47.7590	47.7610	39.50	50.1990	50.2010
37.08	47.7790	47.7810	39.52	50.2190	50.2210
37.10	47.7990	47.8010	39.54	50.2390	50.2410
37.12	47.8190	47.8210	39.56	50.2590	50.2610
37.14	47.8390	47.8410	39.58	50.2790	50.2810
37.16	47.8590	47.8610	39.60	50.2990	50.3010
37.18	47.8790	47.8810	39.62	50.3190	50.3210
37.20	47.8990	47.9010	39.64	50.3390	50.3410
37.22	47.9190	47.9210	39.66	50.3590	50.3610
37.24	47.9390	47.9410	39.68	50.3790	50.3810
37.26	47.9590	47.9610	39.70	50.3990	50.4010
37.28	47.9790	47.9810	39.72	50.4190	50.4210

TABLE 2-4 (Continued)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
39.74	50.4390	50.4410	42.62	53.3190	53.3210
39.76	50.4590	50.4610	42.64	53.3390	53.4410
39.78	50.4790	50.4810	42.66	53.3590	53.3610
39.80	50.4990	50.5010	42.68	53.3790	53.3810
39.82	50.5190	50.5210	42.70	53.3990	53.4010
39.84	50.5390	50.5410	42.72	53.4190	53.4210
39.86	50.5590	50.5610	42.74	53.4390	53.4410
39.88	50.5790	50.5810	42.76	53.4590	53.4610
39.90	50.5990	50.6010	42.78	53.4790	53.4810
39.92	50.6190	50.6210	42.80	53.4990	53.5010
39.94	50.6390	50.6410	42.82	53.5190	53.5210
39.96	50.6590	50.6610	42.84	53.5390	53.5410
39.98	50.6790	50.6810	42.86	53.5590	53.5610
42.02	52.7190	52.7210	42.88	53.5790	53.5810
42.04	52.7390	52.7410	42.90	53.5990	53.6010
42.06	52.7590	52.7610	42.92	53.6190	53.6210
42.08	52.7790	52.7810	42.94	53.6390	53.6410
42.10	52.7990	52.8010	44.62	55.3190	55.3210
42.12	52.8190	52.8210	44.66	55.3590	55.3610
42.14	52.8390	52.8410	44.70	55.3990	55.4010
42.16	52.8590	52.8610	44.74	55.4390	55.4410
42.18	52.8790	52.8810	44.78	55.4790	55.4810
42.20	52.8990	52.9010	44.82	55.5190	55.5210
42.22	52.9190	52.9210	44.86	55.5590	55.5610
42.24	52.9390	52.9410	44.90	55.5990	55.6010
42.26	52.9590	52.9610	44.94	55.6390	55.6410
42.28	52.9790	52.9810	44.98	55.6790	55.6810
42.30	52.9990	53.0010	45.02	55.7190	55.7210
42.32	53.0190	53.0210	45.06	55.7590	55.7610
42.34	53.0390	53.0410	45.10	55.7990	55.8010
42.36	53.0590	53.0610	45.14	55.8390	55.8410
42.38	53.0790	53.0810	45.18	55.8790	55.8810
42.40	53.0990	53.1010	45.22	55.9190	55.9210
42.42	53.1190	53.1210	45.26	55.9590	55.9610
42.44	53.1390	53.1410	45.30	55.9990	56.0010
42.46	53.1590	53.1610	45.34	56.0390	56.0410
42.48	53.1790	53.1810	45.38	56.0790	56.0810
42.50	53.1990	53.2010	45.42	56.1190	56.1210
42.52	53.2190	53.2210	45.46	56.1590	56.1610
42.54	53.2390	53.2410	45.50	56.1990	56.2010
42.56	53.2590	53.2610	45.54	56.2390	56.2410
42.58	53.2790	53.2810	45.58	56.2790	56.2810
42.60	53.2990	53.3010	45.62	56.3190	56.3210

TABLE 2-4 (Continued)

Receive Frequency	Crystal Limits	
	Lower	Upper
45.66	56.3590	56.3610
45.70	56.3990	56.4010
45.74	56.4390	56.4410
45.78	56.4790	56.4810
45.82	56.5190	56.5210
45.86	56.5590	56.5610
45.88	56.5790	56.5810
45.90	56.5990	56.6010
45.94	56.6390	56.6410
45.98	56.6790	56.6810
46.02	56.7190	56.7210
46.06	56.7590	56.7610
46.08	56.7790	56.7810
46.10	56.7990	56.8010
46.12	56.8190	56.8210
46.14	56.8390	56.8410
46.16	56.8590	56.8610
46.18	56.8790	56.8810
46.20	56.8990	56.9010
46.22	56.9190	56.9210
46.24	56.9390	56.9410
46.26	56.9590	56.9610
46.28	56.9790	56.9810
46.30	56.9990	57.0010
46.32	57.0190	57.0210
46.34	57.0390	57.0410
46.36	57.0590	57.0610
46.38	57.0790	57.0810
46.40	57.0990	57.1010
46.42	57.1190	57.1210
46.44	57.1390	57.1410
46.46	57.1590	57.1610
46.48	57.1790	57.1810
46.50	57.1990	57.2010

TABLE 2-5 HIGH BAND VHF FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
151.145	46.8142	46.8158	154.235	47.8442	47.8458
151.160	46.8192	46.8208	154.250	47.8492	47.8508
151.190	46.8292	46.8308	154.265	47.8542	47.8558
151.205	46.8342	46.8358	154.280	47.8592	47.8608
151.235	46.8442	46.8458	154.295	47.8642	47.8658
151.250	46.8492	46.8508	154.310	47.8692	47.8708
151.340	46.8792	46.8808	154.325	47.8742	47.8758
151.355	46.8842	46.8858	154.340	47.8792	47.8808
151.370	46.8892	46.8908	154.355	47.8842	47.8858
151.460	46.9192	46.9208	154.370	47.8892	47.8908
152.030	47.1092	47.1108	154.385	47.8942	47.8958
152.060	47.1192	47.1208	154.400	47.8992	47.9008
152.090	47.1292	47.1308	154.415	47.9042	47.9058
152.120	47.1392	47.1408	154.430	47.9092	47.9108
152.150	47.1492	47.1508	154.445	47.9142	47.9158
152.180	47.1592	47.1608	154.650	47.9825	47.9841
152.210	47.1692	47.1708	154.665	47.9875	47.9891
152.240	47.1792	47.1808	154.680	47.9925	47.9941
152.510	47.2692	47.2708	154.695	47.9975	47.9991
152.540	47.2792	47.2808	154.710	48.0025	48.0041
152.570	47.2892	47.2908	154.725	48.0075	48.0091
152.600	47.2992	47.3008	154.740	48.0125	48.0141
152.630	47.3092	47.3108	154.755	48.0175	48.0191
152.660	47.3192	47.3208	154.770	48.0225	48.0241
152.690	47.3292	47.3308	154.785	48.0275	48.0291
152.720	47.3392	47.3408	154.800	48.0325	48.0341
152.750	47.3492	47.3508	154.815	48.0375	48.0391
152.780	47.3592	47.3608	154.830	48.0425	48.0441
152.810	47.3692	47.3708	154.845	48.0475	48.0491
153.740	47.6792	47.6808	154.860	48.0525	48.0541
153.770	47.6892	47.6908	154.875	48.0575	48.0591
153.830	47.7092	47.7108	154.890	48.0625	48.0641
153.890	47.7292	47.7308	154.905	48.0675	48.0691
153.950	47.7492	47.7508	154.920	48.0725	48.0741
154.010	47.7692	47.7708	154.935	48.0775	48.0791
154.070	47.7892	47.7908	154.950	48.0825	48.0841
154.130	47.8092	47.8108	155.010	48.1025	48.1041
154.145	47.8142	47.8158	155.070	48.1225	48.1241
154.160	47.8192	47.8208	155.130	48.1425	48.1441
154.175	47.8242	47.8258	155.190	48.1625	48.1641
154.190	47.8292	47.8308	155.250	48.1825	48.1841
154.205	47.8342	47.8358	155.310	48.2025	48.2041
154.220	47.8392	47.8408	155.370	48.2225	48.2241

TABLE 2-5 (Continued)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
155.415	48.2375	48.2391	157.950	49.0825	49.0841
155.430	48.2425	48.2441	157.980	49.0925	49.0941
155.445	48.2475	48.2491	158.010	49.1025	49.1041
155.460	48.2525	48.2541	158.040	49.1125	49.1141
155.475	48.2575	48.2591	158.070	49.1225	49.1241
155.490	48.2625	48.2641	158.490	49.2625	49.2641
155.505	48.2675	48.2691	158.520	49.2725	49.2741
155.520	48.2725	48.2741	158.550	49.2825	49.2841
155.535	48.2775	48.2791	158.580	49.2925	49.2941
155.550	48.2825	48.2841	158.610	49.3025	49.3041
155.565	48.2875	48.2891	158.640	49.3125	49.3141
155.580	48.2925	48.2941	158.670	49.3225	49.3241
155.595	48.2975	48.2991	158.730	49.3425	49.3441
155.610	48.3025	48.3041	158.790	49.3625	49.3641
155.625	48.3075	48.3091	158.820	49.3725	49.3741
155.640	48.3125	48.3141	158.850	49.3825	49.3841
155.655	48.3175	48.3191	158.910	49.4025	49.4041
155.670	48.3225	48.3241	158.970	49.4225	49.4241
155.685	48.3275	48.3291	159.030	49.4425	49.4441
155.700	48.3325	48.3341	159.090	49.4625	49.4641
155.730	48.3425	48.3441	159.150	49.4825	49.4841
155.760	48.3525	48.3541	159.210	49.5025	49.5041
155.790	48.3625	48.3641	159.270	49.5225	49.5241
155.850	48.3825	48.3841	159.750	49.6825	49.6841
155.910	48.4025	48.4041	161.010	50.1025	50.1041
155.970	48.4225	48.4241	161.130	50.1425	50.1441
156.030	48.4425	48.4441	161.610	50.3025	50.3041
156.090	48.4625	48.4641	161.730	50.3425	50.3441
156.150	48.4825	48.4841	* 162.400	50.5658	50.5674
156.210	48.5025	48.5041	* 162.550	50.6158	50.6174
156.330	48.5425	48.5441	* = Weather Frequencies		
156.450	48.5825	48.5841			
156.570	48.6225	48.6241			
156.630	48.6425	48.6441			
156.690	48.6625	48.6641			
156.750	48.6825	48.6841			
157.100	48.7992	48.8008			
157.770	49.0225	49.0241			
157.800	49.0325	49.0341			
157.830	49.0425	49.0441			
157.860	49.0525	49.0541			
157.890	49.0625	49.0641			
157.920	49.0725	49.0741			

TABLE 2-6 UHF FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
453.000	49.1438	49.1450	460.025	49.9244	49.9256
453.050	49.1494	49.1506	460.050	49.9271	49.9283
453.100	49.1549	49.1561	460.075	49.9299	49.9311
453.150	49.1605	49.1617	460.100	49.9327	49.9339
453.200	49.1660	49.1672	460.125	49.9355	49.9367
453.250	49.1716	49.1728	460.150	49.9382	49.9394
453.300	49.1771	49.1783	460.175	49.9410	49.9422
453.350	49.1827	49.1839	460.200	49.9438	49.9450
453.400	49.1882	49.1894	460.225	49.9466	49.9478
453.450	49.1938	49.1950	460.250	49.9494	49.9506
453.500	49.1994	49.2006	460.275	49.9521	49.9533
453.550	49.2049	49.2061	460.300	49.9549	49.9561
453.600	49.2105	49.2117	460.325	49.9577	49.9589
453.650	49.2160	49.2172	460.350	49.9605	49.9617
453.700	49.2216	49.2228	460.375	49.9632	49.9644
453.750	49.2271	49.2283	460.400	49.9660	49.9672
453.800	49.2327	49.2339	460.425	49.9688	49.9700
453.850	49.2382	49.2394	460.450	49.9716	49.9728
453.900	49.2438	49.2450	460.475	49.9744	49.9756
453.950	49.2494	49.2506	460.500	49.9771	49.9783
458.000	49.6994	49.7006	465.025	50.4799	50.4811
458.050	49.7049	49.7061	465.050	50.4827	50.4839
458.100	49.7105	49.7117	465.075	50.4855	50.4867
458.150	49.7160	49.7172	465.100	50.4882	50.4894
458.200	49.7216	49.7228	465.125	50.4910	50.4922
458.250	49.7271	49.7283	465.150	50.4938	50.4950
458.300	49.7327	49.7339	465.175	50.4966	50.4978
458.350	49.7382	49.7394	465.200	50.4994	50.5006
458.400	49.7438	49.7450	465.225	50.5021	50.5033
458.450	49.7494	49.7506	465.250	50.5049	50.5061
458.500	49.7549	49.7561	465.275	50.5077	50.5089
458.550	49.7605	49.7617	465.300	50.5105	50.5117
458.600	49.7660	49.7672	465.325	50.5132	50.5144
458.650	49.7716	49.7728	465.350	50.5160	50.5172
458.700	49.7771	49.7783	465.375	50.5188	50.5200
458.750	49.7827	49.7839	465.400	50.5216	50.5228
458.800	49.7882	49.7894	465.425	50.5244	50.5256
458.850	49.7938	49.7950	465.450	50.5271	50.5283
458.900	49.7994	49.8006	465.475	50.5299	50.5311
458.950	49.8049	49.8061	465.500	50.5327	50.5339

TABLE 2-7 AIRCRAFT BAND FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
118.000	64.2492	64.2508	120.150	65.3242	65.3258
118.050	64.2742	64.2758	120.200	65.3492	65.3508
118.100	64.2992	64.3008	120.250	65.3742	65.3758
118.150	64.3242	64.3258	120.300	65.3992	65.4008
118.200	64.3492	64.3508	120.350	65.4242	65.4258
118.250	64.3742	64.3758	120.400	65.4492	65.4508
118.300	64.3992	64.4008	120.450	65.4742	65.4758
118.350	64.4242	64.4258	120.500	65.4992	65.5008
118.400	64.4492	64.4508	120.550	65.5242	65.5258
118.450	64.4742	64.4758	120.600	65.5492	65.5508
118.500	64.4992	64.5008	120.650	65.5742	65.5758
118.550	64.5242	64.5258	120.700	65.5992	65.6008
118.600	64.5492	64.5508	120.750	65.6242	65.6258
118.650	64.5742	64.5758	120.800	65.6492	65.6508
118.700	64.5992	64.6008	120.850	65.6742	65.6758
118.750	64.6242	64.6258	120.900	65.6992	65.7008
118.800	64.6492	64.6508	120.950	65.7242	65.7258
118.850	64.6742	64.6758	121.000	65.7492	65.7508
118.900	64.6992	64.7008	121.050	65.7742	65.7758
118.950	64.7242	64.7258	121.100	65.7992	65.8008
119.000	64.7492	64.7508	121.150	65.8242	65.8258
119.050	64.7742	64.7758	121.200	65.8492	65.8508
119.100	64.7992	64.8008	121.250	65.8742	65.8758
119.150	64.8242	64.8258	121.300	65.8992	65.9008
119.200	64.8492	64.8508	121.350	65.9242	65.9258
119.250	64.8742	64.8758	121.400	65.9492	65.9508
119.300	64.8992	64.9008	121.450	65.9742	65.9758
119.350	64.9242	64.9258	121.500	65.9992	66.0008
119.400	64.9492	64.9508	121.550	66.0242	66.0258
119.450	64.9742	64.9758	121.600	66.0492	66.0508
119.500	64.9992	65.0008	121.650	66.0742	66.0758
119.550	65.0242	65.0258	121.700	66.0992	66.1008
119.600	65.0492	65.0508	121.750	66.1242	66.1258
119.650	65.0742	65.0758	121.800	66.1492	66.1508
119.700	65.0992	65.1008	121.850	66.1742	66.1758
119.750	65.1242	65.1258	121.900	66.1992	66.2008
119.800	65.1492	65.1508	121.950	66.2242	66.2258
119.850	65.1742	65.1758	122.000	66.2492	66.2508
119.900	65.1992	65.2008	122.050	66.2742	66.2758
119.950	65.2242	65.2258	122.100	66.2992	66.3008
120.000	65.2492	65.2508	122.150	66.3242	66.3258
120.050	65.2742	65.2758	122.200	66.3492	66.3508
120.100	65.2992	65.3008	122.250	66.3742	66.3758

TABLE 2-7 (Continued)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
122.300	66.3992	66.4008	124.450	67.4742	67.4758
122.350	66.4242	66.4258	124.500	67.4992	67.5008
122.400	66.4492	66.4508	124.550	67.5242	67.5258
122.450	66.4742	66.4758	124.600	67.5492	67.6508
122.500	66.4992	66.5008	124.650	67.5742	67.5758
122.550	66.5242	66.5258	124.700	67.5992	67.6008
122.600	66.5492	66.5508	124.750	67.6242	67.6258
122.650	66.5742	66.5758	124.800	67.6492	67.6508
122.700	66.5992	66.6008	124.850	67.6742	67.6758
122.750	66.6242	66.6258	124.900	67.6992	67.7008
122.800	66.6492	66.6508	124.950	67.7242	67.7258
122.850	66.6742	66.6758	125.000	67.7492	67.7508
122.900	66.6992	66.7008	125.050	67.7742	67.7758
122.950	66.7242	66.7258	125.100	67.7992	67.8008
123.000	66.7492	66.7508	125.150	67.8242	67.8258
123.050	66.7742	66.7758	125.200	67.8492	67.8508
123.100	66.7992	66.8008	125.250	67.8742	67.8758
123.150	66.8242	66.8258	125.300	67.8992	67.9008
123.200	66.8492	66.8508	125.350	67.9242	67.9258
123.250	66.8742	66.8758	125.400	67.9492	67.9508
123.300	66.8992	66.9008	125.450	67.9742	67.9758
123.350	66.9242	66.9258	125.500	67.9992	68.0008
123.400	66.9492	66.9508	125.550	68.0242	68.0258
123.450	66.9742	66.9758	125.600	68.0492	68.0508
123.500	66.9992	67.0008	125.650	68.0742	68.0758
123.550	67.0242	67.0258	125.700	68.0992	68.1008
123.600	67.0492	67.0508	125.750	68.1242	68.1258
123.650	67.0742	67.0758	125.800	68.1492	68.1508
123.700	67.0992	67.1008	125.850	68.1742	68.1758
123.750	67.1242	67.1258	125.900	68.1992	68.2008
123.800	67.1492	67.1508	125.950	68.2242	68.2258
123.850	67.1742	67.1758	126.000	68.2492	68.2508
123.900	67.1992	67.2008	126.050	68.2742	68.2758
123.950	67.2242	67.2258	126.100	68.2992	68.3008
124.000	67.2492	67.2508	126.150	68.3242	68.3258
124.050	67.2742	67.2758	126.200	68.3492	68.3508
124.100	67.2992	67.3008	126.250	68.3742	68.3758
124.150	67.3242	67.3258	126.300	68.3992	68.4008
124.200	67.3492	67.3508	126.350	68.4242	68.4258
124.250	67.3742	67.3758	126.400	68.4492	68.4508
124.300	67.3992	67.4008	126.450	68.4742	68.4758
124.350	67.4242	67.4258	126.500	68.4992	68.5008
124.400	67.4492	67.4508	126.550	68.5242	68.5258

TABLE 2-7 (Continued)

Receive Frequency	Crystal Limits	
	Lower	Upper
126.600	68.5492	68.5508
126.650	68.5742	68.5758
126.700	68.5992	68.6008
126.750	68.6242	68.6258
126.800	68.6492	68.6508
126.850	68.6742	68.6758
126.900	68.6992	68.7008
126.950	68.7242	68.7258

TABLE 2-8 AMATEUR AND CAP FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
52.525	41.8240	41.8260	146.52	45.2725	45.2741
146.01	45.1025	45.1041	146.55	45.2825	45.2841
146.04	45.1125	45.1141	146.58	45.2925	45.2941
146.07	45.1225	45.1241	146.61	45.3025	45.3041
146.10	45.1325	45.1341	146.64	45.3125	45.3141
146.13	45.1425	45.1441	146.67	45.3225	45.3241
146.16	45.1525	45.1541	146.70	45.3325	45.3341
146.19	45.1625	45.1641	146.73	45.3425	45.3441
146.22	45.1725	45.1741	146.76	45.3525	45.3541
146.25	45.1825	45.1841	146.79	45.3625	45.3641
146.28	45.1925	45.1941	146.82	45.3725	45.3741
146.31	45.2025	45.2041	146.85	45.3825	45.3841
146.34	45.2125	45.2141	146.88	45.3925	45.3941
146.37	45.2225	45.2241	146.91	45.4025	45.4041
146.40	45.2325	45.2341	146.94	45.4125	45.4141
146.43	45.2425	45.2441	146.97	45.4225	45.4241
146.46	45.2525	45.2541	143.90 *	44.3992	44.4008
146.49	45.2625	45.2641	148.15 *	45.8159	45.8175

* = Civil Air Patrol (CAP) Frequencies

TABLE 2-9 VHF MARINE RECEIVE FREQUENCIES (MHz)

Channel Number	Receive Frequency	Crystal Limits		Channel Number	Receive Frequency	Crystal Limits	
		Lower	Upper			Lower	Upper
06	156.300	48.5327	48.5339	65	156.275	48.5244	48.5256
07	156.350	48.5494	48.5506	66	156.325	48.5410	48.5422
08	156.400	48.5660	48.5672	67	156.375	48.5577	48.5589
09	156.450	48.5827	48.5839	68	156.425	48.5744	48.5756
10	156.500	48.5994	48.6006	69	156.475	48.5910	48.5922
11	156.550	48.6160	48.6172	70	156.525	48.6077	48.6089
12	156.600	48.6327	48.6339	71	156.575	48.6244	48.6256
13	156.650	48.6494	48.6506	72	156.625	48.6410	48.6422
14	156.700	48.6660	48.6672	73	156.675	48.6577	48.6589
15	156.750	48.6827	48.6839	74	156.725	48.6744	48.6756
16	156.800	48.6994	48.7006	77	156.875	48.7244	48.7256
17	156.850	48.7160	48.7172	78	156.925	48.7410	48.7422
18	156.900	48.7327	48.7339	79	156.975	48.7577	48.7589
19	156.950	48.7494	48.7506	80	157.025	48.7744	48.7756
20	161.600	50.2994	50.3006	83CG	157.175	48.8244	48.8256
21CG	157.050	48.7827	48.7839	84	161.825	50.3744	50.3756
22CG	157.100	48.7994	48.8006	85	161.875	50.3910	50.3922
23CG	157.150	48.8160	48.8172	86	161.925	50.4077	50.4089
24	161.800	50.3660	50.3672	87	161.975	50.4244	50.4256
25	161.850	50.3827	50.3839	88	157.425	48.9077	48.9089
26	161.900	50.3994	50.4006	WX	162.550	50.6160	50.6172
27	161.950	50.4160	50.4172	WX2	162.400	50.5660	50.5672
28	162.000	50.4327	50.4339				

TABLE 2-10 VHF MARINE TRANSMIT FREQUENCIES (MHz)

<u>Channel Number</u>	<u>Transmit Frequency</u>	<u>Channel Number</u>	<u>Transmit Frequency</u>	<u>Channel Number</u>	<u>Transmit Frequency</u>
06	156.300	21CG	157.050	72	156.625
07	156.350	22CG	157.100	73	156.675
08	156.400	23CG	157.150	74	156.725
09	156.450	24	157.200	77	156.875
10	156.500	25	157.250	78	156.925
11	156.550	26	157.300	79	156.975
12	156.600	27	157.350	80	157.025
13	156.650	28	157.400	83CG	157.175
14	156.700	65	156.275	84	157.225
15	-----	66	156.325	85	157.275
16	156.800	67	156.375	86	157.325
17	156.850	68	156.425	87	157.375
18	156.900	69	156.475	88	157.425
19	156.950	70	156.525	WX	-----
20	157.000	71	156.575	WX2	-----

NOTE: Channels 15, WX and WX2 are for receive only.

CAUTION: FCC Regulations require that Marine Band transmitter crystals be installed and adjusted on frequency under the supervision of a technician holding either a First or Second Class FCC Operator's License.

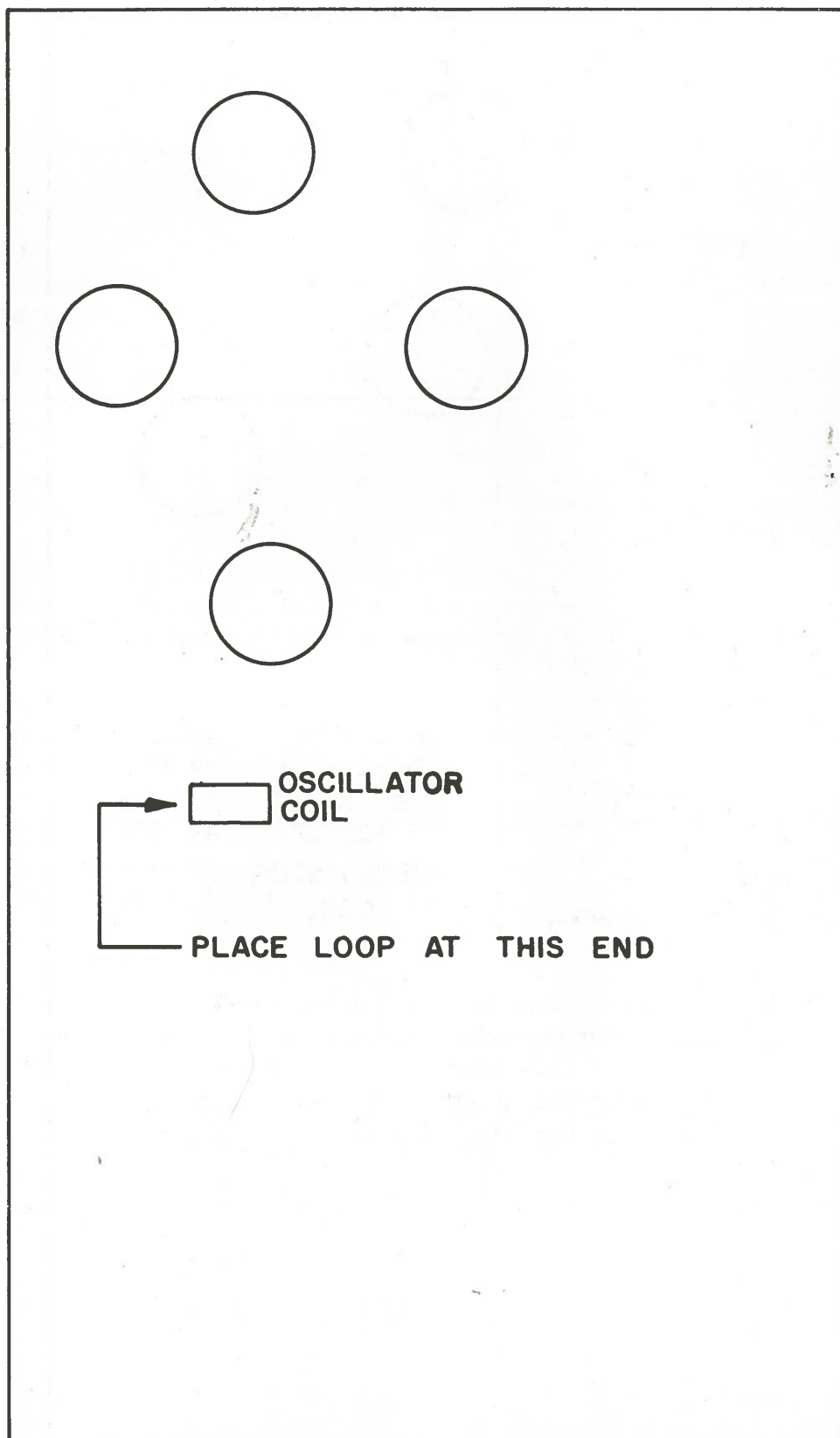
TABLE 2-11 HIGH BAND VHF BUSINESS FREQUENCIES (MHz)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
150.815	46.7045	46.7055	152.420	47.2395	47.2405
150.845	46.7145	46.7155	152.480	47.2595	47.2605
150.875	46.7245	46.7255	152.820	47.2795	47.2805
150.905	46.7345	46.7355	152.870	47.3895	47.3905
150.935	46.7445	46.7455	152.885	47.3945	47.3955
150.965	46.7545	46.7555	152.900	47.3995	47.4005
150.995	46.7645	46.7655	152.915	47.4045	47.4055
151.025	46.7745	46.7755	152.930	47.4095	47.4105
151.055	46.7845	46.7855	152.945	47.4145	47.4155
151.085	46.7945	46.7955	152.960	47.4195	47.4205
151.115	46.8045	46.8055	152.975	47.4245	47.4255
151.175	46.8245	46.8255	152.990	47.4295	47.4305
151.205	46.8345	46.8355	153.005	47.4345	47.4355
151.235	46.8445	46.8455	153.020	47.4395	47.4405
151.265	46.8545	46.8555	153.035	47.4445	47.4455
151.295	46.8645	46.8655	153.050	47.4495	47.4505
151.325	46.8745	46.8755	153.065	47.4545	47.4555
151.355	46.8845	46.8855	153.080	47.4595	47.4605
151.385	46.8945	46.8955	153.095	47.4645	47.4655
151.415	46.9045	46.9055	153.110	47.4695	47.4705
151.445	46.9145	46.9155	153.125	47.4745	47.4755
151.475	46.9245	46.9255	153.140	47.4795	47.4805
151.505	46.9345	46.9355	153.155	47.4845	47.4855
151.520	46.9395	46.9405	153.170	47.4895	47.4905
151.535	46.9445	46.9455	153.185	47.4945	47.4955
151.550	46.9495	46.9505	153.200	47.4995	47.5005
151.565	46.9545	46.9555	153.215	47.5045	47.5055
151.580	46.9595	46.9605	153.230	47.5095	47.5105
151.595	46.9645	46.9655	153.245	47.5145	47.5155
151.625	46.9745	46.9755	153.260	47.5195	47.5205
151.655	46.9845	46.9855	153.275	47.5245	47.5255
151.685	46.9945	46.9955	153.290	47.5295	47.5305
151.715	47.0045	47.0055	153.305	47.5345	47.5355
151.745	47.0145	47.0155	153.320	47.5395	47.5405
151.775	47.0245	47.0255	153.335	47.5445	47.5455
151.805	47.0345	47.0355	153.350	47.5495	47.5505
151.835	47.0445	47.0455	153.365	47.5545	47.5555
151.865	47.0545	47.0555	153.380	47.5595	47.5605
151.895	47.0645	47.0655	153.395	47.5645	47.5655
151.925	47.0745	47.0755	153.410	47.5695	47.5705
151.955	47.0845	47.0855	153.425	47.5745	47.5755
152.300	47.1995	47.2005	153.440	47.5795	47.5805
152.360	47.2195	47.2205	153.455	47.5845	47.5855

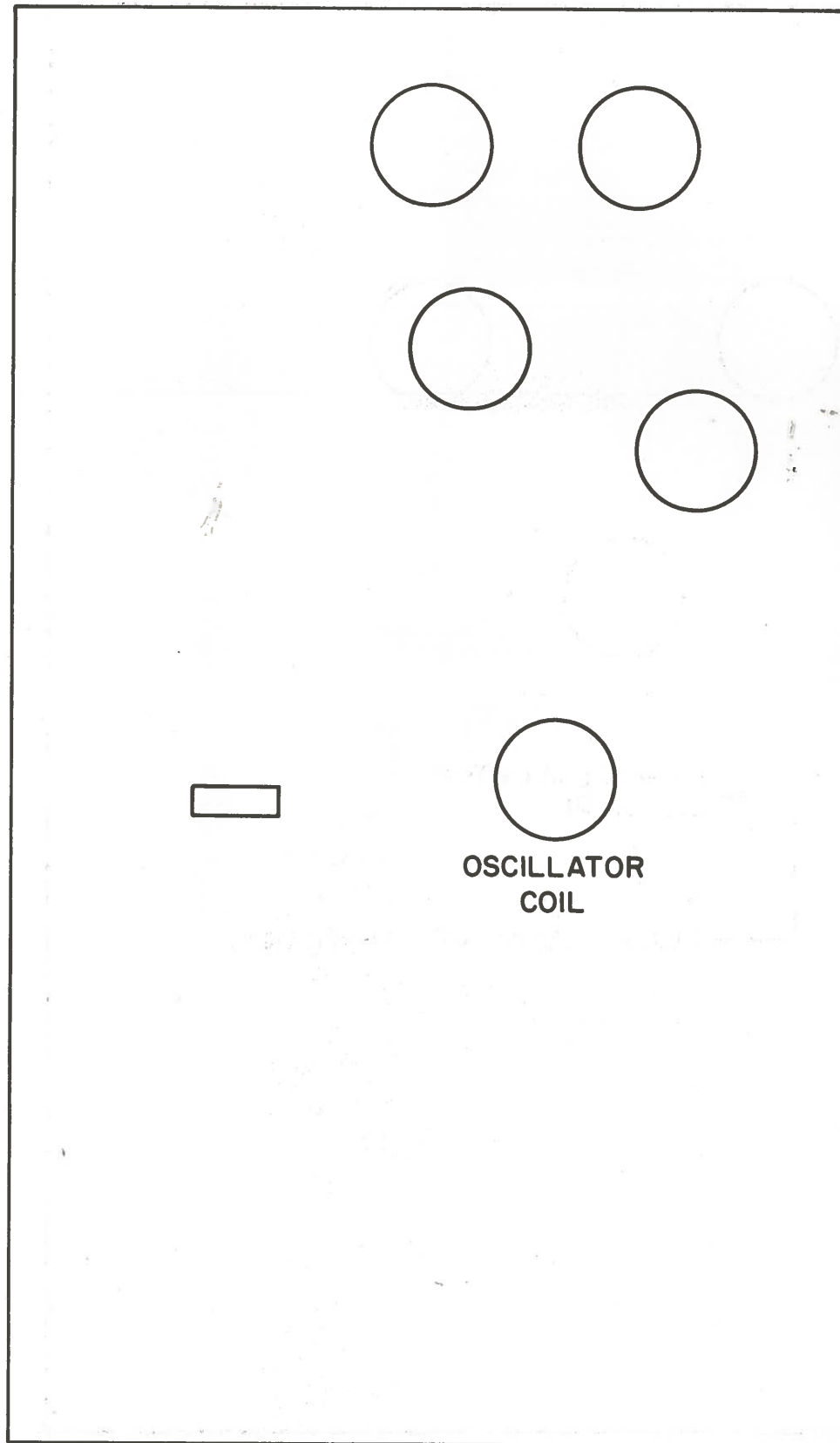
TABLE 2-11 (Continued)

Receive Frequency	Crystal Limits		Receive Frequency	Crystal Limits	
	Lower	Upper		Lower	Upper
153.470	47.5895	47.5905	157.600	48.9661	48.9671
153.485	47.5945	47.5955	157.680	48.9928	48.9938
153.500	47.5995	47.6005	157.740	49.0128	49.0138
153.515	47.6045	47.6055	158.130	49.1428	49.1438
153.530	47.6095	47.6105	158.145	49.1478	49.1488
153.545	47.6145	47.6155	158.160	49.1528	49.1538
153.560	47.6195	47.6205	158.175	49.1578	49.1588
153.575	47.6245	47.6255	158.190	49.1628	49.1638
153.590	47.6295	47.6305	158.205	49.1678	49.1688
153.605	47.6345	47.6355	158.220	49.1728	49.1738
153.620	47.6395	47.6405	158.230	49.1761	49.1771
153.635	47.6445	47.6455	158.250	49.1828	49.1838
153.650	47.6495	47.6505	158.265	49.1878	49.1888
153.665	47.6545	47.6555	158.280	49.1928	49.1938
153.680	47.6595	47.6605	158.295	49.1978	49.1988
153.695	47.6645	47.6655	158.310	49.2028	49.2038
153.710	47.6695	47.6705	158.325	49.2078	49.2088
153.725	47.6745	47.6755	158.355	49.2178	49.2188
154.490	47.9295	47.9305	158.370	49.2228	49.2238
154.515	47.9378	47.9388	158.385	49.2278	49.2288
154.540	47.9461	47.9471	158.400	49.2328	49.2338
154.570	47.9561	47.9571	158.415	49.2378	49.2388
154.600	47.9661	47.9671	158.430	49.2428	49.2438
154.625	47.9745	47.9755	158.460	49.2528	49.2538
157.560	48.9528	48.9538			

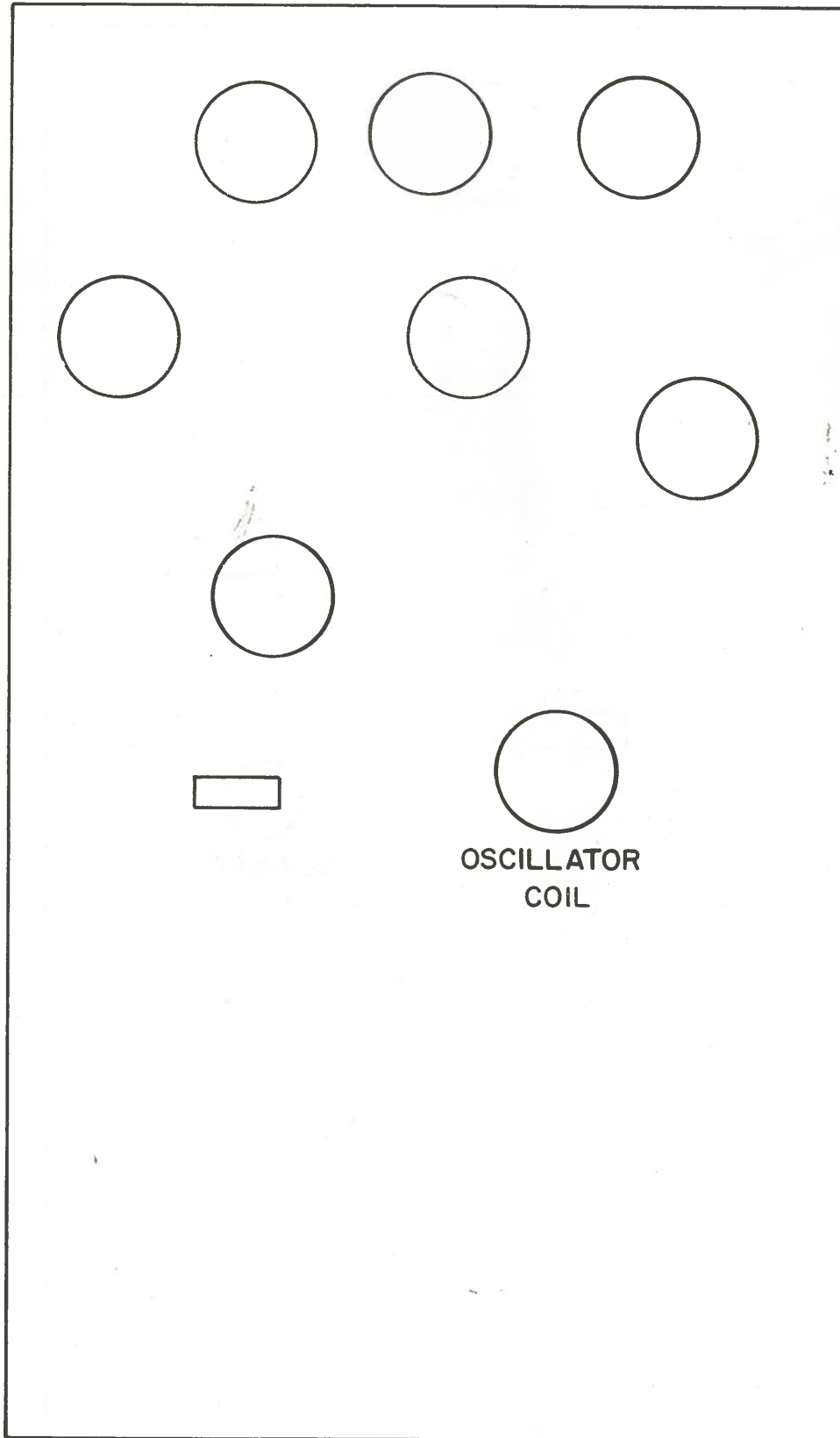
NOTE: FCC Regulations require that Business Band transmitter crystals be installed and adjusted on frequency under the supervision of a technician holding either a First or Second Class FCC Operator's License.



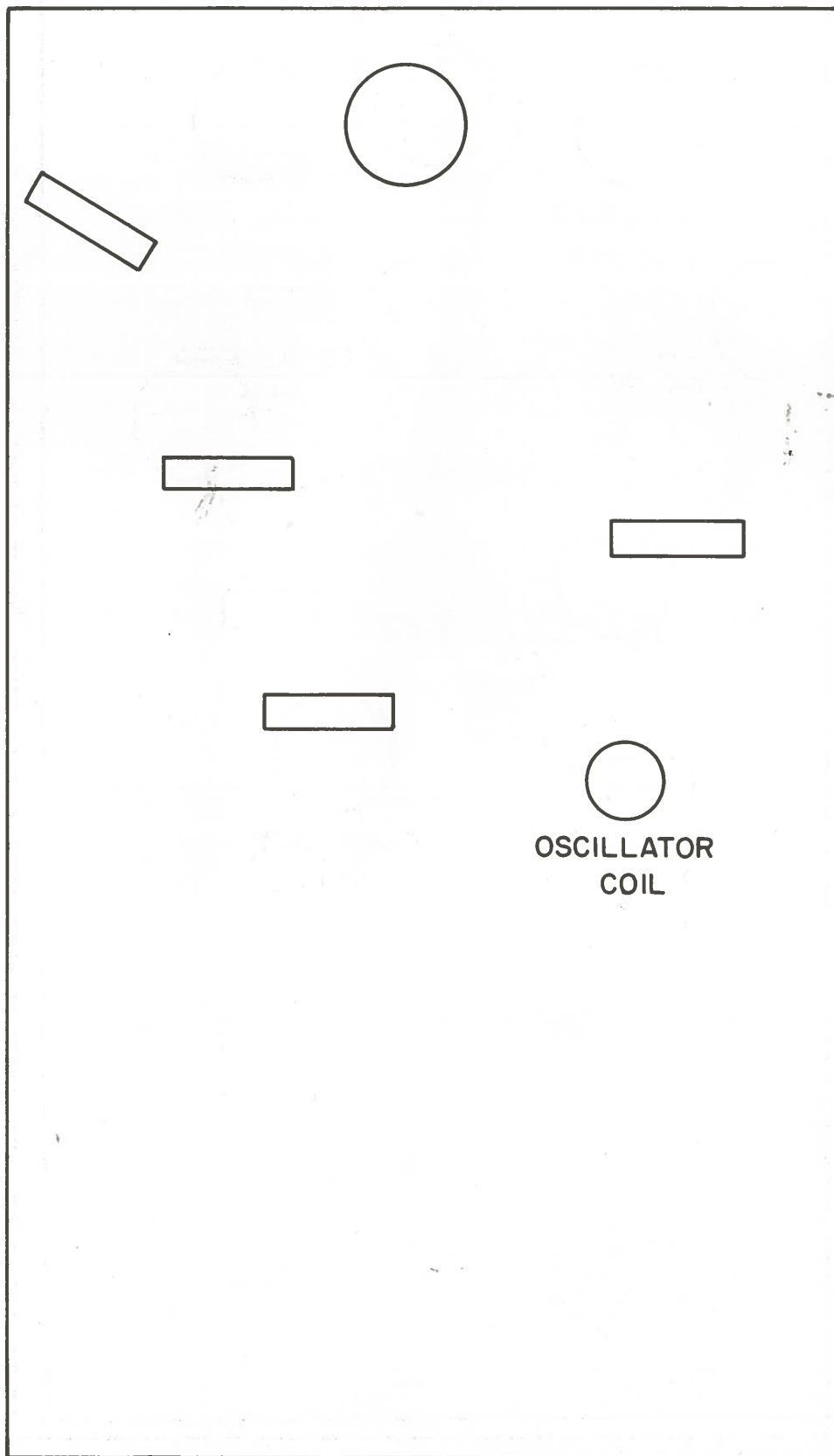
2-12 LOW VHF BAND



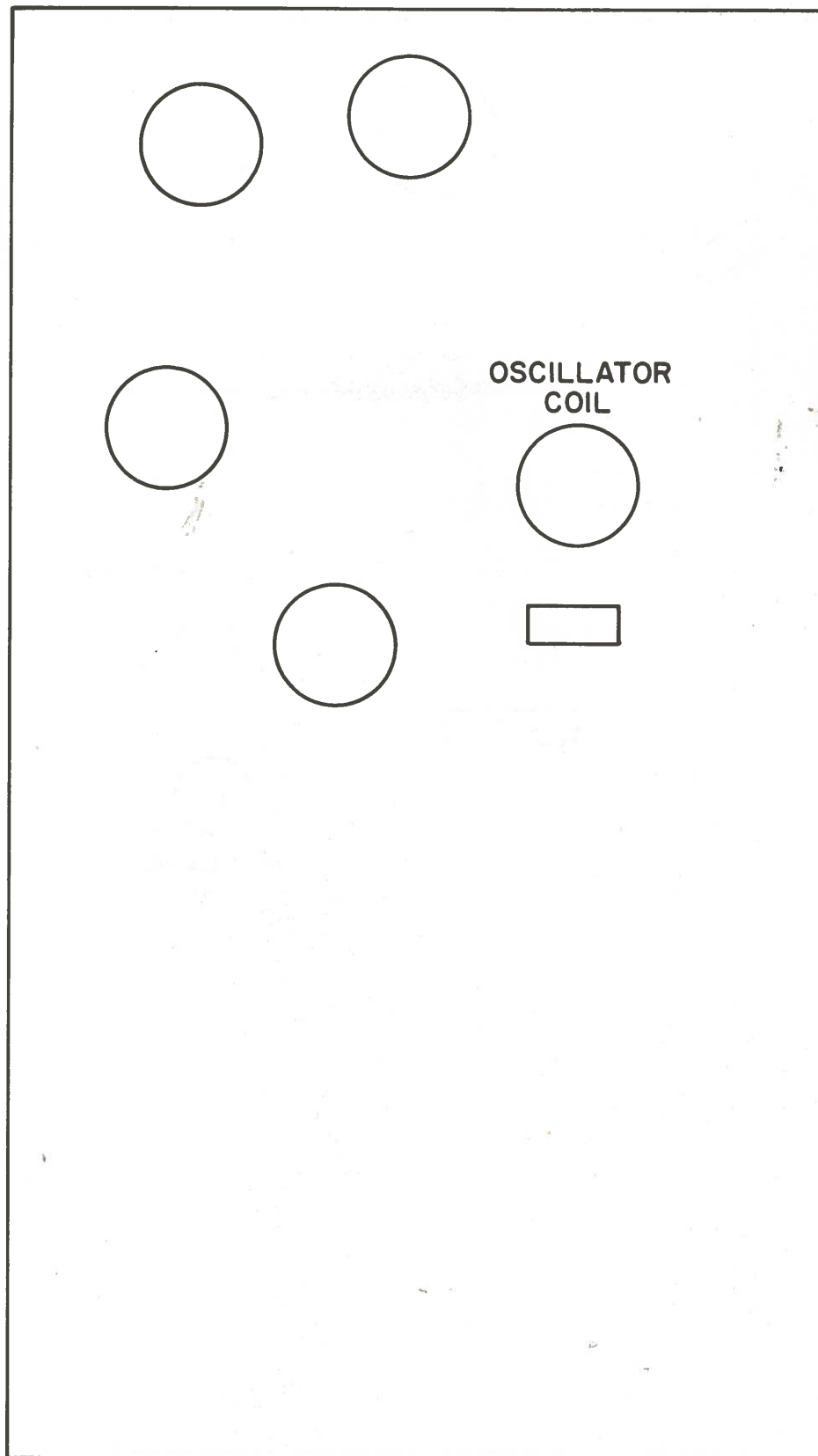
2-13 HIGH VHF AND AIRCRAFT BANDS



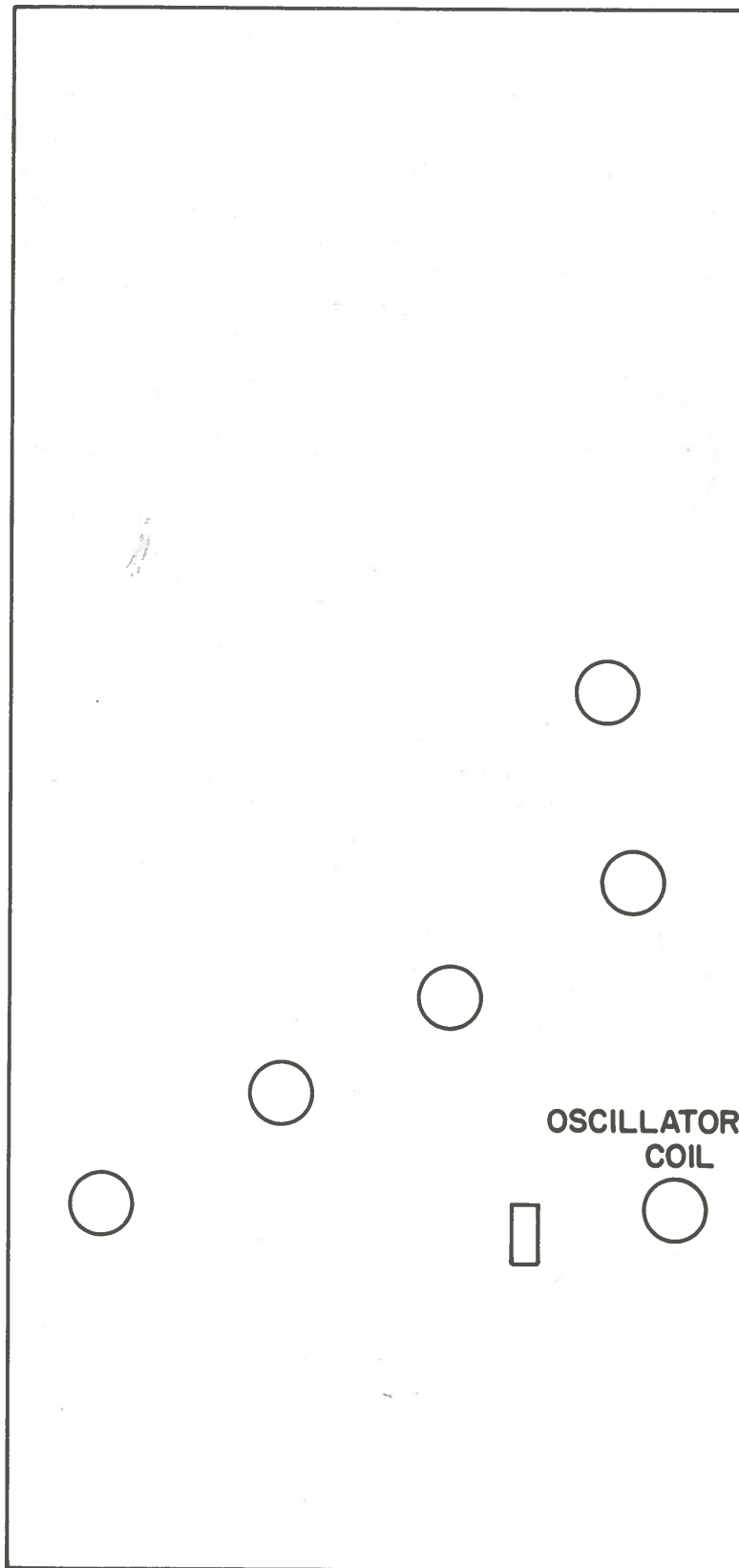
2-14 HI/LO VHF BANDS



2-15 UHF BAND



2-16 2M AMATEUR, MARINE
AND BUSINESS BANDS



2-17 6M AMATEUR BAND

2-18 ALIGNMENT SIGNAL - 10.7 MHz

A crystal controlled oscillator whose frequency is 10.7 MHz provides a signal suitable for alignment purposes. This signal is available from a phono jack (labeled J2) on the rear panel of the EC-175. In the Frequency Measurement accessory, MA-60, there is a cable and loop assembly designed for injecting the 10.7 MHz signal into a receiver or transceiver. The Loop consists of three large turns and is color coded black. The first IF of all Regency products listed in 2-3 is tuned to 10.7 MHz, thus, this signal can be readily used for proper alignment of the IF strip. The various Service Manuals give detailed instructions on this alignment procedure.

In addition to IF alignment, the 10.7 MHz signal can be used to adjust or set the Automatic Frequency Control (AFC) in Regency's UHF Monitoradio's. This procedure is also thoroughly covered in the UHF Service Manuals.

SECTION 3 BASIC CIRCUIT DESCRIPTION

3-1 POWER SUPPLY

The power supply is a series-pass type of regulator. Two full-wave bridge rectifier circuits supply the necessary DC voltage for the series-pass transistor and its regulating integrated circuit. Current limiting is also provided for by the IC. In addition, a thermistor is utilized in the regulator's feedback to help maintain the regulated 5 volt line over widely varying ambient conditions.

3-2 TIME BASE REFERENCE

The Time Base Reference is a crystal controlled oscillator. The crystal's ambient temperature is kept near it's design point by means of a proportionally controlled oven. Thus, as the ambient temperature external to the oven varies over a wide range, the temperature inside of the oven is kept virtually constant. A thermistor in conjunction with a DC bridge provides the basic proportional control required by the oven heaters. See the Block Diagram on page 3 for the simplified interconnection to the main counter circuitry.

3-3 COUNTER LOGIC

There are six other basic functions necessary to the operation of the counter in addition to the power supply and Time Base Reference. These six functions are Input Amplifier, Decade Counters, Display with Storage, Time Base Dividers, Control Logic and a Sample Rate Generator. See page 3 for a simplified block diagram that illustrates the basic connections between these various functions.

The main purpose of each function is pointed out by that function's nomenclature. For example, a Decade Counter is a device (or circuitry) that has an output count of one for every input count of ten. There are six decade counters altogether, which can give a total division of 10^{-6} or one million. Depending upon the Range switch setting, this will result in readout counts of tenth of a Hertz to over a hundred megahertz.

The Display with Storage consists of six 7-segment readouts with built-in storage capabilities. The readouts are actually light-emitting diodes contained within each display integrated circuit package. The necessary storage logic is also contained within each package. Storage permits the counting logic to be actively counting while the display reads out the previous count.

The Time Base Dividers are also counting elements, but are used for a different purpose. Their primary function is to accurately divide the Time Base Reference's frequency into distinct sub-multiples of the Reference. Depending upon the Range Switch setting, just one of these Reference sub-multiples is fed to the control Logic circuitry. Although there are eight sub-multiples available, only five are switch selectable for control logic use. A secondary function of the divider chain provides for a 100 KHz output, which is used for field calibration of the Reference oscillator.

The Control Logic section utilizes a reference signal (selected by the Range Switch) from the Time Base Dividers chain to generate a pulse whose width specifically determines the amount of time the counter counts. This pulse is called the Count Gate pulse. Its width will vary directly with the reference signal's frequency. For example, a reference signal of 1 KHz will result in a Count Gate pulse width of 1 millisecond. At the other extreme, a reference signal of 0.1 Hz results in a Count Gate pulse width of 10 seconds.

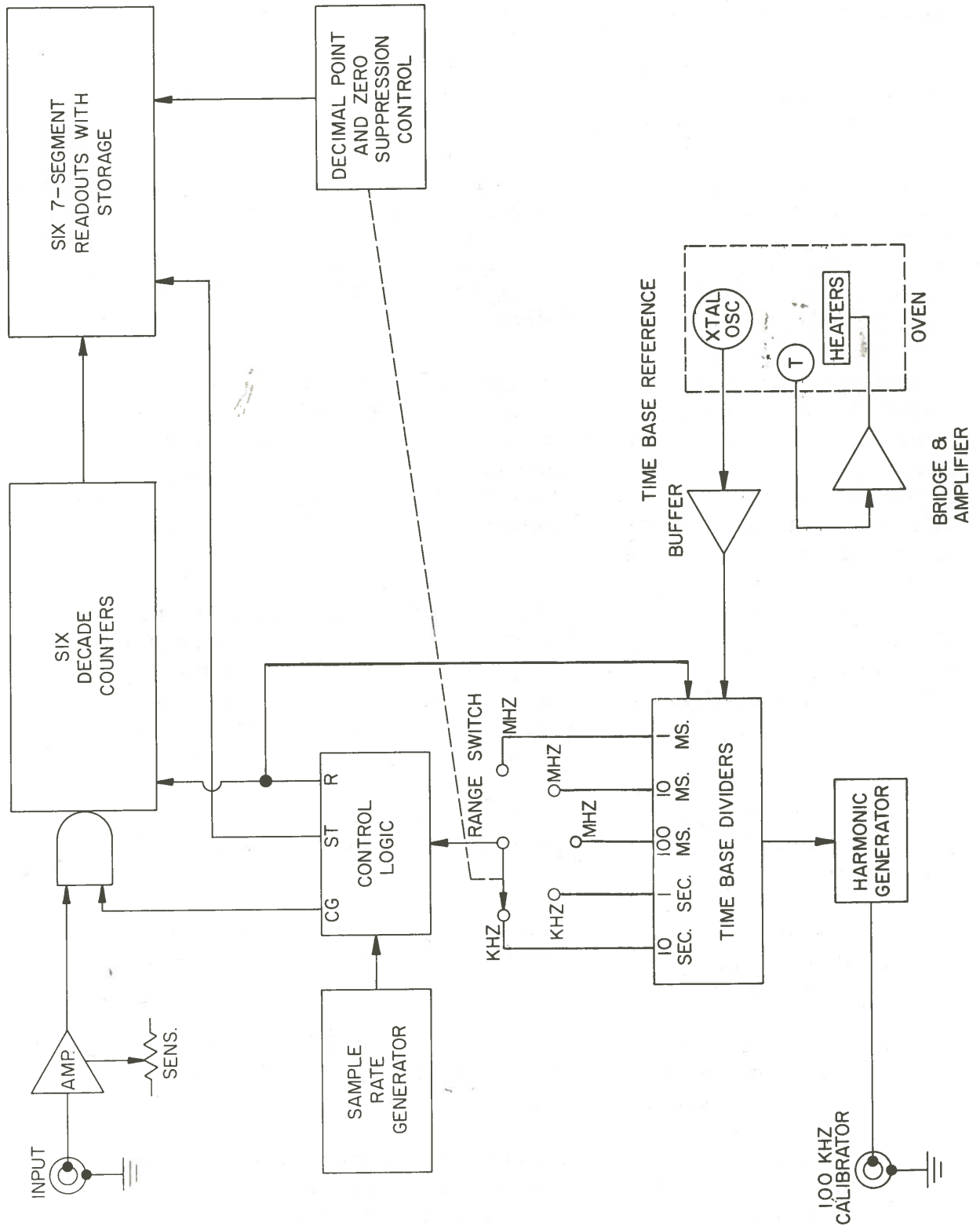
The Count Gate pulse is fed to the first IC package in the Decade Counter chain and controls the period or amount of time that it counts an incoming signal from the Input Amplifier. Thus, the accuracy of this Count Gate pulse width determines the overall accuracy of the counter. If the pulse width is too narrow, the counter's readouts indicate a frequency that is lower than actual. If the gate width is too wide, the frequency indicated is too high.

The Control Logic section also utilizes a signal from the Sample Rate Generator. In effect, this sample rate signal (reset pulse) determines when the Count Gate pulse is fed to the counting chain. Because of various time delays in other parts of the counter, the sampling rate sets the period or length of time between actual counts. This ensures that all counts are for the full Count Gate pulse width and that all other sections are reset to zero count conditions before another count is indicated.

Another pulse output of the Control Logic section is called a Strobe pulse. This Strobe pulse is fed to the display units and initiates the transfer of the count total in Storage to the readouts. The count total readout is always indicative of the previous count totalized by the decade counters. This means that an updating (new) count can be occurring while the readouts display a prior count.

A brief summary of the sequence of events for a counting cycle may help to get a better overall idea of how these six functions are inter-related. The basic counting cycle is:

- a. Decade counters count the input frequency during the Count Gate (CG) period. The Count Gate period is determined by the setting of the Range Switch.
- b. At the end of the Count Gate period, a Strobe pulse (ST) transfers the count total in the decade counters to Storage. The count in Storage is read out in the display.
- c. After a variable delay, determined by the sample rate generator, a Reset Pulse (R) resets the decade counters to zero and resets the time base dividers for an immediate restart of counting.
- d. The display continues to readout the last count in storage.
- e. The Count Gate is enabled and the counting cycle is then repeated.



3-4 EC-175 BASIC BLOCK DIAGRAM

SECTION 4 CALIBRATION AND ADJUSTMENTS

4-1 FACTORY ADJUSTMENT - OVEN TEMPERATURE

This adjustment should be performed only by factory personnel. If the seal to this adjustment is broken or tempered with, the warranty will be voided. Basically, this adjustment sets the temperature in the oven to the proper operating temperature as required by the crystal. Any moderate deviation from this specific temperature greatly affects the frequency and stability of the reference oscillator. Thus, the factory adjustment should NOT be altered or changed. Each oven is precisely adjusted to the crystal installed, therefore, this adjustment is not intended for field service.

4-2 REGULATED VOLTAGE ADJUSTMENT

The regulated 5V line can be set by adjusting variable resistor R403, which is located on the Power Supply Board. Access to this variable resistor is through a hole on the right side of the unit. See diagram 4-6 on page 5. Minimum setting should be 4.8 volts and maximum should be 5.1 volts. This adjustment should be made with the unit turned on and the Range Switch set to the first MHz position so that all readouts are displaying a zero.

4-3 HIGH FREQUENCY (VHF) RESPONSE ADJUSTMENT

The response (or sensitivity) of the EC-175 can be greatly affected by the setting of R106. Unless it has been definitely determined that the VHF sensitivity has become seriously degraded, it should not be necessary to adjust R106. If the degradation is apparent, then the following procedure should be performed:

- a. Connect a very stable signal of approximately 160 MHz (140 MHz may be used) to the counter.
- b. Set the input signal level to approximately 180 millivolts (-2 DBM).
- c. Set the Sensitivity Control full clockwise.
- d. Adjust R106 for a stable reading. See diagram 4-6 on page 5 for the location of the access hole for this adjustment. R106 should not be moved more than 1/16 of a turn.

NOTE: If a stable reading can not be readily accomplished, the unit should be returned to the factory for service.

4-4 LOW FREQUENCY RESPONSE ADJUSTMENT

The response of the EC-175 to low frequency signals (5 Hz to 100 Hz) is

affected by the setting of R116. Again, an adjustment should not be made unless it has definitely been determined that the low frequency response is not as good as it was when the unit was received from the factory. If degradation is evident, then proceed with the following steps:

- a. Connect a very stable signal of 50 to 60 hertz. The frequency of this signal should be known to within 1 hertz.
- b. Set the signal's level to approximately 200 millivolts.
- c. Set the Sensitivity Control full clockwise.
- d. Adjustment R116 for a stable and "on frequency" reading. See diagram 4-6 on page 5 for the location of the access hole for this adjustment.

4-5 TIME BASE REFERENCE CALIBRATION

The Time Base Reference oscillator should not require any calibration adjustments more often than every six months. If the oscillator is consistently off frequency by more than 1 part in 10^{-6} in less than six months, the unit should be returned to the factory for calibration. When a calibration is being performed, or merely checked, the unit should be connected to a power source for at least 24 hours. In addition, the unit should be turned ON for at least 30 minutes prior to this check or adjustment.

Field calibration of the Time Base Reference oscillator will require a highly stable and accurate, or known, frequency source. One such source is the reference or time base oscillator of another counter, which either has recently been factory calibrated or whose basic stability greatly exceeds that of the EC-175. Another frequency source of high accuracy is the radio transmissions of the National Bureau of Standards. These transmissions, under the call of WWV, can be usually received at 5, 10 or 15 Megahertz on a short-wave or amateur receiver. These two frequency sources require different calibration procedures. The use of another reference oscillator is covered in 4-5-1 and the use of WWV is covered by 4-5-2.

4-5-1 FREQUENCY CALIBRATION - STANDARD (REFERENCE) OSCILLATOR SOURCE

- a. The standard or reference oscillator should be turned on for at least 24 hours prior to making this adjustment.
- b. Connect the reference source to the input of the EC-175.
- c. Set Range Switch to readout the most significant digit of the source's frequency. For example, if the reference is a 10

MHz signal, the Range Switch should be set to where the 1 will be displayed as the extreme left side digit. This would require placing the Range Switch in the second MHz position (switch position 4).

- d. Rotate the Range Switch to the second KHz position (switch position 2) and note if the frequency being displayed is high or low in regards to the source frequency. Unless the EC-175 has been abused or misused, the last two digits (which are indicating tens and units of hertz) should be reading within several hertz of the actual frequency.
- e. Remove the metal cap plug from the Frequency Adjust access hole. See diagram 4-7 on page 6 for the location of this access hole.
- f. Using an insulated or non-metallic tool, adjust (very slowly) the trimmer capacitor until the readout agrees with the known frequency of the source. There will be some "backlash", so remove the tool while checking the reading.
- g. Wait at least 5 minutes before replacing the metal plug to make sure that the new reading has stabilized to within at least one (1) Hertz of the desired frequency. If the reading is one Hertz off at 10 MHz, for example, the counter will then be off only 15 Hertz at 150 MHz, which is within .00001% (if the reference signal's frequency was known within that accuracy).

4-5-2 FREQUENCY CALIBRATION - WWV SOURCE

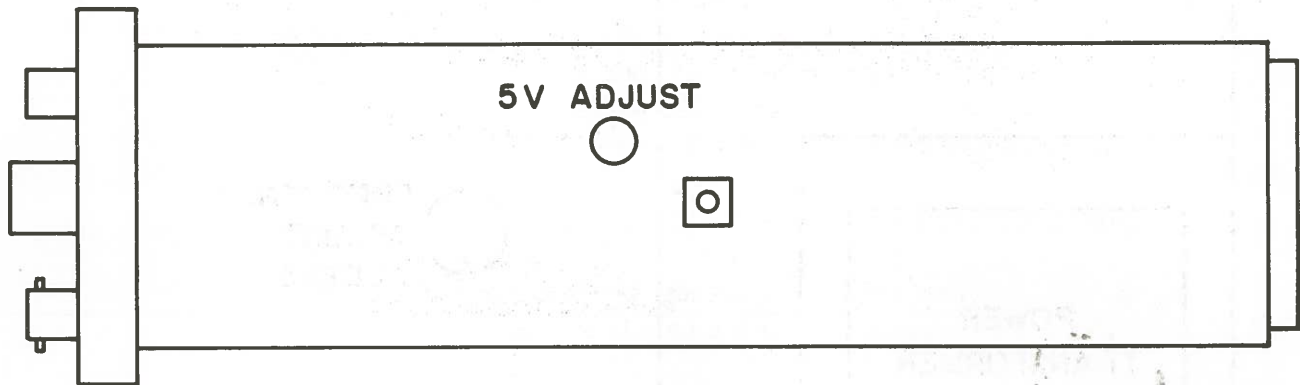
NOTE: The highest transmitting frequency of WWV that can be received with a minimum of fading, should be used in this calibration procedure. The higher the frequency, the easier it is to obtain high accuracy. WWV continuously transmits on 2.5, 5, 10, 15, 20 and 25 MHz.

- a. The receiver should be turned on long enough to stabilize all of its local oscillators. Tune the receiver to WWV.
- b. Using a length of coax with a loop at one end and a phono plug at the other, couple the 100 KHz Calibrator output (located on rear panel of EC-175 and labeled J3) to the receiver's antenna circuitry.
- c. Adjust the amount of coupling until a distinct "beat" note is heard in the receiver's audio output. This beat indicates that the 100 KHz harmonic is slightly off frequency. It may be easier to distinguish this beat note from other audio frequencies when WWV is not transmitting a tone (440 Hz or 600 Hz).

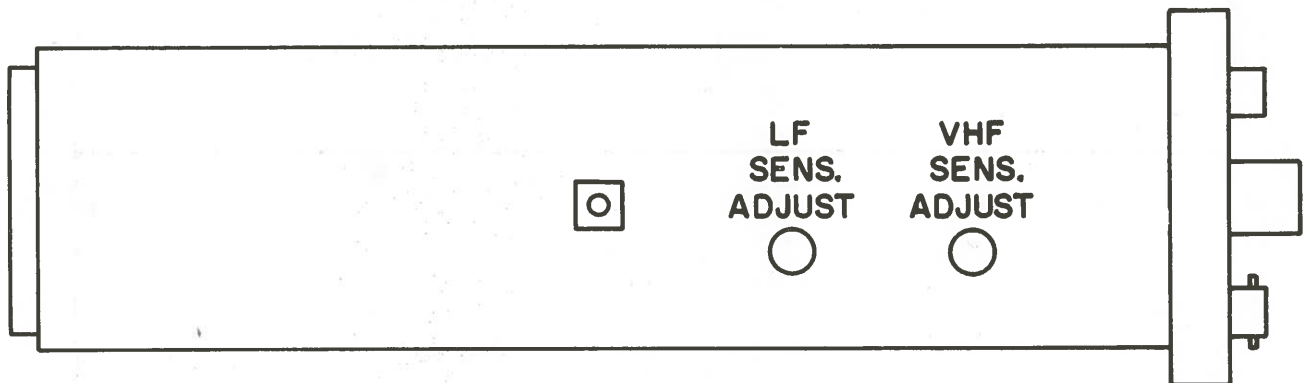
- d. Remove the metal cap plug from the Frequency Adjust access hole. See diagram 4-7 on page 6 for the location of this access hole.
- e. Using an insulated or non-metallic tuning tool, adjust (very slowly) the trimmer capacitor until the "beat" note is lower in pitch or even eliminated (zero beat). The closer the adjustment is to a zero beat condition, the higher the accuracy of the setting of the oscillator's frequency.

CAUTION: Make certain a beat note is heard before adjusting the trimmer capacitor. It should not be necessary to rotate the trimmer more than $1/8$ of a turn, to achieve a zero (or nearly so) beat.

- f. Replace the metal cap plug and continue to monitor the receiver's audio for the zero beat condition to note any significant change. Even a near zero beat condition usually results in an error less than 5 hertz (if listening to WWV at 10 MHz or higher).



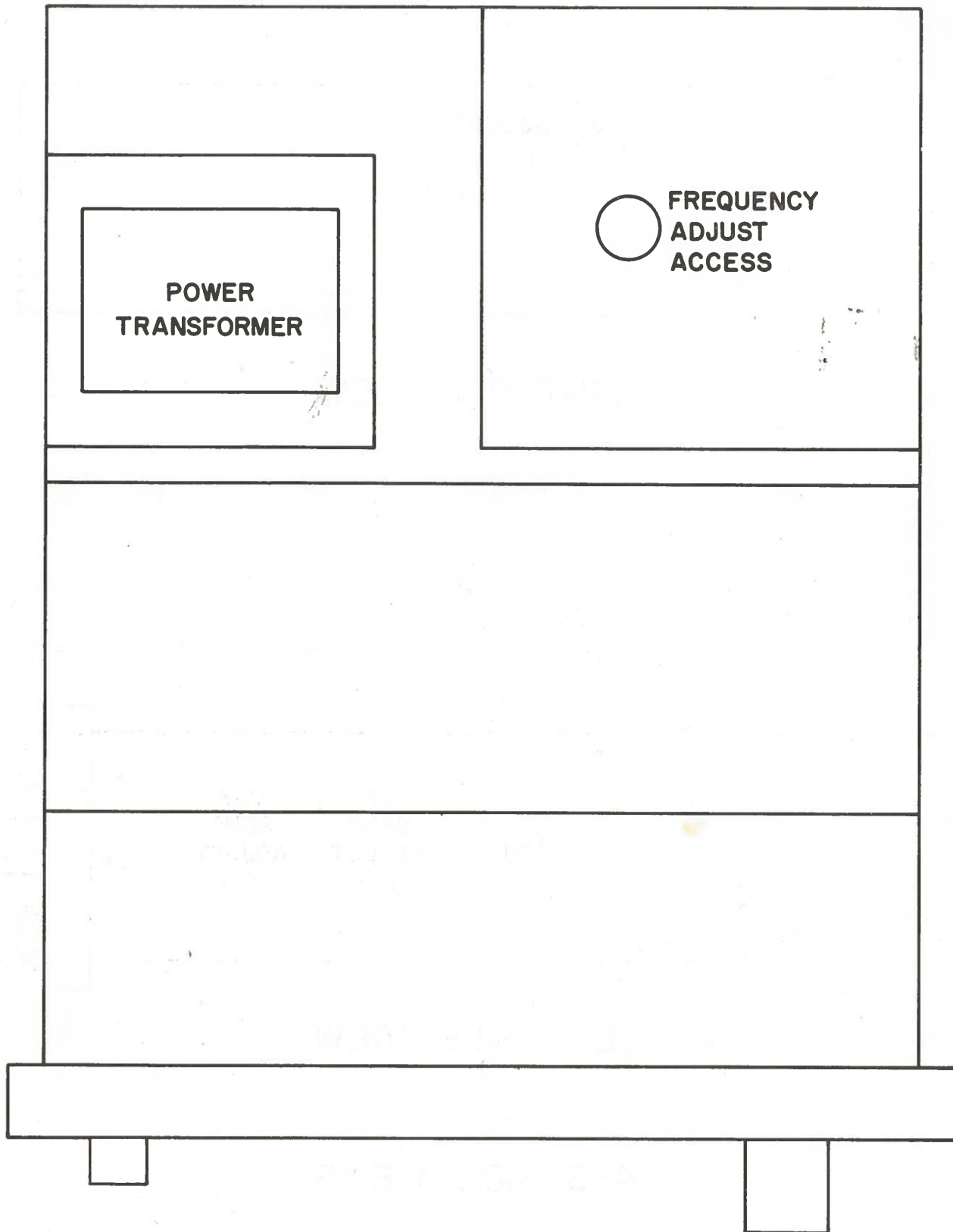
RIGHT SIDE VIEW



LEFT SIDE VIEW

4-6 SIDE VIEWS

REAR PANEL



4-7 TOP VIEW



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Please complete the lower portion of this card and
mail to REGENCY ELECTRONICS, INC. within 10 days
after purchase of your radio. The warranty, as
stated on reverse side of this card, will not be
valid unless registered at the factory.

SEPARATE ALONG THIS LINE AND MAIL LOWER PORTION ONLY

WARRANTY REGISTRATION

SERIAL
NUMBER 40-00398

MODEL
NUMBER

JOBBER'S
PHONE NO.

OCCUPATION

STATE

ZONE

DATE OF
DELIVERY

OWNER'S
NAME

ADDRESS

CITY

JOBBER'S
NAME

ADDRESS

CITY

ZONE

STATE

IF IN OUR OPINION EQUIPMENT HAS BEEN TAMPERED WITH WARRANTY IS VOID.



WARRANTY

This Receiver is sold under an exclusive 1-year warranty, which warrants it to be free from defects in material and workmanship. We agree to repair or replace at the point of manufacture, without charge, all parts showing such defects, provided the unit is delivered to us, intact for our examination, with all transportation charges prepaid to our factory, within one year from the date of sale to the original purchaser, and provided such examination discloses in our final judgment, that it is thus defective. Pilot lights, tubes, vibrator, fuses, and diodes shall be covered by the manufacturer's standard EIA warranty and such items shall be excluded from the provisions of this warranty.

This warranty does not apply if the Receiver has been subjected to misuse, neglect, accidents, incorrect wiring not our own, improper installation, or put to use in violation of instructions furnished by us, nor to Receivers that have been damaged by lightning, excess current, repaired or altered outside our factory, nor to the Receiver that has had its serial number altered or removed.

CHANGES

The Company reserves the right to modify or change the equipment, in whole or in part, at any time prior to delivery in order to include refinements deemed appropriate by the Company, but without incurring any liability to modify or change any equipment previously delivered, or to supply new equipment in accordance with earlier specifications.

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REGENCY ELECTRONICS, INC.

7900 PENDLETON PIKE

INDIANAPOLIS, INDIANA 46226

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