

Service Manual

CLASSIC III

MOBILE/BASE CB TRANSCEIVER



FCC TYPE ACCEPTED



NOTICE

FCC Rules and Regulations, Part 95, requires that only those persons possessing a valid First or Second Class Radio Telephone Operator's license are permitted to make repairs or adjustments in the transmitter section of any Citizens Band Transceiver.

CERTIFICATION

FANON/COURIER Corporation, Pasadena, California, certifies that this Citizens Band Transceiver meets FCC Rules and Regulations, Part 95, regarding frequency tolerance, stability, power input, modulation, and spurious suppression.

This certification is void if crystals other than those recommended by the manufacturer are installed or if any modification is made to the transmitter circuits, not specified by FANON/COURIER Corporation, or by any personnel not holding the proper FCC license.

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SECTION I

INTRODUCTION

This service manual, together with the owner's instruction manual, provides a complete set of instructions necessary to install, operate and service the transceiver.

The service instructions given are intended to be used by service personnel who are familiar with CB (Citizens Band) equipment. Therefore, detailed information on basic electronic circuitry, service procedures and test equipment setups are not included.

Before replacing any parts or making repairs, please read the warranty printed on the back of this manual, under which the unit is warranted.

FANON/COURIER or equivalent quality parts should always be used when replacing faulty or damaged components, as many of the frequency controlling components have been selected for their temperature, vibration, stability and other characteristics.

SERVICE AND FACTORY MAINTENANCE

Should the unit require Factory Service, write or call the FANON/COURIER Service Department, 990 South Fair Oaks Avenue, Pasadena, California 91105, and request RETURN AUTHORIZATION. When shipping the unit to the factory, please enclose a full description of the problem with the unit. Pack all articles well enough to withstand rough handling during shipping. Follow the instructions given in the Return Authorization Form which will be sent to you.

GENERAL DESCRIPTION

The transceiver is a completely solid-state radio receiver and transmitter designed to operate in the 27 MHz (11 meter) Class D Citizens Band.

The receiver section is a double conversion superhetrodyne type with a first IF frequency of 11.275 MHz and a 455 KHz second IF. A ceramic filter is used in the second IF amplifier to enhance selectivity without degrading the audio frequencies. The local oscillator frequencies are generated by a frequency synthesizer.

The transmitter section also utilizes the frequency synthesizer to generate the 23 channel carrier frequencies. The power output stage is a high gain RF power transistor, conservatively rated to produce 3 watts of carrier power.

SECTION II TEST AND ALIGNMENT PROCEDURES

The following procedures provide information required to verify the performance of the transceiver to the manufacturers' specifications. Applicable portions of the procedures should be performed if frequency or RF power output controlling parts have been repaired or replaced.

All test equipment should be checked for accuracy against approved standards, (National Bureau of Standards).

TEST EQUIPMENT REQUIRED

(Or Equivalent)

- * RF Wattmeter with 50 watt load, Bird Model 50
- * VTVM, Hewlett Packard Model 410B
- * Oscilloscope, Tektronix Model 545 or modulation monitor, Heath Model 610
- * RF Signal Generator, Standard Model, Measurements Corp., Model 80 or Hewlett Packard Model 609
- * Frequency Counter, Systron Donner Model 7015
- * Audio Generator, Hewlett Packard Model 200AB
- * RMS Volt/Wattmeter, EICO Model 260
- * DC Power Supply, 13.6VDC, 2 Ampere regulated
- * Spectrum Analyzer, Hewlett Packard Model 141T, 8554L/8552A
- * VHF Counter Pre Amplifier, Pagel Electronics
- * Millivoltmeter, Ballantine Model 300D
- * Distortion Analyzer, Hewlett Packard Model 330B

WARNING

PERSONNEL POSSESSING A FIRST OR SECOND CLASS RADIO
TELEPHONE OPERATOR'S LICENSE ONLY ARE ALLOWED TO
PERFORM ADJUSTMENTS IN THE TRANSMITTING SECTION OF
THIS TRANSCEIVER.

All internal controls are designed to ensure permanence of adjustment and should not be disturbed unless it is positive that readjustments are necessary. The location of all test and adjustment points are shown in Figure 9.

Details on how to connect and disconnect the test equipment are not always given, however, always turn the power OFF before replacing crystals or removing and replacing component parts.

NOMINAL SPECIFICATIONS

GENERAL

- * Transistors - 25
- * Diodes - 16
- * Electronic Switching
- * Self-contained Speaker - 6" x 2" with 8 ohm voice coil
- * Dynamic Microphone - with Press-to-Talk switch
- * Illuminated Channel Indicator and "S"/RF power meter
- * Twenty three Channel Selector with P.A. position
- * Modulation Indicator
- * Volume and Squelch controls
- * Power On/Off switch
- * Regulated AC power supply
- * Delta Tuning switch
- * Automatic Noise Limiter switch
- * External Speaker and P.A. jacks
- * Operates from 13.8V DC or 117V AC. 50/60 Hz (Positive or Negative ground).
- * Coaxial Antenna Connector - 50 ohms impedance
- * DX/Local switch
- * Under dash mounting bracket for mobile installation

RECEIVER SECTION

- | | |
|------------------------------|--|
| * Frequency Range | 26.965 to 27.255 MHz |
| * Sensitivity | 0.3uV for 10db S/N at 1 KHz
at 30% Mod. |
| * Selectivity | BW 6KHz min. at 6db down. |
| * Adj. Channel Rejection | 45db average |
| * Audio Distortion at 1KHz | Less than 10% at 3W |
| * Spurious Response | -50db |
| * Cross Modulation Rejection | Better than 40db |
| * Intermodulation Rejection | Better than 50db |
| * Readability | 0.07uV at 85% Mod. |
| * Squelch Sensitivity | 0.1uV |
| * Squelch Stop Sensitivity | 30uV (adjustable) |
| * Noise Limiter | Series gate |

TRANSMITTER SECTION

- | | |
|----------------------------------|---|
| * Frequency Range | 26.965 to 27.255 MHz |
| * Power Input at 13.8V DC | 5 watts |
| * Power Output at 13.8V DC | 3 watts |
| * Modulation (5mV at microphone) | 100% |
| * Emission (Class D operation) | 6A3 |
| * Hum and Noise | 40db down |
| * Frequency Tolerance | ±.005% |
| * Antenna Impedance | 50 ohms |
| * Switching | Electronic |
| * Modulation Distortion | Less than 15% at 85% modulation at 1KHz |

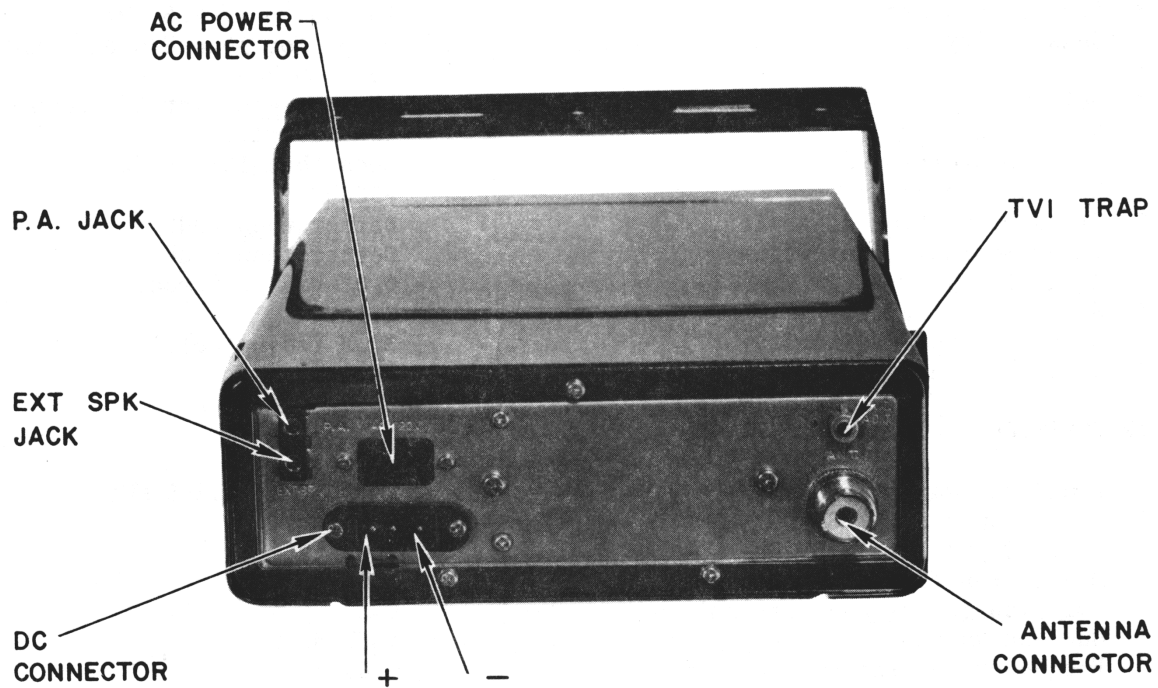
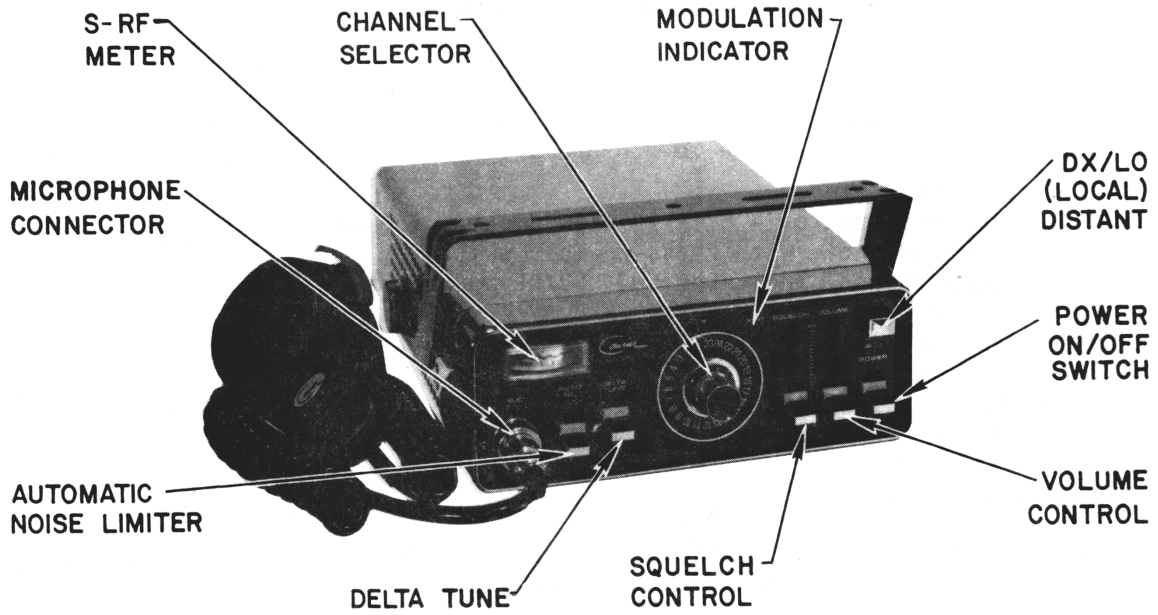


FIGURE 1, FRONT AND REAR PANEL CONTROLS, INDICATORS AND CONNECTORS

1. PRELIMINARY

A. Regulated Power Supply Adjustment

- 1) Remove three screws from the rear of the case and slide the front panel and circuit board forward. Place the unit on a shop towel or other padded surface to protect the printed circuit board.
- 2) Set the transceiver front panel controls as follows:

Power On/Off Switch	to	OFF
Channel Selector	to	CH 13
LO/DX Selector	to	DX
Volume Control	to	Up position
Squelch Control	to	Up position
Delta Tune	to	Zero Position
Auto NL	to	OFF
- 3) Insert the AC power cord connector into the AC receptacle on the rear of the chassis and connect to a 117V AC, 60 Hz power outlet.
- 4) Connect a VTVM negative lead to the speaker ground connection (black wire) and the positive lead to the TOP terminal of the POWER On/Off switch.
- 5) Turn the POWER switch to ON and adjust R728 to obtain 13.8 ± 0.2 volts. R728 may be adjusted from the bottom of the circuit board with an insulated screw driver.

B. Power Source

The transceiver may be operated from either 117 VAC or from 13.8 VDC. For testing convenience 117 VAC is used for the following procedures. However, the unit should be tested for proper operation using 13.8 VDC after repair or adjustments have been completed.

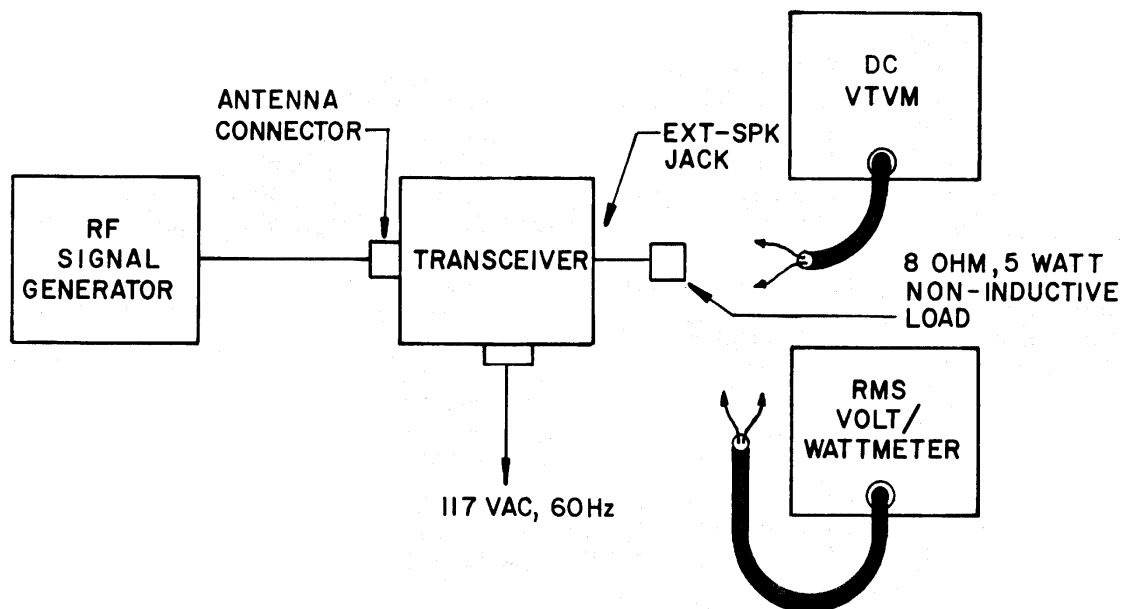


FIGURE 2, TEST SETUP FOR RECEIVER ALIGNMENT

2. Receiver Section Alignment and Tests

- A. Connect the transceiver to the test equipment as shown in Figure 1. Adjust the transceiver front panel controls as follows:

Power Switch	to	ON
Channel Selector	to	Channel 13
LO/DX Switch	to	DX
Volume Control	to	Full Up position
Squelch Control	to	Full Up position
Auto NL	to	OFF
Delta Tune	to	Center position

B. AGC Voltage Adjustment

- 1) Set the RF signal generator frequency to 27.115 MHz and modulate 30% with a 1 KHz audio signal. SET THE RF OUTPUT TO ZERO.
- 2) Connect a DC VTVM to the base of Q302 and adjust R305 to obtain a reading of 2.0 volts. Be sure there is no signal at the antenna.

C. Synthesizer Frequency Measurements

1) 23 MHz Oscillator Adjustment and Frequency Measurement

- a. Connect a DC VTVM to the base terminal of Q901 and observe a reading on the VTVM. Adjust L901 CLOCKWISE until the oscillation stops (VTVM reading approaches ZERO).
- b. Adjust the core of L901 COUNTER CLOCKWISE until oscillation starts again and continue turning ONE FULL TURN MORE.
- c. Connect a frequency counter to the base terminal of Q102. Set the RF signal generator output to ZERO.
- d. Measure the frequency of X4 (23.440 MHz crystal). Allow time for the frequency counter to make a regular count.
- e. Frequency should be 23.440 MHz \pm .002% (\pm 500 Hz). If the frequency is out of tolerance, adjust L901 \pm 1/2 turn to correct for the out of tolerance. If the frequency is still out of tolerance, readjust L901 to its original setting and replace the crystal with a new crystal and measure the frequency.
- f. Rotate the channel selector to the other channels (1, 5, 9, 17, 21) and measure the frequency of the other 5 crystals. Frequency of each should be \pm 500 Hz of their assigned frequency. Replace all defective crystals and measure the frequency.

2) 11.730 MHz Oscillator Frequency Measurement

- a. Remove crystal X4 and set the channel selector to channel 13. Connect the frequency counter to the base of Q301. Set the DELTA/TUNE switch to the center position.
- b. The frequency of X11 should be 11.730 MHz \pm .002% (\pm 300 Hz). Replace if defective and measure the frequency.

2. Receiver Section Alignment and Test (Continued)

D. Alignment of RF Coils and Transformers

- 1) Disconnect the VTVM from the base of Q302. Connect an RMS VTVM across the 8 ohm audio output load. Adjust the RF signal generator output to obtain 0.5 volts on the RMS VTVM.
- 2) Adjust L101, T301, T302, T304, T305 and T306 for maximum reading on the RMS VTVM.

Note: As the coils are adjusted the RMS VTVM reading should increase. Therefore, as the adjustments are made reduce the RF signal generator output to maintain the minimum useful signal on the RMS VTVM, 0.5 volts or less. Repeat the adjustment several times to obtain the maximum output.

- 3) After the above coils and transformers have been peaked for maximum sensitivity, adjust L901, L902, L903 and L904 for maximum reading on the RMS VTVM.

E. Sensitivity Measurements

1) DX Sensitivity

- a. Set the transceiver front panel controls as follows:

Volume Control	to	Full Up position
Squelch Control	to	Full Up position (Minimum)
Channel Selector	to	Ch 13
Delta Tune	to	Center position
Auto NL	to	ON
DX/LO Selector	to	DX
Power Switch	to	ON

- b. Connect an RMS VTVM across the 8 ohm audio load and adjust the RF signal generator to 27.115 MHz, modulate 30% with a 1 KHz audio signal.
- c. Adjust the RF signal generator output to obtain 2.0 volts, (500 mW) on the RMS VTVM. The RF signal generator output should be 0.5 uV (0db) or less.

2) LO Sensitivity

Set the DX/LO selector to the LO position and increase the RF signal generator output to obtain 2.0 volt (500 mW) on the RMS VTVM. The signal generator output should read approximately 50 uV (+40 db).

F. S/RF Meter Calibration

- 1) Maintain the test setup as in Step 2D1). Adjust the RF signal generator output to 100 uV (46 db).
- 2) Observe the S/RF meter and adjust R518 to obtain a reading of 9 on the meter.

G. DELTA TUNE Frequency Measurement

1. Maintain the test setup as in Step 2D. Set the DX/LO Selector to DX. Adjust the signal generator output to obtain 1.0 volt on the RMS VTVM. Vary the signal generator frequency for maximum output on the VTVM. RECORD THE FREQUENCY.
2. Set the DELTA TUNE selector to the (+) position (UP), Carefully adjust the signal generator frequency for maximum reading on the RMS VTVM. RECORD THE FREQUENCY.
3. The difference in the frequency recorded in Step G1 and Step G2 should be approximately 1.2 KHz.
4. Readjust the DELTA TUNE selector to the CENTER position and adjust the signal generator frequency for maximum output. Frequency should be the same as recorded in Step G1).
5. Set the DELTA TUNE selector to the (-) position (DOWN). Carefully adjust the signal generator frequency for maximum reading on the RMS VTVM.
6. The difference in the frequency readings obtained in Steps G4 and G5 should be approximately 1.2 KHz.

H. Squelch Adjustments

1. Set the SQUELCH CONTROL to the MINIMUM (UP) position, the DX/LO SELECTOR to DX, and the AUTO/NL to ON.
2. Connect the signal generator to the antenna connector and adjust the frequency to 27.115 MHz. Modulate 30% with a 1KHz audio signal. Set the output voltage to 1uV (6db).
3. Connect an RMS VTVM across the 8 ohm audio load. Adjust the transceiver VOLUME CONTROL to obtain 2 volts on the RMS VTVM.
4. Readjust the SQUELCH CONTROL to MAXIMUM (DOWN) position. DO NOT CHANGE THE VOLUME CONTROL SETTING.
5. Reset the signal generator output voltage to 1000uV (60db).
6. Adjust R508 to OPEN the squelch, (obtain 2 volts on the VTVM).
7. Disconnect the signal generator from the antenna connector and remove the miniature phone plug from the EXT SPK jack.
8. Turn the VOLUME CONTROL to maximum (UP) and adjust the SQUELCH CONTROL from minimum (UP) position to a point where the noise stops.
9. Reconnect the signal generator to the antenna connector and increase the the generator output to the point where the audio signal is heard in the transceiver speaker. The signal generator output voltage should be approximately 0.2 to 0.4uV (-6db).

I. Audio Output Measurement

1) Connect an RMS VTVM and a distortion analyzer across the 8 ohm audio load. Adjust the RF signal generator to 27.115 MHz and modulate 30% with a 1 KHz audio signal.

2) Set the transceiver front panel controls as follows:

Volume Control	to	Full Up position
Squelch Control	to	Full Up position
DX/LO	to	DX
Delta Tune	to	Center position
Auto NL	to	OFF
Channel Selector	to	13
Power Switch	to	ON

3) Adjust the RF signal generator output to obtain 4.9 volts (3.0 watts) on the RMS VTVM. The distortion analyzer should indicate a maximum of 10% distortion.

3. Transmitter Section Alignment and Tests

PERSONNEL POSSESSING A FIRST OR SECOND CLASS RADIO TELEPHONE OPERATOR'S LICENSE ONLY ARE ALLOWED TO PERFORM ADJUSTMENTS IN THE TRANSMITTING SECTION ON THIS TRANSCEIVER.

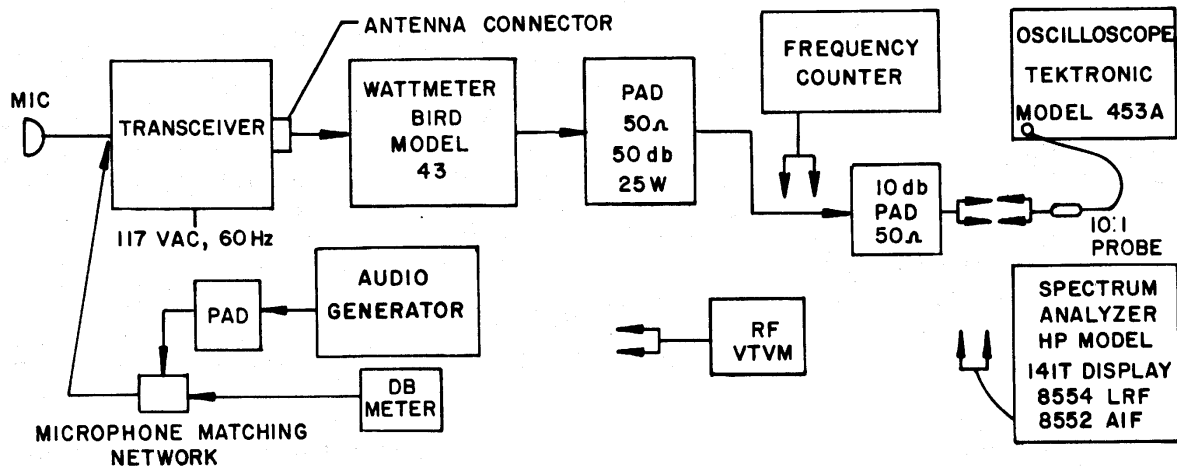


FIGURE 3, TEST SETUP FOR TRANSMITTER ALIGNMENT

3. Transmitter Section Alignment and Tests (Continued)

A. Preliminary

- 1) Remove the case from the transceiver and connect the AC power cord to the power connector on the rear panel. Connect the test equipment as shown in the Test Equipment Setup Diagram.
- 2) Set the transceiver front panel controls as follows:

Volume Control	to	Center position
Squelch Control	to	Full down position (Squelch)
Power Switch	to	ON
Channel Selector	to	Channel 13
Delta Tune	to	Center position
- 3) Connect the AC power plug into a 117 VAC, 60 Hz power source and measure the DC voltage at the power On/Off Switch. Adjust R728 if necessary, to obtain 13.8 VDC \pm .2 volts.

B. Synthesizer Frequency Measurements

- 1) Perform procedure given in Section I, Step 2C for the adjustment of L901 and the frequency measurements of X1, X2, X3, X4, X5, and X6.
- 2) 14 MHz Oscillator Frequency Measurements
 - a. Remove crystal X4 from its socket. Connect a frequency counter to the base terminal of Q902.
 - b. Key the transmitter and measure the frequency of X7 (14.950 MHz) Be sure the channel selector is set to channel 13.
 - c. Allow time for the frequency counter to make a regular count. The frequency of X7 should be 14.950 MHz \pm .002% (\pm 300 Hz).
 - d. Rotate the channel selector to channels 14, 15 and 16 and measure the frequency at each position for crystals X8, X9 and X10. Frequency of each crystal should be .002% (\pm 300 Hz) of their assigned frequency. REPLACE ALL DEFECTIVE CRYSTALS and measure the frequency of each replaced crystal.
- 3) 11.275 MHz Oscillator Frequency Measurement
 - a. Remove crystal X7 from its socket and set the channel selector to channel 13. Connect a frequency counter to the base terminal of Q906.
 - b. Key the transmitter and measure the frequency of X12. Frequency should be 11.275 MHz \pm .002% (\pm 300 Hz). REPLACE WITH A NEW CRYSTAL AND MEASURE THE FREQUENCY if defective.

3. Transmitter Section Alignment and Tests (Continued)

B. Synthesizer Frequency Measurements

4) Channel Frequency Measurement

- a. Install crystals X4 and X7. Connect the frequency counter to the base terminal of Q906. Rotate the channel selector through channel 1 through 23. Key the transmitter at each channel and allow the frequency counter to make a regular count.
- b. Each channel frequency MUST be $\pm 0.005\%$ (± 1000 Hz) of their assigned frequency as shown below

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	26.965000 MHz	9	27.065000 MHz	17	27.165000 MHz
2	26.975000 "	10	27.075000 "	18	27.175000 "
3	26.985000 "	11	27.085000 "	19	27.185000 "
4	27.005000 "	12	27.105000 "	20	27.205000 "
5	27.015000 "	13	27.115000 "	21	27.215000 "
6	27.025000 "	14	27.125000 "	22	27.225000 "
7	27.035000 "	15	27.135000 "	23	27.255000 "
8	27.055000 "	16	27.155000 "		

C. RF Coils and Transformer Adjustments

- 1) Set the CHANNEL SELECTOR to channel 13 and connect an RMS VTVM to the base of Q909 power amplifier. Key the transmitter, do not talk into the microphone
- 2) Adjust L905, L906, L907 and L908 for maximum voltage reading on the meter. Repeat the above adjustment for maximum voltage indication.

D. Unmodulated RF Power Output Measurement

Set the CHANNEL SELECTOR to channel 13 and key the transmitter, do not talk into the microphone. Observe the RF wattmeter and adjust L910, L912 and L913 for maximum RF power output. The RF output reading on the RF wattmeter should be 3 to 4 watts maximum. If more than 4 watts is indicated, adjust L913 to obtain a maximum of 4 watts.

E. Modulated Power Output

- 1) Connect the audio signal generator to pin 2 of the microphone connector through a matching network as shown on the Test Setup Diagram. Set the frequency to 1 KHz and the output to zero.
- 2) Connect an oscilloscope to the 10 db, 50 ohm pad as shown in the Test Setup Diagram. Key the transmitter, do not talk into the microphone, and obtain a carrier wave pattern as shown in Fig. 4, Pg. 15.

E. Modulated Power Output (Continued)

- 3) While keying the transmitter, adjust the audio generator output to obtain 50% modulated carrier as shown on the diagram below.
- 4) Increase the audio generator input 16 db. Observe the modulated carrier and adjust R523 to obtain a maximum of 95% modulation.

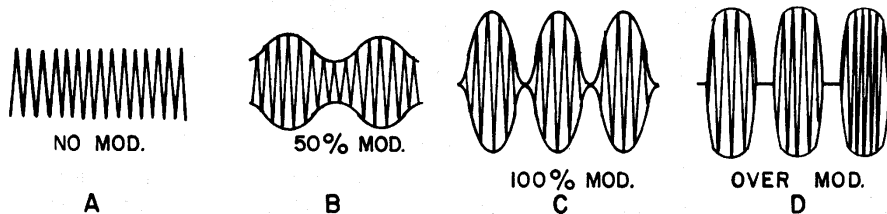


FIGURE 4, MODULATION WAVE PATTERNS

F. Harmonic Suppression Observation

- 1) Connect an audio signal generator to the Mic Jack, terminal #2 through a matching network as shown on the Test Setup Diagram, and set the frequency to 1 KHz and the output to zero.
- 2) Connect an oscilloscope to the 10 db, 50 ohm pad as shown in the Test Setup Diagram. Key the transmitter, do not talk into the microphone, and obtain a carrier wave pattern as shown on Figure 4.
- 3) While keying the transmitter, adjust the audio generator output to obtain a 50% modulated carrier.
- 4) Readjust the audio generator frequency to 2500 Hz and increase the audio generator output 16 db.
- 5) Disconnect the oscilloscope and connect a spectrum analyzer to the 10 db pad.
- 6) Key the transmitter and adjust the TVI trap (L914) for minimum indication of the (54 MHz) signal. All harmonics up to 270 MHz and below 27 MHz should be 50 db or more below the carrier fundamental, as shown in Figure 5.

G. "S"/RF Meter Adjustment

- 1) Press the transmit switch (do not talk into the microphone) and observe a reading on the wattmeter.
- 2) Adjust R517, if necessary, to make the meter read the same wattage as the wattmeter.

Upon completion of all test and adjustments, reseal the RF coils with coil wax and reassemble the cabinet and check harmonics again as in Step 3F.

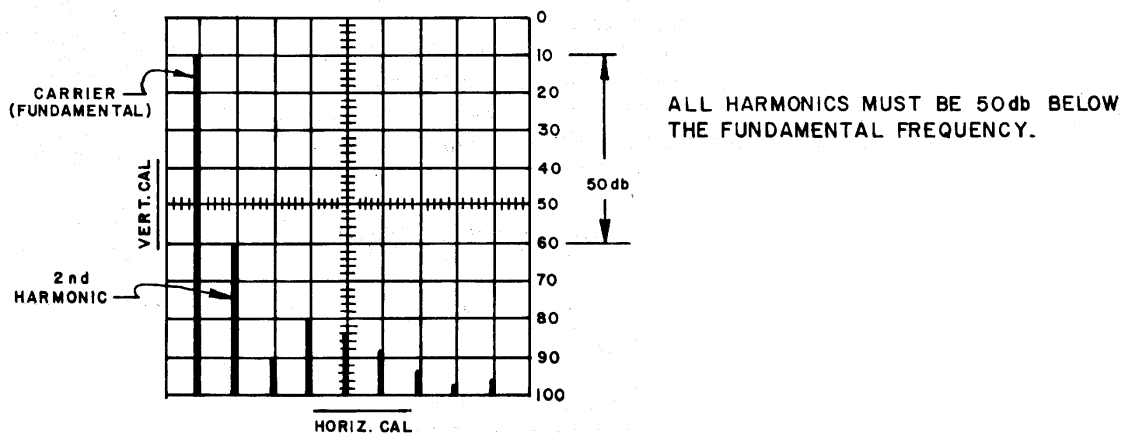


FIGURE 5, HARMONICS FREQUENCY PATTERNS

SECTION III

TABLES AND DIAGRAMS

TABLES

- Table 1, Troubleshooting Guide
- Table 2, Synthesizer Crystal Combination
- Table 3, Transistor Voltage

DIAGRAMS

- Figure 6, Transistor Location Diagram
- Figure 7, Schematic Diagrams
- Figure 8, RF Coils and Transformer location Diagram
- Figure 9, Test Points and Adjustments
- Figure 10, Printed Circuit Board, Component Location
- Figure 11, Printed Circuit Board, Top View
- Figure 12, Diodes and Crystal location Diagram

TABLE I, TROUBLESHOOTING GUIDE

TROUBLE	PROBABLE CAUSE
1. Transceiver will not operate.	<ul style="list-style-type: none">a. On/Off Switch defective.b. Fuse blown.c. Defective power source.d. Voltage regulator defective.e. Polarity reversed. (DC operation only.)
2. Fuse blows after replacement.	<ul style="list-style-type: none">a. Polarity of source voltage reversed. Shorted D-705. (DC operation only)b. Q704, Q705, C718, C722, T704, C720 defective (shorted)
3. No audio output. (S meter indicates reception of signals)	<ul style="list-style-type: none">a. Squelch control set wrong.b. Speaker defective.c. EXT SPK jack defective.d. Volume control defective.
4. No audio output. (Transmitter is not modulated when speaking into microphone.)	<ul style="list-style-type: none">a. All probable causes as in step 3 above.b. Q702, Q703, C704, Q705, defective.c. Microphone defective.d. T701, T702 defective.e. C952, C509, C510 defective.f. D9 open, defective.

TABLE 1, TROUBLESHOOTING GUIDE (Continued)

TROUBLE	PROABLE CAUSE
5. Poor reception of signals and low RF power output.	<ul style="list-style-type: none"> a. Low DC source voltage, less than 10 volts (DC operation only) b. Antenna connector or antenna defective. c. C101, C955, defective (open). d. D956, D102, C501 shorted.
6. Poor sensitivity.	<ul style="list-style-type: none"> a. Q101, Q102 defective. b. C955 open. c. Receiver section poorly aligned.
7. Low background noise on all Channels.	<ul style="list-style-type: none"> a. One of the receiver RF coils has open winding. b. Q101, Q102 or Q301 weak or defective.
8. Squelch function inoperative, receiver does not silence.	<ul style="list-style-type: none"> a. Q501 or Q502 shorted b. Squelch control R510 defective (open). c. C503 shorted.
9. Squelch function inoperative, receiver will not awaken.	<ul style="list-style-type: none"> a. Q501 or 502 defective b. Squelch control R510 defective (shorted) c. C502 shorted
10. Transmitter does not operate, (Receiver operates normally).	<ul style="list-style-type: none"> a. Microphone Transmit switch defective. b. TR18, TR19, or TR20 defective c. L10, L11, L12 or L13 defective (shorted or open). d. TR16 or 11.275 MHz crystal defective.

After the repair or replacement of any critical frequency controlling part or circuit, the transmitter and receiver sections should be tested for operational compliance to the Federal Communications Commission (FCC) frequency and power requirements and the manufacturers specifications.

TABLE 2, SYNTHESIZER CRYSTAL COMBINATION

CHANNEL	A GROUP CRYSTALS	B GROUP CRYSTALS	(A + B)	(A + B) - (11.275 MHz)
1	23.290 MHz	14.950 MHz	38.240 MHz	26.965 MHz
2	"	14.960 "	38.250 "	26.975 "
3	"	14.970 "	38.260 "	26.985 "
4	"	14.990 "	38.280 "	27.005 "
5	23.340 MHz	14.950 "	38.290 "	27.015 "
6	"	14.960 "	38.300 "	27.025 "
7	"	14.970 "	38.310 "	27.035 "
8	"	14.990 "	38.330 "	27.055 "
9	23.390 MHz	14.950 "	38.340 "	27.065 "
10	"	14.960 "	38.350 "	27.075 "
11	"	14.970 "	38.360 "	27.085 "
12	"	14.990 "	38.380 "	27.105 "
13	23.440 MHz	14.950 "	38.390 "	27.115 "
14	"	14.960 "	38.400 "	27.125 "
15	"	14.970 "	38.410 "	27.135 "
16	"	14.990 "	38.430 "	27.155 "
17	23.490 MHz	14.950 "	38.440 "	27.165 "
18	"	14.960 "	38.450 "	27.175 "
19	"	14.970 "	38.460 "	27.185 "
20	"	14.990 "	38.480 "	27.205 "
21	23.540 MHz	14.950 "	38.490 "	27.215 "
22	"	14.960 "	38.500 "	27.225 "
23	"	14.990 "	38.530 "	27.255 "

1) Frequency of Transmitter: $(A + B) - (11.275 \text{ MHz}) = \text{Channel Frequency}$

2) Frequency of Receiver:

$(A + B) - (\text{Received signal}) = 11.275 \text{ MHz}$ (1st IF Frequency). 11.730 MHz
 $(2\text{nd Oscillator Frequency}) - 11.275 \text{ MHz} = 455 \text{ KHz}$ (2nd IF).

**TABLE 3,
TRANSISTOR VOLTAGES**

Measure all voltage with a VTVM or 20K ohm/V voltmeter. Connect the negative meter lead to the circuit board common ground. Make measurements in the receiver section with the squelch control in the "unsquelched" position, and in the transmitter section without modulation.

	Type	RECEIVER (NO SIGNAL)			TRANSMITTER (WITHOUT MODULATION)			APPLICATION
		B	C	E	B	C	E	
Q101	2SC930/ 2SC839	1.47	5.73	1.48	0.45	0.09	0.29	RF AMP.
Q102	2SC930/ 2SC839	2.01	6.28	1.57	0.80	0.15	0.20	1ST MIX.
Q301	2SC930/ 2SC839	2.20	5.88	1.55	0.78	0.12	0.13	2ND MIX
Q302	2SC930/ 2SC839	2.25	4.76	1.55	1.23	0.49	0.48	IF AMP.
Q303	2SC930/ 2SC839	0.71	6.80	0	0.01	0.45	0	IF AMP.
Q501	2SC945/ 2SC372	0.06	0.73	0	0.02	0.05	0	SQUELCH AMP.
Q502	2SC945/ 2SC372	0.73	0.02	0	0.5	0.03	0	SQUELCH AMP.
Q507	2SA495	13.50	0	13.75	12.76	5.26	13.47	MODUL INDICATOR.
Q701	2SC945/ 2SC372	1.83	3.03	1.18	0.02	0.05	0.02	AF AMP.
Q702	2SC945/ 2SC372	1.49	11.53	7.05	1.41	7.12	0.76	AF AMP.
Q703	2SC945/ 2SC372	1.45	10.93	0.81	1.44	10.63	0.76	AF. DRIVER.
Q704	2SC1096	0.64	13.65	0.02	0.64	13.38	0.02	A. F. POWER AMP
Q705	2SC1096	0.64	13.65	0.02	0.64	13.38	0.02	A. F. POWER AMP
Q706	2SC1173	14.39	22.6	13.8	14.43	19.1	13.8	VOLT. REGULATOR
Q707	2SD234	13.8	22.6	13.8	13.8	19.1	13.15	VOLT. REGULATOR
Q708	2SC945/ 2SC372	7.36	14.39	6.69	7.27	14.43	6.67	VOLT. REGULATOR
Q901	2SC930	1.85	6.85	2.11	1.85	6.88	2.08	23 MHZ OSC.
Q902	2SC930/ 2SC839	1.47	6.95	1.21	1.47	6.85	1.19	SYNTHESIZER MIX- ER
Q903	2SC930/ 2SC839	1.92	6.44	1.35	0.02	0.05	0	2ND. OSC.
Q904	2SC930- 2SC839	1.63	5.90	1.04	1.62	5.82	1.02	14 MHZ OSC.
Q905	2SC930/ 2SC839	3.19	6.97	7.06	3.06	6.87	2.62	TRANS 11 MHZ OSC.
Q906	2SC930/ 2SC839	0.80	6.97	7.06	0.67	6.83	0.44	TRANS 2ND MIX- ER
Q907	2SC1166	2.10	13.73	7.06	1.55	0	0.95	BUFFER AMP
Q908	2SC1166	2.10	13.45	0	0.04	11.80	0.33	RF DRIVER AMP
Q909	2SC799	0.03	13.46	0	0.67	12.15	0.01	FINAL RF POWER AMP

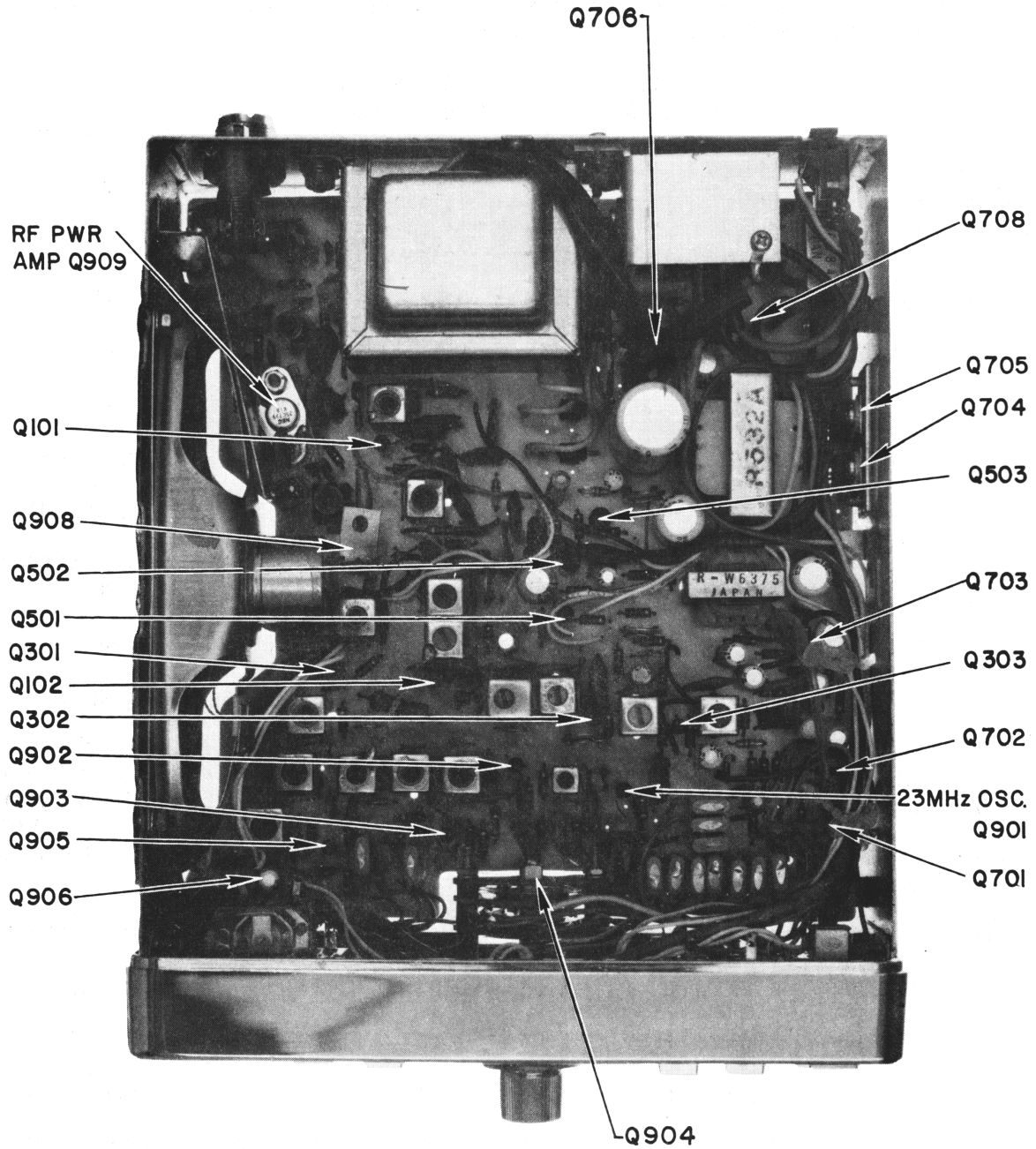


FIGURE 6, TRANSISTORS, LOCATION DIAGRAM

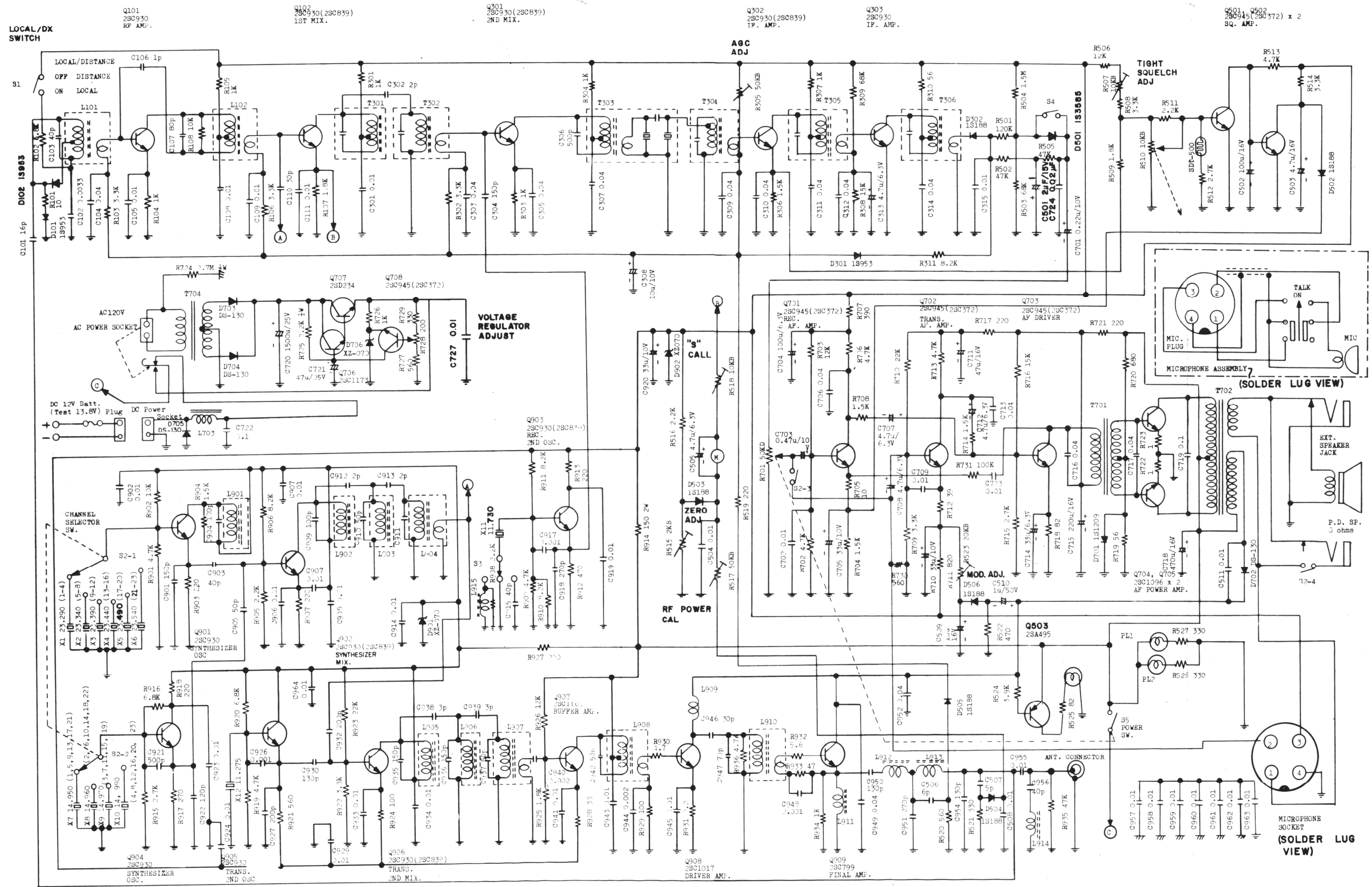


FIGURE 7, SCHEMATIC DIAGRAM, ISSUE B

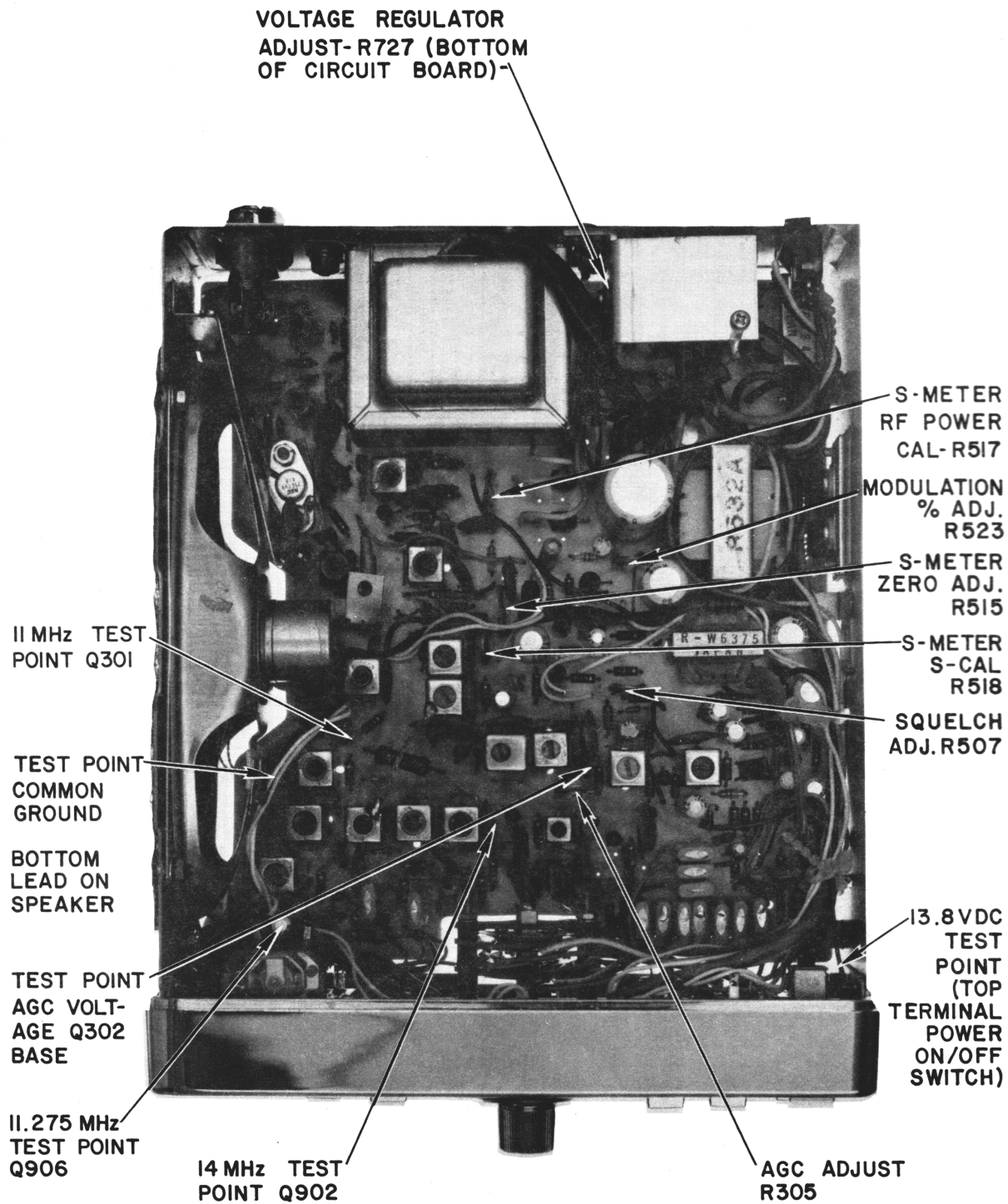


FIGURE 9, INTERNAL ADJUSTMENTS AND TEST POINTS, LOCATION DIAGRAM

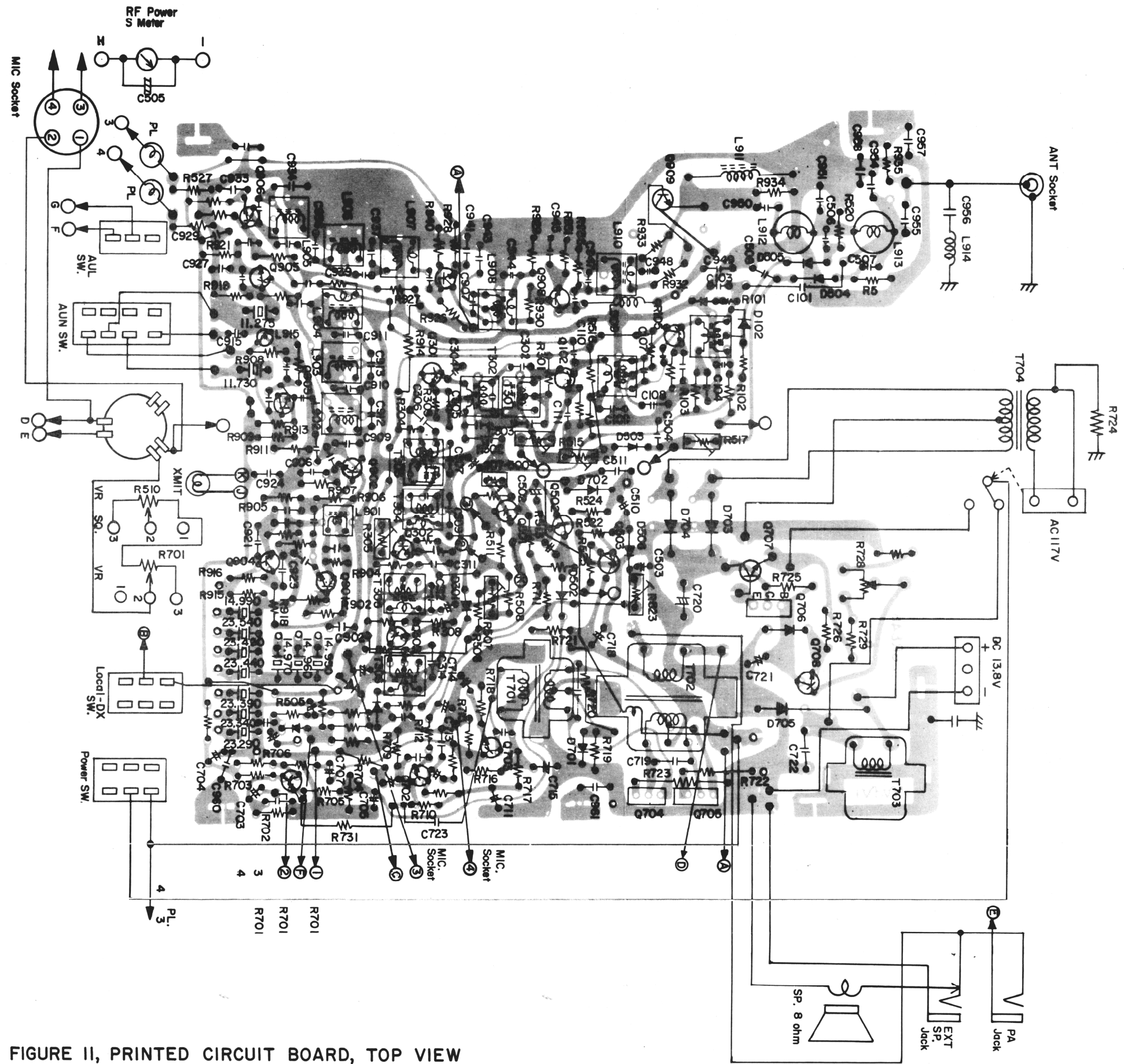


FIGURE II, PRINTED CIRCUIT BOARD, TOP VIEW

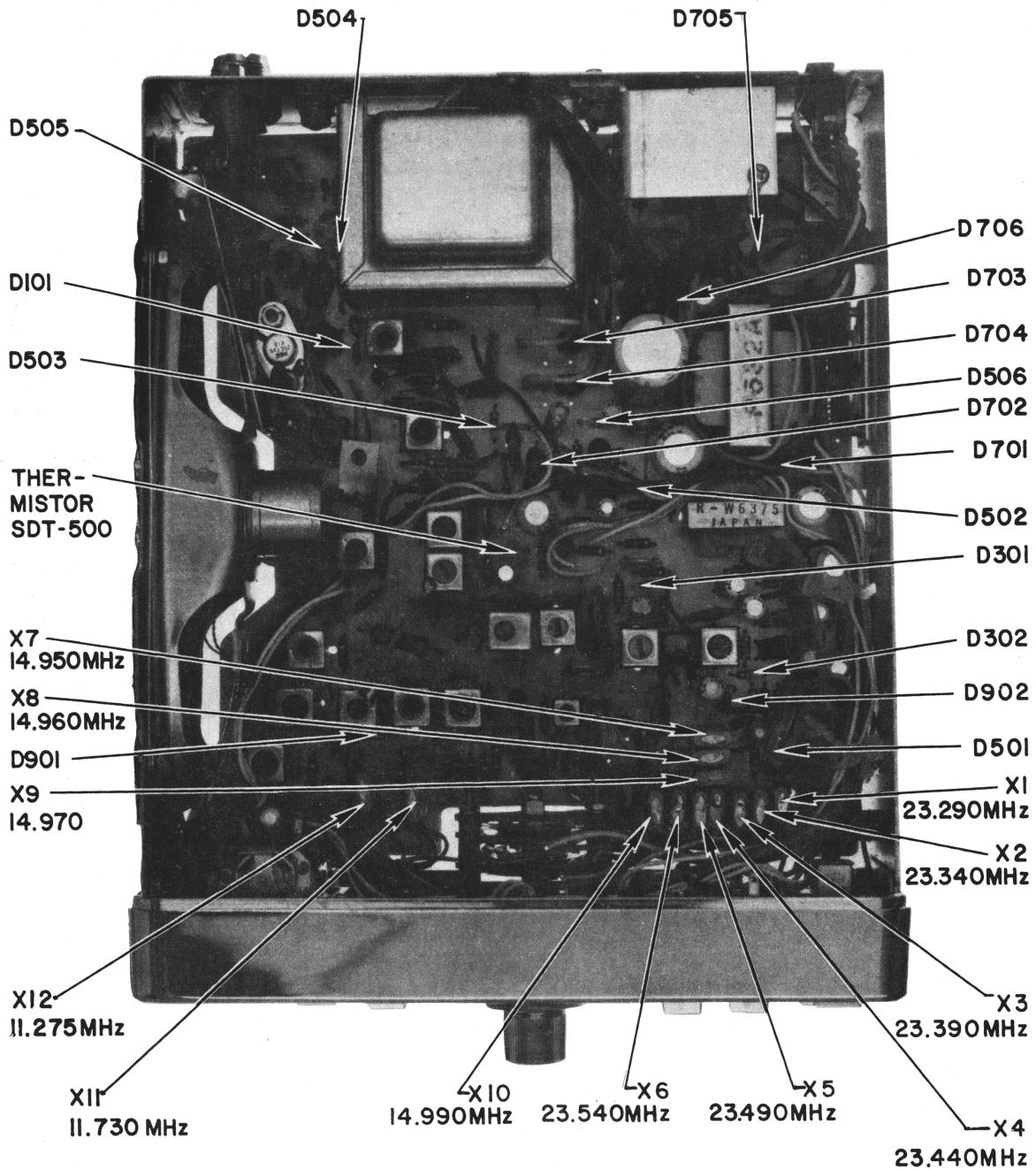


FIGURE 12, DIODES AND CRYSTALS, LOCATION DIAGRAM

SECTION IV

REPLACEMENT PARTS

A list of Special Replacement Parts for the Transceiver is provided to facilitate replacement of defective parts. When ordering from FANON/COURIER include the model and serial numbers of the unit being serviced. In case of a discrepancy between a "listed" part number and the number actually printed on a part, employ the latter. Address your communications to the FANON/COURIER Service Department, 990 South Fair Oaks Avenue, Pasadena, California, 91105.

Note: 1/4 watt resistors that are commonly available via distributor's stock are not stocked by COURIER.

REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NUMBER
SOLID STATE DEVICES		
Q101,303,901,904	Transistor, 2SC930 (D)	1013-15
Q102,301,302,906	" 2SC839 (H)	1042-04
	or	
	" 2SC930	1013-15
Q501,502,701,702	" 2SC372 (Y)	2017-117
703,708	or	
	2SC372	1041-72
	or	
	" 2SC945 (R)	1080-21
	or	
	" 2SC945 (Q)	2004-04
Q503	" 2SA495 (D)	2017-107
Q704,705	" 2SC1096 4ZL	2017-108
Q706	" 2SC1173 (O)	1080-130
Q707	" 2SD234 (O)	2017-109
Q902,905	" 2SC930 (E)	1002-68
Q907	" 2SC1166 (D)	2017-110
Q908	" 2SC1017	1087-01
Q909	" 2SC799	1009-04
D101,301,102	Diode, 1S953	1010-143
D501	" 1S358S	1001-11
D302,502,503, 504,505,506	" 1S188	1002-09
D702,705	" DS-130 (E)	291-20
D703,704	" DS-130 (C)	2017-114
	or	
	" DS-130 (B)	2017-112
D706,901,902	Zener Diode, XZ-070	2017-113
CRYSTALS		
X1	23.290 MHz, HC-25U	2017-12
X2	23.340 MHz "	2017-13
X3	23.390 " "	2017-14
X4	23.440 " "	2017-15
X5	23.490 " "	2017-16
X6	23.540 " "	2017-17
X7	14.950 " "	2017-18
X8	14.960 " "	2017-19

REPLACEMENT PARTS LIST (Continued)

SYMBOL	DESCRIPTION	PART NUMBER
CRYSTALS (Continued)		
X9	14.970 MHz, HC-25U	2017-20
X10	14.990 " "	2017-21
X11	11.730 " "	2017-22
X12	11.275 " "	2017-23
COILS AND TRANSFORMERS		
L101	Coil, (Antenna)	2017-41
L102	" (RF)	2017-42
L901	" (Oscillator) 23 MHz	2017-43
L902	" (RF Filter) 23 MHz	2017-44
L903	" " "	2017-45
L904	" " "	2017-46
L905,906	" " 27 MHz	2017-47
L907	" " "	2017-48
L908	" " "	2017-49
L909	" (Choke)	2017-50
L910	" (RF) "	2017-51
L911	" (Choke) "	2017-52
L912	" (PI network)	2017-53
L913	" " "	2017-54
L914	" TVI TRAP, 54 MHz	2017-55
L915	" (Delta Tune)	2017-56
T301	Transformer, 27 MHz	2017-57
T302	" " "	2017-58
T303	" I F 11 MHz Crystal Filter	1010-78
T304	" I F 455 KHz	1010-79
T305	" " "	2017-59
T306	" " "	2017-60
T701	" (Audio Input)	1010-81
T702	" (Audio Output)	2017-61
T704	" (AC Power)	2017-62
T703	" (Choke, DC Power)	1010-167
SWITCHES		
S1	Switch, Local/DX	2017-38
S2	" , Channel Selector	2017-29
S3	" , Delta Tune	1010-98
S4	" , ANL	1010-97
S5	" , Power On/Off	2017-30
CAPACITORS		
C101	Ceramic, 16pfd, 50V, ±5%	2017-80
C103,903,915 956	" 40pfd, " "	1009-108
C104,713	" 0.04mfd +80%(-)20%	1010-153
C105,108,109 111,301,504, 508,511,702,	" 0.01mfd " ±20%	2017-81

REPLACEMENT PARTS LIST (Continued)

SYMBOL	DESCRIPTION	PART NUMBER
CAPACITORS (Continued)		
C723,902,906 908,923,924 929,933,934, 943,945,955, 957,958,959, 960,961,962, 963,964,941	Ceramic, 0.01mfd +80% ±20%	2017-81
C106	" 1pfd, ±0.25pfd, 50V	1014-120
C107	" 80pfd, ±5%	2017-82
C110,946	" 30pfd, " "	1044-80
C302,912,913	" 2pfd, ±0.25pfd "	1044-88
C303,305,307, 309,311,312, 314,717,949, 952	" 0.04mfd, ±20% "	1014-102
C304,901,935, 936	" 150pfd, ±5%, "	1004-86
C506	" 6pfd, ±0.25pfd "	1004-90
C507,938,939	" 3pfd, " "	1009-134
C709,919	" 0.01mfd, ±80% (-) 20% 50V	160-55-9
C719,722	" 0.1mfd, " "	1019-41
C904,909	" 100mpfd, ±5% " "	1009-110
C905,910,937, 942	" 50pfd " " "	2017-91
C917,926	" 0.001mfd " " "	2017-93
C918,951	" 270pfd " " "	1009-112
C927,932	" 200pfd " " "	2017-94
C930,950,954	" 130pfd " " "	2017-95
C940,944	" 0.002mfd, ±10%, " "	2017-96
C947	" 70pfd ±5%, " "	2017-97
C948,725	" 0.001mfd ±20% " "	1019-39
C724	" 0.02mfd, " "	1042-159
C102	Mylar, 0.0033mfd, " " "	1047-94
C315,907,914	" 0.01mfd " " "	1010-159
C911,922	" 120pfd, ±5% " "	2017-92
C716,706,310	" 0.04mfd ±20% " "	1010-160
C306,921	Styrol, 500pfd ±10% " "	2017-83
C308	Electrolytic, 10mfd, 10V	170-66-9
C313,505,707, 708,712	" 4.7mfd, 6.3V	170-44-9
C501,701	" 0.22mfd, 10V	2017-84
C502	" 100mfd, 16V	1019-45
C503	" 4.7mfd, " "	2017-85
C509	" 10mfd, " "	2017-86
C510	" 1mfd, 50V	1011-40
C703	" 0.47mfd, 10V	2017-115
C704	" 100mfd, 6.3V	1003-102
C705,710,920	" 33mfd, 10V	2017-87
C711	" 47mfd, 16V	2017-88
C714	" 33mfd, 6.3V	170-45-9
C715	" 220mfd, 16V	1019-46
C718	" 470mfd, 16V	170-47-9

REPLACEMENT PARTS LIST (Continued)

SYMBOL	DESCRIPTION	PART NUMBER
CAPACITORS (Continued)		
C720	Electrolytic, 1500mfd, 25V	2017-89
C721	Electrolytic, 47mfd, 25V	2017-90
VARIABLE CONTROLS		
R305	50K ohms B, AGC Adjustment	1010-88
R507,518	10K ohms B, Squelch Adjustment and S-Meter CAL	2017-64
R510	10K ohms B, Squelch Control	2017-65
R515	2K ohms B, S-Meter Zero Adjustment	2017-66
R517	50K ohms B, S-Meter RF Power Cal.	2017-67
R523	20K ohms B, Modulation Adjustment	2017-69
R701	50K ohms D, Volume Control	2017-71
R728	200 ohms, Voltage Regulator Adjustment	2017-77
RESISTORS		
R101,705	Carbon, 10 ohm, $\pm 10\%$, 1/4W	1002-73
R102,916,920	" 6.8K " " "	1010-218
R103,106,302, 508,514,709,922	" 3.3K " " "	1044-73
R104,105,301,303, 304,307,726,934	" 1K " " "	1010-232
R107,509,925	" 1.8K " " "	1010-211
R108,902	" 10K " " "	1010-220
R306,704,708,714, 904	" 1.5K " " "	1010-210
R308,716	" 15K " " "	1011-25
R309,503	" 68K " " "	1010-224
R310	" 56 " " "	1010-101
R311,906,910,911	" 8.2K " " "	1010-219
R501	" 120K " " "	1004-95
R502,505,935	" 47K " " "	1010-223
R504	" 1.5M " " "	2017-63
R506,703,926	" 12K " " "	1010-221
R511,516,905,908	" 2.2K " " "	1010-212
R512,715,915	" 2.7K " " "	1010-213
R513,702,706,713, 901,909,936,919	" 4.7K " " "	1010-216
R519,717,721,903, 907,913,918,927	" 220 " " "	1017-69
R520,727,730,921	" 560 " " "	1010-207
R521,526,527,729	" 330 " " "	1010-204
R522,912	" 470 " " "	1010-206
R524	" 3.9K " " "	1010-215
R525,718	" 87 " " "	2017-70
R707	" 390 " " "	1010-205
R710,923	" 22K " " "	1044-71
R711	" 820 " " "	2017-72
R712	" 39 " " "	2017-73
R719	" 56 " $\pm 5\%$ "	1011-200

REPLACEMENT PARTS LIST (Continued)

SYMBOL	DESCRIPTION	PART NUMBER
RESISTORS (Continued)		
R720	Carbon, 680 ohm, $\pm 5\%$ 1/2W	2017-74
R722, 723	" 1 " " "	1010-198
R724	" 2.7M " $\pm 10\%$ "	2017-75
R725	" 3.3K " " "	2017-76
R731	" 100K " " 1/4W	1010-225
R914	" 150 " " 2W	2017-78
R917	" 270 " " 1/4W	1004-99
R924, 929	" 100 " " "	1010-202
R928	" 33 " " "	1010-231
R920	" 4.7 " " 1/4W	1048-93
R931	" 2.2 " " "	1004-84
R932	" 5.6 " " "	2017-79
R933	" 47 " " "	1010-88

MISCELLANEOUS

AC Power Cord Assembly	2017-33
Bracket, W/Screws, (Microphone Hanger)	1000-167
Cushion for Slide Switch	1044-13
DC Cord Assembly	2017-40
Fuse 2A, for DC	2017-37
Fuse holder for DC	1044-62
Knob - ANL, Delta Tune	1010-14
Knob for power switch	2017-02
Knob, Assembly Channel Selector	1010-31
Lamp for Mod, Chan, Meter	2017-39
Microphone, CMM-1 W/Special Connector	2017-116
Mounting Bracket (Dashboard Mount)	1014-22
Plug, DC Power	2017-28
Plug, Microphone (Cable Mount)	2017-26
Rubber feet	1044-14
Bracket Mounting screw (for 1014-22)	1014-23
Socket for crystal	2017-31
Socket, AC, Power	2017-32
Socket, DC Power	2017-28
Socket, EXT. Speaker	1010-103
Socket, Microphone (Chassis Mount)	2017-25
S Meter	1044-56
Speaker, 8 ohms, 1.5W	1010-96
Spring plate - ANL, Delta Tune	1044-08
Switch	
Chrome Cabinet	1044-03



PARTS ORDERING INFORMATION

- A) All Fanon/Courier replacement parts are stocked at Pasadena only.
- B) Distributor/Warranty Service Station discounts are as established on date of sale.
- C) Minimum parts order --- \$3.00.
- D) Terms --- net 30 days. Open account shipments are extended only to bonafide established accounts on record as of date of sale.
- E) Shipping --- FOB our warehouse (990 S. Fair Oaks Ave., Pasadena, CA 91105).
- F) Prices, part numbers, and descriptions subject to change without notice.
- G) C.O.D. orders accepted. C.O.D. shipments are restricted to the service industry and only when requested on company letterhead or P.O. Accommodation sales to individuals will be quoted, with a request for a "check with order".
- H) All parts are guaranteed to be free from manufacturing defects for 90 days from sale date. NO parts may be returned for credit. Any defective parts returned will be exchanged only, after our examination indicates failure in normal use and installation.
- I) For fastest service, use Fanon/Courier part numbers on your order. Indicate model of unit for which they are intended and a full description of the part's function when part # is not known.
- J) Parts not in stock will be acknowledged by postcard. Discontinued models of 3 years or more may require special order from our suppliers. Discontinued items no longer available will be acknowledged by return mail.
- K) In general, our parts stock is limited to the general area of "failure prone" items and does not include chassis, printed circuit boards, cartons, or other materials not usually required by the servicemen.
- L) Forward all parts orders to Customer Service, Pasadena, CA only. No parts orders filled at our Hopelawn, N.J. warehouse.
- M) Our Western union "TWX" address is: "RESDEL IND PSD"
Our TELEX Number is: 67-5448.
Our Phone Number is: 213-799-9164.

Our Mailing address is:

Fanon/Courier Corp.
Customer Service Dept.
990 S. Fair Oaks Ave.
Pasadena, CA 91105

STANDARD WARRANTY

Adopted and Recommended by Electronic
Industries Association

FANON/COURIER CORPORATION warrants each new electronic product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part (at the Company's option) in exchange for any part of any unit of its manufacture which under normal installation, use and service disclosed such defect; provided the unit is delivered by the owner to us or to our authorized distributor from whom purchased, or authorized service station, intact, for our examination, with all transportation charges prepaid to our factory, within 90 days from the date of sale to original purchaser and provided that such examination discloses, in our judgment, that it is thus defective.

Written authorization must be obtained before any merchandise is returned to the factory.

This warranty does not extend to any of our electronic products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, unauthorized modifications, or to use in violation of instructions furnished by us, nor units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of all warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our electronic products.

FANON/COURIER CORPORATION



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PASADENA, CALIFORNIA 91105
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