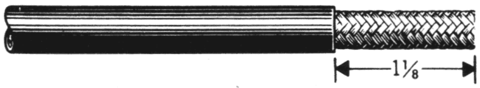
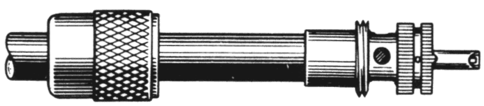
RG-8/U

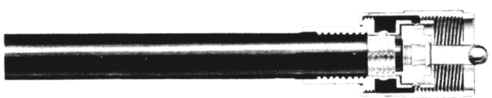


Cut end of cable even. Remove vinyl jacket 1-1/8", except 83-1SP plug remove vinyl jacket 1-1/4".

Bare 5/8" of center conductor. Trim braided shield. Slide coupling ring on cable. Tin exposed center conductor and braid.

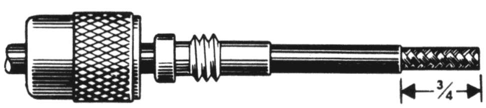


Screw the plug sub-assembly on cable. Solder assembly to braid through solder holes, making a good bond between braid and shell. Solder conductor to contact. Do not use excessive heat.

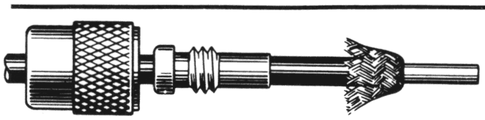


For final assembly, screw coupling ring on plug sub-assembly.

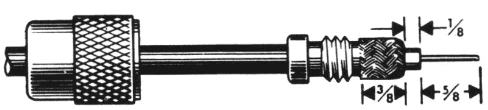
RG-58A/U



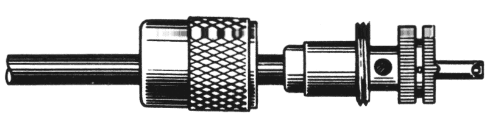
Cut end of cable even. Remove vinyl jacket 3/4". Slide coupling ring and adapter on cable.



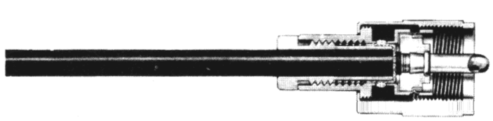
Fan braid slightly and fold back as shown.



Position adapter to dimension shown. Press braid down over body of adapter and trim to 3/8". Bare 5/8" of conductor. Tin exposed center conductor.



Screw plug sub-assembly on adapter. Solder braid to shell through solder holes. Use enough heat to create bond of braid to shell. Solder conductor to contact.



For final assembly, screw coupling ring on plug sub-assembly.

UHF COAXIAL CONNECTORS
ASSEMBLY INSTRUCTIONS
FIGURE 3-2

Reprinted by permission of Amphenol RF Division, Amphenol Corporation.

3.6 NOISE SUPPRESSION

Vehicle electrical noise of some sort is a problem in almost all new mobile radio installations.

Before beginning any special noise suppression steps, be sure that the vehicle is well tuned. Clean and tighten all electrical connections, including alternator, battery, regulator and coil connections. Perform the following maintenance steps as necessary: solder crimped spark plug and distributor leads; clean and regap or replace spark plugs and ignition points; check and clean alternator rings and brushes. Retune the engine every 10,000 miles or twice a year, whichever occurs first.

Ordinarily several sources of noise are present in any vehicle, with the strongest covering the others. Drive to a relatively quiet location (free of man-made electrical interference such as noisy power lines, industrial noise or other vehicles).

Test for ignition noise with a weak signal or no signal on channel. Vehicle may be standing still. Ignition noise will be present at all engine speeds and, if severe, may make a normally readable signal unreadable. Ignition noise is a "popping" sound which varies with engine speed. It stops immediately when the ignition key is turned off with the engine at a fast idle.

A "whining" noise which varies with engine speed and continues with the ignition turned off with the vehicle coasting in gear is characteristic of the alternator. Check and clean the alternator rings and brushes.

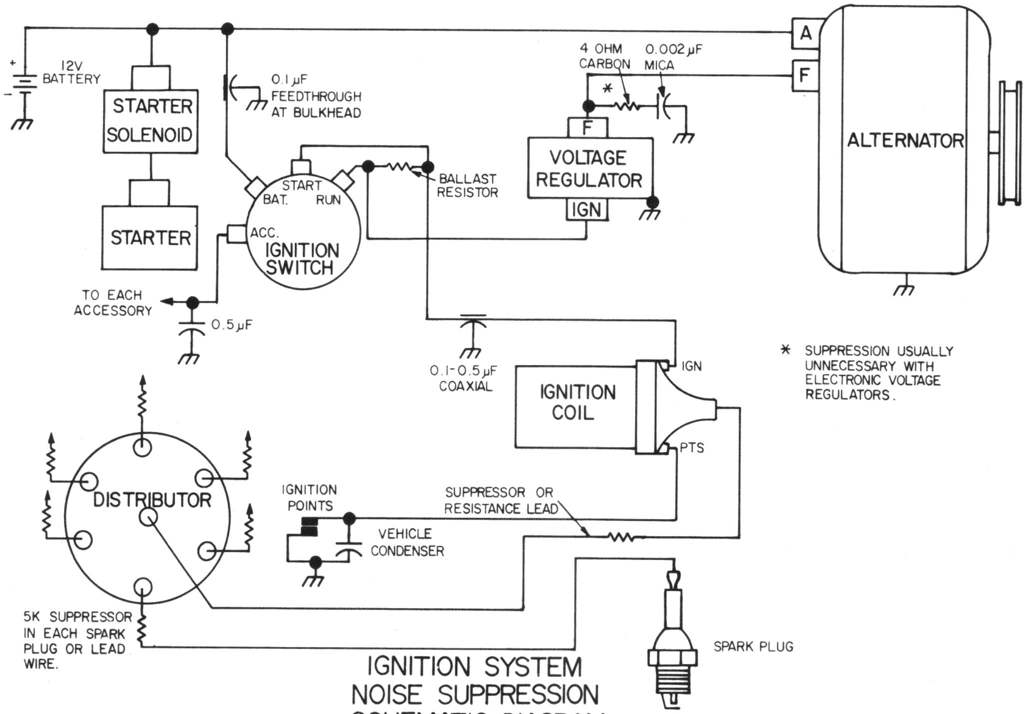
An irregular "clicking" sound which disappears at a slow idle characterizes the voltage regulator.

Irregular popping noises which vary with road surfaces indicate static discharge at any of several locations in the vehicle. Tighten loose nuts and bolts and bond large areas such as the fenders, exhaust pipe, firewall, etc. to the frame with lengths of heavy braid.

The E. F. Johnson Company offers a noise suppression kit Model No. 250-801-1, which you can order from your Johnson dealer or distributor. The Champion Spark Plug Company offers, free of charge, an excellent publication on noise suppression, "Giving Two-Way Radio Its Voice".

Write to:
Automotive Technical Services Department
Champion Spark Plug Company
Toledo, Ohio 43601

Figure 3-3 illustrates a few noise suppression techniques.



IGNITION SYSTEM
NOISE SUPPRESSION
SCHEMATIC DIAGRAM
FIGURE 3-3

SECTION 4
CIRCUIT DESCRIPTION

4.1 GENERAL

You can become familiar with the transceiver by studying the schematic diagram found at the back of this manual and the block diagram, Figure 4-1, while following the circuit description.

4.2 RECEIVER

4.2.1 SWITCHING

A diode, D7, switches the antenna from receive to transmit. The transmit keying switch switches the B+ from transmit to receive.

4.2.2 RECEIVER RF SECTION

In receive, the RF signal from the antenna passes through a Pi network and is coupled to T1 by C37. T1 provides impedance transformation. The first RF amplifier, Q1, raises the RF signal level. T2 provides RF tuning and couples the signal to the base of the mixer, Q2. The mixer receives an emitter input from T3, the oscillator transformer. The oscillator operates at 455 kHz below the carrier frequency.

4.2.3 IF

The output of the mixer is applied to a ceramic filter tuned at the factory for 455 kHz. The output of the filter is coupled to the base of Q4. Transistors Q4 and Q5 raise the 455 kHz signal to a level suitable for detection.

4.2.4 AUDIO

The output of the second IF amplifier is applied to a detector and noise limiter network. Noise limiter action clips off the noise spikes. Detector action detects a change in amplitude and develops the audio. The audio output from this network is coupled by C11 to the volume control, R16. From the movable contact of the volume control the audio is coupled through Z7 to the base of the first audio amp, Q7. The amplified audio from Q7 is amplified by driver Q8 and applied to T6. Driver transformer T6 couples the audio to the Class B audio output stage consisting of audio power transistors Q9 and Q10. The audio output transformer, T7, has two secondaries. One secondary provides audio power to drive the speaker. The other secondary provides modulating power for the transmitter.

4.2.5 AUDIO COMPRESSOR

Constant modulation during transmit is maintained by detected audio feedback from T7. Audio from T7 is coupled to a rectifier filter network by C25. The rectifier filter consists of D5, R20 and C22. The output of this network is negative DC and is applied to the emitter of Q7. The compressor adjusts from a high level mic input by producing a higher level of negative DC. The DC adjusts the emitter voltage of Q7 and reduces its gain.

4.2.6 AGC

A portion of the second IF output is coupled by C5 to a rectifier filter network consisting of D1, R3 and C6. This network develops a negative going AGC voltage that is applied directly to the base of Q1 and indirectly to the base of Q4. Negative going AGC voltage, the result of a stronger received signal at the antenna, causes a decrease in the base voltage of Q1 and reduces its gain. This also causes the base voltage of Q4 to decrease. The base of Q4 is connected to the emitter of Q1 through Z3 and Z4. Any change in the emitter voltage of Q1 results in a change in the base voltage of Q4.

4.2.7 SQUELCH

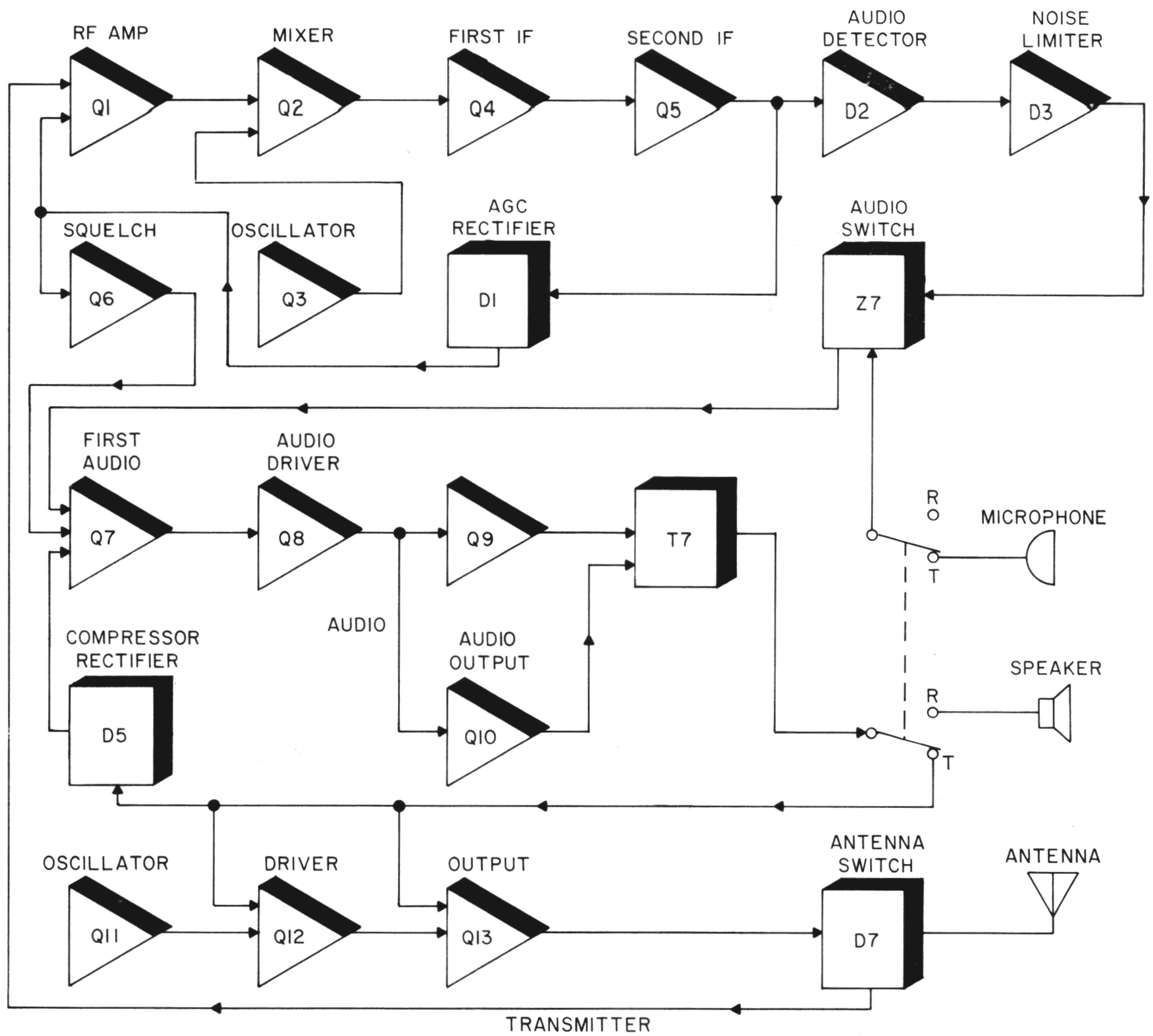
The squelch circuit consists of a squelch amplifier, Q6, and squelch control potentiometer R7. R7 changes the operating point of Q6. The conduction of Q6 determines the emitter voltage of the first audio amp, Q7.

Assume that R7 is set so that Q6 is turned on and Q7 is turned off. In this condition the audio is disabled. When an RF signal is received, the emitter voltage of Q1 goes in a slightly negative direction. This causes Q6 to turn off (depending on the setting of R7) and raises the emitter voltage of Q7. When the emitter voltage of Q1 reaches the forward biased value, it turns Q6 off and Q7 on which enables the audio.

4.3 TRANSMITTER

The transmitter consists of an oscillator operating at the crystal frequency, driver and power output stage. When the PTT (push-to-talk) switch is depressed, +12.6 volts is applied to the oscillator stage; B+ and audio are applied to the driver and PA. The oscillator (Q11) output level is raised by the driver, Q12, and applied to the power output stage.

The power output stage drives a 50 ohm antenna connected to J2.



MESSENGER 125
BLOCK DIAGRAM
FIGURE 4-1

SECTION 5
SERVICING

5.1 GENERAL SERVICING INFORMATION

The information in this section serves as a guide for servicing the Messenger 125 transceiver. Carefully read this information before attempting to isolate malfunctions. A little beforehand knowledge is always an asset when troubleshooting.

Refer to the circuit description, block diagram, and the schematic at the back of this manual to familiarize yourself with the transceiver circuitry.

5.1.1 IDENTIFICATION OF PARTS

The parts list in this service manual is in alphabetical and numerical order by item number, i.e., capacitors first, chassis parts second, etc.

5.1.2 PREVENTIVE MAINTENANCE

The transceiver should be placed on a regular maintenance schedule, and an accurate record of its performance should be maintained. Important items to check are receiver sensitivity, transmitter power output, and frequency output. Use the performance test procedures in the receiver and transmitter servicing sections as guides.

5.1.3 REPLACEMENT TRANSISTORS

The transistors used in this unit are listed with E. F. Johnson house numbers. These transistors are selected for specific parameters. Refer to Section 1 in this service manual for detailed instructions on ordering replacement parts.

5.1.4 GENERAL SOLDERING INFORMATION

The same basic soldering practices used on other printed circuit boards can be used on the Messenger 125 circuit board. Avoid using small wattage soldering irons. Apply the amount of heat that will cause the solder to flow quickly. No iron smaller than 47 watts should be used. Use a vacuum bulb desoldering device, such as a "solder sipper", to remove excess old solder from the circuit board.

5.1.5 REMOVING CABINET SHELL

a. Remove the No. 6 screw (one on each side at the rear) that fasten the cabinet shell to the chassis rail.

b. Grasp the front panel with one hand and the cabinet shell with the other.

c. Carefully slide the cabinet shell away from the front panel.

5.1.6 GENERAL TROUBLESHOOTING INFORMATION

Always give a malfunctioning unit a quick visual check before attempting to isolate troubles. A visual check may spot an overheated or burned component. Most transceiver malfunctions will probably be the result of transistor or diode failures.

Always check transistor emitter voltages first when troubleshooting. They will usually give the first indication of trouble.

5.2 TRANSISTOR TROUBLESHOOTING

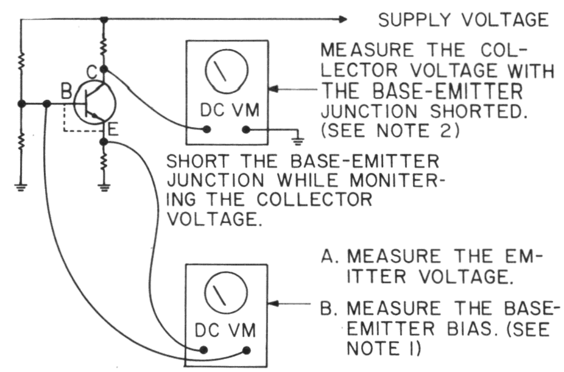
5.2.1 GENERAL

The following information is intended to aid troubleshooting and isolation of transistor circuit malfunctions.

5.2.2 TRANSISTOR OPERATING CHARACTERISTICS

For all practical purposes the transistor base-emitter junction and the transistor base-collector junction can be considered to be diodes. For the transistor to conduct collector to emitter its base-emitter junction must be forward biased in the same manner as a conventional diode. In a germanium transistor the typical forward biased junction voltage is 0.2 to 0.4 volts. A typical silicon transistor will have forward biased junction voltage of 0.5 to 0.7 volts. When collector current is high the base-emitter voltage of both germanium and silicon transistors increases from 0.1 to 0.2 volts. The base-emitter bias voltage in the forward biased condition is then 0.4 to 0.5 volts for a germanium transistor and 0.7 to 0.9 volts for a silicon transistor. High current silicon transistors may go up 2 volts under load.

A high impedance DC voltmeter is usually the only measuring instrument required for determining the operating status of an in-circuit transistor. The meter is used to measure the transistor bias voltages. See Figure 5-1 for the correct voltmeter connections for measuring in-circuit transistor bias.



TEST CONNECTIONS FOR
IN-CIRCUIT TRANSISTOR TESTING
FIGURE 5-I

NOTES

Enough loop current is present in the leads of some electronic voltmeters to destroy transistors if measurements are made directly across transistor junctions. If an electronic voltmeter is used, perform the above measurements with respect to the circuit voltage common.

If the collector voltage is measured with a VOM the meter leads may be connected directly across the collector resistor. The difference between the supply voltage and the collector voltage will then be indicated directly on the VOM.

Be careful when connecting test leads to in-circuit transistors. Operating transistors can be ruined by shorting the base to the collector and, in some circuit configurations, the emitter to ground.

Turn power off when removing or installing transistors.

5.2.3 IN-CIRCUIT TRANSISTOR TESTING

a. Refer to Figure 5-1 for test connections.

b. Measure the emitter voltage. Compare your measurement to the voltage listed on the schematic diagram. A correct emitter voltage reading generally indicates that the transistor is working properly. If you are in doubt as to the condition of the transistor after measuring the emitter voltage, proceed to the following tests.

c. Measure the base-emitter junction bias. The voltage measured across a forward biased junction should be approximately 0.3 volts for a germanium transistor and 0.6 volts for a small signal silicon transistor.

d. Check for amplifier action by shorting the base to the emitter while monitoring the collector voltage.* The transistor should cut off (not conduct emitter to collector) because the base-emitter bias is removed. The collector voltage should rise to near the supply level. Any difference is the result of leakage current through the transistor. Generally, the smaller the leakage current the better the transistor. If no change occurs in the collector voltage when the base-emitter junction is shorted the transistor should be removed from the circuit and checked with an ohmmeter or a transistor tester. The following section describes the technique for testing transistors out of the circuit with an ohmmeter.

* Not recommended for power transistors under driving conditions.

5.2.4 OUT OF CIRCUIT TRANSISTOR TESTING

Only high quality ohmmeters should be used to measure the resistance of transistors. Many ohmmeters of both VOM and electronic types have short circuit current capabilities in their lower ranges that can be damaging to semiconductor devices. A good "rule of thumb" is to never measure the resistance of a semiconductor on any ohmmeter range that produces more than 3 milliamperes of short circuit current. Also, it is not advisable to use an ohmmeter that has an open circuit voltage of more than 1.5 volts. The following section describes a method for determining the short circuit current capabilities of ohmmeters.

5.2.5 HOW TO DETERMINE OHMMETER CURRENT

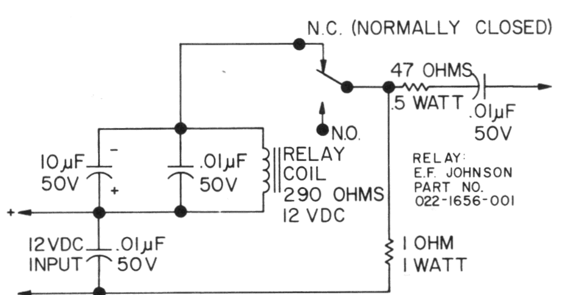
When the ohmmeter test probes are shorted together (measuring the forward resistance of a diode or the base-emitter junction of a transistor amounts to the same thing) the meter deflects full scale and the entire battery voltage appears across a resistance that we will designate as R1. The current through the probes is the battery voltage divided by the resistance of R1. A very easy method is available for determining the value of R1. Look at the exact center of the ohmmeter scale. Your reading is the value of R1 on the Rx1 range.

The only other unknown required to calculate the short circuit current of an ohmmeter is the internal battery voltage. Let's take a well known meter that has a center scale reading on the ohms scale of 4.62 and a battery voltage of 1.5 volts. Its short circuit current can be calculated by using Ohm's Law. Dividing 1.5 volts by 4.62 ohms equals a short circuit current of 324 mA on the Rx1 range.

TABLE 5-1

OUT OF CIRCUIT TRANSISTOR MEASUREMENTS

Transistor Type		Ohmmeter Connections + lead	- lead	Resistance in ohms
Germanium PNP	Power	Emitter	Base	30 to 50 ohms
		Emitter	Collector	Several hundred
	Small Signal	Emitter	Base	200 to 250 ohms
		Emitter	Collector	10k to 100k ohms
Silicon PNP	Small Signal	Emitter	Base	10k to 100k ohms
		Emitter	Collector	Very high (might read open)
Silicon NPN	Power	Base	Emitter	200 to 1000 ohms
		Collector	Emitter	High; often greater than 1 megohm
	Small Signal	Base	Emitter	1k to 3k ohms
		Collector	Emitter	Very high (might read open)



NOISE LIMITER TEST GENERATOR
FIGURE 5-2

5.3 RECEIVER PERFORMANCE TEST

(With troubleshooting information.)

Receiver RF input values are given into a 6 dB 50 ohm pad. Most values are approximate; except where an absolute value is given (i.e., 8 dB minimum) numbers are an approximate guide.

5.3.1 TEST INSTRUMENT CONNECTIONS

Refer to Table 5-2 for test instruments required.

NOTE

Any 117 VAC operated test instruments with grounded power plugs used for servicing the Messenger 125 must be "floated" (ungrounded).

a. Connect an RF signal generator through a 6 dB pad to the antenna jack.

b. Connect an audio voltmeter across the speaker terminals. Connect the "hot" side of the voltmeter to the top terminal.

c. Connect a VOM in series with the power lead. Set the function switch to DC current and the range selector to the range nearest one ampere full scale.

5.3.2 SENSITIVITY AND RECEIVER CURRENT DRAIN

a. Set the volume control for maximum volume and the squelch control for minimum squelch.

b. Push the channel 11 switch (or another available center channel).

c. Set the signal generator output for 1µV modulated 30% at 1000 Hz on channel 11 (27.085 MHz). Use a crystal controlled generator equivalent to the one listed in Table 5-2.

d. Adjust the volume control for a 0 dB indication on the audio voltmeter.

e. Switch the signal generator audio off. The indication on the audio voltmeter should drop 8 dB or more.

f. Reset the volume control for maximum volume.

g. Check the receiver current drain. Normal current drain should be approximately 300 mA with no signal.

TABLE 5-2
TEST INSTRUMENTS REQUIRED FOR SERVICING AND ALIGNMENT

TYPE	REQUIRED CHARACTERISTICS	USE	RECOMMENDED MODEL
VTVM	A low range of 0-1.5 volts on AC and DC	Measure RF, AF and DC voltages	Heath IM-11 with RF probes or equivalent
Oscilloscope with RF Pickup Loop	Direct connection to vertical plates, or vertical amplifier good to 30 MHz. Refer to Figure 5-8 for pickup loop fabrication details.	Check modulated waveforms and audio.	Heath IO-12 or equivalent modified for direct connection to vertical plate. Precision ES-550B
Audio Voltmeter	Measure from -40 dB to +10 dB	Measure audio	Heath IM-21 or equivalent
Audio Generator	With variable attenuator and frequency of 400 to 2500 Hz	Check audio amps. Modulate transmitter.	Heath IG-72 or equivalent
Frequency Meter	Accuracy of ±0.0005% Frequency range of 455 kHz and from 25 to 30 MHz	Measure receiver and transmitter RF frequencies	Viking Instruments Model VFS 700
Thruline Wattmeter	Input and output impedance of 50 ohms. 5 or 10 watts. Accuracy of ±5% of full scale reading.	Measure transmitter power output. Measure antenna VSWR.	Bird Model 43 with 5A or 10A element
DC Current Meter		Measure receiver and transmitter current drain.	Simpson 270 or Triplett 630 or equivalent
Dummy Antenna	Power rating of at least 5 watts 50 ohms resistive	Load for Thruline Wattmeter	Bird Model 80 coaxial resistor or equivalent
Crystal controlled RF Signal Generator with 6 dB 50 ohm pad	23 CB frequencies plus 455 kHz and attenuated output of 1 to 100,000 microvolts capable of 30% modulation at 400 and 1000 Hz	Receiver RF source	Radio Research, Model 71-4 or Model 72 or equivalent. Accuracy ±0.0005% except ±.01% at 455 kHz
RF Voltmeter with	10 mV - 300 volts	Measure RF voltages	Millivac 38B or equivalent

The following instruments can be used if some of the instruments in the above list are not available.

TYPE	CHARACTERISTICS	USE
International crystal C-12B test set NOTE: This instrument lacks 1000 Hz modulation for signal generator and accuracy is lower than the 0.0005% desired, but offers a desirable combination of features at low cost. It is battery operated and portable.	Frequency Meter - 23 CB frequencies, 26.965 to 27.255 MHz, with an accuracy of ±0.0015%.	Measure receiver and transmitter RF frequencies
	RF Power Meter - 5 watts ±1/4 watt	Measure transmitter power output
	Dummy antenna - 5 watts	Load for transmitter
	RF signal generator - 23 CB frequencies ±0.0015%, output 1 to 100 microvolts, 30% modulation at 400 Hz	Receiver RF source
	AM modulation meter - range 0-100% accuracy 3% at 400 Hz and 80% modulation.	Measure transmitter percent of modulation
E. F. Johnson antenna meter, Model 250-849	50 ohms	Measure antenna VSWR

5.3.3 AUDIO

1. Performance Test

   a. Set the squelch control for minimum squelch.

   b. Set the audio voltmeter range selector to the 10 volt range.

   c. Set the volume control full on.

   d. Set the signal generator output for 1 μV modulated 30% at 1000 Hz.

   e. The audio output on the voltmeter should be 2.5 volts ±3 dB on channels 1, 11 and 21.

2. Troubleshooting

The condition of the receiver audio can be checked by signal injections. Refer to the following procedure.

a. 1. Connect the "hot" side of an audio generator to a 0.5μF capacitor. Connect the common side of the audio generator to B+.

   2. Set the volume control for maximum volume and the squelch control for minimum squelch.

b. 1. The reference level for Table 5-3 is 2.5 volts RMS of audio across the speaker terminals.

   2. Use an oscilloscope to check stage to stage distortion.

   3. Table 5-3, Typical Audio Levels, lists the audio gain distribution, measured with an audio voltmeter, that should be obtained from a typical audio section.

TABLE 5-3
TYPICAL AUDIO LEVELS

Signal Injection Point	Volts RMS
	Levels required to produce 2.5 RMS
top of volume control	0.0012
collector of Q7	0.015
base of Q8	0.015
collector of Q8	2.35
base of Q9	2.1 drops to 0.75 when 5 μF cap is touched to base of Q9
collector of Q9	---

NOTES

Class B audio output transistors Q9 and Q10

Check the base and emitter voltages of the class B audio output transistors, Q9 and Q10. The voltages should be approximately equal. If one of the transistors shows no voltage difference between emitter and base, it is probably faulty.

Severe audio distortion may be the result of an open Q9 or Q10. A shorted transistor can cause R24 to burn and possibly blow the fuse. The faulty transistor may have an excessively warm case.

5.3.4 AGC

1. AGC Performance Test

   a. Set the channel selector to channel 11.

   b. Set the squelch control to the minimum squelch setting.

   c. Set the signal generator output to 0.1 volt modulated 30% at 1000 Hz on channel 11 (27.085 MHz).

   d. Adjust the volume control for a 0 dB indication on the audio voltmeter.

   e. Reduce the signal generator output to 1 μV. The audio voltmeter should drop 18dB ±12dB.

2. AGC Troubleshooting

   a. Increase RF signal generator output from 1 μV to 0.3 V. The audio voltage at the speaker should increase relatively fast at first, as signal generator output is increased from 1 μV - 10 μV, then tend to level off.

   b. If the voltage at the speaker increased proportionately as the input voltage increased, check D1 by bridging it with a new diode, and check its associated circuitry.

   c. If D1 and its associated circuitry appear to be good, connect a DC voltmeter between the junction of C6, C7, R3, (pin 1 of Z1) and B-. The AGC voltage measured here should go more positive as the input voltage is increased from 1 μV to 0.1 V.

   d. Refer to Table 5-4 for a list of typical AGC voltage readings.

5.3.5 IF and RF Troubleshooting

Check the RF and IF stages by signal injection. Connect an audio voltmeter across the speaker terminals. Set the signal generator to 30% modulation at 1000 Hz. Select channel 11. Table 5-5 lists the injection points and the input levels necessary to obtain 3 VRMS at the speaker terminals with the volume control set to maximum and the squelch control to minimum.

TABLE 5-4
TYPICAL AGC LEVELS

Test Conditions:

Volume control advanced for reference of 6 VRMS at the speaker terminals with 1000 μV input to 50 ohm 6 dB pad between generator and antenna terminal. Signal generator set to 27.085 MHz (channel 11) at 30% modulation, 1000 Hz. Audio measured across the speaker.

RF Input to 6 dB pad (microvolts)	Relative Audio Output (dB)	Voltage at Junction of C6, C7 and R3
1	+1.5	+1.0
3	+8.5	+0.68
10	+13.5	+0.75
30	+15.5	-0.23
100	+16.5	-0.42
300	+17.5	-0.55
1,000	+17.7	-0.65
3,000	+18.0	-0.72
10,000	+19.8	-0.92
30,000	+17	-2.5
100,000	+2	-2.85

5.3.6 Squelch

1. Squelch Threshold Performance Test

a. Set the channel selector to channel 11 (27.085 MHz).

b. Disconnect the signal generator (if connected) from the antenna terminal.

c. Adjust the squelch control until the background noise disappears.

d. Set the signal generator to 100 μV 30% modulated at 1000 Hz.

e. Connect the signal generator to the antenna jack. The squelch should open.

f. Reduce the signal generator to 1 μV. The squelch should remain open.

2. Squelch Troubleshooting

a. The squelch amplifier, Q6, obtains its information from the AGC line. When squelch action is faulty, check the AGC section first.

b. If the AGC section appears to be functioning properly, connect a DC voltmeter to the emitter of Q7 (15 VDC range).

TABLE 5-5
TYPICAL RF AND IF LEVELS IN RECEIVER

Conditions: The input levels listed in this table are the levels required to produce 2.5 VRMS at the speaker terminals with the volume maximum and the squelch minimum.

Test Point	Input Frequency	Input Level
Antenna terminal	27.085 MHz	1.2 μV
Base of mixer	27.085 MHz	80 μV
Base of first IF amp	455 kHz	370 μV
Base of second IF amp	455 kHz	4.7 mV
Collector of second IF amp	455 kHz	640 mV

c. With power applied to the receiver, monitor the DC voltmeter while adjusting the squelch control from minimum to maximum. The voltage indicated should go from approximately -5 V to +10 V.

d. If the voltage does not change at Q7, substitute Q6 with a transistor known to be good.

e. Check the voltages at Q5.

5.3.7 Noise Limiter Performance Test

A noise limiter test generator such as illustrated in Figure 5-2 must be available to perform the following test.

a. Adjust the squelch control for minimum squelch.

b. Connect the noise generator illustrated in Figure 5-2 to the center conductor of the antenna jack inside the chassis. The signal generator is connected to the antenna jack at the outside of the chassis rail.

c. Set the RF signal generator to 1 μV unmodulated.

d. Connect an audio voltmeter across the speaker terminals and set the volume control for an indication of 0 dB.

e. Turn the noise generator on. The audio voltmeter should indicate an increase of no more than 5 dB.

5.4 TRANSMITTER PERFORMANCE TEST

(With troubleshooting information)

5.4.1 Test Instrument Connections

a. Refer to Table 5-2 for test instruments required.

b. Connect a wattmeter and 50 ohm load to the antenna jack.

c. Connect the "hot" side of an audio generator through a 0.05 μF capacitor to pin 5 of Z7. Connect the common side to B+.