

FIG. 5-2 TRANSMITTER TEST CONNECTION

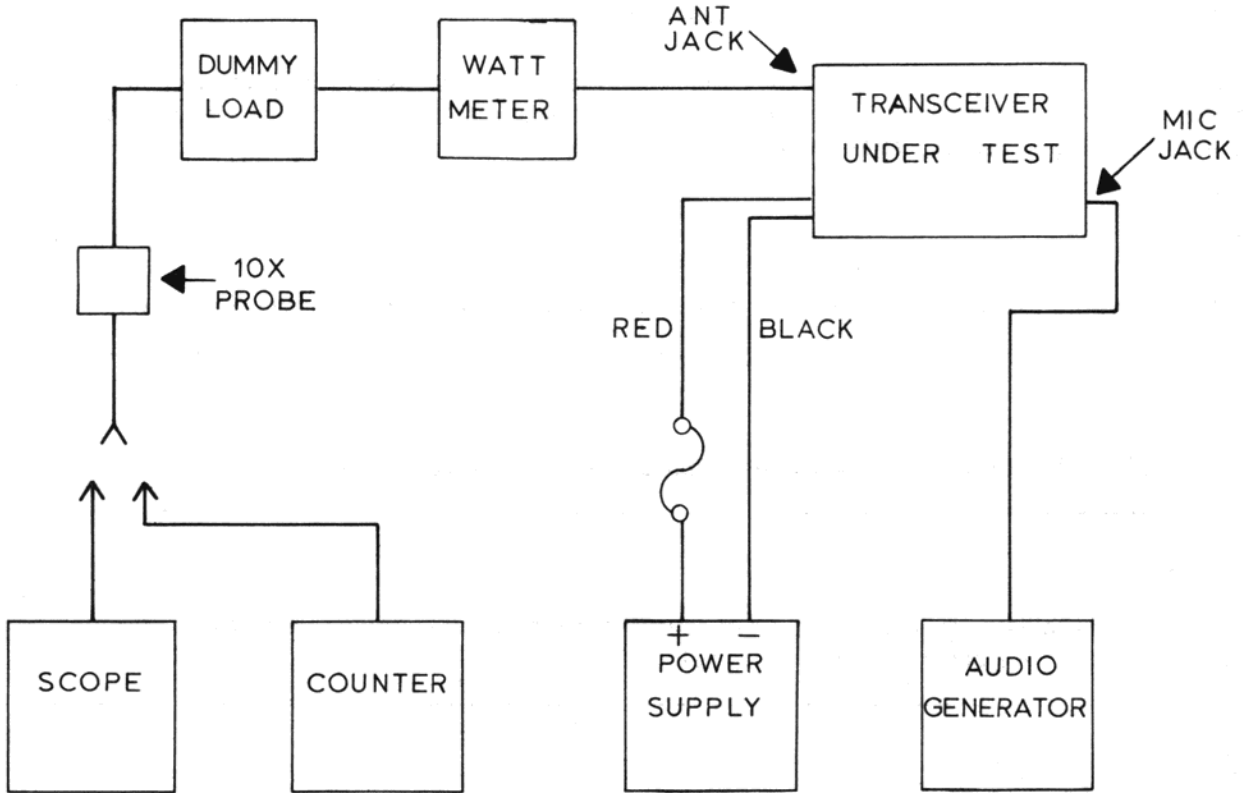


FIG. 5-3 RECEIVER TEST CONNECTION

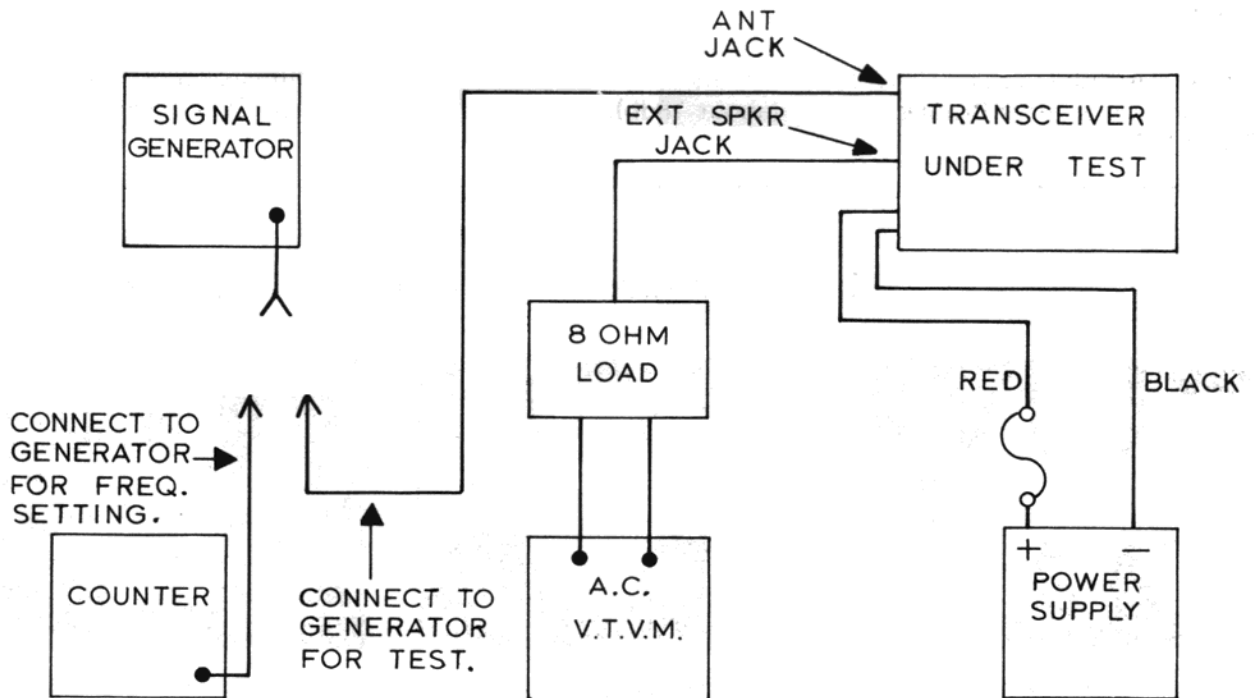
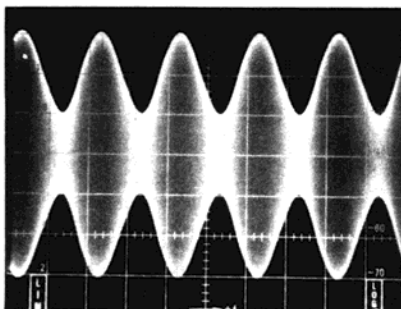


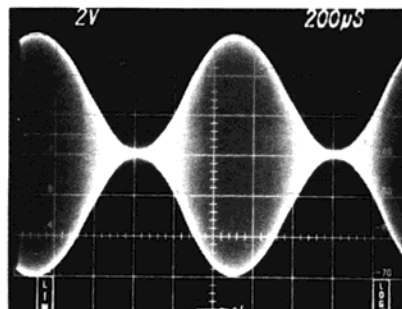
FIG. 5-4 TRANSMITTER ALIGNMENT PROCEDURE

INITIAL SET-UP	
Connect the transceiver to a 12.5 VDC supply. Connect an audio oscillator to the MIC input, a wattmeter and dummy load to the antenna jack, an oscilloscope to the dummy load, and set the channel selector to channel nearest center of band.	
STEP 1	With no modulation, key the transmitter and adjust T7 and T8 for maximum wattmeter indication.
STEP 2	Adjust L7 and L8 for maximum wattmeter indication not to exceed 3.5 watts.
STEP 3	Set the audio oscillator to 1 KHz. Adjust output level for about 80% modulation. While observing scope, adjust L7 and L8 for best modulation symmetry.
STEP 4	Remove dummy load and wattmeter. Fully extend antenna. Set scope probe or relative field strength meter next to antenna. Adjust L1 for maximum indication.
STEP 5	Adjust the audio oscillator's level for 50% modulation. Read level on AC voltmeter and increase level until voltmeter reads 8 times as great (about 18db). Adjust VR-4 for less than 100% modulation. (See Figure 5-5.)

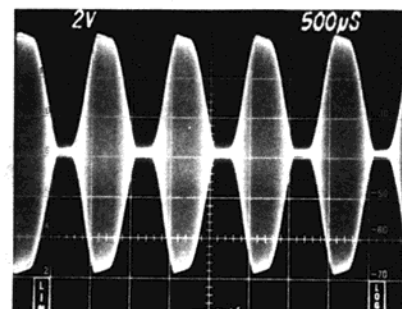
FIG. 5-5 MODULATION WAVEFORMS



50% MODULATION



100% MODULATION



OVERMODULATION

FIG. 5-6 RECEIVER ALIGNMENT PROCEDURE

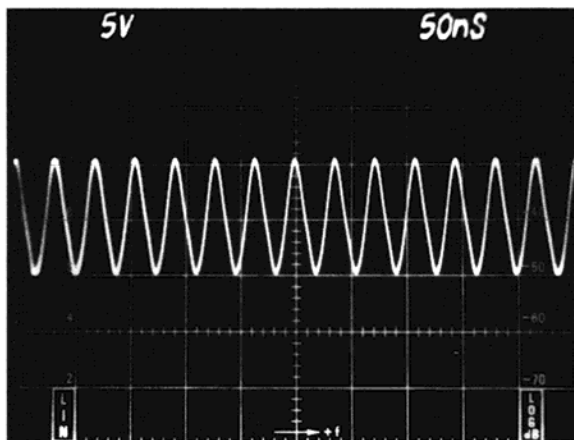
INITIAL SET-UP

Connect the transceiver to a 12.5 VDC supply. Set the channel selector to channel nearest center of band. Connect RF signal generator to the antenna jack and set to channel frequency @ $1\mu\text{V}$ 30% – 1 KHz modulation. Turn the volume control full clockwise and the squelch control full counterclockwise. Connect 16Ω load to external speaker jack, SPKR, and connect AC voltmeter to 16Ω load. (See Figure 5-3.)

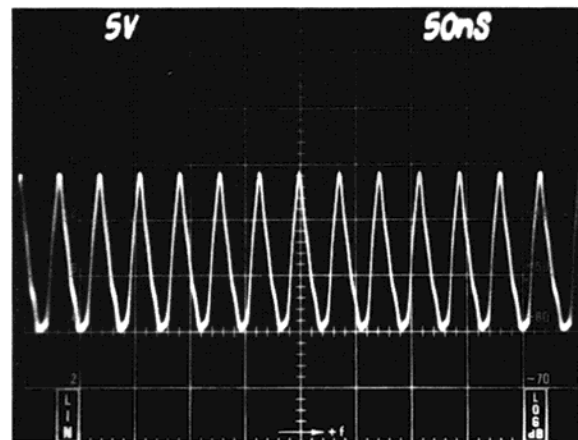
STEP 1

Adjust T1, T2, T3 and T4 for maximum indication on the AC voltmeter.

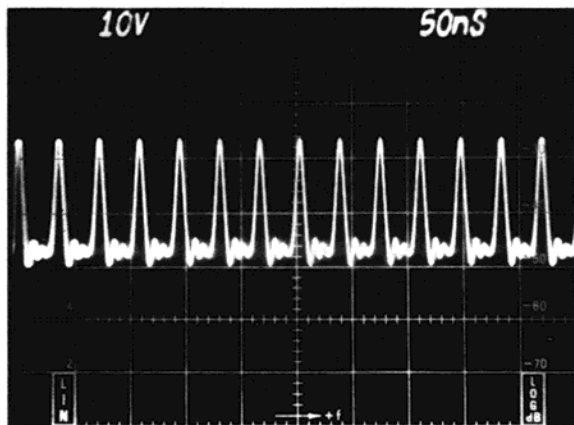
FIG. 5-7 TRANSMITTER ALIGNMENT WAVEFORMS



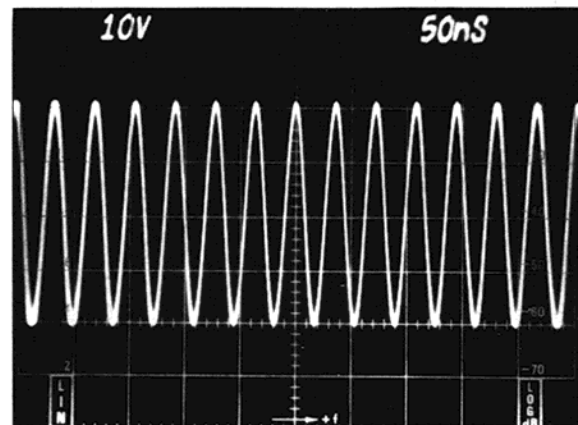
(a) TX OSCILLATOR Q10 5



(b) TX DRIVER Q11 COLLECTOR 6



(c) TX FINAL Q12 COLLECTOR 7



(d) OUTPUT DUMMY LOAD

FIG. 5-8 ALIGNMENT LAYOUT

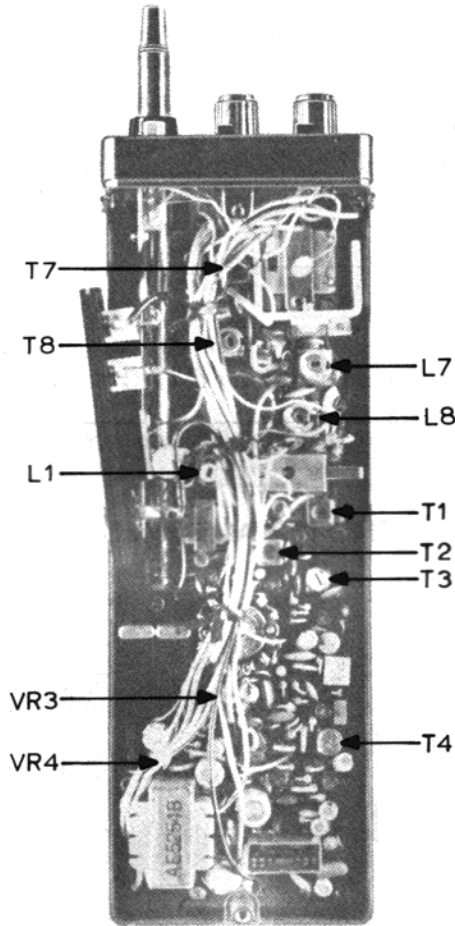


TABLE 5-9 RECEIVER INJECTION VOLTAGES

All injection voltages are at 30% – 1 KHz modulation at the specified frequency fed through a .01 MFD capacitor, and should produce at least 2 VAC audio output measured across the speaker or across a 16Ω load connected at SPKR. Typical audio output voltages are given.

INJECTION POINT	INJECTION LEVEL	FREQUENCY	AUDIO OUTPUT
Antenna	1μV	27.085 MHz	3.6V
Q1 Emitter	1μV	27.085 MHz	3.6V
Q2 Base TP-1	10μV	455 KHz	3.0V
Q3 Base	300μV	455 KHz	3.4V
Q4 Base	1000μV	455 KHz	1.4V

TABLE 5-10 TRANSCEIVER CRYSTALS

CH.	CH. FREQ.	TX OSC. XTAL FREQ.	RX OSC. XTAL FREQ.
1	26.965	26.965	26.510
2	26.975	26.975	26.520
3	26.985	26.985	26.530
4	27.005	27.005	26.550
5	27.015	27.015	26.560
6	27.025	27.025	26.570
7	27.035	27.035	26.580
8	27.055	27.055	26.600
9	27.065	27.065	26.610
10	27.075	27.075	26.620
11	27.085	27.085	26.630
12	27.105	27.105	26.650
13	27.115	27.115	26.660
14	27.125	27.125	26.670
15	27.135	27.135	26.680
16	27.155	27.155	26.700
17	27.165	27.165	26.710
18	27.175	27.175	26.720
19	27.185	27.185	26.730
20	27.205	27.205	26.750
21	27.215	27.215	26.760
22	27.225	27.225	26.770
23	27.255	27.255	26.800

RECEIVE: (CH. FREQ.) – (RX OSC.) = 455 KHz IF

TRANSMIT: (TX OSC.) = CH. FREQ.

TABLE 5-11 AGC VOLTAGES versus RF INPUT LEVEL

INPUT LEVEL (1)	AGC VOLTAGES (2)
1 μ V	-0.19
10 μ V	-0.79
100 μ V	-1.1
1000 μ V	-1.24
10,000 μ V	-1.33

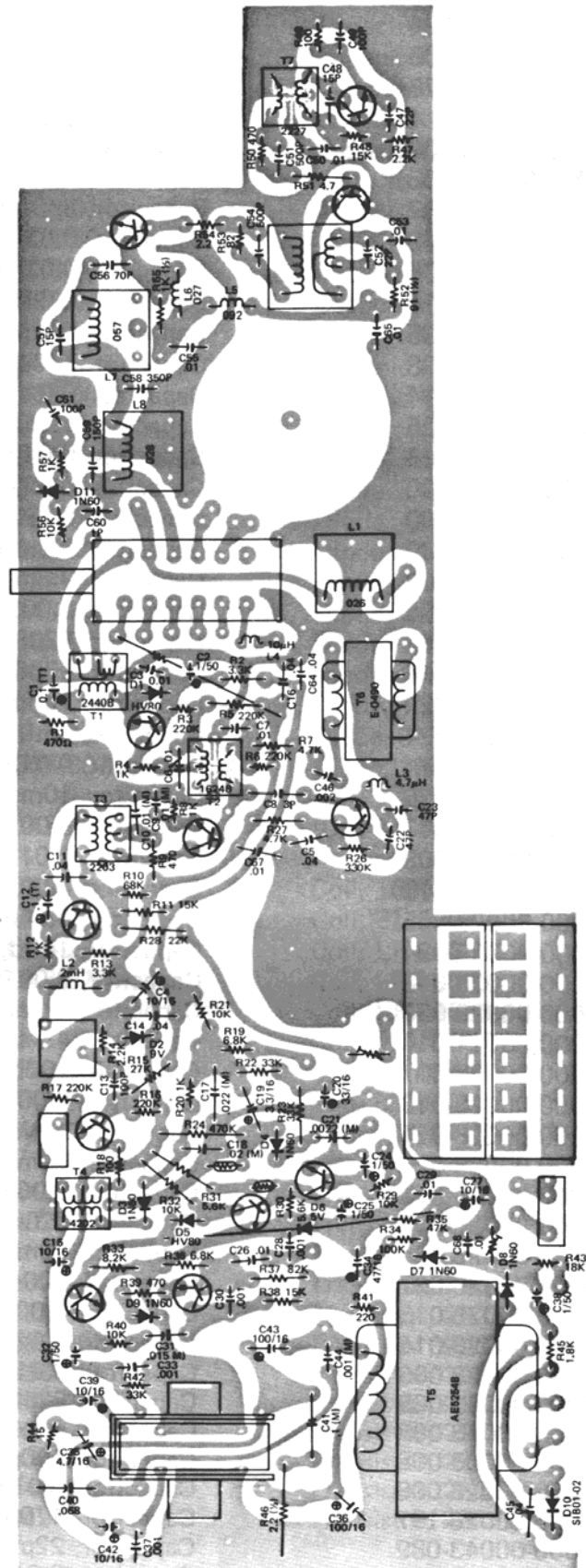
(1) Channel Frequency at Antenna Jack.

(2) Measured with 10M Ω input at TP-2.

FIG. 5-12 RECOMMENDED TEST INSTRUMENTS

<u>TEST INSTRUMENT</u>	<u>REQUIRED SPECIFICATIONS</u>	<u>USE</u>	<u>RECOMMENDED INSTRUMENT TYPE</u>
R.F. Signal Generator	Output frequency: 26.965 to 27.255 MHz. Output level calibrated from .1 microvolts to 500,000 microvolts. Internal modulation capability of 30% minimum at 1 KHz. (Calibrated)	Receiver service and alignment.	Hewlett-Packard Model 606A or B. Wavetek Model 3000.
Oscilloscope	Vertical bandwidth of 25 MHz or greater at 3db point. Triggered sweep capability.	Transmitter and receiver test and alignment.	Tektronics Model T932. Tektronics Model 465. Hewlett-Packard Model 180. Phillips Model PM3260E.
Frequency Counter	Frequency range DC to 30 MHz. Sensitivity: 10mv R.M.S. at 30 MHz. Overall timebase accuracy $\pm .002\%$, 6 digit resolution.	Transmitter frequency check and synthesizer troubleshooting.	Heath-Schlumberger Model SM128A
Wattmeter	25 watts full scale into 50 ohm load $\pm 5\%$ accuracy.	Measure power output and S.W.R.	Bird Model 43 with type 25A element. (May be terminated with antenna load
AC VTVM	-40 to +20db range.	Measure audio output.	Heath Model IM-21.
Audio Oscillator	400 Hz to 4000 Hz output: Adjustable level, 0-1 volt output impedance 600 ohm.	Audio and modulator tests.	Hewlett-Packard Model 204C. Heath Model SG18A.
DC Power Supply	13.8 volt DC $\pm 10\%$ at 4 amperes.	Voltage for servicing.	Heath Model SP2720 (SBE Model SBE-4AC may be used if available.)

FIG. 5-13 COMPONENT LAYOUT



SBE-31CB PARTS LIST

<u>SYMBOL #</u>	<u>PART #</u>	<u>DESCRIPTION</u>
C1	8000-00043-085	Capacitor, .1mfd, 6.3V, Tan.
C2	8000-00028-024	Capacitor, 1mfd, 50V, Elect.
C3	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C4	8000-00028-026	Capacitor, 10mfd, 16V, Elect.
C5	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C6	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C7	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C8	8000-00043-087	Capacitor, 3pfd, 50V, NPO, Cer.
C9	8000-00028-005	Capacitor, 0.01mfd, Mylar
C10	8000-00028-005	Capacitor, 0.01mfd, Mylar
C11	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C12	8000-00043-085	Capacitor, 0.1mfd, 6.3V, Tan.
C13	8000-00003-008	Capacitor, 100pfd, 50V, Cer.
C14	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C15	8000-00028-026	Capacitor, 10mfd, 16V, Elect.
C16	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C17	8000-00028-200	Capacitor, 0.022mfd, Mylar
C18	8000-00028-200	Capacitor, 0.022mfd, Mylar
C19	8000-00028-030	Capacitor, 3.3mfd, 25V, Elect.
C20	8000-00028-030	Capacitor, 3.3mfd, 25V, Elect.
C21	8000-00043-086	Capacitor, 0.0022mfd, Mylar
C22	8000-00038-014	Capacitor, 47pfd, 50V, NPO, Cer.
C23	8000-00038-014	Capacitor, 47pfd, 50V, NPO, Cer.
C24	8000-00028-024	Capacitor, 1mfd, 50V, Elect.
C25	8000-00028-024	Capacitor, 1mfd, 50V, Elect.
C26	8000-00006-071	Capacitor, 0.015mfd, Mylar
C27	8000-00028-026	Capacitor, 10mfd, 16V, Elect.
C28	8000-00028-013	Capacitor, 0.001mfd, 50V, Cer.
C29	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C30	8000-00028-013	Capacitor, 0.001mfd, 50V, Cer.
C31	8000-00028-005	Capacitor, 0.01mfd, Mylar
C32	8000-00028-024	Capacitor, 1mfd, 50V, Elect.
C33	8000-00028-013	Capacitor, 0.001mfd, 50V, Cer.
C34	8000-00028-023	Capacitor, 47mfd, 16V, Elect.
C35	8000-00011-014	Capacitor, 4.7mfd, 35V, Elect.
C36	8000-00028-027	Capacitor, 100mfd, 16V, Elect.
C37	8000-00028-013	Capacitor, 0.001mfd, 50V, Cer.
C38	8000-00028-024	Capacitor, 1mfd, 50V, Elect.
C39	8000-00028-026	Capacitor, 10mfd, 16V, Elect.
C40	8000-00006-073	Capacitor, 0.068mfd, Mylar
C41	8000-00028-021	Capacitor, 0.1mfd, Mylar
C42	8000-00028-026	Capacitor, 10mfd, 16V, Elect.
C43	8000-00028-027	Capacitor, 100mfd, 16V, Elect.
C44	8000-00028-013	Capacitor, 0.001mfd, 50V, Cer.
C45	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C46	8000-00028-005	Capacitor, 0.01mfd, Mylar
C47	8000-00043-089	Capacitor, 22pfd, N220, Cer.
C48	8000-00043-088	Capacitor, 15pfd, N220, Cer.
C49	8000-00003-008	Capacitor, 100pfd, 50V, Cer.
C50	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C51	8000-00028-197	Capacitor, 470pfd, 50V, Cer.
C52	8000-00043-089	Capacitor, 22pfd, N220, Cer.
C53	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C54	8000-00028-197	Capacitor, 470pfd, 50V, Cer.

<u>SYMBOL #</u>	<u>PART #</u>	<u>DESCRIPTION</u>
C55	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C56	8000-00028-010	Capacitor, 68pfd, 50V, Cer.
C57	8000-00043-088	Capacitor, 15pfd, N220, Cer.
C58	8000-00028-215	Capacitor, 330pfd, 50V, Cer.
C59	8000-00003-032	Capacitor, 150pfd, 50V, Cer.
C60	8000-00028-154	Capacitor, 1pfd, 50V, Cer.
C61	8000-00003-008	Capacitor, 100pfd, 50V, Cer.
C62	8000-00003-029	Capacitor, 120pfd, 50V, Cer.
C63	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C64	8000-00028-014	Capacitor, 0.04mfd, 25V, Cer.
C65	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C66	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
C67	8000-00028-008	Capacitor, 0.01mfd, 25V, Cer.
CF1	8000-00043-023	Ceramic Filter LF-B4
CF2	8000-00003-066	Ceramic Filter BFB-455L
D1	8000-00028-045	Diode, HV-80
D2	8000-00043-068	Diode, Zener, EQA01-09R
D3	8000-00006-007	Diode, 1N60
D4	8000-00006-007	Diode, 1N60
D5	8000-00028-045	Diode, HV-80
D6	8000-00043-067	Diode, Zener, EQA01-05S
D7	8000-00006-007	Diode, 1N60
D8	8000-00006-007	Diode, 1N60
D9	8000-00006-007	Diode, 1N60
D10	8000-00006-201	Diode, SIB01-02
D11	8000-00006-007	Diode, 1N60
IC1	8000-00043-070	IC, TBA-810S-H
L1	8000-00043-006	Coil, 10PNP-026
L2	8000-00043-007	Coil, EL-610-202K
L3	8000-00006-263	Coil, LF4-4R7K
L4	8000-00043-075	Coil, LF4-100K
L5	8000-00043-075	Coil, LF4-100K
L6	8000-00043-074	Coil, 4LNC-092
L7	8000-00043-008	Coil, 4LNC-027
L8	8000-00043-009	Coil, 8SNF-057
L9	8000-00043-010	Coil, 10PNP-028
Q1	8000-00043-019	Transistor, 2SC748(R)
Q2	8000-00032-025	Transistor, 2SC372(Y)
Q3	8000-00032-025	Transistor, 2SC372(Y)
Q4	8000-00032-025	Transistor, 2SC372(Y)
Q5	8000-00032-025	Transistor, 2SC372(Y)
Q6	8000-00009-089	Transistor, 2SC373
Q7	8000-00009-089	Transistor, 2SC373
Q8	8000-00009-089	Transistor, 2SC373
Q9	8000-00009-089	Transistor, 2SC373
Q10	8000-00006-280	Transistor, 2SC1364
Q11	8000-00043-064	Transistor, 2SC1728
Q12	8000-00043-065	Transistor, 2SC1816
S1	8000-00043-044	Switch, Talk
S2	8000-00043-078	Switch, Rotary

<u>SYMBOL #</u>	<u>PART #</u>	<u>DESCRIPTION</u>
S3	8000-00043-045	Switch, Slide
S4	8000-00043-045	Switch, Slide
S5	8000-00043-079	Switch, Push
T1	8000-00043-011	Coil, 2440B
T2	8000-00043-012	Coil, 1624B
T3	8000-00043-013	Coil, 7MC352203N9
T4	8000-00043-014	Coil, 4202
T5	8000-00043-076	Transformer, AE-5254B
T6	8000-00043-017	Transformer, E-0490
T7	8000-00043-015	Coil, 2229
T8	8000-00043-073	Coil, 061
TH1	8000-00043-069	Thermistor, TD5C-310
TH2	8000-00043-069	Thermistor, TD5C-310
VR1	8000-00043-003	Resistor, Variable, 15A-50K
VR2	8000-00043-004	Resistor, Variable, 15C-50K
VR3	8000-00043-071	Resistor, Semifixed, 33K
VR4	8000-00043-072	Resistor, Semifixed, 10K
	8000-00043-077	Crystal Socket
	8000-00043-043	Terminal Board
	8000-00043-048	Meter
	8000-00043-080	Heat Sink (A)
	8000-00043-081	Heat Sink (B)
	8000-00043-046	Antenna
	8000-00043-038	Antenna Grommet
	8000-00043-082	Speaker
	8000-00043-083	Volume Control Washer
	8000-00043-084	Antenna Washer
	8000-00043-024	Front Case
	8000-00043-025	Rear Case
	8000-00043-041	Meter Holder
	8000-00043-090	Switch Mount
	8000-00043-052	Dummy Battery
	8000-00043-026	Front Bezel
	8000-00043-027	Top Bezel
	8000-00043-028	Front Panel (A)
	8000-00043-091	Front Panel (B)
	8000-00043-032	Speaker Panel
	8000-00043-092	Top Panel
	8000-00043-031	Top Side Panel
	8000-00043-093	Earphone
	8000-00043-033	Volume/Squelch Knob
	8000-00043-094	Channel Knob
	8000-00043-034	Talk Knob
	8000-00043-035	Talk Holder
	8000-00043-037	Talk Holder Shaft
	8000-00043-097	Carrying Case
	8000-00043-037	Battery Insulator
	8000-00043-053	Battery Case
	8000-00043-095	Channel Panel
	8000-00043-098	Model Label
	8000-00043-039	Styrofoam Box
	8000-00043-096	Display Box

