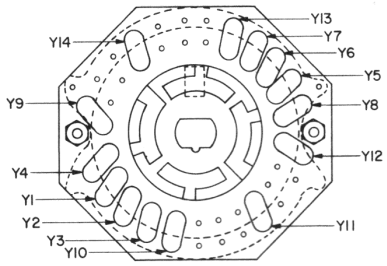


MESSENGER 123A
CRYSTAL SWITCH LAYOUT
FIGURE 5-5

5.6 AC POWER SUPPLY

AC Power Supply, Part No. 239-0125-001, is a regulated 13.8 VDC power source used for base installations.

CIRCUIT DESCRIPTION

The approximately 15 VDC output from the bridge rectifier, D101 through D104, is connected to the series regulator, Q101, and the emitter follower, Q102. A sample of the DC output voltage from Q101 is fed back to the base of the voltage amplifier, Q103, by R105. Regulation of the output voltage is accomplished by comparing this feedback voltage to the emitter voltage of Q103. The emitter of Q103 is fixed by the reference zener diode, DZ106, at 10 volts. The difference voltage between the output and reference source is amplified by Q103 and it is fed back to Q101 and Q102, effectively biasing for more or less DC voltage output. The regulator output voltage is adjusted by R105 and it is factory adjusted for 13.8 VDC output in receive condition. Power supply circuit protection is provided by a 0.3 ampere fuse connected in the primary winding of the power transformer, T101. A shorted output or continuous overload of approximately 1.5 ampere will open this fuse.

AC POWER SUPPLY SERVICING

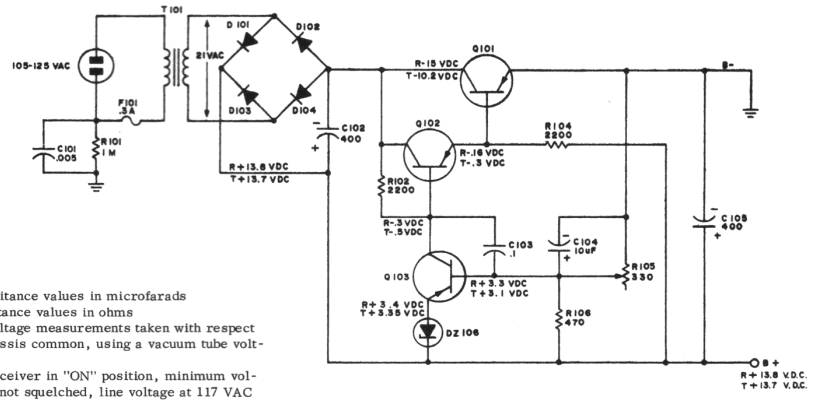
For ease of power supply servicing, a dummy load can be constructed to replace the transceiver. Seven, 2-watt 100 ohm resistors connected in parallel across B+ and ground will simulate transmit conditions. Two, 2-watt 100 ohm resistors connected in parallel across B+ and ground will simulate receive conditions.

a. When trouble has been isolated to the power supply, refer to Table 5-7 for troubleshooting tips.

CAUTION

If the cover assembly and mounting bracket for Q101 are removed for trouble analysis, do not allow Q101 case to touch the power supply chassis, as permanent transistor damage can result.

b. If any components are replaced, be sure to check and adjust R105 for 13.8 VDC output to the dummy load or transceiver in receive condition.



NOTES:
1. Capacitance values in microfarads
2. Resistance values in ohms
3. All voltage measurements taken with respect to chassis common, using a vacuum tube voltmeter
4. Transceiver in "ON" position, minimum volume, not squelched, line voltage at 117 VAC

AC POWER SUPPLY SCHEMATIC

TABLE 5-7

POWER SUPPLY TROUBLESHOOTING

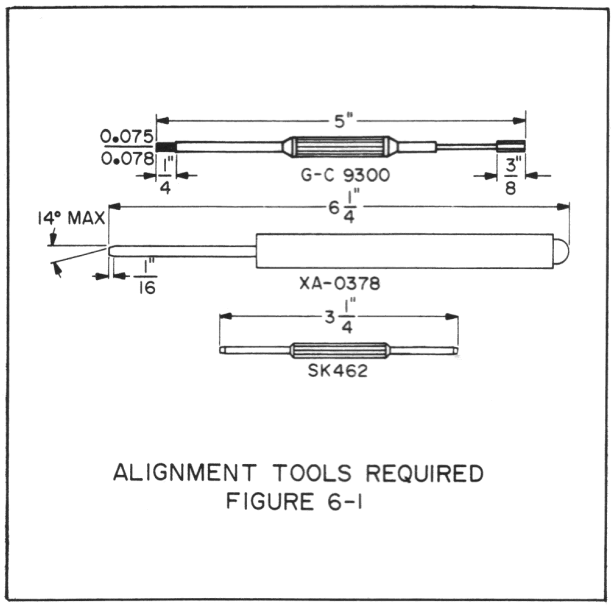
TROUBLE	PROBABLE CAUSE	CHECK
Abnormal transceiver operation	High power supply B+ output voltage	a. Check the B+ output voltage. b. Check Q101, Q102 and Q103 DC bias voltages. Refer to the schematic for typical voltage readings.
Power Supply inoperative	0.3 ampere fuse blown	a. Check and replace the fuse as necessary. b. Check the transceiver for B+ short before reconnecting the power supply.
Power Supply continues to blow fuse	Defective transistor or filter capacitor	a. Check the power supply resistance readings. b. Check C105.
R105 will not adjust to 13.8 VDC	Defective D106, R105 or Q103	a. Check D106, R105 and Q103. b. Remove and replace the defective component.

SECTION 6
ALIGNMENT

6.1 GENERAL

Use care and the proper alignment tools when adjusting various transformers to prevent core damage.

Refer to Figure 6-1 for the required alignment tools and to Figure 6-7 for alignment point locations.



ALIGNMENT TOOLS REQUIRED
FIGURE 6-1

6.2 RECEIVER ALIGNMENT

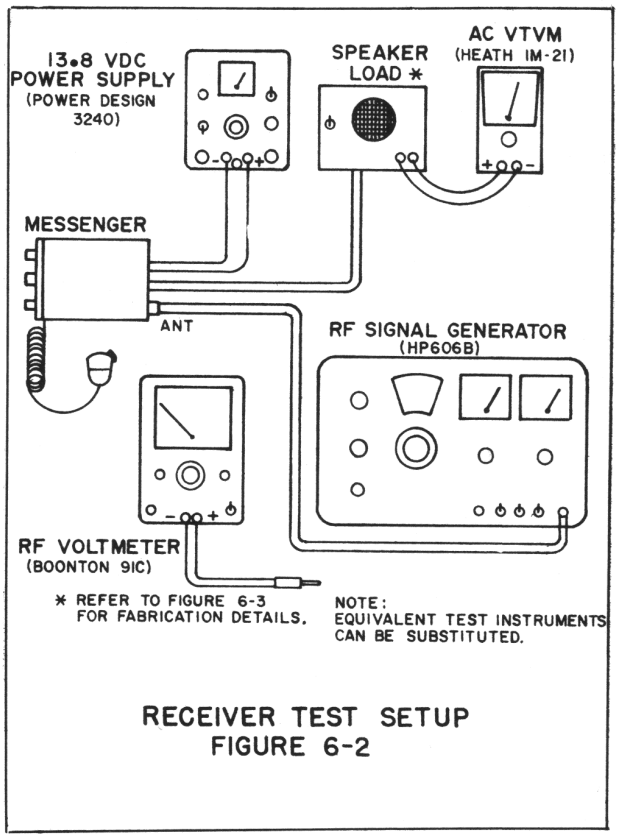
NOTE

Low pass filter adjustments L6 and L7 should be peaked for maximum power output before the receiver is aligned. Refer to the transmitter tuneup section for details.

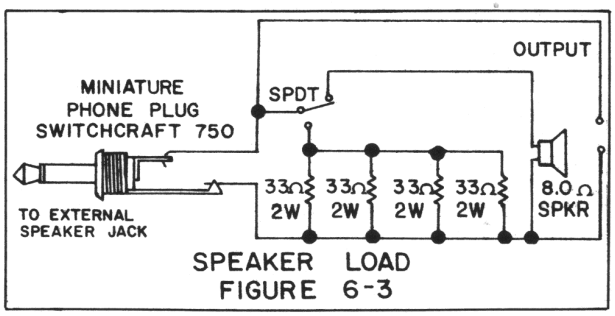
CONNECTIONS AND SETTINGS

a. Connect the test setup as shown in Figure 6-2.

b. Turn the transceiver on and set the squelch control maximum CCW.



RECEIVER TEST SETUP
FIGURE 6-2



SPEAKER LOAD
FIGURE 6-3

FREQUENCY SYNTHESIZER

a. High Frequency Oscillator Adjustment

1. Set the channel selector switch to channel 23 and connect the RF voltmeter to the CR14-CR15 junction.

2. Adjust T7 1/8 turn beyond the peak RF voltage reading point. A typical reading of approximately 0.4 VRF should be measured.

b. Synthesizer Mixer Adjustment

1. Set the channel selector switch to channel 12 and connect the RF voltmeter probe to the case of Q15.

2. Key the transmitter into an RF load and adjust T8, T9, T10 and T11 for a maximum meter reading. A typical reading of approximately 0.28 VRF should be measured.

RF AND IF SECTION (CHANNEL PEAKING METHOD)

a. RF Adjustment

1. Set the channel selector switch to channel 12 and connect a 1 kHz, 30% modulated RF signal to the antenna connector.

2. Adjust T1 and T2 for a maximum audio output while keeping the RF signal generator output at a minimum.

b. IF Adjustment

1. Test setup same as a. 1.

2. Adjust T3 and T4 for a maximum audio output while keeping the RF signal generator output at a minimum.

NOTE

Do not adjust ceramic filter Z1 using this method.

3. Set the RF signal generator output level to 1 μV, modulated 30% at 1 kHz.

4. Readjust T1, T2, T3 and T4 for a maximum audio output and make final adjustment of T1 for best signal to noise ratio.

RF AND IF SECTION (455 kHz GENERATOR METHOD)

a. IF Adjustment

1. Connect a 455 kHz signal generator through a 22 μF coupling capacitor to the base of Q2.

2. Adjust T3 and T4 for a maximum audio voltmeter indication while reducing the generator output level (an excessive generator output level will cause improper IF amplifier alignment).

b. RF Adjustment

1. Remove the 455 kHz signal generator and connect the RF signal generator to the antenna connector. Set the generator output to 1 μV, modulated 30% at 1 kHz on channel 12 frequency.

2. Adjust T1 and T2 for maximum audio output and make final adjustment of T1 for best signal to noise ratio.

NOTE

The crystal or ceramic filter, Z1, does not normally require realignment. However, if the receiver response curve indicates that ceramic filter alignment is necessary, do so with a sweep generator while monitoring the receiver response curve.

METER

With no signal input, adjust meter zero potentiometer R81 for a zero meter reading.

RECEIVER PERFORMANCE TESTS

a. Perform an AGC roll-off test as follows:

1. Set the RF signal generator to the channel frequency and the output level to 1000 μV, modulated 30% at 1 kHz.

2. Adjust the receiver volume control for a 0 dB meter indication, and then set the RF signal generator output level to 1 μV.

3. The audio voltmeter indication should drop a minimum of 13 dB and a maximum of +17 dB.

4. Adjust IF gain control R7 as necessary and repeat steps 1, 2 and 3.

b. Perform a signal plus noise to noise ratio and audio output test as follows:

1. Set the RF signal generator to the channel frequency and the output level to 1 μV, modulated 30% at 1 kHz.

2. Increase the receiver volume control to maximum. The audio voltmeter should indicate at least 0 dB (+10 dB typical).

3. Readjust the receiver volume control for a 0 dB meter indication, then turn the RF signal generator modulation off.

4. The audio voltmeter indication should drop 8 dB or more.

c. Perform the squelch test as follows:

1. Set the RF signal generator to the channel frequency and the output level to 60 μV, modulated 30% at 1 kHz.

2. Adjust the receiver squelch control for maximum squelch. The receiver audio output should squelch off.

3. Reset the RF signal generator output level to 2000 μV. The receiver audio output should become audible.

d. Perform the meter test as follows:

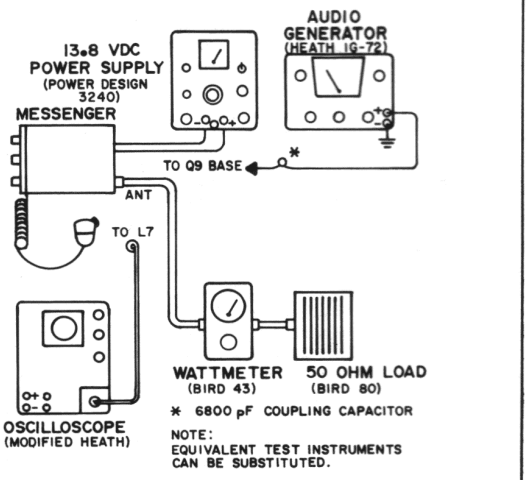
Set the RF signal generator to the channel frequency and the output level to 100 μV (into a 6 dB pad). The meter should indicate between S8 and 10 dB over S9.

6.3 TRANSMITTER TUNEUP

CONNECTIONS AND SETTINGS

a. Connect the test setup as shown in Figure 6-4.

b. Turn the transceiver on and key the transmitter into a 50 ohm load.



TRANSMITTER TEST SETUP
FIGURE 6-4

PREDRIVER AND POWER AMPLIFIER AND FILTER

a. Predriver

1. Tune T12 and T13 for maximum power output.

2. Tune T10 and T11 for maximum power output.

b. Power Amplifier

1. Tune L6 and L7 for a power output between 2.8 and 3.8 watts.

2. Tune L6 for minimum transmitter current while maintaining a power output between 2.8 and 3.8 watts.

TABLE 6-1
CHANNEL FREQUENCIES

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	26.965	13	27.115
2	26.975	14	27.125
3	26.985	15	27.135
4	27.005	16	27.155
5	27.015	17	27.165
6	27.025	18	27.175
7	27.035	19	27.185
8	27.055	20	27.205
9	27.065	21	27.215
10	27.075	22	27.225
11	27.085	23	27.255
12	27.105		

Note:
FCC Regulations require all measured channel frequencies to be within ±0.005% from these listed channel center frequencies.

TRANSMITTER FREQUENCY CHECK

To check the transmitter frequency, proceed as follows:

1. Loop couple a frequency counter or meter to L7.

2. Refer to Table 6-1 for channel frequencies and replace crystals as necessary to maintain a channel frequency to tolerance of ±0.005%.

CRYSTAL STARTING AND MODULATION CHECK

a. Switch between channels 1 and 23 and check for normal crystal starting.

b. Check for normal waveform and percent of modulation.

1. Couple the oscilloscope RF pickup loop to L7.

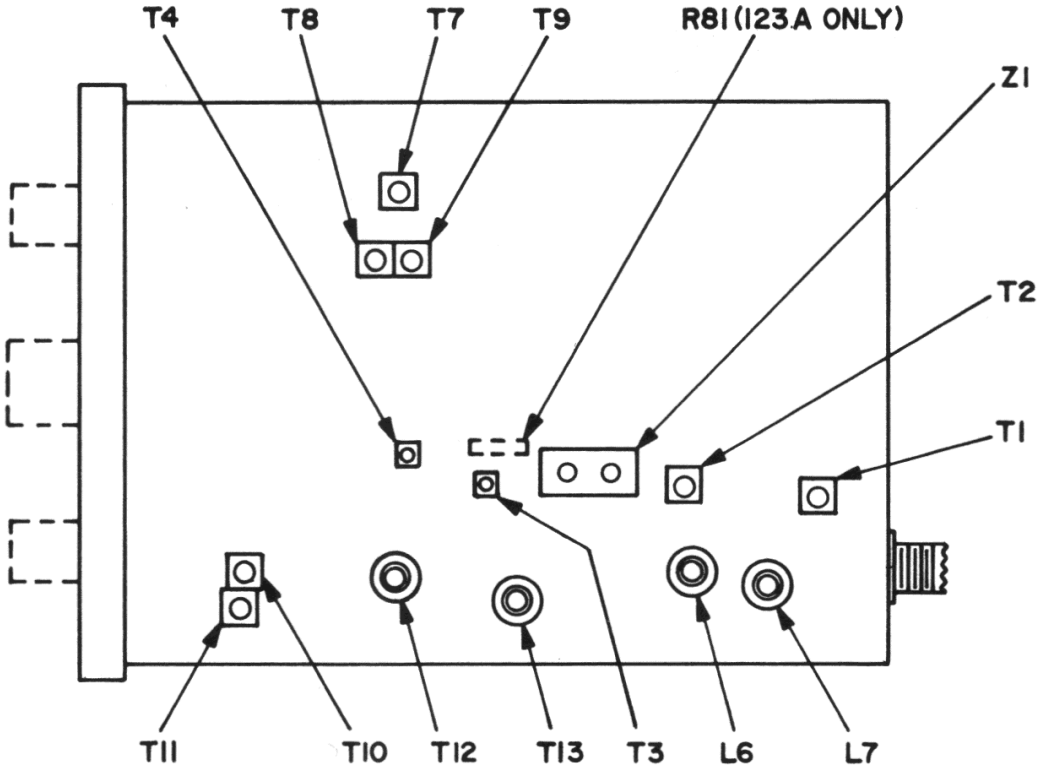
2. Set the audio generator frequency to 1 kHz and couple a -33 dB audio input through a 6800 pF series capacitor to the base of Q9. The oscilloscope should indicate at least 50% modulation.

3. Increase the audio generator level to -17 dB. The oscilloscope should indicate not less than 80% or more than 100% modulation on both negative and positive peaks.

c. Check each channel for clean modulation and absence of oscillations.

1. Adjust T12 and T13 as necessary to eliminate modulation distortion.

d. Speak into the microphone and check for normal modulation.



ALIGNMENT POINTS
(MESSENGER 122 & 123A)

SECTION 7
PARTS LIST

Component Codes

J = ±5%
K = ±10%
M = ±20%
Z = +80/-20%

SYMBOL NO.	DESCRIPTION		PART NO.
	ACCESSORY PACKAGE		
	123A instruction manual		002-0071-002
	Operating manual (122)		002-0122-001
	Installation instructions		004-2001-001
	Ground strap		017-1714-001
	Part 95 Rules		022-1635-001
	FCC Form 505		022-1636-001
	Battery cable		023-1652-001
	Fuse 2A 250V FB AGC		534-0003-024
	Inline fuse holder		534-1004-005
	Connector package		023-2209-001
	Connector, tap		515-9005-001
	Instruction envelope		559-4013-001
	Hardware envelope		023-2615-001
	Printed envelope		559-4019-001
	No. 20 white envelope		041-0413-000
	Microphone clip		537-9004-002
	Mike clip		537-9004-003
	M123A schematic		564-3001-011
	Reduced schematic (122)		564-3001-122
	SCR 4SH MTL PH NPS		575-9504-006
	Battery lead		597-0001-011
	FRONT PANEL ASSEMBLY (123A)		
	Front panel assembly		
	Includes:		
BK1	BKT switch support		017-0679-011
CH12	123 panel		015-0799-002
DS1	6.3V bulb		549-3001-007
DS2	Same as DS1		
M1	Meter		554-0015-002
MP10	Clip		016-1749-001
MP11	Dial		032-0154-101
MP12	Knob, squelch-volume		547-0008-001
MP13	Knob, channel selector		547-0008-005
NP14	123A overlay		559-2032-011
NP15	123 overlay		559-2033-001
R13	10KΩ 1/8 W SPST ON/OFF (M123A)		562-0016-004
R27	Potentiometer		562-0002-011
S2	Crystal switch assembly		583-2029-102
	(C and later models)		583-2029-103
	REAR PANEL ASSEMBLY (122)		
	Rear panel assembly		023-2919-003
	Includes:		
BK1	Mounting bracket		016-1816-002
CH8	Rear panel		017-1628-002
J2	Coax receptacle		142-0101-002
	BUSHING ASSEMBLY (122)		
	Bushing assembly		023-3167-001
	Includes:		
BK1	Plate switch		016-1950-001
MP102	Bushing switch		013-1372-001
MP103	Retainer bulb		016-1958-001
	BRACKETS		
BK1	Bracket, F Panel mtg.	(122)	016-1944-001
BK2	Same as BK1	(122)	

SYMBOL NO.	DESCRIPTION		PART NO.
BK2	Dash mounting bracket	(123A)	017-1249-001
BK4	Dash mounting bracket	(122)	017-1249-001
BK5	Bracket, cabinet mtg.	(122)	016-1884-003
	CAPACITORS		
C1	1000 pF M 1KV Y5S disc		510-3261-102
C2	6.8 µF M 35V dipped		510-2045-689
C3	0.010 µF M 50V Y5U	(123A)	510-3202-103
C4	27 pF J 200V N150 ceramic		510-3216-270
C5	5.1 pF J 200V NPO ceramic		510-3213-519
C6	0.010 µF M 50V Y5U	(123A)	510-3202-103
C7	Same as C6		
C8	1 pF J 500V composition		510-9002-109
C9	Same as C8		
C10	4700 pF M 50V Y5U disc		510-3204-472
C11	150 pF J 100V 1DM15		510-0001-151
C12	6.8 µF M 35V dipped		510-2045-689
C13	0.010 µF M 50V Y5U		510-3202-103
C14	Same as C13		
C15	4700 pF M 50V Y5U disc		510-3204-472
C16	0.047 µF K 250V flatfoil		510-1003-473
C17	1.0 µF M 35V dipped		510-2045-109
C18	Same as C17		
C19	Same as C17		
C20	270 pF J 100V 1DM15	(122)	510-0001-271
C21	820 pF J 100V 1DM15		510-0001-821
C22	390 pF J 100V 1DM15		510-0001-391
C23	0.010 µF M 50V Y5U		510-3202-103
C24	Same as C23		
C25	100 µF 10V aluminum		510-4003-005
C26	47 µF 25V aluminum		510-4006-006
C27	2200 pF M 50V Y5U disc		510-3202-222
C28	22 µF M 15V tubular		510-2003-220
C29	6.8 µF M 35V dipped		510-2045-689
C30	4700 pF M 50V disc		510-3204-472
C31	6.8 µF M 35V dipped		510-2045-689
C32	1.0 µF M 250V flatfoil		510-1004-105
C33	150 µF 25V aluminum		510-4006-006
C34	56 µF M 6V tubular		510-2001-560
C35	0.022 µF M 50V Y5U		510-3202-223
C36	Same as C35		
C37	0.010 µF M 50V Y5U		510-3202-103
C38	220 µF 16V aluminum		510-4006-004
C39	1000 µF 16V aluminum		510-4006-005
C40	0.010 µF M 500V Y5U disc	(122)	510-3004-103
C40	0.010 µF M 50V Y5U disc	(123A)	510-3002-103
C41	0.010 µF M 50V Y5U		510-3202-103
C42	6.8 pF J 200V N750 ceramic		510-3220-689
C43	22 pF J 200V N150 ceramic		510-3216-220
C44	100 pF J 200V N150 ceramic		510-3216-101
C45	0.010 µF M 50V Y5U		510-3202-103
C46	Same as C45		
C47	0.010 µF M 16V Y5S disc		510-3010-103
C48	180 pF J 50V N750 disc		510-3020-181
C49	0.010 µF M 50V Y5U		510-3202-103
C51	1 pF J 500V composition		510-9002-109
C52	33 pF J 200V N150 ceramic		510-3216-330
C53	Same as C52		
C54	0.010 µF M 50V Y5U		510-3202-103
C55	220 µF 16V aluminum		510-4006-004
C56	0.010 µF M 50V Y5U		510-3202-103
C57	Same as C56		
C58	1 pF J 500V composition		510-9002-109

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION		PART NO.
C59	33 pF J 200V N150 ceramic		510-3216-330
C60	0.047 μF M 16V Y5S		510-3210-473
C61	33 pF J 200V N150 ceramic		510-3216-330
C62	1000 pF J 100V 1DM15		510-0001-102
C64	22 pF J 200V NPO ceramic		510-3213-220
C65	0.010 μF M 50V Y5U disc		510-3002-103
C66	12 pF J 200V N750 ceramic		510-3220-120
C67	1000 pF M 1KV Y5S disc		510-3261-102
C68	43 pF J 200V N150 ceramic	(122)	510-3216-430
C68	47 pF J 200V N150 ceramic	(123A)	510-3216-470
C69	4700 pF M 50V Y5U disc		510-3204-472
C70	0.047 μF M 16V Y5S		510-3210-473
C71	0.047 μF M 50V Y5U		510-3202-473
C72	1000 pF J 100V 1DM15		510-0001-102
C73	27 pF J 200V NPO ceramic		510-3213-270
C74	1000 pF M 1KV Y5S disc		510-3261-102
C75	100 pF J 200V N150 ceramic		510-3216-101
C76	300 pF J 100V 1DM15		510-0001-301
C77	330 pF J 100V 1DM15		510-0001-331
C78	4700 pF M 1.4KV Z5U		510-3001-472
C90	470 pF J 100V 1DM15		510-0001-471
C121	0.010 μF M 50V Y5U		510-3202-103
	CHASSIS		
CH1	Rail chassis	(123A)	017-1430-031
CH2	Plate	(122)	016-1949-002
CH2	Cabinet assembly	(123A)	023-2201-011
	Includes:		
	Captive nut		013-1003-002
	Cabinet		032-0270-001
CH3	Front panel	(122)	032-0330-001
CH4	Cabinet assembly	(122)	023-2920-001
CH5	Back plate,	(122)	017-1753-001
	DIODES		
CR1	1N67A 80V 30 mA germ.	(122)	523-1000-067
CR2	1N4148 silicon diode		523-1500-883
CR3	1N67A germanium diode		523-1500-067
CR4	Same as CR3		
CR5	1N4148 silicon diode		523-1500-883
CR6	1N881 silicon diode		523-1500-881
CR7	1N881 silicon diode	(122)	523-1000-881
CR7	1N881 silicon diode	(123A)	523-1500-881
CR8	1N881 silicon diode	(122)	523-1000-881
CR8	1N881 silicon	(123A)	523-1500-881
CR9	1N67A germanium diode		523-1500-067
CR10	10V J 1W zener		523-2503-100
CR11	1N4148 silicon diode		523-1500-883
CR12	1N4003 200V 1A rect.		523-0501-002
CR13	10V J 1W zener	(122)	523-2003-100
CR13	10V J 1W zener	(123A)	523-2503-100
CR14	1N4148 silicon diode		523-1500-883
CR15	Same as CR14		
CR16	1N881 silicon diode		523-1500-881
CR17	1N4148 silicon diode	(123A)	523-1500-883
	PILOT LAMP		
DS2	1705D 14.0V 0.08A clear	(122)	549-3001-011
	ELECTRICAL PARTS		
EP3	0.14 x 0.13 ferrite bead		517-2002-001
EP4	Ferrite bead		515-4101-001
EP12	Insulator	(122)	018-0817-025
EP13	Insulator bulb bracket	(122)	018-0989-001
EP40	Black ext. plas. tubing	(122)	042-0240-770
EP42	Black varnished tubing	(122)	042-0240-500
EP46	Black ext. plas. tubing		042-0240-770
EP47	Same as EP46		
EP48	0.14 x 0.24 ferrite bead		517-2002-002
EP48	Black varnished tubing	(122)	042-0240-500
EP49	Same as EP48		
EP50	Same as EP48		
EP51	Same as EP48		
EP51	Black ext. plas. tubing	(123A)	042-0240-770
	JACKS		
J1	CC tini-jax NTT312		515-2001-001
J2	Coax receptacle	(123A)	142-0101-002
J3	Terminal bushing, red		515-4100-001
	INDUCTORS		
L2	20 mH audio choke		542-8001-011
L3	20 μH choke		542-3002-002
L4	13 μH choke	(122)	542-3003-001
L5	13 μH choke		542-3003-001
L6	10 1/2 T ind. 0.75-1.0 μH		542-1005-010
L7	4 1/2 T ind. 0.24-0.32 μH		542-1005-004
L8	6.8 μH RF choke		542-3004-689
	LOUD SPEAKER		
LS1	Speaker assembly		023-2927-001
	Includes:		
LS	Speaker		589-1003-002
MP	Foam ring		018-0960-001
MP	Foam ring		018-0960-002
	MICROPHONE		
MK1	Microphone assembly	(123A)	023-2708-005
	Includes:		
CH	Case back		023-2701-003
ML	Grille cloth		018-0919-001
MP	Cord clamp		016-1798-001
MP	Resonator		018-0918-001
MP	Case front		032-0216-002
MP	Actuator		032-0218-001
NP	Nameplate		559-0036-001
NP	Viking head		559-0037-001
S	Switch, mike		583-3001-011
U	Cup assm, mike		023-2707-001
W	No. 26 G strand wire		071-0912-105
W	No. 26 blk. strand wire		071-0912-110
W	Retractile cable		597-2001-004
	MECHANICAL PARTS		
MP1	Heat sink for TO-39		013-1074-001
MP2	Heat sink		014-0671-001
MP3	Spacer, switch (long)	(122)	013-1369-001
MP3	Bushing	(123A)	018-0036-011
MP4	Spacer, switch (short)	(122)	013-1369-002
MP5	Bushing		018-0036-011
MP7	Knob, volume	(122)	032-0236-001
MP8	Knob, squelch	(122)	032-0236-001
MP9	Dial	(122)	032-0331-002
MP10	Knob, on-off	(122)	547-0006-020

PARTS LIST (cont'd)

SYMBOL NO.	DESCRIPTION		PART NO.
	OVERLAYS (122)		
ML5	Overlay, channel indicator	(122)	559-2073-001
NP1	Overlay	(122)	559-2071-001
	TRANSISTORS		
Q1	SI NPN 50 MHz amp TO92		576-0003-018
Q2-Q10	SI NPN gen. purp. TO92		576-0003-011
Q11, Q12	SI NPN 60V 4A 36W X75		576-0002-001
Q13	SI NPN 50 MHz amp. TO92		576-0003-018
Q14	SI NPN gen. purp. TO92		576-0003-011
Q15	0.4W 27 MHz amp. TO39	(122)	576-0004-004
Q15	SI NPN HF osc.	(123A)	576-0004-006
Q16	0.4W 27 MHz amp. TO39		576-0004-004
Q17	3.4W 27 MHz amp. TO39		576-0004-005
	RESISTORS		
R1	1.5K ohm K 1/2 W	(123A)	569-1504-152
R2	10K ohm K 1/2 W		569-1504-103
R3	47 ohm K 1/2 W		569-1504-470
R4	1.0K ohm K 1/2 W	(122)	569-1504-102
R4	1.5K ohm K 1/2 W	(123A)	569-1504-152
R7	2.2K 0.1 W trim pot.		562-0019-222
R8	62 ohm J 1/2 W		569-1503-620
R9	4.7K ohm K 1/2 W		569-1504-472
R12	10K ohm K 1/2 W		569-1504-103
R13	10K malloslide	(122)	562-0025-003
R14	150K ohm K 1/2 W		569-1504-154
R15	68K ohm K 1/2 W		569-1504-683
R16	100K ohm K 1/2 W		569-1504-104
R17	2.2K ohm K 1/2 W		569-1504-222
R19	Same as R17		
R21	Same as R17		
R22	680 ohn K 1/2 W		569-1004-681
R23	330 ohm K 1/2 W		569-1504-331
R24	22K ohm K 1/2 W		569-1504-223
R25	330 ohm K 1/2 W		569-1504-331
R26	680 ohm K 1/2 W	(122)	569-1504-681
R26	1.0K ohm K 1/2 W	(123A)	569-1504-102
R27	5K malloslide	(122)	562-0025-004
R29	1.0K ohm K 1/2 W		569-1504-102
R31	3.3K ohm K 1/2 W		569-1504-332
R32	120 ohm K 1/2 W		569-1504-121
R34	3.3K ohm K 1/2 W		569-1504-332
R35	470 ohm K 1/2 W		569-1504-471
R37	330 ohm K 1/2 W		569-1504-331
R38	470 ohm K 1/2 W		569-1504-471
R39	510 ohm J 1/2 W		569-1503-511
R41	27 ohm K 1/2 W		569-1504-270
R42	1.0 ohm K 1/2 W		569-2503-109
R43	2.2K ohm K 1/2 W		569-1504-222
R45	470 ohm K 1/2 W		569-1504-471
R46	120 ohm K 1/2 W	(122)	569-1504-121
R46	33 ohm K 1/2 W	(123A)	569-1504-330
R47	2.7K ohm K 1/2 W		569-1504-272
R48	120 ohm K 1/2 W		569-1504-121
R49	680 ohm K 1/2 W		569-1504-681
R50	22 ohm K 1/4 W		569-1002-220
R51	120 ohm K 1/2 W		569-1504-121
R52	390 ohm K 1/2 W		569-1504-391
R53	39K ohm K 1/2 W		569-1504-393
R54	6.8K ohm K 1/2 W		569-1504-682
R55	120 ohm K 1/2 W		569-1504-121
R56	220 ohm K 1/2 W		569-1504-221
R57	120 ohm K 1/2 W		569-1504-121
R58	62 ohm J 1/2 W		569-1503-620
R59	2.2K ohm K 1/2 W		569-1504-222
R61	3.3K ohm K 1/2 W		569-1504-332
R62	470 ohm K 1/2 W		569-1504-471
R63	47 ohm K 1/2 W	(122)	569-1504-470
R63	27 ohm K 1/2 W	(123A)	569-1504-270
R64	470 ohm K 1/2 W		569-1504-471
R65	120 ohm K 1/2 W		569-1504-121
R66	47 ohm K 1/2 W		569-1504-470
R67	1.2K ohm K 1/2 W		569-1504-122
R68	47K ohm K 1/2 W		569-1004-473
R70	1.0K ohm K 1/4 W	(123A)	569-1002-102
R81	5K 1/8 W PC trim pot.	(123A)	562-0004-502
R82	27 ohm K 1/4 W	(123A)	569-1002-270
RT1	8.0K ohm K -4.4 therm.		569-3001-001
	SWITCHES		
S1	PB switch	(122)	583-4008-021
S2	Switch wafer	(122)	583-2009-211
	TRANSFORMERS		
T1	10MM 27 MHz ant. xfmr.		592-5015-001
T2	10MM 27 MHz mix. xfmr.		592-5015-002
T3	7MM 455 kHz IF xfmr.		592-5020-004
T4	Same as T3		
T5	Input/driver xfmr.		592-1007-004
T6	Out/mod xfmr.		592-1013-006
T7	10MM 27 MHz osc. xfmr.		592-5015-004
T8	10MM 27 MHz auto-xfmr.		592-5015-005
T9-T11	Same as T8		
T12	25-40 MHz osc. xfmr.		592-5014-001
T13	25-50 MHz driver xfmr.		592-5014-002
	PEC, PC BOARD		
U1	PEC R.F. amp. silicon		544-0003-011
U2	PEC 1st mixer, silicon		544-0002-011
U3	PEC 1st I.F. 120 silicon		544-0003-043
U4	PEC 2nd I.F. silicon		544-0002-014
U5	PEC noise limit. germ.		544-0002-015
U6	PEC audio silicon		544-0002-026
U7	PC board	(122)	035-0181-002
U10	PC board	(123A)	035-0181-013
	CRYSTALS		
Y1	5.7350 MHz HC-18/U		519-0023-104
Y2	5.7250 MHz HC-18/U		519-0023-103
Y3	5.7150 MHz HC-18/U		519-0023-102
Y4	5.6950 MHz HC-18/U		519-0023-101
Y5	6.1904 MHz HC-18/U		519-0023-108
Y6	6.1804 MHz HC-18/U		519-0023-107
Y7	6.1704 MHz HC-18/U		519-0023-106
Y8	6.1504 MHz HC-18/U		519-0023-105
Y9	32.700 MHz 3 OT HC-18/U		519-0024-001
Y10	32.750 MHz 30T HC-18/U		519-0024-002
Y11	32.800 MHz 3 OT HC-18/U		519-0024-003
Y12	32.850 MHz 3 OT HC-18/U		519-0024-004
Y13	32.900 MHz 3 OT HC-18/U		519-0024-005
Y14	32.950 MHz 3 OT HC-18/U		519-0024-006
	ELECTRONIC NETWORK		
Z1	Mech. filt-xfmr. pair		532-1004-001

ENGINEERING CHANGES

Serial Number stickers can be used as a guide to unit revisions, but should not be considered absolutely accurate in every instance. For example, a D Model unit might not include every D Model change, and an E Model might include an F Model change. These changes are listed only as a servicing aid.

MESSENGER 123A REVISION B

Components Added	Schematic Location	Part Description	Part Number	Reason
J1	B10	External speaker jack	515-2001-001	Improve performance
EP3	B6	Ferrite bead	517-2002-001	Prevent RF feedback when used with power pack

MESSENGER 123A REVISION C

Components Changed	Schematic Location	From	To	New Part Number	Reason for Change
C21	B3	150 pF	820 pF	510-0001-821	Low oscillator dropout
C22	B3	43 pF	390 pF	510-0001-391	
C44	C3	82 pF	100 pF	510-3016-101	
C47	C3	39 pF	0.01μF	510-3010-103	
C48	C3	82 pF	180 pF	510-3020-181	
C60	C6	0.001μF	0.047μF	510-3010-473	
C70	C6	0.01μF	0.047μF	510-3010-473	
R17	B2	22KΩ	2.2KΩ	569-1504-222	
R19	B3	33KΩ	2.2KΩ	569-1504-222	
R21	B2	22KΩ	2.2KΩ	569-1504-222	
R22	C3	39KΩ	680Ω	569-1004-681	
R23	B3	2.7KΩ	330Ω	569-1504-331	
R48	D3	120Ω	47Ω	569-1504-470	
S2	C1	9102	9103	569-2029-103	
U5	A7	2035	2015	544-0002-015	Availability

Components Deleted	Schematic Location	Part Description	Reason for Change
C20	B2	33 pF ±5%, 200V NPO	Low oscillator dropout
L1	B2	220μH choke, RF	Low oscillator dropout
R5	A3	1KΩ ±10%, 1/2 W	New PEC U3
R6	B5	100KΩ ±10%, 1/4 W	New PEC U3
R11	A8	330KΩ ±10%, 1/2 W	New PEC U5
R18	B2	1KΩ ±10%, 1/2 W	Low oscillator dropout

MESSENGER 122 REVISION B
MESSENGER 123A REVISION D

Components Changed	Schematic Location	From	To	New Part Number	Reason for Change
*R48	D3	47Ω	120Ω	569-1504-121	Voltage sensitive squeal
*U5	A7	2035	2015	544-0002-015	Availability
*Y1	B1	3004	3104	519-0023-104	Low oscillator stability
*Y2	B1	3003	3103	519-0023-103	
*Y3	B1	3002	3102	519-0023-102	
*Y4	B1	3001	3101	519-0023-101	
*Y5	B2	3008	3108	519-0023-108	
*Y6	B2	3007	3107	519-0023-107	
*Y7	B2	3006	3106	519-0023-106	
*Y8	B2	3005	3105	519-0023-105	

Components Deleted	Schematic Location	Part Description	Reason
*L1	B2	220 μH RF choke	Low oscillator stability
*R5	A4	1 KΩ, 1/2 W, CC	Included in U3
*R6	A5	100 KΩ, 1/2 W, CC	Included in U3
*R11	A8	330 KΩ, 1/4 W, CC	Included in U5

Components Added	Schematic Location	Part Description	Part Number	Reason
EP3	B6	Ferrite Bead	517-2002-001	Suppress self-modulation
EP48	D4	Ferrite Bead	517-2002-002	Zener noise

Components Repositioned	New Location	Reason
*CR7	Refer to components layout.	Receiver oscillations
*R21		
*R25		Voltage sensitive squeal
**RT2	Meter lugs	Avoid breakage
Jumper wire Orange lead to R24 Yellow lead to R61 Violet lead lengthened from T1 to C73		Receiver oscillations

MESSENGER 122 REVISION C
MESSENGER 123A REVISION E

Components Changed	Schematic Location	From	To	New Part Number	Reason for Change
Z1	A4	2001	4001	023-3254-001	Availability

MESSENGER 122 REVISION D
MESSENGER 123A REVISION F

Components Changed	Schematic Location	From	To	New Part Number	Reason for Change
**U1		1011	1012	035-0181-012	Mount Z1 on board
U1		1001	1002	035-0181-002	Mount Z1 on board
*R2	A2	22K	10K	569-1004-103	T2 tuning range

Components Added	Schematic Location	Part Description	Part Number	Reason for Change
*C121	A3	0.01 μF M, 50V, Y5U	510-3002-103	Receiver stability
*C90	A4	470 pF J, 100V, 1DM15	510-0001-471	Part of Z1
*L8	A5	6.8 μH RF choke	542-3004-689	Receiver stability

* Indicates a change common to the MESSENGER 122 and MESSENGER 123A.
** Indicates a change in the MESSENGER 123A only.