



MOTOROLA

Mobile Products Division

MaraTrac

Low Band FM Two-Way Radio

Range 1, 29.7 – 36 MHz

Range 2, 36 – 42 MHz

Range 3, 42 – 50 MHz

110 Watts

THIS MANUAL HAS BEEN
DISCONTINUED

Instruction Manual

68P80102W95-O



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Mobile Products Division

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Low Band FM Two-Way Radio
Range 1, 29.7 – 36 MHz
Range 2, 36 – 42 MHz
Range 3, 42 – 50 MHz
110 Watts

Note: The pages preceded by "*" are not included, due to irrelevancy.

Contents

* Foreword	MXW-2808
* General Safety Information	MXW-0866
* Installation Caution	MXW-5321
* FCC Requirements	MXW-2670
Safe Handling of CMOS Integrated-Circuit Devices	68P80100W34
Performance Specifications for Low Band <i>MaraTrac</i> Radio	MXW-6324
Model Chart Low Band <i>MaraTrac</i> Radio	MXW-7681
Unified Chassis Chart for Low Band <i>MaraTrac</i> Radio	MXW-7682
Options Chart for Low Band <i>MaraTrac</i> Radio	MXW-6327
<i>MaraTrac</i> Radio Service Aids	MXW-6461
Theory of Operation	W10002S80
1. Introduction	1
2. Radio Features	1
3. Electrical Characteristics	1
4. Primary Power Source	3
5. Physical Characteristics	3
6. Operating Instructions	3
7. Detailed Theory of Operation	4
8. Extender Field Test	6

Diagrams

Troubleshooting Charts	PW-6328
Radio System Troubleshooting	(Sh 1 of 7)
Improper HHCH Operation	(Sh 1 of 7)
Improper Advanced Control Head Operation	(Sh 2 of 7)
Abnormal Control Head Operation (Clamshell)	(Sh 3 of 7)
Poor Receiver Performance	(Sh 3 of 7)
No PTT	(Sh 3 of 7)
Transmitter Off Frequency	(Sh 3 of 7)
Low Transmit Power	(Sh 4 of 7)
No Receive at Any RF Level	(Sh 5 of 7)
Radio Works on Some Channels But Not Others	(Sh 5 of 7)
Bad Squelch or PL/DPL	(Sh 6 of 7)
Synthesizer Out of Lock	(Sh 7 of 7)
Bad Transmit Modulation	(Sh 7 of 7)
Exciter Problems	(Sh 7 of 7)

Schematics, Circuit Board Diagrams, and Parts Lists	Foldout No.
Handheld Control Head	PW-5272
Basic (Clam Shell) Control Head	PW-5271
Advanced Control Head	PW-5583
Interconnect Board	PW-5273
Audio/Squelch Board	PW-5275
Low Band Exciter/Power Control Board	PW-6331
Low Band Power Amplifier Board (Range 1)	PW-6666
Low Band Power Amplifier Board (Range 2)	PW-6909
Low Band Power Amplifier Board (Range 3)	PW-6337
Microphone and Speaker	PW-5220
Exploded View and Mechanical Parts List for Control Heads	PW-5590
Low Band Radio Exploded View	PW-7678
Low Band RF Board Ranges 1 and 3	PW-6346
Low Band RF Board Range 2	PW-6916
Logic Board	PW-5285
* Commercial Warranty and Computer Software Copyrights	PW-0380

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Safe Handling of CMOS Integrated-Circuit Devices

Many of the integrated-circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open-circuit impedance, CMOS IC's are vulnerable to damage from static charges. Everyone involved in handling, shipping, and servicing them must be extremely careful not to expose them to such damage.

CMOS IC's do have internal protection, but it is effective only against overvoltages in the hundreds of volts, such as those that could occur during normal operations. Overvoltages from static discharge can be in the thousands of volts.

When a CMOS IC is installed in a system, the system's circuit elements distribute static charges and load the CMOS circuits. This decreases the vulnerability of the IC's to static discharge, but improper handling will probably cause static damage even when the IC's are so installed.

To avoid damaging CMOS IC's, take the following precautions when handling, shipping, and servicing them.

1. Before touching a circuit module, particularly after having moved around in the service area, touch both hands to a bare metal earth-grounded surface. This discharges any static charge you may have accumulated.

Note

Wear a conductive wrist strap (Motorola Part No. RSX-4015A) to minimize the buildup of static charges on your person while you are servicing CMOS equipment.

WARNING

When wearing a conductive wrist strap, be careful near sources of high voltage. By grounding you thoroughly, the wrist strap also increases the danger of lethal shock from accidental contact with such a source.

2. Whenever possible, avoid touching any electrically conductive parts of the circuit module with your hands.
3. Check the INSTALLATION and MAINTENANCE sections of the service manual and the notes on the schematic to

find out whether or not you can insert or remove circuit modules with power applied to the unit, and act accordingly.

4. When servicing a circuit module, avoid carpeted areas, dry environments, and the wearing of static-generating clothing.

5. Be sure that all electrically powered test equipment is grounded. Attach the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe before removing the ground lead.

6. When you remove a circuit module from the system, lay it on a sheet of aluminum foil or other conductive surface connected to ground through 100,000 ohms of resistance.

WARNING

If the aluminum foil is connected directly to ground, you may get a shock if you touch it and another electrical circuit at the same time.

7. When soldering, be sure the soldering iron is grounded.

8. Before connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary during the replacement of an integrated-circuit device), be sure to discharge any static buildup on your person (see Procedure 1, above). Because you can have a voltage difference across your body, you should use only one hand if you must touch the board wiring or any of the pins on the CMOS device.

9. When replacing a CMOS integrated-circuit device, leave the device in its metal rail container or conductive foam until you are ready to insert it into the pronged circuit module.

10. Connect any low-impedance test equipment such as a pulse generator to CMOS device inputs after you have applied power to the CMOS circuitry. Similarly, disconnect such low-impedance equipment before turning off the power.

11. Wrap CMOS modules in conductive material when transporting them from one area to another, even within the same room. Use wrapping material similar to that in which replacement modules are wrapped when they arrive from the factory. (You can also use aluminum foil.) Never use nonconductive material for packaging these modules.

Performance Specifications for Conventional Low Band *MaraTrac* Radio

GENERAL

Channel Capability	8 Modes (A3 Model)	16 Modes (A2 Model)	99 Modes (A5 & A7 Model)
Primary Power	12 VDC <i>negative ground only</i>		
Dimensions	10.0" H x 14.5" W x 2.5" L		
Weight	16 lb. (7.26 kg)		
Metering	All adjustments and alignments are performed electronically using an IBM Personal Computer, a Radio Interface Box (RIB) and Field Maintenance Software.		
Environmental	Meets MIL-STD 810D environmental specifications for vibration, shock, rain, dust, and salt fog.		

Maximum Battery Current Drain

Model	Frequency (MHz)			Minimum RF Power Output	Off @ 13.8V	Standby @ 13.8V	Receiver @ 13.8V	Transmit @ Rated Power
	Range1	Range2	Range3					
T81XTA7DA2-K	29.7-36	36-42	42-50	110 watts	60mA	.7 A	3.0 A	27 A
T81XTA7DA3-K	29.7-36	36-42	42-50	110 watts	60mA	.7 A	3.0 A	27 A
T81XTA7TA5-K	29.7-36	36-42	42-50	110 watts	60mA	.7 A	3.0 A	27 A
T81XTA7TA7-K	29.7-36	36-42	42-50	110 watts	60mA	.7 A	3.0 A	27 A

TRANSMITTER

Output Impedance	50 ohms
Spurious and Harmonic Emissions	More than 70 dB below carrier (for EIA spec. RS152B) except $F_c \pm 14.4$ MHz @ FCC
Frequency Stability	$\pm .0005\%$ of assigned center frequency
Modulation	0 to ± 5 kHz
Audio Sensitivity	0.080 V ± 4 dB for 60% maximum deviation @ 1000 Hz
Audio Response	EIA
Audio Distortion	Less than 3% @ 1000 Hz, 60% maximum deviation
Maximum Freq. Separation (MHz)	Range1-6.3; Range2-6; Range3-8
FM Hum and Noise: EIA Method	-45 dB

RECEIVER

Channel Spacing	20 kHz
Sensitivity: 12 dB EIA SINAD	(per EIA spec. RS204C) .30 μ V
Selectivity: EIA SINAD	-80 dB
Spurious & Image Rejection	-80 dB
Intermodulation: EIA SINAD	-80 dB
Input Impedance	50 ohms
Audio Output	10 watts @ less than 5% distortion (into 3.2 ohm load @ 1000 Hz)
Maximum Freq. Separation (MHz)	Range1-6.3; Range2-6; Range3-8
Frequency Stability	$\pm .0005\%$ of assigned center frequency

SPEAKER

Dimensions	5.5" x 2.5" (Excluding Mounting Bracket)
Weight	1.5 lbs. (0.7 kg)

CONTROL HEAD

Dimensions (Excluding Mounting Bracket)	Handheld-2.3" H x 4.8" W x 1.5" L; Basic-5.2" H x 3.7" W x 1.8" L; Basic Plus-6.5" H x 3.4" W x 1.7" L
Weight	.75 lb (0.4 kg)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

FCC TRANSCEIVER DESIGNATION

ABZ89FT1619

MXW-6324-B

10/15/89

Model Chart for Low Band *MaraTrac* Radio 29.7-36, 36-42, 42-50 MHz 110 Watt

CODE:

- = ONE ITEM SUPPLIED
- ⊗ = INDICATES BREAKDOWN IN SEPARATE CHART

MODEL	DESCRIPTION				ITEM	DESCRIPTION
	T81XTA7TA5BK	HHCH 99-FREQUENCY	BASIC 8-FREQUENCY W/SCAN	BASIC 16-FREQUENCY		
	⊗	⊗	⊗	⊗		UNIFIED CHASSIS
		●			HCN4033A	BASIC CONTROL HEAD, 8-MODE W/SCAN
			●		HCN4034A	BASIC CONTROL HEAD, 16-MODE
	●				HCN1051A	HANDHELD CONTROL HEAD (HHCH), 99-MODE
	●	●	●	●	RAB4002ARA	ANTENNA 29.7-36 MHZ OR
					RAB4003ARA	36-42 MHZ, OR
					RAB4004ARA	42-50 MHZ
					TAB6071A	25-28 MHZ
		●	●		HKN4017A	POWER CABLE AND FUSE, BASIC CONTROL HEAD
	●				HKN4319A	POWER CABLE AND FUSE, HHCH
	●	●	●	●	HKN4051A	RED FUSED LEAD
		●	●		HLN4024B	MICROPHONE HANGUP BOX
	●				HLN4830A	HHCH HANGUP BOX
	●	●	●	●	HLN5372A	SOFTWARE KIT
	●	●	●	●	HLN4022C	INSTALLATION KIT
	●	●	●	●	HLN4023A	TUNING TOOL KIT
	●	●	●	●	HHN4032A	TOP COVER
	●	●	●	●	HLN4034C	MOUNTING TRAY
		●	●		HMN1015A	MICROPHONE
		●	●		HSN4020A	SPEAKER
	●		●		HSN4021A	SPEAKER
	●	●	●		HKN4007A	ORANGE CABLE
	●	●	●	●	HLN5371A	NAMEPLATE
	●				HLN5381A	ESCUTCHEON W/O "DIR"
			●		HCN1052B	ADVANCED CONTROL HEAD 99-MODE
			●		HLN5404A	CONTROL HEAD HARDWARE
			●		HLN5406B	ADVANCED CONTROL HEAD BOARDS
			●		HKN4321A	POWER CABLE AND FUSE, ADVANCED
			●		HLN5064A	ADVANCED TOOL
			●		HLN5383A	ADVANCED BUTTON PLUG
			●		HMN1061A	MICROPHONE
			●		HLN4921A	TRUNNION
	●				HKN4324A	FUSE KIT

CODE:

[illegible]

MaraTrac Low Band Two-Way Radio Options Chart

Option	Description	Kit Added	Kit Deleted
B20	DTMF Microphone	HMN1022A	HMN1015A HMN1061A
B42	PL Scan	Plant Programming	—
B70	Omit Antenna	—	RAB400XARA (x = 2, 3, or 4) TAB6071A
B71	Omit Microphone	—	HMN1015A HMN1061A
B87	Omit Speaker	—	HSN4020A or HSN4021A
B90	Omit Accessories	—	Control Head Power Cable Fused Lead Hang-Up Box Microphone Speaker Antenna
B109	Handset	TLN4698A TMN6067A	HLN4024A HMN1015A
B116	External Alarms A7 Only		
B161	Omit Main Radio Cable	—	Fused Power Cable Fused Red Lead Orange Cable
B206	Service Manual	6880102W39 (AK Models) 6880102W95 (BK Models)	—
B239	Noise Cancelling Microphone	TMN6116A	HMN1015A HMN1061A
B269	Siren/PA	By Model	—
B561	<i>Quik-Call II</i>	6880102W58 6880102W60 Plant Programming	—
B566	<i>Single Tone</i>	HLN5455A HLN5472A HLN4341A HLN5476A 6880102W58 6880102W60	—
B833	Stat Alert Decode	6880102W58 6880102W60 Plant Programming	—
B835	DTMF Decoder	HLN5472A HKN4341A HLN5455A 6880102W58 6880102W60	—
B995	Zone Mode	Field Programmable Requires Radio Firmware 4.01	—
XT7600A	Spare Accy A2	—	—
XT7603A	Spare Accy A3	—	—
XT7604A	Spare Accy A5	—	—
XT7605A	Spare Accy A7	—	—

MaraTrac Radio Service Aids

The following service aids are available through Motorola Communications Parts Division to facilitate servicing and programming the *MaraTrac* Mobile Radio. Please contact 1-800-422-4210 for price and delivery.

Model No.	Description
TEST CABLES AND ADAPTERS	
01-855414	TEST CABLE—BNC to BNC cable (4 ft) used with the 58-855270 adapter to connect the <i>MaraTrac</i> mobile radio to the RF test instruments.
01-80355A09	TEST ADAPTER—Attaches to the Program/Test cable in place of the RIB; used to manually key the radio and to inject a tone for troubleshooting purposes.
30-80093P01	TEST CABLE—14 pin ribbon cable used to extend the RF board for servicing.
30-80373B41	VCO TEST CABLE—Provides the interface between the mobile's RF board and the test equipment for troubleshooting.
58-855270	TEST ADAPTER—BNC Female to UHF Male adapter used with the 01-855414 Test Cable to connect the <i>MaraTrac</i> mobile radio to RF test instruments.
SERVICE MANUALS	
68-80102W39	<i>MaraTrac</i> Low Band Radio Instruction Manual (AK Models)
68-80102W95	<i>MaraTrac</i> Low Band Radio Instruction Manual (BK Models) (THIS MANUAL)
68-80102W18	<i>MaraTrac</i> VHF Radio Instruction Manual (AK Models)
68-80102W94	<i>MaraTrac</i> VHF Radio Instruction Manual (BK Models)
68-80102W21	<i>MaraTrac</i> UHF Radio Instruction Manual (AK Models)
68-80102W87	<i>MaraTrac</i> UHF Radio Instruction Manual (BK Models)
68-80102W58	<i>MaraTrac</i> Radio Signalling Options and Retrofits Instruction Manual
OPERATOR CARDS	
68-80102W22	<i>MaraTrac</i> A2 and A3 Basic Model Radio
68-80102W19	<i>MaraTrac</i> A5 Handheld Control Head Model Radio
68-80102W20	<i>MaraTrac</i> A7 Advanced Control Head Model Radio
68-80102W60	<i>MaraTrac</i> Radio Signalling Options—Decoder
PROGRAMMING DEVICES	
RPX-4719	RADIO SERVICE SOFTWARE LICENSING AND INFORMATION PACKAGE—Provides the necessary software licensing information required to purchase Radio Service Software listed below.
RVN-4023	RADIO SERVICE SOFTWARE ON 5-1/4 INCH DISK—Operates on the IBM PC, XT, AT, or PS/2 family of computers for programming and servicing of <i>MaraTrac</i> mobile radios. IBM DOS 3.0 or higher, an RS-232 Asynchronous Serial Communications Adapter and RAM memory of 512K bytes minimum are necessary for the programmer. (Includes users manual 68-80102W24.)
RVN-4024	RADIO SERVICE SOFTWARE ON 3-1/2 INCH DISK—Same as RVN4023 description.
01-80353A74	RADIO INTERFACE BOX (RIB)—Voltage level shifter to enable communications between the radio and the computer's RS-232 Asynchronous Serial Communications Adapter. Requires the Wall Mount Power Supply (01-80357A57).
01-80357A57	WALL MOUNT POWER SUPPLY—Used to supply power to the RIB. For 120 VAC use only.
30-80070N01	PROGRAM/TEST CABLE—Provides the electrical interconnection from the programming receptacle inside the radio to the RIB (01-80353A74) for programming the <i>MaraTrac</i> mobile radio.
30-80369B71	COMPUTER INTERFACE CABLE—Used to connect the IBM PC, PC-XT, or PS/2 computer's Asynchronous Serial Communications Adapter to the RIB (01-80353A74). The previously offered 01-80357A74 Computer Interface Cable will provide the proper connections.
30-80369B72	COMPUTER INTERFACE CABLE—Used to connect the IBM PC-AT computer's Asynchronous Serial Communications Adapter to the RIB (01-80353A74). The previously offered 01-80357A64 Computer Interface Cable will provide the proper connections.

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1. Introduction

The *MaraTrac* radio is a fully synthesized, microprocessor-controlled transceiver. All standard features are performed by software in the radio control processor.

2. Radio Features

2.1 INTERNAL STANDARD FEATURES

The *MaraTrac* radio has the following standard features:

- Remote mount configuration
- High RF power
- Wide bandwidth
- 8, 16, and 99-mode models
- Microprocessor controlled
- Fully synthesized
- *MDC-1200* DOS, Unit ID, Radio Check, and Emergency
- 10-watt audio
- Field programmable EEPROM

2.2 CONTROL HEADS

The following control heads are available with the *MaraTrac* radio:

2.2.1 Basic "Clamshell" Control Head

The clamshell control head is available for use with either an 8 or 16 mode *MaraTrac* radio. This allows either 16 separate modes, or 8 modes and mode-programmable scan. An optional TalkAround switch is available for the control head.

2.2.2 Handheld Control Head (HHCH)

A HHCH is available for the *MaraTrac* radio. This unit allows selection of up to 99 modes. Single priority scan is

standard with either mode-programmable or operator-select scan lists.

2.2.3 Advanced Control Head

An advanced control head is available for the *MaraTrac* radio. This unit allows selection of up to 99 modes. Single priority scan is standard with either mode-programmable or operator-select scan list. A RCL button "recalls" the scan list for reviewing and a HOME button allows for a pre-programmed "home" mode. Also, the MPL button allows multiple PL access. This control head utilizes an electronic volume attenuator to control radio volume.

3. Electrical Characteristics

3.1 CIRCUIT BLOCKS

The radio is grouped into the following physical blocks:

- Interface board
- Squelch/Audio PA board
- Transceiver RF board
- Transceiver Controller board
- Transmitter Exciter board
- Transmitter PA

3.2 FUNCTIONAL DESCRIPTION (SEE FIGURE 1, BLOCK DIAGRAM)

3.2.1 Microcomputer

The *MaraTrac* radio uses the Motorola 68HC11A8 Microcomputer operating in an expanded bus mode to perform all basic radio control functions. The processor is located on the transceiver controller board and operates with a 7.776 MHz clock. User information is stored in both the internal EEPROM and in a separate lithium-battery backed-up RAM IC.

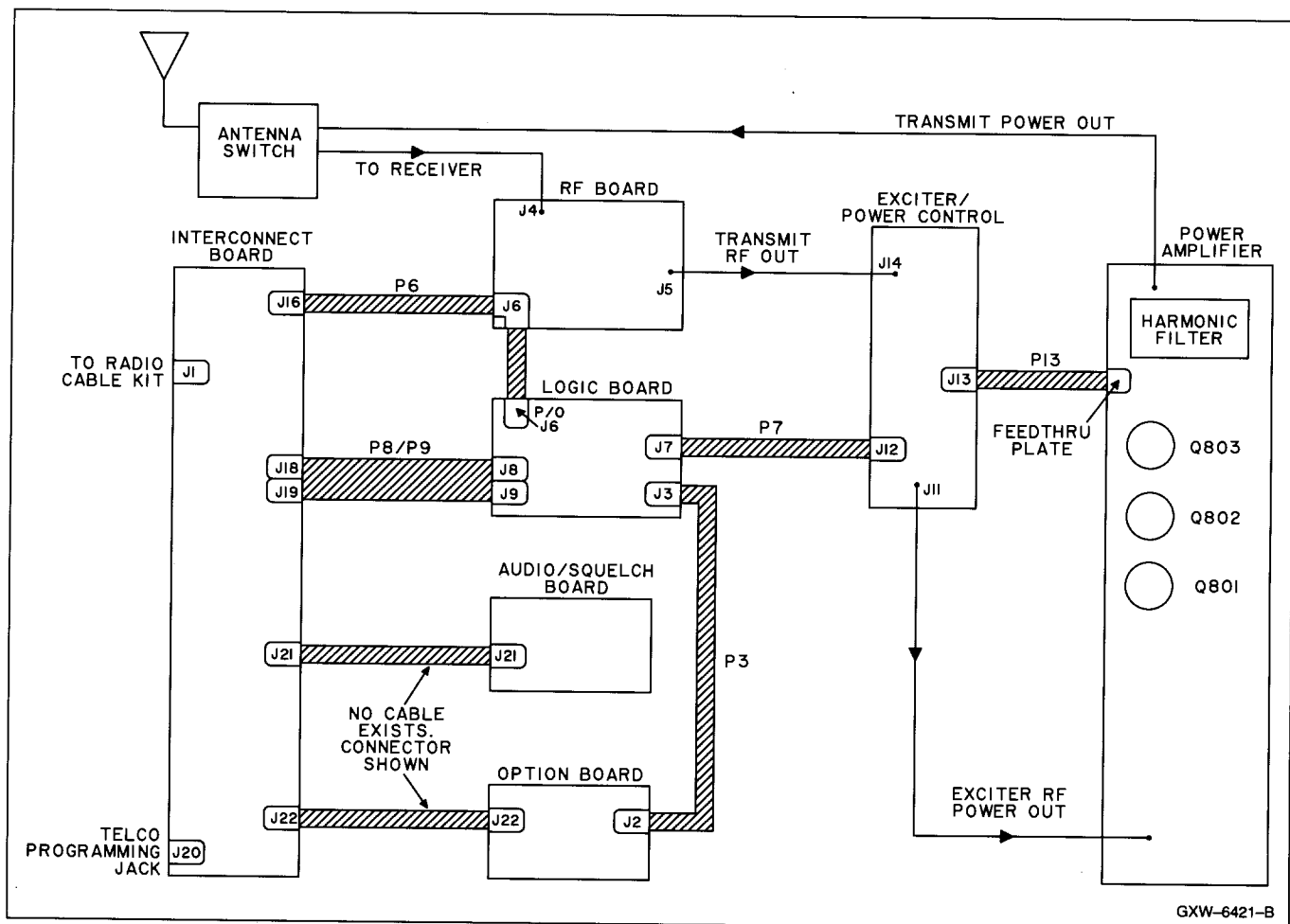


Figure 1. Low Band Radio Block Diagram

3.2.2 Frequency Synthesizer

The frequency synthesizer uses a phase-locked loop (PLL) that consists of a reference oscillator, a voltage controlled oscillator (VCO), a single chip synthesizer (which contains a programmable divider and a phase detector), a charge pump, and a fixed loop filter. The frequency information, carried to the synthesizer IC via the serial clock and data line, is strobed by the synthesizer latch enable line. The reference oscillator is a discrete crystal-controlled oscillator that uses the radio processor to monitor and compensate for temperature variations.

3.2.3 Receiver

Incoming RF signals, directed by the antenna relay, pass into a 4-pole bandpass filter. From that filter, the RF signal passes through one stage of RF amplification, Q1, then into a second 4-pole bandpass filter. The filtered signal then enters the first mixer stage. Meanwhile, the synthesizer output is fed to the first mixer as a high side local oscillator. The mixer produces a 10.7 MHz first IF signal which is amplified before it passes through the IF delay line used for the extender, IF blanking switches Q52 and Q53, followed by another stage of amplification, Q54. Then the RF signal passes through a

4-pole crystal filter. Another stage of amplification occurs before the RF signal passes into the receiver subsystem IC, U51, where the 10.7 MHz signal is mixed with 10.245 MHz to produce a 455 kHz second IF signal. The second IF signal is then amplified, filtered by Y51A and Y51B, limited in U51, and finally detected by a quadrature detector, L64. Detected Audio leaves the receiver IC on pin 5.

3.2.4 Extender

After the first mixer stage CR1, the RF signal passes through post mixer filtering comprised of bandpass selectivity circuits surrounding L51, L52, and L53. First IF amplification is provided by Q51. The IF signal divides at the base of Q51. The extender pulse detector and blanker circuits are fed by one path while the first IF amplifier Q51 is driven by the other.

The first IF amplifier Q51 amplifies the signal where it couples into the IF delay line section comprised of circuits associated with L55 and L56. After the signal passes through the delay line the signal can be blanked with the appropriated signal applied to Q52 and Q53. Post blanker isolation is provided by Q54. The signal then passes into the first 4 pole filtering section of the 10.7 MHz IF.

The Extender samples RF from the base of Q51 and drives the extender isolation amplifier Q351. Q351 in turn amplifies the signal and pulse which is then applied to the gain block U351. Q352 detects the output of U351 for further processing. Pulse shaping and amplification are accomplished by Q353, and Q354. Q355 is driven to toggle Q52 and Q53 in the IF to blank the noise pulse as it exits the IF delay line. The output of Q354 also drives a three stage AGC detector comprised of Q356, Q357, and Q358 which reduces the gain of U351 under large signal and high pulse repetition rate conditions.

3.2.5 Transmitter

The frequency synthesizer generates an RF signal at the required transmit frequency. This signal is buffered and fed to the RF exciter board for additional amplification. From the exciter board, which also contains drive and temperature limiting circuitry, the RF signal is fed to the RF PA compartment where it is amplified up to 110 watts. Finally, the antenna relay directs the RF PA output to the antenna connector.

4. Primary Power Source

The *MaraTrac* radio is designed to operate from a negative ground 12-volt DC source. The negative lead is internally connected to the radio chassis.

5. Physical Characteristics

The *MaraTrac* radio's rugged low-profile housing encloses its electronic circuitry. The front end of the radio houses the antenna connector, a mounting tray lock, the main cable connector, and the handle. On the back end are heatsink fins for cooling the RF PA amplifier. Inside the radio, partitions and shielding covers isolate the various radio circuits from each other. The top cover snaps on and off; four screws secure the bottom cover in place. A mounting tray is supplied with the radio.

The radio's electronic circuits are on printed circuit boards that plug together. Test points on the boards allow access to various metering points.

The radio, less control head, occupies 363 cubic inches and weighs 16 pounds (approximate values).

6. Operating Instructions

Note

Refer to the operator card supplied with each radio for information on the general use of the radio.

6.1 RADIO SELF-CHECK

When the radio is first turned on, the software executes a series of internal self-tests to check digital hardware. The following devices are tested in this order: internal RAM, external RAM, external ROM, external EEPROM, and

internal EEPROM. The following audible diagnostic tones sound when a device fails:

6 beeps	Internal RAM Failure
5 beeps	External RAM Failure
4 beeps	External ROM Failure
3 beeps	External EEPROM Failure
2 beeps	Internal EEPROM Failure

If one of the EEPROM areas has failed, the radio will sound five groups of error tones and then automatically enter "bootloader" mode to allow radio reprogramming. ROM and RAM failures are treated as critical errors and will not allow radio operation of any kind; the failure tones will be repeated indefinitely.

6.2 CHANNEL SCAN

The *Channel Scan* feature allows you to scan a previously defined list of valid channels (modes) for activity. One scan list mode can be assigned as the priority mode and the rest are assigned non-priority modes. The radio can be programmed such that, while scanning, if you take the microphone off-hook, the radio will either continue to scan in carrier squelch mode or it will stop scanning and revert to the selected mode. When the Monitor button is activated, the radio will scan in carrier squelch mode. When you press the PTT to talk, the transmission will take place on the selected mode.

6.3 BASIC CONTROL HEAD SCAN

Activate and deactivate the Basic Control Head Scan by switching the rotary knob to the ON or OFF position. When activity is detected, the BUSY indicator lights solid to indicate the activity is from a non-priority mode, or flashes if the activity is from a priority mode. (A priority alert tone can be field programmed.) The basic control head model supports only a Mode-Slaved Scan list, meaning, the scan list is pre-programmed and requires a field programmer to modify it. The priority mode will always be equal to the selected mode. Also, there is no provision for operator review of the scan list.

6.4 HHCH AND ADVANCED SCAN

Activate and deactivate Scan by momentarily pressing the Scan rocker. The Scan indicator light is on when Scan is activated. If no activity is detected by *Channel Scan*, the radio displays the selected mode. When activity is detected, the BUSY indicator lights solid to indicate the activity is from a non-priority mode, the active mode number is displayed, and the radio unmutes. If activity is detected on the priority channel, the BUSY indicator comes on, the PRI indicator flashes, the priority mode is displayed, and the radio unmutes. (A priority alert tone can be field programmed.) Using a field programmer, the scan list members (priority and non-priority) can be independently designated as either Mode-Slaved or Operator-Selectable. If designated as mode-slaved, the Scan list modes can only be reviewed by the operator. If designated as operator-selectable, the list can be reviewed and modified by entering the Scan Programming Mode as described below.

6.5 SCAN PROGRAMMING/CONFIGURATION MODE

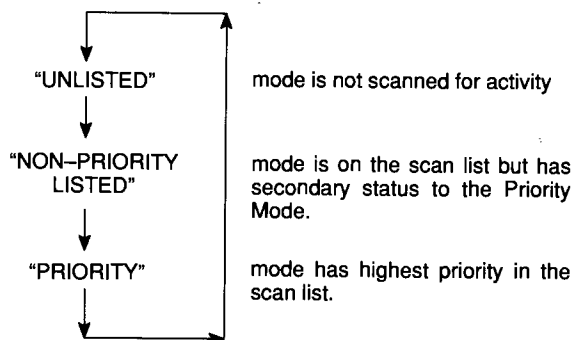
Operator-Selectable Scan lists can be reviewed and modified. Press and hold the SCAN button; an alert tone (if programmed) sounds and the SCAN indicator blinks to enunciate entry into the Scan configuration mode. Use the mode control to scroll to the desired mode. Press SEL to add the displayed mode to the list. Confirming the selection and defining the mode's "non-priority" status in the list, (1) on the handheld control head, the PRI indicator lights, or (2) on the advanced control head, the Non-Pri indicator lights. Raise the mode's status to "priority" by pressing SEL again; the PRI indicator flashes on either control head.

Note

If a different mode was previously selected as "Priority," the above procedure will affect that mode in one of two ways:

- If the non-priority scan list is programmed "operator-selectable," the mode is removed from the "priority" scan list and placed on the "non-priority" scan list.
- If the non-priority scan list is programmed "mode-slaved," the mode is no longer on any scan list.

The SEL button controls an endless loop program—that is, each press of the button changes its status, from:



While in the Scan Programming mode, the radio will sound a "bad-chirp" (if programmed) when one of the following situations occur:

- You try to change the Scan status of a mode-slaved mode (priority or non-priority).
- You try to add a new mode to a non-priority scan list that is full (16 members maximum).

Exit the scan programming mode by momentarily pressing the SCAN button. The radio resumes normal operation. If Scan was activated before entering the configuration mode, the radio will resume scanning.

7. Detailed Theory of Operation

7.1 EXCITER

7.1.1 RF Circuits.

The synthesizer on the RF Board (J5) produces a low-level modulated RF signal at the carrier frequency when the microphone is keyed. The RF output level of minimum 13dBm (typically 17dBm) is fed to J14 on the Exciter/Power Control board. There is about 13dB resistive pad at the input of the first buffer stage (Q1601). This stage takes 0dBm signal and amplifies it to 12.5dBm. The signal goes through another resistive pad of 8dB before it gets to the second buffer stage (Q1701). This stage takes the 4.5dBm signal and amplifies it to 22.5dBm. This signal is fed to controlled stage (Q1801) and is amplified to 34dBm when controlled B+ is 11 volts. The output drive from J11 is applied to the Low Band RF Power Amplifier (RFP A) deck. The RFP A amplifies the signal up to rated power.

7.1.2 Timing Circuits.

The transmit sequence is as follows: between 4 and 21 milliseconds after the PTT is pressed, the logic board sends frequency information to the RF board and the antenna relay energizes (9.6T). Between 34 and 51 milliseconds after the relay energizes, the synthesizer locks on frequency, and the DAC voltage to U451A-3 rises and brings up controlled B+ to Q1801, driving the RFP A deck and producing output power. When PTT is released, 9.6T and controlled B+ drop off, reducing output power to zero. The antenna relay drops out shortly thereafter, routing the antenna back to the receiver circuit.

7.1.3 Power Control.

As part of the tune-up procedure, the radio transmitter is adjusted for rated output power at 16 points distributed across the band. This process determines the proper DAC voltage versus carrier frequency to apply to U451A-3, in order to obtain rated power. At a given frequency, output power is controlled by maintaining a fixed current to the final amplifiers (Q802, Q803). Current to the finals is monitored from the voltage drop across R813. U451B causes Q454 to conduct a small current which is proportional to the finals current. Q454 maintains a voltage drop across R902 and R911 that is identical to the voltage drop across R813 on the RFP A. U451A compares the output of Q454 to the reference from the DAC (U801). U451 drives Q453, Q452, and Q451 to produce controlled B+ which supplies Q1801 and controls its gain in order to control RF drive to the RFP A stages. Controlled B+ fixes the amount of current that flows to the finals, resulting in a controlled amount of output power.

7.1.4 R.F. Power Trim Potentiometer R911

Normally, potentiometer R911 is left at mid-rotation after TRANSMITTER POWER ALIGNMENT. However, potentiometer R911 may be used to trim transmitter power while the radio is in the vehicle. Antenna loading may require adjustment of R911 to achieve rated power output. Adjust potentiometer R911 clockwise to increase power output and

counter clockwise to decrease power output. Monitor all adjustments with a "thru-line" style wattmeter to measure forward and reflected power flow. If the output power requires adjustment more than $\pm 10\%$ to achieve rated output power, check the antenna VSWR.

7.1.5 Protection Circuits.

To prevent damage to the RFPA, the temperature of the RFPA and the drive level to the finals are monitored. Temperature is sensed by thermistor RT801 near the final transistors. Its resistance drops to about 4.2K at 104° C. The voltage rises to 3.5 volts at J13, pin 7 when RT801 drops to 4.2K. This causes Q901 to conduct, dropping the voltage on the current sense low line to the logic board power control circuit. This makes it appear as if the RFPA deck is drawing too much current, and causes the power control circuit to reduce controlled B+. This reduces the drive to the RFPA deck, which reduces output power enough in extremely hot environments to prevent overheating and damage.

Operation of the drive sense circuit is similar to temperature sense. For high VSWRs at certain phase angles, less current flows through shunt resistor R813. Controlled B+ rises to a high level in an attempt to produce rated power from the finals, causing an abnormally high level of RF drive to be produced by Q801, and possibly damaging the final transistors. Shunt resistor R822, transistor Q800, and associated circuitry monitors the current drawn by driver Q801 and hence the drive to finals Q802 and Q803. As this current increases, the RF drive sense line voltage rises, causing Q901 to conduct, and reducing the drive to a safe level without reducing output power significantly.

Finally, a software controlled form of RF drive protection exists. Controlled B+ voltage is monitored by U802-45, an A/D input. When controlled B+ rises above 10.5 volts, the microprocessor reduces the DAC voltage for the duration of the transmission, dropping the controlled B+ voltage from over 10.5 VDC down to about 2 to 4 VDC after about 1/2 second. This prevents Q1801 from overheating when the radio is operating at low line voltages or into high VSWRs.

7.2 AUDIO/SQUELCH CIRCUITS

7.2.1 Audio and Squelch

The FM detector output is routed through a low pass filter, a high pass filter, de-emphasis circuitry, and then to the control head for application to the volume control. The adjustable output of this voltage divider is then routed to the audio/squelch board for application to the respective audio circuits.

The bridge audio power amplifier circuit provides a highly efficient audio output. The circuit uses two differential power amplifiers that provide a balanced push-pull output to the speaker.

Audio is applied from the audio buffer amplifier, U1102C, to the non-inverting input of U501. The output of U501 is applied to one side of the speaker and to U500. R504

and R505 form a voltage divider that attenuates the high level output of U501 before it is applied to the inverting input of U502. The output of U502 is equal in amplitude to the output of U501 but 180 degrees out of phase.

Squelch muting is controlled at two points: at series-connected transistor Q551 and at transistor Q550. Q551 is used for squelch muting as well as for muting in the priority *Channel Scan* mode while the priority channel is being sampled. When AUDIO PA MUTE is low, Q500 turns on, discharging C523 and forward biases CR500 and CR501. This allows internal bias of U501 and U502 to increase and turn off the audio power devices. By turning off the audio power devices, current in standby mode is substantially reduced.

7.2.2 Squelch Operation

The output from the FM detector, a combination of noise and recovered audio, is shaped and amplified by the squelch circuitry. These stages consist of a noise amplifier U1102A, squelch control pot R1132, noise filtering/detection/integration quad operational amplifier U1101, and associated variable squelch-tail-control circuitry. This circuitry has good squelch characteristics because of the following:

- A high-pass filter ahead of the second amplifier, to attenuate the audio frequencies to a specific level;
- Capacitors C1103 and C1104, which attenuate noise at frequencies above 22 kHz, to leave the noise band susceptible to detection;
- An input network to the detector, which further attenuates audio and any harmonics generated audio, to limit at the output of the third amplifier/limiter.

The filtered noise is routed to a positive-peak detector, which adds negative-going spikes at its output. These spikes are forwarded to the integrator and the variable squelch-tail-control circuitry. The integrator compares the average DC level of the detector's output with a reference level and generates a fast-responding output signal, Vo, as follows: Vo is greater than 4.5 V for squelched, and less than 4.5 V for unsquelched.

The detector's output also goes to Q1102 via a dual-time-constant network consisting of R1116, CR1103, and R1117. If the signal is weak, or in the absence of a signal, the noise spike rate becomes high enough to keep C1110 discharged below the turn-on voltage of Q1102. The collector of Q1102 therefore has a potential of +9.6 V. When the signal level increases, Q1102 turns on and its collector voltage, Vo, begins to decrease. With a strong signal, the collector voltage reaches a minimum level of approximately 4 V. For a given level at the integrator output, the voltage across C1111 varies directly with Vo of Q1102.

Q1105 generates an output signal (SQUELCH DECISION) that is a delayed version of the integrator output. The microcomputer mutes the audio when the SQUELCH DECISION signal goes high (4.5 V) and unmutes the audio when the signal goes low (0 V). The Q1103 turn-on voltage at the node between R1118 and R1122 is approximately 4.5 V. This voltage is determined by the 9.6 V supply, R1120, C1111, and the dual-time-constant network comprised of R1118, R1119, and CR1104.

With loss of signal, the greater the voltage across C1111, the longer it takes the node voltage (R1118 and R1122) to increase above 4.5 V, and thus the longer the SQUELCH DECISION signal remains high after loss of signal. Since C1111 charges through R1119 and CR1104, the SQUELCH DECISION detect time is very short. The integrator output is inverted by Q1104 and supplied as a CHANNEL ACTIVITY signal. This is a fast responding output signal that is used only in *Channel Scan* operation.

7.3 INTERCONNECT BOARD

The interconnect board contains seven connectors that connect the logic board/RF board subassembly to the audio board, front connector, programming jack, and the internal option board. Connectors labeled J18 and J19 are combined into one cable assembly.

The serial data signal is logically ANDed with the DISPLAY ENABLE signal. Therefore, data out is always low unless DISPLAY ENABLE is high. The line labeled DATA OUT is used to send serial display data to the control head. Switch data is clocked from the control head and is received on the DATA IN line.

7.4 CONTROL HEAD

MaraTrac radios use three types of control heads. The basic model, a non-display control head, uses rotary knobs to control VOLUME, MODE, and ZONE or SCAN selections. Mode selection is indicated by numbers (and zone letters, on some models) on the knob(s). The handheld model, a display-type control head, uses two seven-segment displays to indicate selected mode; it also contains the microphone circuitry. The advanced model, a display type control head, uses two seven segment displays to indicate selected mode.

All control heads use the CLOCK, DISPLAY ENABLE, and DATA IN lines to control data transmissions between the control head and the radio. Additionally, the handheld and advanced control heads use the DATA OUT line to receive display data from the radio. Both display data and switch/button data is shifted on the positive clock edge. The DISPLAY ENABLE line is used to control the state of the parallel/serial shift register in the control head. When DISPLAY ENABLE is low, the shift register operates in a parallel mode, reading the switch/button condition. When DISPLAY ENABLE goes high, the shift register latches the current switch condition and allows the data to be shifted serially to the radio.

8. Extender Field Test

The purpose of this test is to give field technicians the ability to verify extender functionality without using a pulse generator box (such as the TEK-47A or TEK-21). This test does not take the place of factory testing of the extender.

8.1 TEST EQUIPMENT

R2001D Motorola Communication System Analyzer or Equivalent.

8.2 TEST PROCEDURE

- (1) Ensure that the radio is turned off; then connect the RF generator output to the antenna port of the radio. Tune the RF generator to the receive (RX) frequency of the radio mode to be tested.
- (2) Adjust the RF output level from the R2001D to -47 dBm (1 millivolt).
- (3) Modulate the RF signal with 100% AM modulation at a frequency of 10 kHz. Use either tone A or B modulation from the R2001D with AM limit (RF Section) set to Minimum.
- (4) Locate the VAGC Test Point (see Figure 2) in the extender section of the RF board. Short the test point pad to ground using a small piece of wire soldered from the pad to the coil can (L352/L353) nearby.
- (5) Turn the radio on. The extender is in the "ON" state when the radio is turned on.
- (6) Observe the Extender Test Point (see Figure 2) with a 10:1 oscilloscope probe. Pulses at the repetition rate of 10 kHz should be seen.
- (7) Turn the extender off by depressing the monitor button on the control head for 3 to 4 seconds; listen for the three low-pitched tones. There should be no pulses at the test point. Turn the extender on again by depressing the monitor button on the control head for 3 to 4 seconds; listen for three high-pitched "beeps." The pulses should be seen at the test point.
- (8) Turn the radio off and remove the wire used in Step 4. This concludes the extender functionality test.

Note

If the Extender does not function as described above, replace the Low Band RF board.

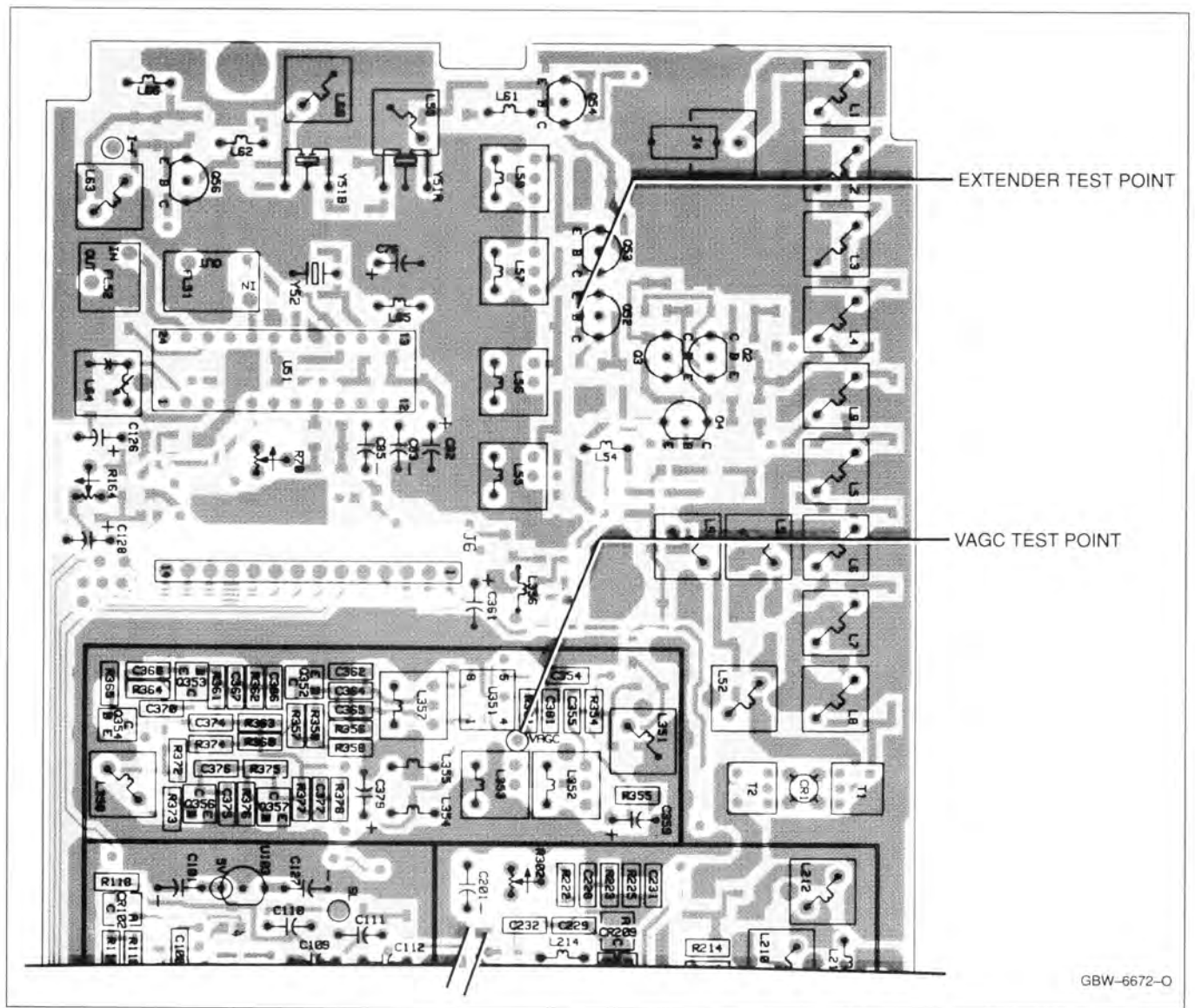
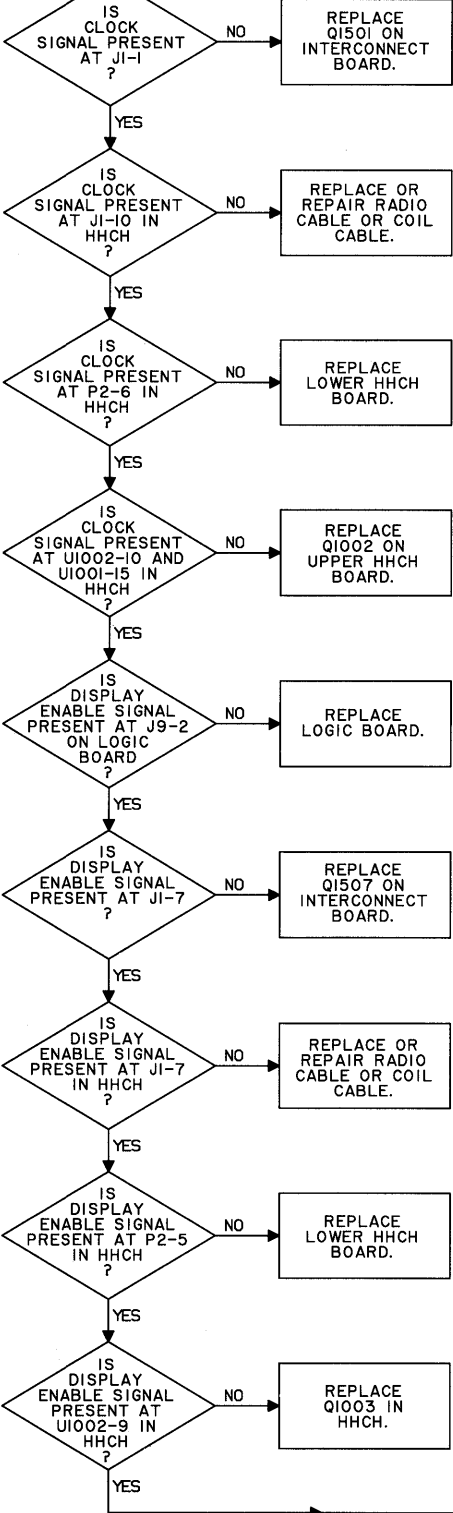
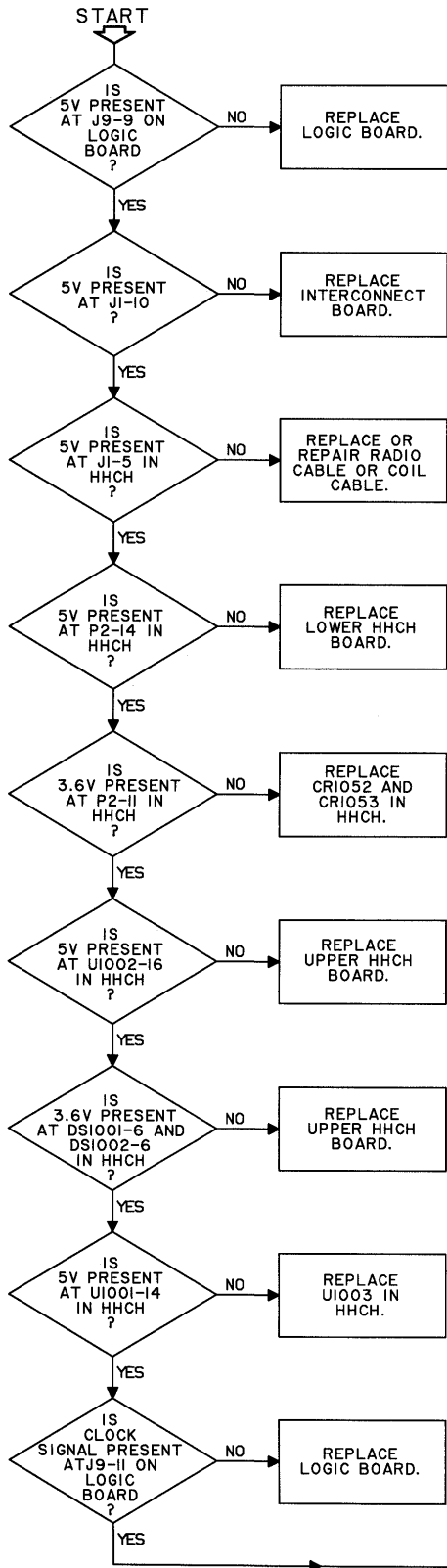
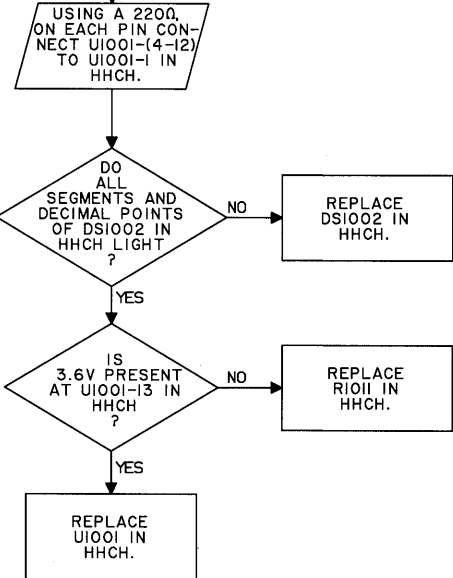
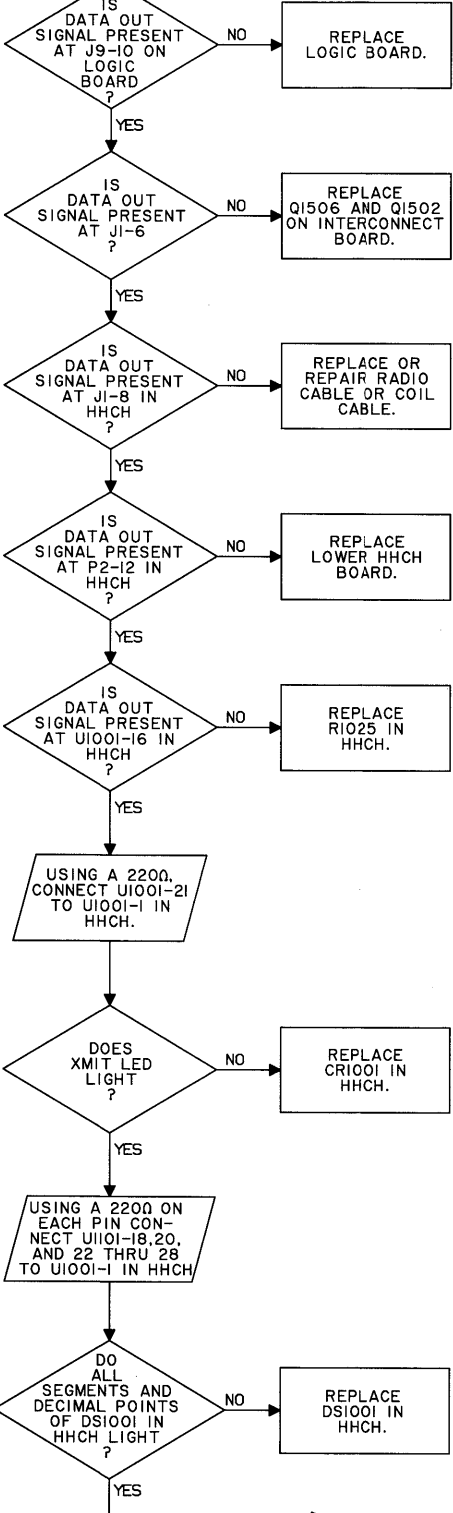
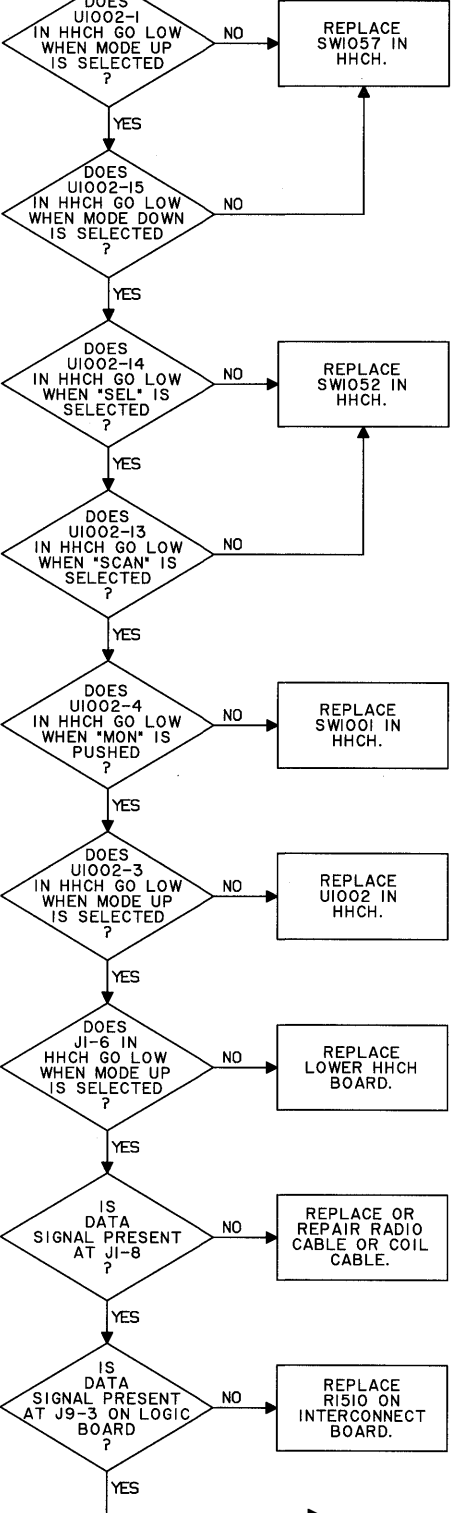


Figure 2. Extender Test Points

RADIO SYSTEM TROUBLESHOOTING CHART
(START ALL TROUBLESHOOTING HERE)



IMPROPER HHCH OPERATION



ERROR TONES CHART

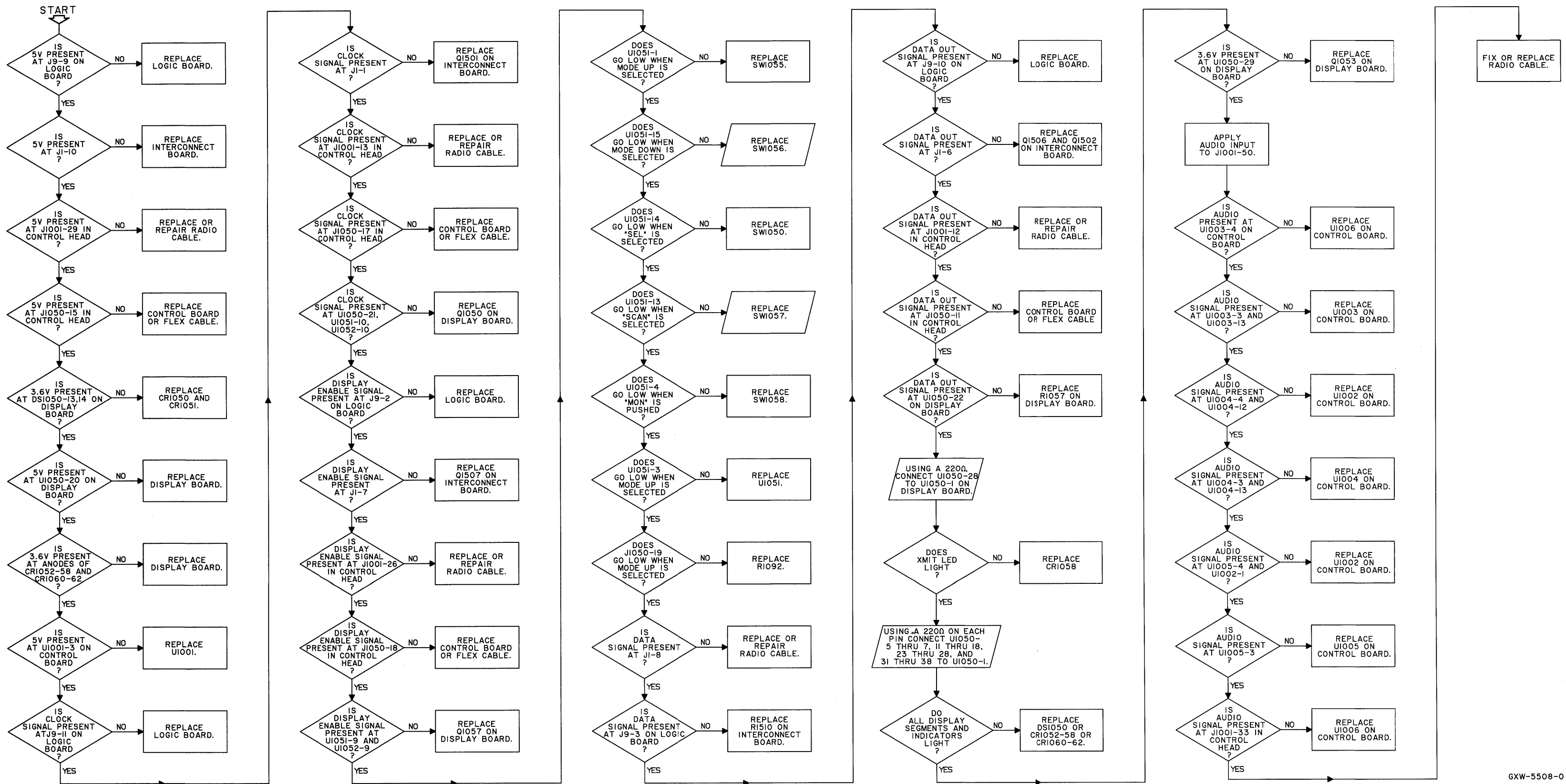
TONES SOUND IN SPEAKER AFTER INITIAL RADIO TURN ON:	
# BEEPS	PROBABLE FAILURE
2	INTERNAL EEPROM FAILURE
3	EXTERNAL EEPROM FAILURE
4	EXTERNAL ROM FAILURE
5	EXTERNAL RAM FAILURE
6	INTERNAL RAM FAILURE

GXW-5206-0

NOTE
1. AUDIO SIGNAL FOR TRANSMIT AUDIO TESTS SHOULD BE 1KHz AT 800mV RMS.

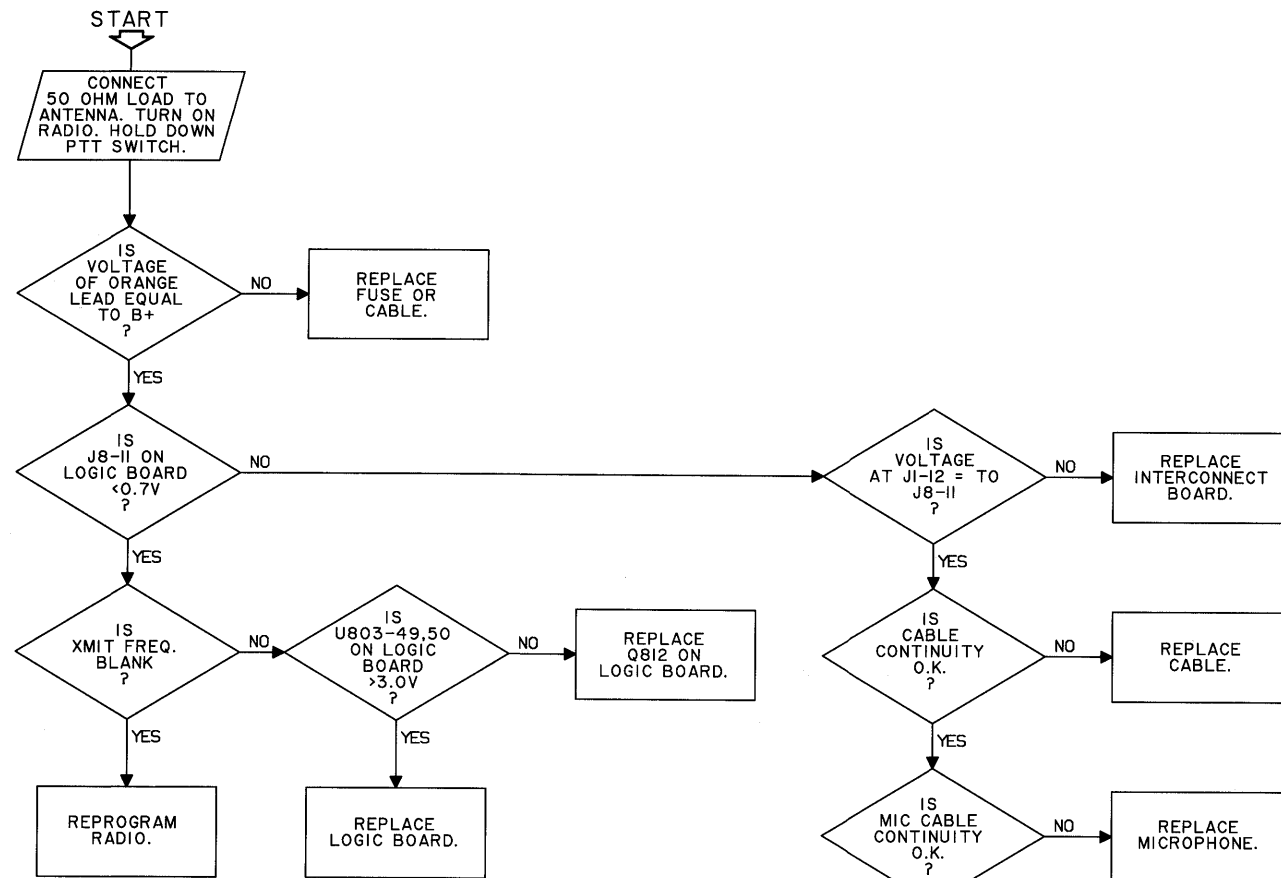
GXW-5204-0

IMPROPER ADVANCED CONTROL HEAD OPERATION

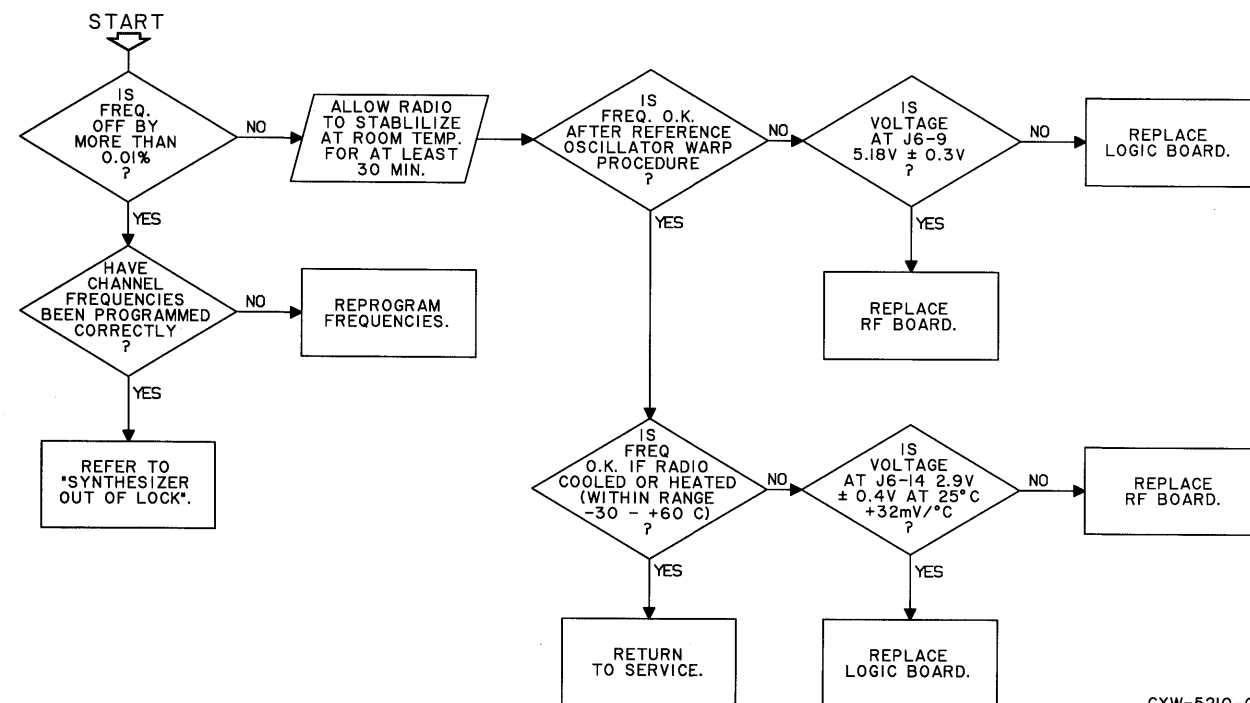


GXW-5508-0

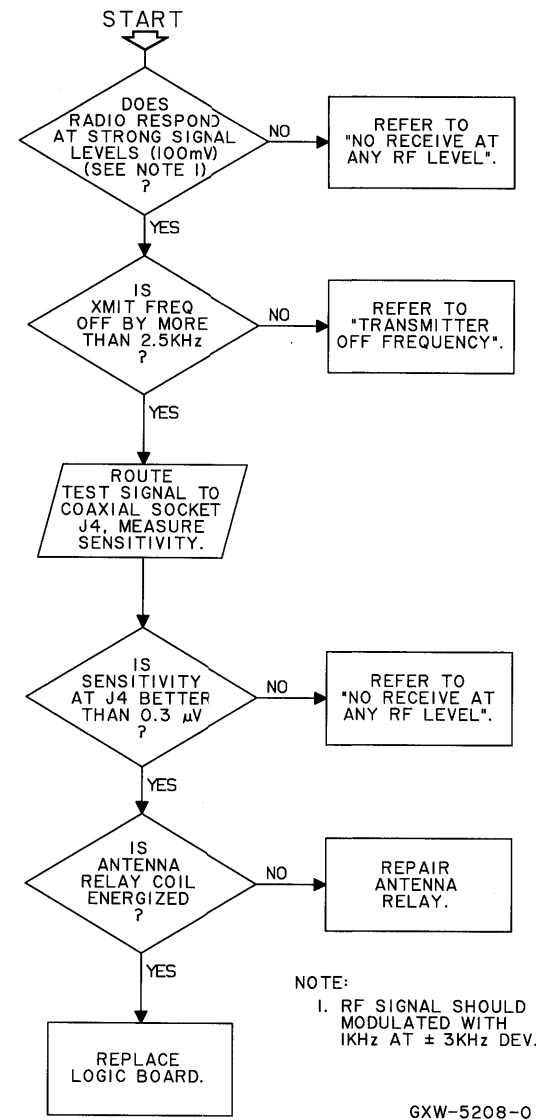
NO PTT



TRANSMITTER OFF FREQUENCY



POOR RECEIVER PERFORMANCE



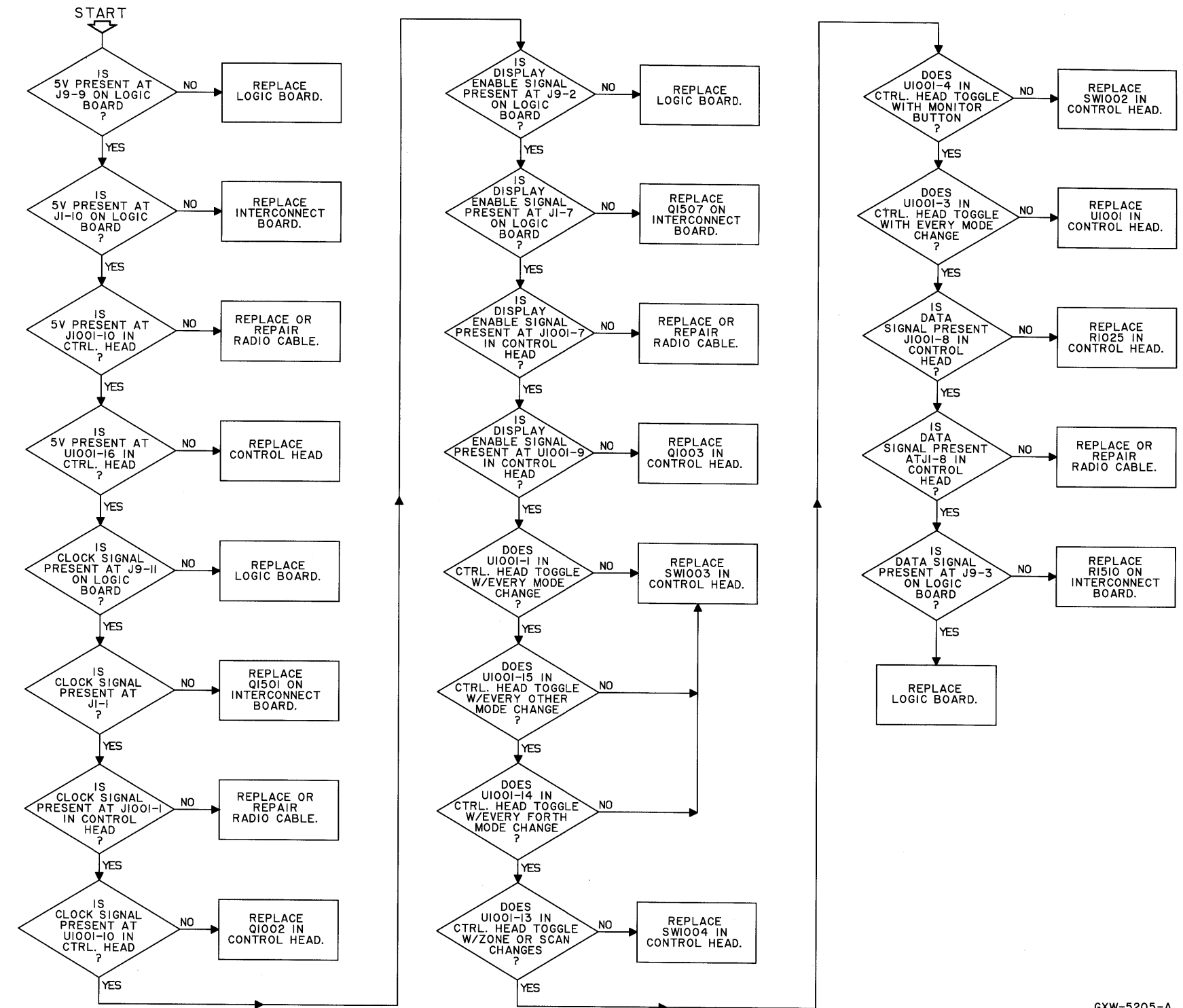
NOTE:
1. RF SIGNAL SHOULD MODULATED WITH 1KHz AT ± 3KHz DEV.

6XW-5208-0

6XW-5207-0

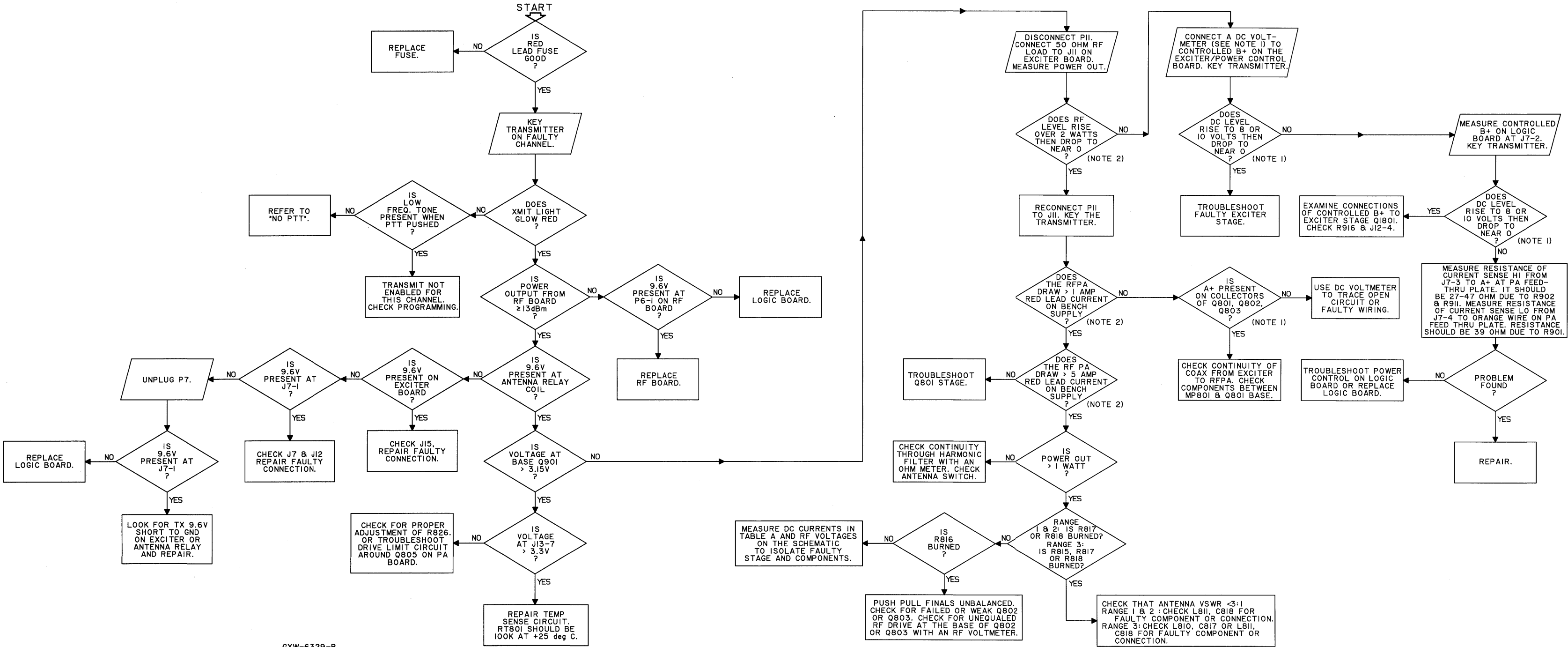
ABNORMAL CONTROL HEAD OPERATION

BASIC CONTROL-SEE SEPERATE CHART FOR HHCH OR ADVANCED CONTROL HEAD



6XW-5205-A

LOW TRANSMIT POWER

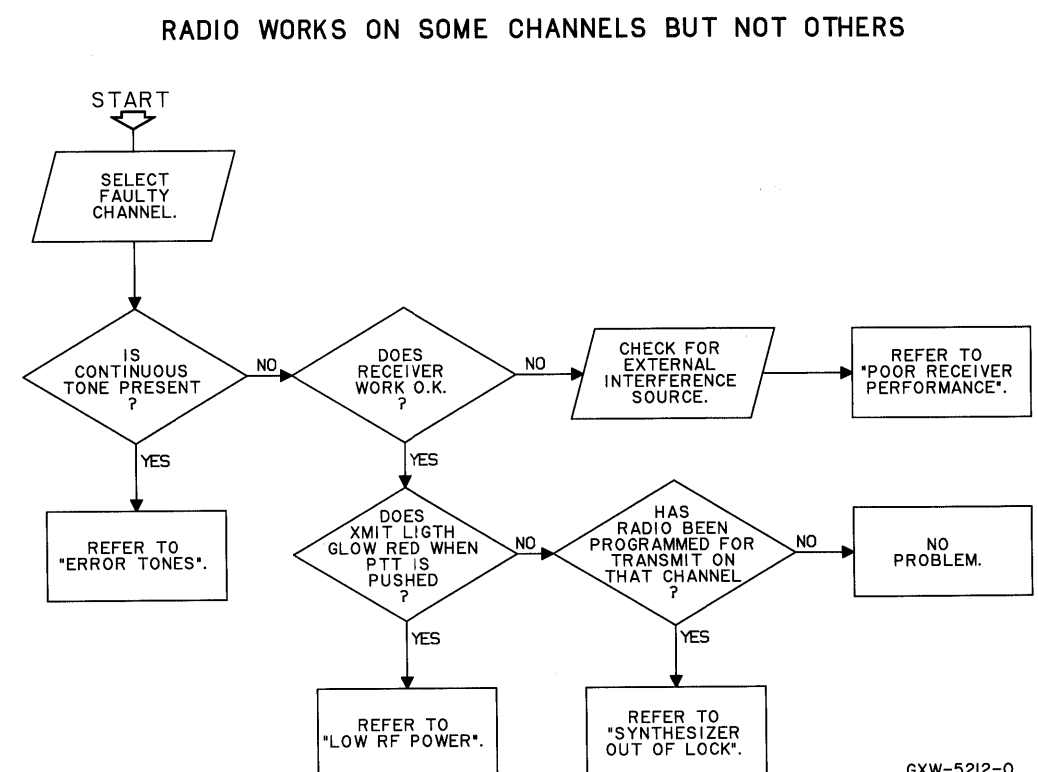
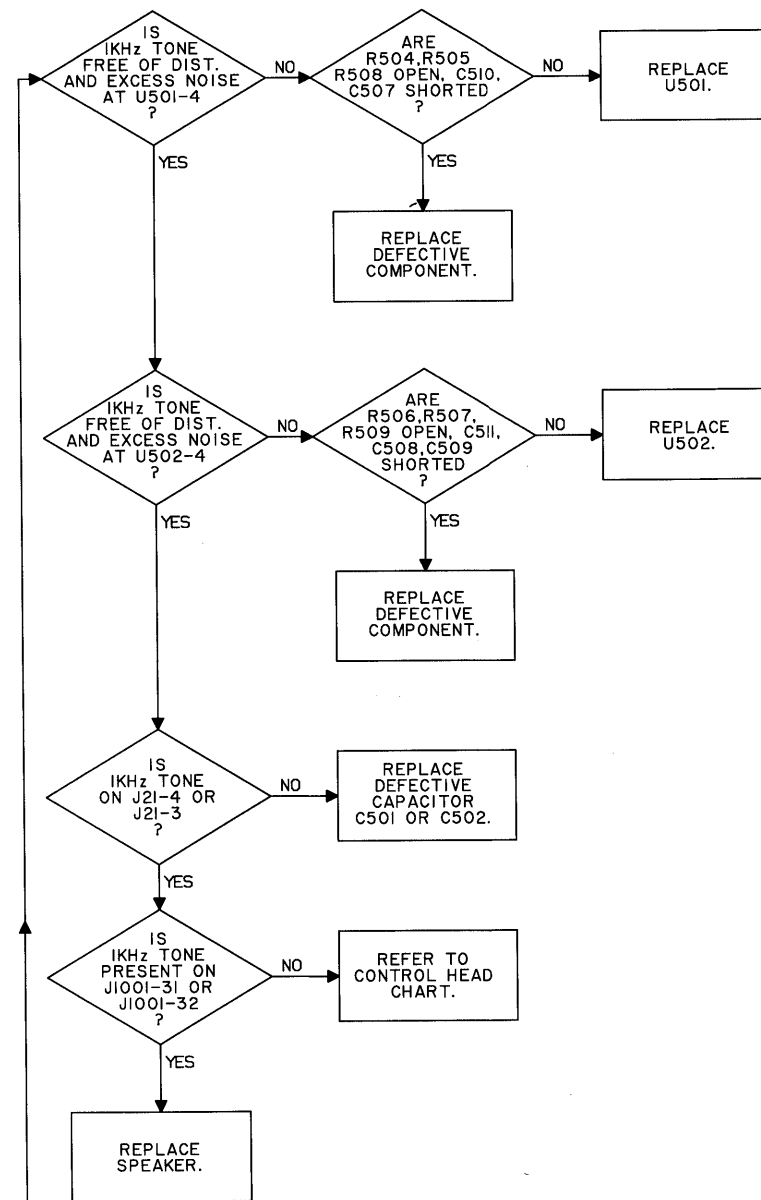
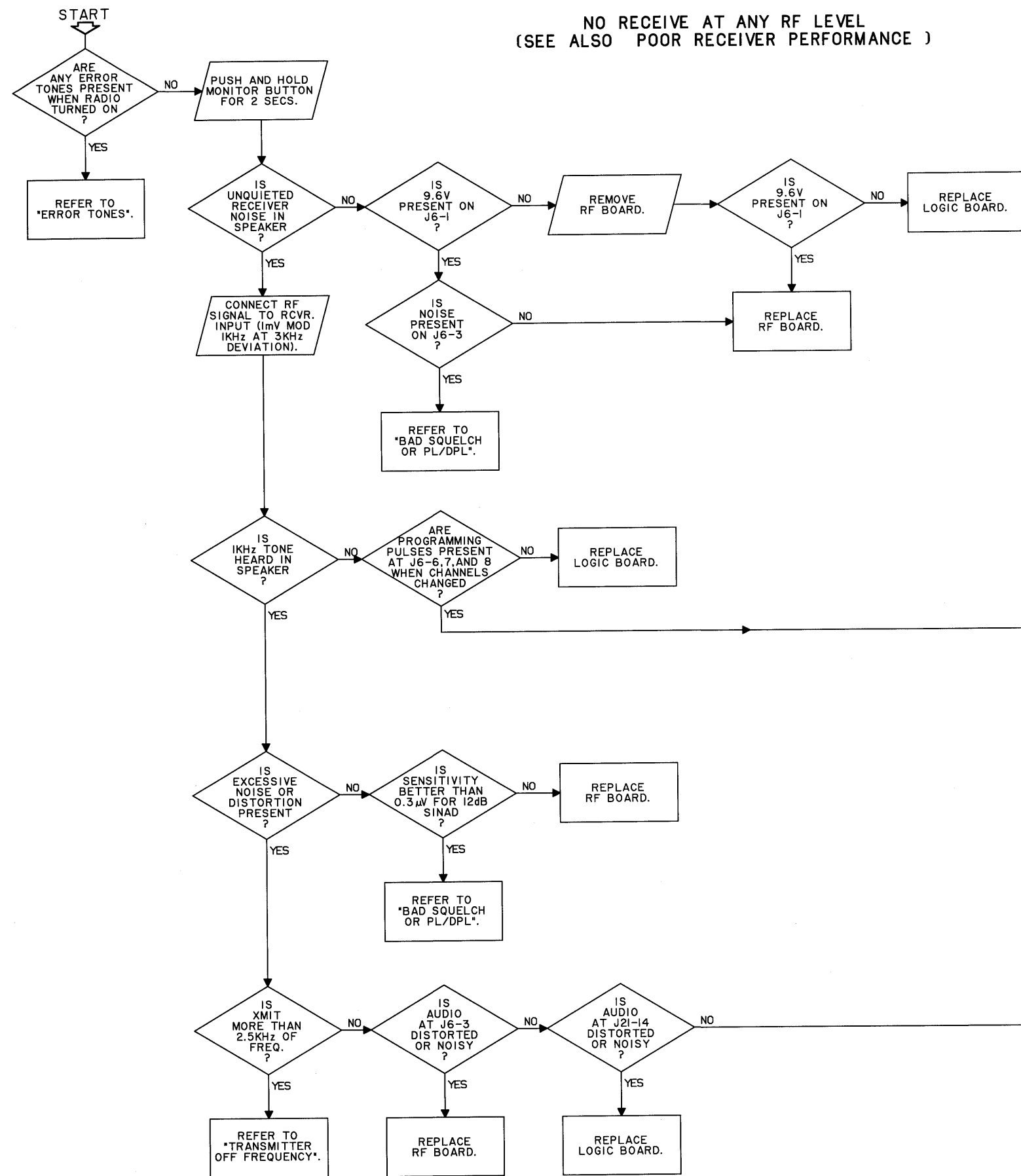


GXW-6329-B

TABLE A
DC CURRENT DRAW -- PA STAGES (SEE NOTE 2)

STAGE	CONNECT AMMETER IN SERIES WITH:	TYPICAL CURRENT DRAW (AMPS) AT 120 WATTS OUTPUT									
		RANGE 1			RANGE 2			RANGE 3			
Q801 Q802, Q803	L802 AND R812 R813	29.7 MHz	33 MHz	36 MHz	36 MHz	39 MHz	42 MHz	42 MHz	46 MHz	50 MHz	
		2.0 16-19	1.9 15-19	1.8 16-19	2.4 15-18	2.2 15-19	2.2 16-20	2.9 17-21	2.3 17-21	1.7 17-19	

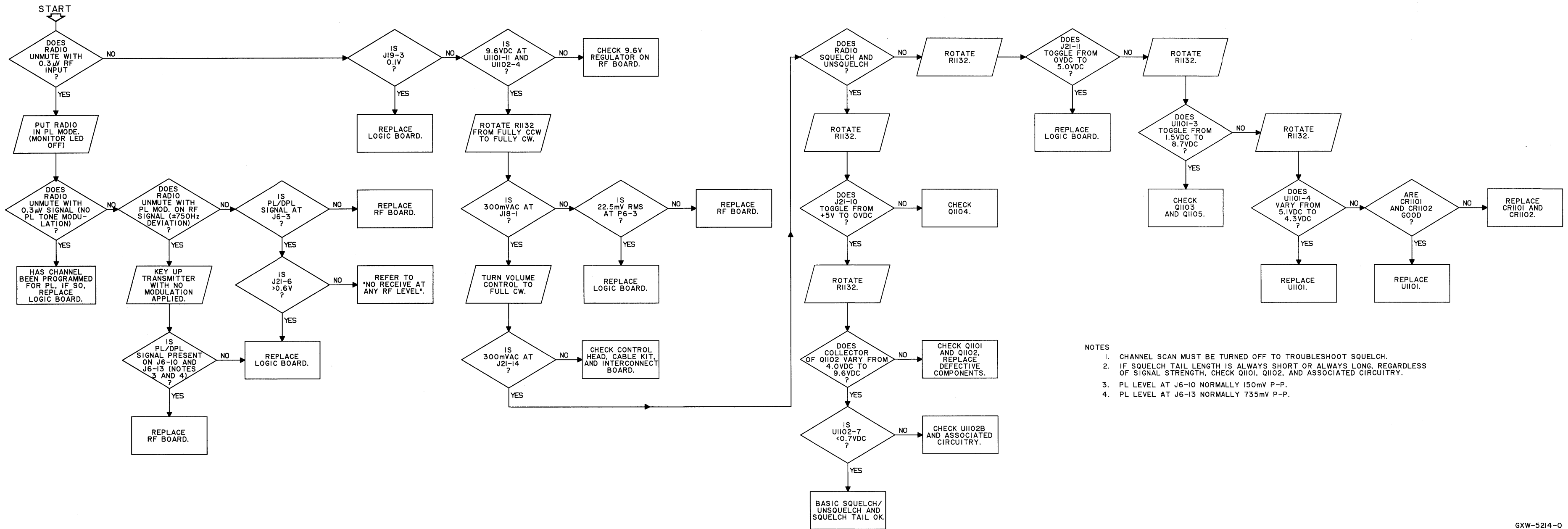
- NOTES:
- USE SIMPSON MODEL 260 OR EQUIVALENT. SOME DVM'S MAY GIVE ERRONEOUS DISPLAY IN THE PRESENCE OF HIGH POWER RF.
 - IF MEASUREMENT CANNOT BE TAKEN BEFORE CONTROLLED B+ DROPS TO NEAR ZERO, DISCONNECT J12-4 AND SUPPLY 6 VOLTS TO THE EXCITER BOARD AT J12-4.



GXW-5209-0

BAD SQUELCH OR PL/DPL

SEE NOTES 1 AND 2.

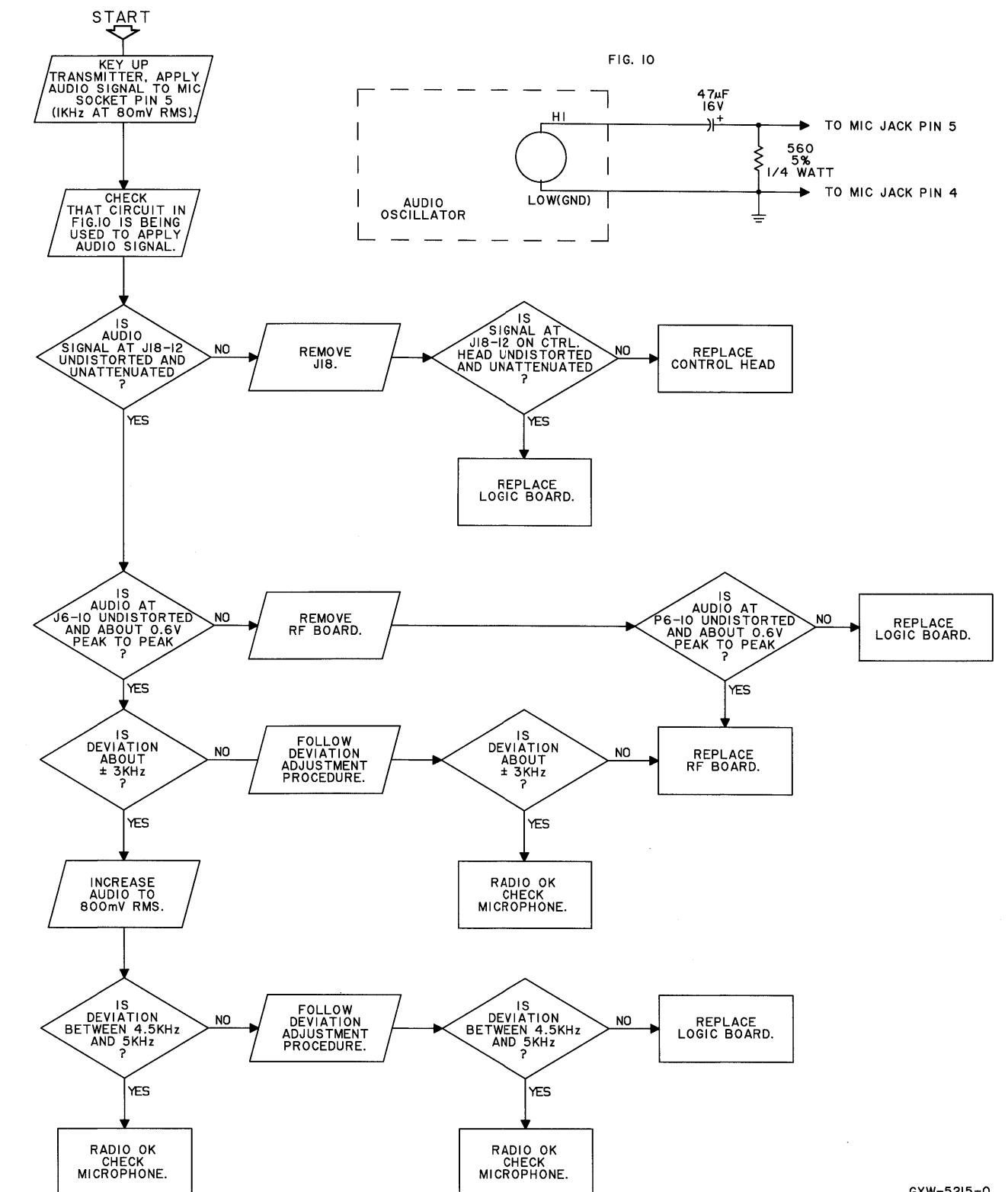
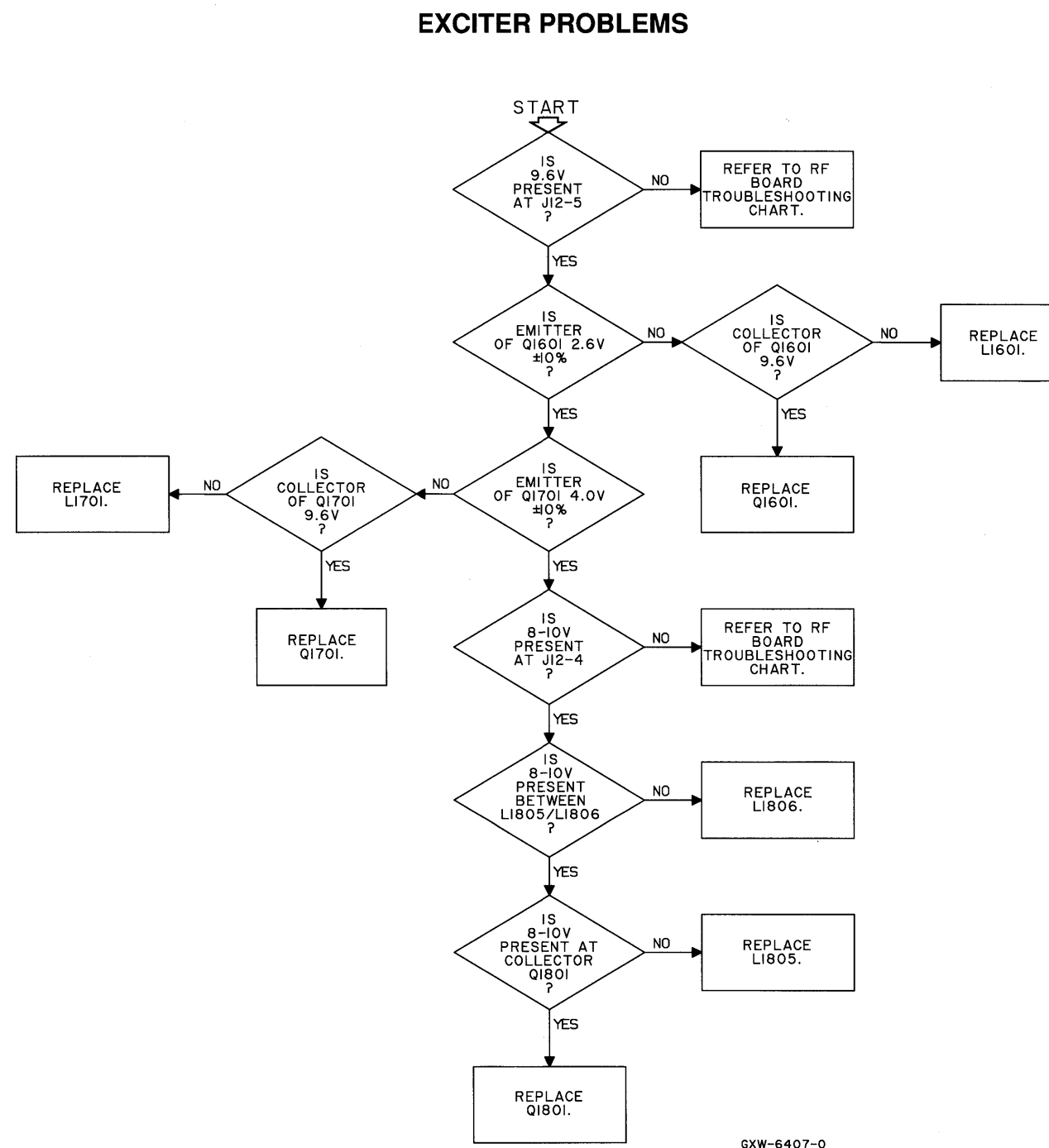


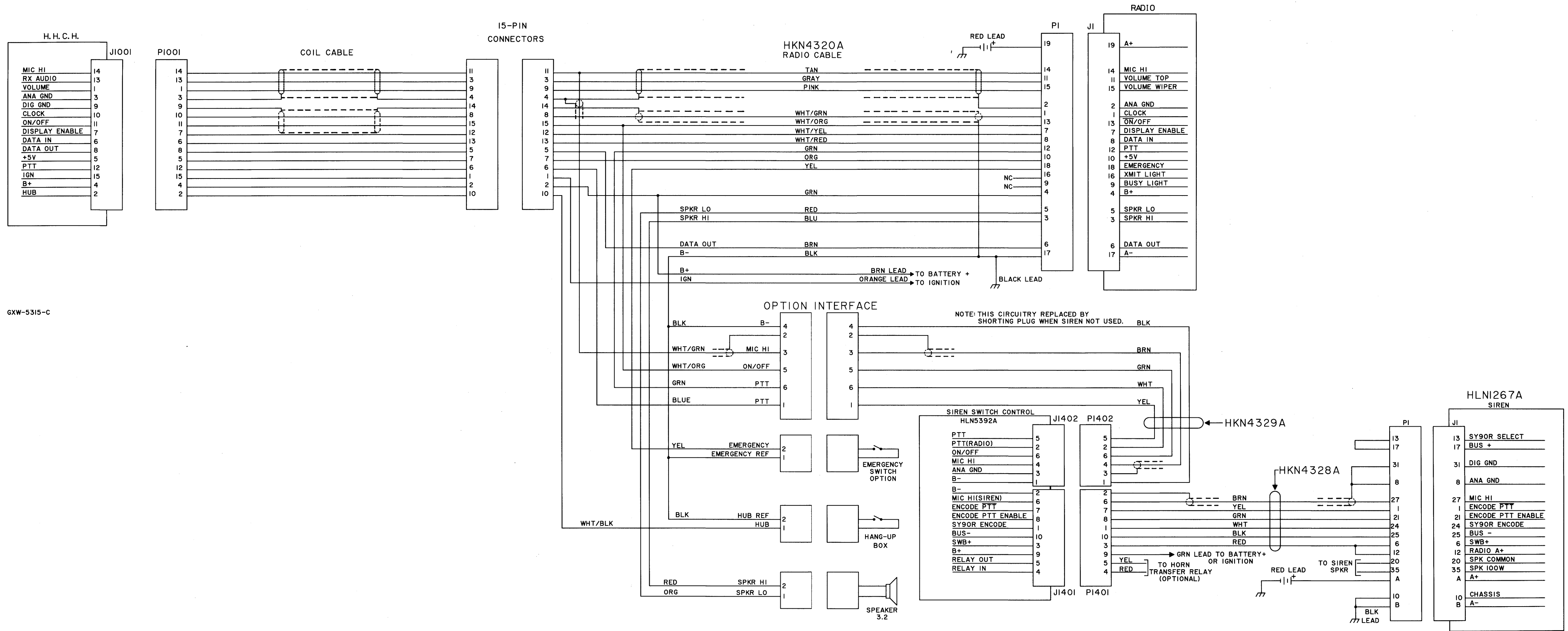
NOTES

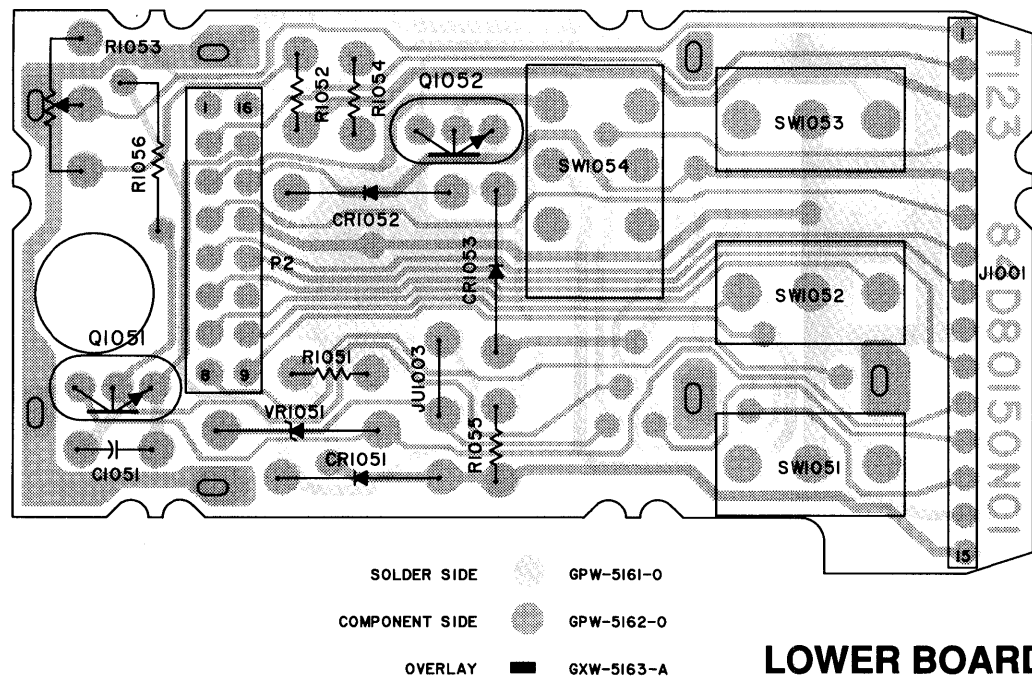
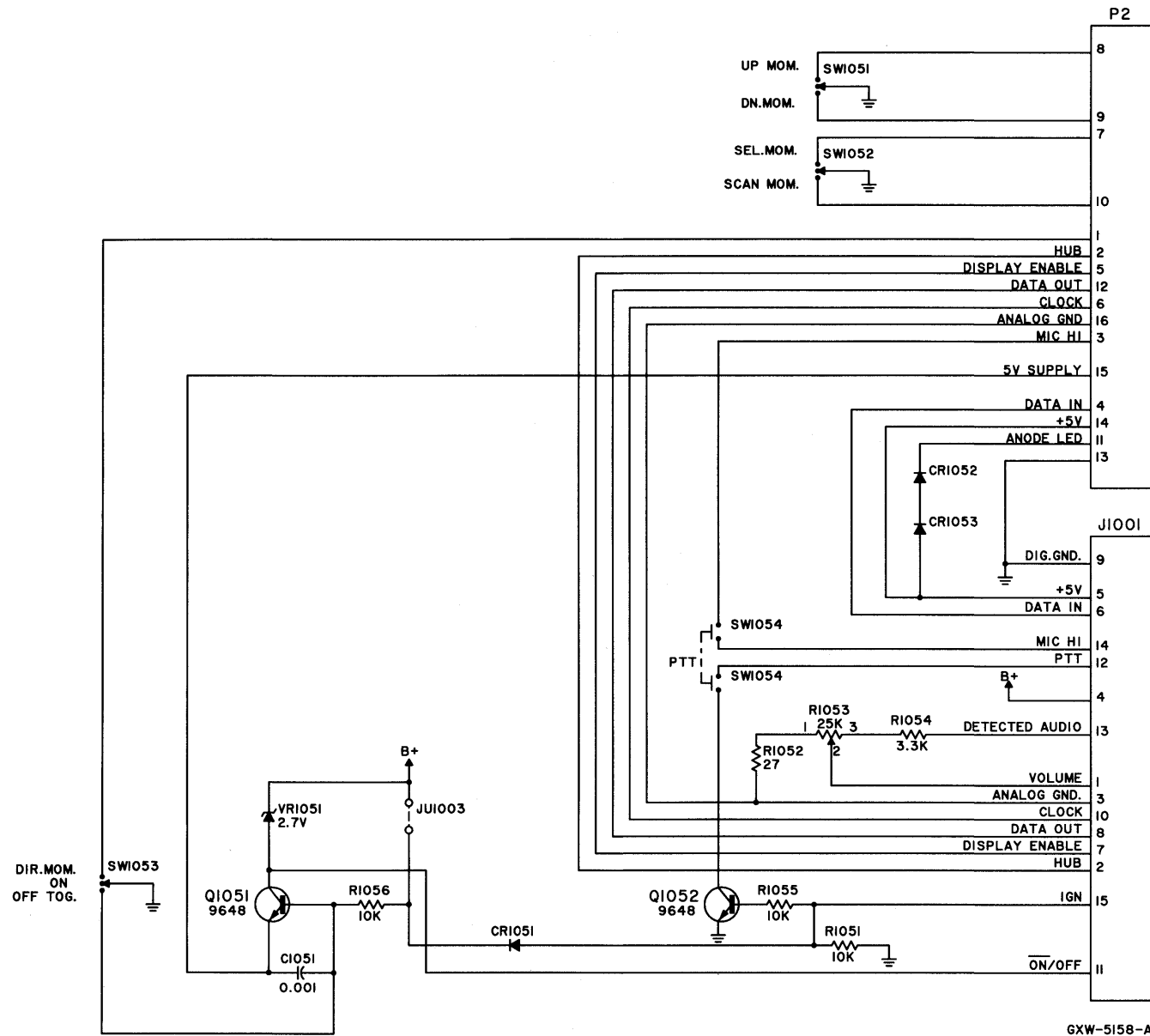
1. CHANNEL SCAN MUST BE TURNED OFF TO TROUBLESHOOT SQUELCH.
2. IF SQUELCH TAIL LENGTH IS ALWAYS SHORT OR ALWAYS LONG, REGARDLESS OF SIGNAL STRENGTH, CHECK Q1101, Q1102, AND ASSOCIATED CIRCUITRY.
3. PL LEVEL AT J6-10 NORMALLY 150mV P-P.
4. PL LEVEL AT J6-13 NORMALLY 735mV P-P.

GXW-5214-0

BAD TRANSMIT MODULATION







LOWER BOARD

parts list

HCN1051A Handheld Control Head (99F)

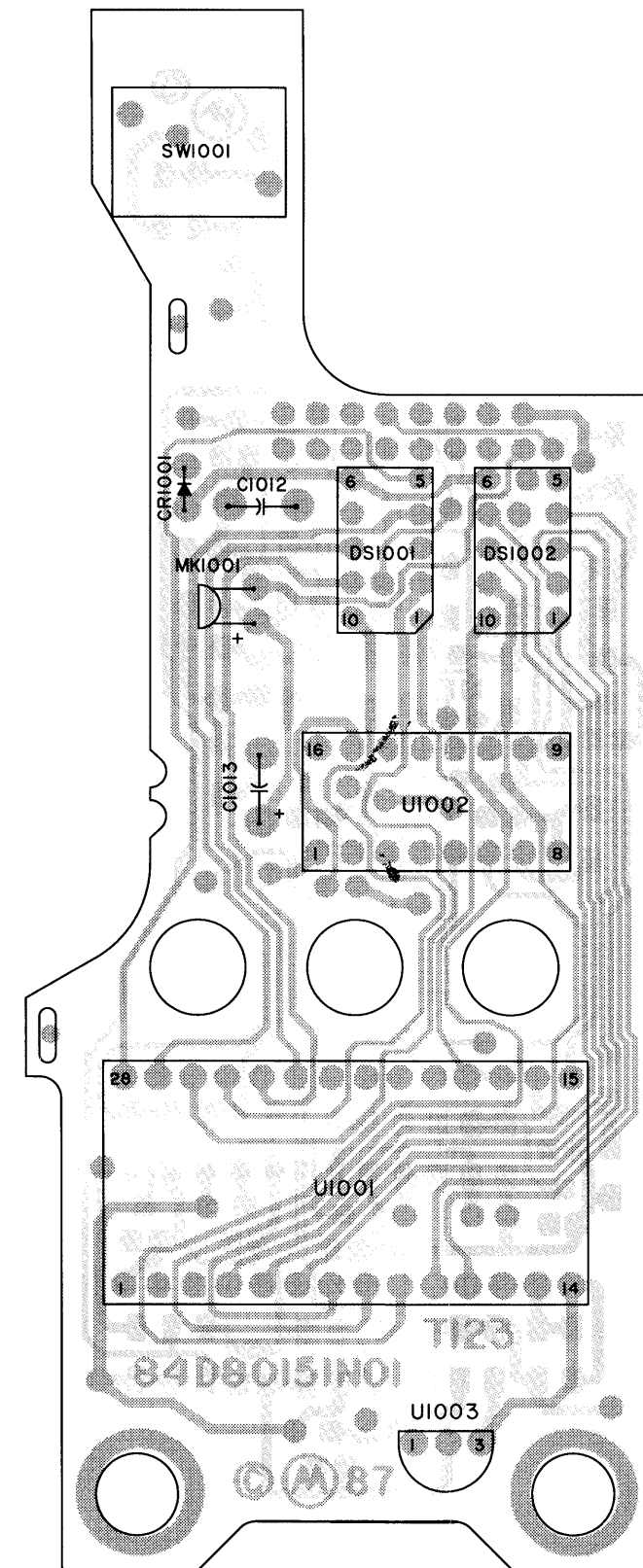
MXW-5160-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, uF, $\pm 10\%$, 50V (unless otherwise stated)		
C1001-1007	21-13741N69	.100
C1008,1009	21-13741N21	.001
C1010	21-13741N69	.100
C1011	21-13741N21	.001
C1012	23-84538G05	10, 25V, tantalum
C1013	23-84538G03	.1, $\pm 20\%$, 35V, tantalum
C1014-1017	21-13741N21	.001
C1018,1019	21-13741N69	.100
C1051	08-11051A01	.001, $\pm 5\%$, 63V
diode (see note)		
CR1001	48-05504C01	LED
CR1051	48-11034A01	silicon
CR1052,1053	48-82466H18	silicon
Indicator		
DS1001,1002	48-80187G05	LED, 7 segment
connector receptacle		
J1	28-80195N01	male, 15-pin right angle
J2	09-80196N01	male, 16-pin
MK1001	50-80258E04	mic cartridge
Jumper		
JU1003	06-11009F23	0 ohm resistor
connector plug		
P2	28-80085E32	male, 16-pin
transistor (see note)		
Q1001-1003	48-80141L04	NPN
Q1051,1052	48-11043C07	NPN
resistor, fixed, ohm, $\pm 5\%$, 1/8 watt (unless otherwise stated)		
R1001-1010	06-11077A98	10k
R1011	06-11077A90	4.7k
R1012-1013	06-11077A98	10k
R1014	06-11077A90	4.7k
R1015,1016	06-11077A74	1k
R1017	06-11077A90	4.7k
R1018	06-11077A98	10k
R1019	06-11077A90	4.7k
R1020	06-11077A74	1k
R1021	06-11077A82	2.2k
R1022	06-11077A74	1k
R1023	06-11077B23	100k
R1024	06-11077A38	33
R1025	06-11077A74	1k
R1051	06-11009E73	10k
R1052	06-11009E11	27
R1054	06-11009E61	3.3k
R1055,1056	06-11009E73	10k
switch		
SW1001	40-80067H01	push button
SW1051,1052	40-80123H01	toggle
SW1053	40-80123H06	toggle
SW1054	40-80065E01	push button
Integrated circuit (see note)		
U1001	51-80135C08	LED display driver
U1002	51-84887K36	shift register, 8 BIT static
U1003	51-84621K27	regulator, 5V
voltage regulator (see note)		
VR1001-1007	48-80140L06	5.1V zener
VR1008	48-80140L07	5.6V zener
VR1009,1011	48-80140L06	5.1V zener
VR1012	48-80140L17	12V zener
VR1051	48-11034A23	2.7V zener

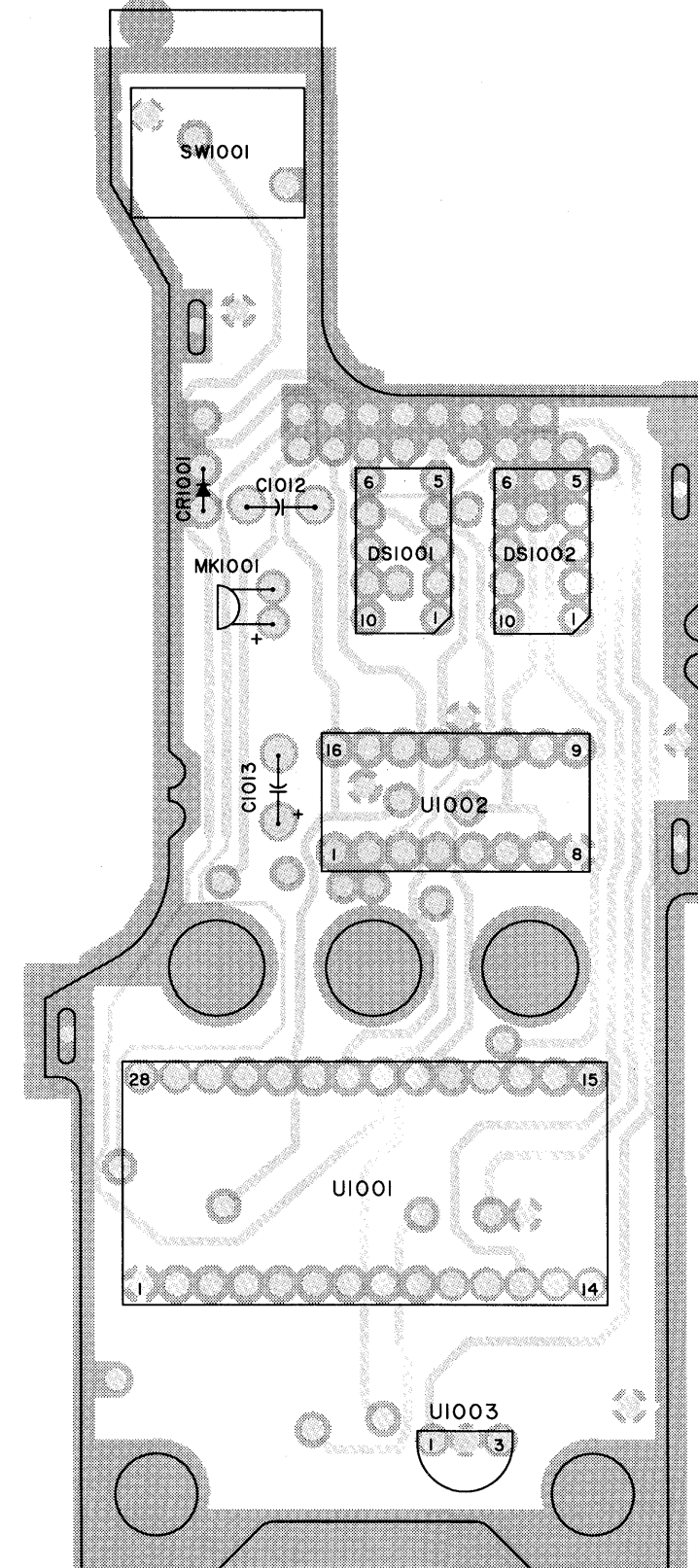
note: For best performance, order diodes, transistors, and integrated-circuit devices by Motorola part number.

6/30/89

UPPER BOARD

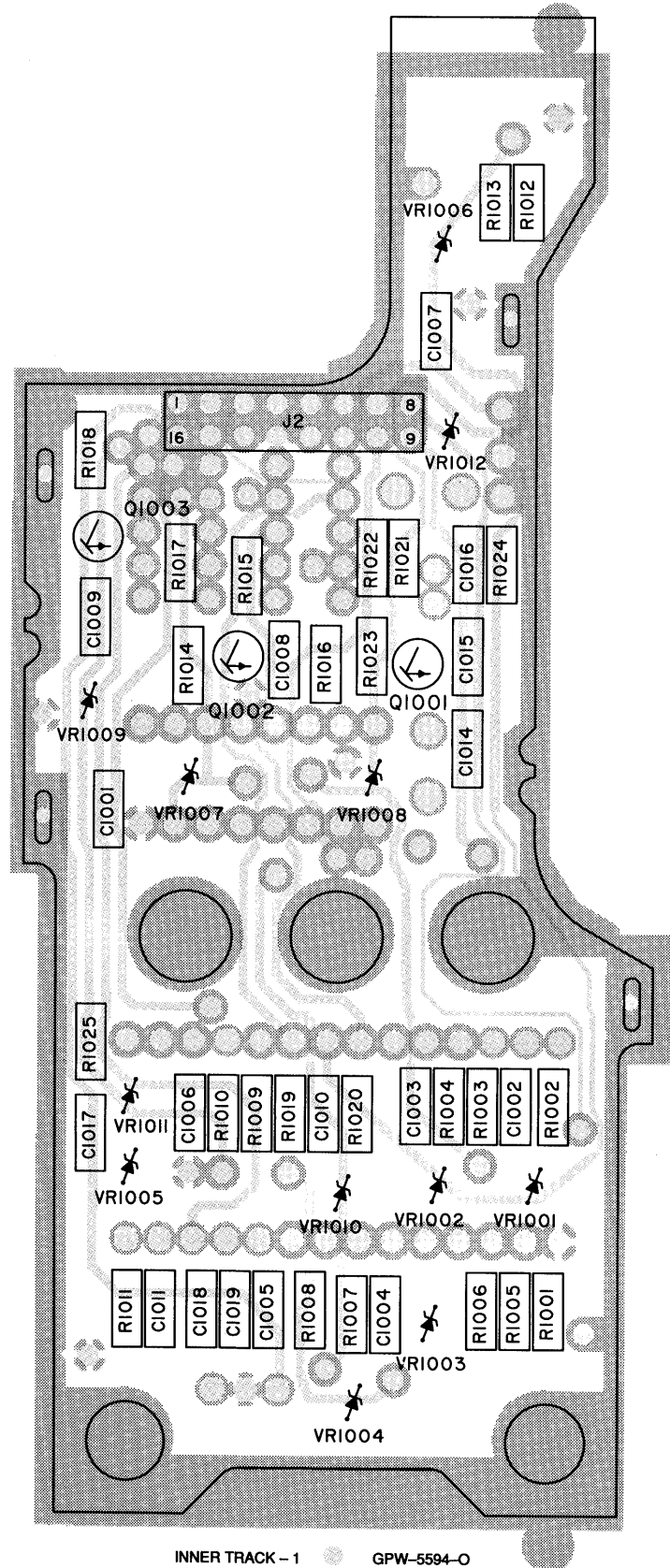


COMPONENT SIDE

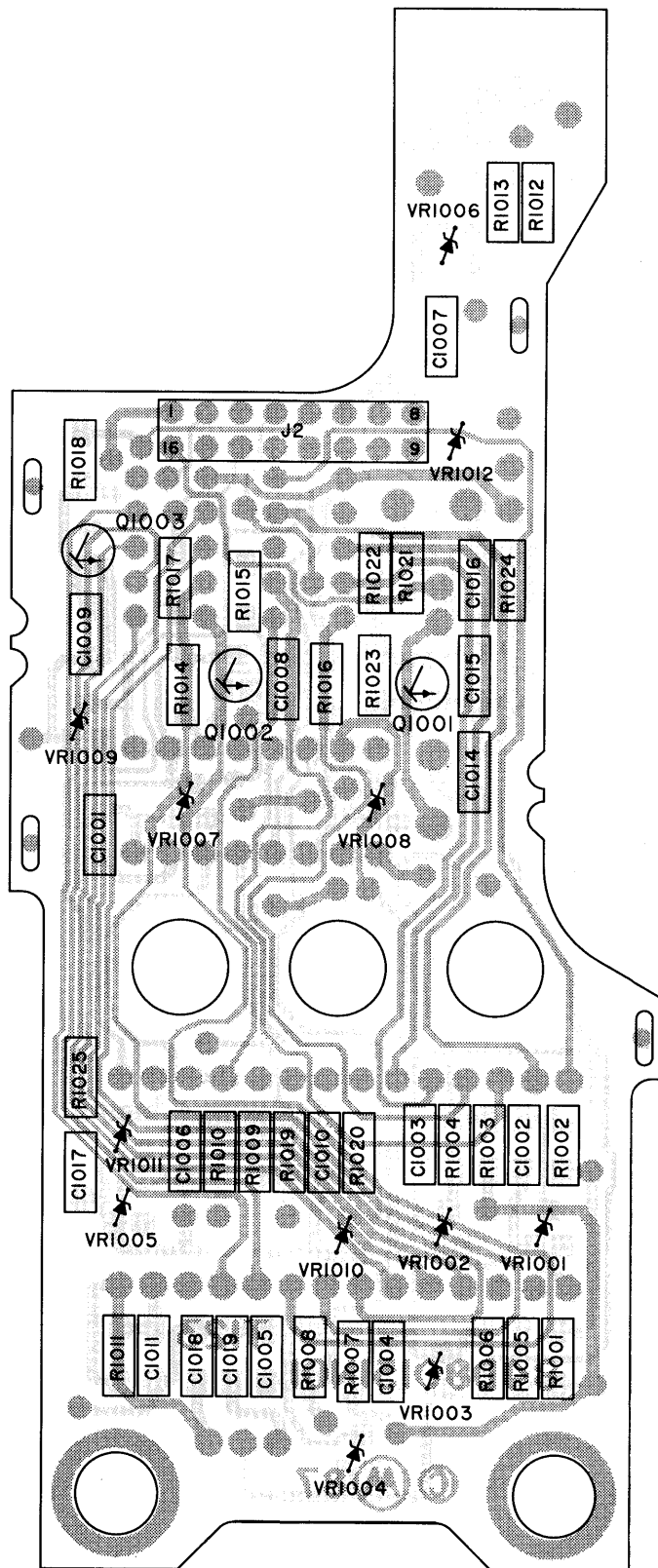


COMPONENT SIDE

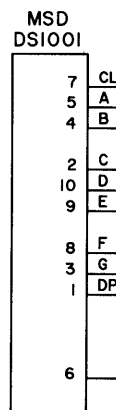
UPPER BOARD



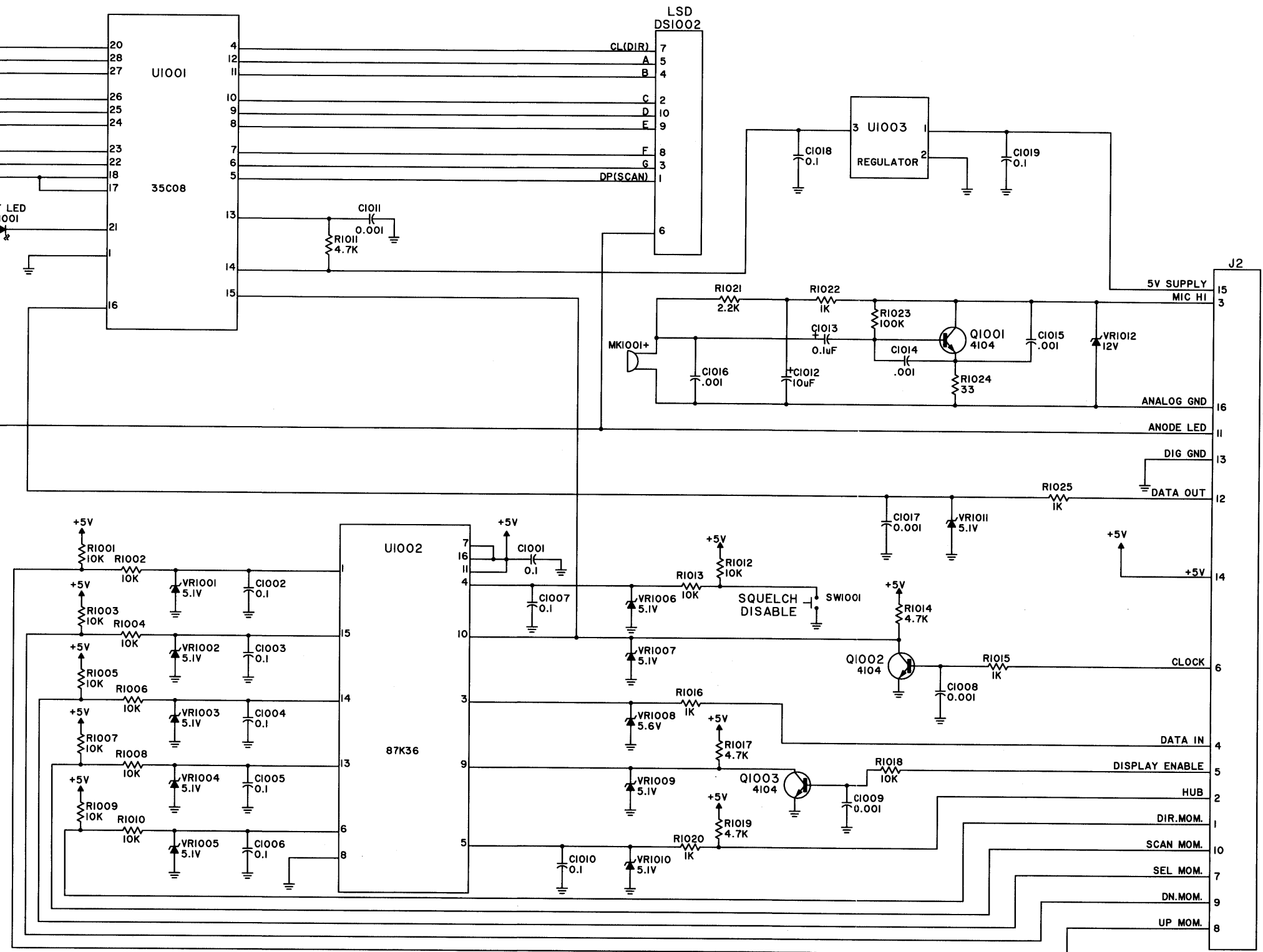
INNER TRACK - 1 GPW-5594-0
INNER TRACK - GND GPW-5595-0
OVERLAY GXW-5166W02-0



SOLDER SIDE GPW-5164-0
COMPONENT SIDE GPW-5165-0
OVERLAY GXW-5166W02-0



GXW-5157-0



parts list

HCN4037A Basic Control Head w/Talkaround (16F)
HCN4038A Basic Control Head w/Scan & Talkaround (8F)
HCN4033A Basic Control Head w/Scan (8F)
HCN4034A Basic Control Head (16F)

MXW-5150-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, uF ±10% 50V (unless otherwise stated)		
C1003-1009	21-13741N69	.100
C1010	23-11019A20	10, ±20%, 25V electrolytic
C1011	21-13741N69	.100
C1012,1013	21-13741N21	.001
C1014,1015	21-13741N69	.100

indicator		
DS1001-1003	65-80284N01	incandescent lamp
connector receptacle		
J104-106	09-80051B01	female, 2-contact, lamp socket
J1002	28-84324M01	male, 2-pin

jumper		
JU1001,1003	06-11077A01	0 ohm
transistor (see note)		
Q1001-1006	48-80141L04	NPN

resistor, fixed, ohm, ± 5%, 1/8 watt (unless otherwise stated)		
R1002	06-11077A86	3.3k
R1003-1004	06-11077A98	10k
R1005	06-11077A90	4.7k
R1006	06-11077A74	1k
R1007,1008	06-11077A98	10k
R1009	06-11077A36	27
R1010	06-11077A90	4.7k
R1011-1020	06-11077A98	10k
R1021	06-11077A74	1k
R1022	06-11077A98	10k
R1023	06-11077A74	1k
R1024	06-11077A98	10k
R1025,1026	06-11077A74	1k
R1027	06-11077A90	4.7k
R1028	06-11077A98	10k
R1029	06-11077A60	270
R1030,1031	06-11077A98	10k

switch		
SW1001	18-80126A03	potentiometer, 25k, ±30%, .16W
SW1002	40-80127A03	push button
SW1003	40-80166N01	rotary 8 position
SW1004	40-80166N02	rotary 2 position

integrated circuit (see note)		
U1001	51-84887K36	8 bit shift register

voltage regulator (see note)		
VR1001	48-80140L06	1.5V zener
VR1002	48-80140L07	5.6V zener
VR1003-1010	48-80140L06	5.1V zene

note: For best performance, order diodes, transistors, and intergrated circuit devices by Motorola part number.

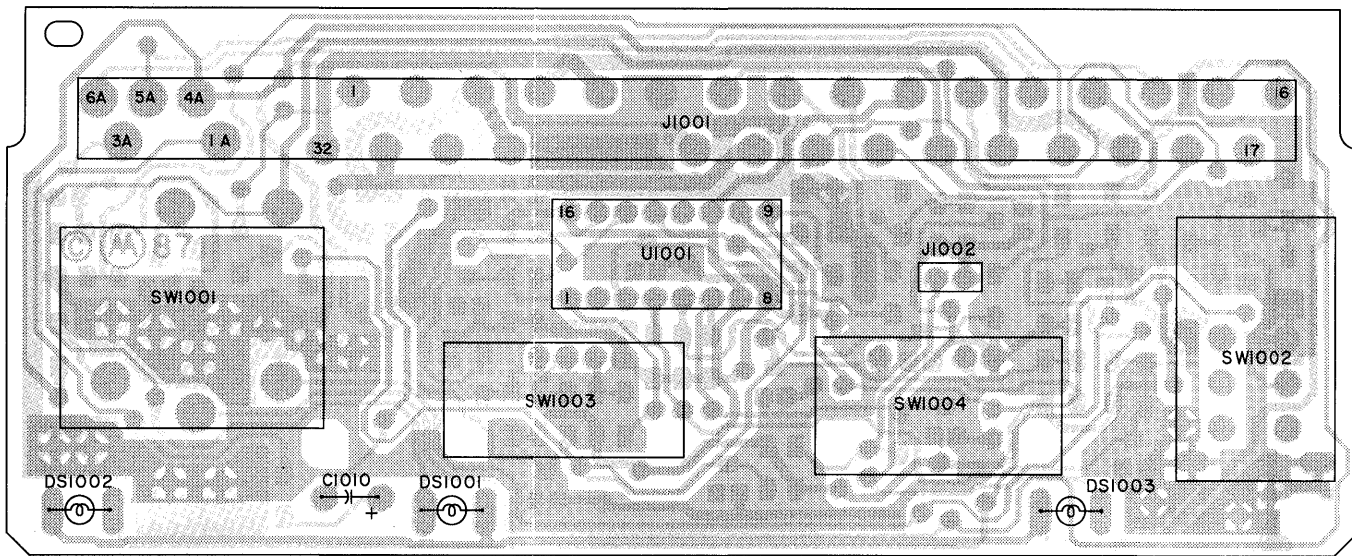
6/30/89

Schematic, Circuit Board Diagram, and Parts List for
HCN4033A, HCN4034A, HCN4037A, HCN4038A for
Control Head (Clam Shell)

PW-5271-C

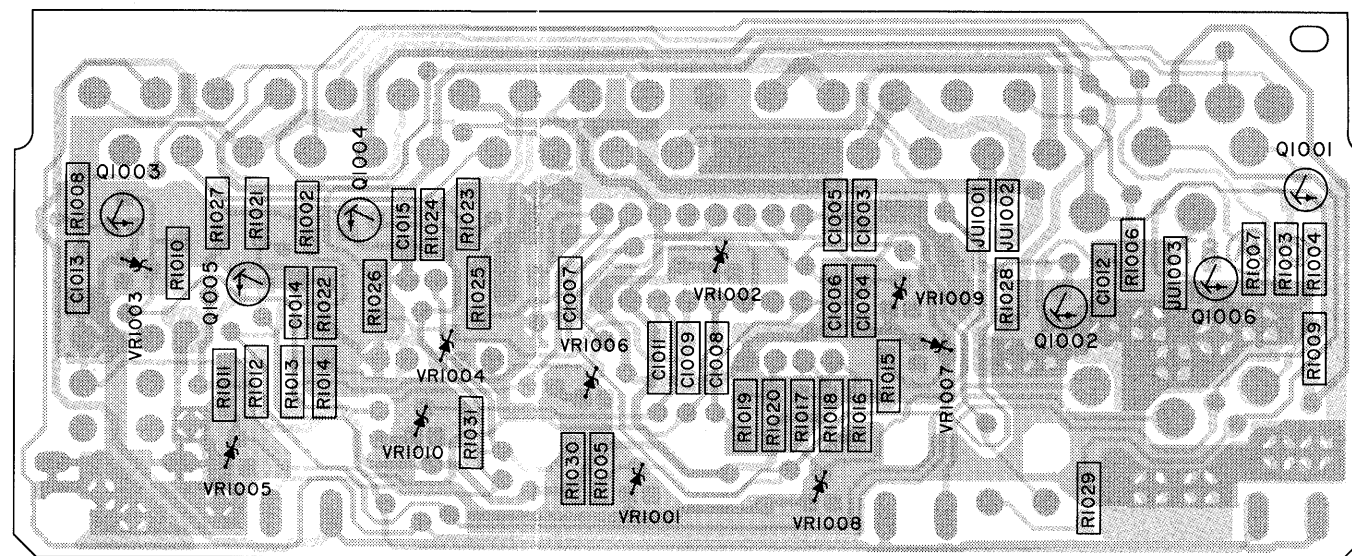
(Sheet 1 of 2)

6/30/89



SOLDER SIDE GPW-5154-0
COMPONENT SIDE GPW-5155-0
OVERLAY GXW-5156W01-0

COMPONENT SIDE



SOLDER SIDE GPW-5154-0
COMPONENT SIDE GPW-5155-0
OVERLAY GXW-5156W02-0

SOLDER SIDE

JUMPER TABLE

JU1001	JU1002	JU1003	SYSTEM OPERATION
IN	IN	*	RECEIVE AUDIO IS ROUTED TO BOTH EXTERNAL SPEAKERS AND HANDSET.
IN	OUT	*	RECEIVE AUDIO IS ROUTED TO HANDSET AND AUDIO TO EXTERNAL SPEAKER IS SWITCHED VIA HANG UP BOX.
OUT	IN	*	RECEIVE AUDIO IS ROUTED TO EXTERNAL SPEAKER AND AUDIO TO HANDSET IS SWITCHED VIA HANG UP BOX.
OUT	OUT	*	RECEIVE AUDIO IS SWITCHED BETWEEN EXTERNAL SPEAKER AND HANDSET VIA HANG UP BOX.
*	*	OUT	IGNITION LEAD IS ENABLED AND CONTROLS BOTH RX AND TX.
*	*	IN	IGNITION LEAD ONLY CONTROLS TX.

* = DON'T CARE

SW1003

MODE SWITCH POSITION	U1001		
	PIN 1	PIN 15	PIN 14
1	5V	5V	5V
2	0V	5V	5V
3	5V	0V	5V
4	0V	0V	5V
5	5V	5V	0V
6	0V	5V	0V
7	5V	0V	0V
8	0V	0V	0V

- NOTES:
- 1.THE ZONE SWITCH IS USED FOR SCAN ON/OFF ON THE SCAN CONTROL HEAD.
 - 2.WHEN DISPLAY ENABLE (PIN 7 OF J1001) IS HIGH (>3.5V) THEN U1001 OPERATES AS A SHIFT REGISTER AND THE LATCHED DATA IS SHIFTED ON THE POSITIVE EDGES AT PIN 10 OF U1001.
WHEN DISPLAY ENABLE IS LOW, U1001 READS THE CURRENT SWITCH POSITIONS.
 - 3.UNLESS OTHERWISE INDICATED CAPACITOR VALUES ARE EXPRESSED IN uF; RESISTOR VALUES ARE EXPRESSED IN OHMS.

GXW-5149-0

BASIC CONTROL HEAD

J1001

IGNITION	20
B+	19
MIC HI	14
RX AUDIO	11
VOLUME	15
ANALOG GND	21
N.C.	2
CLOCK	1

+5V	10
PTT	12
DATA IN	8
XMIT LIGHT	16
ON/OFF	13
EMERGENCY	18
DISPLAY ENABLE	7
BUSY LIGHT	9
B+	4
SPKR HI	3
SPKR LO	5
DATA OUT-DIG GND	6
CHASSIS	17

ON/OFF	22
ANALOG GND	30

HUB REF	27
HUB	24

EMERGENCY REF	28
EMERGENCY	23
SPKR LO	32
SPKR HI	31
SPKR AUDIO HI	29
HUB SWITCH	25
HANDSET AUDIO	26

PTT	6A
PTT REF	3A
AUDIO	1A
GND	4A
MIC HI	5A

P1001

20	ORANGE LEAD	→ TO IGNITION
19	GREEN LEAD	→ TO BATTERY +

14	BLK/YEL	14
11	BLK/BRN	11
15	BLK/GRN	15
21		
2		2
1	BRN	1
10	BLK	10
12	BLK/RED	12
8	GRY	8
16	BLK/BLU	16
13	BLK/ORG	13
18	BLK/GRY	18
7	VIO	7
9	WHT	9
4	YEL	4
3	ORG	3
5	GRN	5
6	BLU	6
17	BLK/VIO	17

22		
30		→ TO SIREN

27		
24		

28		
23		
32		
31		→ TO SPEAKER
29		

25		→ HANDSET HUB
26		

6A		
3A		
1A		→ MICROPHONE
4A		
5A		

P1

19	RED LEAD	
----	----------	--

14		
11		
15		
2		
1		

10		
12		
8		
16		
13		
18		
7		
9		
4		
3		
5		
6		
17		

	BLACK LEAD	
--	------------	--

RADIO

J1

19	A+
14	MIC HI
11	VOLUME TOP
15	VOLUME WIPER
2	ANALOG GND
1	CLOCK
10	+5V
12	PTT
8	DATA IN
16	XMIT LIGHT
13	ON/OFF
18	EMERGENCY
7	DISPLAY ENABLE
9	BUSY LIGHT
4	B+
3	SPKR HI
5	SPKR LO
6	DATA OUT
17	A-

GXW-5151-A

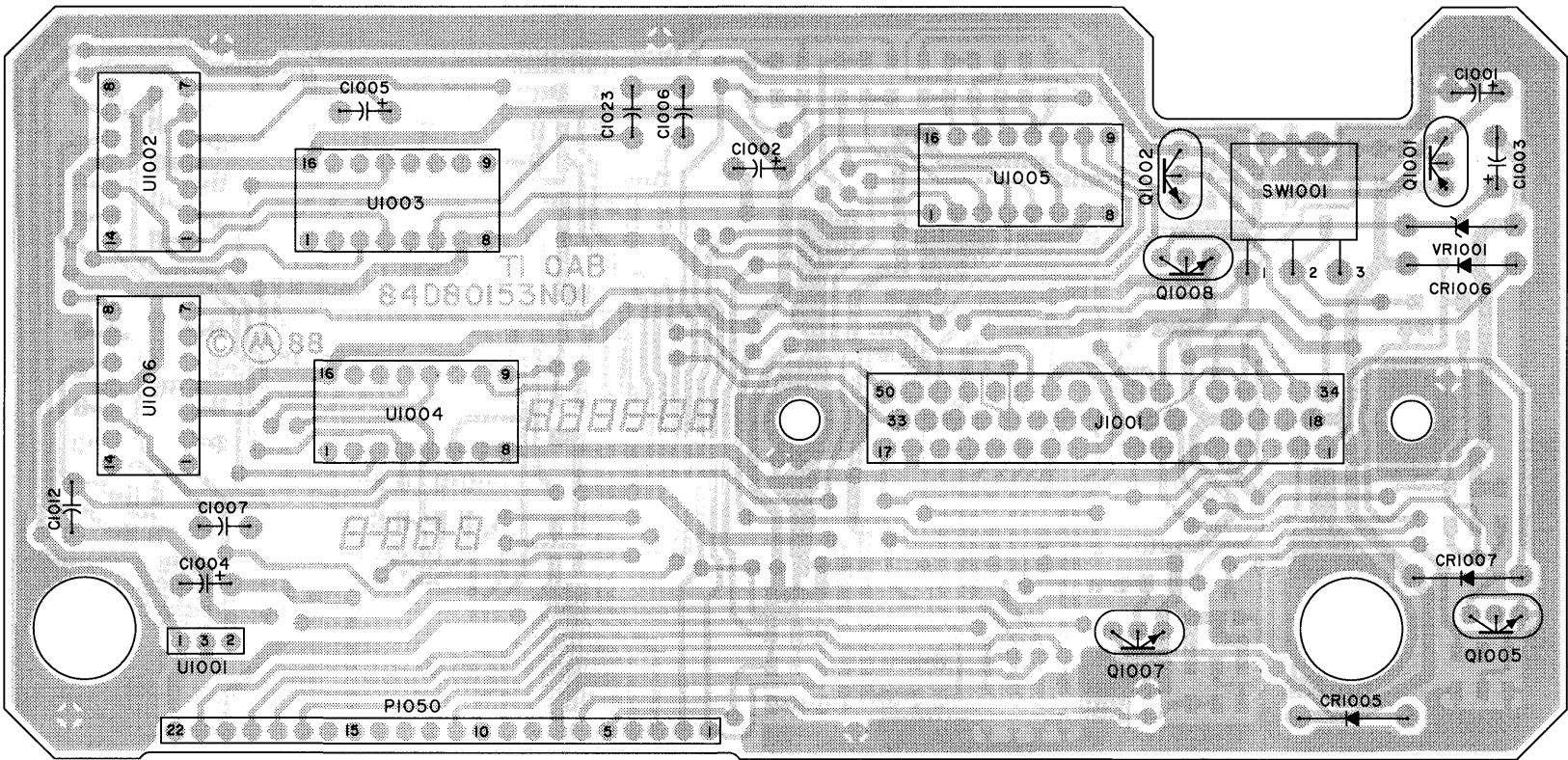
parts list

HLN5406B Advanced Control Head, 99F (Control Board) MXW-5584-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, uF, ±5%, 50V (unless otherwise stated)		
C1001	23-11048C11	10, ±20%, 35V, electrolytic
C1003-1005	23-11048C11	10, ±20%, 35V, electrolytic
C1006,1007	08-11051A17	0.47, 63V
C1008-1011	21-13740B57	220 pF
C1012	08-11051A17	0.47, 63V
C1013,1014	21-13741N21	.001
C1015-1021	21-13741N45	0.01, ±10%
C1022	21-13741N21	.001
C1023	08-11051A11	0.047, 63V
C1024	21-11032A09	.001
C1025-1028	21-11031A47	220
C1029-1045	21-11032A21	0.01, ±10%
diode (see note)		
CR1001,1002	48-80236E08	rectifier, silicon
CR1004	48-80236E08	rectifier, silicon
CR1005-1007	48-82466H18	rectifier, silicon
CR1010	48-80060M01	rectifier, silicon
connector receptacle		
J1001	28-80228J01	connector, 50 position
jumper		
JU1003	06-11077A01	0-ohm resistor
JU1005	06-11077A01	0-ohm resistor
transistor (see note)		
Q1001	48-11043C08	PNP
Q1002	48-11043C07	NPN
Q1004	48-80141L03	PNP, type 41L03
Q1005	48-11043C07	NPN
Q1006	48-80141L04	NPN, type 41L04
Q1007,1008	48-11043C07	NPN
Q1009	48-80141L04	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R1001	06-11077A98	10k
R1002	06-11077A90	4.7k
R1003	06-11077A74	1k
R1004,1005	06-11077A98	10k
R1006-1012	06-11077B11	33k
R1013	06-11077A98	10k
R1014,1015	06-11077A98	10k
R1017	06-11077B07	22k
R1018	06-11077A82	2.2k
R1019	06-11077A62	330
R1020	06-11077A42	47
R1021	06-11077A82	2.2k
R1022	06-11077A86	3.3k
R1023	06-11077A74	1k
R1024	06-11077A54	150
R1025,1026	06-11077A78	1.5k
R1027	06-11077A74	1k
R1028	06-11077A70	680
R1029	06-11077A74	1k
R1030	06-11077A68	560
R1031,1032	06-11077A74	1k
R1033	06-11077A58	220
R1034	06-11077A98	10k
R1035	06-11077A62	330
R1036-1038	06-11077A98	10k
R1039	06-11077A28	12
R1040	06-11077A74	1k
R1041	06-11077A82	2.2k
R1042	06-11077A74	1k
R1043	06-11077A62	330
R1044	06-11077A86	3.3k
R1045,1046	06-11077A74	1k
R1047	06-11077A68	560
R1048	06-11077A58	220
R1049	06-11077A68	560
R1050	06-11077B07	22k
R1051	06-11077A58	220
R1052	06-11077A28	12
R1053	06-11077A58	220
R1054	06-11077A98	10k
R1101	06-11027A98	10k
R1102	06-11077B07	22k
switch		
SW1001	40-80033K01	toggle
integrated circuit (see note)		
U1001	51-84621K27	voltage regulator
U1002	51-84621K32	quad op amp
U1003,1004	51-80073C06	analog multiplexer, CMOS
U1005	51-84887K26	analog multiplexer/demultiplexer
U1006	51-84621K32	quad op amp
voltage regulator (see note)		
VR1001	48-11034A19	zener, 10V, 25 mA
VR1002,1003	48-80140L15	zener, 10V, 5 mA

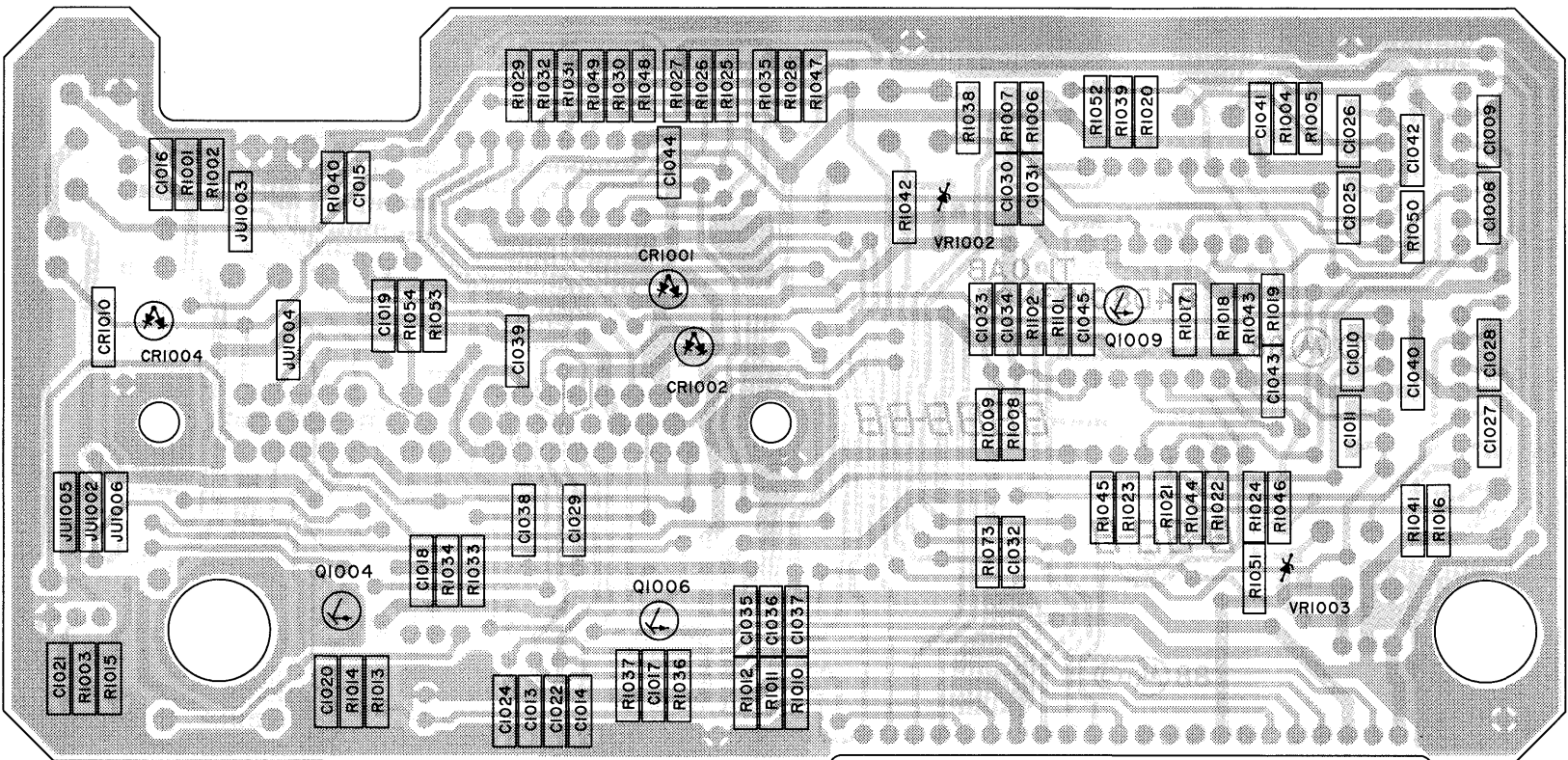
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

CONTROL BOARD



SOLDER SIDE GPW-5558-0
COMPONENT SIDE GPW-5559-0
OVERLAY GXW-5556W01-0

COMPONENT SIDE



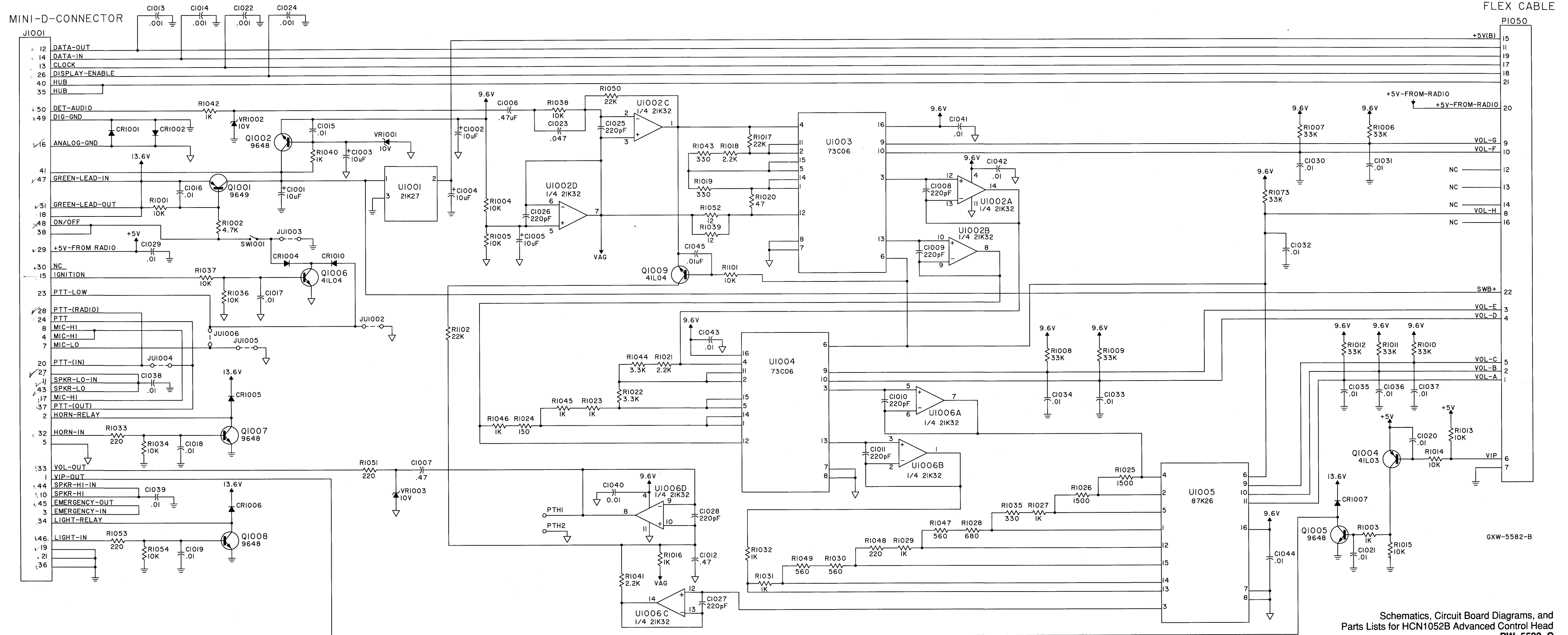
SOLDER SIDE GPW-5558-0
COMPONENT SIDE GPW-5559-0
OVERLAY GXW-5556W02-A

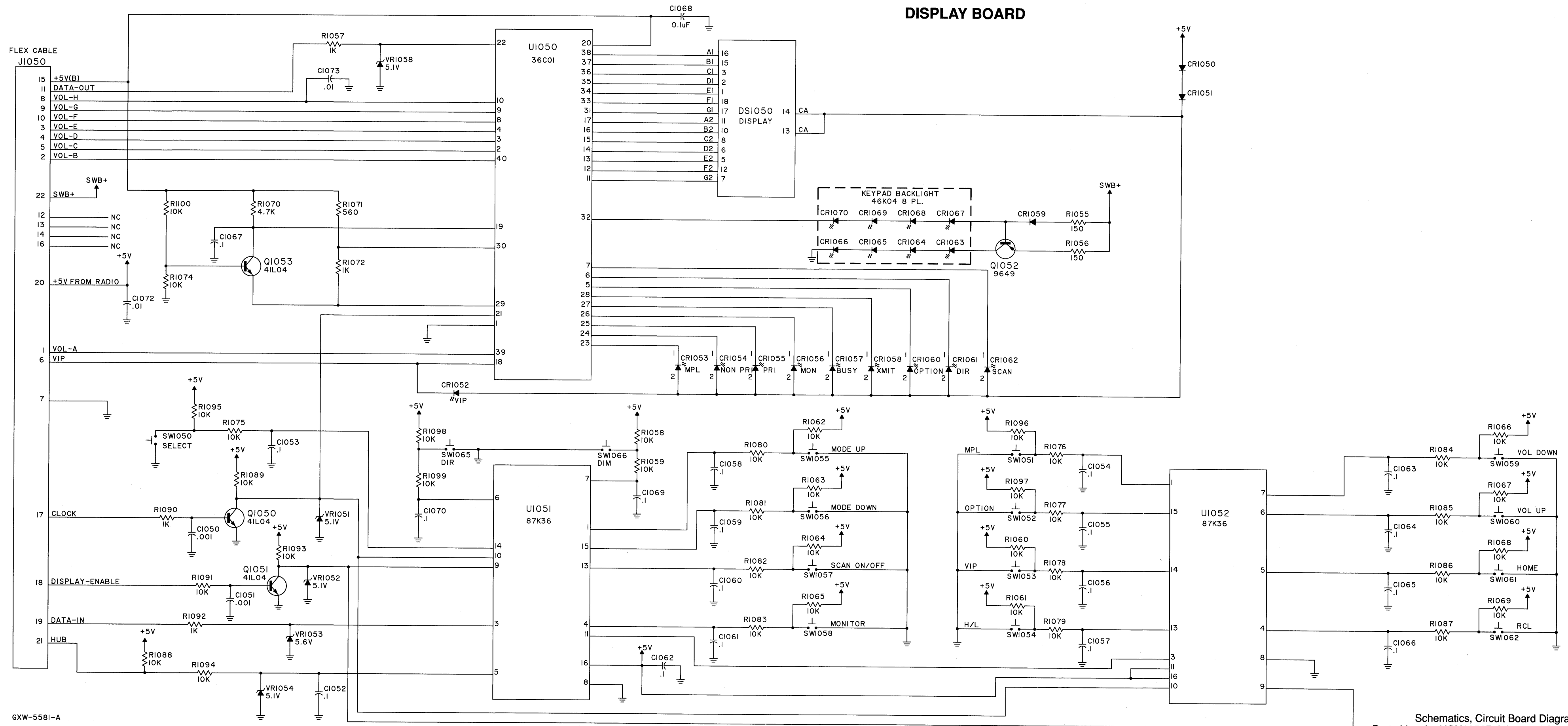
SOLDER SIDE

JUMPER CONFIGURATION	
JUMPER	FUNCTION
CR1010	CONNECTS PTT LOW TO IGNITION SENSE WHICH PREVENTS TRANSMITTING WHEN IGNITION IS OFF.
JU1002	CONNECTS PTT LOW TO ANALOG GROUND TO ALLOW TRANSMITTING REGARDLESS OF IGNITION SENSE.
JU1003	CONNECTS ON/OFF SWITCH TO DIGITAL GROUND ALLOWING RECEIVER OPERATION REGARDLESS OF IGNITION SENSE.
JU1004	CONNECTS PTT TO PTT IN WHICH ALLOWS REMOVAL OF EXTERNAL VIP JUMPER PLUG.
JU1005	CONNECTS MIC LO TO ANALOG GROUND WHEN HANDSET IS NOT USED.
JU1006	CONNECTS MIC LO TO PTT LOW WHEN HANDSET IS USED.

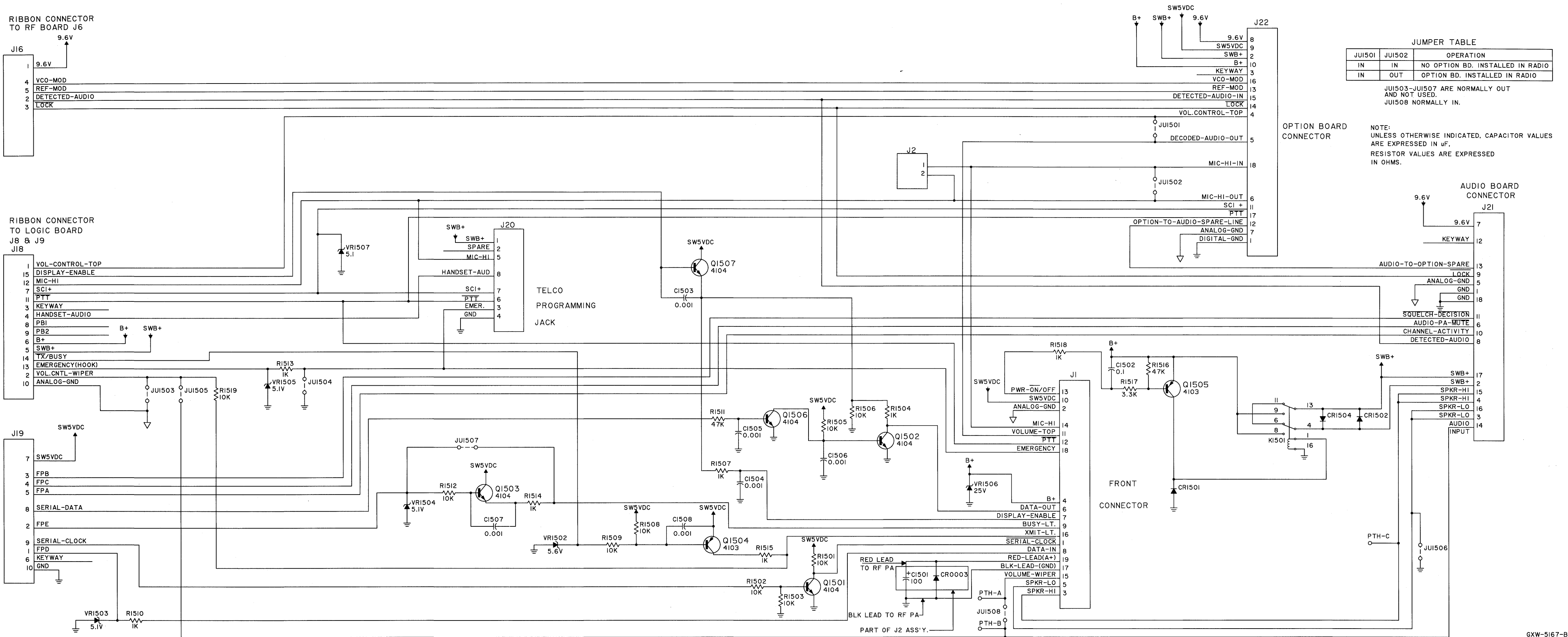
NORMALLY, THE FOLLOWING JUMPERS ARE INSTALLED, JU1001, JU1003, AND JU1005.

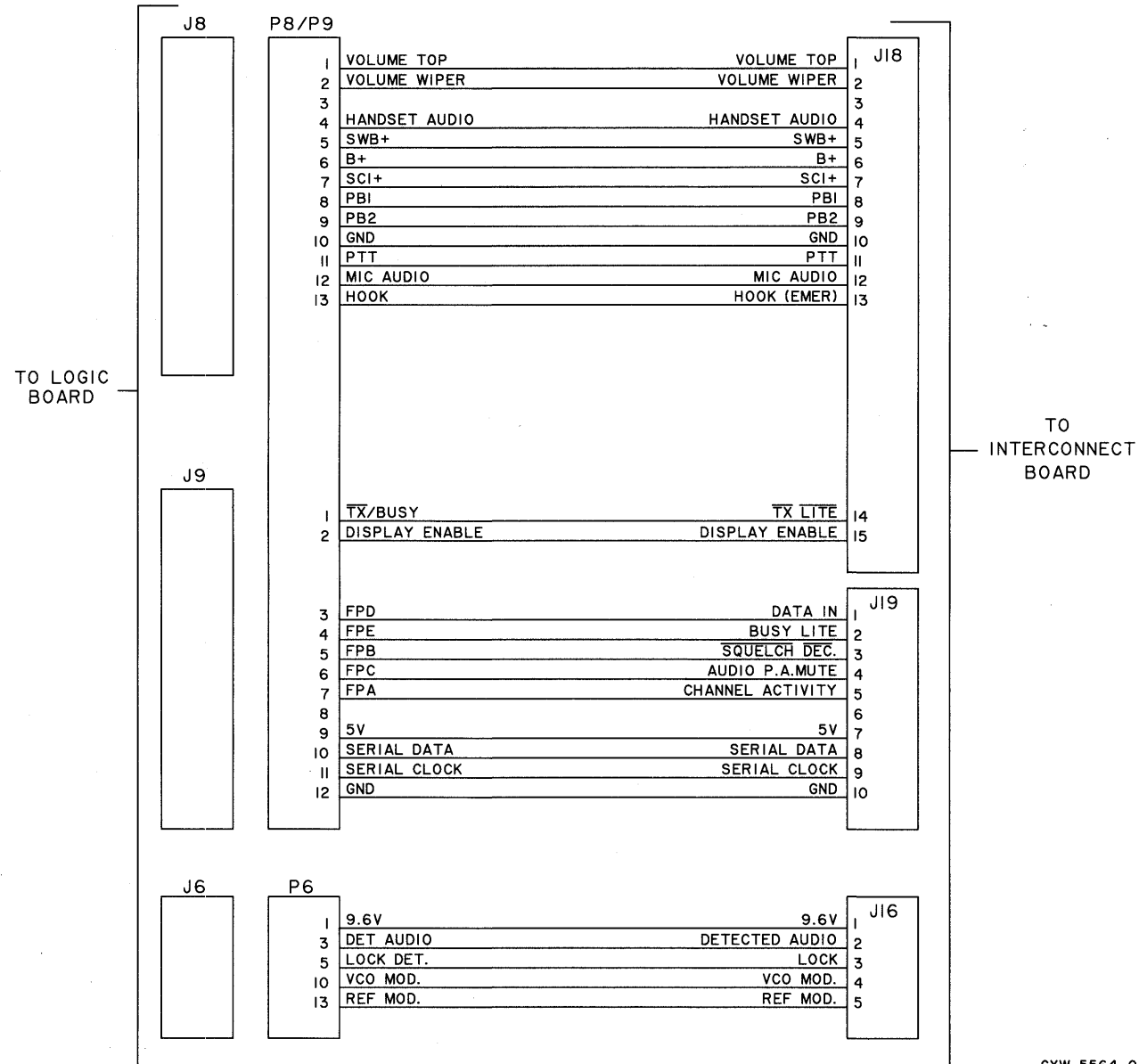
CONTROL BOARD



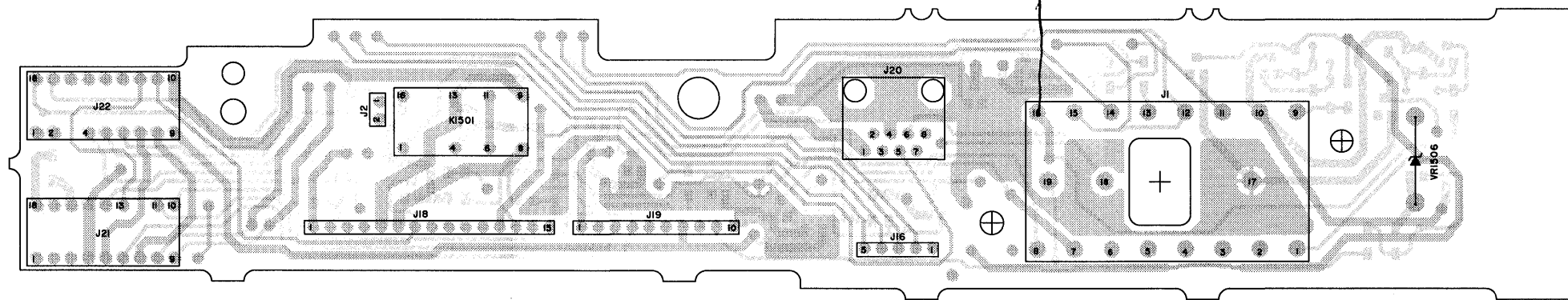


GXW-5581-A

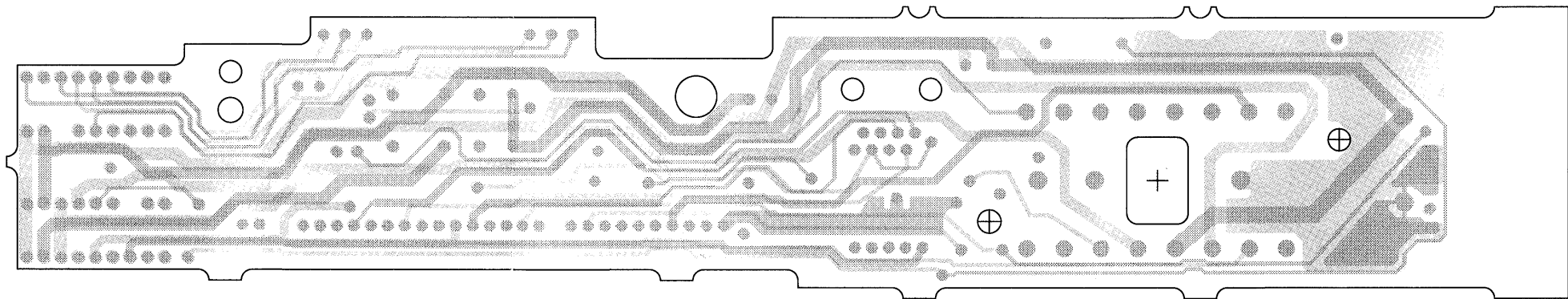




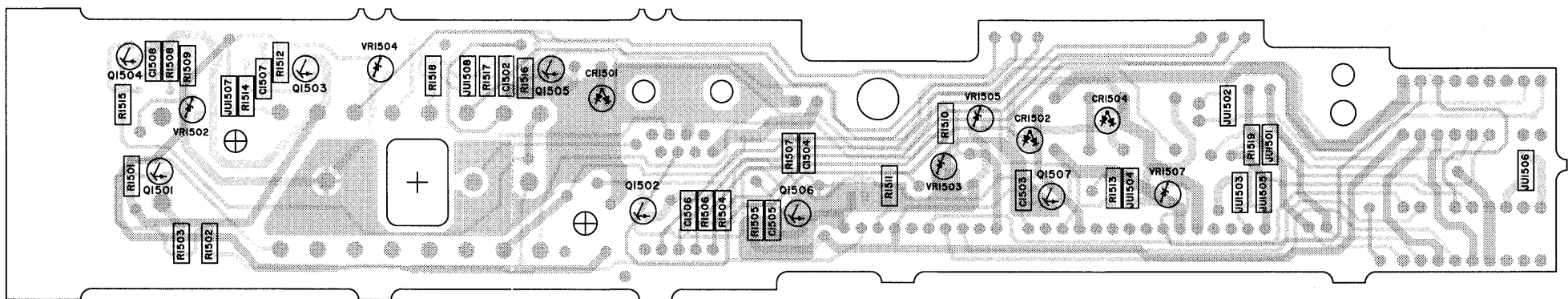
INTERCONNECT RIBBON
DIAGRAM



COMPONENT SIDE



INNER LAYERS



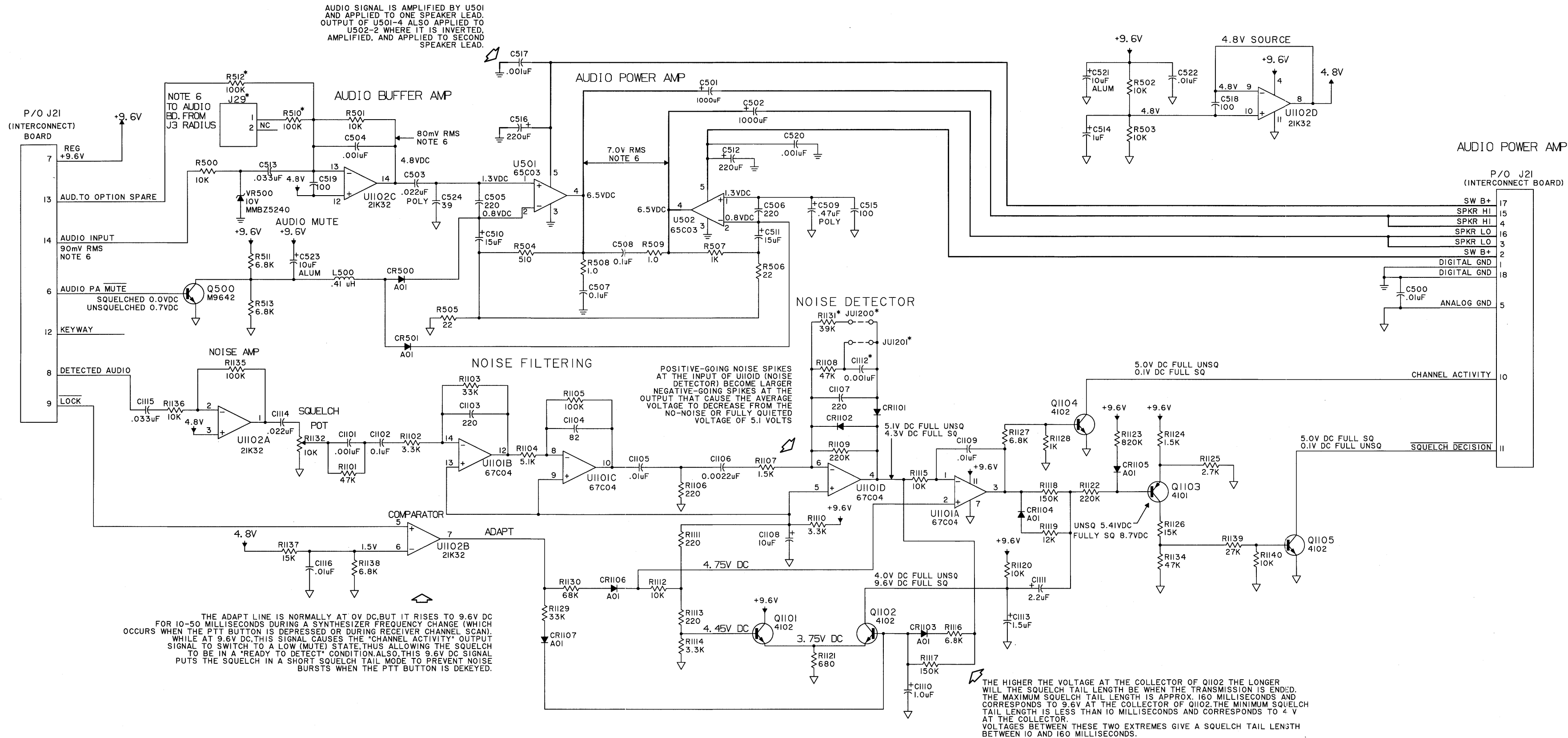
SOLDER SIDE

parts list

HLN5343B MaraTrac Interconnect Board MXW-6593-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, $\pm 10\%$, 50V (unless otherwise stated)		
C11-28	21-84874K01	470 pF, $\pm 20\%$, 250V
C1501	23-80167C03	1000 uF, $\pm 20\%$, 25V, electrolytic
C1502	21-13741N69	0.1
C1503-1508	21-13741N21	0.001
diode (see note)		
CR3	48-80153A01	silicon
CR1501,1502	48-80236E08	silicon
CR1504	48-80236E08	silicon
connector receptacle		
J1	28-80011A01	male, 19-pin
J20	09-80132M01	telco, 8-pin
J21,22	09-80103M05	female, 18-contact
jumper		
JU1501,1502	06-11077A01	0-ohm resistor
JU1508	06-11077A01	0-ohm resistor
relay		
K1501	80-80075G03	220V, 2 amps
transistor (see note)		
Q1501-1503	48-80141L04	NPN
Q1504,1505	48-80141L03	PNP
Q1506,1507	48-80141L04	NPN
resistor, fixed, ohm, $\pm 5\%$, 1/8 watt (unless otherwise stated)		
R1501-1503	06-11077A98	10k
R1504	06-11077A74	1k
R1505,1506	06-11077A98	10k
R1507	06-11077A74	1k
R1508,1509	06-11077A98	10k
R1510	06-11077A74	1k
R1511	06-11077B15	47k
R1512	06-11077A98	10k
R1513-1515	06-11077A74	1k
R1516	06-11077B15	47k
R1517	06-11077A86	3.3k
R1518	06-11077A74	1k
voltage regulator (see note)		
VR1502	48-80140L07	zener, 5.6V
VR1503-1505	48-80140L06	zener, 5.1V
VR1506	48-80236E07	zener, 28V
VR1507	48-80140L06	zener, 5.1V
non-referenced parts		
MP101	26-80191P01	heatsink (2 used)
	64-80264A01	cable plug
	03-10904A02	screw, machine M3.5 x 0.6 x 6 (2 used)

3/31/90
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

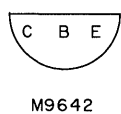


NOTES:

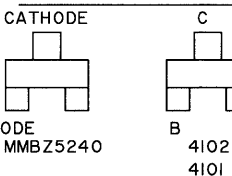
- UNLESS OTHERWISE INDICATED RESISTOR VALUES ARE IN OHMS; CAPACITOR VALUES ARE IN PICOFARADS, INDUCTOR VALUES ARE IN MICROHENRIES.
- TYPES AND CONNECTORS FOR THE INTEGRATED CIRCUITS USED ON THIS BOARD ARE AS FOLLOWS:
- NON-POLARIZED CAPACITORS ARE CHIP TYPE UNLESS OTHERWISE INDICATED.
- POLARIZED CAPACITORS ARE TANTALUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
- DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
- MEASURED IN THE RECEIVE MODE WITH AN ON CHANNEL SQUELCH SIGNAL AT A LEVEL OF -20dBm MODULATED WITH 1KHZ AT 3KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER, VOLUME SET TO GIVE 10 ACROSS 3.2 OHM LOAD.

REF DESIG	TYPE	VCC(PIN)	GND(PIN)	DESC.
U1101	67C04	+9.6V (11)	(7)	QUAD OPAMP
U1102	2IK32	+9.6V (4)	(11)	QUAD OPAMP

SOLDER SIDE VIEW



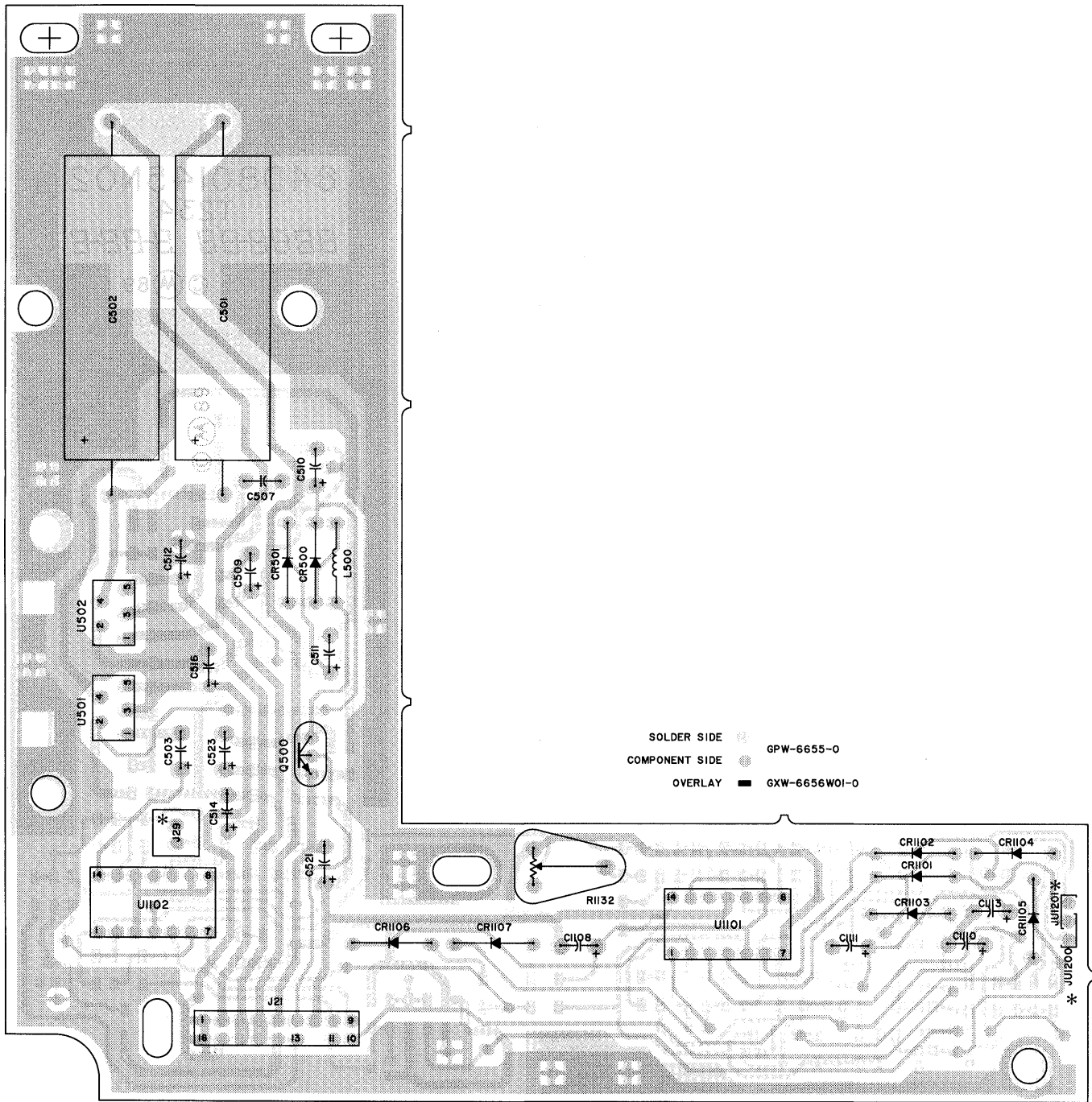
COMPONENT SIDE VIEW



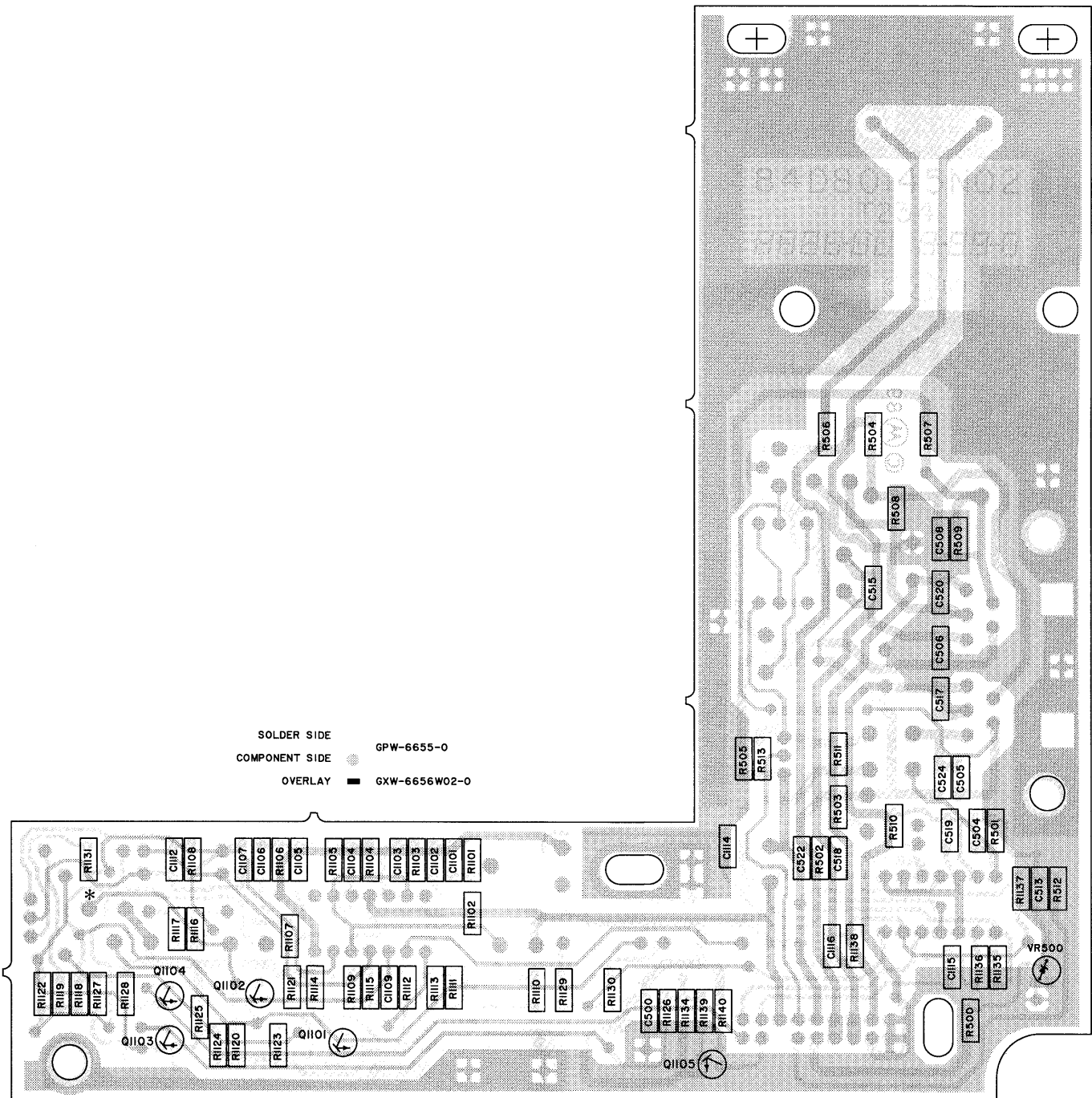
	JUI200	JUI201
CONVENTIONAL	OUT	IN
SECURENET	IN	OUT

* ASTERISK PARTS NOT USED ON LATER VERSION BOARDS: C112 REPLACED WITH 0-OHM CHIP JUMPER P/N 06-11077A01.

GXW-5180-B



COMPONENT SIDE



SOLDER SIDE

parts list

HLN5342B/C MaraTrac Audio Squelch Board MXW-6653-A

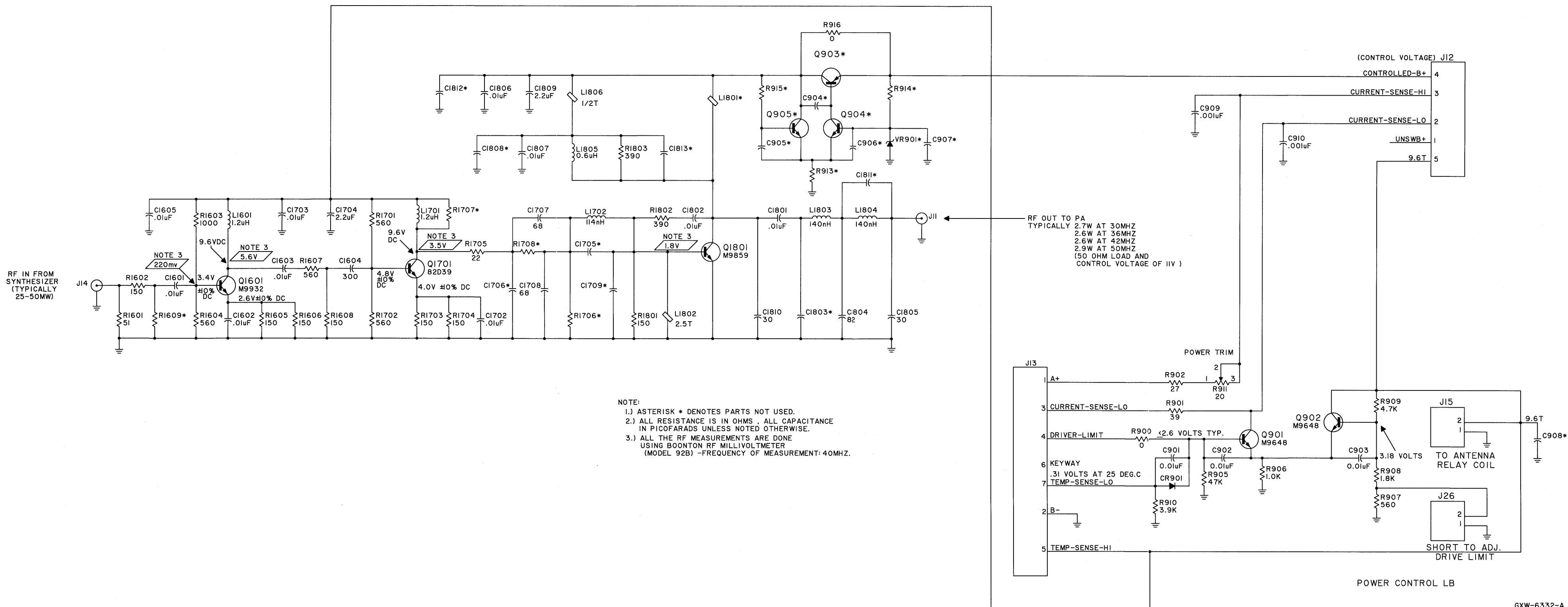
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, uF, $\pm 10\%$, 50V (unless otherwise stated)		
C500	21-13741N45	0.01
C501,502	23-80167C02	1000, $\pm 20\%$, 35V, electrolytic
C503	08-11051A09	0.022, $\pm 5\%$, 63V
C504	21-13741N21	0.001
C505,506	21-13740B57	220 pF, $\pm 5\%$
C507	08-11051A13	0.1, $\pm 5\%$, 63V
C508	21-13741N69	0.1
C509	08-11051A17	0.47, $\pm 5\%$, 63V
C510,511	23-13749L27	15, tantalum
C512	23-84665F06	220, $-10+150\%$, 25V, electrolytic
C513	21-13741N57	0.033
C514	23-13749D51	1, 35V, tantalum
C515	21-13740B49	100 pF, $\pm 5\%$
C516	23-84665F06	220, $-10+150\%$, 25V, electrolytic
C517	21-13741N21	0.001
C518,519	21-13740B49	100 pF, $\pm 5\%$
C520	21-13741N21	0.001
C521	23-11048C11	10, $\pm 20\%$, 44V, electrolytic
C522	21-13741N45	0.01
C523	23-11048C11	10, $\pm 20\%$, 44V, electrolytic
C524	21-13740B39	39 pF, $\pm 5\%$
C1101	21-13741N21	0.001
C1102	21-13741N69	0.1
C1103	21-13740B57	220 pF, $\pm 5\%$
C1104	21-13740B47	82 pF, $\pm 5\%$
C1105	21-13741N45	0.01
C1106	21-13741N29	0.0022
C1107	21-13740B57	220 pF, $\pm 5\%$
C1108	23-13749L23	10, 25V, tantalum
C1109	21-13741N45	0.01
C1110	23-13749D51	1, 35V, tantalum
C1111	23-13749M35	2.2, tantalum
C1112	06-11077A01	0-ohm jumper resistor
C1113	23-13749M31	1.5, 35V, tantalum
C1114	21-13741N53	0.022
C1115	21-13741N57	0.033
C1116	21-13741N45	0.01
diode (see note)		
CR500,501	48-11034A01	silicon
CR1101-1107	48-11034A01	silicon
connector, receptacle		
J21	28-80085E31	male, 12 pin
coil, RF		
L500	24-82723H36	0.41 uH
transistor (see note)		
Q500	48-11043C05	NPN
Q1101,1102	48-80141L02	NPN
Q1103	48-80141L01	PNP
Q1104,1105	48-80141L02	NPN
resistor, fixed, ohm, $\pm 5\%$, 1/8 watt (unless otherwise stated)		
R500-503	06-11077A98	10k
R504	06-11077A67	510
R505,506	06-11077A34	22
R507	06-11077A74	1k
R508,509	06-11077A02	1.0
R511	06-11077A94	6.8k
R513	06-11077A94	6.8k
R1101	06-11077B15	47k
R1102	06-11077A86	3.3k
R1103	06-11077B11	33k
R1104	06-11077A91	5.1k
R1105	06-11077B23	100k
R1106	06-11077A58	220
R1107	06-11077A78	1.5k
R1108	06-11077B15	47k
R1109	06-11077B31	220k
R1110	06-11077A86	3.3k
R1111	06-11077A58	220
R1112	06-11077A98	10k
R1113	06-11077A58	220
R1114	06-11077A86	3.3k
R1115	06-11077A98	10k
R1116	06-11077A94	6.8k
R1117,1118	06-11077B27	150k
R1119	06-11077B01	12k
R1120	06-11077A98	10k
R1121	06-11077A70	680
R1122	06-11077B31	220k
R1123	06-11077B45	820k
R1124	06-11077A78	1.5k
R1125	06-11077A84	2.7k
R1126	06-11077B03	15k
R1127	06-11077A94	6.8k
R1128	06-11077A74	1k
R1129	06-11077B11	33k
R1130	06-11077B19	68k
R1132	18-84944C03	variable, 10k, $\pm 20\%$, .10W
R1134	06-11077B15	47k
R1135	06-11077B23	100k
R1136	06-11077A98	10k
R1137	06-11077B03	15k
R1138	06-11077A94	6.8k
R1139	06-11077B09	27k
R1140	06-11077A98	10k
integrated circuit (see note)		
U501,502	51-80065C03	audio PA
U1101	51-80067C04	quad op-amp

MXW-6653-A (2)

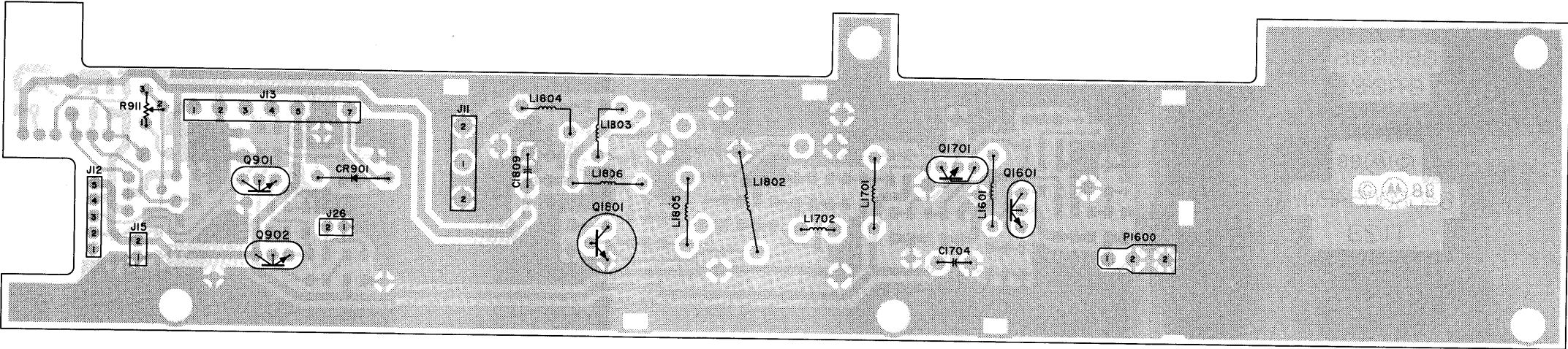
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
U1102	51-84621K32	quad op-amp
voltage regulator (see note)		
VR500	48-80140L15	zener, 10V
non-referenced parts		
	26-80129P01	heatsink, audio final (HLN5342C only)
	03-10908A18	M3 x .5 x .6 (2 used) (HLN5342C only)

note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number

LOW BAND EXCITER BOARD SCHEMATIC

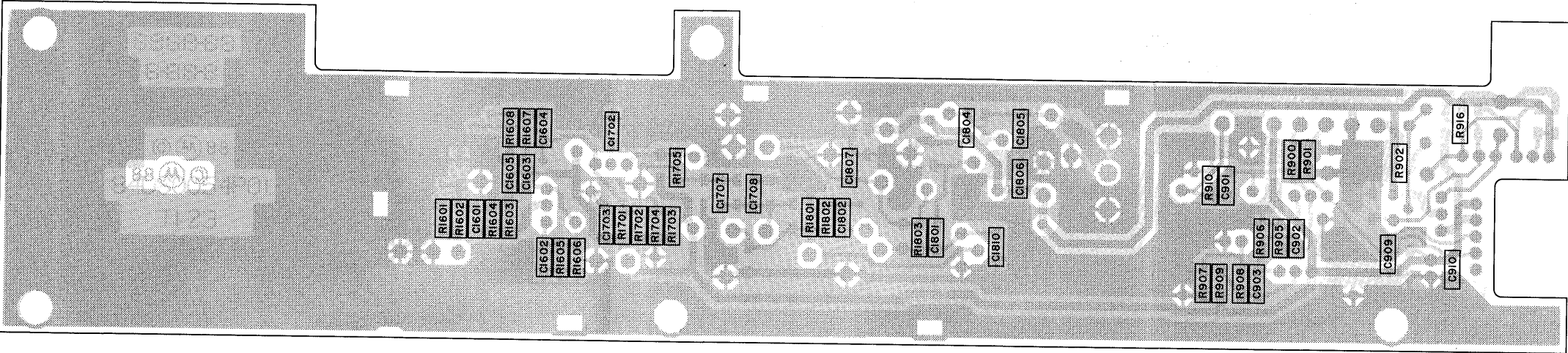


EXCITER/POWER CONTROL BOARD



COMPONENT SIDE

SOLDER SIDE GPW-6334-0
COMPONENT SIDE GPW-6335-0
OVERLAY GXW-6336W01-0



SOLDER SIDE

SOLDER SIDE GPW-6334-0
COMPONENT SIDE GPW-6335-0
OVERLAY GXW-6336W02-0

parts list

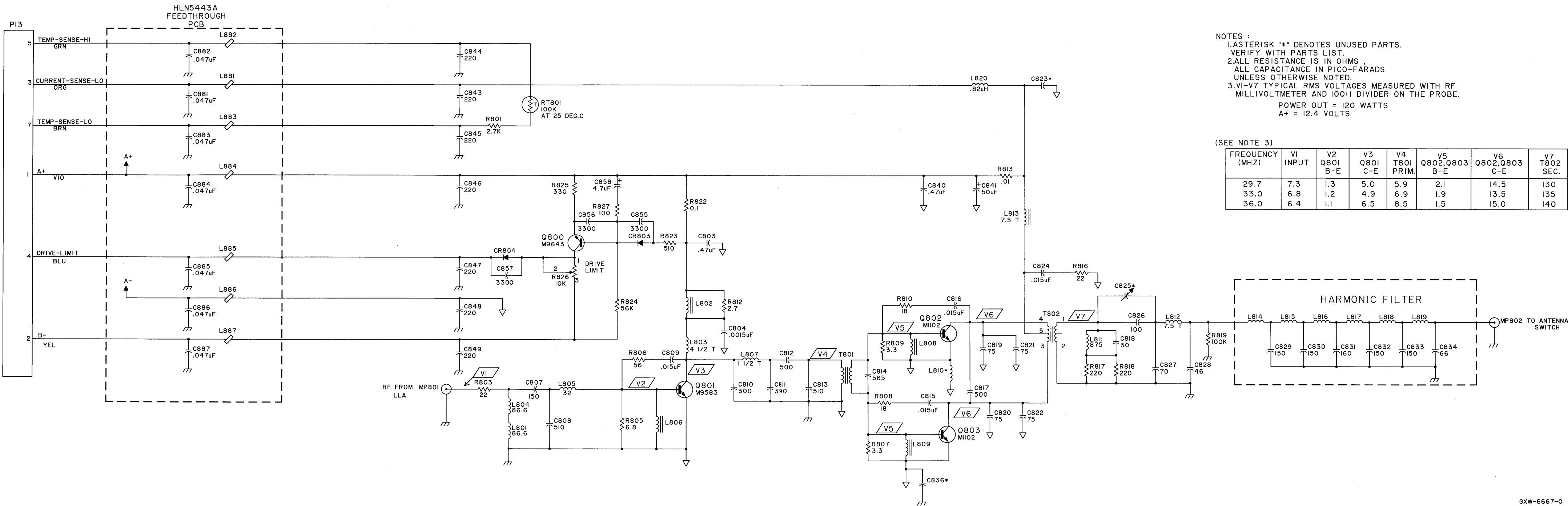
HLB4116A MaraTrac Low Band Exciter/Power Control Board MXW-6333-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, uF, $\pm 10\%$, 50V (unless otherwise stated)		
C901-903	21-13741N45	0.01
C909,910	21-13741N21	1 pF
C1601-1603	21-13741N45	0.01
C1604	21-13740B60	300 pF
C1605	21-13741N45	0.01
C1702,1703	21-13741N45	0.01
C1704	23-11054M01	2.0, 35V, tantalum
C1707,1708	21-13740B45	68 pF
C1801,1802	21-13741N45	0.01
C1804	21-13740B47	82 pF
C1805	21-13740B36	30 pF
C1806,1807	21-13741N45	0.01
C1809	23-11054M01	2.2, 35V, tantalum
C1810	21-13740B36	30 pF
diode (see note)		
CR901	48-11034A01	silicon
connector receptacle		
J11	09-80001F01	jack, phono
J12	28-80164N01	header, 5 pin
J13	28-80071H01	circuit board, 7 contact
J15	28-84324M01	2 contact
J26	28-84318M06	circuit board, 2 pin
coil, RF		
L1601	24-83397L12	1.2 uH
L1701	24-83397L12	1.2 uH
L1702	24-11030B15	114 nH
L1802	24-83977B02	choke, 2-1/2 turns
L1803,1804	24-84411B04	140 nH
L1805	24-82835G32	640 nH
L1806	24-80036A01	ferrite bead
connector plug		
P1600	29-80014A01	clip, coax terminal
transistor (see note)		
Q901,902	48-11043C07	NPN
Q1601	48-11043C16	NPN
Q1701	48-11043C49	NPN
Q1801	48-00869859	NPN
resistor, fixed, ohm, $\pm 5\%$, 1/8 watt (unless otherwise stated)		
R900	06-11077A01	jumper
R901	06-11077A40	39
R902	06-11077A36	27
R905	06-11077B15	47k
R906	06-11077A74	1k
R907	06-11077A68	560
R908	06-11077A80	1.8k
R909	06-11077A90	4.7k
R910	06-11077A88	3.9k
R911	18-80205N02	20, $\pm 10\%$, 1/2W, potentiometer
R916	06-11077A01	jumper
R1601	06-11077A43	51
R1602	06-11077A54	150
R1603	06-11077A74	1k
R1604	06-11077A68	560
R1605,1606	06-11077A54	150
R1607	06-11077A68	560
R1608	06-11077A54	150
R1701,1702	06-11077A68	560
R1703,1704	06-11077A54	150
R1705	06-11077A34	22
R1801	06-11077A54	150
R1802,1803	06-11077A64	390
mechanical parts		
09-80265N01	coax (2 used)	
14-80001C01	insulator, transistor	
26-80006M01	shield, second VCO (4 used)	
29-80146B01	terminal	

note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

6/30/89

RANGE 1 LOW BAND POWER AMPLIFIER SCHEMATIC



parts list

HLB4117A MaraTrac PA Board, 110W Range 1 MXW-6671-O

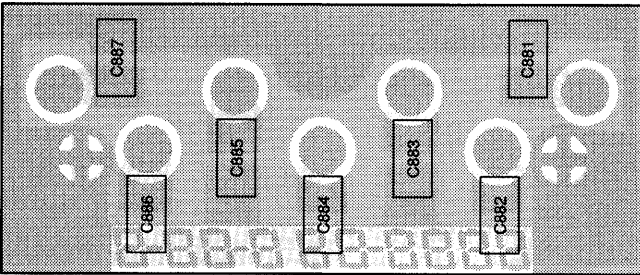
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5% (unless otherwise stated)		
C803	08-11051A17	0.47 uF, 63V
C804	08-11051A02	0.0015 uF, 63V
C807	21-84494B07	150
C808	21-84494B20	510, 300V
C809	08-11051A08	0.015 uF, 63V
C810	21-84494B15	300
C811	21-84494B18	390
C812	21-84395B62	500, 250V
C813	21-84494B20	510, 300V
C814	21-84857K06	565, ±3%
C815,816	08-11051A08	0.015 uF, 63V
C817	21-84395B62	500, 250V
C818	21-80067A45	30
C819-822	21-84494B31	75
C824	08-11051A08	0.015 uF, 63V
C826	21-84395B02	100, 250V
C827	21-84395B40	70, 350V
C828	21-84395B44	46, 250V
C829,830	21-84395B06	150, 250V
C831	21-84395B26	160, ±2%
C832,833	21-84395B06	150, 250V
C834	21-84395B22	66, 250V
C840	08-11051A17	0.47 uF, 63V
C841	23-84669A05	50 uF, -10±150, 25V, electrolytic
C843-849	21-11015B05	220, ±10 pF, 100V
C855-857	21-11015B19	3300, ±10 pF, 100V
C858	23-11054H04	4.7 uF, ±10%, 25V, tantalum
diode (see note)		
CR803,804	48-82466H13	rectifier, silicon
coil, RF		
L801	24-11030D06	86.6 nH
L802	24-80036A02	1/2 turn
L803	24-84235B04	4-1/2 turns, airwound
L804	24-11030D06	86.6 nH
L805	24-11030D03	32 nH
L806	24-83977B01	choke
L807	24-80277A17	1-1/2 turns, airwound
L808,809	24-83977B01	choke
L811	24-80071P13	897 nH
L812	24-80135L06	7-1/2 turns, airwound
L813	24-80110B13	7-1/2 turns
L814	24-80110B02	7-1/2 turns
L815	24-80110B03	8-1/2 turns
L816,817	24-80110B04	9-1/2 turns
L818	24-80110B03	8-1/2 turns
L819	24-80110B02	7-1/2 turns
L820	24-11047A12	.82 uH
transistor (see note)		
Q800	48-11043C06	PNP
thermistor		
RT801	06-83600K09	100k
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R801	06-11009A59	2.7k
R803	06-11086C19	22, 2W
R805	06-11086A09	6.8, 1W
R806	06-11086C29	56, 2W
R807	06-11086A06	3.3, 1W
R808	17-82036G27	18, 2W
R809	06-11086A06	3.3, 1W
R810	17-82036G27	18, 2W
R812	06-11045B24	2.7, 1/2W
R813	17-80165C02	shunt, 0.01, ±10%, 12W
R816	06-11086C19	22, 2W
R817,818	06-11086C43	220, 2W
R819	06-11045A97	100k, 1/2W
R822	17-82291B24	0.1, 3W
R823	06-11009A42	510
R824	06-11009A91	56k
R825	06-11009A37	330
R826	18-80087E08	potentiometer, 10k, ±20%, 1/2W
R827	06-11009A25	100
transformer		
T801	24-80099B01	fixed RF
T802	25-80229J03	high power
mechanical parts		
MP801,802	29-80014A01	clip, coax (2 used)

6/1/89
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLB4077A Power Transistotr Kit MXW-6382-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
transistor (see note)		
Q801	48-00869583	power, NPN
Q802,803	48-84411L02	power, NPN
3/1/89 note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.		
HLN5443A Feedthru Plate Assembly MXW-6381-A		
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 500V (unless otherwise stated)		
C881-887	21-84547A07	.047 uF, ±20%, 100V
connector		
	28-80155K01	male header
coil, RF		
L881-887	76-84069B04	ferrite bead
3/31/90		

HLN5443A FEEDTHRU PLATE

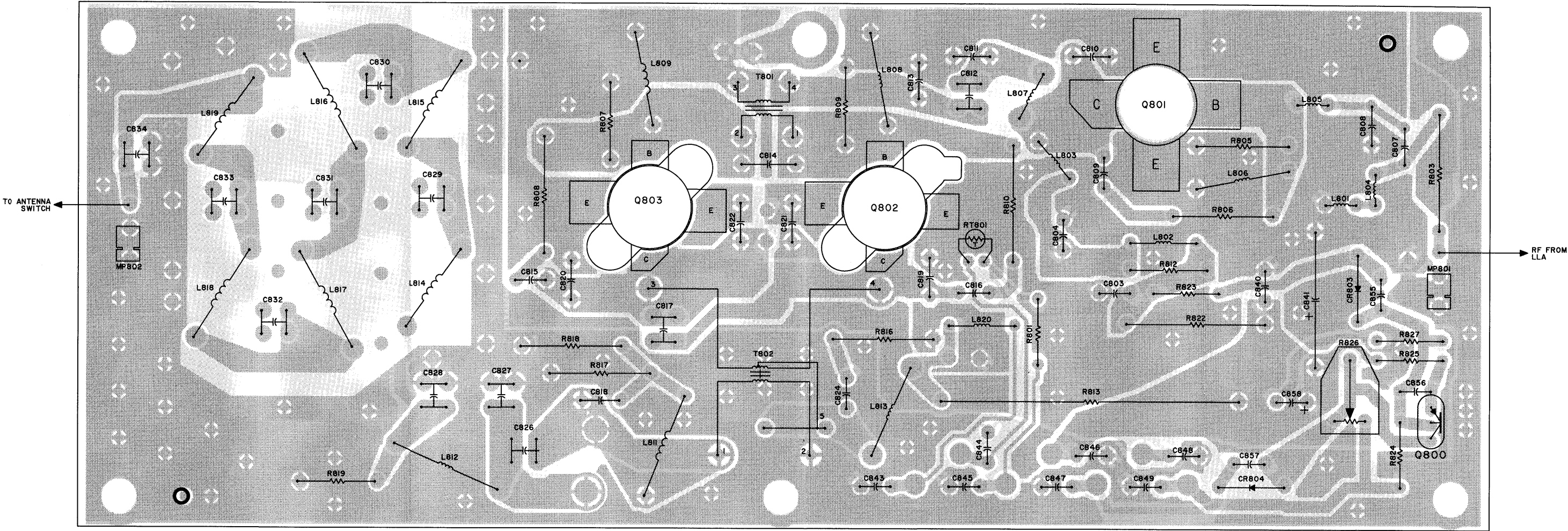


SOLDER SIDE VIEW

SOLDER SIDE
COMPONENT SIDE
OVERLAY

GPW-7744-O
GPW-7745-O

RANGE 1 LOW BAND POWER AMPLIFIER

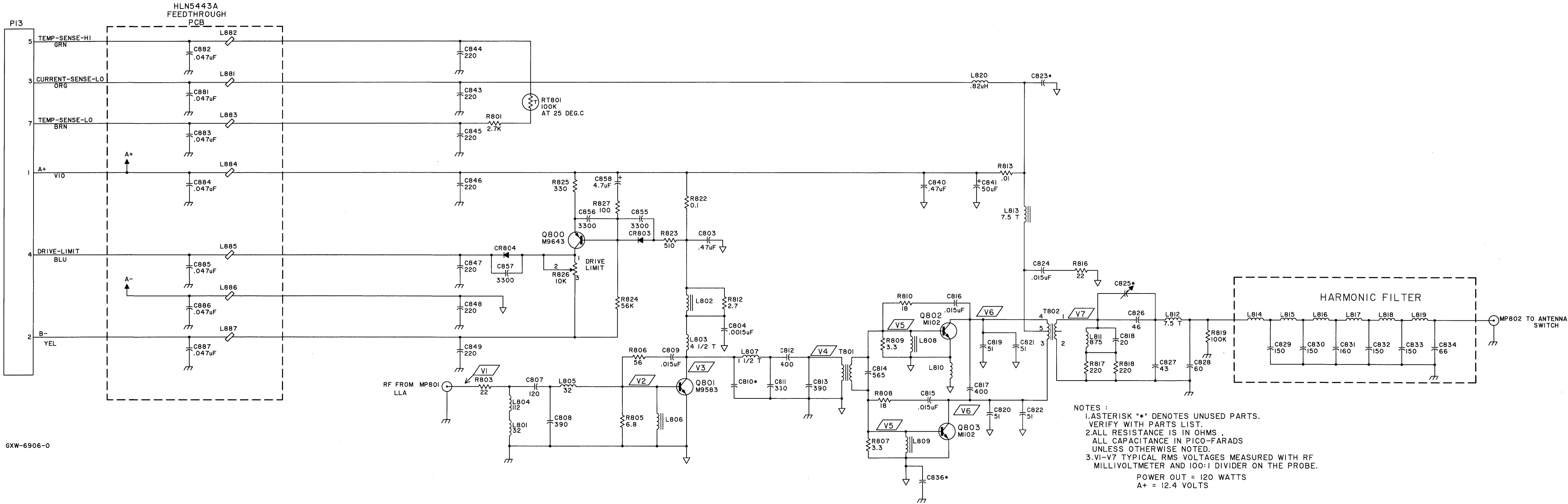


COMPONENT SIDE VIEW

SOLDER SIDE
COMPONENT SIDE
OVERLAY

GPW-6668-O
GPW-6669-O
GXW-6670-O

RANGE 2 LOW BAND POWER AMPLIFIER SCHEMATIC



GXW-6906-0

(SEE NOTE 3)

FREQUENCY (MHZ)	VI INPUT	V2 Q801 B-E	V3 Q801 C-E	V4 T801 PRIM.	V5 Q802,Q803 B-E	V6 Q802,Q803 C-E	V7 T802 SEC.
36.0	6.5	1.5	7.8	7.4	1.2-2.0	13.5	150
39.0	5.4	1.3	8.9	9.0	1.2-2.0	12.6	155
42.0	5.6	1.3	9.4	9.2	1.2-2.0	14.3	180

parts lists

HLB4118A MaraTrac PA Board, 110W Range 2 MXW-6905-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5% (unless otherwise stated)		
C803	08-11051A17	0.47 uF, 63V
C804	08-11051A02	0.0015 uF, 63V
C807	21-84494B06	120, 500V
C808	21-84494B18	390, 500V
C809	08-11051A08	0.015 uF, 63V
C811	21-84494B16	330, 500V
C812	21-84395B14	400, 250V
C813	21-84494B18	390, 500V
C814	21-84857K06	565, 500V, ±3%
C815,816	08-11051A08	0.015 uF, 63V
C817	21-84395B14	400, 250V
C818	21-80067A40	20
C819-822	21-84494B01	51
C824	08-11051A08	0.015 uF, 63V
C826	21-84395B44	46, 250V
C827	21-84395B19	43, 250V
C828	21-84395B07	60, 250V
C829,830	21-84395B06	150, 250V
C831	21-84395B26	160, 250V, ±2%
C832,833	21-84395B06	150, 250V
C834	21-84395B22	66, 250V
C840	08-11051A17	0.47 uF, 63V
C841	23-84669A05	50 uF, -10±150, 25V, electrolytic
C843-849	21-11015B05	220, ±10 pF, 100V
C855-857	21-11015B19	3300, ±10 pF, 100V
C858	23-11054H04	4.7 uF, ±10%, 25V, tantalum
diode (see note)		
CR803,804	48-82466H13	rectifier, silicon
coil, RF		
L801	24-11030D03	32 nH
L802	24-80036A02	1/2 turn
L803	24-84235B04	4-1/2 turns, airwound
L804	24-11030B14	9-1/2 turns, airwound
L805	24-11030D03	32 nH
L806	24-83977B01	choke
L807	24-80277A17	1-1/2 turns, airwound
L808,809	24-83977B01	choke
L810	24-11030E01	fixed RF
L811	24-80071P13	897 nH
L812	24-80135J06	7-1/2 turns, airwound
L813	24-80110B13	7-1/2 turns
L814	24-80110B02	7-1/2 turns
L815	24-80110B03	8-1/2 turns
L816,817	24-80110B04	9-1/2 turns
L818	24-80110B03	8-1/2 turns
L819	24-80110B02	7-1/2 turns
L820	24-11047A12	.82 uH
transistor (see note)		
Q800	48-11043C06	PNP
thermistor		
RT801	06-83600K09	100k
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R801	06-11009A59	2.7k
R803	06-11086C19	22, 2W
R805	06-11086A09	6.8, 1W
R806	06-11086C29	56, 2W
R807	06-11086A06	3.3, 1W
R808	17-82036G27	18, 2W
R809	06-11086A06	3.3, 1W
R810	17-82036G27	18, 2W
R812	06-11045B24	2.7, 1/2W
R813	17-80165C02	shunt, 0.01, ±10%, 12W
R816	06-11086C19	22, 2W
R817,818	06-11086C43	220, 2W
R819	06-11045A97	100k, 1/2W
R822	17-82291B24	0.1, 3W
R823	06-11009A42	510
R824	06-11009A91	56k
R825	06-11009A37	330
R826	18-80087E08	potentiometer, 10k, ±20%, 1/2W
R827	06-11009A25	100
transformer		
T801	24-80099B01	fixed RF
T802	25-80229J03	high power
mechanical parts		
MP801,802	29-80014A01	clip, coax (2 used)

10/15/89
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLB4077A Power Transistor Kit MXW-6382-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
transistor (see note)		
Q801	48-00869583	power, NPN
Q802,803	48-84411L02	power, NPN

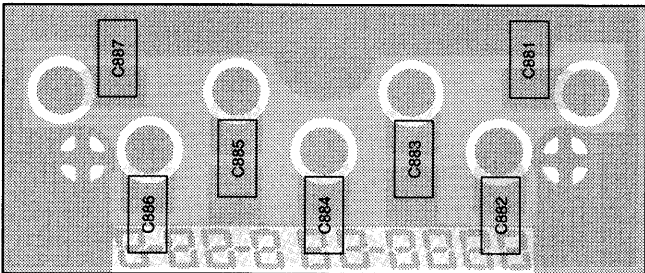
3/1/89
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLN5443A Feedthru Plate Assembly MXW-6381-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 500V (unless otherwise stated)		
C881-887	21-84547A07	.047 uF, ±20%, 100V
connector		
	28-80155K01	male header
coil, RF		
L881-887	76-84069B04	ferrite bead

3/31/90

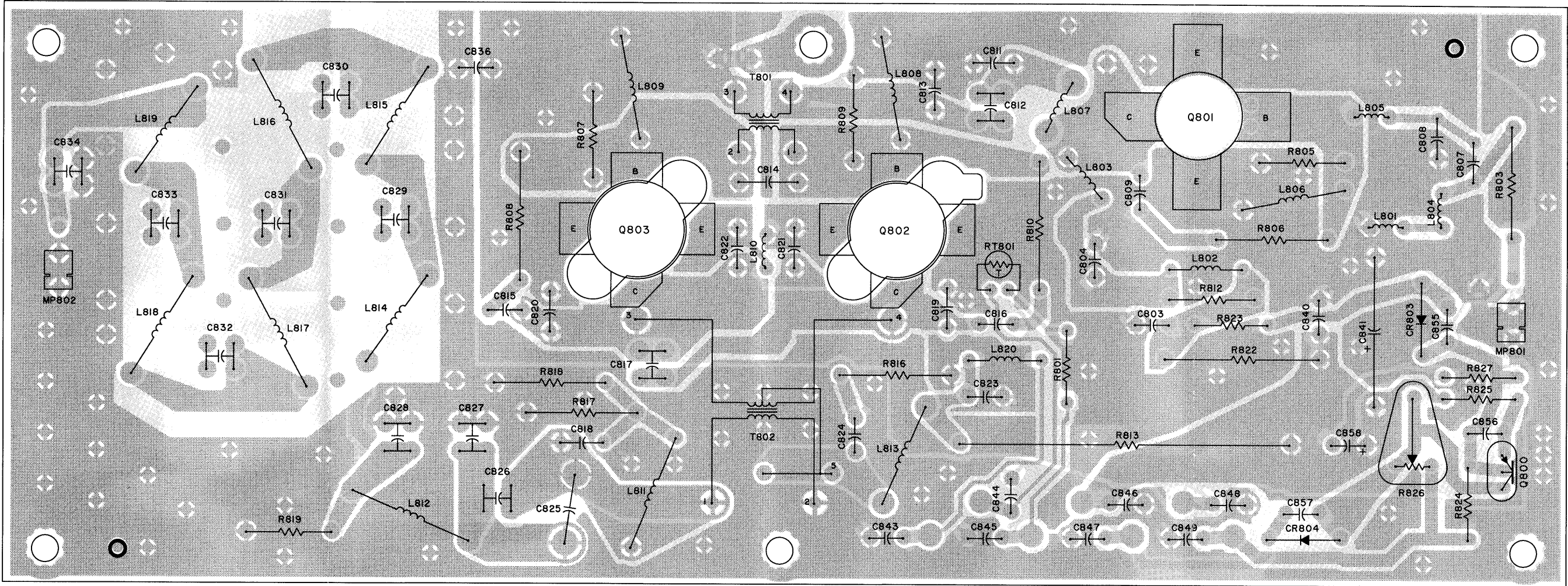
HLN5443A FEEDTHRU PLATE



SOLDER SIDE VIEW

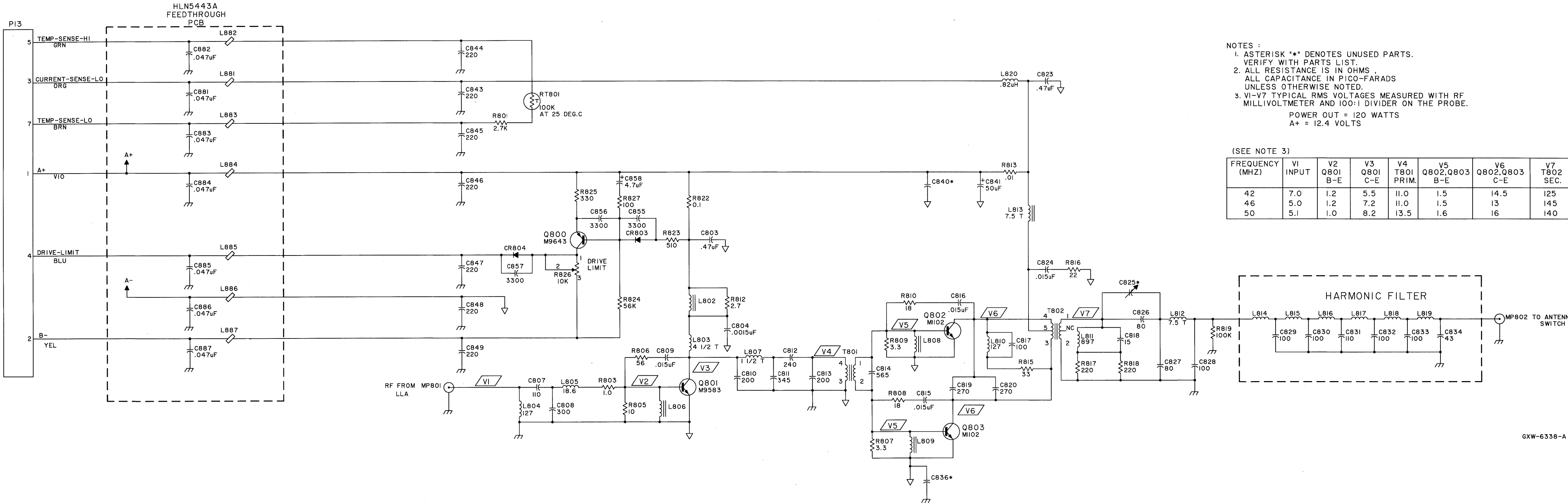
SOLDER SIDE	GPW-7744-O
COMPONENT SIDE	GPW-7744-O
OVERLAY	GPW-7745-O

RANGE 2 LOW BAND POWER AMPLIFIER CIRCUIT BOARD



SOLDER SIDE	GPW-6908-O
COMPONENT SIDE	GPW-6908-O
OVERLAY	GPW-6907-O

RANGE 3 LOW BAND POWER AMPLIFIER SCHEMATIC



NOTES :

1. ASTERISK "*" DENOTES UNUSED PARTS.
VERIFY WITH PARTS LIST.

2. ALL RESISTANCE IS IN OHMS .
ALL CAPACITANCE IN PICO-FARADS
UNLESS OTHERWISE NOTED.

3. VI-V7 TYPICAL RMS VOLTAGES MEASURED WITH RF
MILLIVOLTMETER AND 100:1 DIVIDER ON THE PROBE.

POWER OUT = 120 WATTS
A+ = 12.4 VOLTS

(SEE NOTE 3)

FREQUENCY (MHZ)	VI INPUT	V2 Q801 B-E	V3 Q801 C-E	V4 T801 PRIM.	V5 Q802,Q803 B-E	V6 Q802,Q803 C-E	V7 T802 SEC.
42	7.0	1.2	5.5	11.0	1.5	14.5	125
46	5.0	1.2	7.2	11.0	1.5	13	145
50	5.1	1.0	8.2	13.5	1.6	16	140

parts lists

HLB4115A MaraTrac 110W PA Range 3 MXW-6339-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 500V (unless otherwise stated)		
C803	08-11051A17	0.47 uF, 63V
C804	08-11051A02	0.0015 uF, 63V
C807	21-84494B53	110
C808	21-84494B15	300
C809	08-11051A08	0.015 uF, 63V
C810	21-84494B11	200
C811	21-0086823	345, ±3%
C812	21-84395B35	240, ±10%, 350V
C813	21-84494B11	200
C814	21-84857K06	565, ±3%
C815,816	08-11051A08	0.015 uF, 63V
C817	21-84494B04	100
C818	21-80067A35	15
C819,820	21-84494B14	270
C823	08-11051A17	0.47 uF, 63V
C824	08-11051A08	0.015 uF, 63V
C826,827	21-84395B03	80, 250V
C828-830	21-84395B02	100, 250V
C831	21-84395B20	110, 250V
C832,833	21-84395B02	100, 250V
C834	21-84395B19	43, 250V
C841	23-84669A05	50 uF, -10 ±150%, 25V, electrolytic
C843-849	21-11015B05	220, ±10 pF, 100V
C855-857	21-11015B19	3300, ±10 pF, 100V
C858	23-11054H04	4.7 uF, 10%, 25V, tantalum
diode (see note)		
CR803,804	48-82466H13	rectifier, silicon
coil, RF		
L802	24-80036A02	1/2 turn
L803	24-84235B04	4-1/2 turns, airwound
L804	24-11030B15	10-1/2 turns, white
L805	24-11030B05	2-1/2 turns, green
L806	24-83977B01	choke
L807	24-80277A17	1-1/2 turns, airwound
L808,809	24-83977B01	choke
L810	24-11030B15	10-1/2 turns, white
L811	24-80071P13	897 nH
L812	24-80135J06	7-1/2 turns, airwound
L813	24-80110B13	7-1/2 turns
L814	24-80110B06	7-1/2 turns
L815	24-80110B07	8-1/2 turns
L816,817	24-80110B09	9-1/2 turns
L818	24-80110B07	8-1/2 turns
L819	24-80110B06	7-1/2 turns
L820	24-11047A12	0.82 uH
transistor (see note)		
Q800	48-11043C06	PNP
thermistor		
RT801	06-83600K09	100k
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R801	06-11009A59	2.7k
R803	06-11086A03	1, 1W
R805	06-11045A01	10, 1/2
R806	06-11086C29	56, 2W
R807	06-11086A06	3.3, 1W
R808	17-82036G27	18, 2W
R809	06-11086A06	3.3, 1W
R810	17-82036G27	18, 2W
R812	06-11045B24	2.7, 1/2W
R813	17-80165C02	shunt, 0.01, ±10%, 12W
R815	06-11086C23	33, 2W
R816	06-11086C19	22, 2W
R817,818	06-11086C43	220, 2W
R819	06-11045A97	100k, 1/2W
R822	17-82291B24	0.1, 3W
R823	06-11009A42	510
R824	06-11009A91	56k
R825	06-11009A37	330
R826	18-80087E08	potentiometer, 10k, ±20%, 1/2W
R827	06-11009A25	100
transformer		
T801	24-80099B01	fixed RF
T802	25-80229J02	high power
non referenced parts		
26-80206A02		shield, harmonic filter
15-80205A02		cover, harmonic filter shield
29-80014A01		clip, coax

note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

6/30/89

HLB4077A Power Transistr Kit MXW-6382-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
transistor (see note)		
Q801	48-00869583	power, NPN
Q802,803	48-84411L02	power, NPN

note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

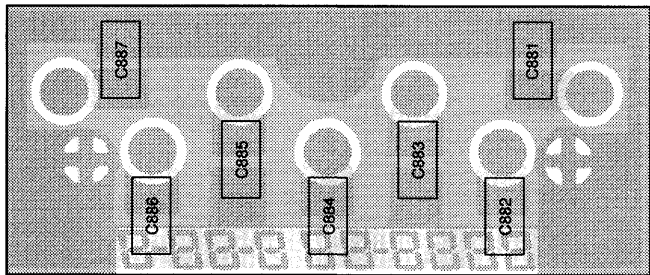
3/1/89

HLN5443A Feedthru Plate Assembly MXW-6381-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 500V (unless otherwise stated)		
C881-887	21-84547A07	.047 uF, ±20%, 100V
connector		
	28-80155K01	male header
coil, RF		
L881-887	76-84069B04	ferrite bead

3/31/90

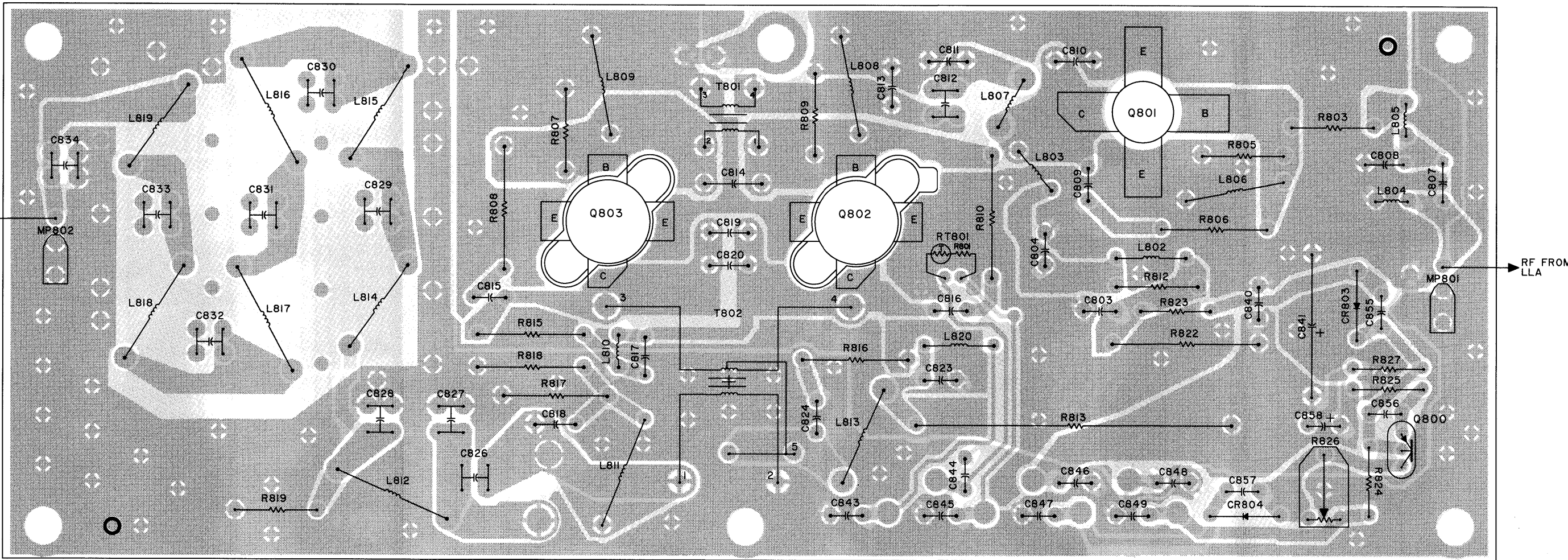
HLN5443A FEEDTHRU PLATE



SOLDER SIDE VIEW

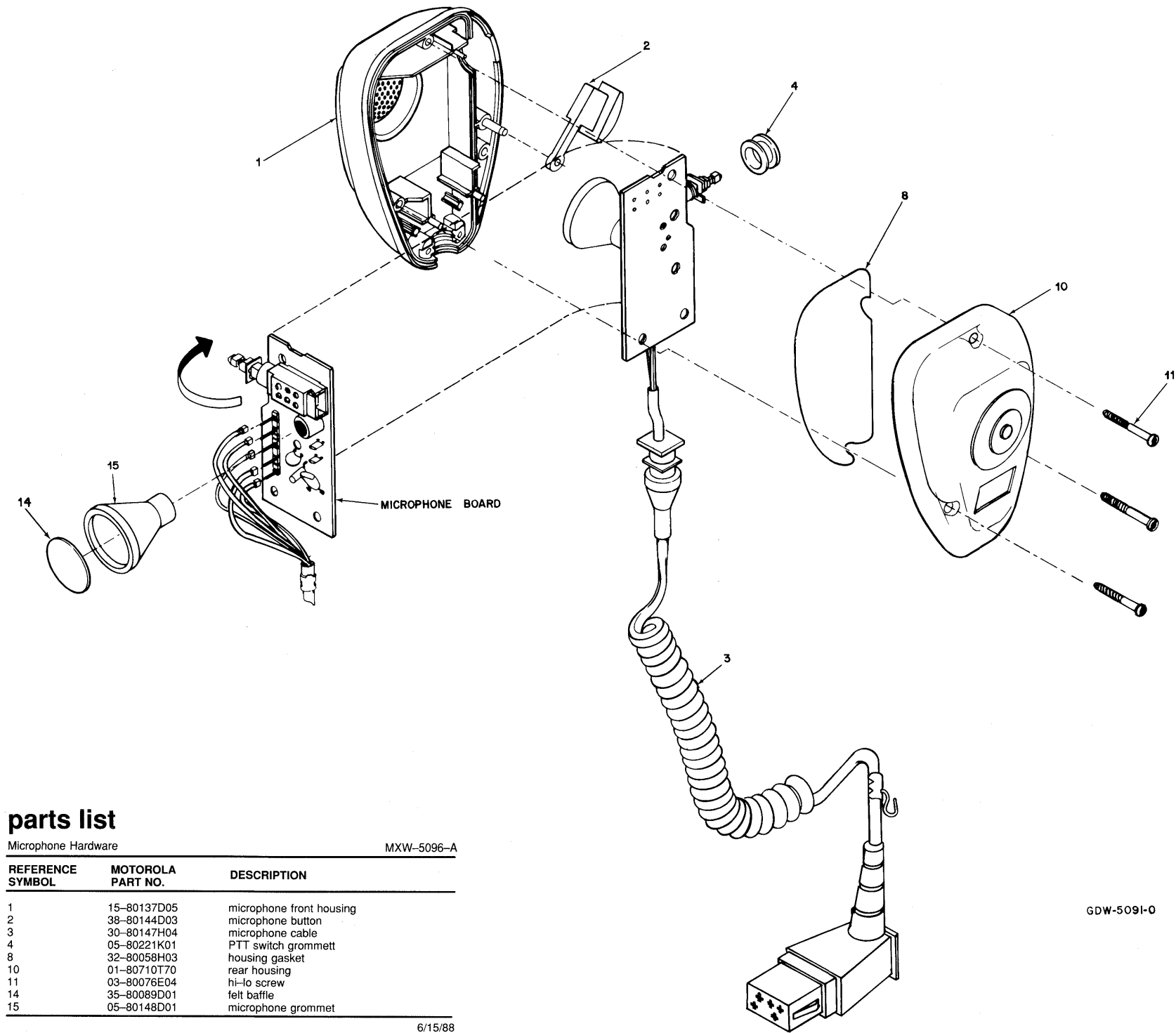
SOLDER SIDE	GPW-7744-O
COMPONENT SIDE	
OVERLAY	GPW-7745-O

RANGE 3 LOW BAND POWER AMPLIFIER



SOLDER SIDE	GPW-6340-O
COMPONENT SIDE	GPW-6341-O
OVERLAY	GXW-6342-A

COMPONENT SIDE VIEW



parts list

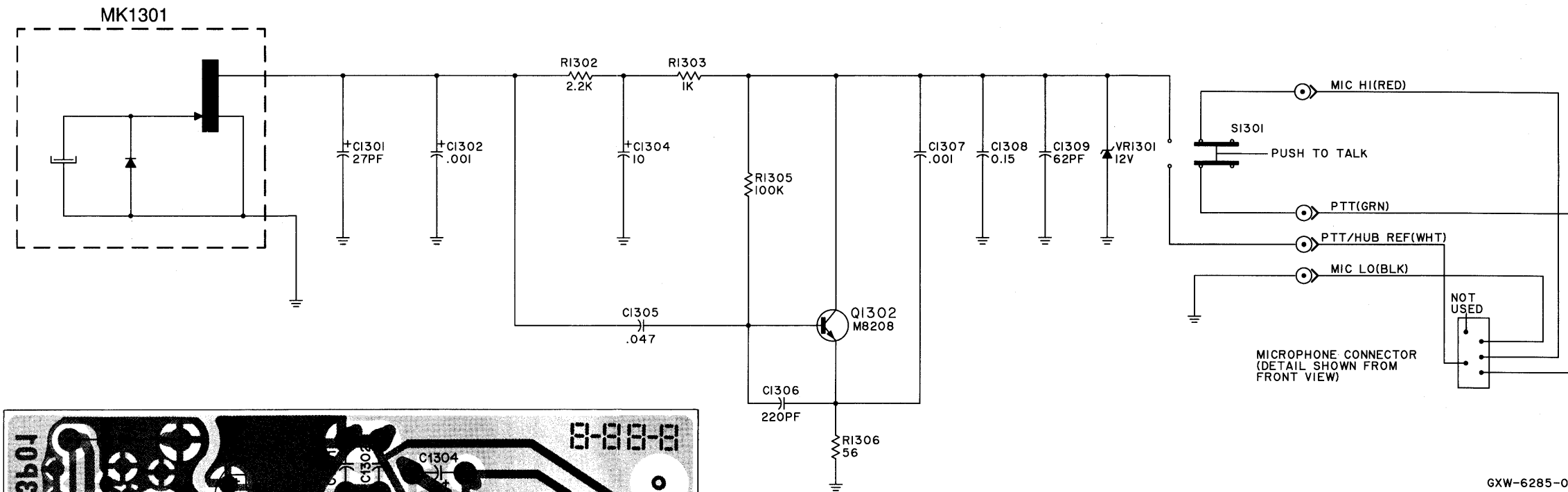
Microphone Hardware MXW-5096-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
1	15-80137D05	microphone front housing
2	38-80144D03	microphone button
3	30-80147H04	microphone cable
4	05-80221K01	PTT switch grommet
8	32-80058H03	housing gasket
10	01-80710T70	rear housing
11	03-80076E04	hi-lo screw
14	35-80089D01	felt baffle
15	05-80148D01	microphone grommet

6/15/88

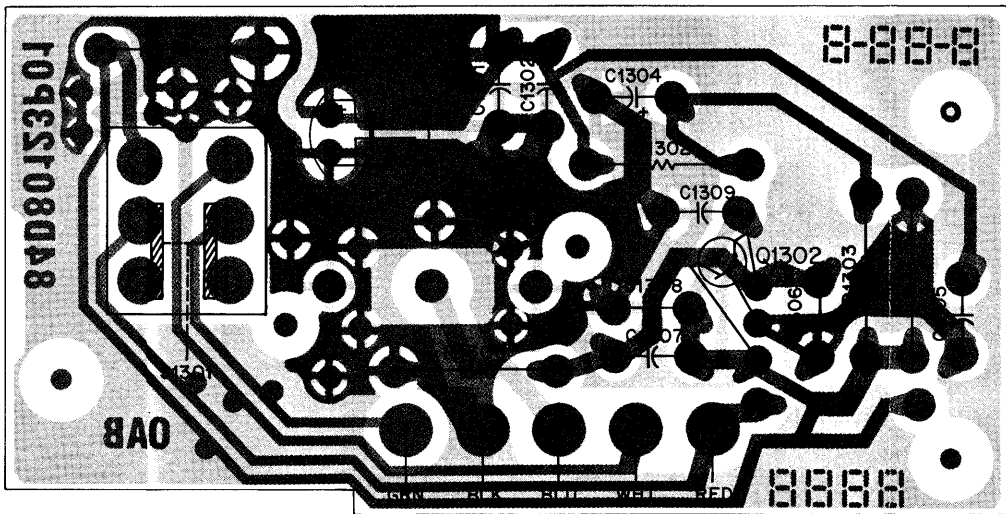
BASIC CONTROL HEAD MICROPHONE

GDW-5091-0



GXW-6285-0

BASIC CONTROL HEAD MICROPHONE SCHEMATIC



SOLDER SIDE • GBW-6287-0
COMPONENT SIDE • GBW-6288-0
OVERLAY — GBW-6289-0

parts list

HLN5459A Microphone Circuit Board MXW-6286-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed uF, ±5%, 50V (unless otherwise stated)		
C1301	21-11038H35	24 pF
C1302	21-11039B13	.001 ±10%
C1304	23-11019A20	10 ±20% 25V, electrolytic
C1305	08-11051A11	.047
C1306	21-11038P50	220 pF
C1307	21-11039B13	.001 ±10%
C1308	08-11051A14	.15 63V
C1309	21-11014H44	62pF, 100V
diode (see note)		
CR1301	48-11034A36	12V zener ±5% 400mW
microphone		
MK1301	50-80258E04	electret cartridge
transistor (see note)		
Q1302	48-11043C05	NPN
resistor, fixed ohm, ±5%, 1/4 watt (unless otherwise stated)		
R1302	06-11009A57	2.2k
R1303	06-11009A49	1k
R1305	06-11009A97	100k
R1306	06-11009A19	56
switch		
S1301	40-80065E02	momentary switch

mechanical part

14-80652E01 switch insulator

note: For best performance, order diodes, transistors, and integrated circuits by Motorola part number.

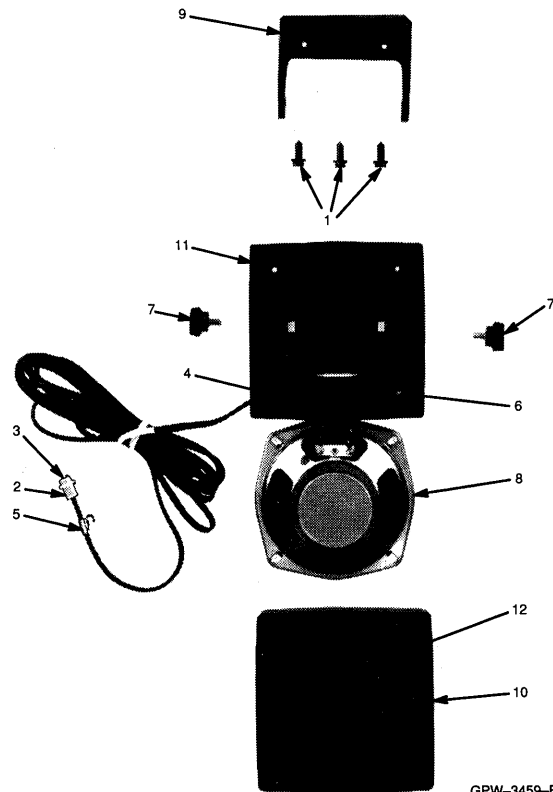
2/15/89

parts list

HSN4020A External Speaker
HSN4021A External Speaker MXW-5223-B

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	03-00136756	tapping screw, 10-16 x 5/8 (3 used)
2	15-10183A18	connector housing, 2- contact
3	39-10184A05	contact
4	42-82018H05	cable retainer
5	42-84081A03	wire clamp
6	03-00140001	tapping screw 6-19 x 7/8 (4-used)
7	03-84244C01	wing screw (2 used)
8	50-84561B08	speaker, 5", 30W
9	07-90200E02	trunnion bracket
10	13-82671M08	bezel
11	15-84981B09	cover
12	32-80195A01	gasket

5/15/89



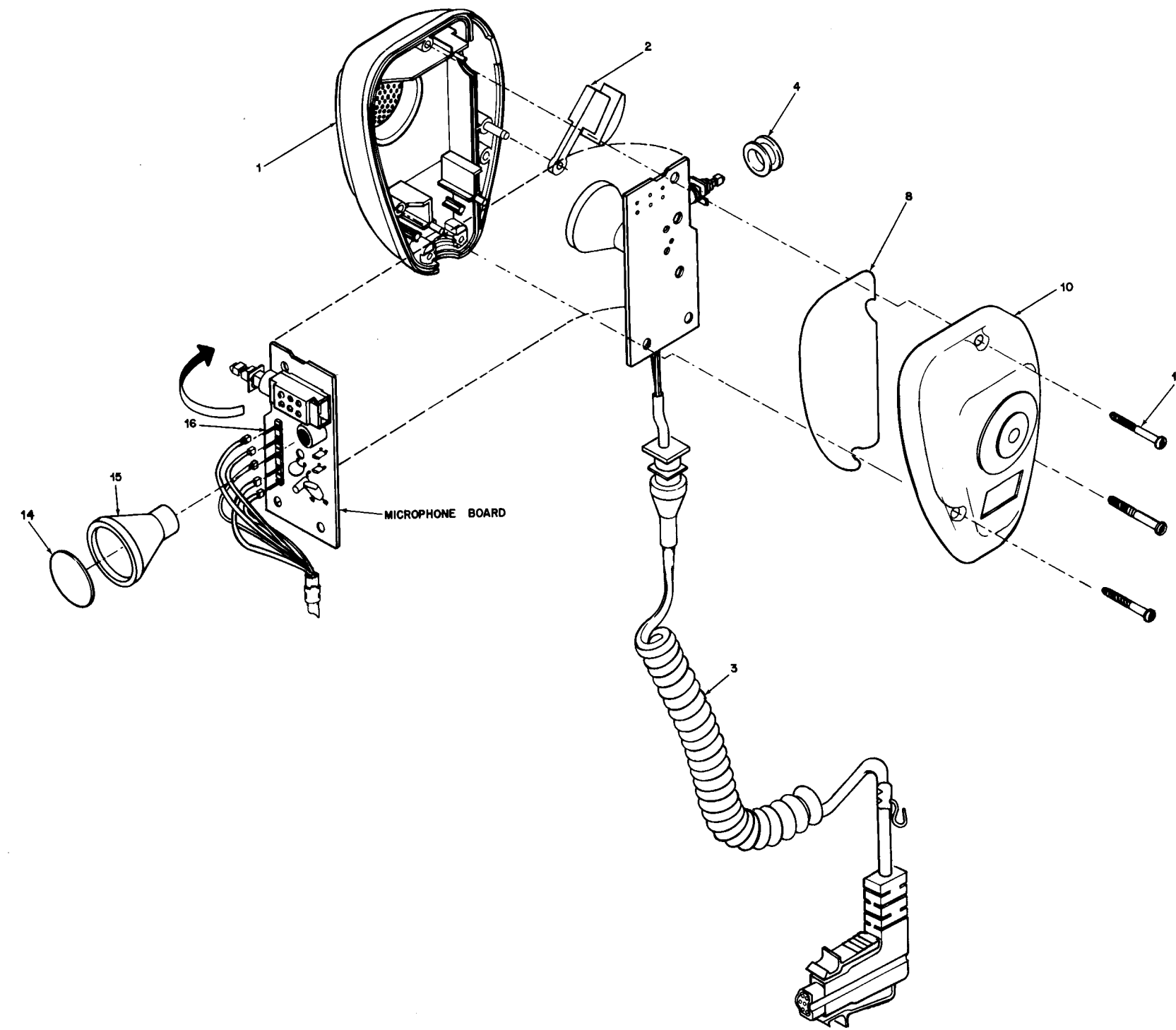
GPW-3459-B

Schematics, Circuit Board Diagram, Exploded Views,
and Parts Lists for MaraTrac Accessories

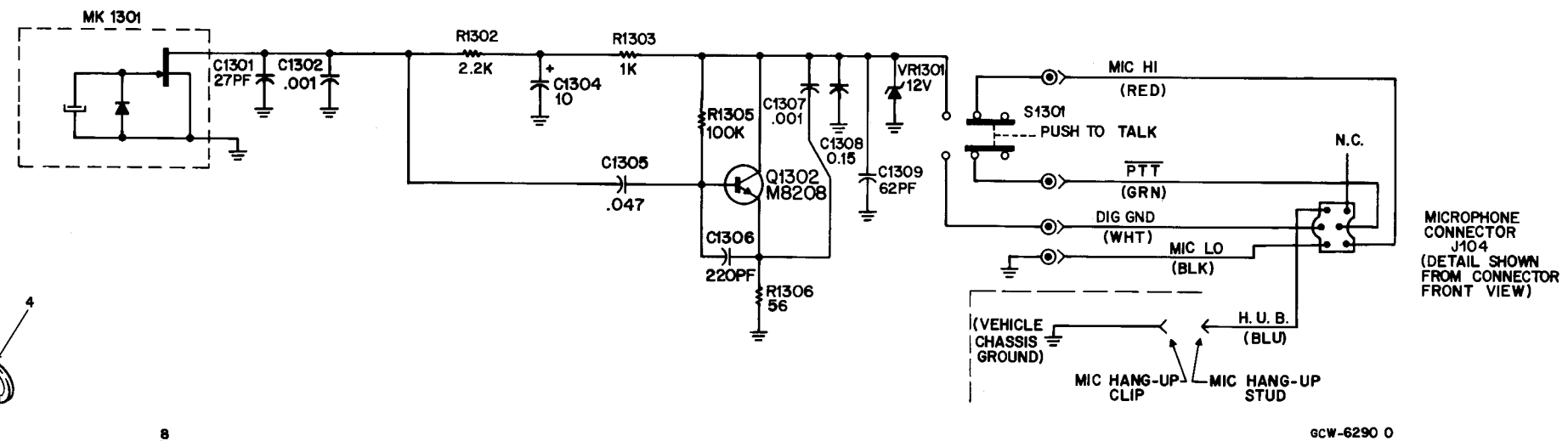
PW-5220-D

(Sheet 1 of 2)

5/15/89



ADVANCED CONTROL HEAD MICROPHONE



ADVANCED CONTROL HEAD MICROPHONE SCHEMATIC

parts list

HLN5389A Microphone Hardware			MXW-5475-A
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
1	15-80137D05	front housing	
2	38-80144D03	mic button	
3	30-80223J01	6 conductor cable	
4	05-80221K01	PTT switch grommet	
8	32-80058H03	housing gasket	
10	15-80137D03	rear housing (p/o housing assembly)	
11	03-80076E04	hi-lo metric screw, 3 used	
14	35-80089D01	felt baffle	
15	05-80148D01	mic cartridge grommet	
16	39-10184A10	contact plug, 5 used	
non referenced items			
	03-10943M09	tapping screw (3 x 0.5 x 6)	
	54-84962K01	safety tag	
	33-80016P01	nameplate	
	04-80093E01	flat washer (p/o housing assembly)	
	46-80297N01	hang-up stud (p/o housing assembly)	
	46-80281G01	mic weight (p/l housing assembly)	
8/30/88			

8/30/88

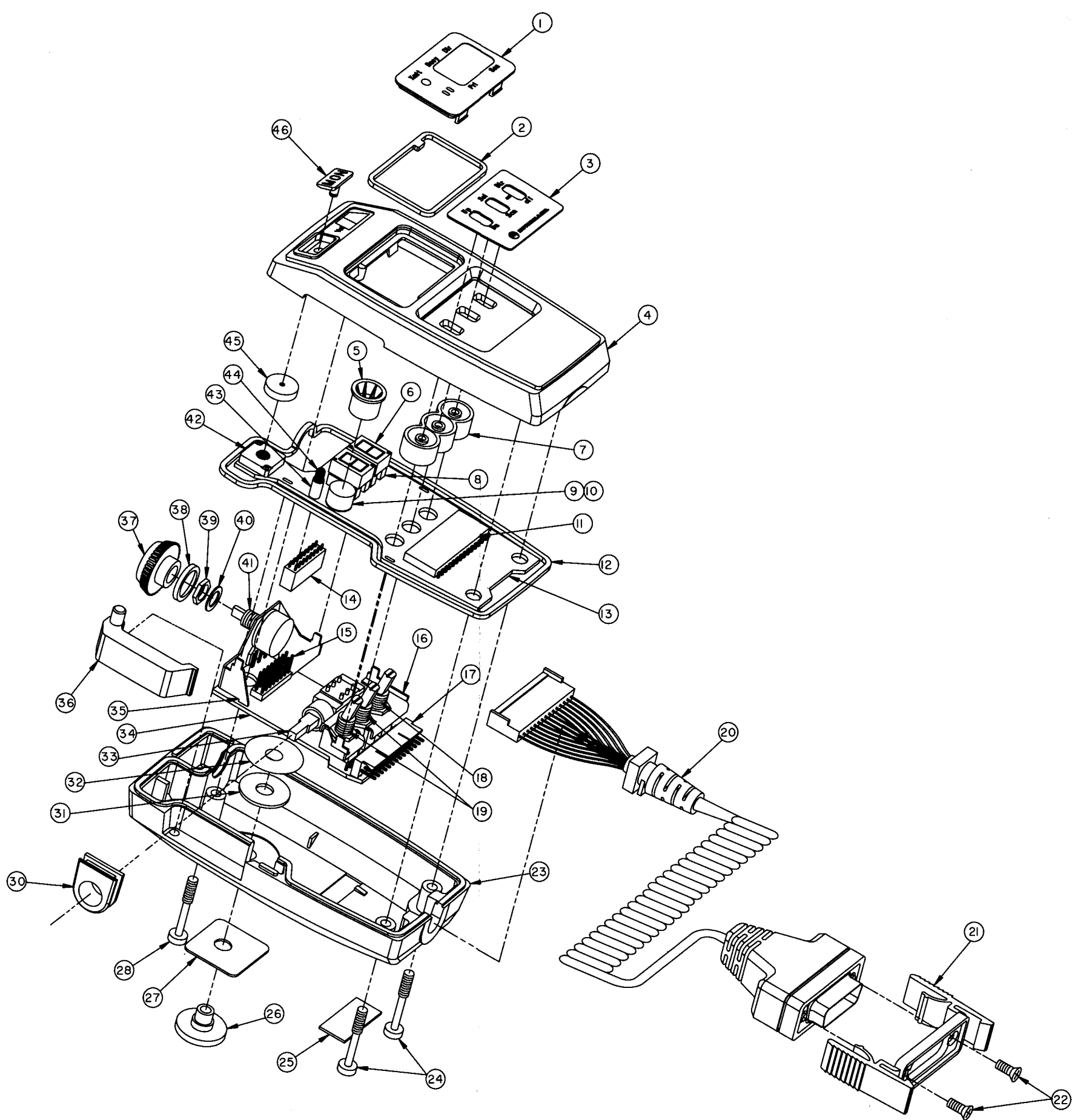
parts list

Handheld Control Head Exploded View MXW-5227-B

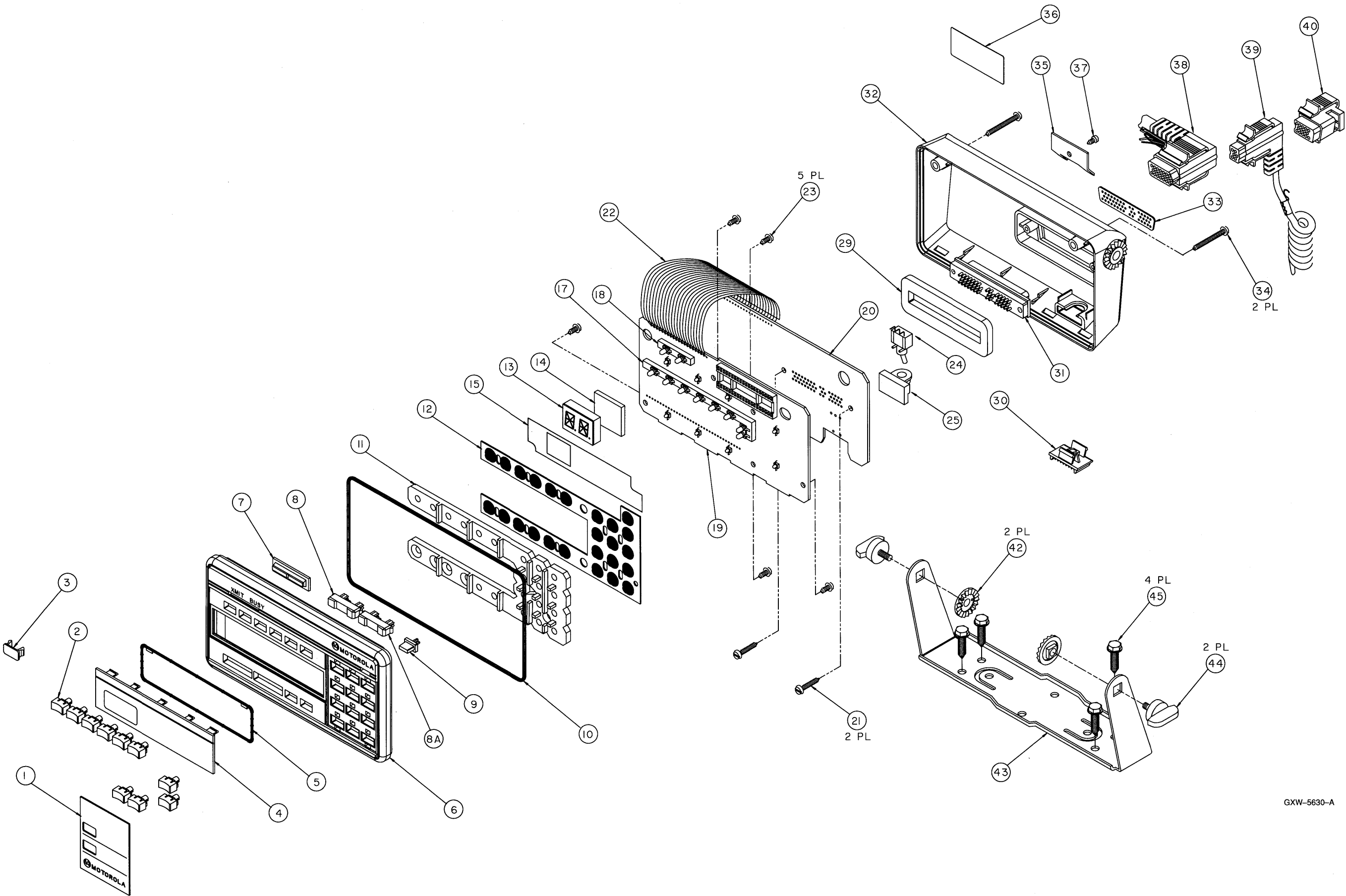
ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	61-80052H07	lens
2	32-80059H01	gasket, lens
3	13-80020H09	escutcheon (for talkaround)
3	13-80020H10	escutcheon (for non-talkaround)
4	15-80047H02	housing, front
5	32-80061H01	seal, microphone
6	48-80187G05	diode, common anode
7	32-80063H01	seal, switch
8	09-80197N01	receptacle, LED
9	50-80258E04	electret, microphone cartridge
10	14-80065H01	insulator, microphone
11	51-80135C08	IC display, driver MM5480
12	32-80058H02	gasket, housing
13	01-80749T73	circuit board, upper
14	09-80196N01	receptacle, vertical
15	28-80085E32	connector, male header
16	07-80050H01	bracket, switch
17	28-80195N01	plug, right angle
18	40-80123H06	switch, toggle
19	40-80123H01	switch, toggle
20	30-80227N01	cable, coiled
21	42-80253N01	clip, coiled cord
22	03-00140287	screw
23	15-80048H02	housing, back
24	03-80076E02	screw, metric, hi-lo
25	33-80025H21	nameplate, HHCH
26	05-00855939	rivet
27	04-80072H01	washer
28	03-80076E06	screw, metric, hi-lo
30	32-80060H01	seal, PTT
31	04-00139386	washer, flat
32	14-80258N01	insulator, microphone
33	40-80065E01	switch, momentary PTT
34	01-80749T68	circuit board, lower
35	07-80002J01	bracket, potentiometer
36	38-80131P01	button, PTT
37	36-80053H01	knob
38	42-84591A03	o-ring
39	02-80188H01	nut, hex, machine
40	04-00124629	washer, flat
41	18-80095D07	resistor, variable, squelch
42	40-80067H01	switch, momentary
43	43-80064H01	spacer, LED
44	48-05504C01	LED
45	32-80062H01	seal, button
46	38-80054H02	squelch button
47	32-80291N01	gasket retainer

5/15/89

HANDHELD CONTROL HEAD



ADVANCED CONTROL HEAD



GXW-5630-A

parts list

Advanced Control Head Hardware MXW-5585-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
1	13-80087J04	escutcheon
2	38-80197P02	pushbutton, MPL
2	38-80197P03	pushbutton, SCAN
2	38-80197P14	pushbutton, RCL
2	38-80197P18	pushbutton, SEL
2	38-80197P19	pushbutton, MON
2	38-80197P39	pushbutton, HOME
2	38-80197P10	pushbutton, H/L
3	38-80253K02	plug
4	61-80095J03	lens, vacuum fluorescent
5	32-80057K02	gasket, lens
6	15-80088J04	housing, front
7	61-80097J01	lens, LED
8	38-80195P03	rocker button, MODE
8A	38-80195P04	rocker button, VOL
9	38-80092J01	pushbutton, DIM
10	32-80180J02	gasket, housing
11	61-80185J02	light pipe, keypad
12	75-80098J01	keypad
13	—	LED display (see Control Heads display board)
14	75-80184J01	shock pad
15	14-80240N01	insulator
16	—	(not used)
17	43-80011L01	spacer, LED, 8-position
18	43-80012L01	spacer, LED, 2-position
19	—	display circuit board (see Control Heads)
20	—	control circuit board (see Control Heads)
21	03-10945A14	screw, tapping, M3.12 x 1.27 x 16
22	30-80034K01	flex cable
23	03-10945A11	screw, tapping, M3.12 x 1.27 x 8
24	—	toggle switch (see Control Heads control board)
25	32-80178J01	gasket, ON/OFF switch
26-28	—	(not used)
29	32-80179J01	gasket, D-connector
30	38-80128J01	topper, ON/OFF switch
31	—	D-connector (see Control Heads control board)
32	15-80089J02	housing, rear
33	32-80181J01	gasket, connector face
34	03-10908A33	screw, machine, M3.5 x 0.6 x 30
35	07-84323C01	bracket, strain relief
36	33-80178M03	nameplate
37	03-10908A18	screw, machine, M3 x 0.5 x 6
38	30-80184N02	radio cable
39	—	microphone cable (see Accessories Section)
40	15-80221J01	VIP connector
42	43-80127J01	spacer, trunnion
43	07-80263L01	bracket, trunnion
44	03-80160E01	screw, wing, M5.0 x .8 x 10
45	03-00136756	screw, tapping, 10-16 x 5/8

8/31/89

parts list

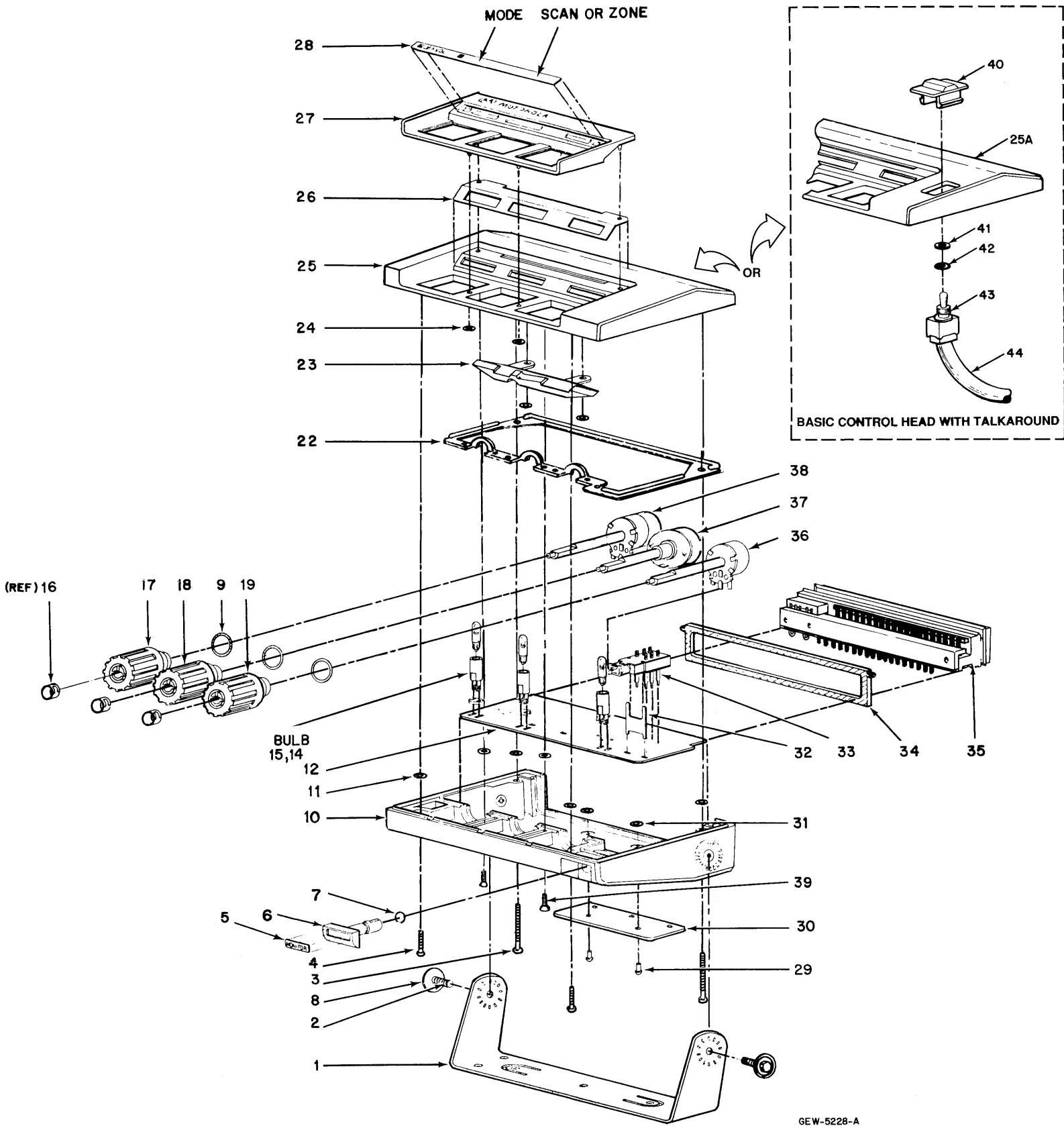
Basic Control Head Mechanical Parts

MXW-5229-A

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	07-80101A01	bracket, trunnion
2	03-00135726	screw, trunnion (2 used)
3	03-10908A33	screw, machine (M3.5x0.6x30)(2 used)
4	03-10908A29	screw, machine housing (2 used)
5	33-80117A01	nameplate "MONITOR"
6	36-80102A01	pushbutton
7	42-10128A22	"O" ring
8	04-00135784	washer, trunnion 2-used
9	42-10128A23	"O" ring (3-used)
10	15-80109A01	housing, bottom
11	04-80149A01	washer, caprice (6-used)
12	84-80148N01	printed circuit board
14	09-80051B01	light socket (3-used)
15	65-80284N01	light bulb (3-used)
16	42-10082A14	retainer, knob (3-used) (for Ref. vendor installed)
17	36-80107A01	knob, volume squelch
18	36-80107A05	knob, mode
19	36-80107A06	knob, zone
	or	
	36-80107A07	knob, scan
22	32-80203B01	gasket, housing
23	61-80119A01	lens
24	42-10113A31	retainer ring (6-used)
25	15-80108A01	housing, top (for non-talkaround)
25A	15-80221N01	housing, top (talkaround)
26	32-80140B03	gasket, bezel
27	13-80114A04	bezel
28	33-80116A09	nameplate (overlay) (8-mode)
	or	
	33-80116A10	nameplate (16-mode)
29	05-00132475	rivet (2-used)
30	07-80100A02	bracket, strain relief
31	04-00007555	washer, flat (2-used)
32	07-80159A01	bracket, switch
33	40-80127A03	switch, pushbutton
34	32-80038C01	gasket, connector
35	01-80749T24	connector assembly
36	40-80166N02	switch, rotary 2-P
37	40-80166N01	switch, rotary 8-P
38	18-80126A03	potentiometer, rotary
39	03-10913A29	screw, machine (2-used)(M3.5x0.6x1x3)
	03-00136756	screw, tapping, 10-16 x 5/8" (3-used)
		(for trunnion mounting)
40	38-80202N01	repeat/direct button
41	02-82653D01	nut, spanner
42	15-80201N01	switch, housing (p/o 25A)
43	32-05082E20	o-ring
44	40-05680K03	toggle switch
45	01-80749T20	cable, talkaround

6/15/88

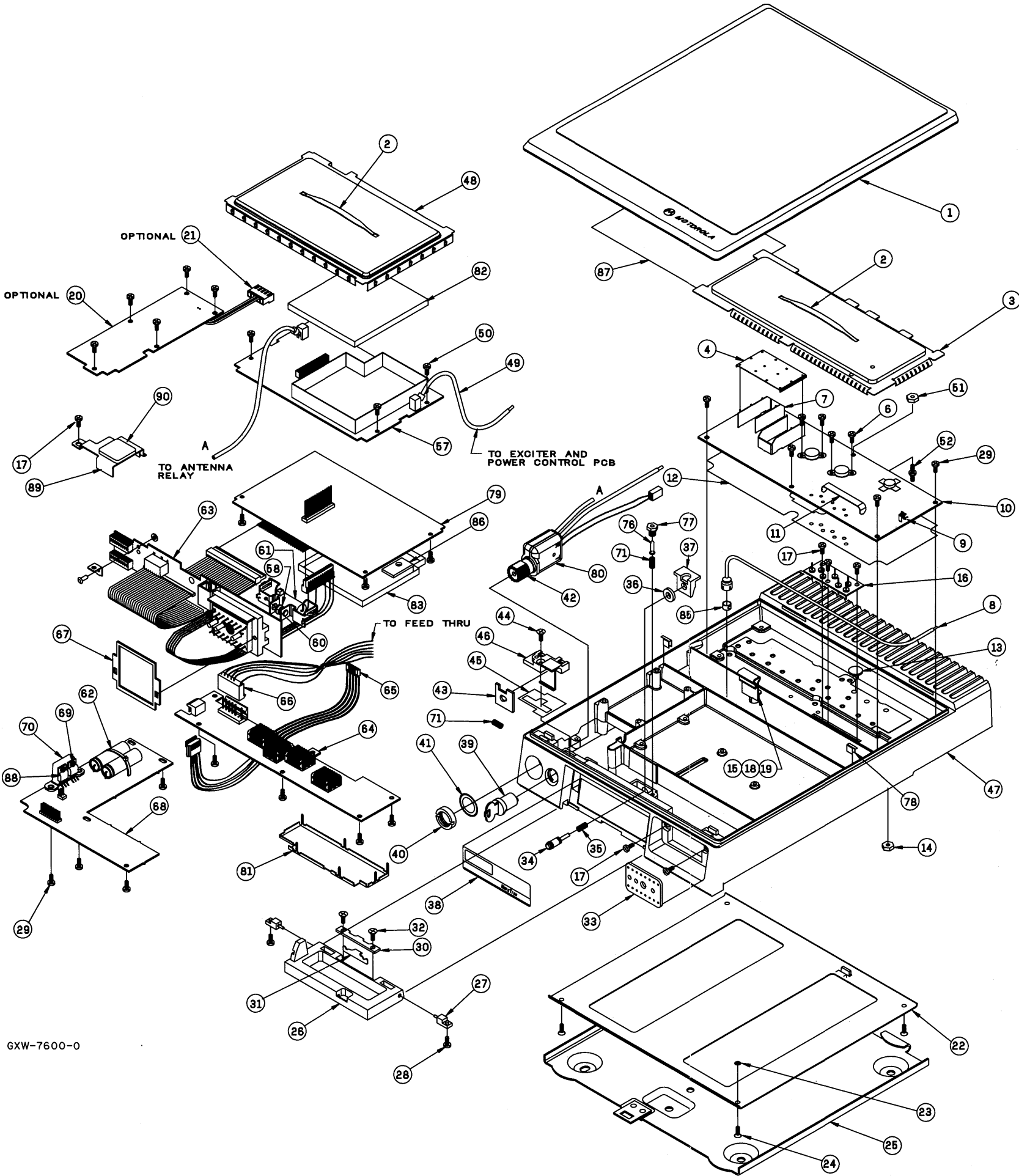
BASIC CONTROL HEAD



parts list

MaraTrac Low Band Radio Exploded View

MXW-7671-O

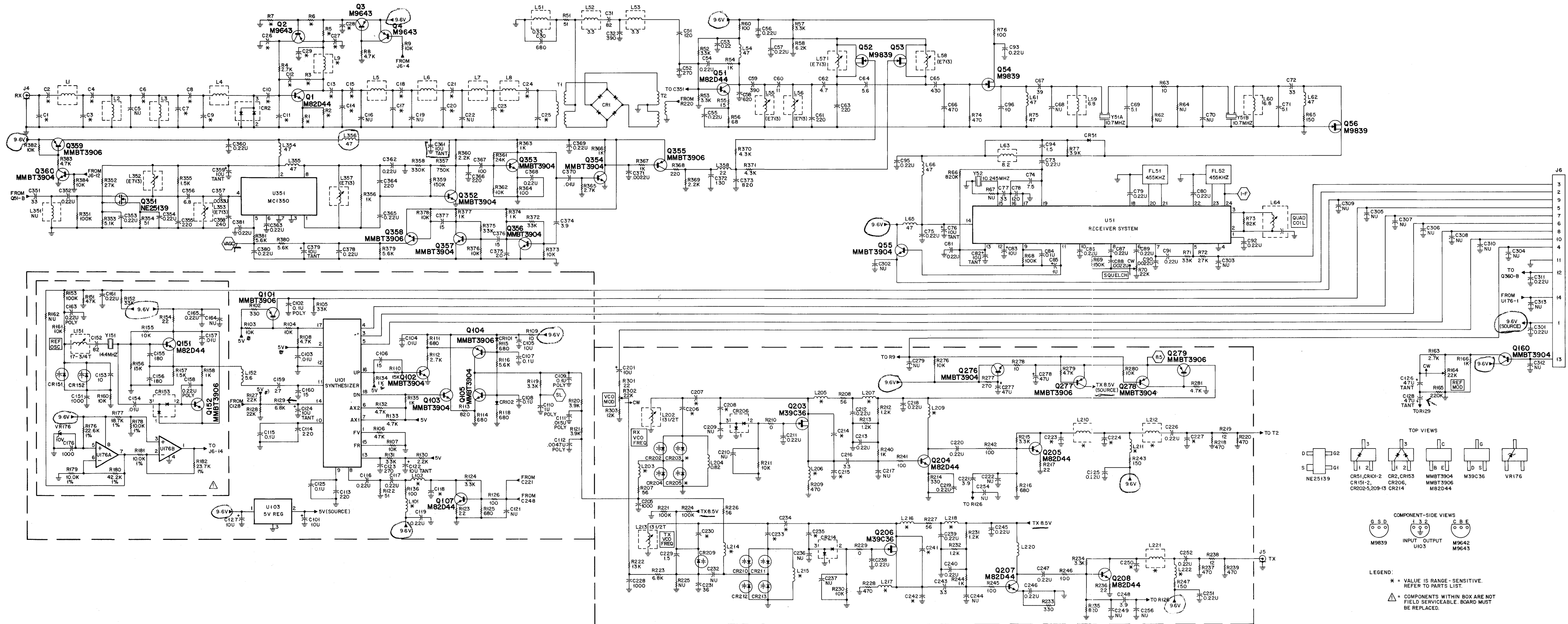


REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
1	—	top cover assembly
2	55-84300B04	handle, nylon (2 used)
3	26-80070B01	shield, PA compartment
4	15-80205A02	cover, RF shield (HLB4115, Range 3)
5	—	not used
6	03-10911A11	machine screw, 3 x 0.5 x 8 (4 used)
7	26-80107P01	shield, RF (2 used) (HLB4115, Range 3)
8	01-80750T31	coaxial cable assembly
9	29-80014A01	clip, coaxial terminal
10	—	110W PA circuit board (Range 3)
11	17-80165C02	resistor, shunt (HLB4115, Range 3)
12	14-80143A03	insulator, PA
13	32-80084A02	gasket, stud device (2 used)
14	02-00119913	nut
15	26-80254A01	heatsink, LLA
16	—	feedthru plate assembly
17	03-10908A26	machine screw, 3.5 x 0.6 x 6 (6 used)
18	02-00007005	nut
19	26-80238N01	heatsink, TO5
20	—	option circuit board
21	30-80157N01	cable, 2 conductor
22	—	bottom cover assembly
23	04-80149A01	washer, captivating (4 used)
24	03-10913A29	machine screw, 3.5 x 0.6 x 13 (4 used)
25	—	mounting tray assembly
26	55-80002A01	handle
27	47-80176P01	pin, pivot (2 used)
28	03-10943R55	tapping screw 3 x 0.5 x 8 (2 used)
29	03-10943M16	tapping screw 3.5 x 0.6 x 10 (19 used)
30	64-80019A01	plate, backup
31	07-80113B01	bracket, latch
32	03-80001P01	screw, 3.5 x 0.6 x 6 (2 used)
33	32-80020C01	gasket, front cable connector
34	47-80027A01	pushbutton
35	41-80029A01	spring latch
36	32-80295C01	gasket
37	07-80030A01	bracket, latch
38	33-80028N03	nameplate, radio
39	55-80370A01	lock
40	02-80006A01	nut, spanner
41	04-00114522	lockwasher
42	32-80080A01	gasket, antenna connector
43	07-80016A01	bracket, lock slide
44	03-10936E14	tapping screw, B3.5 x 1.27 x 13
45	32-80000P01	gasket, lock support
46	07-80015A01	support, lock slide
47	27-80003P01	chassis
48	26-80092P01	shield, RF
49	30-80231N01	cable, coaxial
50	03-10943M10	tapping screw, 3.5 x 0.6 x 8 (12 used)
51	02-10971A63	nut, hex
52	43-80013B01	stand off
53-56	—	not used
57	—	RF circuit board (Range 3)
58	48-80153A01	diode, pellet
59	—	not used
60	26-80191P01	heatsink (2 used)
61	23-80167C03	capacitor, electrolytic
62	42-10217A14	strap, cable harness (2 used)
63	—	interconnect circuit board
64	—	exciter/power control circuit board
65	30-80159N01	cable, power control
66	30-80234N01	cable, feedthru
67	32-80074A02	gasket, cable plug
68	—	audio/squelch circuit board
69	03-10908A18	screw, 3 x 0.5 x 6 (2 used) (HLN5342)
70	26-80129P01	heatsink (HLN5342)
71	41-80022A01	lock, spring (2 used)
72-75	—	not used
76	46-80151A01	stud, cover release
77	43-80150A01	sleeve, cover release
78	42-80013A01	clip, coaxial (3 used)
79	—	logic circuit board
80	—	antenna relay assembly
81	26-80163N01	shield, solder side
82	15-80953T01	cover, VCO shield
83	15-80124M01	cover, logic shield
84	—	not used
85	42-84733F04	ring, compression
86	75-80202C01	pad, compression
87	54-80166K01	label
88	51-80065C03	IC audio (2 used) (HLN5342)
89	07-80126P01	bracket, relay
90	75-82200H01	pad
non-referenced items		
30-10286A06		cable, 14 gage red
30-10286A04		cable, 14 gage black

03/28/90

GXW-7600-0

3/30/90



Range 1 Parts List

HLB4099A RF Board, 29.7–36 MHzMXW-6563-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, chip, pF, ±5%, 50V (unless otherwise indicated)		
C1	21-13740B55	180
C2	21-11032B15	0.22 uF, +80-20%
C3	21-13740B66	510
C4	21-13740B57	220
C6	21-13740B38	36
C7	21-13740B19	5.6, ±.25 pF
C8	21-13740B55	180
C9	21-13740B68	620
C10	21-11032B15	0.22 uF, +80-20%
C11	21-13740B55	180
C12,13	21-11032B15	0.22 uF, +80-20%
C14	—	not used
C15	21-13740B46	75
C17	21-13740B66	510
C18	21-13740B61	330
C19	—	not used
C20	21-13740B71	820
C21	21-13740B60	300
C23	21-13740B69	680
C24	21-13740B73	1000
C25	21-13740B61	330
C26-29	21-11032B15	0.22 uF, +80-20%
C30	21-13740B69	680
C31	21-13740B48	91
C32	21-13740B63	390
C33	—	not used
C51	21-13740B52	130
C52	21-13740B59	270
C53-57	21-11032B15	0.22 uF, +80-20%
C58	21-13740B68	620
C59	21-13740B63	390
C60	21-13740B26	11
C61	21-13740B57	220
C62	21-13740B17	4.7, ±.25 pF
C63	21-13740B57	220
C64	21-13740B19	5.6, ±.25 pF
C65	21-13740B64	430
C66	21-13740B65	470
C67	21-13740B39	36
C69	21-13740B18	5.1, ±.25 pF
C71	21-13740B18	5.1, ±.25 pF
C72	21-13740B37	33
C73	21-11032B15	0.22 uF, +80-20%
C74	21-13740B22	7.5, ±.5 pF
C75	21-11032B15	0.22 uF, +80-20%
C76	23-11013D13	10 uF, ±10%, 20V, tantalum
C77	21-13740B37	33
C78	21-13740B51	120
C79-81	21-11032B15	0.22 uF, +80-20%
C82	23-11013D13	10 uF, ±10%, 20V, tantalum
C83	23-11048B13	10 uF, ±20%, 16V, electrolytic
C84	21-11032B13	0.1 uF, +80-20%
C85	23-11048B05	1 uF, ±20%, electrolytic
C86,87	21-11032B15	0.22 uF, +80-20%
C88	21-13741B29	0.0022 uF, ±10%
C89	21-11032B15	0.22 uF, +80-20%
C90	21-13741B29	0.0022 uF, ±10%
C91-93	21-11032B15	0.22 uF, +80-20%
C94	21-13740B05	1.5, ±.25 pF
C95	21-11032B15	0.22 uF, +80-20%
C96	21-13740B25	10, ±.5 pF
C101	23-11048B13	10 uF, ±20%, 16V, electrolytic
C102	08-11051A13	0.1 uF, 63V
C103,104	21-13741B45	0.01 uF, ±10%
C105	23-11048B13	10 uF, ±20%, 16V, electrolytic
C106	21-13740B47	82
C107,108	21-11032B13	0.1 uF, +80-20%
C109	08-11051A13	0.1 uF, 63V
C110	08-11044A33	1 uF
C111	08-11051A08	0.015 uF, 63V
C112	08-11051A05	0.0047 uF, 63V
C113,114	21-13740B57	220
C115	21-11032B13	0.1 uF, +80-20%
C116,117	21-11032B15	0.22 uF, +80-20%
C118	21-13740B33	22
C119	21-11032B15	0.22 uF, +80-20%
C122	23-11013D13	10 uF, ±10%, 20V, tantalum
C123	21-13740B59	270
C124	23-11013D13	10 uF, ±10%, 20V, tantalum
C125	21-11032B13	0.1 uF, +80-20%
C126	23-11013A56	47 uF, ±20%, 6V, tantalum
C127	23-11048B13	10 uF, ±20%, 16V, electrolytic
C128	23-11013A56	47 uF, ±20%, 6V, tantalum
C151	21-13740B73	1000
C152	21-13740B47	82
C153	21-13740B25	10, ±.5 pF
C154	21-13741B45	0.01 uF, ±10%
C155,156	21-13740B55	180
C157	21-13741B45	0.01 uF, ±10%
C158	08-11051A15	0.22 uF, 63V
C159	21-13740B29	15
C160	21-13740B41	47
C161	21-11032B15	0.22 uF, +80-20%
C163	08-11051A15	0.22 uF, 63V
C165	21-11032B15	0.22 uF, +80-20%
C176	21-13740B73	1000
C201	23-11048B13	10 uF, ±20%, 16V, electrolytic
C205	21-13740B73	1000
C206,207	21-13740B45	68

MXW-6563-B (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C208	21-13740B17	4.7, ±.25 pF
C211-213	21-11032B15	0.22 uF, +80-20%
C214,215	21-13740B43	56
C216	21-13740B13	3.3, ±.25 pF
C218-220	21-11032B15	0.22 uF, +80-20%
C221	21-13740B15	3.9, ±.25 pF
C223	21-13740B25	10, ±.5 pF
C224	21-13740B41	47
C225,226	21-11032B15	0.22 uF, +80-20%
C227	21-13740B41	47
C228	21-13740B73	1000
C229	21-13740B05	1.5, ±.25 pF
C230	21-13740B19	5.6, ±.25 pF
C231	21-13740B38	36
C233	21-13740B63	390
C234	21-13740B49	100
C235	21-13740B17	4.7, ±.25 pF
C238-240	21-11032B15	0.22 uF, +80-20%
C241,242	21-13740B47	82
C243	21-13740B13	3.3, ±.25 pF
C245-247	21-11032B15	0.22 uF, +80-20%
C248	21-13740B15	3.9, ±.25 pF
C250	21-13740B29	15
C251,252	21-11032B15	0.22 uF, +80-20%
C277,278	23-11048B19	47 uF, ±20%, 16V
C301	21-11032B15	0.22 uF, +80-20%
C311	21-11032B15	0.22 uF, +80-20%
C351	21-13740B37	33
C352-354	21-11032B15	0.22 uF, +80-20%
C355	21-13740B57	220
C356	21-13740B21	6.8, ±.5 pF
C357	21-13741B33	0.0033 uF, ±10%
C358	21-13740B58	240
C359	23-11013D13	10 uF, ±10%, 20V, tantalum
C360	21-11032B15	0.22 uF, +80-20%
C361	23-11013D13	10 uF, ±10%, 20V, tantalum
C362,363	21-11032B15	0.22 uF, +80-20%
C364	21-13740B57	220
C365	21-11032B15	0.22 uF, +80-20%
C366	21-13740B57	220
C367	21-13740B49	100
C368,369	21-11032B15	0.22 uF, +80-20%
C370	21-13741B37	0.0047 uF, ±10%
C371	21-13741B29	0.0022 uF, ±10%
C372	21-13740B52	130
C373	21-13740B72	910
C374	21-13740B25	10
C376,377	21-13740B29	15
C378	21-11032B15	0.22 uF, +80-20%
C379	23-11013D13	10 uF, ±10%, 20V, tantalum
C380,381	21-11032B15	0.22 uF, +80-20%
diode (see note)		
CR1	48-80236E16	quad Schottky, crossed
CR2	48-80154K03	dual Schottky, SOT
CR51	48-05128M76	silicon, SOT
CR101,102	48-05128M76	silicon, SOT
CR151,152	48-80006E10	silicon varactor, SOT
CR202	48-80991T01	silicon varactor, SOT
CR203	—	not used
CR204	48-80991T01	silicon varactor, SOT
CR205	—	not used
CR206	48-80154K03	dual Schottky, SOT
CR209	48-80006E10	silicon varactor, SOT
CR210-213	48-80991T01	silicon varactor, SOT
CR214	48-80154K03	dual Schottky, SOT
filters		
FL51	91-80097D05	455 kHz, 6E
FL52	91-80098D05	455 kHz, 4E
connector, receptacle		
J4,5	09-80135M01	coaxial (RX, TX)
J6	09-80130M02	14-pin socket (logic board)
coil		
L1-8	24-80148M21	9-1/2 turns (white)
L9	24-80063M04	0.18 uH
L51	24-80063M07	0.33 uH
L52,53	24-80063M19	3.3 uH
L54	24-80063M31	47 uH
L55-58	24-80164M01	tunable, 0.7 uH
L59,60	24-80063M23	6.8 uH
L61,62	24-80063M31	47 uH
L63	24-80063M24	8.2 uH
L64	25-80000E01	tunable, 455 kHz
L65,66	24-80063M31	47 uH
L101	24-80063M24	8.2 uH
L102	24-80063M11	0.68 uH
L151	24-80299D01	tunable, 17-3/4 turns
L152	24-80063M22	5.6 uH
L202	24-80931W26	tunable, 13-1/2 turns
L203	24-80063M23	6.8 uH
L204	24-80063M12	0.82 uH
L205-207	24-80063M23	6.8 uH
L209	24-80063M23	6.8 uH
L210	24-80063M13	1.0 uH
L211	24-80063M23	6.8 uH
L212	24-80063M07	0.33 uH
L213	24-80931W26	tunable, 13-1/2 turns
L214	24-80063M24	8.2 uH
L215	24-80063M12	0.82 uH

MXW-6563-B (3)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L216-218	24-80063M24	8.2 uH
L220	24-80063M24	8.2 uH
L221	24-80063M11	0.68 uH
L222	24-80063M24	8.2 uH
L352,353	24-80164M01	tunable, 0.7 uH
L354-356	24-80063M31	47 uH
L357	24-80164M01	tunable, 0.7 uH
L358	24-80063M27	22 uH
transistor (see note)		
Q1	48-80182D44	NPN
Q2-4	48-11043C06	PNP
Q51	48-80182D44	NPN
Q52-54	48-11043C12	FET
Q55	48-80214G02	NPN
Q56	48-11043C12	FET
Q101	48-05128M16	PNP
Q102,103	48-80214G02	NPN
Q104	48-05128M16	PNP
Q105	48-80214G02	NPN
Q107	48-80182D44	NPN
Q151	48-80182D44	NPN
Q152	—	not used
Q160	48-80214G02	NPN
Q203	48-80141L06	FET
Q204,205	48-80182D44	NPN
Q206	48-80141L06	FET
Q207,208	48-80182D44	NPN
Q276	48-80214G02	NPN
Q277-279	48-05128M16	PNP
Q351	48-80930W01	dual gate FET
Q352-354	48-80214G02	NPN
Q355	48-05128M16	PNP
Q356,357	48-80214G02	NPN
Q358,359	48-05128M16	PNP
Q360	48-80214G02	NPN
resistor, chip, ohm, ±5%, 1/8 watt (unless otherwise indicated)		
R1	06-11077A26	10
R2	06-11077A30	15
R3	06-11077A68	560
R4	06-11077A84	2.7k
R5	06-11077A56	180
R6	06-11077A98	10k
R7	06-11077A94	6.8k
R8	06-11077A90	4.7k
R9	06-11077A98	10k
R51	06-11077A43	51
R52,53	06-11077A86	3.3k
R54	06-11077A74	1k
R55	06-11077A30	15
R56	06-11077A46	68
R57	06-11077A86	3.3k
R58	06-11077A93	6.2k
R60	06-11077A50	100
R63	06-11077A26	10
R65	06-11077A54	150
R66	06-11077B45	820k
R68	06-11077B23	100k
R69	06-11077B27	150k
R70	18-05500L08	variable, 22k
R71	06-11077B11	33k
R72	06-11077B09	27k
R73	06-11077B21	82k
R74	06-11077A66	470
R75	06-11077A42	47
R76	06-11077A50	100
R77	06-11077A88	3.9k
R102	06-11077A62	330
R103,104	06-11077A98	10k
R105	06-11077B11	33k
R106	06-11077B15	47k
R107	06-11077A98	10k
R108	06-11077A90	4.7k
R109	06-11077A26	10
R110	06-11077B03	15k
R111	06-11077A70	680
R112	06-11077A84	2.7k
R113	06-11077A72	820
R114,115	06-11077A70	680
R116	06-11077A92	5.6k
R118	06-11077A70	680
R119	06-11077A86	3.3k
R120,121	06-11077A88	3.9k
R122	06-11077A43	51
R123	06-11077A34	22
R124	06-11077A86	3.3k
R125	06-11077A70	680
R126	06-11077A50	100
R127	06-11077B07	22k
R128	06-11077B11	33k
R129	06-11077A94	6.8k
R130	06-11077A82	2.2k
R131	06-11077B11	33k
R132,133	06-11077A90	4.7k
R134,135	06-11077A74	1k
R136	06-11077A50	100
R151	06-11077B15	47k
R152	06-11077B11	33k
R153	06-11077B23	100k
R154	06-11077A34	22

MXW-6563-B (4)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R155	06-11077A98	10k
R156	06-11077B03	15k
R157	06-11077A78	1.5k
R158	—	not used
R160,161	06-11077A98	10k
R163	06-11077A84	2.7k
R164	18-05500L08	variable, 22

Range 3 Parts List

HLB4101A RF Board, 42–50 MHzMXW-6348-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, chip, pF, ±5%, 50V (unless otherwise indicated)		
C1	21-13740B48	91
C2	21-13740B65	470
C3	21-13740B59	270
C4	21-13740B49	100
C6	21-13740B29	15
C8	21-13740B48	91
C9	21-13740B64	430
C10	21-13740B57	220
C11	21-13740B55	180
C12	21-13741B49	0.015 uF, ±10%
C13	21-13740B51	120
C14	21-13740B62	360
C15	21-13740B61	120
C17	21-13740B67	560
C18	21-13740B52	130
C20	21-13740B67	560
C21	21-13740B52	130
C23	21-13740B64	430
C24	21-13740B58	240
C25	21-13740B56	200
C26-29	21-13741B49	0.015 uF, ±10%
C30	21-13740B69	680
C31	21-13740B47	82
C32	21-13740B63	390
C51	21-13740B51	120
C52	21-13740B59	270
C53-57	21-11032B15	0.22 uF, +80-20%
C58	21-13740B68	620
C59	21-13740B63	390
C60	21-13740B26	11
C61	21-13740B57	220
C62	21-13740B17	4.7, ±25 pF
C63	21-13740B57	220
C64	21-13740B19	5.6, ±25 pF
C65	21-13740B64	430
C66	21-13740B65	470
C67	21-13740B39	39
C69	21-13740B18	5.1, ±25 pF
C71	21-13740B18	5.1, ±25 pF
C72	21-13740B37	33
C73	21-11032B15	0.22 uF, +80-20%
C74	21-13740B22	7.5, ±5 pF
C75	21-11032B15	0.22 uF, +80-20%
C76	23-11013D13	10 uF, ±10%, 20V, tantalum
C77	21-13740B37	33
C78	21-13740B51	120
C79-81	21-11032B15	0.22 uF, +80-20%
C82	23-11013D13	10 uF, ±10%, 20V, tantalum
C83	23-11048B13	10 uF, ±20%, 16V, electrolytic
C84	21-11032B13	0.1 uF, +80-20%
C85	23-11048B05	1 uF, ±20%, electrolytic
C86,87	21-11032B15	0.22 uF, +80-20%
C88	21-13741B29	0.0022 uF, ±10%
C89	21-11032B15	0.22 uF, +80-20%
C90	21-13741B29	0.0022 uF, ±10%
C91-93	21-11032B15	0.22 uF, +80-20%
C94	21-13740B05	1.5, ±25 pF
C95	21-11032B15	0.22 uF, +80-20%
C96	21-13740B25	10, ±5 pF
C101	23-11048B13	10 uF, ±20%, 16V, electrolytic
C102	08-11051A13	0.1 uF, 63V
C103,104	21-13741B45	0.01 uF, ±10%
C105	23-11048B13	10 uF, ±20%, 16V, electrolytic
C106	21-13740B29	15
C107,108	21-11032B13	0.1 uF, +80-20%
C109	08-11051A13	0.1 uF, 63V
C110	08-11044A33	1 uF
C111	08-11051A08	0.015 uF, 63V
C112	08-11051A05	0.0047 uF, 63V
C113,114	21-13740B57	220
C115	21-11032B13	0.1 uF, +80-20%
C116,117	21-11032B15	0.22 uF, +80-20%
C118	21-13740B27	12
C119	21-11032B15	0.22 uF, +80-20%
C122	23-11013D13	10 uF, ±10%, 20V, tantalum
C123	21-13740B59	270
C124	23-11013D13	10 uF, ±10%, 20V, tantalum
C125	21-11032B13	0.1 uF, +80-20%
C126	23-11013A56	47 uF, ±20%, 6V, tantalum
C127	23-11048B13	10 uF, ±20%, 16V, electrolytic
C128	23-11013A56	47 uF, ±20%, 6V, tantalum
C151	21-13740B73	1000
C152	21-13740B47	82
C153	21-13740B25	10, ±5 pF
C154	21-13741B45	0.01 uF, ±10%
C155,156	21-13740B55	180
C157	21-13741B45	0.01 uF, ±10%
C158	08-11051A15	0.22 uF, 63V
C159	21-13740B35	27
C160	21-13740B29	15
C161	21-11032B15	0.22 uF, +80-20%
C163	08-11051A15	0.22 uF, 63V
C165	21-11032B15	0.22 uF, +80-20%
C176	21-13740B73	1000
C201	23-11048B13	10 uF, ±20%, 16V, electrolytic
C205	21-13740B73	1000
C206	21-13740B37	33
C207	21-13740B27	12
C208	21-13740B17	4.7, ±25 pF
C211-213	21-11032B15	0.22 uF, +80-20%

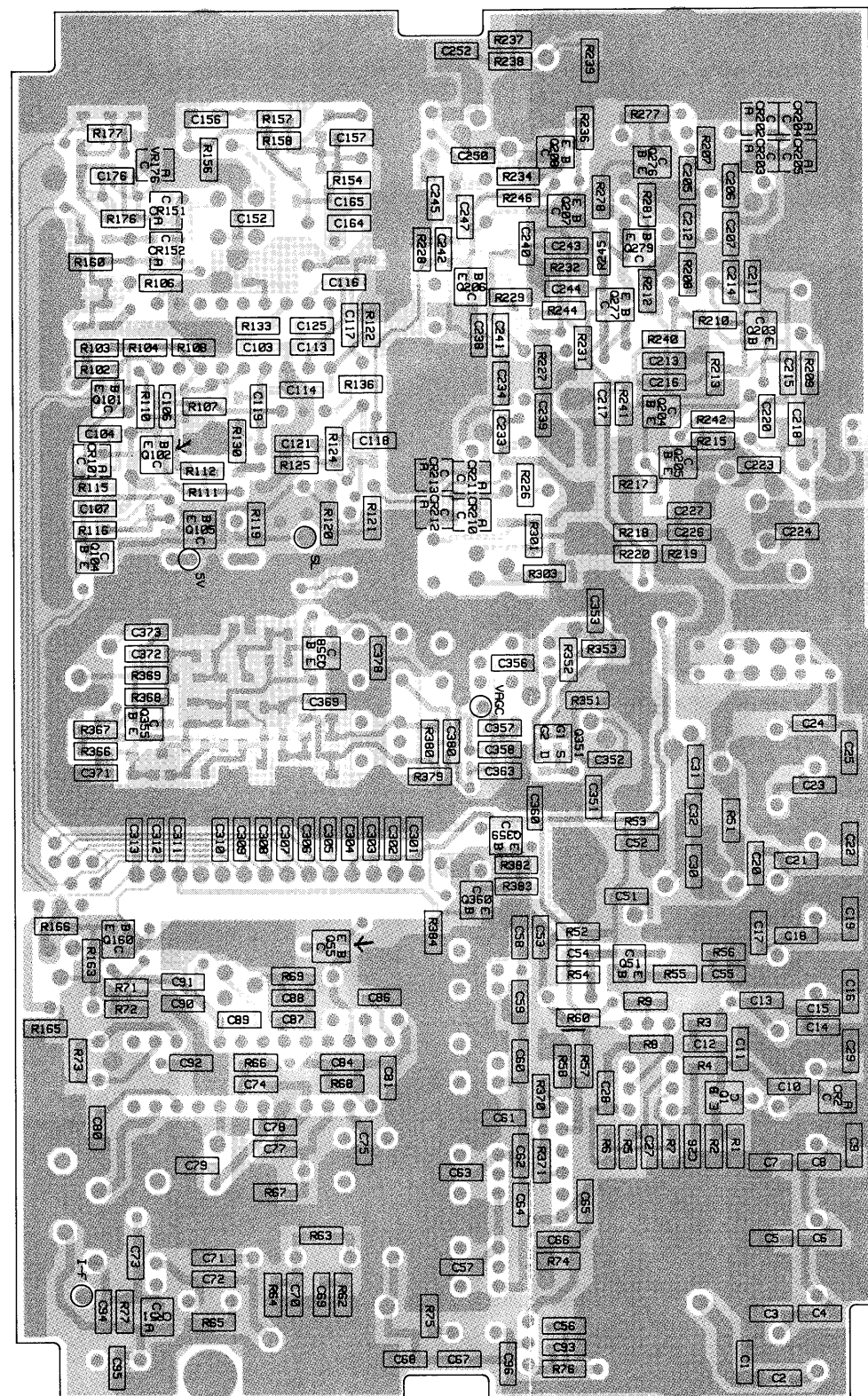
MXW-6348-B (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C214,215	21-13740B27	12
C216	21-13740B13	3.3, ±25 pF
C218-220	21-11032B15	0.22 uF, +80-20%
C221	21-13740B15	3.9, ±25 pF
C223	21-13740B21	6.8, ±25 pF
C224	21-13740B39	39
C225,226	21-11032B15	0.22 uF, +80-20%
C227	21-13740B37	33
C228	21-13740B73	1000
C229	21-13740B05	1.5, ±25 pF
C230	21-13740B15	3.9, ±25 pF
C231	21-13740B38	36
C233	21-13740B49	100
C234	21-13740B34	24
C235	21-13740B17	4.7, ±25 pF
C238-240	21-11032B15	0.22 uF, +80-20%
C241,242	21-13740B31	18
C243	21-13740B13	3.3, ±25 pF
C245-247	21-11032B15	0.22 uF, +80-20%
C248	21-13740B15	3.9, ±25 pF
C250	21-13740B29	15
C251,252	21-11032B15	0.22 uF, +80-20%
C277,278	23-11048B19	47 uF, ±20%, 16V
C301	21-11032B15	0.22 uF, +80-20%
C311	21-11032B15	0.22 uF, +80-20%
C351	21-13740B37	33
C352-354	21-11032B15	0.22 uF, +80-20%
C355	21-13740B57	220
C356	21-13740B21	6.8, ±5 pF
C357	21-13741B33	0.0033 uF, ±10%
C358	21-13740B58	240
C359	23-11013D13	10 uF, ±10%, 20V, tantalum
C360	21-11032B15	0.22 uF, +80-20%
C361	23-11013D13	10 uF, ±10%, 20V, tantalum
C362,363	21-11032B15	0.22 uF, +80-20%
C364	21-13740B57	220
C365	21-11032B15	0.22 uF, +80-20%
C366	21-13740B57	220
C367	21-13740B49	100
C368,369	21-11032B15	0.22 uF, +80-20%
C370	21-13741B37	0.0047 uF, ±10%
C371	21-13741B29	0.0022 uF, ±10%
C372	21-13740B52	130
C373	21-13740B72	910
C374	21-13740B25	10
C376,377	21-13740B29	15
C378	21-11032B15	0.22 uF, +80-20%
C379	23-11013D13	10 uF, ±10%, 20V, tantalum
C380,381	21-11032B15	0.22 uF, +80-20%
diodes (see note)		
CR1	48-80236E16	quad Schottky, crossed
CR2	48-80154K03	dual Schottky, SOT
CR51	48-05129M76	silicon, SOT
CR101,102	48-05129M76	silicon, SOT
CR151,152	48-80006E10	silicon varactor, SOT
CR202-205	48-80006E10	silicon varactor, SOT
CR206	48-80154K03	dual Schottky, SOT
CR209-213	48-80006E10	silicon varactor, SOT
CR214	48-80154K03	dual Schottky, SOT
filters		
FL51	91-80097D05	455 kHz, 6E
FL52	91-80098D05	455 kHz, 4E
connector, receptacle		
J4	09-80135M01	coaxial (RX)
J5	09-80135M01	coaxial (TX)
J6	09-80130M02	14-pin socket (logic board)
coils		
L1-9	24-80148M22	9-1/2 turns (white)
L51	24-80063M07	0.33 uH
L52,53	24-80063M19	3.3 uH
L54	24-80063M31	47 uH
L55-58	24-80164M01	tunable, 0.7 uH
L59,60	24-80063M23	6.8 uH
L61,62	24-80063M31	47 uH
L63	24-80063M24	8.2 uH
L64	25-80000E01	tunable, 455 kHz
L65,66	24-80063M31	47 uH
L101	24-80063M23	6.8 uH
L102	24-80063M09	0.47 uH
L151	24-80299D01	tunable, 17-3/4 turns
L152	24-80063M22	5.6 uH
L202	24-80931W26	tunable, 13-1/2 turns
L203	24-80063M22	5.6 uH
L204	24-80063M12	0.82 uH
L205-207	24-80063M22	5.6 uH
L209	24-80063M22	5.6 uH
L210	24-80063M11	0.68 uH
L211	24-80063M22	5.6 uH
L212	24-80063M06	0.27 uH
L213	24-80931W26	tunable, 13-1/2 turns
L214	24-80063M23	6.8 uH
L215	24-80063M12	0.82 uH
L216-218	24-80063M23	6.8 uH
L220	24-80063M23	6.8 uH
L221	24-80063M09	0.47 uH
L222	24-80063M23	6.8 uH
L352,353	24-80164M01	tunable, 0.7 uH
L354-356	24-80063M31	47 uH
L357	24-80164M01	tunable, 0.7 uH
L358	24-80063M27	22 uH

MXW-6348-B (3)

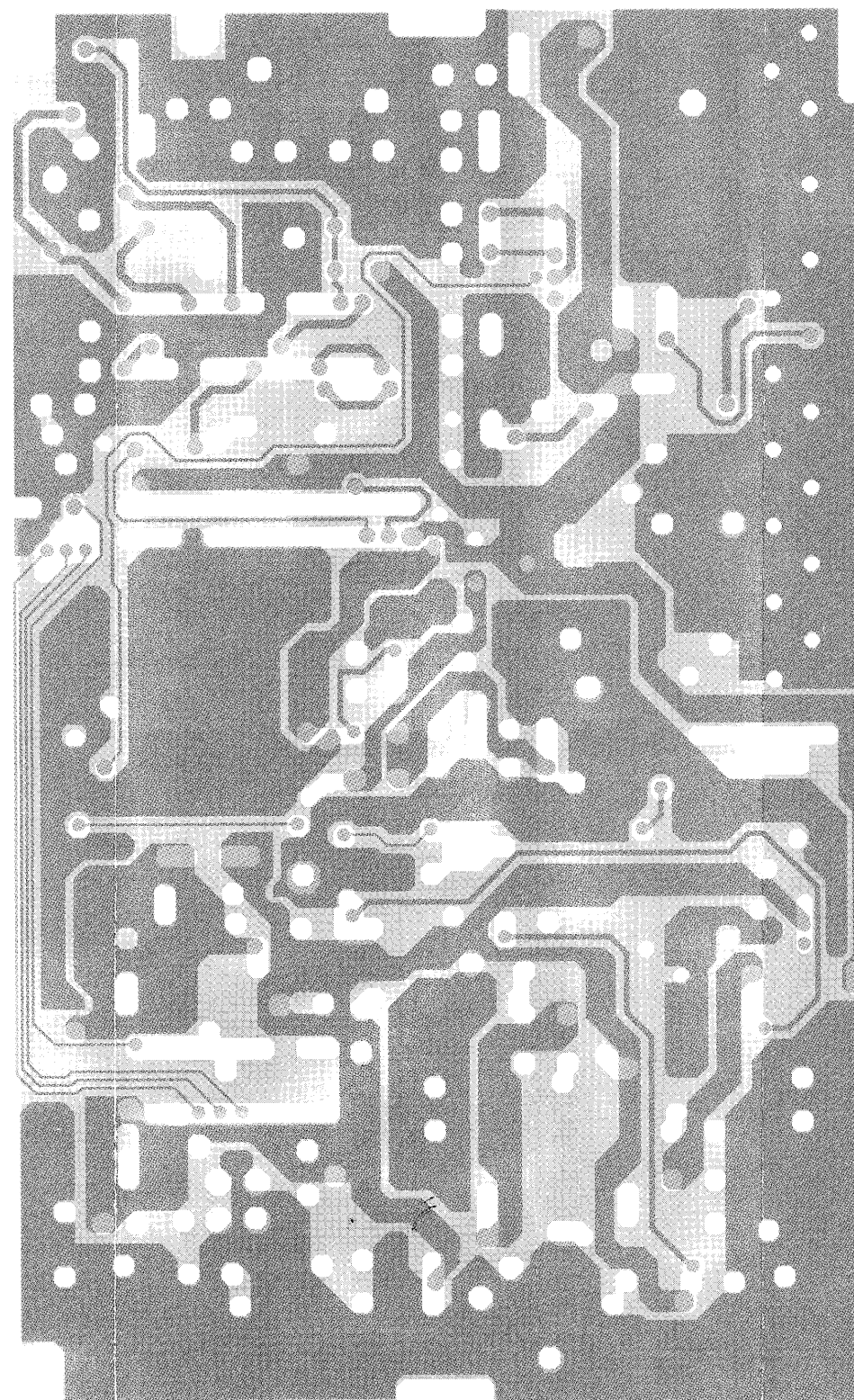
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
transistors (see note)		
Q1	48-80182D44	NPN
Q2-4	48-11043C06	PNP
Q51	48-80182D44	NPN
Q52-54	48-11043C12	FET
Q55	48-80214G02	NPN
Q56	48-11043C12	FET
Q101	48-05128M16	PNP
Q102,103	48-80214G02	NPN
Q104	48-05128M16	PNP
Q105	48-80214G02	NPN
Q107	48-80182D44	NPN
Q151	48-80182D44	NPN
Q152	48-05128M16	PNP
Q160	48-80214G02	NPN
Q203	48-80141L06	FET
Q204,205	48-80182D44	NPN
Q206	48-80141L06	FET
Q207,208	48-80182D44	NPN
Q276	48-80214G02	NPN
Q277-279	48-05128M16	PNP
Q351	48-80930W01	dual gate FET
Q352-354	48-80214G02	NPN
Q355	48-05128M16	PNP
Q356,357	48-80214G02	NPN
Q358,359	48-05128M16	PNP
Q360	48-80214G02	NPN
resistor, chip, ohm, ±5%, 1/8 watt (unless otherwise indicated)		
R1	06-11077A26	10
R2	06-11077A33	20
R3	06-11077A66	470
R4	06-11077A84	2.7k
R5	06-11077A46	68
R6	06-11077A86	3.3k
R7	06-11077B03	15k
R8	06-11077A90	4.7k
R9	06-11077A98	10k
R51	06-11077A43	51
R52,53	06-11077A86	3.3k
R54	06-11077A74	1k
R55	06-11077A30	15
R56	06-11077A46	68
R57	06-11077A86	3.3k
R58	06-11077A93	6.2k
R60	06-11077A50	100
R63	06-11077A26	10
R65	06-11077A54	150
R66	06-11077B45	820k
R68	06-11077B23	100k
R69	06-11077B27	150k
R70	18-05500L08	variable, 22k
R71	06-11077B11	33k
R72	06-11077B09	27k
R73	06-11077B21	82k
R74	06-11077A66	470
R75	06-11077A42	47
R76	06-11077A50	100
R77	06-11077A88	3.9k
R102	06-11077A62	330
R103,104	06-11077A98	10k
R105	06-11077B11	33k
R106	06-11077B15	47k
R107	06-11077A98	10k
R108	06-11077A90	4.7k
R109	06-11077A26	10
R110	06-11077B03	15k
R111	06-11077A70	680
R112	06-11077A84	2.7k
R113	06-11077A72	820
R114,115	06-11077A70	680
R116	06-11077A92	5.6k
R118	06-11077A70	680
R119	06-11077A86	3.3k
R120,121	06-11077A88	3.9k
R122	06-11077A43	51
R123	06-11077A34	22
R124	06-11077A86	3.3k
R125	06-11077A70	680
R126	06-11077A50	100
R127,128	06-11077B07	22k
R129	06-11077A94	6.8k
R130	06-11077A82	2.2k
R131	06-11077B11	33k
R132,133	06-11077A90	4.7k
R134,135	06-11077A74	1k
R136	06-11077A50	100
R151	06-11077B15	47k
R152	06-11077B11	33k
R153	06-11077B23	100k
R154	06-11077A34	22
R155	06-11077A98	10k
R156	06-11077B03	15k
R157	06-11077A78	1.5k
R158	06-11077A74	1k
R160,161	06-11077A98	10k
R163	06-11077A84	2.7k
R164	18-05500L08	variable, 22k
R165	06-11077B31	220k
R166	06-11077A74	1k
R176	06-11077G26	22.6k, ±1%
R177	06-11077G18	18.7k, ±1%

MXW-6348-B (



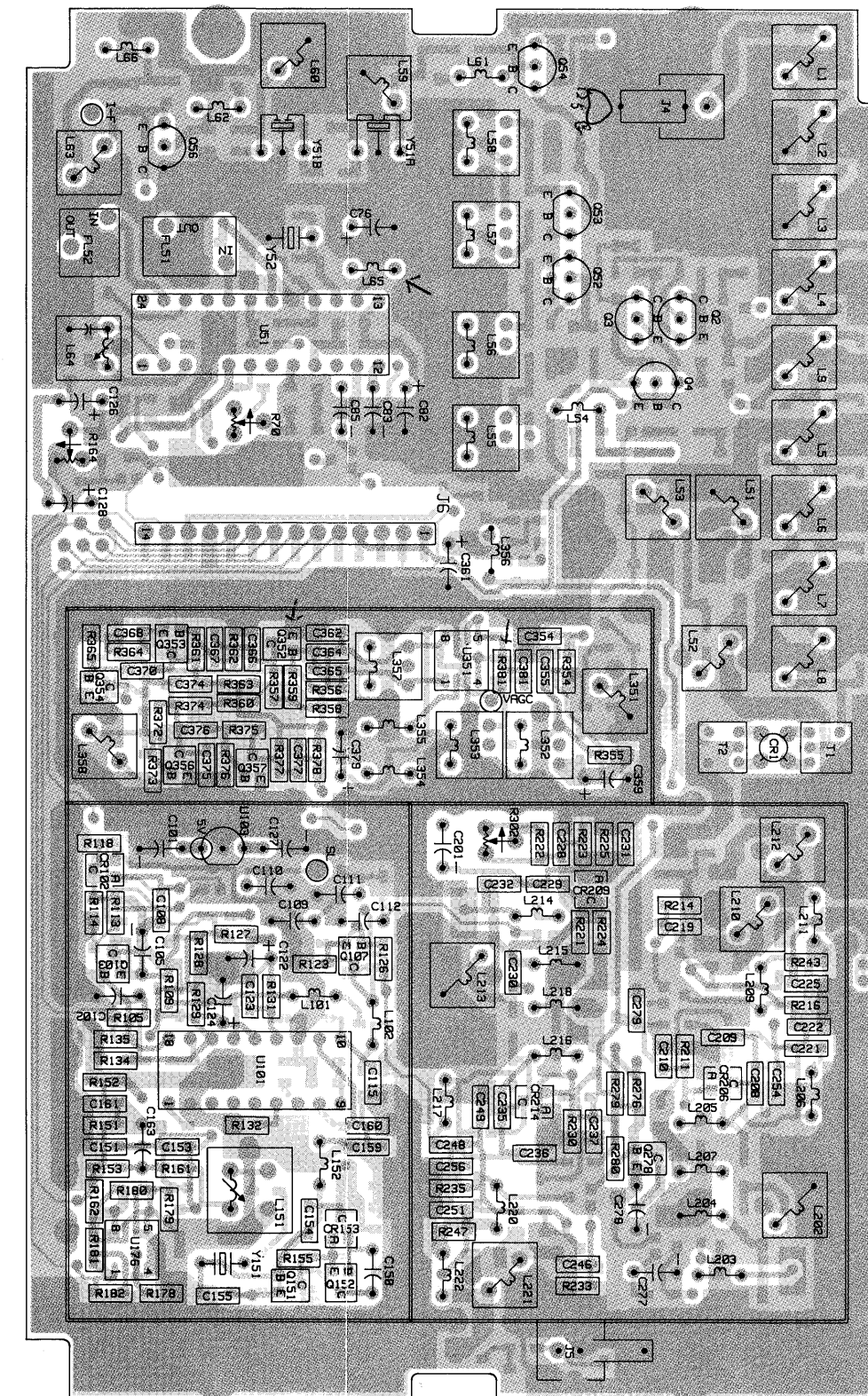
SOLDER SIDE GBW-6349-O
 COMPONENT SIDE GBW-6350-O
 OVERLAY GBW-6351-O

SOLDER SIDE VIEW



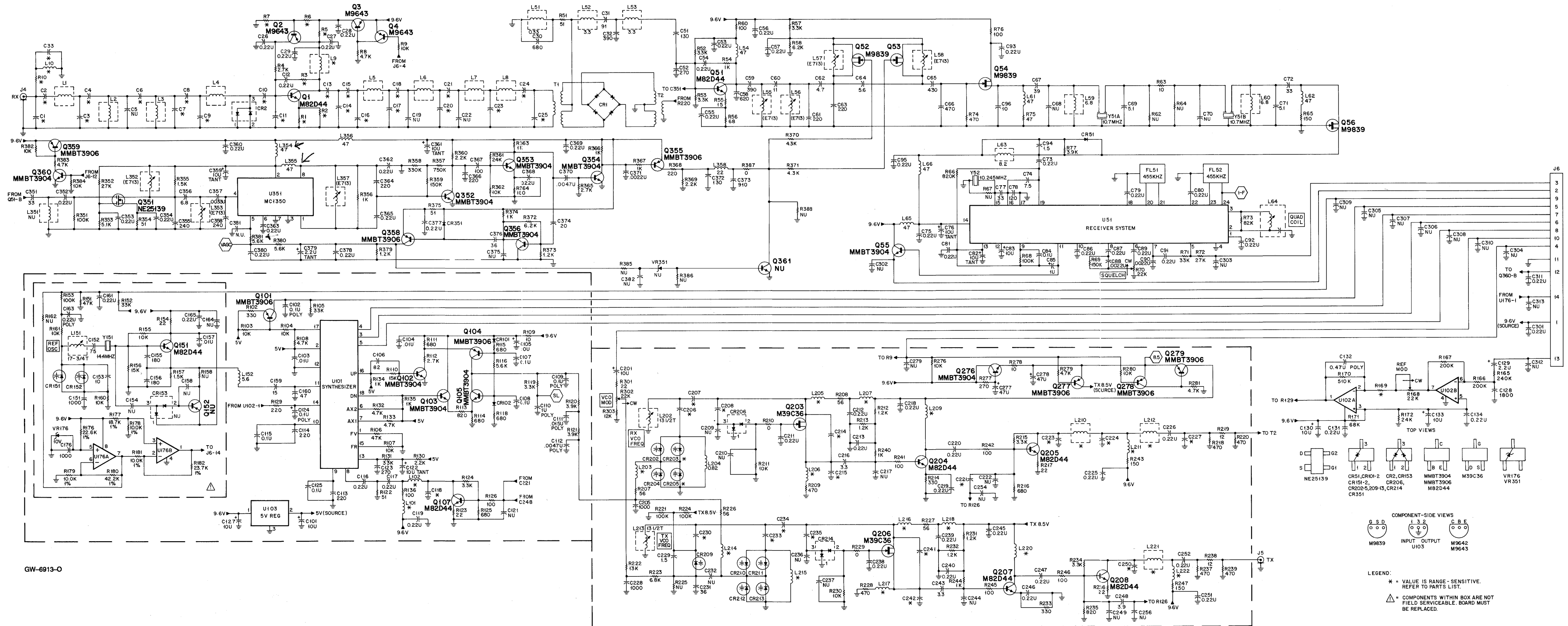
SOLDER INNER LAYER GCW-6389-O
 COMPONENT INNER LAYER GCW-6390-O

INNER LAYERS



SOLDER SIDE GBW-6349-O
 COMPONENT SIDE GBW-6350-O
 OVERLAY GBW-6391-O

COMPONENT SIDE VIEW



Range 2 Parts List

HLB4100A RF Board, 36–42 MHzMXW–6910–O

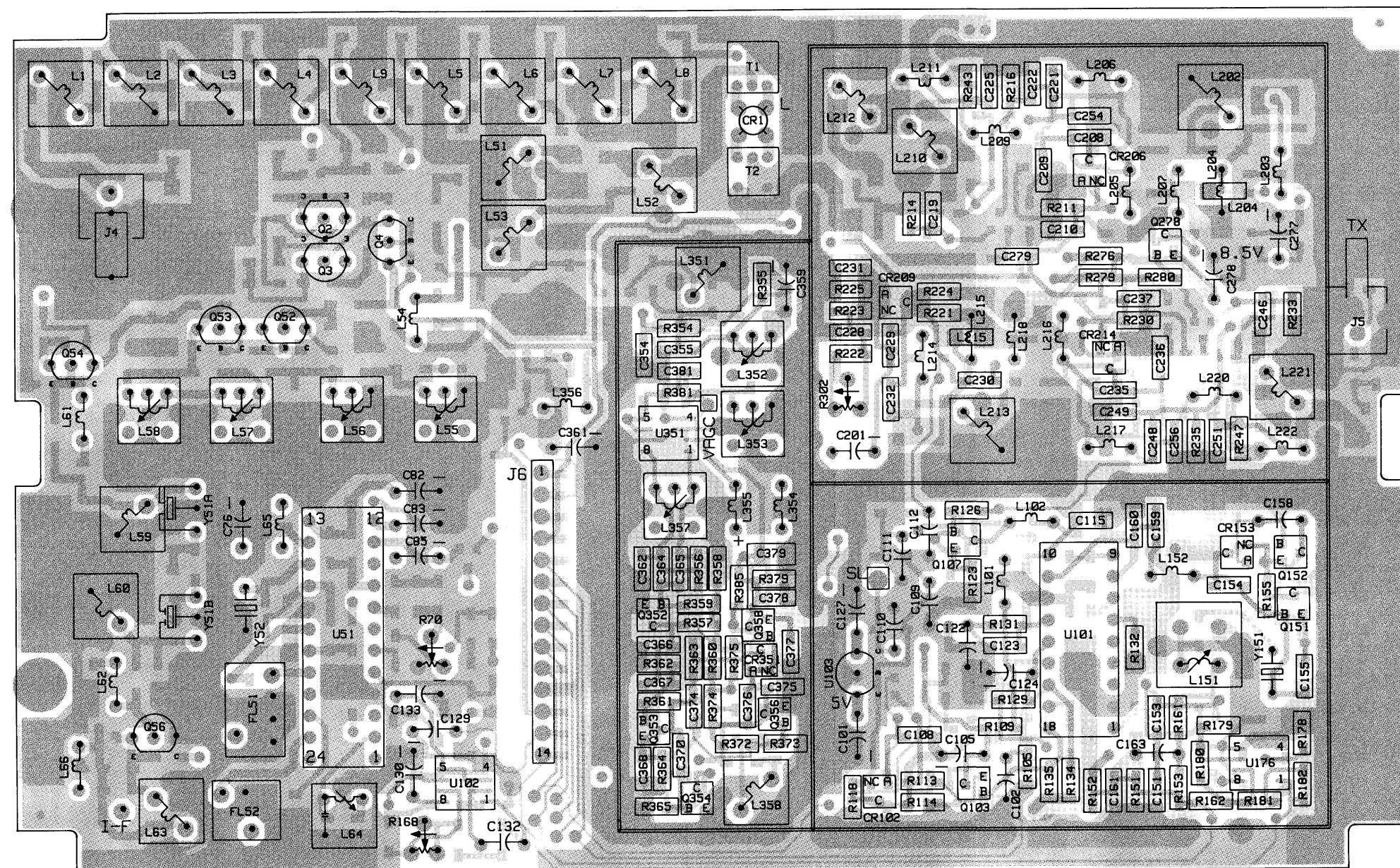
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, chip, pF, ±5%, 50V (unless otherwise indicated)		
C1	21–13740B53	150
C2	21–13740B74	1200
C3	21–13740B63	390
C4	21–13740B53	150
C6	21–13740B36	30
C8	21–13740B52	130
C9	21–13740B65	470
C10	21–13740B73	1000
C11	21–13740B54	160
C12,13	21–11032B15	0.22 uF, +80–20%
C15	21–11032B15	0.22 uF, +80–20%
C16	21–13740B51	120
C17	21–13740B66	510
C18	21–13740B55	180
C20	21–13740B66	510
C21	21–13740B56	200
C23	21–13740B65	470
C24	21–13740B61	330
C25	21–13740B60	300
C26–29	21–11032B15	0.22 uF, +80–20%
C30	21–13740B69	680
C31	21–13740B48	91
C32	21–13740B63	390
C51	21–13740B52	130
C52	21–13740B59	270
C53–57	21–11032B15	0.22 uF, +80–20%
C58	21–13740B68	620
C59	21–13740B63	390
C60	21–13740B26	11
C61	21–13740B57	220
C62	21–13740B17	4.7, ±25 pF
C63	21–13740B57	220
C64	21–13740B19	5.6, ±25 pF
C65	21–13740B64	430
C66	21–13740B65	470
C67	21–13740B39	39
C69	21–13740B18	5.1, ±25 pF
C71	21–13740B18	5.1, ±25 pF
C72	21–13740B37	33
C73	21–11032B15	0.22 uF, +80–20%
C74	21–13740B22	7.5, ±5 pF
C75	21–11032B15	0.22 uF, +80–20%
C76	23–11013D13	10 uF, ±10%, 20V, tantalum
C77	21–13740B37	33
C78	21–13740B51	120
C79–81	21–11032B15	0.22 uF, +80–20%
C82	23–11013D13	10 uF, ±10%, 20V, tantalum
C83	23–11048B13	10 uF, ±20%, 16V, electrolytic
C84	21–13741B69	0.1 uF, ±10%
C85	23–11048B05	1 uF, ±20%, electrolytic
C86,87	21–11032B15	0.22 uF, +80–20%
C88	21–13741B29	0.0022 uF, ±10%
C89	21–11032B15	0.22 uF, +80–20%
C90	21–13741B29	0.0022 uF, ±10%
C91–93	21–11032B15	0.22 uF, +80–20%
C94	21–13740B05	1.5, ±25 pF
C95	21–11032B15	0.22 uF, +80–20%
C96	21–13740B25	10, ±5 pF
C101	23–11048B13	10 uF, ±20%, 16V, electrolytic
C102	08–11051A13	0.1 uF, 63V
C103,104	21–13741B45	0.01 uF, ±10%
C105	23–11048B13	10 uF, ±20%, 16V, electrolytic
C106	21–13740B47	82
C107,108	21–13741B69	0.1 uF, ±10%
C109	08–11051A13	0.1 uF, 63V
C110	08–11044A33	1 uF
C111	08–11051A08	0.015 uF, 63V
C112	08–11051A05	0.0047 uF, 63V
C113,114	21–13740B57	220
C115	21–13741B69	0.1 uF, ±10%
C116,117	21–11032B15	0.22 uF, +80–20%
C118	21–13740B29	15
C119	21–11032B15	0.22 uF, +80–20%
C122	23–11013D13	10 uF, ±10%, 20V, tantalum
C123	21–13740B59	270
C124	08–11051A13	0.1 uF, 63V
C125	21–13741B69	0.1 uF, ±10%
C127	23–11048B13	10 uF, ±20%, 16V, electrolytic
C128	21–13740B78	1800
C129	23–11048B06	2.2 uF, ±20%, electrolytic
C130	23–11048B13	10 uF, ±20%, 16V, electrolytic
C131	21–11032B15	0.22 uF, +80–20%
C132	08–11051A17	0.47 uF, 63V
C133	23–11048B13	10 uF, ±20%, 16V, electrolytic
C134	21–11032B15	0.22 uF, +80–20%
C151	21–13740B73	1000
C152	21–13740B46	75
C153	21–13740B25	10, ±5 pF
C155,156	21–13740B55	180
C157	21–13741B45	0.01 uF, ±10%
C159	21–13740B29	15
C160	21–13740B41	47
C161	21–11032B15	0.22 uF, +80–20%
C163	08–11051A15	0.22 uF, 63V
C165	21–11032B15	0.22 uF, +80–20%
C176	21–13740B73	1000
C201	23–11048B13	10 uF, ±20%, 16V, electrolytic
C205	21–13740B73	1000
C206	21–13740B38	36

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C207	21–13740B35	27
C208	21–13740B17	4.7, ±25 pF
C211–213	21–11032B15	0.22 uF, +80–20%
C214,215	21–13740B35	27
C216	21–13740B13	3.3, ±25 pF
C218–220	21–11032B15	0.22 uF, +80–20%
C221	21–13740B09	2.2, ±25 pF
C223	21–13740B23	8.2, ±5 pF
C224	21–13740B39	39
C225,226	21–11032B15	0.22 uF, +80–20%
C227	21–13740B37	33
C228	21–13740B73	1000
C229	21–13740B05	1.5, ±25 pF
C230	21–13740B17	4.7, ±25 pF
C231	21–13740B38	36
C233	21–13740B49	100
C234	21–13740B38	36
C235	21–13740B17	4.7, ±25 pF
C238–240	21–11032B15	0.22 uF, +80–20%
C241,242	21–13740B31	18
C243	21–13740B13	3.3, ±25 pF
C245–247	21–11032B15	0.22 uF, +80–20%
C248	21–13740B15	3.9, ±25 pF
C250	21–13740B31	18
C251,252	21–11032B15	0.22 uF, +80–20%
C277,278	23–11048B19	47 uF, ±20%, 16V
C301	21–11032B15	0.22 uF, +80–20%
C311	21–11032B15	0.22 uF, +80–20%
C351	21–13740B37	33
C352–354	21–11032B15	0.22 uF, +80–20%
C355	21–13740B58	240
C356	21–13740B21	6.8, ±5 pF
C357	21–13741B33	0.0033 uF, ±10%
C358	21–13740B58	240
C359	23–11013D13	10 uF, ±10%, 20V, tantalum
C360	21–11032B15	0.22 uF, +80–20%
C361	23–11013D13	10 uF, ±10%, 20V, tantalum
C362,363	21–11032B15	0.22 uF, +80–20%
C364	21–13740B57	220
C365	21–11032B15	0.22 uF, +80–20%
C366	21–13740B57	220
C367	21–13740B49	100
C368,369	21–11032B15	0.22 uF, +80–20%
C370	21–13741B37	0.0047 uF, ±10%
C371	21–13741B29	0.0022 uF, ±10%
C372	21–13740B52	130
C373	21–13740B72	910
C374	21–13740B32	20
C376	21–13740B38	36
C377,C378	21–11032B15	0.22 uF, +80–20%
C379	23–11049A09	2.2 uF, ±10%, 20V, tantalum
C380	21–11032B15	0.22 uF, +80–20%
diode (see note)		
CR1	48–80236E16	quad Schottky, crossed
CR2	48–80154K03	dual Schottky, SOT
CR51	48–05129M76	silicon, SOT
CR101,102	48–05129M76	silicon, SOT
CR151,152	48–80006E10	silicon varactor, SOT
CR202–205	48–80006E10	silicon varactor, SOT
CR206	48–80154K03	dual Schottky, SOT
CR209	48–80006E10	silicon varactor, SOT
CR210–213	48–80991T01	silicon varactor, SOT
CR214	48–80154K03	dual Schottky, SOT
CR351	48–80939T01	barrier Schottky
filters		
FL51	91–80097D05	455 kHz, 6E
FL52	91–80098D05	455 kHz, 4E
connector, receptacle		
J4,5	09–80135M01	coaxial (RX, TX)
J6	09–80130M03	14–pin socket (logic board)
coil		
L1–8	24–80148M21	9–1/2 turns (white)
L9	24–80063M31	47 uH
L51	24–80063M07	0.33 uH
L52,53	24–80063M19	3.3 uH
L54	24–80063M31	47 uH
L55–58	24–80164M01	tunable, 0.7 uH
L59,60	24–80063M23	6.8 uH
L61,62	24–80063M31	47 uH
L63	24–80063M24	8.2 uH
L64	25–80000E01	tunable, 455 kHz
L65,66	24–80063M31	47 uH
L101	24–80063M24	8.2 uH
L102	24–80063M10	0.56 uH
L151	24–80299D01	tunable, 17–3/4 turns
L152	24–80063M22	5.6 uH
L202	24–80931W26	tunable, 13–1/2 turns
L203	24–80063M23	6.8 uH
L204	24–80063M12	0.82 uH
L205–207	24–80063M23	6.8 uH
L209	24–80063M23	6.8 uH
L210	24–80063M12	0.82 uH
L211	24–80063M23	6.8 uH
L212	24–80063M06	0.27 uH
L213	24–80931W26	tunable, 13–1/2 turns
L214	24–80063M24	8.2 uH
L215	24–80063M12	0.82 uH
L216–218	24–80063M24	8.2 uH

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L220	24–80063M24	8.2 uH
L221	24–80063M10	0.56 uH
L222	24–80063M24	8.2 uH
L352,353	24–80164M01	tunable, 0.7 uH
L354–356	24–80063M31	47 uH
L357	24–80164M01	tunable, 0.7 uH
L358	24–80063M27	22 uH
transistor (see note)		
Q1	48–80182D44	NPN
Q2–4	48–11043C06	PNP
Q51	48–80182D44	NPN
Q52–54	48–11043C12	FET
Q55	48–80214G02	PNP
Q56	48–11043C12	FET
Q101	48–05128M16	PNP
Q102,103	48–80214G02	NPN
Q104	48–05128M16	PNP
Q105	48–80214G02	NPN
Q107	48–80182D44	NPN
Q151	48–80182D44	NPN
Q203	48–80141L06	FET
Q204,205	48–80182D44	NPN
Q206	48–80141L06	FET
Q207,208	48–80182D44	NPN
Q276	48–80214G02	NPN
Q277–279	48–05128M16	PNP
Q351	48–80930W01	dual gate FET
Q352–354	48–80214G02	NPN
Q355	48–05128M16	PNP
Q356,357	48–80214G02	NPN
Q358,359	48–05128M16	PNP
Q360	48–80214G02	NPN
resistor, chip, ohm, ±5%, 1/8 watt (unless otherwise indicated)		
R2	06–11077A29	13
R3	06–11077A68	560
R4	06–11077A84	2.7k
R5	06–11077A56	180
R6	06–11077A98	10k
R7	06–11077A94	6.8k
R8	06–11077A90	4.7k
R9	06–11077A98	10k
R51	06–11077A43	51
R52,53	06–11077A86	3.3k
R54	06–11077A74	1k
R55	06–11077A30	15
R56	06–11077A46	68
R57	06–11077A86	3.3k
R58	06–11077A93	6.2k
R60	06–11077A50	100
R63	06–11077A26	10
R65	06–11077A54	150
R66	06–11077B45	820k
R68	06–11077B23	100k
R69	06–11077B27	150k
R70	18–05500L08	variable, 22k
R71	06–11077B11	33k
R72	06–11077B09	27k
R73	06–11077B21	82k
R74	06–11077A66	470
R75	06–11077A42	47
R76	06–11077A50	100
R77	06–11077A88	3.9k
R102	06–11077A62	330
R103,104	06–11077A98	10k
R105	06–11077B11	33k
R106	06–11077B15	47k
R107	06–11077A98	10k
R108	06–11077A90	4.7k
R109	06–11077A26	10
R110	06–11077B03	15k
R111	06–11077A70	680
R112	06–11077A84	2.7k
R113	06–11077A72	820
R114,115	06–11077A70	680
R116	06–11077A92	5.6k
R118	06–11077A70	680
R119	06–11077A86	3.3k
R120,121	06–11077A88	3.9k
R122	06–11077A43	51
R123	06–11077A34	22
R124	06–11077A86	3.3k
R125	06–11077A70	680
R126	06–11077A50	100
R129	06–11077A58	220
R130	06–11077A82	2.2k
R131	06–11077B11	33k
R132,133	06–11077A90	4.7k
R134,135	06–11077A74	1k
R136	06–11077A50	100
R151	06–11077B15	47k
R152	06–11077B11	33k
R153	06–11077B23	100k
R154	06–11077A34	22
R155	06–11077A98	10k
R156	06–11077B03	15k
R157	06–11077A78	1.5k
R160,161	06–11077A98	10k
R164	18–05500L08	variable, 22k
R165	06–11077B32	240k

MXW-6910-O (4)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R166	06-11077B30	200k
R167	06-11077B30	200k
R168	18-05500L08	variable, 22k
R169	06-11077B17	56k
R170	06-11077B40	510k
R171	06-11077B19	68k
R172	06-11077B08	24k
R176	06-11077G26	22.6k, ±1%
R177	06-11077G18	18.7k, ±1%
R178,179	06-11077F91	10.0k, ±1%
R180	06-11077G52	42.2k, ±1%
R181	06-11077F91	10.0k, ±1%
R182	06-11077G28	23.7k, ±1%
R207,208	06-11077A44	56
R209	06-11077A66	470
R210	06-11077A01	0
R211	06-11077A98	10k
R212,213	06-11077A76	1.2k
R214	06-11077A62	330
R215	06-11077A86	3.3k
R216	06-11077A70	680
R217	06-11077A34	22
R218	06-11077A66	470
R219	06-11077A28	12
R220	06-11077A66	470
R221	06-11077B23	100k
R222	06-11077B02	13k
R223	06-11077A94	6.8k
R224	06-11077B23	100k
R226,227	06-11077A44	56
R228	06-11077A66	470
R229	06-11077A01	0
R230	06-11077A98	10k
R231,232	06-11077A76	1.2k
R233	06-11077A62	330
R234	06-11077A86	3.3k
R235	06-11077A72	820
R236	06-11077A34	22
R237	06-11077A66	470
R238	06-11077A28	12
R239	06-11077A66	470
R240	06-11077A74	1k
R241,242	06-11077A50	100
R243	06-11077A54	150
R244	06-11077A74	1k
R245,246	06-11077A50	100
R247	06-11077A54	150
R276	06-11077A98	10k
R277	06-11077A60	270
R278	06-11077A26	10
R279	06-11077A90	4.7k
R280	06-11077A98	10k
R281	06-11077A90	4.7k
R301	06-11077A34	22
R302	18-05500L08	variable, 22k
R303	06-11077B01	12k
R351	06-11077B23	100k
R352	06-11077B09	27k
R353	06-11077A91	5.1k
R354	06-11077A43	51
R355	06-11077A78	1.5k
R356	06-11077A74	1k
R357	06-11077B44	750k
R358	06-11077B35	330k
R359	06-11077B27	150k
R360	06-11077A82	2.2k
R361	06-11077B08	24k
R362	06-11077A98	10k
R363	06-11077A74	1k
R364	06-11077A50	100
R365	06-11077A84	2.7k
R366,367	06-11077A74	1k
R368	06-11077A58	220
R369	06-11077A82	2.2k
R370,371	06-11077A89	4.3k
R372	06-11077A93	6.2k
R373	06-11077A76	1.2k
R374	06-11077A74	1k
R375	06-11077A43	51
R379	06-11077A76	1.2k
R380,R381	06-11077A92	5.6k
R382	06-11077A98	10k
R383	06-11077A90	4.7k
R384	06-11077A98	10k
R387	06-11077A01	0
transformer		
T1,T2	25-80163M02	balun
integrated circuit (see note)		
U51	51-05479G05	receiver system
U101	51-80931V01	synthesizer
U102	51-80056M04	dual op-amp
U103	51-84621K27	regulator, 5 volt
U176	51-80932W01	dual op-amp
U351	51-80929W01	MC1350
voltage regulator (see note)		
VR176	48-80140L15	zener, 10V

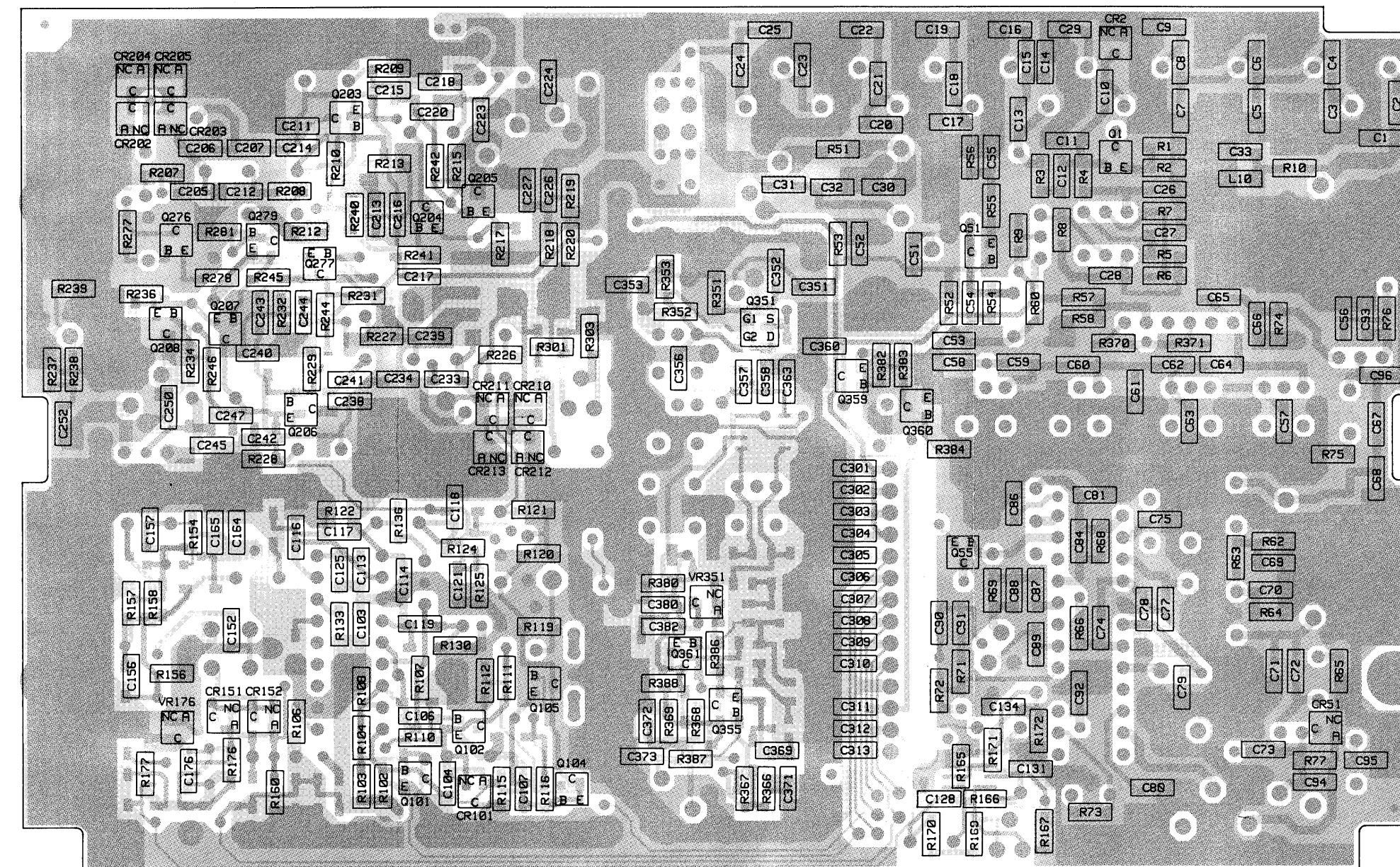


COMPONENT SIDE

COMPONENT SIDE
SOLDER SIDE
OVERLAY

GW-6915-O

GW-6914W01-O

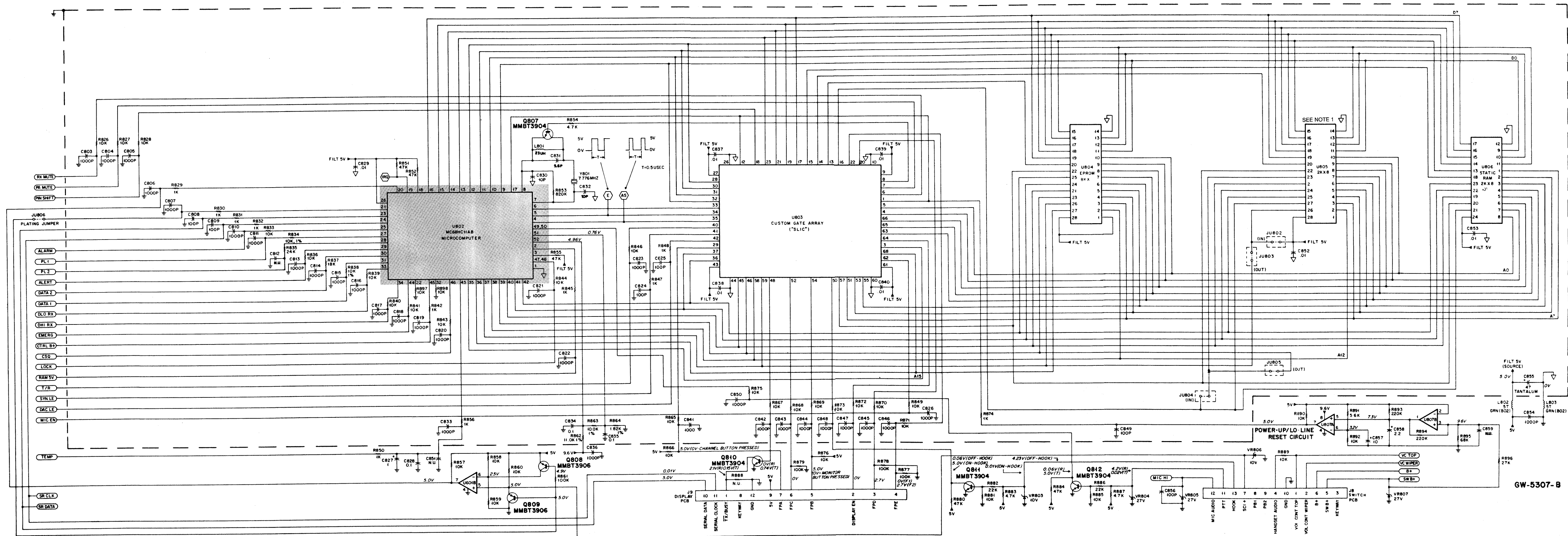


SOLDER SIDE

COMPONENT SIDE
SOLDER SIDE
OVERLAY

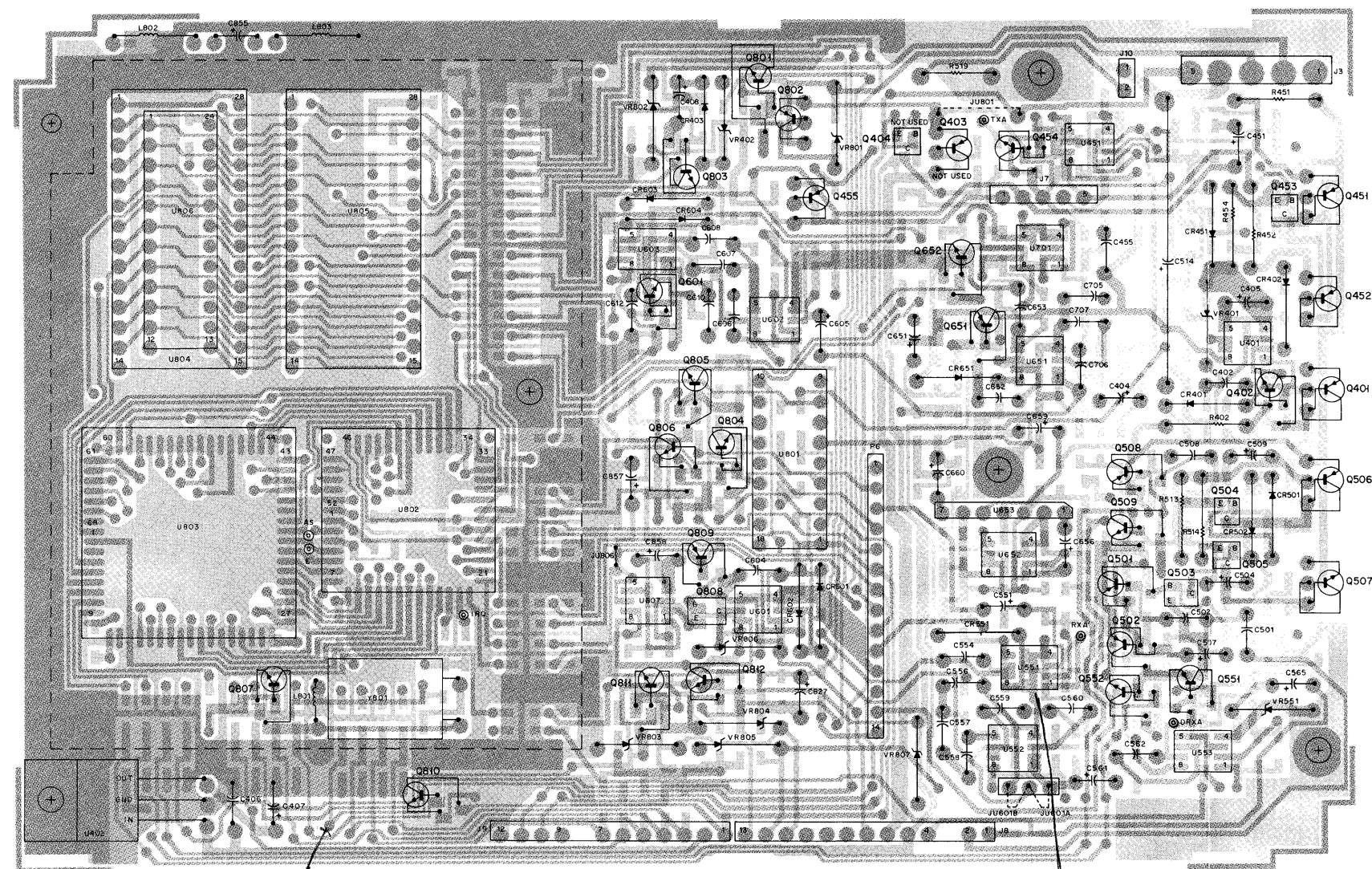
GW-6915-O

GW-6914W02-O



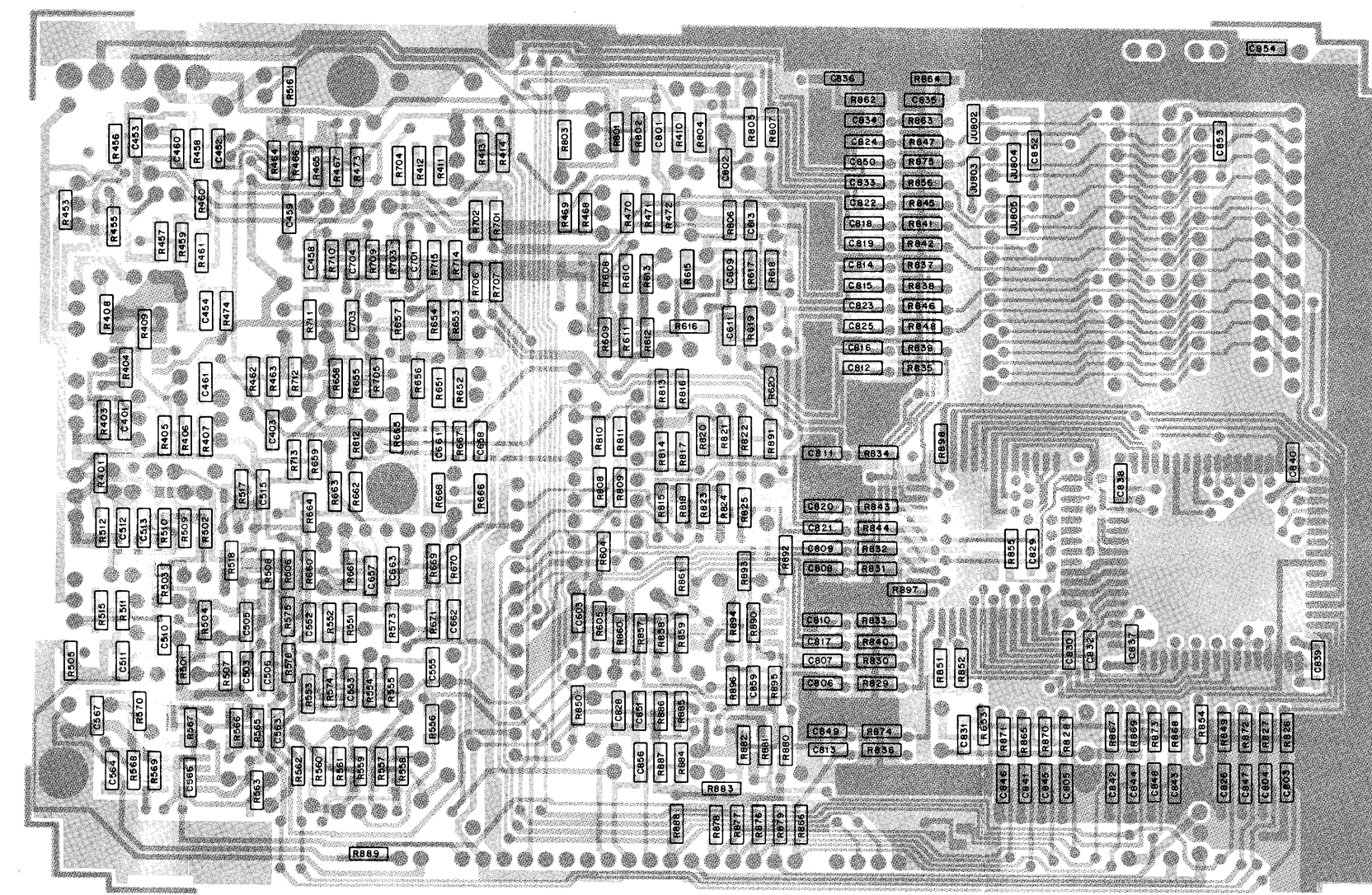
IMPORTANT
COMPONENTS WITHIN SHADED AREA ARE NOT FIELD-SERVICEABLE. IF SERVICING IS REQUIRED, THE ENTIRE BOARD MUST BE REPLACED.

NOTE 1: EARLY MODEL USE 2KX8 NOVDRAM, LATE MODELS USE 2KX8 EEPROM.



COMPONENT SIDE  GW-5299-0
SOLDER SIDE  GW-5298-0
OVERLAY  GW-5300-A

SHOWN FROM COMPONENT SIDE



COMPONENT SIDE  GW-5302-0
SOLDER SIDE  GW-5301-0
OVERLAY — GW-5303-0

SHOWN FROM SOLDER SIDE

parts list

HLN5402A Logic Board MXW-5310-D

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise indicated)		
C401	21-13741B45	0.01 uF, ±10%
C402	08-11051A09	0.022 uF, 63V
C403	21-13741B45	0.01 uF, ±10%
C404	23-11048B19	47 uF, ±20%, 16V, electrolytic
C405	23-11048B13	10 uF, ±20%, 16V, electrolytic
C406	23-11048A17	33 uF, ±20%, 16V, electrolytic
C407	23-11013A56	47 uF, ±20%, 6V, tantalum
C408	23-11048B19	47 uF, ±20%, 16V, electrolytic
C451	23-11048B19	47 uF, ±20%, 16V, electrolytic
C452	21-13741B45	0.01 uF, ±10%
C453	21-13741B69	0.1 uF, ±80-20%
C454	21-13741B45	0.01 uF, ±10%
C455	08-11051A15	0.22 uF, 63V
C458,459	21-13740B36	30
C460,461	21-13741B45	0.01 uF, ±10%
C501,502	08-11051A13	0.1 uF, 63V
C503	21-13740B49	100
C504	23-11048B13	10 uF, ±20%, 16V, electrolytic
C505,506	21-13740B49	100
C507	23-11013D13	10 uF, ±10%, 20V, tantalum
C508	08-11051A15	0.22 uF, 63V
C509	23-11048B13	10 uF, ±20%, 16V, electrolytic
C510	21-13740B61	330
C511-513	21-13740B49	100
C514	23-02308M01	1000 uF, ±20%, 16V, electrolytic
C515	21-13740B49	100
C551	23-11048A17	33 uF, ±20%, 16V, electrolytic
C552	21-13740B33	22
C553	21-13740B73	1000
C554	08-11051A03	0.0022 uF, 63V
C555	21-13740B53	150
C556-558	08-11051A12	0.068 uF, 63V
C559,560	08-11051A13	0.1 uF, 63V
C561	23-11048B05	1 uF, ±20%, electrolytic
C562	08-11051A09	0.022 uF, 63V
C563,564	21-13740B49	100
C565	23-11048B13	10 uF, ±20%, 16V, electrolytic
C566,567	21-13741B45	0.01 uF, ±10%
C604	23-11048B05	1 uF, ±20%, electrolytic
C606	08-11044A22	0.039 uF, 63V
C607	08-11051A13	0.1 uF, 63V
C608	08-11051A05	0.0047 uF, 63V
C609	21-13740B55	180
C610	08-11051A15	0.22 uF, 63V
C611	21-13740B46	75
C612	23-11048B19	47 uF, ±20%, 16V, electrolytic
C651	23-11048B19	47 uF, ±20%, 16V, electrolytic
C652	08-11051A06	0.0068 uF, 63V
C653	08-11051A15	0.22 uF, 63V
C656	23-11048B13	10 uF, ±20%, 16V, electrolytic
C657	21-13741B69	0.1 uF, ±80-20%
C658	21-13741B45	0.01 uF, ±10%
C659	23-11013A56	47 uF, ±20%, 6V, tantalum
C660	23-11048B13	10 uF, ±20%, 16V, electrolytic
C661	21-13740B76	1500
C662	21-13741B39	0.0056
C663	21-13740B49	100
C701	21-13740B78	1800
C703	21-13741B69	0.1 uF, ±80-20%
C704	21-13740B49	100
C705	08-11051A09	0.022 uF, 63V
C706	08-11051A13	0.1 uF, 63V
C707	08-11051A01	0.001 uF, 63V
C801,802	21-13740B49	100
C803-807	21-13740B73	1000
C808,809	21-13740B49	100
C810,811	21-13740B73	1000
C813-823	21-13740B73	1000
C824,825	21-13740B49	100
C826	21-13740B73	1000
C827	23-11048B05	1 uF, ±20%, electrolytic
C828	21-13741B69	0.1 uF, ±80-20%
C829	21-13741B45	0.01 uF, ±10%
C830	21-13740B25	10, ±5 pF
C831	21-11031F10	5.6, ±5 pF
C832	21-13740B25	10, ±5 pF
C833	21-13740B73	1000
C834,835	21-13741B69	0.1 uF, ±80-20%
C836	21-13740B73	1000
C837-840	21-13741B45	0.01 uF, ±10%
C841-848	21-13740B73	1000
C849	21-13740B49	100
C850	21-13740B73	1000
C852,853	21-13741B45	0.01 uF, ±10%
C854	21-13740B73	1000
C855	23-11054A09	47 uF, ±20%, 6V, tantalum
C856	21-13740B49	100
C857	23-11048B13	10 uF, ±20%, 16V, electrolytic
C858	08-11051A15	0.22 uF, 63V
C868	21-13740B49	100
diode (see note)		
CR401	48-83654H01	silicon
CR402	48-83654H02	silicon
CR403	48-83654H01	silicon
CR451	48-83654H01	silicon
CR501,502	48-83654H02	silicon
CR551	06-11009B23	jumper resistor
CR603	48-83654H01	silicon

MXW-5310-D (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
CR604	48-83654H01	silicon
CR651	48-83654H01	silicon
connector, receptacle		
J3	28-80129M01	5-pin, accessories
J7	28-80128M01	5-pin, RF power amplifier
J8	28-80126M01	23-pin
J10	28-80128M02	2-pin, internal speaker jumper
J601	09-84181L01	2-pin push-on
J801	06-11009B23	0-ohm resistor
J802	06-11024B23	0-ohm resistor
J804	06-11024B23	0-ohm resistor
coil		
L801	24-82723H35	23 uH
L802,803	24-83961B02	5 turns, green
connector, plug		
P6	28-80127M02	14-pin, RF board
P601	28-80250B02	3-pin, for JU601
transistor (see note)		
Q401	48-00869619	PNP
Q402	48-80214G02	NPN
Q451,452	48-00869619	PNP
Q453,454	48-80214G02	NPN
Q455	48-11043C10	PNP
Q501,502	48-05128M16	PNP
Q503,504	48-80214G02	NPN
Q505	48-05128M16	PNP
Q506	48-00869619	PNP
Q507	48-00869618	NPN
Q508	48-05128M16	PNP
Q509	48-80214G02	NPN
Q551	48-05128M16	PNP
Q552	48-80214G02	NPN
Q601	48-80214G02	NPN
Q651	48-05128M16	PNP
Q652	48-80214G02	NPN
Q801	48-80214G02	NPN
Q802	48-11043C10	PNP
Q803-807	48-80214G02	NPN
Q808,809	48-05128M16	PNP
Q810-812	48-80214G02	NPN
resistor, fixed, ohm, +5%, 1/8 watt (unless otherwise specified)		
R401	06-11077A70	680
R402	06-02369M31	330, 0.6W, metal film
R403	06-11077A70	680
R404	06-11077F18	1.74k, ±1%
R405	06-11077F28	2.21k, ±1%
R406	06-11077A98	10k
R407	06-11077A76	1.2k
R408,409	06-11077A98	10k
R410	06-11077A80	1.8k
R451,452	06-02369M01	1, 0.6W, metal film
R453	06-11077A70	680
R454	06-02369M31	330, 0.6W, metal film
R455	06-11077A70	680
R456	06-11077A82	2.2k
R457	06-11077A76	1.2k
R458,459	06-11077A90	4.7k
R460	06-11077B01	12k
R461	06-11077A70	680
R462	06-11077B29	180k
R463	06-11077B25	120k
R464,465	06-11077G88	100k, ±1%
R466,467	06-11077F91	10k, ±1%
R468	06-11077A60	270
R469	06-11077A74	1k
R470	06-11077A98	10k
R471	06-11077B07	22k
R472	06-11077A92	5.6k
R473	06-11077B09	27k
R474	06-11077A98	10k
R501	06-11077A84	2.7k
R502,503	06-11077B07	22k
R504	06-11077A98	10k
R505	06-11077A86	3.3k
R506	06-11077A78	1.5k
R507	06-11077A66	470
R508	06-11077A98	10k
R509,510	06-11077A72	820
R511	06-11077B07	22k
R512	06-11077A46	68
R513,514	06-11009B23	2.7, 1/4W, carbon
R515	06-11077A46	68
R516	06-11077A66	470
R517,518	06-11077A98	10k
R519	06-80185M01	1, 2W, metal plate
R551	06-11077B01	12k
R552	06-11077B37	390k
R553	06-11077B19	68k
R554-555	06-11077B18	62k
R556	06-11077F53	4.02k, ±1%
R557	06-11077F20	1.82k, ±1%
R558	06-11077G41	32.4k, ±1%
R559	06-11077G88	100k, ±1%
R560	06-11077E77	665, ±1%
R561	06-11077G91	107k, ±1%
R562	06-11077B11	33k
R563	06-11077B15	47k

MXW-5310-D (3)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R565	06-11077A98	10k
R566	06-11077A96	8.2k
R567	06-11077A86	3.3k
R568	06-11077A98	10k
R569	06-11077A42	47
R570	06-11077B17	56k
R573	06-11077B09	27k
R574	06-11077A01	0
R604	06-11077A98	10k
R605	06-11077A74	1k
R609	06-11077B11	33k
R610	06-11077B07	22k
R611,612	06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11024J15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R618	06-11077B23	100k
R619,620	06-11077A98	10k
R651	06-11077A68	560
R652	06-11077A50	100
R653,654	06-11077A98	10k
R655	06-11077A90	4.7k
R656	06-11077B39	470k
R657	06-11077B42	620k
R658	06-11077H65	619k
R659	06-11077A82	2.2k
R660	06-11077B19	68k
R661	06-11077B03	15k
R662	06-11077B17	56k
R663	06-11077B18	62k
R664	06-11077B07	22k
R665	06-11077A84	2.7k
R666,667	06-11077B23	100k
R668-670	06-11077B18	62k
R671	06-11077A50	100
R701	06-11077G88	100k, ±1%
R702	06-11077H13	178k
R703	06-11077G31	25.5k
R705	06-11077H13	178k
R706	06-11077G88	100k, ±1%
R707	06-11024J26	243k, ±1%
R709	06-11077B10	30k
R710-712	06-11077G68	61.9k, ±1%
R713	06-11077A86	3.3k
R714	06-11077B16	51k
R715	06-11077B05	18k
R801	06-11077A78	1.5k
R802	06-11077A84	2.7k
R803	06-11077A98	10k
R804	06-11077A90	4.7k
R805,806	06-11077A98	10k
R807	06-11077B15	47k
R808,809	06-11077A90	4.7k
R810,811	06-11077B17	56k
R812-815	06-11077A90	4.7k
R816-818	06-11077B23	100k
R820,821	06-11077A98	10k
R822	06-11077B15	47k
R823,824	06-11077A98	10k
R825	06-11077B15	47k
R826-828	06-11077A98	10k
R829-832	06-11077A74	1k
R833	06-11077A98	10k
R834	06-11077F91	10k, ±1%
R835	06-11077B08	24k
R836	06-11077A98	10k
R837	06-11077B05	18k
R838	06-11077F91	10k, ±1%
R839-841	06-11077A98	10k
R842	06-11077A74	1k
R843,844	06-11077A98	10k
R845	06-11077A74	1k
R846	06-11077A98	10k
R847,848	06-11077A74	1k
R849	06-11077A98	10k
R850	06-11077A74	1k
R851,852	06-11077B15	47k
R853	06-11077B45	820k
R854	06-11077A90	4.7k
R855	06-11077B15	47k
R856	06-11077A74	1k
R857-860	06-11077A98	10k
R861	06-11077B23	100k
R862	06-11077F95	11k, ±1%
R863	06-11077F91	10k, ±1%
R864	06-11077F20	1.82k, ±1%
R865-873	06-11077A98	10k
R874	06-11077A74	1k
R875,876	06-11077A98	10k
R877-879	06-11077B23	100k
R880	06-11077B15	47k
R881	06-11077A98	10k
R882	06-11077B07	22k
R883	06-11077A90	4.7k
R884	06-11077B15	47k
R885	06-11077A98	10k
R886	06-11077B07	22k
R887	06-11077A90	4.7k
R889,890	06-11077A98	10k

MXW-5310-D (4)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R891	06-11077A92	5.6k
R892	06-11077A98	10k
R893,894	06-11077B31	220k
R895	06-11077B19	68k
R896	06-11077B09	27k
R897,898	06-11077A98	10k
integrated circuit (see note)		
U401	51-80056M04	dual op-amp
U402	51-80068C06	regulator
U451	51-80056M04	dual op-amp
U551-553	51-80056M04	dual op-amp
U601	51-80056M01	dual comparator
U602,603	51-80056M04	dual op-amp
U651,652	51-80056M04	dual op-amp
U653	51-80059M01	voltage-controlled attenuator
U701	51-80056M04	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microcomputer
U803	51-82862N09	logic array
U804	51-99003D02	EPROM 8KX8
U805	51-80057M01	NOVRAM, 2KX8, early models
U805	51-80901W01	EEPROM, 2KX8, late models
U806	51-80914V01	static RAM, 2KX8
U807	51-80056M01	dual comparator
voltage regulators (see note)		
VR401	48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V
VR551	48-82256C11	zener, 10V
VR801	48-82256C20	zener, 27V
VR802,803	48-82256C11	zener, 10V
VR804,805	48-82256C20	zener, 27V
VR806	48-82256C11	zener, 10V
VR807	48-82256C20	zener, 27V
crystal (see note)		
Y151	48-80173D09	7.776 MHz
non-referenced items		
03-10943M04	screw, M2.5 X 8 (5 used)	
04-00001718	washer (4 used)	
07-80925T01	bracket, heat sink	
09-82071K09	14-pin socket (2 used)	
14-80145M01	insulator, accessory	
14-83369E13	insulator, accessory connector	
14-83820M05	insulator, head conductive	
15-80076M01	plastic housing	
26-80123M01	shield frame, high speed logic	
26-80125L02	heat sink, audio/regulator	
42-80940T01	ring, retaining	