

## 1. Theory Of Operation

The Logic Board consists of 5 segments:

- Microprocessor
- Voltage regulation
- Receive audio circuitry
- Transmit audio circuitry
- Power control circuitry

### 1.1 MICROPROCESSOR

#### 1.1.1 Description

*MaxTrac* radios use the Motorola 68HC11A8 microprocessor U802, which consists of:

- 8 MHz Clock rate
- Multiplexed 8 bit address/data lines
- 16 bit addressing
- Internal watchdog circuitry
- Analog to digital input ports.

The control logic surrounding U802 consists of:

- (1) *Custom Gate Array U803*. This device expands the Input/Output capabilities of the control logic. U802 and U803 exchange information which tells the microprocessor the input port status and the desired state of the output ports.
- (2) *NOVRAM U805*. This is a Non-Volatile Random Access Memory device which consists of a static RAM with a built in lithium battery to maintain it's memory after removing power. The NOVRAM acts as the radio's code plug, storing any operating information pertinent to a particular radio. This information includes operating frequencies, control channels, time out timer, and other special functions.

- (3) *EPROM U804*. This is an Erasable Programmable Read Only Memory. U804's function is to store the Microcomputer's operating program.
- (4) *Static Random Access Memory U806*. This RAM is used for scratch pad operations in the trunked *MaxTrac*.
- (5) *Digital-to-Analog IC U801*. This IC is used to generate precision analog voltages.

#### 1.1.2 Operation

When the radio is connected to the battery, UNSW B+ is applied via J7-5 and to zener diode VR402 and R410. The voltage produced from zener diode VR402 is +5 volts and is labeled RAM 5V. RAM 5V is sent to the microprocessor U802 and is used to maintain the radio's current operating conditions (scan list, current mode, etc.). This voltage will be present as long as the battery voltage is present to the radio.

#### 1.1.3 Power Up/Low-Line Reset

When the radio is turned on, the +5V DC is turned on. This will charge up C858 through R893. The time constant established by C858 and R893 will be of long enough duration for C858's charge to pass the +3.2V DC reference voltage on U807A's negative input. RESET line is held low while this is taking place and enough time elapses so that the microcomputers clock and all other voltages stabilize before the internal program starts running. When C858's charge goes above +3.2V DC, RESET goes inactive where it will remain during normal operation.

If SWB+ should decrease in voltage, the decrease will be sensed on the positive input to U807B. The decreased output from U807B will go to the positive input to U807A. This voltage will be compared to the +3.2 reference voltage. If this voltage should decrease below +3.2V DC, RESET will go low and reset the Custom Gate Array U803 and Microcomputer U802. The *MaxTrac* 800 series has the Power Up/Low line RESET circuitry built into the +5V DC regulator U402.

#### 1.1.4 Microcomputer Start-Up Routine

The microcomputer is stabilized and operational after the RESET line is released to an inactive state. Y801, the crystal oscillator, should be stable at this point. The frequency of

Y801 is divided by four with circuitry internal to U802. The resultant frequency is called the "E CLOCK" and can be seen at U802-5. This frequency is used by the Microcomputer and Custom Gate Array as an internal data clock.

The Microcomputer will then do a self test of the control logic. If any failure is detected, an error tone will sound. Refer to the ERROR TONES tables for more information.

#### 1.1.5 Microcomputer Normal Operation

A successful self test of the control logic will activate the multiplexed address/data bus. The Microcomputer comes equipped with an eight bit address/data bus and an eight bit address only bus. These bus lines are connected to the Custom Gate Array for I/O port information and the external memory IC's to send and receive data.

The Custom Gate Array must de-multiplex the lower order address byte from the address/data bus (AD0-AD7) in order to address a particular function or memory location.

The Microcomputer puts the address information on AD0-7 and the information is then passed to U803. The Address Strobe "AS" is pulsed low and the byte is latched. The de-multiplexed address byte A0-7 is then available on U803. The bus is now ready for the transmission of data. The higher order address byte A8-A15 is not multiplexed and is readily available at the Microcomputer U802.

#### 1.1.6 Reading Or Writing In Memory

The specified memory IC must first be enabled before a read/write operation can take place. Each memory IC has its own "chip select" line. SRAM SEL originates at U803-15, NOVRAM SEL at U803-14, and EPROM SEL at U803-13. These lines will all remain logic level high until one is pulsed low to select the IC chosen.

The R/W line which originates from U803-16, tells the system what operation is being performed. If a read condition exists, the R/W line will go logic level high. If a write condition exists, R/W line goes low. In the case of EPROM U804, it is a read only memory and does not require a R/W input.

The Output Enable line "OE" will enable the tri-state output gates to pass the contents of the desired address out onto the A/D, analog to digital, bus. This line is active when pulsed low.

### 1.2 VOLTAGE REGULATION

The source for B+ is taken off the ignition sense jumper JU801. It is then passed to the switch PCB via J8-6 and is routed to one side of the on/off switch. The output, SWB+, comes back into the logic board via J8-5.

U402, on the logic board, is the +5 volt regulator. SWB+ is applied to U402 and the +5V DC output is sent out to the logic board, RF board, and display boards.

When SWB+ is applied to U401A-8, the +9.6V DC regulator will turn on and produce a positive voltage input. This output is divided by CR402, R404, and R405. The voltage drop across R405 is then sent into the negative input of U401A. Zener diode VR401 will produce a +5.03 reference voltage for the positive input. The 9.6 volt sample is compared to the reference and an error voltage inversely proportional to the status of the +9.6 volt rail is generated at U401A-1. This error voltage will turn on and control the conduction of Q402. The higher the drive voltage, the harder Q402 conducts. Q402 controls the amount of conduction through Q401. The harder Q401 conducts, the higher the +9.6 volt line will go.

If the +9.6 volt line should increase, the voltage at U402-2 would rise causing the voltage at U402-1 to decrease. Q401 will now source less current and reduce the +9.6 volt line drops.

Diode CR401 is used to protect Q401 in the event that the 9.6 volt line should be grounded. When this happens, Q402's base can only be .7V DC maximum and Q401 will turn off.

The +4.8V DC is formed by the divider network of R408 and R409. This voltage is fed into the unity gain op amp U401B. Isolation and current amplification take place at U401B.

### 1.3 RECEIVE AUDIO FILTER

The detected audio is applied to the receiver audio filter on the logic board via J6-3. The filter consists of a 3 kHz low pass filter U551, a 300 Hz high-pass filter U552, a de-emphasis circuit U553A and audio mute gate circuit consisting of Q551 and Q552. U553B sums the detected audio signal with the alert tone generated by the microprocessor U802. The 3 kHz low pass filter U551, is necessary to filter any unwanted high frequency noise from reaching the speaker. The 300 Hz high pass filter U552 restricts PL/DPL tones from reaching the speaker. The receiver audio mute gate, Q551, and Q552, operates by switching out the detected audio signal from the audio power amplifier. The microprocessor controls the "RX Mute" line out of U803-6. This line goes high during unmuted mode causing Q551 and Q552 to turn on. PL/DPL along with the squelch setting will cause the microprocessor to switch "RX Mute" line. The filtered audio is then routed to the audio power amplifier via U553B and the volume control pot.

#### 1.3.1 Audio Power Amplifier

The audio power amplifier is a Class A-B amplifier with a differential input stage. Input to this stage comes from the volume control potentiometer wiper which is connected to J8-2.

The audio signal is routed through C501, C502, and R501 are used to form an active filter with a 12 dB/octave roll off below 300 Hz to help attenuate the PL tones.

Capacitors C503, C505, C506, C511, C512, and C513 are used to prevent high level RF from causing the small signal diode junction to degrade audio amplifier performance.

Capacitor C507 and resistor R507 set the power amplifiers closed loop AC gain to 27 dB. The amplifier is a non-inverting type whose AC gain is determined by the equation:

$$V_{out} = \frac{(R508 + R507)}{R507} (V_{in})$$

Transistors Q501 and Q502 are a small signal differential pair. The half supply voltage reference for Q501 is set by R502 and R503. C504 is used to remove any alternator whine from the half supply reference voltage. Q502 receives 100 per cent DC feedback from the output via R508. R504 and R508 are the same value to help maintain the best differential offset so that the DC output voltage is exactly half-supply voltage as set by the reference voltage at Q501.

Q503 is a Class A driver that causes the output stage to swing within one volt of supply and ground reference. To fully saturate the upper complimentary output pair Q506 and Q504, C509 is used to allow the junction of R509, R510, and C509 to swing about 3 volts higher than supply voltage. C510 from the collector to base of Q503 is a Miller effect capacitance causing the open loop gain to roll off at above 3 kHz and guarantee the amplifier's stability under all closed loop operating conditions.

The pre-drivers Q504 and Q505 are Class A and help prevent low level crossover distortion. At high level signals, crossover will be caused by Class B amplifiers Q506 and Q507. The large amount of negative feedback relative to the close loop gain keeps distortion low. The open loop gain is approximately 80 dB and the close loop gain or operating AC gain is 27 dB. There is about 53 dB of negative feedback to help reduce distortion of the output from Q506 and Q507.

The output stage of the audio power amplifier consists of complimentary Darlington pairs in a push-pull configuration. The upper pair consists of the PNP power device Q506 and small signal NPN driver Q504. Together they work like an NPN power device. The compliment of Q506, Q504 is made up of NPN power device Q507 and PNP small signal device Q505. Together this pair works like an PNP power device. Q506 and Q507 are biased at .2 volts base to emitter and are turned off at DC or small signal AC drive levels. At high AC signal levels, Q506 and Q507 turn on. The pre-drivers Q504 and Q505 are biased on by CR501 and CR502. The bias current is stabilized by emitter feedback resistors R513 and R514. Diodes CR501 and CR502 are placed near transistors Q504, Q505, Q506, and Q507. They help the output stages from turning on to large DC currents as the output stages become hot.

Q508 and Q509 are low current switches controlled by the PA MUTE line from the microprocessor. The audio amplifier can be turned on or off by PA MUTE in about 5 milliseconds. PA MUTE is affected by the PL/DPL and squelch circuitry.

C514 couples the output signal from the audio power amplifier to the speaker. It also provides DC blocking to the speaker and couples the AC signal down to 80 Hz in frequency.

### 1.3.2 Low-Speed Data Filter

This circuit filters the signal higher than 300 Hz from the detected audio with a low pass filter (U602B and U603A). The PL tone between 67–257 Hz or DPL signal between 10–140 Hz is covered. The signal is then pulse shaped to 5V p/p by U603B and Q601. The PL/DPL signal is then routed to the microprocessor U802–33 via R839 (DLO RX). U602A is a PL/DPL cancellation circuit for duplex radios so that the receiver does not decode its own PL/DPL signal modulating the reference oscillator. In duplex radios, the receiver and transmitter VCO are in operation simultaneously. A reference modulation signal will be seen in both the receiver injection and transmitter output. The receiver will detect this reference modulation and without the cancellation effect provided by U602A, will be given a PL decoding error.

### 1.3.3 High Speed Data Filter

U601A contains the circuitry for the High Speed Data filter. Data sent to this circuit can be information such as the MDC data found in certain special options or the different handshakes found in the trunking signaling scheme for trunked radios. U601A's output is a 5V p/p pulse which is routed and processed by the microprocessor.

## 1.4 TRANSMIT AUDIO

The microphone signal is made available to the emitter of Q651 and allowed to pass by turning Q652 on via the MIC EN during the transmit mode. The MIC signal gets pre-emphasized, amplified and limited by U651A. The output is then fed into summation amplifier U652A and voltage control attenuator U653A. The VCA controls the signal level fed to the transmitter VCO for modulation. Voltage changes at U653–3 change the attenuation of the MIC signal. This controlled signal is filtered by the splatter filter U652 to get rid of high frequency signals. The output of U652B goes to P6–10 as VCO Modulation. The Reference Modulation is routed from U651A to P6–13.

### 1.4.1 High-Speed Transmit Data

High-Speed Transmit Data from the microprocessor is applied to U701A. The output of U701A is routed to the summation amplifier U652A.

### 1.4.2 Low-Speed Transmit Data

The PL and DPL data from the microprocessor is applied to U701B. U701B takes the PL and DPL data and transforms it into a four step stair-step waveform. This stair-step waveform is applied to U651B where it is turned into a PL tone or the analog representation of the DPL code. The output of U651B is applied to the summation amplifier U652A.

## 1.5 POWER CONTROL CIRCUIT

The power control circuitry used to control the RF power amplifier is explained in detail in the Power Amplifier section of this manual.

## 2. Troubleshooting Guide

### 2.1 MICROPROCESSOR SECTION

The *MaxTrac* radio uses a microprocessor U802, along with support IC's. U803, the Custom Gate Array, U804 the EPROM, and U805 the NOVRAM.

Most of the problems encountered in this section will be difficult to localize to one particular device. All the devices interact with each other by passing information back and forth on the bus lines.

A very common problem encountered is the Code Plug Error. This is characterized by a 163 Hz tone for a 5 second duration. The ERROR TONE charts will help the servicer in isolating to the Logic Board but will not give the exact IC at fault. The Code Plug information is contained not only in the microprocessor but the NOVRAM as well.

Replacement of the Logic Board is the safest way to make sure the problem is fixed. Before replacing the board, the servicer can attempt to reprogram the radio code plug. Stepping through the Radio Service Software's service menu will sometimes clear the fault if the microprocessor is not the problem. The RF Board Level Replacement procedures can also be followed step by step. Sometimes a system fault can be cleared this way. If these procedures do not clear the problem, board replacement and re-calibration must be done.

Other error tones will point to problems that can be traced back to defective IC's or components not actually in the

shielded area of the Logic Board. By observing the logic voltage levels and waveforms on the schematics, the fault can be found.

### 2.2 RECEIVE AUDIO

Troubleshoot the Receive Audio path by observing voltage and waveforms on the schematics. Troubleshooting chart "BAD SQUELCH OR PL/DPL" will help isolate to a specific section. Review the theory of operation before attempting to find the faulty component.

### 2.3 TRANSMIT AUDIO

The Transmit Audio path is also serviceable by using the "BAD TX MODULATION" troubleshooting chart and schematics. By inserting a tone from an external oscillator and by passing the microphone, the servicer can keep a consistent tone and amplitude as he troubleshoots through the different stages.

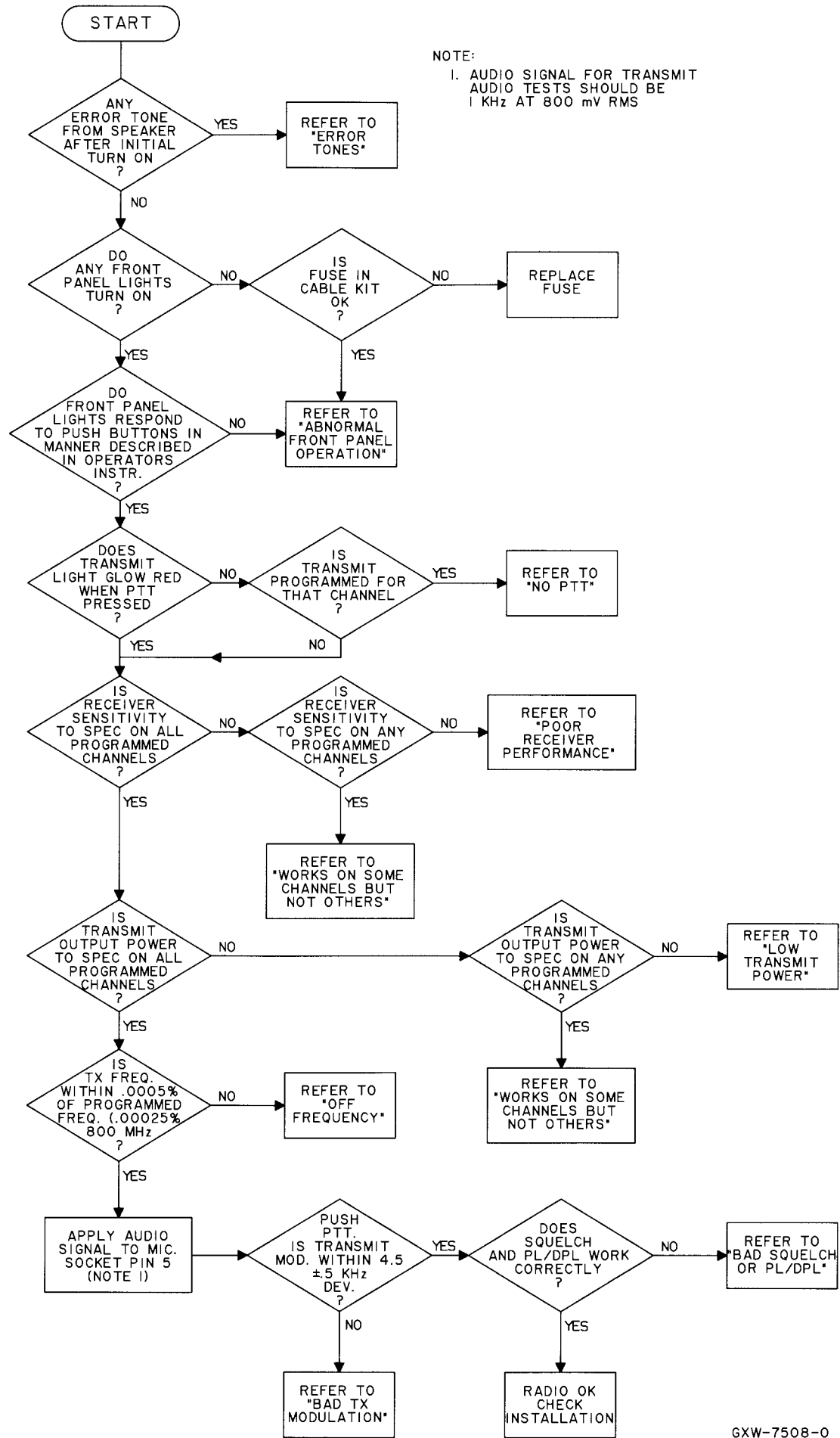
### 2.4 AUDIO POWER AMPLIFIER

Troubleshoot the Receive Audio Power Amplifier using the "NO/LOW AUDIO" chart and the schematics and theory of operation. To help isolate which stage the problem is in under full power out conditions, use a dummy load instead of a speaker and monitor the voltage on the load.

### 2.5 POWER CONTROL CIRCUITRY

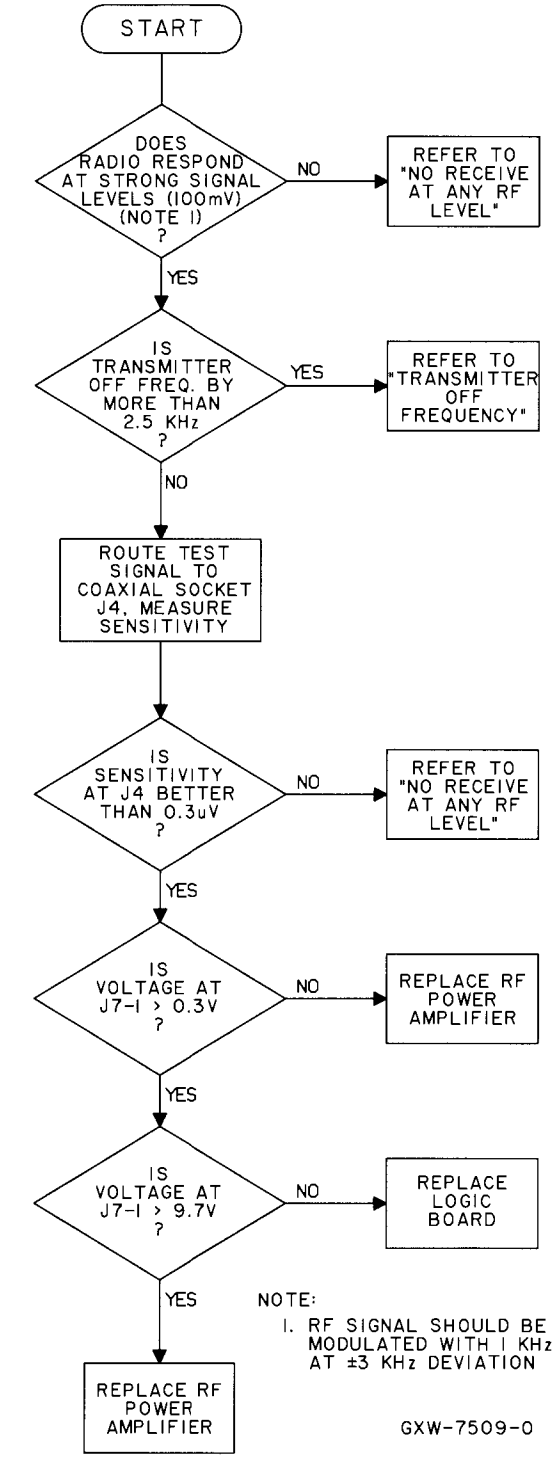
Refer to the Transmitter Troubleshooting section to isolate problems in the Power Control Circuitry part of the Logic Board. This power control loop is very difficult to troubleshoot without breaking the loop and inserting a fixed voltage to certain parts of the circuit. Follow the schematic and theory of operation carefully. Voltages on each device are noted and can be used for comparison.

# BASIC TROUBLESHOOTING (START WITH THIS CHART)



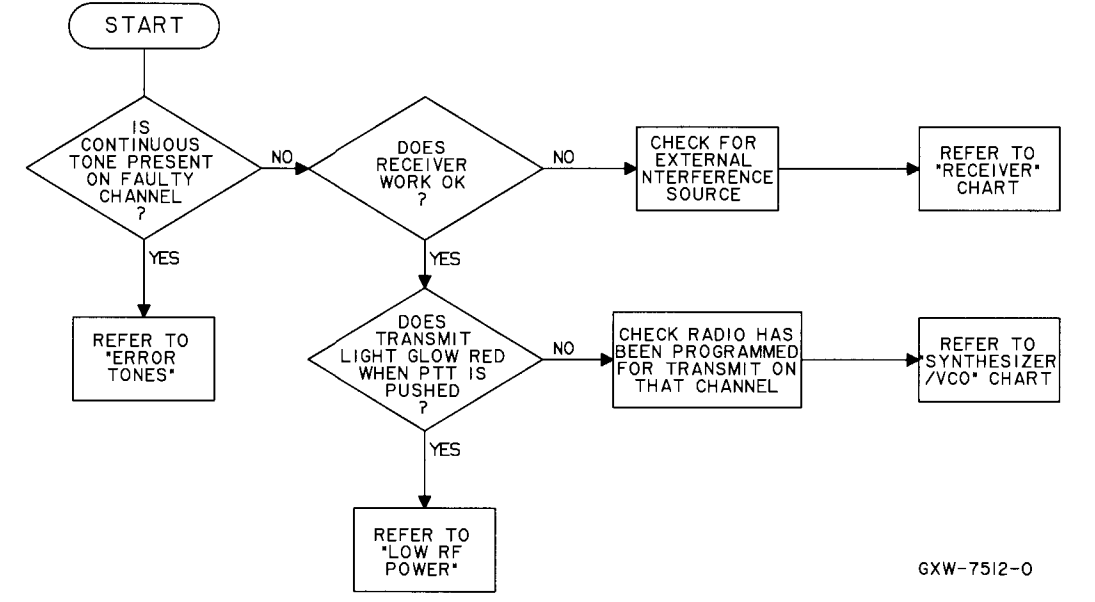
GXW-7508-0

# POOR RECEIVER PERFORMANCE



GXW-7509-0

# RADIO WORKS ON SOME CHANNELS BUT NOT OTHERS

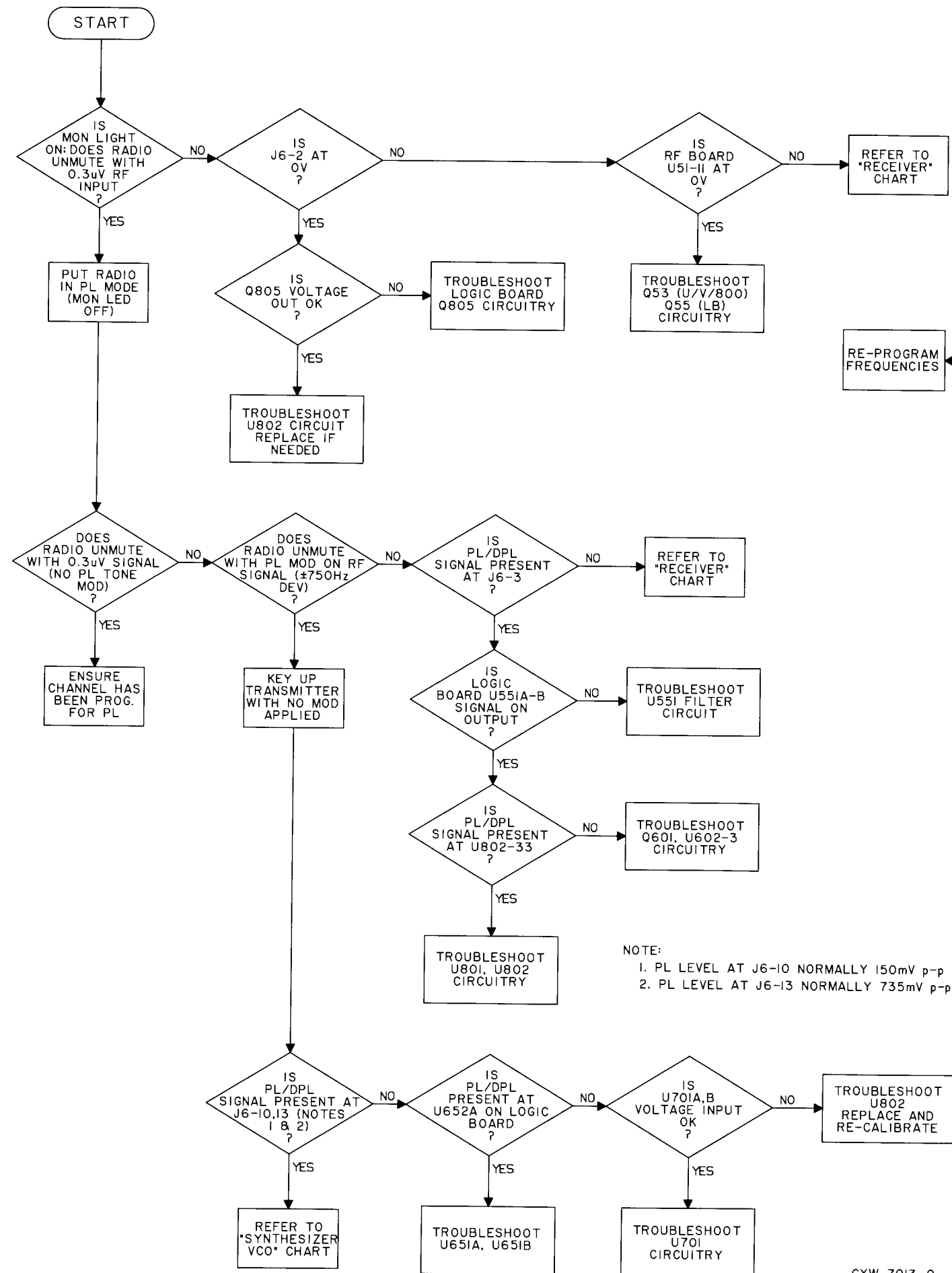


GXW-7512-0

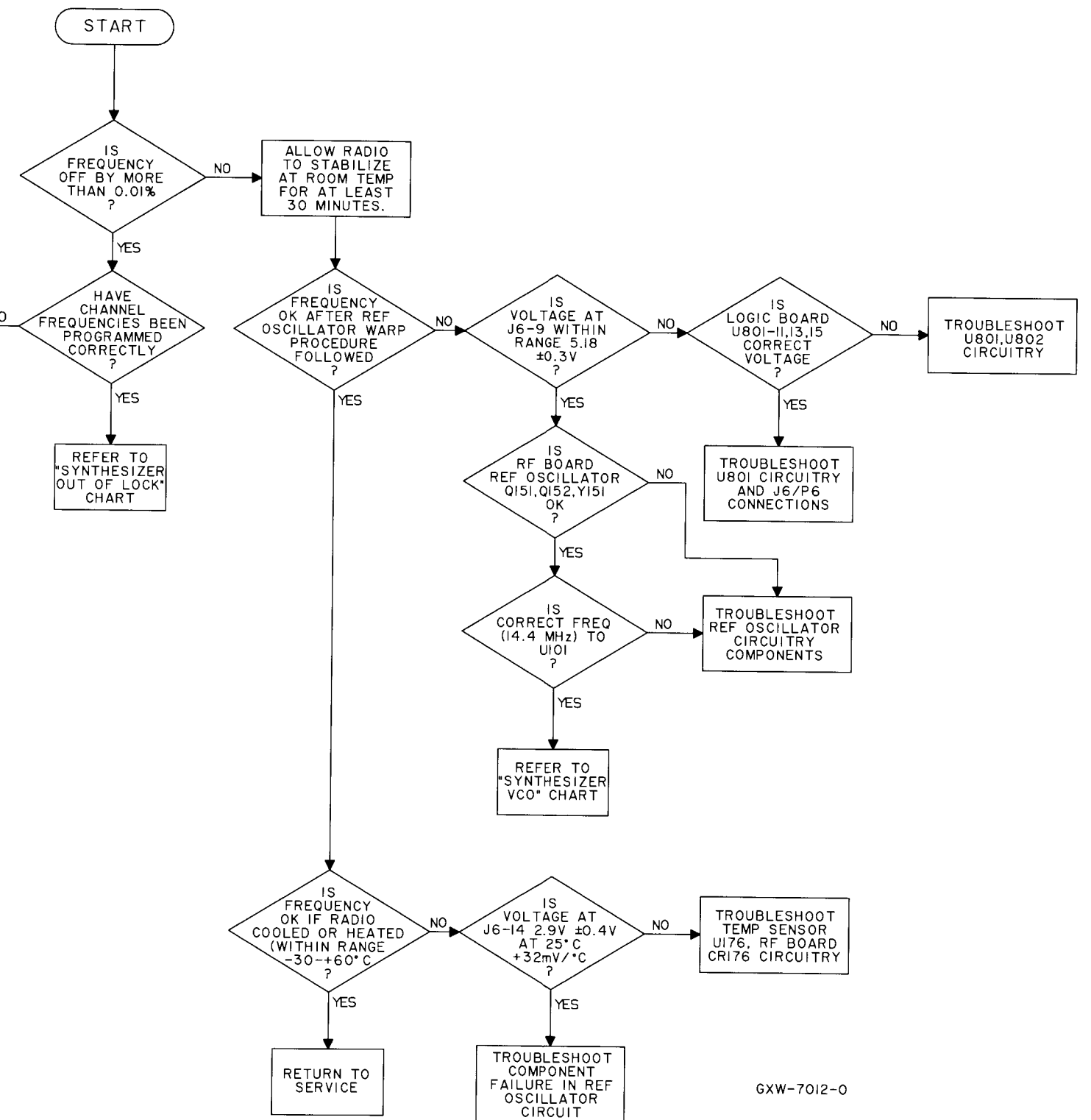
**IMPORTANT**  
IF THE RF BOARD, LOGIC BOARD, OR RF POWER AMPLIFIER ARE REPLACED, RECALIBRATION OF THE RADIO MUST BE PERFORMED.

# BAD SQUELCH OR PL/DPL

# TRANSMITTER OFF FREQUENCY

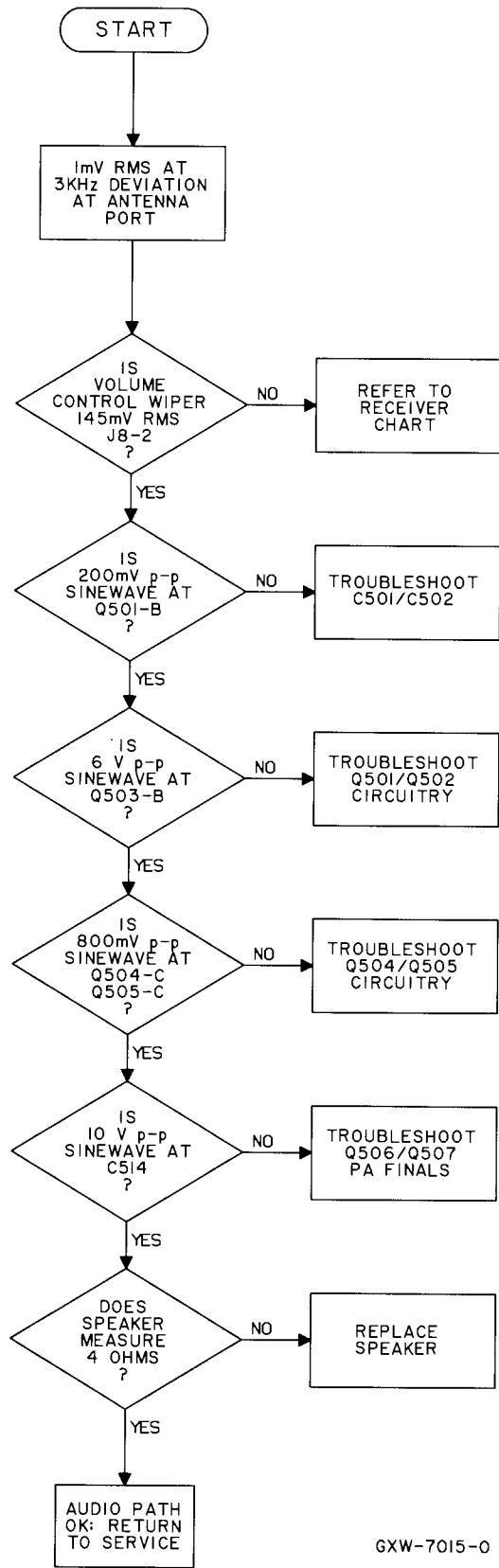


GXW-7013-0



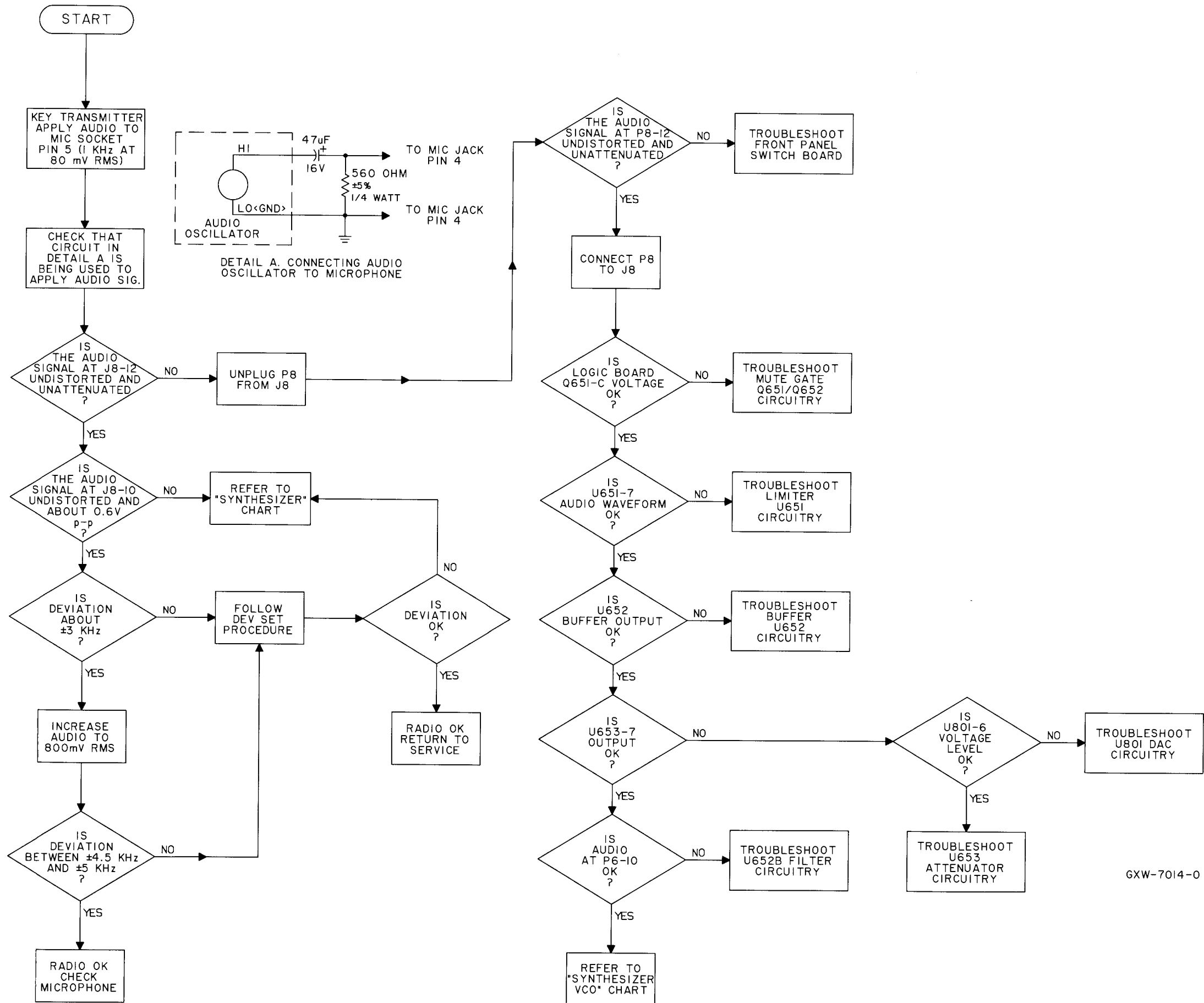
GXW-7012-0

# NO/LOW AUDIO

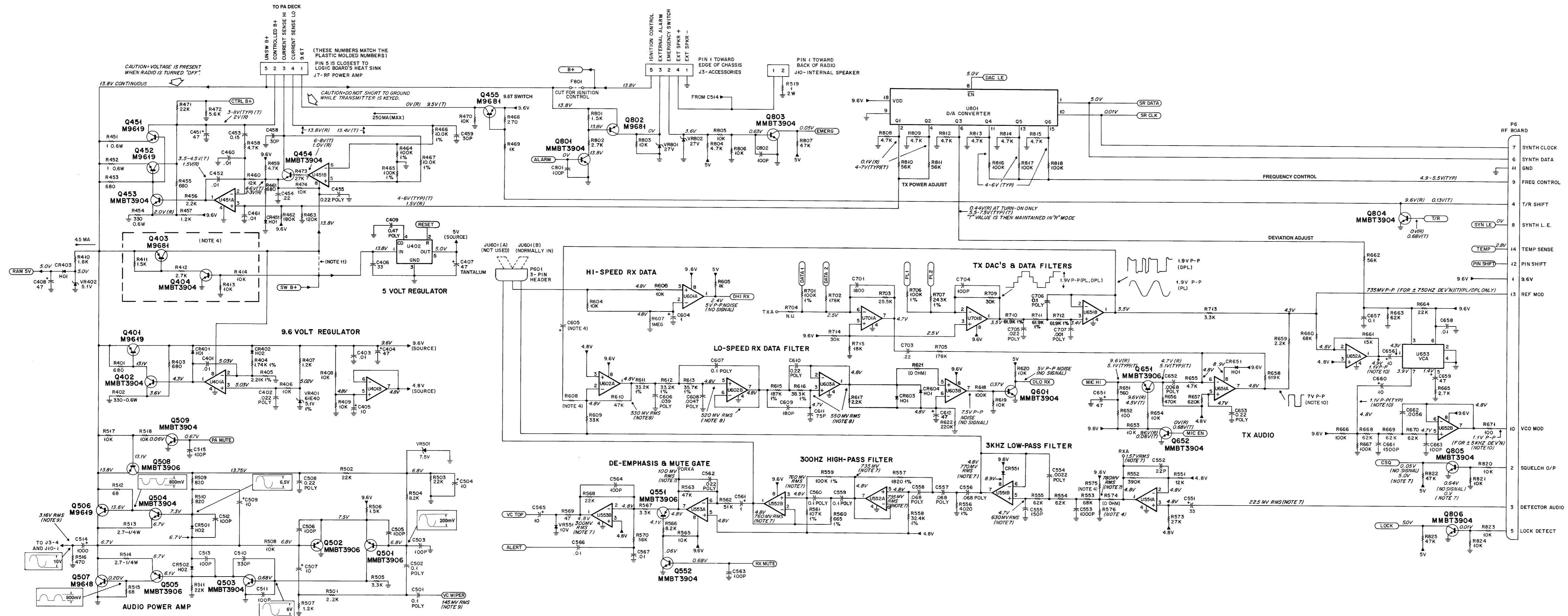


GXW-7015-0

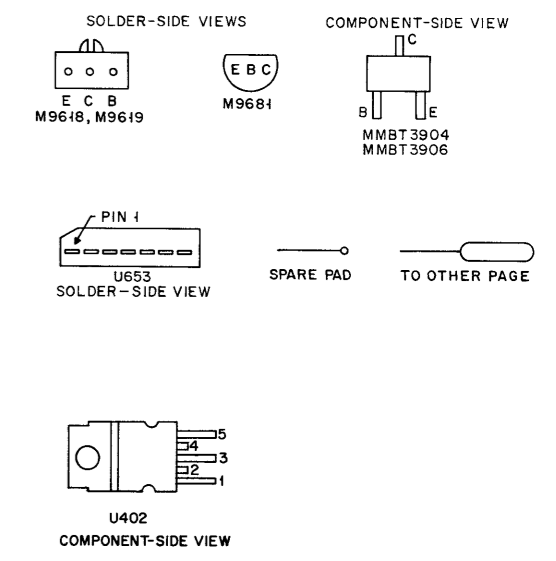
# BAD TX MODULATION



GXW-7014-0

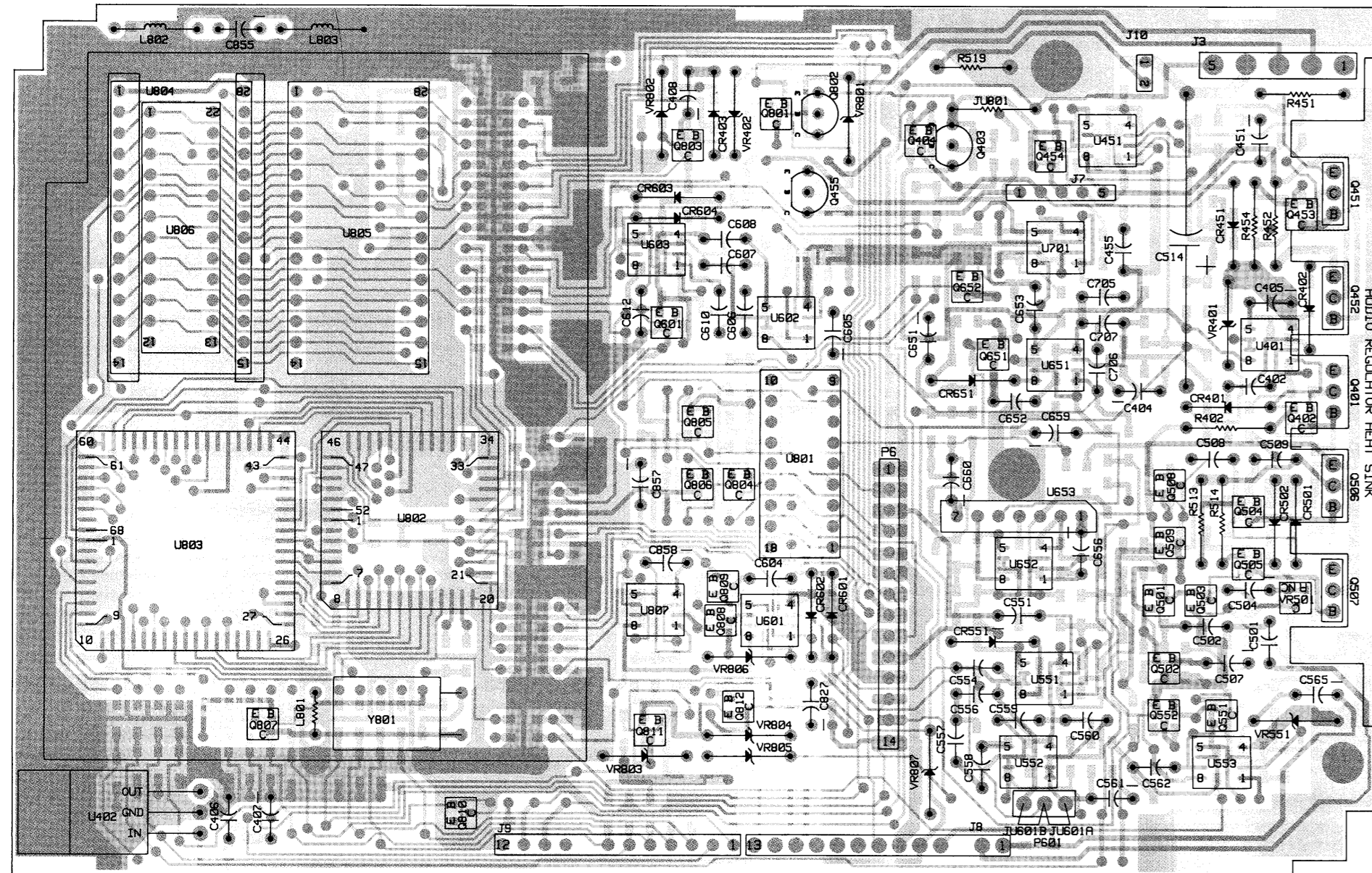


- NOTES:
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICROHENRIES.
  - NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED.
  - POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
  - NOT USED.
  - DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
  - DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:  
(R) RECEIVE MODE  
(T) TRANSMIT MODE
  - MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER.
  - SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.
  - SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 5 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD).
  - MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
  - VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.



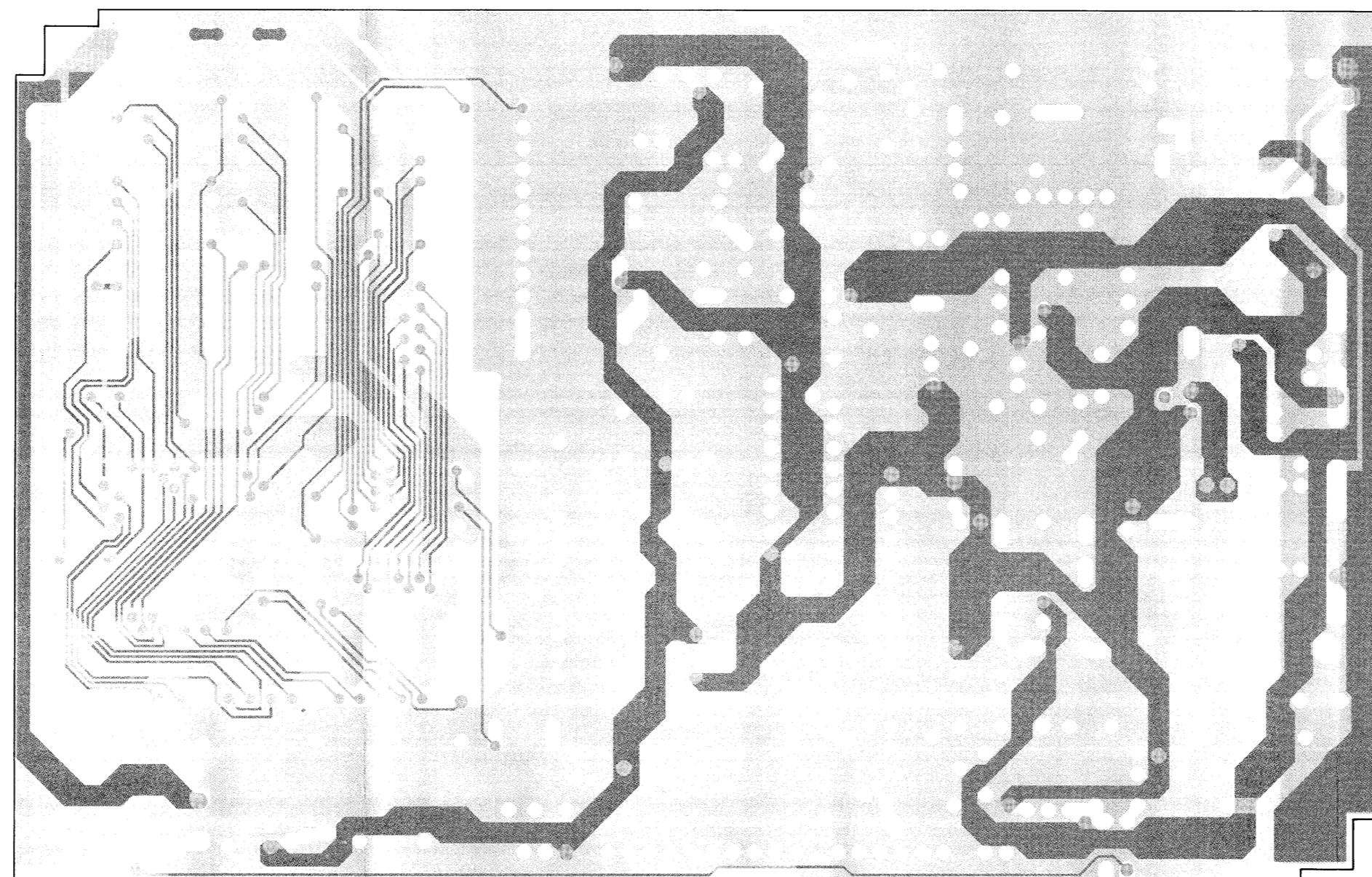






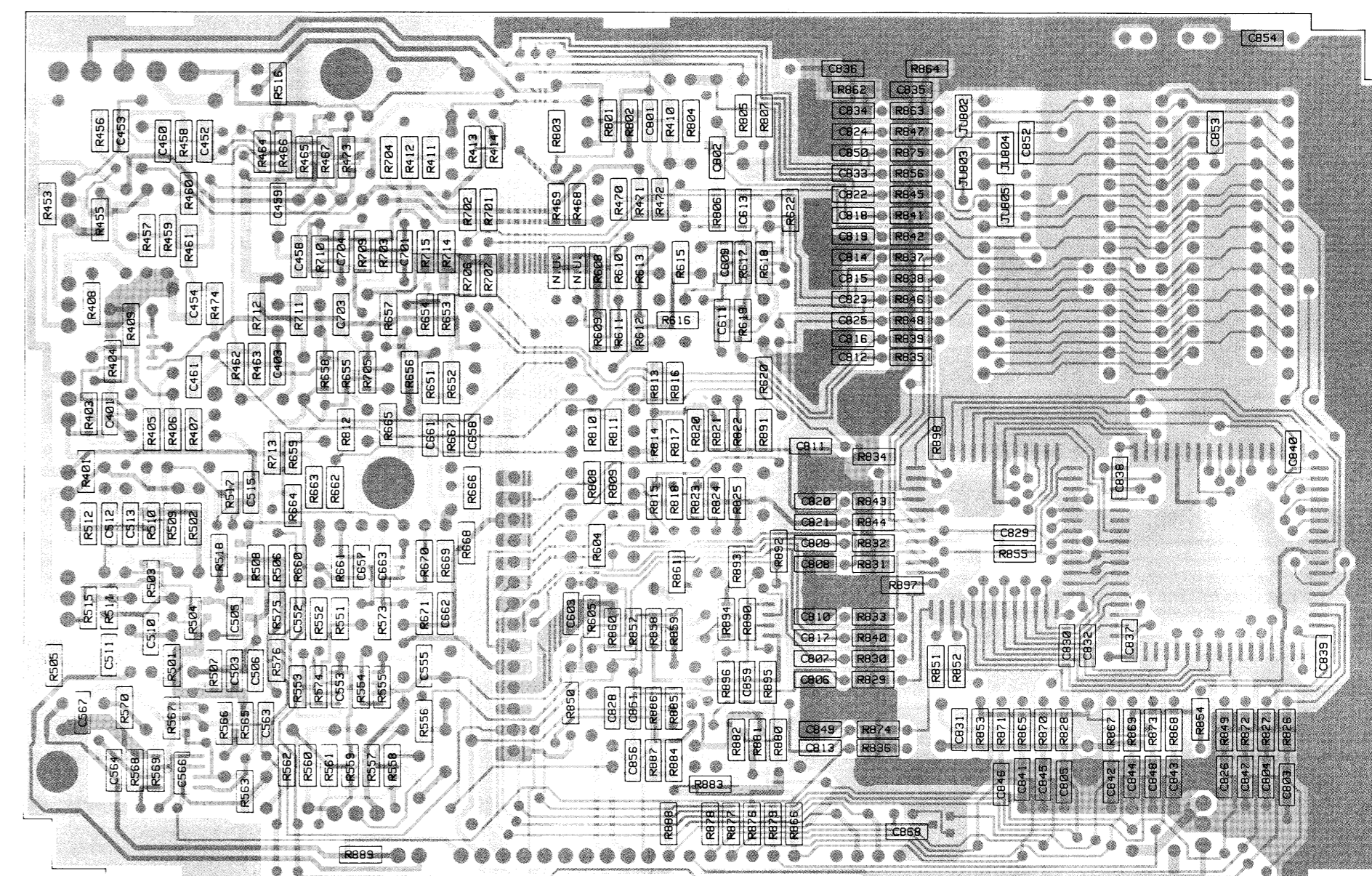
COMPONENT SIDE VIEW

- SOLDER SIDE GCW-7359-O
- COMPONENT SIDE GCW-7358-O
- OVERLAY GCW-7360-O



COMPONENT SIDE VIEW

- INNER LAYER 1 GCW-7521-O
- INNER LAYER 2 GCW-7522-O
- OVERLAY GCW-7523-O



SOLDER SIDE VIEW

- SOLDER SIDE GCW-7359-O
- COMPONENT SIDE GCW-7358-O
- OVERLAY GCW-7361-O

# parts list

HLN5172A Logic Board (Trunking)

MXW-7357-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>capacitor, fixed, uF, ±5%, 50V</b> (unless otherwise stated)		
C401	21-13741B45	0.01, ±10%
C402	08-11051A09	.022, 63V
C403	21-13741B45	0.01, ±10%
C404	23-11048B19	47, ±20%, 16V, electrolytic
C405	23-11048B13	10, ±20, 16V, electrolytic
C406	23-11048A17	33, ±20%, 25V, electrolytic
C407	23-13749A44	47, ±20%, 6V
C408	23-11048B19	47, ±20%, 16V, electrolytic
C409	08-11051A17	.47, 63V
C451	23-11048B19	47, ±20%, 16V, electrolytic
C452	21-13741B45	0.01, ±10%
C453	21-11032B14	.15, +80 -20%
C454	21-11032B15	.22, +80 -20%
C455	08-11051A15	.22, 63V
C458,459	21-13740B36	30 pF
C460,461	21-13741B45	0.01, ±10%
C501,502	08-11051A13	.1, 63V
C503	21-13740B49	100 pF
C504	23-11048B13	10, ±20%, 16V, electrolytic
C505,506	21-13740B49	100 pF
C507	23-13749C39	10, ±10%, 20V
C508	08-11051A15	.22, 63V
C509	23-11048B13	10, ±20%, 16V, electrolytic
C510	21-13740B61	330 pF
C511-513	21-13740B49	100 pF
C514	23-02308M01	1000, ±20%, 16V, electrolytic
C515	21-13740B49	100 pF
C551	23-11048A17	33, ±20, 25V, electrolytic
C552	21-13740B33	22 pF
C553	21-13740B73	1000 pF
C554	08-11051A03	.0022, 63V
C555	21-13740B53	150 pF
C556-558	08-11051A12	.068, 63V
C559,560	08-11051A13	.1, 63V
C561	23-11048B05	1, ±20%, electrolytic
C562	08-11051A09	.022, 63V
C563,564	21-13740B49	100 pF
C565	23-11048B13	10, ±20%, 16V, electrolytic
C566,567	21-13741B45	0.01, ±10%
C604	23-11048B05	1, ±20%, electrolytic
C606	08-11051A22	0.039, 63V
C607	08-11051A13	.1, 63V
C608	08-11051A05	.0047, 63V
C609	21-13740B55	180 pF
C610	08-11051A15	.22, 63V
C611	21-13740B46	75 pF
C612	23-11048B19	47, ±20%, 16V, electrolytic
C651	23-11048B19	47, ±20%, 16V, electrolytic
C652	08-11051A06	.0068, 63V
C653	08-11051A15	.22, 63V
C656	23-11048B13	10, ±20%, 16V, electrolytic
C657	21-13741B69	0.1, +80 -20%
C658	21-13741B45	0.01, ±10%
C659	23-13749A44	47, ±20%, 6V, tantalum
C660	23-11048B13	10, ±20%, 16V, electrolytic
C661	21-13740B76	1500 pF
C662	21-13741B39	.0056
C663	21-13740B49	100 pF
C701	21-13740B78	1800 pF
C703	21-11032B15	.22, +80, -20%
C704	21-13740B49	100 pF
C705	08-11051A09	.022, 63V
C706	08-11051A13	.1, 63V
C707	08-11051A01	.001, 63V
C801,802	21-13740B49	100 pF
C803,804	21-13740B73	1000 pF
C805	21-11032B15	.22, +80 -20%
C806,807	21-13740B73	1000 pF
C808,809	21-13740B49	100 pF
C810,811	21-13740B73	1000 pF
C813-823	21-13740B73	1000 pF
C824,825	21-13740B49	100 pF
C826	21-13740B73	1000 pF
C827	23-11048B05	1, ±20%, electrolytic
C828	21-13741B69	0.1, +80 -20%
C829	21-13741B45	0.01, ±10%
C830	21-13740B25	10 pF, ±5 pF
C831	21-11031F10	5.6 pF, ±5 pF
C832	21-13740B25	10 pF, ±5 pF
C833	21-13740B73	1000 pF
C834,835	21-13741B69	0.1, +80 -20%
C836	21-13740B73	1000 pF
C837-840	21-13741B45	0.01, ±10%
C841-848	21-13740B73	1000 pF
C849	21-13740B49	100 pF
C850	21-13740B73	1000 pF
C852,853	21-13741B45	0.01, ±10%
C854	21-13740B73	1000 pF
C855	23-11054A09	47, ±20%, 6V, tantalum
C856	21-13740B49	100 pF
<b>diode</b> (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
CR603,604	48-83654H01	silicon

Schematics, Circuit Board Diagrams, and Parts Lists for HLN5172A Logic Board  
**PW-7356-O**  
 (Sheet 4 of 4)

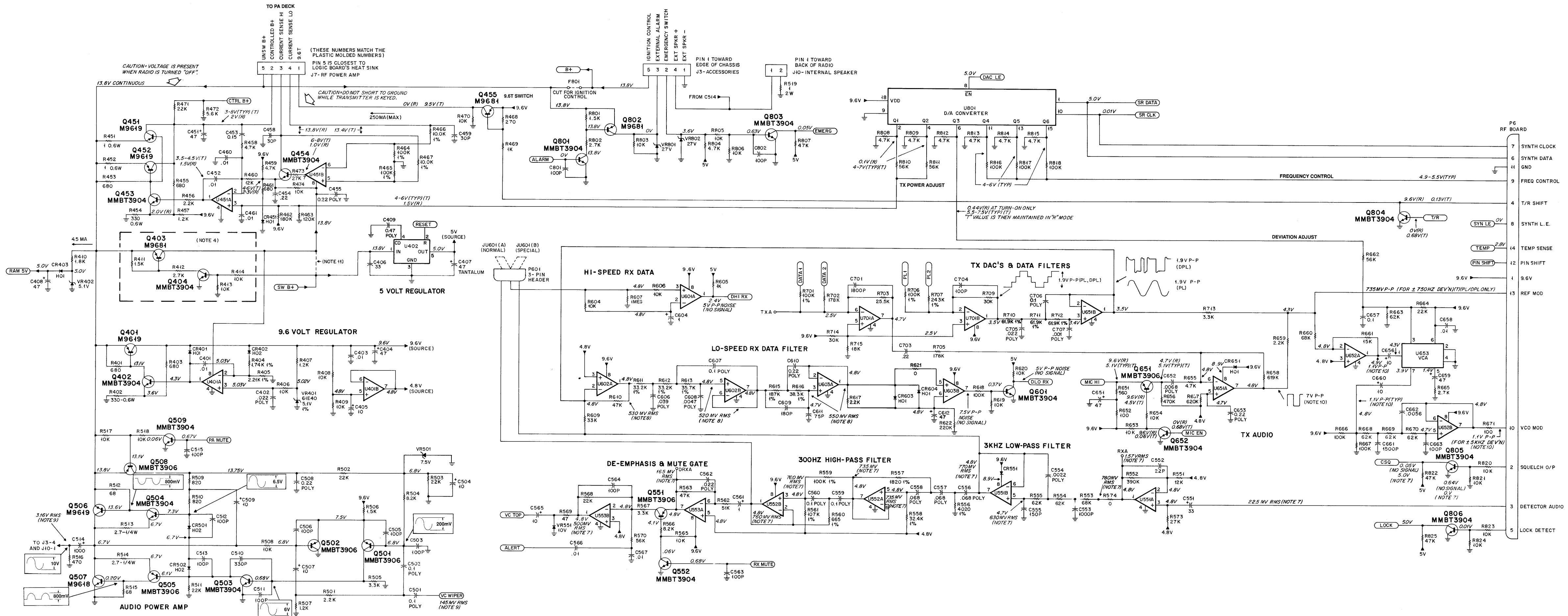
2/28/90

MXW-7357-O (2)

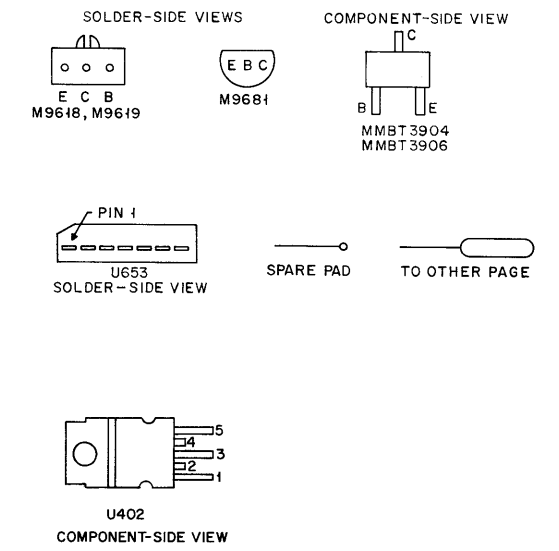
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
CR651	48-83654H01	silicon
<b>fuse</b>		
F801	65-05214E06	1 A
<b>connector receptacle</b>		
J3	28-80129M01	5-pin
J7	28-80128M01	5-pin
J8,9	28-80126M01	23-pin
J10	28-80128M02	2-pin
<b>jumper</b>		
JU601	09-84181L01	2-contact push-on
JU802	06-11077A01	0-ohm resistor
JU804	06-11077A01	0-ohm resistor
<b>coil, RF</b>		
L801	24-82723H35	23 uH, red
L802,803	24-83961B02	5 turns, green
<b>connector plug</b>		
P6	28-80127M02	14-pin, RF board
P601	28-80002R03	3-pin, for JU601
<b>transistor</b> (see note)		
Q401	48-00869619	PNP
Q402	48-80214G02	PNP
Q451,452	48-00869619	PNP
Q453,454	48-80214G02	PNP
Q455	48-11043C10	PNP
Q501,502	48-05128M16	PNP
Q503,504	48-80214G02	PNP
Q505	48-05128M16	PNP
Q506	48-00869619	PNP
Q507	48-00869618	PNP
Q508	48-05128M16	PNP
Q509	48-80214G02	PNP
Q551	48-05128M16	PNP
Q552	48-80214G02	PNP
Q601	48-80214G02	PNP
Q651	48-05128M16	PNP
Q652	48-80214G02	PNP
Q801	48-80214G02	PNP
Q802	48-11043C10	PNP
Q803-807	48-80214G02	PNP
Q808,809	48-05128M16	PNP
Q810-812	48-80214G02	PNP
<b>resistor, fixed, ohm, ±5%, 1/8 watt</b> (unless otherwise stated)		
R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, 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, .6 Watt, metal film
R453	06-11077A70	680
R454	06-02369M31	330, .6 watt, 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	06-11077A82	2.2k
R502,503	06-11077B07	22k
R504	06-11077A96	8.2k
R505	06-11077A86	3.3k
R506	06-11077A78	1.5k
R507	06-11077A76	1.2k
R508	06-11077A98	10k
R509,510	06-11077A72	820
R511	06-11077B07	22k
R512	06-11077A46	68
R513,514	06-11009B26	2.7, 1/4 Watt
R515	06-11077A46	68
R516	06-11077A66	470
R517,518	06-11077A98	10k
R519	06-80185M01	1 ohm, ±10%, 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%

MXW-7357-O (3)

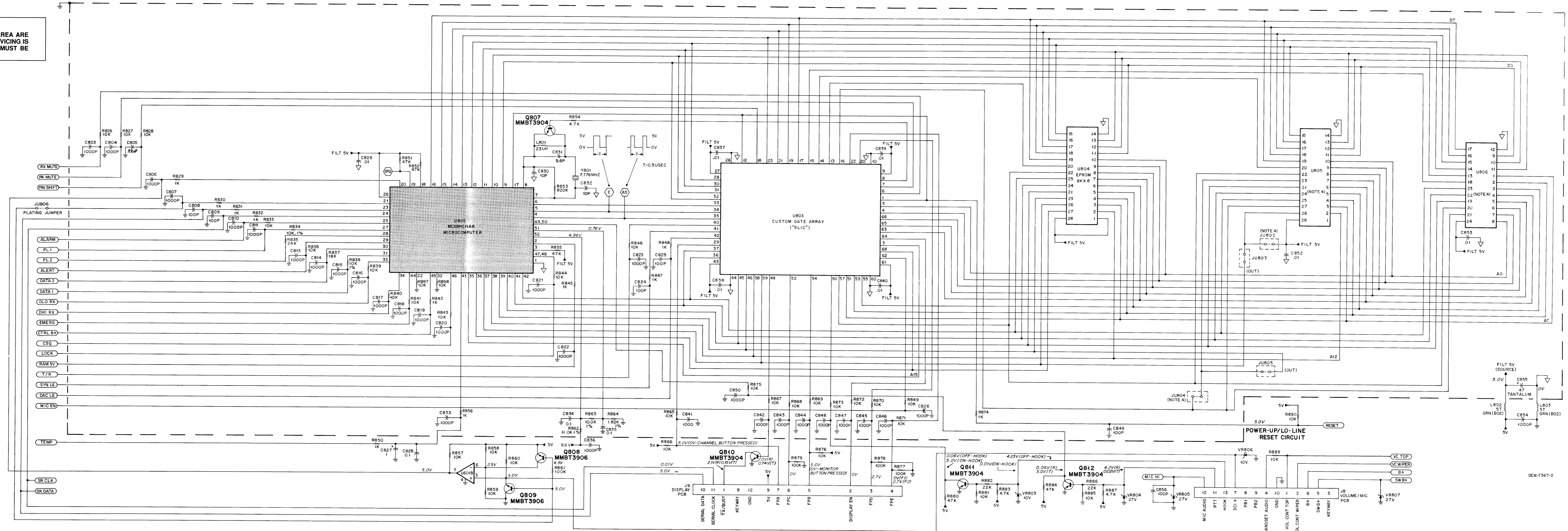
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R562	06-11077B16	51k
R563	06-11077B15	47k
R565	06-11077A98	10k
R566	06-11077A96	8.2k
R567	06-11077A86	3.3k
R568	06-11077B07	22k
R569	06-11077A42	47
R570	06-11077B17	56k
R573	06-11077B09	27k
R574	06-11077A01	0-ohm
R604	06-11077A98	10k
R605	06-11077A74	1k
R606	06-11077A98	10k
R607	06-11077B47	1 meg
R609	06-11077B11	33k
R610	06-11077B15	47k
R611,612	06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11077H15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R618	06-11077B23	100k
R619,620	06-11077A98	10k
R621	06-11077A01	0 ohm
R622	06-11077B31	220k
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, ±1%
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, ±1%
R703	06-11077G31	25.5k, ±1%
R705	06-11077H13	178k, ±1%
R706	06-11077G88	100k, ±1%
R707	06-11077H26	243k, ±1%
R709	06-11077B10	30k
R710-712	06-11077G68	61.9k, ±1%
R713	06-11077A86	3.3k
R714	06-11077B10	30k
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

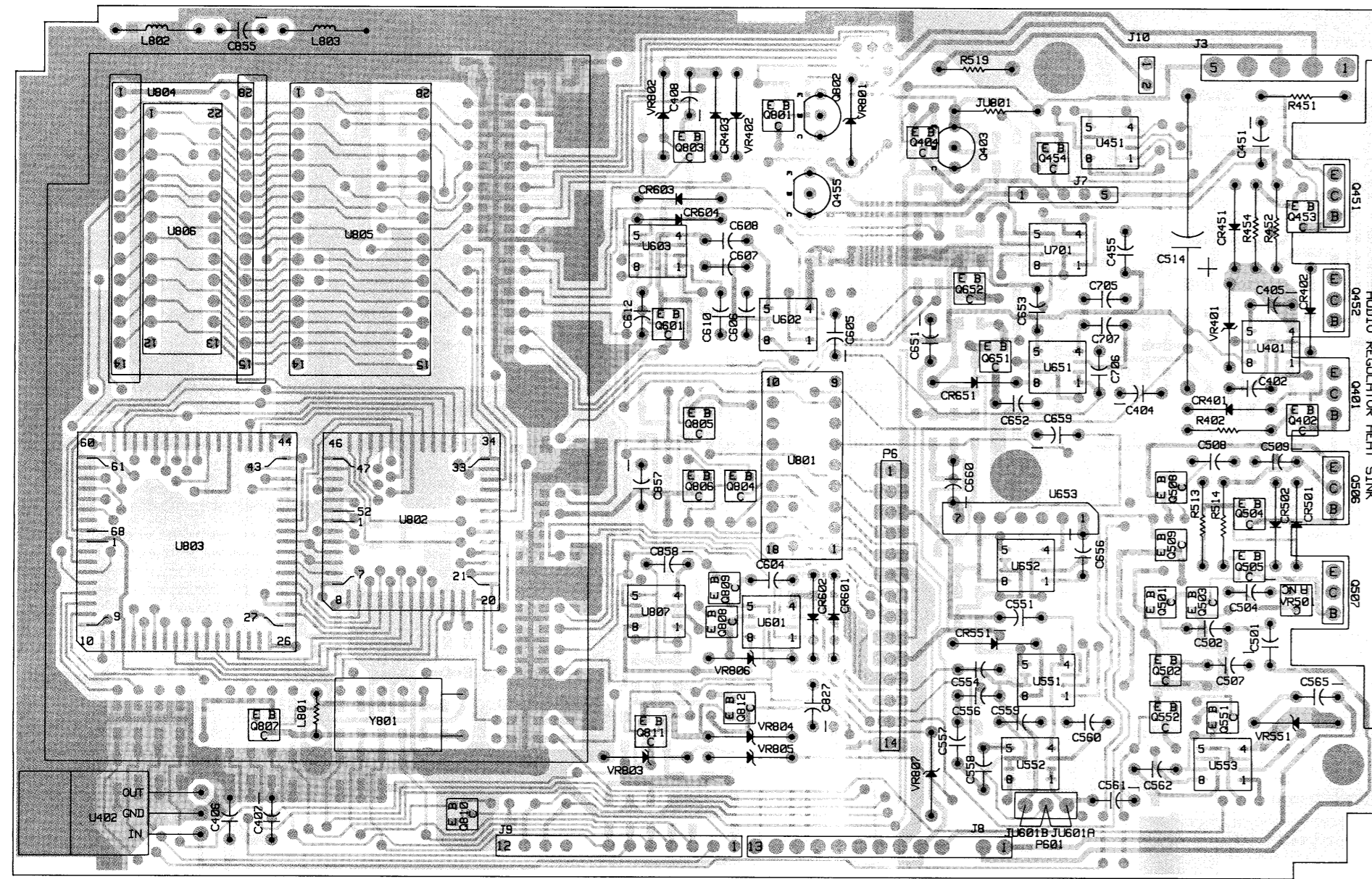


- NOTES:
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICROHENRIES.
  - NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED.
  - POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
  - NOT USED.
  - DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
  - DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS: (R) RECEIVE MODE (T) TRANSMIT MODE
  - MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION, MEASURED WITH AN AC RMS VOLTMETER.
  - SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.
  - SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 5 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD).
  - MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
  - VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.



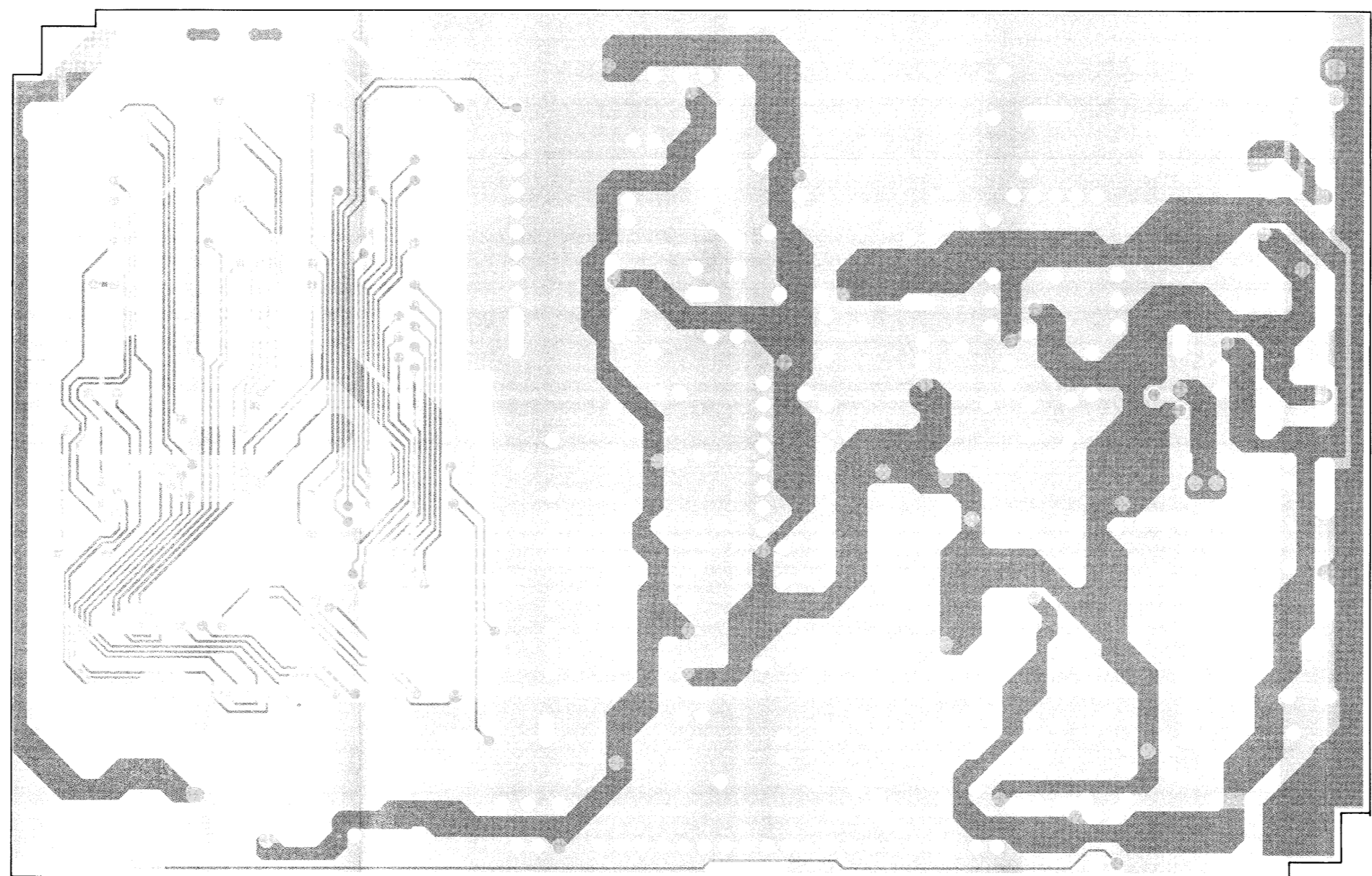
**IMPORTANT**  
 COMPONENTS WITHIN SHADED AREA ARE NOT FIELD-SERVICEABLE. IF SERVICING IS REQUIRED, THE ENTIRE BOARD MUST BE REPLACED.





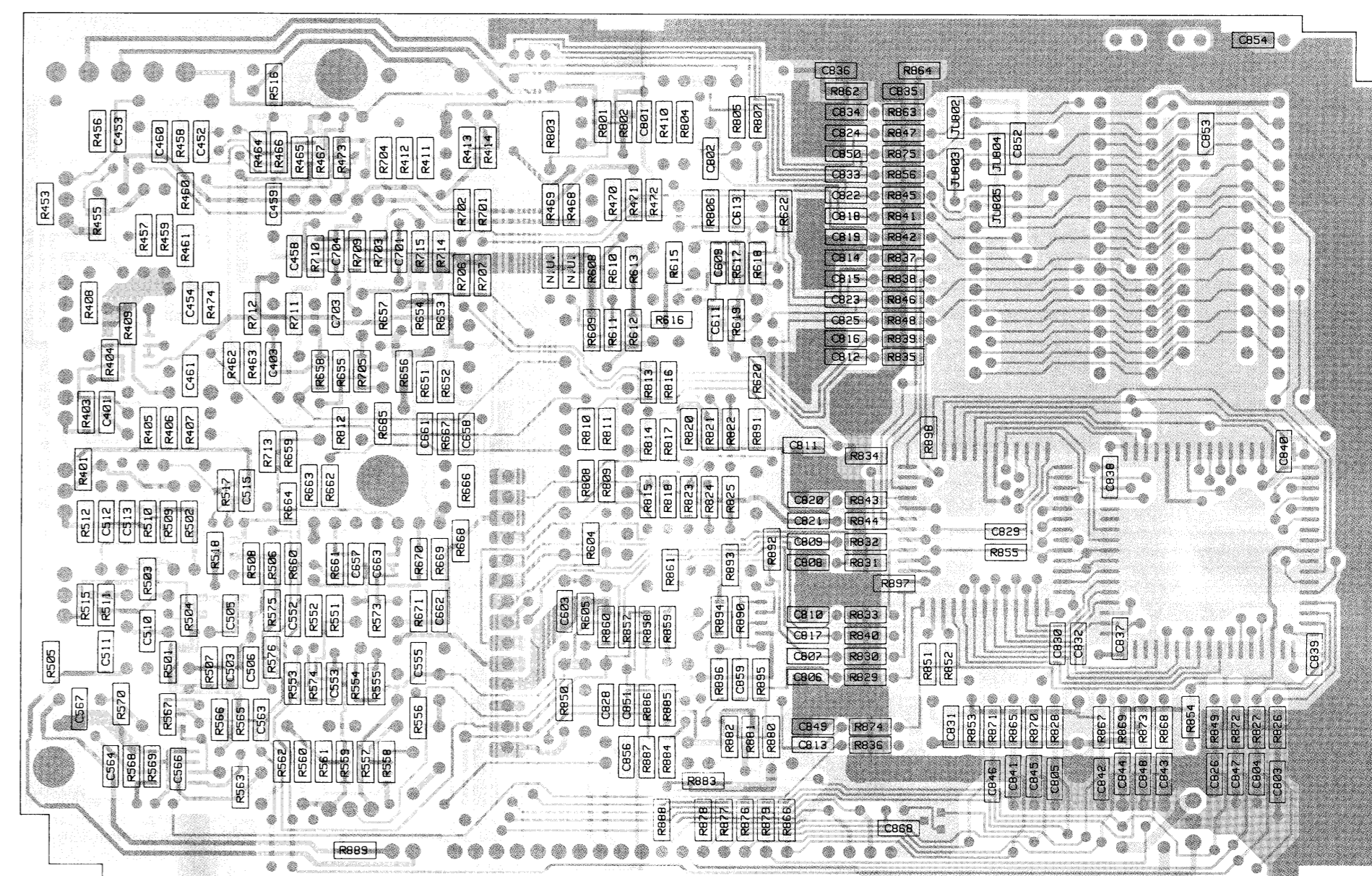
COMPONENT SIDE VIEW

- SOLDER SIDE ○ GCW-7359-O
- COMPONENT SIDE ● GCW-7358-O
- OVERLAY ■ GCW-7360-O



COMPONENT SIDE VIEW

- INNER LAYER 1 ○ GCW-7521-O
- INNER LAYER 2 ● GCW-7522-O
- OVERLAY ■ GCW-7523-O



SOLDER SIDE VIEW

- SOLDER SIDE ○ GCW-7359-O
- COMPONENT SIDE ● GCW-7358-O
- OVERLAY ■ GCW-7361-O

# parts list

HLN5173B Logic Board (Conventional)

MXW-7365-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>capacitor, fixed, uF, ±5%, 50V</b> (unless otherwise stated)		
C401	21-13741B45	0.01, ±10%
C402	08-11051A09	.022, 63V
C403	21-13741B45	0.01, ±10%
C404	23-11048B19	47, ±20%, 16V, electrolytic
C405	23-11048B13	10, ±20, 16V, electrolytic
C406	23-11048A17	33, ±20%, 25V, electrolytic
C407	23-13749A44	47, ±20%, 6V
C408	23-11048B19	47, ±20%, 16V, electrolytic
C409	08-11051A17	.47, 63V
C451	23-11048B19	47, ±20%, 16V, electrolytic
C452	21-13741B45	0.01, ±10%
C453	21-11032B14	.15, +80 -20%
C454	21-11032B15	.22, +80 -20%
C455	08-11051A15	.22, 63V
C458, 459	21-13740B36	30 pF
C460, 461	21-13741B45	0.01, ±10%
C501, 502	08-11051A13	.1, 63V
C503	21-13740B49	100 pF
C504	23-11048B13	10, ±20%, 16V, electrolytic
C505, 506	21-13740B49	100 pF
C507	23-13749C39	10, ±10%, 20V
C508	08-11051A15	.22, 63V
C509	23-11048B13	10, ±20%, 16V, electrolytic
C510	21-13740B61	330 pF
C511-513	21-13740B49	100 pF
C514	23-02308M01	1000, ±20%, 16V, electrolytic
C515	21-13740B49	100 pF
C551	23-11048A17	33, ±20, 25V, electrolytic
C552	21-13740B33	22, pF
C553	21-13740B73	1000 pF
C554	08-11051A03	.0022, 63V
C555	21-13740B53	150 pF
C556-558	08-11051A12	.068, 63V
C559, 560	08-11051A13	.1, 63V
C561	23-11048B05	1, ±20%, electrolytic
C562	08-11051A09	.022, 63V
C563, 564	21-13740B49	100 pF
C565	23-11048B13	10, ±20%, 16V, electrolytic
C566, 567	21-13741B45	0.01, ±10%
C604	23-11048B05	1, ±20%, electrolytic
C606	08-11051A22	0.039, 63V
C607	08-11051A13	.1, 63V
C608	08-11051A05	.0047, 63V
C609	21-13740B55	180 pF
C610	08-11051A15	.22, 63V
C611	21-13740B46	75 pF
C612	23-11048B19	47, ±20%, 16V, electrolytic
C651	23-11048B19	47, ±20%, 16V, electrolytic
C652	08-11051A06	.0068, 63V
C653	08-11051A15	.22, 63V
C656	23-11048B13	10, ±20%, 16V, electrolytic
C657	21-13741B69	0.1, +80 -20%
C658	21-13741B45	0.01, ±10%
C659	23-13749A44	47, ±20%, 6V
C660	23-11048B13	10, ±20%, 16V, electrolytic
C661	21-13740B76	1500 pF
C662	21-13741B39	.0056
C663	21-13740B49	100 pF
C701	21-13740B78	1800 pF
C703	21-11032B15	.22, +80, -20%
C704	21-13740B49	100 pF
C705	08-11051A09	.022, 63V
C706	08-11051A13	.1, 63V
C707	08-11051A01	.001, 63V
C801, 802	21-13740B49	100 pF
C803-804	21-13740B73	1000 pF
C805	21-11032B15	.22, +80 -20%
C806, 807	21-13740B73	1000 pF
C808, 809	21-13740B49	100 pF
C810, 811	21-13740B73	1000 pF
C813-823	21-13740B73	1000 pF
C824, 825	21-13740B49	100 pF
C826	21-13740B73	1000 pF
C827	23-11048B05	1, ±20%, electrolytic
C828	21-13741B69	0.1, +80 -20%
C829	21-13741B45	0.01, ±10%
C830	21-13740B25	10 pF, ±5 pF
C831	21-11031F10	5.6 pF, ±5 pF
C832	21-13740B25	10 pF, ±5 pF
C833	21-13740B73	1000 pF
C834, 835	21-13741B69	0.1, +80 -20%
C836	21-13740B73	1000 pF
C837-840	21-13741B45	0.01, ±10%
C841-848	21-13740B73	1000 pF
C849	21-13740B49	100 pF
C850	21-13740B73	1000 pF
C852, 853	21-13741B45	0.01, ±10%
C854	21-13740B73	1000 pF
C855	23-13749J23	47, ±10%, 6V
C856	21-13740B49	100 pF
<b>diode</b> (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, 604	48-83654H01	silicon
CR651	48-83654H01	silicon

Schematics, Circuit Board Diagrams, and Parts List for HLN5173B Logic Board  
**PW-7364-O**  
 (Sheet 4 of 4)  
 2/28/90

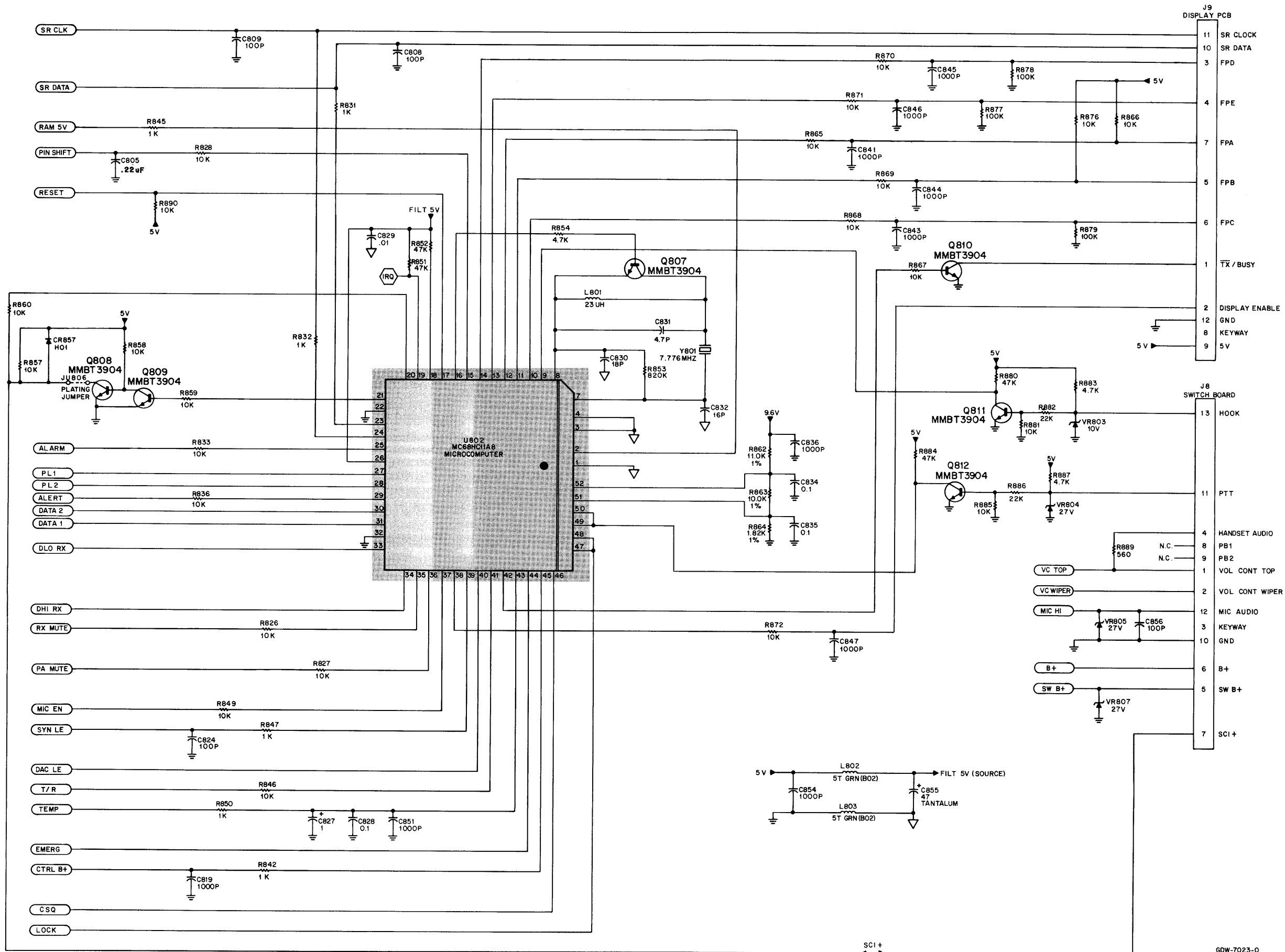
MXW-7365-O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>fuse</b>		
F801	65-05214E06	1 A
<b>connector receptacle</b>		
J3	28-80129M01	5-pin
J7	28-80128M01	5-pin
J8,9	28-80126M01	23-pin
J10	28-80128M02	2-pin
<b>jumper</b>		
JU601	09-84181L01	2-contact push-on
<b>coil, RF</b>		
L801	24-82723H35	23 uH, red
L802, 803	24-83961B02	5 turns, green
<b>connector plug</b>		
P6	28-80127M01	14-pin, RF board
P601	28-80002R03	3-pin, for JU601
<b>transistor</b> (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	PNP
Q508	48-05128M16	PNP
Q509	48-80214G02	NPN
Q551	48-05128M16	PNP
Q552	48-05128M16	PNP
Q553	48-80214G02	NPN
Q554	48-80214G02	NPN
Q555	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
<b>resistor, fixed, ohm, ±5%, 1/8 watt</b> (unless otherwise stated)		
R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, 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, .6 Watt, metal film
R453	06-11077A70	680
R454	06-02369M31	330, .6 watt, 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	06-11077A82	2.2k
R502, 503	06-11077B07	22k
R504	06-11077A96	8.2k
R505	06-11077A86	3.3k
R506	06-11077A78	1.5k
R507	06-11077A76	1.2k
R508	06-11077A98	10k
R509, 510	06-11077A72	820
R511	06-11077B07	22k
R512	06-11077A46	68
R513, 514	06-11009B26	2.7, 1/4 Watt
R515	06-11077A46	68
R516	06-11077A66	470
R517, 518	06-11077A98	10k
R519	06-80185M01	1 ohm, ±10%, 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	06-11077B16	51k
R563	06-11077B15	47k
R565	06-11077A98	10k
R566	06-11077A96	8.2k
R568	06-11077B07	22k

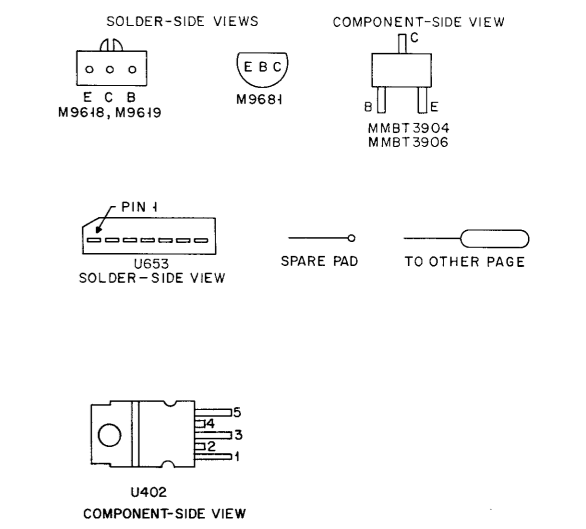
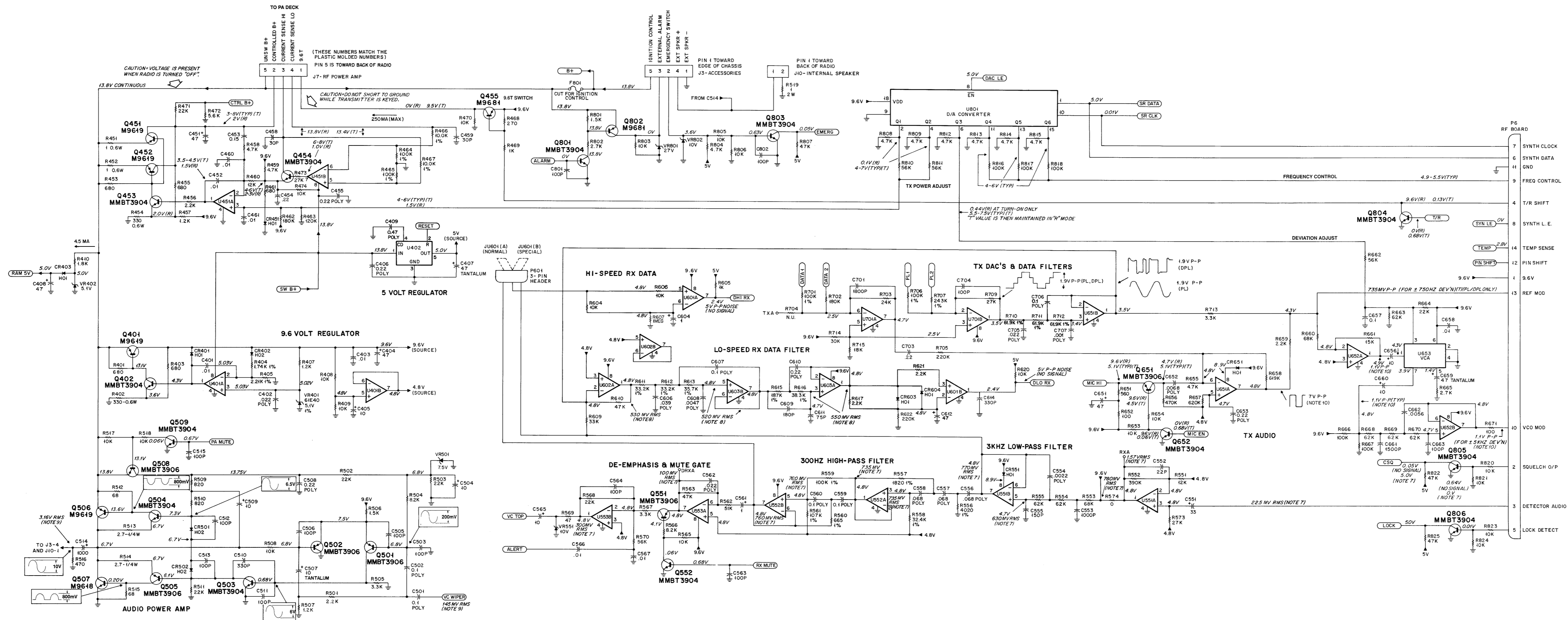
MXW-7365-O (3)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R567	06-11077A86	3.3k
R569	06-11077A42	47
R570	06-11077B17	56k
R573	06-11077B09	27k
R574	06-11077A01	0-ohm
R604	06-11077A98	10k
R605	06-11077A74	1k
R606	06-11077A98	10k
R607	06-11077B47	1 meg
R609	06-11077B11	33k
R610	06-11077B15	47k
R611, 612	06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11077H15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R618	06-11077B23	100k
R619, 620	06-11077A98	10k
R621	06-11077A01	0-ohm
R622	06-11077B31	220k
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, ±1%
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, ±1%
R703	06-11077G31	25.5k, ±1%
R705	06-11077H13	178k, ±1%
R706	06-11077G88	100k, ±1%
R707	06-11077H26	243k, ±1%
R709	06-11077B10	30k
R710-712	06-11077G68	61.9k, ±1%
R713	06-11077A86	3.3k
R714	06-11077B10	30k
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</	

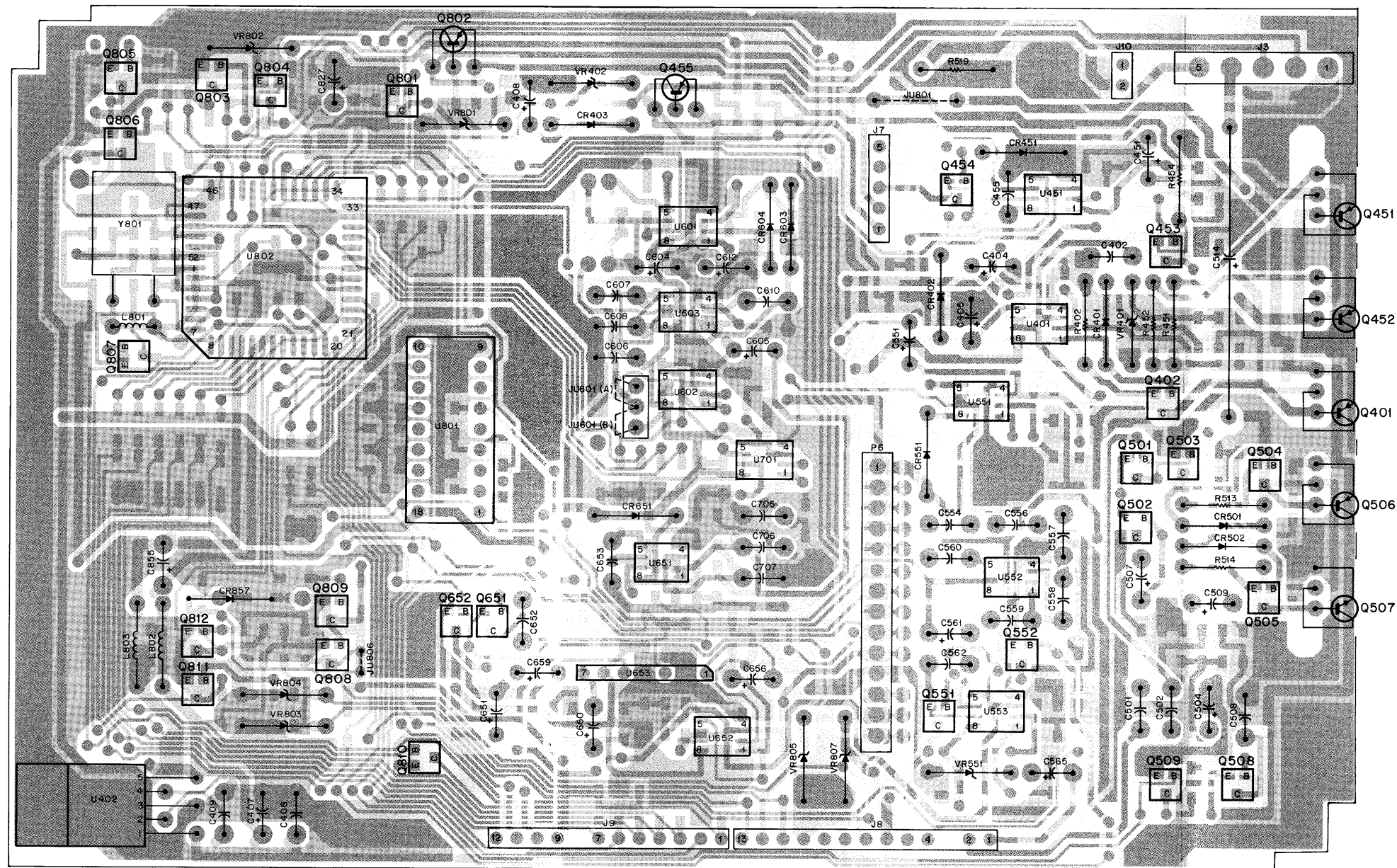
**IMPORTANT**  
 COMPONENTS WITHIN SHADED AREAS ARE NOT  
 FIELD-SERVICEABLE. IF SERVICING IS REQUIRED,  
 THE ENTIRE BOARD MUST BE REPLACED





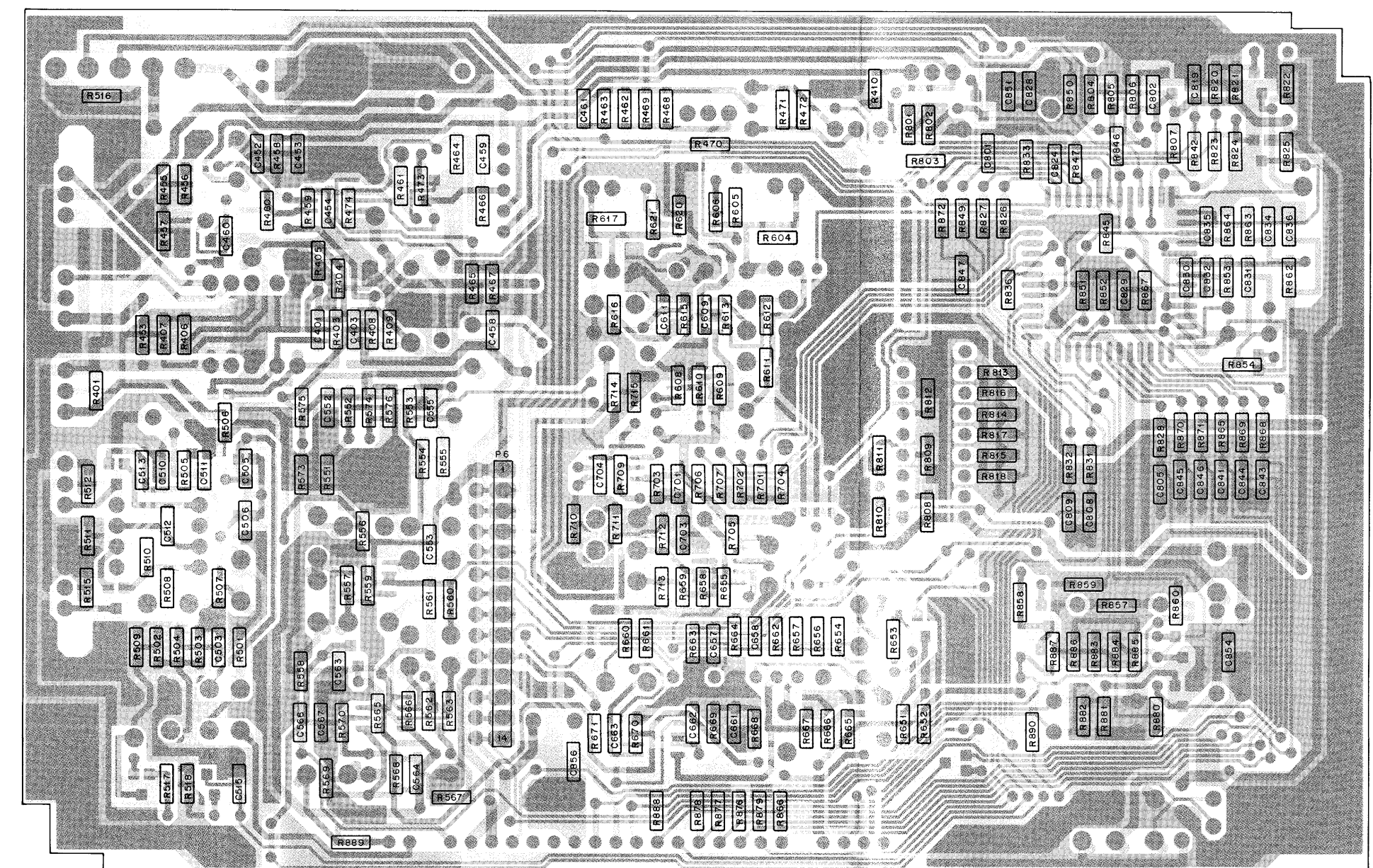


- NOTES:
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICRORHENRIES.
  - NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED.
  - POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
  - NOT USED.
  - DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
  - DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:  
(R) RECEIVE MODE  
(T) TRANSMIT MODE
  - MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER.
  - SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.
  - SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 5 WATTS (3-16 VOLTS RMS ACROSS 2 OHM LOAD).
  - MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
  - VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.



SOLDER SIDE ● GDW-7022-O  
 COMPONENT SIDE ● GDW-7021-O  
 OVERLAY ■ GDW-7455-O

SHOWN FROM COMPONENT SIDE



SOLDER SIDE ● GDW-7022-O  
 COMPONENT SIDE ● GDW-7021-O  
 OVERLAY ■ GDW-7456-O

SHOWN FROM SOLDER SIDE

# parts list

HLN9123A Logic Board, Masked MXW-7019-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>capacitor, fixed uF, ±5%, 50V</b> (unless otherwise stated)		
C401	21-13741B45	.01, ±10%
C402	08-11051A09	.022, 63V
C403	21-13741B45	.01, ±10%
C404	23-11048B19	47, ±20%, 16V, electrolytic
C405	23-11048B13	10, ±20, 16V, electrolytic
C406	08-11051A15	.22, 63V
C407	23-11013A56	47, ±20%, 6V, tantalum
C408	23-11048B19	47, ±20%, 16V, electrolytic
C409	08-11051A17	47, 63V
C451	23-11048B19	47, ±20%, 16V, electrolytic
C452	21-13741B45	.01, ±10%
C453	21-11032B14	.15, +80/-20%
C454	21-11032B15	.22, +80/-20%
C455	08-11051A15	.22, 63V
C458, 459	21-13740B36	30 pF
C460, 461	21-13741B45	.01, ±10%
C501, 502	08-11051A13	.1, 63V
C503	21-13740B49	100 pF
C504	23-11048B13	10, ±20%, 16V
C505, 506	21-13740B49	100 pF
C507	23-11013D13	10, ±10%, 20V, tantalum
C508	08-11051A15	.22, 63V
C509	23-11048B13	10, ±20%, 16V, electrolytic
C510	21-13740B61	330 pF
C511-513	21-13740B49	100 pF
C514	23-02308M01	1000 uF, ±20%, 16V, electrolytic
C515	21-13740B49	100 pF
C551	23-11048A17	33, ±20, 25V, electrolytic
C552	21-13740B33	22 pF
C553	21-13740B73	1000 pF
C554	08-11051A03	.022, 63V
C555	21-13740B53	150 pF
C556-558	08-11051A12	.068, 63V
C559, 560	08-11051A13	.1, 63V
C561	23-11048B05	1, ±20%, electrolytic
C562	08-11051A09	.022, 63V
C563, 564	21-13740B49	100 pF
C565	23-11048B13	10, ±20%, 16V, electrolytic
C566, 567	21-13741B45	0.01, ±10%
C604	23-11048B05	1, ±20%, electrolytic
C606	08-11051A22	0.039, 63V
C607	08-11051A13	.1, 63V
C608	08-11051A05	.0047, 63V
C609	21-13740B55	180 pF
C610	08-11051A15	.22, 63V
C611	21-13740B46	75 pF
C612	23-11048B19	47, ±20%, 16V, electrolytic
C614	21-13740B61	330 pF
C651	23-11048B19	47, ±20%, 16V, electrolytic
C652	08-11051A06	.0068, 63V
C653	08-11051A15	.22, 63V
C656	23-11048B13	10, ±20%, 16V, electrolytic
C657	21-13741B69	0.1, +80 -20%
C658	21-13741B45	0.01, ±10%
C659	23-11013A56	47, ±20%, 6V, tantalum
C660	23-11048B13	10, ±20%, 16V, electrolytic
C661	21-13740B76	1500 pF
C662	21-13741B39	.0056, ±10%
C663	21-13740B49	100 pF
C701	21-13740B78	1800 pF
C703	21-11032B15	.22, +80, -20%
C704	21-13740B49	100 pF
C705	08-11051A09	.022, 63V
C706	08-11051A13	.1, 63V
C707	08-11051A01	.001, 63V
C801, 802	21-13740B49	100 pF
C805	21-11032B15	.22, +80 -20%
C808, 809	21-13740B49	100 pF
C819	21-13740B73	1000 pF
C824	21-13740B49	100 pF
C827	23-11048B05	1, ±20%, electrolytic
C828	21-13741B69	0.1, +80 -20%
C829	21-13741B45	0.01, ±10%
C830	21-13740B31	18 pF
C831	21-13740B17	4.7, ±.25 pF
C832	21-13740B30	16 pF
C834, 835	21-13741B69	0.1, +80 -20%
C836	21-13740B73	1000 pF
C841	21-13740B73	1000 pF
C843-847	21-13740B73	1000 pF
C851	21-13740B73	1000 pF
C854	21-13740B73	1000 pF
C855	23-11013A56	47, ±20%, 6V, tantalum
C856	21-13740B49	100 pF
<b>diode</b> (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, 604	48-83654H01	silicon
CR651	48-83654H01	silicon
CR857	48-83654H01	silicon
<b>fuse</b>		
F801	65-05214E06	1 A
<b>connector receptacle</b>		
J3	28-80129M01	5-pin, accessories

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
J7	28-80128M01	5-pin, RF power amplifier
J8/9	28-80126M01	23-pin
J10	28-80128M02	2-pin, internal speaker jumper
<b>jumper</b>		
JU601	09-84181L01	2-contact push-on
<b>coil, RF</b>		
L801	24-82723H35	23 uH, red
L802, 803	24-83961B02	5 turns, green
<b>connector plug</b>		
P6	28-80127M01	14-pin, RF board
P601	28-80002R03	3-pin, for JU601
<b>transistor</b> (see note)		
Q401	48-00869916	PNP
Q402	48-80214G02	NPN
Q451, 452	48-00869916	PNP
Q453, 454	48-80214G02	NPN
Q455	48-00869681	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
Q651	48-05128M16	PNP
Q652	48-80214G02	NPN
Q801	48-80214G02	NPN
Q802	48-00869681	PNP
Q803-812	48-80214G02	NPN
<b>resistor, fixed, ohm, ±5%, 1/8 watt</b> (unless otherwise stated)		
R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, metal film
R403	06-11077A70	680
R404	06-11077F18	1.74k, ±1%
R405	06-11077F28	2.21k, ±1%
R407	06-11077A76	1.2k
R408, 409	06-11077A98	10k
R410	06-11077A80	1.8k
R451, 452	06-02369M01	1, .6 Watt, metal film
R453	06-11077A70	680
R454	06-02369M31	330, .6 watt, 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	06-11077A82	2.2k
R502, 503	06-11077B07	22k
R504	06-11077A96	8.2k
R505	06-11077A86	3.3k
R506	06-11077A78	1.5k
R507	06-11077A76	1.2k
R508	06-11077A98	10k
R509, 510	06-11077A72	820
R511	06-11077B07	22k
R512	06-11077A46	68
R513, 514	06-11009B26	2.7, 1/4 Watt
R515	06-11077A46	68
R516	06-11077A66	470
R517, 518	06-11077A98	10k
R519	06-80185M01	1 ohm, ±10%, 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	06-11077B16	51k
R563	06-11077B15	47k
R565	06-11077A98	10k
R566	06-11077A96	8.2k
R567	06-11077A86	3.3k
R568	06-11077B07	22k
R569	06-11077A42	47
R570	06-11077B17	56k
R573	06-11077B09	27k
R574	06-11077A01	0-ohm
R604	06-11077A98	10k
R605	06-11077A74	1k
R606	06-11077A98	10k

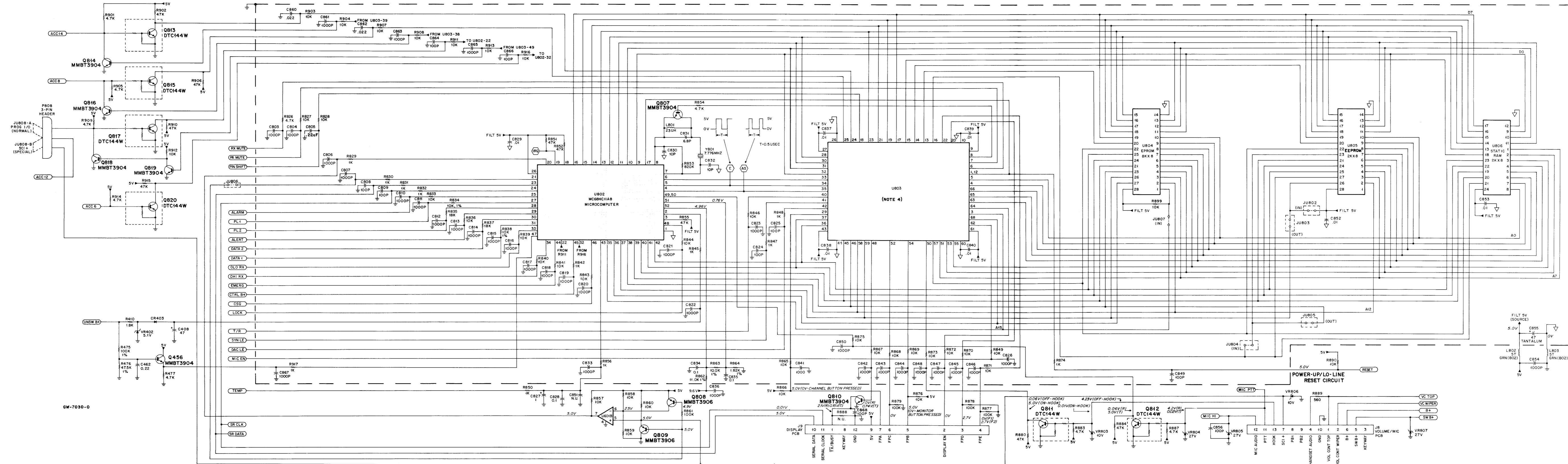
MXW-7019-O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R607	06-11077B47	1 meg
R609	06-11077B11	33k
R610	06-11077B15	47k
R611, 612	06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11077H15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R620	06-11077A98	10k
R621	06-11077A82	2.2k
R622	06-11077B31	220k
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, ±1%
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	06-11077B29	180k
R703	06-11077B08	24k
R705	06-11077B31	220k
R706	06-11077G88	100k, ±1%
R707	06-11077H26	243k, ±1%
R709	06-11077B09	27k
R710-712	06-11077G68	61.9k, ±1%
R713	06-11077A86	3.3k
R714	06-11077B10	30k
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
R831, 832	06-11077A74	1k
R833	06-11077A98	10k
R836	06-11077A98	10k
R842	06-11077A74	1k
R845	06-11077A74	1k
R846	06-11077A98	10k
R847	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
R857-860	06-11077A98	10k
R862	06-11077F95	11K, ±1%
R863	06-11077F91	10k, ±1%
R864	06-11077F20	1.82k, ±1%
R865-872	06-11077A98	10k
R876	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	06-11077A68	560
R890	06-11077A98	10k
<b>integrated circuit</b> (see note)		
U401	51-02198J22	dual op-amp
U402	51-80942T01	voltage regulator 5V
U451	51-02198J22	dual op-amp
U551-553	51-02198J22	dual op-amp
U601	51-02198J23	dual comparator
U602, 603	51-02198J22	dual op-amp
U651, 652	51-02198J22	dual op-amp
U653	51-80059M01	voltage-controlled attenuator
U701	51-02198J22	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microcomputer
<b>voltage regulator</b> (see note)		
VR401	48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V
VR551	48-82256C11	zener, 10V
VR801	48-82256C20	zener, 27V

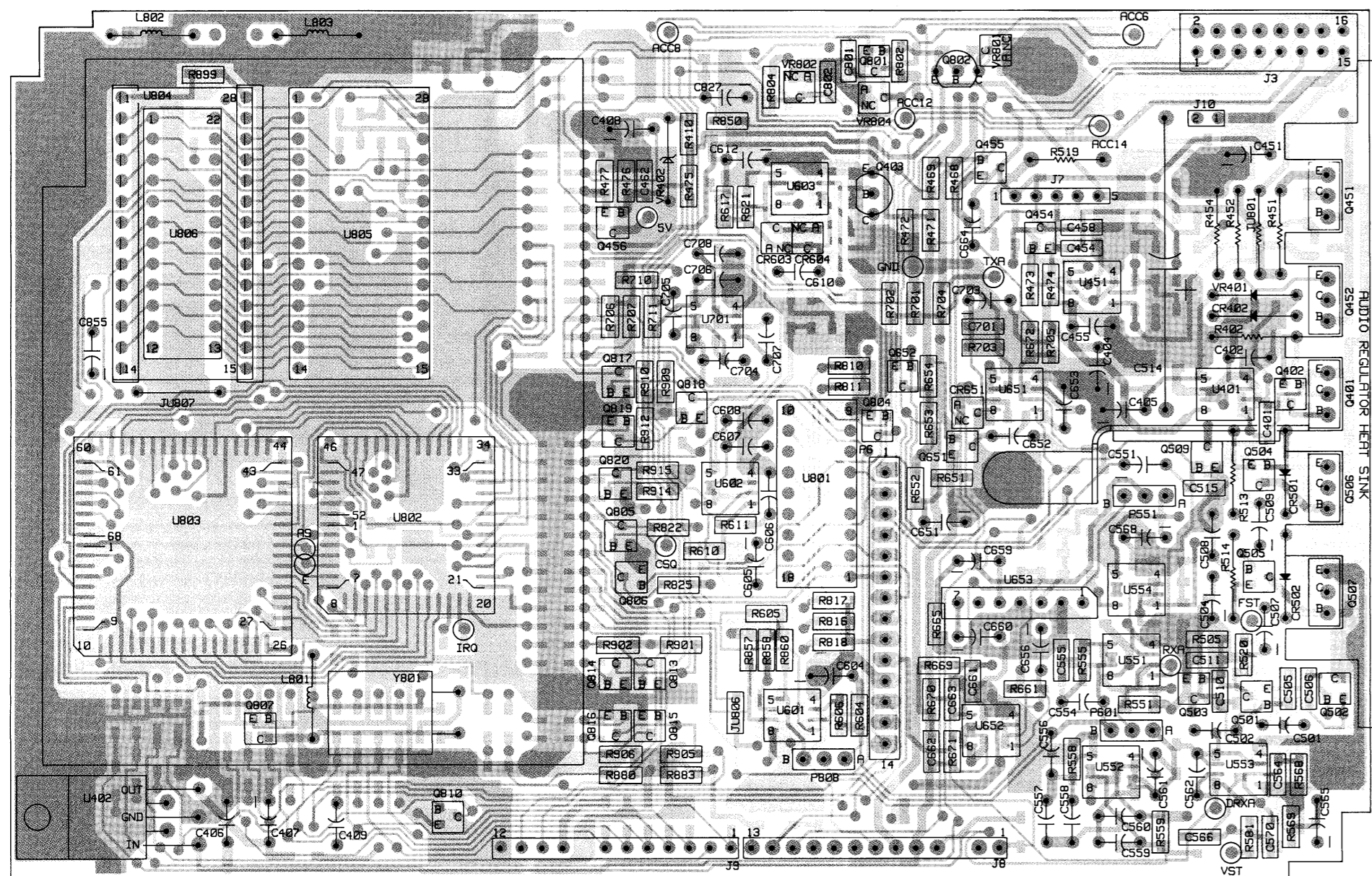
MXW-7019-O (3)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
VR802, 803	48-82256C11	zener, 10V
VR804, 805	48-82256C20	zener, 27V
VR807</		



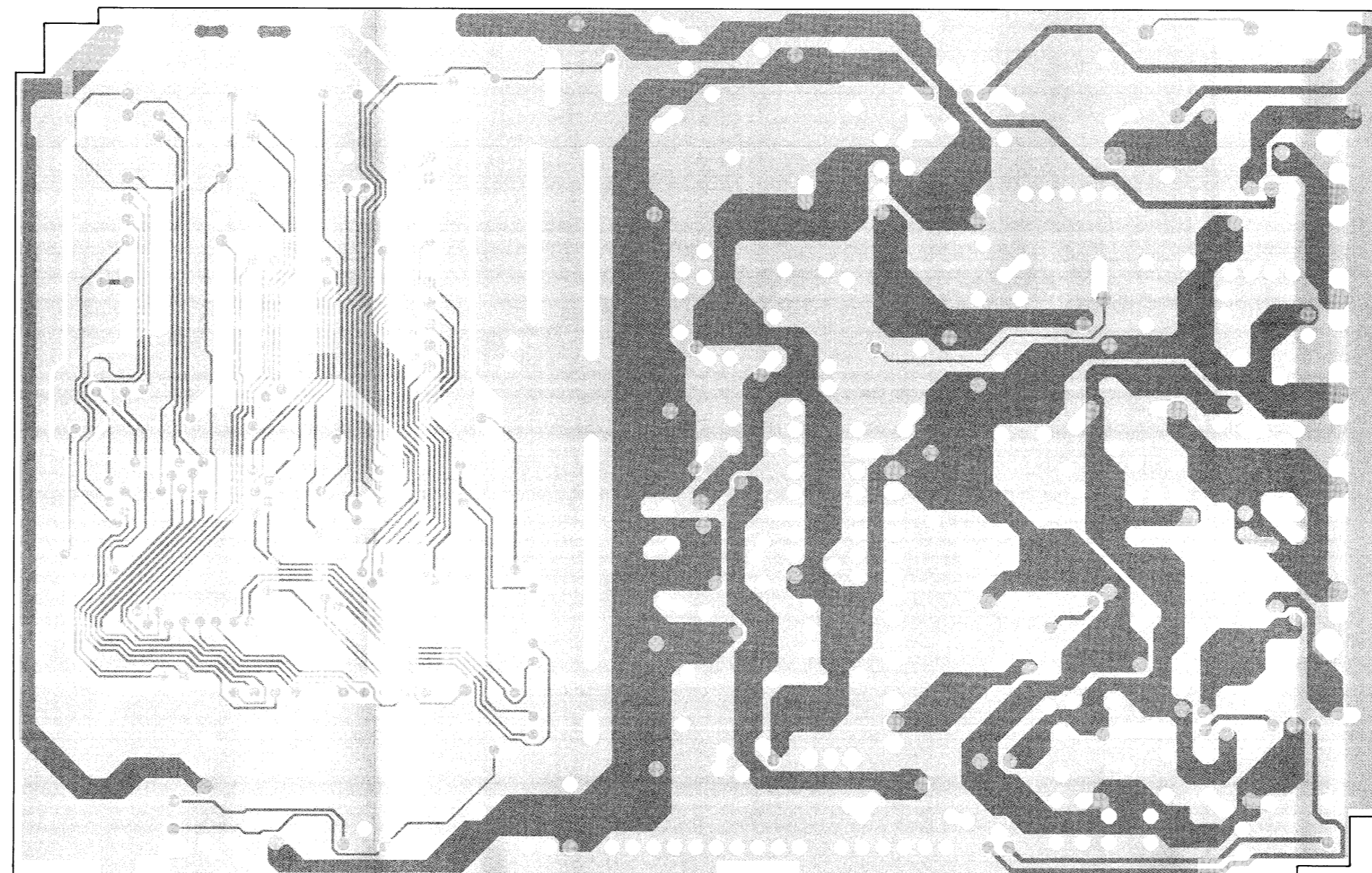


**IMPORTANT**  
 COMPONENTS WITHIN SHADED AREA ARE NOT FIELD-SERVICEABLE. IF SERVICING IS REQUIRED, THE ENTIRE BOARD MUST BE REPLACED. REFER TO SECTION 6.



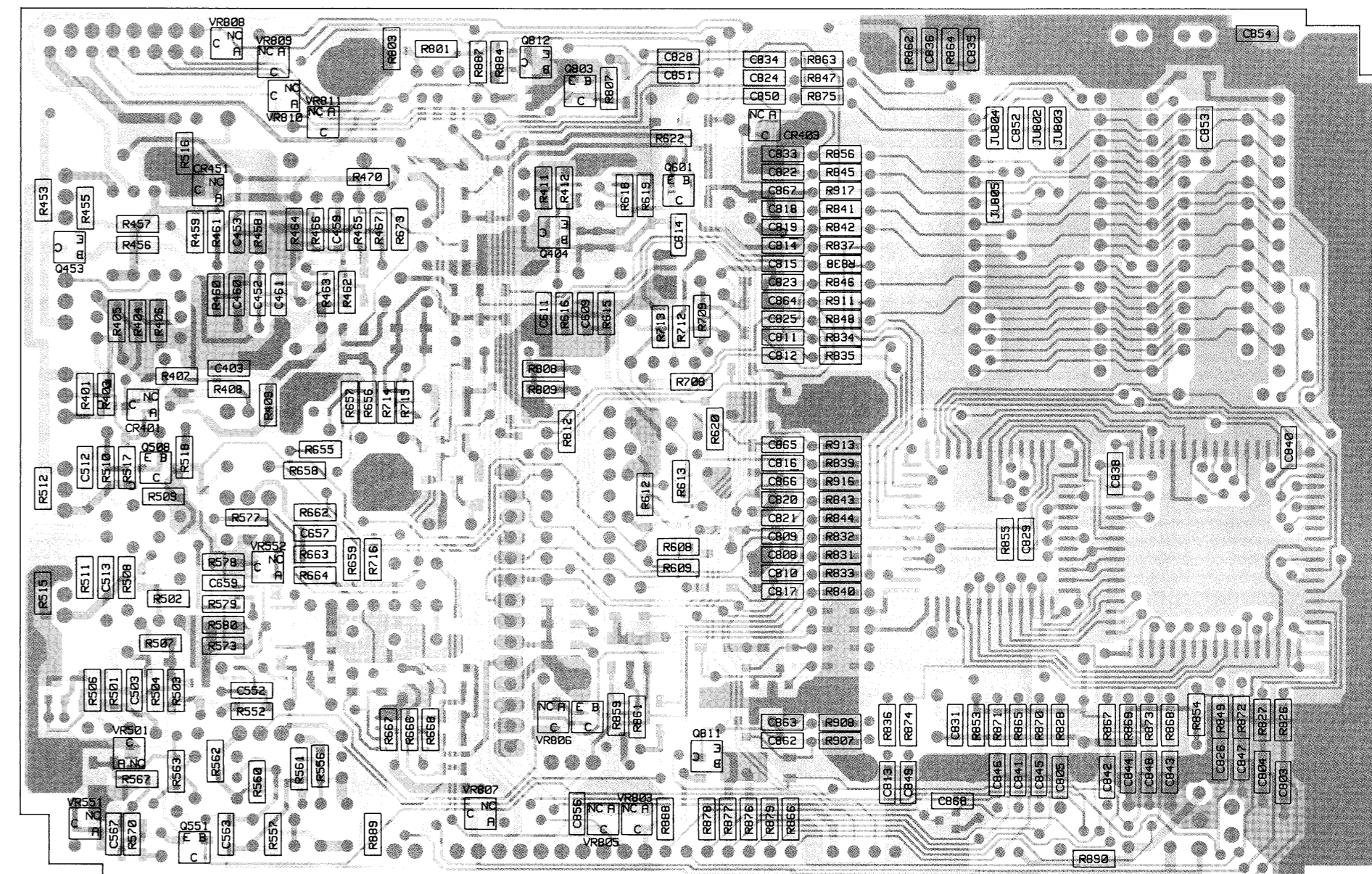
SOLDER SIDE ● GCW-7028-O  
 COMPONENT SIDE ● GCW-7027-O  
 OVERLAY ■ GBW-7457-O

COMPONENT SIDE VIEW



INNER LAYER 1 ● GCW-7473-O  
 INNER LAYER 2 ● GCW-7474-O  
 OVERLAY ■ GCW-7475-O

COMPONENT SIDE VIEW



SOLDER SIDE ● GCW-7028-O  
 COMPONENT SIDE ● GCW-7027-O  
 OVERLAY ■ GBW-7458-O

SOLDER SIDE VIEW

# parts list

HLN9313A Logic Board (Options Connector)

MXW-7025-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>capacitor, fixed uF, +5%, 50V</b> (unless otherwise stated)		
C401	21-13741B45	.01
C402	08-11051A09	.022, 63V
C403	21-13741B45	.01
C404	23-11048B19	47, ±20%, 16V, electrolytic
C405	23-11048B13	10, ±20, 16V, electrolytic
C406	08-11051A15	.22, 63V
C407	23-13749A44	47, ±20%, 6V, tantalum
C408	23-11048B19	47, ±20%, 16V, electrolytic
C409	08-11051A17	.47, 63V
C451	23-11048B19	47, ±20%, 16V, electrolytic
C452	21-13741B45	.01
C453	21-11032B14	.15, +80/-20%
C454	21-11032B15	.22, +80/-20%
C455	08-11051A15	.22, 63V
C458,459	21-13740B36	30 pF
C460,461	21-13741B45	.01
C462	21-11032B15	.22, +80/-20%
C501,502	08-11051A13	.1, 63V
C503	21-13740B49	100 pF
C504	23-11048B13	10, ±20, 16V, electrolytic
C505,506	21-13740B49	100 pF
C507	23-13749C39	10, +10%, 20V
C508	08-11051A15	.22, 63V
C509	23-11048B13	10, ±20, 16V, electrolytic
C510	21-13740B61	330 pF
C511-513	21-13740B49	100 pF
C514	23-02308M01	1000 uF, ±20%, 16V, electrolytic
C515	21-13740B49	100 pF
C551	23-11048A17	33, ±20, 25V, electrolytic
C552	21-13740B33	22 pF
C553	21-13740B73	1000 pF
C554	08-11051A03	0022, 63V
C555	21-13740B53	150 pF
C556-558	08-11051A12	.068, 63V
C559,560	08-11051A13	.1, 63V
C561	23-11048B05	1, ±20%, electrolytic
C562	08-11051A09	.022, 63V
C563	21-13741B69	0.1
C564	21-13740B49	100 pF
C565	23-11048B13	10, ±20, 16V, electrolytic
C566,567	21-13741B45	.01
C568	23-11048B19	47, ±20%, 16V, electrolytic
C569	21-13740B33	22 pF
C570	21-13741B69	0.1
C604	23-11048B05	1, ±20%, electrolytic
C606	08-11051A22	0.039, 63V
C607	08-11051A13	.1, 63V
C608	08-11051A05	0047, 63V
C609	21-13740B55	180 pF
C610	08-11051A15	.22, 63V
C611	21-13740B46	75 pF
C612	23-11048B19	47, ±20%, 16V, electrolytic
C651	23-11048B19	47, ±20%, 16V, electrolytic
C652	08-11051A06	0068, 63V
C653	08-11051A15	.22, 63V
C656	23-11048B13	10, ±20, 16V, electrolytic
C657	21-13741B69	0.1
C658	21-13741B45	.01
C659	23-13749A44	47, ±20%, 6V, tantalum
C660	23-11048B13	10, ±20, 16V, electrolytic
C661	21-13740B76	1500 pF
C662	21-13741B39	0056
C663	21-13740B49	100 pF
C664	23-11048B09	4.7, ±20%, 35V
C701	21-13741B27	1800 pF
C703	23-11048B05	1, ±20%, electrolytic
C704	08-11051A12	068, 63V
C705	08-11051A13	.1, 63V
C706	08-11051A08	015, 63V
C707	08-11051A23	056, 63V
C708	08-11051A03	0022, 63V
C801,802	21-13740B49	100 pF
C803-804	21-13740B73	1000 pF
C805	21-11032B15	.22, +80 -20%
C806,807	21-13740B73	1000 pF
C808,809	21-13740B49	100 pF
C810-823	21-13740B73	1000 pF
C824,825	21-13740B49	100 pF
C826	23-11048B73	1000 pF
C827	23-11048B05	1, ±20%, electrolytic
C828	21-13741B69	0.1
C829	21-13741B45	.01
C830	21-13740B25	10 pF
C831	21-13740B21	6.8 pF, ±25 pF
C832	21-13740B25	10 pF
C833	23-13740B73	1000 pF
C834,835	23-13741B69	0.1
C836	23-13740B73	1000 pF
C837-840	23-13741B45	.01
C841-848	23-13740B73	1000 pF
C849	23-13740B49	100 pF
C850	23-13740B73	1000 pF
C852,853	23-13741B45	.01
C854	23-13740B73	1000 pF
C855	23-13749A44	47, ±20%, 6V, tantalum
C856	23-13740B49	100 pF
C860	23-13741B53	.022
C861	23-13740B73	1000 pF
C862	23-13741B53	.022

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REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C863	23-13740B73	1000 pF
C864	23-13740B49	100 pF
C865	23-13740B73	1000 pF
C866	23-13740B49	100 pF
C867	23-13740B73	1000 pF
C868	23-13740B49	100 pF
<b>diode</b> (see note)		
CR401	48-05129M40	low profile
CR402	48-83654H02	silicon
CR403	48-05129M40	low profile
CR451	48-05129M40	low profile
CR501,502	48-83654H02	silicon
CR603,604	48-05129M40	low profile
CR651	48-05129M40	low profile
<b>fuse</b>		
F801	65-05214E06	1 A
<b>connector receptacle</b>		
J3	28-80923V01	right angle
J7	28-80128M01	5-pin, RF power amplifier
J8,9	28-80126M01	23-pin
J10	28-80128M02	2-pin, internal speaker jumper
<b>jumper</b>		
JU551	09-84181L01	2-contact push-on
JU601	09-84181L01	2-contact push-on
JU802	06-11077A01	0-ohm resistor
JU804	06-11077A01	0-ohm resistor
JU806	06-11077A01	0-ohm resistor
JU807	06-11009B23	0-ohm resistor
JU808	09-84181L01	2-contact push-on
<b>coil, RF</b>		
L801	24-82723H35	23 uH, red
L802,803	24-83961B02	5 turns, green
<b>connector plug</b>		
P6	28-80127M02	14-pin, header
P551	28-80002R03	3-pin
P601	28-80002R03	3-pin, for JU601
P808	28-80002R03	3-pin
<b>transistor</b> (see note)		
Q401	48-00869619	PNP
Q402	48-80214G02	PNP
Q451,452	48-00869619	PNP
Q453,454	48-80214G02	PNP
Q455	48-80141L03	PNP
Q456	48-80214G02	PNP
Q501,502	48-05128M16	PNP
Q503,504	48-80214G02	PNP
Q505	48-05128M16	PNP
Q506	48-00869619	PNP
Q507	48-00869618	PNP
Q508	48-05128M16	PNP
Q509	48-80214G02	PNP
Q551	48-80949V01	JFET n-channel
Q601	48-80214G02	PNP
Q651	48-05128M16	PNP
Q652	48-80214G02	PNP
Q801	48-80214G02	PNP
Q802	48-00869681	PNP
Q803	48-80947V01	PNP
Q804	48-80214G02	PNP
Q805,806	48-80947V01	PNP
Q807	48-80214G02	PNP
Q808,809	48-05128M16	PNP
Q810	48-80214G02	PNP
Q811-813	48-80947V01	PNP
Q814	48-80214G02	PNP
Q815	48-80947V01	PNP
Q816	48-80214G02	PNP
Q817	48-80947V01	PNP
Q818,819	48-80214G02	PNP
Q820	48-80947V01	PNP
<b>resistor, fixed, ohm, ±5%, 1/8 watt</b> (unless otherwise stated)		
R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, metal film
R403	06-11077A70	680
R404	06-11077F18	17.4k, ±1%
R405	06-11077F28	22.1k, ±1%
R406	06-11077A98	10k
R407	06-11077A76	1.2k
R408,409	06-11077F91	10.0k, ±1%
R410	06-11077A80	1.8k
R451,452	06-02369M01	1, .6 Watt, metal film
R453	06-11077A70	680
R454	06-02369M31	330, .6 watt, 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	10.0k, ±1%
R468	06-11077A60	270
R469	06-11077A74	1k
R470	06-11077A98	10k

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REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R471	06-11077B07	22k
R472	06-11077A92	5.6k
R473	06-11077B09	27k
R474	06-11077A98	10k
R475	06-11077G88	100k, ±1%
R476	06-11077G57	47.5k, ±1%
R477	06-11077A90	4.7k
R501	06-11077A82	2.2k
R502,503	06-11077B07	22k
R504	06-11077A96	8.2k
R505	06-11077A86	3.3k
R506	06-11077A78	1.5k
R507	06-11077A76	1.2k
R508	06-11077A98	10k
R509,510	06-11077A72	820
R511	06-11077B07	22k
R512	06-11077A46	68
R513,514	06-11009B26	2.7, 1/4 Watt
R515	06-11077A46	68
R516	06-11077A66	470
R517,518	06-11077A98	10k
R519	06-80185M01	1 ohm, ±10%, 2W, metal plate
R551	06-11077B01	12k
R552	06-11077B37	390k
R553	06-11077B19	68k
R554,555	06-11077B18	62k
R556	06-11077F53	40.2k, ±1%
R557	06-11077F20	18.2k, ±1%
R558	06-11077G41	32.4k, ±1%
R559	06-11077G88	100k, ±1%
R560	06-11077E77	665, ±1%
R561	06-11077G91	107k, ±1%
R562	06-11077B16	51k
R563	06-11077B15	47k
R567	06-11077A86	3.3k
R568	06-11077B07	22k
R569	06-11077A42	47
R570	06-11077B17	56k
R573	06-11077B09	27k
R577	06-11077B23	100k
R578	06-11077A50	100
R579	06-11077B37	390k
R580	06-11077B09	27k
R581	06-11077B07	22k
R604	06-11077A98	10k
R605	06-11077A74	1k
R606	06-11077A98	10k
R607	06-11077B47	1 meg
R609	06-11077B11	33k
R610	06-11077B15	47k
R611,612	06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11077H15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R618	06-11077B23	100k
R619,620	06-11077A98	10k
R621	06-11077A01	0-ohm
R622	06-11077B31	220k
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, ±1%
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
R672	06-11077B17	56k
R673	06-11077B23	100k
R701	06-11077G88	100k, ±1%
R702	06-11077H13	178k, ±1%
R703	06-11077G31	25.5k, ±1%
R705	06-11077H13	178k, ±1%
R706	06-11077G56	46.4k, ±1%
R707	06-11077G95	118k, ±1%
R708	06-11077B15	47k
R709	06-11077B19	68k
R710,711	06-11077G13	16.5k, ±1%
R712,713	06-11077G61	52.3k, ±1%
R714	06-11077B10	30k
R715	06-11077B05	18k
R716	06-11077A86	3.3k
R801	06-11077A78	1.5k
R802	06-11077A84	2.7k
R803	06-11077A98	10k
R804	06-11077A90	4.7k
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

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REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R822	06-11077B15	47k
R825	06-11077B15	47k