### 1. Theory Of Operation

### 1.1 LOWBAND RECEIVER

The received signal is applied to the radio's antenna input J1 and routed through the harmonic filter and antenna switch which are located on the PA deck. The signal is then routed via coax to J4 on the RF board and passes through a 4 pole bandpass filter.

The signal then passes through one stage of RF amplification Q1, which has a current source comprised of Q2, Q3, and Q4. This circuitry sets a bias current that does not vary regardless of DC Beta variations on Q1. CR2 located on the input side of Q1 is a protective diode that ensures Q1 will be protected from high level RF signals. The amplified signal then passes through a second 4 pole bandpass filter.

The amplified RF signal is then mixed with the receive VCO signal in the double balanced quad diode mixer, CR1. The desired 10.7 MHz IF signal is then amplified through Q51 and passes through a IF delay line used for extender operation. The 10.7 MHz IF signal proceeds through the extender blanker switches, Q52 and Q53. Q54 provides another stage of IF amplification to the signal.

The 10.7 MHz IF signal then passes through a 4 pole crystal filter. One more stage of amplification Q56, occurs before the IF signal is sent to the receiver subsystem IC, U51.

U51 (see Figure 1) is a complete receiver subsystem and the 10.7 MHz signal is mixed with a 10.245 MHz crystal to produce a 455 kHz second IF signal. The second IF signal is then amplified and filtered by 455 kHz ceramic filters, FL51 and FL52.

The audio detector is internal to the U51 IC. The quadrature detector detects the audio and routs it to the PL filter and carrier squelch amplifier. The carrier squelch amplifier amplifies the detected audio and routs it via U51–8 to the squelch control R70. The squelch control output is routed through a high pass filter to remove the receive audio components. The remaining noise above the audio band is

detected via U51–6 by the carrier squelch detector which generates a DC voltage. This voltage controls the audio mute circuits. The detected audio is then sent to the logic board audio circuitry via U51–5 to J6–3.

#### 1.2 EXTENDER OPERATION

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 appropriate 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.

### 1.3 VHF RECEIVER

The received signal is applied to the radio's antenna input and routed through the harmonic filter/ antenna switch. The output is then routed via coax to J4 on the RF board. The input at J4 is matched to a fixed tuned 4 pole filter. The 4 pole filter has a 3 dB bandwidth of 40 MHz and 1 dB bandwidth of 35 MHz centered at about 160 MHz.

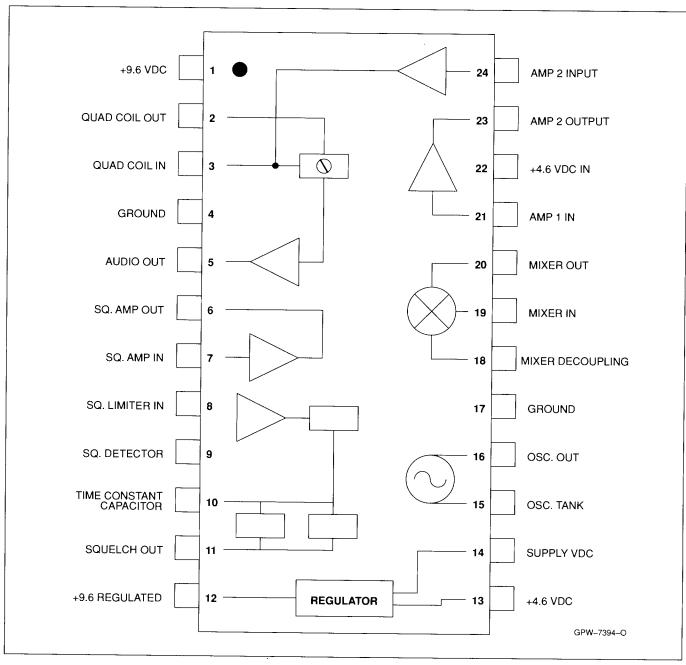


Figure 1. Receiver IC Block Diagram

The output of the filter is matched to the base of RF amplifier Q1. Q1 has a current source, Q2, to set a bias current of 16 mA regardless of DC Beta variations of Q1. The Q1 emitter resistors are used to provide voltage feedback to limit Q1's gain to about 14 dB. CR2, located on Q1's input, is a protective diode that ensures Q1 is protected from high level RF signals.

The output of Q1 is applied to a 3 pole filter centered at about 160 MHz. The first 4 pole filter, RF amplifier and the 3 pole filter provide image spur rejection.

The quad diode mixer, CR1, is a passive double balanced mixer. The output of the mixer goes to the diplexer circuit

which allows the mixer to be matched to the First IF amplifier, Q51, at the IF frequency of 45.1 MHz.

Q51 amplifies the IF signal by approximately  $20\,dB$ . The output of Q51 is filtered by matched ceramic filters Y51A and Y51B. The first IF is then

amplified by Q52 by approximately 18 dB and sent to the receiver subsystem IC U51-19 (see Figure 1).

The 45.1 MHz first IF signal is applied to the second mixer section of U51. A 44.645 MHz crystal oscillator provides the low side injection signal for the second mixer via U51–19. The second mixer takes the 45.1 MHz and the 44.645 MHz and produces a 455 kHz second IF signal. The second IF

filtering is achieved by using multiple resonators, FL51 and Fl52. These filters are tuned to 455kHz.

The audio detector is internal to the U51 IC. The Quadrature detector detects the audio and routs it to the PL filter and to the carrier squelch amplifier. The carrier squelch amplifies the detected audio and routs it via U51-8 to the squelch control R60. The squelch control output is routed through a high pass filter to remove the receive audio components. The remaining noise above the audio band is detected via U51-6 by the carrier squelch detector which generates a D.C. voltage that controls the audio mute circuits. The detected audio is then sent over to the logic board via U51-5/J6-3.

### 1.4 UHF RECEIVER

The receiver signal is applied to the radio's antenna input and routed through the harmonic filter and antenna switch, which are located on the PA deck. The output is then routed via coax to J4 on the RF board.

The incoming signal at J4 passes through a 3 pole bandpass filter. A stage of RF amplification, Q1, amplifies the signal which passes to a 4 pole bandpass filter. The filtered signal then passes to the first mixer stage, CR1. The voltage controlled oscillator output is fed to the first mixer as a low side local oscillator. The resultant signal of 45.1 MHz is then amplified by the first IF amplifier Q51. Then amplified 45.1 MHz IF signal then passes through a 4 pole crystal filter consisting of Y51A and Y51B. Another stage of amplification, Q52, occurs before the RF signal passes into the receiver subsystem IC, U51 (see Figure 1).

The 45.1 MHz first IF signal is applied to the second mixer section of U51. A 44.645 MHz crystal oscillator provides the low side injection signal for the second mixer via U51-19. Y52 is a 44.645 MHz crystal which feeds the oscillator via U51-15. The second mixer takes the 45.1 MHz and the 44.645 MHz signal and produces a 455kHz second IF signal. The second IF filtering is achieved by using multiple resonators, FL51 and FL52. These filters are tuned to 455kHz.

The audio detector is internal to the U51 IC. The quadrature detector detects the audio and routs it to the PL filter and to the carrier squelch amplifier. The carrier squelch amplifies the detected audio and routs it via U51-8 to the squelch control R60. The squelch control output is routed through a high pass filter to remove the receive audio components. The remaining noise above the audio band is detected via U51-6 by the carrier squelch detector which generates a D.C. voltage that controls the audio mute circuits. The detected audio is then sent over to the logic board via U51-5/6-3.

### 1.5 800 MHz RECEIVER

The received signal is applied to the radio's antenna input and routed through the harmonic filter and antenna switch, which are located on the PA deck. The output is then routed via coax to J4 on the RF board.

The incoming signal passes through a bandpass filter, FL1 and then through one stage of RF amplification, Q1. The amplified output of Q1 is then sent through another section of filtering, FL2.

The filtered signal then passes to the first mixer, U1. The voltage controlled oscillator output is fed into the mixer and the resultant 45.1 MHz IF signal is then sent to the first IF amplifier, Q51. The amplified 45.1 MHz signal then passes through a 4 pole crystal filter consisting of Y51A and Y51B. Another stage of amplification, Q52, occurs before the signal passes into the receiver subsystem IC, U51 (see Figure 1).

The 45.1 MHZ first IF signal is applied to the second mixer section of U51. A 44.645 MHz crystal oscillator provides the low side injection signal for the second mixer via U51-19. Y52 is a 44.645 MHz crystal which feeds the oscillator via U51-15. The second mixer takes the 45.1 MHz and the 44.645 MHz signals produces a 455 kHz second IF signal. The second IF filtering is achieved by using multiple resonators, FL51 and FL52. These filters are tuned to 455kHz.

The audio detector is internal to the U51 IC. The quadrature detector detects the audio and routs it to the PL filter and to the carrier squelch amplifier. The carrier squelch amplifier amplifies the detected audio and routs it via U51-8 to the squelch control R60. The squelch control output is routed through a high pass filter to remove the receive audio components. The remaining noise above the audio band is detected via U51-6 by the carrier squelch detector which generates a D.C. voltage that controls the audio mute circuits. The detected audio is then sent over to the logic board via U51-5/J6-3.

### 1.6 SYNTHESIZER OPERATION

Before frequency synthesis can begin the microprocessor must load frequency divider information into the PLL IC U101 (see Figure 2). The PLL IC contains 3 programmable dividers. The program is serially loaded via a common data line U101-10. The data is loaded one bit at a time, with each low-to-high transition of the CLOCK at U101-11 latching data from shift registers into the reference divider (R), divide-by-N, or divide-by-A latches depending on the control bit. A logic of the control bit selects the reference counter latch, while a logic low selects the divide-by-N, or divide-by-A counter latch.

After the microprocessor loads data into the PLL IC, SYNTH LATCH ENABLE line goes low. The synthesizer is then ready to generate a transmit or receive first injection frequency.

As an example for the 800MHz trunk models, the latches are loaded with data to give the following:

- 12.5 kHz at the output of the divided-by-R counter when the reference oscillator signal is applied at U101-1.
- 12.5 kHz at the output of the divided-by-N counter when the VCO is operating at the desired receive injection or transmit frequency.

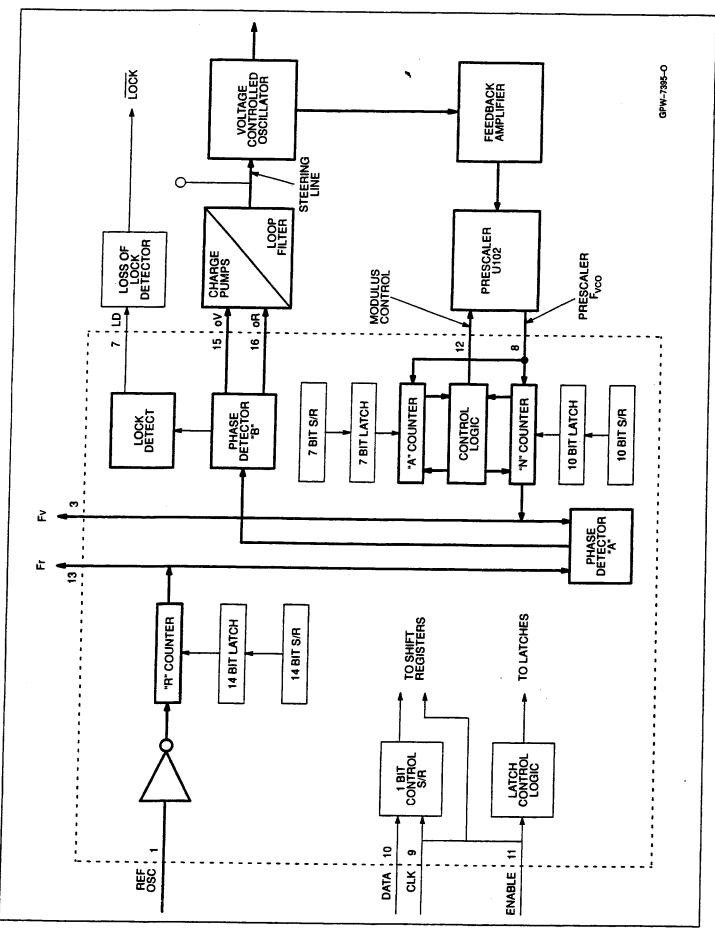


Figure 2. Synthesizer Section Block Diagram

During the frequency synthesis, the divide-by-A and divide-by-N counters begin counting down from the programmed values (A and N respectively) at the same time. The MOD CON line U101-12 is low so the divide-by-127/128 prescaler divides by 128. Therefore, the effect of the prescaler U102 is to divide the VCO output by 128 and apply it to U102-8. When the divide-by-A counter completes counting down, the control logic sets the MOD CON line high, and the divide-by-127/128 prescaler divides by 127 until the divideby-N counter completes the programmed value on N. After the divide-by-N counter completes counting down, the counters are set back to their programmed values. The MOD CON line is set low and the counters begin counting down again. The effect of the prescaler and divide-by-A, divideby-N counters is to divide the VCO frequency by a number, N, where:

$$N_T = 128 \times A + 127 \times (N-A)$$
  
= 127 \times N + A

The output of the divide-by-N counter is equal to:

$$\frac{f_{VCO}}{127 \times N + A}$$

where f<sub>VCO</sub> is the output frequency of the VCO

When the phase-locked loop is locked:

$$\frac{f_{\text{VCO}}}{127 \times N + A} = 12.5 \text{ kHz} = \frac{f_{\text{VCO}}}{N^{\text{T}}}$$

The reference oscillator frequency is 14.4 MHz and the output of the divide-by-R must be 12.5 kHz. Therefore:

$$R = \frac{14.4 \text{ MHz}}{12.5 \text{ kHz}} = 115210 = 0100 \ 1000 \ 00002$$

The values of A and N are dependent on the desired VCO frequency and the VCO frequency is dependent of the transmit frequency or receive frequency as shown:

$$f_{VCO} = f_T$$
 or  $(f_R - 45.1 \text{ MHz})$   
where  $f_T$  = the transmit frequency  
 $f_R$  = the receive frequency

The values of A and N can be determined from the desired frequency of the VCO, where:

N = integer part of 
$$\frac{N_T}{127}$$
  
A = remainder of  $\frac{N_T}{127}$ 

For example, if the receive frequency is 851.0125 MHz

$$f_{VCO} = 851.0125 \text{ MHz} - 45.1 \text{ MHz} = 805.9125 \text{ MHz}$$

then 
$$N_T = \frac{805.9125 \text{ MHz}}{12.5 \text{ MHz}}$$

$$N = 510 = 010 \ 1111 \ 11102$$
  
 $A = 23 = 012 \ 0111$ 

The 12.5 kHz outputs of the divide-by-A and divide-by-N counters are applied to phase detector A. The output of phase detector A is applied to phase detector B. There are 2 output signals for phase detector B (phase R and phase V). Signals phase R (U101-16) and phase V (U101-15) consist of pulses with a pulse width that depends on the phase error for the two signals at phase detector A. If the frequency fv is greater than f<sub>s</sub>, then error information is provided by phase V pulsing low, while phase R remains essentially high. When fv and fr are both in phase, both phase V and phase R remain high, except for a small minimum time period, and they both pulse low in phase. These pulses are applied to the charge pump and are used to correct VCO frequency.

The MaxTrac VHF model uses a divide-by-64/65 prescaler, while the UHF and 800 MHz models use the divide-by-127/128 prescaler. The working principles for the LOWBAND, VHF, UHF and 800 MHz models are the same.

When the synthesizer is locked, U101–7 applies a high level signal with very narrow negative going pulses to the loss–of–lock detector. The very narrow negative going pulses have a high average DC level that is not sufficient to turn on transistor Q101. This keeps the voltage across C102 low which indicates a lock condition.

When the synthesizer is out of lock, the output of U101–7 becomes a pulsating DC signal with an average DC level that varies between 0.5V and 4.4V. This turns on Q101 and charges up C102 to at least 3.0V indicating a out–of–lock condition.

### 1.6.1 Charge Pump

The charge pump consists of Q102–Q105. The phase V (U101–15) signal from the PLL IC is applied to Q103 while phase R (U101–16) is applied to O102. When the synthesizer is locked, both signals consist of a pulse train with a period of 80 uSec and negative going pulses. The phase R negative pulse turns off Q102 and brings the emitter of Q104 to 9.6V which turns on Q104. The negative pulse of phase V turns Q103 off which reduces the current flow to R114 and in turn reduces the voltage across R114. This will cause Q105 to turn on and sink current from Q104. When the synthesizer reaches lock, the voltage at the steering line test point (SL) will be between 1.3V to 7.8V. When the synthesizer is reprogrammed with a new frequency, the previous SL voltage would now give a wrong frequency and will cause the phase R and phase V to have differing pulse widths. This will result in a situation whereby Q104 and Q105 turn on and off at different times resulting in a series of summed current pulses to the loop filter that charges or discharges C110 producing the new SL voltage. If the frequency of the VCO is higher than that of phase R, then C110 discharges. The reverse happens when the frequency of the VCO is lower.

### 1.6.2 Loop Filter

The loop filter consists of R119 and R120, capacitors C109 through C111. This loop filter is a low pass filter that attenuates noise and rejects the loop reference frequency so that these signals cannot modulate the VCO. The voltage across C110 is the steering line voltage that controls the VCO frequency.

### 1.6.3 Reference Oscillator

The 14.4 MHz reference oscillator is supplied from a 14.4 MHz crystal Y151. This crystal has a 8 digit temperature coefficient that needs to be keyed into the radio during unified chassis auto tune. The reference oscillator is warped into the desired range at room temperature by adjusting L151 manually (new field adjustment). The oscillator is temperature compensated by varactors CR151 and CR152. A change in DC voltage at frequency control J6-9 changes the varactor capacitance and warps the frequency of the oscillator. It is very important that this control voltage be defined when tuning L151 i.e. 5.2V +0.01V DC at J6-9. During the 7 digit code generation this control voltage is changed between 4.9V DC to 5.5V DC and the transmit frequency noted. During auto-tuning of the unified chassis, the electronic warping of the reference oscillator is performed by changing this control voltage. During temperature compensation, the radio "reads" the temperature of Y151 by sensing the forward bias across CR176 and its translation via amplifier U176 to give temp sense voltage at J6-14.

The temp sense voltage is proportional to the actual temperature measured. The reference oscillator will be warped according to the temperature of the oscillator in order to correct the drift in frequency due to heating of the crystal Y151. Analysis of this temp sense circuit centers around the DC voltage measurements of the various nodes. All the resistors associated with this circuit have a 1% tolerance, therefore any component damage or part value change will affect the translated voltage at J6–14. The diode, CR176, needs to be flush to the board to ensure an accurate temp sensing. During transmissions with PL/DPL tones, the reference oscillator will be modulated. Potentiometer R164 controls the reference modulation level.

#### 1.7 VOLTAGE CONTROLLED OSCILLATOR

MaxTrac models for LOWBAND, VHF, and UHF use two separate VCO's, one for transmit and one for receive. The MaxTrac 800 MHz radio uses one VCO for transmit and receive. Switching between the transmit and receive VCO's is accomplished by the use of a switching circuit consisting of transistors Q277, Q278, and Q279. Transistor Q276 provides the 8.5 volt source to these transistors to power the VCO's. During the transmit mode, J6–4, the Transmit/Receive Shift Line, is at .1V DC. This will cause Q277 and Q278 to turn on and switch 8.5 volts to the transmit VCO. Q279 is turned off and keeps the 8.5 volts from reaching the receive VCO. During the receive mode, the voltage on J6–4 goes to 9.6 volts. This turns Q277, Q278 off and Q279 on. The 8.5 volts is applied to receive VCO and the transmit VCO is shut off.

The transmit and receive VCO's are very similar in design. The transmit VCO has a modulation circuit added and will be discussed later. The steering line D.C. voltage from the synthesizer is applied to each VCO. L213 in the transmit VCO and L202 in the receive VCO are tuned for a steering line voltage of 7.8V DC at the high end of the band. Varactors CR210–213 in the transmit VCO and CR202–205 in the receive VCO are used to change the frequency of the VCO.

The steering line D.C. voltage is applied to the varactors whose capacitance changes as the voltage increases or decreases. The steering line voltage is checked for greater than 1.8 volts at the low end of the band. This is to ensure that the tuning range is made as large as possible by the synthesizer.

In the transmit mode, the modulating signal applied to J6–10 changes the varactor capacitance of CR209 and modulates the VCO. Resistors R222, R223, and R225 act as potential dividers and only a fraction of the modulating signal is seen by CR209. The resistor combination also helps by attenuating any stray unwanted signals.

Q206 in the transmit VCO and Q203 in the receive VCO are the FET oscillators.

Transistors Q207, Q208 in the transmit VCO and Q204, Q205 in the receive VCO are the buffer amplifiers. A sample of the VCO frequency is fed back to the synthesizer circuit from the base of Q208 (transmit) and Q205 (receive). This sample is necessary for the synthesizer to "know" if the VCO is at the required frequency. The output of Q208 goes to the PA deck to be amplified. The output of Q205 makes up the local oscillator and is fed to the first mixer CR1.

The UHF VCO has an added circuit where the VCO frequency can be shifted by changing the voltage at J6–12. At the lower range, transistor Q209 is turned on and switches 9.6 volts to pin diodes CR201 and CR208. This causes C226 (transmit) and C203 (receive) to be added to the VCO and shifts the frequency of the VCO.

In the 800 MHz radio, there is only one VCO and it is contained in module U201. The transmit frequency range is 806–825 MHz while the receive frequency range is 851–870 MHz. The receive local oscillator signal is extracted from Q202. The transmitter signal is also extracted from Q202 with an additional buffer Q203. During the receive mode, the VCO signal from transistor Q203 is attenuated by turning off Q204. An attenuated VCO output is still available at J5 during the receive mode and the receive injection frequency can be measured. In the 800 MHz talk around radio, there is a similar pin diode shift circuitry like that used in the UHF radios to shift the VCO frequency to the 851–870 MHz range.

### 2. Troubleshooting Guide

### 2.1 RECEIVER SECTION

The theory of operation and schematics along with the troubleshooting chart "RECEIVER" will aid the servicer in isolating to the faulty component.

The use of proper test equipment such as the R2021D or R2001D with TEK-10 probe will also help in making accurate comparison measurements.

Refer to the proper schematic for each band for the voltages and waveforms. Observe the notes for information on how to set up for the measurements. When using the TEK-10 probe, be sure of a good RF ground before assuming the reading is correct.

Although many of the components are located on the solder side, the schematics can be used to isolate before having to pull the board from the chassis.

### 2.2 SYNTHESIZER SECTION

The synthesizer uses a phase locked loop design. Before troubleshooting this section the servicer may wish to review the theory of operation before continuing.

The synthesizer can be checked for an "out-of-lock" condition by looking at the lock detect line at J6-5. When in lock, the voltage will be 0V DC and when out of lock, the line will typically be 3V DC.

Be sure the DC voltages to the synthesizer are correct before proceeding. Troubleshoot the voltage regulators if wrong voltage levels are recorded.

Next, check Fr which is pin 13 of the synthesizer. Depending on the model of radio, a frequency of either 12.5 kHz, 6.25 kHz, or 5 kHz will be seen. This proves that the reference oscillator's output and the programming of the synthesizer are good.

If Fr is bad, check to see that the reference oscillator's output is on frequency and at the proper level. If the reference oscillator is off frequency, use the Radio Service software to try and warp the oscillator frequency on. Do not attempt to warp L151 on the RF board. This coil is factory adjusted and should not be field adjusted.

If the frequency will not warp on, check to make sure the DC voltages around the reference oscillator are correct. Board replacement will have to be done if the fault does not clear after programming.

The use of an open loop test will help to isolate between the synthesizer and VCO. By using a variable DC supply and breaking the steering line voltage away from the VCO, you can insert a DC voltage and observe the VCO's output. If the VCO tracks with the external DC voltage, the problem is in the synthesizer and prior to the steering line.

Tracing the signal through the feedback amplifier, it is important to pay close attention to the signal levels. Refer to the schematics for proper signal level for each band.

At the prescaler, the frequency can be calculated by dividing Fvco by 128 for 800 and UHF. Dividing by 64 is for the VHF model. Check the Modulus Control line on pin 6 of the prescaler. There should be a pulse train at the loop rate (12.5, 6.25, 5 kHz). If this is not present, then either the prescaler is loading down the signal or the synthesizer is bad.

Finally, check Fv. This should be a pulse train at the reference rate. It should be in lock with Fr. If there is no pulse train but you have a good signal from the prescaler, then the synthesizers internal dividers are bad.

If Fv is okay then check the outputs to the Charge Pumps. The ground pulse will be at the reference rate. When Fv leads Fr, the pulse from pin 15 will have an increased pulse width. If Fr leads Fv, then the pulse out pin 16 will have an increased pulse width.

If the DC power supply is still connected on the steering line, disconnect it. Reattach the steering line circuitry and attach a DC DVM to the steering line test point. While monitoring the DVM, momentarily touch the base of Q103. The steering line voltage should drop to almost 0V DC . Next, ground the base of Q102. The DVM should increase to almost  $+9.6 \mbox{V}$  DC . If either of these checks do not work, troubleshoot that particular side of the pumps.

Finally, if everything in the Phase Locked Loop appears to be normal, except for lock detect J6–5, check out the Lock Detect circuit. Synthesizer pin 7 should be very narrow ground pulses when in lock and the pulse width will be random when out of lock.

#### 3. 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.

### 3.1 TEST EQUIPMENT

R2001D Motorola Communication System Analyzer or Equivalent.

### 3.2 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 R2001D with AM limit (RF Section) set to Minimum.
- (4) Locate the VAGC Test Point (see Figure 3) 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 3) 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 RF board.

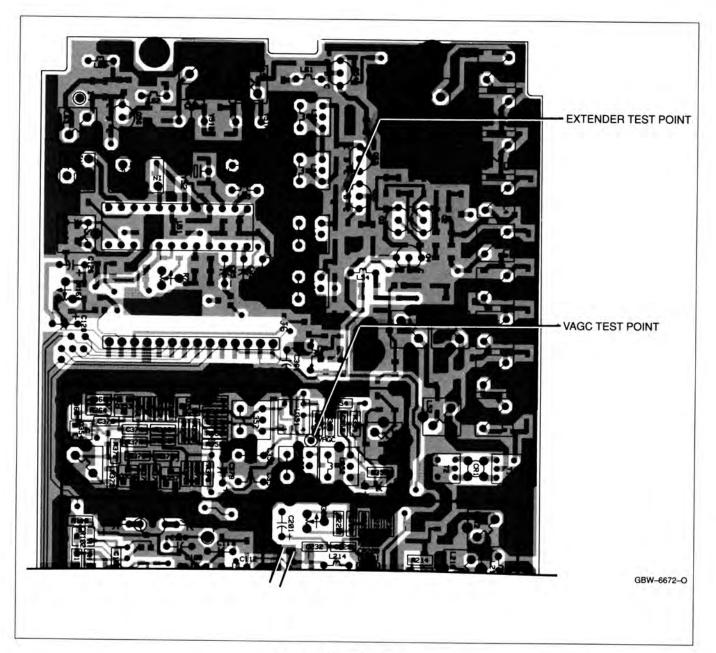
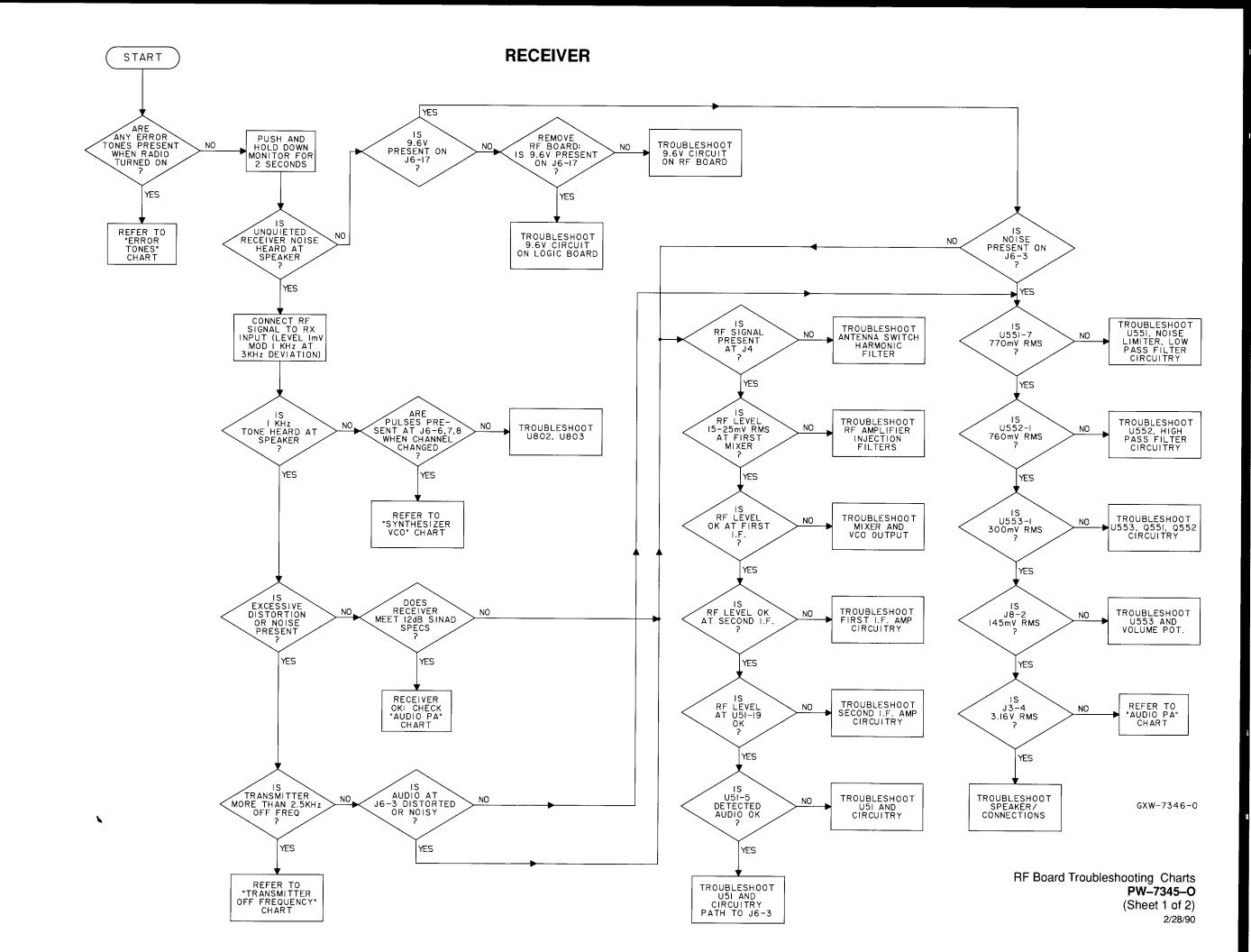
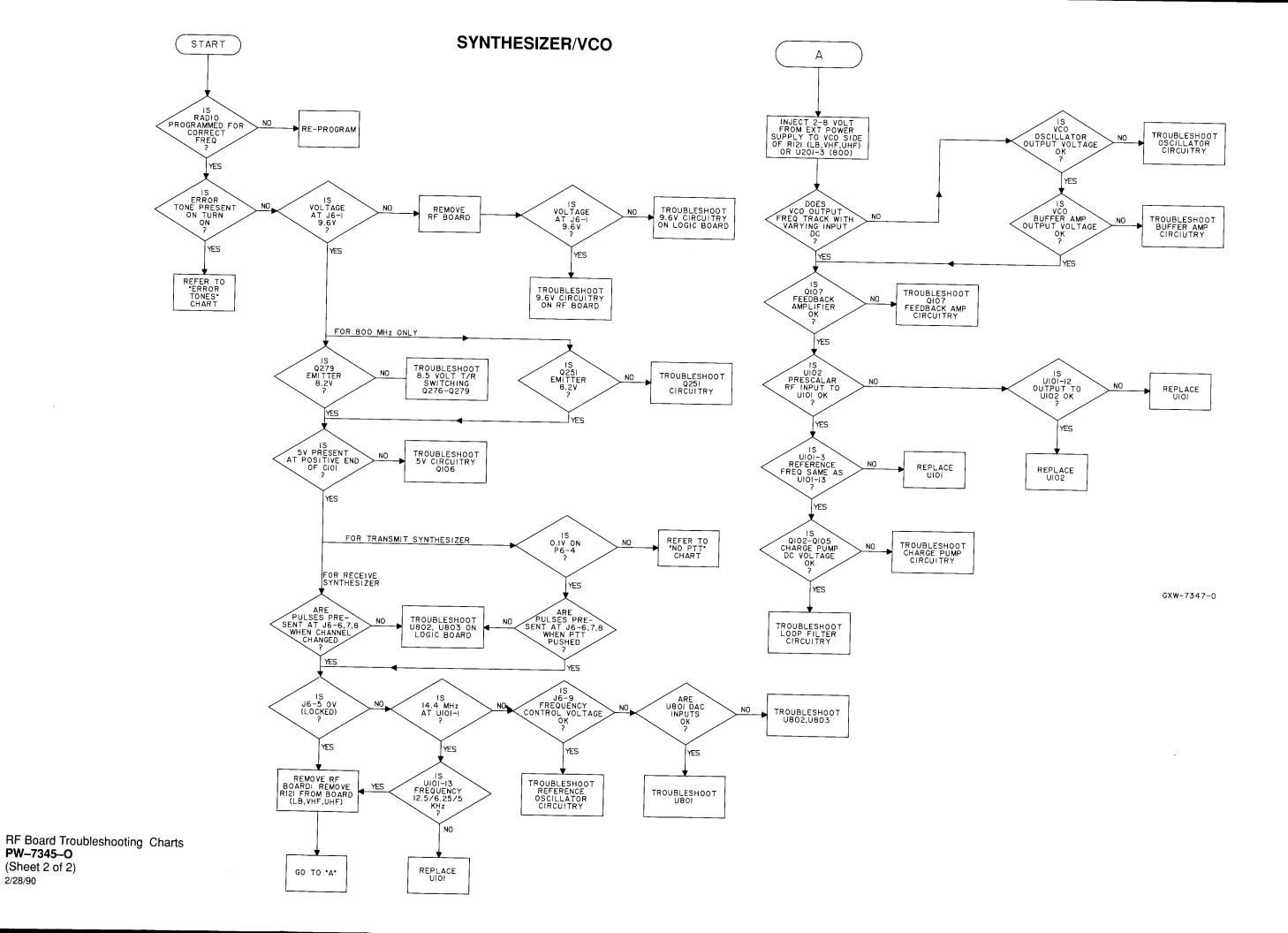


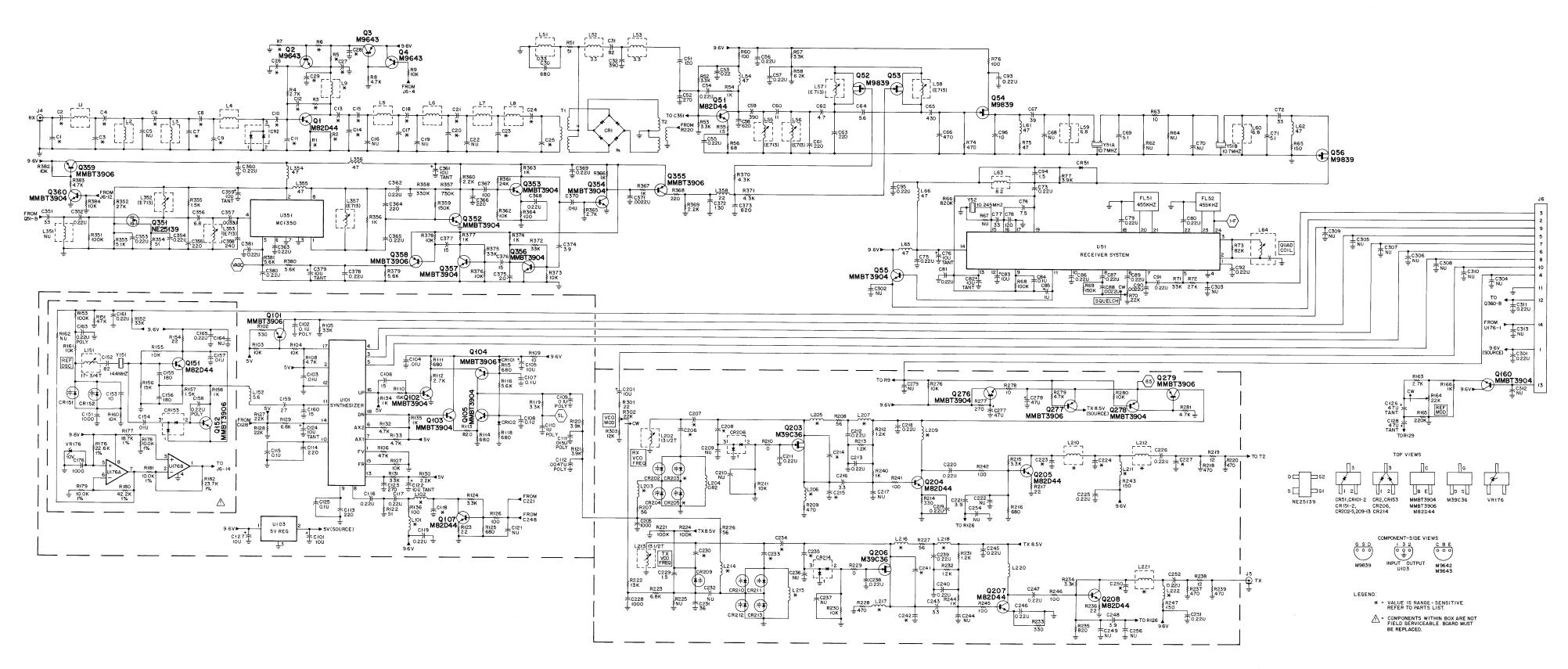
Figure 3. Extender Test Points





PW-7345-O (Sheet 2 of 2)

2/28/90



# Range 1 Parts List

REFERENCE					MXW-6563-B (2)				MXW-6563-B (3)		
SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		REFERENCE SYMBOL	MOTOROLA PART NO.
capacitor, chip, pF	F, ±5%, 50V (unless ot	herwise indicated)	C208	21-13740B17	4.7, ±.25 pF	L216-218	24-80063M24	8.2 uH		R155	06-11077A98
C1	21-13740B55 21-11032B15	180 0.22 uF, +80–20%	C211–213 C214,215	21-11032B15 21-13740B43	0.22 uF, +80–20% 56	L220 L221	24-80063M24 24-80063M11	8.2 uH 0.68 uH		R156 R157	06-11077B03 06-11077A78
C2 C3	21-13740B66	510	C216	21-13740B13	3.3, ±.25 pF	L222	24-80063M24	8.2 uH		R158	 06–11077 <b>A</b> 98
C4	21-13740B57 21-13740B38	220 36	C218–220 C221	21-11032B15 21-13740B15	0.22 uF, +80–20% 3.9, ±.25 pF	L352,353 L354–356	24-80164M01 24-80063M31	tunable, 0.7 uH 47 uH		R160,161 R163	06-11077A98
C6 C7	21-13740B19	5.6, ±.25 pF	C223	21-13740B25	10, <u>±</u> .5 pF	L357	24-80164M01	tunable, 0.7 uH		R164	1805500L08
C8 C9	21-13740B55 21-13740B68	180 620	C224 C225,226	21-13740B41 21-11032B15	47 0.22 uF, +80–20%	L358 transistor (see no	24-80063M27	22 uH		R165 R166	06-11077B31 06-11077A74
C10	21-13740B66 21-11032B15	0.22 uF, +80–20%	C227	21-13740B41	47	Q1	4880182D44	NPN		R176	06-11077G26
C11	21-13740B55	180 0.22 uF, +80–20%	C228 C229	21-13740B73 21-13740B05	1000 1.5, ±.25 pF	Q2-4	48-11043C06	PNP		R177 R178,179	06–11077G18 06–11077F91
C12,13 C14	21–11032B15 —	0.22 ur, +80-20% not used	C230	21-13740B19	5.6, ±.25 pF	Q51 Q52–54	48-80182D44 48-11043C12	NPN FET		R180	06-11077F91 06-11077G52
C15 C17	21-13740B46 21-13740B66	75 510	C231 C233	21-13740B38 21-13740B63	36 390	Q55	48-80214G02	NPN		R181 R182	06-11077F91 06-11077G28
C18	21–13740B66 21–13740B61	330	C234	21-13740B49	100	Q56 Q101	48-11043C12 48-05128M16	FET PNP		R207,208	06-11077A44
C19		not used	C235 C238–240	21-13740B17 21-11032B15	4.7, ±.25 pF 0.22 uF, +80–20%	Q102,103	48-80214G02	NPN		R209 R210	06-11077A66 06-11077A01
C20 C21	21-13740B71 21-13740B60	820 300	C241,242	21-13740B47	82	Q104 Q105	4805128M16 4880214G02	PNP NPN		R211	06-11077A98
C23	21-13740B69	680 1000	C243 C245–247	21-13740B13 21-11032B15	3.3, ±.25 pF 0.22 uF, +80–20%	Q107	48-80182D44	NPN		R212,213 R214	0611077A76 0611077A62
C24 C25	21-13740B73 21-13740B61	330	C248	21-13740B15	3.9, ±.25 pF	Q151 Q152	48–80182D44 —	NPN not used		R215	06-11077A86
C26-29	21-11032B15	0.22 uF, +80–20%	C250 C251,252	21-13740B29 21-11032B15	15 0.22 uF, +80–20%	Q160	48-80214G02	NPN		R216 R217	06-11077A70 06-11077A34
C30 C31	21-13740B69 21-13740B48	680 91	C277,278	23-11048B19	47 uF, ±20%, 16V	Q203 Q204,205	48-80141L06 48-80182D44	FET NPN		R218	06-11077A66
C32 C33	21-13740B63	390	C301 C311	21-11032B15 21-11032B15	0.22 uF, +80–20% 0.22 uF, +80–20%	Q206	48-80141L06	FET		R219 R220	06-11077A28 06-11077A66
C33 C51	 21–13740B52	not used 130	C351	21-13740B37	33	Q207,208 Q276	48-80182D44 48-80214G02	NPN NPN		R221 R222	06-11077B23
C52	21-13740B59	270	C352-354 C355	21-11032B15 21-13740B57	0.22 uF, +80–20% 220	Q276 Q277–279	48-05128M16	PNP		R222 R223	06-11077B02 06-11077A94
C53–57 C58	21-11032B15 21-13740B68	0.22 uF, +80–20% 620	C356	21-13740B21	6.8, ±.5 pF	Q351 Q352-354	48-80930W01	dual gate FET		R224	06-11077B23
C58 C59	21-13740B63	390	C357 C358	21-13741B33 21-13740B58	0.0033 uF, ±10% 240	Q352-354 Q355	48-80214G02 48-05128M16	NPN PNP		R226,227	06-11077 <b>A44</b> 06-11077 <b>A</b> 66
C60 C61	21-13740B26 21-13740B57	11 220	C359	23–11013D13	10 uF, ±10%, 20V, tantalum	Q356,357	48-80214G02	NPN		R228 R229	06-11077A01
C62	21-13740B17	4.7, ±.25 pF	C360 C361	21-11032B15 23-11013D13	0.22 uF, +80–20% 10 uF, +10%, 20V, tantalum	Q358,359 Q360	48-05128M16 48-80214G02	PNP NPN		R230 R231,232	06-11077A98 06-11077A76
C63 C64	21-13740B57 21-13740B19	220 5.6, ±.25 pF	C362,363	21-11032B15	0.22 uF, +80–20%		m, ±5%, 1/8 watt (unles			R233	06-11077A62
C65	21-13740B64	430	C364 C365	21-13740B57 21-11032B15	220	R1	06-11077A26	10		R234 R235	06-11077A86 06-11077A72
C66 C67	21-13740B65 21-13740B39	470 39	C366	21–11032B15 21–13740B57	0.22 uF, +80–20% 220	R2 R3	06-11077 <b>A3</b> 0 06-11077 <b>A</b> 68	15 560		R236	06-11077A34
C69	21-13740B18	5.1, ±.25 pF	C367	21-13740B49 21-11032B15	100	R4	06-11077A84	2.7k		R237 R238	06-11077A61 06-11077A32
C71 C72	21-13740B18 21-13740B37	5.1, ±.25 pF 33	C368,369 C370	21-11032B15 21-13741B37	0.22 uF, +80–20% 0.0047 uF, ±10%	R5 R6	06-11077 <b>A</b> 56 06-11077 <b>A</b> 98	180 10k		R239	06-11077 <b>A</b> 32
C73	21-11032B15	0.22 uF, +80–20%	C371	21-13741B29	0.0022 uF, ±10%	R7	06-11077A94	6.8K		R240	06-11077A74
C74 C75	21-13740B22	7.5, ±.5 pF	C372 C373	21-13740B52 21-13740B72	130 910	R8 R9	0611077A90 0611077A98	4.7k 10k		R241,242 R243	06-11077A50 06-11077A54
C76	21-11032B15 23-11013D13	0.22 uF, +80-20% 10 uF, ±10%, 20V, tantalum	C374	21-13740B72 21-13740B25	10	R51	06-11077A43	51		R244	0611077A74
C77	21-13740B37	33	C376,377 C378	21-13740B29 21-11032B15	15 0.22 uF, +80–20%	R52,53	0611077A86	3.3k		R245,246 R247	0611077A50 0611077A54
C78 C79–81	21-13740B51 21-11032B15	120 0.22 uF, +80–20%	C379	23-11013D13	10 uF, ±10%, 20V, tantalum	R54 R55	06-11077A74 06-11077A30	1k 15		R276	06-11077A98
C82	23-11013D13	10 uF, $\pm$ 10%, 20V, tantalum	C380,381	21-11032B15	0.22 uF, +80–20%	R56	06-11077A46	68		R277 R278	06-11077A60 06-11077A26
C83 C84	23-11048B13 21-11032B13	10 uF, ±20%, 16V, electrolytic 0.1 uF, +80–20%	diode (see note) CR1	48-80236E16	guad Sahattky, arangod	R57 R58	06-11077 <b>A</b> 86 06-11077 <b>A</b> 93	3.3k 6.2k		R279	0611077A90
C85	23-11048B05	1 uF, ±20%, electrolytic	CR2	48-80154K03	quad Schottky, crossed dual Schottky, SOT	R60	06-11077A50	100		R280 R281	0611077A98 0611077A90
C86,87 C88	21-11032B15 21-13741B29	0.22 uF, +80-20% 0.0022 uF, ±10%	CR51	48-05129M76	silicon, SOT	R63 R65	06-11077 <b>A</b> 26 06-11077 <b>A</b> 54	10 150		R301	06-11077A34
C89	21-11032B15	0.22 uF, +80-20%	CR101,102 CR151,152	48-05129M76 48-80006E10	silicon, SOT silicon varactor, SOT	R66	06-11077B45	820k		R302 R303	18-05500L08 06-11077B01
C90 C91–93	21-13741B29 21-11032B15	0.0022 uF, ±10% 0.22 uF, +80–20%	CR202 CR203	48-80991T01	silicon varactor, SOT	R68 R69	06-11077B23 06-11077B27	100k 150k		R351	06-11077B23
C94	21-13740B05	1.5, ±.25 pF	CR203 CR204	48–80991T01	not used silicon varactor, SOT	R70	18-05500L08	variable, 22k		R352 R353	06-11077B09 06-11077A91
C95 C96	21-11032B15 21-13740B25	0.22 uF, +80–20% 10, ±.5 pF	CR205	_	not used	R71 R72	06-11077B11 06-11077B09	33k 27k		R354	06-11077A43
C101	23-11048B13	10 uF, ±20%, 16V, electrolytic	CR206 CR209	48-80154K03 48-80006F10	dual Schottky, SOT silicon varactor, SOT	R73	06-11077B21	82k		R355	06-11077A78
C102 C103,104	08-11051A13 21-13741B45	0.1 uF, 63V 0.01 uF, ±10%	CR210-213	48-80006E10 48-80991T01	silicon varactor, SOT	R74 R75	06-11077 <b>A</b> 66 06-11077 <b>A</b> 42	470 47		R356 R357	06-11077A74 06-11077B44
C105, 104	23-11048B13	10 uF, ±10% 10 uF, ±20%, 16V, electrolytic	CR214	48-80154K03	dual Schottky, SOT	R76	06-11077A50	100		R358	06-11077B35
C105 C106	21-13740B47	82	<b>filters</b> FL51	04 90007005	AFE KLID GE	R77 R102	06-11077A88 06-11077A62	3.9k 330		R359 R360	06-11077B27 06-11077 <b>A</b> 82
C107,108 C109	21-11032B13 08-11051A13	0.1 uF, +80–20% 0.1 uF, 63V	FL51 FL52	91-80097D05 91-80098D05	455 kHz, 6E 455 kHz, 4E	R103,104	06-11077A98	10k		R361	06-11077B08
C110	08-11044A33	1 uF	connector, recept	acle		R105	06-11077B11	33k		R362 R363	06-11077A98 06-11077A74
C111 C112	08-11051A08 08-11051A05	0.015 uF, 63V 0.0047 uF, 63V	J4,5	09-80135M01	coaxial (RX, TX)	R106 R107	06-11077B15 06-11077A98	47k 10k		R364	06-11077A50
C113,114	21-13740B57	220	J6 	09-80130M02	14-pin socket (logic board)	R108	0611077A90	4.7k		R365 R366,367	0611077A84 0611077A74
C115 C116,117	21-11032B13 21-11032B15	0.1 uF, +80–20% 0.22 uF, +80–20%	coil	04 001401401	O 1/O turno (white)	R109 R110	06-11077A26 06-11077B03	10 15k		R368	06-11077A58
C118	21-13740B33	22	L1–8 L9	24-80148M21 24-80063M04	9–1/2 turns (white) 0.18 uH	R111	06-11077A70	680		R369 R370,371	06-11077A82
C119 C122	21-11032B15 23-11013D13	0.22 uF, +80–20% 10 uF, ±10%, 20V, tantalum	L51	24-80063M07	0.33 uH	R112 R113	06-11077 <b>A</b> 84 06-11077 <b>A</b> 72	2.7k 820		R370,371	0611077A89 0611077A93 0611077A76
C123	21-13740B59	270	L52,53 L54	24-80063M19 24-80063M31	3.3 uH 47 uH	R114,115	06-11077A70	680		R373 R374	06-11077A76 06-11077A74
C124	23-11013D13 21-11032B13	10 uF, ±10%, 20V, tantalum 0.1 uF, +80-20%	L55-58	24-80164M01	tunable, 0.7 uH	R116 R118	06-11077 <b>A</b> 92 06-11077 <b>A</b> 70	5.6k 680		R374 R375	06-11077A93
C125 C126	23-11013A56	47 uF, ±20%, 6V, tantalum	L59,60 L61,62	24-80063M23 24-80063M31	6.8 uH 47 uH	R119	06-11077A86	3.3k		R376	0611077A76
C127	23-11048B13	10 uF, ±20%, 16V, electrolytic	L63	24-80063M24	8.2 uH	R120,121 R122	06-11077A88 06-11077A43	3.9k 51		R377 R378	06-11077 <b>A</b> 74 06-11077 <b>A</b> 98
C128 C151	23-11013A56 21-13740B73	47 uF, ±20%, 6V, tantalum 1000	L64 L65,66	25-80000E01 24-80063M31	tunable, 455 kHz 47 uH	R123	06-11077A34	22		R379-381	06-11077A92
C152	21–13740B73 21–13740B47	82	L101	2480063M24	8.2 uH	R124	06-11077A86	3.3k		R382 R383	06-11077A98 06-11077A90
C153 C154	21-13740B25 21-13741B45	10, ±.5 pF 0.01 uF, ±10%	L102 L151	24-80063M11 24-80299D01	0.68 uH tunable, 17–3/4 turns	R125 R126	06-11077A70 06-11077A50	680 100		R384	06-11077A98
C155,156	21-13740B55	180	L152	24-80063M22	tunable, 17–3/4 turns 5.6 uH	R127	06-11077B07	22k		transformer	
C157 C158	21-13741B45 08-11051A15	0.01 uF, ±10% 0.22 uF, 63V	L202	24-80931W26	tunable, 13-1/2 turns	R128 R129	06-11077 <b>B</b> 11 06-11077 <b>A</b> 94	33K 6.8k		T1,T2	25-80163M02
159	21-13740B29	15	L203 L204	24-80063M23 24-80063M12	6.8 uH 0.82 uH	R130	06-11077A82	2.2k		integrated circuit	
2160	21-13740B41 21-11032B15	47 0.22 uF, +80–20%	L205-207	24-80063M23	6.8 uH	R131 R132,133	06-11077 <b>B</b> 11 06-11077 <b>A</b> 90	33k 4.7k		U51 U101	51–05479G05 51–80931V01
	08-11051A15	0.22 uF, 63V	L209 L210	24-80063M23 24-80063M13	6.8 uH 1.0 uH	R134,135	06-11077A74	1k		U103	51-84621K27
2163				2. 000001110		R136	06-11077A50	100		U176	51-80932W0
0161 0163 0165	21-11032B15	0.22 uF, +80–20%	L211	24-80063M23	6.8 uH						51 00002440
C163		1000 10 uF, ±20%, 16V, electrolytic	L211 L212 L213	24-80063M23 24-80063M07 24-80931W26	6.8 uH 0.33 uH tunable, 13–1/2 turns	R151 R152 R153	06-11077B15 06-11077B11 06-11077B23	47k 33k		U351	51–80929W0

REFERENCE Symbol	MOTOROLA PART NO.	DESCRIPTION
R155	06-11077A98	10k
R156	06-11077B03	15k
R157 R158	06–11077A78 —	1.5k not used
R160,161	06-11077 <b>A</b> 98	10k
R163	06-11077A84	2.7k
R164 R165	18-05500L08 06-11077B31	variable, 22k 220k
R165 R166	06-11077B31 06-11077A74	220k 1k
R176	06-11077G26	22.6k, ±1%
R177	06-11077G18	18.7k, ±1%
R178,179 R180	06-11077F91 06-11077G52	10.0k, ±1% 42.2k, ±1%
R181	06-11077F91	10.0k, ±1%
R182	06-11077G28	23.7k, ±1%
R207,208 R209	06-11077A44 06-11077A66	56 470
R210	06-11077A01	0
R211	06-11077A98	10k
R212,213 R214	06-11077A76 06-11077A62	1.2k 330
R214 R215	06-11077A82 06-11077A86	3.3k
R216	06-11077A70	680
R217	0611077A34	22
R218 R219	06-11077A66 06-11077A28	470 12
R219 R220	06-11077A28 06-11077A66	12 470
R221	06-11077B23	100k
R222	06-11077B02	13k
7223 7224	06-11077A94 06-11077B23	6.8k 100k
R226,227	06-11077A44	56
R228	06-11077A66	470
R229	06-11077A01	0
R230 R231,232	06-11077A98 06-11077A76	10k 1.2k
R233	06-11077A62	330
R234	0611077A86	3.3k
R235	06-11077A72	820 22
7236 7237	06-11077A34 06-11077A61	300
R238	06-11077A32	18
R239	06-11077A61	300
R240 R241 242	06-11077A74	1k 100
R241,242 R243	06-11077A50 06-11077A54	150
R244	0611077A74	1k
R245,246	0611077A50	100
R247	06-11077A54	150 10k
R276 R277	06-11077A98 06-11077A60	10k 270
R278	06-11077A00	10
R279	06-11077A90	4.7k
R280 R281	0611077A98 0611077A90	10k 4.7k
728 I 7301	06-11077A90 06-11077A34	4.7k 22
R302	18-05500L08	variable, 22k
303	06-11077B01	12k
R351 R352	0611077B23 0611077B09	100k 27k
R353	06-11077A91	5.1k
R354	06-11077A43	51
R355	06-11077A78	1.5k
R356 R357	06-11077A74 06-11077B44	1k 750k
R358	06-11077B35	330k
R359	06-11077B27	150k
R360 R361	06-11077A82 06-11077B08	2.2k 24k
R362	06-11077B08 06-11077A98	10k
R363	06-11077A74	1k
R364	06-11077A50	100
R365 R366,367	06-11077A84 06-11077A74	2.7k 1k
7366,367 7368	06-11077A74 06-11077A58	220
R369	06-11077A82	2.2k
370,371	06-11077A89	4.3k
7372 7373	06-11077A93 06-11077A76	6.2k 1.2k
7373 7374	06-11077A76 06-11077A74	1.2K 1k
R375	06-11077A93	6.2k
376	0611077A76	1.2k
R377 R378	06-11077A74 06-11077A98	1k 10k
R378 R379–381	06-11077A98 06-11077A92	5.6k
R382	06-11077A98	10k
R383	0611077A90	4.7k
R384	0611077A98	10k
transformer		
T1,T2	25-80163M02	balun
integrated circuit	(see note)	
	51-05479G05	receiver system
J101	51-80931V01	synthesizer
U51 U101 U103 U176		synthesizer regulator, 5 volt dual op–amp

MXW-6563-B (4)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION				
voltage regulator	(see note)					
VR176	48-80140L15	zener, 10V				
crystal (see note)						
Y51	91-80172D01	filter, 10.7 MHz				
Y52	48-80908W01	10.245 MHz				
Y151	48-80174D05	14.4 MHz				
	non-refe	erenced items				
	14-05160A01	insulator, crystal (4 used)				
	26-80097M01	shield, coil can (L151)				
	26-80098M01	shield, coil can (10 used)				
	26-80228L01	shield, can (J4, J5)				
	26-80916V01	shield, VCO frame				
	75-05295B02	pad, crystal (4 used)				

10/15/89

MXW-6563-B (5)

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

MXW-6348-B (4)

HLB4101A RF Board,		MXW-6348-B
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	5%, 50V (unless other	
C1 C2	21-13740B48 21-13740B65	91 470
C3 C4	21-13740B59 21-13740B49	270 100
C6	21-13740B29	15
C8 C9	21-13740B48 21-13740B64	91 430
C10	21-13740B57	220
C11 C12	21-13740B55 21-13741B49	180 0.015 uF, ±10%
C13 C14	21-13740B51 21-13740B62	120 360
C15	21-13740B51	120
C17 C18	21-13740B67 21-13740B52	560 130
C20	21-13740B67	560
C21 C23	21-13740B52 21-13740B64	130 430
C24 C25	21-13740B58	240
C26-29	21-13740B56 21-13741B49	200 0.015 uF, ±10%
C30 C31	21-13740B69 21-13740B47	680 82
C32	21-13740B63	390
C51 C52	21-13740B51 21-13740B59	120 270
C53-57	21-11032B15	0.22 uF, +80-20%
C58 C59	21-13740B68 21-13740B63	620 390
C60	21-13740B26	11
C61 C62	21-13740B57 21-13740B17	220 4.7, ±.25 pF
C63 C64	21–13740B57 21–13740B19	220
C65	21-13740B64	5.6, ±.25 pF 430
C66 C67	21-13740B65 21-13740B39	470 39
C69	21-13740B18	5.1, ±.25 pF
C71 C72	21-13740B18 21-13740B37	5.1, ±.25 pF 33
C73	21-11032B15	0.22 uF, +80-20%
C74 C75	2113740B22 2111032B15	7.5, ±.5 pF 0.22 uF, +80–20%
C76	23-11013D13	10 uF, ±10%, 20V, tantalum
C77 C78	21-13740B37 21-13740B51	33 120
C79–81 C82	21-11032B15 23-11013D13	0.22 uF, +80-20% 10 uF, ±10%, 20V, tantalum
C83	23-11048B13	10 uF, ±20%, 16V, electrolytic
C84 C85	21-11032B13 23-11048B05	0.1 uF, +80–20% 1 uF, ±20%, electrolytic
C86,87	21-11032B15	0.22 uF, +80-20%
C88 C89	21-13741B29 21-11032B15	0.0022 uF, ±10% 0.22 uF, +80–20%
C90 C91–93	21-13741B29 21-11032B15	0.0022 uF, ±10%
C94	21-13740B05	0.22 uF, +80–20% 1.5, ±.25 pF
C95 C96	21-11032B15 21-13740B25	0.22 uF, +80–20% 10, ±.5 pF
C101	23-11048B13	10 uF, ±20%, 16V, electrolytic
C102 C103,104	0811051A13 2113741B45	0.1 uF, 63V 0.01 uF, ±10%
C105	23-11048B13	10 uF, ±20%, 16V, electrolytic
C106 C107,108	21-13740B29 21-11032B13	15 0.1 uF, +80–20%
C109 C110	08-11051A13 08-11044A33	0.1 uF, 63V 1 uF
C111	08-11051A08	0.015 uF, 63V
C112 C113,114	08-11051A05 21-13740B57	0.0047 uF, 63V 220
C115	21-11032B13	0.1 uF, +8020%
C116,117 C118	21-11032B15 21-13740B27	0.22 uF, +80–20% 12
C119 C122	21-11032B15	0.22 uF, +80-20%
C123	23–11013D13 21–13740B59	10 uF, ±10%, 20V, tantalum 270
C124 C125	23-11013D13 21-11032B13	10 uF, ±10%, 20V, tantalum 0.1 uF, +80–20%
C126	23-11013A56	47 uF, ±20%, 6V, tantalum
C127 C128	23-11048B13 23-11013A56	10 uF, ±20%, 16V, electrolytic 47 uF, ±20%, 6V, tantalum
C151	21-13740B73	1000
C152 C153	21-13740B47 21-13740B25	82 10, ±.5 pF
C154 C155,156	21-13741B45 21-13740B55	0.01 uF, ±10% 180
C157	21-13741B45	0.01 uF, ±10%
C158 C159	08-11051A15 21-13740B35	0.22 uF, 63V 27
C160	21-13740B29	15
C161 C163	21-11032B15 08-11051A15	0.22 uF, +80–20% 0.22 uF, 63V
C165	21-11032B15	0.22 uF, +80-20%
C176 C201	21-13740B73 23-11048B13	1000 10 uF, ±20%, 16V, electrolytic
C205	21-13740B73	1000
C206 C207	21-13740B37 21-13740B27	33 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 C218–220	21-13740B13 21-11032B15	3.3, ±.25 pF 0.22 uF, +80–20%
2221	21~13740B15	3.9, ±.25 pF
C223 C224	21-13740B21 21-13740B39	6.8, <u>±</u> .25 pF 39
225,226	21-11032B15	0.22 uF, +80–20%
2227	21-13740B37	33
C228 C229	21-13740B73 21-13740B05	1000 1.5, ±.25 pF
230	21-13740B15	3.9, ±.25 pF
2231	21-13740B38	36
C233 C234	21-13740B49 21-13740B34	100 24
2235	21–13740B34 21–13740B17	4.7, ±.25 pF
238-240	21-11032B15	0.22 uF, +80-20%
2241,242	21-13740B31	18
C243 C245-247	21-13740B13 21-11032B15	3.3, ±.25 pF 0.22 uF, +80–20%
248	21-13740B15	3.9, ±.25 pF
250	21-13740B29	15
251,252	21-11032B15	0.22 uF, +80–20%
2277,278 2301	23-11048B19 21-11032B15	47 uF, ±20%, 16V 0.22 uF, +80-20%
311	21-11032B15	0.22 uF, +80–20%
351	21-13740B37	33
352–354 355	21-11032B15 21-13740B57	0.22 uF, +80-20%
C355 C356	21–13740B37 21–13740B21	220 6.8, ±.5 pF
357	21-13741B33	0.0033 uF, ±10%
358	21-13740B58	240
359 360	23-11013D13 21-11032B15	10 uF, ±10%, 20V, tantalum 0.22 uF, +80–20%
361	23–11013D13	0.22 ur, +80–20% 10 uF, ±10%, 20V, tantalum
362,363	21-11032B15	0.22 uF, +80-20%
364	21-13740B57	220
365 366	21-11032B15 21-13740B57	0.22 uF, +80–20% 220
367	21–13740B49	100
368,369	21-11032B15	0.22 uF, +80-20%
370	21–13741B37	0.0047 uF, ±10%
371 372	21-13741B29 21-13740B52	0.0022 uF, ±10% 130
373	21–13740B72	910
374	21-13740B25	10
376,377	21-13740B29	15
378 379	21–11032B15 23–11013D13	0.22 uF, +80–20% 10 uF, ±10%, 20V, tantalum
380,381	21-11032B15	0.22 uF, +80–20%
liodes (see note)		
R1	48-80236E16	quad Schottky, crossed
R2 R51	48-80154K03 48-05129M76	dual Schottky, SOT silicon, SOT
R101,102	48-05129M76	silicon, SOT
R151,152	48-80006E10	silicon varactor, SOT
R202–205	48-80006E10	silicon varactor, SOT
R206 R209–213	48-80154K03 48-80006E10	dual Schottky, SOT silicon varactor, SOT
R214	48-80154K03	dual Schottky, SOT
Iters		-
L51	9180097D05	455 kHz, 6E
L52	91~80098D05	455 kHz, 4E
onnector, recep 4	tacle 09-80135M01	coavial (BY)
5	09-80135M01 09-80135M01	coaxial (RX) coaxial (TX)
5	09-80130M02	14-pin socket (logic board)
oils		
1–9	24-80148M22	9-1/2 turns (white)
51 52 53	24-80063M07	0.33 uH
52,53 54	24-80063M19 24-80063M31	3.3 uH 47 uH
55–58	24-80164M01	tunable, 0.7 uH
59,60	24-80063M23	6.8 uH
61,62 63	24-80063M31	47 uH 8.2 uH
64	24-80063M24 25-80000E01	tunable, 455 kHz
65,66	24-80063M31	47 uH
101	24-80063M23	6.8 uH
102 151	24-80063M09 24-80299D01	0.47 uH tunable, 17–3/4 turns
152	24-80063M22	5.6 uH
202	24-80931W26	tunable, 13–1/2 turns
203	24-80063M22	5.6 uH
204 205–207	2480063M12 2480063M22	0.82 uH 5.6 uH
205–20 <i>7</i> 209	24-80063M22 24-80063M22	5.6 uH
210	24-80063M11	0.68 uH
211	24-80063M22	5.6 uH
212 213	24-80063M06	0.27 uH tupable 13–1/2 turns
213 214	24-80931W26 24-80063M23	tunable, 13–1/2 turns 6.8 uH
215	24-80063M12	0.82 uH
216–218	24-80063M23	6.8 uH
220	24-80063M23 24-80063M09	6.8 uH
		0.47 uH
221		6.8 uH
221 222 352,353	24-80063M23 24-80164M01	6.8 uH tunable, 0.7 uH
	24-80063M23	

			MXW-6348-B (3)
EFERENCE YMBOL	MOTOROLA PART NO.	DESCRIPTION	
ransistors (see note)		NPN	
2–4	48-80182D44 48-11043C06	PNP	
51 52–54	48-80182D44 48-11043C12	NPN FET	
55	48–80214G02	NPN	
56 101	48-11043C12 48-05128M16	FET PNP	
102,103	48-80214G02	NPN	
104	48-05128M16	PNP	
105 107	48-80214G02 48-80182D44	NPN NPN	
151	48-80182D44	NPN	
152 160	48-05128M16 48-80214G02	PNP NPN	
203	48-80141L06	FET	
204,205 206	48-80182D44 48-80141L06	NPN FET	
207,208	48-80182D44	NPN	
276 277–279	48-80214G02 48-05128M16	NPN PNP	
351	48-80930W01	dual gate FET	
352-354	48-80214G02	NPN	
355 356,357	48-05128M16 48-80214G02	PNP NPN	
358,359	48-05128M16	PNP	
360 soistar ahin ahm	48-80214G02	NPN	
sistor, cnip, onm, <u>+</u> 1	.5%, 1/8 watt (unless of 06–11077A26	otnerwise indicated) 10	
2	06-11077A33	20	
3 4	06-11077A66 06-11077A84	470 2.7k	
5	06-11077A46	68	
6 7	06-11077A86 06-11077B03	3.3k	
8	06-11077A90	15k 4.7k	
9	06-11077A98	10k	
51 52,53	06-11077A43 06-11077A86	51 3.3k	
54	06-11077A74	1k	
55 56	06-11077A30 06-11077A46	15 68	
57	06-11077A86	3.3k	
58 60	06-11077A93	6.2k	
63	06-11077A50 06-11077A26	100 10	
65	06-11077A54	150	
66 68	06-11077B45 06-11077B23	820k 100k	
69	06-11077B27	150k	
70 71	18-05500L08 06-11077B11	variable, 22k 33k	
72	06-11077B09	27k	
73 74	06-11077B21	82k	
75 75	06-11077A66 06-11077A42	470 47	
76	06-11077A50	100	
77 102	06-11077A88 06-11077A62	3.9k 330	
103,104	06-11077A98	10k	
105 106	06-11077B11 06-11077B15	33k 47k	
107	06-11077A98	10k	
108 109	06-11077A90	4.7k	
110	06-11077A26 06-11077B03	10 15k	
111	06-11077A70	680	
112 113	06-11077A84 06-11077A72	2.7k 820	
114,115	06-11077A70	680	
116 118	06-11077A92 06-11077A70	5.6k 680	
119	06-11077A86	3.3k	
120,121 122	06-11077A88 06-11077A43	3.9k 51	
123	06-11077A43 06-11077A34	22	
124	06-11077A86	3.3k	
125 126	0611077A70 0611077A50	680 100	
127,128	06-11077B07	22k	
129 130	06-11077A94 06-11077A82	6.8k 2.2k	
131	06-11077B11	33k	
132,133 134,135	06-11077A90 06-11077A74	4.7k 1k	
136	06-11077A74 06-11077A50	100	
151	06-11077B15	47k	
152 153	06-11077B11 06-11077B23	33k 100k	
154	06-11077A34	22	
155 156	06-11077A98 06-11077B03	10k 15k	
157	06-11077A78	1.5k	
158	06-11077A74	1k	
160,161 163	06-11077A98 06-11077A84	10k 2.7k	
164	18-05500L08	variable, 22k	
165 166	06-11077B31	220k	
176	06-11077A74 06-11077G26	1k 22.6k, ±1%	
177	06-11077G18	18.7k, <u>+</u> 1%	÷

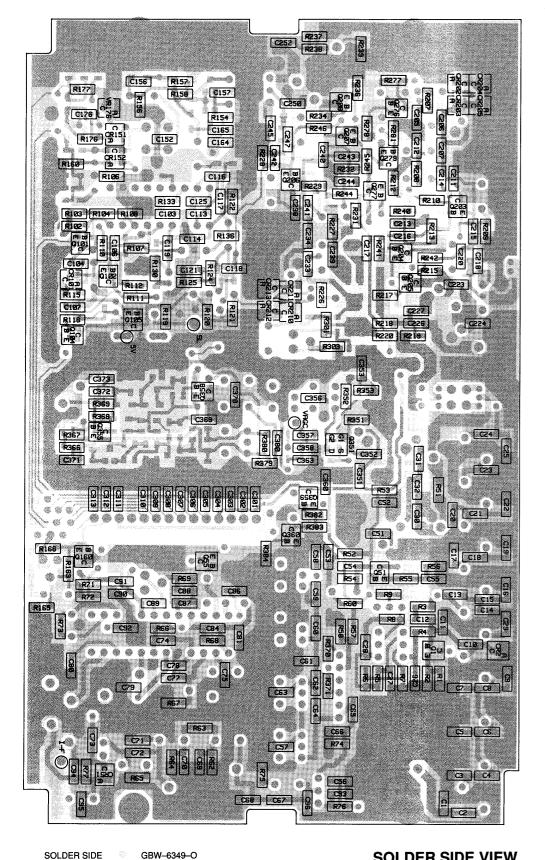
			MXW-6348-B (4
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
R178,179	06-11077F91	10.0k, ±1%	
R180	06-11077G52	42.2k, ±1%	
R181	06-11077F91	10.0k, ±1%	
R182 R207,208	06-11077G28 06-11077 <b>A</b> 44	23.7k, <u>+</u> 1% 56	
R209	06-11077A66	470	
R210	06-11077A01	0	
R211	06-11077A98	10k	
3212,213	06-11077A76	1.2k	
R214 R215	06-11077A62 06-11077A86	330 3.3k	
R216	06-11077A70	680	
R217	06-11077A34	22	
R218	06-11077A66	470	
R219 R220	06-11077A28 06-11077A66	12 470	
R221	06-11077B23	100k	
R222	06-11077B02	13k	
R223	06-11077A94	6.8k	
R224	06-11077B23	100k	
R226,227 R228	06-11077 <b>A</b> 44 06-11077 <b>A</b> 66	56 470	
R229	06-11077A01	0	
R230	06-11077A98	10k	
R231,232	06-11077A76	1.2k	
7233 7234	06-11077A62 06-11077A86	330 3 3k	
n234 R235	06-11077A86 06-11077A72	3.3k 820	
R236	06-11077A34	22	
R237	06-11077A66	470	
R238	06-11077A28	12 470	
R239 R240	06-11077A66 06-11077A74	470 1k	
R241,242	06-11077A50	100	
R243	06-11077A54	150	
R244	06-11077A74	1k	
R245,246 R247	06-11077A50 06-11077A54	100 150	
R276	06-11077A98	10k	
R277	06-11077A60	270	
3278	06-11077A26	10	
R279	06-11077A90	4.7k	
R280 R281	06-11077A98 06-11077A90	10k 4.7k	
R301	06-11077A34	22	
R302	18-05500L08	variable, 22k	
303	06-11077B01	12k	
R351 R352	06-11077B23 06-11077B09	100k	
R353	06-11077A91	27k 5.1k	
R354	06-11077A43	51	
355	06-11077A78	1.5k	
R356	06-11077A74	1k	
7357 7358	06-11077B44 06-11077B35	750k 330k	
359	06-11077B37	150k	
R360	06-11077A82	2.2k	
3361	06-11077B08	24k	
R362 R363	06-11077A98	10k	
7364	06-11077A74 06-11077A50	1k 100	
R365	06-11077A84	2.7k	
366,367	06-11077A74	1k	
R368	06-11077A58	220	
R369 R370,371	06-11077A82 06-11077A89	2.2K 4.3k	
R372	06-11077A93	6.2k	
R373	06-11077A76	1.2k	
R374	06-11077A74	1k	
R375 R376	06-11077A93	6.2k	
7376 7377	06-11077A76 06-11077A74	1.2k 1k	
R378	06-11077A98	10k	
R379-381	06-11077A92	5.6k	
R382	06-11077A98	10k	
R383 R384	06-11077A90 06-11077A98	4.7k 10k	
ransformers	00-110//A90	IUN	
T1,T2	25-80163M02	balun	
ntegrated circuits		Durant	
J51	51–05479G05	receiver system	
J101	51-80931V01	synthesizer	
J103	51-84621K27	regulator, 5 volt	
J176	51-80932W01	dual op-amp	
J351 valtaga ragulatar	51–80929W01	MC1350	
voltage regulator		7000° 101/	
VR176	48-80140L15	zener, 10V	
crystal (see note) Y51	91-80172D01	filtor 10 7 MH-	
Y52	48–80908W01	filter, 10.7 MHz 10.245 MHz	
151	48–80174D05	14.4 MHz	
		erenced items	***************************************
	14-05160A01 26-80097M01	insulator, crystal (4 u shield, coil can (L15	ised)
	26-80097M01 26-80098M01	shield, coil can (L15) shield, coil can (10 u	
	26-80228L01	shield, can (J4, J5)	/
	26-80916V01	shield, VCO frame	

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4099A and HLB4101A Low Band RF Boards

PW-6346-C
(Sheet 3 of 4)

3/31/90



COMPONENT SIDE

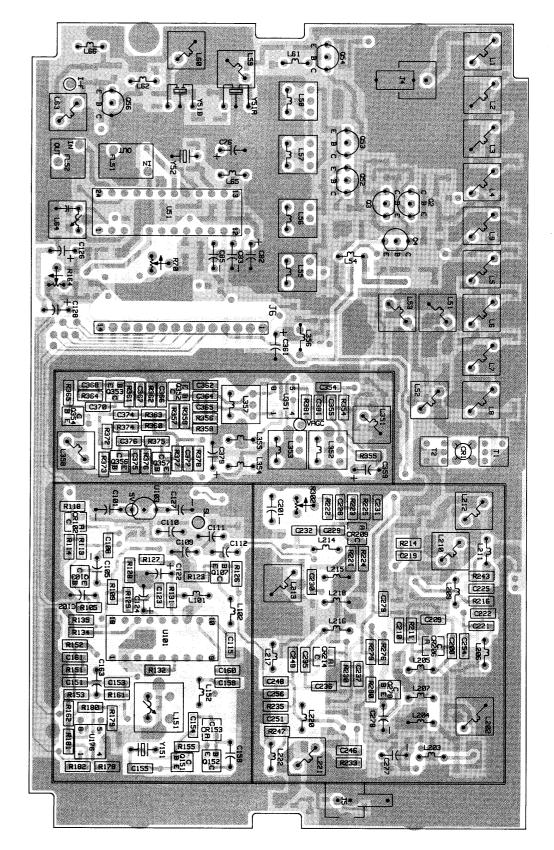
OVERLAY - GBW-6351-O

**SOLDER SIDE VIEW** 

SOLDER INNER LAYER COMPONENT INNER LAYER (6)

GCW-6389-O GCW-6390-O

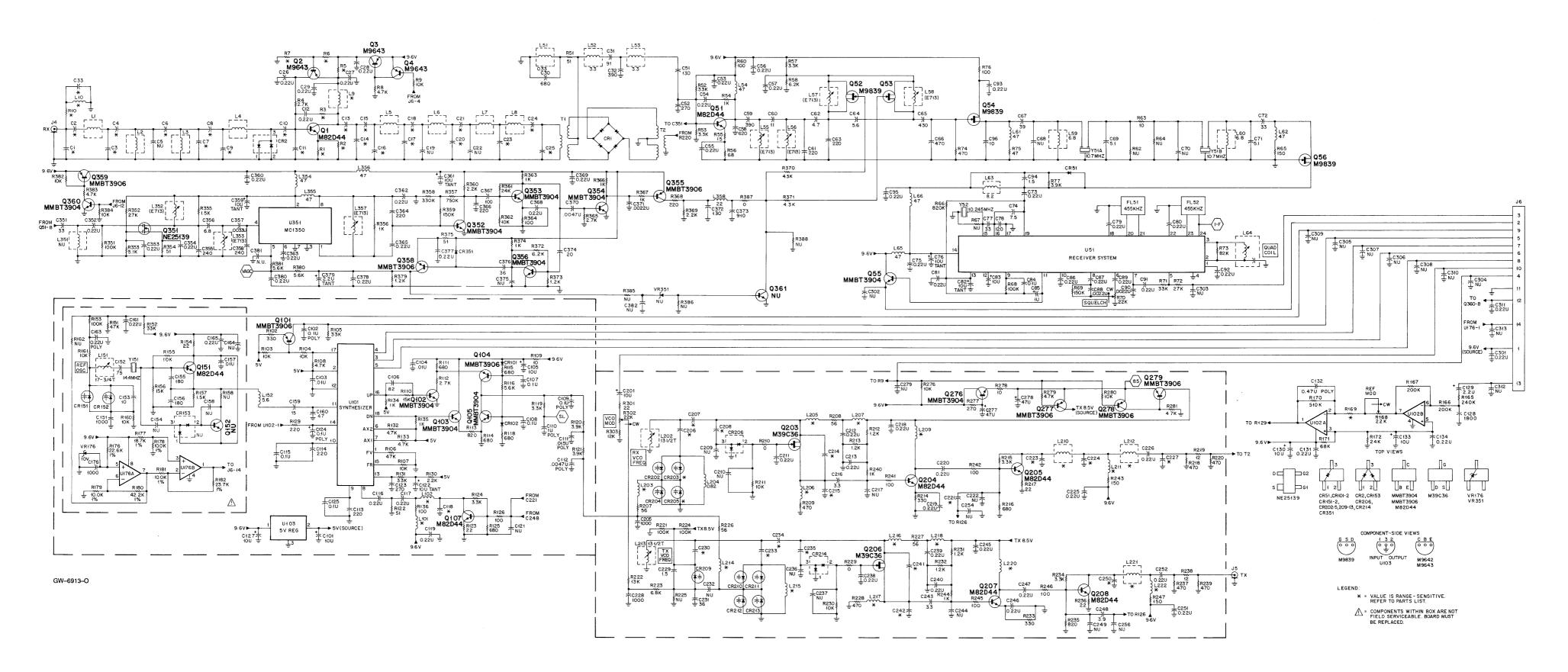
**INNER LAYERS** 



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

### **COMPONENT SIDE VIEW**

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4099A and HLB4101A Low Band RF Boards PW-6346-C (Sheet 4 of 4)



Schematic, Circuit Board Diagram, and Parts List for HLB4100A Low Band RF Board (Early Version) **PW-6916-A** (Sheet 1 of 3) 3/31/90

### Range 2 Parts List

HLB4100A RF Board, 36-42 MHz MXW-6910-O REFERENCE MOTOROLA REFERENCE MOTOROL A DESCRIPTION DESCRIPTION SYMBOL PART NO. SYMBOL capacitor, chip, pF. +5%, 50V (unless otherwise indicated) C207 21-13740B35 C208 21-13740B17 4.7, ±.25 pF C1 21-13740B53 150 1200 C211-213 C214,215 21-11032B15 0.22 uF, +80-20% 21-13740B74 21-13740B35 C3 C4 C6 C8 21-13740B63 390 150 21-13740B13 21-11032B15 3.3, ±.25 pF 21-13740B53 C216 C218-220 0.22 uF, +80-20% 21-13740B36 30 130 C221 C223 21-13740B09 2.2, ±.25 pF 21-13740B52 21-13740B23 8.2,  $\pm$ .5 pF C9 C10 21-13740B65 470 1000 C224 C225,226 21-13740B39 21-13740B73 0.22 uF, +80-20% C11 C12,13 160 0.22 uF. +80–20% 21-13740B54 21-11032B15 C227 C228 21-13740B37 21-11032B15 C15 C16 21-11032B15 21-13740B73 1000 C229 C230 C231 C233 21-13740B05 1.5, ±.25 pF 21-13740B51 120 510 180 510 C17 C18 21-13740B66 21-13740B17 4.7, +.25 pF 21-13740B38 21-13740B55 C20 C21 C23 C24 100 21-13740B66 21-13740B49 C234 C235 21-13740B38 21-13740B56 200 470 36 4.7. +.25 pF 21-13740B65 21-13740B17 C238-240 21-11032B15 0.22 uF, +80-20% 21-13740B61 330 300 C25 C26–29 C30 C31 C32 C51 C241,242 21-13740B60 21-13740B31 21-13740B13 3.3, ±.25 pF 21-11032B15 0.22 uE. +80-20% C245-247 21-13740B69 21-11032B15 0.22 uE +80-20% C248 21-13740B15 3.9, ±.25 pF 21-13740B48 21-13740B63 C250 21-13740B31 390 130 270 21-11032B15 0.22 uF, +80-20% 21-13740B52 C52 C53-57 C59 C60 C61 C62 C63 C64 C65 C66 C67 C72 C73 C74 C75 C75 C76 C77 C78 C277,278 C301 23-11048B19 47 uF, ±20%, 16V 0.22 uF, +80-20% 21-13740B59 21-11032B15 21-11032B15 0.22 uF +80-20% C311 21-13740B68 21-11032R15 0.22 uF, +80-20% 620 21-13740B37 21-13740B63 390 C352-354 21-11032B15 0.22 uF, +80--20% 21-13740B26 C355 21-13740B58 21-13740B57 220 4.7, ±.25 pF C356 C357 C358 C359 21-13740B21 21-13741B33 6.8, ±.5 pF 21-13740B17 0.0033 uF, ±10% 220 5.6, ±.25 pF 21-13740B57 21-13740B58 21-13740B19 23-11013D13 21-13740B64 C360 C361 21-11032B15 21-13740B65 470 23-11013D13 21-13740B39 39 5.1, <u>+</u>.25 pF C362,363 C364 21-11032B15 21-13740B18 21-13740B57 21-13740B18 5.1, ±.25 pF C365 C366 21-11032B15 0.22 uF, +80-20% 21-13740B37 21-11032B15 0.22 uF, +80-20% 21-13740B57 21-13740B49 21-13740B22 7.5, ±.5 pF 0.22 uF, +80–20% C368.369 0.22 uF. +80--20% 21-11032B15 21-11032B15 21-13741B37 0.0047 uF, ±10% 23-11013D13 10 uF, +10%, 20V, tantalum C371 21-13740B37 21-13741B29 0.0022 uF, ±10% 21-13740B51 C373 21-13740B72 21-11032B15 0.22 uF, +80-20% 21-13740B32 C82 10 uF, ±10%, 20V, tantalum 10 uF, ±20%, 16V, electrolytic 23-11013D13 C83 C84 C85 23-11048B13 C376 21-13740B38 C377,C378 0.22 uF, +80-20% 21-11032B15 0.1 uF, ±10% 1 uF, ±20%, electrolytic 21-13741B69 C379 C380 23-11049A09 23-11048B05 21-11032B15 C86,87 C88 0.22 uF, +80–20% 0.0022 uF, ±10% 0.22 uF. +80-20% 21-11032R15 21-13741B29 diode (see note) C89 21-11032B15 0.22 uF, +80-20% CR1 CR2 48-80236E16 C90 21-13741B29 0.0022 uF. +10% 48-80154K03 C91-93 C94 C95 C96 C101 dual Schottky, SOT 21\_11032B15 0.22 uF, +80-20% CR51 CR101,102 48-05129M76 silicon, SOT 21-13740B05 1.5, ±.25 pF 48-05129M76 silicon SOT 21-11032B15 21-13740B25 0.22 uF, +80-20% CR151,152 CR202-205 48-80006E10 silicon varactor, SOT 10. +.5 pF 48-80006F10 silicon varactor, SOT 23–11048B13 08–11051A13 10 uF, ±20%, 16V, electrolytic dual Schottky, SOT C102 0.1 uF. 63V CR209 48-80006E10 silicon varactor, SOT C103,104 21-13741B45 0.01 uF, ±10% CR210-213 48-80991T01 silicon varactor, SO C105 23-11048B13 10 uF, ±20%, 16V, electrolytic CB214 48-80154K03 dual Schottky, SOT C106 C107,108 21-13740B47 CR351 barrier Schottky 0.1 uF, ±10% 21-13741B69 filters C109 08-11051A13 0.1 uF, 63V C110 08-11044A33 FI 51 91\_80097005 455 kHz 6F 08-11051A08 0.015 uF, 63V FL52 91-80098D05 455 kHz. 4E C112 08-11051A05 0.0047 uF, 63V connector, recentacle J4,5 09-80135M01 coaxial (RX, TX) 0.1 uF, ±10% 0.22 uF, +80–20% C115 21-13741B69 C116,117 21-11032B15 09-80130M03 C118 21-13740B29 coil 21-11032B15 0.22 uF, +80-20% L1-8 24-80148M21 9-1/2 turns (white) C122 C123 C124 C125 C127 C128 23-11013D13 10 uF, ±10%, 20V, tantalum 24-80063M31 47 uH 0.33 uH 21-13740B59 270 24-80063M07 0.1 uF, 63V 08-11051A13 L52.53 24\_80063M10 3.3 uH 21-13741B69 0.1 uF. +10% L54 L55–58 24-80063M31 47 uH 23-11048B13 10 uF, ±20%, 16V, electrolytic 24-80164M01 21-13740B78 1800 L59,60 24-80063M23 6.8 uH C129 C130 C131 C132 2.2 uF, ±20%, electrolytic 23-11048B06 16162 24-80063M31 23-11048B13 10 uF, +20%, 16V, electrolytic L63 24-80063M24 8.2 uH 21-11032B15 0.22 uF, +80-20% L64 L65,66 25-80000E01 tunable, 455 kHz 08-11051A17 0.47 uF. 63V 24-80063M31 47 uH C133 C134 C151 C152 23-11048B13 10 uF, ±20%, 16V, electrolytic L101 L102 24-80063M24 8.2 uH 21-11032B15 0.22 uF. +80-20% 24-80063M10 0.56 uH 21-13740B73 L151 L152 24-80299D01 tunable, 17-3/4 turns 21-13740B46 24-80063M22 5.6 uH C153 C155,156 21-13740B25 10, ±.5 pF tunable, 13-1/2 turns L202 L203 24-80931W26 21-13740B55 24-80063M23 6.8 uH C157 21-13741B45 0.01 uF, ±10% L204 24-80063M12 0.82 uH C159 21-13740B29 L205-207 24-80063M23 68 nH C160 C161 C163 C165 21-13740B41 L209 24-80063M23 6.8 uH 21-11032B15 0.22 uF. +80-20% L210 24-80063M12 0.82 uH 08-11051A15 0.22 uF, 63V L211 L212 24-80063M23 6.8 uH 21-11032B15 0.22 uF, +80-20% 24-80063M06 0.27 uH C176 C201 21-13740B73 L213 L214 24-80931W26 tunable, 13-1/2 turns 23-11048B13 10 uF, +20%, 16V, electrolytic 24-80063M24 8.2 uH 21–13740B73 1000 24-80063M12 0.82 uH C206 21-13740B38 36 24-80063M24

MXW-6910-O (2) 240 10 uF, ±10%, 20V, tantalum 10 uE +10% 20V tantalum 2.2 uF, ±10%, 20V, tantalum 14-pin socket (logic board)

MXW-6910-O (3) REFERENCE MOTOROLA DESCRIPTION PART NO. SYMBOL 24-80063M24 8.2 uH L221 24-80063M10 0.56 uH L222 L352.353 24-80063M24 8.2 uH tunable, 0.7 uH 47 uH 24-80164M01 L354-356 L357 24-80063M31 tunable, 0.7 uH 24-80164M01 L358 22 uH 24-80063M27 transistor (see note 01 48-80182D44 Q2-4 48-11043C06 Q51 48-80182D44 NPN FET NPN FET PNP NPN PNP Q52-54 48-11043C12 Q55 Q56 48-80214G02 48-11043C12 Q101 Q102,103 48-05128M16 48-80214G02 Q104 48-05128M16 Q105 48-80214G02 NPN NPN FET NPN Q107 Q151 48-80182D44 Q203 Q204,205 48-80182D44 Q206 48-80141L06 FET NPN Q207 208 48-80182D44 48-80214G02 Q277-279 PNP 48-05128M16 48-80930W01 dual gate FET Q352-354 48-80214G02 NPN PNP Q355 48-05128M16 Q356 357 48-80214G02 NPN PNP Q358,359 48-05128M16 Q360 48-80214G02 NPN ±5%, 1/8 watt (unless otherwise indicated) 06-11077A29 13 06-11077A68 2.7k 180 10k 6.8K 4.7k 10k 06-11077A84 06-11077A56 06-11077498 06-11077A90 R51 06-11077A43 51 3.3k R54 06-11077474 06-11077A30 68 3.3k 6.2k 100 10 150 R56 R57 06-11077A46 06-11077A86 R58 R60 R63 R65 R66 R68 06-11077493 06-11077A50 n6-11077Δ26 06-11077A54 06-11077B45 820k 100k 06-11077B23 R69 R70 R71 R72 R73 R74 06-11077B27 150k 18-05500L08 variable, 22k 06-11077B11 33k 27k 06-11077B09 82k 470 47 100 3.9k 330 10k 33k 47k 06-11077A66 R75 R76 06-11077A42 06-11077A50 R77 06-11077A88 R102 06-11077A62 R103,104 06-11077A98 R105 06-11077B11 R107 06-11077498 10k 4.7k R108 R109 06-11077A26 10 15k 680 2.7k 820 680 5.6k 680 06-11077B03 R111 06-11077A70 R113 06-11077**∆**72 R114,115 06-11077A70 R116 06-11077A92 R118 06-11077A70 R119 06-11077A86 3.3k 3.9k R120,121 06-11077A88 R122 06-11077A43 51 22 3.3k 680 100 220 2.2k 33k 4.7k R123 06-11077A34 R124 06-11077A86 R125 06-11077A70 R126 06-11077A50 R129 06-11077A58 R130 06-11077A82 R131 06-11077B11 R134.135 06-11077A74 1k 100 47k 33k 100k 22 10k 15k 1.5k 10k R151 06-11077B15 R153 06-11077B23 R154 06-11077A34 R155 06-11077A98 06-11077B03

R157

R164

R165

R160,161

06-11077A78

06-11077A98

18-05500L08

06-11077B32

240k

REFERENCE MOTOROLA SYMBOL 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, <u>+</u> 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	06-11077 <b>A</b> 44	56
R209	06-11077A66	470
R210	06-11077A01	0
R211	06-11077A98	10k
R212,213	06-11077A76	1.2k
R214	06-11077A62	330
R215	0611077A86	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	06-11077 <b>A</b> 62	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	0611077A26	10
R279	06-11077A90	4.7k
R280	06-11077A98	10k
R281	06-11077A90	4.7k
R301	06-11077A34	22
R302 R303	18-05500L08	variable, 22k
R351	06-11077B01	12k
R352	06-11077B23 06-11077B09	100k
R353	06-11077A91	27k 5.1k
R354		
R355	06-11077A43 06-11077A78	51 1.5k
R356	06-11077A78	1.5k 1k
R357	06-11077B44	750k
R358	06-11077B35	330k
R359	06-11077B27	150k
R360	06-11077B27	2.2k
R361	06-11077B08	2.2h 24k
R362	06-11077B08	10k
R363	06-11077A38	1k
R364	06-11077A74	100
R365	06-11077A30	2.7k
R366,367	06-11077A84	1k
R368	06-11077A74	220
R369	06-11077A38	2.2k
R370,371	06-11077A82	4.3k
R372	06-11077A93	6.2k
R373	06-11077A35	1.2k
R374	06-11077A74	1k
R375	06-11077A43	51
R379	06-11077A43	1.2k
R380.R381	06-11077A70	5.6k
R382	06-11077A98	10k
R383	06-11077A90	4.7k
R384	06-11077A98	10k
	06-11077A90	0
R387	00 110//H01	~
R387		
transformer		
	25-80163M02	balun
transformer T1,T2		balun
transformer T1,T2 integrated circuit (	see note)	
transformer T1,T2 integrated circuit ( U51	see note) 51–05479G05	receiver system
transformer T1,T2 integrated circuit ( U51 U101	see note) 51–05479G05 51–80931V01	receiver system synthesizer
transformer T1,T2 integrated circuit ( U51 U101 U102	see note) 51-05479G05 51-80931V01 51-80056M04	receiver system synthesizer dual op–amp
transformer T1,T2 integrated circuit ( U51 U101 U102 U103	see note) 51-05479G05 51-80931V01 51-80056M04 51-84621K27	receiver system synthesizer dual op-amp regulator, 5 volt
transformer T1,T2 integrated circuit ( U51 U101 U102	see note) 51-05479G05 51-80931V01 51-80056M04	receiver system synthesizer dual op–amp

DEEEDENCE

VR176

48-80140115

zener, 10V

MOTOROLA

MXW-6910-O (4)

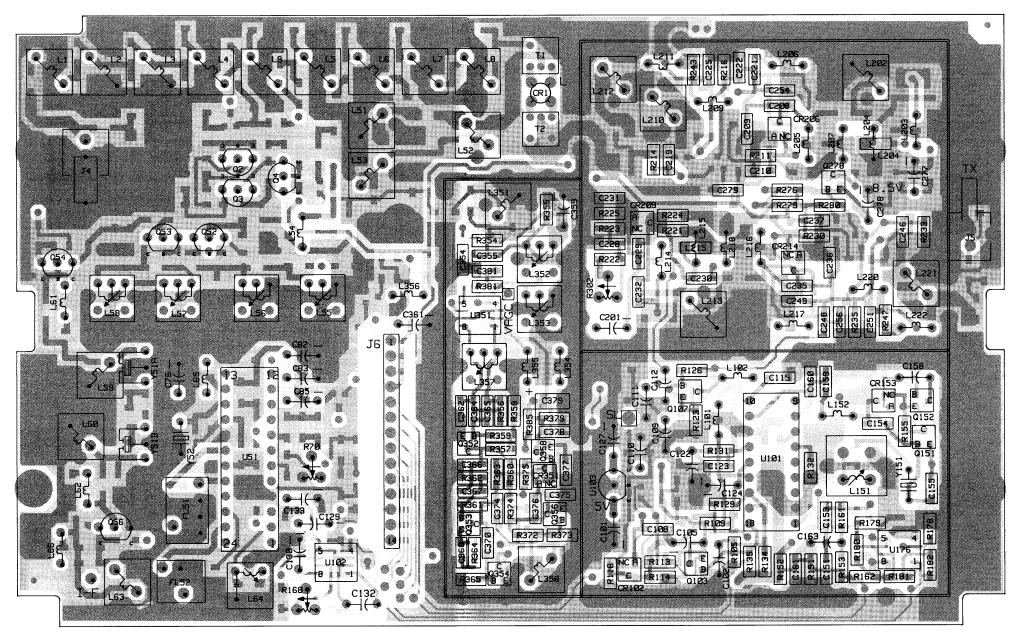
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
crystal (see note)		25.50 Jack
Y51 Y52	91-80172D01 48-80908W01	10.245 MHz _ (4,03 early 14,4 MHz
Y151	48-80174D05	14.4 MHz
	non-refe	erenced items
	14-05160A01	insulator, crystal (4 used)
	26-80097M01	shield, coil can (L151)
	26-80098M01	shield, coil can (11 used)
	26-80228L01	shield, can (J4, J5)
	26-80916V01	shield, VCO frame
	75-05295B02	pad, crystal (4 used)

MXW-6910-O (5)

10/15/89

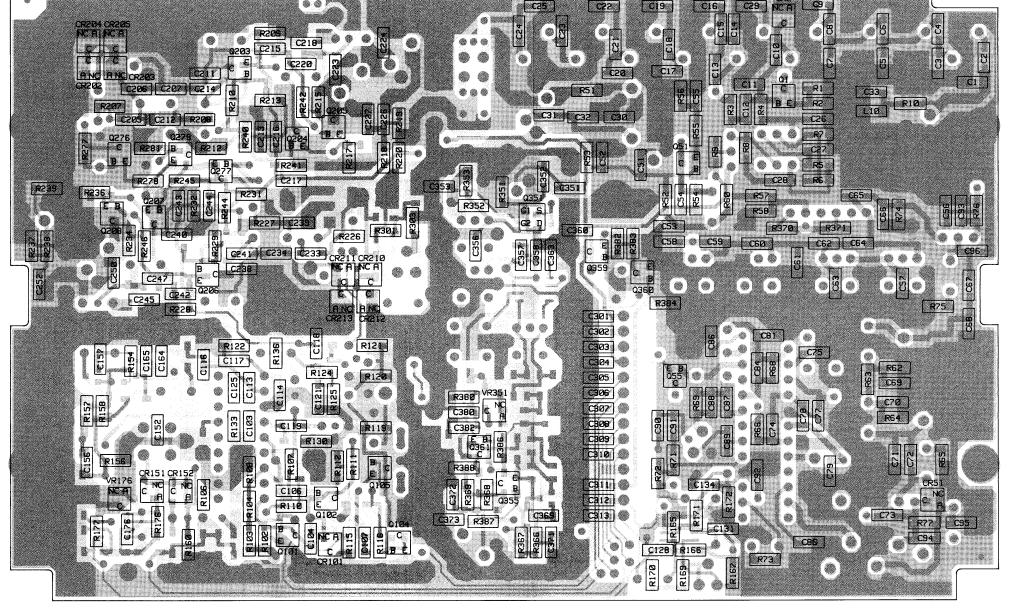
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number

> Schematic, Circuit Board Diagram, and Parts List for HLB4100A Low Band RF Board (Early Version) PW-6916-A (Sheet 2 of 3)



COMPONENT SIDE

OVERLAY GW-6914W01-



SOLDER SIDE

COMPONENT SIDE GW-6915-O

SOLDER SIDE GW-6914W02-O

Schematic, Circuit Board Diagrams, and Parts List for HLB4100A Low Band RF Board (Early Version)

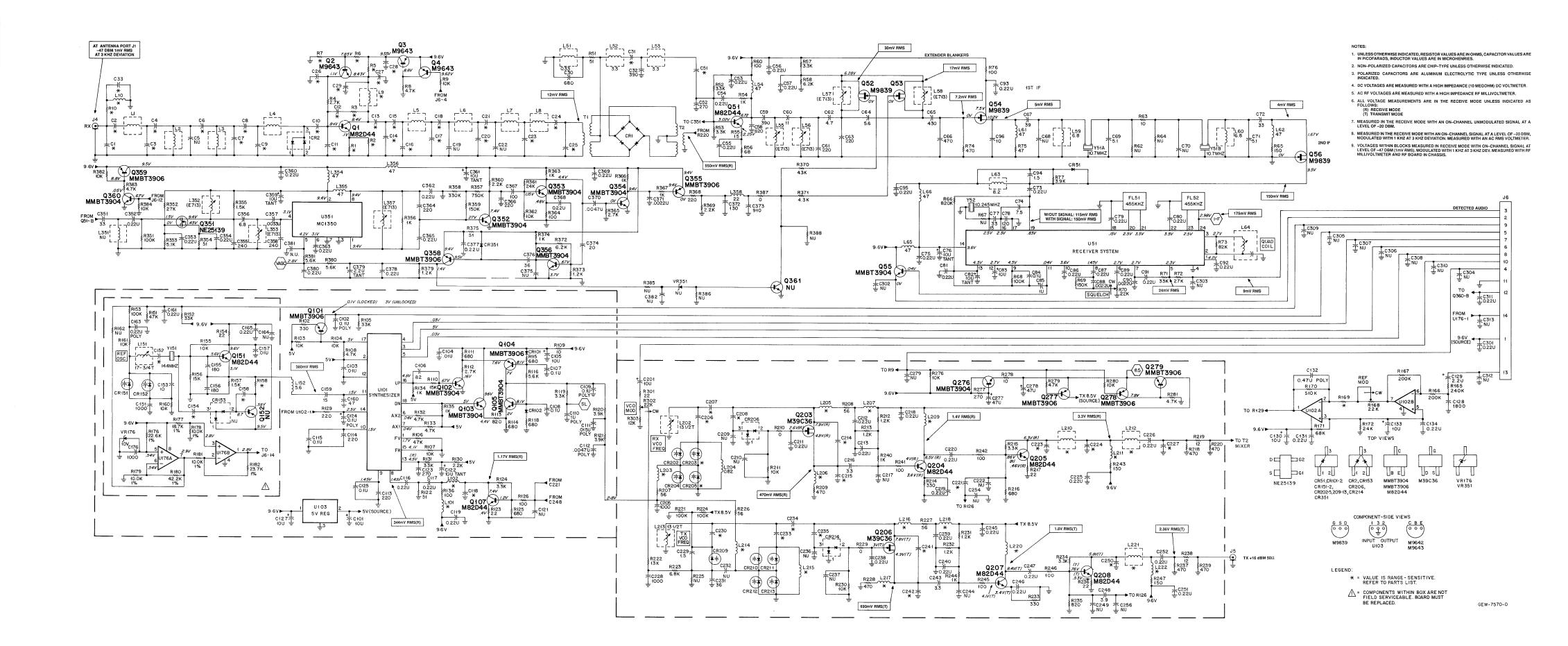
PW-6916-A
(Sheet 3 of 3)

3/31/90

### Low Band RF Board Transistor D.C. Voltage Table

		VOLTAGE			VOLTAGE	
Transistor Ref. No.	BASE	BASE EMITTER COLLECTOR		GATE	SOURCE	DRAIN
Q1	0.8	0.1	8.4	_	_	_
Q2	7.8	8.4	1.1	_	_	_
Q3	.8.8	9.6	9.5	_	_	_
Q4	9.6	9.6	8.8	_	_	_
Q51	3.0	2.3	6.7		_	
Q52		_	_	0	6.3	6.3
Q53	_	_	_	0	6.3	6.3
Q54		_	_	0	1.1	7.5
Q55	.04	0	9.6	_	_	-
Q56	_		_	0	. 1.7	9.5
Q101	5.0	5.0	0.1	_	· –	_
Q102	0.7	0	0.1	<del>-</del>	_	_
Q103	5.0	4.4	9.6	_	_	_
Q104	8.1	2–8v	2–8v	_		_
Q105	8.1	2.0	2–8v	_	_	_
Q107	1.2	0.4	7.4	_	_	-
Q151	5.6	5.1v	9.6	_	_	_
Q152	8.7v	9.5	5.8	_	_	_
Q160	4.3	3.6	9.6		_	_
Q203	_	_	_	2.6(R)	4.8(R)	7.9(R)
Q204	4.0(R)	3.4(R)	8.5(R)		_	
Q205	.86(R)	.46(R)	6.3(R)	<del></del>	_	_
Q206	_	_	_	3.0(T)	4.9(T)	7.8(T)
Q207	4.1(T)	3.4(T)	8.4(T)	_	_	_
Q208	.76(T)	.53(T)	5.8(T)	_	_	_
Q276	9.6	8.5	9.6	_	_	_
Q277	9.5	8.5	9.5		_	_
Q278	9.6	8.5	7.8	_	_	_
Q279	7.8	8.5	8.5		_	_
Q352	.27	0	7.4		_	
Q353	1.2	.48	4.4	-	_	_
Q354	0	0	9.4	_	_	_
Q355	9.4	9.4	0	_		_
Q356	.67	0	3.7		_	_
Q357	.67	0	3.7			_
Q358	9.5	9.4	1.4	_	_	_
Q359	8.8	9.6	9.5	_	_	_
Q360	.67	0	.05			

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4100A/4099B/4101B Low Band RF Board PW-7569-O (Sheet 1 of 4) 3/31/90



# parts list

parts list									Inon services			MYW_7572_O (2)	2)		MXW-75	72-O (3)			MXW-7572-O (4)			MXW-7572-O (5)
HLB4099B Low Band RF Board 29.7–36.0 MHz (Range 1) MXW-7571–O  REFERENCE MOTOROLA PROPERTIES M	MXW-7571-O (2) OTOROLA DESCRIPTION	REFERENCE MOTOROLA		RENCE MOTOR		MXW-7571-O (4)	REFERENCE	MOTOROLA	MXW-7571-O (5)  DESCRIPTION	REFERENCE	MOTOROLA	DESCRIPTION	REFERENCE	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	RE	EFERENCE MOTO YMBOL PART		
HLB4099B Low Band RF Board 29.7—36.0 MHz (Range 1)   MXW-7571-0	OTOROLA ART NO.    -13740B17	SYMBOL         PART NO.           L0221         24-80063M11           L0222         24-80063M21           L0352,0353         24-80164M01           L0357         24-80063M27           transistor         24-80063M27           Q0001         48-80182D44           Q0052-0004         48-11043C06           Q0051         48-80182D44           Q0052-0054         48-11043C12           Q0055         48-801214G02           Q0056         48-11043C12           Q0101         48-95128M16           Q0102,0103         48-80214G02           Q0104         48-95128M16           Q0105         48-80182D44           Q020107         48-80182D44           Q0203         48-80182D44           Q0203         48-80182D44           Q0204-0205         48-80182D44           Q0206         48-8014G02           Q0207,0208         48-80124G02           Q0277-0279         48-5128M16           Q0351         48-80214G02           Q0352         48-80128M16           Q0354         48-80214G02           Q0355         48-80214G02           Q0356         48-80214G02	DESCRIPTION   REF SYM	BOL PART N  B 18-0550 06-1107 0 06-1107	D. DESCRIPTION  D. D		SYMBOL  crystal  Y0051  Y0052  Y0151	91–80172D01 48–80908W01 48–80174D05 non-refer 26–80097M01 26–80228L01 26–80228L01 26–802916V01 75–05295B02 84–80959X01 rmance, order diodes	filter 10.245 MHz 14.4 MHz  renced items  shield, coil can (10 used) shield, coil can (20 used) shield, coil can (10 used) shield, after Low Band pad, crystal base (4 used) circuit board  3/31/90, transistors, and integrated circuit devices by	REFERENCE SYMBOL C0074 C0075 C0076 C0077 C0078 C0079–0081 C0082 C0083 C0084 C0085 C0085 C0086,0087 C0088 C0089 C0089	MOTOROLA PART NO.  21–13740B22 21–13749C39 21–13749C39 21–13749B51 23–13749C39 23–11048B13 23–11048B13 23–11048B13 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13740B5 21–13740B57 21–11032B13 21–11032B13 21–11032B15 23–13740B59 08–11051A13 21–11032B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13	MXW-7572-O (2)  DESCRIPTION  7.5 pF, +25 pF, 50V .22 uF, +80 -20, 50V 10 uF, ±10%, 20V 33 pF, ±5%, 50V 120 pF, ±5%, 50V 120 pF, ±5%, 50V 120 uF, +80 -20, 50V 10 uF, ±20%, 16V .10 uF, ±20%, 50V .22 uF, +80 -20, 50V .22 uF, +80 -20, 50V .22 uF, ±80 -20, 50V .22 uF, ±80 -20, 50V .22 uF, ±5%, 50V .22 uF, ±5%, 50V .22 uF, ±80 -20, 50V .0022 uF, ±5%, 50V .22 uF, ±80 -20, 50V .10 uF, ±25 pF, 50V .22 uF, ±80 -20, 50V .10 uF, ±5%, 63V .10 uF, ±5%, 63V .11 uF, ±5%, 63V .10 uF, ±5%, 63V .10 uF, ±5%, 63V .015 uF, ±5%, 63V .016 uF, ±5%, 63V .017 uF, ±5%, 63V .017 uF, ±5%, 63V .018 uF, ±5%, 63V .019 uF, ±5%, 50V .10 uF, ±20%, 16V .10 uF, ±20%, 16V .10 uF, ±20%, 16V .10 uF, ±20%, 50V	REFERENCE SYMBOL  C0366 C0367 C0368,0369 C0370 C0371 C0372 C0373 C0374 C0376 C0378 C0379 C0380  diode CR001 CR002 CR051 CR101,0102 CR151,152 CR202-205 CR206 CR206 CR206 CR207 CR206 CR207 CR206 CR207 CR206 CR207 CR207 CR207 CR207 CR208 CR207 CR208 CR208 CR208 CR209-213 CR214 CR351 filter FL051 FL052 connector, recel J0004,0005 J0006 coil L0001-0009 L0051 L0052,0053 L0054 L0055-0058 L0059,0060 L0061,0062 L0063 L0064 L0065,0066 L0101	PART NO.  21-13740B57 21-13740B57 21-13740B49 21-11032B15 21-13741B37 21-13740B52 21-13740B52 21-13740B32 21-13740B38 21-11032B15 23-11049A09 21-13740B73  48-80236E16 48-80154K03 48-05129M76 48-801529M76 48-80154K03 48-80154K03 48-8098B10 48-8006E10 48-8006E10 48-80154K03 48-80098D05 ptacle  09-80135M01 09-80135M01 09-80135M01 09-80130M03  24-80063M19 24-80063M19 24-80063M31 24-80063M31 24-80063M24 25-80006D11 24-80063M31 24-80063M31 24-80063M31		REFERENCE SYMBOL  R0051 R0052,0053 R0054 R0055 R0056 R0056 R0057 R0058 R0060 R0063 R0066 R0068 R0069 R0070 R0071 R0072 R0072 R0073 R0074 R0075 R0076 R0077 R0102 R0101 R0111 R0112 R0113 R0114,0115 R0116 R0118 R0119 R0119 R0119 R0122 R0123 R0124 R0125 R0126 R0129	PART NO.  06-11077A4: 06-11077A7: 06-11077A8: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A2: 06-11077A2: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077A6: 06-11077A6: 06-11077A6: 06-11077A7: 06-11077A7: 06-11077A8: 06-11077A9:	DESCRIPTION  3 51 53 34 54 1k 50 15 68 68 63 3.3k 34 6.2k 100 65 10 44 150 55 820k 31 100k 71 50k 822k, ±20%, 100V 11 33k 99 27k 11 82k 64 470 10 100 88 3.9k 12 330 88 10k 13 33k 10k 13 33k 10k 14 33k 15 47k 16 10 17 100 18 10	REST	YMBOL PART	IO.  177A50 100  177A50 100  177A54 150  177A54 150  177A54 150  177A59 10k  17A98 10k  17A99 10k  17A88 10k  17A88 10k  17A88 10k  17A88 10k  17A84 22k  17B23 100k  12k  17B23 100k  12k  17B23 100k  12k  17B23 100k  12k  17B33 10k  15k  15k  17A91 15k  15k  17A74 1k  17A93 15k  15k  17A74 1k  17A74 1k  17A84 22k  17A89 10k  17A83 12k  17A93 12k  17A93 12k  17A93 12k  17A93 12k  17A43 11k  17A43 11k  17A744 11k  17A745 12k  17A93 12k  17A93 12k  17A93 10k	V
COURTS   21-111032B15   22 UF - 80 - 20, 50V   CO370   27   27   27   27   27   27   27	1-11032B13	R0052,0053	3.3k R02- 1k R02- 15 R02- 15 R02- 68 R02- 3.3k R02- 3.3k R02- 100 R02- 110 R03- 110 R03- 1100k R03- 1100k R03- 1100k R03- 1100 R	06-1107 5-0246 6-1107 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 8 6-1107 8 6-1107 9 06-1107 9 06-1107 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7A54 150 7A747 1k 7A747 1k 7A50 100 7A54 150 7A98 10k 7A98 10k 7A90 4.7k 7A99 10k 7A99 4.7k 7A98 10k 7A90 4.7k 7A94 22 0L08 22k, ±20%, 100V 7B01 12k 7B02 27k 7B01 5.1k 7A43 51 7A78 1.5k 7A74 1k 7B44 750k 7B35 330k 7B27 150k 7B85 22k 7A86 2.2k 7A88 24k 7A98 10k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A75 1.5k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A75 1.5k 7A74 1k 7A76 1.2k 7A98 1.3k 7A77 1k 7A78 1.5k 7A78 1.5k 7A74 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A98 1.0k 7A98 1.0k 7A98 1.0k 7A98 1.0k 7A99 1.		Parts list HLB4101B Low Band REFERENCE SYMBOL  capacitor, fixed (unk C0001 C0002 C0003 C0004 C0006 C0008 C0009 C0010 C0011 C0012 C0013 C0014 C0015 C0017 C0018 C00016 C0018 C0020 C0021 C0023 C0024 C0025 C0026 C0026 C0060 C0061 C0059 C0060 C0061 C0062 C0063 C0064 C0066 C0066 C0066 C0066 C0066 C0067 C0069	d RF Board 42.0-50.0  MOTOROLA  PART NO.	DESCRIPTION	C0133 C0134 C0151 C0152 C0153 C0154 C0155,0156 C0157 C0158 C0159	08-11051A17 23-11048B13 21-11032B15 21-13740B25 21-13740B25 21-13740B25 21-13741B45 21-13740B55 21-13741B45 21-13740B29 21-13740B29 21-13740B29 21-13740B15 21-13740B31 21-13740B37 23-11032B15 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B38 21-13740B39 21-11032B15 21-13740B38 21-13740B39 21-11032B15 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38	47 uF, ±5%, 63V 10 uF, ±20%, 16V 22 uF, +80 -20, 50V 1000 pF, ±5%, 50V 75 pF, ±5%, 50V 10 pF, ±5%, 50V 10 pF, ±5%, 50V 11 uF, ±5%, 50V 21 uF, ±5%, 50V 22 uF, ±5%, 63V 22 uF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 22 uF, ±5%, 50V 33 pF, ±25 pF, 50V 22 uF, ±80 -20, 50V 33 pF, ±25 pF, 50V 22 uF, ±80 -20, 50V 33 pF, ±25 pF, 50V 33 pF, ±25 pF, 50V 33 pF, ±25 pF, 50V 39 pF, ±5%, 50V 15 pF, ±25 pF, 50V 39 pF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 39 pF, ±5%, 50V	L0102 L0151 L0152 L0202 L0203 L0204 L0205 L0209 L0210 L0211 L0211 L0212 L0213 L0214 L0215 L0216 L0222 L0352,0353 L0354 L0357 L0358 transistor Q0001 Q0002 -0004 Q0051 Q0002 -0004 Q0051 Q0055 Q0056 Q0101 Q0102,0103 Q0104 Q0105 Q0107 Q0151 Q0152 Q0203 Q0204 Q0207 Q0208 Q0277 Q0208 Q0277 Q0355 Q0356 Q0277 Q0355 Q0356 Q0277 Q0355 Q0206 Q0277 Q0355 Q0356 Q0357 Q0356 Q0357 Q0356 Q0357 Q0356 Q0357 Q0357 Q0357 Q0358 Q0277 Q0357 Q0358 Q0277 Q0359 Q0350 Q0359 Q0360 Pesistor, fixed of R0001 R0002 R00002 R00003 R0004 R00005	24-80063M09 24-8029D01 24-80063M22 24-80063M22 24-80063M22 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M23 24-80063M23 24-80063M23 24-80063M23 24-80063M06 24-80063M23 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M02 24-80164M01 24-80063M23 24-80164M01 24-80063M23 24-80164M01 24-8063M23 24-80164M01 24-8063M12 24-80164M01 24-8012B016 48-80141G02 48-05128M16 48-80141L06 48-80141L06 48-80141C02 48-05128M16 48-80141C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-80214G02 48-05177A26 06-11077A26	1.7.75 turns 1.7.75 turns 1.6. uH 1.7.75 turns 1.6. uH 1.8.2 uH 1.6. uH 1.6. uH 1.6. uH 1.7. uH 1.8.2 uH 1.8.2 uH 1.8.3 turns 1.8.3 uH 1.8.4 uH 1.9.4 uH 1.9	R0130 R0131 R0132,0133 R0134,0135 R0135,0136 R0151 R0152 R0151 R0152 R0155 R0155 R0155 R0155 R0155 R0166,0167 R0168 R0160 R0161 R0165 R0166,0167 R0168 R0160 R0161 R0165 R0160,0167 R0180 R0181 R0182 R0207,0208 R0209 R0210 R0211 R0212 R0213 R0214 R0215 R0215 R0216 R0217 R0218 R0219 R0221 R0222 R0223 R0223 R0224 R0222 R0223 R0223 R0229 R0230 R0231 R0233 R0234 R0236 R0237 R0238	06-11077A8 06-11077B1 06-11077A9 06-11077A9 06-11077A9 06-11077A5 06-11077B1 06-11077B1 06-11077B2 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B2 06-11077B3 06-11077B3 06-11077B3 06-11077B3 06-11077B3 06-11077B4 06-11077B3 06-11077B4 06-11077B4 06-11077B3 06-11077B3 06-11077B4 06-11077B4 06-11077B3 06-11077B4 06-11077B4 06-11077B3 06-11077B4	2 2.2k 1 33k 0 4.7k 4 1k 0 100 5 47k 1 33k 33 100k 44 22 88 10k 33 15k 81 1.5k 4 1k 10 100 200k 88 22k, ±20%, 100V 47k 10 510k 10 200k	tra Tra in U U U U V V V V C C C C C C C C C C C C	ransformer 0001,0002 25–80  tegrated circuit 10051 51–95 10101 51–80 10102 51–80 10103 51–84 10176 51–80 10351 51–80 aractor (R176 48–80 rystal (0051 91–80 (0051 91–80 (0052 48–80 (0151 48–80 26–80 26–80 26–80 26–80 26–80 46–80 Arborote: For best performance, Motorola part number.	arts Lists for HLB4	(10 used) nnector (2 used) Band se (4 used)

# parts list

REFERENCE	MOTOROLA	DESCRIPTION	REFERENCE	MOTOROLA	MXW-6910-A ( DESCRIPTION		
SYMBOL anacitor fixed /	PART NO. unless otherwise stated)		SYMBOL	PART NO.			
0001	21–13740B53	150 pF, ±5%, 50V	C0207 C0208	21-13740B27 21-13740B35	12 pF, ±5%, 50V 27 pF, ±.25 pF, 50V		
0002	21-13740B74	1200 pF, ±5%, 50V	C0211-0213	21-11032B15	.22 uF, +80 -20, 50V		
0003 0004	21-13740B63 21-13740B53	390 pF, ±5%, 50V 150 pF, ±5%, 50V	C0214,0215 C0216	21-13740B35	27 pF, ±5%, 50V		
0006	21-13740B36	30 pF, ±5%, 50V	C0218-0220	21-13740B13 21-11032B15	3.3 pF, ±.25 pF, 50V .22 uF, +80 –20, 50V		
0008	21-13740B52	130 pF, ±5%, 50V	C0221	21-13740B09	2.2 pF, ±.25 pF, 50V		
0009 0010	21-13740B65	470 pF, ±5%, 50V	C0223	21-13740B23	8.2 pF, ±25 pF, 50V		
0011	21-13740B73 21-13740B54	1000 pF, ±5%, 160 pF, ±5%, 50V	C0224 C0225,0226	21-13740B39 21-11032B15	39 pF, ±5%, 50V .22 uF, +80 –20, 50V		
0012,0013	21-11032B15	.22 uF, +80 –20, 50V	C0227	21-13740B37	33 pF, ±5%, 50V		
0015	21-11032B15	.22 uF, +80 -20, 50V	C0228	21-13740B73	1000 pF, ±5%, 50V		
0016 0017	21-13740B51 21-13740B66	120 pF, ±5%, 50V 510 pF, ±5%, 50V	C0229 C0230	21-13740B05 21-13740B17	1.5 pF, ±.25 pF, 50V 4.7 pF, +.25 pF, 50V		
0018	21-13740B55	180 pF, ±5%, 50V	C0231	21-13740B38	36 pF, ±5%, 50V		
0020	21-13740B66	510 pF, ±5%, 50V	C0233	21-13740B49	100 pF, ±5%, 50V		
0021 0023	21-13740B56 21-13740B65	200 pF, ±5%, 50V 470 pF, ±5%, 50V	C0234 C0235	21-13740B38 21-13740B17	36 pF, ±5%, 50V 4.7 pF, ±.25 pF, 50V		
0024	21-13740B61	330 pF, ±5%, 50V	C0238-0240	21–11032B15	.22 uF, +80 –20, 50V		
0025	21-13740B60	300 pF, ±5%, 50V	C0241,0242	21-13740B31	18 pF, ±5%, 50V		
0026-0029 0030	21-11032B15 21-13740B69	.022 uF, +80 –20, 50V	C0243	21-13740B13	3.3 pF, ±.25 pF, 50V		
0031	21-13740B48	680 pF, ±5%, 50V 91 pF, ±5%, 50V	C0245-0247 C0248	21-11032B15 21-13740B15	.22 uF, +80 –20. 50V 3.9 pF, ±.25 pF, 50V		
0032	21-13740B63	390 pF, ±5%, 50V	C0250	21-13740B31	18 pF, ±5%, 50V		
0051	21-13740B52	130 pF, ±5%, 50V	C0251,0252	21-11032B15	.22 uF, +80 -20, 50V		
0052 0053–0057	21-13740B59 21-11032B15	270 pF, ±5%, 50V .22 uF, +80 –20, 50V	C0277,0278 C0301	23-11048B19 21-11032B15	47 uF, ±20%, 16V .22 uF, +80 –20, 50V		
0058	21-13740B68	620 pF, ±5%, 50V	C0301	21–11032B15 21–11032B15	.22 uF, +80 –20, 50V .22 uF, +80 –20, 50V		
0059	21-13740B63	390 pF, ±5%, 50V	C0351	21-13740B37	33 pF, ±5%, 50V		
0060 0061	21-13740B26 21-13740B57	11 pF, ±5%, 50V	C0352-0354 C0355	21-11032B15	.22 uF, +80 -20, 50V		
0062	21–13740B37 21–13740B17	220 pF, ±5%, 50V 4.7 pF, ±.25 pF, 50V	C0356	21-13740B58 21-13740B21	240 pF, ±5%, 50V 6.8 pF, ±.25 pF, 50V		
0063	21-13740B57	220 pF, ±5%, 50V	C0357	21-13741B33	.0033 uF, ±5%, 50V		
0064	21-13740B19	5.6 pF. ±.25 pF, 50V	C0358	21-13740B58	240 pF, ±5%, 50V		
0065 0066	21-13740B64 21-13740B65	430 pF, ±5%, 50V 470 pF, ±5%, 50V	C0359 C0360	21-13749C39 21-11032B15	10 uF, ±10%, 20V .22 uF, +80 –20, 50V		
0067	21-13740B39	39 pF. ±5%, 50V	C0361	23-13749C39	10 uF, ±10%, 20V		
0069	21-13740B18	5.1 pF. ±.25 pF, 50V	C0362,0363	21-11032B15	.22 uF, +80 -20, 50V		
)071 )072	21-13740B18 21-13740B37	5.1 pF. ±.25 pF, 50V 33 pF. +5%. 50V	C0364	21–13740B57	220 pF, ±5%, 50V		
0073	21-13740B37 21-11032B15	.22 uF. +80 –20, 50V	C0365 C0366	21-11032B15 21-13740B57	.22 uF, +80 -20, 50V 220 pF, ±5%, 50V		
0074	21-13740B22	7.5 pF. +.25 pF, 50V	C0367	21-13740B49	100 pF, ±5%, 50V		
0075	21-11032B15	.22 uF. +80 -20, 50V	C0368,0369	21-11032B15	.22 uF, +80 –20, 50V		
)076 )077	23-13749C39 21-13740B37	10 uF, ±10%. 20V 33 pF. ±5%, 50V	C0370 C0371	21-13741B37 21-13741B29	.0047 uF, ±5%, 50V .0022 uF, ±5%, 50V		
078	21-13740B51	120 pF, ±5%, 50V	C0372	21–13741B23	130 pF, ±5%, 50V		
079-0081	21-11032B15	.22 uF. +80 -20, 50V	C0373	21-13740B72	910 pF, ±5%, 50V		
1082 1083	23-13749C39	10 uF, ±10%, 20V	C0374	21-13740B32	20 pF, ±5%, 50V		
084	23-11048B13 21-13741B69	10 uF. ±20%, 16V .01 uF. ±5%, 50V	C0376 C0377,0378	21-13740B38 21-11032B15	36 pF, ±5%, 50V .22 uF, +80 –20, 50V		
085	23-11048B05	1 uF. ±20%, 50V	C0379	23-11049A09	2.2 uF, ±10%, 20V		
086,0087	21-11032B15	.22 uF. +80 -20, 50V	C0380	21-11032B15	.22 uF, +80 -20, 50V		
1088 1089	21-13741B29 21-11032B15	.0022 uF. ±5%, 50V .22 uF. +80 –20, 50V	diode				
090	21-13741B29	.0022 uF. ±5%, 50V	CR001	48-80236E16	quad SCHOTTKY		
091-0093	21-11032B15	.22 uF. +80 -20, 50V	CR002 CR051	48-80154K03 48-05129M76	quad SCHOTTKY silicon SOT		
094 095	21-13740B05 21-11032B15	1.5 pF, ±.25 pF, 50V	CR101,0102	48-05129M76	silicon SOT		
096	21-11032B15 21-13740B25	.22 uF, +80 -20, 50V 10 pF, ±5%, 50V	CR151,152	48-80006E10	silicon varactor SOT		
101	23-11048B13	10 uF. <u>+</u> 20%, 16V	CR202-205 CR206	48-80006E10 48-80154K03	varactor dual SCHOTTKY		
102	08-11051A13	.1 uF, ±5%, 63V	CR209	48-80006E10	varactor		
103,0104 105	21-13741B45 23-11048B13	.01 uF. ±5%, 50V 10 uF. ±20%, 16V	CR210-213	48-80991T01	varactor		
106	21-13740B47	82 pF, ±5%, 50V	CR214	48-80154K03	dual SCHOTTKY		
107,0108	21-13741B69	.01 uF, ±5%, 50V	CR351	48-80939T01	SCHOTTKY		
1109 1110	08-11051A13 08-11051A19	.1 uF, ±5%, 63V	filter FL051	91-80097D05	6-element, 455 kHz		
111	08-11051A08	1.0 uF, ±5%, 63V .015 uF, ±5%, 63V	FL052	91–80098D05	3-element, 455 kHz		
112	08-11051A05	.0047 uF, ±5%, 63V	connector, recept				
113,0114 115	21-13740B57	220 pF, ±5%, 50V	J0004,0005	09-80135M01	2-pin, coax		
115 116,0117	21-13741B69 21-11032B15	.01 uF, ±5%, 50V .22 uF, +80 –20, 50V	J0006	09-80130M03	14-pin, socket		
118	21-13740B29	15 pF, ±5%, 50V	coil				
119	21-11032B15	.22 uF, +80 -20, 50V	L0001-0008	24-80148M21	147 uH, 9.5 turns		
122 123	23-13749C39 21-13740B59	10 uF, ±10%, 20V	L0009 L0051	24-80063M31 24-80063M07	47 uH .33 uH		
124	08-11051A13	270 pF, ±5%, 50V .1, ±5%, 63V	L0052,0053	24-80063M19	3.3 uH		
125	21-13741B69	.01 uF, ±5%, 50V	L0054	24-80063M31	47 uH		
127	23-11048B13	10 uF, ±20%, 16V	L0055-0058 L0059,0060	24-80164M01 24-80063M23	.7 uH, 1:6 turns 6.8 uH		
128 129	21-13740B78 23-11048B06	180 uF, ±5%, 50V 2.2 uF, ±20%, 50V	L0059,0000 L0061,0062	24-80063M31	47 uH		
130	23-11048B13	10 uF, ±20%, 16V	L0063	24-80063M24	8.2 uH		
131	21-11032B15	.22 uF, +80 -20, 50V	L0064	25-80000E01	transformer, 455 KHz		
132 133	08-11051A17	.47 uF, ±5%, 63V	L0065,0066 L0101	24-80063M31 24-80063M24	47 uH 8.2 uH		
134	23-11048B13 21-11032B15	10 uF, ±20%, 16V .22 uF, +80 -20, 50V	L0102	24-80063M24 24-80063M10	.56 uH		
151	21-13740B73	1000 pF, ±5%, 50V	L0151	24-80299D01	17.75 turns		
152	21-13740B45	68 pF, ±5%, 50V	L0152	24-80063M22	5.6 uH		
153 155,0156	21-13740B25 21-13740B55	10 pF, ±5%, 50V	L0202 L0203	24-80931W26 24-80063M23	44 uH, 13.5 turns 6.8 uH		
155,0156	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V	L0204	24-80063M12	.82 uH		
159	21-13740B29	15 pF, ±5%, 50V	L0205-0207	24-80063M23	6.8 uH		
160	21-13740B41	47 pF, ±5%, 50V	L0209	24-80063M23	6.8 uH		
161 163	21-11032B15 08-11051A15	.22 uF, +80 -20, 50V	L0210 L0211	24-80063M10 24-80063M23	.82 uH 6.8 uH		
165	21–11032B15	.22 uF, ±5%, 63V .22, +80 –20, 50V	L0212	24-80063M25	.27 uH		
176	21-13740B73	1000 pF, ±5%, 50V	L0213	24-80931W26	44 uH, 13.5 turns		
201	23-11048B13 21-13740B73	10 uF, ±20%, 16V 1000 pF, ±5%, 50V	L0214 L0215	24-80063M24 24-80063M12	8.2 uH .82 uH		
205							

REFERENCE	MOTOROLA	DESCRIPTION	
SYMBOL	PART NO.	DESCRIPTION	
L0220	24-80063M24	8.2 uH	
L0221 L0222	24-80063M10 24-80063M24	5.6 uH 8.2 uH	
L0352,0353	24-80164M01	1:6 turns	
L0354-0356	24-80063M31	47 uH	
L0357 L0358	24-80164M01 24-80063M27	.7 uH, 1:6 turns 22 uH	
transistor	24-00003WIZ7	22 011	
Q0001	48-80182D44	NPN	
Q0002-0004	48-11043C06	PNP	
Q0051	48-80182D44	NPN	
Q0052-0054 Q0055	48-11043C12 48-80214G02	n-Channel NPN	
Q0056	48-11043C12	n-Channel	
Q0101	48-05128M16	PNP	
Q0102,0103 Q0104	48-80214G02 48-05128M16	NPN PNP	
Q0105	48-80214G02	NPN	
Q0107	48-80182D44	NPN	
Q0151 Q0152	48-80182D44 48-05128M16	NPN PNP	
Q0203	48-80141L06	n-channel MOS FET	
Q0204-0205	48-80182D44	NPN	
Q0206	48-80141L06	N-channel MOS FET	
Q0207,0208 Q0276	48-80182D44 48-80214G02	NPN NPN	
Q0277-0279	48-05128M16	PNP	
Q0351	48-80930W01	dual gate FET	
Q0352-0354 Q0355	48-80214G02 48-05128M16	NPN PNP	
Q0356	48-80214G02	NPN	
Q0358,0359	48-05128M16	PNP	
Q0360	48-80214G02	NPN	
resistor, fixed ohr R0002	n, ±5%, 1/8 watt (unles 06-11077A29	s otherwise stated) 13	
R0003	06-11077A68	560	
R0004	06-11077A84	2.7k	
R0005 R0006	06-11077A56	180	
R0007	06-11077A98 06-11077A94	10k 6.8k	
R0008	06-11077A90	4.7k	
R0009	06-11077A98	10k	
H0051 R0052,0053	06-11077A43 06-11077A86	51 3.3k	
R0054	06-11077A74	1k	
R0055	06-11077A30	15	
R0056 R0057	06-11077A46 06-11077A86	68 3.3k	
R0058	06-11077A93	6.2k	
R0060	06-11077A50	100	
R0063 R0065	06-11077A26	10	
R0066	06-11077A54 06-11077B45	150 820k	
R0068	06-11077B23	100k	
R0069 R0070	06-11077B27 18-05500L08	150k	
R0071	06-11077B11	22k, <u>+</u> 20%, 100V 33k	
R0072	06-11077B09	27k	
R0073	06-11077B21	82k	
R0074 R0075	06-11077A66 06-11077A42	470 47	
R0076	06-11077A50	100	
R0077	06-11077A88	3.9k	
R0102 R0103.0104	06-11077A62 06-11077A98	330 10k	
R0105	06-11077B11	33k	
R0106	06-11077B15	47k	
R0107 R0108	06-11077A98 06-11077A90	10k 4.7k	
R0109	06-11077A90	10	
R0110	06-11077B03	15k	
R0111	06-11077A70 06-11077A84	680	
R0112 R0113	06-11077A64 06-11077A72	2.7k 820	
R0114,0115	06-11077A70	680	
R0116	06-11077A92	5.6k	
R0118 R0119	06-11077A70 06-11077A86	680 3.3k	
R0120,0121	06-11077A88	3.9k	
R0122	06-11077A43	51	
R0123 R0124	06-11077A34 06-11077A86	22 3.3k	
R0125	06-11077A70	680	
R0126	06-11077A50	100	
R0129 R0130	06-11077A58 06-11077A82	220 2.2k	
R0131	06-11077B11	2.2k 33k	
R0132,0133	06-11077A90	4.7k	
R0134,0135	06-11077A74	1k	
R0136 R0151	06-11077A50 06-11077B15	100 47k	
R0152	06-11077B11	33k	
R0153	06-11077B23	100k	
R0154 R0155	06-11077A34	22 10k	
R0156	06-11077A98 06-11077B03	10k 15k	
R0157	06-11077A78	1.5k	
	06-11077A98	10k	
R0160,161 R0165	06-11077B32	240k	

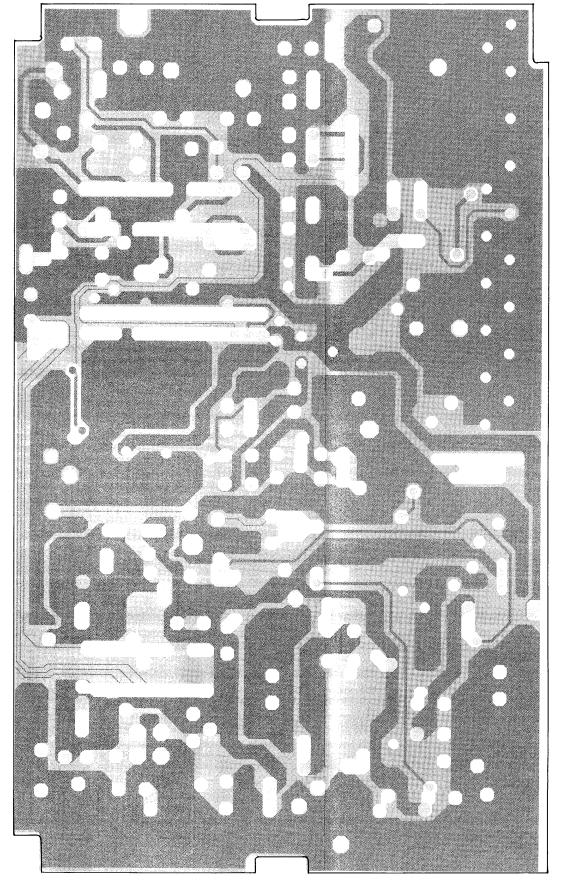
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R0168	18-05500L08	22k, ±20%, 100V
R0169 R0170	06-11077B17 06-11077B40	56k 510k
R0171	06-11077B19	68k
R0172	06-11077B08	24k
R0176	06-11077G26	22.6k, ±1%
R0177 R0178,0179	06-11077G18 06-11077F91	18.7k, ±1% 10k, ±1%
R0180	06-11077G52	42.2k, ±1%
R0181	06-11077F91	10k, ±1%
R0182	06-11077G28	23.7k, ±1%
R0207,0208	06-11077A44	56
R0209 R0210	06-11077A66 06-11077A01	470 0
R0211	06-11077A98	10k
R0212,0213	06-11077A76	1.2k
R0214	06-11077A62	330
R0215 R0216	06-11077A86 06-11077A70	3.3k
R0217	06-11077A70	680 22
R0218	06-11077A66	470
R0219	06-11077A28	12
R0220	06-11077A66	470
R0221 R0222	06-11077B23 06-11077B02	100k 13k
R0223	06-11077B02	6.8k
R0224	06-11077B23	100k
R0226,0227	06-11077A44	56
R0228	06-11077A66	470
R0229	06-11077A01 06-11077A98	0
R0230 R0231-0232	06-11077A98 06-11077A76	10k 1.2k
R0233	06-11077A62	330
R0234	06-11077A86	3.3k
R0235	06-11077A72	820
₹0236 ₹0237	06-11077A34 06-11077A66	22 470
R0238	06-11077A66	12
R0239	06-11077A66	470
R0240	06-11077A74	1k
30241,0242	06-11077A50	100
R0243 R0244	06-11077A54	150
R0245-0246	06-11077A74 06-11077A50	1k 100
R0247	06-11077A54	150
R0276	06-11077A98	10k
R0277	06-11077A60	270
R0278 R0279	06-11077A26 06-11077A90	10 4.7k
R0280	06-11077A98	10k
R0281	06-11077A90	4.7k
R0301	06-11077A34	22
R0302	18-05500L08	22k, <u>+</u> 20%, 100V
R0303 R0351	06-11077B01 06-11077B23	12k 100k
R0352	06-11077B09	27k
R0353	06-11077A91	5.1k
R0354	06-11077A43	51
R0355 R0356	06-11077A78	1.5k
R0357	06-11077A74 06-11077B44	1k 750k
R0358	06-11077B35	330k
R0359	06-11077B27	150k
R0360	06-11077A82	2.2k
R0361 R0362	06-11077B08	24k 10k
R0362 R0363	06-11077A98 06-11077A74	10k 1k
R0364	06-11077A50	100
R0365	06-11077A84	2.7k
30366-0367	06-11077A74	1k
R0368 R0369	06-11077A58 06-11077A82	220 2.2k
R0370,0371	06-11077A82 06-11077A89	2.2k 4.3k
30372	06-11077A93	6.2k
30373	06-11077A76	1.2k
R0374	06-11077A74	1k
R0375 R0379	06-11077A43 06-11077A76	51 1.2k
R0379 R0380,0381	06-11077A76 06-11077A92	1.2k 5.6k
R0382	06-11077A98	10k
R0383	06-11077A90	4.7k
R0384 R0387	06-11077A98 06-11077A01	10k 0
	00 11077A01	•
ransformer		
0001,0002	25-80163M02	500 MHz
ntegrated circuit		
J0051	51-05479G05	linear
10101	51-80931V01	custom direct divider syn
J0102	51-02198J22	dual op amp
J0103 J0176	51-84621K27	voltage regulator
J0176 J0351	51-80932W01 51-80929W01	dual op amp bipolar
varactor	01 000201101	Sipolar
	48-80140115	zener diode 10V
	.0 00.40210	255. 5.545 757
VR176	48-80140L15	zener diode 10V

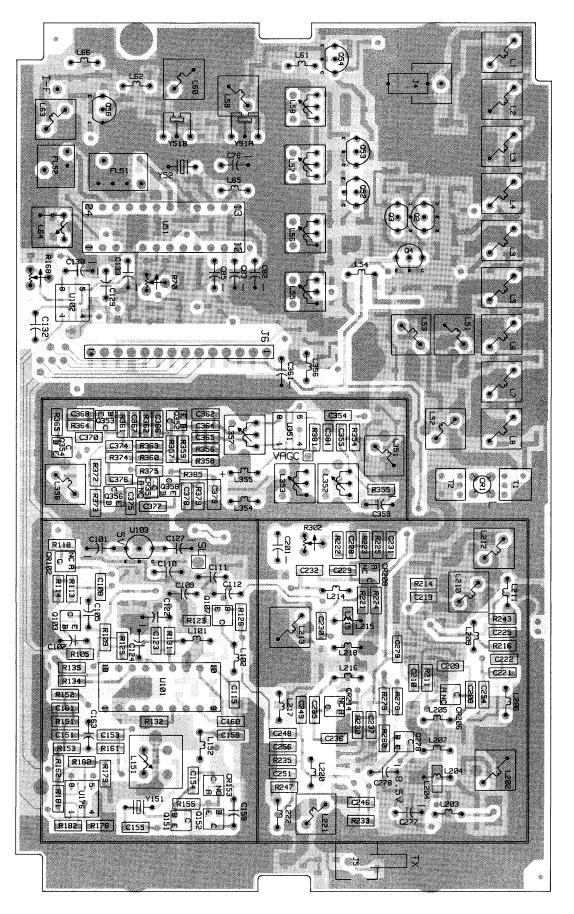
MXW--6910-A (4)

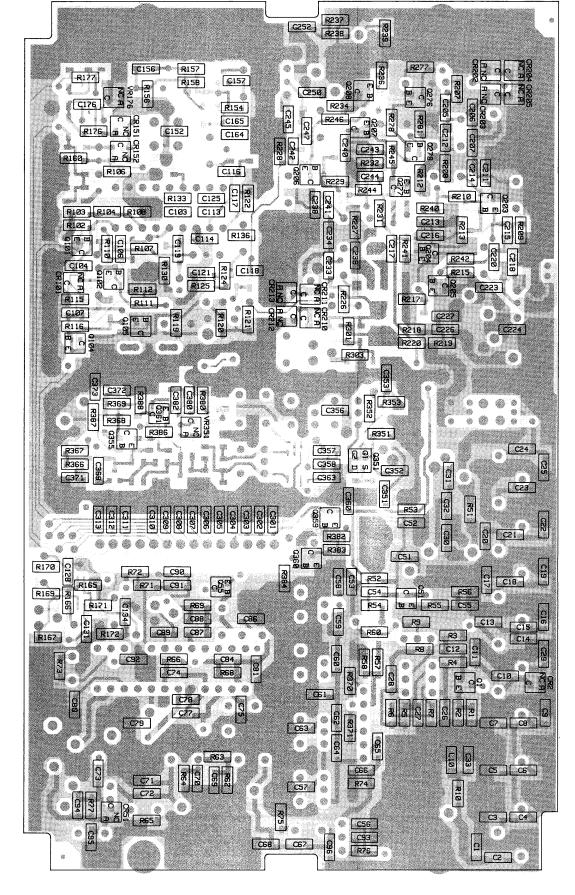
		MXW-6910-A (5
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
crystal		
Y0051	91-80172D01	filter
Y0052	48-80908W01	10.245 MHz
Y0151	48-80174D05	14.4 MHz
	non-refe	erenced items
	26-80098M01	shield, coil can (11 used)
	26-80228L01	shield, coax connector (2 used)
	26-80916V01	shield, RF Low Band
	75-05295B02	pad, crystal base (4 used)
	84-80959X01	circuit board

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4100A/4099B/4101B Low Band RF Board **PW-7569-O** (Sheet 3 of 4) 3/31/90







 INNER LAYER 1
 RED
 GAW-7688-0

 INNER LAYER 2
 GREY
 GAW-7689-0

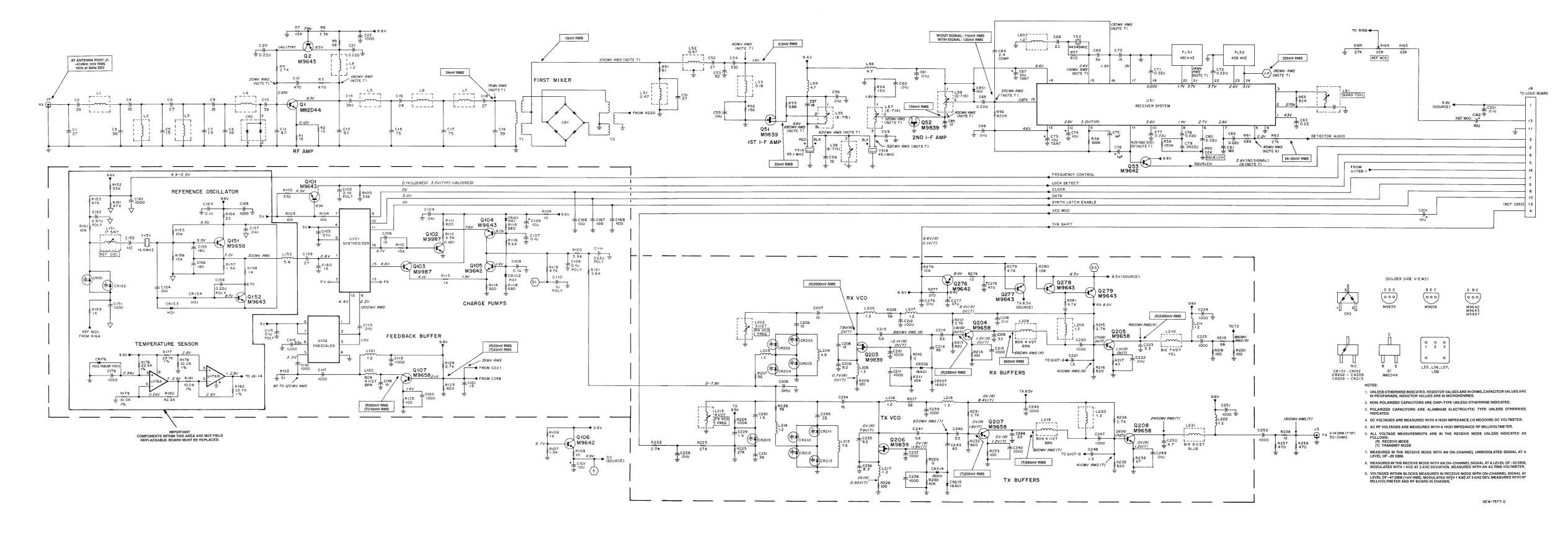
 OVERLAY
 BLACK
 GDW-7690-0

SOLDER SIDE RED
COMPONENT SIDE GREY
OVERLAYS BLACK

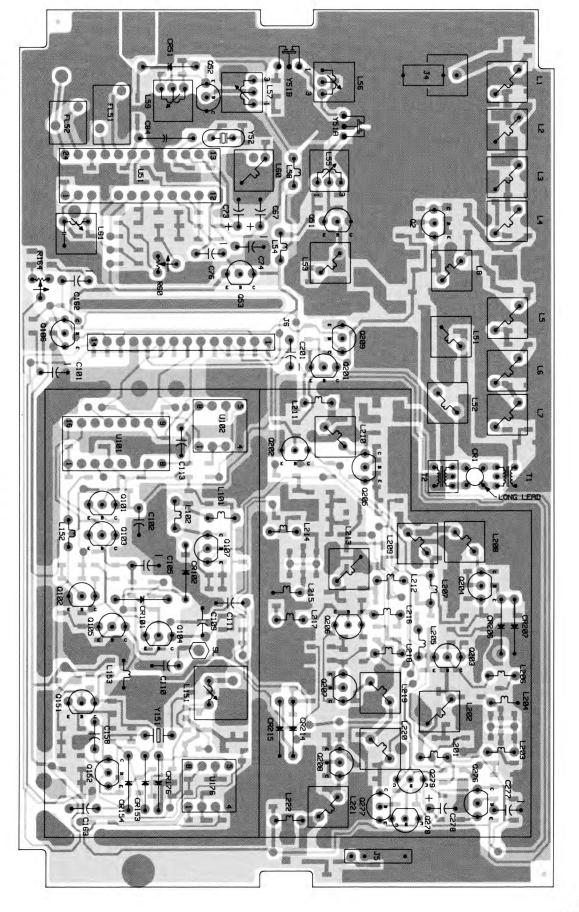
D GAW-7685-O
EY GAW-7686-O
CK GDW-7687-O

### VHF RF Board Transistor D.C. Voltage Table

		VOLTAGE			VOLTAGE	
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.83	.12	8.5	-	_	
Q2	7.9	8.5	1.1	<del></del>	_	_
Q51		_	_	0	1.8	9.6
Q52	_			0	1.8	9.6
Q53	4.2	3.6	9.6			_
Q101	5.0	5.0	.1 (LOCKED)	_	_	_
Q102	0.7	0	0	_		_
Q103	4.8	4.1	9.6	. –	_	_
Q104	8.1	7.6	2–8v	_		_
Q105	1.4	1.9	2–8v	_		_
Q106	5.7	4.9	9.6	_		_
Q107	2.1	1.4	9.6	_	_	_
Q151	5.5	5.2	9.5			_
Q152	8.7	9.5	6.7	_		_
Q203	_	_	_	-2.1(R)	.7(R)	7.9
Q204	1.9(R)	1.2(R)	8.5	<del>-</del>	_	
Q205	1.7(R)	1.1(R)	9.6	_	_	_
Q206	_	_	_	-1.9(T)	.95(T)	7.9
Q207	1.8(T)	1.2(T)	8.5	_	_	
Q208	1.7(T)	1.2(T)	9.6	_	_	
Q276	9.5	8.6	9.6			_
Q277	9.6	8.5(T)	8.5	_	_	_
Q278	9.6(R)	8.5	8.5	_		_
Q279	7.6(R)	8.5	8.5		_	_



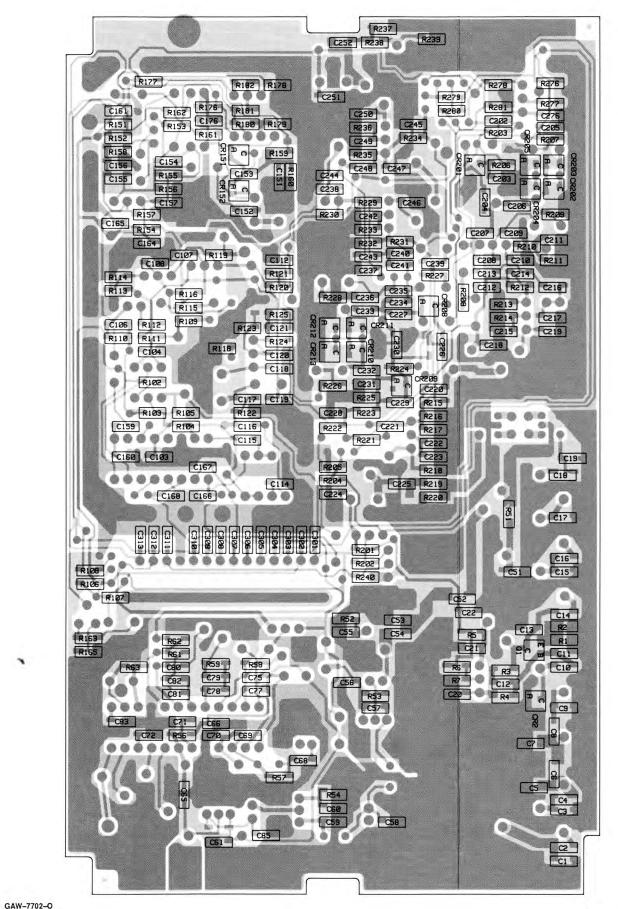
Schematic, Circuit Board Diagrams, and Parts List for HLD4322B VHF RF Board PW-7576-O (Sheet 1 of 3) 3/31/90



Schematic, Circuit Board Diagrams, and Parts List for HLD4322B VHF RF Board PW-7576-O (Sheet 2 of 3)

3/31/90

**SOLDER SIDE VIEW** 



SOLDER SIDE

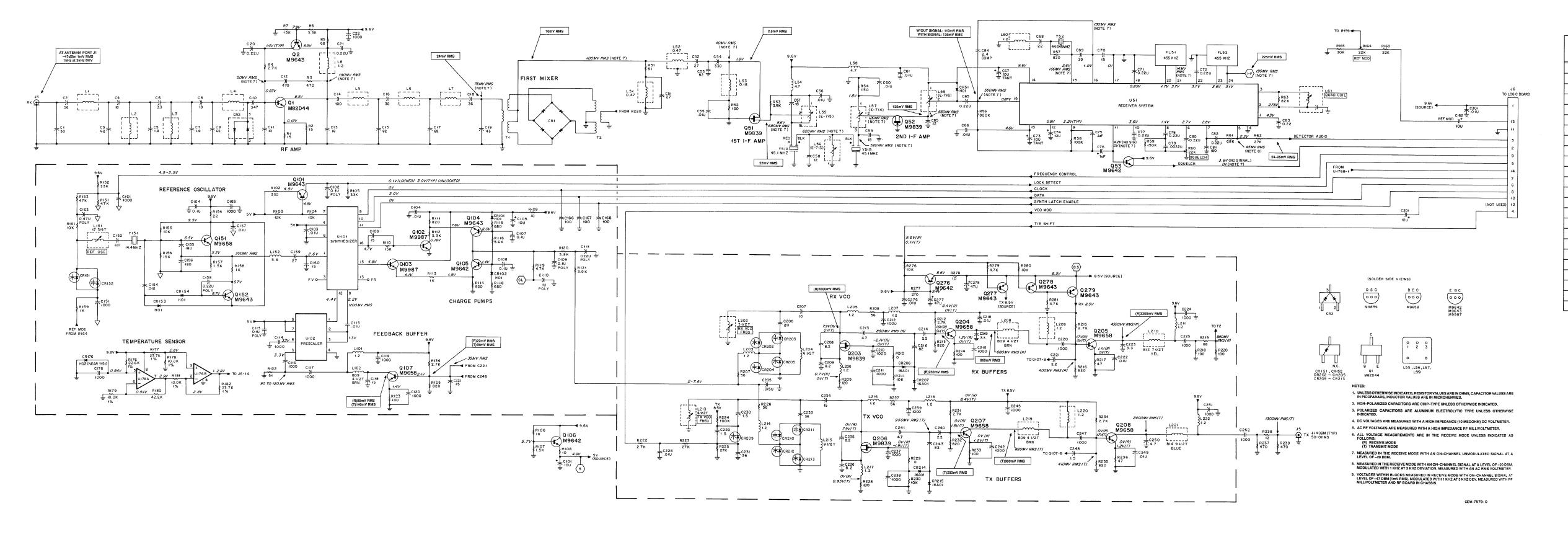
OVERLAYS

HLD4322B MaxTrac VHF RF Board MXW-7404-O (4) MXW-7404-O MXW-7404-O (2) MXW-7404-O (3)

HLD4322B Max Ira	ac VHF HF Board	MXW-/404-O			MXW-7404-O (2)			MXW-7404-O (
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	unless otherwise stated)	1	C0218	21-13741B45	.01 uF, ±5%, 50V	R0053	06-11077A88	3.9k
C0001	21-13740B35	27 pF, ±5%, 50V	C0219	21-13740B13	3.3 pF, ±5%, 50V	Q0104	48-00869643	PNP
C0002	21-13740B39	39 pF, ±5%, 50V 56 pF, +5%, 50V	C0220 C0221	21-13740B73 21-13740B05	.001 uF, ±5%, 50V 1.5 pF, ±5%, 50V	Q0105,0106 Q0107	48-00869642	NPN NPN
C0003 C0004	21-13740B43 21-13740B29	15 pF, +5%, 50V	C0222	21-13740B05	.01 uF, ±5%, 50V	Q0151	48-00869658 48-00869658	NPN
C0005	21-13740B05	1.5 pF, ±5%, 50V	C0223	21-13740B13	3.3 pF, ±5%, 50V	Q0152	48-00869643	PNP
C0006	21-13740B11	2.7 pF, ±5%, 50V	C0224,0225 C0228	21-13740B73 21-13741B45	.001 uF, ±5%, 50V	Q0203	48-00869839	N-channel
C0007 C0008	21-13740B05 21-13740B29	1.5 pF, ±5%, 50V 15 pF, ±5%, 50V	C0229,0230	21-13741B45 21-13740B05	.01 uF, ±5%, 50V 1.5 pF, ±5%, 50V	Q0204,0205 Q0206	48-00869658 48-00869839	NPN NPN
C0009	21-13740B43	56 pF, ±5%, 50V	C0231	21-13740B38	36 pF, ±5%, 50V	Q0207,0208	48-00869658	NPN
C0010	21-13740B39	39 pF, ±5%, 50V	C0233	21-13740B37	33 pF, ±5%, 50V	Q0276	48-00869642	NPN
C0011 C0012	21-13740B17 21-13740B65	4.7 pF, ±5%, 50V 470 pF, +5%, 50V	C0234 C0235,0236	21-13740B29 21-13740B23	15 pF, ±5%, 50V 8.2 pF, ±5%, 50V	Q0277-0279	48-00869643	PNP
C0013	21-13740B24	9.1 pF, ±5%, 50V	C0237-0239	21-13740B73	.001 uF, ±5%, 50V	R0001,0002	m, ±5%, 1/8 watt (unle 06-11077A30	ss otnerwise stated) 15
C0014	21-13740B63	390 pF, ±5%, 50V	C0240	21-13740B13	3.3 pF, ±5%, 50V 5.6 pF, +5%, 50V	R0003	06-11077A66	470
C0015 C0016	21-13740B46 21-13740B34	75 pF, ±5%, 50V 24 pF, +5%, 50V	C0241 C0242	21-13740B19 21-13740B73	.001 uF, ±5%, 50V	R0004	06-11077A84	2.7k
C0017	21-13740B46	75 pF, ±5%, 50V	C0243	21-13740B47	82 pF, ±5%, 50V	R0005 R0006	06-11077A46 06-11077A86	68 3.3k
C0018	21-13740B35	27 pF, ±5%, 50V	C0245	21-13740B73	.001 uF, ±5%, 50V	R0007	06-11077B03	15k
C0019 C0020,0021	21-13740B39 21-11032B15	39 pF, ±5%, 50V .22 uF, +80,20%, 50V	C0246 C0247	21-13740B13 21-13740B73	3.3 pF, ±5%, 50V .001 uF, ±5%, 50V	R0051	06-11077A43	51
C0022	21-13740B73	.001 uF, ±5%, 50V	C0248	21~13740B05	1.5 pF, ±5%, 50V	R0052 R0054	06-11077A54 06-11077A54	150 150
C0051,0052	21-13740B35	27 pF, ±5%, 50V	C0249	21-13741B45	.01 uF, ±5%, 50V	R0056	06-11077B45	820k
C0053 C0054	21-13740B47 21-13740B61	82 pF, ±5%, 50V 330 pF, ±5%, 50V	C0250 C0251,0252	21-13740B17 21-13740B73	4.7 pF, ±5%, 50V .001 uF, ±5%, 50V	R0057	06-11077A72	820
C0055,0056	21–13741B45	.01 uF, ±5%, 50V	C0253	21-13740B29	15 pF, ±5%, 50V	R0058 R0059	06-11077B31 06-11077B27	220k 150k
C0057	21-13740B31	18 pF, ±5%, 50V	C0276	21-13741B45	.01 uF, ±5%, 50V	R0060	18-05500L08	22k, +20%, potentiometer
C0058 C0059	21-13740B27 21-13740B31	12 pF, ±5%, 50V 18 pF, ±5%, 50V	C0277,0278 C0301	23-11048B19 21-13741B45	47 uF, ±20%, 16V, electrolytic .01 uF, +5%, 50V	R0061	06-11077B19	68k
C0059 C0060,0061	21–13740B31	.01 uF, ±5%, 50V	diode (see note)	21 107 41040	.01 di , ±370, 301	R0062	06-11077B09	27k
C0065	21-11032B15	.22 uF, +80, -20%, 50V	CR0001	48-80236E16	Schottky	R0063 R0102	06-11077B21 06-11077A62	82k 330
C0066 C0067	21-13741B45 23-13749C39	.01 uF, ±5%, 50V 10 uF, ±10%, 50V, tantalum	CR002	48-80154K03	Schottky	R0103,0104	06-11077A98	10k
C0067 C0068	21-13749C39 21-13740B33	22 pF, ±5%, 50V	CR0051 CR0101,0102	48-83654H01 48-83654H01	silicon	R0105	06-11077B11	33k
C0069	21-13740B39	39 pF, ±5%, 50V	CR0151,0152	48-80006E10	silicon silicon	R0106 R0107	06-11077A74 06-11077A78	1k 1.5k
C0070 C0071.0072	21-13740B29	15 pF, ±5%, 50V	CR0153,0154	48-83654H01	silicon	R0108,0109	06-11077A26	10
C0071,0072 C0073	21-11032B15 23-13749C39	.22 uF, +80, -20%, 50V 10 uF, ±10%, 50V, tantalum	CR0176	48-83654H02	silicon	R0110	06-11077B03	15k
C0074	23-11048B13	10 uF, ±20%, 16V, electrolytic	CR0202-0205 CR0206,0207	48-80006E10 48-84616A01	silicon hot carrier	R0111 R0112	06-11077 <b>A</b> 72 06-11077 <b>A</b> 86	820 3.3k
C0075	21-13741B69	.1 uF, ±5%, 50V	CR0209-0213	48-80006E10	silicon	R0113	06-11077A74	1k
C0076 C0077,0078	23-11048B05 21-11032B15	1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V	CR0214,0215	48-84616A01	hot carrier	R0114	06-11077A72	820
C0079	21-13741B29	.0022 uF, ±5%, 50V	filter			R0115 R0116	06-11077 <b>A</b> 70 06-11077 <b>A</b> 92	680 5.6k
C0080	21-11032B15	.22 uF, +80, -20%, 50V	FL0051 FL0052	91–80097D06 91–80098D06	6 element, ceramic 3 wire, ceramic	R0118	06-11077A70	680
C0081 C0082,0083	21-13740B55 21-11032B15	180 pF, ±5%, 50V .22 uF, +80, -20%, 50V	connector receptac		3 wire, ceramic	R0119	06-11077A90	4.7k
C0084	21-82450B14	2.4 pF, +5%, 500V	J0004,0005	09-80135M01	2 pin coax	R0120,0121 R0122	06-11077A88 06-11077A43	3.9k 51
C0085	21-13740B27	12 pF, ±5%, 50V	J0006	09-80130M03	14 position socket	R0123	06-11077 <b>A</b> 50	100
C0101 C0102	23-11048B13 08-11051A13	10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 63V	RF coil			R0124	06-11077A84	2.7k
C0103,0104	21-13741B45	.01 uF, ±5%, 50V	L0001-0007	24-80148M06	82 nH, 4.5 turns	R0125 R0151	06-11077 <b>A</b> 72 06-11077 <b>B</b> 15	820 47k
C0105	23-11048B13	10 uF, ±20%, 16V, electrolytic	L0008 L0051,0052	24-80063M14 24-80063M09	1.2 uH .47 uH	R0152	06-11077B13	33k
C0106 C0107,0108	21-13740B29 21-13741B69	15 pF, ±5%, 50V .1 uF, ±5%, 50V	L0053	24-80063M04	.18 uH	R0153	06-11077B15	47k
C0109	08-11051A13	.1 uF, ±5%, 63V	L0054	24-80063M21	4.7 uH	R0154 R0155	06-11077 <b>A</b> 34 06-11077 <b>A</b> 98	22 10k
C0110	08-11051A19	1 uF, ±5%, 63V	L0055 L0056	24-80164M02 24-80164M01	1.8 turns, variable 1:6 ratio, variable	R0156	06-11077B03	15k
C0111 C0113	08-11051A09 08-11051A13	.022 uF, ±5%, 63V .1 uF, ±5%, 63V	L0057	24-80164M04	5.2 turns, variable	R0157	06-11077A78	1.5k
C0114	21–13740B73	.001 uF, ±5%, 50V	L0058	24-80063M21	4.7 uH	R0158,0159 R0161	06-11077A74 06-11077A98	1k 10k
C0115	21-13741B45	.01 uF, ±5%, 50V	L0059 L0060	24-80164M03 24-80063M14	4.3 turns, variable 1.2 uH	R0163	06-11077B07	22k
C0116,0117 C0118	21-13740B73 21-13740B29	.001 uF, ±5%, 50V 15 pF, ±5%, 50V	L0061	25-80000E01	transmformer	R0164	18-05500L08	22k, ±20%, potentiometer
C0119,0120	21–13740B73	.001 uF, ±5%, 50V	L0101	24-80063M14	1.2 uH	R0165 R0176	06-11077B09	27k
C0121	21-13740B29	15 pF, ±5%, 50V	L0102 L0151	2411030B09 2480299D01	4.5 turns, brown 17.75 turns, orange	R0177	06-11077G26 06-11077G28	22.6k, ±1% 23.7k, ±1%
C0151 C0152	21-13740B73 21-13740B50	.001 uF, ±5%, 50V 110 pF, +5%, 50V	L0152	24-80063M22	5.6 uH	R0178,0179	06-11077F91	10k, ±1%
C0154	21–13740B30	.01 uF, ±5%, 50V	L0202	24-80148M05	62 nH, 3.5 turns	R0180 R0181	06-11077G52 06-11077F91	42.2k, ±1% 10k, ±1%
C0155,0156	21-13740B55	180 pF, <u>+</u> 5%, 50V	L0203 L0204	24-80063M14 24-11030B08	1.2 uH 4.5 turns, brown	R0182	06-11077F91 06-11077G28	23.7k, ±1%
C0157 C0158	21-13741B45 08-11051A15	.01 uF, ±5%, 50V	L0205-0207	24-80063M14	1.2 uH	R0207,0208	06-11077A44	56
C0159	21–13740B35	.22 uF, ±5%, 63V 27 pF, ±5%, 50V	L0208	24-11030B09	4.5 turns, brown	R0209	06-11077A52 06-11077A01	120
C0160	21-13740B29	15 pF, <u>+</u> 5%, 50V	L0209 L0210	24-80063M14 24-11030B12	1.2 uH 7.5 turns, yellow	R0210 R0211	06-11077A98	0 ohm 10k
C0161	21-13740B73	.001 uF, ±5%, 50V	L0210	24-80063M14	1.2 uH	R0212	06-11077A84	2.7k
C0162 C0163	23-11048B13 08-11051A17	10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V	L0213	24-80148M08	82 nH, 4.5 turns	R0213	06-11077A72	820
C0164	21-13741B69	.1 uF, ±5%, 50V	L0214	24-80063M14	1.2 uH	R0214 R0215	06-11077 <b>A</b> 50 06-11077 <b>A</b> 84	100 2.7k
C0165	21-13740B73	.001 uF, ±5%, 50V	L0215 L0216–0218	24-11030B12 24-80063M14	7.5 turns, yellow 1.2 uH	R0216	06-11077A72	820
C0166-0168 C0176	21-13740B49 21-13740B73	100 pF, ±5%, 50V .001 uF, ±5%, 50V	L0219	24-11030B09	4.5 turns, brown	R0217	06-11077A42	47
C0201	23-11048B13	10 uF, ±20%, 16V, electrolytic	L0220	24-80063M14	1.2 uH	R0218 R0219	06-11077 <b>A</b> 50 06-11077 <b>A</b> 46	100 68
C0205	21-13741B49	.015 uF, ±5%, 50V	L0221 L0222	24-11030B14 24-80063M14	9.5 turns, blue 1.2 uH	R0220	06-11077A50	100
C0206 C0207	21-13740B27 21-13740B29	12 pF, ±5%, 50V 15 pF, ±5%, 50V	transistor (see note)		1.E WIT	R0222	06-11077A84	2.7k
C0207 C0208	21-13740B27	12 pF, ±5%, 50V	Q0001	48-80182D44	NPN	R0223 R0224	06-11077B09 06-11077B23	27k 100k
C0209	21-13740B23	8.2 pF, ±5%, 50V	Q0002	48-00869643	N-channel	R0225	06-11077B23 06-11077B09	27k
C0210-212	21-13740B73 21-13740B19	.001 uF, ±5%, 50V 5.6 pF, ±5%, 50V	Q0051,0052	48-00869839	NPN NDN	R0226,0227	06-11077A44	56
	Z I = 1.3 / 4UD 19	J.U pr, ±376, 30 v	Q0053	48-00869642	NPN	R0228	06-11077A50	100
C0213 C0214		3.3 pF, +5%, 50V	Q0101	48-00869643	PNP	DOSSO		
C0213 C0214 C0215 C0216	21-13740B13 21-13740B73 21-13740B47	3.3 pF, ±5%, 50V .001 uF, ±5%, 50V 82 pF, ±5%, 50V	Q0101 Q0102,0103	48-00869643 48-80182D20	PNP NPN	R0229 R0230	06-11077A01 06-11077A98	0 ohm 10k

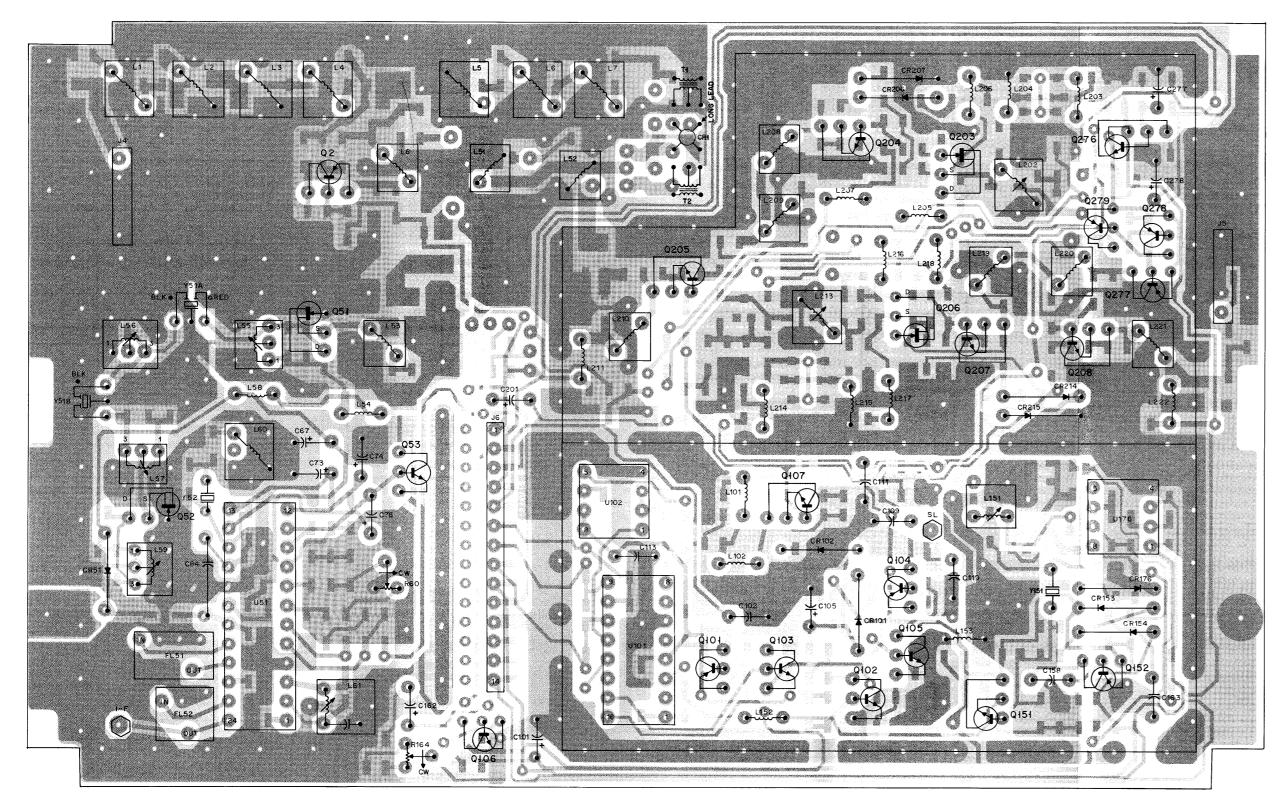
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
R0231	06-11077A84	2.7k	
R0232	06-11077 <b>A</b> 72	820	
R0233	06-11077A50	100	
R0234	06-11077 <b>A84</b>	2.7k	
R0235	06-11077 <b>A</b> 72	820	
R0236	06-11077 <b>A</b> 42	47	
R0237	06-11077 <b>A</b> 66	470	
R0238	06-11077A28	12	
R0239	06-11077A66	470	
R0241	06-11077B23	100k	
R0276	06-11077A98	10k	
R0277	06-11077 <b>A</b> 60	270	
R0278	06-11077A26	10	
R0279	06-11077A90	4.7k	
R0280	06-11077A98	10k	
R0281	06-11077 <b>A9</b> 0	4.7k	
transformer			
T0001,0002	25-80163M02	500 MHz balance transformer	
integrated circuits	(see note)		
U0051	51-05479G05	linear	
U0101	51-84704M75	synthesizer	
U0102	51-84810F66	dual divider	
U0176	51-84621K89	dual opamp	
crystal (see note)			
Y0051	91-80022M02	45.1 MHz	
Y0052	48-80008K02	44.645 MHz	
Y0151	48-80174D05	14.4 MHz	
	non-refe	erenced parts	
	14-05160A01	insulator	
M0201-0211	26-80098M01	coil can shield	
	26-80097M01	coil can shield	
M0004	26-80228L01	coax connector shield	
M0005	26-80228L01	coax connector shield	
M0002	26-80229L03	VCO shield	
M4016	26-80256L02	coax connector bottom shield	
	30-10286A72	24 strand wire, white	
	5480111F01	PROM label	
	75-05295B07 84-80927T01	crystal base pad, 2 used circuit board	

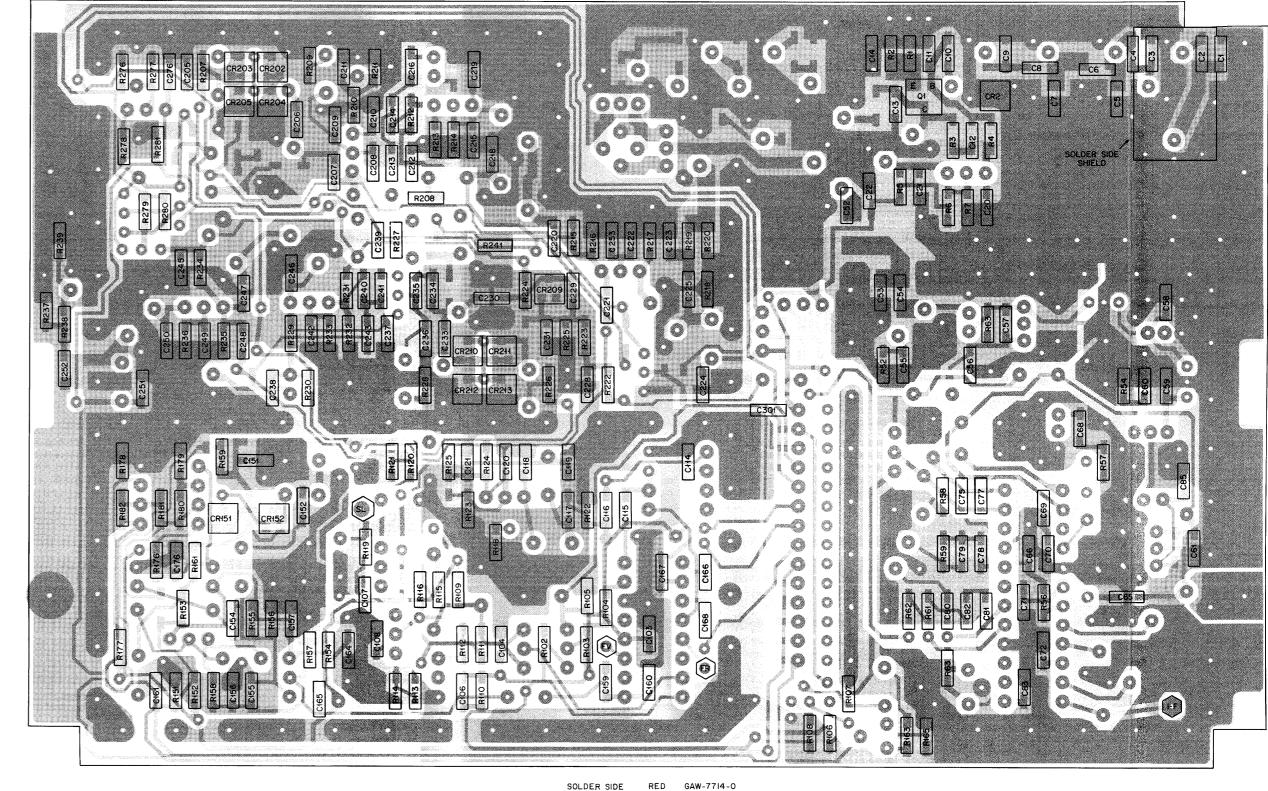
2/28/90 **note:** For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.



### VHF RF Board Transistor D.C. Voltage Table

		VOLTAGE		VOLTAGE			
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN	
Q1	.83	.12	8.5	_	_	_	
Q2	7.9	8.5	1.1		T -		
Q51		_	_	0	1.8	9.6	
Q52	_		_	0	1.8	9.6	
Q53	4.2	3.6	9.6	_		_	
Q101	5.0	5.0	.1 (LOCKED)				
Q102	0.7	0	0	_	_		
Q103	4.8	4.1	9.6	_			
Q104	8.1	7.6	2–8v		_	_	
Q105	1.4	1.9	2–8v	_	<u> </u>		
Q106	5.7	4.9	9.6	_	_	_	
Q107	2.1	1.4	9.6				
Q151	5.5	5.2	9.5	_		_	
Q152	8.7	9.5	6.7	_	_		
Q203	_	_		-2.1(R)	.7(R)	7.9	
Q204	1.9(R)	1.2(R)	8.5	_	_	_	
Q205	1.7(R)	1.1(R)	9.6	_		_	
Q206	_		_	-1.9(T)	.95(T)	7.9	
Q207	1.8(T)	1.2(T)	8.5	_	_		
Q208	1.7(T)	1.2(T)	9.6		_		
Q276	9.5	8.6	9.6	_		_	
Q277	9.6	8.5(T)	8.5				
Q278	9.6(R)	8.5	8.5	_	_	_	
Q279	7.6(R)	8.5	8.5				





SOLDER SIDE RED GAW-7714-0
COMPONENT SIDE GRAY GAW-7715-0

**COMPONENT SIDE VIEW** 

COMPONENT SIDE GRAY GAW-7715-0

OVERLAY BLACK GDW-7889-0

**SOLDER SIDE VIEW** 

MXW-7405-O (4) HLD4321B MaxTrac VHF 30 kHz RF Board MXW-7405-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (unless		
C0001	21-13740B36	30 pF, ±5%, 50V
C0002	21-13740B43	56 pF, ±5%, 50V
C0003 C0004	21-13740B44 21-13740B31	62 pF, ±5%, 50V 18 pF, ±5%, 50V
C0005	21-13740B07	1.8 pF, ±5%, 50V
C0006 C0007	21-13740B13 21-13740B07	3.3 pF, ±5%, 50V 1.8 pF, ±5%, 50V
C0007	21–13740B31	18 pF, ±5%, 50V
C0009	21-13740B44	62 pF, ±5%, 50V
C0010 C0011	21-13740B41 21-13740B25	347pF, ±5%, 50V 10 pF, ±5%, 50V
C0012	21-13740B65	470 pF, ±5%, 50V
C0013 C0014	21-13740B31 21-13740B49	18 pF, ±5%, 50V 100 pF, ±5%, 50V
C0015	21-13740B47	82 pF, ±5%, 50V
C0016	21-13740B36	30 pF, ±5%, 50V
C0017 C0018	21-13740B47 21-13740B38	82 pF, ±5%, 50V 36 pF, ±5%, 50V
C0019	21-13740B40	43 pF, ±5%, 50V
C0020,0021 C0022	21-11032B15 21-13740B73	.22 uF, +80, -20%, 50V .001 uF, <u>+</u> 5%, 50V
C0051,0052	21-13740B35	27 pF, ±5%, 50V
C0053 C0054	21-13740B47 21-13740B61	82 pF, ±5%, 50V 330 pF, ±5%, 50V
C0055,0056	21–13741B45	.01 uF, <u>+</u> 5%, 50V
C0057	21-13740B31	18 pF, ±5%, 50V
C0058 C0059	21-13740B27 21-13740B31	12 pF, ±5%, 50V 18 pF, ±5%, 50V
C0060,0061	21-13741B45	.01 uF, <u>+</u> 5%, 50V
C0065 C0066	21–11032B15 21–13741B45	.22 uF, +80, -20%, 50V .01 uF, ±5%, 50V
C0067	23-13749C39	10 uF, ±10%, 50V, tantalum
C0068	21-13740B33	22 pF, ±5%, 50V
C0069 C0070	21-13740B39 21-13740B29	39 pF, ±5%, 50V 15 pF, ±5%, 50V
C0071,0072	21-11032B15	.22 uF, +80, -20%, 50V
C0073 C0074	23-13749C39 23-11048B13	10 uF, ±10%, 50V, tantalum 10 uF, ±20%, 16V, electrolytic
C0075	21-13741B69	.1 uF, <u>+</u> 5%, 50V
C0076	23-11048B05 21-11032B15	1 uF, ±20%, 50V, electrolytic .22 uF, +80, –20%, 50V
C0077,0078 C0079	21–13741B29	.0022 uF. +5%, 50V
C0080	21-11032B15	.22 uF, +80, -20%, 50V 180 pF, ±5%, 50V
C0081 C0082,0083	21-13740B55 21-11032B15	.22 uF, +80, –20%, 50V
C0084	21-82450B14	2.4 pF, ±5%, 500V
C0085 C0101	21-13740B27 23-11048B13	12 pF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic
C0102	08-11051A13	.1 uF, ±5%, 63V
C0103,0104	21-13741B45	.01 uF, ±5%, 50V
C0105 C0106	23-11048B13 21-13740B29	10 uF, ±20%, 16V, electrolytic 15 pF, ±5%, 50V
C0107,0108	21-13741B69	.1 uF, ±5%, 50V
C0109 C0110	08-11051A13 08-11051A19	.1 uF, ±5%, 63V 1 uF, ±5%, 63V
C0111	08-11051A09	.022 uF, ±5%, 63V
C0113 C0114	08-11051A13 21-13740B73	.1 uF, ±5%, 63V .001 uF, ±5%, 50V
C0115	21-13741B45	.01 uF, ±5%, 50V
C0116,0117	21-13740B73	.001 uF, ±5%, 50V
C0118 C0119,0120	21-13740B29 21-13740B73	15 pF, ±5%, 50V .001 uF, ±5%, 50V
C0121	21-13740B29	15 pF, ±5%, 50V
C0151 C0152	21-13740B73 21-13740B50	.001 uF, ±5%, 50V 110 pF, ±5%, 50V
C0154	21-13741B45	.01 uF, ±5%, 50V
C0155	21-13740B55 21-13740B55	180 pF, ±5%, 50V 180 pF, ±5%, 50V
C0156,0157 C0158	08-11051A15	.22 uF, ±5%, 63V
C0159	21-13740B35	27 pF, ±5%, 50V
C0160 C0161	21-13740B29 21-13740B73	15 pF, ±5%, 50V .001 uF, ±5%, 50V
C0162	23-11048B13	10 uF, ±20%, 16V, electrolytic
C0163 C0164	08-11051A17 21-13741B69	.47 uF, ±5%, 63V .1 uF, ±5%, 50V
C0165	21-13740B73	.001 uF, ±5%, 50V
C0166-0168	21-13740B49	100 pF, ±5%, 50V
C0176 C0201	21-13740B73 23-11048B13	.001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic
C0205	21-13741B49	.015 uF, ±5%, 50V
C0206 C0207	21-13740B32 21-13740B25	20 pF, ±5%, 50V 10 pF, ±5%, 50V
C0208,0209	21-13740B23	8.2 pF, ±5%, 50V
C0210-0212	21-13740B73	.001 uF, ±5%, 50V
C0213 C0214	21–13740B17 21–13740B09	4.7 pF, ±5%, 50V 2.2 pF, ±5%, 50V
C0215	21-13740B73	.001 uF, ±5%, 50V
C0216 C0218	21-13740B47 21-13741B45	82 pF, ±5%, 50V .01 uF, ±5%, 50V
C0219	21-13740B13	3.3 pF, ±5%, 50V
C0220 C0221	21–13740B73 21–13740B09	.001 uF, ±5%, 50V 2.2 pF, ±5%, 50V
C0221	21–13741B45	.01 uF, ±5%, 50V
C0223	21-13740B13	3.3 pF, ±5%, 50V .001 uF, ±5%, 50V
C0224,0225 C0228	21-13740B73 21-13741B45	.001 uF, ±5%, 50V .01 uF, ±5%, 50V
C0229,0230	21-13740B05	1.5 pF, ±5%, 50V
C0231 C0233	21-13740B38 21-13740B38	36 pF, ±5%, 50V 36 pF, ±5%, 50V

		MXW-7405-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C0234	21-13740B29	15 pF, ±5%, 50V
C0235,0236 C0237–0239	21-13740B23 21-13740B73	8.2 pF, ±5%, 50V .001 uF, ±5%, 50V
C0240	21-13740B09	2.2 pF, ±5%, 50V
C0241	21-13740B17	4.7 pF, ±5%, 50V
C0242 C0243	21-13740B73 21-13740B47	.001 uF, ±5%, 50V 82 pF, ±5%, 50V
C0245	21-13740B73	.001 uF, ±5%, 50V
C0247	21-13740B73 21-13740B05	.001 uF, ±5%, 50V 1.5 pF, ±5%, 50V
C0248 C0249	21–13741B45	.01 uF, ±5%, 50V
C0250	21-13740B17	4.7 pF, ±5%, 50V
C0251,0252 C0276	21-13740B73 21-13741B45	.001 uF, ±5%, 50V .01 uF, ±5%, 50V
C0277,0278 C0301	23–11048B19 21–13741B45	47 uF, ±20%, 16V, electrolytic .01 uF, ±5%, 50V
diode (see note)		
CR0001	48-80236E16 48-80154K03	Schottky Schottky
CR002 CR0051	48-83654H01	silicon
CR0101,0102	48-83654H01	silicon
CR0151,0152	48-80006E10	silicon silicon
CR0153,0154 CR0176	48-83654H01 48-83654H02	silicon
CR0202-0205	48-05129M21	silicon
CR0206,0207	48-84616A01	hot carrier
CR0209-0213 CR0214,0215	48-05129M21 48-84616A01	silicon hot carrier
filter FL0051	91-80097D06	6 element, ceramic
FL0052 connector receptacle	91–80098D06	3 wire, ceramic
J0004,0005	09-80135M01	2 pin coax
J0006	09-80130M03	14 position socket
RF coil	0.4.004.404.400	00 -11 45 5
L0001-0007 L0008	24-80148M06 24-80063M14	82 nH, 4.5 turns 1.2 uH
L0051,0052	24-80063M09	.47 uH
L0053	24-80063M04	.18 uH
L0054 L0055	24-80063M21 24-80164M02	4.7 uH 1.8 turns, variable
L0056	24-80164M01	1:6 ratio, variable
L0057	24-80164M04	5.2 turns, variable
L0058 L0059	24-80063M21 24-80164M03	4.7 uH 4.3 turns, variable
L0059	24-80164M03	1.2 uH
L0061	25-80000E01	transmformer
L0101	24-80063M14	1.2 uH
L0102 L0151	24-11030B09 24-80299D01	4.5 turns, brown 17.75 turns, orange
L0152	24-80063M22	5.6 uH
L0202	24-80148M05	62 nH, 3.5 turns 1.2 uH
L0203 L0204	2480063M14 2411030B11	6.5 turns, orange
L0205	24-80063M14	1.2 uH
L0206,0207	24-80063M14	1.2 uH
L0208 L0209	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH
L0210	24-11030B12	7.5 turns, yellow
L0211	24-80063M14	1.2 uH
L0213 L0214	24-80148M08 24-80063M14	82 nH, 4.5 turns 1.2 uH
L0214 L0215	24-11030B14	9.5 turns, blue
L0216-0218	24-80063M14	1.2 uH
L0219 L0220	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH
L0220 L0221	24-11030B14	9.5 turns, blue
L0222	24-80063M14	1.2 uH
transistor (see note)	49 .00100D44	NPN
Q0001 Q0002	48-80182D44 48-00869643	N-channel
Q0051,0052	48-00869839	NPN
Q0053	48-00869642	NPN BNB
Q0101 Q0102,0103	48-00869643 48-80182D20	PNP NPN
Q0102,0103 Q0104	48-00869643	PNP
Q0105,0106	48-00869642	NPN
Q0107 Q0151	48–00869658 48–00869658	NPN NPN
Q0151 Q0152	48-00869643	PNP
Q0203	48-00869839	N-channel
Q0204,0204	48-00869658	NPN Nchannel
Q0206 Q0207,0208	48-00869839 48-00869658	NPN
Q0276 Q0277–0279	48-00869642 48-00869643	NPN PNP
	±5%, 1/8 watt (unless	
R0001,0002	06-11077A30	15
R0003	06-11077A66	470
R0004 R0005	06-11077A84 06-11077A46	2.7k 68
R0006	06-11077A46	3.3k
R0007	06-11077B03	15k
R0051	06-11077A43	51
DOOES		
R0052 R0053	06-11077A54 06-11077A88	150 3.9k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R0056	06-11077B45	820k
R0057	06-11077A72	820
R0058 R0059	06-11077B23 06-11077B27	100k 150k
R0060	18-05500L08	22k, ±20%, potentiometer
R0061	06-11077B19	68k
R0062	06-11077B09	27k
R0063 R0102	06-11077B21 06-11077A62	82k 330
R0102 R0103,0104	06-11077A62 06-11077A98	10k
R0105	06-11077B11	33k
R0106	06-11077A74	1k
R0107	06-11077A78 06-11077A26	1.5k 10
R0108,0109 R0110	06-11077B03	15k
R0111	06-11077A72	820
R0112	06-11077A86	3.3k
R0113	06-11077A74 06-11077A72	1k 820
R0114 R0115	06-11077A72 06-11077A70	680
R0116	06-11077A92	5.6k
R0118	06-11077A70	680
R0119	06-11077A90	4.7k
R0120,0121 R0122	06-11077A88 06-11077A43	3.9k 51
R0123	06-11077A50	100
R0124	06-11077A84	2.7k
R0125	06-11077A72	820
R0151	06-11077B15	47k 33k
R0152 R0153	06-11077B11 06-11077B15	47k
R0154	06-11077B13	22
R0155	06-11077A98	10k
R0156	06-11077B03	15k
R0157 R0158,0159	06-11077A78 06-11077A74	1.5k 1k
R0161	06-11077A74	10k
R0163	06-11077B07	22k
R0164	18-05500L08	22k, ±20%, potentiometer
R0165 R0176	06-11077B10 06-11077G26	30k 22.6k, ±1%
R0177	06-11077G28	23.7k, ±1%
R0178,0179	06-11077F91	10k, ±1%
R0180	06-11077G52	42.2k, ±1%
R0181 R0182	06-11077F91 06-11077G28	10k, ±1% 23.7k, ±1%
R0207,0208	06-11077A44	56
R0209	06-11077A52	120
R0210	06-11077A01	0 ohm
R0211 R0212	06-11077A98 06-11077A84	10k 2.7k
R0213	06-11077A72	820
R0214	06-11077A50	100
R0215	06-11077A84	2.7k
R0216 R0217	0611077A72 0611077A42	820 47
R0218	06-11077A50	100
R0219	06-11077A46	68
R0220	06-11077A50	100
R0222	06-11077A84	2.7k 27k
R0223 R0224	06-11077B09 06-11077B23	100k
R0225	06-11077B09	27k
R0226,0227	06-11077A44	56
R0228	06-11077A50	100 0 ohm
R0229 R0230	06-11077A01 06-11077A98	u onm 10k
R0231	06-11077A98	2.7k
R0232	06-11077A72	820
R0233	06-11077A50	100
R0234 R0235	0611077A84 0611077A72	2.7k 820
R0236	06-11077A42	47
R0237	06-11077A66	470
R0238	06-11077A28	12
R0239	06-11077A66 06-11077B23	470 100k
R0241 R0276	06-11077B23	10k
R0277	06-11077A60	270
R0278	06-11077A26	10
R0279	06-11077A90 06-11077A98	4.7k 10k
R0280 R0281	06-11077A98 06-11077A90	4.7k
transformer		
T0001,0002 integrated circuits		500 MHz balance transformer
U0051	51-05479G05	linear
U0101	51-84704M75	synthesizer
U0102	51-84810F66 51-84621K89	dual divider dual opamp
U0176	31-04021N03	συαι ορατιρ
crystal (see note) Y0051	91-80022M02	45.1 MHz
Y0051 Y0052	48–80008K02	44.645 MHz
Y0151	48-80174D05	14.4 MHz
	non-ref	ferenced parts
	26-80228L01	coax connector shield
	26-80228L01	coax connector shield

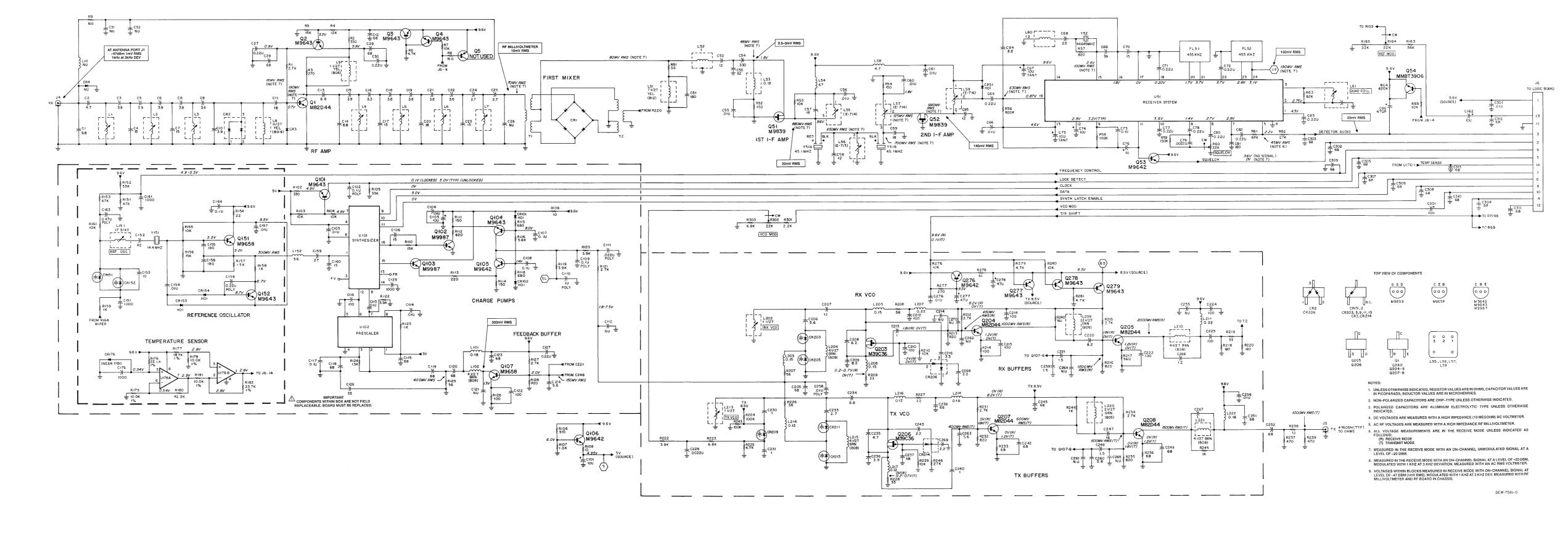
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	14-05160A01	insulator
	26-80098M01 26-80097M01	coil can shield (10 used) coil can shield
	26-80256L02	coax connector bottom shield
	30-10286A72 54-80111F01	24 strand wire, white PROM label
	75–05295B07	crystal base pad, 2 used
	84-80232L01	circuit board

2/28/90 **note:** For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

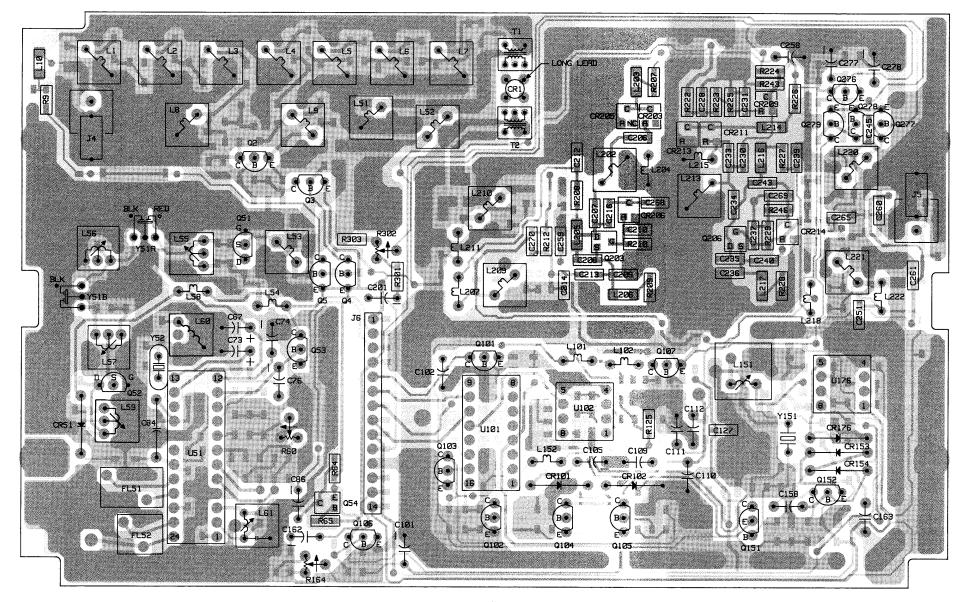
Schematic, Circuit Board Diagrams, and Parts List for HLD4321B VHF RF Board **PW-7578-O** (Sheet 3 of 3) 3/31/90

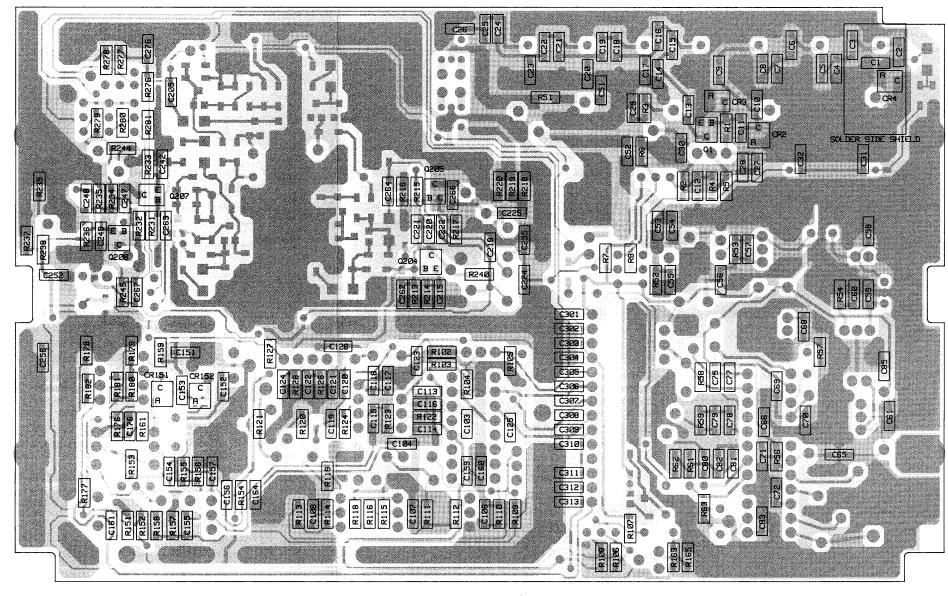
### MaxTrac UHF RF Board Transistor D.C. Voltage Table

		VOLTAGE			VOLTAGE	
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.7	0	5.9	_	_	
Q2	5.3	5.9	.9	-	_	_
Q51	_	_	_	0	1.8	9.6
Q52			_	0	1.8	9.6
Q53	0	0 (W/ SIG)	9.6	_	_	_
Q101	5.0	4.9	.1 (LOCKED)	_	_	_
Q102	.7	0	0.1	_	_	_
Q103	5.0	4.4	9.6	_	_	_
Q104	8.1	2.8v	2–8v		_	_
Q105	1.4	VAR.	2–8v	_	_	_
Q106	6.0	5.0	9.6	_	_	
Q107	2.0	1.3	9.6	_	_	_
Q151	5.5	5.2	9.5	_	_	_
Q152	8.7	9.5	6.7	-	_	
Q201	_	9.6	0(U) 9.3(L)	U=UF	PPER L=LOWER RA	ANGE
Q202	0(U).7(L)	0	6.7(U)0(L)	_	_	_
Q203	_	_	T -	2.6(R)	4.8(R)	7.9(R)
Q204	1.8(R)	1.2(R)	8.2(R)	_	_	_
Q205	1.8(R)	1.2(R)	9.6	_		_
Q206	_	_	_	5(T)	1.1(T)	7.8(T)
Q207	1.8(T)	1.2(T)	8.5(T)	_	_	
Q208	1.8(T)	1.2(T)	9.6	_		-
Q276	9.5	8.6	9.6	_	_	_
Q277	9.6	8.5(T)	8.5	_	_	-
Q278	9.6	8.3	7.6(R)	_	_	_
Q279	7.6(R)	8.5	8.5	_	_	_



Schematic, Circuit Board Diagrams, and Parts List for HLE9310A UHF RF Board PW-7580-O (Sheet 1 of 3) 3/31/90





SOLDER SIDE 
GCW-7617-O

COMPONENT SIDE 
OVERLAY 
GCW-7619-O

**SOLDER SIDE VIEW** 

**COMPONENT SIDE VIEW** 

### parts list

HLE9310A UHF RF Board MXW-7406-O

REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. capacitor, fixed (unless otherwise stated) 21-13740B21 6.8 pF, ±5%, 50V 4.7 pF, ±5%, 50V 4.7 pF, ±5%, 50V 3.9 pF, ±5%, 50V 3.9 pF, ±5%, 50V 15 pF, ±5%, 50V 3.9 pF, ±5%, 50V 3.9 pF, ±5%, 50V 21-13740B17 21-13740B29 C5,6 C7 C8 C9 21-13740B29 21-13740R14 3.6 pF, ±5%, 50V 3.9 pF, ±5%, 50V 18 pF, ±5%, 50V 68 pF, ±5%, 50V C11 21-13740B31 21-13740B45 6.8 pF, ±5%, 50V 3.9 pF, ±5%, 50V C13.14 21-13740B21 21-13740B15 3.3 pF, ±5%, 50V 15 pF, ±5%, 50V 3.6 pF, ±5%, 50V 16 pF, ±5%, 50V C16 21-13740R13 21-13740B29 C18.19 21-13740R14 21-13740B30 3.6 pF, ±5%, 50V 15 pF, ±5%, 50V C21.22 21-13740B14 21-13740B29 2.7 pF, ±5%, 50V .22 uF, +80, -20%, 50V C24,25 21-13740B11 21-11032B15 C28,29 C30 21-13740B45 21-11032B15 .22 uF. +80. -20%, 50\ C51 C52 C53 C54 21-13740B55 21-13740B27 12 pF, ±5%, 50V 21-13740B47 82 pF, ±5%, 50V 21-13740B6 330 pF, ±5%, 50V .01 uF, ±5%, 50V C55,56 C57 21-13741B45 18 pF, ±5%, 50V 12 pF, ±5%, 50V 21-13740B31 C58 C59 21-13740B27 18 pF, ±5%, 50V .01 uF, ±5%, 50V .22 uF, +80, -20%, 50V .01 uF, ±5%, 50V 21-13740B31 C60,61 21-13741B45 C65 21-11032B15 C66 C67 21-13741B45 23-13749C39 10 uF, ±10%, 50V, tantalum 22 pF, ±5%, 50V C68 C69 C70 C71 C72 39 pF, ±5%, 50V 15 pF, ±5%, 50V 21-13740B39 21-11032B15 .22 uF, +80, -20%, 50V .22 uF, +80, -20%, 50V C73 C74 C75 C76 C77,78 23-13749C39 23-11048B13 10 uF, ±10%, 50V, tantalum 10 uF, ±20%, 16V, electrolytic 21-13741B69 .1 uF, ±5%, 50V 1 uF, ±20%, 50V, electrolytic 23-11048B05 .22 uF, +80, -20%, 50V .0022 uF, ±5%, 50V 21-11032B15 C79 C80 C81 21-13741B29 21\_11032B15 21-13740B55 180 pF. +5%, 50V 21-11032B15 21-13740B09 .22 uF, +80, -20%, 50V 2.2 pF. +5%, 50V C82.83 C85 C86 21-13740B27 12 pF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 63V 23-11048B49 23-11048B13 08-11051A13 C101 C103,104 21-13741B45 .01 uF, ±5%, 50V C105 10 uF, ±20%, 16V, electrolytic 15 pF, ±5%, 50V 23-11048B13 C106 C107,108 .1 uF, ±5%, 50V .1 uF, ±5%, 63V 21-13741B69 1 uF, ±5%, 63V .022 uF, ±5%, 63V .01 uF, ±5%, 50V 68 pF,±5%, 50V C110 08-11051A19 C113-114 21-13741B45 100 pF, ±5%, 50V .1 uF, ±5%, 50V C116 21-13740B49 C118-120 21-13740B45 68 pF, ±5%, 50V 100 pF, ±5%, 50V 68 pF, ±5%, 50V 21-13740B49 C122 C123 21-13740B45 C124 21-13740B19 5.6 pF, ±5%, 50V .001 uF, ±5%, 50V C125 21-13740B73 21-13740B37 21-11032B15 C126 C127 33 pF, ±5%, 50V .22 uF. +80. -20%. 50V C151 21-13740B73 21-13740B47 82 pF. +5%, 50V 10 pF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V 21–13740B25 21–13741B45 C153 C154 C155,156 C157 21-13740B55 21-13741B45 .22 uF, ±5%, 63V 27 pF, ±5%, 50V 15 pF, ±5%, 50V C158 C159 08-11051A15 21-13740B35 C160 C161 21-13740B29 .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V 21-13740B73 C162 C163 C164 C165 23-11048B13 08-11051A17 21-13741B69 .1 uF, ±5%, 50V not used C166 C167 not used not used not used 21-13740B73 .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic C176 C201 23-11048B13 C205 C206 C207 21-13740B45 68 pF, ±5%, 50V 21-13740B19 5.6 pF. +5%, 50V 21-13740B27 12 pF, ±5%, 50V C208,209 21-13740B23 8.2 pF. +5%, 50V C210 21-13740B49

21-13740B49

100 pF, ±5%, 50V

REFERENCE	MOTOROLA	MXW-7406-O (2
SYMBOL	PART NO.	DESCRIPTION
C213 C121	21-13740B01	1 pF, ±5%, 50V not used
C215	21-13740B49	100 pF, ±5%, 50V
C216 C218	21–13740B13	3.3 pF, ±5%, 50V
C219	21–13741B49	100 pF, ±5%, 50V not used
C220	21-13740B23	8.2 pF, ±5%, 50V
C221 C222	21-13740B05	1.5 pF, ±5%, 50V
C223	21-13740B49	100 pF, ±5%, 50V not used
C224,225	21-13740B49	100 pF, ±5%, 50V
C228 C229	21-13741B29	.0022 uF, ±5%, 50V
C230,231	21-13740B01	not used 1 pF, ±5%, 50V
C233	21-13740B11	2.7 pF, ±5%, 50V
C234 C235	21–13740B21	6.8 pF, ±5%, 50V
C236	21–13740B17 21–13740B15	4.7 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C237	21-13740B45	68 pF, ±5%, 50V
C238 C239	01 10740045	not used
C240	21-13740B45 21-13740B01	68 pF, ±5%, 50V 1 pF, ±5%, 50V
C241	21 107 10201	not used
C242	21-13740B45	68 pF, ±5%, 50V
C243 C245	21–13740B09 21–13740B45	2.2 pF, ±5%, 50V
C246	21 107-105-10	68 pF, ±5%, 50V not used
C247	21-13740B29	15 pF <u>, ±</u> 5%, 50V
C248 C249	21–13740B05 21–13740B45	1.5 pF, ±5%, 50V
C250	21-13/40043	68 pF, ±5%, 50V not used
C251,252	21-13740B45	68 pF, ±5%, 50V
C253 C256	21-13741B45	not used
C258	08-11051A07	.01 uF, ±5%, 50V .01 uF, ±5%, 63V
C259	21-13740B22	7.5 pF, ±5%, 50V
C260	21-13740B19	5.6 pF, ±5%, 50V
C263 C266	21–13740B19 21–13740B03	5.6 pF, ±5%, 50V 1.2 pF, ±5%, 50V
C267	21-13740B01	1 pF, ±5%, 50V
C268	21-13740B13	3.3 pF, ±5%, 50V
C269 C276	21-13740B09 21-13741B45	2.2 pF, ±5%, 50V
C277,278	23-11048B19	.01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic
C301	21-13741B45	.01 uF, ±5%, 50V
C302–313	21-13740B45	68 pF, ±5%, 50V
diode (see note)	40.00000540	0.1
CR1 CR2	48-80236E16 48-80154K02	Schottky Schottky
CR3	48-80939T01	Schottky
CR51	48-83654H01	silicon
CR101,102 CR151,152	48-83654H01 48-05129M21	silicon varactor
CR153,154	48-83654H01	silicon
CR176	48-83654H02	silicon
CR203 CR205	48-84534N02 48-84534N02	varactor
CR206	48-80154K02	varactor Schottky
CR209	48-84534N02	varactor
CR211	48-84534N02	varactor
CR213 CR214	48-84534N02 48-80939T01	varactor Schottky
ilter	.0 00000101	Conotaty
-L51	91-80097D06	6 element, ceramic
L52	91-80098D06	3 element, ceramic
connector recepta 14,5		2 pin cooy
14,5 16	09-80135M01 09-80130M03	2 pin coax 14 position socket
RF coil		•
_1_7	24-80148M01	27 nH, 1.5 turns
.8,9 .51	24-11030B04	1.5 turns, yellow
.51 .52	24-11030B12 24-80063M13	7.5 turns, yellow 1 uH
.53	24-80063M04	.18 uH
.54 .55	24-80063M21	4.7 uH
.56	24-80164M04 24-80164M01	5.2 turns, variable 1:6 ratio, variable
.57	24-80164M04	5.2 turns, variable
.58 50	24-80063M21	4.7 uH
.59 .60	24-80164M03 24-80063M14	4.3 turns, variable 1.2 uH
.61	25-80000E01	transmformer
.101	24-80063M04	.18 uH
.102 .151	24-11030B08 24-80299D01	4.5 turns, brown 17.75 turns, orange
.152	24-80299D01 24-80063M22	5.6 uH
.202	24-80148M01	27 nH, 1.5 turns
203	24-80989T02	150 nH, ±20%
.204 .205,206	24-11030B09 24-80989T02	4.5 turns, brown 150 nH, ±20%
.207	24-80063M05	.22 uH
209	24-11030B05	2.5 turns, green
.210 .211	24~11030B08	4.5 turns, brown
.213	24-80063M05 24-80148M01	.22 uH 27 nH, 1.5 turns
.214	24-80989T01	120 nH, ±20%
.215	24-11030B08	4.5 turns, brown

24-11030B08 24-80989T01

L216,217

4.5 turns, brown

120 nH. +20%

MXW-7406-O (3) REFERENCE **MOTOROLA** DESCRIPTION PART NO. SYMBOL L218 24-80063M04 24-11030B05 2.5 turns, green 4.5 turns, brown L222 24~80063M04 .18 uH transistor (see note O1 48-80182D44 48-00869643 N-channel NPN Q51.52 48-00869839 Q53 48-00869642 Q54 48-05128M16 PNP PNP Q101 48-00869643 NPN PNP NPN NPN Q102.103 48-80182D20 Q104 48-00869643 Q105,106 48--00869642 48-00869658 Q151 Q152 48-00869658 NPN PNP 48-00869643 Q203 48-05128M66 N-channel Q204,205 48-80950X01 NPN Q206 Q207,208 48-05128M66 N-channel 48-80950X01 NPN Q277-279 48-00869643 PNP resistor, fixed ±5%, 1/8 watt (ur otherwise stated) 06-11077A84 06-11077A62 2.7k 330 270 12k 15k 4.7k 10k 56 150 10k 150 820k 06-11077460 06-11077B01 R5 R6 R7 06-11077B03 06-11077A90 06-11077A98 06-11077A44 R52 R53 06-11077A54 06-11077A98 R54 R56 R57 06-11077A54 06-11077B45 06-11077A72 06-11077B23 820 100k R58 R59 R60 R61 R62 06-11077B27 18-05500L08 22k, +20%, potentiometer 06-11077B19 68k 27k 82k 820k 10k 330 10k 33k 910 1.5k 10 150 820 220 150 680 5.6k 680 3.9k 2.7k 3.9K 06-11077B09 R63 R64 06-11077B2 06-11077B45 R65 R102 06-11077A98 06-11077A62 R105 06-11077B11 R106 R107 06-11077A78 R110 06-11077B03 R112 06-11077A72 R114 06-11077450 R116 06-11077A92 06-11077A70 R119.120 06-11077A88 06-11077A84 06-11077A88 06-11077A74 R122 1k 1.5k 56 100 2.7k 820 47k 33k 47k 22 10k 1.5k 1.5k 06-11077A78 06-11077A44 R124 R125 06-11077A50 06-11077A84 R126 R127 06-11077A72 06-11077B15 R128 R151 06-11077B11 R153 06-11077B15 06-11077A34 R155 06-11077A98 R156 06-11077A78 R158,159 06-11077A74 R161 06-11077A98 06-11077B17 R164 18-055001 08 22k, ±20%, potentiometer 06-11077B07 22k 22.6k, <u>+</u>1% R176 06-11077G26 06-11077G18 18.7k, +1% 10k, ±1% 10k, ±1% R178 06-11077F9 06-11077F91 06-11077G52 06-11077F91 R180 42.2k, ±1% 10k. +1% 06-11077G28 06-11077A44 R182 23.7k, ±1% R207,208 56 33 10k R209 R210 06-11077A38 06-11077A98 R211 R212

not used

2.7k

06-11077A84

06-11077A72

06-11077A50

06-11077A72

06-11077A56

06-11077A56

R213

R215

R216

R217

R218

R220

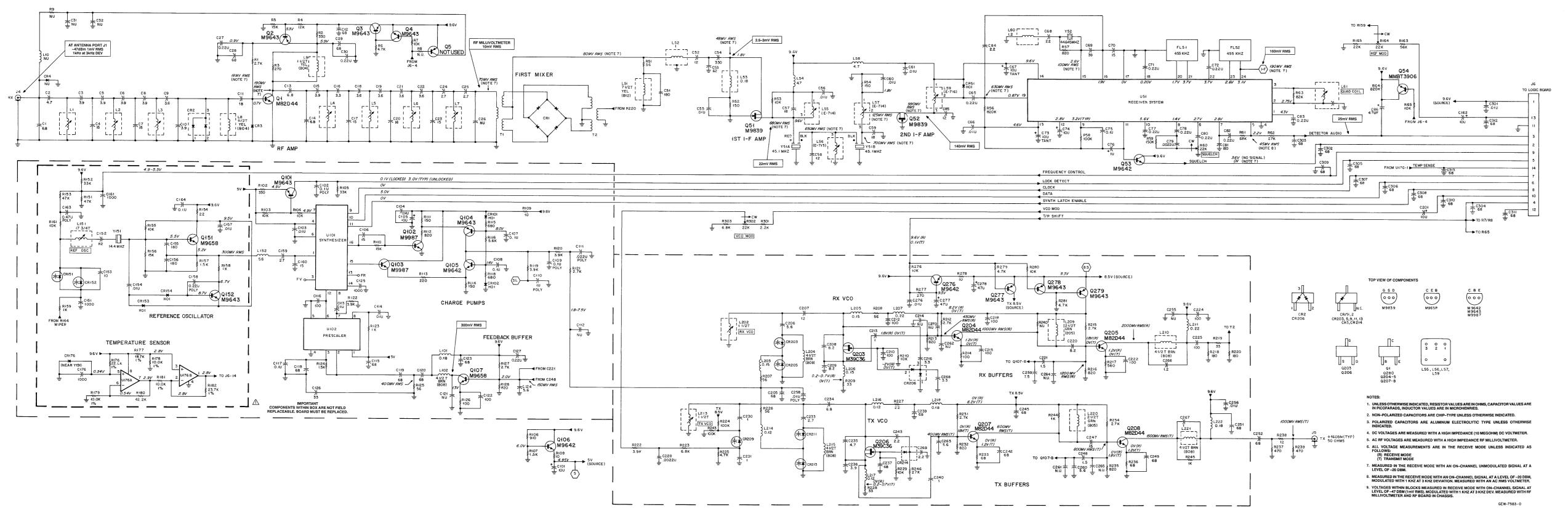
R214

MXW-7406-O (4)

REFERENCE SYMBOL	MOTOROLA	DESCRIPTION
	PART NO.	DESCRIPTION
R222	06-11077A88	3.9k
R223	06-11077A94	6.8k
R224	06-11077B23	100k
R225	06-11077A90	4.7k
R226	06-11077A44	56
R227	06-11077A34	22
R228	06-11077A38	33
R229	06-11077A98	10k
R231	06-11077A84	2.7k
R232	06-11077A72	820
R233	06-11077A46	68
R234	06-11077A84	2.7k
R235	06-11077A72	820
R236	06-11077A46	68
R237	06-11077A66	470
R238	06-11077A00	12
R239	06-11077A26	470
R241	00-11077A00	not used
R243	06-11077B23	
R244,245	06-11077B23	100k
R246		1k
R276	06-11077B09 06-11077A98	27k
		10k
R277 R278	06-11077A60	270
	06-11077A26	10
R279	06-11077A90	4.7k
R280	06-11077A98	10k
R281	06-11077A90	4.7k
R301	06-11077A82	2.2k
R302	18-05500L08	22k, ±20%, 100V, potentiometer
R303	06-11077A94	6.8k
transformer		
T1,2	25-80163M02	500 MHz balance transformer
integrated circuits (s	see note)	
U51	51–05479G05	linear
U101	51-84704M75	synthesizer
U102	51-83977M45	
U176	51-84621K89	prescaler
	31-84621N89	dual opamp
crystal (see note)		
Y51	91-80022M02	45.1 MHz
Y52	4880008K02	44.645 MHz
Y151	4880174D05	14.4 MHz
	mecha	anical parts
	14-05160A01	insulator
	26-80098M01	coil can shield, 10 used
	26-80097M01	coil can shield
	26-80228L01	coax connector shield
	26-80228L01	coax connector shield
	26-80229L03	VCO shield
	26-80256L02	coax connector bottom shield
	30-10286A72	24 strand wire, white
	42-80957X01	grounding clip
	54-80111F01	PROM label
	75–05295B02	
	75–05295B02 75–05295B07	crystal base pad, 2 used
	84-80233L01	crystal base pad, 2 used circuit board
	J. OULUULUT	Circuit board

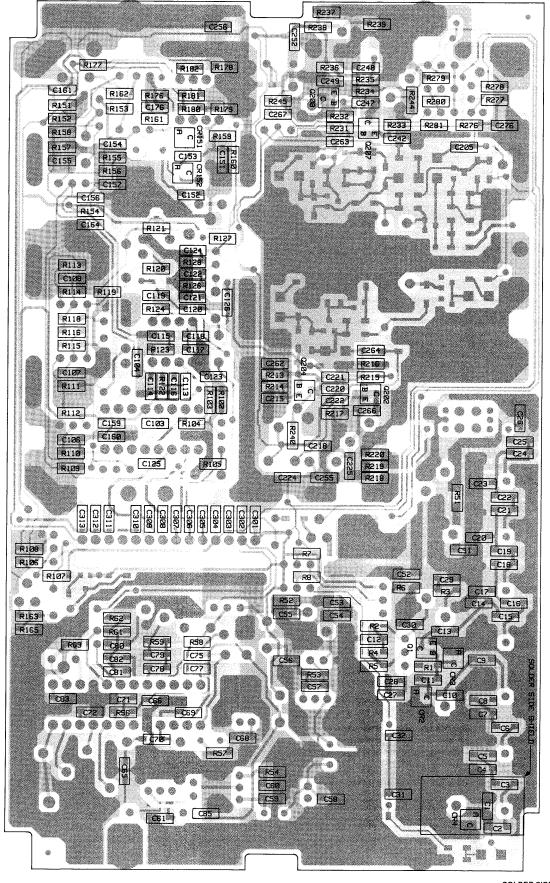
2/28/90 note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

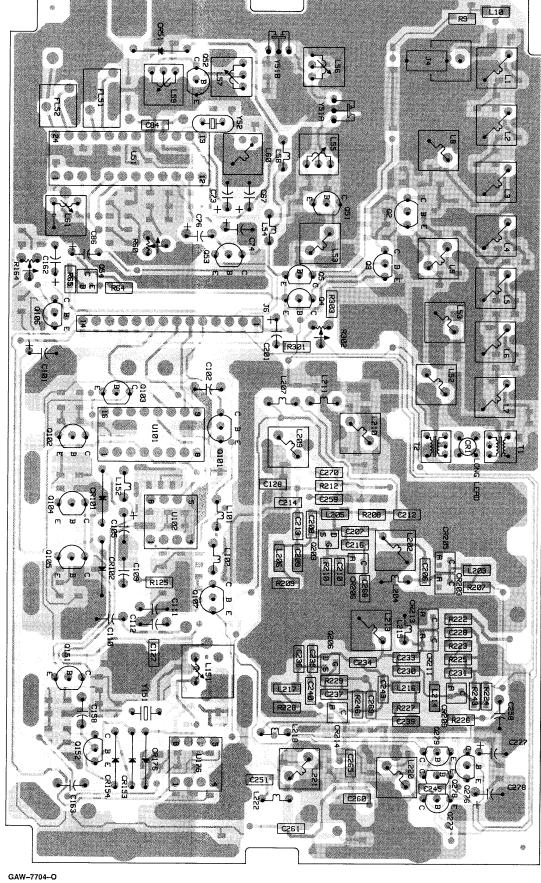
Schematic, Circuit Board Diagrams, and Parts List for HLE9310A UHF RF Board PW-7580-O (Sheet 3 of 3) 3/31/90



### UHF RF Board Transistor D.C. Voltage Table

		VOLTAGE			VOLTAGE		
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN	
Q1	.7	0	5.9	_	_	_	
Q2	5.3	5.9	.9		_	_	
Q51	_	_		0	1.8	9.6	
Q52	_		_	0	1.8	9.6	
Q53	0	0 (W/ SIG)	9.6	_		_	
Q101	5.0	4.9	.1 (LOCKED)		_		
Q102	.7	0	0.1	_		-	
Q103	5.0	4.4	9.6	_	_	_	
Q104	8.1	2.8v	2–8v		_		
Q105	1.4	VAR.	2-8v	_	_	_	
Q106	6.0	5.0	9.6	_		_	
Q107	2.0	1.3	9.6	_		_	
Q151	5.5	5.2	9.5		_		
Q152	8.7	9.5	6.7	_	_	_	
Q201	-	9.6	0(U) 9.3(L)	U=UPPER L=LOWER RANGE		ANGE	
Q202	0(U).7(L)	0	6.7(U)0(L)	_		-	
Q203	-		_	2.6(R)	4.8(R)	7.9(R	
Q204	1.8(R)	1.2(R)	8.2(R)	_	_	_	
Q205	1.8(R)	1.2(R)	9.6	_	_	_	
Q206	_	_		5(T)	1.1(T)	7.8(T	
Q207	1.8(T)	1.2(T)	8.5(T)		_		
Q208	1.8(T)	1.2(T)	9.6		_	_	
Q276	9.5	8.6	9.6	_	<del>-</del>	_	
Q277	9.6	8.5(T)	8.5		_		
Q278	9.6	8.3	7.6(R)	_		_	
Q279	7.6(R)	8.5	8.5		_	_	





**SOLDER SIDE VIEW** 

SOLDER SIDE

OVERLAYS BLACK GDW-7706-O

**COMPONENT SIDE VIEW** 

MXW-7584-O MXW-7584-O (4) HLE9310B UHF RF Board

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (	unless otherwise stated	6.8 pF, ±5%, 50V
C2	21-13740B17	4.7 pF, ±5%, 50V
C3 C4	21-13740B15 21-13740B29	3.9 pF, ±5%, 50V 15 pF, ±5%, 50V
C5,6	21-13740B15	3.9 pF, ±5%, 50V
C7 C8	21-13740B29 21-13740B15	15 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C9	21-13740B14	3.6 pF, ±5%, 50V
C10 C11	21-13740B15 21-13740B31	3.9 pF, ±5%, 50V 18 pF, ±5%, 50V
C12	21-13740B45	68 pF, <u>+</u> 5%, 50V
C13,14 C15	21-13740B21 21-13740B15	6.8 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C16 C17	21-13740B13 21-13740B29	3.3 pF, ±5%, 50V
C18,19	21–13740B14	15 pF, ±5%, 50V 3.6 pF, ±5%, 50V
C20 C21,22	21-13740B30 21-13740B14	16 pF, ±5%, 50V 3.6 pF, ±5%, 50V
C23	21-13740B29	15 pF, ±5%, 50V
C24,25 C27	21-13740B11 21-11032B15	2.7 pF, ±5%, 50V .22 uF, +80, -20%, 50V
C28,29	21-13740B45	68 pF, ±5%, 50V
C30 C51	21-11032B15 21-13740B55	.22 uF, +80, -20%, 50V 180 pF, ±5%, 50V
C52	21-13740B27	12 pF, <u>+</u> 5%, 50V
C53 C54	21-13740B47 21-13740B61	82 pF, ±5%, 50V 330 pF, ±5%, 50V
C55,56 C57	21-13741B45 21-13740B31	.01 uF, ±5%, 50V
C58	21–13740B31	18 pF, ±5%, 50V 12 pF, ±5%, 50V
C59 C60,61	21-13740B31 21-13741B45	18 pF, ±5%, 50V .01 uF, ±5%, 50V
C65	21-11032B15	.22 uF, +80, -20%, 50V
C66 C67	21-13741B45 23-13749C39	.01 uF, ±5%, 50V 10 uF, ±10%, 50V, tantalum
C68	21-13740B33	22 pF, ±5%, 50V
C69 C70	21-13740B39 21-13740B29	39 pF, ±5%, 50V 15 pF, ±5%, 50V
C71	21-11032B15	.22 uF, +80, -20%, 50V
C72 C73	21-11032B15 23-13749C39	.22 uF, +80, –20%, 50V 10 uF, ±10%, 50V, tantalum
C74 C75	23-11048B13 21-13741B69	10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V
C76	23–11048B05	1 uF, ±20%, 50V, electrolytic
C77,78 C79	21-11032B15 21-13741B29	.22 uF, +80, -20%, 50V .0022 uF, ±5%, 50V
080	21-11032B15	.22 uF, +80, -20%, 50V
C81 C82,83	21-13740B55 21-11032B15	180 pF, ±5%, 50V .22 uF, +80, –20%, 50V
C84	21-13740B09	2.2 pF, ±5%, 50V
C85 C86	21–13740B27 23–11048B49	12 pF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic
C101 C102	23-11048B13 08-11051A13	10 uF, ±20%, 16V, electrolytic
2103,104	21-13741B45	.1 uF, ±5%, 63V .01 uF, ±5%, 50V
C105 C106	23-11048B13 21-13740B29	10 uF, ±20%, 16V, electrolytic 15 pF, ±5%, 50V
C107,108	21-13741B69	.1 uF, ±5%, 50V
C109 C110	08-11051A13 08-11051A19	.1 uF, ±5%, 63V 1 uF, ±5%, 63V
C111	08-11051A09	.022 uF, ±5%, 63V
C113-114 C115	21-13741B45 21-13740B45	.01 uF, ±5%, 50V 68 pF,±5%, 50V
C116	21-13740B49	100 pF, ±5%, 50V
C117 C118–120	21–13741B69 21–13740B45	.1 uF, ±5%, 50V 68 pF, ±5%, 50V
C121 C122	21-13740B49	not used 100 pF, ±5%, 50V
C123	21-13740B45	68 pF, ±5%, 50V
C124 C125	21-13740B19 21-13740B73	5.6 pF, ±5%, 50V .001 uF, ±5%, 50V
C126	21-13740B37	33 pF, ±5%, 50V
C127 C151	21–11032B15 21–13740B73	.22 uF, +80, -20%, 50V .001 uF, +5%, 50V
C152	21-13740B47	82 pF, ±5%, 50V
C153 C154	21-13740B25 21-13741B45	10 pF, ±5%, 50V .01 uF, ±5%, 50V
C155,156 C157	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V
C157	08–11051A15	.22 uF, ±5%, 63V
C159 C160	21-13740B35 21-13740B29	27 pF, ±5%, 50V 15 pF, ±5%, 50V
C161	21-13740B73	.001 uF, ±5%, 50V
C162 C163	23-11048B13 08-11051A17	10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V
C164	21–13741B69	.1 uF, ±5%, 50V
C165 C166		not used not used
C167		not used
C168 C176	21-13740B73	not used .001 uF, ±5%, 50V
C201	23-11048B13	10 uF, ±20%, 16V, electrolytic
C205 C206	21-13740B45 21-13740B19	68 pF, ±5%, 50V 5.6 pF, ±5%, 50V
C207 C208,209	21-13740B27	12 pF, ±5%, 50V
C210	21-13740B23 21-13740B49	8.2 pF, ±5%, 50V 100 pF, ±5%, 50V
C211 C212	21-13740B49	not used 100 pF, ±5%, 50V
	2. 10170070	. 13 pr., 1070, 001

		MXW-7584-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C213	21-13740B01	1 pF, ±5%, 50V
C121 C215	21-13740B49	not used 100 pF, ±5%, 50V
C216	21-13740B13	3.3 pF, ±5%, 50V
C218	21-13741B49	100 pF, ±5%, 50V
C219 C220	21-13740B23	not used 8.2 pF, ±5%, 50V
C221	21–13740B05	1.5 pF, ±5%, 50V
C222	21-13740B49	100 pF, ±5%, 50V
C223 C224,225	21-13740B49	not used 100 pF, ±5%, 50V
C228	21-13741B29	.0022 uF, ±5%, 50V
C229	04 40740004	not used
C230,231 C233	21-13740B01 21-13740B11	1 pF, ±5%, 50V 2.7 pF, ±5%, 50V
C234	21-13740B21	6.8 pF, ±5%, 50V
C235 C236	21-13740B17 21-13740B15	4.7 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C237	21–13740B45	68 pF, ±5%, 50V
C238	04 40740745	not used
C239 C240	21-13740B45 21-13740B01	68 pF, ±5%, 50V 1 pF, ±5%, 50V
C241	21 10740001	not used
C242	21-13740B45	68 pF, ±5%, 50V
C243 C245	21-13740B09 21-13740B45	2.2 pF, ±5%, 50V 68 pF, ±5%, 50V
C246	21 10740540	not used
C247	21-13740B29	15 pF, ±5%, 50V
C248 C249	21-13740B05 21-13740B45	1.5 pF, ±5%, 50V 68 pF, ±5%, 50V
C250		not used
C251,252 C253	21-13740B45	68 pF, ±5%, 50V not used
C256	21-13741B45	.01 uF, ±5%, 50V
C258	08-11051A07	.01 uF, <u>+</u> 5%, 63V
C259	21-13740B22 21-13740B19	7.5 pF, ±5%, 50V
C260 C263	21–13740B19 21–13740B19	5.6 pF, ±5%, 50V 5.6 pF, ±5%, 50V
C266	21-13740B03	1.2 pF, ±5%, 50V
C267	21-13740B01	1 pF, ±5%, 50V
C268 C269	21-13740B13 21-13740B09	3.3 pF, ±5%, 50V 2.2 pF, ±5%, 50V
C276	21-13741B45	.01 uF, ±5%, 50V
C277,278	23-11048B19	47 uF, ±20%, 16V, electrolytic
C301 C302–313	21-13741B45 21-13740B45	.01 uF, ±5%, 50V 68 pF, ±5%, 50V
diode (see note)		55 p., 25 %, 55 °
CR1	48-80236E16	Schottky
CR2	48-80154K02	Schottky
CR3 CR51	48-80939T01 48-83654H01	Schottky silicon
CR101,102	48-83654H01	silicon
CR151,152	48-05129M21	varactor
CR153,154 CR176	48-83654H01 48-82256C11	silicon
CR203	48-84534N02	zener varactor
CR205	48-84534N02	varactor
CR206 CR209	48-80154K02 48-84534N02	Schottky
CR211	48-84534N02	varactor varactor
CR213	48-84534N02	varactor
CH214	48-80939101	Schottky
filter FL51	91-80097D06	6 element, ceramic
FL52	91–80097D00	3 element, ceramic
connector recepta	cle	
J4,5	09-80135M01	2 pin coax
J6	09-80130M03	14 position socket
RF coil L1-7	24-80148M01	27 nH, 1.5 turns
L8,9	24-11030B04	1.5 turns, yellow
L51	24-11030B12	7.5 turns, yellow
L52 L53	24-80063M13 24-80063M04	1 uH .18 uH
L54	24-80063M21	4.7 uH
L55	24-80164M04	5.2 turns, variable
L56 L57	24-80164M01 24-80164M04	1:6 ratio, variable 5.2 turns, variable
L57 L58	24-80063M21	4.7 uH
L59	24-80164M03	4.3 turns, variable
L60 L61	2480063M14 2580000E01	1.2 uH transmformer
L101	24-80063M04	.18 uH
L102	24-11030B08	4.5 turns, brown
L151	24-80299D01	17.75 turns, orange
L152 L202	24-80063M22 24-80148M01	5.6 uH 27 nH, 1.5 turns
L203	24-60578C15	150 nH, <u>+</u> 20%
L204	24-11030B09	4.5 turns, brown
L205,206 L207	24-60578C15 24-80063M05	150 nH, <u>±</u> 20% .22 uH
L209	2411030B05	2.5 turns, green
L210	24-11030B08	4.5 turns, brown
L211	24-80063M05 24-80148M01	.22 uH 27 nH 1.5 turns
L213 L214	24-80148M01 24-60578C14	27 nH, 1.5 turns 120 nH, ±20%
L215	24-11030B08	4.5 turns, brown
L216,217	24-60578C14	120 nH, ±20%
		-

REFERENCE	MOTOROLA PART NO	DESCRIPTION
<b>SYMBOL</b> L218	PART NO. 24–80063M04	.18 uH
L220 L221	24-11030B05 24-11030B08	2.5 turns, green 4.5 turns, brown
.222	24-80063M04	.18 uH
transistor (see note	e) 48–80182D44	NPN
Q1 Q2–4	48-00869643	PNP
Q51,52 Q53	48-00869839 48-00869642	N-channel NPN
Q54	4805128M16	PNP
Q101 Q102,103	48-00869643 48-80182D20	PNP NPN
Q104	4800869643	PNP NPN
Q105,106 Q107	48-00869642 48-00869658	NPN
Q151 Q152	48-00869658 48-00869643	NPN PNP
Q203	48-05128M66	N-channel
Q204,205 Q206	48-80950X01 48-05128M66	NPN N-channel
Q207,208	48-80950X01	NPN
Q276 Q277–279	48-00869642 48-00869643	NPN PNP
	m, ±5%, 1/8 watt (unle	
R1 R2	06-11077A84 06-11077A62	2.7k 330
R3	06-11077A60	270
R4 R5	06-11077B01 06-11077B03	12k 15k
R6	06-11077A90	4.7k
R7 R51	0611077A98 0611077A44	10k 56
R52 R53	06-11077A54 06-11077A98	150 10k
R54	0611077A54	150
R56 R57	06-11077B45 06-11077A72	820k 820
R58	06-11077B23	100k
R59 R60	06-11077B27 18-05500L08	150k 22k, ±20%, potentiometer
R61 R62	06-11077B19 06-11077B09	68k 27k
R63	06-11077B21	82k
R64 R65	06-11077B45 06-11077A98	820k 10k
R102	06-11077A62	330
R103,104 R105	06-11077A98 06-11077B11	10k 33k
R106	06-11077A43	910
R107 R108,109	06-11077A78 06-11077A26	1.5k 10
R110 R111	06-11077B03 06-11077A54	15k 150
R112	06-11077A72	820
R113 R114	06-11077A58 06-11077A50	220 150
R115	06-11077A70	680
R116 R118	06-11077A92 06-11077A70	5.6k 680
R119,120	06-11077A88	3.9k
R121 R122	0611077A84 0611077A88	2.7k 3.9K
R123 R124	06-11077A74 06-11077A78	1k 1.5k
R125	06-11077A44	56
R126 R127	0611077A50 0611077A84	100 2.7k
R128	06-11077A72	820
R151 R152	06-11077B15 06-11077B11	47k 33k
R153	06-11077B15 06-11077A34	47k 22
R154 R155	06-11077A98	10k
R156 R157	06-11077B03 06-11077A78	15k 1.5k
R158,159	06-11077A74	1k
R161 R163	06-11077A98 06-11077B17	10k 56k
R164	18-05500L08	22k, ±20%, potentiometer 22k
R165 R176	06-11077B07 06-11077G26	22.6k, <u>+</u> 1%
R177 R178	06-11077G18 06-11077F91	18.7k, ±1% 10k, ±1%
R179	06-11077F91	10k, ±1%
R180 R181	06-11077G52 06-11077F91	42.2k, ±1% 10k, ±1%
R182	06-11077G28	23.7k, ±1%
R207,208 R209	06-11077A44 06-11077A38	56 33
R210	06-11077A98	10k
R211 R212	06-11077A84	not used 2.7k
R213	06-11077A72	820 100
R214 R215	06-11077A50 06-11077A84	2.7k
R216 R217	06-11077A72 06-11077A68	820 560
R218	06-11077A56	180
R219 R220	06-11077A38 06-11077A56	33 180

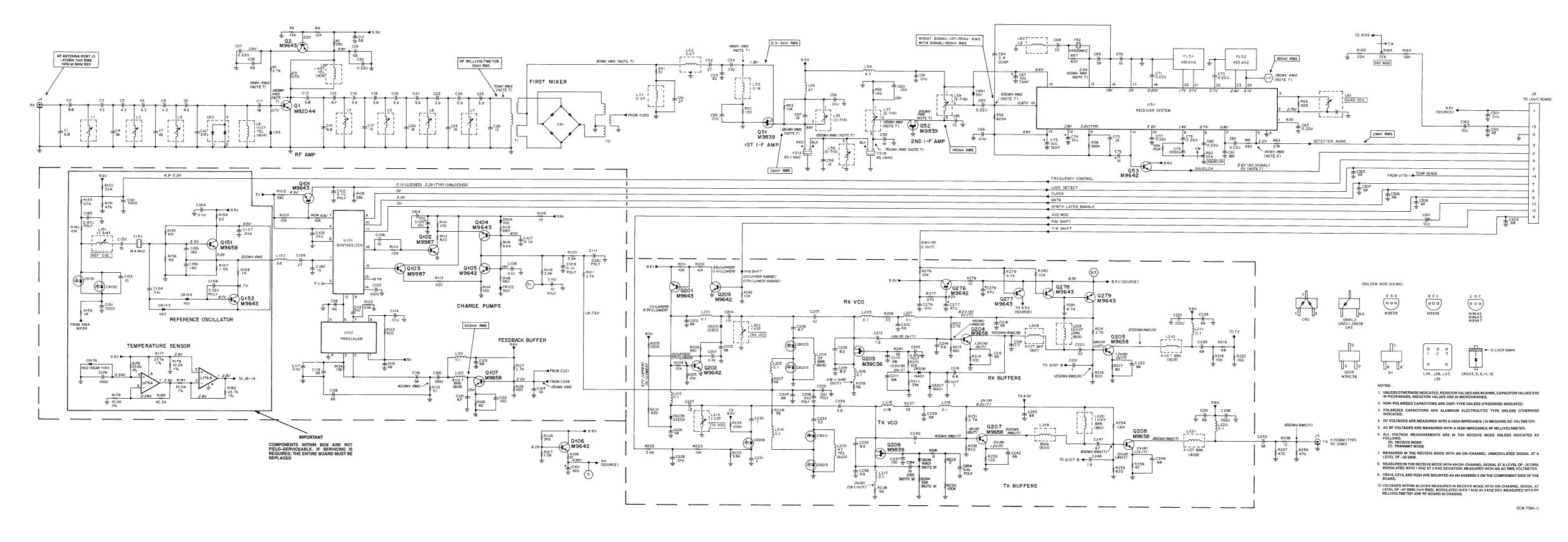
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R222	06-11077A88	3.9k
R223	06-11077A94	6.8k
R224	06-11077B23	100k
R225	06-11077A90	4.7k
R226	06-11077A44	56
R227	06-11077A34	22
R228	06-11077A38	33
R229	06-11077A98	10k
R231	06-11077A84	2.7k
R232	06-11077A72	820
R233	06-11077A46	68
R234	06-11077A84	2.7k
R235	06-11077A72	820
	06-11077A46	68
R236		
R237	06-11077A66	470
R238	06-11077A28	12
R239	06-11077A66	470
R241		not used
R243	0611077B23	100k
R244,245	06-11077A74	1k
R246	06-11077B09	27k
R276	06-11077A98	10k
R277	06-11077A60	270
R278	06-11077A26	10
R279	06-11077A20	4.7k
R280	06-11077A90	10k
R281	06-11077A90	4.7k
R301	06-11077A82	2.2k
R302	1805500L08	22k, ±20%, 100V, potentiometer
R303	0611077A94	6.8k
transformer		500 1111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
T1,2	25-80163M02	500 MHz balance transformer
integrated circuits		
U51	51-05479G05	linear
U101	51-84704M75	synthesizer
U102	51-83977M45	prescaler
U176	51-84621K89	dual opamp
crystal (see note)		• •
Y51	91-80022M02	45.1 MHz
Y52	48-80008K02	44.645 MHz
Y151	48–80174D05	14.4 MHz
		anical parts
	14-05160A01	insulator
	26-80098M01	coil can shield, 10 used
	26-80097M01	coil can shield
		coay connector shield
	26-80228L01	coax connector shield
	26-80228L01 26-80228L01	coax connector shield
	26-80228L01 26-80228L01 26-80229L03	coax connector shield VCO shield
	26-80228L01 26-80228L01 26-80229L03 26-80256L02	coax connector shield VCO shield coax connector bottom shield
	26-80228L01 26-80228L01 26-80229L03 26-80256L02 30-10286A72	coax connector shield VCO shield coax connector bottom shield 24 strand wire, white
	26-80228L01 26-80228L01 26-80229L03 26-80256L02 30-10286A72 42-80957X01	coax connector shield VCO shield coax connector bottom shield 24 strand wire, white grounding clip
	26-80228L01 26-80228L01 26-80229L03 26-80256L02 30-10286A72 42-80957X01 54-80111F01	coax connector shield VCO shield coax connector bottom shield 24 strand wire, white grounding clip PROM label
	26-80228L01 26-80228L01 26-80229L03 26-80256L02 30-10286A72 42-80957X01	coax connector shield VCO shield coax connector bottom shield 24 strand wire, white grounding clip PROM label crystal base pad, 2 used
	26-80228L01 26-80228L01 26-80229L03 26-80256L02 30-10286A72 42-80957X01 54-80111F01	coax connector shield VCO shield coax connector bottom shield 24 strand wire, white grounding clip PROM label

2/28/90 **note:** For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

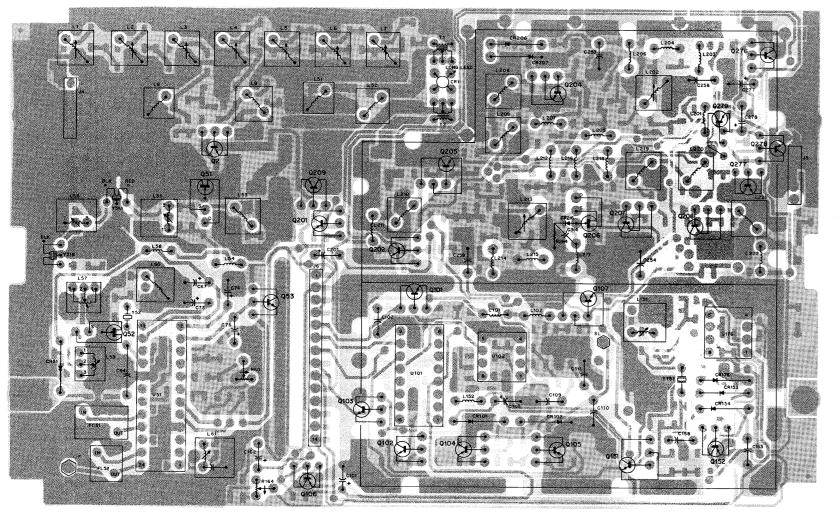
Schematic, Circuit Board Diagrams, and Parts List for HLE9310B UHF RF Board PW-7582-O (Sheet 3 of 3) 3/31/90

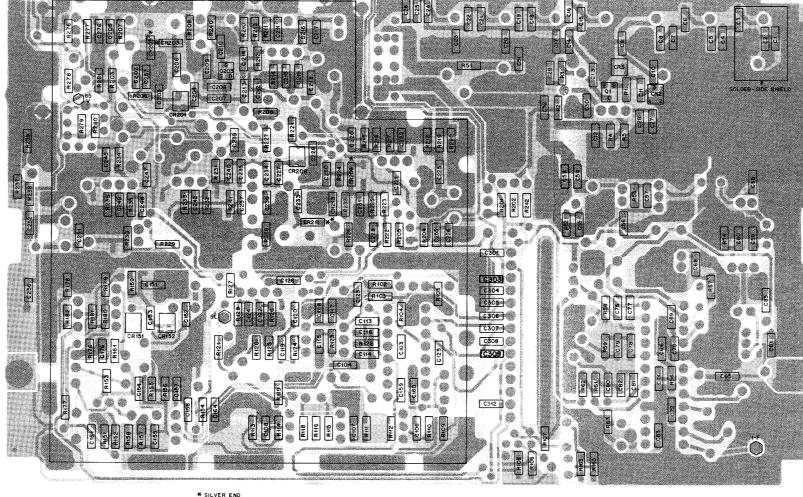
UHF RF Board Transistor D.C. Voltage Table

		VOLTAGE		VOLTAGE		
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.7	0	5.9	_		_
Q2	5.3	5.9	.9		_	<u> </u>
Q51	_	_	_	0	1.8	9.6
Q52	_			0	1.8	9.6
Q53	0	0 (W/ SIG)	9.6	_		
Q101	5.0	4.9	.1 (LOCKED)			_
Q102	.7	0	0.1	_	_	_
Q103	5.0	4.4	9.6	_	_	
Q104	8.1	2.8v	2–8v	_		
Q105	1.4	VAR.	2–8v	_	<b>†</b>	_
Q106	6.0	5.0	9.6		_	_
Q107	2.0	1.3	9.6	_		_
Q151	5.5	5.2	9.5			
Q152	8.7	9.5	6.7	_		_
Q201		9.6	0(U) 9.3(L)	U=UPPER L=LOWER RANGE		
Q202	0(U).7(L)	0	6.7(U)0(L)	_	_	_
Q203	_	_	_	2.6(R)	4.8(R)	7.9(R)
Q204	1.8(R)	1.2(R)	8.2(R)			_
Q205	1.8(R)	1.2(R)	9.6	_		
Q206	_	_		5(T)	1.1(T)	7.8(T)
Q207	1.8(T)	1.2(T)	8.5(T)	_	_	_
Q208	1.8(T)	1.2(T)	9.6	——————————————————————————————————————		_
Q276	9.5	8.6	9.6		_	_
Q277	9.6	8.5(T)	8.5		-	_
Q278	9.6	8.3	7.6(R)		_	_
Q279	7.6(R)	8.5	8.5			_



Schematic, Circuit Board Diagrams, and Parts List for HLE4425B UHF RF Board PW-5283-C (Sheet 1 of 2) 4/28/90





**COMPONENT SIDE VIEW** 

SOLDER SIDE OVERLAY

BLACK

SOLDER SIDE RED BLACK GBW-5297-A

SOLDER SIDE VIEW

parts list HLE4425B MaxTrac UHF 25 kHz Range 2 RF Board MXW-7407-O (2) MXW-7407-O (3) MOTOROLA PART NO. DESCRIPTION capacitor, fixed (unless otherwise stated) 21-13740B01 21-13740B45 48-00869643 21-13740B21 48-00869839 48-00869642 21–13740B16 21–13740B30 21–13740B16 21–13740B30 21-13740B45 21-13740B01 21-13741B45 21-13740B01 48-00869643 48-80182D20 48-00869643 48-00869642 48-00869658 C224-226
C227
C228
C230,231
C233
C234
C235,236
C237
C238
C239
C240
C242
C245
C247
C248
C249
C251,252
C253
C254
C255,256
C257
C258,259
C276
C277,278
C302
C303
C304-308
C309
C314 21–13740B13 21–13740B19 21–13740B16 21–13740B53 48-00869658 48-00869643 48-00869643 48-00869642 21-13740B15 21-13740B31 21-13740B45 21-13740B15 21-13740B17 21-13740B15 21-13740B15 21-13740B31 21-13740B31 4.3 pF, ±5%, 50V 150 pF, +5%, 50V 21–13740B45 21–13740B45 21–13740B45 21–13740B45 21–13740B17 21–13740B07 21–13740B45 08–11051A17 08–11051A17 08–11051A17 08–11051A07 21–13741B53 21–13741B69 08–11051A07 21–13741B45 23–11048B19 21–13741B45 not used 68 pF, ±5%, 50V 48-84939C36 48-00869658 48-00863839 48-80182D39 1 pF, ±5%, 50V 68 pF, ±5%, 50V 68 pF, ±5%, 50V 4.7 pF, ±5%, 50V 1.8 pF, ±5%, 50V 48-00863642 48-00863642 21-13740B15 21-13740B25 21-13740B25 21-13740B45 21-13740B45 21-13740B45 21-13740B61 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B32 21-13740B39 21-13741B45 23-13741B45 23-13740B39 21-13740B29 21-11032B15 21-13740B29 21-11032B15 21-13740B29 21-11032B15 21-13740B29 21-11032B15 21-13740B29 21-11032B15 21-13740B29 21-11032B15 21-13740B29 21-13740B29 21-13740B29 21-13740B29 21-13740B25 21-13740B29 21-13740B45 21-13740B55 21-13740B45 21-13740B45 21-13740B45 21-13740B45 21-13740B55 21-13740B5 21-13740B55 21-13740B45 21-13740B55 21-13740B45 21-13740B5 21-13740B55 21-13740B56 21-1374 15 pF, ±5%, 50V 3.9 pF, ±5%, 50V 12 pF, ±5%, 50V 48-00869643 68 pF, ±5%, 50V .47 uF, ±5%, 63V .1 uF, ±5%, 63V hm, ±5%, 1/8 watt (unless otherwise stated) .022 uF. +5%, 50V 06-11077A60 06-11077B01 06-11077B03 06-11077A43 06-11077A54 06-11077A98 .022 ur, ±5%, 50V .1 uF, ±5%, 50V .01 uF, ±5%, 63V .01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic .01 uF, ±5%, 50V 06-11077A54 06-11077B45 21-13740B45 68 pF, ±5%, 50V not used 68 pF, ±5%, 50V 10 pF, ±.5 pF, 50V 06-11077B23 06-11077B27 18-05500L08 06-11077B19 21-13740B45 21-11022H27 C314
diode (see note)
CR1
CR2
CR3
CR51
CR101,102
CR1511,152
CR153,154
CR176
CR201
CR203
CR205
CR206,207
CR208
CR209
CR209
CR211
CR213
CR216
filter 22k. +20%, potentiomete 10 uF, ±10%, 50V, tantalur 22 pF, ±5%, 50V 39 pF, ±5%, 50V 15 pF, ±5%, 50V .22 uF, +80, -20%, 50V 10 uF, ±10%, 50V, tantalum Schottky Schottky Schottky silicon varactor silicon pin varactor varactor varactor hot carrier 48-80236E16 06-11077809
06-11077821
06-11077A92
06-11077A93
06-11077A73
06-11077A73
06-11077A73
06-11077A92
06-11077A58
06-11077A58
06-11077A59
06-11077A70
06-11077A92
06-11077A94
06-11077A97 48-80154K02 48-80939T01 R63
R102
R103,104
R105
R106
R107
R108,109
R110
R111
R112
R113
R114
R115
R118
R119,120
R121
R122
R123
R124
R125
R126
R127
R128
R151
R152
R153
R154
R155
R156
R157
R158,159
R161
R161
R177
R178,179
R180
R181
R182
R201,202
R203
R204,205
R207
R208
R209
R210
R211
R212
R213
R214 48-83654H01 48-83654H01 48-05129M21 48-83654H01 1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V 48-83654H02 48-80142L01 .0022 uF, ±5%, 50V .22 uF, +80, -20%, 50V 48-05649Q02 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V 48-84616A01 48-80142L01 C82,83
C84
C85
C101
C102
C103,104
C105
C106
C107,108
C109
C110
C111
C113,114
C115,116
C120
C121
C122
C123
C124
C125
C126
C151
C152
C153
C154
C155,156
C157
C158
C159
C160 12 pF, +5%, 50V 48-05649Q02 varactor varactor .1 uF, ±5%, 63V .01 uF, ±5%, 50V 48-84616A01 91-80097D06 FL51 FL52 15 pF, ±5%, 50V .1 uF, ±5%, 50V 6 element, ceramic 91-80098D06 3 element, ceramic 06-11077A72 06-11077A78 06-11077A51 06-11077A48 06-11077A84 06-11077B15 06-11077B15 06-11077B15 connector receptacle J4,5 J6 24-11030B04 24-80063M09 06-11077A34 06-11077A98 24-80063M04 24-80063M21 24-80164M04 06-11077R03 06-11077A78 06-11077A74 06-11077A98 06-11077B17 18-05500L08 06-11077G26 06-11077G26 06-11077G28 06-11077F91 06-11077F91 06-11077G38 06-11077A98 06-11077A98 06-11077A98 06-11077A98 06-11077A98 06-11077A98 5.2 turns, variable 1:6 ratio, variable 24-80164M04 24-80063M21 24-80164M03 24-80063M14 4.3 turns, variable 1.2 uH 22k, ±20%, potentiometer 24–80063M14 25–80000E01 24–80063M01 24–11030B08 24–80299D01 24–80063M01 24–80148M01 24–80063M01 4.5 turns, brown 17.75 turns, orange 10k, ±1% 23.7k, ±1% 27 µF, ±5%, 50V 15 pF, ±5%, 50V .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V .1 uF, ±5%, 50V 27 nH, 1.5 turns 24-11030A04 24-80063M01 24-11030B07 24-11030B05 2.5 turns, areer 24-11030B08 24-80063M01 24-80148M01 24-80063M01 06-11077A44 06-11077A98 27 nH, 1.5 turns 06-11077A36 06-11077B11 06-11077A84 06-11077A72 06-11077A50 24-11030A03 24-80063M04 24-80063M01 06-11077A84 06-11077A72 24-11030E01 24-11030B01 24-11030B09 1.5 turns, brown 4.5 turns, brown 06-11077A50

06-11077A50 06-11077A72 06-11077A88

transformer T1,2

transistor (see note)

25-80163M02

48-80950X01

500 MHz balance transformer

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R225	06-11077A86	3.3k
R226	06-11077A44	56
R227	06-11077A38	33
R228	06-11077A44	56
R229	06-11077A01	0 ohm
R230	06-11077B23	100k
R231	06-11077A84	2.7k
R232	06-11077A72	820
R233	06-11077A50	100
R234	06-11077A80	1.8k
R235	06-11077A72	820
R236	06-11077A48	82
R237	06-11077A-66	470
R238	06-11077A28	12
R239	06-11077A66	470
R240	06-11077A00	10
R241	06-11077A20	0 ohm
R242	06-11077A98	10k
R276	06-11077A98	10k
R277	06-11077A98	270
B278	06-11077A00	10
R279	06-11077A20	4.7k
R280	06-11077A98	10k
R281	06-11077A90	4.7k
R284	18-05500L08	22k, ±20%, 100V, potentiometer
		22K, ±20%, 100V, potentionieter
integrated circuits		P
U51	51-05479G05	linear
U101	51-84704M75	synthesizer
U102	51-83977M45	prescaler
U176	51-84621K89	dual opamp
crystal (see note)		
Y51	91-80022M02	45.1 MHz
Y52	48-80008K02	44.645 MHz
Y151	48-80174D05	14.4 MHz
	non-refe	erenced parts
	05-00003152	eyelet
	14-05160A01	insulator
	26-80098M01	coil can shield, 10 used
	26-80097M01	coil can shield
	26-80228L01	IF bottom shield
	26-80256L02	coax connector bottom shield
	26-80229L03	VCO shield
	30-10286A72	24 strand wire, white
	42-80957X01	grounding clip
	54-80111F01	PROM label
	75-05295B02	crystal base pad, 2 used
	75-05295B07	crystal base pad, 2 used
		circuit board

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

> Schematic, Circuit Board Diagrams, and Parts List for HLE4425B UHF RF Board PW-5283-C

(Sheet 2 of 2) 4/28/90

UHF RF Board Transistor D.C. Voltage Table

C31 C32

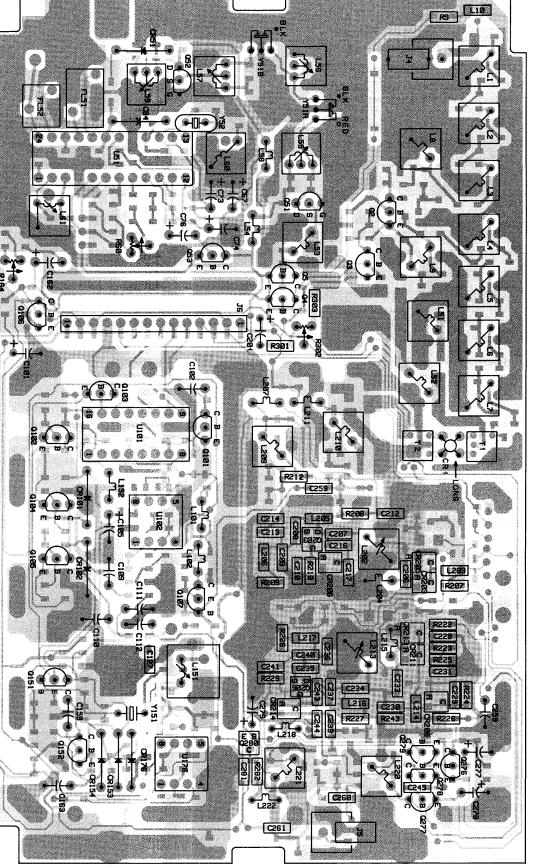
		VOLTAGE			VOLTAGE	
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.7	0	5.9			
Q2	5.3	5.9	.9	_		
Q51		_		0	1.8	9.6
Q52	_	_	_	0	1.8	9.6
Q53	0	0 (W/ SIG)	9.6	_	_	_
Q101	5.0	4.9	.1 (LOCKED)	_	_	_
Q102	.7	0	0.1		_	
Q103	5.0	4.4	9.6	<del>-</del>	_	
Q104	8.1	2.8v	28v	_	_	_
Q105	1.4	VAR.	2–8v	_		_
Q106	6.0	5.0	9.6	-	_	_
Q107	2.0	1.3	9.6	_	_	_
Q151	5.5	5.2	9.5		_	_
Q152	8.7	9.5	6.7		_	_
Q201	_	9.6	0(U) 9.3(L)	U=UF	PER L=LOWER RA	ANGE
Q202	0(U).7(L)	0	6.7(U)0(L)	_		_
Q203	_	_	_	2.6(R)	4.8(R)	7.9(R)
Q204	1.8(R)	1.2(R)	8.2(R)	_	_	_
Q205	1.8(R)	1.2(R)	9.6		_	_
Q206	_	-	_	5(T)	1.1(T)	7.8(T,
Q207	1.8(T)	1.2(T)	8.5(T)	_	_	_
Q208	1.8(T)	1.2(T)	9.6	_	_	
Q276	9.5	8.6	9.6	_	_	_
Q277	9.6	8.5(T)	8.5	_	_	_
Q278	9.6	8.3	7.6(R)	_	_	_
Q279	7.6(R)	8.5	8.5	_		_

FIRST MIXER RECEIVER SYSTEM IST I-F AMP FROM U476-4 TEMP SENSE FREQUENCY CONTROL O.IV (LOCKED) 3.OV (TYP) (UNLOCKED) LOCK DETECT VCO MOD T/R SHIFT CR2 CR206, 14 CHARGE PUMPS REFERENCE OSCILLATOR L202 21/2T RX VCO PRESCALER 1. UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN PICOFARADS, INDUCTOR VALUES ARE IN MICROHENRIES. 2. NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED. 3. POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED. 4. DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER. 5. AC RF VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE RF MILLIVOLTMETER. 6.0V M9642
RIOR
1.5K RIOR
10.95V SV (SOURCE) 6. ALL VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:

(R) RECEIVE MODE

(T) TRANSMIT MODE R237 R239 7. MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM. 8. 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. TX BUFFERS

Schematic, Circuit Board Diagrams, and Parts List for HLE4424A UHF RF Board **PW-7587-O** (Sheet 1 of 2) 3/31/90



**COMPONENT SIDE VIEW** 

COMPONENT SIDE OVERLAYS

GBW-7720-C RED GREY GBW-7721-O BLACK

R106

GDW-7722-O

R53 C57

**SOLDER SIDE VIEW** 

### parts list

HLE4424A MaxTrac UHF 25 kHz Range 1 RF Board MXW-7408-O MOTOROLA capacitor, fixed (unless otherwise stated) 8.2 pF, ±5%, 50V 21-13740B23 8.2 pf., ±5%, 50V 6.8 pf., ±5%, 50V 4.7 pf. ±5%, 50V 16 pf., ±5%, 50V 16 pf., ±5%, 50V 4.7 pf. ±5%, 50V 4.7 pf., ±5%, 50V 8.2 pf., ±5%, 50V 8.2 pf., ±5%, 50V 6.8 pf., ±5%, 50V 6.8 pf., ±5%, 50V 6.8 pf., ±5%, 50V 8.2 pf., ±5%, 50V 21-13740B21 21-13740B17 21-13740B18 21-13740B30 21-13740B17 21-13740B19 21-13740B23 21–13740B37 21–13740B45 C12 C13 C14 C15,16 C17 C18,19 C20 C21,22 C23 C24 C25 C26 C27 C28,29 C30 C31 21–13740B23 21–13740B17 21–13740B29 21–13740B17 8.2 pF, ±5%, 50V 4.7 pF, ±5%, 50V 15 pF, ±5%, 50V 4.7 pF, ±5%, 50V 4.7 pF, ±5%, 50V 18 pF, ±5%, 50V 1.7 pF, ±5%, 50V 1.5 pF, ±5%, 50V 3.9 pF, ±5%, 50V 3.9 pF, ±5%, 50V 6.8 pF, ±5%, 50V .22 uF, +80, -20%, 50V .22 uF, +80, -20%, 50V .22 uF, +80, -20%, 50V 21-13740B17 21-13740B17 21-13740B17 21-13740B17 21-13740B15 21-13740B21 21-11032B15 21-13740B45 21-11032B15 21-13740B49 100 pF, ±5%, 50V .22 uF, +80, -20%, 50V 21–11032B15 21–13740B55 .22 uF, +80, -20%, 50V 150 pF, ±5%, 50V 12 pF, ±5%, 50V 82 pF, ±5%, 50V 330 pF, ±5%, 50V .01 uF, ±5%, 50V 12 pF, ±5%, 50V 12 pF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V 21-13740B27 21-13740B47 C54 C55,56 C57 21–13740B61 21–13741B45 21–13740B31 21–13740B27 21-13741B45 21–13741B45 21–11032B15 21–13741B45 .22 uF, +80, -20%, 50V .01 uF, ±5%, 50V 10 uF, ±10%, 50V, tantalum 22 pF, ±5%, 50V 39 pF, ±5%, 50V .22 uF, +80, -20%, 50V 10 uF, ±10%, 50V, tantalum 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V .1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V .0022 uF, ±5%, 50V 23-13749C39 21-13740B33 21-13740B39 21–13740B29 21–13740B29 21–11032B15 23–13749C39 23–11048B13 21–13741B69 23–11048B05 C74 C75 C76 C77,78 C79 C80 C81 C82,83 21-11032B15 21-13741B29 21-11032B15 21-13740B55 .22 ur, +60, -20%, 50V 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V 2.4 pF, ±5%, 50V 12 pF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 63V 21-11032B15 21-82450B14 C82,83 C84 C85 C101 C102 C103,104 C105 C106 C107,108 C109 C110 C111 C113,114 08-11051A13 21-13741B45 .01 uF, ±5%, 50V 10 uF, ±5%, 50V 15 pF, ±5%, 50V .1 uF, ±5%, 50V 23-11048B13 21-13740B29 21-13741B69 08-11051A11 1.0 L, ±5%, 50V 0.47 uF, ±5%, 63V 1.0 L, ±5%, 63V 0.1 uF, ±5%, 50V 1.0 LF, ±5%, 50V 08-11051A11 08-11051A19 08-11051A07 21-13741B45 21-13740B45 21-13740B49 C115 C116 C117 C118-123 C124 C126 C127 C151 C152 C153 C154 C155,156 C157 C161 C162 C163 C164 C176 C201 C205 C206 C207 C208,209 21–13740B49 21–13740B49 21–13740B19 21–13740B73 21-13740B37 21-11032B15 33 pF, ±5%, 50V .22 uF, +80, -20%, 50V 22 uF, +80, -20%, 50V .001 uF, ±5%, 50V 82 pF, ±5%, 50V 10 pF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V .01 uF, ±5%, 50V .02 uF, ±5%, 50V .05 pF, ±5%, 50V .001 uF, ±5%, 50V .001 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 50V .001 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 50V .001 uF, ±5%, 50V 21–13740B73 21–13740B47 21–13740B25 21–13741B45 21–13740B55 21–13741B45 08-11051A15 21-13740B35 21-13740B29 21-13740B73 23-11048B13 08-11051A17 21-13741B69 21–13740B73 23–11048B13 21–13740B49 21–13740B17 21–13740B17 21–13740B25 21–13740B49 21–13740B49 C210 C212 C213 C215 C216,217 1 pF, ±5%, 50V 1 pF, ±5%, 50V 100 pF, ±5%, 50V 3.3 pF, ±5%, 50V 100 pF, ±5%, 50V 10 pF, ±5%, 50V 1.5 pF, ±5%, 50V 21-13740B01 21-13740B49 21-13740B13 21-13741B49 21-13740B25 21-13740B05

EFERENCE	MOTOROLA	MXW-7408-O (2) DESCRIPTION	REFERENCE	MOTOROLA	MXW-7408-O (3)  DESCRIPTION
YMBOL	PART NO.		SYMBOL	PART NO.	
222 224,225	21-13740B49 21-13740B49	100 pF, ±5%, 50V 100 pF, ±5%, 50V	Q101 Q102,103	48-00869643 48-80182D20	PNP NPN
228	21-13741B29	.0022 uF, ±5%, 50V	Q104	48-00869643	PNP
230,231 233	21-13740B05 21-13740B17	1.5 pF, ±5%, 50V 4.7 pF, ±5%, 50V	Q105,106 Q107	48-00869642 48-00869658	NPN NPN
234	21-13740B26	11 pF, <u>+</u> 5%, 50V	Q151	48-00869658	NPN
235,236 237	21-13740B19 21-13740B49	5.6 pF, ±5%, 50V 100 pF, ±5%, 50V	Q152 Q203	48-00869643 48-05128M66	PNP N-channel
239	21-13740B49	100 pF, ±5%, 50V	Q204,205	48-80950X01	NPN
240 242	21-13740B05 21-13740B49	1.5 pF, ±5%, 50V 100 pF, ±5%, 50V	Q206 Q207,208	48-05128M66 48-80950X01	N-channel NPN
243,244	21-13740B13	3.3 pF, ±5%, 50V	Q276	48-00869642	NPN
245 247	21-13740B49 21-13740B23	100 pF, ±5%, 50V 8.2 pF, ±5%, 50V	Q277–279 Q280	48–00869643 48–80214G02	PNP
248	21-13740B01	1 pF, <u>+</u> 5%, 50V		m, ±5%, 1/8 watt (unle	ss otherwise stated)
249 252	21-13740B49 21-13740B49	100 pF, ±5%, 50V 100 pF, ±5%, 50V	R1	06-11077A84	2.7k
258	08-11051A07	.01 uF, ±5%, 63V	R2 R3	06-11077A62 06-11077A60	330 270
259 263	21-13740B23 21-13740B19	8.2 pF, ±5%, 50V 5.6 pF, ±5%, 50V	R4	06-11077B01	12k
266	21–13740B03	1.2 pF, ±5%, 50V	R5 R7,8	06-11077B03 06-11077A98	15k 10k
267 276	21-13740B01 21-13741B45	1 pF, ±5%, 50V .01 uF, ±5%, 50V	R9	06-11077A72	820
277–279	23–11048B19	47 uF, ±20%, 16V, electrolytic	R51 R52	06-11077A43 06-11077A54	51 150
280	21-13740B45	68 pF, ±5%, 50V	R53	06-11077A98	10k
301 302	21-13741B45 21-13740B49	.01 uF, ±5%, 50V 100 pF, ±5%, 50V	R54	06-11077A54	150
304–308	21-13740B45	68 pF, ±5%, 50V	R56 R57	06-11077B45 06-11077A72	820k 820
309–311 312	21-13740B49 21-13740B45	100 pF, ±5%, 50V 68 pF, ±5%, 50V	R58	06-11077B23	100k
313	21-13740B49	100 pF, ±5%, 50V	R59 R60	06-11077B27 18-05500L08	150k 22k, ±20%, potentiometer
314	21-11022H27	10 pF, ±.5 pF, 50V	R62	06-11077B09	27k
ode (see note) R1	48-80236E16	Schottky	R63 R102	06-11077B21 06-11077A62	82k 330
R2	48-80154K02	Schottky	R103,104	06-11077A98	10k
R3 R4	48-80939T01 48-80142L01	Schottky pin	R105 R106	06-11077B11 06-11077A73	33k 910
R51	48-83654H01	silicon	R107	06-11077A78	1.5k
R101,102 R151,152	48-83654H01 48-05129M21	silicon varactor	R108,109 R110	06-11077A26 06-11077B03	10 15k
R153,154	48-83654H01	silicon	R111	06-11077A60	270
R176 R203	48–83654H02 48–84534N02	silicon varactor	R112 R113	06-11077A76 06-11077A64	1.2k 390
R205	48-84534N02	varactor	R114	06-11077A60	270
R206 R209	4880154K02 4884534N02	Schottky varactor	R115 R116	0611077A72 0611077A94	820 6.8k
R211	48-84534N02	varactor	R118	06-11077A72	820
R213	48-84534N02	varactor	R119 R120	06-11077A88	3.9k 6.8k
R214 ter	48–80154K02	Schottky	R121	06-11077A94 06-11077A98	10k
51	91-80097D06	6 element, ceramic	R122	06-11077A88	3.9k
_52	91-80098D06	3 wire, ceramic	R123 R124	06-11077A74 06-11077A78	1k 1.5k
onnector receptack		2 pin appy	R125	06-11077A44	56
1,5 S	0980135M01 0980130M03	2 pin coax 14 position socket	R126 R127	06-11077A50 06-11077A84	100 2.7k
F coil			R128	06-11077A72	820
1–7	24-80148M01	27 nH, 1.5 turns	R151 R152	06-11077B15 06-11077B11	47k 33k
9	2411030B02 2411030B04	1.5 turns, red 1.5 turns, yellow	R153	0611077B15	47k
10	24-80989T02	150 nH, <u>+</u> 20%	R154 R155	06-11077A34 06-11077A98	22 10k
51 52	24-11030B12 24-80063M13	7.5 turns, yellow 1 uH	R156	06-11077B03	15k
53	24-80063M04	.18 uH	R157 R158,159	06-11077A78 06-11077A74	1.5k 1k
54 55	24-80063M21 24-80164M04	4.7 uH 5.2 turns, variable	R161	06-11077A98	10k
56	24-80164M01	1:6 ratio, variable	R163 R164	06-11077B17 18-05500L08	56k 22k, +20%, potentiometer
57 58	24-80164M04 24-80063M21	5.2 turns, variable 4.7 uH	R165	06-11077B07	22k
59	24-80164M03	4.3 turns, variable	R176 R177	06-11077G26 06-11077G28	22.6k, ±1% 23.7k ±1%
50 51	24-80063M14 25-80000E01	1.2 uH transmformer	R178,179	06-11077F91	23.7k, ±1% 10k, ±1%
101	24-80063M05	.22 uH	R180	06-11077G52	42.2k, ±1%
102 151	24-11030B08 24-80299D01	4.5 turns, brown 17.75 turns, orange	R181 R182	06-11077F91 06-11077G28	10k, ±1% 23.7k, ±1%
152	24-80253D01	5.6 uH	R207	06-11077A44	56
202	24-80148M02 24-80989T02	43 nH, 2.5 turns	R208,209 R210	06-11077A38 06-11077A98	33 10k
203 204	24-00909102 24-11030A04	150 nH, ±20% 5 turns, green	R212	06-11077A84	2.7k
205,206	24-80989T02	150 nH, ±20%	R213 R214	06-11077A72 06-11077A50	820 100
207 209	24-80063M05 24-11030B05	.22 uH 2.5 turns, green	R215	06-11077A84	2.7k
210	24-11030B08	4.5 turns, brown	R216 R217	06-11077A72 06-11077A50	820 100
211 213	24-80063M05 24-80148M01	.22 uH 27 nH, 1.5 turns	R218	06-11077A49	91
214	24-80989T02	150 nH, ±20%	R219 R220	06-11077A48 06-11077A49	82 91
215 216	24-11030B08 24-80989T02	4.5 turns, brown 150 nH, ±20%	R222	06-11077A88	3.9k
217	24-80989T02	150 nH, <u>+</u> 20%	R223 R224	06-11077A94 06-11077B23	6.8k 100k
218 220	24-80063M05 24-11030B05	.22 uH 2.5 turns, green	R225	06-11077A88	3.9k
221	24-11030B08	4.5 turns, brown	R226	06-11077A44	56 33
222	24-80063M05	.22 uH	R227 R228	06-11077A38 06-11077A38	33 33
ansistor (see note)	48-80950X01	NPN	R229	06-11077A98	10k
2–5	48-00869643	N-channel	R231 R232	06-11077A84 06-11077A72	2.7k 820
51,52	48-00869839	NPN	R233	06-11077A50	100
53	48-00869642	NPN	R234	06-11077A84	2.7k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R236	06-11077A50	100
R237	06-11077A61	300
R238	06-11077A32	18
R239	06-11077A61	300
R243	06-11077B23	100k
R245	06-11077A74	1k
R276	06-11077A98	10k
R277	06-11077A60	270
R278	0611077A26	10
R279	06-11077A90	4.7k
R280	0611077A98	10k
R281	06-11077A90	4.7k
R282	06-11077A60	270
R301	06-11077A82	2.2k
R302	18-05500L08	22k, ±20%, 100V, potentiometer
R303	06-11077A94	6.8k
transformer		
T1,2	25-80163M02	500 MHz balance transformer
integrated circuits (se	e note)	
U51	51-05479G05	linear
U101	51-84704M75	synthesizer
U102	51-83977M45	prescaler
U176	51-84621K89	dual opamp
crystal (see note)		
Y51	91-80022M02	45.1 MHz
Y52	48-80008K02	44.645 MHz
Y151	48-80174D05	14.4 MHz
	non-referen	ced parts
	05-00003152	eyelet
	1405160A01	insulator
	26-80098M01	coil can shield, 10 used
	26-80097M01	coil can shield
	26-80228L01	IF bottom shield
	26-80256L02	coax connector bottom shield
	26-80229L03	VCO shield
	30-10286A72	24 strand wire, white
	42-80957X01	grounding clip

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

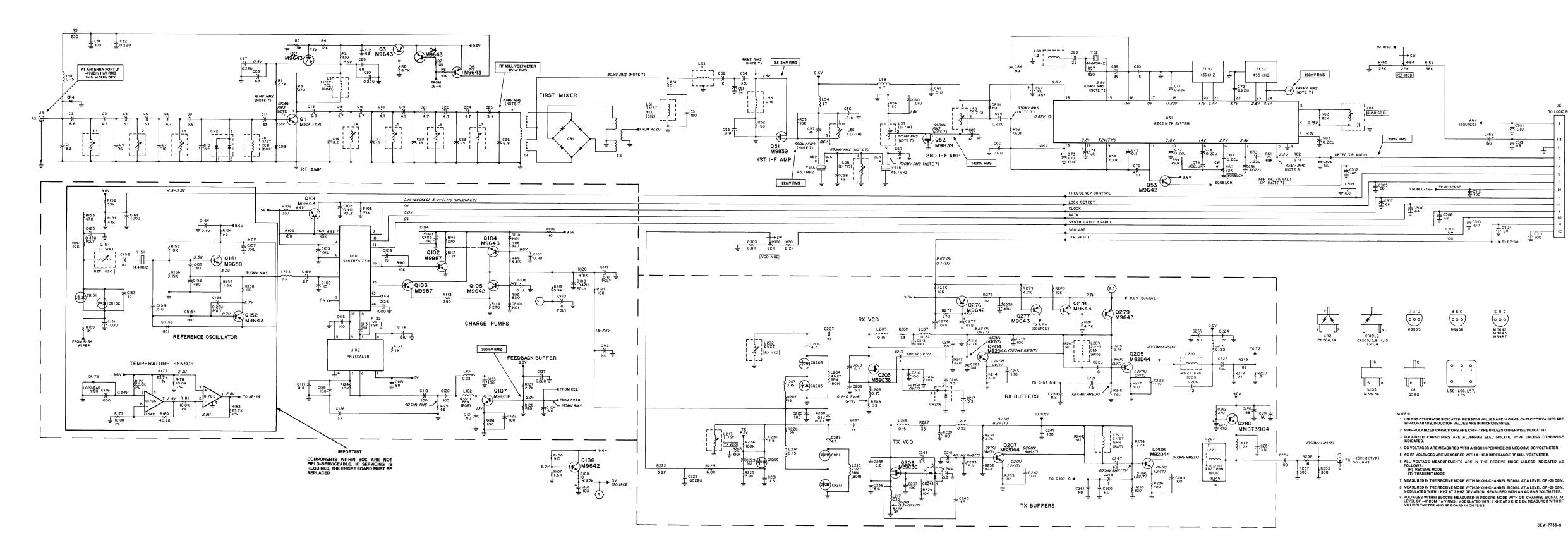
crystal base pad, 2 used crystal base pad, 2 used

Schematic, Circuit Board Diagrams, and Parts List for HLE4424A UHF RF Board PW-7587-O (Sheet 2 of 2)

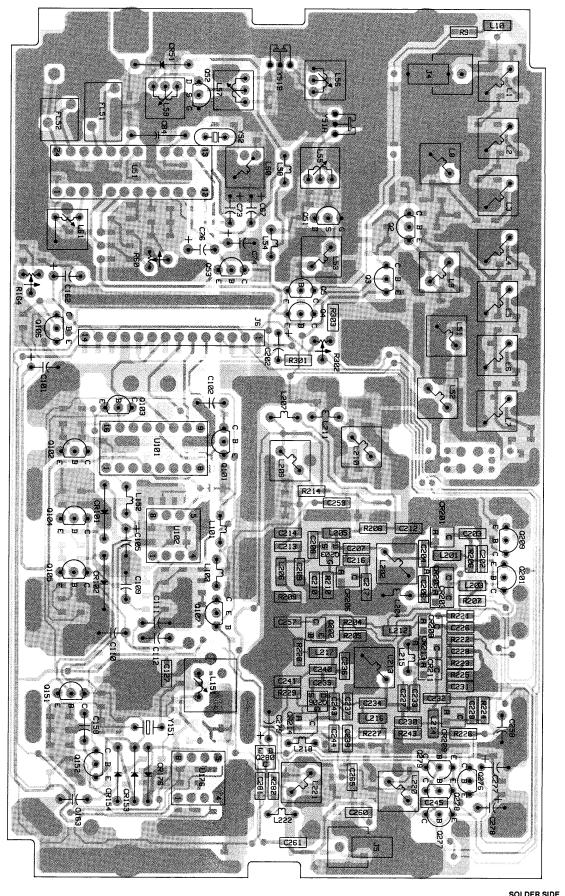
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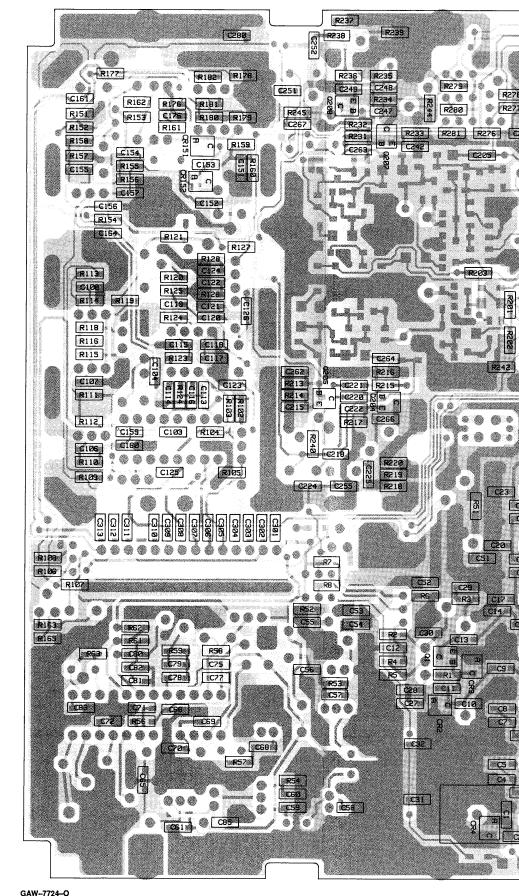
UHF RF Board Transistor D.C. Voltage Table

Transistor Ref. No.	VOLTAGE			VOLTAGE		
	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.7	0	5.9		_	
Q2	5.3	5.9	.9			
Q51	_		_	0	1.8	9.6
Q52		_		0	1.8	9.6
Q53	0	0 (W/ SIG)	9.6	-	_	_
Q101	5.0	4.9	.1 (LOCKED)	_	_	
Q102	.7	0	0.1			
Q103	5.0	4.4	9.6			_
Q104	8.1	2.8v	2–8v		_	
Q105	1.4	VAR.	2–8v	_	_	_
Q106	6.0	5.0	9.6			
Q107	2.0	1.3	9.6	_	_	<u> </u>
Q151	5.5	5.2	9.5	<del></del>	-	
Q152	8.7	9.5	6.7	_	_	
Q201		9.6	0(U) 9.3(L)	U=UI	PPER L=LOWER R	ANGE
Q202	0(U).7(L)	0	6.7(U)0(L)		_	
Q203			_	2.6(R)	4.8(R)	7.9(R)
Q204	1.8(R)	1.2(R)	8.2(R)	_	_	_
Q205	1.8(R)	1.2(R)	9.6		_	_
Q206	_	_	_	5(T)	1.1(T)	7.8(T)
Q207	1.8(T)	1.2(T)	8.5(T)	_	_	_
Q208	1.8(T)	1.2(T)	9.6		_	
Q276	9.5	8.6	9.6	_	_	_
Q277	9.6	8.5(T)	8.5	_		
Q278	9.6	8.3	7.6(R)			
Q279	7.6(R)	8.5	8.5		_	_



Schematic, Circuit Board Diagrams, and Parts List for HLE4424B UHF RF Board PW-7723-O (Sheet 1 of 2) 3/31/90





**COMPONENT SIDE VIEW** 

RED

**SOLDER SIDE VIEW** 

### parts list

21-13740B25

HLE4424B MaxTrac UHF 25 kHz Range 1 RF Board MXW-7758-O (2) MXW-7758-O (3) REFERENCE MOTOROL A MOTOROLA PART NO. MOTOROLA PART NO. REFERENCE REFERENCE DESCRIPTION DESCRIPTION SYMBOL SYMBOL 100 pF, ±5%, 50V .0022 uF, ±5%, 50V 21-13740B23 C224,225 C228 1-13740B49 48-80182020 1-13741B29 -13740B2 6.8 pF, +5%, 50V 48-00869643 C230,231 C233 C234 C235,236 1.5 pF, ±5%, 50V 4.7 pF, ±5%, 50V 1-13740B17 48-00869642 1-13740B1 1--13740B30 16 pF. +5%, 50V 48-00869658 1-13740B18 1-13740B30 11 pF, ±5%, 50V 5.6 pF, ±5%, 50V Q151 Q152 Q203 Q204,205 8-00869658 21-13740B19 16 pF. +5%, 50V 48-00869643 21–13740B17 21–13740B19 1-13740B49 48-05128M66 5.6 pF, +5%, 50\ 1-13740B49 100 pF, ±5%, 50V 1.5 pF, ±5%, 50V 48-80950X01 C10 C11 C12 C13 C14 C15,16 C17 C18,19 21-13740B23 21-13740B37 48-05128M66 33 pF. +5%, 50V 21-13740B49 100 pF, ±5%, 50V 3.3 pF, ±5%, 50V Q207,208 48-80950X01 21–13740B45 21–13740B21 1-13740B4 100 pF, ±5%, 50V 8.2 pF, ±5%, 50V 48-00869643 21–13740B23 21–13740B17 -13740B23 48-80214G02 4.7 pF +5% 50V 21-13740B0 pE +5% 50V hm, ±5%, 1/8 watt (unless otherwise stated) resistor, fixed. 21-13740B29 21-13740B17 15 pF, ±5%, 50V 4.7 pF, ±5%, 50V 100 pF, ±5%, 50V .01 uF, ±5%, 63V 21-13740B49 06-11077462 C20 C21,22 C23 C24 C25 C26 C27 C28,29 C30 C31 18 pF, ±5%, 50V 4.7 pF, ±5%, 50V 15 pF, ±5%, 50V 4.7 pF, ±5%, 50V 3.9 pF, ±5%, 50V 1-13740B17 21-13740B23 8.2 pF, ±5%, 50V 1 pF, ±5%, 50V 06-11077B01 5.6 pF, ±5%, 50V 1.2 pF, ±5%, 50V 1-13740B17 21-13740B19 06-11077A90 -13740B15 06-11077A98 1 pF, ±5%, 50V .01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic 68 pF, ±5%, 50V 6.8 pF, ±5%, 50V .22 uF, +80, -20%, 50V 21-13740B21 21-13740B01 06-11077472 1-11032B15 21-13741B45 68 pF, ±5%, 50V .22 uF, +80, –20%, 50V 21-13740B45 23-11048B19 6-11077A54 1-11032B15 -13740B45 06-11077A98 100 pF, ±5%, 50V .22 uF, +80, -20%, 50V 21-13740B49 1-13741B45 01 uF, ±5%, 50V 06-11077A54 C302 C304–308 21-11032B15 -13740B49 100 pF, ±5%, 50V 68 pF, ±5%, 50V 06-11077B45 21-13740B55 21-13740B27 150 pF, ±5%, 50V 12 pF, ±5%, 50V 21-13740B45 C51 C52 C53 C54 C55,56 C57 C58 C59 06-11077A72 21-13740B49 100 pF, ±5%, 50\ 21–13740B47 21–13740B61 21-13740B45 68 pF, <u>+</u>5%, 50V 21–13740B49 100 pF, +5%, 50V 330 pF. +5%, 50V 18-05500L08 22k, +20%, potentiometer 21-13741B45 21-13740B31 06-11077B19 06-11077B09 18 pF. +5%, 50V diode (see note) 21-13740B27 21-13740B31 48-80236E16 18 pF, ±5%, 50V .01 uF, ±5%, 50V CR2 CR3 CR4 CR51 CR101,102 48-80154K02 06-11077A62 21-13741B45 1-11032B15 22 uF +80 -20% 50V 48-80142L01 06-11077B11 1-13741B45 .01 uF, ±5%, 50V 23-13749C39 10 uF, +10%, 50V, tantalum C67 C68 C69 C70 C71,72 C73 C74 C75 C76 C77,78 48-83654H01 06-11077A78 22 pF, ±5%, 50V CR151,152 21-13740B39 39 pF. +5%, 50V CB153 154 48-83654H01 06-11077B03 15 pF, ±5%, 50V .22 uF, +80, –20%, 50V 1-13740B29 48-82256C1 21-11032B15 06-11077A76 48-84534N02 23-13749C39 10 uF, ±10%, 50V, tantalum 48-84534N0 23-11048B13 21-13741B69 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V 48-80154K02 6-11077A72 23-11048B05 21-11032B15 1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V 48-84534N02 06-11077494 CR213 48-84534N02 06-11077A72 C79 C80 21-13741B29 .0022 uF, ±5%, 50V .22 uF, +80, -20%, 50V CR214 48-80154K02 06-11077A88 21-11032B15 06-11077A94 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V 21-13740B55 C81 C82,83 C85 C101 C102 C103,104 C105 C106 C107,108 C109 C110 C111 C113,114 06-11077A98 06-11077A88 FL51 FL52 91-80097D06 6 element, ceramic 21-11032B15 21-13740B27 12 pF, ±5%, 50V 91-80098D06 3 wire, ceramic 6-11077A74 23-11048B13 08-11051A13 21-13741B45 10 uF, +20%, 16V, electrolytic connector rece 06-11077A78 06-11077A44 06-11077A50 J4.5 09-80135M01 .01 uF. +5%, 50V 23–11048B13 21–13740B29 10 uF, ±20%, 16V, electrolytic 06-11077A84 06-11077A72 RF coil 15 pF. +5%, 50V 27 nH, 1.5 turns 21-13741B69 08-11051A11 24-11030B02 .5 turns, red .047 uF. +5%, 63V 06-11077B1 08-11051A19 08-11051A07 1.5 turns, yellow 6-11077B15 24-60578C15 .01 uE. +5%, 63V 06-11077A34 24-11030B12 7.5 turns, vellow 21-13741B45 24-80063M13 21-13740B45 68 pF. +5%, 50V 06--11077B03 24-80063M04 1-13740B49 24-80063M21 21-13741B69 1 uF. +5%, 50V R158,159 06-11077A74 24-80164M04 5.2 turns, variable C118-120 C122,123 C124 C125 C126 C127 C151 C152 C153 C154 C155,156 C157 C158 C159 C160 C161 C162 C163 C164 C176 C201 C201 C205 C206 C207 C208,209 00 pF, ±5%, 50V 24-80164M0 100 pF, ±5%, 50V 5.6 pF, ±5%, 50V 21-13740B49 06-11077B17 24-80164M04 1-13740B19 5.2 turns, variable L57 L58 L59 L60 L61 L101 L102 L151 L152 L202 L203 L204 L205,206 18-05500L08 22k, ±20%, potentiometer 24-80063M21 21-13740B73 .001 uF. +5%, 50V 06-11077B07 06-11077G26 24-80164M03 4.3 turns, variable 1-13740B37 33 pF, ±5%, 50V 24-80063M14 21-11032B15 21-13740B73 .22 uF, +80, -20%, 50V 06-11077G28 06-11077F91 .001 uF, ±5%, 50V 25-80000E01 transmformer 10k, ±1% 42.2k, ±1% 24-80063M05 21-13740B47 21-13740B25 82 pF, ±5%, 50V 06-11077G52 06-11077F91 4.5 turns, brown 24-11030B08 10 pF, ±5%, 50V 10k, ±1% 23.7k, ±1% 24-80299D0 7.75 turns, orange 21-13741B45 06-11077G28 06-11077A44 21–13740B55 24-80063M22 180 pF, ±5%, 50V 43 nH, 2.5 turns 24-80148M0 21-13741B45 08-11051A15 .01 uF, ±5%, 50V R208,209 06-11077A38 06-11077A98 24-60578C15 150 nH, <u>+</u>20% .22 uF, +5%, 63V 21-13740B35 21-13740B29 4.5 turns 06-11077A84 06-11077A72 15 pF, ±5%, 50V .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic 24-60578C15 150 nH, ±20% 24-80063M0 21-13740B73 06-11077A50 06-11077A84 24-11030B05 2.5 turns, green 08-11051A17 .47 uF, ±5%, 63V 4.5 turns, brown 24-80063M05 .22 uH 27 nH, 1.5 turns 21-13741B69 .1 uF. +5%, 50V 06-11077A50 24-80148M0 21-13740B73 06-11077A49 06-11077A48 10 uF, ±20%, 16V, electrolytic 100 pF, ±5%, 50V 4.7 pF, ±5%, 50V 24-60578C15 150 nH, <u>+</u>20% 23-11048B13 24-11030B08 21-13740B49 21-13740B17 4.5 turns, brown 5-11077A49 L216.217 24-60578C15 150 nH, ±20% 06-11077A88 24-80063M05 21-13740B25 24-11030B05 2.5 turns, green 5.6 pF +5% 50V 21-13740B19 C208,209 C210 C212 C213 C215 C216,217 C218 C220 C221 06-11077B23 1-13740B49 100 pF, ±5%, 50V 24-11030B08 4.5 turns, brown 24-80063M05 21-13740B49 100 pF. +5%, 50V I-13740B01 1 pF, ±5%, 50V transistor (see 100 pF, ±5%, 50V 3.3 pF, ±5%, 50V 100 pF, ±5%, 50V 10 pF, ±5%, 50V 1.5 pF, ±5%, 50V 1-13740B49 48-80950X01 06-11077A98 1-13740B13 48-00869643 N-channel 6-11077A84 21-13741B49

48-00869642

06-11077A72

06-11077A50

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REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
R235	06-11077A72	820	
R236	06-11077A50	100	
R237	06-11077A61	300	
R238	06-11077A32	18	
R239	06-11077A61	300	
R243	06-11077B23	100k	
R245	06-11077A74	1k	
R276	06-11077A98	10k	
R277	06-11077A60	270	
R278	06-11077A26	10	
R279	06-11077A90	4.7k	
R280	06-11077 <b>A</b> 98	10k	
R281	0611077A90	4.7k	
R282	06-11077A60	270	
R301	06-11077A82	2.2k	
R302	18-05500L08	22k, ±20%, 100V, potentiometer	
R303	06-11077A94	6.8k	
transformer			
T1,2	25-80163M02	500 MHz balance transformer	
integrated circuits	(see note)		
U51	51-05479G05	linear	
U101	51-84704M75	synthesizer	
U102	51-83977M45	prescaler	
U176	51-84621K89	dual opamp	
crystal (see note)			
Y51	91-80022M02	45.1 MHz	
Y52	48-80008K02	44.645 MHz	
Y151	48-80174D05	14.4 MHz	
	mecha	anical parts	
	26-80098M01	coil can shield, 12 used	Τ
	26-80097M01	coil can shield	
	26-80228L01	IF bottom shield, 3 used	
	26-80229L02	VCO shield	
	75-05295B02	crystal base pad, 2 used	
	75-05295B07	crystal base pad, 2 used	
.,	84-80929V02	circuit board	
			3/

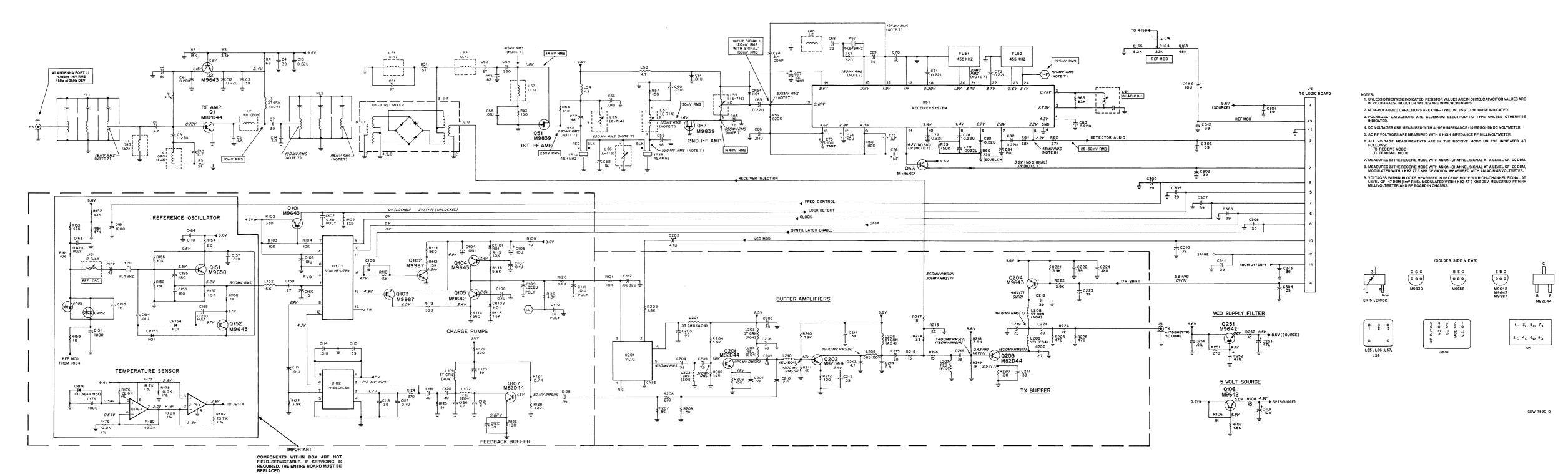
note: For best performance, order diodes, transistors, and integrated circuit devices by

Schematic, Circuit Board Diagrams, and Parts List for HLE4424B UHF RF Board PW-7723-O

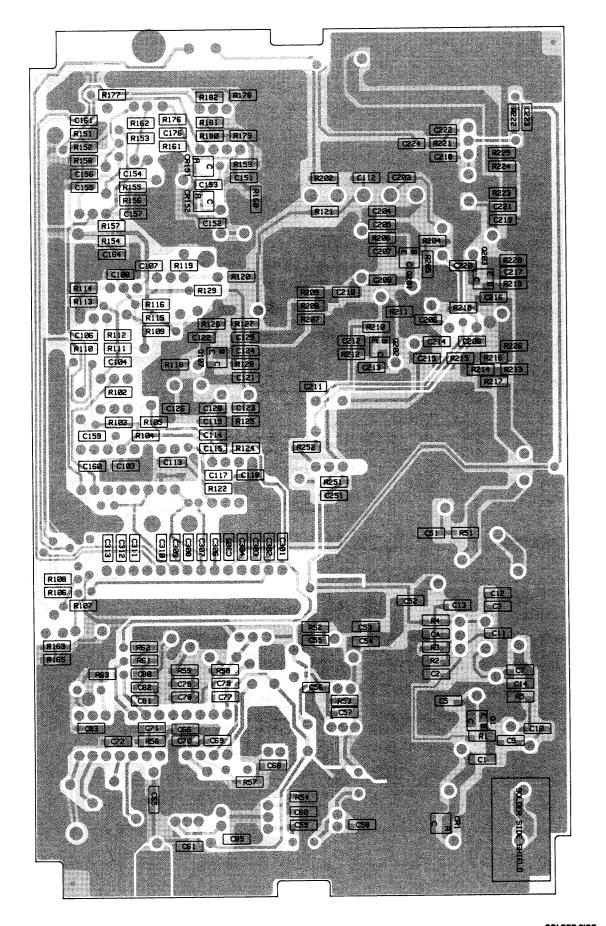
(Sheet 2 of 2) 3/31/90

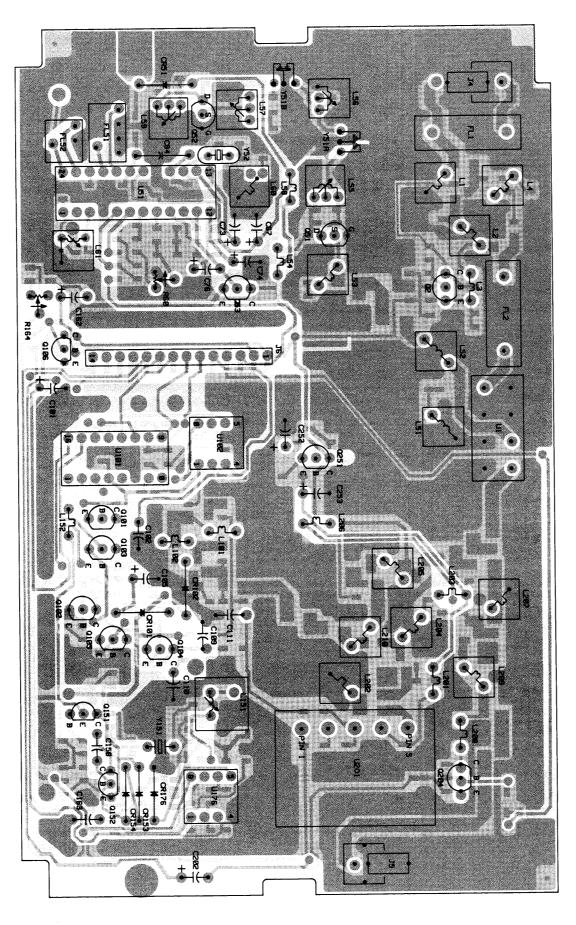
### 800 MHz RF Board Transistor D.C. Voltage Table

	VOLTAGE			VOLTAGE			
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN	
Q1	7.2	0	8.4	_	_	_	
Q2	7.8	8.4	1.2	_	<u> </u>		
Q51		_	_	0	1.8	9.6	
Q52		_	<u> </u>	0	1.8	9.6	
Q53	0(SIG)	0(SIG)	9.6	_			
Q101	4.8	4.8	0 (LOCK)		_	_	
Q102	.72(R)	0	.21	_	_	_	
Q103	4.8	4.0	9.6	_	-		
Q104	7.4	6.9	2-8v	_	_	_	
Q105	2.0	2.4	2–8v	_	_		
Q106	5.8	5.0	9.6		_	_	
Q107	1.6	.87	9.6	_	<u> </u>		
Q151	5.5	5.2	9.5		_	_	
Q152	8.7	9.5	6.7	_	<u> </u>		
Q201	1.8	1.2	8.5		_	_	
Q202	1.3	2.4	9.6	_			
Q203	1.6(T)	2.5(T)	9.4(T)		_	_	
Q204	9.5(R)	9.6	9.4(T)	_	-	_	
Q251	9.5	8.8	9.6				



Schematic, Circuit Board Diagrams, and Parts List for HLF4095B 800 MHz RF Board PW-7589-O (Sheet 1 of 2) 3/31/90





SOLDER SIDE VIEW

GAW-7727-0 GAW-7728-0 GDW-7728-0 COMPONENT SIDE VIEW

## parts list

HLF4095B MaxTrac 80	00 MHz RF Board	MXW-7409-O			MXW-7409-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (unle	ss otherwise stated)		L2	24-11030E08	white
C1	21-13740B17 21-13740B39	4.7 pF, ±5%, 50V 39 pF, ±5%, 50V	L3 L4	24-11030A04 24-11030E03	5 turns, green orange
C2-4 C5	21–13740B35 21–13740B05	1.5 pF, <u>+</u> 5%, 50V	L51,52	24-80063M09	.47 uH
C7	21-13740B39	39 pF, ±5%, 50V .22 uF, +80%, -20%, 50V	L53 L54	24-80063M04 24-80063M21	.18 uH 4.7 uH
C9 C10	21-11032B15 21-13740B11	2.7 pF, ±5%, 50V	L55	24-80164M04	5.2 turns, variable
C11-13	21-11032B15	.22 uF, +80%, -20%, 50V 3.3 pF, ±5%, 50V	L56 L57	24-80164M01 24-80164M04	1:6 ratio, variable 5.2 turns, variable
C14 C51	21-13740B13 21-13740B35	3.3 pF, ±5%, 50V 27 pF, ±5%, 50V	L58	24-80063M21	4.7 uH
C52	21-13740B35	27 pF, ±5%, 50V 82 pF, ±5%, 50V	L59 L60	24-80164M03 24-80063M14	4.3 turns, variable 1.2 uH
C53 C54	21-13740B47 21-13740B61	330 pF, ±5%, 50V	L61	25-80000E01	transmformer
C55,56	21-13741B45	.01 uF, ±5%, 50V	L101 L102	24-11030A04 24-11030E04	5 turns, green yellow
C57 C58	21-13740B31 21-13740B27	18 pF, ±5%, 50V 12 pF, ±5%, 50V	L151	24-80299D01	17.75 turns, orange
C59	21-13740B31	18 pF, ±5%, 50V .01 uF, ±5%, 50V	L152 L201	24-80063M22 24-11030A04	5.6 uH 5 turns, green
C60,61 C65	21-13741B45 21-11032B15	.22 uF, +80, -20%, 50V	L202	24-11030E01	brown
C66	21-13741B45	.01 uF, ±5%, 50V 10 uF, ±10%, 20V, tantalum	L203 L204	24-11030A04 24-11030E04	5 turns, green yellow
C67 C68	23-11013D13 21-13740B33	22 pF, ±5%, 50V	L205	24-11030E03	orange
C69	21-13740B39	39 pF, ±5%, 50V	L206 L207	24-11030A04 24-11030E02	5 turns, green red
C70 C71,72	21-13740B29 21-11032B15	15 pF, ±5%, 50V .22 uF, +80, –20%, 50V	L208	24-11030A04	5 turns, green
C73	23-11013D13	10 uF, ±10%, 20V, tantalum	L209,210	24-11030E04	yellow
C74 C75	23-11048B13 21-13741B69	10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V	connector receptar J4,5	09–80135M01	2 pin coax
C76	23-11048B05	1 uF, ±20%, 50V, electrolytic	J6	09-80130M03	14 position socket
C77,78 C79	21-11032B15 21-13741B29	.22 uF, +80, -20%, 50V .0022 uF, ±5%, 50V	transformer		FOR MILE II I I I I I I I I I I I I I I I I I
C80	21-11032B15	.22 uF, +80, -20%, 50V	T1,2	25-80163M02	500 MHz balance transformer
C81 C82,83	21-13740B55 21-11032B15	180 pF, ±5%, 50V .22 uF, +80, -20%, 50V	transistor (see note Q1	4880950X01	NPN
C84	21-82450B14	2.4 pF, ±5%, 500V	Q2	48-00869643	PNP
C85 C101	21-13740B27 23-11048B13	12 pF, ±5%, 50V 10 uF, +20%, 16V, electrolytic	Q51,52 Q53	48-00869839 48-00869642	N-channel NPN
C102	08-11051A13	.1 uF, ±5%, 63V	Q101	48-00869643	PNP
C103,104 C105	21-13741B45 23-11048B13	.01 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic	Q102,103 Q104	48-80182D20 48-00869643	NPN PNP
C106	21-13740B29	15 pF, ±5%, 50V	Q105,106	48-00869642	NPN
C107 C108	21-13741B69 21-13741B69	.1 uF, ±5%, 50V .1 uF, ±5%, 50V	Q107 Q151	48-80950X01 48-00869658	NPN NPN
C100	08-11051A09	.022 uF, ±5%, 63V	Q152	48-00869643	PNP
C110 C111	08-11051A19 08-11051A07	1 uF, ±5%, 63V .01 uF, ±5%, 63V	Q201–203 Q204	48-80950X01 48-00869643	NPN PNP
C112	21-13741B43	.0082 uF, ±5%, 50V	Q251	48-00869642	NPN
C113,114 C115	21-13741B45 21-13740B39	.01 uF, ±5%, 50V 39 pF, ±5%, 50V		n, ±5%, 1/8 watt (unles	
C117	21-13741B69	.1 uF, ±5%, 50V	R1 R2	06-11077A84 06-11077B03	2.7k 15k
C118-120 C121	21-13740B39 21-13740B11	39 pF, ±5%, 50V 2.7 pF, ±5%, 50V	R3	06-11077A86	3.3k
C122,123	21-13740B39	39 pF, ±5%, 50V	R4 R5	06-11077A46 06-11077A43	68 51
C125 C126	21-13740B39 21-13740B17	39 pF, ±5%, 50V 4.7 pF, ±5%, 50V	R51	06-11077A43	51
C151	21-13740B73	.001 uF, ±5%, 50V	R52 R53	06-11077A54 06-11077A98	150 10k
C152 C153	21-13740B46 21-13740B25	75 pF, ±5%, 50V 10 pF, ±5%, 50V	R54	06-11077A54	150
C154	21-13741B45	.01 uF, ±5%, 50V	R56 R57	06-11077B45 06-11077A72	820k 820
C155,156 C157	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V	R58	06-11077B23	100k
C158	08-11051A15	.22 uF, ±5%, 63V	R59 R60	06-11077B27 18-05500L08	150k 22k, ±20%, potentiometer
C159 C160	21-13740B35 21-13740B29	27 pF, ±5%, 50V 15 pF, ±5%, 50V	R61	06-11077B19	68k
C161	21-13740B73	.001 uF, ±5%, 50V	R62 R63	06-11077B09 06-11077B21	27k 82k
C162 C163	23-11048B13 08-11051A17	10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V	R102	06-11077A62	330
C164	21-13741B69	.1 uF, ±5%, 50V	R103,104 R105	06-11077A98 06-11077B11	10k 33k
C176 C202	21-13740B73 23-11048B19	.001 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic	R106	06-11077A74	1k
C203,204	21-13740B39	39 pF, ±5%, 50V	R107 R108,109	06-11077A78 06-11077A26	1.5k 10
C205 C206–208	21-13740B22 21-13740B39	7.5 pF, ±5%, 50V 39 pF, ±5%, 50V	R110	06-11077B03	15k
C209	21-13740B07	1.8 pF, <u>+</u> 5%, 50V	R111 R112	06-11077A68 06-11077A78	560 1.5k
C210 C211,212	21-13740B09 21-13740B39	2.2 pF, ±5%, 50V 39 pF, ±5%, 50V	R113	06-11077A64	390
C213	21-13740B17	4.7 pF, ±5%, 50V	R114 R115	06-11077A68 06-11077A78	560 1.5k
C214 C215–217	21-13740B21 21-13740B39	6.8 pF, ±5%, 50V 39 pF, ±5%, 50V	R116	06-11077A92	5.6k
C218	21-13741B39	39 pF, ±5%, 50V	R118 R119	06-11077A78 06-11077A89	1.5k 4.3k
C219 C220	21-13740B22 21-13740B11	7.5 pF, ±5%, 50V 2.7 pF, ±5%, 50V	R120	06-11077A96	8.2k
C221-223	21-13740B39	39 pF, ±5%, 50V	R121 R122	06-11077A98 06-11077A88	10k 3.9K
C224 C251	21-13740B45 21-13740B45	.01 uF, ±5%, 50V 68 pF, ±5%, 50V	R124	06-11077A60	270
C252,253	23-11048B19	47 uF, ±20%, 16V, electrolytic	R125 R126	06-11077A43 06-11077A50	51 100
C301-313	21-13740B39	39 pF, ±5%, 50V	R127	06-11077A84	2.7k
diode (see note) CR51	48-83654H01	silicon	R128 R129	06-11077A72 06-11077A58	820 220
CR101,102	48-83654H01	silicon	R151	06-11077B15	47k
CR151,152 CR153,154	48-05129M21 48-83654H01	varactor silicon	R152 R153	06-11077B11 06-11077B15	33k 47k
CR153,154 CR176	48-82256C11	10V zener	R154	06-11077A34	22
filter			R155	06-11077A98 06-11077B03	10k 15k
FL1,2 FL51	91-80054M01 91-80097D06	3 pole, ceramic 6 element, ceramic	R156 R157	06-11077A78	1.5k
FL52	91–80097D00	3 element, ceramic	R158,159 R161	06-11077A74 06-11077A98	1k 10k
RF coil			R163	06-11077B19	68k
L1	24-11030E03	orange			

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R164	18-05500L08	22k, ±20%, potentiometer
R165	06-11077A96	8.2k
R176	06-11077G26	22.6k, ±1%
R177	06-11077G18	18.7k, ±1%
R178,179	06-11077F91	10k, <u>±</u> 1%
R180	06-11077G52	42.2k, <u>+</u> 1%
R181	06-11077F91	10k, ±1%
R182	06-11077G28	23.7k, ±1%
R202	06-11077A80	1.8k
R204	06-11077A88	3.9k
R205	06-11077A76	1.2k
R206	06-11077A50	100
R207	06-11077A44	56
R208	06-11077A60	270
R209	06-11077A44	56
R210	06-11077A88	3.9k
R211	06-11077A74	1k
R212	06-11077A50	100
R213	06-11077A44	56
R214	06-11077A38	33
R215,216	06-11077A30	15
R217	06-11077A32	18
R218	06-11077A88	3.9k
R219	06-11077A74	1k
R220	06-11077A50	100
R221	06-11077A88	3.9k
R222	06-11077A88	3.9k
R223	06-11077A66	470
R224	06-11077A28	12
R225	06-11077A66	470
R251	06-11077A60	270
R252	06-11077A26	10
integrated circuits		
Integrated circuits	51-80058M01	mixer
• .	51-05479G05	linear
U51	51-05479G05 51-84704M75	synthesizer
U101	51-80924V01	prescaler
U102	51-84621K89	dual opamp
U176	51-80267L01	VCO hybrid
U201	31-0020/101	VOO Hybrid
crystal (see note)	04 000001100	45 1 MU-
Y51	91-80022M02	45.1 MHz
Y52	48-80008K02	44.645 MHz
Y151	48-80174D05	14.4 MHz
	non-ref	erenced parts
	14-05160A01	insulator
	26-80098M01	coil can shield, 7 used
	26-80097M01	coil can shield
	26-80228L01	coax connector shield
	26-80228L01	coax connector shield
	26-80229L03	VCO shield
	26-80256L01	coax connector bottom shield
	30-10286A72	24 strand wire, white
	42-80047N01	grounding clip
	54-80111F01	PROM label
	75-05295B02	crystal base pad, 2 used
	75-05295B07	crystal base pad, 2 used
	84-80132L01	circuit board

MXW-7409-O (3)

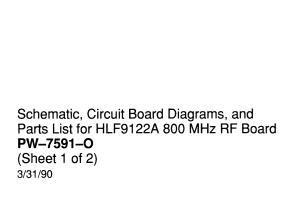
**note:** For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

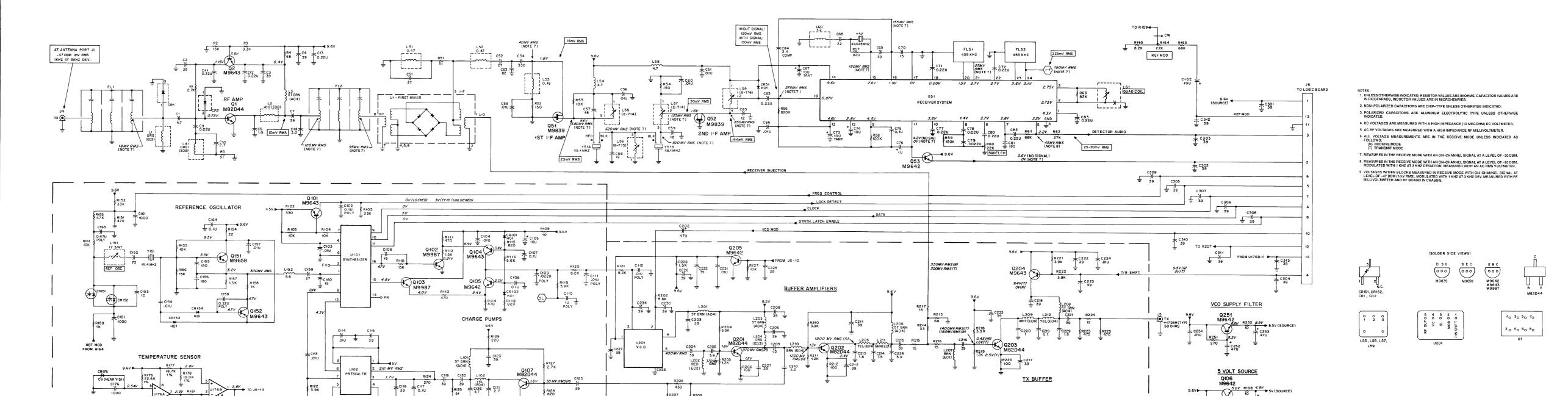
Schematic, Circuit Board Diagrams, and Parts List for HLF4095B 800 MHz RF Board PW-7589-O (Sheet 2 of 2)

3/31/90

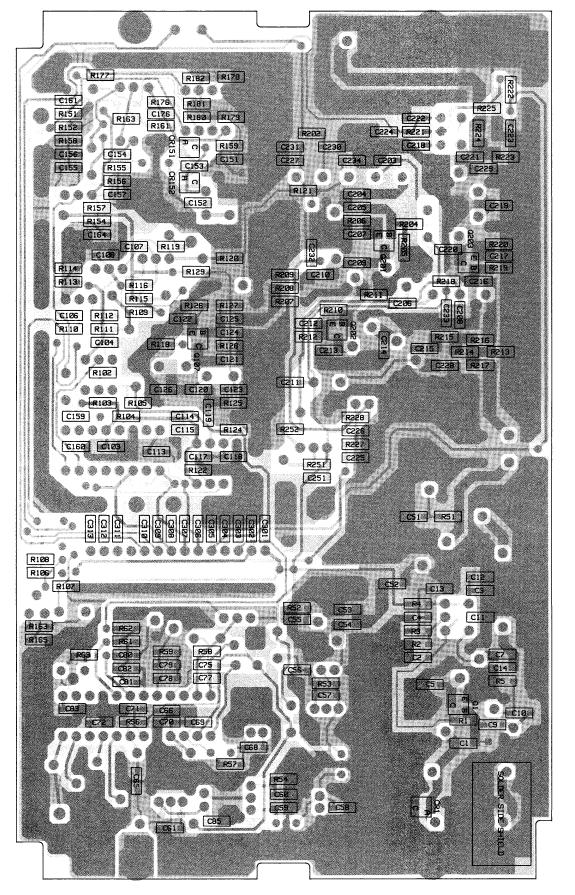
800 MHz RF Board Transistor D.C. Voltage Table

	VOLTAGE			VOLTAGE		
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	7.2	0	8.4	_		_
Q2	7.8	8.4	1.2	_	_	_
Q51		_	_	0	1.8	9.6
Q52	_		_	0	1.8	9.6
Q53	0(SIG)	0(SIG)	9.6	_		
Q101	4.8	4.8	0 (LOCK)		_	_
Q102	.72(R)	0	.21	_	_	
Q103	4.8	4.0	9.6	_	_	
Q104	7.4	6.9	2–8v	_	_	
Q105	2.0	2.4	2–8v	<del>-</del>		_
Q106	5.8	5.0	9.6	_		
Q107	1.6	.87	9.6	_		_
Q151	5.5	5.2	9.5	_		_
Q152	8.7	9.5	6.7	_		
Q201	1.8	1.2	8.5	_	_	
Q202	1.3	2.4	9.6		_	_
Q203	1.6(T)	2.5(T)	9.4(T)	<del></del>		_
Q204	9.5(R)	9.6	9.4(T)	_	_	_
Q251	9.5	8.8	9.6		_	

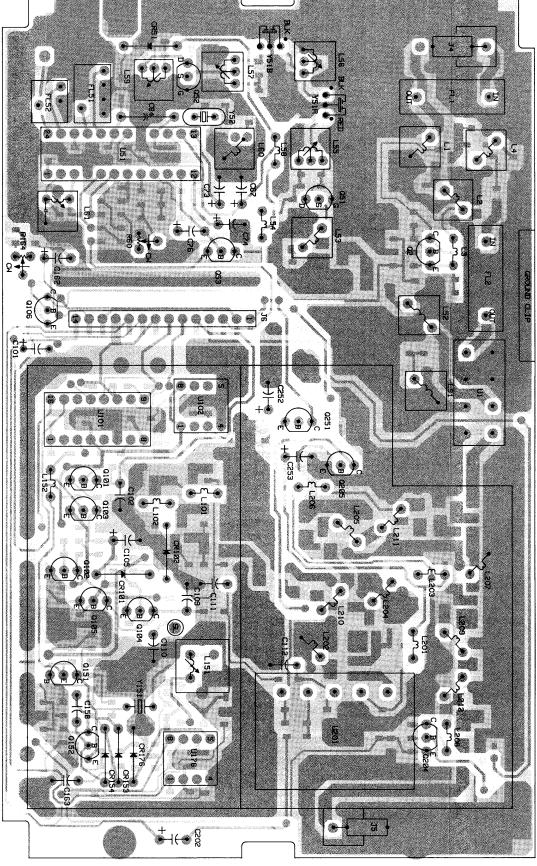




FEEDBACK BUFFER



**SOLDER SIDE VIEW** 



COMPONENT SIDE

GAW-7731-O GDW-7732-O

GREY

**COMPONENT SIDE VIEW** 

### parts list

HLF9122A MaxTrac 800 MHz RF Board with Talkaround MXW-7410-O MXW-7410-O (2) REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. SYMBOL PART NO. CR151.152 48-05129M21 capacitor, fixed (unless otherwise stated) 48-83654H01 21-13740B17 4.7 pF, ±5%, 50V C2-4 21-13740B39 39 pF, ±5%, 50V 1.5 pF, ±5%, 50V CR176 48-82256C11 10V zener 21-13740B05 21-13740B39 39 pF, ±5%, 50V FL1,2 FL51 FL52 91-80054M01 3 pole, ceramic 91-80097D06 6 element, ceramic .22 uF, +80%, -20%, 50V 2.7 pF, ±5%, 50V 21-60521H41 91-80098D06 3 element, ceramic 21-13740B11 .22 uF, +80%, -20%, 50V 3.3 pF, ±.25pF, 50V 21-60521H41 24-11030E03 24-11030E08 orange white 5 turns, green 21-13740B13 C51,52 C53 21–13740B35 21–13740B47 24-11030A04 82 pF, +5%, 50V C54 C55,56 21-13740B61 24-11030E03 L4 L51,52 L53 L54 L55 L56 L57 L58 L59 L60 24-80063M09 21-13741B45 .01 uF. +5%, 50V 21-13741B45 24-80063M04 .18 uH 24-80063M21 21-13740B31 18 pF, ±5%, 50V 21-13740B27 24-80164M04 5.2 turns, variable 24-80164M01 18 pF, ±5%, 50V .01 uF, ±5%, 50V 21-13740B31 21-13741B45 24-80164M04 5.2 turns, variable 21-60521H41 .22 uF. +80, -20%, 50V 4.3 turns, variable 1-13741B45 .01 uF, ±5%, 50V 24-80164M03 23-43749C39 10 uF, ±10%, 50V, tantalum 22 pF, ±5%, 50V 25-80000E01 transmformer L101 L102 L151 L152 L201 L202 L203 C68 C69 C70 C71,72 C73 C74 C75 C76 C77,78 5 turns, green 39 pF, ±5%, 50V 15 pF, ±5%, 50V 21-13740B39 21–13740B29 24-11030F04 17.75 turns, orange 21-60521H41 .22 uF, +80, -20%, 50V 10 uF, ±10%, 20V, tantalum 23-11013D13 24-80063M22 24-11030A04 5 turns, green 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V 23-11048B13 21–13741B69 24-11030F02 24-11030A04 5 turns, green 23-11048B05 1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V orange 5 turns, green 21-60521H41 L204.205 24-11030E03 L206 L207 L208 C77,78 C79 C80 C81 C82,83 24-11030A04 21-13741B29 .0022 uF, ±5%, 50V .22 uF, +80, -20%, 50V 21-60521H41 24-11030E01 24-11030A04 5 turns, green 21-13740B55 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V L209 L210 24-11030E08 21-60521H41 C84 C85 C101 C102 C103,104 C105 24-11030E05 21-82450B14 2.4 pF, ±5%, 500V L211 L212 24-11030E01 21-13740B27 12 pF. +5%, 50V 23-11048B13 08-11051A13 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 63V 24-11030E04 connector 21-13741B45 .01 uF, ±5%, 50V 09-80135M01 J4.5 2 pin coax 23-11048B13 10 uF, +20%, 16V, electrolytic C106 C107,108 21-13740B29 21-13741B69 15 pF, ±5%, 50V .1 uF, +5%, 50V transforme T1,2 25-80163M02 500 MHz balance transformer (Part of U1) 08-11051A09 08-11051A19 1 uF. +5%, 63V transistor (see note) C111,112 C113,114 08-11051A07 01 uF, ±5%, 63V 48-80950X01 21-13741B45 .01 uF, ±5%, 50V 39 pF, ±5%, 50V 48-00869643 C115 C116 C117 C118–120 21-13740B39 Q51,52 48-00869839 N-channel 48-00869642 21-13741B69 1 uF, ±5%, 50V 48-00869643 21-13740B39 39 pF, ±5%, 50V 2.7 pF, ±5%, 50V 48-80182D20 NPN PNP NPN NPN NPN PNP NPN PNP C121 C122,123 C124 C125 C126 C127 C151 C152 C153 C154 C155,156 C157 C158 C159 C160 C161 C162 C163 C164 C176 C201 C202 C203,204 48-00869643 21-13740B39 39 pF, ±5%, 50V Q105,106 48-00869642 not used 39 pF, ±5%, 50V 4.7 pF, ±5%, 50V 48-80950X01 21-13740B39 48-00869658 21-13740B17 48-00869643 not used .001 uF, ±5%, 50V 48-80950X01 Q204 Q205 48-00869643 75 pF, ±5%, 50V 10 pF, ±5%, 50V 21-13740B46 48-00869642 NPN NPN 21-13740B25 Q251 48-00869642 21-13741B45 resistor, fixed, ohm, ±5%, 1/8 watt (unles 21-13740B55 180 pF, ±5%, 50V .01 uF, ±5%, 50V .22 uF, ±5%, 63V 06-11077A84 21-13741B45 08-11051A15 06-11077A86 21-13740B35 27 pF, ±5%, 50V 15 pF, ±5%, 50V 21-13740B29 06-11077A43 .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic 21-13740B73 R51 R52 R53 R54 R56 R57 R58 R60 R61 R62 R63 R102 23-11048B13 06-11077A54 08-11051A17 21-13741B69 .1 uF, +5%, 50V 06-11077A54 21-13740B73 06-11077A72 23-11048B19 21-13740B39 47 uF, ±20%, 16V, electrolytic 06-11077B23 39 pF. +5%, 50V C205 C206-208 21-13740B15 22k, +20%, potentiometer 18-05500L08 21-13740B39 39 pF +5% 50V 06-11077B19 06-11077B09 21-13740B05 1.5 pF, ±5%, 50V C210 2.2 pF, ±5%, 50V 39 pF, ±5%, 50V 21-13740B09 06-11077A62 1.8 pF, ±5%, 50V 7.5 pF, ±5%, 50V 21-13740B07 06-11077A98 C214 C215–217 06-11077B1 39 pF, ±5%, 50V 39 pF, ±5%, 50V 21-13740B39 R106 R107 06-11077A74 C213-217 C218 C219 C220 C221-223 06-11077A78 5.1 pF, ±5%, 50V 1 pF, ±5%, 50V 21-13740B18 R108,109 06-11077A2 21-13740B01 06-11077B03 39 pF, ±5%, 50V .01 uF, ±5%, 50V 21-13740B39 21-13740B45 R112 06-11077A78 C225-227 C228 39 pF, ±5%, 50V 3.9 pF, ±5%, 50V 21-13740B39 21-13740B15 06-11077A72 1.8 pF, ±5%, 50V 39 pF, ±5%, 50V C229 C230 21-13740B07 R116 R118 21-13740B39 06-11077A72 820 3.9k 8.2k 3.9K C231 C232–234 .01 uF, ±5%, 50V 39 pF, ±5%, 50V 21-13741B45 21-13740B39 R120 121 06-11077A96 .01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic C251 C252,253 21-13741B45 23-11048B19 R124 R125 R126 R127 06-11077A60 21-13740B39 diode (see note) 48-80939T01 R128 48-83654H0 silicon silicon 06-11077A72 CR101,102 48-83654H01

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R129	0611077A58	220
R151	06-11077B15	47k
R152	0611077B11	33k
R153	06-11077B15	47k
R154	06-11077A34	22
R155	06-11077A98	10k
R156	06-11077B03	15k
R157	06-11077A78	1.5k
R158,159	06-11077A74	1k
R161	06-11077A98	10k
R163	06-11077B19	68k
R164	1805500L08	22k, ±20%, potentiometer
R165	06-11077A96	8.2k
R176	0611077G26	22.6k, ±1%
R177	06-11077G18	18.7k, ±1%
R178	06-11077F91	10k, ±1%
R179	06-11077F91	10k, ±1%
R180	06-11077G52	42.2k, +1%
R181	06-11077G32	
		10k, ±1%
R182	06-11077G28	23.7k, ±1%
R202	06-11077A80	1.8k
R204	06-11077A86	3.3k
R205	06-11077A76	1.2k
R206	06-11077 <b>A</b> 50	100
R207	06-11077 <b>A</b> 44	56
R208	06-11077A65	430
R209	06-11077A44	56
R210	06-11077A88	3.9k
R211	06-11077A76	1.2k
R212	06-11077A70	100
R213		68
	06-11077A46	
R214	06-11077A38	33
R215,216	06-11077A30	15
R217	06-11077A32	18
R218	06-11077A88	3.9k
R219	06-11077A76	1.2k
R220	06-11077A50	100
R221,222	06-11077A88	3.9k
R223	06-11077A66	470
R224	06-11077A28	12
R225	06-11077A66	470
B227	06-11077A98	10k
R228	06-11077A78	1.5k
R251	06-11077A70	270
R252	06-11077A26	10
integrated circuit	s (see note)	
U1	51-80058M01	mixer
U51	51-05479G05	linear
U101	51-84704M75	synthesizer
U102	51-80924V01	prescaler
U176		
	51–84621K89	dual opamp
U201	51-80267L01	VCO hybrid
crystal (see note)		
Y51	91-80022M02	45.1 MHz
Y52	48-80008K02	44.645 MHz
Y151	48–80174D05	
1131	46-60174003	14.4 MHz
		erenced parts
	14-05160A01	insulator
	26-80098M01	coil can shield, 7 used
	26-80097M01	coil can shield
	26-80228L01	coax connector shield
	26-80228L01	coax connector shield
	26-80229L03	VCO shield
	42-80047N01	grounding clip
	75-05295B02	crystal base pad, 2 used
	75-05295B07	crystal base pad, 2 used
	84-80949T01	circuit board

MXW-7410-O (3)

## **END OF PART 3 OF 4**

Schematic, Circuit Board Diagrams, and Parts List for HLF9122A 800 MHz RF Board PW-7591-O (Sheet 2 of 2)