Power Amplifier

1. Theory Of Operation

1.1 60 WATT LOW BAND POWER AMPLIFIER

The power amplifier consists of 4 stages. The first stage, Q2110, is a Class A amplifier. Base bias is set by the 9.6T voltage being divided by R2110 and R2111.

The second stage, Q2120, power output is regulated by the power control circuitry located on the logic board.

Third and Fourth stages of amplification, Q2130 and Q2140 respectively, are powered by UNSW B+ and the output power is amplified to the 60 watt level.

The antenna switch uses pin diodes, CR2150 and CR2151, along with a current limiting resistor R2150 and components C2153, C2151, L2150, and L2151 to switch the transmitted signal to the antenna port.

The harmonic filter is a seven pole chebyshev filter. The insertion loss of the filter is designed to be less than 1 dB in the passband.

1.2 25 WATT VHF POWER AMPLIFIER

The 25 watt VHF amplifier consists of three basic circuits:

- Power amplifier
- Antenna switch
- Harmonic filter

The power amplifier consists of three stages. The first stage, Q2310, has it's base biased up to 1.2 volts via 9.6T and limits the collector current to the device. The collector is driven by the controlled B+ voltage. This voltage determines the gain of the first stage.

The second stage, Q2320, is operated in Class C mode with UNSW B+ supplied to the collector. The first two stages amplify the signal supplied by the VCO to approximately 3 watts.

The third stage, Q2330, is a Class C amplifier and amplifies the 3 watts from the second stage to 30 watts.

The antenna switch consists of two pin diodes, CR2350 and CR2351, a pi network, C2335, C2336, L2334, C2337, C2338, and current limiting resistors. 9.6 volts is supplied to the antenna switch circuit to turn on the pin diodes in transmit. L2351 and C2351 form a 1/4 wave matching circuit at VHF.

When 9.6 volts is applied to pin diodes CR2350 and CR2351, a low impedance path is provided to the antenna through J1. A high impedance path is presented to the transmitted signal to prevent RF from reaching the receiver front end via P4.

The harmonic filter is a seven pole chebyshev lowpass filter. The 3 dB knee of the filter is designed to be approximately 205 MHz and the insertion loss of the filter is designed to be less than 1 dB in the passband.

1.3 45 WATT VHF POWER AMPLIFIER

The power amplifier consists of four stages. The first stage, Q2410, has a forward bias of 1.2 volts from the 9.6T line and is designed to run Class AB under a constant load to avoid load pulling of the VCO. Good return loss is also assured with the first stage acting as a buffer.

The additional stages, Q2420, Q2430, and Q2440, are operated as Class C RF amplifiers. RF input drive to the PA from the VCO is at +13.0 dBm minimum. The first two stages amplify this signal to 36.5 dBm or 4.5 watts.

The third stage, Q2430, amplifies the power to 11 watts, and the fourth stage amplifier, Q2440, supplies 65 watts to the antenna port J1.

Antenna switch and harmonic filter are the same as the 25 watt VHF PA.

1.4 25 WATT UHF POWER AMPLIFIER

The amplifier has 4 stages. The first stage, Q2610, is operated Class A and biased via R2610, R2611, and R2612. 9.6T voltage is applied to the collector and the biasing resistors. Nominal gain of the stage is 11.8 dB or 300 milliwatts.

The second stage, Q2620, has a nominal gain of 8.2 dB and power output of 2 watts. Output of this stage is regulated by the power control circuit located on the logic board.

The third stage, Q2630, has its collector tied directly to UNSW B+. This stage is operated Class C and has a nominal gain of 8.1 dB or power output of 13 watts.

The fourth stage, Q2640, is the final stage of amplification and has a power output of 25 watts. The stage is operated Class C and the collector is tied to UNSW B+.

The antenna switch consists of pin diodes CR2650 and CR2651, current limiting resistors, and C2652, C2650, L2651, L2652, and C2651. 9.6T voltage is applied to the antenna switch to provide the path for transmitted signal to the antenna port.

The harmonic filter is a 7 pole chebyshev lowpass filter. Insertion loss through the filter will be less than 1 dB.

1.5 UHF 40 WATT POWER AMPLIFIER

The amplifier is identical to the 25 watt UHF amplifier except for the third and fourth stages of amplification.

The first stage, Q2710, is operated Class A and the bias voltage is established by R2710, R2711, and R2712. Gain of the stage is 11.8 dB and power output is 300 milliwatts.

The second stage, Q2720, has its collector voltage regulated by the power control circuit on the logic board. Power output is 2 watts.

The last two stages, Q2730 and Q2740, are operated Class C and have nominal gains of 8.1 dB and 5.9 dB respectively. Power output of the final stage is 40 watts.

The antenna switch consists of pin diodes CR2750 and CR2751, current limiting resistors, and C2750, C2751, C2752, L2750, L2751 and L2752. The pin diodes, CR2750 and CR2751, have each been fitted into a small metal spring clip. The purpose of this is to prevent the diodes from exceeding their maximum temperature ratings under extreme conditions of heat and high VSWR.

The harmonic filter is the same as the 25 watt UHF power amplifier. Capacitors C2760, C2761, C2762, C2763, and C2764, have been changed from chip capacitors to clamped mica to handle the 40 watt power level.

1.6 800 MHZ 15 WATT AND 35 WATT POWER AMPLIFIERS

The 800 MHz power amplifier has four stages of amplification. The first stage of amplification, Q3110 (15 watt amplifier) or Q3210 (35 watt amplifier), is controlled by the 9.6T voltage supplied to the collector of each device.

The second, third, and fourth stages of RF amplification are done by using an RF module, U3120 (15 watt) or U3220 (35 watts), to boost the RF level to the necessary output power.

Controlled B+, from the power control circuit located on the logic board, is used to control the second stage of amplification located within the module.

Unswitched B+ is supplied to the third and fourth stages of amplification within the module.

The antenna switch theory of operation is the same as VHF and UHF.

The harmonic filter uses strip line inductors instead of airwound coils, but is the same type of filter arrangement as the VHF or UHF models.

1.7 POWER CONTROL CIRCUITRY

The transmit power control circuitry is common to all *MaxTrac* models currently being produced. The following is an explanation of the different sections of power control.

1.7.1 Control Lines

(1) *Unswitched B+*. This line is connected directly to the car battery. The line has a reverse polarity protection by the diode. Some line filtering is provided by the accompanying capacitors. The voltage is supplied to the third and fourth stages of RF amplification.

(2) *9.6T*. This line goes to 9.6V when in the transmit mode. During transmit, 9.6T line will provide the base bias for the first stage amplifier and will supply 9.6V to the antenna switch. During the Receive mode, this line is OV and the first stage amplifier and the antenna switch are turned off.

(3) *Controlled B+*. This line controls the power out of the PA by regulating the collector voltage to the second stage amplifier.

(4) *Current Sense HI/LO*. Uses current sensing as an indication of the RF power output. These two lines provide negative feedback to the transmitter power control, located on the logic board, so that power regulation is achieved.

1.7.2 Over–Current Protection

When the radio is keyed up and the RF signal is sent through the PA Deck, the Final PA will start drawing current. A small metering resistor is used to measure the Final's collector current. CURRENT SENSE HI (P7–3) is tied directly to the top of the metering resistor, which is tied to the + battery lead. CURRENT SENSE LO (P7–4) is tied to the bottom of the metering resistor, and under normal conditions should be no more than a few hundred millivolts below B+. These lines are tied to the +/– inputs of the op Amp U451B, which is located on the logic board. The output of U451B will be a positive voltage (6–8V DC) directly proportional to the amount of current drawn by the Final PA stage.

The current detect voltage is then sent to the emitter follower Q454, whose output will be summed with samples of the +9.6v and SWB+ lines. This summed voltage is applied to the inverting input of the comparator U451A. If there is an increase in +9.6v, SWB+, or PA Current, the voltage at U451A–2 will increase causing a decrease in voltage at U451A's output (pin 1).

The decreased voltage out of U451A is seen on the base of Q453 and will cause it to decrease conduction. Q453 is supplying a base current path for the Control Voltage Amps, Q451 and Q452. When Q451 and Q452 conduct less they will pass less of the battery voltage from their emitters to their collectors. This will decrease the voltage on the CONTROLLED B+ line.

1.7.3 DAC Reference Voltage

The non–inverting input to the Comparator U451A, is the sum of a reference voltage coming from the DAC IC U801 and a sample of the +9.6V DC supply. This input voltage to U451A will typically be 4–6V DC. When the radio is keyed, the microprocessor loads data into U801 using the SR DATA, SR CLK, and DAC LE lines. U801 converts this digital information into analog voltages at it's outputs Q1–Q6. By summing two or more of these outputs, a more precise output voltage can be obtained. Q1 and Q2 are summed together using the resistive network of R808–11. +9.6V DC is divided by R462 and R463. All of these inputs sum together to charge the capacitor C461. The charged voltage of C461 is then applied to the positive input of the comparator, U451A.

1.7.4 Over–Temperature Protection

In order to protect against an over–temperature condition, the radio's microprocessor calculates the temperature of it's PA Deck. It keeps track of Temp Sense from the RF Board, the amount of time the transmitter is keyed, and the amount of time the transmitter is unkeyed. If the calculated temperature should increase past a safe value stored in the memory of the radio, the microprocessor will cut back on the reference voltage via U801.

1.7.5 Control Voltage Shutback

The CONTROLLED B+ is fed into an Analog to Digital Converter (ADC) port on the microprocessor on U802 pin 45. The ADC's output is written into RAM approximately every 17 ms. This value is then compared against the maximum control voltage variable in the code plug. If the radio's control voltage exceeds the maximum control voltage variable, the the power out DAC voltage is decremented by one. Since the DAC is decremented by one, it will take a maximum of 270 ms to shut back the Control Voltage from maximum to minimum.

2. Troubleshooting

Transmit problems can be found in one of three areas:

- Modulation path
- RF path
- Power Control circuitry.

The J7–P7 connection between the logic board and PA deck can be helpful in determining where to start the troubleshooting. The "LOW TRANSMITTER POWER" chart will also help to isolate the problem to a certain area.

Take voltage readings on the J7 pins and compare your readings with those shown in Table 1. Power control loops that exist between the PA deck and the logic board will have to be "broken" before you can isolate to the problem.

Table 1

		RECEIVE	TRANSMIT
J7–1	9.6T	0V DC	+9.6V DC
J7–2	CTL B+	2V DC	3–12.5V DC
J7–3	CURRENT SENSE +	BATTERY	BATTERY
J7–4	CURRENT SENSE –	BATTERY	(J7–3)–X00 MV DC
J7–5	UNSW B+	BATTERY	BATTERY

On the logic board, begin to isolate transmit problems at P7–2. The controlled B+ voltage to the PA can be substituted here by carefully prying up on the plastic finger holding the P7–2 pin. After removing this wire and pin from P7–2, supply a good DC voltage from either an external power supply or by using a jumper wire from P7–2 to J6–1. This will supply 9.6V DC to the PA Deck. If the radio keys up with good power output, then the PA deck is good and the problem is in the power control circuitry located on the logic board.

Refer to the troubleshooting chart "LOW TRANSMITTER POWER OUT" for power control circuit problems. This chart will guide you through the logic board power control circuitry.

No or low power out of the radio with a good external DC voltage indicates a problem either in the PA deck or VCO. Check the power level out of the RF board. This level should be a minimum of +13 dBm or 20 milliwatts. If a proper reading is not obtained, refer to the RF board section and the troubleshooting chart on Synthesizer/VCO.

A good RF level at J5 verifies a PA deck problem. Visually observe the power amplifier for signs of component failure such as burned resistors or inductors.

Check the 9.6T voltage when the transmitter is keyed. If 9.6 volts is not measured, troubleshoot the PA deck first stage amplifier and the antenna switch for component failure. Also verify that the problem does not exist on the logic board.

Verify that UNSW B+ is measured on the collectors of the PA finals.

With a RF Detector Probe, such as the RTL4075A, measure the output of each stage. Check for a DC voltage that is equal to the RMS value of the signal under test. Refer to the schematic for parts location.

The PA's final amplifiers operate in Class C—the amplifiers draw no current when no input signal is present. Observe the current drain of the PA deck while in transmit to determine if the driver transistors or PA finals are drawing current. Also verify that the current sense resistors are the correct resistance. Refer to the "LOW TRANSMIT POWER" chart for correct resistance readings.

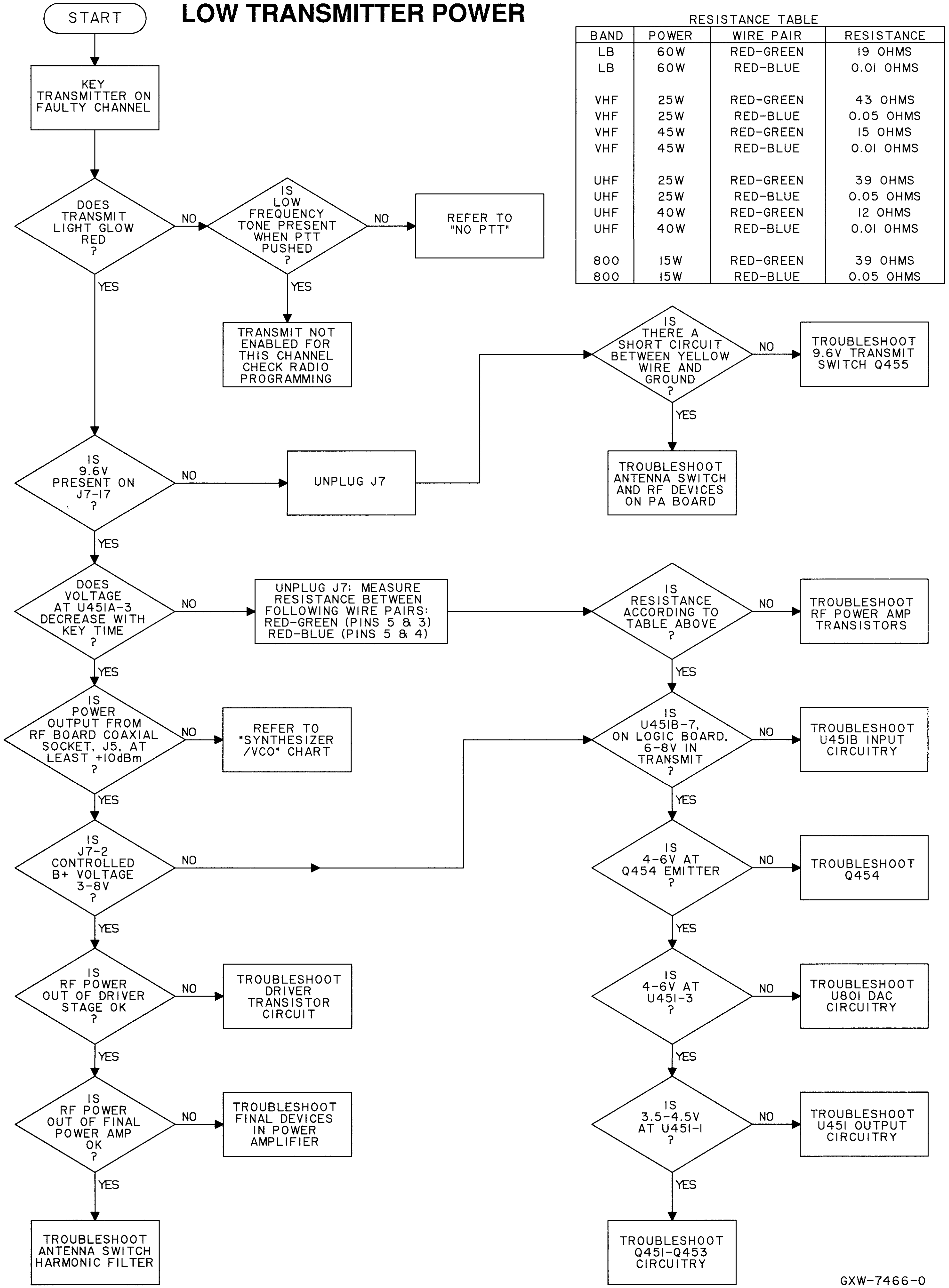
IMPORTANT

For the PA to operate as designed, proper soldering of the power module leads is critical in all bands, but even more so in the 800 MHz models.

In the VHF PA, the amplifier's (Q2320) body must be soldered to the mounting plate. A defective solder joint will cause symptoms of no power, or low power out.

Verify that the pin diode circuitry is working properly. Check the pin diodes with an ohmmeter if you suspect a bad diode. An ohm–check through the harmonic filter may also help locate a bad component.

LOW TRANSMITTER POWER

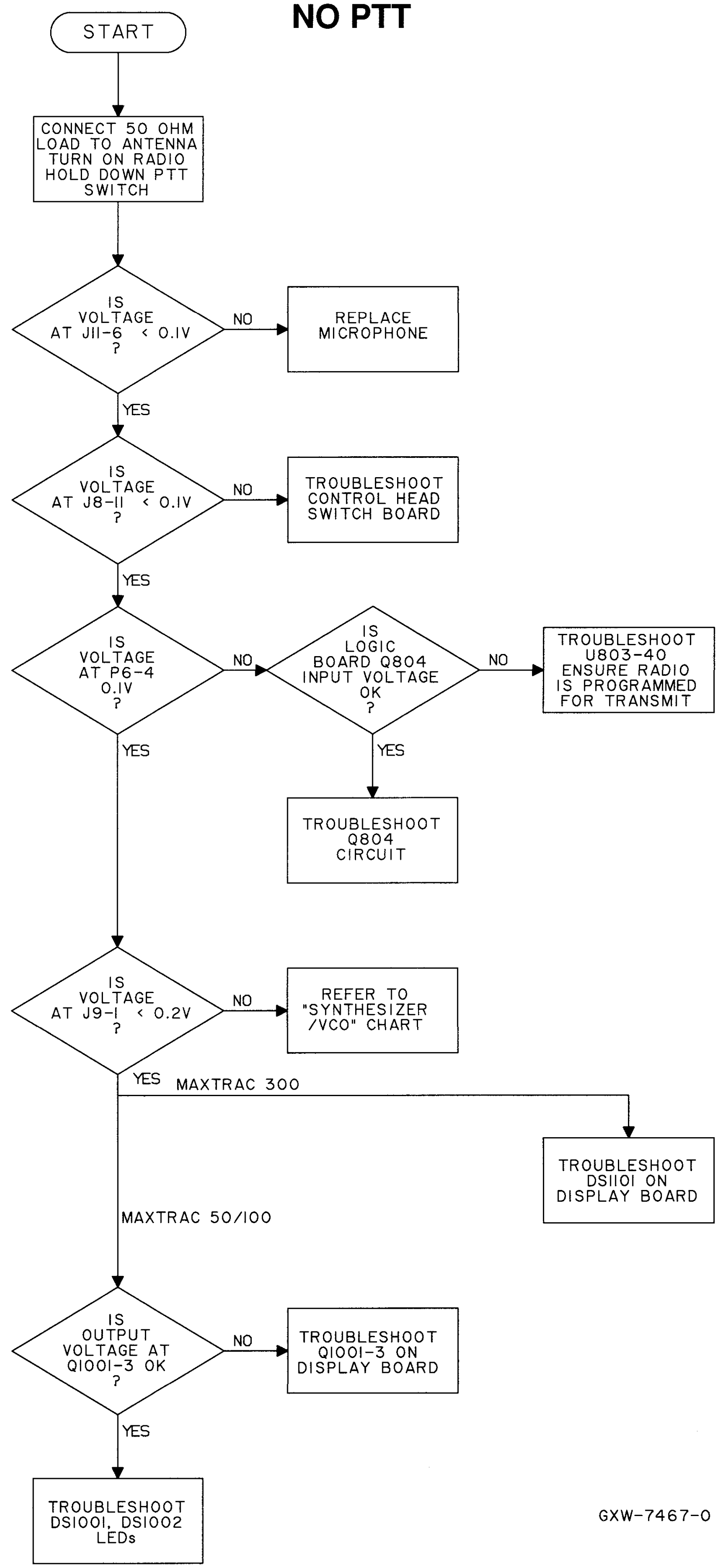


RESISTANCE TABLE

BAND	POWER	WIRE PAIR	RESISTANCE
LB	60W	RED-GREEN	19 OHMS
LB	60W	RED-BLUE	0.01 OHMS
VHF	25W	RED-GREEN	43 OHMS
VHF	25W	RED-BLUE	0.05 OHMS
VHF	45W	RED-GREEN	15 OHMS
VHF	45W	RED-BLUE	0.01 OHMS
UHF	25W	RED-GREEN	39 OHMS
UHF	25W	RED-BLUE	0.05 OHMS
UHF	40W	RED-GREEN	12 OHMS
UHF	40W	RED-BLUE	0.01 OHMS
800	15W	RED-GREEN	39 OHMS
800	15W	RED-BLUE	0.05 OHMS

GXW-7466-0

NO PTT



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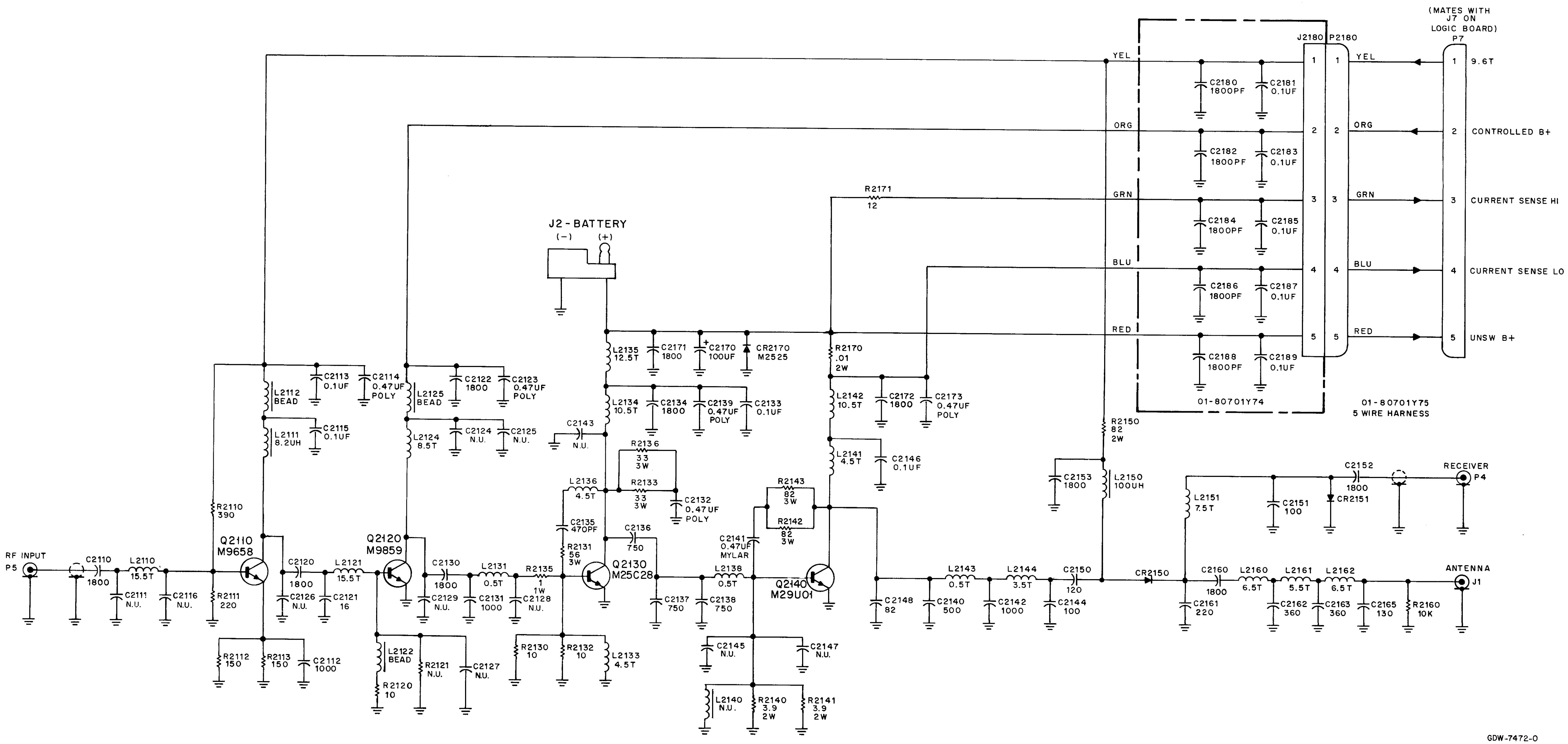
Power Amplifier Troubleshooting Charts
PW–7465–O
4/28/90



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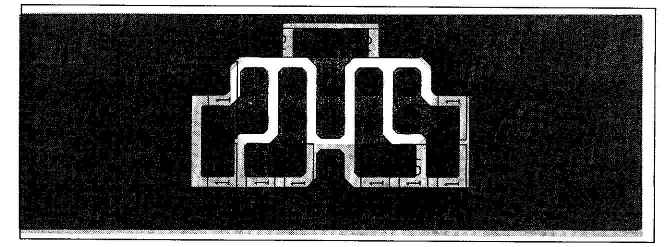
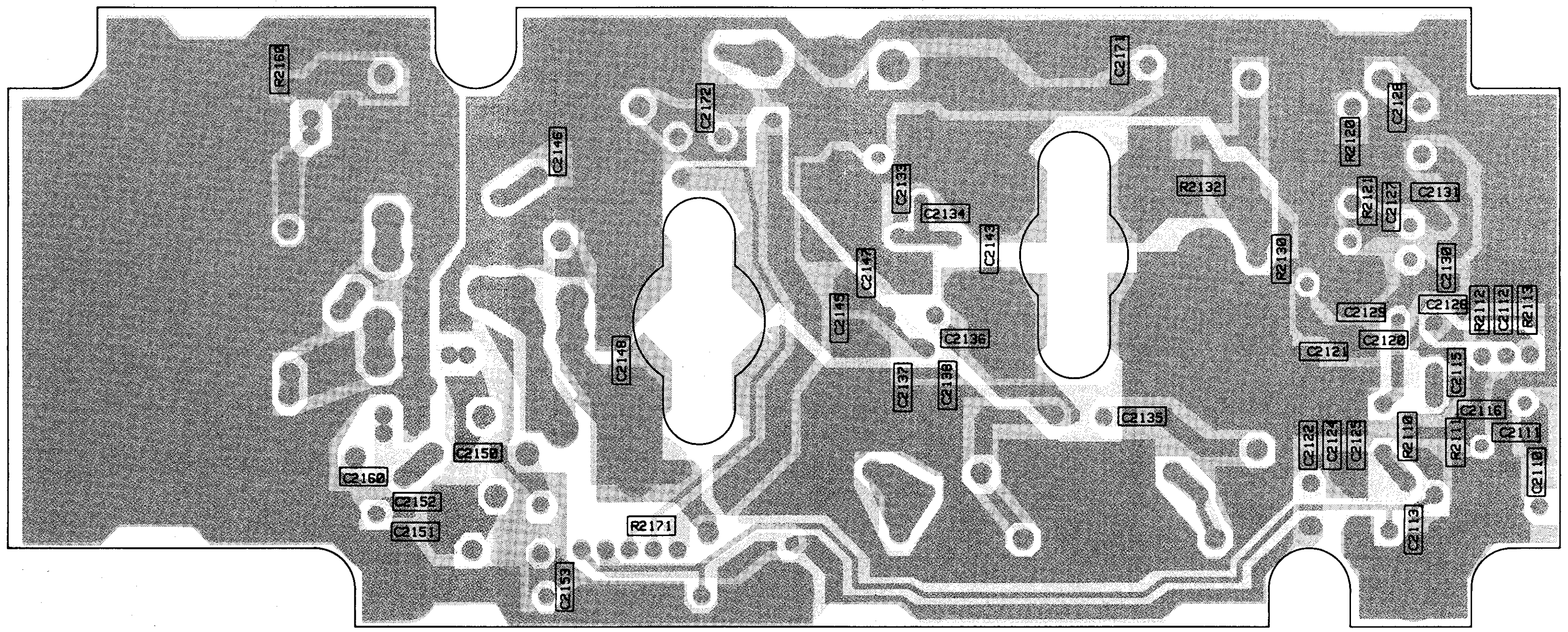


SOLDER SIDE	RED	GAW–7769–O
COMPONENT SIDE	GRAY	GAW–7768–O
OVERLAY	BLACK	GCW–7770–O

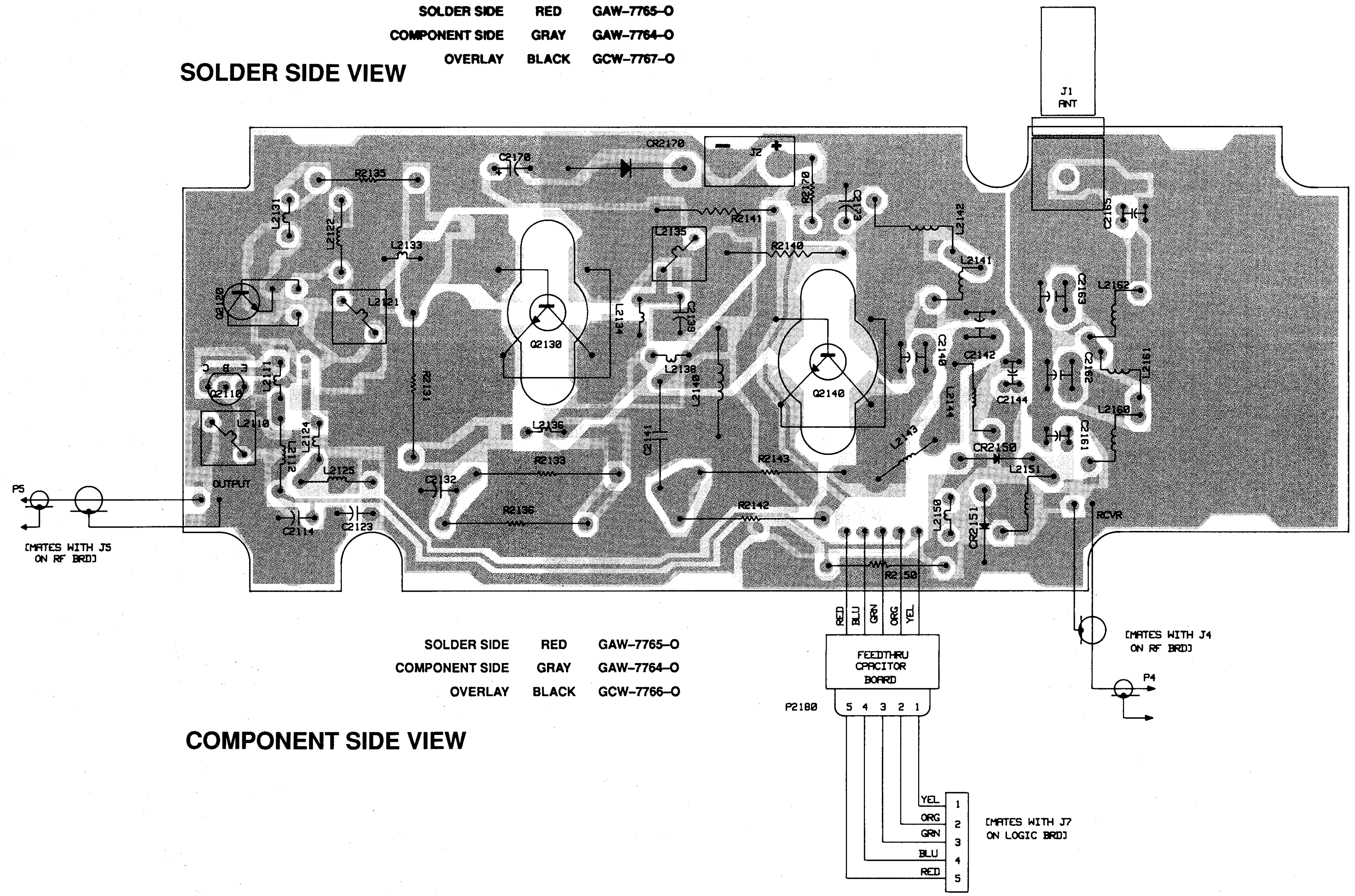
SOLDER SIDE VIEW

Schematic, Circuit Board Diagrams, and
Parts Lists for HLB4105A 60 Watt Low Band
Range 1 Power Amplifier
PW–7468–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE RED GAW-7765-O
COMPONENT SIDE GRAY GAW-7764-O
OVERLAY BLACK GCW-7767-O

SOLDER SIDE VIEW



SOLDER SIDE RED GAW-7765-O
COMPONENT SIDE GRAY GAW-7764-O
OVERLAY BLACK GCW-7766-O

COMPONENT SIDE VIEW

parts list

HLB4105A 60 Watt Low Band PA Board — MXW-7469-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2110	21-13740B78	1800
C2112	21-13740B73	1000
C2113	21-13741B69	0.1 uF
C2114	08-11051A17	.47 uF, 63V
C2115	21-13741B69	0.1 uF
C2120	21-13740B78	1800
C2121	21-13740B30	16
C2122	21-13740B78	1800
C2123	08-11051A17	.47 uF, 63V
C2130	21-13740B78	1800
C2131	21-13740B73	1000
C2132	08-11051A17	.47 uF, 63V
C2133	21-13741B69	0.1 uF
C2134	21-13740B78	1800
C2135	21-11078B59	470, 100V
C2136-2138	21-13740B70	750
C2139	08-11051A17	.47 uF, 63V
C2140	21-84395B15	500, 250V
C2141	08-84637L42	.47 uF, ±10%, 100V
C2142	21-80240G59	.001 uF, ±2%, 350V
C2144	21-80240G48	100, 250V
C2146	21-13741B69	0.1 uF
C2148	21-11078B40	82, 100V
C2150	21-11078B44	120, 100V
C2151	21-11078B42	100, 100V
C2152,2153	21-13740B78	1800
C2160	21-13740B78	1800
C2161	21-80240G57	220, 250V
C2162,2163	21-80240G89	360, 350V
C2165	21-80240G51	130, 250V
C2170	23-11019A46	100 uF, ±20%, 25V
C2171,2172	21-13740B78	1800
C2173	08-11051A17	.47 uF, 63V
C2180	21-13740B78	1800
C2181	21-13741B69	0.1 uF
C2182	21-13740B78	1800
C2183	21-13741B69	0.1 uF
C2184	21-13740B78	1800
C2185	21-13741B69	0.1 uF
C2186	21-13740B78	1800
C2187	21-13741B69	0.1 uF
C2188	21-13740B78	1800
C2189	21-13741B69	0.1 uF
diode (see note)		
CR2150,2151	48-80236E11	silicon PIN
CR2170	48-80236E07	transient suppressor, MR2525L
connector receptacle		
J2101	09-83228R01	mini UHF coax
coil, RF		
L2110	24-80931W29	15.5 turns, 33 UH
L2111	24-80063M24	8.2 uH, .300MA
L2112	24-80036A01	.5 turn
L2121	24-80931W29	15.5 turns, 33 UH
L2122	24-80036A01	.5 turn
L2124	24-11030B13	8.5 turn
L2125	24-80036A01	.5 turn
L2131	24-11030E01	.5 turn
L2133	24-11030B08	4.5 turns
L2134	24-11030B15	10.5 turns
L2135	24-80931W23	12.5 turns, 267 uH
L2136	24-11030B08	4.5 turns
L2138	24-11030E01	.5 turn
L2141	24-80908T26	4.5 turns
L2142	24-80908T42	10.5 turns
L2143	24-80949X06	.5 turn
L2144	24-80913W24	3.5 turns
L2150	24-82549D41	100 uH
L2151	24-80908T37	7.5 turns
L2160	24-80908T35	6.5 turns
L2161	24-80908T30	5.5 turns
L2162	24-80908T35	6.5 turns
plug		
P2180	28-80128M01	5-pin
transistor (see note)		
Q2110	48-11043C19	NPN
Q2120	48-00869859	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2110	06-11077A64	390
R2111	06-11077A58	220
R2112,2113	06-11077A54	150
R2120	06-11077A26	10
R2130	06-11077A26	10
R2131	06-80279M11	56, 3 watt
R2132	06-11077A26	10
R2133	06-80279M08	33, 3 watt
R2135	06-11086A03	1, 1 watt
R2136	06-80279M08	33, 3 watt
R2140,2141	06-11086C07	3.9, 2 watt
R2142,2143	06-80279M01	82, 3 watt
R2150	06-11086C33	82, 2 watt
R2160	06-11077A98	10k
R2170	06-80147M02	.01, ±10%, 2 watt
R2171	06-11077A28	12

MXW-7469-O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non-referenced parts		
	02-80905X01	nut (2 used)
	29-80014A03	coax clip, 2 used
	54-80072G01	label, circuit board
	84-80941W01	circuit board
	84-80918W01	circuit board, feedthru
	26-80158L01	heatsink
	30-80138M12	coax cable
	30-80138M13	coax cable

4/28/90

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

HLN9302A 60 Watt PA Hardware Kit — MXW-7470-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
connector, receptacle		
J2	09-80255E02	power (includes feedthru)
plug		
P7	15-80075M01	housing connector
P2180	15-80075M01	housing connector
transistor (see note)		
Q2130	48-80225C28	NPN
Q2140	48-80929U01	NPN
non-referenced parts		
	09-80133M01	receptacle connector (10 used)
	37-00132026	tubing, heat sink
	03-10908A21	machine screw M3X0.5X13 (2 used)
	03-10943M10	tapping screw TT3X0.5X8 (8 used)
	03-10943M11	tapping screw TT3X0.5X10 (7 used)
	04-00131974	flat washer (2 used)
	04-80943V01	lock washer
	07-80078A01	bracket, mounting (2 used)
	26-80901V02	heat sink, lowband & 800
	26-80960X01	shield

4/28/90

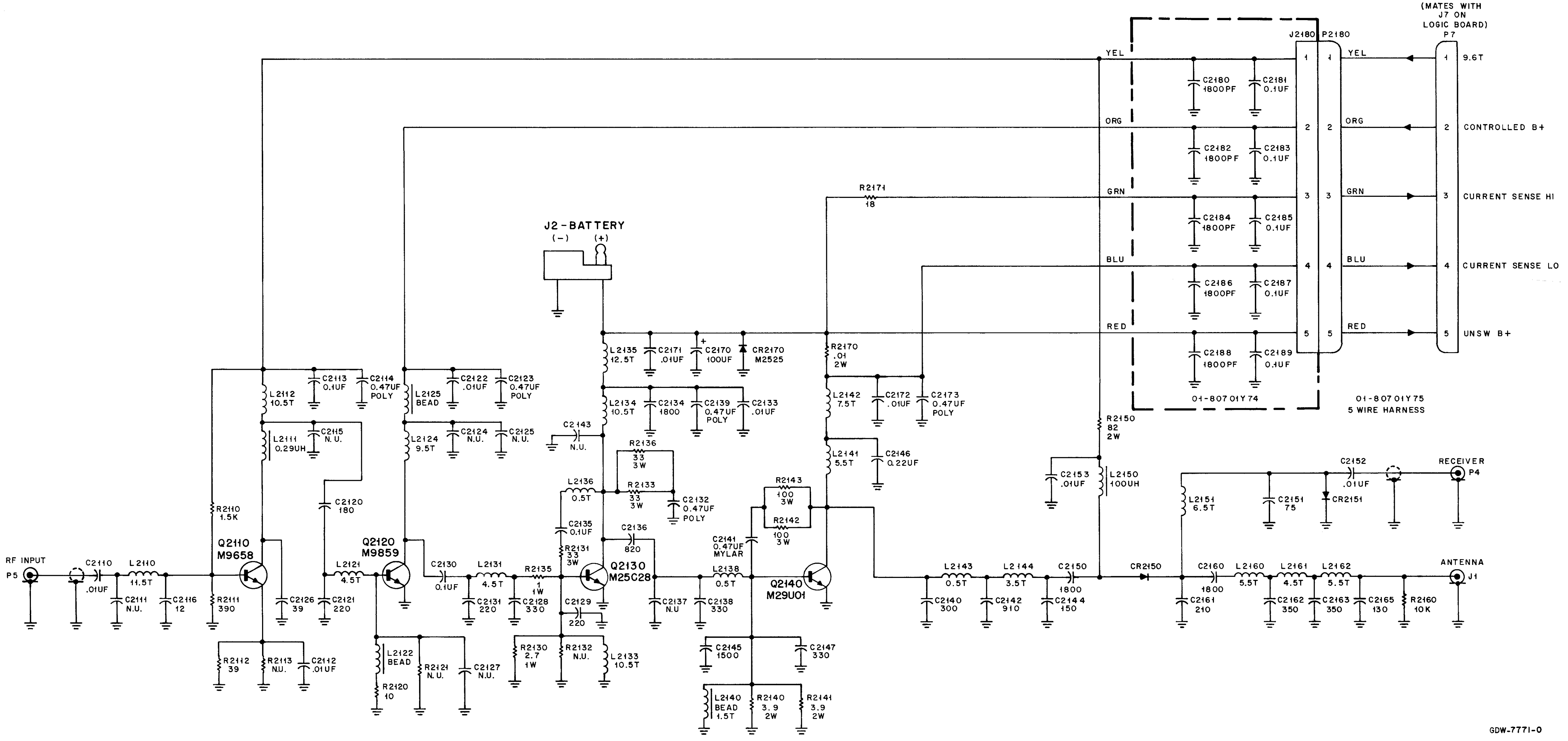
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLN9411A Low Band PA Hardware — MXW-7471-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	03-10908B01	machine screw M4X0.7X13
	03-10943M57	tapping screw M3x.5x10 (7used)
	15-80902V01	cover, low band heat sink

4/28/90

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4105A 60 Watt Low Band Range 1 Power Amplifier
PW-7468-O
(Sheet 2 of 2)
4/28/90



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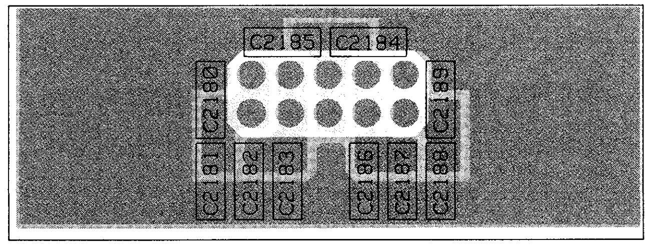
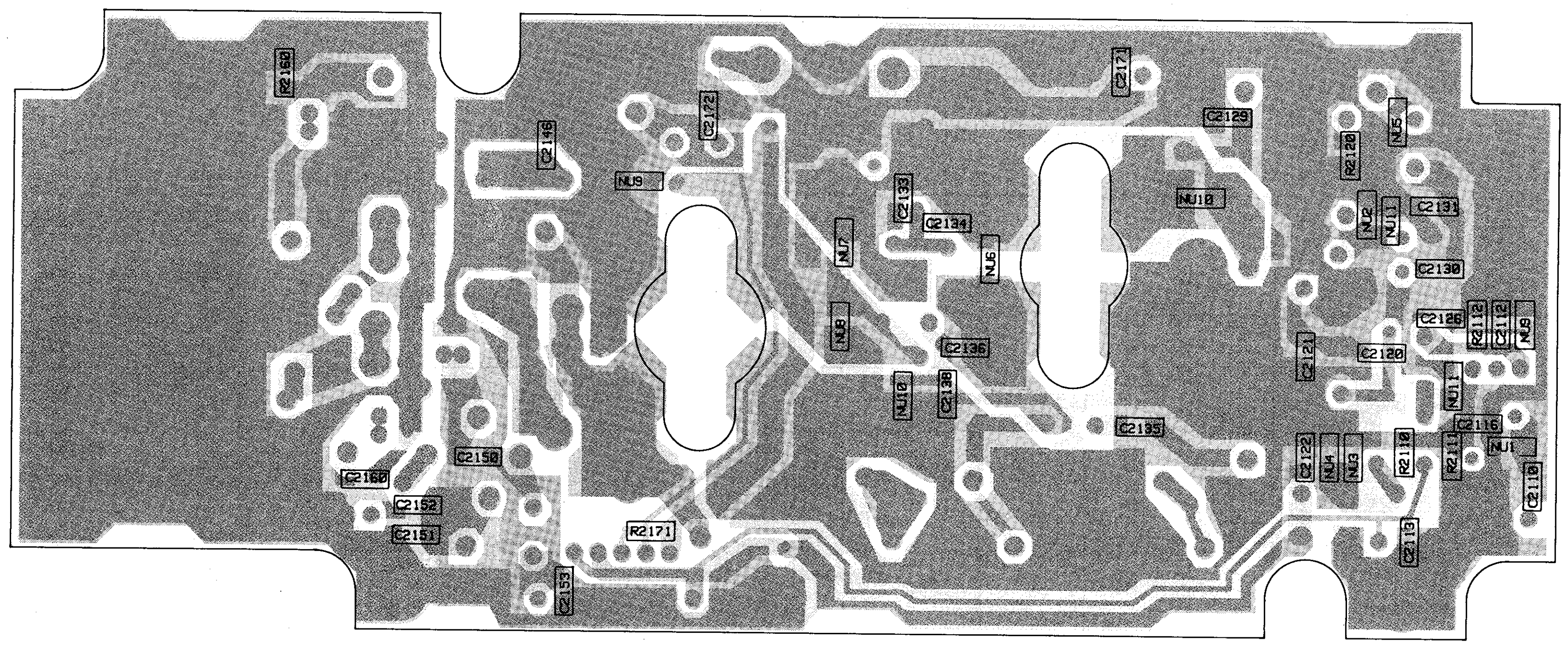


SOLDER SIDE	RED	GAW-7769-O
COMPONENT SIDE	GRAY	GAW-7768-O
OVERLAY	BLACK	GCW-7770-O

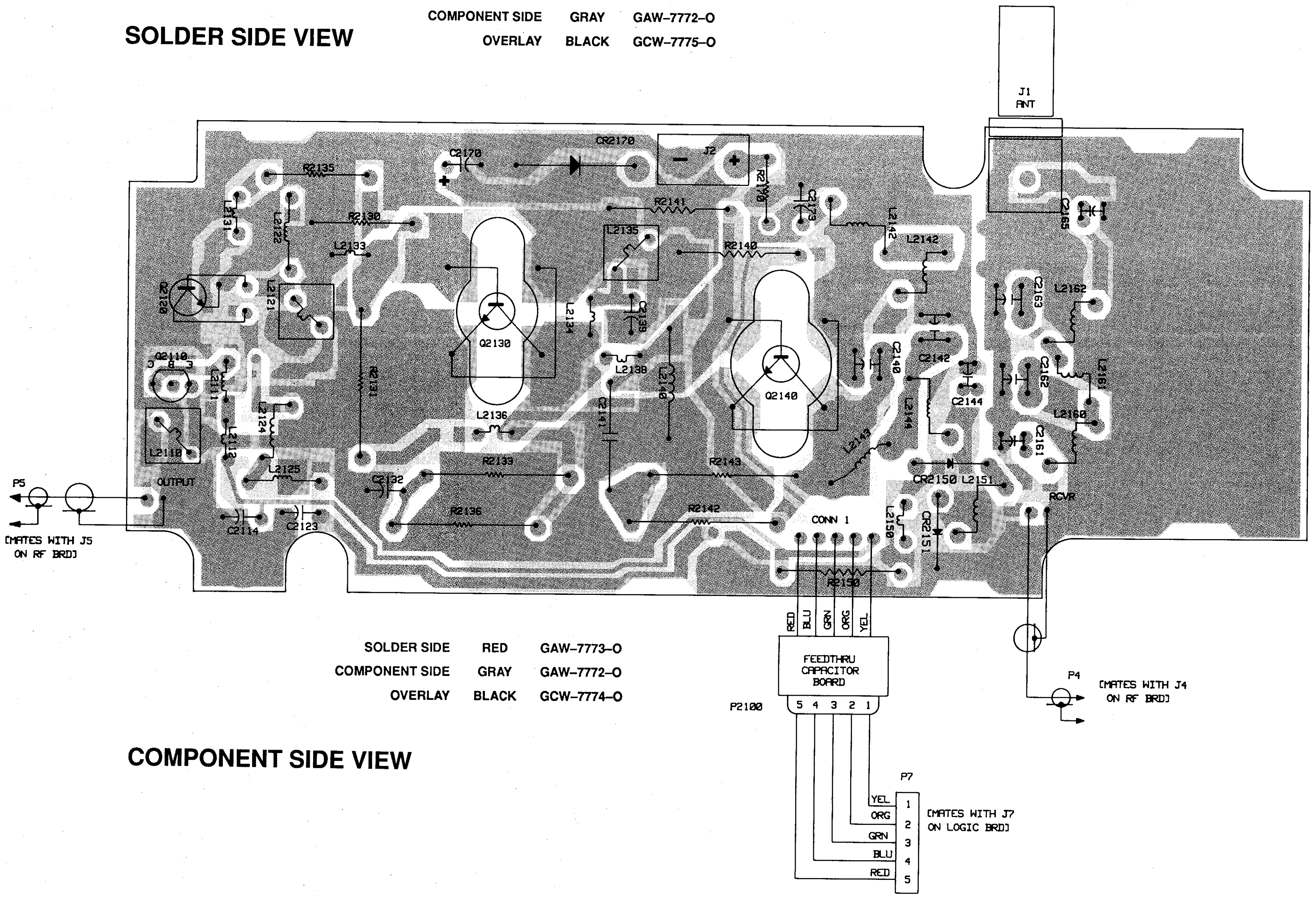
SOLDER SIDE VIEW

Schematic, Circuit Board Diagrams, and
Parts Lists for HLB4106A 60 Watt Low Band
Range 2 Power Amplifier
PW-7640-O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE	RED	GAW–7773–O
COMPONENT SIDE	GRAY	GAW–7772–O
OVERLAY	BLACK	GCW–7775–O

SOLDER SIDE VIEW



SOLDER SIDE	RED	GAW–7773–O
COMPONENT SIDE	GRAY	GAW–7772–O
OVERLAY	BLACK	GCW–7774–O

COMPONENT SIDE VIEW

parts list

HLB4106A 60 Watt Low Band PA Board — MXW–7637–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2110	21–13741B45	.01 uF
C2112,2113	21–13741B45	.01 uF
C2114	08–11051A17	.47 uF, 63V
C2116	21–13740B27	12
C2120	21–13740B55	180
C2121	21–13740B57	220
C2122	21–13741B45	.01 uF
C2123	08–11051A17	.47 uF, 63V
C2126	21–13740B39	39
C2128	21–13740B61	330
C2129	21–13740B57	220
C2130	21–13741B45	.01 uF
C2131	21–13740B57	220
C2132	08–11051A17	.47 uF, 63V
C2133	21–13741B45	.01 uF
C2134	21–13740B78	1800
C2135	21–13741B45	.01 uF
C2136	21–13740B71	820
C2138	21–13740B61	330
C2139	08–11051A17	.47 uF, 63V
C2140	21–84395B13	300, 250V
C2141	08–84637L42	.47 uF, ±10%, 100V
C2142	21–80240G99	910, ±.5 pf, 350V
C2144	21–80240G53	150, 250V
C2145	21–13740B76	1500, ±.5 pF
C2146	21–11032B15	.22 uF, +80, –20%
C2147	21–13740B61	330
C2150	21–13740B78	1800
C2151	21–13740B46	75
C2152,2153	21–13741B45	.01 uF
C2160	21–13740B78	1800
C2161	21–80964X01	210, 250V
C2162	21–84395B25	350, 250V
C2163	21–84395B25	350, 250V
C2165	21–80240G51	130, 250V
C2170	23–11019A46	100 uF, ±20%, 25V
C2171,2172	21–13741B45	.01 uF
C2173	08–11051A17	.47 uF, 63V
C2180	21–13740B78	1800
C2181	21–13741B69	.001 uF
C2182	21–13740B78	1800
C2183	21–13741B69	.001 uF
C2184	21–13740B78	1800
C2185	21–13741B69	.001 uF
C2186	21–13740B78	1800
C2187	21–13741B69	.001 uF
C2188	21–13740B78	1800
C2189	21–13741B69	.001 uF
diode (see note)		
CR2150,2151	48–80236E11	pin
CR2170	48–80236E07	transient suppressor
connector receptacle		
J2101	09–83228R01	mini UHF coax
coil, RF		
L2110	24–80931W21	11.5 turns
L2111	24–82723H40	.29 uH
L2112	24–11030B15	10.5 turns
L2121	24–11030B08	4.5 turns
L2122	24–80036A01	.5 turn
L2124	24–83884G05	9.5 turns
L2125	24–80036A01	.5 turn
L2131	24–11030B09	4.5 turns
L2133,2134	24–11030B15	10.5 turns
L2135	24–80931W23	12.5 turns, 267 uH
L2136	24–11030E01	.5 turn
L2138	24–11030E01	.5 turn
L2140	24–83977B01	1.5 turns
L2141	24–80908T31	5.5 turns
L2142	24–80908T37	7.5 turns
L2143	24–80949X04	.5 turn
L2144	24–80913W22	3.5 turns
L2150	24–82549D41	100 uH
L2151	24–80908T34	6.5 turns
L2160	24–80908T31	5.5 turns
L2161	24–80908T26	4.5 turns
L2162	24–80908T30	5.5 turns
connector, plug		
P2180	28–80128M01	5–pin
transistor (see note)		
Q2110	48–11043C19	NPN
Q2120	48–00869859	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2110	06–11077A78	1.5k
R2111	06–11077A64	390
R2112	06–11077A40	39
R2120	06–11077A26	10
R2131	06–80279M08	33
R2133	06–80279M08	33
R2135	06–11086A03	1, 1 watt
R2136	06–80279M08	33
R2140,2141	06–11086C07	3.9, 2 watt
R2142	06–80279M13	100
R2143	06–80279M13	100
R2150	06–11086C33	82, 2 watt
R2160	06–11077A98	10k
R2170	06–80147M02	.01, ±10%, 2 watt
R2171	06–11077A32	18

MXW–7637–O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non–referenced parts		
	02–80905X01	nut (2 used)
	26–80158L01	heatsink
	29–80014A03	clip, coax (2 used)
	84–80951X01	circuit board
	84–80918W01	circuit board, feedthru
	30–80138M13	coax cable
	30–80138M12	coax cable
	54–80072G01	label

4/28/90

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

HLN9302A 60 Watt PA Hardware Kit — MXW–7470–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
connector, receptacle		
J2	09–80255E02	power (includes feedthru)
plug		
P7	15–80075M01	housing connector
P2180	15–80075M01	housing connector
transistor (see note)		
Q2130	48–80225C28	NPN
Q2140	48–80929U01	NPN
non–referenced parts		
	09–80133M01	receptacle connector (10 used)
	37–00132026	tubing, heat sink
	03–10908A21	machine screw M3X0.5X13 (2 used)
	03–10943M10	tapping screw TT3X0.5X8 (8 used)
	03–10943M11	tapping screw TT3X0.5X10 (7 used)
	04–00131974	flat washer (2 used)
	04–80943V01	lock washer
	07–80078A01	bracket, mounting (2 used)
	26–80901V02	heat sink, lowband & 800
	26–80960X01	shield

4/28/90

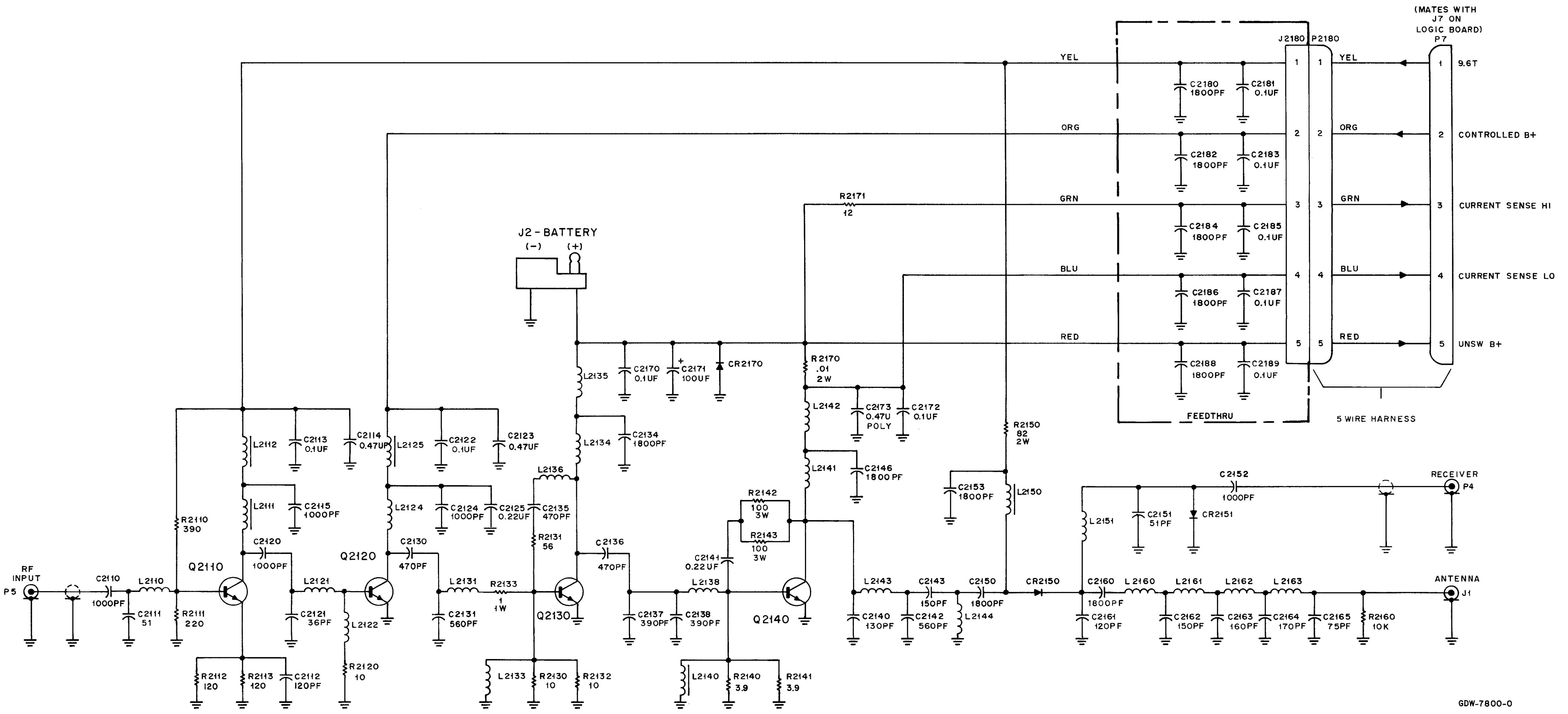
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLN9411A Low Band PA Hardware — MXW–7471–O

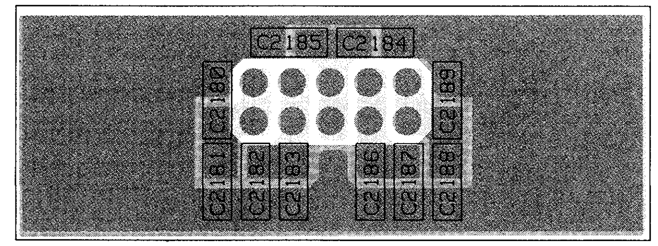
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	03–10908B01	machine screw M4X0.7X13
	03–10943M57	tapping screw M3x.5x10 (7used)
	15–80902V01	cover, low band heat sink

4/28/90

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4106A 60 Watt Low Band Range 2 Power Amplifier
PW–7640–O
(Sheet 2 of 2)
4/28/90



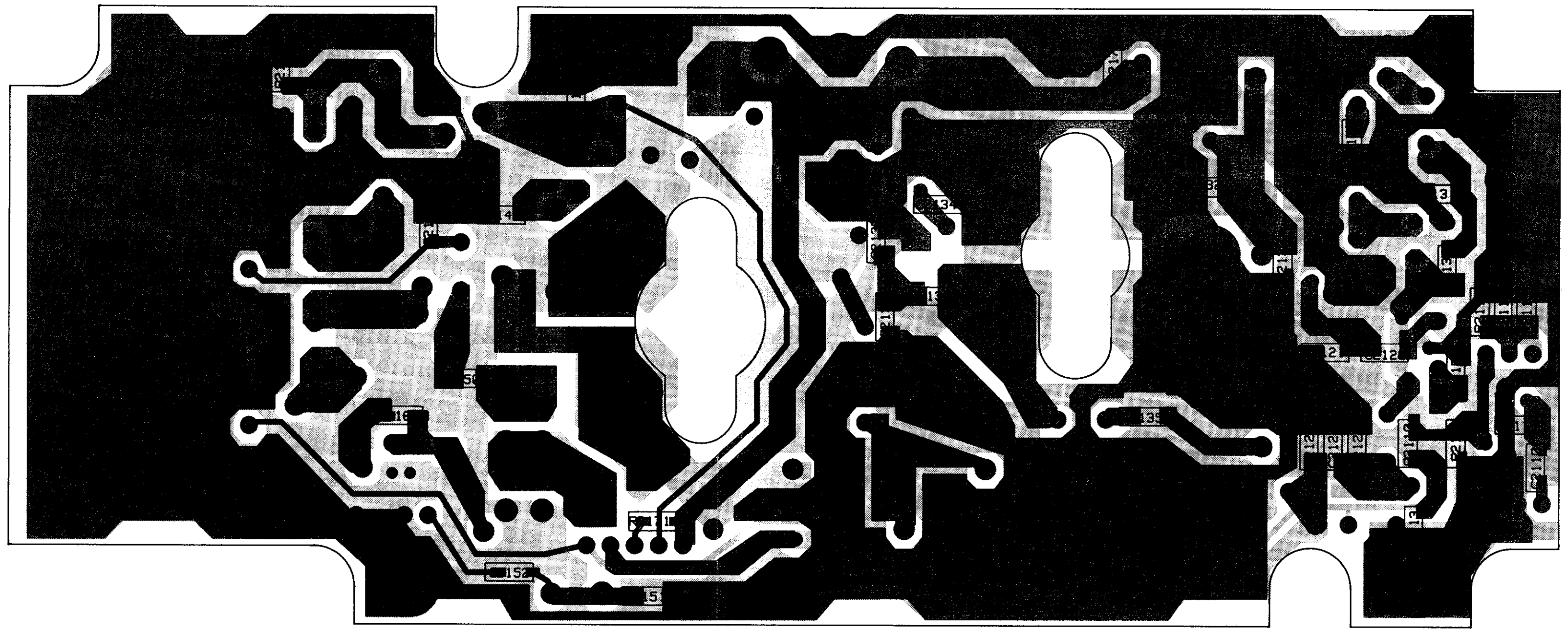
FEEDTHRU



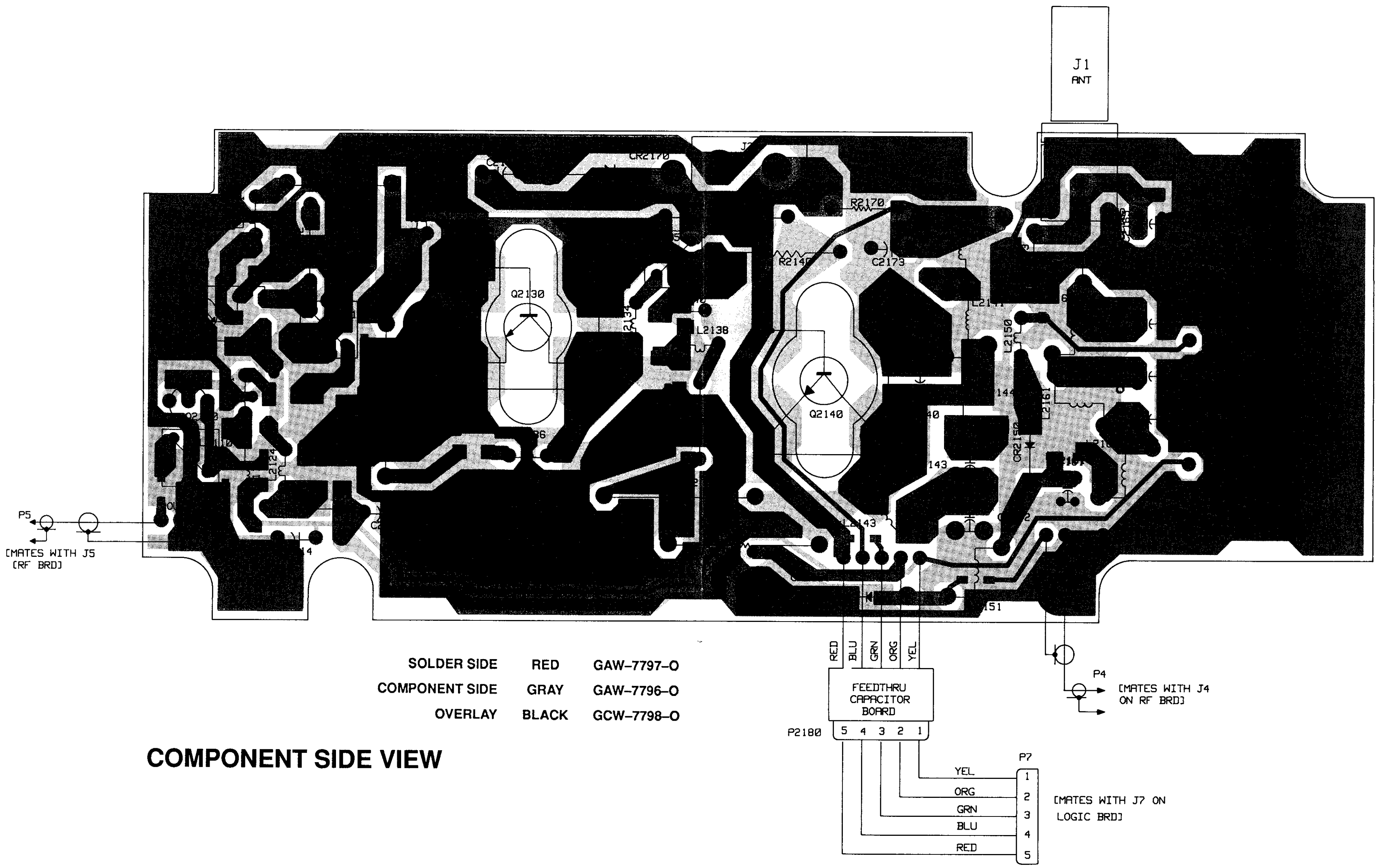
SOLDER SIDE	RED	GAW-7769-O
COMPONENT SIDE	GRAY	GAW-7768-O
OVERLAY	BLACK	GCW-7770-O

SOLDER SIDE VIEW

Schematic, Circuit Board Diagrams, and
Parts Lists for HLB4107A 60 Watt Low Band
Range 3 Power Amplifier
PW–7641–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE	RED	GAW–7797–O
COMPONENT SIDE	GRAY	GAW–7796–O
OVERLAY	BLACK	GCW–7799–O



SOLDER SIDE	RED	GAW–7797–O
COMPONENT SIDE	GRAY	GAW–7796–O
OVERLAY	BLACK	GCW–7798–O

COMPONENT SIDE VIEW

parts list

HLB4107A 60 Watt Low Band PA Board — MXW–7638–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2110	21–13740B73	1000
C2111	21–13740B42	51
C2112	21–13740B51	120
C2113	21–13741B69	0.1 uF
C2114	08–11051A17	.47 uF, 63V
C2115	21–13740B73	1000
C2120	21–13740B73	1000
C2121	21–13740B38	36
C2122	21–13741B69	0.1 uF
C2123	08–11051A17	.47 uF, 63V
C2124	21–13740B73	1000
C2125	21–11032B15	.22 uF, +80 –20
C2130	21–13740B65	470
C2131	21–13740B67	560
C2134	21–13740B78	1800
C2135,2136	21–11078B59	470 pF, 100V
C2137,2138	21–11078B57	390, 100V
C2140	21–80240G51	130 pF, 250V
C2141	08–84637L22	.22 uF, ±10%, 100V
C2142	21–80240G94	560, ±.5 pF, 350V
C2143	21–83366K16	150, 250V
C2146	21–13740B78	1800
C2150	21–13740B78	1800
C2151	21–11078B35	51, 100V
C2152	21–13740B73	1000
C2153	21–13740B78	1800
C2160	21–13740B78	1800
C2161	21–80240G50	120, 250V
C2162	21–80240G53	150, 250V
C2163	21–80240G54	160, 250V
C2164	21–80240G85	170, ±.5 pF, 250V
C2165	21–80240G45	75, 250V
C2170	21–13741B69	0.1 uF
C2171	21–11019A46	100, ±20%, 25V
C2172	21–13741B69	0.1 uF
C2173	08–11051A17	.47 uF, ±5%, 63V
C2180	21–13740B78	1800
C2181	21–13741B69	0.1 uF
C2182	21–13740B78	1800
C2183	21–13741B69	0.1 uF
C2184	21–13740B78	1800
C2185	21–13741B69	0.1 uF
C2186	21–13740B78	1800
C2187	21–13741B69	0.1 uF
C2188	21–13740B78	1800
C2189	21–13741B69	0.1 uF
diode (see note)		
CR2170	48–80236E07	transient suppressor
CR2150,2151	48–80236E11	pin
connector receptacle		
J2101	08–83228R01	mini UHF coax
coil, RF		
L2110	24–80931W17	9.5 turns, 195 uH
L2111	24–80044F05	1.5 uH
L2112	24–80036A01	.5 turns
L2121	24–80931W23	12.5 turns, 267 uH
L2122	24–80036A01	.5 turns
L2124	24–11030B15	10.5 turns
L2125	24–80036A01	.5 turns
L2131	24–11030E03	RF
L2133	24–82835G22	5.6 uH
L2134	24–11030B15	10.5 turns
L2135	24–80931W11	6.5 turns, 124 uH
L2136	24–11030B15	10.5 turns
L2138	24–11030E01	RF
L2140	24–82835G22	5.6 uH
L2141	24–80913W21	airwound
L2142	24–80913W32	airwound
L2143	24–80949X06	airwound
L2144	24–80913W25	airwound
L2150	24–82549D41	100 uH
L2151	24–80908T35	airwound
L2160	24–80908T35	airwound
L2161–2163	24–80908T34	airwound
plug		
P2180	28–80128M01	5–pin
transistor (see note)		
Q2120	01–80747T08	transistor & heat sink assembly
Q2110	48–00869658	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2110	06–11077A64	390
R2111	06–11077A58	220
R2112,2113	06–11077A52	120
R2120	06–11077A26	10
R2130	06–11077A26	10
R2131	06–80279M11	56
R2132	06–11077A26	10
R2133	06–11086A03	1, 1 watt
R2140,2141	06–11086C07	3.9, 2 watt
R2142,2143	06–80279M13	100
R2150	06–11086C33	82, 2 watt
R2160	06–11077A98	10k
R2170	06–80147M02	.01, ±10%, 2 watt
R2171	06–11077A28	12

MXW–7638–O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non–referenced parts		
	02–80905X01	nut, 2 used
	29–80014A01	coax clip, 2 used
	30–80138M12	cable, coax assembly
	30–80138M13	cable, coax assembly
	84–80904V02	circuit board
	84–80918W01	circuit board, feedthru

4/28/90

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

HLN9304A 60 Watt PA Hardware Kit — MXW–7639–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
transistor (see note)		
Q2130	48–80225C22	NPN
Q2140	48–80929U01	NPN
non–referenced parts		
	01–80754T01	5–wire harness assembly consists of:
	09–80133M01	connector, 10 used
	15–80075M01	connector housing, 2 used
	03–10908A21	machine screw M3x0.5x13, 2 used
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 7 used
	04–00131974	flat washer, 2 used
	04–80943V01	lock washer
	07–80078A01	mounting bracket, 2 used
	09–80255E02	heatsink connector
	26–80901V02	heatsink

4/24/90

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

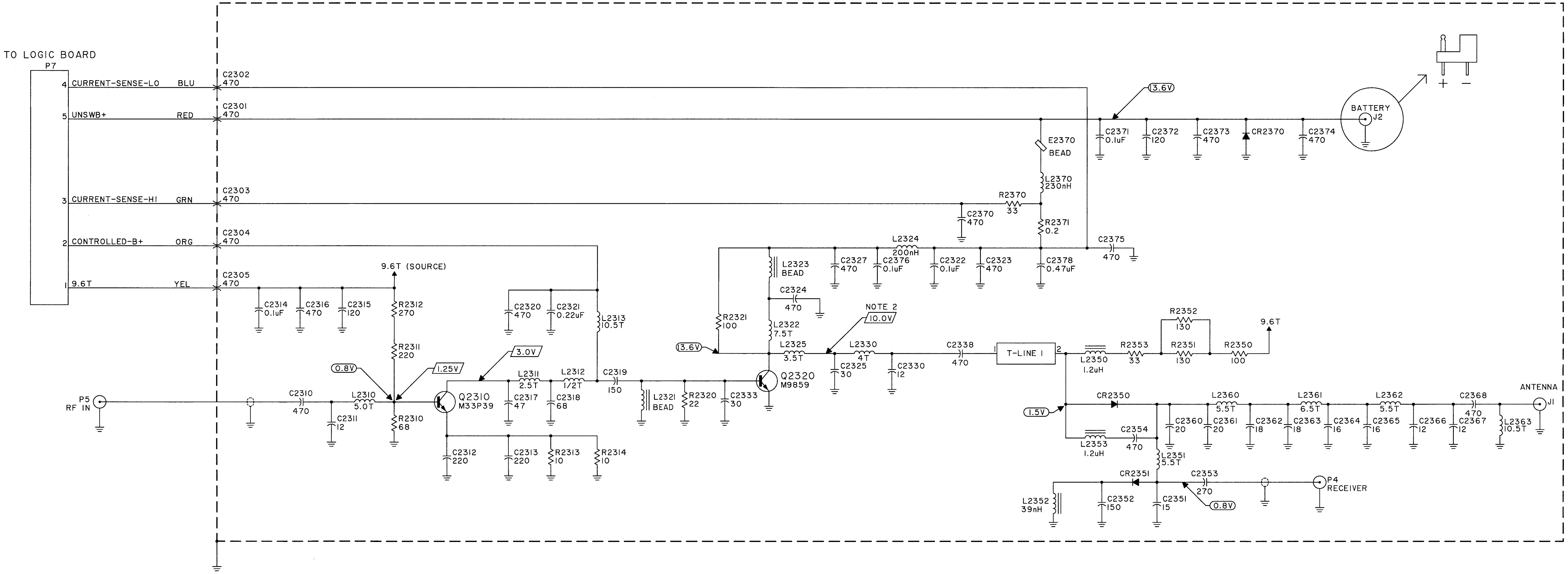
HLN9411A Low Band PA Hardware — MXW–7471–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	03–10908B01	machine screw M4X0.7X13
	03–10943M57	tapping screw M3x.5x10 (7used)
	15–80902V01	cover, low band heat sink

4/28/90

Schematic, Circuit Board Diagrams, and Parts Lists for HLB4107A 60 Watt Low Band Range 3 Power Amplifier
PW–7641–O
(Sheet 2 of 2)
4/28/90

2–WATT VHF POWER AMPLIFIER SCHEMATIC

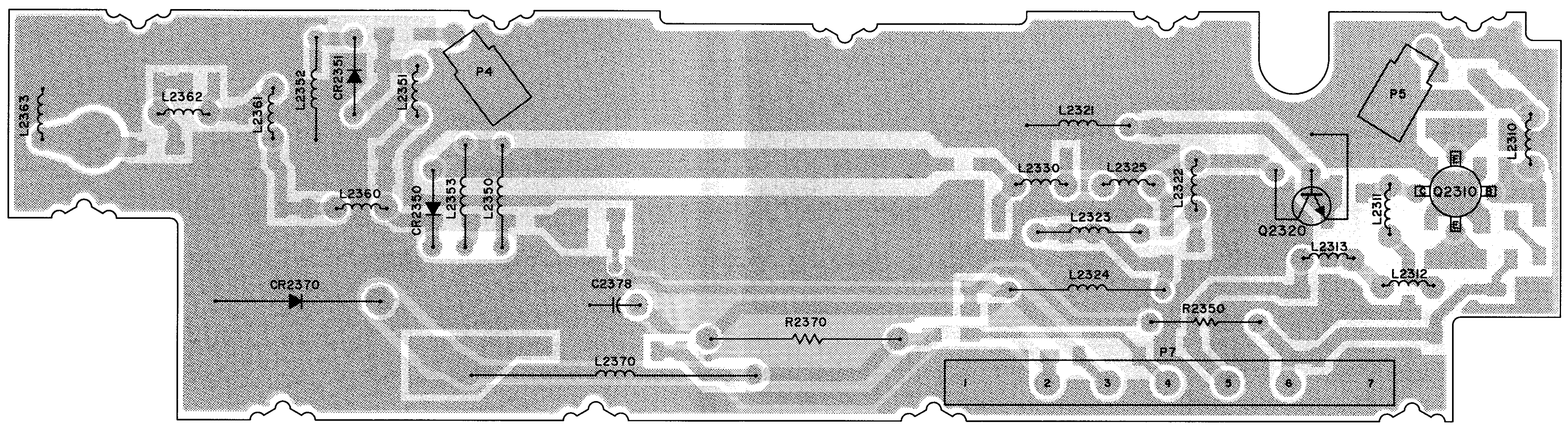


NOTES:
1. ALL RF MEASUREMENTS MADE USING BOONTON RF MILLIVOLTMETER (MODEL 92). FREQUENCY OF MEASUREMENT: 160 MHZ.
2. MUST USE 100:1 DIVIDER PROBE TIP HERE (BOONTOON MODEL 91-7C)
3. (10.0V) DENOTES D.C. VOLTAGE (WITH NO TX INJECTION APPLIED)
4. /10.0V/ DENOTES RF VOLTAGE VALUES.

GXW-7000-0

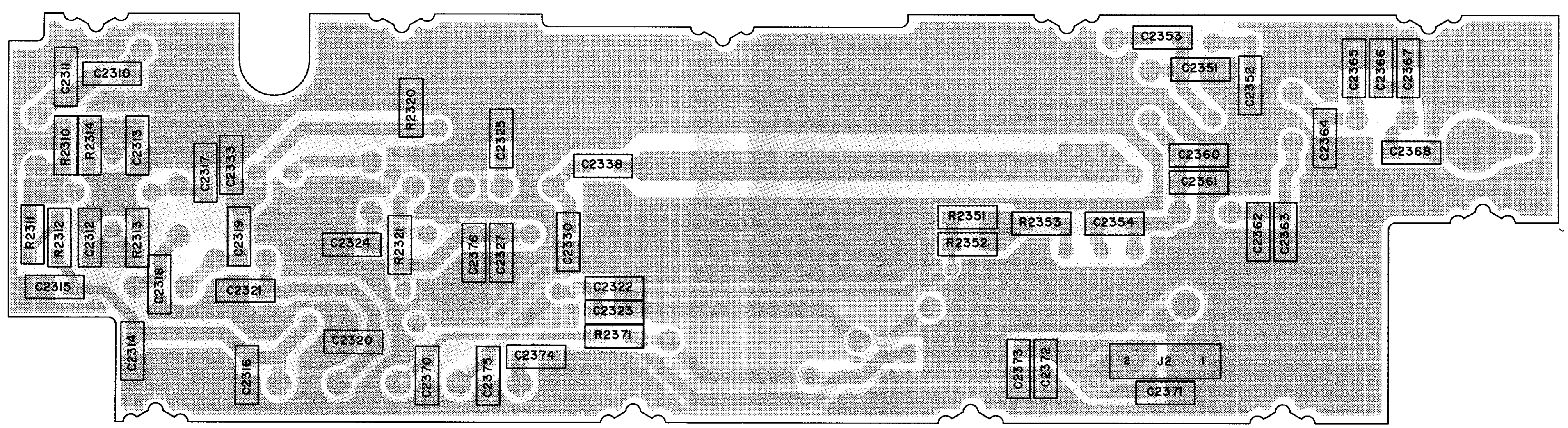
Schematic, Circuit Board Diagrams, and Parts Lists for HLD9523A 2–Watt VHF LPI Power Amplifier
PW–7001–A
(Sheet 1 of 2)
4/28/90

2–WATT VHF POWER AMPLIFIER CIRCUIT BOARD



SOLDER SIDE
COMPONENT SIDE — GPW-7017-0
OVERLAY — GXW-7018W01-0

COMPONENT SIDE



SOLDER SIDE
COMPONENT SIDE — GPW-7017-0
OVERLAY — GXW-7018W02-0

SOLDER SIDE

parts lists

HLD9523A *MaxTrac* LPI VHF PA Board — MXW–7002–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (unless otherwise stated)		
C2301–2305	21–84874K01	470 pF, feedthru
C2310	21–13740B65	470 pF, ±5%, 50V
C2311	21–13740B27	12 pF, ±5%, 50V
C2312,2313	21–13740B57	220 pF, ±5%, 50V
C2314	21–13741B69	.1 uF, ±5%, 50V
C2315	21–13740B51	120 pF, ±5%, 50V
C2316	21–13740B65	470 pF, ±5%, 50V
C2317	21–13740B41	47 pF, ±5%, 50V
C2318	21–13740B45	68 pF, ±5%, 50V
C2319	21–13740B53	150 uF, ±5%, 50V
C2320	21–13740B65	470 pF, ±5%, 50V
C2321	21–11032B15	.22 uF, +80, –20%, 50V
C2322	21–13741B69	.1 uF, ±5%, 50V
C2323	21–13740B65	470 pF, ±5%, 50V
C2324	23–13740B65	470 pF, ±5%, 50V
C2325	21–13740B36	30 pF, ±5%, 50V
C2327	21–13740B65	470 pF, ±5%, 50V
C2330	21–13740B27	12 pF, ±5%, 50V
C2333	21–13740B36	30 pF, ±5%, 50V
C2338	21–13740B65	470 pF, ±5%, 50V
C2351	21–13740B29	15 pF, ±5%, 50V
C2352	21–13740B53	150 pF, ±5%, 50V
C2353	21–13740B59	270 pF, ±5%, 50V
C2354	21–13740B65	470 pF, ±5%, 50V
C2360,2361	21–13740B31	18 pF, ±5%, 50V
C2362,2363	21–13740B31	18 pF, ±5%, 50V
C2364,2365	21–13740B30	16 pF, ±5%, 50V
C2366,2367	21–13740B27	12 pF, ±5%, 50V
C2368	23–13740B65	470 uF, ±5%, 50V
C2370	21–13740B65	470 pF, ±5%, 50V
C2371	21–13741B69	.1 uF, ±5%, 50V
C2372	21–13740B51	120 pF, ±5%, 50V
C2373–2375	21–13740B65	470 pF, ±5%, 50V
C2376	21–13741B69	.1 uF, ±5%, 50V
C2378	08–11051A17	.47 uF, ±5%, 63V
diode (see note)		
CR2350,2351	48–80010E01	pin
CR2370	48–80236E07	transient suppressor
ferrite bead		
E2370	76–83960B01	core
coil, RF		
L2310	24–11030A04	5 turns, green
L2311	24–11030B05	2.5 turns, green
L2312	24–11030E01	1/2 turn, brown
L2313	24–11030B15	10.5 turns, white
L2321	24–80036A01	ferrite, 1/2 turn
L2322	24–11030B12	7.5 turns, yellow
L2323	24–80036A01	ferrite, 1/2 turn
L2324	24–82723H46	.2 uH, blue–green
L2325	24–11030B07	3.5 turns, white
L2330	24–11030A03	4 turns, yellow
L2350	24–82723H49	1.2 uH, blue–black
L2351	24–11030B10	5.5 turns, red
L2352	24–82723H44	.39 uH, blue–yellow
L2353	24–82723H49	1.2 uH, blue–black
L2360	24–11030B10	5.5 turns, red
L2361	24–11030B11	6.5 turns, orange
L2362	24–11030B10	5.5 turns, red
L2363	24–11030B15	10.5 turns, white
L2370	24–84346A02	.23 uH
transistor (see note)		
Q2310	48–82233P39	NPN
Q2320	48–00869859	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2310	06–11077A46	68
R2311	06–11077A58	220
R2312	06–11077A60	270
R2313,2314	06–11077A26	10
R2320	06–11077A34	22
R2321	06–11077A50	100
R2350	06–11009A25	100, 1/4W
R2351,2352	06–11077A53	130
R2353	06–11077A38	33
R2370	06–11077A38	33
R2371	06–11086D01	.2, 2W
non–referenced parts		
	26–80158L01	transistor heatsink
	29–80014A01	coax terminal clip, 2 used
	37–00132049	1/4" heatshrink tubing
	84–80947X01	circuit board

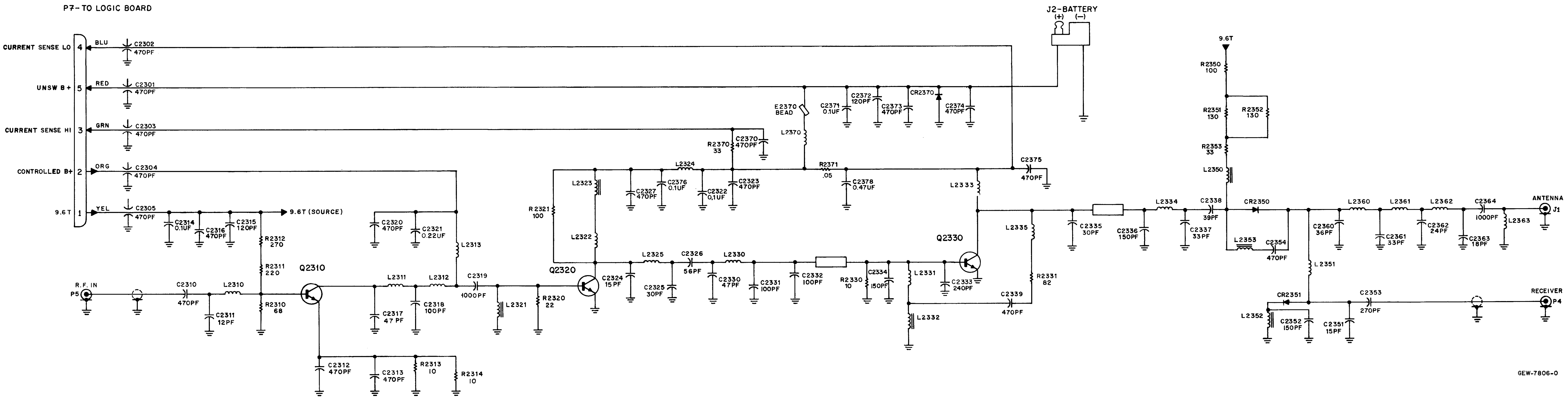
10/5/89

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

HLN9524A *MaxTrac* LPI VHF Hardware — MXW–7003–A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	03–10943M10	tapping screw, TT3 x 0.5 x 8, 6 used
	03–13943M11	tapping screw, TT3 x 0.5 x 10, 2 used
	04–80943V01	lock washer
	09–80131M01	mini coax receptacle connector
	09–80255E01	power connector
	26–80124L01	heatsink
	26–80223M05	PA shield
	30–80138M07	coax cable assembly
	32–80014N02	access connector gasket
	38–80041M01	button plug
	38–80138M08	coax cable assembly

4/28/90

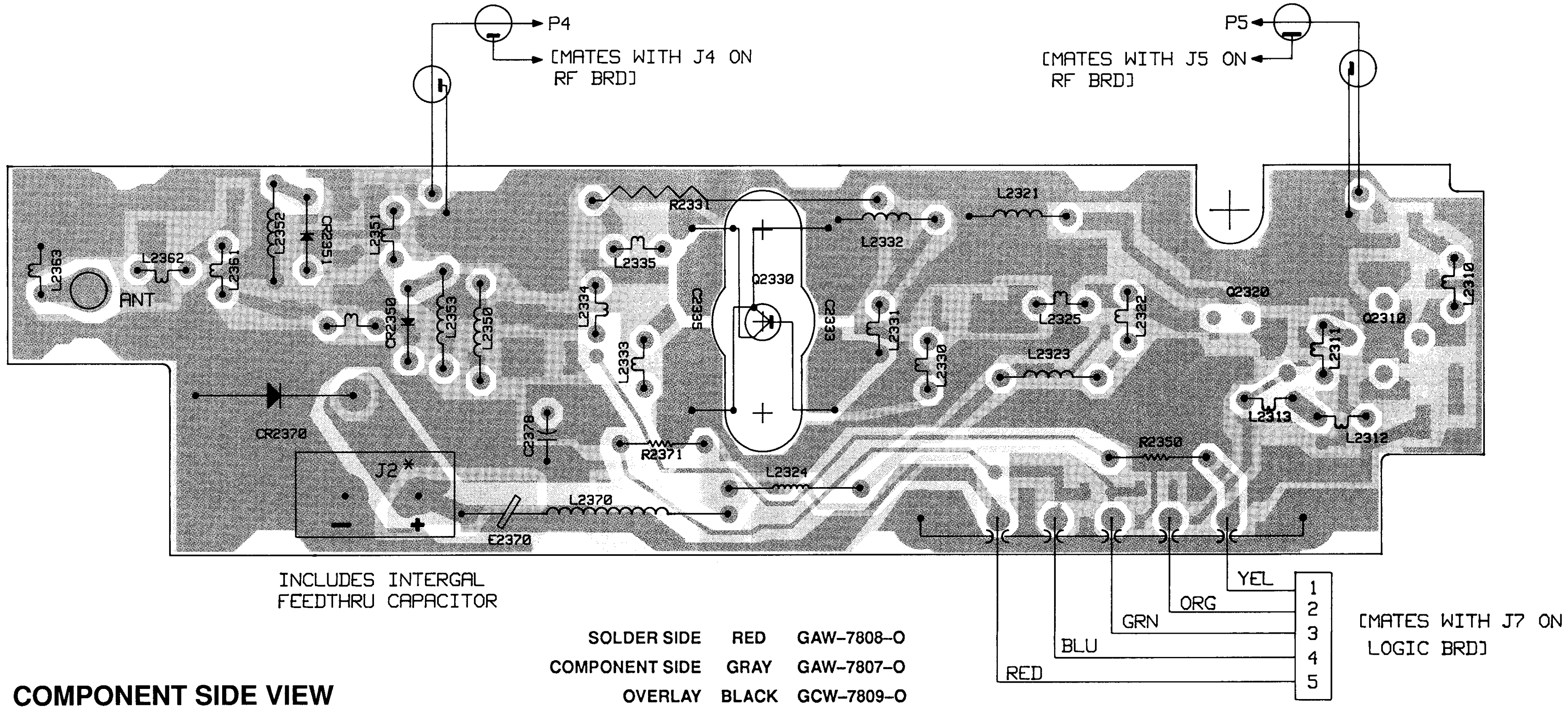


Schematic, Circuit Board Diagrams, and
Parts Lists for HLD4324A 25 Watt VHF
Range 2 Power Amplifier

PW–7481–O

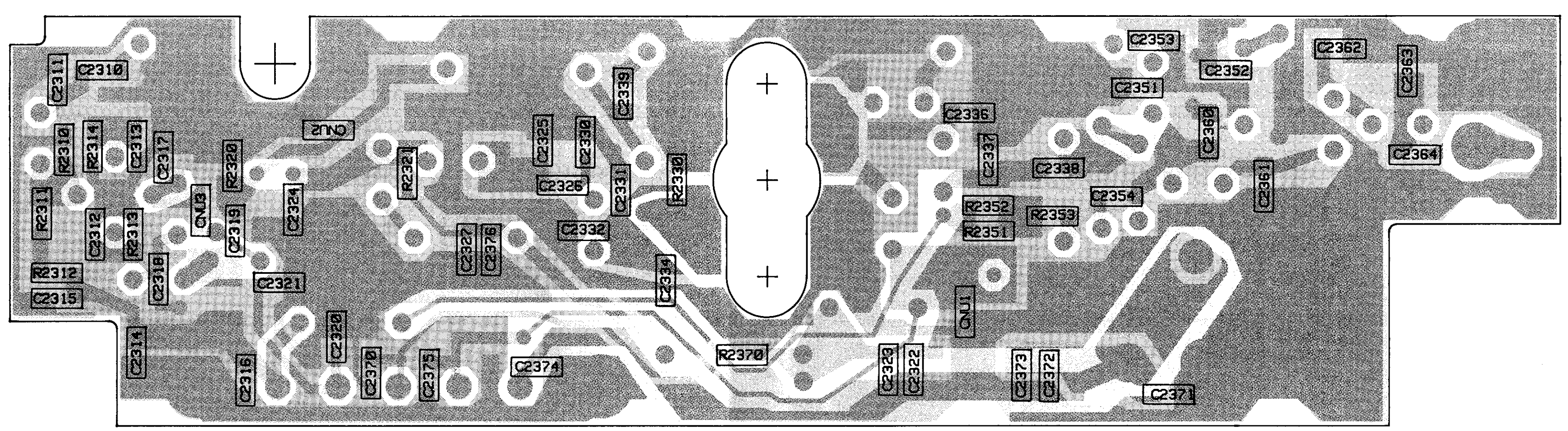
(Sheet 1 of 2)

4/28/90



SOLDER SIDE	RED	GAW–7808–O
COMPONENT SIDE	GRAY	GAW–7807–O
OVERLAY	BLACK	GCW–7809–O

COMPONENT SIDE VIEW



SOLDER SIDE	RED	GAW–7808–O
COMPONENT SIDE	GRAY	GAW–7807–O
OVERLAY	BLACK	GCW–7810–O

SOLDER SIDE VIEW

parts list

HLD4324A 25 Watt VHF PA — MXW–7482–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2301–2305	21–84874K01	470, ±20%, 250V
C2310	21–13740B65	470
C2311	21–13740B27	12
C2312,2313	21–13740B65	470
C2314	21–13741B69	0.1 uF
C2315	21–13740B51	120
C2316	21–13740B65	470
C2317	21–13740B41	47
C2318	21–13740B49	100
C2319	21–13740B73	1000
C2320	21–13740B65	470
C2321	21–11032B15	.22 uF, +80 –20%
C2322	21–13741B69	0.1 uF
C2323	21–13740B65	470
C2324	21–13740B29	15
C2325	21–13740B36	30
C2326	21–13740B43	56
C2327	21–13740B65	470
C2330	21–13740B41	47
C2331,2332	21–13740B49	100
C2334	21–80060M47	150, 100V
C2336	21–80060M47	150, 100V
C2337	21–80060M31	33, 500V
C2338	21–80060M33	39, 500V
C2339	21–13740B65	470
C2351	21–13740B29	15
C2352	21–13740B53	150
C2353	21–13740B59	270
C2354	21–13740B65	470
C2360	21–80060M32	36, 500V
C2361	21–80060M31	33, 500V
C2362	21–80060M28	24, 500V
C2363	21–80060M25	18, 500V
C2364	21–13740B73	1000
C2370	21–13740B65	470
C2371	21–13741B69	0.1 uF
C2372	21–13740B51	120
C2373–2375	21–13740B65	470
C2376	21–13741B69	0.1 uF
C2378	08–11051A17	.47 uF, 63V
diode (see note)		
CR2350,2351	48–80010E01	pin
CR2370	48–80236E07	transient suppressor
ferrite bead		
E2370	76–83960B01	ferrite core
coil, RF		
L2310	24–11030A04	5 turns
L2311	24–11030B07	3.5 turns
L2312	24–11030E03	RF
L2313	24–11030B15	10.5 turns
L2321	24–80036A01	.5 turn
L2322	24–11030B07	3.5 turns
L2323	24–80036A01	.5 turn
L2324	24–82723H46	.2 uH
L2325	24–11030B05	1.5 turns
L2330	24–11030A01	2 turns
L2331	24–11030E01	RF
L2332	24–80036A01	.5 turn
L2333	24–11030B15	10.5 turns
L2334	24–11030B07	3.5 turns
L2335	24–11030A02	3 turns
L2350	24–82723H49	1.2 uH
L2351	24–11030B10	5.5 turns
L2352	24–82723H44	.039 uH
L2353	24–82723H49	1.2 uH
L2360	24–11030B10	5.5 turns
L2361	24–11030B11	6.5 turns
L2362	24–11030B10	5.5 turns
L2363	24–11030B15	10.5 turns
L2370	24–84346A02	.23 uH
transistor (see note)		
Q2310	48–82233P39	NPN
Q2320	48–00869859	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2310	06–11077A46	68
R2311	06–11077A58	220
R2312	06–11077A60	270
R2313,2314	06–11077A26	10
R2320	06–11077A34	22
R2321	06–11077A50	100
R2330	06–11077A26	10
R2331	06–80279M01	metal film 82, 3 watt
R2350	06–11009A25	100, 1/4 watt
R2351,2352	06–11077A53	130
R2353	06–11077A38	33
R2370	06–11077A38	33
R2371	06–80147M01	metal plate .05, ±10%, 2 watt
non–referenced parts		
	29–80014A01	coax clip, 2 used
	26–80158L01	heatsink
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	connector, receptacle
	15–80075M01	housing, connector
	84–80926T03	circuit board

4/28/90

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

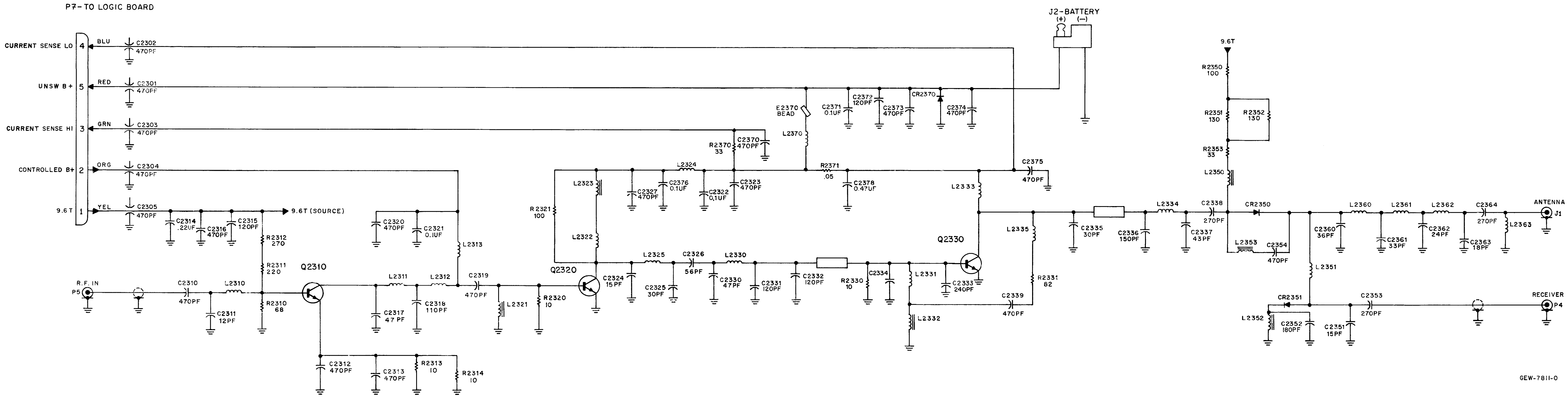
HLN5183A 25 Watt VHF PA Hardware Kit — MXW–7483–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5%, 50V (unless otherwise stated)		
C2333	21–11078B52	240, 100V
C2335	21–11078B27	30, 100V
transistor (see note)		
Q2330	48–80225C22	NPN
non–referenced parts		
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer, 2 used
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	32–80014N02	gasket, connector access
	38–80041M01	button, plug
	42–80281L01	ground clip, 2 used

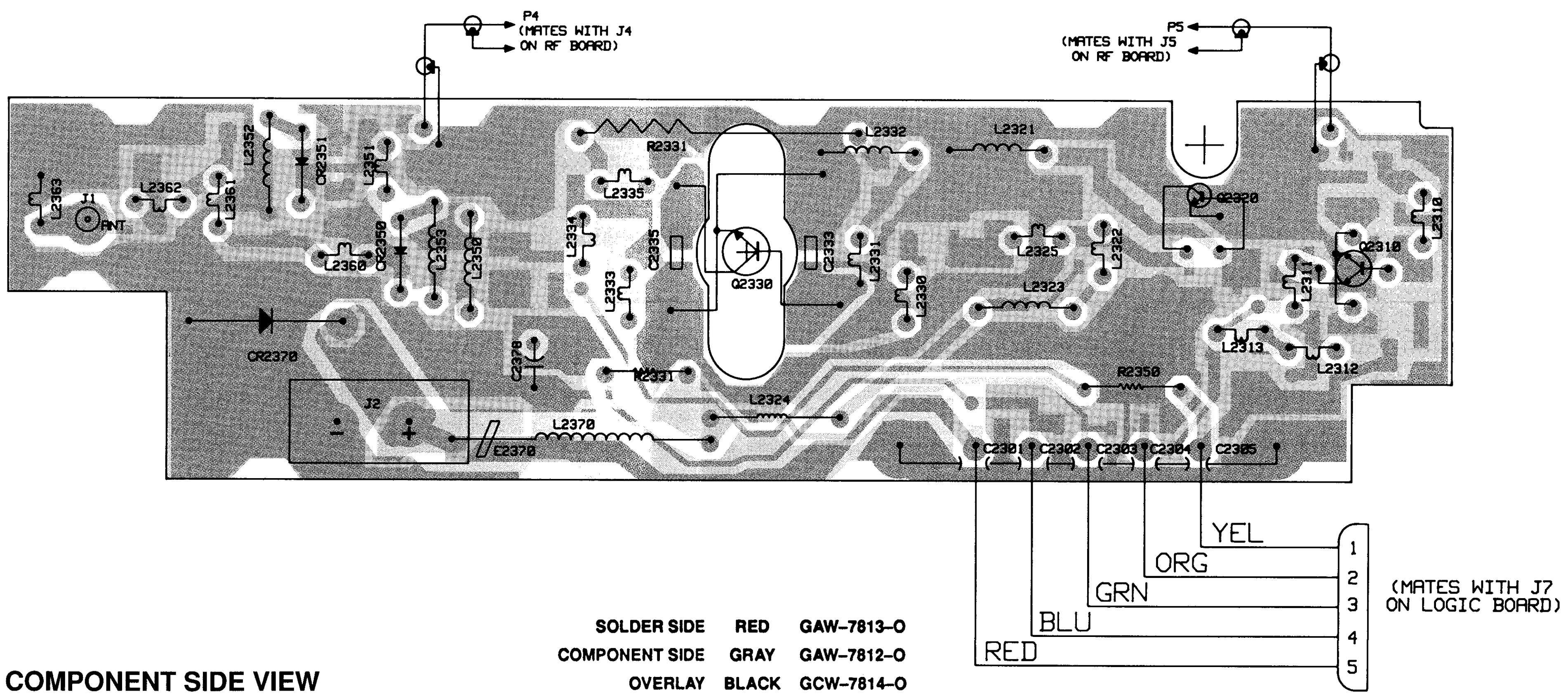
4/28/90

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLD4324A 25 Watt VHF Range 2 Power Amplifier
PW–7481–O
(Sheet 2 of 2)
4/28/90

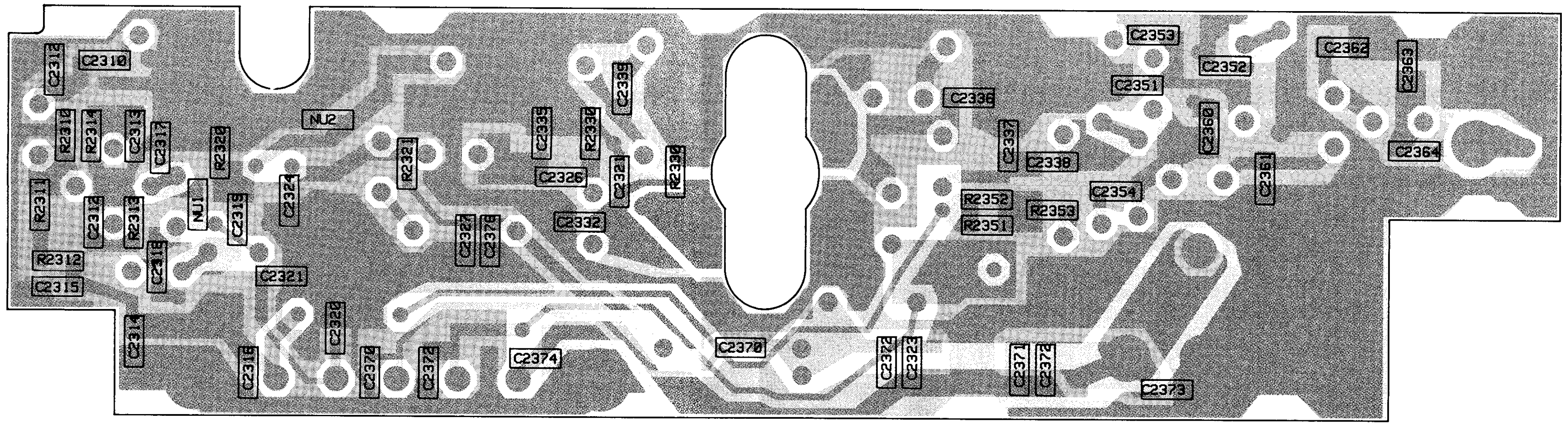


Schematic, Circuit Board Diagrams, and
Parts Lists for HLD4323A 25 Watt VHF
Range 1 Power Amplifier
PW–7484–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE	RED	GAW–7813–O
COMPONENT SIDE	GRAY	GAW–7812–O
OVERLAY	BLACK	GCW–7814–O

COMPONENT SIDE VIEW



SOLDER SIDE	RED	GAW–7813–O
COMPONENT SIDE	GRAY	GAW–7812–O
OVERLAY	BLACK	GCW–7815–O

SOLDER SIDE VIEW

parts list

HLD4323A 25 Watt VHF PA — MXW–7485–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2301–2305	21–84874K01	470, ±20%, 250V
C2310	21–13740B65	470
C2311	21–13740B27	12
C2312,2313	21–13740B65	470
C2314	21–11032B15	.22 uF, +80 –20%
C2315	21–13740B51	120
C2316	21–13740B65	470
C2317	21–13740B41	47
C2318	21–13740B50	110
C2319	21–13740B65	470
C2320	21–13740B65	470
C2321,2322	21–13741B69	0.1 uF
C2323	21–13740B65	470
C2324	21–13740B29	15
C2325	21–13740B36	30
C2326	21–13740B43	56
C2327	21–13740B65	470
C2330	21–13740B41	47
C2331,2332	21–13740B51	120
C2336	21–80060M47	150, 100V
C2337	21–80060M34	43, 500V
C2338	21–13740B59	270
C2339	21–13740B65	470
C2351	21–13740B29	15
C2352	21–13740B55	180
C2353	21–13740B59	270
C2354	21–13740B65	470
C2360	21–80060M32	36, 500V
C2361	21–80060M31	33, 500V
C2362	21–80060M28	24, 500V
C2363	21–80060M25	18, 500V
C2364	21–13740B59	270
C2370	21–13740B65	470
C2371	21–13741B69	0.1 uF
C2372	21–13740B51	120
C2373–2375	21–13740B65	470
C2376	21–13741B69	0.1 uF
C2378	08–11051A17	.47 uF, 63V
diode (see note)		
CR2350,2351	48–80010E01	pin
CR2370	48–80236E07	transient suppressor
ferrite bead		
E2370	76–83960B01	ferrite core
coil, RF		
L2310	24–11030A04	5 turns
L2311	24–11030B07	3.5 turns
L2312	24–11030E01	RF
L2313	24–11030B15	10.5 turns
L2321	24–80036A01	.5 turn
L2322	24–11030B07	3.5 turns
L2323	24–80036A01	.5 turn
L2324	24–82723H46	.2 uH
L2325	24–11030B05	1.5 turns
L2330	24–11030A01	2 turns
L2331	24–11030A02	3 turns
L2332	24–80036A01	.5 turn
L2333	24–11030B15	10.5 turns
L2334,2335	24–11030A02	3 turns
L2350	24–82723H49	1.2 uH
L2351	24–11030B10	5.5 turns
L2352	24–82723H44	.039 uH
L2353	24–82723H49	1.2 uH
L2360	24–11030B10	5.5 turns
L2361	24–11030B11	6.5 turns
L2362	24–11030B10	5.5 turns
L2363	24–11030B15	10.5 turns
L2370	24–84346A02	.23 uH
transistor (see note)		
Q2310	48–82233P39	NPN
Q2320	48–00869859	NPN
resistor, fixed, ohm, +5%, 1/8 watt (unless otherwise stated)		
R2310	06–11077A46	68
R2311	06–11077A58	220
R2312	06–11077A60	270
R2313,2314	06–11077A26	10
R2320	06–11077A26	10
R2321	06–11077A50	100
R2330	06–11077A26	10
R2331	06–80279M01	metal film 82, 3 watt
R2350	06–11009A25	100, 1/4 watt
R2351,2352	06–11077A53	130
R2353	06–11077A38	33
R2370	06–11077A38	33
R2371	06–80147M01	metal plate .05, 10%, 2 watt
non–referenced parts		
	29–80014A01	coax clip (2 used)
	26–80158L01	heatsink
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	connector, receptacle(5 used)
	15–80075M01	housing, connector
	84–80217M02	circuit board

4/28/90

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

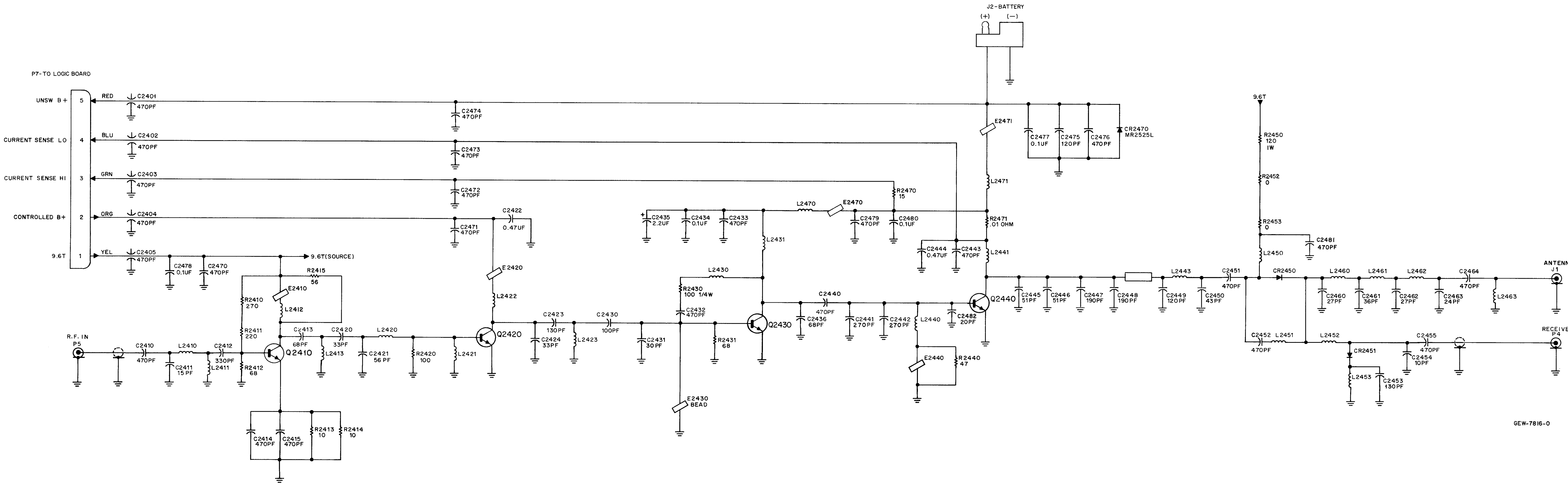
HLN5183A 25 Watt VHF PA Hardware Kit — MXW–7483–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5%, 50V (unless otherwise stated)		
C2333	21–11078B52	240, 100V
C2335	21–11078B27	30, 100V
transistor (see note)		
Q2330	48–80225C22	NPN
non–referenced parts		
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer, 2 used
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	32–80014N02	gasket, connector access
	38–80041M01	button, plug
	42–80281L01	ground clip, 2 used

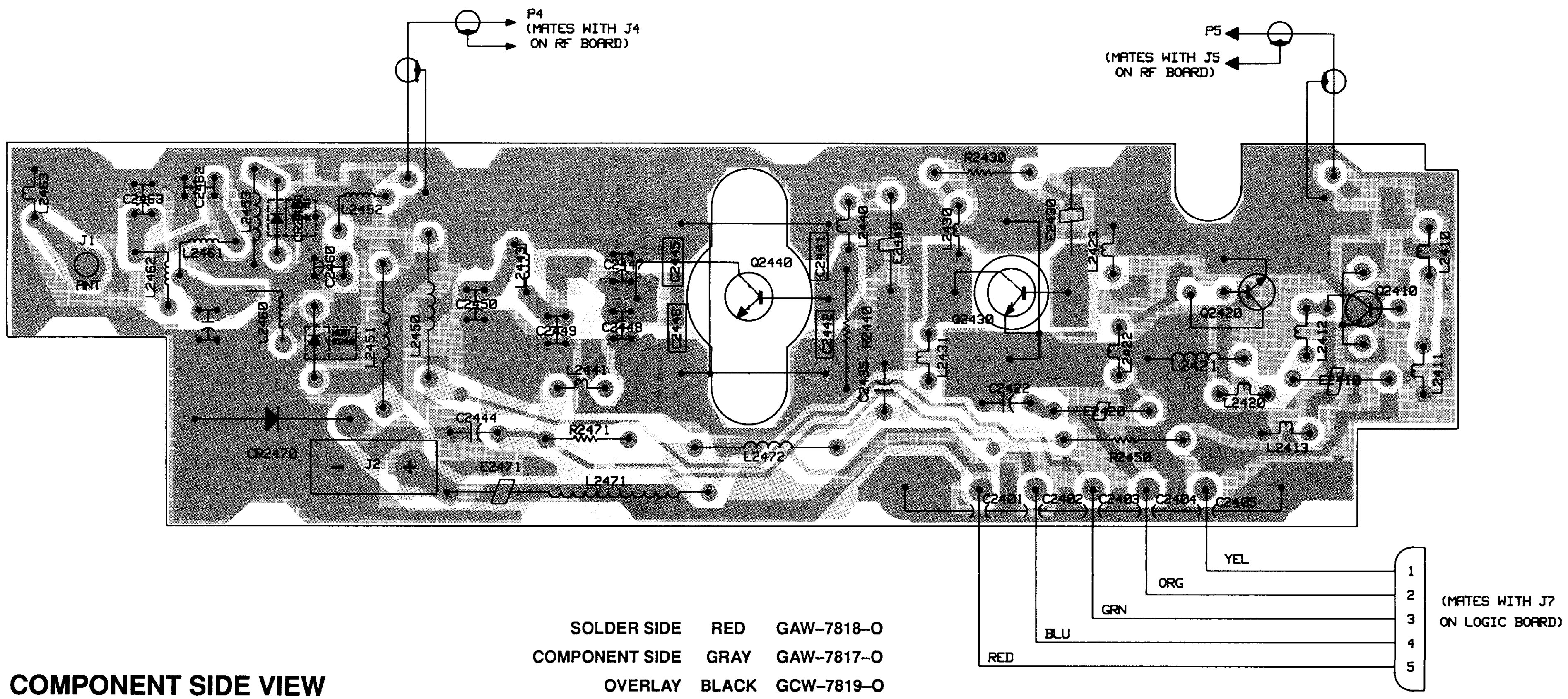
4/28/90

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLD4323A 25 Watt VHF Range 1 Power Amplifier
PW–7484–O
(Sheet 2 of 2)
4/28/90

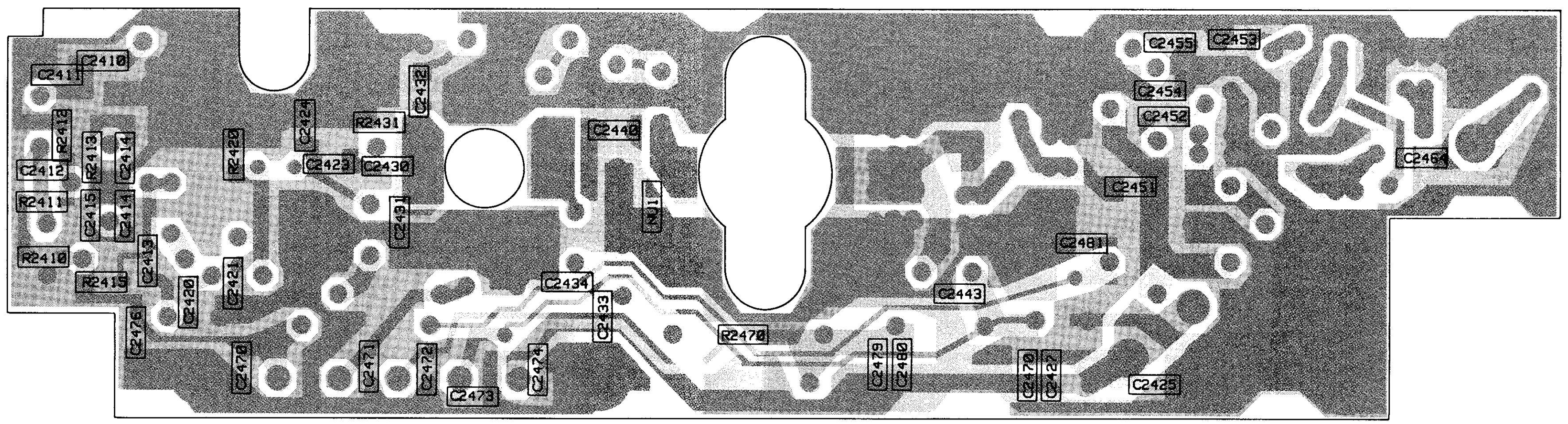


Schematic, Circuit Board Diagrams, and Parts
Lists for HLD4326A 45 Watt VHF Power Amplifier
PW–7486–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE	RED	GAW–7818–O
COMPONENT SIDE	GRAY	GAW–7817–O
OVERLAY	BLACK	GCW–7819–O

COMPONENT SIDE VIEW



SOLDER SIDE	RED	GAW–7818–O
COMPONENT SIDE	GRAY	GAW–7817–O
OVERLAY	BLACK	GCW–7820–O

SOLDER SIDE VIEW

parts list

HLD4326A 45 Watt VHF PA MXW–7487–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2401–2405	21–84874K01	470, ±20%, 250V
C2410	21–13740B65	470
C2411	21–13740B29	15
C2412	21–13740B61	330
C2413	21–13740B45	68
C2414,2415	21–13740B65	470
C2420	21–13740B37	33
C2421	21–13740B43	56
C2422	08–11051A17	.47 uF, 63V
C2423	21–13740B52	130
C2424	21–13740B37	33
C2430	21–13740B49	100
C2431	21–13740B36	30
C2432	21–11078B59	470 pV, 100V
C2433	21–13740B65	470
C2434	21–13741B69	0.1 uF
C2435	21–13749D64	2.2 uF, ±20%, 35V
C2440	21–11078B59	470, 100V
C2443	21–13740B65	470
C2444	08–11051A17	.47 uF, 63V
C2447,2448	21–80240G77	190, 250V
C2449	21–80240G50	120, 250V
C2450	21–80240G42	43, 250V
C2451	21–11078B59	470, 100V
C2452	21–13740B65	470
C2453	21–11078B45	130, 100V
C2454	21–13740B25	10
C2455	21–13740B65	470
C2460	21–80240G40	27, 250V
C2461	21–80240G41	36, 250V
C2462	21–80240G40	27, 250V
C2463	21–80240G39	24, 250V
C2464	21–11078B59	470 pV, 100V
C2470–2474	21–13740B65	470
C2475	21–13740B51	120
C2476	21–13740B65	470
C2477,2478	21–13741B69	0.1 uF
C2479	21–13740B65	470
C2480	21–13741B69	0.1 uF
C2481	21–13740B65	470
C2482	21–11078B21	20, 100V
diode (see note)		
CR2450,2451	48–80010E01	pin
CR2470	48–80236E07	transient suppressor
ferrite bead		
E2410	24–80036A01	ferrite, .5 turn
E2420	24–80036A01	ferrite, .5 turn
E2430	24–80036A01	ferrite, .5 turn
E2440	24–80036A01	ferrite, .5 turn
E2470,2471	76–83960B01	ferrite core
coil, RF		
L2410	23–11030A01	2 turns
L2411	24–11030B07	3.5 turns
L2412	24–11030B15	10.5 turns
L2413	24–11030A06	7 turns
L2420	24–11030E01	RF
L2421	24–82723H49	1.2 uH
L2422	24–11030E01	RF
L2423	24–11030E04	RF
L2430	24–11030B07	3.5 turns
L2431	24–11030A03	4 turns
L2440	24–11030A03	4 turns
L2441	24–11030A01	2 turns
L2443	24–80908T09	1.5 turns
L2450,2451	24–82835G25	1.5 uH
L2452	24–80908T22	3.5 turns
L2453	24–82723H44	.039 uH
L2460	24–80908T22	3.5 turns
L2461	24–80908T23	3.5 turns
L2462	24–80908T22	3.5 turns
L2463	24–11030B15	10.5 turns
L2470	24–82723H46	.2 uH
L2471	24–84346A02	.23 uH
transistor (see note)		
Q2410	48–82233P39	NPN
Q2420	48–00869859	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2410	06–11077A60	270
R2411	06–11077A58	220
R2412	06–11077A46	68
R2413,2414	06–11077A26	10
R2415	06–11077A44	560
R2420	06–11077A50	100
R2430	06–11009C25	100, 1/4 watt
R2431	06–11077A46	68
R2440	06–11086A27	47, 1 watt
R2450	06–11086A37	120, 1 watt
R2452,2453	06–11077A01	0
R2470	06–11077A30	15
R2471	06–80147M02	.01, 10%, 2 watt

MXW–7487–O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non–referenced parts		
	26–80275M01	heatsink (2 used)
	29–80014A01	coax clip (2 used)
	26–80158L01	heatsink
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	receptacle connector (5 used)
	15–80075M01	housing, connector
	84–80292M03	circuit board

4/28/90

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

HLN9071A 50 Watt VHF PA Hardware Kit MXW–7488–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5% (unless otherwise stated)		
C2436	21–11078B38	68, 100V
C2441,2442	21–11078B53	270, 100V
C2445,2446	21–11078B35	51, 100V
transistor (see note)		
Q2430	48–80225C18	NPN
Q2440	48–84411L04	NPN
non–referenced parts		
	02–00007003	hex nut 8–32x5/16x1/8
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer, 2 used
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	32–80014N02	gasket, connector access
	42–80281L01	ground clip, 2 used

4/28/90

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

HLE9502A *MaxTrac* LPI UHF PA Board — MXW–6747–A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2601–2605	21–84874K01	feedthru, 470 pF
C2610	21–13740B49	100
C2611	21–13740B27	12
C2612	21–13740B21	6.8, ±.5 pF
C2613,2614	21–13740B73	1000
C2615	21–13740B21	6.8, ±.5 pF
C2616	21–13741B69	0.1 uF
C2617,2618	21–13740B49	100
C2619	21–13741B69	0.1 uF
C2620	21–13740B31	18
C2621	21–13740B34	24
C2622	21–13740B09	2.2, ±.25 pF
C2626	21–13740B49	100
C2627	21–13740B73	1000
C2628,2629	21–11032B15	0.22 uF, +80–20%
C2630	21–13740B43	56
C2631,2632	21–13740B33	22
C2635	21–13740B23	8.2, ±.5 pF
C2636	21–13740B49	100
C2641	21–13740B23	8.2, ±.5 pF
C2644,2645	21–13740B23	8.2, ±.5 pF
C2646	21–13740B21	6.8, ±.5 pF
C2647	21–11078B42	100, 100V
C2648	21–11032B15	0.22 uF, +80–20%
C2649	21–13741N21	1000, ±10%
C2650	21–13740B21	6.8, ±.5 pF
C2651	21–13740B19	5.6, ±.25 pF
C2652	21–13740B13	3.3, ±.25 pF
C2653–2656	21–13740B49	100
C2660	21–80060M17	9.0, ±.5 pF, 500V
C2661,2662	21–80060M21	12.0, ±.5 pF, 500V
C2663	21–80060M11	6.0, ±.5 pF, 500V
C2664	21–11078B42	100, 100V
C2670,2671	21–13740B49	100
C2672	21–13740B73	1000
C2673	21–13741B69	0.1 uF
C2674	21–13740B49	100
C2675	08–11051A17	0.47 uF, 63V
C2676	21–13740B49	100
C2677	21–13740B73	1000
C2678	21–13741B69	0.1 uF
C2679	21–13740B49	100
C2685	21–13740B49	100
diode (see note)		
CR2650,2651	48–80010E01	pin
CR2652	48–80142L01	pin
CR2670	48–80236E07	zener, 28V
ferrite bead		
E2620	76–83960B01	core
E2670,2671	76–83960B01	core
coil, RF		
L2610	24–11030E01	brown
L2611,2612	24–11030E03	orange
L2613	24–11030B01	1.5 turns, brown
L2622	24–82723H44	0.39 uH
L2630	24–11030A03	4 turns
L2631	24–80036A01	choke, 1/2 turn
L2632	24–11030A02	3 turns
L2643	24–11030A02	3 turns
L2650	24–82723H40	0.29 uH
L2651	24–11030B04	1.5 turns, yellow
L2652	24–82723H40	0.29 uH
L2653	24–11030B06	2.5 turns, blue
L2654	24–82723H40	0.29 uH
L2660	24–11030B04	1.5 turns, yellow
L2661	24–11030A02	3 turns
L2662	24–11030B06	2.5 turns, blue
L2663	24–11030B11	6.5 turns, orange
L2670	24–82723H46	0.20 uH
L2671	24–84346A02	choke, 0.23 uH
transistor (see note)		
Q2610	48–82233P39	NPN
Q2620	48–80225C09	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2610	06–11077A60	270
R2611	06–11077A58	220
R2612	06–11077A46	68
R2613,2614	06–11077A26	10
R2620	06–11077A40	39
R2621	06–11045A25	100, 1/2 W
R2650	06–11009A25	100, 1/4W
R2651,2652	06–11077A50	100
R2653	06–11077A38	33
R2654	06–11077A66	470
R2670	06–11086D01	0.2, 2W
R2671	06–11077A40	39
non–referenced parts		
	04–83755H01	washer, solder
	07–80982T01	bracket, feedthru
	09–80133M01	receptacle, connector
	15–80075M01	housing, connector
	26–80158L01	heatsink
	29–80014A01	clip, coax (2 used)
	42–10217A30	tie strap
	84–80929X01	circuit board

4/28/90

note: Field repair of this kit is not recommended. It should be replaced in its entirety. Parts listed are for reference only.

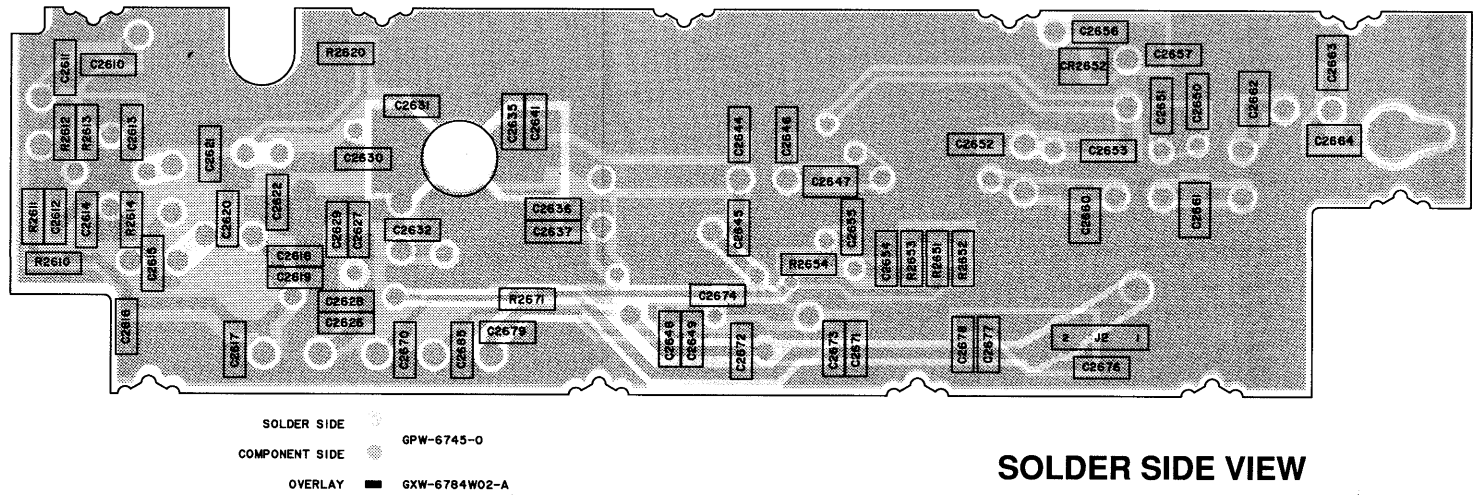
HLN9501A *MaxTrac* LPI UHF PA Hardware — MXW–6748–A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
connector, receptacle		
J1	09–80131M01	coax connector, mini–UHF
J2	09–80255E01	power connector (2 contacts)
connector, plug		
P4	30–80138M07	coax cable assembly
P5	30–80138M08	coax cable assembly
transistor (see note)		
Q2630	48–80225C19	power, NPN
non–referenced parts		
	02–00007003	hex nut, 8–32 x 5/16 x 1/8
	03–10943M10	screw, tapping, 3 x 0.5 x 8 (6 used)
	03–10943M11	screw, tapping, 3 x 0.5 x 10 (2 used)
	04–80943V01	lockwasher
	26–80124L01	heatsink
	26–80223M05	shield, PA
	32–80014N02	gasket, connector access
	42–80047N01	clip, grounding

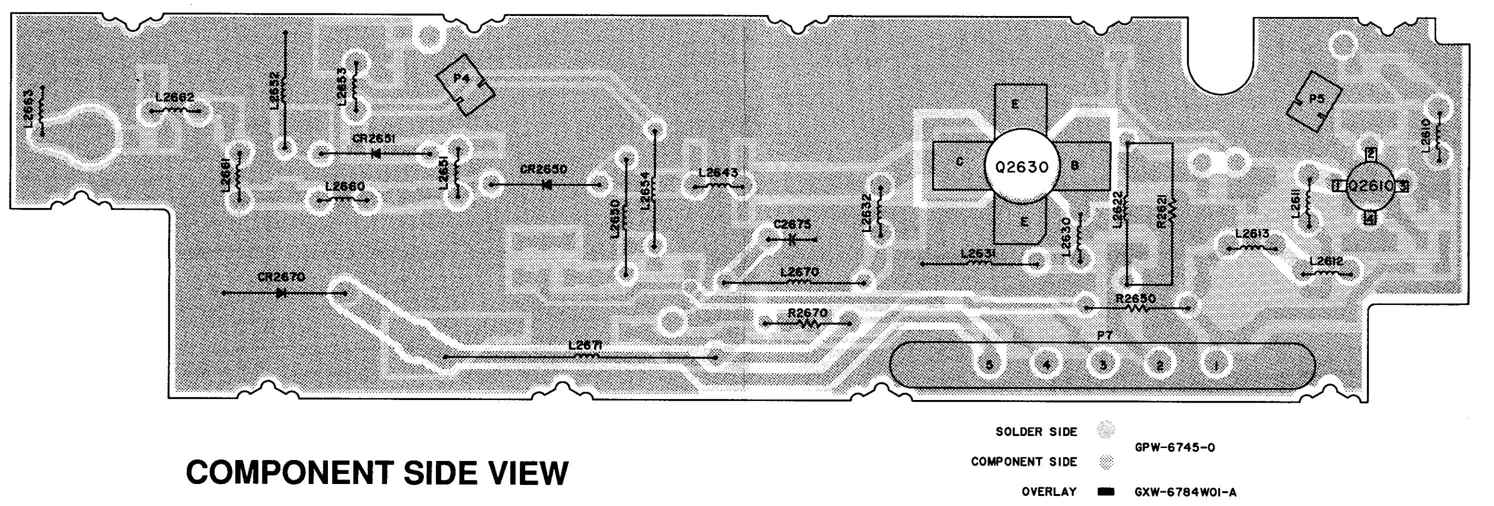
4/28/90

note: Field repair of this kit is not recommended. It should be replaced in its entirety. Parts listed are for reference only.

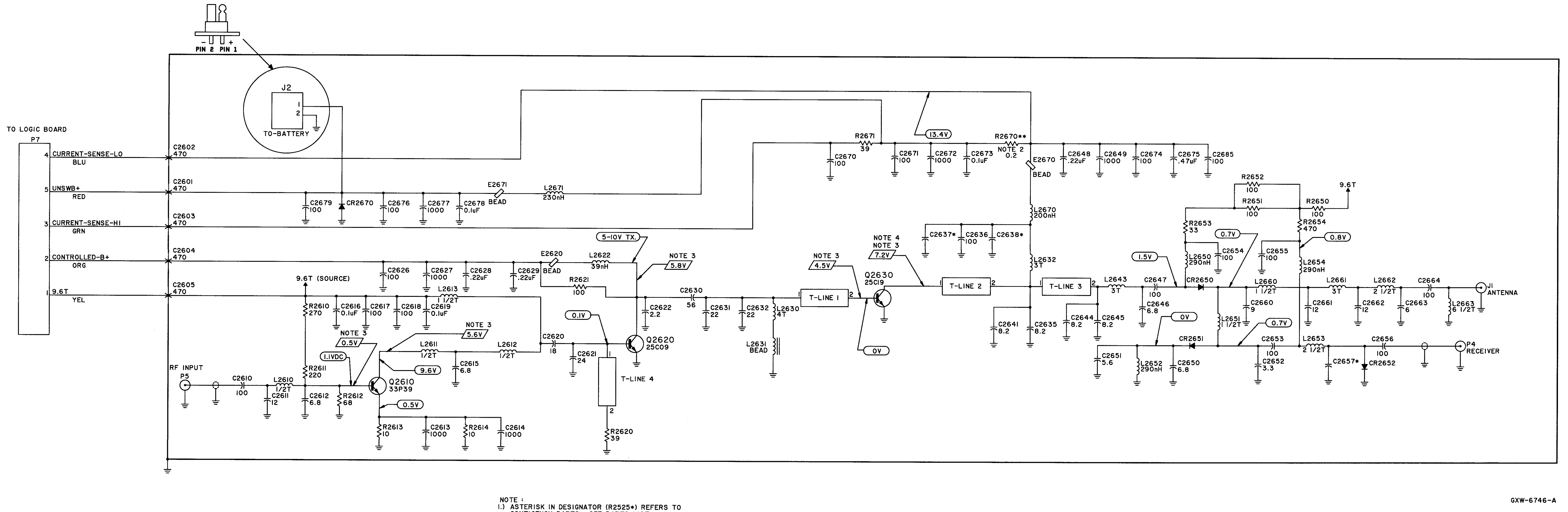
HLE9502A LPI UHF POWER AMPLIFIER BOARD



SOLDER SIDE VIEW



COMPONENT SIDE VIEW



NOTE :

1.) ASTERISK IN DESIGNATOR (R2525*) REFERS TO CONTIGENCY PARTS . SEE PARTS LIST.

2.) R2670 HAS UNIQUE LAYOUT.

3.) ALL R.F. MEASUREMENTS* ARE DONE USING A BOONTON R.F. MILLIVOLTMETER (MODEL 92BD). FREQUENCY OF MEASUREMENT: 460 MHZ.

4.) MUST USE 100:1 DIVIDER PROBE TIP HERE. (MODEL 91-7C BOOTON)

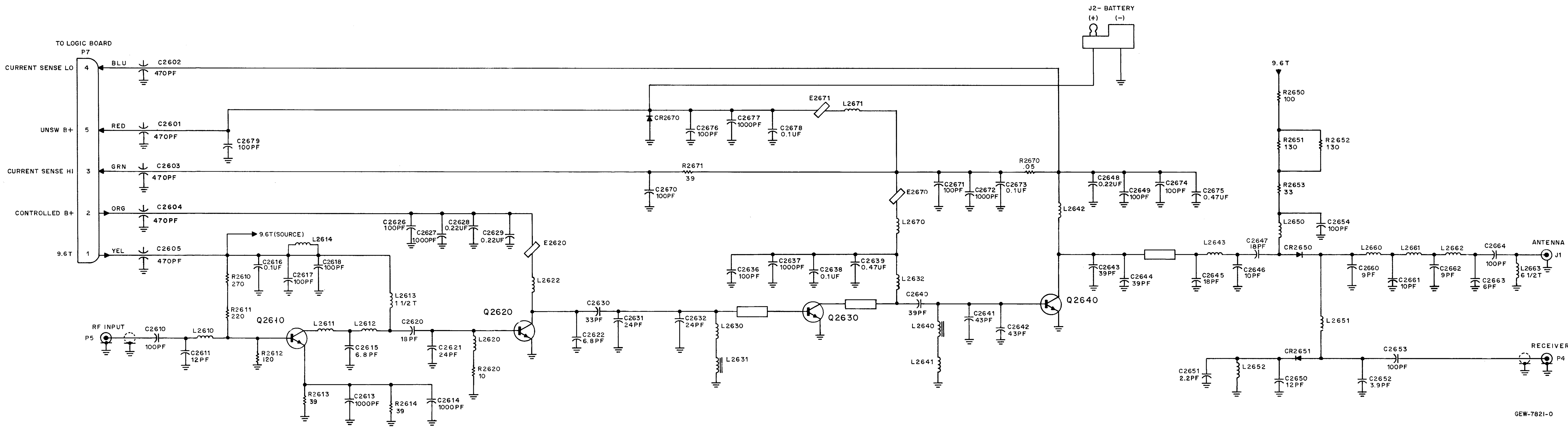
5.) 5.8V = R.F. VOLTAGE MEASUREMENTS.

5.8V = TX.D.C. VOLTAGE MEASUREMENTS.

Schematic, Circuit Board Diagram, and Parts Lists for HLE9502A 2–Watt UHF LPI Power Amplifier

PW–6744–A

4/28/90

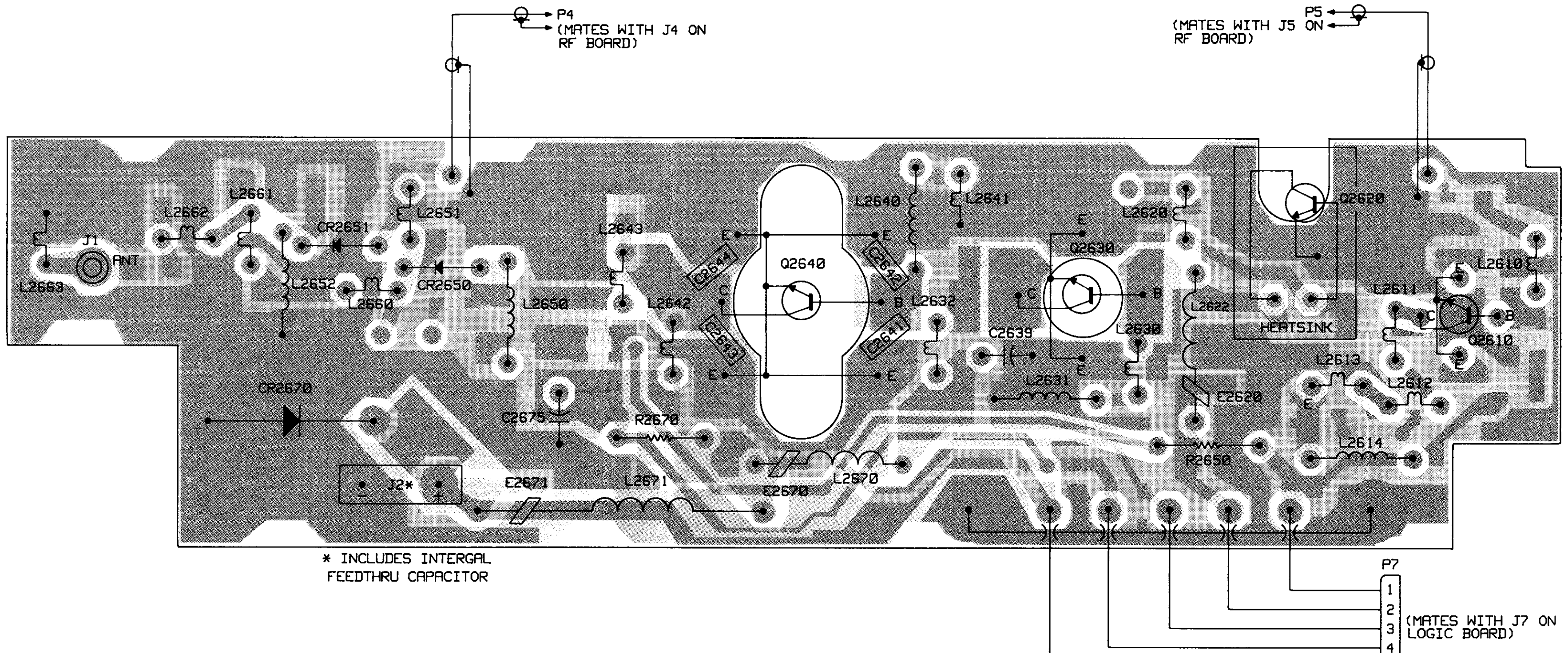


Schematic, Circuit Board Diagrams, and
Parts Lists for HLE4431A 25 Watt UHF
Power Amplifier

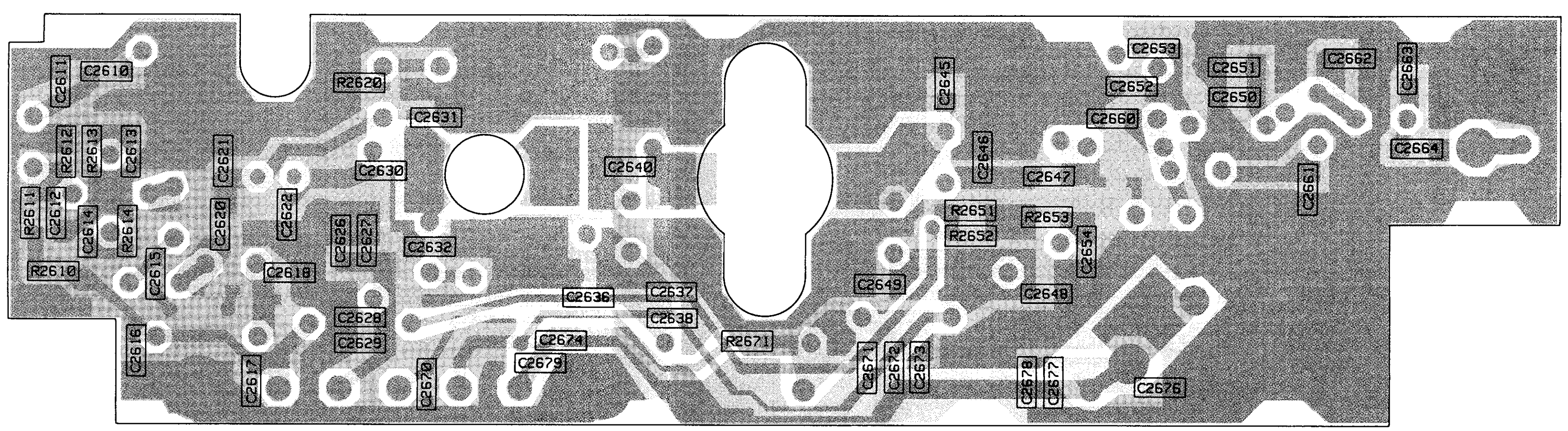
PW–7642–O

(Sheet 1 of 2)

4/28/90



COMPONENT SIDE VIEW



SOLDER SIDE	RED	GAW–7823–O
COMPONENT SIDE	GRAY	GAW–7822–O
OVERLAY	BLACK	GCW–7824–O

SOLDER SIDE VIEW

parts list

HLE4431A 25 Watt UHF PA — MXW–7643–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2601–2605	21–84874K01	470, ±20%, 250V
C2610	21–13740B49	100
C2611	21–13740B27	12
C2613,2614	21–13740B73	1000
C2615	21–13740B21	6.8. ±.25 pF
C2616	21–13741B69	0.1 uF
C2617,2618	21–13740B49	100
C2620	21–13740B31	18
C2621	21–13740B34	24
C2622	21–13740B21	6.8, ±.25 pF
C2626	21–13740B49	100
C2627	21–13740B73	1000
C2628,2629	21–11032B15	.22 uF, +80 –20%
C2630	21–13740B37	33
C2631,2632	21–13740B34	24
C2636	21–13740B49	100
C2637	21–13740B73	1000
C2638	21–13741B69	0.1 uF
C2639	08–11051A17	.47 uF, 63V
C2640	21–80060M33	39, 500V
C2645	21–80060M25	18, 500V
C2646	21–80060M19	10, 500V
C2647	21–80060M25	18, 500V
C2648	21–11032B15	.22 uF, +80 –20%
C2649	21–13740B49	100
C2650	21–80060M21	12, 500V
C2651	21–13740B09	2.2, ±.25 pF
C2652	21–13740B15	3.9, ±.25 pF
C2653,2654	21–13740B49	100
C2660	21–80060M17	9, ±.5 pF, 500V
C2661	21–80060M19	10, 500V
C2662	21–80060M17	9, ±.5 pF, 500V
C2663	21–80060M11	6, ±.5 pF, 500V
C2664	21–80060M43	100, 100V
C2670,2671	21–13740B49	100
C2672	21–13740B73	1000
C2673	21–13741B69	0.1 uF
C2674	21–13740B49	100
C2675	08–11051A17	.47 uF, 63V
C2676	21–13740B49	100
C2677	21–13740B73	1000
C2678	21–13741B69	0.1 uF
C2679	21–13740B49	100
diode (see note)		
CR2650,2651	48–80010E01	pin
CR2670	48–80236E07	transient suppressor
ferrite bead		
E2620	76–83960B01	ferrite core
E2670,2671	76–83960B01	ferrite core
coil, RF		
L2610	24–11030E01	RF
L2611	24–11030B04	1.5 turns
L2612	24–11030E03	RF
L2613	24–11030B01	1.5 turns
L2620	24–11030E01	RF
L2622	24–82723H44	.039 uH
L2630	24–11030A03	4 turns
L2631	24–80036A01	.5 turn
L2632	24–80030A03	4 turns
L2640	24–80036A01	.5 turn
L2641	24–11030A03	4 turns
L2642	24–11030A02	3 turns
L2643	24–11030E03	RF
L2650	24–82723H40	.29 uH
L2651	24–11030B04	1.5 turns
L2652	24–82723H40	.29 uH
L2660	24–11030B04	1.5 turns
L2661	24–11030B06	2.5 turns
L2662	24–11030B06	2.5 turns
L2663	24–11030B11	6.5 turns
L2670	24–82723H46	.2 uH
L2671	24–84346A02	.23 uH
transistor (see note)		
Q2610	48–82233P39	NPN
Q2620	48–80225C09	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2610	06–11077A60	270
R2611	06–11077A58	220
R2612	06–11077A52	120
R2613,2614	06–11077A40	39
R2620	06–11077A26	10
R2650	06–11009A25	100, 1/4 watt
R2651,2652	06–11077A53	130
R2653	06–11077A38	33
R2670	06–80147M01	metal plate .05, ±10%, 2 watt
R2671	06–11077A40	39

MXW–7643–O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non–referenced parts		
	29–80014A01	coax clip (2 used)
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	connector, receptacle (5 used)
	15–80075M01	housing, connector
	04–83755H01	washer
	26–80158L01	heatsink
	84–80173L04	circuit board

4/28/90

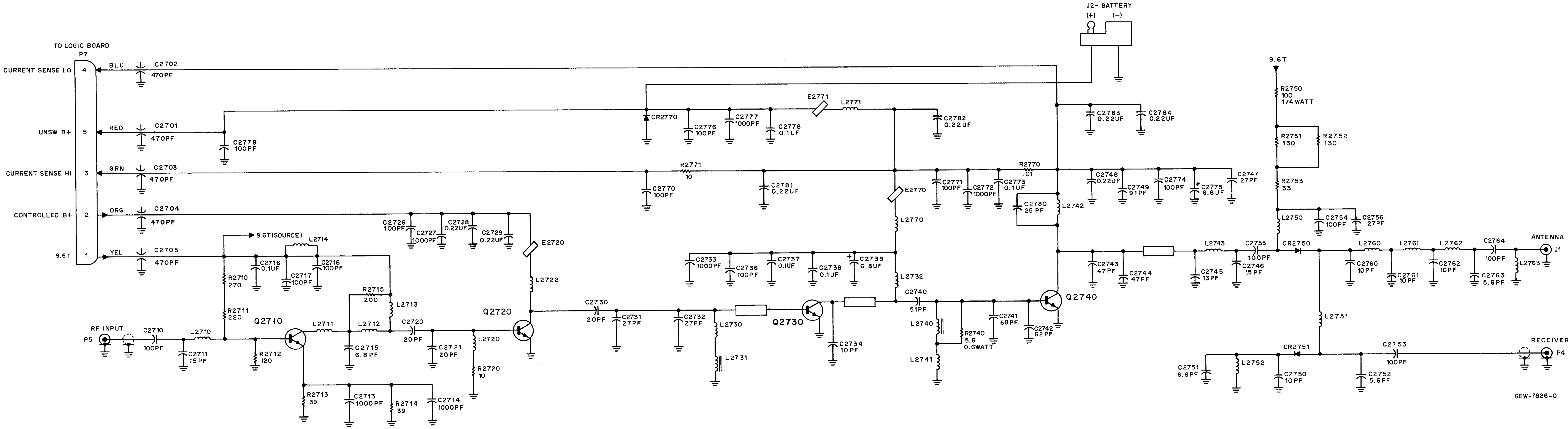
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

HLN5182A 25 Watt UHF PA Hardware Kit — MXW–7644–O

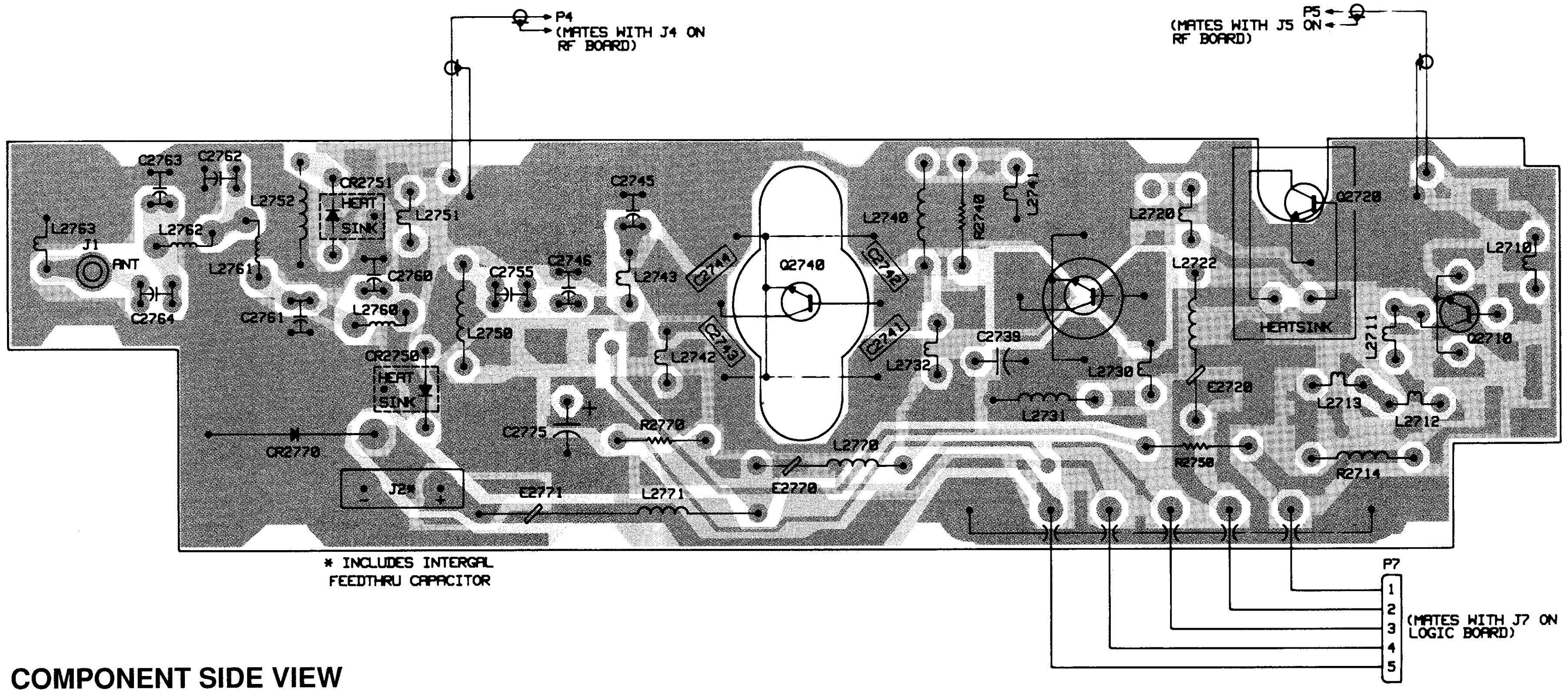
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5% (unless otherwise stated)		
C2641,2642	21–11078B33	43, 100V
C2643,2644	21–11078B32	39, 100V
transistor (see note)		
Q2630	48–80225C19	NPN
Q2640	48–84411L07	NPN
non–referenced parts		
	02–00007003	hex nut 8–32x5/16x1/8
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer, 2 used
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	32–80014N02	gasket, connector access
	42–80281L01	ground clip, 2 used

4/28/90

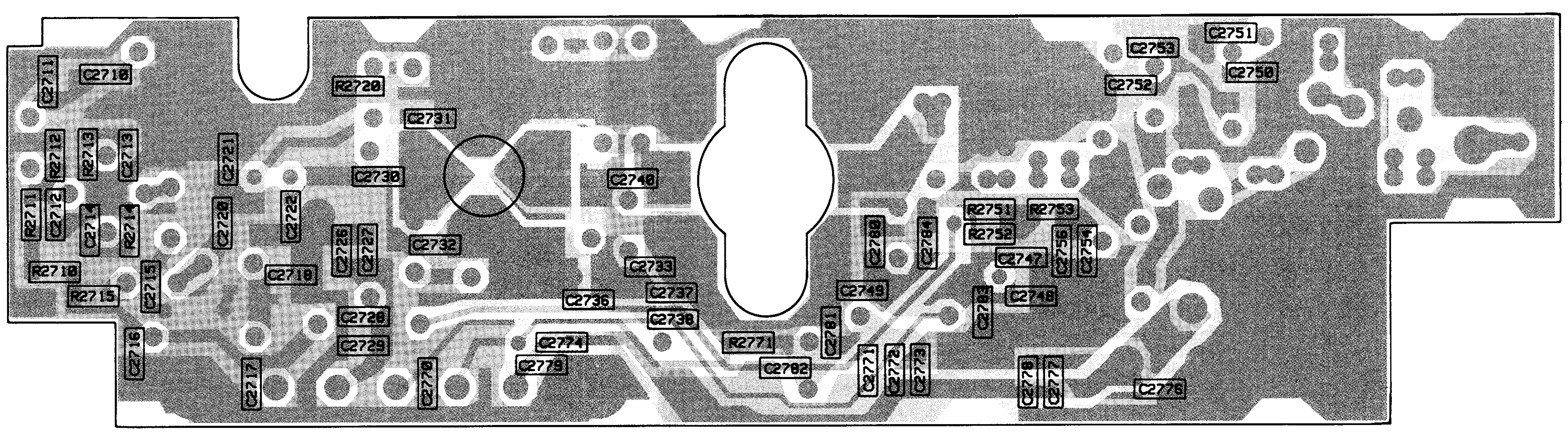
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.



Schematic, Circuit Board Diagrams, and
Parts Lists for HLE4430A 40 Watt UHF
Power Amplifier
PW–7645–O
(Sheet 1 of 2)
4/28/90



COMPONENT SIDE VIEW



SOLDER SIDE	RED	GAW-7828-O
COMPONENT SIDE	GRAY	GAW-7827-O
OVERLAY	BLACK	GCW-7829-O

SOLDER SIDE VIEW

parts list

HLE4430A 40 Watt UHF PA — MXW-7646-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2701–2705	21–84874K01	470, ±20%, 250V
C2710	21–13740B49	100
C2711	21–13740B29	15
C2713,2714	21–13740B73	1000
C2715	21–13740B21	6.8. ±.25 pF
C2716	21–13741B69	0.1 uF
C2717,2718	21–13740B49	100
C2720,2721	21–13740B32	20
C2726	21–13740B49	100
C2727	21–13740B73	1000
C2728,2729	21–11032B15	.22 uF, +80 –20%
C2730	21–13740B32	20
C2731,2732	21–11078B25	27, 100V
C2733	21–13740B73	1000
C2736	21–13740B49	100
C2737,2738	21–13741B69	0.1 uF
C2739	23–80217J08	6.8, ±20%, 25V
C2740	21–11078B35	51, 100V
C2745	21–80240G33	13, 250V
C2746	21–80240G35	15, ±1 pF, 250V
C2747	21–13740B35	27
C2748	21–11032B15	.22 uF, +80 –20%
C2749	21–11078B41	91, 100V
C2750	21–11078B13	10, ±.5 pF, 100V
C2751	21–13740B21	6.8, ±.25 pF
C2752	21–13740B19	5.6, ±.25 pF
C2753,2754	21–13740B49	100
C2755	21–80240G48	100, 250V
C2756	21–13740B35	27
C2760–2762	21–80240G16	10, ±1 pF, 250V
C2763	21–80240G10	5.6, ±.5 pF, 250V
C2764	21–80240G48	100, 250V
C2770,2771	21–13740B49	100
C2772	21–13740B73	1000
C2773	21–13741B69	0.1 uF
C2774	21–13740B49	100
C2775	23–80217J08	6.8, ±20%, 25V
C2776	21–13740B49	100
C2777	21–13740B73	1000
C2778	21–13741B69	0.1 uF
C2779	21–13740B49	100
C2780	21–11078B24	25, 100V
C2781–2784	21–11032B15	.22 uF, +80 –20%
diode (see note)		
CR2750,2751	48–80010E01	pin
CR2770	48–80236E07	transient suppressor
ferrite bead		
E2720	76–83960B01	ferrite core
E2770,2771	76–83960B01	ferrite core
coil, RF		
L2710	24–11030E02	RF
L2711	24–11030B04	1.5 turns
L2712	24–11030E06	RF
L2713	24–11030B01	1.5 turns
L2714	24–80036A01	.5 turn
L2720	24–11030E01	RF
L2722	24–82723H44	.039 uH
L2730	24–11030A03	4 turns
L2731	24–80036A01	.5 turn
L2732	24–80030A02	3 turns
L2740	24–80036A01	.5 turn
L2741	24–11030A02	3 turns
L2742	24–11030A01	2 turns
L2743	24–11030E02	RF
L2750	24–82723H40	.29 uH
L2751	24–11030B03	1.5 turns
L2752	24–82723H40	.29 uH
L2760	24–80908T09	airwound
L2761,2762	24–80908T12	airwound
L2763	24–11030B11	6.5 turns
L2770	24–82723H46	.2 uH
L2771	24–84346A02	.23 uH
transistor (see note)		
Q2710	48–82233P39	NPN
Q2720	48–80225C09	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2710	06–11077A60	270
R2711	06–11077A58	220
R2712	06–11077A52	120
R2713,2714	06–11077A40	39
R2715	06–11077A57	200
R2720	06–11077A26	10
R2740	06–02369M10	metal film 5.6, 0.6 watt
R2750	06–11009A25	100, 1/4 watt
R2751,2752	06–11077A53	130
R2753	06–11077A38	33
R2770	06–80147M02	metal plate .01, ±10%, 2 watt
R2771	06–11077A26	10

MXW-7646-O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	non–referenced parts	
	26–80275M01	heatsink diode (2 used)
	26–80158L01	heatsink diode (2 used)
	29–80014A01	coax clip (2 used)
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	connector, receptacle (5 used)
	15–80075M01	housing, connector
	04–83755H01	washer
	84–80906V04	circuit board

4/28/90

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

HLN9153A 40 Watt UHF PA Hardware Kit — MXW-7647-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5% (unless otherwise stated)		
C2734	21–11078B12	9.1, ±.5pF, 100V
C2741	21–11078B38	68, 100V
C2742	21–11078B37	62, 100V
C2743,2744	21–11078B34	47, 100V
transistor (see note)		
Q2730	48–80225C19	NPN
Q2740	48–80225C24	NPN
	non–referenced parts	
	02–00007003	hex nut 8–32x5/16x1/8
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	42–80915V01	clip, PA grounding
	42–80281L01	ground clip, 2 used

4/28/90

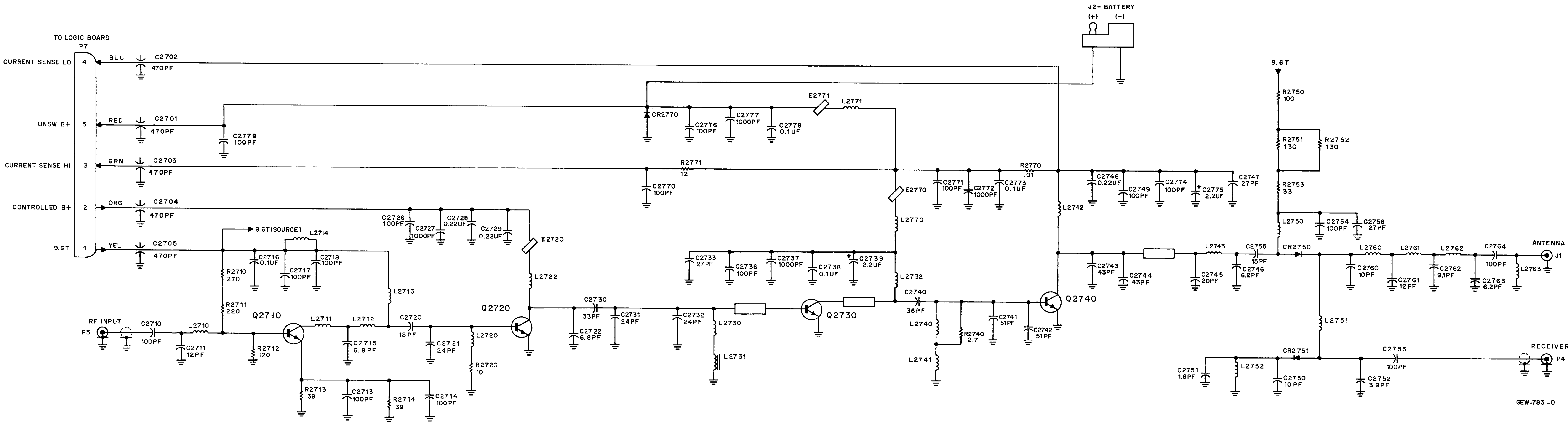
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

Schematic, Circuit Board Diagrams, and Parts Lists for HLE4430A 40 Watt UHF Power Amplifier

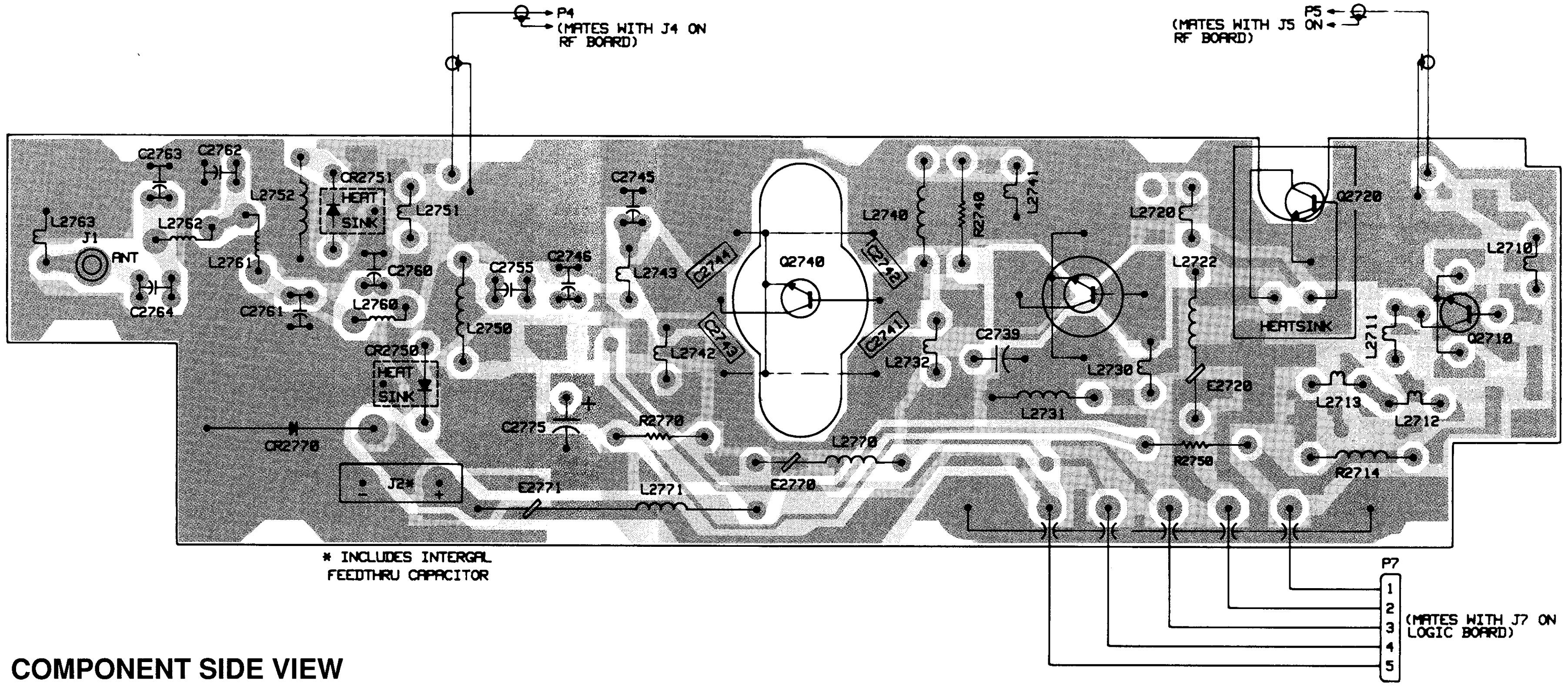
PW–7645–O

(Sheet 2 of 2)

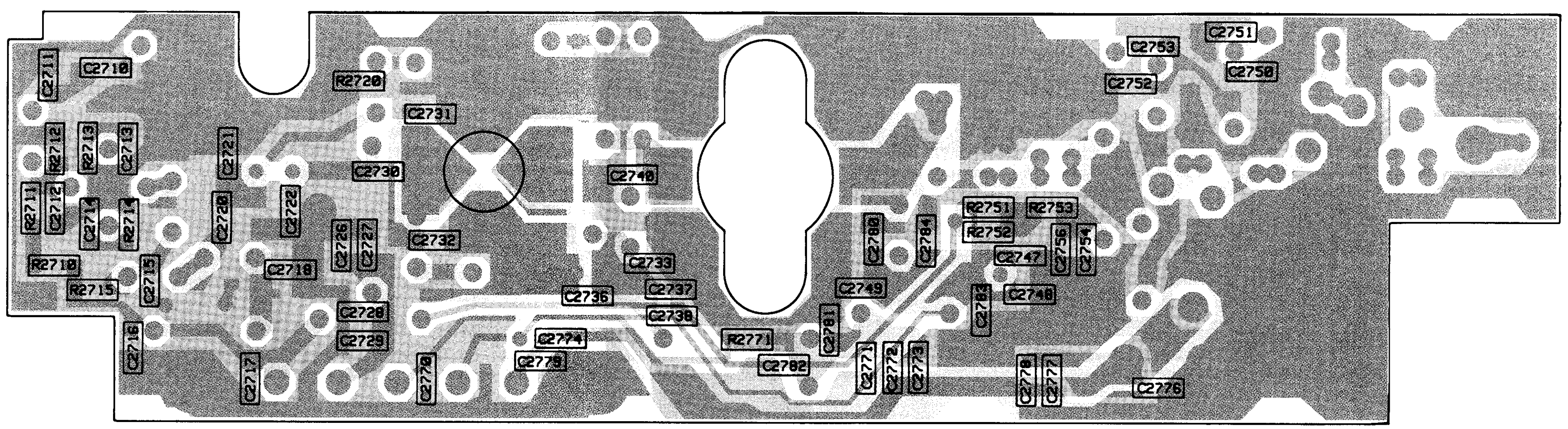
4/28/90



Schematic, Circuit Board Diagrams, and
Parts Lists for HLE4432A 40 Watt UHF
Range 2 Power Amplifier
PW–7648–O
(Sheet 1 of 2)
4/28/90



COMPONENT SIDE VIEW



SOLDER SIDE VIEW

SOLDER SIDE	RED	GAW–7828–O
COMPONENT SIDE	GRAY	GAW–7827–O
OVERLAY	BLACK	GCW–7829–O

parts list

HLE4432A 40 Watt UHF PA — MXW–7649–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C2701–2705	21–84874K01	470, ±20%, 250V
C2710	21–13740B49	100
C2711	21–13740B27	12
C2713,2714	21–13740B49	100
C2715	21–13740B21	6.8. ±.25 pF
C2716	21–13741B69	0.1 uF
C2717,2718	21–13740B49	100
C2720	21–13740B31	18
C2721	21–13740B34	24
C2722	21–13740B21	6.8 ±.25 pF
C2726	21–13740B49	100
C2727	21–13740B73	1000
C2728,2729	21–11032B15	.22 uF, +80 –20%
C2730	21–13740B37	33
C2731,2732	21–13740B34	24
C2733	21–13740B35	27
C2736	21–13740B49	100
C2737	21–13740B73	1000
C2738	21–13741B69	0.1 uF
C2739	23–13749D64	2.2, ±20%, 35V
C2740	21–11078B31	36, 100V
C2745	21–80240G37	20, 250V
C2746	21–80240G11	6.2 ±.25 pF, 250V
C2747	21–13740B35	27
C2748	21–11032B15	.22 uF, +80 –20%
C2749	21–13740B49	100
C2750	21–11078B13	10, ±.5 pF, 100V
C2751	21–13740B07	1.8, ±.25 pF
C2752	21–13740B15	3.9, ±.25 pF
C2753,2754	21–13740B49	100
C2755	21–80240G35	15, ±1 pF, 250V
C2756	21–13740B35	27
C2760	21–80240G16	10 ±1 pF, 250V
C2761	21–80240G17	12 ±1 pF, 250V
C2762	21–80240G15	9.1 ±.25 pF, 250V
C2763	21–80240G11	6.2, ±.25 pF, 250V
C2764	21–80240G48	100, 250V
C2770,2771	21–13740B49	100
C2772	21–13740B73	1000
C2773	21–13741B69	0.1 uF
C2774	21–13740B49	100
C2775	23–13749D64	2.2, ±20%, 35V
C2776	21–13740B49	100
C2777	21–13740B73	1000
C2778	21–13741B69	0.1 uF
C2779	21–13740B49	100
diode (see note)		
CR2750,2751	48–80010E01	pin
CR2770	48–80236E07	transient suppressor
ferrite bead		
E2720	76–83960B01	ferrite core
E2770,2771	76–83960B01	ferrite core
coil, RF		
L2710	24–11030E01	RF
L2711	24–11030B04	1.5 turn
L2712	24–11030E03	RF
L2713	24–11030B01	1.5 turns
L2714	24–80036A01	.5 turn
L2720	24–11030E01	RF
L2722	24–82723H44	.039 uH
L2730	24–11030A03	4 turns
L2731	24–80036A01	.5 turn
L2732	24–80030A03	4 turns
L2740	24–82723H40	.29 uH
L2741,2742	24–11030A02	3 turns
L2743	24–11030E07	RF
L2750	24–82723H40	.29 uH
L2751	24–11030B04	1.5 turns
L2752	24–82723H40	.29 uH
L2760,2761	24–80908T09	airwound
L2762	24–80908T10	airwound
L2763	24–11030B11	6.5 turns
L2770	24–82723H46	.2 uH
L2771	24–84346A02	.23 uH
transistor (see note)		
Q2710	48–82233P39	NPN
Q2720	48–80225C09	NPN
resistor, fixed, ohm, ±5%, 1/8 watt (unless otherwise stated)		
R2710	06–11077A60	270
R2711	06–11077A58	220
R2712	06–11077A52	120
R2713,2714	06–11077A40	39
R2720	06–11077A26	10
R2740	06–11009B26	2.7, 1/4 watt
R2750	06–11009A25	100, 1/4 watt
R2751,2752	06–11077A53	130
R2753	06–11077A38	33
R2770	06–80147M02	metal plate .01, ±10%, 2 watt
R2771	06–11077A28	12

MXW–7649–O (2)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
non–referenced parts		
	26–80275M01	heatsink diode (2 used)
	26–80158L01	heatsink diode (2 used)
	29–80014A01	coax clip (2 used)
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	connector, receptacle (5 used)
	15–80075M01	housing, connector
	04–83755H01	washer
	84–80906V04	circuit board

4/28/90

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

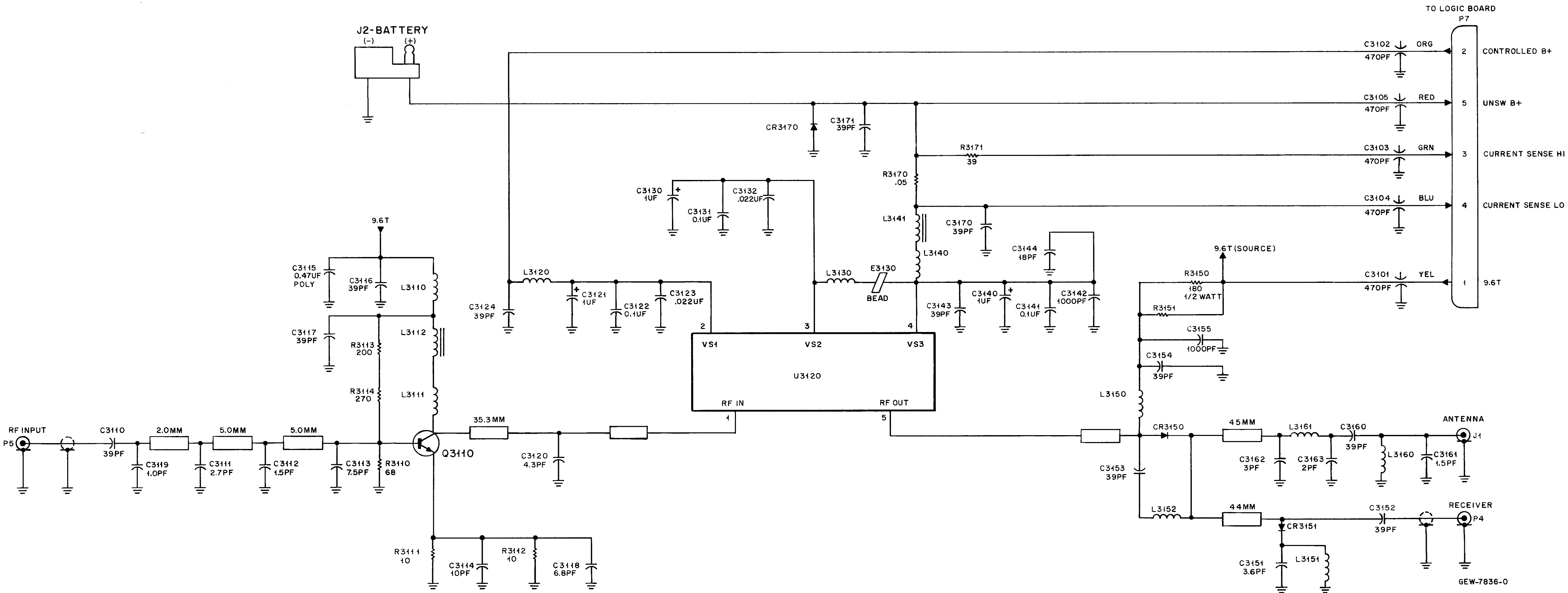
HLN5274A 40 Watt UHF PA Hardware Kit — MXW–7650–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pf, ±5% (unless otherwise stated)		
C2741,2742	21–11078B35	51, 100V
C2743,2744	21–11078B33	43, 100V
transistor (see note)		
Q2730	48–80225C19	NPN
Q2740	48–80225C24	NPN
non–referenced parts		
	02–00007003	hex nut 8–32x5/16x1/8
	03–10943M10	tapping screw TT3x0.5x8, 8 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	26–80124L01	heatsink
	26–80223M05	shield, PA
	30–80138M07	coax, cable assembly
	30–80138M08	coax, cable assembly
	32–80014N02	gasket, connector access
	42–80915V01	clip, PA grounding
	42–80281L01	ground clip, 2 used

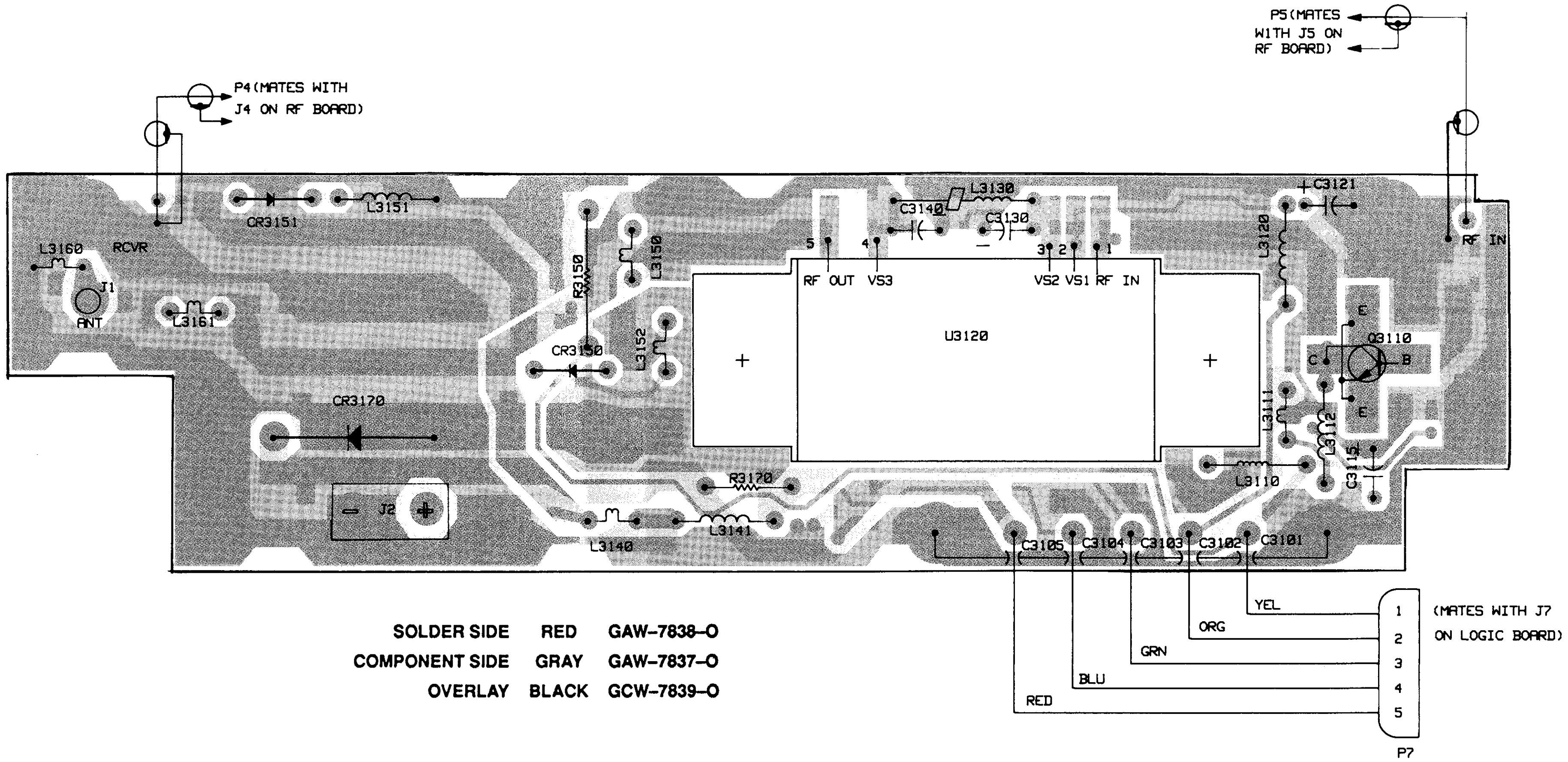
4/28/90

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

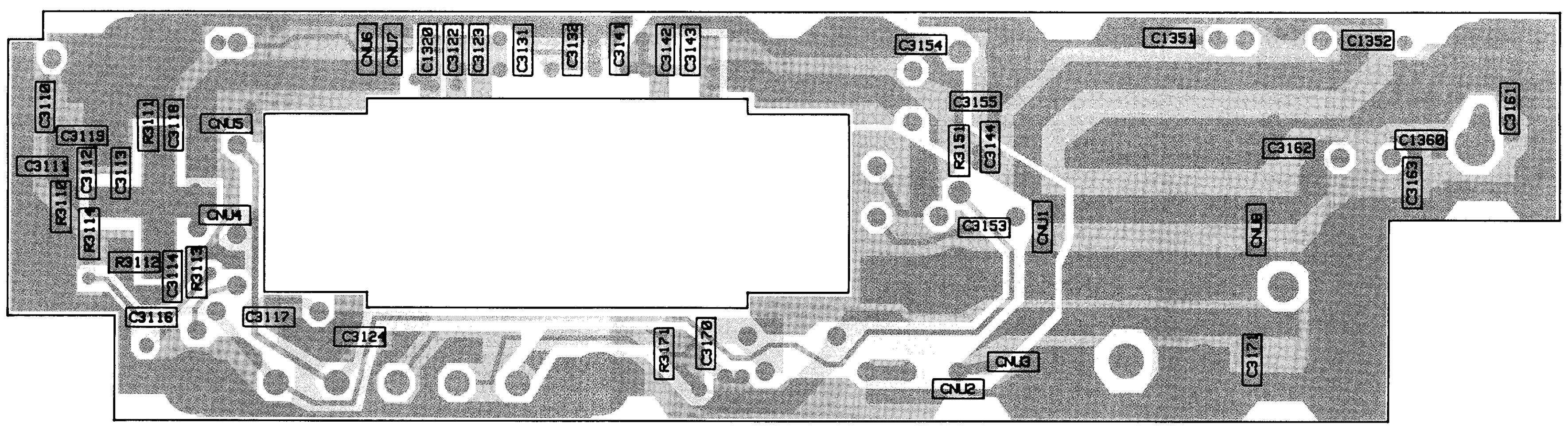
Schematic, Circuit Board Diagrams, and Parts Lists for HLE4432A 40 Watt UHF Range 2 Power Amplifier
PW–7648–O
(Sheet 2 of 2)
4/28/90



Schematic, Circuit Board Diagrams, and
Parts Lists for HLF4097A 15 Watt 800 MHz
Power Amplifier
PW–7651–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE	RED	GAW-7838-O
COMPONENT SIDE	GRAY	GAW-7837-O
OVERLAY	BLACK	GCW-7839-O



SOLDER SIDE	RED	GAW-7838-O
COMPONENT SIDE	GRAY	GAW-7837-O
OVERLAY	BLACK	GCW-7840-O

parts list

HLF4097A 15 Watt 800 MHz Simplex PA — MXW-7652-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C3101–3105	21–84874K01	470, ±20%, 250V
C3110	21–13740B39	39
C3111	21–13740B11	2.7, ±.25 pF
C3112	21–13740B05	1.5, ±.25 pF
C3113	21–13740B22	7.5, ±.25 pF
C3114	21–13740B25	10
C3115	08–11051A17	.47 uF, 63V
C3116,3117	21–13740B39	39
C3118	21–13740B21	6.8, ±.25 pF
C3119	21–13740B01	1.0, ±.25 pF
C3120	21–13740B16	4.3, ±.25 pF
C3121	23–11048B05	1 uF, ±20%
C3122	21–13741B69	0.1 uF
C3123	21–13741B53	.022 uF
C3124	21–13740B39	39
C3130	23–11048B05	1 uF, ±20%
C3131	21–13741B69	0.1 uF
C3132	21–13741B53	.022 uF
C3140	23–11048B05	1 uF, ±20%
C3141	21–13741B69	0.1 uF
C3142	21–13740B73	1000
C3143	21–13740B39	39
C3144	21–13740B31	18
C3151	21–13740B14	3.6, ±.25 pF
C3152–3154	21–13740B39	39
C3155	21–13740B73	1000
C3160	21–13740B39	39
C3161	21–80060M02	1.5, 500V
C3162	21–80060M05	3, 500V
C3163	21–80060M03	2, 500V
C3170,3171	21–13740B39	39
diode (see note)		
CR3150,3151	48–80010E01	pin
CR3170	48–80236E07	transient suppressor
bead		
E3130	76–83960B01	ferrite core
coil		
L3110	24–80036A01	.5 turn
L3111	24–11030A04	5 turns
L3112	24–80036A01	.5 turn
L3120	24–82723H46	.2 uH
L3130	24–82723H46	.2 uH
L3140	24–11030B15	10.5 turns
L3141	24–80036A01	.5 turn
L3150	24–11030B12	7.5 turns
L3151	24–82723H40	.29 uH
L3152	24–11030B08	4.5 turns
L3160	24–11030E07	RF
L3161	24–11030E04	RF
transistor (see note)		
Q3110	48–82233P39	NPN
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R3110	06–11077A46	68
R3111,3112	06–11077A26	10
R3113	06–11077A57	200
R3114	06–11077A60	270
R3150	06–11045A31	180, 1/2 watt
R3151	06–11077A76	1.2k
R3170	06–80147M01	.05, ±10%, 2 watt
R3171	06–11077A40	39
non–referenced parts		
	29–80014A01	clip, coax (2 used)
	42–10217A30	tie strap
	07–80982T01	bracket, feedthru
	09–80133M01	receptacle, connector (5 used)
	15–80075M01	housing, connector
	84–80216L03	circuit board

4/28/90

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

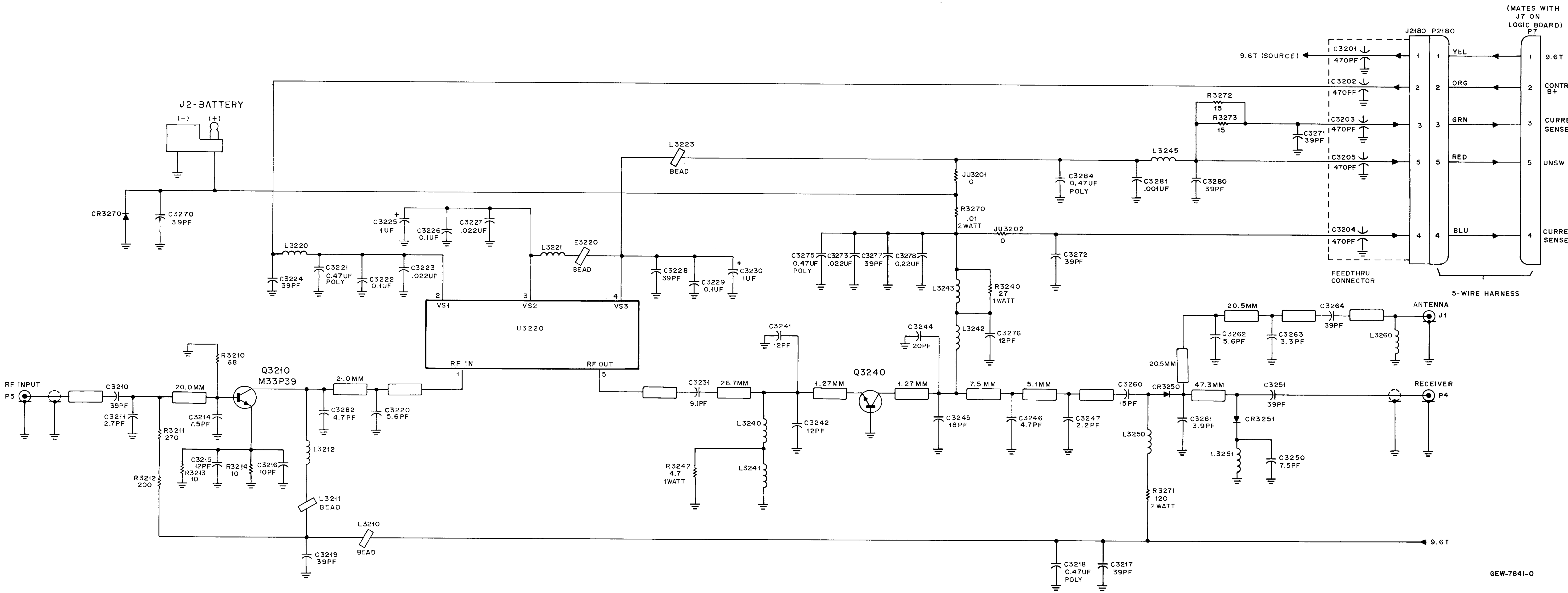
HLN5293A 15 Watt 800 MHz Simplex Hardware Kit — MXW-7653-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
integrated circuit (see note)		
U3150	51–80110E01	RF power 800 MHz 20W
non–referenced parts		
	03–10943M10	tapping screw TT3x0.5x8, 10 used
	03–10943M11	tapping screw, TT3x0.5x10, 2 used
	04–00131974	flat washer
	04–05587G01	washer, 2 used
	04–80943V01	lock washer
	09–80131M01	mini UHF coax connector
	09–80255E01	heatsink connector
	30–80138M02	coax, cable assembly, 2 used
	26–80124L02	heatsink
	26–80223M06	shield, PA
	29–80921T01	lug, terminal, 2 used
	32–80014N02	gasket, connector access
	42–80024N01	strap, grounding
	42–80915V01	clip, PA grounding

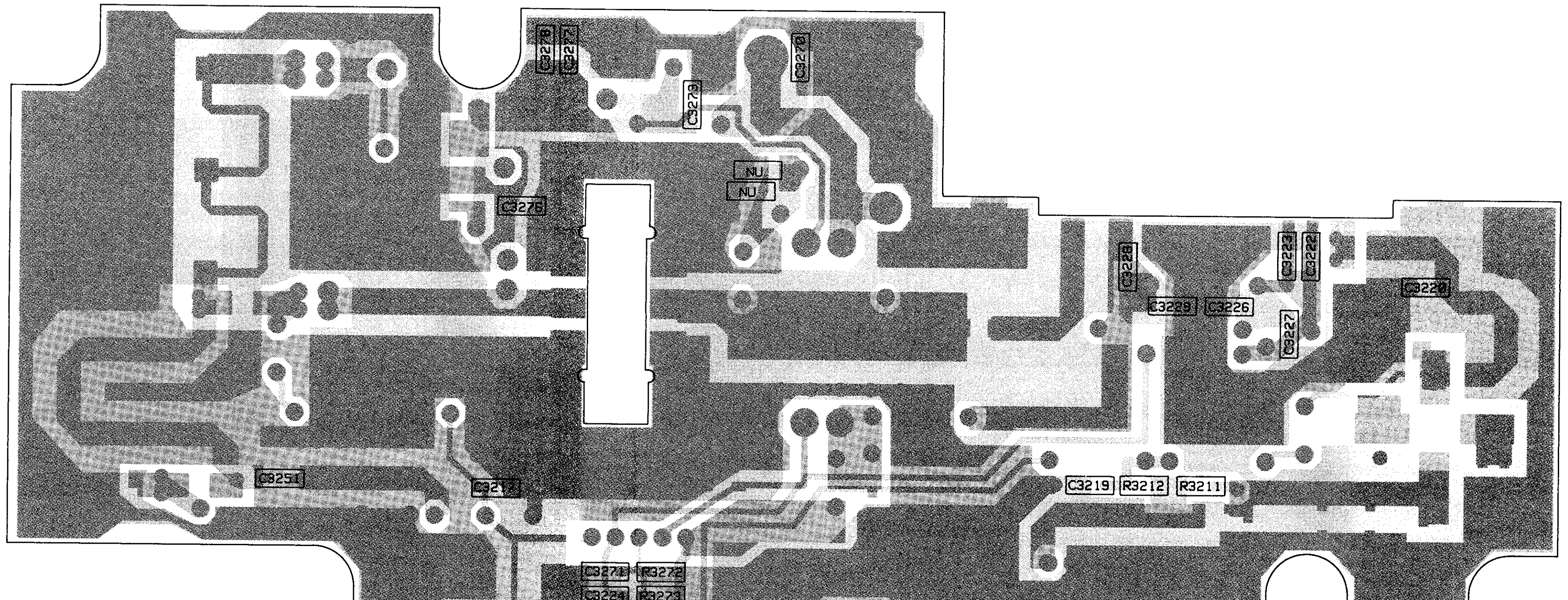
4/28/90

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLF4097A 15 Watt 800 MHz Power Amplifier
PW–7651–O
(Sheet 2 of 2)
4/28/90

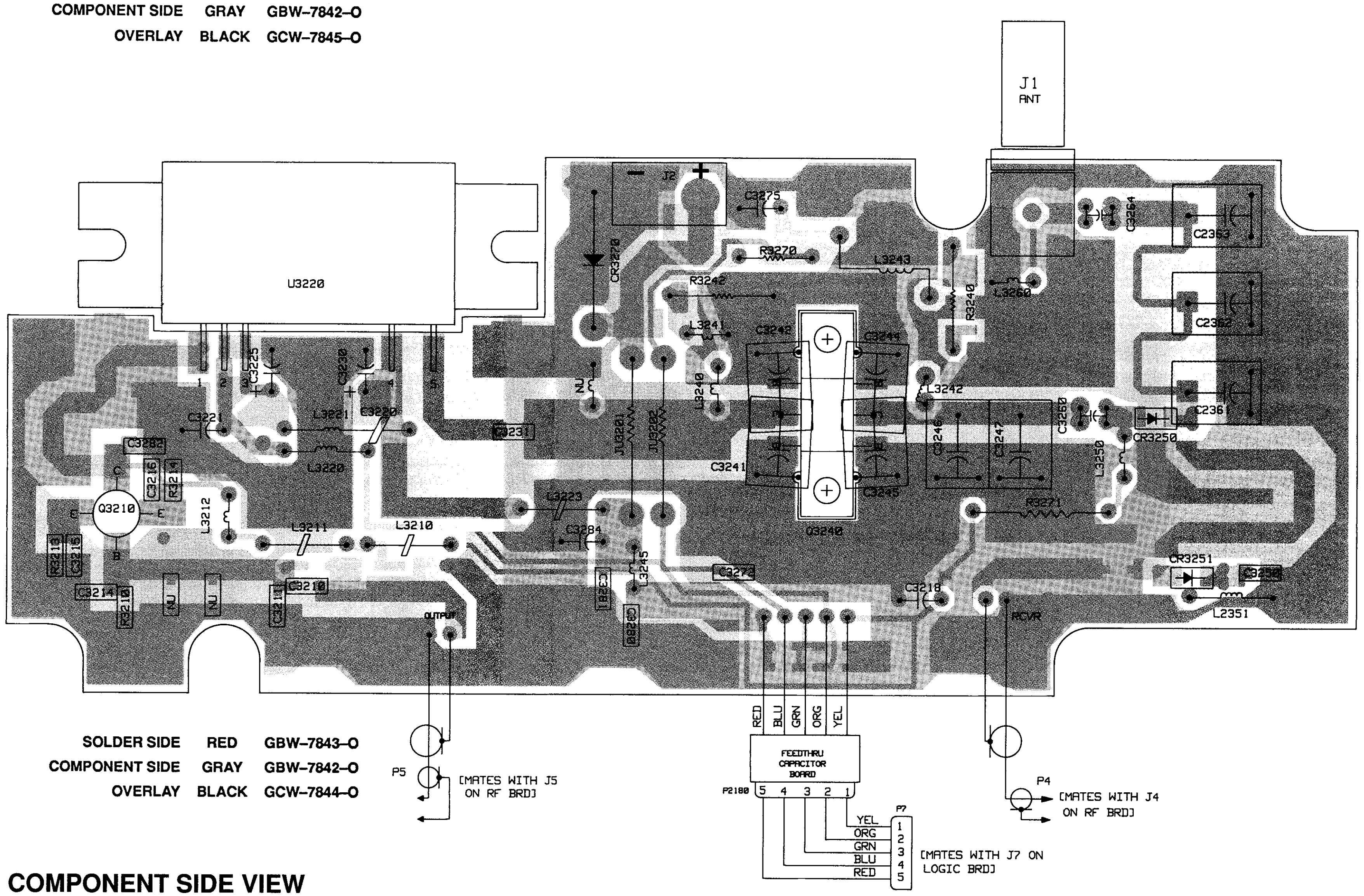


Schematic, Circuit Board Diagrams, and
Parts Lists for HLF4098A 35 Watt 800 MHz
Power Amplifier
PW–7654–O
(Sheet 1 of 2)
4/28/90



SOLDER SIDE VIEW

SOLDER SIDE	RED	GBW–7843–O
COMPONENT SIDE	GRAY	GBW–7842–O
OVERLAY	BLACK	GCW–7845–O



SOLDER SIDE	RED	GBW–7843–O
COMPONENT SIDE	GRAY	GBW–7842–O
OVERLAY	BLACK	GCW–7844–O

COMPONENT SIDE VIEW

parts list

HLF4098A 35 Watt 800 MHz PA Board (Simplex) MXW–7655–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed, pF, ±5%, 50V (unless otherwise stated)		
C3201–3205	21–84874K01	470, ±20%, 250V
C3210	21–13740B39	39
C3211	21–13740B11	2.7
C3214	21–13740B22	7.5
C3215	21–13740B27	12
C3216	21–13740B25	10
C3217	21–13740B39	39
C3218	08–11051A17	.47 uF, 63V
C3219	21–13740B39	39
C3220	21–11078B07	5.6, ±.25, 100V
C3221	08–11051A17	. 47 uF, 63V
C3222	21–13741B69	0.1 uF, +80 –20%
C3223	21–13741B53	.022 uF
C3224	21–13740B39	39
C3225	23–11048B05	1 uF, ±20%
C3226	21–13741B69	0.1 uF, +80 –20%
C3227	21–13741B53	.022 uF
C3228	21–13740B39	39
C3229	21–13741B69	0.1 uF, +80 –20%
C3230	23–11048B05	1 uF, ±20%
C3231	21–11078B12	9.1. ±.5, 100V
C3246	21–80240G72	4.7, ±.25 pF, 250V
C3247	21–80240G67	2.2, ±.25 pF, 250V
C3250	21–11078B10	7.5, ±.25 pF, 100V
C3251	21–13740B39	39
C3260	21–80240G35	15 pF, 250V
C3261	21–80240G70	3.9, ±.25 pF, 250V
C3262	21–80240G79	5.6, ±.25 pF, 250V
C3263	21–80240G69	3.3, ±.25 pF, 250V
C3264	21–80240G03	39, 250V
C3270–3272	21–13740B39	39
C3273	21–13741B53	.022 uF
C3275	08–11051A17	.47 uF, 63V
C3276	21–13740B27	12
C3277	21–13740B39	39
C3278	21–11032B15	.22 uF, +80 –20%
C3280	21–13740B39	39
C3281	21–13741B21	.001 uF, ±10%
C3282	21–11078B05	4.7, ±.25, 100V
C3284	08–11051A17	.47 uF, 63V
clip		
CL3200,3201	29–80014A01	coax, terminal
diode (see note)		
CR3250,3251	48–80236E21	pin
CR3270	48–80236E07	transient suppressor
bead		
E3220	76–83960B01	ferrite core
connector receptacle		
J3201	09–83228R01	mini UHF coax
jumper		
JU3201,3202	31–80912W01	strip, conductive
coil, RF		
L3210,3211	24–80036A01	.5 turn
L3212	24–11030B09	4.5 turns
L3220,3221	24–82723H46	.2 uH
L3223	24–80036A01	.5 turn
L3240	24–11030E01	RF
L3241	24–11030B13	8.5 turns
L3242	24–80908T01	airwound
L3243	24–80908T42	airwound
L3245	24–11030B10	5.5 turns
L3250	24–11030B13	8.5 turns
L3251	24–82723H44	.039 uH
L3260	24–11030B07	3.5 turns
transistor (see note)		
Q3210	48–82233P39	NPN
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R3210	06–11077A46	68
R3211	06–11077A60	270
R3212	06–11077A57	200
R3213,3214	06–11077A26	10
R3240	06–11086A21	27, 1 watt
R3242	06–11086A08	4.7, 1 watt
R3270	06–80147M02	.01, ±10, 2 watt
R3271	06–11086C37	120, 2 watt
R3272,3273	06–11077A30	15
non–referenced parts		
	30–80138M19	coax, cable assembly, 2 used
	84–80905V01	circuit board

4/28/90

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

HLN9305A 35 Watt 800 MHz Simplex Hardware Kit MXW–7656–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, pF, ±5%, 50V (unless otherwise stated)		
C3241,3242	21–80240G20	12
C3244,3245	21–80240G231	18
transistor (see note)		
Q3240	48–80225C17	NPN
integrated circuit (see note)		
U3220	51–80110E01	RF power 800 MHz 20W
non–referenced parts		
	03–10943M10	tapping screw TT3x0.5x8, 9 used
	03–10943M11	tapping screw, TT3x0.5x10, 8 used
	04–00131974	flat washer, 2 used
	04–80943V01	lock washer
	09–80255E02	connector, power heat sink
	09–80133M01	receptacle, connector (5 used)
	15–80075M01	housing, connector
	15–80946W02	housing, connector
	26–80901V02	heatsink
	29–80921T01	lug, terminal (2 used)
	29–84249N01	terminal (5 used)
	38–80131N01	plug, connector
	42–80281L02	clip, ground
	42–80985T01	clip, grounding, coax, (2 used)

4/28/90

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

Schematic, Circuit Board Diagrams, and Parts Lists for HLF4098A 35 Watt 800 MHz Power Amplifier
PW–7654–O
(Sheet 2 of 2)
4/28/90

Motorola
Mobile Products Division

Radio Disassembly and Assembly Procedure

1. Radio Disassembly and Assembly

1.1 TO REMOVE CONTROL HEAD AND CHASSIS COVERS

(1) Remove control head mounting screws (Figure 1). Pull control head off and away from the radio.

(2) Remove the two chassis cover screws from each side (Figure 1). Remove top and bottom covers from chassis.

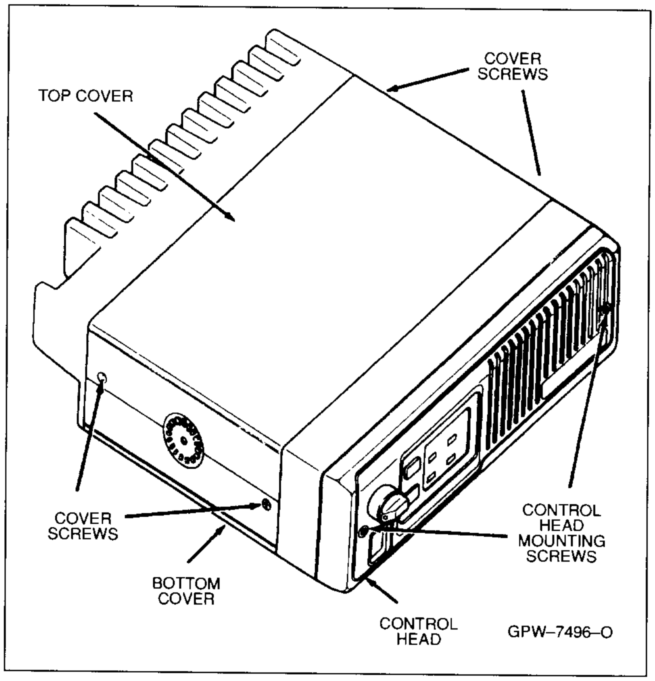


Figure 1.

1.2 TO REMOVE RF CHASSIS SHIELD

Remove RF chassis shield by prying each of the four corners at the indentations provided (Figure 2). Be careful not to over bend any one corner.

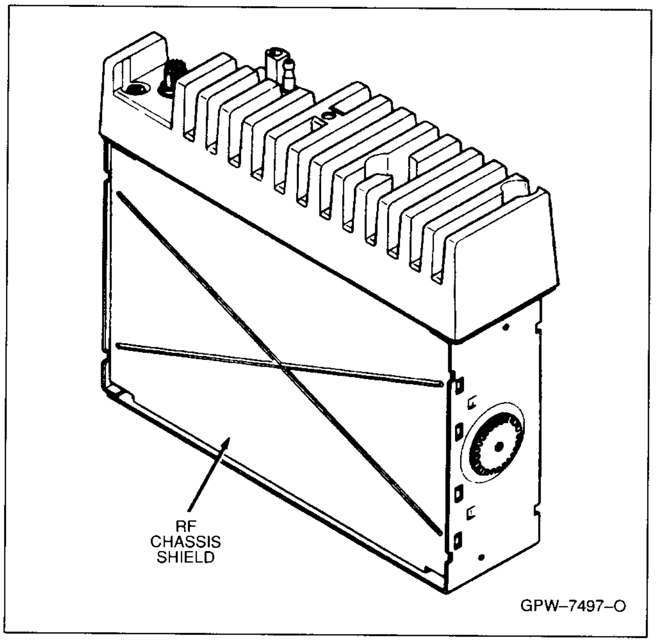


Figure 2.

1.3 TO REMOVE THE POWER AMPLIFIER HEATSINK (EXCEPT LOW BAND AND 35 WATT 800 MHZ)

(1) Disconnect the transmit and receive coaxial cables from the RF Board (Figure 3).

(2) Disconnect the 5–pin connector from the logic board (Figure 4).

(3) Remove the heatsink mounting screws (Figure 4). Pull heatsink off of chassis while carefully feeding the transmit and receive coax cables through their respective holes in the chassis.

1.4 TO REMOVE THE POWER AMPLIFIER HEATSINK (LOW BAND AND 35 WATT 800 MHZ ONLY) (REFER TO Figure 5)

(1) Disconnect the transmit and receive coaxial cables from the RF board.

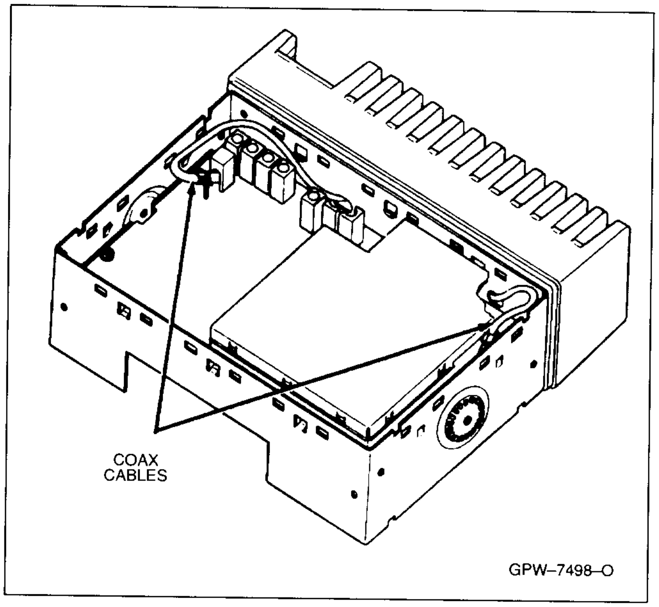


Figure 3.

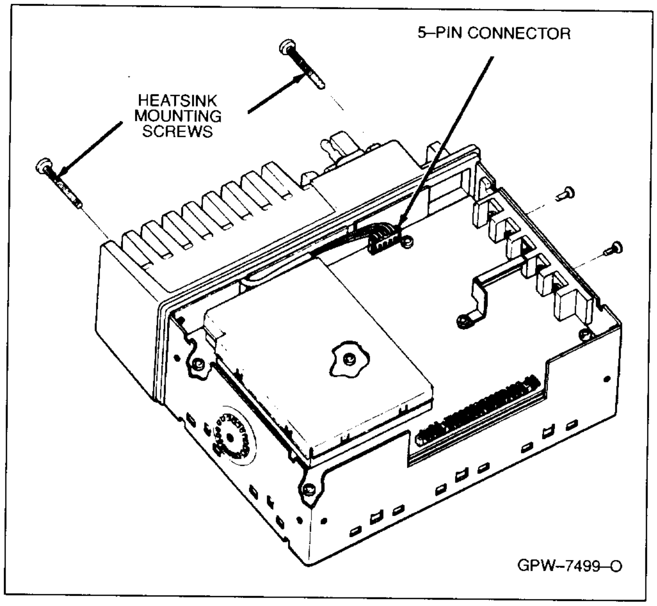


Figure 4.

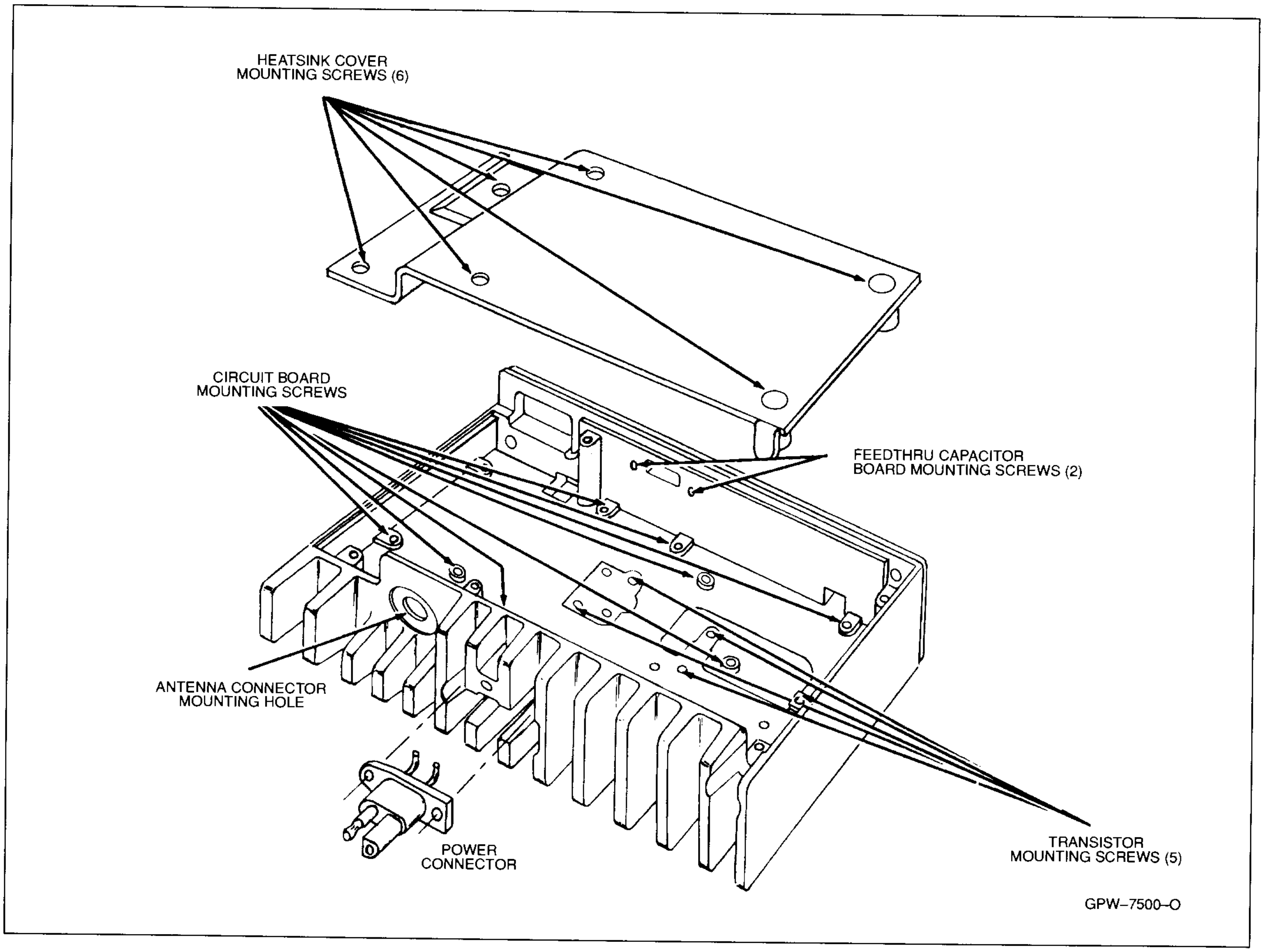


Figure 5.

(2) Disconnect the 5–pin connector P2180 from its mating connector J2180 on the Feedthru Capacitor board.

(3) Remove six screws securing the heat sink cover to the heat sink. Remove heatsink cover.

(4) Remove the four heatsink mounting screws which secure the heatsink to the radio chassis. Separate heatsink from chassis while carefully feeding the transmit and receive coaxial cables through their respective holes in the chassis.

1.5 TO REMOVE THE RF CIRCUIT BOARDS

(1) After the P.A. heatsink has been removed, pry off the RF shield (Figure 6). Be careful not to over bend any one corner or side.

(2) After removing the RF shield, then remove all the RF board mounting screws and take out the RF board (Figure 6).

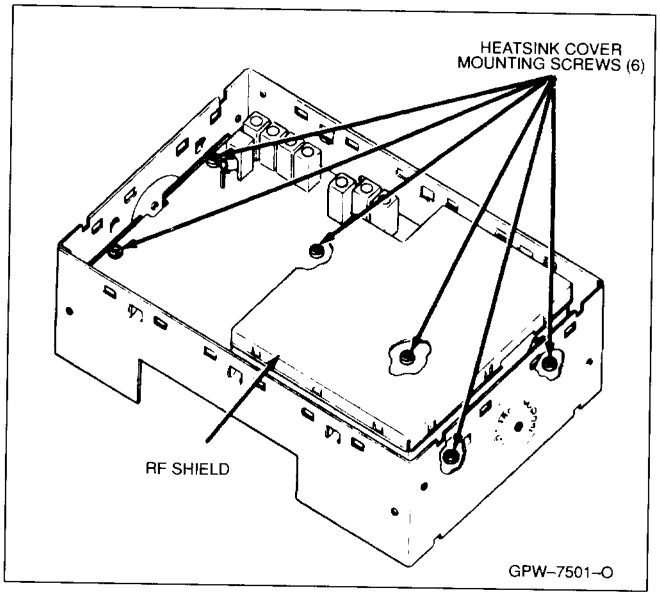


Figure 6.

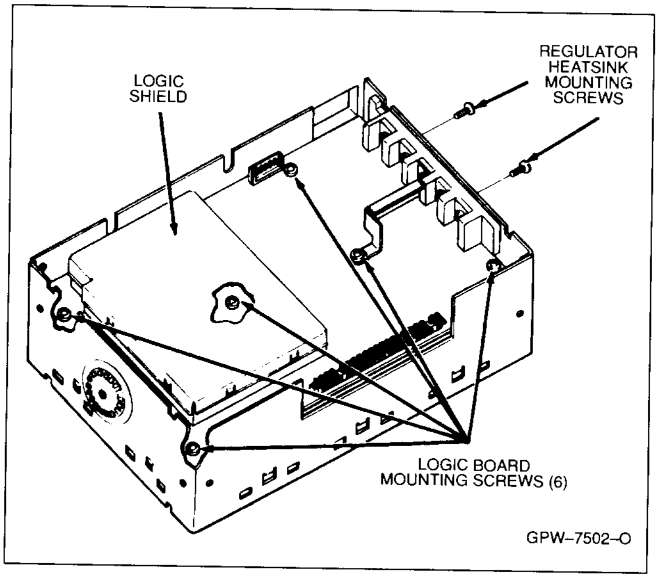


Figure 7.

1.6 TO REMOVE THE LOGIC CIRCUIT BOARD

(1) After the RF board has been removed, turn the radio over and pry off the logic shield (Figure 7), again being careful not to bend any one corner or side.

(2) Remove all logic board mounting screws (Figure 7).

(3) No remove the two regulator heat sink mounting screws from the side of the chassis (Figure 7). The logic board can now be lifted out of the chassis.

1.7 TO REMOVE THE POWER AMPLIFIER CIRCUIT BOARD (EXCEPT LOW BAND AND 35 WATT 800 MHZ)

(1) Remove the power amplifier shield by carefully prying each corner and side until you can slide the shield off easily (Figure 8). Remove the shield completely by guiding the coaxial cables out.

(2) Unsolder the A+ power connector feedthru leads and the antenna connector lead (Figure 9).

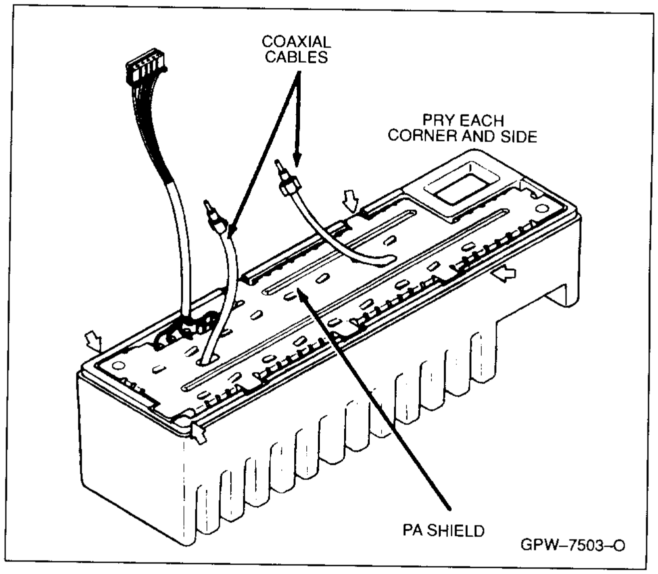


Figure 8.

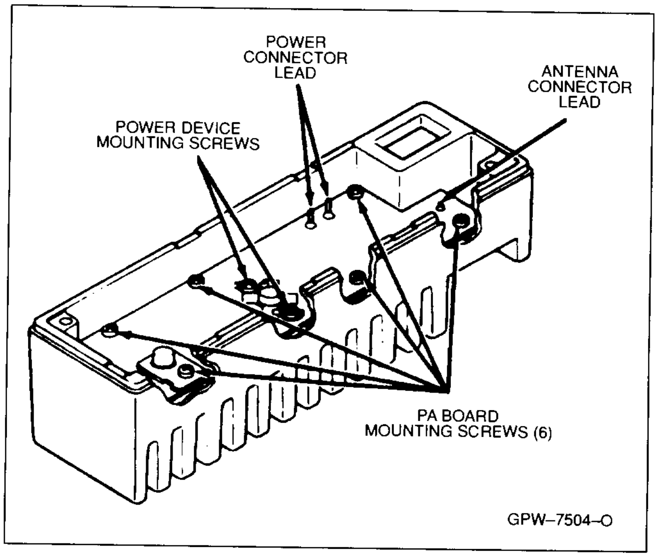


Figure 9.

(3) UHF ONLY – Remove the stud mount transistor mounting nut from the back of the heat sink (Figure 11).

(4) Remove two power device mounting screws and all P.A. board mounting screws (Figure 9 and Figure 10), and then take out the P.A. board.

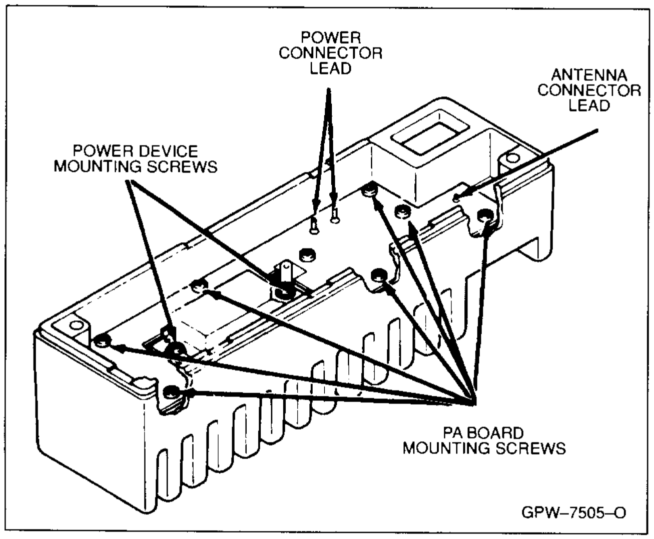


Figure 10.

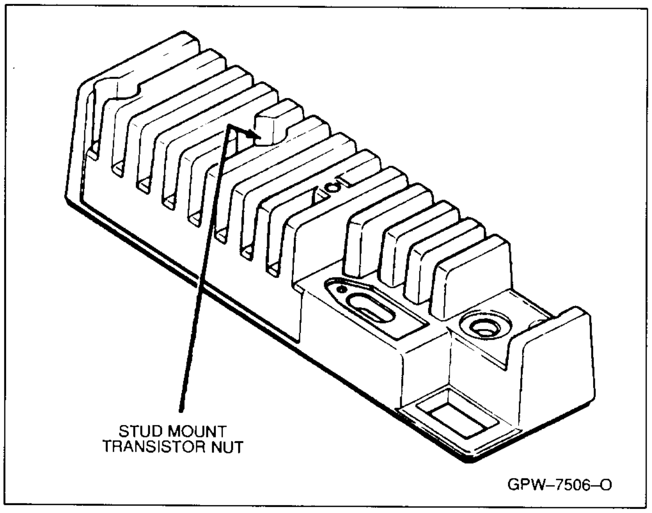


Figure 11.

1.8 TO REMOVE THE POWER AMPLIFIER CIRCUIT BOARD (LOW BAND AND 35 WATT 800 MHZ ONLY) (REFER TO Figure 5)

(1) Remove two screws securing Feedthru Capacitor Board to headsink wall. Separate the Feedthru Capacitor Board from heatsink wall.

(2) Remove nut and lock washer securing antenna connector J1 to heatsink.

(3) Remove five transistor mounting screws and eight circuit board mounting screws.

(4) Unsolder the (+) lead of power connector J2 from the circuit board. (Do not remove the screws securing J2 to the heatsink.

(5) Apply heat from the soldering iron to the (–) lead of the power connector while simultaneously lifting the board upward at an angle until antenna connector clears the hole in the heatsink.

1.9 TO RE–ASSEMBLE THE RADIO (EXCEPT LOW BAND AND 35 WATT 800 MHZ)

Reverse the disassembly procedure and tighten all screws to the torques specified in Table 1.

1.10 TO RE–ASSEMBLE THE RADIO (LOW BAND AND 35 WATT 800 MHZ ONLY) (REFER TO Figure 5)

(1) Set the circuit board into the heatsink.

(2) Reinstall lockwasher and nut securing antenna connector J1 and tighten.

(3) Reinstall five transistor mounting screws and tighten.

(4) Reinstall eight circuit board mounting screws and tighten. Note that the hole marked "*" is secured by one of the heatsink cover mounting screws, so do not install al board mounting screw in this hole.

(5) Reinstall Feedthru Capacitor Board to heatsink wall using two screws.

(6) Reassemble heatsink to radio chassis and secure with four heatsink mounting screws.

(7) Reconnect 5–pin connector P2180 to J2180 on Feedthru Capacitor Board, and reconnect two coaxial cables to RF board.

(8) Replace heatsink cover and secure with four cover mounting screws.

2. Programming

The *MaxTrac* radios can be programmed in the field to these parameters:

- Receive and Transmit frequencies
- Transmit Frequency Adjustment (warp)
- PL or DPL encode and decode Codes
- Transmit Power Output
- Transmit Deviation
- Time Out Timer
- Mode Slaved Scan List

Configuration information for programming these parameters is contained in the *MaxTrac* RADIO SERVICE SOFTWARE package (RVN4019C for 5.25 inch drives and RVN4020C for 3.5 inch drives).

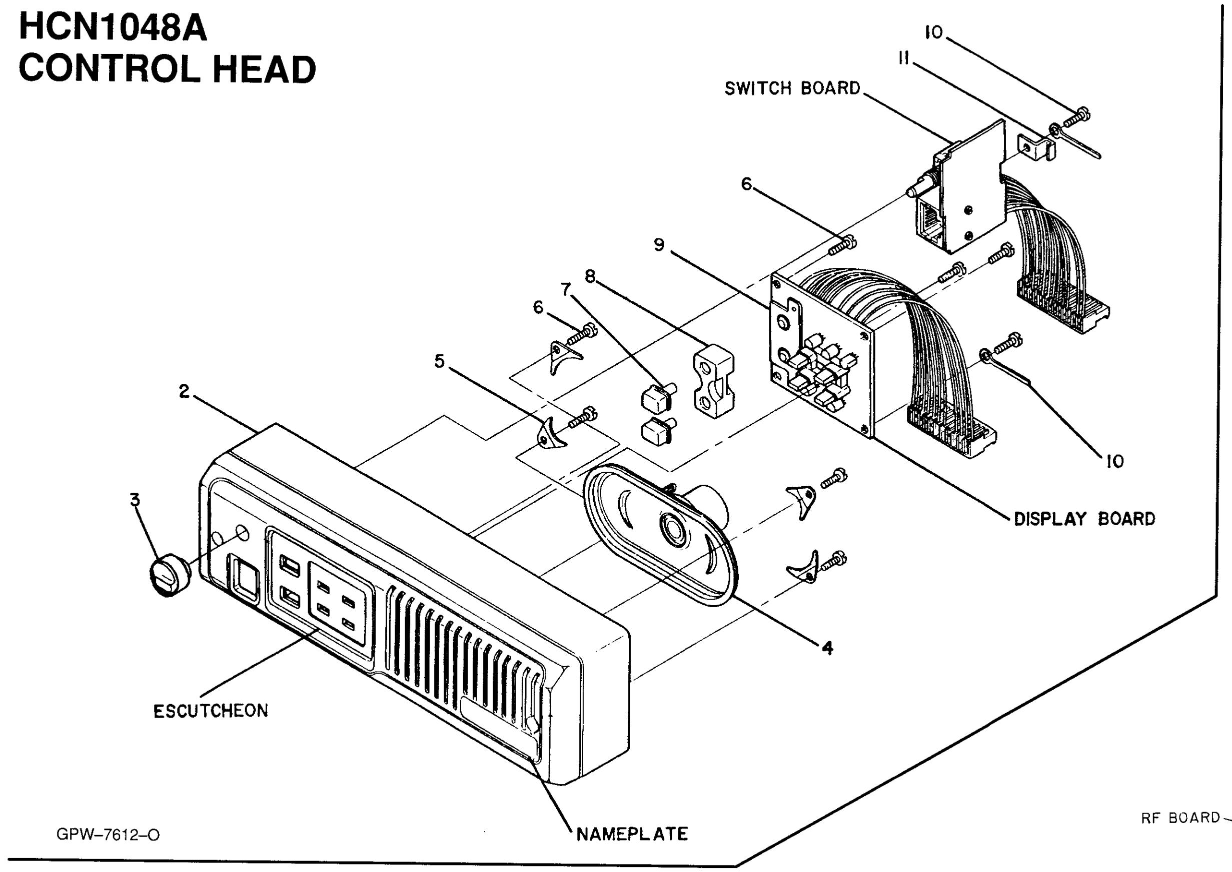
A personal computer (P.C.) and the appropriate software Diskette will be required in addition to the items listed in Recommend Test Equipment.

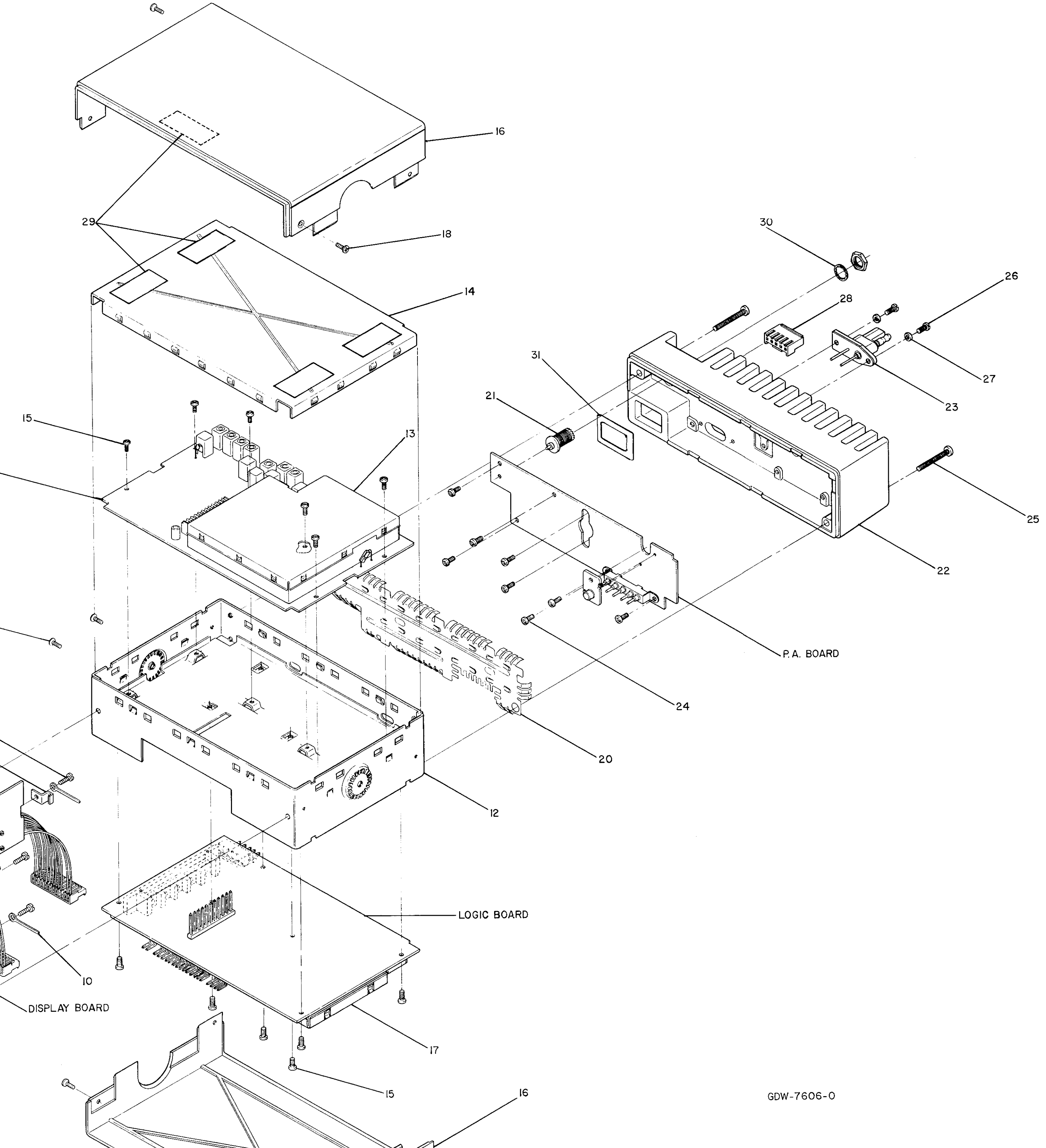
We strongly suggest the servicer become familiar with the programming techniques applicable to the *MaxTrac* Radios.

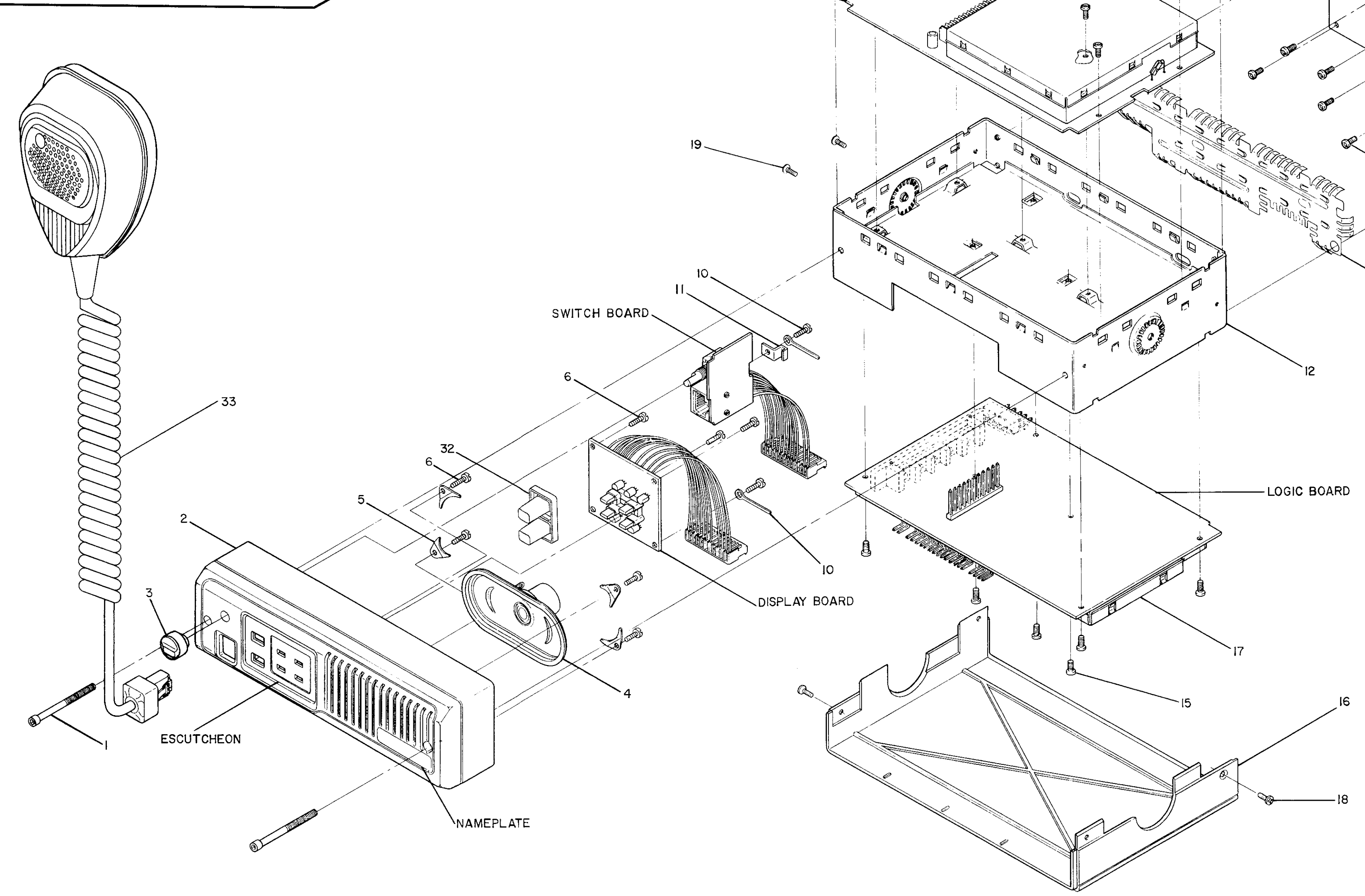
Table 1. Fasteners, Tools, and Torques

PART NUMBER	DESCRIPTION	LOCATION	QTY.	DRIVER SIZE	INPUT TORQUE	REPAIR TORQUE	ILLUST. REF.
03–10945A11	Plastite M3 x SLT. Torx Pan Head	Control Head Brds. and Int'l. Spx'r	9	T10	8 in. lbs.	7 in. lbs.	
03–80270L01	Machine M4 x .7 x 38 Torx. Cap Screw Blk.	Control Head Mounting	2	T15	10 in. lbs.	10 in. lbs.	
03–80271L01	Machine M4 x .7 x 27 Slt. Torx. Pn. Hd. Blk.	Heat Sink Mounting	2	T15	12–14 in. lbs.	12–14 in. lbs.	H
03–10943M04	Taptite M2.5 x 8 Slt. Torx. Pan Head	Regulator H.S. Device Mounting	5	T8	6–8 in. lbs.	4–6 in. lbs.	A
03–10943M09	Taptite M3 x 6 Slt. Torx. Pan Head	RF/Logic Brd. Mounting	12	T10	8–9 in. lbs.	8–9 in. lbs.	C
03–10943M10	Taptite M3 x 8 Slt. Torx. Pan Head	P.A. Device/Brd Mounting	8	T10	11–13 in. lbs.	8–10 in. lbs.	D
03–10943R04	Taptite M2.5 x 8 Torx. Flat Head	Regulator H.S. Device Mounting	2	T8	8–10 in. lbs.	6–8 in. lbs.	B
03–10943R55	Taptite M3 x 8 Torx. Flat Head Blk.	Chassis Covers	4	T10	10–12 in. lbs.	8–10 in. lbs.	I
03–00136756	Tapping 10–16 x 5/8 Plain Hex	External Speaker Mounting Trunnion	3	5/16" Hex Driver	Field Inst'l.	Field Inst'l.	
03–00140001	Tapping 8–19 x 7/8 Philips. Pan	External Speaker Rear Housing	4	P–2	6–8 in. lbs.	6–8 in. lbs.	J
09–80131M01	Hex/Tension Nut (Part of Ant. Con. Assy.)	P.A.–Antenna Connector Mounting	1	1/2 Hex Driver	18–20 in. lbs.	18–20 in. lbs.	E
02–00007003	Hex Nut 8–32	P.A.–Stud Device Mounting	1	5/16" Hex Driver	5 in. lbs.	5 in. lbs.	G
38–90041M01	Plug, Button	Heat Sink Plug	1	—	—	—	F
03–84244C03	Screw, Wing	External Speaker Mounting Trunnion	2	—	Field Inst'l.	Field Inst'l.	
03–80105F01	Screw, Tee Knob	Radio Mounting Trunnion	2	—	Field Inst'l.	Field Inst'l.	
03–10943M72	Taptite M5 x 8 Slt. Torx. Pan Head	P.A.–High Vib. Mounting Bracket.	1	T25	32–34 in. lbs.	30–32 in. lbs.	
03–00138021	Tapping 10–16 x 3/4 Plain Hex Chs.	Trunnion Mounting	6	5/16" Hex Driver	Field Inst'l.	Field Inst'l.	
	Tapping 10–16 x 3/4 Plain Hex Chs.	Locking Trunnion Mounting	6	5/16" Hex Driver	Field Inst'l.	Field Inst'l.	
03–10913A43	Machine M5 x 8 Slt. Torx. Flat Head	Base MK Mounting Clip	1	T25	12–14 in. lbs.	12–14 in. lbs.	
03–10908B08	Machine M5 x 10 Slt. Torx. Pan Head	Locking Trunnion Mounting	2	T25	Field Inst'l.	Field Inst'l.	
03–10943M11	Taptite M3 x 10 S/L Torx. Pam H6	Power Connector	2	T10	9–11 in. lbs.	7–9 in. lbs.	D

HCN1048A CONTROL HEAD







parts list

MaxTrac 50/100/820 Radio Exploded View MXW–7605–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
1	03–80270L01	mounting screws, front, 2 used
2	15–80129L01	housing, control head, 2 frequency
3	36–80144M01	knob, control
4	50–80085D02	speaker
5	42–80253L01	retainer, speaker, 4 used
6	03–10945A11	screw, plastic, 9 used
7	38–80272L02	pushbutton, 2 used (HCN1048 only)
8	43–80273L01	spacer, pushbutton (HCN1048 only)
9	75–80200L01	keypad (HCN1048 only)
10	29–00129883	wire wrap, 2 used
11	07–80037M01	bracket, switch board
12	27–80128L02	frame, chassis
13	15–80953T01	cover, VCO shield
	14–80932U01	mylar insulator, VOC shield cover
14	26–80038M03	shield, RF chassis
	14–80935U01	paper insulator, RF chassis shield
15	03–10943M09	taptite screw (M3x6), 12 used
16	15–80127L01	cover, housing, 2 used
17	15–80124M01	cover, logic shield
18	03–10943R55	taptite screw (M3x8, flathead), 4 used
19	03–10943R04	taptite screw (M2.5x8, flathead), 2 used
20	26–80223M05	shield, PA, VHF/UHF
20	26–80223M06	shield, PA, 800 MHz
21	09–80131M01	connector, antenna
22	26–80124L01	heatsink, VHF/UHF
22	26–80124L02	heatsink, 800 MHz
23	09–80255E01	connector, power
24	03–10943M10	taptite screw (M3x8), 8 used
25	03–80271L01	machine screw (M4x17), 2 used
26	03–10943M11	taptite screw (M3x10), 2 used
27	04–00131974	washer, 2 used
28	15–80076M01	housing, accessory connector
29	75–80918T02	pad, shock insulating, 5 used
30	04–00002636	washer
31	32–80014N02	gasket, accessory connector
32	75–80019R01	keypad
33	30–80043N05	coilcord (std)
33	30–80043N06	coilcord (long)

3/31/90

Exploded View and Parts List
for *MaxTrac* 50/100/820
PW–7604–O
3/31/90

parts list

MaxTrac 300/840 Radio Exploded View MXW–7608–O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
1	03–80270L01	mounting screws, front, 2 used
2	15–80129L02	housing, controi head
3	36–80144M01	knob, control
4	50–80085D02	speaker
5	42–80253L01	retainer, speaker, 4 used
6	03–10945A11	screw, plastic, 9 used
7	38–80272L02	pushbutton (HCN1043, HCN1049 only) 6 Freqeuncy Models, 3 used 16 Freqeuncy Models, 5 used
8	43–80274L01	spacer (1x2), pushbutton (HCN1043, HCN1049 only)
9	43–80275L01	spacer (1x3), pushbutton (HCN1043, HCN1049 only)
10	75–80201L01	keypad (HCN1043, HCN1049 only)
11	38–80077N01	button, plug, 2 used (6 Frequency only)
12	32–80907T01	gasket (6 Frequency only), 2 used (HCN1043, HCN1049 only)
13	29–00129883	wire wrap, 2 used
14	07–80037M01	bracket, switch board
15	27–80128L02	frame, chassis
16	15–80953T01	cover, VCO shield
	14–80932U01	mylar insulator, VOC shield cover
17	26–80038M03	shield, RF chassis
	14–80935U01	paper insulator, RF chassis shield
18	03–10943M09	taptite screw (M3x6), 12 used
19	15–80127L01	cover, housing, 2 used
20	15–80124M01	cover, logic shield
21	03–10943R55	taptite screw (M3x8, flathead), 4 used
22	03–10943R04	taptite screw (M2.5x8, flathead), 2 used
23	26–80223M05	shield, PA, VHF/UHF
23	26–80223M06	shield, PA, 800 MHz
24	09–80131M01	connector, antenna
25	26–80124L01	heatsink, VHF/UHF
25	26–80124L02	heatsink, 800 MHz
26	09–80255E01	connector, power
27	03–10943M10	taptite screw (M3x8), 8 used
28	03–80271L01	machine screw (M4x17), 2 used
29	03–10943M11	taptite screw (M3x10), 2 used
30	04–00131974	washer, 2 used
31	32–80039M01	gasket
32	15–80076M01	housing, accessory connector (5 pin)
32	15–80922V01	housing, accessory connector (16 pin)
33	75–80918T02	pad, shock insulating, 5 used
34	04–00002636	washer
35	32–80014N02	gasket, accessory connector
36	75–80958X01	keypad (16 Frequency)
36	75–80018R01	keypad (6 Frequency)
37	30–80043N05	coilcord (std)
37	30–80043N06	coilcord (long)

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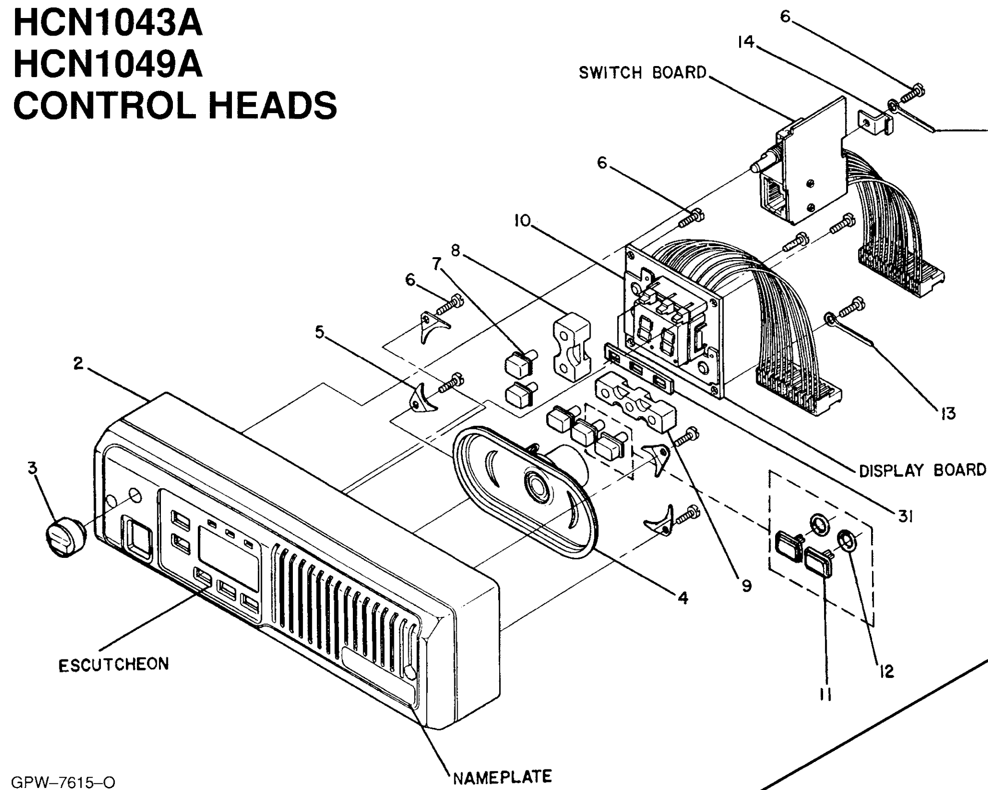
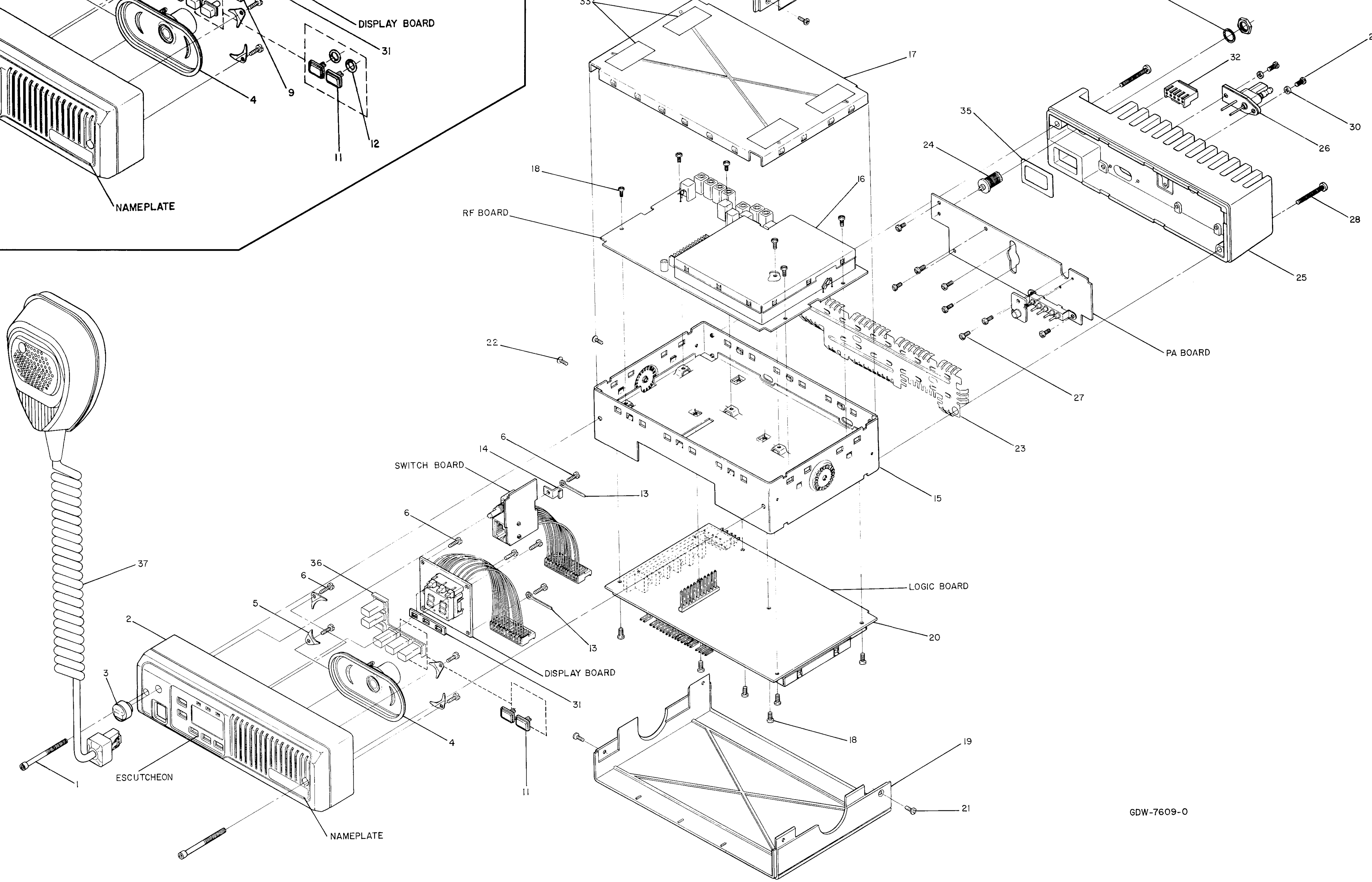
note: The part number for the speaker lead assembly, including connector P10 and two speaker lugs, is 01–80747T30.

HCN1043A
HCN1049A
CONTROL HEADS





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Exploded View and Parts List
for *MaxTrac* 300/840
PW–7607–O
3/31/90