



# instruction manual revision

## GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to update your instruction manual.

## INSTRUCTION MANUAL AFFECTED:

68-80101W58-A Radius Two-Way Radio Service Manual

## REVISION DETAILS:

This revision contains servicing information for Radius Low Band 29.7-36 MHz models. The following pages include a model chart, disassembly and reassembly information, schematics, circuit board diagrams, and/or parts lists for the following new Low Band kits:

HLB4099A	RF Board, 29.7-36 MHz
HLB4105A	PA Board, 60 Watt, 29.7-36 MHz
HLN9302A	PA Hardware Kit (Low Band 60 Watt 29.7-36 MHz)
01-80701Y74	Feedthru Capacitor Board
01-80701Y75	5-Wire Harness Assembly

All of these items except the HLB4099A RF Board are part of the HLB3048A RF Power Amplifier Kit.

The following pages contain additional information covering new kits. No pages in your existing manual should be discarded.



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**Radius Products Division**

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**MMR023**

8/1/89

[MMR023 8/1/89]

## Low Band Radius Mobile Radio 60 Watt RF Power 29.7-36 MHz

VERSION		FREQ.		MODEL		DESCRIPTION	
Radius M206 (PL/DPL/CSO)		6	14	D51LRA9732AK	D51LRA9932AK	X = ONE ITEM SUPPLIED.	
Radius M214 (PL/DPL/CSO)						ITEM	DESCRIPTION
						HLB4099A	RF BOARD 29.7-36 MHz
						HLN5172A	LOGIC BOARD
						HLN5175A	DISPLAY BRD 6/14 FREQ.
						HLN9142A	FRONT PANEL HDWR 6 FREQ.
						HLN9143A	FRONT PANEL HDWR 14 FREQ.
						HLN5194A	FRONT PANEL SWITCH BRD
						HLN9436A	CHASSIS HDWR KIT
						HLB4105A	60W PA BOARD 29.7-36 MHz
						HLN9302A	60W PA HDWR 29.7-36 MHz
						HLN1245A	MICROPHONE
						HLN5301A	COILED CORD
X	X	HUB1093A	UNIFIED CHASSIS 29.7-36 MHz (See Note 1)	X	X		
X	X	HLB3048A	PA KIT 60 WATT 29.7-36 MHz (See Note 1)				X X
X	X	HLN9411A	LOWBAND HEATSINK COVER & HDWR (See Note 1)				
X		HCN3033A	FRONT PANEL 6 FREQ.			X X	
	X	HCN3034A	FRONT PANEL 14 FREQ.			X X	
	X	HLN5191A	FRONT PANEL ESCUTCHEON 14 FREQ.				
X	X	HLN9180A	NAMEPLATE				
X	X	HHN4029A	HOUSING KIT				
X	X	HMN1056B	MICROPHONE KIT				X X
X	X	HLN9073A	MICROPHONE HANGUP CLIP				
X	X	HKN9402A	POWER CABLE KIT				
X	X	HLN9404A	INSTALLATION HDWR KIT				
X	X	HBN9403A	PACKING KIT				
X	X	HLN9499A	ROM KIT RAPID CALL				

NOTES: 1. HUB3170A "SUPER CHASSIS" CONSISTS OF HUB1093A, HLB3048A AND HLN9411A.

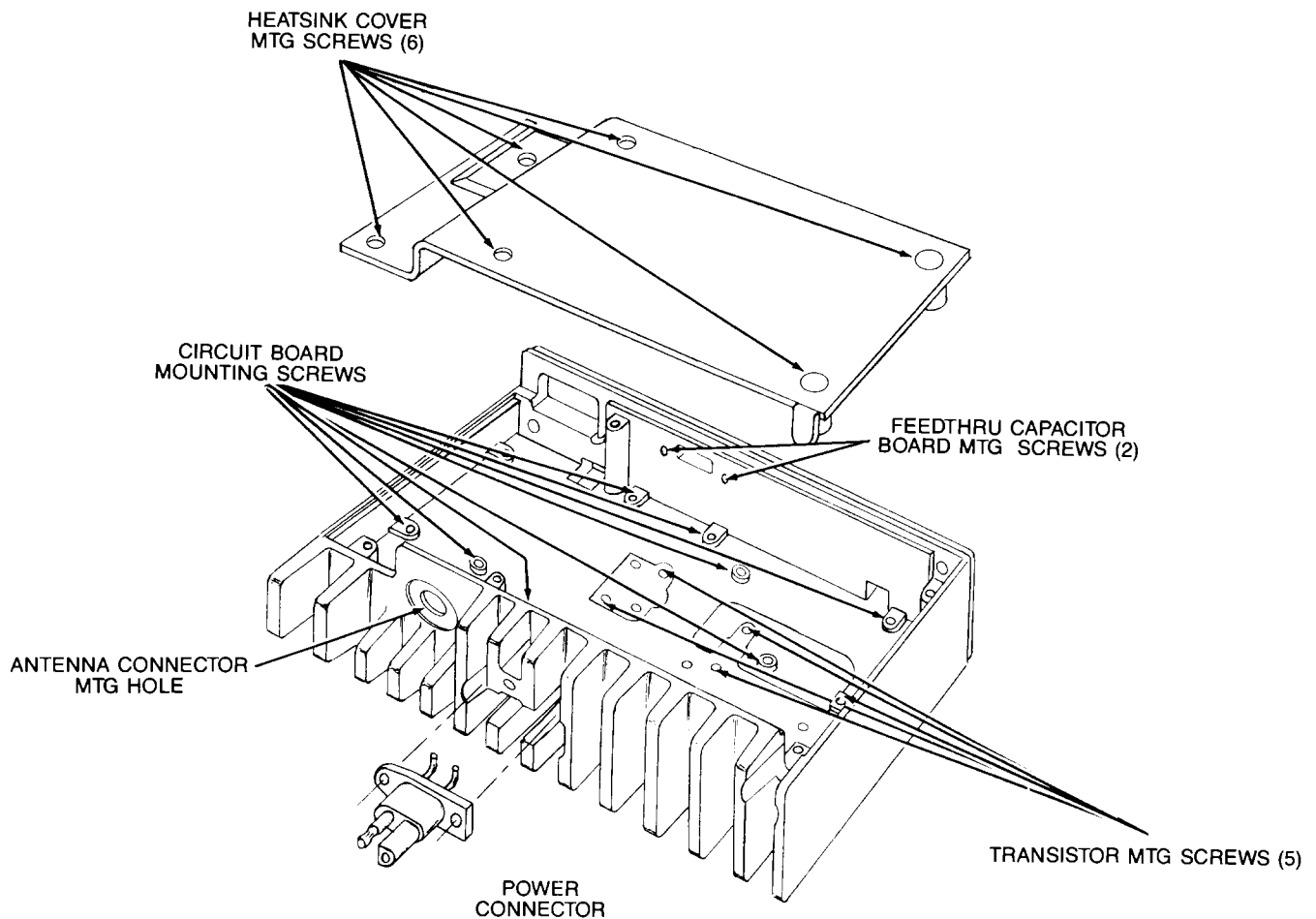
2. WITH B383 SIGNALING OPTIONS, HUB3173A "SUPER CHASSIS" REPLACES HUB3170A, HUB1096A UNIFIED CHASSIS REPLACES HUB1093A, HLN9313A LOGIC BOARD REPLACES HLN5172A, AND HLN9491A HARDWARE KIT IS ADDED.

## POWER AMPLIFIER DISASSEMBLY AND BOARD REMOVAL (Low Band Models)

Follow the procedures given in Section 1 of your Service Manual, with the following exceptions:

### 1.3 TO REMOVE THE POWER AMPLIFIER HEATSINK

- (1) Disconnect the transmit and receive coaxial cables from the RF board.
- (2) Disconnect the 5-pin connector P2180 from its mating connector J2180 on the Feedthru Capacitor board.
- (3) Remove six screws securing the heatsink cover to the heatsink. Remove heatsink cover (see Figure).
- (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.

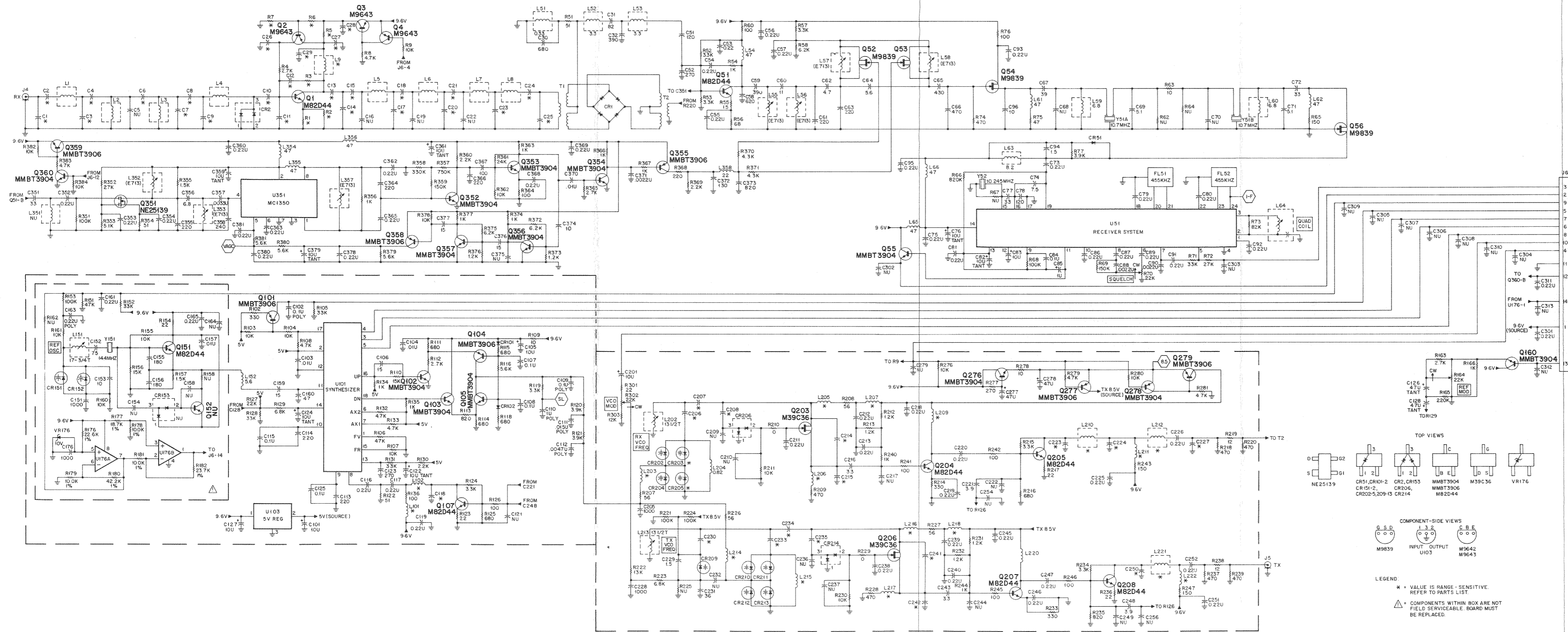


## 1.6 TO REMOVE THE POWER AMPLIFIER CIRCUIT BOARD

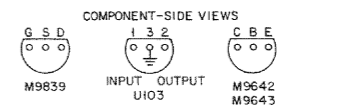
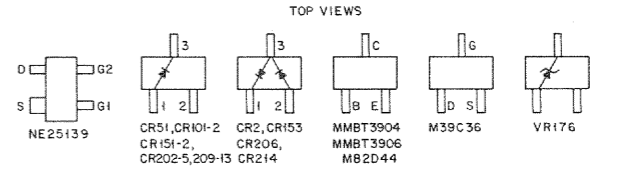
- (1) Remove two screws securing Feedthru Capacitor Board to heatsink wall. Separate the Feedthru Capacitor Board from heatsink wall.
- (2) Remove nut and lockwasher securing antenna connector J1 to heatsink.
- (3) Remove five transistor mounting screws and eight circuit board mounting screws.
- (4) 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.

## TO RE-ASSEMBLE

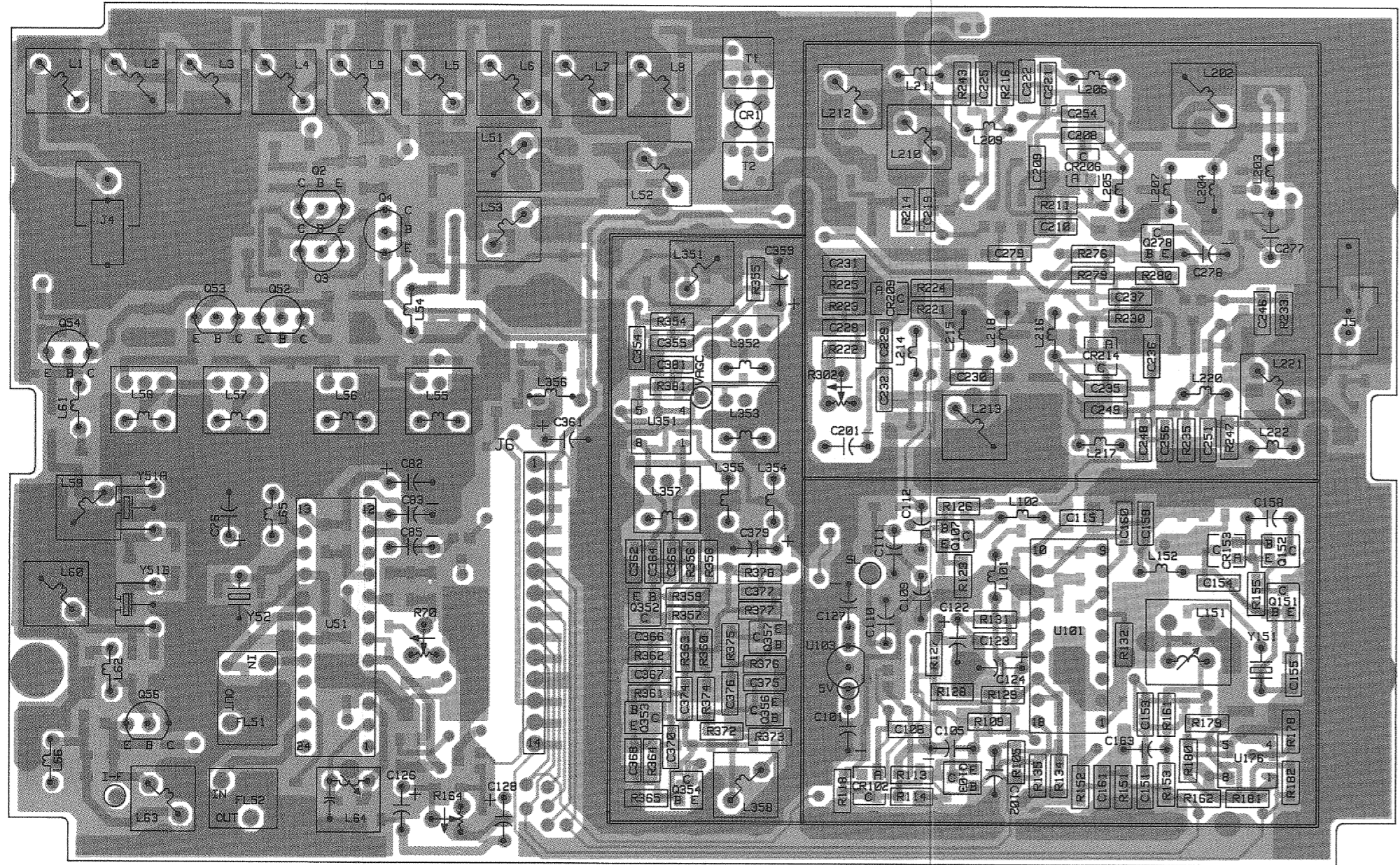
- (1) Set the circuit board into the heatsink.
- (2) Reinstall lockwasher and nut securing antenna connector J1 and tighten.
- (3) Reinstall five transistor mounting screws and tighten.
- (4) Reinstall eight circuit board mounting screws and tighten. Note that the hole marked "\*" is secured by one of the heatsink cover mounting screws, so do not install a 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.



- NOTES:
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN PICOFARADS, INDUCTOR VALUES ARE IN MICRO-HENRIES.
  - NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED.
  - POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
  - DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
  - AC RF VOLTAGES ARE MEASURED WITH A HIGH-IMPEDANCE RF MILLIVOLTMETER.
  - ALL VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATES AS FOLLOWS:  
(R) RECEIVE MODE  
(T) TRANSMIT MODE
  - MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL UNMODULATED SIGNAL AT A LEVEL OF -20 DBM.
  - MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER.

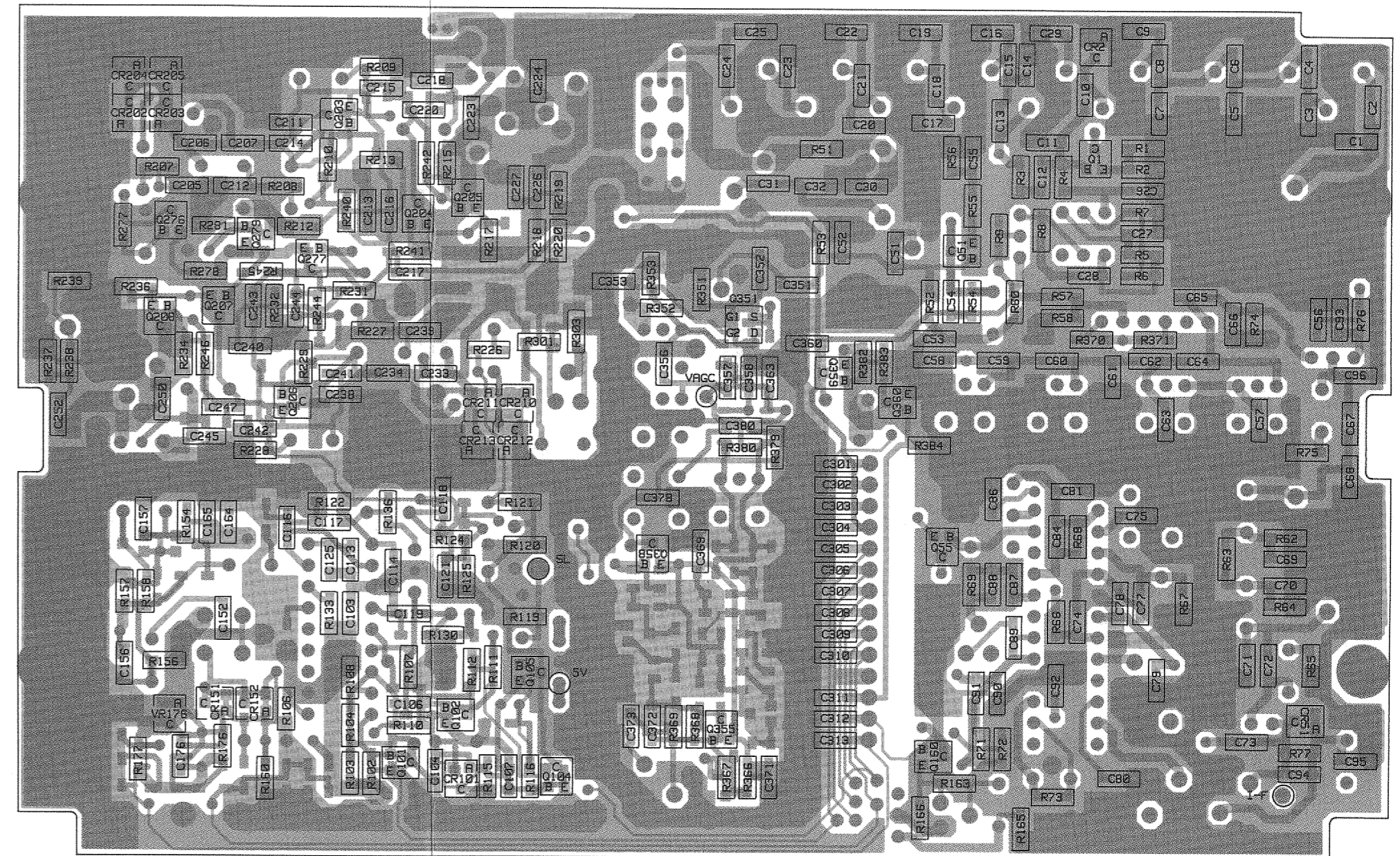


LEGEND:  
 \* VALUE IS RANGE-SENSITIVE. REFER TO PARTS LIST.  
 Δ COMPONENTS WITHIN BOX ARE NOT FIELD SERVICEABLE. BOARD MUST BE REPLACED.



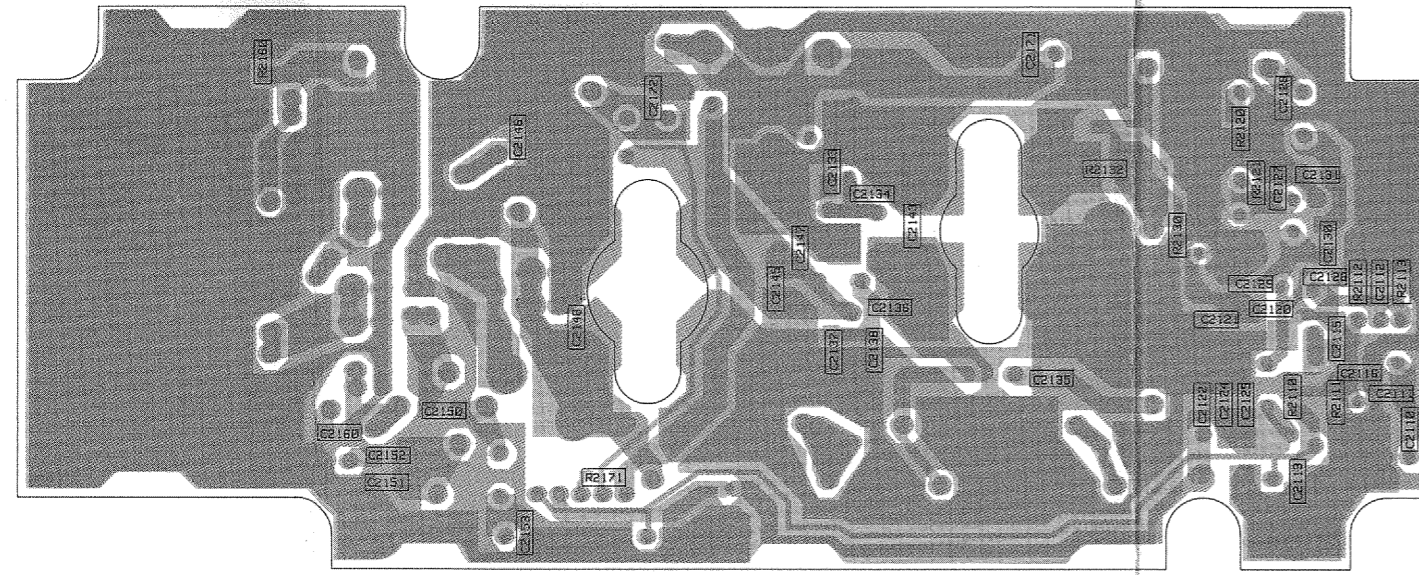
SHOWN FROM COMPONENT SIDE

COMPONENT ●  
 SOLDER SIDE ○  
 OVERLAY —



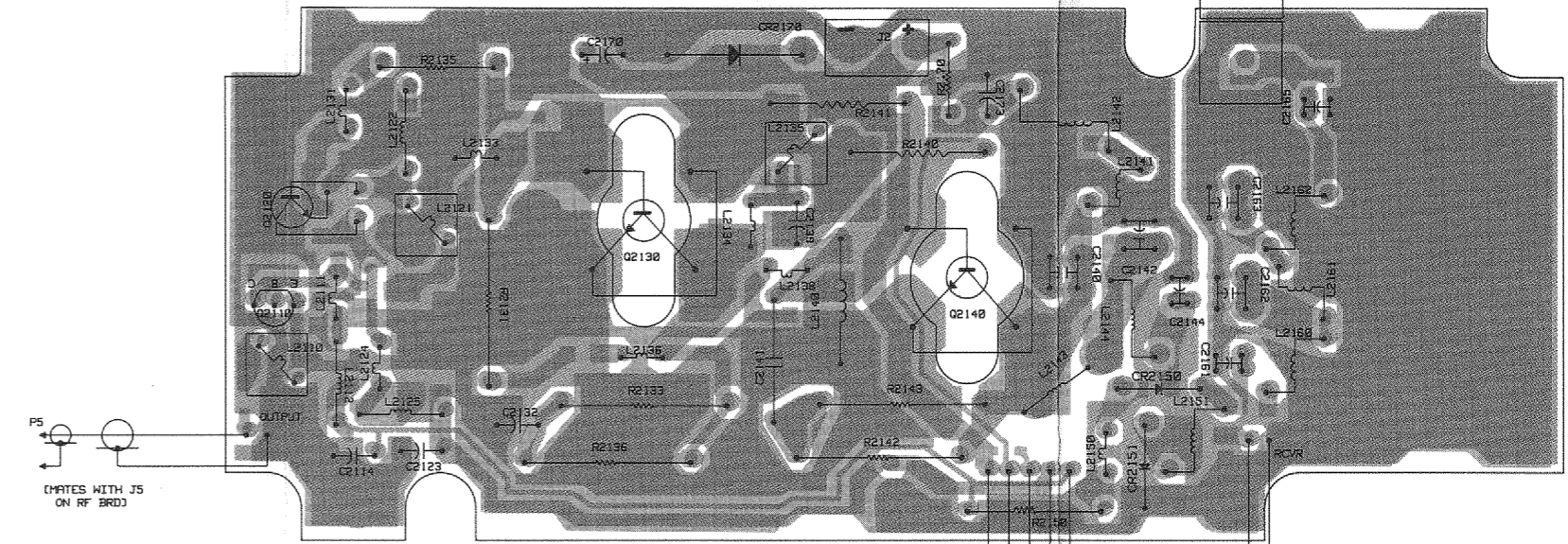
SHOWN FROM SOLDER SIDE

COMPONENT ●  
 SOLDER SIDE ○  
 OVERLAY —

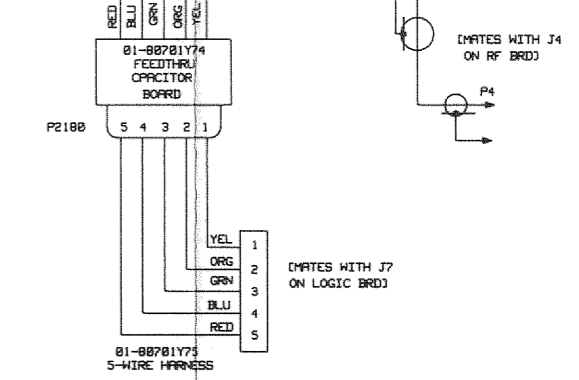
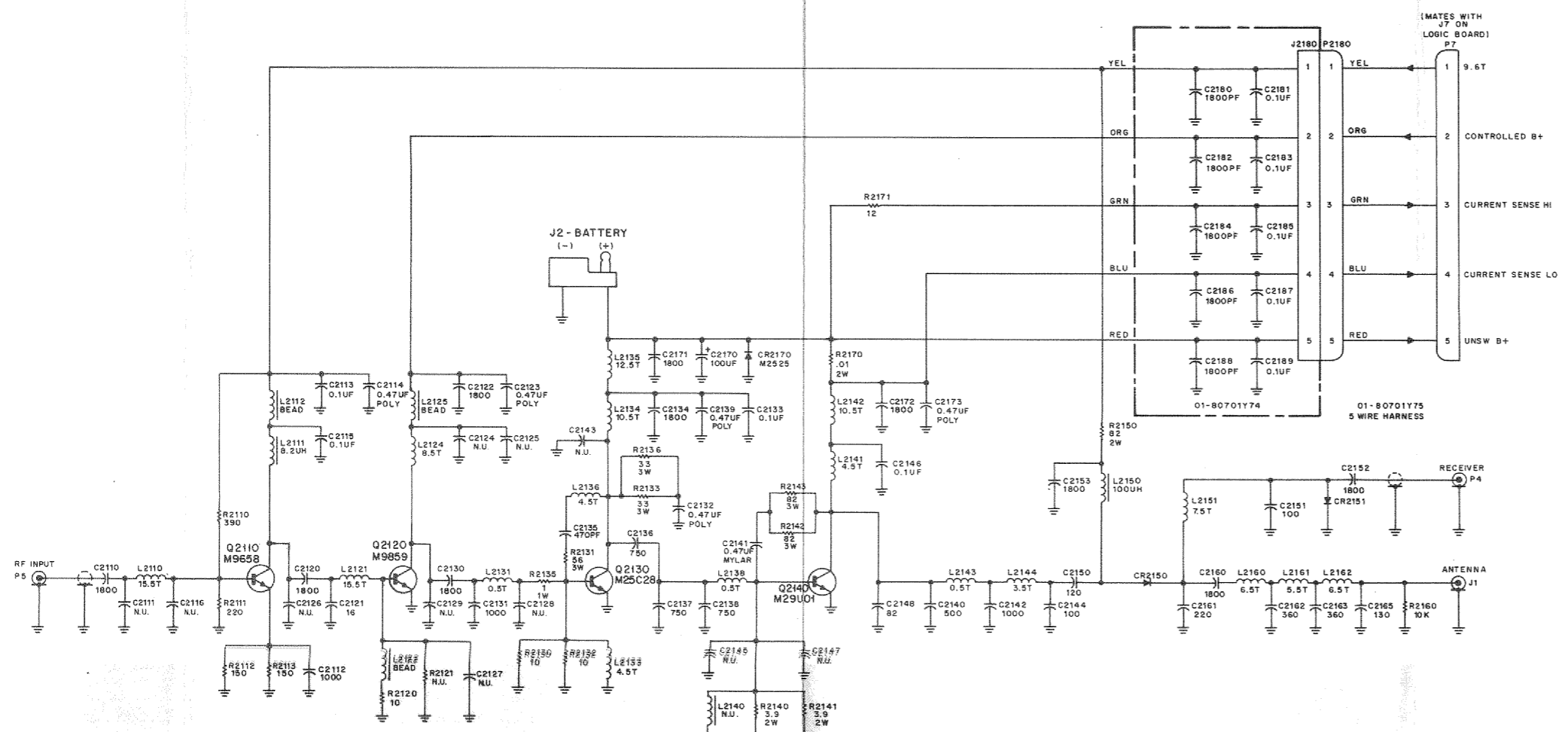


SHOWN FROM SOLDER SIDE

COMPONENT ●  
SOLDER SIDE ●  
OVERLAY —



SHOWN FROM COMPONENT SIDE



COMPONENT ●  
SOLDER SIDE ●  
OVERLAY —

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REFERENCE NUMBER	MOTOROLA PART NO.	DESCRIPTION
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Capacitor, chip, 5%, 50V unless otherwise indicated

C1	21-11031A45	180 pF
C2	21-11032B15	.22 uF +80/-20%
C3	21-11031A56	510 pF
C4	21-11031A47	220 pF
C5		not used
C6	21-11031A28	36 pF
C7	21-11031A10	5.6 +/- .5 pF
C8	21-11031A45	180 pF
C9	21-11031A58	620 pF
C10	21-11032B15	.22 uF +80/-20%
C11	21-11031A45	180 pF
C12	21-11032B15	.22 uF +80/-20%
C13	21-11032B15	.22 uF +80/-20%
C14		not used
C15	21-11031A36	75 pF
C16		not used
C17	21-11031A56	510 pF
C18	21-11031A51	330 pF
C19		not used
C20	21-11031A60	820 pF
C21	21-11031A50	300 pF
C22		not used
C23	21-11031A59	680 pF
C24	21-11031A61	1000 pF
C25	21-11031A51	330 pF
C26	21-11032B15	.22 uF +80/-20%
C27	21-11032B15	.22 uF +80/-20%
C28	21-11032B15	.22 uF +80/-20%
C29	21-11032B15	.22 uF +80/-20%
C30	21-11031A59	680 pF
C31	21-11031A38	91 pF
C32	21-11031A53	390 pF
C51	21-11031A42	130 pF
C52	21-11031A49	270 pF
C53	21-11032B15	.22 uF +80/-20%
C54	21-11032B15	.22 uF +80/-20%
C55	21-11032B15	.22 uF +80/-20%
C56	21-11032B15	.22 uF +80/-20%
C57	21-11032B15	.22 uF +80/-20%
C58	21-11031A58	620 pF
C59	21-11031A53	390 pF
C60	21-11031A16	11 pF
C61	21-11031A47	220 pF
C62	21-11031A09	4.7 +/- .25 pF
C63	21-11031A47	220 pF
C64	21-11031A10	5.6 +/- .5 pF
C65	21-11031A54	430 pF
C66	21-11031A55	470 pF
C67	21-11031A29	39 pF
C68		not used
C69	21-11031A62	5.1 +/- .25 pF
C70		not used
C71	21-11031A62	5.1 +/- .25 pF
C72	21-11031A27	33 pF
C73	21-11032B15	.22 uF +80/-20%
C74	21-11031A12	7.5 +/- .5 pF
C75	21-11032B15	.22 uF +80/-20%
C76	23-11013D13	tantalum 10 uF 10% 20V
C77	21-11031A27	33 pF
C78	21-11031A41	120 pF
C79	21-11032B15	.22 uF +80/-20%
C80	21-11032B15	.22 uF +80/-20%
C81	21-11032B15	.22 uF +80/-20%
C82	23-11013D13	tantalum 10 uF 10% 20V
C83	23-11048B13	lytic 10 uF 20% 16V
C84	21-11032B13	.1 uF +80/-20%
C85	23-11048B05	lytic 1 uF 20% 50V
C86	21-11032B15	.22 uF +80/-20%
C87	21-11032B15	.22 uF +80/-20%
C88	21-11032A13	.0022 uF 10%

C89	21-11032B15	.22 uF +80/-20%
C90	21-11032A13	.0022 uF 10%
C91	21-11032B15	.22 uF +80/-20%
C92	21-11032B15	.22 uF +80/-20%
C93	21-11032B15	.22 uF +80/-20%
C94	21-11031A03	1.5 +/- .25 pF
C95	21-11032B15	.22 uF +80/-20%
C96	21-11031A15	10 +/- .5 pF
C101	23-11048B13	lytic 10 uF 20% 16V
C102	08-11051A13	poly .1 uF 63V
C103	21-11032A21	.01 uF 10%
C104	21-11032A21	.01 uF 10%
C105	23-11048B13	lytic 10 uF 20% 16V
C106	21-11031A37	82 pF
C107	21-11032B13	.1 uF +80/-20%
C108	21-11032B13	.1 uF +80/-20%
C109	08-11051A13	poly .1 uF 63V
C110	08-11044A33	poly 1 uF
C111	08-11051A08	poly .015 uF 63V
C112	08-11051A05	poly .0047 uF 63V
C113	21-11031A47	220 pF
C114	21-11031A47	220 pF
C115	21-11032B13	.1 uF +80/-20%
C116	21-11032B15	.22 uF +80/-20%
C117	21-11032B15	.22 uF +80/-20%
C118	21-11031A22	20 pF
C119	21-11032B15	0.22 uF +80/-20%
C121		not used
C122	23-11013D13	tantalum 10 uF 10% 20V
C123	21-11031A49	270 pF
C124	23-11013D13	tantalum 10 uF 10% 20V
C125	21-11032B13	.1 uF +80/-20%
C126	23-11013A56	tantalum 47 uF 20% 6V
C127	23-11048B13	lytic 10 uF 20% 16V
C128	23-11013A56	tantalum 47 uF 20% 6V
C151	21-11031A61	1000 pF
C152	21-11031A36	75 pF
C153	21-11031A15	10 +/- .5 pF
C154		not used
C155	21-11031A45	180 pF
C156	21-11031A45	180 pF
C157	21-11032A21	.01 uF 10%
C158		not used
C159	21-11031A19	15 pF
C160	21-11031A31	47 pF
C161	21-11032B15	.22 uF +80/-20%
C163	08-11051A15	poly .22 uF 63V
C164		not used
C165	21-11032B15	.22 uF +80/-20%
C176	21-11031A61	1000 pF
C201	23-11048B13	lytic 10 uF 20% 16V
C205	21-11031A61	1000 pF
C206	21-11031A35	68 pF
C207	21-11031A35	68 pF
C208	21-11031A09	4.7 +/- .25 pF
C209		not used
C210		not used
C211	21-11032B15	.22 uF +80/-20%
C212	21-11032B15	.22 uF +80/-20%
C213	21-11032B15	.22 uF +80/-20%
C214	21-11031A33	56 pF
C215	21-11031A33	56 pF
C216	21-11031A07	3.3 +/- .25 pF
C217		not used
C218	21-11032B15	.22 uF +80/-20%
C219	21-11032B15	.22 uF +80/-20%
C220	21-11032B15	.22 uF +80/-20%
C221	21-11031A08	3.9 +/- .25 pF
C222		not used
C223	21-11031A15	10 +/- .5 pF
C224	21-11031A31	47 pF
C225	21-11032B15	.22 uF +80/-20%
C226	21-11032B15	.22 uF +80/-20%
C227	21-11031A31	47 pF
C228	21-11031A61	1000 pF
C229	21-11031A03	1.5 +/- .25 pF
C230	21-11031A10	5.6 +/- .5 pF
C231	21-11031A28	36 pF



C232		not used
C233	21-11031A53	390 pF
C234	21-11031A39	100 pF
C235	21-11031A09	4.7 +/- .25 pF
C236		not used
C237		not used
C238	21-11032B15	.22 uF + 80/-20%
C239	21-11032B15	.22 uF + 80/-20%
C240	21-11032B15	.22 uF + 80/-20%
C241	21-11031A37	82 pF
C242	21-11031A37	82 pF
C243	21-11031A07	3.3 +/- .25 pF
C244		not used
C245	21-11032B15	.22 uF + 80/-20%
C246	21-11032B15	.22 uF + 80/-20%
C247	21-11032B15	.22 uF + 80/-20%
C248	21-11031A08	3.9 +/- .25 pF
C249		not used
C250	21-11031A19	15 pF
C251	21-11032B15	.22 uF + 80/-20%
C252	21-11032B15	.22 uF + 80/-20%
C254		not used
C256		not used
C277	23-11048B19	lytic 47 uF 20% 16V
C278	23-11048B19	lytic 47 uF 20% 16V
C279		not used
C301	21-11032B15	.22 uF + 80/-20%
C302		not used
C303		not used
C304		not used
C305		not used
C306		not used
C307		not used
C308		not used
C309		not used
C310		not used
C311	21-11032B15	.22 uF + 80/-20%
C312		not used
C313		not used
C351	21-11031A27	33 pF
C352	21-11032B15	.22 uF + 80/-20%
C353	21-11032B15	.22 uF + 80/-20%
C354	21-11032B15	.22 uF + 80/-20%
C355	21-11031A48	240 pF
C356	21-11031A11	6.8 +/- .5 pF
C357	21-11032A15	.0033 uF 10%
C358	21-11031A48	240 pF
C359	23-11013D13	tantalum 10 uF 10% 20V
C360	21-11032B15	.22 uF + 80/-20%
C361	23-11013D13	tantalum 10 uF 10% 20V
C362	21-11032B15	.22 uF + 80/-20%
C363	21-11032B15	.22 uF + 80/-20%
C364	21-11031A47	220 pF
C365	21-11032B15	.22 uF + 80/-20%
C366	21-11031A47	220 pF
C367	21-11031A39	100 pF
C368	21-11032B15	.22 uF + 80/-20%
C369	21-11032B15	.22 uF + 80/-20%
C370	21-11032A17	.0047 uF 10%
C371	21-11032A13	.0022 uF 10%
C372	21-11031A42	130 pF
C373	21-11031A60	820 pF
C374	21-11031A15	10 +/- .5 pF
C375		not used
C376	21-11031A19	15 pF
C377	21-11031A19	15 pF
C378	21-11032B15	.22 uF + 80/-20%
C379	23-11013D13	tantalum 10 uF 10% 20V
C380	21-11032B15	.22 uF + 80/-20%
C381	21-11032B15	.22 uF + 80/-20%

Diodes (see note)

CR1	48-80236E16	quad Schottky crossed
CR2	48-80154K03	dual Schottky SOT
CR51	48-05129M76	silicon SOT
CR101	48-05129M76	silicon SOT
CR102	48-05129M76	silicon SOT

CR151	48-80006E10	silicon varactor SOT
CR152	48-80006E10	silicon varactor SOT
CR153		not used
CR202	48-80991T01	silicon varactor SOT
CR203		not used
CR204	48-80991T01	silicon varactor SOT
CR205		not used
CR206	48-80154K03	dual Schottky SOT
CR209	48-80006E10	silicon varactor SOT
CR210	48-80991T01	silicon varactor SOT
CR211	48-80991T01	silicon varactor SOT
CR212	48-80991T01	silicon varactor SOT
CR213	48-80991T01	silicon varactor SOT
CR214	48-80154K03	dual Schottky SOT

Filters

FL51	91-80097D05	455 kHz, 6E
FL52	91-80098D05	455 kHz, 4E

Connectors, receptacle

J4	09-80135M01	coaxial (RX)
J5	09-80135M01	coaxial (TX)
J6	09-80130M02	14-pin socket (logic board)

Coils

L1	24-80148M21	9-1/2 turns WHT
L2	24-80148M21	9-1/2 turns WHT
L3	24-80148M21	9-1/2 turns WHT
L4	24-80148M21	9-1/2 turns WHT
L5	24-80148M21	9-1/2 turns WHT
L6	24-80148M21	9-1/2 turns WHT
L7	24-80148M21	9-1/2 turns WHT
L8	24-80148M21	9-1/2 turns WHT
L9	24-80063M04	0.18 uH
L51	24-80063M07	0.33 uH
L52	24-80063M19	3.3 uH
L53	24-80063M19	3.3 uH
L54	24-80063M31	47 uH
L55	24-80164M01	tunable .7 uH E713
L56	24-80164M01	tunable .7 uH E713
L57	24-80164M01	tunable .7 uH E713
L58	24-80164M01	tunable .7 uH E713
L59	24-80063M23	6.8 uH
L60	24-80063M23	6.8 uH
L61	24-80063M31	47 uH
L62	24-80063M31	47 uH
L63	24-80063M24	8.2 uH
L64	25-80000E01	tunable 455 kHz with cap
L65	24-80063M31	47 uH
L66	24-80063M31	47 uH
L101	24-80063M24	8.2 uH
L102	24-80063M11	.68 uH
L151	24-80299D01	tunable 17-3/4 turns
L152	24-80063M22	5.6 uH
L202	24-80931W26	tunable 13-1/2 turns
L203	24-80063M23	6.8 uH
L204	24-80063M12	.82 uH
L205	24-80063M23	6.8 uH
L206	24-80063M23	6.8 uH
L207	24-80063M23	6.8 uH
L209	24-80063M23	6.8 uH
L210	24-80063M13	1 uH
L211	24-80063M23	6.8 uH
L212	24-80063M07	.33 uH
L213	24-80931W26	tunable 13-1/2 turns
L214	24-80063M24	8.2 uH
L215	24-80063M12	.82 uH
L216	24-80063M24	8.2 uH
L217	24-80063M24	8.2 uH
L218	24-80063M24	8.2 uH
L220	24-80063M24	8.2 uH
L221	24-80063M11	.68 uH
L222	24-80063M24	8.2 uH
L351		not used
L352	24-80164M01	tunable .7 uH E713

L353	24-80164M01	tunable .7 uH E713
L354	24-80063M31	47 uH
L355	24-80063M31	47 uH
L356	24-80063M31	47 uH
L357	24-80164M01	tunable .7 uH E713
L358	24-80063M27	22 uH

Transistors (see note)

Q1	48-80182D44	NPN; type M82D44
Q2	48-00869643	PNP; type M9643
Q3	48-00869643	PNP; type M9643
Q4	48-00869643	PNP; type M9643
Q51	48-80182D44	NPN; type M82D44
Q52	48-00869839	field effect; type M9839
Q53	48-00869839	field effect; type M9839
Q54	48-00869839	field effect; type M9839
Q55	48-80214G02	NPN; type MMBT3904
Q56	48-00869839	field effect; type M9839
Q101	48-05128M16	PNP; type MMBT3906
Q102	48-80214G02	NPN; type MMBT3904
Q103	48-80214G02	NPN; type MMBT3904
Q104	48-05128M16	PNP; type MMBT3906
Q105	48-80214G02	NPN; type MMBT3904
Q107	48-80182D44	NPN; type M82D44
Q151	48-80182D44	NPN; type M82D44
Q152		not used
Q160	48-80214G02	NPN; type MMBT3904
Q203	48-84939C36	field effect; type M39C36
Q204	48-80182D44	NPN; type M82D44
Q205	48-80182D44	NPN; type M82D44
Q206	48-84939C36	field effect; type M39C36
Q207	48-80182D44	NPN; type M82D44
Q208	48-80182D44	NPN; type M82D44
Q276	48-80214G02	NPN; type MMBT3904
Q277	48-05128M16	PNP; type MMBT3906
Q278	48-05128M16	PNP; type MMBT3906
Q279	48-05128M16	PNP; type MMBT3906
Q351	48-80930W01	dual gate field effect; type NE25139
Q352	48-80214G02	NPN; type MMBT3904
Q353	48-80214G02	NPN; type MMBT3904
Q354	48-80214G02	NPN; type MMBT3904
Q355	48-05128M16	PNP; type MMBT3906
Q356	48-80214G02	NPN; type MMBT3904
Q357	48-80214G02	NPN; type MMBT3904
Q358	48-05128M16	PNP; type MMBT3906
Q359	48-05128M16	PNP; type MMBT3906
Q360	48-80214G02	NPN; type MMBT3904

Resistors, chip, 5%, 1/8 watt, unless otherwise indicated

R1		not used
R2	06-11024A05	15
R3	06-11024A43	560
R4	06-11024A59	2.7k
R5	06-11024A31	180
R6	06-11024A73	10k
R7	06-11024A69	6.8k
R8	06-11024A65	4.7k
R9	06-11024A73	10k
R51	06-11024A18	51
R52	06-11024A61	3.3k
R53	06-11024A61	3.3k
R54	06-11024A49	1k
R55	06-11024A05	15
R56	06-11024A21	68
R57	06-11024A61	3.3k
R58	06-11024A68	6.2k
R60	06-11024A25	100
R62		not used
R63	06-11024A01	10
R64		not used
R65	06-11024A29	150
R66	06-11024B20	820k
R67		not used
R68	06-11024A97	100k
R69	06-11024B02	150k

R70	18-05500L08	variable 22k
R71	06-11024A85	33k
R72	06-11024A83	27k
R73	06-11024A95	82k
R74	06-11024A41	470
R75	06-11024A17	47
R76	06-11024A25	100
R77	06-11024A63	3.9k
R102	06-11024A37	330
R103	06-11024A73	10k
R104	06-11024A73	10k
R105	06-11024A85	33k
R106	06-11024A89	47k
R107	06-11024A73	10k
R108	06-11024A65	4.7k
R109	06-11024A01	10
R110	06-11024A77	15k
R111	06-11024A45	680
R112	06-11024A59	2.7k
R113	06-11024A47	820
R114	06-11024A45	680
R115	06-11024A45	680
R116	06-11024A67	5.6k
R118	06-11024A45	680
R119	06-11024A61	3.3k
R120	06-11024A63	3.9k
R121	06-11024A63	3.9k
R122	06-11024A18	51
R123	06-11024A09	22
R124	06-11024A61	3.3k
R125	06-11024A45	680
R126	06-11024A25	100
R127	06-11024A81	22k
R128	06-11024A85	33k
R129	06-11024A69	6.8k
R130	06-11024A57	2.2k
R131	06-11024A85	33k
R132	06-11024A65	4.7k
R133	06-11024A65	4.7k
R134	06-11024A49	1k
R135	06-11024A49	1k
R136	06-11024A25	100
R151	06-11024A89	47k
R152	06-11024A85	33k
R153	06-11024A97	100k
R154	06-11024A09	22
R155	06-11024A73	10k
R156	06-11024A77	15k
R157	06-11024A53	1.5k
R158		not used
R160	06-11024A73	10k
R161	06-11024A73	10k
R162		not used
R163	06-11024A59	2.7k
R164	18-05500L08	variable 22k
R165	06-11024B06	220k
R166	06-11024A49	1k
R176	06-11024H26	22.6k 1%
R177	06-11024H18	18.7k 1%
R178	06-11024G91	10.0k 1%
R179	06-11024G91	10.0k 1%
R180	06-11024H52	42.2k 1%
R181	06-11024G91	10.0k 1%
R182	06-11024H28	23.7k 1%
R207	06-11024A19	56
R208	06-11024A19	56
R209	06-11024A41	470
R210	06-11024B23	0
R211	06-11024A73	10k
R212	06-11024A51	1.2k
R213	06-11024A51	1.2k
R214	06-11024A37	330
R215	06-11026A61	3.3k
R216	06-11024A45	680
R217	06-11024A09	22
R218	06-11024A41	470
R219	06-11024A03	12
R220	06-11024A41	470

R221	06-11024A97	100k
R222	06-11024A76	13k
R223	06-11024A69	6.8k
R224	06-11024A97	100k
R225		not used
R226	06-11024A19	56
R227	06-11024A19	56
R228	06-11024A41	470
R229	06-11024B23	0
R230	06-11024A73	10k
R231	06-11024A51	1.2k
R232	06-11024A51	1.2k
R233	06-11024A37	330
R234	06-11024A61	3.3k
R235	06-11024A47	820
R236	06-11024A09	22
R237	06-11024A50	300
R238	06-11024A21	18
R238	06-11024A03	12
R239	06-11024A50	300
R240	06-11024A49	1k
R241	06-11024A25	100
R242	06-11024A25	100
R243	06-11024A29	150
R244	06-11024A49	1k
R245	06-11024A25	100
R246	06-11024A25	100
R247	06-11024A29	150
R276	06-11024A73	10k
R277	06-11024A35	270
R278	06-11024A01	10
R279	06-11024A65	4.7k
R280	06-11024A73	10k
R281	06-11024A65	4.7k
R301	06-11024A09	22
R302	18-05500L08	variable 22k
R303	06-11024A75	12k
R351	06-11024A97	100k
R352	06-11024A83	27k
R353	06-11024A66	5.1k
R354	06-11024A18	51
R355	06-11024A53	1.5k
R356	06-11024A49	1k
R357	06-11024B19	750k
R358	06-11024B10	330k
R359	06-11024B02	150k
R360	06-11024A57	2.2k
R361	06-11024A82	24k
R362	06-11024A73	10k
R363	06-11024A49	1k
R364	06-11024A25	100
R365	06-11024A59	2.7k
R366	06-11024A49	1k
R367	06-11024A49	1k
R368	06-11024A33	220
R369	06-11024A57	2.2k
R370	06-11024A64	4.3k
R371	06-11024A64	4.3k
R372	06-11024A68	6.2k
R373	06-11024A51	1.2k
R374	06-11024A49	1k
R375	06-11024A68	6.2k
R376	06-11024A51	1.2k
R377	06-11024A49	1k
R378	06-11024A73	10k
R379	06-11024A67	5.6k
R380	06-11024A67	5.6k
R381	06-11024A67	5.6k
R382	06-11024A73	10k
R383	06-11024A65	4.7k
R384	06-11024A73	10k

Transformers

T1	25-80163M02	balun
T2	25-80163M02	balun

Integrated Circuits (see note)

U51	51-05479G05	receiver system
U101	51-80931V01	synthesizer C42C
U103	51-84621K27	5 volt regulator
U176	51-80932W01	dual op-amp LM2904 SOIC
U351	51-80929W01	MC1350 SOIC

Voltage regulator (see note)

VR176	48-80140L15	zener diode 10V SOT
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Crystals

Y51	91-80172D01	filter 10.7 MHz (includes Y51A, Y51B)
Y52	48-80908W01	10.245 MHz
Y151	48-80174D05	14.4 MHz

Non-Referenced Items

75-05295B02	insulator crystal (4 used)
26-80097M01	shield coil can (for L151)
26-80098M01	shield coil can (11 used)
26-80228L01	shield can (2 used, for J4 and J5)
26-80916V01	shield VCO frame lowband

Note: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.

REFERENCE NUMBER	MOTOROLA PART NO.	DESCRIPTION
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Capacitor, chip, 5%, 50V unless otherwise indicated

C2110	21-11031A65	1800 pF
C2111		not used
C2112	21-11031A61	1000 pF
C2113	21-11032B13	.1 uF + 80/-20%
C2114	08-11051A17	poly .47 uF 63V
C2115	21-11032B13	.1 uF + 80/-20%
C2116		not used
C2120	21-11031A65	1800 pF
C2121	21-11031A20	16 pF
C2122	21-11031A65	1800 pF
C2123	08-11051A17	poly .47 uF 63V
C2124		not used
C2125		not used
C2126		not used
C2127		not used
C2128		not used
C2129		not used
C2130	21-11031A65	1800 pF
C2131	21-11031A61	1000 pF
C2132	08-11051A17	poly .47 uF 63V
C2133	21-11032B13	.1 uF + 80/-20%
C2134	21-11031A65	1800 pF
C2135	21-11078B59	470 pF 100V
C2136	21-13740B70	750 pF
C2137	21-13740B70	750 pF
C2138	21-13740B70	750 pF
C2139	08-11051A17	poly .47 uF 63V
C2140	21-84395B15	mica 500 pF 250V
C2141	08-84637L42	mylar .47 uF 10% 100V
C2142	21-80240G59	mica 1000 pF 250V
C2143		not used
C2144	21-80240G48	mica 100 pF 250V
C2145		not used
C2146	21-11032B15	.1 uF + 80/-20%
C2147		not used
C2148	21-11078B40	82 pF 100V
C2150	21-11078B44	120 pF 100V
C2151	21-11078B42	100 pF 100V
C2152	21-11031A65	1800 pF
C2153	21-11031A65	1800 pF
C2160	21-11031A65	1800 pF
C2161	21-80240G57	mica 220 pF 250V
C2162	21-80240G89	mica 360 pF 250V
C2163	21-80240G89	mica 360 pF 250V
C2165	21-80240G51	mica 130 pF 250V
C2170	23-11019A46	lytic 100 uF 20% 25V
C2171	21-11031A65	1800 pF
C2172	21-11031A65	1800 pF
C2173	08-11051A17	poly .47 uF 63V

Diodes (see note)

CR2150	48-80236E11	silicon PIN
CR2151	48-80236E11	silicon PIN
CR2170	48-80236E07	transient suppressor MR2525L

Connector, receptacle

J1 09-83228R01 mini UHF coax

Connector, plug

P4 30-80138M13 coaxial cable 145 mm with plug  
P5 30-80138M12 coaxial cable 135 mm with plug

Coils

L2110	24-80931W29	15-1/2 turns GRN
L2111	24-80063M24	8.2 uH
L2112	24-80036A01	ferrite bead 1/2 turn
L2121	24-80931W29	15-1/2 turns GRN
L2122	24-80036A01	ferrite bead 1/2 turn
L2124	24-11030B13	8-1/2 turns GRN
L2125	24-80036A01	ferrite bead 1/2 turn
L2131	24-11030E01	1/2 turn BRN
L2133	24-11030B08	4-1/2 turns BRN
L2134	24-11030B15	10-1/2 turns WHT
L2135	24-80931W23	12-1/2 turns RED
L2136	24-11030B08	4-1/2 turns BRN
L2138	24-11030E01	1/2 turn BRN
L2140		not used
L2141	24-80908T26	4-1/2 turns GRN
L2142	24-80908T42	10-1/2 turns GRN
L2143	24-80949X06	1/2 turn
L2144	24-80913W24	3-1/2 turns GRN
L2150	24-82549D41	100 uH
L2151	24-80908T37	7-1/2 turns RED
L2160	24-80908T35	6-1/2 turns RED
L2161	24-80908T30	5-1/2 turns GRN
L2162	24-80908T35	6-1/2 turns RED

Transistors (see note)

Q2110	48-00869658	NPN; type M9658
Q2120	48-00869859	NPN; type M9859

Resistors, chip, 5%, 1/8 watt, unless otherwise indicated

R2110	06-11024A39	390
R2111	06-11024A33	220
R2112	06-11024A29	150
R2113	06-11024A29	150
R2120	06-11024A01	10
R2121		not used
R2130	06-11024A01	10
R2131	06-80279M11	metal film 56 5% 3 watt
R2132	06-11024AA01	10
R2133	06-80279M08	metal film 33 5% 3 watt
R2135	06-11086A03	metal film 1 5% 1 watt
R2136	06-80279M08	metal film 33 5% 3 watt
R2140	06-11086C07	metal film 3.9 5% 2 watt
R2141	06-11086C07	metal film 3.9 5% 2 watt
R2142	06-80279M01	metal film 82 5% 3 watt
R2143	06-80279M01	metal film 82 5% 3 watt
R2150	06-11086C33	metal film 82 5% 2 watt
R2160	06-11024A73	10k
R2170	06-80147M02	metal plate .01 10% 2 watt
R2171	06-11024A03	12

Non-referenced items

04-83755H01	washer shldr (for Q2120)
26-80158L01	heat sink (for Q2120)
26-80960X01	shield harmonic filter
29-80014A01	clip coax terminal (2 used)

Note: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.

HLN9302A PA Hardware Kit (60 Watt, 29.7-36 MHz)

REFERENCE NUMBER	MOTOROLA PART NO.	DESCRIPTION
Connector, receptacle		
J2	09-80255E02	power (includes feedthru)
Transistors (see note)		
Q2130	48-80225C28	NPN; type M25C28
Q2140	48-80929U01	NPN; type M29U01
Non-referenced items		
	03-10908A21	machine screw M3x13 (2 used for Feedthru Board)
	03-10943M10	screw M3x.5x8 (8 used for pcb mounting)
	03-10943M11	screw M3x.5x10 (7 used, for Q2120,30,40 and J2)
	03-10943M57	screw M3x.5x13 blk (6 used for heatsink cover)
	04-00131974	washer (2 used for J2)
	07-80078A01	ground lug (2 used for Q2140)
	15-80902V01	heatsink cover
	26-80901V02	heatsink
	43-80943X01	spacer (secures J1)

Note: The heatsink cover (15-80902V01) and six screws (03-10943M57) are part of the HLN9411A Chassis Hardware kit. They are included here for reference only.

Note: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.

01-80701Y74 Feedthru Capacitor Board

REFERENCE NUMBER	MOTOROLA PART NO.	DESCRIPTION
Capacitor, chip, 5%, 50V unless otherwise indicated		
C2180	21-11031A65	1800 pF
C2181	21-11032B13	.1 uF +80/-20%
C2182	21-11031A65	1800 pF
C2183	21-11032B13	.1 uF +80/-20%
C2184	21-11031A65	1800 pF
C2185	21-11032B13	.1 uF +80/-20%
C2186	21-11031A65	1800 pF
C2187	21-11032B13	.1 uF +80/-20%
C2188	21-11031A65	1800 pF
C2189	21-11032B13	.1 uF +80/-20%

Connector, receptacle

J2180	28-80128M01	5-pin
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01-80701Y75 5 Wire Harness Assembly

REFERENCE NUMBER	MOTOROLA PART NO.	DESCRIPTION
Non-referenced items		
	09-80133M01	receptacle, connector (10 used)
	15-80075M01	housing, connector 5 pin (2 used, P7 and P2180)