

GENERAL

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

INSTRUCTION MANUALS AFFECTED:

68-80101W58-A Radius Two-Way Radio Service Manual — 21.04
68-80101W76-A MaxTrac Two-Way Radio Service Manual REPLACED BY 6880102W84 \$25.50

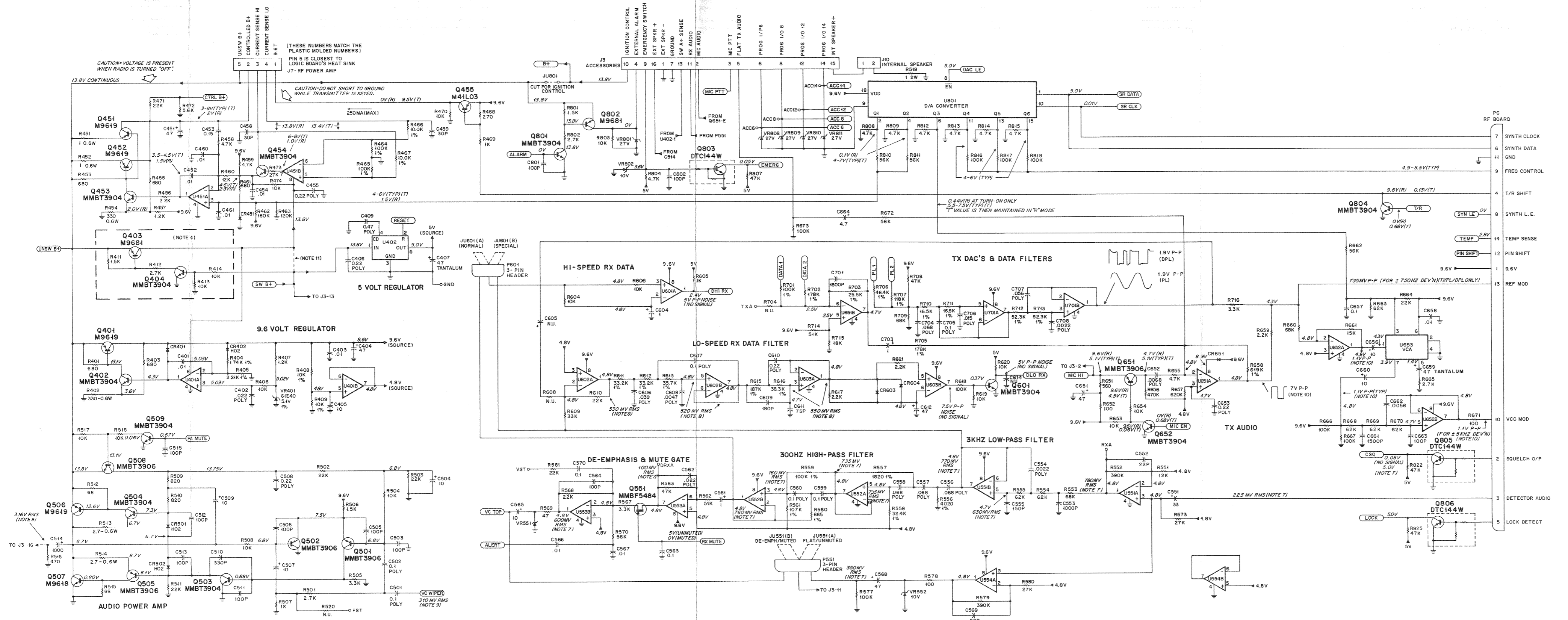
REVISION DETAILS:

This revision contains the schematic, circuit board diagrams and parts list for the HLN9313A Expanded Accessory Connector Logic Board kit.

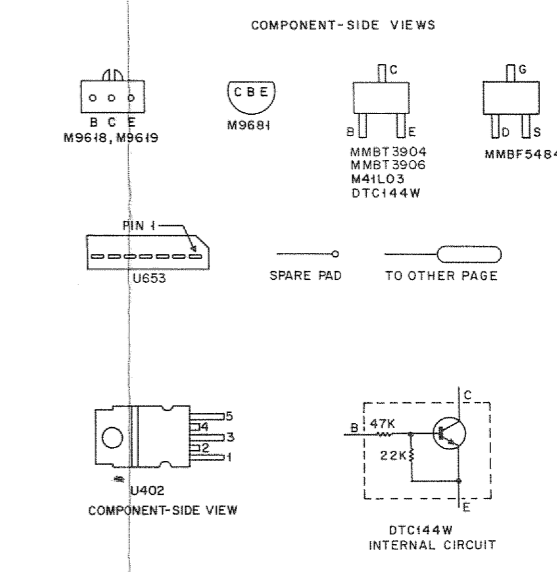
This board replaces the HLN9123A or HLN5173B Logic Board when Option B308 or when any Signaling Option is ordered. New Unified Chassis kit numbers have been assigned for chassis kits containing the HLN9313A Logic Board, as follows:

Chassis Kit	Band and Freq Range	Power Level
HUD1704A	VHF 146-174 MHz	25 Watt
HUD1709A	VHF 136-162 MHz	25 Watt
HUD3053B	VHF 146-174 MHz	High Power
HUE2068A	UHF 403-430 MHz	High Power
HUE2069A	UHF 449-470 MHz	25 Watt
HUE3052B	UHF 449-470 MHz	High Power (note 1)
HUE3052C	UHF 449-470 MHz	High Power (note 2)
HUF3137A	800 MHz Talk Around	15 Watt
HUF1042A	800 MHz Conventional	High Power

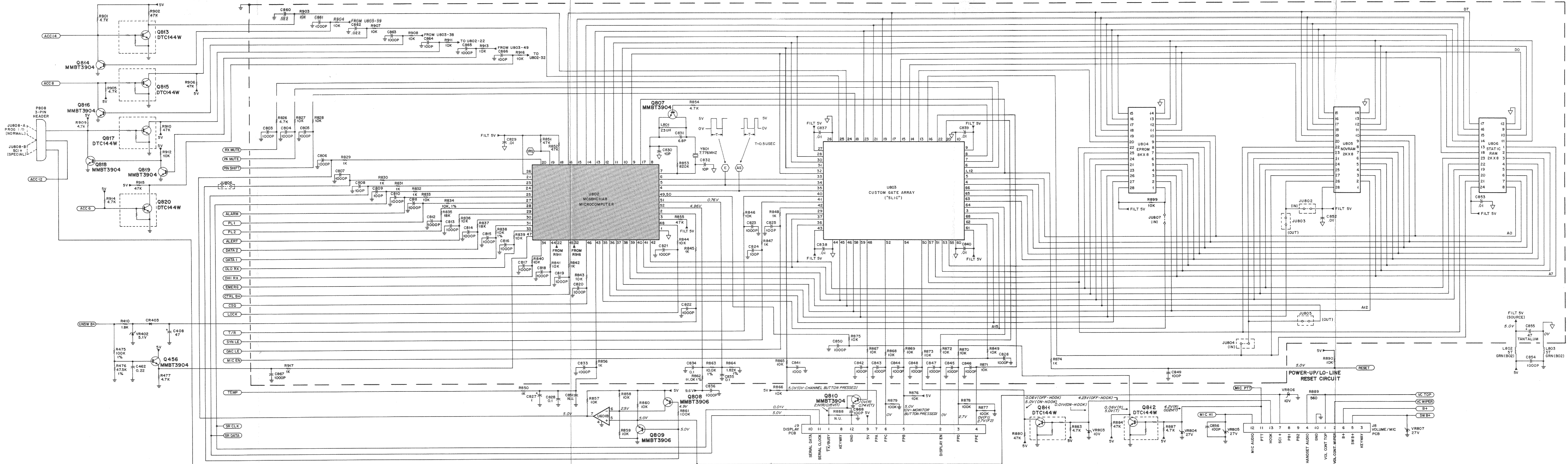
- Notes:
1. Old version RF board HLE4425B.
 2. New version RF board HLE9310A



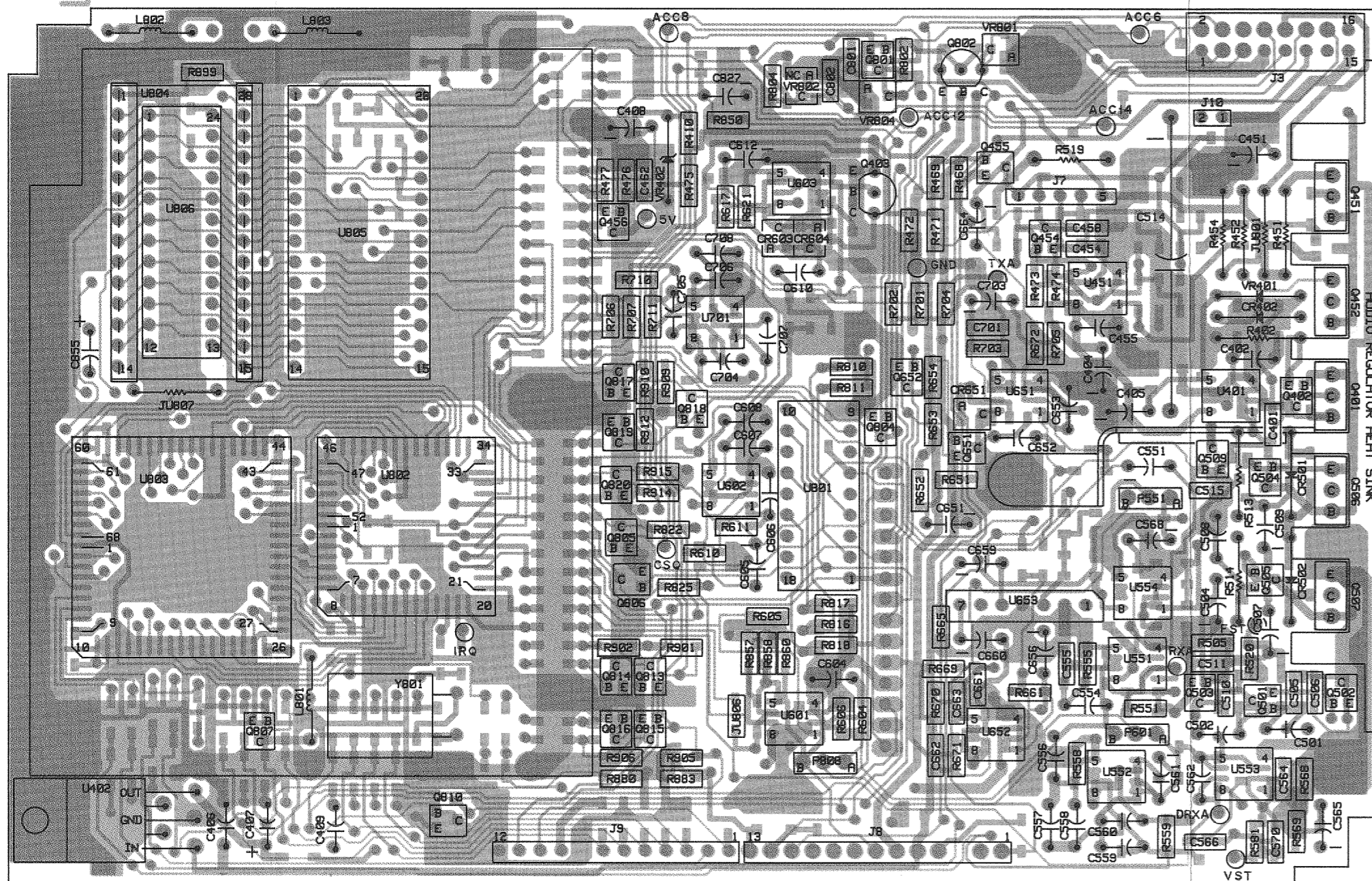
- NOTES:
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICROHENRIES.
 - NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE INDICATED.
 - POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
 - NOT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



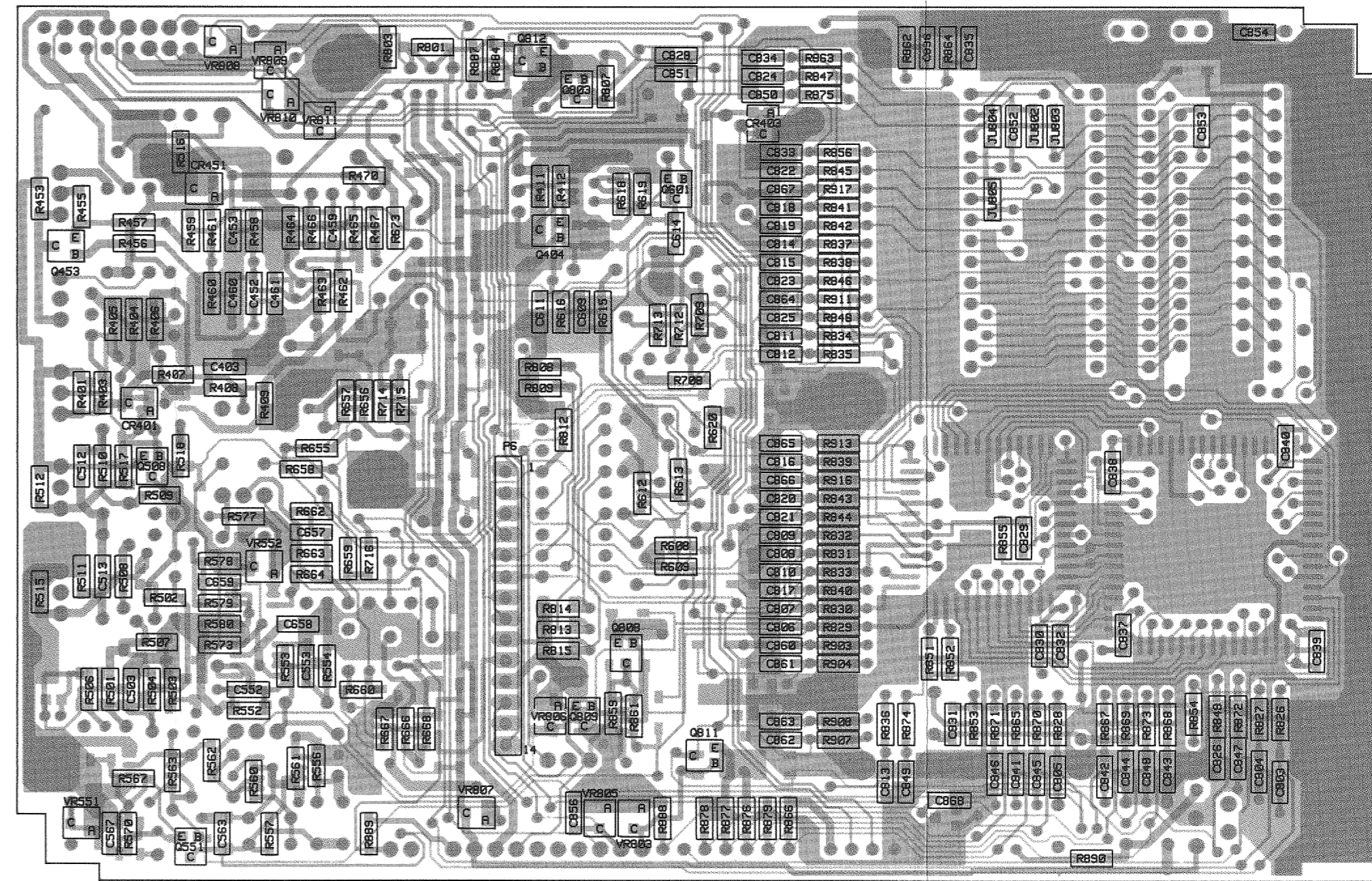
16-PIN ACCESSORY



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



COMPONENT SIDE ●
SOLDER SIDE ●
OVERLAY —



COMPONENT SIDE ●
SOLDER SIDE ●
OVERLAY —

HLN9313A Logic Board, Expanded Accessories Connector

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

C401	21-11032A21	.01 uF 10%
C402	08-11051A09	poly .022 uF 63V
C403	21-11032A21	.01 uF 10%
C404	23-11048B19	lytic 47 uF 20% 16V
C405	23-11048B13	lytic 10 uF 20% 16V
C406	08-11051A15	poly .22 uF 63V
C407	23-11013A56	tantalum 47 uF 20% 6V
C408	23-11048B19	lytic 47 uF 20% 16V
C409	08-11051A17	poly .47 uF 63V
C451	23-11048B19	lytic 47 uF 20% 16V
C452	21-11032A21	.01 uF 10%
C453	21-11032B14	.15 uF +80/-20%
C454	21-11032A21	.01 uF 10%
C455	08-11051A15	poly .22 uF 63V
C458	21-11031A26	30 pF
C459	21-11031A26	30 pF
C460	21-11032A21	.01 uF 10%
C461	21-11032A21	.01 uF 10%
C462	21-11032B15	.22 uF +80/-20%
C501	08-11051A13	poly .1 uF 63V
C502	08-11051A13	poly .1 uF 63V
C503	21-11031A39	100 pF
C504	23-11048B13	lytic 10 uF 20% 16V
C505	21-11031A39	100 pF
C506	21-11031A39	100 pF
C507	23-11013D13	tantalum 10 uF 10% 20V
C508	08-11051A15	poly .22 uF 63V
C509	23-11048B13	lytic 10 uF 20% 16V
C510	21-11031A51	330 pF
C511	21-11031A39	100 pF
C512	21-11031A39	100 pF
C513	21-11031A39	100 pF
C514	23-02308M01	lytic 1000 uF 20% 16V
C515	21-11031A39	100 pF
C551	23-11048A17	lytic 33 uF 20% 25V
C552	21-11031A23	22 pF
C553	21-11031A61	1000 pF
C554	08-11051A03	poly .0022 uF 63V
C555	21-11031A43	150 pF
C556	08-11051A12	poly .068 uF 63V
C557	08-11051A12	poly .068 uF 63V
C558	08-11051A12	poly .068 uF 63V
C559	08-11051A13	poly .1 uF 63V
C560	08-11051A13	poly .1 uF 63V
C561	23-11048B05	lytic 1 uF 20% 50V
C562	08-11051A09	poly .022 uF 63V
C563	21-11032B13	.1 uF +80/-20%
C564	21-11031A39	100 pF
C565	23-11048B13	lytic 10 uF 20% 16V
C566	21-11032A21	.01 uF 10%
C567	21-11032A21	.01 uF 10%
C568	23-11048B19	lytic 47 uF 20% 16V
C569	21-11031A23	22 pF
C570	21-11032B13	.1 uF +80/-20%
C604	23-11048B05	lytic 1 uF 20% 50V
C605		not used
C606	08-11044A22	poly .039 uF 63V
C607	08-11051A13	poly .1 uF 63V
C608	08-11051A05	poly .0047 uF 63V
C609	21-11031A45	180 pF
C610	08-11051A15	poly .22 uF 63V
C611	21-11031A36	75 pF
C612	23-11048B19	lytic 47 uF 20% 16V
C614		not used
C651	23-11048B19	lytic 47 uF 20% 16V
C652	08-11051A06	poly .0068 uF 63V
C653	08-11051A15	poly .22 uF 63V
C656	23-11048B13	lytic 10 uF 20% 16V
C657	21-11032B13	.1 uF +80/-20%
C658	21-11032A21	.01 uF 10%

C659	23-11013A56	tantalum 47 uF 20% 6V
C660	23-11048B13	lytic 10 uF 20% 50V
C661	21-11031A64	1500 pF
C662	21-11032A18	.0056 uF 10%
C663	21-11031A39	100 pF
C664	23-11048B09	lytic 4.7 uF 20% 35V
C701	21-11031A65	1800 pF
C703	23-11048B05	lytic 1 uF 20% 50V
C704	08-11051A12	poly .068 uF 63V
C705	08-11051A13	poly .1 uF 63V
C706	08-11051A08	poly .015 uF 63V
C707	08-11044A13	poly .056 uF 63V
C708	08-11051A03	poly .0022 uF 63V
C801	21-11031A39	100 pF
C802	21-11031A39	100 pF
C803	21-11031A61	1000 pF
C804	21-11031A61	1000 pF
C805	21-11031A61	1000 pF
C806	21-11031A61	1000 pF
C807	21-11031A61	1000 pF
C808	21-11031A39	100 pF
C809	21-11031A39	100 pF
C810	21-11031A61	1000 pF
C811	21-11031A61	1000 pF
C812	21-11031A61	1000 pF
C813	21-11031A61	1000 pF
C814	21-11031A61	1000 pF
C815	21-11031A61	1000 pF
C816	21-11031A61	1000 pF
C817	21-11031A61	1000 pF
C818	21-11031A61	1000 pF
C819	21-11031A61	1000 pF
C820	21-11031A61	1000 pF
C821	21-11031A61	1000 pF
C822	21-11031A61	1000 pF
C823	21-11031A61	1000 pF
C824	21-11031A39	100 pF
C825	21-11031A39	100 pF
C826	21-11031A61	1000 pF
C827	23-11048B05	lytic 1 uF 20% 50V
C828	21-11032B13	.1 uF +80/-20%
C829	21-11032A21	.01 uF 10%
C830	21-11031A15	10 +/- .5 pF
C831	21-11031A11	6.8 +/- .5 pF
C832	21-11031A15	10 +/- .5 pF
C833	21-11031A61	1000 pF
C834	21-11032B13	.1 uF +80/-20%
C835	21-11032B13	.1 uF +80/-20%
C836	21-11031A61	1000 pF
C837	21-11032A21	.01 uF 10%
C838	21-11032A21	.01 uF 10%
C839	21-11032A21	.01 uF 10%
C840	21-11032A21	.01 uF 10%
C841	21-11031A61	1000 pF
C842	21-11031A61	1000 pF
C843	21-11031A61	1000 pF
C844	21-11031A61	1000 pF
C845	21-11031A61	1000 pF
C846	21-11031A61	1000 pF
C847	21-11031A61	1000 pF
C848	21-11031A61	1000 pF
C849	21-11031A39	100 pF
C850	21-11031A61	1000 pF
C851		not used
C852	21-11032A21	.01 uF 10%
C853	21-11032A21	.01 uF 10%
C854	21-11031A61	1000 pF
C855	23-11054A09	tantalum 47 uF 20% 6V
C856	21-11031A39	100 pF
C860	21-11032A25	.022 uF 10%
C861	21-11031A61	1000 pF
C862	21-11032A25	.022 uF 10%
C863	21-11031A61	1000 pF
C864	21-11031A39	100 pF
C865	21-11031A61	1000 pF
C866	21-11031A39	100 pF
C867	21-11031A61	1000 pF
C868	21-11031A39	100 pF

Diodes (see note)

CR401	48-05129M76	silicon SOT
CR402	48-83654H02	silicon
CR403	48-05129M76	silicon SOT
CR451	48-05129M76	silicon SOT
CR501	48-83654H02	silicon
CR502	48-83654H02	silicon
CR603	48-05129M76	silicon SOT
CR604	48-05129M76	silicon SOT
CR651	48-05129M76	silicon SOT

Connectors, receptacle

J3	28-80923V01	16-pin, accessories
J7	28-80128M01	5-pin, RF power amplifier
J8/J9	28-80126M01	23-pin, includes J8 and J9
J10	28-80128M02	2-pin, internal speaker

Jumpers

JU551	09-84181L01	push-on jumper, 2-pin
JU601	09-84181L01	push-on jumper, 2-pin
JU801	06-11009B23	axial jumper
JU802	06-11024B23	chip jumper
JU803		not used
JU804	06-11024B23	chip jumper
JU805		not used
JU806	06-11024B23	chip jumper
JU807	06-11009B23	axial jumper
JU808	09-84181L01	push-on jumper, 2-pin

Coils

L801	24-82723H35	23 uH
L802	24-83961B02	5 turns GRN
L803	24-83961B02	5 turns GRN

Connector, plug

P6	28-80127M02	14-pin, RF board
P551	28-80250M01	3-pin, for JU551
P601	28-80250M01	3-pin, for JU601
P808	28-80250M01	3-pin, for JU808

Transistors (see note)

Q401	48-00869619	PNP; type M9619
Q402	48-80214G02	NPN; type MMBT3904
Q403		not used
Q404		not used
Q451	48-00869619	PNP; type M9619
Q452	48-00869619	PNP; type M9619
Q453	48-80214G02	NPN; type MMBT3904
Q454	48-80214G02	NPN; type MMBT3904
Q455	48-00869681	PNP; type M9681
Q456	48-80214G02	NPN; type MMBT3904
Q501	48-05128M16	PNP; type MMBT3906
Q502	48-05128M16	PNP; type MMBT3906
Q503	48-80214G02	NPN; type MMBT3904
Q504	48-80214G02	NPN; type MMBT3904
Q505	48-05128M16	PNP; type MMBT3906
Q506	48-00869619	PNP; type M9619
Q507	48-00869618	NPN; type M9618
Q508	48-05128M16	PNP; type MMBT3906
Q509	48-80214G02	NPN; type MMBT3904
Q551	48-80949V01	field effect; type MMBF5484
Q601	48-80214G02	NPN; type MMBT3904
Q651	48-05128M16	PNP; type MMBT3906
Q652	48-80214G02	NPN; type MMBT3904
Q801	48-80214G02	NPN; type MMBT3904
Q802	48-00869681	PNP; type M9681
Q803	48-80947V01	digital NPN; type DTC144W
Q804	48-80214G02	NPN; type MMBT3904
Q805	48-80947V01	digital NPN; type DTC144W
Q806	48-80947V01	digital NPN; type DTC144W
Q807	48-80214G02	NPN; type MMBT3904

Q808	48-05128M16	PNP; type MMBT3906
Q809	48-05128M16	PNP; type MMBT3906
Q810	48-80214G02	NPN; type MMBT3904
Q811	48-80947V01	digital NPN; type DTC144W
Q812	48-80947V01	digital NPN; type DTC144W
Q813	48-80947V01	digital NPN; type DTC144W
Q814	48-80214G02	NPN; type MMBT3904
Q815	48-80947V01	digital NPN; type DTC144W
Q816	48-80214G02	NPN; type MMBT3904
Q817	48-80947V01	digital NPN; type DTC144W
Q818	48-80214G02	NPN; type MMBT3904
Q819	48-80214G02	NPN; type MMBT3904
Q820	48-80947V01	digital NPN; type DTC144W

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

R401	06-11024A45	680
R402	06-02369M31	metal film 330 0.6 watt
R403	06-11024A45	680
R404	06-11024G18	1.74k 1%
R405	06-11024G28	2.21k 1%
R406	06-11024A73	10k
R407	06-11024A51	1.2k
R408	06-11024G91	10.0k 1%
R409	06-11024G91	10.0k 1%
R410	06-11024A55	1.8k
R411		not used
R412		not used
R413		not used
R414		not used
R451	06-02369M01	metal film 1 0.6 watt
R452	06-02369M01	metal film 1 0.6 watt
R453	06-11024A45	680
R454	06-02369M31	metal film 330 0.6 watt
R455	06-11024A45	680
R456	06-11024A57	2.2k
R457	06-11024A51	1.2k
R458	06-11024A65	4.7k
R459	06-11024A65	4.7k
R460	06-11024A75	12k
R461	06-11024A45	680
R462	06-11024B04	180k
R463	06-11024A99	120k
R464	06-11024H88	100k 1%
R465	06-11024H88	100k 1%
R466	06-11024G91	10.0k 1%
R467	06-11024G91	10.0k 1%
R468	06-11024A35	270
R469	06-11024A49	1k
R470	06-11024A73	10k
R471	06-11024A81	22k
R472	06-11024A67	5.6k
R473	06-11024A83	27k
R474	06-11024A73	10k
R475	06-11024H88	100k 1%
R476	06-11024H57	47.5k 1%
R477	06-11024A65	4.7k
R501	06-11024A59	2.7k
R502	06-11024A81	22k
R503	06-11024A81	22k
R504	06-11024A73	10k
R505	06-11024A61	3.3k
R506	06-11024A53	1.5k
R507	06-11024A49	1k
R508	06-11024A73	10k
R509	06-11024A47	820
R510	06-11024A47	820
R511	06-11024A81	22k
R512	06-11024A21	68
R513	06-02369M06	metal film 2.7 0.6 watt
R514	06-02369M06	metal film 2.7 0.6 watt
R515	06-11024A21	68
R516	06-11024A41	470
R517	06-11024A73	10k
R518	06-11024A73	10k
R519	06-80185M01	metal plate 1 2 watt
R520		not used
R551	06-11024A75	12k

R552	06-11024B12	390k	R802	06-11024A59	2.7k
R553	06-11024A93	68k	R803	06-11024A73	10k
R554	06-11024A92	62k	R804	06-11024A65	4.7k
R555	06-11024A92	62k	R807	06-11024A89	47k
R556	06-11024G53	4.02k 1%	R808	06-11024A65	4.7k
R557	06-11024G20	1.82k 1%	R809	06-11024A65	4.7k
R558	06-11024H41	32.4k 1%	R810	06-11024A91	56k
R559	06-11024H88	100k 1%	R811	06-11024A91	56k
R560	06-11024F77	665 1%	R812	06-11024A65	4.7k
R561	06-11024H91	107k 1%	R813	06-11024A65	4.7k
R562	06-11024A90	51k	R814	06-11024A65	4.7k
R563	06-11024A89	47k	R815	06-11024A65	4.7k
R567	06-11024A61	3.3k	R816	06-11024A97	100k
R568	06-11024A81	22k	R817	06-11024A97	100k
R569	06-11024A17	47	R818	06-11024A97	100k
R570	06-11024A91	56k	R822	06-11024A89	47k
R573	06-11024A83	27k	R825	06-11024A89	47k
R577	06-11024A97	100k	R826	06-11024A65	4.7k
R578	06-11024A25	100	R827	06-11024A73	10k
R579	06-11024B12	390k	R828	06-11024A73	10k
R580	06-11024A83	27k	R829	06-11024A49	1k
R581	06-11024A81	22k	R830	06-11024A49	1k
R604	06-11024A73	10k	R831	06-11024A49	1k
R605	06-11024A49	1k	R832	06-11024A49	1k
R606	06-11024A73	10k	R833	06-11024A73	10k
R608		not used	R834	06-11024G91	10.0k 1%
R609	06-11024A85	33k	R835	06-11024A79	18k
R610	06-11024A81	22k	R836	06-11024A73	10k
R611	06-11024H42	33.2k 1%	R837	06-11024A79	18k
R612	06-11024H42	33.2k 1%	R838	06-11024G91	10.0k 1%
R613	06-11024H45	35.7k 1%	R839	06-11024A73	10k
R615	06-11024J15	187k 1%	R840	06-11024A73	10k
R616	06-11024H48	38.3k 1%	R841	06-11024A73	10k
R617	06-11024A57	2.2k	R842	06-11024A49	1k
R618	06-11024A97	100k	R843	06-11024A73	10k
R619	06-11024A73	10k	R844	06-11024A73	10k
R620	06-11024A73	10k	R845	06-11024A49	1k
R621	06-11024A57	2.2k	R846	06-11024A73	10k
R651	06-11024A43	560	R847	06-11024A49	1k
R652	06-11024A25	100	R848	06-11024A49	1k
R653	06-11024A73	10k	R849	06-11024A73	10k
R654	06-11024A73	10k	R850	06-11024A49	1k
R655	06-11024A65	4.7k	R851	06-11024A89	47k
R656	06-11024B14	470k	R852	06-11024A89	47k
R657	06-11024B17	620k	R853	06-11024B20	820k
R658	06-11024J65	619k 1%	R854	06-11024A65	4.7k
R659	06-11024A57	2.2k	R855	06-11024A89	47k
R660	06-11024A93	68k	R856	06-11024A49	1k
R661	06-11024A77	15k	R857	06-11024A73	10k
R662	06-11024A91	56k	R858	06-11024A73	10k
R663	06-11024A92	62k	R859	06-11024A73	10k
R664	06-11024A81	22k	R860	06-11024A73	10k
R665	06-11024A59	2.7k	R861	06-11024A97	100k
R666	06-11024A97	100k	R862	06-11024G95	11.0k 1%
R667	06-11024A97	100k	R863	06-11024G91	10.0k 1%
R668	06-11024A92	62k	R864	06-11024G20	1.82k 1%
R669	06-11024A92	62k	R865	06-11024A73	10k
R670	06-11024A92	62k	R866	06-11024A73	10k
R671	06-11024A25	100	R867	06-11024A73	10k
R672	06-11024A91	56k	R868	06-11024A73	10k
R673	06-11024A97	100k	R869	06-11024A73	10k
R701	06-11024H88	100k 1%	R870	06-11024A73	10k
R702	06-11024J13	178k 1%	R871	06-11024A73	10k
R703	06-11024H31	25.5k 1%	R872	06-11024A73	10k
R704		not used	R873	06-11024A73	10k
R705	06-11024J13	178k 1%	R874	06-11024A49	1k
R706	06-11024H56	46.4k 1%	R875	06-11024A73	10k
R707	06-11024H95	118k 1%	R876	06-11024A73	10k
R708	06-11024A89	47k	R877	06-11024A97	100k
R709	06-11024A93	68k	R878	06-11024A97	100k
R710	06-11024H13	16.5k 1%	R879	06-11024A97	100k
R711	06-11024H13	16.5k 1%	R880	06-11024A89	47k
R712	06-11024H61	52.3k 1%	R883	06-11024A65	4.7k
R713	06-11024h61	52.3k 1%	R884	06-11024A89	47k
R714	06-11024A90	51k	R887	06-11024A65	4.7k
R715	06-11024A79	18k	R888		not used
R716	06-11024A61	3.3k	R889	06-11024A43	560
R801	06-11024A53	1.5k	R890	06-11024A73	10k

R899	06-11024A73	10k
R901	06-11024A65	4.7k
R902	06-11024A89	47k
R903	06-11024A73	10k
R904	06-11024A73	10k
R905	06-11024A65	4.7k
R906	06-11024A89	47k
R907	06-11024A73	10k
R908	06-11024A73	10k
R909	06-11024A65	4.7k
R910	06-11024A89	47k
R911	06-11024A73	10k
R912	06-11024A73	10k
R913	06-11024A73	10k
R914	06-11024A65	4.7k
R915	06-11024A89	47k
R916	06-11024A73	10k
R917	06-11024A49	1k

Integrated Circuits (see note)

U401	51-80056M04	dual op-amp SOIC
U402	51-80942T01	regulator, 5V with reset
U451	51-80056M04	dual op-amp SOIC
U551	51-80056M04	dual op-amp SOIC
U552	51-80056M04	dual op-amp SOIC
U553	51-80056M04	dual op-amp SOIC
U554	51-80056M04	dual op-amp SOIC
U601	51-80056M01	dual comparator SOIC
U602	51-80056M04	dual op-amp SOIC
U603	51-80056M04	dual op-amp SOIC
U651	51-80056M04	dual op-amp SOIC
U652	51-80056M04	dual op-amp SOIC
U653	51-80059M01	voltage-controlled attn
U701	51-80056M04	dual op-amp SOIC
U801	51-80135C10	D/A converter
U802	51-80960T01	microcomputer MC68HC11A8
U803	51-82862N09	logic array
U804		contained in ROM kit
U805		not used
U806	51-80914V01	RAM 2Kx8

Voltage Regulators, 5% unless otherwise specified

VR401	48-83461E40	zener diode 5.1V 1%
VR402	48-82256C15	zener diode 5.1V
VR551	48-80140L15	zener diode 10V SOT
VR552	48-80140L15	zener diode 10V SOT
VR801	48-80948V01	zener diode 27V SOT
VR802	48-80140L15	zener diode 10V SOT
VR803	48-80140L15	zener diode 10V SOT
VR804	48-80948V01	zener diode 27V SOT
VR805	48-80948V01	zener diode 27V SOT
VR806	48-80140L15	zener diode 10V SOT
VR807	48-80948V01	zener diode 27V SOT
VR808	48-80948V01	zener diode 27V SOT
VR809	48-80948V01	zener diode 27V SOT
VR810	48-80948V01	zener diode 27V SOT
VR811	48-80948V01	zener diode 27V SOT

Crystals

Y801	48-80173D09	7.776 MHz
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Non-Referenced Items

03-10943M04	screw M2.5x.45x8 (5 used)
04-00001718	washer (4 used)
07-80925T01	bracket, heat sink
09-82071K09	14 pin socket (2 used for U804)
14-83820M05	insulator TO-118 (5 used)
01-80701Y58	plastic housing 16 pin with int spkr jumper (for J3)
26-80123M02	shield frame hi-speed logic
26-80125L02	heat sink, audio/regulator

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