



MaxTrac Two-Way FM Radio

Note: Revisions WMR-0447, WMR-0462, FMR-1626-1, and FMR-1725-1 have been incorporated.

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Safe Handling of CMOS Integrated-Circuit Devices

Many of the integrated-circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open-circuit impedance, CMOS IC's are vulnerable to damage from static charges. Everyone involved in handling, shipping, and servicing them must be extremely careful not to expose them to such damage.

CMOS IC's do have internal protection, but it is effective only against overvoltages in the hundreds of volts, such as those that could occur during normal operations. Overvoltages from static discharge can be in the thousands of volts.

When a CMOS IC is installed in a system, the system's circuit elements distribute static charges and load the CMOS circuits. This decreases the vulnerability of the IC's to static discharge, but improper handling will probably cause static damage even when the IC's are so installed.

To avoid damaging CMOS IC's, take the following precautions when handling, shipping, and servicing them.

1. Before touching a circuit module, particularly after having moved around in the service area, touch both hands to a bare metal earth—grounded surface. This discharges any static charge you may have accumulated.

Note

Wear a conductive wrist strap (Motorola Part No. RSX-4015A) to minimize the buildup of static charges on your person while you are servicing CMOS equipment.

WARNING

When wearing a conductive wrist strap, be careful near sources of high voltage. By grounding you thoroughly, the wrist strap also increases the danger of lethal shock from accidental contact with such a source.

- 2. Whenever possible, avoid touching any electrically conductive parts of the circuit module with your hands.
- 3. Check the INSTALLATION and MAINTENANCE sections of the service manual and the notes on the schematic to

find out whether or not you can insert or remove circuit modules with power applied to the unit, and act accordingly.

- 4. When servicing a circuit module, avoid carpeted areas, dry environments, and the wearing of static—generating clothing.
- 5. Be sure that all electrically powered test equipment is grounded. Attach the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe before removing the ground lead.
- 6. When you remove a circuit module from the system, lay it on a sheet of aluminum foil or other conductive surface connected to ground through 100,000 ohms of resistance.

WARNING

If the aluminum foil is connected directly to ground, you may get a shock if you touch it and another electrical circuit at the same time.

- 7. When soldering, be sure the soldering iron is grounded.
- 8. Before connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary during the replacement of an integrated—circuit device), be sure to discharge any static buildup on your person (see Procedure 1, above). Because you can have a voltage difference across your body, you should use only one hand if you must touch the board wiring or any of the pins on the CMOS device.
- 9. When replacing a CMOS integrated—circuit device, leave the device in its metal rail container or conductive foam until you are ready to insert it into the pronged circuit module.
- 10. Connect any low-impedance test equipment such as a pulse generator to CMOS device inputs after you have applied power to the CMOS circuitry. Similarly, disconnect such low-impedance equipment before turning off the power.
- 11. Wrap CMOS modules in conductive material when transporting them from one area to another, even within the same room. Use wrapping material similar to that in which replacement modules are wrapped when they arrive from the factory. (You can also use aluminum foil.) Never use nonconductive material for packaging these modules.

Model Chart for Front Panel For MaxTrac Radios

CODE:

FRONT PANEL, 2 FREQUENCY
FRONT PANEL, 6 FREQUENCY
FRONT PANEL, 6 FREQUENCY

DESCRIPTION
FRONT PANEL, 2 FREQUENCY

FRONT PANEL, 16 FREQUENCY FRONT PANEL, 32 FREQUENCY

= ONE ITEM SUPPLIED

	HCN1048A	HCN3293A	HCN1049A	HCN3292A	HCN1043A	HCN3217A		
					_		ITEM	DESCRIPTION
	•	•					HLN5174A	DISPLAY BOARD, 2 FREQUENCY
			•	•	•	•	HLN5175A	DISPLAY BOARD, 6/16/32 FREQUENCY
	•	•	•	•	•	•	HLN5184A	SWITCH BOARD
	•						HLN5273A	FRONT PANEL HARDWARE, 2 FREQUENCY
L		•					HLN9731A	FRONT PANEL HARDWARE, 2 FREQUENCY
			•				HLN5311A	FRONT PANEL HARDWARE, 6 FREQUENCY
1				•			HLN9730A	FRONT PANEL HARDWARE, 6 FREQUENCY
l					•		HLN5186A	FRONT PANEL HARDWARE, 16 FREQUENCY
		_				•	HLN9584A	FRONT PANEL HARDWARE, 32 FREQUENCY

Model Chart for MaxTrac **Low Band Mobile Radio 60 Watt RF Power** 29.7-50 MHz

CODE:

DESCRIPTION
MAXTRAC 100 2 FREQUENCY
MAXTRAC 300 6 FREQUENCY

MAXTRAC 300 16 FREQUENCY MAXTRAC 300 32 FREQUENCY

ONE ITEM SUPPLIED
 BREAKDOWN IN A SEPARATE CHART

10	1 3	3	3	3		İ	ONE ITEM SUPPLIED
1	¥	¥	¥	¥			
l	88	× 3	8	8	ĺ	Ī	
یے ا	\$	₩	8	8			
MODEL	D51MJA93A5AK	D51MJA97A3AK	D51MJA9DA5AK	D51MGA93A5AK			
3	٦	۵	ă	ä			
	H	-	~	_	_	ITEM	DESCRIPTION
ı	12	Ø	Ø	Ø	<u> </u>		SUPER UNIFIED CHASSIS
1	Ø	<u> </u>			<u> </u>	HCN1048A	FRONT PANEL 2 FREQUENCY
	Ø	_			_	OR HCN3293A	FRONT PANEL 2 FREQUENCY
l	<u> </u>	Ø			_	HCN1049A	FRONT PANEL 6 FREQUENCY
	L	Ø			L.	OR HCN3292A	FRONT PANEL 6 FREQUENCY
	L		Ø		<u> </u>	HCN1043A	FRONT PANEL 16 FREQUENCY
İ				Ø		HLN3217A	FRONT PANEL 32 FREQUENCY
l	•	•	•	•		HHN4029A	HOUSING
	•	•	•	•		HKN4191B	POWER CABLE KIT
	•					HLN5283A	NAMEPLATE 100
l		•	•	•		HLN5284A	NAMEPLATE 300
	•					HLN5289A	ESCUTCHEON 2 FREQUENCY
		•				HLN9063A	ESCUTCHEON 6 FREQUENCY
			•	•		HLN5191A	ESCUTC: JEON 16 FREQUENCY
	•	•	•	•		HLN9073A	MICROPHONE HANG-UP CLIP
	•	•	•]		HLN9333A	ROM KIT
				•		HLN9333B	ROM KIT 32 CHANNEL
1	•	•	•	•		HLN9404A	INSTALLATION KIT
	•	•	•	•		HLN9583A	HP SHIELD KIT
	•	•	•	•		HMN1056C	MICROPHONE
	•	•	•	•		HLN1245A	MICROPHONE (ELECTRICAL)
	•	•	•	•		HLN5307A	MICROPHONE HOUSING
	•	•	•	•		HLN5308B	RADIUS MICROPHONE WITH LIGHT KIT
	•	•	•	•		HLN9559A	COMPACT MICROPHONE COIL CORD
	•	•	•	•	╗	HLN9563A	INSTALLATION HARDWARE
	•	•	•	•	┪	HAB9405A	ANTENNA 1/4 WAVE 29.7-36.0 MHz
	•	•	•	•	7	HAB9406A	ANTENNA 1/4 WAVE 36.0-42.0 MHz
	•	•	•	•	寸	HAB9407A	ANTENNA 1/4 WAVE 42.0-50.0 MHz
	•	•	•	•	7	HBN9403A	PACKING KIT
	1	7	+	+	1		· restance (III
_	_	_			_		

DESCRIPTION	UNIFIED CHASSIS (SUPER) 29.7-36.0 MHz	UNIFIED CHASSIS (SUPER) 36.0-42.0 MHz	UNIFIED CHASSIS (SUPER) 42:0-50:0 MHz	UNIFIED CHASSIS (SUPER) 29.7-36.0 MHz	UNIFIED CHASSIS (SUPER) 36.0-42.0 MHz	UNIFIED CHASSIS (SUPER) 42.0-50.0 MHz	Low E 60 U	Chart for <i>MaxTrac</i> Band Mobile Radio Watt RF Power nified Chassis 29.7–50 MHz
MODEL	HUB3170A	HUB3171A	HUB3172A	HUB3173A	HUB3174A	HUB3175A		
ļ		_					ITEM DE	SCRIPTION
	•						HUB1093A UN	NIFIED CHASSIS 29.7–36.0 MHz
				•				NIFIED CHASSIS 29.7-36.0 MHz
		•					HUB1094A UN	NIFIED CHASSIS 36.0-42.0 MHz
ı					•		HUB1097A UN	NIFIED CHASSIS 36.0-42.0 MHz
ŀ		_	•					VIFIED CHASSIS 42.0-50.0 MHz
ŀ		_				•	HUB1098A UN	NIFIED CHASSIS 42.0-50.0 MHz
ŀ	•	•	•	_			HLN5172A LC	OGIC BOARD
ŀ				•	•	•		OGIC BOARD, OPTIONS CONNECTOR /6 PIN
ŀ	•	•	•	•	•	•		HASSIS HARDWARE
ŀ	•	_		•	_	\dashv		BOARD
ŀ		•			•			BOARD
-	_		•			•		BOARD
1	•			•	_	-		TANAPA
-	_	•	_		•	_		TANAPA
ŀ	_		•	_		•		TANAPA
- [•			•			HLB4105A PA	BOARD
-		•			•	-1		BOARD
-	_		•			•	HLB4107A PA	BOARD
		•		•	•		HLN9302A PA	BOARD HARDWARE

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HLN9411A

PA HARDWARE

Model Chart for VHF MaxTrac LPI Mobile Radio 2 Watts RF Power 146-174 MHz

CODE:

MAXTRAC LPI-300, 6 FREQUENCY
MAXTRAC LPI-300, 16 FREQUENCY

MAXTRAC LPI-50, 2 FREQUENCY

MAXTRAC LPI-300, 32 FREQUENCY

- = ONE ITEM SUPPLIED
 = BREAKDOWN IN A SEPARATE CHART

MODEL	D03MJ/	DO3MJ/	D03MJ/	D03MJ/			
-	_		_		ITEM	DESCRIPTION	
	Ø	Ø	Ø		HUD3198A	UNIFIED CHASSIS	
				Ø	HUD3204A	UNIFIED CHASSIS, EXPANDED OPTION CONNECTOR	16 PIN
	Ø				HCN1048A	FRONT PANEL, 2 FREQUENCY	
	Ø				OR HCN3293A	FRONT PANEL, 2 FREQUENCY	
		Ø			HCN1049A	FRONT PANEL, 6 FREQUENCY	
		Ø			OR HCN3292A	FRONT PANEL, 6 FREQUENCY	
			Ø		HCN1043A	FRONT PANEL, 16 FREQUENCY	
			Ø	Ø	OR HCN3217A	FRONT PANEL, 32 FREQUENCY	
	•	•			HHN9370A	HOUSING, TWO LAYER	
			•	•	HHN4029A	HOUSING	
	•	•	•	•	HKN4137A	MOBILE POWER CABLE	
	•	•	•	•	HLN5189A	INSTALLATION KIT	
	•				HLN5289A	ESCUTCHEON, 2 FREQUENCY	
		•			HLN9063A	ESCUTCHEON, 6 FREQUENCY	
			•	•	HLN5191A	ESCUTCHEON, 16/32 FREQUENCY	
	•	•	•	•	HLN9073A	HANG-UP CLIP	
	•	•	•	•	HLN9277A	ROM KIT	
				•	HLN9333B	ROM KIT, 32 CHANNEL	
	•				HLN9521A	NAMEPLATE, LPI-50	
		•	•	•	HLN9522A	NAMEPLATE, LPI-300	
	•	•	•	•	HMN1056C	MICROPHONE	
	•	•	•	•	HLN1245A	MICROPHONE (ELECTRICAL)	
	•	•	•	•	HLN5307A	MICROPHONE HOUSING	
	•	•	•		HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT	
	•	•	•		HLN9559A	COMPACT MICROPHONE COIL CORD	
	•	•	•	•	HLN9563A	INSTALLATION HARDWARE	
	•	•	•	•	HAD4007A	ANTENNA, ROOF TOP (144-150.8 MHz)	
	•	•	•	•	HAD4008A	ANTENNA, ROOF TOP (150.8–162 MHz)	
	•	•	•	•	HAD4009A	ANTENNA, ROOF TOP (162–176 MHz)	
	•	•	•	•	HBN4040A	PACKING KIT	
				•	HAD4006A	ANTENNA, ROOF TOP (136–144.0 MHz)	
						· · · · · · · · · · · · · · · · · · ·	

DESCRIPTION	UNIFIED CHASSIS	UNIFIED CHASSIS, EXPANDED OPTION CONNECTOR		Model Chart for axTrac LPI Mobile Rad Chassis 2 Watt RF Pout 146–174 MHz	
ی ا	HUD3198A	HUD3204A			
MODEL	₹	⊋	ITEM	DESCRIPTION	
MODE	₹	₽	ITEM HLD3195A	DESCRIPTION PA TANAPA	
MODE	●	⊕	HLD3195A		
MODE	∃	₽	HLD3195A	PA TANAPA	
MODE	H • •	₽ • • • • • • • • • • • • • • • • • • •	HLD3195A HLD9523A	PA TANAPA PA BOARD	
MODE	→ • • • •	₽ • • • • • • • • • • • • • • • • • • •	HLD3195A HLD9523A HLN9524A	PA TANAPA PA BOARD PA HARDWARE	
MODE	H • • • •	⊕ • •	HLD3195A HLD9523A HLN9524A HLN9105A	PA TANAPA PA BOARD PA HARDWARE CHASSIS HARDWARE	16 PIN

									•
	DESCRIPTION	MAXTRAC 50 2 FREQUENCY (CSQ)	MAXTRAC 50 2 FREQUENCY (PL/DPL/CSQ)	MAXTRAC 100 2 FREQUENCY	MAXTRAC 300 6 FREQUENCY	MAXTRAC 300 16 FREQUENCY	MAXTRAC 300 32 FREQUENCY	CODE:	Model Chart for Trac VHF Mobile Radio 25—Watt RF Power 136—174 MHz
	MODEL	D33MJA1304BK	D33MJA7304BK	D33MJA73A5CK	D33MJA77A3CK	D33MJA7DA5CK	D33MJA7JA5AK		
ı	ŀ	_	_				\Box	ITEM	DESCRIPTION
l	ŀ	8	8	_	⊗	8	\otimes		UNIFIED CHASSIS
l	- 1	8	8	8				HCN1048A	FRONT PANEL 2 FREQUENCY
l	ŀ	⊗	8	⊗	0			OR HCN3293A	FRONT PANEL 2 FREQUENCY
l	ł				⊗ ⊗		Н	HCN1049A	FRONT PANEL & FREQUENCY
١	ŀ	_	_		Ø	8	Н	OR HCN3292A HCN1043A	FRONT PANEL 6 FREQUENCY FRONT PANEL 16 FREQUENCY
	ı					8	8	OR HCN3217A	FRONT PANEL 16 FREQUENCY FRONT PANEL 32 FREQUENCY
l	ŀ					⊗	•	HHN4029A	HOUSING
	ŀ	•	•	•				HHN9370A	HOUSING
	ŀ	•	•	•	•	•		HKN4137A	POWER CABLE KIT
	ł	•	•	-	Ť	Ť	Ĥ	HLN9138A	NAMEPLATE 50
	ŀ	-	_	•			H	HLN5283A	NAMEPLATE 100
	ı				•	•	•	HLN5284A	NAMEPLATE 300
	İ	•	•	•				HLN5289A	ESCUTCHEON 2 FREQUENCY
	ı				•			HLN9063A	ESCUTCHEON 6 FREQUENCY
	ı					•	•	HLN5191A	ESCUTCHEON 16 FREQUENCY
	İ	•	•	•	•	•	•	HLN9073A	MICROPHONE HANG-UP CLIP
	1	•	•	•	•	•	•	HLN5189A	INSTALLATION
		•	•	•	•	•	•	HMN1056C	MICROPHONE
		•	•	•	•	•	•	HLN1245A	MICROPHONE (ELECTRICAL)
	ſ	•	•	•	•	•	•	HLN5307A	MICROPHONE HOUSING
		•	•	•	•	•	•	HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT
1	- 1								

COMPACT MICROPHONE COIL CORD

INSTALLATION HARDWARE

ANTENNA, ROOF TOP 136-144 MHz
ANTENNA, ROOF TOP 144-150.8 MHz

ANTENNA, ROOF TOP 150.8-162 MHz

ANTENNA, ROOF TOP 162-174 MHz

PACKING KIT

ROM KIT, 32 CHANNEL

ROM KIT

HLN9559A HLN9563A

HAD4006A

HAD4007A

HAD4008A HAD4009A

HBN4040A

HLN9277A

HLN9333B

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UNIFIED CHASSIS, 136-172 MHz (B310 OPTION) UNIFIED CHASSIS, 136-162 MHz (B310 OPTION) **Model Chart for** UNIFIED CHASSIS, 146-174 MHz **MaxTrac VHF Mobile Radio** 25-Watt RF Power Unified Chassis 136-162 MHz (Range 1) 146-174 MHz (Range 2) CODE: ● = ONE ITEM SUPPLIED HUD1703A HUD1706B HUD1705B HUD1704A ITEM DESCRIPTION HLN9123A LOGIC BOARD (MASKED) • HLN5173B LOGIC BOARD (EXPANDED) HLN9313A LOGIC BOARD, OPTIONS CONNECTOR • • • HLN9105A CHASSIS HARDWARE HLN5188A MAIN BOARD HARDWARE HLD4322B RF BOARD 146--174 MHz HLD4321B RF BOARD 136-162 MHz • HLD3009A PA TANAPA 146-174 MHz HLD1615A PA TANAPA 136~162 MHz HLD4324A PA BOARD 146-174 MHz HLD4323A PA BOARD 136-162 MHz • • • HLN5183A PA BOARD HARDWARE

MODEL	DESCRIPTION
D43MJA7304BK	MAXTRAC 50 2 FREQUENCY, 40 WATT
D43MJA73A5CK	MAXTRAC 100 2 FREQUENCY, 40 WATT
D43MJA77A3CK	MAXTRAC 300 6 FREQUENCY, 40 WATT
D43MJA7DA5CK	MAXTRAC 300 16 FREQUENCY, 50 WATT
D43MJA7JA5AK	MAXTRAC 300 32 FREQUENCY, 45 WATT

Model Chart for MaxTrac VHF Mobile Radio 40–50 Watt RF Power 146–174 MHz

CODE:

ONE ITEM SUPPLIED
 BREAKDOWN IN A SEPARATE CHART

Ž۱	å	ă	ă	ă	à		
						ITEM	DESCRIPTION
ſ	Ø	Ø	Ø	Ø	Ø		UNIFIED CHASSIS
	Ø	Ø				HCN1048A	FRONT PANEL 2 FREQUENCY
	Ø	Ø				OR HCN3293A	FRONT PANEL 2 FREQUENCY
			Ø			HCN1049A	FRONT PANEL 6 FREQUENCY
			Ø			OR HCN3292A	FRONT PANEL 6 FREQUENCY
				Ø		HCN1043A	FRONT PANEL 16 FREQUENCY
				Ø	Ø	HCN3217A	FRONT PANEL 32 FREQUENCY
١				•	•	HHN4029A	HOUSING
-	•	•	•			HH N 9370A	HOUSING
ı	•	•	•	•	•	HKN4137A	POWER CABLE KIT
	•					HLN9138A	NAMEPLATE 50
١		•				HLN5283A	NAMEPLATE 100
			•	•	•	HLN5284A	NAMEPLATE 300
	•	•		<u> </u>		HLN5289A	ESCUTCHEON 2 FREQUENCY
			•			HLN9063A	ESCUTCHEON 6 FREQUENCY
				•	•	HLN5191A	ESCUTCHEON 16 FREQUENCY
	•	•	•	•	•	HLN9073A	MICROPHONE HANG-UP CLIP
	•	•	•	•	•	HLN5189A	INSTALLATION HARDWARE
	•	•	•	•	•	HMN1056C	MICROPHONE
	•	•	•	•	•	HLN1245A	MICROPHONE (ELECTRICAL)
	•	•	•	•	•	HLN5307A	MICROPHONE HOUSING
	•	•	•	•	•	HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT
	•	•	•	•	•	HLN9559A	COMPACT MICROPHONE COIL CORD
	•	•	•	•	•	HLN9563A	INSTALLATION HARDWARE
		•	•	•	•	HAD4006A	ANTENNA, ROOF TOP 136-144 MHz
	•	•	•	•	•	HAD4007A	ANTENNA, ROOF TOP 144-150.8 MHz
	•	•	•	•	•	HAD4008A	ANTENNA, ROOF TOP 150.8–162 MHz
	•	•	•	•	•	HAD4009A	ANTENNA, ROOF TOP 162-174 MHz
	•	•	•	•	•	HBN4040A	PACKING KIT
				•		HLN9277A	ROM KIT
					•	HLN9333B	ROM KIT 32 CHANNEL

Model Chart for MaxTrac VHF Mobile Radio UNIFIED CHASSIS, 40 WATT UNIFIED CHASSIS, 50 WATT 40-50 Watt RF Power Unified Chassis 146-174 MHz CODE: = ONE ITEM SUPPLIED HUD1710B HUD1707A ITEM DESCRIPTION HLN9123A LOGIC BOARD (MASKED) • HLN5173B LOGIC BOARD (EXPANDED) LOGIC BOARD, OPTIONS CONNECTOR HLN9313A • HLN9105A CHASSIS HARDWARE HLN5188A MAIN BOARD HARDWARE RF BOARD

PA TANAPA

PA BOARD

PA BOARD HARDWARE

HLD4322B HLD3010A

HLD4326A

HLN9071A

•

CODE:

MAXTRAC LPI-300, 16 FREQUENCY MAXTRAC LPI-300, 32 FREQUENCY

MAXTRAC LPI-300, 16 FREQUENCY MAXTRAC LPI-300, 6 FREQUENCY MAXTRAC LPI-300, 6 FREQUENCY MAXTRAC LPI-50, 2 FREQUENCY MAXTRAC LPI-50, 2 FREQUENCY

DESCRIPTION

MODEL	D04MJA7304AK A	D04MJA7304BK A	D04MJA77A3AK A	D04MJA77A3BK A	D04MJA7DA5AK A	D04MJA7DA5BK A	D04MJA7JA5AK A			EITEM SUPPLIED AKDOWN IN A SEPARATE CHART
									ITEM	DESCRIPTION
	Ø		Ø		Ø				HUE3197A	UNIFIED CHASSIS
		Ø		Ø		Ø			HUE3197B	UNIFIED CHASSIS
							Ø		HUE3203B	UNIFIED CHASSIS, EXPANDED
	_	Ø							HCN1048A	FRONT PANEL, 2 FREQUENCY
	Ø	Ø							OR HCN3293A	FRONT PANEL, 2 FREQUENCY
			_	Ø				77-17-1-18	HCN1049A	FRONT PANEL, 6 FREQUENCY
			Ø	Ø					OR HCN3292A	FRONT PANEL, 6 FREQUENCY
					Ø		Ø		HCN1043A	FRONT PANEL, 16 FREQUENCY
						Ø	Ø		OR HCN3217A	FRONT PANEL, 16/32 FREQUENCY
	•	•	•	•	•	•	•		HKN4137A	POWER CABLE KIT
	•	•	•	•	•	•	•		HLN5189A	INSTALLATION HARDWARE KIT
	•	•	•	•	•	•	•		HAE4003A	ANTENNA
	•	•	•	•	•	•	•		HBN4040A	PACKING KIT
					•	•	•		HHN4029A	HOUSING KIT
	•	•	•	•					HHN9370A	HOUSING, TWO LAYER
	•	•							HLN5289A	ESCUTCHEON, 2 FREQUENCY
			•	•					HLN9063A	ESCUTCHEON, 6 FREQUENCY
					•	•	•		HLN5191A	ESCUTCHEON, 16/32 FREQUENCY
	•	•	•	•	•	•	•		HLN9073A	HANG-UP CLIP
	•	•	•	•	•	•	•		HMN1056C	MICROPHONE, COMPACT
	•	•	•	•	•	•	•		HLN1245A	MICROPHONE
	•	•	•	•	•	•	•		HLN5307A	MICROPHONE HOUSING
	•	•	•	•	•	•	•		HLN5308B	MICROPHONE WITH LIGHT KIT
	•	•	•	•	•	•	•		HLN9563A	INSTALLATION HARDWARE
	•	•	•	•	•	•	•		HLN9559A	COILED CORD
	•	•							HLN9521A	NAMEPLATE – 50
			•	•	•	•	•		HLN9522A	NAMEPLATE – 300
ļ	•	•	•	•	•	•			HLN9277A	ROM KIT
							•		HLN9333B	ROM KIT 32 CHANNEL

Model Chart for MaxTrac UHF LPI Mobile Radio 2 Watt RF Power Unified Chassis 449–470 MHz

CODE:

UNIFIED CHASSIS
UNIFIED CHASSIS, EXPANDED

ONE ITEM SUPPLIED

	HUE	HUE	ITEM	DESCRIPTION
•	•	•	HLE3192A	PA ASSEMBLY
•	•	•	HLE9502A	PA BOARD
•	•	•	HLN9501A	PA HARDWARE
•			HLE9310A	RF BOARD
	•	•	HLE9310B	RF BOARD
•	•		HLN5173B	LOGIC BOARD, CONVENTIONAL TRUNKED
•	•	•	HLN5188A	MAIN BOARD HARDWARE
		•	HLN9313A	LOGIC BOARD OPTIONS CONNECTOR

DESCRIPTION	MAXTRAC 50.2 FREQUENCY	MAXTRAC 502 FREQUENCY	MAXTRAC 502 FREQUENCY	MAXTRAC 502 FREQUENCY	MAXTRAC 100 2 FREQUENCY	MAXTRAC 100 2 FREQUENCY		MAXTRAC 300 6 FREQUENCY	8		300 32	CODE:	Model Chart for x <i>Trac</i> UHF Mobile Radio 25 Watt RF Power 449–470 MHz
MODEL	D34MJA1304BK	D34MJA1304CK	D34MJA7304BK	D34MJA7304CK	D34MJA73A5CK	D34MJA73A5DK	D34MJA77A3CK	D34MJA77A3DK	D34MJA7DA5CK	D34MJA7DA5DK	D34MJA75A5AK		ONE ITEM SUPPLIED BREAKDOWN IN A SEPARATE CHART
												ITEM	DESCRIPTION
								Ø	Ø	0	Ø		UNIFIED CHASSIS
- 1			Ø					_	Ĺ	<u> </u>	Ш	HCN1048A	FRONT PANEL 2 FREQUENCY
ļ	Ø	Ø	Ø	Ø	Ø	Ø	_		<u> </u>			OR HCN3293A	FRONT PANEL, 2 FREQUENCY
1	-		_				_	Q	_	<u> </u>		HCN1049A	FRONT PANEL 6 FREQUENCY
ŀ	_	_	_	_	_		Ø	Ø	+			OR HCN3292A	FRONT PANEL, 6 FREQUENCY
ŀ	+			-				_	1-	0		HCN1043A	FRONT PANEL 16 FREQUENCY
ŀ	4			_	4		_		Ø	\mathbb{Z}		OR HCN3217A	FRONT PANEL 32 FREQUENCY
╁			_	_		_		_	•	•	•	HHN4029A	HOUSING
\perp	-					-	•	•	-	<u> </u>		HHN9370A	HOUSING
ŀ	-			-	-	_	•	_	•	•	•	HKN4137A	POWER CABLE KIT
┢	-	-	-		_	_			-		\vdash	HLN9138A	NAMEPLATE 50
ŀ	+	-		-	•	•	_	_	-	-		HLN5283A	NAMEPLATE 100
+		_		•	\exists		•	-	-	•	•	HLN5284A	NAMEPLATE 300
\vdash	-	•	•	•	•	•	_	_				HLN5289A	ESCUTCHEON 2 FREQUENCY
ŀ	+	-	_	_	4	_	•	•	-	-		HLN9063A	ESCUTCHEON 6 FREQUENCY
H	\perp	_	_	4	\exists				•	•	•	HLN5191A	ESCUTCHEON 16/32 FREQUENCY
F	•	-	•	•	•	•	•	•	•	•	•	HLN9073A	MICROPHONE HANG-UP CLIP
F	•	-	•	-	-	•	•	•	•	•	•	HLN5189A	INSTALLATION HARDWARE
F	_	-		•	-	•	•	•	•	•	•	HMN1056C	MICROPHONE
F	_	-	-	•	<u>. </u>	•	•	•	•	•	•	HLN1245A	MICROPHONE (ELECTRICAL)
E		-			-	-	•	•	•	•	•	HLN5307A	MICROPHONE HOUSING
E	_	-		-	-	-	-	•	•	•	•	HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT
E	_		-		_	-		-	•	•	•	HLN9559A	COMPACT MICROPHONE COIL CORD
E	•					_	-	•	•	•	•	HLN9563A	INSTALLATION HARDWARE
F	-	-	-		-	-	-	-	•	•	•	HAE4003A	ANTENNA, ROOF TOP 450-470 MHz
т,	<u>- ۱</u>	•	•	•	•	•	•	•	•	•	•	HBN4040A	PACKING KIT
t		- 1	- 1	- 1					•			HLN9277A	

HLN9333B

ROM KIT 32 CHANNEL

Model Chart for MaxTrac UHF Mobile Radio Unified Chassis 25 Watt RF Power 449–470 MHz

CODE:

UNIFIED CHASSIS
UNIFIED CHASSIS
UNIFIED CHASSIS

= ONE ITEM SUPPLIED

	HUE	HUE2	HUE2	HUE2		
L					ITEM	DESCRIPTION
•	•	•	•	•	HLE1687A	PA TANAPA
•	•	•	•	•	HLE4431A	PA BOARD
•	•	•	•	•	HLN5182A	PA HARDWARE
•	'	•			HLE4425B	RF BOARD
L	•		•		HLE9310A	RF BOARD
L				•	HLE9310B	RF BOARD
•	•				HLN9123A	LOGIC BOARD (MASKED)
L	1	•		•	HLN5173B	LOGIC BOARD (EXPANDED)
L			•		HLN9313A	LOGIC BOARD OPTIONS CONNECTOR
Ŀ		•			HLN9212A	MAIN BOARD HARDWARE
L	•		•	•	HLN5188A	MAIN BOARD HARDWARE
L						
L		\dashv				
L						
l		İ				

Model Chart for UHF Mobile Radio 40 Watt RF Power 403-430 MHz 449-470 MHz

CODE:

MAXTRAC 300 16 FREQUENCY MAXTRAC 300 16 FREQUENCY MAXTRAC 300 32 FREQUENCY

MAXTRAC 100 2 FREQUENCY MAXTRAC 100 2 FREQUENCY MAXTRAC 300 6 FREQUENCY MAXTRAC 300 6 FREQUENCY

MAXTRAC 50 2 FREQUENCY MAXTRAC 50 2 FREQUENCY

ONE ITEM SUPPLIED
 BREAKDOWN IN A SEPARATE CHART

MODEL	D44MJA7340BK	D44MJA7340CK	D44MJA73A5CK	D44MJA73A5DK	D44MJA77A3CK	D44MJA77A3DK	D44MJA7DA5CK	D44MJA7DA5DK	D44MJA7JA5AK		Ø.	= ONE ITEM SUPPLIED i = BREAKDOWN IN A SEPARATE CHART
											ITEM	DESCRIPTION
	Ø			Ø	Ø	Ø	Ø	Ø	Ø			UNIFIED CHASSIS
	Ø	Ø		_							HCN1048A	FRONT PANEL 2 FREQUENCY
	Ø	Ø	Ø	Ø							OR HCN3293A	FRONT PANEL 2 FREQUENCY
				ļ	Ø	Ø					HCN1049A	FRONT PANEL 6 FREQUENCY
ļ					Ø	Ø					OR HCN3292A	FRONT PANEL 6 FREQUENCY
ļ		_					Ø	Ø			HCN1043A	FRONT PANEL 16 FREQUENCY
-				i			Ø	Ø	Ø		OR HCN3217A	FRONT PANEL 32 FREQUENCY
		_			\Box		•	•	•		HHN4029A	HOUSING
ŀ	•	•	•	•	•	•					HHN9370A	HOUSING
ļ	•	•	•	•	•	•	•	•	•		HKN4137A	POWER CABLE KIT
	•	•									HLN9138A	NAMEPLATE 50
	4		•	•	\dashv						HLN5283A	NAMEPLATE 100
1					•	•	•	•	•		HLN5284A	NAMEPLATE 300
ļ	•	•	•	•							HLN5289A	ESCUTCHEON 2 FREQUENCY
ļ			_	_	•	•					HLN9063A	ESCUTCHEON 6 FREQUENCY
	_			1	_		•	•	•	_	HLN5191A	ESCUTCHEON 16 FREQUENCY
ŀ	•	•	•	•	•	•	•	•	•		HLN9073A	MICROPHONE HANG-UP CLIP
L	•	•	•	•	•	•	•	•	•		HLN5189A	INSTALLATION
ŀ	•	•	•	•	•	•	•	•	•		HMN1056C	MICROPHONE
L	•	•	•	•	•	•	•	•	•	_	HLN1245A	MICROPHONE (ELECTRICAL)
	•	•	•	•	•	•	•	•	•		HLN5307A	MICROPHONE HOUSING
L	•	•	•	•	•	•	•	•	•		HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT
L	•	•	•	•	•	•	•	•	•		HLN9559A	COMPACT MICROPHONE COIL CORD
	•	•	•	•	•	•	•	•	•		HLN9563A	INSTALLATION HARDWARE
L			•	•	•	•	•	•	•	\perp	HAE4002A	ANTENNA, ROOF TOP 403-430 MHz
	•	•	•	•	•	•	•	•	•		HAE4003A	ANTENNA, ROOF TOP 450-470 MHz
	•	•	•	•	•	•	•	•	•	\perp	HBN4040A	PACKING KIT
L					\perp			•	•	\perp	HLN9333B	ROM KIT 32 CHANNEL
				4			•				HLN9277A	ROM KIT
\perp												

	MODEL	DESCRIPTION
	HUE2063A	UNIFIED CHASSIS UHF 25 KHz 40 WATT LIMITED
	HUE2063B	UNIFIED CHASSIS UHF 25 KHz 40 WATT LIMITED
	HUE2066A	UNIFIED CHASSIS UHF 35 WATT PL/DPL
	HUE2066B	UNIFIED CHASSIS UHF 40 WATT
	HUE2064B	UNIFIED CHASSIS UHF 25 KHz 40 WATT
	HUE2064C	UNIFIED CHASSIS UHF 25 KHz 40 WATT
	HUE2068A	UNIFIED CHASSIS UHF 25 KHz 40 WATT EXPANDED
	HUE2068B	UNIFIED CHASSIS UHF 25 KHz 40 WATT EXPANDED
	HUE3052C	UNIFIED CHASSIS UHF 40 WATT
L		

Model Chart for MaxTrac UHF Mobile Radio 40 Watt RF Power Unified Chassis 403–430 MHz

CODE:

= ONE ITEM SUPPLIED

			┢┈╴	1	1		+	-	ITEM	DECODIDATION
_	_			-	┢	-	+-	┿	TIEM	DESCRIPTION
•	•			<u> </u>	<u> </u>	•	•		HLE30	025A PA UHF 40 WATT
		•	•	•	•	<u> </u>	_	•	HLE30	011A PA UHF 40 WATT
•	•		_	L	L	•	•		HLE44	430A PA BOARD
		•	•	•	•		-	•	HLE44	432A PA BOARD
		•	•	•	•			•	HLN52	274A PA HARDWARE
•	•					•	•		HLN91	153A PA HARDWARE
•	•					•	•		HLE44	424A RF BOARD
		•		•			<u> </u>		HLE44	125B RF BOARD
			•					•	HLE93	B10A RF BOARD
_					•				HLE93	310B RF BOARD
•	•			•	•				HLN51	173B LOGIC BOARD (MASKED)
		•	•		L.,				HLN91	123A LOGIC BOARD (EXPANDED)
•	•		•		•	•	•	•	HLN51	188A MAIN BOARD HARDWARE
		•		•			L		HLN92	212A MAIN BOARD HARDWARE
						•	•	•	HLN93	B13A LOGIC BOARD OPTIONS CONNECTOR

Model Chart for MaxTrac 800 MHz Mobile Radio 15 Watt RF Power RX: 851-870 MHz

TX: 806-825 MHz

TX: 806-825 or 851-870 MHz (T/A Models)

CODE:

Max Trac 300 32 FREQUENCY

MaxTrac 100 6 FREQUENCY Max Trac 100 6 FREQUENCY

MaxTrac 300 6 FREQUENCY

Max Trac 100 2 FREQUENCY

- = ONE ITEM SUPPLIEDØ = BREAKDOWN IN A SEPARATE CHART

1	2	2	≥	5	2	CODE:			
D35M.147345CK	D35MJA73A6AK	D35MJA73A6BK	D35MJA77A4AK	D35MJA7DA6AK	D35MJA75A6AK	• Ø	= ONE ITEM SUPPLIED = BREAKDOWN IN A SEPARATE CHART		
						ITEM	DESCRIPTION		
Q	3					HUF1036A	UNIFIED CHASSIS 806-870 MHz		
	Ø		Ø			HUF3090A	UNIFIED CHASSIS TALKAROUND		
		Ø				HUF3054A	UNIFIED CHASSIS TALKAROUND		
				Ø		HUF3024A	UNIFIED CHASSIS TALKAROUND 806-870 MHz		
					Ø	HUF3137A	UNIFIED CHASSIS TALKAROUND SIGNALLING		
Q	Ø	Ø				HCN1048A	FRONT PANEL 2 FREQUENCY		
Q	Ø	Ø				OR HCN3293A	FRONT PANEL 2 FREQUENCY		
Ĺ			Ø			HCN1049A	FRONT PANEL 6 FREQUENCY		
			Ø			OR HCN3292A	FRONT PANEL 6 FREQUENCY		
L				Ø	Ø	HCN1043A	FRONT PANEL 16 FREQUENCY		
				•	•	HHN4029A	HOUSING		
•	•	•	•			HHN9370A	HOUSING		
•	•	•	•	•	•	HKN4137A	POWER CABLE KIT		
•	•	•				HLN5283A	NAMEPLATE 100		
L			•	•	•	HLN5284A	NAMEPLATE 300		
•	•	•				HLN5289A	ESCUTCHEON 2 FREQUENCY		
L			•			HLN9063A	ESCUTCHEON 6 FREQUENCY		
				•	•	HLN5191A	ESCUTCHEON 16 FREQUENCY		
•	•		•	•	•	HLN9073A	MICROPHONE HANG-UP CLIP		
L		•				HLN4606A	MICROPHONE HANG-UP CLIP		
•	•	•	•	•	•	HLN5189A	INSTALLATION HARDWARE		
•	•		•	•	•	HMN1056C	MICROPHONE		
•	•		•	•	•	HLN1245A	MICROPHONE (ELECTRICAL)		
•	•		•	•	•	HLN5307A	MICROPHONE HOUSING		
•	•		•	•	•	HLN5306B	RADIUS MICROPHONE WITH LIGHT KIT		
•	•		•	•	•	HLN9559A	COMPACT MICROPHONE COIL CORD		
•	•		•	•	•	HLN9563A	INSTALLATION HARDWARE		
		•				HMN1035A	MICROPHONE		
L		•				HMN5238A	MICROPHONE BOARD		
L		•				HLN5239A	MICROPHONE C/F HARDWARE		
•	•	•	•	•	•	HAF4002A	ANTENNA, ROOF TOP UNITY 800		
•	•	•	•	•	•	HBN4040A	PACKING KIT		
L			•	•		HLN9277A	ROM KIT		
L					•	HLN9333B	ROM KIT 32 CHANNEL		

DESCRIPTION	UNIFIED CHASSIS 806-870 MHz	UNIFIED CHASSIS TALKAROUND	UNIFIED CHASSIS TALKAROUND	UNIFIED CHASSIS TALKAROUND 806-870 MHz	UNIFIED CHASSIS TALKAROUND SIGNALLING	Model Chart for MaxTrac 800 MHz Mobile Radio Unified Chassis 15 Watt RF Power RX: 851–870 MHz TX: 806–825 MHz TX: 806–825 or 851–870 MHz (T/A Models)
MODEL	HUF1036A	HUF3090A	HUF3054A	HUF3024A	HUF3137A	● = ONE ITEM SUPPLIED
						ITEM DESCRIPTION

L						ITEM	DESCRIPTION	
[•	•	•	•	•	HLF1038A	PA TANAPA	
Ŀ	•	•	•	•	•	HLF4097A	PA BOARD SIMPLEX	
Ŀ	•	•	•	•	•	HLN5293A	PA HARDWARE SIMPLEX	
Ŀ	•					HLF4095B	RF BOARD	
L		•	•	•		HLF9122A	RF BOARD TALKAROUND	
•	•	•	•			HLN9123A	LOGIC BOARD (MASKED)	
L				•		HLN5173B	LOGIC BOARD (EXPANDED)	
L					•	HLN9313A	LOGIC BOARD OPTIONS CONNECTOR	
ŀ	•	•	•	•	•	HLN5188A	MAIN BOARD HARDWARE	

Model Chart for MaxTrac 800 MHz **Trunked Mobile Radio** 15 Watt RF Power

CODE:

- = ONE ITEM SUPPLIED
 = BREAKDOWN IN A SEPARATE CHART

MODEL DESCRIPTION	D35MQA5GB1AK MaxTrac 800 MHz TRUNKED	D35MQA5GB1BK MaxTrac 800 MHz TRUNKED	D35MQA5GB3AK MaxTrac 800 MHz TRUNKED	D35MQA5GB4AK MaxTrac 800 MHz TRUNKED	D35MQA5GB5BK MaxTrac 800 MHz TRUNKED	D35MWA5GB6AK MaxTrac 800 MHz TRUNKED	D35MWA5GB7AK MaxTrac 800 MHz TRUNKED				CODE:	MaxTrac 800 MHz runked Mobile Radio 15 Watt RF Power
					Ļ						ITEM	DESCRIPTION
	Ø	Ø	Ø		Ø			_			HUF1041A	UNIFIED CHASSIS, CONVENTIONAL LTD
-	_	_		Ø		Ø	Ø			ļ	HUF3037A	UNIFIED CHASSIS, CONVENTIONAL LPD
-	Ø	Ø					_	_			HCN1048A	FRONT PANEL, 2 FREQUENCY
ŀ	Ø	Ø	Ø	Ø	Ø						OR HCN3293A	FRONT PANEL, 2 FREQUENCY
ŀ		_	- 1				Ø				HCN1043A	FRONT PANEL, 16 FREQUENCY
ŀ		_				Ø	Ø				OR HCN3217A	FRONT PANEL, 32 FREQUENCY
-	•	•	•	•	•	•	•	_			HHN4029A	HOUSING
-	•	•	•	•	•	•	•				HKN4137A	POWER CABLE KIT
ŀ	•	•	•	•	•	•	•				HLN5189A	INSTALLATION HARDWARE KIT
ŀ	•	•	•	•	•	•	•				HLN5286A	NAMEPLATE, 800
-	•	•			•						HLN5319A	ESCUTCHEON, 820
-			•					_			HLN5320A	ESCUTCHEON, T200
-			_	•	[HLN9251A	ESCUTCHEON, 820 B4
ŀ					_	•	_		-		HLN9252A	ESCUTCHEON, 840 B4
ŀ	\dashv	_	-	_	╣	_	•	_	_		HLN9253A	ESCUTCHEON, 840 B7
ŀ	•	•		•	•	•	•	_			HLN9073A	HANG-UP CLIP
ŀ		•	-	•	•	•	•	_			HMN1056C	MICROPHONE, COMPACT
-	_	•	\dashv	•		•	•				HLN1245A	MICROPHONE
ŀ	-	•		•	•	•	•	-		-	HLN5307A	MICROPHONE HOUSING
ŀ	+	•		•	•	•	•	_	+ $+$		HLN5306B	MICROPHONE WITH LIGHT KIT
-	-+	•	-+	-	•	•	•	+			HLN9563A	INSTALLATION HARDWARE
-		-	\dashv	•	•	•	•	+			HLN9559A	COILED CORD
ŀ	•	-	\dashv		\dashv	-	+	+			HMN1035A	MICROPHONE, FULL SIZE
-	•	+		-	\dashv		+	-			HLN5238A	MICROPHONE BOARD
ŀ	-	\dashv	_	-	\dashv	-		-	-		HLN5239A	INSTALLATION HARDWARE
\perp			•					\dashv	+		HMN3013A	MICROPHONE DTMF TRUNKED
\perp	-	-	•	•	•	-	•	+			HAF9067A	ANTENNA, 3dB GAIN 800 ROOF
\perp					\dashv	-	•	+	+		OR RRA4914B	ANTENNA
-			-	-	•		•	+			HBN4040A	PACKING KIT
	•	•	•	•	•	•	•				HLN9260C	ROM KIT

UNIFIED CHASSIS CONVENTIONAL LIMITED UNIFIED CHASSIS CONVENTIONAL **Model Chart for** MaxTrac 800 MHz Trunked Mobile Radio 15 Watt Unified Chassis RF Power DESCRIPTION CODE: • = ONE ITEM SUPPLIED HUF1041A HUF3037A MODEL ITEM DESCRIPTION • HLF4095B RF BOARD HLF9122A RF BOARD • HLN5172A LOGIC BOARD • • HLN5188A UNIFIED CHASSIS HARDWARE

PA TANAPA

PA BOARD SIMPLEX

PA HARDWARE SIMPLEX

• •

• •

• •

HLF1038A

HLF4097A

HLN5293A

Model Chart for MaxTrac 800 MHz Mobile Radio 35 Watt RF Power with Talkaround TX: 806-825 or 851-870 MHz RX: 851-870 MHz

CODE:

MAKTAG 100 2 FREQUENCY
MAKTAG 300 6 FREQUENCY
MAKTAG 300 16 FREQUENCY
MAKTAG 300 18 FREQUENCY

Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	10	ĮΣ	3	₹	₹			
		×	¥	¥	×			
	ł	ş	1	Ş.	¥9(ĺ		Ø = BREAKDOWN IN A SEPARATE CHART
	Ι.	3	15	18	175			
	買	₹	3	3	₹			
MUF3188A SUPER UNIFIED CHASSIS MASKED	ΙŢ	3	3	3	3			
MUF3188A SUPER UNIFIED CHASSIS MASKED		_	-	H		Н	GEN.	
HUF3191A SUPER UNIFIED CHASSIS EXPANDED	l	L		-				
D		0	0	-			HUF3188A	SUPER UNIFIED CHASSIS MASKED
Ø HCN1048A FRONT PANEL 2 FREQUENCY Ø OR HCN3293A FRONT PANEL 2 FREQUENCY Ø HCN1049A FRONT PANEL 6 FREQUENCY Ø HCN1043A FRONT PANEL 16 FREQUENCY W HCN1043A FRONT PANEL 32 FREQUENCY W HCN3217A HOUSING WHAN4191B POWER CABLE KIT WHAN4191B POWER CABLE KIT WHAN4191B POWER CABLE KIT WHAN4284A NAMEPLATE 300 WHAN4284A NAMEPLATE 300 WHAN4284A NAMEPLATE 300 WHAN4284A NAMEPLATE 300 WHAN4284A NESCUTCHEON 6 FREQUENCY WHAN4284A MICROPHONE HANG-UP CLIP WHAN4284A MICROPHONE (ELECTRICAL) WHAN4284A MICROPHONE (ELECTRICAL)		_	↓_	0			HUF3191A	SUPER UNIFIED CHASSIS EXPANDED
Ø OR HCN3293A FRONT PANEL 2 FREQUENCY Ø HCN1049A FRONT PANEL 6 FREQUENCY Ø OR HCN3292A FRONT PANEL 6 FREQUENCY Ø HCN1043A FRONT PANEL 16 FREQUENCY HCN3217A FRONT PANEL 32 FREQUENCY HCN3217A FRONT PANEL 32 FREQUENCY HCN3217A HCN3217A HCN3217A FRONT PANEL 32 FREQUENCY HCN3217A HOUSING HCN3217A HOUSING HKN4191B POWER CABLE KIT HCN3283A NAMEPLATE 100 HLN5283A NAMEPLATE 300 HLN5283A HAMEPLATE 300 HLN5283A HESCUTCHEON 2 FREQUENCY HAMEDIA HESCUTCHEON 16 FREQUENCY HAMEDIA HESCUTCHEON 16 FREQUENCY HAMEDIA HICROPHONE HANG-UP CLIP HAMEDIA HICROPHONE HANG-UP CLIP HAMEDIA HICROPHONE (ELECTRICAL) HAMEDIA HICROPHONE HANG-UP HOUSING HAMEDIA HICROPHONE HANG-UP HOUSING HAMEDIA HAMEDIA HAMEDIA HAMEDIA			L		Ø		HUF3189A	SUPER UNIFIED CHASSIS
C			L_				HCN1048A	FRONT PANEL 2 FREQUENCY
Ø OR HCN3292A FRONT PANEL 6 FREQUENCY Ø HCN1043A FRONT PANEL 16 FREQUENCY Image: Property of the part of t		Ø				_	OR HCN3293A	FRONT PANEL 2 FREQUENCY
MCN1043A			Ø				HCN1049A	FRONT PANEL 6 FREQUENCY
MCN3217A FRONT PANEL 32 FREQUENCY			Ø				OR HCN3292A	FRONT PANEL 6 FREQUENCY
	i			Ø			HCN1043A	FRONT PANEL 16 FREQUENCY
● HHN9370A HOUSING					Ø		HCN3217A	FRONT PANEL 32 FREQUENCY
				•	•		HHN4029A	HOUSING
HLN5283A NAMEPLATE 100		•	•				HHN9370A	HOUSING
Name		•	•	6	•		HKN4191B	POWER CABLE KIT
HLN5289A		•			[HLN5283A	NAMEPLATE 100
HLN9083A			•	•	G		HLN5284A	NAMEPLATE 300
		•			j		HLN5289A	ESCUTCHEON 2 FREQUENCY
● ● ● ● HLN9073A MICROPHONE HANG-UP CLIP ● ● ● ● HLN9404A INSTALLATION HARDWARE ● ● ● ● HMN1056C MICROPHONE ● ● ● ● HLN1245A MICROPHONE (ELECTRICAL) ● ● ● ● HLN5307A MICROPHONE HOUSING ● ● ● ● HLN5308B RADIUS MICROPHONE WITH LIGHT KIT ● ● ● ● HLN9559A COMPACT MICROPHONE COIL CORD ● ● ● ● HLN9563A INSTALLATION HARDWARE ● ● ● ● HSN9403A PACKING KIT					$_{\perp}$	\Box	HLN9063A	ESCUTCHEON 6 FREQUENCY
○ ○ ○ ○ ○ ○ ○ ○ ○ ○		-		•	•		HLN5191A	ESCUTCHEON 16 FREQUENCY
● ● ● ● HMN1056C MICROPHONE ● ● ● ● HLN1245A MICROPHONE (ELECTRICAL) ● ● ● ● HLN5307A MICROPHONE HOUSING ● ● ● ● HLN5306B RADIUS MICROPHONE WITH LIGHT KIT ● ● ● ● HLN9559A COMPACT MICROPHONE COIL CORD ● ● ● ● HLN9563A INSTALLATION HARDWARE ● ● ● ● HAF4002A ANTENNA, ROOF TOP UNITY ● ● ● ● HBN9403A PACKING KIT	1	•	•	•	•		HLN9073A	MICROPHONE HANG-UP CLIP
● ● ● HLN1245A MICROPHONE (ELECTRICAL) ● ● ● HLN5307A MICROPHONE HOUSING ● ● ● HLN5306B RADIUS MICROPHONE WITH LIGHT KIT ● ● ● HLN9559A COMPACT MICROPHONE COIL CORD ● ● ● HLN9563A INSTALLATION HARDWARE ● ● ● HAF4002A ANTENNA, ROOF TOP UNITY ● ● ● HBN9403A PACKING KIT		•	•	•	•	\Box	HLN9404A	INSTALLATION HARDWARE
● ● ● ● HLN5307A MICROPHONE HOUSING ● ● ● ● HLN5306B RADIUS MICROPHONE WITH LIGHT KIT ● ● ● ● HLN9559A COMPACT MICROPHONE COIL CORD ● ● ● ● HLN9563A INSTALLATION HARDWARE ● ● ● ● HAF4002A ANTENNA, ROOF TOP UNITY ● ● ● ● HBN9403A PACKING KIT		•	•	•	•		HMN1056C	MICROPHONE
HLNS306B RADIUS MICROPHONE WITH LIGHT KIT HLNS36B RADIUS MICROPHONE COIL CORD HLNS559A COMPACT MICROPHONE COIL CORD HLNS563A INSTALLATION HARDWARE HAF4002A ANTENNA, ROOF TOP UNITY HBN9403A PACKING KIT		•	•	•	•		HLN1245A	MICROPHONE (ELECTRICAL)
HLN9559A COMPACT MICROPHONE COIL CORD HLN9559A INSTALLATION HARDWARE HAF4002A ANTENNA, ROOF TOP UNITY HBN9403A PACKING KIT		•	•	•	•		HLN5307A	MICROPHONE HOUSING
		•	•	•	•		HLN53068	RADIUS MICROPHONE WITH LIGHT KIT
● ● ● HAF4002A ANTENNA, ROOF TOP UNITY		•	•	•	•		HLN9559A	COMPACT MICROPHONE COIL CORD
● ● ● HBN9403A PACKING KIT		•	•	•	•	\exists	HLN9563A	INSTALLATION HARDWARE
]	•	•	•	•		HAF4002A	ANTENNA, ROOF TOP UNITY
		•	•	•	•	1	HBN9403A	PACKING KIT
HLN9277A ROM KIT		i	•	•	\exists	1	HLN9277A	ROM KIT
6 HLN9333B ROM KIT 32 CHANNEL					6	T	HLN9333B	ROM KIT 32 CHANNEL
		1	1	٦	\dashv	1		

Model Chart for MaxTrac 800 MHz Mobile Radio Unified Chassis 35 Watt RF Power with Talkaround TX: 806–825 or 851–870 MHz RX: 851–870 MHz

CODE:

SUPER UNIFIED CHASSIS EXPANDED

SUPER UNIFIED CHASSIS SIGNAL

SUPER UNIFIED CHASSIS MASKED

ONE ITEM SUPPLIED

HUF3188A	HUF3191A	HUF3189A		
			ITEM	DESCRIPTION
•			HUF1038A	UNIFIED CHASSIS SIMPLEX EXPANDED
	•		HUF1034A	UNIFIED CHASSIS SIMPLEX LIMITED
		•	HUF1042A	UNIFIED CHASSIS CONVENTIONAL LIMITED
•	•	•	HLF9122A	RF BOARD TALKAROUND
•			HLN9123A	LOGIC BOARD (MASKED)
	•		HLN5173B	LOGIC BOARD (EXPANDED)
		•	HLN9313A	LOGIC BOARD OPTIONS CONNECTOR
•	•	•	HLN9436A	UNIFIED CHASSIS HARDWARE
•	•	•	HLF3030A	PA TANAPA
•	•	•	HLF4098A	PA BOARD
•	•	•	HLN9305A	PA HARDWARE
•	•	•	HLN9411A	SUPER UNIFIED CHASSIS HARDWARE
l	1		1	

Model Chart for MaxTrac 800 Series 800 MHz Trunked Mobile Radio 35 Watt RF Power RX: 851-870 MHz TX: 806-825 MHz TX: 806-825 or 851-870 MHz (T/A Models)

CODE:

MODEL DESCRIPTION	D45MQA5GB1AK MaxTrac 820 1/1	D45MQA5GB3AK MaxTrac 820 2/1, DTMF MIC	82	D45MQA5GB4AK MarTrac 820 1/1, 1 CONV, T/A	Max Trac 840 6/6, 2 CONV.	MaxTrac 840 10/10, 10 CO	MaxTrac	ł	'AND 0 '00 00 00 00 00 00 00 00 00 00 00 00		35 Watt RF Power RX: 851-870 MHz TX: 806-825 MHz TX: 806-825 or 851-870 MHz (T/A Models) CODE: One ITEM SUPPLIED Description of the supplied
				_		F			+	_	ITEM DESCRIPTION
	Ø	Ø	Ø	Ø	Ø	Ø	5		T		HUF3190A SUPER UNIFIED CHASSIS TRUNKED
							2	12	5		HUF3189A SUPER UNIFIED CHASSIS SIGNAL
	Ø	Ø	Ø	Ø					Т	1	HCN1048A FRONT PANEL 2 FREQUENCY
	Ø	Ø	Ø	Ø					Τ	T	OR HCN3293A FRONT PANEL 2 FREQUENCY
					Ø	Ø	2	2	5		HCN1043A FRONT PANEL 16 FREQUENCY
					Ø	Ø	i		Т		OR HCN3217A FRONT PANEL 16/32 FREQUENCY
	•	•	•	•	•	•	•	•		Т	HHN4029A HOUSING
	•	•	•	•	•	•	•	•	Т		HKN4191B POWER CABLE KIT
	•	•	•	•	•	•				1	HLN5286A NAMEPLATE 800
							•	•	Π		HLN9387A NAMEPLATE SMARTNET
	•		•								HLN5319A ESCUTCHEON 820
ļ		•									HLN5320A ESCUTCHEON T200
				•							HLN9251A ESCUTCHEON 820 B4
					•						HLN9252A ESCUTCHEON 840 B4
							•				HLN9386A ESCUTCHEON SMARTNET C3
ļ								•			HLN9384A ESCUTCHEON SMARTNET SCAN
						•			L		HLN9253A ESCUTCHEON 840 B7
	•		•	•	•	•	•	•		ot	HLN9073A MICROPHONE HANG-UP CLIP
ļ	•	•	•	•	•	•	•	•	L		HLN9404A INSTALLATION
	•	Ш	•	•	•	•	•	•	L		HMN1056C MICROPHONE
	•		•	•	•	•	•	•	L	Ш	HLN1245A MICROPHONE (ELECTRICAL)
	•		•	•	•	•	•	•	L		HLN5307A MICROPHONE HOUSING
	•		•	•	•	•	•	•	L	Ш	HLNS306B RADIUS MICROPHONE WITH LIGHT KIT
	•	Ш	•	•	•	•	•	•	\perp	\sqcup	HLN9559A COMPACT MICROPHONE COIL CORD
ļļ	•		•	•	•	•	•	•	L	\sqcup	HLN9563A INSTALLATION HARDWARE
	4	•				L	_	_	<u> </u>	Ш	HMN3013A DTMF TRUNKED MICROPHONE
	•	•	•	•	•	•	•	•	_	Щ	HAF9067A ANTENNA, 3 dB GAIN
	•	•	•	•	•	•	•	•	<u> </u>	\sqcup	OR RRA4914B ANTENNA
	•	•	•	•	•	•	•	•	<u> </u>	Ш	HBN9403A PACKING KIT
	•	•	•	•	•	•	_	_	-	Ш	HLN9250C ROM KIT
					لــــا	Ш	•	•		Ш	HLN9383A ROM KIT SMARTNET

Model Chart for MaxTrac 800 Series 800 MHz Trunked Mobile Radio **Unified Chassis, 35 Watt RF Power**

RX: 851-870 MHz TX: 806-825 MHz TX: 806-825 or 851-870 MHz (T/A Models)

CODE:

DESCRIPTION SUPER UNIFIED CHASSIS TRUNKED

SUPER UNIFIED CHASSIS SIGNAL

= ONE ITEM SUPPLIED

MODEL	HUF3190A	HUF3189A			
				ITEM	DESCRIPTION
	•			HUF1043A	UNIFIED CHASSIS CONVENTIONAL 15 WATT EXPANDED
		•		HUF1042A	UNIFIED CHASSIS CONVENTIONAL 35 WATT LIMITED
ı	•	•		HLF9122A	RF BOARD TALKAROUND
	•			HLN5172A	LOGIC BOARD
L		•		HLN9313A	LOGIC BOARD OPTIONS CONNECTOR
L	•	•		HLN9436A	UNIFIED CHASSIS HARDWARE
L	•	•		HLF3030A	PA TANAPA
	•	•		HLF4098A	PA BOARD
L	•	•		HLN9305A	PA HARDWARE
- 1	•	•		HLN9411A	SUPER UNIFIED CHASSIS HARDWARE

Model Chart for
MaxTrac SMARTNET
800 MHz Trunked Mobile Radio
15 Watt RF Power

CODE:

MODEL DESCRIPTION	D35MWA5GC0AK MaxTrac SMARTNET 800 MHz TRUNKED	D35MWA5GC3AK MaxTrac SMARTNET 800 MHz TRUNKED	D35MWA5GC5AK MaxTrac SMARTNET 800 MHz TRUNKED	D35MWA5GC6AK MaxTrac SMARTNET 800 MHz TRUNKED		Model Chart for MaxTrac SMARTNET MHz Trunked Mobile Radio 15 Watt RF Power DE: - ONE ITEM SUPPLIED - BREAKDOWN IN A SEPARATE CHART
	_	_			ITEM	DESCRIPTION
		Ø	Ø	Ø	HUF3137A	UNIFIED CHASSIS, 800 T/A SIGNALLING
	Ø	_	L		HUF3037A	UNIFIED CHASSIS, 800 MHz CONVENTIONAL LPD
	\mathbb{Q}	Ø	Ø	Ø	HCN1043A	FRONT PANEL, 16 FREQUENCY
	Ø	_		_	OR HCN3217A	FRONT PANEL, 16 FREQUENCY
	•	•	•	•	HHN4029A	HOUSING
	•	•	•	•	HKN4137A	POWER CABLE KIT
	•	•	•	•	HLN5189A	INSTALLATION HARDWARE KIT
		•	•	•	HLN4606A	HANG-UP CLIP
			•		HLN9073A	HANG-UP CLIP
	H	Ť		•	HLN9383A HLN9383B	ROM KIT
	-	•			HLN9386A	ROM KIT
		Ť	•		HLN9384A	ESCUTCHEON, C3 ESCUTCHEON, SCAN
			_	•	HLN9536A	ESCUTCHEON SCAN
	•			-	HLN9144A	ESCUTCHEON
	Н	•	•	•	HLN9387A	NAMEPLATE
	•			-	HLN5286A	NAMEPLATE
	•				HLN9166A	EMERGENCY PUSH SWITCH ATM HARDWARE
		•	•	•	HMN1056C	MICROPHONE, COMPACT
		•	•	•	HLN1245A	MICROPHONE
[•	•	•	HLN5307A	MICROPHONE HOUSING
		•	•	•	HLN5306B	MICROPHONE WITH LIGHT KIT
		•	•	•	HLN9563A	INSTALLATION HARDWARE
		•	•	•	HLN9559A	COILED CORD
	•	_			HMN1035A	MICROPHONE, FULL SIZE
	•	_	_	_	HLN5238A	MICROPHONE BOARD
	•	_		_	HLN5239A	INSTALLATION HARDWARE
	•	•	•	•	HAF9067A	ANTENNA, 3dB GAIN 800 ROOF
				_	OR RRA4914B	ANTENNA
	•	•	•	•	HBN4040A	PACKING KIT

Model Chart for *MaxTrac SMARTNET* 800 MHz Trunked Mobile Radio 15 Watt RF Power Unified Chassis

CODE:

UNIFIED CHASSIS, 800 MHz CONVENTIONAL LPD

DESCRIPTION
UNIFIED CHASSIS, 800 T/A SIGNALLING

• = ONE ITEM SUPPLIED

	HUF3137A	HUF3037A			
	HUE	HUF		ITEM	DESCRIPTION
	•	•		HLF9122A	RF BOARD, TALKAROUND
L		•		HLN5172A	LOGIC BOARD
L	•			HLN9313A	LOGIC BOARD, OPTIONS CONNECTOR
Ŀ	•	•		HLN5188A	MAIN BOARD HARDWARE
Ŀ	•	•		HLF1038A	PA TANAPA
Ľ	•	•		HLF4097A	PA BOARD SIMPLEX
Ŀ	•	•		HLN5293A	PA HARDWARE SIMPLEX
L					
ı					

DESCRIPTION	D35AHA5GB1AK 15 WATT COVERAGEPLUS MAXTRAC	D45AHA5GB1AK 35 WATT COVERAGEPLUS MAXTRAC	MHz	ragePLUS MaxTrac 800 Trunked Mobile Radio 5/35 Watt RF Power	DESCRIPTION	IA PA TANAPA, 15 WATT	A PABOARD, 15 WATT	3A HEAT SINK HARDWARE, 15 WATT	A PA TANAPA, 35 WATT	IA PA BOARD, 35 WATT	SA HEAT SINK HARDWARE, 35 WATT	2A UNIFIED CHASSIS	A RF BOARD	IA CHASSIS HARDWARE	IA LOGIC BOARD	A UNIFIED CHASSIS HARDWARE	A UNIFIED CHASSIS HARDWARE	A FRONT PANEL DISPLAY BOARD	A FRONT PANEL SWITCH BOARD	A FRONT PANEL HARDWARE	
MODEL	D35AHA	DASAHA	ITEM	DESCRIPTION	TEM	HLF1038A	HLF4097A	HLN5293A	HLF3030A	HLF4098A	HLN9305A	HUF1042A	HLF9122A	HLN5188A	HLN9313A	HLN9436A	HLN9411A	HLN5175A	HLN5184A	HLN9584A	
7	•	\vdash	HUF3137A	UNIFIED CHASSIS KIT (15W)	+	•			\dashv	-		-	•	•	•						
7	•	\dashv	HLF1038A	PA TANAPA, 15 WATT (See Note 1)	+	ř	•	•	\neg				Ť		-			-	\dashv		_
┪	\exists	•	HUF3189A	UNIFIED CHASSIS KIT (35W)	+	\vdash			•	\dashv		•	•		•	•	•	-	-	-	
		•	HLF3030A	PA TANAPA, 35 WATT (See Note 1)	\top	 			-	•	•		-		\dashv	-	Ť	-	\dashv	\dashv	
T	7	•	HLN9583A	SHIELD KIT (35W)	\top	H		_			_			\neg				_	\dashv	-	-
	•	•	HCN3217A	FRONT PANEL	+					一			\neg	-		ᅱ		•		•	_
1	•	•	HLN9386A	ESCUTCHEON, C3	\top		Ħ	7					٦	\neg	\neg				-	Ť	_
1	•	\neg	HKN4372A	POWER CABLE KIT (15W)	+			\neg		\neg								\dashv			_
	П	•	HKN9498A	POWER CABLE KIT (35W)	1			\neg	$\neg \dagger$	7								\neg	\dashv	-	
			HMN3013A	MICROPHONE KIT (NON-BACKLIT) (See Note 2)	1	Г				\dashv		\dashv			\dashv	7		-	7		
T	•	•	TDN8310A	MICROPHONE KIT (BACKLIT)		П			T	\dashv		\neg			7					7	_
7	•	•	HHN4029A	COVER KIT				\dashv		7				一		\dashv		-		\dashv	_
	•		HLN5189A	INSTALLATION HARDWARE KIT (15W)	1	П				\dashv		\dashv				\dashv			_		
I	J	•	HLN9404A	INSTALLATION HARDWARE KIT (35W)	\top	П				\dashv				1		一	T	7	7	7	
J	•	•	RAF4031ARM	ANTENNA KIT							\neg	\neg				٦					_
J	•	\Box	HBN4040A	PACKING KIT (15W)	\top															\dashv	_
	$oldsymbol{\mathbb{I}}$	•	HBN9403A	PACKING KIT (35W)				\exists		T								\dashv			_
	•	•	HLN9569A	LABEL, COVERAGEPLUS MAXTRAC	\top			7		\dashv						\neg	\dashv	\dashv	\dashv	寸	
T	•	•	HLN9597A	ROM KIT			\neg			7								_	7	寸	
\top	T					П	\neg	-		┪	_	7	-		-	\dashv	\neg	-	-		_

NOTES:

- 1. HLF1038A IS PART OF HUF3137A AND HLF3030A IS PART OF HUF3189A.
- 2. THE BACKLIT DTMF MICROPHONE (TDNB310A) COMES STANDARD WITH THE COVERAGEPLUS RADIO.

Performance Specifications for MaxTrac Low Band Mobile Radios

GENERAL

Model Series:	D51MJA, D51MGA
Typical RF Output:	60 Watts
Frequency (MHz):	29.7–36, 36–42, 42–50
Dimensions (H x W x L):	2" x 7" x 9.9" (50.8 x 178 x 251mm)
Primary Voltage Input:	13.8 Volts DC
Weight:	76 oz. (2.16 kg)
Typical Current Drain Receive (5W): Transmit: Standby:	1.6 Amps 17 Amps 500 milliAmps
Channel Capability:	2 channel, 6 channels, 16 channels, 32 channels
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch
External Speaker (Option):	5 Watts
FCC Designation:	ABZ89FT1620

TRANSMITTER

–61 dB
+0.0005% (-30°C to +60°C, 25°C ref.)
16K0F3E, 16K0F1D, 15K0F2D
6.3 MHz 6.0 MHz 8.0 MHz
5% measured per EIA
50 Ohms
80 mV rms for 60% max. deviation @ 1 kHz

RECEIVER

Channel Spacing:	20 kHz
Sensitivity 12 dB SINAD:	0.30 uV -117.5 d Bm
Intermodulation EIA SINAD:	–80 dB
Spurious & Image Rejection:	-80 dB
Selectivity EIA SINAD:	-80 dB
Audio Output:	3 Watts (5 Watts with external speaker) at less than 5% distortion
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)
Max Frequency Separation 29.7–36 MHz: 36–42 MHz: 42–50 MHz:	6.3 MHz 6.0 MHz 8.0 MHz
Output Impedance:	50 Ohms

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

Performance Specifications for MaxTrac LPI VHF Mobile Radio

GENERAL

Band:	VHF
Model Series:	D03MJA
Typical RF Output:	2 Watts
Frequency:	146–174 MHz
Dimensions (H x W x L):	2" x 7" x 7-3/4" (50.8 x 178 x 198mm)
Primary Voltage Input:	13.8 Volts DC
Weight:	61 oz. (1.73 kg)
Typical Current Drain	
Receive (5W):	1.5 Amps
Transmit:	2.5 Amps
Standby:	400 milliAmps
Channel Capability	
MaxTrac LPI 50:	2 channels
MaxTrac LPI 300:	6 or 16 channels
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch
External Speaker (Option):	5 Watts
TRANSMITTER	
Spurious & Harmonic Emissions:	-46 dBc
Frequency Stability $(-30^{\circ}\text{C to }+60^{\circ}\text{C},$	
25°C ref.):	±0.0005%
Modulation:	16K0F1D, 16K0F3E, 15K0F2D
Max. Frequency Separation	
MaxTrac LPI 50:	12 MHz
MaxTrac LPI 300:	28 MHz
Audio Distortion:	5% measured per EIA
Output Impedance:	50 Ohms
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1kHz
RECEIVER	
Channel Spacing:	30 kHz
Sensitivity 12 dB SINAD:	0.30 uV
Intermodulation EIA SINAD	
MaxTrac LPI 50:	−75 dB
MaxTrac LPI 300:	–78 dB
Spurious & Image Rejection	
MaxTrac LPI 50:	−75 dB
MaxTrac LPI 300:	−80 dB
Selectivity EIA SINAD	
MaxTrac LPI 50:	–75 dB
MaxTrac LPI 300:	-80 dB
Audio Output:	3 Watts (5 Watts with optional external speaker) at less than 5% distortion
Frequency Stability (-30°C to +60°C,	
25°C ref.):	±0.0005%
Max. Frequency Separation	
MaxTrac LPI 50:	12 MHz
MaxTrac LPI 300:	28 MHz
Output Impedance:	50 Ohms

Performance Specifications for MaxTrac 50 VHF Mobile Radios

GENERAL

Model Series:	D33MJA	D34MJA				
Typical RF Output:	25 Watts	45 Watts				
Frequency (MHz):	146–174	•				
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198 mm)					
Primary Voltage Input:	13.8 Volts DC					
Weight:	61 oz. (1.73 kg)					
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 9.5 Amps 15.0 Amps 400 milliAmps 400 milliAmps					
Channel Capability:	2 channels					
Squelch Capability:	Private-Line, Digital Private-Line, coded s	quelch and/or carrier squelch				
External Speaker (Option):	5 Watts					
FCC Designation:	ABZ89FT3712	ABZ89FT3730				

TRANSMITTER

Spurious & Harmonic Emissions:	–57 dB	–60 dB
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	
Max Frequency Separation	11.2 MHz	
Audio Distortion:	5% measured per EIA	
Output Impedance:	50 Ohms	
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1 kHz	

RECEIVER

Channel Spacing:	30 kHz	
Sensitivity 12 dB SINAD:	0.30 uV	
Intermodulation EIA SINAD:	–75 dB	
Spurious & Image Rejection:	–75 dB	
Audio Output:	3 Watts (5 Watts with optional speaker) at less than 5% distortion	
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Max Frequency Separation	11.2 MHz	
Output Impedance:	50 Ohms	

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

Performance Specifications for MaxTrac 100/300 VHF Mobile Radios

GENERAL

GENERAL		
Model Series:	D33MJA	D43MJA
Typical RF Output:	25 Watts	45 Watts
Frequency (MHz):	136–162	146–174
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198 mm)	
Primary Voltage Input:	13.8 Volts DC	
Weight:	54 oz. (1.51 kg)	
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 9.5 Amps 400 milliAmps	1.5 Amps 15.0 Amps 400 milliAmps
Channel Capability: MaxTrac 100: MaxTrac 300:	2 channels 6, 16, or 32 channels	
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch	
External Speaker (Option):	5 Watts	
FCC Designation:	ABZ89FT3712	ABZ89FT3730
Spurious & Harmonic Emissions:	–57 dB	-60 dB
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	
Max Frequency Separation 136–172 MHz: 146–174 MHz:	26 MHz 28 MHz	
Audio Distortion:	5% measured per EIA	

RECEIVER

Output Impedance:

Modulation Sensitivity:

Channel Spacing:	30 kHz	
Sensitivity 12 dB SINAD:	0.30 uV	
Intermodulation EIA SINAD:	–78 dB	
Spurious & Image Rejection:	-80 dB	
Selectivity EIA SINAD:	80 dB	
Audio Output:	3 Watts (5 Watts with optional speaker) at less than 5% distortion	
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Max Frequency Separation 136–172 MHz: 146–174 MHz:	26 MHz 28 MHz	
Output Impedance:	50 Ohms	

80 mV rms for 60% max. deviation @ 1 kHz

50 Ohms

Performance Specifications for MaxTrac LPI UHF Mobile Radio

GENERAL

Band:	UHF
Model Series:	D04MJA
Typical RF Output:	2 Watts
Frequency:	449–470 MHz
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198mm)
Primary Voltage Input:	13.8 Volts DC
Weight:	61 oz. (1.73 kg)
Typical Current Drain	
Receive (5W):	1.5 Amps
Transmit:	2.5 Amps
Standby:	400 milliAmps
Channel Capability	
MaxTrac LPI 50:	2 channels
MaxTrac LPI 300:	6, 16, or 32 channels
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch
External Speaker (Option):	5 Watts
TRANSMITTER	
Spurious & Harmonic	
Emissions:	-46 dBc
Frequency Stability	
$(-30^{\circ}\text{C to }+60^{\circ}\text{C},$	
25°C ref.):	±0.0005%
Modulation:	16K0F1D, 16K0F3E, 15K0F2D
Max. Frequency Separation	
MaxTrac LPI 50:	10 MHz
MaxTrac LPI 300:	21 MHz
Audio Distortion:	5% measured per EIA
Output Impedance:	50 Ohms
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1kHz
RECEIVER	
Channel Spacing:	25 kHz
Sensitivity 12 dB SINAD:	0.30 uV
Intermodulation EIA SINAD	
MaxTrac LPI 50:	−70 dB
MaxTrac LPI 300:	-75 dB
Spurious & Image Rejection	
MaxTrac LPI 50:	-70 dB
MaxTrac LPI 300:	-75 dB
Selectivity EIA SINAD	
MaxTrac LPI 50:	-70 dB
MaxTrac LPI 300:	-75 dB
Audio Output:	3 Watts (5 Watts with optional external speaker) at less than 5% distortion
Frequency Stability	
$(-30^{\circ}\text{C to }+60^{\circ}\text{C},$	
25°C ref.):	±0.0005%
Max. Frequency Separation	
MaxTrac LPI 50:	10 MHz
MaxTrac LPI 300:	21 MHz
Output Impedance:	50 Ohms
SPECIFICATIONS SUBJECT	T TO CHANGE WITHOUT NOTICE
	-

Performance Specifications for MaxTrac 50 UHF Mobile Radios

GENERAL

Model Series:	D34MJA	D44MJA
Typical RF Output:	25 Watts	40 Watts
Frequency (MHz):	449–470	
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198 mm)	
Primary Voltage Input:	13.8 Volts DC	
Weight:	61 oz. (1.73 kg)	
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 9.5 Amps 400 milliAmps	1.5 Amps 12.5 Amps 400 milliAmps
Channel Capability:	2, 6, 16, or 32 channels	
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch	
External Speaker (Option):	5 Watts	
FCC Designation:	ABZ89FT4713	ABZ89FT4725

TRANSMITTER

Spurious & Harmonic Emissions:	–57 dB	–60 dB
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	
Max Frequency Separation	21 MHz	
Audio Distortion:	5% measured per EIA	
Output Impedance:	50 Ohms	
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1 kHz	

RECEIVER

25 kHz
0.30 uV
-70 dB
70 dB
3 Watts (5 Watts with optional speaker) at less than 5% distortion
+0.0005% (-30°C to +60°C, 25°C ref.)
21 MHz
50 Ohms

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

Performance Specifications for MaxTrac 100/300 UHF Mobile Radios

GENERAL

Model Series:	D43MJA	D44MJA
Typical RF Output:	25 Watts	40 Watts
Frequency (MHz):	449–470 MHz	403–430 MHz; 449–470 MHz
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198 mm)	
Primary Voltage Input:	13.8 Volts DC	
Weight:	61 oz. (1.73 kg)	
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 9.5 Amps 400 milliAmps	1.5 Amps 12.5 Amps 400 milliAmps
Channel Capability: MaxTrac 100: MaxTrac 300:	2 channels 6, 16, or 32 channels	
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch	and/or carrier squelch
External Speaker (Option):	5 Watts	
FCC Designation:	ABZ89FT4713	ABZ89FT4741 (403–430 MHz) ABZ89FT4725 (449–470 MHz)
FRANSMITTER		
Spurious & Harmonic Emissions:	–57 dB	-60 dB
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	
Max Frequency Separation 403–430 MHz 449–470 MHz	27 MHz 21 MHz	
Audio Distortion:	5% measured per EIA	
Output Impedance:	50 Ohms	
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1 kHz	
RECEIVER		
Channel Spacing:	25 kHz	
Sensitivity 12 dB SINAD:	0.30 uV	
Intermodulation EIA SINAD:	–75 dB	
Spurious & Image Rejection:	–75 dB	
Selectivity EIA SINAD	–75 dB	
Audio Output:	3 Watts (5 Watts with optional speaker) at less that	n 5% distortion
Frequency Stability:	+0.0005% (-30°C to +60°C, 25°C ref.)	
Max Frequency Separation 403-430 MHz 449-470 MHz	27 MHz 21 MHz	

Performance Specifications for MaxTrac 100/300/800 MHz Mobile Radios

GENERAL

Model Series:	D35MJA	D45MJA
Typical RF Output:	15 Watts *	35 Watts *
Frequency (MHz):	TX: 806–825 MHz; 851–870 MHz: T/A RX: 851–870 MHz	
Dimensions (H x W x L):	2" x 7" x 9.9" (50.8 x 178 x 251mm)	
Primary Voltage Input:	13.8 Volts DC	
Weight:	76 oz. (2.16 kg)	
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 7.5 Amps 400 milliAmps	1.5 Amps 15.0 Amps 400 milliAmps
Channel Capability MaxTrac 100: MaxTrac 300:	2 channels 6, 16, or 32 channels	
Squelch Capability:	Private-Line, Digital Private-Line, coded squelch and/or carrier squelch	
External Speaker (Option):	5 Watts	
FCC Designation:	ABZ89FT5672 ABZ89FT5677 (Talkaround) ABZ89FT5709	

TRANSMITTER

Spurious & Harmonic Emissions:	ns: -55 dB -59 dB	
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)	
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	7.01
Max Frequency Separation:	19 MHz	
Audio Distortion:	5% measured per EIA	
Output Impedance:	50 Ohms	
Modulation Sensitivity:	80 mV rms for 60% max. deviation @ 1 kHz	

RECEIVER

Channel Spacing:	25 kHz
Sensitivity 12 dB SINAD:	0.40 uV
Intermodulation EIA SINAD:	-68 dB
Spurious & Image Rejection:	–70 dB
Selectivity EIA SINAD:	−68 dB
Audio Output:	3 Watts (5 Watts with external speaker) at less than 5% distortion
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)
Max Frequency Separation:	19 MHz
Output Impedance:	50 Ohms

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

^{* 12} Watt in Talkaround * 20 Watt in Talkaround

Performance Specifications for MaxTrac 820 Trunked Mobile Radios

GENERAL

	•			
Model Series:	D35MQA D45MQA			
Typical RF Output:	15 Watts * 35 Watts *			
Frequency (MHz):	TX: 806–825 MHz; 851–870 MHz	z: T/A RX: 851–870 MHz		
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198mm) 2" x 7" x 9.9" (50.8 x 178 x 251mm)			
Primary Voltage Input:	13.8 Volts DC, Negative ground			
Weight:	61 oz. (1.73 kg)	76 oz. (2.16 kg)		
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 1.5 Amps 7.5 Amps 15.0 Amps 400 milliAmps 400 milliAmps			
Channel Capability:	20 Trunked channels			
Metering:	Adjustments and alignments are performed electronically and field maintenance software.	using an IBM PC, a Radio Interface Box (RIB),		
External Speaker (Option):	5 Watts			
FCC Designation:	ABZ89FT5672 ABZ89FT5677 (Talkaround)	ABZ89FT5709		
TRANSMITTER				
Spurious & Harmonic Emissions:	–55 dB	-59 dB		
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)			
Modulation:	16K0F3E, 16K0F1D, 15K0F2D			
Max Frequency Separation:	19 MHz			
Audio Distortion:	5% measured per EIA			
Output Impedance:	50 Ohms			
Audio Frequency Response:	+1 to -3 dB from 6 dB per octave pre-emphasis characte	ristic from 300 to 3000 Hz		
FM Hum and Noise (EIA method):	–40 dB			
RECEIVER				
Channel Spacing:	25 kHz			
Sensitivity 12 dB SINAD:	0.40 uV			
Intermodulation EIA SINAD:	-68 dB			
Spurious & Image Rejection:	-70 dB			
Selectivity EIA SINAD:	-68 dB			
Audio Output:	3 Watts (5 Watts with external speaker) at less than 5% di	stortion		
Frequency Stability:	+0.00025% (–30°C to +60°C, 25°C ref.)			
Max Frequency Separation:	19 MHz			
Output Impedance:	50 Ohms			
	, , , , , , , , , , , , , , , , , , , 			

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

* 12 Watt in Talkaround

* 20 Watt in Talkaround

Performance Specifications for MaxTrac 840 Trunked Mobile Radios

GENERAL

Model Series:	D35MWA	D45MWA	
Typical RF Output:	15 Watts *	35 Watts *	
Frequency (MHz):	TX: 806–825 MHz; 851–870 MH	z: T/A RX: 851–870 MHz	
Dimensions (H x W x L):	2" x 7" x 7–3/4" (50.8 x 178 x 198mm)	2" x 7" x 9.9" (50.8 x 178 x 251mm)	
Primary Voltage Input:	13.8 Volts DC, Negative ground		
Weight:	61 oz. (1.73 kg)	76 oz. (2.16 kg)	
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 7.5 Amps 400 milliAmps	1.5 Amps 15.0 Amps 400 milliAmps	
Channel Capability:	20 Trunked/10 Conventional		
Metering:	Adjustments and alignments are performed electronically using an IBM PC, a Radio Interface Box (RIB), and field maintenance software.		
External Speaker (Option):	5 Watts		
FCC Designation:	ABZ89FT5677 ABZ89FT5709		

TRANSMITTER

Spurious & Harmonic Emissions:	ns: -55 dB -59 dB		
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)		
Modulation:	16K0F3E, 16K0F1D, 15K0F2D	16K0F3E, 16K0F1D, 15K0F2D	
Max Frequency Separation:	19 MHz		
Audio Distortion:	5% measured per EIA		
Output Impedance:	50 Ohms		
Audio Frequency Response:	+1 to -3 dB from 6 dB per octave pre-emphasis characteristic from 300 to 3000 Hz		
FM Hum and Noise (EIA method):	-40 dB		

RECEIVER

Channel Spacing:	25 kHz
Sensitivity 12 dB SINAD:	0.40 uV
Intermodulation EIA SINAD:	−68 dB
Spurious & Image Rejection:	–70 dB
Selectivity EIA SINAD:	–68 dB
Audio Output:	3 Watts (5 Watts with external speaker) at less than 5% distortion
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)
Max Frequency Separation:	19 MHz
Output Impedance:	50 Ohms

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE
* 12 Watt in Talkaround

¹² Watt in Talkaround

^{* 20} Watt in Talkaround

Performance Specifications for SMARTNET MaxTrac Trunked Mobile Radios

GENERAL

Model Series:	D35MWA	D45MWA
Typical RF Output:	15 Watts * 35 Watts *	
Frequency (MHz):	TX: 806–825 MHz; 851–870 MHz	
Dimensions (H x W x L):	2" x 7" x 7-3/4" (50.8 x 178 x 198mm)	2" x 7" x 9.9" (50.8 x 178 x 251mm)
Primary Voltage Input:	13.8 Volts DC, Negative ground	
Weight:	61 oz. (1.73 kg)	76 oz. (2.16 kg)
Typical Current Drain Receive (5W): Transmit: Standby:	1.5 Amps 7.5 Amps 400 milliAmps	1.5 Amps 15.0 Amps 400 milliAmps
Channel Capability:	20 Trunked/8 Conventional	
Metering:	Adjustments and alignments are performed electronically using an IBM PC, a Radio Interface Box (RIB), and field maintenance software.	
External Speaker (Option):	5 Watts	
FCC Designation:	ABZ89FT5672	ABZ89FT5702

TRANSMITTER

Spurious & Harmonic Emissions:	-55 dB -59 dB		
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)		
Modulation:	16K0F3E, 16K0F1D, 15K0F2D		
Max Frequency Separation:	19 MHz		
Audio Distortion:	5% measured per EIA		
Output Impedance:	50 Ohms		
Audio Frequency Response:	+1 to -3 dB from 6 dB per octave pre-emphasis characteristic from 300 to 3000 Hz		
FM Hum and Noise (EIA method):			

RECEIVER

Channel Spacing:	25 kHz
Sensitivity 12 dB SINAD:	0.40 uV
Intermodulation EIA SINAD:	–68 dB
Spurious & Image Rejection:	-70 dB
Selectivity EIA SINAD:	-68 dB
Audio Output:	3 Watts (5 Watts with external speaker) at less than 5% distortion
Frequency Stability:	+0.00025% (-30°C to +60°C, 25°C ref.)
Max Frequency Separation:	19 MHz
Output Impedance:	50 Ohms

SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

* 12 Watt in Talkaround

^{* 20} Watt in Talkaround

MaxTrac FM Two-Way Radio Options

Option	Description	Adds	Deletes
B109	Handset	Handset Kit & Accessories	Compact Microphone & Hang-Up Kit
B113	Ignition Switch Cable	Cable Kit	
B18	5-Watt External Speaker	External Speaker & Mtg Hardware	Internal Radio Speaker
B20	DTMF Microphone	Touch Code Microphone	Compact Microphone
B221	External Alarms Relay/Cable/Switch Kit MaxTrac 300	Relay Kit Cable & Switch	
B239	Noise Cancelling Microphone	Noise-Cancelling Microphone	Compact Microphone
B308	Expanded Options Connector		
B382	Full Size Microphone	Full Size Microphone	Compact Microphone
B470	Emergency Footswitch	Footswitch	
B663	Extra Stability Mount	3-Point Mounting Bracket & Hardware	
B665	Control Station Operation	Power Supply Desk Microphone Mounting Tray	Compact Microphone & Hang-Up Kit
B674	External Alarms Relay/Cable/Switch Kit MaxTrac 100	Relay Kit Cable & Switch	
B688	Emergency Pushbutton	External Mount Pushbutton Switch	
B81	Keylock Mounting Trunnion	Keylock Mtg Installation Kit	Standard Installation Kit
Antenna	Options:		
B124	UHF 5 dB Gain Trunk Lip Mount		
B172	UHF 5 dB Gain Roof Mount		
B542	VHF/800 MHz 3 dB Gain Trunk Lip Mount		
B542	UHF 3.5 dB Gain Trunk Lip Mount		
B652	29.7–50 MHz Broad–Band		
B925	VHF/UHF 1/4 Wave Trunk Lip Mount		
B925	800 MHz Unity Gain Trunk Lip Mou	unt	
B926	VHF/800 MHz 3 dB Gain Roof Mou	unt	
B926	UHF 3.5 dB Gain Roof Mount		

MaxTrac Mobile Radio Service Aids, Tools, & Programming Devices

The following service aids are available through Motorola Communications Parts Division to facilitate servicing and programming of the *MaxTrac* Mobile Radio. Please contact 1–800–422–4210 for price and delivery.

01-80352A01	SERVICE AIDS TEST CABLE – Mini UHF to BNC cable (3 ft.) used for connecting the MaxTrac mobile to the RF test instruments.
01-80355A09	TEST ADAPTER – Attaches to the Program/Test cable in place of the RIB; used to manually key the radio and to inject a tone for troubleshooting purposes.
30-80373B41	VCO TEST CABLE - Provides the interface between the mobile's RF board and the test equipment for troubleshooting.
30-80373B42	TEST CABLE – Mini UHF to N-type RF coax (low loss) cable (14 inch) used for connecting the MaxTrac mobile to the RF test instruments.
RLN4137A	External Keying Plug – Used to place the radio in test mode and key the radio.
66-80388A26	SERVICE TOOLS CRIMPING TOOL – For customer installations requiring crimping of mini UHF RF connector (28–84606M01) onto antenna cable.
66–80947W01	EXTRACTION TOOL – Provides the ability to remove the terminal pins (29–84249N01) from the 16 pin Expanded Options Connector housing (15–80922V01).
	PROGRAMMING DEVICES
RPX-4719	RADIO SERVICE SOFTWARE LICENSING AND INFORMATION PACKAGE – Provides the necessary software licensing information required to purchase radio service software listed below.
RVN-4019	RADIO SERVICE SOFTWARE ON 5 1/4 IN. DISK – Operates on the IBM PC, XT, AT, or PERSONAL SYSTEM/2 family of computers for programming and servicing of the <i>MaxTrac</i> Mobile radios. IBM DOS 3.0 or higher, an RS–232 Asynchronous Serial Communications adapter and RAM memory of 512K bytes minimum are necessary for the programmer. This software provides the capability of changing the radio frequencies, squelch codes, and other radio parameters.
RVN-4020	RADIO SERVICE SOFTWARE ON 3 1/2 IN. DISK - Same as RVN-4019 descriptions.
RVN-4043	SMARTNET RADIO SERVICE SOFTWARE ON 5 1/4 IN. DISK – Operates on the IBM PC, XT, AT or PERSONAL SYSTEM/2 family of computers for programming and servicing of the SMARTNET MaxTrac mobile radios. IBM DOS 3.0 or higher, an RS–232 Asynchronous Serial Communications Adapter and RAM memory of 512K bytes minimum are necessary for the programmer. This software provides the capability of changing the radio frequencies, squelch codes and other radio parameters.
RVN-4044	SMARTNET RADIO SERVICE SOFTWARE ON 3 1/2 IN. DISK – Same as RVN–4043 description.
RLN-4008	RADIO INTERFACE BOX (RIB) – Voltage level shifter to enable the communications between the radio and the computers RS–232 Asynchronous Serial Communications Adapter. Requires the Wall Mount Power Supply (01–80357A57).
01-80357A57	WALL MOUNT POWER SUPPLY - Used to supply power to the RIB. For 120 VAC use only.
01-80359A29	MAXTRAC DUPLEX PROGRAMMING ADAPTER – Used on all T25CPA series models. The 01–80359A29 adapter must be used in conjunction with the 30–80070N01 Program/Test Cable and the RLN–4008 Radio Interface Box to program the radio.
30-80070N01	PROGRAM/TEST CABLE – Provides the electrical interconnection from the programming receptacle inside the radio to the RIB (RLN–4008) programming the <i>SMARTNET MaxTrac</i> mobile radio.
30-80369B71	COMPUTER INTERFACE CABLE – Used to connect the IBM PC, XT, PC CONVERTIBLE or PERSONAL SYSTEM/2 computer's Asychronous Serial Communications Adapter to the RIB (01–80353A72). The previously offered 01–80357A44 Computer Interface Cable will provide the proper connections.
30-80369B72	COMPUTER INTERFACE CABLE – Used to connect the IBM AT computer's Asychronous Serial Communications Adapter to the RIB (01–80353A74.) The previously offered 01–80357A64 Computer Interface Cable will provide the proper connections.

SERVICE MANUALS/OPERATING INFORMATION

	SERVICE MANUALS/OPERATING INFORMATION	
•	Service manuals for: Conventional MaxTrac	CoveragePlus MaxTrac 68–80103W07 Privacy Plus 900 MaxTrac (B2,B3) 68–02977G11 Privacy Plus 900 MaxTrac (B6,B7) 68–02977G12 SMARTNET 900 MaxTrac 68–02979G91 SMARTNET 900 MaxTrac (C5) with Scan 68–02979G92 SMARTNET 900 MaxTrac (C5) with Search 68–02979G93 Operator's manuals for:
	Operators cards for:	<i>MaxTrac 50</i>
	MaxTrac 50 68-80900Z17 MaxTrac 50/100 68-80900Z99 MaxTrac 100 68-80101W68 MaxTrac 300 (6 Channel) 68-80101W96 MaxTrac 300 (16 Channel) 68-80900Z46 MaxTrac 300 (16 Channel w/MDC-1200 Signalling) 68-80900Z26 MaxTrac 300 (16 Channel w/Selective Signalling) 68-80901Z01 Privacy Plus 820 MaxTrac (B1,B3,B5) Trunked 68-80901Z01 Privacy Plus 820 MaxTrac (B4) Dual Mode 68-80900Z50 Privacy Plus 840 MaxTrac (B6) Dual Mode without Scan 68-80900Z51 Privacy Plus 840 MaxTrac (B7) Dual Mode with Scan 68-80900Z52 SMARTNET 800 MaxTrac (C3) 68-80900Z74 SMARTNET 800 MaxTrac (C5,C6) Dual Mode with Scan	MaxTrac 100/300 68-80900Z04 Privacy Plus 820 MaxTrac (B1,B3,B5) Trunked 68-80900Z54 Privacy Plus 820 MaxTrac (B4) Dual Mode 68-80900Z54 Privacy Plus 840 MaxTrac (B6) 68-80900Z54 Privacy Plus 840 MaxTrac (B7) Dual Mode with Scan 68-80900Z54 SMARTNET 800 MaxTrac (C3) 68-80102W37 SMARTNET 800 MaxTrac (C5,C6) 68-80102W37 Dual Mode with Scan 68-80102W37 SMARTNET 800 (C5,C6) Dual Mode with Search 68-80102W37 CoveragePlus MaxTrac 68-80103W07 Privacy Plus 900 MaxTrac (B2,B3) 68-02977G15 Privacy Plus 900 MaxTrac (B6,B7) 68-02979G75 SMARTNET 900 MaxTrac (C5) with Scan 68-02979G75 SMARTNET 900 MaxTrac (C5) with Search 68-02979G75 SMARTNET 900 MaxTrac (C5) with Search 68-02979G75
	SMARTNET 800 (C5,C6) Dual Mode with Search 68–80900Z76	MaxTrac 888
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General Information



1. Description

This section of the manual includes a general system troubleshooting guide and a basic troubleshooting chart to assist in isolating radio problems to board level.

The other sections of this manual troubleshoot down to component level. A number of parts in the MaxTrac radio, which are not field serviceable, are identified in the schematics in shaded areas. Field replacement of these parts will affect the factory calibrated numbers on the tuning label. If any of these parts are found to be defective, board replacement is the only acceptable means of repair.

Replacement of the Logic Board, RF Board, or Power Amplifier requires that recalibration be performed using the Motorola Radio Service Software. Therefore, it is strongly advised that the servicer become familiar with the programming techniques applicable to the MaxTrac Radios.

A personal computer capable of running the MaxTrac RADIO SERVICE SOFTWARE package (RVN4019C for 5.25 inch drives and RVN4020C for 3.5 inch drives) is required in addition to the items listed in the Recommended Test Equipment Section. Refer to MaxTrac Mobile Radio Service Aids, Tools, and Programming Devices for more information on equipment requirements.

Failure to perform the required calibration procedure will affect performance of the Reference Oscillator, RF Power Leveling and Protection, and Transmitter Modulation over frequency and temperature. An uncalibrated radio may not comply with FCC rules and may be unreliable at temperature extremes.

2. Recommended Test Equipment

The following is a list of recommended equipment, with which the servicer of *MaxTrac* radios can be as flexible and effective as possible.

(1) R2001D Communications System Analyzer. This analyzer utilizes a microprocessor to control more than 16 different functions associated with performing tests and analyzing problems on the MaxTrac radios. The R2001D can be upgraded to a R2021D Trunking Systems

Analyzer by adding a Trunking Systems Option Board (RPX4392A).

- (2) R2021D Trunking Systems Analyzer. This analyzer includes all the functions of the R2001D plus a trunking service option which allows the servicer to "final test" a MaxTrac mobile in a simulated trunking system. The R2021D will provide the necessary signalling to change frequencies and allow "handshaking" between the MaxTrac mobile and a simulated system controller.
- (3) R2200 Communications Service Monitor. This unit contains all the features necessary to service MaxTrac radios. The R2200 cannot be upgraded to a trunking system analyzer.
- (4) DC Multimeter/Milliohmmeter. This is a general purpose instrument for troubleshooting. Recommended equipment is the Motorola R-1047/1048 Digital Multimeter.
- (5) High Current Power Supply. This power supply must be capable of handling at least 10–15 amps. Recommended equipment is the Motorola R–1011 Power Supply.
- (6) RF Millivoltmeter. This device is used for measuring the RF sections of the MaxTrac. Recommended equipment is the Motorola S1339A RF Millivoltmeter.

3. Recommended Repair Equipment

The following is a list of repair equipment recommended for the repair of the *MaxTrac* printed circuit boards.

- (1) RSX4057A Repair Station. This device is recommended for replacing leadless chip carriers on MaxTrac radio boards. With it, desoldering and soldering is accomplished by controlling the flow of hot air through accessory precision heat focus heads. A spring loaded mechanism automatically senses solder melt and removes the component from the printed circuit board.
- (2) Miniature Digital Readout Soldering Station. Motorola Part Number 01–80386A81.
- (3) Leadless Component Extractor. Motorola Part Number 66–80387A59. A desoldering device for safe removal of leadless components.

technical publication services

Table 1. Conventional Radio Error Tones

TONE	PROBLEM	
High-pitch beep (900 Hz 119 ms) on turn on or when key pressed.	Normal operation — no error.	
Low-pitched tone (163 Hz) for 5 seconds following turn on.	Code plug error. For all code plug errors, try to re-program radio. If this does not clear the fault or if problem recurs, replace the logic board.	
Low frequency (163 Hz) continuous tone present whenever radio is on.	Logic board failure. Refer to Logic Board Section for troubleshooting.	
Low pitch beep (300 Hz 200 ms) when a button is pressed.	Do not press that button in the current operating condition. Change operating condition (select another mode, etc.).	
Low frequency (150 Hz or 112.5 Hz) continuous tone while PTT is held.	Transmit is not allowed. If it was time—out—timer, you may release PTT then continue your call.	

Table 2. Trunking Radio Error Tones

TONE	PROBLEM	
Low pitched tone (163 Hz) for 5 seconds after turn on.	Try to re-program tuning codeplug. If this does not clear the fault or of the problem recurs, replace the logic board.	
Volume set tone (450 Hz) for 1 second, followed by illegal function tone after turn on.	Re-program or replace the trunking codeplug.	
Continuous pattern of one beep (1000 Hz) followed by a pause after turn on.	Microprocessor RAM failure. Replace logic board.	
Continuous pattern of two beeps (1000 Hz) followed by a pause after turn on.	External RAM failure. Replace logic board.	
Continuous pattern of three beeps (1000 Hz) followed by a pause after turn on.	Watchdog error. Re-program the microprocessor CONFIG register. If the error still exists, replace the logic board.	
Continuous pattern of five beeps (1000 Hz) followed by a pause after turn on.	External ROM checksum failure. Re-program or replace external ROM.	

(4) Power Desoldering System. Motorola Part Number 01-80333B61. An excellent power solder removal system, complete with temperature controlled hollow tip iron. Aids in cleaning plated through holes of solder.

4. General Troubleshooting

The MaxTrac radio consists of five major sections:

- Front Panel
- Logic Board
- RF Board
- Power Amplifier
- Unified Chassis.

Each radio section is covered by theory of operation, troubleshooting information, schematics, board overlays, and parts lists. The troubleshooting section includes troubleshooting flow charts, tables, and descriptive text. The schematics show voltage levels and waveforms as needed.

5. Preliminary Checks

The MaxTrac radio goes through a self check of the control logic section upon initial turn on. If the radio passes the self test, a single high-pitched, short-duration beep (900 Hz) sounds. If other types of tones or tone sequences are heard, the

self test has failed. Refer to Table 1 for conventional radio error tones and Table 2 for trunked radio error tones.

The error tone tables will help direct the servicer to the appropriate section(s) of the manual for troubleshooting information.

6. Trunked FM Radio Test Mode Routine

6.1 GENERAL

In normal field operation, the microcomputer in the radio controls RF channel selection, transmitter key-up, and receiver muting functions. However, when the unit is on the bench and is out of its normal operating environment, the microcomputer does not key the PA or unmute the receiver, and this prevents use of normal test procedures. To solve this problem, a special test routine has been incorporated into the radio.

6.2 INITIAL SETUP

To enter the TEST mode, short across VR806 on the Logic Board prior to turning the radio on. This grounds the Serial Data Input (SERIAL BUS +). To exit the TEST mode, turn the radio off, remove the short, then turn the radio back on.

There are seven TEST frequencies: three fixed TEST mode frequencies (see Table 3), and four control channel frequencies of the system selected when the TEST mode was entered.

Table 3. Fixed Test Mode Frequencies

TEST MODE CHANNEL	RECEIVE FREQUENCY	TRANSMIT FREQUENCY
1	851.0125 MHz	806.0125 MHz
2	869.9875 MHz	824.9875 MHz
3	860.5125 MHz	815.5125 MHz

Operation of the radio in TEST mode is described in the following paragraphs and is the same whether using the customer code plug frequencies or the internal plug test frequencies.

6.3 CHANNEL SELECTION AND RECEIVE MODE

- (1) Short across VR806 (as described above). Apply power to the radio. A single 450 Hz beep in the speaker indicates operation on test mode Channel 1 (CH1), after which the receiver unmutes.
- (2) Step the radio to the next channel by tapping the microphone PTT button (push the PTT and release it within 200 milliseconds). Two beeps in the speaker indicate CH2, after which the receiver unmutes. Repeat this procedure to step the receiver from CH1 through CH7 with the number of beeps indicating the chosen test channel. (CH1 through CH3 are fixed test mode frequencies.)

Note

The test mode cycles, which means that the radio reverts back to the first frequency (CH1) after the last possible test mode frequency.

6.4 TRANSMITTER ALIGNMENT MODES OF OPERATION

Four transmit modes are used for various transmitter checks and adjustments.

(1) Transmit Mode 1: Silent Carrier

On a given test channel, when the microphone PTT button is pressed once and held, the microcomputer keys the PA without data modulation, and MIC audio is enabled. In this mode, the transmitter frequency, hum and noise, and voice deviation can be checked and adjusted.

When the PTT button is released, the PA is de-keyed and the receiver unmutes.

(2) Transmit Mode 2: Sub-audible Connect Tone Plus Voice (Low-Speed Mode)

If the microphone PTT button is pressed and held the second time, the power amplifier is keyed with low-speed sub-audible tone modulation, and a pulsed 150 Hz tone is heard at the speaker. This 150 Hz tone is the BUSY

tone. This procedure is used to adjust the maximum voice plus sub-audible tone deviation. Deviation levels are shown below.

- 3.7 kHz deviation for voice
- 1 kHz deviation for sub-audible connect tone
- 4.7 kHz deviation total

When the PTT button is released, the PA is de-keyed and the receiver unmutes.

Note

The low-speed sub-audible tone may be 76.60 Hz, 83.72 Hz, 90.00 Hz, 97.30 Hz, 105.88 Hz, 116.13 Hz, 128.57 Hz, or 138.46 Hz. The specific tone is coded in the codeplug, and is a specific tone for a specific system.

(3) Transmit Mode 3: High-Speed Acknowledge Tone (High-Speed Mode)

If the microphone PTT button is pressed and held for the third time, the PA is keyed with 1800 Hz tone modulation. The MIC audio is disabled and a 900 Hz alert tone is heard at the speaker. This tone is known as talk permit. This step is used to check high-speed data deviation. The deviation level should be 2.4 kHz to 3.1 kHz.

When the PTT button is released, the PA is de-keyed and the receiver remains muted.

(4) Transmit Mode 4: DTMF Transmit Mode

If the microphone PTT button is pressed and held for the fourth time, the PA is keyed and modulated with DTMF for the # button (combination of a 1477 Hz and a 973 Hz tone).

The MIC audio is disabled and a unique tone is heard at the speaker. This tone is known as the Dynamic Regrouping tone. This step is used to check the DTMF deviation (for the DTMF generated by the auto-dial feature). The deviation level should be 3 kHz to 4.5 kHz.

When the PTT button is released, the PA is de-keyed and the receiver remains muted.

Note

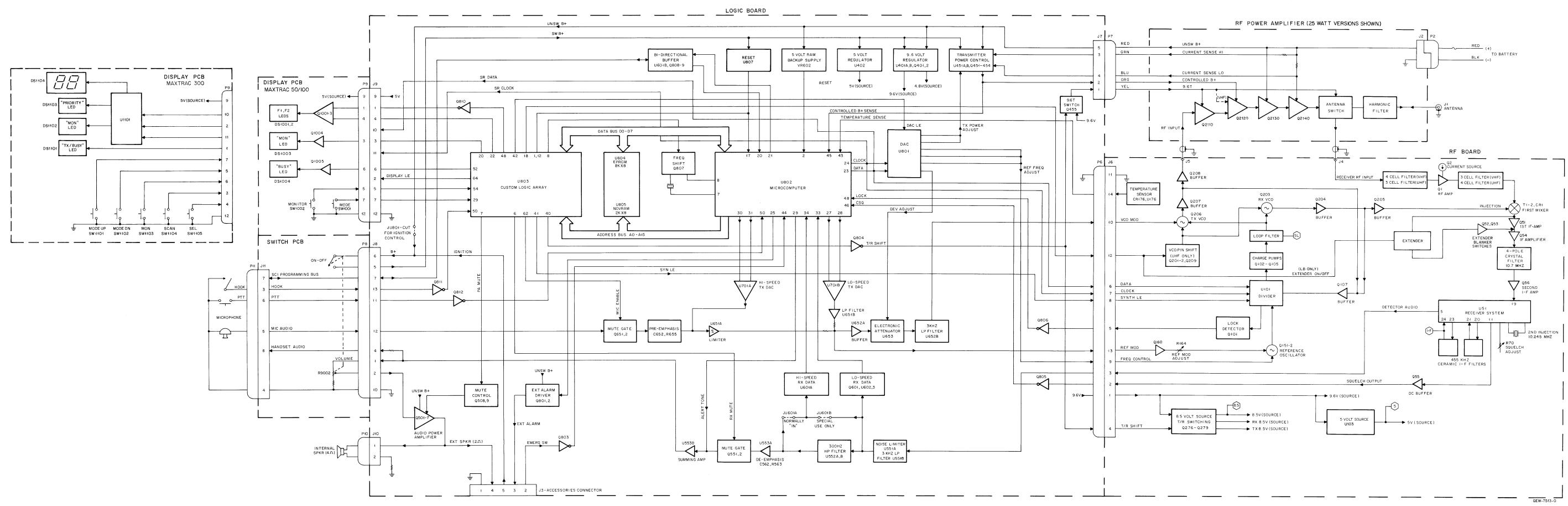
Repeated pressing and releasing the PTT button cycles the radio through the four modes described above.

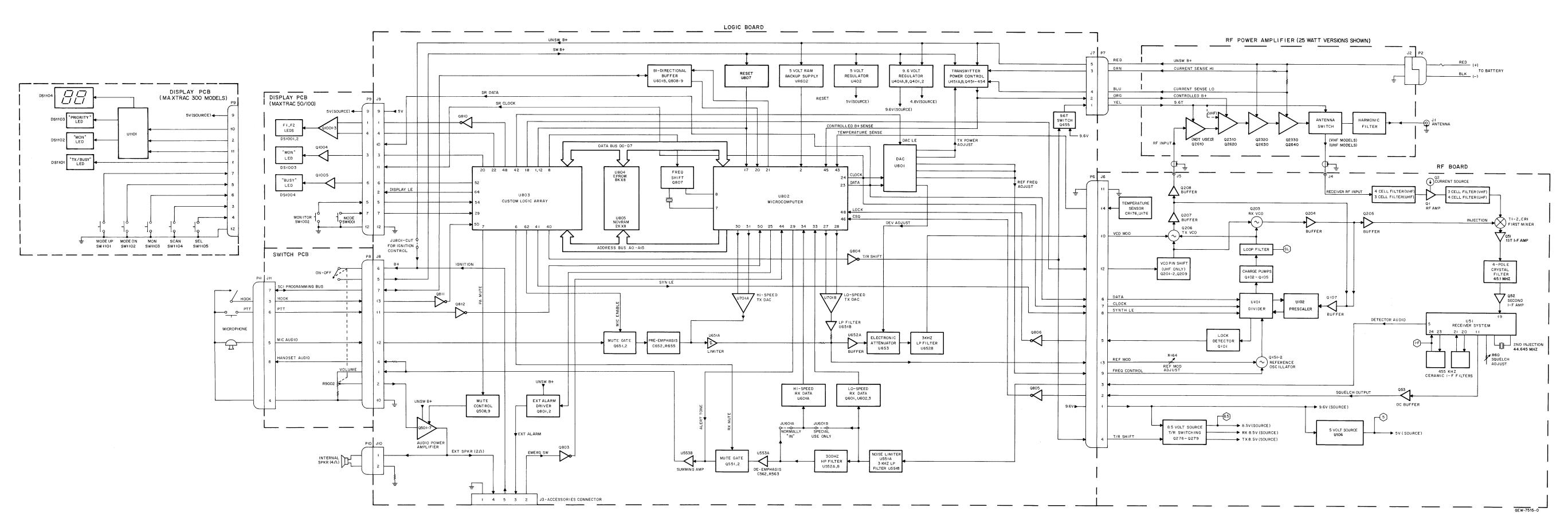
Note

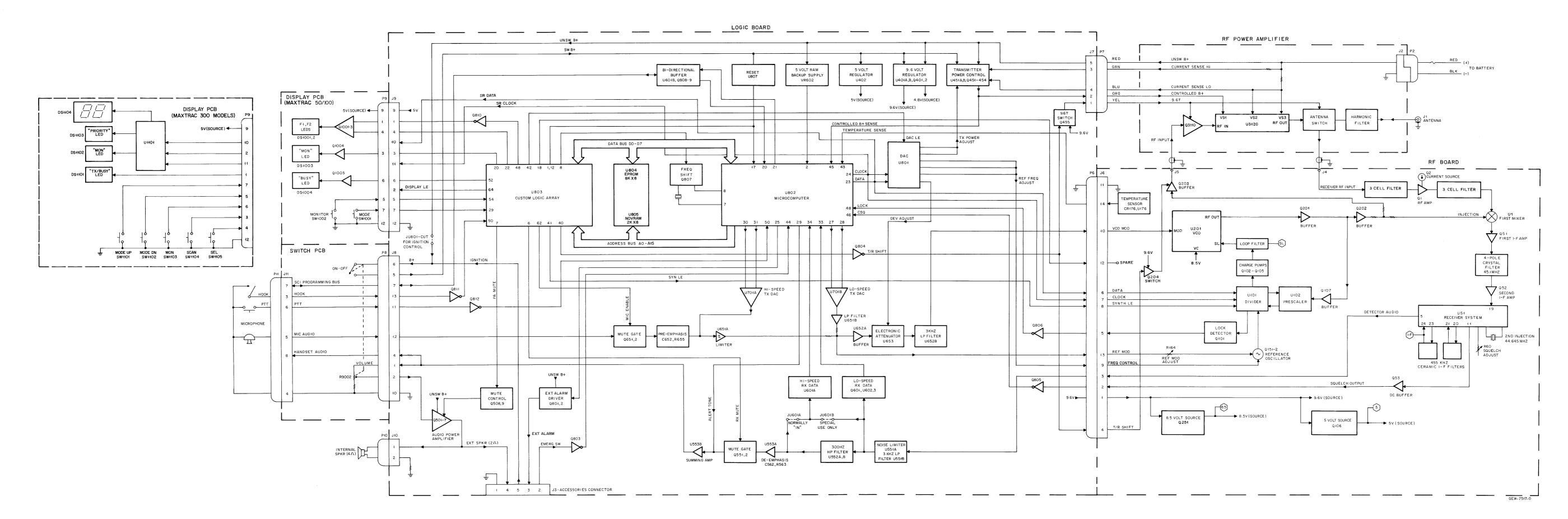
If any of the above tests indicate that adjustment of the transmitter deviation is necessary, refer to the *MaxTrac* RADIO SERVICE SOFTWARE package for procedures.

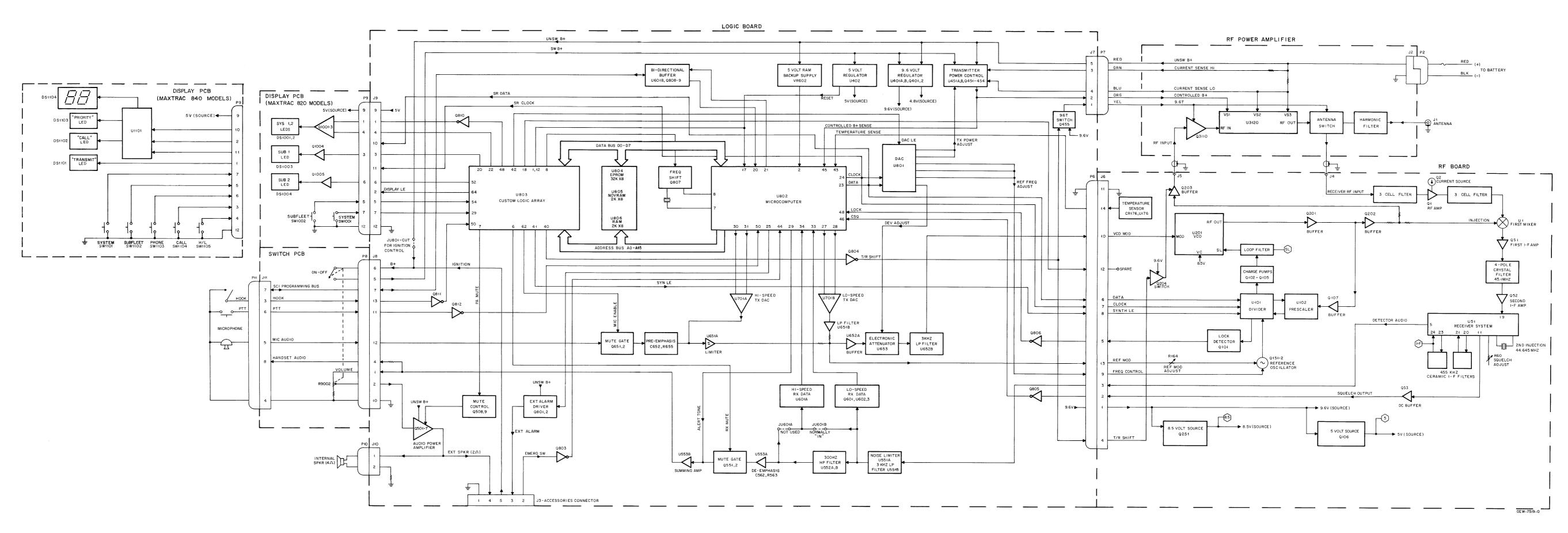
Table 4. General System Troubleshooting Guide

SYMPTOM	POSSIBLE TROUBLE SOURCE	REFER TO CHART OR DIAGRAM
No Receive Audio.	Red Lead Fuse. Audio PA. Squelch. Synthesizer Out of Lock. Receiver Front End. Receiver Back End.	None, check fuse. "NO/LOW AUDIO" Chart. "BAD SQUELCH or PL/DPL" Chart. "SYNTHESIZER/VCO" Chart. "RECEIVER" Chart. "RECEIVER" Chart.
Distorted Audio.	Audio PA. QUAD Detector. IF Amplifiers.	"NO/LOW AUDIO" Chart. "RECEIVER" Chart. "RECEIVER" Chart.
Failure to Squelch.	Squelch Circuit. Audio Mute Gate. Microcomputer.	"BAD SQUELCH or PL/DPL" Chart. Logic Board Schematic. Logic Board Schematic.
Failure to Unsquelch.	Microcomputer.	Logic Board Schematic.
Absence of PL/DPL ENCODE/DECODE.	Microcomputer. Logic Board Audio Circuitry.	Logic Board Schematic. Logic Board Schematic.
Poor Receiver Sensitivity.	RF Amplifier. First Mixer. First IF Amplifier. QUAD Detector. Second IF Amplifier.	"RECEIVER" Chart and Receiver Schematic.
Synthesizer Fails to Lock.	Synthesizer. VCO. Microcomputer.	"SYNTHESIZER/VCO" Chart. "SYNTHESIZER/VCO" Chart. Logic Board Schematic.
Absence of RF Power Output.	Power Control Circuitry. Keyed 9.6 Voltage. Synthesizer. Transmit VCO. PA Transistors.	Logic Board Schematic. "NO PTT" Chart. "SYNTHESIZER/VCO" Chart. "SYNTHESIZER/VCO" Chart. PA Schematic.
Absence of Power Control.	Power Control Circuitry. Microcomputer.	Logic Board Schematic. Logic Board Schematic.
Absence of Transmitter Modulation.	Logic Board Transmit Audio. VCO. Microcomputer.	"BAD TX MODULATION" Chart. "SYNTHESIZER/VCO" Chart. Logic Board Schematic.
Improper Microphone Sensitivity.	Logic Board Transmit Audio. Microcomputer. VCO.	"BAD TX MODULATION" Chart. Logic Board Schematic. "SYNTHESIZER/VCO" Chart.
Alternator Whine.	Excessive Whine in Vehicle.	Manual 68P81109E33.

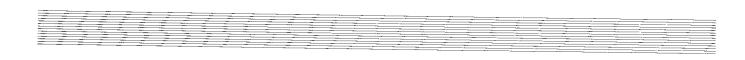












1. Theory Of Operation

The *MaxTrac* Radio has two different front panels. *MaxTrac* Models 50, 100, and 820 use the Dual Mode front panel. The *MaxTrac* Models 300 and 840 use the 6/16/32 Mode front panel. Each Front panel assembly consists of a display board and a switch board. The switch board is common to all *MaxTrac* Models.

1.1 DUAL MODE DISPLAY BOARD

1.1.1 Description

The MaxTrac Models 50, 100, and 820 use the Dual Mode Display Board. The difference between trunking and conventional models is the way the controls and indicators are labeled.

1.1.2 Operation

To select a particular system or Channel LED, the microprocessor (U802) changes the state of P9–4 (CH1/CH2). When Channel One is selected, P9–4 is a logic level low and Q1003 is in cut off. This action places an open on the cathode of DS1002, and allows +5V DC to be applied to the base of Q1001 via R1005 and R1006. Q1001 enables DS1001 by placing a ground on its cathode. If Channel Two is selected, +2.7V DC is seen on P9–4, causing Q1003 to conduct and Q1001 to cut off. This action places a ground on the cathode of DS1002 while removing the ground from DS1001.

To select the color of the System/Channel LED, the microprocessor changes the state of P9–1 (TX/RX). In receive, this line is +2.1V DC, causing the green side of the selected dual LED to illuminate. At the same time, Q1002 is being saturated, grounding the red anodes and preventing them from turning on. In transmit, P9–1 is grounded, which turns off the green LED and Q1002. Via R1004, Q1002 removes the ground from, and applies +5V DC to, the red anodes.

P9-3 and P9-6 control the illuminating of DS1003 and DS1004 respectively. DS1003 acts as the Monitor or Subfleet

A Indicator. DS1004 acts as the Busy or Subfleet B Indicator. To illuminate the LED, the microprocessor must raise the respective control line to +2.7V DC. This turns on Q1004 or Q1005 which provides a ground path for the LED.

SW1001 (Mode/System) and SW1002 (Monitor/Subfleet) are connected to P9–7 and P9–5. Normally, these lines are +5V DC. When the associated button is pressed, it places a ground on the line being read by the microprocessor.

1.2 6/16/32 MODE DISPLAY PANEL

1.2.1 Description

The 6/16/32 Mode Display board consists of three separate LED's (DS1101–3), five normally open switches (SW1101–5), a dual 7–segment LED display (DS1104), and a Display Driver (U1101).

1.2.2 Operation

After power up, the microprocessor (U802) loads U1101 with information using SERIAL DATA (P9–10), SERIAL CLOCK (P9–11), and DISPLAY ENABLE (P9–2). This data tells U1101 which segments and LED's to illuminate. Note that DS1101 is controlled directly by the logic board via P9–1.

U1101 is a Shift Register Latch. When a ground appears on a particular output, the associated LED illuminates. When the LED is to remain off, the O/P from U1101 will be an open. It is important to note that the LED's cathode will be +3.15V DC when on and +3.5V DC when off.

DS1104 is the Display Unit LED. Note that the decimal points are not connected and the common anodes are tied directly to +5V DC. To illuminate a segment, U1101 pulls the segments cathode line to ground.

SW1101 through SW1105 are normally-open momentary pushbutton switches. SW1101 and SW1102 are the Mode up/down switches; SW1103-SW1105 are Option Select buttons.

1.3 SWITCH BOARD

The Switch Board, common to all *MaxTrac* Models, consists of:

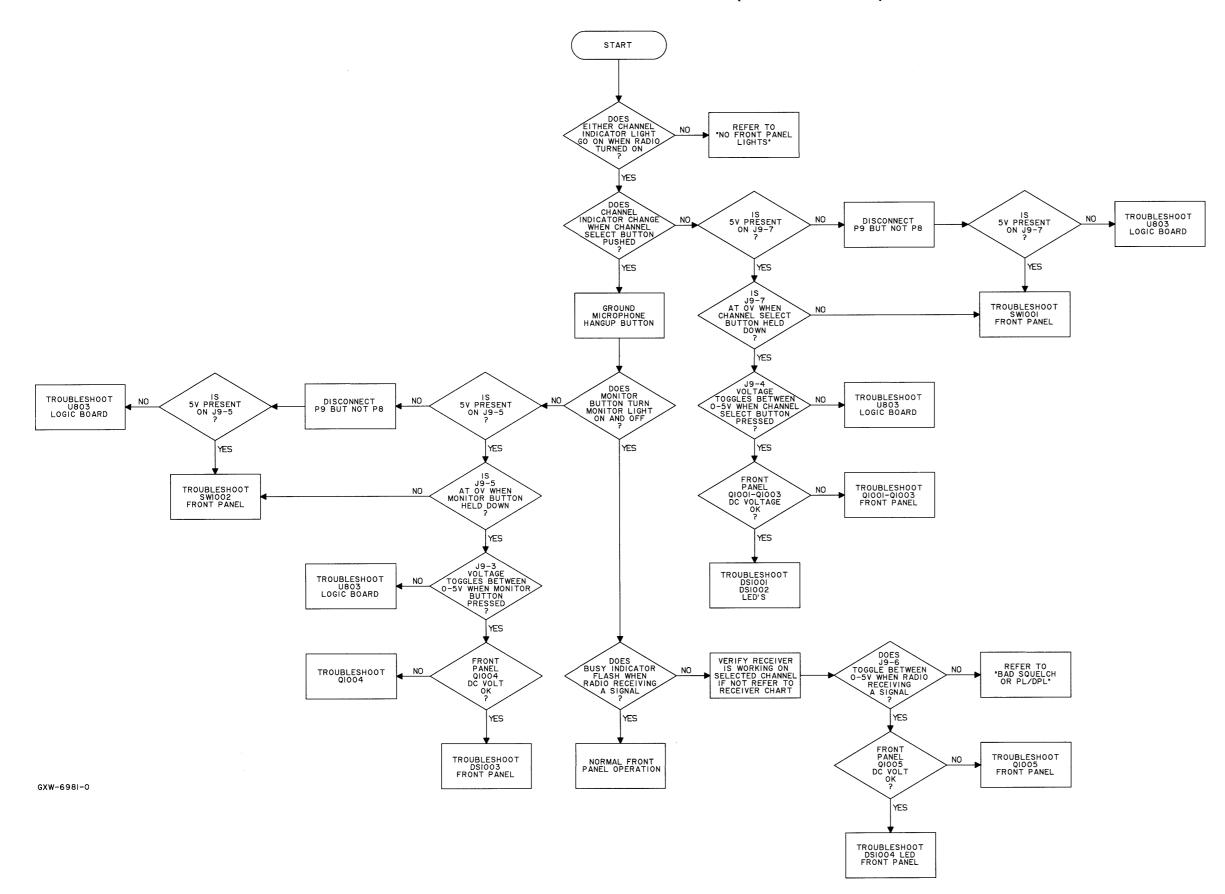
- R9001 Fixed Resistor
- R9002 ON/OFF Volume Control
- J11 Microphone Jack
- Printed Circuit Board

Use continuity checks and ohmic measurements to verify proper operation of the switch board.

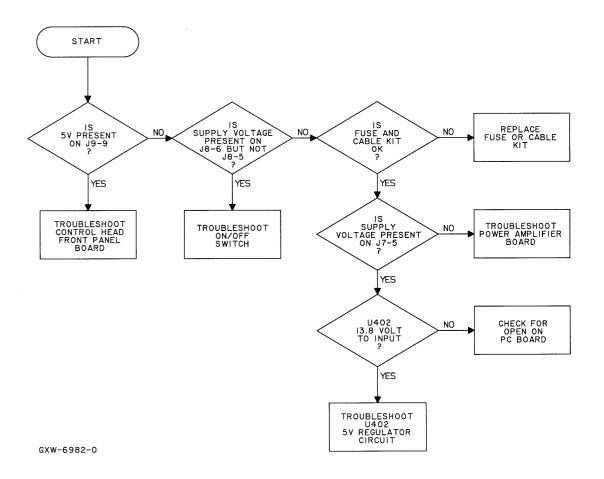
2. Troubleshooting and Repair

The troubleshooting diagrams on the following pages will help you diagnose problems which may occur on the front panel boards. Use these diagrams, and the schematics, circuit board diagrams, and parts lists to locate failed components and remedy the problem.

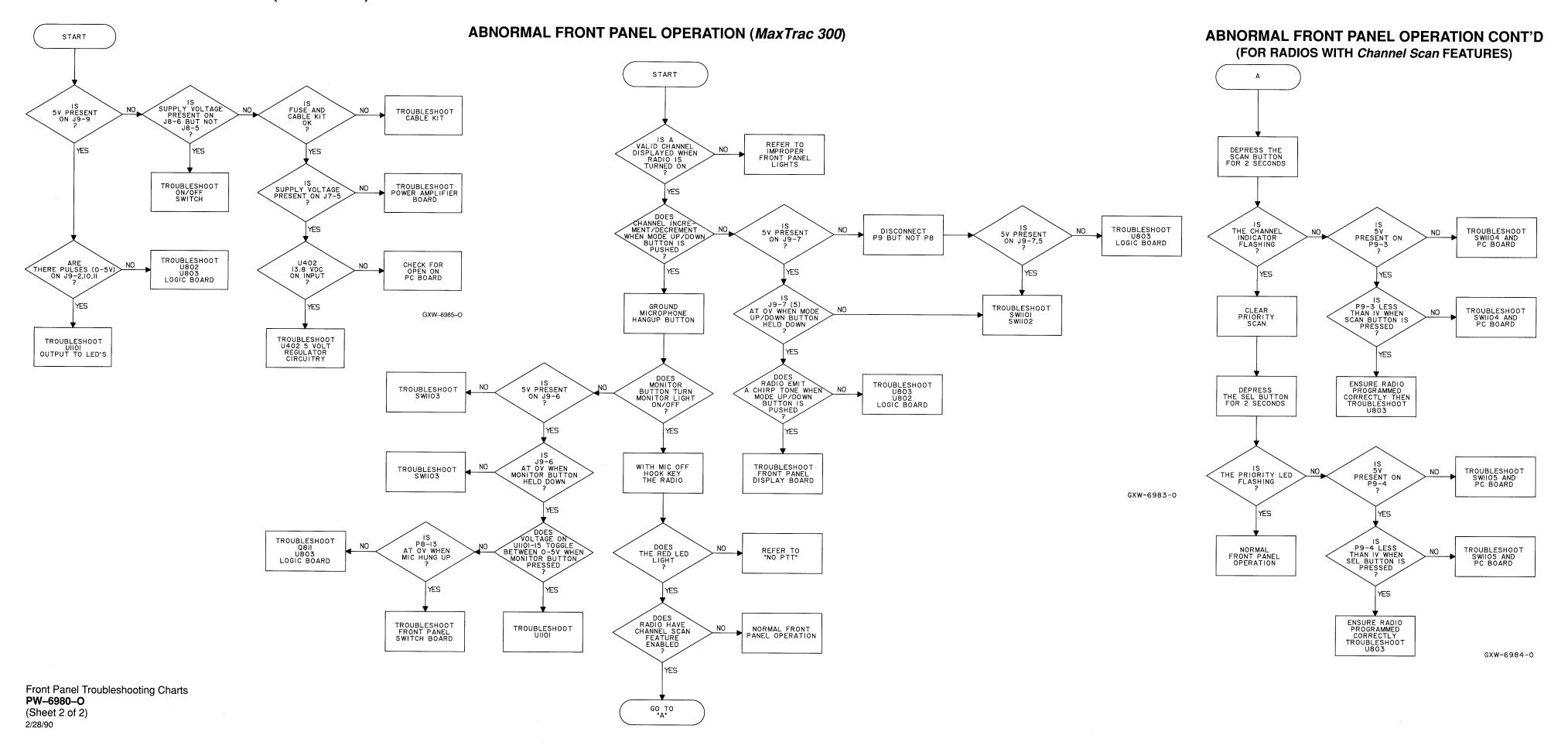
ABNORMAL FRONT PANEL OPERATION (MaxTrac 50/100)

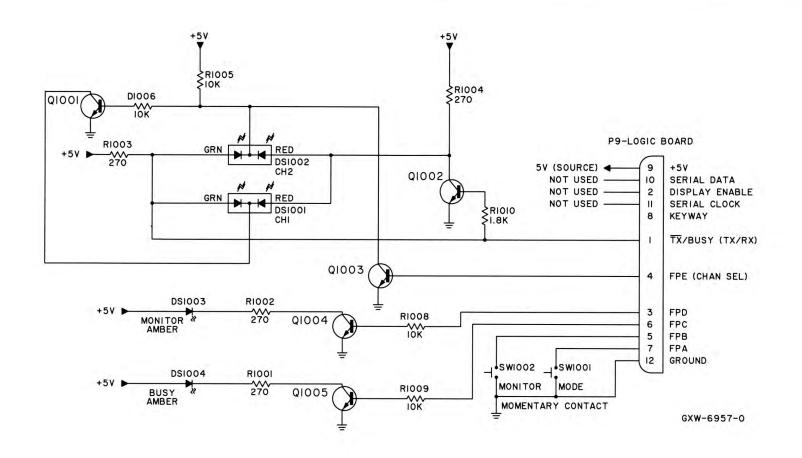


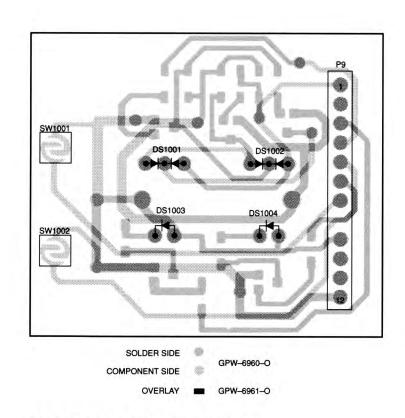
NO FRONT PANEL LIGHTS (MaxTrac 50/100)

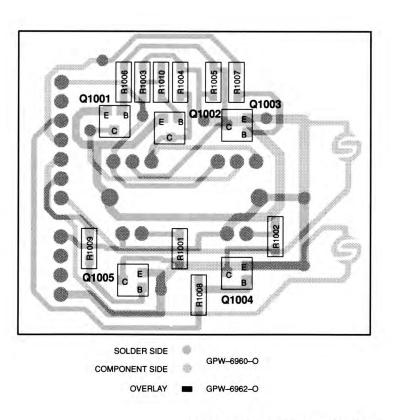


IMPROPER FRONT PANEL LIGHTS (MaxTrac 300)









COMPONENT SIDE VIEW

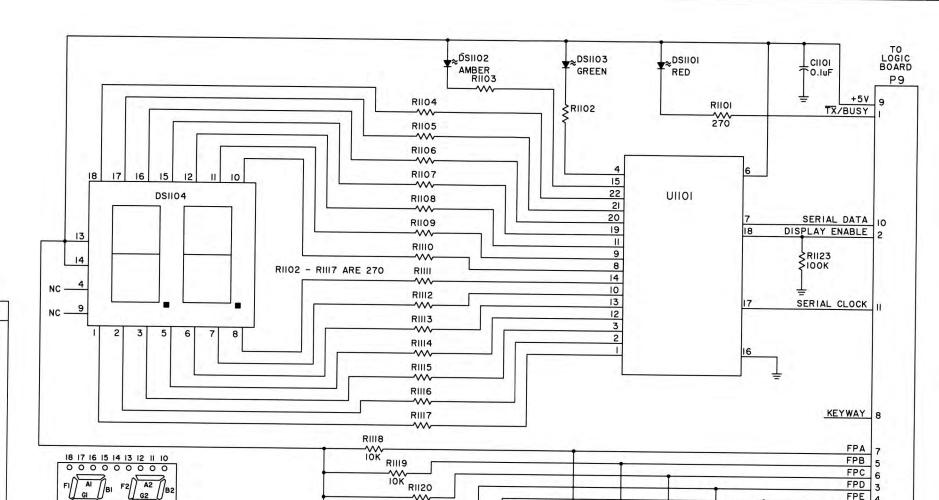
SOLDER SIDE VIEW

parts list

TENST/4A FIORE	Panel Display Board (2 I	-requency)	MXW-6958-(
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
display, LED			
DS1001.1002	48-80051M07	green-red	
DS1003,1004	48-80051M06	amber	
transistor (see no	te)		
Q1001-1005	48-80124G02	NPN	
resistor, fixed, ch	ip, ±5%, 1/8 watt (unles	ss otherwise stated)	
R1001-1004	06-11077A60	270	
R1005-1009	06-11077A98	10k	
R1010	06-11077A80	1.8k	
	non-refe	erenced parts	
M1001	84-80184L02	display circuit board	
M1002	43-80279L01	LED spacer	
M1006	01-80747T11	cable assembly (includes P9)	
	42-80052N01	ground strap	

2/28/90

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

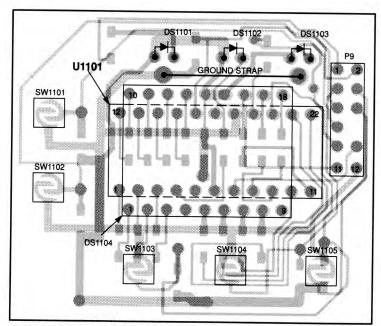


IOK RII2I

IOK RII22

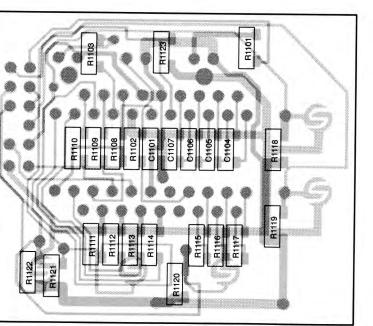
DS1104 PIN ASSIGNMENTS

PIN	ASSIGNMENT
1	Cathode e1
2	Cathode d1
3	Cathode c1
4	Cathode dp1
5	Cathode e2
6	Cathode d2
7	Cathode g2
8	Cathode c2
9	Cathode dp2
10	Cathode b2
11	Cathode a2
12	Cathode f2
13	anode digit 2
14	anode digit 1
15	Cathode b1
16	Cathode a1
17	Cathode g1
F1	Cathode f1



COMPONENT SIDE VIEW

SOLDER SIDE GPW-6968-O COMPONENT SIDE OVERLAY GPW-6970-O



J.SWIIOI J.SWIIO2 J.SWIIO3 J.SWIIO4 J.SWIIO5

SOLDER SIDE VIEW

FPD 3

GXW-6966-0

FPE GROUND 12

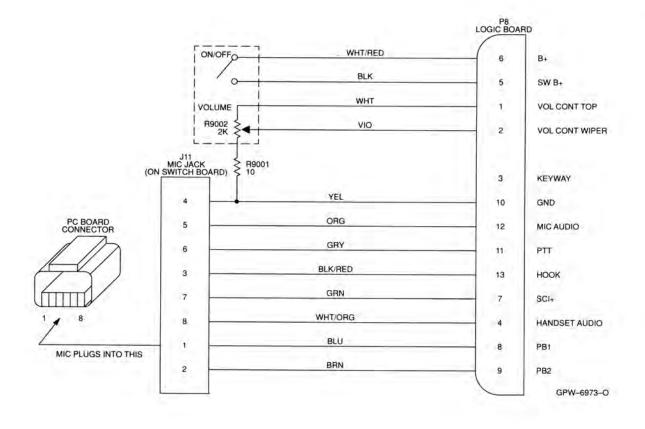
SOLDER SIDE GPW-6968-O COMPONENT SIDE OVERLAY GPW-6971-O

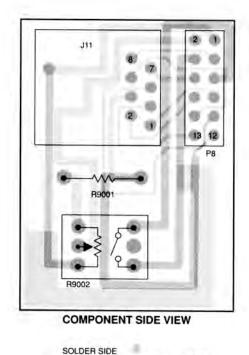
parts list

HLN5175A Front F	and Diopidy Board (or	re rioqueriej)	MXW-6967-C
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
capacitor, fixed, u	IF, ±5%, 50V (unless of	herwise stated)	
C1101	21-13741B96	0.1	
display, LED			
DS1101	48-80051M01	red	
DS1102	48-80051M03	amber	
DS1103	48-80051M02	green	
DS1103	48-80055M01	dual, 7 segment	
resistor, fixed, oh	m, ±5%, 1/8 watt (unle:	ss otherwise stated)	
R1101-1117	06-11077A60	270	
R1118-1122	06-11077A98	10k	
R1123	06-11077B23	100k	
integrated circuit	(see note)		
U1101	51-84437N25	driver, serial to parallel	
	non-refe	erenced parts	
	01-80747T11	cable assembly (includes PS	9)
1.270	42-80053N01	ground strap	,
M1102	43-80280L01	spacer, LED	
M1103	43-80278L01	spacer, LED display	
	84-80155L02	display circuit board	

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

Schematic, Circuit Board Diagrams, and Parts List for *MaxTrac* HLN5175A Display Board **PW-6965-O**





COMPONENT SIDE OVERLAY

GPW-6975-O

GPW-6977-O

parts list

HLN5184A Front F	Panel Switch Board		MXW-6974-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
receptacle, jack			
J11	09-80132M01	telephone type, 8 contact	3.15
resistor, fixed, oh	m, ±5%, 1/4 watt (unle	ss otherwise stated)	
R9001	06-11009A01	10	
R9002	18-80140M01	2k, VOLUME potentiometer	er with switch
	non-ref	erenced parts	
M9001	84-80185L02	switch circuit board	
	01-80747T12	cable assembly (includes I	28)
			0,00,00

Schematic, Circuit Board Diagram, and Parts List for HLN5184A Front Panel Switch Board



1. Theory Of Operation

The Logic Board consists of 5 segments:

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

1.1 MICROPROCESSOR

1.1.1 Description

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

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

The control logic surrounding U802 consists of:

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

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

1.1.2 Operation

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

1.1.3 Power Up/Low-Line Reset

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

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

1.1.4 Microcomputer Start-Up Routine

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

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

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

1.1.5 Microcomputer Normal Operation

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

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

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

1.1.6 Reading Or Writing In Memory

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

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

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

1.2 VOLTAGE REGULATION

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

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

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

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

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

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

1.3 RECEIVE AUDIO FILTER

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

1.3.1 Audio Power Amplifier

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

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

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

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

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

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

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

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

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

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

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

1.3.2 Low-Speed Data Filter

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

1.3.3 High Speed Data Filter

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

1.4 TRANSMIT AUDIO

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

1.4.1 High-Speed Transmit Data

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

1.4.2 Low–Speed Transmit Data

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

1.5 POWER CONTROL CIRCUIT

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

2. Troubleshooting Guide

2.1 MICROPROCESSOR SECTION

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

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

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

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

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

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

2.2 RECEIVE AUDIO

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

2.3 TRANSMIT AUDIO

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

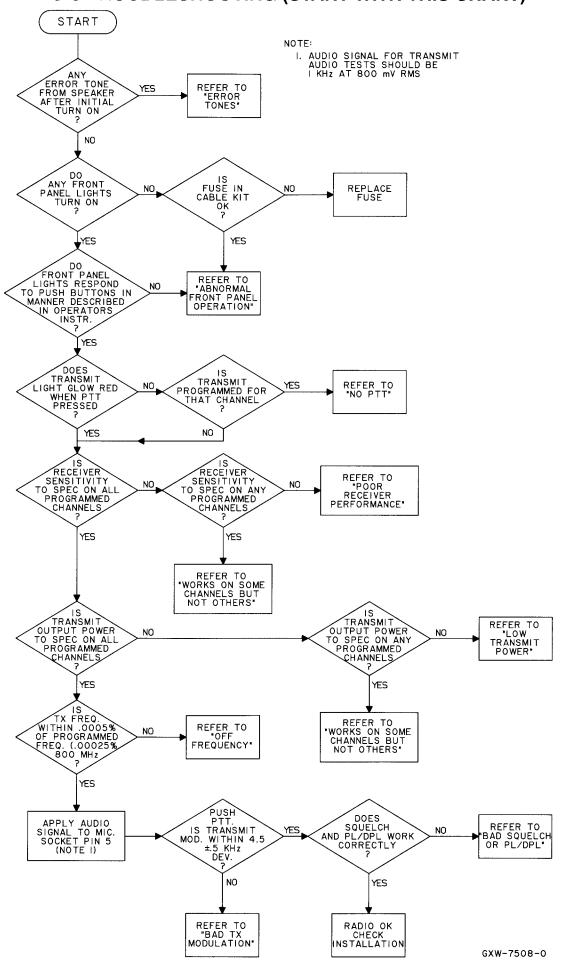
2.4 AUDIO POWER AMPLIFIER

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

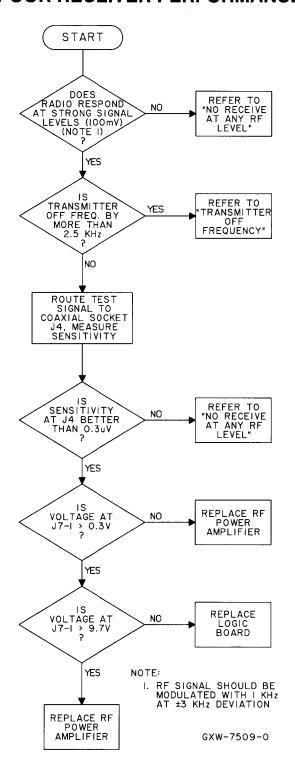
2.5 POWER CONTROL CIRCUITRY

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

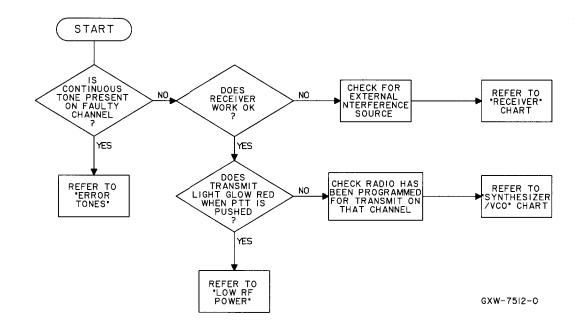
BASIC TROUBLESHOOTING (START WITH THIS CHART)



POOR RECEIVER PERFORMANCE



RADIO WORKS ON SOME CHANNELS BUT NOT OTHERS

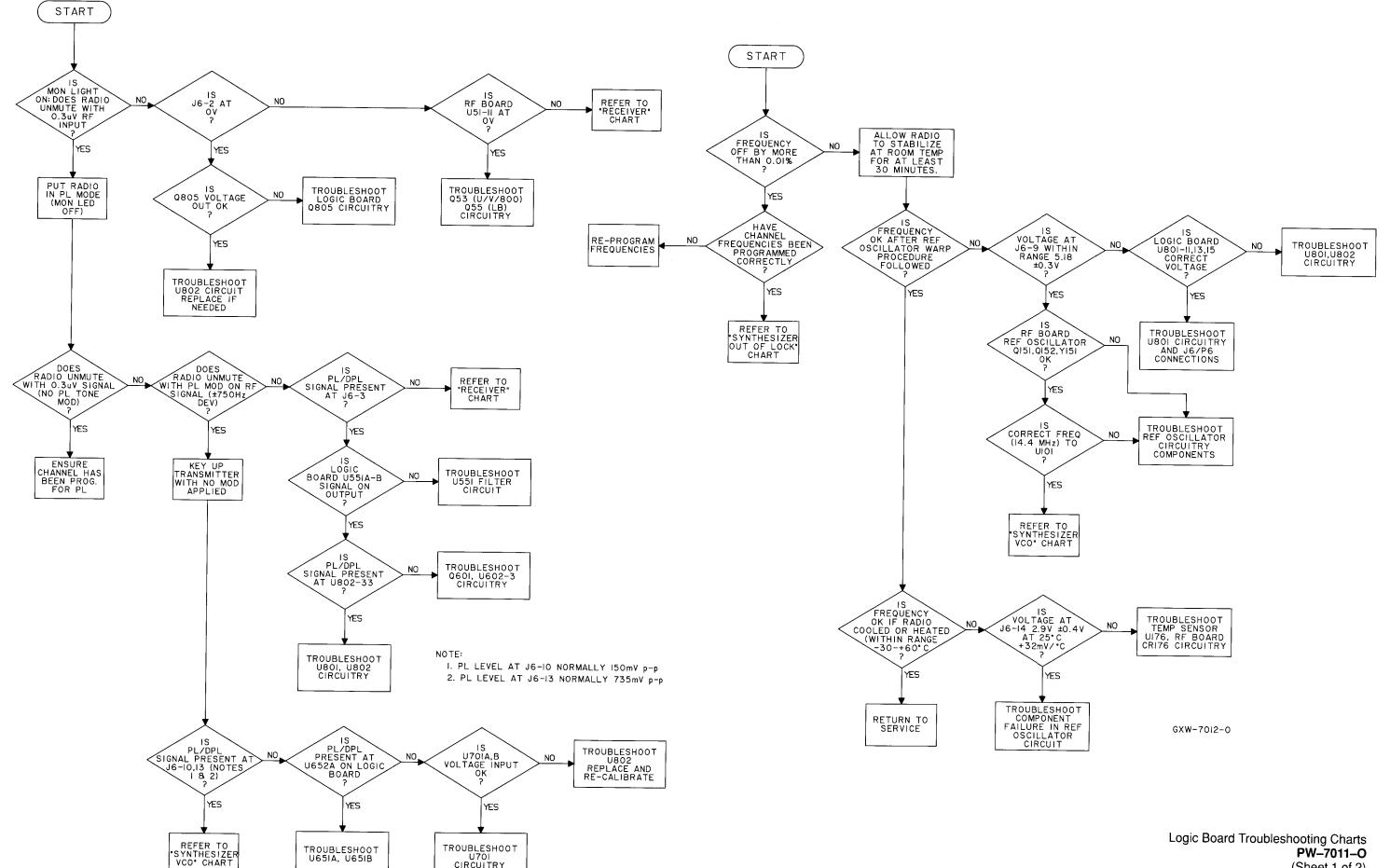


IMPORTANT

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

BAD SQUELCH OR PL/DPL

TRANSMITTER OFF FREQUENCY



U701 CIRCUITRY

GXW-7013-0

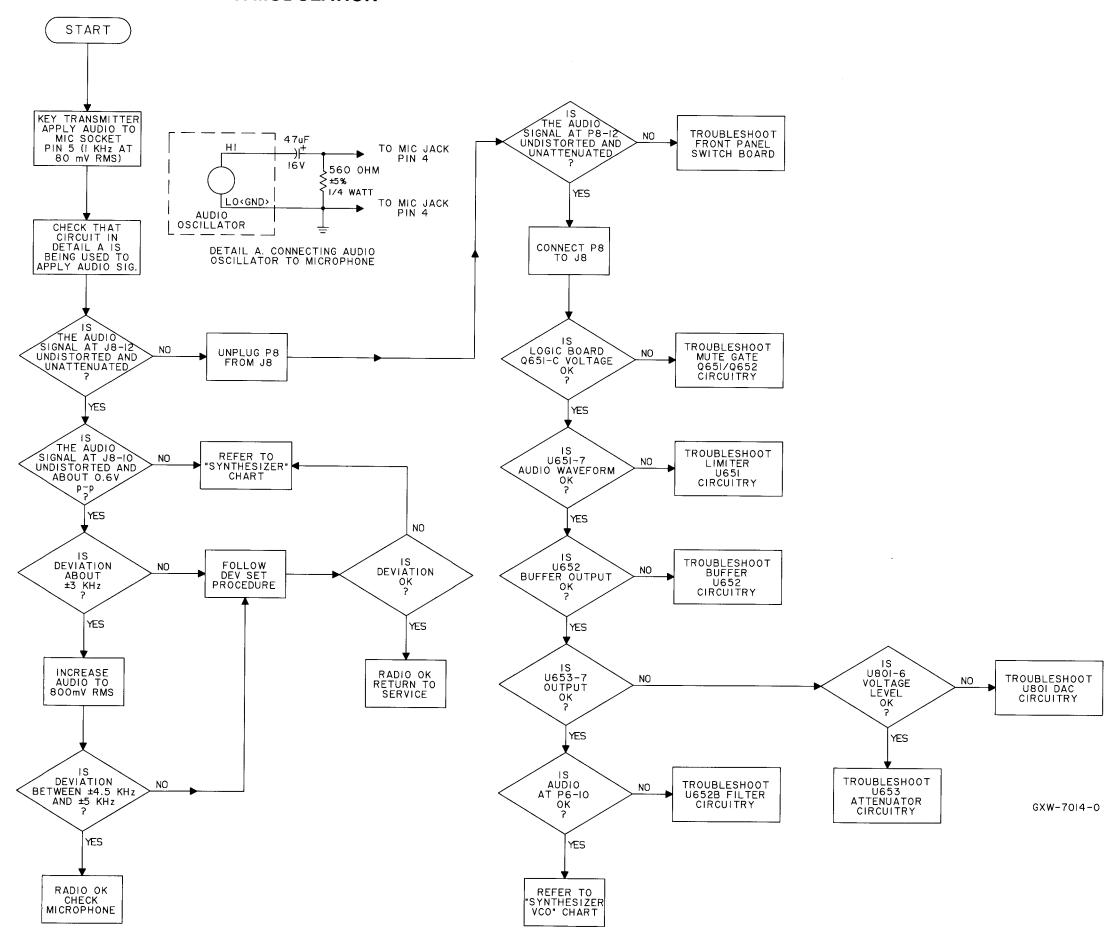
PW-7011-0 (Sheet 1 of 2) 2/28/90

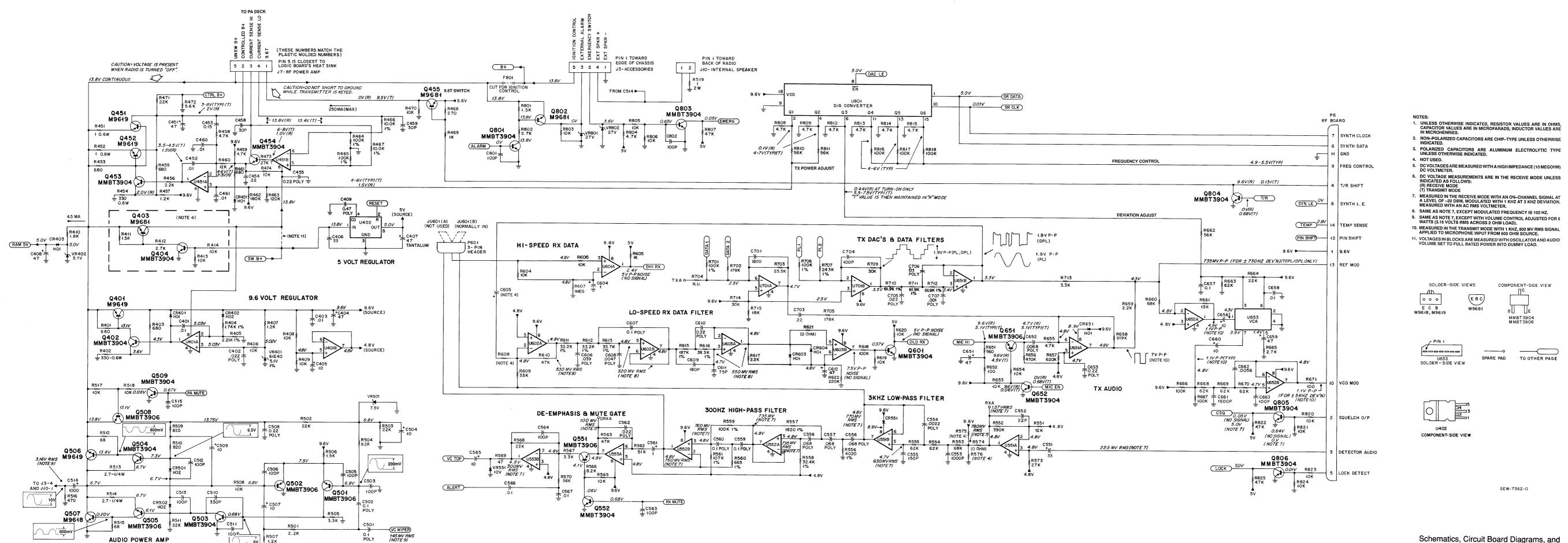
NO/LOW AUDIO

START ImV RMS AT 3KHz DEVIATION AT ANTENNA PORT IS VOLUME REFER TO RECEIVER CHART CONTROL WIPER 145mV RMS J8-2 YES IS 200mV p-p SINEWAVE AT Q501-B TROUBLESHOOT C501/C502 YES 6 V p-p SINEWAVE AT Q503-B TROUBLESHOOT Q501/Q502 CIRCUITRY YES IS 800mV p-p SINEWAVE AT TROUBLESHOOT Q504/Q505 CIRCUITRY Q504-C Q505-C YES IS IO V p-p SINEWAVE AT C514 ? TROUBLESHOOT Q506/Q507 PA FINALS YES DOES SPEAKER REPLACE SPEAKER MEASURE 4 OHMS YES AUDIO PATH OK: RETURN TO SERVICE GXW-7015-0

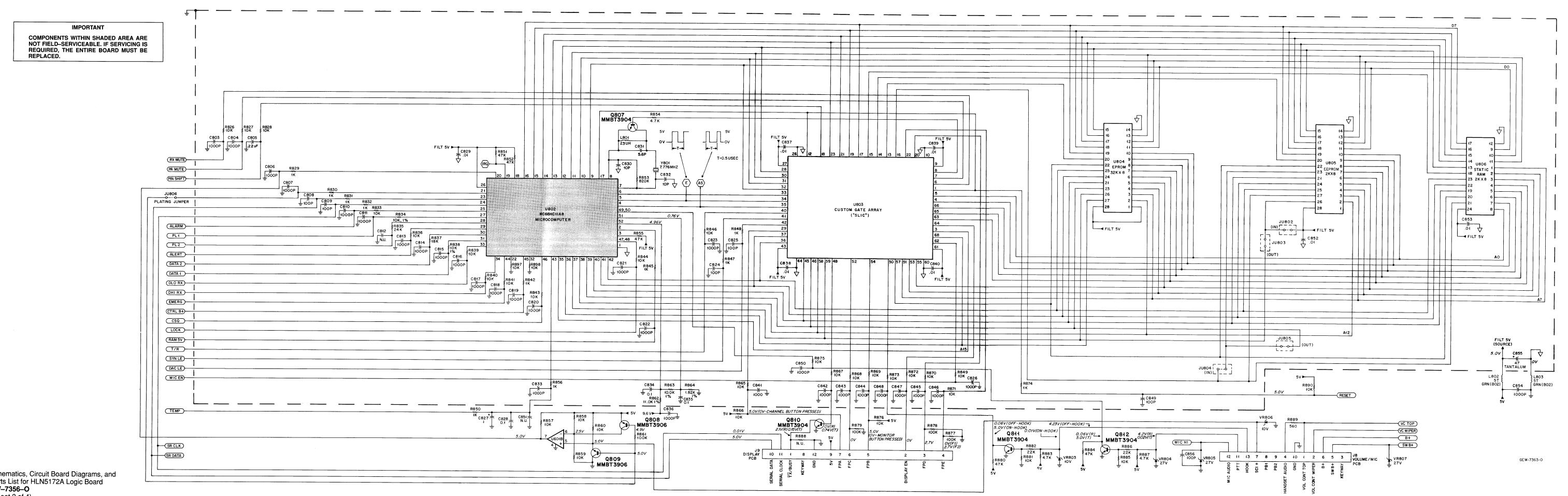
Logic Board Troubleshooting Charts **PW-7011-O** (Sheet 2 of 2) 2/28/90

BAD TX MODULATION

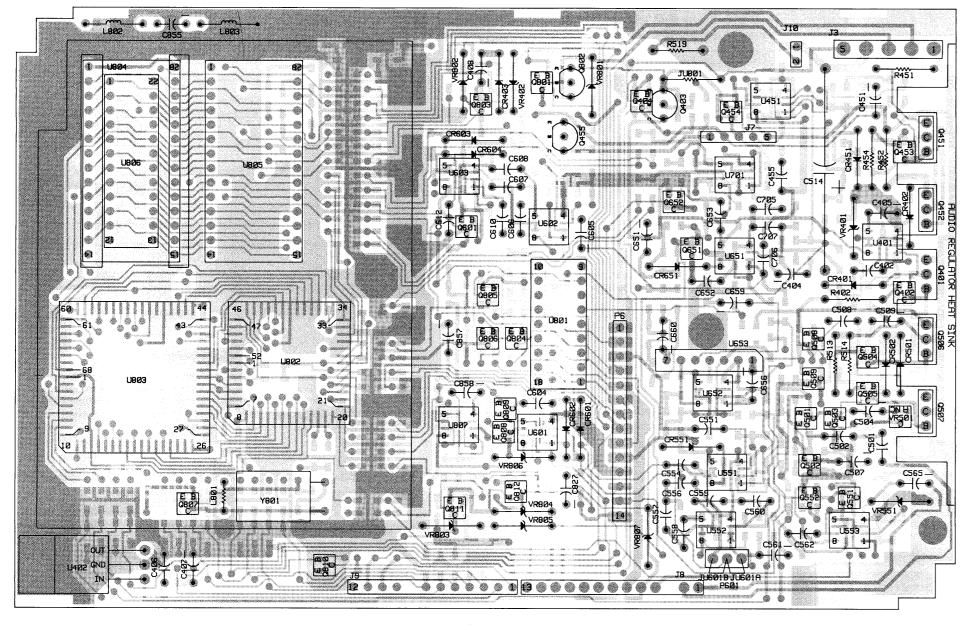




AUDIO POWER AMP



Schematics, Circuit Board Diagrams, and Parts List for HLN5172A Logic Board PW-7356-O (Sheet 2 of 4) 2/28/90



SOLDER SIDE GCW-7359-O
COMPONENT SIDE VIEW

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

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

COMPONENT SIDE VIEW

CB54

COMPONENT SIDE GCW-7358-O

SOLDER SIDE VIEW

parts list

CR603,604

48-83654H01

HLN5172A Logic Board (Trunking)

MXW-7357-O

REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. capacitor, fixed, uF, +5%, 50V (unless otherwise stated) 21-13741B45 0.01.+10% C402 08-11051A09 .022, 63V C402 C403 C404 C405 C406 C407 21-13741B45 0.01.+10% 23-11048B19 23-11048B13 47, ±20%, 16V, electrolytic 10, +20, 16V, electrolytic 23-11048A1 33, ±20%, 25V, electrolytic 23-13749A44 47. +20%, 6V C408 C409 C451 C452 23-11048B19 47, ±20%, 16V, electrolytic 08-11051A17 47 63V 23-11048B19 47, ±20%, 16V, electrolytic 0.01, ±10% .15, +80 -20% .22, +80 -20% .22, 63V 21-13741B45 C453 C454 21-11032B14 21-11032B15 08-11051A15 C458.459 30 pF 0.01 ±10% 21-13740B36 C460,461 C501,502 21-13741B45 .1, 63V 100 pF 08-11051A13 21-13740B49 10, ±20%, 16V, electrolytic 100 pF C504 23-11048B13 C505,506 C507 21-13740B49 23-13749C39 08-11051A15 10, ±10%, 20V .22, 63V C509 23-11048B13 10, ±20%, 16V, electrolytic C510 C511–513 C514 21-13740B61 330 pF 21-13740B49 23-02308M01 1000, +20%, 16V, electrolytic C515 C551 C552 C553 C554 C555 21-13740B49 23-11048A17 100 pF 33, +20, 25V, electrolytic 21-13740B33 1000 pF 21-13740B73 08-11051A03 21-13740B53 .0022, 63V 150 pF C556-558 C559,560 08-11051A12 .068, 63V 08-11051A13 1 63V C561 C562 23-11048B05 1, ±20%, electrolytic 08-11051A09 .022, 63V C563,564 21-13740B49 100 pF C565 10, ±20%, 16V, electrolytic 0.01, ±10% 23-11048B13 C566,567 C604 21-13741B45 23-11048B05 1, ±20%, electrolytic 0.039, 63V C606 C607 C608 C609 C610 08-11051A22 08-11051A13 .1, 63V .0047, 63V 08-11051A05 180 pF .22, 63V 75 pF 47, ±20%, 16V, electrolytic 21-13740B55 08-11051A15 21-13740B46 C611 C612 C651 C652 C653 C656 C657 C658 C659 C660 C661 C662 C663 C701 C703 C704 C705 C706 23-11048B19 23_110//8R10 08-11051A06 .0068, 63V 08-11051A15 23-11048B13 10. +20%, 16V, electrolytic 21-13741B69 21-13741B45 0.1, +80 -20% 0.01 +10% 23-13749A44 23-11048B13 10, +20%, 16V, electrolytic 21-13740B76 21-13741B39 0056 21-13740B49 100 pF 21-13740B78 1800 pF .22, +80, -20% 100 pF .022, 63V 21-13740B49 .1, 63V .001, 63V 100 pF 1000 pF 08-11051A13 C707 C801,802 21-13740B49 C803,804 21-13740B73 .22, +80 -20% 1000 pF C805 21-11032R15 21-13740B73 100 pF 1000 pF C808,809 21-13740B49 C810,811 21-13740B73 C813-823 21-13740B73 1000 pF 100 pF 21-13740B49 C826 C827 C828 C829 C830 C831 C832 C833 21–13740B73 23–11048B05 1000 pF 1, ±20%, electrolytic 0.1, +80 -20% 21-13741B69 21-13741B45 0.01, ±10% 10 pF, ±.5 pF 5.6 pF, ±.5 pF 10 pF, ±.5 pF 1000 pF 21-13740B25 21-11031F10 21-13740B25 21-13740B73 C834,835 C836 21-13741B69 0.1, +80 -20% 21-13740B73 1000 pF C837-840 C841-848 21-13741B45 0.01, ±10% 1000 pF 100 pF 21-13740B73 C849 21-13740B49 C850 1000 pF 21-13740B73 C852,853 21-13741B45 0.01, ±10% C854 21-13740B73 1000 pF C855 23-11054A09 47, ±20%, 6V, tantalum C856 21-13740B49 100 pF diode (see note) CR401 48-83654H01 silicon CR402 48-83654H02 silicon silicon silicon CR403 48_83654H01 CR403 CR451 CR501,502 CR551 48-83654H01 48-83654H02 06-11009B23 iumper resistor

MXW-7357-O (2) REFERENCE MOTOROL A DESCRIPTION PART NO. SYMBOL CR651 48-83654H01 silicon fuse F801 65-05214E06 1 A 28-80129M01 5-pin 28-80128M01 5-pin J8,9 28-80126M01 23-pin J10 28-80128M02 jumpe JU601 09-84181L01 2-contact push-on JU802 06-11077A01 0-ohm resistor 0-ohm resistor JU804 06-11077A01 coil, RF L801 L802.803 24-82723H35 23 uH. red 24-83961B02 28-80127M02 14-pin, RF board P601 28-80002R03 3-pin, for JU601 transistor (see not Q401 48-00869619 0402 48-80214G02 NPN PNP NPN PNP PNP NPN PNP NPN PNP NPN PNP NPN Q451.452 48-00869619 Q453,454 Q455 48-11043C10 Q501,502 Q503.504 48-80214G02 48-05128M16 Q506 48-00869619 Q507 Q508 48-00869618 48-05128M16 Q509 Q551 48-80214G02 48-05128M16 Q552 48-80214G02 NPN PNP NPN Q601 Q651 48-80214G02 48-05128M16 Q652 48-80214G02 Q801 Q802 NPN PNP NPN PNP 48-80214G02 48-11043C10 Q803-807 48-80214G02 Q808.809 48-05128M16 Q810-812 48-80214G02 NPN resistor, fixe +5%, 1/8 watt (ur otherwise stated) R401 06-11077A70 680 R402 330, .6 watt, metal film R403 680 1.74k, <u>+</u>1% 06-11077A70 R404 R405 06-11077F28 2.21k, ±1% R406 10k 1.2k R407 06-11077A76 R408,409 06-11077A98 1.8k 1, .6 Watt, metal film R410 06-11077A80 06-02369M01 R453 06-11077A70 06-02369M31 330. .6 watt. metal film 680 2.2k 1.2k 4.7k 12k 680 180k 120k 06-11077A70 06-11077A82 R455 R456 R457 06-11077A76 R458,459 06-11077A90 R460 06-11077B01 06-11077A70 R462 06-11077B29 R463 06-11077B25 R464,465 R466,467 06-11077G88 100k, ±1% 06-11077F91 10k, ±1% 270 R468 R469 06-11077A74 1k 10k 22k 5.6k 27k 10k 2.2k 8.2k 8.2k 3.3k 1.5k 1.2k 10k 820 22k 68 R470 R471 06-11077B07 R472 R473 06-11077B09 R474 R501 06-11077A82 R502,503 R504 06-11077A96 R505 R506 06-11077A78 R507 06-11077A76 R508 06-11077A98 R509,510 06-11077A72 R511 06-11077R07 06-11077A46 R513.514 06-11009B26 2.7, 1/4 Watt 06-11077A46 R516 06-11077A66 470 06--11077A98

R519

R552

R553

R556

R557 R558

R559 R560

R561

R554.555

06-80185M0

06-11077B01

06-11077B37

06-11077B19

06-11077B18

06-11077F53

06-11077F20

06-11077G41

06-11077E77

1 ohm, ±10%, 2W, metal plate

12k

68k 62k 4.02k, ±1% 1.82k, ±1%

32.4k, ±1%

100k, ±1%

665, ±1% 107k, ±1%

MXW--7357-O (3) REFERENCE DESCRIPTION SYMBOL PART NO. 06-11077B16 R562 06-11077B15 R565 06-11077A98 10k 8.2k 3.3k 22k 47 56k 27k R566 R567 06-11077A96 06-11077A86 R569 06-11077A42 06-11077B17 B573 06-11077B09 06-11077A01 0-ohm 10k R604 06-11077A98 R605 R606 R607 06-11077A74 06-11077A98 06-11077B47 1 meg 06-11077B11 06-11077B15 R609 33k 47k R610 R611.612 06-11077G42 06-11077G45 35.7k, ±1% 187k, ±1% 06-11077H15 06-11077G48 B615 R616 38.3k, +1% 06-11077A82 06-11077B23 R617 100k 10k 0 ohm R619.620 06-11077A98 06-11077A01 R621 220k 560 100 10k 4.7k R622 06-11077B31 R651 06-11077A68 R652 R653.654 06-11077A98 06-11077A90 R656 06-11077B39 470k 620k R657 R658 06-11077B42 06-11077H65 619k, ±1% 06-11077A82 2.2k 2.2k 68k 15k 56k 62k 22k 2.7k 100k 62k 100 100k, ±1% R660 06-11077R10 R661 06-11077B03 R662 06-11077B17 06-11077B18 R664 06-11077B07 R665 06-11077A84 B666 667 06-11077B23 06-11077B18 06-11077A50 06-11077G88 R701 R702 R703 06-11077H13 06-11077G31 25.5k. +1% R705 R706 06-11077H13 178k, ±1% 06-11077G88 100k +1% R707 243k, ±1% R709 30k 61.9k, ±1% 06-11077B10 R710-712 R713 06-11077A86 3.3k R714 30k 18k 1.5k 2.7k 10k 4.7k 10k, 47k 4.7k 56k 4.7k R715 06-11077B05 R801 R802 06-11077A84 06-11077A90 06-11077A98 R804 R807 06-11077B15 06-11077A90 R810.811 06-11077B17 06-11077A90 R812-815 B816-818 06-11077B23 100k 10k 47k 10k 47k 10k 1k 10k R820,821 06-11077A98 06-11077B15 06-11077A98 R823,824 06-11077B15 06-11077A98 R825 R826-828 R829-832 06-11077A74 06-11077A98 R833 R834 R835 06-11077F91 06-11077B08 R836 R837 06-11077A98 06-11077B05 R838 06-11077F91 R839-841 06-11077A98 R842 R843,844 06-11077A74 06-11077A98 1k 10k 06-11077A98 R847,848 1k 10k R849 06-11077A98 06-11077A74 1k 47k 820k 4.7k 47k R851.852 06-11077B15 06-11077B45 R854 06-11077490 06--11077B15 R856 06-11077A74 R857-860 06-11077A98 06-11077B23 100k 06-11077E25 11K. +1% 06-11077F91 06-11077F20 10k, ±1% 1.82k, ±1% R863 06-11077A98 06-11077A74 R865-873

1k 10k 100k

47k 10k 22k 4.7k

06-11077A98

06-11077B23

06-11077B15

06-11077A98

06-11077A90

R875 876

R877-879

R881

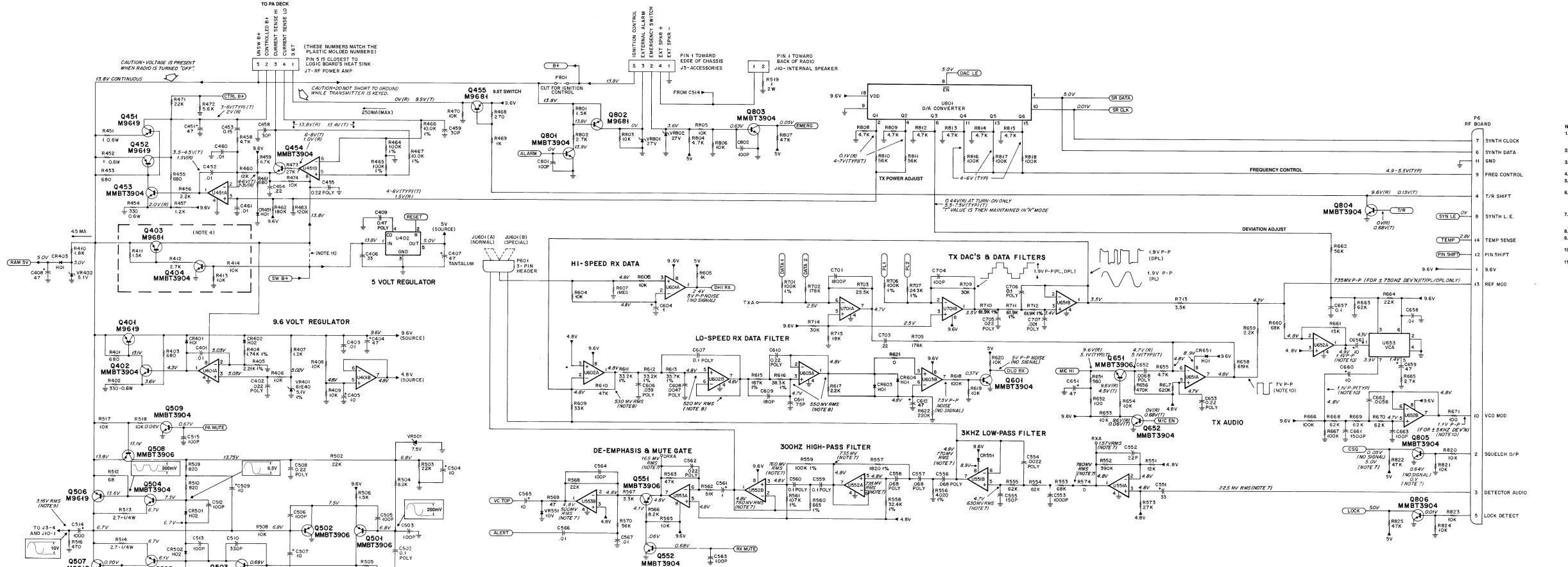
R882

R883

REFERENCE	MOTOROLA	DESCRIPTION
SYMBOL	PART NO.	
R884	06-11077B15	47k
R885	06-11077A98	10k
R886	0611077B07	22k
R887	06-11077A90	4.7k
R889	06-11077A68	560
R890	06-11077 A 98	10k
R897,898	06-11077A98	10k
integrated circuit		
U401	51-02198J22	dual op-amp
U402	51-80942T01	voltage regulator 5V
U451	51-02198J22	dual op-amp
U551-553	51-02198J22	dual op-amp
U601	51-02198J23	dual comparator
U602,603	51-02198J22	dual op-amp
U651,652	51-02198J22	dual opamp
U653	51-80059M01	voltage-controlled attenuator
U701	51-02198J22	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microprocessor
U803	51-82862N09	logic array
U804	HLN9722A	ROM kit
U805	51-80901W01	EEPROM, 2KX8
U806	51-80914V01	static RAM
U807	51-02198J23	dual comparator
voltage regulator	(see note)	·
VR401	48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V
VR501	48-80140L11	zener, 7.5V
VR551	48-82256C11	zener, 10V
VR801.802	48-82256C20	zener, 27V
VR803	48-82256C11	zener, 10V
VR804,805	48-82256C20	zener, 27V
VR806	48-82256C11	zener, 10V
VR807	48-82256C20	zener, 10V zener. 27V
		Zoner, Zr v
crystal (see note) Y801	48-80173D09	7.776 MHz
		erenced parts
M406-410	14-83820M05	
M406–410 M413		insulator
M413 M414	14-80145M01 26-80123M01	insulator, accessory connector
		logic shield
M415,416	09-82071K09	14-pin socket
	03-10943M04	tapping screws (5 used)
	04-00131974	flat washer (4 used)
	07-80925T01	bracket, audio regulator
	14-82392E13	cover insulator
	26-80125L02	heat sink, audio regulator
	42-80940T01	ring, retaining (2 used)
	84-80199M02	circuit board

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

Schematics, Circuit Board Diagrams, and Parts List for HLN5172A Logic Board PW-7356-O (Sheet 4 of 4) 2/28/90



Q505 MMBT3906

AUDIO POWER AMP

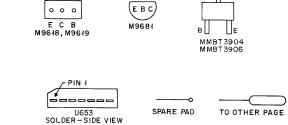
Q503

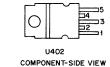
145 MV RMS (NOTE 9)

- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE
- NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWIS INDICATED.

- 4. NOT USED. 5. DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOI IM) DC VOLTMETER.
- 6. DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:
 (R) RECEIVE MODE
 (T) TRANSMIT MODE
- 7. 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.
- 8. SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.
- SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 8 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD).
- 10. MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
- 11. VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.

SOLDER-SIDE VIEWS

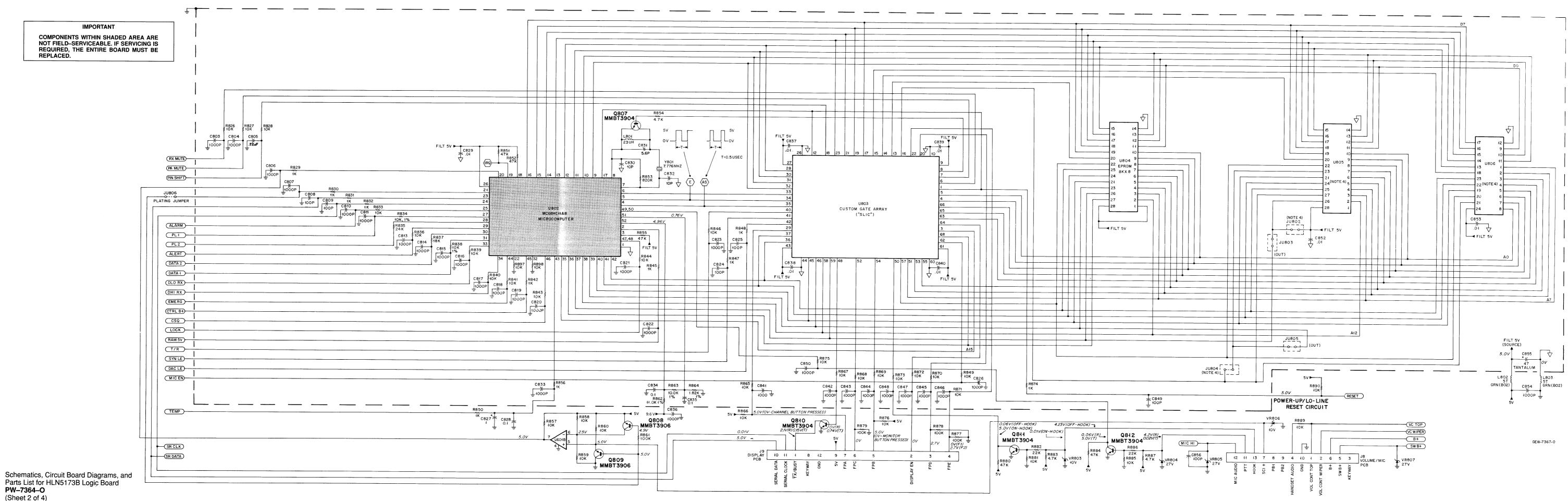




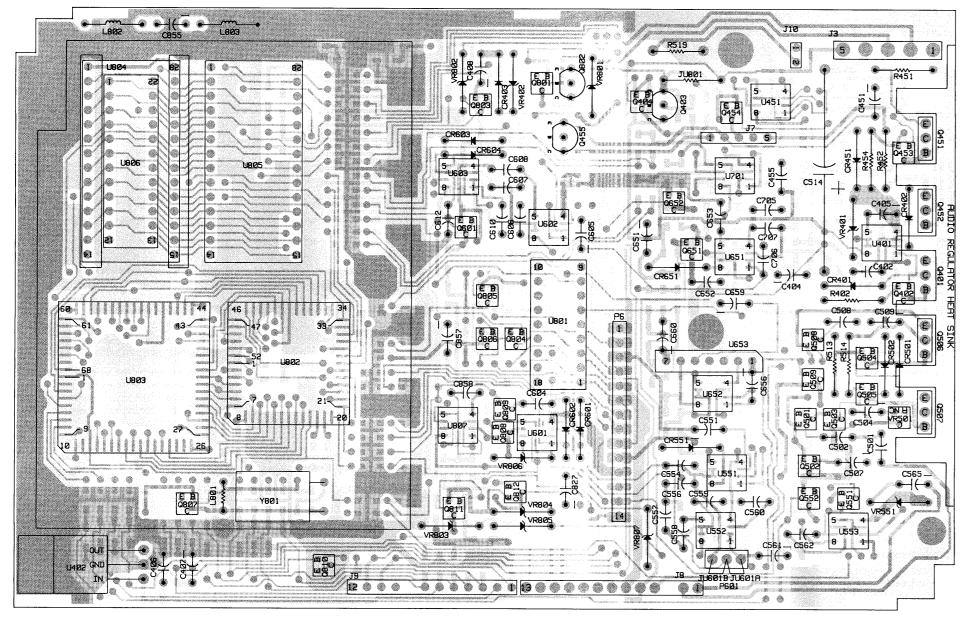
GEW-7366-0

COMPONENT-SIDE VIEW

Schematics, Circuit Board Diagrams, and Parts List for HLN5173B Logic Board PW-7364-0 (Sheet 1 of 4)



PW-7364-O (Sheet 2 of 4) 2/28/90



COMPONENT SIDE (3) GCW-7358-O OVERLAY GCW-7360-O

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

COMPONENT SIDE VIEW

C854

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

SOLDER SIDE VIEW

COMPONENT SIDE VIEW

parts list

MXW-7365-O HLN5173B Logic Board (Conventional) MOTOROLA REFERENCE DESCRIPTION capacitor, fixed, uF, ±5%, 50V (unless otherwise stated) C401 21-13741B45 0.01. +10% C403 C404 C405 C406 C407 C408 C409 C451 C452 C453 C454 C455 21-13741B45 0.01. +10% 47, ±20%, 16V, electrolytic 23-11048B13 10 +20 16V electrolytic 23-11048A17 33, ±20%, 25V, electrolytic 23-13749A44 47, +20%, 6V 47, ±20%, 16V, electrolytic 08-11051A17 .47. 63V 47, ±20%, 16V, electrolytic 0.01, ±10% .15, +80 –20% 21-13741B45 21-11032B14 .22, +80 -20% .22, 63V 21-11032B15 08-11051A15 C458, 459 C460, 461 30 pF 0.01 ±10% 21-13740B36 21-13741B45 C501, 502 C503 08-11051A13 21-13740B49 100 pF C504 C505, 506 23-11048B13 21-13740B49 10, ±20%, 16V, electrolytic C507 C508 23-13749C39 10, ±10%, 20V 08-11051A15 .22, 63V C509 C510 23-11048B13 21-13740B61 10, ±20%, 16V, electrolytic 330 pF C511-513 21-13740B49 1000. +20%, 16V, electrolytic C514 23-02308M01 C515 C551 21-13740B49 23-11048A17 33. +20. 25V. electrolytic 21-13740B33 1000 pF C553 21-13740B73 C554 C555 C556–558 08-11051A03 .0022, 63V 21-13740B53 150 pF .068, 63V C559, 560 C561 08-11051A13 1 63V 1, ±20%, electrolytic C562 08-11051A09 022 63V C563, 564 21-13740B49 100 pF 10, ±20%, 16V, electrolytic C565 C566, 567 C604 C606 23-11048B13 21–13741B45 0.01, ±10% 1 +20%, electrolytic 23-11048B05 08-11051A22 0.039, 63V C607 C608 C609 C610 08-11051A13 .1. 63V 08-11051A05 .0047, 63V 21-13740B55 180 pF 08-11051A15 .22, 63V 21-13740B46 23-11048B19 75 pF 47, ±20%, 16V, electrolytic C611 C612 C651 C652 23-11048B19 47, ±20%, 16V, electrolytic .0068, 63V 08-11051A06 08-11051A15 23-11048B13 C653 C656 C657 C658 C659 C660 C661 C662 C663 C701 C703 C704 C705 C706 C707 .22, 63V 10, +20%, 16V, electrolytic 21-13741B69 0.1, +80 -20% 0.01, ±10% 21-13741B45 23-13749A44 23-11048B13 47, ±20%, 6V 10. +20%, 16V, electrolytic 21-13740B76 21-13741B39 .0056 21-13740B49 21-13740B78 1800 pF .22, +80, -20% 21-13740B49 100 pF 08-11051A09 .022, 63V 08-11051A13 1 63V 08-11051A01 .001, 63V C801, 802 21-13740B49 100 pF C803-804 21-13740B73 C805 21-11032B15 .22, +80 -20% 21-13740B73 C806, 807 C808, 809 21-13740B49 100 pF C810, 811 21-13740B73 1000 pF C813-823 21-13740B73 1000 pF C824, 825 21-13740B49 C826 C827 C828 C829 21-13740B73 1000 pF 23-11048B05 1, ±20%, electrolytic 21-13741B69 21-13741B45 0.1, +80 -20% 0.01, ±10% 21-13740B25 21-11031F10 C830 C831 5.6 pF. +.5 pF C832 21-13740B25 C833 21-13740B73 1000 pF 21-13741B69 21-13740B73 C834, 835 0.1, +80 -20% C836 1000 pF 21-13741B45 0.01, ±10% C841-848 21-13740B73 1000 pF C849 C850 21-13740B49 1000 pF 21-13740B73 21-13741B45 0.01, ±10%

MXW-7365-O (2) REFERENCE **MOTOROLA** DESCRIPTION SYMBOL fuse F801 65-05214E06

28-80129M01 J3 J7 5-pin 5–pin 23–pin 28-80128M01 J8,9 J10 28-80126M01 28-80128M02 jumpei JU601 09-84181L01 2-contact push-or coil. RF 24-82723H35 L801 L802, 803 24-83961B02 5 turns, green connector plug 28-80127M01 14-pin, RF board P6 P601 28-80002R03 3-pin, for JU60

transistor (see note 48-00869619 PNP Q401 Q402 Q451, 452 48-80214G02 NPN PNP 48-00869619 NPN PNP Q453, 454 Q455 48-11043C10

connector recepta

Q501, 502 48-05128M1 PNP NPN PNP PNP Q503, 504 48-80214G02 48-05128M16 Q505 Q506 Q507 48-00869619 NPN PNP 48-00869618 Q508 Q509 48-05128M16 48-80214G02 Q551 Q552 PNP 48-05128M16 48-80214G02 NPN PNP Q601 Q651 48-80214G02 48-05128M16

48-80214G02 48-80214G02 Q652 Q801 NPN NPN PNP Q802 48-11043C10 Q803-807 48-80214G02 48-05128M16 PNP 48-80214G02 Q810-812 resistor, fixed ±5%, 1/8 watt (unless otherwise stated) R401 06-11077A70

06-02369M31 R403 06-11077A70 R404 06-11077F18 R405 06-11077F28 2.21k, ±1% R406 06-11077A98 10k 1.2k 10k R407 06-11077A76 R408, 409 R410 06-11077A80 R451, 452 06-02369M0 I, .6 Watt, metal film R453 06-11077A70 R454 06-02369M3 330, .6 watt, metal film R455 06-11077A70 680 R456 06-11077A82 2.2k R457 R458, 459 06-11077A76

1.2k 4.7k 06-11077A90 12k 680 180k 06-11077B0 06-11077A70 06-11077B29 120k 120k 100k, ±1% 10k, ±1% 270 1k 06-11077B25 R464, 465 R466, 467 06-11077G88 06-11077F91 06-11077A60 06-11077A74 10k 22k 5.6k 27k 10k 2.2k 06-11077A98 06-11077B07

R460 R461

R462 R463

R468 R469

R470

R471

R472 R473

R501

R504

R506

B508

R511

R512

R516

B519

R551

R552

R553

R556

R557

R558

R559

R560

R561

R562

R563

R565

R568

R554, 555

R502, 503

06-11077A92 06-11077B09 06-11077A98 06-11077A82 22k 8.2k 06-11077A96 06-11077A86 3.3k 1.5k 06-11077A78 1.2k 10k 820 22k 06-11077A98

06-11077B07 06-11077A46 68 2.7. 1/4 Watt R513, 514 06-11009B26 06-11077A66 R517, 518 06-11077A98 06-80185M0 06-11077B01 06-11077B37 06-11077B19

> 06-11077F53 06-11077F20 06-11077G41 06-11077G88 06-11077E77 06-11077G9 06-11077B16 06-11077B15 06-11077A98

06-11077B18

4.02k. +1% 1.82k, ±1% 32.4k, ±1% 100k, ±1% 665, ±1% 107k, ±1% 51k 47k 10k 06-11077A96 06-11077B07 22k

470

390k

62k

1 ohm. +10%, 2W, metal plate

R857-860

R865-873

R877-879

R862

R864

R874

R881

R882

R883

R884 R885 R886 R887

R863

06-11077A98

06-11077B23

06-11077F95

06-11077F91

06-11077F20

06-11077A98

06-11077A74

06-11077B23

06-11077A98

06-11077A90

06-11077A98

06-11077A90

100k

10k 100k

47k 10k

22k 4.7k

22k 4.7k

11K. +1%

10k, ±1% 1.82k, +1%

MXW-7365-O (3) REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. R567 06-11077A86 3.3k 06-11077A42 06-11077B17 R570 56k 27k 06-11077B09 06-11077A01 0–ohm 10k R574 R604 06-11077A98 06-11077A74 R605 06-11077A98 R607 06-11077B47 1 meg 33k 47k R610 06-11077B15 35.7k, ±1% 187k, ±1% B613 06-11077G45 R616 06-11077G48 38.3k, +1% 2.2k 100k 10k R618 06-11077B23 R619, 620 0-ohm 220k 560 100 R621 06-11077A01 R622 06-11077B31 R651 06-11077A68 R652 06-11077A50 B653 654 06-11077498 10k 4.7k 06-11077A90 R655 R656 06-11077B39 470k 620k 06-11077B42 R657 R658 06-11077H65 619k, ±1% 06-11077A82 R659 2.2k R660 06-11077B19 R661 06-11077B03 R662 06-11077B17 56k 62k R663 06-11077B18 R664 06-11077B07 22k 2.7k R665 06-11077A84 06-11077B23 R668-670 06-11077B18 62k 100 06-11077A50 100k, ±1% B701 06-11077G88 R703 06-11077G31 25.5k. +1% 178k, ±1% R706 06-11077G88 100k. +1% 243k, ±1% 30k 61.9k, ±1% B709 06-11077B10 R710-712 B713 06-11077486 3.3k 06-11077B10 18k 1.5k 2.7k R715 06-11077B05 06-11077A78 R801 R802 R803 06-11077A84 06-11077A98 10k 4.7k 10k R804 06-11077A90 06-11077A98 R805, 806 47k 4.7k 06-11077B15 06-11077A90 R808, 809 R810, 81 06-11077B17 56k 4.7k 06-11077A90 R812-815 06-11077B23 06-11077A98 100k R820, 821 06-11077B15 R823, 824 06-11077A98 10k 06-11077B15 47k R826-828 06-11077A98 10k 06-11077A74 **B833** 06-11077A98 10K, ±1% 06-11077F91 R835 06-11077B08 R836 R837 06-11077B05 10k, ±1% R839-841 06-11077A98 R843 844 06-11077A98 R845 06-11077A74 06-11077498 R847, 848 06-11077A74 R849 06-11077A98 06-11077A74 R850 B851 852 06-11077B15 47k 06-11077B45 820k R853 R854 06-11077A90 4.7k 47k 06-11077B15 R855 06-11077A74

MOTOROLA PART NO. SYMBOL R889 06-11077A68 R890 06-11077A98 R897, 898 06-11077A98 integrated circuit (see note) 51-02198J22 dual op-amp U401 U402 51-80942T02 voltage regulator 5V U451 51-02198J22 dual op-amp U551-553 51-02198J22 dual op-amp U601 51-02198J23 dual comparator 51-02198J22 dual op-amp U651, 652 51-02198J22 dual op-amp U653 U701 U801 U802 51-80059M01 voltage-controlled attenuate 51-02198J22 dual op-amp 51-80135C10 51-80960T01 microcomputer U804 HLN9277A ROM kit U803 51-82862N09 logic array U807 dual comparator voltage regulate see note) VR401 48-83461E40 zener, 5.1V VR402 48-82256C15 zener, 5.1V VR501 48--80140L11 zener, 7.5V VR551 48-82256C1 zener, 10V VR801, 802 48-82256C20 zener, 27V VR803 48-82256C1 VR804, 805 zener, 27V 48-82256C20 VR806 VR807 zener, 10V zener, 27V 48-82256C1 48-82256C20

DESCRIPTION

REFERENCE

crystal (see note) Y801	48-80173D09	7.776 MHz
	non-ref	erenced parts
B1 M401-404 M406-410 M412 M413 M414 M415, 416	56-83350K05 03-10943M04 14-83820M05 84-80199M02 14-80145M01 26-80123M01 09-82071K09 14-82392E13	bag tapping screw insulator circuit board insulator accessory connector logic shield 14—pin socket cover insulator
	42-80940T01 03-10943M04 04-00131974 07-80925T01 26-80125L02	retaining ring tapping screw flat washer bracket, audio regulator heat sink, audio regulator

2/28/90

MXW-7365-O (4)

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

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

C854

C856

CR401 CR402

CR403

CR451

CR551

CR501, 502

CR603, 604 CR651

21-13740B73

21-13740B49

48-83654H01

48-83654H0

48-83654H0

48-83654H02

06-11009B23

48-83654H0

48-83654H01

48-83654H02

1000 pF

100 pF

silicon

silicon

silicon

silicon

silicon

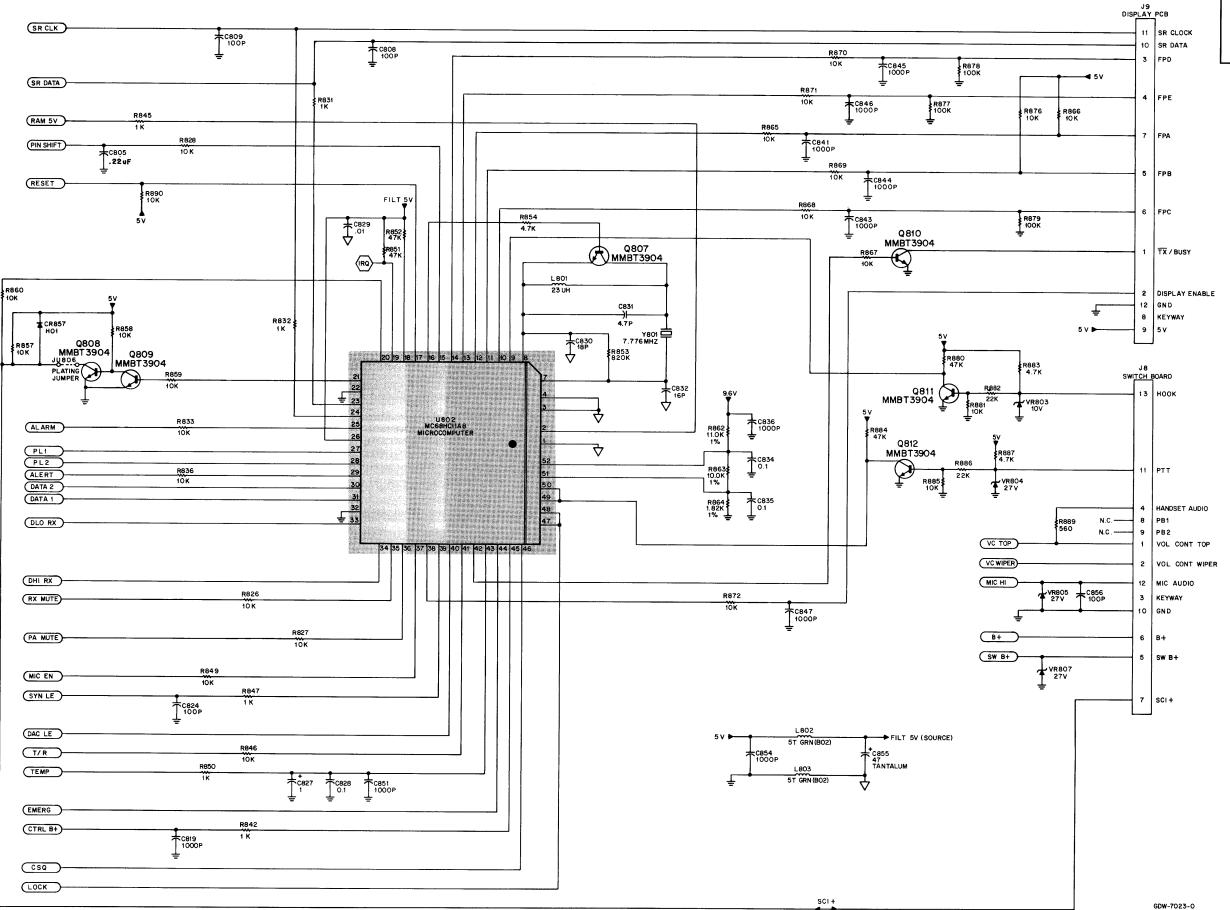
silicon

47, ±10%, 6V

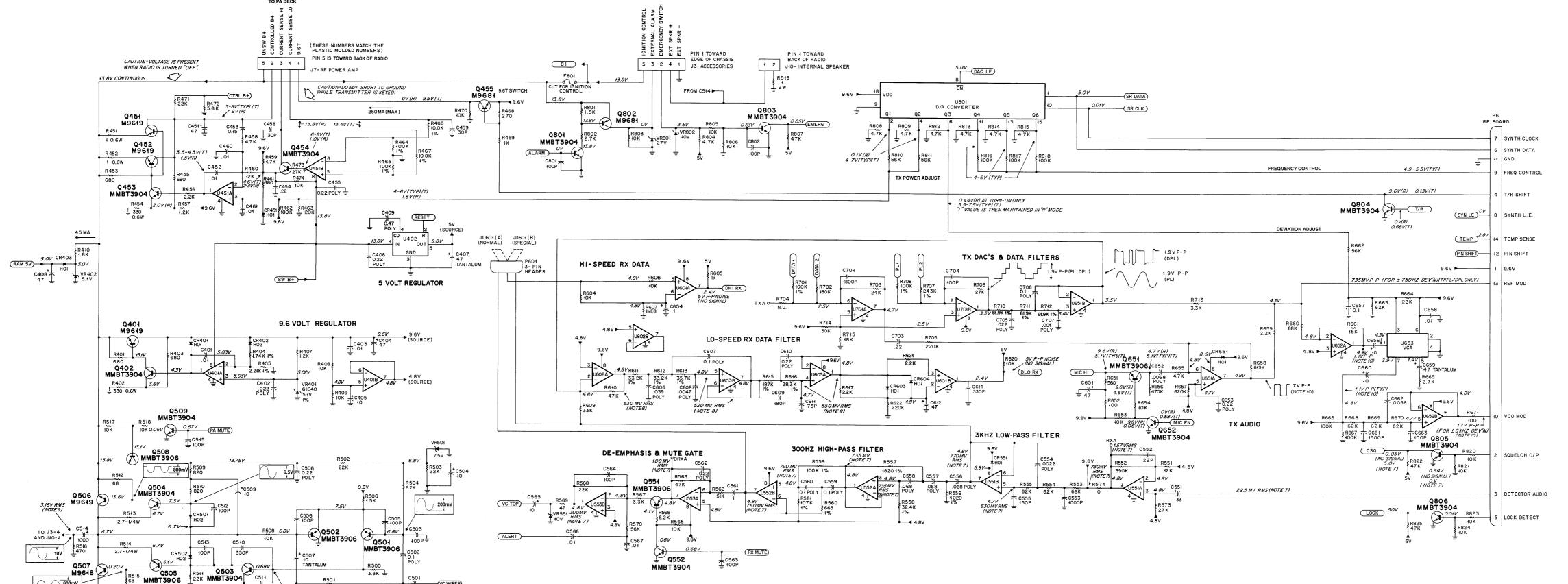
jumper resistor

IMPORTANT

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



Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-0 (Sheet 1 of 4)



VC WIPER) 145 MV RMS (NOTE 9)

Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-O (Sheet 2 of 4) 2/28/90

AUDIO POWER AMP

COMPONENT-SIDE VIEW UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICROHENIES.

COMPONENT-SIDE VIEW

SPARE PAD TO OTHER PAGE

2. NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE

SOLDER-SIDE VIEWS

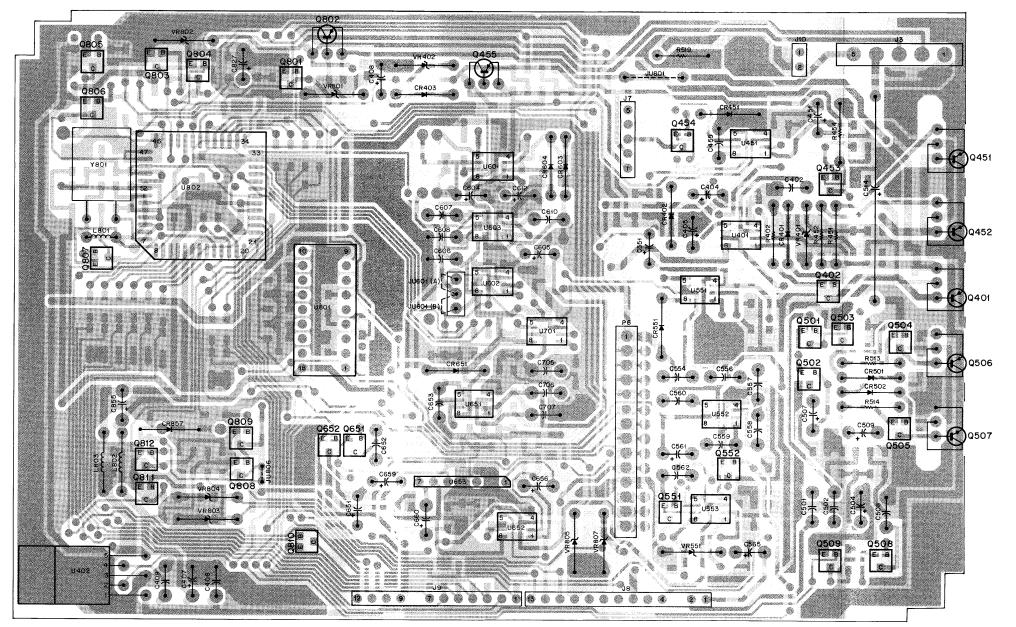
0 0 0 E C B M9618, M9619

- POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED.
- 4. NOT USED.
- 5. DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.
- 6. DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:
 (R) RECEIVE MODE
 (T) TRANSMIT MODE
- (1) TRANSMIT MODE

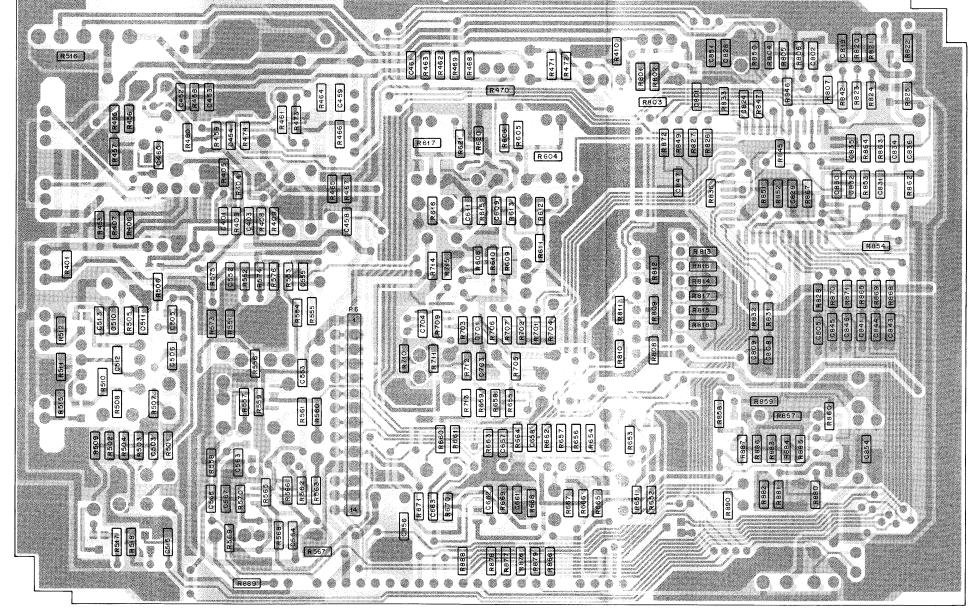
 MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER.

 8. SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.

- 9. SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 5 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD). 10. MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
- 11. VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.



SHOWN FROM COMPONENT SIDE



SOLDER SIDE

COMPONENT SIDE

OVERLAY

GDW-7022-0

GDW-7021-0

GDW-7456-0

SHOWN FROM SOLDER SIDE

Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board **PW-7020-O** (Sheet 3 of 4) 2/28/90

parts list

Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-0

(Sheet 4 of 4)

2/28/90

MXW-7019-O (3) MXW-7019-O (4) MXW-7019-O MXW-7019-O (2) HLN9123A Logic Board, Masked

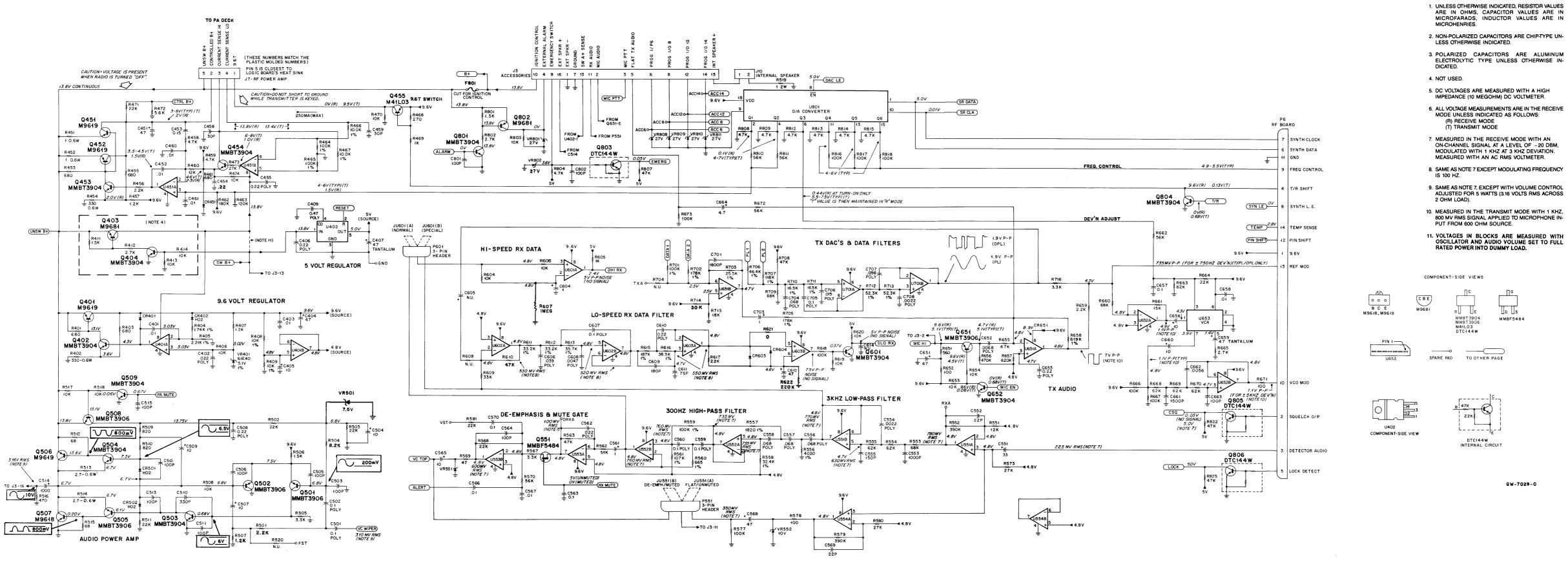
HLN9123A Logic Board, Masked MXW-7019-0			
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
capacitor, fixed uF, ±5			
C401 C402	21-13741B45 08-11051A09	.01, ±10% .022, 63V	
C403	21-13741B45	.01, ±10%	
C404	23-11048B19	47, ±20%, 16V, electrolytic	
C405 C406	23-11048B13 08-11051A15	10, <u>+</u> 20, 16V, electrolytic .22, 63V	
C407	23-11013A56	47, ±20%, 6V, tantalum	
C408	23-11048B19	47, ±20%, 16V, electrolytic .47, 63V	
C409 C451	08-11051A17 23-11048B19	47, ±20%, 16V, electrolytic	
C452	21-13741B45	.01, ±10%	
C453 C454	21-11032B14 21-11032B15	.15, +80/–20% .22, +80/–20%	
C455	08-11051A15	.22, 63V	
C458, 459	21-13740B36	30 pF	
C460, 461 C501, 502	21-13741B45 08-11051A13	.01, ±10% .1, 63V	
C503	21-13740B49	100 pF	
C504	23-11048B13	10, ±20%, 16V	
C505, 506 C507	21-13740B49 23-11013D13	100 pF 10, ±10%, 20V, tantalum	
C508	08-11051A15	.22, 63V	
C509	23-11048B13	10, ±20%, 16V, electrolytic	
C510 C511–513	21-13740B61 21-13740B49	330 pF 100 pF	
C514	23-02308M01	1000 uF, ±20%, 16V, elect	rolytic
C515	21-13740B49	100 pF	•
C551	23-11048A17 21-13740B33	33, ±20, 25V, electrolytic	
C552 C553	21–13740B33 21–13740B73	22 pF 1000 pF	
C554	08-11051A03	.0022, 63V	
C555	21-13740B53	150 pF .068, 63V	
C556–558 C559, 560	08-11051A12 08-11051A13	.1, 63V	
C561	23-11048B05	1, ±20%, electrolytic	
C562	08-11051A09 21-13740B49	.022, 63V 100 pF	
C563, 564 C565	23-11048B13	10, ±20%, 16V, electrolytic	:
C566, 567	21-13741B45	0.01, ±10%	
C604 C606	23-11048B05 08-11051A22	1, ±20%, electrolytic 0.039, 63V	
C607	08-11051A13	.1, 63V	
C608	08-11051A05	.0047, 63V	
C609 C610	21–13740B55 08–11051A15	180 pF .22, 63V	
C611	21-13740B46	75 pF	
C612	23-11048B19	47, ±20%, 16V, electrolytic	:
C614 C651	21–13740B61 23–11048B19	330 pF 47, ±20%, 16V, electrolytic	;
C652	08-11051A06	.0068, 63V	
C653	08-11051A15	.22, 63V	
C656 C657	23-11048B13 21-13741B69	10, ±20%, 16V, electrolytic 0.1, +80 –20%	•
C658	21-13741B45	0.01, ±10%	
C659 C660	23-11013A56 23-11048B13	47, ±20%, 6V, tantalum 10, ±20%, 16V, electrolytic	
C661	21–13740B76	1500 pF	•
C662	21-13741B39	.0056, ±10%	
C663 C701	21-13740B49 21-13740B78	100 pF 1800 pF	
C703	21-11032B15	.22, +80, –20%	
C704	21-13740B49	100 pF	
C705 C706	08-11051A09 08-11051A13	.022, 63V .1, 63V	
C707	08-11051A01	.001, 63V	
C801, 802	21-13740B49	100 pF	
C805 C808, 809	21-11032B15 21-13740B49	.22, +80 –20% 100 pF	
C819	21-13740B73	1000 pF	
C824	21-13740B49	100 pF	
C827 C828	23-11048B05 21-13741B69	1, ±20%, electrolytic 0.1, +80 –20%	
C829	21-13741B45	0.01, ±10%	
C830	21-13740B31	18 pF	
C831 C832	21-13740B17 21-13740B30	4.7, <u>±</u> .25 pF 16 pF	
C834, 835	21-13741B69	0.1, +8020%	
C836	21-13740B73	1000 pF	
C841 C843–847	21-13740B73 21-13740B73	1000 pF 1000 pF	
C851	21-13740B73	1000 pF	
C854	21-13740B73	1000 pF	
C855 C856	23-11013A56 21-13740B49	47, <u>+</u> 20%, 6V, tantalum 100 pF	
diode (see note)		•	
CR401	48-83654H01	silicon	
CR402	48-83654H02	silicon	
CR403 CR451	48-83654H01 48-83654H01	silicon silicon	
CR501, 502	48-83654H02	silicon	
CR551	0611009B23	jumper resistor	
CR603, 604 CR651	48-83654H01 48-83654H01	silicon silicon	
CR857	48–83654H01	silicon	
fuse			
F801	65-05214E06	1 A	
connector receptacle		5 ata	
J3	28-80129M01	5-pin, accessories	

		MXW-7019-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
J7	28-80128M01	5-pin, RF power amplifier
J8/9 J10	28-80126M01 28-80128M02	23-pin 2-pin, internal speaker jumper
umper	00 94191101	2 contact push-on
JU601 coil, RF	09-84181L01	2-contact push-on
_801	24-82723H35	23 uH, red
_802, 803	24-83961B02	5 turns, green
connector plug P6	28-80127M01	14-pin, RF board
P601	28-80002R03	3-pin, for JU601
transistor (see note) Q401	48-00869916	PNP
Q402	48-80214G02	NPN
Q451, 452 Q453, 454	48-00869916 48-80214G02	PNP NPN
Q455, 454 Q455	48-00869681	PNP
Q501, 502	48-05128M16	PNP NPN
Q503, 504 Q505	48-80214G02 48-05128M16	PNP
Q506 0507	48-00869619	PNP
Q507 Q508	48-00869618 48-05128M16	NPN PNP
Q509	48-80214G02	NPN
Q551 Q552	48-05128M16 48-80214G02	PNP NPN
Q651	48-05128M16	PNP
Q652 Q801	48-80214G02 48-80214G02	NPN NPN
Q802	48-00869681	PNP
Q803–812 resistor, fixed, ohm,	48-80214G02	NPN
resistor, fixed, offin, R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, metal film
R403 R404	06-11077A70 06-11077F18	680 1.74k, ±1%
R405	06-11077F28	2.21k, ±1%
R407 R408, 409	06-11077A76 06-11077A98	1.2k 10k
R410	06-11077A80	1.8k
R451, 452 R453	06-02369M01 06-11077A70	1, .6 Watt, metal film 680
R454	06-02369M31	330, .6 watt, metal film
R455 R456	06-11077A70 06-11077A82	680 2.2k
R457	06-11077A76	1.2k
R458, 459 R460	06-11077A90 06-11077B01	4.7k 12k
R461	06-11077A70	680
R462 R463	06-11077B29 06-11077B25	180k 120k
R464, 465	06-11077G88	100k, ±1%
R466, 467 R468	06-11077F91 06-11077A60	10k, ±1% 270
R469	06-11077A74	1k
R470 R471	06-11077A98 06-11077B07	10k 22k
R472	06-11077A92	5.6k
R473 R474	06-11077B09 06-11077A98	27k 10k
R501	06-11077A82	2.2k
R502, 503 R504	06-11077B07 06-11077A96	22k 8.2k
R505	06-11077A86	3.3k
R506 R507	06-11077A78 06-11077A76	1.5k 1.2k
R508	06-11077A98	10k ·
R509, 510 R511	06-11077A72 06-11077B07	820 22k
R512	06-11077A46	68
R513, 514 R515	06-11009B26 06-11077A46	2.7, 1/4 Watt 68
R516	06-11077A66	470
R517, 518 R519	06-11077A98 06-80185M01	10k 1 ohm, +10%, 2W, metal plate
R551	06-11077B01	12k
R552 R553	06-11077B37 06-11077B19	390k 68k
R554, 555	06-11077B18	62k
R556 R557	06-11077F53 06-11077F20	4.02k, ±1% 1.82k, ±1%
R558	06-11077G41	32.4k, <u>+</u> 1%
R559 R560	06-11077G88 06-11077E77	100k, ±1% 665, ±1%
R561	06-11077G91	107k, ±1%
R562 R563	06-11077B16 06-11077B15	51k 47k
R565	06-11077A98	10k
R566 R567	06-11077A96 06-11077A86	8.2k 3.3k
R568	06-11077807	22k
R569 R570	06-11077A42 06-11077B17	47 56k
R573	06-11077B09	27k
R574 R604	06-11077A01 06-11077A98	0–ohm 10k
R605	30	
R606	06-11077A74 06-11077A98	1k 10k

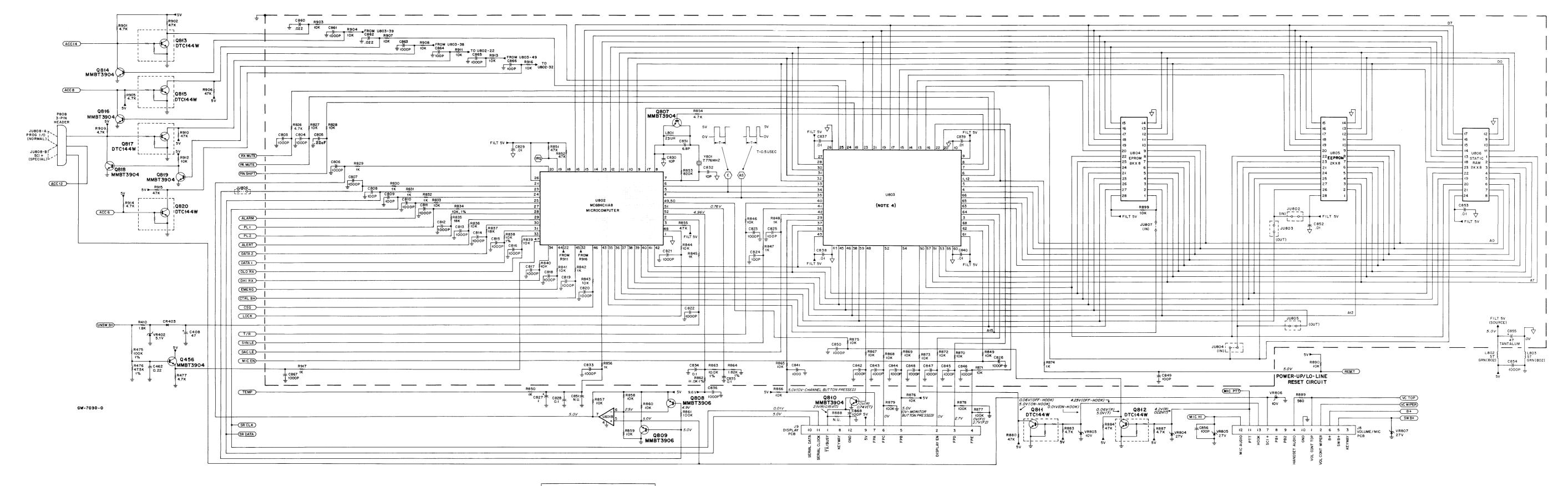
REFERENCE SYMBOL R607 R609 R610 R611, 612 R613 R615 R616 R617 R620 R621 R622 R651 R652 R655 R656 R658 R656 R657 R658 R659 R660 R661 R661 R662	MOTOROLA PART NO. 06-11077B47 06-11077B15 06-11077G45 06-11077G45 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A98 06-11077A98 06-11077A99 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077B19	1 meg 33k 47k 33.2k, ±1% 35.7k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k 15k
R609 R610 R611, 612 R613 R615 R615 R616 R617 R620 R621 R621 R651 R655 R655 R655 R656 R657 R658 R659 R660 R660 R661	06-11077B11 06-11077G15 06-11077G45 06-11077G45 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A83 06-11077A98 06-11077A90 06-11077A90 06-11077B39 06-11077B39 06-11077B42 06-11077B42 06-11077B42 06-11077B19 06-11077B19	33/k 47k 33.2k, ±1% 35.7k, ±1% 187k, ±1% 187k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R610 R611, 612 R613 R615 R616 R617 R620 R621 R621 R652 R653, 654 R655 R656 R657 R658 R659 R659 R660 R660	06-11077B15 06-11077G42 06-11077G45 06-11077G48 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A83 06-11077A98 06-11077A90 06-11077B39 06-11077B39 06-11077B39 06-11077B39 06-11077B42 06-11077B19 06-11077B19	47k 33.2k, ±1% 35.7k, ±1% 187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 668k
R611, 612 R613 R615 R616 R617 R620 R621 R621 R651 R655 R653, 654 R655 R656 R657 R658 R659 R660 R661	06-11077G42 06-11077G45 06-11077H15 06-11077H82 06-11077A82 06-11077A82 06-11077A82 06-11077A93 06-11077A50 06-11077A50 06-11077A90 06-11077A90 06-11077B93 06-11077B93 06-11077B93 06-11077B93 06-11077B93 06-11077B93	33.2k, ±1% 35.7k, ±1% 187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R615 R616 R617 R620 R621 R621 R652 R653, 654 R655 R656 R657 R656 R657 R659 R660 R660	06-11077H15 06-11077G48 06-11077A98 06-11077A98 06-11077A98 06-11077B31 06-11077A68 06-11077A68 06-11077A98 06-11077A99 06-11077B39 06-11077B39 06-11077B42 06-11077B42 06-11077B19 06-11077B19	187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R616 R617 R620 R621 R621 R651 R652 R653, 654 R656 R657 R658 R659 R669 R660 R661	06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A50 06-11077A50 06-11077A98 06-11077A99 06-11077B99 06-11077B42 06-11077H65 06-11077B19 06-11077B19	38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R617 R620 R621 R621 R651 R652 R653, 654 R656 R657 R658 R658 R659 R660 R661 R661	06-11077A82 06-11077A98 06-11077A98 06-11077A93 06-11077A68 06-11077A98 06-11077A99 06-11077B39 06-11077B42 06-11077H65 06-11077A92 06-11077B19 06-11077B19 06-11077B19	2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R621 R651 R651 R652 R653, 654 R656 R656 R657 R658 R659 R660 R661 R661	06-11077A82 06-11077B31 06-11077A68 06-11077A50 06-11077A98 06-11077A99 06-11077B42 06-11077H65 06-11077H65 06-11077B19 06-11077B19	2.2k 220k 560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k
R622 R651 R652 R653, 654 R656 R656 R657 R658 R659 R660 R661 R661	06-11077B31 06-11077A68 06-11077A50 06-11077A98 06-11077A99 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B19 06-11077B17	220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R651 R652, 654 R653, 654 R656 R656 R657 R658 R659 R660 R661	06-11077A68 06-11077A50 06-11077A98 06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B13	560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k
R653, 654 R655 R656 R657 R658 R659 R660 R661	06-11077A98 06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077B19 06-11077B19 06-11077B17	10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R655 R656 R657 R658 R659 R660 R661 R661	06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	4.7k 470k 620k 619k, ±1% 2.2k 68k
R657 R658 R659 R660 R661 R662	06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	620k 619k, ±1% 2.2k 68k
R658 R659 R660 R661 R662	06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	619k, ±1% 2.2k 68k
R659 R660 R661 R662	06-11077A82 06-11077B19 06-11077B03 06-11077B17	2.2k 68k
R661 R662	06-11077B03 06-11077B17	
R662	06-11077B17	IOK
		56k
		62k
R664	06-11077B07	22k
R665 R666, 667	06-11077A84 06-11077B23	2.7k 100k
R668–670	06-11077B18	62k
R671	06-11077A50	100
R701 R702	06-11077G88 06-11077B29	100k, ±1% 180k
R703	06-11077B08	24k
R705 R706	06-11077B31 06-11077G88	220k 100k, ±1%
R707	06-11077H26	243k, ±1%
R709	06-11077B09	27k
R710-712	06-11077G68 06-11077A86	61.9k, ±1% 3.3k
R713 R714	06-11077B10	3.3k 30k
R715	06-11077B05	18k
R801 R802	0611077A78 0611077A84	1.5k 2.7k
R803	06-11077A98	10k
R804	06-11077A90	4.7k
R805, 806 R807	06-11077A98 06-11077B15	10k 47k
R808, 809	06-11077A90	4.7k
R810, 811	06-11077B17	56k
R812–815 R816–818	06-11077A90 06-11077B23	4.7k 100k
R820, 821	06-11077A98	10k
R822	06-11077B15 06-11077A98	47k 10k
R823, 824 R825	06-11077B15	47k
R826-828	06-11077A98	10k
R831, 832 R833	06-11077A74 06-11077A98	1k 10k
R836	06-11077A98	10k
R842	06-11077A74	1k
R845 R846	06-11077A74 06-11077A98	1k 10k
R847	06-11077A74	1k
R849	06-11077A98	10k
R850 R851, 852	06-11077A74 06-11077B15	1k 47k
R853	06-11077B45	820k
R854	06-11077A90	4.7k
R857–860 R862	06-11077A98 06-11077F95	10k 11K, ±1%
R863	06-11077F91	10k, ±1%
R864 R865_872	06-11077F20	1.82k, <u>±</u> 1% 10k
R865–872 R876	06-11077A98 06-11077A98	10k 10k
R877-879	06-11077B23	100k
R880 R881	06-11077B15 06-11077A98	47k 10k
H881 R882	06-11077A98 06-11077B07	22k
R883	06-11077A90	4.7k
R884 R885	06-11077B15 06-11077A98	47k 10k
R886	06-11077B07	22k
R887	06-11077A90	4.7k
R889 R890	06-11077A68 06-11077A98	560 10k
integrated circuit (s		
U401	51–02198J22	dual op-amp
U402	51-80942T01	voltage regulator 5V
U451 U551–553	51-02198J22 51-02198J22	dual op-amp dual op-amp
U601	51-02198J23	dual comparator
U602, 603	51-02198J22	dual op-amp
U651, 652 U653	51-02198J22 51-80059M01	dual op-amp voltage-controlled attenuator
U701	51-00059M01	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microcomputer
voltage regulator (s VR401	see note) 48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V zener, 5.1V
VR551 VR801	48-82256C11 48-82256C20	zener, 10V zener, 27V

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
VR802, 803	48-82256C11	zener, 10V
VR804, 805	48-82256C20	zener, 27V
VR807	48-82256C20	zener, 27V
crystal (see note)		
Y801	48-80173D09	7.776 MHz
	non-ref	erenced parts
	14-80145M01	insulator accessory connector
	03-10943M04	screw M2.5x8 (5 used)
	42-80940T01	retaining ring
	07-80925T01	bracket, heat sink
	14-83820M05	insulator T0-118 (5 used)
	26-80125L02	heat sink, audio/regulator
	04-00131974	flat washer (4 used)

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

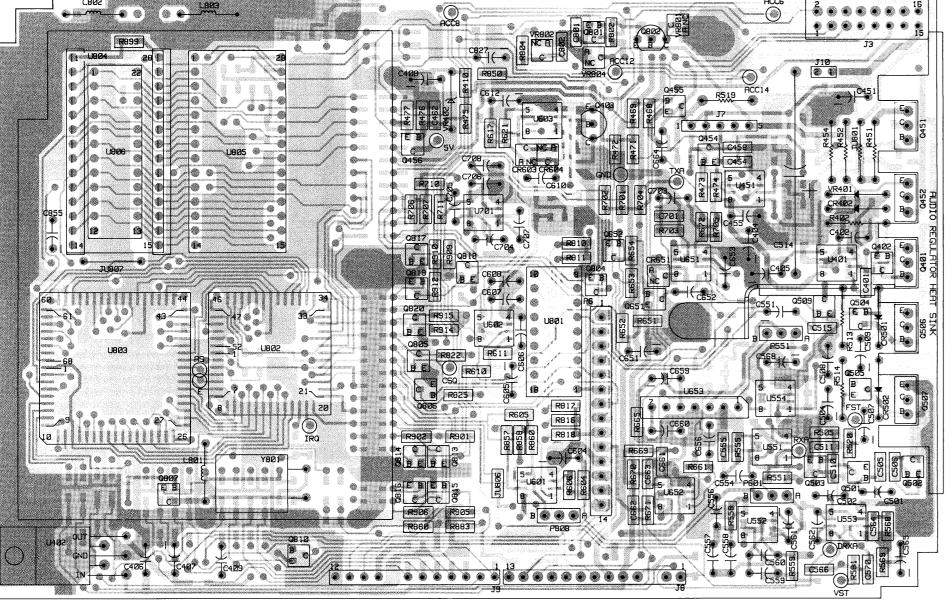


GW-7029-0



IMPORTANT

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



INNER LAYER 1 GCW-7473-O INNER LAYER 2 GCW-7474-O

OVERLAY GCW-7475-O

CB54 SOLDER SIDE GCW-7028-O

COMPONENT SIDE @ GCW-7027-O

OVERLAY B GBW-7458-O

SOLDER SIDE VIEW

COMPONENT SIDE VIEW

parts list

23-13740B49

23~13741B53

23-13740B73 23-13741B53

1000 pF

C861 C862

R468

R469

R470

06-11077A60

06-11077A74

06-11077A98

270

10k

MXW-7025-O (4) MXW-7025-O MXW-7025-O (2) MXW-7025-O (3) HLN9313A Logic Board (Options Connector) REFERENCE MOTOROLA MOTOROLA PART NO. REFERENCE MOTOROLA REFERENCE MOTOROL A REFERENCE DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION PART NO. SYMBOL SYMBOL SYMBOL 06-11077B15 C863 23-13740B73 B471 06-11077B0 R822 capacitor, fixed uF, +5%, 50V (unless otherwise stated) 21-13741B45 C864 06-11077A92 C401 C402 23-13740B49 100 pF R472 27k 10k 100k, ±1% 08-11051A09 .022, 63V C865 23-13740B73 1000 pF R473 R474 06-11077B09 06-11077A98 R826 06-11077A90 4.7k R827,828 C403 C404 C405 C406 21-13741B45 C866 23-13740B49 100 pF C867 23-13740B73 06-11077G88 B829-832 06-11077A74 47, ±20%, 16V, electrolytic 23-11048B19 R833 C868 R476 06-11077G57 47.5k. +1% 23-11048B13 10, ±20, 16V, electrolytic 23-13740B49 100 pF R477 06-11077A90 4.7k R834 R835 06-11077F91 10.0k +1% 08-11051A15 .22. 63V diode (see note) C407 C408 23-13749A44 R501 06-11077A82 2.2k 06-11077B05 48-05129M40 CR401 low profile R836 06-11077A98 10k 23-11048B19 47. +20%, 16V, electrolytic CR402 48-83654H02 silicon R837 06-11077B05 8.2k 3.3k 1.5k 1.2k C409 C451 08-11051A17 R504 06-11077A96 CR403 48-05129M40 low profile R838 R839–841 06-11077F91 10.0k ±1% R505 47, ±20%, 16V, electrolytic 23-11048B19 48-05129M40 CR451 low profile C452 C453 21-13741B45 R506 06-11077A78 CR501.502 48-83654H02 06-11077A76 06-11077A74 15. +80/-20% 21-11032B14 CR603,604 low profile 48-05129M40 R843.844 06-11077A98 10k 820 C454 21-11032B15 .22, +80/-20% R508 06-11077A98 CR651 48-05129M40 R509,510 R845 06-11077474 1k 10k C455 08-11051A15 .22, 63V 06-11077A98 fuse R846 C458,459 06-11077B07 22k F801 65-05214E06 1 A R847,848 06-11077A74 1k 10k C460 461 21-13741B45 C462 C501.502 06-11077A98 .22, +80/–20% R513 514 06-11009R26 1/4 Watt R849 connector receptacle 06-11077A74 1k 47k R515 08-11051A13 .1. 63V 28-80923V01 right angle 5-pin. RF power amplifier B851.852 06-11077B15 21-13740B49 06-11077466 470 28-80128M01 06-11077B45 820k C504 23-11048B13 10, +20, 16V, electrolytic 28-80126M01 4.7k C505,506 21-13740B49 2-pin, internal speaker iumpe 06-80185M01 1 ohm, +10%, 2W, metal plate R854 06-11077A90 J10 28-80128M02 06-11077B01 47k 10. +10%, 20V C507 C508 23-13749C39 R551 06-11077A74 08-11051A15 B552 06-11077B37 B856 JU551 09-84181101 2-contact push-on 06-11077A98 10, ±20, 16V, electrolytic 06-11077B19 C509 C510 23-11048B13 R553 JU601 09-84181L01 2-contact push-on 62k 40.2k, ±1% 21-13740B61 R554,555 06-11077B18 R861 06-11077B23 100k 330 pF JU802 JU804 06-11077A01 0-ohm resistor 06-11077F53 R862 11.0k, ±1% C511-513 C514 21-13740B49 R556 06-11077A01 0-ohm resisto R557 06-11077F20 18.2k, ±1% R863 06-11077F91 10.0k +1% 1000 uF, ±20%, 16V, electrolytic 23-02308M01 JU806 JU807 06-11077A01 0-ohm resisto 18.2k, ±1% 06-11077G41 21-13740B49 23-11048A17 C515 C551 R558 32.4k, +1% 06-11009B23 06-11077G88 06-11077E77 33, +20, 25V, electrolytic 0—ohm resistor R559 R560 100k, ±1% R865-873 06-11077A98 10k JU808 09-84181L01 2-contact push-on C552 C553 21-13740B33 665, +1% 10k 100k coil, RF 06-11077G91 107k, ±1% B875 876 06-11077A98 1000 pF 21-13740B73 R877-879 08-11051A03 21-13740B53 R562 06-11077B16 C554 C555 .0022, 63V L801 24-82723H35 23 uH. red R563 R567 06-11077B15 R880 R883 06-11077R15 47k L802.803 150 pF 24-83961B02 5 turns, green 06-11077A90 C556-558 C559,560 08-11051A12 08-11051A13 .068, 63V 06-11077A86 3.3k 22k 47 connector plug R884 R887 06-11077B15 47k 4.7k 1. 63V 28-80127M02 P6 14-pin header R569 R570 R573 C561 23-11048B05 06-11077A42 P551 28-80002R03 560 10k 10k 4.7k 56k 27k 100k 100 390k 27k 22k 10k R889 R890 06-11077468 C562 08-11051A09 .022, 63V 3-pin, for JU601 P601 28-80002R03 06-11077A98 C563 C564 21-13741B69 06-11077B09 P808 28-80002R03 R899 06-11077498 21-13740B49 06-11077A90 C565 C566.567 23-11048B13 10, ±20, 16V, electrolytic transistor (see note R578 06-11077A50 R901 48-00869619 R579 R902 R903,904 06-11077B15 47k 10k 4.7k 21-13741845 Q401 06-11077A98 C568 47. ±20%, 16V, electrolytic 48-80214G02 48-00869619 NPN R580 06-11077B09 06-11077A90 Q451,452 C569 C570 21-13740B33 22 pF 06-11077B15 47k 21-13741B69 Q453,454 48-80214G02 NPN PNP R604 R605 06-11077A98 R906 R907,908 06-11077A98 10k 4.7k 48-80141L03 06-11077A74 C604 C606 C607 C608 1 +20% electrolytic 23-11048B05 Q455 Q456 Q501,502 48-80214G02 48-05128M16 NPN PNP R606 R607 06-11077498 10k R909 06-11077A90 06-11077B15 47k 06-11077B47 1 meg 08-11051A13 1 63V NPN PNP PNP 48-80214G02 48-05128M16 06-11077B11 10k 08-11051A05 .0047. 63V Q503,504 R609 R610 R911-913 06-11077A98 06-11077A90 4.7k 47k 06-11077B15 C609 C610 C611 C612 21-13740B55 180 pF Q505 .22, 63V Q506 48-00869619 R611,612 R613 06-11077G42 33.2k, +1% R915 06-11077B15 08-11051A15 NPN 06-11077G45 06-11077A98 Q507 48-00869618 21-13740R46 35.7k. +1% 187k, ±1% 38.3k, ±1% 23-11048B19 47, ±20%, 16V, electrolytic Q508 48-05128M16 PNP NPN R615 R616 06-11077H15 R917 06-11077A74 06-11077G48 C651 C652 C653 C656 23-11048B19 47. ±20%, 16V, electrolytic Q509 48-80214G02 integrated circuit e note) 2.2k 100k .0068, 63V Q551 48-80949V01 JFET 06-11077A82 08-11051A06 U401 51-02198.122 dual on amn 08-11051A15 23-11048B13 06-11077B23 O601 48-80214G02 NPN R618 U402 51-80942T0 voltage regulator 5V 10. ±20, 16V, electrolytic Q651 48-05128M16 PNP R619,620 06-11077A98 10k dual op amp dual op amp U451 51-02198J22 06-11077A0 NPN 0-ohr 220k C657 C658 21-13741B69 Q652 48-80214G02 R621 U551-554 51-02198J22 06-11077B31 06-11077A68 NPN PNP 21-13741B45 U601 51-02198J23 51-02198J22 dual comparator 560 100 10k 4.7k C659 C660 23-13749A44 23-11048B13 47 +20% 6V tantalum Q802 48-00869681 R651 U602-604 dual op amp Q803 48-80947V01 NPN 06-11077A50 06-11077A98 10, +20, 16V, electrolytic U651.652 51-02198J22 dual op amp NPN B653.654 C661 C662 21-13740B76 1500 pF O804 48-80214G02 51-80059M01 voltage-controlled attenuator U653 NPN 06-11077A90 21-13741B39 U701 U801 51-02198J22 51-80135C10 dual op amp NPN PNP NPN 06-11077B39 470k C663 C664 21-13740B49 100 pF 4.7, +20%, 35V O807 48-80214G02 R656 D/A converter 620k 619k, +1% Q808,809 48-05128M16 06-11077B42 23-11048B09 U802 51_80960T0 microcomputer C701 C703 C704 C705 06-11077H65 21-13741B27 0810 48-80214G02 R658 51-82862N09 U803 custom gate array Q811-813 48-80947V01 06-11077A82 23-11048B05 +20%, electrolytic U804 HLN9277A BOM kit 08-11051A12 .068, 63V O814 48-80214G02 NPN R660 06-11077B19 **EEPROM** U805 51-80901W0 Q815 48-80947V01 R661 08-11051A13 .1. 63V U806 51-80914V01 static RAM C706 C707 08-11051A08 .015, 63V O816 48-80214G02 NPN R662 06-11077B17 56k 62k 22k 2.7k voltage regu Q817 48-80947V01 see note) 08-11051A23 056 63V 48-83461E40 C708 C801.802 08-11051A03 .0022, 63V O818.819 48-80214G02 NPN R664 06-11077B07 48-80947V01 R665 VR402 48-82256C15 zener, 5.1V 21-13740B49 100 pF Q820 zener, 7.5V 21-13740B73 R666 667 06-11077B23 100k resistor, fixed, ohm, +5%, 1/8 watt (un ess otherwise stated) 62k 100 VR551.552 48-80140L15 zener, 10V C805 21-11032B15 .22. +80 -20% 06-11077A70 R401 1000 pF C806,807 21-13740B73 B671 06-11077450 R402 06-02369M31 330, .6 watt, metal film R672 06-11077B17 VR803 48-80140115 zener 10V C808 809 21-13740B49 R403 06-11077A70 zener, 27V VR804,805 48-80948V0 C810-823 21-13740B73 B673 06-11077B23 100k R404 06-11077F18 17.4k, ±1% VR806 48-80140115 zener 10V 100k, ±1% C824 825 21-13740B49 100 pF R405 06-11077F28 22.1k, ±1% VR807-811 zener. 27V 23-13740B73 B702 06-11077H13 178k, ±1% 25.5k, ±1% C826 1000 pF R406 06-11077A98 R703 06-11077G31 C827 23-11048B05 1. +20%, electrolytic crystal (see note) R407 06-11077A76 C828 21-13741B69 B705 06-11077H13 178k, ±1% 48-80173D09 7.776 MHz 06-11077F91 06-11077A80 R408,409 10.0k, ±1% Y801 06-11077G56 R706 46.4k, ±1% C829 C830 21-13741B45 1.8k 1, .6 Watt, metal film R410 non-referenced parts 118k, ±1% 47k 21-13740B25 R707 R708 06-11077G95 R451,452 06-02369M01 06-11077B15 C831 C832 21-13740B21 6.8 pF. +.25 pF M415,416 09-82071K09 14 contact receptacle (2 used) R453 06-11077A70 06-11077B19 21-13740B25 26-80123M02 M414 330, .6 watt, metal filn 16.5k, ±1% R710.711 06-11077G13 23-13740B73 1000 pF M412 84-80942V03 circuit board R455 06-11077A70 23-13741B69 06-11077G6 52.3k, ±1% 15-80922V01 housing, connecto R456 06-11077A82 2.2k 06-11077B10 C836 C837-840 23-13740B73 1000 pF R714 29-84249N01 terminal (4 used) R457 06-11077A76 1.2k 4.7k 23-13741B45 06-11077B05 03-10943M04 tapping screw M2.5x8 R458,459 06-11077A90 23-13740B73 23-13740B49 03-10943M04 04-00131974 C841-848 1000 nF R716 06-11077A86 tapping screw M2.5x8 12k 680 180k 120k B460 06-11077B01 06-11077A78 1.5k 2.7k 100 pF M401-404 flat washer (4 used) 23-13740B73 R802 06-11077A84 07-80925T0 bracket, audio regulato R462 06-11077B29 06-11077A98 C852.853 23-13741B45 M406-410 insulator heat conductive (5 used) R463 06-11077B25 14-83820M05 23-13740B73 23-13749A44 C854 C855 R804 06-11077A90 26-80125L02 R464 465 06-11077G88 100k, ±1% 06-11077B15 47. ±20%. 6V, tantalum R466,467 06-11077F91 10.0k. +1%

R808 809

R810,811

B812-815

06-11077A90

06-11077A90

4.7k

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

Motorola part number

END OF PART 2 OF 4

Schematics, Circuit Board Diagrams, and Parts List for HLN9313A Logic Board PW-7026-O (Sheet 4 of 4) 2/28/90



1. Theory Of Operation

The Logic Board consists of 5 segments:

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

1.1 MICROPROCESSOR

1.1.1 Description

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

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

The control logic surrounding U802 consists of:

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

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

1.1.2 Operation

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

1.1.3 Power Up/Low-Line Reset

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

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

1.1.4 Microcomputer Start-Up Routine

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

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

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

1.1.5 Microcomputer Normal Operation

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

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

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

1.1.6 Reading Or Writing In Memory

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

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

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

1.2 VOLTAGE REGULATION

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

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

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

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

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

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

1.3 RECEIVE AUDIO FILTER

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

1.3.1 Audio Power Amplifier

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

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

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

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

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

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

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

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

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

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

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

1.3.2 Low-Speed Data Filter

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

1.3.3 High Speed Data Filter

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

1.4 TRANSMIT AUDIO

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

1.4.1 High-Speed Transmit Data

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

1.4.2 Low–Speed Transmit Data

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

1.5 POWER CONTROL CIRCUIT

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

2. Troubleshooting Guide

2.1 MICROPROCESSOR SECTION

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

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

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

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

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

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

2.2 RECEIVE AUDIO

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

2.3 TRANSMIT AUDIO

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

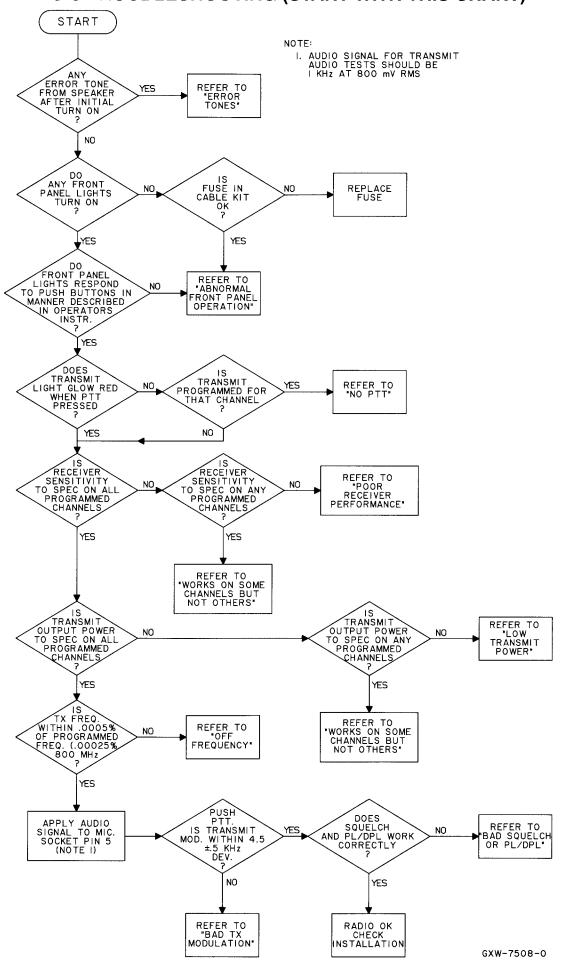
2.4 AUDIO POWER AMPLIFIER

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

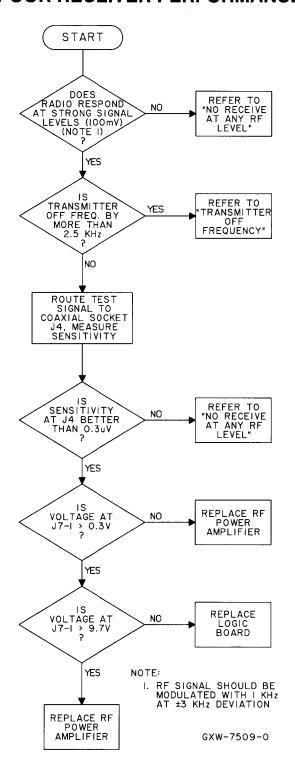
2.5 POWER CONTROL CIRCUITRY

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

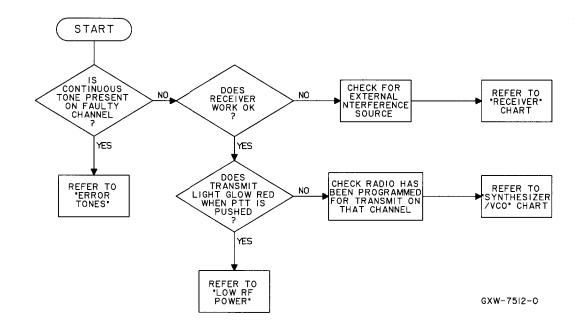
BASIC TROUBLESHOOTING (START WITH THIS CHART)



POOR RECEIVER PERFORMANCE



RADIO WORKS ON SOME CHANNELS BUT NOT OTHERS

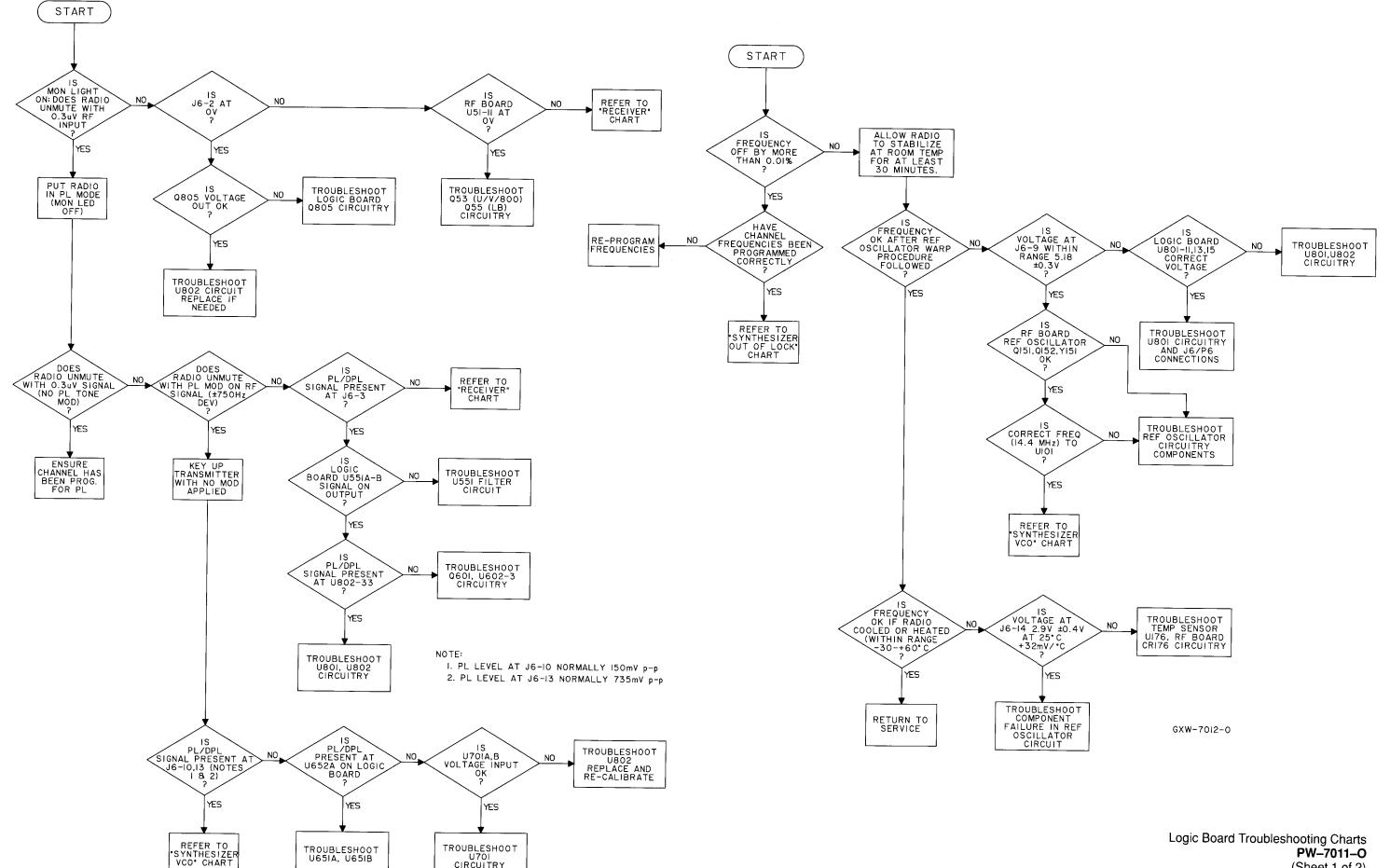


IMPORTANT

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

BAD SQUELCH OR PL/DPL

TRANSMITTER OFF FREQUENCY



U701 CIRCUITRY

GXW-7013-0

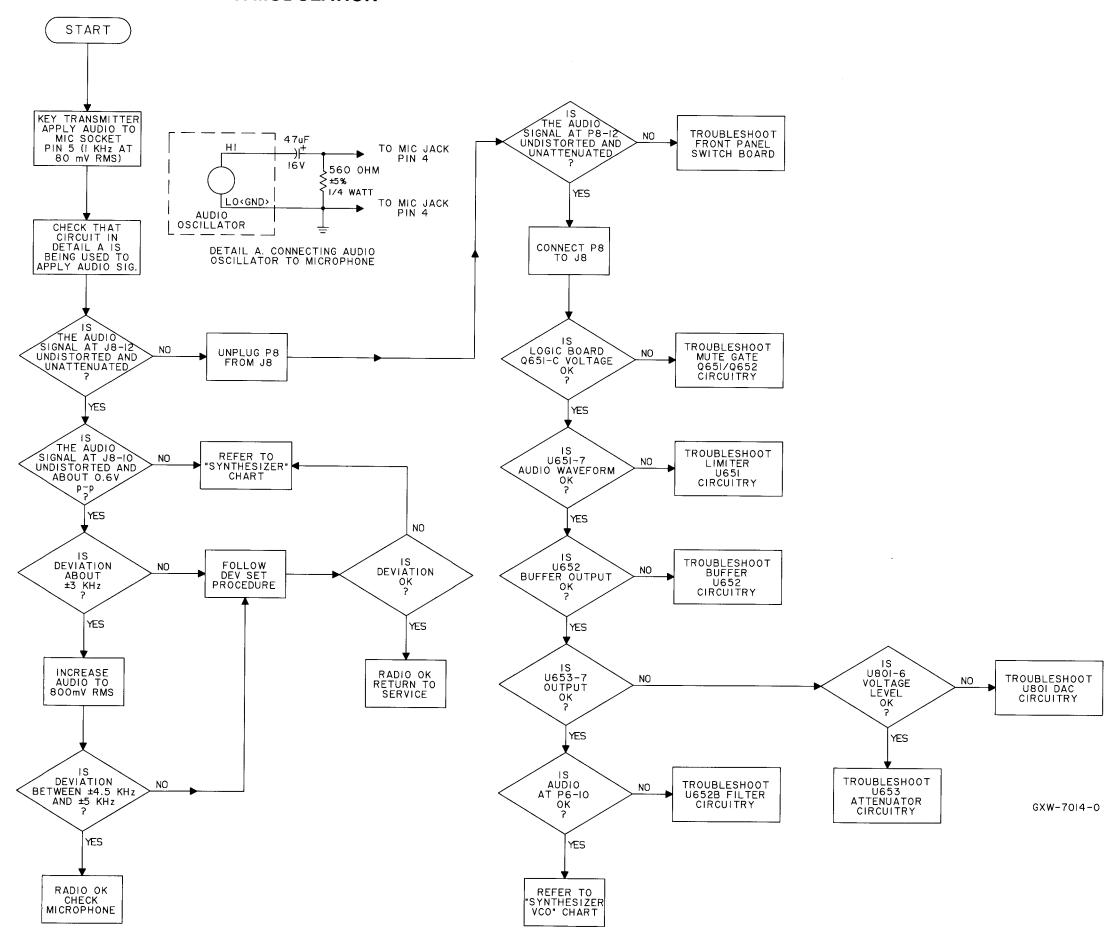
PW-7011-0 (Sheet 1 of 2) 2/28/90

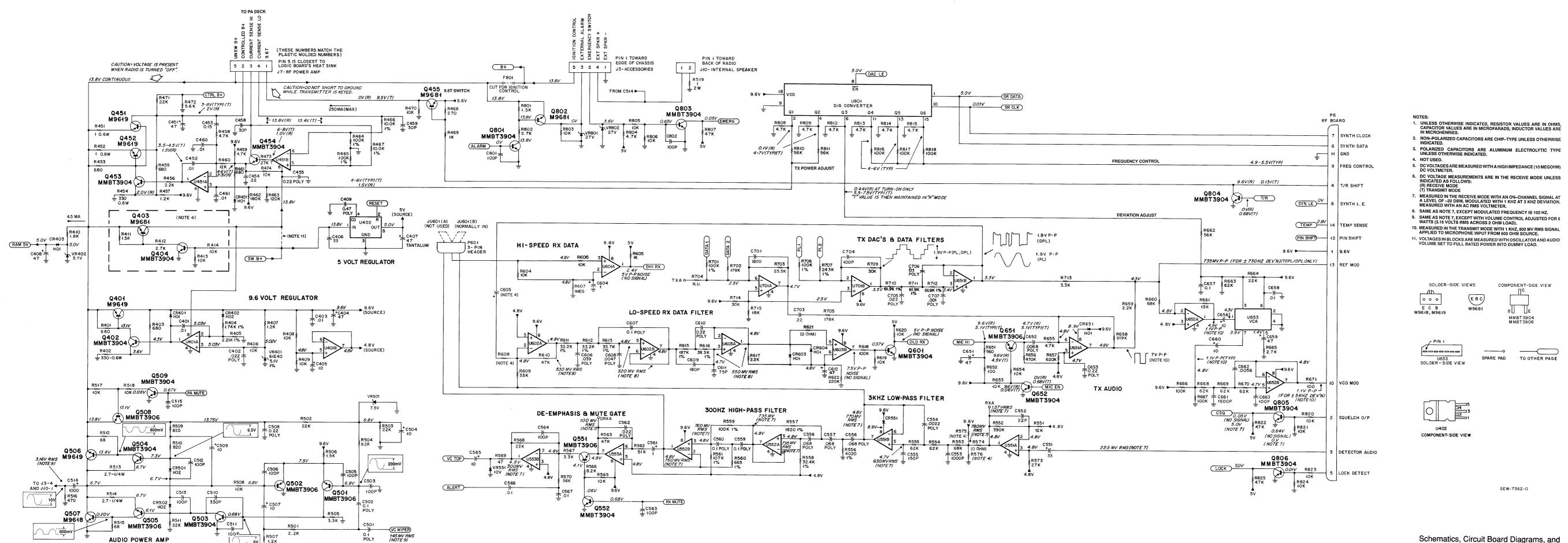
NO/LOW AUDIO

START ImV RMS AT 3KHz DEVIATION AT ANTENNA PORT IS VOLUME REFER TO RECEIVER CHART CONTROL WIPER 145mV RMS J8-2 YES IS 200mV p-p SINEWAVE AT Q501-B TROUBLESHOOT C501/C502 YES 6 V p-p SINEWAVE AT Q503-B TROUBLESHOOT Q501/Q502 CIRCUITRY YES IS 800mV p-p SINEWAVE AT TROUBLESHOOT Q504/Q505 CIRCUITRY Q504-C Q505-C YES IS IO V p-p SINEWAVE AT C514 ? TROUBLESHOOT Q506/Q507 PA FINALS YES DOES SPEAKER REPLACE SPEAKER MEASURE 4 OHMS YES AUDIO PATH OK: RETURN TO SERVICE GXW-7015-0

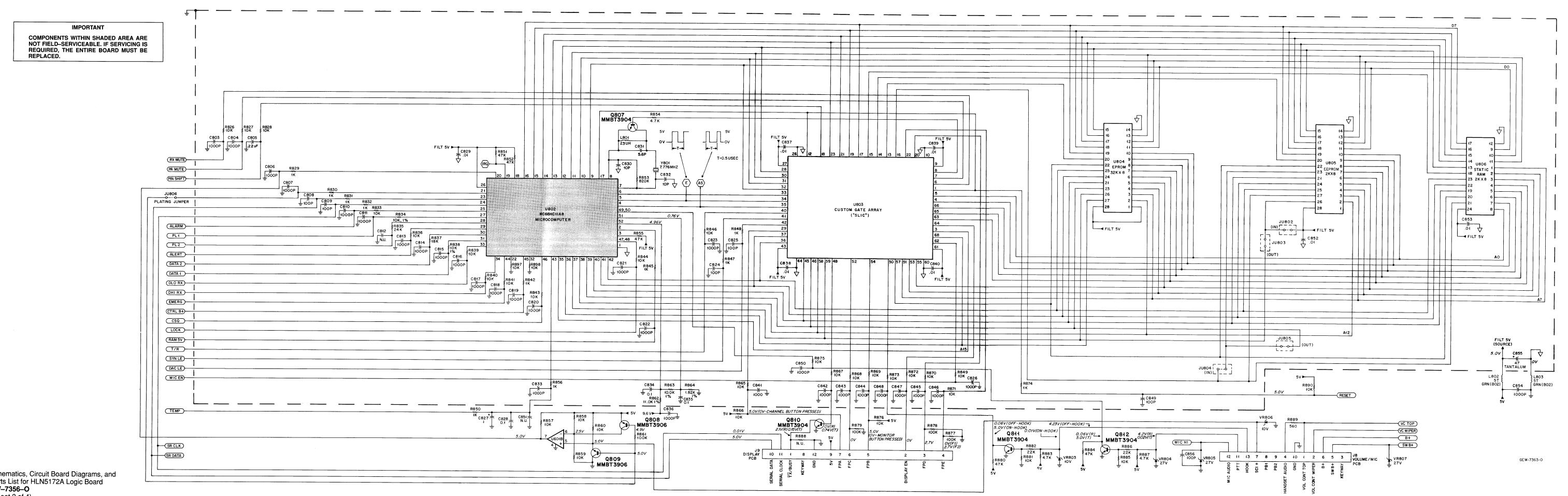
Logic Board Troubleshooting Charts **PW-7011-O** (Sheet 2 of 2) 2/28/90

BAD TX MODULATION

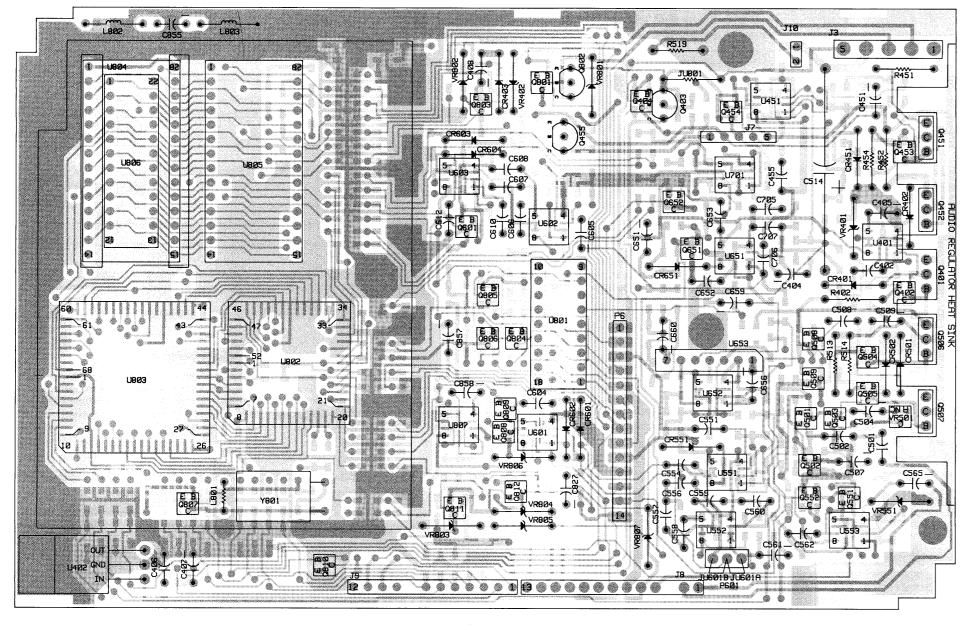




AUDIO POWER AMP



Schematics, Circuit Board Diagrams, and Parts List for HLN5172A Logic Board PW-7356-O (Sheet 2 of 4) 2/28/90



SOLDER SIDE GCW-7359-O
COMPONENT SIDE VIEW

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

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

COMPONENT SIDE VIEW

CB54

COMPONENT SIDE GCW-7358-O

SOLDER SIDE VIEW

parts list

CR603,604

48-83654H01

HLN5172A Logic Board (Trunking)

MXW-7357-O

REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. capacitor, fixed, uF, +5%, 50V (unless otherwise stated) 21-13741B45 0.01.+10% C402 08-11051A09 .022, 63V C402 C403 C404 C405 C406 C407 21-13741B45 0.01.+10% 23-11048B19 23-11048B13 47, ±20%, 16V, electrolytic 10, +20, 16V, electrolytic 23-11048A1 33, ±20%, 25V, electrolytic 23-13749A44 47. +20%, 6V C408 C409 C451 C452 23-11048B19 47, ±20%, 16V, electrolytic 08-11051A17 47 63V 23-11048B19 47, ±20%, 16V, electrolytic 0.01, ±10% .15, +80 -20% .22, +80 -20% .22, 63V 21-13741B45 C453 C454 21-11032B14 21-11032B15 08-11051A15 C458.459 30 pF 0.01 ±10% 21-13740B36 C460,461 C501,502 21-13741B45 .1, 63V 100 pF 08-11051A13 21-13740B49 10, ±20%, 16V, electrolytic 100 pF C504 23-11048B13 C505,506 C507 21-13740B49 23-13749C39 08-11051A15 10, ±10%, 20V .22, 63V C509 23-11048B13 10, ±20%, 16V, electrolytic C510 C511–513 C514 21-13740B61 330 pF 21-13740B49 23-02308M01 1000, +20%, 16V, electrolytic C515 C551 C552 C553 C554 C555 21-13740B49 23-11048A17 100 pF 33, +20, 25V, electrolytic 21-13740B33 1000 pF 21-13740B73 08-11051A03 21-13740B53 .0022, 63V 150 pF C556-558 C559,560 08-11051A12 .068, 63V 08-11051A13 1 63V C561 C562 23-11048B05 1, ±20%, electrolytic 08-11051A09 .022, 63V C563,564 21-13740B49 100 pF C565 10, ±20%, 16V, electrolytic 0.01, ±10% 23-11048B13 C566,567 C604 21-13741B45 23-11048B05 1, ±20%, electrolytic 0.039, 63V C606 C607 C608 C609 C610 08-11051A22 08-11051A13 .1, 63V .0047, 63V 08-11051A05 180 pF .22, 63V 75 pF 47, ±20%, 16V, electrolytic 21-13740B55 08-11051A15 21-13740B46 C611 C612 C651 C652 C653 C656 C657 C658 C659 C660 C661 C662 C663 C701 C703 C704 C705 C706 23-11048B19 23_110//8R10 08-11051A06 .0068, 63V 08-11051A15 23-11048B13 10. +20%, 16V, electrolytic 21-13741B69 21-13741B45 0.1, +80 -20% 0.01 +10% 23-13749A44 23-11048B13 10, +20%, 16V, electrolytic 21-13740B76 21-13741B39 0056 21-13740B49 100 pF 21-13740B78 1800 pF .22, +80, -20% 100 pF .022, 63V 21-13740B49 .1, 63V .001, 63V 100 pF 1000 pF 08-11051A13 C707 C801,802 21-13740B49 C803,804 21-13740B73 .22, +80 -20% 1000 pF C805 21-11032R15 21-13740B73 100 pF 1000 pF C808,809 21-13740B49 C810,811 21-13740B73 C813-823 21-13740B73 1000 pF 100 pF 21-13740B49 C826 C827 C828 C829 C830 C831 C832 C833 21–13740B73 23–11048B05 1000 pF 1, ±20%, electrolytic 0.1, +80 -20% 21-13741B69 21-13741B45 0.01, ±10% 10 pF, ±.5 pF 5.6 pF, ±.5 pF 10 pF, ±.5 pF 1000 pF 21-13740B25 21-11031F10 21-13740B25 21-13740B73 C834,835 C836 21-13741B69 0.1, +80 -20% 21-13740B73 1000 pF C837-840 C841-848 21-13741B45 0.01, ±10% 1000 pF 100 pF 21-13740B73 C849 21-13740B49 C850 1000 pF 21-13740B73 C852,853 21-13741B45 0.01, ±10% C854 21-13740B73 1000 pF C855 23-11054A09 47, ±20%, 6V, tantalum C856 21-13740B49 100 pF diode (see note) CR401 48-83654H01 silicon CR402 48-83654H02 silicon silicon silicon CR403 48_83654H01 CR403 CR451 CR501,502 CR551 48-83654H01 48-83654H02 06-11009B23 iumper resistor

MXW-7357-O (2) REFERENCE MOTOROL A DESCRIPTION PART NO. SYMBOL CR651 48-83654H01 silicon fuse F801 65-05214E06 1 A 28-80129M01 5-pin 28-80128M01 5-pin J8,9 28-80126M01 23-pin J10 28-80128M02 jumpe JU601 09-84181L01 2-contact push-on JU802 06-11077A01 0-ohm resistor 0-ohm resistor JU804 06-11077A01 coil, RF L801 L802.803 24-82723H35 23 uH. red 24-83961B02 28-80127M02 14-pin, RF board P601 28-80002R03 3-pin, for JU601 transistor (see not Q401 48-00869619 0402 48-80214G02 NPN PNP NPN PNP PNP NPN PNP NPN PNP NPN PNP Q451.452 48-00869619 Q453,454 Q455 48-11043C10 Q501,502 Q503.504 48-80214G02 48-05128M16 Q506 48-00869619 Q507 Q508 48-00869618 48-05128M16 Q509 Q551 48-80214G02 48-05128M16 Q552 48-80214G02 NPN PNP NPN Q601 Q651 48-80214G02 48-05128M16 Q652 48-80214G02 Q801 Q802 NPN PNP NPN PNP 48-80214G02 48-11043C10 Q803-807 48-80214G02 Q808.809 48-05128M16 Q810-812 48-80214G02 NPN resistor, fixe +5%, 1/8 watt (ur otherwise stated) R401 06-11077A70 680 R402 330, .6 watt, metal film R403 680 1.74k, <u>+</u>1% 06-11077A70 R404 R405 06-11077F28 2.21k, ±1% R406 10k 1.2k R407 06-11077A76 R408,409 06-11077A98 1.8k 1, .6 Watt, metal film R410 06-11077A80 06-02369M01 R453 06-11077A70 06-02369M31 330. .6 watt. metal film 680 2.2k 1.2k 4.7k 12k 680 180k 120k 06-11077A70 06-11077A82 R455 R456 R457 06-11077A76 R458,459 06-11077A90 R460 06-11077B01 06-11077A70 R462 06-11077B29 R463 06-11077B25 R464,465 R466,467 06-11077G88 100k, ±1% 06-11077F91 10k, ±1% 270 R468 R469 06-11077A74 1k 10k 22k 5.6k 27k 10k 2.2k 22k 8.2k 3.3k 1.5k 1.2k 10k 820 22k 68 R470 R471 06-11077B07 R472 R473 06-11077B09 R474 R501 06-11077A82 R502,503 R504 06-11077A96 R505 R506 06-11077A78 R507 06-11077A76 R508 06-11077A98 R509,510 06-11077A72 R511 06-11077R07 06-11077A46 R513.514 06-11009B26 2.7, 1/4 Watt 06-11077A46 R516 06-11077A66 470 06--11077A98

R519

R552

R553

R556

R557 R558

R559 R560

R561

R554.555

06-80185M0

06-11077B01

06-11077B37

06-11077B19

06-11077B18

06-11077F53

06-11077F20

06-11077G41

06-11077E77

1 ohm, ±10%, 2W, metal plate

12k

68k 62k 4.02k, ±1% 1.82k, ±1%

32.4k, ±1%

100k, ±1%

665, ±1% 107k, ±1%

MXW--7357-O (3) REFERENCE DESCRIPTION SYMBOL PART NO. 06-11077B16 R562 06-11077B15 R565 06-11077A98 10k 8.2k 3.3k 22k 47 56k 27k R566 R567 06-11077A96 06-11077A86 R569 06-11077A42 06-11077B17 B573 06-11077B09 06-11077A01 0-ohm 10k R604 06-11077A98 R605 R606 R607 06-11077A74 06-11077A98 06-11077B47 1 meg 06-11077B11 06-11077B15 R609 33k 47k R610 R611.612 06-11077G42 06-11077G45 35.7k, ±1% 187k, ±1% 06-11077H15 06-11077G48 B615 R616 38.3k, +1% 06-11077A82 06-11077B23 R617 100k 10k 0 ohm R619.620 06-11077A98 06-11077A01 R621 220k 560 100 10k 4.7k R622 06-11077B31 R651 06-11077A68 R652 R653.654 06-11077A98 06-11077A90 R656 06-11077B39 470k 620k R657 R658 06-11077B42 06-11077H65 619k, ±1% 06-11077A82 2.2k 2.2k 68k 15k 56k 62k 22k 2.7k 100k 62k 100 100k, ±1% R660 06-11077R10 R661 06-11077B03 R662 06-11077B17 06-11077B18 R664 06-11077B07 R665 06-11077A84 B666 667 06-11077B23 06-11077B18 06-11077A50 06-11077G88 R701 R702 R703 06-11077H13 06-11077G31 25.5k. +1% R705 R706 06-11077H13 178k, ±1% 06-11077G88 100k +1% R707 243k, ±1% R709 30k 61.9k, ±1% 06-11077B10 R710-712 R713 06-11077A86 3.3k R714 30k 18k 1.5k 2.7k 10k 4.7k 10k, 47k 4.7k 56k 4.7k R715 06-11077B05 R801 R802 06-11077A84 06-11077A90 06-11077A98 R804 R807 06-11077B15 06-11077A90 R810.811 06-11077B17 06-11077A90 R812-815 B816-818 06-11077B23 100k 10k 47k 10k 47k 10k 1k 10k R820,821 06-11077A98 06-11077B15 06-11077A98 R823,824 06-11077B15 06-11077A98 R825 R826-828 R829-832 06-11077A74 06-11077A98 R833 R834 R835 06-11077F91 06-11077B08 R836 R837 06-11077A98 06-11077B05 R838 06-11077F91 R839-841 06-11077A98 R842 R843,844 06-11077A74 06-11077A98 1k 10k 06-11077A98 R847,848 1k 10k R849 06-11077A98 06-11077A74 1k 47k 820k 4.7k 47k R851.852 06-11077B15 06-11077B45 R854 06-11077490 06--11077B15 R856 06-11077A74 R857-860 06-11077A98 06-11077B23 100k 06-11077E25 11K. +1% 06-11077F91 06-11077F20 10k, ±1% 1.82k, ±1% R863 06-11077A98 06-11077A74 R865-873

1k 10k 100k

47k 10k 22k 4.7k

06-11077A98

06-11077B23

06-11077B15

06-11077A98

06-11077A90

R875 876

R877-879

R881

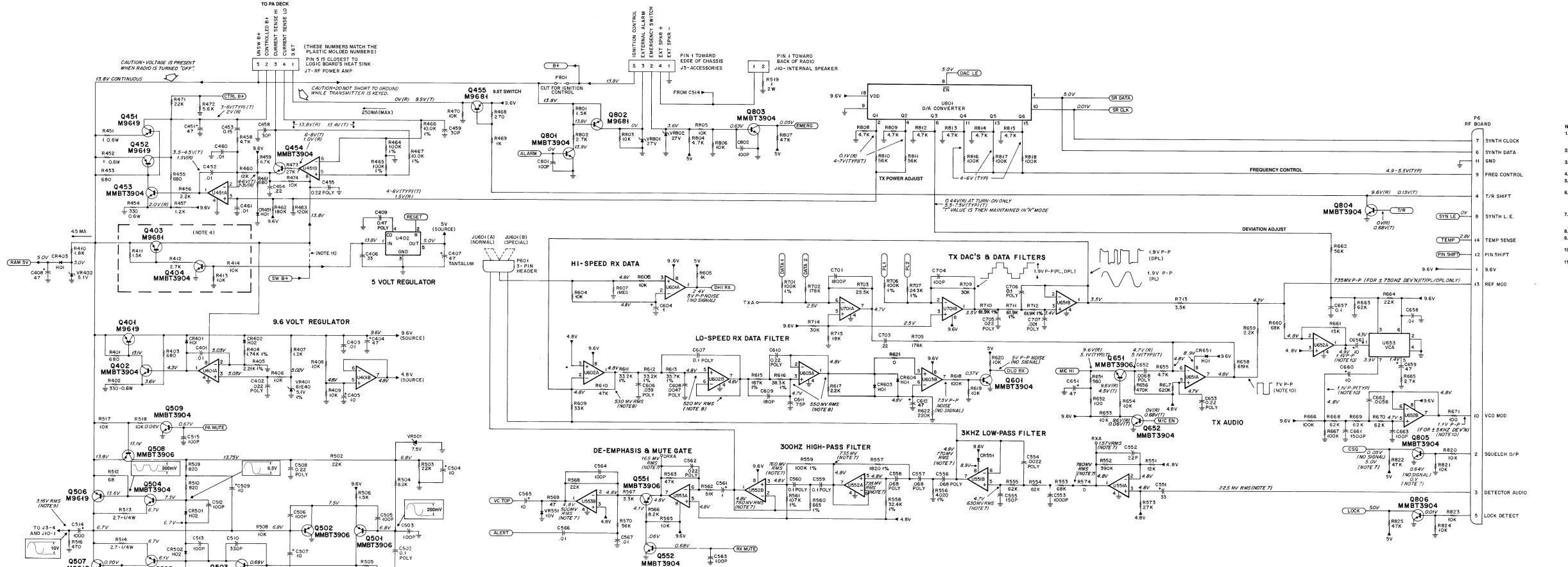
R882

R883

REFERENCE	MOTOROLA	DESCRIPTION
SYMBOL	PART NO.	
R884	06-11077B15	47k
R885	06-11077A98	10k
R886	0611077B07	22k
R887	06-11077A90	4.7k
R889	06-11077A68	560
R890	06-11077 A 98	10k
R897,898	06-11077A98	10k
integrated circuit		
U401	51-02198J22	dual op-amp
U402	51-80942T01	voltage regulator 5V
U451	51-02198J22	dual op-amp
U551-553	51-02198J22	dual op-amp
U601	51-02198J23	dual comparator
U602,603	51-02198J22	dual op-amp
U651,652	51-02198J22	dual op-amp
U653	51-80059M01	voltage-controlled attenuator
U701	51-02198J22	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microprocessor
U803	51-82862N09	logic array
U804	HLN9722A	ROM kit
U805	51-80901W01	EEPROM, 2KX8
U806	51-80914V01	static RAM
U807	51-02198J23	dual comparator
voltage regulator	(see note)	·
VR401	48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V
VR501	48-80140L11	zener, 7.5V
VR551	48-82256C11	zener, 10V
VR801.802	48-82256C20	zener, 27V
VR803	48-82256C11	zener, 10V
VR804,805	48-82256C20	zener, 27V
VR806	48-82256C11	zener, 10V
VR807	48-82256C20	zener, 10V zener. 27V
		Zoner, Zr v
crystal (see note) Y801	48-80173D09	7.776 MHz
		erenced parts
M406-410	14-83820M05	
M406–410 M413		insulator
M413 M414	14-80145M01 26-80123M01	insulator, accessory connector
		logic shield
M415,416	09-82071K09	14-pin socket
	03-10943M04	tapping screws (5 used)
	04-00131974	flat washer (4 used)
	07-80925T01	bracket, audio regulator
	14-82392E13	cover insulator
	26-80125L02	heat sink, audio regulator
	42-80940T01	ring, retaining (2 used)
	84-80199M02	circuit board

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

Schematics, Circuit Board Diagrams, and Parts List for HLN5172A Logic Board PW-7356-O (Sheet 4 of 4) 2/28/90



Q505 MMBT3906

AUDIO POWER AMP

Q503

145 MV RMS (NOTE 9)

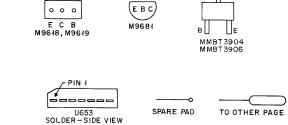
- UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE
- NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWIS INDICATED.

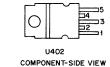
- 4. NOT USED. 5. DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOI IM) DC VOLTMETER.
- 6. DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:

 (R) RECEIVE MODE

 (T) TRANSMIT MODE
- 7. 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.
- 8. SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.
- SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 8 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD).
- 10. MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.
- 11. VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.

SOLDER-SIDE VIEWS

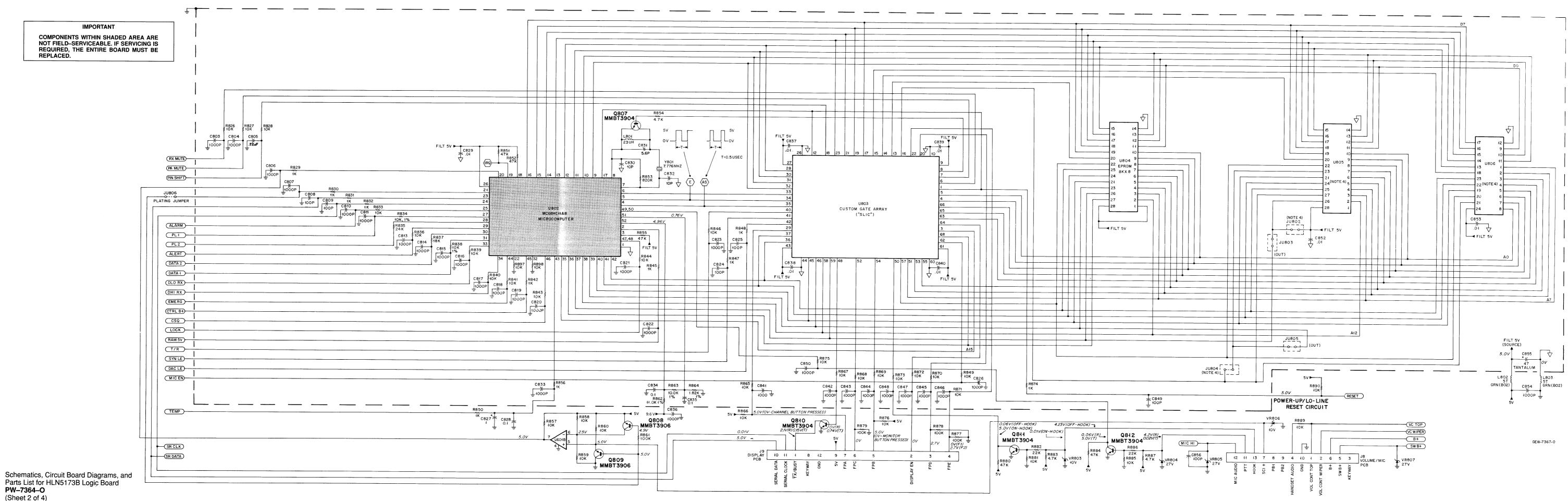




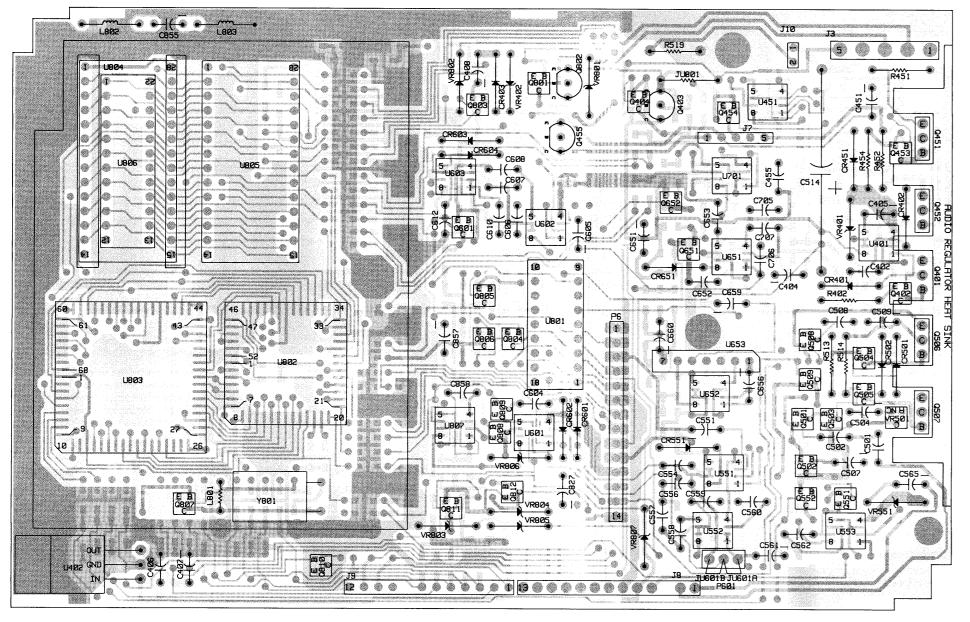
GEW-7366-0

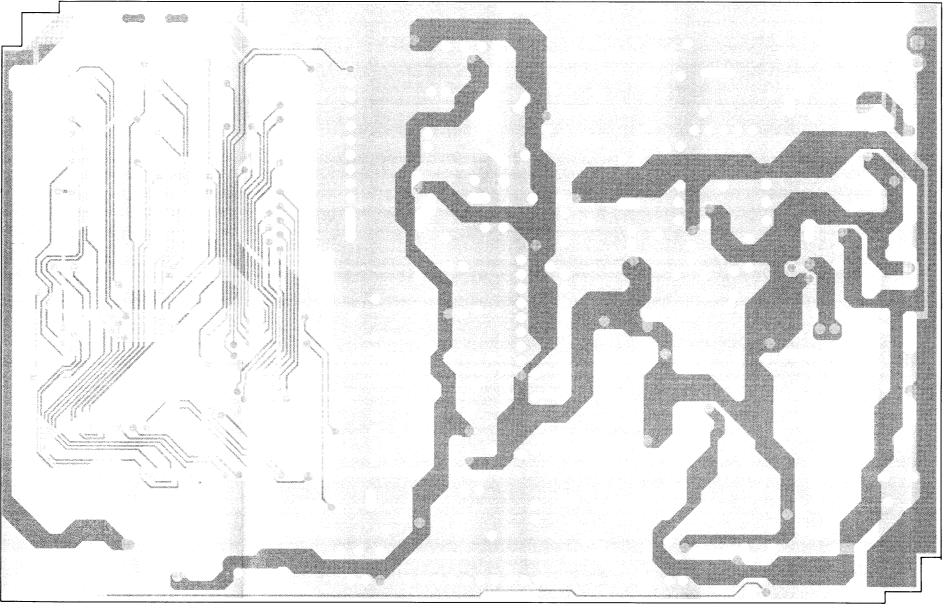
COMPONENT-SIDE VIEW

Schematics, Circuit Board Diagrams, and Parts List for HLN5173B Logic Board PW-7364-0 (Sheet 1 of 4)



PW-7364-O (Sheet 2 of 4) 2/28/90





 SOLDER SIDE GCW-7359-O
COMPONENT SIDE GCW-7359-O
COMPONENT SIDE GCW-7359-O
COMPONENT SIDE GCW-7359-O
COMPONENT SIDE GCW-7359-O

OVERLAY • GCW-7361-O

SOLDER SIDE VIEW

COMPONENT SIDE VIEW

COMPONENT SIDE VIEW

Schematics, Circuit Board Diagrams, and Parts List for HLN5173B Logic Board PW-7364-O (Sheet 3 of 4) 2/28/90

C854

parts list MXW-7365-O HLN5173B Logic Board (Conventional) REFERENCE REFERENCE MOTOROLA DESCRIPTION SYMBOL $\textbf{capacitor, fixed, uF, $\underline{\textbf{+}}5\%$, 50V (unless otherwise stated)}$ fuse F801 C401 21-13741B45 0.01. +10% 08-11051A09 C402 C403 C404 C405 C406 C407 C408 C409 C451 C452 C453 C454 C455 21-13741B45 0.01, ±10% J3 J7 47, ±20%, 16V, electrolytic 23-11048B13 10 +20 16V electrolytic J8,9 J10 23-11048A17 33, ±20%, 25V, electrolytic 23-13749A44 47, +20%, 6V jumpei JU601 47, ±20%, 16V, electrolytic 08-11051A17 .47. 63V 23-11048B19 47, ±20%, 16V, electrolytic coil. RF 0.01, ±10% .15, +80 –20% 21-13741B45 L801 21-11032B14 L802, 803 .22, +80 -20% .22, 63V 21-11032B15 connector plug 08-11051A15 C458, 459 C460, 461 C501, 502 C503 P6 P601 30 pF 0.01 ±10% 21-13740B36 21-13741B45 08-11051A13 transistor (see note 21-13740B49 100 pF Q401 C504 C505, 506 23-11048B13 21-13740B49 10, ±20%, 16V, electrolytic Q402 Q451, 452 C507 C508 23-13749C39 10, ±10%, 20V Q453, 454 08-11051A15 .22, 63V Q455 C509 C510 23-11048B13 21-13740B61 10, ±20%, 16V, electrolytic Q501, 502 330 pF Q503, 504 21-13740B49 Q505 1000. +20%, 16V, electrolytic Q506 Q507 C514 23-02308M01 C515 C551 C552 21-13740B49 23-11048A17 33. +20. 25V. electrolytic Q508 Q509 21-13740B33 C553 C554 C555 C556–558 1000 pF Q551 Q552 21-13740B73 08-11051A03 .0022, 63V 21-13740B53 150 pF Q601 Q651 .068, 63V C559, 560 C561 08-11051A13 1 63V Q652 Q801 1, ±20%, electrolytic C562 C563, 564 08-11051A09 022 63V Q802 21-13740B49 100 pF Q803-807 10, ±20%, 16V, electrolytic 0.01, ±10% 1, ±20%, electrolytic C565 C566, 567 C604 C606 23-11048B13 Q808, 809 21–13741B45 Q810-812 23-11048B05 resistor, fixed 08-11051A22 0.039, 63V R401 C607 C608 C609 C610 08-11051A13 .1. 63V 08-11051A05 .0047, 63V R403 21-13740B55 08-11051A15 180 pF .22, 63V R404 R405 R406 21-13740B46 23-11048B19 75 pF 47, ±20%, 16V, electrolytic C611 C612 C651 C652 C653 C656 C657 C659 C660 C661 C662 C663 C701 C703 C704 C705 C706 C706 R407 23-11048B19 08-11051A06 47, ±20%, 16V, electrolytic .0068, 63V R408, 409 R410 R451, 452 08-11051A15 23-11048B13 .22, 63V 10, +20%, 16V, electrolytic R453 21-13741B69 0.1, +80 -20% R454 0.01, ±10% 47, ±20%, 6V 10, ±20%, 16V, electrolytic 21-13741B45 R455 R456 23-13749A44 23-11048B13

21-13740B76 21-13741B39

21-13740B49

21-13740B78

21-13740B49

08-11051A09

08-11051A13

08-11051A01

21-13740B49

21-11032B15

21-13740B73

21-13740B73

21-13740B49

21-13740B73

21-13740B73

21-13740B49

21-13740B73 23-11048B05

21-13741B69 21-13741B45

21-13740B25 21-11031F10

21-13740B25

21-13740B73

21-13741B69 21-13740B73

21-13741B45

21-13740B73

21-13740B49

21-13740B73

21-13741B45

21-13740B73

21-13740B49

48-83654H01

48-83654H0

48-83654H0

48-83654H02

06-11009B23

48-83654H0

48-83654H01

48-83654H02

C801, 802

C803-804

C806, 807

C808, 809

C810, 811

C813-823 C824, 825

C826 C827 C828 C829

C830 C831

C832 C833

C836

C849 C850

C854

C856

CR401 CR402

CR403 CR451

CR551

CR501, 502

CR603, 604 CR651

C834, 835

C841-848

C805

.0056

1800 pF

100 pF

1 63V

100 pF

100 pF

1000 pF

1000 pF

1000 pF

1, ±20%, electrolytic

0.1, +80 -20% 0.01, ±10%

5.6 pF. +.5 pF

0.1, +80 -20%

1000 pF

1000 pF

1000 pF

1000 pF

1000 pF

100 pF

silicon

silicon

silicon

silicon

silicon

silicon silicon

jumper resistor

0.01, ±10%

0.01, ±10%

47, ±10%, 6V

.022, 63V

.001, 63V

.22, +80 -20%

.22, +80, -20%

65-05214E06 connector recepta 28-80129M01 5-pin 5–pin 23–pin 28-80128M01 28-80126M01 28-80128M02 09-84181L01 24-82723H35

MOTOROLA

DESCRIPTION

1, .6 Watt, metal film

24-83961B02 5 turns, green 28-80127M01 14-pin, RF board 28-80002R03 3-pin, for JU60 48-00869619 PNP

MXW-7365-O (2)

NPN PNP NPN PNP PNP NPN PNP PNP 48-80214G02 48-00869619 48-11043C10 48-05128M1 48-80214G02 48-05128M16 48-00869619

48-00869618 NPN PNP NPN PNP 48-05128M16 48-80214G02 48-05128M16 NPN NPN PNP 48-80214G02 48-80214G02 48-05128M16 NPN NPN PNP 48-80214G02 48-80214G02

48-11043C10 48-80214G02 NPN PNP 48-05128M16 48-80214G02 ±5%, 1/8 watt (unless otherwise stated) 06-11077A70 06-02369M31

06-11077A70 06-11077F18 06-11077F28 2.21k, ±1% 10k 1.2k 10k 06-11077A98 06-11077A76 06-11077A80 06-02369M01 06-11077A70 06-02369M31

R457 R458, 459

R462 R463 R464, 465 R466, 467

R460 R461

R468 R469

R470

R471

R472 R473

R501

R506

R507

R508

R511

R512

R515

R516

B519

R551

R552

R553

R556

R557

R558

R559

R560

R561

R562

R563

R565

R568

R513, 514

R517, 518

R554, 555

R502, 503 R504

330, .6 watt, metal film 06-11077A70 680 06-11077A82 06-11077A76 06-11077A90 1.2k 4.7k 12k 680 180k 06-11077B01 06-11077A70 06-11077B29 180k 120k 100k, ±1% 10k, ±1% 270 1k 06-11077B25 06-11077G88 06-11077F91

06-11077A60 06-11077A74 06-11077A98 06-11077B07 06-11077A92 06-11077B09 06-11077A98 06-11077A82 06-11077A96

1k 10k 22k 5.6k 27k 10k 2.2k 22k 8.2k 3.3k 1.5k 1.2k 10k 820 22k 68 2.7, 1/4 Watt 06-11077A78 06-11077A98 06-11077B07 06-11077A46 06-11009B26 68 470 06-11077A66 06-11077A98

06-11077A86

06-80185M0 1 ohm. +10%, 2W, metal plate 06-11077B01 06-11077B37 390k 06-11077B19 06-11077B18 62k 06-11077F53 06-11077F20 06-11077G41

06-11077G88 06-11077E77 06-11077G91 06-11077B16 51k 06-11077B15 47k 06-11077A98 10k 06-11077A96

06-11077B07

4.02k, ±1% 1.82k, ±1% 32.4k, ±1% 100k, ±1% 665, ±1% 107k, ±1% 22k

R850

R853

R854

R855

R862

R864

R874

R881

R882

R883

R884 R885 R886 R887

R863

B851 852

R857-860

R865-873

R877-879

06-11077A74

06-11077B15

06-11077B45

06-11077A90

06-11077B15

06-11077A74

06-11077A98

06-11077B23

06-11077F95

06-11077F91

06-11077F20

06-11077A98

06-11077A74

06-11077B23

06-11077A98

06-11077A90

06-11077A98

06-11077A90

47k

820k

4.7k 47k

100k

10k 100k

47k 10k

22k 4.7k

22k 4.7k

11K. +1%

10k, ±1% 1.82k, +1%

REFERENCE	MOTOROLA	MXW-7365-O
SYMBOL	PART NO.	DESCRIPTION
R567	06-11077A86	3.3k
R569 R570	06-11077A42 06-11077B17	47 56k
R573	06-11077B09	27k
R574	06-11077A01	0-ohm
R604	06-11077A98	10k
R605	06-11077A74	1k
R606	06-11077A98	10k
R607	06-11077B47	1 meg
R609	06-11077B11	33k 47k
R610 R611, 612	06-11077B15 06-11077G42	33.2k, ±1%
R613	06-11077G45	35.7k, ±1%
R615	06-11077H15	187k, ±1%
R616	06-11077G48	38.3k, ±1%
R617	06-11077A82	2.2k
R618	06-11077B23	100k
R619, 620 R621	06-11077A98 06-11077A01	10k 0–ohm
R622	06-11077B31	220k
R651	06-11077A68	560
R652	06-11077A50	100
R653, 654	06-11077A98	10k
R655	06-11077A90	4.7k
R656	06-11077B39	470k
R657 R658	06-11077B42 06-11077H65	620k 619k, ±1%
R659	06-110771103 06-11077A82	2.2k
R660	06-11077B19	68k
R661	06-11077B03	15k
R662	06-11077B17	56k
R663	06-11077B18	62k
R664	06-11077B07	22k 2.7k
R665 R666, 667	06-11077A84 06-11077B23	100k
R668–670	06-11077B18	62k
R671	06-11077A50	100
R701	06-11077G88	100k, <u>+</u> 1%
R702	06-11077H13	178k, ±1%
R703	06-11077G31	25.5k, ±1%
R705 R706	06-11077H13 06-11077G88	178k, ±1% 100k, ±1%
R707	06-11077G06	243k, ±1%
R709	06-11077B10	30k
R710-712	06-11077G68	61.9k, ±1%
R713	06-11077A86	3.3k
R714	06-11077B10	30k
R715	06-11077B05	18k
R801 R802	0611077A78 0611077A84	1.5k 2.7k
R803	06-11077A98	10k
R804	06-11077A90	4.7k
R805, 806	06-11077A98	10k
R807	06-11077B15	47k
R808, 809	06-11077 A 90	4.7k
R810, 811 R812–815	06-11077B17 06-11077A90	56k 4.7k
R816–818	06-11077B23	100k
R820, 821	06-11077A98	10k
R822	06-11077B15	47k
R823, 824	06-11077A98	10k
R825	06-11077B15	47k
R826-828	06-11077A98	10k
R829-832 R833	06-11077A74 06-11077A98	1k 10k
R834	06-11077A98	10K 10K, ±1%
R835	06-11077B08	24k
R836	06-11077A98	10k
R837	06-11077B05	18k
R838	06-11077F91	10k, ±1%
R839-841	06-11077A98	10k
R842	06-11077A74	1k
R843, 844 R845	06-11077A98 06-11077A74	10k 1k
R846	06-11077A74 06-11077A98	10k
R847, 848	06-11077A38	1k
R849	06-11077A98	10k
R850	0611077474	11

06-11077A68 06-11077A98 R897, 898 06-11077A98 integrated circuit (see note) 51-02198J22 dual op-amp 51-80942T02 voltage regulator 5V 51-02198J22 dual op-amp U551-553 51-02198J22 dual op-amp 51-02198J23 dual comparator

DESCRIPTION

U601 U602, 603 U651, 652 51-02198J22 dual op-amp 51-02198J22 dual op-amp U653 U701 U801 U802 51-80059M01 voltage-controlled attenuate 51-02198J22 dual op-amp 51-80135C10 51-80960T01 microcomputer U804 HLN9277A U803 51-82862N09 logic array U807 dual comparator

voltage regulate see note) VR401 48-83461E40 zener, 5.1V VR402 48-82256C15 zener, 5.1V VR501 48--80140L11 zener, 7.5V VR551 48-82256C1 zener, 10V zener, 27V VR801, 802 48-82256C20 VR803 48-82256C1 zener, 27V VR804, 805 48-82256C20 48-82256C11 48-82256C20 zener, 10V zener, 27V VR806 VR807 crystal (see note)

MOTOROLA PART NO.

REFERENCE

SYMBOL R889

U401

U402

U451

48-80173D09 7.776 MHz Y801 non-referenced parts bag M401-404 03-10943M04 tapping screw M406-410 14-83820M05 M412 84-80199M02 circuit board M413 insulator accessory connector M414 26-80123M01 logic shield 14-pin socket 14-82392F13 cover insulator 42-80940T0 retaining ring tapping screw flat washer 03-10943M04 04-00131974 07-80925T0 bracket, audio regulator

2/28/90

MXW-7365-O (4)

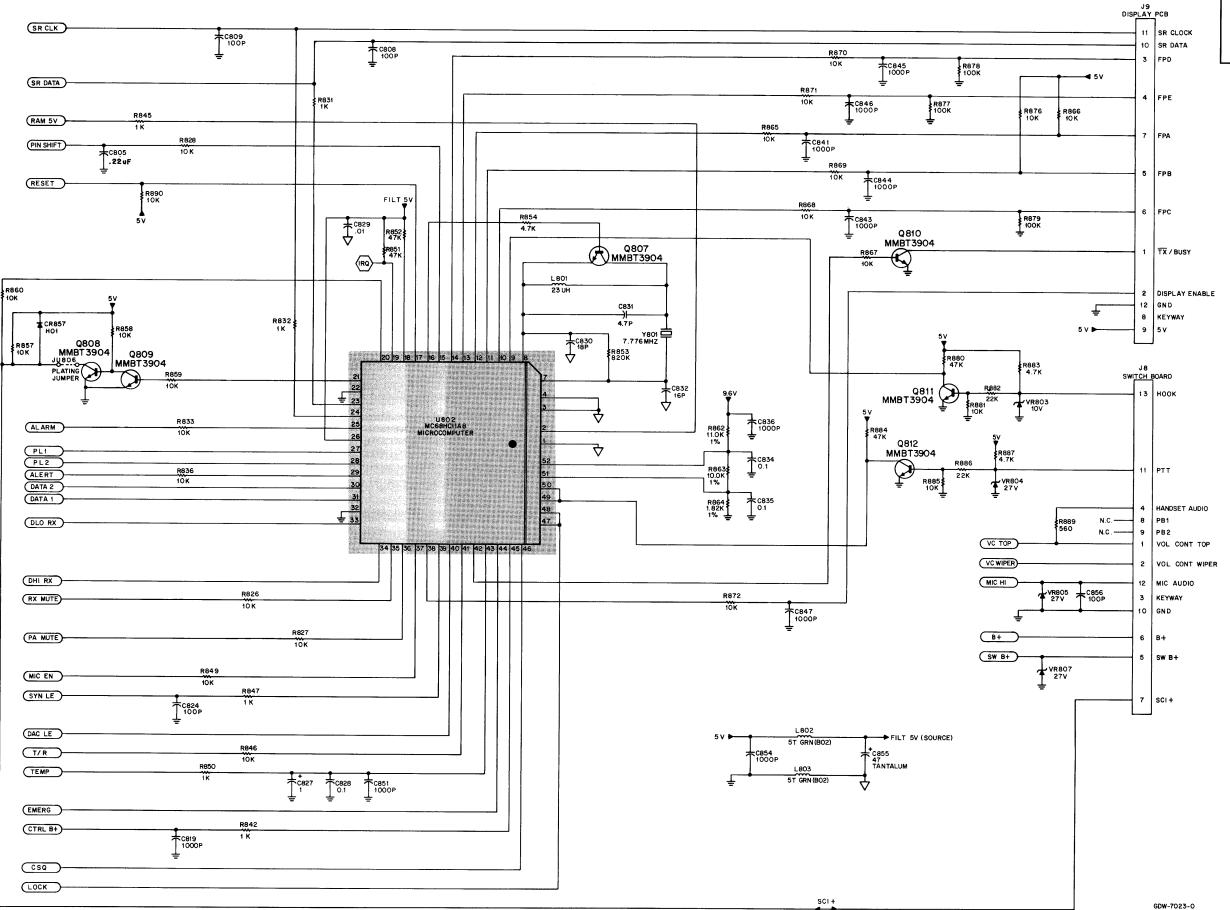
note: For best performance, order diodes, transistors, and integrated circuit devices by

heat sink, audio regulato

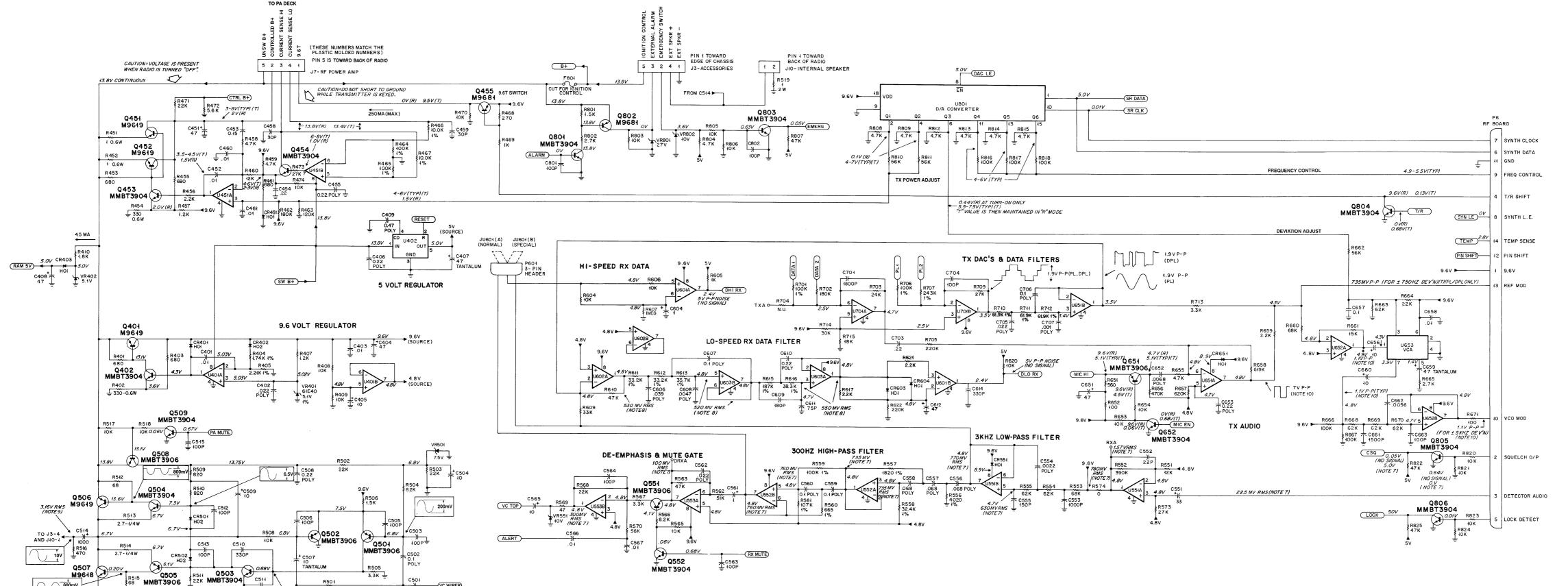
Schematics, Circuit Board Diagrams, and Parts List for HLN5173B Logic Board PW-7364-O (Sheet 4 of 4) 2/28/90

IMPORTANT

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



Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-0 (Short 1 of 4)



Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-O (Sheet 2 of 4) 2/28/90

Q503

AUDIO POWER AMP

VC WIPER) 145 MV RMS (NOTE 9)

 UNLESS OTHERWISE INDICATED, RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN MICROFARADS, INDUCTOR VALUES ARE IN MICROHENIES. 2. NON-POLARIZED CAPACITORS ARE CHIP-TYPE UNLESS OTHERWISE POLARIZED CAPACITORS ARE ALUMINUM ELECTROLYTIC TYPE UNLESS OTHERWISE INDICATED. 4. NOT USED.

5. DC VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE (10 MEGOHM) DC VOLTMETER.

COMPONENT-SIDE VIEW

SOLDER-SIDE VIEWS

0 0 0 E C B M9618, M9619

COMPONENT-SIDE VIEW

SPARE PAD TO OTHER PAGE

6. DC VOLTAGE MEASUREMENTS ARE IN THE RECEIVE MODE UNLESS INDICATED AS FOLLOWS:
(R) RECEIVE MODE
(T) TRANSMIT MODE

(1) TRANSMIT MODE

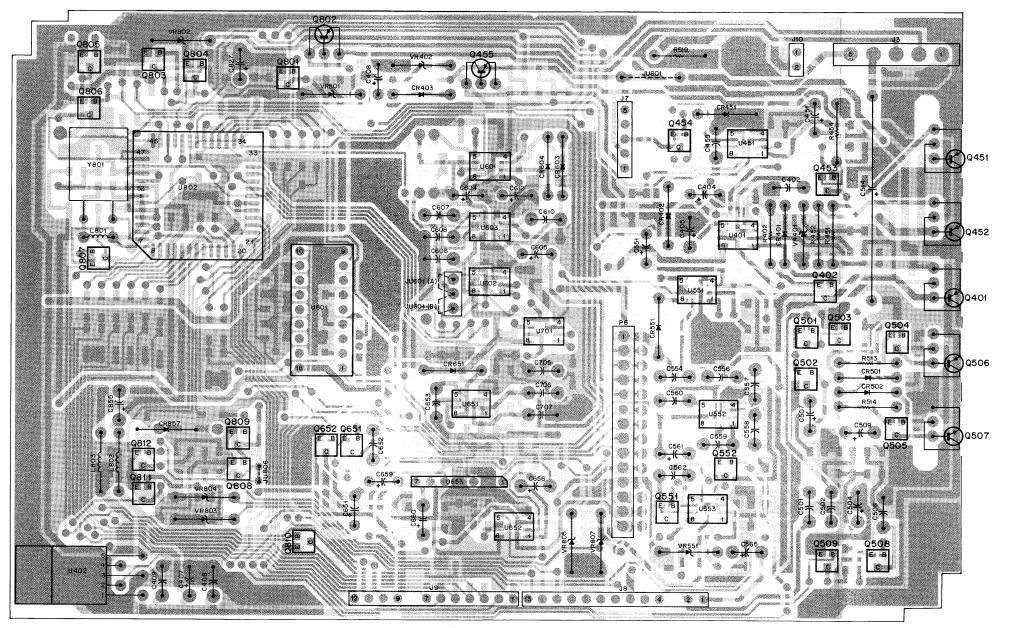
MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER.

8. SAME AS NOTE 7, EXCEPT MODULATED FREQUENCY IS 100 HZ.

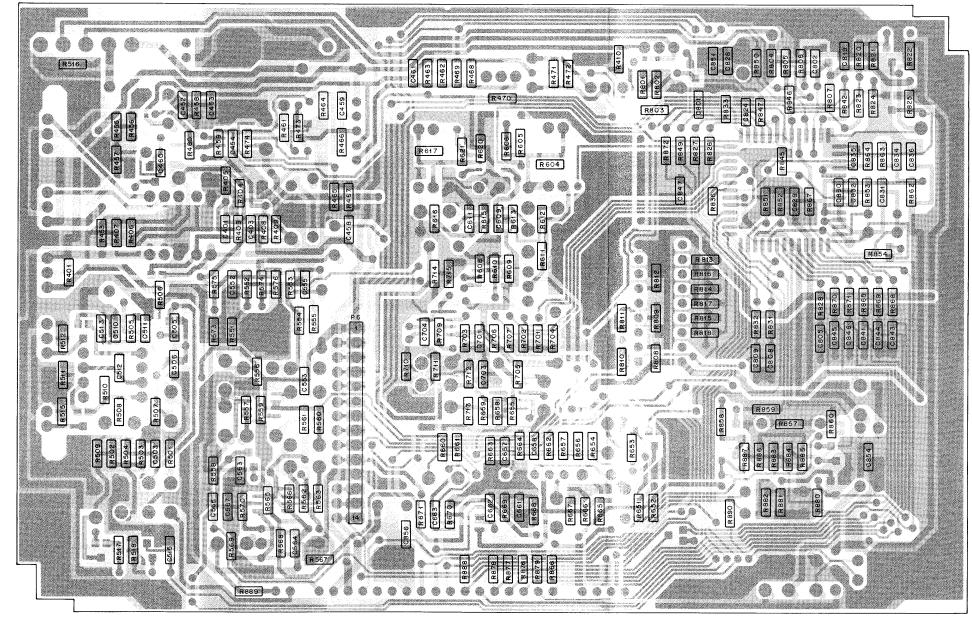
9. SAME AS NOTE 7, EXCEPT WITH VOLUME CONTROL ADJUSTED FOR 5 WATTS (3.16 VOLTS RMS ACROSS 2 OHM LOAD).

10. MEASURED IN THE TRANSMIT MODE WITH 1 KHZ, 800 MV RMS SIGNAL APPLIED TO MICROPHONE INPUT FROM 600 OHM SOURCE.

11. VOLTAGES IN BLOCKS ARE MEASURED WITH OSCILLATOR AND AUDIO VOLUME SET TO FULL RATED POWER INTO DUMMY LOAD.



SHOWN FROM COMPONENT SIDE



SOLDER SIDE

COMPONENT SIDE

OVERLAY

GDW-7022-0

GDW-7021-0

GDW-7456-0

SHOWN FROM SOLDER SIDE

Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board **PW-7020-O** (Sheet 3 of 4) 2/28/90

parts list

Schematics, Circuit Board Diagrams, and Parts List for HLN9123A Logic Board PW-7020-0

(Sheet 4 of 4)

2/28/90

MXW-7019-O (3) MXW-7019-O (4) MXW-7019-O MXW-7019-O (2) HLN9123A Logic Board, Masked

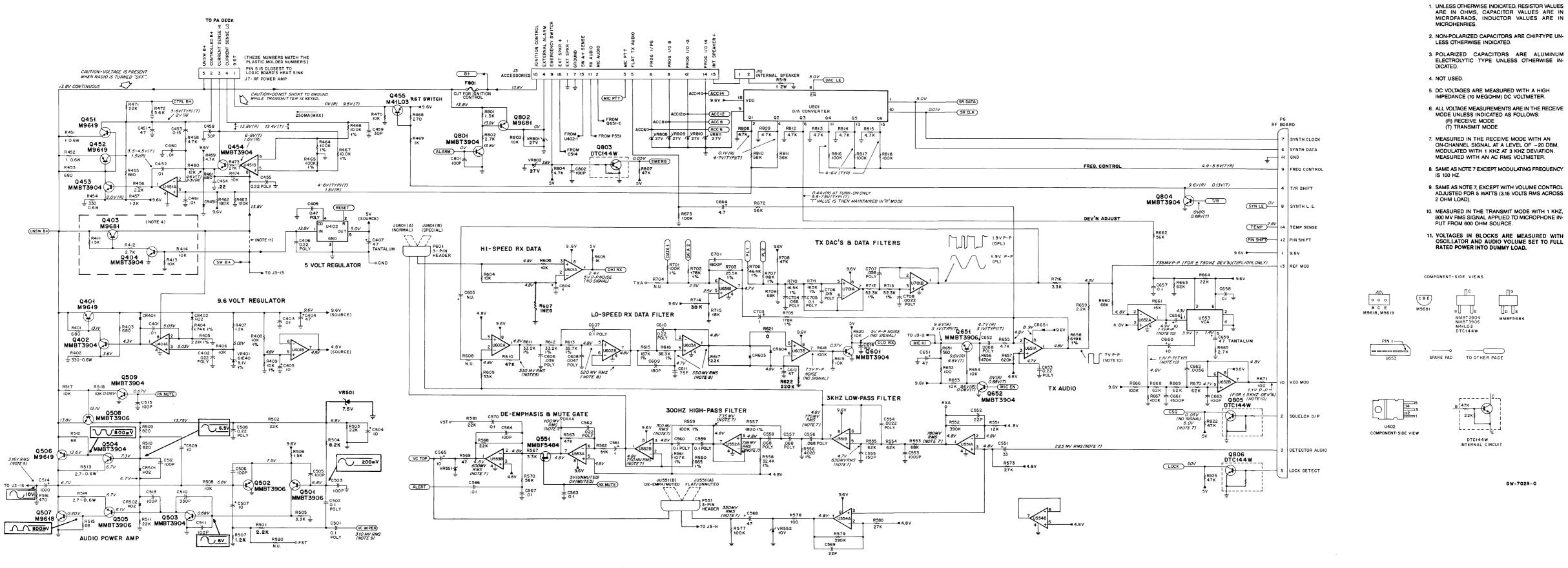
HLN9123A Logic Board, Masked MXW-7019-0			
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
capacitor, fixed uF, ±5			
C401 C402	21-13741B45 08-11051A09	.01, ±10% .022, 63V	
C403	21-13741B45	.01, ±10%	
C404	23-11048B19	47, ±20%, 16V, electrolytic	
C405 C406	23-11048B13 08-11051A15	10, <u>+</u> 20, 16V, electrolytic .22, 63V	
C407	23-11013A56	47, ±20%, 6V, tantalum	
C408	23-11048B19	47, ±20%, 16V, electrolytic .47, 63V	
C409 C451	08-11051A17 23-11048B19	47, ±20%, 16V, electrolytic	
C452	21-13741B45	.01, ±10%	
C453 C454	21-11032B14 21-11032B15	.15, +80/–20% .22, +80/–20%	
C455	08-11051A15	.22, 63V	
C458, 459	21-13740B36	30 pF	
C460, 461 C501, 502	21-13741B45 08-11051A13	.01, ±10% .1, 63V	
C503	21-13740B49	100 pF	
C504	23-11048B13	10, ±20%, 16V	
C505, 506 C507	21-13740B49 23-11013D13	100 pF 10, ±10%, 20V, tantalum	
C508	08-11051A15	.22, 63V	
C509	23-11048B13	10, ±20%, 16V, electrolytic	
C510 C511–513	21-13740B61 21-13740B49	330 pF 100 pF	
C514	23-02308M01	1000 uF, ±20%, 16V, elect	rolytic
C515	21-13740B49	100 pF	•
C551	23-11048A17 21-13740B33	33, ±20, 25V, electrolytic	
C552 C553	21–13740B33 21–13740B73	22 pF 1000 pF	
C554	08-11051A03	.0022, 63V	
C555	21-13740B53	150 pF .068, 63V	
C556–558 C559, 560	08-11051A12 08-11051A13	.1, 63V	
C561	23-11048B05	1, ±20%, electrolytic	
C562	08-11051A09 21-13740B49	.022, 63V 100 pF	
C563, 564 C565	23-11048B13	10, ±20%, 16V, electrolytic	:
C566, 567	21-13741B45	0.01, ±10%	
C604 C606	23-11048B05 08-11051A22	1, ±20%, electrolytic 0.039, 63V	
C607	08-11051A13	.1, 63V	
C608	08-11051A05	.0047, 63V	
C609 C610	21–13740B55 08–11051A15	180 pF .22, 63V	
C611	21-13740B46	75 pF	
C612	23-11048B19	47, ±20%, 16V, electrolytic	:
C614 C651	21–13740B61 23–11048B19	330 pF 47, ±20%, 16V, electrolytic	;
C652	08-11051A06	.0068, 63V	
C653	08-11051A15	.22, 63V	
C656 C657	23-11048B13 21-13741B69	10, ±20%, 16V, electrolytic 0.1, +80 –20%	•
C658	21-13741B45	0.01, ±10%	
C659 C660	23-11013A56 23-11048B13	47, ±20%, 6V, tantalum 10, ±20%, 16V, electrolytic	
C661	21–13740B76	1500 pF	•
C662	21-13741B39	.0056, ±10%	
C663 C701	21-13740B49 21-13740B78	100 pF 1800 pF	
C703	21-11032B15	.22, +80, –20%	
C704	21-13740B49	100 pF	
C705 C706	08-11051A09 08-11051A13	.022, 63V .1, 63V	
C707	08-11051A01	.001, 63V	
C801, 802	21-13740B49	100 pF	
C805 C808, 809	21-11032B15 21-13740B49	.22, +80 –20% 100 pF	
C819	21-13740B73	1000 pF	
C824	21-13740B49	100 pF	
C827 C828	23-11048B05 21-13741B69	1, ±20%, electrolytic 0.1, +80 –20%	
C829	21-13741B45	0.01, ±10%	
C830	21-13740B31	18 pF	
C831 C832	21-13740B17 21-13740B30	4.7, <u>±</u> .25 pF 16 pF	
C834, 835	21-13741B69	0.1, +8020%	
C836	21-13740B73	1000 pF	
C841 C843–847	21-13740B73 21-13740B73	1000 pF 1000 pF	
C851	21-13740B73	1000 pF	
C854	21-13740B73	1000 pF	
C855 C856	23-11013A56 21-13740B49	47, <u>+</u> 20%, 6V, tantalum 100 pF	
diode (see note)		•	
CR401	48-83654H01	silicon	
CR402	48-83654H02	silicon	
CR403 CR451	48-83654H01 48-83654H01	silicon silicon	
CR501, 502	48-83654H02	silicon	
CR551	0611009B23	jumper resistor	
CR603, 604 CR651	48-83654H01 48-83654H01	silicon silicon	
CR857	48–83654H01	silicon	
fuse			
F801	65-05214E06	1 A	
connector receptacle		5 ata	
J3	28-80129M01	5-pin, accessories	

		MXW-7019-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
J7	28-80128M01	5-pin, RF power amplifier
J8/9 J10	28-80126M01 28-80128M02	23-pin 2-pin, internal speaker jumper
umper	00 94191101	2 contact push-on
JU601 coil, RF	09-84181L01	2-contact push-on
_801	24-82723H35	23 uH, red
_802, 803	24-83961B02	5 turns, green
connector plug P6	28-80127M01	14-pin, RF board
P601	28-80002R03	3-pin, for JU601
transistor (see note) Q401	48-00869916	PNP
Q402	48-80214G02	NPN
Q451, 452 Q453, 454	48-00869916 48-80214G02	PNP NPN
Q455, 454 Q455	48-00869681	PNP
Q501, 502	48-05128M16	PNP NPN
Q503, 504 Q505	48-80214G02 48-05128M16	PNP
Q506 0507	48-00869619	PNP
Q507 Q508	48-00869618 48-05128M16	NPN PNP
Q509	48-80214G02	NPN
Q551 Q552	48-05128M16 48-80214G02	PNP NPN
Q651	48-05128M16	PNP
Q652 Q801	48-80214G02 48-80214G02	NPN NPN
Q802	48-00869681	PNP
Q803–812 resistor, fixed, ohm,	48-80214G02	NPN
resistor, fixed, offin, R401	06-11077A70	680
R402	06-02369M31	330, .6 watt, metal film
R403 R404	06-11077A70 06-11077F18	680 1.74k, ±1%
R405	06-11077F28	2.21k, ±1%
R407 R408, 409	06-11077A76 06-11077A98	1.2k 10k
R410	06-11077A80	1.8k
R451, 452 R453	06-02369M01 06-11077A70	1, .6 Watt, metal film 680
R454	06-02369M31	330, .6 watt, metal film
R455 R456	06-11077A70 06-11077A82	680 2.2k
R457	06-11077A76	1.2k
R458, 459 R460	06-11077A90 06-11077B01	4.7k 12k
R461	06-11077A70	680
R462 R463	06-11077B29 06-11077B25	180k 120k
R464, 465	06-11077G88	100k, ±1%
R466, 467 R468	06-11077F91 06-11077A60	10k, ±1% 270
R469	06-11077A74	1k
R470 R471	06-11077A98 06-11077B07	10k 22k
R472	06-11077A92	5.6k
R473 R474	06-11077B09 06-11077A98	27k 10k
R501	06-11077A82	2.2k
R502, 503 R504	06-11077B07 06-11077A96	22k 8.2k
R505	06-11077A86	3.3k
R506 R507	06-11077A78 06-11077A76	1.5k 1.2k
R508	06-11077A98	10k ·
R509, 510 R511	06-11077A72 06-11077B07	820 22k
R512	06-11077A46	68
R513, 514 R515	06-11009B26 06-11077A46	2.7, 1/4 Watt 68
R516	06-11077A66	470
R517, 518 R519	06-11077A98 06-80185M01	10k 1 ohm, +10%, 2W, metal plate
R551	06-11077B01	12k
R552 R553	06-11077B37 06-11077B19	390k 68k
R554, 555	06-11077B18	62k
R556 R557	06-11077F53 06-11077F20	4.02k, ±1% 1.82k, ±1%
R558	06-11077G41	32.4k, <u>+</u> 1%
R559 R560	06-11077G88 06-11077E77	100k, ±1% 665, ±1%
R561	06-11077G91	107k, ±1%
R562 R563	06-11077B16 06-11077B15	51k 47k
R565	06-11077A98	10k
R566 R567	06-11077A96 06-11077A86	8.2k 3.3k
R568	06-11077807	22k
R569 R570	06-11077A42 06-11077B17	47 56k
R573	06-11077B09	27k
R574 R604	06-11077A01 06-11077A98	0–ohm 10k
R605	30	
R606	06-11077A74 06-11077A98	1k 10k

REFERENCE SYMBOL R607 R609 R610 R611, 612 R613 R615 R616 R617 R620 R621 R622 R651 R652 R655 R656 R658 R656 R657 R658 R659 R660 R661 R661 R662	MOTOROLA PART NO. 06-11077B47 06-11077B15 06-11077G45 06-11077G45 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A98 06-11077A98 06-11077A99 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077A90 06-11077B19	1 meg 33k 47k 33.2k, ±1% 35.7k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k 15k
R609 R610 R611, 612 R613 R615 R615 R616 R617 R620 R621 R621 R651 R655 R655 R655 R656 R657 R658 R659 R660 R660 R661	06-11077B11 06-11077G15 06-11077G45 06-11077G45 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A83 06-11077A98 06-11077A90 06-11077A90 06-11077B39 06-11077B39 06-11077B42 06-11077B42 06-11077B42 06-11077B19 06-11077B19	33/k 47k 33.2k, ±1% 35.7k, ±1% 187k, ±1% 187k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R610 R611, 612 R613 R615 R616 R617 R620 R621 R621 R652 R653, 654 R655 R656 R657 R658 R659 R659 R660 R660	06-11077B15 06-11077G42 06-11077G45 06-11077G48 06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A83 06-11077A98 06-11077A90 06-11077B39 06-11077B39 06-11077B39 06-11077B39 06-11077B42 06-11077B19 06-11077B19	47k 33.2k, ±1% 35.7k, ±1% 187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 668k
R611, 612 R613 R615 R616 R617 R620 R621 R621 R651 R655 R653, 654 R655 R656 R657 R658 R659 R660 R661	06-11077G42 06-11077G45 06-11077H15 06-11077H82 06-11077A82 06-11077A82 06-11077A82 06-11077A93 06-11077A50 06-11077A50 06-11077A90 06-11077A90 06-11077B93 06-11077B93 06-11077B93 06-11077B93 06-11077B93 06-11077B93	33.2k, ±1% 35.7k, ±1% 187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R615 R616 R617 R620 R621 R621 R652 R653, 654 R655 R656 R657 R656 R657 R659 R660 R660	06-11077H15 06-11077G48 06-11077A98 06-11077A98 06-11077A98 06-11077B31 06-11077A68 06-11077A68 06-11077A98 06-11077A99 06-11077B39 06-11077B39 06-11077B42 06-11077B42 06-11077B19 06-11077B19	187k, ±1% 38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R616 R617 R620 R621 R621 R651 R652 R653, 654 R656 R657 R658 R659 R669 R660 R661	06-11077G48 06-11077A82 06-11077A82 06-11077A82 06-11077A82 06-11077A50 06-11077A50 06-11077A98 06-11077A99 06-11077B99 06-11077B42 06-11077H65 06-11077B19 06-11077B19	38.3k, ±1% 2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R617 R620 R621 R621 R651 R652 R653, 654 R656 R657 R658 R658 R659 R660 R661 R661	06-11077A82 06-11077A98 06-11077A98 06-11077A93 06-11077A68 06-11077A98 06-11077A99 06-11077B39 06-11077B42 06-11077H65 06-11077B42 06-11077B19 06-11077B19	2.2k 10k 2.2k 220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k
R621 R651 R651 R652 R653, 654 R656 R656 R657 R658 R659 R660 R661 R661	06-11077A82 06-11077B31 06-11077A68 06-11077A50 06-11077A98 06-11077A99 06-11077B42 06-11077H65 06-11077H65 06-11077B19 06-11077B19	2.2k 220k 560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k
R622 R651 R652 R653, 654 R656 R656 R657 R658 R659 R660 R661 R661	06-11077B31 06-11077A68 06-11077A50 06-11077A98 06-11077A99 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B19 06-11077B17	220k 560 100 10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R651 R652, 654 R653, 654 R656 R656 R657 R658 R659 R660 R661	06-11077A68 06-11077A50 06-11077A98 06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B13	560 100 10k 4.7k 470k 620k 619k, ±1% 2.2k 68k
R653, 654 R655 R656 R657 R658 R659 R660 R661	06-11077A98 06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077B19 06-11077B19 06-11077B17	10k 4.7k 4.70k 620k 619k, ±1% 2.2k 68k
R655 R656 R657 R658 R659 R660 R661 R661	06-11077A90 06-11077B39 06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	4.7k 470k 620k 619k, ±1% 2.2k 68k
R657 R658 R659 R660 R661 R662	06-11077B42 06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	620k 619k, ±1% 2.2k 68k
R658 R659 R660 R661 R662	06-11077H65 06-11077A82 06-11077B19 06-11077B03 06-11077B17	619k, ±1% 2.2k 68k
R659 R660 R661 R662	06-11077A82 06-11077B19 06-11077B03 06-11077B17	2.2k 68k
R661 R662	06-11077B03 06-11077B17	
R662	06-11077B17	IOK
		56k
		62k
R664	06-11077B07	22k
R665 R666, 667	06-11077A84 06-11077B23	2.7k 100k
R668–670	06-11077B18	62k
R671	06-11077A50	100
R701 R702	06-11077G88 06-11077B29	100k, ±1% 180k
R703	06-11077B08	24k
R705 R706	06-11077B31 06-11077G88	220k 100k, ±1%
R707	06-11077H26	243k, ±1%
R709	06-11077B09	27k
R710-712	06-11077G68 06-11077A86	61.9k, ±1% 3.3k
R713 R714	06-11077B10	3.3k 30k
R715	06-11077B05	18k
R801 R802	0611077A78 0611077A84	1.5k 2.7k
R803	06-11077A98	10k
R804	06-11077A90	4.7k
R805, 806 R807	06-11077A98 06-11077B15	10k 47k
R808, 809	06-11077A90	4.7k
R810, 811	06-11077B17	56k
R812–815 R816–818	06-11077A90 06-11077B23	4.7k 100k
R820, 821	06-11077A98	10k
R822	06-11077B15 06-11077A98	47k 10k
R823, 824 R825	06-11077B15	47k
R826-828	06-11077A98	10k
R831, 832 R833	06-11077A74 06-11077A98	1k 10k
R836	06-11077A98	10k
R842	06-11077A74	1k
R845 R846	06-11077A74 06-11077A98	1k 10k
R847	06-11077A74	1k
R849	06-11077A98	10k
R850 R851, 852	06-11077A74 06-11077B15	1k 47k
R853	06-11077B45	820k
R854	06-11077A90	4.7k
R857–860 R862	06-11077A98 06-11077F95	10k 11K, ±1%
R863	06-11077F91	10k, ±1%
R864 R865_872	06-11077F20	1.82k, <u>±</u> 1% 10k
R865–872 R876	06-11077A98 06-11077A98	10k 10k
R877-879	06-11077B23	100k
R880 R881	06-11077B15 06-11077A98	47k 10k
H881 R882	06-11077A98 06-11077B07	22k
R883	06-11077A90	4.7k
R884 R885	06-11077B15 06-11077A98	47k 10k
R886	06-11077B07	22k
R887	06-11077A90	4.7k
R889 R890	06-11077A68 06-11077A98	560 10k
integrated circuit (s		
U401	51–02198J22	dual op-amp
U402	51-80942T01	voltage regulator 5V
U451 U551–553	51-02198J22 51-02198J22	dual op-amp dual op-amp
U601	51-02198J23	dual comparator
U602, 603	51-02198J22	dual op-amp
U651, 652 U653	51-02198J22 51-80059M01	dual op-amp voltage-controlled attenuator
U701	51-00059M01	dual op-amp
U801	51-80135C10	D/A converter
U802	51-80960T01	microcomputer
voltage regulator (s VR401	see note) 48-83461E40	zener, 5.1V
VR402	48-82256C15	zener, 5.1V zener, 5.1V
VR551 VR801	48-82256C11 48-82256C20	zener, 10V zener, 27V

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
VR802, 803	48-82256C11	zener, 10V
VR804, 805	48-82256C20	zener, 27V
VR807	48-82256C20	zener, 27V
crystal (see note)		
Y801	48-80173D09	7.776 MHz
	non-ref	erenced parts
	14-80145M01	insulator accessory connector
	03-10943M04	screw M2.5x8 (5 used)
	42-80940T01	retaining ring
	07-80925T01	bracket, heat sink
	14-83820M05	insulator T0-118 (5 used)
	26-80125L02	heat sink, audio/regulator
	04-00131974	flat washer (4 used)

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

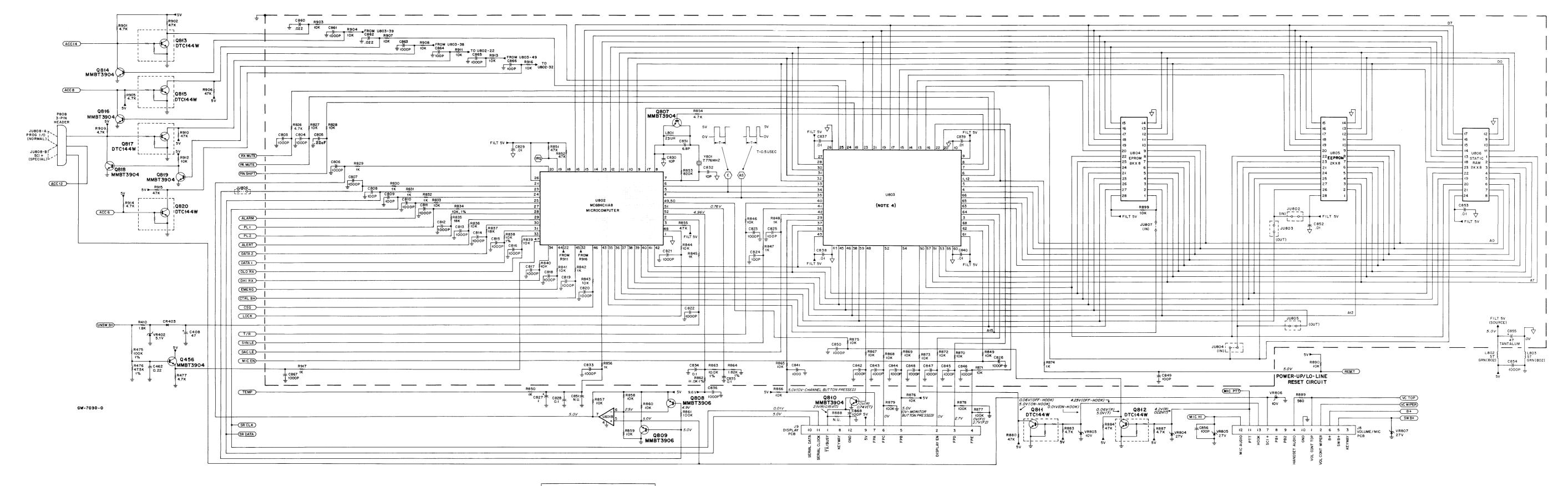


M41L03 DTC144W

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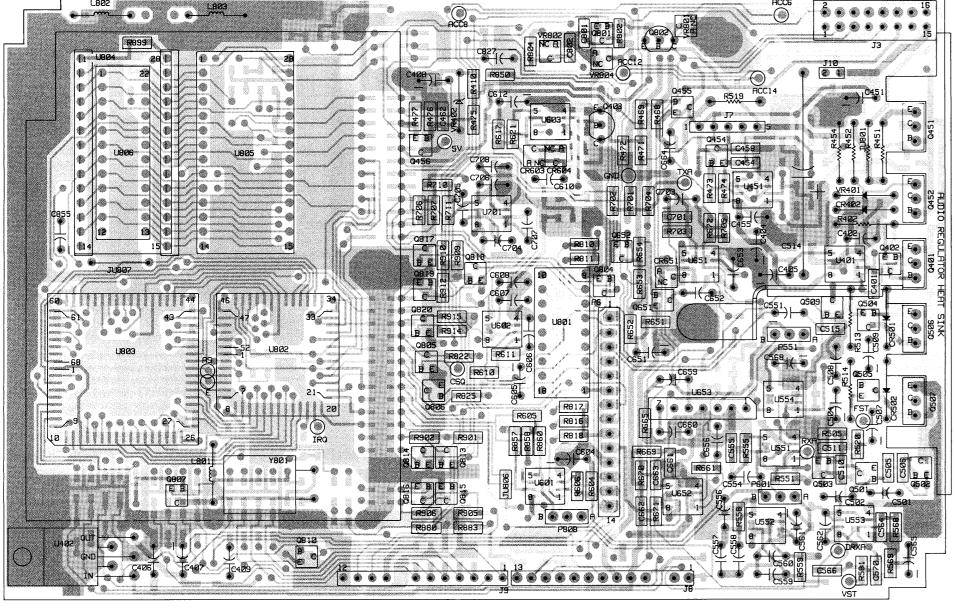
DTC144W INTERNAL CIRCUIT

GW-7029-0



IMPORTANT

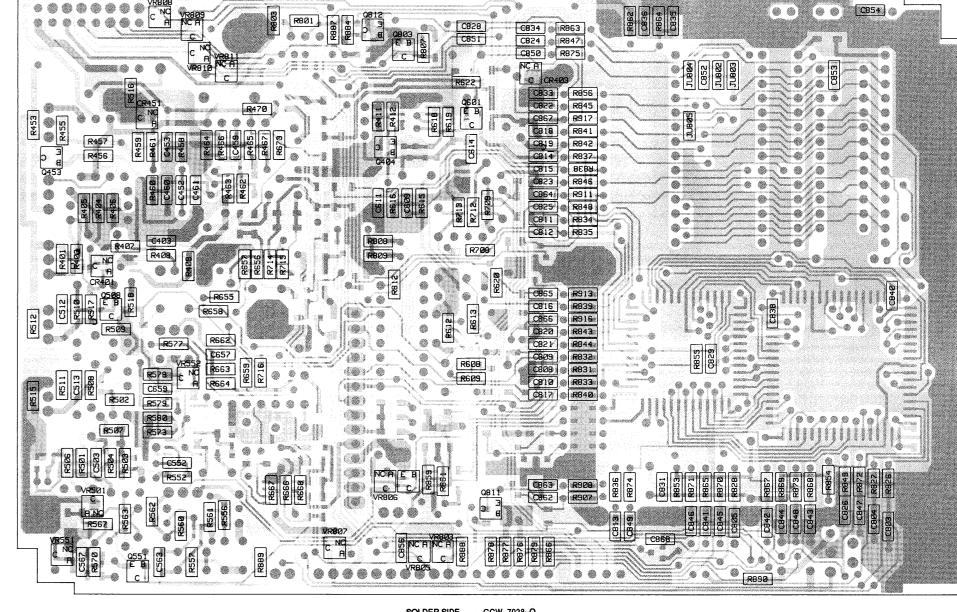
COMPONENTS WITHIN SHADED AREA ARE NOT FIELD-SERVICEABLE. IF SERVICING IS REQUIRED, THE ENTIRE BOARD MUST BE REPLACED. REFER TO SECTION 6.



COMPONENT SIDE VIEW

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

COMPONENT SIDE VIEW



SOLDER SIDE GCW-7028-O COMPONENT SIDE @ GCW-7027-O OVERLAY B GBW-7458-O

SOLDER SIDE VIEW

parts list

MXW-7025-O MXW-7025-O (2) MXW-7025-O (3) HLN9313A Logic Board (Options Connector) REFERENCE MOTOROLA MOTOROLA PART NO. REFERENCE MOTOROLA REFERENCE MOTOROL A REFERENCE DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION PART NO. SYMBOL SYMBOL SYMBOL 06-11077B15 C863 23-13740B73 B471 06-11077B0 R822 capacitor, fixed uF, +5%, 50V (unless otherwise stated) 21-13741B45 C864 06-11077A92 C401 C402 23-13740B49 100 pF R472 27k 10k 100k, ±1% 08-11051A09 .022, 63V C865 23-13740B73 1000 pF R473 R474 06-11077B09 06-11077A98 R826 06-11077A90 4.7k R827,828 C403 C404 C405 C406 21-13741B45 C866 23-13740B49 100 pF C867 23-13740B73 06-11077G88 B829-832 06-11077A74 47, ±20%, 16V, electrolytic 23-11048B19 R833 C868 R476 06-11077G57 47.5k. +1% 23-11048B13 10, ±20, 16V, electrolytic 23-13740B49 100 pF R477 06-11077A90 4.7k R834 R835 06-11077F91 10.0k +1% 08-11051A15 .22. 63V diode (see note) C407 C408 23-13749A44 R501 06-11077A82 2.2k 06-11077B05 48-05129M40 CR401 low profile R836 06-11077A98 10k 23-11048B19 47. +20%, 16V, electrolytic CR402 48-83654H02 silicon R837 06-11077B05 8.2k 3.3k 1.5k 1.2k C409 C451 08-11051A17 R504 06-11077A96 CR403 48-05129M40 low profile R838 R839–841 06-11077F91 10.0k ±1% R505 47, ±20%, 16V, electrolytic 23-11048B19 48-05129M40 CR451 low profile C452 C453 21-13741B45 R506 06-11077A78 CR501.502 48-83654H02 06-11077A76 06-11077A74 15. +80/-20% 21-11032B14 CR603,604 low profile 48-05129M40 R843.844 06-11077A98 10k 820 C454 21-11032B15 .22, +80/-20% R508 06-11077A98 CR651 48-05129M40 R509,510 R845 06-11077474 1k 10k C455 08-11051A15 .22, 63V 06-11077A98 fuse R846 C458,459 06-11077B07 22k F801 65-05214E06 1 A R847,848 06-11077A74 1k 10k C460 461 21-13741B45 C462 C501.502 06-11077A98 .22, +80/–20% R513 514 06-11009R26 1/4 Watt R849 connector receptacle 06-11077A74 1k 47k R515 08-11051A13 .1. 63V 28-80923V01 right angle 5-pin. RF power amplifier B851.852 06-11077B15 21-13740B49 06-11077466 470 28-80128M01 06-11077B45 820k C504 23-11048B13 10, +20, 16V, electrolytic 28-80126M01 4.7k C505,506 21-13740B49 2-pin, internal speaker iumpe 06-80185M01 1 ohm, +10%, 2W, metal plate R854 06-11077A90 J10 28-80128M02 06-11077B01 47k 10. +10%, 20V C507 C508 23-13749C39 R551 06-11077A74 08-11051A15 B552 06-11077B37 B856 JU551 09-84181101 2-contact push-on 06-11077A98 10, ±20, 16V, electrolytic 06-11077B19 C509 C510 23-11048B13 R553 JU601 09-84181L01 2-contact push-on 62k 40.2k, ±1% 21-13740B61 R554,555 06-11077B18 R861 06-11077B23 100k 330 pF JU802 JU804 06-11077A01 0-ohm resistor 06-11077F53 R862 11.0k, ±1% C511-513 C514 21-13740B49 R556 06-11077A01 0-ohm resisto R557 06-11077F20 18.2k, ±1% R863 06-11077F91 10.0k +1% 1000 uF, ±20%, 16V, electrolytic 23-02308M01 JU806 JU807 06-11077A01 0-ohm resisto 18.2k, ±1% 06-11077G41 21-13740B49 23-11048A17 C515 C551 R558 32.4k, +1% 06-11009B23 06-11077G88 06-11077E77 33, +20, 25V, electrolytic 0—ohm resistor R559 R560 100k, ±1% R865-873 06-11077A98 10k JU808 09-84181L01 2-contact push-on C552 C553 21-13740B33 665, +1% 10k 100k coil, RF 06-11077G91 107k, ±1% B875 876 06-11077A98 1000 pF 21-13740B73 R877-879 08-11051A03 21-13740B53 R562 06-11077B16 C554 C555 .0022, 63V L801 24-82723H35 23 uH. red R563 R567 06-11077B15 R880 R883 06-11077R15 47k L802.803 150 pF 24-83961B02 5 turns, green 06-11077A90 C556-558 C559,560 08-11051A12 08-11051A13 .068, 63V 06-11077A86 3.3k 22k 47 connector plug R884 R887 06-11077B15 47k 4.7k 1. 63V 28-80127M02 P6 14-pin header R569 R570 R573 C561 23-11048B05 06-11077A42 P551 28-80002R03 560 10k 10k 4.7k 56k 27k 100k 100 390k 27k 22k 10k R889 R890 06-11077468 C562 08-11051A09 .022, 63V 3-pin, for JU601 P601 28-80002R03 06-11077A98 C563 C564 21-13741B69 06-11077B09 P808 28-80002R03 R899 06-11077498 21-13740B49 06-11077A90 C565 C566.567 23-11048B13 10, ±20, 16V, electrolytic transistor (see note R578 06-11077A50 R901 48-00869619 R579 R902 R903,904 06-11077B15 47k 10k 4.7k 21-13741845 Q401 06-11077A98 C568 47. ±20%, 16V, electrolytic 48-80214G02 48-00869619 NPN R580 06-11077B09 06-11077A90 Q451,452 C569 C570 21-13740B33 22 pF 06-11077B15 47k 21-13741B69 Q453,454 48-80214G02 NPN PNP R604 R605 06-11077A98 R906 R907,908 06-11077A98 10k 4.7k 48-80141L03 06-11077A74 C604 C606 C607 C608 1 +20% electrolytic 23-11048B05 Q455 Q456 Q501,502 48-80214G02 48-05128M16 NPN PNP R606 R607 06-11077498 10k R909 06-11077A90 06-11077B15 47k 06-11077B47 1 meg 08-11051A13 1 63V NPN PNP PNP 48-80214G02 48-05128M16 06-11077B11 10k 08-11051A05 .0047. 63V Q503,504 R609 R610 R911-913 06-11077A98 06-11077A90 4.7k 47k 06-11077B15 C609 C610 C611 C612 21-13740B55 180 pF Q505 .22, 63V Q506 48-00869619 R611,612 R613 06-11077G42 33.2k, +1% R915 06-11077B15 08-11051A15 NPN 06-11077G45 06-11077A98 Q507 48-00869618 21-13740R46 35.7k. +1% 187k, ±1% 38.3k, ±1% 23-11048B19 47, ±20%, 16V, electrolytic Q508 48-05128M16 PNP NPN R615 R616 06-11077H15 R917 06-11077A74 06-11077G48 C651 C652 C653 C656 23-11048B19 47. ±20%, 16V, electrolytic Q509 48-80214G02 integrated circuit e note) 2.2k 100k .0068, 63V Q551 48-80949V01 JFET 06-11077A82 08-11051A06 U401 51-02198.122 dual on amn 08-11051A15 23-11048B13 06-11077B23 O601 48-80214G02 NPN R618 U402 51-80942T0 voltage regulator 5V 10. ±20, 16V, electrolytic Q651 48-05128M16 PNP R619,620 06-11077A98 10k dual op amp dual op amp U451 51-02198J22 06-11077A0 NPN 0-ohr 220k C657 C658 21-13741B69 Q652 48-80214G02 R621 U551-554 51-02198J22 06-11077B31 06-11077A68 NPN PNP 21-13741B45 U601 51-02198J23 51-02198J22 dual comparator 560 100 10k 4.7k C659 C660 23-13749A44 23-11048B13 47 +20% 6V tantalum Q802 48-00869681 R651 U602-604 dual op amp Q803 48-80947V01 NPN 06-11077A50 06-11077A98 10, +20, 16V, electrolytic U651.652 51-02198J22 dual op amp NPN B653.654 C661 C662 21-13740B76 1500 pF O804 48-80214G02 51-80059M01 voltage-controlled attenuator U653 NPN 06-11077A90 21-13741B39 U701 U801 51-02198J22 51-80135C10 dual op amp NPN PNP NPN 06-11077B39 470k C663 C664 21-13740B49 100 pF 4.7, +20%, 35V O807 48-80214G02 R656 D/A converter 620k 619k, +1% Q808,809 48-05128M16 06-11077B42 23-11048B09 U802 51_80960T0 microcomputer C701 C703 C704 C705 06-11077H65 21-13741B27 0810 48-80214G02 R658 51-82862N09 U803 custom gate array Q811-813 48-80947V01 06-11077A82 23-11048B05 +20%, electrolytic U804 HLN9277A BOM kit 08-11051A12 .068, 63V O814 48-80214G02 NPN R660 06-11077B19 **EEPROM** U805 51-80901W0 Q815 48-80947V01 R661 08-11051A13 .1. 63V U806 51-80914V01 static RAM C706 C707 08-11051A08 .015, 63V O816 48-80214G02 NPN R662 06-11077B17 56k 62k 22k 2.7k voltage regu Q817 48-80947V01 see note) 08-11051A23 056 63V 48-83461E40 C708 C801.802 08-11051A03 .0022, 63V O818.819 48-80214G02 NPN R664 06-11077B07 48-80947V01 R665 VR402 48-82256C15 zener, 5.1V 21-13740B49 100 pF Q820 zener, 7.5V 21-13740B73 R666 667 06-11077B23 100k resistor, fixed, ohm, +5%, 1/8 watt (un ess otherwise stated) 62k 100 VR551.552 48-80140L15 zener, 10V C805 21-11032B15 .22. +80 -20% 06-11077A70 R401 1000 pF C806,807 21-13740B73 B671 06-11077450 R402 06-02369M31 330, .6 watt, metal film R672 06-11077B17 VR803 48-80140115 zener 10V C808 809 21-13740B49 R403 06-11077A70 zener, 27V VR804,805 48-80948V0 C810-823 21-13740B73 B673 06-11077B23 100k R404 06-11077F18 17.4k, ±1% VR806 48-80140115 zener 10V 100k, ±1% C824 825 21-13740B49 100 pF R405 06-11077F28 22.1k, ±1% VR807-811 zener. 27V 23-13740B73 B702 06-11077H13 178k, ±1% 25.5k, ±1% C826 1000 pF R406 06-11077A98 R703 06-11077G31 C827 23-11048B05 1. +20%, electrolytic crystal (see note) R407 06-11077A76 C828 21-13741B69 B705 06-11077H13 178k, ±1% 48-80173D09 7.776 MHz 06-11077F91 06-11077A80 R408,409 10.0k, ±1% Y801 06-11077G56 R706 46.4k, ±1% C829 C830 21-13741B45 1.8k 1, .6 Watt, metal film R410 non-referenced parts 118k, ±1% 47k 21-13740B25 R707 R708 06-11077G95 R451,452 06-02369M01 06-11077B15 C831 C832 21-13740B21 6.8 pF. +.25 pF M415,416 09-82071K09 14 contact receptacle (2 used) R453 06-11077A70 06-11077B19 21-13740B25 26-80123M02 M414 330, .6 watt, metal filn 16.5k, ±1% R710.711 06-11077G13 23-13740B73 1000 pF M412 84-80942V03 circuit board R455 06-11077A70 23-13741B69 06-11077G6 52.3k, ±1% 15-80922V01 housing, connecto R456 06-11077A82 2.2k 06-11077B10 C836 C837-840 23-13740B73 1000 pF R714 29-84249N01 terminal (4 used) R457 06-11077A76 1.2k 4.7k 23-13741B45 06-11077B05 03-10943M04 tapping screw M2.5x8 R458,459 06-11077A90 23-13740B73 23-13740B49 03-10943M04 04-00131974 C841-848 1000 nF R716 06-11077A86 tapping screw M2.5x8 12k 680 180k 120k B460 06-11077B01 06-11077A78 1.5k 2.7k 100 pF M401-404 flat washer (4 used) 23-13740B73 R802 06-11077A84 07-80925T0 bracket, audio regulato R462 06-11077B29 06-11077A98 C852.853 23-13741B45 M406-410 insulator heat conductive (5 used) R463 06-11077B25 14-83820M05 23-13740B73 23-13749A44 C854 C855 R804 06-11077A90 26-80125L02 R464 465 06-11077G88 100k, ±1% 06-11077B15 47. ±20%. 6V, tantalum R466,467 06-11077F91 10.0k. +1% 23-13740B49 R808 809 06-11077A90 4.7k

R810,811

B812-815

06-11077A90

R468

R469

R470

23~13741B53

23-13740B73 23-13741B53

1000 pF

C861 C862

06-11077A60

06-11077A74

06-11077A98

270

10k

END OF PART 2 OF 4

Schematics, Circuit Board Diagrams, and Parts List for HLN9313A Logic Board PW-7026-O (Sheet 4 of 4) 2/28/90

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

MXW-7025-O (4)

1. Theory Of Operation

1.1 LOWBAND RECEIVER

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

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

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

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

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

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

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

1.2 EXTENDER OPERATION

After the first mixer stage CR1, the RF signal passes through post mixer filtering comprised of bandpass selectivity circuits surrounding L51, L52, and L53. First IF amplification is provided by Q51. The IF signal divides at the base of Q51. The extender pulse detector and blanker circuits are fed by one path while the first IF amplifier Q51 is driven by the other.

The first IF amplifier Q51 amplifies the signal where it couples into the IF delay line section comprised of circuits associated with L55 and L56. After the signal passes through the delay line the signal can be blanked with the appropriate signal applied to Q52 and Q53. Post blanker isolation is provided by Q54. The signal then passes into the first 4 pole filtering section of the 10.7 MHz IF.

The Extender samples RF from the base of Q51 and drives the extender isolation amplifier Q351. Q351 in turn amplifies the signal and pulse which is then applied to the gain block U351. Q352 detects the output of U351 for further processing. Pulse shaping and amplification are accomplished by Q353 and Q354. Q355 is driven to toggle Q52 and Q53 in the IF to blank the noise pulse as it exits the IF delay line. The output of Q354 also drives a three stage AGC detector comprised of Q356, Q357, and Q358 which reduces the gain of U351 under large signal and high pulse repetition rate conditions.

1.3 VHF RECEIVER

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

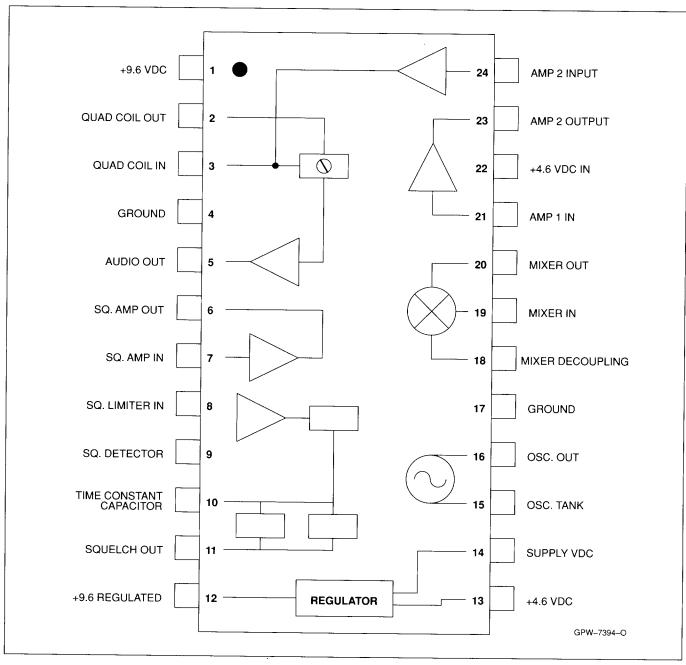


Figure 1. Receiver IC Block Diagram

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

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

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

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

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

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

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

filtering is achieved by using multiple resonators, FL51 and F152. These filters are tuned to 455kHz.

The audio detector is internal to the U51 IC. The Quadrature detector detects the audio and routs it to the PL filter and to the carrier squelch amplifier. The carrier squelch amplifies the detected audio and routs it via U51-8 to the squelch control R60. The squelch control output is routed through a high pass filter to remove the receive audio components. The remaining noise above the audio band is detected via U51-6 by the carrier squelch detector which generates a D.C. voltage that controls the audio mute circuits. The detected audio is then sent over to the logic board via U51-5/16-3.

1.4 UHF RECEIVER

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

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

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

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

1.5 800 MHz RECEIVER

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

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

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

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

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

1.6 SYNTHESIZER OPERATION

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

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

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

12.5 kHz at the output of the divided-by-R counter when the reference oscillator signal is applied at U101-1.

12.5 kHz at the output of the divided-by-N counter when the VCO is operating at the desired receive injection or transmit frequency.

3

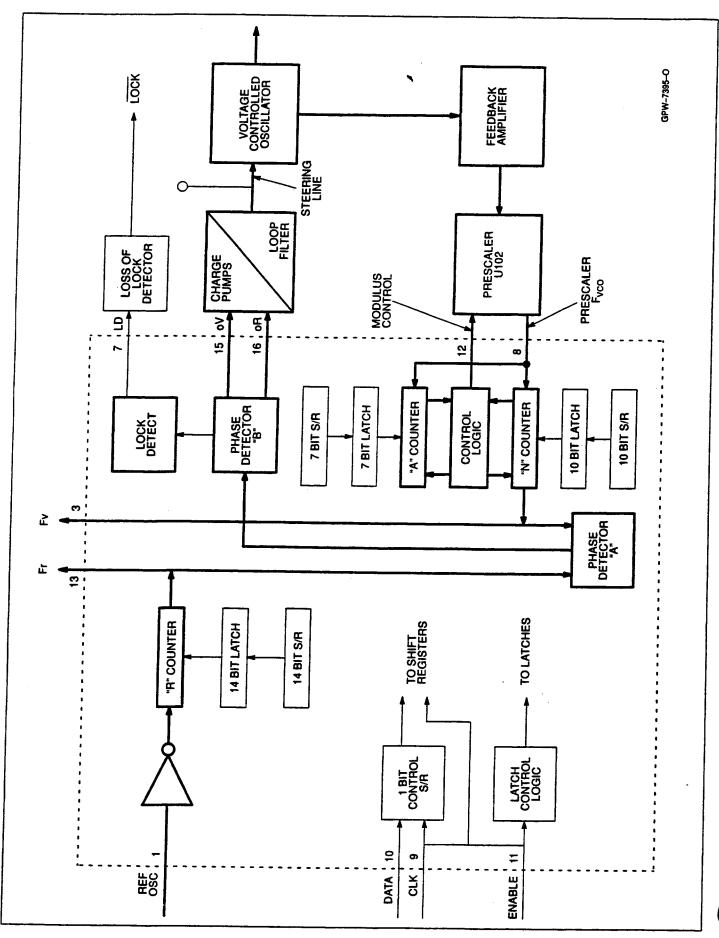


Figure 2. Synthesizer Section Block Diagram

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

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

= 127 \times N + A

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

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

where f_{VCO} is the output frequency of the VCO

When the phase-locked loop is locked:

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

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

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

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

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

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

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

A = remainder of $\frac{N_T}{127}$

For example, if the receive frequency is 851.0125 MHz

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

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

$$N = 510 = 010 \ 1111 \ 11102$$

 $A = 23 = 012 \ 0111$

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

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

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

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

1.6.1 Charge Pump

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

1.6.2 Loop Filter

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

1.6.3 Reference Oscillator

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

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

1.7 VOLTAGE CONTROLLED OSCILLATOR

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

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

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

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

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

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

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

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

2. Troubleshooting Guide

2.1 RECEIVER SECTION

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

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

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

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

2.2 SYNTHESIZER SECTION

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

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

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

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

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

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

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

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

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

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

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

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

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

3. Extender Field Test

The purpose of this test is to give field technicians the ability to verify extender functionality without using a pulse generator box (such as the TEK-47A or TEK-21). This test does not take the place of factory testing of the extender.

3.1 TEST EQUIPMENT

 $R2001D\ Motorola\ Communication\ System\ Analyzer\ or\ Equivalent.$

3.2 TEST PROCEDURE

- (1) Ensure that the radio is turned off; then connect the RF generator output to the antenna port of the radio. Tune the RF generator to the receive (RX) frequency of the radio mode to be tested.
- (2) Adjust the RF output level from the R2001D to-47 dBm (1 millivolt).
- (3) Modulate the RF signal with 100% AM modulation at a frequency of 10 kHz. Use either tone A or B modulation from R2001D with AM limit (RF Section) set to Minimum.
- (4) Locate the VAGC Test Point (see Figure 3) in the extender section of the RF board. Short the test point pad to ground using a small piece of wire soldered from the pad to the coil can (L352/L353) nearby.
- (5) Turn the radio on. The extender is in the "ON" state when the radio is turned on.
- (6) Observe the Extender Test Point (see Figure 3) with a 10:1 oscilloscope probe. Pulses at the repetition rate of 10 kHz should be seen.
- (7) Turn the extender off by depressing the monitor button on the control head for 3 to 4 seconds; listen for the three low–pitched tones. There should be no pulses at the test point. Turn the extender on again by depressing the monitor button on the control head for 3 to 4 seconds; listen for three high–pitched "beeps." The pulses should be seen at the test point.
- (8) Turn the radio off and remove the wire used in Step 4. This concludes the extender functionality test.

Note

If the Extender does not function as described above, replace the RF board.

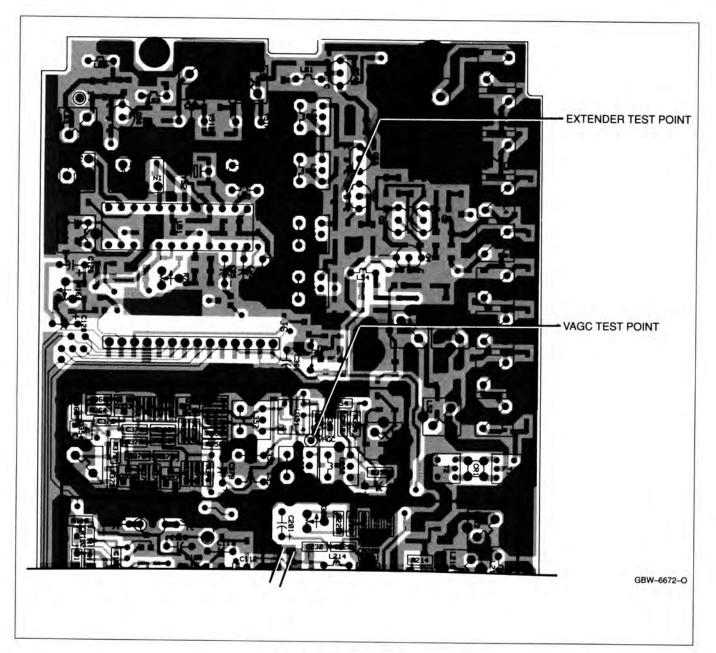
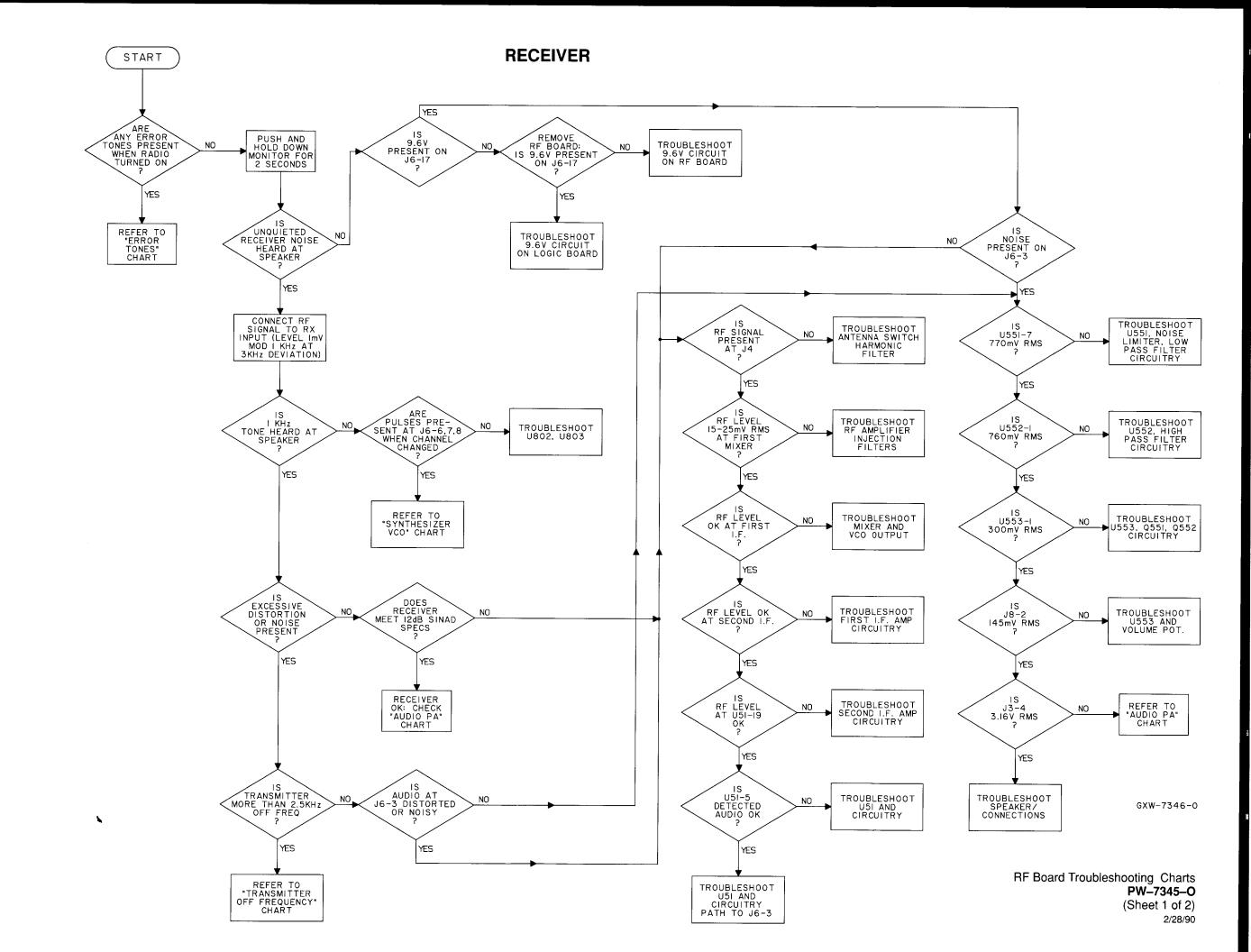
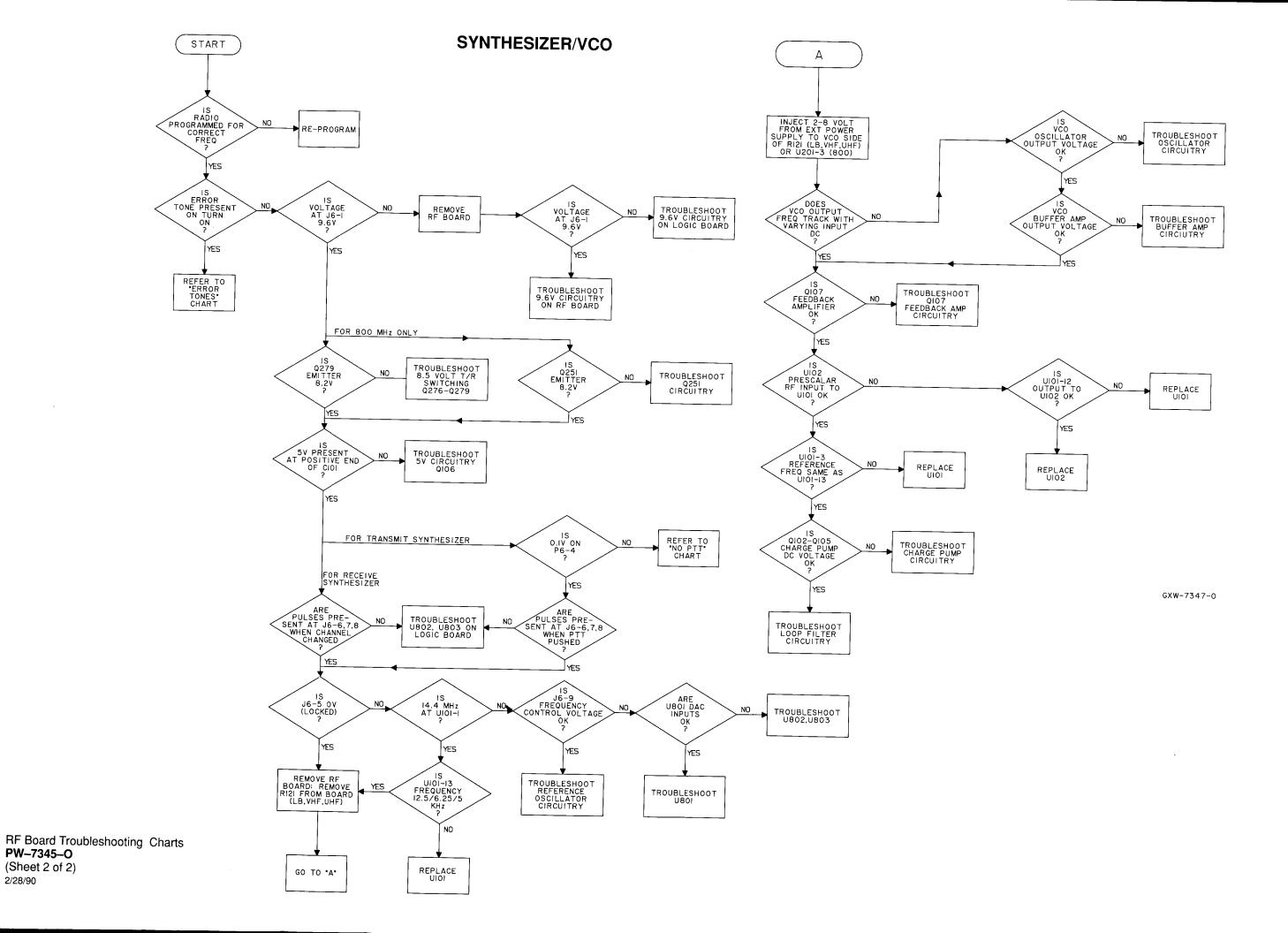


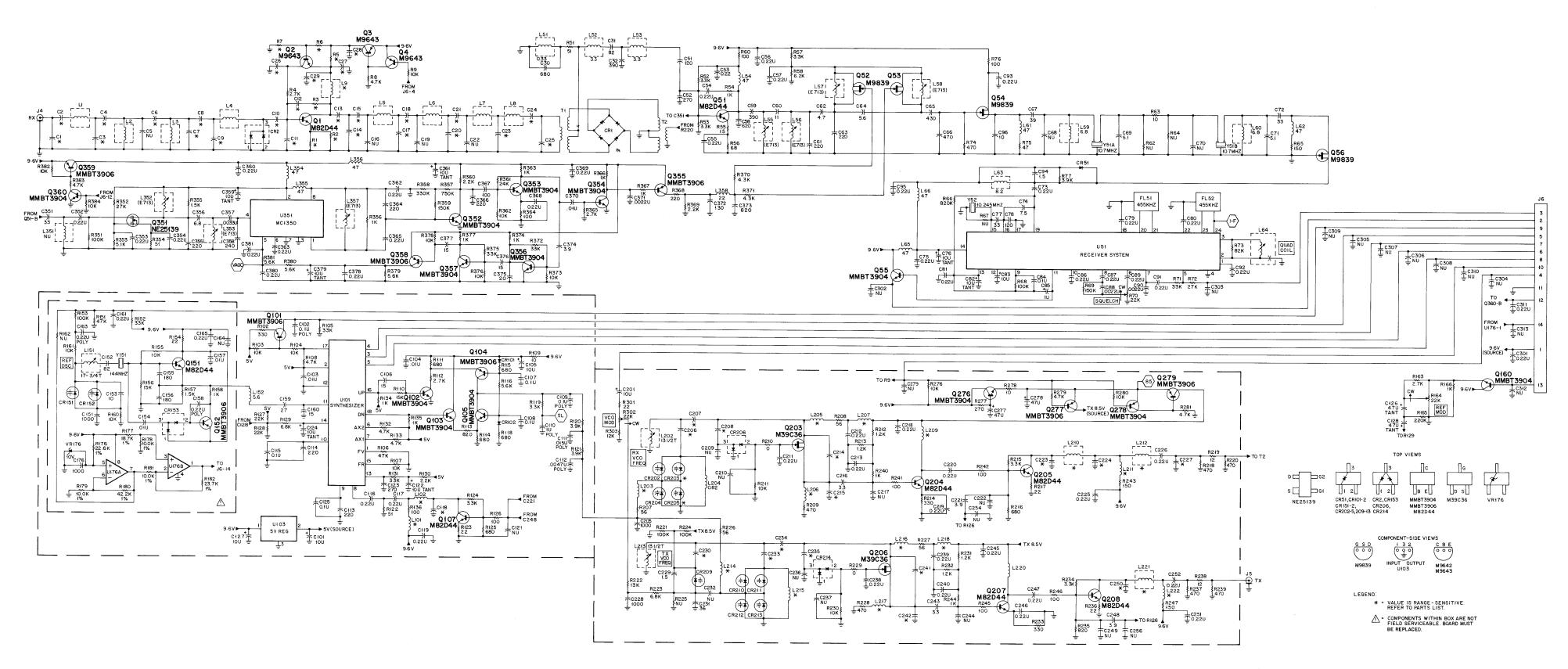
Figure 3. Extender Test Points





PW-7345-O (Sheet 2 of 2)

2/28/90



Range 1 Parts List

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

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

MXW-6563-B (4)

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

10/15/89

MXW-6563-B (5)

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

MXW-6348-B (3) MXW-6348-B (4)

HLB4101A RF Board,		MXW-6348-B
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	5%, 50V (unless other	
C1 C2	21-13740B48 21-13740B65	91 470
C3 C4	21-13740B59	270
C6	21-13740B49 21-13740B29	100 15
C8 C9	21-13740B48 21-13740B64	91 430
C10	21-13740B57	220
C11 C12	21-13740B55 21-13741B49	180 0.015 uF, ±10%
C13	21-13740B51	120
C14 C15	21-13740B62 21-13740B51	360 120
C17 C18	21-13740B67 21-13740B52	560 130
C20	21-13740B67	560
C21 C23	21-13740B52 21-13740B64	130 430
C24	21-13740B58	240
C25 C26–29	21-13740B56 21-13741B49	200 0.015 uF, ±10%
C30	21-13740B69	680
C31 C32	21-13740B47 21-13740B63	82 390
C51 C52	21-13740B51	120 270
C53-57	21-13740B59 21-11032B15	0.22 uF, +80-20%
C58 C59	21-13740B68 21-13740B63	620 390
C60	21-13740B26	11
C61 C62	21-13740B57 21-13740B17	220 4.7, ±.25 pF
C63	21-13740B57	220
C64 C65	21-13740B19 21-13740B64	5.6, ±.25 pF 430
C66 C67	21-13740B65 21-13740B39	470 39
C69	21-13740B18	5.1, ±.25 pF
C71 C72	21-13740B18 21-13740B37	5.1, ±.25 pF 33
C73	21-11032B15	0.22 uF, +80-20%
C74 C75	2113740B22 2111032B15	7.5, ±.5 pF 0.22 uF, +80–20%
C76 C77	23-11013D13	10 uF, ±10%, 20V, tantalum 33
C78	21-13740B37 21-13740B51	120
C79–81 C82	21-11032B15 23-11013D13	0.22 uF, +80–20% 10 uF, ±10%, 20V, tantalum
C83	23-11048B13	10 uF, ±20%, 16V, electrolytic
C84 C85	2111032B13 2311048B05	0.1 uF, +80–20% 1 uF, ±20%, electrolytic
C86,87	21-11032B15	0.22 uF, +80-20%
C88 C89	21-13741B29 21-11032B15	0.0022 uF, ±10% 0.22 uF, +80–20%
C90 C91–93	21-13741B29 21-11032B15	0.0022 uF, ±10%
C94	21-13740B05	0.22 uF, +80–20% 1.5, ±.25 pF
C95 C96	21-11032B15 21-13740B25	0.22 uF, +80–20% 10, ±.5 pF
C101	23-11048B13	10 uF, ±20%, 16V, electrolytic
C102 C103,104	0811051A13 2113741B45	0.1 uF, 63V 0.01 uF, ±10%
C105 C106	23-11048B13 21-13740B29	10 uF, ±20%, 16V, electrolytic
C107,108	21-11032B13	15 0.1 uF, +80–20%
C109 C110	08-11051A13 08-11044A33	0.1 uF, 63V 1 uF
C111	08-11051A08	0.015 uF, 63V
C112 C113,114	08-11051A05 21-13740B57	0.0047 uF, 63V 220
C115	21-11032B13	0.1 uF, +8020%
C116,117 C118	21-11032B15 21-13740B27	0.22 uF, +80–20% 12
C119 C122	21-11032B15 23-11013D13	0.22 uF, +80-20% 10 uF, ±10%, 20V, tantalum
C123	21-13740B59	270
C124 C125	23-11013D13 21-11032B13	10 uF, ±10%, 20V, tantalum 0.1 uF, +80–20%
C126	23-11013A56	47 uF, ±20%, 6V, tantalum
C127 C128	23-11048B13 23-11013A56	10 uF, ±20%, 16V, electrolytic 47 uF, ±20%, 6V, tantalum
C151 C152	21-13740B73 21-13740B47	1000 82
C153	21-13740B25	10, ±.5 pF
C154 C155,156	21-13741B45 21-13740B55	0.01 uF, ±10% 180
C157	21-13741B45	0.01 uF, ±10%
C158 C159	08-11051A15 21-13740B35	0.22 uF, 63V 27
C160	21-13740B29	15
C161 C163	21-11032B15 08-11051A15	0.22 uF, +80–20% 0.22 uF, 63V
C165	21-11032B15	0.22 uF, +80-20%
C176 C201	21–13740B73 23–11048B13	1000 10 uF, ±20%, 16V, electrolytic
C205 C206	21-13740B73 21-13740B37	1000
C207	21-13740B27	12
C208 C211–213	21-13740B17 21-11032B15	4.7, ±.25 pF 0.22 uF, +80–20%
-		U.L. U., TOO LO/0

		MXW-6348-B (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C214,215	21-13740B27 21-13740B13	12
C216 C218–220	21–13740B13 21–11032B15	3.3, ±.25 pF 0.22 uF, +80–20%
C221	21~13740B15	3.9, ±.25 pF
C223 C224	21-13740B21 21-13740B39	6.8, <u>±</u> .25 pF 39
C225,226	21-11032B15	0.22 uF, +80-20%
C227 C228	21–13740B37 21–13740B73	33 1000
C229	21–13740B/5	1.5, ±.25 pF
C230	21-13740B15	3.9, ±.25 pF
C231 C233	21–13740B38 21–13740B49	36 100
C234	21-13740B34	24
C235	21-13740B17	4.7, ±.25 pF
C238-240 C241,242	21-11032B15 21-13740B31	0.22 uF, +80–20% 18
C243	21-13740B13	3.3, ±.25 pF
C245-247	21-11032B15	0.22 uF, +80–20%
C248 C250	21-13740B15 21-13740B29	3.9, ±.25 pF 15
C251,252	21-11032B15	0.22 uF, +80-20%
C277,278	23-11048B19	47 uF, ±20%, 16V
C301 C311	21-11032B15 21-11032B15	0.22 uF, +80–20% 0.22 uF, +80–20%
C351	21-13740B37	33
C352–354	21-11032B15	0.22 uF, +80-20%
C355 C356	21–13740B57 21–13740B21	220 6.8, ±.5 pF
C357	21–13741B33	0.0033 uF, ±10%
C358	21-13740B58	240
C359 C360	23-11013D13 21-11032B15	10 uF, ±10%, 20V, tantalum 0.22 uF, +80–20%
C361	23–11013D13	10 uF, ±10%, 20V, tantalum
C362,363	21-11032B15	0.22 uF, +80-20%
C364 C365	21-13740B57 21-11032B15	220 0.22 uF, +80–20%
2365 2366	21–11032B15 21–13740B57	0.22 uF, +80–20% 220
2367	21-13740B49	100
C368,369 C370	21-11032B15	0.22 uF, +80–20%
C371	21–13741B37 21–13741B29	0.0047 uF, ±10% 0.0022 uF, ±10%
372	21-13740B52	130
2373	21-13740B72	910
C374 C376,377	21-13740B25 21-13740B29	10 15
2378	21-11032B15	0.22 uF, +80-20%
C379	23-11013D13	10 uF, ±10%, 20V, tantalum
C380,381	21-11032B15	0.22 uF, +80–20%
diodes (see note) CR1	48-80236E16	quad Schottky, crossed
CR2	48-80154K03	dual Schottky, SOT
CR51	48-05129M76	silicon, SOT
CR101,102 CR151,152	48-05129M76 48-80006E10	silicon, SOT
CR202-205	48-80006E10	silicon varactor, SOT silicon varactor, SOT
CR206	48-80154K03	dual Schottky, SOT
CR209-213 CR214	48-80006E10 48-80154K03	silicon varactor, SOT
ilters	40-00134103	dual Schottky, SOT
L51	91-80097D05	455 kHz, 6E
L52	91-80098D05	455 kHz, 4E
onnector, recept		
4 5	09-80135M01	coaxial (RX)
5 6	09-80135M01 09-80130M02	coaxial (TX) 14-pin socket (logic board)
coils		- F (10810 post(a)
_1–9	24-80148M22	9-1/2 turns (white)
.51 52.52	24-80063M07	0.33 uH
.52,53 .54	24-80063M19 24-80063M31	3.3 uH 47 uH
.55–58	24-80164M01	tunable, 0.7 uH
59,60	24-80063M23	6.8 uH
.61,62 .63	24-80063M31 24-80063M24	47 uH 8.2 uH
.64	25-80000E01	tunable, 455 kHz
.65,66	24-80063M31	47 uH
101	24-80063M23	6.8 uH
102 151	24-80063M09 24-80299D01	0.47 uH tunable, 17–3/4 turns
152	24-80063M22	5.6 uH
202	24-80931W26	tunable, 13-1/2 turns
203 204	24-80063M22 24-80063M12	5.6 uH 0.82 uH
205–207	24-80063M12 24-80063M22	5.6 uH
209	24-80063M22	5.6 uH
210	24-80063M11	0.68 uH
211 212	24-80063M22 24-80063M06	5.6 uH 0.27 uH
213	24-80931W26	tunable, 13–1/2 turns
.214	24-80063M23	6.8 uH
215	24-80063M12	0.82 uH
216–218 220	24-80063M23 24-80063M23	6.8 uH 6.8 uH
221	24-80063M09	0.47 uH
222	24-80063M23	6.8 uH
		tunable, 0.7 uH
.352,353	24-80164M01 24-80063M31	
.352,353 .354–356 .357 .358	24-80164M01 24-80063M31 24-80164M01	47 uH tunable, 0.7 uH

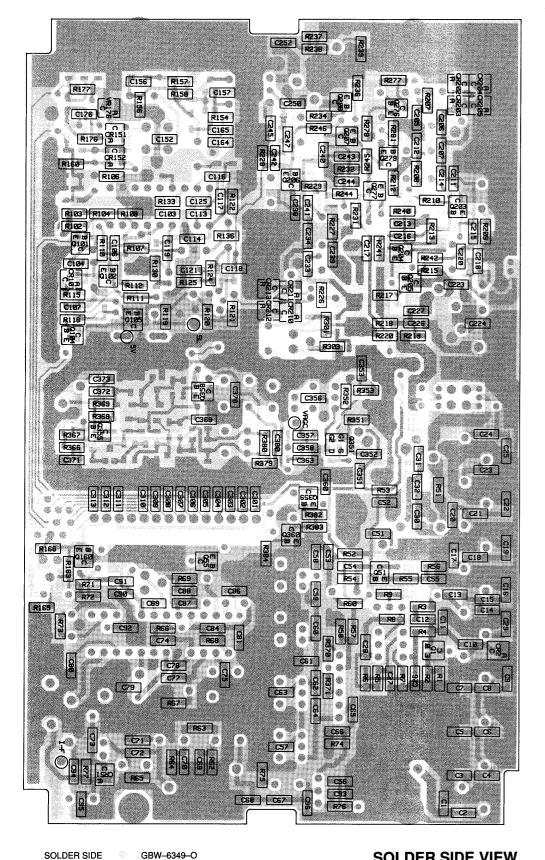
		MXW-6348-B (3)
EFERENCE /MBOL	MOTOROLA PART NO.	DESCRIPTION
ansistors (see no	te)	
1	48-80182D44	NPN
2–4 51	48-11043C06 48-80182D44	PNP NPN
52-54	48-11043C12	FET
55 56	48-80214G02	NPN
56 101	48-11043C12 48-05128M16	FET PNP
102,103	48-80214G02	NPN
104 105	48-05128M16	PNP
107	48-80214G02 48-80182D44	NPN NPN
151	48-80182D44	NPN
152 160	48-05128M16 48-80214G02	PNP NPN
203	48-80141L06	FET
204,205	48-80182D44	NPN
206 207,208	48-80141L06 48-80182D44	FET NPN
276	48-80214G02	NPN
277–279	48-05128M16	PNP
351 352–354	48-80930W01 48-80214G02	dual gate FET NPN
355	48-05128M16	PNP
356,357	48-80214G02	NPN
358,359 360	48-05128M16 48-80214G02	PNP NPN
		ss otherwise indicated)
l	06–11077A26	10
2	06-11077A33	20
3 1	06-11077A66 06-11077A84	470 2.7k
5	06-11077A84 06-11077A46	2.7K 68
6	06-11077A86	3.3k
,	06-11077B03	15k
3)	06-11077A90 06-11077A98	4.7k 10k
51	06-11077A43	51
2,53	06-11077A86	3.3k
54 55	06-11077A74 06-11077A30	1k 15
6	06-11077A46	68
7	06-11077A86	3.3k
68 60	06-11077A93 06-11077A50	6.2k 100
3	06-11077A26	10
55	06-11077A54	150
66 8	06-11077B45 06-11077B23	820k 100k
69	06-11077B27	150k
70	18-05500L08	variable, 22k
'1 '2	06-11077B11 06-11077B09	33k 27k
3	06-11077B03	82k
4	06-11077A66	470
'5 '6	06-11077A42 06-11077A50	47 100
7	06-11077A88	3.9k
02	06-11077A62	330
03,104 05	06-11077A98 06-11077B11	10k 33k
06	06-11077B15	47k
07	06-11077A98	10k
08 09	06-11077A90	4.7k
10	06-11077A26 06-11077B03	10 15k
11	0611077A70	680
12 13	06-11077A84	2.7k
14,115	06-11077A72 06-11077A70	820 680
16	06-11077A92	5.6k
18 19	06-11077A70	680
20,121	06-11077A86 06-11077A88	3.3k 3.9k
22	06-11077A43	51
23	06-11077A34	22
24 25	06-11077A86 06-11077A70	3.3k 680
26	06-11077A50	100
27,128	06-11077B07	22k
29 30	06-11077A94 06-11077A82	6.8k 2.2k
31	06-11077B11	2.2k 33k
32,133	06-11077A90	4.7k
34,135 36	06-11077A74	1k
36 51	06-11077A50 06-11077B15	100 47k
52	06-11077B13	33k
53	06-11077B23	100k
54 55	06-11077A34 06-11077A98	22 10k
	06-11077B03	15k
	00-11077003	
56 57	06-11077A78	1.5k
56 57 58	06-11077A78 06-11077A74	1k
56 57 58 60,161	06-11077A78 06-11077A74 06-11077A98	1k 10k
56 57 58 60,161 63	06-11077A78 06-11077A74	1k
56 57 58 60,161 63 64 65	06-11077A78 06-11077A74 06-11077A98 06-11077A84 18-05500L08 06-11077B31	1k 10k 2.7k variable, 22k 220k
56 57 58 60,161 63 64 65 66 76	06-11077A78 06-11077A74 06-11077A98 06-11077A84 18-05500L08	1k 10k 2.7k variable, 22k

			MXW-6348-B (4)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
R178,179	06-11077F91	10.0k, ±1%	
R180 R181	06-11077G52 06-11077F91	42.2k, <u>+</u> 1%	
R181 R182	06-11077F91 06-11077G28	10.0k, ±1% 23.7k, ±1%	
3207,208	06-11077A44	56	
R209 R210	06-11077A66 06-11077A01	470 0	
R211	06-11077A98	10k	
R212,213	06-11077A76	1.2k	
R214 R215	06-11077A62 06-11077A86	330 3.3k	
R216	06-11077A70	680	
R217 R218	06-11077A34 06-11077A66	22 470	
R219	06-11077A28	12	
R220	06-11077A66	470	
R221 R222	06-11077B23 06-11077B02	100k 13k	
R223	06-11077A94	6.8k	
R224 R226,227	0611077B23	100k	
3226,227 3228	06-11077A44 06-11077A66	56 470	
R229	06-11077A01	0	
R230 R231,232	06-11077 A 98	10k 1.2k	
1231,232 1233	06-11077A76 06-11077A62	1.2k 330	
R234	06-11077A86	3.3k	
R235 R236	06-11077A72 06-11077A34	820 22	
R237	06-11077A66	470	
238	06-11077A28	12	
R239 R240	06-11077A66 06-11077A74	470 1k	
3241,242	06-11077A50	100	
3243	06-11077A54	150	
R244 R245,246	06-11077A74 06-11077A50	1k 100	
R247	06-11077A54	150	
R276 R277	06-11077A98 06-11077A60	10k 270	
1278	06-11077A60 06-11077A26	10	
279	06-11077A90	4.7k	
280 281	06-11077A98 06-11077A90	10k 4.7k	
301	06-11077A30	22	
302	18-05500L08	variable, 22k	
1303 1351	06-11077B01 06-11077B23	12k 100k	
352	06-11077B09	27k	
353 354	06-11077A91	5.1k	
354 355	06-11077A43 06-11077A78	51 1.5k	
356	06-11077A74	1k	
357 358	06-11077B44 06-11077B35	750k 330k	
359	06-11077B33	150k	
360	06-11077A82	2.2k	
361 362	06-11077B08 06-11077A98	24k 10k	
363	06-11077A74	1k	
364 365	06-11077A50	100	
365 366,367	06-11077A84 06-11077A74	2.7k 1k	
368	06-11077A58	220	
R369 R370.371	06-11077A82	2.2k	
1370,371 1372	06-11077A89 06-11077A93	4.3k 6.2k	
373	06-11077A76	1.2k	
1374 1375	06-11077A74 06-11077A93	1k	
1375 1376	06-11077A93 06-11077A76	6.2k 1.2k	
R377	06-11077A74	1k	
R378 R379–381	06-11077A98 06-11077A92	10k 5.6k	
1379–381 1382	06-11077A92 06-11077A98	5.6K 10k	
383	06-11077A90	4.7k	
384	0611077A98	10k	
ransformers	25_201628402	halun	
1,T2 ntegrated circuits	25–80163M02 s (see note)	balun	
J51	51–05479G05	receiver system	
J101	51-80931V01	synthesizer	
J103 J176	51-84621K27 51-80932W01	regulator, 5 volt dual op-amp	
J351	51-80929W01	MC1350	
oltage regulator			
/R176	48-80140L15	zener, 10V	
rystal (see note)	01_00170004	filtor 10.7 MH I-	
751 752	91–80172D01 48–80908W01	filter, 10.7 MHz 10.245 MHz	
151	48–80174D05	14.4 MHz	***************************************
	non-refe	erenced items	
	14-05160A01	insulator, crystal (4 us	
	26-80097M01 26-80098M01	shield, coil can (L151)	
	26-80098M01 26-80228L01	shield, coil can (10 us shield, can (J4, J5)	eu)
	26-80916V01	shield, VCO frame	
			10/15/8

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

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

PW-6346-C
(Sheet 3 of 4)



COMPONENT SIDE

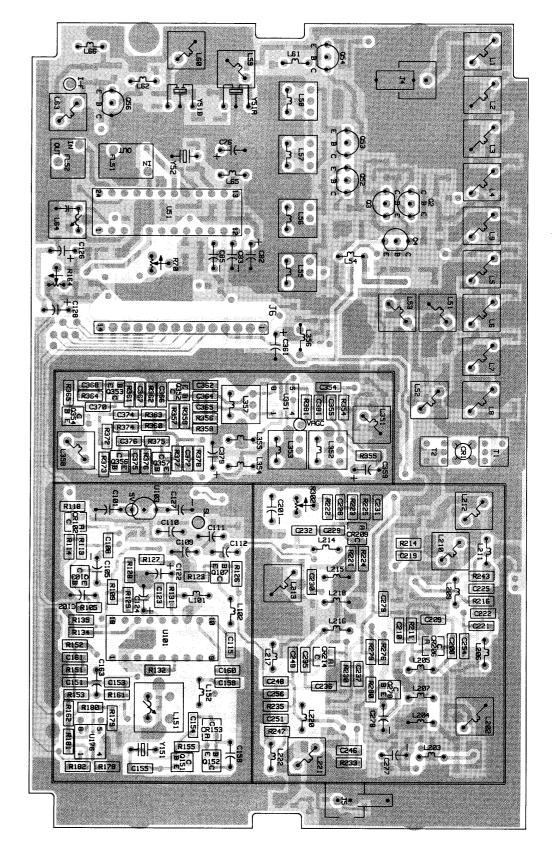
OVERLAY - GBW-6351-O

SOLDER SIDE VIEW

SOLDER INNER LAYER COMPONENT INNER LAYER (6)

GCW-6389-O GCW-6390-O

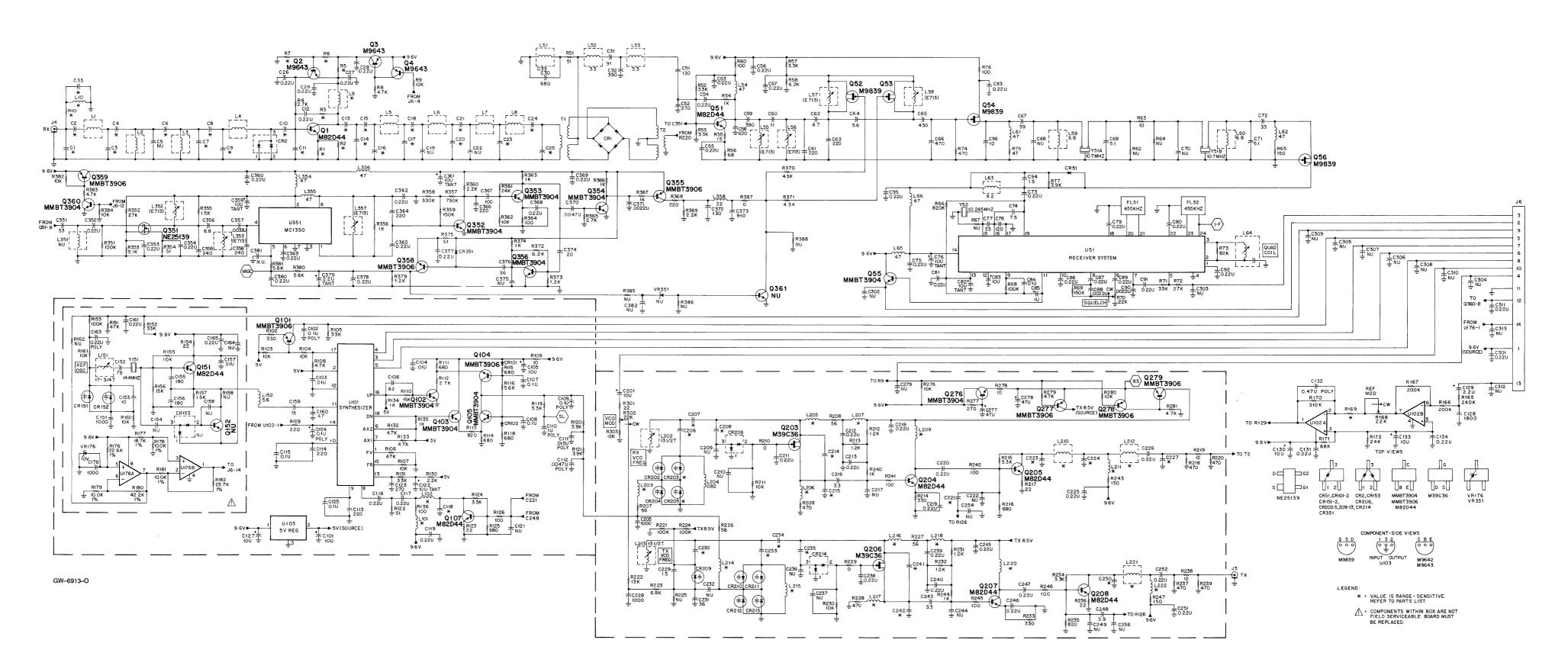
INNER LAYERS



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

COMPONENT SIDE VIEW

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



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

Range 2 Parts List

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

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

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

R157

R164

R165

R160,161

06-11077A78

06-11077A98

18-05500L08

06-11077B32

240k

REFERENCE MOTOROLA SYMBOL PART NO.		DESCRIPTION				
R166	06-11077B30	200k				
R167	06-11077B30	200k				
R168	18-05500L08	variable, 22k				
R169	06-11077B17	56k				
R170	06-11077B40	510k				
R171	06-11077B19	68k				
R172	06-11077B08	24k				
R176	06-11077G26	22.6k, <u>+</u> 1%				
R177	06-11077G18	18.7k, ±1%				
R178,179	06-11077F91	10.0k, ±1%				
R180	06-11077G52	42.2k, ±1%				
R181	06-11077F91	10.0k, ±1%				
R182	06-11077G28	23.7k, ±1%				
R207,208	06-11077 A 44	56				
R209	06-11077A66	470				
R210	06-11077A01	0				
R211	06-11077A98	10k				
R212,213	06-11077A76	1.2k				
R214	06-11077A62	330				
R215	0611077A86	3.3k				
R216	06-11077A70	680				
R217	06-11077A34	22				
R218	06-11077A66	470				
R219	06-11077A28	12				
R220	06-11077A66	470				
R221	06-11077B23	100k				
R222	06-11077B02	13k				
R223	06-11077A94	6.8k				
R224	06-11077B23	100k				
R226,227	06-11077A44	56				
R228	06-11077A66	470				
R229	06-11077A01	0				
R230	06-11077A98	10k				
R231,232	06-11077A76	1.2k				
R233	06-11077 A 62	330				
R234	06-11077A86	3.3k				
R235	06-11077A72	820				
R236	06-11077A34	22				
R237	06-11077A66	470				
R238	06-11077A28	12				
R239	06-11077A66	470				
R240	06-11077A74	1k				
R241,242	06-11077A50	100				
R243	06-11077A54	150				
R244	06-11077A74	1k				
R245,246	06-11077A50	100				
R247	06-11077A54	150				
R276	06-11077A98	10k				
R277	06-11077A60	270				
R278	0611077A26	10				
R279	06-11077A90	4.7k				
R280	06-11077A98	10k				
R281	06-11077A90	4.7k				
R301	06-11077A34	22				
R302 R303	18-05500L08	variable, 22k				
R351	06-11077B01	12k				
R352	06-11077B23 06-11077B09	100k				
R353	06-11077A91	27k 5.1k				
R354						
R355	06-11077A43 06-11077A78	51 1.5k				
R356	06-11077A78	1.5k 1k				
R357	06-11077B44	750k				
R358	06-11077B35	330k				
R359	06-11077B27	150k				
R360	06-11077B27	2.2k				
R361	06-11077B08	2.2h 24k				
R362	06-11077B08	10k				
R363	06-11077A38	1k				
R364	06-11077A74	100				
R365	06-11077A30	2.7k				
R366,367	06-11077A84	1k				
R368	06-11077A74	220				
R369	06-11077A38	2.2k				
R370,371	06-11077A82	4.3k				
R372	06-11077A93	6.2k				
R373	06-11077A35	1.2k				
R374	06-11077A74	1k				
R375	06-11077A43	51				
R379	06-11077A43	1.2k				
R380.R381	06-11077A70	5.6k				
R382	06-11077A98	10k				
R383	06-11077A90	4.7k				
R384	06-11077A98	10k				
	06-11077A90	0				
R387	00 110//H01	~				
R387						
transformer						
	25-80163M02	balun				
transformer T1,T2		balun				
transformer T1,T2 integrated circuit (see note)					
transformer T1,T2 integrated circuit (U51	see note) 51–05479G05	receiver system				
transformer T1,T2 integrated circuit (U51 U101	see note) 51–05479G05 51–80931V01	receiver system synthesizer				
transformer T1,T2 integrated circuit (U51 U101 U102	see note) 51-05479G05 51-80931V01 51-80056M04	receiver system synthesizer dual op–amp				
transformer T1,T2 integrated circuit (U51 U101 U102 U103	see note) 51-05479G05 51-80931V01 51-80056M04 51-84621K27	receiver system synthesizer dual op-amp regulator, 5 volt				
transformer T1,T2 integrated circuit (U51 U101 U102	see note) 51-05479G05 51-80931V01 51-80056M04	receiver system synthesizer dual op–amp				

DEEEDENCE

VR176

48-80140115

zener, 10V

MOTOROLA

MXW-6910-O (4)

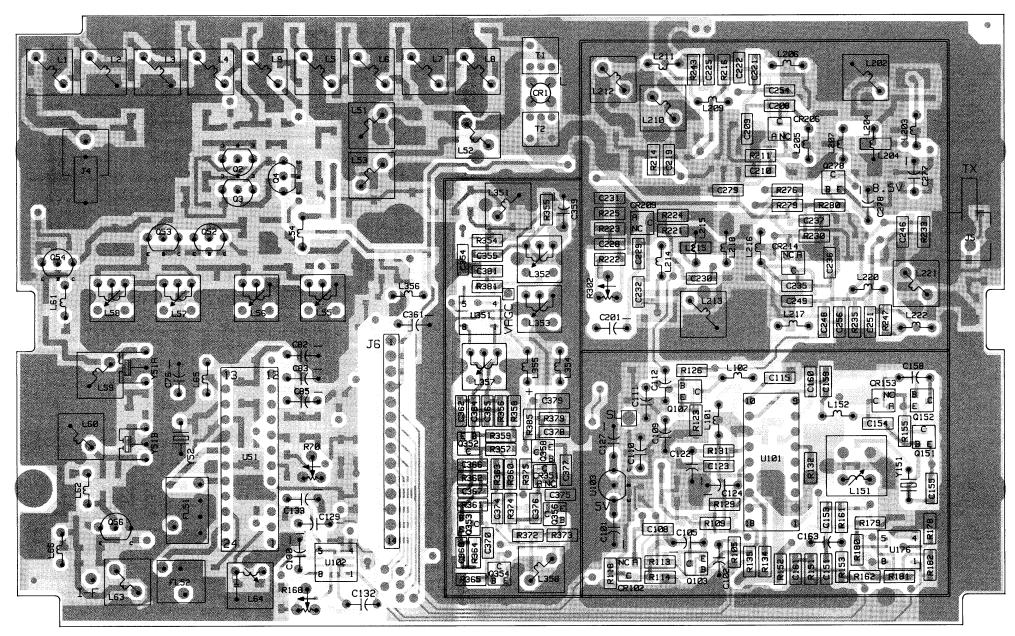
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
crystal (see note)		25.50 Jack
Y51 Y52	91-80172D01 48-80908W01	10.245 MHz _ (4,03 early 14,4 MHz
Y151	48-80174D05	14.4 MHz
	non-refe	erenced items
	14-05160A01	insulator, crystal (4 used)
	26-80097M01	shield, coil can (L151)
	26-80098M01	shield, coil can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

MXW-6910-O (5)

10/15/89

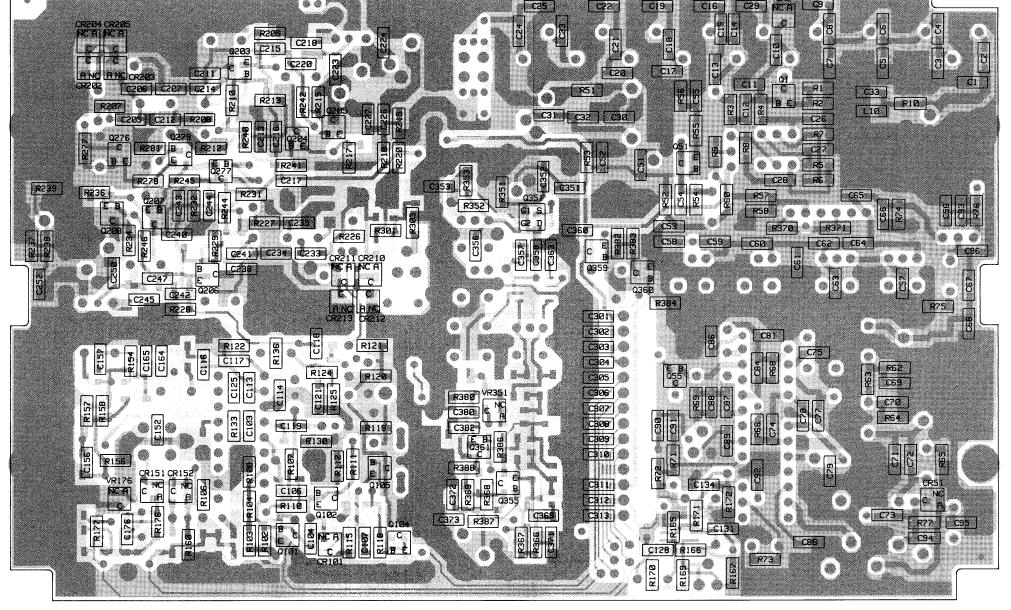
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number

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



COMPONENT SIDE

OVERLAY GW-6914W01-



SOLDER SIDE

COMPONENT SIDE GW-6915-O

SOLDER SIDE GW-6914W02-O

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

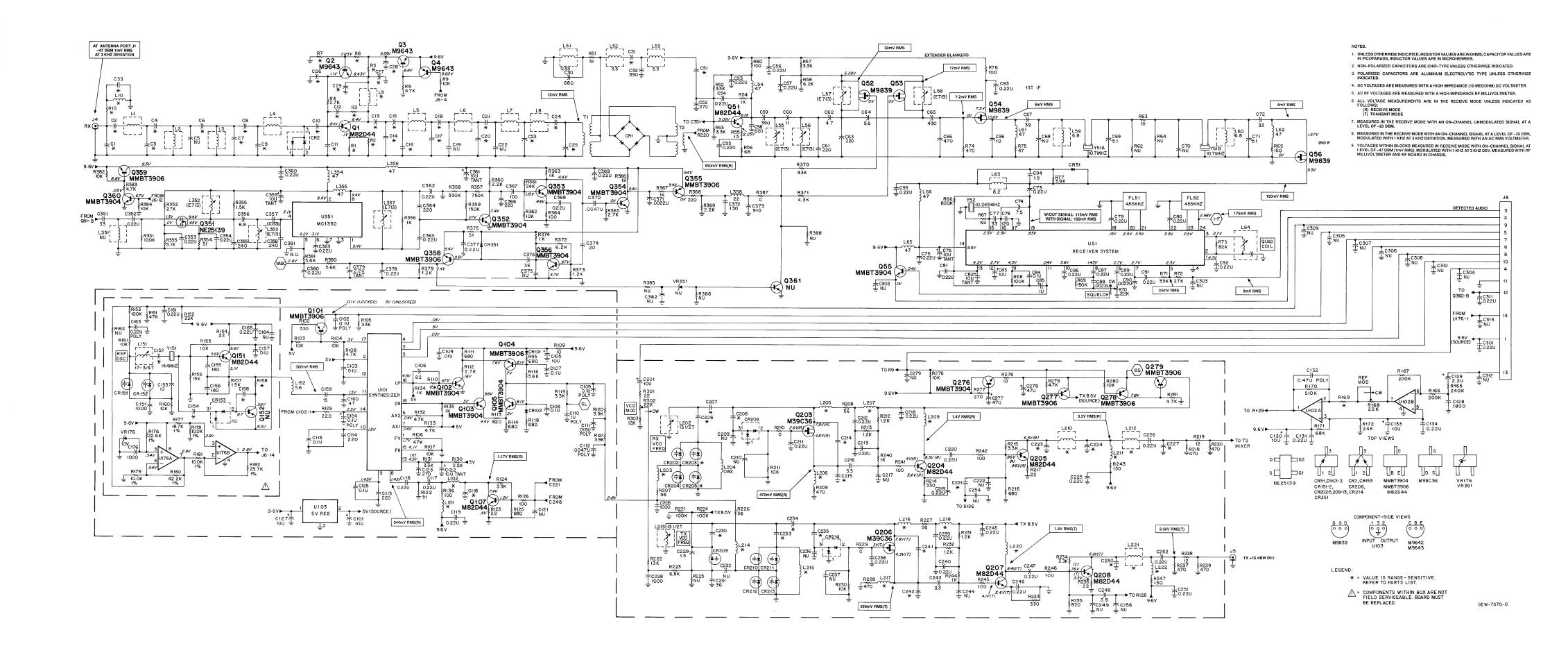
PW-6916-A
(Sheet 3 of 3)

3/31/90

Low Band RF Board Transistor D.C. Voltage Table

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

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



parts list

parts list									Inon services			MYW_7572_O (2)	2)		MXW-75	72-O (3)			MXW-7572-O (4)			MXW-7572-O (5)
HLB4099B Low Band RF Board 29.7–36.0 MHz (Range 1) MXW-7571–O REFERENCE MOTOROLA PROPERTIES M	MXW-7571-O (2) OTOROLA DESCRIPTION	REFERENCE MOTOROLA		RENCE MOTOR		MXW-7571-O (4)	REFERENCE	MOTOROLA	MXW-7571-O (5) DESCRIPTION	REFERENCE	MOTOROLA	DESCRIPTION	REFERENCE	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	RE	EFERENCE MOTO YMBOL PART		
HLB4099B Low Band RF Board 29.7—36.0 MHz (Range 1) MXW-7571-0	OTOROLA ART NO. -13740B17	SYMBOL PART NO. L0221 24-80063M11 L0222 24-80063M21 L0352,0353 24-80164M01 L0357 24-80063M27 transistor 24-80063M27 Q0001 48-80182D44 Q0052-0004 48-11043C06 Q0051 48-80182D44 Q0052-0054 48-11043C12 Q0055 48-801214G02 Q0056 48-11043C12 Q0101 48-95128M16 Q0102,0103 48-80214G02 Q0104 48-95128M16 Q0105 48-80182D44 Q020107 48-80182D44 Q0203 48-80182D44 Q0203 48-80182D44 Q0204-0205 48-80182D44 Q0206 48-8014G02 Q0207,0208 48-80124G02 Q0277-0279 48-5128M16 Q0351 48-80214G02 Q0352 48-80128M16 Q0354 48-80214G02 Q0355 48-80214G02 Q0356 48-80214G02	DESCRIPTION REF SYM	BOL PART N B 18-0550 06-1107 0 06-1107	D. DESCRIPTION D. D. D. D. D. D. D. D. D. D. D. D. D. D		SYMBOL crystal Y0051 Y0052 Y0151	91–80172D01 48–80908W01 48–80174D05 non-refer 26–80097M01 26–80228L01 26–80228L01 26–802916V01 75–05295B02 84–80959X01 rmance, order diodes	filter 10.245 MHz 14.4 MHz renced items shield, coil can (10 used) shield, coil can (20 used) shield, coil can (10 used) shield, after Low Band pad, crystal base (4 used) circuit board 3/31/90, transistors, and integrated circuit devices by	REFERENCE SYMBOL C0074 C0075 C0076 C0077 C0078 C0079–0081 C0082 C0083 C0084 C0085 C0085 C0086,0087 C0088 C0089 C0089	MOTOROLA PART NO. 21–13740B22 21–13749C39 21–13749C39 21–13749B51 23–13749C39 23–11048B13 23–11048B13 23–11048B13 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13741B29 21–11032B15 21–13740B57 21–11032B13 21–11032B13 21–11032B15 23–13740B59 08–11051A13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13 21–11032B15 23–11048B13	MXW-7572-O (2) DESCRIPTION 7.5 pF, +25 pF, 50V .22 uF, +80 -20, 50V 10 uF, ±10%, 20V 33 pF, ±5%, 50V 120 pF, ±5%, 50V 120 pF, ±5%, 50V 120 uF, +80 -20, 50V 10 uF, ±20%, 16V .10 uF, ±20%, 50V .22 uF, +80 -20, 50V .22 uF, +80 -20, 50V .22 uF, ±80 -20, 50V .22 uF, ±80 -20, 50V .22 uF, ±5%, 50V .22 uF, ±5%, 50V .22 uF, ±80 -20, 50V .0022 uF, ±5%, 50V .22 uF, ±80 -20, 50V .10 uF, ±25 pF, 50V .22 uF, ±80 -20, 50V .10 uF, ±5%, 63V .10 uF, ±5%, 63V .11 uF, ±5%, 63V .10 uF, ±5%, 63V .10 uF, ±5%, 63V .015 uF, ±5%, 63V .016 uF, ±5%, 63V .017 uF, ±5%, 63V .017 uF, ±5%, 63V .018 uF, ±5%, 63V .019 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±5%, 50V .10 uF, ±20%, 16V .10 uF, ±20%, 16V .10 uF, ±20%, 16V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V .10 uF, ±20%, 50V	REFERENCE SYMBOL C0366 C0367 C0368,0369 C0370 C0371 C0372 C0373 C0374 C0376 C0378 C0379 C0380 diode CR001 CR002 CR051 CR101,0102 CR151,152 CR202-205 CR206 CR206 CR206 CR207 CR206 CR207 CR206 CR207 CR206 CR207 CR206 CR207 CR206 CR207 CR207 CR207 CR208 CR208 CR208 CR209-213 CR214 CR351 filter FL051 FL052 connector, recel J0004,0005 J0006 coil L0001-0009 L0051 L0052,0053 L0054 L0055-0058 L0059,0060 L0061,0062 L0063 L0064 L0065,0066 L0101	PART NO. 21-13740B57 21-13740B57 21-13740B49 21-11032B15 21-13741B37 21-13740B52 21-13740B52 21-13740B32 21-13740B38 21-11032B15 23-11049A09 21-13740B73 48-80236E16 48-80154K03 48-05129M76 48-801529M76 48-80154K03 48-80154K03 48-8098B10 48-8006E10 48-8006E10 48-80154K03 48-80098D05 ptacle 09-80135M01 09-80135M01 09-80135M01 09-80130M03 24-80063M19 24-80063M19 24-80063M19 24-80063M31 24-80063M24 25-80006D11 24-80063M31 24-80063M31 24-80063M31 24-80063M31		REFERENCE SYMBOL R0051 R0052,0053 R0054 R0055 R0056 R0056 R0057 R0058 R0060 R0063 R0066 R0068 R0069 R0070 R0071 R0072 R0072 R0073 R0074 R0075 R0076 R0077 R0102 R0101 R0111 R0112 R0113 R0114,0115 R0116 R0118 R0119 R0119 R0119 R0122 R0123 R0124 R0125 R0126 R0129	PART NO. 06-11077A4: 06-11077A7: 06-11077A8: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A3: 06-11077A2: 06-11077A2: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B4: 06-11077B6: 06-11077A6: 06-11077A6: 06-11077A6: 06-11077A7: 06-11077A7: 06-11077A8: 06-11077A9:	DESCRIPTION 3 51 53 34 54 1k 50 15 68 68 63 3.3k 34 6.2k 100 65 10 44 150 55 820k 31 100k 71 50k 822k, ±20%, 100V 11 33k 99 27k 11 82k 64 470 10 100 88 3.9k 12 330 88 10k 13 33k 10k 13 33k 10k 14 33k 15 47k 16 10 17 100 18 10	REST	YMBOL PART	IO. 177A50 100 177A50 100 177A54 150 177A54 150 177A54 150 177A59 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A98 10k 17A99 17A88 10k 17A99 17A88 10k 17A99 17A88 10k 17B23 100k 17B23 100k 17B23 100k 17B23 100k 17B23 100k 17B23 100k 18B27 150k 17A91 150k 17A94 150k 17A96 10k 17A96 12k 17A96 12k 17A96 12k 17A97 12k 17A93 10k	V
COURTS 21-111032B15 22 UF - 80 - 20, 50V CO370 27 27 27 27 27 27 27	1-11032B13	R0052,0053	3.3k R02- 1k R02- 15 R02- 15 R02- 68 R02- 3.3k R02- 3.3k R02- 100 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R02- 110 R03- 1100k R03- 1100k R03- 1100k R03- 1100 R0	06-1107 5-0246 6-1107 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 7 6-1107 8 6-1107 8 6-1107 9 06-1107 9 06-1107 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7A54 150 7A747 1k 7A747 1k 7A50 100 7A54 150 7A98 10k 7A98 10k 7A90 4.7k 7A99 10k 7A99 4.7k 7A98 10k 7A90 4.7k 7A94 22 0L08 22k, ±20%, 100V 7B01 12k 7B02 27k 7B01 5.1k 7A43 51 7A78 1.5k 7A74 1k 7B44 750k 7B35 330k 7B27 150k 7B85 22k 7A86 2.2k 7A88 24k 7A98 10k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A75 1.5k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A74 1k 7A75 1.5k 7A74 1k 7A76 1.2k 7A98 1.3k 7A77 1k 7A78 1.5k 7A78 1.5k 7A74 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A71 1k 7A70 1.0k 7A98 1.0k 7A98 1.0k 7A98 1.0k 7A98 1.0k 7A99 1.		Parts list HLB4101B Low Band REFERENCE SYMBOL capacitor, fixed (unk C0001 C0002 C0003 C0004 C0006 C0008 C0009 C0010 C0011 C0012 C0013 C0014 C0015 C0017 C0018 C00016 C0018 C0020 C0021 C0023 C0024 C0025 C0026 C0026 C0060 C0061 C0059 C0060 C0061 C0062 C0063 C0064 C0066 C0066 C0066 C0066 C0066 C0067 C0069	d RF Board 42.0-50.0 MOTOROLA PART NO.	DESCRIPTION	C0133 C0134 C0151 C0152 C0153 C0154 C0155,0156 C0157 C0158 C0159	08-11051A17 23-11048B13 21-11032B15 21-13740B25 21-13740B25 21-13740B25 21-13741B45 21-13740B55 21-13741B45 21-13740B29 21-13740B29 21-13740B29 21-13740B15 21-13740B31 21-13740B37 23-11032B15 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B37 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B38 21-13740B38 21-13740B38 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B39 21-11032B15 21-13740B38 21-13740B38 21-13740B38 21-13740B39 21-11032B15 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38 21-13740B38	47 uF, ±5%, 63V 10 uF, ±20%, 16V 22 uF, +80 -20, 50V 1000 pF, ±5%, 50V 75 pF, ±5%, 50V 10 pF, ±5%, 50V 10 pF, ±5%, 50V 11 uF, ±5%, 50V 21 uF, ±5%, 50V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 63V 22 uF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 1000 pF, ±5%, 50V 22 uF, ±5%, 50V 22 uF, ±5%, 50V 22 uF, ±5%, 50V 22 uF, ±5%, 50V 33 pF, ±25 pF, 50V 22 uF, ±80 -20, 50V 33 pF, ±25 pF, 50V 22 uF, +80 -20, 50V 33 pF, ±25 pF, 50V 33 pF, ±25 pF, 50V 33 pF, ±25 pF, 50V 33 pF, ±25 pF, 50V 34 pF, ±5%, 50V 35 pF, ±25 pF, 50V 36 pF, ±5%, 50V 39 pF, ±5%, 50V	L0102 L0151 L0152 L0202 L0203 L0204 L0205 L0209 L0210 L0211 L0211 L0212 L0213 L0214 L0215 L0216 L0222 L0352,0353 L0354 L0357 L0358 transistor Q0001 Q0002 -0004 Q0051 Q0002 -0004 Q0051 Q0055 Q0056 Q0101 Q0102,0103 Q0104 Q0105 Q0107 Q0151 Q0152 Q0203 Q0204 Q0207 Q0208 Q0277 Q0208 Q0277 Q0355 Q0356 Q0277 Q0355 Q0356 Q0277 Q0355 Q0206 Q0277 Q0355 Q0356 Q0357 Q0356 Q0357 Q0356 Q0357 Q0356 Q0357 Q0357 Q0357 Q0358 Q0277 Q0357 Q0358 Q0277 Q0359 Q0350 Q0359 Q0360 Pesistor, fixed of R0001 R0002 R00002 R00003 R0004 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005 R00005	24-80063M09 24-8029D01 24-80063M22 24-80063M22 24-80063M22 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M12 24-80063M23 24-80063M23 24-80063M23 24-80063M23 24-80063M06 24-80063M23 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M09 24-80063M02 24-80164M01 24-80063M23 24-80164M01 24-80063M23 24-80164M01 24-8063M23 24-80164M01 24-8063M12 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-80164M01 24-8012B016 48-80141G02 48-05128M16 48-80141L06 48-80141L06 48-80141C02 48-05128M16 48-80141C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-8014C02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02 48-05128M16 48-80214G02	1.7.75 turns 1.7.75 turns 1.6. uH 1.7.75 turns 1.6. uH 1.8.2 uH 1.6. uH 1.6. uH 1.6. uH 1.7. uH 1.8.2 uH 1.8.2 uH 1.8.3 turns 1.8.3 uH 1.8.4 uH 1.9	R0130 R0131 R0132,0133 R0134,0135 R0135,0136 R0151 R0152 R0151 R0152 R0155 R0155 R0155 R0155 R0155 R0166,0167 R0168 R0160 R0161 R0165 R0166,0167 R0168 R0160 R0161 R0165 R0160,0167 R0180 R0181 R0182 R0207,0208 R0209 R0210 R0211 R0212 R0213 R0214 R0215 R0215 R0216 R0217 R0218 R0219 R0221 R0222 R0223 R0223 R0224 R0222 R0223 R0223 R0229 R0230 R0231 R0233 R0234 R0236 R0237 R0238	06-11077A8 06-11077B1 06-11077A9 06-11077A9 06-11077A9 06-11077A5 06-11077B1 06-11077B1 06-11077B2 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077A9 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B1 06-11077B2 06-11077B2 06-11077B3 06-11077B3 06-11077B3 06-11077B3 06-11077B4 06-11077B3 06-11077B4 06-11077B4 06-11077B3 06-11077B3 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B3 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4 06-11077B4	2 2.2k 1 33k 0 4.7k 4 1k 0 100 5 47k 1 33k 33 100k 44 22 88 10k 33 15k 81 1.5k 4 1k 10 100 200k 88 22k, ±20%, 100V 47k 10 510k 10 200k	tra Tra in U U U U V V V V C C C C C C C C C C C C	ransformer 0001,0002 25–80 tegrated circuit 10051 51–95 10101 51–80 10102 51–80 10103 51–84 10176 51–80 10351 51–80 aractor (R176 48–80 rystal (0051 91–80 (0051 91–80 (0052 48–80 (0151 48–80 26–80 26–80 26–80 26–80 26–80 46–80 Arborote: For best performance, Motorola part number.	arts Lists for HLB4	(10 used) nnector (2 used) Band se (4 used)

parts list

REFERENCE	MOTOROLA	DESCRIPTION	REFERENCE	MOTOROLA	DESCRIPTION
SYMBOL anacitor fixed /	PART NO. unless otherwise stated)		SYMBOL	PART NO.	
0001	21–13740B53	150 pF, ±5%, 50V	C0207 C0208	21-13740B27 21-13740B35	12 pF, ±5%, 50V 27 pF, ±.25 pF, 50V
0002	21-13740B74	1200 pF, ±5%, 50V	C0211-0213	21-11032B15	.22 uF, +80 -20, 50V
0003 0004	21-13740B63 21-13740B53	390 pF, ±5%, 50V 150 pF, ±5%, 50V	C0214,0215 C0216	21-13740B35	27 pF, ±5%, 50V
0006	21-13740B36	30 pF, ±5%, 50V	C0218-0220	21-13740B13 21-11032B15	3.3 pF, ±.25 pF, 50V .22 uF, +80 –20, 50V
0008	21-13740B52	130 pF, ±5%, 50V	C0221	21-13740B09	2.2 pF, ±.25 pF, 50V
0009 0010	21-13740B65	470 pF, ±5%, 50V	C0223	21-13740B23	8.2 pF, ±25 pF, 50V
0011	21-13740B73 21-13740B54	1000 pF, ±5%, 160 pF, ±5%, 50V	C0224 C0225,0226	21-13740B39 21-11032B15	39 pF, ±5%, 50V .22 uF, +80 –20, 50V
0012,0013	21-11032B15	.22 uF, +80 –20, 50V	C0227	21-13740B37	33 pF, ±5%, 50V
0015	21-11032B15	.22 uF, +80 -20, 50V	C0228	21-13740B73	1000 pF, ±5%, 50V
0016 0017	21-13740B51 21-13740B66	120 pF, ±5%, 50V 510 pF, ±5%, 50V	C0229 C0230	21-13740B05 21-13740B17	1.5 pF, ±.25 pF, 50V 4.7 pF, +.25 pF, 50V
0018	21-13740B55	180 pF, ±5%, 50V	C0231	21-13740B38	36 pF, ±5%, 50V
0020	21-13740B66	510 pF, ±5%, 50V	C0233	21-13740B49	100 pF, ±5%, 50V
0021 0023	21-13740B56 21-13740B65	200 pF, ±5%, 50V 470 pF, ±5%, 50V	C0234 C0235	21-13740B38 21-13740B17	36 pF, ±5%, 50V 4.7 pF, ±.25 pF, 50V
0024	21-13740B61	330 pF, ±5%, 50V	C0238-0240	21–11032B15	.22 uF, +80 –20, 50V
0025	21-13740B60	300 pF, ±5%, 50V	C0241,0242	21-13740B31	18 pF, ±5%, 50V
0026-0029 0030	21-11032B15 21-13740B69	.022 uF, +80 –20, 50V	C0243	21-13740B13	3.3 pF, ±.25 pF, 50V
0031	21-13740B48	680 pF, ±5%, 50V 91 pF, ±5%, 50V	C0245-0247 C0248	21-11032B15 21-13740B15	.22 uF, +80 –20. 50V 3.9 pF, ±.25 pF, 50V
0032	21-13740B63	390 pF, ±5%, 50V	C0250	21-13740B31	18 pF, ±5%, 50V
0051	21-13740B52	130 pF, ±5%, 50V	C0251,0252	21-11032B15	.22 uF, +80 -20, 50V
0052 0053–0057	21-13740B59 21-11032B15	270 pF, ±5%, 50V .22 uF, +80 –20, 50V	C0277,0278 C0301	23-11048B19 21-11032B15	47 uF, ±20%, 16V .22 uF, +80 –20, 50V
0058	21-13740B68	620 pF, ±5%, 50V	C0301	21–11032B15 21–11032B15	.22 uF, +80 –20, 50V .22 uF, +80 –20, 50V
0059	21-13740B63	390 pF, ±5%, 50V	C0351	21-13740B37	33 pF, ±5%, 50V
0060 0061	21-13740B26 21-13740B57	11 pF, ±5%, 50V	C0352-0354 C0355	21-11032B15	.22 uF, +80 -20, 50V
0062	21–13740B37 21–13740B17	220 pF, ±5%, 50V 4.7 pF, ±.25 pF, 50V	C0356	21-13740B58 21-13740B21	240 pF, ±5%, 50V 6.8 pF, ±.25 pF, 50V
0063	21-13740B57	220 pF, ±5%, 50V	C0357	21-13741B33	.0033 uF, ±5%, 50V
0064	21-13740B19	5.6 pF. ±.25 pF, 50V	C0358	21-13740B58	240 pF, ±5%, 50V
0065 0066	21-13740B64 21-13740B65	430 pF, ±5%, 50V 470 pF, ±5%, 50V	C0359 C0360	21-13749C39 21-11032B15	10 uF, ±10%, 20V .22 uF, +80 –20, 50V
0067	21-13740B39	39 pF. ±5%, 50V	C0361	23-13749C39	10 uF, ±10%, 20V
0069	21-13740B18	5.1 pF. ±.25 pF, 50V	C0362,0363	21-11032B15	.22 uF, +80 -20, 50V
)071)072	21-13740B18 21-13740B37	5.1 pF. ±.25 pF, 50V 33 pF. +5%. 50V	C0364	21–13740B57	220 pF, ±5%, 50V
0073	21-13740B37 21-11032B15	.22 uF. +80 –20, 50V	C0365 C0366	21-11032B15 21-13740B57	.22 uF, +80 -20, 50V 220 pF, ±5%, 50V
0074	21-13740B22	7.5 pF. +.25 pF, 50V	C0367	21-13740B49	100 pF, ±5%, 50V
0075	21-11032B15	.22 uF. +80 -20, 50V	C0368,0369	21-11032B15	.22 uF, +80 –20, 50V
)076)077	23-13749C39 21-13740B37	10 uF, ±10%. 20V 33 pF. ±5%, 50V	C0370 C0371	21-13741B37 21-13741B29	.0047 uF, ±5%, 50V .0022 uF, ±5%, 50V
078	21-13740B51	120 pF, ±5%, 50V	C0372	21–13741B23	130 pF, ±5%, 50V
079-0081	21-11032B15	.22 uF. +80 -20, 50V	C0373	21-13740B72	910 pF, ±5%, 50V
1082 1083	23-13749C39	10 uF, ±10%, 20V	C0374	21-13740B32	20 pF, ±5%, 50V
084	23-11048B13 21-13741B69	10 uF. ±20%, 16V .01 uF. ±5%, 50V	C0376 C0377,0378	21-13740B38 21-11032B15	36 pF, ±5%, 50V .22 uF, +80 –20, 50V
085	23-11048B05	1 uF. ±20%, 50V	C0379	23-11049A09	2.2 uF, ±10%, 20V
086,0087	21-11032B15	.22 uF. +80 -20, 50V	C0380	21-11032B15	.22 uF, +80 -20, 50V
1088 1089	21-13741B29 21-11032B15	.0022 uF. ±5%, 50V .22 uF. +80 –20, 50V	diode		
090	21-13741B29	.0022 uF. ±5%, 50V	CR001	48-80236E16	quad SCHOTTKY
091-0093	21-11032B15	.22 uF. +80 -20, 50V	CR002 CR051	48-80154K03 48-05129M76	quad SCHOTTKY silicon SOT
094 095	21-13740B05 21-11032B15	1.5 pF, ±.25 pF, 50V	CR101,0102	48-05129M76	silicon SOT
096	21-11032B15 21-13740B25	.22 uF, +80 -20, 50V 10 pF, ±5%, 50V	CR151,152	48-80006E10	silicon varactor SOT
101	23-11048B13	10 uF. <u>+</u> 20%, 16V	CR202-205 CR206	48-80006E10 48-80154K03	varactor dual SCHOTTKY
102	08-11051A13	.1 uF, ±5%, 63V	CR209	48-80006E10	varactor
103,0104 105	21-13741B45 23-11048B13	.01 uF. ±5%, 50V 10 uF. ±20%, 16V	CR210-213	48-80991T01	varactor
106	21-13740B47	82 pF, ±5%, 50V	CR214	48-80154K03	dual SCHOTTKY
107,0108	21-13741B69	.01 uF, ±5%, 50V	CR351	48-80939T01	SCHOTTKY
1109 1110	08-11051A13 08-11051A19	.1 uF, ±5%, 63V	filter FL051	91-80097D05	6-element, 455 kHz
111	08-11051A08	1.0 uF, ±5%, 63V .015 uF, ±5%, 63V	FL052	91–80098D05	3-element, 455 kHz
112	08-11051A05	.0047 uF, ±5%, 63V	connector, recept		
113,0114 115	21-13740B57	220 pF, ±5%, 50V	J0004,0005	09-80135M01	2-pin, coax
115 116,0117	21-13741B69 21-11032B15	.01 uF, ±5%, 50V .22 uF, +80 –20, 50V	J0006	09-80130M03	14-pin, socket
118	21-13740B29	15 pF, ±5%, 50V	coil		
119	21-11032B15	.22 uF, +80 -20, 50V	L0001-0008	24-80148M21	147 uH, 9.5 turns
122 123	23-13749C39 21-13740B59	10 uF, ±10%, 20V	L0009 L0051	24-80063M31 24-80063M07	47 uH .33 uH
124	08-11051A13	270 pF, ±5%, 50V .1, ±5%, 63V	L0052,0053	24-80063M19	3.3 uH
125	21-13741B69	.01 uF, ±5%, 50V	L0054	24-80063M31	47 uH
127	23-11048B13	10 uF, ±20%, 16V	L0055-0058 L0059,0060	24-80164M01 24-80063M23	.7 uH, 1:6 turns 6.8 uH
128 129	21-13740B78 23-11048B06	180 uF, ±5%, 50V 2.2 uF, ±20%, 50V	L0059,0000 L0061,0062	24-80063M31	47 uH
130	23-11048B13	10 uF, ±20%, 16V	L0063	24-80063M24	8.2 uH
131	21-11032B15	.22 uF, +80 -20, 50V	L0064	25-80000E01	transformer, 455 KHz
132 133	08-11051A17	.47 uF, ±5%, 63V	L0065,0066 L0101	24-80063M31 24-80063M24	47 uH 8.2 uH
134	23-11048B13 21-11032B15	10 uF, ±20%, 16V .22 uF, +80 -20, 50V	L0102	24-80063M24 24-80063M10	.56 uH
151	21-13740B73	1000 pF, ±5%, 50V	L0151	24-80299D01	17.75 turns
152	21-13740B45	68 pF, ±5%, 50V	L0152	24-80063M22	5.6 uH
153 155,0156	21-13740B25 21-13740B55	10 pF, ±5%, 50V	L0202 L0203	24-80931W26 24-80063M23	44 uH, 13.5 turns 6.8 uH
155,0156	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V	L0204	24-80063M12	.82 uH
159	21-13740B29	15 pF, ±5%, 50V	L0205-0207	24-80063M23	6.8 uH
160	21-13740B41	47 pF, ±5%, 50V	L0209	24-80063M23	6.8 uH
161 163	21-11032B15 08-11051A15	.22 uF, +80 -20, 50V	L0210 L0211	24-80063M10 24-80063M23	.82 uH 6.8 uH
165	21–11032B15	.22 uF, ±5%, 63V .22, +80 –20, 50V	L0212	24-80063M25	.27 uH
176	21-13740B73	1000 pF, ±5%, 50V	L0213	24-80931W26	44 uH, 13.5 turns
201	23-11048B13 21-13740B73	10 uF, ±20%, 16V 1000 pF, ±5%, 50V	L0214 L0215	24-80063M24 24-80063M12	8.2 uH .82 uH
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REFERENCE	MOTOROLA	DESCRIPTION	
SYMBOL	PART NO.	DESCRIPTION	
L0220	24-80063M24	8.2 uH	
L0221 L0222	24-80063M10 24-80063M24	5.6 uH 8.2 uH	
L0352,0353	24-80164M01	1:6 turns	
L0354-0356	24-80063M31	47 uH	
L0357 L0358	24-80164M01 24-80063M27	.7 uH, 1:6 turns 22 uH	
transistor	24-00003WIZ7	22 011	
Q0001	48-80182D44	NPN	
Q0002-0004	48-11043C06	PNP	
Q0051	48-80182D44	NPN	
Q0052-0054 Q0055	48-11043C12 48-80214G02	n-Channel NPN	
Q0056	48-11043C12	n-Channel	
Q0101	48-05128M16	PNP	
Q0102,0103 Q0104	48-80214G02 48-05128M16	NPN PNP	
Q0105	48-80214G02	NPN	
Q0107	48-80182D44	NPN	
Q0151 Q0152	48-80182D44 48-05128M16	NPN PNP	
Q0203	48-80141L06	n-channel MOS FET	
Q0204-0205	48-80182D44	NPN	
Q0206	48-80141L06	N-channel MOS FET	
Q0207,0208 Q0276	48-80182D44 48-80214G02	NPN NPN	
Q0277-0279	48-05128M16	PNP	
Q0351	48-80930W01	dual gate FET	
Q0352-0354 Q0355	48-80214G02 48-05128M16	NPN PNP	
Q0356	48-80214G02	NPN	
Q0358,0359	48-05128M16	PNP	
Q0360	48-80214G02	NPN	
resistor, fixed ohr R0002	n, ±5%, 1/8 watt (unles 06-11077A29	s otherwise stated) 13	
R0003	06-11077A68	560	
R0004	06-11077A84	2.7k	
R0005 R0006	06-11077A56	180	
R0007	06-11077A98 06-11077A94	10k 6.8k	
R0008	06-11077A90	4.7k	
R0009	06-11077A98	10k	
H0051 R0052,0053	06-11077A43 06-11077A86	51 3.3k	
R0054	06-11077A74	1k	
R0055	06-11077A30	15	
R0056 R0057	06-11077A46 06-11077A86	68 3.3k	
R0058	06-11077A93	6.2k	
R0060	06-11077A50	100	
R0063 R0065	06-11077A26	10	
R0066	06-11077A54 06-11077B45	150 820k	
R0068	06-11077B23	100k	
R0069 R0070	06-11077B27 18-05500L08	150k	
R0071	06-11077B11	22k, <u>+</u> 20%, 100V 33k	
R0072	06-11077B09	27k	
R0073	06-11077B21	82k	
R0074 R0075	06-11077A66 06-11077A42	470 47	
R0076	06-11077A50	100	
R0077	06-11077A88	3.9k	
R0102 R0103.0104	06-11077A62 06-11077A98	330 10k	
R0105	06-11077B11	33k	
R0106	06-11077B15	47k	
R0107 R0108	06-11077A98 06-11077A90	10k 4.7k	
R0109	06-11077A90	10	
R0110	06-11077B03	15k	
R0111	06-11077A70 06-11077A84	680	
R0112 R0113	06-11077A64 06-11077A72	2.7k 820	
R0114,0115	06-11077A70	680	
R0116	06-11077A92	5.6k	
R0118 R0119	06-11077A70 06-11077A86	680 3.3k	
R0120,0121	06-11077A88	3.9k	
R0122	06-11077A43	51	
R0123 R0124	06-11077A34 06-11077A86	22 3.3k	
R0125	06-11077A70	680	
R0126	06-11077A50	100	
R0129 R0130	06-11077A58 06-11077A82	220 2.2k	
R0131	06-11077B11	2.2k 33k	
R0132,0133	06-11077A90	4.7k	
R0134,0135	06-11077A74	1k	
R0136 R0151	06-11077A50 06-11077B15	100 47k	
R0152	06-11077B11	33k	
R0153	06-11077B23	100k	
R0154 R0155	06-11077A34	22 10k	
R0156	06-11077A98 06-11077B03	10k 15k	
R0157	06-11077A78	1.5k	
	06-11077A98	10k	
R0160,161 R0165	06-11077B32	240k	

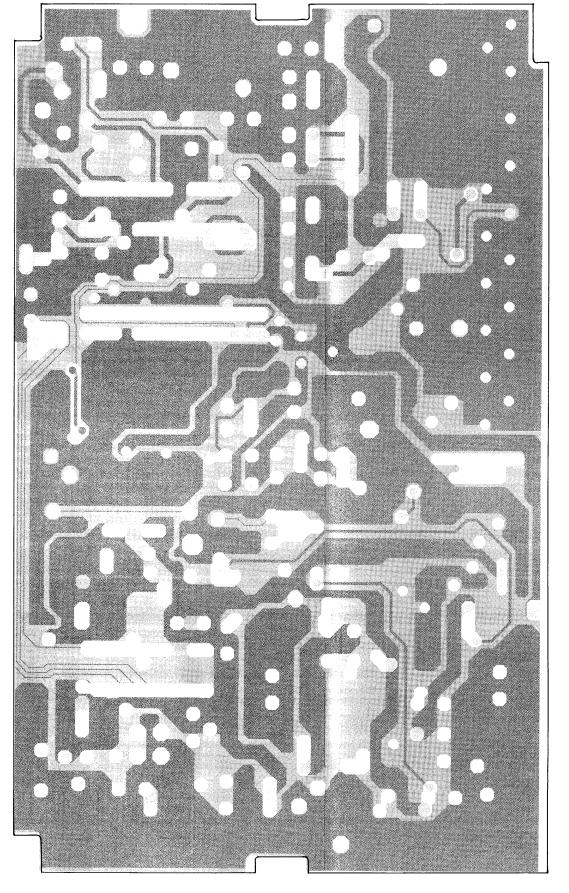
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R0168	18-05500L08	22k, ±20%, 100V
R0169 R0170	06-11077B17 06-11077B40	56k 510k
R0171	06-11077B19	68k
R0172	06-11077B08	24k
R0176	06-11077G26	22.6k, ±1%
R0177 R0178,0179	06-11077G18 06-11077F91	18.7k, ±1% 10k, ±1%
R0180	06-11077G52	42.2k, ±1%
R0181	06-11077F91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

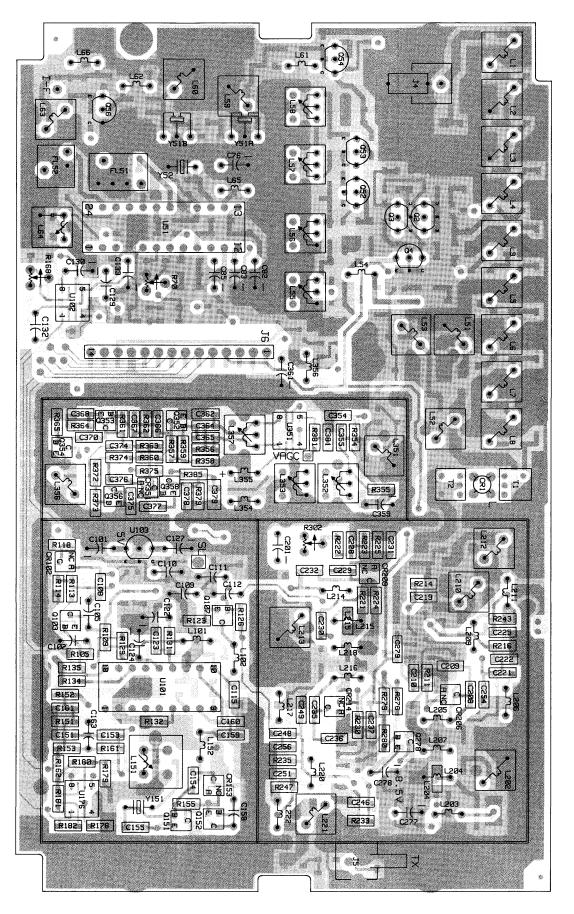
MXW--6910-A (4)

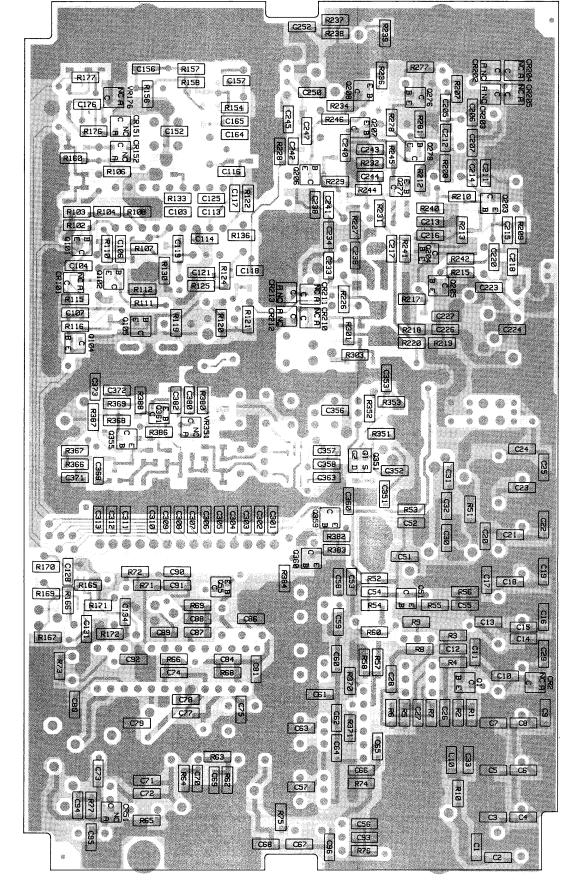
		MXW-6910-A (5
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
crystal		
Y0051	91-80172D01	filter
Y0052	48-80908W01	10.245 MHz
Y0151	48-80174D05	14.4 MHz
	non-refe	erenced items
	26-80098M01	shield, coil can (11 used)
	26-80228L01	shield, coax connector (2 used)
	26-80916V01	shield, RF Low Band
	75-05295B02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

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

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







 INNER LAYER 1
 RED
 GAW-7688-0

 INNER LAYER 2
 GREY
 GAW-7689-0

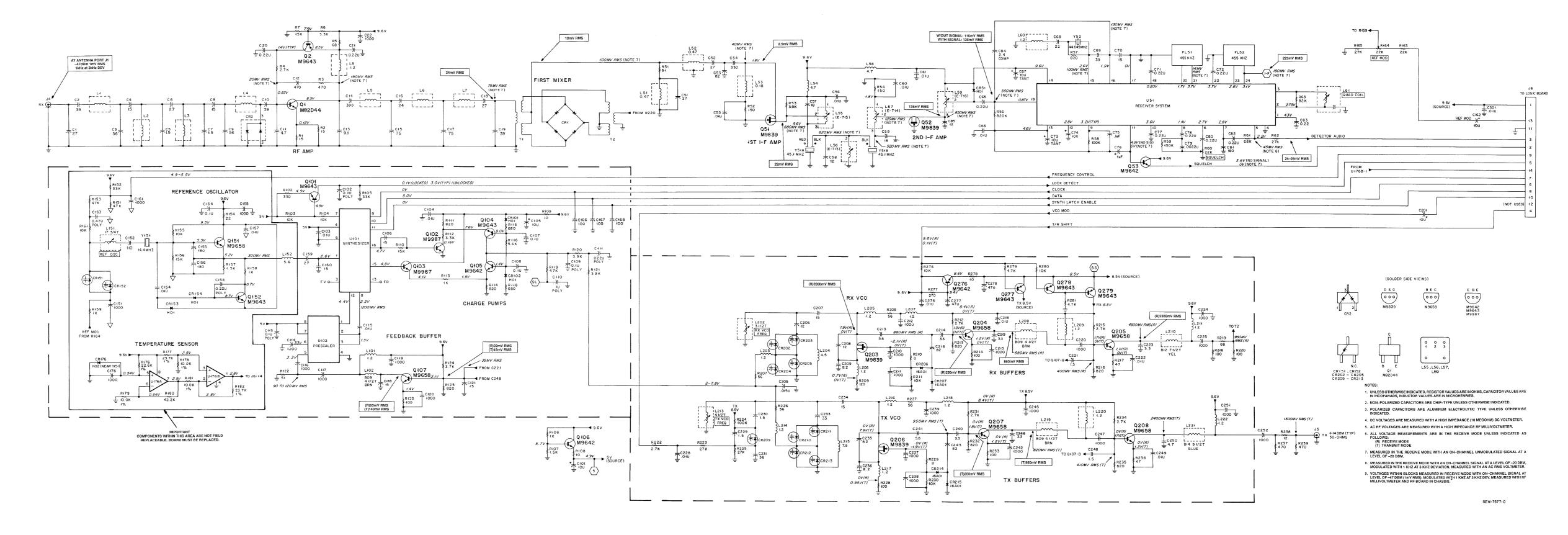
 OVERLAY
 BLACK
 GDW-7690-0

SOLDER SIDE RED
COMPONENT SIDE GREY
OVERLAYS BLACK

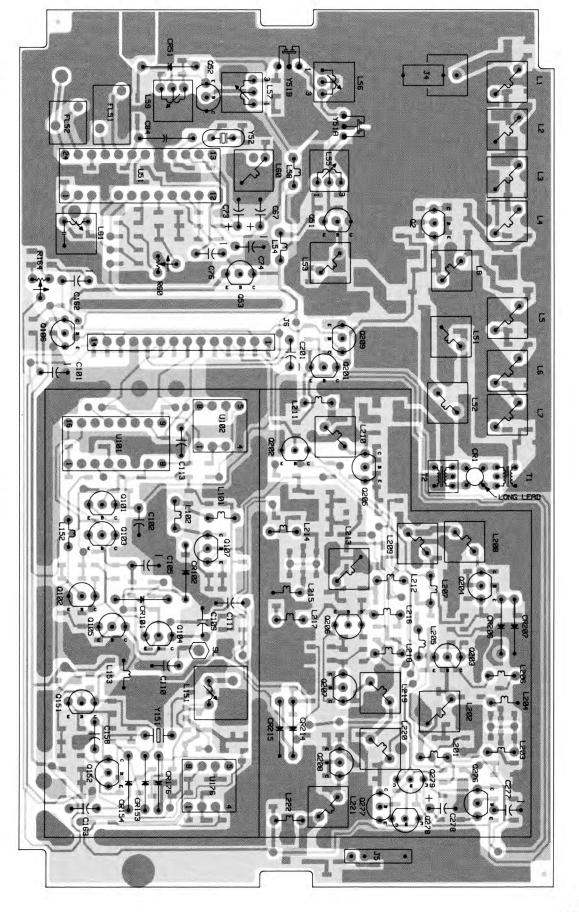
D GAW-7685-O
EY GAW-7686-O
CK GDW-7687-O

VHF RF Board Transistor D.C. Voltage Table

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



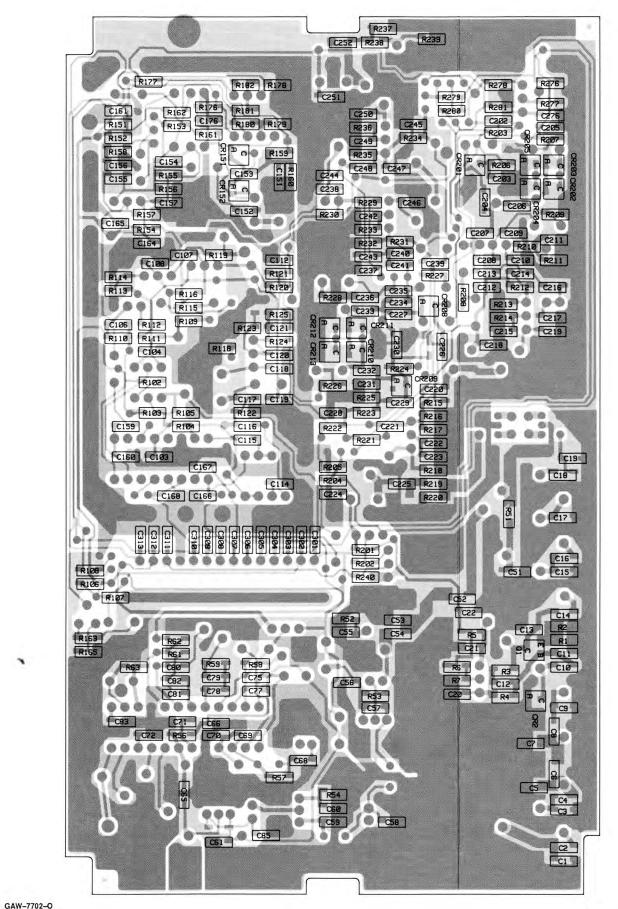
Schematic, Circuit Board Diagrams, and Parts List for HLD4322B VHF RF Board PW-7576-O (Sheet 1 of 3) 3/31/90



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

3/31/90

SOLDER SIDE VIEW



SOLDER SIDE

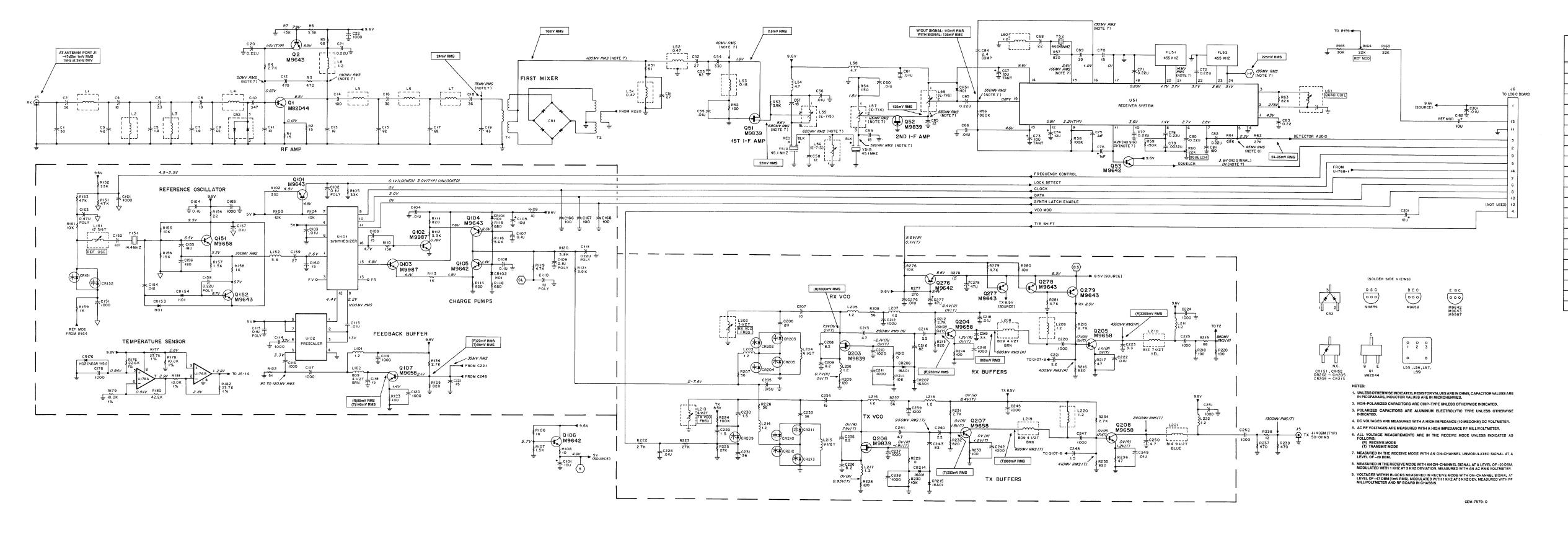
OVERLAYS

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

REFERENCE	MOTOROLA		REFERENCE	MOTOROLA		DEFEDENCE	MOTOROL A	WXV-7404-0 (
SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (un	less otherwise stated)		C0218	21-13741845	.01 uF, ±5%, 50V	R0053	06-11077A88	3.9k
C0001	21-13740B35	27 pF, ±5%, 50V	C0219	21-13740B13	3.3 pF, ±5%, 50V	Q0104	48-00869643	PNP
C0002 C0003	21-13740B39 21-13740B43	39 pF, ±5%, 50V 56 pF, ±5%, 50V	C0220 C0221	21-13740B73 21-13740B05	.001 uF, ±5%, 50V 1.5 pF, ±5%, 50V	Q0105,0106 Q0107	48-00869642 48-0086 9 658	NPN NPN
C0004	21-13740B43 21-13740B29	15 pF, +5%, 50V	C0222	21-13741B45	.01 uF, ±5%, 50V	Q0151	48-00869658	NPN
C0005	21-13740B05	1.5 pF, ±5%, 50V	C0223	21-13740B13	3.3 pF, ±5%, 50V	Q0152	48-00869643	PNP
C0006 C0007	21-13740B11 21-13740B05	2.7 pF, ±5%, 50V 1.5 pF, ±5%, 50V	C0224,0225 C0228	21-13740B73 21-13741B45	.001 uF, ±5%, 50V .01 uF, ±5%, 50V	Q0203 Q0204,0205	48-00869839 48-00869658	N–channel NPN
C0007	21–13740B03	1.5 pF, ±5%, 50V	C0229,0230	21-13741B45	1.5 pF, ±5%, 50V	Q0204,0203 Q0206	48-00869839	NPN
C0009	21-13740B43	56 pF, ±5%, 50V	C0231	21-13740B38	36 pF, ±5%, 50V	Q0207,0208	48-00869658	NPN
C0010 C0011	21-13740B39 21-13740B17	39 pF, ±5%, 50V	C0233 C0234	21-13740B37 21-13740B29	33 pF, ±5%, 50V 15 pF, ±5%, 50V	Q0276 Q0277–0279	48-00869642 48-00869643	NPN PNP
C0011	21-13740B17	4.7 pF, ±5%, 50V 470 pF, +5%, 50V	C0235,0236	21-13740B23	8.2 pF, ±5%, 50V		m, ±5%, 1/8 watt (unle	
C0013	21-13740B24	9.1 pF, ±5%, 50V	C0237-0239	21-13740B73	.001 uF, ±5%, 50V	R0001,0002	06-11077A30	15
C0014 C0015	21-13740B63 21-13740B46	390 pF, ±5%, 50V 75 pF, ±5%, 50V	C0240 C0241	21-13740B13 21-13740B19	3.3 pF, ±5%, 50V 5.6 pF, ±5%, 50V	R0003	06-11077A66	470
C0015	21-13740B40 21-13740B34	24 pF, ±5%, 50V	C0242	21-13740B73	.001 uF, ±5%, 50V	R0004	06-11077A84	2.7k
C0017	21-13740B46	75 pF, ±5%, 50V	C0243	21-13740B47	82 pF, ±5%, 50V	R0005 R0006	06-11077A46 06-11077A86	68 3.3k
C0018 C0019	21-13740B35 21-13740B39	27 pF, ±5%, 50V	C0245 C0246	21-13740B73 21-13740B13	.001 uF, ±5%, 50V 3.3 pF, ±5%, 50V	R0007	06-11077B03	15k
C0019 C0020,0021	21-11032B15	39 pF, ±5%, 50V .22 uF, +80,20%, 50V	C0240 C0247	21-13740B73	.001 uF, ±5%, 50V	R0051	06-11077A43	51
C0022	21-13740B73	.001 uF, ±5%, 50V	C0248	21-13740B05	1.5 pF, ±5%, 50V	R0052 R0054	06-11077A54 06-11077A54	150 150
C0051,0052	21-13740B35	27 pF, ±5%, 50V	C0249 C0250	21-13741B45 21-13740B17	.01 uF, ±5%, 50V	R0056	06-11077B45	820k
C0053 C0054	21-13740B47 21-13740B61	82 pF, ±5%, 50V 330 pF, ±5%, 50V	C0250 C0251,0252	21-13740B77 21-13740B73	4.7 pF, ±5%, 50V .001 uF, ±5%, 50V	R0057	06-11077A72	820
C0055,0056	21-13741B45	.01 uF, ±5%, 50V	C0253	21-13740B29	15 pF, ±5%, 50V	R0058 R0059	06-11077B31 06-11077B27	220k 150k
C0057	21-13740B31	18 pF, ±5%, 50V	C0276	21-13741B45	.01 uF, ±5%, 50V	R0060	18-05500L08	22k, +20%, potentiometer
C0058 C0059	21-13740B27 21-13740B31	12 pF, ±5%, 50V 18 pF, ±5%, 50V	C0277,0278 C0301	23-11048B19 21-13741B45	47 uF, ±20%, 16V, electrolytic .01 uF, +5%, 50V	R0061	06-11077B19	68k
C0060,0061	21-13741B45	.01 uF, ±5%, 50V	diode (see note)	21 10711210	10 t d. 1 ±0 /0, 00 t	R0062 R0063	06-11077B09 06-11077B21	27k 82k
C0065	21-11032B15	.22 uF, +80, -20%, 50V	CR0001	48-80236E16	Schottky	R0102	06-11077A62	330
C0066 C0067	21-13741B45 23-13749C39	.01 uF, ±5%, 50V 10 uF, ±10%, 50V, tantalum	CR002	48-80154K03	Schottky	R0103,0104	0611077A98	10k
C0067	21-13749B33	22 pF, ±5%, 50V	CR0051 CR0101.0102	48-83654H01 48-83654H01	silicon silicon	R0105	06-11077B11	33k 1k
C0069	21-13740B39	39 pF, ±5%, 50V	CR0151,0152	48-80006E10	silicon	R0106 R0107	06-11077A74 06-11077A78	1.5k
C0070 C0071,0072	21-13740B29 21-11032B15	15 pF, ±5%, 50V .22 uF, +80, -20%, 50V	CR0153,0154	48-83654H01	silicon	R0108,0109	06-11077A26	10
C0071,0072	23–13749C39	10 uF, ±10%, 50V, tantalum	CR0176 CR0202-0205	48-83654H02 48-80006E10	silicon silicon	R0110	06-11077B03 06-11077A72	15k
C0074	23-11048B13	10 uF, ±20%, 16V, electrolytic	CR0206,0207	48-84616A01	hot carrier	R0111 R0112	06-11077A86	820 3.3k
C0075 C0076	21-13741B69 23-11048B05	.1 uF, ±5%, 50V	CR0209-0213	48-80006E10	silicon	R0113	06-11077A74	1k
C0076 C0077,0078	21-11032B15	1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V	CR0214,0215	48-84616A01	hot carrier	R0114	06-11077A72	820
C0079	21-13741B29	.0022 uF, ±5%, 50V	filter	04 00007000	0 -1	R0115 R0116	0611077A70 0611077A92	680 5.6k
C0080 C0081	21-11032B15 21-13740B55	.22 uF, +80, -20%, 50V 180 pF, +5%, 50V	FL0051 FL0052	91–80097D06 91–80098D06	6 element, ceramic 3 wire, ceramic	R0118	06-11077A70	680
C0081 C0082,0083	21-11032B15	.22 uF, +80, -20%, 50V	connector receptac		5	R0119	06-11077A90	4.7k
C0084	21-82450B14	2.4 pF, ±5%, 500V	J0004,0005	09-80135M01	2 pin coax	R0120,0121 R0122	06-11077A88 06-11077A43	3.9k 51
C0085 C0101	21-13740B27 23-11048B13	12 pF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic	J0006	09-80130M03	14 position socket	R0123	06-11077A50	100
C0101	08-11051A13	.1 uF, ±5%, 63V	RF coil			R0124	06-11077 A84	2.7k
C0103,0104	21-13741B45	.01 uF, ±5%, 50V	L0001-0007 L0008	24-80148M06 24-80063M14	82 nH, 4.5 turns 1.2 uH	R0125 R0151	06-11077A72 06-11077B15	820 47k
C0105 C0106	23-11048B13 21-13740B29	10 uF, \pm 20%, 16V, electrolytic 15 pF, \pm 5%, 50V	L0051,0052	24-80063M14 24-80063M09	.47 uH	R0152	06-11077B11	33k
C0107,0108	21-13741B69	.1 uF, ±5%, 50V	L0053	24-80063M04	.18 uH	R0153	0611077B15 0611077A34	47k 22
C0109	08-11051A13	.1 uF, ±5%, 63V	L0054 L0055	24-80063M21 24-80164M02	4.7 uH 1.8 turns, variable	R0154 R0155	06-11077A98	10k
C0110 C0111	08-11051A19 08-11051A09	1 uF, ±5%, 63V .022 uF, ±5%, 63V	L0056	24-80164M01	1:6 ratio, variable	R0156	06-11077B03	15k
C0113	08-11051A09	.1 uF, ±5%, 63V	L0057	24-80164M04	5.2 turns, variable	R0157	06-11077A78	1.5k
C0114	21-13740B73	.001 uF, ±5%, 50V	L0058 L0059	24-80063M21 24-80164M03	4.7 uH 4.3 turns, variable	R0158,0159 R0161	06-11077A74 06-11077A98	1k 10k
C0115 C0116,0117	21-13741B45 21-13740B73	.01 uF, ±5%, 50V .001 uF, +5%, 50V	L0060	24-80063M14	1.2 uH	R0163	06-11077B07	22k
C0118,0117	21–13740B29	15 pF, ±5%, 50V	L0061	25-80000E01	transmformer	R0164 R0165	18-05500L08 06-11077B09	22k, ±20%, potentiometer
C0119,0120	21-13740B73	.001 uF, ±5%, 50V	L0101 L0102	24-80063M14 24-11030B09	1.2 uH 4.5 turns, brown	R0176	06-11077B09 06-11077G26	27k 22.6k, ±1%
C0121 C0151	21-13740B29 21-13740B73	15 pF, ±5%, 50V .001 uF, ±5%, 50V	L0151	24-80299D01	17.75 turns, orange	R0177	06-11077G28	23.7k, ±1%
C0152	21-13740B50	110 pE. +5%, 50V	L0152	24-80063M22	5.6 uH	R0178,0179 R0180	06-11077F91 06-11077G52	10k, ±1%
C0154	21-13741B45	.01 uF, ±5%, 50V	L0202 L0203	24-80148M05 24-80063M14	62 nH, 3.5 turns 1.2 uH	R0181	06-11077G32 06-11077F91	42.2k, ±1% 10k, ±1%
C0155,0156 C0157	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V	L0204	24-11030B08	4.5 turns, brown	R0182	06-11077G28	23.7k, ±1%
C0157	08-11051A15	.22 uF, ±5%, 63V	L0205-0207	24-80063M14	1.2 uH	R0207,0208 R0209	06-11077A44 06-11077A52	56 120
C0159	21-13740B35	27 pF, ±5%, 50V	L0208 L0209	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH	R0210	06-11077A01	0 ohm
C0160 C0161	21-13740B29 21-13740B73	15 pF, ±5%, 50V	L0210	24-11030B12	7.5 turns, yellow	R0211	06-11077A98	10k
C0161 C0162	23-11048B13	.001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic	L0211	24-80063M14	1.2 uH	R0212	06-11077A84	2.7k
C0163	08-11051A17	.47 uF, <u>+</u> 5%, 63V	L0213 L0214	24-80148M08 24-80063M14	82 nH, 4.5 turns 1.2 uH	R0213 R0214	06-11077A72 06-11077A50	820 100
C0164 C0165	21-13741B69 21-13740B73	.1 uF, ±5%, 50V	L0214 L0215	24-00003N14 24-11030B12	7.5 turns, yellow	R0215	06-11077A84	2.7k
C0166-0168	21-13740B73	.001 uF, ±5%, 50V 100 pF, ±5%, 50V	L0216-0218	24-80063M14	1.2 uH	R0216	06-11077A72	820
C0176	21-13740B73	.001 uF, ±5%, 50V	L0219 L0220	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH	R0217 R0218	06-11077 A4 2 06-11077 A 50	47 100
C0201	23-11048B13	10 uF, ±20%, 16V, electrolytic	L0220 L0221	24-80063M14 24-11030B14	9.5 turns, blue	R0219	06-11077A46	68
C0205 C0206	21-13741B49 21-13740B27	.015 uF, ±5%, 50V 12 pF, ±5%, 50V	L0222	24-80063M14	1.2 uH	R0220	06-11077A50	100
C0207	21-13740B29	15 pF, ±5%, 50V	transistor (see note)		R0222 R0223	06-11077A84 06-11077B09	2.7k 27k
C0208	21-13740B27	12 pF, ±5%, 50V	Q0001	48-80182D44	NPN	R0224	06-11077B23	100k
C0209 C0210212	21-13740B23 21-13740B73	8.2 pF, ±5%, 50V .001 uF, ±5%, 50V	Q0002 Q0051,0052	48-00869643 48-00869839	N–channel NPN	R0225	06-11077B09	27k
C0210-212	21–13740B19	5.6 pF, ±5%, 50V	Q0051,0052 Q0053	48-00869642	NPN	R0226,0227 R0228	06-11077A44 06-11077A50	56 100
C0214	21-13740B13	3.3 pF, ±5%, 50V	Q0101	48-00869643	PNP	R0229	06-11077A30	0 ohm
C0215 C0216	21-13740B73 21-13740B47	.001 uF, ±5%, 50V 82 pF, ±5%, 50V	Q0102,0103	48-80182D20	NPN	R0230	06-11077 A 98	10k
		1						

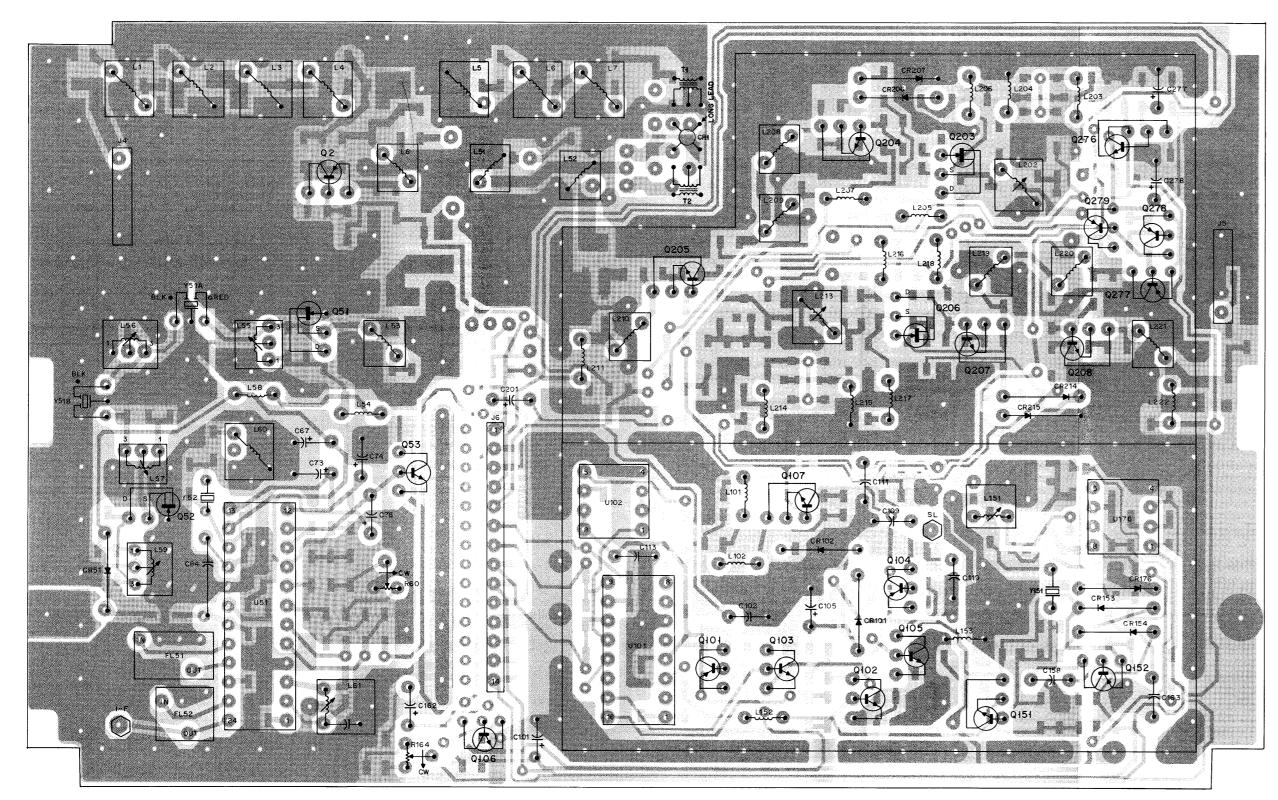
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R0231	06-11077A84	2.7k
R0232	0611077A72	820
R0233	06-11077 A5 0	100
R0234	06-11077A84	2.7k
R0235	06-11077A72	820
R0236	06-11077 A42	47
R0237	06-11077 A 66	470
R0238	0611077 A 28	12
R0239	06-11077 A 66	470
R0241	0611077B23	100k
R0276	06-11077 A 98	10k
R0277	06-11077A60	270
R0278	0611077A26	10
R0279	06-11077A90	4.7k
R0280	06-11077A98	10k
R0281	06-11077A90	4.7k
transformer		
T0001,0002	25-80163M02	500 MHz balance transformer
integrated circuit	ts (see note)	
U0051	51-05479G05	linear
U0101	51-84704M75	synthesizer
U0102	51-84810F66	dual divider
U0176	51-84621K89	dual opamp
crystal (see note)		
Y0051	91-80022M02	45.1 MHz
Y0052	48-80008K02	44.645 MHz
Y0151	48-80174D05	14.4 MHz
	non-refe	erenced parts
	14-05160A01	insulator
M0201-0211	26-80098M01	coil can shield
	26-80097M01	coil can shield
M0004	26-80228L01	coax connector shield
M0005	26-80228L01	coax connector shield
M0002	26-80229L03	VCO shield
M4016	26-80256L02	coax connector bottom shield
	30-10286A72	24 strand wire, white
	54-80111F01	PROM label
	7505295B07	crystal base pad, 2 used
	84-80927T01	circuit board

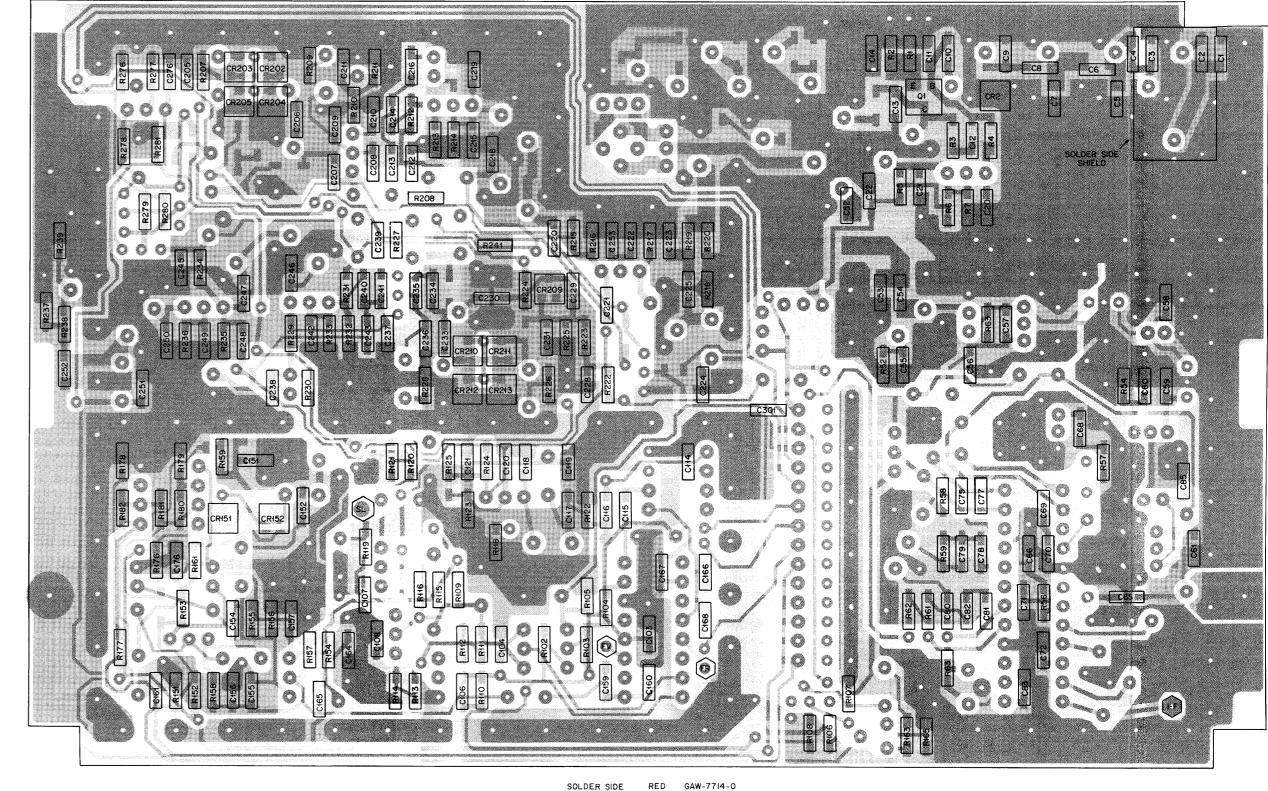
2/28/90 **note:** For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.



VHF RF Board Transistor D.C. Voltage Table

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





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

COMPONENT SIDE VIEW

COMPONENT SIDE GRAY GAW-7715-0

OVERLAY BLACK GDW-7889-0

SOLDER SIDE VIEW

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

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

		MXW-7405-O (2)
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C0234	21-13740B29	15 pF, ±5%, 50V
C0235,0236 C0237–0239	21-13740B23 21-13740B73	8.2 pF, ±5%, 50V .001 uF, ±5%, 50V
C0240	21-13740B09	2.2 pF, ±5%, 50V
C0241	21-13740B17	4.7 pF, ±5%, 50V
C0242 C0243	21-13740B73 21-13740B47	.001 uF, ±5%, 50V 82 pF, ±5%, 50V
C0245	21-13740B73	.001 uF, ±5%, 50V
C0247	21-13740B73 21-13740B05	.001 uF, ±5%, 50V 1.5 pF, ±5%, 50V
C0248 C0249	21–13741B45	.01 uF, ±5%, 50V
C0250	21-13740B17	4.7 pF, ±5%, 50V
C0251,0252 C0276	21-13740B73 21-13741B45	.001 uF, ±5%, 50V .01 uF, ±5%, 50V
C0277,0278 C0301	23–11048B19 21–13741B45	47 uF, ±20%, 16V, electrolytic .01 uF, ±5%, 50V
diode (see note)		
CR0001	48-80236E16 48-80154K03	Schottky Schottky
CR002 CR0051	48-83654H01	silicon
CR0101,0102	48-83654H01	silicon
CR0151,0152	48-80006E10	silicon silicon
CR0153,0154 CR0176	48-83654H01 48-83654H02	silicon
CR0202-0205	48-05129M21	silicon
CR0206,0207	48-84616A01	hot carrier
CR0209-0213 CR0214,0215	48-05129M21 48-84616A01	silicon hot carrier
filter FL0051	91-80097D06	6 element, ceramic
FL0052 connector receptacle	91–80098D06	3 wire, ceramic
J0004,0005	09-80135M01	2 pin coax
J0006	09-80130M03	14 position socket
RF coil	0.4.004.404.400	00 -11 45 5
L0001-0007 L0008	24-80148M06 24-80063M14	82 nH, 4.5 turns 1.2 uH
L0051,0052	24-80063M09	.47 uH
L0053	24-80063M04	.18 uH
L0054 L0055	24-80063M21 24-80164M02	4.7 uH 1.8 turns, variable
L0056	24-80164M01	1:6 ratio, variable
L0057	24-80164M04	5.2 turns, variable
L0058 L0059	24-80063M21 24-80164M03	4.7 uH 4.3 turns, variable
L0060	24-80164M03	1.2 uH
L0061	25-80000E01	transmformer
L0101	24-80063M14	1.2 uH
L0102 L0151	24-11030B09 24-80299D01	4.5 turns, brown 17.75 turns, orange
L0152	24-80063M22	5.6 uH
L0202	24-80148M05	62 nH, 3.5 turns 1.2 uH
L0203 L0204	2480063M14 2411030B11	6.5 turns, orange
L0205	24-80063M14	1.2 uH
L0206,0207	24-80063M14	1.2 uH
L0208 L0209	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH
L0210	24-11030B12	7.5 turns, yellow
L0211	24-80063M14	1.2 uH
L0213 L0214	24-80148M08 24-80063M14	82 nH, 4.5 turns 1.2 uH
L0214 L0215	24-11030B14	9.5 turns, blue
L0216-0218	24-80063M14	1.2 uH
L0219 L0220	24-11030B09 24-80063M14	4.5 turns, brown 1.2 uH
L0220 L0221	24-11030B14	9.5 turns, blue
L0222	24-80063M14	1.2 uH
transistor (see note)	49 .00100D44	NPN
Q0001 Q0002	48-80182D44 48-00869643	N-channel
Q0051,0052	48-00869839	NPN
Q0053	48-00869642	NPN BNB
Q0101 Q0102,0103	48-00869643 48-80182D20	PNP NPN
Q0102,0103 Q0104	48-00869643	PNP
Q0105,0106	48-00869642	NPN
Q0107 Q0151	48–00869658 48–00869658	NPN NPN
Q0151 Q0152	48-00869643	PNP
Q0203	48-00869839	N-channel
Q0204,0204	48-00869658	NPN Nchannel
Q0206 Q0207,0208	48-00869839 48-00869658	NPN
Q0276 Q0277–0279	48-00869642 48-00869643	NPN PNP
	±5%, 1/8 watt (unless	
R0001,0002	06-11077A30	15
R0003	06-11077A66	470
R0004 R0005	06-11077A84 06-11077A46	2.7k 68
R0006	06-11077A46	3.3k
R0007	06-11077B03	15k
R0051	06-11077A43	51
DOOES		
R0052 R0053	06-11077A54 06-11077A88	150 3.9k

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

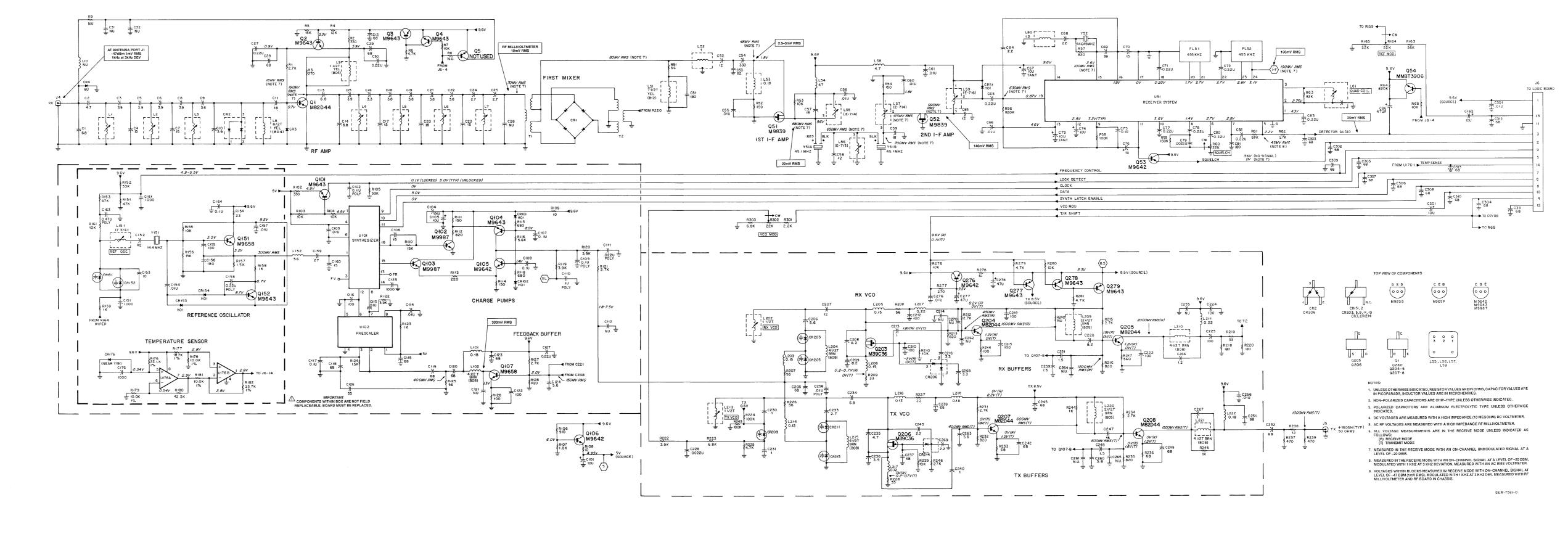
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		
	14-05160A01	insulator		
	26-80098M01 26-80097M01	coil can shield (10 used) coil can shield		
	26-80256L02	coax connector bottom shield		
	30-10286A72 54-80111F01	24 strand wire, white PROM label		
	75–05295B07	crystal base pad, 2 used		
	84-80232L01	circuit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

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

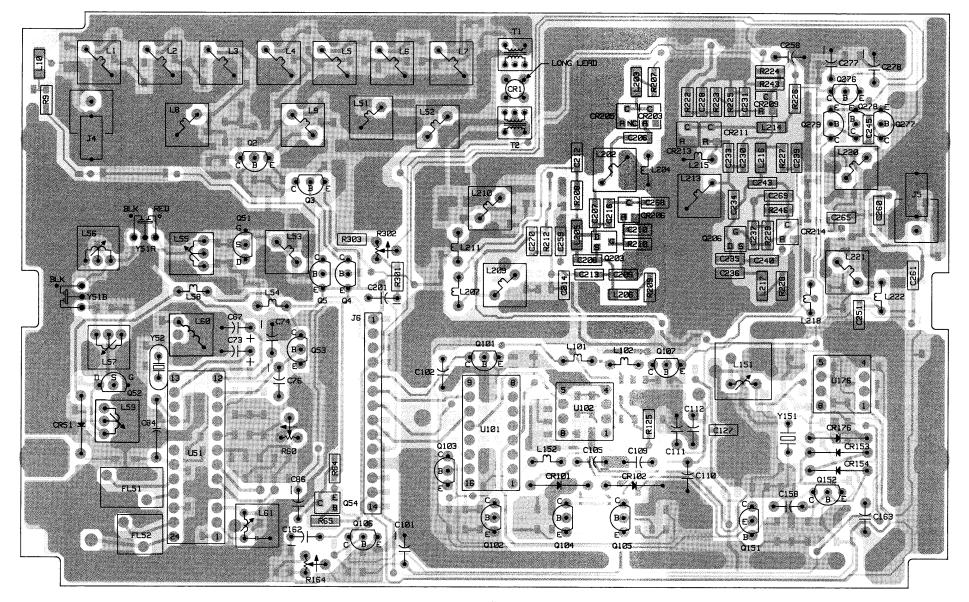
Schematic, Circuit Board Diagrams, and Parts List for HLD4321B VHF RF Board **PW-7578-O** (Sheet 3 of 3) 3/31/90

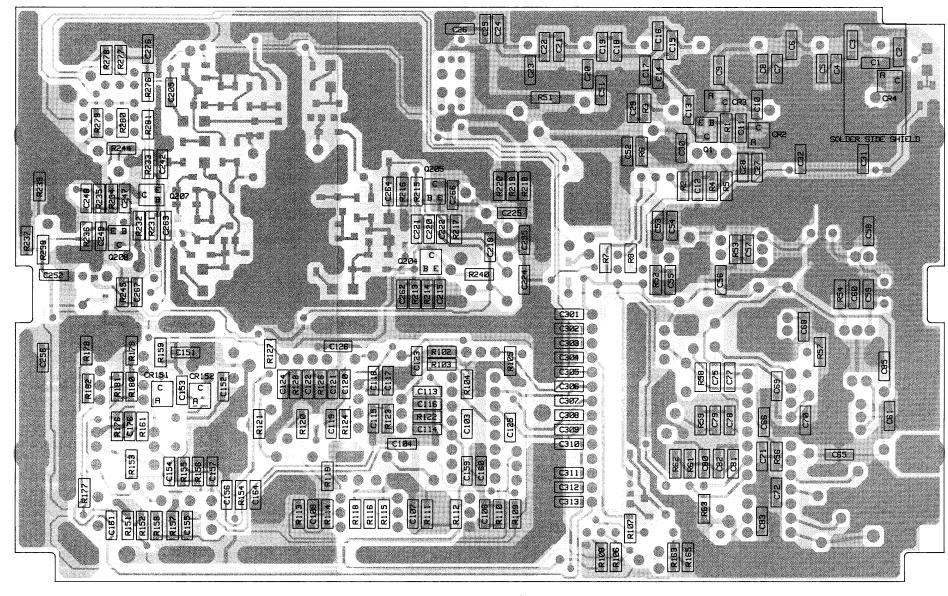
MaxTrac UHF RF Board Transistor D.C. Voltage Table

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



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





SOLDER SIDE
GCW-7617-O

COMPONENT SIDE
OVERLAY
GCW-7619-O

SOLDER SIDE VIEW

COMPONENT SIDE VIEW

parts list

HLE9310A UHF RF Board MXW-7406-O

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

21-13740B49

100 pF, ±5%, 50V

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

24-11030B08 24-80989T01

L216,217

4.5 turns, brown

120 nH. +20%

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

not used

2.7k

06-11077A84

06-11077A72

06-11077A50

06-11077A72

06-11077A56

06-11077A56

R213

R215

R216

R217

R218

R220

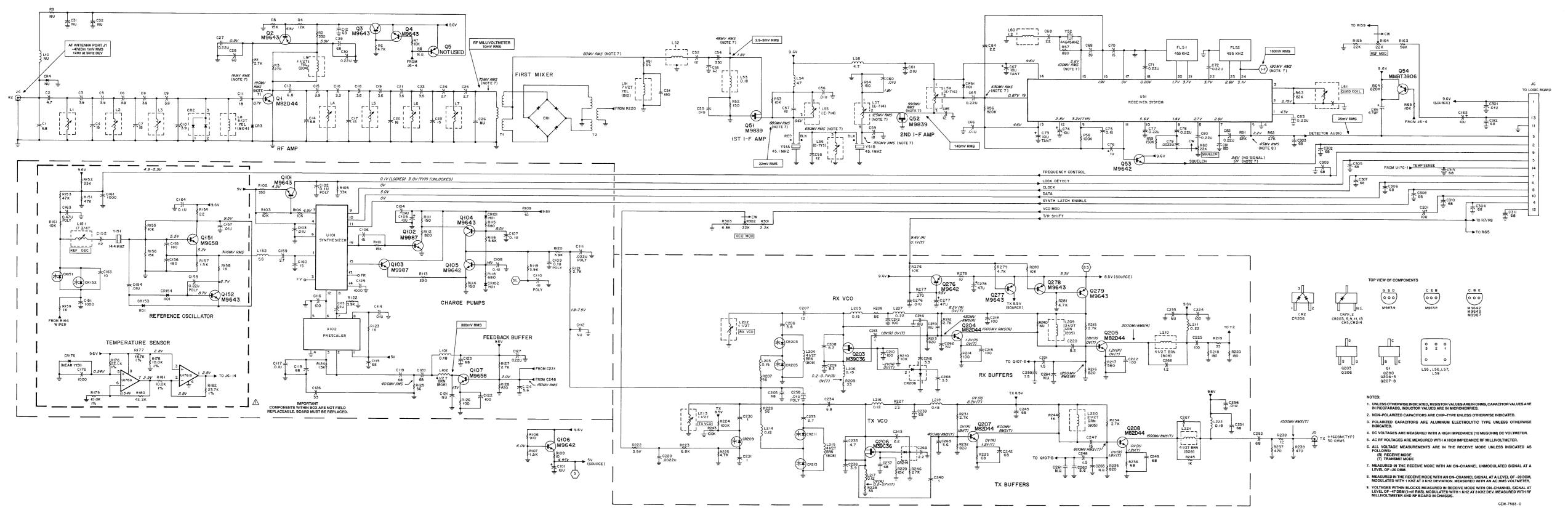
R214

MXW-7406-O (4)

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

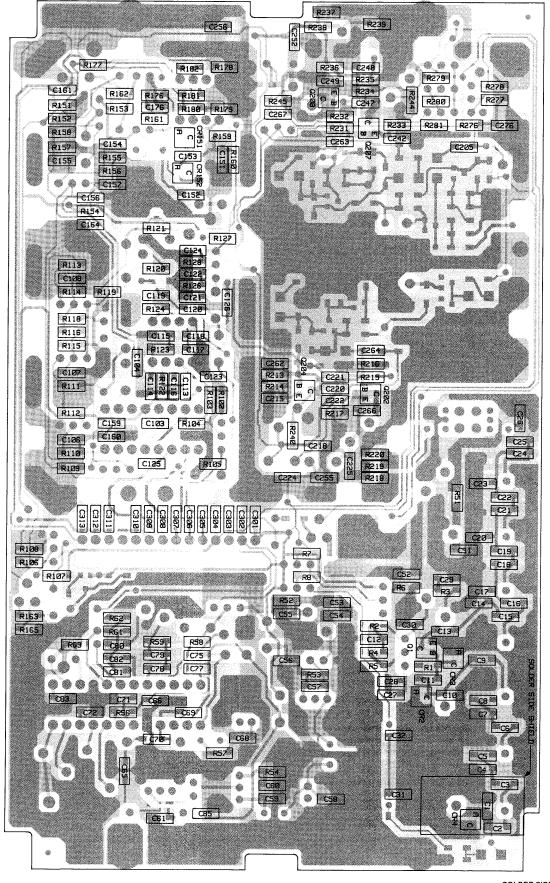
2/28/90 note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

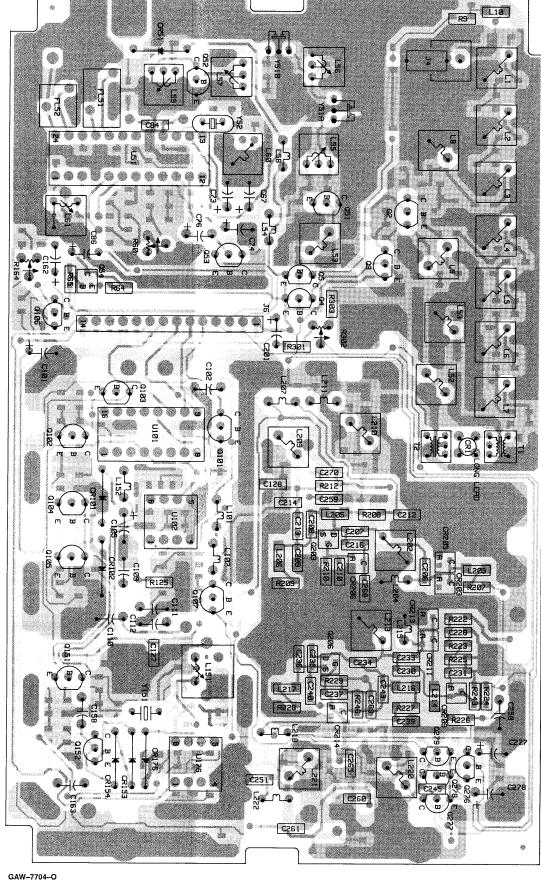
Schematic, Circuit Board Diagrams, and Parts List for HLE9310A UHF RF Board PW-7580-O (Sheet 3 of 3) 3/31/90



UHF RF Board Transistor D.C. Voltage Table

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





SOLDER SIDE VIEW

SOLDER SIDE

OVERLAYS BLACK GDW-7706-O

COMPONENT SIDE VIEW

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

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed (unless otherwise stated	6.8 pF, ±5%, 50V
C2	21-13740B17	4.7 pF, ±5%, 50V
C3 C4	21-13740B15 21-13740B29	3.9 pF, ±5%, 50V 15 pF, ±5%, 50V
C5,6	21-13740B15	3.9 pF, ±5%, 50V
C7 C8	21-13740B29 21-13740B15	15 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C9	21-13740B14	3.6 pF, ±5%, 50V
C10 C11	21-13740B15 21-13740B31	3.9 pF, ±5%, 50V 18 pF, ±5%, 50V
C12	21-13740B45	68 pF, <u>+</u> 5%, 50V
C13,14 C15	21-13740B21 21-13740B15	6.8 pF, ±5%, 50V 3.9 pF, ±5%, 50V
C16 C17	21-13740B13 21-13740B29	3.3 pF, ±5%, 50V
C18,19	21–13740B14	15 pF, ±5%, 50V 3.6 pF, ±5%, 50V
C20 C21,22	21-13740B30 21-13740B14	16 pF, ±5%, 50V 3.6 pF, ±5%, 50V
C23	21-13740B29	15 pF, ±5%, 50V
C24,25 C27	21-13740B11 21-11032B15	2.7 pF, ±5%, 50V .22 uF, +80, -20%, 50V
C28,29	21-13740B45	68 pF, ±5%, 50V
C30 C51	21-11032B15 21-13740B55	.22 uF, +80, -20%, 50V 180 pF, ±5%, 50V
C52	21-13740B27	12 pF, <u>+</u> 5%, 50V
C53 C54	21-13740B47 21-13740B61	82 pF, ±5%, 50V 330 pF, ±5%, 50V
C55,56 C57	21-13741B45 21-13740B31	.01 uF, ±5%, 50V
C58	21–13740B31	18 pF, ±5%, 50V 12 pF, ±5%, 50V
C59 C60,61	21-13740B31 21-13741B45	18 pF, ±5%, 50V .01 uF, ±5%, 50V
C65	21-11032B15	.22 uF, +80, -20%, 50V
C66 C67	21-13741B45 23-13749C39	.01 uF, ±5%, 50V 10 uF, ±10%, 50V, tantalum
C68	21-13740B33	22 pF, ±5%, 50V
C69 C70	21-13740B39 21-13740B29	39 pF, ±5%, 50V 15 pF, ±5%, 50V
C71	21-11032B15	.22 uF, +80, -20%, 50V
C72 C73	21-11032B15 23-13749C39	.22 uF, +80, –20%, 50V 10 uF, ±10%, 50V, tantalum
C74 C75	23-11048B13 21-13741B69	10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V
C76	23–11048B05	1 uF, ±20%, 50V, electrolytic
C77,78 C79	21-11032B15 21-13741B29	.22 uF, +80, -20%, 50V .0022 uF, ±5%, 50V
080	21-11032B15	.22 uF, +80, -20%, 50V
C81 C82,83	21-13740B55 21-11032B15	180 pF, ±5%, 50V .22 uF, +80, –20%, 50V
084	21-13740B09	2.2 pF, ±5%, 50V
C85 C86	21–13740B27 23–11048B49	12 pF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic
C101 C102	23-11048B13 08-11051A13	10 uF, ±20%, 16V, electrolytic
C103,104	21-13741B45	.1 uF, ±5%, 63V .01 uF, ±5%, 50V
C105 C106	23-11048B13 21-13740B29	10 uF, ±20%, 16V, electrolytic 15 pF, ±5%, 50V
C107,108	21-13741B69	.1 uF, ±5%, 50V
C109 C110	08-11051A13 08-11051A19	.1 uF, ±5%, 63V 1 uF, ±5%, 63V
C111	08-11051A09	.022 uF, ±5%, 63V
C113-114 C115	21-13741B45 21-13740B45	.01 uF, ±5%, 50V 68 pF,±5%, 50V
C116	21-13740B49	100 pF, ±5%, 50V
C117 C118–120	21–13741B69 21–13740B45	.1 uF, ±5%, 50V 68 pF, ±5%, 50V
C121 C122	21-13740B49	not used 100 pF, ±5%, 50V
C123	21-13740B45	68 pF, ±5%, 50V
C124 C125	21-13740B19 21-13740B73	5.6 pF, ±5%, 50V .001 uF, ±5%, 50V
C126	21-13740B37	33 pF, ±5%, 50V
C127 C151	21–11032B15 21–13740B73	.22 uF, +80, -20%, 50V .001 uF, +5%, 50V
C152	21-13740B47	82 pF, ±5%, 50V
C153 C154	21-13740B25 21-13741B45	10 pF, ±5%, 50V .01 uF, ±5%, 50V
C155,156 C157	21-13740B55 21-13741B45	180 pF, ±5%, 50V .01 uF, ±5%, 50V
C157	08–11051A15	.22 uF, ±5%, 63V
C159 C160	21-13740B35 21-13740B29	27 pF, ±5%, 50V 15 pF, ±5%, 50V
C161	21-13740B73	.001 uF, ±5%, 50V
C162 C163	23-11048B13 08-11051A17	10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V
C164	21–13741B69	.1 uF, ±5%, 50V
C165 C166		not used not used
C167		not used
C168 C176	21-13740B73	not used .001 uF, ±5%, 50V
C201	23-11048B13	10 uF, ±20%, 16V, electrolytic
C205 C206	21-13740B45 21-13740B19	68 pF, ±5%, 50V 5.6 pF, ±5%, 50V
C207 C208,209	21-13740B27	12 pF, ±5%, 50V
C210	21-13740B23 21-13740B49	8.2 pF, ±5%, 50V 100 pF, ±5%, 50V
C211 C212	21-13740B49	not used 100 pF, ±5%, 50V
	2. 10170070	. 13 pr., 1070, 001

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

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

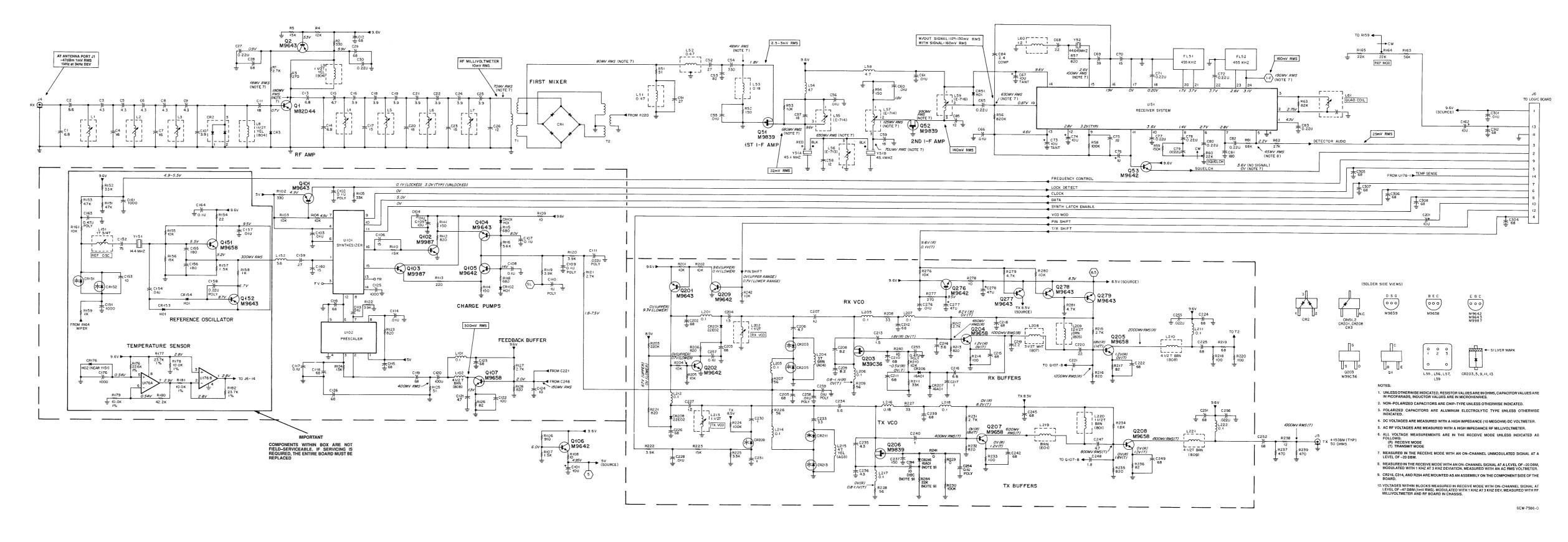
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R222	06-11077A88	3.9k
R223	06-11077A94	6.8k
R224	06-11077B23	100k
R225	06-11077A90	4.7k
R226	06-11077A44	56
R227	06-11077A34	22
R228	06-11077A38	33
R229	06-11077A98	10k
R231	06-11077A84	2.7k
R232	06-11077A72	820
R233	06-11077A46	68
R234	06-11077A84	2.7k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

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

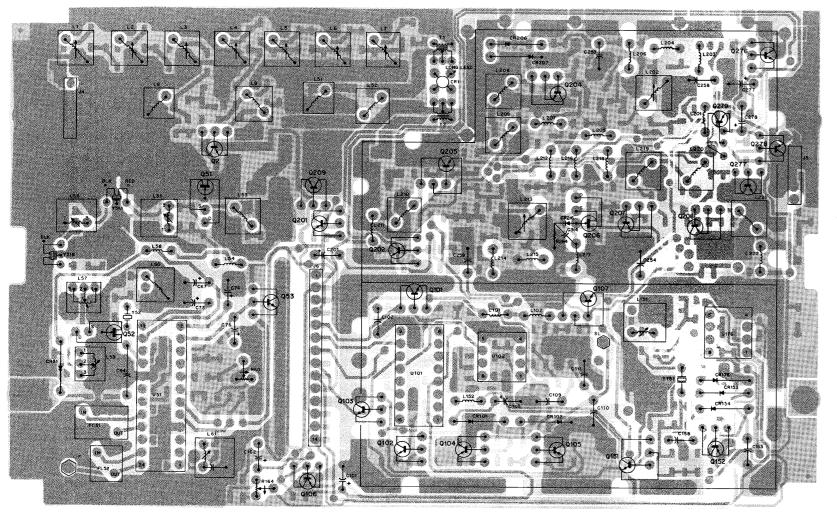
Schematic, Circuit Board Diagrams, and Parts List for HLE9310B UHF RF Board PW-7582-O (Sheet 3 of 3) 3/31/90

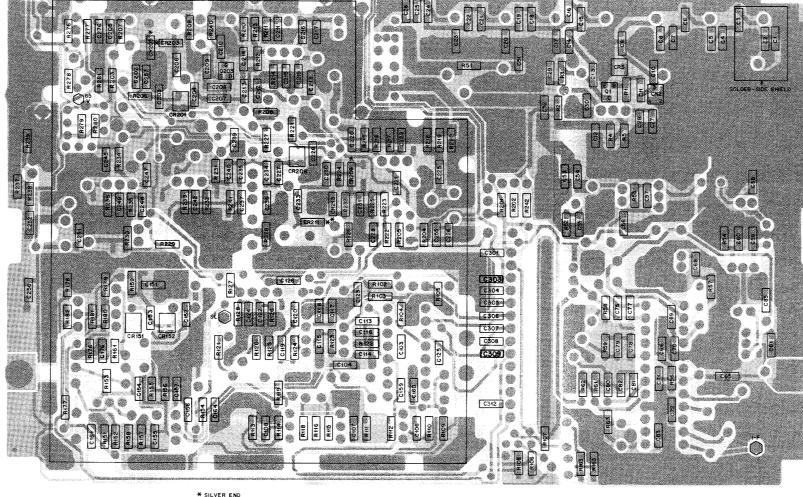
UHF RF Board Transistor D.C. Voltage Table

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



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





COMPONENT SIDE VIEW

SOLDER SIDE OVERLAY

BLACK

SOLDER SIDE RED BLACK GBW-5297-A

SOLDER SIDE VIEW

parts list HLE4425B MaxTrac UHF 25 kHz Range 2 RF Board MXW-7407-O (2) MXW-7407-O (3) MOTOROLA PART NO. DESCRIPTION capacitor, fixed (unless otherwise stated) 21-13740B01 21-13740B45 48-00869643 21-13740B21 48-00869839 48-00869642 21–13740B16 21–13740B30 21–13740B16 21–13740B30 21-13740B45 21-13740B01 21-13741B45 21-13740B01 48-00869643 48-80182D20 48-00869643 48-00869642 48-00869658 C224-226
C227
C228
C230,231
C233
C234
C235,236
C237
C238
C239
C240
C242
C245
C247
C248
C249
C251,252
C253
C254
C255,256
C257
C258,259
C276
C277,278
C302
C303
C304-308
C309
C314 21–13740B13 21–13740B19 21–13740B16 21–13740B53 48-00869658 48-00869643 48-00869643 48-00869642 21-13740B15 21-13740B31 21-13740B45 21-13740B17 21-13740B17 21-13740B15 21-13740B15 21-13740B31 21-13740B31 4.3 pF, ±5%, 50V 150 pF, +5%, 50V 21–13740B45 21–13740B45 21–13740B45 21–13740B45 21–13740B17 21–13740B07 21–13740B45 08–11051A17 08–11051A17 08–11051A17 08–11051A07 21–13741B53 21–13741B69 08–11051A07 21–13741B45 23–11048B19 21–13741B45 not used 68 pF, ±5%, 50V 48-84939C36 48-00869658 48-00863839 48-80182D39 1 pF, ±5%, 50V 68 pF, ±5%, 50V 68 pF, ±5%, 50V 4.7 pF, ±5%, 50V 1.8 pF, ±5%, 50V 48-00863642 48-00863642 21-13740B15 21-13740B25 21-13740B25 21-13740B45 21-13740B45 21-13740B45 21-13740B61 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B31 21-13740B32 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B39 21-13740B45 21-13740B55 21-13740B45 21-13740B45 21-13740B45 21-13740B45 21-13740B5 21-13740B55 21-13740B55 21-13740B55 21-13740B45 21-13740B5 21-13740B56 21-13740B56 21-1374 15 pF, ±5%, 50V 3.9 pF, ±5%, 50V 12 pF, ±5%, 50V 48-00869643 68 pF, ±5%, 50V .47 uF, ±5%, 63V .1 uF, ±5%, 63V hm, ±5%, 1/8 watt (unless otherwise stated) .022 uF. +5%, 50V 06-11077A60 06-11077B01 06-11077B03 06-11077A43 06-11077A54 06-11077A98 .022 ur, ±5%, 50V .1 uF, ±5%, 50V .01 uF, ±5%, 63V .01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic .01 uF, ±5%, 50V 06-11077A54 06-11077B45 21-13740B45 68 pF, ±5%, 50V not used 68 pF, ±5%, 50V 10 pF, ±.5 pF, 50V 06-11077B23 06-11077B27 18-05500L08 06-11077B19 21-13740B45 21-11022H27 C314
diode (see note)
CR1
CR2
CR3
CR51
CR101,102
CR1511,152
CR153,154
CR176
CR201
CR203
CR205
CR206,207
CR208
CR209
CR209
CR211
CR213
CR216
filter 22k. +20%, potentiomete 10 uF, ±10%, 50V, tantalur 22 pF, ±5%, 50V 39 pF, ±5%, 50V 15 pF, ±5%, 50V .22 uF, +80, -20%, 50V 10 uF, ±10%, 50V, tantalum Schottky Schottky Schottky silicon varactor silicon pin varactor varactor varactor hot carrier 48-80236E16 06-11077809
06-11077821
06-11077A92
06-11077A93
06-11077A73
06-11077A73
06-11077A73
06-11077A92
06-11077A58
06-11077A58
06-11077A59
06-11077A70
06-11077A92
06-11077A94
06-11077A97 48-80154K02 48-80939T01 R63
R102
R103,104
R105
R106
R107
R108,109
R110
R111
R112
R113
R114
R115
R118
R119,120
R121
R122
R123
R124
R125
R126
R127
R128
R151
R152
R153
R154
R155
R156
R157
R158,159
R161
R161
R177
R178,179
R180
R181
R182
R201,202
R203
R204,205
R206
R207
R208
R209
R210
R211
R212
R213
R214 48-83654H01 48-83654H01 48-05129M21 48-83654H01 1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V 48-83654H02 48-80142L01 .0022 uF, ±5%, 50V .22 uF, +80, -20%, 50V 48-05649Q02 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V 48-84616A01 48-80142L01 C82,83
C84
C85
C101
C102
C103,104
C105
C106
C107,108
C109
C110
C111
C113,114
C115,116
C120
C121
C122
C123
C124
C125
C126
C151
C152
C153
C154
C155,156
C157
C158
C159
C160 12 pF, +5%, 50V 48-05649Q02 varactor varactor .1 uF, ±5%, 63V .01 uF, ±5%, 50V 48-84616A01 91-80097D06 FL51 FL52 15 pF, ±5%, 50V .1 uF, ±5%, 50V 6 element, ceramic 91-80098D06 3 element, ceramic 06-11077A72 06-11077A78 06-11077A51 06-11077A48 06-11077A84 06-11077B15 06-11077B15 06-11077B15 connector receptacle J4,5 J6 24-11030B04 24-80063M09 06-11077A34 06-11077A98 24-80063M04 24-80063M21 24-80164M04 06-11077R03 06-11077A78 06-11077A74 06-11077A98 06-11077B17 18-05500L08 06-11077G26 06-11077G26 06-11077G28 06-11077F91 06-11077F91 06-11077G38 06-11077A98 06-11077A98 06-11077A98 06-11077A98 06-11077A98 06-11077A98 5.2 turns, variable 1:6 ratio, variable 24-80164M04 24-80063M21 24-80164M03 24-80063M14 4.3 turns, variable 1.2 uH 22k, ±20%, potentiometer 24–80063M01 25–80000E01 24–80063M01 24–11030B08 24–80299D01 24–80063M01 24–80148M01 24–80063M01 4.5 turns, brown 17.75 turns, orange 10k, ±1% 23.7k, ±1% 27 µF, ±5%, 50V 15 pF, ±5%, 50V .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic .47 uF, ±5%, 63V .1 uF, ±5%, 50V 27 nH, 1.5 turns 24-11030A04 24-80063M01 24-11030B07 24-11030B05 2.5 turns, areer 24-11030B08 24-80063M01 24-80148M01 24-80063M01 06-11077A44 06-11077A98 27 nH, 1.5 turns 06-11077A36 06-11077B11 06-11077A84 06-11077A72 06-11077A50 24-11030A03 24-80063M04 24-80063M01 06-11077A84 06-11077A72 24-11030E01 24-11030B01 24-11030B09 1.5 turns, brown 4.5 turns, brown 06-11077A50

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

transformer T1,2

transistor (see note)

25-80163M02

48-80950X01

500 MHz balance transformer

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

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

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

(Sheet 2 of 2) 4/28/90

UHF RF Board Transistor D.C. Voltage Table

C31 C32

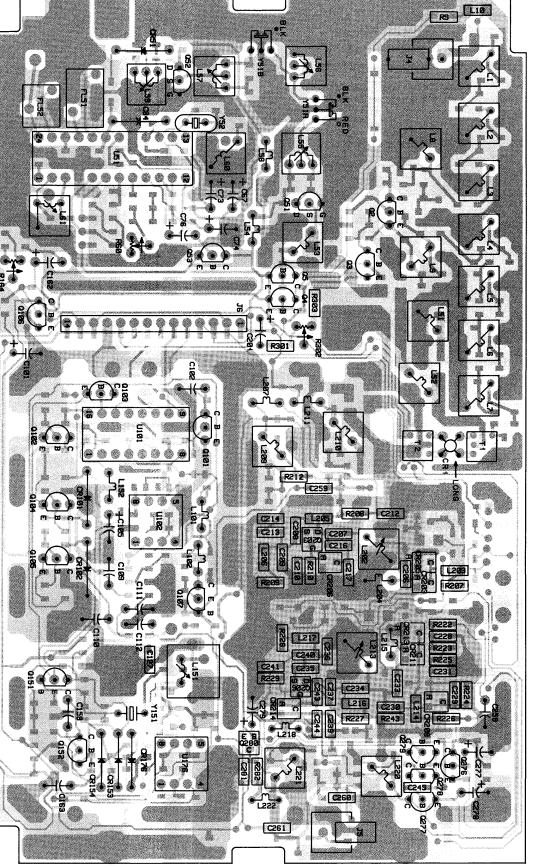
		VOLTAGE			VOLTAGE	
Transistor Ref. No.	BASE	EMITTER	COLLECTOR	GATE	SOURCE	DRAIN
Q1	.7	0	5.9			
Q2	5.3	5.9	.9	_		
Q51		_		0	1.8	9.6
Q52	_	_	_	0	1.8	9.6
Q53	0	0 (W/ SIG)	9.6	_	_	_
Q101	5.0	4.9	.1 (LOCKED)	_	_	_
Q102	.7	0	0.1		_	
Q103	5.0	4.4	9.6	-	_	
Q104	8.1	2.8v	28v	_	_	_
Q105	1.4	VAR.	2–8v	-		_
Q106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

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

(R) RECEIVE MODE

(T) TRANSMIT MODE R237 R239 7. MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM. 8. MEASURED IN THE RECEIVE MODE WITH AN ON-CHANNEL SIGNAL AT A LEVEL OF -20 DBM, MODULATED WITH 1 KHZ AT 3 KHZ DEVIATION. MEASURED WITH AN AC RMS VOLTMETER. TX BUFFERS

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



COMPONENT SIDE VIEW

COMPONENT SIDE OVERLAYS

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

R106

GDW-7722-O

R53 C57

SOLDER SIDE VIEW

parts list

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

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

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

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

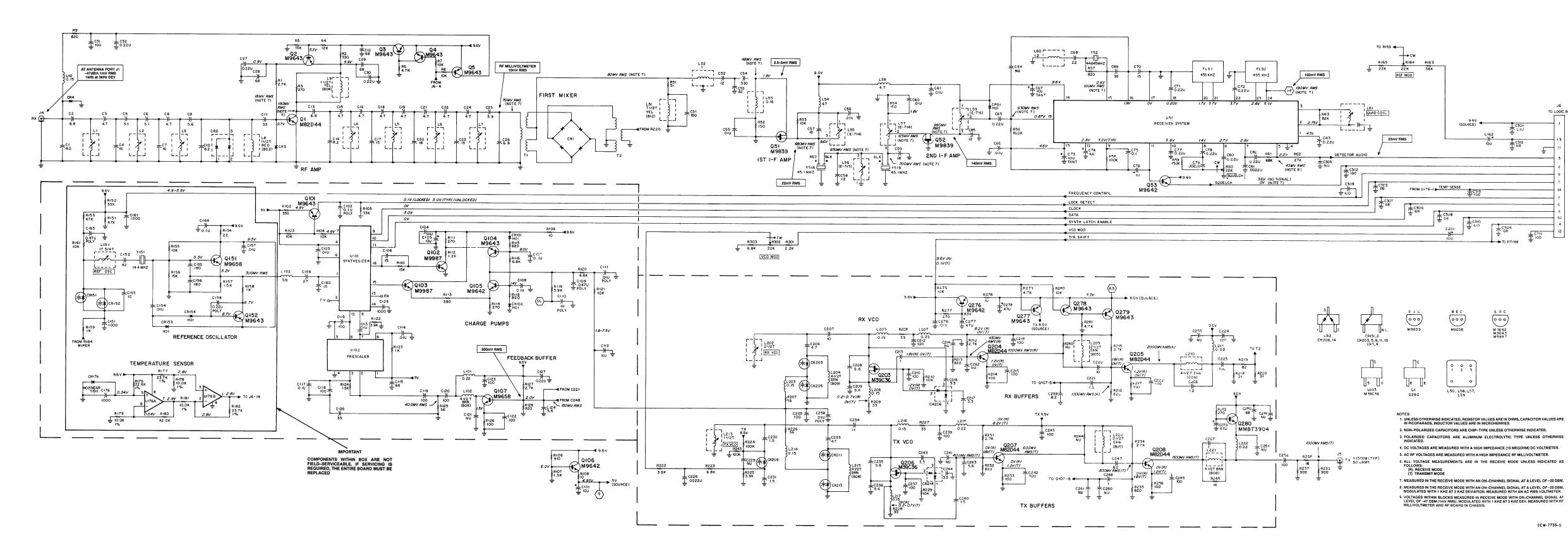
crystal base pad, 2 used crystal base pad, 2 used

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

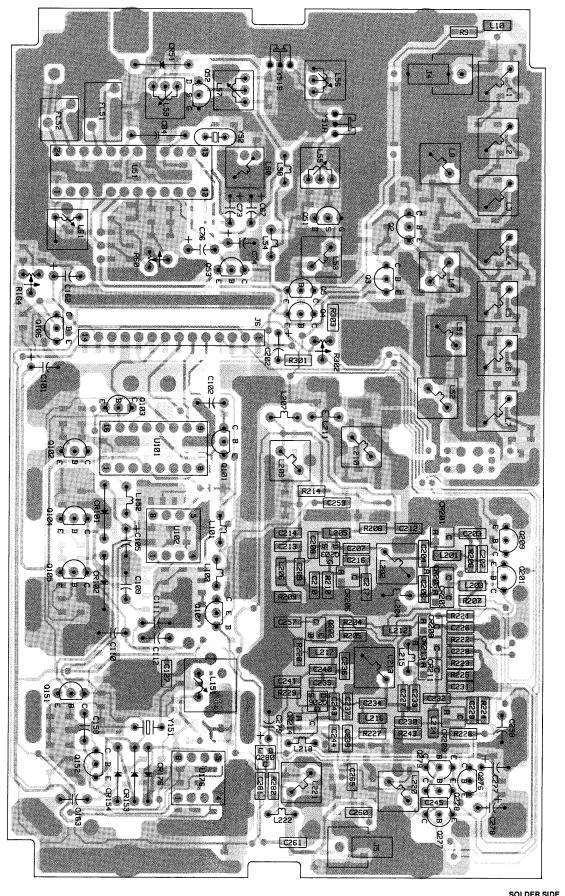
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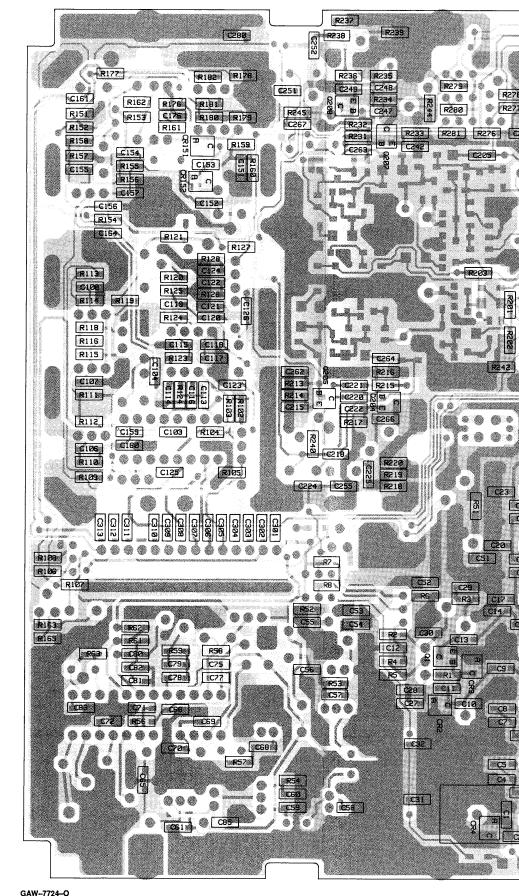
UHF RF Board Transistor D.C. Voltage Table

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



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





COMPONENT SIDE VIEW

RED

SOLDER SIDE VIEW

parts list

21-13740B25

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

48-00869642

06-11077A72

06-11077A50

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

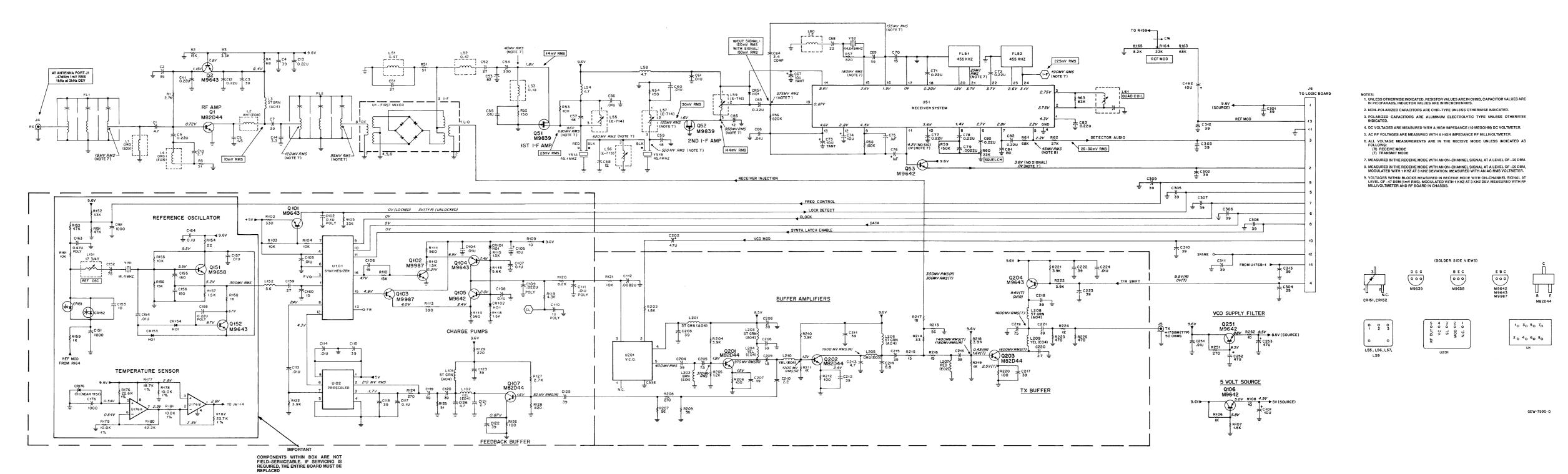
note: For best performance, order diodes, transistors, and integrated circuit devices by

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

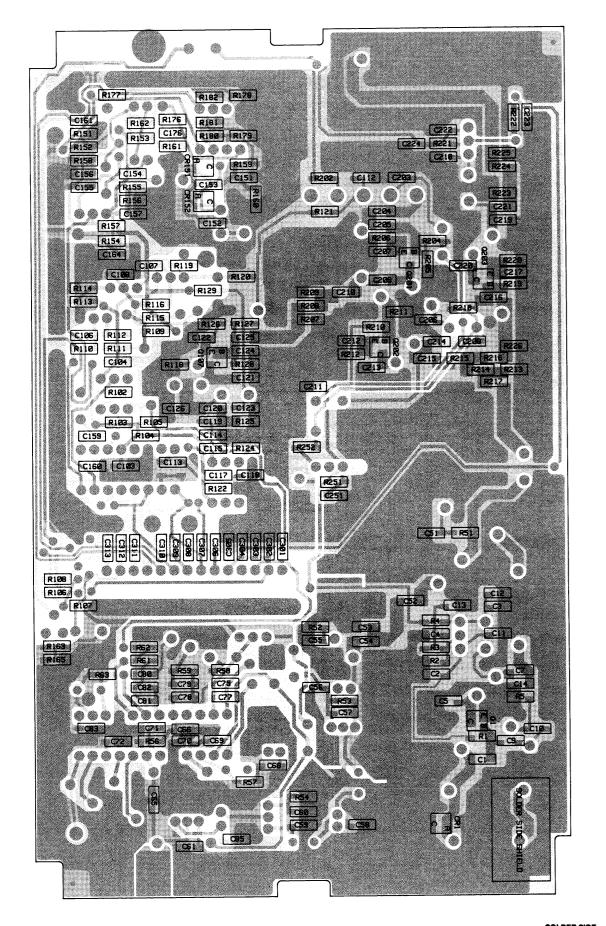
(Sheet 2 of 2) 3/31/90

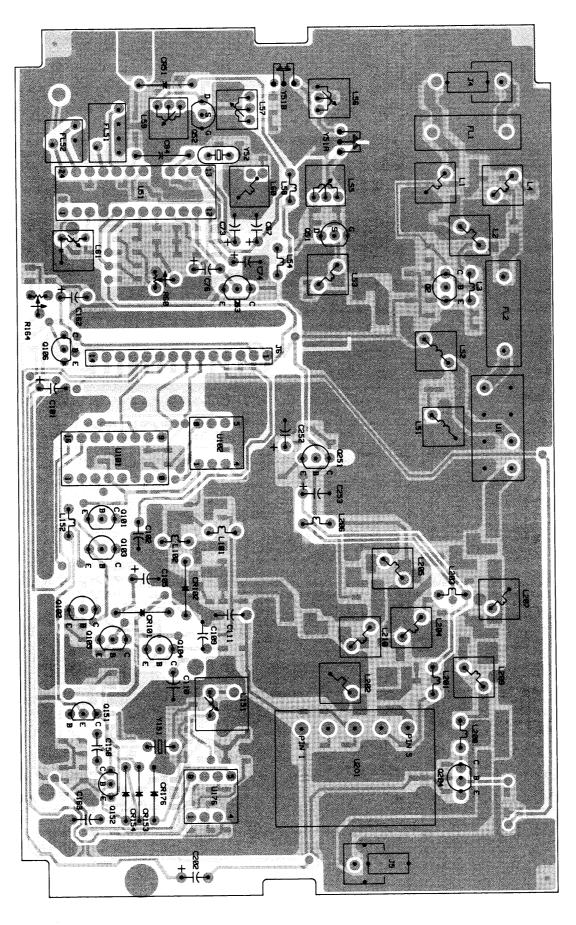
800 MHz RF Board Transistor D.C. Voltage Table

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



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





SOLDER SIDE VIEW

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

parts list

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

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

MXW-7409-O (3)

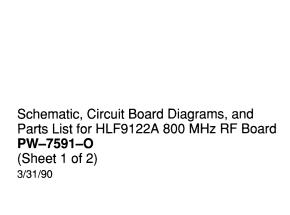
note: For best performance, order diodes, transistors, and integrated circuit devices by Motorola part number.

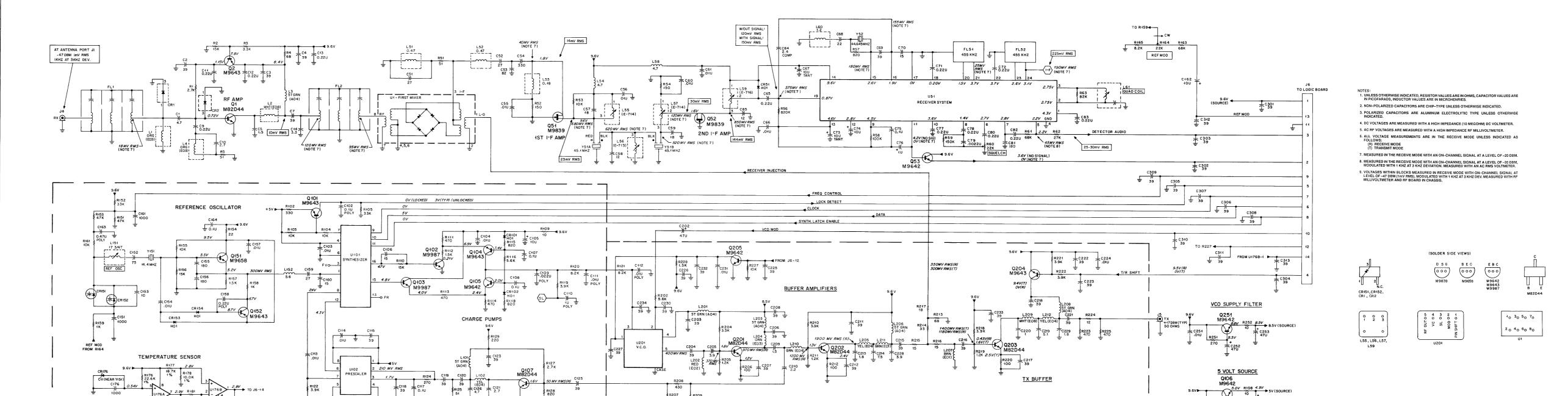
Schematic, Circuit Board Diagrams, and Parts List for HLF4095B 800 MHz RF Board PW-7589-O (Sheet 2 of 2)

3/31/90

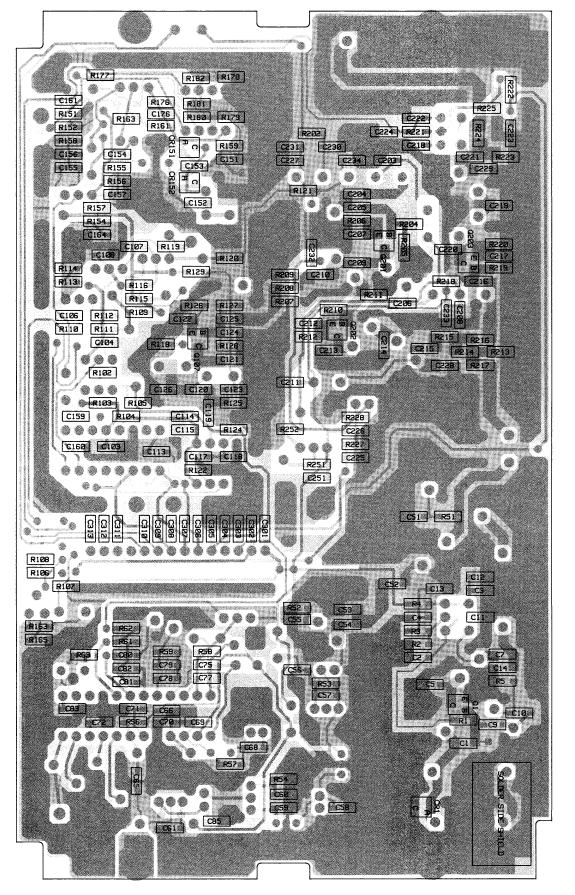
800 MHz RF Board Transistor D.C. Voltage Table

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

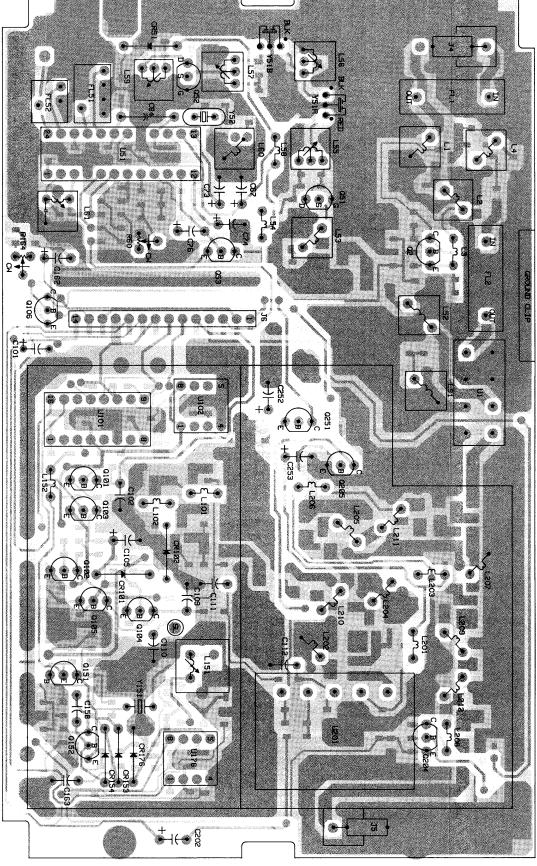




FEEDBACK BUFFER



SOLDER SIDE VIEW



COMPONENT SIDE

GAW-7731-O GDW-7732-O

GREY

COMPONENT SIDE VIEW

parts list

HLF9122A MaxTrac 800 MHz RF Board with Talkaround MXW-7410-O MXW-7410-O (2) REFERENCE MOTOROLA DESCRIPTION SYMBOL PART NO. SYMBOL PART NO. CR151.152 48-05129M21 capacitor, fixed (unless otherwise stated) 48-83654H01 21-13740B17 4.7 pF, ±5%, 50V C2-4 21-13740B39 39 pF, ±5%, 50V 1.5 pF, ±5%, 50V CR176 48-82256C11 10V zener 21-13740B05 21-13740B39 39 pF, ±5%, 50V FL1,2 FL51 FL52 91-80054M01 3 pole, ceramic 91-80097D06 6 element, ceramic .22 uF, +80%, -20%, 50V 2.7 pF, ±5%, 50V 21-60521H41 91-80098D06 3 element, ceramic 21-13740B11 .22 uF, +80%, -20%, 50V 3.3 pF, ±.25pF, 50V 21-60521H41 24-11030E03 24-11030E08 orange white 5 turns, green 21-13740B13 C51,52 C53 21–13740B35 21–13740B47 24-11030A04 82 pF, +5%, 50V C54 C55,56 21-13740B61 24-11030E03 L4 L51,52 L53 L54 L55 L56 L57 L58 L59 L60 24-80063M09 21-13741B45 .01 uF. +5%, 50V 21-13741B45 24-80063M04 .18 uH 24-80063M21 21-13740B31 18 pF, ±5%, 50V 21-13740B27 24-80164M04 5.2 turns, variable 24-80164M01 18 pF, ±5%, 50V .01 uF, ±5%, 50V 21-13740B31 21-13741B45 24-80164M04 5.2 turns, variable 21-60521H41 .22 uF. +80, -20%, 50V 4.3 turns, variable 1-13741B45 .01 uF, ±5%, 50V 24-80164M03 23-43749C39 10 uF, ±10%, 50V, tantalum 22 pF, ±5%, 50V 25-80000E01 transmformer L101 L102 L151 L152 L201 L202 L203 C68 C69 C70 C71,72 C73 C74 C75 C76 C77,78 5 turns, green 39 pF, ±5%, 50V 15 pF, ±5%, 50V 21-13740B39 21–13740B29 24-11030F04 17.75 turns, orange 21-60521H41 .22 uF, +80, -20%, 50V 10 uF, ±10%, 20V, tantalum 23-11013D13 24-80063M22 24-11030A04 5 turns, green 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 50V 23-11048B13 21–13741B69 24-11030F02 24-11030A04 5 turns, green 23-11048B05 1 uF, ±20%, 50V, electrolytic .22 uF, +80, -20%, 50V orange 5 turns, green 21-60521H41 L204.205 24-11030E03 L206 L207 L208 C77,78 C79 C80 C81 C82,83 24-11030A04 21-13741B29 .0022 uF, ±5%, 50V .22 uF, +80, -20%, 50V 21-60521H41 24-11030E01 24-11030A04 5 turns, green 21-13740B55 180 pF, ±5%, 50V .22 uF, +80, -20%, 50V L209 L210 24-11030E08 21-60521H41 C84 C85 C101 C102 C103,104 C105 24-11030E05 21-82450B14 2.4 pF, ±5%, 500V L211 L212 24-11030E01 21-13740B27 12 pF. +5%, 50V 23-11048B13 08-11051A13 10 uF, ±20%, 16V, electrolytic .1 uF, ±5%, 63V 24-11030E04 connector 21-13741B45 .01 uF, ±5%, 50V 09-80135M01 J4.5 2 pin coax 23-11048B13 10 uF, +20%, 16V, electrolytic C106 C107,108 21-13740B29 21-13741B69 15 pF, ±5%, 50V .1 uF, +5%, 50V transforme T1,2 25-80163M02 500 MHz balance transformer (Part of U1) 08-11051A09 08-11051A19 1 uF. +5%, 63V transistor (see note) C111,112 C113,114 08-11051A07 01 uF, ±5%, 63V 48-80950X01 21-13741B45 .01 uF, ±5%, 50V 39 pF, ±5%, 50V 48-00869643 C115 C116 C117 C118–120 21-13740B39 Q51,52 48-00869839 N-channel 48-00869642 21-13741B69 1 uF, ±5%, 50V 48-00869643 21-13740B39 39 pF, ±5%, 50V 2.7 pF, ±5%, 50V 48-80182D20 NPN PNP NPN NPN NPN PNP NPN PNP C121 C122,123 C124 C125 C126 C127 C151 C152 C153 C154 C155,156 C157 C158 C159 C160 C161 C162 C163 C164 C176 C201 C202 C203,204 48-00869643 21-13740B39 39 pF, ±5%, 50V Q105,106 48-00869642 not used 39 pF, ±5%, 50V 4.7 pF, ±5%, 50V 48-80950X01 21-13740B39 48-00869658 21-13740B17 48-00869643 not used .001 uF, ±5%, 50V 48-80950X01 Q204 Q205 48-00869643 75 pF, ±5%, 50V 10 pF, ±5%, 50V 21-13740B46 48-00869642 NPN NPN 21-13740B25 Q251 48-00869642 21-13741B45 resistor, fixed, ohm, ±5%, 1/8 watt (unles 21-13740B55 180 pF, ±5%, 50V .01 uF, ±5%, 50V .22 uF, ±5%, 63V 06-11077A84 21-13741B45 08-11051A15 06-11077A86 21-13740B35 27 pF, ±5%, 50V 15 pF, ±5%, 50V 21-13740B29 06-11077A43 .001 uF, ±5%, 50V 10 uF, ±20%, 16V, electrolytic 21-13740B73 R51 R52 R53 R54 R56 R57 R58 R69 R60 R61 R62 R63 R102 23-11048B13 06-11077A54 08-11051A17 21-13741B69 .1 uF, +5%, 50V 06-11077A54 21-13740B73 06-11077A72 23-11048B19 21-13740B39 47 uF, ±20%, 16V, electrolytic 06-11077B23 39 pF. +5%, 50V C205 C206-208 21-13740B15 22k, +20%, potentiometer 18-05500L08 21-13740B39 39 pF +5% 50V 06-11077B19 06-11077B09 21-13740B05 1.5 pF, ±5%, 50V C210 2.2 pF, ±5%, 50V 39 pF, ±5%, 50V 21-13740B09 06-11077A62 1.8 pF, ±5%, 50V 7.5 pF, ±5%, 50V 21-13740B07 06-11077A98 C214 C215–217 06-11077B1 39 pF, ±5%, 50V 39 pF, ±5%, 50V 21-13740B39 R106 R107 06-11077A74 C213-217 C218 C219 C220 C221-223 06-11077A78 5.1 pF, ±5%, 50V 1 pF, ±5%, 50V 21-13740B18 R108,109 06-11077A2 21-13740B01 06-11077B03 39 pF, ±5%, 50V .01 uF, ±5%, 50V 21-13740B39 21-13740B45 R112 06-11077A78 C225-227 C228 39 pF, ±5%, 50V 3.9 pF, ±5%, 50V 21-13740B39 21-13740B15 06-11077A72 1.8 pF, ±5%, 50V 39 pF, ±5%, 50V C229 C230 21-13740B07 R116 R118 21-13740B39 06-11077A72 820 3.9k 8.2k 3.9K C231 C232–234 .01 uF, ±5%, 50V 39 pF, ±5%, 50V 21-13741B45 21-13740B39 R120 121 06-11077A96 .01 uF, ±5%, 50V 47 uF, ±20%, 16V, electrolytic C251 C252,253 21-13741B45 23-11048B19 R124 R125 R126 R127 06-11077A60 21-13740B39 diode (see note) 48-80939T01 R128 48-83654H0 silicon silicon 06-11077A72 CR101,102 48-83654H01

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

MXW-7410-O (3)

END OF PART 3 OF 4

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