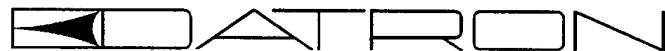


**AM1088-MS**

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**AM1088**  
**OPERATOR/TECHNICAL MANUAL**



DATRON WORLD COMMUNICATIONS INC.

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Manual No. AM1088-MS  
Publication #990607  
Printed: July 1996  
Revision: B

304 Enterprise Street  
Escondido, CA 92029, U.S.A.  
Phone: (760) 747-1079, Fax (760) 741-1658  
EMail: sales@dtwc.com

## One Year Limited Warranty and Remedies

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Datron World Communications Inc. (DWC) warrants that its equipment is free from defects in design, materials and workmanship for a period of 12 months from the date of installation of the equipment, but in no event later than 15 months from the date of shipment. If the equipment does not provide satisfactory service due to defects covered by this warranty, DWC will, at its option, replace or repair the equipment free of charge.

Should it be impractical to return the equipment for repair, DWC will provide replacements for defective parts contained in the equipment for a period of 12 months from the date of installation of the equipment, but in no event later than 15 months from the date of shipment.

This warranty is limited to the original purchaser and is not transferable. Repair service performed by DWC is warranted for the balance of the original warranty or 90 days, whichever is longer.

**Exclusive Warranty:** There are no other warranties beyond the warranty as contained herein. No agent, employee, or representative of DWC has any authority to bind DWC to any affirmation, representation, or warranty concerning the equipment or its parts that is not in conformity with the warranties contained herein. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, ARE MADE WITH RESPECT TO THE EQUIPMENT OR THE PARTS CONTAINED THEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND DWC EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN.

**Limitations of Warranty:** This warranty does not cover:

- Physical damage to the equipment or its parts that does not involve defects in design, material or workmanship, including damage by impact, liquids, temperature, or gases.
- Damage to the equipment or its parts caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages.
- Defects or failures caused by unauthorized attempts to repair or modify the equipment.
- Defects or failures caused by Buyer abuse or misuse.

**Return of Equipment - Domestic:** To obtain performance of any obligation under this warranty, the equipment must be returned freight prepaid to the Customer Service Department. Datron World Communications Inc., 304 Enterprise Street, Escondido, California 92029. The equipment must be packed securely. DWC shall not be responsible for any damage incurred in transit. A letter containing the following information must be included with the equipment.

- a. Model, serial number and date of installation;
- b. Name of dealer or supplier of the equipment;
- c. Detailed explanation of problem;
- d. Return shipping instructions; and
- e. Telephone or fax number where buyer may be contacted.

DWC will return the equipment prepaid by United Parcel Service, Parcel Post, or truck. If alternate shipping is specified by Buyer, freight charges will be made collect.

**Return of Equipment - International:** Contact DWC or your local Representative for specific instructions. Do not return equipment without authorization. It is usually not possible to clear equipment through U.S. Customs without the correct documentation. If equipment is returned without authorization, Buyer is responsible for all taxes, customs duties, clearance charges, and other associated costs.

**Parts Replacement:** The following instructions for the supply of replacement parts must be followed:

- a. Return the parts prepaid to "Parts Replacement" Datron World Communications Inc., 304 Enterprise Street, Escondido, California 92029; and
- b. Include a letter with the following information:
  1. part number;
  2. serial number and model of equipment; and
  3. date of installation.

Parts returned without this information will not be replaced. In the event of a dispute over the age of the replacement part, components date-coded over 24 months previously will be considered out of warranty.

**Remedies:** Buyer's sole remedies and the entire liability of DWC are set forth above. In no event will DWC be liable to buyer or any other person for any damages, including any incidental or consequential damages, expenses, lost profits, lost savings, or other damages arising out of use of or inability to use the equipment. 1/96

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# CHAPTER 1

## INTRODUCTION AND TECHNICAL SPECIFICATIONS

---

### 1.1 GENERAL

This manual describes the AM1088 RF Power Amplifier, its installation, operation and organizational maintenance. This manual provides detailed information on the service and repair of this amplifier. Full technical information is given including schematic diagrams, circuit descriptions, theory of operation, and test procedures. This manual also contains a detailed parts list.

### 1.2 DESCRIPTION

The AM1088 is a 30 to 88 MHz RF Power Amplifier designed to boost the output power of the PRC1088 transceiver to 50 watts. This amplifier is designed to function in the frequency-hopping mode, as well as normal single-frequency transmission.

The AM1088 is controlled by the PRC1088 via the MT1088, the RF output from the radio is processed

through the MT1088 to the AM1088. When the PRC1088 is set for either the HI or LO power mode, the AM1088 passes the RF transmitted signal through without amplification, to the antenna. When the PRC1088 is set to the High Power Amplifier mode, (HPA), the AM1088 will automatically amplify the RF signal output of the radio to the 50-watt level, before passing it to the antenna.

The AM1088 has no controls or adjustments. The only connections to the AM1088 are the RF in, RF out, and control cables. All connections are made to the AM1088 front panel. The AM1088 is easily removed by loosening the securing thumb screw on the MT1088. There are no connections to the rear of the amplifier.

### 1.3 TECHNICAL CHARACTERISTICS

The technical characteristics for the AM1088 amplifier are shown in Table 1-1.

**TABLE 1-1.**  
**Technical Characteristics.**

**Electrical Specifications**

Frequency Range	30 to 88 MHz.
Power Output	50 W, $\pm 1$ dB.
Duty Cycle	Continuous to 90° heatsink temperature. The amplifier is automatically bypassed when the heatsink temperature exceeds 90° celsius.
Input RF Power	5 W.
Primary Power	28 V @ 7 A nominal. (dc)
Harmonic Suppression	55 dB.
Output Protection	Amplifier is protected against open and short circuit at antenna terminals.
Connectors	
a) Input RF	BNC; 50 ohm, 2-5 W.
b) Output RF	BNC; 50 ohm, 50 W (nominal).
c) Amp Control	14 Pin, U318/U Military style.

**Mechanical Specifications**

Size	13.0 x 6.5 x 2.25 inches (330 x 165 x 57 mm).
Weight	6 lbs 1 oz (2.8 Kgs).
Mounting	Locking pins/screw clamp to MT1088.

**Environmental Specifications**

Operating Temperature	-40° to +60° Celsius.
Shock, Vibration, Salt, Spray Humidity, Immersion	Per applicable test conditions and methods of MIL-STD-810E.

## CHAPTER 2 INSTALLATION

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### 2.1 UNPACKING

The AM1088 is packed in a heavy-duty, corrugated cardboard carton. The carton and packing materials should be retained in case the equipment is re-shipped.

### 2.2 INSPECTION

Inspect the equipment for possible damage during shipment. Check all accessories against the packing list.

### 2.3 COMPATIBLE EQUIPMENT

The AM1088 is electrically and mechanically compatible with the following equipment:

- PRC1088 Transceiver.

- MT1088 Mobile Mount.
- U.S. Army MT1029 Mobile Mount.

- Broadband 30 to 88 MHz, nominal 10 ft. vehicular antennas, SHAKESPEARE 4242 MK I/II, or equivalent.

- Hy-gain bodel 4331 (centerfed).

- U.S. Army AS-1729 vehicular antenna (when used in restricted hop-band mode).

- AB-591/PRC Antenna Base.

- AT-271 Antenna.

The AM1088 is designed as an RF amplifier specifically for the PRC1088. This amplifier is not intended for use with any other transceiver. Serious damage could result if connected to any other transceiver.



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## CHAPTER 3 OPERATING INSTRUCTIONS

### 3.1 CONNECTIONS

All connections are listed in Table 3-1.

The AM1088 has no controls or adjustments of any kind, and should only be opened by a qualified service technician.

### 3.2 OPERATION

The AM1088 is controlled by the PRC1088 and the MT1088. The PRC1088 (via the MT1088) controls the band HI/LO switching, the PTT signal, and the Automatic Level Control, (ALC).

The AM1088 is protected against damage due to mismatched loads. When the amplifier is subjected to

RF loads of greater than 3.5 to 1, the VSWR detector bypasses the amplifier for that transmission. Under these circumstances the fault indicator will light. If the fault is transitory in nature the fault circuit will reset at the beginning of the next PTT cycle and the amplifier will function normally. If the fault is still present the amplifier will remain in the bypass mode.

After installation into the MT1088, and the HPA mode is selected on the PRC1088, the AM1088 will amplify RF signals arriving at its input port when the radio PTT is keyed. The RF output level from the AM1088 is controlled by the MT1088 ALC circuit. The ALC circuit consists of the RF output Forward Power Level, the "Low Forward Power" fault trip point and the "High Reverse Power" fault trip point.

**TABLE 3-1.  
Connector Information.**

<b>CONNECTOR J5, (AM1088 CONTROL)</b>		
<u>PIN</u>	<u>NAME</u>	<u>DESCRIPTION</u>
A	Ground	System Ground
B	+28 Volts Dc	Input Voltage (28 -volts NOM.)
C	Fault (Temp)	Temperature Fault Warning to MT1088 "BITE" Circuitry.
D	Amp PTT	Keying Signal from MT1088 to AM1088
E	Fwd Pwr	Forward Power Signal to MT1088
F	Rev Pwr	Reverse Power Signal to MT1088
H	ALC In/Out	ALC Cntrl, Out from MT1088, into AM1088
M	Amp Present	Signal To MT1088 Indicating AM1088 is Present
K	Band Hi/Lo	Band Switching Signal from MT1088 to AM1088
L	-100 Volts Dc	-VE Supply to Bias Filter Band Switching Diodes
J		Ground
N		28 Vdc

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# CHAPTER 4 THEORY OF OPERATION

## 4.1 GENERAL

A system interconnect diagram of the AM1088 is shown in Figure 4-1. The amplifier is a single-board assembly, which is easily removable should it become defective. The only non-printed circuit board mounted components, are the connectors and cables mounted on the front panel.

## 4.2 POWER AMPLIFIER

Transmit RF is applied to an attenuator consisting of R47, R48 and R49, and to the input of the amplifier. This pad is to prevent amplifier overloading. The RF signal is then applied to the input coupler T2 and input splitter T3. The split input signals are then applied to the push-pull final amplifier stage, Q10 and Q11. The output is then coupled through T4 and T5 to T6, where the signal is recombined and delivered to the switched band filters.

## 4.3 BAND SWITCHING

The AM1088 band switching circuitry selects the appropriate filter band for the current transceiver channel.

When the high band is selected, the band HI/LO signal at J5-7 goes high, this energizes the high-band switch drivers Q4, Q5, Q6, and Q9. The resulting +4 Vdc output is then used to switch the PIN diodes to steer the RF signal to the high-band, low-pass filter. The band select signal is also applied to the inverting transistor U1C, and is used to de-energize the low band switch drivers Q1, Q2, Q3, and Q8. When de-energized, these drivers output -100 Vdc to reverse bias the PIN diodes, and isolate the low-band, low-pass filter. When the band HI/LO signal is low, the band switching operation is reversed.

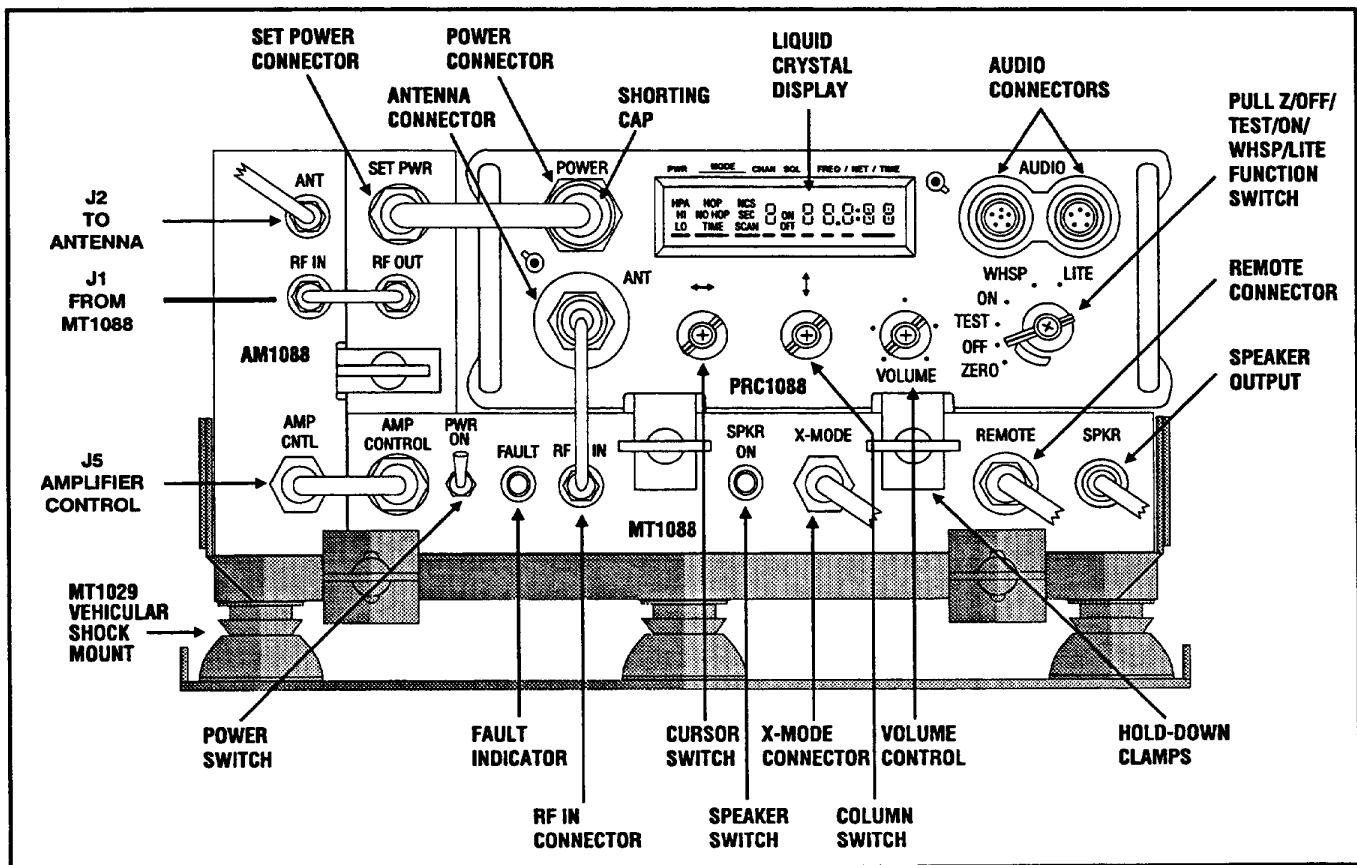


FIGURE 4-1.  
System Interconnect Diagram.

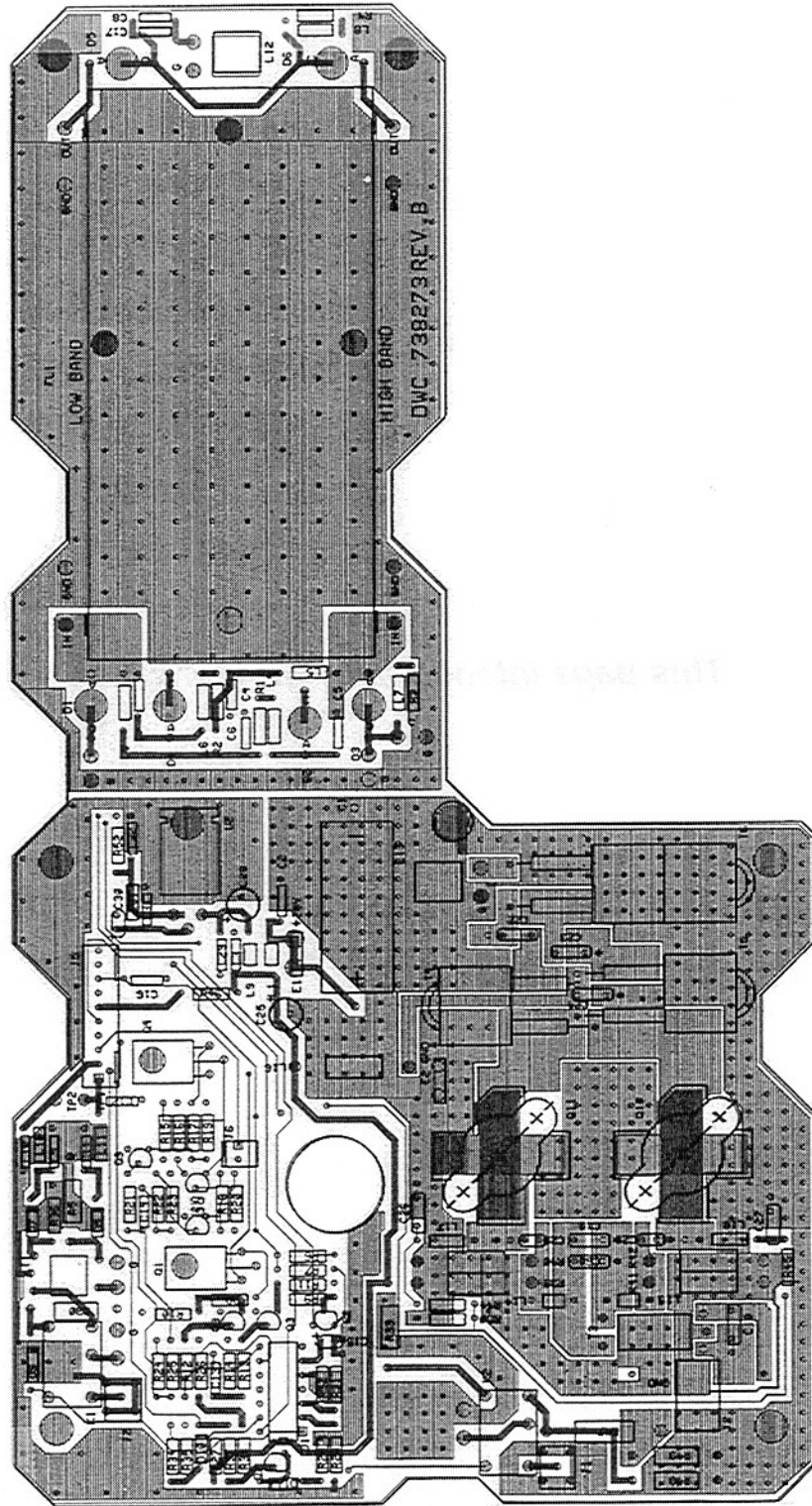
#### **4.4 LOW PASS FILTER**

The AM1088 amplifier uses a two-band, sealed, low-pass filter to reduce unwanted transmit harmonics and spurious emissions. The filter used has a low band cutoff of 52 MHz, and a high band cutoff of 88 MHz. The RF is directed to the appropriate low-pass filter by the band select circuitry described in the preceding section.

#### **4.5 OUTPUT POWER SAMPLING**

The amplified RF signal from the low-pass filter is fed to the output coupler T1. The output RF passes through K1 to the RF output connector J2, and to the antenna. The output coupler, T1, samples the forward and reflected output power, and directs it to the MT1088. These signals are used as inputs to the ALC circuitry to level the RF output power, and detect amplifier/antenna fault conditions.

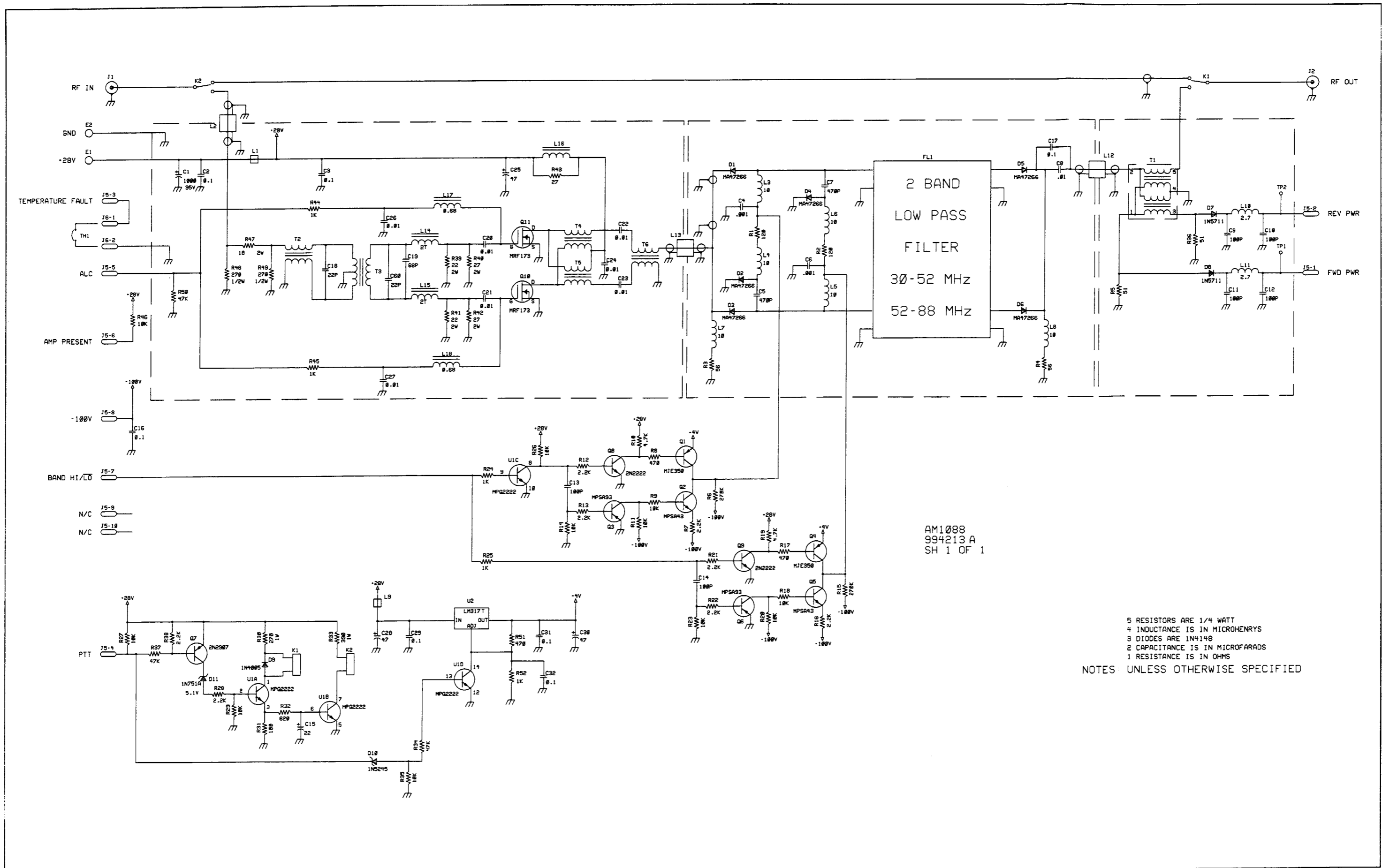
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COMPONENT SIDE TWC 738273 REV. B

SILKSCREEN TWC 738273 REV. B

FIGURE 4-2  
Component Locations, Squelch Board

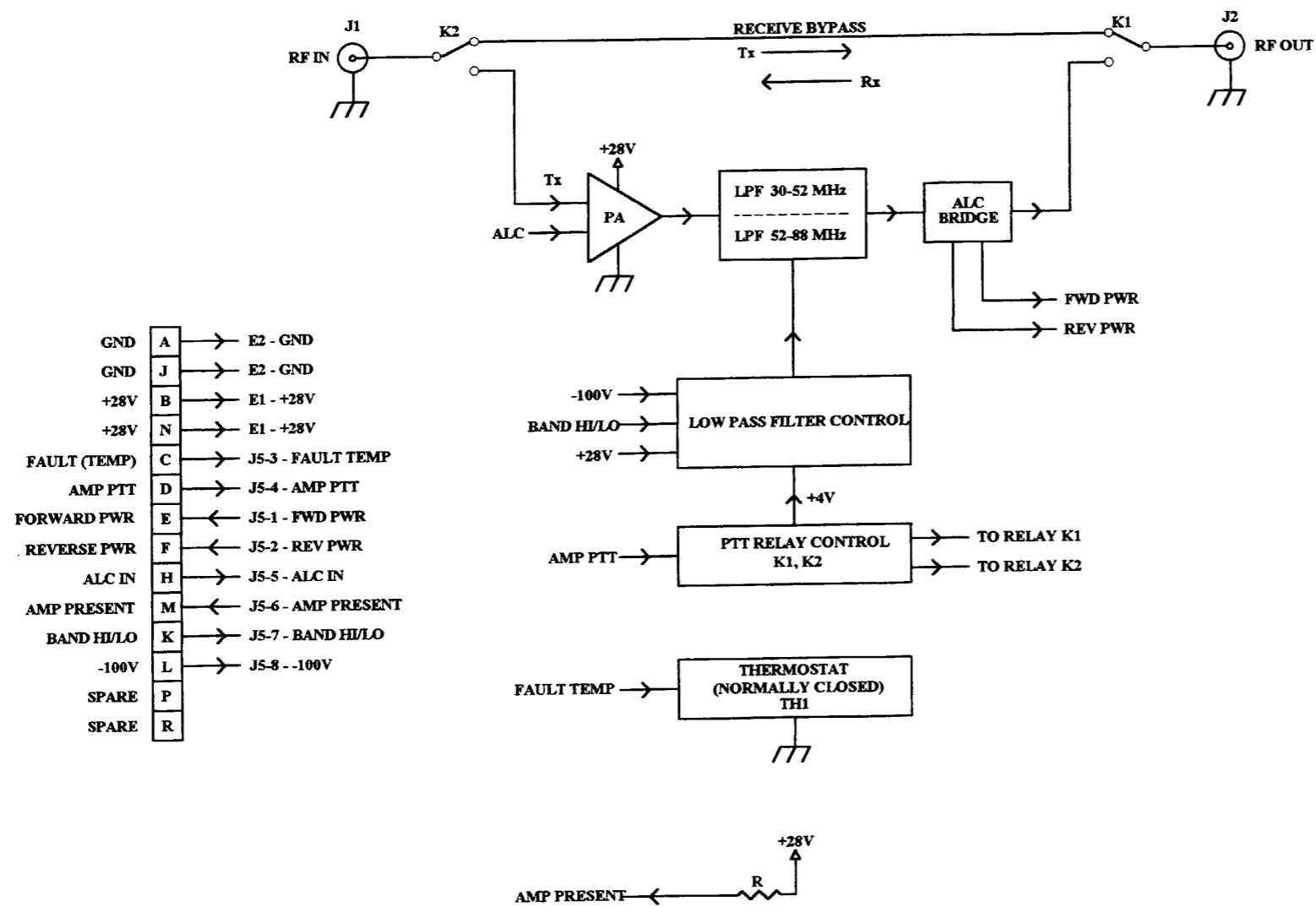


AM1088  
994213A  
SH 1 OF 1

5 RESISTORS ARE 1/4 WATT  
4 INDUCTANCE IS IN MICROHENRYS  
3 DIODES ARE 1N4148  
2 CAPACITANCE IS IN MICROFARADS  
1 RESISTANCE IS IN OHMS  
NOTES: UNLESS OTHERWISE SPECIFIED

FIGURE 4-3  
Schematic, AM1088





GND	A	→	E2 - GND
GND	J	→	E2 - GND
+28V	B	→	E1 - +28V
+28V	N	→	E1 - +28V
FAULT (TEMP)	C	→	J5-3 - FAULT TEMP
AMP PTT	D	→	J5-4 - AMP PTT
FORWARD PWR	E	←	J5-1 - FWD PWR
REVERSE PWR	F	←	J5-2 - REV PWR
ALC IN	H	→	J5-5 - ALC IN
AMP PRESENT	M	←	J5-6 - AMP PRESENT
BAND HI/LO	K	→	J5-7 - BAND HI/LO
-100V	L	→	J5-8 - -100V
SPARE	P		
SPARE	R		

NOTE: RECEIVE BYPASS IS IN EFFECT IF ANY OF THE FOLLOWING IS TRUE:

1. PRC1088 IS NOT IN HPA MODE.
2. MT1088 "BITE" CIRCUITRY HAS DETECTED AN AM1088 FAULT.
3. PRC1088 IS IN RECEIVE MODE.

		304 Enterprise St. Escondido, CA 92029 (619)747-1079 FAX (619)741-1658	
DATRON WORLD COMMUNICATIONS INC.			
Title: <i>Schematic</i>			
<b>AM1088 BLOCK DIAGRAM</b>			
Drawn: SATEL	Date: 9MAY96	Size: B	Drawing Number: 994314
Engr:	Date:		Rev: A
Appr:	Date:	File: C:\CLIENTS\CH3\SCHEMS\994314A.SCH	Sheet 1 of 1
		Date: 11-Jul-1996	Time: 16:00:38

FIGURE 4-4  
AM1088 Block Diagram

**TABLE 4-1  
AM1088 AMPLIFIER BOARD  
PARTS LIST**

**026-00200**

<b>DESIGNATOR</b>	<b>PART #</b>	<b>DESCRIPTION</b>
C1	232102-1	CAP, 1K MF 35V ELECT AXL
C2	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
4	277102	CAP, ML 1000PF X7R AXIAL 10%
C5	277471	CAP, ML 470PF NPO AXIAL 5%100V
C6	277102	CAP, ML 1000PF X7R AXIAL 10%
C7	277471	CAP, ML 470PF NPO AXIAL 5%100V
C8	277103	CAP, ML 0.01 UF AXIAL X7R 10%
C9	277101	CAP, ML 100PF NPO AXIAL 5%
C10	277101	CAP, ML 100PF NPO AXIAL 5%
C11	277101	CAP, ML 100PF NPO AXIAL 5%
C12	277101	CAP, ML 100PF NPO AXIAL 5%
C13	277101	CAP, ML 100PF NPO AXIAL 5%
C14	277101	CAP, ML 100PF NPO AXIAL 5%
C15	241226	CAP, 22MF DIP TANTALUM
C16	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C17	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C18	275220	CAP, ML 22PF NPO 100V 5% 0.2S
C19	275680	CAP, 68 PF NPO MONOLITHIC
C20	214103	CAP, 0.01MF 50V MONO
C21	214103	CAP, 0.01MF 50V MONO
C22	275103	CAP, ML 0.01UF NPO 5% 100V .2S
C23	275103	CAP, ML 0.01UF NPO 5% 100V .2S
C24	275103	CAP, ML 0.01UF NPO 5% 100V .2S
C25	234470	CAP, 47MF 35V ELECT VRT
C26	275103	CAP, ML 0.01UF NPO 5% 100V .2S
C27	275103	CAP, ML 0.01UF NPO 5% 100V .2S
C28	234470	CAP, 47MF 35V ELECT VRT
C29	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C3	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C30	241476	CAP, 47MF 16V DIP TANT
C31	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C32	277104	CAP, ML 0.1UF AXIAL X7R 10%50V
C60	275220	CAP, ML 22PF NPO 100V 5% 0.2S
D1	320507	DIODE PIN MA47266
D10	320270	DIODE, 1N5245B
D11	320204	DIODE, ZENER 5.1V
E1	860047	QUICK DISCONNECT PC MOUNT
E2	860047	QUICK DISCONNECT PC MOUNT
FL1	370031	FILTER 30-88 MHZ 75 WATT
J1	610511	CONNECTOR SMB PC JACK
J2	610511	CONNECTOR SMB PC JACK
J5	610144	HEADER, MLX, 10PIN, .100
J6	610105	HEADER, MLX, 2PIN, .100,
K1	540067	RELAY, NON-LATCH SEALED DS1E
K2	540067	RELAY, NON-LATCH SEALED DS1E

**TABLE 4-1 (Continued)**  
**AM1088 AMPLIFIER BOARD**  
**PARTS LIST**

DESIGNATOR	PART #	DESCRIPTION
L1	430223	INDUCTOR BEAD 1T MOLDED
L3	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L4	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L5	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L6	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L7	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L8	430029	INDUCTOR, 10 UH 10% FIXED MOLD
L9	430223	INDUCTOR BEAD 1T MOLDED
L10	430212	INDUCTOR, 2.7 UH 10% Q35 MOLD
L11	430212	INDUCTOR, 2.7 UH 10% Q35 MOLD
L12	459281	IND ASSY, 1T766040 1-490203
L13	459276	IND ASSY, 1T-766040 1-490203
L14	459277	AIR COIL 2T#20 .175DIA .3SPC
L15	459277	AIR COIL 2T#20 .175DIA .3SPC
L16	459278	IND ASSY 8T#22 1-490401
L17	430005	INDUCTOR FIXED .68UH
L18	430005	INDUCTOR FIXED .68UH
Q1	310151	XISTOR, PNP, MJE350, TO126
Q2	310152	XISTOR, NPN, MPSA42, TO92
Q3	310153	XISTOR, PNP, MPSA92, TO92
Q4	310151	XISTOR, PNP, MJE350, TO126
Q5	310152	XISTOR, NPN, MPSA42, TO92
Q6	310153	XISTOR, PNP, MPSA92, TO92
Q7	310052	XISTOR, PNP, PN2907A, TO92
Q8	310057	XISTOR, NPN, PN2222A, TO92
Q9	310057	XISTOR, NPN, PN2222A, TO92
R1	124121	RES, 120 OHM 1/4W, 5% CARB FILM
R2	124121	RES, 120 OHM 1/4W, 5% CARB FILM
R3	124560	RES, 56 OHM 1/4W 5%
R4	124560	RES, 56 OHM 1/4W 5%
R5	124510	RES, 51 OHM 1/4W 5% CARBON FILM
R6	124274	RES, 270K 1/4W 5% CARBON FILM
R7	124222	RES, 2.2K 1/4W 5% CARBON FILM
R8	124471	RES, 470 OHM 1/4W 5% CF
R9	124103	RES, 10K 1/4W 5% CARBON FILM
R10	124472	RES, 4.7K 1/4W 5% CARBON FILM
R11	124103	RES, 10K 1/4W 5% CARBON FILM
R12	124222	RES, 2.2K 1/4W 5% CARBON FILM
R13	124222	RES, 2.2K 1/4W 5% CARBON FILM
R14	124103	RES, 10K 1/4W 5% CARBON FILM
R15	124274	RES, 270K 1/4W 5% CARBON FILM
R16	124222	RES, 2.2K 1/4W 5% CARBON FILM
R17	124471	RES, 470 OHM 1/4W 5% CF
R18	124103	RES, 10K 1/4W 5% CARBON FILM
R19	124472	RES, 4.7K 1/4W 5% CARBON FILM
R20	124103	RES, 10K 1/4W 5% CARBON FILM
R21	124222	RES, 2.2K 1/4W 5% CARBON FILM
R22	124222	RES, 2.2K 1/4W 5% CARBON FILM
R23	124103	RES, 10K 1/4W 5% CARBON FILM
R24	124102	RES, 1K 1/4W 5% CARBON FILM
R25	124102	RES, 1K 1/4W 5% CARBON FILM

**TABLE 4-1 (Continued)**  
**AM1088 AMPLIFIER BOARD**  
**PARTS LIST**

DESIGNATOR	PART #	DESCRIPTION
R26	124103	RES, 10K 1/4W 5% CARBON FILM
R27	124103	RES, 10K 1/4W 5% CARBON FILM
R28	124222	RES, 2.2K 1/4W 5% CARBON FILM
R29	124222	RES, 2.2K 1/4W 5% CARBON FILM
R30	144271	RES, 270 OHM 1W 5% FILM
R31	124101	RES, 100 OHM 1/4W 5% CF
R32	124621	RES, 620 OHM 1/4W 5% CF
R33	144391	RES, 390 OHM 1W 5% FILM
R34	124473	RES, 47K 1/4W 5% CARBON FILM
R35	124103	RES, 10K 1/4W 5% CARBON FILM
R36	124510	RES, 51 OHM 1/4W 5% CARBON FILM
R37	124473	RES, 47K 1/4W 5% CARBON FILM
R38	124222	RES, 2.2K 1/4W 5% CARBON FILM
R39	153220	RES, 22 OHM 2W 5% FP FILM
R40	153270	RES, 27 OHM 2W 5% FLAME PROOF
R41	153220	RES, 22 OHM 2W 5% FP FILM
R42	153270	RES, 27 OHM 2W 5% FLAME PROOF
R44	124102	RES, 1K 1/4W 5% CARBON FILM
R45	124102	RES, 1K 1/4W 5% CARBON FILM
R46	124103	RES, 10K 1/4W 5% CARBON FILM
R47	155100	RES, 10 OHM 3W 5% FILM
R48	144471	RES, 470 OHM 1W 5% FILM
R49	144471	RES, 470 OHM 1W 5% FILM
R50	124473	RES, 47K 1/4W 5% CARBON FILM
R51	124471	RES, 470 OHM 1/4W 5% CF
R52	124102	RES, 1K 1/4W 5% CARBON FILM
T1	459272	XFMR 10T10T#34AWG 1-490321
T2	459274	XFMR 2T#766040 1-490323
T3	459275	XFMR 2T2T-2T 1-490324
T4	459273	XFMR 2T#7667057 1-490322
T5	459273	XFMR 2T#7667057 1-490322
T6	459271	XFMR 1T-766040 2-490315
U1	310101	XISTOR, NPN, MPQ2222A, 14-DIP, IC
U2	330340	IC, LM317T

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