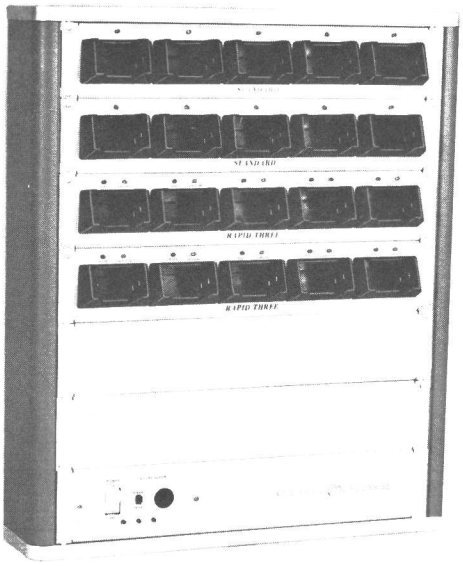
MOBILE RADIO

MASTR® Personal Series
PROGRESS LINE
PE 3-HOUR RACK CHARGERS



SPECIFICATIONS *

CABINET

PL Number	19C321522G1	19C321522G2
Dimensions (H X W X D)	12" x 21.625" x 5.5"	26" x 21.625" x 5.5"
Capacity (change panels) plus one power supply	2	6

CHARGE PANEL

PL Number	19D423210G1
Charge Time	3 hours
Dimensions (H X W X D)	3 1/2" x 19" x 3 1/2"
Number Inserts	5
Indicators/Insert	Amber CHARGING Green READY
Input Current	2 amperes

POWER SUPPLIES

4-Amp Power Supply

PL Number	19D42307G1 & G2
Dimensions (H X W X D)	3.5" x 19" x 4.5"
Weight	9.4 pounds
Output Current	4 amperes
Output Ripple	100%
Output Voltage	16

12-Amp Power Supply

PL Number	19D423208G1 & G2
Dimensions (H X W X D)	3.5" x 19" x 4.5"
Weight	20.8 pounds
Output Current	12 amperes
Output Ripple	100%
Output Voltage	16

hese specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

EQUIPMENT INDEX

EQUIPMENT	PART NUMBER
Cabinets	
2 panel	19C321522G1
6 panel	19C321522G2
Panels	
Charge Panel	19D423210G1
Blank Panel	19D417978P4
Power Supplies	
4-Amp	
121 VAC	19D423207G1
220 VAC	19D423207G2
12-Amp	
121 VAC	19D423208G1
220 VAC	19D423208G2
Control Units	
4-Amp, Power Supply	19C321566G2
12-Amp, Power Supply	19C321566G1
Cables	
1 Charge Panel	19B226773G1
2 through 6 Charge Panels	19B226773G2

COMBINATION NOMENCLATURE

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th Digits
Product Line	Application	Package	Input Voltage	Charge Time	Version	Type	Frequency Range
3 Charger	**6** PE (700 mah Batt)	**2** Rack (2 Panels)	**L** 121 VAC	**3** 3 Hour	**C** 1 Charge Panel*	**1** Standard	**X** Not Range Sensitive
		3 Rack (6 Panels)	**M** 220 VAC				

* Option 4643 adds at the factory one additional three hour charge panel 19D423210G1 with five charging inserts.

Other charge panels may be added at the factory as follows:

Option 4642 adds one additional standard sixteen hour charge panel 19D423211G1 with five charging inserts.

DESCRIPTION

General Electric 3-Hour Rack Charger combinations will recharge both 500 and 700 mAh battery packs used with the MASTR Personal PE Series, FM, two-way radios. A fully discharged 500 mAh battery pack will be recharged 100% in 16 hours at a constant current charge rate of C/10 or 50 milliamps. A 700 mAh battery pack will be recharged 100% in 3 hours at a constant current, charge rate of C/2 or 350 milliamps.

A rack charger combination consists of a cabinet with a capability of two or six charge panels. Each charge panel has five charging inserts, giving a maximum recharging capability of ten or thirty battery packs. The 3-Hour Rack Charger combination can have one of four power supplies: a 4-amp power supply for 121 VAC operation, a 4-amp power supply for 220 VAC operation, a 12-amp power supply for 121 VAC operation and a 12-amp power supply for 220 VAC operation. The combination also has a power supply control unit providing AC switching, fusing, and a failure alarm circuit. Anytime the AC power or DC output from any supply fails an audible alert will sound.

For a complete listing of charger components refer to the Table of Contents for the Equipment Index.

When a battery pack is inserted into a charging insert an amber LED indicator labeled "CHARGING" will light, indicating the battery pack is being charged. The amber indicator light is the only indicator provided for the 500 mAh battery pack. When a 700 mAh battery pack is fully charged a green LED labeled "READY" will light and the charger will automatically switch to a safe 50 milliamp trickle charge.

Each charging circuit in the charge panel uses heat sensors to constantly monitor the temperature of both the battery pack and the charging insert. When a cold battery pack is inserted into a charging insert, the charging circuit for the insert will wait until the battery pack has warmed up to within approximately 10°C of ambient. The charging circuit will then, automatically, apply the high C/2 charging rate. When the battery pack overcharges enough to heat the cells 10°C above ambient the charging circuit will switch from fast charge to trickle charge. The charging circuit also has a memory, set when switching from the C/2 charging rate to trickle charge and reset by removing the battery pack from the charging insert, or an AC power failure. If a hot battery is in the charging insert and the memory has not been reset, the charging circuit will remain at the trickle charge rate. If the memory has been reset the charging circuit will wait until the battery pack has cooled before automatically switching to fast charge. If a fully charged battery pack is removed from the charging insert and then re-inserted, it will charge for approximately 1/2 hour until the cells reheat.

OPERATION

Temperature characteristics of nickel-cadmium batteries, prevent a full charge at temperature extremes. For a maximum charge, recharge the battery pack at room temperatures of from 65° to 85° Fahrenheit whenever possible.

WARNING

General Electric Chargers are designed for charging GE 500 mAh battery pack 19D413522G1 and 700 mAh battery pack 19D413522G4 only. Charging any other battery pack or batteries may result in damage to equipment, leakage or explosion.

During shipment from the factory, connector P1 of battery BT1 is connected to J2 on the control unit. Before placing the rack charger into operation it is necessary to first remove the control unit from the power supply and move P1 to J1. See the Table of Contents for the schematic and outline diagrams of the control unit.

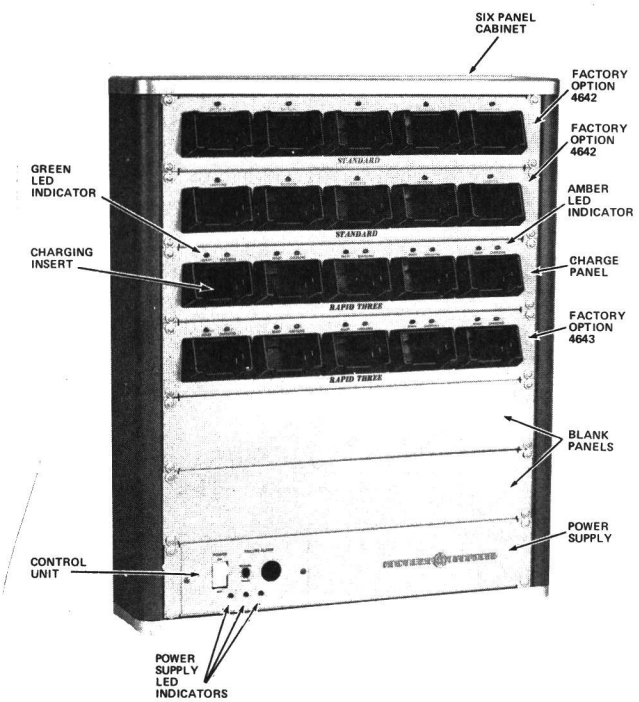


Figure 1 - 3-Hour Rack Charger

To use the rack charger, plug the power cable into the appropriate AC power source (121 VAC or 220 VAC, 50/60 Hertz). Place the POWER, OFF, ON switch on the control unit in the ON position. Place the NORMAL, failed switch on the control unit in the NORMAL position. LED indicators CR1, CR2 and CR3 on the control unit should light. Place the radio into a charging insert with the speaker facing down or place the battery pack into a charging insert with the arrow on the yellow label pointing up. The amber LED indicator, on the charging insert, labeled "CHARGING" will light. The battery pack is being charged.

To charge the 500 mAh battery pack to 100% capacity, let it stay in the charging insert for at least 16 hours. Let the 700 mAh battery pack charge for 3 hours or until the green LED indicator labeled "READY" comes on. See Figure 1.

CIRCUIT ANALYSIS

The 3-Hour Rack Charger combination consists of charge panels and a power supply with a control unit. Any references to symbols mentioned in the following text can be found on the applicable schematic and outline diagrams or parts list (see Table of Contents).

Charge Panel

Charge Panel 19D423210G1 has five parallel connected charging circuits. Each charging circuit consists of a silicon controlled rectifier (SCR), and charging resistor, connected in series with the charging insert, and a Temperature control cut-off circuit.

The unfiltered output from the power supply causes charging current to flow through the SCR and series connected charging resistor at 100 to 120 Hz/second. The charging resistor determines the high charge rate. The duration of high charge rate is controlled by the temperature controlled cutoff circuit.

The temperature controlled cut-off circuit is contained in a thick film hybrid integrated circuit and monitors the temperature of both the charging insert, through thermistor RT1, and the battery pack through a thermistor inside the battery pack. It also fires the SCR, turns the "READY" indicator on when the battery pack is fully charged and provides memory to prevent the same battery pack from being recharged at the high rate.

Thermistors RT1 and RT Battery are connected with R1 and R2 to form a bridge circuit (see Figure 2). The outputs of the bridge circuit are connected to terminals 2 and 14 of U1. When a battery pack is in the charging insert and U1 senses the bridge to be in a nearly balanced condition, the high rate of charge is enabled. When the battery pack is removed from the charging insert, RT Battery is removed from the bridge circuit causing the bridge to be unbalanced. U1 senses the bridge to be unbalanced, the voltage on U1-14 being much larger than the voltage on U1-2, and the charger memory is reset.

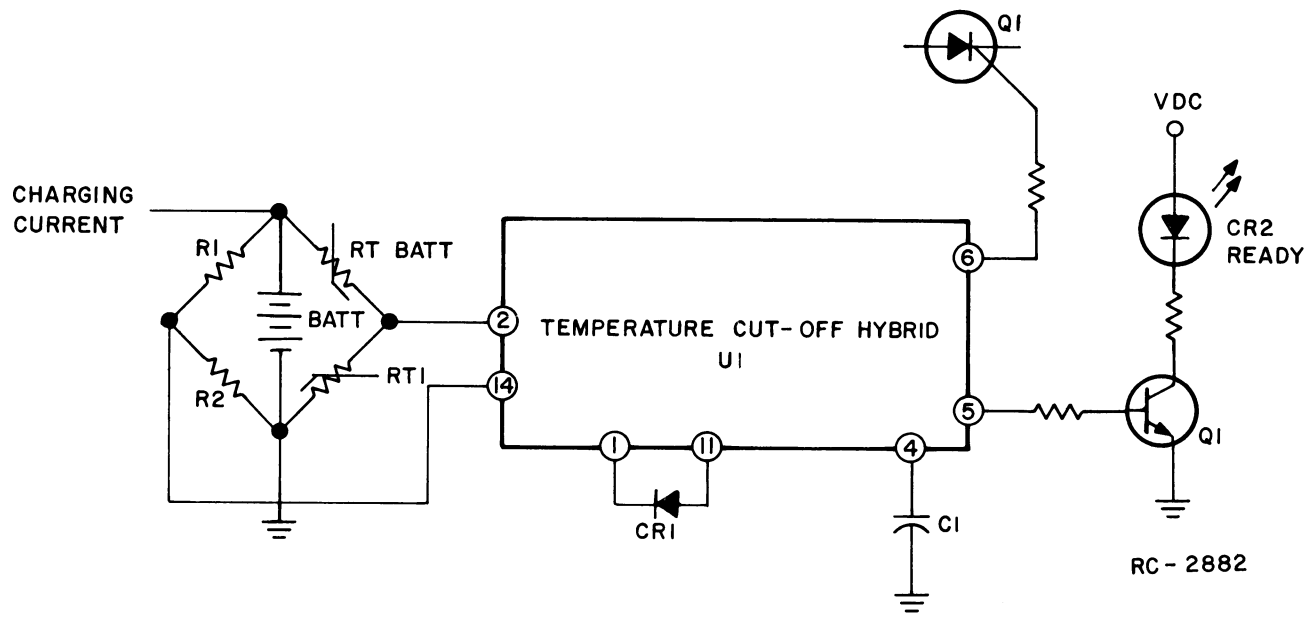


Figure 2 - Typical Temperature Controlled Cut-off Circuit

When the battery pack temperature is more than 10°C below ambient, thermistor RT Battery is a high resistance and the voltage on U1-14 is larger than the voltage on U1-2 just as though no battery pack were present. There is no output from U1-6 or U1-5 and SCR Q7 and LED "READY" indicator CR2 remain off. The battery pack charges at a C/10 rate, determined by a series resistance, until it is less than 10°C below ambient. At less than 10°C below ambient, the voltage at U1-14 and U1-2 are nearly equal and the output at U1-6 goes high to fire Q2 and begin the high charge rate. As the battery pack temperature increases 10°C above ambient during overcharge, the voltage at U1-2 becomes larger than the voltage at U1-14 causing U1-6 to go low. U1-6 going low removes the gating signal from SCR Q1. Q1 cuts off and the charge rate switches from the high rate to the C/10 rate. The larger voltage on U1-2 also causes U1-5 to go high. The high output on U1-5 causes transistor Q2 to conduct and CR2 to light. A memory circuit inside of U1 is set so that the same battery pack cannot be recharged at the high charge rate unless it is first removed from the charging insert to reset the memory.

A portion of the charging current is channeled through the amber LED indicator labeled "CHARGING". When a battery pack is in the charging insert and contact has been made the indicator will light.

4-Amp Power Supply

4-Amp Power Supply 19D423207G1 for 121 VAC operation and 19D423207G2 for 220 VAC operation provide a rectified, unfiltered charging voltage for 3-hour rack charger combinations.

AC voltage developed across the secondary of T801/T802 is rectified by full-wave rectifier circuit CR2 and CR3. The 16 Volt rectified output is connected to the charging panels through parallel connected Molex® connectors J1 and J2.

12-Amp Power Supply

12-Amp Power Supply 19D423208G1 for 121 VAC operation and 19D423208G2 for 220 VAC operation provide three rectified, unfiltered charging voltages for 3-hour rack charger combinations.

AC voltage developed across the secondary of transformers T801/T804, T802/T805 and T803/T806 is rectified by full-wave rectifier circuits CR4 and CR5, CR6 and CR7, and CR8 and CR9. The 16 volt, rectified outputs are connected to the charging panels through parallel connected Molex® connectors J1 and J2, J3 and J4, and J5 and J6.

Control Unit

Control Unit 19C321566G1 for the 12-Amp power supply and 19C321566G2 for the 4-amp power supply provides a POWER, OFF, ON switch, fusing and a failure alarm circuit. With P1 of the control unit plugged into J8 on A801 of the 12-amp power supply or J3 on A801 of the 4-amp power supply, AC voltage is applied through POWER, OFF, ON switch S1 and fuses F1, F2 and F3 to transformer primaries T801/T804, T802/T805 and T803/T806 of the 12-amp power supply and the primary of T801/T802 of the 4-amp power supply. LED indicators CR1, CR2 and CR3 monitor the supply outputs and remain on as long as there is voltage. Bias for the base of transistor Q1 is applied through diodes CR1, CR3 and CR5. Diodes CR2, CR4 and CR6 provide conduction paths back through the power supplies if there is a supply failure. A trickle charge for battery BT1 is applied through CR8 and R14. BT1 provides supply voltage for the failure alarm circuit.

If there is a supply failure the LED indicator associated with the faulty supply will turn off. The conduction path back through the faulty supply will pull the bias voltage on the base of Q1 down. The loss of bias will cause Q1 to turn off, turning transistor Q2 on. With NORMAL, FAILED switch S2 in the NORMAL position, audio oscillator transistors Q3 and Q4 will turn on. The failure alarm will be heard from speaker LS1. With transistor Q2 conducting and S2 switched to the FAILED position, the audio oscillator will be off. When the supply voltage is restored, the failure alarm will again sound until S2 is switched back to the NORMAL position.

For a remote alarm speaker, remove the jumper between H8 and H9 on the Control Unit (See note 1 on the Schematic Diagram). With a maximum of 100-feet of number 22 AWG wire or larger, connect a remote 8-ohm speaker across TB801 on A801 of the power supply.

MAINTENANCE

Access

To gain access to the circuitry of a charger panel or power supply, remove the four screws holding the defective panel or power supply in the rack. Lift the panel or power supply from the rack disconnecting any Molex® connectors. A charger panel must be removed to replace any LED indicators. To replace a fuse it is necessary only to remove the control unit from the power supply.

Troubleshooting

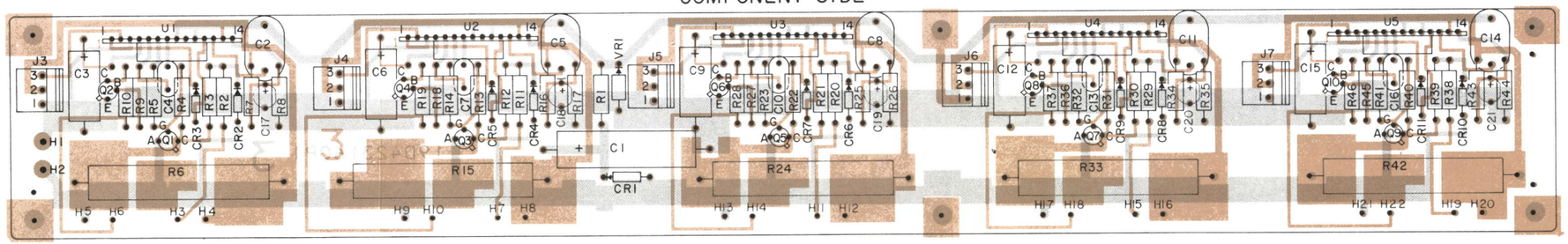
Should a difficult service problem arise, the Troubleshooting Procedure listed in the Table of Contents is provided to assist the service technician. The procedure includes servicing the 3 hour charger panel, the 4-amp power supply and the 12-amp power supply.

INSTALLATION

Rack chargers should be mounted on a wall close to a 121-Volt AC or 220-Volt AC (50/60 Hertz) source. Care should be taken when mounting to insure proper top and bottom ventilation. A minimum air space of two inches is required between the bottom of a rack charger and other surfaces.

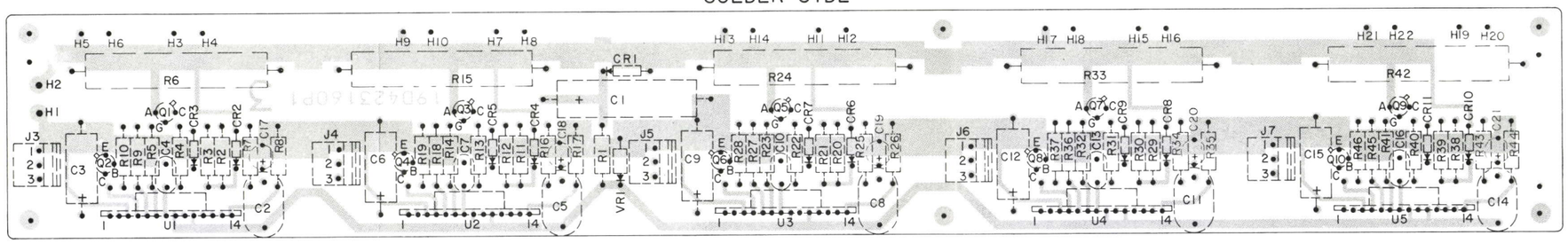
In multiple rack charger installations, horizontal placement along a wall is recommended. Vertical placement will not allow proper ventilation.

A1
COMPONENT SIDE



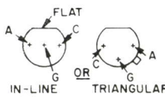
(19C321474, Sh. 1, Rev. 3)
(19C321474, Sh. 2, Rev. 3)

SOLDER SIDE

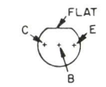


(19C321474, Sh. 2, Rev. 3)

LEAD IDENTIFICATION
FOR Q1,Q3,Q5,Q7 & Q9



LEAD IDENTIFICATION
FOR Q2,Q4,Q6,Q8,Q10



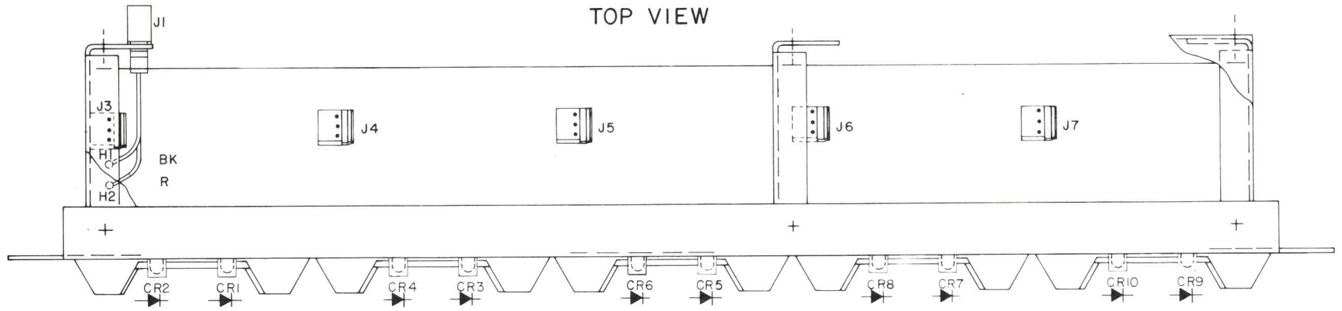
VIEW FROM CASE END

NOTE LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION. TAB INDICATES EMITTER LEAD.

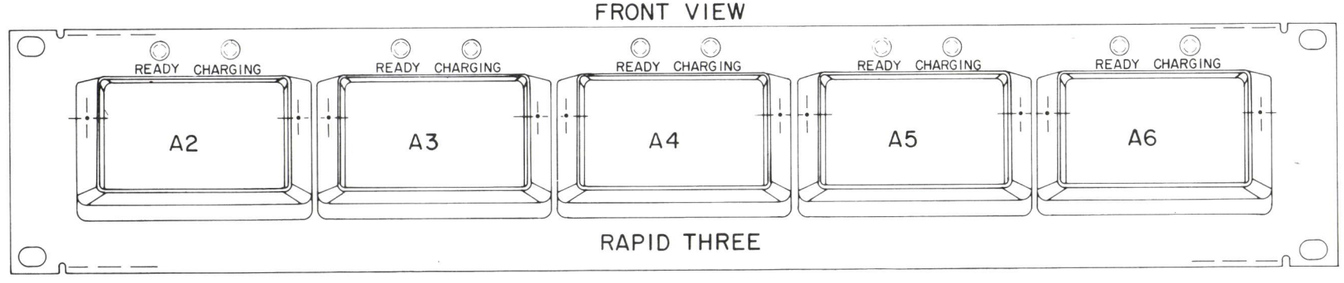
LEAD IDENTIFICATION
(FOR CR1 THROUGH CR10)

VIEW FROM LEAD END

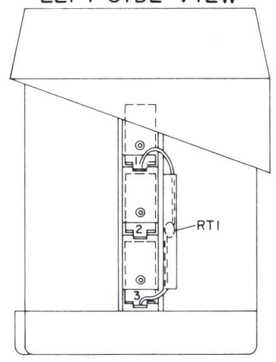
TOP VIEW



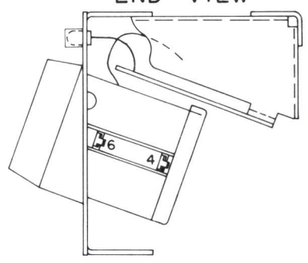
FRONT VIEW

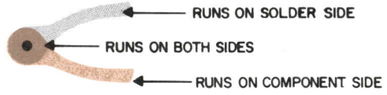


CHARGING SLEEVE
LEFT SIDE VIEW



END VIEW





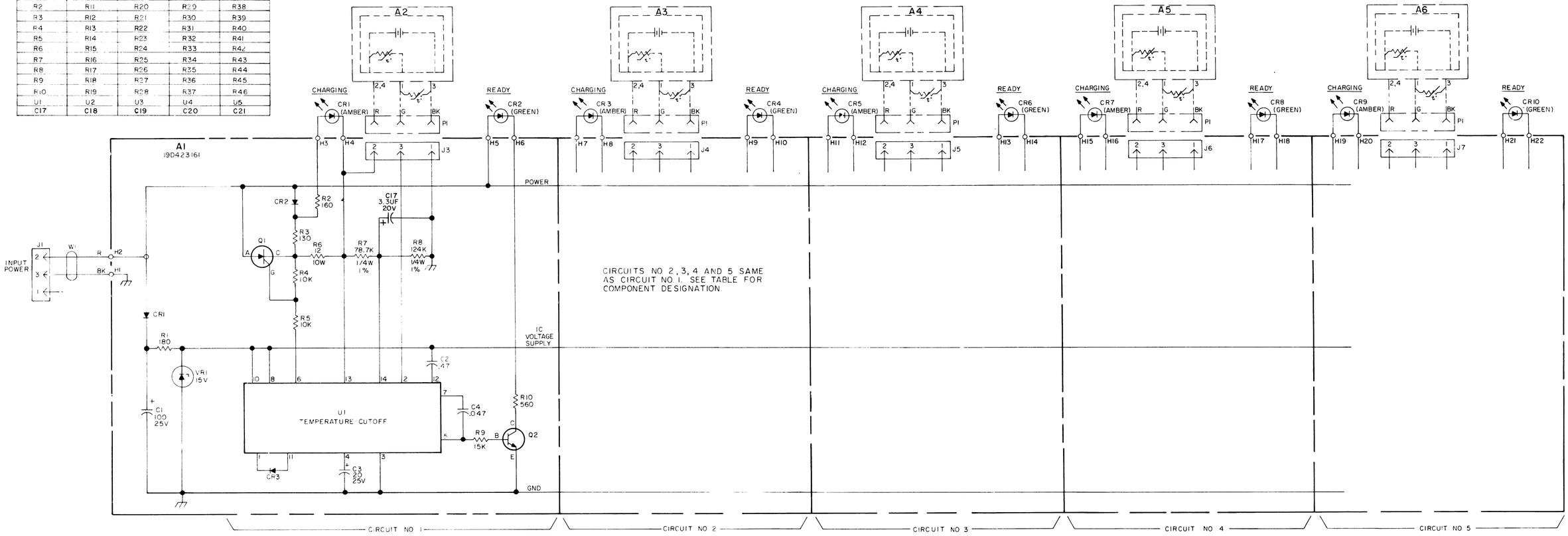
OUTLINE DIAGRAM

3 HOUR CHARGING PANEL
19D423210G1

(19D423702, Rev. 3)

TABLE OF COMPONENT DESIGNATION

CIRCUIT NO 1	CIRCUIT NO 2	CIRCUIT NO 3	CIRCUIT NO 4	CIRCUIT NO 5
C2	C5	C8	C11	C14
C3	C6	C9	C12	C15
C4	C7	C10	C13	C16
CR2	CR4	CR6	CR8	CR10
CR3	CR5	CR7	CR9	CR11
Q1	Q3	Q5	Q7	Q9
Q2	Q4	Q6	Q8	Q10
R2	R11	R20	R29	R38
R3	R12	R21	R30	R39
R4	R13	R22	R31	R40
R5	R14	R23	R32	R41
R6	R15	R24	R33	R42
R7	R16	R25	R34	R43
R8	R17	R26	R35	R44
R9	R18	R27	R36	R45
R10	R19	R28	R37	R46
U1	U2	U3	U4	U5
C17	C18	C19	C20	C21



ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN MICROFARADS

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19R622160, Rev. 5)

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
FL19D423210G1	A
P_19D423161G1	B

SCHEMATIC DIAGRAM

3 HOUR CHARGING PANEL
19D423210G1

PARTS LIST

LBI30010D

3 HOUR CHARGER PANEL
19D423210G1

SYMBOL	GE PART NO.	DESCRIPTION
		COMPONENT BOARD 19D423161G1
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115680P5	Electrolytic: 100 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C2	19A116080P111	Polyester: 0.48 µf ±10%, 50 VDCW.
C3	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C4	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C5	19A116080P111	Polyester: 0.48 µf ±10%, 50 VDCW.
C6	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C7	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C8	19A116080P111	Polyester: 0.48 µf ±10%, 50 VDCW.
C9	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C10	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C11	19A116080P111	Polyester: 0.48 µf ±10%, 50 VDCW.
C12	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C13	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C14	19A116080P111	Polyester: 0.48 µf ±10%, 50 VDCW.
C15	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C16	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C17* thru C21*	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW. Added by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4037822P1	Silicon, 1000 mA, 400 PIV.
CR2 thru CR11	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J3 thru J7	19A116659P55	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116642P1	Thyristor, rectifier, silicon controlled: sim to Type 2N5064.
Q2	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q3	19A116642P1	Thyristor, rectifier, silicon controlled: sim to Type 2N5064.
Q4	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q5	19A116642P1	Thyristor, rectifier, silicon controlled: sim to Type 2N5064.
Q6	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q7	19A116642P1	Thyristor, rectifier, silicon controlled: sim to Type 2N5064.
Q8	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q9	19A116642P1	Thyristor, rectifier, silicon controlled: sim to Type 2N5064.
Q10	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P181J	Composition: 180 ohms ±5%, 1/2 w.
R2	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R3	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R4 and R5	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R6*	5493035P61	Wirewound: 12 ohms ±5%, 10 w; sim to Hamilton Hall Type HR.
		Earlier than REV A:
	5493035P26	Wirewound: 12 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R7	19C314256P27872	Metal film: 78.7K ohms ±1%, 1/4 w.
R8	19C314256P21243	Metal film: 124K ohms ±1%, 1/4 w.
R9	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R10	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R11	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R12	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R13 and R14	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R15*	5493035P61	Wirewound: 12 ohms ±5%, 10 w; sim to Hamilton Hall Type HR.
		Earlier than REV A:
	5493035P26	Wirewound: 12 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R16	19C314256P27872	Metal film: 78.7K ohms ±1%, 1/4 w.
R17	19C314256P21243	Metal film: 124K ohms ±1%, 1/4 w.
R18	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R19	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R20	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R21	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R22 and R23	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R24*	5493035P61	Wirewound: 12 ohms ±5%, 10 w; sim to Hamilton Hall Type HR.
		Earlier than REV A:
	5493035P26	Wirewound: 12 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R25	19C314256P27872	Metal film: 78.7K ohms ±1%, 1/4 w.
R26	19C314256P21243	Metal film: 124K ohms ±1%, 1/4 w.
R27	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R28	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R29	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R30	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R31 and R32	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R33*	5493035P61	Wirewound: 12 ohms ±5%, 10 w; sim to Hamilton Hall Type HR.
		Earlier than REV A:
	5493035P26	Wirewound: 12 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R34	19C314256P27872	Metal film: 78.7K ohms ±1%, 1/4 w.
R35	19C314256P21243	Metal film: 124K ohms ±1%, 1/4 w.
R36	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R37	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R38	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R39	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R40 and R41	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R42*	5493035P61	Wirewound: 12 ohms ±5%, 10 w; sim to Hamilton Hall Type HR.
		Earlier than REV A:
	5493035P26	Wirewound: 12 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R43	19C314256P27872	Metal film: 78.7K ohms ±1%, 1/4 w.
R44	19C314256P21243	Metal film: 124K ohms ±1%, 1/4 w.
R45	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R46	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1 thru U5	19D423164G1	Temp. Cut-Off Hybrid.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	4036887P12	Zener: 500 mW, 15 v nominal.
A2 thru A6		SLEEVE ASSEMBLY 19C321506G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1		(Part of W1).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
RT1	19C300048P6	Disc: 50K ohms ±10%; sim to NL IND. 4D103.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19B226769G1	Cable: 3 contacts; approx 6 inches long. Includes P1 (19A116659P14).
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A134354P2	Diode, optoelectronic: yellow; sim to Hew. Packard 5082-4555.
CR2	19A134354P3	Diode, optoelectronic: green; sim to Hew. Packard 5082-4955.
CR3	19A134354P2	Diode, optoelectronic: yellow; sim to Hew. Packard 5082-4555.
CR4	19A134354P3	Diode, optoelectronic: green; sim to Hew. Packard 5082-4955.
CR5	19A134354P2	Diode, optoelectronic: yellow; sim to Hew. Packard 5082-4555.
CR6	19A134354P3	Diode, optoelectronic: green; sim to Hew. Packard 5082-4955.
CR7	19A134354P2	Diode, optoelectronic: yellow; sim to Hew. Packard 5082-4555.
CR8	19A134354P3	Diode, optoelectronic: green; sim to Hew. Packard 5082-4955.
CR9	19A134354P2	Diode, optoelectronic: yellow; sim to Hew. Packard 5082-4555.
CR10	19A134354P3	Diode, optoelectronic: green; sim to Hew. Packard 5082-4955.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1		(Part of W1).
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19B226803G1	Cable: approx 3-1/2 inches long. Includes J1 (19B209288P9).
		MECHANICAL PARTS (SEE RC2895)
1	19C321490P1	Support.
2	19B226756P1	Cover.
3	19B201074P304	Tap screw, Phillips POZIDRIV : No. 6-32 x 1/4.
4	19C321490P2	Support.
5	N136AP905C6	Tap screw, Phillips POZIDRIV : No. 4-24 x 5/16.
6	N330P603F22	Eyelet, metallic: No. 1/16 x 3/32.
7	19B216916P1	Contact.
8	19E500915P1	Sleeve.
9	19C321020P2	Cover.
10	19D417978P1	Panel.
11	NP279946P1	Nameplate. (READY-CHARGING).
12	19C321506G1	Sleeve assembly. (Includes items 6-9).
13	NP279946P3	Nameplate. (RAPID THREE).
14	19A134521P2	Lens. (READY).
15	19A134521P4	Lens. (CHARGING).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

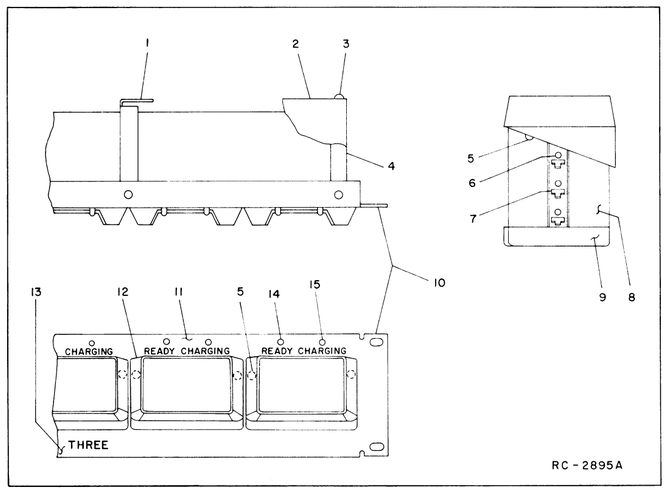
PRODUCTION CHANGES

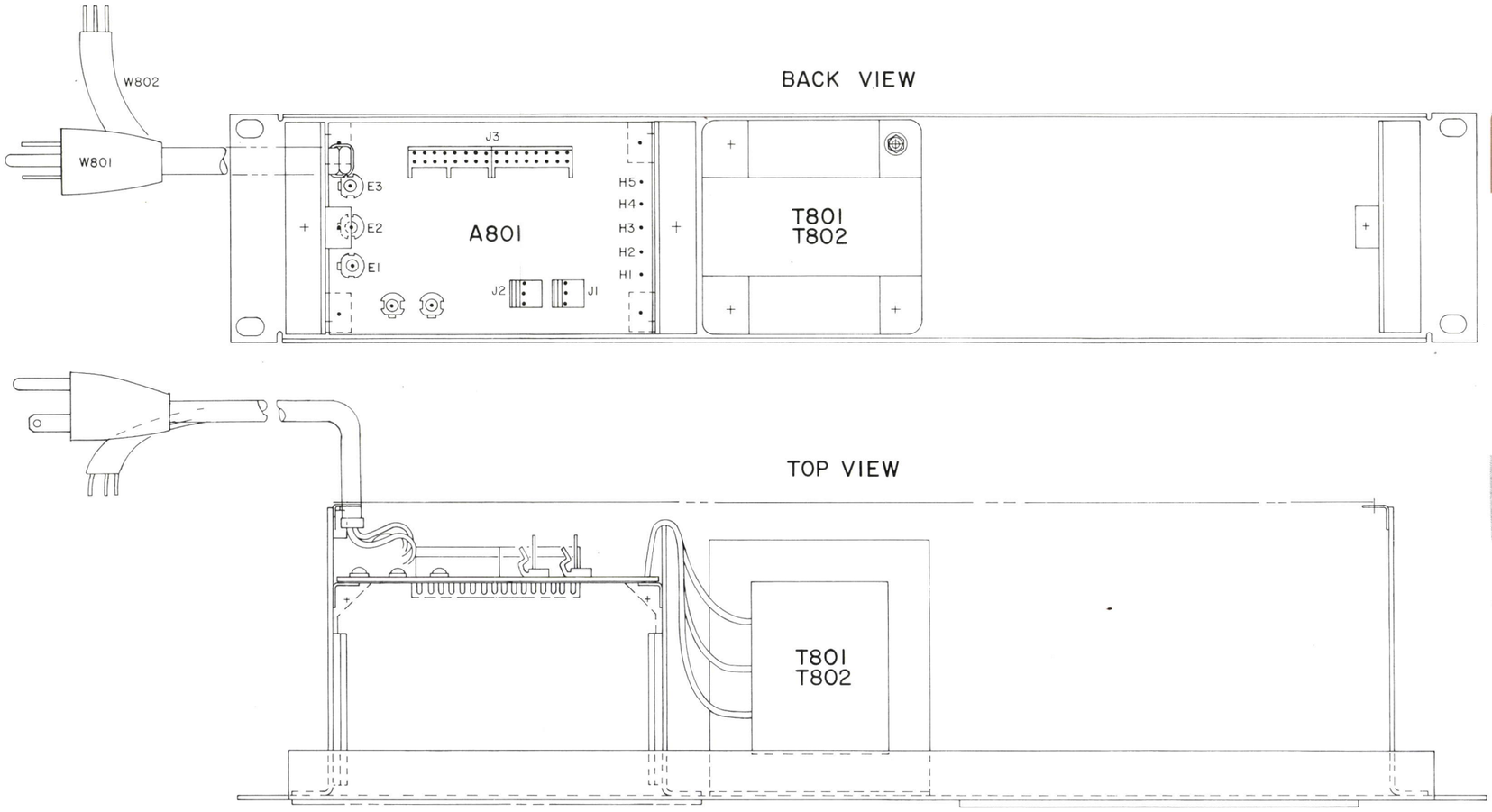
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - Component Board 19D423161G1
To improve reliability. Changed R6, R15, R24, R33 and R42.

REV. A - Charger Panel 19D423210G1
To improve reliability. Added ventilation slots in cover.

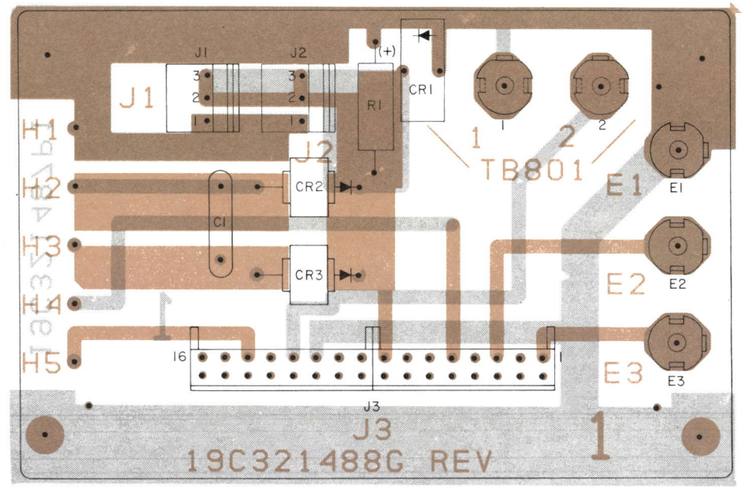
REV. B - Component Board 19D423161G1
To improve performance of "Fast" to "trickle" chagre switching.
Added C17 through C21.





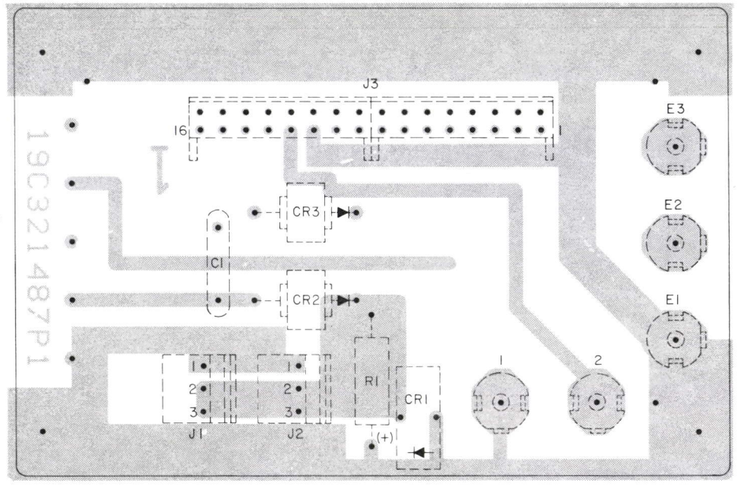
(19D423687, Rev. 1)

A801
COMPONENT SIDE



(19B226762, Sh. 1, Rev. 1)
(19B226762, Sh. 2, Rev. 1)

SOLDER SIDE



(19B226762, Sh. 2, Rev. 1)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM

4 AMP POWER SUPPLY

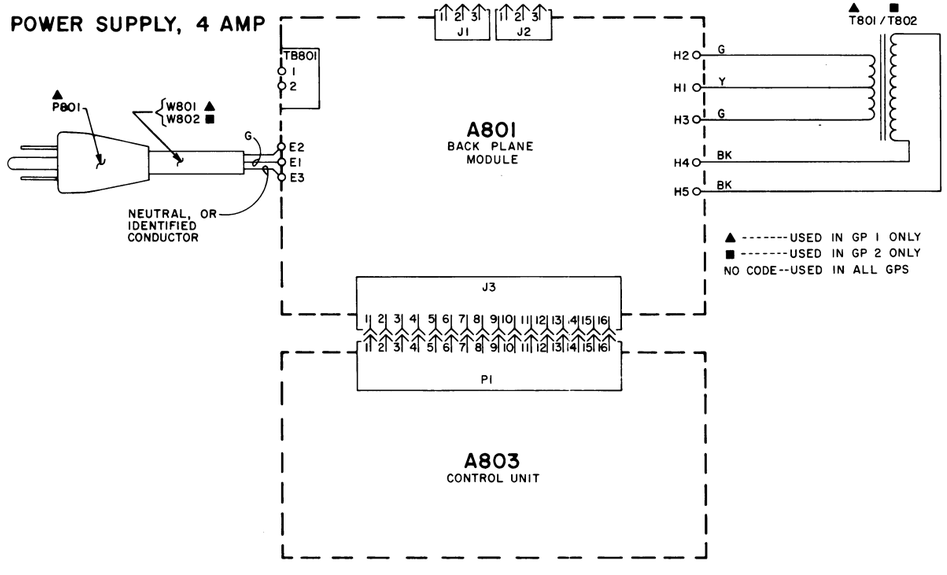
PARTS LIST

LBI-30004

4 AMP POWER SUPPLY
19D423207G1 121 VAC
19D423207G2 220 VAC

SYMBOL	GE PART NO.	DESCRIPTION
A801		BACK PLANE BOARD 19C321488G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	7774750P13	Ceramic disc: .01 µf +100% -0%, 500 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A116062P2	Selenium.
CR2 and CR3	19A116783P1	Silicon.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 thru E3	19A116667P3	Plate nut.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	19A116659P55	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.
J3	19A116659P3	Connector, printed wiring: 8 contacts; sim to Molex 09-52-3082.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R78P391J	Composition: 390 ohms ±5%, 1 w.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB801	19A116667P3	Plate nut. (Quantity 2).
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T801	19A116218P1	Power, step-down: Pri: 117 VRMS, 50/60 Hz, Sec: 15.25 VRMS each side of CT (no load).
T802	19A116218P2	Power, step-down: Pri: 220 VRMS, 50/60 Hz, Sec: 15.25 VRMS each side of CT (no load).
		- - - - - - - - - - CABLES - - - - - - - - - -
W801	19A130534G1	Power: 3 wire.
W802	19A130534G2	Power: 3 wire.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C321399P1	Cover.
	19B226804P1	Insulator. (Used with cover).
	4035449P4	Rubber bumper. (Located on cover).
	19B209572P2	Identification plate.
	19C307038P7	Nut, push-on: sim to Palnut PS094032. (Used with identification plate).
	19A115185P4	Retainer block. (Used with retainer strap).
	19A115185P5	Retainer strap. (Used with retainer block).
	NP279972	Nameplate, aluminum foil. 65 watt, .53 amp, 50-60 Hz, 109-133 VAC.
	NP279974	Nameplate, aluminum foil. 65 watt, .29 amp, 50-60 Hz, 198-242 VAC.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

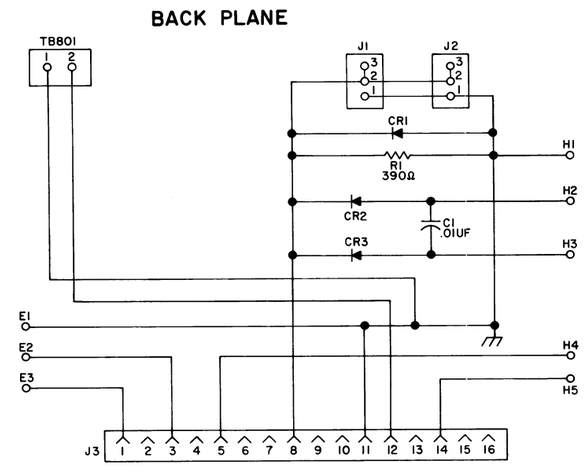
MODEL NO REV LETTER

PL19D423207G1
121 VAC

PL19D423207G2
220 VAC

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19C321531, Rev. 1)



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO REV LETTER

PL19321488G1

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

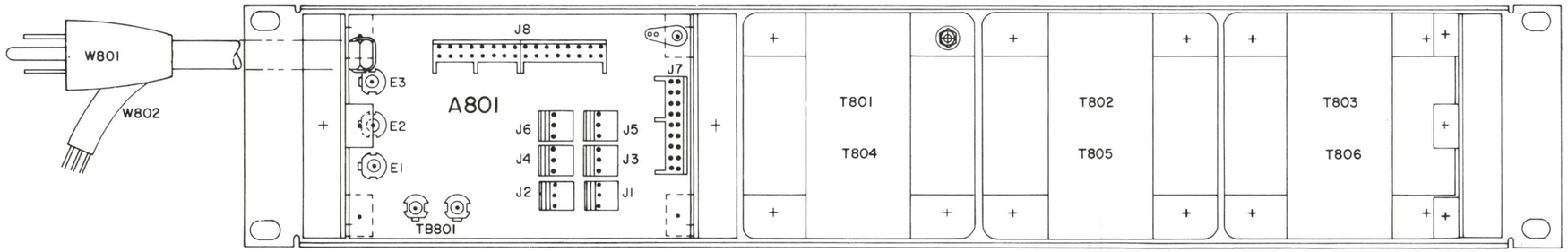
(19B226669, Rev.1)

SCHEMATIC DIAGRAM

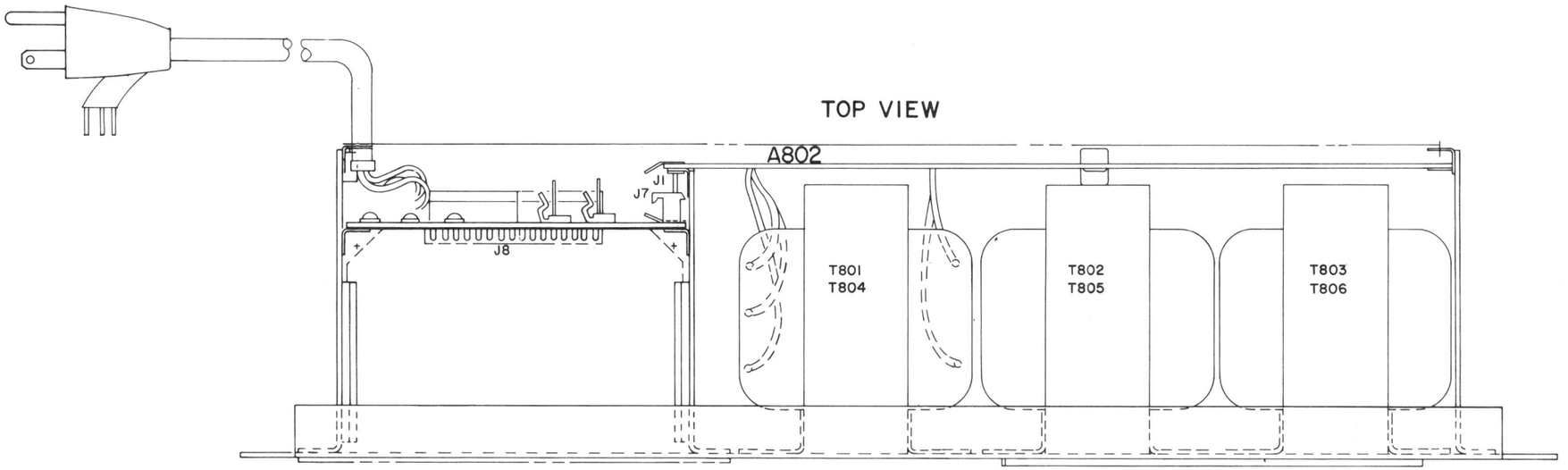
4 AMP POWER SUPPLY & BACK PLANE

Issue 1

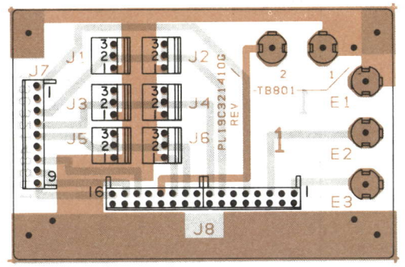
BACK VIEW



TOP VIEW

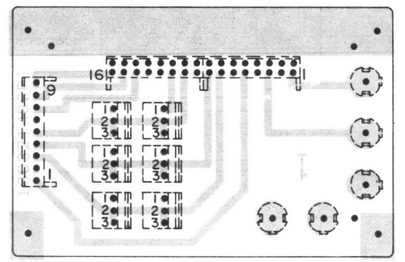


A801
COMPONENT SIDE



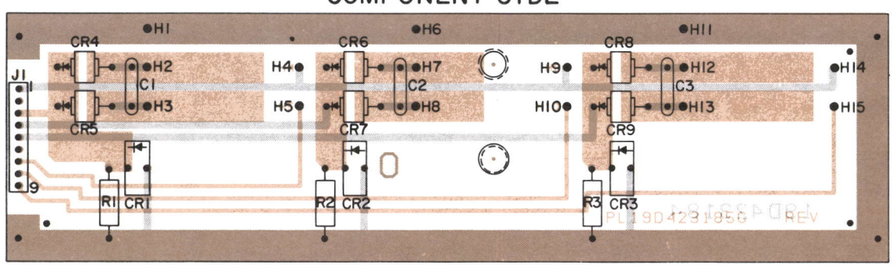
(19B226761, Sh. 1, Rev. 1)
(19B226761, Sh. 2, Rev. 1)

SOLDER SIDE



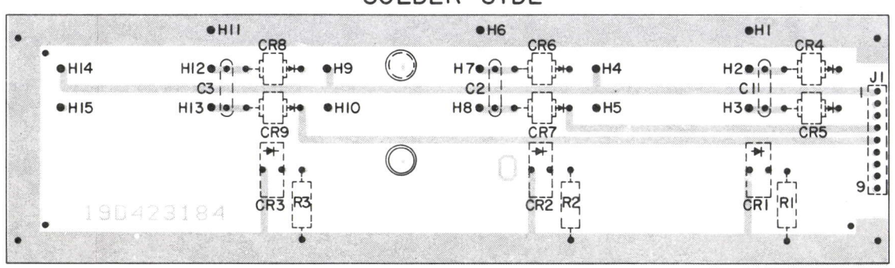
(19B226761, Sh. 2, Rev. 1)

A802
COMPONENT SIDE



(19C321489, Sh. 1, Rev. 0)
(19C321489, Sh. 2, Rev. 0)

SOLDER SIDE



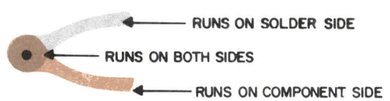
(19C321489, Sh. 2, Rev. 0)

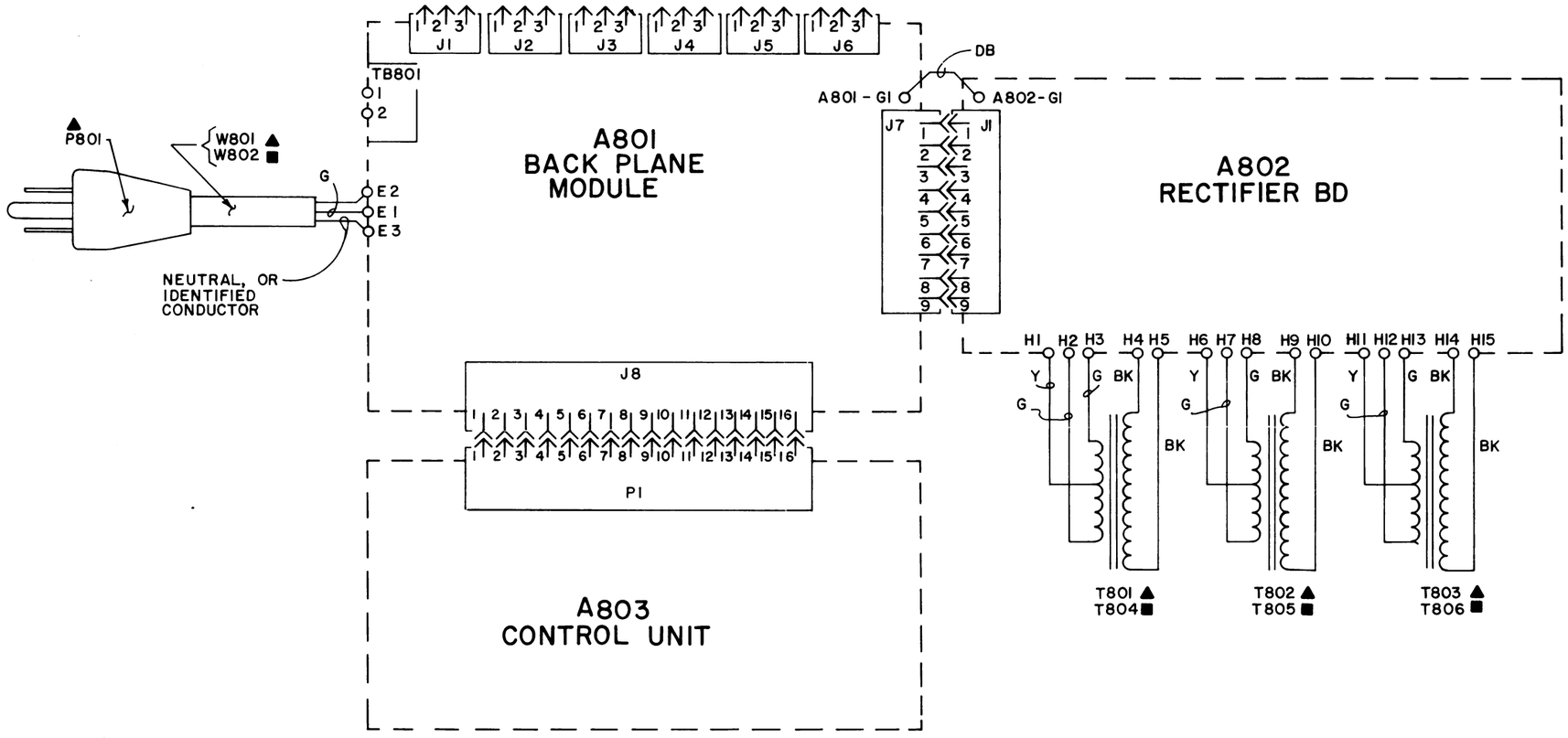
(19D423700, Rev. 2)

OUTLINE DIAGRAM

12 AMP POWER SUPPLY

12 Issue 3





SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.	
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9D423208G1 121VAC	
PLI9D423208G2 220VAC	

▲ USED FOR GP1 ONLY
■ USED FOR GP2 ONLY
NO CODE, USED IN ALL GPS

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19C321530, Rev. 1)

SCHEMATIC DIAGRAM

12 AMP POWER SUPPLY
19D423208G1 & G2

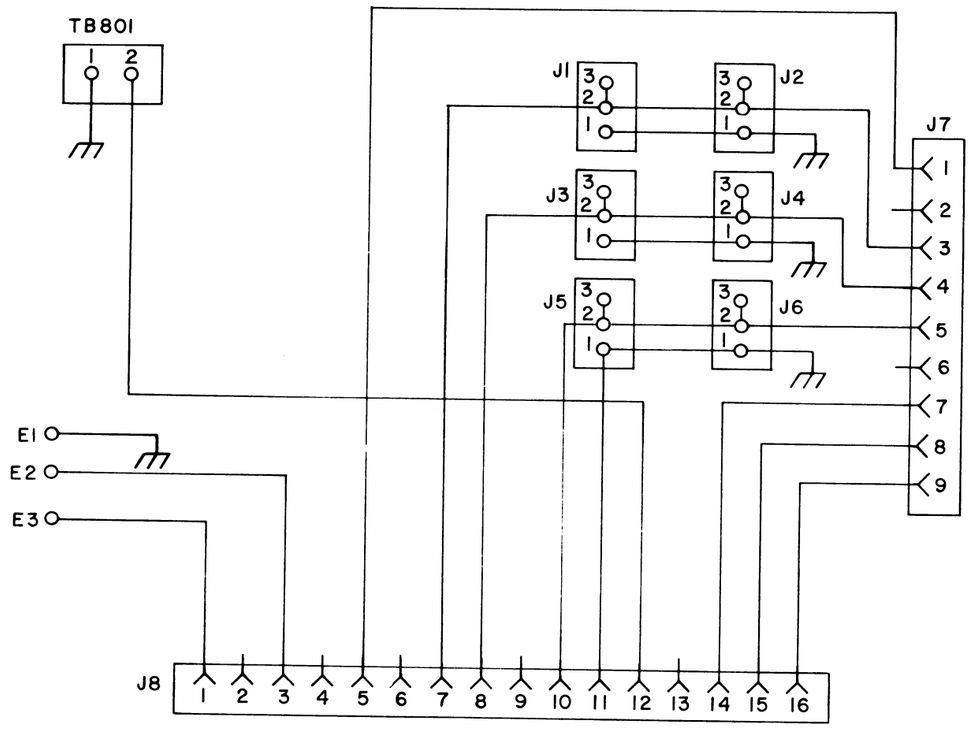
PARTS LIST

LBI-30003

12 AMP POWER SUPPLY
19D423208G1 121 VAC
19D423208G2 220 VAC

SYMBOL	GE PART NO.	DESCRIPTION
A801		COMPONENT BOARD 19C321410G1
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 thru E3	19A116667P3	Plate nut.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J6	19A116659P55	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.
J7	19A116659P62	Connector, printed wiring: 9 contacts; sim to Molex 09-52-3093.
J8	19A116659P3	Connector, printed wiring: 8 contacts; sim to Molex 09-52-3082. (Quantity 2).
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB801	19A116667P3	Plate nut. (Quantity 2).
A802		RECTIFIER BOARD 19D423185G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C3	7774750P13	Ceramic disc: .01 µf +100% -0%, 500 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR3	19A116062P1	Selenium.
CR4 thru CR9	19A116783P1	Silicon.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A116659P39	Connector, printed wiring: 9 contacts; sim to Molex 09-64-1099.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1 thru R3	3R78P391J	Composition: 390 ohms ±5%, 1 w.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - -
T801 thru T803	19A116218P1	Power, step-down: Pri: 117 VRMS, 50/60 Hz, Sec: 15.25 VRMS each side of CT (no load).
T804 thru T806	19A116218P2	Power, step-down: Pri: 220 VRMS, 50/60 Hz, Sec: 15.25 VRMS each side of CT (no load).
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W801	19A130534G1	Cable: 3 wire.
W802	19A130534G2	Cable: 3 wire.
		- - - - - - - - - - MISCELLANEOUS - - - - - - -
	19C321399P1	Cover.
	19A115185P4	Retainer base. (Used with strap 19A115185P5 to secure W801, W802).
	19A115185P5	Retainer strap. (Used with retainer base 19A115185P4 to secure W801, W802).
	4036994P1	Terminal, solder: sim to Zierick Mfg Corp 505.
	19B226804P1	Insulator. (Located under A801).
	4035449P4	Rubber bumper. (Located in cover).
	19C307038P7	Nut, push on. (Located on identification plate).
	19B209572P1	Identification plate.
	NP279973	Nameplate, aluminum foil. 195 watt, 1.6 amps, 50-60 Hz, 109-133 VAC.
	NP279975	Nameplate, aluminum foil. 195 watt, .88 amp, 50-60 Hz, 198-242 VAC.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER

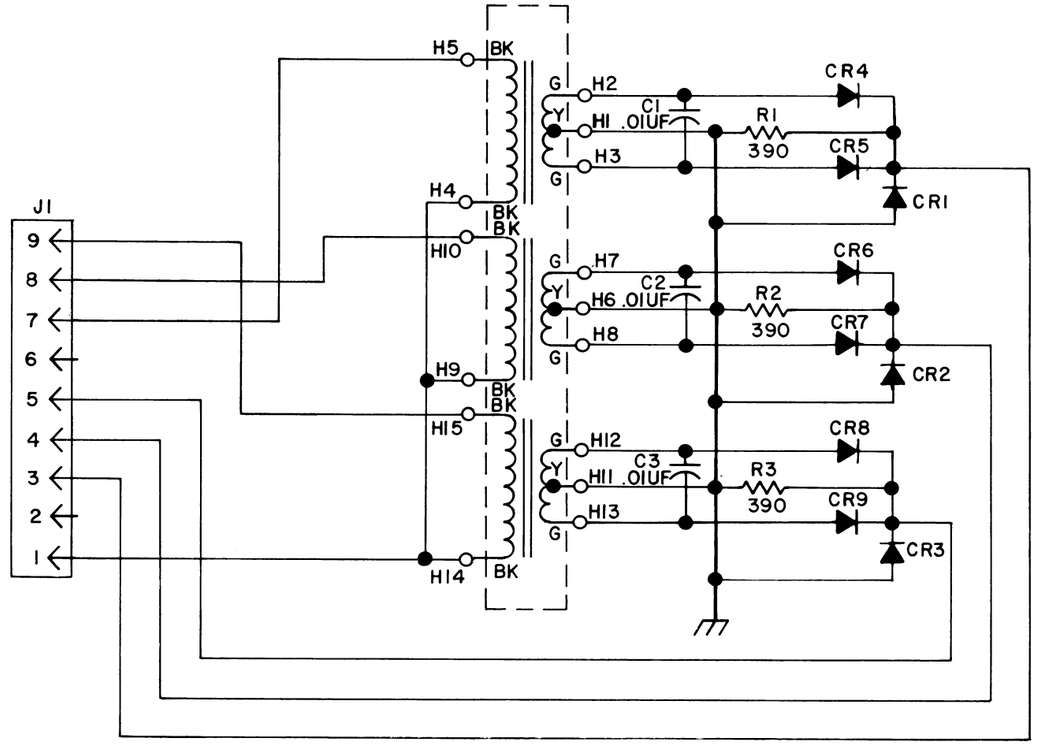
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C321410G1	

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19B226780, Rev. 1)

SCHEMATIC DIAGRAM

12 AMP POWER SUPPLY
BACK PLANE (A801)
19C321410G1



ALL RESISTORS ARE 1 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19D423185	

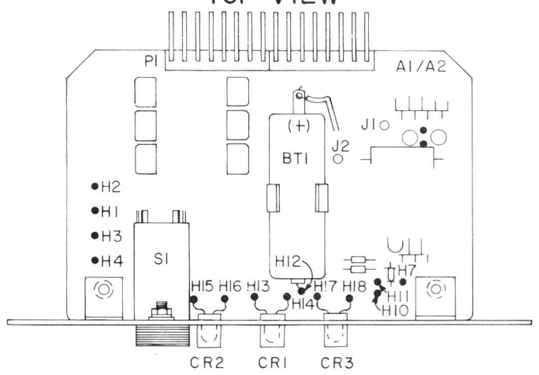
(19B226792, Rev. 1)

SCHEMATIC DIAGRAM

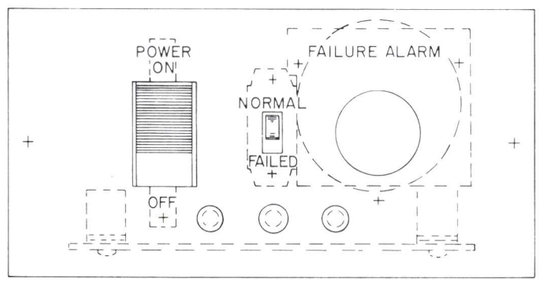
12 AMP POWER SUPPLY
RECTIFICER BOARD (A803)
19D423185G1

A801

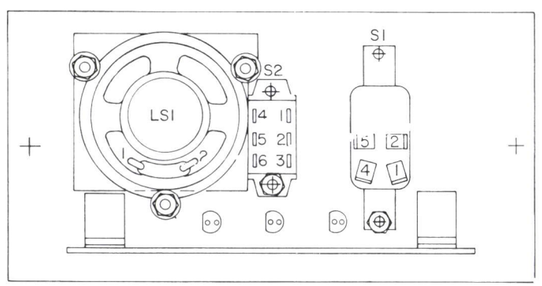
TOP VIEW



FRONT VIEW

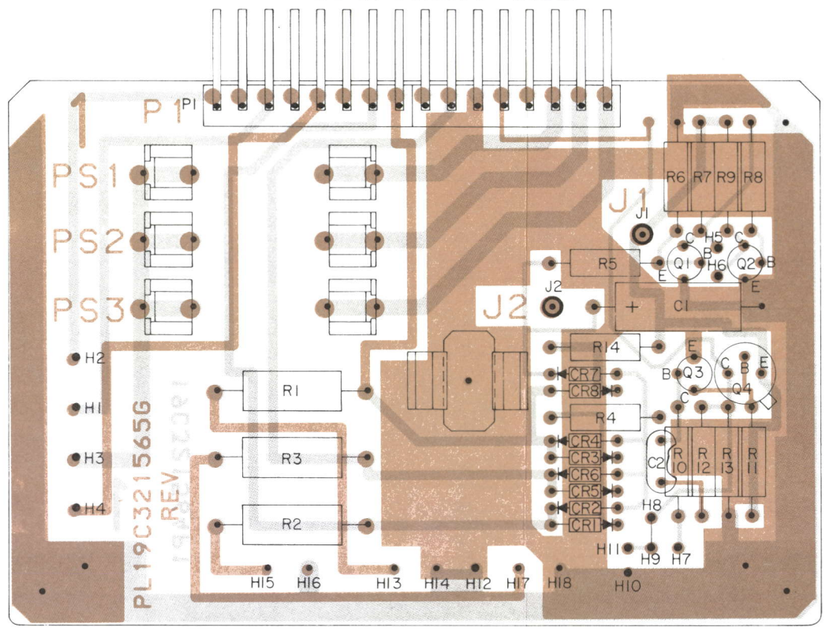


BACK VIEW



A1/A2

COMPONENT SIDE



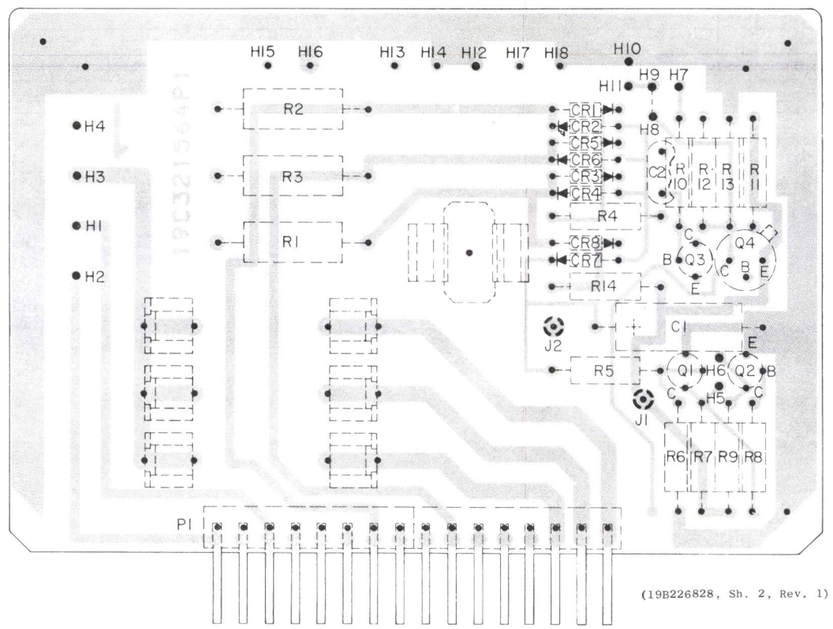
(19B226828, Sh. 1, Rev. 1)
(19B226828, Sh. 2, Rev. 1)

LEAD IDENTIFICATION
FOR CR1, CR2 AND CR3

(CATHODE TO H14, H16, & H18 ON BD.)

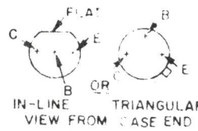
FLAT DENOTES CATHODE

SOLDER SIDE



(19B226828, Sh. 2, Rev. 1)

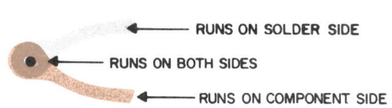
LEAD IDENTIFICATION
FOR Q1 THRU Q3



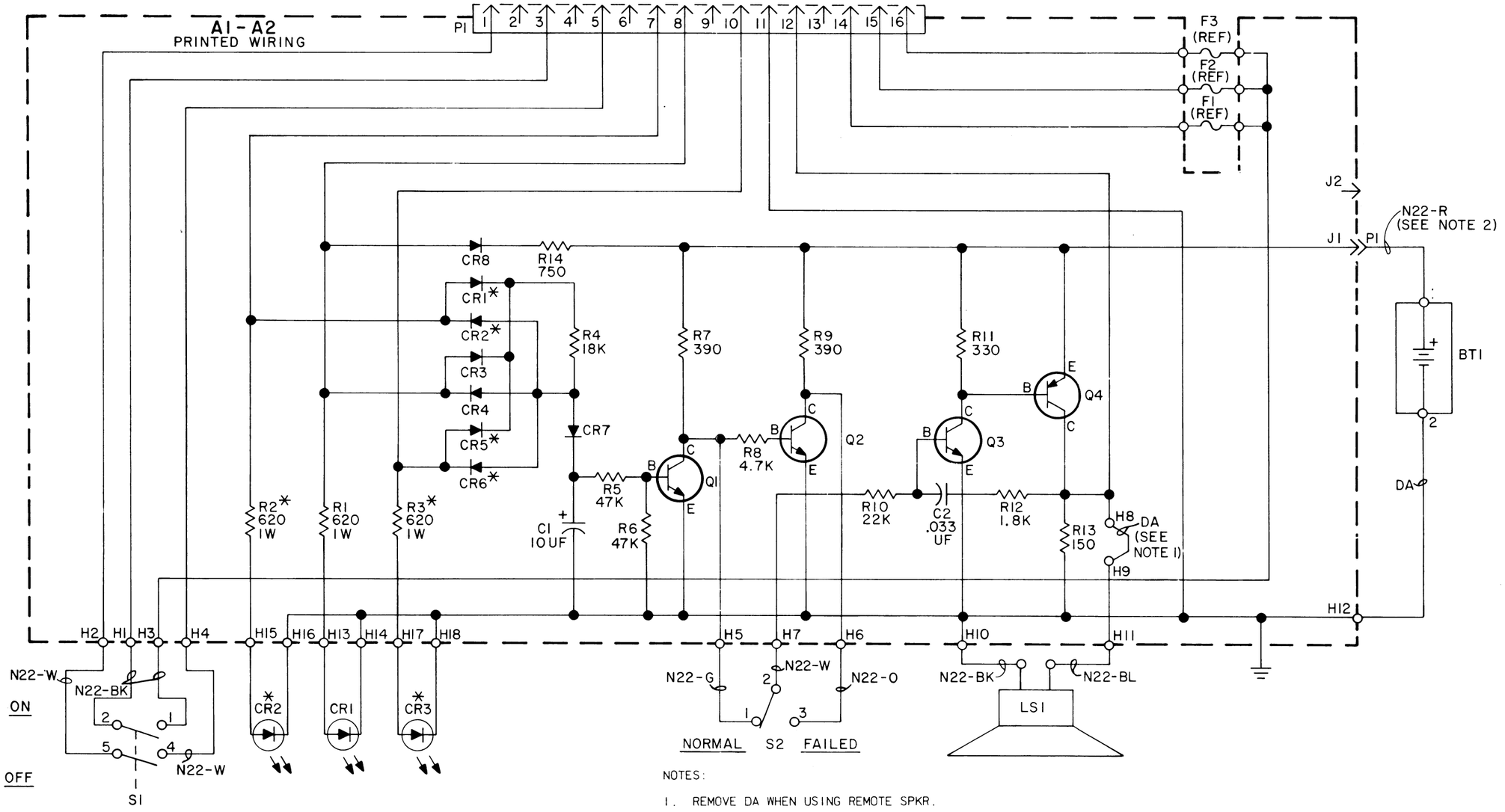
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION. TAB INDICATES EMITTER LEAD.

OUTLINE DIAGRAM

CONTROL UNIT
19C321566-G1 & G2



(19D423682, Rev. 1)



NOTES:

1. REMOVE DA WHEN USING REMOTE SPKR.
2. P1 OF BT-1 CONNECTED TO J2 OF A1-A2 DURING SHIPMENT.
3. OMIT COMPONENTS MARKED * IN GP 2.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9C321565G1 (P.C. BD ASM)	
PLI9C321566G1 (MODULE ASM)	

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG = 1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF = MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH = MILLIHENRYS OR H = HENRYS.

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19C321582, Rev. 2)

SCHEMATIC DIAGRAM

CONTROL UNIT
19C321566-G1 & G2

PARTS LIST

LBI-30037

CONTROL UNIT
19C321566G1 12 AMP
19C321566G2 4 AMP

SYMBOL	GE PART NO.	DESCRIPTION
A1 and A2		COMPONENT BOARD A1 19C321565G1 12 AMP A2 19C321565G2 4 AMP
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115680P8	Electrolytic: 10 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C2	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 thru CR8	19A115250P1	Silicon.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 thru E6	4031537P1	Terminal: sim to Alden Products 654T.
		- - - - - - - - - - - FUSES - - - - - - - - - - -
F1 thru F3	7487942P26	Slow blowing: 1.6 amp at 125 v; sim to Bussmann MDL-1.6. (121 VAC, 4 and 12 AMP).
F1 thru F3	7487942P4	Slow blowing: 3/4 amp at 250 v; sim to Bussmann MDL-3/4. (220 VAC, 4 and 12 AMP).
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A116659P30	Connector, printed wiring: 8 contacts; sim to Molex 2373-8A.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q4	19A115562P1	Silicon, PNP: sim to Type 2N2904A.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R3	3R78P621J	Composition: 620 ohms ±5%, 1 w.
R4	3R77P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R5 and R6	3R77P473J	Composition: 47,000 ohms ±5%, 1/2 w.
R7	3R77P391J	Composition: 390 ohms ±5%, 1/2 w.
R8	3R77P472J	Composition: 4700 ohms ±5%, 1/2 w.
R9	3R77P391J	Composition: 390 ohms ±5%, 1/2 w.
R10	3R77P223J	Composition: 22,000 ohms ±5%, 1/2 w.
R11	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R12	3R77P182J	Composition: 1800 ohms ±5%, 1/2 w.
R13	3R77P151J	Composition: 150 ohms ±5%, 1/2 w.
R14	3R77P751J	Composition: 750 ohms ±5%, 1/2 w.
		- - - - - - - - - - BATTERIES - - - - - - - - - -
BT1	19A130557G1	Battery: Nickel Cadmium, rechargeable, 1.2 volt, 0.6 ampere hour; sim to GE 41B907AA07-11.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 thru CR3	19A134146P5	Diode, optoelectronic: green; sim to Opcoa LSM-16L.
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - - -
LS1	19A116090P1	Permanent magnet: 2.00 inch, 8 ohms ±10% voice coil imp, 450 Hz ±112 Hz resonant; freq range 400 to 3000 Hz.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B209498P2	Push: DPST, 20 amps and 220 VRMS; sim to McGill 0811-0188 with black knob.
S2	7145098P1	Slide: DPDT, 0.75 amp at 125 VAC or 0.5 amp at 125 VDC; sim to Stackpole SS-150.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B226677G3	Cover. (Used with 12 AMP).
	19B226677G4	Cover. (Used with 4 AMP).
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4. (Secures A1, A2 component board to module).
	19A130555P1	Screen. (Used with LS1).
	NP279976	Decal. (POWER, ON-OFF; FAILURE ALARM, NORMAL-FAILED).
	19A116688P1	Clip, electrical. (Fuse clips).
	7118719P3	Clip, spring tension: sim to Prestole E-50003-003. (Battery).
	19B200525P153	Rivet, tubular. (Secures battery clip).
	4036555P1	Insulator, washer: nylon. (Used with Q4 on A1, and A2).

PARTS LIST

LBI-30007

3 AND 7 PANEL CABINETS
19C321522G1 3 PANEL
19C321522G2 7 PANEL

SYMBOL	GE PART NO.	DESCRIPTION
	19B226790G1	Support, cabinet siding. (3 Panel).
	19B226790G2	Support, cabinet siding. (7 Panel).
	19C321521G1	Cover. (Top and bottom).
	19B209008P29	Bushing, electrical conduit: sim to Heyman Mfg. SB-1500-18. (AC power entry).
	7160861P33	Nut, sheet spring: sim to Tinnerman C19640-104B-600. (Used to secure panels).
	4037460P16	Stud, self-clinching: No. 10-32; sim to Penn FH-032-6CL.
	N210P16C6	Hex nut: No. 10-32. (Used to secure cabinet covers).
	N403P19C6	Lockwasher, external tooth: No. 10. (Used to secure cabinet covers).
	N402P9C6	Flatwasher, narrow: No. 10. (Used to secure cabinet covers).
	19D417978P4	Blank panel.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

TROUBLESHOOTING PROCEDURE

Should a difficult service problem arise, the following Quick Check Chart, Logic Chart and DC Voltage readings should provide assistance for the service technician.

QUICK CHECKS

SYMPTOM	QUICK CHECK
1. None of the LED indicators light.	1. Insure P1 of power supply control unit is securely plugged into J3 of the power supply. 2. Check fuse F1, F2 and F3 in the control unit.
2. A single LED indicator does not light.	1. Insure the battery pack is secure in the charging insert. 2. Check for defective LED. 3. Check connections between charging circuit and charging insert.
3. LED indicators of a charge panel do not light.	Check connectors and cabling between the defective panel and the power supply.
4. Battery pack does not recharge in 3 hours.	1. Check for a defective battery pack. 2. Check for open diodes and resistors in the defective charging circuit.

The test circuit shown can be used to simulate battery pack conditions and determine if the charger is working properly. Switch S1 simulates battery pack temperature (open-room temperature, closed-hot battery pack). Switch S2 resets charging circuit logic, the same as removing the battery pack from the charging insert.

Connect the test circuit as shown on the diagram. Insert a battery pack into the defective charging insert. Use the logic chart and DC voltage readings on the diagram to determine the working condition of the charging circuit.

If the charging circuit works properly with the test circuit, but not with the battery pack, check thermistors RT1 and RT Battery. Each should measure approximately 50K ohms at room temperature (25°C).

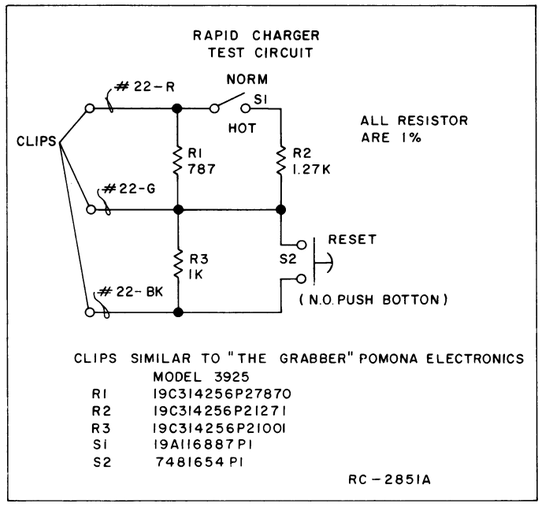
Other Checks:

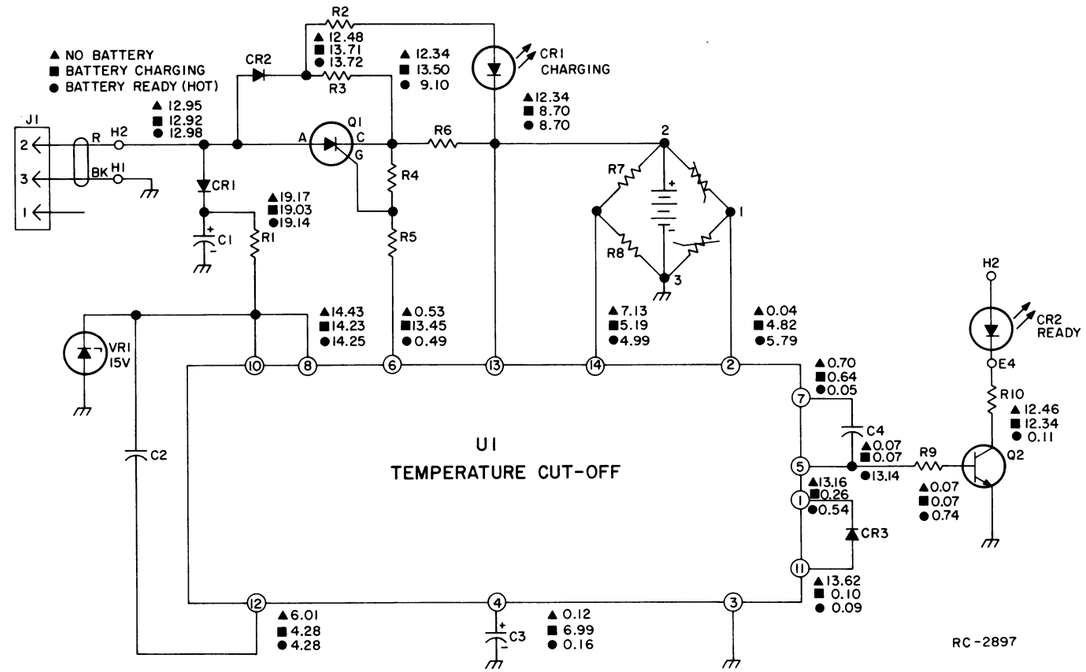
1. If a known good battery pack has been charging and the charging circuit fails to shut-off (READY light does not come on) at the end of the charge time, check Q1 and Q2.
2. U1-11 always high, logic will not reset, check C2.
3. U1-6 always low, no high rate of charge, check C3.
4. U1-5 always low, logic will not reset, check C4.
5. No high rate of charge, check for open CR3.

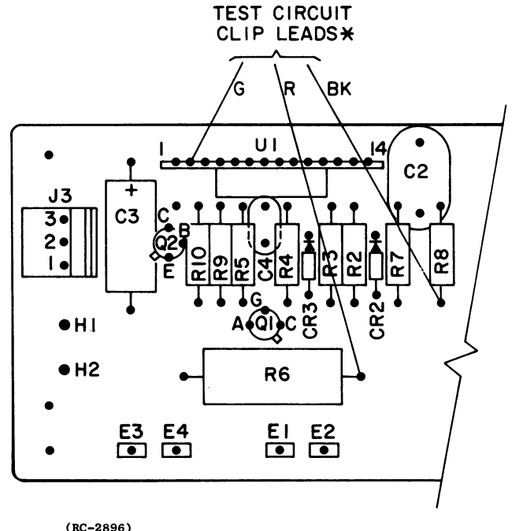
LOGIC CHART

TEST BATTERY CONDITION	U1 PIN				TEST CKT SWITCH POSITION	
	11	4	6	5	S1	S2
No Battery	High	Low	Low	Low	Norm	Closed
Cold Battery	High	Low	Low	Low	Norm	Closed
Normal Battery Charging	Low	High	High	Low	Norm	Open
Charged Battery	Low	Low	Low	High	Hot	Open
Hot Battery Just Inserted	Low	Low	Low	Low	Hot	Open

Low = Pin Voltage < 1.0 Volts
High = Pin Voltage > 3.0 Volts







(RC-2896)
(19D423702, Rev. 0)

*ALTERNATIVE CONNECTION OF TEST CIRCUIT CLIP LEADS AS FOLLOWS:

1. CONNECT G WIRE TO CHARGING INSERT A2-1.
2. CONNECT R WIRE TO CHARGING INSERT A2-2, 4.
3. CONNECT BK WIRE TO CHARGING INSERT A2-3.