

## TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE	REMEDY
I. Unit appears normal with pilot indicator lights on, but:		
1) Goes dead or becomes distorted after a period of play.	A. Overloaded output. B. Insufficient cooling.	A. Reduce load to specified value. B. Add fan pack to increase loading capacity.
2) No output either channel.	A. Same as #1 above. B. No input signals. C. No plug in accessory or jumpers installed in accessory octal sockets. D. Gain controls turned down. (front and/or rear). E. Faulty power supply component such as transformer, bridge, or wire.	A. See above. B. Apply input. C. Install accessory or jumpers. D. Turn up controls. E. Replace faulty component.
II. Unit does not appear normal in that:		
1) Unit comes on for a moment, then goes dead.	A. DC latch fuse blown. B. Defective channel amp board. C. Defective latch circuit.	A. Replace fuse. B. See procedure B. C. See procedure C.
2) Unit will not turn off.	A. Remote AC cord still activated. B. TRIAC defective. C. AC control board.	A. Turn off remote cord. B. See procedure D. C. See procedure F.
3) Unit will not turn on.	A. Bad line fuse. B. DC latch fuse blown. C. TRIAC defective.	A. Replace line fuse. B. See section II. 1, above C. See procedure D.
4) Blows line fuse immediately.	A. Loose or broken wire in B. Faulty power supply components. C. Faulty channel amp board.	A. Inspect for same and B. Replace faulty power supply components. C. See procedure E.

SERVICE TECHNICIAN: Before gaining access to the interior compartment, remove all input and output connections and ALL AC POWER CONNECTIONS.

ACCESS PROCEDURES: Interior Compartment: Remove 6 cover screws.

- A. Rear Panel: Remove 6 top cover screws.  
Remove 2 rearward bottom cover screws.  
Remove 3 side screws into rear panel each side, and move panel back.
- Front Panel: Remove 4 hex head screws thru handles.

PROCEDURES

NOTE: When removing or testing any module, note color and location of any wires disconnected for reconnection purposes.

- B. B1. Remove any output loads and all inputs.  
B2. Obtain access to the interior compartment. (SEE ACCESS)  
B3. Unplug blue wire pushed on AC control board near front center. This will disable the DC Latch circuit.  
B4. With no wires shorting out, turn unit on and measure the DC output condition of each channel at the rear terminals. If either channel indicates a DC condition of greater than +/- 2 volts, replace that channel amp board to restore operation. (See procedure G)  
B5. If both channels indicated a DC condition, verify that both B+ and B- (+/- = 70-100V DC) appear on the power chassis capacitors.  
B6. If neither channel indicates a DC condition, proceed to "C" below.
- C. C1. Proceed as in B above.  
C2. Turn unit off and wait 5 minutes, or drain off supply capacitor charge via a resistor load.  
C3. Replace blue wire removed in B3 above.  
C4. Remove orange wire pushed on at right front end of each channel amp board. This is the Latch signal from that board.  
C5. With no wires shorting, turn on unit and carefully replace one orange wire at a time. The orange wire which causes the Latch circuit to operate indicates the channel amp board with a faulty Latch detector circuit. Replace the channel amp module. (See procedure G)
- D. D1. Remove all AC power connections.  
D2. Remove screws securing top cover.  
D3. Locate TRIAC and AC control board at left side and bottom.  
D4. Loosen TRIAC mounting nut's and remove TRIAC from main chassis.  
D5. Note lead color coding and install new TRIAC leads accordingly. (See accompanying diagram).  
D6. Mount new TRIAC on main chassis and tighten mounting nuts.
- E. E1. Remove any output loads and all inputs.  
E2. Obtain access to the interior compartment. (See ACCESS)  
E3. Loosen back panel and move rearward.  
E4. Remove the red and green wires pushen on to ONE channel amp module at far right and left.  
E5. With caution and NO WIRES SHORTED, turn unit AC power on. If fuse remains intact, remove AC power, drain supply, and replace channel amp module that was disconnected.  
E6. If line fuse blows, remove AC power, drain supply, replace disconnected wires, and repeat process for the other channel amp board.  
E7. If line fuse still blows, disconnect red and green wires from both channel amp modules and repeat process. If fuse remains intact, replace both modules. If fuse still blows, fault is in power supply section or in primary AC circuit.

MODULE REPLACEMENT: Refer to accompanying diagrams for push on wire color location. Caution; disconnect all input/output and AC power connection prior to any module removal.

REMOVAL OF AC CONTROL BOARD:

- F. F1. Remove front panel. (See ACCESS)
- F2. Carefully unplug all push on connections on AC control board (note their locations).
- F3. Remove (4) nuts from corners and remove board. Care should be used to avoid loss of 4 screws or plastic spacers.
- F4. Reverse procedure to install new board.

REMOVAL OF CHANNEL AMP MODULE:

- G. G1. Remove rear panel. (See ACCESS)
- G2. Carefully unplug all push on connections on channel amp module (note their locations).
- G3. Remove 4 screws through heat sink angle into rear panel.
- G4. Pry heat sink angle loose from rear panel (thermate sealed).
- G5. Reverse procedure to install new module (apply sufficient amount of new silicon thermal compound to back of heat sink angle before installation).

410 A-B-C

1. Inspect
2. Hook-up
3. AC to threshold; check both channels output.
4. Line to 120 vac1 Adjust outputs to 1 watt output.
5. Set Distortion: .6% each channel individually with opposite channel turned down.
6. Set DC offset to 0 mV.
7. Check DC latch-Apply<sup>±</sup> supply DC voltage thru 1k resistor to 15k (100k), 6.8uFd cap, ~~adjust~~<sup>and</sup> diac junction to latch off. Reset by discharging caps.

\*410c same as 9220.

8. Check full power output:

410	8 $\Omega$ 200w	410B	8 $\Omega$ 250w
410A	4 $\Omega$ 350w	410C	4 $\Omega$ 375w

9. Check led operation: On/clip.
10. 410 b/c- Check switch down operation:
  - 410b- Unplug yellow wire on switchdown. PCB to get 2/3 power output.
  - 410c- Switch therm-EFF switch on front panel to get 2/3 power.

11. Check frequency response 20-20k Hz.
12. Check bridge operation:
  - 410b- (Switchmatic) unplugged channel 2 ¼" input jack.
  - 410c- Switch on input module.
13. Check power switch and stress power triac by turning on/off several times. Orange power switch has 28v bulb for lense illumination.
14. Check signal to noise: 101dB.  
(Older units did not always meet spec).
  - 410c- Generation prior 9220- test similar to 9220-
    - Bridge switch
    - Different input XLR(input module).
    - Line switch

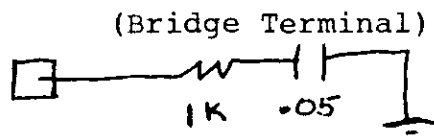
COMMON PROBLEMS:

Open 62k resistor- Change to 100k  
 Open 15k resistor- Replace (DC offset),  
 Defective Motorola 5415 date code 039,026

NOTE:

Units with bridge (410b)

1k resistor- .05 cap network to channel 2 bridge terminal.



- \* For LF response at low frequency.
- \*\* Older units use octal sockets- insure jumpers are in unit or customers input transformer to get input.

## LIST OF REFERENCED PARTS

MAIN CHASSIS

<u>REF. DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
C101, C102	Capacitor Elect. 9800MF 75V	416-001
D101	Bridge Rectifier	478-003
F101	Fuse 15A 3AG	498-002
S101	Power Switch	730-001
S101*	Power Switch Lamp (28V)	610-001
S102	Thermal Cutout	740-001
Q101	Triac Q5015A	763-001

CHANNEL AMP MODULE

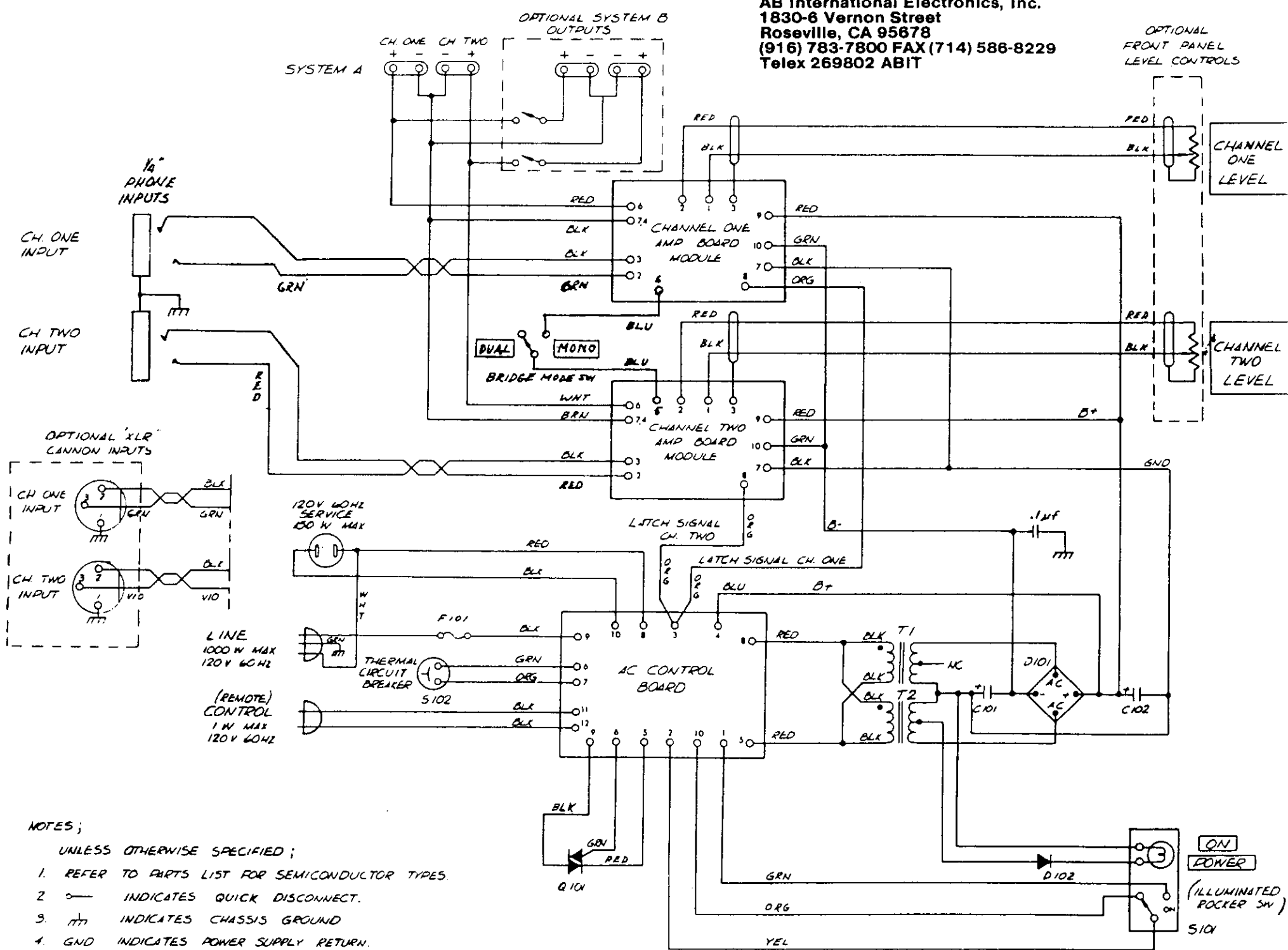
<u>REF. DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
D1-6, 8-14	Diode IN914	476-001
D7	Zener 12V	474-001
D15, 16	Diode IN4004	478-002
D17	DIAC IN5759	476-002
Q1,2,4	Transistor MPS-L01	763-002
Q3,5,6,11	Transistor MPS-8599	763-001
Q7,13	Transistor 2N5415	763-005
Q8	Transistor 2N3405	763-007
Q9	Transistor 2N3440	763-006
Q10	Transistor MPS6571	763-004
Q14-21	Transistor 1B04	763-010
Q22	TRIAC MAC 92-4	763-008

AC CONTROL BOARD

<u>REF. DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NUMBER</u>
D1	Diode IN4004	478-002
K1,K2	Relay 24 VDC	684-001



\*Lamp replacement only

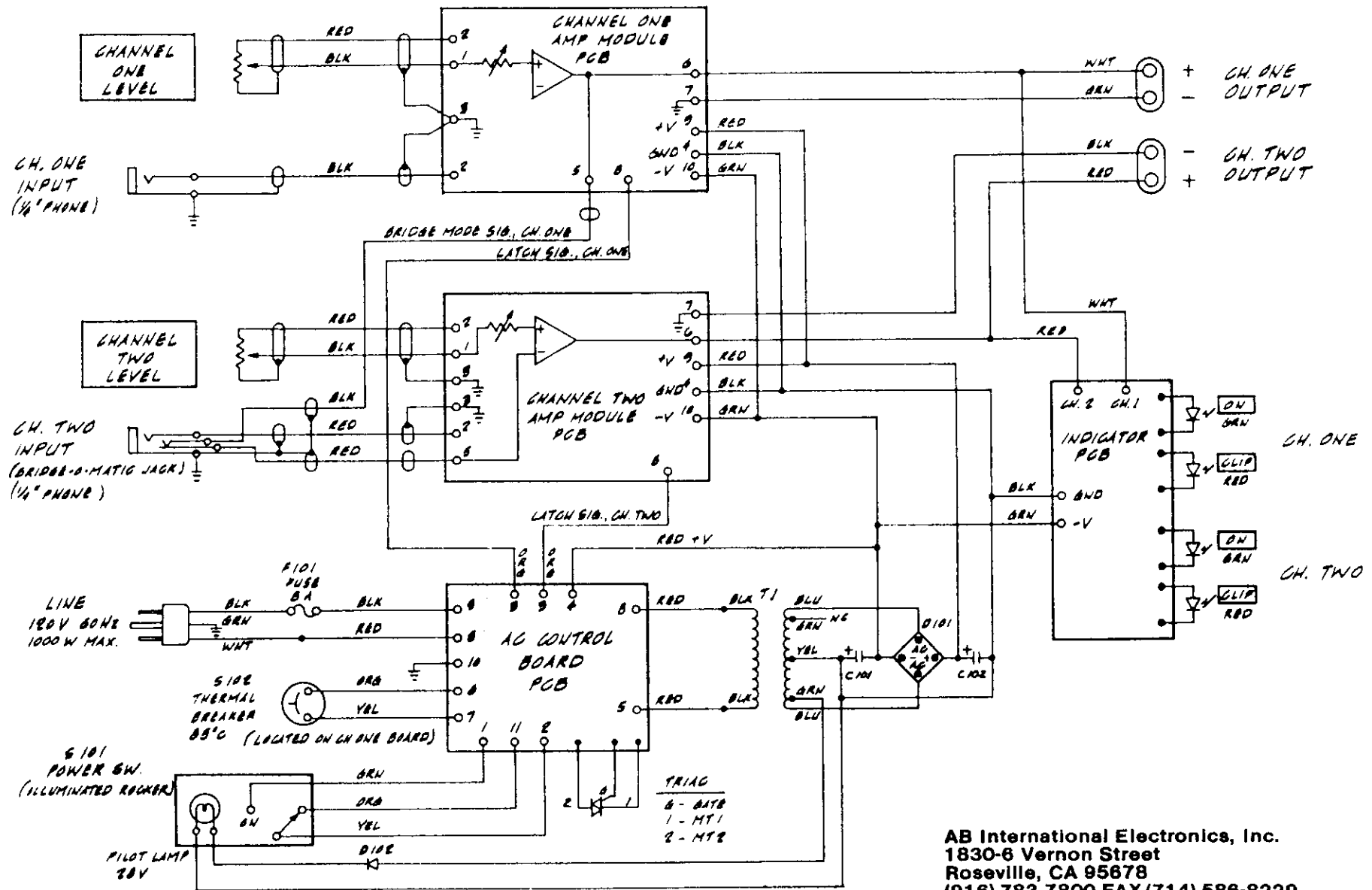
OPTIONAL  
 FRONT PANEL  
 LEVEL CONTROLS



NOTES;

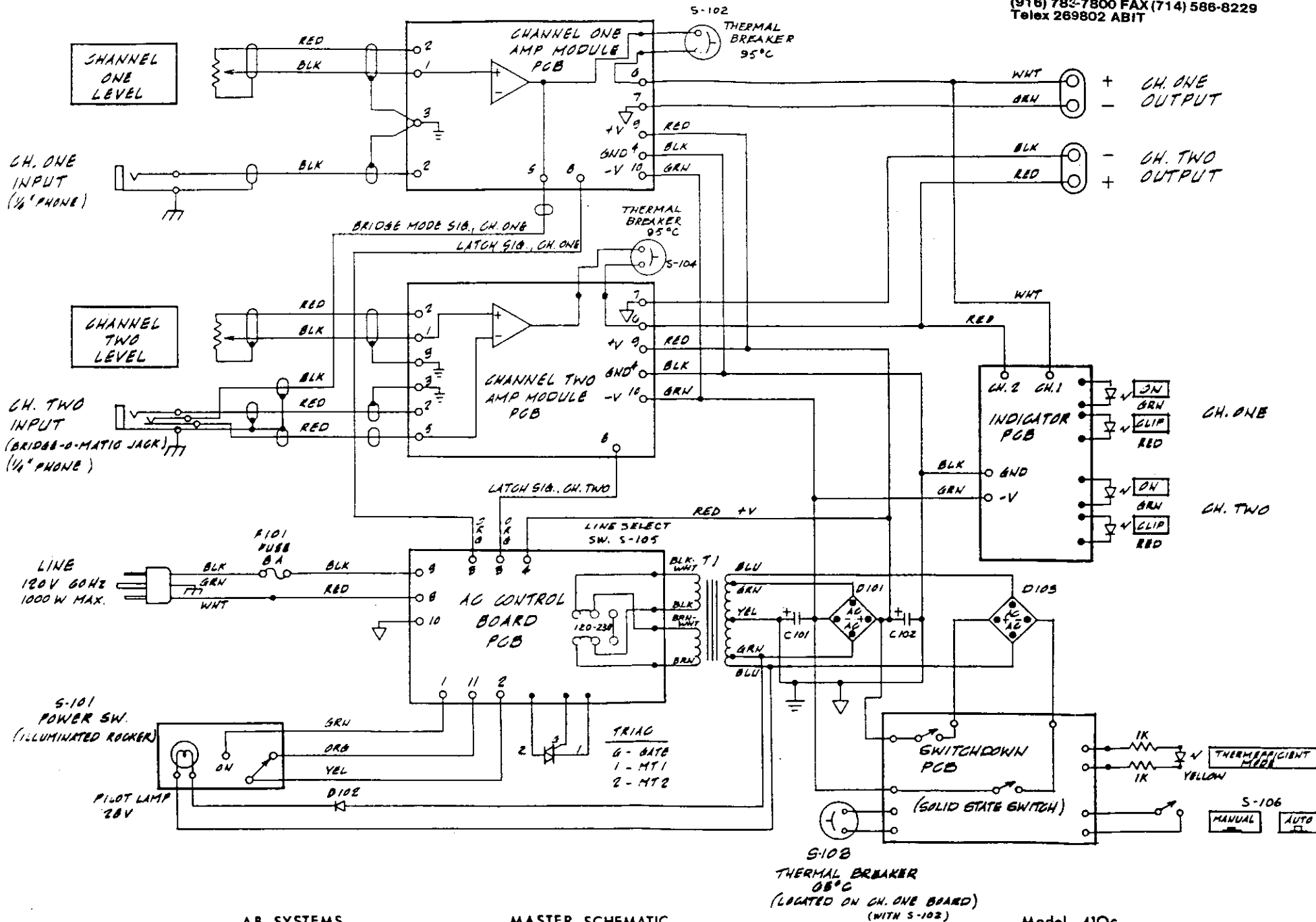
UNLESS OTHERWISE SPECIFIED;

1. REFER TO PARTS LIST FOR SEMICONDUCTOR TYPES.
2.  INDICATES QUICK DISCONNECT.
3.  INDICATES CHASSIS GROUND
4. GND INDICATES POWER SUPPLY RETURN.

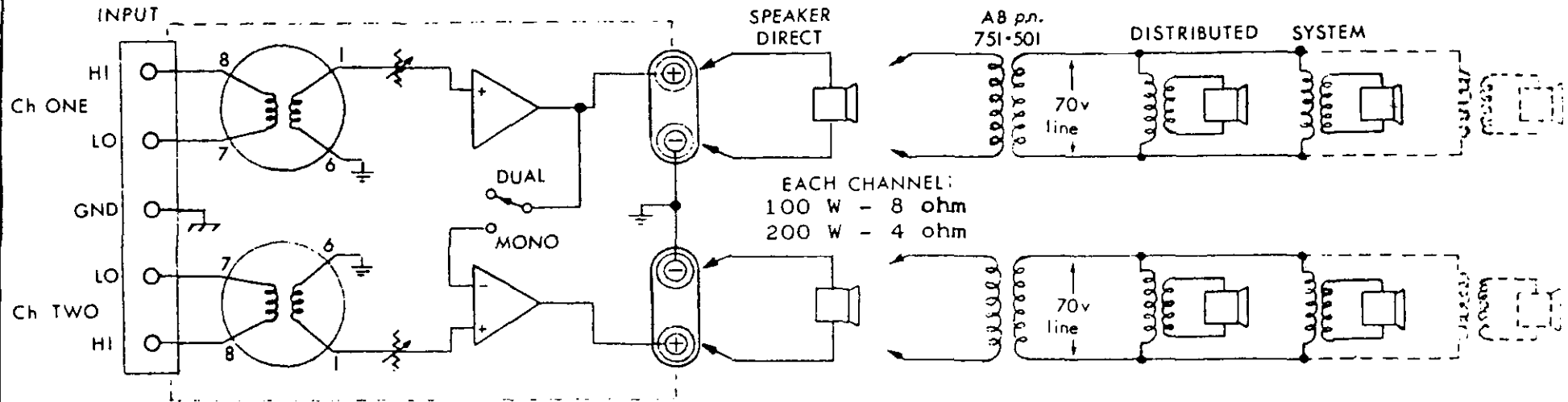


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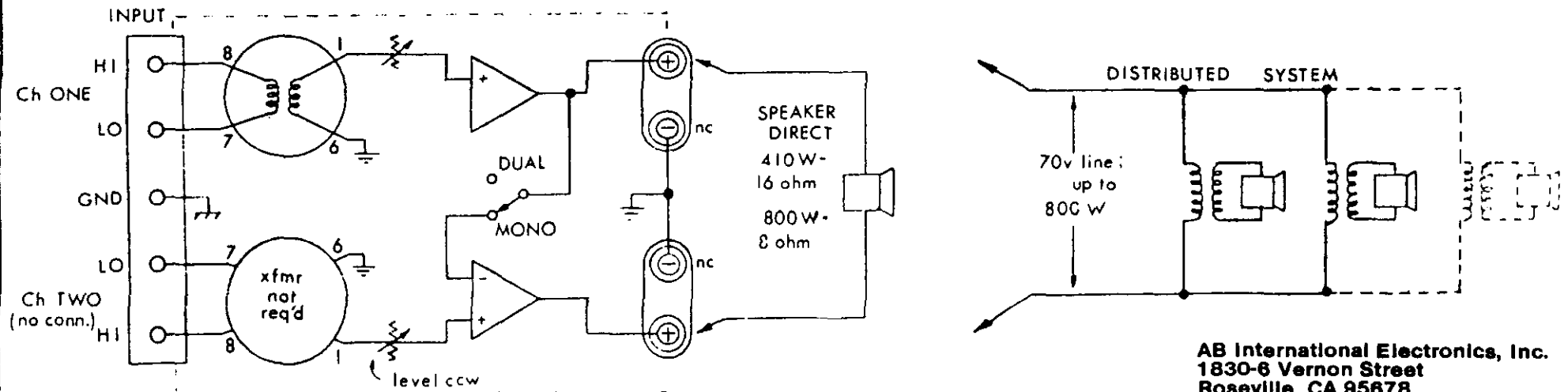


2 CHANNEL OPERATION, INCLUDING DUAL BALANCED 70 V LINES

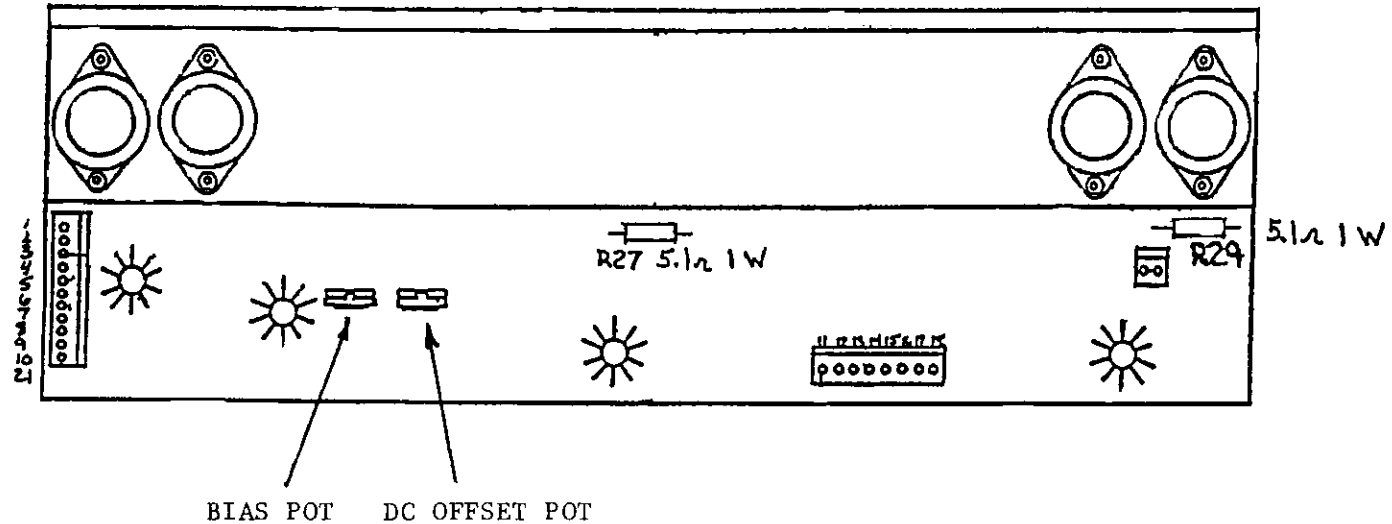


DIA. 1

1 CHANNEL MONO OPERATION INCLUDING 70 V LINE DIRECT TRANSFORMLESS



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DC VOLTAGE BIAS MEASUREMENT:

AT 20K HZ; 1 WATT OUTPUT; MEASURE DC VOLTAGE ACROSS THE TWO  
OUTPUT DRIVER TRANSISTORS' EMITTER RESISTORS:

600 - CH 1, R26 = APROX. .55VDC

R28 = APROX. .55VDC

CH 2, R66 = APROX. .55VDC

R68 = APROX. .55VDC

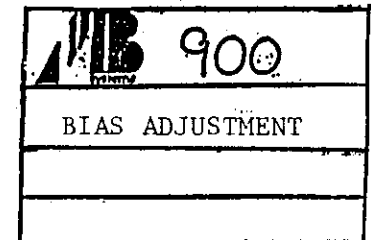
900 - R27 = APROX. .35VDC

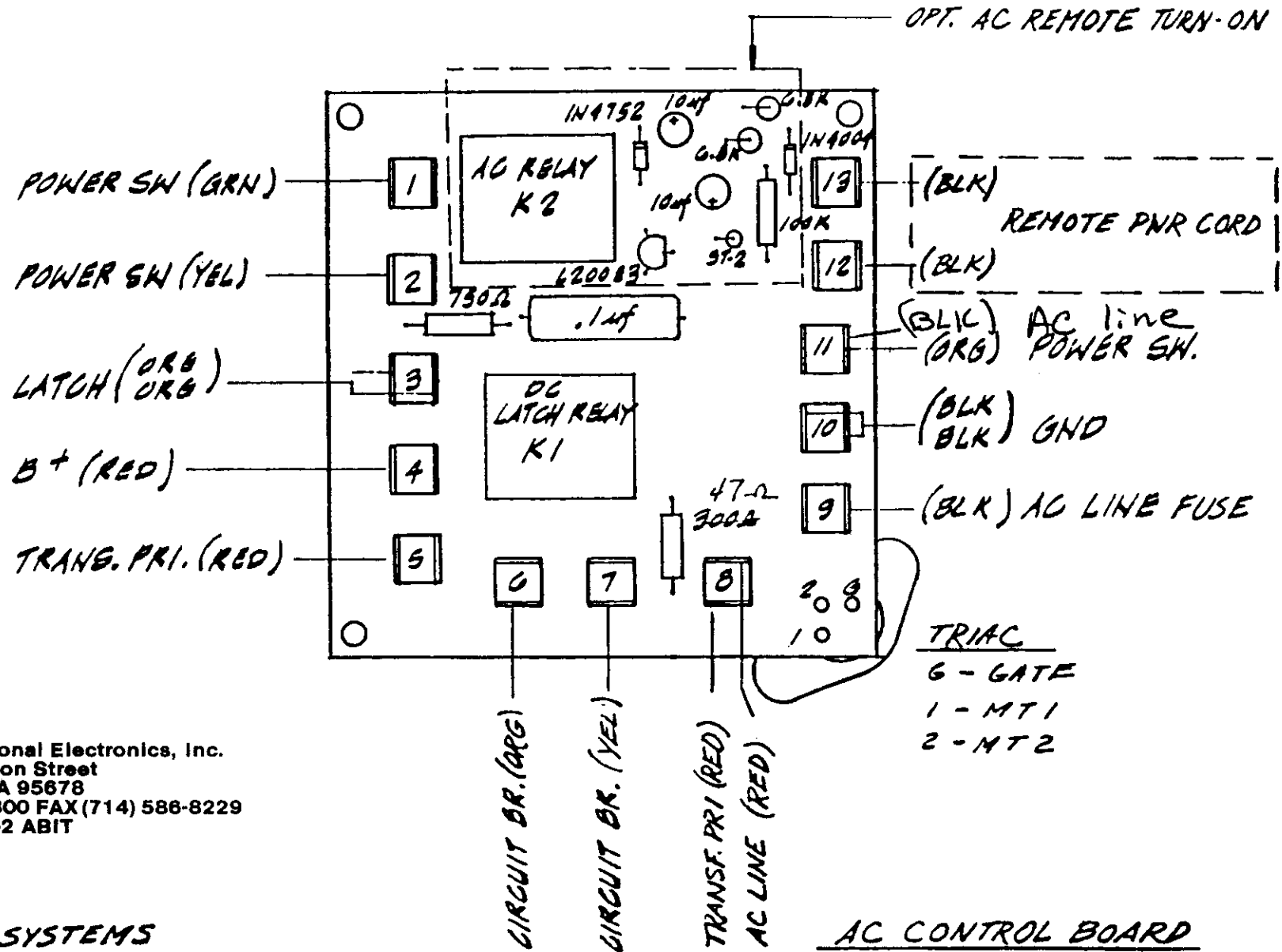
R29 = APROX. .50VDC

SEE SCHEMATIC & BIAS DIAGRAM FOR LOCATIONS.

NOTE:410C SAME AS 900

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AB SYSTEMS

AC CONTROL BOARD

POWER SWITCH  
(GRN, AWG 22)

POWER SWITCH, COMM.  
(YEL, AWG 22)

-2-  
DC LATCH  
(ORG, AWG 22)

B+  
(BLU, AWG 22)

POWER TRANSF. PRI  
(RED, AWG 16)

TRIAC CATHODE  
(RED, AWG 16)

TRIAC  
GATE  
(GRN, AWG 22)

CIRCUIT BREAKER  
(GRN, AWG 22)

CIRCUIT BREAKER  
(ORG, AWG 22)

POWER TRANSF. PRI  
(RED, AWG 16)

AC  
REMOTE OPTIONAL  
(BLK, AWG 18, LINE CORD)

POWER SW.  
(ORG, AWG 22)

AC SERVICE OUTLET  
(BLK, AWG 16)

TO AC LINE FUSE  
(BLK, AWG 16)

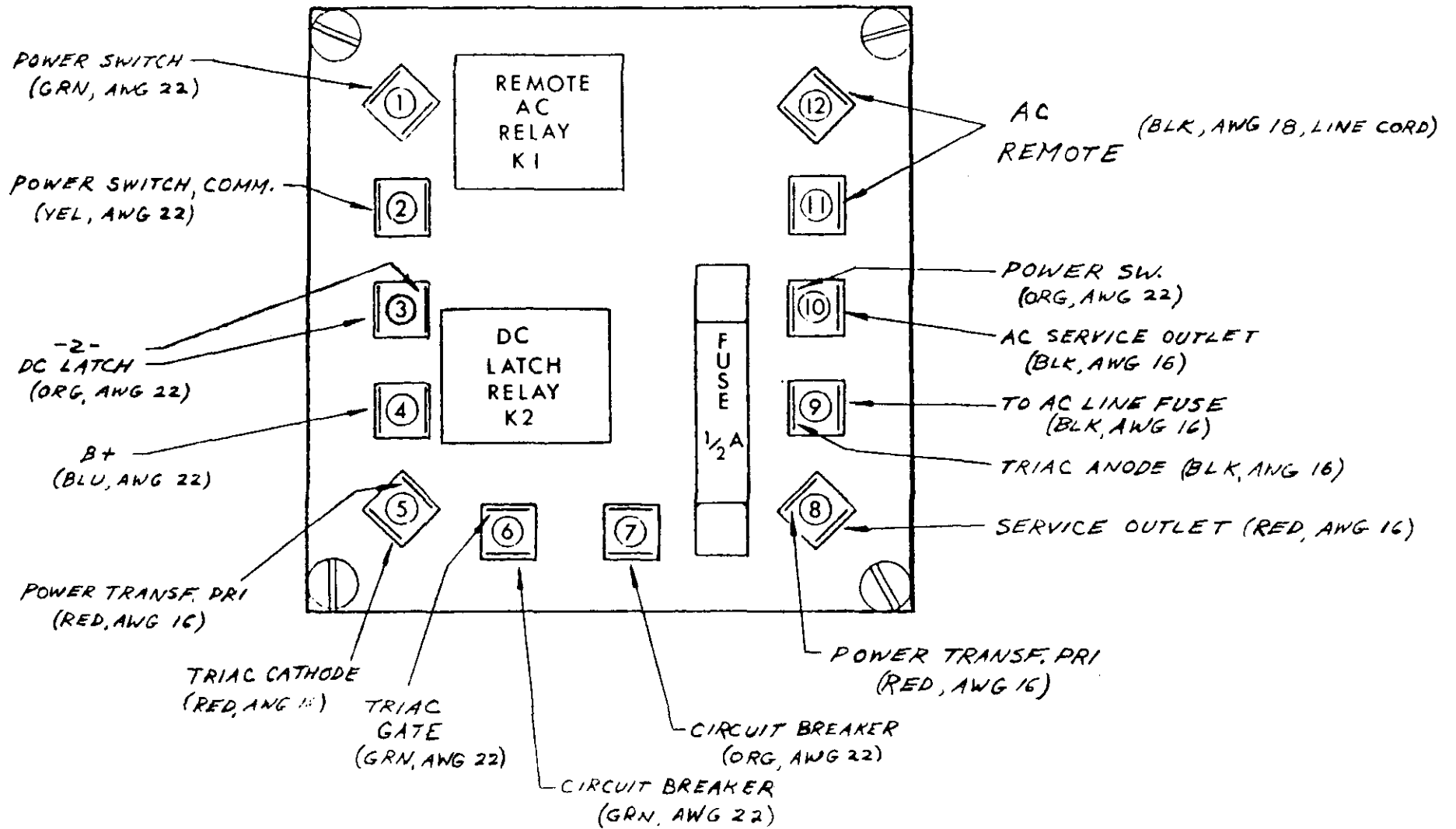
TRIAC ANODE (BLK, AWG 16)

SERVICE OUTLET (RED, AWG 16)

AB SYSTEMS

AC CONTROL BOARD CONNECTIONS

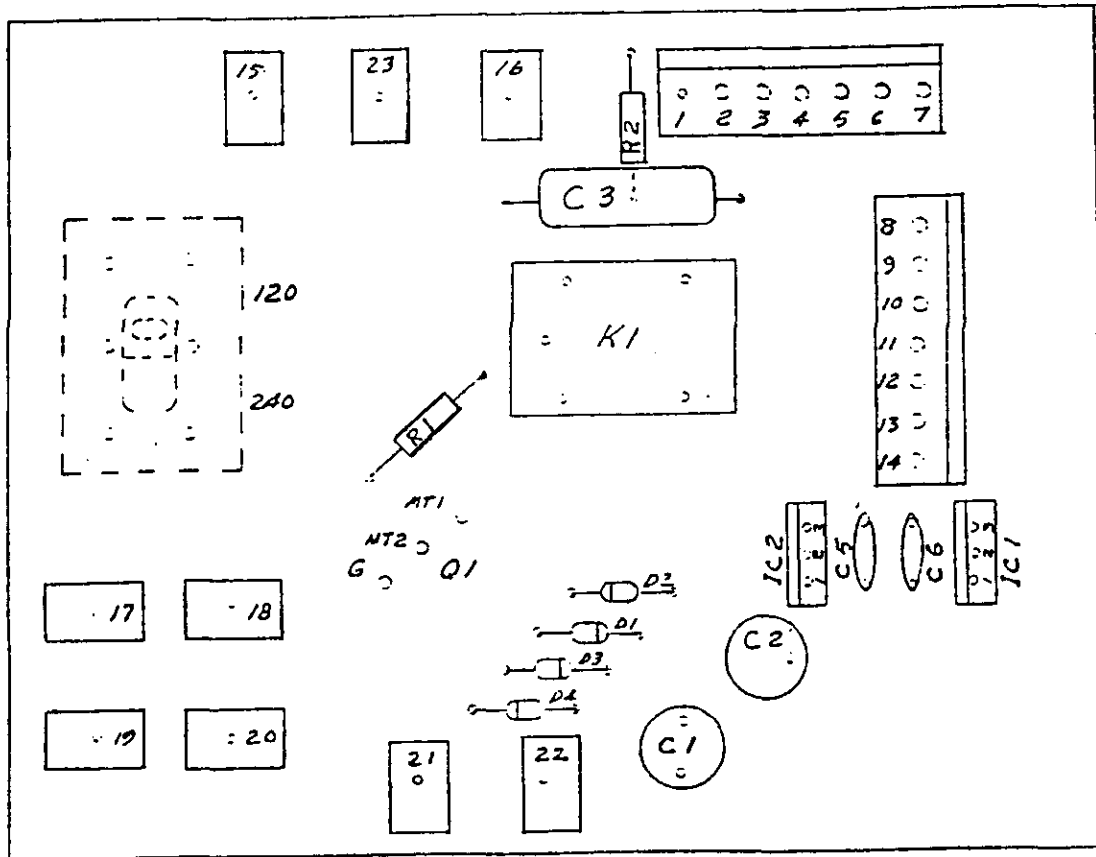
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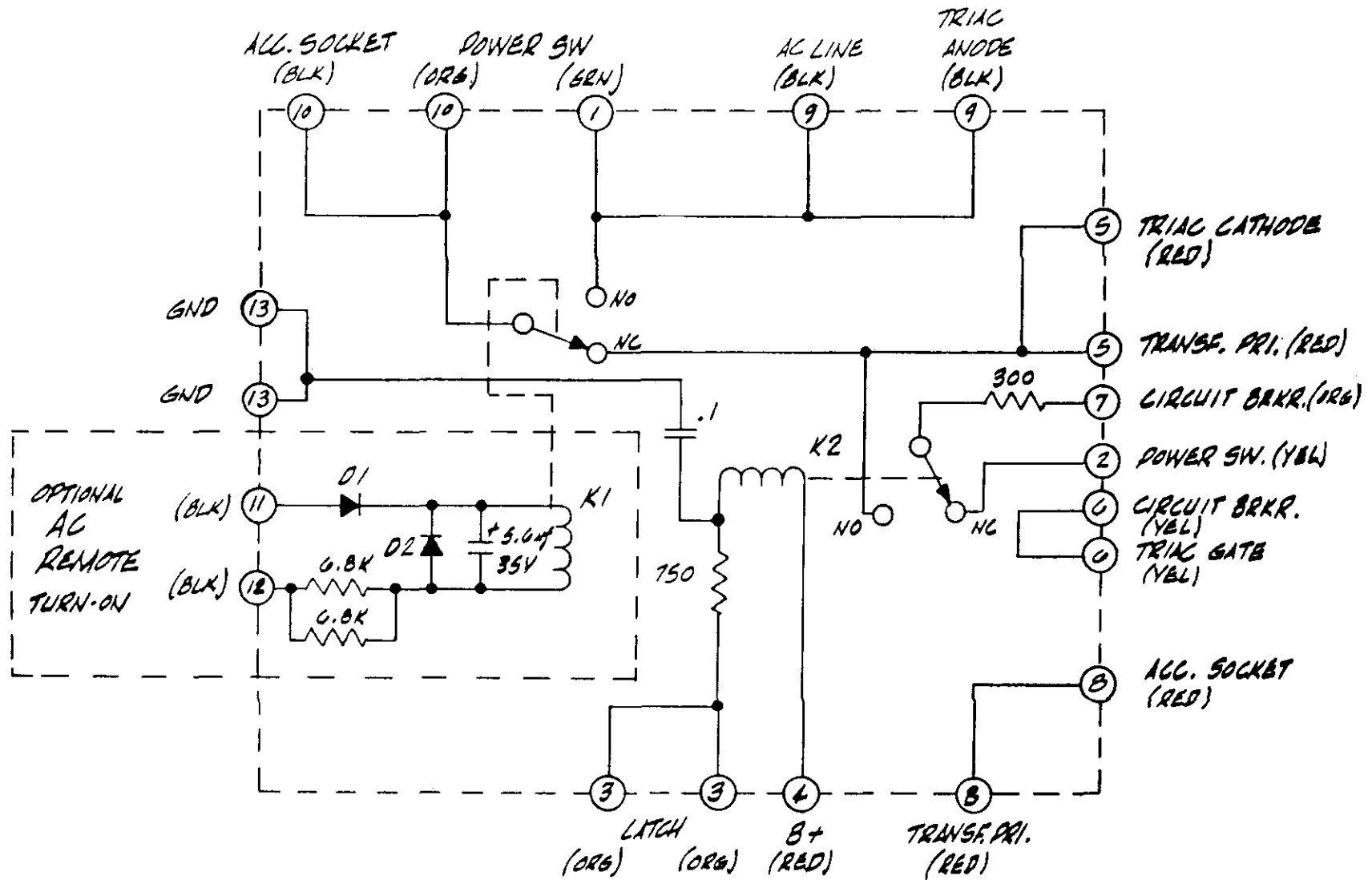
AC CONTROL BOARD CONNECTIONS

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PCB ASSEMBLY : AC POWER BD.	
DATE : NOV '82	REV.
ASSEMBLY NO. 502-609	

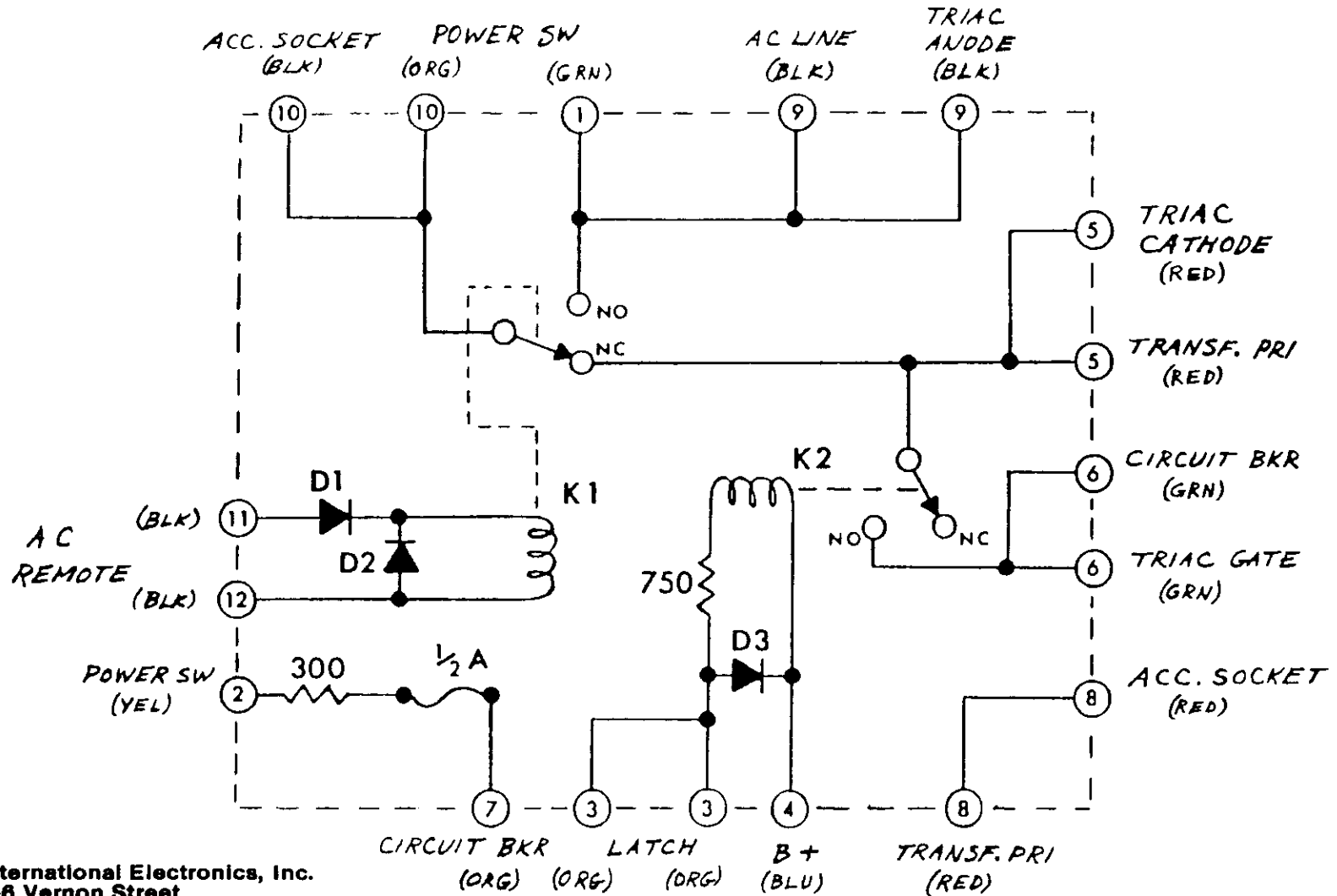


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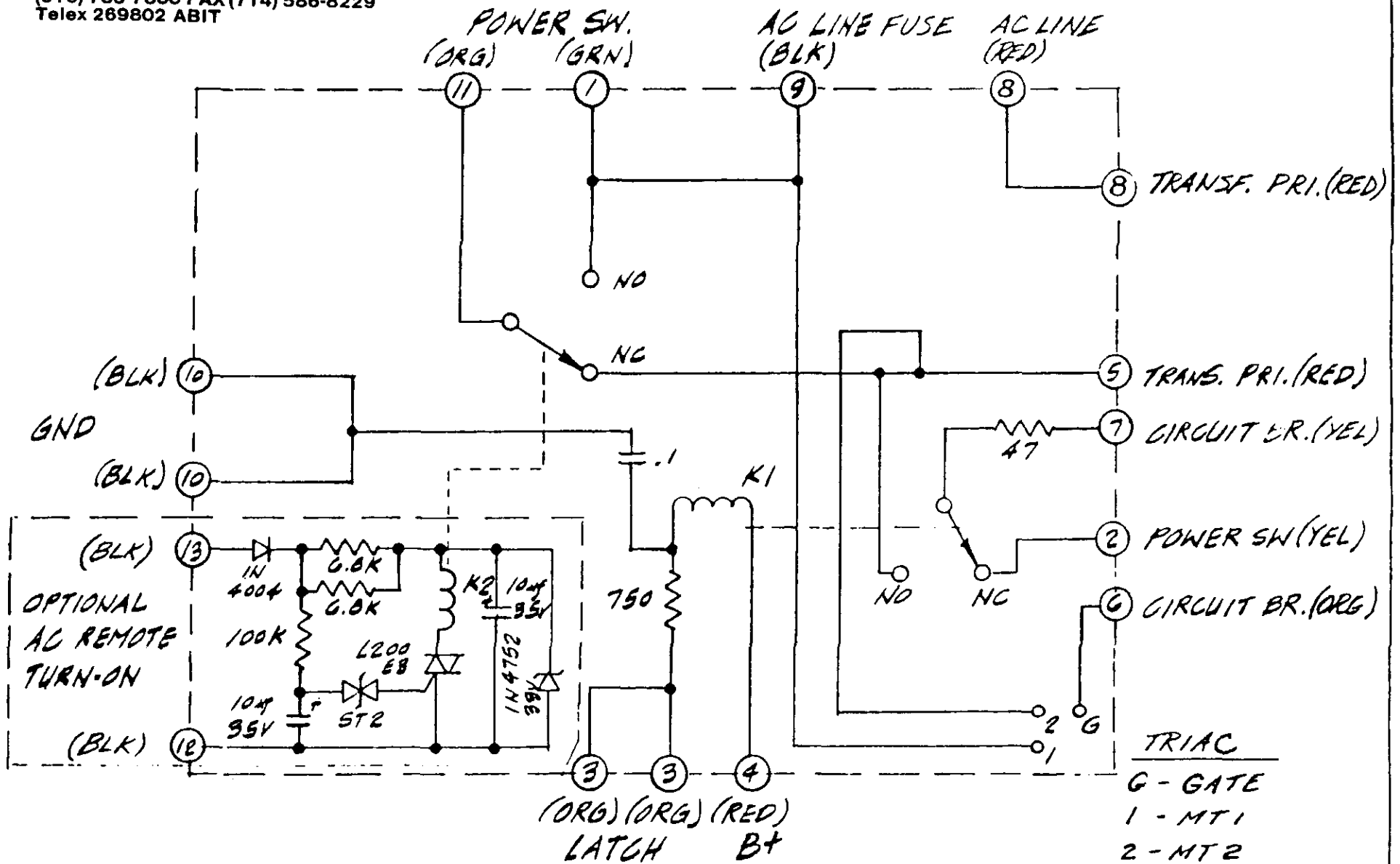


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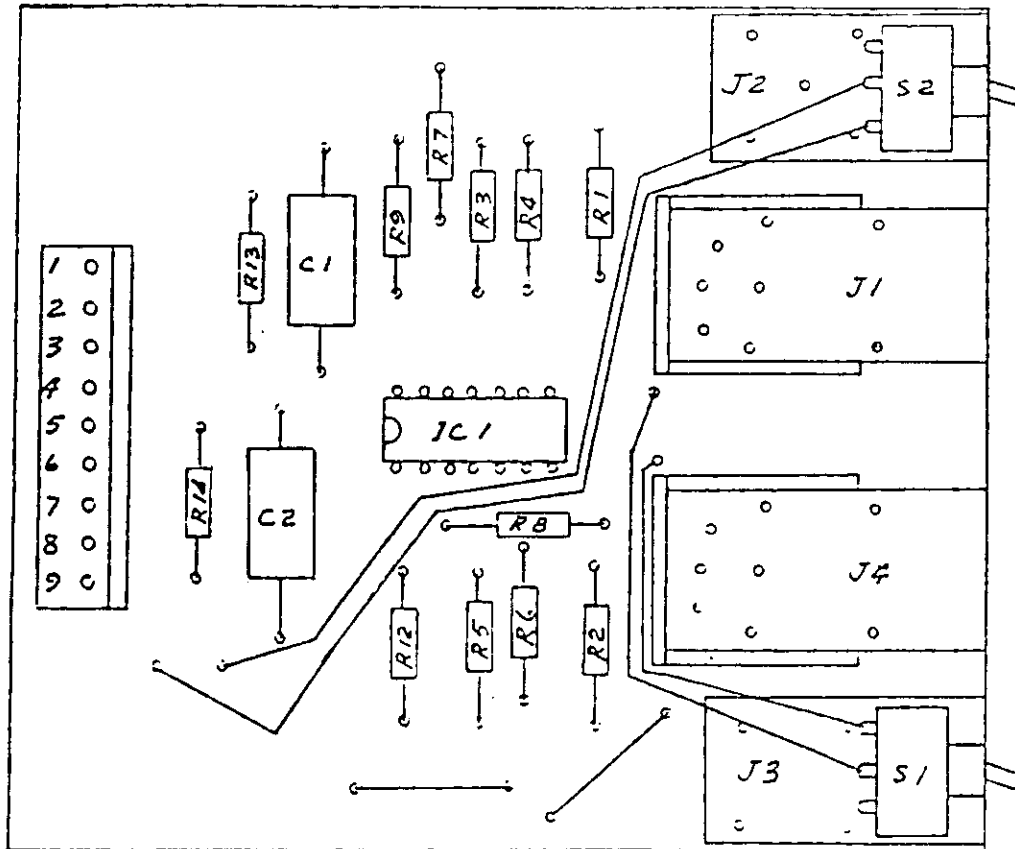
AC CONTROL BOARD

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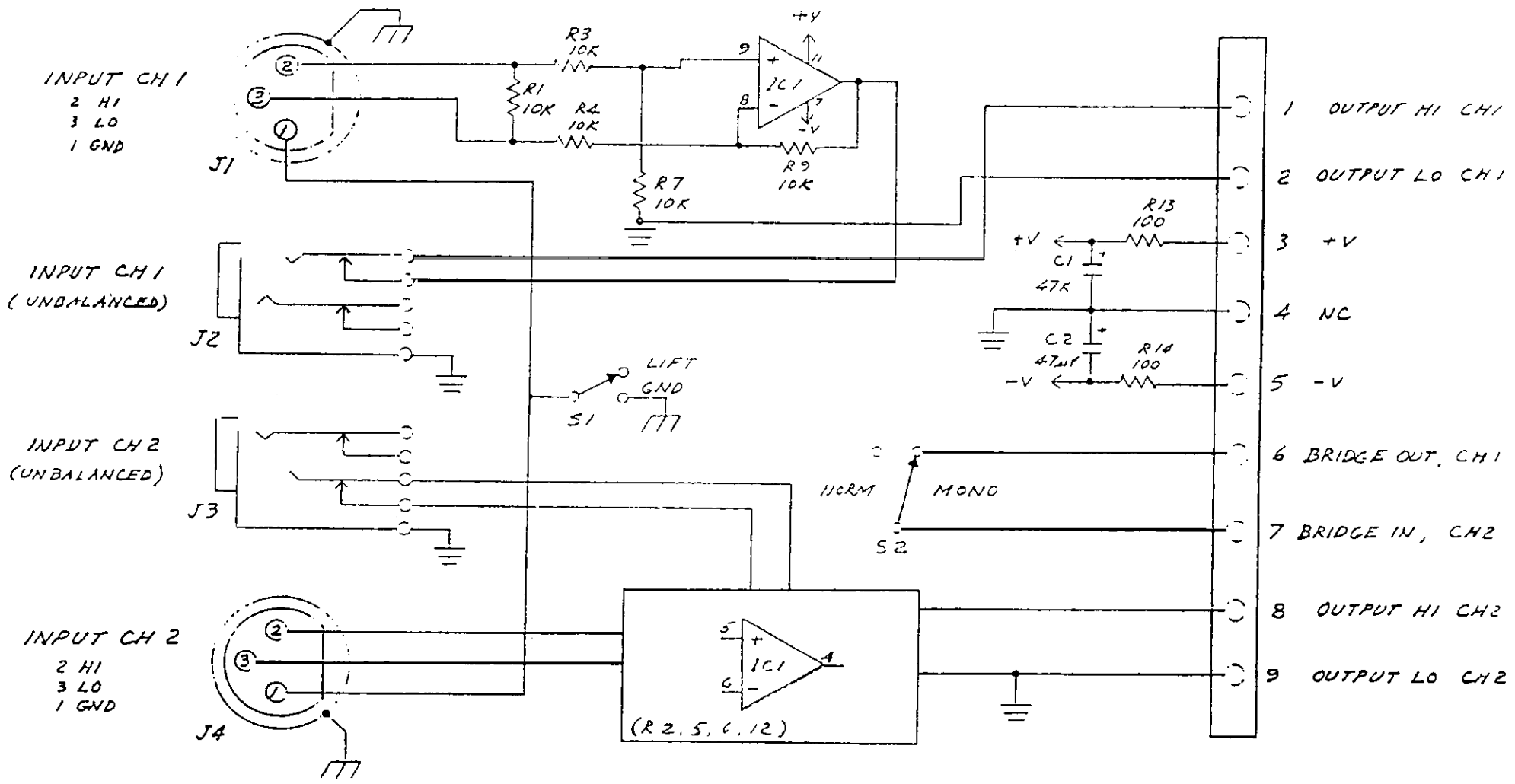
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AC CONTROL BOARD



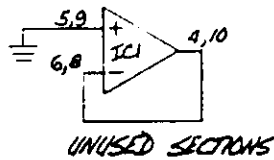
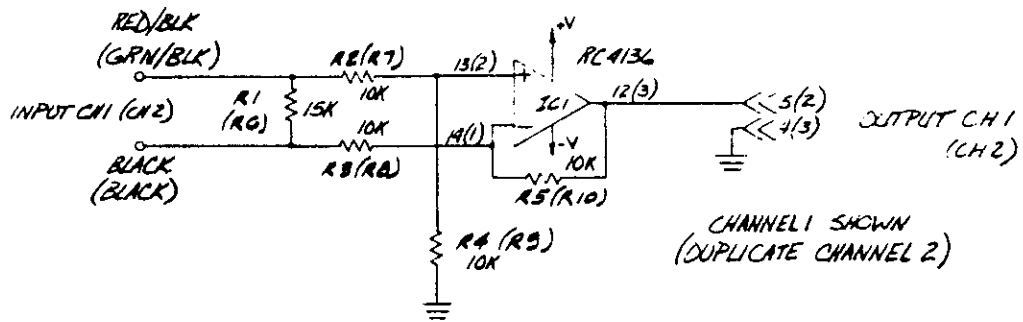
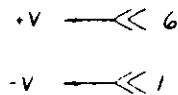
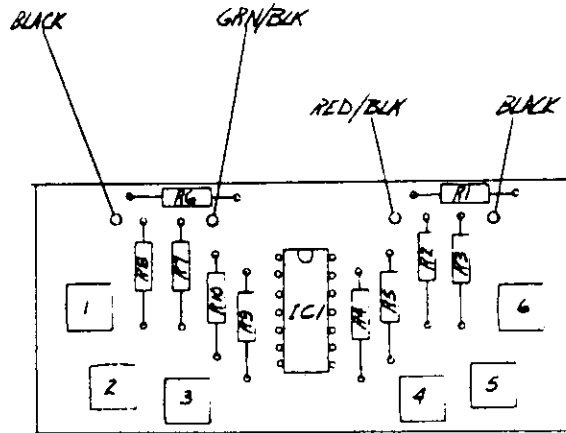
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PCB ASSEMBLY: INPUT MODULE	
FIRST USAGE: MODEL 6220	
DATE FEB '82	REV
ASSEMBLY NO. 503-502	



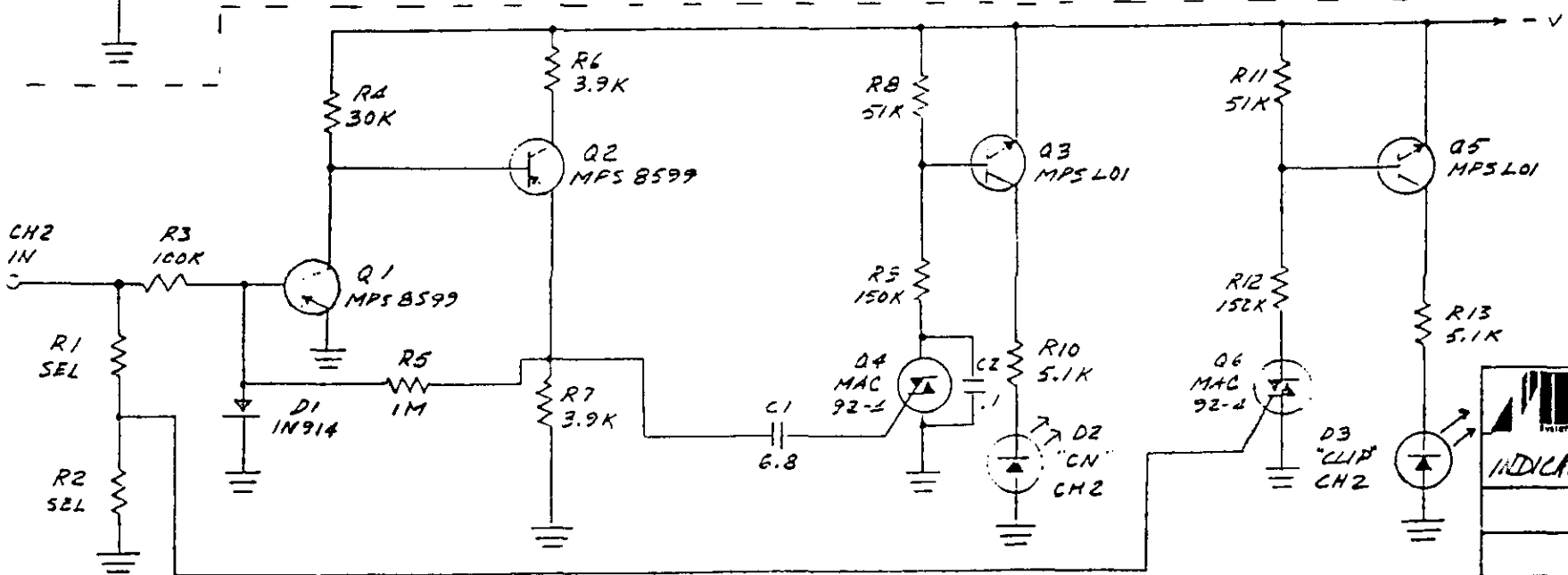
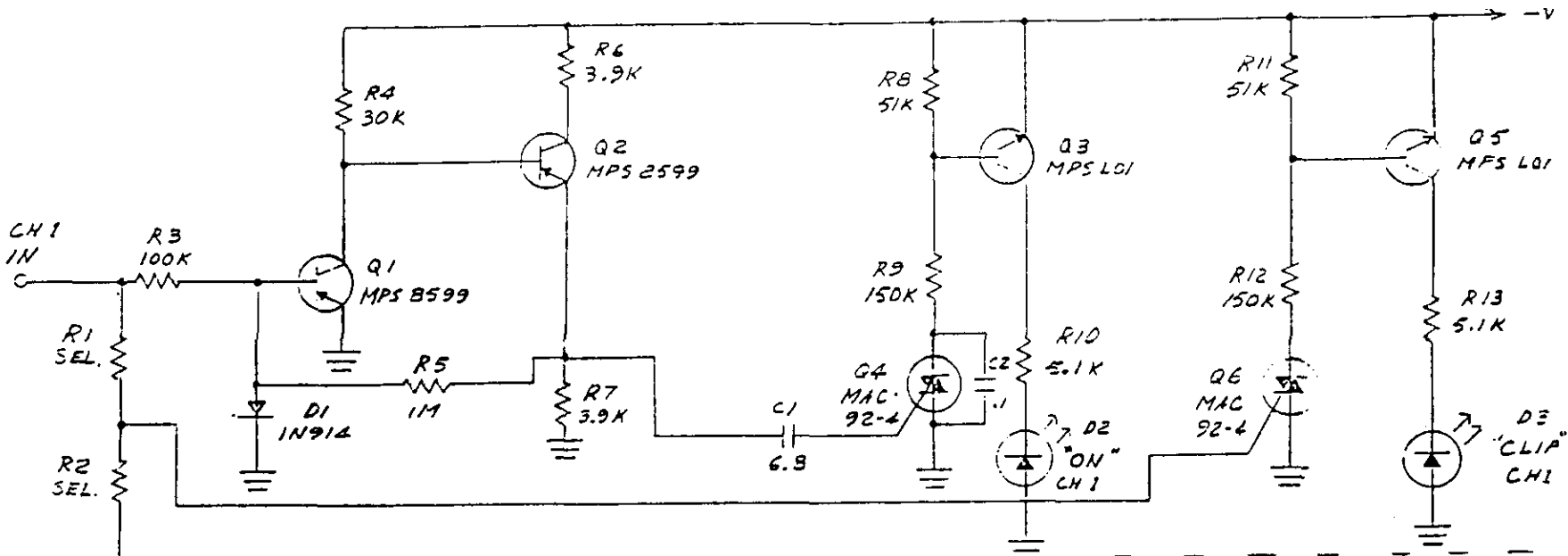
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PCB ASSEMBLY: INPUT MODULE	
FIRST USAGE: MODEL 6220	
DATE FEB '82	REV
ASSEMBLY NO. 503-502	

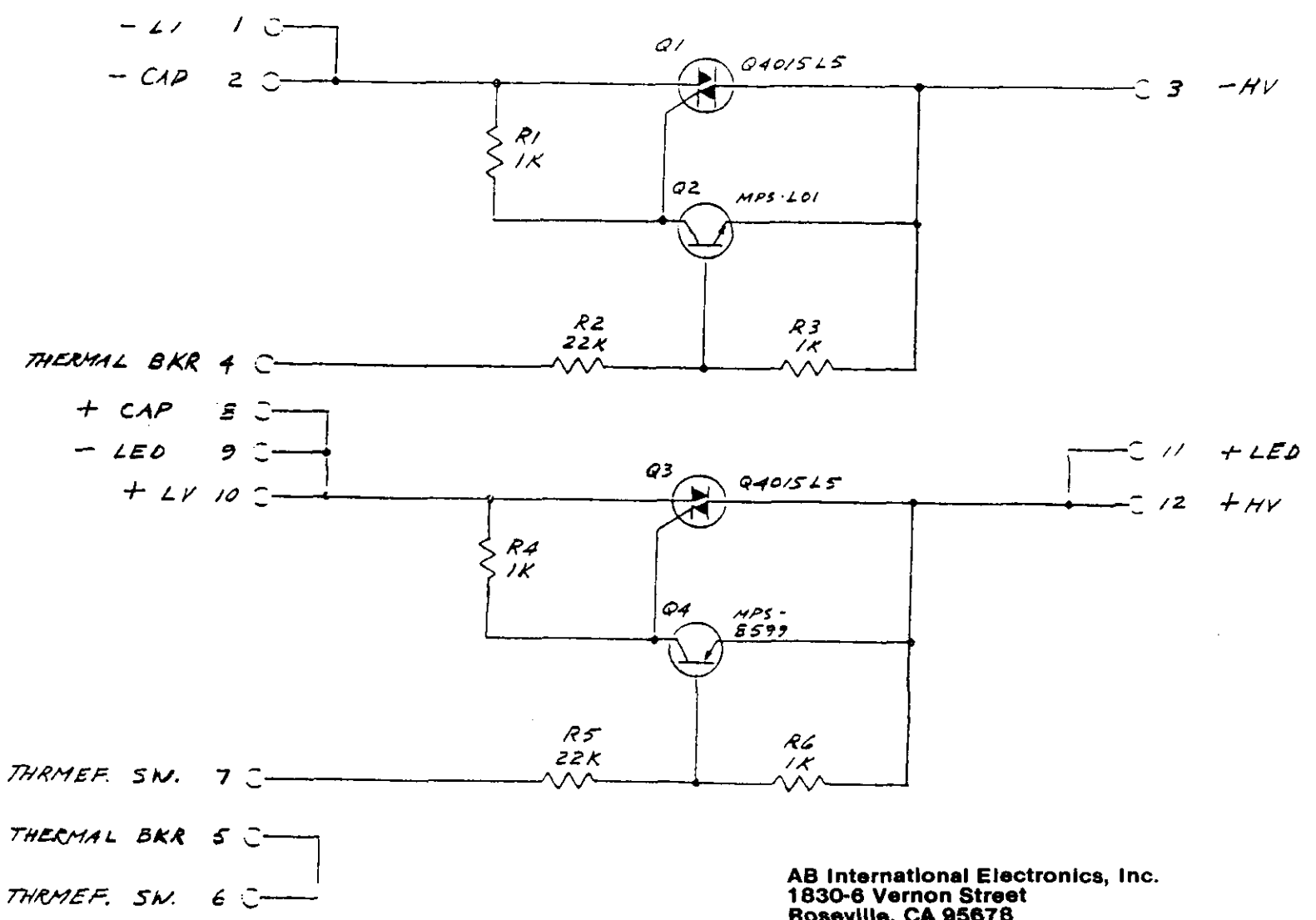


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AB SYSTEMS DESIGN, INC	
PCB ASSEMBLY: DIFF. INPUT	
FIRST USAGE: ALL 2 CHANNEL MODELS	
DATE: DEC '76	REV. AUG '80
ASSEMBLY NO. 502-557	



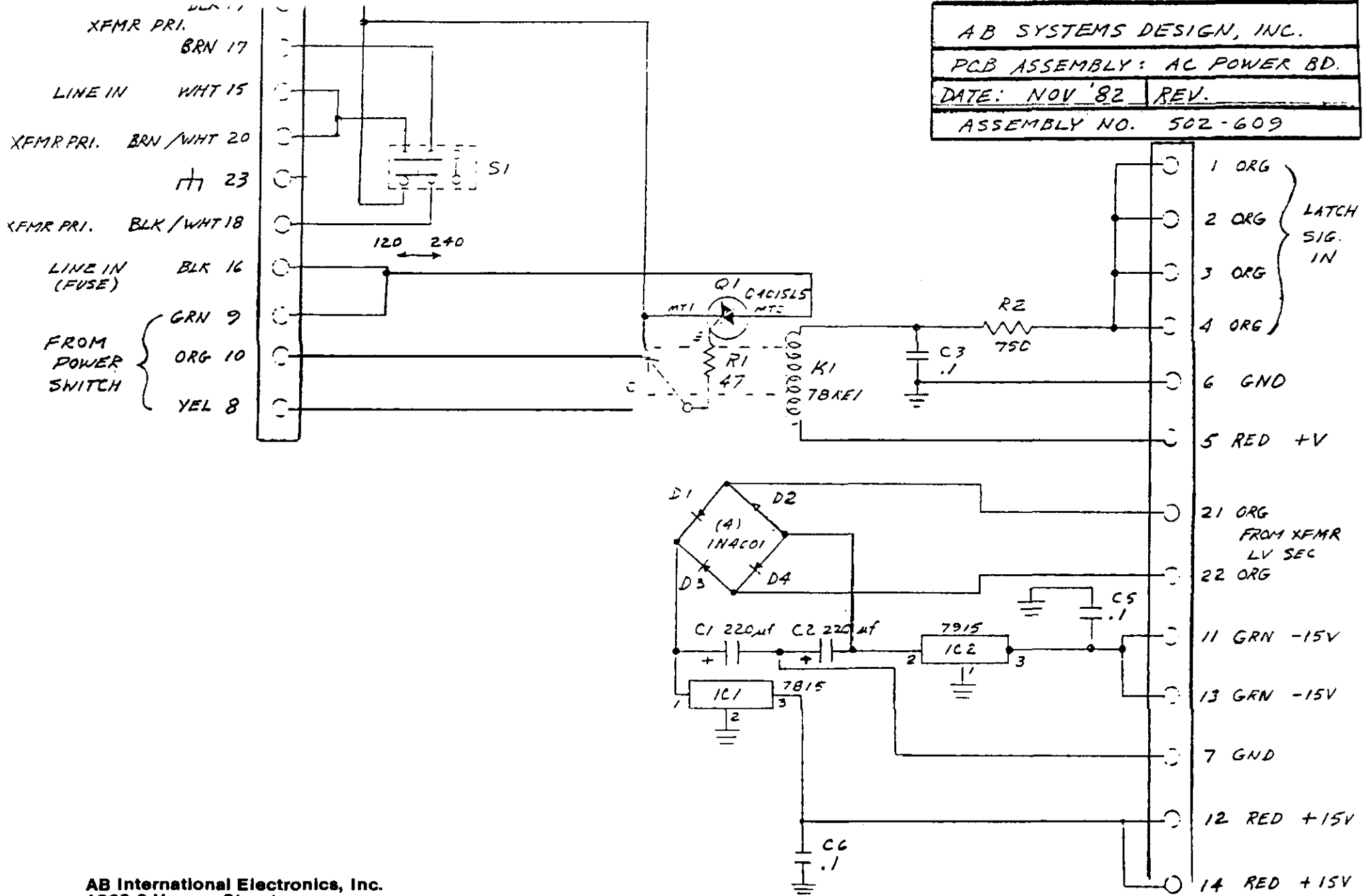
**MB**  
INDICATOR PCB ASSY.



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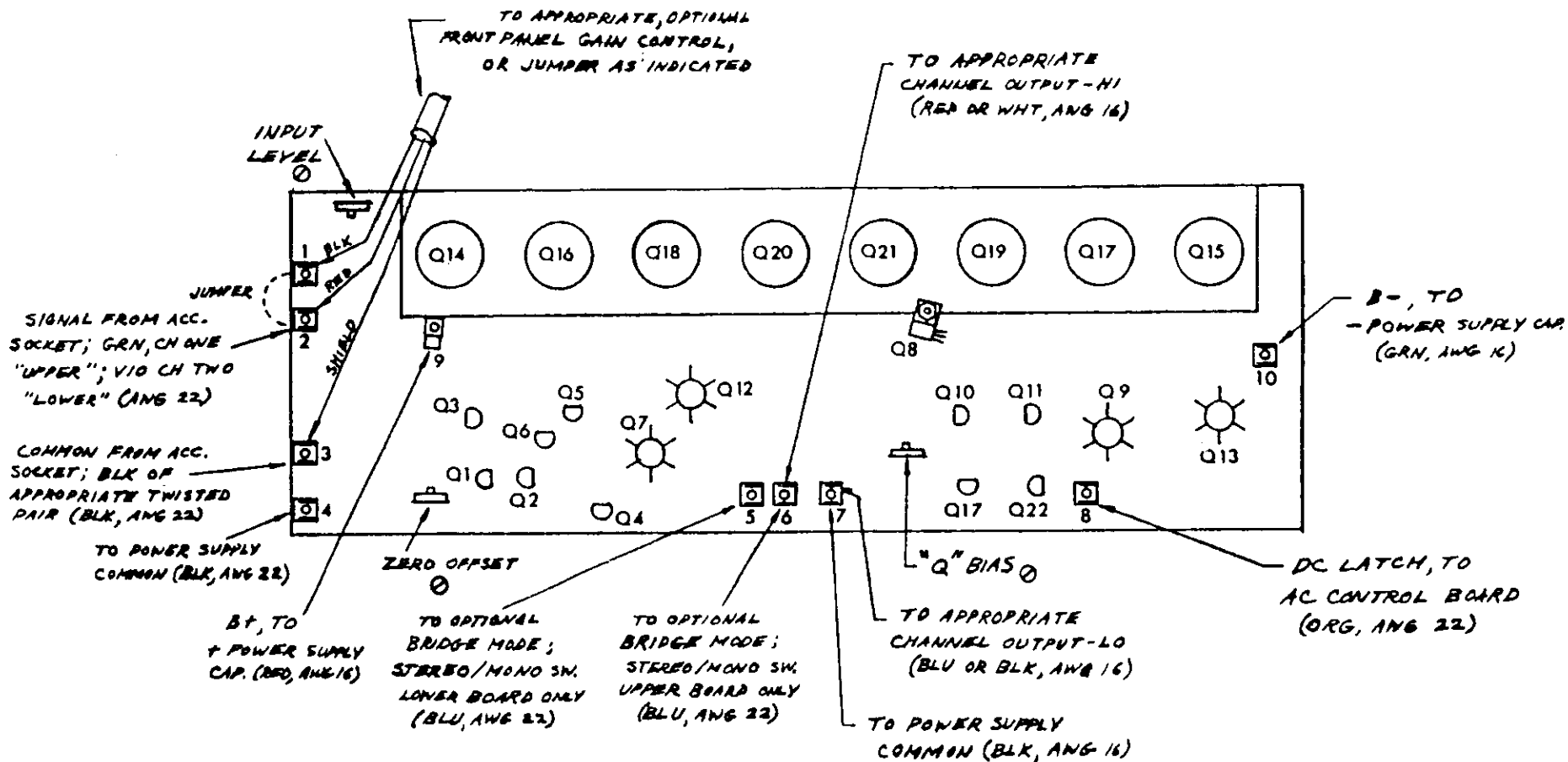
 <b>AB</b> <small>INTERNATIONAL ELECTRONICS</small>
SWITCHDOWN ASSY.

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 PCB ASSEMBLY: AC POWER BD.  
 DATE: NOV '82 REV.  
 ASSEMBLY NO. 502-609

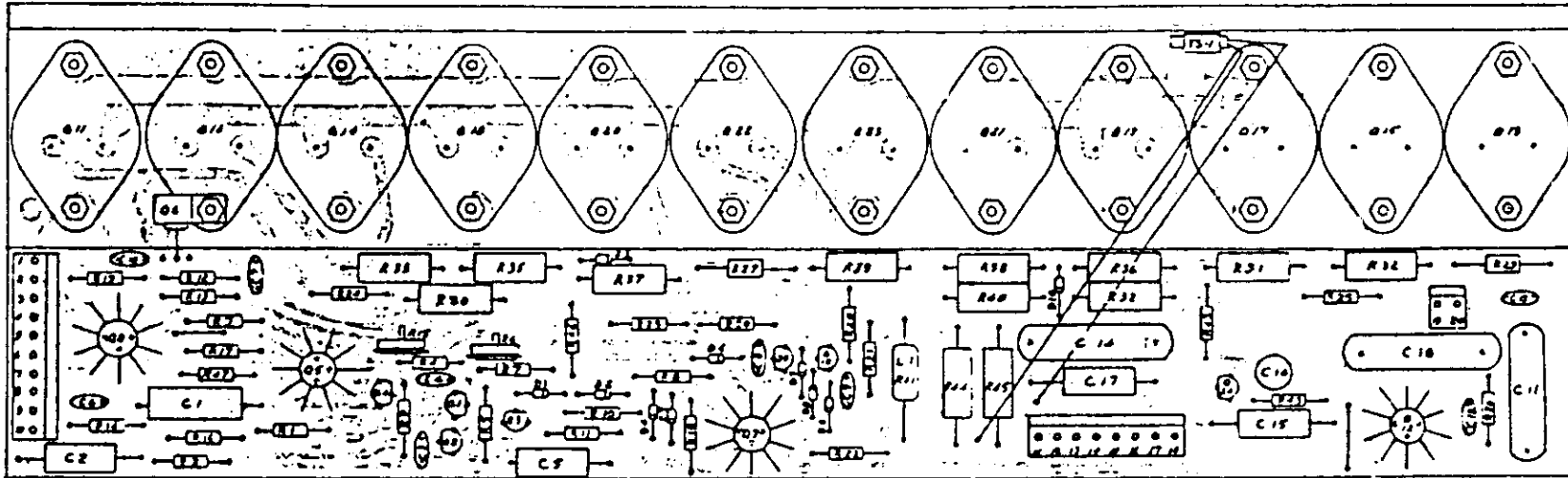


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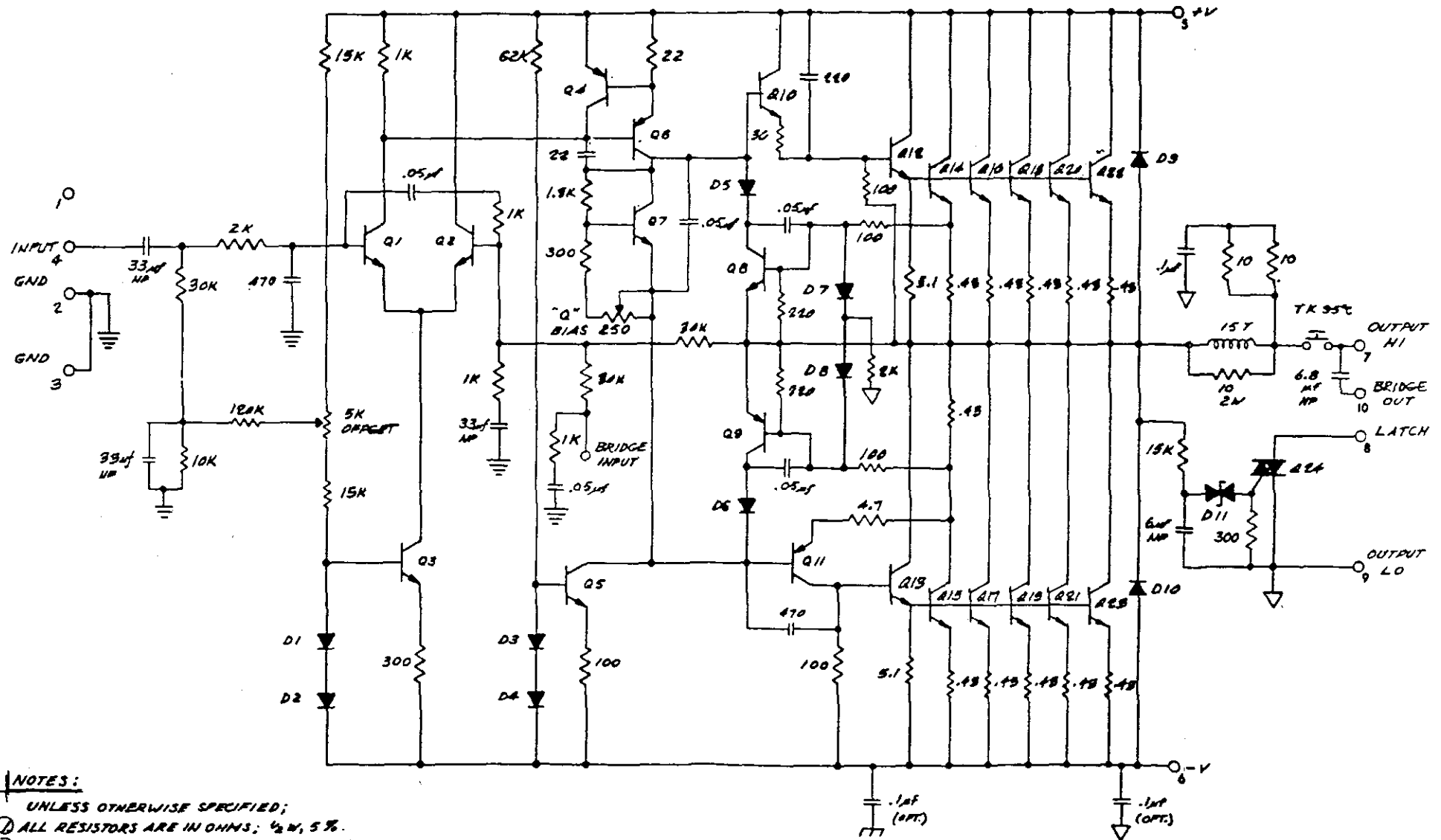
TERMINAL STRIP CONNECTIONS

- |                              |                    |       |
|------------------------------|--------------------|-------|
| 1 +V                         | 11 BRIDGE SIG. OUT | 18 -V |
| 2 +V                         | 12 NC.             | 20 -V |
| 3 BRIDGE INPUT               | 13 NC.             |       |
| 4 INPUT L0                   | 14 LED SIG. OUT    |       |
| 5 INPUT HI                   | 15 OUTPUT HI       |       |
| 6 INPUT HI TIE TO F.P. LEVEL | 16 OUTPUT L0       |       |
| 7 'LEVEL' CONTROL WIPER      | 17 CAP BUSS        |       |
| 8 INPUT 'LEVEL' L0           | 18 LATCH SIG. OUT  |       |
| 9 INPUT GND                  |                    |       |
| 10 INPUT GND                 |                    |       |

AB SYSTEMS DESIGN
PCB ASSEMBLY
FIRST PAGE: 4/1/74
DATE: MAR 02 1974
ASSEMBLY NO. 10

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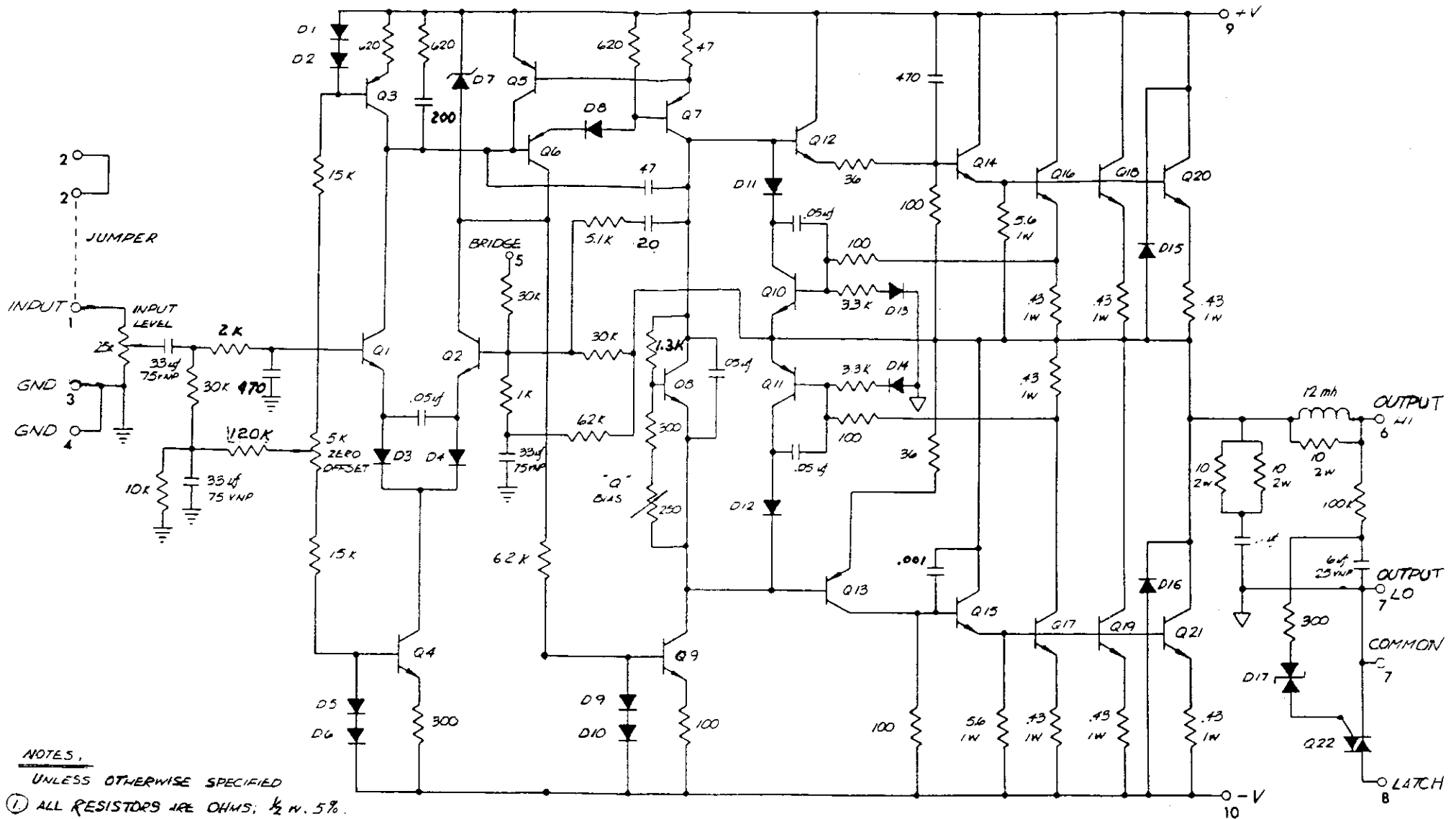


- NOTES:**  
 UNLESS OTHERWISE SPECIFIED;  
 ① ALL RESISTORS ARE IN OHMS; 1/2 W, 5%.  
 ② ALL CAPACITORS ARE IN PICO FARADS (PF).  
 ③ REFER TO PARTS LIST FOR SEMICONDUCTOR TYPES.  
 ④ ○ INDICATES QUICK DISCONNECT.  
 ⑤ ⊕ INDICATES INPUT SIGNAL GROUND.  
 ⑥ ⊓ INDICATES CHASSIS GROUND.

AB SYSTEMS

CHANNEL AMP BOARD

Model 410c



**NOTES.**

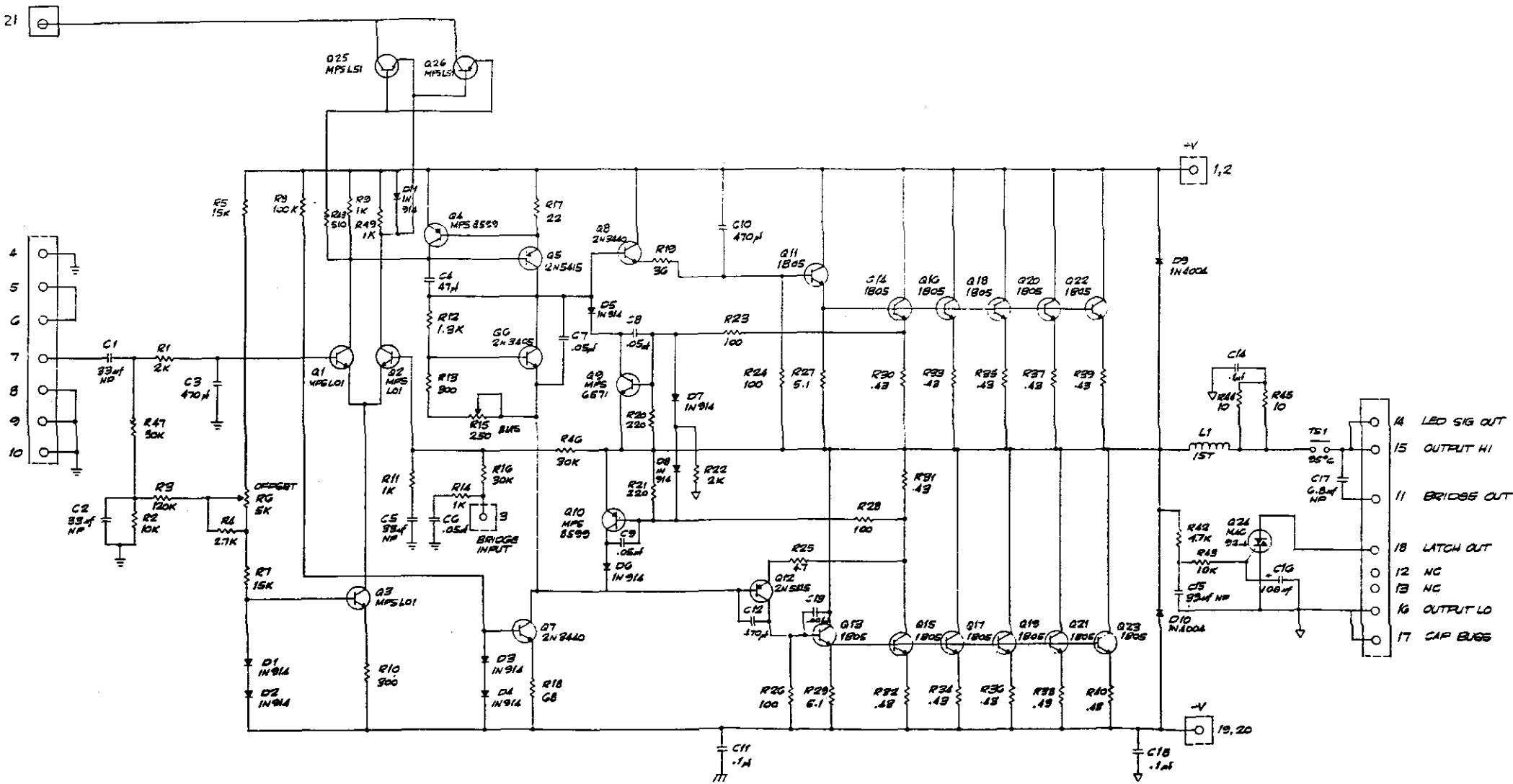
UNLESS OTHERWISE SPECIFIED

- ① ALL RESISTORS ARE OHMS; 1/2 W. 5%.
- ② ALL CAPACITORS ARE IN PICCOFARADS (P).
- ③ REFER TO PARTS LIST FOR SEMICONDUCTOR TYPES.
- ④ ⊥ INDICATES SIGNAL GROUND.
- ⑤ ↓ INDICATES POWER SUPPLY RETURN
- ⑥ — INDICATES QUICK DISCONNECT.

AB SYSTEMS

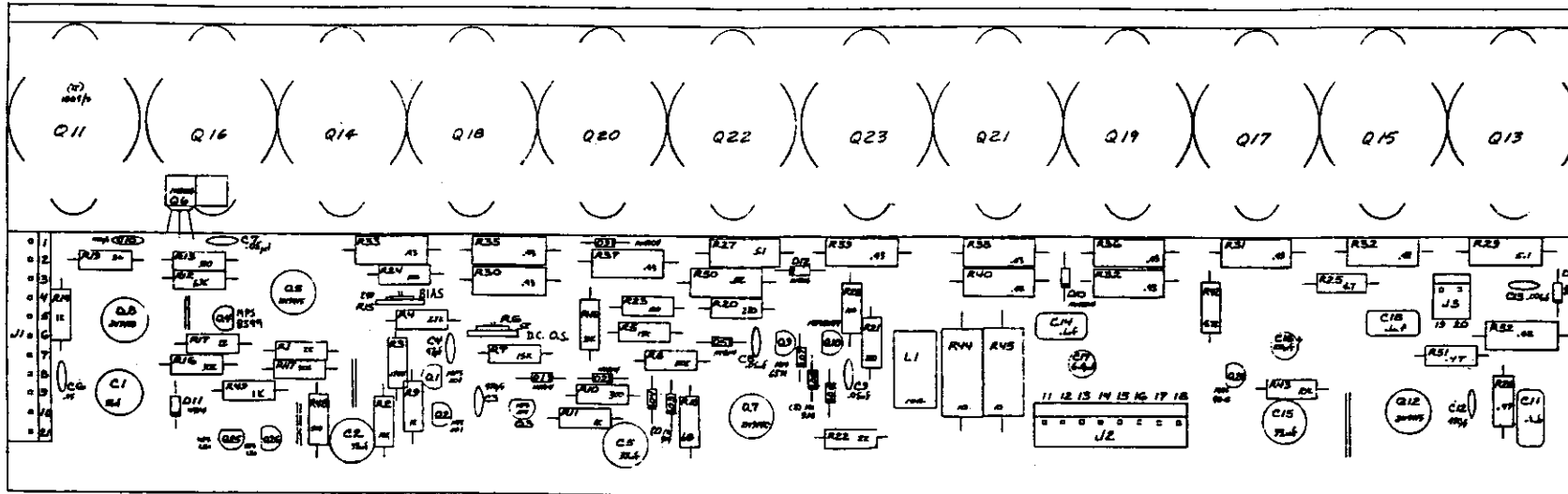
CHANNEL AMP BOARD

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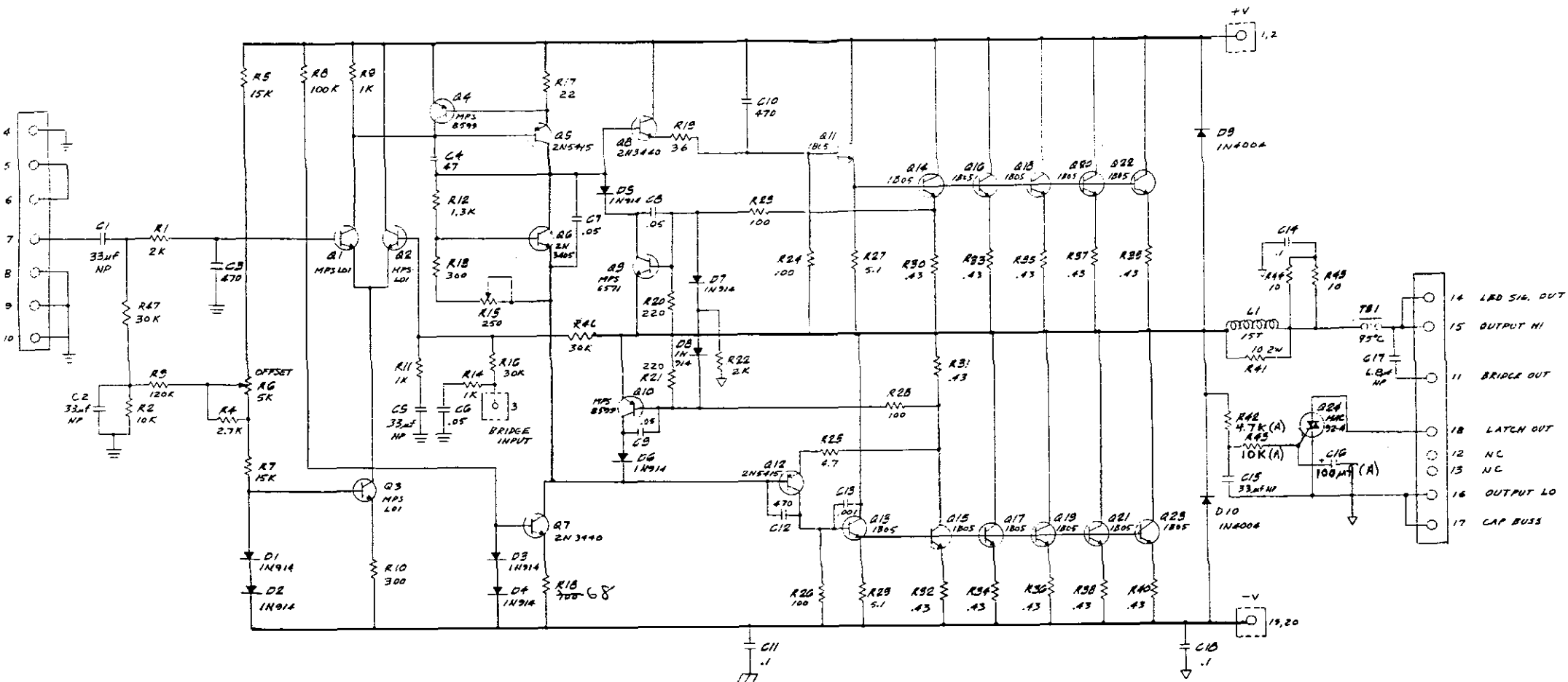


INPUT TERMINAL CONNECTIONS

- 4. INPUT LO
- 5. INPUT HI
- 6. INPUT HI TIE TO R2 LEVEL
- 7. 'LEVEL' CONTROL WIPER
- 8. INPUT 'LEVEL' LO
- 9. INPUT GND
- 10. INPUT GND.
- 21. CLIP



AB SYSTEMS DESIGN, INC.  
 PCB ASSEMBLY: 250W BOARD  
 FIRST USAGE: MODEL 410C  
 DATE: MAR. '82 | REV: SEPT. '82  
 ASSEMBLY NO: 502-622 *See 2a*



INPUT TERMINAL CONNECTIONS

- 4. INPUT LO
- 5. INPUT HI
- 6. INPUT HI TIE TO F.P. LEVEL
- 7. 'LEVEL' CONTROL WIPER
- 8. INPUT 'LEVEL' LO
- 9. INPUT GND.
- 10. INPUT GND.

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AB SYSTEMS DESIGN, INC.	
SCHEMATIC, PCB : 250 W B.D.	
FIRST USAGE : MODEL 410C	
DATE : MAR '82	REV : SEPT. '82
ASSEMBLY NO. 582-574	