COLLECTED BY MARC MILLER
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cr. 8149

THIS INCLUDES INFORMATION FROM MY 7560 BINDER, AND TROUBLESHOOTING INFORMATION ON MY COMPUTER.

7560 FAMILY TROUBLESHOOTING INFORMATION

7560 repair notes

Marc Miller

High THD at 4 ohm	Check that both high voltage transformers are properly operating. Not miswired, somehow unconnected, or bad. Also check cap from red binding post to well (A7).
Low to no bias, chassis	Sense resistor value too high or open.
4 Ω pos osc, all else OK	This type of oscillation is typical with D 5841-8 output transistors. Some amplifiers are worse than others. No fix, problem somewhere with the overall oscillation. Eng didn't do anything about it way back when in production.
High THD all else OK	7562 amplifier, .1 cap across red binding post to heat sink bad.
Fuse blows,2 ohms	Older amplifier blows fuse during 2 ohm current limit test and the Interlock check test. Output transistors have been replaced in the past. Quite possibly there is a leaky or several leaky outputs. Don't see any significant difference by measuring across the emitter resistors with a signal. May be time to replace all outputs. They all may be stressed enough. (Ed)
Pos limiting jumpy	2 ohm positive limiting jumpy, not stable. Found .33 ohm on sense resistor increases it's value under load.
Current Limit levels	Use 1K @ 8 ohms and drive amp to aprox. 40V output. Measure across the "sense" output transistor, then measure the other outputs in that bank. Replace the sense transistor and it's emitter resistor with those with a lower voltage reading to INCREASE current limit. Replace with higher readings to DECREASE current limit.
7570 I mon not cal	Can't calibrate the current monitor. .015 and .033 mf caps not installed.
Low bias A2 & A7	Found black ground wire to A7 & A8 not connected.
High IM 8 &4 & no load	Found big 2.7 ohm resistor with coil around it to be 6 ohms.
High IM 8 &4 & no load	Replaced old "newspaper" capacitors, C138, C129, & C140, with new caps and IM dropped DRAMATICLY!
80Db noise	Bad fan
Blows 20 A fuse	8415, originally wired for 120V by us. Customer re-wired the amplifier for 220V usage. Found one transformer wired backwards at the "A B C . . . " connectors.
Oscillates on output	Bias transistor shorted.
High bias, rail shift, 62V offset	7560, Found a shorted output and it's emitter resistor had opened.
No bias A3 & A6 wells	8415, C128 was bad, measured incorrectly, had worn out.
Jneven bias, A1&2 – A7&8	M600, Found Q119 to be open.

Low I limit, 9797 brd	M600. Has 9797 main board. 2 ohm voltage limit at 40V with 68K or greater osc on it instead of 60V and clipped smooth. New CAD brd work OK on the chassis. I replaced some of the older caps around the limiting circuit and the limiting transistors. I parralleled across R160 to increase the voltae, (instead of parralleling to reduce) and got the voltage up to 58V. This is all the higher I could go without the amp clamping down to 40V.
Low Freq Protect high	8730. LFP would kick in around 50 HZ instead of around 12ish HZ. Found R418 (470K) to be low, but within spec. I guess low is bad.
Blows LV fuse	8730, Ran through test with no problem. Noise a bit too high. It was then Ray noticed the low voltage transformer to be terribly hot. More testing/experimenting blew the fuse. Looked OK with ohmmeter readings. Replaced the transformer. Much cooler operation, happy amp!
Output terminator resistor	Records of observations. Don't remember the problem. Measured 4.09 mΩ bad, 3.58 mΩ good
No low side bias	After shorted outputs, replaced + no low bias. Q119 was shorted (Q111, D113 were also bad)

7560 Card file information

Cardfile - 7560FAM.CRD

File Edit View Card Search Help

List View — 23 Cards

```
7560 Family Maintenance (All Models)  #1
7560 Family Maintenance (All Models)  #2
All Models, 7560 Family Inspection    #1
All Models, 7560 Family Inspection    #2
All Models, 7560 Family Inspection    #3
All Models, 7560 Family Inspection    #4
All Models, 7560 Family Inspection    #5
General Updates, 7560 Family          #1
General Updates, 7560 Family          #2
General Updates, 7560 Family          #3
General Updates, 7560 Family          #4
General Updates, 7560 Family          #5
General Updates, 7560 Family          #6
General Updates, 7560 Family          #7
General Updates, 7560 Family          #8
General Updates, 7560 Family          #9
M600    Updates                       #1
M600    Updates                       #2
M600    Updates                       #3
M600, 7560 Family +Vcc Buss Mod. Details
M600, 7560 Family Output Mixing
M600, Early 7560 Stability Mod Details 1
M600, Early 7560 Stability Mod Details 2
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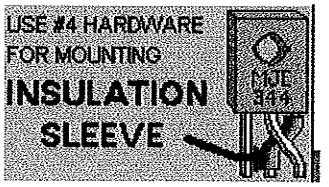
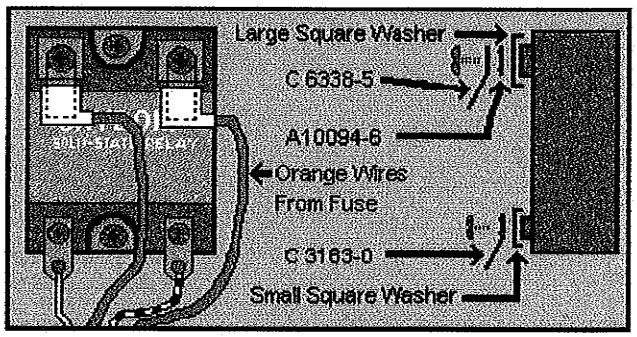
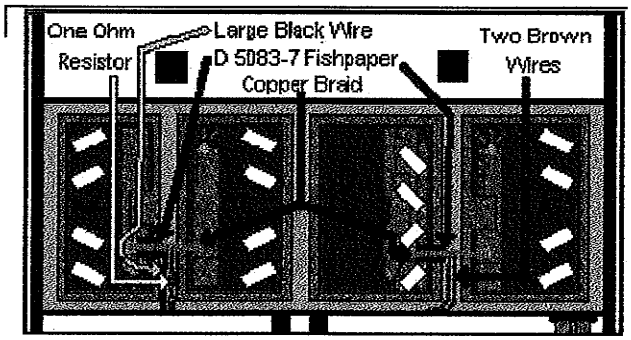
Color pictures of the included black and white







7560 Family Maintenance (All Models) #1
1) Open top side of plenum, vacuum out dust from heatsink fins & fans. Blow out any remaining dust with compressed air. 2) Tighten the four Phillips screws on each side of chassis, & control Xfmr. 3) Tighten output and driver transistor hardware. On old units with starwashers, not Belleville type, HOLD the nuts and TURN the screws to prevent board damage. 4) Repl. loose, missing fishpaper under corners of main & control bds. D 4760-1.

7560 Family Maintenance (All Models) #2
5) Vacuum clean the fan filter(s); replace any that are missing or damaged, use D 5459A7; use C 3818-9 on old units. 6) Clean main & control board mounting pins with Q-tip and S 6329-7, and lube with S 5596-2 Amp contact lubricant.

All Models, 7560 Family Inspection #1
1) Check that the fans rotate freely, replace any with noisy, tight, or loose bearings. Old fans obsolete, use new. 2) Tighten the filter capacitor screws; replace any burned hardware. Replace cap if threads or vent are damaged or leaky. 3) Check for open thermal sensors(all 4) thusly: while checking resistance, heat edge of case; resistance should start at 7-8 K Ohms and drop rapidly under 1 KΩ. Replace C 3785-0 that react differently.

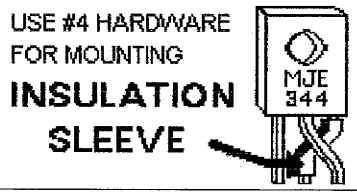
All Models, 7560 Family Inspection #2
4) Check AC line voltage setup, and for correct fuses. Test unit as wired, or return to customer's setup and reset high line, unless change was requested. 5) To come out of standby, units with old square power control module require a C 3911-2 plug with pins 1-2, 3-4, and 8-9 jumpered in J3; add when missing. 6) On old units with the sheetmetal fan bracket(s), verify the fan blade(s) are centered if amp is right side up, bend.

All Models, 7560 Family Inspection #3
7) Replace all missing, worn-out, non-standard, or damaged hardware. 8) Replace all rusty, or otherwise corroded electrically conducting hardware [driver & output transistors, filter caps, relay, etc.]. 9) Any non-standard, substitute [ECG, NTE, etc.] semiconductors must be replaced with the correct parts. Other components are acceptable, if their ratings and types are identical to orig.

All Models, 7560 Family Inspection #4
10) If any output transistors failed in 1980's and older amps, check old "gunk" for a powdery condition. If found, all outputs are probably stressed and should be replaced, using new "gunk". Remove the dried-up mess with rags & S 6329-7. The minimum repair for this is: Remove remaining good outputs, clean off old gunk, and re-install using fresh gunk. ====>> Return outputs to their original locations to avoid protection troubles.

All Models, 7560 Family Inspection #5
11) Check output transistor lead solder integrity, on old (10 years +) units. Solder failure of the "metal fatigue" variety occurs due to thermal cycling. 12) Whenever A6Q6 or A7Q6 (- current sensing outputs) are replaced, make sure BOTH screws have insulation tubing, and the insulating wafer is intact.

General Updates, 7560 Family #1
1) Older 7560's and M600's that have only the filters, must have the fan safety screens (F10639J6) added behind. 2) If the top cover caution label is missing or not legible, it must be replaced (D 5491-2); clean cover first. 3) Replace any model/voltage label (D 7389-6) that doesn't have correct model number and voltage information. 4) Replace missing top cover insulators, clean cover, (3) D 4760-1, cut in half.

General Updates, 7560 Family #2
5) Replace all 180K, R114 on Q42585-2, or Q42533-2 made before 5/87 with 2.7M, C 2634-1; affects early CAD bds. only. 6) Do the + Vcc buss modification if not already present. See the detail card. 7) If bad Q115 or Q118 are C 5065-5, use C 7339-2, cross and insulate base and collector leads per drawing. ===> 

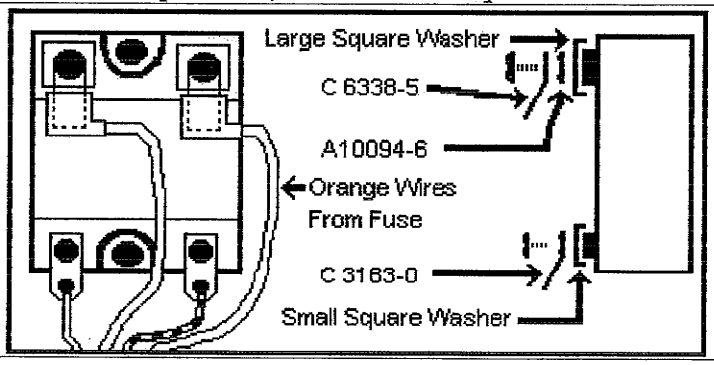
General Updates, 7560 Family #3

8) Serial # 12270 and below, except old units with RCA outputs: Do stability modification per detail cards and bulletin 7560060883, if osc. @ 20 Hz.
9) Add C140, C 2288-6 to Q114, B-C for oscillation, if amp has a 7985, 7985-1, 7985-2, or 9579 early main module.
10) Change R137 or R159 to 240 Ω for last resort cure of limiting oscillations.
11) For oscillations without load, check R300 for open, and soldering on L300.

General Updates, 7560 Family #4

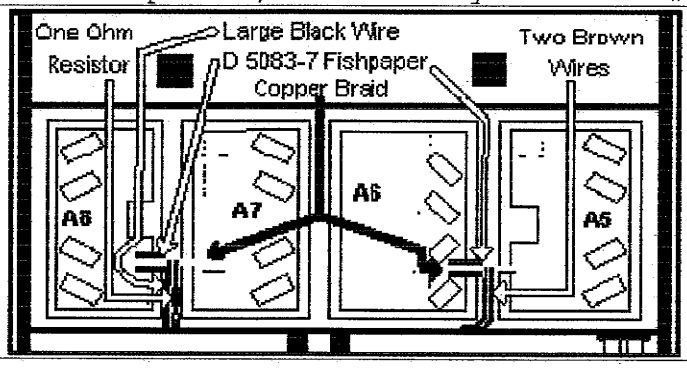
12) If a mechanical relay fails, replace it with D 8063-6, (2) lugs C 6338-5, (2) lugs C 3163-0. Remove old relay and insulator, clean off glue. Mount relay per drawing with "gunk", using top hole. Hardware: (2) A10086-10810 screws, (2) A10094-6, (2) A10102-6. Drill 11/64 hole for other screw, remove shavings, add hardware; don't forget terminal strip inside plenum. Mount lugs using hardware with relay, and (2) A10094-6 at top.==>>

General Updates, 7560 Family #5



General Updates, 7560 Family #6
13) On old style single-sided main boards, split and spread apart the heatsink tabs of Q115 & Q118, to better prevent lead breakage due to vibration. 14) Amps made after 8/16/95 must have bias voltages set to 400 mV ±10 mV, allow minimum 10-15 minute warmup, per T950310. Older amps remain: 300mV cold, to 350 mV (max) after 15 minute warmup, unless the customer complaint is high THD. Extreme high THD has other causes.

General Updates, 7560 Family #7
15) Braid strap update: Applies to old units that lack the straps connecting the negative quadrants. Use (2) D 5083-7 fishpaper & (2) 2¾ inch pieces A10123-6 braid. Remove the existing solder lugs connecting A5 & A6, A7 & A8. Turn around well A8, glue D 5083-7 to A6 & A8, as on newer units. Solder straps to wells, over the fishpaper. Solder brown wires to strap on A5/A6; black wire & 1 ohm to strap on A7/A8. See picture. =====>>

General Updates, 7560 Family #8


General Updates, 7560 Family #9
16) Add (2) A10102-5 #6 nuts between the input plug-in socket and the shield box, for spacers. Use Loctite 232, Perma-Lok MM115 (S 2217-8) on threads. 17) If a CPN 7930, 9570, or P 9570A4 (Q41480-7) control board must be replaced, use the current version Q42501-9. For partial interlock circuit compatibility add R422, 2.7 K, C 1067-5, per P.S. schematic. Avoid replacement if possible, requires system modifications.

M600 Updates #1
1) Replace plastic heat sink mounting plates; use (2) F 9776A8 plates, (2) D 5656-0 gaskets, and (32) C 2543-4 expansion nuts. Use wooden gasket jig. 2) If grade of RCA outputs unavailable, all outputs, drivers, and main module must be replaced with current parts. 3) Do the +Vcc buss mod, see details; add braid strap & fishpaper to - wells. 4) Do all inspection & maintenance items that apply, and general updates.

M600 Updates #2
5) Add RC networks R1, A10266-1204, C3, C 8512-3 to A4 & A5; add R1 & R2, A10266-1204, C3, C 8511-5 to A1 & A8. Remove original bypass parts & add R302 R303, and R304, A10266-1021. Use (3) C 5050-7 for C302, C303, C304, if unit is used as a 7570 (CCM1 or CCM2 input). 6) For oscillations without load, check R300 for open, and soldering on L300. Also check wire routing and twist the wires from main bd. to base of drivers.

M600 Updates #3
7) Main module 7985: Add (2) C 2874-3, R147 & R156 to foil side, per schematic MI-267. Change: R138, R155 and R174 to A10266-1111, and R173 to A10266-1211. 8) If replacement of D409 on control bd. 7930 is necessary, the part must be selected for 24 Volts or higher. If IC400 fell out of its socket during shipment or seems loose, replace old socket with C 3451-9.

M600, 7560 Family +Vcc Buss Mod. Details
On older units (any model), add H42629-8 buss wire connecting the positive wells (collector of outputs). Remove all six jumper lugs from between the wells, use four of them to connect the buss to the back output transistor screw. Solder the 4 lugs and the 3 red wires to the new buss. Make sure there is a lockwasher (A10094-4) between each lug and the board foil. Use a 13 inch, red 12 AWG wire if H42629-8 is unavailable.

M600, 7560 Family Output Mixing
Part number C 7423-4 may be mixed with C 7064-6 in a unit, but all outputs must be the same part number and grade number, in any given quadrant. Also, all four drivers must be the same part number and grade number. NOTE: There are EIGHT outputs per quadrant, and four quadrants per amplifier.

M600, Early 7560 Stability Mod Details 1
1) Parts needed: (2) C 2342-1, 27 pF; (1) A10266-5621, 5.6 K; (2) C 2820-6, 5 pF; (1) C 3627-4, 82 pF; (1) A10266-5R62, 5.6 Ohm ½ W; (1) A10434-473JD (or C 8511-5), .047 µF; (1) C 3804-9, 2 K ohm. 2) Change C104 from 10 pF to 27 pF. 3) Change R176 from 22K, ¼W to 5.6K, ¼W. 4) Parallel R176 with a 5 pF capacitor. 5) Move ground side of C103 to IC100 pin 6 (junction of R112 and R171). 6) Parallel R109 with a 5 pF capacitor.

M600, Early 7560 Stability Mod Details 2
7) Change C139 from 27 pF to 82 pF. 8) Remove C136, L103, and R170. Install 5.6 Ohm ½W in place of R170. Install a .047 µF cap from Q120 emitter to ground trace near D107, through a new hole drilled in the board. Leave L103 empty. 9) For 7570 (sometimes helps 7560, too), add a 2 K ohm in series with 27-200 pF, from IC100 pin 13 to the +15 V trace. Extra holes must be drilled in board.

3/28/00 10:43:51 ENGINEERING CHANGE NUMBER INQUIRY DATA3

CHANGE# **87E177E** Date **062687** Changed by CHUCK GIBSON

Engr. Project# E6 Approved by CARLA LANCASTER
Open Work Orders Effected: 0M18880 - BOM CHANGE EFFECTIVE 6/25/87

Models/Families that are effected by this change:
***7560 FAMILY**
Applies to *C 7064-6 outputs only (same as C 7423-4), Q42585-2*

1.0 ALTER COMPENSATION ON MAIN MOD FOR IMPROVED 10K SQUARE WAVE RESPONSE
2.0 AND STABILITY MARGIN.
3.0
4.0 Delete (1) C 4151-4 .0039MF 200V film from Q42585-2 7560 main mod
5.0 Add (1) C 3996-3 .0047MF 200V film to " (new qty 2) "
6.0 Delete (1) C 4295-9 180PF dipped mica from " "
7.0 Delete (3) C 2342-1 27PF dipped mica from " (new qty 1) "
8.0 Add (1) C 2626-7 470OHM .25W 5% to " (new qty 3) "
9.0 Delete (1) C 3220-8 5.6KOHM .25W 5% from " "
10.0 Add (1) C 3409-7 47PF dipped mica to " (new qty 5) "
11.0 Delete (1) C 3627-4 82PF mica from " "
12.0 Add (1) C 6227-0 20PF mica to " "
13.0 Add (1) C 2821-4 10PF mica to " "
14.0 Add (1) C 6087-8 62PF mica to " "
15.0
16.0 AREA OR NOTIFIED
17.0 PERSON DATE TASK
18.0
19.0 Service 6/25/87 The compensation changes listed below may be
20.0 implemented on any unit with C 7064-8 outputs to improve IM
21.0 and square wave performance.
22.0

Schem #	Old Value	New Value
C104	27PF, C 2342-1	47PF, C 3409-7
C112	82PF, C 3627-4	10PF, C 2821-4
C135	180PF, C 4295-9	20PF, C 6227-0
C137	.0039MF, C 4151-4	.0047MF, C 3996-3
C139	27PF, C 2342-1	62PF, C 6087-8
R176	5.6KOHM, C 3220-8	470OHM, C 2626-7
	27PF, C 2342-1	

31.0
32.0 CC: Ruth Overhulser Chip Estep Purchasing Tom Malinoff
33.0 Craig Hunter Harold Greeley

3/28/00 12:25:03 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# 95E299C Date 102695 Changed by JIM MARKS

Engr. Project# B034 Approved by SR GN BJL RS JLS

Open Work Orders Effected:

NONE - BOM CHANGE EFFECTIVE 10-26-95

Models/Families that are effected by this change:

*DCA FAMILY *PS FAMILY
*D150 FAMILY *7560 FAMILY

1.0 UNLINK AN OTPT TRANSISTOR (D 6729-4) FROM ANOTHER XSISTOR (C 7064-6)
2.0 We used to buy C 6729-4. All demand for C 7064-6 came out of these.
3.0 They were sorted with different VBE steps and then were re-marked
4.0 with number C 7064-6. Now we buy both part numbers from Motorola
5.0 and we do not re-mark the part number. These part numbers were
6.0 originally linked on ECN 91E316B.
7.0
8.0 Delete (1) D 6729-4 MJ15003, SJ7140 PWR NPN
9.0 from C 7064-6 MJ15003, SJ4425 PWR NPN
10.0
11.0 Deleted part is used elsewhere.
12.0
13.0 AREA OR NOTIFIED
14.0 PERSON DATE TASK
15.0 Service 10-26-95 No change to service parts. All places that
16.0 used D 6729-4 will still use D 6729-4. All
17.0 places that used C 7064-6 will still use
18.0 C 7064-6. The phantom arrangement of C 7423-4
19.0 (150V) and C 7064-6 (180V) is unchanged. All
+
20.0 models with C 7423-4 linked can use C 7064-6.

3/28/00 12:26:40 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# T950310 Date 081695 Changed by STEVE REIVES

Engr. Project# 7560 Approved by SR, JF, MS, DP, REB

Open Work Orders Effected:

NONE

Models/Families that are effected by this change:

*7560 FAMILY

1.0 7560 BIAS SETTING
2.0 WHERE USED: 7560 FAMILY
3.0
4.0 TO IMPROVE THE THD MEASUREMENTS FOR THE 7560 TYPE AMPLIFIERS THE
5.0 BIAS SETTING WAS CHANGED FROM 300-350 mVdc TO THE NEW SETTING OF 400
6.0 + 10 mVdc. THE TEST PROCEDURE IS CURRENTLY BEING REVISED BY
7.0 MANUFACTURING TO REFLECT THIS CHANGE.
8.0
9.0 MITCH SHECKLER: THE FOLLOWING IS A LIST OF STARTING SERIAL NUMBERS
10.0 FOR THE 400 mV BIAS SETTING.
11.0
12.0 FAMILY STARTING SERIAL NUMBER FOR 400 mV BIAS SETTING
13.0 7560 15132
14.0 7570 54595
15.0 7571 520304
16.0 MB 7560 8121
17.0 MB 7570 148220
18.0 8401 34313
19.0 8402 54339
+
20.0 8415 45298

3/28/00 12:28:05 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# T940243 Date 122394 Changed by SR

Engr. Project# 7560/70 Approved by SR,DE,RK,DH,RJ

Open Work Orders Effected:

NONE

Models/Families that are effected by this change:

*BI-LEVEL *7560 FAMILY
*ISA FAMILY

1.0 IT HAS BEEN DETERMINED THAT GRADE #2 AND #3 DRIVER TRANSISTORS CAUSE
2.0 OSCILLATIONS ON THE ISA, BI-LEVEL AND 7560/70 TYPE AMPLIFIERS. SINCE

3.0 THE QUANTITY OF THESE TWO GRADES ARE CURRENTLY AT LESS THAN 1% YIELD.
4.0 IT IS MORE COST EFFICIENT TO CONSIDER THESE PARTS AS REJECTS AND
5.0 SCRAP.
6.0
7.0 IF THE YIELD OF THESE PARTS EXCEED MORE THAN 10% ENGINEERING WILL
8.0 LOOK INTO THE POSSIBILITY OF USING THESE NUMBERS BY CHANGING
9.0 AMPLIFIER DESIGN OR REPLACING THIS TRANSISTOR WITH ANOTHER PART.
10.0
11.0 RENU KAMATH PLEASE REVISE CURRENT SORTING PROCEDURE TO REJECT
12.0 GRADE #2 AND #3 UNLESS THE YIELD IS MORE THAN 10%.
13.0 THEN ENGINEERING SHALL BE NOTIFIED.
14.0
15.0 DIANE ELLIS CHECK STOCK OF D 8274-9 AND SCRAP PARTS THAT ARE
16.0 GRADE #2 AND #3.

3/28/00 12:29:24 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# 94E026A Date 012694 Changed by STEVEN REIVES

Engr. Project# T166S Approved by DM/VE/RJ/NB/WM/JLS

Open Work Orders Effected:

NONE - BOM CHANGE EFFECTIVE 1-27-94

Models/Families that are effected by this change:

*7560 FAMILY

1.0 ON CCM2 MOD, PARTS CHANGED BECAUSE THESE ARE COMPENSATION VALUES USED
2.0 most of the time by line tech. Change C6 from .02MF to 1.0MF C 4472-4
3.0 and add to location C5 150PF C 5195-0 and location R16 56K ohm
4.0 A10266-5631.
5.0
6.0 Delete (1) C 5230-5 0.02MF 50V disc
7.0 Add (1) C 4472-4 1.0 MF 100V 5% met poly
8.0 Add (1) C 5195-0 150PF 5% mica
9.0 Add (1) A10266-5631 56.Kohm .25W 5% CF 25 T/R
10.0 on Q42508-4 Mod, CCM2
11.0
12.0 Deleted part is used elsewhere.
13.0
14.0 AREA OR NOTIFIED
15.0 PERSON DATE TASK
16.0 Modules 01-26-94 Revise samples and documentation with the above
17.0 changes.

```
  18.0
  19.0 pc:  D McBrier  V Eichorst   B Miller   R Jones   J Downs   V Manchow
+
20.0       C Hunter   D Lutz  T Pettifor  B Caprarotta   R Overhulser
  21.0                 K Clingenpeel    Fabcom Planners(2)
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3/28/00  12:31:19   ENGINEERING CHANGE NUMBER INQUIRY   DATA3         PSRQ0030

     CHANGE#  93E126B  Date  050693   Changed by  STEVE REIVES

     Engr. Project#  T166S           Approved by  GN/RR/DM/JLS

     Open Work Orders Effected:

     NONE - BOM CHANGE EFFECTIVE 5-8-93


     Models/Families that are effected by this change:

     *7560 FAMILY

   1.0 CHANGE TO NEW DRIVER TRANSISTOR BECAUSE PRESENT PART UNAVAILABLE.
   2.0
   3.0   Delete (1) M43248-0 7560 bottom output panel
   4.0     Add  (1) M45839-4 7560 btm otpt pnl asm #2
   5.0   Delete (1) M43247-2 7560 top output panel
   6.0     Add  (1) M45840-2 7560 top otpt pnl asm #2
   7.0           on M43388-4 7560 common parts
   8.0              M44319-8 BB7560 common parts
   9.0              M45589-5 7570DSF pkg
  10.0
  11.0 Deleted parts are not used elsewhere.  See disposition below.
  12.0
  13.0 This change increases the usage of D 8274-9 and decreases the use of
  14.0 C 8210-4.
  15.0
  16.0 AREA OR   NOTIFIED
  17.0 PERSON      DATE     TASK
  18.0 D Meyer    05-06-93  Keep track of the beginning serial numbers that
  19.0                      use the new driver transistors.
+
20.0 M Gall     05-06-93  Obsolete part numbers not used elsewhere.
  21.0
  22.0 pc:  G Neff    R Reynolds    D Meyer    J Downs    Marc Miller
  23.0   K Laffoon     Dick Moore  D Hosack  B Dorsey    R Sunday
  24.0                      M Sheckler    D Cripe    M Gall
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CHANGE# 91E051A Date 022091 Changed by STEVEN REIVES

Engr. Project# E6 Approved by JMAGUIRE/JMARKS/JSMITH

Open Work Orders Effected:

0S78530 0S8520 00T8090 T8130 - BOM CHANGE EFFECTIVE 2-20-91

Models/Families that are effected by this change:

*DCA FAMILY *7560 FAMILY
*PSA FAMILY

1.0 CHANGE TO NEW DRIVER TRANSISTOR BECAUSE OLD ARE NO LONGER AVAILABLE.
2.0 Delete (qty) D 5702-2 SEL 2SD555S pwr NPN
3.0 Add (qty) C 8210-4 Xsistor, NPN driver SJ7130
4.0 (4) GDC300A2A1
5.0 (4) M43382-7 DC-300A-2 common parts
6.0 (4) M44583-9 5530 common parts
7.0 (1) M43144-1 PSA2 PNP output test
8.0 Delete (1) C 5869-0 2SD555 RA pwr NPN
9.0 on D 5702-2
10.0 Delete (2) C 5869-0
11.0 Add (2) C 8210-4
12.0 on M43247-2 7560 top output panel
13.0 M43248-0 7560 bottom output panel

14.0		FIRST S/N			FIRST S/N			FIRST S/N
15.0	MODEL	w/C 8210-4		MODEL	w/C 8210-4		MODEL	w/C 8210-4
16.0	TM7550	134324		7550/E3/E4	034376		8555	188048
17.0	8555E4	349322		FS5530	018046		VTS5530	318360
18.0	5530	054505		MB7560	008080		MB7560M/S	008092
19.0	MB7570	148169		7570	054396		7571	9520279
+								
20.0	8401	034294		8402	054327		8415	045201
21.0	8730	115368		8740	137352		8410	850197
22.0	BB7560	259302		8930	none assigned		8556	no record
23.0	8451	no record		8452	no record		8408	no record
24.0	PSA2	038168		DC300A2	87772		7560	014946

25.0
26.0 D 5702-2 is not used elsewhere. There is no stock. C 5869-0 is still
27.0 used on GE units but will be changed after parts are approved by GE.

28.0	AREA OR	NOTIFIED	
29.0	PERSON	DATE	TASK
30.0	L Stevens	02-20-91	Notify customers of change of driver transistors.

```
  31.0 D Meyer     02-20-91  Keep track of serial numbers of units that have
  32.0                       the new driver transistors (C 8210-4).
  33.0 B Laws      02-14-91  Thank you for already changing allocations on
  34.0                       open CROWN and AMCRON orders.
  35.0 H Cosby     02-14-91  Use new transistors in above open workorders.
  36.0 R Rombke    02-14-91  D 5702-2 is item status 4.
  37.0
  38.0 cc:  Purchasing    A Mattox    L Ponder    Mike Rockwell    K Guin
+
39.0 H Greeley    J Downs    D Menges    K Laffoon    G Dexter    D Moore
  40.0         Becky Stuber    Mathews Abraham        Rich Putz
```

```
3/28/00  12:36:05   ENGINEERING CHANGE NUMBER INQUIRY   DATA3         PSRQ0030

     CHANGE#  87E224D  Date  081487   Changed by  CHUCK GIBSON

     Engr. Project#                  Approved by  CARLA LANCASTER

     Open Work Orders Effected:

     NONE - BOM CHANGE EFFECTIVE 8/12/87.


     Models/Families that are effected by this change:

     *DCA FAMILY       *PS FAMILY        *7560 FAMILY
     *D150 FAMILY      *TEF FAMILY

   1.0 ESTABLISH A 150V BVCEO GRADE FOR MJ15003 TRANSISTOR.
   2.0 A phantom arrangement will be set up on C 7423-4 with C 7064-6 linked
   3.0 under it.  C 7064-6 and C 7423-4 may be mixed in a batch and may be
   4.0 mixed on a unit.  VBE grade #'s must still be matched on units with
   5.0 parallel devices.
   6.0
   7.0 Replace C 7064-6 (D 5841-8 on TEF-10) with C 7423-4 on the following
   8.0 assemblies:
   9.0       M39095-1        M39098-5        M39143-9        M43247-2
  10.0       M43248-0        M43257-1        M43268-8        M43308-2
  11.0
  12.0 AREA OR   NOTIFIED
  13.0 PERSON      DATE     TASK
  14.0
  15.0 Don F.    8/12/87    Mark the 150V parts with C 7423-4.
  16.0
  17.0 CC:  Harold Greeley   Helen Cosby   Barb Stock   Craig Hunter
  18.0      Dale Kauffman    Peggy Skirvin
```

3/28/00 12:38:57 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# 95E180C Date 062995 Changed by STEVE REIVES

Engr. Project# T166S Approved by VE/JS/DM/DP/RO/RJ/KH/BJL

Open Work Orders Effected:

NONE - BOM CHANGE EFFECTIVE 06-30-95

Models/Families that are effected by this change:

*7560 FAMILY

1.0 REMOVED CAPACITOR AND RESISTOR FROM 7560 MODELS TO IMPROVE POWER
2.0 factor correction. This change is to decrease current draw
3.0 through low voltage fuse.
4.0
5.0 Delete (1) C 5056-4 1" LYTRE ALUM CABLE CLAMP (new qty of 1)
6.0 (1) C 7595-9 8.0UF 250V 10% POLYPROPYLENE(new qty of 1)
7.0 (1) D 6109-9 .25TAB #8H TERM STRIP (new qty of 1)
8.0 from M39101-7 7560 COMMON PARTS
9.0 M45588-7 7570DSF ASM
10.0 M45920-2 7560 220V COMMON PHANTOM
11.0 Delete (1) C 6066-2 33.0OHM 10W 10% WIRE (new qty of 1)
12.0 from Q42535A5 MOD, 7560 LOW VOLTAGE WIRING
13.0 Delete (8) A10120-22B6 WIRE, #22 BLU 300V 105C C/U(new qty of 10)
14.0 (8) A10120-22B98 WIRE, #22 GRY ON WHT 7/30 UL
15.0 (2) C 7350-9 INS FLAG FASTON #22-18 WIRE
16.0 from H42554C2 WIRES, 7560 DUAL FAN
17.0
18.0 Deleted parts are used elsewhere.
19.0 +
20.0 AREA OR NOTIFIED
21.0 PERSON DATE TASK
22.0 SERVICE 06-29-95 No Special instructions.
23.0 Overhulser 06-29-95 Delete R9 from Q42535A5 (33 ohm 10W).

3/28/00 12:40:43 ENGINEERING CHANGE NUMBER INQUIRY DATA3 PSRQ0030

CHANGE# 91E316B Date 111391 Changed by JIM MARKS

Engr. Project# B034 Approved by GNEFF/JW/SR/JSMITH

Open Work Orders Effected:

NONE - BOM CHANGE EFFECTIVE 11-14-91

Models/Families that are effected by this change:

*CT FAMILY *D150 FAMILY *MR FAMILY *PSA FAMILY
*DCA FAMILY *MA FAMILY *PS FAMILY *7560 FAMILY

1.0 CHANGE PARENT/COMP RELATIONSHIP OF SORTED XSISTORS. WE BUY 1 XSISTOR
2.0 and depending on usage and result of tests, it becomes 1 of 3 p/n,
3.0 D 6729-4, C 7064-6 or C 7423-4. Before this change we bought
4.0 transistors marked C 7064-6 and changed the majority of them to
5.0 D 6729-4. After this we will buy transistors marked D 6729-4 and
6.0 the majority will stay marked with that number.
7.0
8.0 Once they are tested and sorted by Incoming Inspection and put into
9.0 stock, there is no difference between transistors before and after
10.0 this change. Both before and after this change, C 7423-4 is a
11.0 phantom and its component is C 7064-6.
12.0
13.0 This change was requested by Greg Neff and Jim Downs so that fewer
14.0 transistors have changed marks.
15.0
16.0 Delete (1) C 7064-6 MJ15003, SJ4425 pwr NPN
17.0 on D 6729-4 MJ15003, SJ7140 pwr NPN
18.0 Add (1) D 6729-4
19.0 on C 7064-6
+
20.0 AREA OR NOTIFIED
21.0 PERSON DATE TASK
22.0 J Downs 11-13-91 Adjust incoming test procedures.
23.0 G Neff 11-13-91 Buy D 6729-4 instead of C 7064-6.
24.0
25.0 cc: Purchasing(5) A Mattox L Ponder J McLaughlin M Rockwell
26.0 Rich Put K Guin D Menges K Laffoon G Dexter Dick Moore
27.0 D Hosack M Sheckler L Stevens

ENGINEERING NOTICE

Subject: 7560 BIAS SETTING

E.N. No. T-310

Where Used: 7560 FAMILY

E.N. Rec'd

E.N. Issued

Sheet 1 of 1

To improve the THD measurements for the 7560 type amplifiers the bias setting was changed from 300 - 350 mVdc to the new setting of 400 ±10 mVdc. The test procedure is currently being revised by manufacturing to reflect this change.

Mitch Sheckler

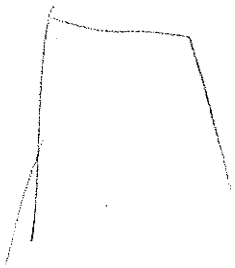
The following is a list of starting serial numbers for the 400 mV bias setting.

FAMILY	Starting Serial Number for 400 mV bias setting
7560	15132
7570	54595
7571	520304
MB7560	8121
MB7570	148220
8401	34313
8402	54339
8415	45298

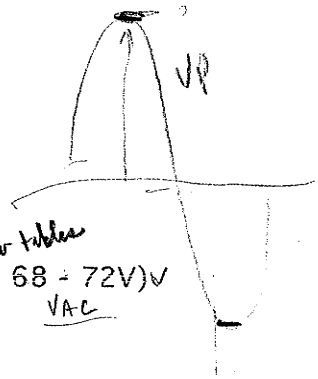
Originator	Electrical Eng.	Mechanical Eng.	Project Eng.	Manufacturing Eng.	Regulatory	Distribution		
SR	SR					T-1	Acct.	Mitch Sheckler
Date: 8-16-95	Date: 8-16-95	Date:	Date:	Date: 8-16-95	Date:	T-2	Pur.	Jim Finneran
Line Mgr.	Sales	Purchasing	Quality Assurance	Other D. Pease 8/16/95	Final Approval	Q/A	Ser.	Dawn Pease
Date:	Date:	Date:	Date:	Date: 8-16-95	Date: 8-16-95	M/E	Line	
						S/M	other	

7560 Bench Test Briefs

NO LOAD
- Set bias ✓
- Set offset ✓
- Set Static Balance ✓
- Pass 100-1K signal ✓
- Unloaded voltage limit
- Voltage Gain
- Slew Rate
- Low Freq Protect



8Ω LOAD ON
- Delay test ✓
- Interlock test ✓
- Dynamic Balance - 1K @79V ✓



7570 MODIFICATIONS HERE!!
- Voltage limit - 1K @ 2Ω = 60 (Norm. Stnd) / 68V (64) (EST = 68 - 72V)V (Shaker tables) VAC
- Shunt box - Current limit
- Inductive test - 1K, 8Ω
- 10K Square wave Frequency response
- Thermal limit

THD	1K Voltage max THD into 8Ω	= 72.66V min
	1K @ 69V into 8Ω	= .0150% max
	1K Voltage max THD into 4Ω	= 66.33V min
	20K @ 69V into 8Ω	= .0625% max
	45K @ 69V into 8Ω	= .45% max
IM	8Ω, .312V 55.5V - .004%	= .04% max
	4Ω, .312V 55.5V - .01%	= .045% max
NOISE	8Ω @69V reference	= 100dB min

Look hardware grd screw low +15V supply

FREQUENCY RESPONSE SWEEP

NO LOAD
- High voltage cutoff
- Check for meter operation
- Paint pots
- Serial number
- Discharge unit

ASR drops, Pecs

R138	- CURR	Decr
R139	- CURR	Incr
R158	+ CURR	Incr
R160	+ CURR	Decr

7560

CROWN INTERNATIONAL INC.	ELECTRICAL TEST PROCEDURE
TITLE: 7560 - M600 TEST PROCEDURE	

PROCEDURE #: T0066-0	REV: E
ORIGINATED BY: JOHN HARRIS*	RELEASE DATE: 4-20-83
USED ON: G7560 - M600	

*SEEManufacturing Engineering for changes/revisions

REVISION HISTORY

John Harris April 20, 1983
REV A 10/24/83 Changed step 14-d. JM
REV B 3/25/85 CG Revised for new main module and noise procedures.
REV C 8/28/85 CG Revised power specifications.
REV D 5/9/86 CG Revised #17 (Meter Adjustment)
REV E 1/8/88 CG ECN 87-0861

JMH/wcm:Ta

INSPECTION

1. Blow unit out with air.
2. Solder inspect.
3. Check for proper wiring.
4. Check polarity of all caps, diodes, etc.
5. Check thermal sensor wiring for shorts.
6. Check bias trans., outputs for shorts, (check with ohm meter).
7. Check output terminals for shorts.
8. Plug in power supply module.
9. Plug in main module.
10. Mount and plug in display module.

TEST

1. Be sure power switch is off.
2. Plug in unit and connect load (loads off).
3. Set delay and low frequency protect switches off.
4. Turn unit on.
5. Install octal plug with pins 8 and 9 jumpered.
6. A.C. line over voltage.
   a. Switch LR to variable. Adjust A.C. line for 133 VAC (10% high line voltage). Adjust R421 on power supply module to a point just causing relay K1 to open. Switch LVR back to 120 VAC, relay K1 should close.
   b. Double check break point by adjusting LVR up until K1 opens. This voltage must be > 132 VAC < 134 VAC.

   Check for the following:

   a. Red power light on.
   b. Amber standby light off.
   c. Power relay K1 closed.
   d. Quiesent A.C. power $\leq$ 116 W.
   e. Power supply D.C. levels $\pm$15 VDC, $\pm$24 VDC, $\pm$60 VDC.

7. Hold a temporary jumper across the leads of thermal sensors on output module. Amplifier should go into standby.
8. If unit is a single fan model, hold a temporary jumper across thermal switches SW 300 and SW 301 on negative output modules. The fan must go to high speed with a switch jumpered.
9. Quiesent offset less than 10 mV.
   a. With input attenuator full CCW, adjust output offset control (R115) for 0Vdc at output.
   b. Static balance - adjust the static balance control (R117) for 0Vdc $\pm$ .1 V between chassis ground and Vcc common (P3, pin 6).

79
87

10. Bias adjustment.
    a. Adjust each bias servo stage (M600 has two bias servos) at the base emitter junction of it's respective positive output transistor section (.3 - .35 Vdc).

11. Turn loads on (1 khz 8 ohms 79 vrms output signal).
    a. Dynamic balance - (place probe on pin 6 of U101). Adjust dynamic balance control (R122) to where the positive portion of the signal at pin 6 is near but not saturation. (Figure #1.) T1 IN MAIN BD

12. Power test.
    a. 75 vrms, 1 khz, 8 ohm load. Before clipping (700W).
    b. 69 vrms, 1 khz, 4 ohm load. Before clipping (1200W)

13. Delay and frequency protection.
    a. Place delay switch into the on position, amplifier should go into standby for approximately 5 seconds, WHEN POWERED UP.
    b. Place low frequency protection switch into the on position, apply a 79 vrms .5 hz, amplifier should go into standby.

NEAREST OCTAL SOCK

14. 72 vrms, 20 khz, 8 ohm load. Before clipping. (650W)

15. Current limiting.
    a. For tests b, c, d, and g drive amp with a 3.8 V ± .2 V input signal.
    b. 1 khz, 1 ohm (place probe on pin 6 of U100). There should be no negative or positive error signal. (See Figure #2)
    c. 1 khz, 2 ohm. Look at output of amplifier. Should see current limiting of both positive and negative halves. (See Figure #3)
    d. 20 hz, 2 ohm. Look at output of amplifier. Should be able to see 120 hz power supply ripple. No current limiting. (See Figure #4.)
    e. Connect an 0.01 volt/ampere current shunt to the output of the amplifier. T0202-1 is a diagram of one suitable shunt. Disconnect all other loads. Connect a DC voltmeter to the shunt so that you can read current output of the amplifier. Apply positive .5 to 1.5 volts DC to the input of the amplifier. Current must be 16 amperes + or - 10%. Repeat with negative input voltage. The negative current must also be 16 amperes + or - 10%.

5.5 V p-p input

?

f. If any circuit changes have been made in the last four steps, return to a. and repeat all steps.
g. 1 khz, 8 ohms with 160 μH air core coil applied to output terminals and with output voltage approximate full power waveform should resemble that of Figure #5.

16. 10 khz squarewave, 8 ohm load 100VP-P. (See Figure #6.)

17. Short test.
a. Place some sort of cover over the fan to restrict air flow.
b. Short output terminals.
c. 3 Vrms, ± 1 V, 1 Hz input signal.
d. At 140 degrees F, high speed fan should come on.
e. At 160 degrees F, amplifier should go into standby.
f. Let amplifier thermal out three times.

18. Meter adjustment.
a. Operate amp with no load.
b. Set red lamp attenuator switch at 0dB.
c. Set green lamp attenuator switch at -3dB.
d. Set amp to 55 Vrms out, 1 kHz, sinewave.
e. Connect scope probe to the wiper of R227.
f. Adjust R227 so that the scope display does not jitter.
g. Set amp for 70.7 Vrms out.
h. Set R219 so the meter reads OVU.
i. Set test input card CEN632 to all test positions in sequence.
j. Set amp to 78 Vrms out. The AC line must be an LVR for this test.
k. Set R201 so that the red lamp just comes on.

19. I.M. distortion 55.5 Vrms low frequency 4:1, 60 hz, 7 khz.

	8 ohms	4 ohms
0dB	.004%	.01%
-5dB	.01	.01
-10dB	.01	.01
-15dB	.01	.01
-20dB	.01	.01
-25dB	.01	.01
-30dB	.01	.01
-35dB	.01	.01
-40dB	.03	.03
-45dB	.03	.03

20. Signal to noise 0dB = -103 bench specification.

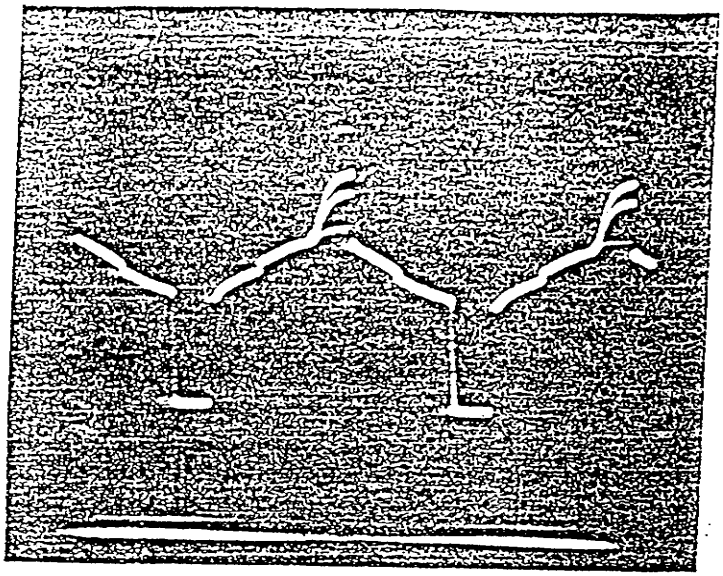


FIG. 1 1 kHz into 8 ohms at pin 6 of U101 or T1. 2 V/div, .2 us/div

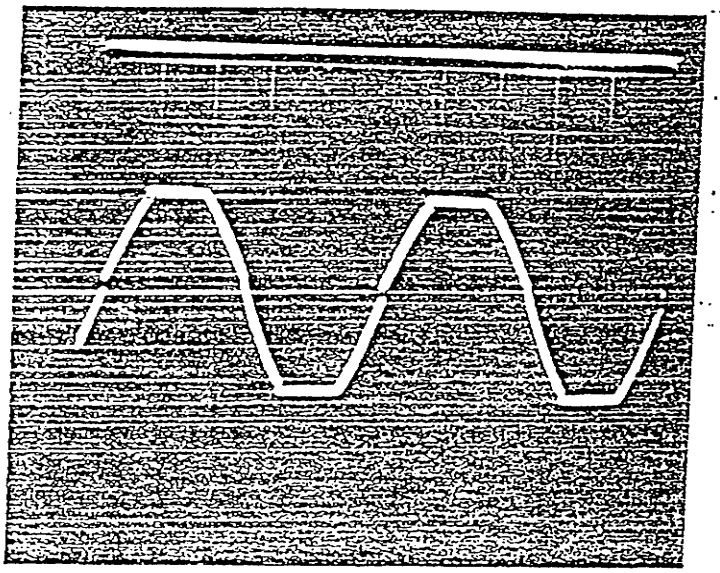


FIG. 2 1 kHz into 1 ohm at pin 6 of U101 or T2 2 V/div, .2 us/div

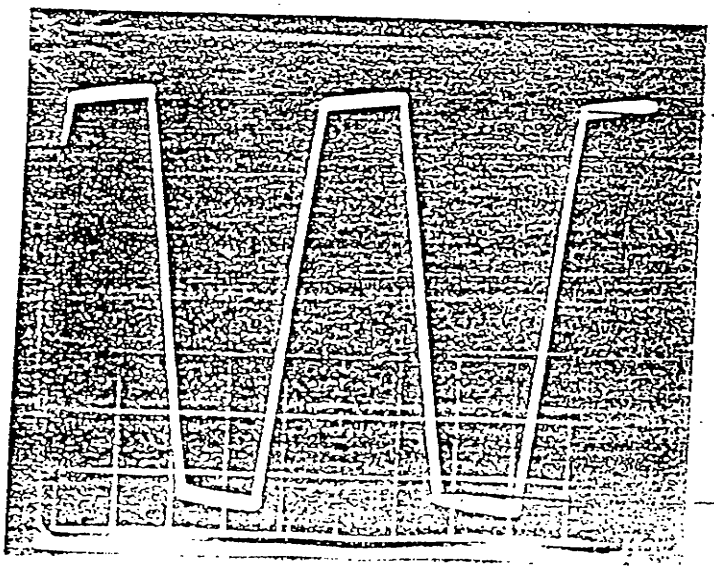


FIG. 3 1 kHz into 2 ohm at output. 20 V/div, .2 us/div

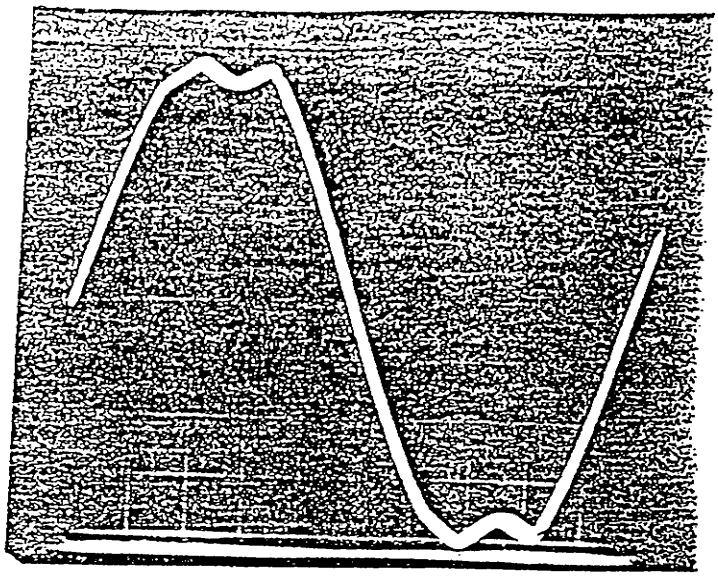


FIG. 4 20 Hz into 2 ohm
at amp output
20 V/div, 5 ms/d

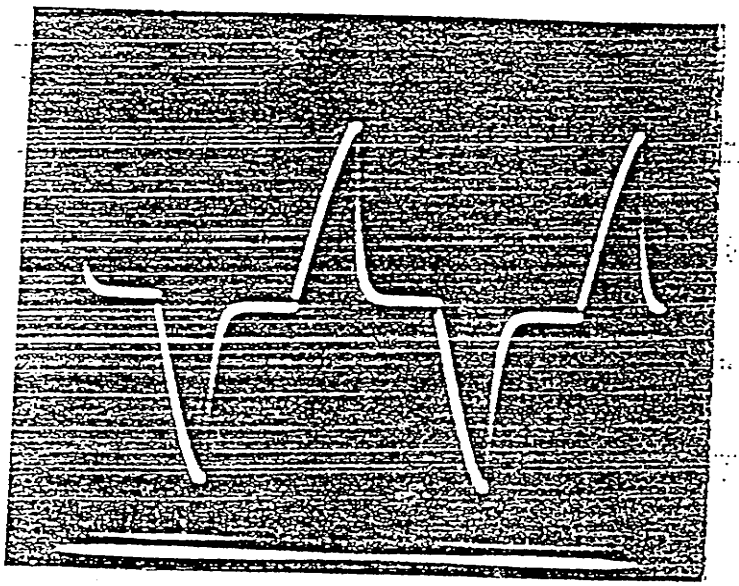


FIG. 5 1 kHz into 8 ohm
// 160 uh
20 V/div, .2 ms/

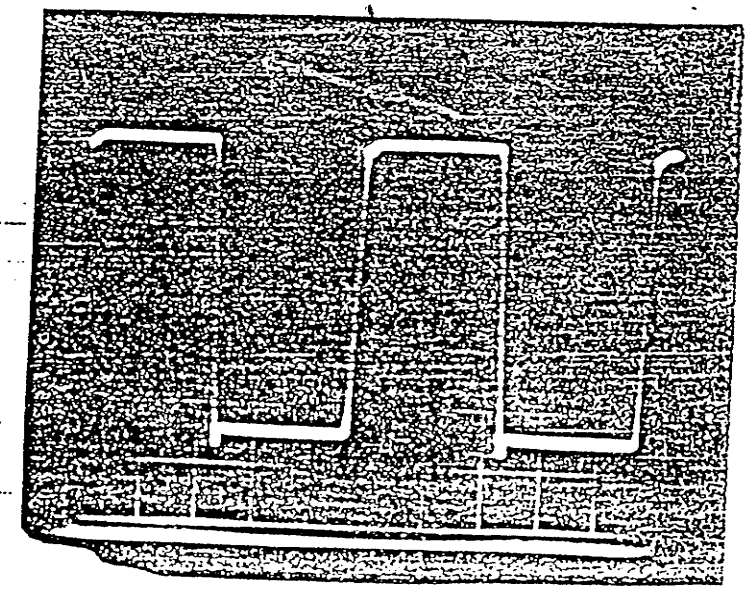


FIG. 6 10 kHz square wav
8 ohms
20 V/div, 20 ms/

SERVICE BULLETIN

crown®

SUBJECT: 7560/7570 Stability Modification

SERIAL NUMBERS AFFECTED: 12270 and below

When used in industrial applications the 7560/7570 model amplifier can exhibit instability under certain conditions. All modification changes are on the main module. The following are the modification proceedures and part numbers:

Model 7560/7570

	Description	Crown Part Number
1.	Change C104 from 10 pfd to 27 pfd.	C 2342-1
2.	Change R176 from 22 Kohm ¼w to 5.6 Kohm ¼w.	C 3220-8
3.	Place in parallel with R176 a 5 pfd capacitor.	C 2820-6
4.	Change the ground side connection of C103 to the pin 6. This can be done by unsoldering the lead of C103 connected to ground and soldering it to the junction of R112 and R171. (see Fig. 1)	
5.	Place in parallel with R109 a 5 pfd capacitor.	C 2820-6
6.	Change C139 from 27pfd to 82pfd.	C 3627-4
7.	Remove L103, C136 and R170 (Q120 emitter RLC network- negative predriver in the low side of the bridge). In place of R170 install a 5.6 ohm ½w resistor. Likewise install from the emitter of Q120 to ground a .047 mfd capacitor (see fig. 1).	C 3299-2 C 3978-1

.047 C 3288-5

Model 7570 (7560 with constant current module)

-The following modification is for the 7570 only and is included with the preceeded seven step modification.

1.	From pin 13 of IC 100B to the +15v supply, install (in series) a 2 Kohm ¼w resistor and 27pfd capacitor network (see fig. 1). In order to insure maximum stability this value of capacitance may vary. The variation range is from 27pfd to 200pfd.	C 3804-9 C 2342-1

(Cont)

SERVICE BULLETIN

crown®

Listed below are the description, quantity and Crown Part Numbers for the parts needed to perform this modification:

Description	Qty.	CPN
27 pfd capacitor	2	C 2342-1
5.6K ohm ¼w resistor	1	C 3220-8
5 pfd capacitor	2	C 2820-6
82 pfd capacitor	1	C 3627-4
5.6 ohm ½w resistor	1	C 3299-2
.047 mfd capacitor	1	C 3978-1
2K ohm ¼w resistor	1	C 3804-9

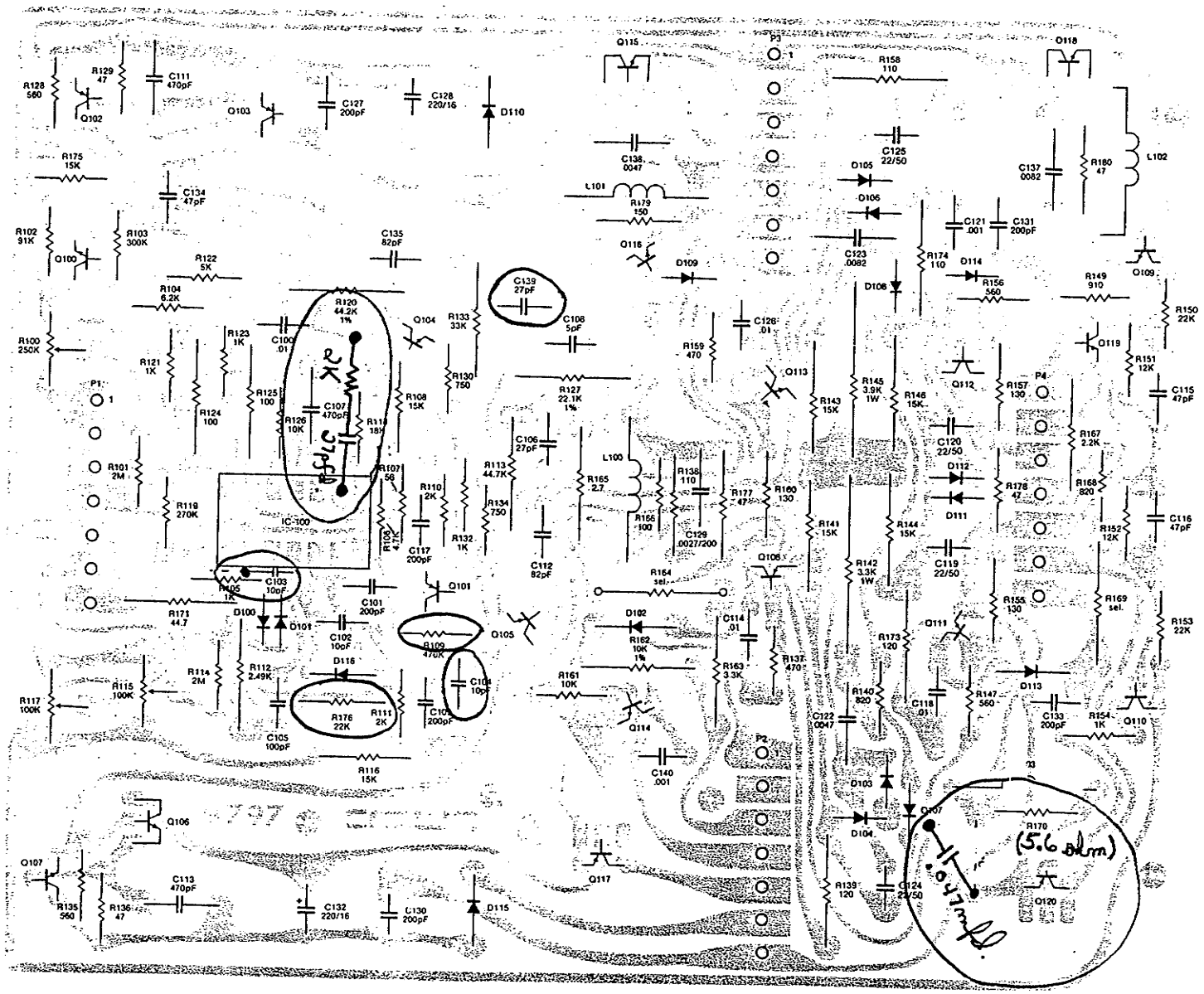
Note: Figure 1 is the foil side of 7560/7570 main module and Figure 2 is the schematic diagram of the 7560/7570 main module with the modification changes noted.

If you have any questions please feel free to call or write.

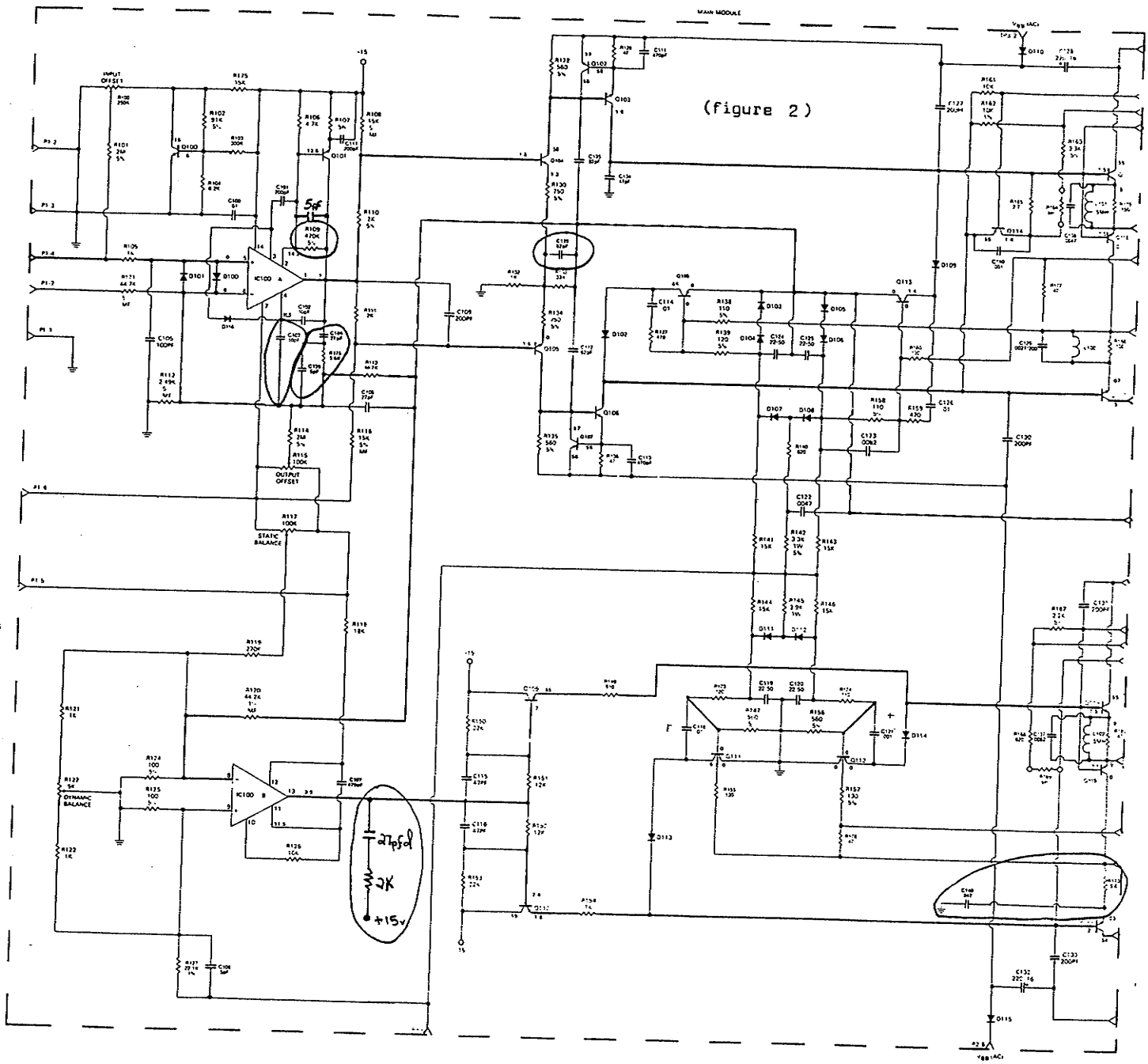
David R.Engstrom
Regional Service Manager

DRE/gjm

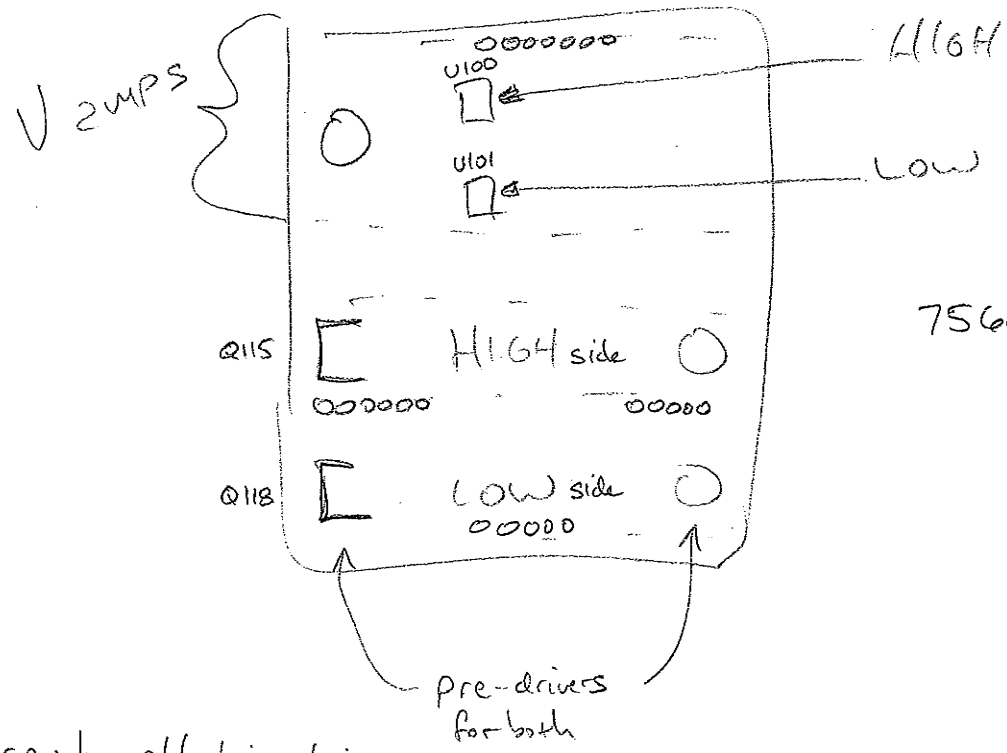
(Figure 1)



Main Module Printed Circuit Card

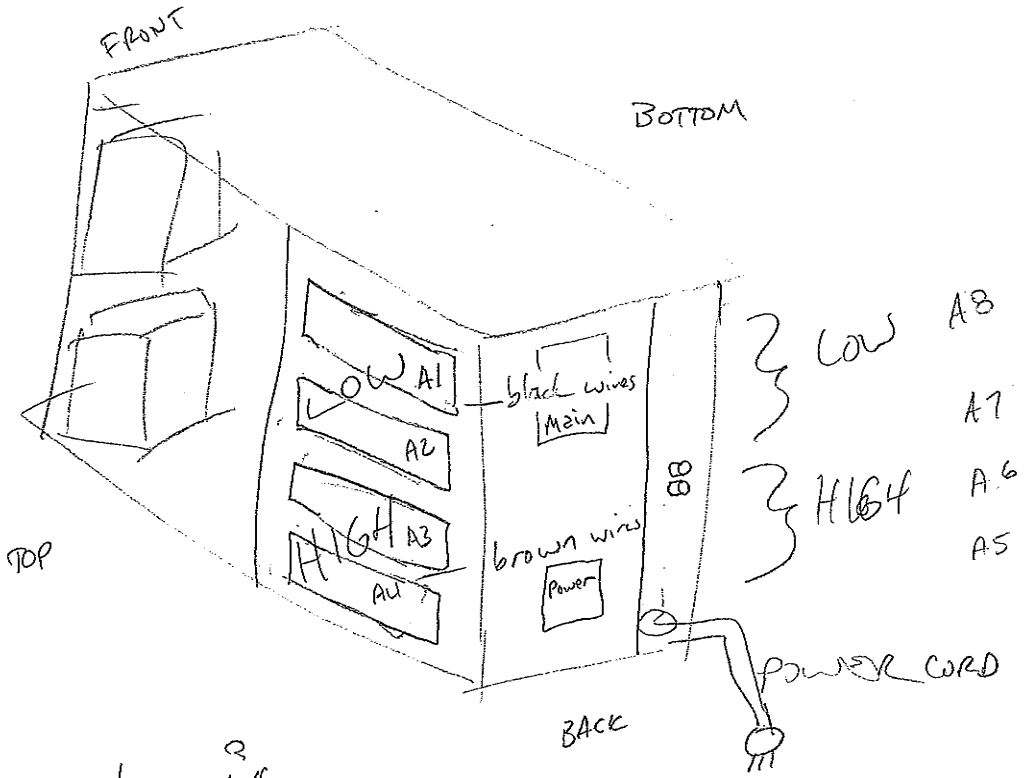

MAIN MODULE
(figure 2)
INPUT OFFSET
OUTPUT OFFSET
STATIC BALANCE
DYNAMIC BALANCE
IC100 A
IC100 B
5pf
27pfd
2K
+15v
-15

7560 NOTES



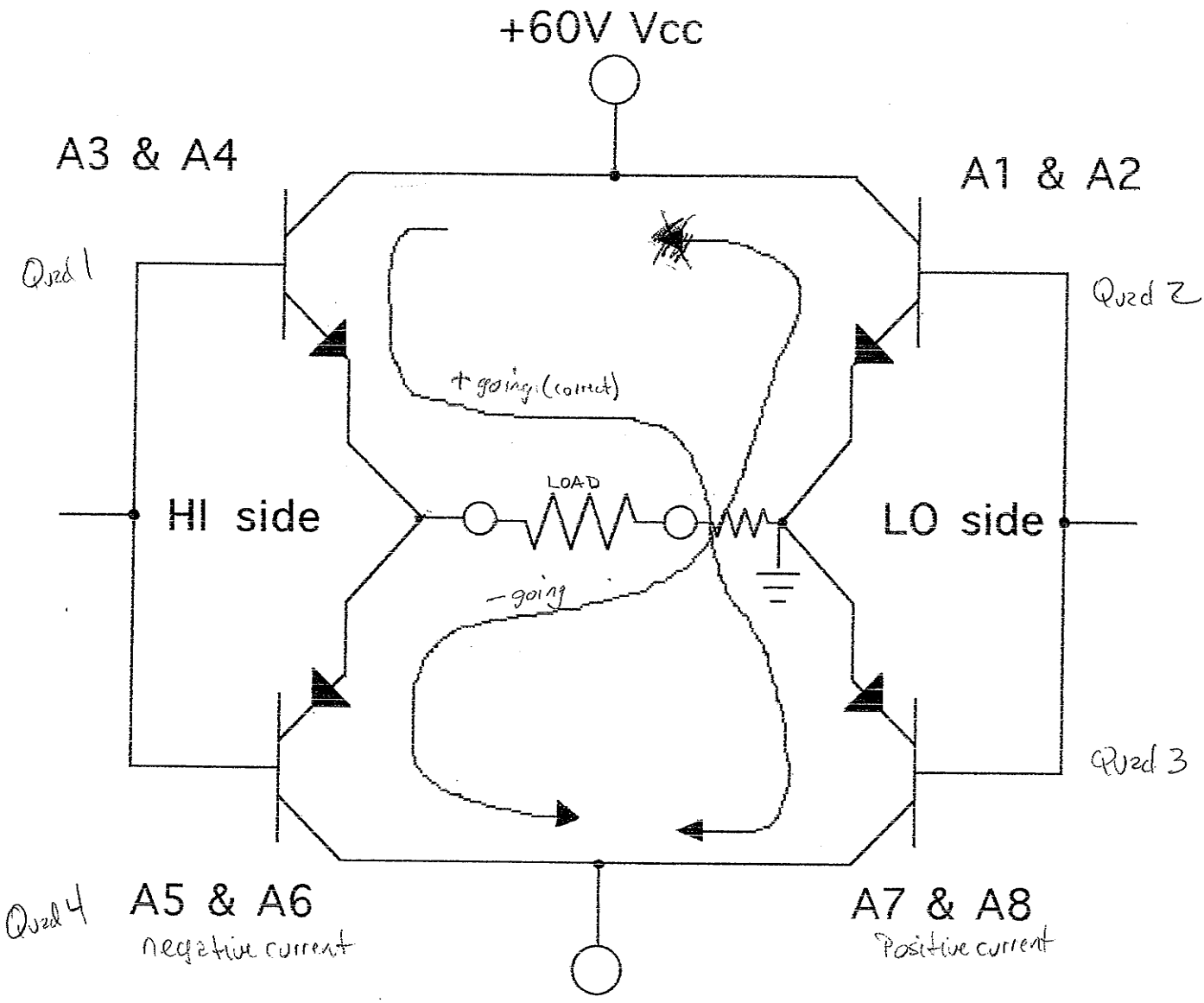
7560 type Main board

Errorout - old big chip
pins 1 + 13



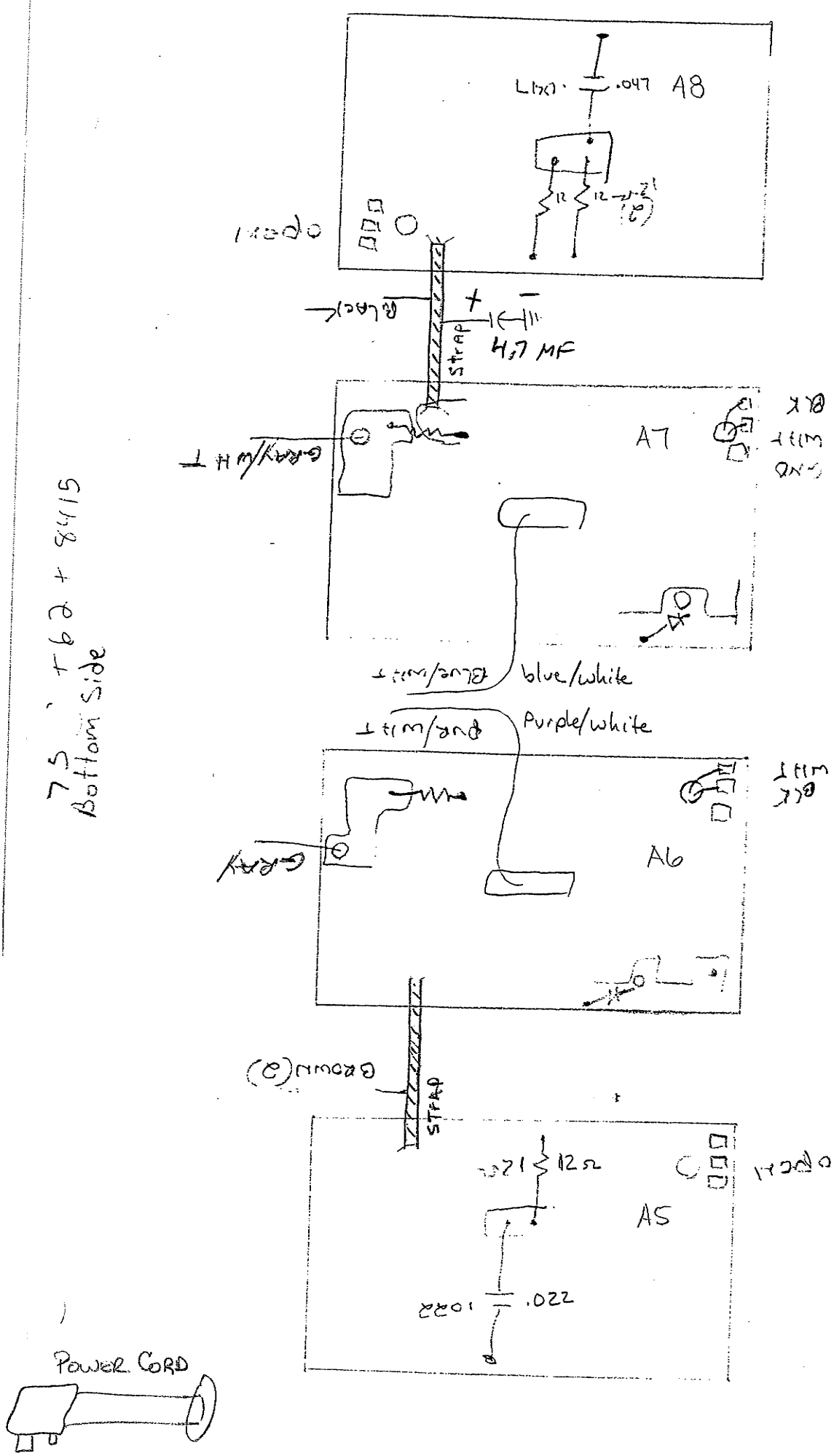
Mark Miller

4/16/97



7560 TYPE OUTPUT TOPOLOGY

4/97 Marc Miller



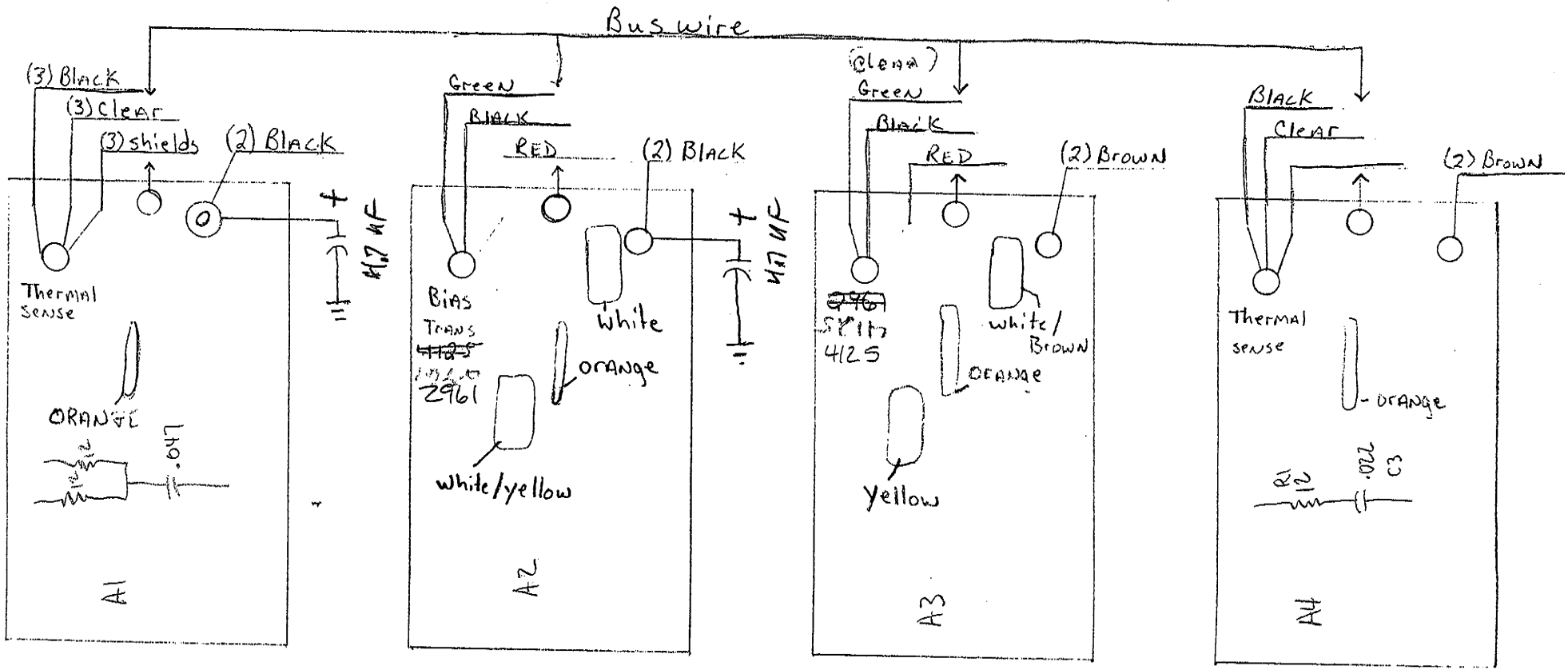
75 Ω Bottom side

Front of AMP

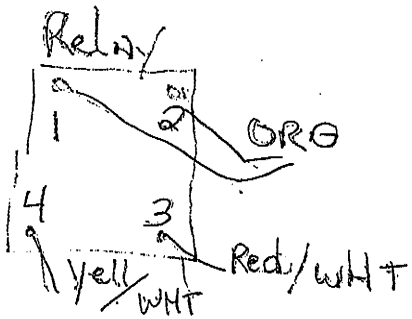
4/97
Marc Miller

7572 + 62 + 8415

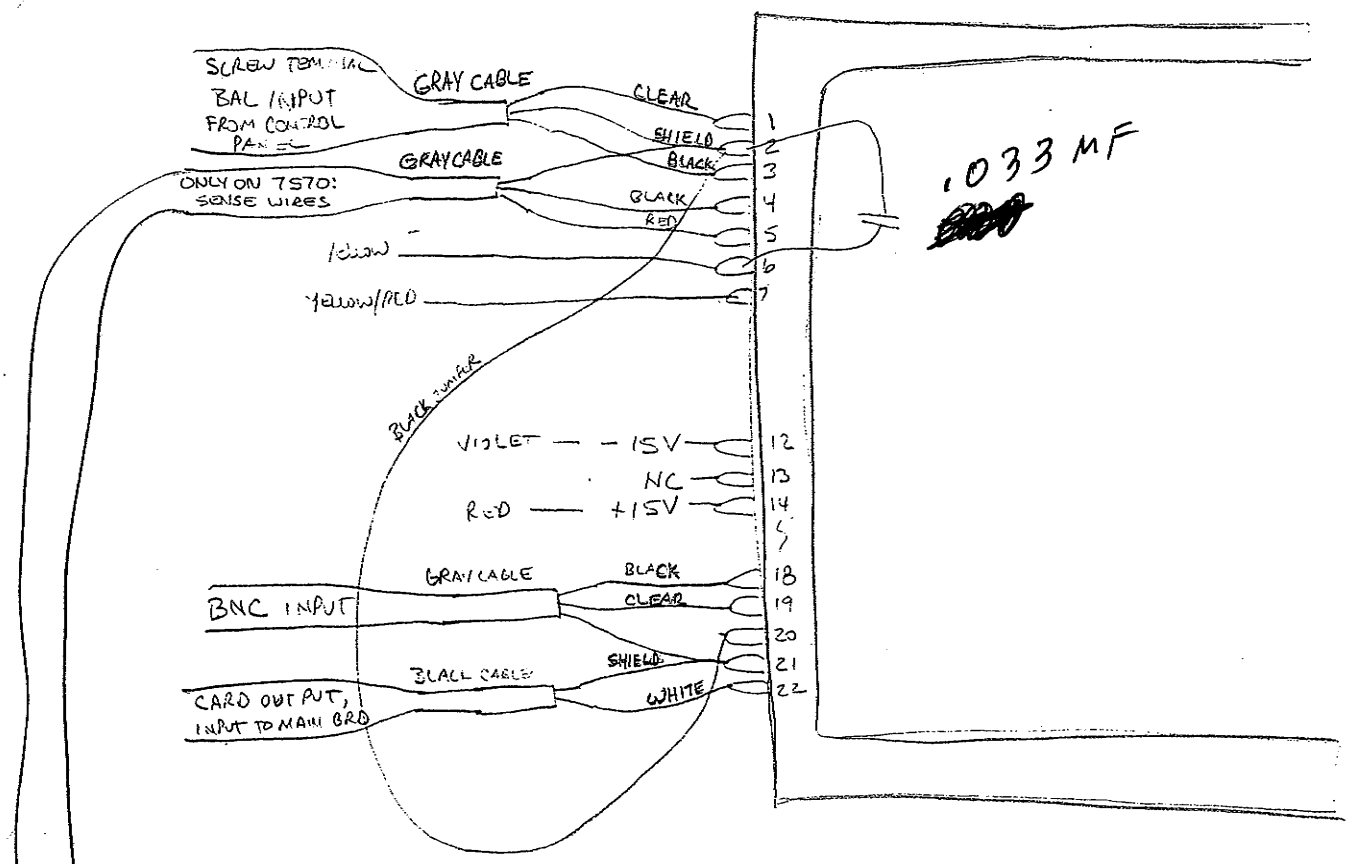
TOP Side



Front of AMP

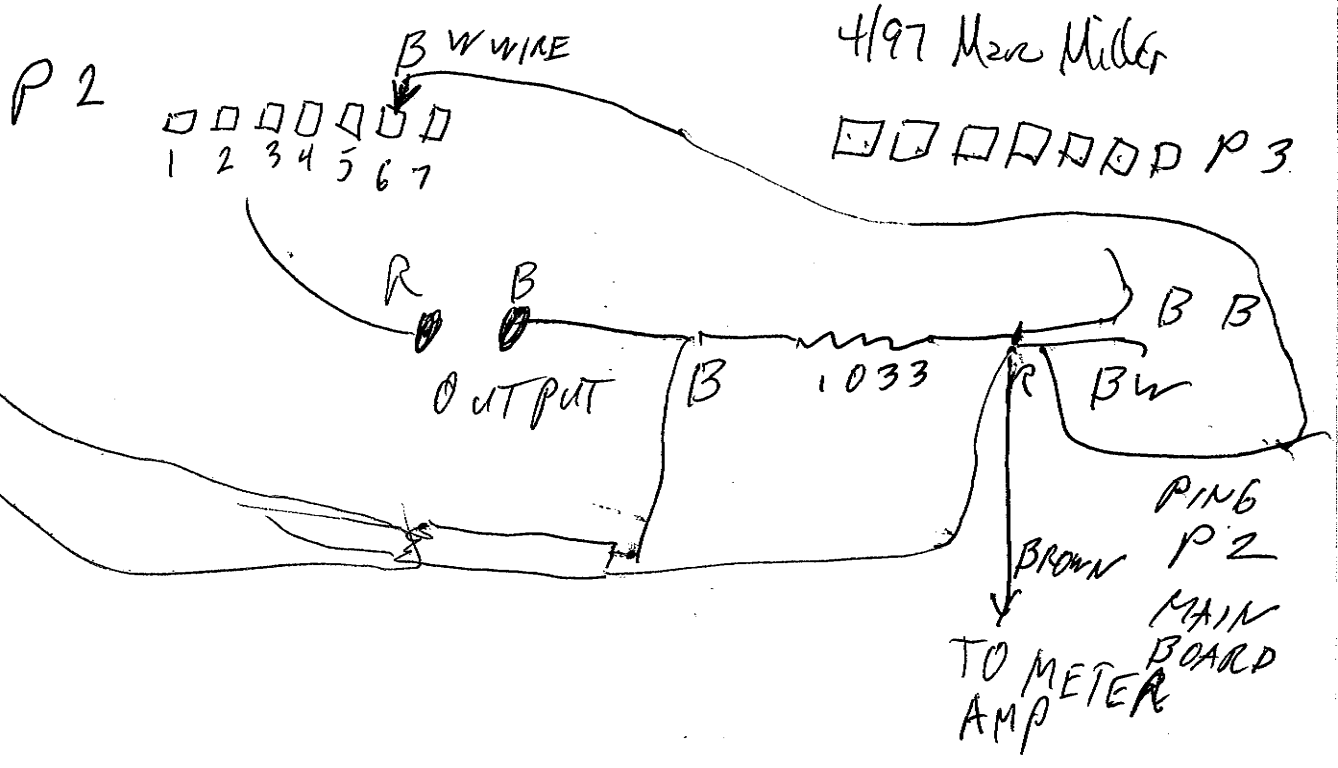


4/97 MacMiller



7562/72

INPUT CARD WIRING



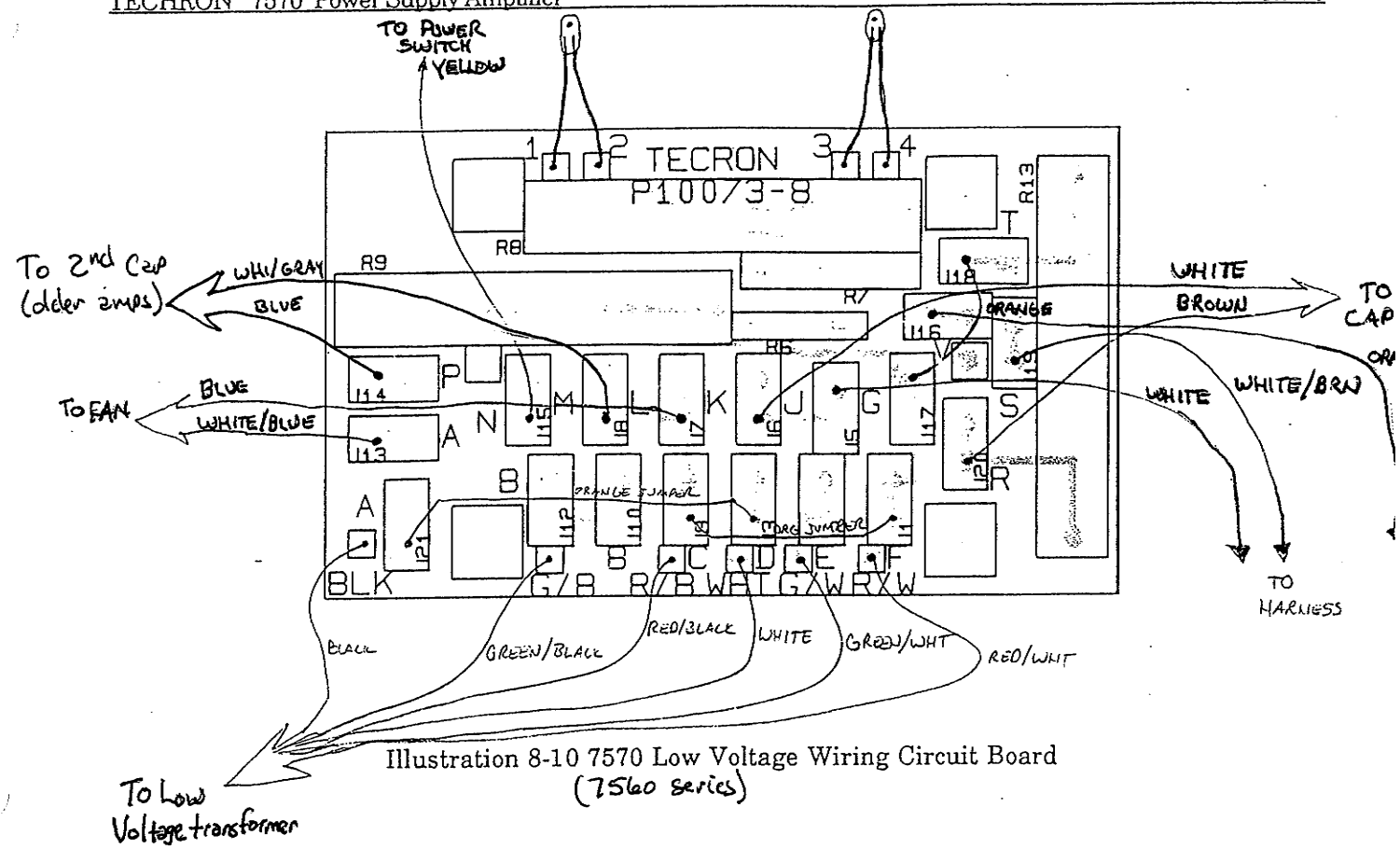


Illustration 8-10 7570 Low Voltage Wiring Circuit Board
(7560 series)

120VAC

4/97
Marc Miller

7/30/87 11:56:17 CHANGE NUMBER REPORT GIDSON PGRRO

CHANGE# 87E177E DATE 6/26/87 ENGR PROJECT # E6

CHANGED BY CHUCK GIBSON APPROVED BY CARLA LANCASTER

OPEN WORKORDERS AFFECTED

OM18880 - BOM CHANGE EFFECTIVE 6/25/87

MODEL/FAMILY #7560 MAIN - C7064-6 OUTPUTS MOD. 042585-2

7560 FAMILY 22.3429/7.8850 = applies only to 7064 outputs C 7423-4 - Semiconductors

DESCRIPTION

ALTER COMPENSATION ON MAIN MOD FOR IMPROVED 10KHZ SQUARE WAVE RESPONSE AND STABILITY MARGIN.

Delete	(1)	C 4151-4 .0039MF 200V film	from	042585-2 7560 main mod		
Add	(1)	C 3996-3 .0047MF 200V film	to	"	(new qty 2)	"
Delete	(1)	C 4295-9 180PF dipped mica	from	"		"
Delete	(3)	C 2342-1 27PF dipped mica	from	"	(new qty 1)	"
Add	(1)	C 2626-7 470OHM .25W 5%	to	"	(new qty 3)	"
Delete	(1)	C 3220-8 5.6KOHM .25W 5%	from	"		"
Add	(1)	C 3409-7 47PF dipped mica	to	"	(new qty 5)	"
Delete	(1)	C 3627-4 82PF mica	from	"		"
Add	(1)	C 6227-0 20PF mica	to	"		"
Add	(1)	C 2821-4 10PF mica	to	"		"
Add	(1)	C 6087-8 62PF mica	to	"		"

AREA OR PERSON	NOTIFIED DATE	TASK
Service	6/25/87	The compensation changes listed below may be implemented on any unit with C 7064-6 outputs to improve IM and square wave performance.

Schem #	Old Value	New Value	
C104	27PF, C 2342-1	47PF, C 3409-7	17-1
C112	82PF, C 3627-4	10PF, C 2821-4	17-1
C135	~~180~~PF, ~~C 4295-9~~	20PF, C 6227-0	17-3
C137	.0039MF, C 4151-4	.0047MF, C ~~3996-3~~	17-4
C139	27PF, C 2342-1	62PF, C 6087-8	17-3
R176	5.6KOHM, C 3220-8	470OHM, C ~~2626-7~~	
	~~27PF~~, C 2342-1	.	

180pf C4295-9

C8189-6

A102466-4711 21-2

CC: Ruth Overhulser Chip Estep Purchasing Tom Malinoff
Craig Hunter Harold Greeley

Located below U100 under 2.49K

.015

C 3288-5

M 600 7560

* Steve Reaves (EE) – obsolete pts bringing new pts

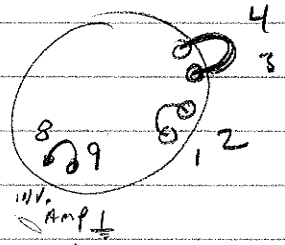
7560 one fan & first

early 2 diff low volt. transformers

thermal moxie high R norm – go low @ set temp.
heat w/ soldn iron

Rats nest

turn fan wiring around to



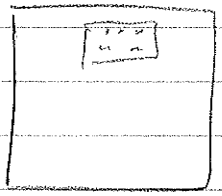
2 versions of 1V pwr supply bd

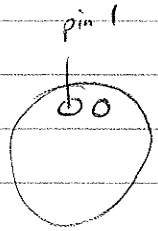
older units break a connection for standby

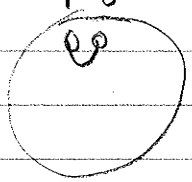
Older smaller + square
8 pin Reg. w/heatsink

newer larger

ground pin 1 – standby mode







INV. input ground

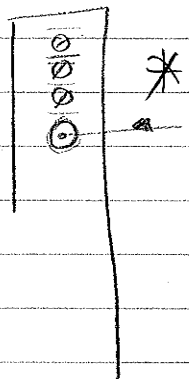
EST - shaker tables

8401 → Relay wired to interlock
8402 on pwr Bd
0.1Ω to ⊕

Pot HV cut off. 10% above rated
samples LV transf.

7560 - 7570 small diff on main bd
2 caps near Q118 / "R183" cap in

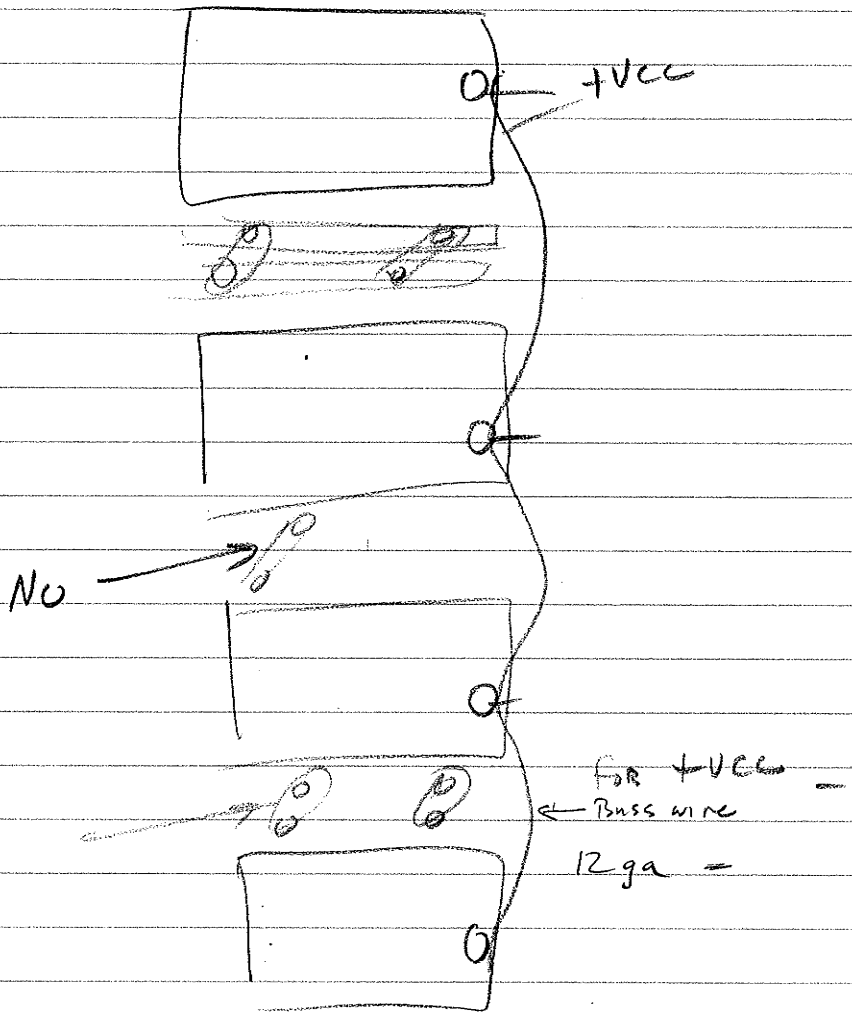
Relay

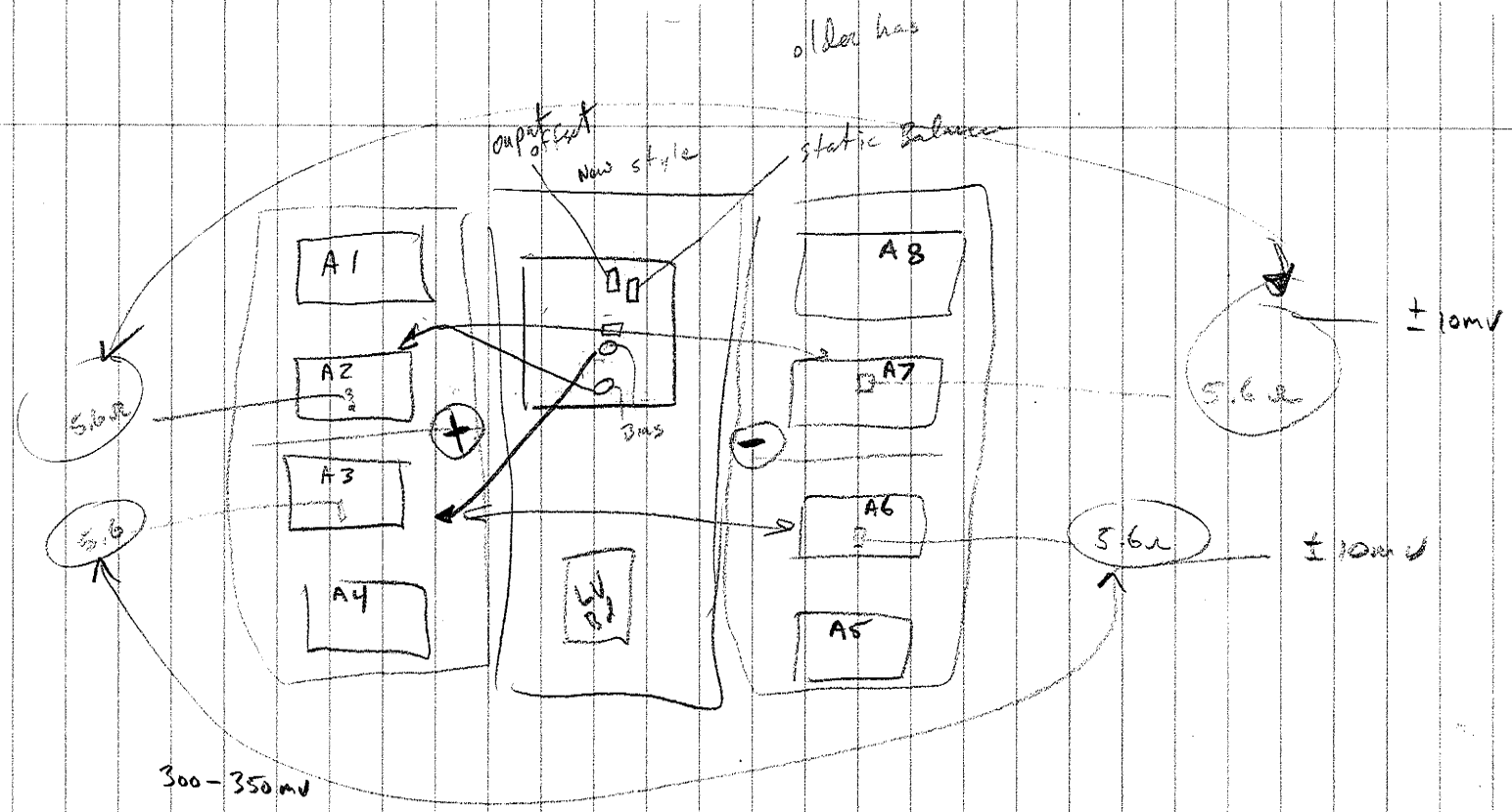


* Standard 75A04 Drive w/BNC

all filter caps

* 3600 + 5000 was missing belville washer
EDI (B) Barbadoes - Bad parts —


+Vcc
No
For +Vcc
Buss wire
12ga



low bias

high bias socket

300–350mV

400mV ±10mV

7064-6 = 7423-4
(graded 150V GE/Pickering)

lower value of R138 source neg limit

R139 inter neg limit

R160 source pos limit

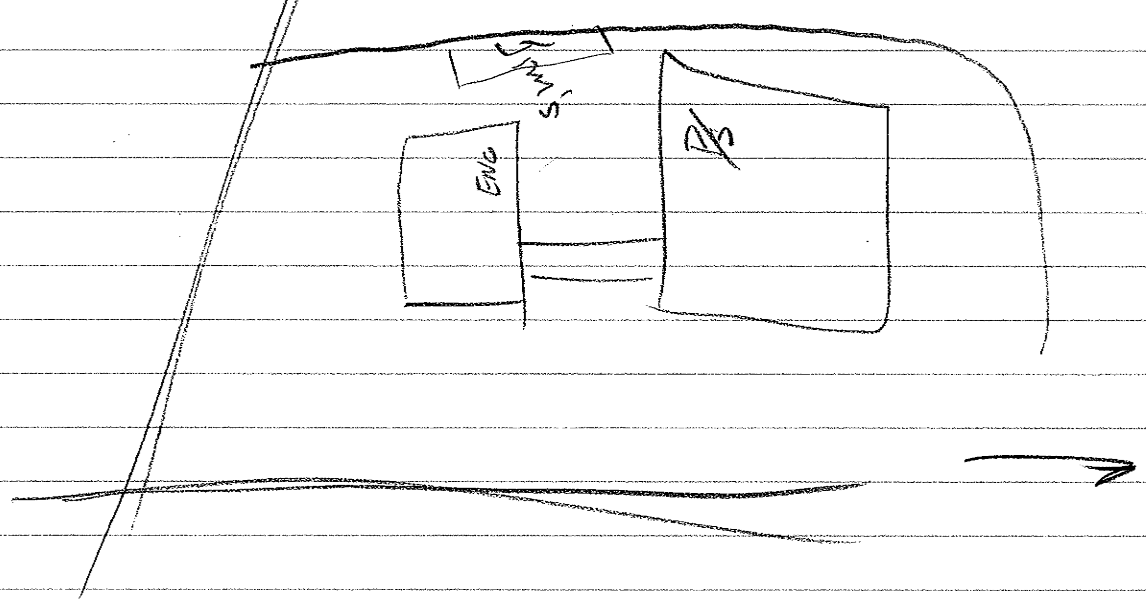
R158 inter pos limit

(Jort 8288)

Jim Word -
Distortion Anyz.
PIP card
AGC doz } 1/2 10:30
Contronics 1 1/2

Taurus
Blue/Green
Back Condenser dent
D.Vacic's Back ...

GPD $150



20 kHz THD

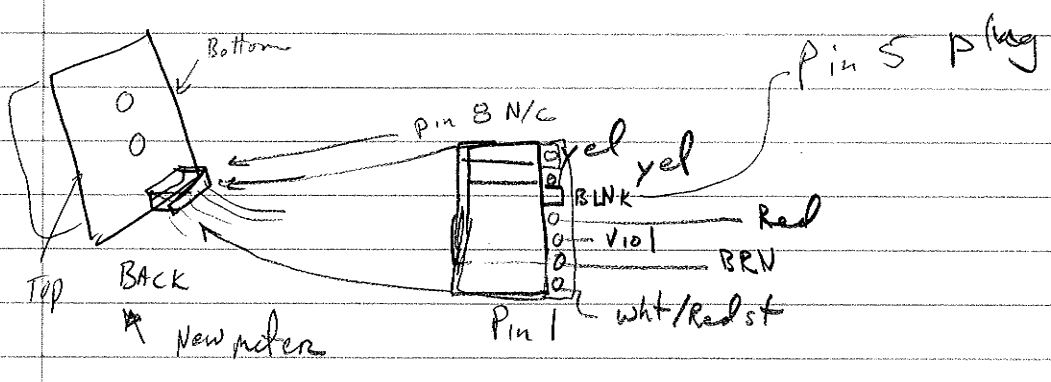
IM Audio Precision ATS-1
7kHz / 60Hz

just out of standby main pwr up / turn off

measure bias turn on while still in stby

400mV ± 20m diff - worse case less than 400 mv

older Peak amp & no switch



Voltage reading NO /

LDJ 8415

S# 045202 /9031

out puts

C7423-4 + C7064-6 #3/#4

drivers C5869-0

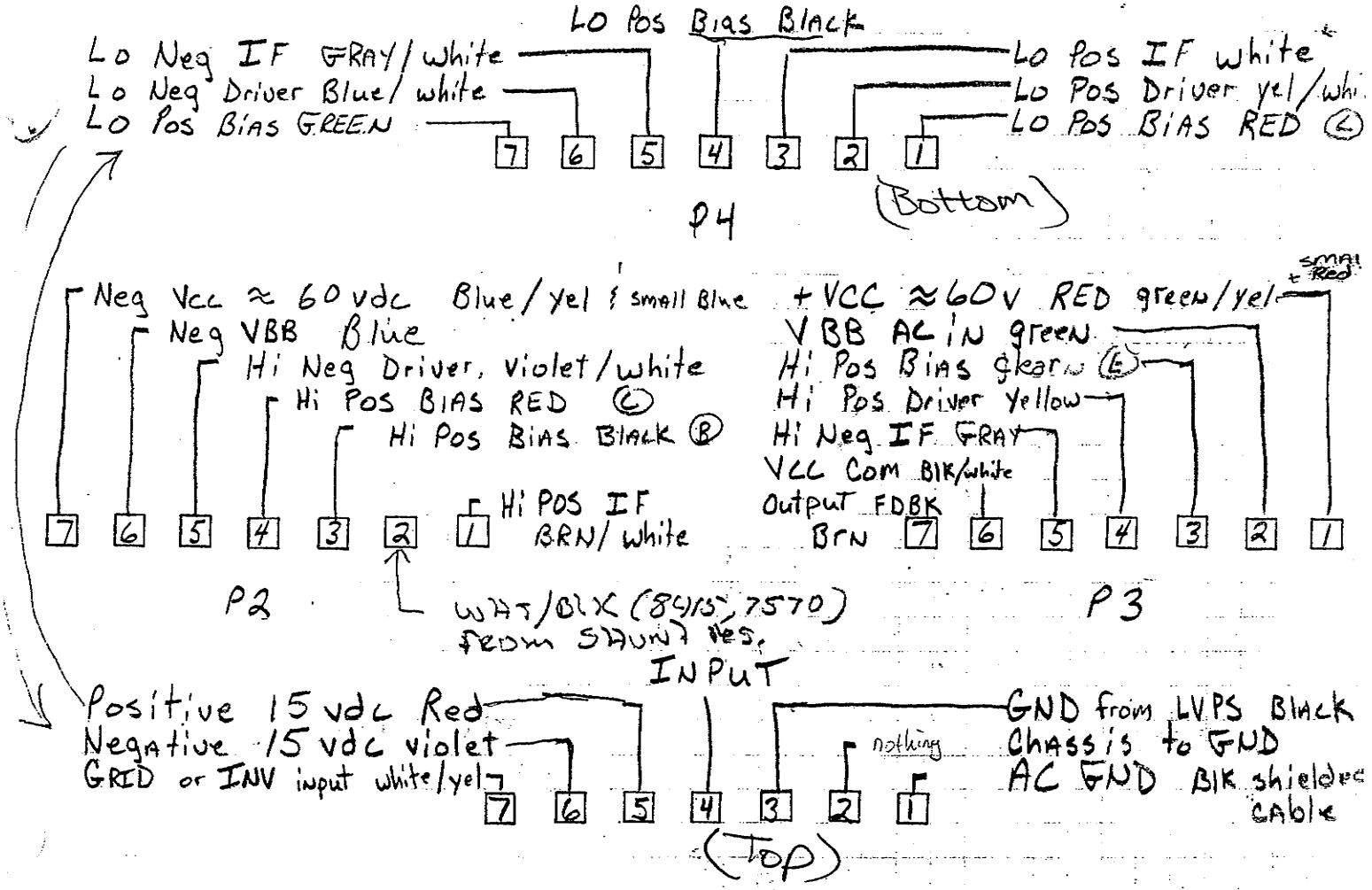
✓ offset

✓ static bal

✓ bias 300-320mV

63V 3.5Ω no limit

7560 Family MAIN



LO VOLTAGE P.S

P51		P71		P61	
7	White/yellow	7	Red/yellow CT AC	7	Red pair +15
6	White/RED	6	RED AC	6	— WHT/clear (8401)
5	Yellow	5	RED AC	5	Blue
4	Green	4	— -23v	4	White/Blue
3	White/Green	3	White/Red +23v	3	—
2	Clear	2	— WHT/clear (8401)	2	BLACK
1	—	1	Violet pair -15v	1	Black pair shielded

4/97
Matt Thomson

75A08 CONTROLLED CURRENT MODULE

TEST PROCEDURE

EQUIPMENT:

7540 Power Supply Amp - grounded *
DVM
Oscilloscope - with 3-2 ground lifted *
Function Generator - with 3-2 ground lifted *
HP 400F AC Voltmeter - grounded *
4 OHM 1500W Load
75A08 Noise Test Cable
75A08 Input Signal Cable
75A08 Load Cable with the switch and 158uh coil attached
(2) W shaped shorting clips
Micro-Ohmmeter

* AC Power cable

VISUAL INSPECTION:

1. Gently pull the three sections of the assembly apart.
2. Verify solder quality on the back of both circuit boards.
3. Verify that there is an insulator and it is straight, under both transistors on the inside of the back panel.
4. Verify the point to point wiring is correct per the component ID on the monitor (center) circuit board and Figure 1.
5. Reassemble the three sections of the assembly.
5. Verify that when assembled, no component is too high to interfer with the assembly process or to short out to anything else
6. Verify protective fish paper is on the ribbon cables, protecting them from the circuit board side of the top module.

SETUP:

1. Turn the gain adjust knobs on the 7540 Amp to minimum (fully CCW).
2. Power up the 7540 Amp and verify that there is less than ±10 mv across the CH1 and CH2 outputs with no load connected.
3. Turn off the 7540 Amp.
4. Using the micro-ohmmeter measure and record the value of the load. Measure the load at the Amp end of the load cables with the 158uh coil not installed (switch pushed in green dot showing).

** This verifies that the 7540 Amp is functioning properly, and the value of the load for current monitor calibration. Steps 1 thru 4 only need to be performed before testing the first module of each new lot. **

5. Turn the gain adjust knobs on the 7540 Amp to maximum (fully CW).
6. Plug the 75A08 into the "octal" accessory jack on the rear of the 7540.
7. Connect the 4 output wires from the UUT.

BLACK	to	CHANNEL 2 POSITIVE	WHITE	to	CHANNEL 1 POSITIVE
RED	to	CHANNEL 2 NEGATIVE	GREEN	to	CHANNEL 1 NEGATIVE

TEST:

OFFSETS

1. Adjust the gain pots R104 and R204 on the input (front) board fully CCW. (These are 25 turn pots.)
2. Place SW1 and SW2 on the UUT in the up position (voltage mode).
3. Connect the DVM across CH1 output. See Illustration 2-3
4. Turn on the 7540 Amp.
5. Adjust the AMP OFFSET R102 (CH1) or R202 (CH2) for 0Vdc ±.1mv.
6. Using a W shaped clip short the channel under test INPUT to SIGNAL GND
7. Set GAIN, R104 (CH1) or R204 (CH2), fully CW for the channel under tes
8. Adjust INPUT OFFSET, R101 (CH1) or R201 (CH2), for 0Vdc ±.1mv. too sensitive ±.3mv
9. Connect the DVM across CH2 outputs. See Illustration 2-3
10. Repeat steps 5 thru 8 for CH2.
11. Connect the DVM from CH1 "+" MONITOR terminal to SIGNAL GROUND.
12. Adjust the LOAD OFFSET, R114 (CH1) or R214 (CH2), for 0Vdc ±.1mv. *
13. Connect the DVM from CH1 "-" MONITOR terminal to SIGNAL GROUND.
14. Adjust the MONITOR OFFSET, R124 (CH1) or R224 (CH2), for 0Vdc ±.1mv. *
15. Repeat steps 11 thru 14 for CH2.
16. Remove the shorting clips from both inputs.

* Sensitive

CMR

1. Set the switch on the input signal cable to CMR.
2. Connect the input signal cable to CH1 inputs.
3. Input a ~~1~~10K ~~Khz~~ triangle ~~square~~ wave.
4. Connect scope to the channel under test output terminals.
5. Adjust CMRL, R101 (CH1) or R201 (CH2), for ~~minimum~~. square wave waveform.
6. ~~Input a 20 Khz 5V pk-pk square wave to input.~~
7. Adjust CMRH, R102 (CH1) or R202 (CH2), for minimum square wave signal.
8. Connect the input signal cable to CH2 inputs.
9. Repeat steps ~~1~~3 thru ~~3~~6 for CH2.

CURRENT MONITOR ADJUSTMENT

1. Set the switch on the input cable to ~~BAL~~. SIGNAL
2. Connect the 4 ohm load to CH1 output. (VERIFY THE LOAD BUTTON IS IN)
3. Connect the input cable to CH1 input.
4. Input a 1Khz .8V pk-pk sine wave. (.5656V RMS)
5. Connect the DVM to the OUTPUT of the channel under test.
6. Adjust the GAIN, R104 (CH1) or R204 (CH2), for Vac equal to the load resistance in ohms.

** load resistance = 4.04 ohms set Vout for 4.04Vac **
** This sets a 1 amp output at the load. I=Vout/Rload **

7. Connect the DVM across the MONITOR of the channel under test.
8. Adjust CAL, R119 (CH1) or R219 (CH2), for 1.0Vac ±[redacted] .1mV
9. Connect the input cable to CH2 input.
10. Connect the 4 ohm load to CH2 output. (VERIFY THE LOAD BUTTON IS IN)
11. Repeat steps 4 thru 8 for CH2.

75A08 CONTROLLED CURRENT MODULE

STABILITY

1. Install the 158uh coil into the load. (LOAD BUTTON IS OUT)
2. Connect the scope to the terminals on the 4 ohm load.
3. Connect input signal cable to CH1 input.
4. Input a 300 Hz .8V pk-pk square wave.
5. Set the mode switch for the channel under test to current mode. (DOWN)
6. The output waveform across the load should be a clean square wave with no overshoot or undershoot.
7. Set the mode switch for the channel under test to voltage mode.(UP)
8. Connect input signal cable to CH2 input.
9. Repeat steps 4 thru 7 for CH2.
10. Turn both gain adjust pots, R104 and R204, fully CW.
11. Remove the 158uh coil from the load. (LOAD BUTTON IN)

NOISE

1. Turn off the 7540 Amp.
2. Remove the load and the input cables from the UUT.
3. Seal all adjustments EXCEPT GAIN R104, AND R204.
4. Install the cover and reinstall the UUT. See Illustration 5-1
5. Using the 75A08 noise cable zero the 400F AC Voltmeter.
6. Turn on the 7540 Amp.
7. Connect the AC Voltmeter to the CH1 monitor outputs and signal ground.
8. Measurement should be less than 80 microvolts.

** The noise cable position will effect this measurement. **
** Move the cable around to achieve the lowest reading. **

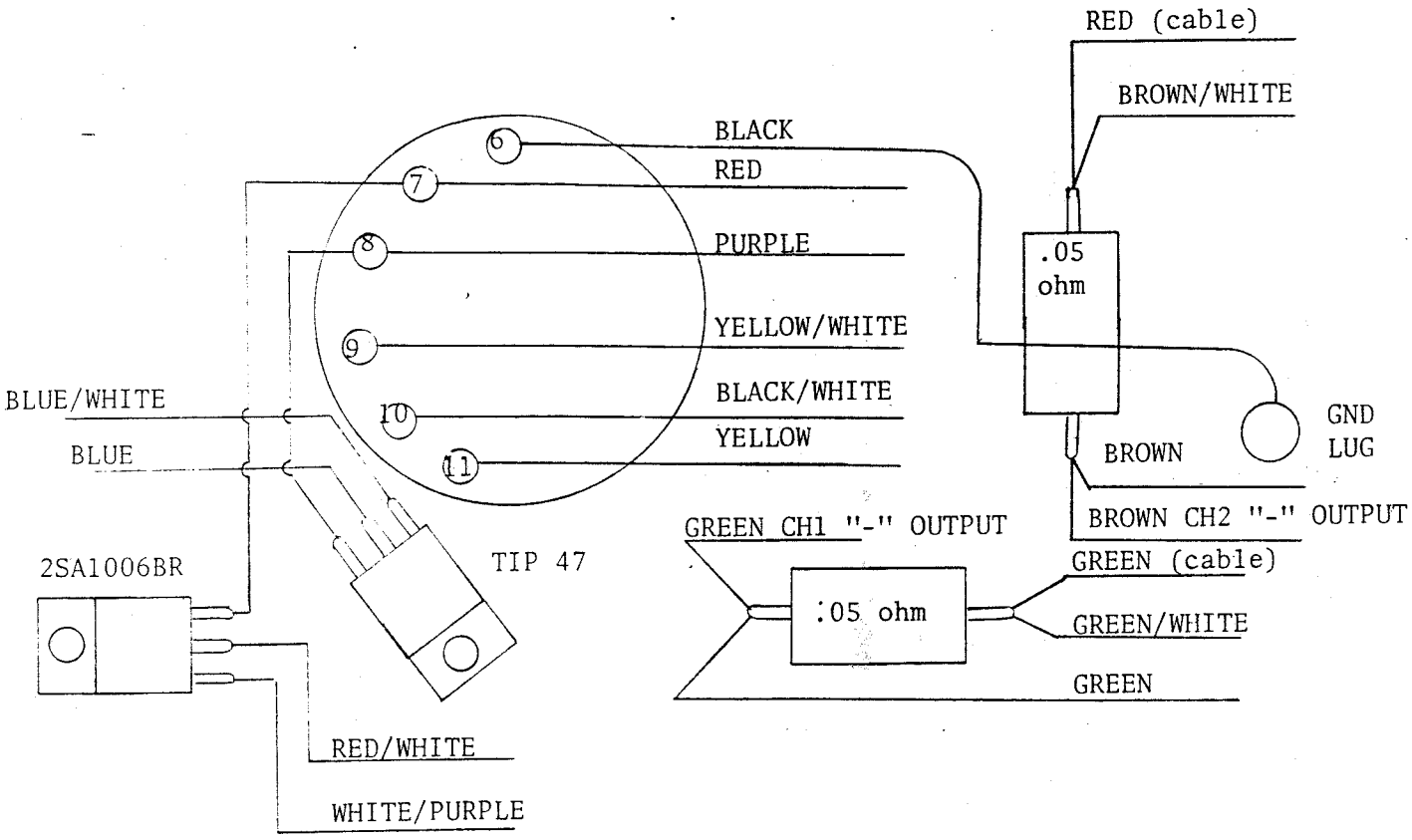

RED (cable)
BROWN/WHITE
BLACK
RED
PURPLE
YELLOW/WHITE
BLACK/WHITE
YELLOW
6
7
8
9
10
11
.05
ohm
GND
LUG
BROWN
BLUE/WHITE
BLUE
2SA1006BR
TIP 47
GREEN CH1 "-" OUTPUT
BROWN CH2 "-" OUTPUT
GREEN (cable)
:05 ohm
GREEN/WHITE
GREEN
RED/WHITE
WHITE/PURPLE

FIGURE 1

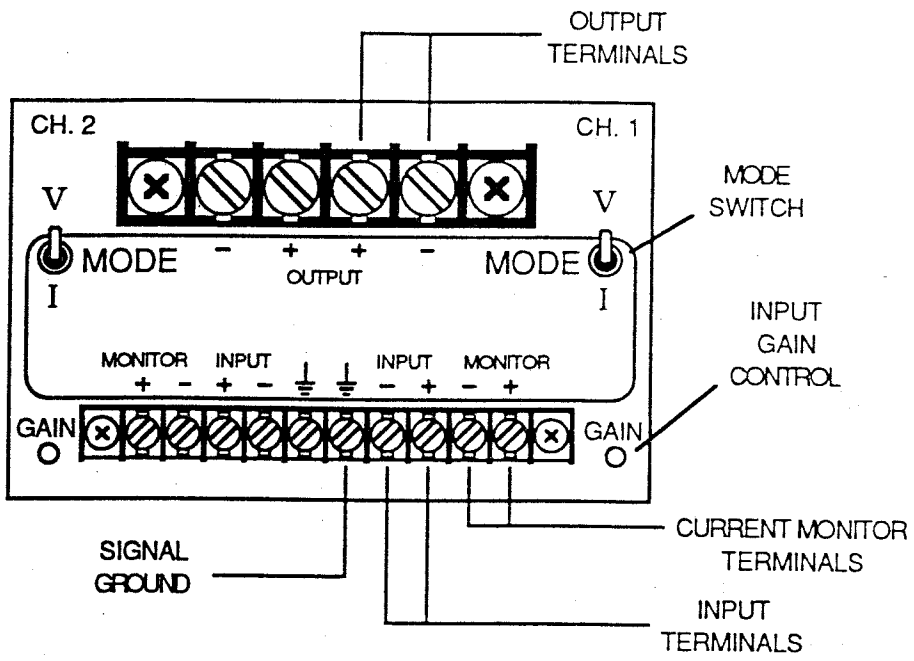


Illustration 2-3 75A08 Controls

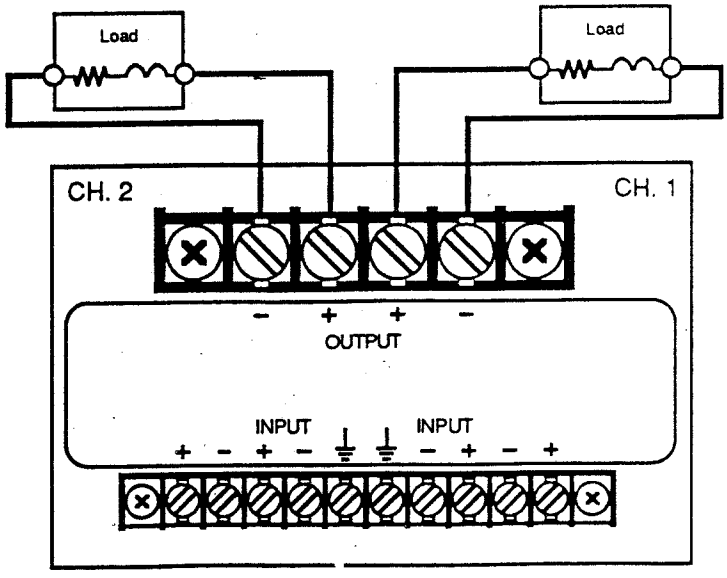


Illustration 2-7 Load Connections

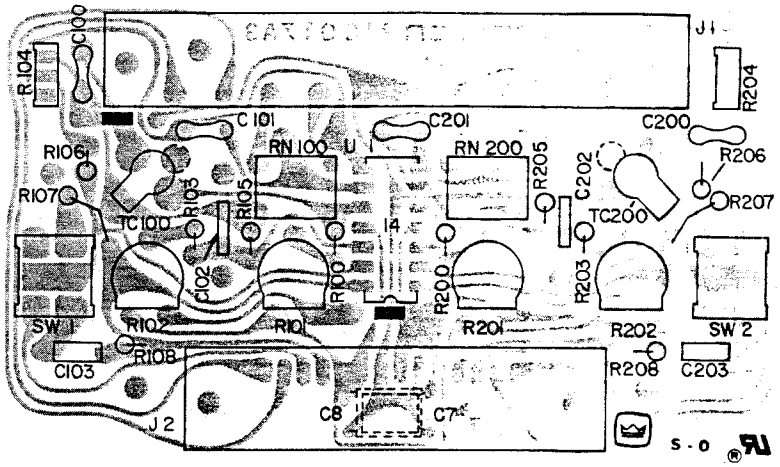


Illustration 5-2 75A08 Input Circuit Board

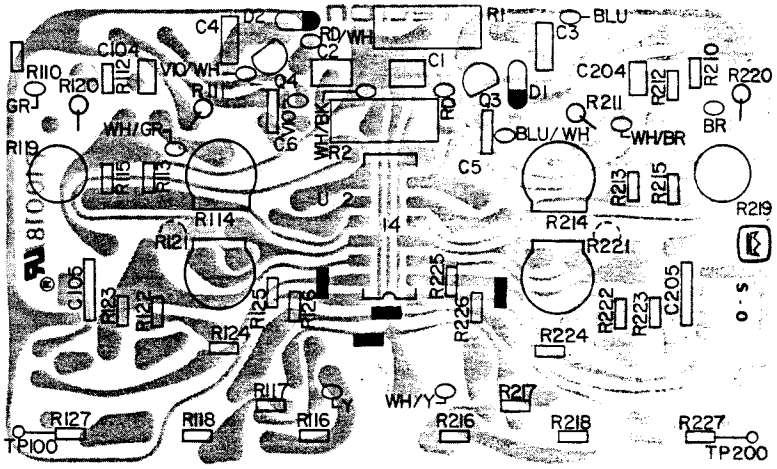


Illustration 5-3 75A08 Monitor Circuit Board

5.6. Exploded View Parts

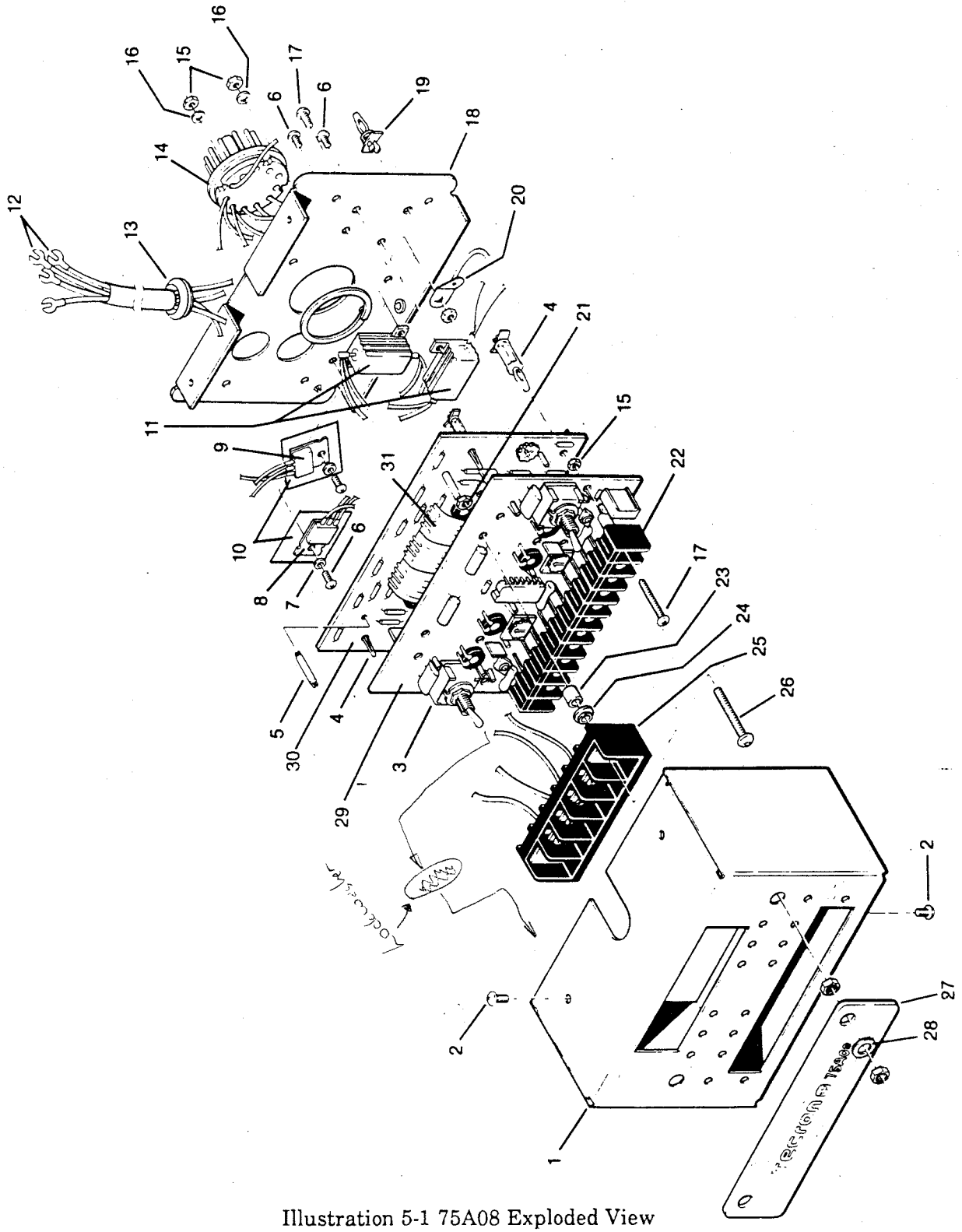


Illustration 5-1 75A08 Exploded View

TECHRON®

TECHNICAL MANUAL

INCLUDES SERVICE INFORMATION

75A08
CONTROLLED CURRENT MODULE

Techron division of Crown International, Inc. 1718 W. Mishawaka Road, Elkhart, IN 46517

K80200-7
5/86

SECTION 1
GENERAL INFORMATION

1.1. INTRODUCTION

The 75A08 is a module that adds controlled current capability to the TECHRON 7520, 7540, or 7550. This module features an active differential input circuit to avoid ground loops and give maximum noise immunity. The current monitor output is also balanced to prevent grounding problems with monitoring equipment.

Precise input level adjustments are made with 25 turn pots. A switch to change operation from controlled current to constant voltage is provided on the back panel to add flexibility to the 75A08. All controls and adjustments are clearly marked for easy identification.

1.2. CONTROL PANEL DESCRIPTION

A four terminal barrier block for load connection, (+) and (-) for each channel.

A ten terminal barrier block for balanced input and balanced current monitor output.

Mode switches to select the constant voltage or constant current mode of operation

Gain controls, 25 turn screwdriver adjusted, used to select system gain. Clockwise rotation is used to increase gain.

CAUTION: The amplifier front panel level controls should be turned fully clockwise (MAXIMUM) and not used to control input as the 75A08 gain control will now be used for system adjustment.

Under the cover plate (retained by nuts on V-I switches) are a set of adjustment access holes used to trim DC offsets, high and low frequency common mode adjustments, and monitor amp gain controls.

1.3. SPECIFICATIONS

1.3.1. INPUT

Balanced input, 20K ohm impedance.

1.3.2. CURRENT MONITOR

600 ohm balanced.

Calibration 1.0 volts per amp balanced, 0.5 volts per amp unbalanced.

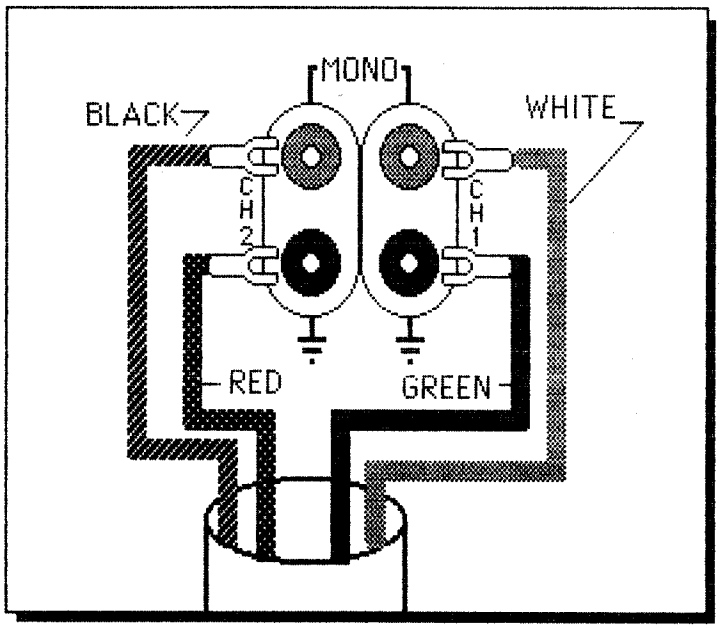
1.3.3. NOISE

Absolute noise was measured at 80 uVRMS at the balanced MONITOR output. Referenced to 1V/A RMS, this is well below 1 part in 12,000.

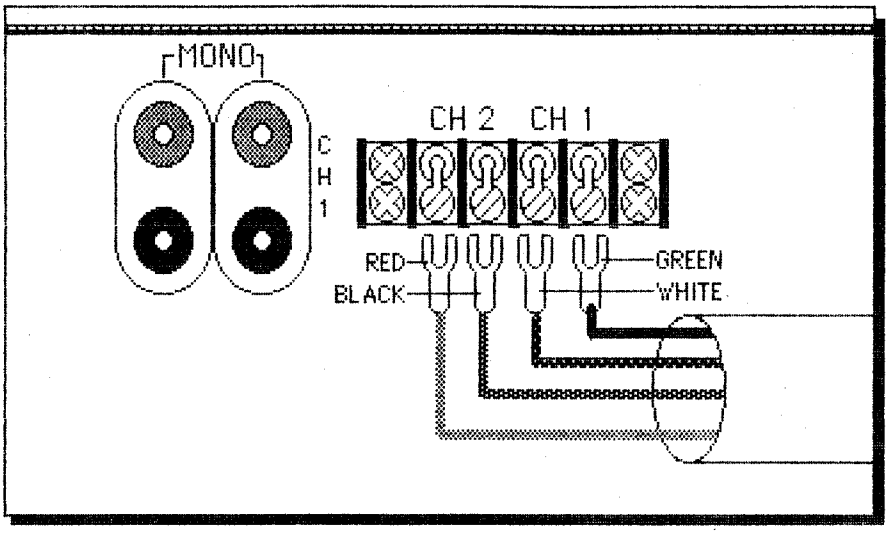
SECTION 2
INSTALLATION ON THE HOST AMPLIFIER

The 75A08 is designed to be installed on the TECHRON 7520, 7540, and 7550 power supply amplifiers with a minimum of fuss. Mounting is accomplished by plugging the 75A08 module into the host amplifier's 11 pin "octal" style socket on the back of the amplifier.

After the module is mounted, connect the four wires in the gray cable to the host amplifier output terminals. The installation will be slightly different for the 7550 than for the 7540 or 7520. Choose the following illustration that fits the amplifier.



Ill. 2-1: 7550 INSTALLATION



Ill. 2-2: 7520 AND 7540 INSTALLATION

Turn both input controls on the front panel of the host amplifier to the maximum clockwise position. Also be sure the STEREO/MONO switch is in the STEREO position.

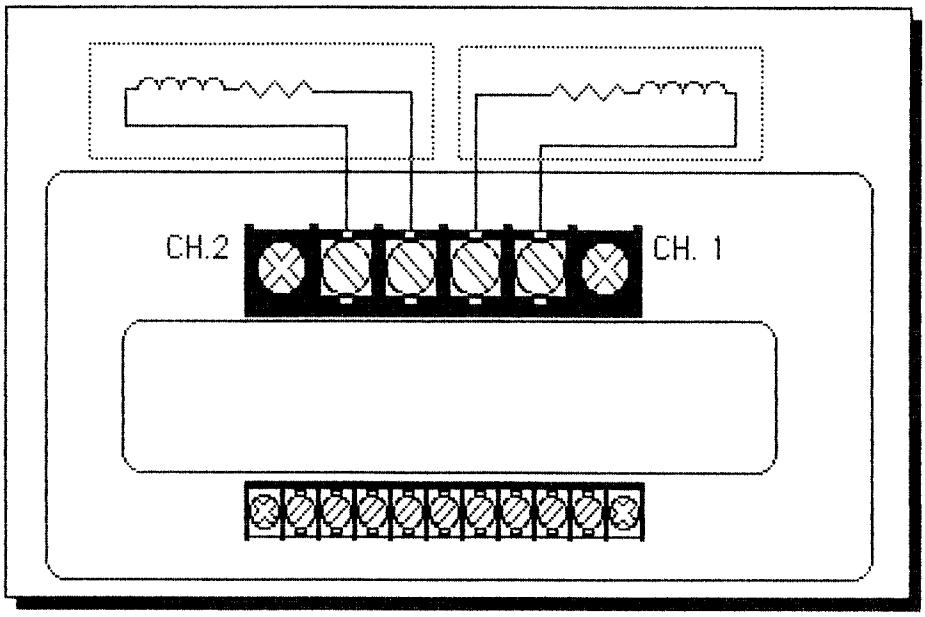
2.1. CONNECTIONS TO THE CONSTANT CURRENT SYSTEM

The 75A08 screw terminals have now become the constant current amplifier input and output connecting points. All connections to the amplifier must be made to this module.

2.2. LOAD CONNECTION

Connect the load to the terminals marked **OUTPUT** on the upper face of the 75A08 module.

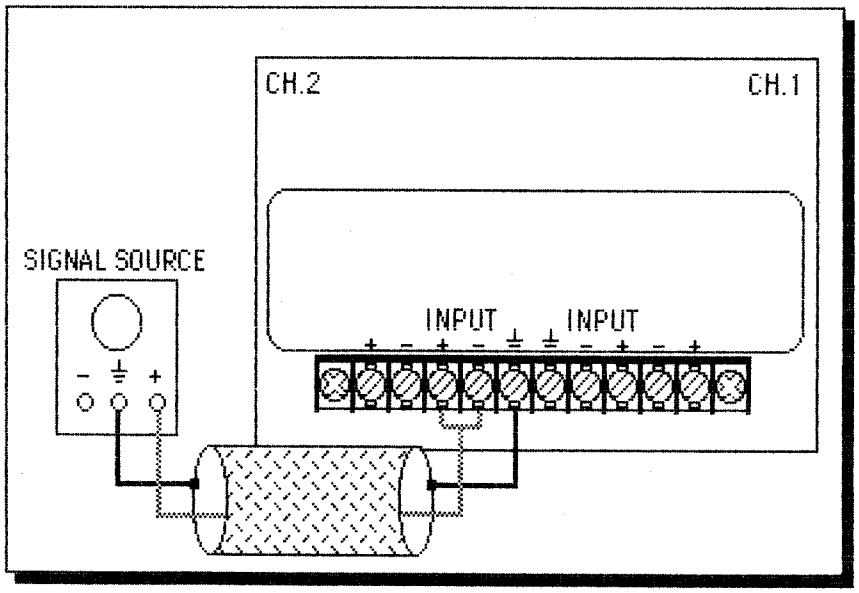
CAUTION: The - (common) terminals are not grounded to the chassis. These terminals are two separate points and must not be connected together. Improper system operation will result.



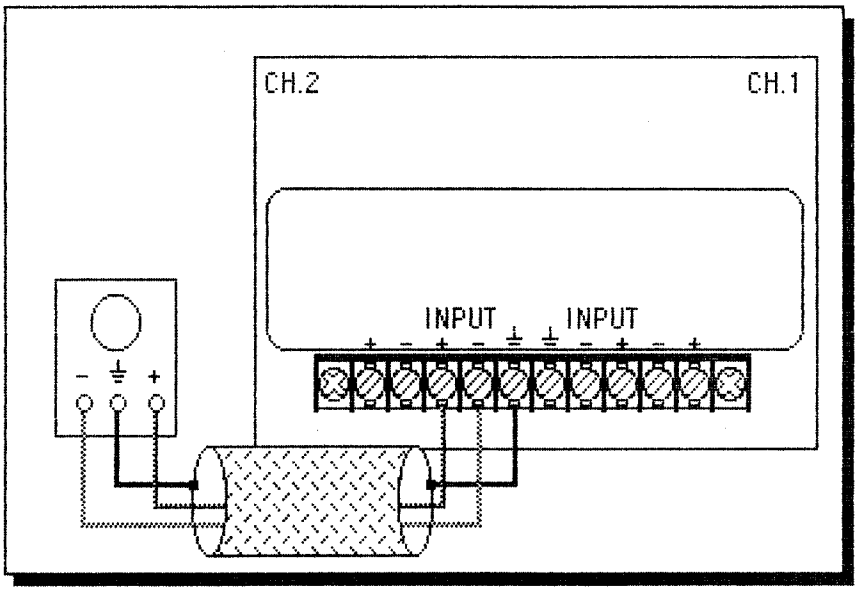
III. 2-3: LOAD CONNECTION

2.3. INPUT CONNECTIONS

The input connections are now made through the screw terminal strip on the lower part of the 75A08 through the terminals marked **BAL. IN**. A signal source with a balanced output may be connected by using the + and − terminals. An unbalanced output signal source may be connected by connecting the shield to the ground terminal and the signal source output to the + terminal.



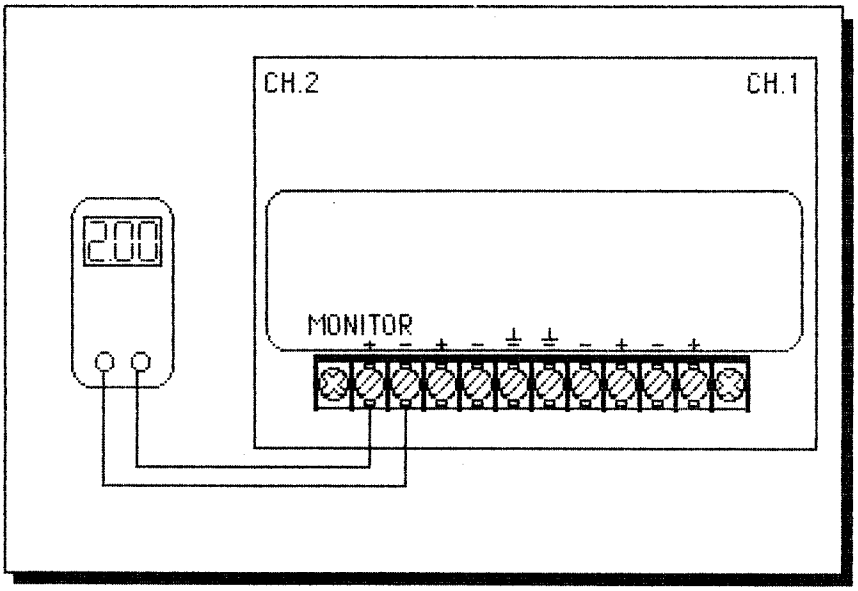
III. 2-4: UNBALANCED INPUT



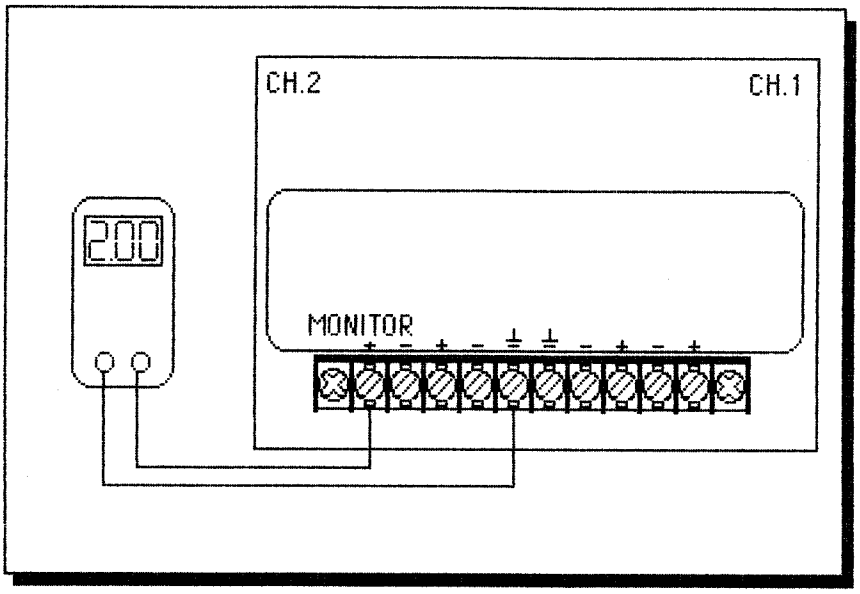
Ill. 2-5: BALANCED INPUT

2.4. CURRENT MONITOR CONNECTIONS

The output current may be observed by placing an unbalanced input instrument between the **MON OUT** + terminal and ground. An instrument with a balanced input would be connected from the **MON OUT** + and - terminals. The shield would be connected to the ground terminal.



Ill. 2-6: BALANCED CURRENT MONITOR



Ill. 2-7: UNBALANCED CURRENT MONITOR

2.5. SETTING THE GAIN

The gain or sensitivity of the 75A08 is adjustable using the 25 turn pot labeled **GAIN**.

CAUTION: The 75A08 will cause a transient current when switched from the current to voltage mode. This transient can cause damage to equipment. To avoid this problem turn the amplifier front panel controls full CCW before switching modes. Return the pots to the full CW position after switching.

SECTION 3
THEORY OF OPERATION

The following theory of operation explains the theory for channel one only. Channel two performs in the same manner.

The active balanced input to the 75A08 is formed by U1A and resistance pack RN100. The common mode rejection of the amplifier is tuned for optimum rejection at low frequencies by adjusting the trimmer of resistance network RN100. The high frequency common mode is adjusted by tuning TC100 which is tuned to set TC100 plus C100 to equal C101. U!A is offset zeroed by R101 via R100.

R104 provides the operator with a precision gain control.

The controlled current mode works by U1C comparing the current output of the amplifier with the desired current waveform at the output of U1A. The current of the host amplifier is sensed by R109 and amplified by U2B for use in the current control loop. U2B acts as a differential amplifier with an adjustable gain control, R119. Resistor R110 along with C104 compensate the sense resistor for its series inductance. The output of U2B is calibrated for .5 ampere per volt of output. The zero offset of U2B is eliminated by adjustment of R114.

The current monitor output is made available at the monitor screws of the barrier strip. U2A is a unity gain inverter to provide a balanced output. The output is isolated from capacitive loads by R126 and R127. The monitor output amplifier, U2A, is offset zeroed by R121 via R122. R123 and C105 provide the proper source impedance to U2A for minimum offset drift.

The current control amplifier, U1C, is offset zeroed by R102 via R103. R105 and C102 provide the proper source impedance to U1C for minimum offset drift.

C103 and R108 comprise the principle compensation network which serve to control the open loop gain of the closed loop current controlled system. In the controlled voltage mode of operation these compensation parts are not used. U1C becomes a unity gain stage when SW1 switches in R107 to operate in the constant voltage mode.R116, R117 and R118 form a divider to match the output of U2B to the compensation network C103 and R108.

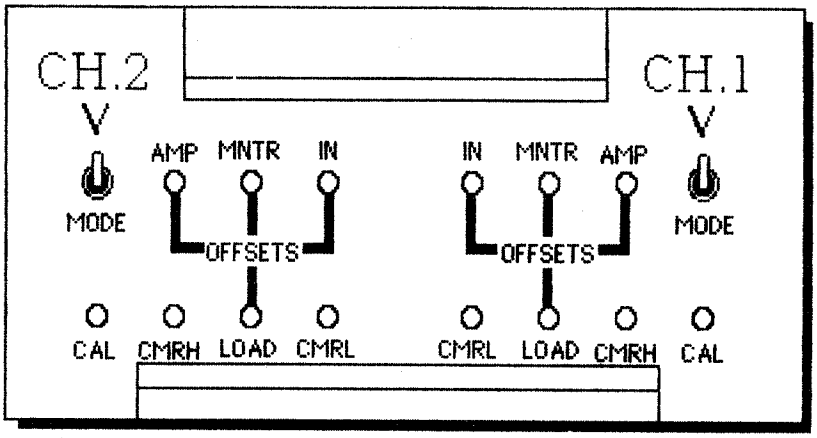
Q1 and Q2 along with D1 and D2 form series regulators to allow the 75A08 to operated from a wide range of power supply voltages provided by the host amplifier.

SECTION 4
SERVICE

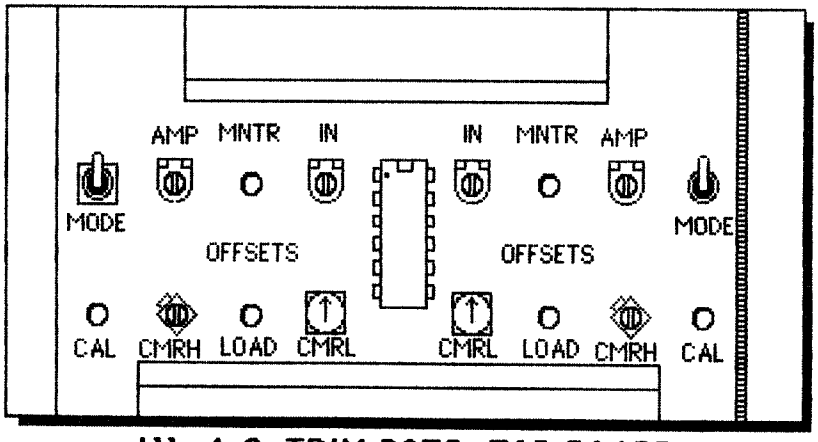
4.1. Introduction

The adjustment procedure describes the adjustment for one channel only. Adjustments on both channels are identical.

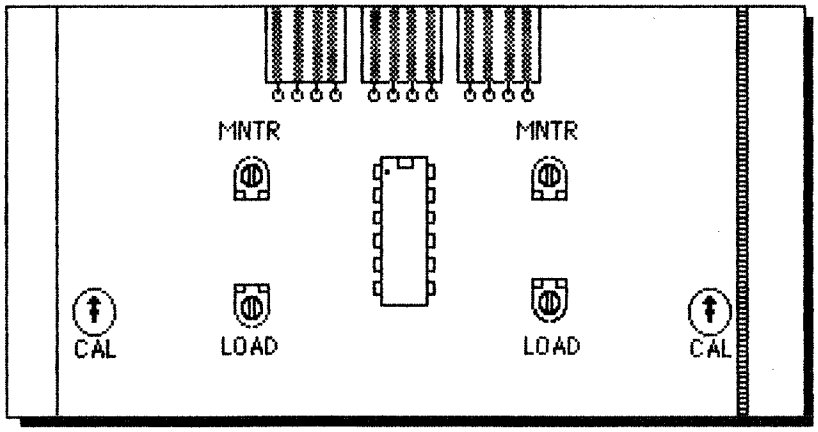
The adjustment pots are on two different boards of the 75A08. The next three illustrations show the access holes and locations of the pots with the cover on and on both of the PC boards.



Ill. 4-1: TRIM POTS, EXTERNAL LOCATION



Ill. 4-2: TRIM POTS, TOP BOARD



Ill. 4-3: TRIM POTS, BOTTOM BOARD

4.2. DC OFFSET

1. Turn the host amplifier front panel level control fully clockwise and set the 75A08 into the "**V**" mode.
2. Place the **V-I** switch of the channel not under test in the **V** position.
3. Turn the level controls fully counter clockwise.
4. Remove the 75A08 adjustment hole cover plate.
5. Power up the amplifier.
6. Place a DVM across the load terminals. You should read +/- 10 mv or less across each of the load terminals with the loads disconnected.

4.2.1. AMPLIFIER OFFSET

1. Adjust the AMP offset control for 0.00 VDC at the host amplifier output terminals.

4.2.2. INPUT OFFSET

1. Short the **INPUT** "+" and "-" terminals.
2. Turn the 75A08 gain control fully clockwise
3. Adjust the **INPUT OFFSET** screws for 0.00V at the amplifier load terminals.

4.2.3. MONITOR OFFSET

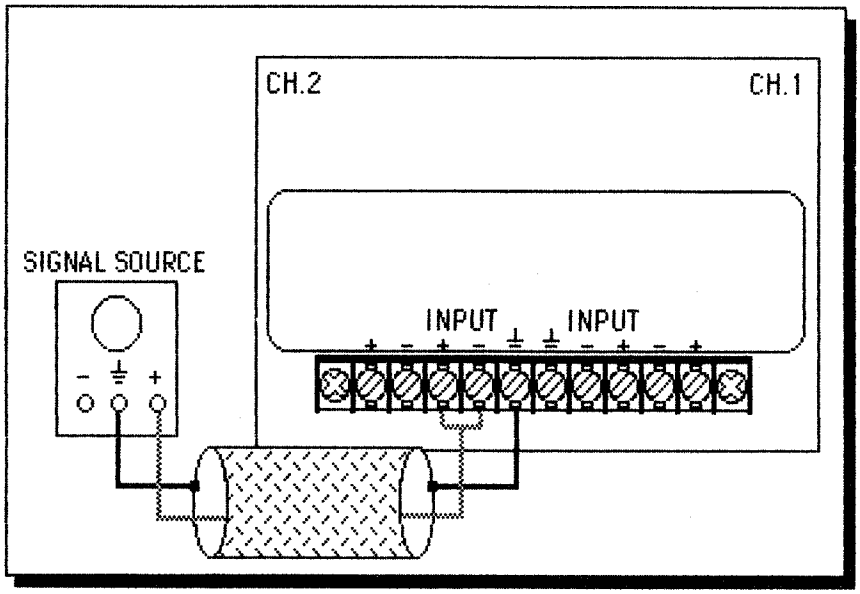
1. Adjust the LOAD offset for 0.00V from the balanced MONITOR "+" terminal to ground.

2. Adjust the monitor offset (**MNTR**) for 0.00V from the **MONITOR** "-" terminal to ground.

4.3. COMMON MODE REJECTION

4.3.1. CONNECTION

1. Connect the INPUT to a signal source as shown in Illustration 4-4.



Ill. 4-4: COMMON MODE REJECTION INPUT

4.3.2. Adjustment

1. Set the input signal for 1kHz output.
2. Adjust the CMRL(Low Frequency Common Mode) screw for a null at the 75A08 OUTPUT terminals.
2. Change the input signal to 20 kHz.
3. Adjust the CMRH (High Frequency Common Mode) screw for a null at the 75A08 OUTPUT terminals.
5 Repeat 1,2,3 and 4 for minimum interaction.

4.4. CURRENT MONITOR CALIBRATION

1. Connect a current meter capable of handling currents greater than 16 amps in series with the load.
2. Measure from the "+" to the "−" MONITOR terminal with an AC voltmeter.
3. Adjust the input **GAIN** control for 1.00 volts at the **MONITOR** terminals.
4. Adjust the **CAL** control for 1.00 ampere through the load.
5. Repeat this sequence for the other channel.

4.5. LOAD COMPENSATION

To compensate the 7A08 for loads other than load specified at time of ordering the 75A08 two parts in each channel must be replaced. Remove the top cover and replace R108, R208, C103, and C203 according to the following formulas:

$C = .0013 \text{ LOG } (L + 1)$

$R = .10 L$

L = value of the load inductance in uH.
C = value of C103, C203 in uf.
R = value of R108, R208 in K ohms.

Table 4-1: COMPENSATION VALUES

SECTION 5
REPLACEMENT PARTS AND SCHEMATICS

5.1. GENERAL PARTS INFORMATION

This section contains illustrations, parts list, and schematics for the 75A08 constant current module. This information should be used with the service, repair and adjustment procedures in Service section.

Mechanical and structural type parts are illustrated and indexed on exploded view drawings. Electrical and electronic parts are listed and indexed in both the exploded view drawings and the schematic parts lists.

The quantity of each part used in each location is shown for the exploded view parts listing.

5.2. STANDARD AND SPECIAL PARTS

Many electrical an electronic parts used in the 75A08 are standard items stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard, are actually special. A part ordered from TECHRON will assure a workable replacement. Structural items, covers and panels are available only from TECHRON.

5.3. ORDERING PARTS

TECHRON, a division of Crown International, supplies parts through the Crown International Parts Department. Replacement parts are obtained from the following address:

Crown International Parts Department
1718 W. Mishawaka Road
Elkhart Indiana 46517
(219) 294-8210
TWX 810 294 2160

When ordering parts, be sure to give the model and serial number and include the part description and Crown Part Number (CPN) from the parts list. Price quotes are available upon request.

5.4. SHIPMENT

Shipment will be made by UPS or best method unless a preferred method is specified.

Shipments are made F.O.B. Elkhart Indiana only.
Established accounts will have large orders shipped freight prepaid and billed. All other shipped freight collect.

5.5. TERMS

Normal terms are C.O.D., Master Card or Visa unless the order is prepaid. If prepaying please add an amount for the freight charge. $1.60 is average for an order under one pound.

Net 30 day terms apply only to established accounts. Parts prices are subject to change without notice. New parts returned for credit are subject to a 10% restocking charge.

You must receive authorization from the Crown Parts Department before returning parts for credit._

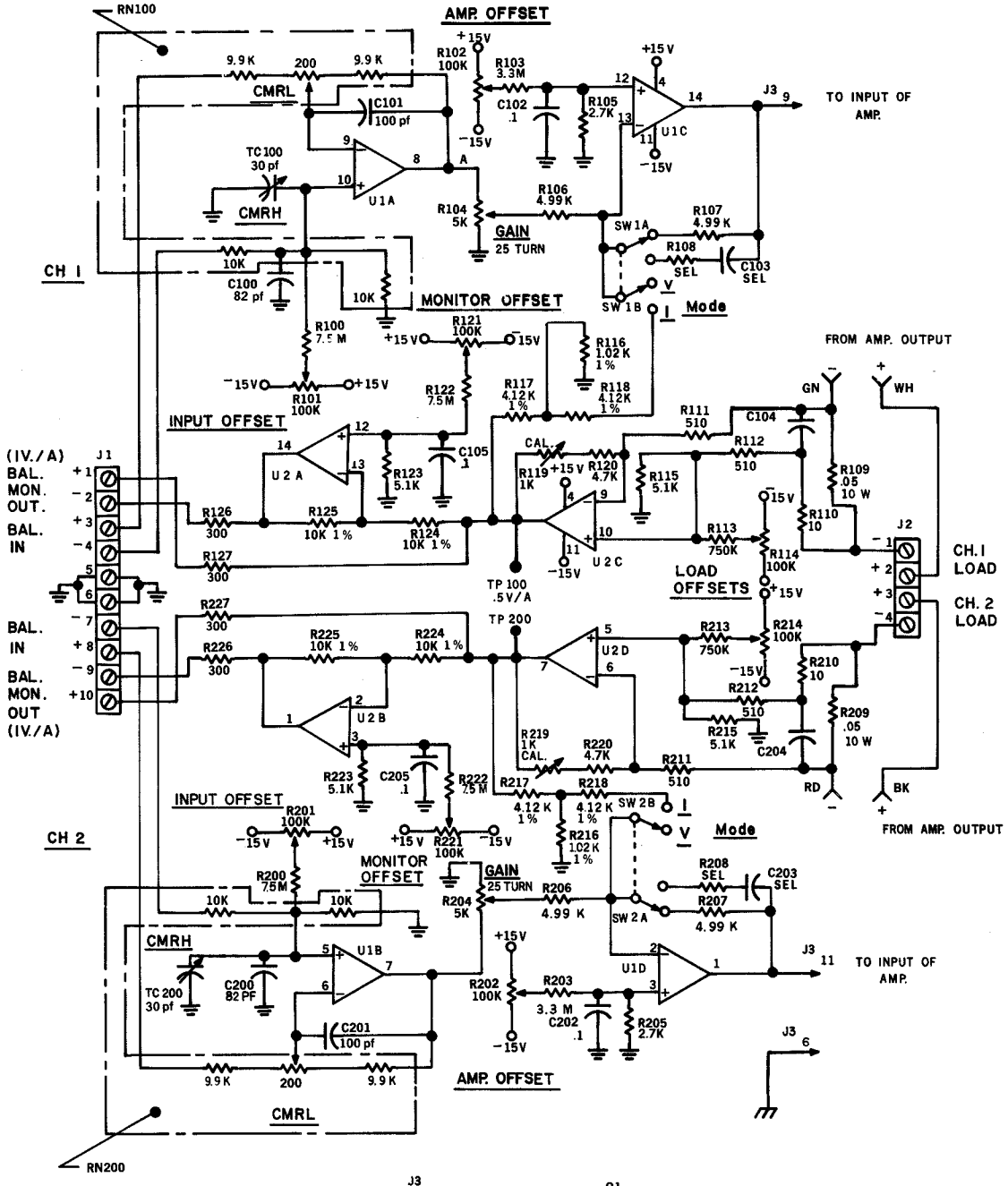
5.6. REPLACEMENT PARTS LIST

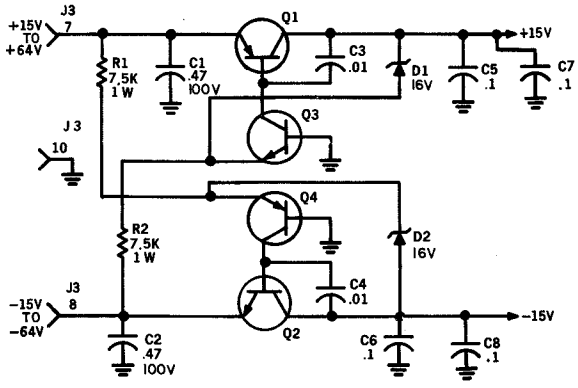
LOCATION	DESCRIPTION	CPN
C1	.47MF 100V	C 4119-1
C2	.47MF 100V	C 4119-1
C3	.01MF 500V DISC	C 1751-4
C4	.01MF 500V DISC	C 1751-4
C5	.1MF MONO	C 5639-7
C6	.1MF MONO	C 5639-7
C7	.1MF MONO	C 5639-7
C8	.1MF MONO	C 5639-7
C100	82PF MICA	C 3627-4
C101	100PF MICA	C 3410-5
C102	.1MF MONO	C 5639-7
C103	SELECTED	
C104	SELECTED	
C105	.1MF MONO	C 5639-7

LOCATION	DESCRIPTION	CPN
C200	82PF MICA	C 3627-4
C201	100PF MICA	C 3410-5
C202	.1MF MONO	C 5639-7
C203	SELECTED	
C204	SELECTED	
C205	.1MF MONO	C 5639-7
D1	1N966B 16V ZENER	C 3533-4
D2	1N966B 16V ZENER	C 3533-4
J1	10 TERM #3 BARRIOR	C 6430-0
J2	4 TERM #6 BARRIOR	C 6429-2
J3	11 PIN PLUG	C 3911-2
Q1	A1006 T0220 PNP	C 5453A1
Q2	TIP47 T0220 NPN	C 4647-1
Q3	MPSA43 NPN	C 3810-6
Q4	MPSA93 PNP	C 3578-9
R1	7.5K 1W 5%	C 6427-6
R2	7.5K 1W 5%	C 6427-6
R100	7.5M .25W 5% COMP	C 4915-2
R101	100K LIN TRIM POT	C 5062-2
R102	100K LIN TRIM POT	C 5062-2
R103	3.3M .25W 5% CF	C 4237-1
R104	5K 25 TURN POT	C 6428-4
R105	2.7K .25W 5% CF	C 5168-7
R106	4.99K .25W 1% MF	C 3686-0
R107	4.99K .25W 1% MF	C 3686-0
R108	SELECTED	
R109	.05 OHM 10W 1% WIRE	C 6426-8
R110	10 OHM .25W 5% CF	C 3753-8
R111	510 OHM .25W 5% CF	C 4849-3
R112	510 OHM .25W 5% CF	C 4849-3
R113	750K .25W 5% CF	C 4228-0
R114	100K LIN TRIM POT	C 5062-2

LOCATION	DESCRIPTION	CPN
R115	5.1K .25W 5% CF	C 5163-8
R116	1.02K .25W 1% MF	C 6086-0
R117	4.12K .25W 1% MF	C 5749-2
R118	4.12K .25W 1% MF	C 5749-2
R119	1K HELIPOT TRIM	C 3669-6
R120	4.7K .25W 5% CF	C 3939-3
R121	100K LIN TRIM POT	C 5062-2
R122	7.5M .25W 5% COMP	C 4915-2
R123	5.1K .25W 5% CF	C 5163-8
R124	10K .25W 1% MF	C 4859-2
R125	10K .25W 1% MF	C 4859-2
R126	300 OHM .25W 5% CF	C 3801-5
R127	300 OHM .25W 5% CF	C 3801-5
R200	7.5M .25W 5% COMP	C 4915-2
R201	100K LIN TRIM POT	C 5062-2
R202	100K LIN TRIM POT	C 5062-2
R203	3.3M .25W 5% CF	C 4237-1
R204	5K 25TURN POT	C 6428-4
R205	2.7K .25W 5% CF	C 5168-7
R206	4.99K.25W 1% MF	C 3686-0
R207	4.99K .25W 1% MF	C 3686-0
R208	SELECTED	
R209	.05 OHM 10W 1% WIRE	C 6426-8
R210	10 OHM .25W 5% CF	C 3753-8
R211	510 OHM .25W 5% CF	C 4849-3
R212	510 OHM .25W 5% CF	C 4849-3
R213	750K .25W 5% CF	C 4228-0
R214	100K LIN TRIM POT	C 5062-2
R215	5.1K .25W 5% CF	C 5163-8
R216	1.02K .25W 1% MF	C 6086-0
R217	4.12K .25W 1% MF	C 5749-2
R218	4.12K .25W 1% MF	C 5749-2
R219	1K HELIPOT TRIM	C 3669-6

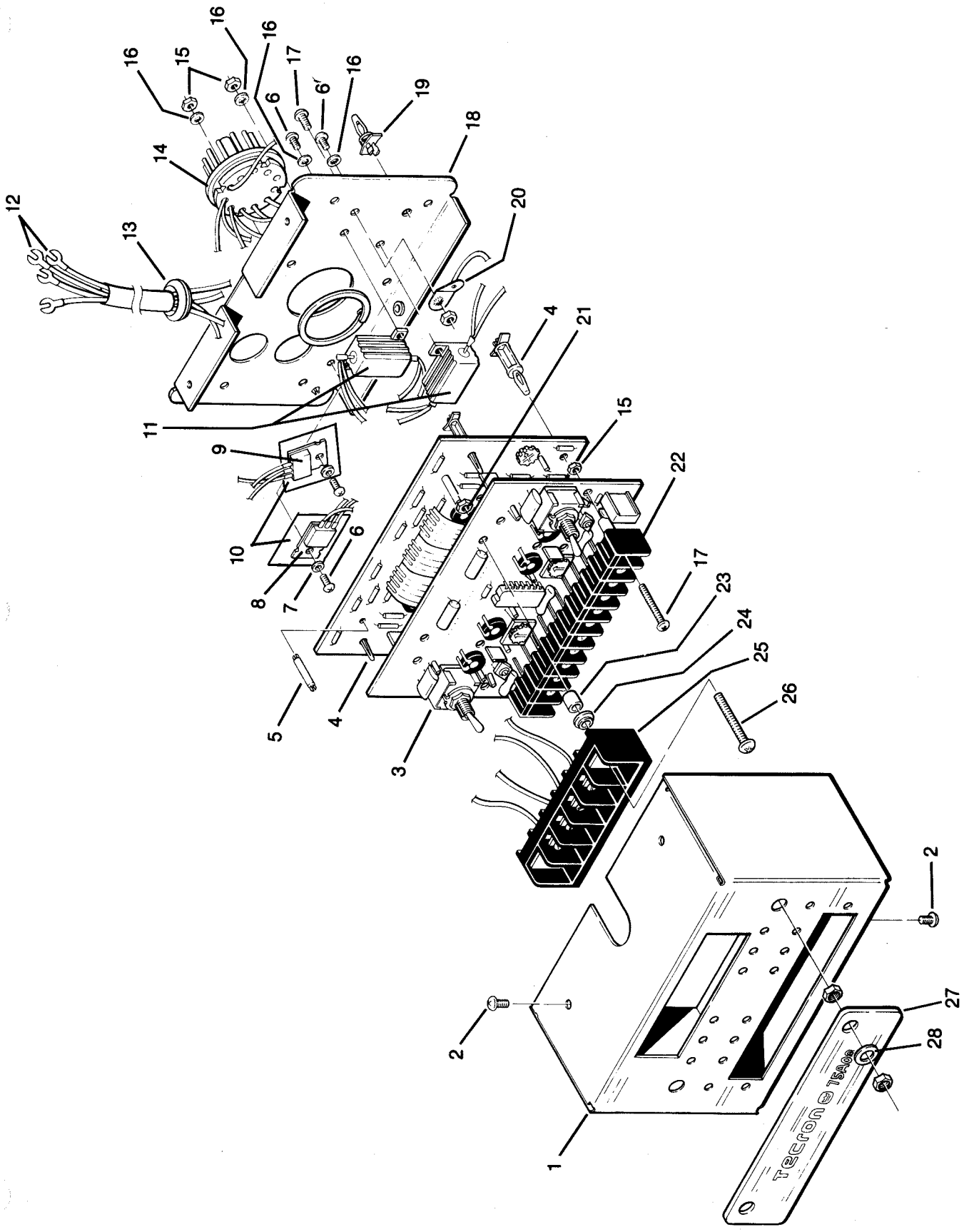
LOCATION	DESCRIPTION	CPN
R220	4.7K .25W 5% CF	C 3939-3
R221	100K LIN TRIM POT	C 5062-2
R222	7.5M .25W 5% COMP	C 4915-2
R223	5.1K .25W 5% CF	C 5163-8
R224	10K .25W 1% MF	C 4859-2
R225	10K .25W 1% MF	C 4859-2
R226	300 OHM .25W 5% CF	C 3801-5
R227	300 OHM .25W 5% CF	C 3801-5
RN100	BAL INPUT RES TRIM	D 4669-4
RN200	BAL INPUT RES TRIM	C 4669-4
SW1	DPDT MINI TOGGLE SW	C 4359-3
SW2	DPDT MINI TOGGLE SW	C 4359-3
TC100	30PF PC MNT TRIM	C 5058-0
TC200	30PF PC MNT TRIM	C 5058-0
U1	HA-4741 QUAD OP AMP	C 4160-5
U2	HA-4741 QUAD OP AMP	C 4160-5





75 A08 SCHEMATIC NOTES

- ALL RESISTORS ARE IN OHMS, ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE DESIGNATED.
- ALL RESISTORS ARE .25 WATT, 5 % TOLERANCE UNLESS OTHERWISE DESIGNATED.
- COMPONENTS COMMON TO BOTH CHANNELS ARE NUMBERED FROM 1 TO 99.
- CHANNEL ONE COMPONENTS ARE NUMBERED FROM 100 TO 199.
- CHANNEL TWO COMPONENTS ARE NUMBERED FROM 200 TO 299.
- C104, C 204 = LOAD RELATED PARTS (OPTIONAL).
- J3 = REAR PANEL 11 PIN "OCTAL" SOCKET.


Techron 75A08

5.7. EXPLODED VIEW PARTS LIST

LOCATION	DESCRIPTION	CPN
1	75A08 CHASSIS	F10411J0
2	6-32 X.25 SCREW	C 4758-6
3	DPDT MIMI TOGGLE SW	C 4359-3
4	.5" PC BROARD SUPPORT	C 6434-2
5	.5" MINI SUPPORT POST	C 6432-6
6	4-40 X.37 SCREW	C 1844-7
7	.115 NYL SHLDR WSHR	C 6446-6
8	A1006BR TO-220 PNP	C 5453A1
9	TIP-47 TO-220 NPN	C 4647-1
10	TO-220 MICA INSULATOR	C 6052-2
11	.05 OHM 10W 1% WIRE RES	C 6426-8
12	#8 BRASS SOLDER LUG	C 6433-4
13	RUBBER GROMET	C 5021-8
14	11 PIN PLUG	C 3911-2
15	4-40 HEX NUT	C 1938-7
16	#4 INT STAR LCKWSHR	C 1824-9
17	4-40 X1.25 SCREW	C 4574-7
18	75A08 BACK COVER	M20295J7
19	.25" BOARD SUPPORT	C 6032-4
20	#6 SOLDER LUG	C 3163-0
21	6-32 HEX NUT	C 1889-2
22	10 TERM #3 BARRIOR	C 6430-0
23	.25 X.14 X.375 RD SPCR	C 6431-8
24	.375 X.141 X.093 NYL WSHR	C 4037-5
25	4 TERM #6 BARRIOR	C 6429-2
26	6-32 X1" SCREW	C 2138-3
27	75A08 PLATE	F10410J2

I. TOOLS NEEDED

HAND TOOLS

None

B. TEST EQUIPMENT

15 Mhz scope
IMA
ACVM with 20-20khz bandpass filter
2,4,8 ohm non-reactive load
DVM or VOM
Signal generator
7560 Extendr Card

II. CONSUMABLE MATERIALS LIST

None

III. REFERANCE DOCUMENTS

A. SCHEMATICS

J 0055B0 75A11 Schematic

B. BILL OF MATERIALS

G42876-9 MODEL 75A11 *PKG*

IV. INSTALLATION PROCEDURE

1. Install the 75A11 in the 7560 input plug in. Use the blank Access door to cover the opening secured with the Access door retainer screws.

V. TEST PROCEDURE

1. Visually inspect the 75A11 for proper components, solder bridges, poor solder joints, broken components, etc.

2. Using a properly operating 7560 or M-600, insert the 75A11 module into the amplifier using an extender card.

3. Use a 1 KHz square wave and feed the signal into screws 1 and 3 of the J2 and connect the ground from the generator to screw 3. Adjust the CMR pot (R512) for a null.

NOTE: If the input is connected to the BNC connector than step 3 may be omitted.

Remove the extender card and plug in the 75A11 directly to the 7560.

5. With a balanced 1K sine wave fed into J2, check gain control to see that it varies the output ± 2%.

6. Fasten the blank access door in place over the 75A11 with the access door retaining screws.

7. Sweep 20-20k Hz to check to see if the frequency respnse is flat.

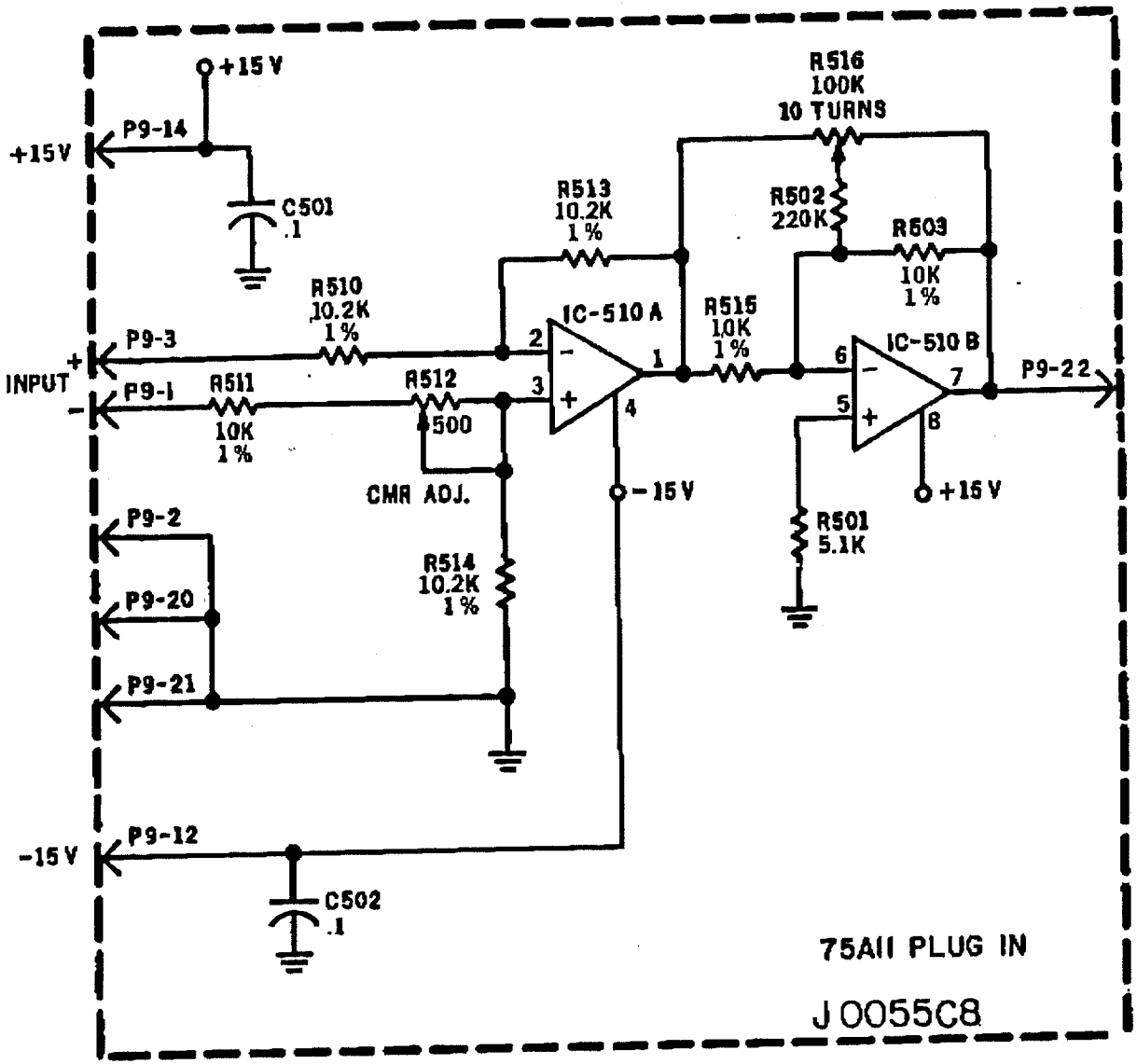
VI. PACKING PROCEDURE

1. Normally the 75A11 is shipped installed in a 7560.

2. If a 75A11 needs to be shipped seperatly, place it in a plastic bag and obtain a box with at least 2 inches of space on all sides of the 75A11.

3. Use pouralble dunage CPN C 5625-9 to pack the 75A11 in.

TO : Mitch Shedler



R502 WAS 510K

CROWN INTERNATIONAL		
75AII Plug-in		
D.W.	10-10-82	J0055C8
	NONE	

75A11 TEST PROCEDURES

1. Visually inspect the 75A11 for proper components, solder bridges, poor solder joints, broken components, etc.
2. Using a properly operating 7560 or M600 set at unity gain, insert the 75A11 module into the amplifier.
3. Use a 10KHZ ~~Square~~ Triangle wave and feed the signal into screws 1 and 3 of J2 and connect the ground from the generator to screw 3. Adjust the CMR pot (R512) for ~~default~~ minimum
4. With a balanced 50V rms or DVM 1K sinewave fed into J2, check gain control to see if it varies the output ~~20%~~ 5%-10%. Set at mid position or mid gain
5. Sweep 0 - 20KHZ to check to see if the frequency response is flat

PAINT CMR POT (R512)

DO NOT PAINT GAIN CONTROL

7SA12 TEST PROCEDURES

1. Visually inspect the 7SA12 for proper components, solder bridges, poor solder joints, broken components, etc.
2. Using a proper operating 7560 or M600. Insert the 7SA12 module into the amplifier.
3. Use a 1kHz sinewave into the BNC input of the amp to check for signal flow and proper ~~operation of the gain pot~~
4. Set CMR - 10K triangle waveform method, unless options A and C installed. If opt A-C used, 500Ω CMR Helitrim pot full way and set point
5. Check bandwidth. Should be 3dB point 5 Hz to 3KHz
6. Check for Slave Output Sig, if ~~applicable.~~ options A & C used Should see output from 7SA12 at the Balanced screw terminal Input connector on the back of the control panel (J2), pin 3 (black conductor, or screw terminal closest to the side panel) at the output of the amp with 70VRMS/1, should see about 5Vp out with scope

8401 get A and C modification

4/23/97

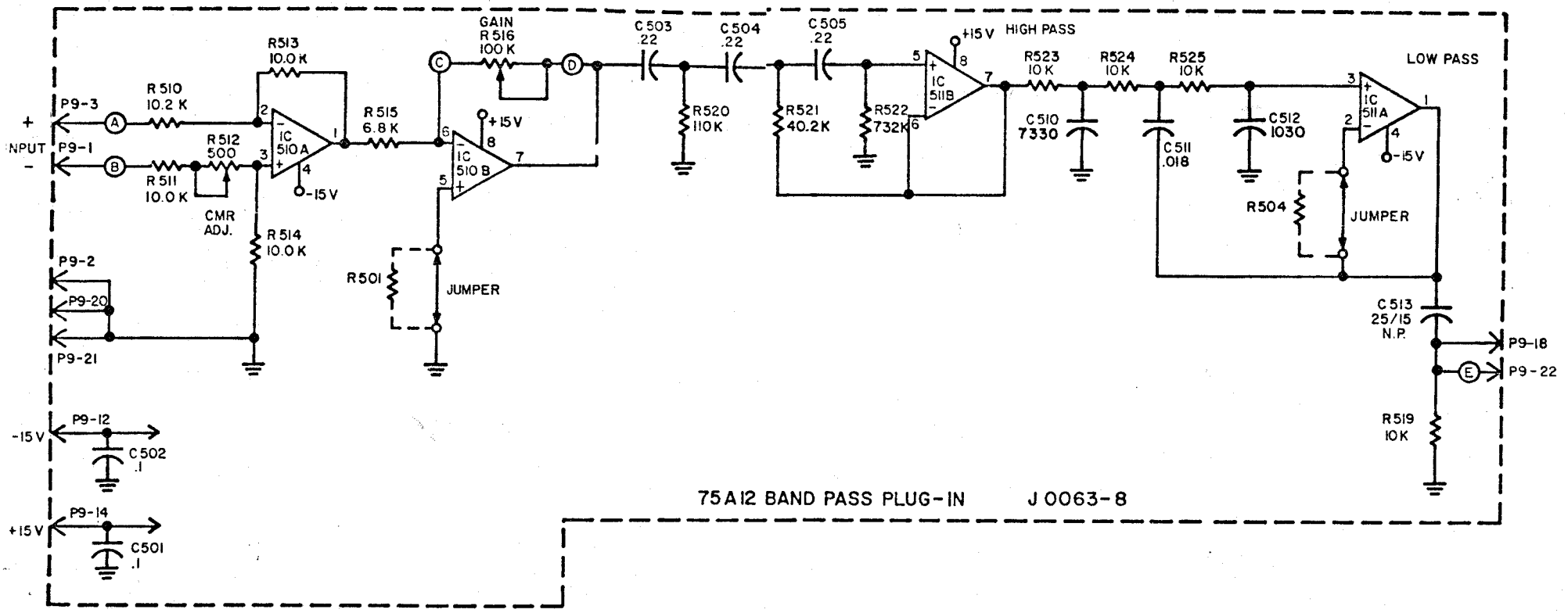
Marc

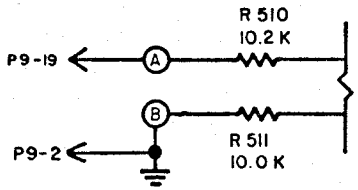
EO need
Sig gen
1 ea 8060
BNC to BNC cable

7SA12 TEST PROCEDURE FOR 8401

1. Confirm ~~Options~~ that the 7SA12 has options A & C installed. Refer to Schematic 10063-8, 7SA12 Band Pass Plug-in. OR ~~Sample~~ 8401 Kimball 7SA12 sample card.
2. Set CMR pot R512 (500Ω) for ~~mid~~ center position. Paint pot with fingernail polish. With Option
3. Insert 7SA11 into ~~working~~ ~~amp~~ the 8401 or a working 7560.
4. ~~Set the~~
4. Connect generator to BNC input of amp
5. Input a 1KHZ sine wave signal @ 5V as measured by 8060
6. Adjust R516, white Gain pot, for unity gain.
7. Press dB, the REL on 8060
8. Sweep generator up till 8060 measures -3dB.
9. Press HZ, reading should be 3KHZ ± ?
10. Press dB on ~~8060~~ 8060
11. Sweep generator down to -3dB.
12. Generator frequency knob should indicate ~~zero~~ 5HZ ± ? (the frequency response of the 8060 only goes down to ~~10~~ 10 HZ.)
13. Affix small label with a T written on it, to the component side of the 7SA12. This indicates that the module has been tested.
14. Install the 7SA12 in the 8401, or return it to the anti-static bag for packing or use later.

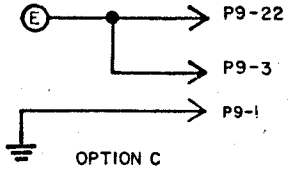
1/25/95
Mark Miller





OPTION A
BNC INPUT

OPTION B
UNITY GAIN



OPTION C
SLAVE DRIVE THROUGH SCREW TERMINALS.

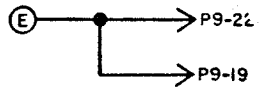
NOTE:

1.) IF OPTION "C" IS USED, OPTION "A" MUST ALSO BE USED.

2.) TRACE BETWEEN (B) AND P9-1 CUT WITH OPTION "A".

3.) ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.

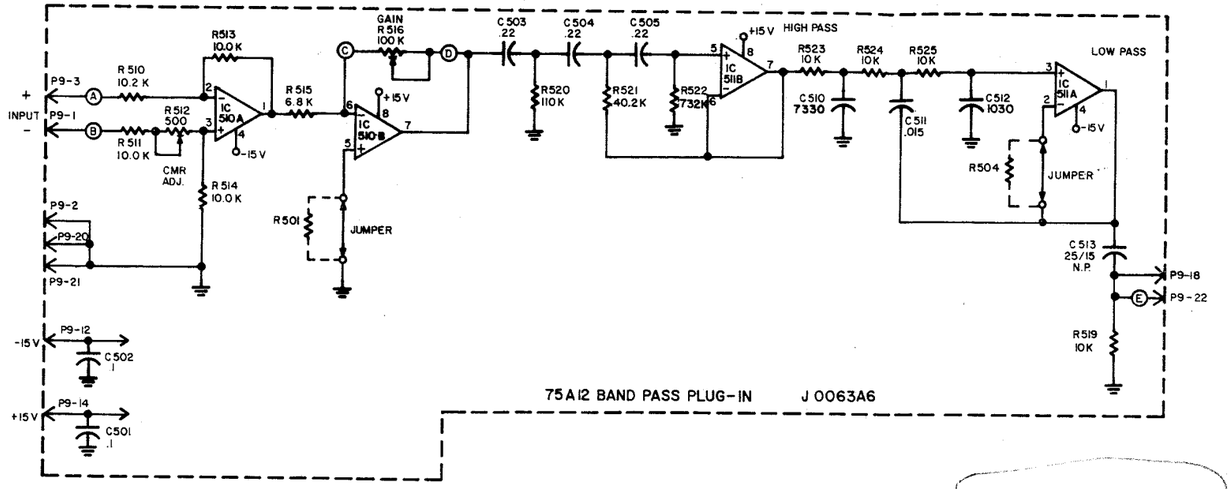
4.) ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

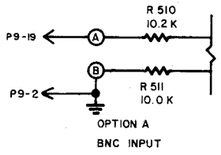


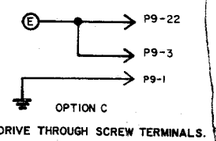
OPTION D
SLAVE DRIVE THROUGH BNC

5Hz to 3Khz

crown. 1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-5571				
75A12 BAND PASS PLUG-IN				
DRAWN	D. WILSON	11-26-82	SCALE NONE	
CHECKED	J. FLANAGAN	4-5-83	PROJ D043	SUPERSEDES X825A 9-9-82
APPROVED				J0063-8

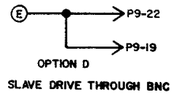






NOTE:
1.) IF OPTION "C" IS USED, OPTION "A" MUST ALSO BE USED.
2.) TRACE BETWEEN (B) AND P9-1 CUT WITH OPTION "A".
3.) ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
4.) ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

WRONG, REFER TO J0063A6 REV (A).



NOTES:

1. This schematic applies only to PC board #P 9560B3.
2. The three changes shown in dotted lines are for industrial applications using DC signals.
3. R* is chosen according to the following general limitations:
   a) $2K < R^* < 330K$
   b) $R520 > 2K$
   c) $R525 < 1M$
4. With valid values of R* and C*, R520, R521, R525, and C510, C511, C512 are chosen according to the following formulas:

$$R520 = \frac{.7184}{2\pi f_h C^*} \qquad C510 = \frac{1.392}{2\pi f_l R^*}$$

$$R521 = \frac{.2820}{2\pi f_h C^*} \qquad C511 = \frac{3.546}{2\pi f_l R^*}$$

$$R525 = \frac{4.941}{2\pi f_h C^*} \qquad C512 = \frac{.2024}{2\pi f_l R^*}$$

   when f_h = highpass cutoff

   f_l = lowpass cutoff

5. For values of C*, R*, C510, C511, C512, R520, R521, and R525 shown f_h = 30Hz and f_l = 15KHz.

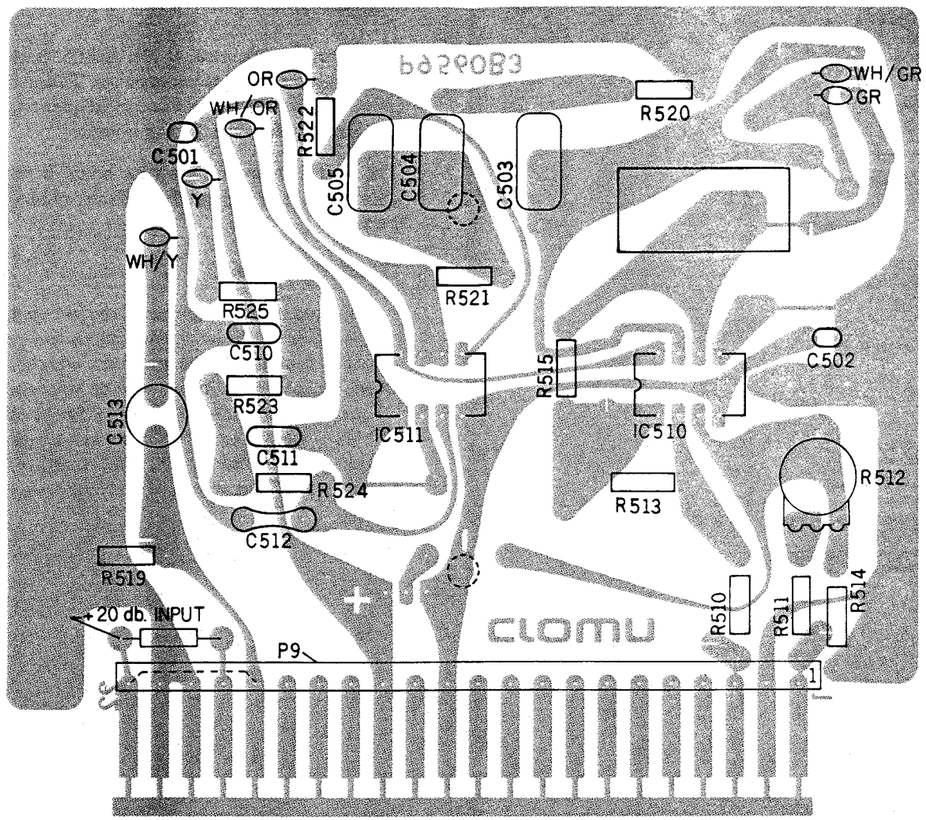
5.4 Bandpass Filter with Bridging Input (75A12)

This circuit is identical to the 75A09, Section 5.3, but does not have front panel controls. This is designed as a fixed bandpass filter with cutoff frequencies determined by using the formulas in the notes.

The 75A12 is supplied with a blank front panel. The control is screw driver adjustable by removing the front panel.

Circuit Description

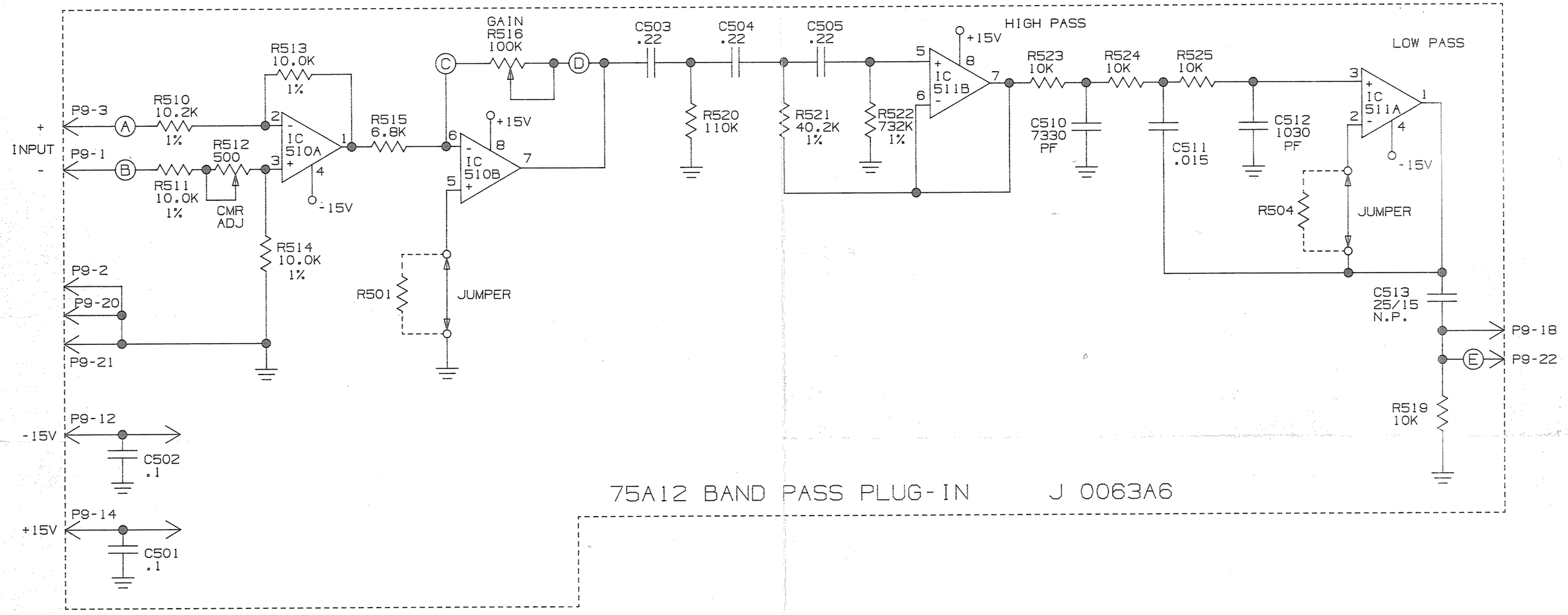
A balanced input is provided by one-half of a 4558 operational amplifier providing unity gain. R535 provides common-mode rejection adjustment for this stage. The other half of the 4558 provides driving power for the 3-pole Butterworth filters. R539 controls the gain of this stage. Again a 4558 makes up the two filter sections. With values of C*, R530, R531, R532 and R*, C530, C531, C532 shown ; fh = 30Hz, and fl = 15KHZ.



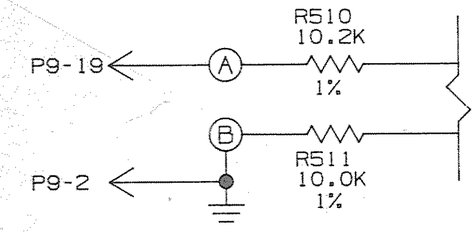
BANDPASS FILTER WITH BRIDGING INPUT

Schematic Designation	Description	Crown Part No.	Other Information
	Resistors		
R530	18K ohm ½ watt 5% CF	C 1075-8	
R531	618K ohm	NA	
R532	120K ohm ¼ watt 5% CF	C 4214-0	
R533, R534, R*			
R537, R538	10K ohm ½ watt 5% CF	C 1035-2	
R535	500 ohm 10 watt 10% wire	C 3624-1	
R536	10K ohm ½ watt 1% MF	C 2343-9	
R539	100K ohm ½ watt 5% CF	C 1027-9	
	Capacitors		
C530	1.5 NF 200V filmatic	C 3089-7	
C531	3.9 NF 200V filmatic	C 4151-4	
C532	220PF	NA	
C*	220 MF 40V axial	C 4147-2	
C**	75 PF	NA	
C**	10-100 PF 467 Arco trimmer cap	C 1256-4	
	Integrated Circuits		
IC530A, B IC531A, B	RC4558 Dual op amp	C 3919-5	

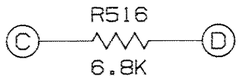
E.C.N.	REV	DESCRIPTION	DAT	Y	APPR
87-0331	A	ADDED NOTE #2; ADDED NOTE #5	6-11-87	RG	JF / CG
	B				
	C				
	D				
	E				



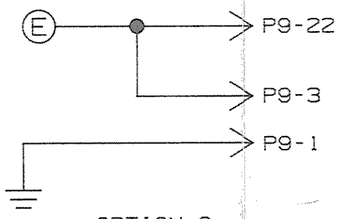
75A12 BAND PASS PLUG-IN J 0063A6



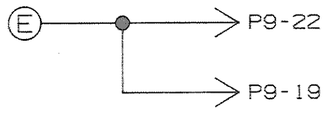
OPTION A
BNC INPUT



OPTION B
UNITY GAIN



OPTION C
SLAVE DRIVE THROUGH SCREW TERMINALS



OPTION D
SLAVE DRIVE THROUGH BNC

NOTES:
1) IF OPTION "C" IS USED, OPTION "A" MUST ALSO BE USED.
(A) 2) TRACE BETWEEN (B) AND P9-1 CUT WITH OPTION "A" UNLESS OPTION "C" IS ALSO IMPLEMENTED.
3) ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
4) ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
(A) 5) TRACE BETWEEN (A) AND P9-3 CUT WHEN OPTIONS "A" OR "C" ARE IMPLEMENTED.

JUN 1 8 1987

CROWN. 1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

75A12 BAND PASS PLUG-IN

TOL. UNLESS SPECIFIED .00 = +/-.020 .000 = +/-.005 ANGLES = +/-0.5°

DRAWN	RG	6-11-87	SCALE NONE	DO NOT SCALE PRINT	
CHECKED	JF	6-15-87	PROJ E6	SUPERSEDES J 0063A6/11-26-82	
APPROVED	CG	6-15-87	ECN 87-0331	C.P.N. J 0063A6	REV (A)
NEXT ASSEMBLY					

AMPDESIGN	J0063A6	1-4
USERNAME	FILE NAME	LAYER NO.

BY MdH T

75M01 PANEL METER

EQUIPMENT:

(1) of the following amps: 7570, 7560, or test M600
Meter extender cable
Function generator
Oscilloscope
DMM
7560 input cable set for SIGNAL

SETUP:

1. Set test amp to: Voltage Mode Input Coupling AC Input Atten. 10
2. Input a 1 Khz sine wave and adjust for 35 Vac output.
3. Verify wiring of the meter plug coming out of the front of the test amp.
   WHITE/RED BROWN VIOLET RED KEY YELLOW & BLACK YELLOW
4. Plug the meter extender cable into the test amp.

VISUAL INSPECTION:

1. Verify solder quality.
2. Verify the meter face is clean and the plastic cover is clear.

TEST:

1. Set the bottom scale on the meter to zero using the screw on front of the meter.
2. Plug the meter into the meter extender cable.
3. Set the db Below Red switch for 3db, db Below Max. for 0db.
4. Turn on the test amp.
5. Verify the (2) illumination lamps at the bottom of the meter under the black bezel come on.
6. Connect scope to middle pin of the white pot (R227). (See diagram A)
7. Adjust the white pot (R227) for no pulsing on the scope and no pulsing of the meter needle.
8. Adjust generator for 70.7 Vac output of the test amp.
9. Adjust the ~~red~~ blue pot (R219) for meter reading of 0 db. (See diagram A)
10. Adjust generator for 45 Vac output of the test amp.
11. Meter should read -3 db.
12. While watching the meter, quickly decrease the input signal to zero. The meter should hold its reading for approx. 1 second before dropping.
13. Adjust the generator for 78.9 Vac output of the test amp.
14. Adjust the ~~red~~ blue pot (R201) so the red light just comes on. (See diagram A)
15. Verify GREEN and RED light operation using the following charts.

** ALL READINGS IN THE FOLLOWING CHARTS ARE APPROXIMATE VALUES **

75M01 PANEL METER

GREEN LIGHT
db Below Max. switch set to 0

db Below Red Setting	Meter Reading	Amplifier Output
0	GREEN LIGHT SHOULD NOT TURN ON AT ANY OUTPUT	
3	-1.9 db	55 Vac
6	-4 db	39 Vac
10	-6.75 db	25 Vac
15	-9.25 db	14 Vac
20	-13 db	8 Vac

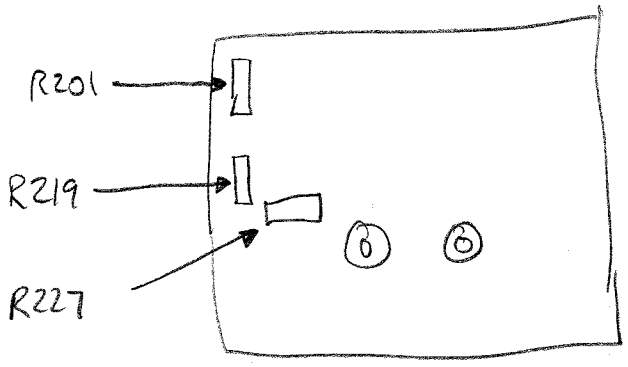
RED LIGHT
db Below Red set to 0

db Below Max Setting	Meter Reading	Amplifier Output
0	+.75 db	78.9 Vac
3	-1.9 db	56 Vac
6	-3.9 db	41 Vac
10	-6.5 db	26 Vac
15	-9.5 db	14 Vac
20	-13 db	8.75 Vac

FINAL

1. Set db Below Max to 0 db.
2. Set bd Below Red to 3 db.
3. Paint the pots.

Matt T re-typed ≈ 1996-95



The mech talked about diagram A

C.P.N. J0709-6 REV (A)

E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVALS CK	ME	EE	PE
T95-0435	C5	A	R232 WAS: 681K IS: 243K, R233 WAS: 340K IS: 121K	12/19/95	CRB				(A)

NOTES :

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

LAST USED	OBSOLETED
C205	C200
D206	D200 - D202
I203	I200, I201
IC202	IC200
M200	
P8	P1-P7
Q203	
R233	R200 - R216
S1	

-15 VDC P8-9
+15 VDC P8-4
FROM OUTPUT + P8-8
N.C. P8-1
FROM R307 P8-2
TO POWER SUPPLY GROUND P8-5
6.3 VAC/GND P8-6
6.3 VAC P8-7

R229 22M 0.50W
C205 2.2
C202 0.068
R230 180K
Q203 2N4125
C204 2.2 50V
R231 3.3K
Q202 2N3859A
IC201B RC4558
R228 2.7M
D206 1N4148
R232 243K 1%
R233 121K 1%
S1A
S1B
IC202A RC4558
Q200 2N3859A
Q201 2N3859A
D205 1N4148
R222 1K 1%
R217 2K 1%
R224 10K 1% 0.50W
R223 10K 1% 0.50W
D204 1N4148
D203 1N4148
IC202B RC4558
I202
I203
IC201A RC4558
R218 10K 1% 0.50W
R219 5K CW
R220 11K
R221 300
M200 METER
CALIB.
R225 15
DRIFT
R227 250K LOG
R226 56M CW
C201 0.47
C203 0.01

REL FOR TOOLING	BY	DATE
REL FOR PROD	BY	DATE
AMPDESIGN		

CROWN INTERNATIONAL, INC.
1718 WEST MISHAWAKA ROAD ELKHART, IN. 46517 PHONE (219) 294-8000

PEAK CURRENT METER SCHEMATIC

DRAWN	CRB	9-4-95	APPROVED BY :			DO NOT SCALE PRINT
CHECKED			ME			SUPERSEDES ———
SCALE	NONE		EE			E.C.N. ———
PROJ #	T371		PE	RM	11-09-95	C.P.N. J0709-6 REV (A)
NEXT ASSEMBLY						

TECHRON®

Instruction Sheet

7560/70 Meter Assembly

Section 1—Introduction to Kit

1.1 Purpose

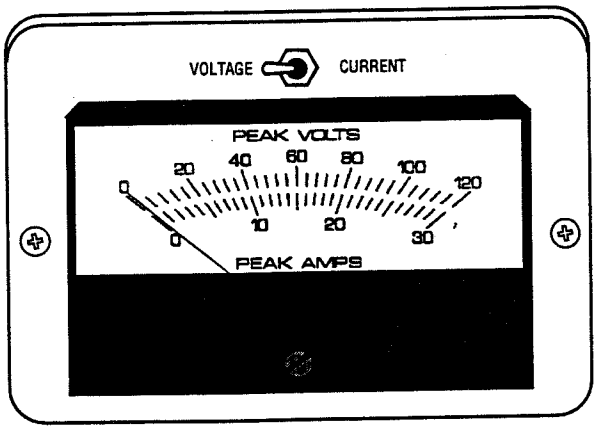
The 7560/70 meter assemblies have become obsolete and are no longer available. With the addition of a selector switch, this new meter assembly will operate in either a 7560 or 7570 amplifier. When replacing an older meter assembly with this new one, the modular connector on the amplifier will have to be modified (see section 2.1 or 2.2).

The purpose of this meter assembly is the same as that of the ones it replaces: to provide visual monitoring of either voltage or current levels being delivered to the load at the amplifier's output.

1.2 Kit Contents

In addition to these instructions (100416-1), the contents of the 7560/70 Meter Assembly Kit are listed below.

P/N	Description
A11603–91	Display Assembly (7560/70 Meter, light pearl in color).
	OR
A11603–92	Display Assembly (7560/70 Meter, tan in color).



Section 2—Installation

Remove the existing meter assembly or blank panel from the amplifier by removing the two phillips screws holding it in place. Unplug the assembly from the amplifier or find the connector behind the front panel, then follow the procedures in section 2.1 for a model 7560 or section 2.2 for a model 7570 series amplifier.

⚠ WARNING

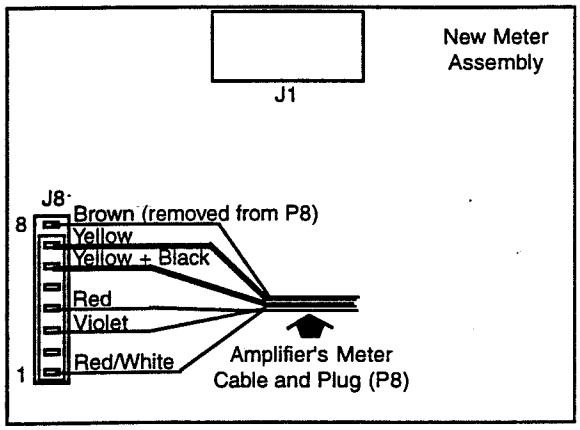
A **lethal** electric *SHOCK* hazard exists inside the amplifier. Always turn the power OFF and unplug the AC cord when making changes to the amplifier.

2.1 7560 Meter Installation

This procedure requires that a pin be removed from the amplifier's meter plug connector P8, then plugged onto the new meter assembly in a special way.

Procedure:

1. Locate the 7–pin female meter plug (P8) behind the amplifier's front panel.
2. Remove pin 2 (brown wire) from P8 using a small pointed tool.
3. Insulate this pin with shrink tubing or tape.
4. Plug this connector (7–pin) on to the new meter assembly J8, an 8–pin connector, upside down at the bottom so that pin 8 is left exposed (see illustration below).



Back of New Meter Assembly

5. Plug the insulated pin on to pin 8 of the new meter assembly as shown above.
6. Fit the new meter assembly in place on the amplifier and secure it with the two phillips screws.

⚠ CAUTION

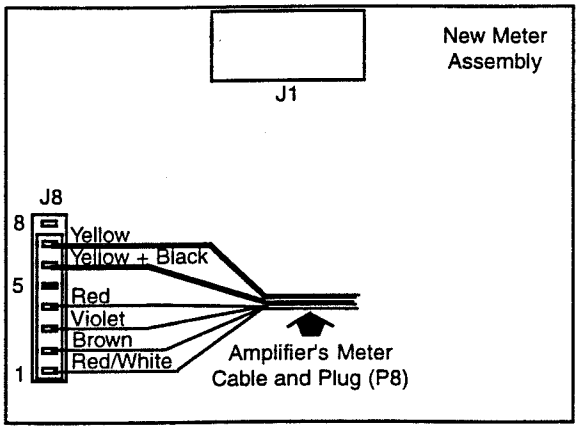
The switch on the new meter assembly allows readings to be made as **voltage** across the load only. Placing the switch in the **current** position will produce a meaningless reading.

2.2 7570 Meter Installation

This procedure requires that a pin be removed from the new meter assembly's connector J8, then be plugged in to the amplifier in a special way.

Procedure:

1. Remove pin 5 from J8 on the new meter assembly using a suitable tool (see illustration below).
2. Locate the 7–pin female meter plug (P8) behind the amplifier's front panel.
3. Plug this connector (7–pin) on to the new meter assembly J8, an 8–pin connector, upside down at the bottom so that pin 8 is left exposed (see illustration below).



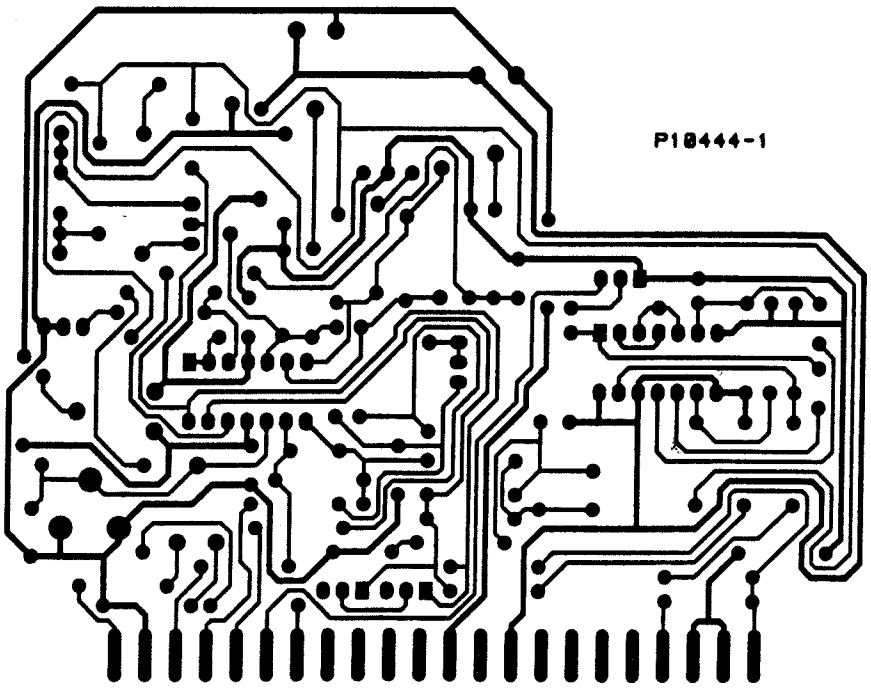
Back of New Meter Assembly

4. Fit the new meter assembly in place on the amplifier and secure it with the two phillips screws.

⚠ CAUTION

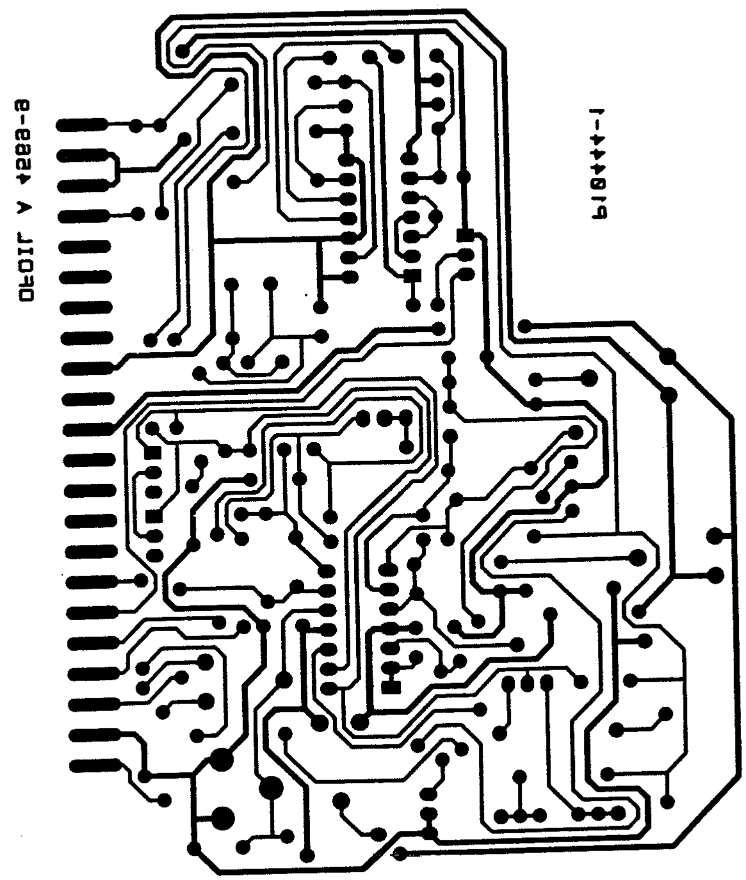
The switch on the new meter assembly allows readings to be made as **current** through the load only. Placing the switch in the **voltage** position will produce an erroneous reading.

7572 CCM Board

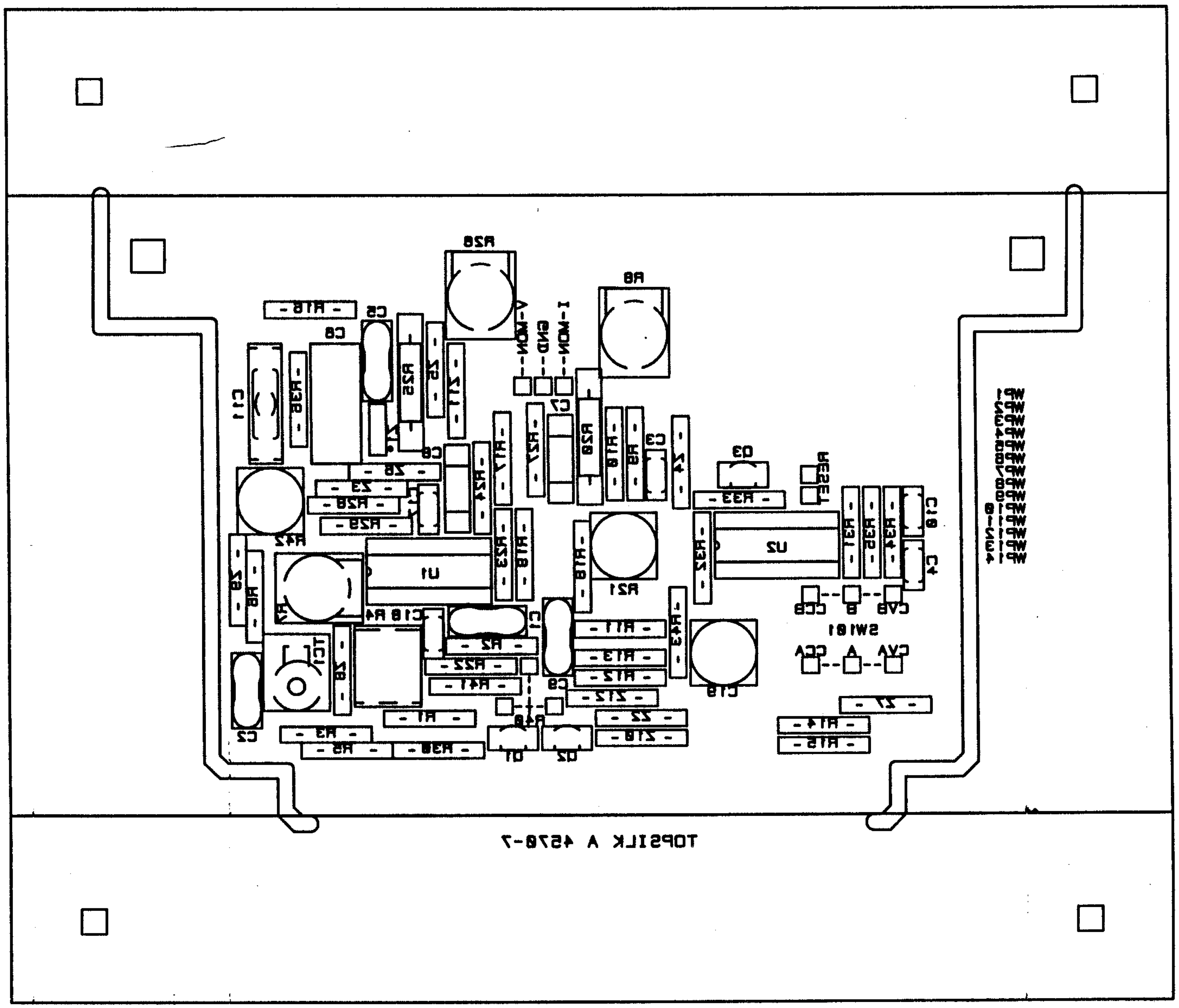


P10444-1

OFOIL A 4569-9



7572 CCA



Pin out of input module for 7560, 7570, 7562 / 7572

pin #	7560	7570	7562 / 7572
1	input -20	input -20	input -20
2	gnd	gnd	gnd
3	input + 20	input + 20	input + 20
4		I sense +	I sense +
5		I sense -	I sense -
6			interlock
7			V mon out
12	DC -15V	DC -15V	DC -15V
14	DC +15V	DC +15V	DC +15V
18	N/A	N/A	N/A
19	input +20	input +20	input +20
20	gnd	gnd	gnd
21	gnd	gnd	gnd
22	output to amp	output to amp	output to amp

meter plug for 7560, 7570, 7562 / 7572

pin #	7560	7570	7571	7562 / 7572
1	23V DC	23V DC	23V DC	N/C
2	V input	V input	I input	I input
3	DC -15V	DC -15V	DC -15V	DC -15V
4	DC +15V	DC +15V	DC +15V	DC +15V
5	N/C	N/C	N/C	Gnd
6	Gnd	Gnd	Gnd	Gnd
7	AC 6.3	AC 6.3	AC 6.3	AC 6.3
8	N/C	N/C	N/C	V input

TECHRON®

TECHNICAL MANUAL

Includes Service Information

77M01
DIGITAL PANEL
METER

Techron Division of Crown International, Inc., 1718 W. Mishawaka Road, Elkhart, IN 46517-4095

K80302-1
12/88

TECHRON
LIMITED ONE-YEAR WARRANTY

SUMMARY OF WARRANTY

CROWN INTERNATIONAL, INC., 1718 W. Mishawaka Road, Elkhart, Indiana 46517 (Warrantor) warrants to the ORIGINAL COMMERCIAL PURCHASER ONLY of each NEW TECHRON product, for a period of one (1) year from the date of purchase by the original purchaser (warranty period) that the product is free of defects in materials or workmanship and will meet or exceed all advertised specifications for such a product. This warranty does not extend to any subsequent purchaser or user, and automatically terminates upon your sale or other disposition of our product.

ITEMS EXCLUDED FROM WARRANTY

We are not responsible for product failure caused by misuse, accident or neglect. This warranty does not extend to any product on which the serial number has been defaced, altered or removed. It does not cover damage to loads or any other products or accessories resulting from Techron product failure. It does not cover defects or damage caused by your use of unauthorized modifications, accessories, parts, or service.

WHAT WE WILL DO

We will remedy any defect in materials or workmanship by repair, replacement, or refunds. If a refund is elected, then you must make the defective or malfunctioning component available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at our factory. Expenses in remedying the defect will be borne by Crown, including one way surface freight shipping costs within the United States. (Purchaser must bear the expense of shipping the product between any foreign country and the port of entry in the United States and all taxes, duties, and other custom's fee for such foreign shipments.)

HOW TO OBTAIN WARRANTY SERVICE

You must notify us of your need for warranty service not later than ninety (90) days after expiration of the warranty period. We will give you an authorization to return it to us for service. All components must be shipped in a factory pack or equivalent which, if needed, may be obtained from us for a nominal charge. Corrective actions will be taken within a reasonable time of the date of receipt of the defective product by us. If the repairs made by us are not satisfactory, notify us immediately.

DISCLAIMER OF CONSEQUENTIAL AND INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN OUR PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT.

WARRANTY ALTERATIONS

NO PERSON HAS THE AUTHORITY TO ENLARGE, AMEND, OR MODIFY THIS WARRANTY. THE WARRANTY IS NOT EXTENDED BY THE LENGTH OF TIME WHICH YOU ARE DEPRIVED OF THE USE OF THE PRODUCT. REPAIRS AND REPLACEMENT PARTS PROVIDED UNDER THE TERMS OF THIS WARRANTY SHALL CARRY ONLY THE UNEXPIRED PORTION OF THIS WARRANTY.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

There is no warranty which extends beyond the terms hereof. This written warranty is given in lieu of any oral or implied warranties not contained herein. WE DISCLAIM ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No action to enforce this Warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

TECHRON division of Crown International, Inc.
1718 W. Mishawaka Road, Elkhart, IN 46517-4095

4/88

LIST OF EFFECTIVE PAGES

Revision 0 **December 88**

Page Number	Revision Number
Title Page	0
Warranty Page	0
a	0
i	0
1-1 to 1-2	0
2-1 to 2-2	0
3-1 to 3-5	0
4-1 to 4-7	0

TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

SCHEMATICS

SECTION 1. INTRODUCTION

The TECHRON 77M01 Panel Meter adds a valuable 3 1/2 digit display to the 7700 series industrial power amplifier. Front panel controls offer flexibility in choosing between the display of true R.M.S. or peak output current or output voltage readings, eliminating external monitoring instruments. The large LCD display is easy to read at a distance.

By including a 77M01 digital meter the precision display capability is added to the 7700 power amplifier.

1.1. Specifications for 77M01

Mode: Output current or output voltage.
Range: 0 to 199.9, and 0 to 1.999
Controls: RMS/PEAK-Slide switch. Range-200/20 Slide switch. VOLTS/AMPS-Slide switch.
Display: 1" high, 3 1/2 digit LCD.
CONVERSION: True R.M.S. and Peak.

1.2. Operation

V-I Switch

The V - I Switch selects between amplifier output voltage and output current. Set the V/I Switch up for voltage (V) and down for current.

200- 20 Switch

Selects the full scale display range. Set the switch up for 200 volts or current full scale and down for 20 volts or amps.

Peak - RMS Switch

Displays the highest peak or RMS value reached.

Display

The 3 1/2 digit 77M01 display shows the output voltage or output current of the amplifier it is mounted on. For amplifiers in systems, the display may be a fraction or multiple of the total output voltage or current.

1.3. Service Policies

Due to the sophisticated circuitry of Model 77M01, have only qualified and fully trained technicians perform service work, or return to the factory.

When returning Model 77M01, enclose a brief letter explaining as completely as possible the problem or problems. For any service performed outside the TECHRON factory, be sure to read, understand and follow instructions in this manual.

Return authorization is not required before sending a 77M01 to the factory for service.

* TECHRON is a division of CROWN INTERNATIONAL, INC.

1.4. Installing 77M01 in the Field

To Install:

1. Remove the amplifier front panel.
2. Remove the display plate (see Illustration 4-1, Item 2).
3. Carefully remove the amplifier main board.
4. Locate the three black nylon screw (Item 8) and nylon standoffs (Item 7).
5. Fasten the nylon standoffs to the main board with the nylon screws.
6. Locate the 77M01 Display Interconnect Cable (Item 6) and plug it into J150 on the main board.
7. Place the 77M01 display board insulator (Item 9) over the nylon standoffs.
8. Place the 77M01 display board over the insulator and the nylon standoffs.
9. Secure the display board with the following hardware:
   a. Upper left with #6 Hex Nut (Item 4) and #6 star washer (Item 5)
   b. Upper right with #6 hex standoff (Item 11) and #6 lock washer.

CAUTION

In the next step, use a screwdriver narrower than the slotted standoff. A wide screwdriver will crack the meter display and damage it beyond repair.

   c. Lower middle - with slotted standoff (Item 12) and #6 lock washer.
10. Tighten all hardware.
11. Plug the interconnect cable into J150 on the meter display board.
12. Replace the mainboard on the amplifier and reconnect all cables.
13. Install the 75M01 display plate. Secure it at the four points shown in Illustration 1-1 with #6 machine screws (Illustration 4-1, Item 1).
14. Replace the amplifier front panel.

To Remove:

1. Remove the amplifier front panel
2. Remove the display plate by removing four #6 screws from the locations shown in Illustration 1-1.
3. Unplug the 77M01 Display Interconnect Cable (Item 6) from the main board.
4. Remove the following display board hardware:
   a. Upper left with #6 Hex Nut (Item 4) and #6 star washer (Item 5)
   b. Upper right with #6 hex standoff (Item 11) and #6 lock washer.

CAUTION

In the next step, use a screwdriver narrower than the slotted standoff. A wide screwdriver will crack the meter display and damage it beyond repair.

   c. Lower middle - with slotted standoff (Item 12) and #6 lock washer.
5. The display board may now be removed from the nylon standoffs for service.

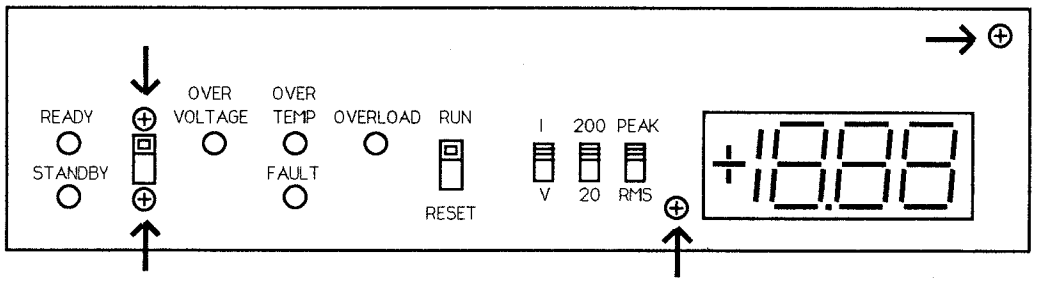


Illustration 4-1 77M01 Mounting Screws

SECTION 2. THEORY OF OPERATION

Refer to schematic J0212-1 Rev. C and the block diagram for the discussion of 77M01 operation.

The 77M01 contains five functional areas:

- Attenuation
- RMS conversion
- Catch-and-Hold
- Display
- Power Supply

2.1. Attenuation

R1 and R2 form an input attenuator to scale the host amplifiers output voltage by a factor of 16.6. This attenuation is not needed in the current mode as the current monitor's output voltage is scaled to a value compatible with the input of the R.M.S. converter, U1. Range attenuation is performed by R3 and R4.

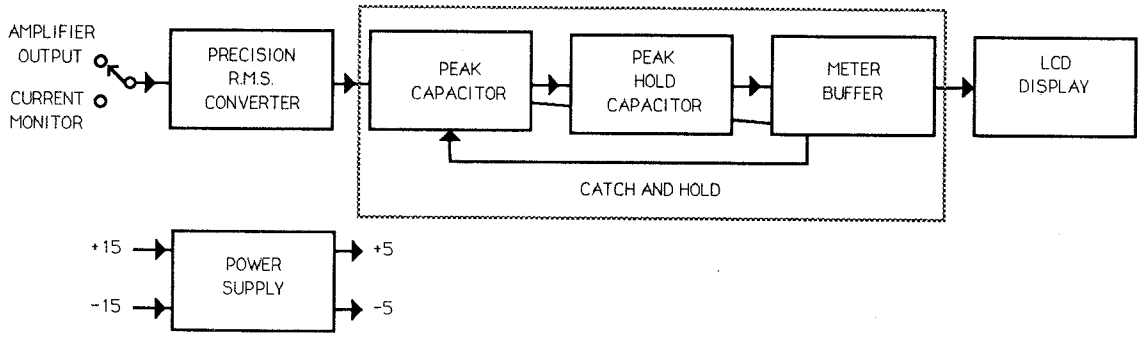
2.2. Conversion

U1 is a precision R.M.S. convertor with a built in reference voltage. The response and conversion characteristics are set by capacitors C2 and C3, In the R.M.S. mode, C3 is the only capacitance in the circuit. When S3 is set to the Peak mode, C2 is placed in series with C3, making the effective capacitance slightly less than the value of C2. Because C2 is considerably smaller than C3, the response of U1 becomes very fast with an output voltage that is representative of the peak value of the input voltage. R5 trims the input offset via R6 while R10 and R9 trim the output offset voltage.

2.3. Catch-and-Hold

The catch-and-hold function begins at U2. U2A compares the input signal with the meter output through R13. Should the output signal be greater than the input signal, D1 conducts. If the opposite is true, Q1 conducts. Q1 charges C5 which is buffered by voltage follower U2B. U2B drives R13 and the input of the LCD display driver. The result is that C5 stores the largest peak value of the input signal.

The catch-and-hold discharge timing circuit consists of Q2, U3A and C4. Hold time is set by R19 and C4. When Q1 charges C5, its collector current triggers Q2 to fully charge C4. During the intervals when D1 is conducting, C4 discharges through R19. When the charge on C4



3.1. Preparation for Testing

Perform these procedures following service to Model 77M01 Digital Panel Meter.

1. Turn off power to the amplifier by setting the main circuit breaker on the back panel down.
2. Remove the front panel of the amplifier and the control panel plate (Illustration 4-1, Item 2).
3. Disconnect loads from the amplifier output terminal and remove connections from the amplifier interlock.

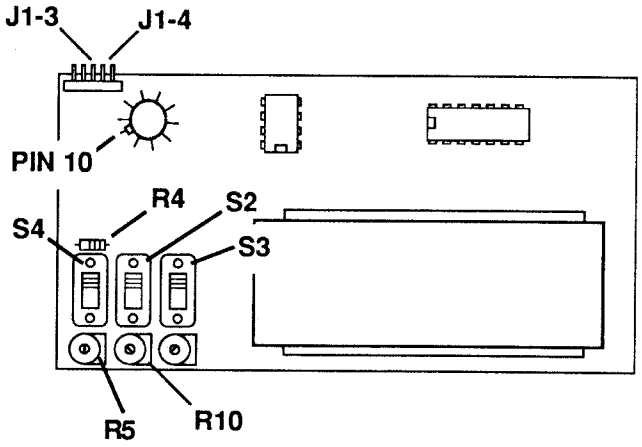
Note: Always test the digital panel meter without loads. Loads connected to the output of the amplifier may distort waveforms and limit the accuracy of calibration.

4. Short the inverting and non-inverting inputs of the amplifier to the input common.
5. Set the controls and switches on the amplifier main board to the following positions:

S501	Down	(standby)
S100	UP	(master)
B5	Left	(constant voltage mode)

3.2. Meter Zero

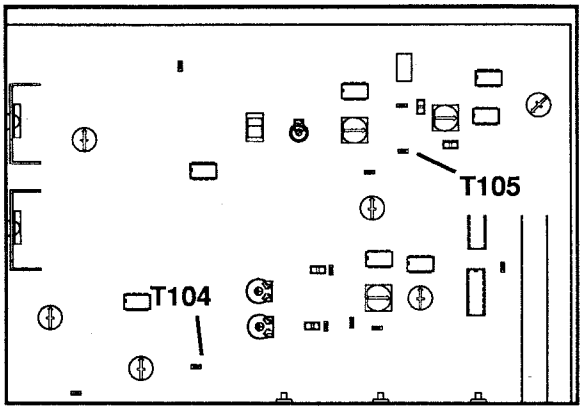
1. Plug the amplifier into the 3 phase AC line and turn on the rear panel circuit breaker.
2. Set S501 Up (to the Ready position).
3. Connect the negative lead of the digital voltmeter (DVM) to J1 pin 3 and the positive lead to J1 pin 4. If there is more than +.003 volts DC present, perform offset adjustments to the amplifier.
4. Set the Meter switches as follows:
   S4 Volts (Down)
   S2 200 (UP)
   S3 Peak (Up)
5. Connect the negative lead of the DVM to the right side of R4 and the positive lead to pin 10 of U1.
6. Set the DVM to read DC volts on the 200 mV range.
7. Adjust R5 on the Digital Panel Meter to get the most negative (or least positive) reading on the DVM.
8. Adjust R10 to zero out any offset voltage remaining on the DVM.



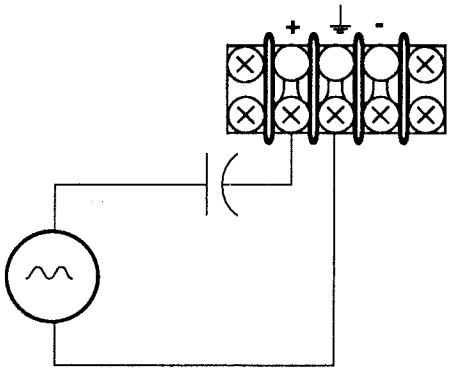
3.3. Calibration

Note: This procedure calibrates the Digital Panel Meter to a known value. The accuracy of this adjustment is proportional to the accuracy of the digital voltmeter measuring the output of the amplifier.

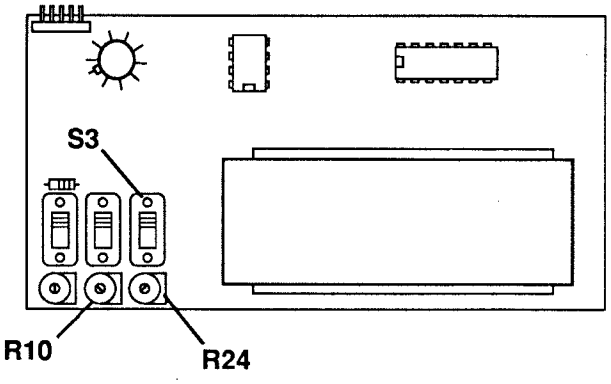
1. Connect the negative lead to the main board ground (T105) and the positive lead to T104 (amplifier output). Set the meter to measure AC volts on the 200 volt range.



2. Connect a 22µF non-polar capacitor in series with the generator output and then to the amplifier input. Set the generator to 100 Hz sine wave. Adjust the level so that the DVM reads 80 VAC RMS (+ 5 volts).



3. Set S3 down (RMS).
4. Adjust R24 until the Digital Panel Meter reads the same as the DVM, (+ 0.1) volts.
5. Set the output voltage of the amplifier to 8.0 VAC (+0.5 VAC) by attenuating the input signal by 20 dB.
6. Adjust R10 until the Digital Panel Meter reads the same as the DVM (+ 0.1) volts.
7. Repeat steps 2 through 6 until the 77M01 agrees with the DVM.



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Continued

8. Set the output voltage of the amplifier to 25.3 VAC (+ 1.6 VAC) (10 dB down from 80 VAC).
9. The Digital Panel Meter must read the same voltage as the DVM (+0.1 VAC).
10. Turn the amplifier off at the back panel circuit breaker.

3.4. Final Procedure

1. Restore the amplifier to its original configuration.
2. Use standard latex paint to seal all adjustment points. This will protect adjustments against vibration or accidental movement.
3. Replace all covers.

SECTION 4. EXPLODED VIEWS AND PARTS LIST

4.1 General Parts Information

This section contains illustrations, parts list, and schematics for the 77M01 meter module. Use this information with the service, repair and adjustment procedures in Section 3.

Mechanical and structural type parts are illustrated and indexed on an exploded view drawing. Electrical and electronic parts are listed and indexed in both the exploded view drawing and the schematic parts lists.

The quantity of each part used in each location is shown for the exploded view parts listing.

4.2 Standard and Special Parts

Many electrical an electronic parts used in the 77M01 are standard items stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard, are actually special. A part ordered from TECHRON will assure a workable replacement. Structural items are available only from TECHRON.

4.3 Ordering Parts

TECHRON, a division of Crown International, supplies parts through the Crown International Parts Department. Replacement parts are obtained from the address below.

When ordering parts, be sure to give the model and serial number and include the part description and Crown Part Number (CPN) from the parts list. Price quotes are available upon request.

4.4 Shipment

Shipment will be made by UPS or best method unless a preferred method is specified.

Shipments are made F.O.B. Elkhart Indiana only. Established accounts will have large orders shipped freight prepaid and billed. All other shipped freight collect.

4.5 Terms

Normal terms are C.O.D., Master Card or Visa unless the order is prepaid. If prepaying please add an amount for the freight charge. $1.60 is average for an order under one pound.

Net 30 day terms apply only to established accounts. Parts prices are subject to change without notice. New parts returned for credit are subject to a 10% restocking charge.

You must receive authorization from the Crown Parts Department before returning parts for credit.

Crown International Parts Department
1718 W. Mishawaka Road
Elkhart, Indiana 46517
(219) 294-8210
TWX 810 294-2160
FAX (219) 294-8329

4.6 Exploded View Parts List

ITEM #	PART #	QTY.	DESCRIPTION
1	C 1954-4	2	6-32 X .25 RDHD PH MSCR
2	F11017J4	1	PLATE, 77M01
3	Q42631-4	1	MOD, 77M01 (A) DISPLAY
4	C 1889-2	1	6 X32 HEX NUT
5	C 1823-1	3	#6 INT.STAR WASHER BLACK
6	H42740-3	1	CABLE, 7700 DISPLAY INTERCONN
	B 5616-6	1.85"	10 COND 24 AWG GRY RIB CBL
	C 6827-7	2	5POS .1"CENTERS #22GA MTA CONN
7	C 6961-4	3	.5 NYLON STANDOFF CBS-TFM-801
8	C 2620-0	3	6-32 X .38 BLACK NYLON MSCR
9	D 6408A3	1	INSULATOR, 7780 DISPLAY BD
10	C 6866-5	1	M5735-H4 3.5 DIGIT LCD 3/4"
11	D 6350-9	1	.413 HEX STANDOFF 6/32
12	D 6379-8	1	7/32 X .413 SLOTTED STANDOFF

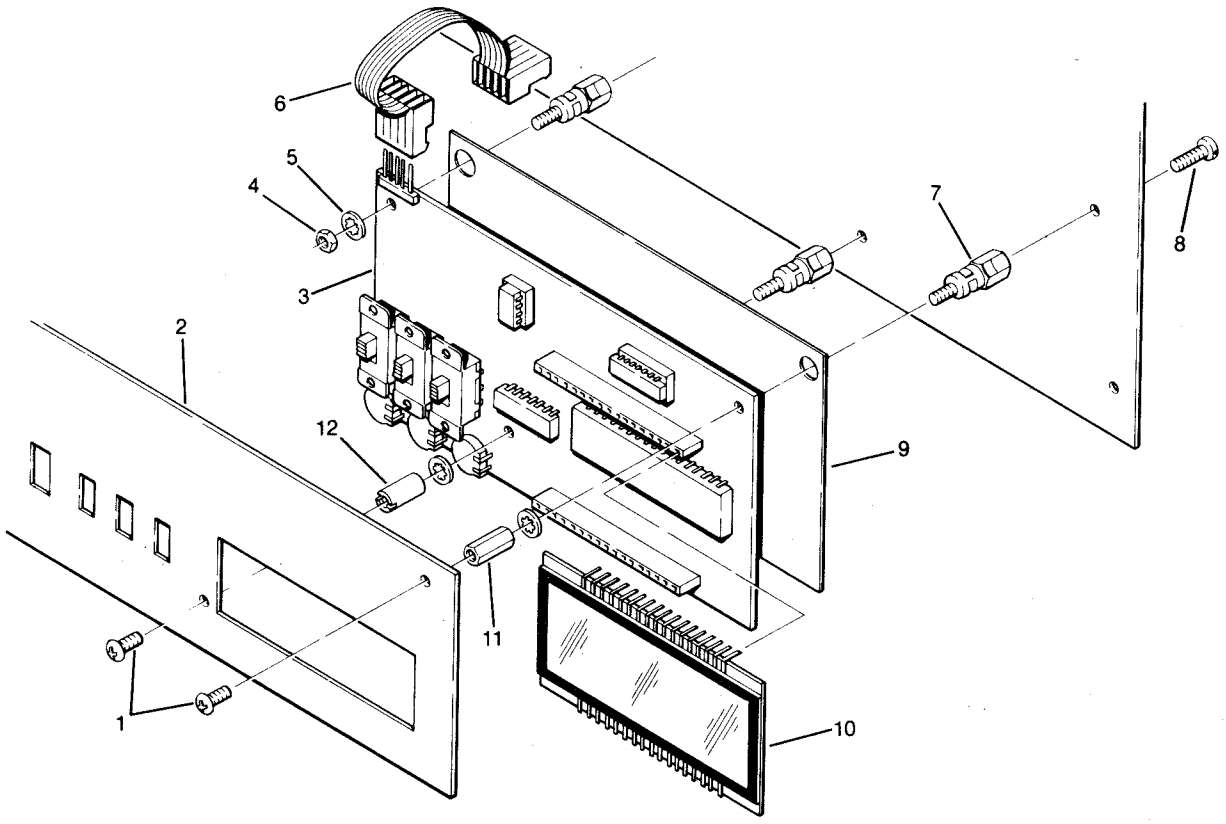


Illustration 4-1 77M01 Exploded View

4.7 Schematic Parts List

LOCATION #	PART #	DESCRIPTION
C1	C 5230-5	0.02MF 50V DISC
C2	C 3411-3	200PF DIPPED SILVER MICA
C3	C 3728-0	10MF 50V VERT
C4	C 7430-9	0.22MF 63V 5% MET POLY BOX
C5	C 7603-1	.47MF 63V 10% MET POLY BOX
C6	C 3410-5	100PF DIPPED SILVER MICA
C7	C 6130-6	0.1MF 50V MONO
C8	C 1751-4	0.01MF500V DISC
C9	C 4404-7	0.047MF250V 5%CARB
C10	C 4404-7	0.047MF250V 5%CARB
C11	C 6130-6	0.1MF 50V MONO
C12	C 6130-6	0.1MF 50V MONO
C13	C 6130-6	0.1MF 50V MONO
C14	C 6130-6	0.1MF 50V MONO
C15	C 6130-6	0.1MF 50V MONO
C17	C 6130-6	0.1MF 50V MONO
C18	C 6130-6	0.1MF 50V MONO
C19	C 6130-6	0.1MF 50V MONO
C20	C 5825-2	470PF MICA - SMALL
D1	C 3181-2	DIODE, 1N4148
D2	C 3181-2	DIODE, 1N4148
D3	C 3181-2	DIODE, 1N4148
D4	C 5082-0	DIODE, 1N4733A 5V ZENER
D5	C 5082-0	DIODE, 1N4733A 5V ZENER
J1	C 6851-7	5POS.1CENTER RT ANGLE MTA HDR
M1	C 6866-5	M5735-H4 3.5 DIGIT LCD 3/4"
Q1	D 2961-7	SEL 2N3859A, SPS8010 NPN
Q2	C 3625-8	2N4125 PNP
R1	C 6482-1	24.9KOHM 1W.5% MF
R2	C 6932-5	1.5 KOHM .25W 1% MF
R3	C 4496-3	9.09KOHM .25W 1% MF
R4	C 4850-1	1.0 KOHM .25W 1 MF
R5	C 5062-2	100KOHM LINEAR TRIMPOT
R6	C 4206-6	100.MOHM .25W 5 COMP
R7	C 5217-2	24. KOHM .25W 5 CF
R8	C 6517-4	24.0 OHM .25W 5% CF
R9	C 5270-1	30. KOHM .25W 5 CF
R10	C 5062-2	100KOHM LINEAR TRIMPOT

LOCATION #	PART #	DESCRIPTION
R12	C 4859-2	10. KOHM .25W 1 MF
R13	C 4859-2	10. KOHM .25W 1 MF
R14	C 4479-9	22.0 OHM .25W 5 CF
R15	C 5170-3	2.2 MOHM .25W 5 CF
R16	C 3939-3	4.7 KOHM .25W 5% CF
R17	C 3302-4	22. KOHM .25W 5% CF
R19	C 3221-6	10. MOHM .25W 5% CF
R20	C 2876-8	1.5 KOHM .25W 5% CF
R21	C 2876-8	1.5 KOHM .25W 5% CF
R22	C 2631-7	10. KOHM .25W 5% CF
R23	C 3198-6	1.0 MOHM .25W 5 CF
R24	C 6346-8	2KOHM HORZ TRIMPOT
R25	C 2627-5	1.0 KOHM .25W 5% CF
R26	C 2883-4	100.KOHM .25W 5% CF25
R27	C 6170-2	560.KOHM .25W 5% CF
R28	C 2883-4	100.KOHM .25W 5% CF25
R29	C 2883-4	100.KOHM .25W 5% CF25
R32	C 2883-4	100.KOHM .25W 5% CF25
R33	C 3198-6	1.0 MOHM .25W 5 CF
S2	C 5080-4	DPDT PC-MNT SLIDE SWITCH
S3	C 5080-4	DPDT PC-MNT SLIDE SWITCH
S4	C 5080-4	DPDT PC-MNT SLIDE SWITCH
U1	C 6867-3	AD536AJH RMS/DC CONVERTER
U2	C 6377-3	LF412A ACN LODRIFT OP AMP
U3	C 4345-2	LM339N VOLTCOMPARATR
U4	C 6868-1	ICL7116CPL 3.5 DIGIT A/D DISHL
U5	C 4833-7	MC14070EXCLV.OR GATE
	C 3450-1	IC SOCKET, 14PIN DIP
	C 3451-9	IC SOCKET, 8PIN DIP 2-640463-3
	C 6883-0	20PIN DIP SOCKET #ICC-120-S-T

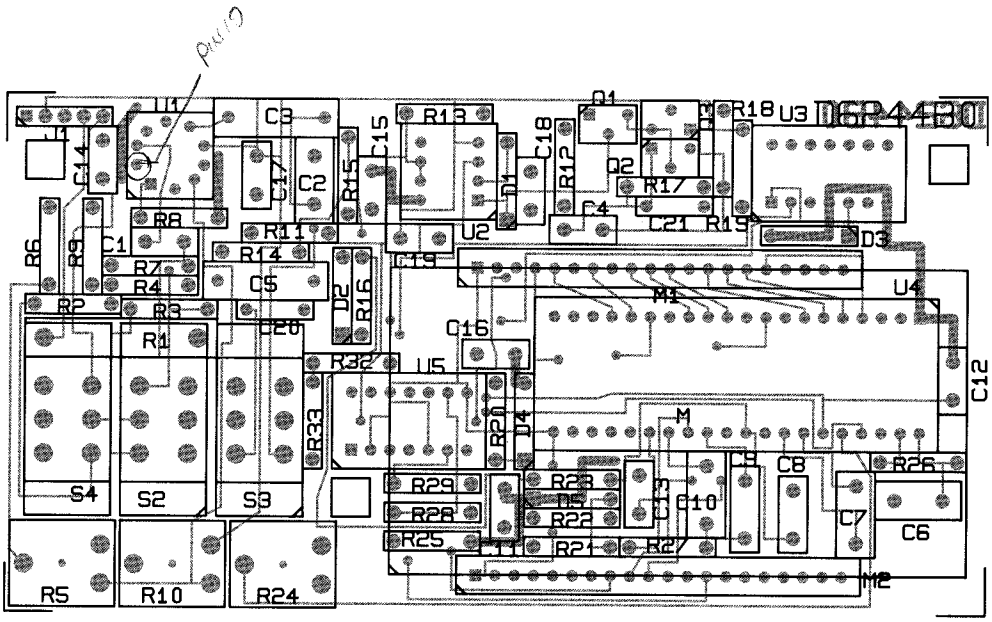
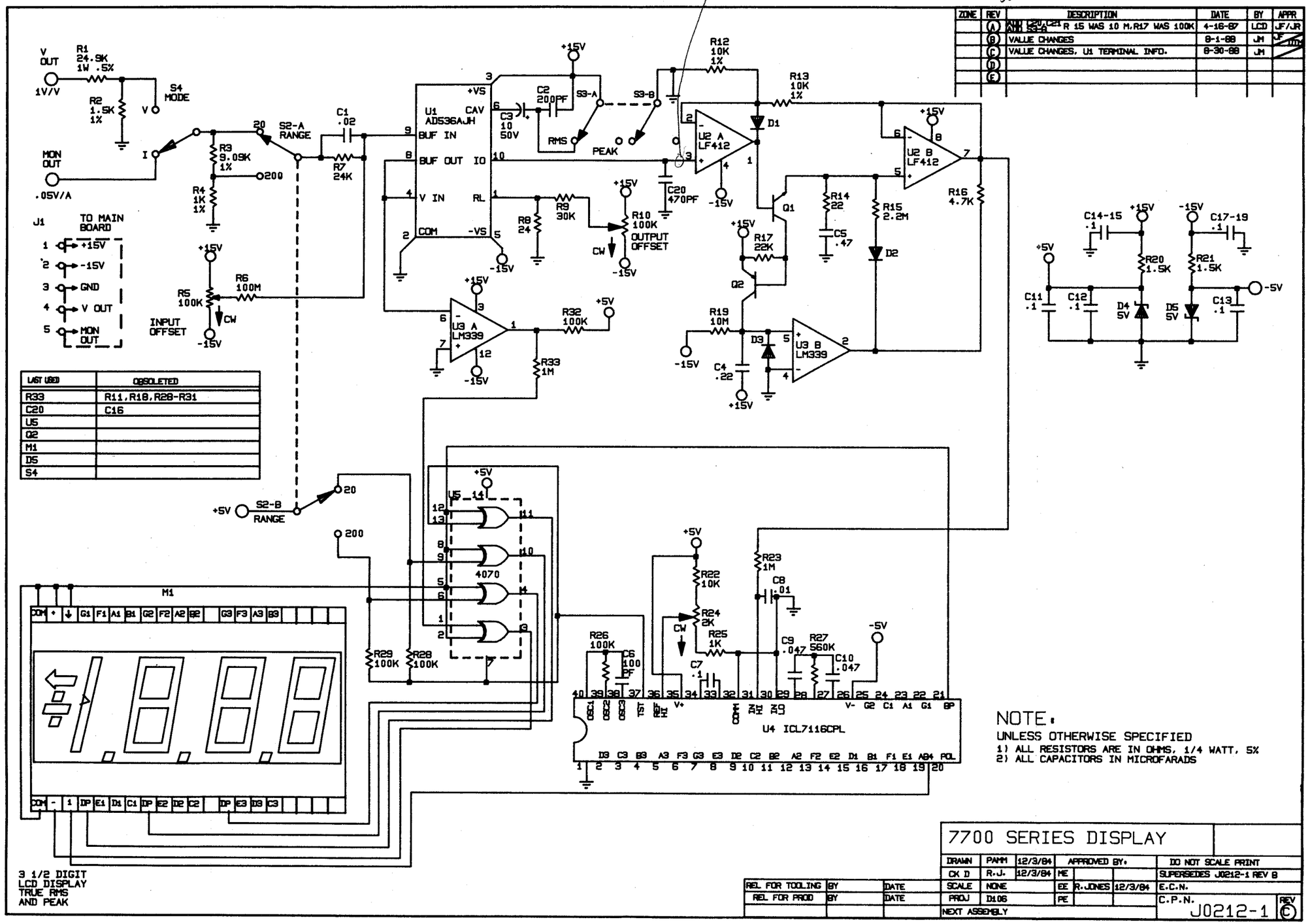


Illustration 4-2 77M01 Circuit Board


TEST POINT TO NULL
R5 (rough setting)
R10 (fine setting)
ZONE | REV | DESCRIPTION | DATE | BY | APPR
A | ADD C20, C21 R 15 WAS 10 M, R17 WAS 100K | 4-16-87 | LCD | JF/JR
B | VALUE CHANGES | 8-1-88 | JM | JF
C | VALUE CHANGES, U1 TERMINAL INFO. | 8-30-88 | JM
V OUT
1V/V
R1 24.9K 1W .5%
R2 1.5K 1%
S4 MODE
MON OUT
.05V/A
R3 9.09K 1%
R4 1K 1%
200
20
S2-A RANGE
C1 .02
R7 24K
J1
TO MAIN BOARD
1 +15V
2 -15V
3 GND
4 V OUT
5 MON OUT
R5 100K
INPUT OFFSET
CW
R6 100M
U1 AD536AJH
+VS
BUF IN
BUF OUT IO
V IN RL
COM -VS
C2 200PF
C3 10 50V
RMS
PEAK
S3-A
S3-B
R8 24
R9 30K
R10 100K OUTPUT OFFSET
C20 470PF
R12 10K 1%
R13 10K 1%
U2 A LF412
U2 B LF412
D1
R14 22
C5 .47
R15 2.2M
D2
R16 4.7K
Q1
Q2
R17 22K
R19 10M
D3
C4 .22
U3 A LM339
U3 B LM339
R32 100K
R33 1M
+15V
-15V
+5V
GND
C14-15 .1
C17-19 .1
R20 1.5K
R21 1.5K
C11 .1
C12 .1
C13 .1
D4 5V
D5 5V
-5V
LAST USED | OBSOLETED
R33 | R11, R18, R28-R31
C20 | C16
U5
Q2
M1
D5
S4
S2-B RANGE
U5 4070
M1
R29 100K
R28 100K
R22 10K
R23 1M
R24 2K
R25 1K
C8 .01
C9 .047
R27 560K
C10 .047
C7 .1
R26 100K
C6 100 PF
U4 ICL7116CPL
3 1/2 DIGIT LCD DISPLAY TRUE RMS AND PEAK
NOTE:
UNLESS OTHERWISE SPECIFIED
1) ALL RESISTORS ARE IN OHMS, 1/4 WATT, 5%
2) ALL CAPACITORS IN MICROFARADS
7700 SERIES DISPLAY
DRAWN PAMM 12/3/84
CK'D R.J. 12/3/84
APPROVED BY:
ME
EE R.JONES 12/3/84
PE
DO NOT SCALE PRINT
SUPERSEDES J0212-1 REV B
E.C.N.
C.P.N. J0212-1 REV C
REL FOR TOOLING BY DATE
REL FOR PROD BY DATE
SCALE NONE
PROJ D106
NEXT ASSEMBLY

TECHRON®

Instruction Sheet

77L01 Installation

Section 1—Introduction

1.1 Purpose

The 77L01 adds gain control and output monitor jacks to a Techron amplifier.

When installed in a Techron amplifier, the three jacks of the 77L01 provide front-panel monitor points of output voltage and current. This gives easy access to information about amplifier output. The voltage monitor is scaled at 1 volt for each 20 volts at the output terminals. The current monitor is scaled at 1 volt for each 20 amps drawn by the load.

Gain (level control) is adjusted by turning a front-mounted potentiometer with a medium flat-blade screwdriver. Turning the potentiometer full counterclockwise sets the amplifier to zero gain. Turning it full clockwise sets the amplifier to maximum gain.

The kit can be mounted in any Techron 7700 family amplifier (except for the TEC 7780RLY and TEC7790RLY).

1.2 Kit Contents

The 77L01 consists of the following items.

- The 77L01 circuit board (see Illustration 1).
- Four phenolic spacers and eight 6–32 x .375 screws (not shown) for mounting the circuit board to the front of the amplifier's main board.

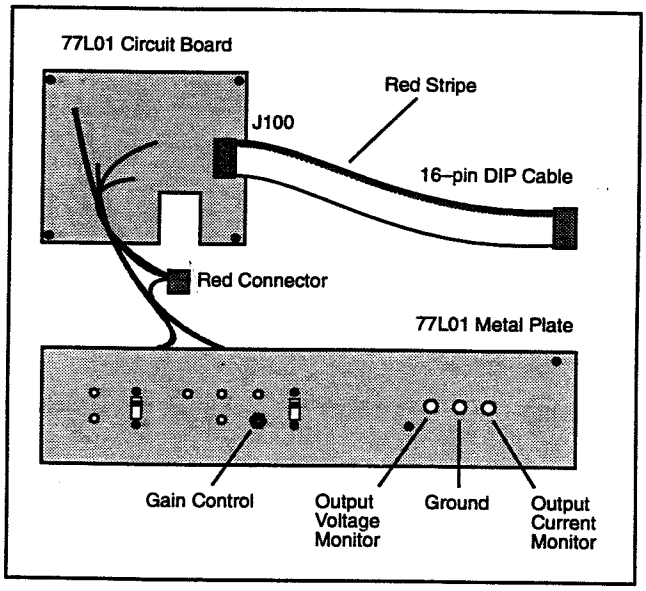


Illustration 1

- A front metal plate that replaces the existing plate on the amplifier.
- The necessary cables and connectors linking the plate and the two circuit boards.

1.3 Tools Required

- Grounding wrist strap
- Medium phillips screwdriver
- Cutting pliers
- Medium flat-blade screwdriver (for gain control)

Section 2—Procedure

1. Switch off power to the amplifier.
2. Since touching an inner conductor of one of the cables or jacks could cause electrostatic damage to a circuit board, properly ground yourself with a wrist strap.
3. Remove the front panel of the amplifier by loosening the four screws.
4. Unplug connectors from J300, J400, and J500. See Illustration 2.

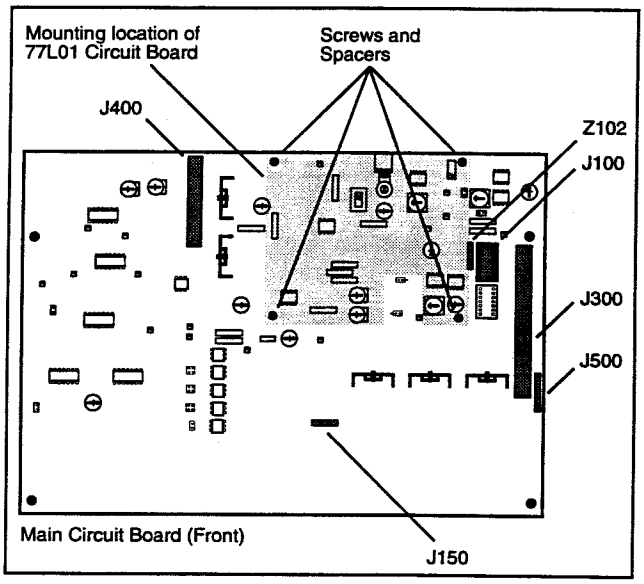


Illustration 2

5. Remove the four phillips-head screws (with washers) from the outer edges of the main circuit board. Remove the board and place on a static-free surface.
6. Remove the six screws that mount the metal plate to the main board. (Refer to Illustration 3 for locations.) Note that the screws for the reset switch have nuts and washers behind the panel. Remove the ground wire if so equipped.
7. Locate Z102 (zero-ohm resistor) next to J100. Clip the leads and remove Z102 from the board.

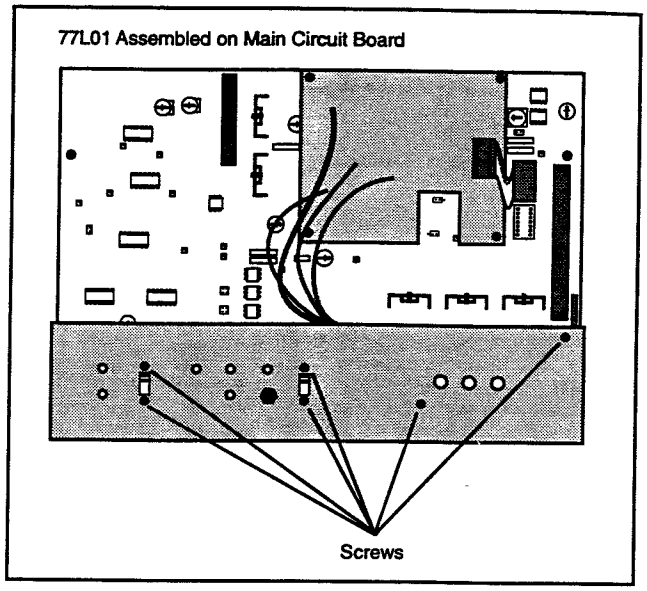


Illustration 3

8. Plug the red connector into J150 so that the three wires in the connector are in the three right-hand pins of J150. Be sure the connector seats fully.
9. Using four of the eight screws provided, attach the four phenolic spacers underneath the corners of the 77L01 circuit board. Using the remaining four screws mount the 77L01 circuit board to the top right of the upper surface of the main circuit board. Refer to Illustrations 2 and 3.
10. Fit the 16–pin DIP cable provided between J100 on the main board and J100 on the 77L01 board. Orient the cable so that the red striped wire is to the top of each connector. Be sure the connector seats fully.
11. Mount the 77L01 metal plate on the main circuit board using the hardware removed in Step 6.
12. Reinstall the main circuit board on the amplifier. Be sure that connectors J400, J100, J300, J500 seat fully.
13. Reinstall the front panel of the amplifier.

*

THERMOTRON 8403 -

I. TOOLS NEEDED

A. HAND TOOLS

Phillips screwdriver
~~.125" Flat blade screwdriver~~
~~.250" Flat blade screwdriver~~
~~.250" nut driver~~
.500" nut driver or wrench
Soldering iron

B. TEST EQUIPMENT

15 Mhz scope
~~IMA~~
ACVM with 20-20khz bandpass filter
2,4,8 ohm non-reactive load
DVM or VOM
Signal generator

II. CONSUMABLE MATERIALS LIST

~~S 2217-8 Blue Loctite~~
S 3793-7 1.0 ~~IN~~ Lime protect tape
S 2162-6 Type 340 ~~Heat~~ sink compound (White)

None

III. REFERANCE DOCUMENTS

A. SCHEMATICS

J0065-3 Thermotron 75A12

B. BILL OF MATERIALS

M42901-5 Thermotron conversion parts

C. CHECKLISTS
TO 75 AVL procedure.

D. T 0112-2 75D02 Procedures.

IV. INSTALLATION PROCEDURE

1. Add a 75C01 dual fan option.

2. Rewire the BNC connector. Clip the shield off at the outer insulation. Solder the black wire to the ground (outer) terminal of the BNC.

3. Add a 75D02 screw terminal output option.

4. Wire the 7560s AC mains for 240 volt operation.

5. From the 24 volt side (red/white wire) of relay K1 connect an 8.0" blue/white #22 wire and route to J3F-6.

6. From the ground side (yellow/white wire) of relay K1, connect an 8.0" green/white wire and route to J3F-5.

7. Add a tested 75A12 with the following modifications.

8. Gain pot R516 removed and a 6.8k ohm 1/4 watt resistor added.

9. R520 is 110k ohms.
R521 is 40.2k ohms.
R522 is 732k ohms.
R* is 30k ohms.

10. C513 is removed and jumpered.

11. Change front panel parts using items in M42901-5 parts list.
NOTE: Thermotron does not get end bars for logo strip access door.

12. Install a tested 75M01 meter option with Meter Display Plate from M42901-5 parts list.

13. Install a Q41480-2 power supply board with Q405 changed to MPS A06.

V. TEST PROCEDURE

Connect a 1 khz sine wave to J1. Test for full power and limiting into 2,4, and 8 ohms.

2. Test and adjust the meter for proper operation.

3. Sweep the input from 5 hz to 5 khz. Check for smooth bandpass and smooth rolloff with -3 db points at 5 hz and 5 khz.

4. Connect a volt meter to J3 as follows:

Red lead to pin 6.
Black lead to pin 5.

Force the unit into standby. The voltage should be 22 to 24 volts dc in standby and less than 1 volt when the unit is in operation.

VI. PACKING PROCEDURE

CHECKLIST FOR THERMOTRON SERIAL NUMBER _____

1. DUAL FANS INSTALLED IV-1 _____
2. BNC WIRED TO THERMOTRON SPEC IV-2 _____
3. AC MAINS WIRED FOR 240 IV-4 _____
4. 75D02 ADDED IV-3 _____
5. INTERLOCK WIRING ADDED IV-5 - IV-6 _____
6. INSTALL MODIFIED 75A12 IV-7 to IV-10 _____
7. CHANGE FRONT PANEL PARTS IV-11 _____
8. INSTALL 75M01 IV 12 _____
9. Q 41480-2 POWER SUPPLY BOARD INSTALLED IV-13 _____
10. FULL POWER TEST V-1 _____
11. BANDPASS FILTER TESTED V-3 _____
12. METER SET UP AND TESTED V-2 _____
13. ADDED INTERLOCK WIRING TESTED V-4 _____
14. COORDINATORS INSPECTION _____
15. DEPARTMENT SUPERVISORS REVIEW _____

To: Marc Miller

CROWN
1718 WEST MISHAWAKA ROAD
ELKHART, INDIANA 46514
(219) 294-5571
TWX 810-294-2160

SUBJECT: Thermotron Power Supply

DATE: 12-7-82

Reply Message

FOLD—

MESSAGE

Use the old power supply board in Thermotron 7560,.

This is the supply built on P 9570 A 4

REPLY

SIGNED D. L. Morgan

DATE OF REPLY

REPLY TO

FOLD—

SIGNED

SEND WHITE AND PINK COPIES WITH CARBONS INTACT. PINK COPY IS RETURNED WITH REPLY.

DETACH AND FILE FOR FOLLOW-UP

0 M 42901-5 8402 Conversion parts

1		F _____ S.S.	Thermo tron 8403 F.P	1
	2	A _____	7560 F.P. art	ϕ
	2	F10231A1	7560 F.P. overlay	1
	2	T _____	Thermotron gray paint standard.	ϕ
1		M20238K	M600 Lower extrusion	1
1		D 5880K2	M600 Upper extrusion	1
1		D 5884K4	M600 knobs	2
1		F10254K1	M600 Handles	2
1		F10255K8	Handle spacer, Long	2
1		F10256K6	" " , Short	2
1		F10241K8	Meter display plate	1
1		Q41480-2	Power supply module	1
1		C 3528-4	MPS AØ6	1
1		H _____	Thermo tron wires	1
	2	B 1393-6	Red-White #22	8.0
	2	B 1395-4	White-Yellow #22	8.00

MODEL 8403 PAGE 1 of 1

ASM # # Thermotron 8403 wires

#	CPN	DESCRIPTION	TERMINAL	CUT LENGTH	STRIP LENGTH	QTY
1	B 1393-6	Red - white # 22		8.0	.25 x .25	1
Total Usage	B 1393-6	Red - white # 22		8.0		
1	B 1395-4	White - Yellow #22		8.0	.25 x .25	1
Total USAGE	B 1395-4	White - Yellow #22		8.0		

C.P.N. J0593-4 REV (C)

E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVALS CK	ME	EE	PE
	-	(A)	ADDED ADDITIONAL CIRCUITRY.	05-12-95	TAP				RM
T95-0233	-	(B)	DELETED W2 AND W3. ADDED R111, R112, NOTE 3 AND DASHED LINES. CHANGED TITLE.	07-10-95	TAP				RM
T95-0359	C4	(C)	R108 WAS: 976 IS: 1.1K	11-29-95	CRB				

R111
JUMPER

33KHZ LOW PASS BESSEL FILTER CIRCUIT

33KHZ FILTER IN J100-1

R100 10K 1%
R101 8.66K 1%
R103 8.66K 1%
C100 220PF
R102 27.4K 1%
U100B
MC33078P
C101 100PF
R104 9.53K 1%
C102 220PF
+15V C103 0.1
U100A MC33078P
-15V C104 0.1
R110 JUMPER
+15V C105 0.1
J5
5K POT NOT ON BOARD
J6
J7
U101A MC33078P
-15V C106 0.1
J100-2 FILTER OUT

J100-3
J100-4
J100-5
J100-6
J100-7
J100-9 -15V
J100-10 +15V
J100-11
J100-12
J100-13
J100-14
J100-15
J100-16

+15V C107 0.1
J8
U102A MC33078P
R105 75
J3 CURRENT MONITOR
-15V C108 0.1

J9
R107 20K
R108 1.1K 1%
R109 50
R106 75
J4 VOLTAGE MONITOR
U102B MC33078P

+15V
D001 1N4004
U001A LM393
K001 RELAY
-15V
J100-8
R005 7.5M
C006 0.01

U101B MC33078P
U001B LM393

J1
J2
COMPENSATION NETWORK
CONNECT IN PLACE OF C103 ON 7780 MAIN BOARD
R001 100K
R002 330K
R003 1M
R004 3.3M
C001 10PF
C002 33PF
C003 100PF
C004 330PF
C005 1000PF
W1

LAST USED	OBSOLETED
C108	C007-C99
D001	
J150	J8-J99, J101-J149
K001	
R111	R006-R99
TP2	
U102	U002-U99
W1	

JUL 24 1997

NOTES :

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. CIRCUITRY IN DOTTED LINES USED IN 77L01.

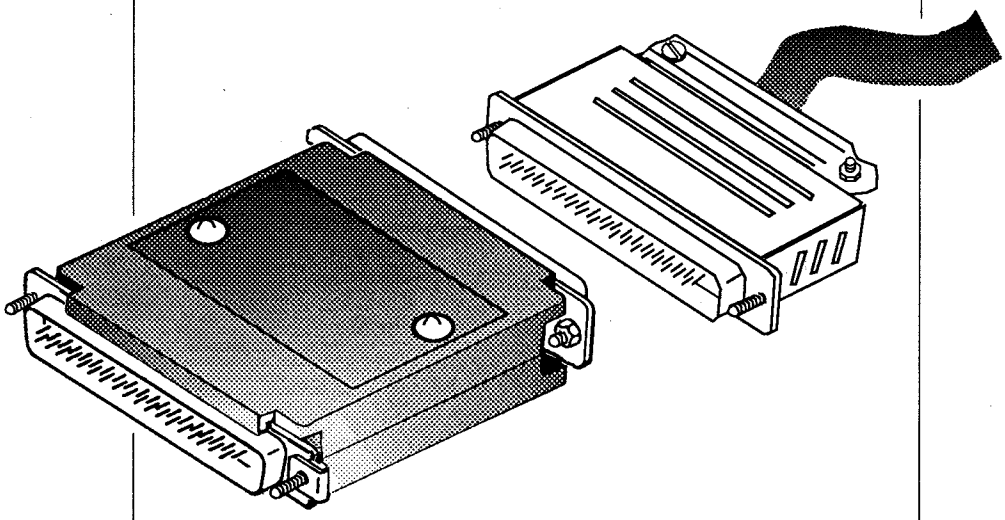
CROWN INTERNATIONAL, INC.
1718 WEST MISHAWAKA ROAD ELKHART, IN. 46517 PHONE (219) 294-8000

SCM; ISA RLY ADD-ON/77L01

PRINTS TO	
G	

DRAWN	CRB	1-15-93	APPROVED BY :		DO NOT SCALE PRINT
CHECKED			ME		SUPERSEDES J0593-4 REV B
SCALE	NONE		EE		E.C.N.
PROJ #	T198		PE		C.P.N. J0593-4 REV (C)
NEXT ASSEMBLY					

Using OPTOC–1



TECHRON®

a Division of Crown® International Incorporated
1718 W. Mishawaka Road, Elkhart, Indiana 46517
(219) 294-8300
K80429–2

Understanding OPTOC–1

The term, "OPTOC", refers to an optical interlock and coupling device used with the Techron 7700 family of amplifiers configured in series. OPTOC–1 optically couples the interlock signals between the 7700 amplifiers with a shared load. OPTOC–1 is used to isolate the interlock systems of all amplifiers above ground potential.

OPTOC–1 consists of a small, printed circuit board and 2, 37–pin connectors that route the input and output signals.

Use OPTOC–1 whenever the COMMON or SAMPLED COMMON output from a 7700 amplifier connects to the output of another 7700 series amplifier. When using OPTOC–1, note that all amplifiers shut down when one is not functioning.

OPTOC–1 isolates the following signals to the originating amplifier:

- ❑ INTERLOCK COMMON
- ❑ +15V
- ❑ INTERLOCK
- ❑ AMP READY

OPTOC–1 passes the following signals without isolation:

- ❑ AMP OUT
- ❑ SAMPLED COMMON
- ❑ +1
- ❑ –1

WARNING
Damage WILL occur to the Techron 7700 family of amplifiers if OPTOC–1 is not installed when it is needed. Using OPTOC–1 when it is not needed does not impair correct operation of the amplifier.

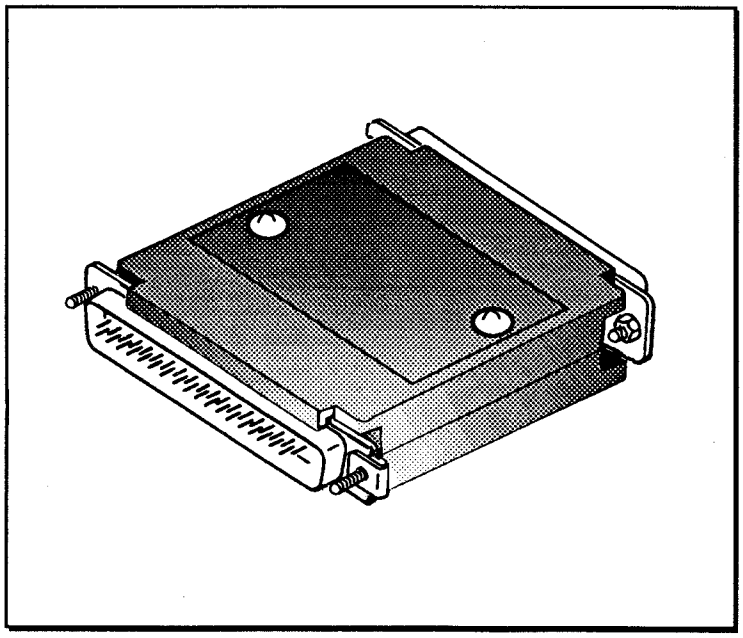


Figure 1 OPTOC–1 Optical Isolator, Interlock, and Coupling Device

Installing OPTOC–1

1. Attach the male connector of OPTOC–1 to the back of the slave amplifier.
2. Attach a cable to the female connector to daisy chain to the other OPTOC–1s and the master amplifier.
3. On the back of the amplifier (see Figure 2), remove the 2.7Ω 2w resistor connected between Sampled Common and Chassis Ground. Do so for all amplifiers except the master amplifier. (This resistor functions as a "fuse" for circulating ground currents that may be present due to incorrect wiring.)
4. Verify that the master amplifier is switched to "master" and the other amplifiers are in the "slave" mode. The 16–pin DIP connector, J300, should be properly configured for whatever current summing your system needs.

Other Installation Notes

- ❑ You should review the illustrations and text in the section, *Using OPTOC–1*, for more details about wiring considerations.
- ❑ If you have three or more amplifiers in a series stack, you must enable jumper Z505 (model 7780 revision C and above) on the main board of each amplifier in the stack. (Model and revision number information is located on the Techron label on the back of the amplifier.) This jumper disables an amplifier in the event of a long duration overload. Locate this jumper on the lower left side of the main board (see Figure 3). If this circuit is not enabled, serious damage to the amplifiers may occur from the possible thermal overload of a slave amplifier.
- ❑ If you use a cable between OPTOC–1 and the slave amplifier instead of a direct, physical connection, it may be good practice to connect all pins of the 37–pin connector. In this manner you ensure compatibility should engineering changes occur in future versions of OPTOC–1.

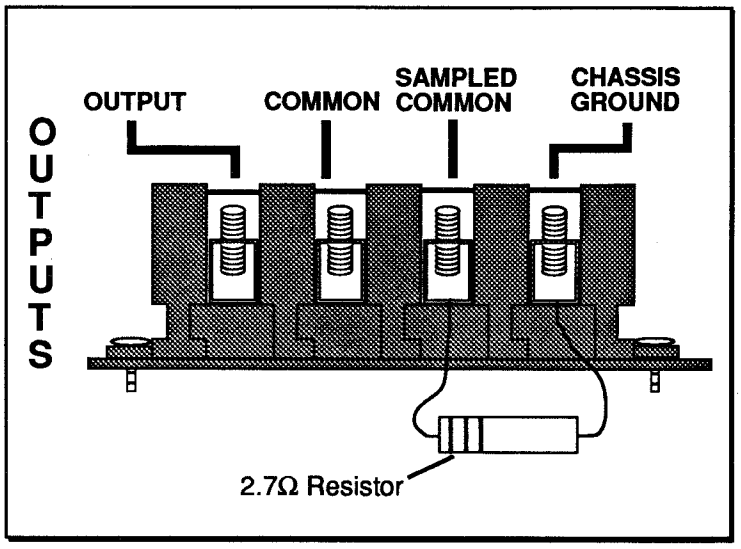


Figure 2 Removing the 2.7Ω Resistor

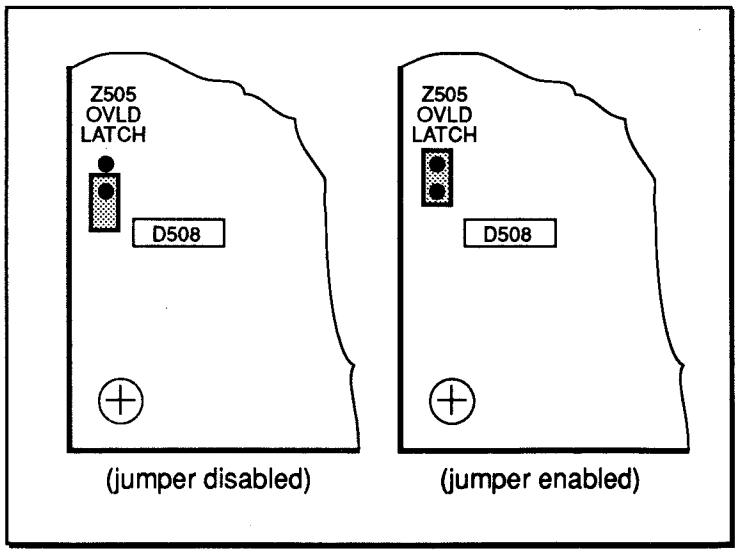


Figure 3 Enabling Jumper Z505

Using OPTOC–1

Limitations

- When configuring the Techron 7700 family of amplifiers in series, the maximum number of amplifiers, relative to ground, is five. This series stacking limit is a result of the maximum voltage potential standoff limit within each amplifier. If you need more than five amplifiers in series, contact Techron Application Engineering to discuss your application.
- The common mode range of the +1 and –1 inputs is one output level. In other words, when you connect more than two levels of series-configured, 7700 amplifiers, you must use an amplifier's output with lower potential (nearer the master) to reference the input signal of the next level amplifier. See Figure 4.
- Every amplifier exhibits a measurable amount of rise time, or signal response time delay, as well as phase delay. When configured in a series stack, phase delay is cumulative. However, Techron 7700 amplifiers configured in a push-pull series do not exhibit as much phase delay as stacked series configurations.

Application Examples

A. Figures 4 and 5 show an acceptable number of levels of amplifiers. While Figure 4 shows all amplifiers in a true stacked series configuration, Figure 5 uses one less OPTOC–1, showing amplifiers 1–3 in stacked series and amplifiers 4 and 5 in stacked series. Amplifiers 4 and 5 are in push-pull series mode with the master.

B. Figure 4 shows that, when stacked in series, an amplifier needs to be referenced to the output of the amplifier immediately preceding it. Amplifiers 2, 3, and 4 are referencing slaves because they provide a reference for the amplifier immediately after (above) them.

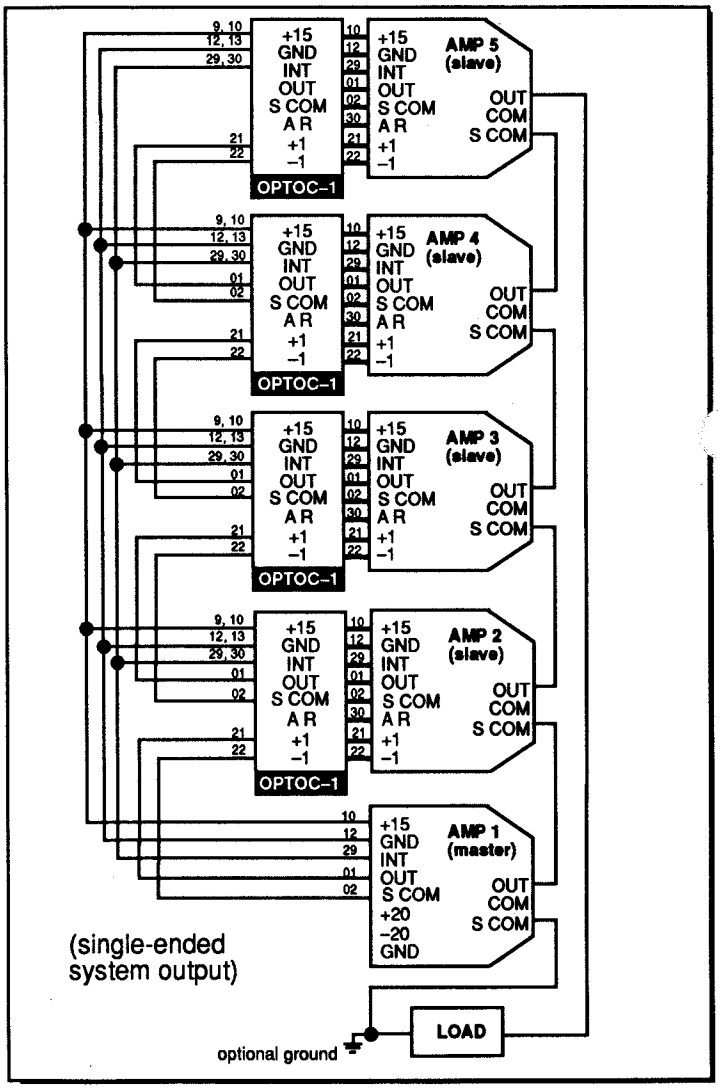


Figure 4 Series Stack Using OPTOC–1

Amplifier 4 in Figure 5 is referenced to amplifier 1, because it is in a push-pull series configuration with the master amplifier (amplifier 1). Amplifier 5 is referenced to amplifier 4. Amplifiers 4 and 5 are out of phase with the master amplifier. The configuration shown in Figure 5 is generally more desirable than the Figure 4 configuration because of cost (one less OPTOC–1) and better phase response (through more direct signal coupling).

C. With multiple amplifier systems, overall system phase response will be improved if the signal path is kept as short as possible. Figures 6a and 6b are simplified representations of Figure 4 and Figure 5 respectively. Figure 6c shows the optimum signal path for a 2X4 (2 parallel, 4 series amplifiers) system configuration.

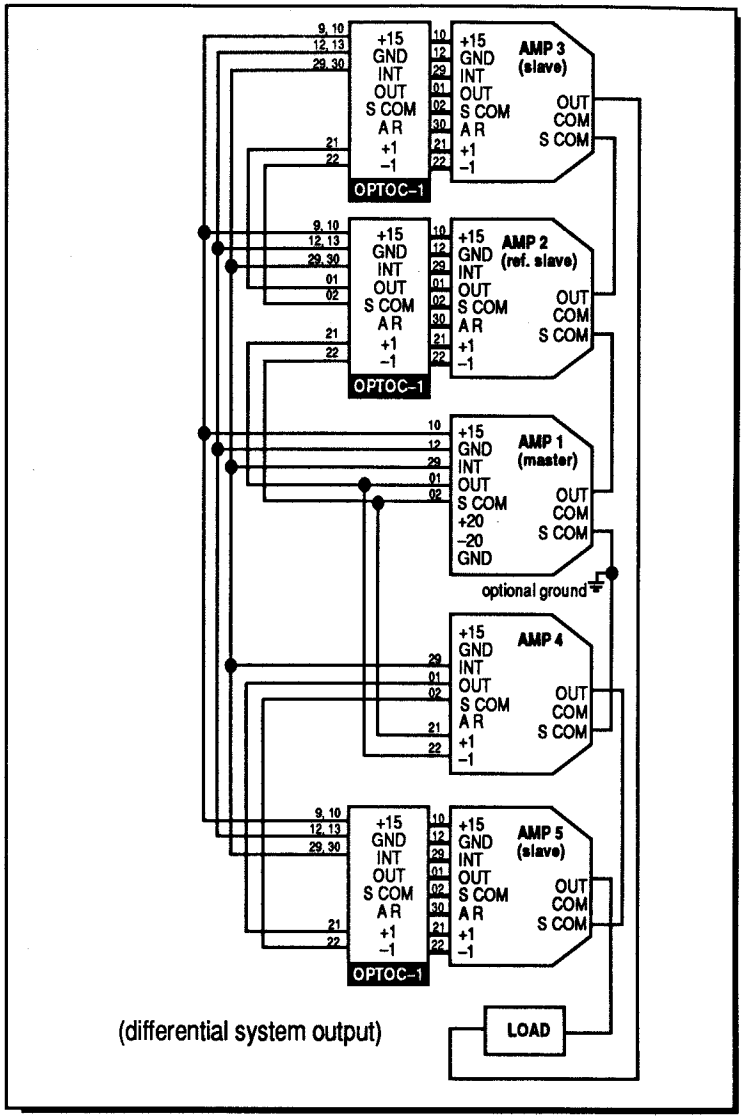


Figure 5 Alternate Series Stack Using OPTOC–1

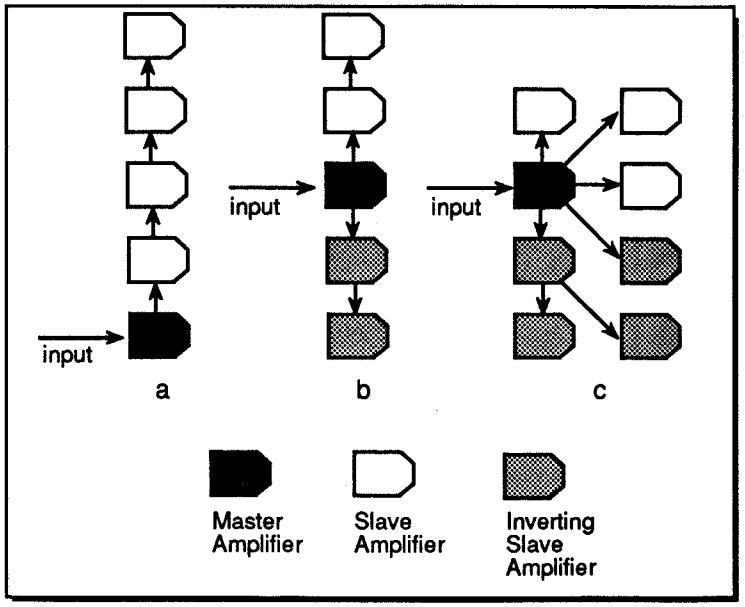


Figure 6 Signal Path Summary

Schematic

Figure 7 represents a schematic of OPTOC–1 circuitry. You may find this drawing helpful as you configure your system. Parts information associated with this schematic follows this section under the heading, *Servicing OPTOC–1.*

The interconnect shown on the right side of the schematic connects to a slave amplifier (or reference slave). The interconnect on the left side is to daisy chain to other OPTOC–1s and the master amplifier.

You may be confused by the multiple pin numbers for the +15, Interlock, and Interlock Common signals on the left side of the schematic. You saw these same pin numbers earlier in the application examples. The dual pin numbers for each of the three signals were created in OPTOC–1 so that you would not have to solder two wires together before placing the single, joined wire into one pin connector.

Under normal circumstances, pins 9, 13, and 30 on the J3 connector perform other functions for the 7700 family of amplifiers. Used with OPTOC–1, however, these pin numbers join pins 10, 12 and 29 respectively so that you can run one wire in and another wire out. The "official" pin numbers for the +15, Interlock and Interlock Common signals are 10, 29, and 12 respectively.

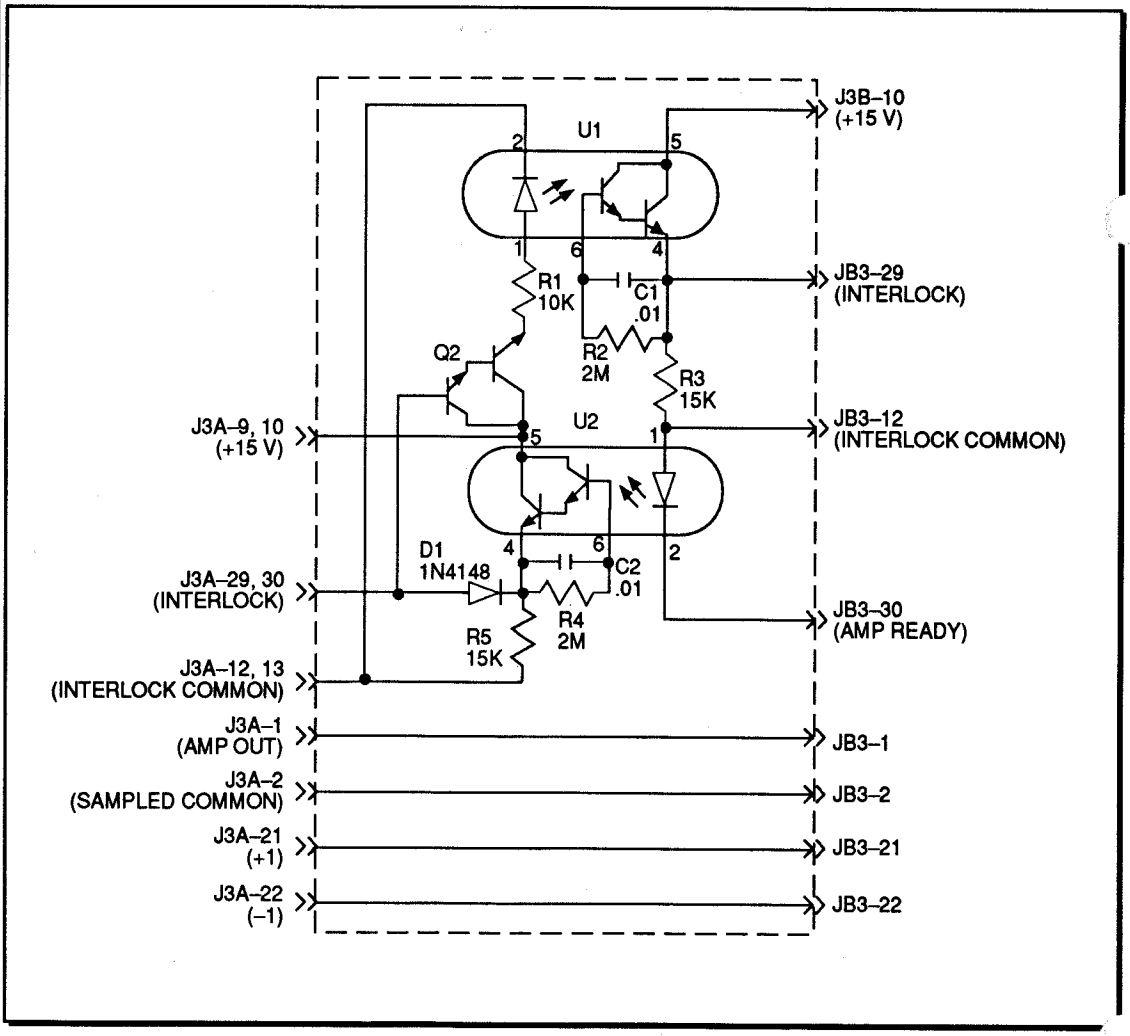


Figure 7 OPTOC–1 Schematic

Servicing OPTOC–1

Ordering Parts

Techron, a division of Crown International, supplies parts through the Crown International Parts Department. Obtain replacement parts using the address below.

When ordering parts, be sure to give the model and serial number and include the part description and Crown Part Number (CPN) from the parts list. Price quotes are available upon request.

We ship by UPS or best method unless you specify a preferred method. Shipments are made F.O.B. Elkhart, Indiana only. We ship large orders to established accounts with freight prepaid and billed. All others orders are shipped freight collect.

Unless your order is prepaid, normal terms are C.O.D., MasterCard, or Visa®. If prepaying please add an amount for the freight charge. $1.60 is average for an order under one pound. Net 30–day terms apply only to established accounts. Parts prices are subject to change without notice. New parts returned for credit are subject to a 10% restocking charge.

You must receive authorization from the Crown Parts Department before returning parts for credit.

Crown International Parts Department

1718 W. Mishawaka Road

Elkhart, Indiana 46517

(219) 294-8210

FAX (219) 294-8329

Parts List—Circuit Board

The following parts list describes components on the OPTOC–1 circuit board. Use the schematic on the previous page to identify the parts. Main components of OPTOC–1 are illustrated on the next page.

I.D.	PART#	DESCRIPTION
C1	C-6806-1	.01 u l00V AXIAL
C2	C-6806-1	.01 u l00V AXIAL
D1	C-3181-2	IN4148
J3A	C-6969-7	DC37P D-SUB
J3B	C-7717-9	DCE37S D-SUB
Q2	C-7685-8	MPSA13 DARLINGTON TRANSITOR
R1	C 2631-7	10k Ω 1/4W 5%
R2	C-3199-4	2m Ω 1/4W 5%
R3	C-2632-5	l5k Ω 1/4W 5%
R4	C-3199-4	2m Ω 1/4W 5%
R5	C-2632-5	l5k Ω 1/4W 5%
U1	C-7684-1	H11G3 OPTO DARLINGTON
U2	C-7684-1	H11G3 OPTO DARLINGTON

Parts List and Exploded View

ITEM#	PART#	QTY.	DESCRIPTION
1	D-7065-2	2	COVER,OPTO INTERLOCK
2	C-7721-1	2	SCREW 6-20 X 7/16 7YP.25
3	D-7064-5	1	BOARD
4	C 7074-5	2	SCRLOK W/.312 THD LG #205818-2
4	C 7231-1	2	#4 SCREW RETAINER
5	C 6969-7	1	CONNECTOR DC37P
6	C 7717-9	1	37 PIN D-SUB SOCKET SOLDER CUP
7	C 7717-9	1	DCE37S D-SUB
8	C 6968-9	1	CONNECTOR COVER
9	C 7231-1	2	MALE SCREW RETAINERS
N/A	D 7075-1	1	LABEL, TECHRON SERIAL/MODEL

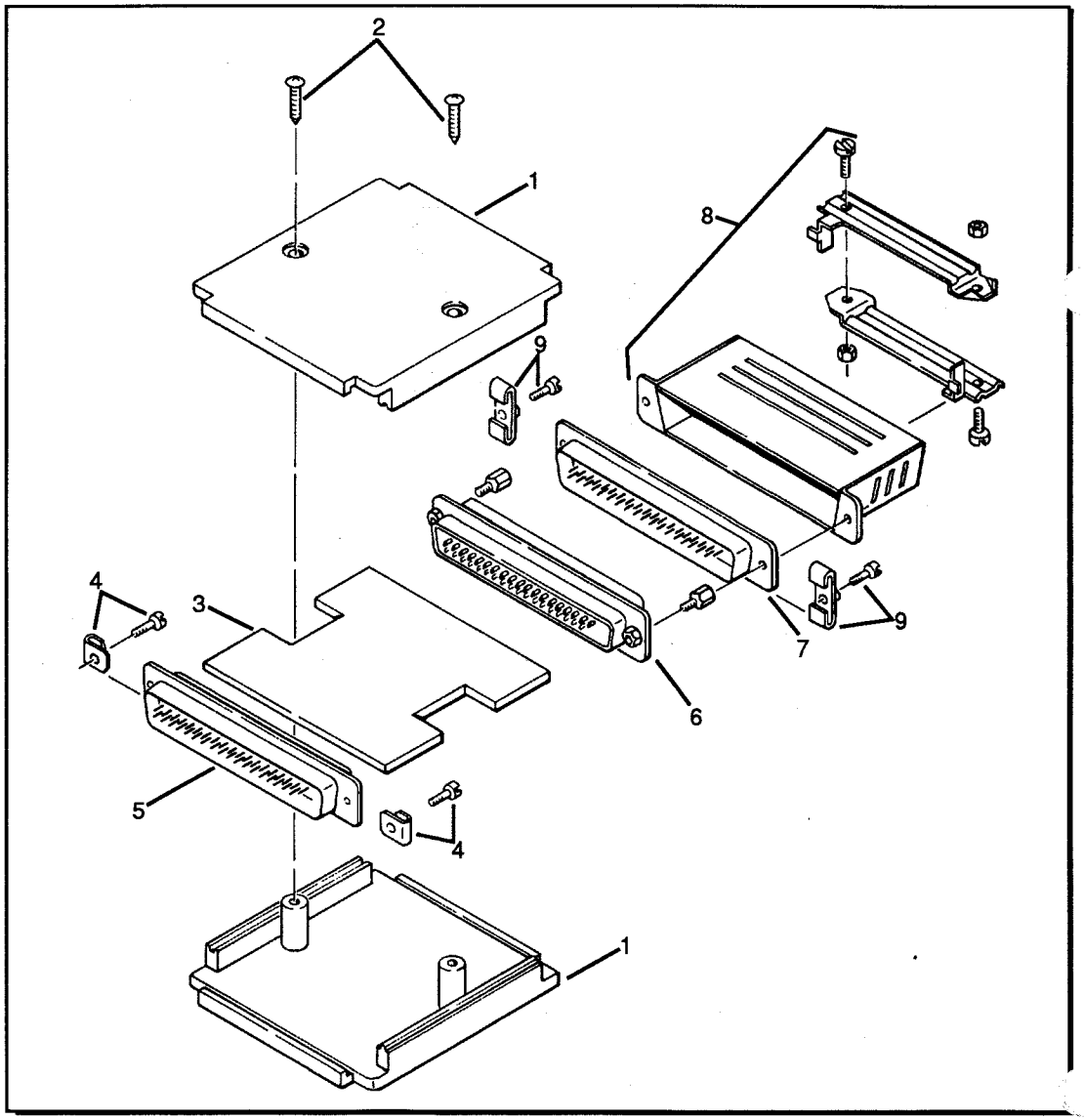


Figure 8 OPTOC–1 Exploded View

FAIRCHILD SEMICONDUCTOR®

September 2007

74AC04, 74ACT04 Hex Inverter

Features

- I_{CC} reduced by 50% on 74AC only
- Outputs source/sink 24mA
- ACT04 has TTL-compatible inputs

General Description

The AC/ACT04 contains six inverters.

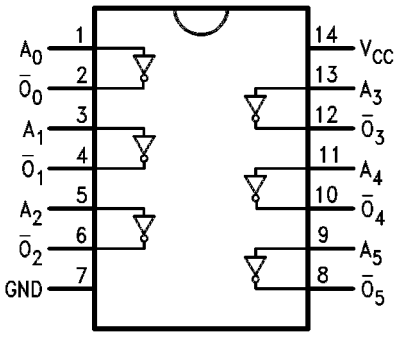
Ordering Information

Order Number	Package Number	Package Description
74AC04SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74AC04SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC04MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC04PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT04SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74ACT04MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT04PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering code. (PC not available in Tape and Reel.)

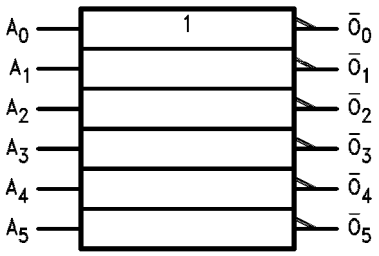
All packages are lead free per JEDEC: J-STD-020B standard.

Connection Diagram



Logic Symbol

IEEE/IEC



Pin Description

Pin Names	Description
A_n	Inputs
$\overline{O}_n$	Outputs

FACT™ is a trademark of Fairchild Semiconductor Corporation.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5V to +7.0V
I_{IK}	DC Input Diode Current	
	$V_I = –0.5V$	–20mA
	$V_I = V_{CC} + 0.5V$	+20mA
V_I	DC Input Voltage	–0.5V to V_{CC} + 0.5V
I_{OK}	DC Output Diode Current	
	$V_O = –0.5V$	–20mA
	$V_O = V_{CC} + 0.5V$	+20mA
V_O	DC Output Voltage	–0.5V to V_{CC} + 0.5V
I_O	DC Output Source or Sink Current	±50mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current per Output Pin	±50mA
T_{STG}	Storage Temperature	–65°C to +150°C
T_J	Junction Temperature	
	PDIP	140°C

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	
	AC	2.0V to 6.0V
	ACT	4.5V to 5.5V
V_I	Input Voltage	0V to V_{CC}
V_O	Output Voltage	0V to V_{CC}
T_A	Operating Temperature	–40°C to +85°C
$\Delta V / \Delta t$	Minimum Input Edge Rate, AC Devices:	125mV/ns
	V_{IN} from 30% to 70% of V_{CC}, V_{CC} @ 3.3V, 4.5V, 5.5V	
$\Delta V / \Delta t$	Minimum Input Edge Rate, ACT Devices:	125mV/ns
	V_{IN} from 0.8V to 2.0V, V_{CC} @ 4.5V, 5.5V	

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = +25°C	T_A = –40°C to +85°C		Units
				Typ.	Guaranteed Limits		
V_{IH}	Minimum HIGH Level Input Voltage	3.0	V_{OUT} = 0.1V or V_{CC} – 0.1V	1.5	2.1	2.1	V
		4.5		2.25	3.15	3.15	
		5.5		2.75	3.85	3.85	
V_{IL}	Maximum LOW Level Input Voltage	3.0	V_{OUT} = 0.1V or V_{CC} – 0.1V	1.5	0.9	0.9	V
		4.5		2.25	1.35	1.35	
		5.5		2.75	1.65	1.65	
V_{OH}	Minimum HIGH Level Output Voltage	3.0	I_{OUT} = –50µA	2.99	2.9	2.9	V
		4.5		4.49	4.4	4.4	
		5.5		5.49	5.4	5.4	
		3.0	V_{IN} = V_{IL} or V_{IH}: I_{OH} = –12mA		2.56	2.46	
		4.5	I_{OH} = –24mA		3.86	3.76	
		5.5	I_{OH} = –24mA(1)		4.86	4.76	
V_{OL}	Maximum LOW Level Output Voltage	3.0	I_{OUT} = 50µA	0.002	0.1	0.1	V
		4.5		0.001	0.1	0.1	
		5.5		0.001	0.1	0.1	
		3.0	V_{IN} = V_{IL} or V_{IH} I_{OL}= 12mA		0.36	0.44	
		4.5	I_{OL} = 24mA		0.36	0.44	
		5.5	I_{OL} = 24mA(1)		0.36	0.44	
I_{IN}(3)	Maximum Input Leakage Current	5.5	V_I = V_{CC}, GND		±0.1	±1.0	µA
I_{OLD}	Minimum Dynamic Output Current(2)	5.5	V_{OLD} = 1.65V Max.			75	mA
I_{OHD}		5.5	V_{OHD} = 3.85V Min.			–75	mA
I_{CC}(3)	Maximum Quiescent Supply Current	5.5	V_{IN} = V_{CC} or GND		2.0	20.0	µA

Notes:

1. All outputs loaded; thresholds on input associated with output under test.
2. Maximum test duration 2.0ms, one output loaded at a time.
3. I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.

DC Electrical Characteristics for ACT

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = +25°C	T_A = –40°C to +85°C		Units
				Typ.	Guaranteed Limits		
V_{IH}	Minimum HIGH Level Input Voltage	4.5	V_{OUT} = 0.1V or V_{CC} – 0.1V	1.5	2.0	2.0	V
		5.5		1.5	2.0	2.0	
V_{IL}	Maximum LOW Level Input Voltage	4.5	V_{OUT} = 0.1V or V_{CC} – 0.1V	1.5	0.8	0.8	V
		5.5		1.5	0.8	0.8	
V_{OH}	Minimum HIGH Level Output Voltage	4.5	I_{OUT} = –50µA	4.49	4.4	4.4	V
		5.5		5.49	5.4	5.4	
		4.5	V_{IN} = V_{IL} or V_{IH}: I_{OH} = –24mA		3.86	3.76	
		5.5	I_{OH} = –24mA(4)		4.86	4.76	
V_{OL}	Maximum LOW Level Output Voltage	4.5	I_{OUT} = 50µA	0.001	0.1	0.1	V
		5.5		0.001	0.1	0.1	
		4.5	V_{IN} = V_{IL} or V_{IH}: I_{OL}= 24mA		0.36	0.44	
		5.5	I_{OL}= 24mA(4)		0.36	0.44	
I_{IN}	Maximum Input Leakage Current	5.5	V_I = V_{CC}, GND		±0.1	±1.0	µA
I_{CCT}	Maximum I_{CC}/Input	5.5	V_I = V_{CC} – 2.1V	0.6		1.5	mA
I_{OLD}	Minimum Dynamic Output Current(5)	5.5	V_{OLD} = 1.65V Max.			75	mA
I_{OHD}		5.5	V_{OHD} = 3.85V Min.			–75	mA
I_{CC}	Maximum Quiescent Supply Current	5.5	V_{IN} = V_{CC} or GND		4.0	40.0	µA

Notes:

4. All outputs loaded; thresholds on input associated with output under test.

5. Maximum test duration 2.0ms, one output loaded at a time.

AC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)[6]	T_A = +25°C, C_L = 50pF			T_A = –40°C to +85°C, C_L = 50pF		Units
			Min.	Typ.	Max.	Min.	Max.	
t_{PLH}	Propagation Delay	3.3	1.5	4.5	9.0	1.0	10.0	ns
		5.0	1.5	4.0	7.0	1.0	7.5	
t_{PHL}	Propagation Delay	3.3	1.5	4.5	8.5	1.0	9.5	ns
		5.0	1.5	3.5	6.5	1.0	7.0	

Note:

6. Voltage range 3.3 is 3.3V ± 0.3V. Voltage range 5.0 is 5.0V ± 0.5V.

AC Electrical Characteristics for ACT

Symbol	Parameter	V_{CC} (V)[7]	T_A = +25°C, C_L = 50pF			T_A = –40°C to +85°C, C_L = 50pF		Units
			Min.	Typ.	Max.	Min.	Max.	
t_{PLH}	Propagation Delay	5.0	1.0	6.0	8.5	1.0	9.0	ns
t_{PHL}	Propagation Delay	5.0	1.0	5.5	8.0	1.0	8.5	ns

Note:

7. Voltage range 5.0 is 5.0V ± 0.5V.

Capacitance

Symbol	Parameter	Conditions	Typ.	Units
C_{IN}	Input Capacitance	V_{CC} = OPEN	4.5	pF
V_{CC}	Power Dissipation Capacitance	V_{CC} = 5.0V	30.0	pF

Physical Dimensions

Dimensions are in millimeters unless otherwise noted.

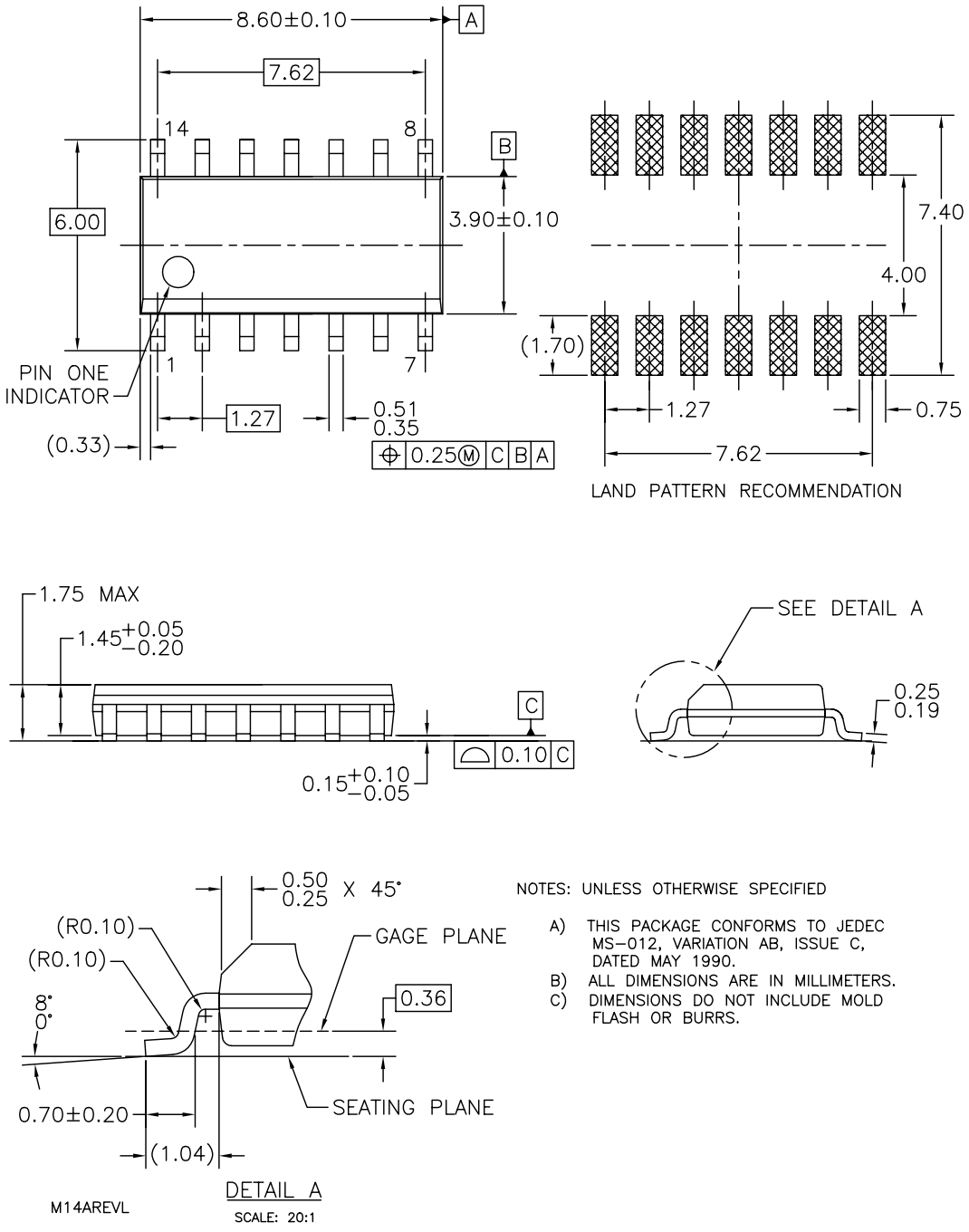
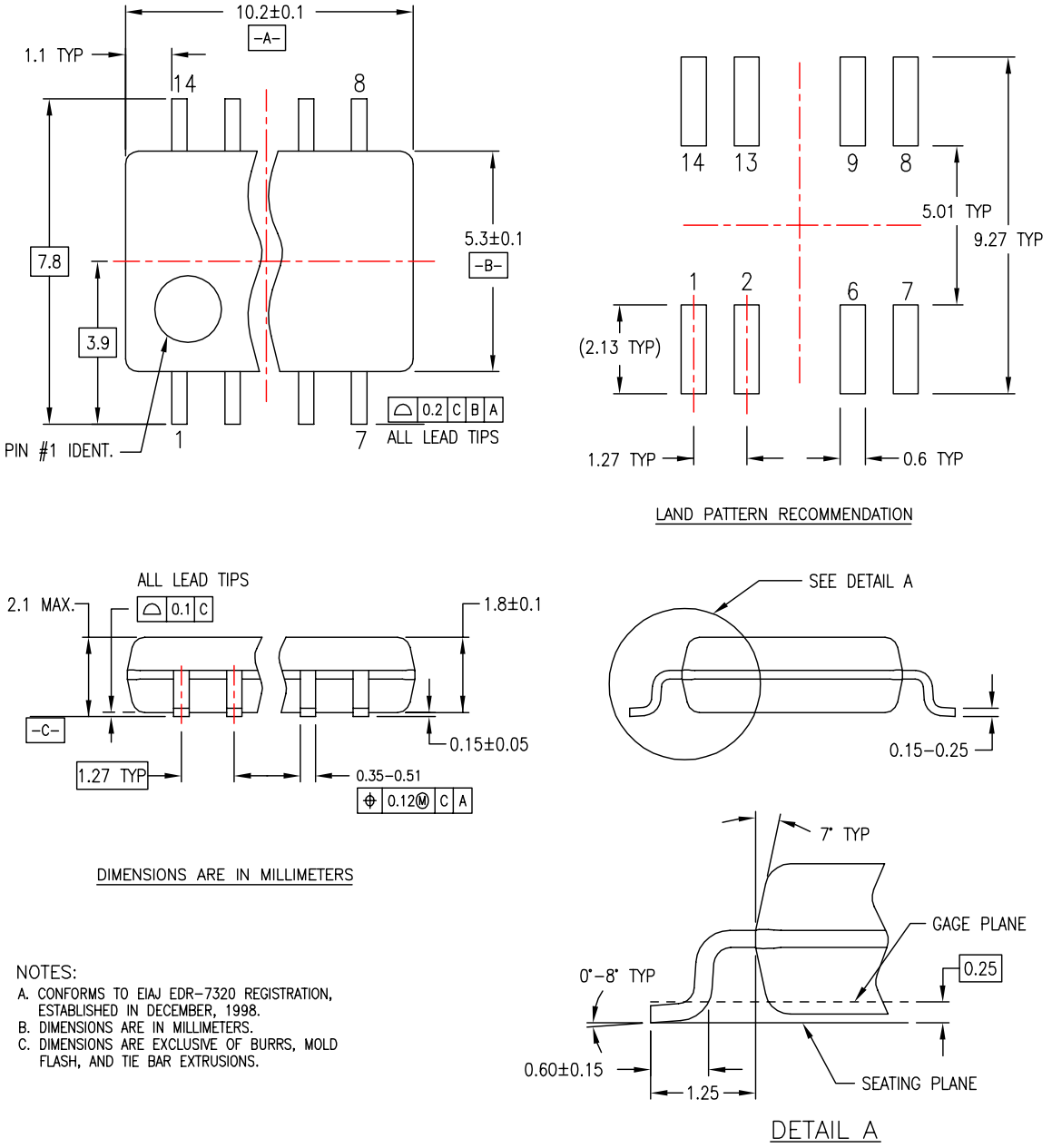


Figure 1. 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M14A

Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.



NOTES:

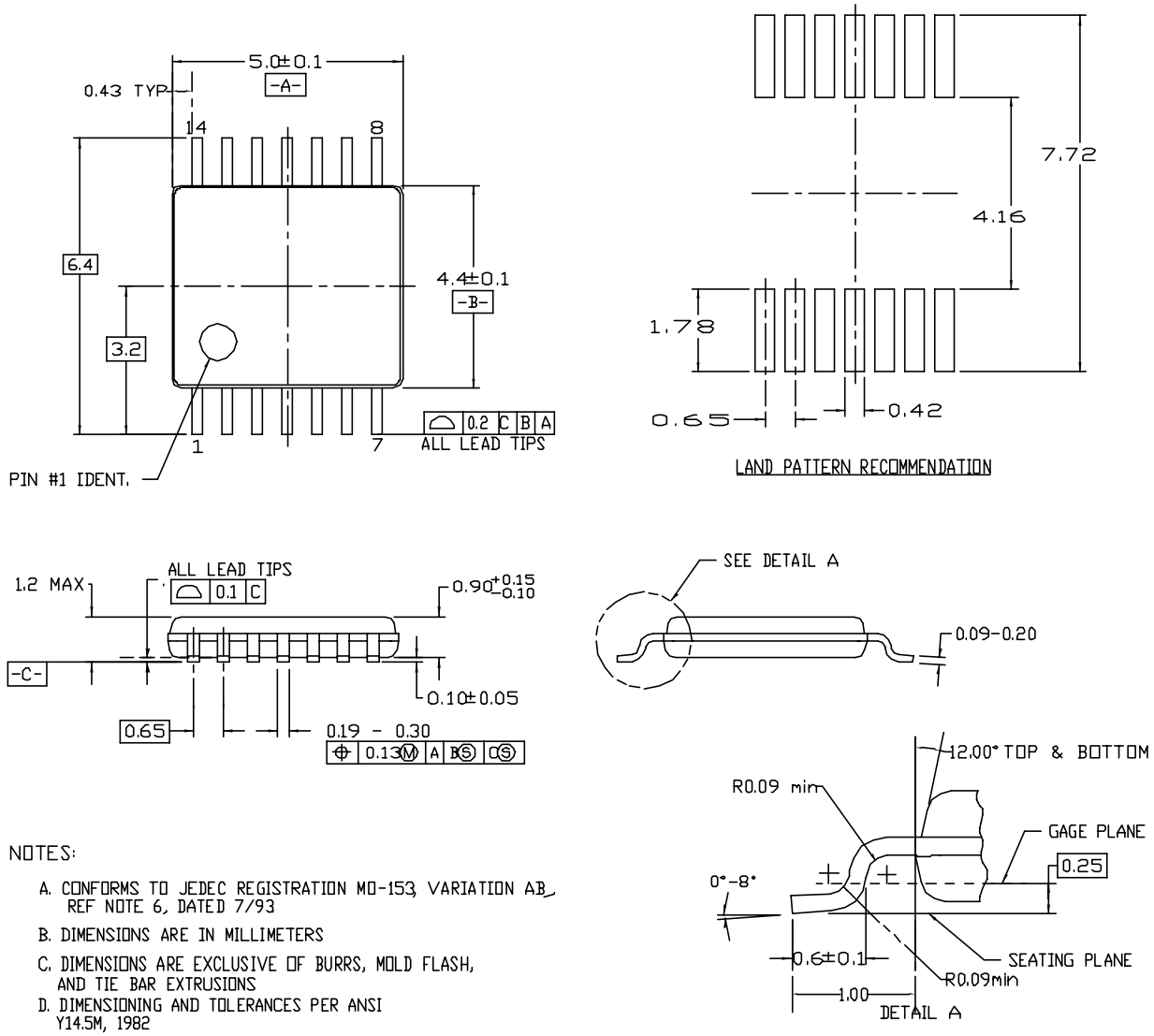
A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DREVC

Figure 2. 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D

Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.



NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATED 7/93

B. DIMENSIONS ARE IN MILLIMETERS

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS

D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1982

MTC14revD

Figure 3. 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC14

Physical Dimensions (Continued)

Dimensions are in inches (millimeters) unless otherwise noted.

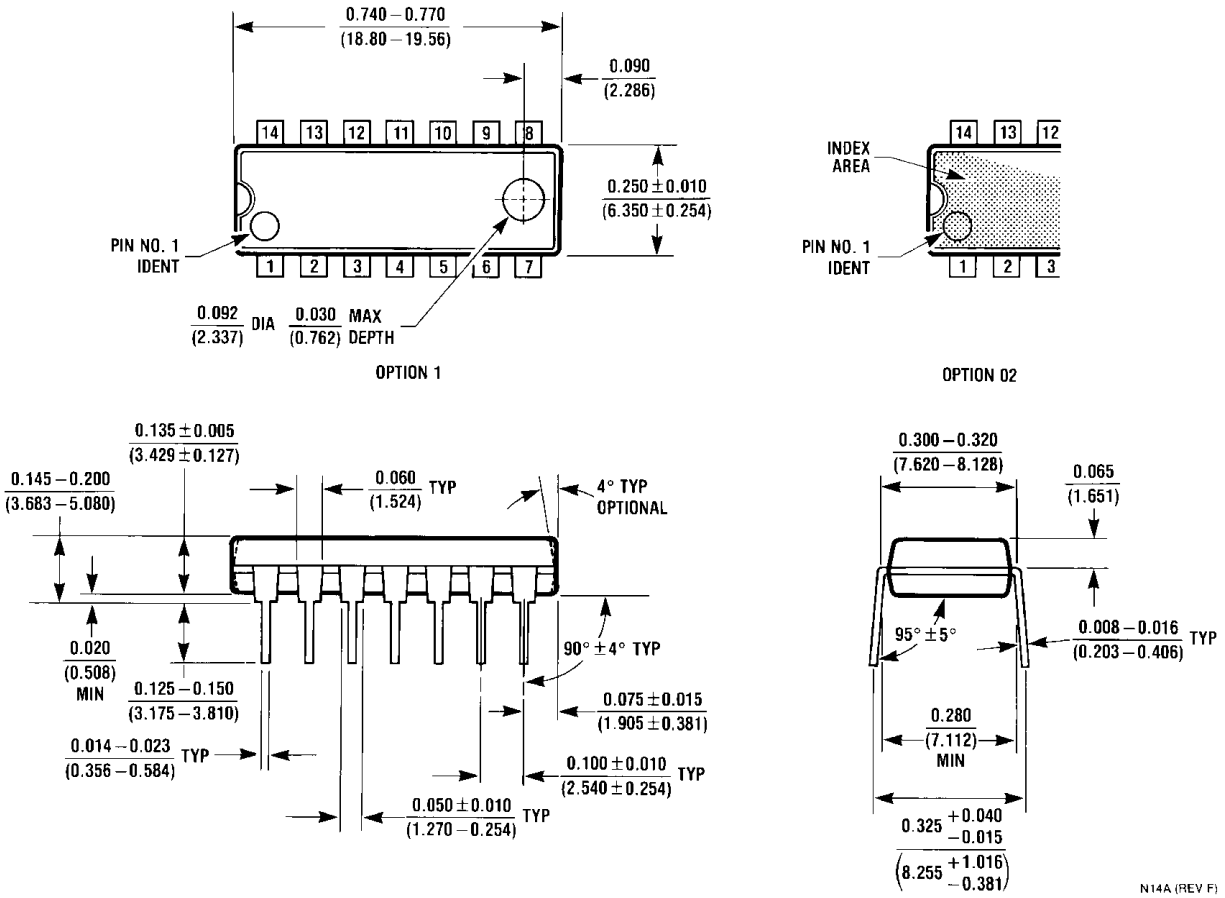


Figure 4. 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N14A

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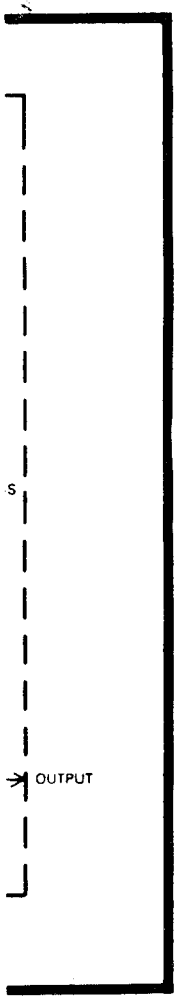
Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I31



5.3 Filter Input Module (75A09)

The filter input module is designed for band limiting the input signal.

- 30K balanced differential input
- Front panel gain control
- Filter network (3 pole Butterworth) providing the following switch selectable functions:

  High pass filter (30Hz)
  Band pass filter (30Hz-15KHz)
  Low pass filter (15KHz)
  Flat

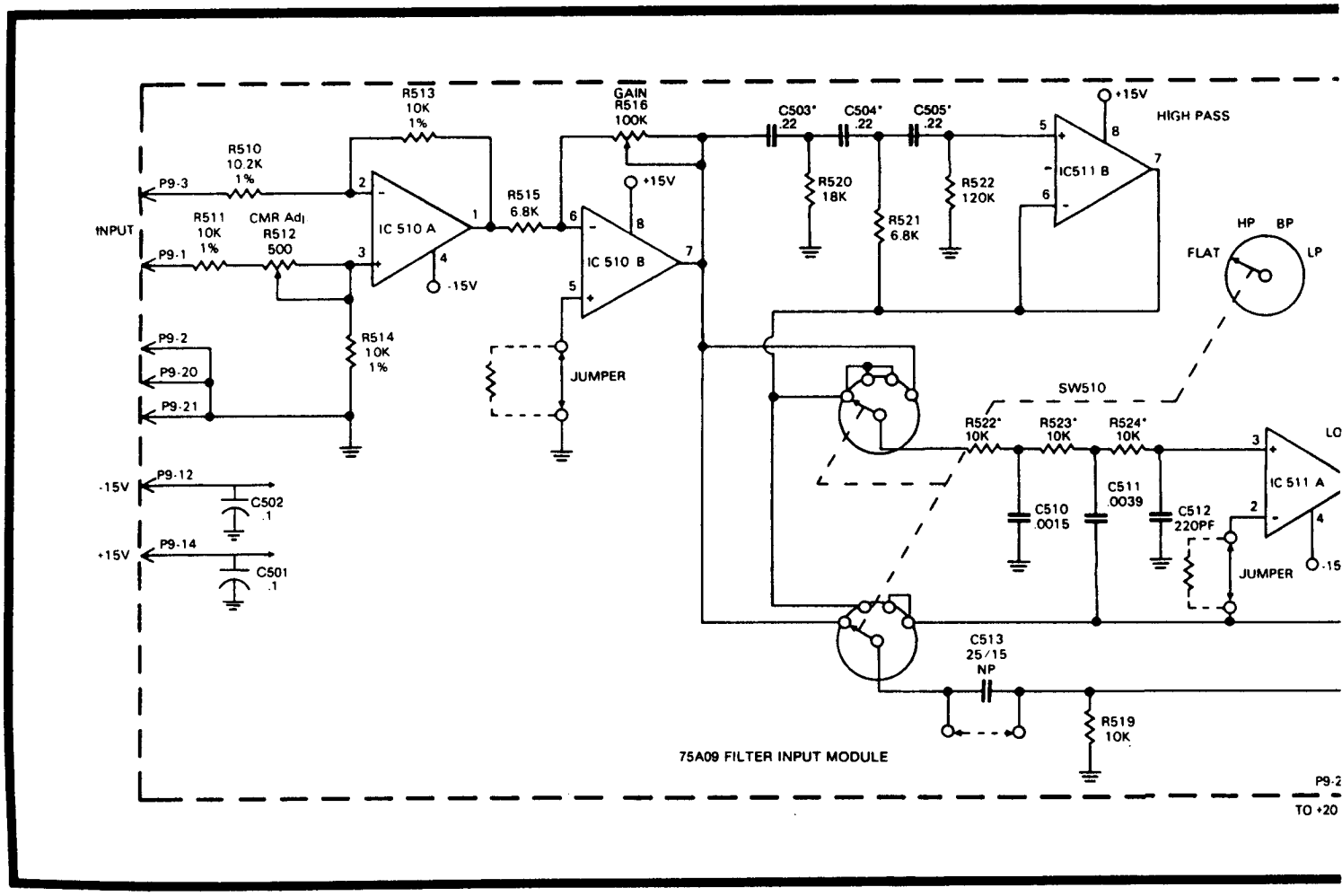
- Directions are provided for changing the filter frequencies.

Circuit Description

A balanced input is provided by one-half of a 4558 operational amplifier providing unity gain. R512 provides common mode rejection adjustment for this stage. The other half of the 4558 provides driving power for the 3 pole Butterworth filters. R516 controls the gain of this stage and is located on the front panel of the module. Again a 4558 makes up the two filter sections whose operation is switch-selected from the module's front panel.

Selecting Frequency Determining Components

After determining the desired cut-off frequencies, use the instructions and formulas in the notes to determine correct component values.



NOTES:

1. **This schematic applies only to PC board #P 9560B3.**
2. **The three changes shown in dotted lines are for industrial applications using DC signals.**
3. **R* is chosen according to the following general limitations:**
   a) $2K < R^* < 330K$
   b) $R520 > 2K$
   c) $R522 < 1M$
4. **With valid values of R* and C*, R520, R521, R522, and C510, C511, C512 are chosen according to the following formulas:**

$$R520 = \frac{.7184}{2\pi f_h C^*} \qquad C510 = \frac{1.392}{2\pi f_l R^*}$$

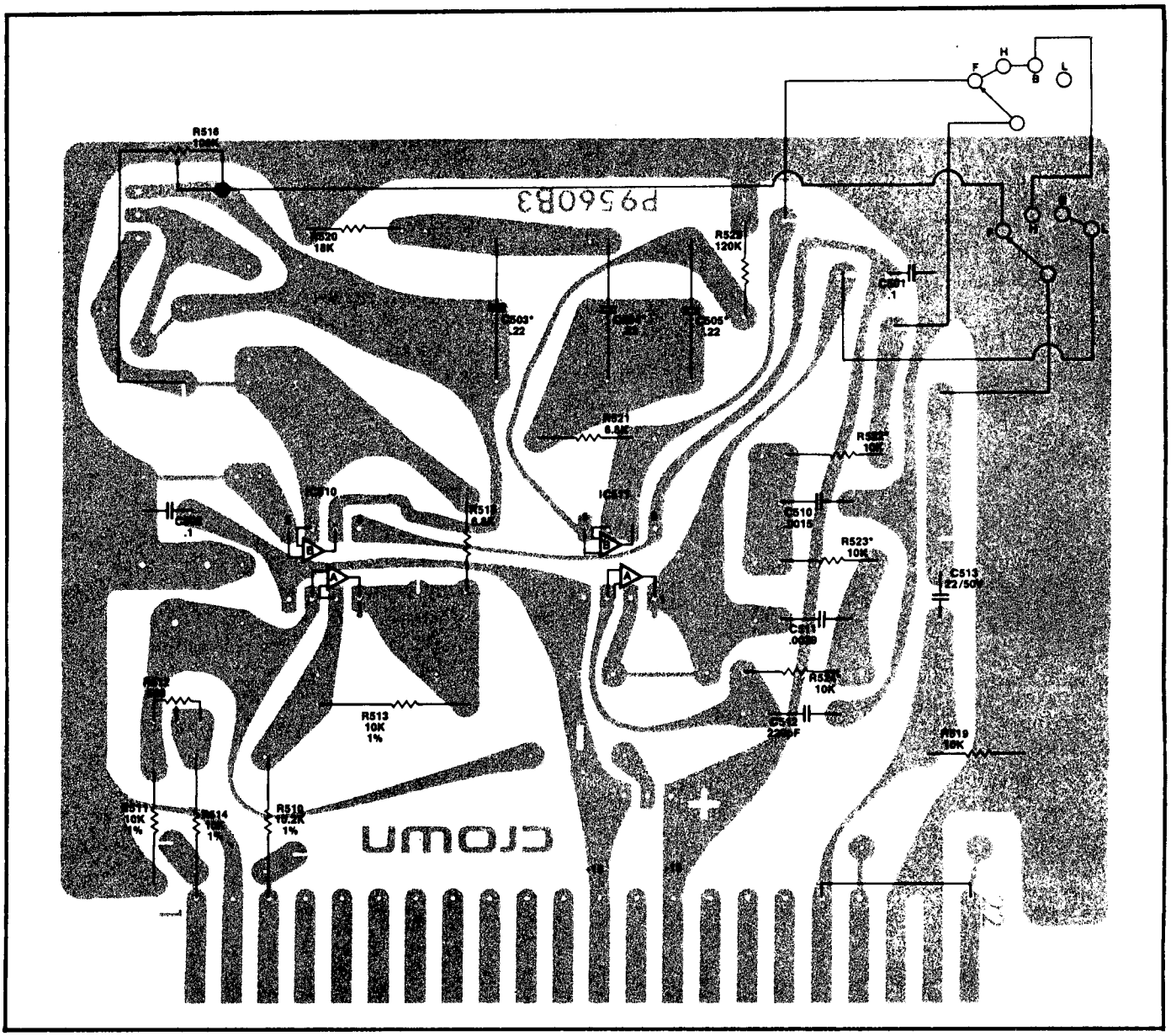
$$R521 = \frac{.2820}{2\pi f_h C^*} \qquad C511 = \frac{3.546}{2\pi f_l R^*}$$

$$R522 = \frac{4.941}{2\pi f_h C^*} \qquad C512 = \frac{.2024}{2\pi f_l R^*}$$

   when f_h = highpass cutoff

   f_l = lowpass cutoff

5. **For values of C*, R*, C510, C511, C512, R520, R521, and R522 shown f_h = 30Hz and f_l = 15KHz.**



LEGEND:

— ●——● = JUMPER WIRE
— □ = COMPONENT STANDING ON END
— × = CUT TRACE
— VIEW FROM FOIL SIDE OF PC BOARD

Schematic Designation	Description	Crown Part No.	Other Information
	Miscellaneous		
	M-600 access door	F 9529J2	
	Front end bracket	F 9530J0	
	Circuit board	P 9560-7	
	#8 x .375 hex SMT screw	C 2708-3	
	Control knob	D 3513-5	
	Resistors		
R510	10.2K ohm ½ watt 1% MF	C 2344-7	
R511, R513, R514	10K ohm ½ watt 1% film	C 2343-9	
R512	500 ohm helipot trim	C 3668-8	CMR adjust
R515, R521	6.8K ohm ½ watt	C 1639-1	
R516	100K ohm audio pot ZY7194	D 2341-2	Gain
R519, R222*, R223*, R224*	10K ohm ¼ watt 5% CF	C 2631-8	
R520	18K ohm ¼ watt	C 2633-3	
R522	120K ohm ½ watt MF	C 3856-9	
	Capacitors		
C501, C502	.1mF NP	C 5639-7	
C503*, C504*, C505*	0.22 MF 100V filmatic	C 3218-2	
C510	.0015 MF 200V filmatic	C 3089-7	
C511	.0039 MF filmatic	C 4151-4	
C512	200 PF mica	C 3411-3	
C513	25 MF 15V NP vertical	C 5311-3	
	Integrated Circuits		
IC510, IC511	RC4558 dual op amp	C 3919-5	
	PC Board	P 9560B3	

3.5 Alternative Supply Voltage

Model 7560/70 is factory wired for a specific AC mains voltage. The serial plate indicates factory voltage wiring. For new applications, users can make limited modifications to allow operation under different voltages.

Illustrations 3-13 and 3-14 shows transformer wiring for five AC mains configurations. Conversion requires changing the wiring connections to match the wiring diagrams in the illustrations. The following steps will be helpful in interpreting the diagrams:

⚠ WARNING

Only a competent technician should attempt to convert from one voltage to another. Follow instructions thouroughly.

1. Disconnect the amplifier from the AC mains.
2. Remove top, bottom and back cover.
3. Determine the desired AC mains voltage.
4. Locate the two high voltage transformers and their terminal strips or terminal boards.
5. Move the jumpers and wires to the positions shown in Illustration 3-13.

Note: Both high voltage terminal strips are wired identically but are positioned to mirror each other.

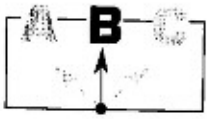
6. Locate the control voltage transformer terminal board.
7. Move the jumpers and wires to the positions shown in Illustration 3-14.
8. Change the fuses F1 and F2 to values shown in Table 3-1.
9. Replace covers.

Note: Amplifier may go into standby after conversion. If this happens, adjust R421 CW to allow amplifier to just leave standby and start normal operation. Refer to Section 6 for complete adjustment procedure of R421.

Note: All fuses measure 0.3438 in (8.731mm) X 1.5 in (3.81 cm).

AC Mains	F2 (high voltage fuse)	CPN	F1 (low voltage fuse)	CPN
100 V	20 Amp Type 3AB	A10285-29	1/2 Amp Type 3AB	A10285-8
120 V	20 Amp Type 3AB	A10285-29	1/2 Amp Type 3AB	A10285-8
200 V	10 Amp Type FNM	A10285-25	1/2 Amp Type 3AB	A10285-8
220 V	10 Amp Type FNM	A10285-25	1/2 Amp Type 3AB	A10285-8
240 V	10 Amp Type FNM	A10285-25	1/2 Amp Type 3AB	A10285-8

Table 3-1 Fuse Chart



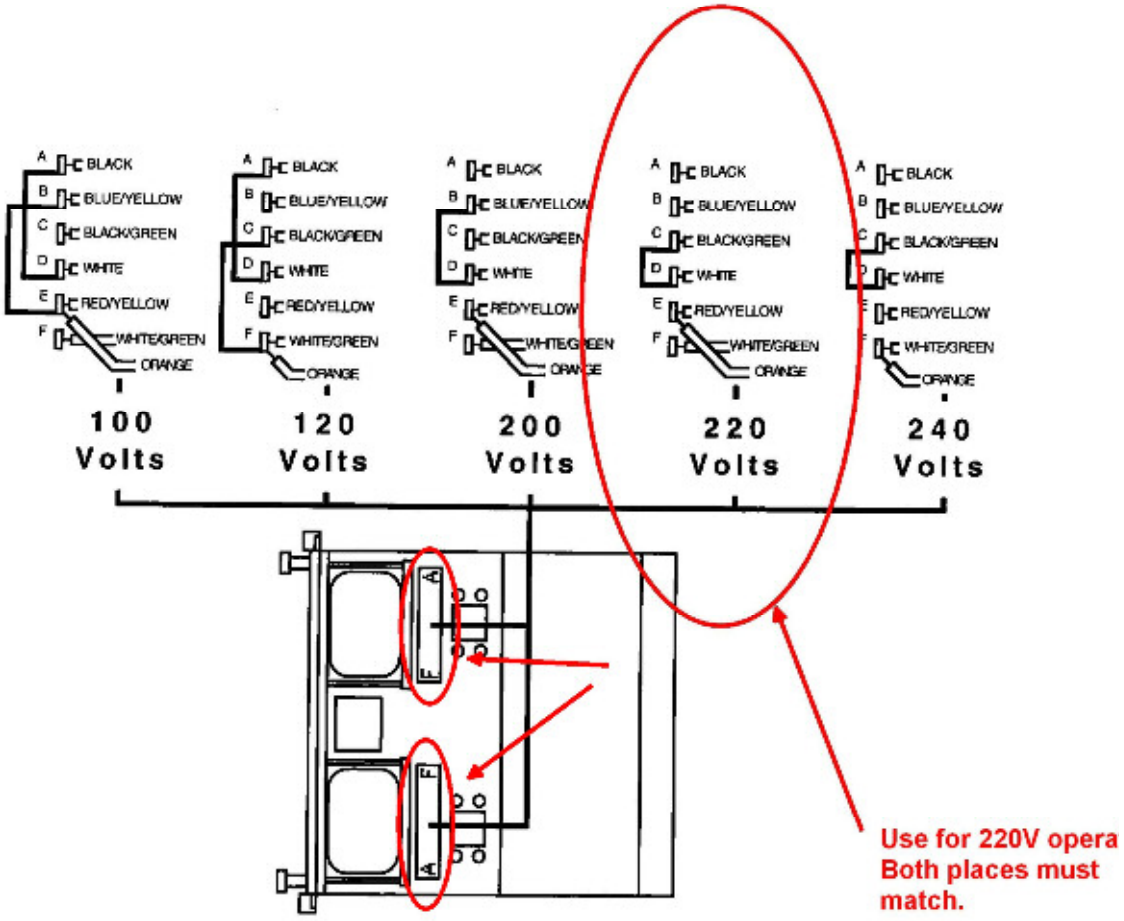


Illustration 3-13 Power Transformer Alternate Primary Voltage Connections

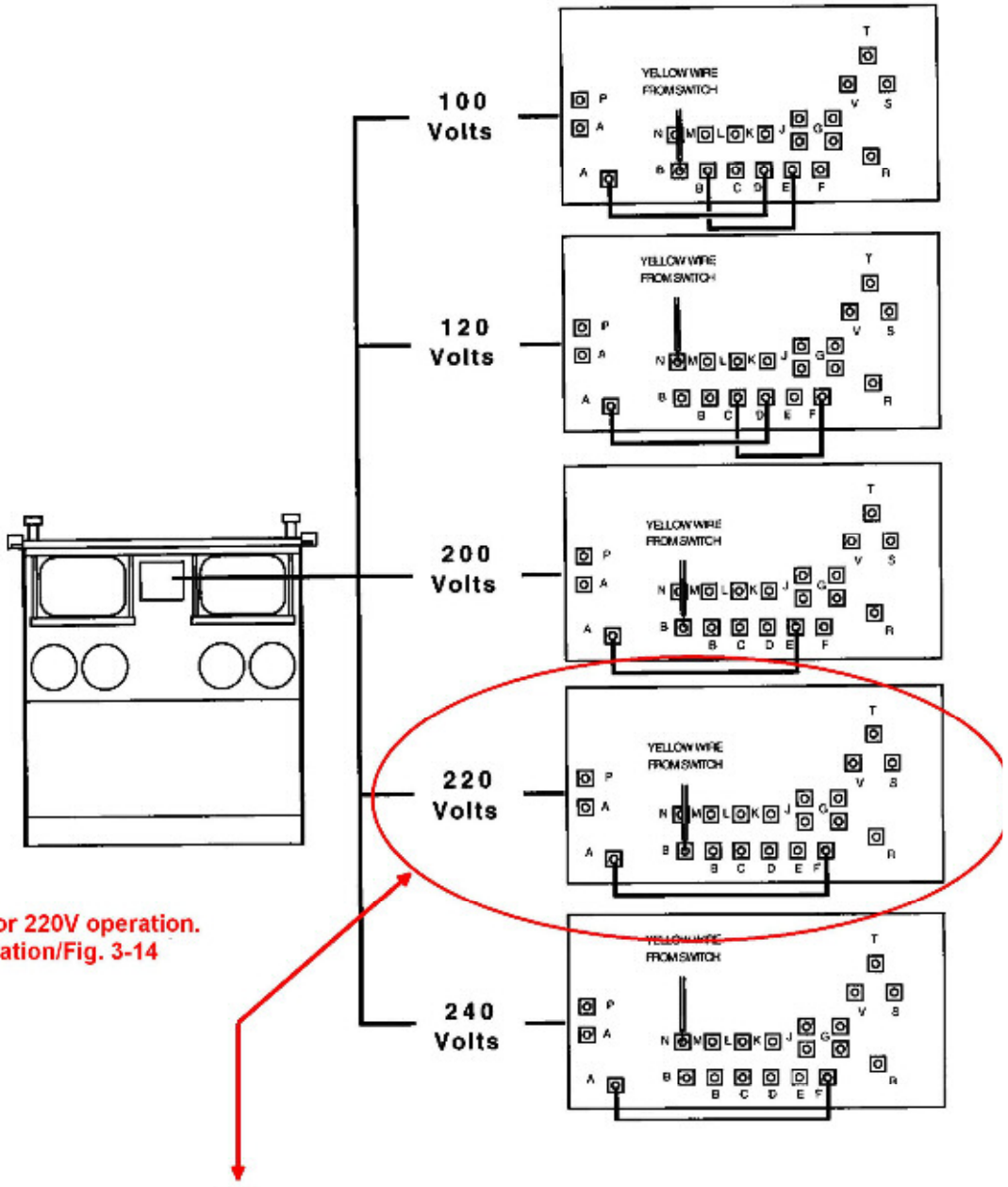


Illustration 3-14 Control Transformer Alternate Primary Voltage Connections

Specifications

*Performance**

Max Output Power: 1,018 W rms into 4 Ω

Max Output Voltage: 64 V rms into 4 Ω

Max Output Current: 15.9 A rms into 4 Ω

(*Tests used 1 kHz sine wave with amplifier in controlled-voltage mode. Specifications depend on load and waveform and are subject to manufacturing change.)

Physical

Weight: 92 pounds (41.7 kg)

Chassis: Aluminum with steel reinforcements

Finish: Tan and brown two-tone panel coated with durable textured polyurethane

Indicators, Controls and Connectors:

(A) Standby Indicator

(B) Accessory analog meter location

(C) On Indicator

(D) Input Coupling Switch (switches between ac or dc coupling of input) on 7560; Input Attenuator (attenuates input signal) on 7570

(E) Current Monitor (7570 only)

(F) Power Switch

(G) Input Attenuator on 7560; Mode Switch (CV or CC) on 7570

(H) AC Power Input

(I) High Voltage Fuse

(J) Low Voltage Fuse

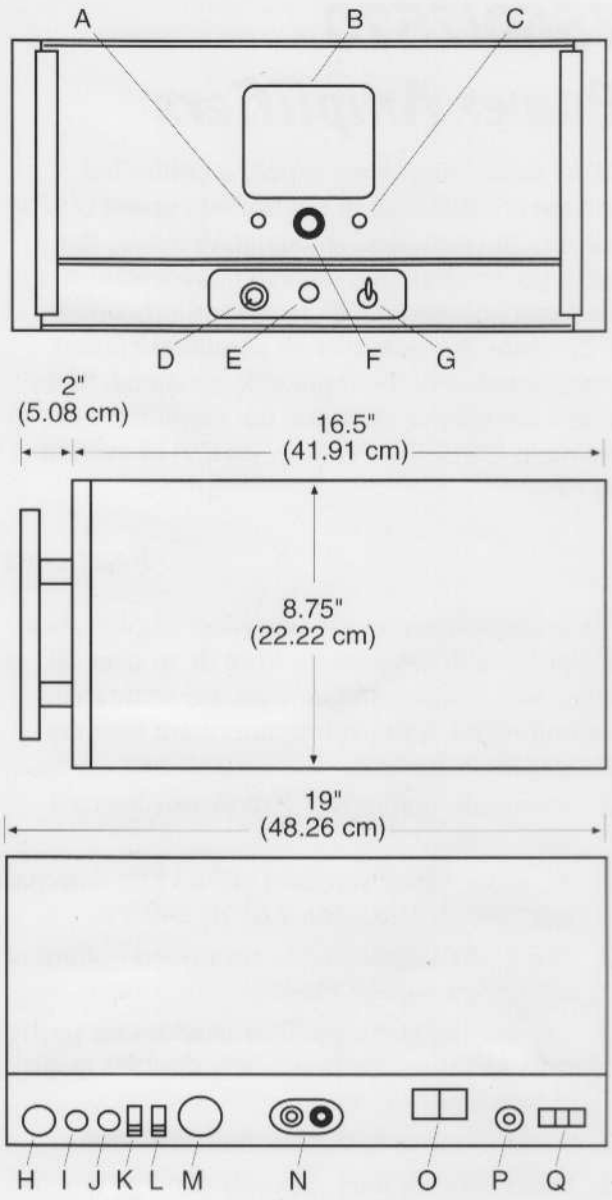
(K) Low Frequency Protect Switch (when selected, initiates standby when dc–10 Hz @ 10 V or more appears at the output)

(L) Delay Switch (when selected, invokes a four-second delay whenever turning on power switch)

(M) Interlock (signals and controls for multiple amplifier systems)

(N) Output (five-way binding posts)

(O) Output (barrier block)



(P) Input (BNC connector, 7560 only)

(Q) Input (barrier block, 7570 only)

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Specifications

*Performance**

Max. Output Power: 1,018 W rms into 4 Ω

Max. Output Voltage: 64 V rms into 4 Ω

Max. Output Current: 15.9 A rms into 4 Ω

(*Tests used 1 kHz sine wave with amplifier in CV mode. Specifications depend on load and waveform and are subject to manufacturing change.)

Physical

Weight: 92 pounds (41.7 kg)

Chassis: Aluminum with steel reinforcements

Finish: Light pearl

Indicators, Controls and Connectors:

(A) Standby Indicator

(B) Analog meter (TEC7572 only)

(C) Meter voltage/current selector switch (TEC7572 only)

(D) Power Switch

(E) On Indicator

(F) Input Attenuator

(G) Output Voltage Monitor (TEC7572 only)

(H) Monitor Ground (TEC7572 only)

(I) Output Current Monitor (TEC7572 only)

(J) Reset Switch (TEC7572 only)

(K) CC/CV Mode Selector Switch (TEC7572 only)

(L) AC/DC Coupling Switch (TEC7562 only)

(M) AC Power Input

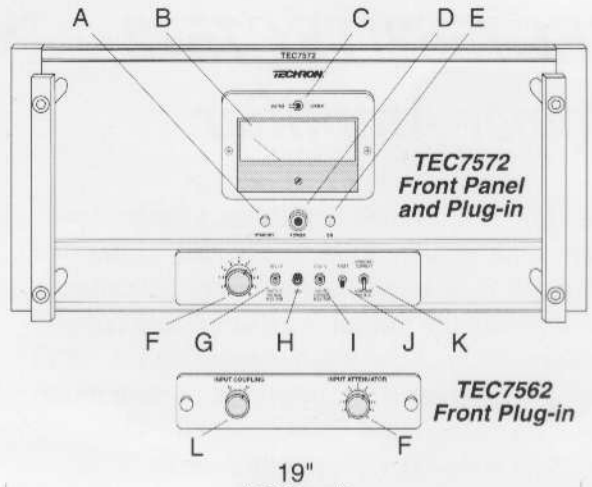
(N) High Voltage Fuse

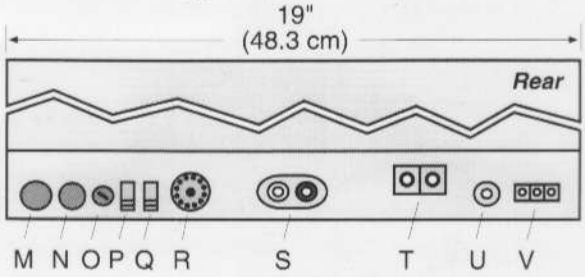
(O) Low Voltage Fuse

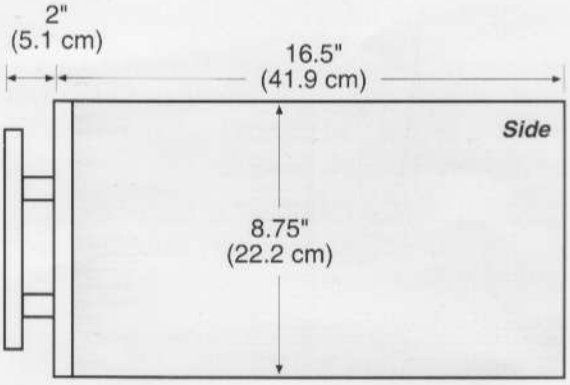
(P) Low Frequency Protect Switch (when selected, initiates standby when dc–10 Hz @ 10 V or more appears at the output)

(Q) Delay Switch (when selected, invokes a four-second delay whenever turning on power switch)

(R) Interlock (signals and controls for multiple amplifier systems)







(S) Output (five-way binding posts)

(T) Output (barrier block)

(U) Single-ended Input (BNC connector) for TEC7562

(V) Differential Input (barrier block) for TEC7572

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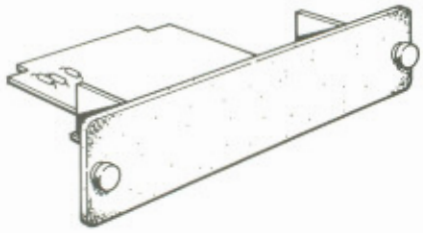

MODEL 75A11 DIFFERENTIAL INPUT MODULE SPECIFICATIONS

TECHRON's 75A11 Active Differential Input Module provides excellent isolation from noise created by long input lines and ground loops. This module plugs into a 7560 power supply amplifier without modifications or the use of tools. Input to the 75A11 is via a three screw terminal barrier block on the back of the 7560.

The 75A11 is used to parallel a 7560 with other 7560s or 7570s. Each slave 7560 will need a 75A11. The 75A11 is configured at the factory as a unity gain module with a precision, gain adjustment. Other configurations are available on request.

Input Impedance: 20 KΩ differential.

Frequency Response: DC to greater than 20kHz.

Common Mode Range: ± 10 volts.

Common Mode Rejection Ratio: Greater than 70 dB

Connectors: Three screw terminal barrier block. BNC (floating shell) optional.

Finish: Textured tan polyuerethane. Matches 7560 front panel.

Controls: Unity gain option has a 10 turn pot that adjusts the gain through plus and minus 2% of the gain range. A front panel pot can be added to provide 0-100% gain adjust

Installation: Field installed without tools.

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