

## CX-1 COMPRESSOR- EXPANDER

Revised 11 - 82

**QUICK OPERATING GUIDE**



**CX-1  
COMPRESSOR-EXPANDER**

**METER SELECT SWITCHES**

Both out; Shows Audio out.  
"C" in; Shows Compression  
"X" in; Shows Expansion  
Both in; Shows both.

**"COMPRESSION" SWITCH**

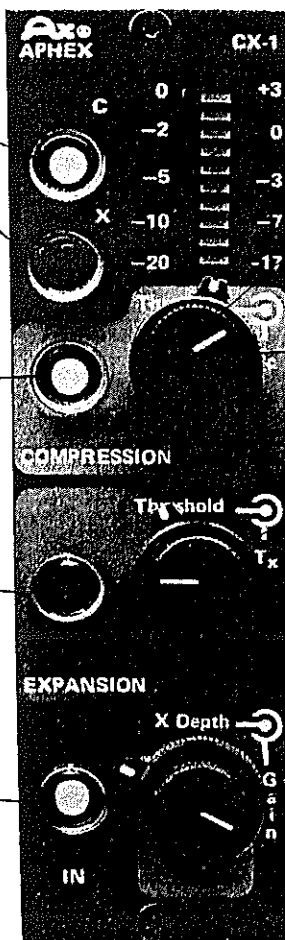
Engages Compressor

**"EXPANSION" SWITCH**

Engages Expander

**MAIN IN/OUT SWITCH**

When out, it disengages  
all effects of the CX-1  
(except input gain).



**LED VU METER**

Displays Compression (left scale)  
Expansion & Audio output (right  
scale).

**COMPRESSION "THRESHOLD" KNOB**

For adjusting level at which  
circuit begins compressing.  
(clockwise = lowest threshold).

**"Tc" KNOB**

Sets Compression release time.  
(clockwise = longest release).

**EXPANSION "THRESHOLD" KNOB**

For adjusting level at which  
circuit begins expanding.  
(clockwise = lowest threshold).

**"Tx" KNOB**

Sets Expansion release time  
(clockwise = longest release).

**"X DEPTH" KNOB**

Sets depth of expansion clockwise  
from 0 to 100 db.

**INPUT "GAIN" KNOB**

For adjusting proper input level.



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## CX-1 COMPRESSOR-EXPANDER

### COMPRESSOR FEATURES

- ◆ "Soft knee" or leveling amplifier characteristic comparable to LA-2A.
- ◆ "Tube type" overload characteristics.
- ◆ Release time variable from 50 msec to 2.5 sec. ( $T_C$ ).
- ◆ Threshold control works from -20 dBV to +20 dBV.

### EXPANDER FEATURES

- ◆ Expansion depth control allows settings from 0 dB to 100 dB maximum gating (X depth).
- ◆ Expansion delay time from 50 msec to 2.5 sec. ( $T_X$ ).
- ◆ Threshold control works from -45 dB V to +8 dB V.

### METERING

- ◆ Internal metering: 10 segment bar graph displaying:
  - ◆ Compression gain reduction
  - ◆ Expansion gain reduction
  - ◆ C + X gain reduction
  - ◆ Output level
- ◆ External metering: optional vu meter connection terminals for traditional meter display.

### CONTROLS

- ◆ Display select (compression or expansion)
  - ◆ Compression in/out
  - ◆ Compression threshold
  - ◆ Compression release time
  - ◆ Expansion in/out
  - ◆ Expansion threshold
  - ◆ Expansion delay time
- ◆ In/Out – control defeat
- ◆ Input gain
- ◆ Expansion depth

### SPECIFICATIONS

- ◆ INPUT GAIN: Adjustable from -20 dB loss to +20 dB gain.
- ◆ INPUT LEVEL: Adjustable from -20 dB V to +40 dB V nominal.
- ◆ MAXIMUM OUTPUT: +30 dBm via Jensen nickel core transformer.
- ◆ MAXIMUM THD: Under steady state conditions: 0.10% (20 to 20 kHz.).
- ◆ MAXIMUM IMD: Under steady state conditions: 0.20% (SMPTE test).
- ◆ SLEW RATE OF MAIN SIGNAL PATH: Greater than 10 V/microsec.
- ◆ OUTPUT NOISE AT UNITY GAIN: -85 dBm (input shorted, 20 kHz BW).
- ◆ DIMENSIONS: Front Panel: 5.25 in. x 1.5 in. (13.3 cm. x 3.8 c.,)  
Depth: 6 in. (15.2 cm.)



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# CX-1 COMPRESSOR- EXPANDER

GAIN REDUCTION  
(dB)

OUTPUT LEVEL  
(VU)

BOTH OUT  
=  
OUTPUT  
LEVEL  
METERING

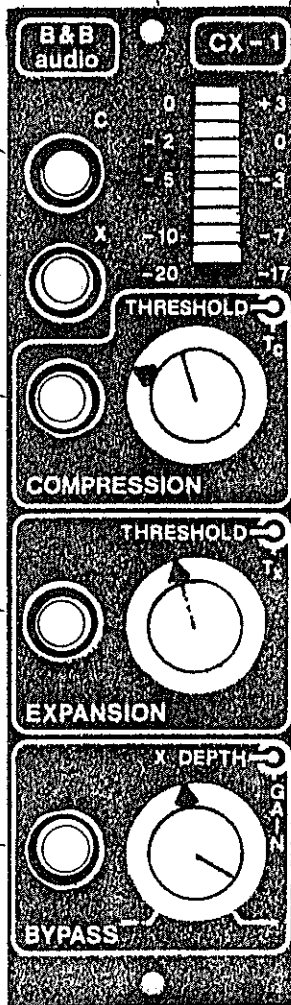
COMPRESSION  
METERING

EXPANSION  
METERING

COMPRESSION  
ENABLE/DEFEAT

GATE  
ENABLE/DEFEAT

MASTER PROCESSING  
DEFEAT



COMPRESSION RELEASE  
TIME

COMPRESSION THRESHOLD

GATE RELEASE TIME

GATE THRESHOLD

GAIN CALIBRATION

MAXIMUM GATING DEPTH

## CX-1 CHECK OUT PROCEDURES

### NECESSARY EQUIPMENT:

- Distortion analyzer capable of +30dBm input
- A.C. Signal source
- Dual trace scope with X-Y capability
- Test Fixture: (female edge connector, wired to interface with test equipment.)
- Power Supply:  $\pm$  16V @ .2A
- Triangle or ramp wave source: (20V p-p)

### INITIAL:

#### Set Controls:

- a) All buttons out
- b) Mini dip switch #2 - In (Pre) Position
- c) Connect equipment

#### I. Signal Pass Test

Generator at 2kHz +4dBm

- a) Adjust gain control to verify max unclipped output of +30 dBm.
- b) Switch signal source to 20 kHz. Observe waveform on scope to verify no triangulation at full output.
- c) Set signal source for +4dBm output. Set gain control of CX-1 at unity.
- d) Adjust VU cal trimmer (R116) for 0VU on LED display.

#### II. Expander Test

- a) Bypass, expand & X buttons in.  
x depth - max (cw)  
x threshold full CW
- b) Rotate threshold to verify gating action.
- c) While gated (off) rotate x depth. Verify change in attenuation depth as knob is rotated.
- d) Rotate Xtc and verify change in turnoff time in several positions as Xthresh. is rapidly changed.
- e) Generator to +10dBm. Xthresh full CCW slowly decrease generator level. CX should gate at +7 to +9 dBm.
- f) Mute generator  
x depth full CCW  
Set C-X meter trim (R240) to Fullon  
Verify meter goes off as Xdepth --full CW

#### III. Noise Test


- a. Mute input
- b. Put CX-1 in expand mode
- c. Rotate X depth full CW. Noise should measure  $\approx$  90dBm
- d. Slowly rotate X depth CCW. Noise should rise to  $\approx$  -83dBm with worst case peak value of  $\approx$  -82dBm just below full CCW.

IV. Compressor Test

Generator on +4dBm, 2kHz  
bypass, Comp, C buttons in, others out.

- a) Comp thres. Full CCW, verify no attenuation.
- b) As knob is turned CW, verify signal attenuation, meter decline.
- c) Ctc at min (CCW). Signal should follow as Cth is quickly turned.
- d) Ctc at max (CW), signal should slowly turn on as Cth is rotated quickly.

## D.C. OFFSET ADJUSTMENTS

Equipment - Triangle Wave () Gen

Dual trace scope:  
x-y capability  
5mV sensitivity  
±16V @ .2A power supply  
Noise filter

### I. Set Controls:

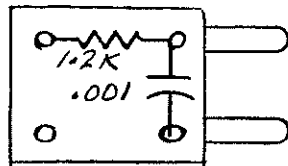
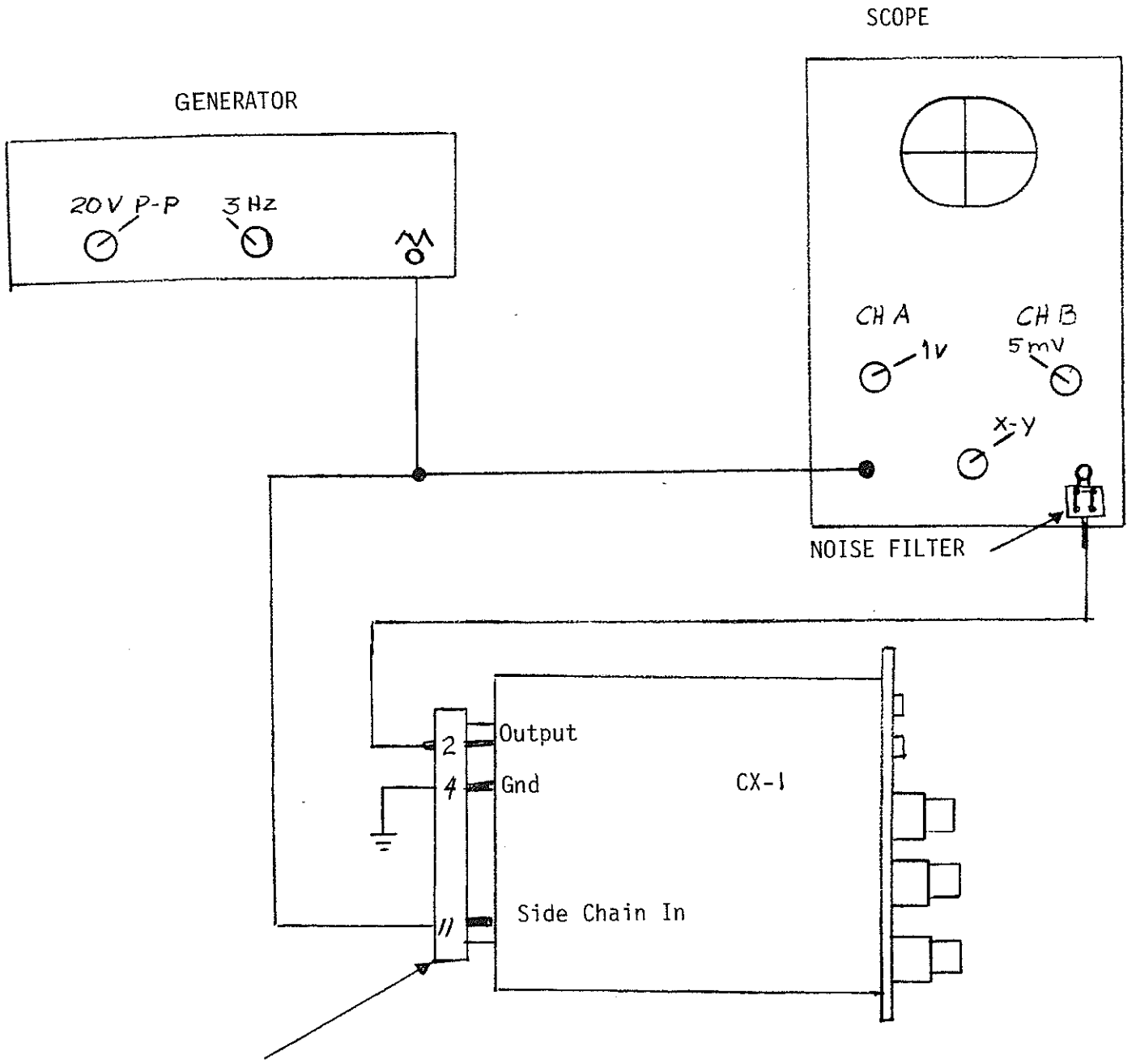
Bypass and expand in others out  
Knobs - Xdepth full CW, gain = unity  
Xtc, Xthresh. = Full CCW  
Sidechains off(out)

### II. Hookup - See drawing

- a. Generator at 20V P-P, 3Hz
  1. to scope Horiz. input IV scale, DC coupled
  2. to CX side chain, input, pin II
- b. CX input shorted
- c. CX output, pin Z to scope vert input, 5mV scale  
ac coupled

- III. a. Observe scopetrace and trim DC offset (R205) for  
minimum vertical deflection on scope.
- b. DC should remain below 8mV P-P.

CX-1 DC OFFSET NULL TEST SET-UP

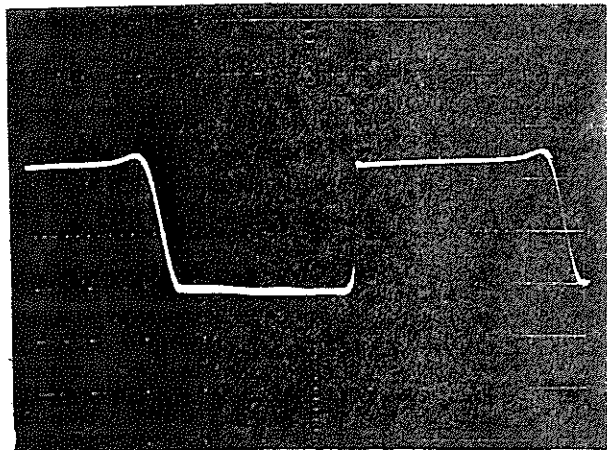


Noise Filter (Detail)

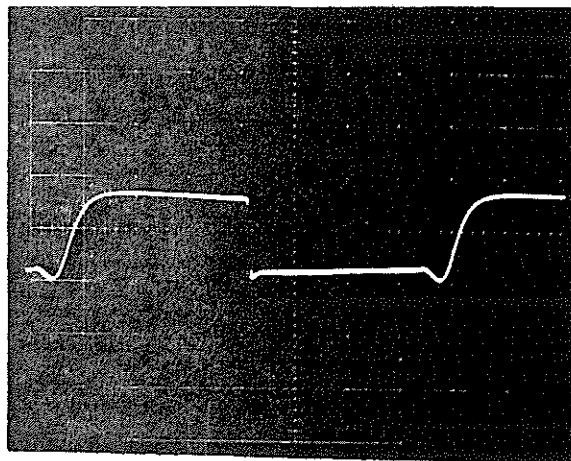


CX-1 DC SHIFT NULL

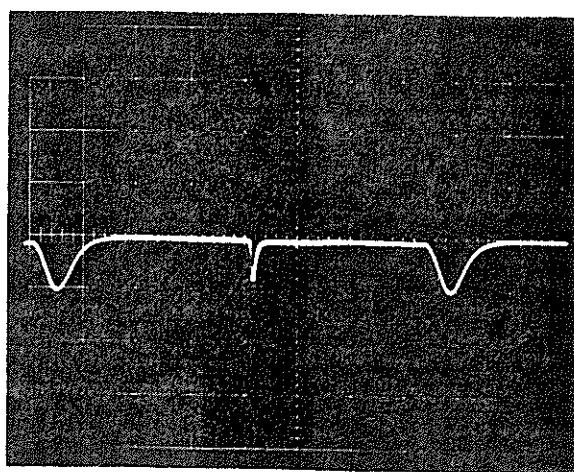
EXPECTED SCOPE TRACES



SHIFT TOO HIGH

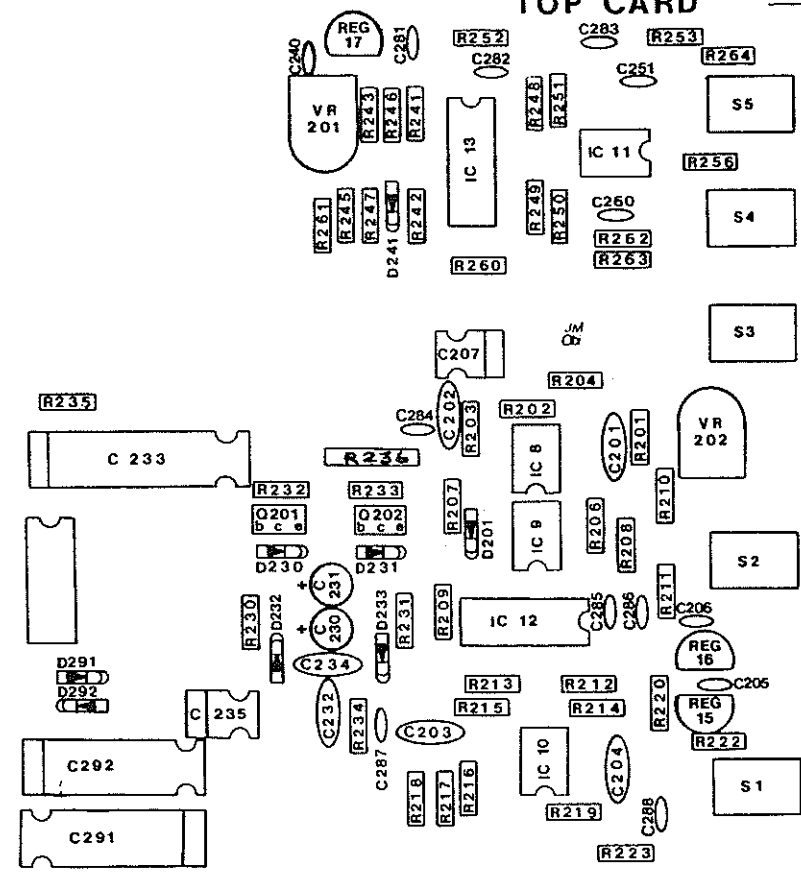


SHIFT TOO LOW

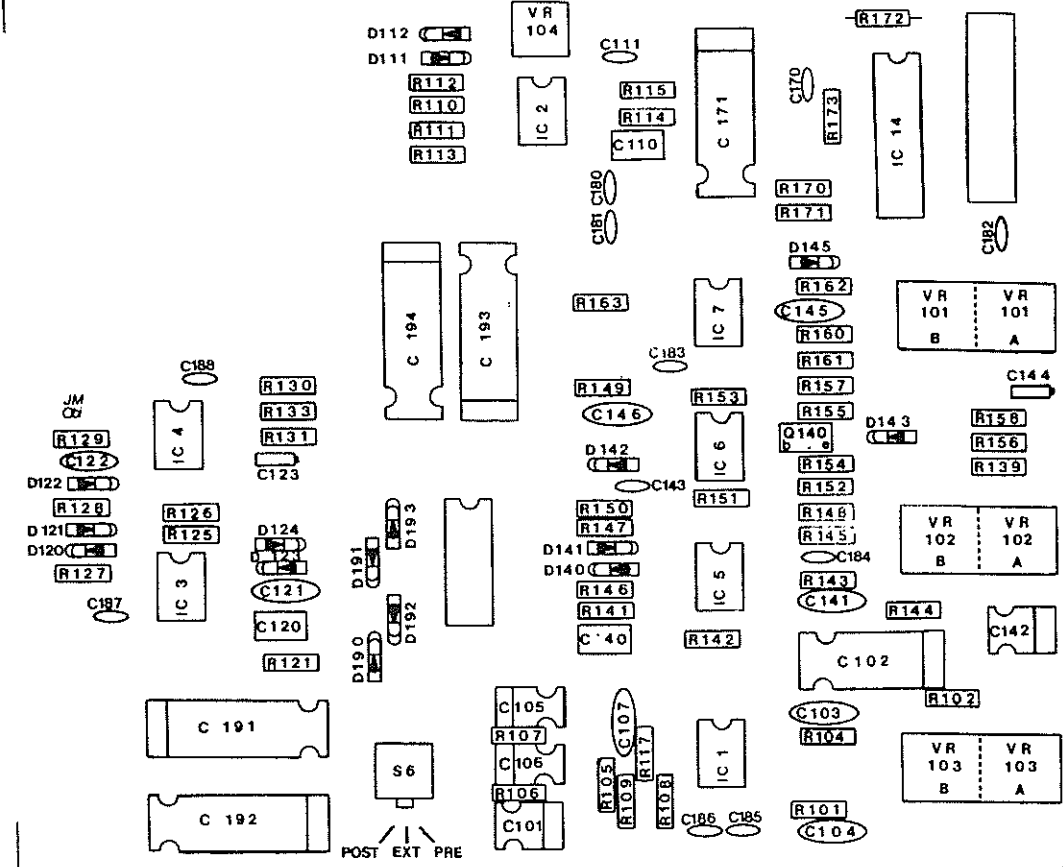


DC SHIFT CORRECT  
(NULLED)

# TOP CARD



# BOTTOM CARD



POST EXT PRE

CX-1 COMPONENT LIST

AS OF S/N 1500

RESISTORS

R101 20K 5%  
 R102 2K 5%  
 R104 20K 5%  
 R105 15K 5%  
 R106 150 ohm 5%  
 R107 " " "  
 R108 5K1  
 R109 "  
 R110 10K 1%  
 R111 20K 1%  
 R112 10K 1%  
 R113 " "  
 R114 470K 5% w/xfmr  
 R114 150K " w/out xfmr  
 R115 150 ohm 5%  
  
 R117 15K  
 R121 100K 5%  
 R123 Omit  
 R124 see D123-124  
 R125 10K 1%  
 R126 20K 1%  
 R127 10K 1%  
 R128 " "  
 R129 249K 1%  
 R130 10K 5%  
 R131 1K 5%  
 R133 150 ohm 5%  
 R139 120 ohm 5%  
 (470 " " if VR102  
 B=100K)  
 R141 1K 5%  
 R142 1 meg 5%  
 R143 68K 5%  
 R144 3K6 5%  
 R145 10K 5%  
 R146 20K 1%  
 R147 10K 1%  
 R148 10K 1%  
 R149 100K 1%  
 R150 100K 5%  
 R151 1K 5%  
 R152 330 ohm 5%  
 R153 2m2M  
 R154 1K 5%  
 R155 15K 5%  
 R156 2K 5%  
 R157 1K 5%  
 R158 10K 5%

R160 10K 5%  
 R161 10K 5%  
 R162 " "  
 R163 13A3 1%  
 R170 33K 5%  
 R171 10K 5%  
 R172 1/2w 180ohm 5%  
 R174 Jumper  
 (some models  
 1K 5%)  
 R201 10K 1%  
 R202 10K 1%  
 R203 " "  
 R204 470K 5%  
  
 R206 3K32 1%  
 R207 " "  
 R208 " "  
 R209 " "  
 R210 16K5 1%  
 R211 44K2 1%  
 R212 3K32 1%  
 R213 " "  
 R214 10K 1%  
 R215 " "  
 R216 " "  
 R217 536 ohm 1%  
 R218 21.5 ohm 1%  
 R219 10K 1%  
 R220 100K 1%  
 R222 10K 1%  
 R223 2K7 5%  
 R230 " "  
 R231 " "  
 R232 4K7 ohm 5%  
 R233 " " "  
 R234 10K ohm 1%  
 R235 100K 5%  
 R236 10ohm 5% (Ferrite beads in some units)  
  
 R241 4.7K 5%  
 R242 10K 5%  
 R243 " "  
 R245 " "  
 R246 " 1%  
 R247 " "  
 R248 20K 5%  
 R249 " "

R250 10K 5%  
 R251 " "  
 R252 " "  
 R253 " "  
 R260 2.49K 1%  
 R261 100 ohm 1%  
 R262 10K 1%  
 R263 100K 1%  
 R264 10K 1%  
 R265 " "

VR101,102 A,B 1M Lin,25K Log  
 DUAL CONC. POT  
 VR102 B 100K lin  
 VR103 A,B 20K Lin,10K Lin  
 DUAL CONC. POT  
 VR104 10K trimmer  
 VR201 10K trimmer  
 VR202 50K trimmer

ADDENDUM	
FOR S/N 900-1000	
R143	470K 5%
R144	1.2K 5%
R148	20K 1%
R149	10K 1%
DELETED C141	

CAPACITORSSEMICONDUCTOR

C101 22uf/25vE  
 C102 330uf/25vE  
 C103 20pf disc  
 C104 " "  
 C105 22uf/25vE  
 C106 " "  
 C107 39pf  
 C110 .33uf S  
 C110 luf tant  
 (w/out xfmr  
 C111 .luf mono  
 C120 .33uf S  
 C121 39 pf disc  
 C122 " " "  
 C123 luf Tant  
 C140 .33uf S  
 C141 10 pf disc  
 C142 22 uf/25vE  
 C143 .luf mono  
 C144 luf tant  
 C145 47 pf disc  
 C146 10 " "  
 C170 .luf mono  
 C171 330uf/25v  
 C191 330uf/25v  
 C192 " "  
 C193 " "  
 C194 " "  
 C201 39pf disc  
 C202 10pf disc  
 C203 20pf disc  
 C204 47pf disc  
 C205 .luf mono  
 C206 .luf mono  
 C207 22uf/25vE  
 C230 15uf tant  
 C231 " "  
 C232 20pf disc  
 C233 1000uf/4vE  
 C235 22uf/25vE  
 C240 .luf mono  
 C250 " "  
 C251 " "  
 C260 " "  
 C291 330uf/25vE  
 C292 " "  
 C293 .luf mono  
 C294 " "  
 C295 " "  
 C296 " "

D111 1N914B  
 D112 1N914B  
 D120 1N914B thru D124  
 D140 1n914B " D143  
 D145 1N914B  
 D190 1N4001 thru D233  
 D201 1N914B  
 D230 1N914B thru D233  
 D241 1N914B  
 D291 1N4001  
 D292 1N4001

Q140 MJE-171 }  
 Q201 MJE-181 } or equivalent  
 Q202 MJE-171 }

IC1 LF353  
 IC2 LM1458  
 IC3 LF353  
 IC4 "  
 IC5 "  
 IC6 "  
 IC7 "  
 IC8 "  
 IC9 "  
 IC10 "  
 IC11 LM1458  
 IC12 1537A 0-2  
 IC13 1537A 10-20  
 IC14 LM3914  
  
 A15 LM78L05  
 A16 LM320LZ5  
 A17 LM78L05

ADDENDUM FOR TRANSFORMERLESS CX-1

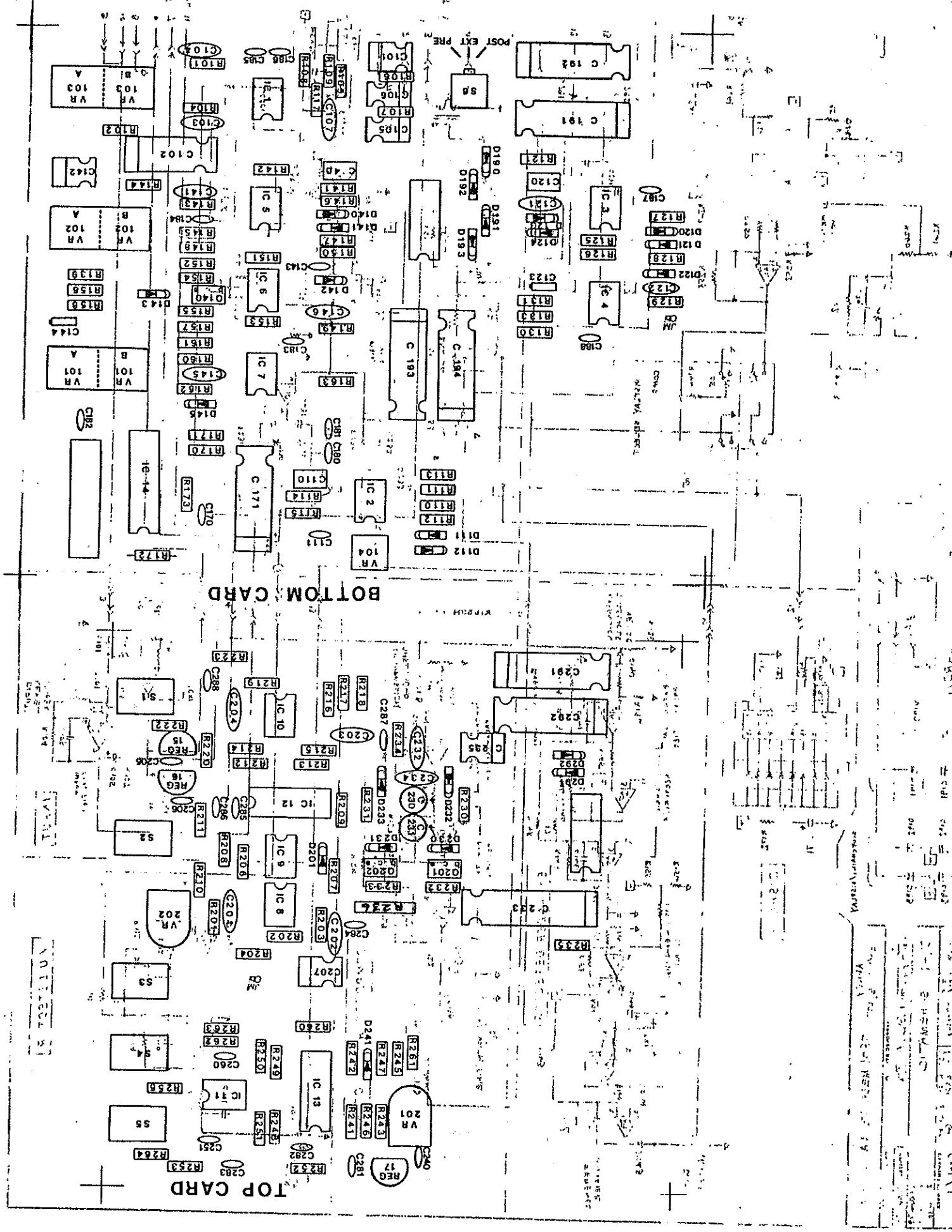
R114 = 120K

C110 = 1uf

FB201 = 150ohm

Top card output to pin 2 edge connector.

Jumper pins 2 & 3 and 4 & 5 on edge connector.



BOTTOM CARD

TOP CARD

NOTICE

Handwritten notes and technical specifications in the bottom right corner, including a date '1-1-58' and other illegible text.

V.U. DETECTOR

INPUT

AUDIO VCA

POWER (TOP CARD)

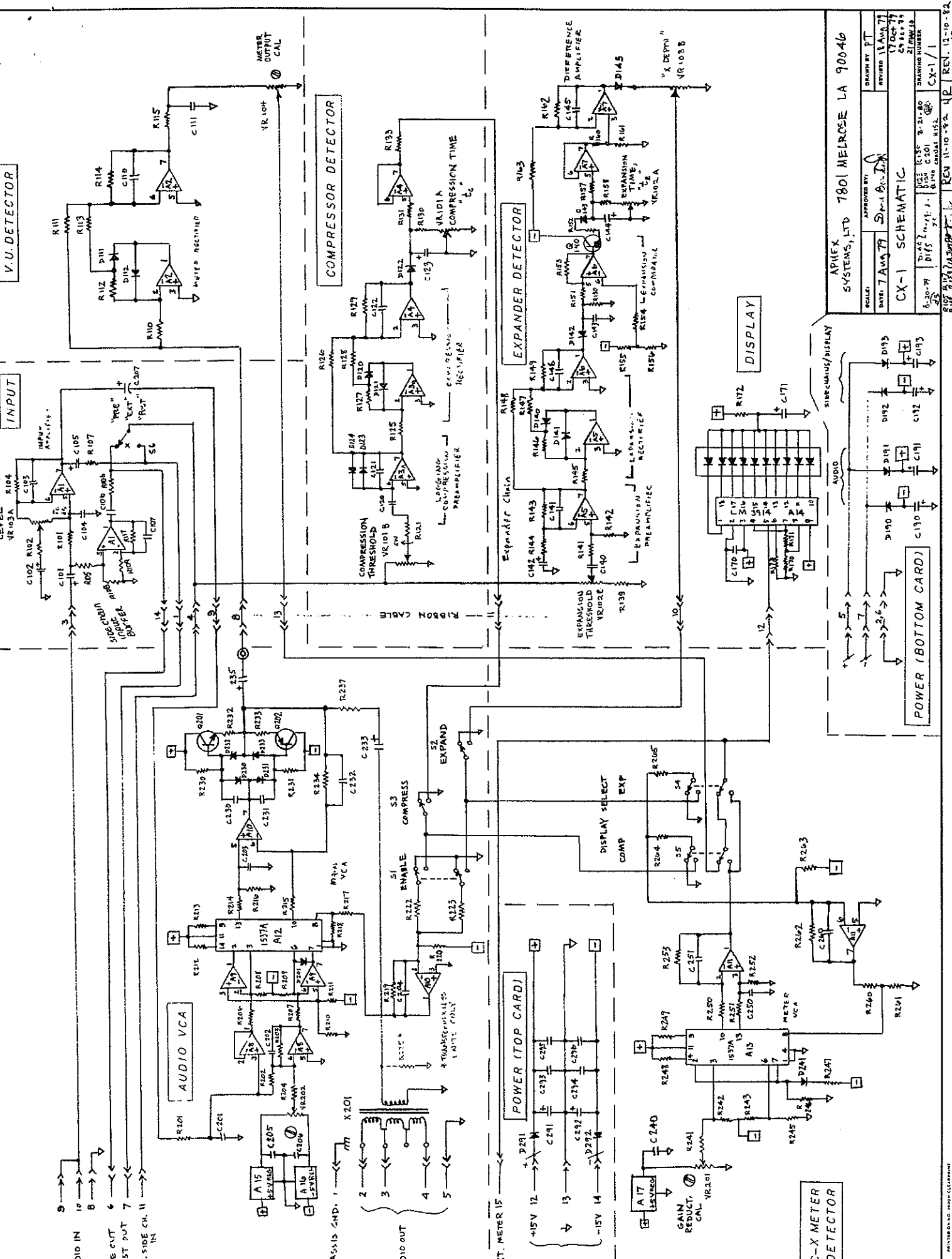
C-X METER DETECTOR

COMPRESSOR DETECTOR

EXPANDER DETECTOR

DISPLAY

POWER (BOTTOM CARD)



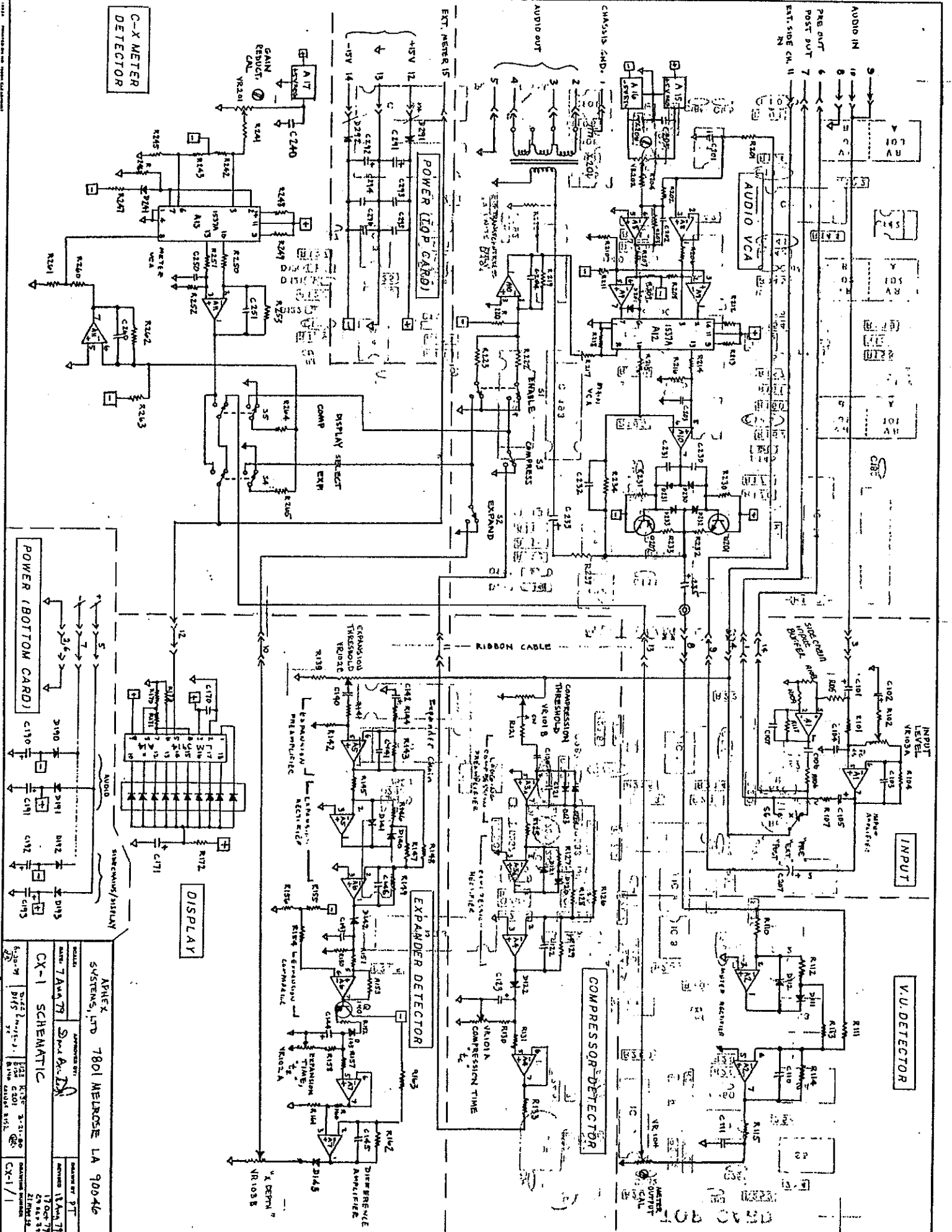
APLEX SYSTEMS, LTD 7801 MELROSE LA 90046

DATE: 7 AUG 79  
 DRAWN BY: S. L. B. J. W.  
 APPROVED BY: [Signature]

CX-1 SCHEMATIC

REV. 11-10-82 4R  
 REV. 8-21-80 2L  
 REV. 6-30-79 2S  
 REV. 3-15-77 2E  
 REV. 10-1-76 1R  
 REV. 11-10-82 4R  
 REV. 5-6-81 4E

DRAWING NUMBER: 218410  
 CX-1/1



<b>ARTEX SYSTEMS, LTD 7801 MELROSE LA 90046</b>	
<b>MODEL:</b> CX-1	<b>DATE:</b> 7/24/79
<b>DESIGNED BY:</b> [Signature]	<b>APPROVED BY:</b> [Signature]
<b>DATE:</b> 7/24/79	<b>REV:</b> 15-00-02
<b>BY:</b> [Signature]	<b>CHK:</b> [Signature]
<b>DATE:</b> 7/24/79	<b>REV:</b> 15-00-02
<b>BY:</b> [Signature]	<b>CHK:</b> [Signature]

15-00-02  
 17 OCT 79  
 21 45 55  
 21 45 55  
 21 45 55



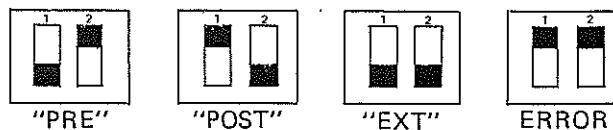
## CX-1 COMPRESSOR/EXPANDER

### Side Chain Switch

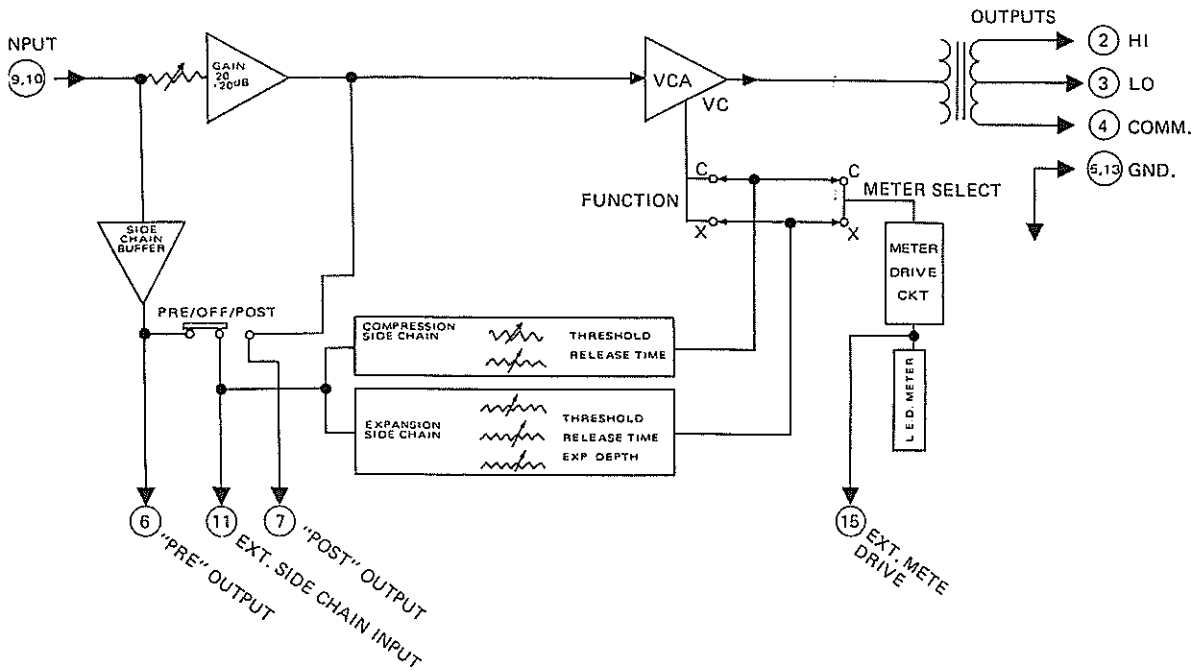
CX-1's are equipped with a side chain source switch on P. C. Board # 1 which allows even greater versatility of the CX-1. The switch positions are:

- PRE:** In this position the CX-1 is triggered from an internal audio signal, before the input gain pot. This is the normal mode of operation unless the CX-1 is installed in a "normalling" type rack. (See note 1).
- POST:** This position can be used when triggering is desired off signals lower than -40Bv. The threshold pots now follow the gain pot. Not used for most general applications.
- EXT:** (External) — In this position the CX-1 can be triggered from any external low voltage including audio, between -40 and +8dBv. This position would be used when triggering the CX-1 from an equalizer or other outboard signal processing device, or when installed in a rack/patch bay which normals "Pre Out" to "Ext In" making the external keying input available at the patch bay.

- NOTES:** 1) The Aphex Systems 4B-1 is a "normalling" type rack. The switch must be in the Ext position to use the side chain access.
- 2) If building your own rack system, the card edge terminals for the Ext functions are: Pre Out = # 6, Post Out = # 7, Ext In = # 11.
- 3) Some earlier model CX-1's have a D. I. P. type switch instead of the slide switch. The settings are:



# CX-1 BLOCK DIAGRAM



## CONNECTOR:

1. CHASSIS GND
2. HI LEVEL OUT
3. LO LEVEL OUT
4. OUTPUT LOW SIDE
5. GND
6. PRE OUT
7. POST-OUT
8. GND
9. AUDIO IN
10. "
11. EXT. SIDE CH. IN
12. +16V
13. GND
14. -16V
15. EXT. METER OUT



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