



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.



APHEX SYSTEMS LTD.



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

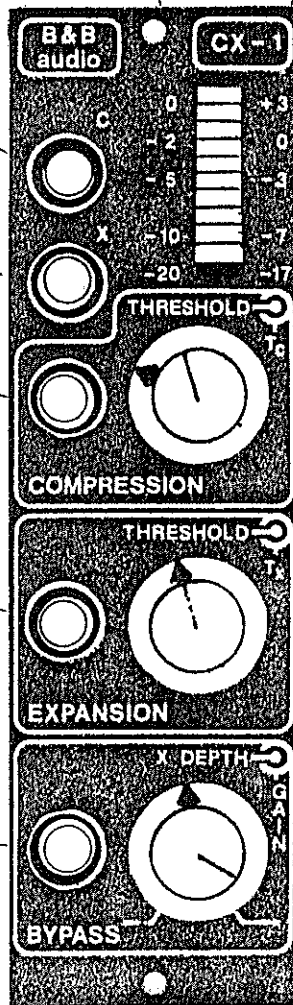
COMPRESSION
METERING

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 $\approx 90\text{dBm}$
- d. Slowly rotate X depth CCW. Noise should rise to $\approx -83\text{dBm}$ with worst case peak value of $\approx -82\text{dBm}$ 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:

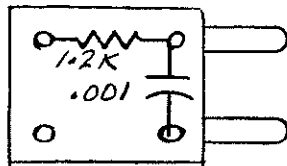
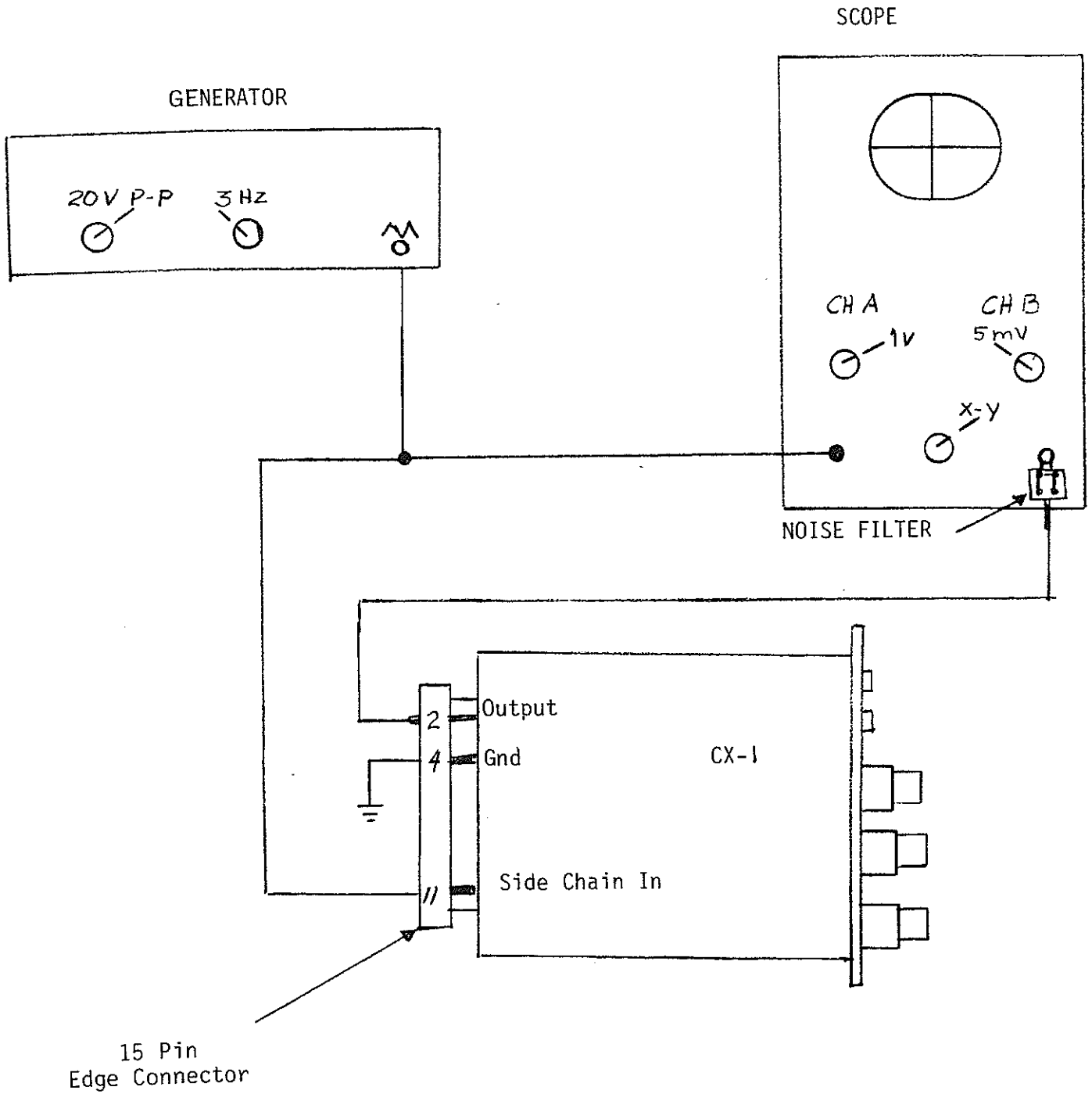
Bypass and expand in others out
Knobs - Xdepth full CW, gain = unity
Xtc, Xthresh. = Full CCW
Sidechains off(out)

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.

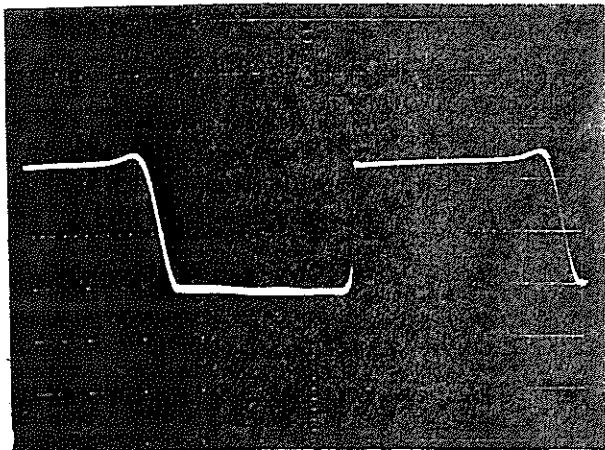
CX-1 DC OFFSET NULL TEST SET-UP



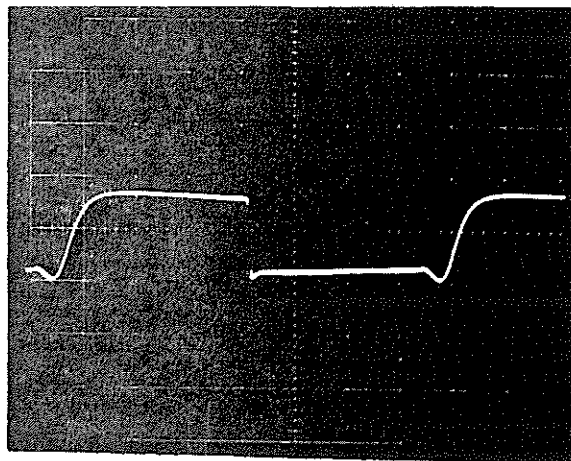
Noise Filter (Detail)

CX-1 DC SHIFT NULL

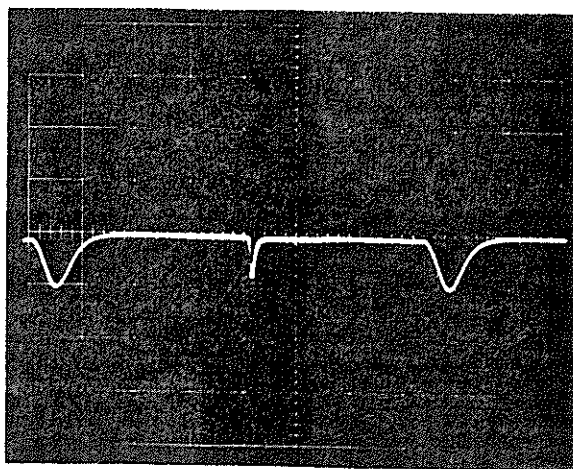
EXPECTED SCOPE TRACES



SHIFT TOO HIGH

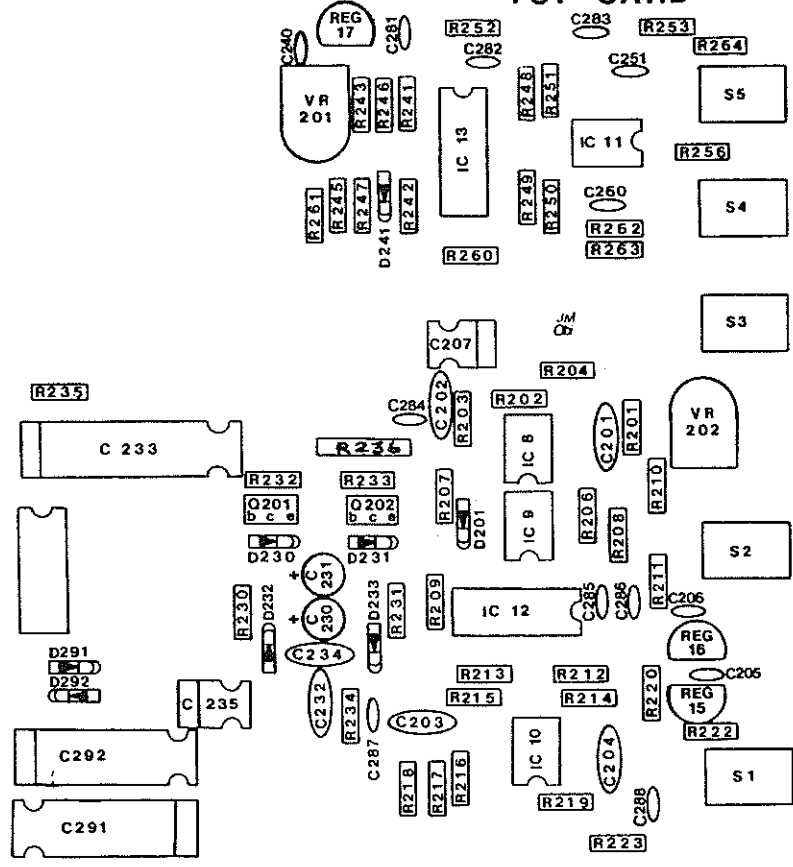


SHIFT TOO LOW

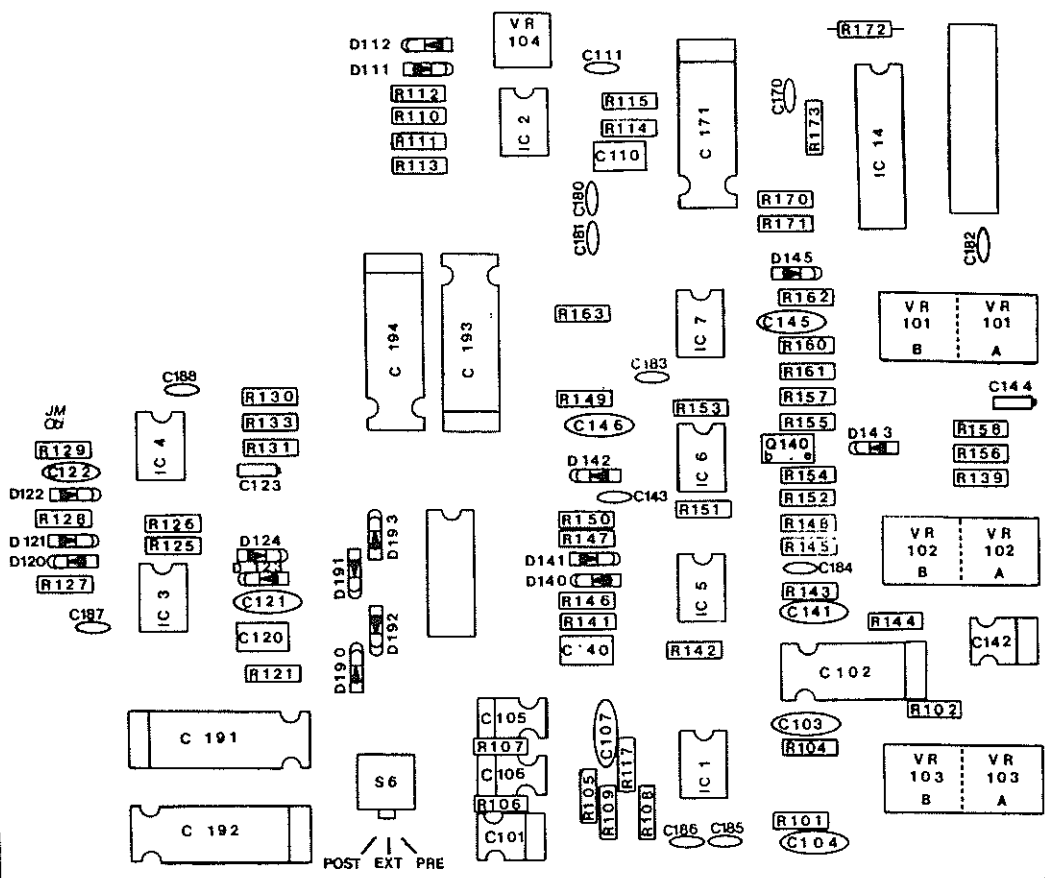


DC SHIFT CORRECT
(NULLED)

TOP CARD



BOTTOM CARD



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% DE-27E C141

CAPACITORS

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 " "

SEMICONDUCTOR

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

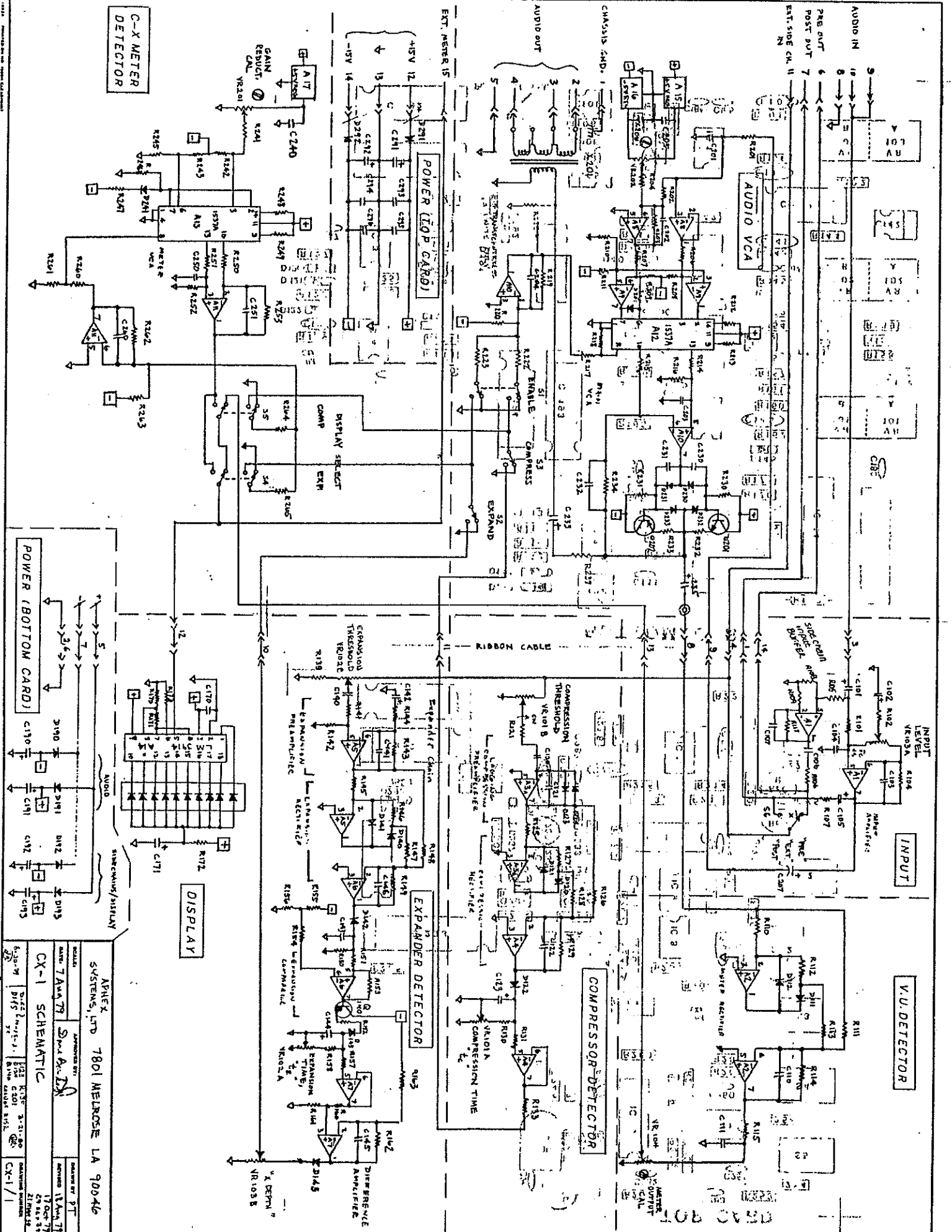
R114 = 120K

C110 = 1uf

FB201 = 150ohm

Top card output to pin 2 edge connector.

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



ARTEX SYSTEMS, LTD 7801 MELROSE LA 90046	
MODEL: 7ANA79	APPROVED BY: <i>[Signature]</i>
DATE: 7/24/79	DATE: 11/24/77
DESIGNER: DVS	DATE: 5/21/78
REVISION: 1	DATE: 11/24/77
PROJECT: CX-1	DATE: 5/21/78
REVISION: 1	DATE: 11/24/77
REVISION: 1	DATE: 11/24/77

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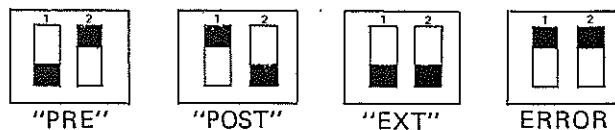
CX-1 COMPRESSOR/EXPANDER

Side Chain Switch

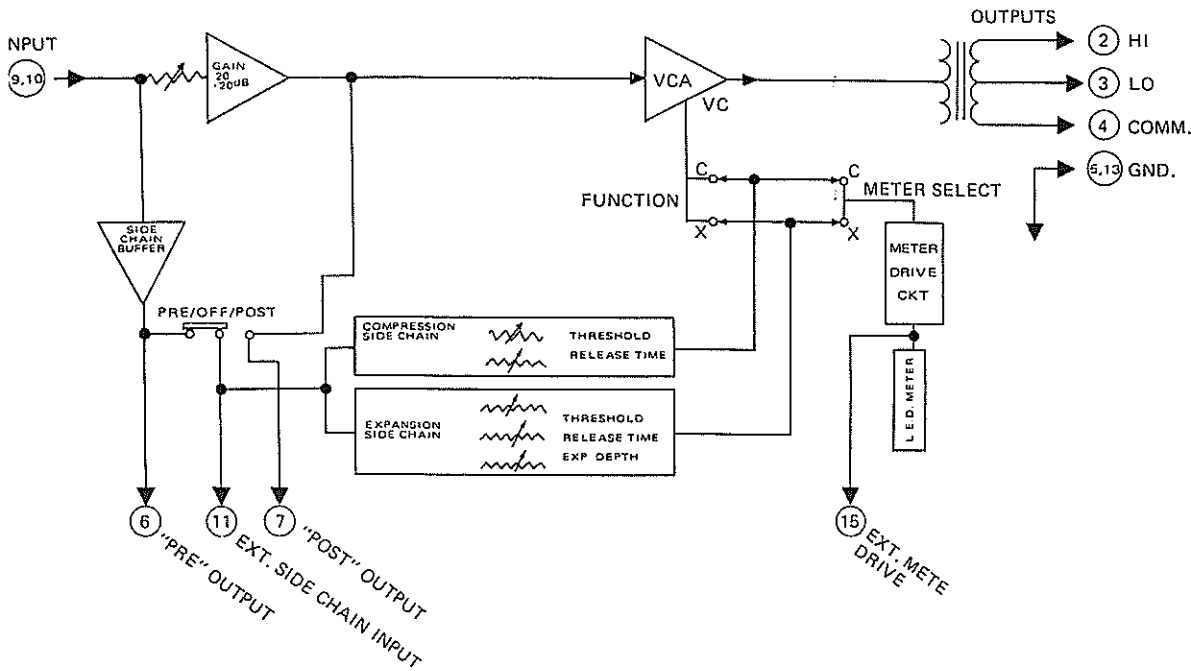
CX-1's are equipped with a side chain source switch on P. C. Board # 1 which allows even greater versatility of the CX-1. The switch positions are:

- 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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