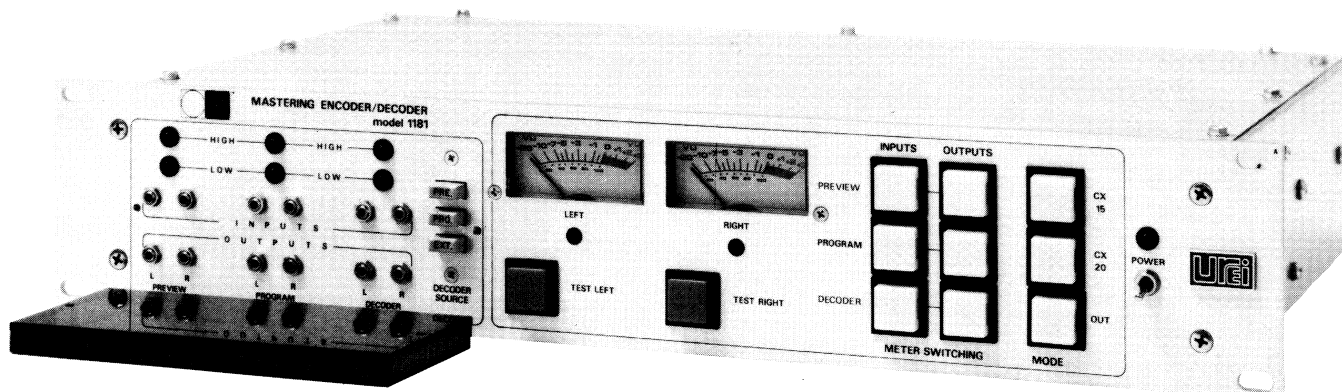


# CX ENCODER/DECODER

MODEL  
1181



The UREI Model 1181 CX Encoder/Decoder offers the mastering, production or mixdown facility the ability to precisely record and playback according to the CBS Technology CX disc noise reduction standard.

The CX noise reduction system is designed for phonograph and video disc recording and reproduction. In the encoding process which is done during disc mastering, all signals below a preset threshold level are not compressed — in the CX 20 position, the threshold is -40 dB ref. 0 VU\*, and in the CX 15 position, the threshold is -30 dB. Above this threshold, all program is compressed with 2:1 ratio, using a signal-dependent variable time constant. In decoding, complementary expansion takes place, using the same signal-dependent variable time constant.

The 1181 includes encoders for Preview and Program channels and a decoder which may be switched to audition preview, program or any "line level" external source. The encoders are highly accurate 2:1 compressors switchable for CX 15 or CX 20 conformance. High technology gain control blocks, audio operational amplifiers and precision control circuits assure excellent performance and long term stability. The decoder or expander section is a mirror of the encoder, using the identical gain control circuitry to assure accurate playback tracking. Operating modes can also be remotely controlled through a rear panel connector so that the 1181 may be installed wherever convenient.

\*For phonograph records, 0 VU corresponds to 3.54 cm/sec groove modulation at 1 kHz.

## FEATURES:

- Preview, Program and Audition in two rack spaces (3½").
- Tamper resistant, screwdriver adjust setup controls behind security cover.
- Fully automatic operation after initial setup. No special techniques need be learned by the mastering engineer.
- Relay bypass with power off.
- LEDs allow setup with 0.1 dB resolution.
- Extremely low noise and distortion.
- Remote mode selection.
- Full metering matrix.
- Built and backed by UREI.



**UNITED RECORDING ELECTRONICS INDUSTRIES**

8460 SAN FERNANDO RD., SUN VALLEY, CALIFORNIA 91352  
TELEX 65-1389 UREI SNVY

(213) 767-1000



MODEL  
1181

# TECHNICAL SPECIFICATIONS

## ELECTRICAL: (Each Channel)

<b>Inputs</b>	:	Balanced bridging differential amplifiers, six each.
<b>Input Impedance</b>	:	10 kohms, used as balanced input. 5 kohms, used as unbalanced (single ended) input.
<b>Input Level</b>	:	+20 dB maximum (Ref. 0.775 V rms).
<b>Outputs</b>	:	Floating, transformer isolated, six each.
<b>Output Load</b>	:	600 ohms or greater.
<b>Power Output</b>	:	+24 dBm into 600 ohm load (12.28 V).
<b>Frequency Response</b>	:	+0, -0.5 dB, 20 Hz – 20 kHz.
<b>Distortion</b>	:	Less than 0.1% THD, 50 Hz – 15 kHz, at worst case gain.
<b>Control Law</b>	:	According to CBS Technology CX Standard, CX 15 or CX 20.
<b>Noise (Encoder)</b>	:	Program -95 dB. Preview -85 dB. (Referred to Input; Ref. 0.775 V rms).
<b>(Decoder)</b>	:	Output -83 dB (15.7 kHz BW), -95 dB (A-weighted).

## CONTROLS:

<b>Front Panel</b>	:	Input Gain, Output Attenuator Trims, Meter Switches, Mode Switches, Power Switch.
<b>Metering</b>	:	Two Meters, switch selectable to read any Input or Output. "0" Reference +4 dB (Ref. 0.775 V).
<b>LEDs</b>	:	Six LEDs to precisely indicate 1 kHz, 3.54 cm/sec "0" point during setup. Power LED.
<b>External Connections</b>	:	Rear chassis barrier strips for inputs and outputs, plus barrier strip for remote control of operating mode. Power through 3-wire IEC style connector.
<b>Power Requirements</b>	:	110-120 VAC, or 220-240 VAC, 50/60 Hz, switch selectable, 25 watts. Special option: 1181-100 V for 100 V operation.
<b>Environment</b>	:	Operating 0°C to +50°C. Storage -20°C to +60°C.

## PHYSICAL:

<b>Dimensions</b>	:	483x89mm rack panel, depth behind panel 305mm (19 in x 3½ in x 12 in).
<b>Finish</b>	:	Panel is 3.18mm (¼ in.) brushed clear anodized aluminum. Chassis is cadmium plated steel.
<b>Weight</b>	:	7.5 kg (16.5 pounds).
<b>Shipping Weight</b>	:	9.3 kg (20.5 pounds).
<b>Accessories</b>	:	Security Cover, SC 1181, included. 100 V power option available on request (1181-100 V).

BEFORE PROCEEDING WITH COMPLETE UNPACKING AND SETUP,  
CONSULT UNPACKING AND INSPECTION INSTRUCTIONS ON PAGE 2

**model 1181**  
**CX ENCODER/DECODER**



**United Recording Electronics Industries**

B460 SAN FERNANDO ROAD, SUN VALLEY, CALIFORNIA 91352

**(818) 767-1000**

Printed in U.S.A.

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# UREI - 1181 CX ENCODER/DECODER

## Preliminary Operating Instructions

### SECTION I

#### General Description:

The Model 1181 is designed to facilitate the cutting of master discs to the C.B.S. standard for the CX process. Basically the process consists of soft but precise compression during the mastering process and playback through precise expansion to recreate the original dynamics with a 15 to 20 dB reduction in perceived surface noise.

#### Topology

The 1181 consists of two stereo encoding (compression) sections designed nominally to be used in the preview and program feed to the mastering lathe, and a stereo decoder (expander) to audition playback or feedback from the lathe. Inputs are balanced differential amplifiers (5532 op amps) and outputs are transistor boosted 5532 amps followed by very high quality isolation transformers. Voltage controlled gain is facilitated with Allison Research EGC 101's.

## SECTION II

### INSPECTION AND INSTALLATION

#### Unpacking and Inspection

Your Model 1181 was carefully packed at the factory, and the container was designed to protect the unit from rough handling. Nevertheless, we recommend careful examination of the shipping carton and its contents for any sign of physical damage which could have occurred in transit.

If damage is evident, do not destroy any of the packing material or the carton, and immediately notify the carrier of a possible claim for damage. Shipping claims must be made by the consignee.

The shipment should include:

Model 1181 CX Encoder/Decoder

UREI Preliminary Instructions

Two-Part Warranty Card bearing the same serial number as the Model 1181

Rack mounting hardware

#### Environmental Considerations

The system will operate satisfactorily over a range of ambient temperatures from 0°C to +50° (+32°F to 122°F), and up to 80% noncondensing relative humidity.

If the system is installed in an equipment rack with high heat producing equipment (such as power amplifiers), adequate ventilation should be provided in order to assure longest component life. Also, while circuitry susceptible to hum pick-up is sufficiently shielded from moderate electromagnetic fields, installation should be planned to avoid mounting the system immediately adjacent to large power transformers, motors, etc.

#### Powering

The 1181 may be operated from either 115 - 125 VAC or 220 - 240 VAC mains (50 Hz or 60 Hz, single phase). The nominal line voltage may be selected with a rear panel switch. BE SURE TO VERIFY BOTH THE ACTUAL LINE VOLTAGE, AND THE SETTING OF THE VOLTAGE SELECTOR SWITCH BEFORE CONNECTING THE 1181 TO THE MAINS. (For operation in Japan (100V mains) a special power supply transformer is required.)

SECTION III  
SET-UP AND CALIBRATION

Scope:

This procedure assures accurate adherence to the CBS CX noise reduction standard with regard to level matching the compression curve.

The input sensitivity is adjusted first using the input trim controls and then the output level is matched to the input for unit gain at the calibrated level. The standard calibration level is 3.54 cm/second for a single channel (or 5 cm/second mono combined).

Equipment required:

1. Small screwdriver to adjust trimpots on front panel.
2. Test record with 5 cm/second 1000 Hz test tone.

Note: 5 cm/second (lateral) may not be the standard used for "0" level in your facility. Nevertheless all CBS compatible decoders are referenced to 5 cm/second and therefore if proper playback at the consumer level is to be had this procedure must use 5 cm/second for the test level.

Procedure:

For this procedure the 1181 is presumed to be patched between the mastering console output and the cutting chain input. The decoder input should be connected to the feedback/playback output of the cutting chain. These connections may be permanent without concern about affecting non - CX operation in any way, as the signal is normalled through relays when the 1181 is off or in bypass.

1. Bring up a 1 kHz tone on the output of the mastering console equivalent to 5 cm/sec lateral (3.54 cm/sec each channel). If there is any question about the level, cut a test laquer and compare it on playback to a standard level 5 cm/sec disc, such as the CBS' SRT-101.
2. With 3.54 cm/sec tone at the input of encoder press the "TEST LEFT" button and adjust preview and program left input trimpots to extinguish the "high-low" LEDs.
3. Press the test right button and adjust the preview and program right input trimpots to extinguish the high-low LEDs. This completes the preview and program input level set-up.
4. Select CX 15 or CX 20 mode. Press "PREVIEW INPUTS" meter switch and note the readings on left and right meters. Press the "PREVIEW OUTPUTS" meter switch and adjust the preview L and R trimpots for the same readings as at the inputs (unity gain). Caution: It's very easy and very frustrating to adjust the wrong trim pots in this step. The output pots are the bottom row. Next press the "PROGRAM OUTPUTS" meter switch and adjust the "L and R PROGRAM" outputs for a meter match to the program inputs as was done on preview.

### Checking Calibration:

1. With the 3.54 cm/sec tone at program and preview inputs, press "TEST LEFT" no LEDs should light. Press "TEST RIGHT" no LEDs should light. Press CX 20.
2. Check program input levels with meters. Check program output levels with meters. They should match the inputs.
3. Check preview inputs and outputs. (As above)

### Decoder Set-up:

1. Play the 3.54 cm/sec test record through the decoder. Press "TEST LEFT" button and set decoder "L INPUT" trimmer to extinguish LEDs. Repeat this test for the right channel.
2. Next, set the decoder outputs (lower controls) to level match the inputs (CX 20 mode/CX 15 mode).

## SECTION IV

### MAINTENANCE

#### General

The Model 1181 is an all solid-state unit, ruggedly constructed with only the highest quality components. As such, it should provide years of trouble free use with normal care. All parts used are conservatively rated for their application, and workmanship meets the rigid standards you have learned to expect in UREI products.

NO SPECIAL PREVENTIVE MAINTENANCE IS REQUIRED.

#### Repairs and Warranty

This product is factory warranted to the original purchaser against defects in material and workmanship for one year after initial purchase. This limited warranty must be activated at the time of purchase by returning the registry portion of the Warranty Card to the factory. Should a malfunction ever occur, the dealer from whom the unit was purchased will be glad to handle return for factory repair. Please call or write to the factory for a Return Authorization Number which must accompany all repairs. For prompt service, ship the unit prepaid directly to the factory with the RA Number visible on the shipping label. Be sure it is well packed in a sturdy carton, with shock-absorbing material such as foam rubber, styrofoam pellets, or "bubble-pack" completely filling the remaining space. Particular attention should be paid to protecting the controls, switches, etc. Tape a note to the top of the unit describing the malfunction, and instructions for return. We will pay one-way return shipping costs on any in-warranty repair.

Because of specially selected components in this product, field repairs are not authorized during the warranty period, and attempts to perform repairs may invalidate the warranty.

Even if your unit is out of warranty, we recommend that you return it to the factory for repairs. Our experienced personnel, supported by special test equipment, will be able to find and eliminate any problem in the most efficient way.

**WARNING:** The full AC Line voltage is present at several points inside the chassis. Be careful to avoid personal shock when you work on the unit with the covers removed.



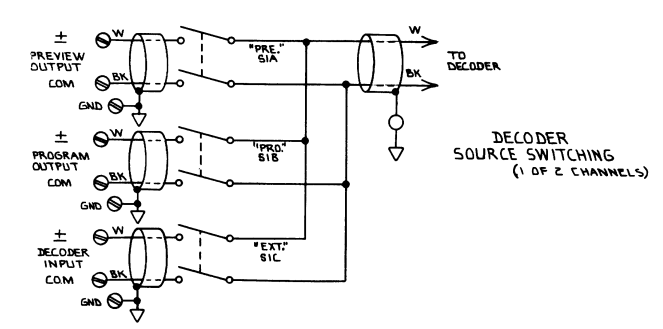
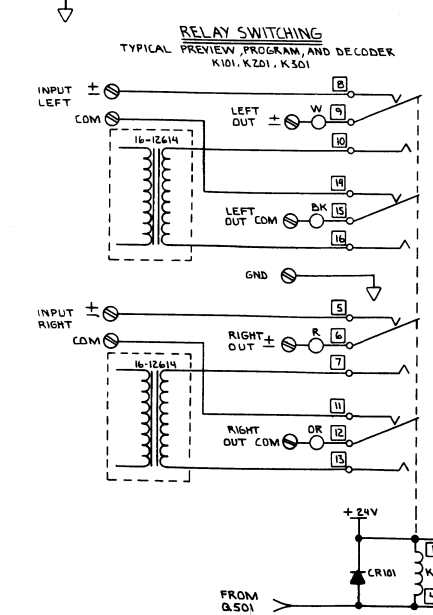
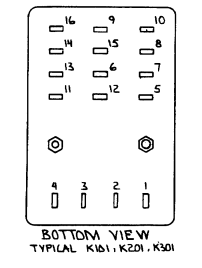
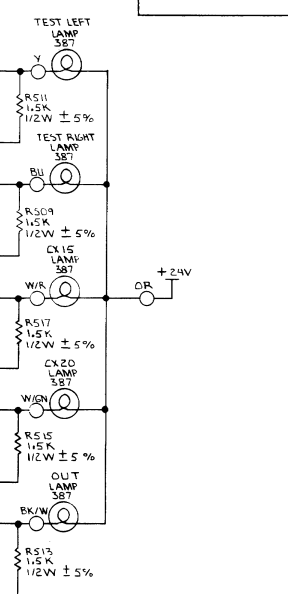
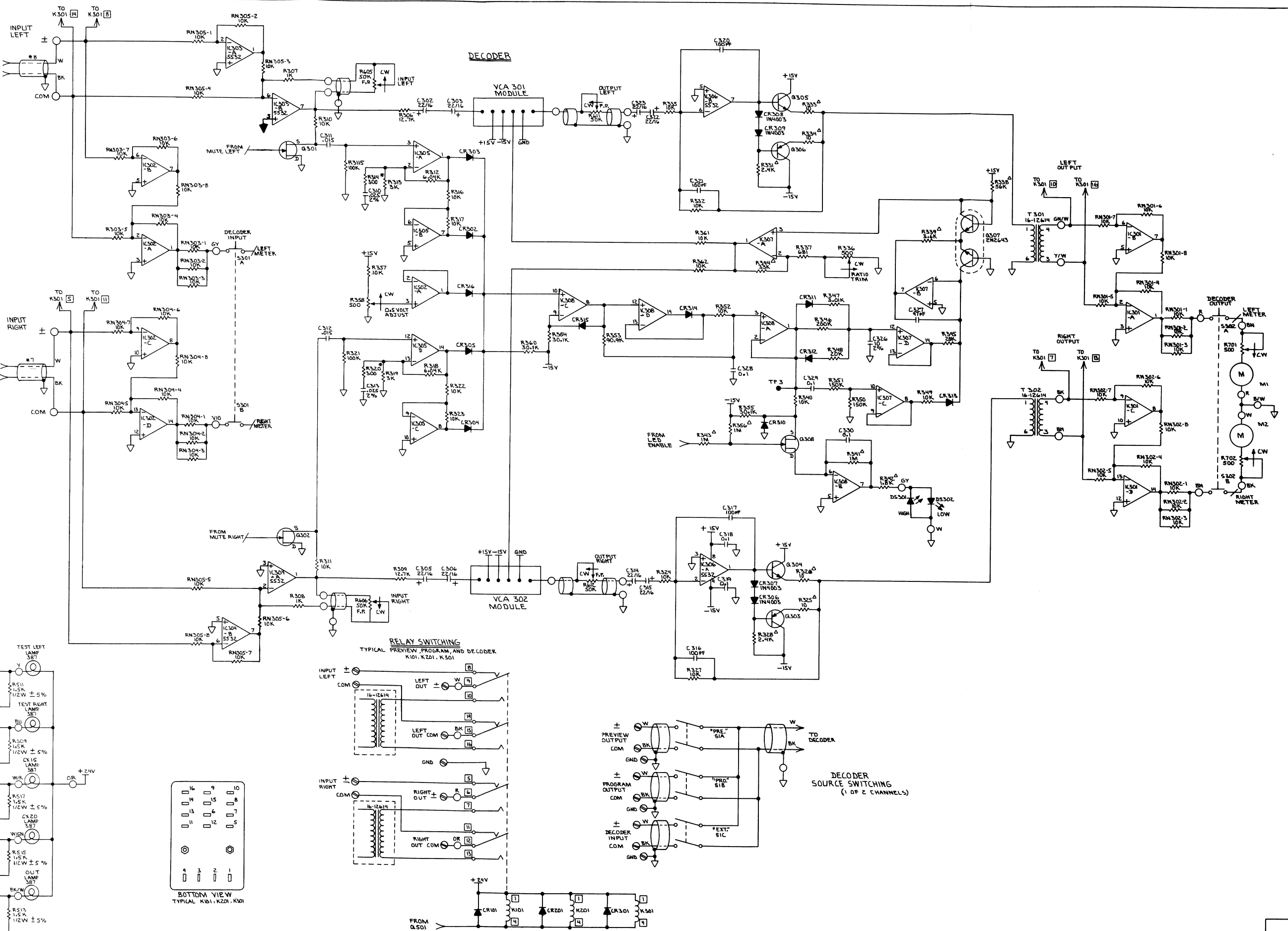
## CX LICENSING INFORMATION

The CX noise reduction system provides a 20 dB reduction in the background groove noise ("surface noise") of a disc record, while permitting the original program source to be reproduced without systematic alterations. This requires that the compression used in recording and the expansion used in playback be complementary processes. To assure correct record and expander performance, as well as consistent product identification, CBS Inc. is making available licenses for CX audio disc encoding and CX playback apparatus, both of which require adherence to established technical specifications and CX identification. The CX encoding license is royalty-free, permits use of the CX trademark only on records encoded according to CX specifications.<sup>(\*)</sup> This will result in standardization in the audio record industry and avoid public confusion, as well as assure interchangeability of CX records and CX playback equipment.

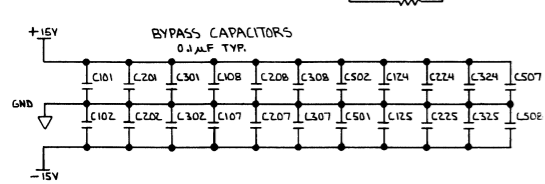
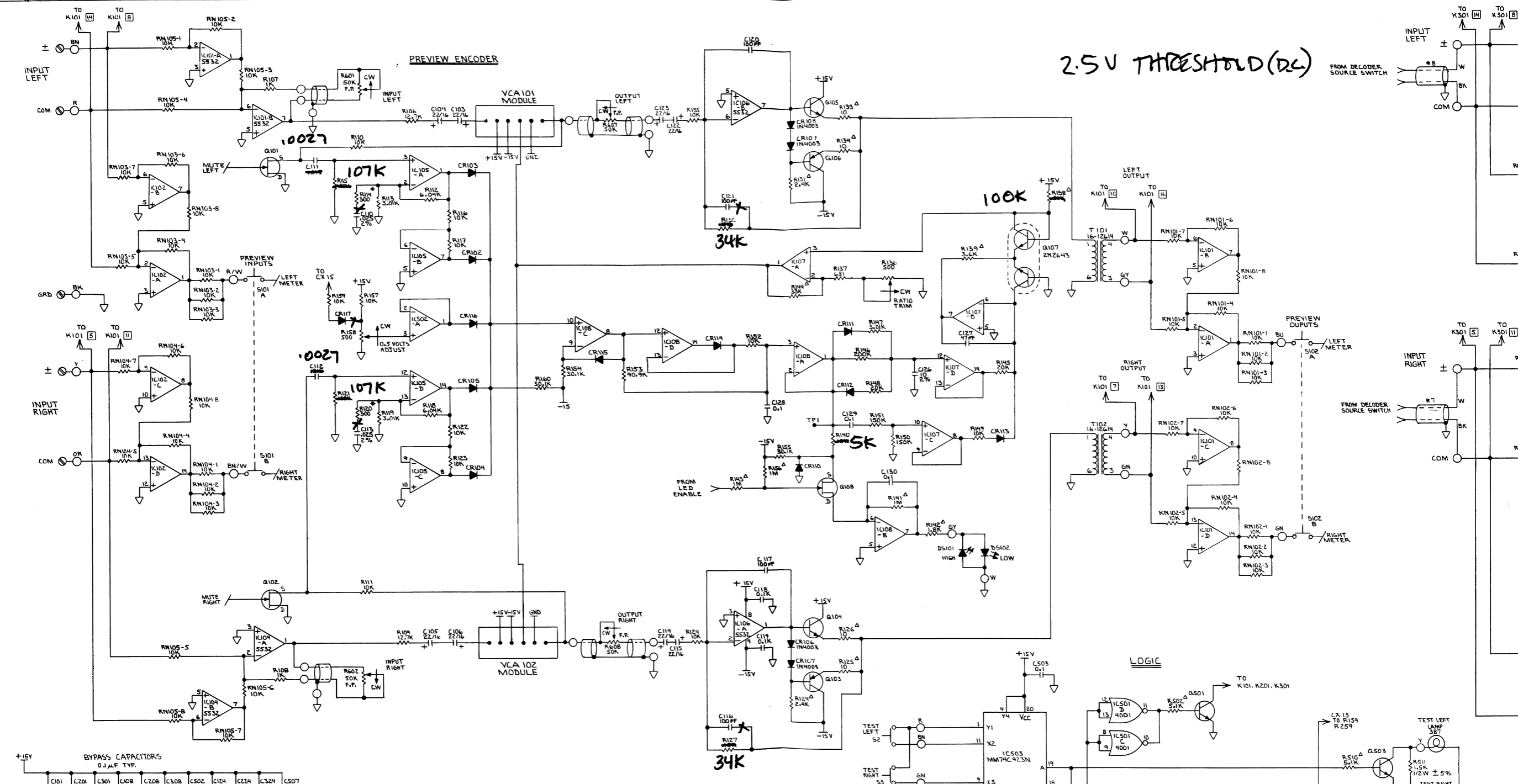
To obtain a CX encoding license (or CX playback apparatus license) or further information, please contact the Patent Counsel, CBS Technology Center, 227 High Ridge Road, Stamford, CT. 06905, telephone (203) 327-2000.

(\*) The encoding specification is essentially confirmed by using a properly operating UREI model 1181, producing a record calibrated in accordance with the instructions contained within this manual.

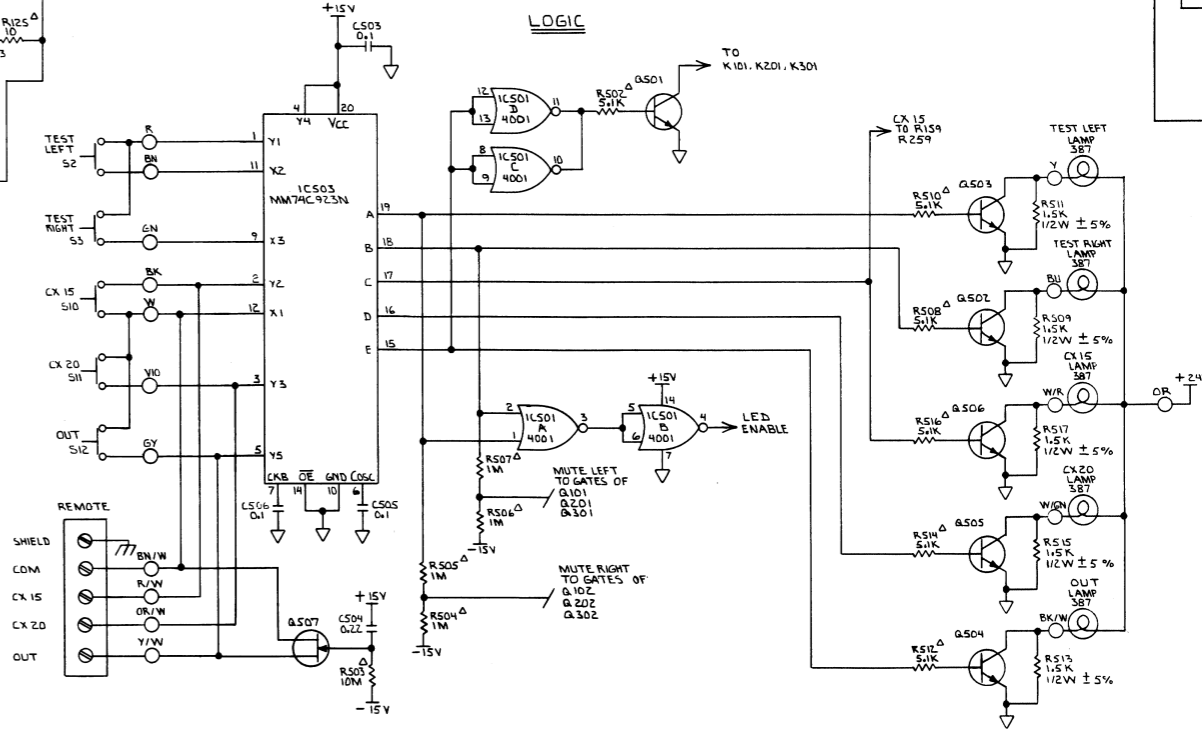
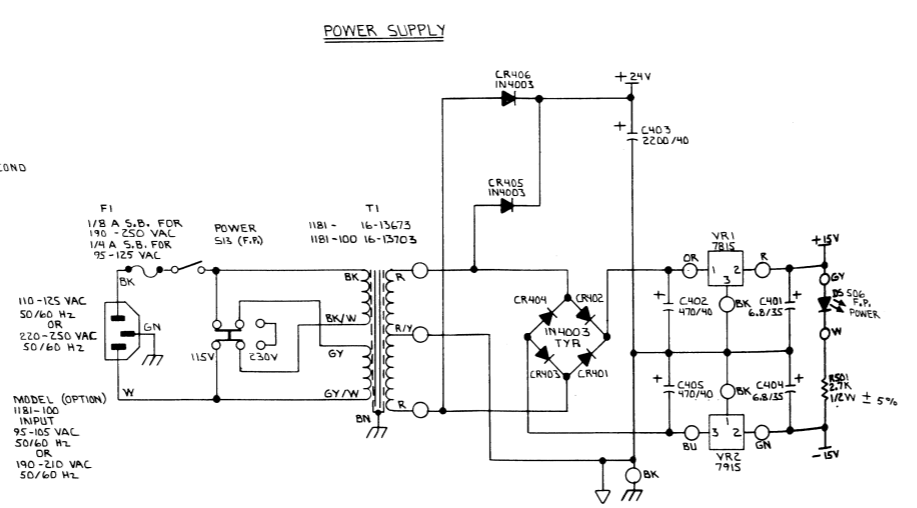




SCHEMATIC	
CX ENCODER/DECODER	
SIB# MODEL	DRAWING NO.
R 1181	13698
DR. BY: R.P. MARIN	DATE: 11-16-81

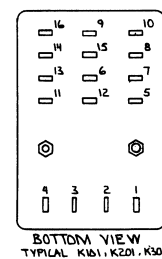
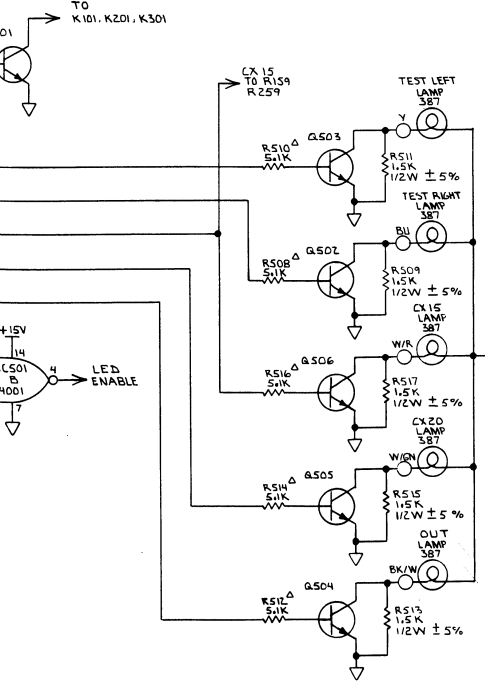
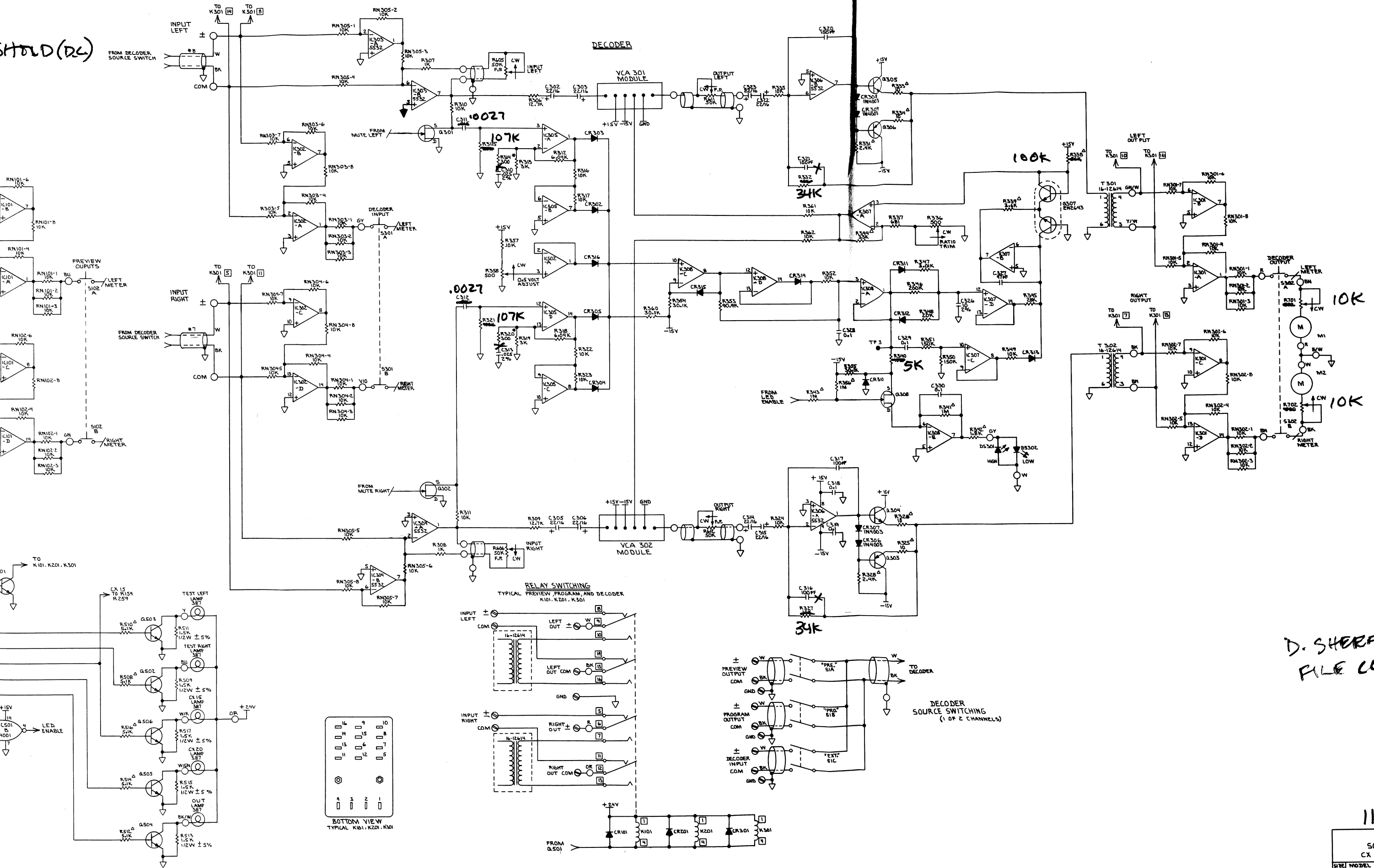


17. PROGRAM ENCODER CIRCUIT IS IDENTICAL TO PREVIEW. COMPONENT DESIGNATIONS USE ZOO SERIES NUMBERS.
16. \* DENOTES RESISTOR 1/8W ± 1% TO BE INSTALLED FOR 75 MICRO-SECOND PRE-EMPHASIS FOR VIDEO DISC.
15. ALL QUAD OP-AMPS TL084, OR EQUIVALENT.
14. ALL LED S754.
13. RXX± INDICATES ± 5% 1/4W RESISTOR.
12. [Symbol] INDICATES RELAY PIN NUMBER.
11. [Symbol] INDICATES CHASSIS GROUND.
10. [Symbol] INDICATES CIRCUIT GROUND.
9. F.R. INDICATES COMPONENT LOCATED ON FRONT PANEL.
8. [Symbol] INDICATES WIRE CONNECTION TO P.C. BOARD.
7. [Symbol] INDICATES REAR PANEL BARRIER STRIP CONNECTION.
6. ALL FETS ARE URE1 J12.
5. ALL DIODES ARE 1N4148, OR EQUIVALENT.
4. ALL PNP TRANSISTORS ARE 2N6728, OR EQUIVALENT.
3. ALL NPN TRANSISTORS ARE 2N6716, OR EQUIVALENT.
2. CAPACITOR VALUES ARE IN MICROFARADS.
1. RESISTOR VALUES ARE IN OHMS, ± 1%.

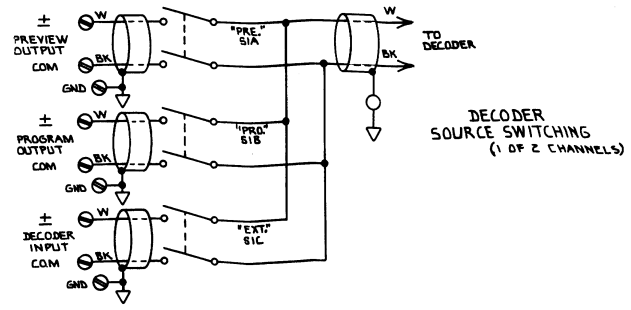
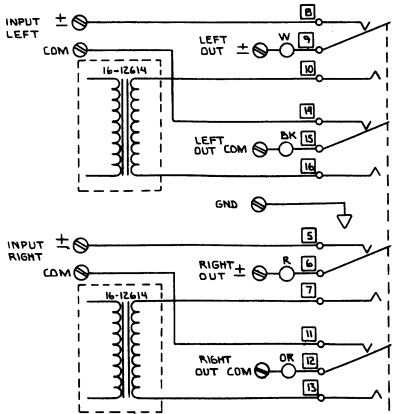


NOTES: UNLESS OTHERWISE SPECIFIED.

SHOLD (R4)



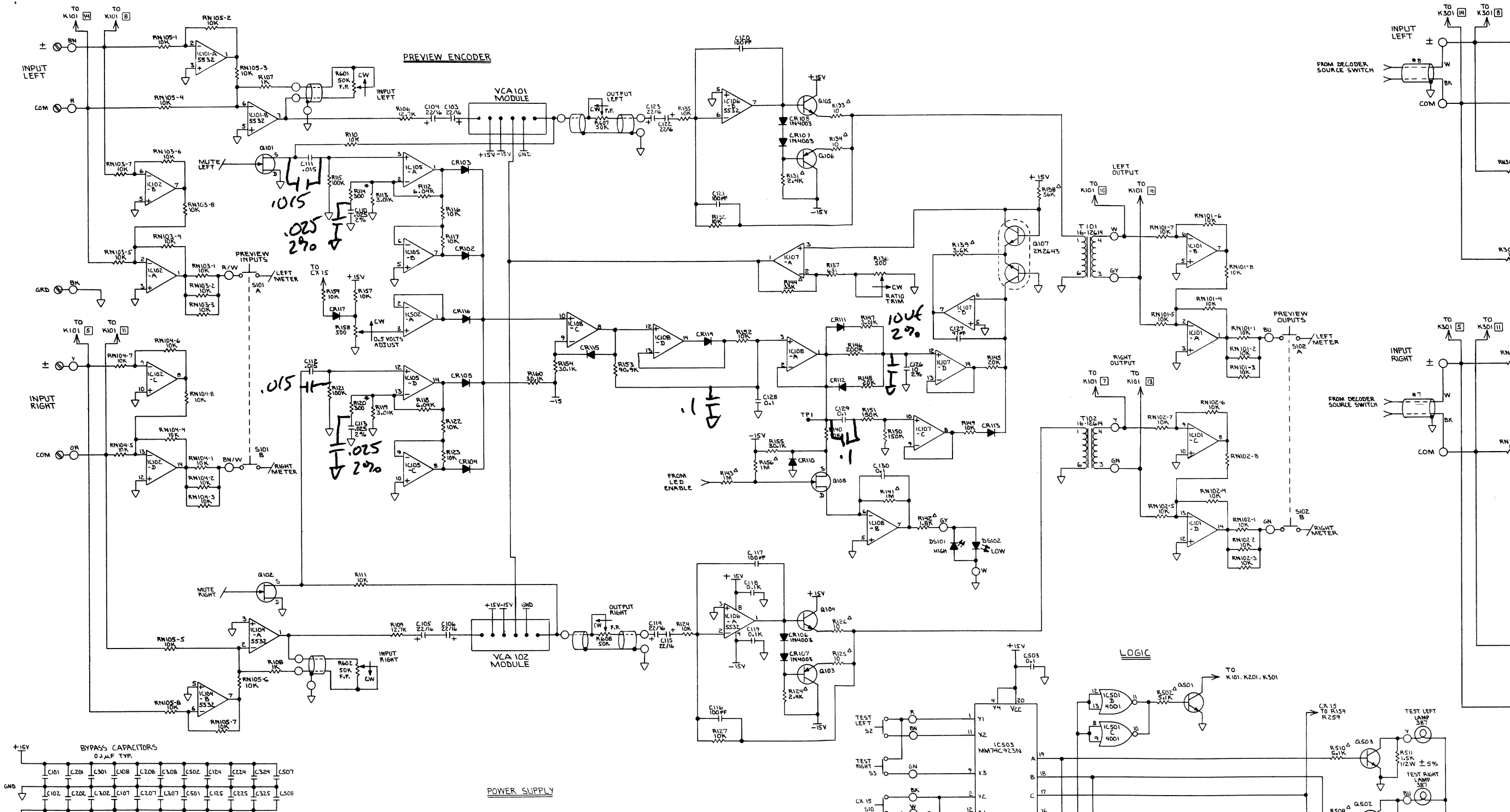
RELAY SWITCHING  
TYPICAL PREVIEW, PROGRAM, AND DECODER  
K101, K201, K301



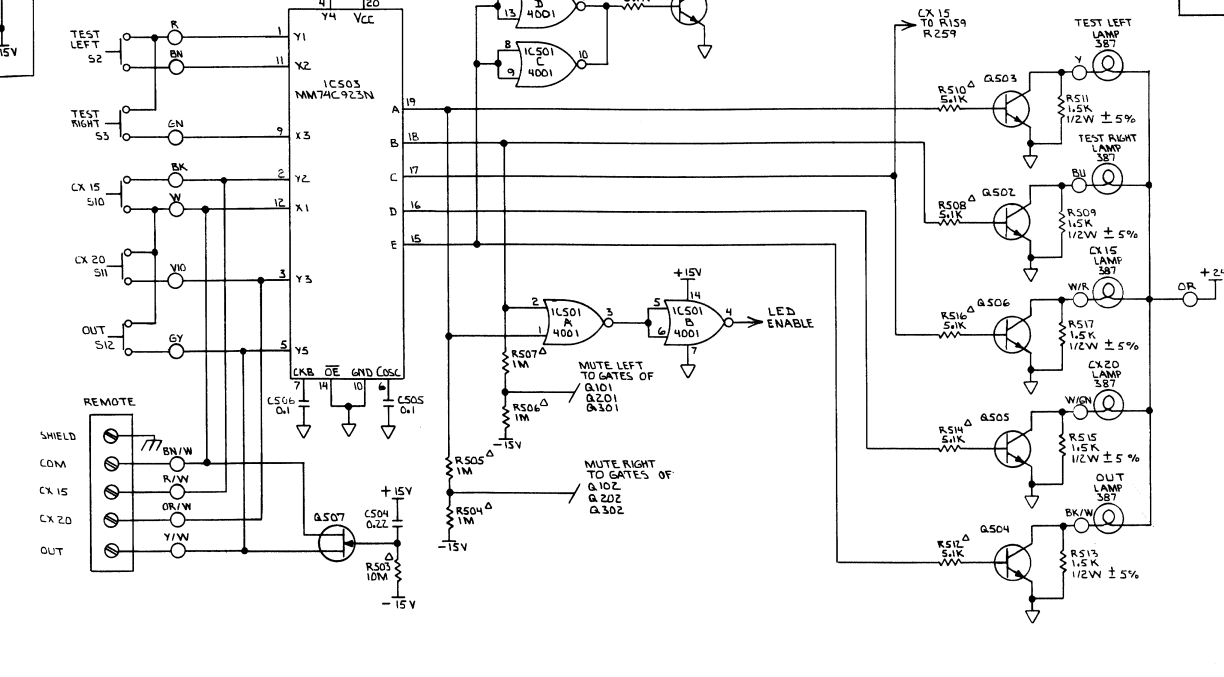
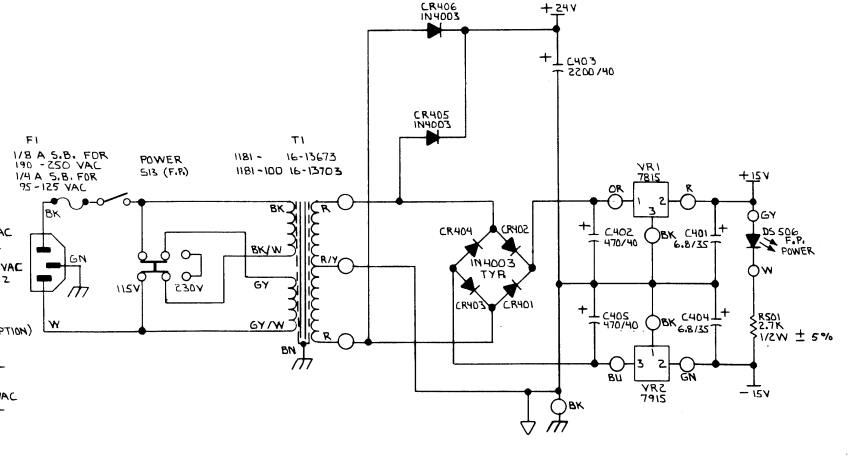
D. SHERF  
FILE COPY

1181LV

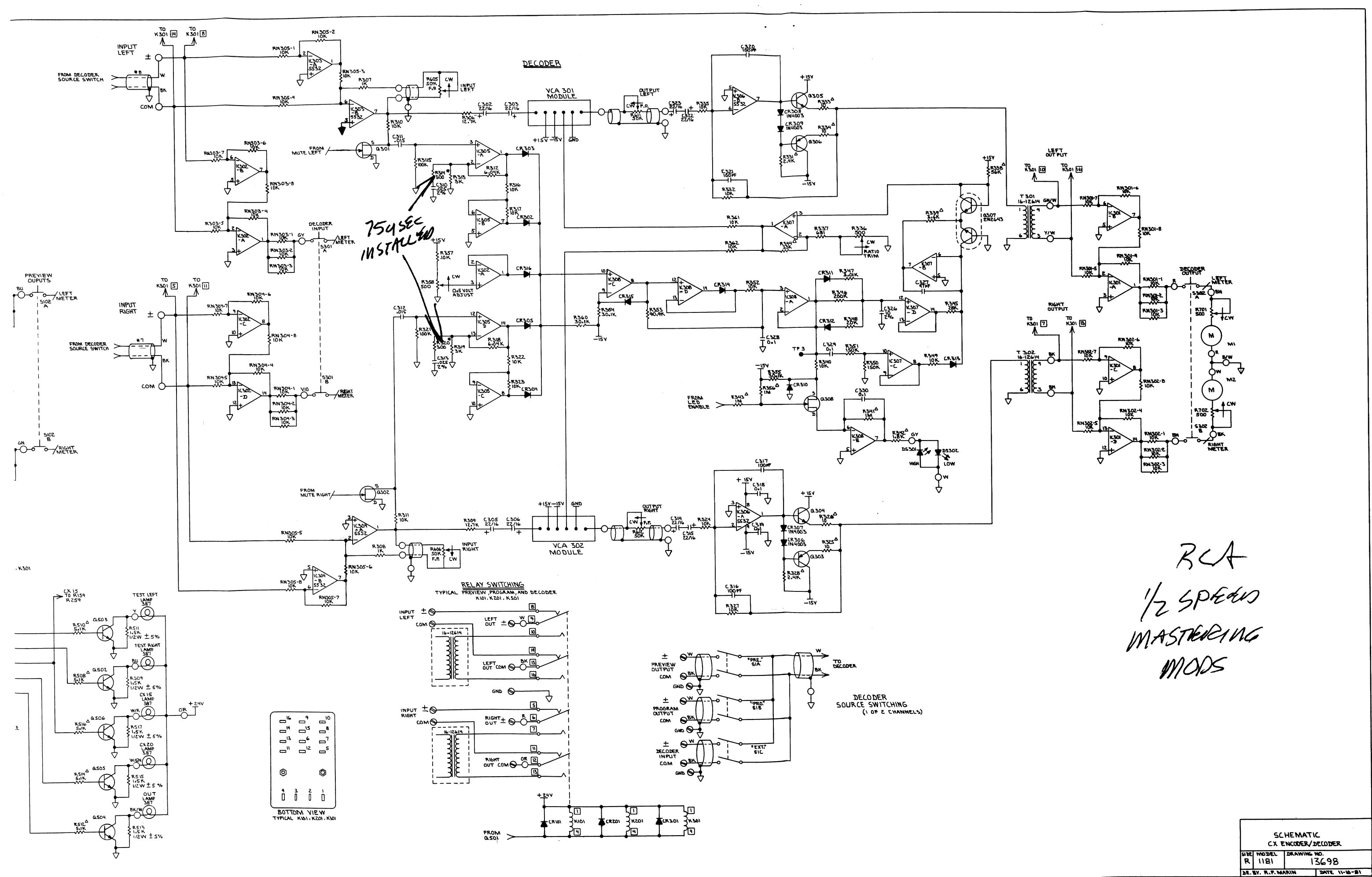
SCHEMATIC CX ENCODER/DECODER	
SIZE MODEL R 1181	DRAWING NO. 13698
DR. BY R.P. MARIN	DATE 11-10-81



- 17 PROGRAM ENCODER CIRCUIT IS IDENTICAL TO PREVIEW. COMPONENT DESIGNATIONS USE 200 SERIES NUMBERS.
- 16 \* DENOTES RESISTOR 1/8W ± 1% TO BE INSTALLED FOR 75 MICRO-SECOND PRE-EMPHASIS FOR VIDEO DISC.
- 15 ALL QUAD OP-AMPS TL081, OR EQUIVALENT.
- 14 ALL LED 5754.
- 13 RXX± INDICATES ± 5% 1/4W RESISTOR.
- 12 [16] INDICATES RELAY PIN NUMBER.
- 11 [GND] INDICATES CHASSIS GROUND.
- 10 [GND] INDICATES CIRCUIT GROUND.
- 9 F.P. INDICATES COMPONENT LOCATED ON FRONT PANEL.
- 8 [W] INDICATES WIRE CONNECTION TO PIC BOARD.
- 7 [S] INDICATES REAR PANEL BARRIER STRIP CONNECTION.
6. ALL FETS ARE URE1 J112.
5. ALL DIODES ARE 1N4148, OR EQUIVALENT.
4. ALL PNP TRANSISTORS ARE 2N4728, OR EQUIVALENT.
3. ALL NPN TRANSISTORS ARE 2N6716, OR EQUIVALENT.
2. CAPACITOR VALUES ARE IN MICROFARADS.
1. RESISTOR VALUES ARE IN OHMS, ± 1%.



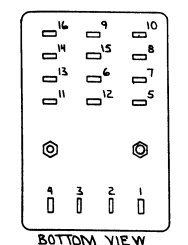
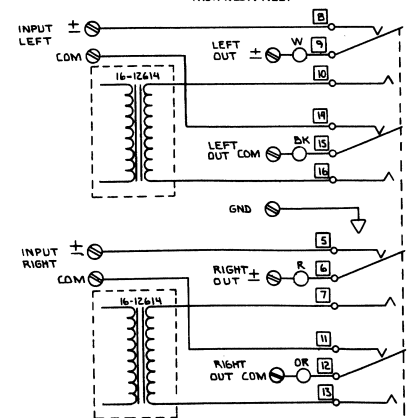
NOTES: UNLESS OTHERWISE SPECIFIED.



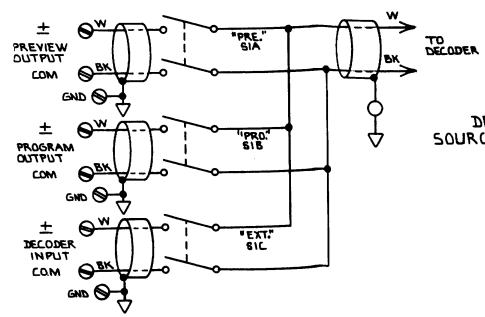
75u SEC  
INSTALLED

RCA  
1/2 SPEEDS  
MASTERING  
MODS

**RELAY SWITCHING**  
TYPICAL PREVIEW, PROGRAM, AND DECODER  
K101, K201, K301



**DECODER SOURCE SWITCHING**  
(1 OF 2 CHANNELS)



SCHEMATIC		CX ENCODER/DECODER	
SIB#	MODEL	DRAWING NO.	
R	1181	13698	
DR. BY	R.P. MARIN	DATE	11-16-81

## 1/2 speed MASTERING modification

Encode  
Mod

1. 150  $\mu$ s pre-emphasis in side chain  
Add 300  $\Omega$  resistor (R114, 120, 214, 220)  
Add .025  $\mu$ f 2% style cap in parallel w/ C110, C210, C113,
2. PARALLEL C126 & C226 with 10  $\mu$ f 2%
3. PARALLEL C128, 129, 228, 229 with .1  $\mu$ f MYLAR
4. PARALLEL C111, 112, 211, 212 with .015  $\mu$ f MYLAR

decode  
Mod

5. Add 300  $\Omega$  resistor R314, 320  
75  $\mu$ s pre-emphasis

This mod causes a threshold shift, more responsive to high frequency.  
+ 1 1/2 db at 2.154 kHz  
+ 6 db per octave from there on.

Sn 108 & 138 have complete half-speed mod  
Sn 161 & 163 have decode only half-speed mod.



SECTION III  
SET-UP AND CALIBRATION

Scope:

This procedure assures accurate adherence to the Pioneer Laser Vision noise reduction standard with regard to level matching the compression curve.

The input sensitivity is adjusted first using the input trim controls and then the output level is matched to the input for unity gain at the calibrated level. The standard calibration level is 40% modulation at 1 kHz.

Equipment Required:

1. Small screwdriver to adjust trimpots on front panel.
2. Test recording with 1000 Hz test tone at 40% modulation.

Procedure:

For this procedure the 1181 is presumed to be patched between the mastering console output and the recorder input. The decoder input should be connected to the playback output of the recording chain. These connections may be permanent without concern about affecting non - CX operation in any way, as the signal is normalled through relays when the 1181 is off or in bypass.

1. Bring up a 1 kHz tone on the output of the mastering console equivalent to 40% modulation.
2. With the 40% tone at the input of encoder press the "TEST LEFT" button and adjust preview and program left input trimpots to extinguish the "high-low" LEDs.
3. Press the "TEST RIGHT" button and adjust the preview and program right input trimpots to extinguish the high-low LEDs. This completes the preview and program input level set-up.
4. Select CX 15 mode. Press "PREVIEW INPUTS" meter switch and note the readings on left and right meters. Press the "PREVIEW OUTPUTS" meter switch and adjust the preview L and R trimpots for the same readings as at the inputs (unity gain). Caution: It's very easy and very frustrating to adjust the wrong trimpots in this step. The output pots are the bottom row. Next press the "PROGRAM OUTPUTS" meter switch and adjust the "L and R PROGRAM" outputs for a meter match to the program inputs as was done on preview.

Checking Calibration:

1. With the 40% modulation tone at the program and preview inputs, press "TEST LEFT". No LEDs should light. Press "TEST RIGHT". No LEDs should light. Press CX15.

2. Check program input levels with meters. Check program output levels with meters. They should match the inputs when the encoder inputs are at the 40% level.
3. Check preview inputs and outputs (as above).

Decoder Set-up:

1. With a 40% tone at the decoder inputs press "TEST LEFT" button and set decoder "L INPUT" trimmer to extinguish LEDs. Repeat this test for the right channel.
2. Next, set the decoder outputs (lower controls) to level match the inputs.

□X CX COMPRESSION SPECIFICATIONS FOR LASERVISION VIDEODISCS

General

To improve the dynamic range of the audio program on the laser optical videodisc, an optional companding technique is recommended. This technique has been developed by the CBS Technology Center and is known as CX. Use of this system for videodisc players or discs is only permitted if a license has been executed with the CBS Technology Center. The version of CX for LaserDisc has been modified from the standard CX for LP's or other videodisc formats, and those CX encoders/decoders will not yield optimum results for LaserDisc. The technique is compatible in that the program, if encoded in the CX format, can be played back on a decoding player or a non-decoding player. If played on a decoding player the full benefit of 14 dB noise reduction will be achieved. Playback on a non-decoding player will be completely satisfactory but will not yield noise reduction improvement.

To assure optimum compatibility between disc and player, it is essential that all disc manufacturers encoding discs for the CX process use the same reference level parameters to ensure a specific correspondence between the static compression curve of the encoder and the modulation level of the audio carriers on the videodisc. Similarly, all player manufacturers incorporating CX decoders should arrange operating levels to match the prescribed disc characteristic.

Encoding Characteristics

1. Statics

The static encoding characteristic of the CX system, optimized for LaserDisc use is shown in Figure 1. The figure describes the static gain relationship between the input signal level to the encoder, in dB, referenced to standard operating level, and the audio subcarrier modulation in dB re 100% modulation. Note that the modulator gain should be adjusted such that standard 0 db operating level at 1 KHz produces 40% modulation  $\pm 0.5$  dB ( $\pm 40$  KHz deviation) and at the limit, + 16 dB input will produce 100% modulation ( $\pm 100$  KHz deviation)  $\pm 0.5$  dB.

The diagram also indicates that the "knee", the point on the compressor characteristic curve below which a 1:1 gain correspondence exists between input and output, should occur 28 dB  $\pm 0.5$  dB below standard operating level.

Input Signal to Compressor, measured at 1kHz  
 (in dB Re "0 db" Operating Level)

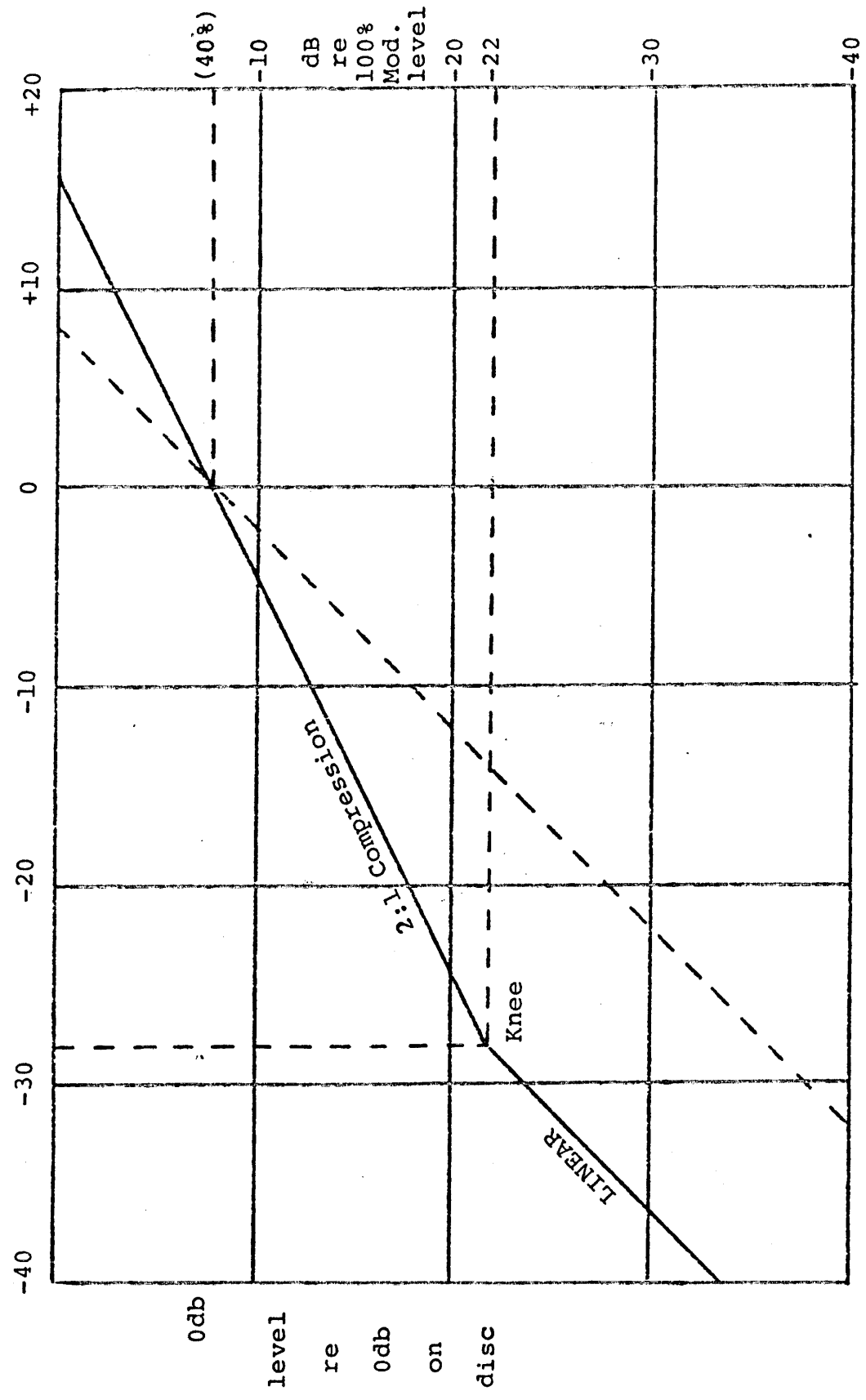


Figure 1 CX Static Encoding Characteristics

## 2. Dynamics

To ensure compatibility between encoding and decoding it is also necessary to match the dynamics between compression and subsequent expansion. These parameters are defined with reference to Figure 2A (encoder block diagram) and Figure 3, a simplified circuit diagram of the control portion of the CX system. These parameters are:

1. Control High Pass Filter (C25, R81):  $f_c = 500 \text{ Hz} \pm 5\%$
2. Fast Rectifier Attack Time (C27, R100):  $= 1 \text{ msec} \pm 5\%$
3. Fast Rectifier Release Time (C27, R99 + R100):  $= 10 \text{ msec} \pm 5\%$
4. Slow Rectifier Attack Time (C29, R105):  $= 30 \text{ msec} \pm 5\%$
5. Slow Rectifier Release Time (C29, R107):  $= 200 \text{ msec} \pm 5\%$
6. Low Level Integrator (C29, R106):  $= 2 \text{ sec} \pm 5\%$
7. Attack Compensator Decay Time (C28, R108 + R109):  $= 30 \text{ msec} \pm 5\%$
8. In order to ensure proper transitions between different time constant attack and decay times, a fixed relationship should exist between diode forward voltage drops and the audio operating level. This relationship is established by providing the proper control path gain for specific diode types. With the application of a 1 KHz standard operating level signal, the DC control voltage (at TP-1, Figure 2) should be  $3.85 \pm 10\%$  times greater than the forward voltage drop of the diodes CR 12, 13, 14.

## Engineering Practice

1. In order to prevent overloading of either audio transmission channels or the control voltage, a headroom of 16 dB should be maintained above "0" operating level.
2. At no time should the peak modulation level be allowed to exceed 150% (+ 150 KHz). A hard limiter should be used after the preemphasis network in the mastering machine to accomplish this objective.
3. The purpose of the CX process is to prevent the deterioration of the program noise floor due to noise contributions from the videodisc process. For this to be effective, the signal to noise ratio of material presented to the CX Encoder should be at least 70 dB with CCIR 468-2 and ARM metering.

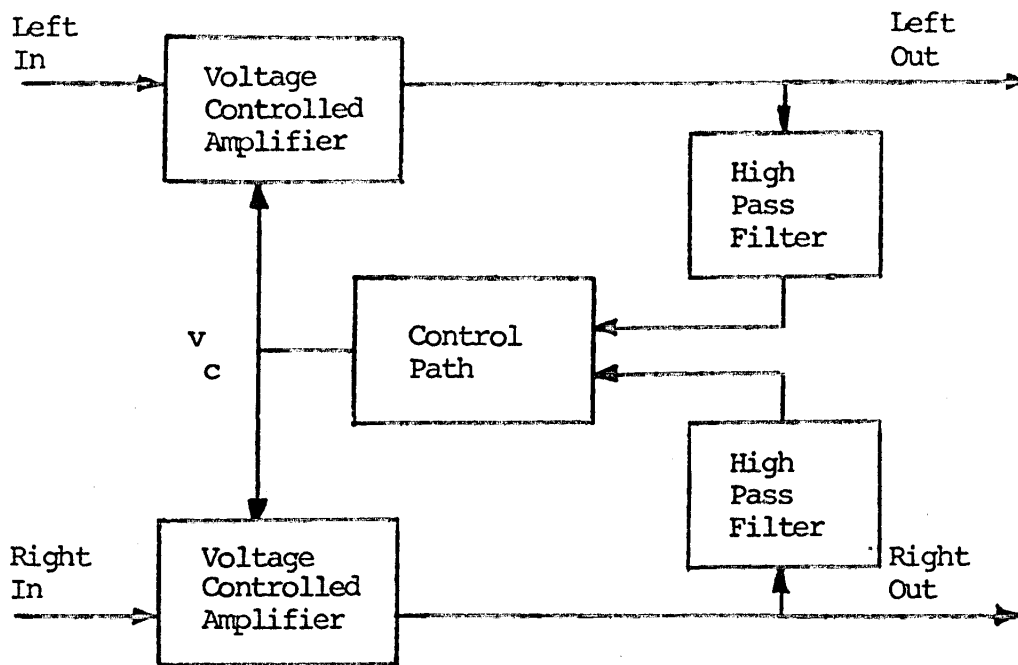


Figure 2A Block Diagram of Encoder

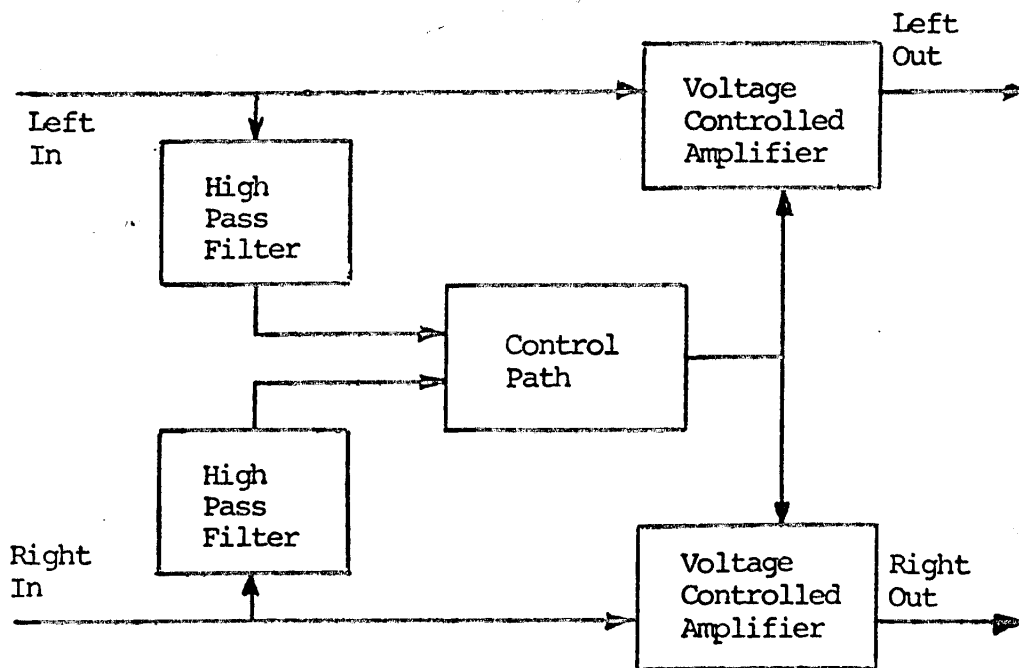


Figure 2B Block Diagram of Decoder

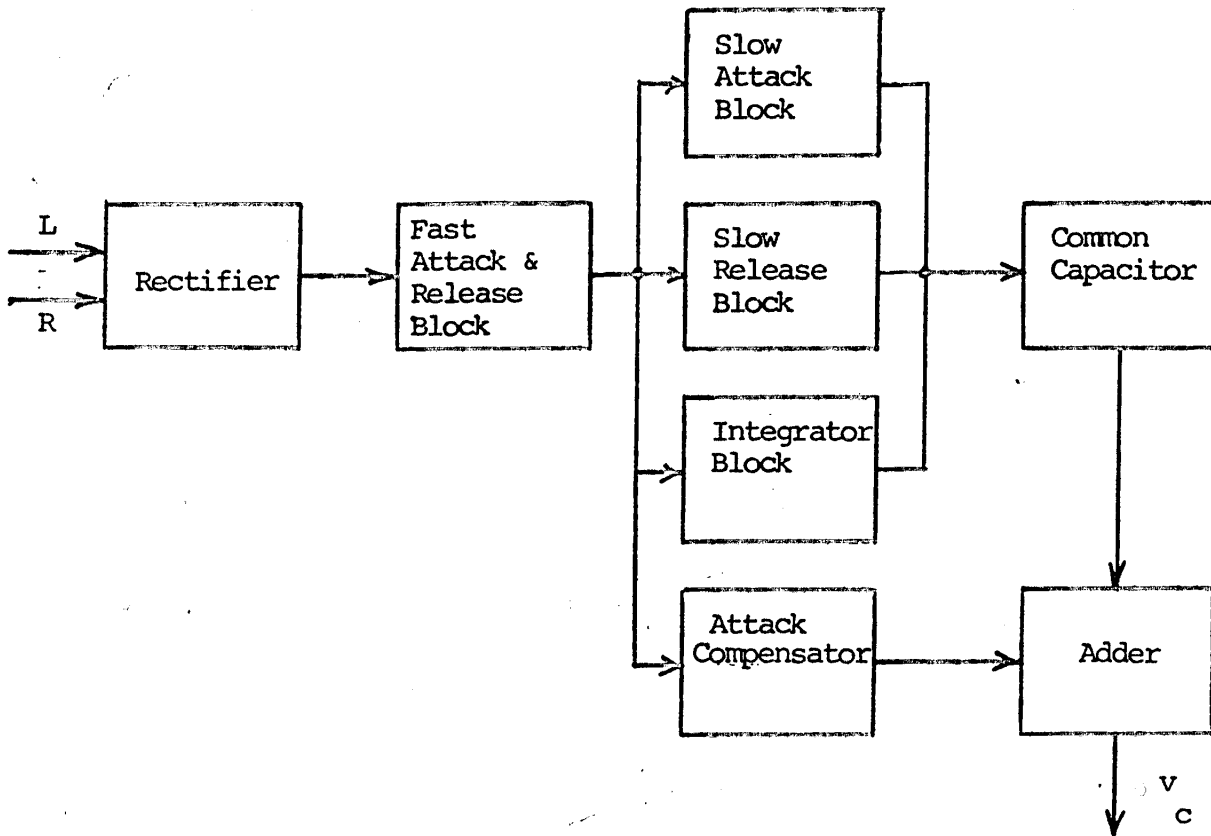


Figure 3 Block Diagram of Control Path

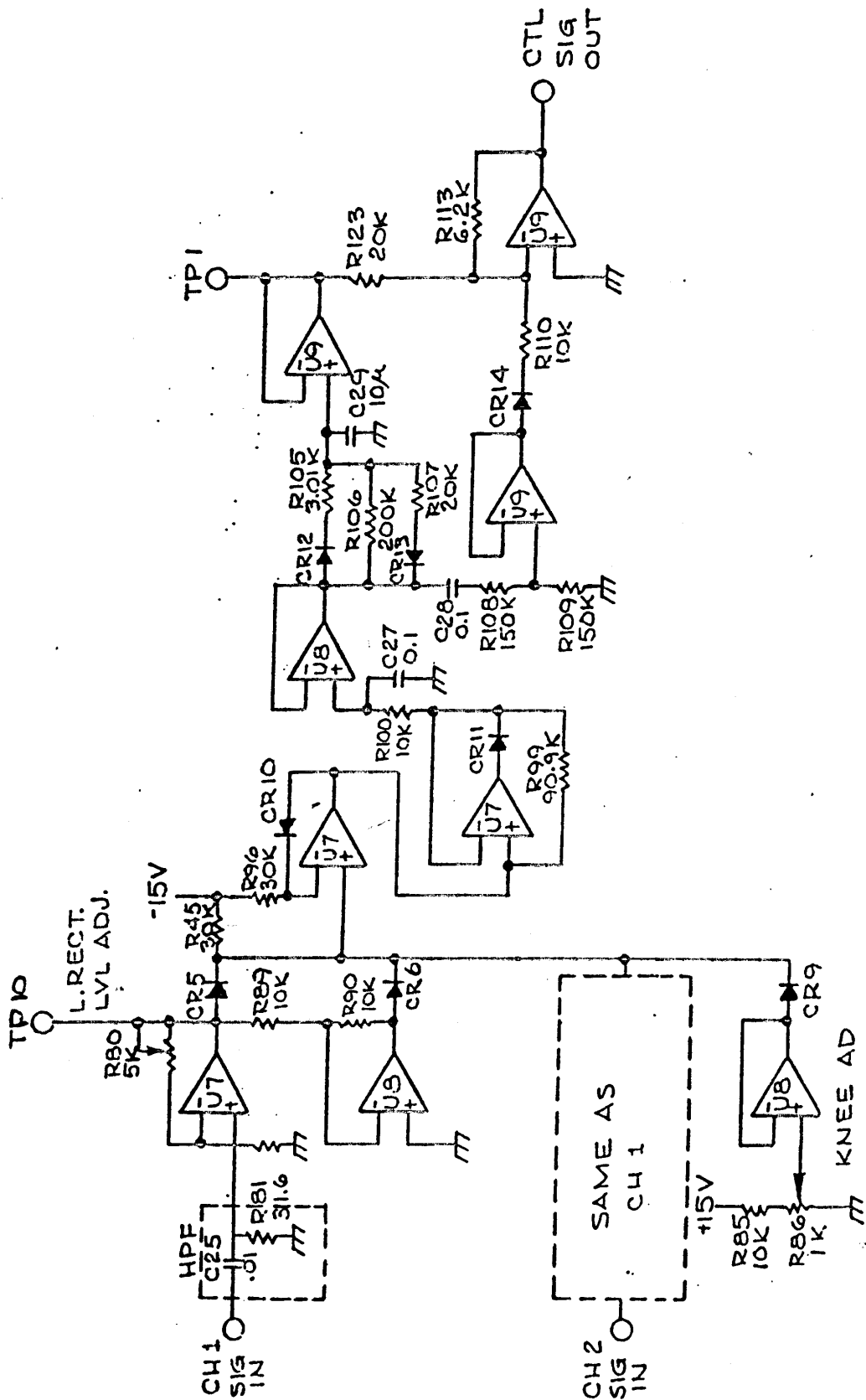


Figure 4. CX Control Logic.



## ☒ CX EXPANSION SPECIFICATIONS FOR LASERVISION VIDEODISCS

### 1. Statics

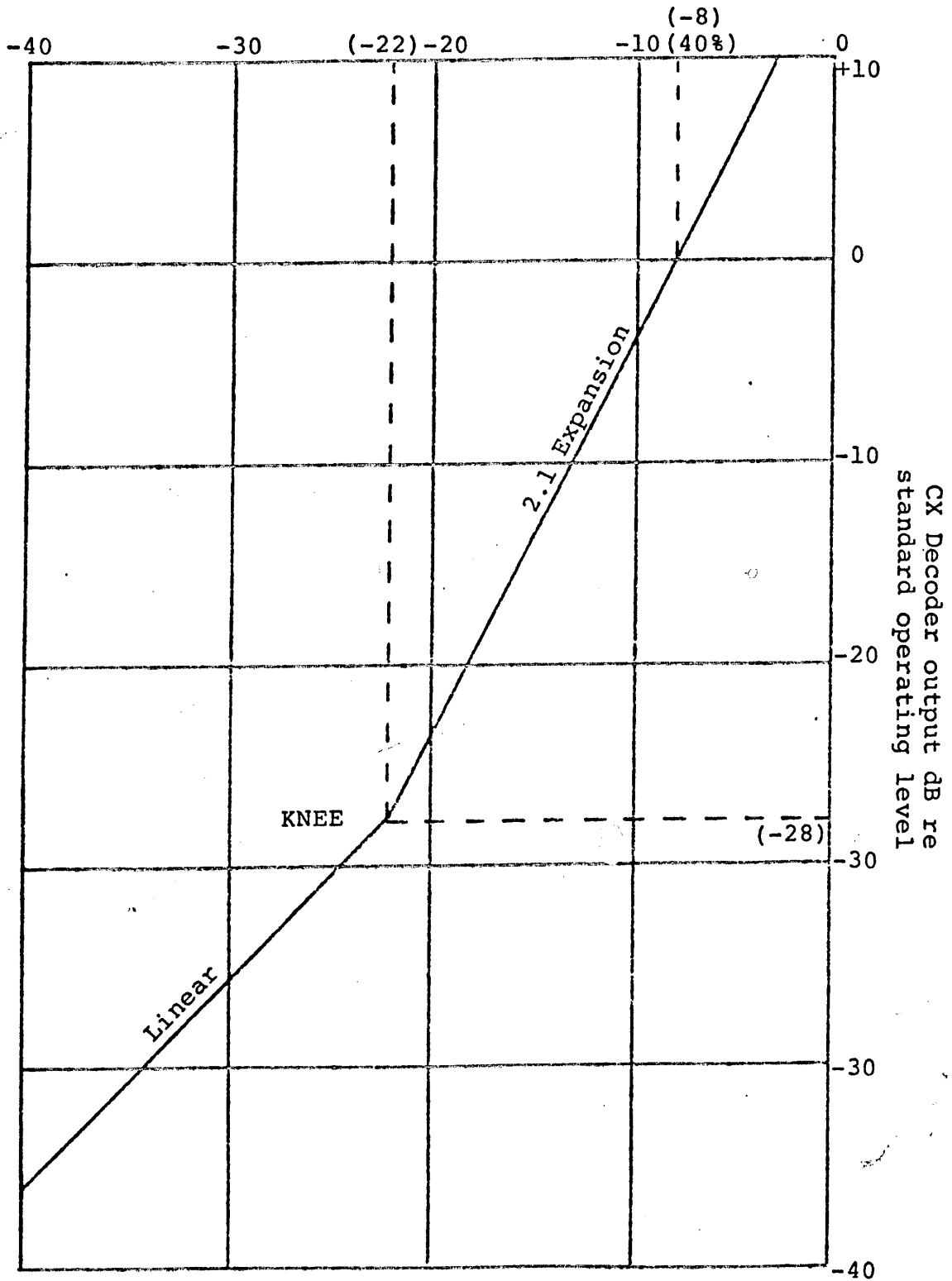
The static decoding characteristic of the CX system optimized for videodisc use is shown in Figure 4. The figure describes the static gain relationship between the output of the audio demodulator in dB referenced to the level at 100% modulation and the output of the decoder after deemphasis in dB referenced to standard operating level. Note that the knee, the point at which the decode characteristic switches to linear operation, occurs at an audio demodulator output 22 dB below the 100% modulation reference point (+ 1 dB).

### 2. Dynamics

The time constants associated with the circuits which control the dynamics of the decoding process must agree with the time constants employed in the encoding process. These time constant specifications referenced to Figures 2B (the decoder block diagram) and Figure 3 (the CX control logic) are as follows:

1. Control High Pass Filter (C25, R81)  $f_c = 500 \text{ Hz} \pm 5\%$
2. Fast Rectifier Attack Time (C27, R100):  $= 1 \text{ msec} (\pm 15\%)$
3. Fast Rectifier Release Time (C27, R99 + R100):  $= 10 \text{ msec} \pm 15\%$
4. Slow Rectifier Attack Time (C29, R105):  $= 30 \text{ msec} \pm 15\%$
5. Slow Rectifier Release Time (C29, R107):  $= 200 \text{ msec} \pm 15\%$
6. Low Level Integrator (C29, R106):  $= 2 \text{ sec} \pm 15\%$
7. Attack Compensator Decay Time (C29, R108 + R109):  $= 30 \text{ msec} \pm 15\%$
8. In order to ensure proper transitions between different time constant attack and decay times, a fixed relationship should exist between diode forward voltage drops and the audio operating level. This relationship is established by providing the proper control path gain for specific diode types. With the application of a 1 kHz standard operating level signal, the DC control voltage (at TP-1, Figure 2) should be  $3.85 \pm 10\%$  times greater than the forward voltage drop of the diodes CR 12, 13, 14.

Audio Demodulator Output  
(dB Re 100% Modulation)



4  
Figure 5. CX Decoding Gain Characteristic