Film-Tech

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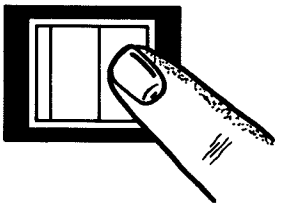
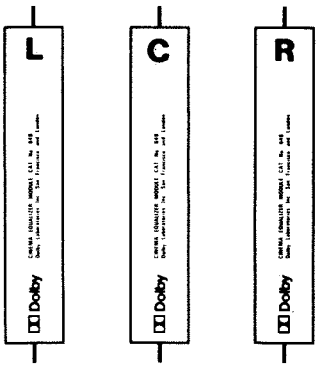
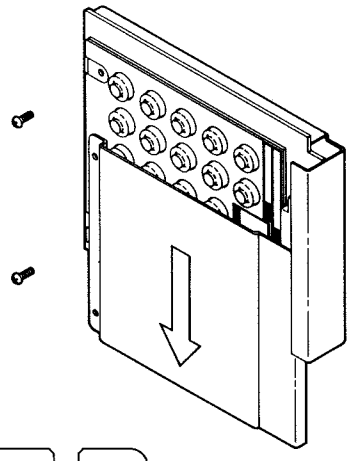
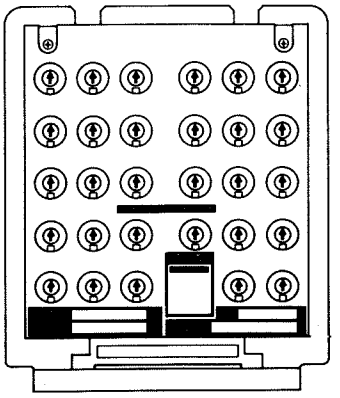
SECTION 5
B-CHAIN ALIGNMENT

a. Setting Room Equalization

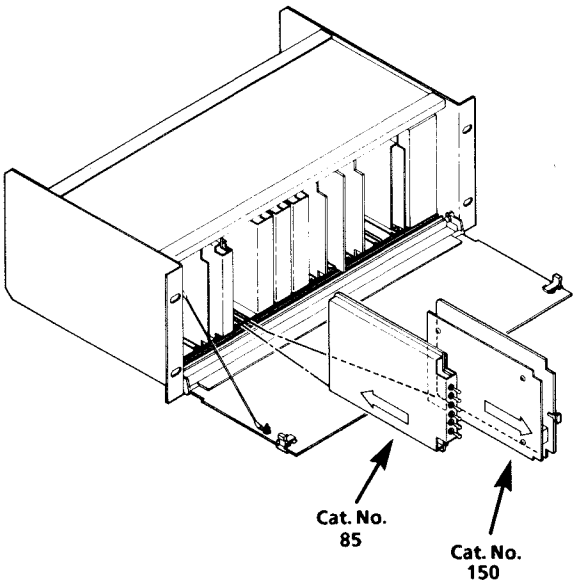
B-Chain Alignment Procedures

Step No.	Action	Indication
1	NORMAL BYPASS 	bypass (switch behind panel)
2		
3	 	

Notes
Open the front panel and place the **NORMAL/BYPASS** switch in the **BYPASS** position so power is removed from the Cat. No. 64 Equalizer modules and the loudspeakers are protected. The **BYPASS** LED should be flashing.
Use the labels that are furnished with the CP55 to mark the three Equalizer modules as **L**, **C**, and **R** respectively. The labels make it easy to restore the modules to their correct positions after they have been removed.
Remove all of the marked Equalizer modules. Remove the shield cover from each equalizer and verify that all of the equalizer controls are set to the mid-position (12 o'clock). Replace the screws then plug each of the equalizer modules with its cover removed back into the CP55 in its proper slot.

a. Setting Room Equalization

B-Chain Alignment Procedures

Step No.	Action	Indication
4		
5		

Notes

Remove the Cat. No. 150 Card. Note that when the Cat. No. 150 card is removed, two card edge connectors are exposed on the backplane and that another slot to the immediate left of the Cat. No. 150 slot is accessible. This second slot and associated connector are for the Cat. No. 85 Pink Noise Generator.

Install the Cat. No. 85 Pink Noise Generator in the special slot to the left of the Cat. No. 150 slot. The switches in the Cat. No. 85 are **up** or **down** for **ON** and **center** for **OFF**. The phase is positive when the switches are in the **up** position and negative in the **down** position.

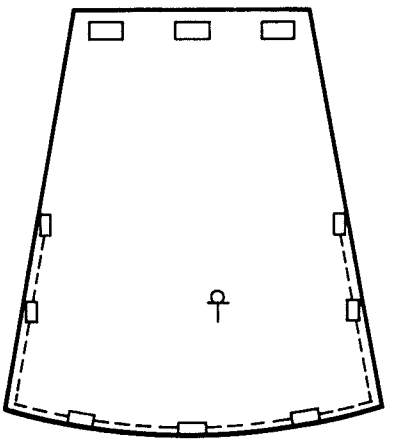
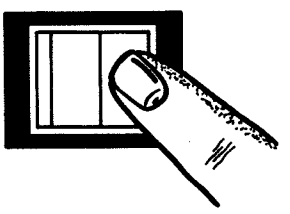
Loudspeakers and Crossovers

Thoroughly check the loudspeakers and power amplifiers for sources of poor performance:

- Rattles (a leak in the woofer cabinet may appear to be a rattle)
- Loose bolts or other hardware
- Open drivers
  In systems with pairs of drivers -- woofers or tweeters -- one of the pair may be open but the system will still function. Check the speakers with an ohmmeter. If one channel requires markedly more equalization than the other or if one speaker overloads at lower levels than the other speakers, an open driver circuit could be the cause.
- Missing drivers or other components
- The settings of the crossovers to match the type of drivers in use and the acoustics of the theater
  The tweeter level control must be set for the best possible frequency response with the Cat. No. 64 controls all at mid-point before you attempt any equalization. (The same procedures should be followed if the system uses active crossovers with bi-amp equipment.) This check should be made with a real time analyzer.
- Phasing between the woofers and tweeters, and between the channels (see Appendix A).

a. Setting Room Equalization

B-Chain Alignment Procedures

Step No.	Action	Indication
5 CONT'D		
6		
7	NORMAL BYPASS 	bypass (switch behind panel)

Notes

Amplifiers

- Distortion.
- Gross gain differences among amplifiers.
  If one amplifier differs in performance from the others, it should be checked and repaired, if necessary, before proceeding further. Input gain controls should all be at the same setting.
- Blown fuses.
  Some types of power amplifiers operate at very low gain and distortion even if fuses are blown.
- Good air movement through power amplifiers.

General

If air-conditioning noise is audible in the theatre, arrange for lubrication of the motor, fan bearings and adjustment of belts and drives to reduce the ambient noise to a minimum.

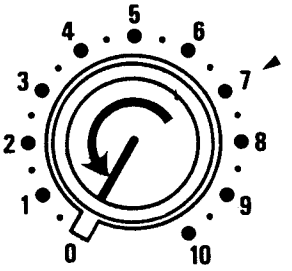
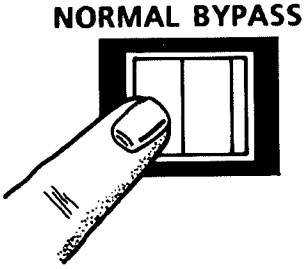
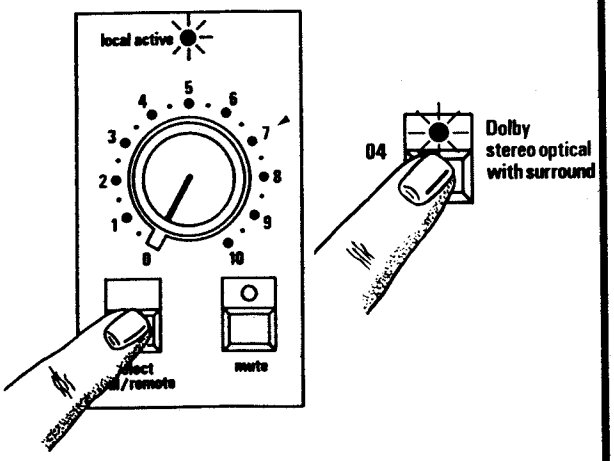
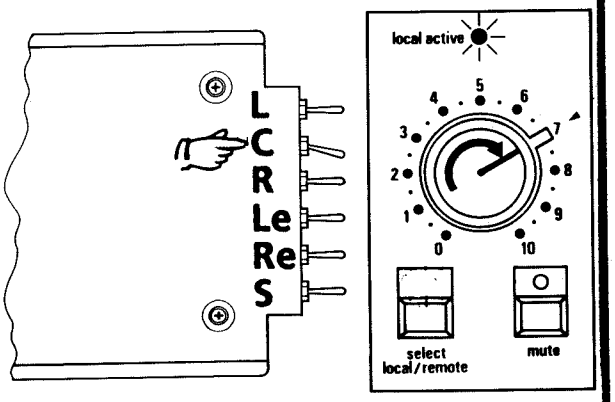
Set all the gain controls on all power amplifiers to a known repeatable setting, but do **not** turn amplifiers on. The preferred setting for the amplifier gain controls is maximum. If a different setting is required in order to optimize the noise performance of the system, the controls should be locked in position or marked clearly.

Position a calibrated microphone in the theatre. The recommended position is shown in the diagram -- 2/3 of the way from the front speakers to the rear -- but off the axis of the center speaker -- 5 feet off the floor level-- and angled 45 degrees upward toward the screen. Connect the microphone to the RTA.

Open the front door of the CP55 and ensure that the **NORMAL/BYPASS** switch is in the **BYPASS** position. Turn power **ON** to the power amplifiers.

a. Setting Room Equalization

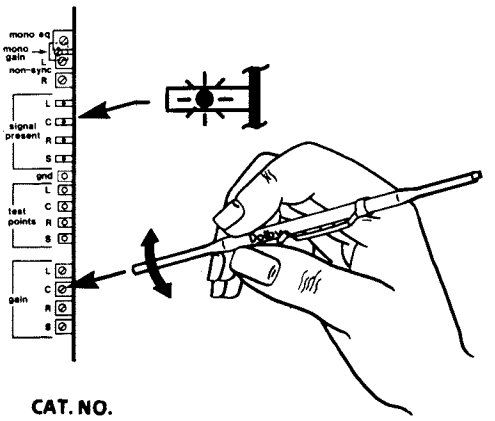
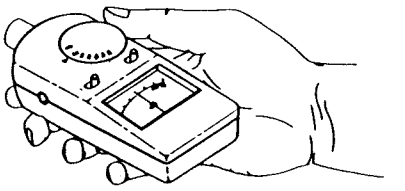
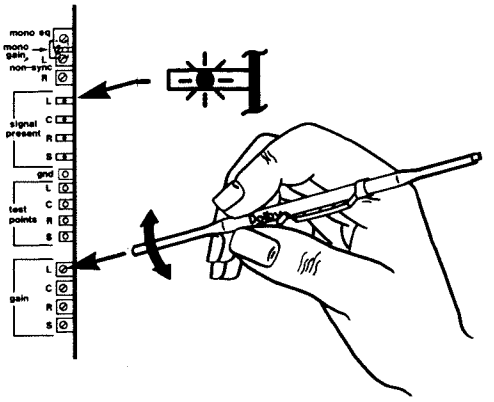
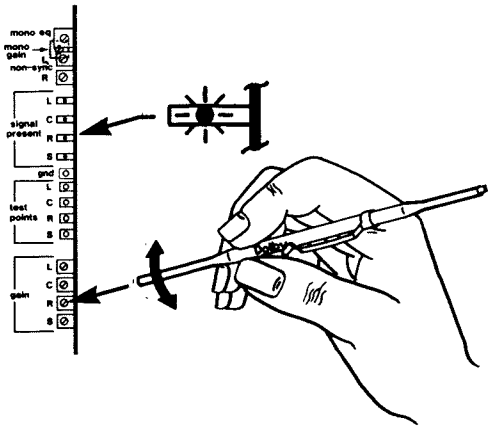
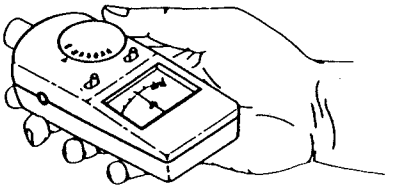
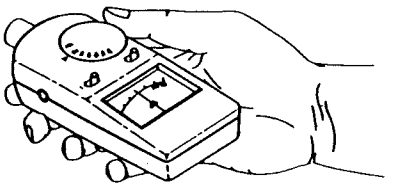
B-Chain Alignment Procedures

Step No.	Action	Indication
8		
9		
10		
11		

Notes
Set the fader to the **0** position.
Set the **NORMAL/BYPASS** switch to the **NORMAL** position.
Verify that the fader **local active** LED is on. If necessary, press the **select local/remote** switch. Press the **04 Dolby stereo optical with surround** switch; the LED in the switch should light.
Switch on the center channel pink noise on the Cat. 85 Pink Noise Generator (**C** switch up or down). Slowly advance the fader control to position **7**. You should hear pink noise.

a. Setting Room Equalization

B-Chain Alignment Procedures

Step No.	Action	Indication
12	 CAT. NO. 242	75–80 dBC 
13	REPEAT 11 → 12  	75–80 dBC  75–80 dBC 

Notes

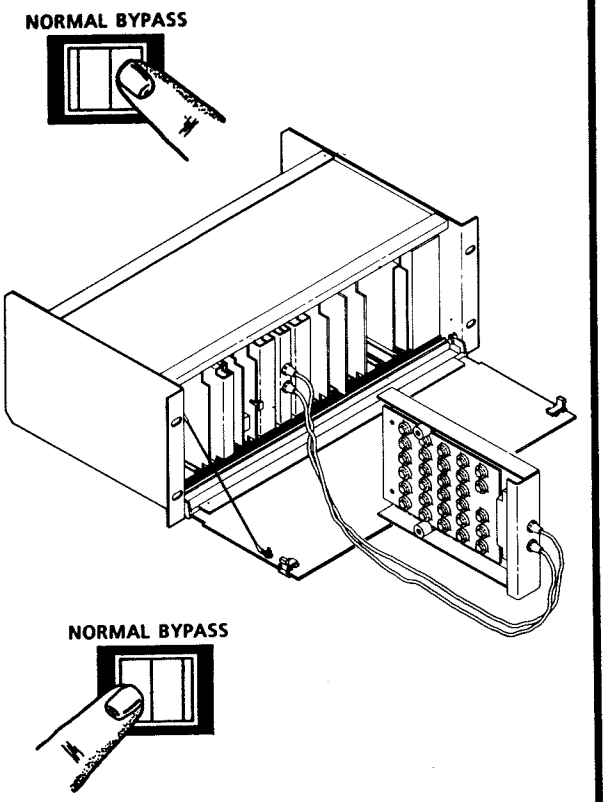
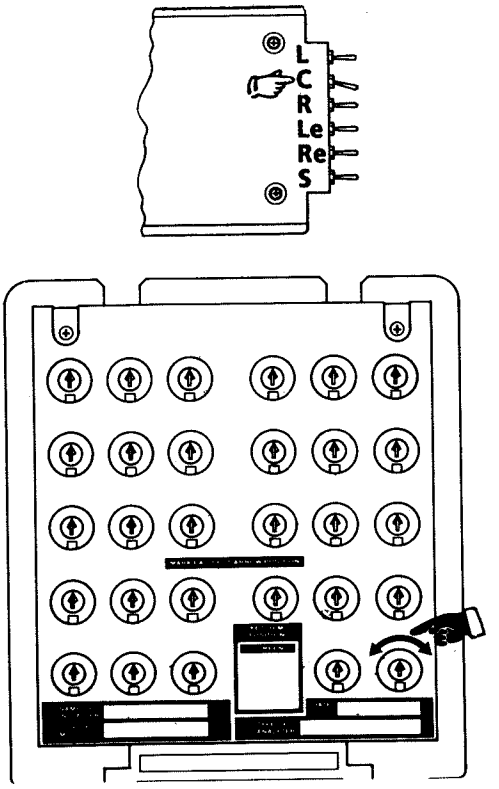
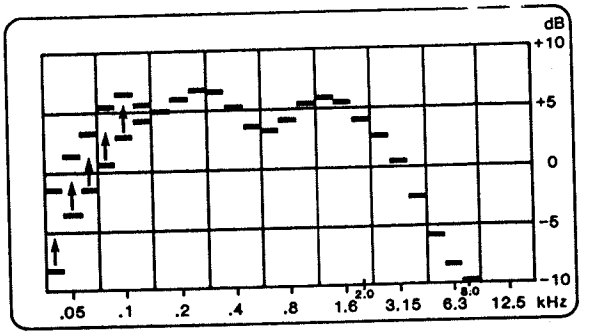
With a sound pressure level meter located at the position in the theatre used for step 6, adjust the center channel gain on the Cat. No. 242 card until the channel produces a reading of 75-80 dBC. (After room equalization for all channels is set, the sound pressure level will be set to 85 dBC.) The pink noise should be at least 20 dB above the background noise level of the theatre. A row of four LEDS, **signal present L, C, R** and **S,** is on the front edge of the Cat. No. 242 card. Each LED indicates the presence of signal for the appropriate channel and lights intermittently when pink noise is sent through the system from the Cat. No. 85 or from a film.

Repeat steps 11 and 12 for the left and right channels. Switch on the appropriate pink noise switch on the Cat. No. 85 pink noise generator, one channel at a time.

Compare the response displayed on the real time analyzer (RTA) for each channel (L, C, R). All should show a similar shape. Any large differences indicate faulty or misaligned crossovers or defective speakers. Speaker phasing could also be at fault. See Appendix A.

a. Setting Room Equalization

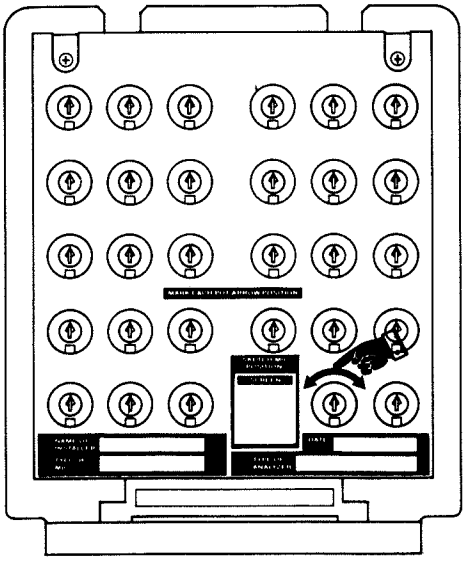
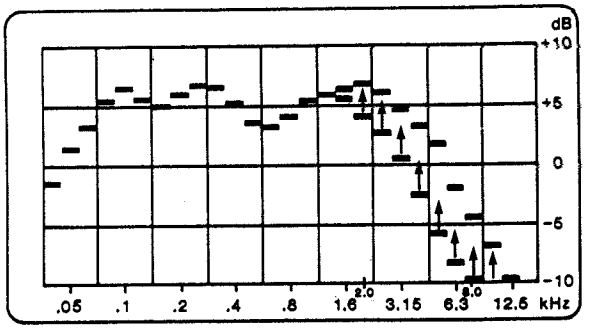
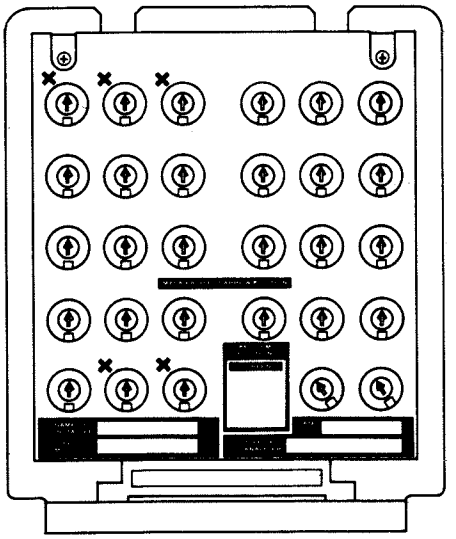
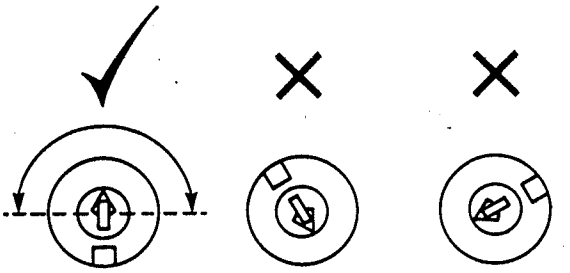
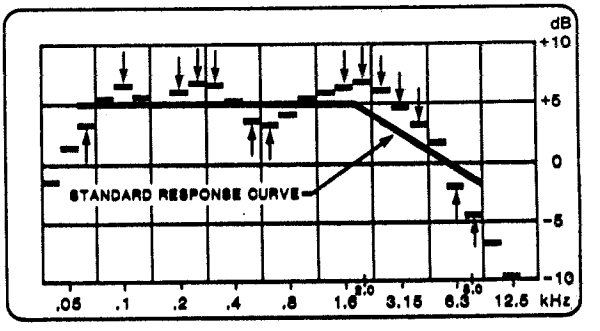
B-Chain Alignment Procedures

Step No.	Action	Indication
14		bypass (switch behind panel) 04 Dolby stereo optical with surround
15		

Notes
Change the **NORMAL/BYPASS** switch to the **BYPASS** position. Remove the center channel Cat. No. 64 equalizer module and plug the Cat. No. 67 extender in its slot. Then plug the equalizer module into the free end of the extender. Restore the switch to the **NORMAL** position and make certain the **format** switch is still in the **04** position.
Turn on the center channel only on the Cat. No. 85. While observing the RTA display, adjust the **bass** control on the Cat. No. 64 so the bass frequency response is approximately flat. Once you set this control,do not change the setting during the rest of the room equalization procedure.

a. Setting Room Equalization

B-Chain Alignment Procedures

Step No.	Action	Indication
16		
17	 *Do not adjust	 

Notes

While observing the frequency response curve on the RTA, adjust the **treble** control on the Cat. No. 64 for a flat response as close as possible up to 2 kHz, followed by a 3 dB per octave roll-off above 2 kHz (the frequency response specified in ISO Standard 2969). Once you set this control, do not change the setting during the rest of the room equalization procedure.

The next step is to fine-tune the equalization by adjusting the third-octave controls on the Cat. No. 64 equalizer. There are certain rules to keep in mind:

The object is to achieve the final adjustment of room equalization with all of the controls as close to the 12 o'clock position as is possible.

All of the equalizer controls interact with each other so you cannot start at the low end of the response curve and merely work your way to the high end. As each control is adjusted, the response obtained by adjustment of adjacent controls is affected.

Start at the center frequency and attempt to achieve results with cut rather than with boost. The desired curve is a flat frequency response up to 2 kHz,falling at 3 dB per octave to 8 kHz (1dB per third-octave band). Do not change the position of the 50 Hz or 40 Hz band controls nor turn the controls for bands above 8 kHz. This protects the loudspeakers and power amplifiers from damage and prevents distortion of the reproduced sound.

If woofer systems designed on Thiele and Small principles are installed in the theatre (vented-box direct radiator enclosures), moderate bass equalization down to 40 Hz may be used.

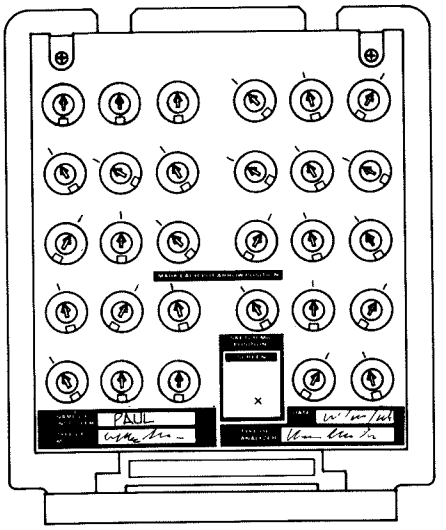
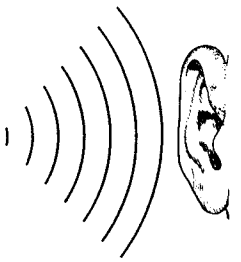
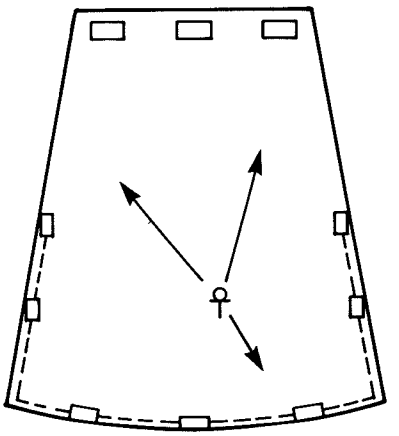
Once an adjustment seems OK, work on the frequencies to either side of it. You may find that a cut at one frequency is followed by a slight boost at adjacent frequencies.

Control settings should not fall outside the band between the 9 o'clock and the 3 o'clock positions. Avoid diametrically opposed adjacent control settings.

Adjust for the response that is closest to the curve shown. The diagrams show a typical equalization procedure, from the response before equalization to the final equalization.

a. Setting Room Equalization

B-Chain Alignment Procedures

Step No.	Action	Indication
18		
19		
20	 REPEAT 17	

Notes

When equalization is completed, the average of the 27 third-octave band controls should be approximately 12 o'clock (not mostly up or down). If you find the controls are set differently, repeat the equalization procedure until you obtain the proper equalization; settings that diverge from this average may result in unpleasant sound.

Although the equalization may be set correctly for the chosen microphone position, it still may not be correct for providing the best sound to the greatest number of seats in the theater. You should therefore check the sound quality at several locations (three or more) in the auditorium with the calibrated microphone and RTA system. If time does not permit this procedure, walk around the theater with pink noise playing. If necessary, adjust the equalizer for a compromise at several seat positions so that all of them sound acceptable.

Mark the settings for each control on the white card provided inside the Cat. No. 64 module.

If the sound quality varies significantly as you walk around, the equalization has not been adequate:

You may have overequalized. Check the positions of the controls; all should be as close to 12 o'clock as possible.

There may be phase shift present if the adjacent controls are pointed in opposite directions, especially if you did so to eliminate a sharp dip that resulted from physical problems in the auditorium (horn location, speaker orientation).

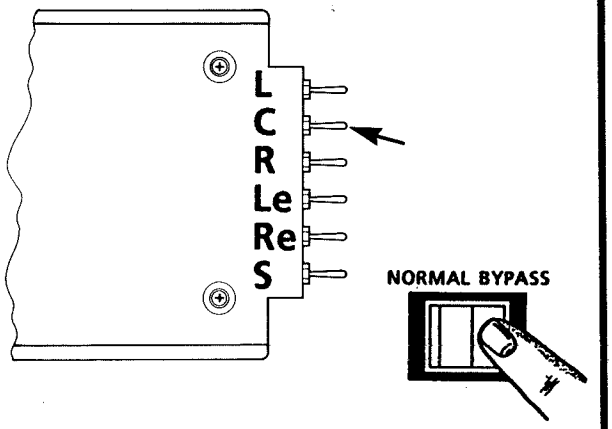
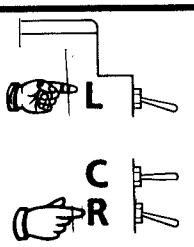
The size of the room may be a multiple of a given wavelength, wall surfaces are parallel, or there may be a severe balcony overhang.

There may be reflection off the walls behind the screen or crosstalk from adjacent theatres.

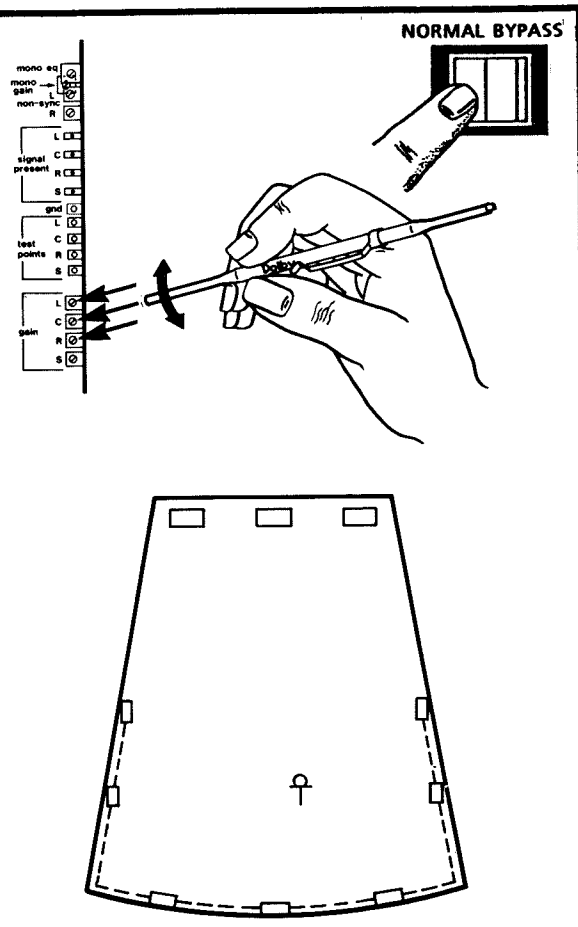
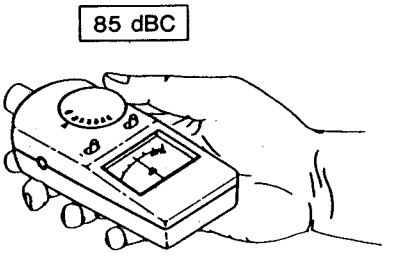
The seat and seat materials may be too reflective.

The microphone may have been placed in an untypical position.

Repeat the procedure with the microphone in other average locations in the auditorium. Adjust the controls for the best compromise to fit all of the locations of the microphone.

Step No.	Action	Indication
21		
22	REPEAT L 14 → 21 R 14 → 21 	

b. Adjusting L,C,R Gain

1		

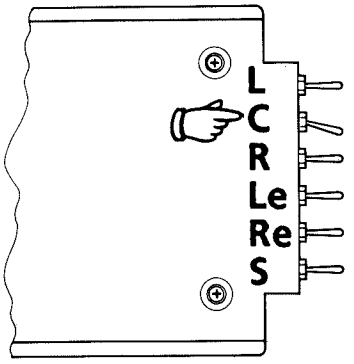
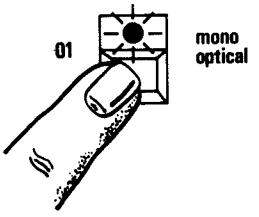
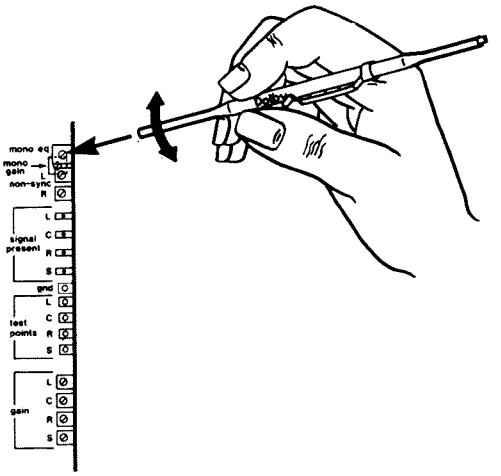
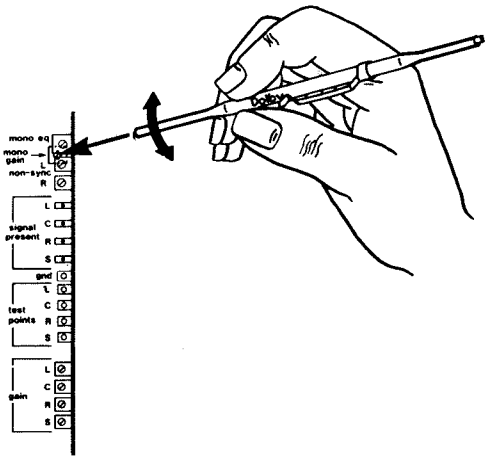
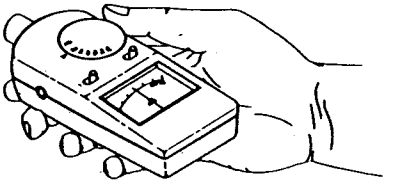
Notes
Turn off the pink noise on the center channel. Switch the CP55 to BYPASS.
Disconnect the center equalizer module from the extender and then remove the extender from the CP55. Re-install the cover on the module. Repeat for the left and right channel equalizer modules, using the Cat. No. 67 extender.

b. Adjusting L,C,R Gain

Turn the pink noise switches **L, C, R** on <u>one at a time</u> and adjust the **L, C** and **R** gain controls on the Cat. No. 242 B-Chain Card so that each channel produces 85dBC in the theatre, as measured by the sound level meter at the standard location described in Step 15 above. Be sure that the front panel fader is set to 7 during this step.

c. Setting Mono Gain

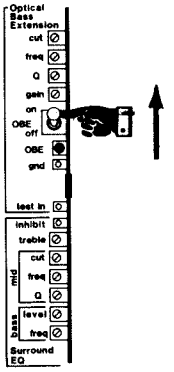
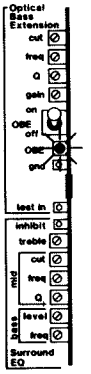
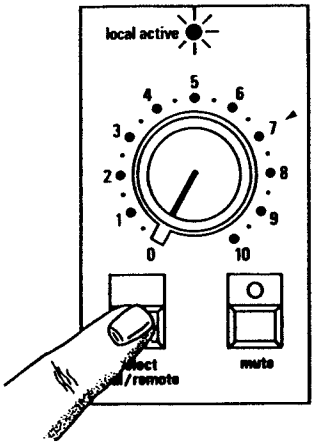
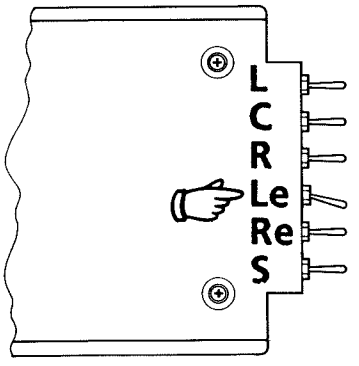
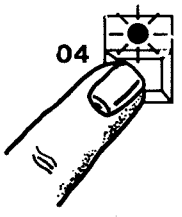
B-Chain Alignment Procedures

Step No.	Action	Indication
1		
2	  	ⓘ **MIDPOINT** 85 dBC 

Notes
Turn on the center **C** channel of the Cat. No. 85 Pink Noise Generator.
Press the **format 01 mono optical** switch.
Set the **mono eq** control on the Cat. No. 242 B-Chain Card (top control) to the midway position.
Adjust the **mono gain** control (just under the **mono eq** control) for 85 dBC.
The **mono eq** control adjustment is covered later.

d. Optical Bass Extension Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
1		
2		
3	 	

Notes

If the CP55 being installed does not contain a Cat. No. 241 Optical Bass Extension and Surround Equalizer Card, skip this procedure and the next procedure and go directly to part **f, Adjustment of Surround Delay,** on page 5.44.

The **OBE** switch on the Cat. No. 241 card places in effect optical bass extension in **format 03 Dolby stereo optical no surround** and **format 04 Dolby stereo optical with surround.** The **OBE** switch must be in the **ON** (up) position during the following procedure or at any time the OBE system is to function. The **OBE** LED is on when the switch is ON.

Confirm that the microphone is in the position defined on page 5.6.

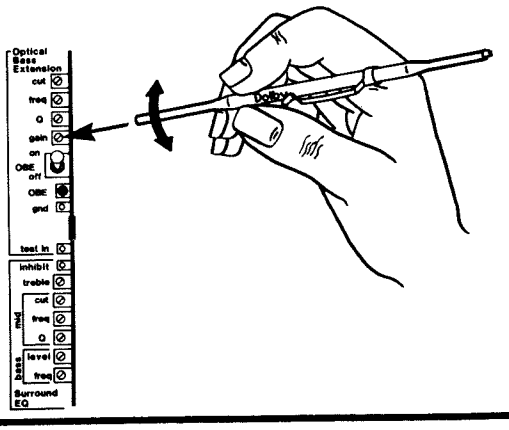
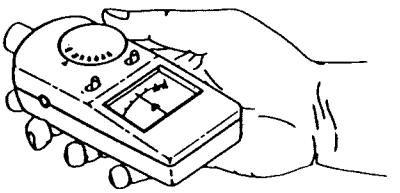
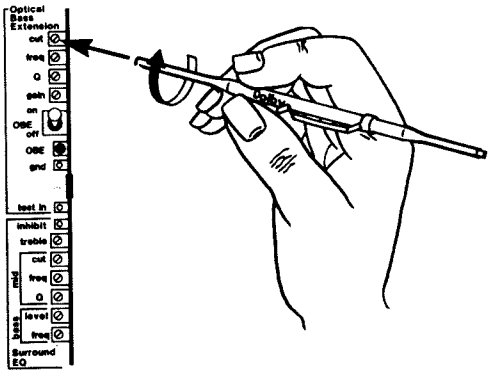
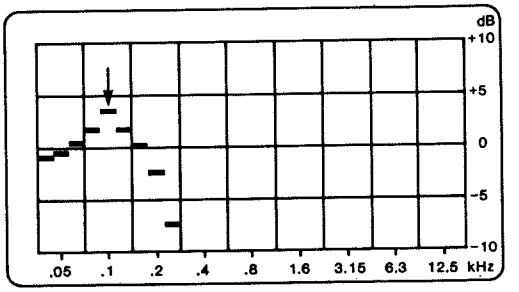
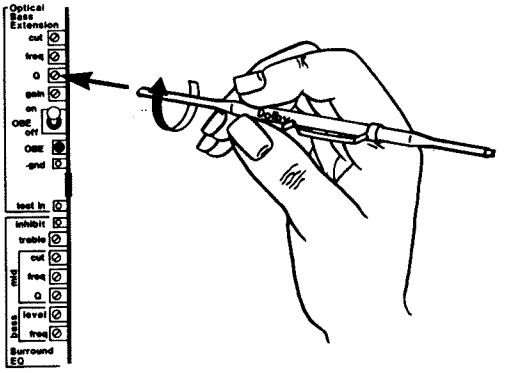
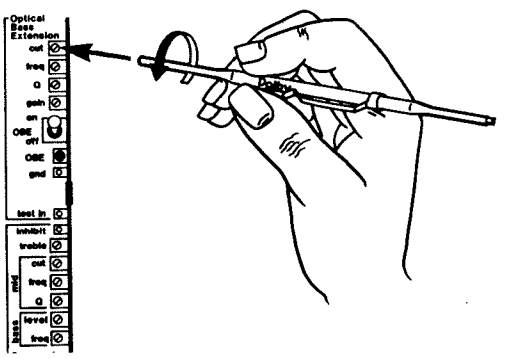
All connections established in the room equalization procedure apply to the following steps.

The main front panel fader should be **active** and set to **7**. If necessary, press the **select local/remote** switch.

Place the **Le** toggle switch on the Cat. No. 85 card in the **ON** (up or down) position and set the CP55 to **format 04 Dolby optical stereo with surround**.

d. Optical Bass Extension Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
4		80 dBC 
5		
6		
7		

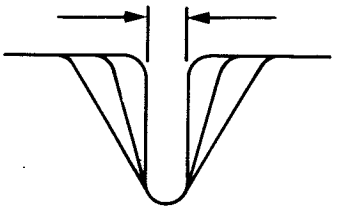
Notes

Adjust the **OBE** gain control on the Cat. No. 241 card for an 80 dBC SPL (sound pressure level) in the theatre. (If necessary, change the jumper setting to increase the output - - see page 2.4.)

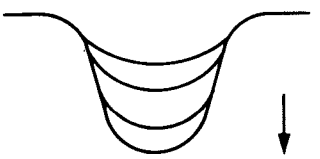
Turn the **cut** control at the top of the Cat. No. 241 card to the fully clockwise (CW) position for minimum cut. This disables the optical bass extension equalizer circuit.

Note the frequency of the peak in the response. You will need this information in Step 8 following.

Turn the **Q** control on the Cat. No. 241 card fully clockwise (CW) for maximum Q (the narrowest possible width).

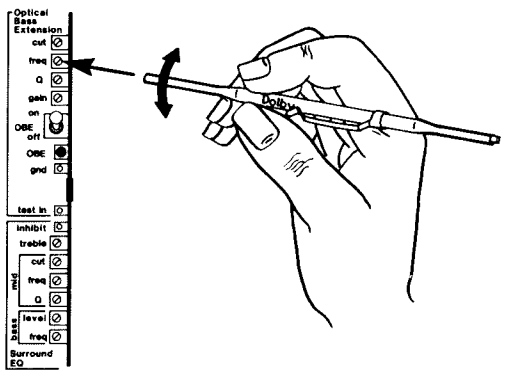
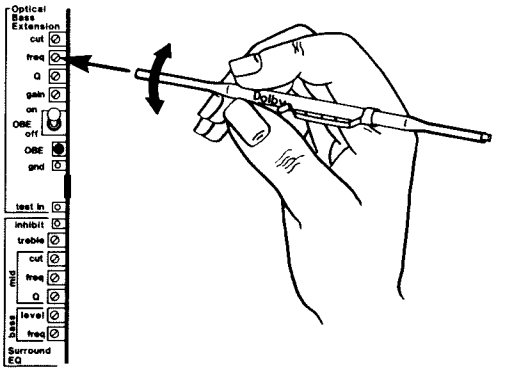
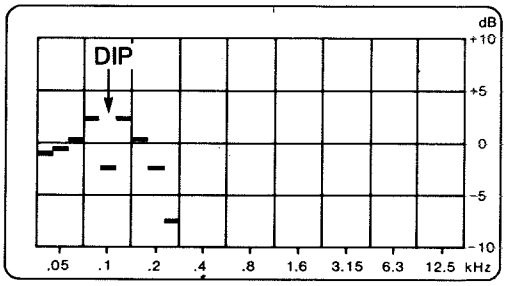
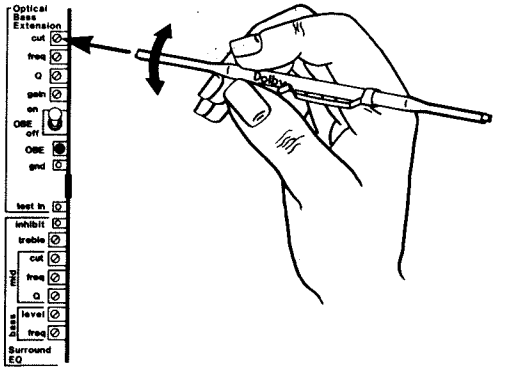
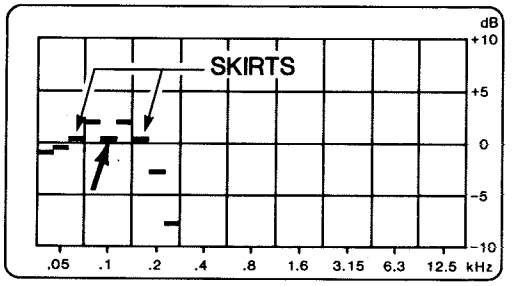
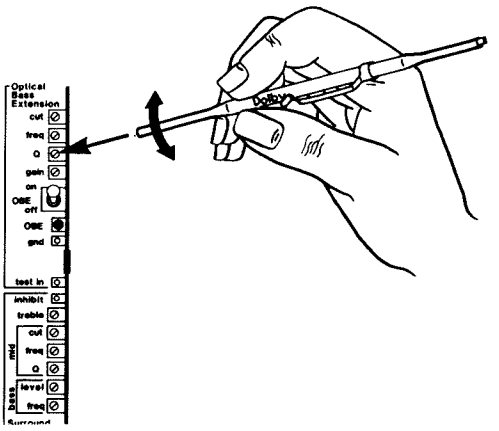
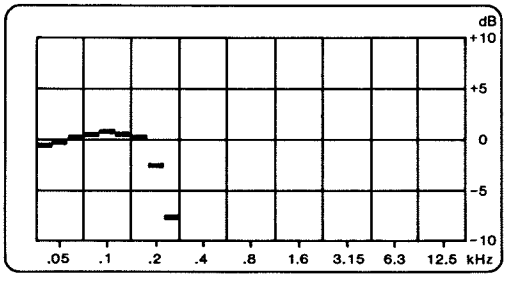


Turn the **cut** control back to the fully counterclockwise (CCW) position for full cut.



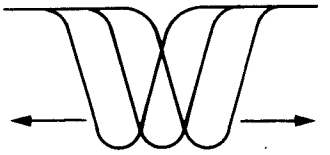
d. Optical Bass Extension Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
8		
9		
10		
		

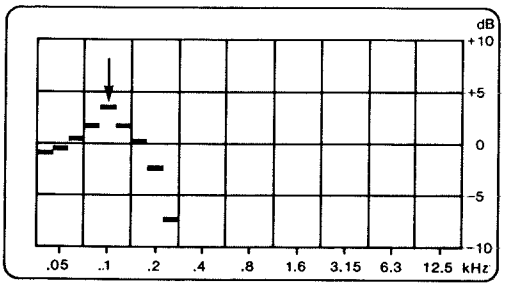
Notes

Turn the **freq** control on the Cat. No. 241 card. A dip in the frequency response will move along the frequency axis of the RTA display.



Adjust the **freq** control so the center of the dip is in the same band as the highest peak in the unequalized subwoofer frequency response you were asked to take note of in Step 5.

FROM 5

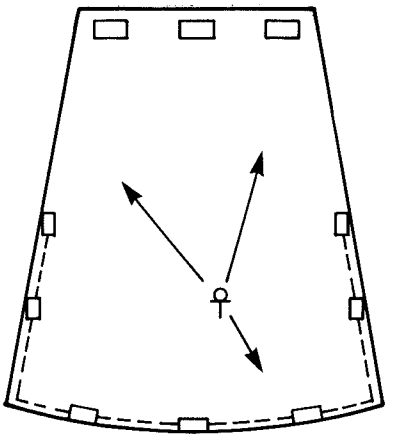
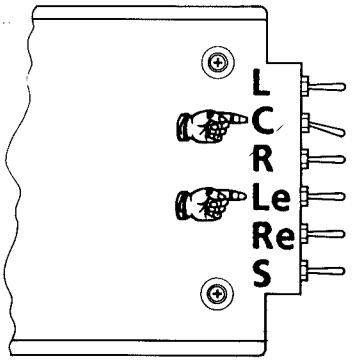
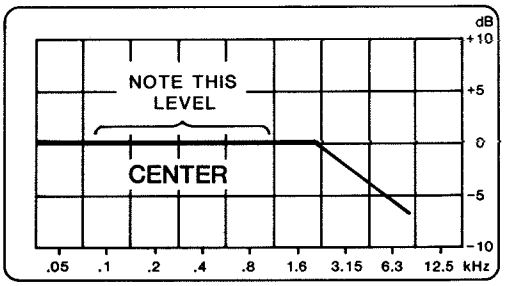
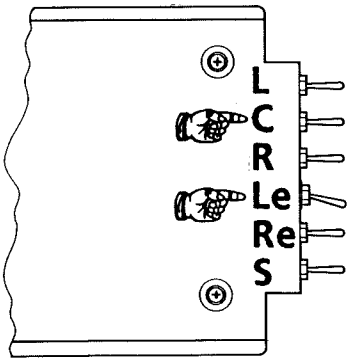
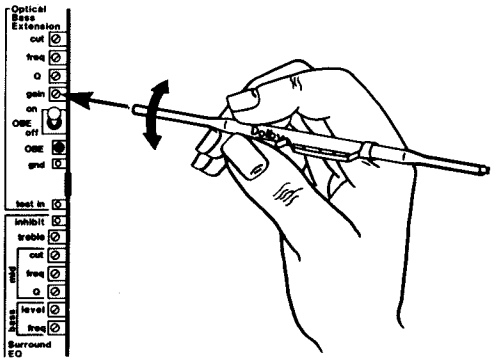
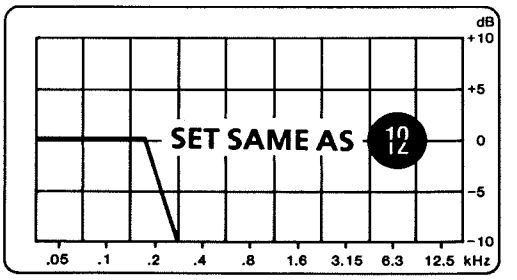


Adjust the **cut** control so the center of the dip flattens. The center of the dip should be at the same level as the skirts.

Adjust the **Q** control for the flattest possible frequency response.

d. Optical Bass Extension Alignment

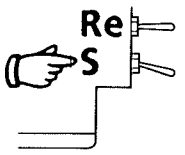
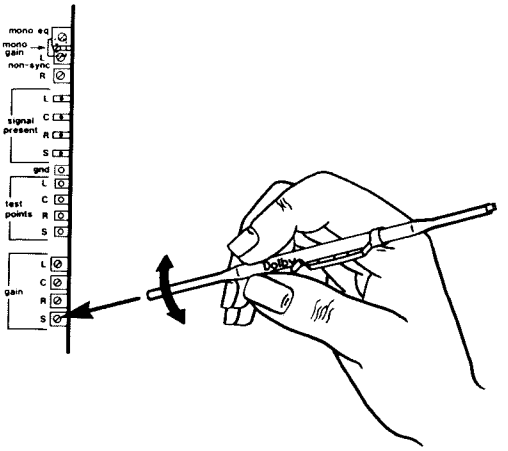
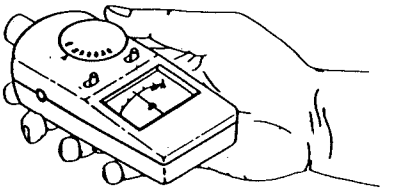
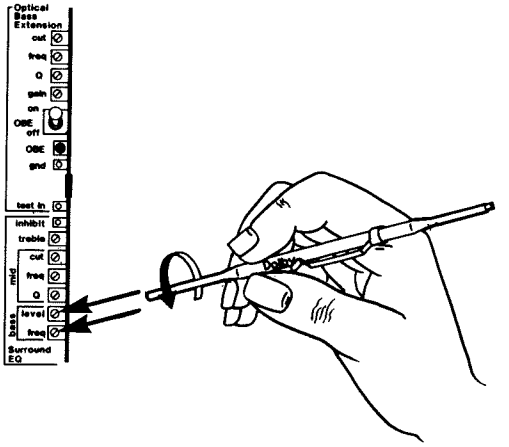
B-Chain Alignment Procedures

Step No.	Action	Indication
11	 REPEAT 8 → 10	
12		
13	 	

Notes
Relocate the microphone to at least one other location in the theatre and check the audio spectrum on the RTA. Repeat the **freq**, **cut**, and **Q** adjustments to obtain a good average overall equalization at these locations of the microphone.
Place the **Le** toggle switch on the Cat. No. 85 card in the **OFF** (center) position and place the **C** (center channel) toggle switch in the **ON** position. Note the average level of the third-octave bands between 100 Hz and 1 kHz.
Place the **C** toggle switch in the **OFF** (center) position and place the **Le** toggle switch in the **ON** (up or down) position. Adjust the **gain** control on the Cat. No. 241 card so that the average level of the bands from 20Hz to 160 Hz is the same as the level you noted for the center channel in the previous step. When you have adjusted the control to obtain this condition, the OBE alignment is completed.

e. Surround Equalization Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
1	 	80 dBC 
2		

Notes

If your CP55 does not contain the Cat. No. 241 Surround Equalizer and Optical Bass Extension Card, skip this paragraph and go directly to page 5.44, **Adjustment of Surround Delay**. The CP55 will function without the Cat. No. 241 card, but the surround frequency response cannot be equalized.

The surround equalizer on the Cat. No. 241 card consists of (1) a parametric bass section with variable gain and center frequency, (2) a parametric mid-band section with variable gain, bandwidth, and center frequency, and (3) a shelving type treble control.

All connections established in the previous procedure still apply to the surround equalization alignment.

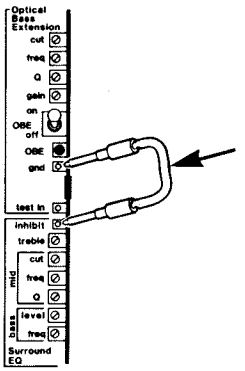
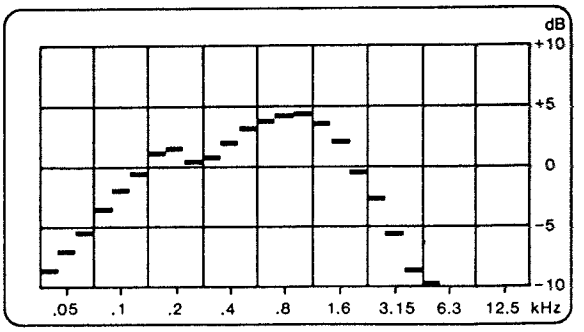
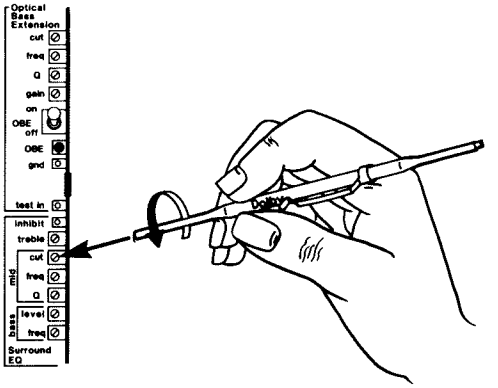
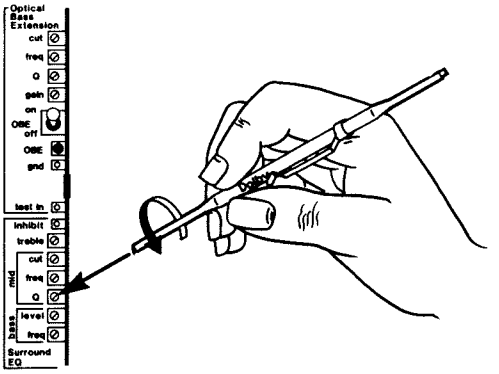
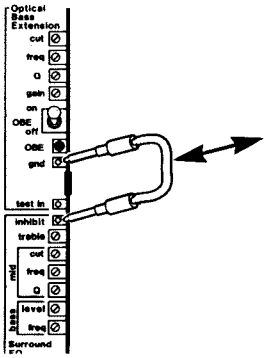
Confirm that the microphone is in the position defined on page 5.6.

Turn on the **S** switch on the Cat. No. **85** pink noise generator.

Adjust the **S** (surround) **gain** control on the Cat. No. 242 B-Chain card for a sound pressure level of approximately 80 dBC in the theatre.

Turn the **bass level** and **bass freq** controls on the Cat. No. 241 card fully counterclockwise (CCW) for no boost and the minimum frequency.

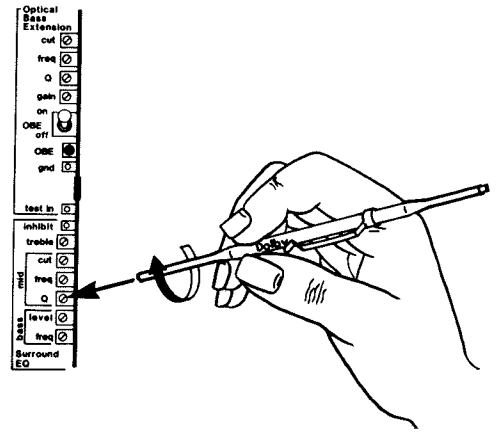
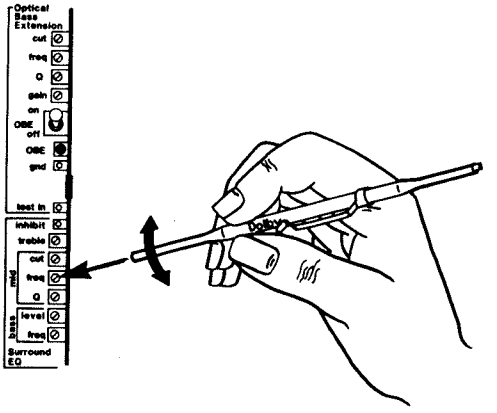
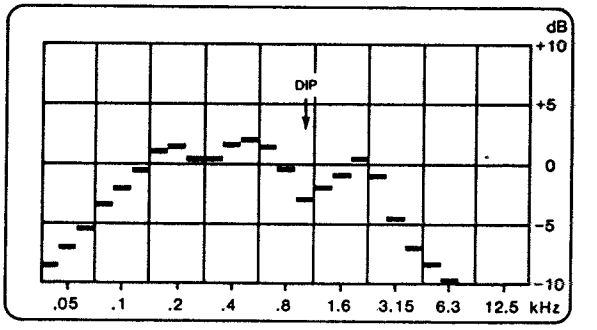
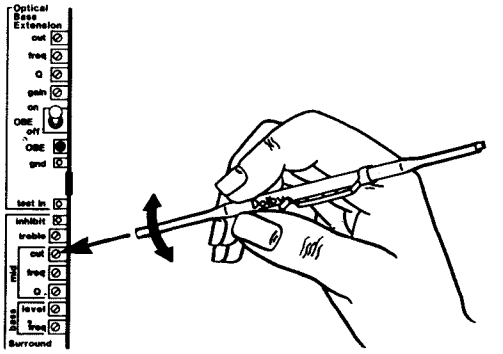
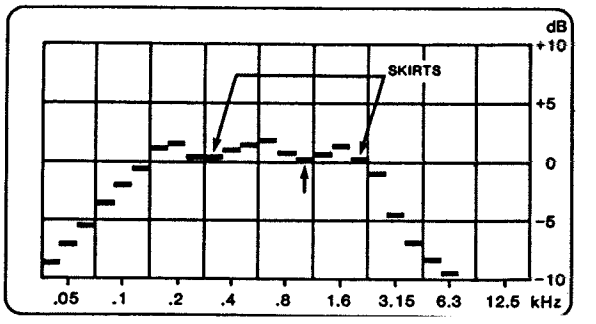
e. Surround Equalization Alignment

Step No.	Action	Indication
3		
4		
5		
6		

Notes
NOTE The next ten steps cover the treble and mid-frequency equalization. Connect one end of a pin plug jumper to the inhibit jack and the other end of the jumper to the gnd jack on the Cat. No. 241 card. The surround equalizer is now disabled. Note the frequency response displayed on the RTA (which is the response of the unequalized surround speaker system).
Turn the mid cut control fully counterclockwise (CCW) for full cut -- produces the deepest notch.
Turn the mid Q control fully counterclockwise (CCW) for minimum Q -- produces the broadest notch.
Alternately connect and disconnect the inhibit jumper wire at the gnd test jack. Note that a dip in the frequency response appears and disappears. (The jumper must be left disconnected before you perform the next step.)

e. Surround Equalization Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
7		
		
8		

Notes

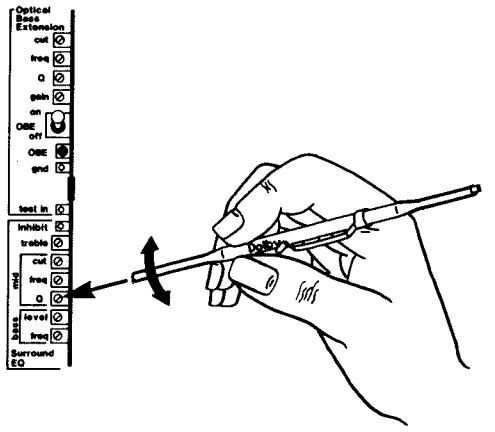
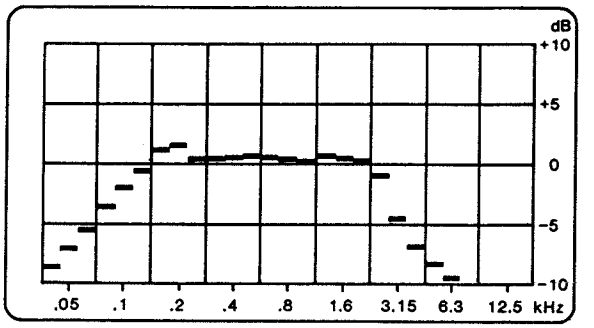
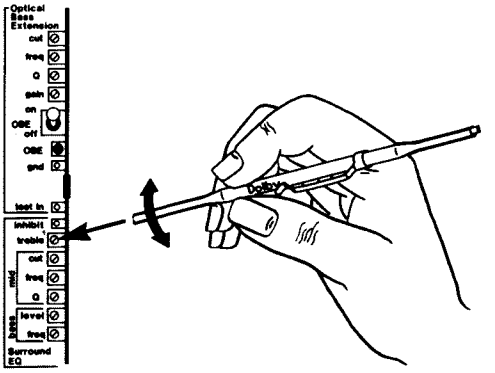
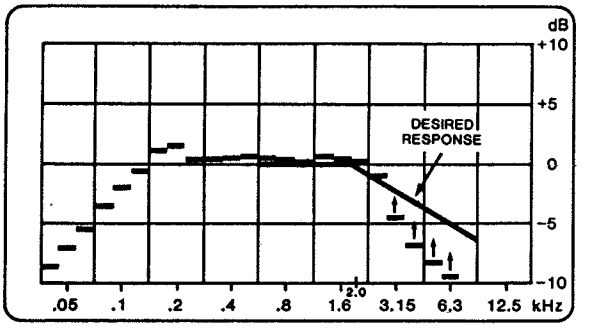
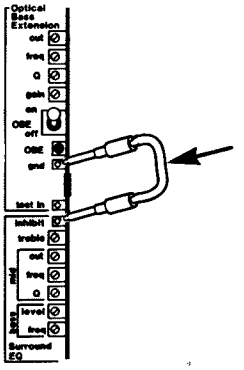
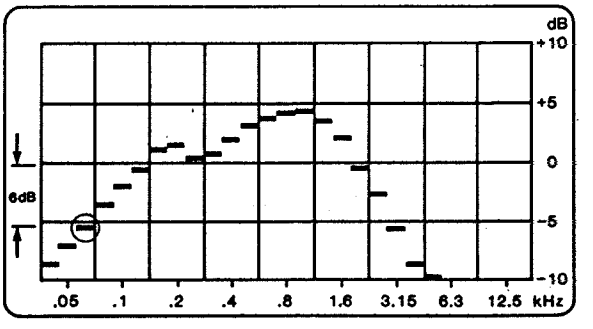
With the inhibit jumper disconnected, turn the **mid Q** control fully clockwise (maximum Q) and verify that the **mid cut** control is still in the fully counterclockwise position.

Adjust the **mid freq** control to move the dip to the center of the highest frequency peak in the 350 Hz to 3 kHz region.

Adjust the **mid cut** control so that the center of the dip between 350 Hz and 3 kHz is flattened. Note that the center of the dip should be at the same level as the skirts.

e. Surround Equalization Alignment

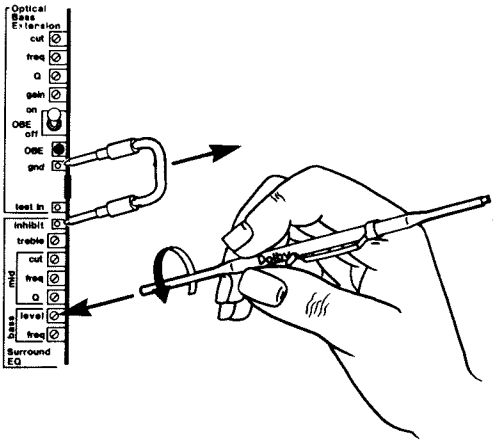
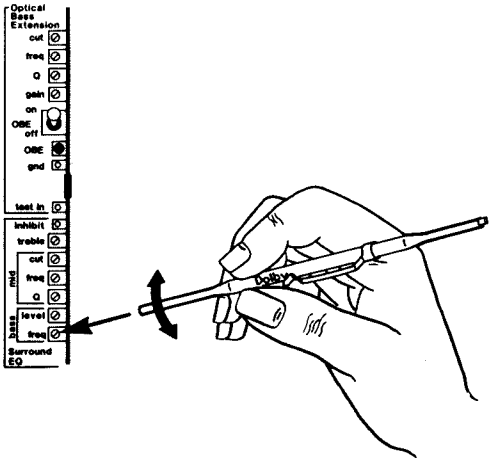
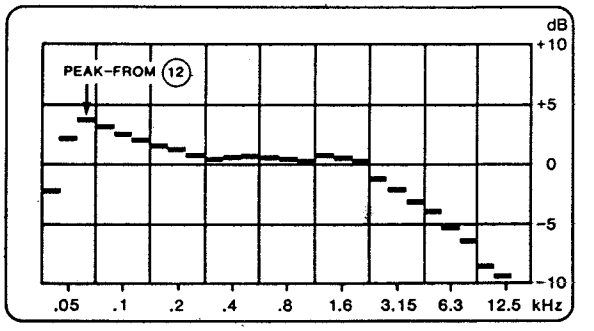
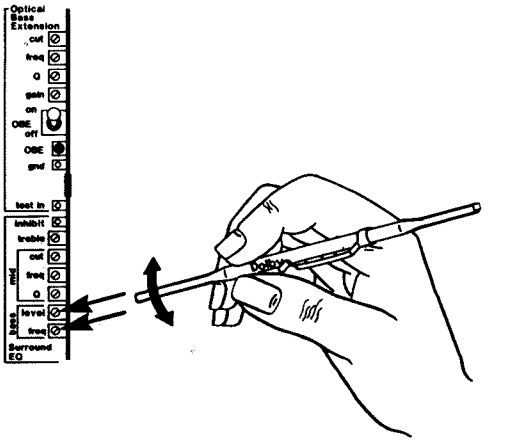
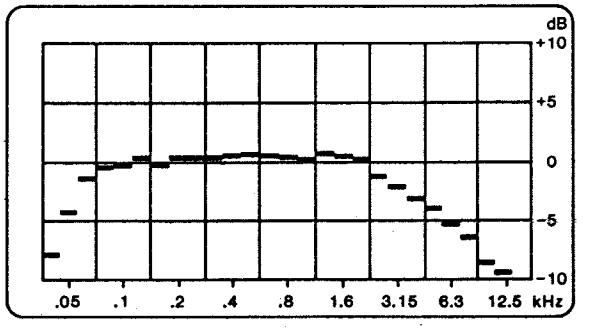
B-Chain Alignment Procedures

Step No.	Action	Indication
9		
10		
11	REPEAT 7 → 10	
12		

Notes
Adjust the **mid Q** control for the flattest possible frequency response.
Adjust the **treble** control for the flattest frequency response up to 2 kHz, then falling at a 3dB per octave rate (1 dB per third-octave band) above 2 kHz.
The **treble** and **mid** equalizer controls interact. Repeat the adjustments until no further adjustment is required and you have attained the optimum frequency response.
NOTE The next six steps cover the bass equalization. The shape of the low-frequency curve is adjusted over the range of frequencies from 50 Hz to 250 Hz. Connect one end of the pin plug jumper to the **surround eq inhibit** jack and the other end to the **gnd** test jack on the Cat. No. 241 card. Observe the low-frequency response on the RTA and determine the band in which the frequency response drops by 6 dB.

e. Surround Equalization Alignment

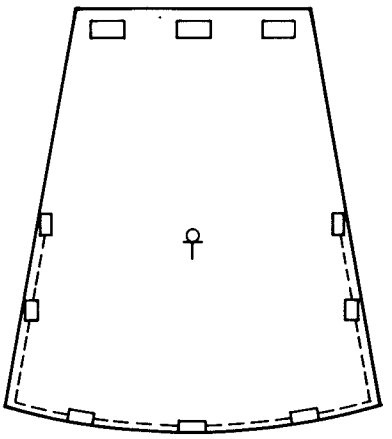
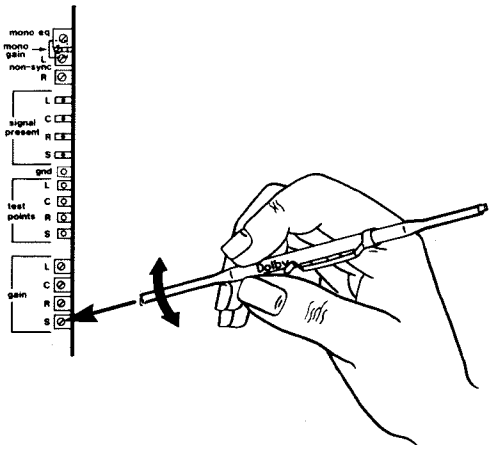
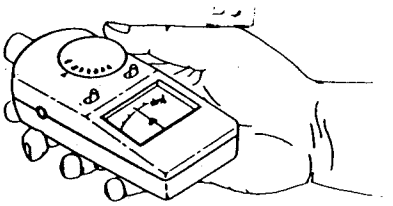
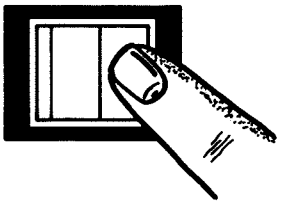
B-Chain Alignment Procedures

Step No.	Action	Indication
13		
14		
15		

Notes
Disconnect the jumper and turn the **bass level** control fully counterclockwise (CCW) for maximum boost.
Adjust the **bass freq** control so the peak of the response is in the frequency band in which the frequency response dropped by 6 dB noted in Step 12.
Adjust the **bass level** and **freq** controls for the flattest frequency response between 50 Hz and 250 Hz.

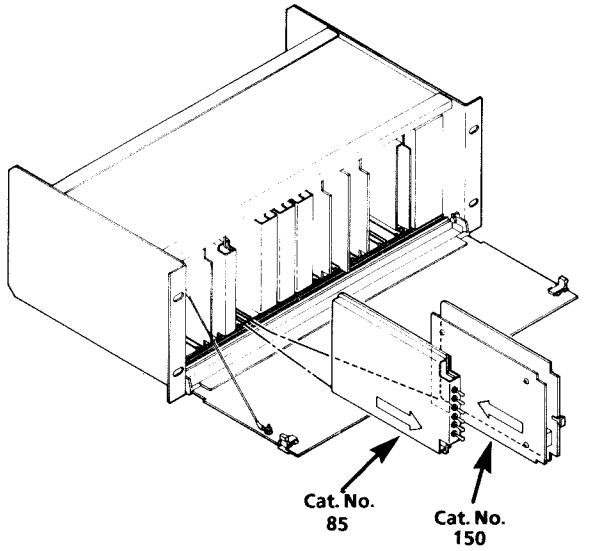
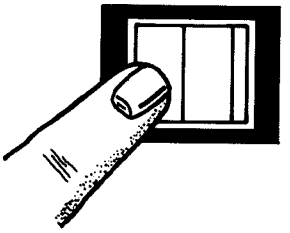
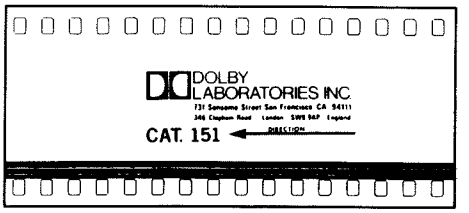
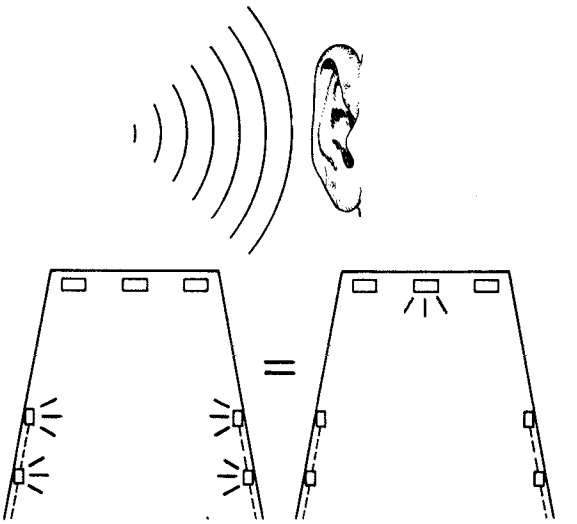
e. Surround Equalization Alignment

B-Chain Alignment Procedures

Step No.	Action	Indication
16	 	85 dBC 
17	NORMAL BYPASS 	bypass (switch behind panel)

Notes
Place the microphone at the center of the theatre. Then adjust the **S** (surround) **gain** control on the Cat. No. 242 B-Chain card for a sound pressure level of 85 dBC.

Open the CP55 and place the **NORMAL/BYPASS** switch in the **BYPASS** position.

Step No.	Action	Indication
18		
19	NORMAL BYPASS 	
20	 Cat. No. 151	

Notes
Remove the Cat. No. 85 card and re-install the Cat. No. 150 card.
Restore the **BYPASS/NORMAL** switch to the **NORMAL** position.
Thread and play the Cat. No. 151 stereo optical surround level film. Check the sound by walking around the theatre. The surround and center channels should sound equally loud at most locations. If necessary, re-adjust the surround gain until you are satisfied with the surround-to-front center balance. A large change in the gain setting should be unnecessary.

f. Adjustment of Surround Delay

The CP55 incorporates a delay line in the surround channel to ensure that sound from the rear of the theatre arrives at the listeners' ears approximately 20 milliseconds after the arrival of sound from the front speakers.

The delay is set into the Cat. No. 150 card via a thumbwheel switch by using the following formula:

1. The distance between a rear seat close to a surround loudspeaker, in feet, is estimated. If the metric system is used, convert the distance from meters to feet by multiplying by three (3).

2. The distance from this seat to the front loudspeakers is estimated, in feet. If the metric system is used, multiply the distance by three (3) to convert distance from meters to feet.

3. Subtract the distance in **1** above from the distance in **2** above.

4. Add 20 to the difference in **3**. above to obtain the delay time, in milliseconds.

Determine the Cat. No. 150 card thumbwheel switch setting (delay line setting) from the table below.

Delay Time (msec)	Thumbwheel Switch Setting
30	1
40	2
50	3
60	4
70	5
80	6
90	7
100	8
110	9
120	10
130	11
140	12
150	13

For example:

The selected seat is **10 feet** (3.3 meters) from the surround speakers.

The selected seat is **80 feet** (26.7 meters) from the front speakers.

The delay is set for **(80-10) + 20 = 90** milliseconds -- switch position **7**.

You can verify that the delay setting is acceptable by listening to a familiar Dolby Stereo film which ideally contains both center channel dialogue and some discernable surround sound. The Dolby Cat. No. 251 "***Jiffy***" film serves excellently for this purpose. If a stereo film is not available, the delay time can be checked with a mono film if the film is played in format **04 Dolby stereo optical with surround**. Before you set the delay time, set the individual level adjustments for each channel because the subjective effects of channel level and delay time interact somewhat. Make certain **all** speakers are **ON** for this test.

While the film is playing, walk around the theatre and carefully listen to the surround speakers when there is center channel dialogue. The dialogue should appear to be coming from the screen with no significant dialogue coming from the surround speakers.

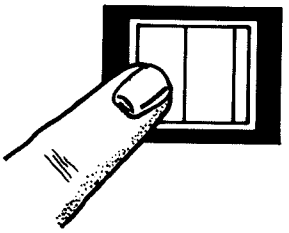
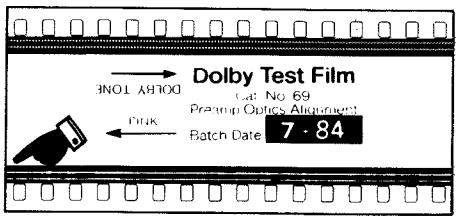
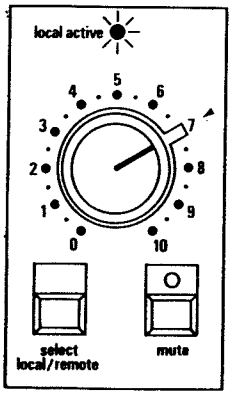
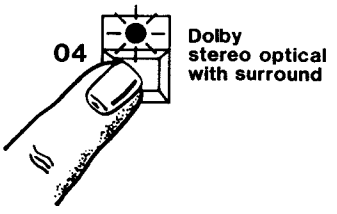
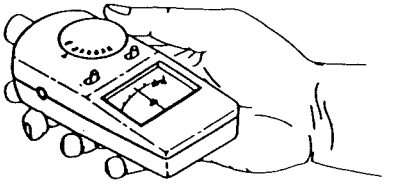
If you hear discernable dialogue from the surround speakers, the delay time was probably set too long.

If you hear an objectionable amount of dialogue from the surround speakers, which persists regardless of the delay time setting, there is probably severe gain or azimuth error in the system. Recheck both the Dolby level and the A-chain alignment of the optical system.

In many films, the surround information is intended for subtle effects and may provide only a low-level ambience. If the surround level and delay time have been adjusted as previously described, the surround information will be at the level desired by the film director. Do **not** be tempted to increase the surround level because the effect desired by the film production team may be impaired or destroyed.

g. Adjustment of Bypass Gain

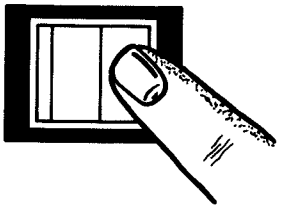
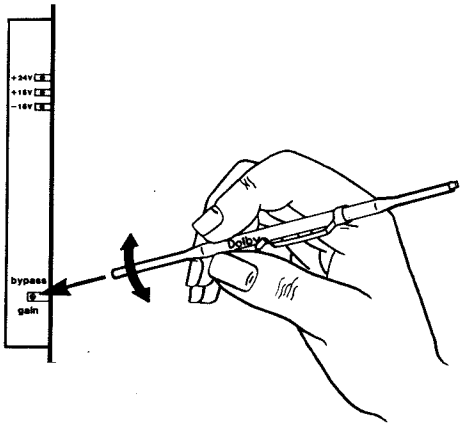
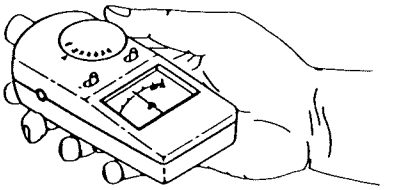
B-Chain Alignment Procedures

Step No.	Action	Indication
1	NORMAL BYPASS 	
2	DOLBY TONE PINK NOISE 	
3		
4		XXX dBC 

Notes
This section of the alignment procedure covers the adjustment of the gain that is in effect when the CP55 is switched from **NORMAL** to **BYPASS**. Verify that the **NORMAL/BYPASS** switch is in the **NORMAL** position.
Thread and play the Cat. No. 69 Pink Noise film loop on the projector.
Check that the local fader is selected -- the **local active** LED on the CP55 is lit. If necessary, select the local fader by pressing the **select local/remote** switch. Set the fader to the **7** setting.
Press the **format 04 Dolby stereo optical with surround** switch. Measure and note the SPL (sound pressure level) in the theatre.

g. Adjustment of Bypass Gain

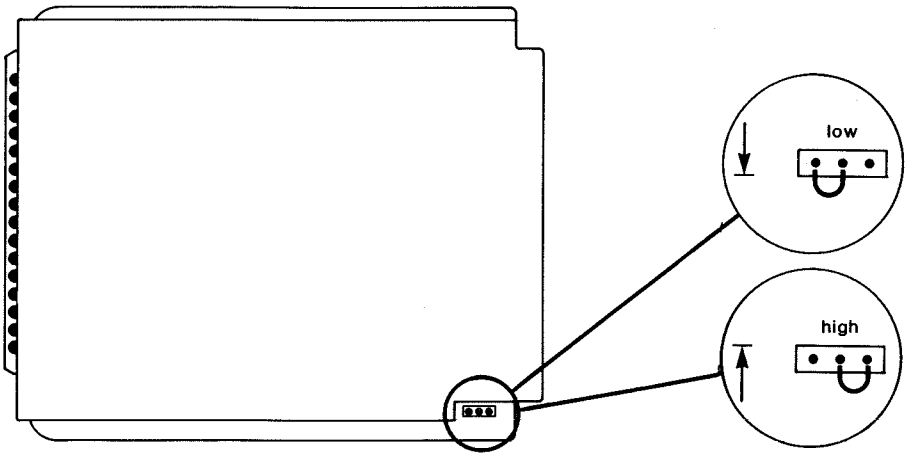
B-Chain Alignment Procedures

Step No.	Action	Indication
5	NORMAL BYPASS 	bypass (switch behind panel) 
6		FROM 4 XXX dBC 
7		

Notes

Place the **NORMAL/BYPASS** switch in the **BYPASS** position.

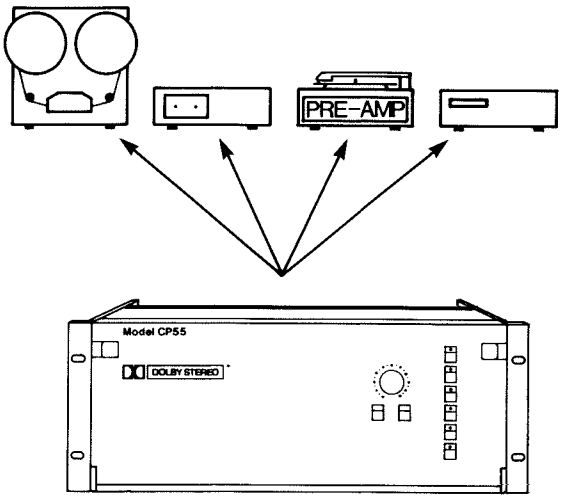
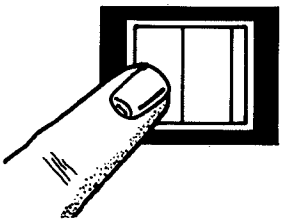
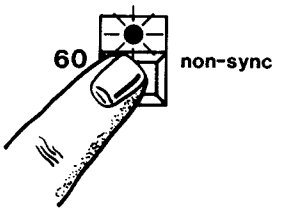
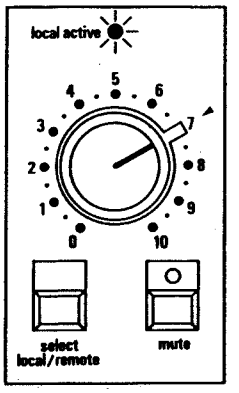
Adjust the **bypass gain** control on the Cat. No. 249 Power Supply card for the same SPL you noted in the NORMAL mode two steps above. If this level cannot be achieved via the control, disconnect the CP55 from AC power, remove the Cat. No. 249 card, switch the **J1** jumper from the **Low** to the **Hi** position, reinstall the Cat. No. 249 card, reconnect AC power to the CP55, and readjust the SPL to the required level.



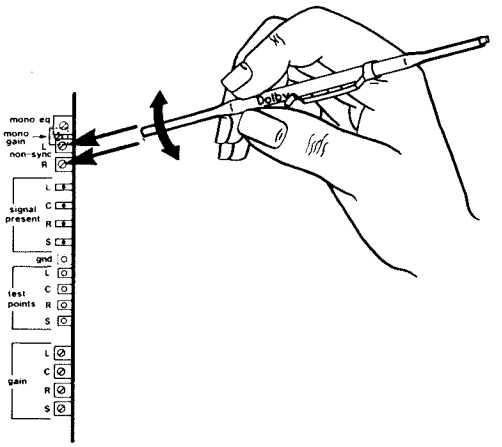
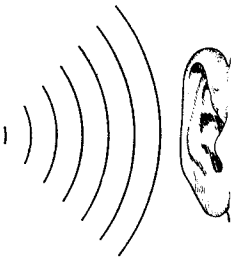
At this point, you can disconnect all external equipment from the CP55. The remainder of the alignment procedure does not require measuring instruments.

h. Adjustment of Non-sync Gain

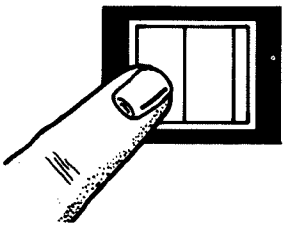
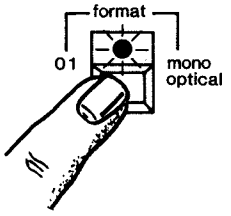
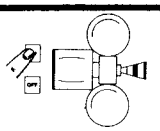
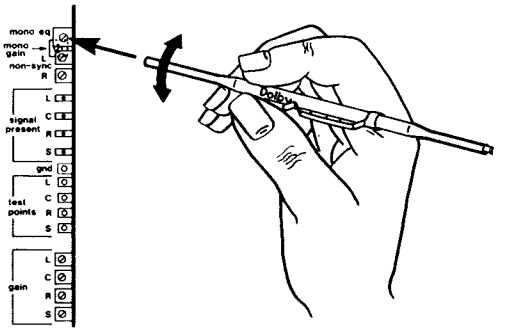
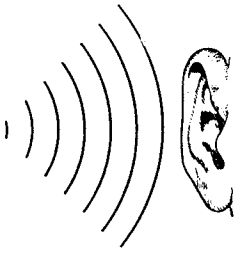
B-Chain Alignment Procedures

Step No.	Action	Indication
1		
2	**NORMAL BYPASS** 	
3		
4		

Notes
Connect a cassette deck or tape deck or turntable to the **from non sync** terminals on terminal strip **TB1** on the backplane of the CP55.
Place the **NORMAL/BYPASS** switch in the **NORMAL** position.
Press the **format 60 non sync** switch.
Check that the local fader is selected – the **local active** LED on the CP55 is lit. If necessary, select the local fader by pressing the **select local/remote** switch. Set the fader to the **7** setting.

Step No.	Action	Indication
5		

i. Adjustment of Mono Equalization

1	NORMAL BYPASS 	
2		
3		
4		

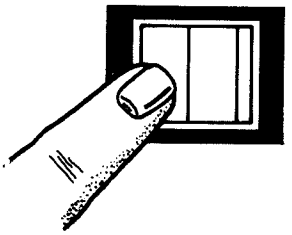
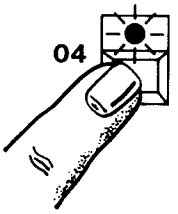
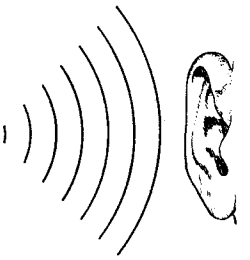
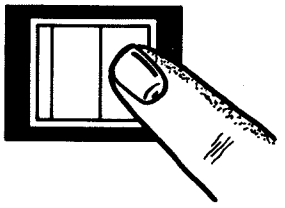
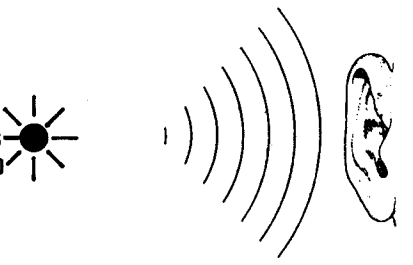
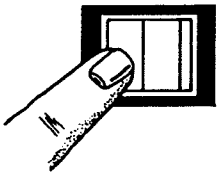
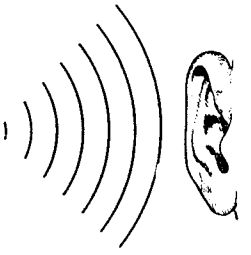
Notes
Play a cassette, tape, or record on the non-sync device and adjust the **non-sync L** (left) and **non-sync R** (right) controls on the Cat. No. 242 B-Chain card for the desired level in the theatre.

i. Adjustment of Mono Gain and Equalization

Verify that the **NORMAL/BYPASS** switch is in the **NORMAL** position.
Select the format **01 mono optical**.
Thread and play a mono film. It is best to play a film familiar to you.
The **mono eq** control affects high frequencies and should generally be left in the midpoint of its range to provide the "Academy" high-frequency playback standard. Turn it to the midpoint of the range and listen to the film. If necessary, adjust the **mono eq** control on the Cat. No. 242 B-Chain card for pleasing sound. Then remove the mono film from the projector. While the film is running, repeat the mono gain adjustment (page 5.21) with the front panel fader set to 7.

j. Final Checks

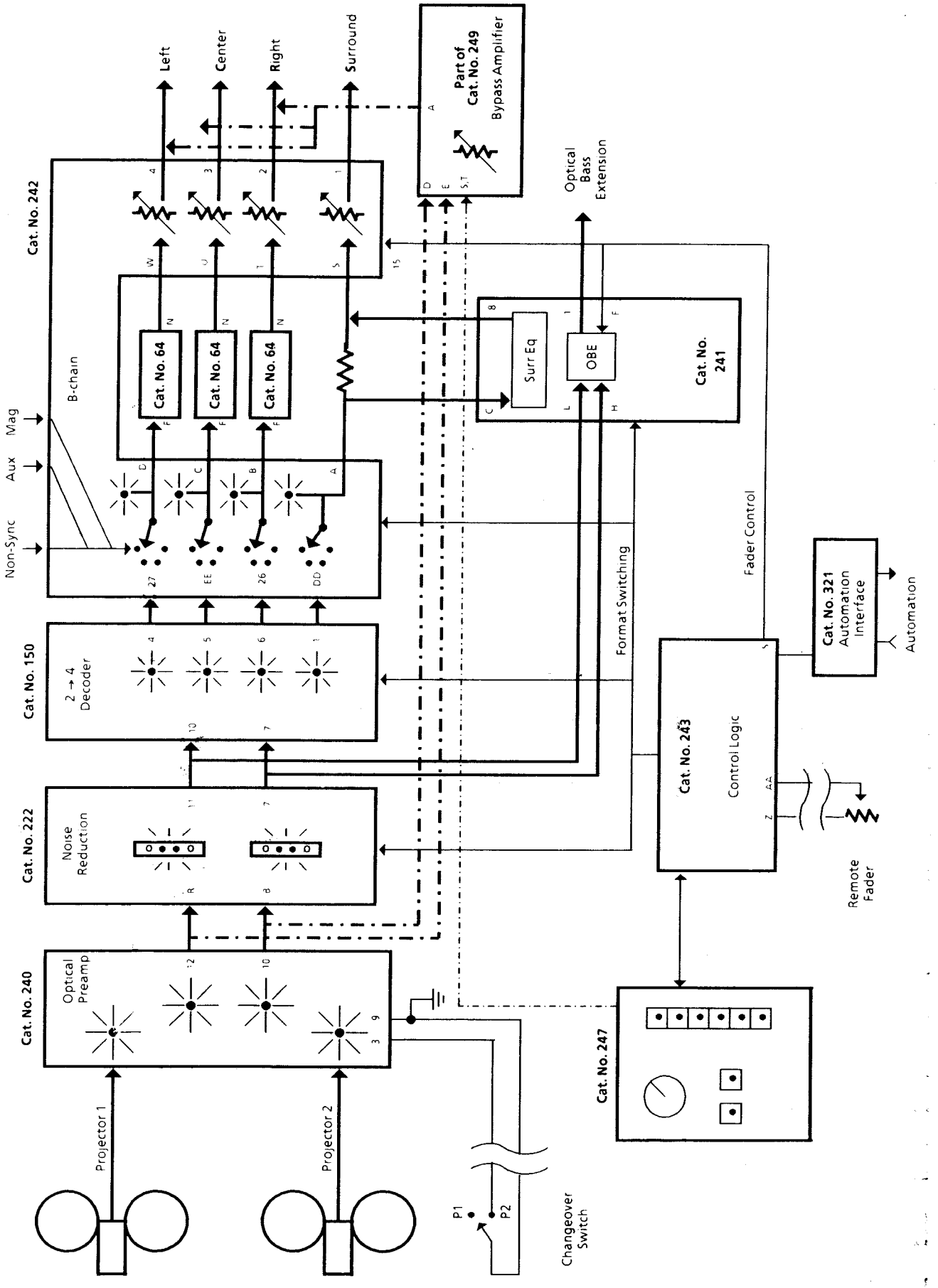
B-Chain Alignment Procedures

Step No.	Action	Indication
1	NORMAL BYPASS 	
2		
3		
4	NORMAL BYPASS 	bypass (switch behind panel) 
5	NORMAL BYPASS  	

Notes
Verify that the **NORMAL/BYPASS** switch is in the **NORMAL** position.
Press the **format 04 Dolby stereo optical with surround** switch.
Thread and play the Dolby Cat. No. 251 "**Jiffy**" test film, if available, for a quick check of the system alignment. This film contains a series of tests, each of which is described by a male or female voice and is supplemented by captions on the screen to help identify the causes of sound problems. Visual checks are also included to assist in identifying some picture projection problems.
While the film is running, place the **NORMAL/BYPASS** switch in the **BYPASS** position. Verify that the sound level is acceptable in **BYPASS**, and that the volume remains nearly the same as it was in **NORMAL**.
Remove the "Jiffy" film, return to **NORMAL** and play the Dolby Cat. No. 351 "***listen . . .***" film on the newly aligned system. The film consists of a wide variety of short scenes -- both live action and animated. Each scene was selected to demonstrate different aspects of stereo sound. Evaluate the quality of the sound. If problems occur, contact the technical staff at Dolby Laboratories.

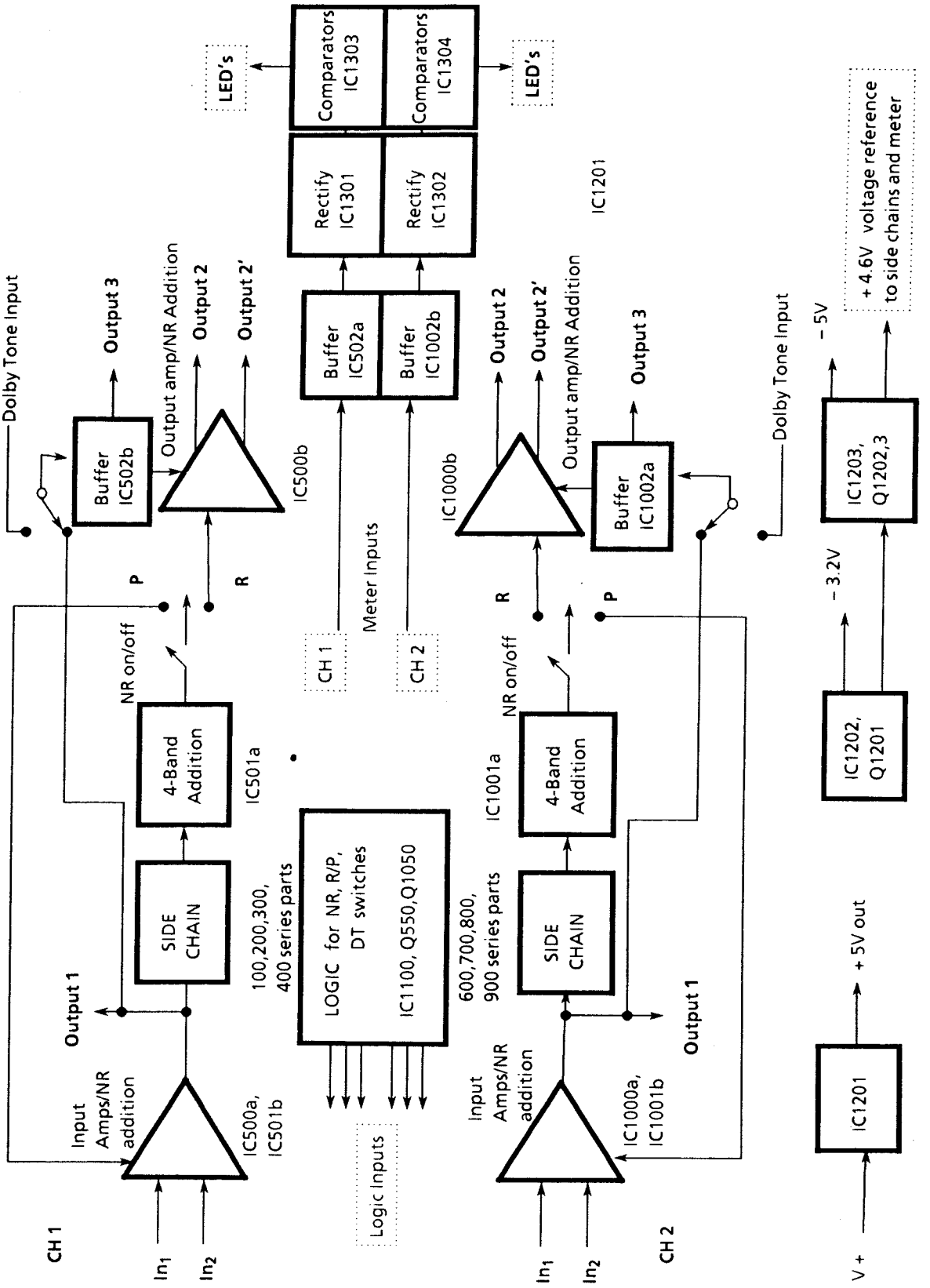
SECTION 6
REFERENCE BLOCK DIAGRAMS

CP55 SIMPLIFIED BLOCK DIAGRAM



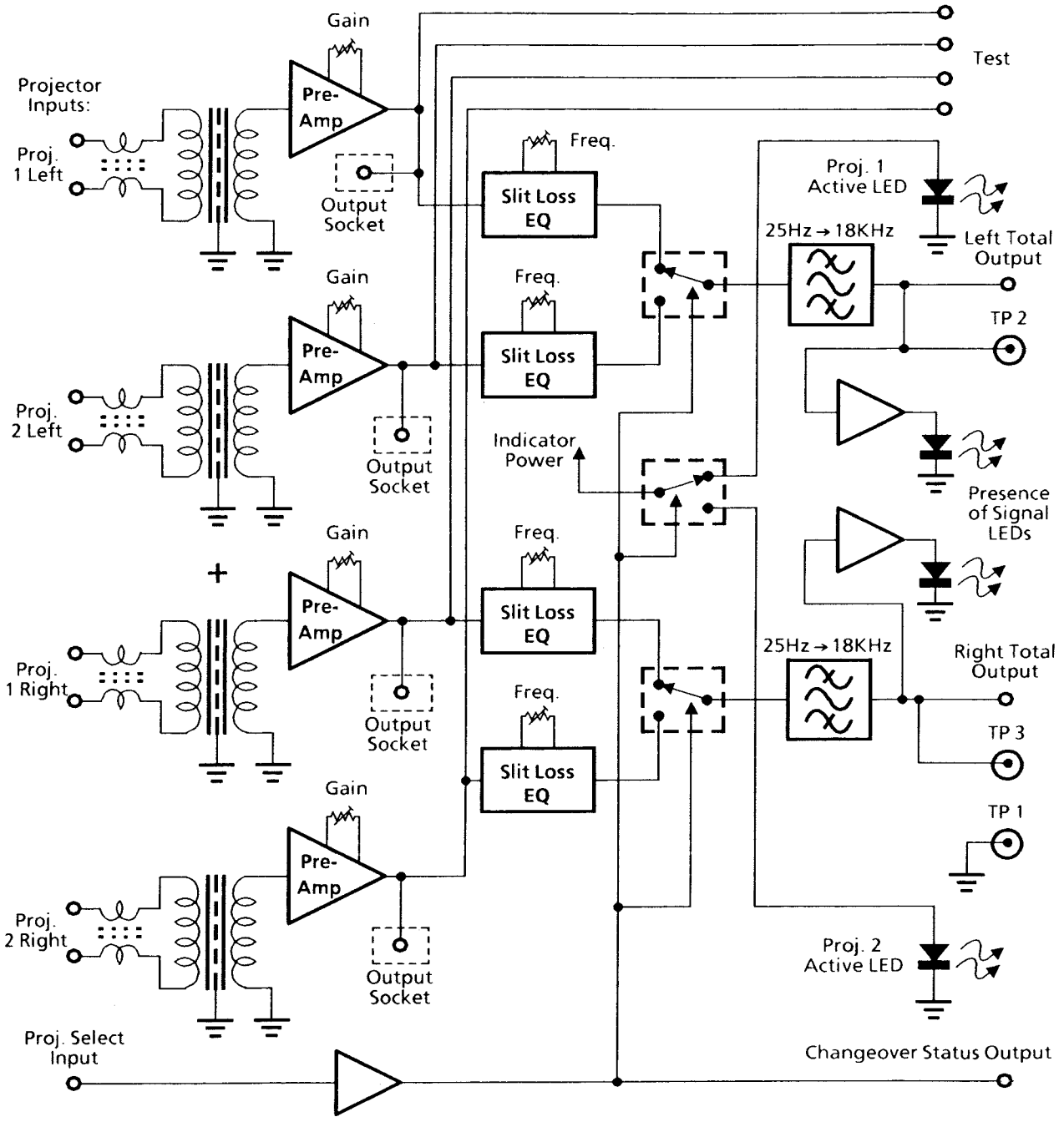
S86/6282/7184

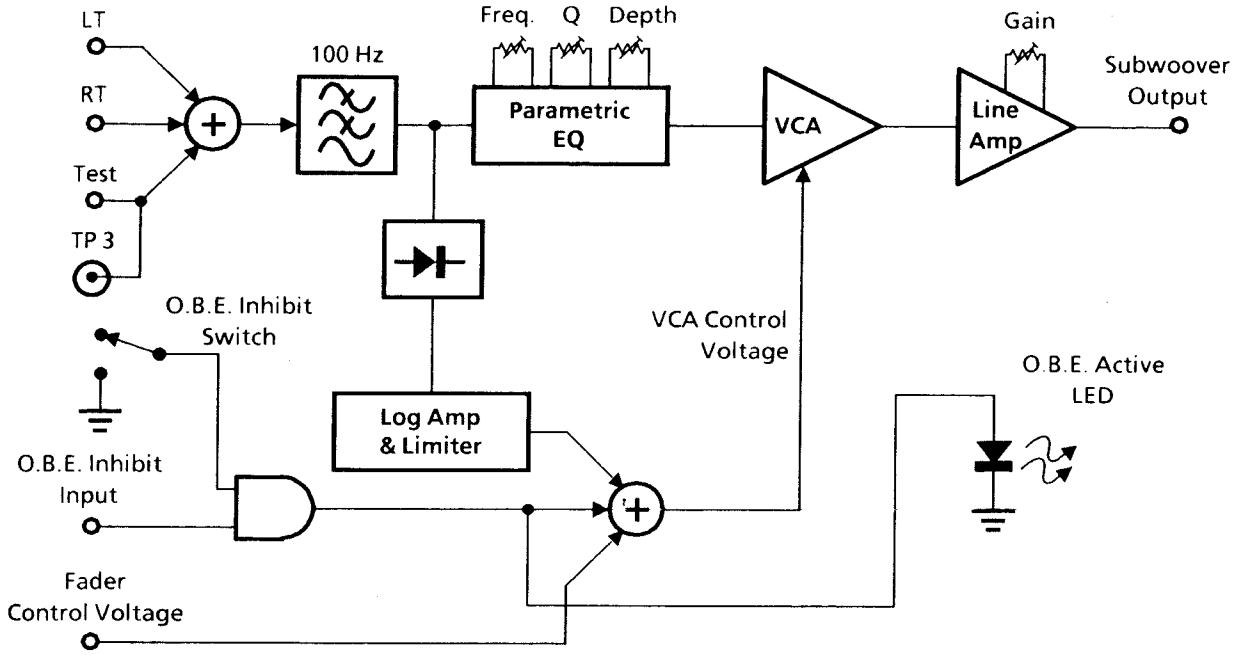
CAT. NO. 222 DUAL NOISE REDUCTION MODULE

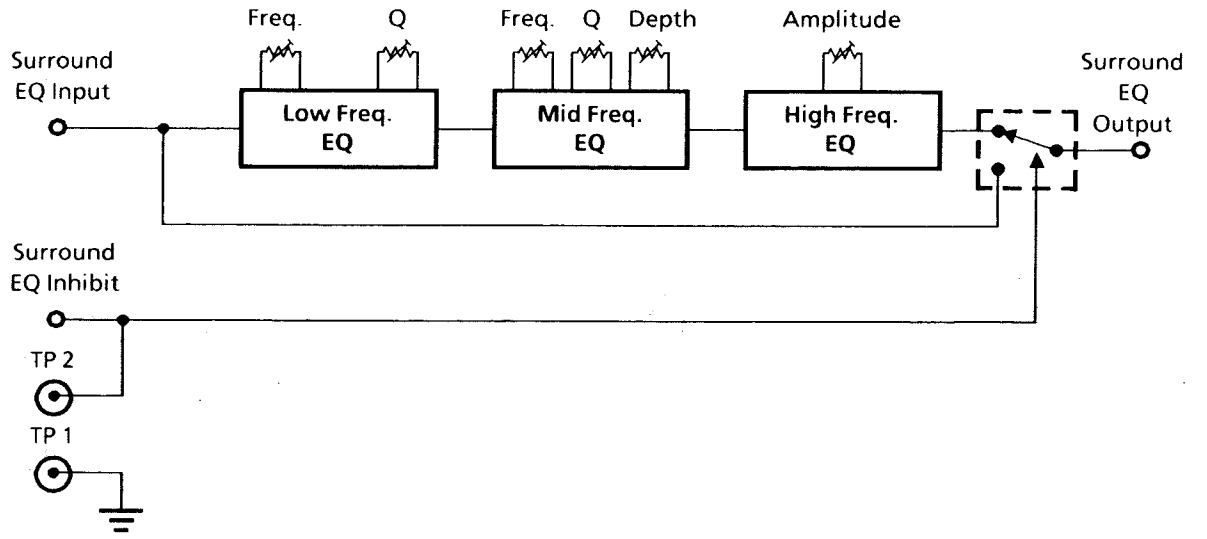


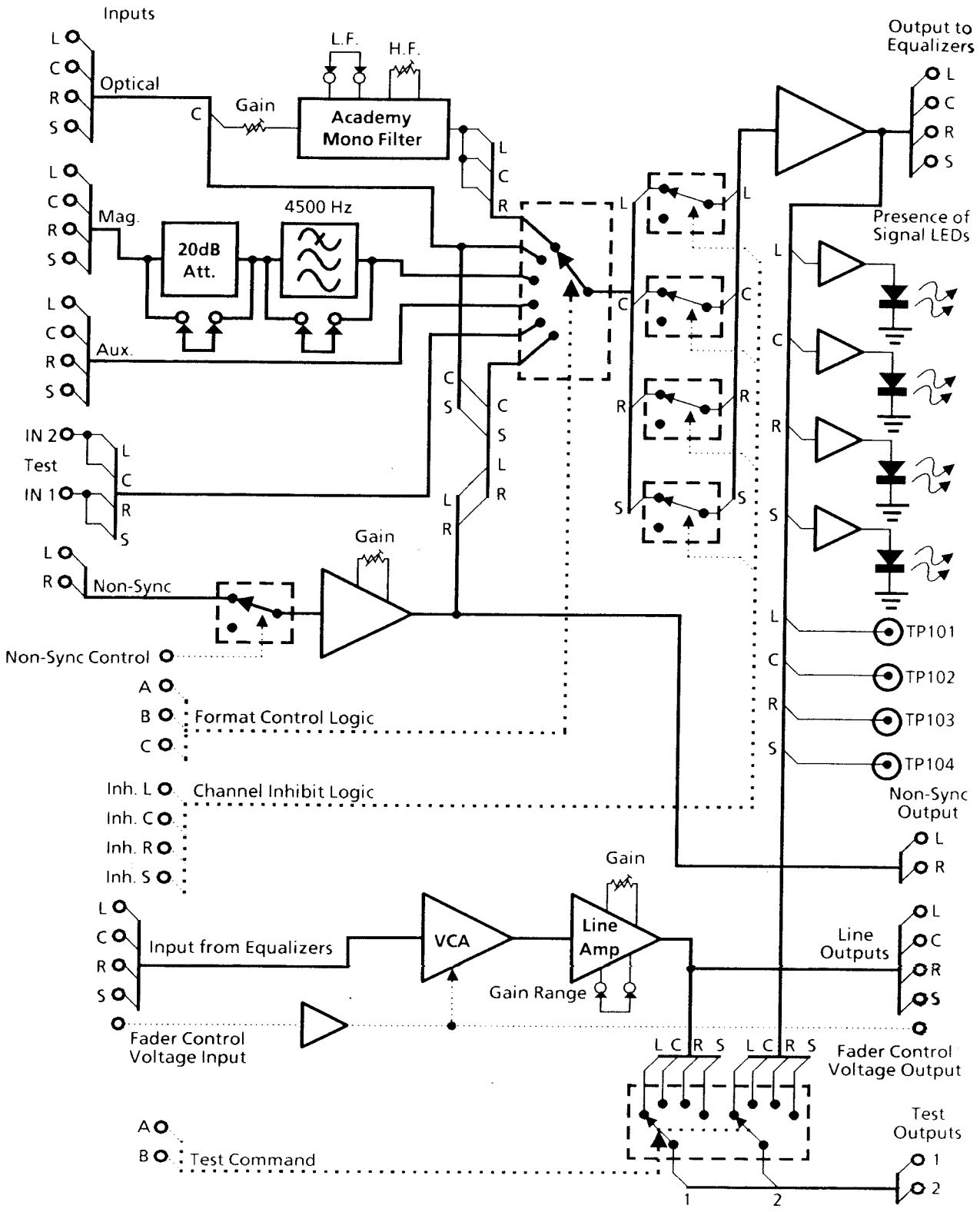
S86/6283/7185

CAT. NO. 240 OPTICAL PRE-AMPLIFIER CARD

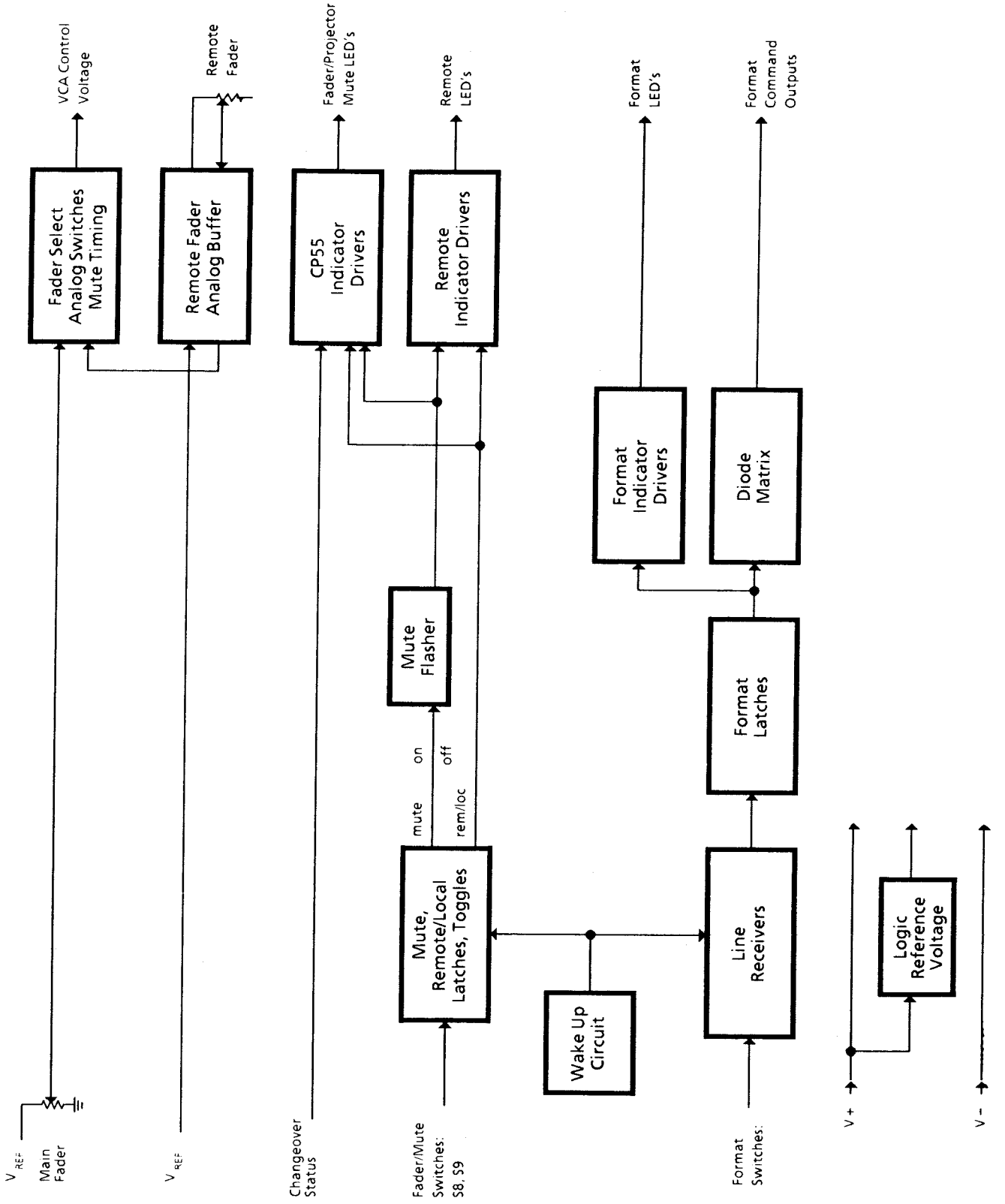



LT
RT
Test
TP 3
100 Hz
Freq.
Q
Depth
Parametric EQ
VCA
Gain
Line Amp
Subwoover Output
O.B.E. Inhibit Switch
O.B.E. Inhibit Input
Log Amp & Limiter
VCA Control Voltage
O.B.E. Active LED
Fader Control Voltage

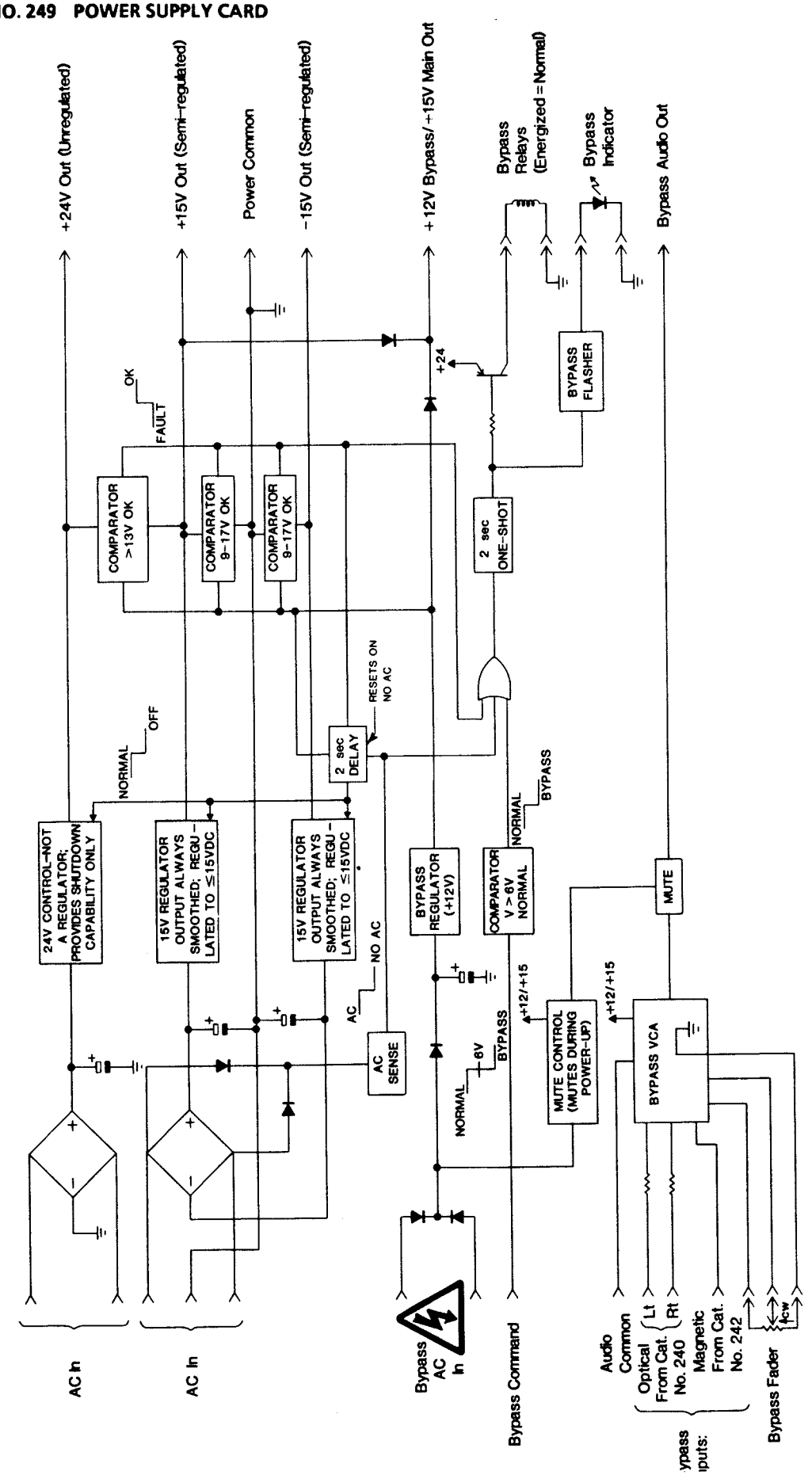

Surround EQ Input
Freq.
Q
Low Freq. EQ
Freq.
Q
Depth
Mid Freq. EQ
Amplitude
High Freq. EQ
Surround EQ Output
Surround EQ Inhibit
TP 2
TP 1


Inputs
L
C
R
S
Optical
C
Gain
L.F.
H.F.
Academy
Mono Filter
L
C
R
Output to
Equalizers
L
C
R
S
L
C
R
S
Mag.
4500 Hz
20dB
Att.
L
C
R
S
Aux.
Presence of
Signal LEDs
IN 2
Test
IN 1
L
C
R
S
C
S
L
R
L
C
R
S
L
C
R
S
L
R
Non-Sync
Gain
Non-Sync Control
A
B
C
Format Control Logic
TP101
TP102
TP103
TP104
Inh. L
Inh. C
Inh. R
Inh. S
Channel Inhibit Logic
Non-Sync
Output
L
R
Gain
L
C
R
S
Input from Equalizers
VCA
Line
Amp
Gain Range
Line
Outputs
L
C
R
S
Fader Control
Voltage Input
L C R S L C R S
Fader Control
Voltage Output
A
B
Test Command
Test
Outputs
1
2
1
2

CAT. NO. 243 CONTROL LOGIC CARD

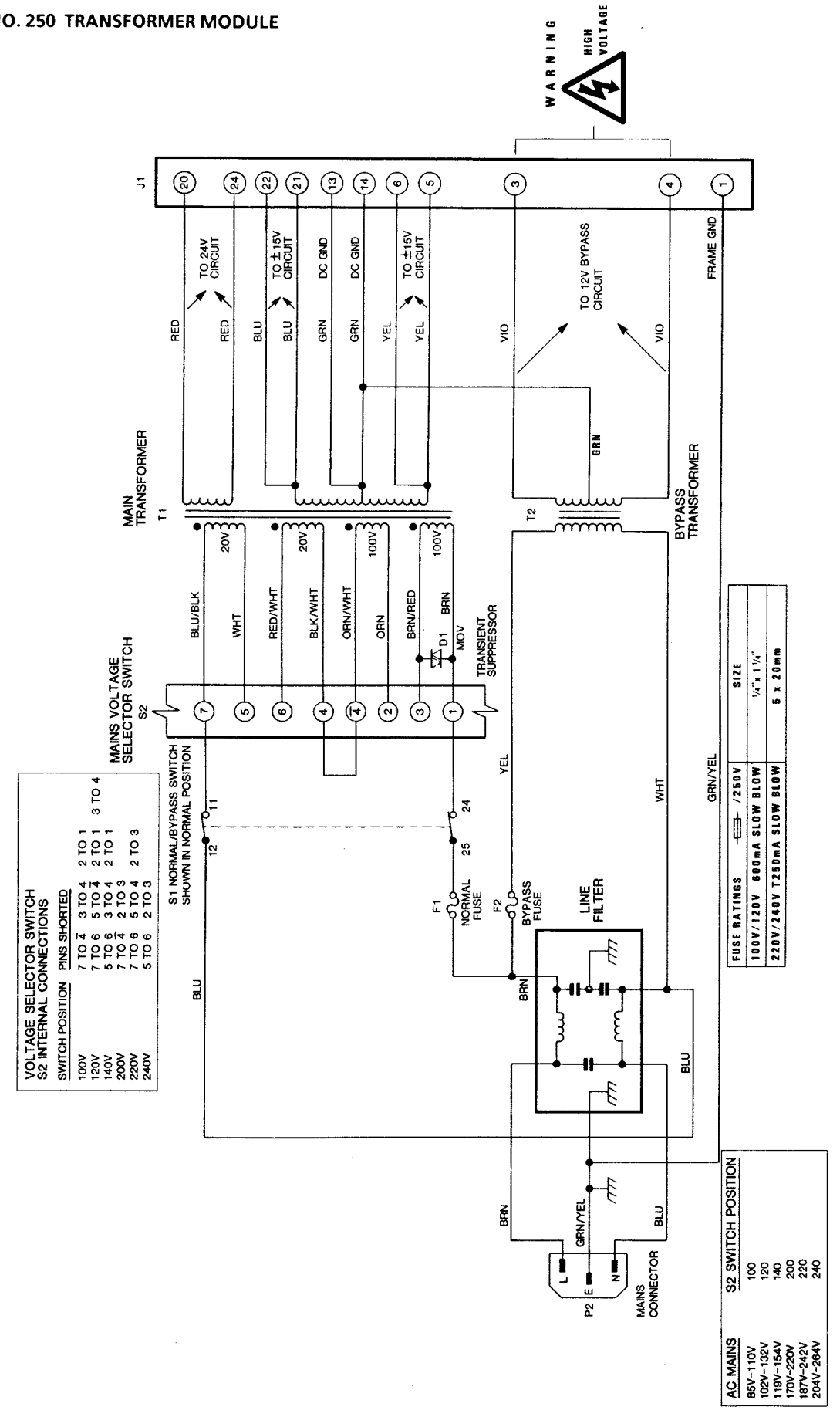


CAT. NO. 249 POWER SUPPLY CARD

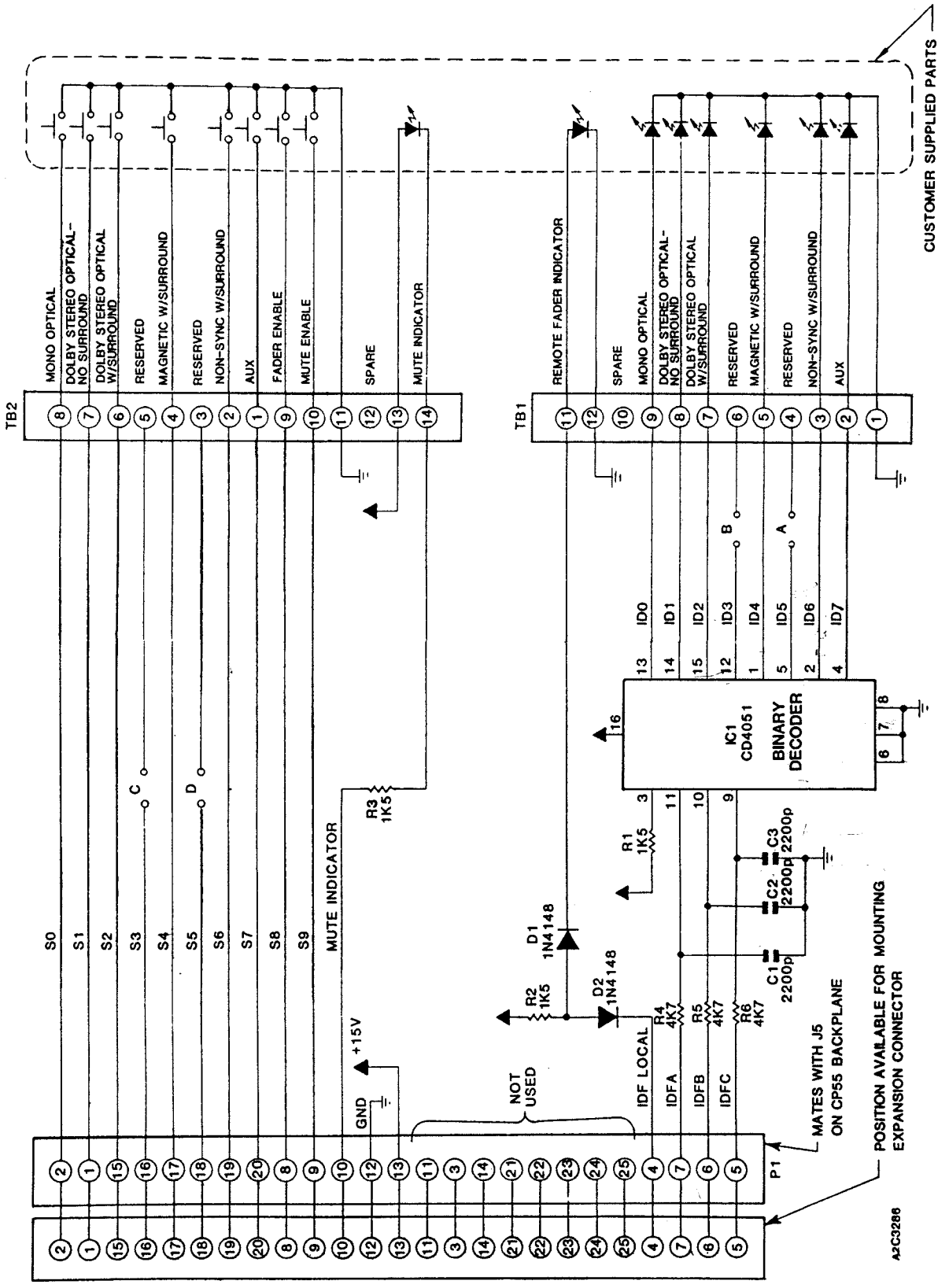


L90/045

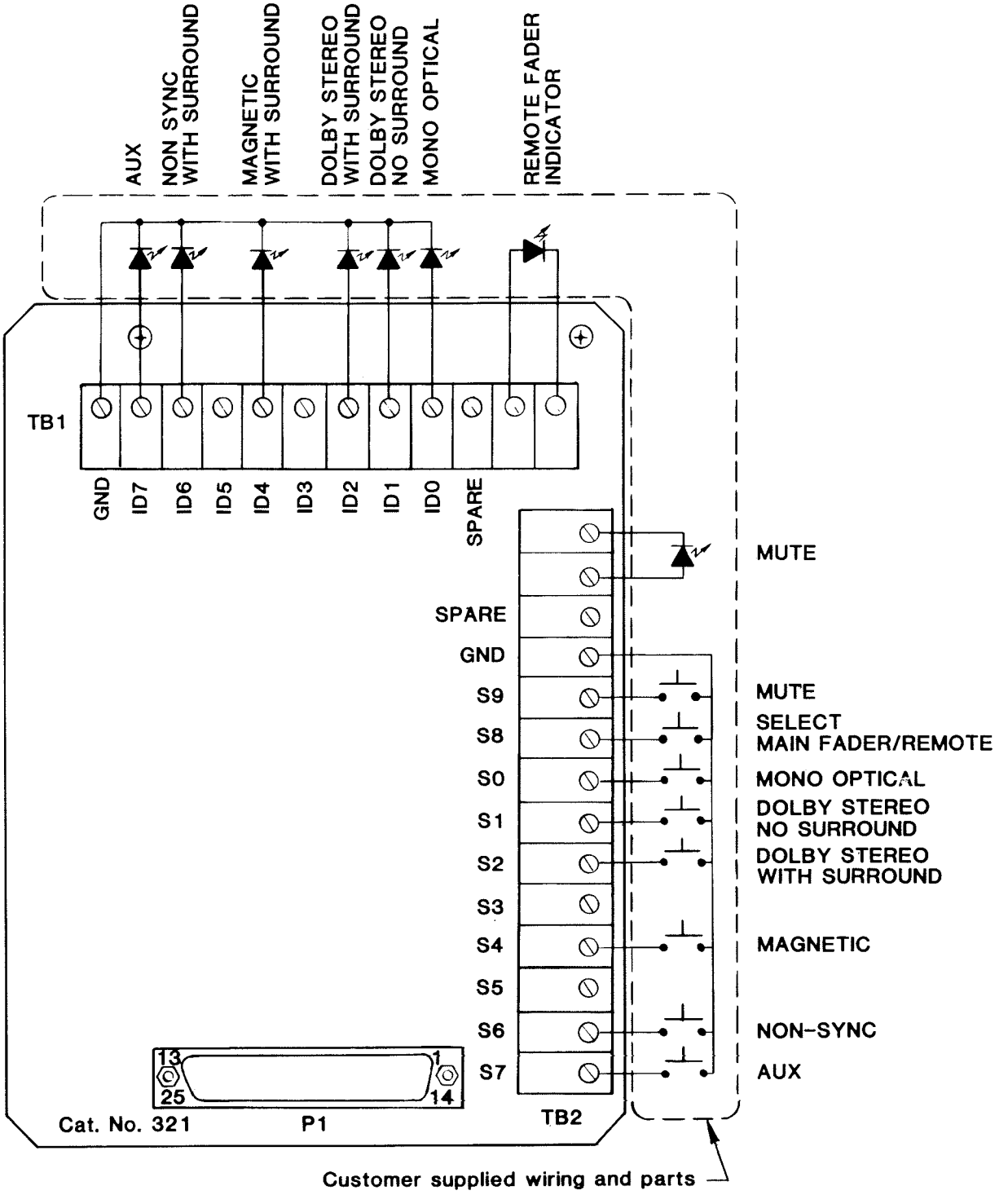
CAT. NO. 250 TRANSFORMER MODULE

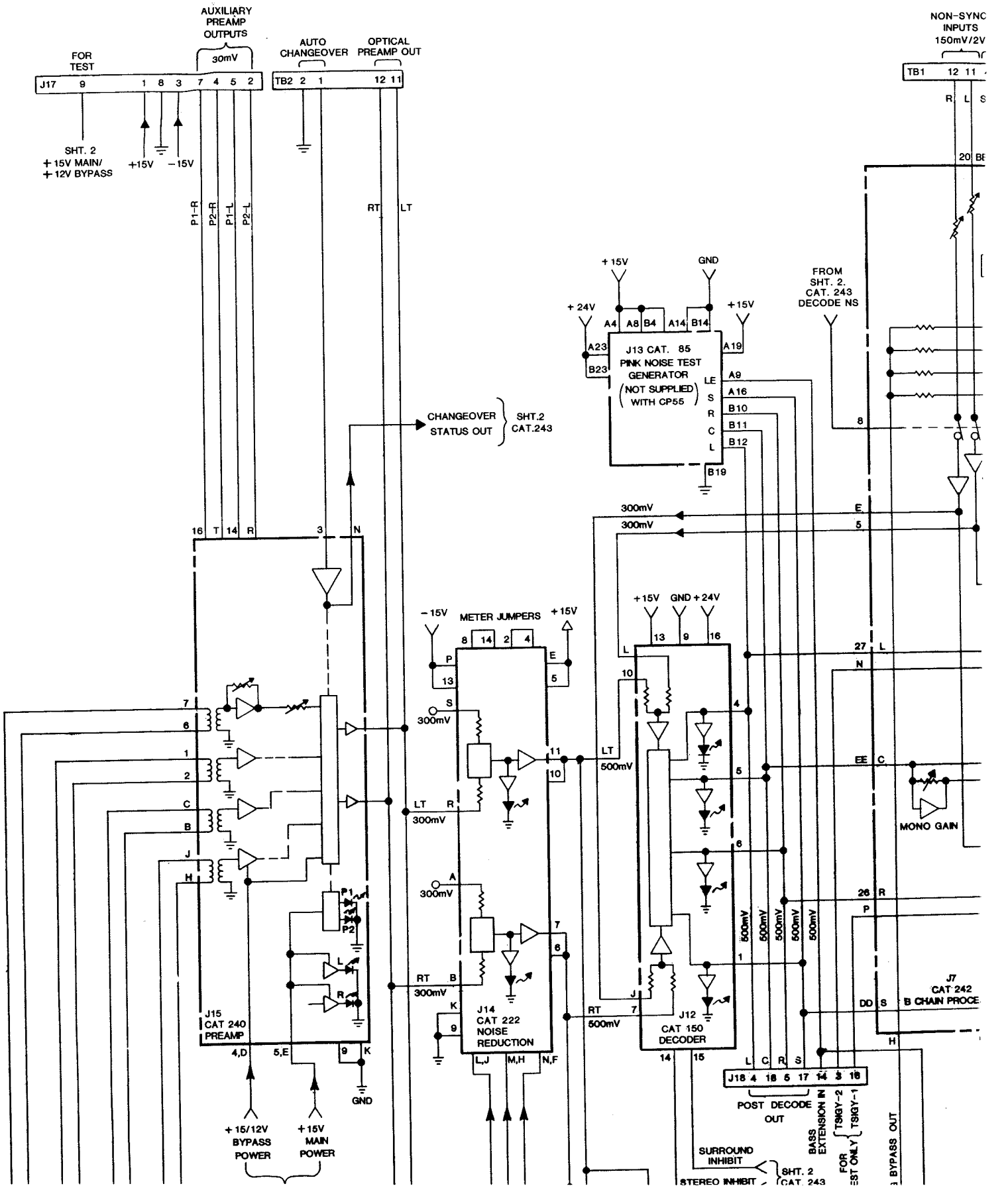


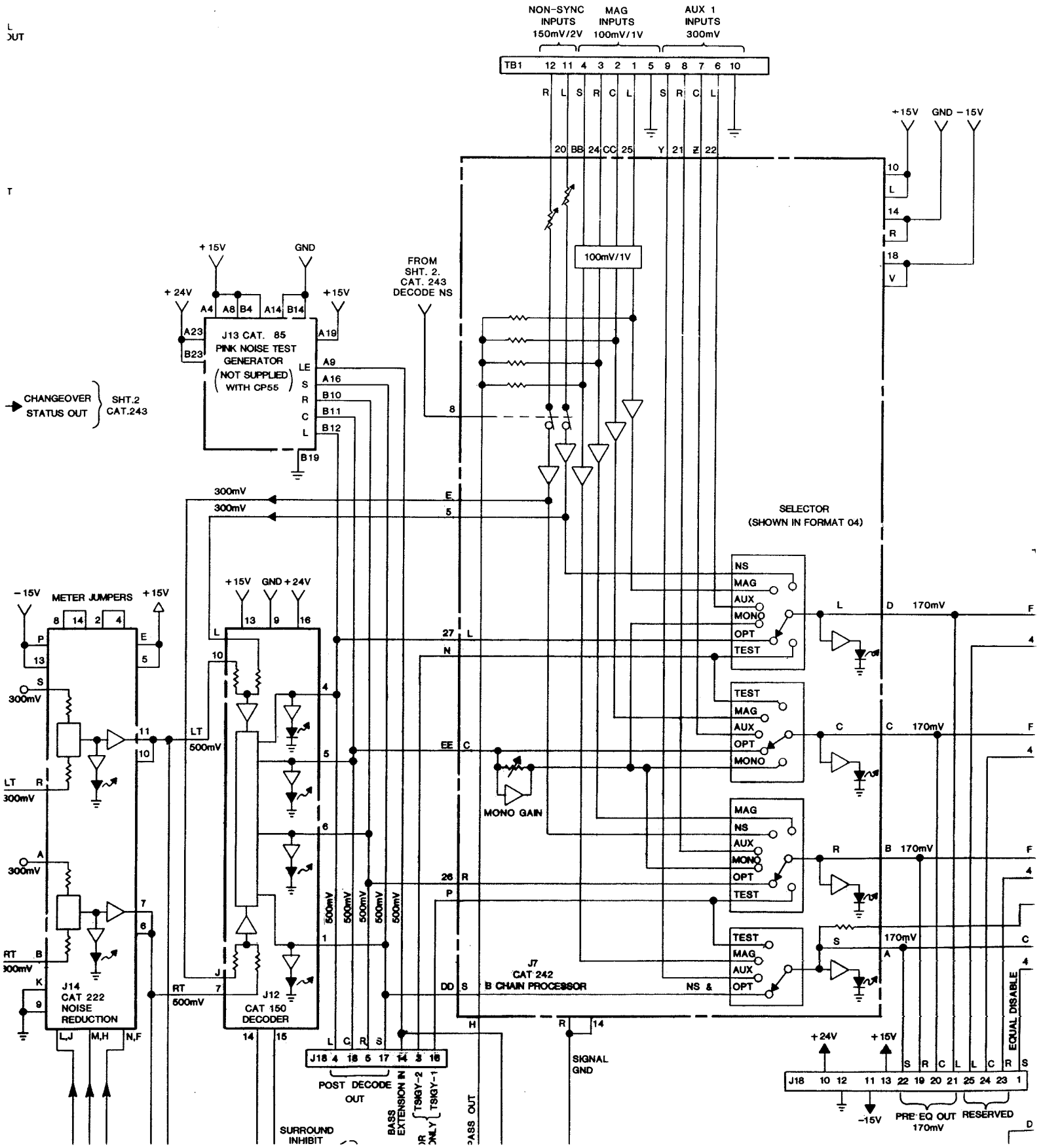
CAT. NO. 321 AUTOMATION INTERFACE BOARD SCHEMATIC

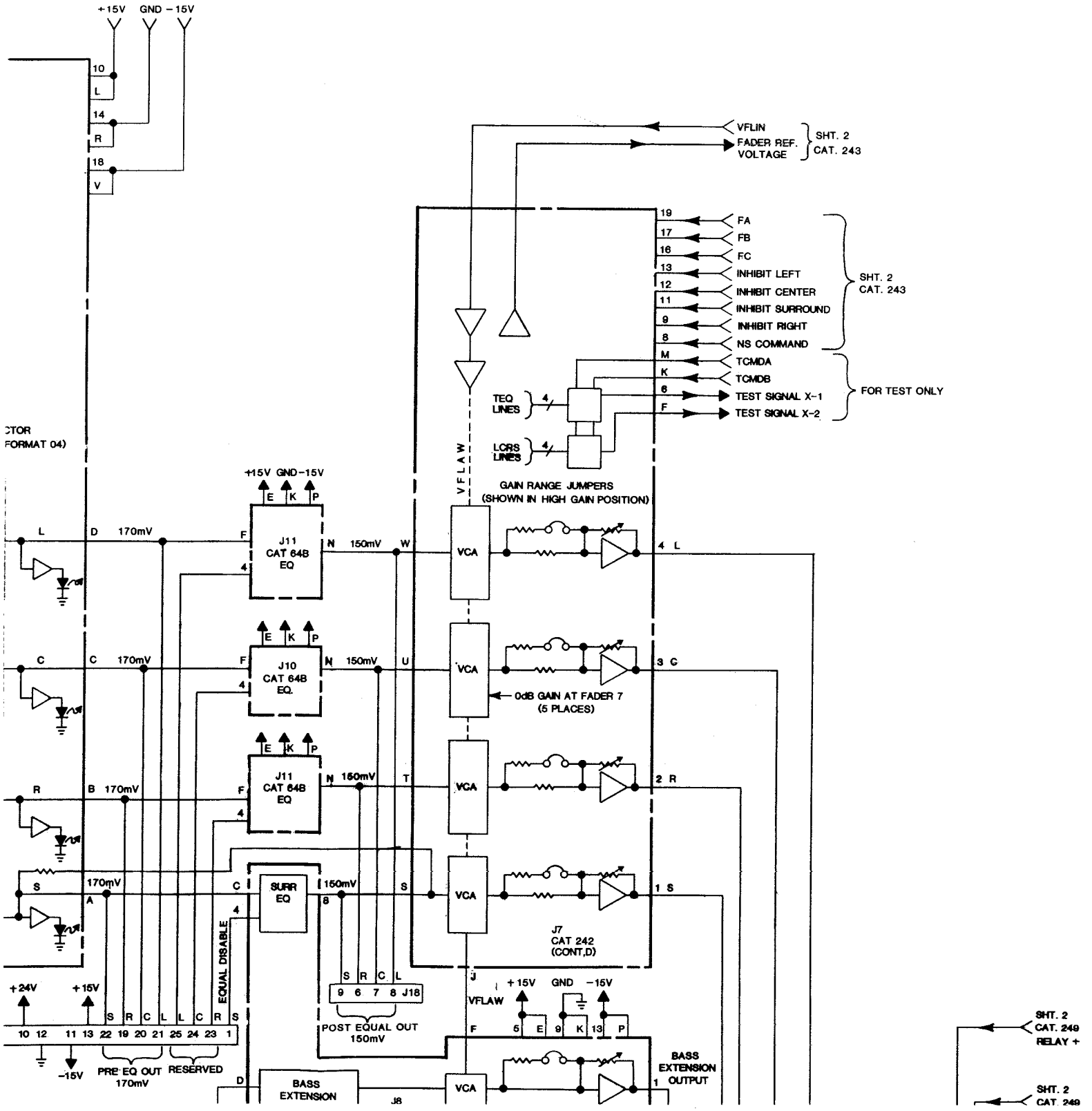


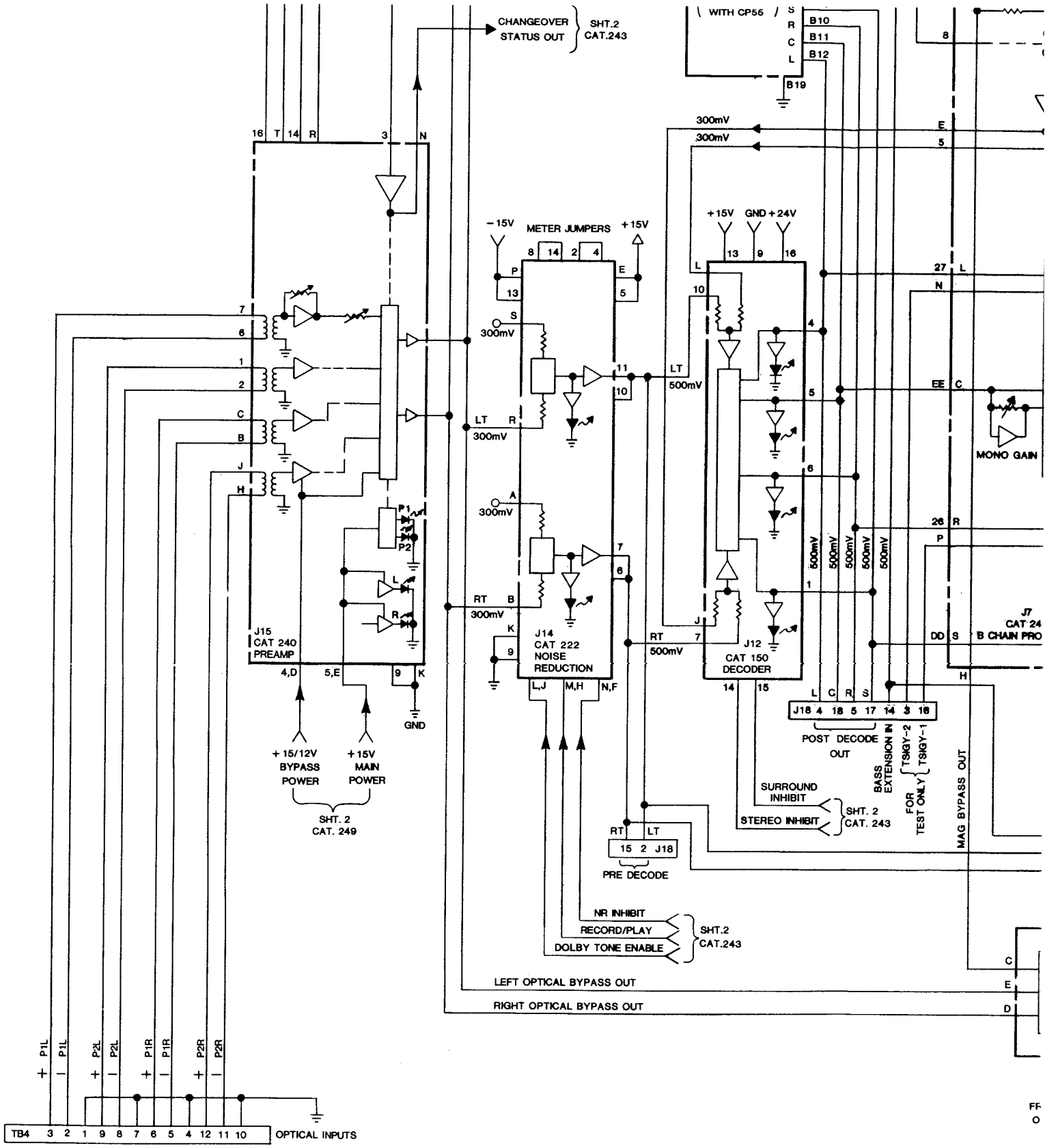
CAT. NO. 321 AUTOMATION INTERFACE BOARD WIRING DIAGRAM

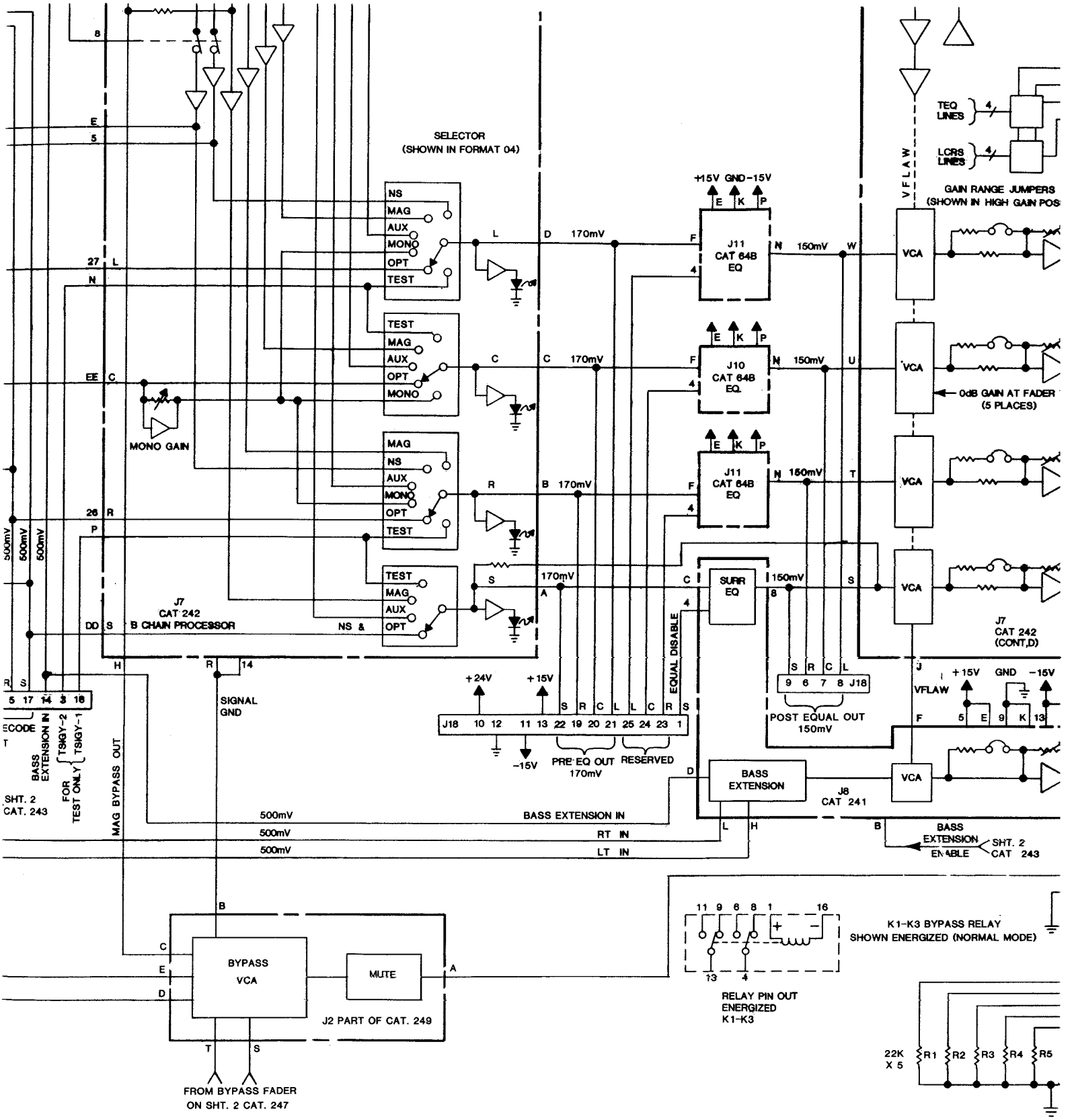



AUXILIARY PREAMP OUTPUTS
30mV
FOR TEST
J17 9 1 8 3 7 4 5 2
SHT. 2 +15V MAIN/ +12V BYPASS
+15V
−15V
P1-R
P2-R
P1-L
P2-L
AUTO CHANGEOVER
OPTICAL PREAMP OUT
TB2 2 1 12 11
RT
LT
NON-SYNC INPUTS 150mV/2V
TB1 12 11
R L S
20 BE
+15V
GND
+24V
A4 A8 B4 A14 B14
A23
B23
J13 CAT. 85 PINK NOISE TEST GENERATOR (NOT SUPPLIED WITH CP55)
A19
A9
A16
B10
B11
B12
B19
LE
S
R
C
L
FROM SHT. 2. CAT. 243 DECODE NS
8
CHANGEOVER STATUS OUT
SHT.2 CAT.243
300mV
E
5
16 T 14 R 3 N
−15V
METER JUMPERS
+15V
8 14 2 4
P
13
S
300mV
11
10
LT
500mV
+15V GND +24V
13 9 16
L
27 L
N
10
4
EE C
5
MONO GAIN
6
26 R
P
500mV
1
J
7
RT
500mV
J12 CAT 150 DECODER
14 15
L C R S
J18 4 18 5 17 14 3 18
POST DECODE OUT
BASS EXTENSION IN
T3KGY-2
T3KGY-1
FOR TEST ONLY
BYPASS OUT
SURROUND INHIBIT
STEREO INHIBIT
SHT. 2 CAT. 243
LT R
300mV
RT B
300mV
A
300mV
K
9
J14 CAT 222 NOISE REDUCTION
L,J M,H N,F
7
6
J7 CAT 242
DD S
H
7
6
1
2
C
B
J
H
P1
P2
L
R
J15 CAT 240 PREAMP
4,D 5,E 9 K
GND
+15/12V BYPASS POWER
+15V MAIN POWER

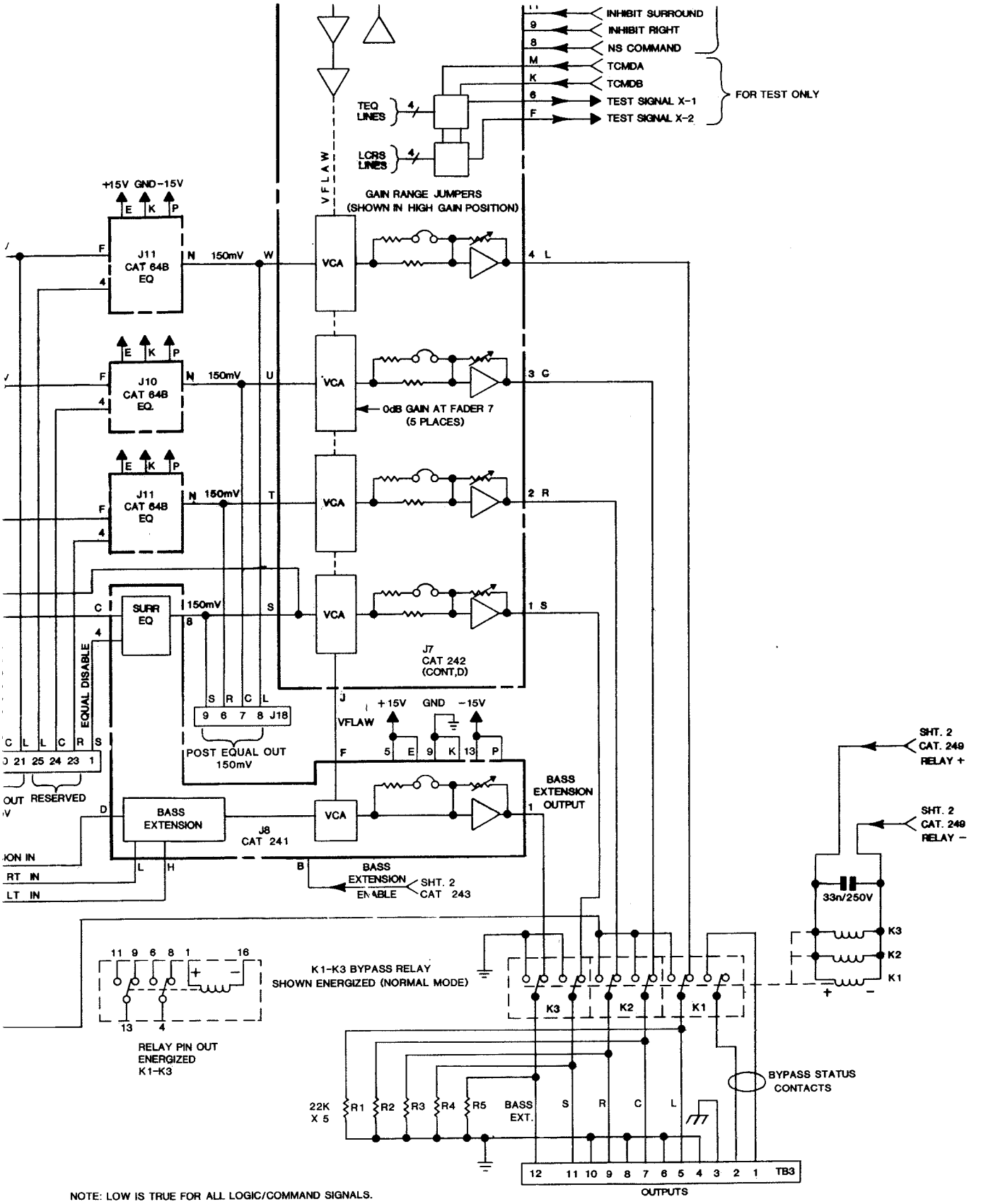

NON-SYNC INPUTS 150mV/2V
MAG INPUTS 100mV/1V
AUX 1 INPUTS 300mV
TB1 12 11 4 3 2 1 5 9 8 7 6 10
R L S R C L S R C L
20 BB 24 CC 25 Y 21 Z 22
+15V GND −15V
10 L
14 R
18 V
100mV/1V
+15V GND
+24V
A4 A8 B4 A14 B14
A23 B23
J13 CAT. 85 PINK NOISE TEST GENERATOR (NOT SUPPLIED WITH CP55)
LE S R C L
A19 A9 A16 B10 B11 B12 B19
FROM SHT. 2. CAT. 243 DECODE NS
CHANGEOVER STATUS OUT
SHT.2 CAT.243
300mV
300mV
SELECTOR (SHOWN IN FORMAT 04)
NS MAG AUX MONO OPT TEST
TEST MAG AUX OPT MONO
MAG NS AUX MONO OPT TEST
TEST MAG AUX OPT
−15V METER JUMPERS +15V
+15V GND +24V
LT 500mV
RT 500mV
MONO GAIN
J14 CAT 222 NOISE REDUCTION
J12 CAT 150 DECODER
J7 CAT 242 B CHAIN PROCESSOR
NS &
170mV
EQUAL DISABLE
J18 4 18 5 17 14 3 16
POST DECODE OUT
BASS EXTENSION IN
SURROUND INHIBIT
SIGNAL GND
+24V +15V
J18 10 12 11 13 22 19 20 21 25 24 23 1
−15V
PRE EQ OUT 170mV
RESERVED


+15V
GND
−15V
10
L
14
R
18
V
VFLIN
FADER REF. VOLTAGE
SHT. 2 CAT. 243
19
FA
17
FB
16
FC
13
INHIBIT LEFT
12
INHIBIT CENTER
11
INHIBIT SURROUND
9
INHIBIT RIGHT
8
NS COMMAND
SHT. 2 CAT. 243
M
TCMDA
K
TCMDB
6
TEST SIGNAL X-1
F
TEST SIGNAL X-2
FOR TEST ONLY
TEQ LINES
4
LCRS LINES
4
VFLAW
GAIN RANGE JUMPERS (SHOWN IN HIGH GAIN POSITION)
CTOR
FORMAT 04)
+15V GND −15V
E K P
J11 CAT 64B EQ
J10 CAT 64B EQ
SURR EQ
L
D 170mV
C
C 170mV
R
B 170mV
S
170mV
A
F
4
N 150mV
W
U
T
S
8
VCA
4 L
3 C
2 R
1 S
0dB GAIN AT FADER 7 (5 PLACES)
J7 CAT 242 (CONT,D)
EQUAL DISABLE
+24V
+15V
10 12 11 13 22 19 20 21 25 24 23 1
S R C L L C R S
−15V
PRE EQ OUT 170mV
RESERVED
9 6 7 8 J18
S R C L
POST EQUAL OUT 150mV
J
VFLAW
+15V GND −15V
F 5 E 9 K 13 P
D
BASS EXTENSION
J8
BASS EXTENSION OUTPUT
SHT. 2 CAT. 249 RELAY +
SHT. 2 CAT. 249


CHANGEOVER STATUS OUT
SHT.2 CAT.243
WITH CP55
B10
B11
B12
B19
300mV
300mV
+15V
GND +24V
−15V
METER JUMPERS
+15V
LT 500mV
LT 300mV
RT 300mV
RT 500mV
MONO GAIN
J15 CAT 240 PREAMP
J14 CAT 222 NOISE REDUCTION
J12 CAT 150 DECODER
J7 CAT 24 B CHAIN PRO
J18 4 18 5 17 14 3 16
POST DECODE OUT
BASS EXTENSION IN
FOR TEST ONLY
TSNGY-2
TSNGY-1
MAG BYPASS OUT
SURROUND INHIBIT
STEREO INHIBIT
SHT. 2 CAT. 243
PRE DECODE
NR INHIBIT
RECORD/PLAY
DOLBY TONE ENABLE
SHT.2 CAT.243
+15/12V BYPASS POWER
+15V MAIN POWER
SHT. 2 CAT. 249
GND
LEFT OPTICAL BYPASS OUT
RIGHT OPTICAL BYPASS OUT
TB4 3 2 1 9 8 7 6 5 4 12 11 10
OPTICAL INPUTS



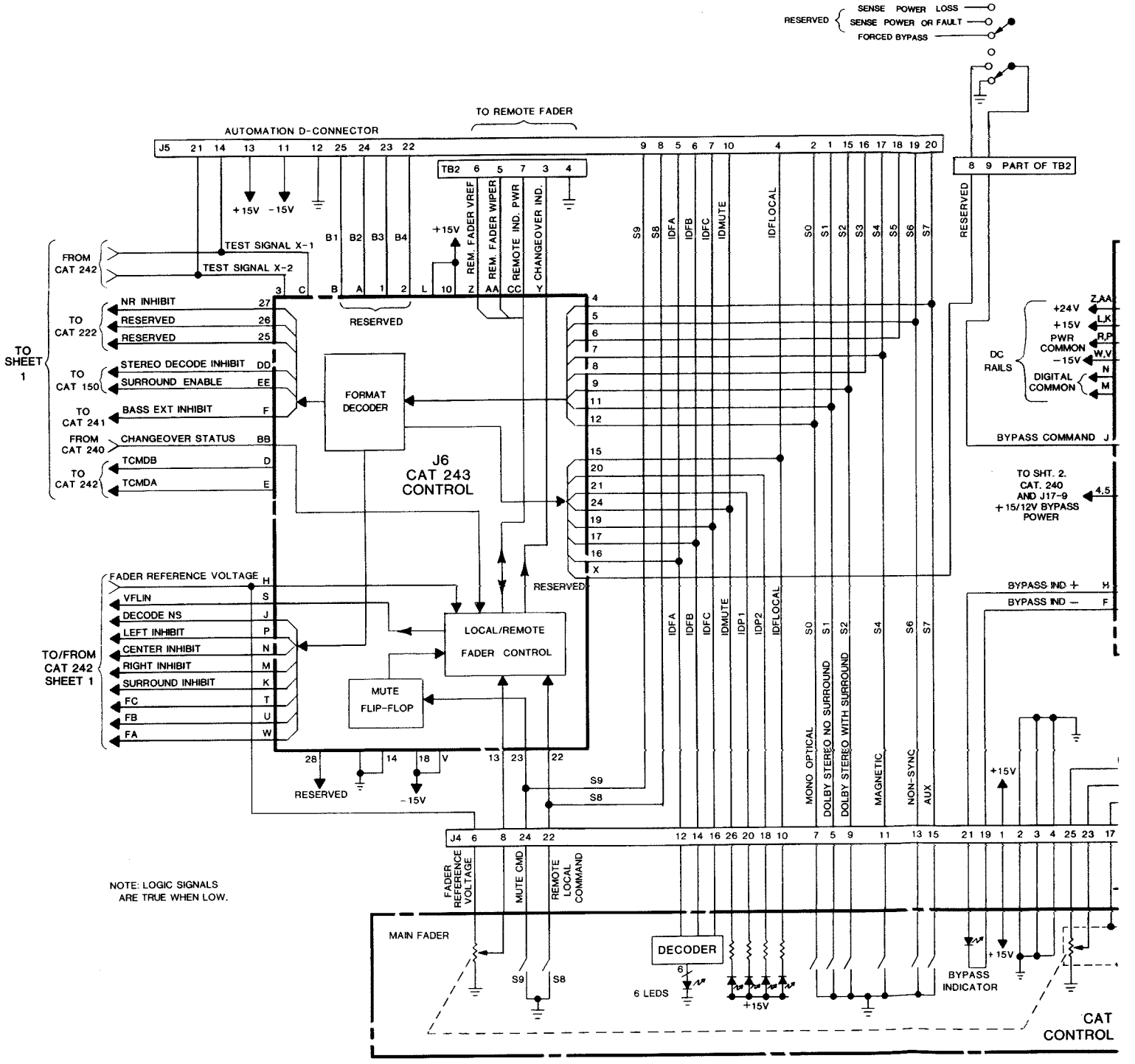
NOTE: LOW IS TRUE FOR ALL LOGIC/COMMAND SIGNALS.

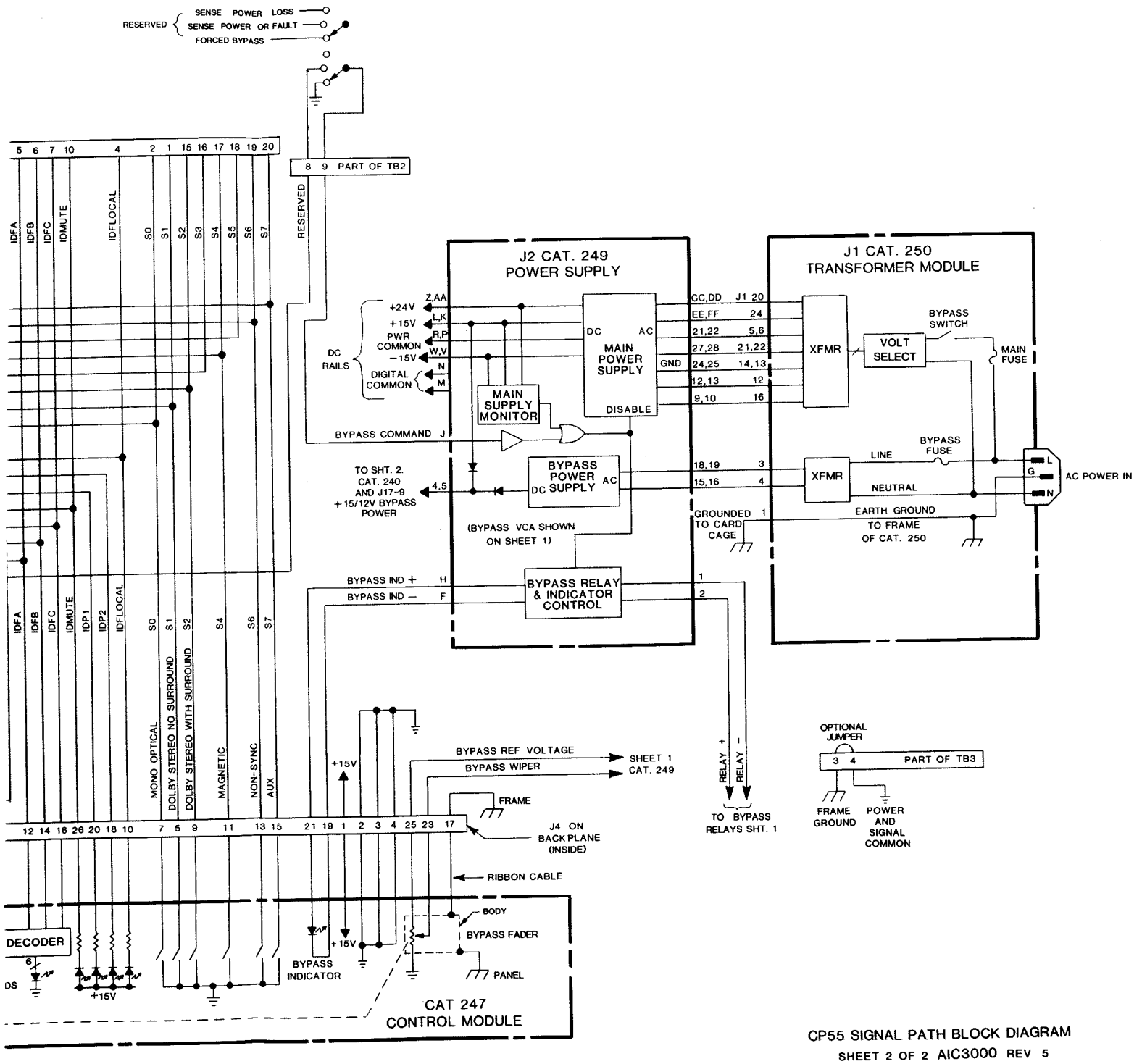


NOTE: LOW IS TRUE FOR ALL LOGIC/COMMAND SIGNALS.

CP55 SIGNAL PATH BLOCK DIAGRAM

SHEET 1 OF 2 AO3000 REV 5


RESERVED
SENSE POWER LOSS
SENSE POWER OR FAULT
FORCED BYPASS
TO REMOTE FADER
AUTOMATION D-CONNECTOR
J5 21 14 13 11 12 25 24 23 22
9 8 5 6 7 10 4 2 1 15 16 17 18 19 20
TB2 6 5 7 3 4
8 9 PART OF TB2
+15V -15V
B1 B2 B3 B4
+15V
REM. FADER VREF
REM. FADER WIPER
REMOTE IND. PWR
CHANGEOVER IND.
S9 S8 IDFA IDFB IDFC IDMUTE IDFLOCAL S0 S1 S2 S3 S4 S5 S6 S7
RESERVED
TO SHEET 1
FROM CAT 242
TEST SIGNAL X-1
TEST SIGNAL X-2
3 C B A 1 2 L 10 Z AA CC Y
RESERVED
TO CAT 222
NR INHIBIT 27
RESERVED 26
RESERVED 25
TO CAT 150
STEREO DECODE INHIBIT DD
SURROUND ENABLE EE
TO CAT 241
BASS EXT INHIBIT F
FROM CAT 240
CHANGEOVER STATUS BB
TO CAT 242
TCMDB D
TCMDA E
FORMAT DECODER
J6
CAT 243
CONTROL
4 5 6 7 8 9 11 12 15 20 21 24 19 17 16 X
DC RAILS
+24V Z,AA
+15V L,K
PWR COMMON R,P
-15V W,V
DIGITAL COMMON N M
BYPASS COMMAND J
TO SHT. 2. CAT. 240 AND J17-9 +15/12V BYPASS POWER
4,5
FADER REFERENCE VOLTAGE H
VFLIN S
DECODE NS J
LEFT INHIBIT P
CENTER INHIBIT N
RIGHT INHIBIT M
SURROUND INHIBIT K
FC T
FB U
FA W
TO/FROM CAT 242 SHEET 1
LOCAL/REMOTE FADER CONTROL
MUTE FLIP-FLOP
RESERVED
IDFA IDFB IDFC IDMUTE IDP1 IDP2 IDFLOCAL S0 S1 S2 S4 S6 S7
MONO OPTICAL
DOLBY STEREO NO SURROUND
DOLBY STEREO WITH SURROUND
MAGNETIC
NON-SYNC
AUX
BYPASS IND + H
BYPASS IND — F
28 14 18 V 13 23 22
RESERVED
-15V
S9
S8
+15V
J4 6 8 24 22 12 14 16 26 20 18 10 7 5 9 11 13 15 21 19 1 2 3 4 25 23 17
FADER REFERENCE VOLTAGE
MUTE CMD
REMOTE LOCAL COMMAND
NOTE: LOGIC SIGNALS ARE TRUE WHEN LOW.
MAIN FADER
S9 S8
DECODER
6
6 LEDS
+15V
+15V
BYPASS INDICATOR
CAT CONTROL



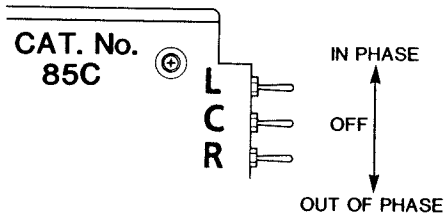
CP55 SIGNAL PATH BLOCK DIAGRAM

SHEET 2 OF 2 AIC3000 REV 5

APPENDIX A
CHECKING PHASING OF SPEAKERS

Loudspeakers are two-wire devices that can be connected incorrectly as well as correctly. Incorrectly wired loudspeakers in a multiple-speaker installation cause degraded performance. For example, woofers in an array must work together to generate a solid wavefront of sound pressure. If some woofers are moving in one direction at the same time that other woofers are moving in the opposite direction, the result is partial cancellation and hence loss of bass. (The lower the frequencies being handled, the greater is the cancellation.) Wiring can be reversed inside a connector, a transformer can be mislabeled, and the internal wiring polarities of mixers, crossovers, voice coils, and other inaccessible equipment may be unknown.

The Cat. No 85C pink noise generator can be used to determine correct speaker phasing. Position a microphone as shown on page 5.6 and connect it to the RTA. Switch on pink noise to the center channel in phase (**C** switch down) and observe the RTA display. Switch on pink noise to the left channel in phase (**L** switch down). The level in each band displayed on the RTA should rise by 2 to 4 dB. If the level in any band decreases then check phasing of the speaker connections. Repeat this procedure for center and right channel speakers.



A number of hand-held devices are available to assist the installer to determine if the speakers in a theatre installation are correctly wired. Virtually all such devices consist of two units -- a pulse or tone generator which is connected to the speaker being tested -- and a polarity detector which is driven either by an integral or external microphone. The detector contains LEDs which indicate the direction of motion of the speaker. It is necessary only to connect the generator to the speaker being tested and turn on the test signal. The detector LEDs automatically indicate the direction of motion. It is sometimes difficult to interpret the indication given on these devices, but they are useful in determining whether several loudspeakers behave identically. (If a special adapter cable is made, the generator can be connected to the CP55 **aux** input or the **L** and **R** output test points on the Cat. No. 240 module so the phase check will include all of the system after the optical preamplifier.)

It is strongly recommended that the phasing of all of the speakers be checked before any of the alignment procedures are started.

Typical phasing checkers are as follows:

Model AR130S/AR130D -- Brooke Siren Systems, Ltd, 262 A Eastern Parkway, Farmingdale, N.Y.

Model 500 -- Sounder Electronics, inc., 21 Madrona Street, Mill Valley, CA 94941

Model PC80 -- SCV Audio, B.P. 50056. 186 Allee des Erables. Paris Nord II

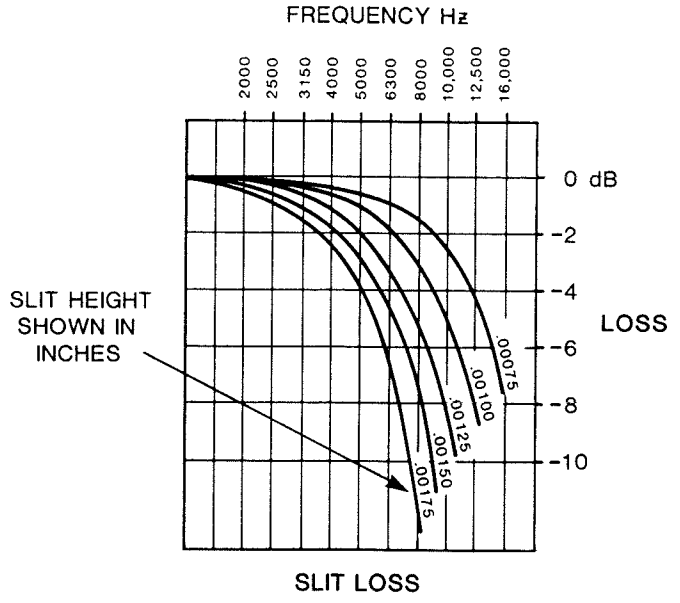
Check with your dealer for complete information on these and other systems.

APPENDIX B
EFFECT OF CHANGES IN SLIT HEIGHT ON SLIT LOSSES

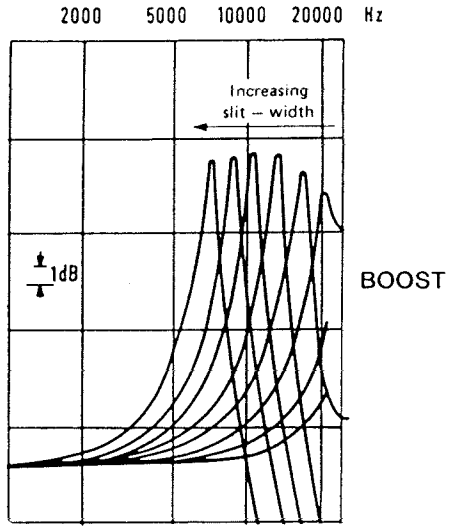
The slit has a finite height that cannot be reduced without a simultaneous reduction in the light output and, thus, the electrical output of the system. The exciter lamp supply output could be increased in an effort to compensate, but this would shorten the life of the lamp. Equally, the cell preamplifier gain could be increased, but this could cause unwanted hum and noise. The slit acts essentially as a high-frequency filter that has a sharp roll-off to a null at the specific frequency at which the slit height is equal to a recorded wavelength. High-frequency roll-off of the optical cell output is dictated by this **slit loss** that is, in turn, a function of the wavelength at which these physical factors are equal. The resulting cancellation frequency varies almost exclusively with the height of the slit. The shape of the roll-off curve is essentially independent of the height of the slit; only the cancellation frequency depends on it.

Unfortunately, a conventional treble control cannot compensate for the slit loss characteristic because of its fixed turnover frequency and the gradual slope of the curve. What is needed is a curve that precisely complements the slit loss function by the provision of a boost that can be shifted in frequency to compensate for various slit heights. This is provided by the Dolby optical preamplifiers contained in the Cat. No. 240.

The figures below show the slit losses at the indicated frequencies and the equalization circuit characteristic for slit heights from 0.00075 to 0.00175 inch (0.018375 mm to 0.042875 mm).



SLIT LOSS



SLIT LOSS EQUALIZATION

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