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SA5

SA5 Information

This booklet contains information on the SA5 Surround Adapter, and is comprised of general information, circuit diagrams, and installation and calibration procedures. While the package is self-contained, those pages numbered 7.39 to 7.49 inclusive can be removed and placed in Section 7 of the CP100 manual.

Contents

Dolby Laboratories Inc Information

DOLBY SA5 SURROUND ADAPTER

The Dolby SA5 surround adapter has been designed for use by theatres equipped with Dolby model CP100 units, to enable playback of separate left and right (stereo) surround information contained on the 70mm magnetic prints of "Apocalypse Now".

The SA5 includes other CP100 accessories, and consequently reduces the complexity of the theatre sound system, and makes for significantly easier operation.

Track configuration on 70mm magnetic prints of "Apocalypse Now".

The track configuration of the stereo surround format used for 70mm prints of "Apocalypse Now" differs only slightly from regular Dolby Stereo 70mm prints:

- --Tracks 1, 3, and 5: Left, center, and right (as with conventional Dolby Stereo 70mm);
- --Track 6: Single-channel surround with the full frequency range (as with conventional Dolby Stereo 70mm);
- --Track 2: Channel 2 stage speaker low frequency enhancement (as with normal Dolby 70mm prints) and mid and high frequency information for left rear surrounds.
- --Track 4: Same as Track 2 for channel 4 stage speaker and right rear surrounds.

All channels with the exception of the low frequency information on tracks 2 and 4 require Dolby noise reduction decoding.

Stereo surround playback of "Apocalypse Now" (see Fig. 1)

In houses equipped with the Dolby CP100 sound processor the following are the minimum necessary steps to playback the stereo surround tracks:

- -- Installation of an SA5 surround adapter;
- -- Rewiring (if necessary) of the surround speakers to provide separate left and right surround channels;
- -- Installation of a second surround power amplifier so that left and right surround channels are powered individually.

Once the installation is completed, the stereo surround print plays as follows:

1) The information on tracks 1, 3, and 5 is fed to the left, center, and right screen speakers as usual;
2) The bass enhancement information on tracks 2 and 4 is fed to the left extra and right extra screen speakers as usual;

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3) The middle and high frequency stereo surround information on tracks 2 and 4 is fed to the left and right surround speakers respectively, combined with the non-directional bass information from track 6.

The SA5 contains the necessary circuitry to select at the push of a switch either stereo or conventional magnetic surround playback.

Conventional Dolby Stereo playback of "Apocalypse Now".

It is possible that the stereo surround format used for "Apocalypse Now" may be adopted for selected other future Dolby70mm releases. While the special directional effects created for "Apocalypse Now" and any other films using this same format will not be reproduced with conventional Dolby Stereo playback, the film will sound as good as conventional Dolby Stereo 70mm releases when played without the SA5. The single channel of surround information on track 6 will be fed to the the theatre's single surround channel as usual, and the bass enhancement information on tracks 2 and 4 will be fed to the left extra and right extra screen speakers again as with conventional Dolby 70mm playback. The stereo surround information on tracks 2 and 4 is not utilized.

Features of the SA5

In addition to the circuitry and switching for deriving and routing the stereo surround channels, the SA5 features:

-- Two Dolby Cat. No. 22 noise reduction modules for tracks 2 and 4. With conventional Dolby Stereo releases, tracks 2 and 4 are used only for bass enhancement and do not require noise reduction. However, with the stereo surround format the full frequency range of these tracks is used. Thus on "Apocalypse Now" prints, tracks 2 and 4 are Dolby encoded, and noise reduction decoding is provided in the SA5.

-- Facilities for adding a third Cat. No. 22 noise reduction module for track 6. This may be purchased as an option, or alternatively, if the theatre system already incorporates an outboard Dolby 364 noise reduction unit for track 6, its Cat. No. 22 module may be removed from the 364 and plugged into the SA5, and the 364 eliminated from the system.

-- Cat. No. 150 optical center channel/surround decoder. A new optical decoder Cat. No. 150 module is included within the SA5. If the theatre is already equipped with an outboard SA-3 or SA-4 optical surround adapter, some components may apply for a trade-in credit (see your Dolby Stereo theatre equipment dealer).

-- Level metering for tracks 2 and 4 of 70mm prints, and for the center and surround channels of 35mm Dolby Stereo optical prints.

-- Facilities for adding two Cat. No. 64 equalizer modules to equalize the separate left and right stereo surround channels (at the exhibitor's option). New equalizer modules can be plugged in, or if the system already incorporates outboard E-2 equalizers, the Cat. No. 64 modules can be removed from the E-2 (s), plugged into the SA5, and the outboard unit (s) eliminated from the system.

-- Sophisticated switching logic to facilitate selecting film sound formats. When going from one format to another, the projectionist has to push fewer switches when the SA5 is incorporated. The logic follows that of the CP100 so that the two function together as one unit.

-- A single-channel low frequency output to feed a subwoofer and amplifier. Information below 100 Hz from tracks 2 and 4 is fed to an output jack to drive a subwoofer and its amplifier without the need for an external crossover. LB / RB Aux

-- Levels on all outputs of the SA5 are controlled by the normal CP100 or remote fader.

Notes on the theatre installation

"Apocalypse Now" is particularly demanding of the theatre sound system, as are an increasing number of Dolby Stereo 70mm releases. The following recommendations thus apply both for best reproduction of "Apocalypse Now" and for best system performance on all Dolby Stereo films.

1. Screen speakers. For best results, particularly on "Apocalypse Now", screen speakers should be no smaller than Altec A-4's, or another manufacturer's equivalent.

2. Amplifier power. 100 watts per channel (a total of 7 channels with stereo surround) should be used in the vast majority of theatres. Large theatres may require more, and very small theatres may get away with a bit less. Keep in mind that amplifier power these days is relatively far less expensive than a few years ago, and is well worth it. For example, inadequate transistor amplifiers, when overdriven, can produce loud "clicks" which not only sound bad, but can result in speaker damage on loud effects.

3. Subwoofers. The sound-tracks of "Apocalypse Now" contain recorded information well below 100 Hz, and can benefit by the extra very low bass output provided by subwoofers. While information that low in frequency is fairly rare on films, there have been and may very well be others with such low frequency information. The optional addition of subwoofers will cause no problems when left in use on films containing more conventional sound information.

4. The surround channels. The surround tracks of "Apocalypse Now" from time to time carry very loud effects, as well as low level ambience sounds. Thus in addition to the usual surround requirement for as diffuse a sound field as possible from the surround speakers, adequate power handling must be provided as well. And while for example a single pair of large surround speakers with appropriate amplification might provide adequate power handling, the discrete sound sources provided by just the two speakers will very much dilute the surround effects (both with conventional surround and stereo surround).

   The best method for providing for both needs is the use of multiple, small high-Q speakers mounted above the audience's heads (but not on the ceiling) every few feet along the sides and rear of the theatre, starting about half way back along the sides. With proper amplification -- about 100 watts per left and right "string" of speakers -- this combination results in both adequate power handling for loud effects and the proper diffuse surround characteristic. Wide-dispersion speakers, such as those with dome tweeters designed for home use, should not be used, as those seated close to them will be too aware of a point source nearby. Limited-dispersion high-Q speakers used in multiples, on the other hand, will create the proper, diffuse, effect on both stereo and conventional surround tracks.

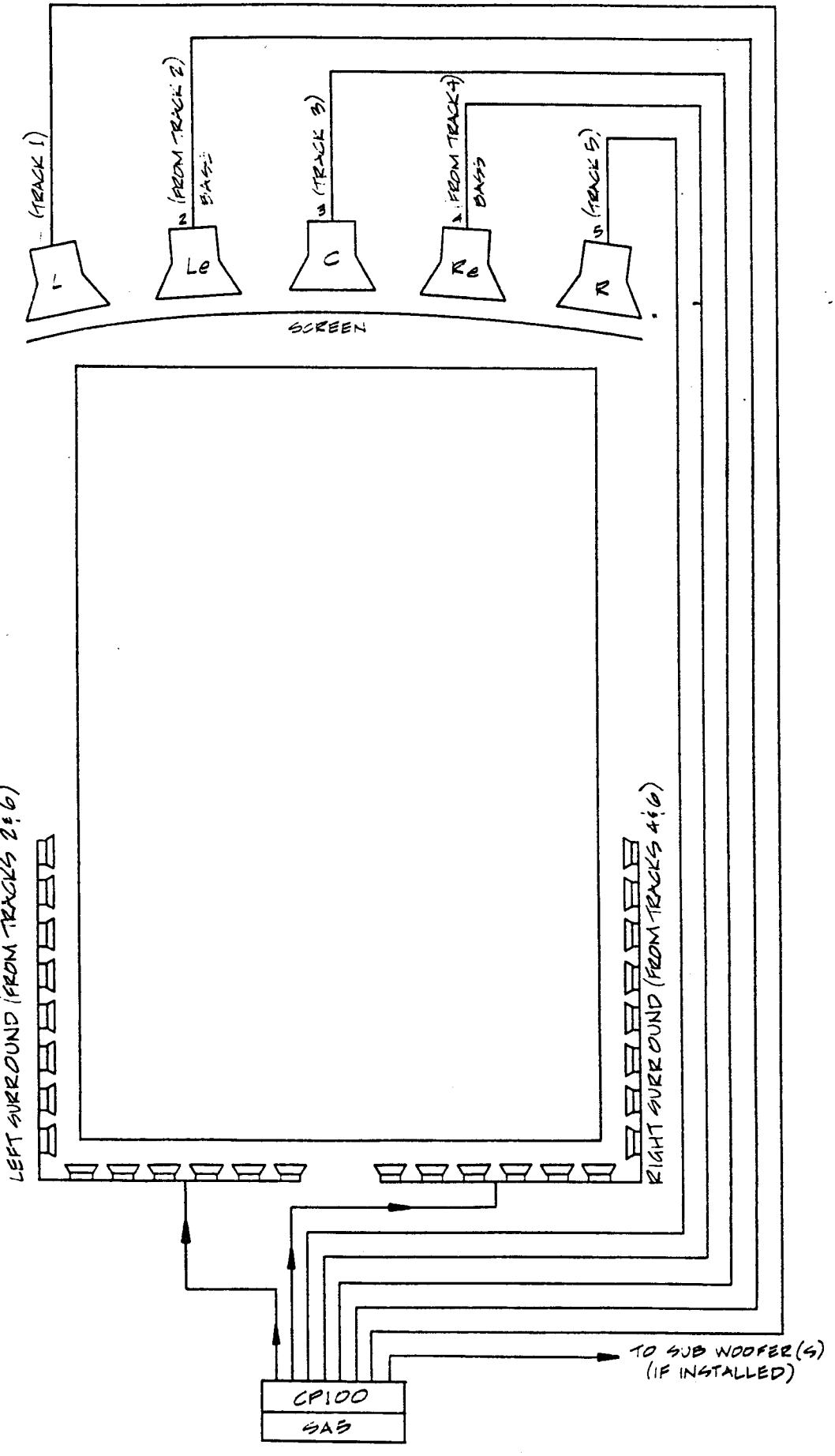
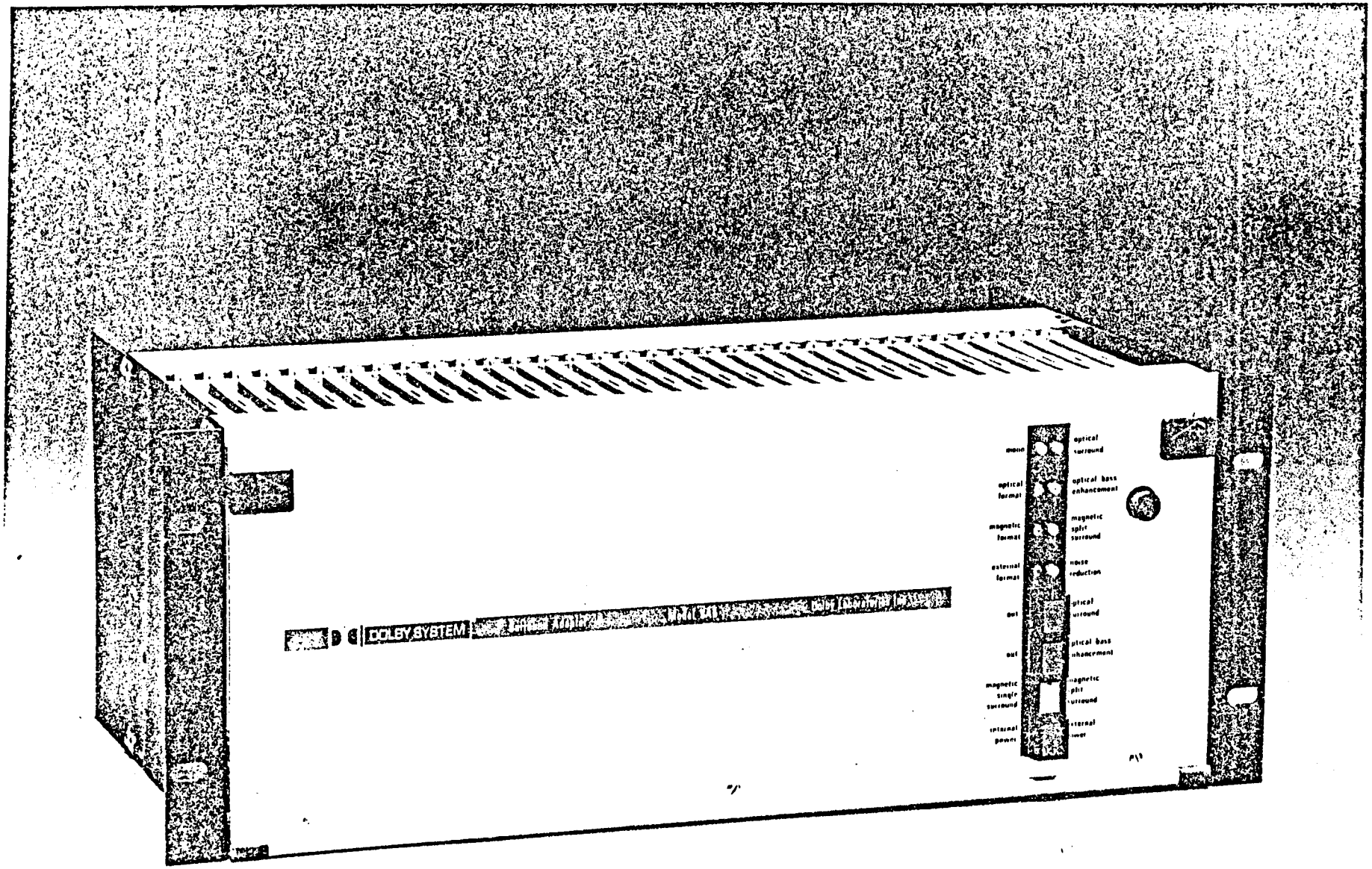


FIG. 1 PLAYBACK OF "APOCALYPSE NOW" UTILIZING DOLBY MODEL SA5 FOR STEREO SURROUNDS

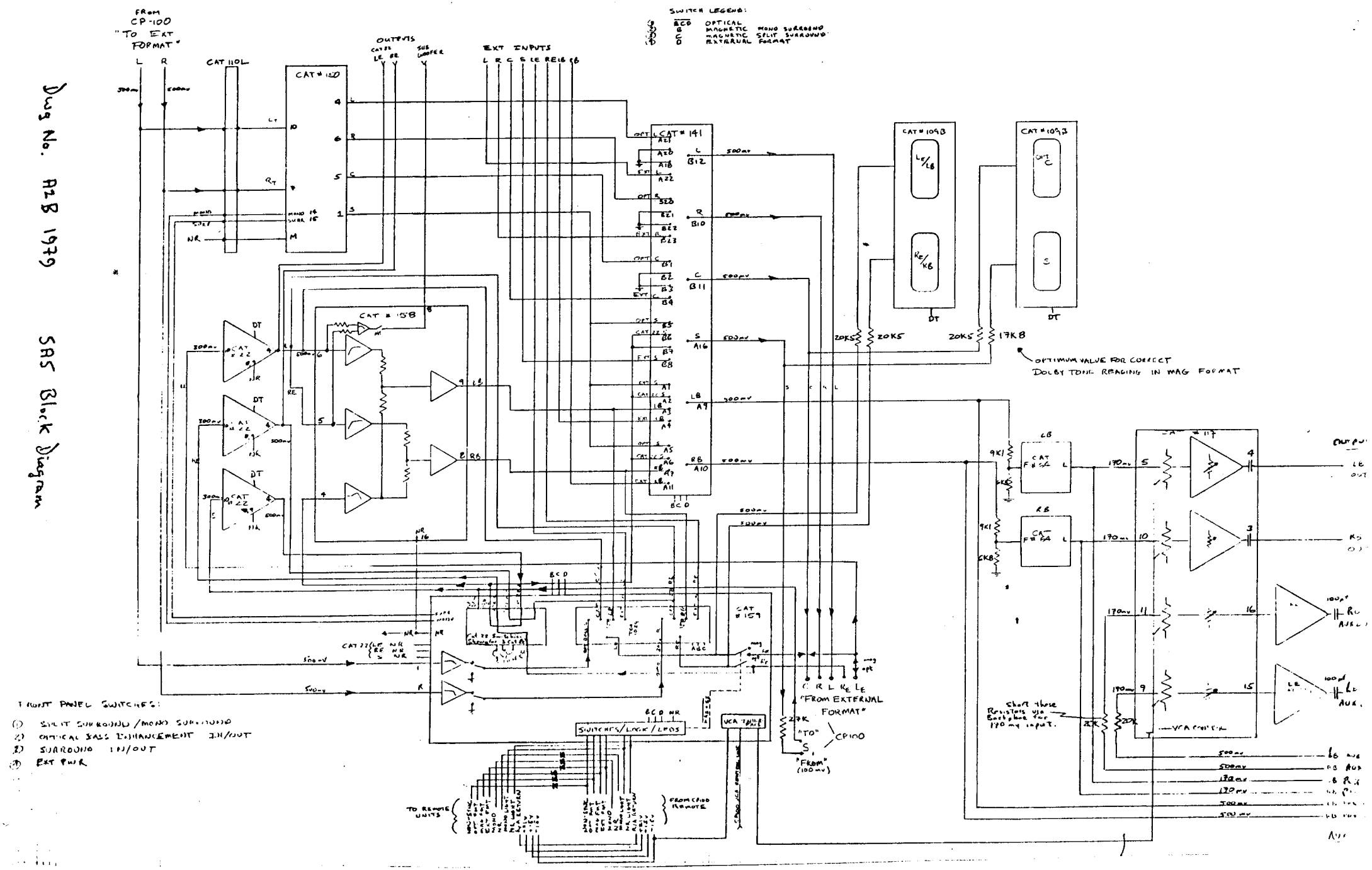
(Note: in certain countries different track numbers may apply, though locations remain the same)

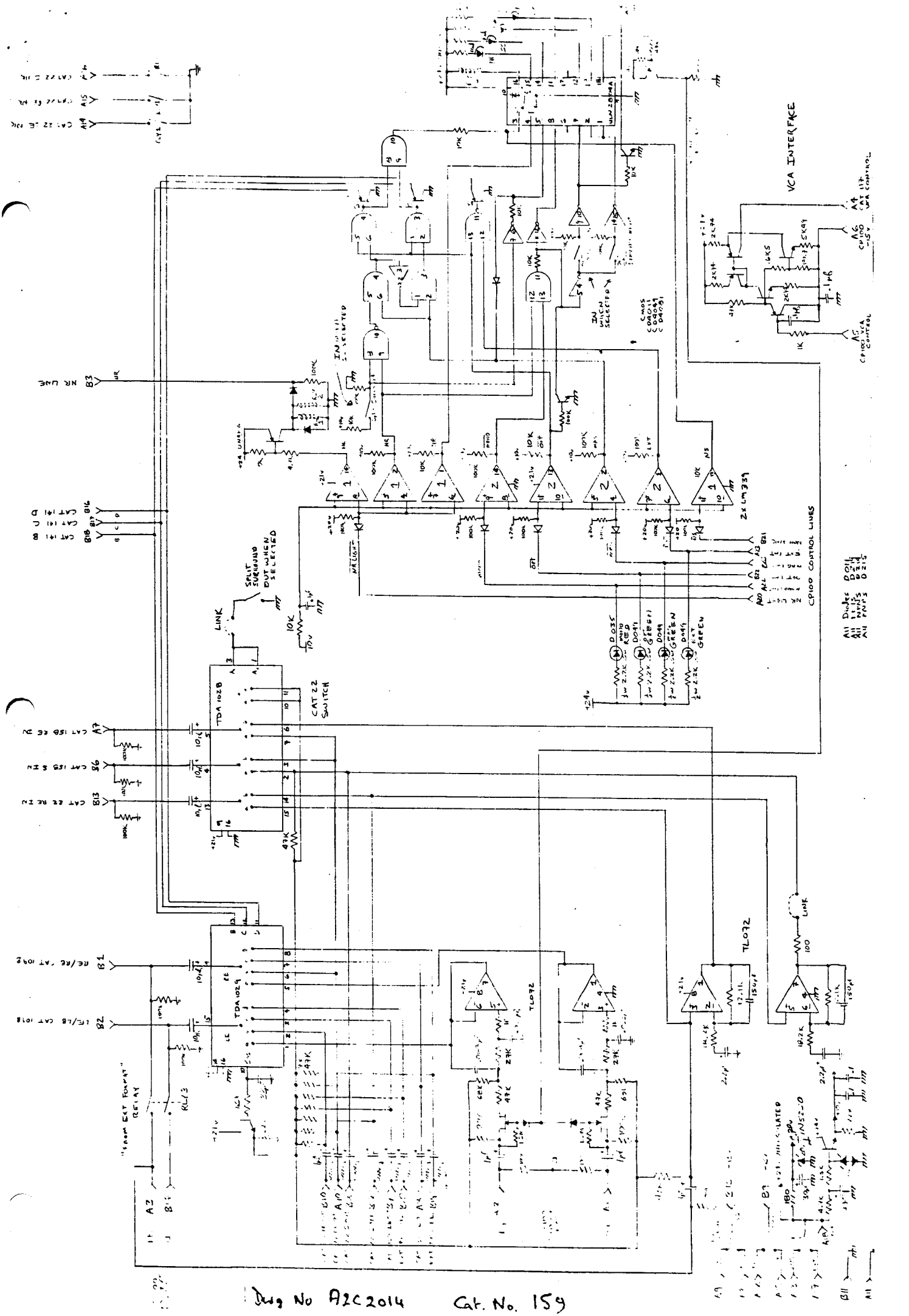


Dolby SA–5 Surround Adapter

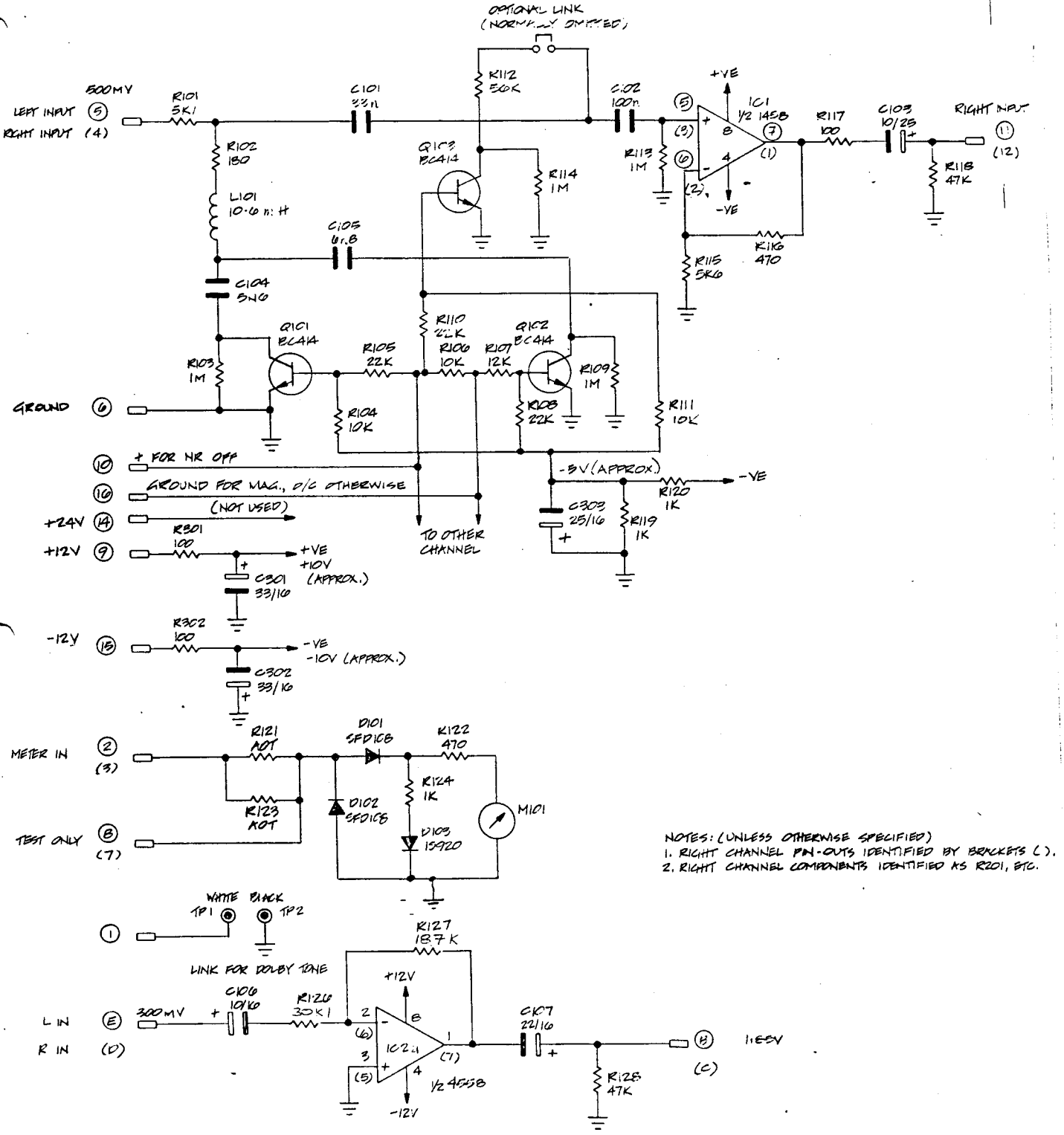
Dwg No. A2B 1979

SAS Block Diagram

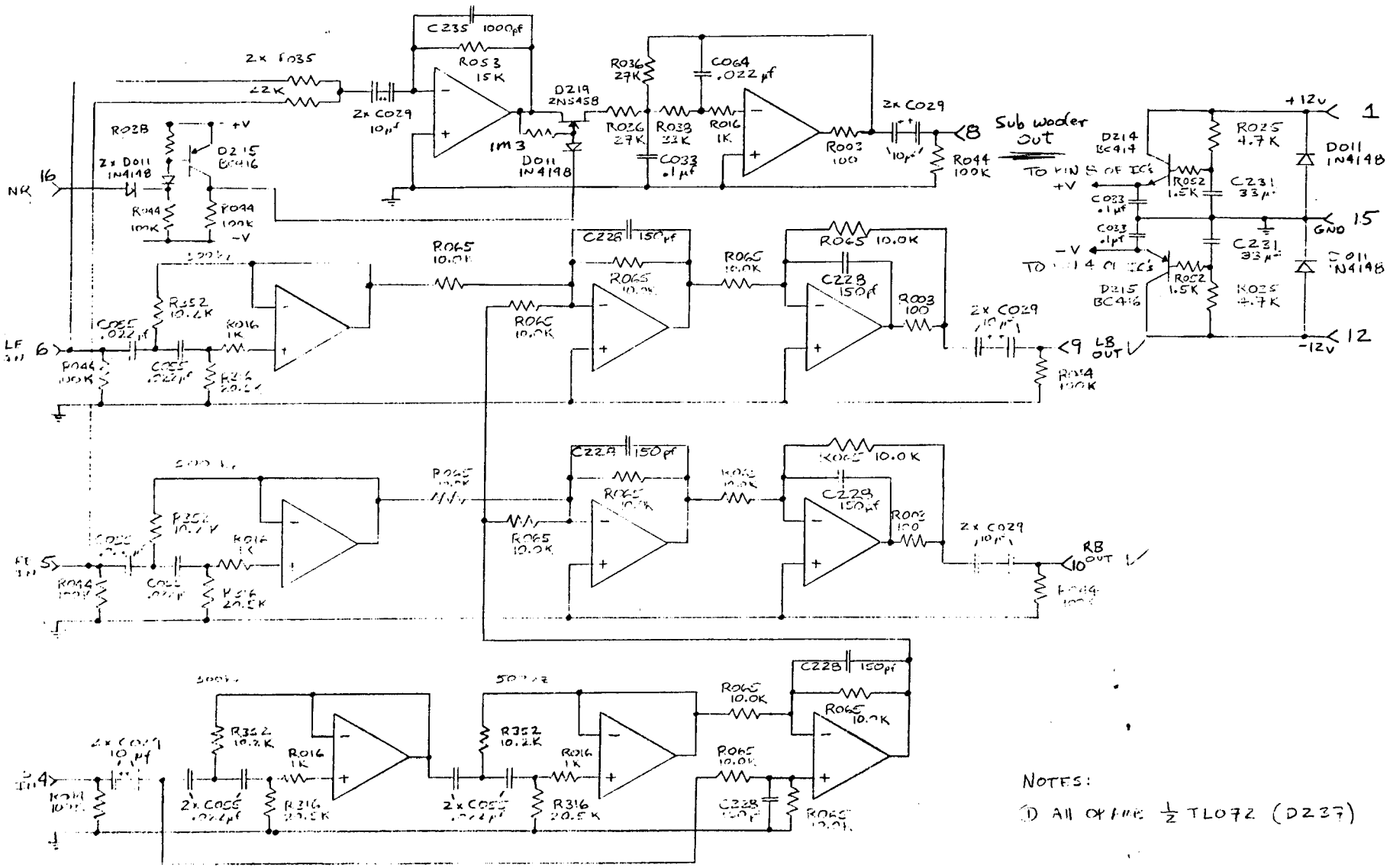




Dwg No A2C2014 Cat. No. 159



Dwg No A2C 1685 Cat. No. 109 B



NOTES:

1) All of the ½ TL072 (D237)

Dwg No. A3C 1982

Cat. No. 1584

7.3 Installation of Surround Adapter (Model SA5)

(a) The Model SA5 surround adapter incorporates features applicable to both 70 mm magnetic and 35 mm optical sound tracks. For optical sound tracks, it allows the use of the Cat. No. 150 to decode properly optically encoded Dolby stereo tracks (replacing this function of the SA4). A combination of internal logic and external pushbuttons allows selection and routing of the optical surround channel (channel 6 in a 70 mm house), as well as optical bass enhancement (via channels 2 and 4). For 70 mm prints, the SA5 includes a noise reduction module to decode the surround track (with the earlier SA3 and SA4, an external Model 364 was used). It also offers split surround reproduction capability for those Dolby encoded 70 mm films specially recorded with this process. (This is a compatible process and films so encoded can still be heard in the usual single surround format without an SA5). For both magnetic and optical sound tracks the SA5 allows equalization of the surround speakers to be carried out if desired.

Because the capabilities of the SA5 are quite broad as compared to the SA4 and earlier surround adapters, an installation may not always contain a full complement of modules. See part (g) for a description of the minimum modules necessary to perform the desired functions.

Connection of the SA5 to a CP100 requires several simple modifications to the parent CP100. This is covered in part (b). Part (c) describes the installation procedure. Part (d) includes a basic operational checklist for the SA5, and part (e) adjustment procedures. Part (f) describes the use of the SA5, and part (h) covers remote powering.

(b) Modification of CP100 for SA5

1. Remove the back panel. Hook support wires between the CP100 main frame and around the lower screw holes of the back panel to prevent any strain on the internal wiring harness.

2. The internal VCA control voltage must be connected to a terminal on the back panel to allow the normal CP100 gain controls to control the circuits in the SA5. Connect a wire from pin B of SK14 (the connector for the facilities module) to pin 12 of SK35, the "from external format" block. Counting from the bottom, pin B of SK14 is the second on the right. Looking from the back of the unit, pin 12 of SK35 is the bottom pin. (See Section 9, Fig. 9.18, CP100 Manual)

Also required is the shorting of the 6 diodes that appear on the inside back cover immediately behind the remote format select block (SK38). This is best done by simply hooking a wire across each diode and soldering it in place. (These diodes are replaced by diodes within the SA5.) Any remote format select switches previously attached to SK38 on the CP100 will be transferred to the "to remote unit" block on the SA5. (Connection of remotes is covered in part (c).)

3. Replace the Cat. Nos. 84 (or 135) and 148 format modules in the CP100 with Cat. Nos. 84B (or 135B) and 148B format modules, placing the Cat. No. 148B in the Format 1 slot and the Cat. No. 84B (or 135B) in the Format 2 slot. The "B" version of these cards contain an extra relay that interconnect the Re and Le channels within the CP100 to the SA5.

If your present system uses an SA2 or an SA3 optical surround adapter, replace both the Cat. No. 82 and 94 format modules with a single Cat. No. 148B.

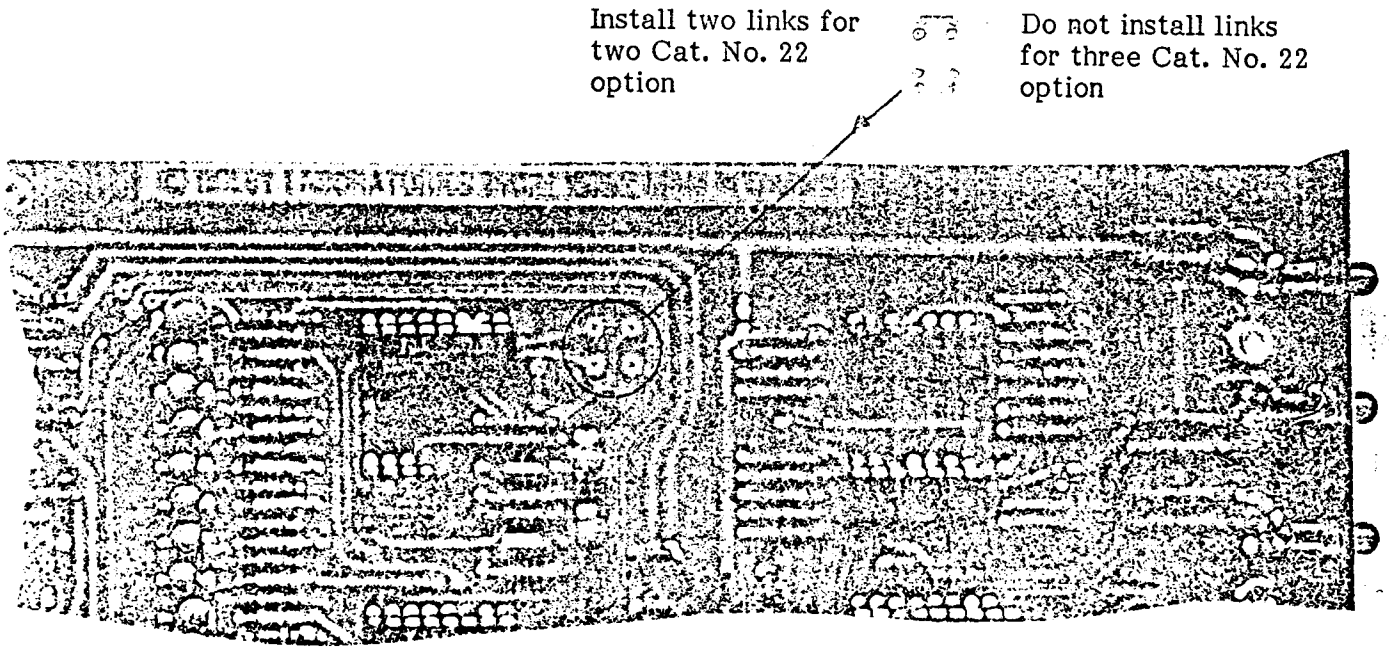
(c) 1. Interconnection of the SA5 with the CP100 is accomplished with three pre-assembled wiring harnesses that connect three blocks on the rear of the SA5 and four blocks on the rear of the CP100 (see drawing 7.3.1):

CP100		SA5
"remote/auto" block (SK38) remote"	to	"from CP100
"from external format" (SK35) external format"	to	"CP100 from
"to external format" (SK34) external format"*	to	"CP100 to
"surround to/from" (SK31) to/from"*	to	"CP100 surround

*these last two interconnection points are combined on one block of the SA5 backplane.

2. A common ground between the two units is obtained via a separate ground wire between the surround information blocks on both units. Although provision is made on the backplane to allow connection of the SA5 chassis to its internal ground, this connection should only be made if the SA5 chassis is not grounded via its rack.

3. If the version of the SA5 using two Cat. No. 22 noise reduction modules has been purchased (as opposed to the version with three Cat. No. 22 modules), the Cat. No. 159 control card (containing the switches and the LEDs) should be modified as follows. For the two-Cat. 22 option, two shorting wires are placed in the front-to-back direction between the four large pads that appear to the immediate right of the TDA 1028 integrated circuit (upper center of board, see diagram below). Be sure that the two Cat. No. 22's are installed in the left two slots designated for Cat. No. 22's.



4. The L_b/R_b outputs found on the back of the SA5 drive the L_b/R_b amplifiers powering the surround speakers.

5. Provision has been made for delay lines, should they be required, on the extreme rear surrounds in the theatre. The inputs for the delay lines can be taken from the "pre eq" or "post eq" terminals on the rear panel. The "pre eq" output occurs prior to the Cat. No. 64 (in case different equalization or no equalization is required for the delayed surrounds) and "post eq" occurs after the Cat. No. 64 (allowing all surrounds to share the same equalization). The outputs of the delay units should then feed into the "R_b Aux In" and the "L_b Aux In" inputs to route the signals through the internal VCA and line amps. The delayed outputs to feed the power amplifiers should then be taken from the "L_b Aux"and "R_b Aux" outputs on the SA5. (Refer to block diagram A2B 1979 for clarification.)

6. If sub-woofers are to be used and the auxiliary VCA channels do not have delay lines connected to them, then the sub-woofer output should be linked to the "L_b Aux In" input (to pass the signal through a VCA channel) with the "L_b Aux" output used to drive the sub-woofer amplifiers.

If delay lines are installed, the sub-woofer output should be routed through the unused S channel in the CP100. This is done by disconnecting the wire leading to the "From" terminal on the SA5 block labeled "CP100 Surround" and reconnecting this same wire through a series 27K resistor to the "Sub Woofer" terminal. The sub-woofer output feeding the power amplifiers is now taken from the CP100 output labeled "S+".

7. Remote units and automation systems that previously were connected to block SK38 on the rear of the CP100 now connect to the block labeled "to remote units" on the rear of the SA5. The "to remote units" block on the rear of the SA5 has the identical pinout as the SK38 block on the CP100 to minimize installation difficulties. The remote changeover pin ("Rem C/O" on SK37) and the remote fader pin ("Remote Fader" on SK37) remain active on the rear panel of the CP100 and do not appear on the backplane of the SA5.

8. Installation of an SA5 which is equipped with the magnetic format split surround feature increases the number of active channels in a theatre from 6 to 7. This imposes a strain on CP100 installations which still make use of a passive 6-channel wall attenuator. If audio level control is required near the projectors, Cat. No. 88 remote boxes should be installed and the wall attenuator bypassed.

9. With the installation of an SA5, the assignment of optical and magnetic formats to particular format numbers (Format 1, etc.) is no longer arbitrary. Format 1 is now the optical format and a Cat. No. 148B should now be installed in the Format 1 slot in the CP100. Format 2 is now the magnetic format, and either a Cat. No. 135B or a Cat. No. 84B should be installed in the Format 2 slot. Format 3 is now the external format and for those installations requiring special external equipment, a Cat. No. 83 should be installed in the Format 3 slot. See part (e) for use of Format 3.

(d) Testing

1. After the SA5 is completely installed, both the CP100 and the SA5 should be powered "on" and a visual functional check of the logic should be made. With the CP100 in "Format 1" mode, the green optical format light on the SA5 should be lit. In "Format 2", the magnetic format light should go on, and for "Format 3" the external format light should go on.

When in both optical and Dolby NR mode (selected on the CP100), depressing the "optical surround" and "optical bass enhancement" switches on the SA5 should cause their respective lights to go on. Switching the CP100 into "mono" should cause these lights to go off. Switching the CP100 back into stereo (lights should come back on), switch NR off. The lights should once again turn off.

With the CP100 in both magnetic and NR mode, depressing the "split surround" switch on the SA5 should cause its respective light to go on. Switching NR off should cause the "split surround" light to go off.

2. The Dolby tone oscillators in the Cat. No. 22's can be activated by linking the two test points on either of the Cat. 109B's. In the magnetic single surround mode, Dolby tone should appear on channels L_b, R_b, and S if three Cat. No. 22's are present. If only two Cat. No. 22's are present, Dolby tone will appear on L_e and S. The presence of Dolby tone should be observed on the appropriate Cat. No. 109B meter.

3. The Cat. No. 85 pink noise generator can be placed in the Cat. No. 141 slot to individually test channels L, C, R, L_b, R_b, and S. Channels L_b and R_b are controlled by the switches labeled Le and Re, respectively. Pink noise on channels L, C, R, and S will pass through the CP100 only with an external format card (Cat. No. 83) in place and the external format mode selected. Pink noise on the L_b and R_b channels will not register on the L_b and R_b meters, but pink noise on channels S and C will register on their respective meters.

4. Functioning of the Cat. No. 150 can be tested by removing the Cat. No. 110L link card from its slot and replacing it with a Cat. No. 85 pink noise generator. The CP100 should have both optical and NR formats selected. Switching pink noise onto the left channel only should cause an indication on the left meter of the CP100. Switching pink noise onto the right channel only should cause an indication on the right meter of the CP100. Switching pink noise onto both left and right channels should cause an indication on both the center meters of the CP100 and of the SA5. The optical surround channel cannot be tested using the Cat. No. 85.

The Cat. No. 150 can also be tested using the Dolby tone oscillators in the Cat. No. 22's within the CP100. The CP100 again should be set for optical and NR formats. The SA5 should have optical surround selected. Push the test tone button on the CP100 and set its meters for "check equalizer". Because the left and right oscillators are not phase locked or otherwise synchronized to each other, the center and surround channel meters on the SA5 should dance 180° out of phase from each other. This is to say that as one meter indicates the presence of signal, the other meter should indicate nothing, and vice versa. The left and right meters will arbitrarily dance about at a lower level than the center and surround channels.

The Cat. No. 151 optical test film allows the ability to test the L, C, R, and S channels all at once and provides a reliable and consistent method for testing the Cat. No. 150. Use of this test film is discussed in Engineering Field Bulletins Nos. 88 and 89.

5. The Cat. No. 158 can be tested in installations with the three Cat. No. 22 option by activating Dolby tone on the SA5 via the links on the Cat. No. 109B. The CP100 should be in magnetic and NR formats. The SA5 should have split surround selected (the split surround light should be lit). Because the tone oscillators are not phase-locked or otherwise synchronized, the L_b and R_b meters on the SA5 will dance about rather than indicate a steady level. Placing the SA5 into single surround mode will steady the meters.

(e) Adjustment

1. The meters on the SA5 are to be used to adjust the input levels to the Re, Le, and S channel Cat. No. 22's that appear (depending upon the option) within the SA5. These levels are adjusted at the appropriate channel of the magnetic head preamplifier with either a Cat. No. 84B or a Cat. No. 135B installed in the Format 2 slot of the CP100. When adjusting for Dolby level, be sure that the NR button on the CP100 is off. This will disengage any features selected on the SA5 as well as prevent errors in level reading due to the noise reduction circuitry being active.

2. The levels in the Cat. No. 64's (for those units using Cat. No. 64's and not Cat. No. 105 bypass cards) are adjusted by applying a Dolby level signal at the inputs turning down the input control as far as it will go, and adjusting the output control until 150 mv of signal appears at the appropriate test point on the Cat. No. 117. The Dolby tone oscillators in the Cat. No. 22 can provide this proper Dolby level for this adjustment and can be activated by switching to the magnetic mode and linking the test points on either of the Cat. 109B's. (The Cat. No. 64 equalization controls should be in the flat position when using the Dolby tone oscillators. If for some reason they cannot be set flat for this adjustment, a pink noise film recorded at Dolby level will give more accurate results.)

3. To adjust for equal sound pressure levels, plug the Cat. No. 85 pink noise generator into the Format 2 slot of the CP100. Depress the Format 2 selection, switch on the CP100 and remove any selections from the SA5. The SA5 lights should indicate magnetic mode only (not split surround). The L, C, R, S switches on the pink noise generator (switches are down for "on" and up for "off") should now control the pink noise fed to the left, center, right and surround speaker systems. Adjust the trimpots on the Cat. No. 79 fader module (CP100) for equal sound pressure level out of the L, C, R speaker systems. If the surround channel is taken from the CP100, adjust for equal sound pressure level here on the Cat. No. 79. If a single channel of surround is being taken from the SA5, then the Cat.. No. 117 in the SA5 should be adjusted. If both surround channels of the SA5 are being used, then the pink noise generator should be placed in the Cat. No. 141 slot in the SA5. The switches on the generator labeled L_e, R_e control channels L_b, R_b respectively. Sound pressure level should now be adjusted via the Cat. No. 117 on each surround channel individually for a sound pressure level 3 dB below that of the L, C, R channels. With both surround channels on the sound pressure level should match that of the individual L, C, R channels.

Sound pressure level for a subwoofer system is adjusted by sending pink noise into channels L_e and R_e simultaneously. A modification of the Cat. No. 85 is required to do this (see section i). Sound pressure level is trimmed at the appropriate VCA channel through which the subwoofer signal has been coupled. The L_e, R_e amplifiers should be switched off during this adjustment, and the NR button (on the CP100) should be switched on. (It is essential that equal sound pressure levels are set up for the Cat. No. 150 in contrast to the accepted procedure for the older 116A/94 system, whereby in certain types of halls the center channel was deliverately raised by a few dB to compensate for decoding deficiencies, thus improving the center lock.) If L_e and R_e speakers and amplifiers are installed, also check that they produce equal sound pressure levels.

4. Place the Cat. No. 148B in the Format 1 slot of the CP100, the Cat. No. 84B (or 135B) in the Format 2 slot and replace the Cat. No. 141 in the SA5.

5. The remaining adjustment is to set the optical delay time, which is varied by a thumbwheel switch on the Cat. No. 150 card. With the switch indicating '1',

the delay is set at 30 milliseconds. Each succeeding switch position adds 10 ms up to a maximum of 100 ms with the switch indicating '8'. The object of the delay line is to insure that front signals not intended for the surround loudspeakers but which are present due to the normal crosstalk in the surround decoder arrive at the listener about 20 ms later than those from the front. The ear then interprets these signals as coming entirely from the front, and does not hear them from the surround speakers.

The delay is set by estimating the distance from a rear seat (close to a surround loudspeaker) to the front loudspeakers in feet, subtracting the distance from this seat to the surround speaker. Add 20 to this number, and set the delay line to this delay. (Example: The chosen seat is 80 feet from the front speakers, and 10 feet from the surround speakers. The delay is set for (80 - 10) + 20 = 90 ms, or switch position '7'.)

If you work in the metric system, convert the seat-loudspeaker distances to feet by multiplying by 3, before adding 20.

6. The delay setting may be checked by playing a film with the surround decoder on. The dissimilar left-right sounds on a stereo film will produce some crosstalk into the surround channel. When sitting in a seat near a surround speaker these sounds should appear to come from behind the screen. If sounds which should be behind the screen appear to be coming from the surround speakers, the delay is probably too short. If a definite rear echo is heard, the delay is too long.

Any mono film may also be used to check the delay setting. However, since mono or center channel information is almost entirely rejected by the surround channel it will be necessary to get close to a surround speaker to hear any crosstalk. Sit in the nearest seat to a surround speaker at the back of the auditorium, and play the mono film with the CP100 switched for optical surround. If program material appears to come from the surround speaker the delay is probably too short. If a definite echo is heard the delay is too long.

If a substantial amount of mono or center channel information appears out the surround channel then there is probably a severe gain or azimuth error. Dolby level and optical system alignment should both be checked.

7. In many films the surround information is meant to be a subtle effect and to provide a low level ambience. Provided that the surround level and delay time have been adjusted as described, the surround level will be what the film director wanted. Do not be tempted to increase the surround volume as this might destroy the effect that the film production team desired.

(f) Users' guide to the SA5

The SA5 has internal logic that tracks the logic within the CP100 to maximize ease of operation. For example, when changing formats from optical to magnetic, only the controls on the CP100 need to be switched; the SA5 will follow automatically.

The SA5 logic also determines when all the conditions have been met to allow a special function to be selected. Selecting the front panel switches does not necessarily mean that a function has been selected. A function has been selected only when its indicator light is lit.

For example, when the CP100 is in the optical/stereo/NR mode and the surround switch on the SA5 is depressed, the optical surround light on the SA5 will light up. Taking the CP100 out of the NR mode will cause the surround light to go

out; the SA5 is no longer in the stereo optical surround mode. Re-selecting NR on the CP100 will place the SA5 back into the optical surround mode. Placing the CP100 in the mono format will also take the SA5 out of the optical stereo mode.

The same logic also holds for optical bass enhancement. In the magnetic format, the split surround feature will only go into effect when the CP100 is in the magnetic/NR mode and the split surround switch on the SA5 is selected. Removing any of these selections will take the SA5 out of the split surround mode.

CP100/SA5 operating instructions:

1. Optical

Academy Mono:

CP100/select Format 1, mono, NR off.
SA5/no selection.

Dolby Mono:

CP100/select Format 1, mono, NR on.
SA5/no selection.

Dolby Stereo without Surround or Optical Bass Enhancement:

CP100/select Format 1, stereo, NR on.
SA5/no selection

Dolby Stereo with Surround:

CP100/select Format 1, stereo, NR on.
SA5/select optical surround

Dolby Stero with Optical Bass Enhancement:

CP100/select Format 1, stereo, NR on.
SA5/select optical bass enhancement.

Dolby Stereo with both Surround and OBE:

CP100/select Format 1, stereo, NR on.
SA5/select optical surround, optical bass enhancement.

2. Magnetic

Conventional Magnetic:

CP100/select Format 2, NR off.
SA5/no selection.

Dolby Magnetic with Single Surround:

CP100/select Format 2, NR on.
SA5/no selection.

Dolby Magnetic with Split Surround:

CP100/select Format 2, NR on.
SA5/select magnetic split surround.

3. External

CP100/select Format 3.
SA5/no selection.

(g) Possible Configurations of the SA5

There are four possible configurations of the SA5. To reproduce 35 mm Dolby stereo optical prints, the modules required are the Cat. No. 110L, the Cat. No. 150, the Cat. No. 141, and the Cat. No. 159. To operate with only these modules, the power supply lines from the CP100 that appear on the remote block on the rear of the SA5 must be crossed over to the external power inputs on the power block of the SA5 (upper left hand corner, facing the rear of the unit). The external power button must be depressed on the front panel of the SA5 unit. The resistive pad that appears on the back of the CP100 on the surround block (SK31) should remain in place.

To add Dolby decoding to the surround channel, a Cat. No. 22 (in the far right slot) and a Cat. No. 109B (in the S/C channel slot) should be installed. The resistive pad on the rear of the CP100 should be removed; however, the powering from the CP100 should remain. The surround channel will still connect to the rear of the CP100.

If equalization of the surround channel is desired, the Cat. No. 117 and a Cat. No. 64 (right slot) should be installed. The Cat. No. 114B should also be installed to power internally the SA5 unit, and the external power switch on the front panel of the SA5 should not be depressed. The surround output now should be taken from the R_b output on the rear of the SA5. Adjustment of the Cat. No. 64 is described in paragraph (d)7.

Split surround capability for 70 mm magnetic format can be achieved by installing all three Cat. No. 22's, the Cat. No. 158, both Cat. No, 109B's, and both Cat. No. 64's. If equalization of the surrounds is not desired, the Cat. No. 105 can be used in place of the Cat. No. 64. Also, if Dolby decoding is not felt necessary for the middle and bass frequencies in the surrounds, then only two Cat. No. 22's need be installed (in the left two slots). If this option is chosen, then the links on the Cat. No. 159 must be installed, as described in paragraph (c)3.

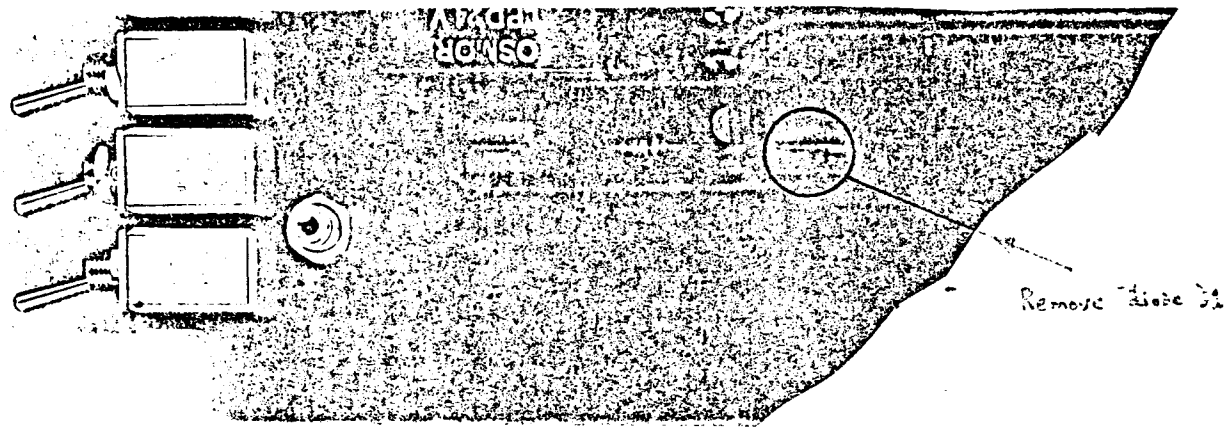
(h) Remote Powering

Provisions for an external emergency power supply exist in the SA5. An external Cat. No. 114B power supply can be connected to the external power supply terminals on the SA5's backpanel. If use of the emergency power supply is required, the front panel switch labeled "external power" should be depressed, disconnecting the SA5's internal power supply and connecting the external supply.

(i) Modification of the Cat. No. 85 Pink Noise Generator

The Cat. No. 85 pink noise generator was originally designed to disable the internal signal line that tells the various signal processing cards in a Dolby cinema processor that a movie with Dolby NR is being played. Since the subwoofer circuitry of an SA5 is disabled by this feature, it is impossible to pass pink noise through the subwoofer channel. Fortunately, elimination of this feature does not hamper use of the Cat. No. 85 in either the CP50, CP100, SA5, or CP200. To modify

the Cat. No. 85, remove the mounting nuts from the front switches, remove the cover plate screws (component side) and remove diode D1 (as shown below).



(j) Explanation of Optical Surround and Magnetic Split Surround

1. Optical Surround

Films which have an optical surround track are encoded using a technique in which the surround information is recorded out-of-phase. Correct decoding of this track is necessary to provide the separate surround information; however, the film will play back in either stereo or mono satisfactorily.

The early surround adapter system consisted of an SA2 frame which housed the Cat. No. 116 surround decoder and a delay line. This worked in conjunction with a Cat. No. 94 pentoptical format module housed in the CP100 mainframe and, where magnetic surround was also installed, a Cat. No. 124 relay board.

Later technology allowed the delay line to be mounted on the decoder board and the combination was designated the Cat. No. 116A; the SA3 frame is designed to hold the Cat. No. 116A. The SA3 differs from the SA2 in that it does not contain a delay line, and it contains a switch for selection of magnetic or optical surround. The Cat. No. 124 relay is not required with the SA3. The Cat. No. 94 pentoptical module is still required.

The Cat. No. 150 represents a further advance in decoder technology and takes advantage of linear large scale integrated circuits which were designed for the Tate directional enhancement system (DES). The Cat. No. 150 assembly consists of a Cat. No. 146 decoder on which is mounted a delay line assembly. The Cat. No. 150 accepts left and right channel inputs and decodes all four channels: left, center, right, and surround.

The Cat. No. 150 can be used only in an SA5 or an SA4 frame, as these frames have an output terminal for the center channel. When using the Cat. No. 150, there is no requirement for either the Cat. No. 82 Mono/Stereo Optical module, or the Cat. No. 94 Pentoptical Module. (However, the Cat. No. 82 may be retained as an emergency replacement for the new optical system). The Cat. Nos. 82 and 94 are together replaced with a single Cat. No. 148B Optical Format Module. (The earlier Cat. No. 148 is different from the Cat. No. 148B in that it will not allow the passage of optical bass enhancement signals from the SA5 to the CP100). The SA5/Cat. No. 150 and the SA4/Cat. No. 150 combinations in conjunction with the Cat. No. 148B Optical Fromat Module decode all optical formats: Academy Mono, Dolby Mono, Dolby Stereo, or Dolby Stereo with Surround.

2. Magnetic Split Surround

The conventional channel assignment on 70 mm magnetic film comprises 5 channels in the front behind the screen (channels 1 through 5) and a single channel in the rear (channel 6). Channel 1 is the left channel, channel 3 is the center channel, channel 5 is the right channel, and channel 6 is the surround. Channel 2 is placed between the left and center speakers and is called left extra; channel 4 is placed between the center and right speakers and is called right extra. Originally intended to aid in the placement of sound across the large screen, the 2 and 4 channels proved more to hamper than to aid in the creative efforts of producers and mixing engineers. With films using a Dolby encoded soundbank these channels are used for low frequency effects. The use of the Cat. No. 105 series card in the CP100 is to roll-off all frequencies above 250 Hz to eliminate mid and high frequency noise and signals and to allow the passage of just the bass signals through to the L_e and R_e speakers.

Dolby split surround makes use of the unused mid and high frequency capability of channels 2 and 4. Frequencies above 500 Hz from each of the two surround channels are recorded (along with bass effects below 250 Hz) on tracks 2 and 4. The two surround channels are also combined and recorded with their full frequency range on channel 6, thus providing a conventional surround channel. In playback through an SA5, the Cat. No. 158 assembles the full frequency range left back and right back signals by adding together the separate mid and high frequency tracks from channels 2 and 4 and blending in a monophonic bass track derived from channel 6. This technique allows for two nearly discrete surround channels while maintaining complete single surround compatibility for theaters equipped with Dolby processing but not equipped to reproduce the split surround information.

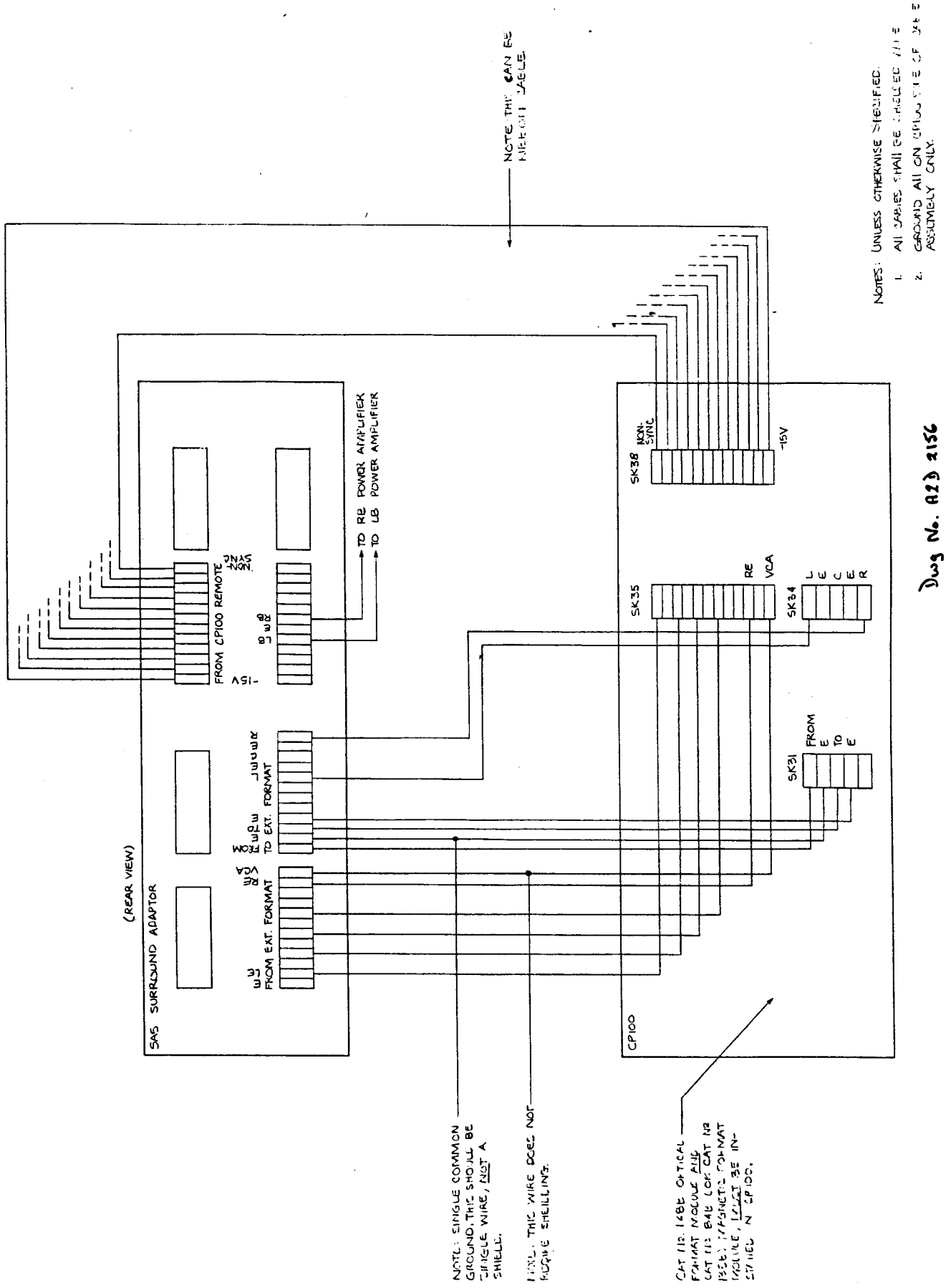
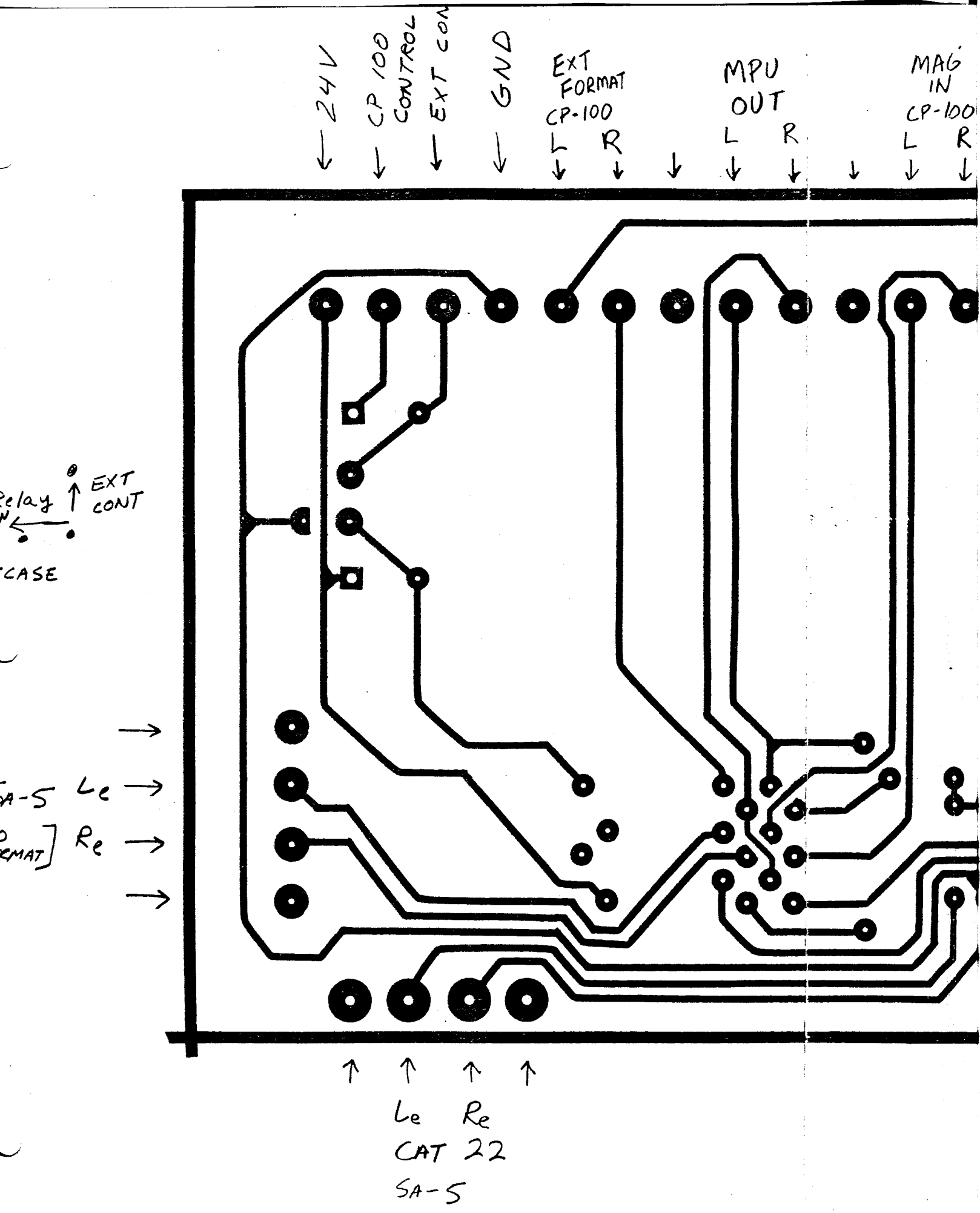
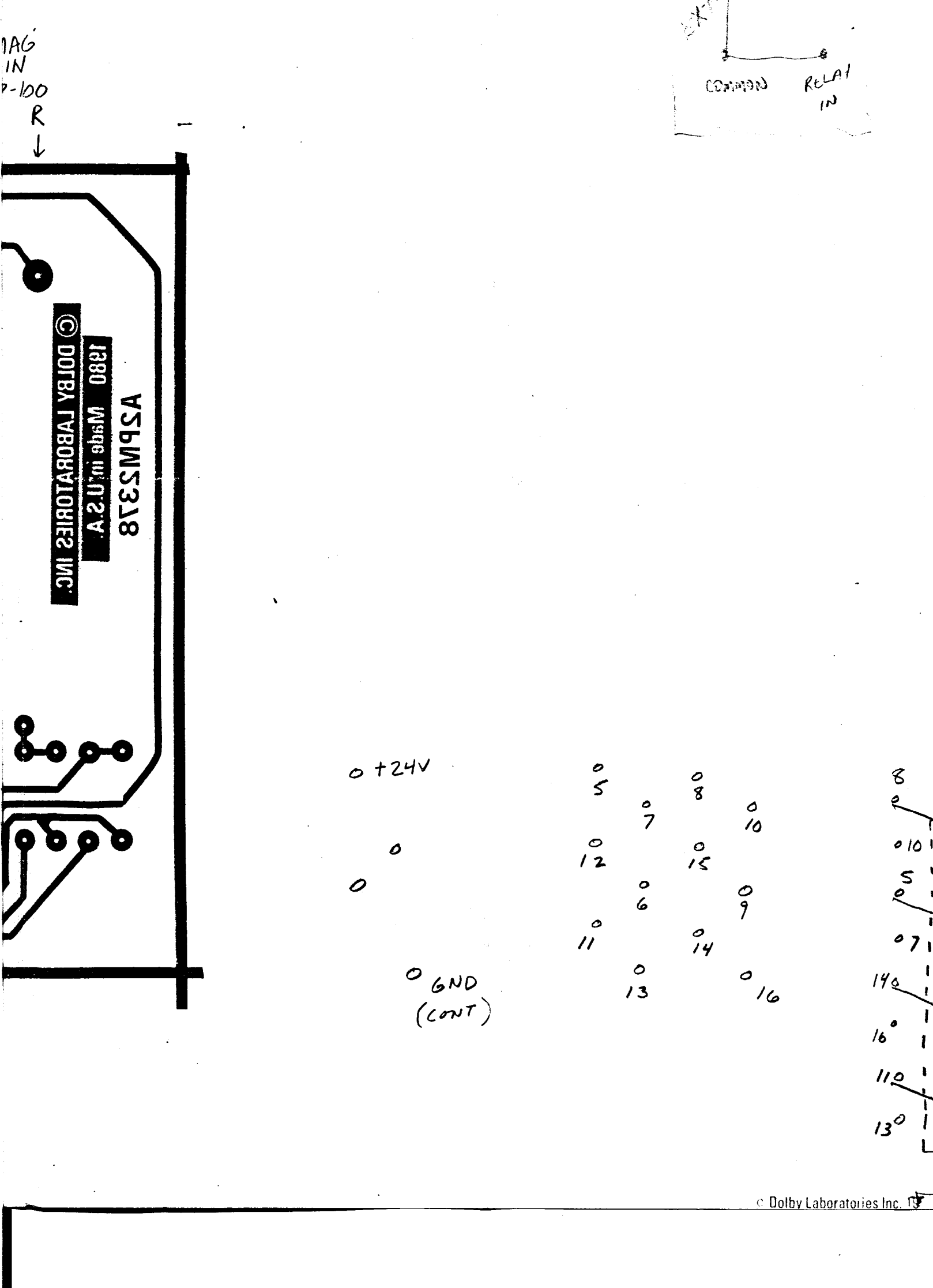
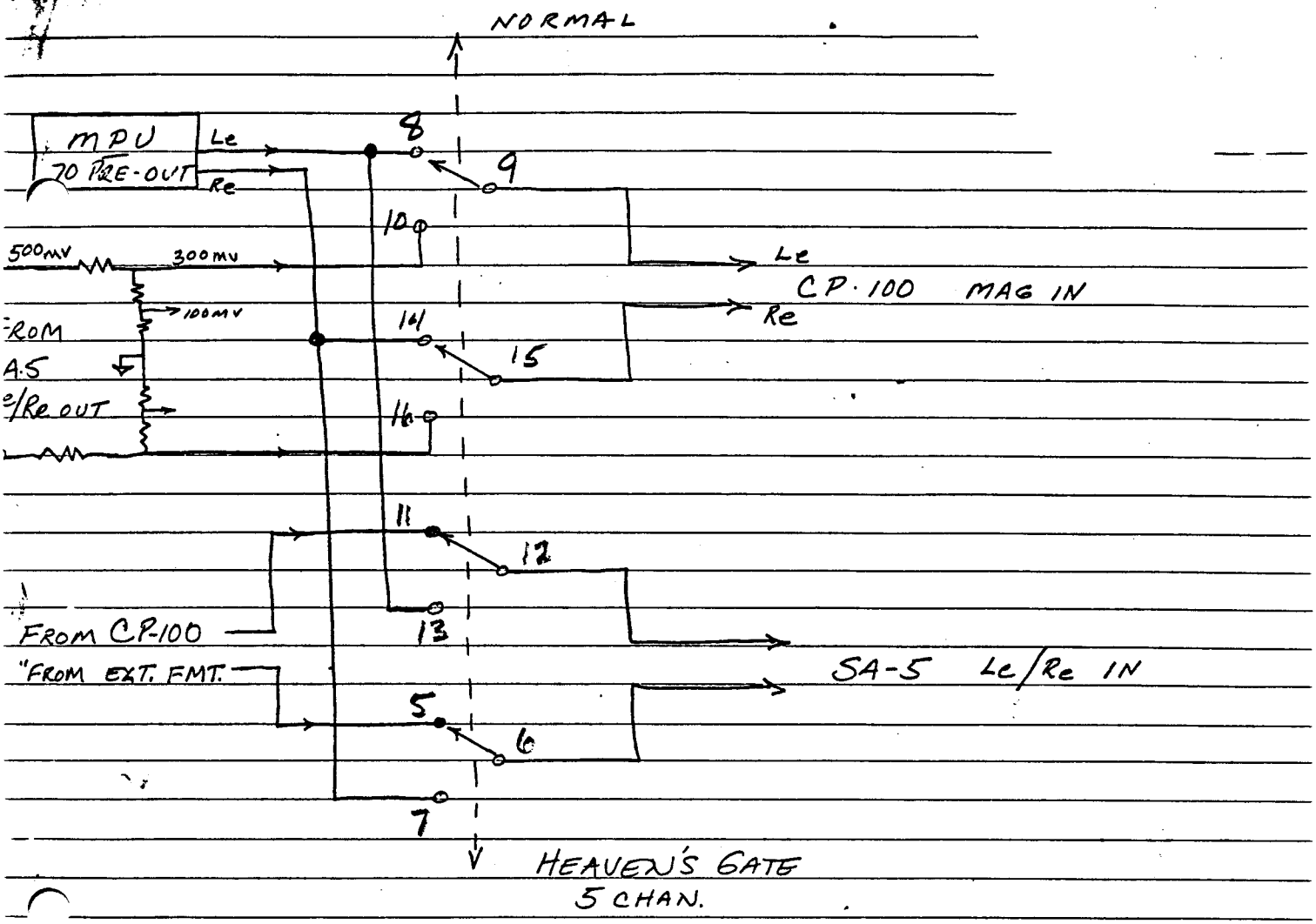


Fig. 7.3.1. CP100/SA5 Interface

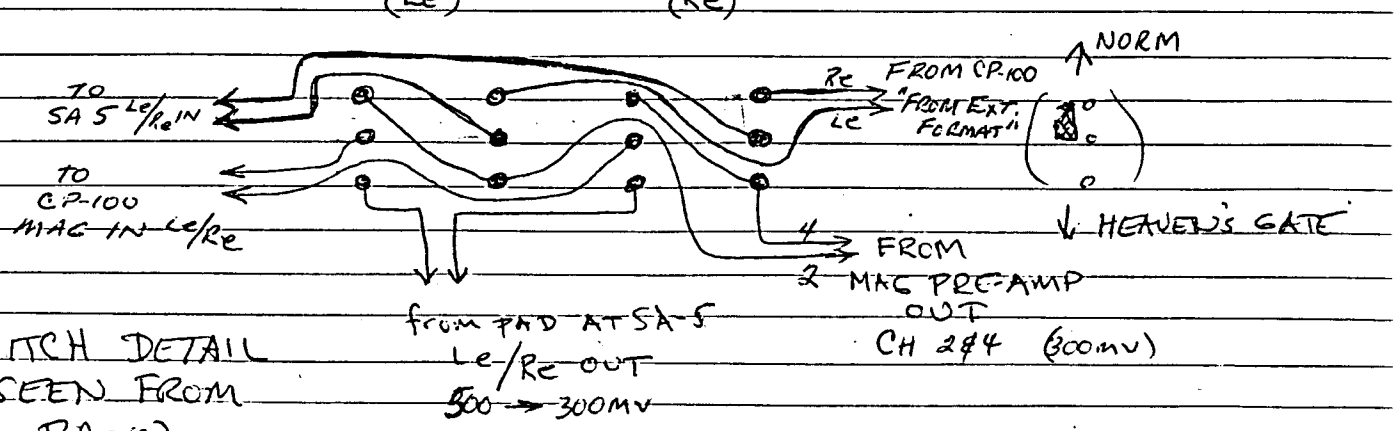

24V
CP 100 CONTROL
EXT CON
GND
EXT FORMAT CP-100
L R
MPU OUT
L R
MAG IN CP-100
L R
Relay
EXT CONT
CASE
SA-5 Le
FORMAT] Re
Le Re
CAT 22
SA-5



SA-5 SWITCH: NORMAL



TO USE 4POLE 2THROW SWITCH OF THE TYPE USED AS OUTPUT PAD ON CP-50 & 200:



SWITCH DETAIL (SEEN FROM BACK)