



Professional Products

DOLBY LABORATORIES INC . **MH Series**
London — San Francisco

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SECTION 1

M SERIES MULTICHANNEL NOISE REDUCTION SYSTEM - INTRODUCTION

Introduction

The Dolby A-type Noise Reduction System has been designed to reduce noises commonly encountered in audio signal recording and transmission systems. These noises may take the form of rumble, hum, crosstalk, clicks, pops, buzzing, and hiss, as well as discrete frequency interference such as television synchronizing pulse crosstalk. All of these noises are reduced by the system without affecting the overall frequency response or dynamics of the signal itself.

In the particular field of magnetic tape recording, the system will reduce tape hiss and also alleviate other problems such as print-through and high-frequency modulation noise. The print-through reduction is of special significance, as it allows the long-term storage of high-quality master tapes with minimal degradation.

The system is suitable for use in any situation in which the signal is available for processing at both ends of the recording or transmission chain. The processing operations can be separated by any distance or any time duration, since once correctly adjusted, the system parameters are extremely accurate and stable. Furthermore, the system is tolerant of gain-errors in the recording or transmission channel. An incorrect level to the playback unit of ± 2 dB does not result in any perceptible alteration of the restored signal.

It should be appreciated that when recording or transmission noise is reduced, other noises masked by it naturally become more apparent. Full use of the increased dynamic range provided by the noise reduction system may therefore sometimes require a tightening of standards in the rest of the chain - i. e. in connection with noise from microphone amplifiers, mixers, and monitor amplifiers, as well as noise from wholly acoustic sources such as buzzing fluorescent lights, creaking chairs, and the movement of persons in the studio. (On the other hand, it can be argued that acoustic noises, having purely natural origins, contribute to a feeling of realism and immediacy).

The Dolby M Series multichannel units are third-generation Dolby A-type (professional) noise reduction units, which are compatible with the A301 and 360 Series. Designed specifically for multichannel use, the M Series units offer studios 8, 16, and 24 tracks of noise reduction in compact, expandable modular assemblies.

The basic functional elements of the M Series are the standard A-type Dolby Cat. No. 22 plug-in noise reduction modules and the Cat. No. 44 interface modules; the M16 contains sixteen of each of these modules and a 115/230-volt power supply. In addition, each M16 is supplied with a separate remote control module with which all controls common to the sixteen tracks can be actuated from the studio mixing console. The remote controls are duplicated on the common facilities panel of the M16, where local or remote operation can be selected with a switch. The structure of the M16 is based upon a precision aluminum casting which combines ruggedness and durability with the high dimensional accuracy required in modular electronic assemblies. The M8

contains eight noise reduction processors in a pre-wired M16 main frame, allowing conversion to full M16 by simple addition of modules. The M8X expands an M16 to an M24, retaining control of common facilities at the M16 control panel.

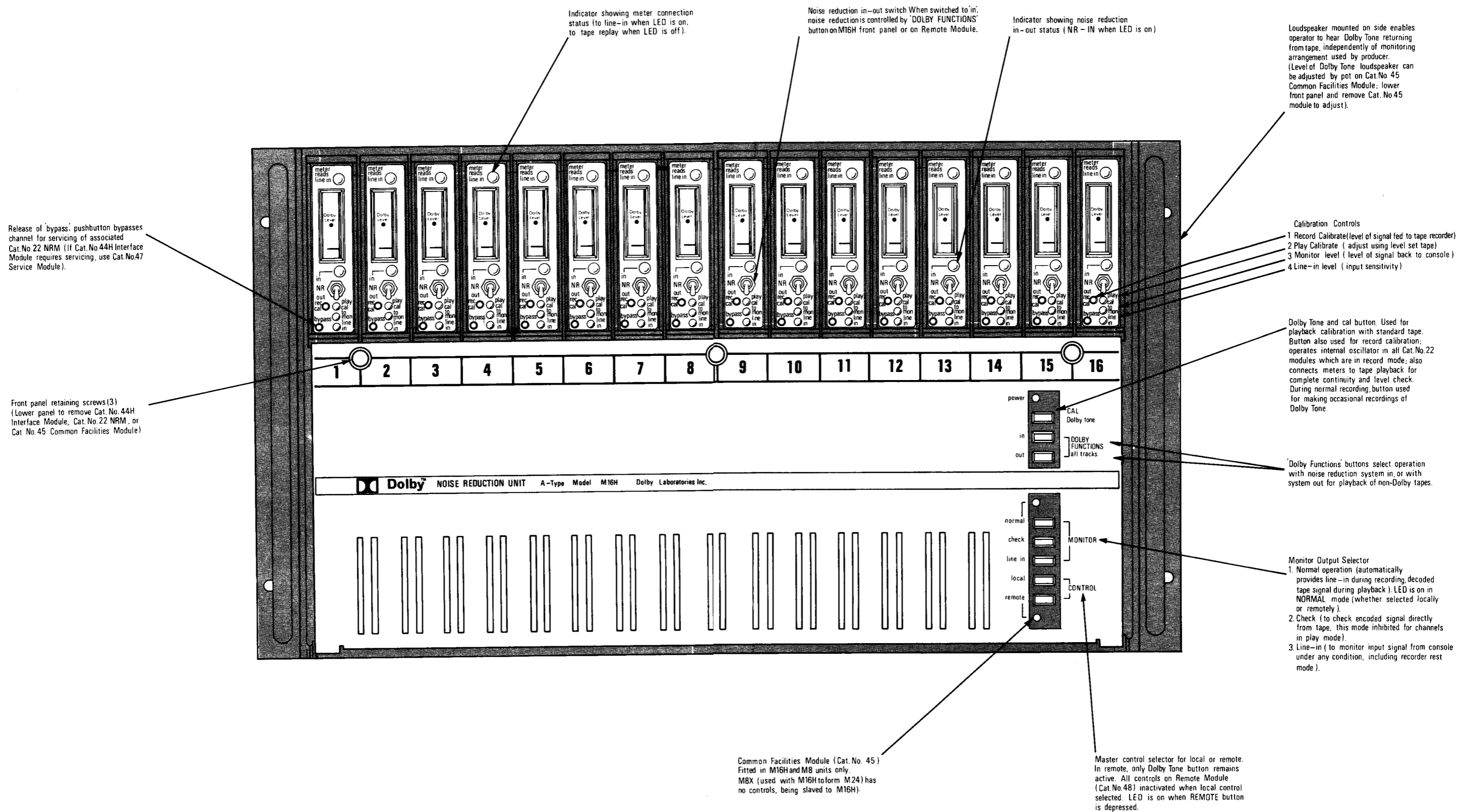
Switching between the record and play modes of the M16 is automatic and is remotely controlled by the mode of the tape recorder. Because of its small size, the entire M16 can be installed inside or on top of many tape recorders, eliminating the need for studio rack space and simplifying wiring.

Setting up and calibration of the M16 is extremely simple and requires no instrumentation. A pushbutton actuates the calibration oscillators built into the M16, feeding the characteristic Dolby Tone to the recorder; the M16 meters show the flux level of the tone on each of the sixteen tracks of the tape; and, at the same time, small loudspeakers in the M16 and remote control module reproduce the tone from the tape. Apart from its use in calibration, the audible Dolby Tone feature assures the producer and engineer at any time that the entire recording and re-producing chain is operative, even if the regular monitor facilities cannot be used for this purpose. At all times, indicator lights on each of the interface modules clearly indicate whether the taped signal or the line-in is being metered on the M16.

All circuits are highly stable and do not require any adjustments, apart from signal levels at line input, monitor output and from recorder points, which are set during installation by multiturn potentiometers. Noise reduction circuitry is factory-set to precise limits and contains no adjustable controls. Components for each track are mounted on two modules, which can be purchased separately. Should failure ever occur, plug-in substitution will rapidly restore operation of the system with no adjustments necessary. Each channel is provided with a 'Service' mode allowing sessions to continue if the noise reduction module requires servicing.

A removable front panel provides access to the noise reduction modules and acts as a retainer to the interface modules. All controls in the interface modules are operable without removing panels.

SECTION 2
OPERATING CONTROLS



3.1

Figure 3.1 - M Series

1111

SECTION 3
SPECIFICATIONS

Specifications - M Series

Layout:	M16	Unitary chassis, sixteen noise reduction processors with built-in record-play changeover facilities; processor circuitry is also transferred automatically between play and record sides of recorder. Channel electronics contained in two modules per channel, Cat. No. 22 Noise Reduction Module and Cat. No. 44 Interface Module.
	M8	Same as M16, but with eight noise reduction processors; chassis is pre-wired to allow conversion to M16 by addition of eight Cat. No. 22 and eight Cat. No. 44 modules.
	M8X	For addition to M16, forming M24; contains eight noise reduction processors in M Series chassis. Functions controlled by M16 logic.
Signal Connections:		Standard screw-type terminal blocks for each channel and remote facilities. Solder tag fanning strip supplied for each terminal block.
Interface Module Operating Controls:		<p>a) Noise Reduction 'Off-Remote' switch controls channel noise reduction action. In 'remote' position, noise reduction switched by master control on front panel or by Remote Module. M Series also permits remote switching of individual channel noise reduction.</p> <p>b) 'Service' push button bypasses M16 on that channel, allowing recordings to continue if Noise Reduction Module requires servicing. Cat. No. 47 Bypass Module is provided with each unit, and permits operation if Interface Module requires servicing.</p>
Common Facilities Controls:		<p>Controls grouped at right hand side of unit in Common Facilities Module. Push buttons provided for:</p> <p>a) Dolby Tone. Operates internal oscillators in noise reduction modules; used to establish correct operating levels standardized internationally. Dolby Tone is recorded at Dolby Level (185 nWb/m) and is modulated in a characteristic way for identification. Small</p>

loudspeakers built into M8 and M16 units and Remote Module reproduce Dolby Tone from tape.

b) **Dolby system In-Bypass.** Selects operation with noise reduction system, or without for playback of non-Dolby tapes.

c) **Monitor selection.** Monitor Output of unit may be switched to Line In, Check (encoded signal directly from tape), or Normal (line-in during recording, decoded tape signal during playback).

d) **Remote-Local selection.** Transfers operation of all Common Facilities controls to Cat. No. 48 Remote Module which may be mounted on mixing console in studio. All controls on common facilities module are then inoperative except Dolby Tone, which may be operated either locally or remotely.

Remote Control Module:

Cat. No. 48 Remote Module supplied with M8, M16, and M24 units, controls Dolby Tone, Dolby system In-Bypass, and Monitor selection. May be extended to give remote operation of channel NR in-out. Indicator lights show mode of M Series units. Remote Module requires 33 x 164 mm of console mounting space.

Panel Meters:

Level setting meters for recorder gain calibration. Calibration mark for Dolby Level (185 nWb/m, Ampex NAB level) and DIN level (320 nWb/m).

Input Circuit:

Bridging circuit, electronically balanced, 10 k ohms impedance.

Monitor Output Circuit:

Low impedance output (less than 15 ohms), electronically balanced; will drive any load impedance from 200 ohms upwards.

To Recorder Output Circuit:

Low impedance unbalanced output, designed to drive 10 k ohms bridging load.

From Recorder Input Circuit:

Unbalanced input, 10 k ohms impedance.

Signal Levels:	Multiturn potentiometers (accessible from front of unit) adjust Line In, Monitor Output and From Recorder signal levels. Minimum input 350 mV for Dolby Level, 600 mV for DIN level. Maximum monitor output level +23 dB into bridging load; +22 dBm into 600 ohms; +21 dBm into 200 ohms. Level to recorder +4 dB (1.23 V) for Dolby Level (185 nWb/m); maximum output +21 dB into 10k ohm.
Switching Circuits:	Electronic switches for mode switching and NR in-out function. Unit uses no relays.
Remote Mode Operation:	Mode controlled automatically by record circuits of recorder. A dc voltage between +6 V and +50 V will operate each M16 channel electronic switch, changing mode from play to record. Input impedance at remote control connector, 10 ⁴ ohms.
Mode Changeover Time:	200 usec.
Indicator Lights:	Solid state LEDs for visual indication of status of channels and Common Facilities.
Overall Frequency Response:	±1 dB from 30 Hz to 20 kHz.
Overall Total Harmonic Distortion:	At +8 dBm, less than 0.1% at 1 kHz; less than 0.2% from 40 Hz to 20 kHz.
Noise Reduction:	Dolby A-type professional characteristic, providing 10 dB of noise reduction from 30 Hz to 5 kHz, rising to 15 dB at 15 kHz. With noise reduction action switched off, unit becomes unity-gain line amplifier.
Overall Noise Level:	Record-playback, 75 dB (unweighted, 30 Hz to 20 kHz bandwidth) below Dolby Level.
Matching between units:	±1 dB at any level and any frequency, 30 Hz to 20 kHz.
Signal Delay:	Constant with frequency, 18 usec per channel. Overall encode-decode process, 36 usec.
Phase Error:	Less than 5 ⁰ , 20 Hz to 20 kHz overall encode-decode.
Stability:	System is highly stable and does not require alignment. Only controls in unit are input and output level controls on front of Interface Modules.

Crosstalk:	Better than 80 dB between any two channels.
Ambient Operating Temperature:	Up to 40°.
Construction:	Plug-in Noise Reduction Module (Cat. No. 22) and Interface Module (Cat. No. 44) accessible through front panel. Fibre-glass printed circuits, solid state devices throughout. Precision aluminium cast frame with steel panels, black stoved plastic textured finish; front panel stove enamelled blue with white characters.
Size:	267 x 493 mm rack mounting (10½" x 19"). Maximum projection behind mounting surface - 280 mm (11"). Maximum projection in front of mounting surface - 25 mm (1") excluding handles; handles project 50 mm (2"). Eight and sixteen track installations require 10½" of rack space; twenty-four track installation requires 21".
Weight:	M8: 15.5 kg, 34 lb; M16: 20.5 kg, 45 lb; M24: 36 kg, 79 lb.
Power Requirements:	Units are designed for operation from centrally switched power source. Power cables provided. 105-130 V or 210-260 V, 50-60 Hz single phase. M8: 95 VA; M16: 175 VA; M24: 270 VA. (90-115 V version also available).

SECTION 7
INSTALLATION

INSTALLATION INSTRUCTIONS: M Series

Note: Instructions refer specifically to M16 but apply equally to M8 and M24 installations.

MODEL M16

16-track record-playback noise reduction unit (automatic changeover)

CHECK VOLTAGE SELECTOR AND FUSE BEFORE APPLYING POWER

7.1 Installation

1. Unpack M16 unit and check for damage. Lower front panel and check seating of Cat. No. 22 Noise Reduction Modules and Cat. No. 44 Interface Modules.
2. Mount unit appropriately in rack or in tape recorder. The M16 should be mounted within 4 meters (12 feet) of the recorder, unless recorder has balanced floating input and output transformers. Unit must be in well-ventilated position; if enclosed in rack leave $1\frac{3}{4}$ " (45 mm) space above and below.
3. Set voltage selector switch (115/230 V) appropriately.
4. Connect power cable. If power plug on cable is changed for another type, the following wiring convention should be observed (for cable supplied with unit).

U.S. style Power: L, black N, white Earth: green

Continental style Power: L, brown N, blue Earth: yellow/green

5. Using the 2-terminal solder tag strips provided, connect record/play remote control circuits of M16 to recorder electronics. A dc voltage between +6 V and +50 V will operate M16 switch on each channel and change channel from play to record mode. Connect pins 2 and 3 of each channel remote control connector via two-conductor cables directly across the record relay coil of the corresponding channel of the tape recorder; polarity is unimportant. Alternatively connect to a suitable record-only voltage, often available at recorder remote operation connector (see connection drawings included in this section which describes in detail the remote control arrangements of several popular multi-track recorders). Note: a common ground must be provided between M16 and tape recorder chassis for proper operation of the automatic mode switching function.

6. Connect signal cables to M16, using the 12-terminal solder tag strips provided. Prepare cables from mixing console; cables to recorder; cables from recorder; cables to monitor facilities. Use cables with two conductors plus a screen (shield). In all connections, pins 2 and 3 are signal. Earth is pin 1; in the cases of 'TO REC' and 'FROM REC' a common earth terminal is used, and is labelled as such. The 'LINE IN' connection is an electronically balanced circuit, with pin 2 as the 'low' side and pin 3 as the 'high' side for standardized phasing. Connections 'TO REC' and 'FROM REC' are unbalanced; connect cable normally with pin 2 'low' and pin 3 'high'. The 'TO MON' output can provide an electronic hum loop cancelling function which can be used with unbalanced mixing console monitor inputs. When not required, e.g. with balanced mixing consoles, this function should be disabled by linking pins 2 and 1 of all connections 'TO MON'.

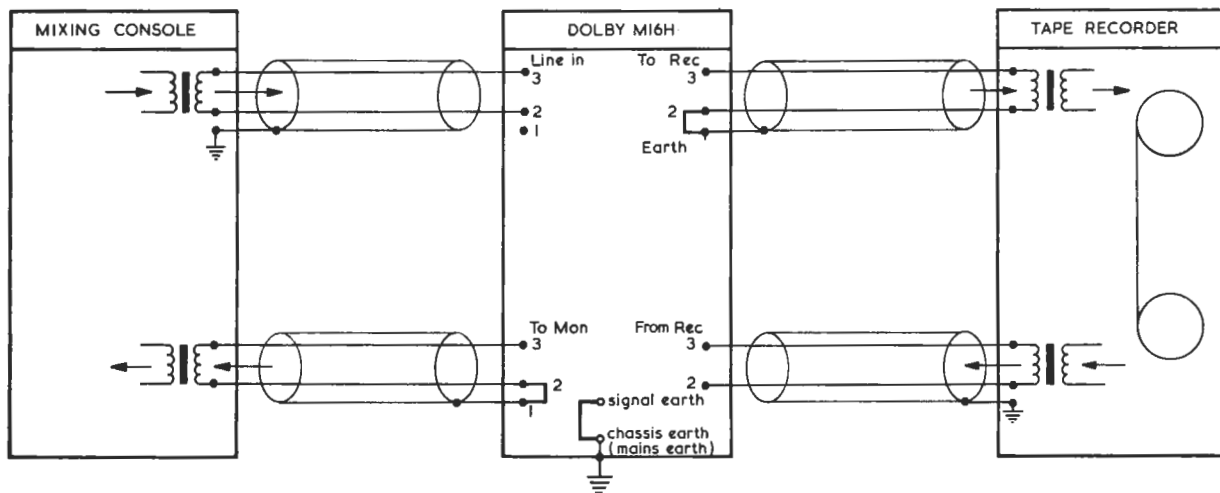
For more detailed wiring instructions see the block diagrams below. In the unbalanced cases, screens and 'low' sides must not be commoned, but individually connected as shown. In the cases when the screen is connected at the mixing console or tape recorder ends make sure that connections to earth are actually provided inside the console or the recorder; in some mixing consoles, the third pin is normally open ended and not connected to earth.

As far as the M16 is concerned, it is unnecessary to terminate the 'LINE IN' and 'FROM REC' inputs. It is also unnecessary to terminate the 'TO MON' output, although it will drive a 200 ohm or 600 ohm load if required. The 'TO REC' output must not be terminated, as it is designed only to drive the 10 kohm bridging load of a recorder input.

M units from Serial. No. 000730 and M8X units from Serial No. 000140 are fitted with easily accessible external links between pins 1 and 2 of all 'TO MON' connections, and between pins 2 and earth of all 'TO REC' connections. From the same serial numbers, an externally accessible link between signal earth within the M unit and the chassis is provided. The chassis is always connected to the earth pin of the mains (power) socket of the M unit.

On earlier units signal earth can be isolated from the chassis by a simple wiring change inside the unit. For this purpose the black wire has to be interrupted that leads from the mains (power) socket on the back panel to a seven way tagstrip on the right hand side panel.

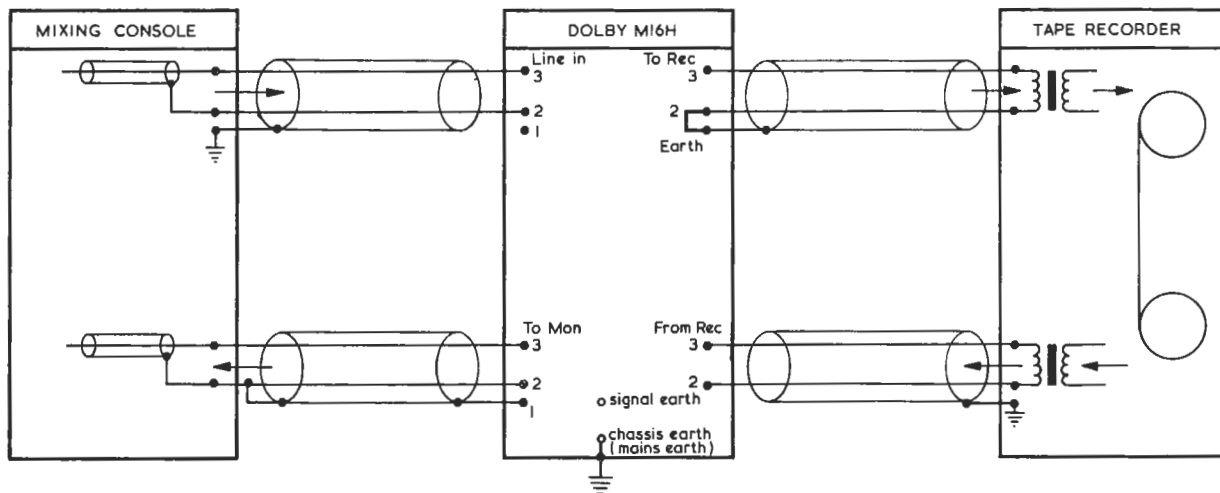
Note: In order to provide full operator protection against electric shock, the unit must always be connected to a good ground (earth) via the three conductor power cord supplied. Do not use two pin power line connectors which will remove this safety feature.



Wiring For MI6H, Tape Recorder - balanced, Mixing console - balanced.

MI6H - No.730 on.
MBXH - No.140 on.

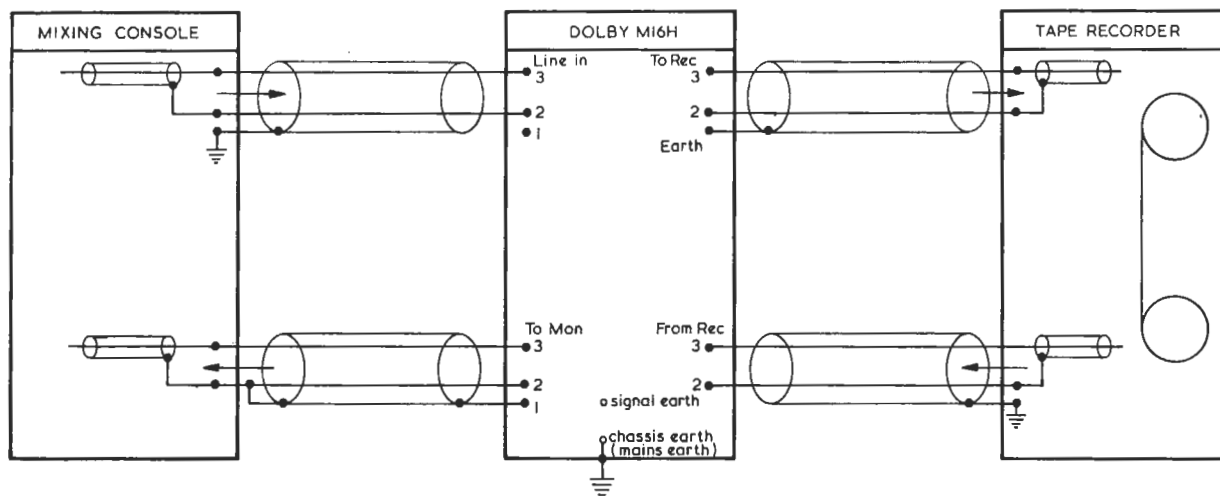
A2C 5033.



Wiring for MI6H, Tape Recorder - balanced, Mixing console - unbalanced.
This earthing configuration should also be used for mixing consoles with balanced line outputs but unbalanced monitor inputs.

MI6H - No.730 on.
MBXH - No.140 on.

A2C 5034.



Wiring For MI6H, Tape recorder - unbalanced, Mixing console - unbalanced.
This earthing configuration should also be used for mixing consoles with balanced line outputs but unbalanced monitor inputs.

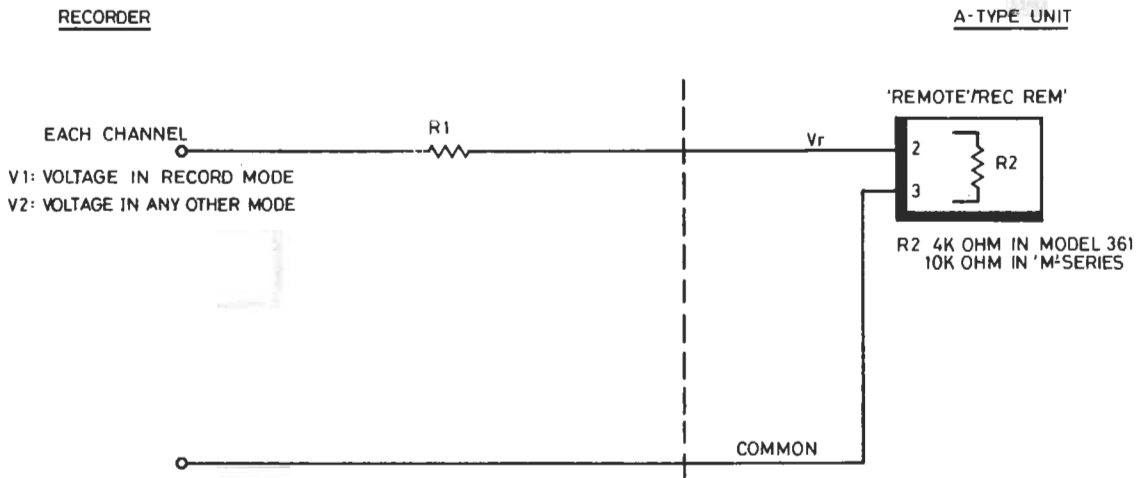
MI6H - No.730 on.
MBXH - No.140 on.

A2C 5035

7. For remote operation of common facilities controls (for example on the mixing console) connect a seven way cable from the rear 'remote' connector (using the 7-terminal solder tagstrips provided) to a suitably mounted Cat.No. 48 Remote Module (provided with each M16 unit). Terminals on Remote Module correspond to terminals on M16 'remote' connector. (Circuit diagrams of the Remote Module and connection details to the M16 are included in Section 9 of this Manual). No external power supply is required; remote module is powered from M16 supply. Remote Module connections are as follows:

<u>Terminal</u>	<u>Function</u>
1	Speaker
2	Dolby System IN-OUT
3	Line In
4	Check
5	Dolby Tone
6	Earth
7	+36v
8	Control for channel NR remote (optional)
9	Control for channel NR remote (optional)

8. In most installations it is sufficient to provide only a master noise reduction IN-OUT function, as on the Cat.No. 48 Remote Module. NR IN-OUT on a channel by channel basis is provided by the Interface Module switches on the M16 unit itself. If an NR IN-OUT control function is required remotely for each channel, the NR-REM terminals on the back of the M Series unit may be connected to a remote panel with individual channel switches. For NR-OUT, switch the NR-REM terminal to earth. A more complete switching and indication scheme is shown on circuit diagram A0C 880.
9. Refer to M16H Operating Instructions for calibration and operating procedures.
- 10(a) M8X installation for 24-track operation follows section 1-6 and 8. Common facilities are controlled by associated M16 unit; connect a seven way cable between 'Link Units' connectors on rear of M16 and M8X units.
- (b) To supply up to 32-tracks of noise reduction, two M16 units can be linked in the same way as M16 and M8X. In the M16 unit intended to follow the master unit, the common facilities switches have to remain in the following positions; Dolby System 'In'; Monitor 'normal'; Control 'local'.
11. One bar assembly is provided for rear mounting to act as cable strain reliever should the rack used not be provided with suitable supports. Lace the cable assemblies to the bar at either side of the unit.



REMOTE CONNECTION OF A-TYPE UNIT TO RECORDERS WITH VOLTAGE LEVEL CHANGE BETWEEN RECORD AND PLAY AND/OR READY MODES

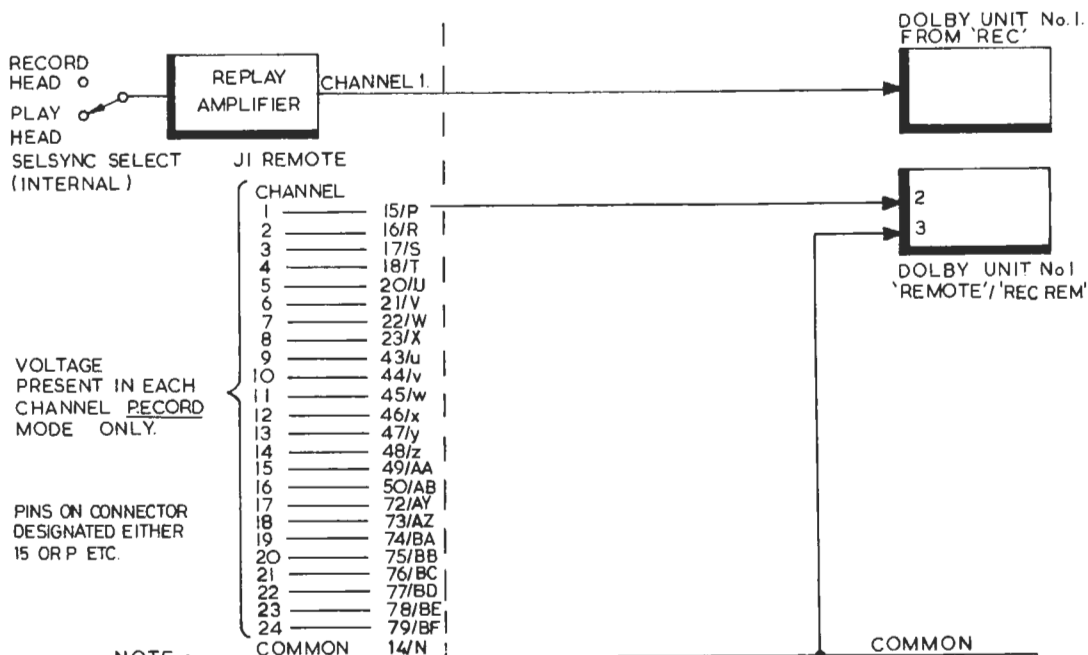
CHOOSE RESISTOR R1 SO THAT FOR MODEL 361, Vr IS MORE THAN 14.0 VOLTS IN RECORD,
LESS THAN 4.0 VOLTS IN ANY OTHER MODE
(MAY NECESSITATE THE USE OF ZENER IN PLACE OF R1)

FOR M-SERIES, Vr IS MORE THAN 6.0 VOLTS IN RECORD,
LESS THAN 4.0 VOLTS IN ANY OTHER MODE

REMOTE CONNECTION OF A-TYPE UNIT TO TAPE RECORDER

AMPEX MM 1000

A-TYPE UNIT.

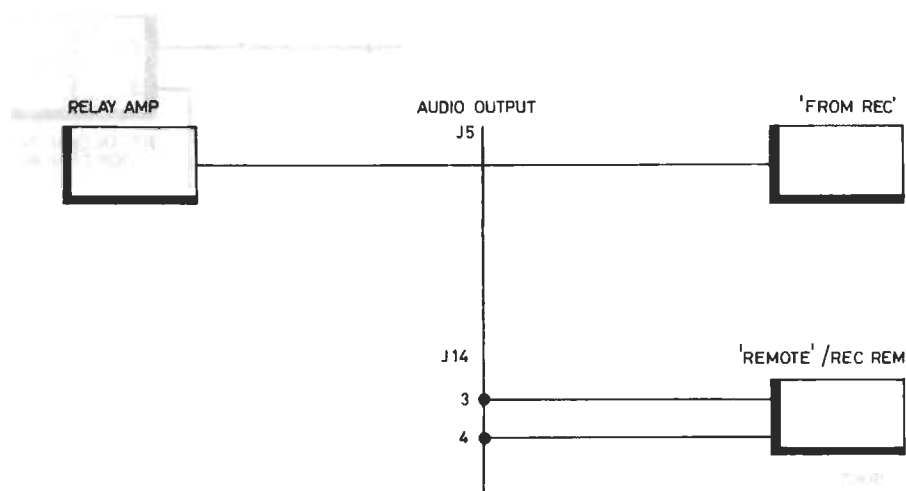


NOTE :-
1. READ IN CONJUNCTION WITH SECTION 9 OF A-TYPE MANUAL - SIGNAL ROUTING

REMOTE CONNECTION OF A-TYPE UNIT TO AMPEX MM 1000 RECORDER.

AMPEX AG 440

A - TYPE UNIT

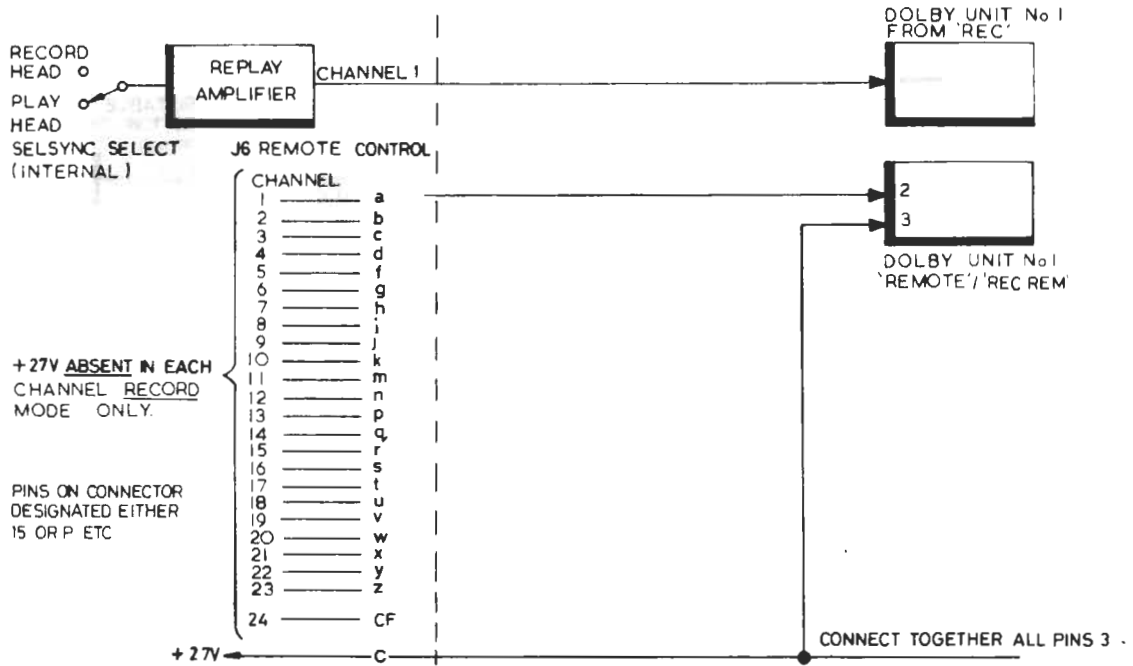


Notes: Many versions of the AG440 electronics have been made. In most cases, the remote selsync connection to rear-mounted socket J14 will not be in use, and J14 can be used for connection to Dolby units. Withdraw unit from rack assembly, inspect and consult Ampex manual to check version; then follow instructions below. The object of the conversion is to provide a positive voltage on pin 3 of socket J14, and a ground return on pin 4. If J14 is used for remote selsync operating a switching scheme for the particular AG440 version used must be devised to operate Dolby units.

1. Early units with no J14 fitted:
 - a) Fit 4 pin socket (preferably of the Jones type as J11) between fuse F1 and socket J12 on the rear of the electronics unit. This socket will be called J14.
 - b) Connect a wire from J14, pin 3 to spare pin 10 on Record Relay K1.
 - c) Connect a wire from K1, pin 6 to K1, pin 12 (do not disturb 180 ohm resistor already connected to pin 12).
 - d) Connect a wire from J14, pin 4 to J11, pin 8.
2. Units built with connection from J14 to K1, pins 2 and 10; no connection to K1, pin 6.
 - a) Remove and discard wire connecting socket J14, pin 4 to Record Relay K1, pin 2.
 - b) Connect a wire from J14, pin 4 to J14, pin 2; do not disturb connection already on pin 2.
 - c) Connect a wire from K1, pin 6 to K1, pin 12.
 - d) In wiring the plug for J14 to connect the AG440 electronics to the A-type unit, do not disturb the link joining pins 1 and 2.
3. Units built to schematic No. 4952276 or 4952765 (MM1000-01 and -03 versions).
 - a) Connect a link between socket J14, pin 2 and pin 3.
 - b) Connect a wire from J14, pin 4 to J11, pin 8.
4. Units built to schematic No. 4952629 (MM1000-02 version).
 - a) Remove and discard wire connecting socket J14, pin 4 to Record Relay K1, pin 2.
 - b) Connect a wire from J14, pin 4 to J14, pin 2.
 - c) In wiring the plug for J14 to connect the AG440 electronics to the A-type unit, do not disturb the link joining pins 1 and 2.

AMPEX MM 1100

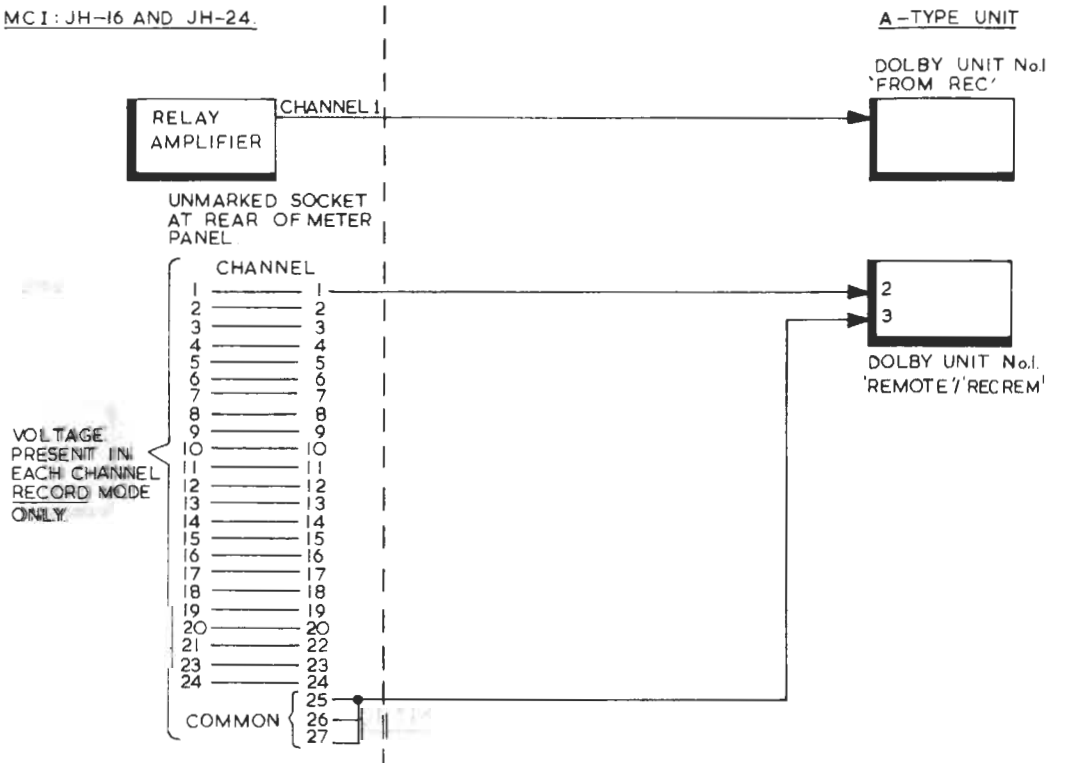
A-TYPE UNIT



REMOTE CONNECTION OF A-TYPE UNIT TO AMPEX MM 1100 RECORDER

MCI: JH-16 AND JH-24

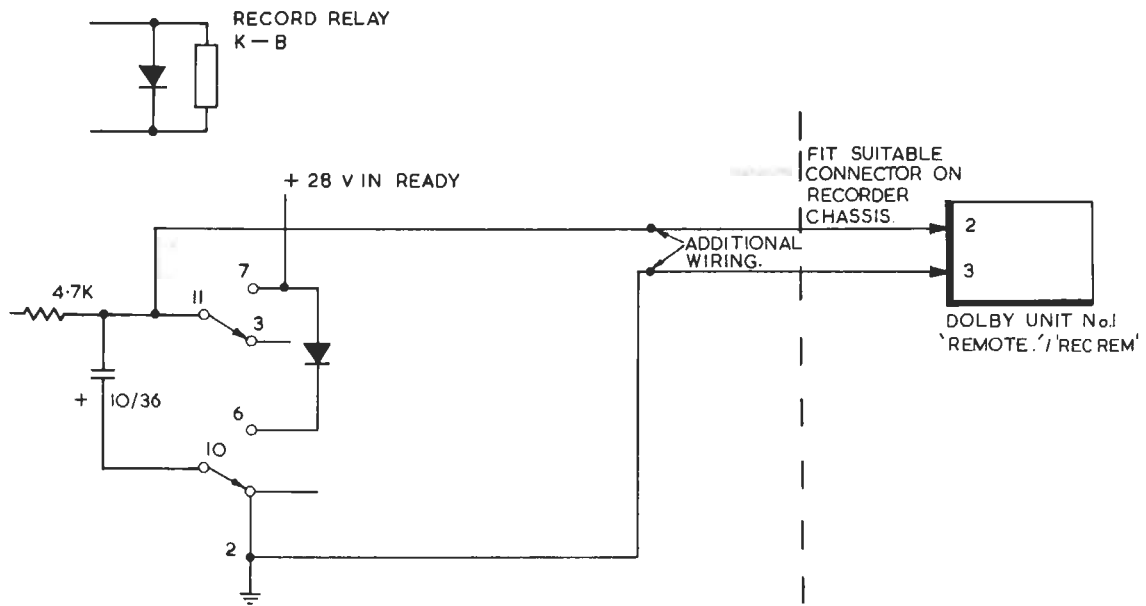
A-TYPE UNIT



REMOTE CONNECTION OF A-TYPE UNIT TO MCI: JH-16 AND JH-24 RECORDERS.

3 M MODEL 56

A-TYPE UNIT



REMOTE CONNECTION OF A-TYPE UNIT TO 3 M MODEL 56 ELECTRONICS.

3 M SERIES 79

M SERIES UNIT

SIGNAL ELECTRONICS CARD
EDGE CONNECTOR NUMBERS
(3M DRG. No. E790 S9C010)

FIT SUITABLE
CONNECTOR ON RECORDER
CHASSIS

CHANNEL 1
A2
(LAMP TEST)

CHANNEL 2
A2
(LAMP TEST)

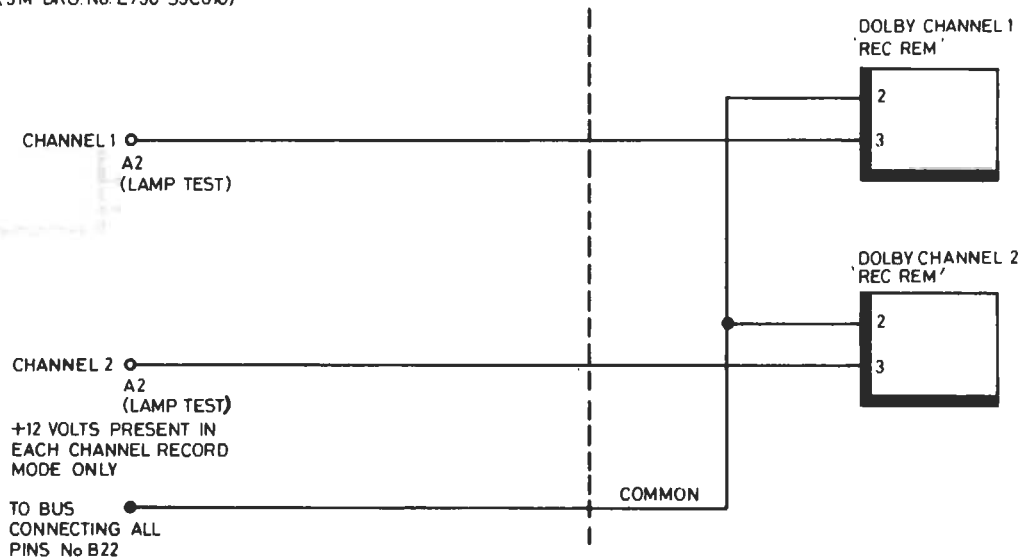
+12 VOLTS PRESENT IN
EACH CHANNEL RECORD
MODE ONLY

TO BUS
CONNECTING ALL
PINS No B22

COMMON

DOLBY CHANNEL 1
'REC REM'

DOLBY CHANNEL 2
'REC REM'



REMOTE CONNECTION OF M SERIES UNIT TO 3M SERIES 79 RECORDER

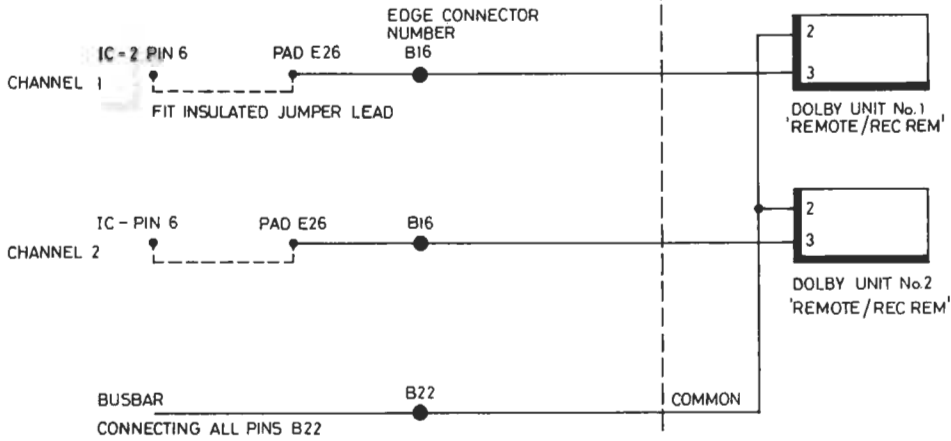
3M SERIES 79

A-TYPE UNIT

(ALTERNATIVE SCHEME SUITABLE FOR ALL A-TYPE UNITS)

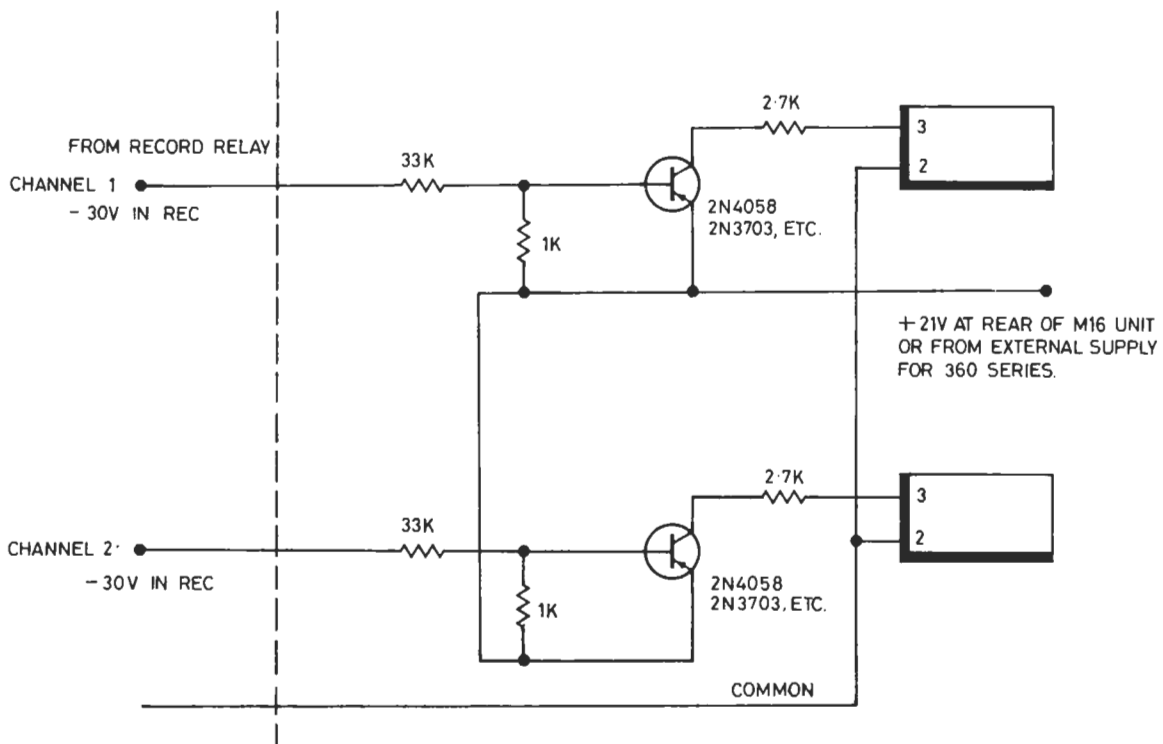
SIGNAL ELECTRONICS CARD
(3M DRAWING No. E790 59C010)

FIT SUITABLE CONNECTOR
ON RECORDER CHASSIS



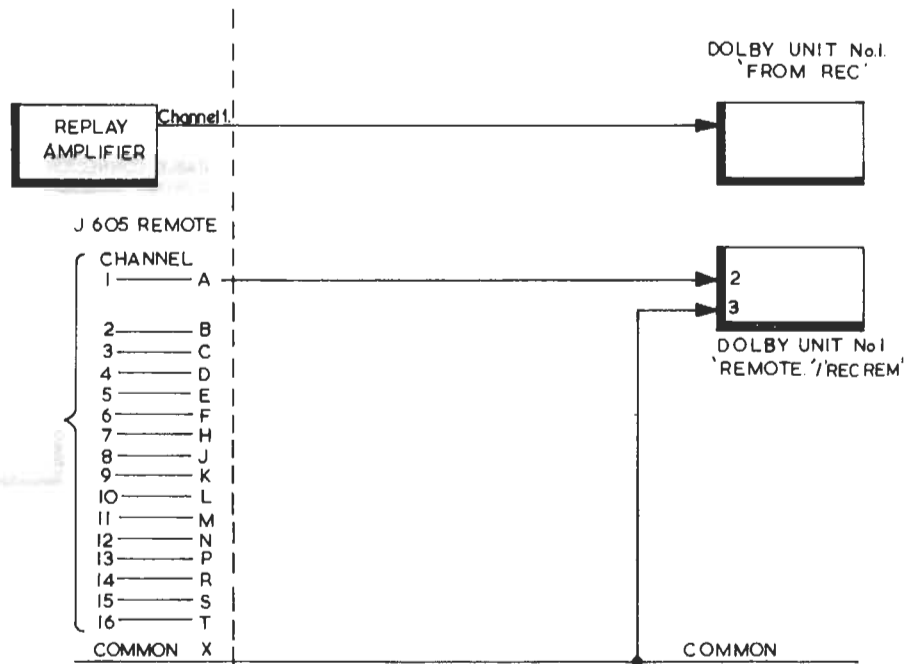
STEPHENS RECORDERS

A-TYPE UNIT



SCULLY 100

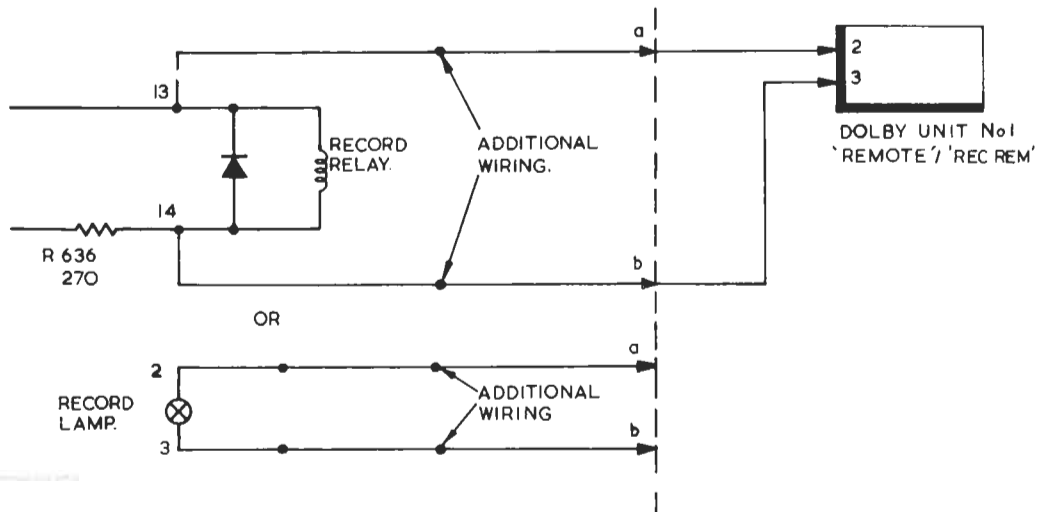
A-TYPE UNIT



REMOTE CONNECTION OF A-TYPE UNIT TO SCULLY MODEL 100 RECORDER

SCULLY 280

A-TYPE UNIT

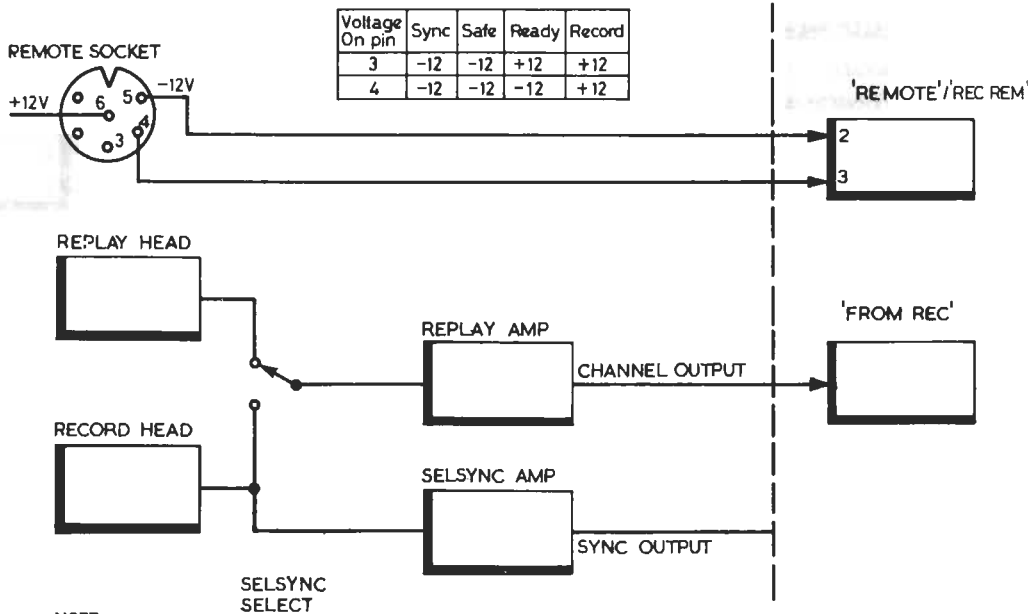


NOTE :- ADDITIONAL WIRING TAKEN TO SUITABLE CONNECTOR ON AMPLIFIER, FOR EXAMPLE TO PINS 2 & 3 OF J 601. MIC. INPUT IF MIC. OPTION NOT USED. MACHINES FACTORY-WIRED FOR REMOTE CONTROL OF DOLBY UNITS HAVE J 601 SO WIRED.

REMOTE CONNECTION OF A-TYPE UNIT TO SCULLY 280
 SERIES ELECTRONICS.

STUDER A-80

A-TYPE UNIT



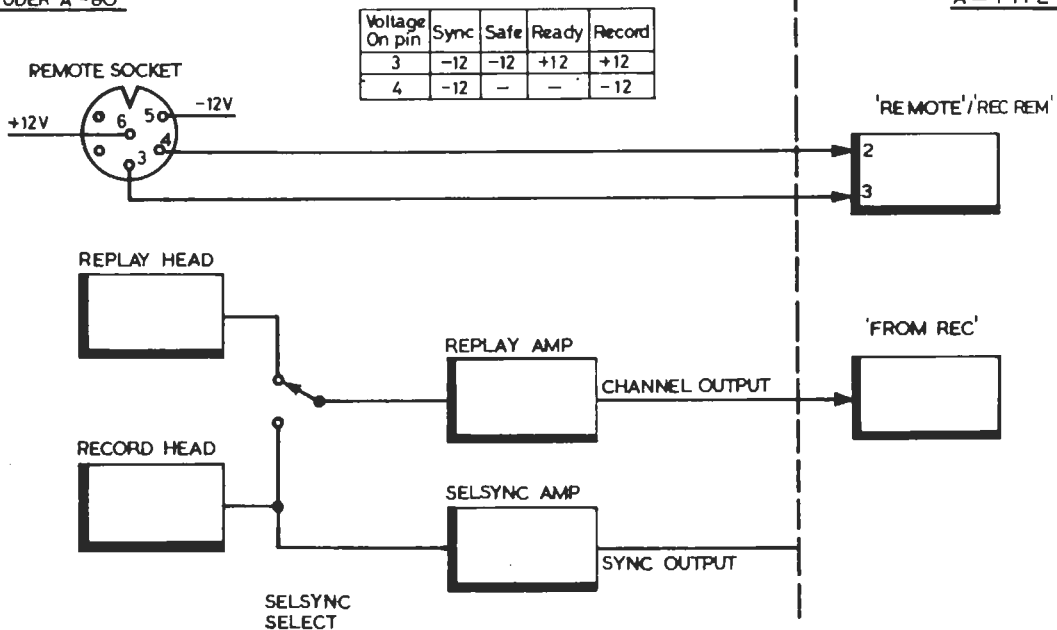
NOTE

1. Selsync output appears automatically on channel output when selsync selected.
2. Identical connections for all channels in each A-80 installation.
3. Remote/rec rem pins must not be commoned in any circumstances.
4. Check voltages on remote socket pins in all modes to produce table as above to ensure correct A-80 model.

REMOTE CONNECTION OF A-TYPE UNITS TO STUDER A80 RECORDER (UK MODIFIED MACHINES)

STUDER A-80

A-TYPE UNIT



NOTES

1. Selsync output appears automatically on channel output when selsync selected.
2. Identical connections for all channels in each A-80 installation.
3. Remote/rec rem pins must not be commoned in any circumstances.
4. Check voltages on remote socket pins in all modes to produce table to ensure correct A-80 model.

REMOTE CONNECTION OF A-TYPE UNITS TO STUDER A80 RECORDER (STANDARD UNIT)

TELEFUNKEN M15

A-TYPE UNIT

SOCKET

"FERNBEDIENUNG SPURWAHL"

CHANNEL	CONTACT
1	a1
2	b1
3	c1
4	a2
5	b2
6	c2
7	a3
8	b3
COMMON	a13
(CHANNELS 1-8)	
9	c3
10	a4
11	b4
12	c4
13	a5
14	b5
15	c5
16	a6
COMMON	b13
(CHANNELS 9-16)	
17	b6
18	c6
19	a7
20	b7
21	c7
22	a8
23	b8
24	c8
COMMON	c13
(CHANNELS 17-24)	

1

2

3

4

5

6

7

8

COMMON

(CHANNELS 1-8)

9

10

11

12

13

14

15

16

COMMON

(CHANNELS 9-16)

17

18

19

20

21

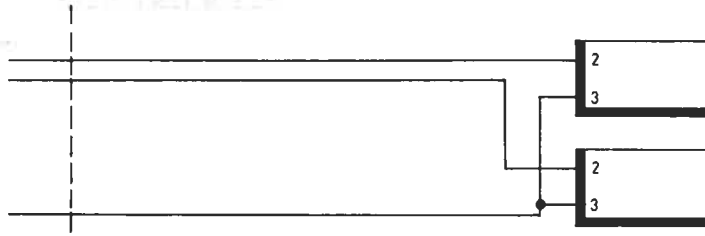
22

23

24

COMMON

(CHANNELS 17-24)



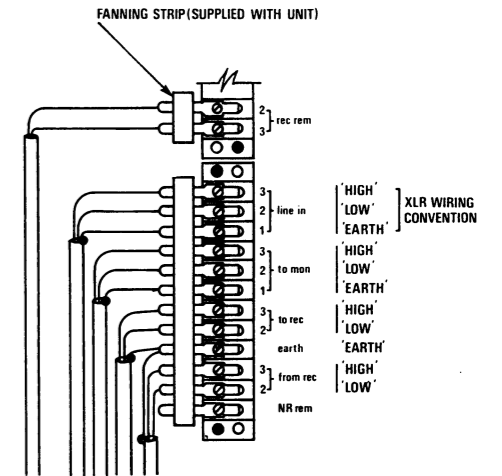
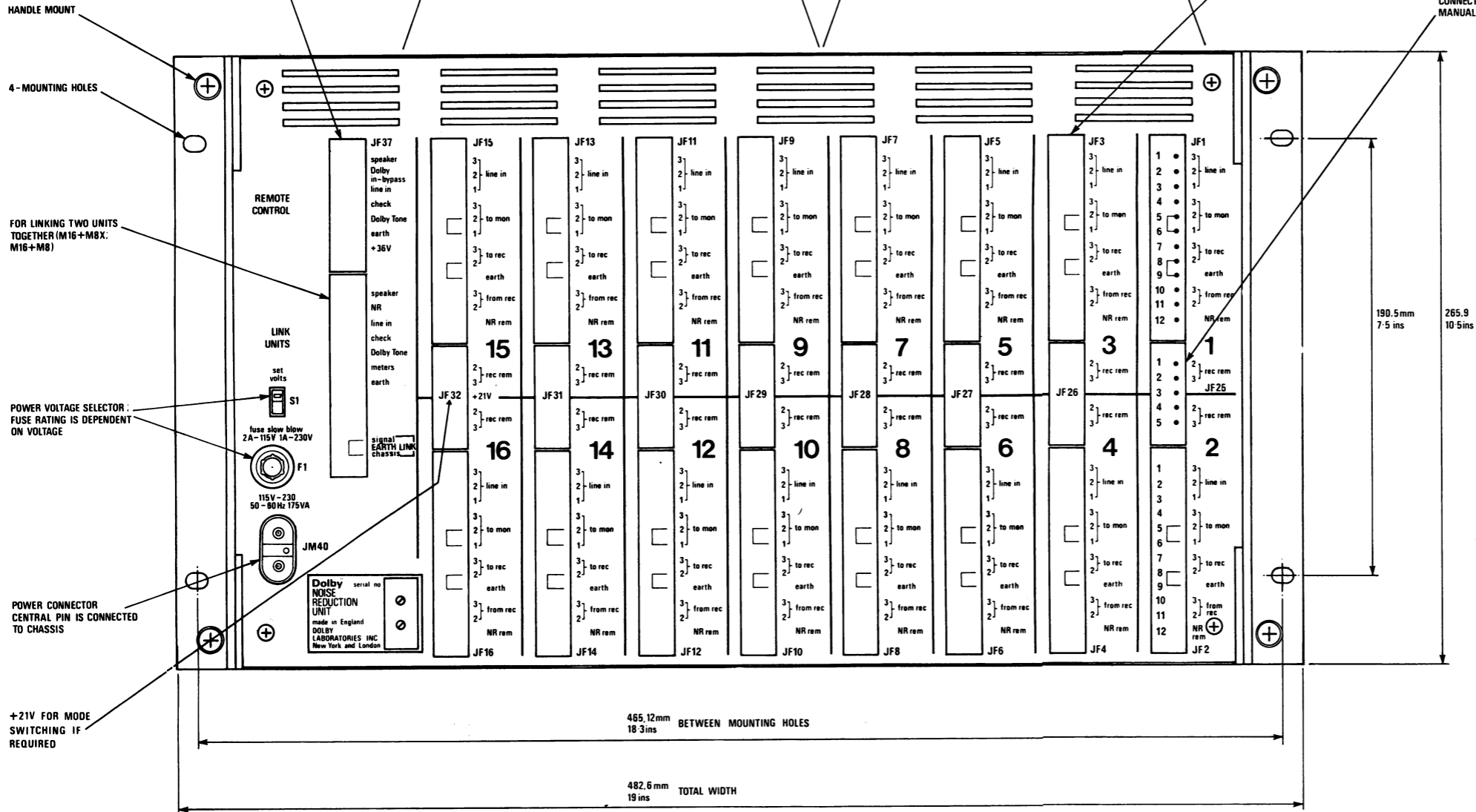
REMOTE CONTROL:
CONNECT TO CAT No. 48 REMOTE MODULE
(SUPPLIED WITH UNIT). THIS FACILITY ON
M16 & M8 ONLY. NOT ON MBX. MBX IS CONTROLLED
BY M16 THROUGH 'LINK UNITS' CONNECTOR

CONNECTOR AREA BLANK ON MBX

THESE CONNECTORS USED ON M8 & MBX
(NUMBERED 1 - 8 ON M8; 17 - 24 ON MBX)

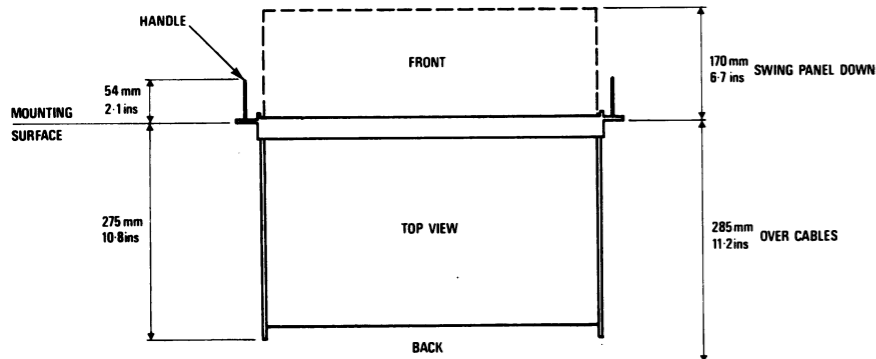
AUDIO CONNECTIONS TO AND FROM
RECORDER AND CONSOLE

REMOTE CONNECTOR FOR REC/PLAY MODE SWITCHING.
CONNECT TO SUITABLE POINTS IN RECORDER. SEE
MANUAL OR ENGINEERING FIELD BULLETIN No.22 FOR DETAILS.



BASIC TERMINAL BLOCK ASSEMBLY
For detail see installation instructions

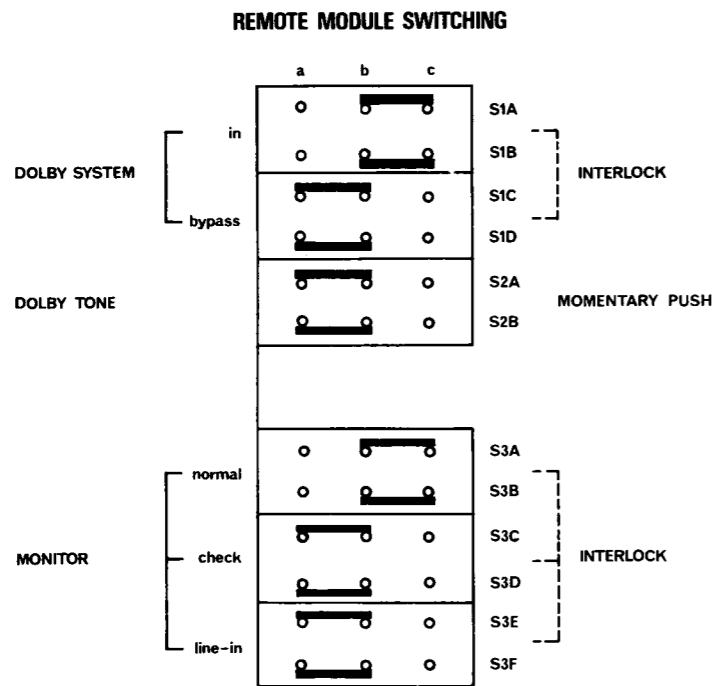
NOTES
MBX Signal connectors JF17 - 24
Remote operation JF33 - 36
Link unit JF39



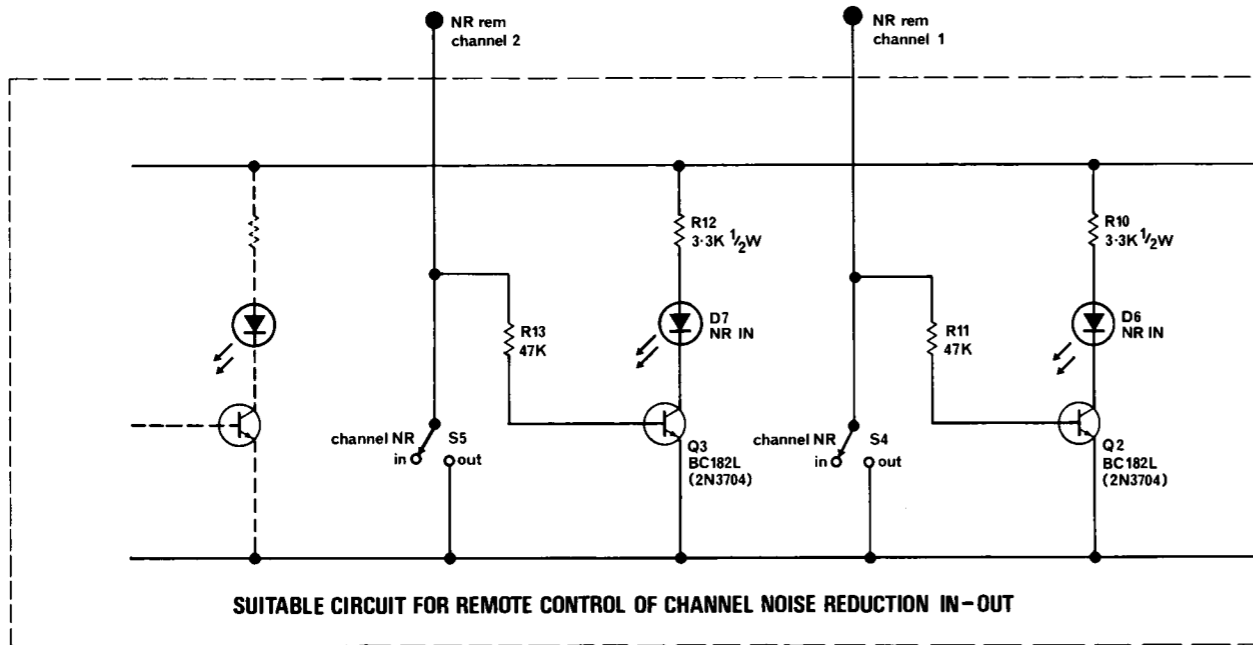
L76/130

'M' SERIES REAR VIEW and Installation Details
© Dolby Laboratories Inc 1973 Drawing No AOD 1054

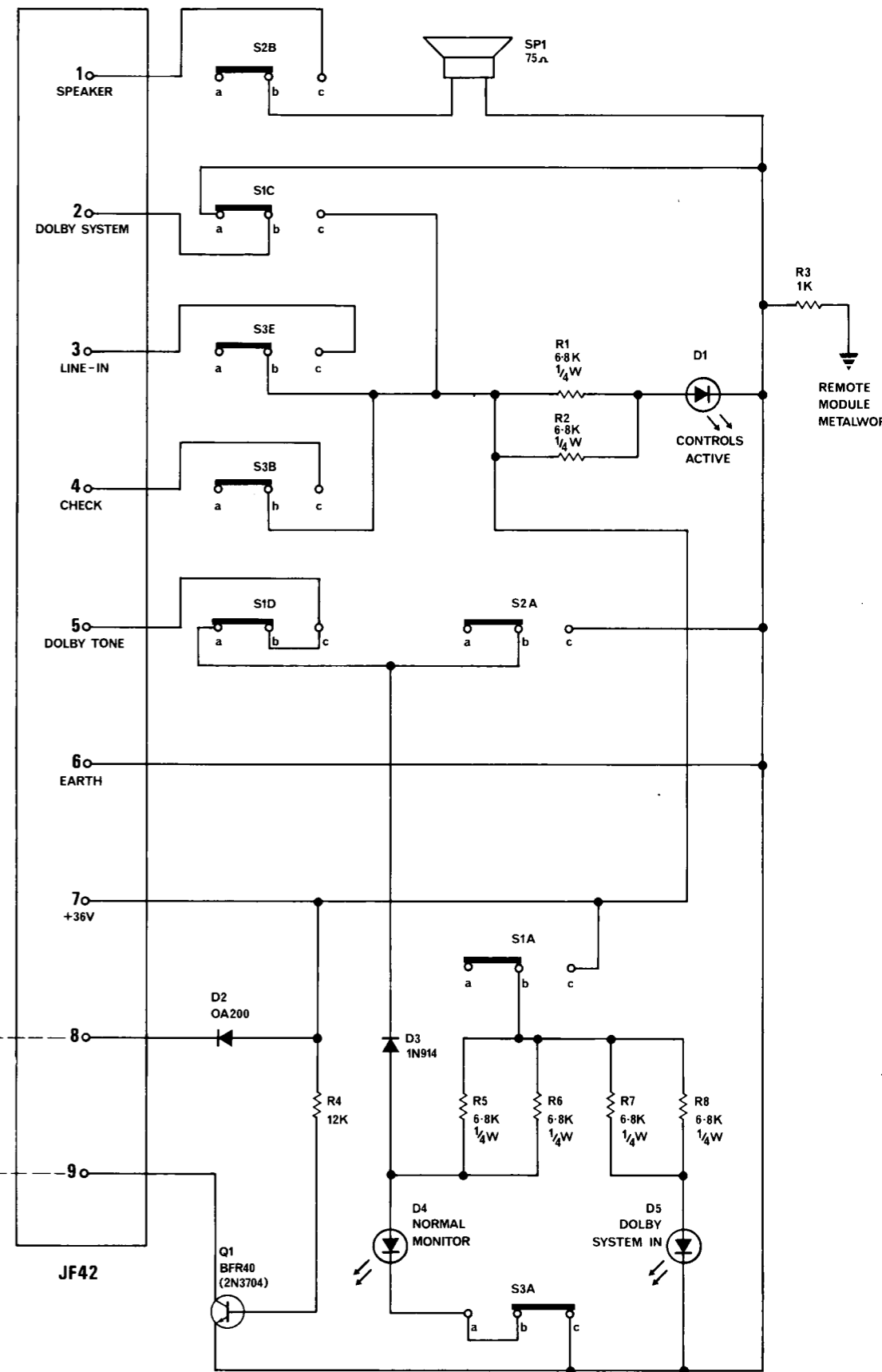
REMOTE MODULE CAT No 48



NR rem to be connected to corresponding channel terminal on rear of M-series unit



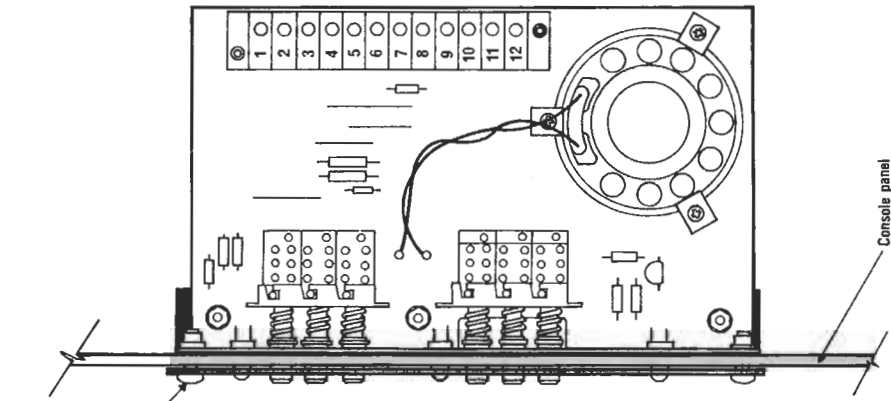
(Terminals 1-7 to remote connector of M16 or M8; terminals 8 & 9 to optional remote channel NR in-out)



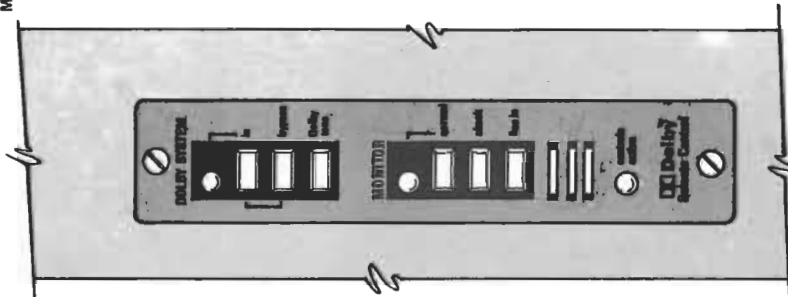
NOTES:

1. All light emitting diodes are HP5082-4415, TIL 210 or similar.
2. Switch positions shown for Dolby System in, Dolby Tone off and Normal Monitor.
3. Unused switch poles: S1B, S3B, S3C, S3F.
4. Resistors are $\pm 5\%$ and $1/8W$ unless otherwise stated.

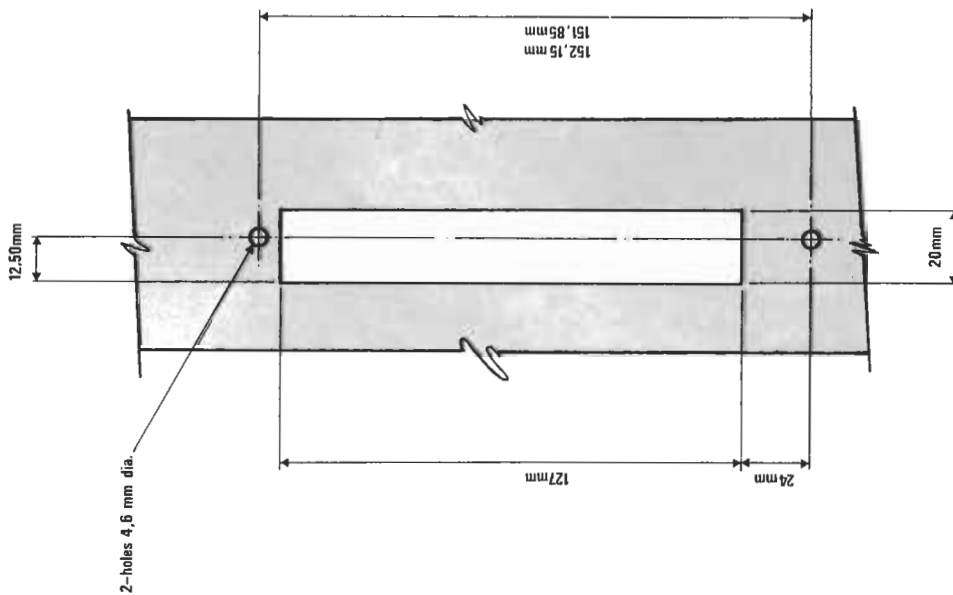
Connect terminals 1-7 to remote connector, JF37 of M16 or M8; terminals 8 and 9 to optional customer-supplied remote channel MR in-out. Use single wire or multicore cable; screened cable not required.



Two mounting screws supplied M4x12mm (metric thread)



Assembly



Console cut-out

NOTES

1. Use Cat. No. 48 front panel as rough template for marking console panel cut-out.
2. Sandwich console panel between Cat. No. 48 front panel and printed circuit card assembly.

8.1

SECTION 8
OPERATION

DOLBY MODEL M16H
OPERATING INSTRUCTIONS

See separate instructions for Model M16 and Model 361

Revised Version - March 1975

8.1 Introduction

These instructions supersede all previous M16H instructions. The new instructions allow for a greater variety of operating conditions, including those of the pre-1975 instructions. In particular, the new instructions take account of elevated level operation and the use of non-standard (user-selected) magnetic flux levels for Dolby Level.

The pre-1975 recommendation of Dolby Laboratories was a strict adherence to 185 nWb/m for A-Type Dolby Level in magnetic recording. The intention was to promote tape interchangeability without any theoretical need for Dolby Tone on each tape or for recorder adjustment in order to match any tape being played. With the new high output tapes the previous procedures have not proved to be practicable in some cases in which studios have used various elevated level test tapes and recording procedures. Confusion and incorrect operation of the Dolby units have sometimes been the result.

These new instructions recognize the existing situation and include procedures for operation under the following conditions:

- A. Standard recording level with standard Dolby Level (185 nWb/m).
- B. Elevated recording level with standard Dolby Level (185 nWb/m).
- C. Elevated recording level with elevated Dolby Level (user-selected).

Condition A is the one applying in pre-1975 Dolby instructions. Many studios continue to operate on this standard, choosing to use standard level recording tapes (e.g. for minimum print-through) or choosing to take some of the headroom of high output tapes in the form of reduced distortion. These considerations are particularly relevant in classical music, in which long-term storage quality and standardization are important. Many popular music studios also continue to operate under standard condition A, primarily in Europe.

When studios change to high output tapes, they often change the operation of their Dolby units to condition C, either intentionally or inadvertently; it is the latter which causes problems because such studios often do not record Dolby Tone on the beginning of the tape. (A short recording of Dolby Tone will always ensure correct decoding or over-dubbing at any time by any studio, regardless of the flux level used for Dolby Level). Since many studios,

especially in the Los Angeles area, are already effectively operating in accordance with condition C, a recommended alignment procedure is included in these instructions.

A procedure for condition B is also included, as there are some studios which up to now have been operating in accordance with condition A but who wish to use elevated level on high output tapes while still retaining Dolby Level at the 185 nWb/m standard. Some studios are already operating in this way (e.g. some in London).

For initial calibration, check through the reasons given for operation under the three different conditions below (A, B, C). Choose the condition that matches your situation best; use it for initial calibration and ignore the others. For normal operation, section 8.3 applies regardless of the initial calibration method used.

Note that the actual noise reduction operation of the Dolby system is the same regardless of the calibration procedure used. Consistent use of any of the following procedures will produce correct results. However, various steps of the different procedures should not be mixed together.

Before proceeding to the calibration instructions below, check that the installation has been carried out according to 'Installation Instructions: Model M16H'.

8.2 M16H Initial Calibration: CONDITION A

Condition A: Standard recording level with standard Dolby Level (185 nWb/m).

Some of the following are reasons for operation under condition A:

- a) You record classical music or other demanding material at standard recording levels. With your material it is particularly important to minimize distortion, print-through and high frequency compression.
- b) The original tapes of the material you record must be stored on a long-term basis. Therefore, standard level recording tapes must be used in order to minimize print-through and ensure long-term stability of the recording. Dolby Level standardization for ease of auditioning and collating material is also important.
- c) You are a new Dolby user and have checked that other studios with which you will be exchanging tapes operate on this standard.
- d) Not necessarily any of the above, but you are already operating under these conditions, having followed the original recommendations, and you wish to continue on the same standard for the sake of convenience.

The pre-1975 Dolby M16H calibration procedure can be used for operation under condition A. Alternatively, the following new procedure is a convenient one; the end result is still condition A.

Procedure A

For standard recording level with standard Dolby Level (185 nWb/m).

a) Calibrate Recorder

1. Press and release the M16H BYPASS buttons to bypass the M16H (buttons out).

When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console; if the impedance is 600 ohms, the recorder output termination switches, if any, should be in the 'off' position.

Note: Bypassing of the M16H is not normally required during routine alignment of the tape recorder; the signals to and from the recorder can pass unmodified through the M16H (with the DOLBY FUNCTIONS OUT button depressed). Nevertheless, during initial installation of the Dolby M16H, bypassing is convenient for establishing the correct record gains on the recorder (and therefore the correct REC CAL

settings on the M16H) without the use of extra test meters. If no extra test meters are used, it is also necessary with some consoles to bypass the M16H in order to establish the correct console tape return fader settings (and therefore the correct TO MON settings on the M16H). The bypassing exercise is also useful for familiarization purposes; the M16H BYPASS buttons are used in the event of Cat. No. 22 Noise Reduction Module failure.

2. Adjust both play and record aspects of the tape recorder, including its line level interfacing with the console. Use an Ampex (185 nWb/m) test tape. European equivalent is a DIN 320 nWb/m test tape. If the machine has separate sync level controls, they should be set to match play level.

Note: As an alternative to the tapes mentioned above, Dolby Level Reference Tapes are now available from Dolby Laboratories. The tapes are available in $\frac{1}{2}$ ", 1" and 2" versions - Cat. No. 72, 73 and 74 - and contain 5, 8 and 10 minutes, respectively, of Dolby Tone at standard Dolby Level, 185 nWb/m.

3. During both record and play, the recorder and console meter readings should match or at least have a known relationship. Correct the meter calibrations if necessary.

If the console has faders before the tape return meters, the faders should be set by recording and playing back test tone from the console. Keep the settings for later use in M16H alignment (TO MON controls).

b) Match M16H to Recorder

1. Press in the M16H BYPASS buttons to put the M16H back into the circuit. If the recorder has output termination switches, they should now be set to the 'on' position.
2. Play the test tape used during recorder calibration (step a2 above) again and check the recorder output meter reading. The playback level (and sync level) controls on the recorder should be trimmed, if necessary, so that the recorder output meter reading is the same as in step a2 above.

Note: No trimming should be necessary if the console has bridging (10 kohm) tape return inputs.

Trimming will be required with low impedance (600 ohm) inputs. When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console. However, when the M16H is put back into the circuit, this load is removed (the M16H is bridging input). The recorder

output level will therefore rise somewhat unless the recorder output termination switches are then set to the 'on' position. Correct setting of the termination switches is usually sufficient to eliminate level discrepancies, so that minimal playback level trimming should be required.

3. Remove the test tape. Use blank tape and put the recorder into record mode. Ensure that the recorder output switches are set to the 'playback' (from tape) position.
4. Press the LOCAL control button on the M16H. Press the DOLBY FUNCTIONS IN button. Press the NORMAL monitor button. Set the NR switches to the IN (up) position.
5. Press the CAL AND DOLBY TONE button on the M16H to record Dolby Tone.
6. Continue recording Dolby Tone and adjust the REC CAL controls on the M16H until the tape recorder output meter reading is the same as when playing the Ampex test tape or the Dolby Level reference tape (both 185 nWb/m) in step a2 above. European equivalent is to adjust the REC CAL controls on the M16H until the tape recorder output meter reading when playing Dolby Tone is 5 dB less than when playing the DIN test tape in step a2 above.
7. Continue recording Dolby Tone and adjust the PLAY CAL controls on the M16H until the M16H meters read on the DOLBY LEVEL dot.

c) Match M16H to Console

1. Press and release the CAL AND DOLBY TONE button on the M16H (out).
2. Set the NR switches on the M16H to the OUT (down) position.
3. Feed test tone at 0VU level (or 5 dB below DIN peak level for European operation) from the console to the M16H.
4. Record on blank tape and adjust the LINE IN controls on the M16H until the M16H meters read on the DOLBY LEVEL dot.
5. Press the CHECK monitor button on the M16H (for simultaneous record/play).
6. Continue recording the test tone and adjust the TO MON controls on the M16H until the test tone returns to the console (with tape return faders already set in step a3 above) at 0VU level (or 5 dB below DIN peak level for European operation).

Note: On some consoles it might be difficult to send test tone and measure the returned test tone at the console at the same time. In such cases, record and rewind, then adjust the TO MON controls while playing.

After the calibration procedure A above has been carried out, it is normally unnecessary to make any further adjustments on the Dolby M16H unit. Level variations due to changes in tape sensitivity should be compensated by adjusting the input level controls on the tape recorder.

8.2 M16H Initial Calibration: CONDITION B

Condition B: Elevated recording level with standard Dolby Level (185 nWb/m).

Some of the following are reasons for operation under condition B:

- a) You move your Dolby M16H units around and patch them into a particular session only when required. On non-Dolby sessions, your recorders are set up for elevated level operation on high output tape. When patching in your Dolby units, you want to continue operating at elevated level without having to recalibrate anything. (However, with low impedance tape return inputs on the console, you will still have to switch on the recorder output terminations and/or trim the recorder playback level controls).
- b) You use the Dolby system all the time but you feel that you would like to improve the signal-to-noise ratio still further by recording at elevated level on high output tape. At the same time you want to retain Dolby Level at the standard 185 nWb/m for compatibility with standard level tapes you have already recorded (i. e. under condition A above). Print-through is not a serious problem with the types of material you record.
- c) Some other studios in your area (e. g. London) are recording in this way and you would not only like your Dolby Level but your recorded signal levels to be compatible for overdubbing purposes.

Procedure B

For elevated recording level with standard Dolby Level (185 nWb/m).

a) Calibrate Recorder

1. Press and release the M16H BYPASS buttons to bypass the M16H (buttons out).

When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console; if the impedance is 600 ohms, the recorder output termination switches, if any, should be in the 'off' position.

Note: Bypassing of the M16H is not normally required during routine alignment of the tape recorder; the signals to and from the recorder can pass unmodified through the M16H (with the DOLBY FUNCTIONS OUT button depressed). Nevertheless, during initial installation of the Dolby M16H, bypassing is convenient for establishing the correct record gains on the recorder (and thereby the correct REC CAL settings on the M16H) without the use of extra test meters. If no extra test meters are used, it is also necessary with some consoles to bypass the M16H in order to establish the correct console

tape return fader settings (and therefore the correct TO MON settings on the M16H). The bypassing exercise is also useful for familiarization purposes; the M16H BYPASS buttons are used in the event of Cat. No. 22 Noise Reduction Module failure.

2. Adjust both play and record aspects of the tape recorder for operation at the desired elevated recording level, including line level interfacing of the recorder with the console. Any test tape can be used for this step. If the machine has separate sync level controls, they should be set to match play level.
3. During both record and play, the recorder and console meter readings should match or at least have a known relationship. Correct the meter calibrations if necessary.

If the console has faders before the tape return meters, the faders should be set by recording and playing back test tone from the console. Keep the settings for later use in M16H alignment (TO MON controls).

b) Match M16H to Recorder

1. Press in the M16H BYPASS buttons to put the M16H back into the circuit. If the recorder has output termination switches, they should now be set to the 'on' position.
2. Play the test tape used during recorder calibration (step a2 above) again and check the recorder output meter reading. The playback level (and sync level) controls on the recorder should be trimmed, if necessary, so that the recorder output meter reading is the same as in step a2 above.

Note: No trimming should be necessary if the console has bridging (10 kohm) tape return inputs.

Trimming will be required with low impedance (600 ohm) inputs. When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console. However, when the M16H is put back into the circuit, this load is removed (the M16H is bridging input). The recorder output level will therefore rise somewhat unless the recorder output termination switches are then set to the 'on' position. Correct setting of the termination switches is usually sufficient to eliminate level discrepancies, so that minimal playback trimming should be required.

3. Next play an Ampex (185 nWb/m) test tape; make a note of the recorder output meter reading obtained. Don't adjust anything. European equivalent is to play a DIN (320 nWb/m) test tape; make a note of the recorder output meter reading obtained.

Note: As an alternative to the tapes mentioned above, Dolby Level Reference Tapes are now available from Dolby Laboratories. The tapes are available in $\frac{1}{2}$ ", 1" and 2" versions - Cat. No. 72, 73 and 74 - and contain 5, 8 and 10 minutes, respectively, of Dolby Tone at standard Dolby Level, 185 nWb/m.

4. Remove the test tape. Use blank tape and out the recorder into record mode. Ensure that the recorder output switches are set to the 'playback' (from tape) position.
5. Press the LOCAL control button on the M16H. Press the DOLBY FUNCTIONS IN button. Press the NORMAL monitor button. Set the NR switches to the IN (up) position.
6. Press the CAL AND DOLBY TONE button on the M16H to record Dolby Tone.
7. Continue recording Dolby Tone and adjust the REC CAL controls on the M16H until the tape recorder output meter reading is the same as when playing the Ampex test tape in step 3 above. European equivalent is to adjust the REC CAL controls on the M16H until the recorder output meter reading when playing Dolby Tone is 5 dB less than when playing the DIN test tape in step 3 above.
8. Continue recording Dolby Tone and adjust the PLAY CAL controls on the M16H until the M16H meters read on the DOLBY LEVEL dot.

c) Match M16H to Console

1. Press the DOLBY FUNCTIONS OUT button on the M16H.
2. Feed test tone at the usual line level from the console to the M16H.
3. Record on blank tape and adjust the LINE IN controls on the M16H until the required elevated recording level is obtained at the recorder.
4. Continue recording the test tone and adjust the TO MON controls on the M16H until the test tone returns to the console at the desired level (with tape return faders already set in step a3 above).

Note: On some consoles it may be difficult to send test tone and measure the returned test tone at the console at the same time. In such cases, record and rewind, then adjust the TO MON controls while playing.

After the calibration procedure B above has been carried out, it is normally unnecessary to make any further adjustments on the Dolby M16H unit. Level variations due to changes in tape sensitivity should be compensated by adjusting the input level controls on the tape recorder. However, if the type of tape is markedly different (allowing operation at a different elevated level - e. g. + 4 dB instead of + 2 dB), then the complete procedure B above must be carried out again.

Operating note: Under operating condition B, an elevated signal level passes through the processing portions of the M16H unit (but the line output circuits handle normal signal levels). The elevated signal level can be handled adequately by the M16H circuits since the internal overload point is 20 dB above Dolby Level. This is above the saturation point of high output tape; the M16H therefore does not limit the signal levels which can be used.

Under this operating condition, the M16H meters will read high on program material and may frequently deflect full scale. No harm is done since the meter circuits include overload protection.

8.2 M16H Initial Calibration: CONDITION C

Condition C: Elevated recording level with elevated Dolby Level (user-selected).

Some of the following are reasons for operation under condition C:

- a) You do not use a standard Ampex calibration tape (185 nWb/m) but instead use one of the other recently available test tapes.
- b) You move your Dolby units around and patch them into a particular session only when required. On non-Dolby sessions, your recorders are set up for elevated level operation on high output tape. When patching in your Dolby units you want to continue operating at elevated level without having to recalibrate anything. (However, with low impedance tape return inputs on the console, you will still have to switch on the recorder output terminations and/or trim the recorder playback level controls).
- c) Most of the studios with which you exchange tapes are operating with an elevated Dolby Level (e.g. 3 dB above Ampex level) on high output tape and you wish to be compatible with them.
- d) Some of your clients have their own ideas about recording levels and types of tape to be used. You want to accommodate them during their sessions simply by readjusting your recorder, leaving the Dolby M16H settings alone.

Non-standard Dolby Level operation (condition C) was not considered at all in the pre-1975 Dolby calibration procedures. Nevertheless, such operation is a reality in some studios (e.g. many in the Los Angeles area). Therefore, for such cases - in which the user effectively selects his own tape flux level for Dolby Tone - the following procedure is recommended:

Procedure C

For elevated recording level with elevated Dolby Level (user-selected).

a) Calibrate Recorder

1. Press and release the M16H BYPASS buttons to bypass the M16H (buttons out).

When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console; if the impedance is 600 ohms, the recorder output termination switches, if any, should be in the 'off' position.

Note: Bypassing of the M16H is not normally required during routine alignment of the tape recorder; the signals to and from the recorder can pass unmodified through the M16H (with the DOLBY FUNCTIONS OUT button depressed). Nevertheless, during initial installation of the Dolby M16H, bypassing is convenient for establishing the correct record gains on the recorder (and thereby the correct REC CAL settings on the M16H) without the use of extra test meters. If no extra test meters are used, it is also necessary with some consoles to bypass the M16H in order to establish the correct console tape return fader settings (and therefore the correct TO MON settings on the M16H). The bypassing exercise is also useful for familiarization purposes; the M16H BYPASS buttons are used in the event of Cat. No. 22 Noise Reduction Module failure.

2. Adjust both play and record aspects of the tape recorder for operation at the desired elevated recording level, including line level interfacing of the recorder with the console. Any test tape can be used. If the machine has separate sync level controls, they should be set to match play level.
3. During both record and play, the recorder and console meter readings should match or at least have a known relationship. Correct the meter calibrations if necessary.

If the console has faders before the tape return meters, the faders should be set by recording and playing back test tone from the console. Keep the settings for later use in M16H alignment (TO MON controls).

b) Match M16H to Recorder

1. Press in the M16H BYPASS buttons to put the M16H back into the circuit. If the recorder has output termination switches, they should now be set to the 'on' position.
2. Play the test tape used during recorder calibration (step a2 above) again and check the recorder output meter reading. The playback level (and sync level) controls on the recorder should be trimmed, if necessary, so that the recorder output meter reading is the same as in step a2 above.

Note: No trimming should be necessary if the console has bridging (10 kohm) tape return inputs.

Trimming will be required with low impedance (600 ohm) inputs. When the M16H is bypassed, the recorder output is loaded by the tape return input impedance of the console. However, when the M16H is put back into the circuit, this load is removed (the M16H is bridging input). The recorder output level will therefore rise somewhat unless the recorder output termination switches are then set to the 'on' position. Correct setting of the termination switches is usually sufficient to eliminate level discrepancies, so that minimal playback level trimming should be required.

3. Remove the test tape. Use blank tape and put the recorder into record mode. Ensure that the recorder output switches are set to the 'playback' (from tape) position.
4. Press the LOCAL control button on the M16H. Press the DOLBY FUNCTIONS IN button. Press the NORMAL monitor button. Set the NR switches to the IN (up) position.
5. Press the CAL AND DOLBY TONE button on the M16H to record Dolby Tone.
6. Continue recording Dolby Tone and adjust the REC CAL controls on the M16H until a level corresponding to 0VU (or about 5 dB below DIN peak level for European operation) is obtained at the recorder.
7. Continue recording Dolby Tone and adjust the PLAY CAL controls on the M16H until the M16H meters read on the DOLBY LEVEL dot.

c) Match M16H to Console

1. Press and release the CAL AND DOLBY TONE button on the M16H (out).
2. Set the NR switches on the M16H to the OUT (down) position.
3. Feed test tone at 0VU level (or 5 dB below DIN peak level for European operation) from the console to the M16H.
4. Record on blank tape and adjust the LINE IN controls on the M16H until the M16H meters read on the DOLBY LEVEL dot.
5. Press the CHECK monitor button on the M16H (for simultaneous record/play).
6. Continue recording the test tone and adjust the TO MON controls on the M16H until the test tone returns to the console (with tape return faders already set in step a3 above) at 0VU level (or 5 dB below DIN peak level for European operation).

Note: On some consoles it may be difficult to send test tone and measure the returned test tone at the console at the same time. In such cases, record and rewind, then adjust the TO MON controls while playing.

After the calibration procedure C above has been carried out, it is normally unnecessary to make any further adjustments on the Dolby M16H unit. Level variations due to changes in tape sensitivity should be compensated by adjusting the input level controls on the tape recorder.

Furthermore, all adjustments for operation with different types of tape can be made on the recorder (including test tape changes, changes from normal to high output recording tape, and even changes in elevated level operating conditions - e. g. + 2 dB, + 3 dB, + 4 dB). This flexibility is an advantage of operating condition C. However, because Dolby Tone is not at a standard flux level, in contrast with operating conditions A and B, the disadvantage is that it becomes absolutely essential that Dolby Tone is always recorded at the beginning of each tape so that the tape can be properly decoded or over-dubbed at any time by any studio.

8.3 Operation

The following instructions apply for normal M16H operation, regardless of the conditions of operation or method of initial calibration (A, B, or C above).

IMPORTANT

Whether playing your own tape or a tape from another studio, the Dolby warble tone already on the tape must read on the M16H Dolby Level dots.

a) Set-up

1. All bypass buttons on the M16H should be depressed (unit in circuit).
2. Set all NR switches on the M16H to the IN (up) position, unless NR-OUT is required on any particular channel.
3. Press the LOCAL or REMOTE control buttons on M16H as required. In REMOTE mode, all common facilities controls on the M16H are transferred to the Remote Module; however, Dolby Tone may be operated either locally or remotely.

Note: The REMOTE control button also permits the remote control of NR IN-OUT on a channel by channel basis, if this optional facility has been provided during installation. Such operation requires that all the NR switches on the M16H should be in the IN (up) position.

4. Press the DOLBY FUNCTIONS IN button. Press the NORMAL monitor button. Ensure that the CAL AND DOLBY TONE button is released (out).
5. The M16H is now ready for use. The tape recorder is used normally, although if the recorder has input/playback output switches, the switches should be set to the playback (from tape) position.

b) Monitor buttons

1. While the NORMAL monitor button is depressed, the M16H monitor output (back to the console) is the signal on line-in during record mode and the decoded tape signal during play mode. A normal (non-encoded) signal is thus heard at all times.
2. If monitoring of line-in is desired while the recorder is in either rest or play mode, press the LINE IN monitor button on the M16H. If the recorder also has a line-in monitor switch, it should not be used; always leave the recorder switch in the line-out (from tape) position.

3. The encoded signal directly from the tape may be monitored by pressing the CHECK button. The recording thus may be checked on a simultaneous record/play basis at any time, although the CHECK signal heard will be in the encoded form. The check facility functions only on those channels which are in the record mode to avoid incorrect operation of the decoding process during ping-pong or sync modes.

c) CAL AND DOLBY TONE button

1. It is essential to make a recording of the Dolby Tone calibration signal by pressing the CAL AND DOLBY TONE button at least at the beginning of each reel of tape. Record the tone on all tracks (NR switches must be up) even though not all may be used in the first session. Use of the Dolby Tone will ensure correct decoding or over-dubbing, including punching-in on existing tracks, at any time by any studio. Dolby Tone must be recorded even if any other normal studio tones are recorded as well. Note that Dolby Tone always warbles in a characteristic way for positive identification.
2. When the DOLBY TONE button is depressed, Dolby Tone signal is sent to the recorder (on all channels in record mode) and the playback signal is automatically switched to read on the M16H meters. The complete recorder and M16H combination is therefore checked easily, both for signal continuity and level calibration. When the calibration is correct the M16H meters should always read on the Dolby Level dot, independently of the alignment procedure used.

In addition to being indicated on the M16H meters, the returning Dolby Tone signal is reproduced on the M16H internal loudspeaker and on the Remote Module loudspeaker. (The remote Module loudspeaker is activated only if the remote DOLBY TONE button is depressed).

If desired, the loudspeaker amplifier gain can be adjusted by means of a control situated on the Common Facilities printed circuit board (next to power supply). To turn the level up or down, lower the front panel and remove the Common Facilities Module. Adjust the level potentiometer as required (upper left hand corner of circuit board). For ease in re-inserting the module, it is helpful to remove the adjacent Cat. No. 22 module (channel 16). The Common Facilities Module connector can then be seen, which aids insertion.

3. Note that pressing the CAL AND DOLBY TONE button has the effect of inhibiting the noise reduction action on all channels in both play and record modes; this fact is indicated by the NR LED on each channel interface module (LED out). However, the Dolby Tone oscillators are activated only on channels on which NR is operative (switches up).

d) Metering point indicators

1. Each Channel Interface Module includes a metering point indicator. Whenever the 'Meter Reads Line In' LED is lit, the meter is connected to line-in; when the LED is out, the meter is connected to the recorder output.
2. During replay the LED is out, unless the LINE-IN button is depressed.
3. During recording, the LED is lit (meter reads line-in), unless the DOLBY TONE button is depressed (in this case the meter is transferred to the output of the recorder, enabling simultaneous record/play level checks to be made).

e) Tape variations

1. Note that the M16H unit itself is extremely stable. After the M16H unit has been calibrated initially it will usually be found that any level discrepancies are due to recorder and tape variables.
2. The recorder playback level should be trimmed by the use of the appropriate test tape (as used in alignment procedures A, B or C above).
3. A convenient way of compensating for a recording level discrepancy due to a change in tape sensitivity is simply to record Dolby Tone on blank tape and adjust the input level controls on the recorder until the discrepancy is eliminated.
4. In any event, do not start adjusting the M16H unit until after the recorder and tape have been thoroughly checked. When doing this, press the DOLBY FUNCTIONS OUT button on the M16H. Alternatively, to bypass the M16H unit completely, press and release the individual channel BYPASS buttons. Switch off the output terminations on the recorder if the tape return inputs on the console are low impedance (600 ohms).

f) Tapes from other studios

1. If you receive a tape from another studio, it is necessary to match the level of the Dolby Tone recorded on it to Dolby Level in your M16H unit. For this purpose, disregard the levels of any other tones on the tape. Note that a Dolby Level discrepancy does not necessarily mean that the other studio has aligned its recorder and/or Dolby units carelessly; there may be a track width difference between your recorder and theirs (or, if the difference is as much as 2 or 3 dB, they are using a different Dolby Level standard from yours).
2. If the Dolby Tone on the tape is outside the Dolby Level dot on your M16H meters, then an adjustment should be made. If playback only

is required, adjust the playback level controls on your recorder until the normal readings for Dolby Tone are obtained on the recorder meters. Your M16H meters should then read on the Dolby Level dot, with the CAL AND DOLBY TONE button depressed (which inhibits the noise reduction action and eliminates a $\frac{1}{2}$ dB level discrepancy).

3. If over-dubbing, especially punching-in, is required on some tracks, first make the playback adjustments in step 2 above, including sync level adjustments. Then record on a blank section of the tape with the CAL AND DOLBY TONE button depressed. While recording, adjust the record level controls on your tape recorder until the normal readings for Dolby Tone are obtained on the recorder meters. Your M16H meters should then indicate Dolby Level.

8.4 Miscellaneous Notes

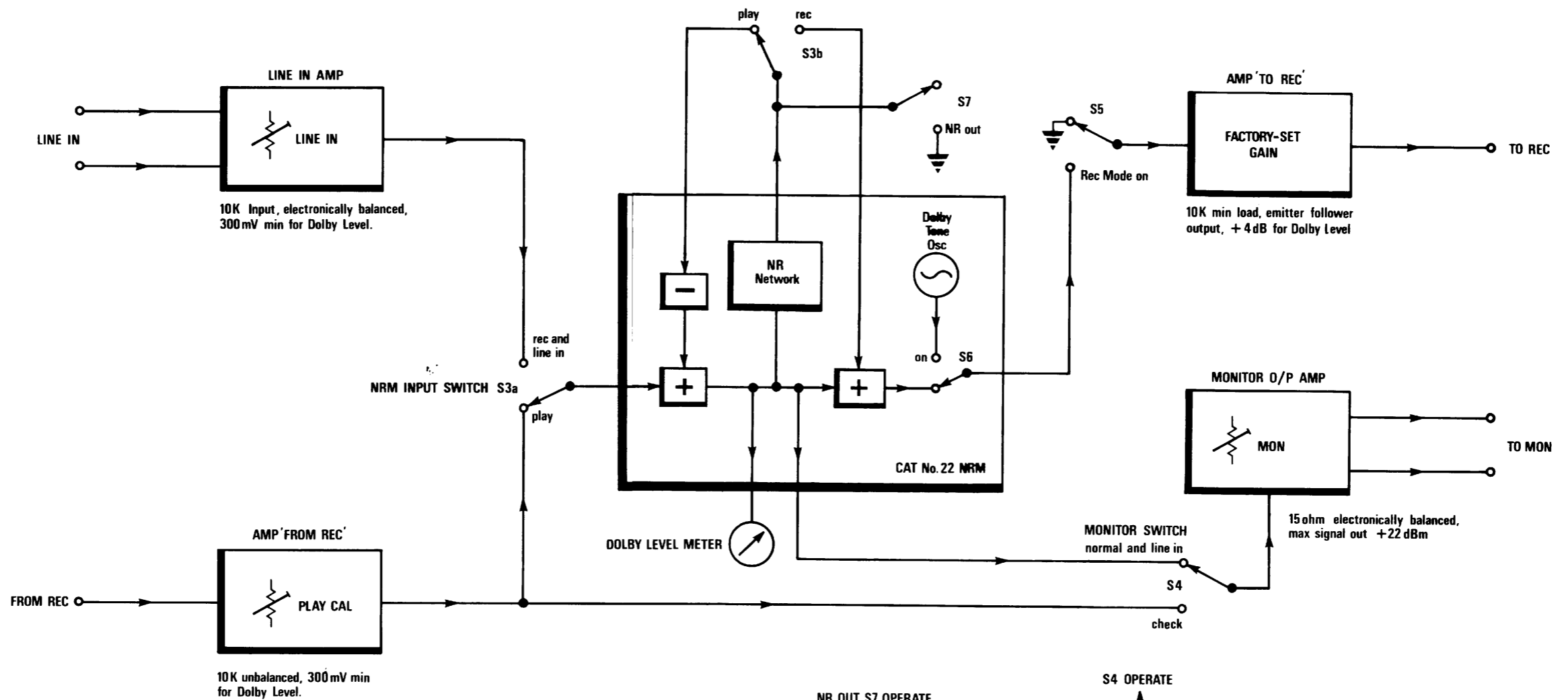
1. In the record mode, pressing the CAL AND DOLBY TONE button energizes the Dolby Tone oscillators (on tracks with NR IN) and connects the M16H meters to the off-tape (playback) signal. Another function of the CAL AND DOLBY TONE button in both record and play modes is to inhibit the Dolby noise reduction action; at the Dolby Tone level and frequency (850 Hz) this action is $-\frac{1}{2}$ dB during recording and $+\frac{1}{2}$ dB during playback (i. e. overall no change). The button can therefore be used (instead of the individual NR switches) to prevent a potential $\frac{1}{2}$ dB calibration error when playing back Dolby Tone.
2. If a check of the recorder playback frequency response is required at the console (using a test tape), the DOLBY FUNCTIONS OUT button should be depressed (or DOLBY SYSTEM OUT on the remote module) in order to avoid confusion (at 0 VU the Dolby system decode characteristic varies from flat by about $\frac{1}{2}$ dB in a pre-determined way; in normal use this is compensated during encoding). Overall record-playback frequency response at the console can be checked with the Dolby system in or out (since the response is flat overall). However, if a tone or frequency run from the console is to be left on the tape, the DOLBY FUNCTIONS OUT button must be depressed (or DOLBY SYSTEM OUT on the remote module).
3. To make a Dolby-encoded copy of a tape already made with the system, just copy the tape 'straight'. Copy the Dolby Tone at the same time for reference.
4. Use 'Dolby A' stickers (Cat. No. 68) on your tapes to identify encoded recordings.

8.5 Breakdowns

1. In the event of Cat. No. 22 Noise Reduction Module failure, simply remove the faulty module and plug in a good one. Modules can be swapped between channels if required. It is unnecessary to make any adjustments when changing a Cat. No. 22 module.

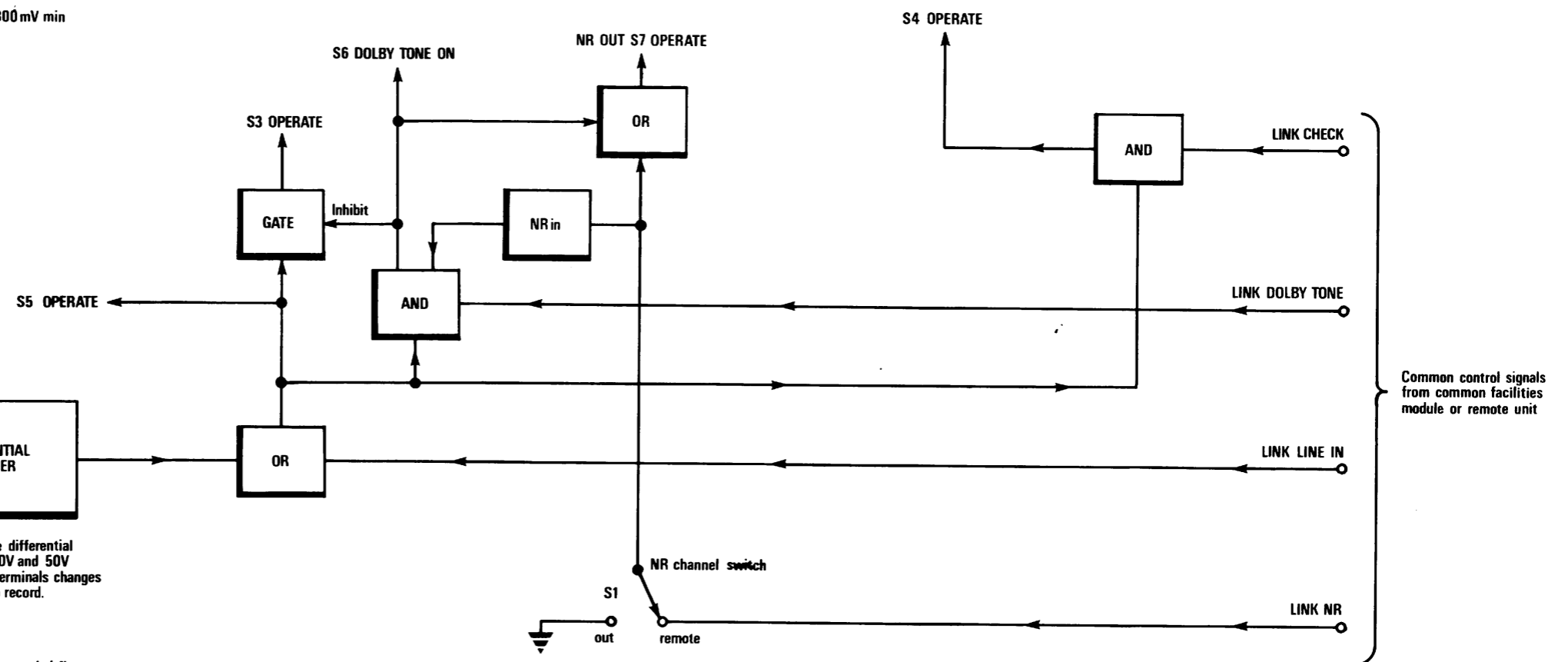
2. If a spare Cat. No. 22 module is not available, the channel can be bypassed by pressing and releasing the BYPASS button on the corresponding Channel Interface Module. Switch off the output terminations on the recorder if the tape return inputs on the console are low impedance (600 ohms).
3. If a Cat. No. 44 Interface Module fails, it can be changed or swapped in the same way as Cat. No. 22 modules. If the module has been pre-set to the same operating levels as the other Cat. No. 44 modules, then no adjustment is necessary; otherwise the complete alignment procedure (A, B, or C) should be followed.
4. If a spare Cat. No. 44 module is not available, the channel can be bypassed by the use of a Cat. No. 47 Service Module (one provided with each M16H unit). Remove the corresponding Cat. No. 22 module when using the Service Module. Switch off the channel output termination on the recorder if the tape return input on the console is low impedance (600 ohms).
5. When sending a faulty module back to your Dolby distributor for repair or replacement, be sure to pack the module adequately. Include a note of the fault observed. Write on a piece of paper or on a sticker or masking tape (not directly on the covers of the module, as this ruins the anodized aluminium finish).

SECTION 9
M SERIES CIRCUITS

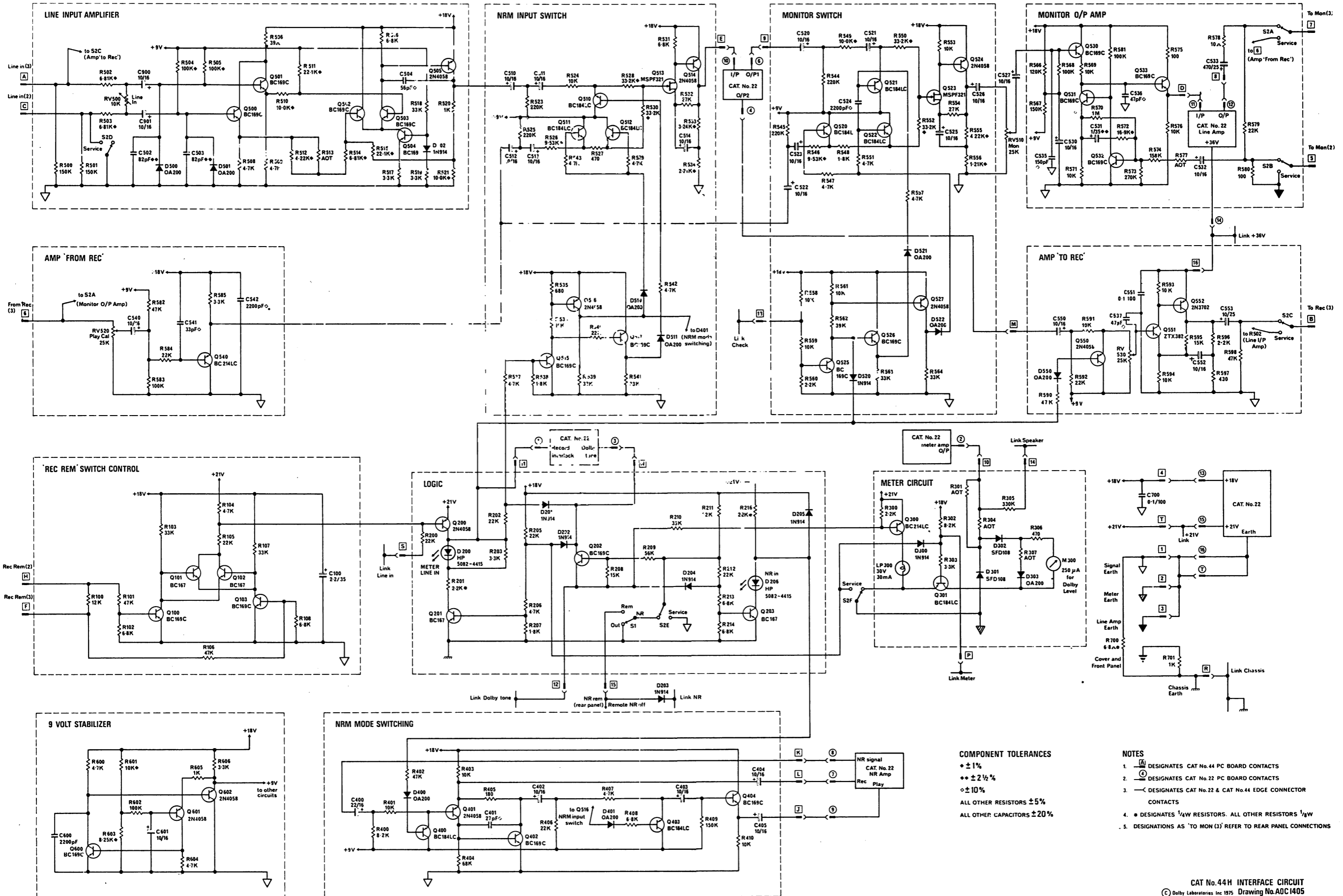


NOTES

1. Voltages referenced to Dolby Level = 185 nWb/m recorded flux.
2. All switches shown in non-operated condition.

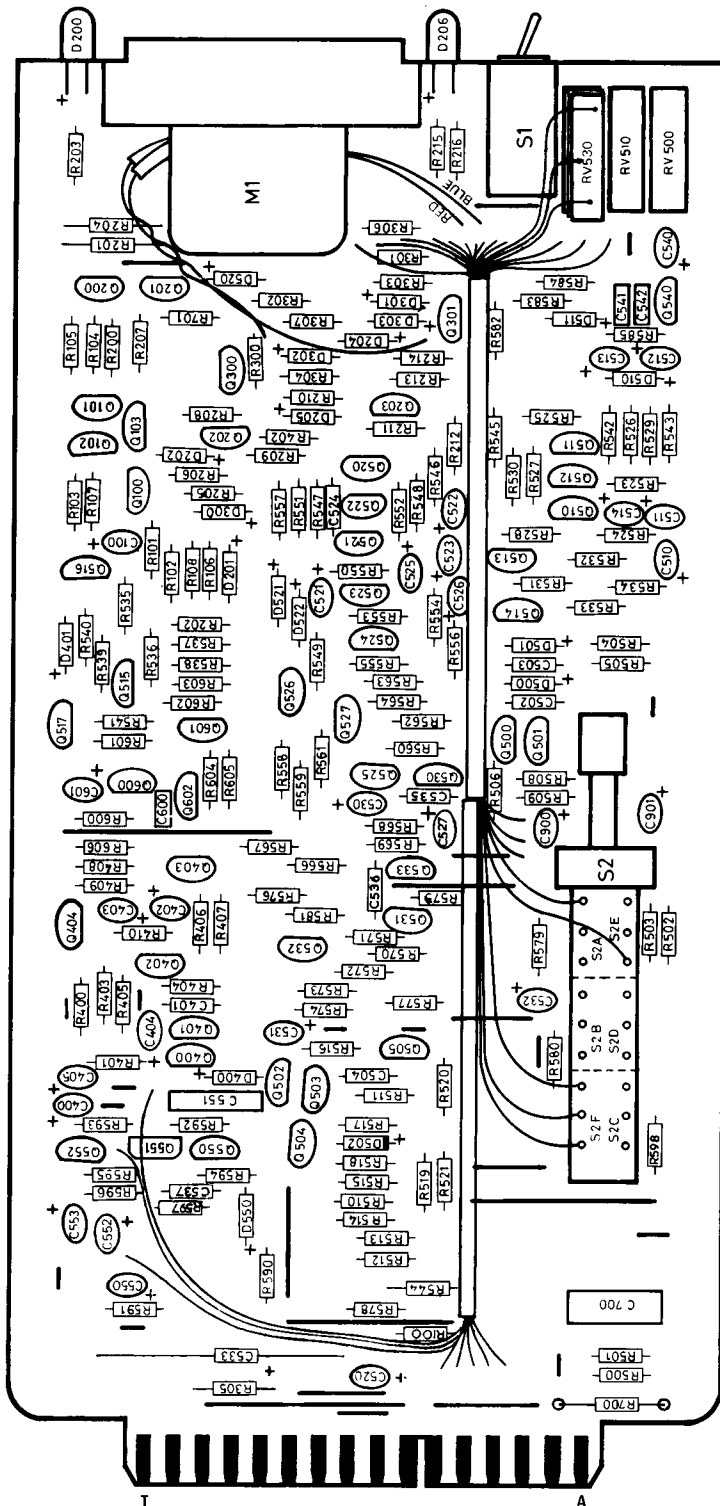


Both copies were done poorly on the copier - use your imagination with some of the values and lines.



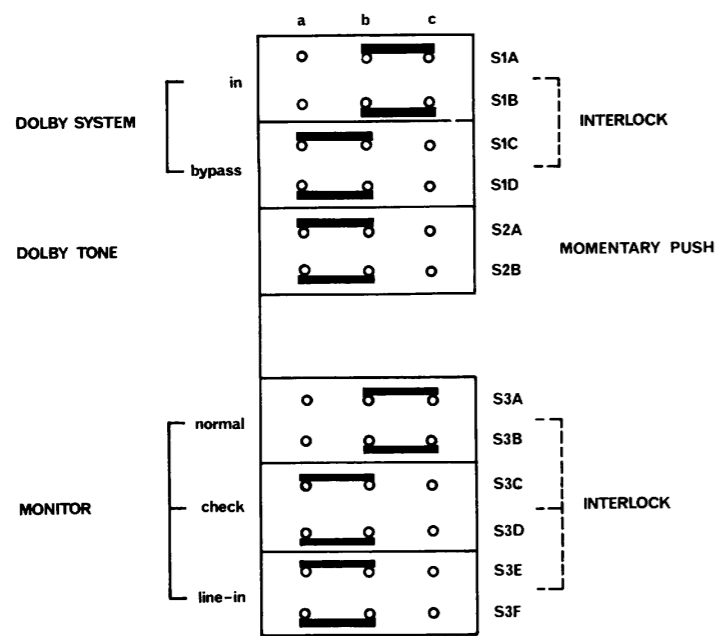
COMPONENT TOLERANCES
 ± 1%
 ± 2 1/2%
 ± 10%
 ALL OTHER RESISTORS ± 5%
 ALL OTHER CAPACITORS ± 20%

- NOTES**
- DESIGNATES CAT No. 44 PC BOARD CONTACTS
 - DESIGNATES CAT No. 22 PC BOARD CONTACTS
 - DESIGNATES CAT No. 22 & CAT No. 44 EDGE CONNECTOR CONTACTS
 - DESIGNATES 1/4W RESISTORS. ALL OTHER RESISTORS 1/8W
 - DESIGNATIONS AS 'TO MON (3)' REFER TO REAR PANEL CONNECTIONS



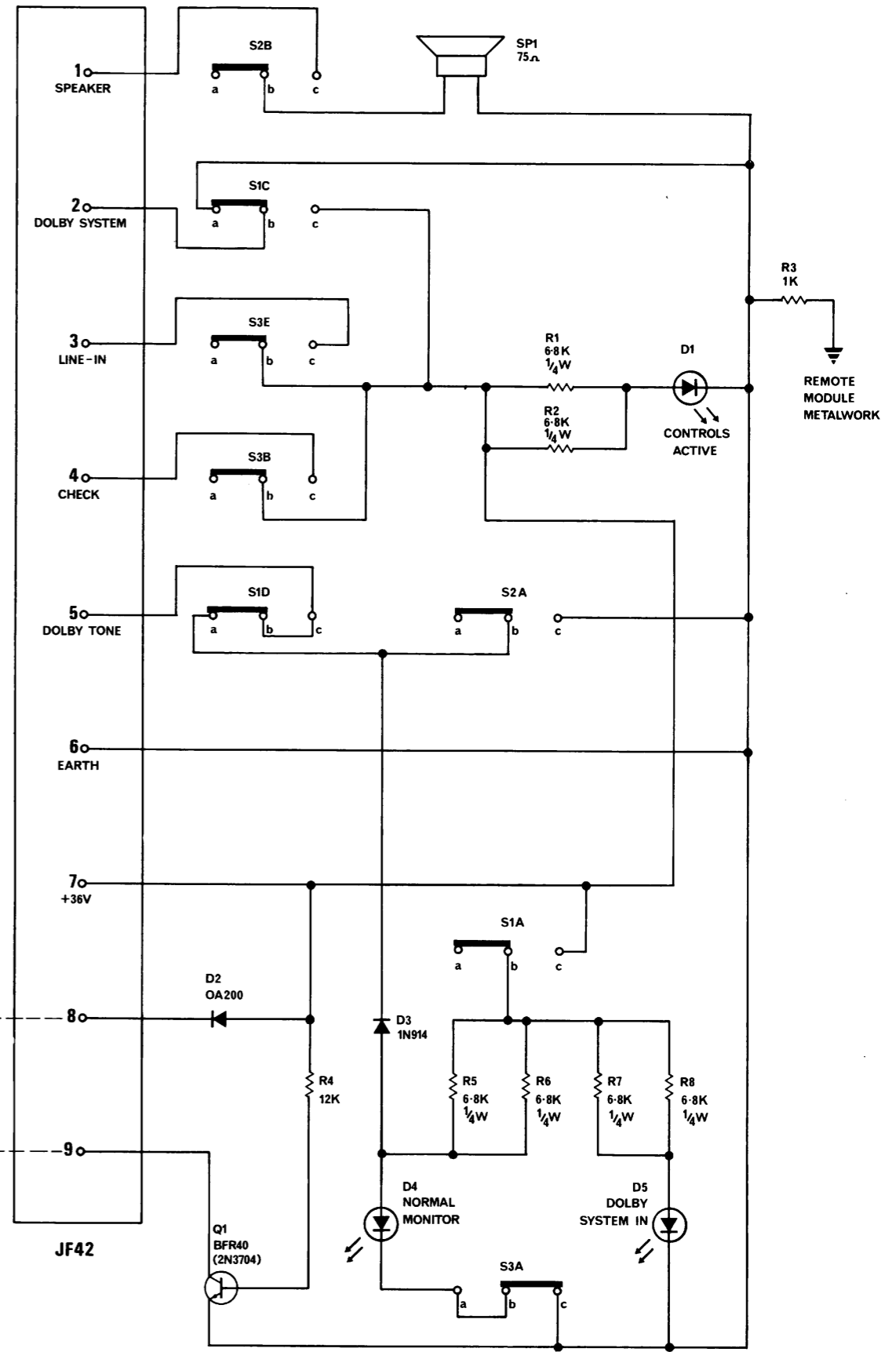
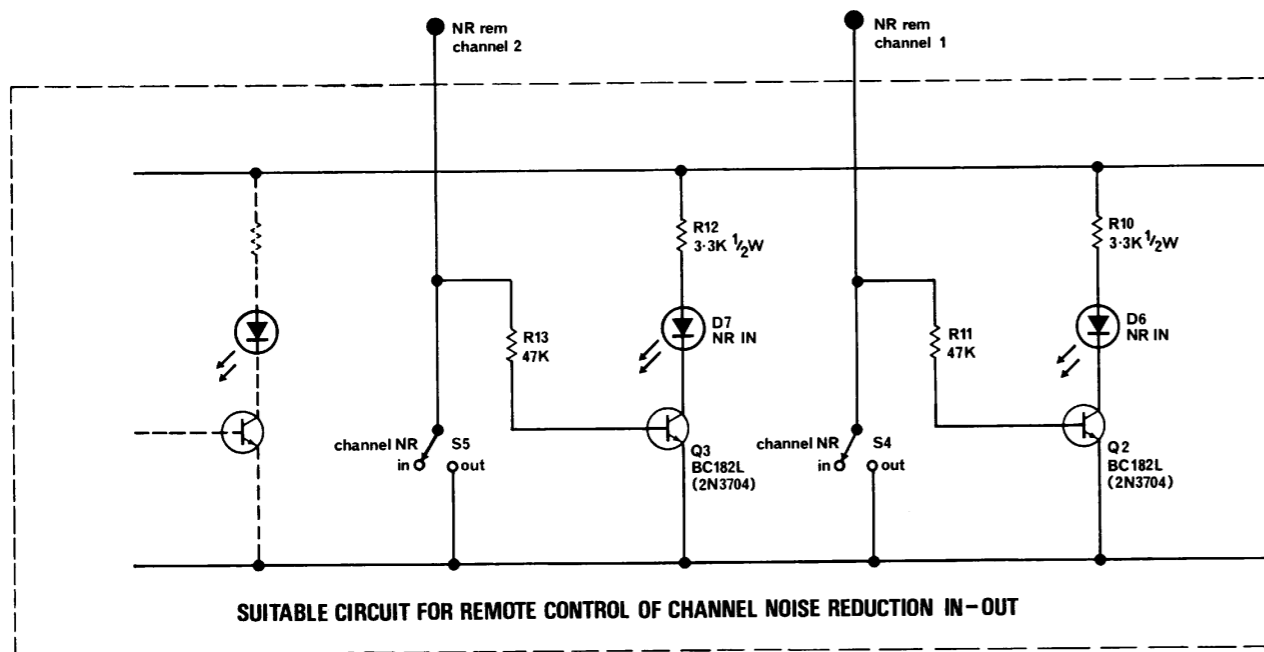
Cat No 44H COMPONENT LOCATION

REMOTE MODULE SWITCHING



(Terminals 1-7 to remote connector of M16 or M8; terminals 8 & 9 to optional remote channel NR in-out)

NR rem to be connected to corresponding channel terminal on rear of M-series unit



NOTES:

1. All light emitting diodes are HP5082-4415, TIL 210 or similar.
2. Switch positions shown for Dolby System in, Dolby Tone off and Normal Monitor.
3. Unused switch poles: S1B, S3B, S3C, S3F.
4. Resistors are ±5% and 1/8W unless otherwise stated.