Service Manual

Model E-16 E-8

Recorder/Reproducer

FOSTEX

TABLE OF CONTENTS

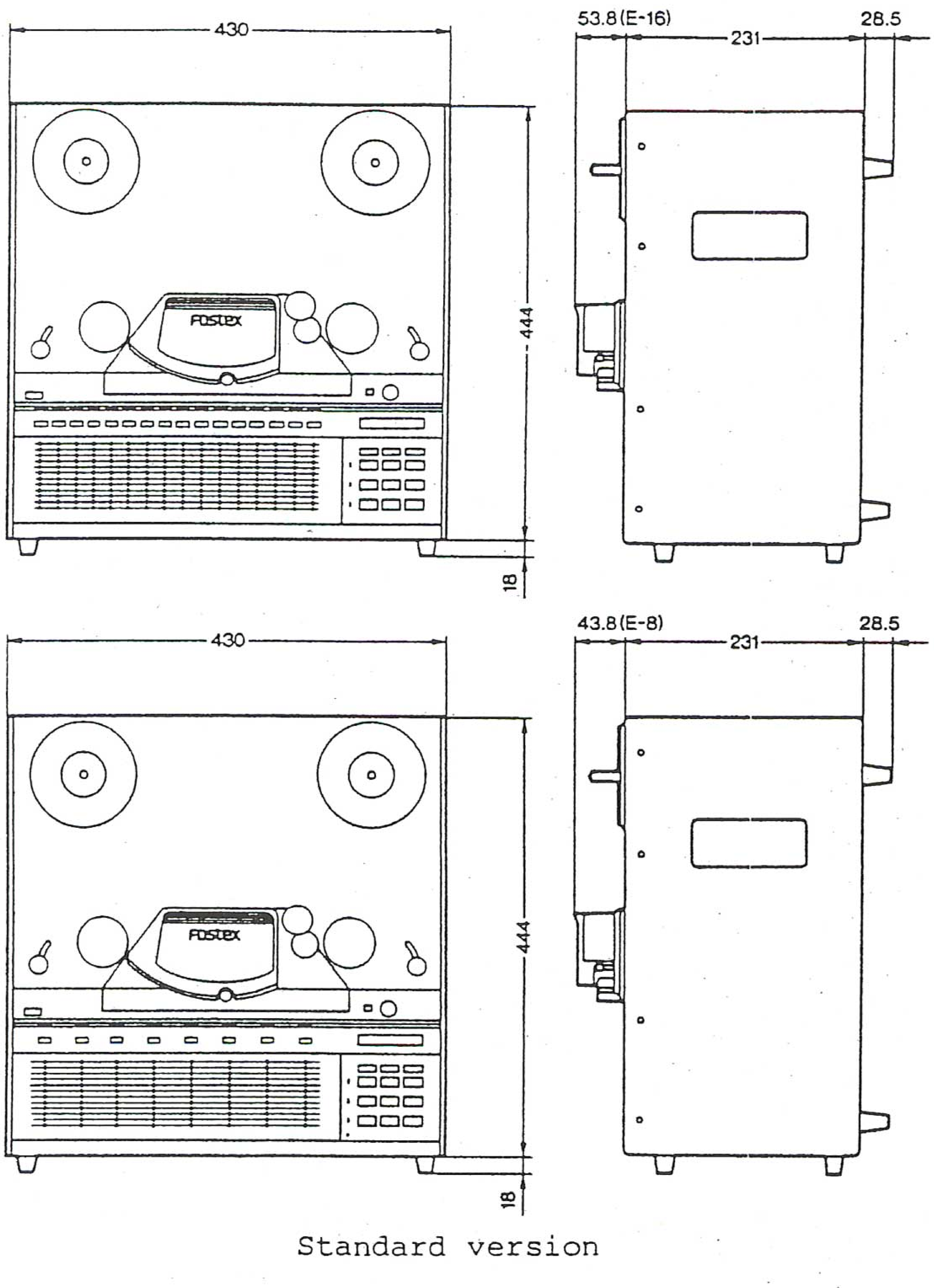
1. INTRODUCTION

This Service Manual is common to both E-8 and E-16 MULTI-TRACK RECORDER/ REPRODUCER.
Adjustment procedures are given in this manual which also includes a Parts List and schematic diagrams to assist the service technician in maintenance of Models E-8 and E-16.
For any technical questions on the E-8/E-16 recorder, please feel free to contact the nearest Fostex Dealer and Distributor, or write direcly to a Fostex office, the addresses of which are printed on the back cover of this manual.

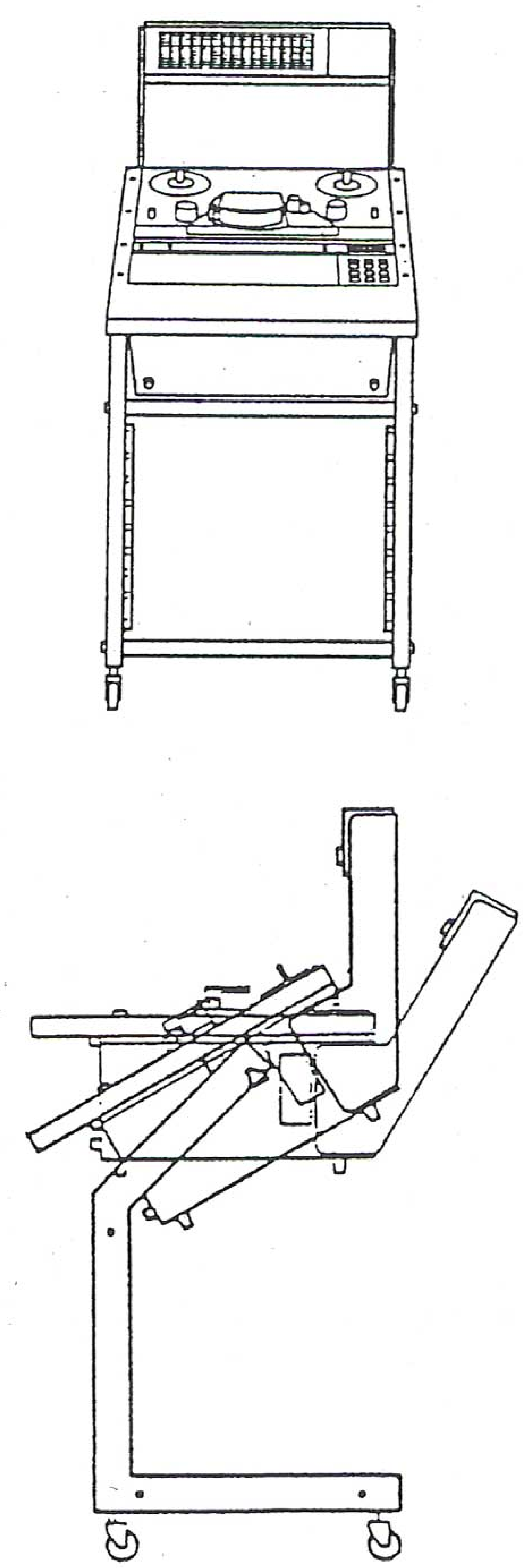
⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components. Refer to the Fostex Parts List and ensure exact replacement.

Power requirements	120VAC, 60Hz, 120W
	220VAC, 50Hz, 120W
	240VAC, 50Hz, 120W
Dimensions	430(W) x 445(H) x 235(D) mm
Weight	30Kg. (standard version)

Dolby Noise Reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trade marks of Dolby Laboratories Licensing Corporation.



Standard version


Rack mount and meter bridge

2. SPECIFICATIONS

Model E-16

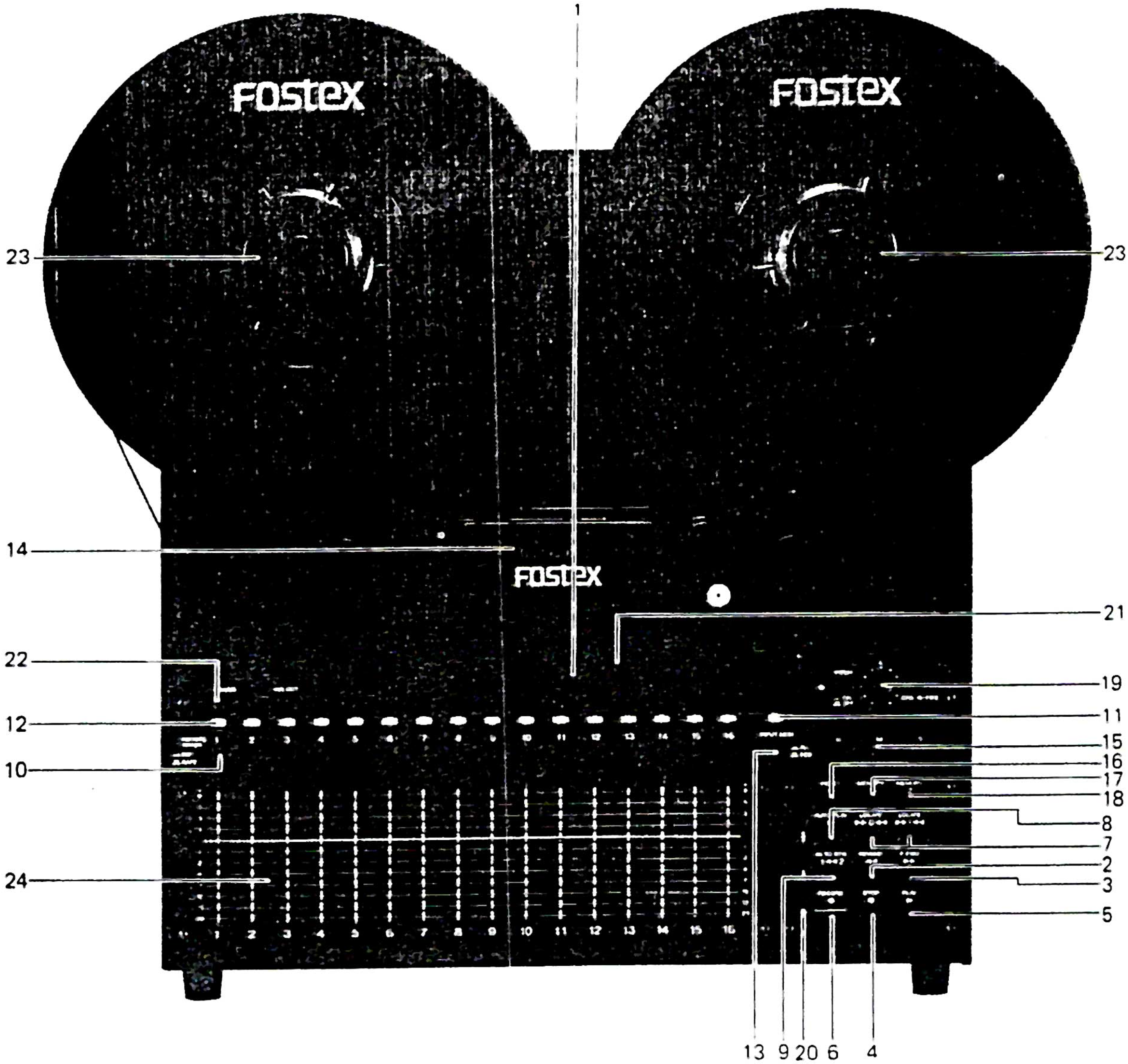
Tape	1/2" (12.7mm), 1.5 mil base
Format	16 track, 16 channel
Head	2 heads (Erase, Rec/Play)
Reel size	10-1/2" (270mm), NAB hub
Tape speed	15 ips (38 cm/s), ±0.2%
Pitch control	±15%
Line input	-10dBV/0.3V nominal, unbalanced, imp. 30Kohms
Line output	-10dBV/0.3V nominal unbalanced, load imp. 10Kohms or higher
Equalization	15 ips; IEC-1 (∞ + 35μsec)
Record level calibration	0dB referenced to 320 mWb/m of tape flux
Wow & flutter	15 ips, ±0.05% WTD, ±0.10% UNWTD
Starting time	0.5 sec. or less
Fast wind time	140 sec. for 2500 ft. (762m) of tape
Frequency response	40Hz ∿ 18KHz, ±3dB
Signal to noise ratio	80dB WTD, 60dB UNWTD (With built-in Dolby C)
T.H.D.	Less than 1% at 1KHz, 0dB
Erasure	Better than 70dB at 1KHz
Crosstalk	Better than 50dB/1KHz
Power requirements	120VAC, 60Hz, 155W 220VAC, 50Hz, 155W 240VAC, 50Hz, 155W
Dimensions	430(W) x 445(H) x 235(D) mm
Weight	30Kg. (standard version)

Model E-8

Tape	1/4" (6.3mm), 1.5 mil base
Format	8 track 8 channel
Head	2 heads (Erase, Rec/Play)
Reel size	Up to 10-1/2" (270mm), NAB or EIA/CINE
Tape speed	15 ips (38 cm/s), ±0.2%
Pitch control	±15%
Line input	-10dBV/0.3V nominal, unbalanced, imp. 30Kohms
Line output	-10dBV/0.3V nominal unbalanced, load imp. 10Kohms or higher
Equalization	15 ips; IEC-1 (∞ + 35μs)
Record level calibration	0dB referenced to 320 nWb/m of tape flux
Wow and flutter	15 ips; ±0.05% WTD, ±0.10% UNWTD
Starting time	0.5 sec. or less
Fast wind time	140 sec. for 2500 ft. (762m) of tape
Frequency response	40Hz ∿ 18KHz, ±3dB
Signal to noise ratio	80dB WTD, 60dB UNWTD (With built-in Dolby C)
T.H.D.	Less than 1% at 1KHz, 0dB
Erasure	Better than 70dB at 1KHz
Crosstalk	Better than 55dB/1KHz level (all tracks in REC mode)

3. FUNCTION AND CONTROLS

1) HEAD SHIELD GATE
2) REWIND BUTTON [◀◀]
3) FAST FORWARD BUTTON [▶▶]
4) STOP BUTTON [■]
5) PLAY BUTTON [▶]
6) RECORD BUTTON [REC]
7) LOCATE 0 [▶▶0◀◀] AND LOCATE 1 [▶▶1◀◀] button
8) AUTO PLAY [AUTO▶] BUTTON
9) AUTO RTN [1◀◀2] BUTTON
10) RECORD TRACK SELECTOR
11) INPUT MONITOR LED
12) RECORD LED (Tracks 1 ∿ 16 or 1 ∿ 8)
13) INPUT MONITOR selector
14) Head assembly
15) Tape timer
16) RESET [0] button
17) Memory 1 button
18) Memory 2 button
19) Pitch control button knob [PITCH]
20) Record LED [REC]
21) Cue lever
22) Power switch [POWER]
23) Reel clamp
24) LED bargraph meter
25) INPUT jack
26) OUTPUT jack
27) NR INT/EXT switch [NR]
28) LOCATE 1/PLAY
29) PUNCH IN/OUT switch
30) ACCESSORY 1
31) ACCESSORY 2
32) AC power cord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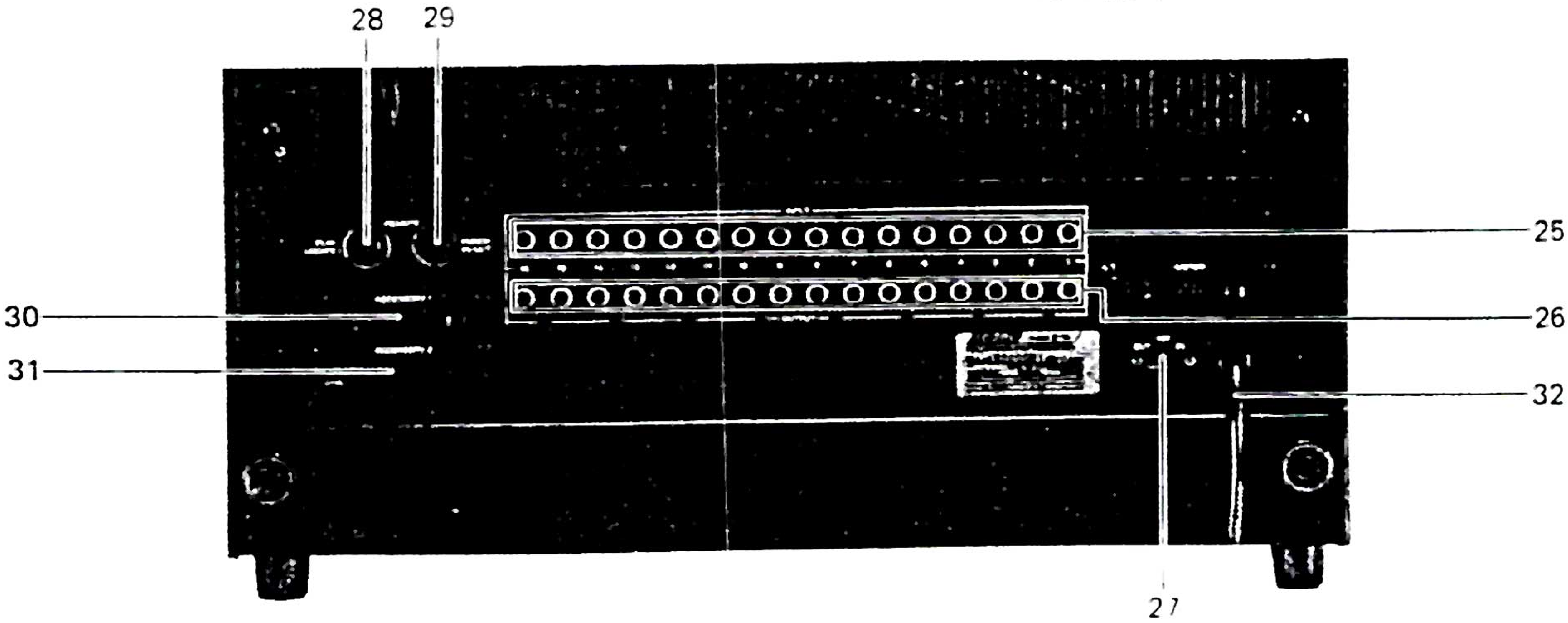
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4. THEORY OF OPERATION

4.1 System control

Control signals, the basic elements in transport control, are generated by a C-MOS one chip 8-bit CPU, U9, and the expansion I/O port IC, U10.

At system control of this unit, each signal for PLAY-O, STOP-O, FF-O, RWD-O, B-SOL-O and BOOST-O from the output pin, is used in the various control circuits. When these signals of low level are applied to the input pin of U10, the corresponding OUTPUT pin of U10 turns to low level.

1) RESET (U9-4, U5-4)

This is the reset signal input pin for U9 and U5. At power on, U9-4 and U5-4 goes to low level to reset U9 and U5, for the duration of C25 and C13 to be fully charged through the internal pull up resister (about 50Kohm). When power is switched off, the base of Q5 goes to low, Q5 is switched on by the charged voltage of C39 which, in turn, switches on U35 and U27, resulting in a quick discharge of C25 and C13, thus preparing the circuit for the next power on.

2) LOW (U9-1)

When the STOP button is depressed during the F.FWD or RWD mode, the transport temporarily goes into the reverse tape travel mode. Then, low level is applied to LOW and then into the STOP mode, to engage the mechanical brakes. When tape speed decelerates to about 38 cm/s, a low level is applied to LOW from U13-6. This is due to the nature of the circuit, such that the height of the saw tooth wave at the collector of U36 (generated by the count pulse) becomes higher with progessively slower tape speeds. The timing chart is shown in Fig. 4-1.

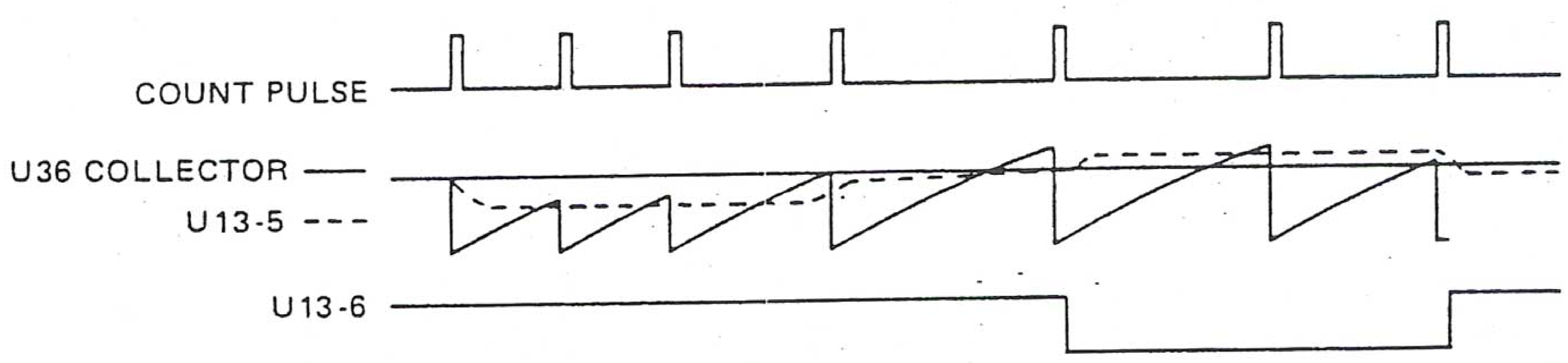


Fig. 4-1

3) D-PLAY-IN (U9-28)

D-PLAY-IN is the input signal to inform U9 that the transport is in the REC-PLAY mode. Although PLAY-O (U10-1) will be at low level during the PLAY mode, it quickly goes to high by engaging STOP or other signals. However, the tranport control output is delayed about 100 ∿ 250 msec. by delay of the U34-3 MASTER OSC ON/OFF signal. As the transport will remain in the PLAY mode for the duration of this delay time, this information is transmitted to U9 via the D-PLAY-IN input signal, to prevent changing to the next mode.

4) SC0 (U9-36), SC1 (U9-37), SC2 (U9-38)

These are outputs for controlling tape speed in the fast winding modes. SC0 (U9-36), however, will be the PUNCH IN/OUT input terminal, only during the PLAY or REC-PLAY modes, but during other modes, U19-3 goes to "L" which switches OFF U39 via D25, thus acting as the output terminal.

5) Spooling and editing modes

Signal combinations of SC0, SC1 and SC2 for spooling speed control is output from U9 which determines that it is the spooling mode when FF (U9-16) or RWD (U9-15) together with PLAY 2 (U9-12) and PLAY (U9-18) are simultaneously input to it. Also, in addition to U9-16 or U9-15, U8-11, U8-3, U9-12 goes to "L" for the duration the transport FF or RWD button is depressed, and thus FF or RWD and PLAY 2 are simultaneously input. Then, U9 determines this to be the EDITING mode and outputs a speed control signal combination of SC0, SC1 and SC2.

6) SHUT OFF (U9-34)

Both detecting photo interrupters will shut off and their outputs go to "H" when the left and right tension arms fully drop. This is then input to J12 and J13 to switch ON U41, an "L" is input to SHUT OFF (U9-34) which applies the mechanical brakes and the tape stops.

The photo-interrrupter of the sensor located at the head housing side switches ON and an "L" level is output when the transparent section of the tape, such as a leader tape, passes through the sensor. This "L" level passing through U8-5 and D4 forces U7-8 to "L" which in turn, applies an "L" to U9-12, U9-18 and U9-19, thus enters the stop mode. However, for the duration the FF or RWD switch is depressed, U8-10 goes to "L", the collector of U34 goes to "H", but even though the tape sensor may be switched ON, an "H" is input to U8-5, U9-19 also goes to "H" and a STOP signal will not be input. At the same time, U7-8, U7-10, U9-18 and U9-12 are set to "L" via D4, and a PLAY and PLAY 2 signal are input. This means that an FF or RWD input and PLAY, PLAY 2 will be input simultaneously, U9 will process these as the spooling mode and fast wind the tape at the same speed as for spooling.

7) PLAY 2 (U9-12)

When both the PLAY input (U9-18) and this PLAY 2 input (U9-12) are input during REC-PLAY, this mode is cancelled and reverts to the PLAY mode. REC-PLAY will not be cancelled by PLAY input (U9-18) only.

8) A.RTN (U9-29)(A.PLAY(U9-31))

The transport will enter the AUTO RTN mode (A.PLAY mode) when a low level is applied to this input. Each time A.RTN (A.PLAY) is engaged, flip-flop U11-11 (U11-3) is alternately set and reset, the AUTO RTN LED (AUTO PLAY LED) goes on and off according to the output of U11-13 (U11-1) and U11-12 (11-2) signals U11-9 (U11-5) that the transport is in the AUTO RTN mode (AUTO PLAY mode).

9) CAN-OUT (U9-32)

An "H" level is output here for as long as these switches are engaged: LOCATE 0, LOCATE 1, F.FWD, RWD, PLAY, STOP and the foot switch for LOCATE 1/PLAY, and for about 100 ∿ 200 msec. immediately after release.

10) CAN-IN (U9-35)

This signal is applied from the remote control, etc., simultaneously with the control signals (PLAY 2, STOP, FF, RWD, REC). When this signal is input, the present modes of LOCATE 0, LOCATE 1, AUTO-PLAY and AUTO RTN will be cancelled and subsequently revert to the control signal mode that was input.

11) FF-O (U10-22), RWD-O (U10-23)
The signal for controlling the reel motor at F.FWD and RWD is output here. PLAY-O (U10-1) is immediately output when PLAY is input during FF or RWD. However, even if U19-10 reverts to "H" at the completion of F.FWD or RWD, U19-1 is held at "L" level until C54 is charged (about 1 sec.), during which the transport is kept in the STOP mode; when U19-1 turns to "H" level, it will enter PLAY.

12) BOOST-O (U10-5)
An "L" level pulse of about 50 msec. is output here when FAST-SOL or PLAY-SOL is actuated. This pulse, stretched to 150 ∿ 250 msec. by charge and discharge of C35, switches ON Q8 and Q16 of the solenoid intermittent circuit, thus applying a 13V intermittent voltage to the proper solenoid.

13) B-SOL-O (U10-4)
The "H" level output here at F.FWD or EDIT switches ON Q14, U72 and Q13 which pulls in the FAST-SOL.

14) Timer
This timer accumulates and displays the total PLAY mode time up to a maximum 2,000 hours. Be careful when handling this timer as it is weak against shock and rough handling.

4.2 Tape Counter Detecting Circuit
Rotation of the left side footage roller is detected by two photo-interrupters; their outputs are fed to the counter section. These outputs serve as the count pulse and the up/down signal.

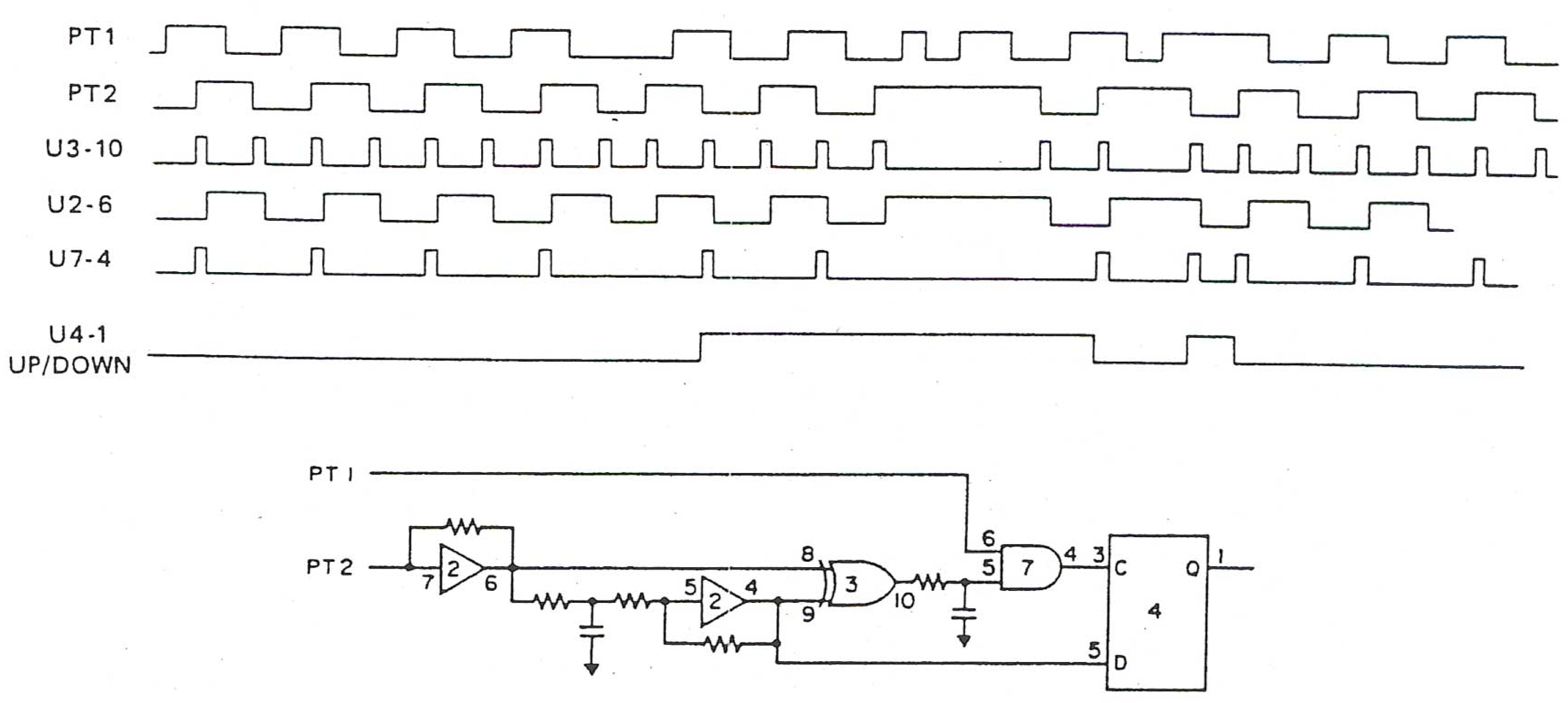


Fig. 4-3

The signals from the two photo-interrupters are converted, as shown in the Signal Timing Chart of Fig. 4-3, and applied to the count pulse (U9-39) and the up/down (U9-6) signal.

4.3 Counter Section

1) BCD OUT (U10-17 ∿ 20), DIG OUT (U10-13 ∿ 16), MINUS-0 (U10-3)

The four 7 segment LED displays are lit by multiplexing.
Each signal of the DIG1 through 4 outputs is held at "H" level for a constant length of time and the output from BCD OUT is displayed as numerical information. This BCD OUT is decoded into a 7 segment signal by U1 and the resulting "H" level applied through a resistor to the a ∿ g segments of the LED.
The output from MINUS-0 (U10-3) is a pulse signal for minus indication of the display.

2) CLEAR (U9-27)

This is the input port for entering RESET, M1 and M2 by utilizing the multiplexing signal for the LED digital display.
For example, when RESET is depressed, CLEAR (U9-27) will go to "L" during ON of DIG4, thus resetting the counter display.
In the same way, M1 and M2 are applied when DIG3 for M1 or DIG2 is ON; the CLEAR (U9-27) INPUT will, respectively, go to "L".

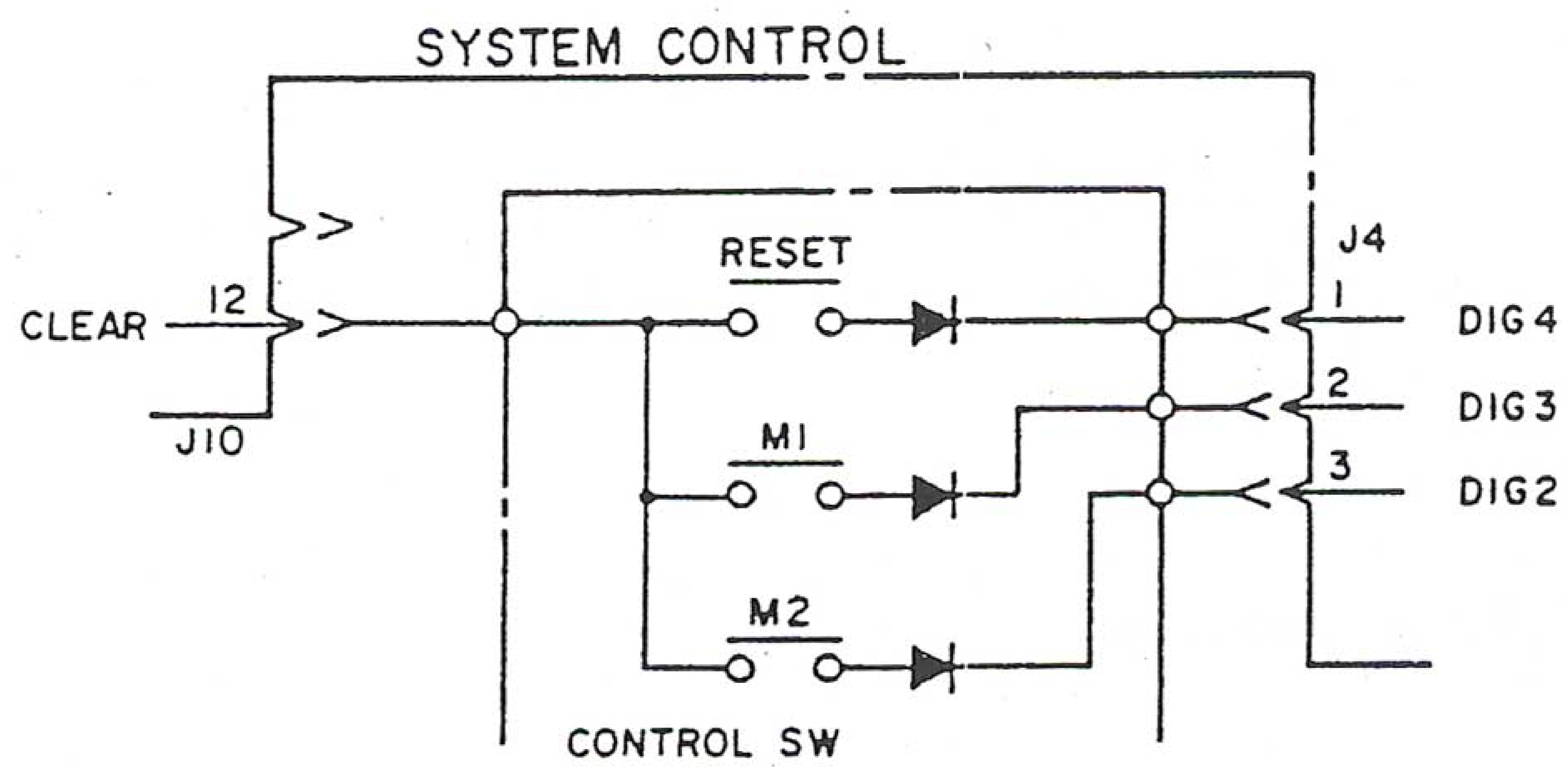


Fig. 4-4

4.4 Speed Display

Speed display is handled by a C-MOS one chip 8 bit CPU, U5. U9 and U5 are of the same type number.

1) CG (U5-1)

CG input is for switching to tape counter display or speed display. The BCD0 (U5-12) input and BCD0 (U5-27) output are internally connected when CG (U5-1) is "H". In the same way, pins 13 and 28, 14 and 29, 15 and 30, MINUS-0 (U5-21) input and MINUS-0 (U5-22) output are connected inside the U5, and the counter display is lighted according to the BCD output data from U10 to display the tape count. At the same time, the dot point display output D.P. (U5-23) of DIG5 will be at "H".
When the pitch control knob is touched, impedance of the J2-1 CG input will drop resulting in switch ON of Q2, and U69 will also switch ON. Consequently, an "L" level is input to U5-1, U5 will enter the speed display mode and a speed data is output to BCD0 ∿ 3 (U5-27 ∿ 30) and MINUS-0 (U5-22). An "L" level is output from D.P. (U5-23).

2) 2.4K (U5-6), 4.8K (U5-39)

These are input pins to receive signals from the DD CAPSTAN servo circuit and a frequency of 2.4KHz for time measuring is input to 2.4K (U5-6) and a reference frequency (2.4KHz ∿ 9.6KHz) for PLL of the DD CAPSTAN is input to 4.8K (U5-39).

3) DIG2 ∿ 5 (U5-16 ∿ 19)

These are the input points to determine which digit, from among DIG2 ∿ 5, should be output in BCD data, and data of the digit at "L" level is output to BCD0 ∿ 3 (U5-27 ∿ 30).

4.5 Reel servo

In this transport the reel servo circuit functions to apply constant tape tension during PLAY or EDIT modes, and maintain constant tape speed during FAST winding and LOCATE modes.

1) Tension control circuit

Tape tension is detected by the tension sensor circuit whose output is proportionate to movement of the tension arm and the output response is as shown in Fig. 4-5.

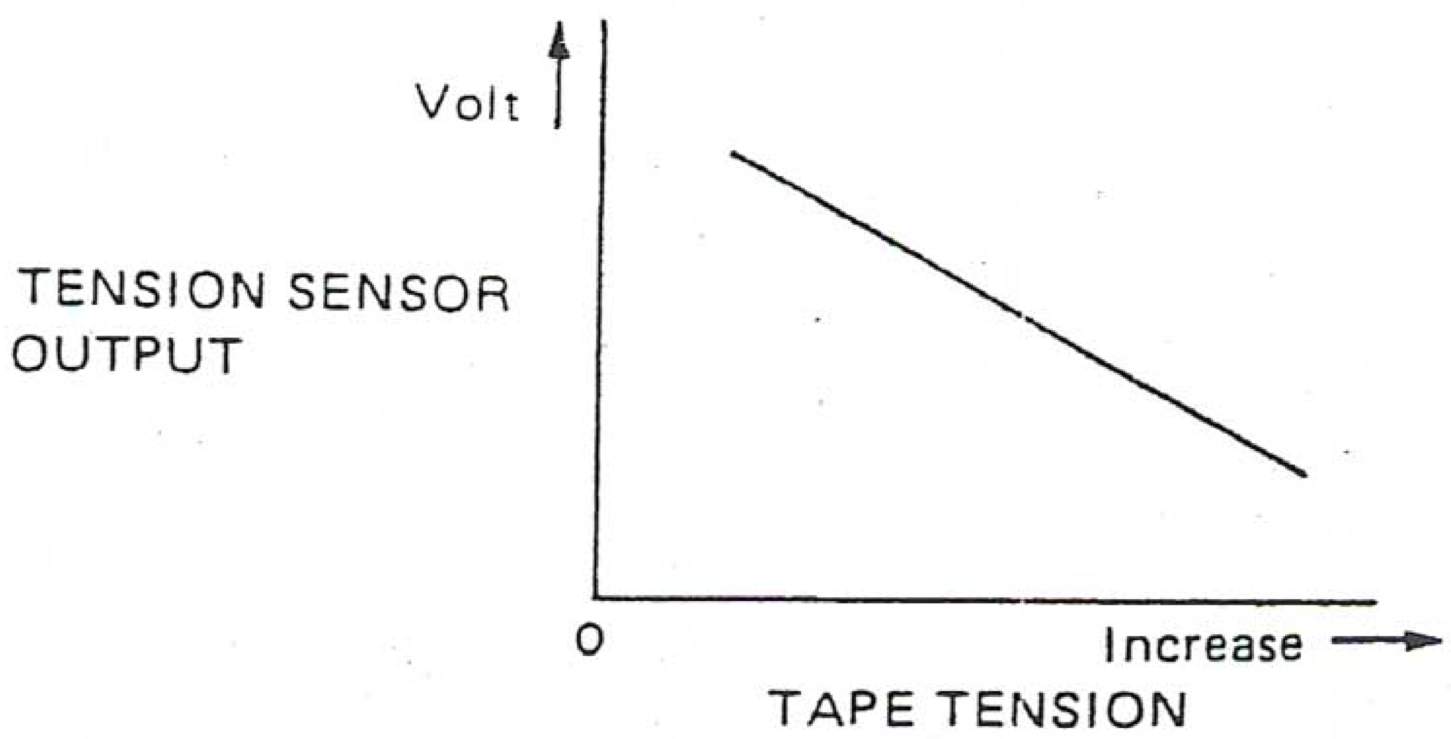


Fig. 4.5

For the takeup side, the tension sensor output fed to U22-3, is compared with U22-2 and output at U22-1. Then, passing through a phase advance circuit, is applied to the motor drive circuit consisting of U20, Q26 and Q101 (current feedback is applied by R271) to drive the motor. The motor torque thus created puts tension on the tape which moves the tension arm, and its position is detected and output by the tension sensor. As shown in Fig. 4-5, when tape tension rises, the tension sensor output drops and U22-1 also drops. In response to this, the motor drive circuit input also drops and as a result, motor torque decreases to reduce tape tension. When tape tension falls, the operation is reversed to increase the tape tension.

As a result of these operations, tape tension is maintained at a constant figure. This constant figure can be established by the voltage input to U22-2. In other words, U21-7 is the reference voltage by which tape tension is established.

This reference voltage is set by R507 for the EDIT mode, by R505 for the PLAY mode when U55 is ON, and by R504 for F.FWD mode when Q17 is ON.

2) Fast wind speed control circuit

Speed is controlled by the U9 outputs, SC0, SC1 and SC2.

The count pulse passes through Q6, U18-15, the delay circuit, U18-2, differentiated by C55 to generate a sawtooth wave at the U58 collector. The peak voltage of this waveform is sampled by the Q11 switching operation and held in C58. This voltage is output at the source of Q28 and after being compared with the reference voltage generated by R235 and R227, is output from U25-1 and U25-7. In the FF

mode, U24-8 and U24-9 are switched ON and the takeup motor is rotated. In this case, the output of U25-7 is reversed by Q24 and with switch ON of U24-4 and U24-3, a braking torque is created in the SUPPLY motor. Now, if the tape speed increases, the output of U25-7 drops resulting in increase of the Q24 collector output, it reacts to reduce the speed. On the other hand, if speed decreases, the respective outputs previously mentioned are reversed and the motor is controlled such as to increase speed. This speed is controlled by changing the U58 sawtooth wave angle with the current from the Q10 constant current circuit. The speed will increase if this current is large. Thus, if the X(U7-3) voltage drops, the Q10 collector current will increase and speed will rise. U7 is a multiplexer and in accordance to the "H"/"L" combinations of SC0, SC1 and SC2 of U9 , one input signal from among X0 ∿ X7 of U17 and X of U17 is connected inside the IC. The divided voltages from R276, R277 and R4 are applied to X0 ∿ X7. X0 is adjusted by R502 to maximum voltage and X7 is adjusted by R503 to minimum voltage. When X7-X, X drops to minimum voltage, the fast wind tape speed reaches maximum (FF. RWD speed). On the other hand, when X0-X, X reaches maximum voltage, the tape speed drops to minimum (EDITING speed).
In the LOCATE mode, the speed is reduced from beforehand of the objective point by changing the voltages in steps from X7-X through X0-X.
The relations between SC0, SC1, SC2 and various operations are shown next.

Mode	U9 pin No.	SC0	SC1	SC2	U17 Pin Xm-X	
	U17 pin No.	(11)	(10)	(9)		
FF, RWD		L (H)	L (H)	L (H)	X7-X	
SPOOLING		H (L)	H (L)	L (H)	X4-X	
EDITING		H (L)	H (L)	H (L)	X0-X	
LOCATE		H (L)	H (L)	L (H)	X4-X	* 64sec. - 15sec.
		L (H)	L (H)	H (L)	X3-X	* 15sec. - 5.5sec.
		H (L)	L (H)	H (L)	X2-X	* 5.5sec.- 1.5sec.
		H (L)	H (L)	H (L)	X0-X	* 1.5sec.- 0 sec.

* Tape counter time up to the LOCATE point set at zero (at 15 ips).
NOTE: SC0 ∿ 2 are inverted by U37, 38 and 40, and input to A, B and C.

Fig. 4.6

4.6 Connector Board

R/P amplifier control circuit

Operation of channel 1 only will be explained as all 16 channels operate in the same way.

When an ENCODE signal arrives from the system control PCB, U1-6 goes to "L" level; if channel 1 of the record selector switch is depressed, U1-5

will also go to "L" level. Further, U1-4 will go to "L" level, the R/P amplifier will change to ENCODE mode and channel 1 will be in the input monitor mode. If the transport is in the REC-PLAY mode and if a TRANSPORT REC signal is applied at "L" level from the system control PCB; U1-1 goes to "L" level; when channel 1 of the record selector switch is depressed, U1-2 goes to "L" level. As a result, U1-3 goes to "L" level, and the R/P amplifier will go to the REC mode.
When the transport is put in the REC mode, the MASTER OSC CONTROL signal from the R/P amplifier goes to "L" level and the master oscillator begins to oscillate. This signal switches OFF Q3 to switch ON the MASTER BIAS.
When either the TRANSPORT REC signal goes to "H" or the RECORD SELECTOR is switched OFF, U1-3 goes to "H", and thus the R/P amplifier REC signal goes to OFF. As a result, the R/P amplifier enters the DECODE mode.
The operation is the same for channels 2 through 16.

4.7 Function switch (Function/Display)

S1 through S16 are the RECORD SELECTOR switches and the numbers correspond to channel numbers 1 through 16.
D1 through D16 are the mode display LED's for the RECORD SELECTOR switches. S1 through S16 are used for the SAFE/RDY signal. Q1 and Q2 are constant current circuits and are controlled by the FUNCTION LED CONT signal. Q3 is for REMOTE/LOCAL switching, and when ON, the transport RECORD SELECTOR switch becomes effective.

4.8 DD CAPSTAN SERVO ADJUSTING PROCEDURE

4.8.1 Lock duty adjusting

1) Connect the oscilloscope probe to TP-2 on the DD Capstan PCB.
2) Set transport in the PLAY mode and adjust R85 and R86 so that a square wave appears at TP-2.
3) Switch ON the PITCH CONT and while watching the waveform of TP-2 on the oscilloscope, vary the SPEED from maximum through minimum. If the square wave duty changes as shown in Fig. 4.8, rotate R86 clockwise (CW), looking at it from the component side of the DD Capstan PCB, so that duty is about 50%. If the waveform is opposite to that in Fig. 4.8 then rotate R86 for a less than 50% waveform and R85 for a 50% duty.

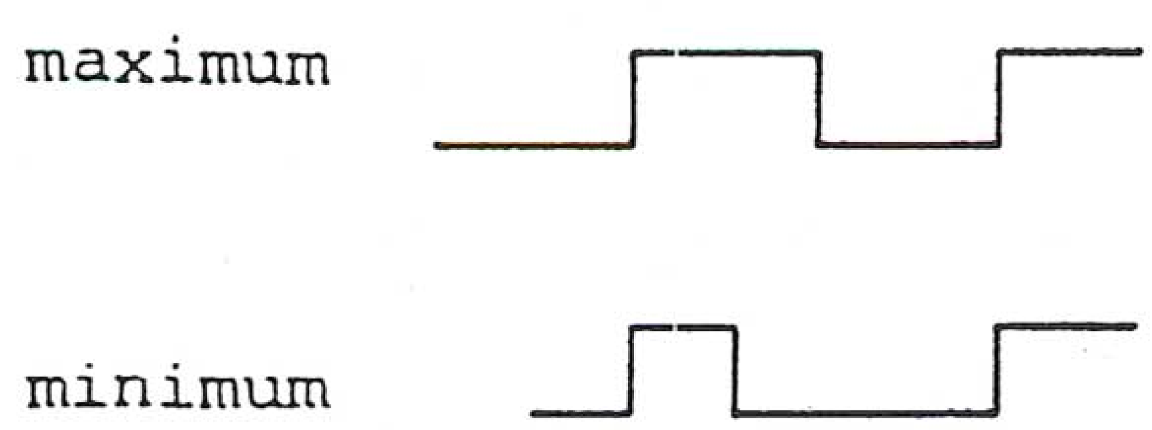


Fig. 4.8

4) Repeat above step 3) until the duty remains at about 50% when SPEED is changed from maximum through minimum.

4.8.2 Adjusting the PITCH CONT oscillator

1) Connect a frequency counter to TP-2.
2) Set the PITCH CONT knob to center position and switch ON the PITCH CONT.
3) Put transport in the PLAY mode and read the frequency counter. Then adjust R87 on the DD Capstan PCB for a 2.4KHz reading. Speed will

increase when R87 (looking at it from the foil side) is rotated CW. This adjustment can also be done by using the Speed Tape (3KHz).

4.8.3 Centering the Magnet FG and the Print Coil

This procedure is done at the factory and must not be done at routine maintenance and servicing.

When wow and flutter is extremely bad, it could be that the FG magnet and print coil are off center and therefore should be adjusted as follows:

1) Thread the Speed Tape (3KHz) on the transport.
2) Loosen screws A and B just enough to allow shifting the PCB print coil.
3) Connect a wow meter to the reproduce output.
4) Put the transport in the PLAY mode and while reading the wow meter, slowly shift the PCB print coil to search for least amount of wow.
5) Carefully tighten screws A and B while checking the wow meters' best reading.

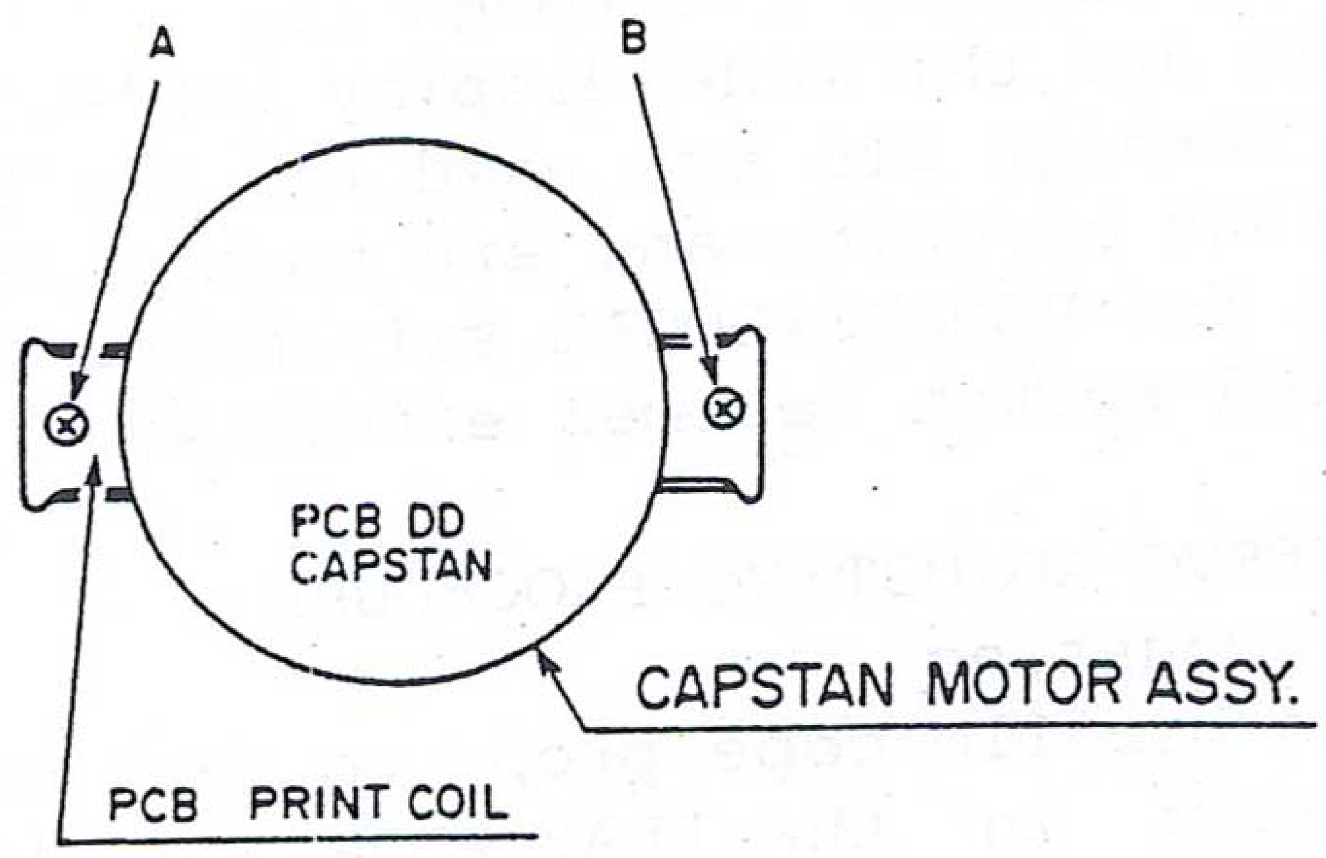
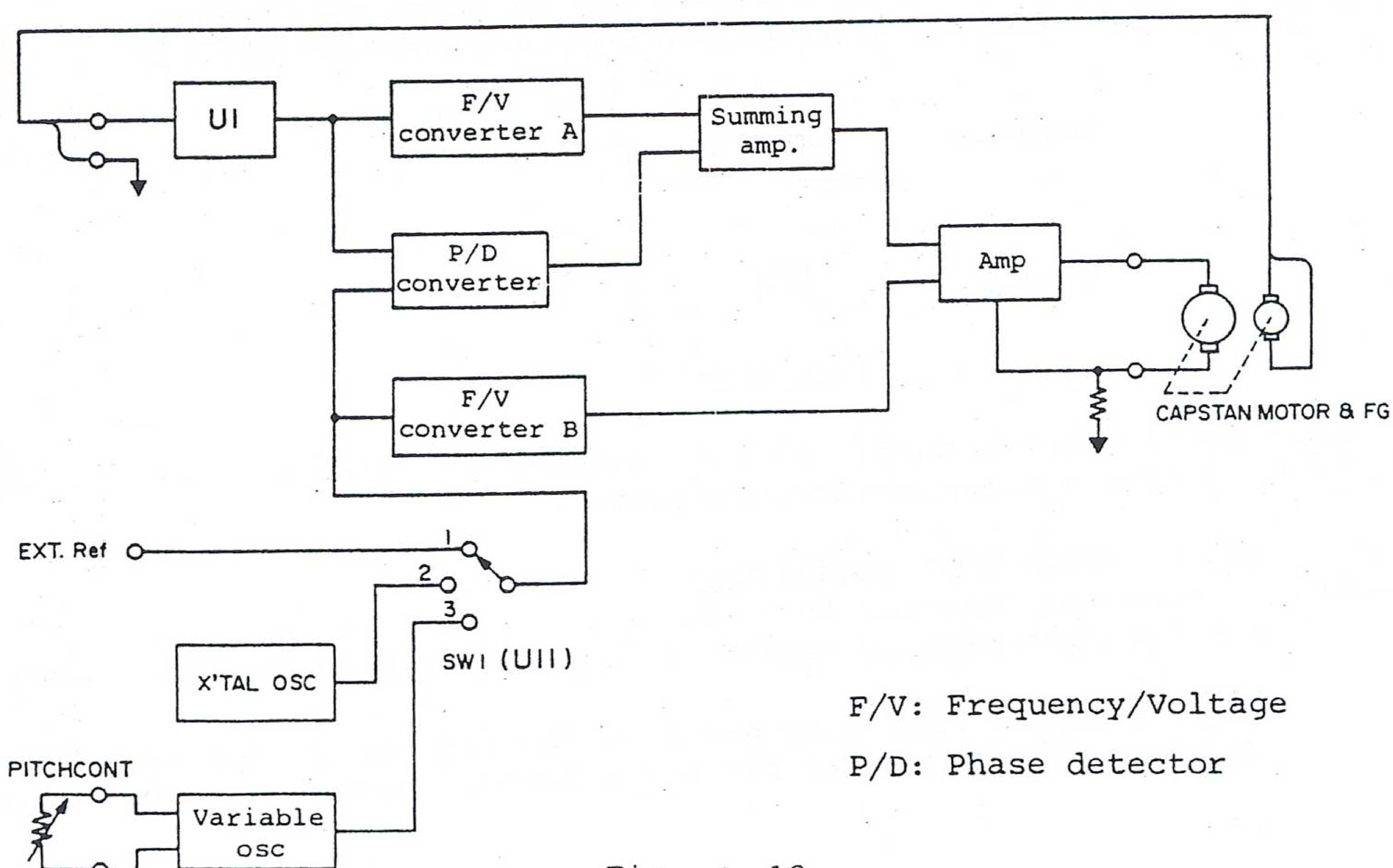


Fig. 4.9

4.9 DD CAPSTAN CIRCUIT THEORY

4.9.1 Block diagram



F/V: Frequency/Voltage

P/D: Phase detector

Fig. 4.10

The FG output of the capstan motor is shaped into a square wave by U1 and applied to the F/V converter and P/D. After setting the reference frequency to position 3 or 2, or the external reference frequency of position 1 by the PITCH CONT switch which activates SW1 (U11), it is applied to the F/V converter and P/D. The F/V converter output will drop when the input frequency rises. The output of the P/D is a voltage related to phase difference between the FG output and reference frequency. Its output voltage rises when phase of the FG output lags from the reference frequency. By action of the P/D, the FG output frequency from the motor and the reference frequency will be the same. Now, if SW1 is set to position 3 and the reference frequency is changed, output of the F/V converter A will change to disturb the amplifier input offset voltage, thus exceeding the lock range of the P/D and the lock will be released. F/V converter B is provided to prevent this and acts to compensate the input offset voltage.

4.9.2 Circuit details

1) F/V converter circuit

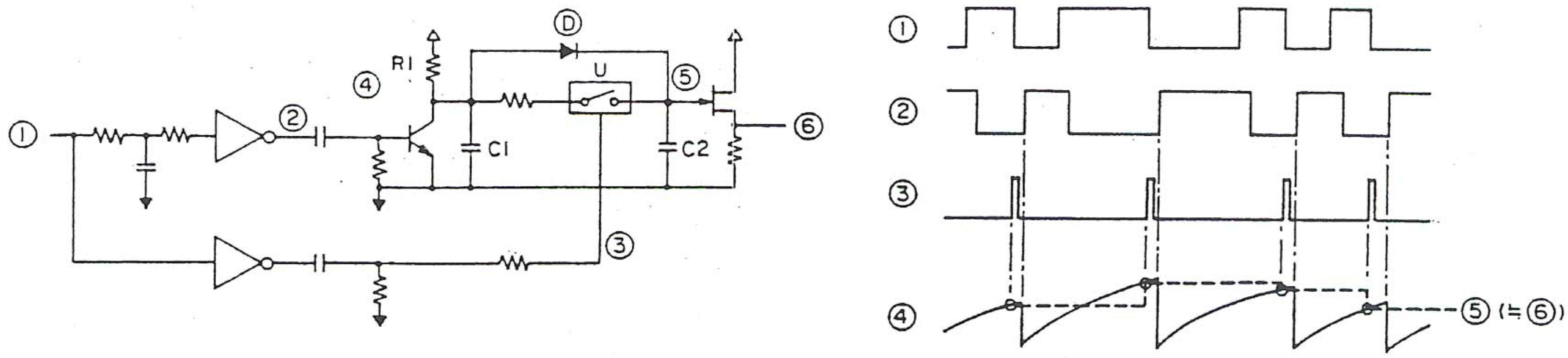


Fig. 4.11

A sawtooth wave is generated by R1 and C1, analog switch U is switched on by pulse (3), and the sawtooth peak level is held by C2. This level is output at (6).

Diode D is inserted in the F/V converter A circuit to start the motor by an output from (6) even when the motor is stopped and there is no input at (1).

2) P/D circuit

The outputs are as shown by the time chart of Fig.4.12 D6 acts in the same way as D in above 1).

3) Amplifier

The pin 7 output of U4 is amplified, passed through the phase compensating circuit, current amplified by U5, Q5 and Q6 to drive the motor.

4) Oscillator and frequency divider circuit

One stage of the CMOS is used for the crystal oscillator and the output is 38.4KHz. This is divided to 1/4 by U12. The variable oscillator circuit uses the timer IC 555 (U9) and frequency varied by the pitch control pot. The oscillating center frequency is 9.6KHz.

When the PITCH CONT SW is switched on, pin 1 of U11 goes to L and the output of U9 is applied to pin 1 of U12. When the switch is off, pin 2 of U11 is at L and the output at pin 12 of U12 is applied to pin 1 of U12. When the external reference frequency is input, pin 6 of U10 goes to H, pin 1 of U12 goes to L and pin 2 where the external reference frequency is input becomes effective.

Pins 3, 4, 5 and 6 of U12 outputs divided frequencies for tape speeds of 30 ips through 3-3/4 ips. Two speeds from among these are selected by jumpers and two speeds are again selected by U11.

5) Motor start/stop circuit

The motor is started by the PLAY signal. Pin 14 of U4 goes to L by the PLAY signal, U14, Q2 and Q4 switched off and the motor is started. When the PLAY signal goes to H by depressing the STOP button, pin 6 of U5 is reverse biased, pin 7 of U5 drops near to the minus power supply voltage and a reverse voltage is applied to the motor to brake it. As the motor revolution drops, the source voltage of Q1 which is the output of the F/V converter A, goes up. When the motor revolution slows down to where the voltage at pin 3 of U4 becomes higher than the voltage set at pin 2 of U4, pin 1 of U4 goes to H, U14, Q2 and Q4 switches on and the motor stops.

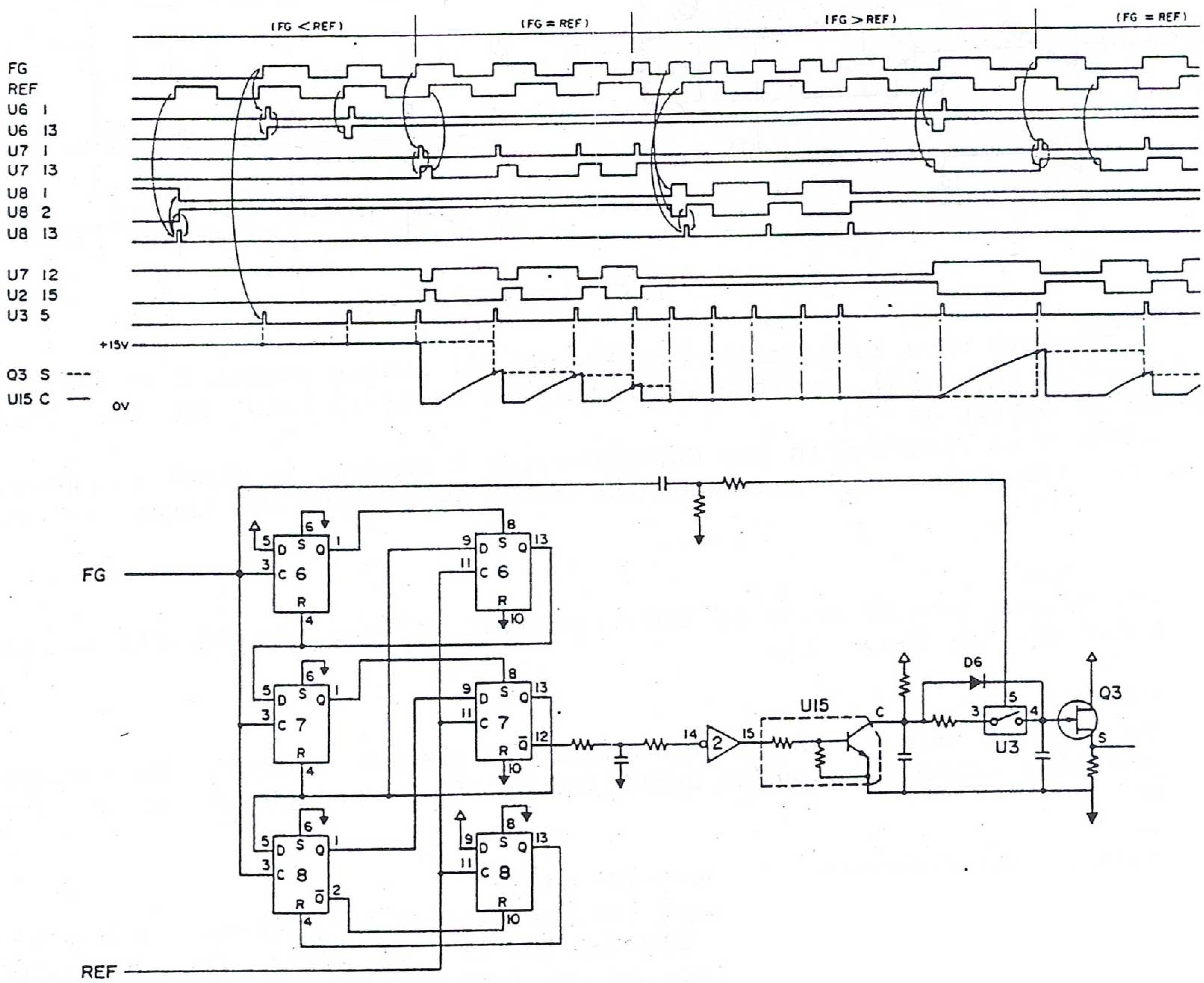


Fig. 4.12

5. ALIGNMENT AND ADJUSTMENTS

5.1 Test equipment required

Spring scale	0 ∿ 4 Kg. (0 ∿ 8 lbs.) 0 ∿ 300 g. (0 ∿ 10 ozs.)
Flutter meter	Meguro Denpa Sokki Co., Model MK-668B (Japan)
Audio oscillator	Hewlett Packard, Model 204C or equivalent
Frequency counter	Range: 0 ∿ 1MHz; sensitivity: 0.1Vrms; impedance: >1MΩ, <25pF
Band-pass filter	General purpose frequency analyzer
AC voltmeter	Range: -80dB ∿ +40dB; impedance: >1MΩ, <25pF
Oscilloscope	General purpose
Test tapes	
For Model E-16	For reproduce alignment: Fostex 9200, P/N 8266033001 or MRL 31J329 For wow/flutter measurement: Fostex Model 9201, P/N 8266034001 or STL CAT No. 62
Blank tape	Ampex 456 or equivalent
For Model E-8	For reproduce alignment: Fostex Model 9100A
or -	* [MRL 21J303, Magnetic Reference Lab.] * [BASF Calibration Tape (DIN 45513/2)] All specs are identical with Model 9100A. For wow/flutter measurement: Fostex Model 9102A
or -	* [STL #53-1, Standard Tape Lab.]
Blank tape	Ampex 457 or equivalent

5.2 Transport check and adjustment

5.2.1 Pinch roller pressure

Pinch roller pressure is applied by the Pinch Roller Pressure Spring only and is most important that the solenoid plunger be fully bottomed before taking a pressure measurement.

1) Attach a suitable spring scale to the pinch roller shaft with a short loop of twine as shown in Fig. 5.1.

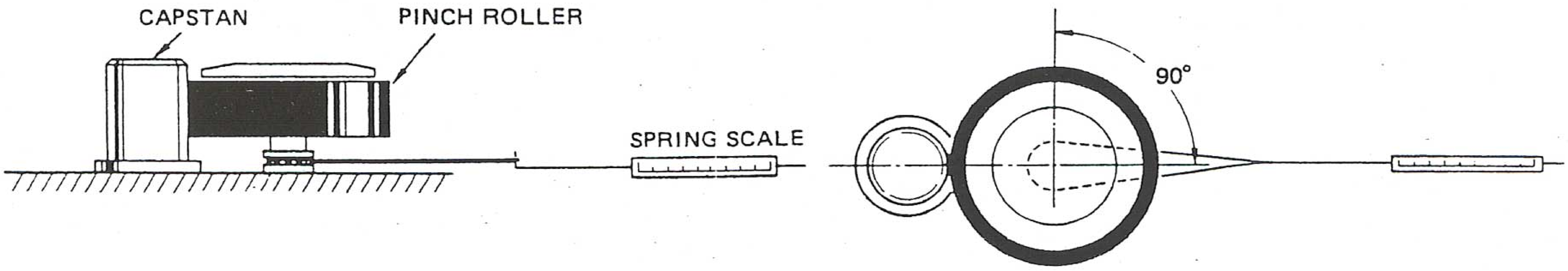


Fig. 5.1

2) Put the deck in the PLAY mode, and positioning the scale as illustrated, slowly draw it in direction opposite the capstan until the pinch roller stops rotating.

NOTE: Insert a piece of opague paper between the LED and sensor so as to deactivate the Tape Presence Sensor.

3) The spring scale should indicate 2.0Kg ∿ 2.5Kg (4.4lbs ∿ 5.5lbs) for E-8, and 2.5Kg ∿ 3Kg (5.5lbs ∿ 6.6lbs) for E-16.

4) If the reading is off specification, loosen the screw securing the plunger solenoid bracket and shift the solenoid in direction of arrow shown in Fig. 5.2.

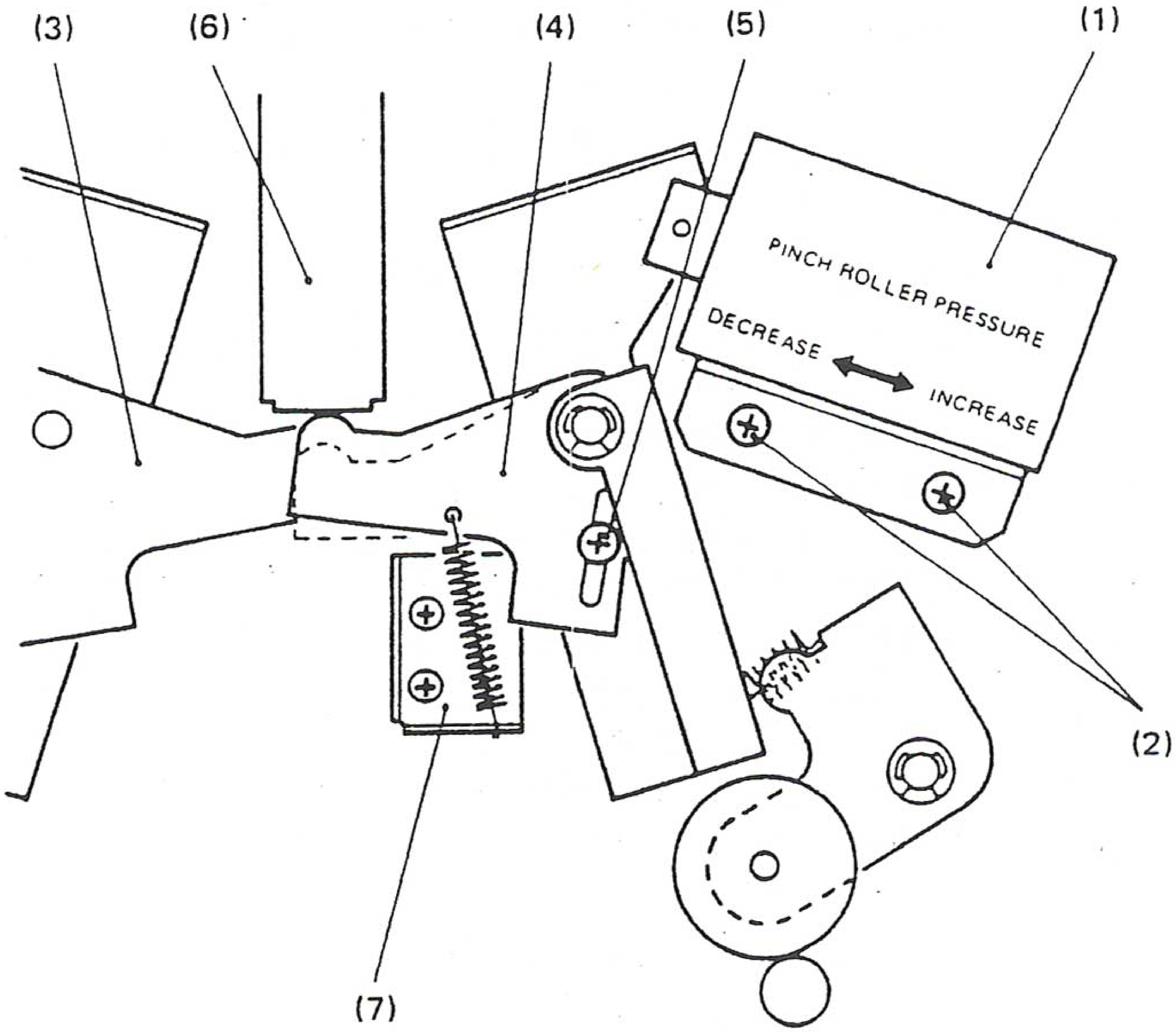


Fig. 5.2

5) With the solenoid in the bottomed state, manually lift lever (3) to its uppermost position, loosen screw (5) to allow changing the upper limit of lever (4), then match the top side of the left end of lever (4) with the same top side of lever (3), and tighten screw (5).

6) Loosen the two screws securing the stopper (7) bracket and fix the stopper position so that the top side of both arm end of levers (3) and (4) are at the same distance from lever slide (6), then tighten the two screws.

5.2.2 Brake torque

Brake torque is applied mechanically. Pressure is set by variable spring force. While making these measurements and adjustments, be careful not to bend the brake bands. As brake torque will change after cleaning, brake drums and brake shoes should be cleaned only when absolutely necessary. If cleaning is required, use isopropyl alcohol. After cleaning, operate the machine for a month of normal operation before

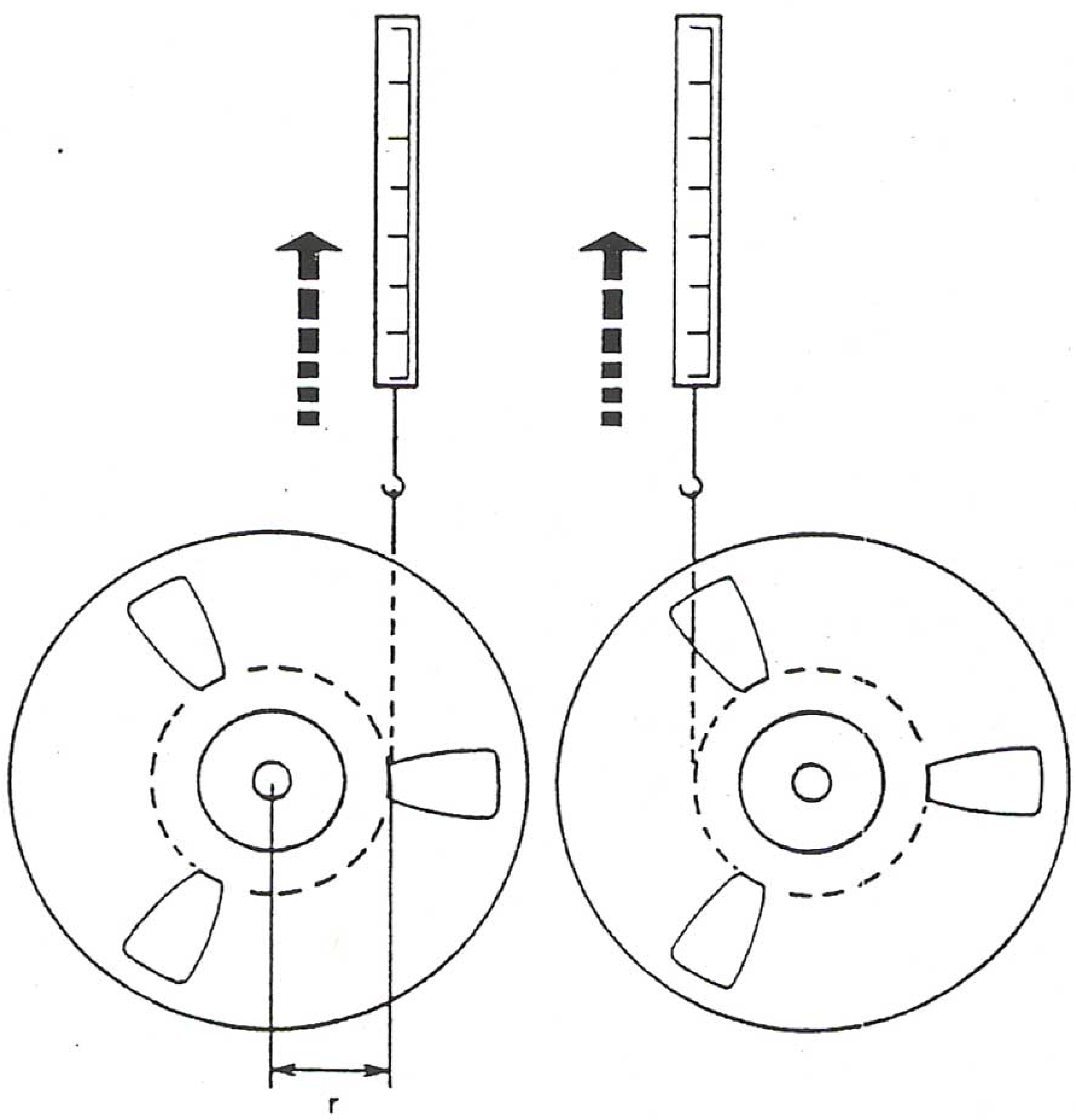
performing the procedures below.
Brake adjustments are made with NO power to the equipment.

1) Place an empaty reel on the left reel table, and fasten one end of a 30" length of twine to the reel anchor.

2) Wind several turns of twine CCW around the hub and attach a suitable spring scale to the free end of the twine.

3) Take a reading only when the reel is in steady motion since the force required to overcome static friction will produce a false, excessively high initial reading.

4) The reading should be 1200 ∿ 1800 g-cm (17 ∿ 25 in-oz).



*FORMULA FOR TORQUE CALCULATION
T(g.cm/in.oz) = R x W

WHERE – R = RADIUS OF HUB (cm/in)
W = (g/oz)

Fig. 5.3

5) If the measurements do not comply with the specs, loosen screw (6) and rotate bracket (3) to adjust torque. Rotate it to the right if torque is low and to the left if it is high. The bracket has five hole positions which allow changing the torque from 1 Kg-cm up to 1.8 Kg-cm by choosing the proper hole. (Fig. 5.4)

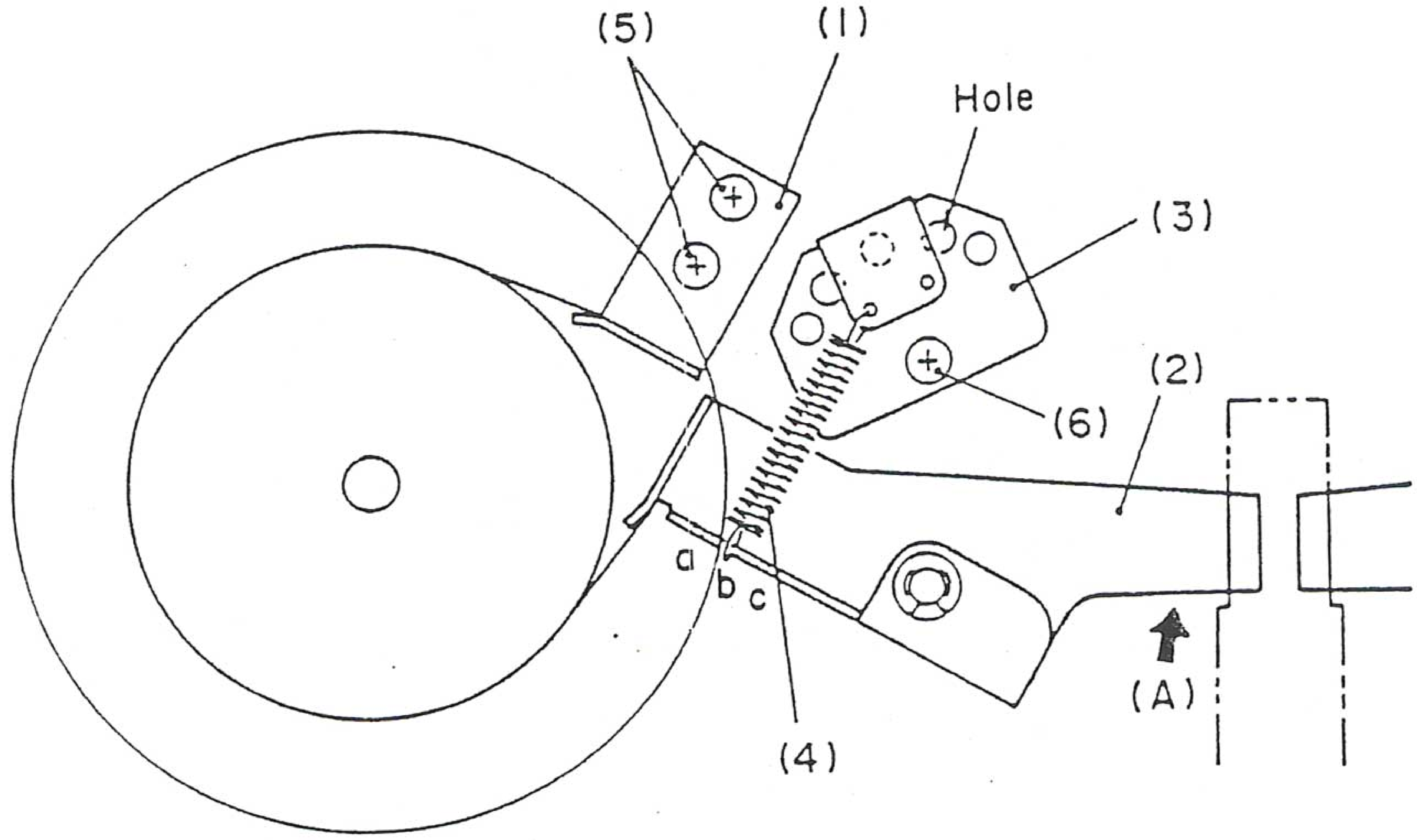


Fig. 5.4

NOTE: a) Referring to Fig. 5.6, loosen the two screws securing the Bracket Stopper (16), shift the Bracket Stopper downward, and tighten the two screws previously loosened.

b) Loosen the two screws (5) of the Brake Band Bracket (1), Fig. 5.4, move lever (17) 3mm upward so that Slide Lever (13) is also shifted upward, then with the brake band touching the drum, move the Brake Band Bracket (1) until the protrusion on Slide Lever (13) just touches the Brake Lever (14). Then, tighten the previously loosened two screws (5).

5.3 Tension roller height adjustment

If tape travel is unsatisfactory due to a misaligned tension roller, its height must be corrected by loosening the 4mm hex screw (3), readjusting the height and then tightening the hex screw again. (Fig. 5.5)

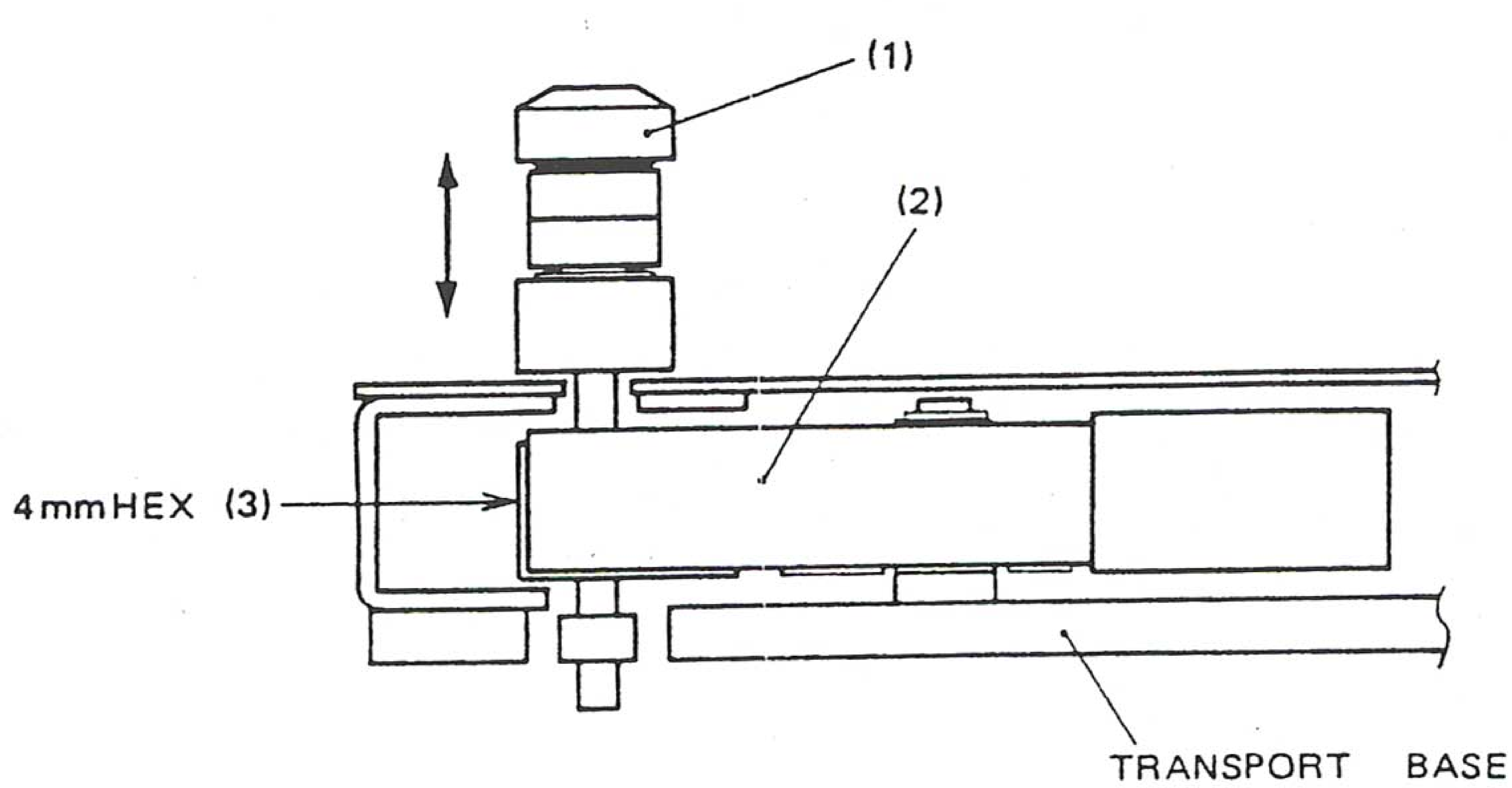


Fig. 5.5

5.4 Height adjustment of the head assembly guide

Height of the center guide in the head assembly must be adjusted when tape travel is unsatisfactory.
The height is adjusted by rotating the screw on top of the guide with a 3mm box wrench while running a tape over the guide.

5.5 Tape lifter adjustment

1) Referring to Fig. 5.6, with the solenoid (1) plunger bottomed, the solenoid bracket (5) position is adjusted so that the gap between the rubber sleeve on the lifter pin (3) and the lower part of the perpendicular hole in the base guide (4) is 0 ∿ 1mm.

2) With the plunger of solenoid (1) bottomed, push lever (17) upward until lever (14) rises 2mm, then tighten screw (15).

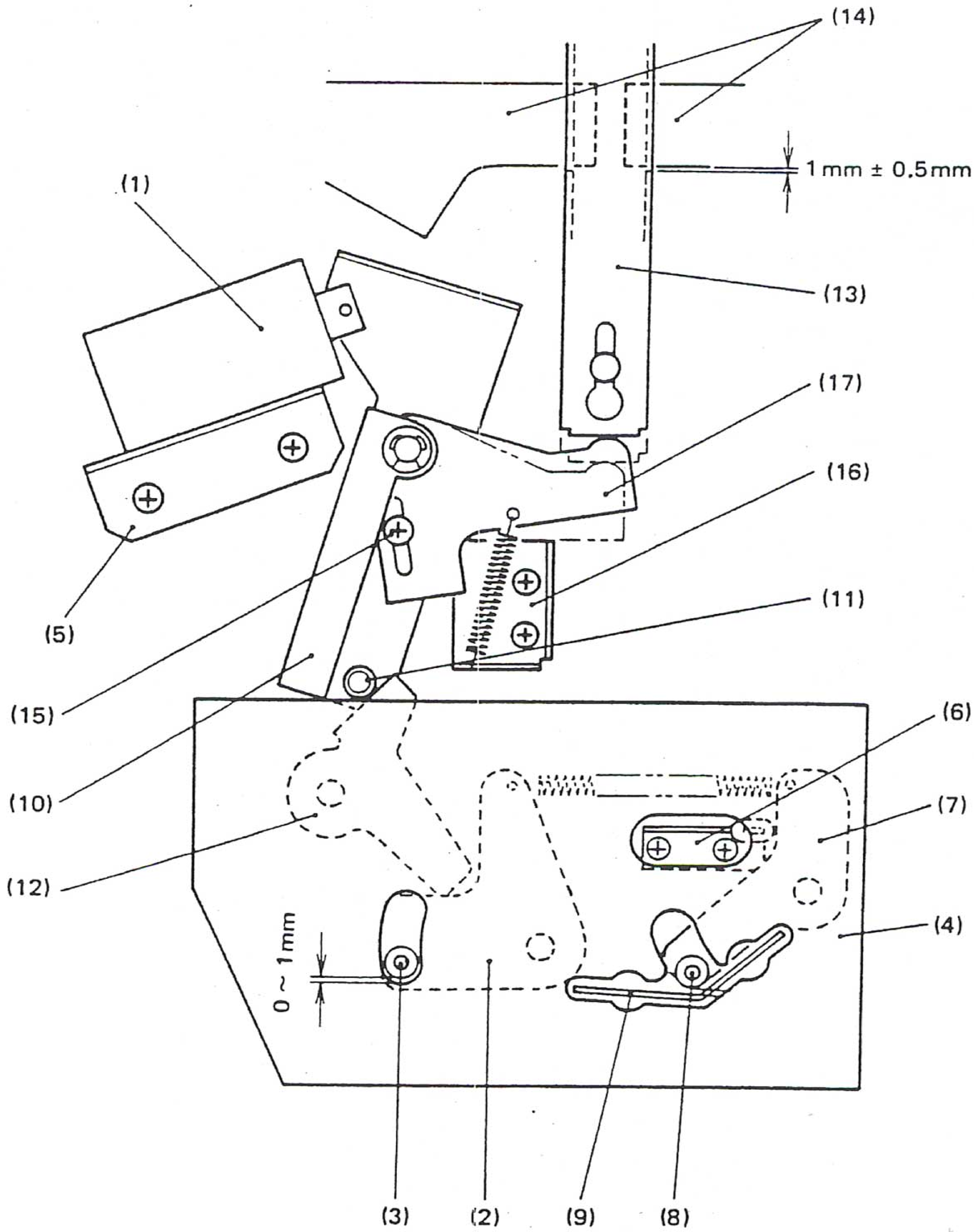


Fig. 5.6

5.6 ADJUSTING THE REEL SERVO

5.6.1 Tools

Oscilloscope	
Tape tension gauge	Tentel Model T2-H20-ML
Blank tape	1/4" (1/2") width, Ampex 456

5.6.2 Procedure

Tension spring adjustment (Fig. 5.7)

1) Loosen screw (b) of the bracket tension spring (a).
2) Move tension roller shaft (c) toward "x" and position it at the 7.5 degree point indicating hole (e) on the base tension arm (d).
3) Bracket tension spring (a) is adjusted so that tension spring B (f) begins to take effect from the 7.5 degree point, and the bracket tension spring is secured by tightening screw (b).

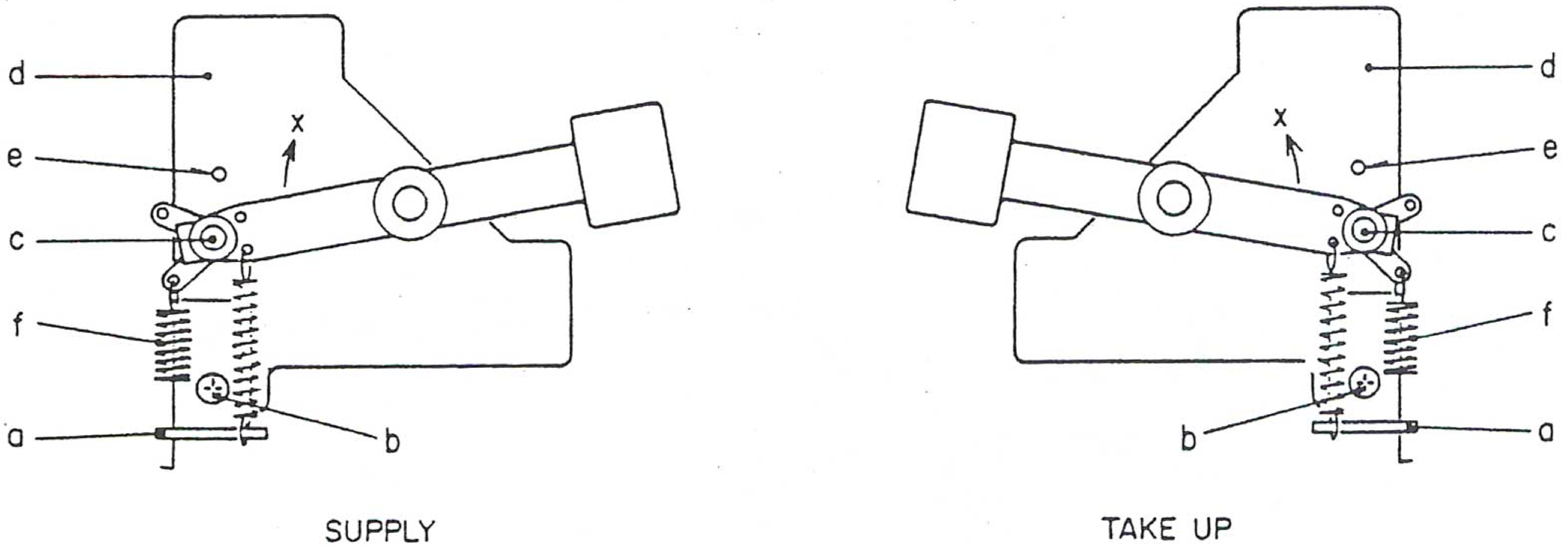


Fig. 5.7

4) Both the supply and takeup sides are adjusted by these procedures.

5.6.3 Tape tension adjusting

Tape tension measurements will slightly differ due to scattered calibration figures of the tension gauge and ambient temperature differences from that at manufacture of the gauge. If the measurement is only for checking, it will be sufficient if preparations are made as in Item 5.6.4 and checked as explained in Item 5.6.9 .

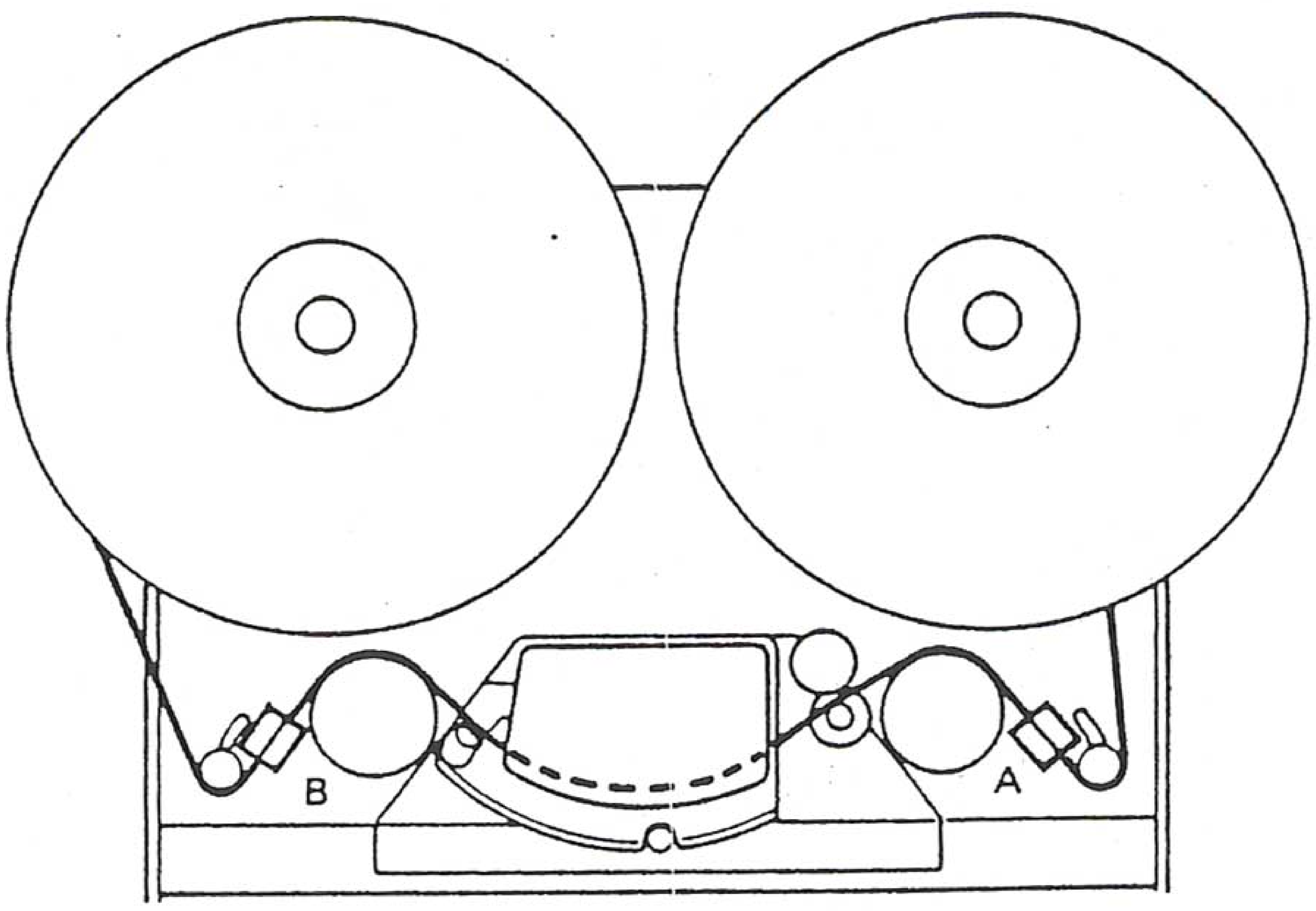


Fig. 5. 8

5.6.4 Preparation

1) Load 10 inch reels wound with about the same amount of tape on both left and right reel turntables.
2) Remove the plugs from J19 and J20 on the system control PCB and insert the plug that was in J20 into J21.
3) Remove the plug from J1 to prevent the capstan motor from rotating in the PLAY mode.

5.6.5 At EDIT mode

1) Depress the STOP button and put transport in the EDIT mode.
2) Insert the tension gauge at point "a" and set R507 (S. ADJ) for a tape tension of 35g ±2g (1/4") or 40g ±2g (1/2"). Next, insert the tension gauge at point "b" and set R511 (S. ADJ) so that tape tension is within ±2g (1/4" & 1/2") to that at point "a".

5.6.6 At PLAY mode

1) Put transport in the PLAY mode.
2) Set R505 (PLAY) so that tape tension at "a" is 65g ±5g (1/4") or 115g ±5g (1/2"). In the same way, set R509 (PLAY) so that tape tension at "b" is 45g ±5g (1/4") or 80g ±5g (1/2").

5.6.7 At fast wind modes

1) Put transport in the FF mode.
2) Set R504 (FF) so that tape tension at "a" is 155g +10-0g (1/4") or 160g ±5g (1/2").
3) Put transport in the RWD mode.
4) Set R508 (RWD) so that tape tension is ±5g of the figure adjusted to in above Item 2).
   Example: If point "a" is 165g, set point "b" to 160 ∿ 170g.

5.6.8 At the STOP mode

1) Put transport in the STOP mode.
2) Return the plugs into J19 and J20, and also the plug to J1.
   NOTE: Follow the EDIT mode adjusting before going to this procedure.

5.6.9 Checking the tape tension (Fig.5.8)

Follow the procedure in Item 5.6.4 before this check, then proceed to Item 5.6.8 .

5.6.10 At EDIT mode

1) Depress the STOP button then, enter the EDIT mode.
2) Tape tensions at points "a" and "b" should be 30 ∿ 45g (1/4") or 35 ∿ 50g (1/2") and the difference in tension between them should be less than 5g.

5.6.11 At PLAY mode

1) Put transport in the PLAY mode.
2) Tape tension should be 55 ∿ 75g (1/4") or 105 ∿ 125g (1/2") at point "a" and 40 ∿ 55g (1/4") or 70 ∿ 90g (1/2") at point "b".

5.6.12 At fast wind modes

1) Tape tensions, at point "a" during FF and, at point "b" during RWD should, respectively be 150 ∿ 175g and furthermore, the difference in tension between "a" and "b" should be less than 7g.

5.6.13 Adjusting the count pulse duty (Fig. 5.9)

1) Monitor the test point 2 waveform with an oscilloscope.
2) Put transport in the FF or RWD mode.
3) Adjust R501 on the system control PCB for a 50% duty of the test point 2 waveform.
4) Monitor the test point 1 waveform with an oscilloscope.
5) Adjust R500 for a 50% duty of the test point 1 waveform.

At routine checking, a 45 ∿ 55% duty is permissible.

5.6.14 Adjusting the fast wind speeds (Fig. 5.9)

1) Monitor the test point 1 waveform with an oscilloscope.
2) Wind tape to about the same amount on both reels.
3) Hold down the FF (RWD) button.
4) Adjust R502 (REEL LOW) on the system control PCB so that wave length at test point 1 becomes 14, +0.5-1 msec. (1/4") or 16, +0-1, msec. (1/2").
5) Wind tape to the beginning and enter the FF mode.
6) Adjust R503 (REEL HIGH) so that the test point 1 wave length at maximum speed is 0.78 ∿ 0.82 msec.
7) Wind tape to end of the reel and enter the RWD mode.
8) If the test point 1 wave length is less than 0.78 msec. at maximum speed, adjust R503 (REEL HIGH) so that it is 0.78 ∿ 0.82 msec.
9) Check the following if R503 was touched in above Item 8). The test point 1 wave length at maximum speed in FF should be less than 0.85 msec. If it is larger than this, check and adjust by the procedures in Item 5.6.7 .

At routine checking, the figures of Item 4) may be 13 ∿ 15 msec. (1/4") or 14.5 ∿ 16.5 msec. (1/2") and; maximum speed at FF and RWD may be 0.73 ∿ 0.85 msec.

5.7.3 Adjusting the reproduce frequency response

1) Set the NR IN/OUT switch on the recorder rear panel to OUT and switch off all RECORD TRACK buttons.
2) Playback the Head Azimuth section and Frequency Response section of the Reproduce Alignment Tape.
The Azimuth and Phase Adjusting Screw is adjusted for this alignment as shown in Fig. 5.11.

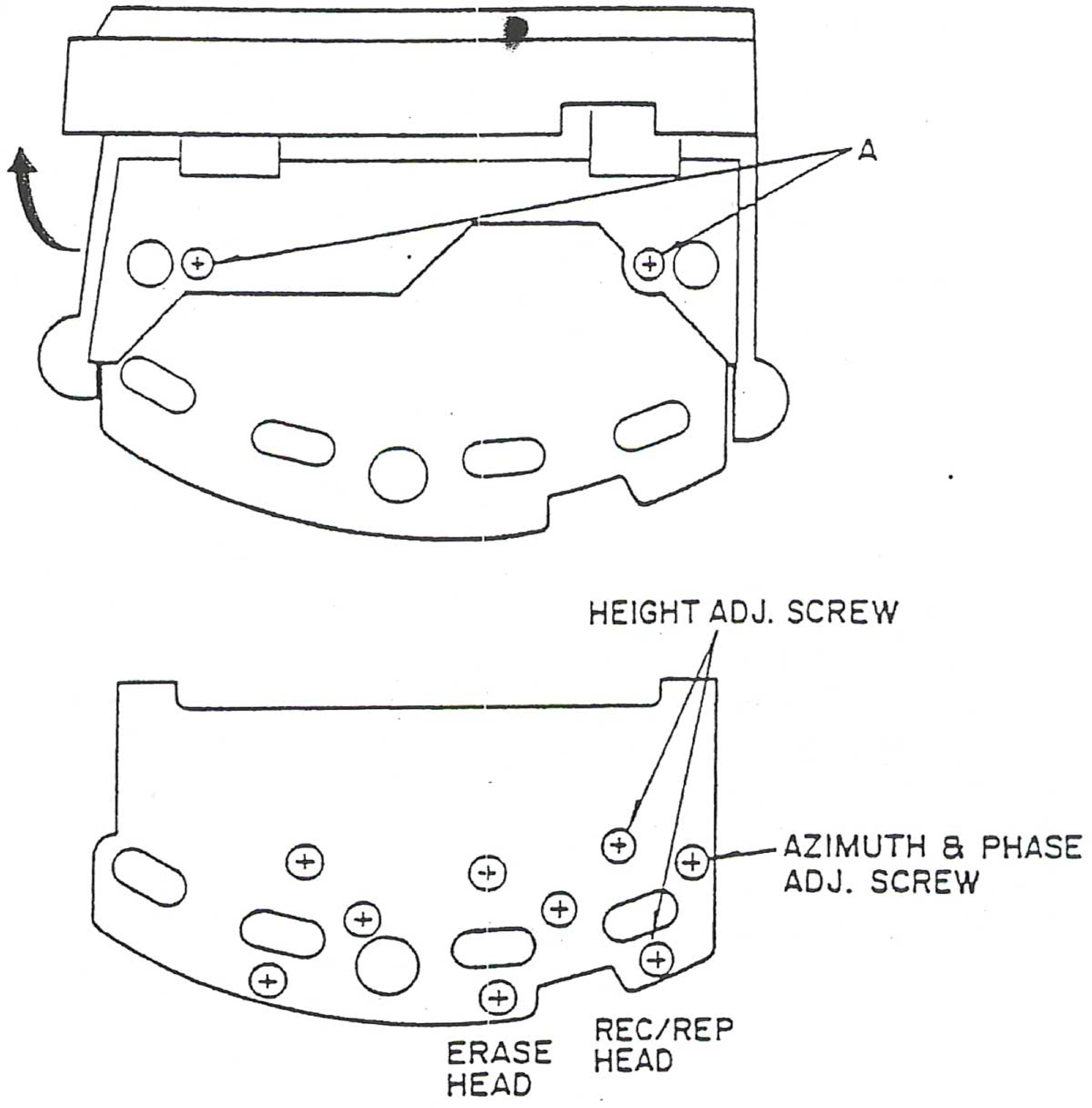


Fig. 5.11

3) Adjust the Azimuth and Phase Adjusting Screw for maximum reading on all sixteen BAR GRAPH meters of the recorder.
Then, connect the vertical input of the oscilloscope to the TRACK 1 output and the horizontal input to one among TRACKS 2 ∿ 8 (E-8), 2 ∿ 16 (E-16), set the oscilloscope to XY mode to obtain a lissajous waveform to check the phase.

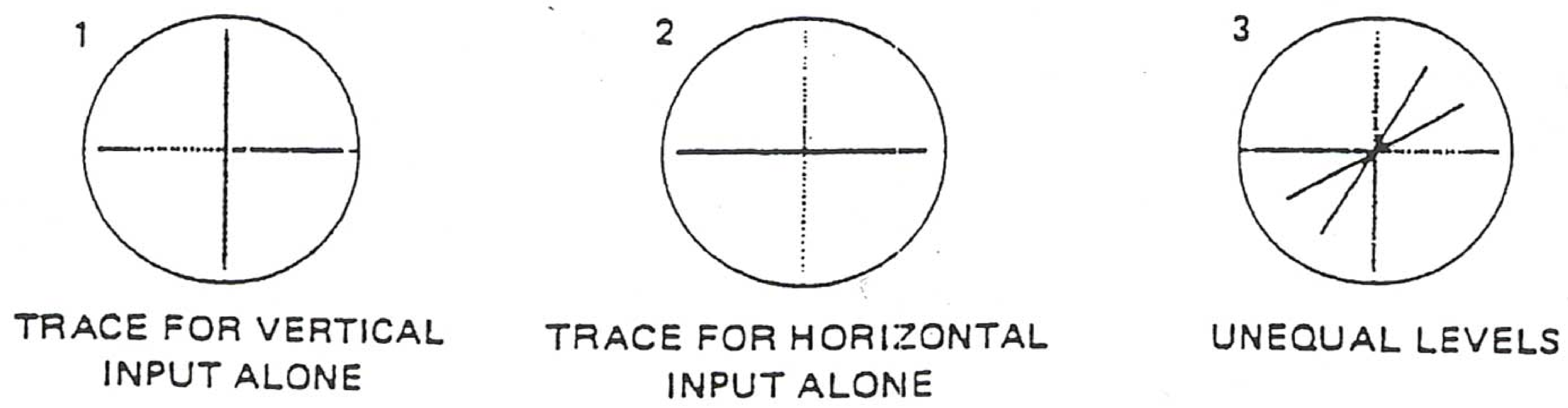


Fig. 5.12

5.7 Record/Reproduce Amplifier Checks and Adjustments

Checking and adjusting the record/reproduce amplifiers can be speedily and efficiently carried out by following the procedures below.

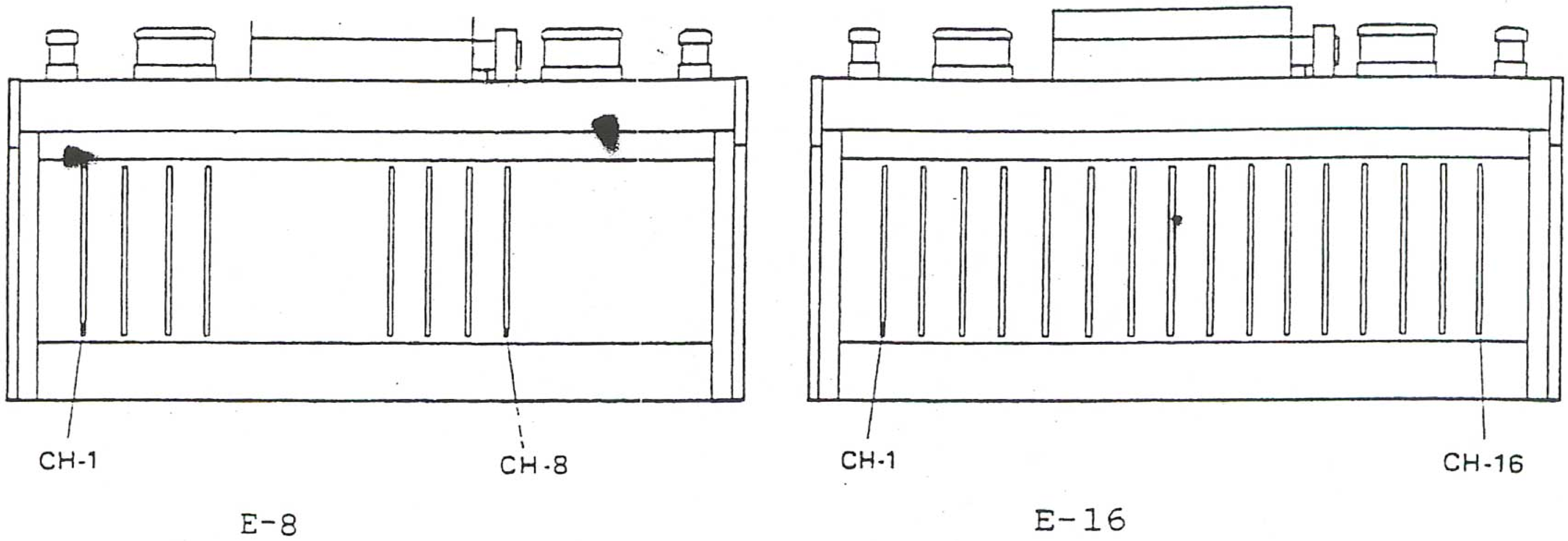


Fig. 5.10

5.7.1 Calibrating the Dolby encode mode and meters

1) To calibrate TRACK 1, depress the RECORD TRACK 1 button, depress RECORD to put TRACK 1 (CHAN 1) in the record mode without running the tape.
2) Plug in an audio oscillator output to the recorder rear panel INPUT 1 jack and apply a 1KHz, -10dBV (0.3V) signal.
3) Set the NR IN/OUT switch on the recorder rear panel to OUT, connect a level meter to test point TP-1 and adjust REC CAL (R-103, 5KΩB) so that the level here is 390mV.
4) On completing the above adjustments, connect the level meter to OUTPUT 1 jack on the recorder rear panel and check that the level here is -10dBV (0.3V) ±1dB.
5) After checking the OUTPUT jack level, adjust METER CAL (R104, 50KΩB) for a 0dB reading on the recorder BARGRAPH METER.
6) Calibrate tracks 2 ∿ 8 (E-8), 2 ∿ 16 (E-16) in the same way.

5.7.2 Calibrating the Dolby decode mode

1) Set the NR IN/OUT switch on the recorder rear panel to OUT and switch off all RECORD TRACK buttons.
2) Playback the Reference Level Section of the Reproduce Alignment Tape.
3) Beginning adjustments from TRACK 1 (CHAN 1), connect a level meter to test point TP-1 located near U2 on the CHAN 1 PCB of the record/reproduce amplifier, and adjust REP CAL (R102, 10kΩB) so that the level is 390mV.
4) After these adjustments, connect the level meter to the recorder rear panel OUTPUT 1 jack and check that the level is -10dBV (0.3V) ±1dB.
5) After check of the OUTPUT jack level, confirm that the meter reading is 0dB, ±1dB.
   If the reading is not 0dB, ±1dB, repeat the adjustments in the previous section, Item 5.7.1.
6) Calibrate tracks 2 ∿ 8 (E-8), 2 ∿ 16 (E-16) by the same procedures for TRACK 1, above.
7) On completing the above adjustments, return to IN the NR IN/OUT switch on the recorder rear panel.


J1
TP1 R500 R501 TP2
R502 REEL LOW
R503 REEL HIGH
J19 J20
J21
R504 FF
R507 S. ADJ
R505 PLAY
R509 PLAY
R511 S. ADJ
R508 RWD
TIMER
FOSTEX 8251228 100
SYSTEM CONTROL FPK-N3

Fig. 5.9

5.7.5 Erase current adjustment

In adjusting the erase current, put the track to be adjusted in the record mode.

To adjust TRACK 1, for example, connect the hot side of the oscilloscope probe to TP-4 located near REP CAL, and the ground clip of the probe to GND pin near TP-3. Next, adjust the core of T-1 ERASE ADJ for maximum voltage at TP-4. Then, adjust the ERASE LEVEL POT (R108, 10KΩB) to 30 ∿ 32mV RMS at TP-4.

Adjust the remaining tracks 2 ∿ 16 in the same way.

5.7.6 Bias current adjustment

The track to be adjusted is put in the record mode.

To adjust TRACK 1, for example, connect the oscilloscope probe hot side to TP-2, located near connector U-2, and the ground clip to the GND pin.

Then, set the BIAS LVL trimmer capacitor C101, 150pF, for a level of approximately 100mV RMS.

For an accurate adjustment, load a blank tape (Ampex #456 or an equivalent) on the recorder, record a test signal, set the NR switch to IN, and trim the BIAS LVL trimmer capacitor so that the overall frequency is within 3dB between 250Hz and 10KHz, or within 5dB when the higher end is 14KHz (measured at -25dB below the reference level).

During this adjustment, temporarily set the screwdriver adjusting slot of REC EQ, R106, 2KΩB so that this slot is parallel with the PCB plane, then trim it for a flatter overall frequency response.

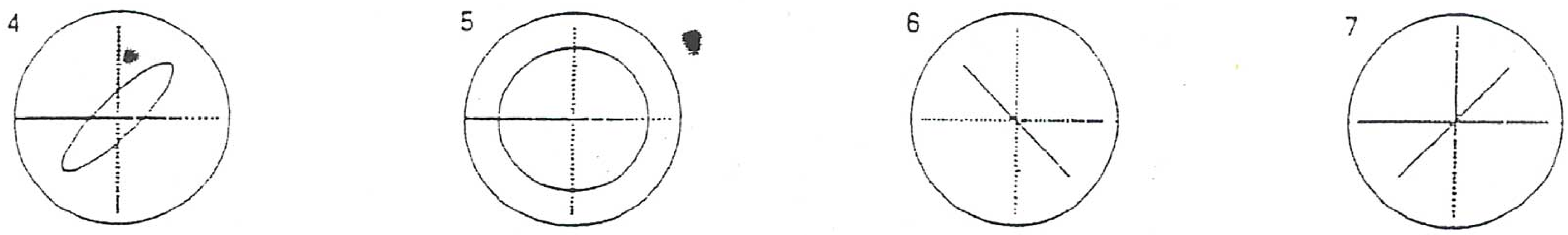
5.7.7 Recording level adjustment

1) Proceed to the following adjustments only after checks and adjustments in the previous Section 5.7.1 ∿ 5.7.6 have been completed.
   Set the front panel NR IN/OUT switch to OUT.
2) Load a blank tape (Ampex #456 or an equivalent) on the transport and apply an audio oscillator output of 1KHz, -10dBV (0.3V) to the INPUT jack on the recorder rear panel.
   Also, plug in a level meter to the OUTPUT jack.
   Using TRACK 1 as an example, the connector number is "1" for both INPUT and OUTPUT jacks.
3) Depress the RECORD TRACK 1 button, then, depress the RECORD and PLAY buttons to put TRACK 1 in the record mode.
   When in the record mode, the meter will indicate the input level regardless to position of the input button.
   Check to see that the reading of this meter is 0dB ±1dB.
4) The tape can be simply and quickly rewound to the start point if the tape index counter reset button is depressed, to return the display to 0000, at start of the recording.
5) After recording a certain length of 1KHz, 0dB signal, depress ZERO RTN to rewind tape to the starting point, put transport in the PLAY mode and check the meter reading. The MONITOR switch must be at TAPE.
   In the normal condition, the meter reading is 0dB ±1dB.
   If response is off spec, correct by adjusting REC LVL R-105, 5KΩB.
   Repeat this procedure for the remaining tracks 2 ∿ 16.

5.4.8 Overall frequency response

1) With the rear panel NR IN/OUT switch at IN and under the measurement setup of the previous Section 5.7.7, apply signals from 40Hz through 18KHz at -10dBV (0.3V) to the recorder INPUT jack.

If the trace length between (1) and (2) are not the same, it means that the two inputs are not of the same level. Correct to equal lengths by the oscilloscope controls.
If the playback head azimuth is out of alignment, the following patterns will result:



(A SMALL MISALIGNMENT 30° OUT OF PHASE) (A LARGER ERROR 90° OUT OF PHASE) (A BIG ONE, 180° OUT OF PHASE) (PERFECT AZIMUTH 0°, IN PHASE)

Fig. 5.13

As a result of phase check with a 10KHz signal, the adjustment is finished if difference in phase is less than 90 degrees between tracks and azimuth adjustment is at the best point.

4) Check the playback frequency response of each channel by playback of the Frequency Response Section of the Reproduce Alignment Tape. The recorder BARGRAPH meters can be used for this check, but if a more accurate measurement is necessary, the level meter is plugged one by one into the recorder rear panel 1 ∿ 8 (E-8), 1 ∿ 16 (E-16) OUTPUT jacks and the levels are then measured here.
   The normal playback frequency response should be within ±3dB for a frequency range of 40 ∿ 18,000Hz.
   If response is not within spec, adjust REP EQ R101, 5KΩB.
5) Whenever R101 is adjusted, the Dolby encode must be recalibrated.

5.7.4 Bias leakage check

Two bias trap modules are provided for each channel. One is in the first stage of the reproduce amplifier and the other in the output stage of the record amplifier.

1) Reproduce bias trap module, U4
   To check bias leakage of TRACK 1, the oscilloscope probe is connected to TP-3 and the probe ground clip to the nearest GND.
   Put TRACK 1 in the reproduce mode, the adjacent TRACK 2 in the record mode, check bias leakage at TP-3 and trim the core of U4 for a minimum reading. (At checking TRACK 2, put the adjacent tracks 1 or 3 in the record mode.) If the voltage is high, it is adjusted by rotating the center core of U4 but before doing this, check the frequency (100KHz, ±0.5KHz) of the erase/bias master oscillator. To check the oscillator frequency, the record/reproduce amplifier PCB is pulled out from the E-8 or E-16, and the frequency checked at connector pin No. 6.
   If the oscillator frequency is off spec, adjust the core of T-1 OSC transformer on the system control PCB, to 100KHz, ±0.5KHz.
2) Record bias trap module, U7
   To check bias leakage of TRACK 1, the oscilloscope probe is connected to TP-5 and the probe ground clip to GND nearest to TP-3.
   Put TRACK 1 in the record mode and check bias leakage at TP-5. Normal voltage is 1.1V P-P.
   If response is off spec, check frequency (100KHz, ±0.5KHz) of the bias/erase master oscillator. Then rotate the center core of U7 to adjust bias leakage.

To adjust TRACK 1, for example, apply the signal to INPUT 1 and plug in a level meter to OUTPUT jack 1. Put TRACK 1 in the record mode to record a certain length of the signal, rewind it to the start, and playback the tape. In the normal condition, the frequency response in reference to 1KHz, is within ±1dB.

If response does not fall within spec in the high frequency region, correct it by a slight rotation of the REC EQ pot R106, 2KΩB.

2) Check and adjust the remaining tracks in the same way.

5.7.9 Overall S/N measurement

1) Set the front panel NR IN/OUT switch to IN.
2) Upon completing checks up to Section 5.7.8, apply a 1KHz, -10dBV (0.3V) signal to the rear panel INPUT jack 1 (example for track 1), record the signal onto a blank tape, then, without stopping the tape, unplug the oscillator connected to the INPUT jack and further record a length of no-signal on the tape.
3) Plug a level meter into OUTPUT jack 1, playback the recorded signal section to measure the noise level of the no-signal section against the 1KHz reference level, add 10dB to it and obtain the ratio between peak recording level and noise level.

Specification: 80dB weighted
60dB unweighted

5.7.10 T.H.D. measurement

1) Set the front panel NR IN/OUT switch to IN.
2) To adjust TRACK 1, for example, apply a 1KHz, -10dBV (0.3V) test signal to INPUT jack 1, record it, playback the recorded tape and apply its output from OUTPUT jack 1 to the distortion meter.

Specification: T.H.D. 1% or less

3) If response is not within spec, demagnetize the head, check the bias trap adjustment and record level.
If response still does not fall within spec after taking the corrective measures above, readjust the bias current by the procedures in the previous Section 5.7.6.
4) When the Section 5.7.6 adjustments are made, it is necessary to go through procedures again in Sections 5.7.7 and 5.7.9.

5.7.11 Erase measurement

1) Set the rear panel NR IN/OUT switch to IN.
2) To adjust TRACK 1, for example, apply a 1KHz, 0dBV (1V) signal which is 10dB higher than the reference level, to INPUT jack 1 and put TRACK 1 in the record mode.
Partially rewind the tape to retain a section of the 1KHz signal and then record over the remaining section without any signal at the input.
3) Rewind to start of recording, playback the tape, insert a 1KHz bandpass filter between OUTPUT 1 and the level meter to measure the output.
4) The level ratio between the 1KHz recording and the no-signal recording is the erasure figure. In normal condition, erasure is higher than 70dB.
5) If response is less than the spec, increase erase current by about 10% according to the procedure of Section 5.7.5. Monitor the erase current

waveform on the oscilloscope and set the core just before the waveform begins to deteriorate. A higher current will heat the erase head and result in damage to the tape.

5.7.12 SYNC crosstalk adjustment

The SYNC crosstalk cancelling circuit is included in the R/P AMP PCB.

1) Set the NR IN/OUT switch to OUT.
2) Put TRACK 1 of the RECORD TRACK SELECT button to SAFE.
3) Apply a 1KHz, -10dBV signal to the input jack for TRACK 2.
4) Set the TRACK 2 SYNC crosstalk canceller pot (R107 220ΩB) at a point slightly CW from the full CCW position.
5) Plug in a level meter to the TRACK 1 OUTPUT jack and put TRACK 2 in REC mode.
6) Slowly rotate R107 CW and fix it at a point 3 ∿ 5dB above minimum to obtain minimum sync crosstalk in the high region.
7) Put TRACK 1 in REC mode, TRACK 2 at SAFE, and adjust R107 of TRACK 1 in the same way.
8) Repeat the same adjustments on pot R107 for the remaining channels.

6. DISMOUNTING OF MAJOR COMPONENTS

Depending on the extent of special maintenance, you may have to remove the bottom cover, trim panel, and furthermore, dismount major components inside.

For the sake of efficient maintenance, follow the procedures below. Should it be difficult to fully understand the procedures, please refer to the EXPLODED VIEWS.

6.1 REAR PANEL (Fig. 6.1)

* Screw (A) - Four on the rear cover and two on the top are removed.
* Screw (B) - Two on the rear lower side and four on the bottom are removed.
* Trim pots for METER CAL and REC CAL on the R/P AMP can be adjusted from the bottom by removing the six screws (B) and removing the bottom cover.

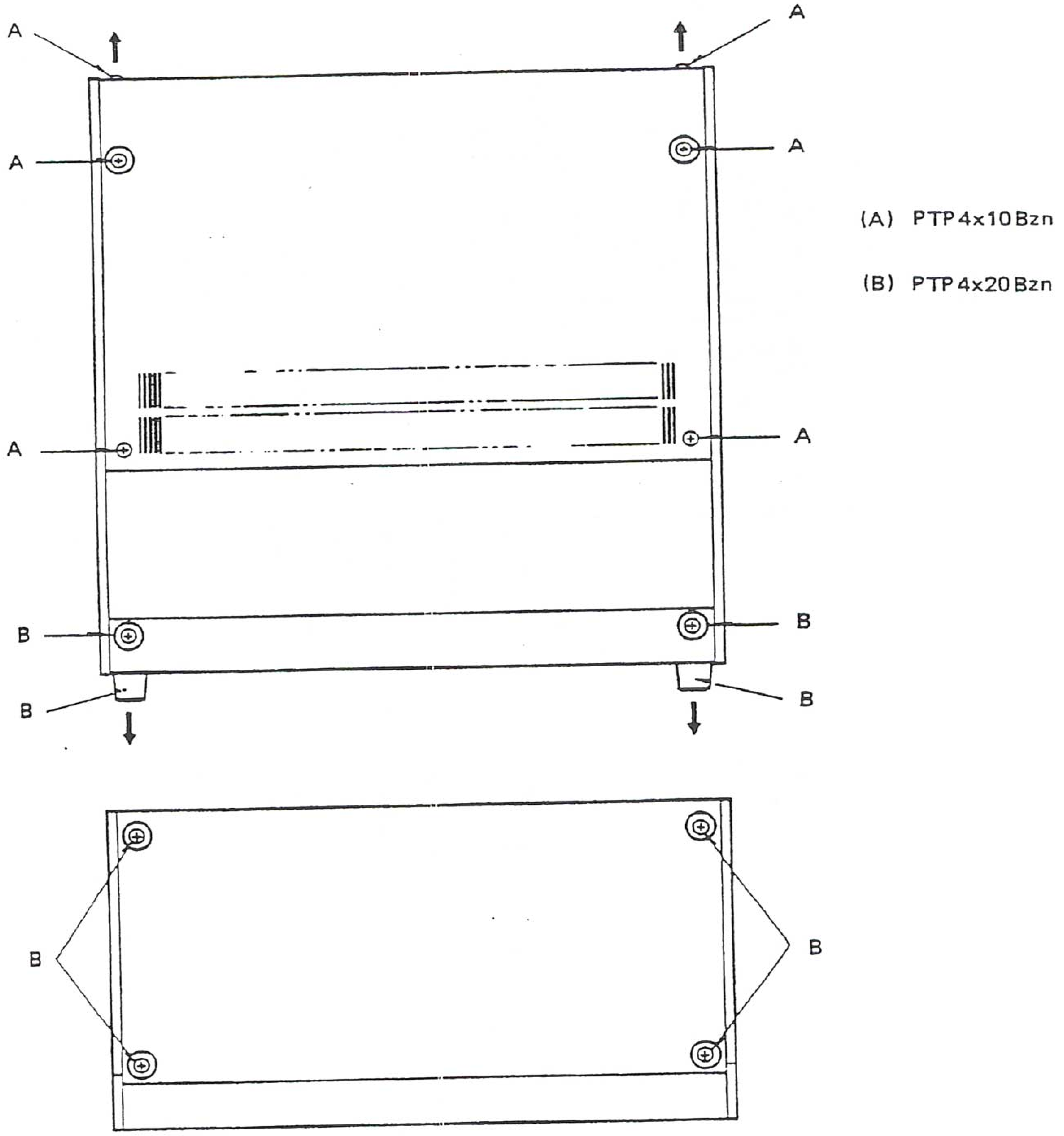


Fig. 6.1

6.2 TAPE TRANSPORT PANEL (Fig. 6.2)

* Lift the head cover and remove the head housing by unscrewing the two housing screws (A).
* Rotate the pinch roller cap (B) CCW to remove it and then take off the pinch roller.
* Remove the four screws (C) and the head base panel can be lifted out.
* Remove six screws (E).

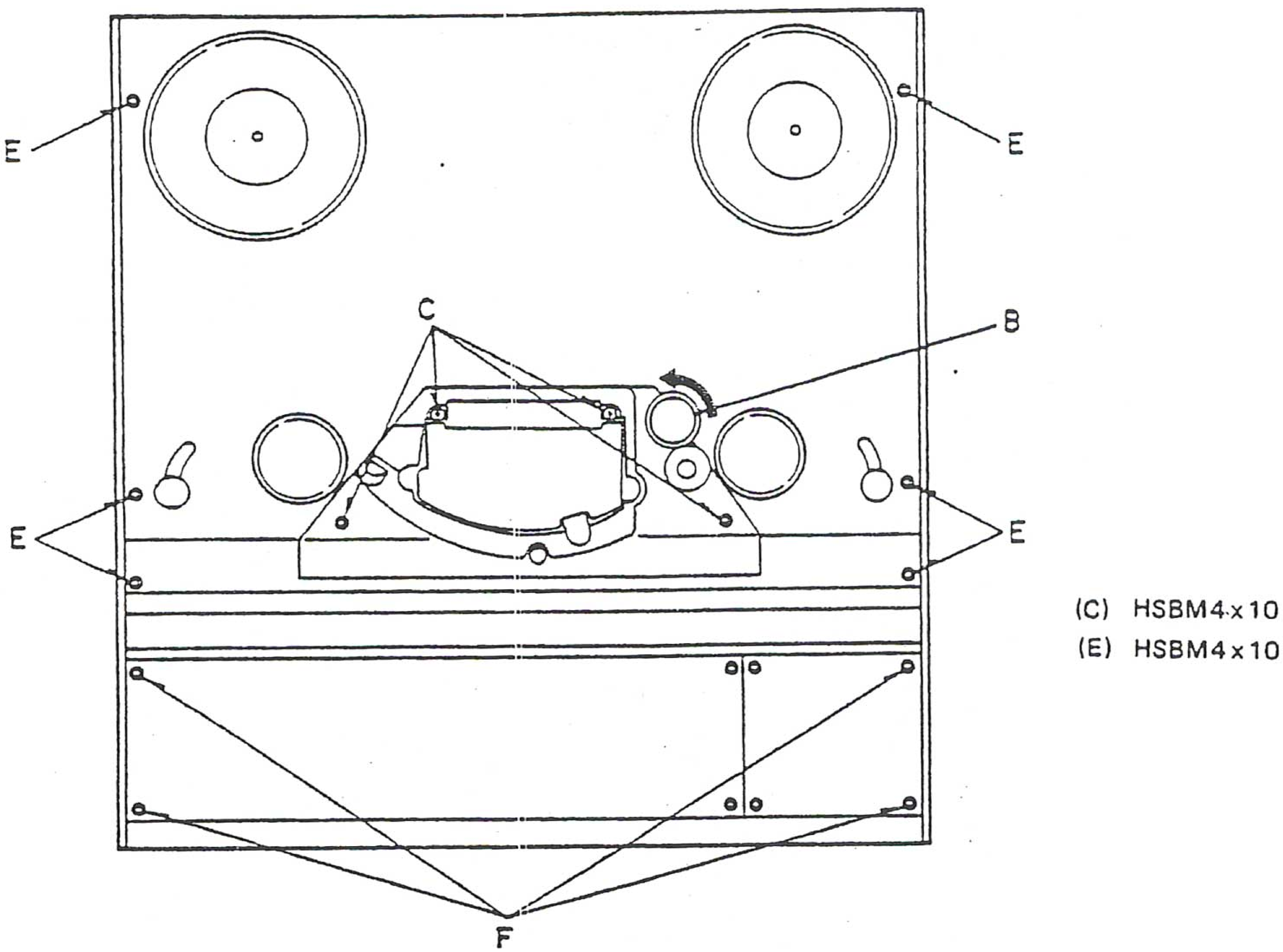


Fig. 6.2

* The tape transport panel can then be removed for adjusting the pinch roller pressure, brake torque, tape lifters, etc. For each adjusting procedure, refer to pages 14 Thru 18 .

6.3 AMPLIFIER PANEL (Figs. 6.2 and 6.3)

* By removing four screws (F), the amplifier panel hinged at the lower side, can be swung down to make adjustments from the front side on other than METER CAL and REC CAL.

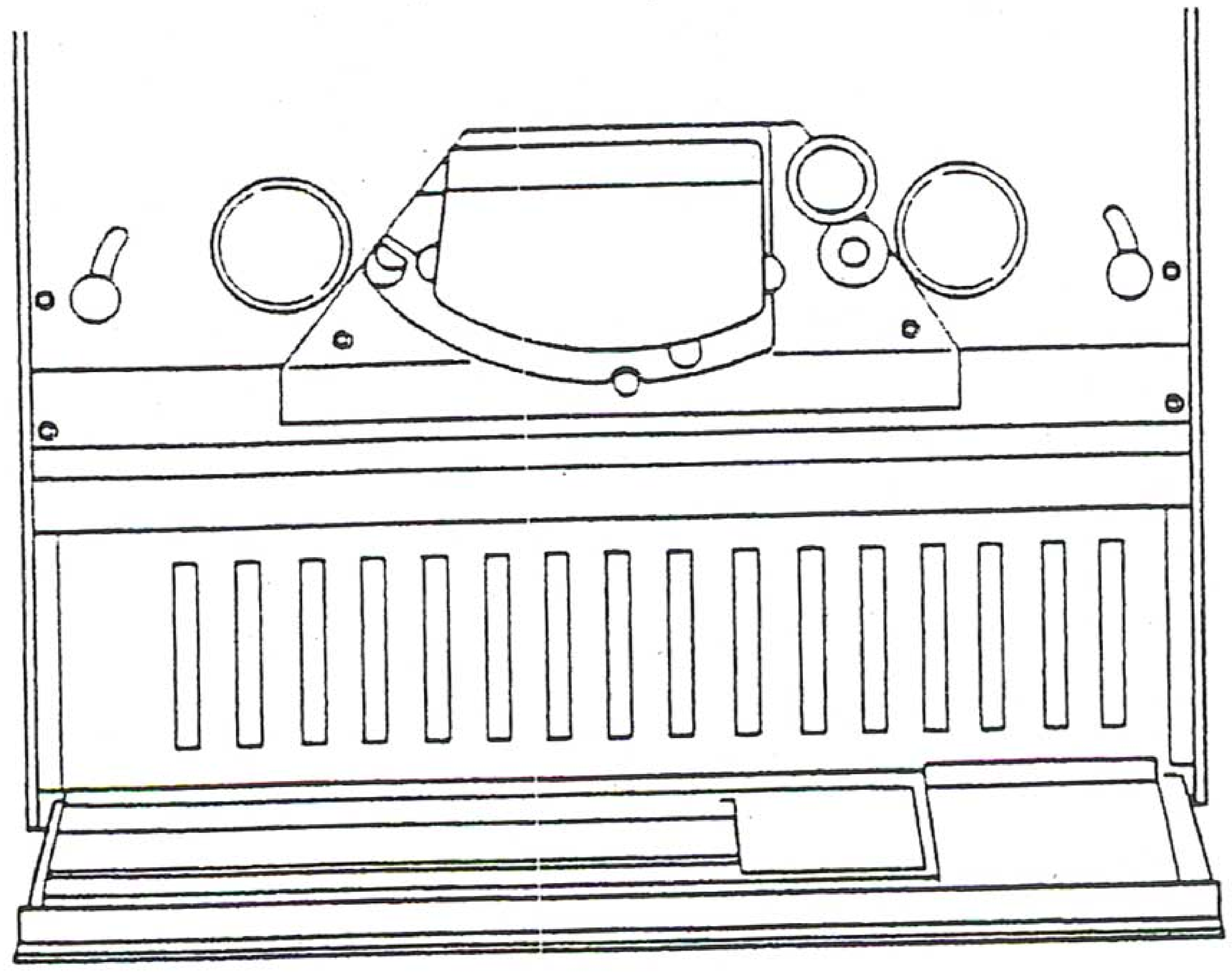


Fig. 6.3

6.4 RECORD/REPRODUCE PCB (Fig. 6.4)

* Regular adjustments on the record/reproduce amplifier is possible without removing the bottom cover, as previously mentioned, but for adjusting the bias trap coil or to connect an AC voltmeter and oscilloscope to the test point at adjusting trim pots, the record/reproduce PCB must be brought out by using the extension card (Fostex P/N 8273329000); the extension card, provided in the bottom card cage, can be pulled out by removing screw (A), Fig. 6.4.

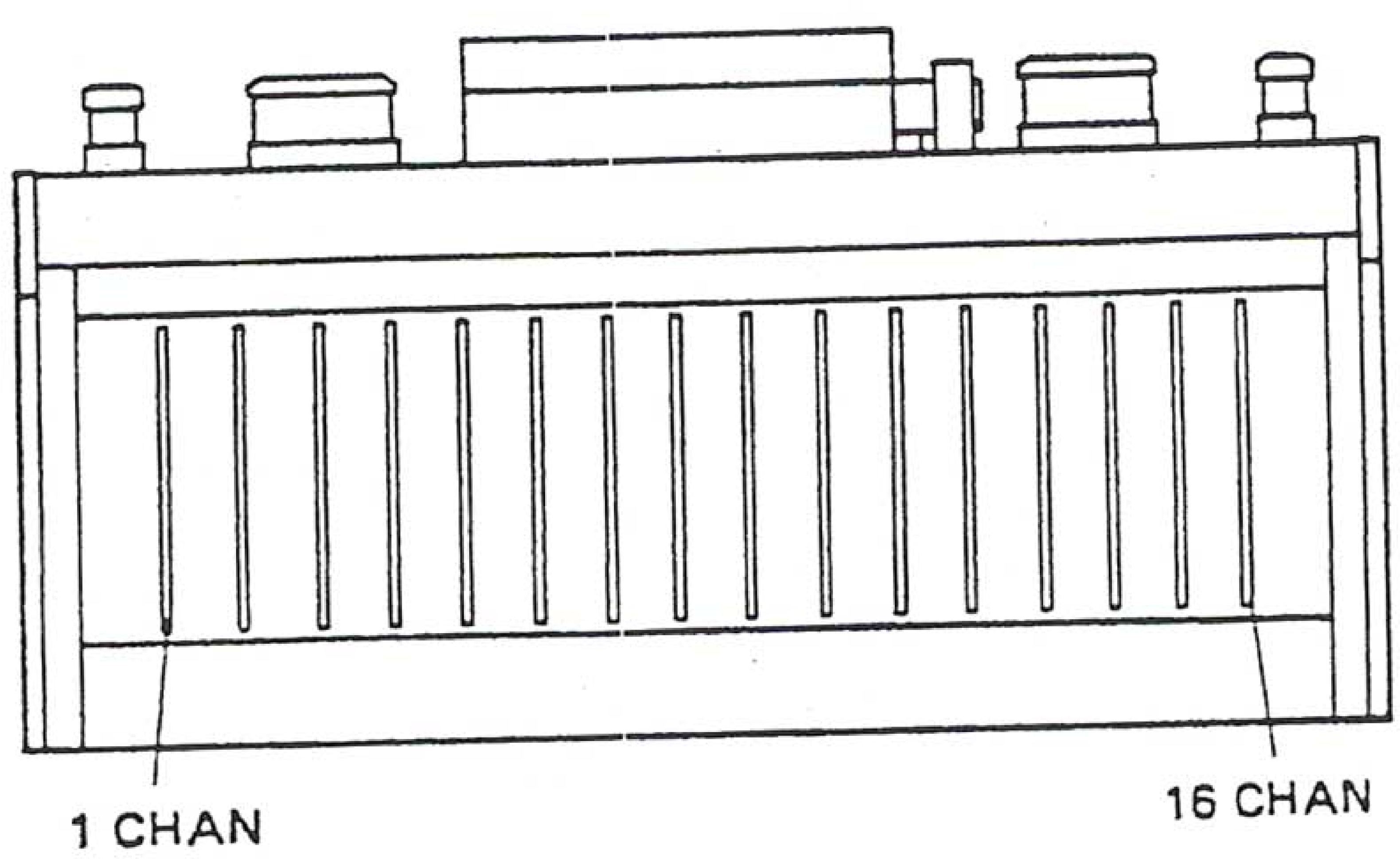
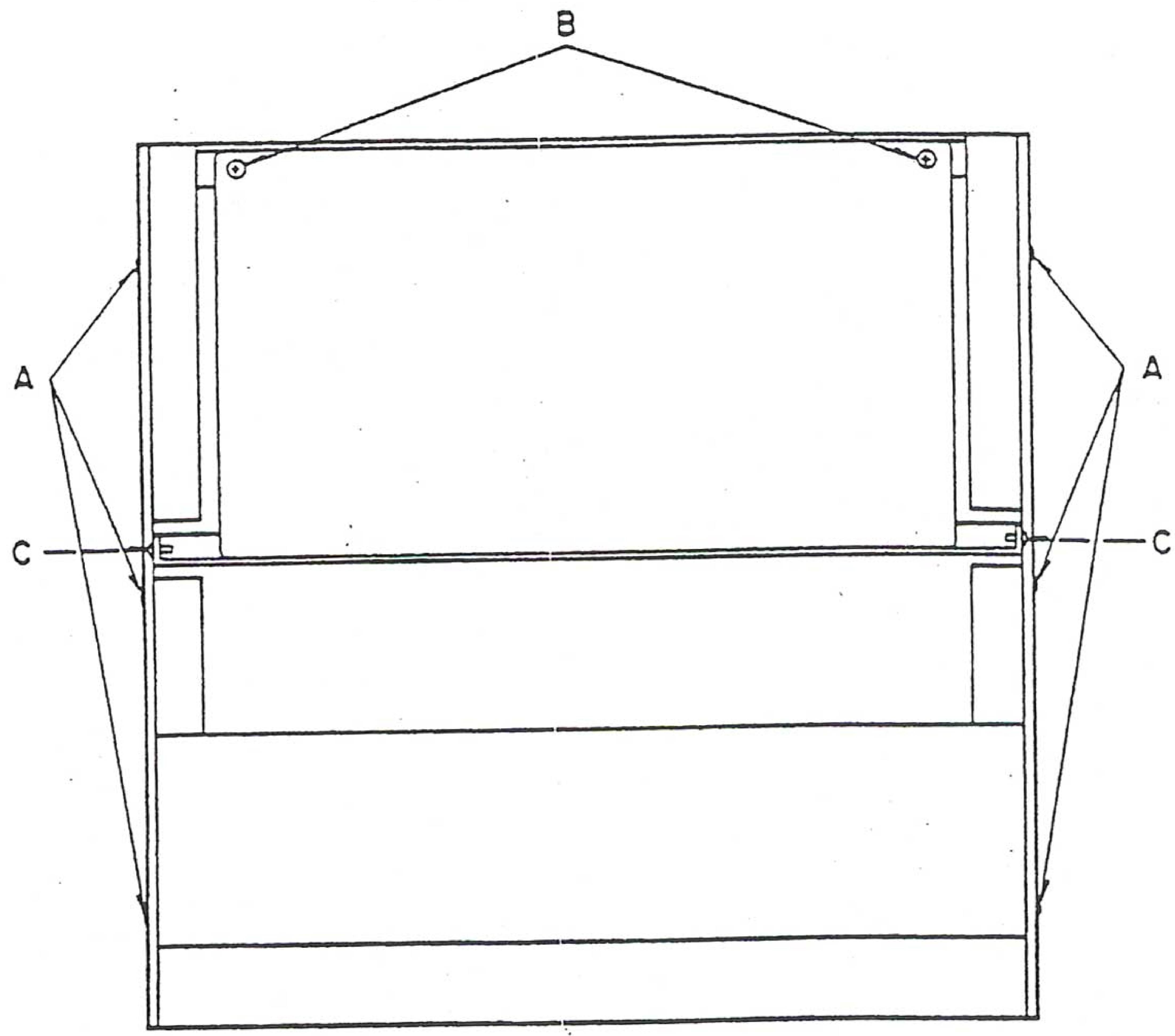


Fig. 6.4

6.5 SYSTEM CONTROL PCB ASSEMBLY (Fig. 6.5)

* After removing the rear cover, removing screw (B) will allow the System Control PCB to be swung down pivoted on the lower side by two screws (C). If the System Control PCB must be removed from the E-2 and E-22, the side boards must be removed by unscrewing (A), then removing screw (C).



(A) PTP 4x10Bzn

(B) PTP 3x8Bzn

(C) PTP 4x10Bzn

Fig. 6.5

6.6 POWER TRANSFORMER (Fig. 6.6)

* Remove the four screws (A).
* Unsolder the primary wires at the power switch and the secondary wires at the rectifier PCB assembly.

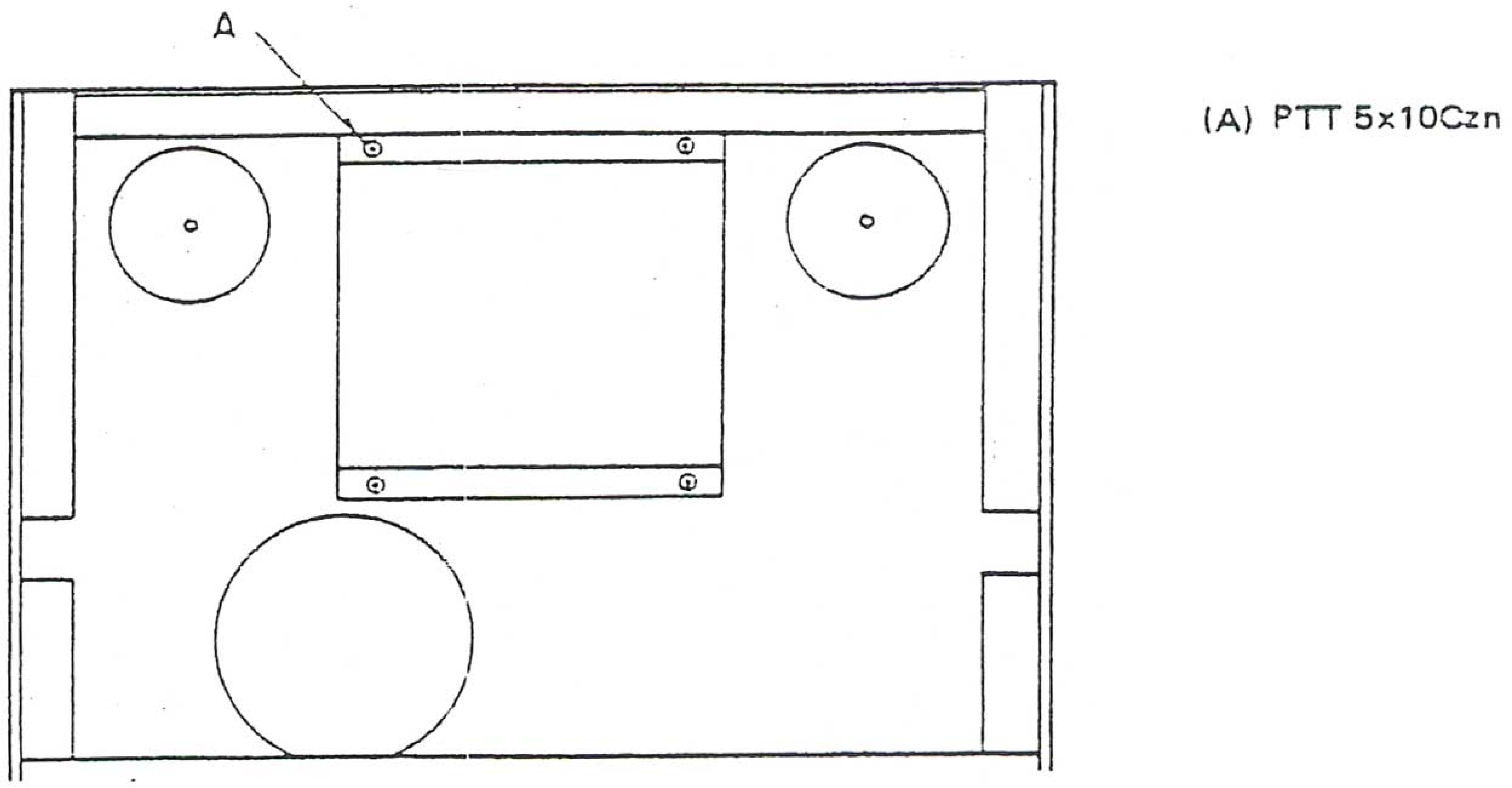


Fig. 6.6

6.7 CAPSTAN MOTOR ASSEMBLY (Fig. 6.7)

* Remove the three (B) screws and the capstan motor assembly can be taken out.
* Unsolder the motor lead wires at the terminating PCB.

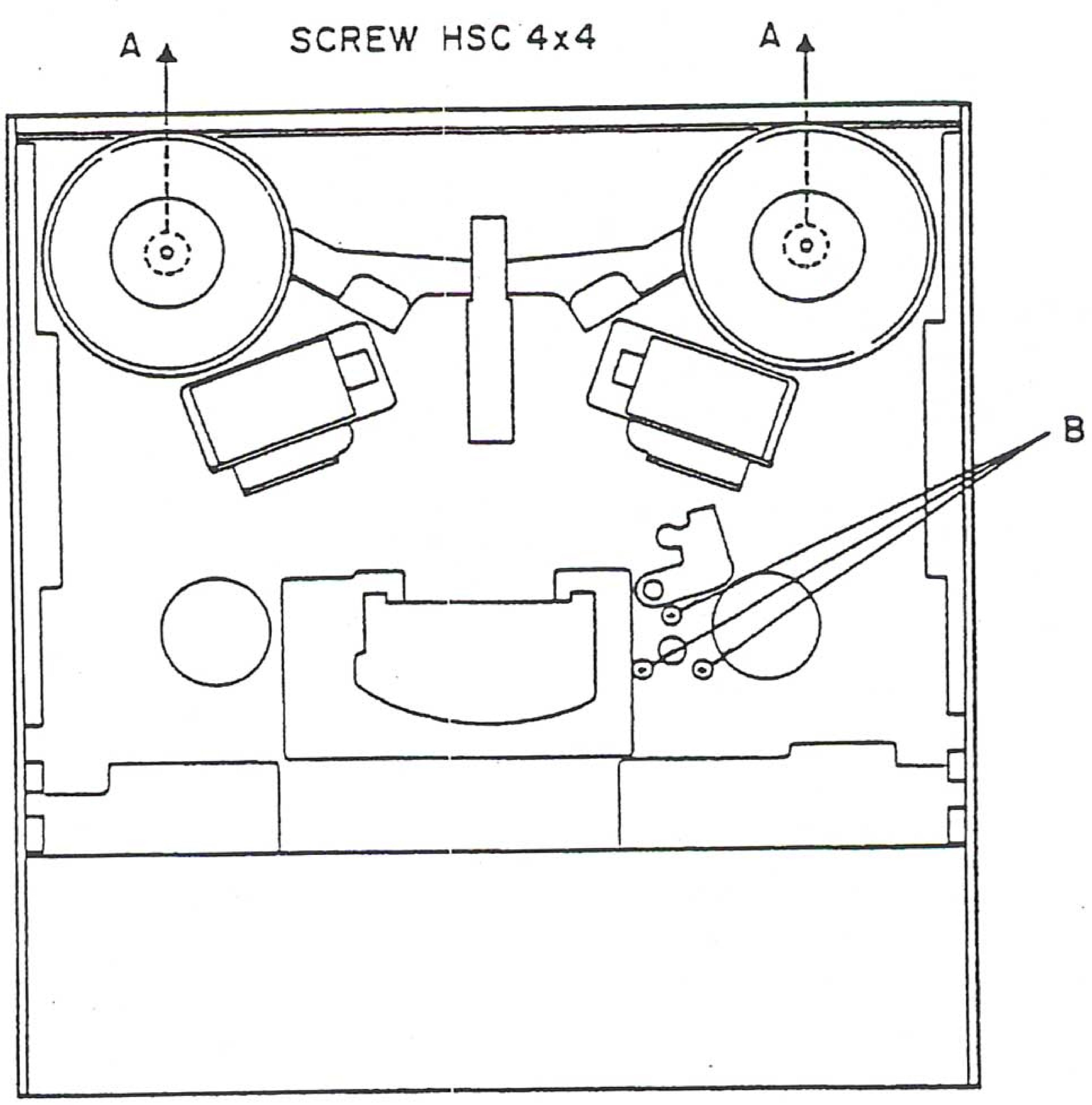


Fig. 6.7

6.8 REEL MOTOR ASSEMBLY (Figs. 6.7 and 6.8)

* Loosen the two (A) screws at left and right to remove the reel drums. Then, remove three each of screw (B) on the left and right side, and the assembly can be lifted out.
* Unsolder the motor lead wires at the terminating PCB.

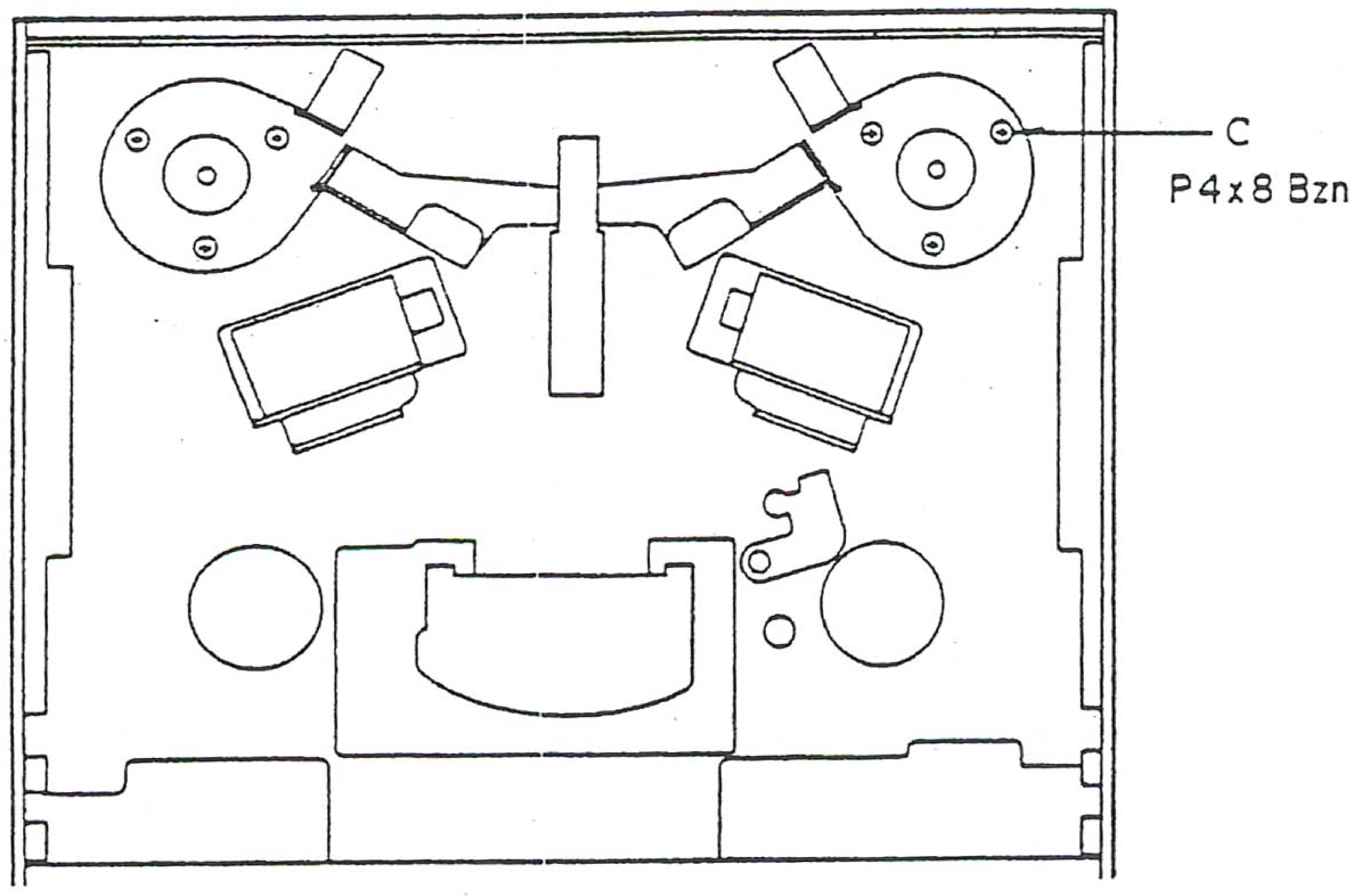


Fig. 6.8

6.9 AMPLIFIER ASSEMBLY (Fig. 6.10)

* Remove all screws as detailed in previous Items 1) and 5).
* Remove the eight screw (A) - four on each side.
* Referring to the EXPLODED VIEW (Page 37), remove the two screws securing the Head Shield Sheet, Ref. No. 7, and unplug the cables from the jacks and connectors on the R/P Amplifier.
* Unsolder the AC cable at the power switch terminals.
* The AMPLIFIER ASSEMBLY can then be removed from the main unit.

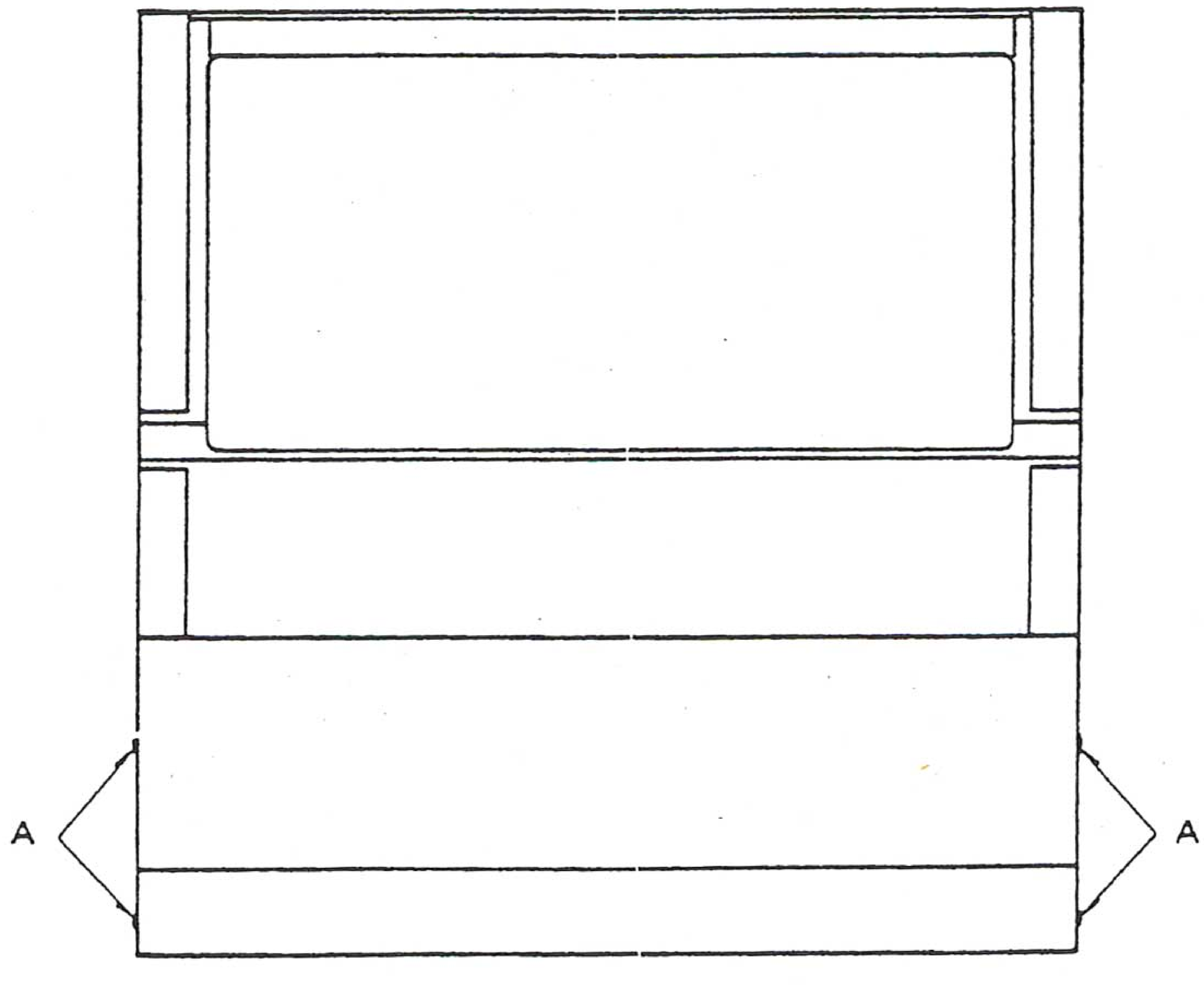


Fig. 6.10

7. EXPLODED VIEWS, PCB ASSEMBLY AND PARTS LIST

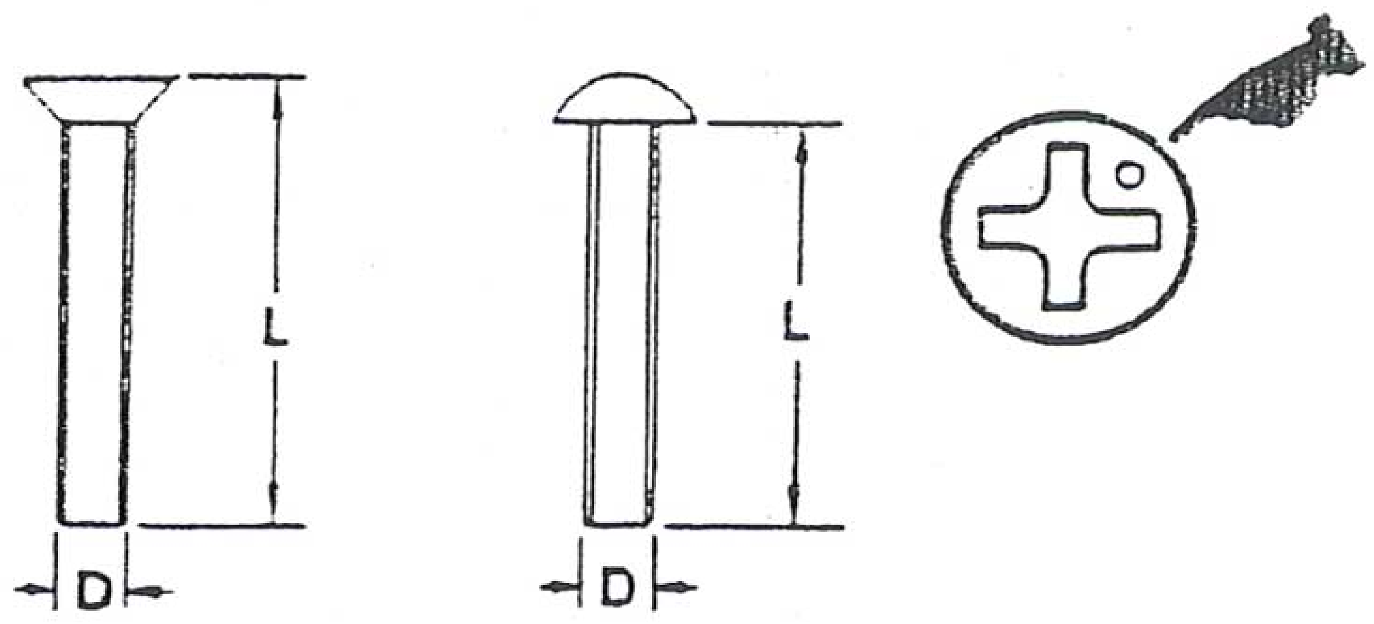
ASSEMBLING HARDWARE CODING LIST

All screws conform to ISO standards, anc have crossrecessed heads, unless otherwise noted.
ISO screws have the head inscribed with a point as in the figure to the right.

FOR EXAMPLE:

B M 3 x 6

- 6 — Length in mm (L)
- 3 — Diameter in mm (D) *
- M — Metric System
- B — Nomenclature



* Inner dia. for washers and nuts

	CODE	NAME	TYPE
MACHINE SCREW	P	Pan Head Screw	
	T	Stove Head Screw (Truss)	
	B	Binding Head Screw	
	F	Flat Countersunk Head Screw	
	O	Oval Countersunk Head Screw	
	PWH	Pan-Washer Head Screw	
WOOD SCREW	RW	Round Head Wood Screw	
	FW	Flat Countersunk Wood Screw	
	OW	Oval Countersunk Wood Screw	
TAPPING SCREW	PTP	Pan Head Self Tapping Screw (B type)	
	PTPWH	Pan-washer Head Self Tapping Screw (B type)	
	TTP	Stove Head Self Tapping Screw (B type)	
	FTP	Flat Countersunk Head Self Tapping Screw (B type)	
TAPTITE SCREW	PTT	Pan Head Tapping Screw	
	PTTWH	Pan-Washer Head Tapping Screw	
	TTT	Stove Head Tapping Screw	
	FTT	Flat Countersunk Head Tapping Screw	
SEMS SCREW	PS	Pan Head Screw with Spring Washer	
	PSW	Pan Head Screw with Washer and Spring Washer	
WASHER, LUG, NUT	W	Flat Washer	
	LW	Spring Washer	
	LWI	Internal Teeth Lock Washer	
	LWE	External Teeth Lock Washer	

	CODE	NAME	TYPE
WASHER, LUG, NUT	TW	Trim Washer (Countersunk)	
	N	Hex Nut	
	L	Lug	
	THW	Thrust Washer (Poly Washer)	
SETSCREW	HSF	Hex Socket Setscrew (Flat Point)	
	HSC	Hex Socket Setscrew (Cup Point)	
	SSF	Slotted Socket Setscrew (Flat Point)	
	SSC	Slotted Socket Setscrew (Cup Point)	
BOLT	HSB	Hex Soket Head Bolt	
	HB	Hex Head Bolt	
RING, PIN	ER	E-Ring (Retaining Washer)	
	CRR	C-Ring (Inner)	
	CRS	C-Ring (Outer)	
	GR	Seeger Ring	
	SP	Spring Pin	
	SR	Snap Ring	
FINISH	Zn	Zinc plating	
	CZn	Colored zinc plating	
	BZn	Black zinc plating	
	Ni	Nickel plating	
	BNi	Black nickel plating	
	Cr	Chrome plating	
	BCr	Black chrome plating	

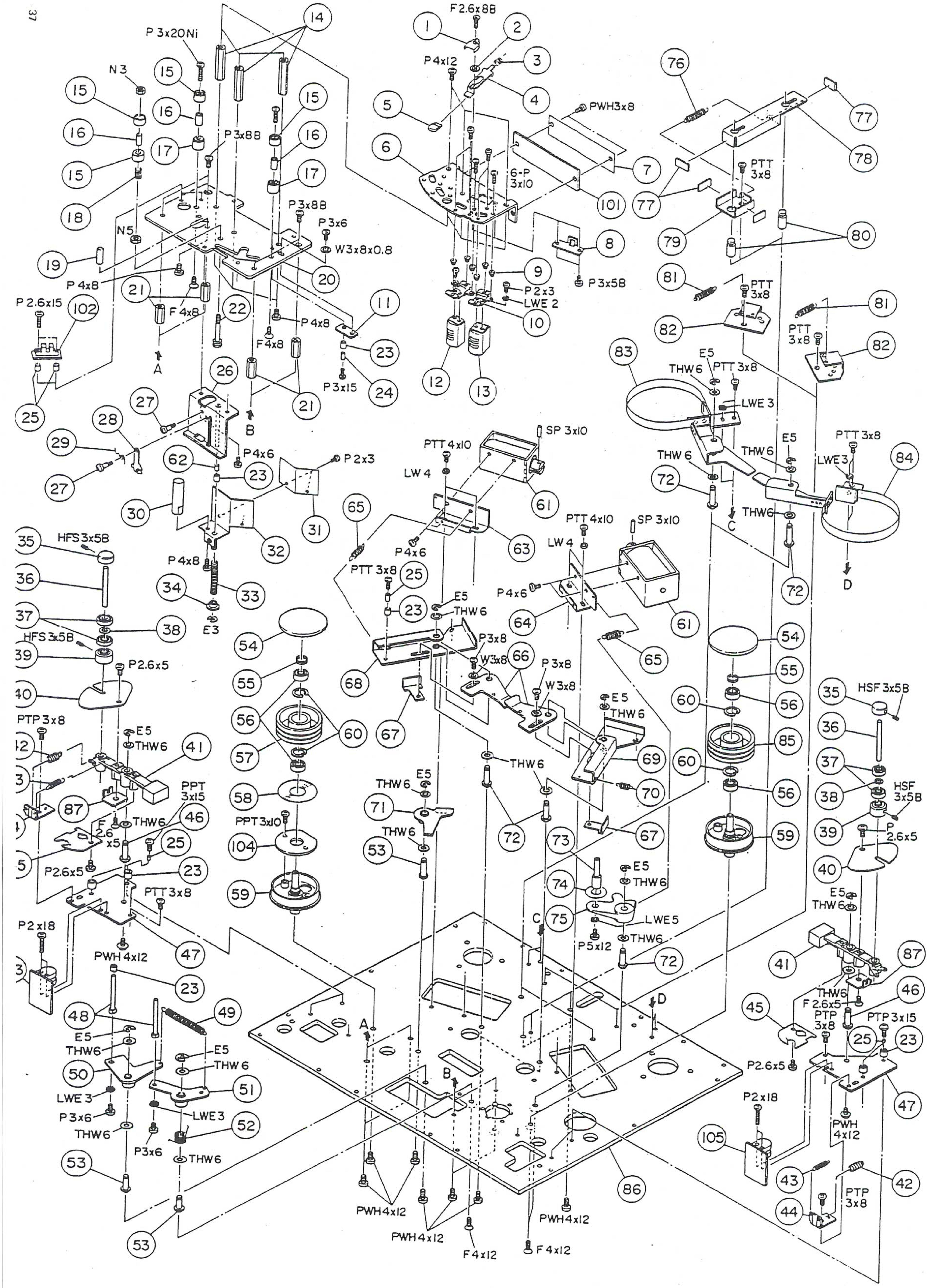
OVERALL EXPLODED VIEW

Ref. No.	Parts No.	Nomenclature
1	8220 2381 00	Cover, heat sink
2	8223 1011 00	Heat sink, B
3	8260 2110 01	Reel clamper assy, 1/4(E-8)
	8260 2110 02	" " " 1/2(E-16)
4	8212 1570 00	Cover, head housing
5	8212 1550 00	Housing, head, 1/4 (E-8)
	8212 1560 00	" " 1/2 (E-16)
6	8212 1700 00	Panel, LED A
7	8212 1710 00	" " B
8	8204 0230 01	Screw, button head,HSB,M3x8
9	8226 0630 00	Escutcheon, C
10	8220 4210 00	Panel, function, 8
	8220 3970 00	" " 16
11	8226 0640 00	Escutcheon, D
12	8212 1610 00	Panel, counter
13	8212 1720 00	Guide, tension roller
14	8223 1270 00	Cap, pinch roller B
15	8260 2030 01	Pinch roller B, 1/4 (E-8)
	8260 2030 02	" " " 1/2 (E-16)
16	8220 3953 00	Panel, transport
17	8212 1580 00	Housing, head base
18	8212 1620 01	Panel, side L
19	8212 1620 02	" " R
20	8207 0021 01	Foot, DA-2023A
21	8220 1702 01	Cover, rear
22	8207 0016 02	Foot, Tranleg, TL-027
23	8216 1550 00	Cushion, amp panel
24	8220 3990 00	Cover, bottom
25	8260 1750 01	Nut, reel clamper (E-8)
	8260 1750 02	" " " (E-16)
101	8234 0092 02	Transistor, 2SD1148-0
102	8236 0282 00	IC, analog, 7815A
103	8236 0263 00	" " 7824A, JRC
104	8236 0263 03	" " " , Toshiba
105	8236 0284 00	" " 7809A
106	8236 0262 00	" " 7805A
107	8234 0092 02	Transistor, 2SD1148-0

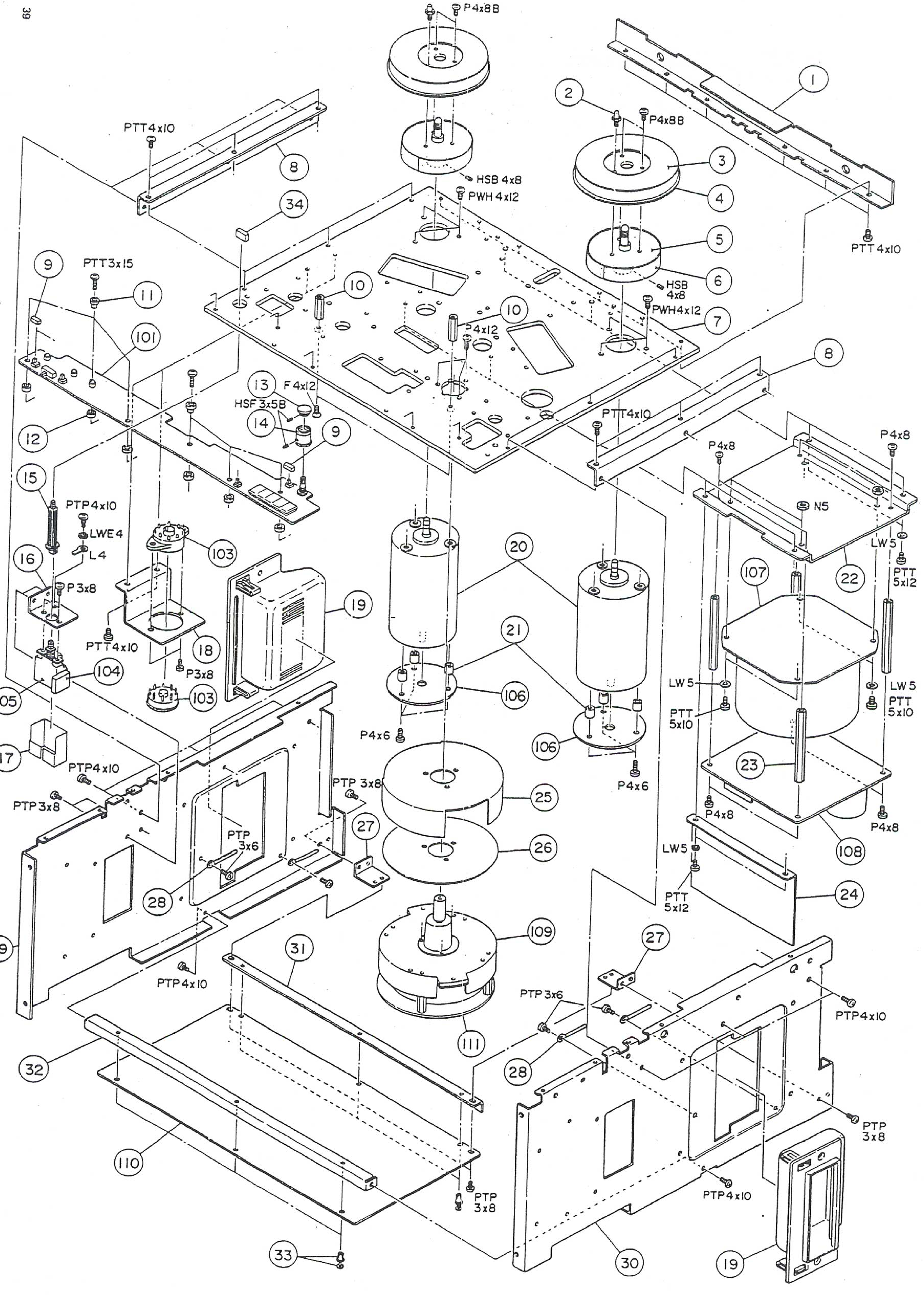
8
W4B
6
7
9
11
8
W4B
10
11
12
25
3
4
5
PTP4x15B
1
102
2
101
103
104
PTP4x15B
105
107
106
6-P3x8
25
8
W4B
P3x8
13
14
15
THW5
3
17
16
PTP
2x6
13
PTPWH
4x12B
18
PTP3x8
PTP3x8
20
PTPWH4x12B
19
PTPWH
4x12B
PTP
3x8B
PTP4x10B
W4B
21
24
23
22
PTP4x15B
PTP4x15B
W4B
PTP4x10B

TRANSPORT EXPLODED VIEW 1

Ref. No.	Parts No.	Nomenclature
1	8220 2621 00	Bracket, lock
2	8223 1130 00	Collar, cue
3	8214 0060 00	Spring
4	8220 3760 00	Arm, cue, C
5	8226 0470 00	Knob, cue
6	8220 3750 00	Base, head, C
7	8216 1540 00	Sheet, head shield, C
8	8220 3770 00	Bracket, cue
9	8214 0990 00	Spring, head B
10	8220 0342 00	Bracket, head
11	8220 4400 00	Bracket, lift stopper
12	8279 0160 00	Head assy, E (E-8)
	8279 0090 00	" " " (E-16)
13	8279 0170 00	Head assy, R/P (E-8)
	8279 0080 00	" " " (E-16)
14	8223 0680 06	Stay, 30.5 (E-8)
	8223 0680 04	" " (E-16)
15	8223 0851 00	Guide, tape C
16	8223 0150 00	" " B (E-8)
	8223 0870 00	" " 1/2 (E-16)
17	8223 0881 00	" " A
18	8214 0970 00	Spring, guide
19	8223 0841 00	Stay, head
20	8220 3721 00	Base, guide B
21	8223 0710 00	Stay, base guide
22	8223 1410 00	Shaft, guide B
23	8216 0070 00	Tube, rubber
24	8204 0130 09	Spacer, 3x10
25	8204 0130 04	Spacer, 3x5
26	8260 1461 00	Base assy, shield
27	8204 0050 01	Sholdek, M2.6, L=4
28	8220 3120 00	Lock B
29	8214 0160 00	Spring
30	8223 0891 00	Button, shield
31	8220 3731 00	Plate, shield, D
32	8260 2071 00	Bracket assy, shield, C
33	8214 0980 00	Spring, shield
34	8223 0900 00	Washer, spring
35	8223 1380 00	Cap, tension roller, B
36	8223 1370 01	Shaft, tens.roller,1/4(E-8)
	8223 1370 02	" " " 1/2(E-16)
37	8204 0210 00	Bearing, 624ZZ
38	8214 1340 00	Spacer, bearing, B
39	8223 1390 00	Base, tension roller, B
40	8216 1570 00	Screen, tension arm
41	8210 0101 00	Arm, tension
42	8214 1280 00	Spring, tension, B
43	8214 1270 00	" " A
44	8220 3800 00	Bracket, tension spring
45	8220 3790 00	Plate, servo, B
46	8223 1360 00	Shaft, tension arm
47	8220 3780 00	Base, tension arm
48	8223 1281 01	Shaft, lifter, B, 1/4(E-8)
	8223 1281 02	" " " 1/2(E-16)
49	8214 1250 00	Spring, lifter, C
50	8260 1420 00	Arm assy, lifter, A
51	8260 1430 00	" " " B
52	8214 0930 00	Spring, arm
53	8223 1310 00	Shaft, arm, B
54	8223 1320 00	Cap, footage roller, B
55	8214 0960 00	Spring, bearing
56	8204 0200 00	Bearing, 696ZZ
57	8260 2090 00	Roller assy, footage, C(E-8)
	8260 1520 00	" " " A(E-16)
58	8218 1540 00	Sticker, strobe
59	8260 2080 01	Base assy, ft. roller1/4(E-8)
	8260 2080 02	" " " " 1/2(E-16)
60	8204 0240 01	Ring, CRR-15
61	8249 0120 00	Solenoid, B
62	8204 0080 06	Spacer, 4x9
63	8220 3710 01	Bracket, solenoid, L
64	8220 3710 02	" " R
65	8214 1310 00	Spring, solenoid arm, B
66	8220 1951 00	Lever A
67	8220 1960 00	Nut
68	8220 1930 00	Lever, solenoid, L
69	8220 1940 00	" " R
70	8214 1120 00	Spring, pinch roller
71	8260 1410 00	Arm assy, joint
72	8223 1290 00	Shaft, arm A
73	8223 1260 01	Shaft, pinch roller,B,1/4(E-8)
	8223 1260 02	" " " " 1/2(E-16)
74	8214 0031 00	Washer, felt
75	8210 0110 00	Arm, pinch roller
76	8214 1070 00	Spring
77	8216 1560 00	Felt, stopper
78	8220 3700 00	Lever, slide, B
79	8220 3690 00	Bracket, stopper
80	8223 1300 00	Shaft, slide, A
81	8214 1030 00	Spring, brake


14
F2.6x8B
1
2
3
4
5
P4x12
P3x20Ni
N3
15
16
17
18
PWH3x8
6
7
6-P
3x10
101
8
P3x5B
9
P2x3
LWE 2
10
12
13
76
77
78
PTT
3x8
79
80
81
82
P3x8B
P3x6
W3x8x0.8
N5
19
20
21
22
P4x8
F4x8
11
23
24
P3x15
P2.6x15
102
25
A
B
26
27
28
29
62
P4x6
P2x3
30
31
32
33
34
E3
83
E5
THW6
PTT 3x8
LWE 3
84
72
C
D
SP 3x10
PTT 4x10
LW4
61
63
64
65
66
67
68
69
70
71
73
74
75
LWE5
P5x12
35
HFS3x5B
36
37
38
39
40
P2.6x5
41
42
PTP 3x8
87
PPT
3x15
46
47
P2x18
PWH 4x12
48
49
50
51
52
LWE 3
P3x6
53
54
55
56
57
58
59
60
104
PPT3x10
85
86
HSF 3x5B
HSF
3x5B
45
F 2.6x5
PTP 3x15
105
43
44
PWH4x12
F4x12

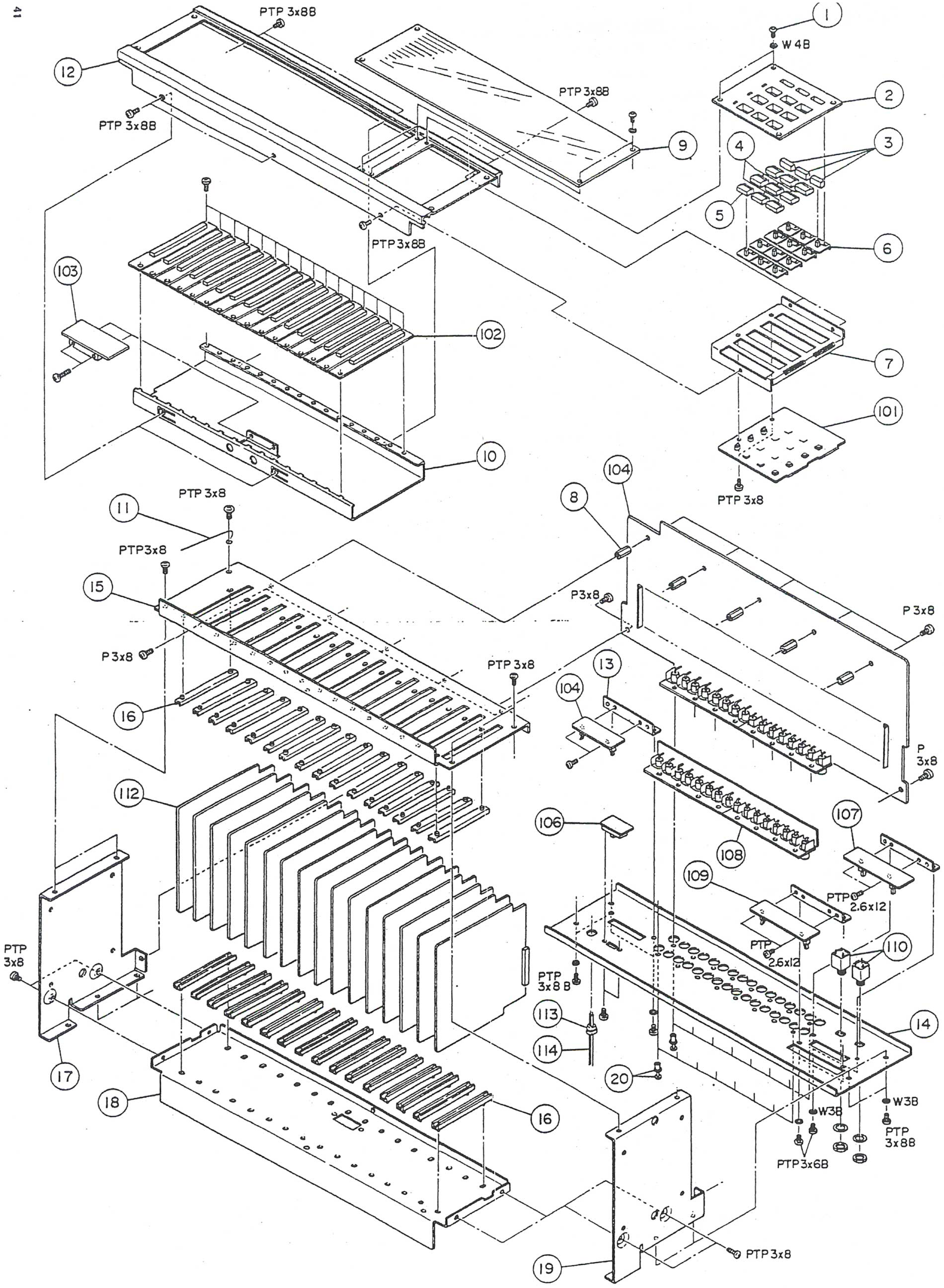
Ref. No.	Parts No.	Nomenclature
82	8220 3680 00	Bracket, spring, B
83	8260 1290 00	Band assy, brake L, B-16
84	8260 1300 00	" " " R, "
85	8223 1330 00	Roller, footage, D (E-8)
	8223 0730 00	" " B (E-16)
86	8220 3630 00	Base, transport, B
87	8220 4310 00	Weight (E-8)
		(Deleted)(E-16)
101	8273 3100 00	PCB assy, Head terminal (E-8)
	8273 3000 00	" " " " (E-16)
102	8273 3270 00	" " tape sensor, E
103	8273 2920 00	" " tension sensor, S
104	8273 2900 00	" " count sensor
105	8273 2910 00	" " tension sensor, T



P4x8B
1
2
P4x8B
3
4
5
6
HSB 4x8
PWH 4x12
HSB 4x8
PWH4x12
7
8
PTT4x10
34
PTT 4x10
9
PTT3x15
11
10
10
P4x12
101
8
PTT4x10
P4x8
P4x8
13
F 4x12
HSF 3x58
14
9
12
N5
LW5
PTT 5x12
22
15
PTP4x10
LWE4
L4
103
20
107
16
P 3x8
19
21
PTT4x10
18
P3x8
104
106
LW 5
LW 5
PTT 5x10
PTT 5x10
105
103
P4x6
106
P4x6
17
PTP4x10
PTP 3x8
25
23
PTP3x8
27
P4x8
P4x8
PTP 3x6
108
26
LW5
24
PTT 5x12
28
29
109
27
31
PTP 3x6
PTP4x10
PTP4x10
111
32
28
PTP 3x8
110
PTP 3x8
PTP4x10
33
30
19

TRANSPORT EXPLODED VIEW 2

Ref. No.	Parts No.	Nomenclature
1	8220 3650 00	Angle, transport, B
2	8223 0630 00	Pin, stopper
3	8216 1590 00	Sheet, reel B
4	8210 0130 00	Table, reel
5	8210 0120 00	Drum, reel
6	8216 1090 00	Felt, brake B
7	8220 3631 00	Base, transport, B
8	8220 3640 00	Angle, transport, C
9	8226 0710 00	Button, push, N
10	8223 0750 05	Spacer, M3x22
11	8207 0019 00	Bushing, TB-300
12	8207 0020 01	Collar, TA-305
13	8226 0750 00	Knob, double, I
14	8226 0740 00	" " L
15	8212 0810 00	Joint arm
16	8220 3940 00	Bracket, power switch, B
17	8216 0270 00	Cover, switch, A series
18	8220 2141 00	Bracket, voltage selector
19	8212 1130 00	Grip
20	8249 0140 00	Motor, reel
21	8204 0380 01	Spacer, 8M4.10
22	8220 2131 00	Bracket, transformer
23	8223 0680 07	Stay, 100
24	8220 2560 00	Plate, shield L
25	8220 2631 00	Shield, D motor
26	8220 2690 00	Plate, shield
27	8220 3670 00	Bracket, control
28	8207 0005 00	Clamp, cable, SCF50226
29	8220 3661 01	Chassis, side, BL
30	8220 3661 02	" " BR
31	8220 3810 00	Bracket, control, C
32	8220 3820 00	" " D
33	8207 0004 00	Plastirivet, #980
34	8226 0500 00	Button, push I
101	8273 3530 00	PCB assy, funct./disp. (E-8)
	8273 2570 00	" " " " (E-16)
102		(Deleted)
103	8245 0630 00	Connector, voltage selector
104	8256 0080 00	Sparkiller, DM, NSKG115
	8256 0090 00	" UL, NSK135
	8256 0100 00	" CSA, NSK132
	8256 0110 03	" SEMKO, PME265
105	8253 0340 00	Switch, push, power, SDGA1P
	8253 0350 00	" " " SDGA3P
106	8251 2510 00	PCB, terminal, reel motor
107	8242 0910 00	Transformer, powr, E
108	8273 3070 01	PCB assy,pwr sup,FCA/DM/CND
	8273 3070 02	" " " " EUR/UK/AUS
109	8270 3580 03	Motor assy, direct capstan(E-8
	8273 3580 05	" " " " (E-1
110	8273 2700 05	PCB assy, system control(E-8/1
111	8273 2580 03	" " DD capstan (E-8)
	8273 2580 05	" " " " (E-16)

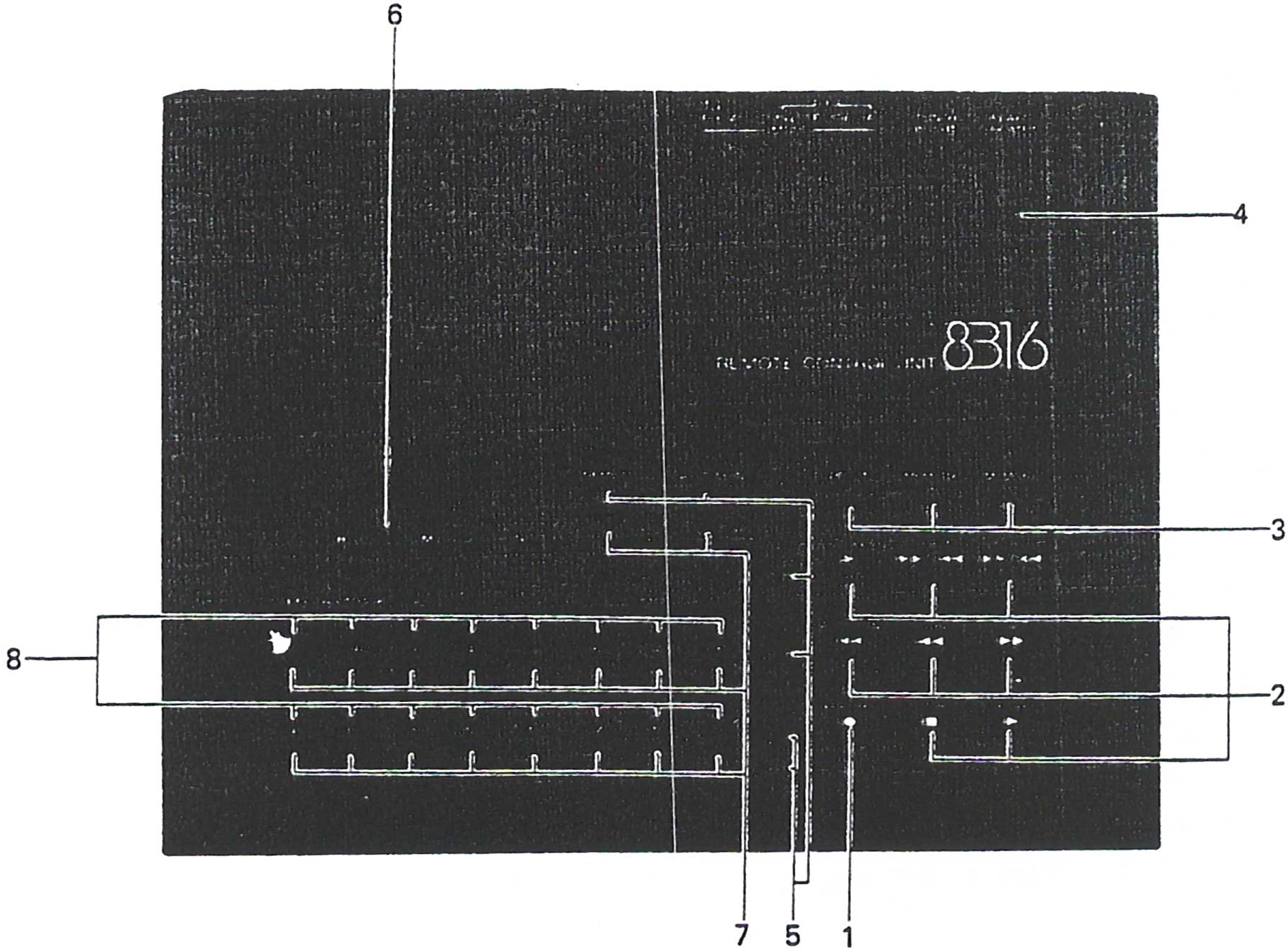


PTP 3x8B
1
W 4B
12
2
PTP 3x8B
PTP 3x8B
3
4
9
5
6
PTP 3x8B
103
102
7
101
10
PTP 3x8
104
8
11
PTP 3x8
PTP3x8
15
P3x8
P 3x8
P 3x8
PTP 3x8
13
104
16
P
3x8
112
106
107
108
109
PTP
2.6x12
PTP
2.6x12
110
PTP
3x8
PTP
3x8 B
113
14
114
20
17
W3B
W3B
18
16
PTP
3x8B
PTP3x6B
19
PTP 3x8

AMPLIFIER EXPLODED VIEW

Ref. No.	Parts No.	Nomenclature
1	8204 0230 01	Screw, button head, HSB, M3x8
2	8212 1520 00	Panel, control, E
3	8226 0500 00	Button, push I
4	8226 0480 01	" " G 01
5	8226 0480 02	" " G 02
6	8212 1230 00	Hinge, button
7	8220 3900 00	Bracket, control switch
8	8223 0750 01	Spacer, M3.15.4
9	8212 1680 00	Panel, bargraph (E-8)
	8212 1530 00	" " (E-16)
10	8220 4200 00	Bracket, meter, (E-8)
	8220 3930 00	" " (E-16)
11	8214 1350 00	Spring, panel open B
12	8220 3890 00	Panel, amplifier
13	8220 2900 00	Bracket, connector
14	8220 4190 00	Panel, rear (E-8)
	8220 3870 00	" " (E-16)
15	8220 3840 00	Bracket, R/P amp, front
16	8212 0280 00	Guide, PCB
17	8220 3830 01	Bracket, R/P amp, L
18	8220 3851 00	" " " rear
19	8220 3830 02	" " " R
20	8207 0006 02	Plasti rivet, #920
101	8273 3010 00	PCB assy, control SW
102	8256 0260 00	Module, bargraph, 12 dot, amber
103	8273 3060 01	PCB assy, meter connector(E-8)
	8273 3060 00	" " " " (E-16)
104	8273 2960 00	" " cnctr board (E-8)
	8273 2950 00	" " " " (E-16)
105		(Deleted)
106	8273 3490 00	PCB assy, NR switch (E-16)
107	8273 3280 00	" " cnctr, synchro, E
108	8273 3500 01	" " line out (E-8)
	8273 3500 02	" " " " (E-16)
109	8273 3540 00	" " cnctr, remote (E-8)
	8273 3250 00	" " " " (E-16)
110	8276 3430 05	Cable assy, foot switch, E
111		(Deleted)
112	8273 2720 02	PCB sub-assy, R/P amp.(E-8)
	8273 2720 01	" " " " (E-16)
113	8207 0002 08	Bushing, SR-4N-4
	8207 0002 14	" SR-5N-4
114	8276 3130 00	Cord, power, 3 cond, EUR
	8276 3140 00	" " " UK
	8276 0030 00	" " DM
	8276 0050 00	" " HYDRO
	8276 3150 00	" " 3 cond, AUS

REMOTE CONTROL UNIT



Ref. No.	Parts No.	Nomenclature
1	8226 0480 02	Button, push, G02
2	8226 0480 01	" " G01
3	8226 0500 00	" " I
4	8260 1991 01	Panel assy, 8308
	8260 1991 02	" " 8316
5	8234 0052 00	Opto, LED, GRN, GL-2NG5
6	8234 0045 00	" " 7 segment, GL-8P03
7	8226 0621 00	Button, push, C-1
8	8234 0051 00	Opto, LED, RED, GL-2PR5

FUNCTION/DISPLAY PCB ASS'Y

FUNCTION/DISPLAY PCB ASSY, Assy No. 8273 3530 00

Ref. No.	Parts No.	Nomenclature
	8251 2620 00	PCB, function/display, E-8
	IC's	
U01 ∿ 08	8234 0180 00	Photo-coupler, PC815
	TRANSISTORS	
Q001	8234 0003 03	2SA1015GR
Q002	8234 0002 03	2SC1815GR
	DIODES	
D01 ∿ 09	8234 0061 00	LED, red, GL-5HD22
D10 ∿ 18	8234 0082 00	DS442X-FAI
D19,20	8234 0051 00	LED, red, GL-2PR5
D21 ∿ 25	8234 0045 00	" , 7 segment, GL-8P03
	CARBON RESISTORS	

All resistors 1/4W, ±5% unless noted otherwise.

Ref. No.	Parts No.	Nomenclature
R01	8230 0062 23	Vertical mtg, 22KΩ
R02	8230 0061 62	" " 1.6KΩ
R03	8230 0062 23	" " 22KΩ
R04	8230 0061 61	" " 160Ω
R05 ∿ 12	8230 0063 92	" " 3.9KΩ
R13	8230 0064 72	" " 4.7KΩ
R14	8230 0062 22	" " 2.2KΩ
R15	8230 0061 02	" " 1KΩ
R16	8230 0062 21	" " 220Ω
R17	8230 0062 71	" " 270Ω
	MISCELLANEOUS	
S01 ∿ 10	8253 0550 00	Switch, push, SPH121A
	8245 0700 02	Connector, IC socket, 14P
	8216 1710 00	Tube, LED
	8212 1221 00	Spacer, LED, W
	8212 0520 00	" "
	8276 4350 12	Cable assy,9073,5P,wht,120mm
	8276 4343 24	" " " 4P,yel,240mm
	8276 4370 40	" " " 7P,wht,400mm
	8276 4380 45	" " " 8P, " 450mm
	8276 3910 45	" " shield,2P," "
	8276 4322 28	" " 9073,2P,red,280mm
	8276 4352 45	" " " 5P, " 450mm
	8276 2800 25	" " 3P, wht, 250mm
R501	8240 0520 00	Pot, vernier, 16Φ, 5KΩ, B

E-16 CONNECTOR BOARD PCB ASS'Y
E-8 CONNECTOR BOARD PCB ASS'Y

E-16 CONNECTOR BOARD PCB ASSY, Assy No. 8273 2950 00
E-8 " " " " Assy No. 8273 2960 00

Ref. No.	Parts No.	Nomenclature
	8251 2591 00	PCB, con'ctor board, E-8/E-16
	IC's	
U01,02	8236 0033 01	Digital, MC14071B(E-8/16)
U03,04	"	" " (E-16)
U05,06	"	" " (E-8/16)
U07,08	"	" " (E-16)
U09	8236 0001 01	" MC14001B(E-8/16)
U10	8236 0005 01	" MC14011B(E-8/16)
U11	8236 0505 02	" UN1212 (E-8/16)
U12	8236 0505 03	" UN1213 (")
U13	8236 0505 02	" UN1212 (")
	TRANSISTORS	
Q001	8234 0003 03	2SA1015GR
Q002∿004	8234 0002 05	2SC1815GR
Q005∿007	8234 0003 03	2SA1015GR
	DIODES	
D01 ∿ 04	8234 0040 00	Array, MA154WA (E-8/16)
D05 ∿ 08	"	" " (E-16)
D09 ∿ 12	"	" " (E-8/16)
D13 ∿ 16	"	" " (E-16)
D17 ∿ 20	8234 0082 00	DS442X-FAI (E-8/16)
D21 ∿ 24	"	" (E-16)
D25 ∿ 28	"	" (E-8/16)
D29 ∿ 32	"	" (E-16)
D33	8234 0080 00	DS442VB5 (E-8/16)
D34	8234 0082 00	DS442X-FAI (")
D35 ∿ 37	8234 0080 00	DS442VB5 (")
D38	8234 0082 00	DS442X-FAI (")
D39	8234 0080 00	DS442VB5 (")
D40	8234 0007 00	1N4002 (")
	CARBON RESISTORS	

All resistors 1/4W, ±5% unless noted otherwise.

Ref. No.	Parts No.	Nomenclature
R01	8230 0510 04	1/8W,7.5L-10Kx4,RKC-E(E-8/16)
R02	"	" " " (E-16)
R03	"	" " " (E-8/16)
R04	"	" " " (E-16)
R05 ∿ 08	8230 0041 04	Vertical mtg, 100KΩ(E-8/16)
R09 ∿ 12	"	" " " (E-16)
R13 ∿ 16	"	" " " (")

Ref. No.	Parts No.	Nomenclature
R17 ∿ 20	8230 0041 04	Vertical mtg, 100KΩ(E-16)
R21	8230 0044 71	" " 470Ω(E-8/16)
R22	8230 0041 53	" " 15KΩ(E-8/16)
R23,24	8230 0041 23	" " 12KΩ(")
R25	8230 0044 73	" " 47KΩ(")
R26,27	8230 0042 23	" " 22KΩ(")
R28	8230 0044 73	" " 47KΩ(")
R29	8230 0041 03	" " 10KΩ(")
R30	8230 0042 23	" " 22KΩ(")
R31	8230 0044 72	" " 4.7KΩ(")
R32	8230 0042 23	" " 22KΩ(")
R33	8230 0041 03	" " 10KΩ(")
R34	8230 0041 04	" " 100KΩ(")
R35	8230 0041 64	" " 160KΩ(")
R36	8230 0041 63	" " 16KΩ(")
R37	8230 0041 03	" " 10KΩ(")
R38	8230 0041 04	" " 100KΩ(")
R39	8230 0044 74	" " 470KΩ(")
R40	8230 0041 04	" " 100KΩ(")
R41	8230 0044 73	" " 47KΩ(")
R42,43	8230 0041 03	" " 10KΩ(")
R44	8230 0041 04	" " 100KΩ(")
R45	8230 0043 91	" " 390Ω(")
R46	8230 0041 03	" " 10KΩ(")
R47	8230 0042 24	" " 220KΩ(")
R48	8230 0044 71	" " 470Ω(")
R49	8230 0042 22	" " 2.2KΩ(")
R50	8230 0041 03	" " 10KΩ(")
R51	8230 0042 23	" " 22KΩ(")
R52	8230 0042 24	" " 220KΩ(")
R53	8230 0044 71	" " 470Ω(")
R54	8230 0042 21	" " 220Ω(")
R55	8230 0041 01	" " 100Ω(")
R56	8230 0042 22	" " 2.2KΩ(")
R57	8230 0041 84	" " 180KΩ(")
R58	8230 0042 73	" " 27KΩ(")
R59	8230 0041 01	" " 100Ω(")
R60	8230 0041 23	" " 12KΩ(")
R61	8230 0046 82	" " 6.8KΩ(")
R62 ∿ 65	8230 0043 61	" " 360Ω(")
R66 ∿ 69	"	" " " (E-16)
R70 ∿ 72	"	" " " (E-8/16)
R73 ∿ 76	"	" " " (E-16)
R77	8230 0044 73	" " 47KΩ(E-8/16)
R78,79	8230 0572 41	Flat mtg, 1/2W,240Ω(")

Ref. No.	Parts No.	Nomenclature
	CAPACITORS	
ALU = Electrolytic		
CER = Ceramic		
PES = Mylar		
C01 ∿ 04	8232 0351 03	CER, 50V, 0.01µF, YF(E-8/16)
C05 ∿ 08	"	" " " " (E-16)
C09 ∿ 12	"	" " " " (E-8/16)
C13 ∿ 16	"	" " " " (E-16)
C17	8232 0032 26	ALU,16V,22µF,20%, SM(E-8/16)
C18	8232 0061 05	" 50V, 1µF, " " (")
C19	8232 0351 03	CER, " 0.01µF, YF (")
C20	8232 0062 25	ALU, " 2.2µF,20%,SM(")
C21	8232 0061 05	" " 1µF, " " (")
C22	8232 0722 26	" 25V,22µF," LR-VB(")
C23		(Deleted)
C24	8232 0351 03	CER,50V, 0.01µF, YF (E-8/16)
C25	8232 0041 08	ALU,25V,1000µF,20%,SM(")
C26	8232 0034 76	" 16V,47µF, " " (E-16)
C27	8232 0031 06	" " 10µF, " " (")
C28		(Deleted)
C29	8232 0034 76	ALU,16V,47µF, 20%, SM(E-8/16)
C30	8232 0031 06	" " 10µF, " " (")
C31		(Deleted)
C32	8232 0023 37	ALU,10V,330µF, " " (")
C33 ∿ 36	8232 0261 03	PES,50V,0.01µF,5%,AMX(")
C37 ∿ 40	"	" " " " " (E-16)
C41 ∿ 43	"	" " " " " (E-8/16)
C44 ∿ 47	"	" " " " " (E-16)
C48	8232 0033 36	ALU,16V,33µF, 20%, SM(E-8/16)
C49 ∿ 51	8232 0351 03	CER, 50V, 0.01µF, YF (")
	MISCELLANEOUS	
J01 ∿ 04	8245 0490 19	Jack, 5256-19A, wht (E-8/16)
J05 ∿ 08	"	" " " (E-16)
J09 ∿ 12	"	" " " (E-8/16)
J13 ∿ 16	"	" " " (E-16)
J17	8245 0530 05	" 8263, 5, " (E-8/16)
J18	"	" " " " (E-16)
J19	"	" " " " (E-8/16)
J20	"	" " " " (E-16)
J21	8245 0070 05	" 5129-05A (E-8/16)
J22	8245 0530 23	" 8263, 3, red (")
J23	8245 0070 03	" 5129-03A (")
J24	8245 0070 02	" 5129-02A (")
J25	8245 0070 03	" 5129-03A (")

Ref. No.	Parts No.	Nomenclature
J26	8245 0070 04	Jack, 5129-04A (E-8/16)
J27	8245 0530 07	" 8263, 7, wht (")
J28	8245 0530 44	" " 4, blk (")
J29	8245 0530 05	" " 5, wht (")
J30	8245 0530 04	" " 4, " (")
J31,32	8245 0530 24	" " " red (E-16)
J33,34	8245 0530 64	" " " yel (E-8/16)
J35,36	8245 0530 44	" " " blk (E-16)
J37	8245 0070 02	" 5129-02A (E-8/16)
J38	"	" " (E-16)
J39	"	" " (E-8/16)
J40	8245 0800 00	" RCA, 4P, blk (")
J41	"	" " " " (E-16)
J42	8245 0720 00	" " " " (E-8/16)
J43	"	" " " " (E-16)
L001	8242 0090 00	Inductor, bias (E-16)
L002	"	" " (E-8/16)
	8276 3110 00	Cable assy,meter,B-16(")
	8276 3750 18	" " GND lug D3(")

E-16 LINE OUT PCB ASS'Y
E-8 LINE OUT PCB ASS'Y

E-8 LINE OUT PCB ASSY, Assy No. 8273 3500 01
E-16 " " " " Assy No. 8273 3500 02

Ref. No.	Parts No.	Nomenclature
	8251 2600 03	PCB, line out, E-8/E-16
J01,02	8245 0800 00	Jack, RCA, 4P, blk (E-8)
J01 ∿ 04	"	" " " " (E-16)
	8276 4350 12	Cable assy,9073,5P,wht(E-8)
	"	" " " " " (E-16)

E-16 NR SWITCH PCB ASS'Y

E-16 NR SWITCH PCB ASSY, Assy No. 8273 3490 00

Ref. No.	Parts No.	Nomenclature
	8251 2600 04	PCB, NR switch, E-16
S001	8253 0400 04	Switch, slide,2-2,SSB022,L6
	8276 2400 12	Cable assy, 3P, red, 120mm

E-16 R/P AMP PCB ASS'Y
E-8 R/P AMP PCB ASS'Y

E-16 R/P AMP PCB ASSY (w/o switch)
Assy No. 8273 3430 00
" " " " " (w/switch)
Assy No. 8273 3440 00
E-8 R/P AMP PCB ASSY (w/o switch)
Assy No. 8273 3450 00
" " " " " (w/switch)
Assy No. 8273 3460 00

Ref. No.	Parts No.	Nomenclature
	8251 2610 01	PCB, R/P amp, E-8/E-16
		IC's
U001	8236 0315 00	NJM4560SD
U002	8236 0291 00	Dolby,TEA0665
U003	8236 0283 00	NJM3404AD
U004	8256 0240 00	Trap,S,100KHz,10MH
U005	8256 0130 00	Lo-pass filter,25KHz
U006	8256 0120 00	Module, skewing
U007	8256 0240 00	Trap,S, 100KHz, 10MH
U008	8236 0196 02	Driver, RN1002
		TRANSISTORS
Q001	8234 0091 01	FET, 2SK170GR
Q002	8234 0002 06	2SC1815Y,GR,BL
Q003		(Deleted)
Q004	8234 0006 02	2SC2878B
Q005	8234 0003 04	2SA1015Y,GR
Q006	8234 0002 06	2SC1815Y,GR,BL
Q007	8234 0006 02	2SC2878B
Q008	8234 0076 02	2SC1627Y
Q009	8234 0002 03	2SC1815GR
Q010	8234 0002 06	2SC1815Y,GR,BL
Q011	8234 0001 11	FET, 2SK117GR
Q012	8234 0002 03	2SC1815GR
Q013,14	8234 0002 07	2SC1815GR,BL
		DIODES
D01 ∿ 06	8234 0080 00	DS442VB5
D07		(Deleted)
D08,09	8234 0080 00	DS442VB5
D10	8234 0007 00	1N4002
D11	8234 0080 00	DS442VB5
D12	8234 0019 04	Zener, 05AZ3.9Z
D13 ∿ 17	8234 0080 00	DS442VB5
D18	8234 0019 05	Zener, 05AZ15Z

CARBON RESISTORS

All resistors 1/4W, ±5% unless noted otherwise.

Ref. No.	Parts No.	Nomenclature
R001	8230 0045 10	Vertical mtg, 51Ω
R002	8230 0041 00	" " 10Ω
R003	8230 0041 03	" " 10KΩ
R004	8230 0046 82	" " 6.8KΩ
R005	8230 0235 62	" " 5.6KΩ, 1%
R006	8230 0232 21	" " 220Ω
R007	8230 0041 01	" " 100Ω
R008	8230 0042 73	" " 27KΩ
R009	8230 0041 03	" " 10KΩ
R010	8230 0043 33	" " 33KΩ
R011	8230 0043 91	" " 390Ω
R012	8230 0044 74	" " 470KΩ
R013	8230 0042 71	" " 270Ω
R014	8230 0043 92	" " 3.9KΩ
R015	8230 0048 23	" " 82KΩ
R016	8230 0044 71	" " 470Ω
R017	8230 0042 73	" " 27KΩ
R018	8230 0043 32	" " 3.3KΩ
R019	8230 0045 62	" " 5.6KΩ
R020	8230 0043 32	" " 3.3KΩ
R021	8230 0041 02	" " 1KΩ
R022	8230 0238 23	" " 82KΩ, metal, 1%
R023	8230 0235 12	" " 5.1KΩ " "
R024	8230 0046 83	" " 68KΩ
R025	8230 0232 22	" " 2.2KΩ, metal, 1%
R026	8230 0238 23	" " 82KΩ, " "
R027	8230 0041 83	" " 18KΩ
R028	8230 0044 73	" " 47KΩ
R029	8230 0042 22	" " 2.2KΩ
R030	8230 0042 23	" " 22KΩ
R031	8230 0041 01	" " 100Ω
R032	8230 0041 84	" " 180KΩ
R033	8230 0043 32	" " 3.3KΩ
R034	8230 0041 53	" " 15KΩ
R035	8230 0041 04	" " 100KΩ
R036	8230 0042 21	" " 220Ω
R037	8230 0041 53	" " 15KΩ
R038	8230 0048 21	" " 820Ω
R039	8230 0043 92	" " 3.9KΩ
R040, 41	8230 0049 12	" " 9.1KΩ
R042	8230 0042 23	" " 22KΩ
R043	8230 0041 53	" " 15KΩ

Ref. No.	Parts No.	Nomenclature
R044	8230 0044 72	Vertical mtg, 4.7KΩ
R045	8230 0044 73	" " 47KΩ
R046	8230 0041 03	" " 10KΩ
R047	8230 0041 82	" " 1.8KΩ
R048	8230 0041 04	" " 100KΩ
R049	8230 0043 33	" " 33KΩ
R050	8230 0044 72	" " 4.7KΩ
R051	8230 0043 33	" " 33KΩ
R052	8230 0041 04	" " 100KΩ
R053	8230 0042 72	" " 2.7KΩ
R054		(Deleted)
R055	8230 0041 52	Vertical mtg, 1.5KΩ
R056	8230 0041 22	" " 1.2KΩ
R057	8230 0041 53	" " 15KΩ
R058	8230 0041 09	" " 1Ω
R059	8230 0041 53	" " 15KΩ
R060	8230 0048 22	" " 8.2KΩ
R061	8230 0042 72	" " 2.7KΩ
R062	8230 0042 20	" " 22Ω
R063	8230 0044 73	" " 47KΩ
R064	8230 0045 62	" " 5.6KΩ
R065	8230 0045 61	" " 560Ω
R066	8230 0041 53	" " 15KΩ
R067	8230 0041 03	" " 10KΩ
R068	8230 0043 93	" " 39KΩ
R069	8230 0044 73	" " 47KΩ
R070		(Deleted)
R071	8230 0041 03	Vertical mtg, 10KΩ
R072	8230 0041 53	" " 15KΩ
R073	8230 0046 22	" " 6.2KΩ
R074	8230 0042 72	" " 2.7KΩ
R075	8230 0042 03	" " 20KΩ
R076	8230 0041 52	" " 1.5KΩ
R077	8230 0043 33	" " 33KΩ
R078	8230 0042 23	" " 22KΩ
R079	8230 0041 03	" " 10KΩ
R080	8230 0043 92	" " 3.9KΩ
R081		(Deleted)
R082	8230 0043 61	" " 360Ω
R083	8230 0046 82	" " 6.8KΩ
R084	8230 0042 23	" " 22KΩ
R085	8230 0044 72	" " 4.7KΩ
R086	8230 0045 61	" " 560Ω
R087	8230 0041 53	" " 15KΩ
R088	8230 0048 23	" " 82KΩ
R089	8230 0042 70	" " 27Ω

Ref. No.	Parts No.	Nomenclature
R090	8230 0043 31	Vertical mtg, 330Ω
R091	8230 0042 23	" " 22KΩ
R092	8230 0043 33	" " 33KΩ
R093	8230 0041 53	" " 15KΩ

CAPACITORS

ALU = Electrolytic
CER = Ceramic
PES = Mylar
PPR = Polypropylene

Ref. No.	Parts No.	Nomenclature
C001	8232 0261 02	PES, 50V, 0.001μF, 5%, AMZ
C002	8232 0511 01	CER, " 100pF, 10%, SL
C003	8232 0032 27	ALU, 16V, 220μF, 20%, SM
C004	8232 0851 05	" 50V, 1μF, 20%, LR-BP
C005	8232 0342 71	CER, " 270pF, 10%, YB
C006	8232 0024 76	ALU, 10V, 47μF, 20%, SM
C007	8232 0261 53	PES, 50V, 0.015μF, 5%, AMZ
C008	8232 0512 20	CER, " 22pF, 10%, SL
C009	8232 0031 06	ALU, 16V, 10μF, 20%, SM
C010,011	8232 0061 05	" 50v, 1μF, " "
C012	8232 0304 72	PPR, 100V,0.0047μF, 2%, APS
C013	8232 0031 06	ALU, 16V, 10μF, 20%, SM
C014	8232 0264 73	PES, 50V, 0.047μF, 5%, AMZ
C015	8232 0062 24	ALU, 50V, 0.22μF, 20%, SM
C016	8232 0066 84	" " 0.68μF, " "
C017	8232 0022 27	" 10V, 220μF, " "
C018	8232 0301 03	PPR, 100V, 0.01μF, 2%, APS
C019	8232 0304 72	" 50V, 0.0047μF," "
C020	8232 0031 06	ALU, 16V, 10μF, 20%, SM
C021	8232 0264 73	PES, 50V, 0.047μF, 5%, AMZ
C022	8232 0062 24	ALU, " 0.22μF, 20%, SM
C023	8232 0C66 84	" " 0.68μF, " "
C024	8232 0041 07	" 25V, 100μF, " "
C025	8232 0054 75	" 35V, 4.7μF, " "
C026	8232 0318 21	PPR, 100V, 820pF, 5%, APS
C027	8232 0031 06	ALU, 16V, 10μF, 20%, SM
C028	8232 0033 36	" " 33μF, " "
C029	8232 0711 06	" " 10μF, " LR-VB
C030	8232 0033 36	" " 33μF, " SM
C031	8232 0323 30	CER, 50V, 33pF, 5%, NPO
C032	8232 0263 32	PES, " 0.0033μF, 5%, AMZ
C033	8232 0063 34	ALU, " 0.33μF, 20%, SM
C034	8232 0711 06	" 16V, 10μF, 20%, LR-VB
C035	8232 0262 72	PES, 50V, 0.0027μF, 5%, AMZ
C036	8232 0021 07	ALU, 10V, 100μF, 20%, SM
C037	8232 0054 75	ALU, 35V, 4.7μF, 20%, SM
C038	8232 0266 83	PES, 50V, 0.068mF, 5%, AMZ
C039	8232 0261 03	" " 0.01μF, " "
C040	8232 0024 76	ALU, 10V, 47μF, 20%, SM
C041	8232 0031 06	" 16V, 10μF, " "
C042	8232 0263 33	PES, 50V, 0.033μF, 5%, AMZ
C043	8232 0031 06	ALU, 16V, 10μF, 20%, SM
C044	8232 0042 26	" 25V, 22μF, " "
C045	8232 0031 06	" 16V, 10μF, " "
C046	8232 0721 06	ALU, 25V, 10μF, " LRBV
C047	8232 0062 25	ALU, 50V, 2.2μF, 20%, SM
C048,49	8232 0054 75	" 35V, 4.7μF, " "
C050	8232 0316 82	PPR, 100V, 0.0068μF,5%,APS
C051	8232 0061 05	ALU, 50V, 1μF, 20%, SM
C052	8232 0054 75	" 35V, 4.7μF, " "
C053	8232 0263 93	PES, 50V, 0.039μF, 5%, AMZ
C101	8256 0250 01	Trimmer, CTZ83K, 150pF

MISCELLANEOUS

Ref. No.	Parts No.	Nomenclature
R101	8231 0045 02	Pot, trimmer, carbon, 5KΩ,B
R102,103	8231 0041 03	" " " 10KΩ,B
R104	8231 0045 03	" " " 50KΩ,B
R105	8231 0045 02	" " " 5KΩ,B
R106	8231 0042 02	" " " 2KΩ,B
R107	8231 0042 21	" " " 220Ω,B
R108	8231 0041 03	" " " 10KΩ,B
S001	8253 1040 02	Switch, push, 1-2, SPPJ3-E (for PCB assy w/switch only)
	8276 0010 00	Pin, header
	8276 2470 14	Cable assy, 2 cond, 3P, wht
J001	8245 0880 19	Jack, 5244-19AHPB, wht
K001	8248 0090 04	Relay, G6E-134P, 12V

ERASE TRANSFORMER C PCB ASS'Y

ERASE TRANSFORMER C PCB ASSY, Assy No. 8273 3110 00

Ref. No.	Parts No.	Nomenclature
	8251 2610 02	PCB, erase transformer
J001	8245 0360 05	Jack, 5P, W, 3094-5A
T001	8242 0920 00	Transformer, erase, A

E-16 HEAD TERMINAL PCB ASS'Y
E-8 HEAD TERMINAL PCB ASS'Y

E-16 HEAD TERMINAL PCB ASSY, Assy No. 8273 3000 00
E-8 " " " " Assy No. 8273 3100 00

Ref. No.	Parts No.	Nomenclature
	8251 2600 01	PCB, head terminal, E-8/E-16
J01 ∿ 04	8245 0700 03	IC socket, 16P (E-16)
J01	"	" " " (E-8)
J03	"	" " " (")
	8276 3200 38	Cable assy, 8P, wht (E-8/16)
	8276 3210 38	" " " red (")
	8276 3200 38	" " " wht (E-16)
	8276 3210 38	" " " red (")
	8276 3220 38	" " " wht (E-8/16)
	8276 3230 38	" " " red (")
	8276 3220 38	" " " wht (E-16)
	8276 3230 38	" " " red (")

E-16 METER CONNECTOR PCB ASS'Y
E-8 METER CONNECTOR PCB ASS'Y

E-16 METER CONNECTOR PCB ASSY, Assy No. 8273 3060 00
E-8 " " " " Assy No. 8273 3060 01

Ref. No.	Parts No.	Nomenclature
	8251 2600 02	PCB, meter connector, E-8/E-16
C001	8232 0031 06	Cap, ALU, 16V, 10μF, 20%, SM(E-8/16)
J001	8245 0670 01	Jack, FC, 20P (")
	8276 3120 16	Cable assy, 3044, 4P, wht(E-16)
	"	" " " " " (E-8)

E-16 FUNCTION/DISPLAY PCB ASS'Y

E-16 FUNCTION/DISPLAY PCB ASSY
Assy No. 8273 2570 00

Ref. No.	Parts No.	Nomenclature
	8251 2580 00	PCB, function/display E-16
		IC's
U01 ∿ 16	8234 0180 00	Photo-coupler, PC815
		TRANSISTORS
Q01, 02	8234 0003 03	2SA1015GR
Q03	8234 0002 03	2SC1815GR

Ref. No.	Parts No.	Nomenclature
		DIODES
D01 ∿ 17	8234 0061 00	LED, red, GL-5HD22
D18 ∿ 34	8234 0082 00	DS442X-FAI
D35, 36	8234 0051 00	LED, red, GL-2PR5
D37 ∿ 41	8234 0045 00	" 7 segment, GL-8P03
		CARBON RESISTORS
		All resistors 1/4W, ±5% unless noted otherwise.
R01	8230 0062 23	Flat mtg, 22KΩ
R02	8230 0061 62	" " 1.6KΩ
R03	8230 0062 23	" " 22KΩ
R04	8230 0061 61	" " 160Ω
R05	8230 0062 23	" " 22KΩ
R06	8230 0061 62	" " 1.6KΩ
R07	8230 0062 23	" " 22KΩ
R08	8230 0061 61	" " 160Ω
R09	8230 0064 72	" " 4.7KΩ
R10	8230 0062 22	" " 2.2KΩ
R11	8230 0061 02	" " 1KΩ
R12 ∿ 27	8230 0063 92	" " 3.9KΩ
R28	8230 0062 21	" " 220Ω
R29	8230 0062 71	" " 270Ω
		MISCELLANEOUS
S01 ∿ 18	8253 0550 00	Switch, push, SPH121A
R501	8240 0520 00	Pot, vernier, Φ16, 5KΩ, B
	8216 1710 00	Tube, LED
	8212 1221 00	Spacer, LED, W
	8212 0520 00	" "
	8245 0700 02	IC socket, 14P
	8276 4350 12	Cable assy, 9073, 5P, wht
	8276 4342 14	" " " 4P, red
	8276 4343 24	" " " " yel
	8276 4341 26	" " " " blk
	8276 4370 40	" " " 7P, wht
	8276 4380 45	" " " 8P, "
	8276 3910 45	" " 5395, 2P, "
	8276 4322 28	" " 9073, " red
	8276 4352 45	" " " 5P, red
	8276 2800 25	" " 3P, wht

TAPE SENSOR PCB ASS'Y

TAPE SENSOR PCB ASSY, Assy No. 8273 3270 00

Ref. No.	Parts No.	Nomenclature
	8251 2480 03	PCB, tape sensor, E
U01	8234 0047 00	Photo-interrupter, GP-1S01F
	8276 2810 66	Cable assy, 3P, yel, 660mm

COUNT SENSOR PCB ASS'Y

COUNT SENSOR PCB ASSY, Assy No. 8273 2900 00

Ref. No.	Parts No.	Nomenclature
	8251 1291 00	PCB, count sensor
U01,02	8234 0048 01	Photo-inter'ter, GP-2S02, AB
	8276 3920 70	Cable assy, 4P, wht, 700mm

TAKE UP (T) TENSION SENSOR PCB ASS'Y
SUPPLY (S) TENSION SENSOR PCB ASS'Y

TAKE UP (T) TENSION SENSOR PCB ASSY
Assy No. 8273 2910 00
SUPPLY (S) TENSION SENSOR PCB ASSY
Assy No. 8273 2920 00

Ref. No.	Parts No.	Nomenclature
	8251 2270 01	PCB, sensor, tension, (T)
	8251 2270 02	" " " (S)
	IC	
U01	8234 0181 00	Photo-interrupter, GP-1S04
	TRANSISTORS	
Q01	8234 0002 03	2SC1815GR
Q02	8234 0001 21	FET, 2SK117GR, BL
	DIODE	
D01	8234 0080 00	DS442VB5
	CARBON RESISTORS	
	All resistors 1/4W, ±5% unless noted otherwise.	
R01	8230 0043 93	Vertical mtg, 39KΩ
R02	8230 0048 22	" " 8.2KΩ
R03	8230 0041 02	" " 1KΩ
R04	8230 0041 54	" " 150KΩ
R05	8230 0044 71	" " 470Ω
R06	8230 0042 22	" " 2.2KΩ
R07	8230 0041 01	" " 100Ω
R08	8230 0043 31	" " 330Ω

Ref. No.	Parts No.	Nomenclature
	CAPACITORS	
ALU = Electrolytic		
CER = Ceramic		
PES = Mylar		
C01	8232 0061 05	ALU, 50V, 1μF, 20%, SM
C02	8232 0321 51	CER, " 150pF, 5%, NPO
C03	8232 0311 02	PPR, " 0.001μF, 5%, AMZ
C04	8232 0322 20	CER, " 22pF, 5%, NPO
C05	8232 0261 04	PES, " 0.1μF," AMZ
	MISCELLANEOUS	
L01,02	8242 0950 00	Inductor, servo, E
	8276 4330 65	Cable assy, 3P, 9073, 650MM(T)
	8276 4331 55	" " " " 550MM
	8276 4330 55	" " " " " (S)
	8276 4331 65	" " " " 650MM(S)

E-16 DD CAPSTAN PCB ASS'Y
E-8 DD CAPSTAN PCB ASS'Y

DD CAPSTAN PCB ASSY, E-8, Assy No. 8273 2580 03
DD CAPSTAN PCB ASSY, E-16, Assy No. 8273 2580 05

Ref. No.	Parts No.	Nomenclature
	8251 2171 00	PCB, DD capstan
	IC's	
U01	8236 0209 00	Analog, NJM4559DF
U02	8236 0028 01	Digital, CMOS, 4049UB
U03	8236 0270 00	Analog SW, 4066B
U04	8236 0292 00	Analog, NJM3403AD
U05	8236 0215 00	" NJM2904D
U06~08	8236 0007 01	Digital, CMOS, 4013B
U09	8236 0288 00	Analog, timer, 555
U10	8236 0031 01	Digital, CMOS, 4069UB
U11	8236 0001 01	" " 4001B
U12	8236 0062 00	Digital, CMOS, 4520B
U13	8236 0505 01	Driver, UN1211
U14	8236 0505 03	" UN1213
U15,16	8236 0505 01	Driver, UN1211
U17~20	8236 0505 03	" UN1213
U21	8236 0313 00	Analog, 79L09A
U22,23	8236 0505 03	Driver, UN1213
	TRANSISTORS	
Q01	8234 0001 21	2SK117GR, BL
Q02	8234 0003 04	2SA1015Y, GR
Q03	8234 0001 21	2SK117GR, BL

Ref. No.	Parts No.	Nomenclature
Q04	8234 0006 02	2SC2878B
Q05	8234 0037 02	2SC2655Y
Q06	8234 0038 02	2SA1020Y
Q07	8234 0001 21	2SK117GR, BL
Q08,09	8234 0003 03	2SA1015GR
	DIODES	
D01~10	8234 0080 00	DS442VB5
D11	8234 0019 10	Zener, 05AZ5.1Z
D12	8234 0080 00	DS442VB5
D13	8234 0007 00	IN4002
D14	8234 0080 00	DS442VB5(E-8)
D14		(Deleted)(E-16)
	CARBON RESISTORS	

All resistors 1/4W, ±5% unless noted otherwise.
Metal = Metal film

Ref. No.	Parts No.	Nomenclature
R01,02	8230 0042 22	Vertical mtg, 2.2KΩ
R03	8230 0041 02	" " 1KΩ
R04	8230 0041 03	" " 10KΩ
R05	8230 0041 05	" " 1MΩ
R06	8230 0041 04	" " 100KΩ
R07,08	8230 0041 03	" " 10KΩ
R09	8230 0041 05	" " 1MΩ
R10	8230 0041 03	" " 10KΩ
R11,12	8230 0042 23	" " 22KΩ
R13	8230 0041 02	" " 1KΩ
R14	8230 0042 24	" " 220KΩ
R15	8230 0046 81	" " 680Ω
R16	8230 0041 03	" " 10KΩ
R17,18	8230 0041 04	" " 100KΩ
R19	8230 0044 73	" " 47KΩ
R20	8230 0043 33	" " 33KΩ
R21,22	8230 0041 03	" " 10KΩ
R23	8230 0044 73	" " 47KΩ
R24	8230 0041 04	" " 100KΩ
R25~27	8230 0041 03	" " 10KΩ
R28,29	8230 0042 23	" " 22KΩ
R30	8230 0041 04	" " 100KΩ
R31	8230 0046 81	" " 680Ω
R32	8230 0041 03	" " 10KΩ
R33	8230 0044 73	" " 47KΩ
R34	8230 0042 24	" " 220KΩ
R35	8230 0042 73	" " 27KΩ
R36	8230 0044 74	" " 470KΩ
R37	8230 0042 24	Vertical mtg, 220KΩ
R38	8230 0044 73	" " 47KΩ
R39	8230 0043 92	" " 3.9KΩ
R40	8230 0041 23	" " 12KΩ(E-8)
R40	8230 0041 53	" " 15KΩ(E-16)
R41	8230 0041 02	" " 1KΩ
R42	8230 0041 03	" " 10KΩ
R43	8230 0042 72	" " 2.7KΩ(E-8)
R43		(Deleted) (E-16)
R44	8230 0041 02	Vertical mtg, 1KΩ
R45,46	8230 0041 01	" " 100Ω
R47	8230 0354 78	Power res, 2W, 0.47Ω, 10%
R48,49	8230 0042 23	Vertical mtg, 22KΩ
R50	8230 0041 02	" " 1KΩ
R51	8230 0042 04	" " 200KΩ
R52	8230 0046 81	" " 680Ω
R53	8230 0041 02	" " 1KΩ
R54~56	8230 0041 03	" " 10KΩ
R57	8230 0048 22	" " 8.2KΩ
R58	8230 0044 71	" " 470Ω
R59	8230 0044 72	" " 4.7KΩ
R60	8230 0045 63	" " 56KΩ
R61	8230 0041 04	" " 100KΩ
R62	8230 0042 24	" " 220KΩ
R63	8230 0041 03	" " 10KΩ
R64,65	8230 0041 04	" " 100KΩ
R66	8230 0231 03	" " 10KΩ, 1%
R67	8230 0044 72	" " 4.7KΩ
R68	8230 0041 03	" " 10KΩ
R69	8230 0232 22	" " 2.2KΩ, 1%
R70	8230 0042 23	" " 22KΩ
R71	8230 0041 04	" " 100KΩ
R72	8230 0042 23	" " 22KΩ
R73	8230 0041 03	" " 10KΩ
R74	8230 0042 23	" " 22KΩ
R75	8230 0041 04	" " 100KΩ
R76	8230 0041 02	" " 1KΩ
R77	8230 0331 06	" " 10MΩ, metal
R78	8230 0041 04	" " 100KΩ
R79,80	8230 0041 03	" " 10KΩ
R81	8230 0042 24	" " 220KΩ
R82,83	8230 0041 04	" " 100KΩ
R84	8230 0041 05	" " 1MΩ
R85,86	8231 0031 53	Pot, trimmer, 15KΩ, B
R87	8231 0011 02	" " 1KΩ, B, metal

Ref. No.	Parts No.	Nomenclature
R88	8230 0046 81	Vertical mtg, 680Ω
R89	8230 0044 72	" " 4.7KΩ
R90	8230 0041 04	" " 100KΩ

CAPACITORS

ALU = Electrolytic
CER = Ceramic
PES = Mylar
PPR = Polypropylene

Ref. No.	Parts No.	Nomenclature
C01	8232 0041 06	ALU, 25V, 10μF, 20%, SM
C02	8232 0541 06	" 16V, " " SMBP
C03		(Deleted)
C04	8232 0315 61	PPR, 100V, 560pF, 5%, APS
C05	8232 0322 21	CER, 50V, 220pF, 5%, NPO
C06	8232 0261 03	PES, " 0.01μF," AMZ
C07	8232 0263 32	" " 0.0033μF, 5%, AMZ
C08	8232 0313 31	PPR, 100V, 330pF, 5%, APS
C09	8232 0315 61	" " 560pF, " "
C10	8232 0261 03	PES, 50V, 0.01μF, " AMZ
C11	8232 0263 31	" " 0.003μF," "
C12	8232 0261 02	" " 0.001μF," "
C13	8232 0261 83	" " 0.018μF," "
C14	8232 0315 61	PPR, 100V, 560pF, " APS
C15	8232 0322 21	CER, 50V, 220pF, " NPO
C16	8232 0261 03	PES, " 0.01μF, " AMZ
C17	8232 0263 32	" " 0.0033μF, 5%, AMZ
C18	8232 0313 31	PPR, 100V, 330pF, " APS
C19	8232 0261 52	PES, 50V, 0.0015μF, 5%, AMZ
C20	8232 0313 91	PPR, 100V, 390pF, " APS
C21	8232 0351 03	CER, 50V, 0.01μF, YF
C22	8232 0322 20	" " 22pF,, 5%, NPO
C23	8232 0325 60	" " 56pF, " "
C24	8232 0061 05	ALU, " 1μF, 20%, SM
C25	8232 0261 04	PES, 50V, 0.1μF, 5%, AMZ
C26	8232 0351 03	CER, " 0.01μF, YF
C27	8232 0041 07	ALU, 25V, 100μF, 20%, SM
C28	8232 0351 03	CER, 50V, 0.01μF, YF
C29,30	8232 0051 06	ALU, 35V, 10μF, 20%, SM
C31	8232 0401 04	CER, 12V, 0.1μF, " Y5U
C32∿38	8232 0351 03	" 50V, 0.01μF, YF
C39	8232 0511 01	" " 100pF, 10%, SL

MISCELLANEOUS

Ref. No.	Parts No.	Nomenclature
J01	8245 0530 62	Jack, 8263, 2, yel
J02	8245 0530 03	" " 3, wht
J03	8245 0530 22	Jack, 8263, 2, red
J04	8245 0530 04	" " 4, wht
J05	8245 0530 62	" " 2, yel
J06	8245 0530 42	" " 2, blk
J07	8245 0530 04	" " 4, wht
J08	8245 0530 22	" " 2, red
J09	8245 0530 05	" " 5, wht
J10	8245 0530 63	" " 3, yel
J11	8245 0530 42	" " 2, blk
	8245 0732 12	" 12P, 9067, 2-ganged
	8245 0740 01	Plug, 9067
TP1,2	8276 0010 00	Header, pin

POWER Tr/TAKEUP PCB ASS'Y

POWER Tr/TAKEUP PCB ASSY, Assy No. 8273 3300 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 02	PCB, power transistor
Q101	8234 0092 02	Transistor, 2SD1148-0
	8276 4350 65	Cable assy, 5P, wht, 9073

POWER Tr/SUPPLY PCB ASS'Y

POWER Tr/SUPPLY PCB ASSY, Assy No. 8273 3310 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 02	PCB, power transistor
Q102	8234 0092 02	Transistor, 2SD1148-0
	8276 4352 35	Cable assy, red, 9073

U1 REGURATOR PCB ASS'Y

U1 REGULATOR PCB ASSY, Assy No. 8273 3320 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 04	PCB, regulator, U1
U001	8236 0282 00	IC, Analog, 7815A
C01	8232 0061 05	Cap., ALU, 50V, 1μF, 20%, SM
	8276 4330 20	Cable assy, 3P, wht, 9073

U2B, REGURATOR PCB ASS'Y

U2B, REGULATOR PCB ASSY, Assy No. 8273 3340 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 05	PCB, regulator, U2
U002	8236 0284 00	IC, analog, 7809A

U3 REGURATOR PCB ASS'Y

U3 REGULATOR PCB ASSY, Assy No. 8273 3350 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 06	PCB, regulator, U3
U003	8236 0262 00	IC, analog, 7805A
C01,02	8232 0061 05	Cap., ALU, 50V, 1μF,20%,SM
	8276 4331 20	Cable assy, 3P, wht, 9073

U4 REGURATOR PCB ASS'Y

U4 REGULATOR PCB ASSY, Assy No. 8273 3360 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 07	PCB, regulator, U4
U004	8236 0263 00	IC, analog, 7824A
C01,02	8232 0061 05	Cap., ALU, 50V, 1μF,20%,SM
	8276 4333 20	Cable assy, 3P, yel, 9073

U5B, REGURATOR PCB ASS'Y

U5B, REGULATOR PCB ASSY, Assy No. 8273 3380 00

Ref. No.	Parts No.	Nomenclature
	8251 2210 03	PCB, regulator, U5
U005	8236 0263 03	IC, analog, 7824A
C01,02	8232 0061 05	ALU, 50V, 1μF, 20%, SM

E-16 SYSTEM CONTROL PCB ASS'Y
E-8 SYSTEM CONTROL PCB ASS'Y

E-8 SYSTEM CONTROL PCB ASSY, Assy No. 8273 2930 03
E-16 " " " " " " 8273 2930 05

Ref. No.	Parts No.	Nomenclature
	8251 2281 00	PCB, system control
	IC's	
U01	8236 0072 00	CMOS, 4511B
U02	8236 0029 01	" 4050B
U03	8236 0032 01	" 4070B
U04	8236 0007 01	" 4013B
U05	8236 0522 00	System control E, 80C49HC
U06	8236 0517 00	Driver, TD62306P
U07,08	8236 0040 01	CMOS, 4081B
U09	8236 0522 00	System control E, 80C49HC
U10	8236 0524 00	82C43C
U11	8236 0007 01	CMOS, 4013B
U12	8236 0005 01	" 4011B
U13	8236 0031 01	" 4069B
U14	8236 0005 01	CMOS, 4011B

Ref. No.	Parts No.	Nomenclature
U15	8236 0032 01	" 4070B
U16	8236 0195 00	Tr array, TD62504P
U17	8236 0314 00	Multiplexer, 4051B
U18	8236 0028 01	CMOS, 4049UB
U19	8236 0040 01	CMOS, 4081B
U20~23	8236 0215 00	NJM2904D
U24	8236 0270 00	CMOS, 4066B
U25	8236 0215 00	NJM2904D
U26	8236 0505 01	Driver, UN1211
U27	8236 0505 02	" UN1212
U28	8236 0510 04	" UN1114
U29	8236 0505 03	" UN1213
U30,31	8236 0505 03	" UN1213
U32~34	8236 0510 03	" UN1113
U35	8236 0505 02	" UN1212
U36	8236 0196 06	" RN1006
U37~41	8236 0505 03	" UN1213
U42,43	8236 0505 01	" UN1211
U44	8236 0505 04	" UN1214
U45~47	8236 0505 03	" UN1213
U48	8236 0510 03	" UN1113
U49	8236 0505 04	" UN1214
U50~55	8236 0505 03	" UN1213
U56	8236 0510 03	" UN1113
U57	8236 0505 03	" UN1213
U58	8236 0505 01	" UN1211
U59	8236 0505 02	" UN1212
U60,61	8236 0505 03	" UN1213
U62	8236 0505 02	" UN1212
U63	8236 0505 03	" UN1213
U64	8236 0510 03	" UN1113
U65	8236 0505 02	" UN1212
U66	8236 0505 03	" UN1213
U67,68	8236 0510 04	" UN1114
U69	8236 0505 03	" UN1213
U70	8236 0505 02	" UN1212
U71,72	8234 0180 00	Photo-coupler, PC815
	TRANSISTORS	
Q01	8234 0001 21	2SK117GR, BL
Q02	8234 0105 02	2SA970, BL
Q03,04	8234 0002 03	2SC1815GR
Q05	8234 0003 03	2SA1015GR
Q06	8234 0002 03	2SC1815GR
Q07	8234 0003 03	2SA1015GR

Ref. No.	Parts No.	Nomenclature
Q08	8234 0002 05	2SC1815Y, GR
Q09	8234 0002 03	2SC1815GR
Q10	8234 0003 03	2SA1015GR
Q11	8234 0001 21	2SK117GR, BL
Q12	8234 0002 05	2SC1815Y, GR
Q13	8234 0037 02	2SC2655Y
Q14	8234 0002 05	2SC1815Y, GR
Q15	8234 0037 02	2SC2655Y
Q16	8234 0038 02	2SA1020Y
Q17	8234 0002 03	2SC1815GR
Q18	8234 0038 02	2SA1020Y
Q19	8234 0037 02	2SC2655Y
Q20	"	" (E-16)
Q20		(Deleted)(E-8)
Q21	8234 0038 02	2SA1020Y (E-16)
Q21		(Deleted)(E-8)
Q22	8234 0002 03	2SC1815GR
Q23	8234 0076 02	2SC1627Y
Q24,25	8234 0002 03	2SC1815GR
Q26,27	8234 0078 02	2SD600KE
Q28	8234 0001 21	2SK117GR, BL
	DIODES	
D01~05	8234 0080 00	DS442VB5
D06,07	8234 0040 00	D array, MA154WA
D08	8234 0080 00	DS442VB5
D09	8234 0039 00	D array, MA154WK
D10	8234 0040 00	" MA154WA
D11	8234 0039 00	D array, MA154WK
D12	8234 0080 00	DS442VB5
D13	8234 0040 00	D array, MA154WA
D14	8234 0039 00	" MA154WK
D15,16	8234 0080 00	DS442VB5
D17	8234 0040 00	D array, MA154WA
D18	8234 0039 00	" MA154WK
D19~26	8234 0080 00	DS442VB5
D27	8234 0040 00	D array, MA154WA
D28	8234 0039 00	" MA154WK
D29~34	8234 0080 00	DS442VB5
D35		(Deleted)
D36~52	8234 0080 00	DS442VB5
D53		(Deleted)
D54~62	8234 0080 00	DS442VB5
D63		(Deleted)
D64	8234 0080 00	DS442VB5
D65,66	8234 0007 00	1N4002

CARBON RESISTORS

All resistors 1/4W, ±5% unless noted otherwise.

Ref. No.	Parts No.	Nomenclature
R001	8230 0522 23	R array, 1/8W, 22KΩx5, RKC
R002	8230 0363 32	" " 3.3KΩx4, "
R003	8230 0542 23	" " 22KΩx7, "
R004	8230 0551 02	" " 1KΩx5, RKC5A
R005	8230 0362 23	" " 22KΩx4, RKC
R006,007	8230 0041 04	Vertical mtg, 100KΩ
R008	8230 0041 02	" " 1KΩ
R009	8230 0042 21	" " 220Ω
R010	8230 0043 35	" " 3.3MΩ
R011	8230 0041 04	" " 100KΩ
R012	8230 0042 23	" " 22KΩ
R013	8230 0041 02	" " 1KΩ
R014	8230 0331 56	Flat mtg, metal, 15MΩ
R015	8230 0041 04	Vertical mtg, 100KΩ
R016	8230 0044 73	" " 47KΩ
R017	8230 0042 21	" " 220Ω
R018,19	8230 0041 51	" " 150Ω
R020	8230 0042 23	" " 22KΩ
R021~023	8230 0041 51	" " 150Ω
R024	8230 0042 71	" " 270Ω
R025,26	8230 0041 51	" " 150Ω
R027	8230 0044 73	" " 47KΩ
R028	8230 0041 05	" " 1MΩ
R029	8230 0041 03	" " 10KΩ
R030	8230 0044 72	" " 4.7KΩ
R031	8230 0042 22	" " 2.2KΩ
R032	8230 0044 73	" " 47KΩ
R033	8230 0041 04	" " 100KΩ
R034	8230 0044 73	" " 47KΩ
R035	8230 0041 04	" " 100KΩ
R036	8230 0041 03	" " 10KΩ
R037	8230 0041 04	" " 100KΩ
R038	8230 0041 03	" " 10KΩ
R039	8230 0041 01	" " 100Ω
R040,041	8230 0044 73	" " 47KΩ
R042	8230 0041 05	" " 1MΩ
R043	8230 0041 03	" " 10KΩ
R044	8230 0044 72	" " 4.7KΩ
R045,046	8230 0042 23	" " 22KΩ
R047,048	8230 0041 03	" " 10KΩ
R049	8230 0041 04	" " 100KΩ
R050	8230 0041 03	" " 10KΩ

Ref. No.	Parts No.	Nomenclature	
R051	8230 0042 23	Vertical mtg,	22KΩ
R052	8230 0041 04	" "	100KΩ
R053	8230 0044 71	" "	470Ω
R054	8230 0041 03	" "	10KΩ
R055	8230 0042 23	" "	22KΩ
R056	8230 0044 73	" "	47KΩ
R057	8230 0044 71	" "	470Ω
R058	8230 0041 04	" "	100KΩ
R059	8230 0041 03	" "	10KΩ
R060	8230 0042 23	" "	22KΩ
R061	8230 0041 03	" "	10KΩ
R062	8230 0042 23	" "	22KΩ
R063	8230 0044 72	" "	4.7KΩ
R064~066	8230 0041 04	" "	100KΩ
R067	8230 0041 03	" "	10KΩ
R068	8230 0042 23	" "	22KΩ
R069	8230 0044 73	" "	47KΩ
R070	8230 0044 72	" "	4.7KΩ
R071	8230 0041 21	" "	120Ω
R072	8230 0042 23	" "	22KΩ
R073	8230 0044 73	" "	47KΩ
R074,075	8230 0042 23	" "	22KΩ
R076	8230 0041 21	" "	120Ω
R077	8230 0042 22	" "	2.2KΩ
R078	8230 0041 04	" "	100KΩ
R079	8230 0042 21	" "	220Ω
R080,081	8230 0042 23	" "	22KΩ
R082	8230 0042 22	" "	2.2KΩ
R083	8230 0043 33	" "	33KΩ
R084	8230 0041 02	" "	1KΩ
R085	8230 0041 04	" "	100KΩ
R086	8230 0044 71	" "	470Ω
R087,088	8230 0041 04	" "	100KΩ
R089~091	8230 0041 03	" "	10KΩ
R092~094	8230 0041 04	" "	100KΩ
R095	8230 0041 03	" "	10KΩ
R096	8230 0044 74	" "	470KΩ
R097	8230 0041 04	" "	100KΩ
R098,099	8230 0044 73	" "	47KΩ
R100	8230 0041 02	" "	1KΩ
R101,102	8230 0041 04	" "	100KΩ
R103	8230 0044 73	" "	47KΩ
R104	8230 0041 04	" "	100KΩ
R105,106	8230 0041 03	" "	10KΩ

Ref. No.	Parts No.	Nomenclature	
R107	8230 0043 33	Vertical mtg,	33KΩ
R108		(Deleted)	
R109	8230 0043 33	Vertical mtg,	33KΩ
R110		(Deleted)	
R111	8230 0044 73	Vertical mtg,	47KΩ
R112	8230 0042 23	" "	22KΩ
R113	8230 0043 33	" "	33KΩ
R114	8230 0041 04	" "	100KΩ
R115	8230 0042 23	" "	22KΩ
R116	8230 0041 04	" "	100KΩ
R117	8230 0041 03	" "	10KΩ
R118	8230 0042 23	" "	22KΩ
R119	8230 0041 04	" "	100KΩ
R120	8230 0044 73	" "	47KΩ
R121	8230 0041 02	" "	1KΩ
R122,123	8230 0041 05	" "	1MΩ
R124,125	8230 0044 73	" "	47KΩ
R126	8230 0041 04	" "	100KΩ
R127	8230 0041 03	" "	10KΩ
R128	8230 0042 23	" "	22KΩ
R129	8230 0041 05	" "	1MΩ
R130	8230 0041 02	" "	1KΩ
R131	8230 0044 73	" "	47KΩ
R132	8230 0042 23	" "	22KΩ
R133	8230 0041 04	" "	100KΩ
R134	8230 0042 23	" "	22KΩ
R135,136	8230 0041 04	" "	100KΩ
R137	8230 0042 23	" "	22KΩ
R138	8230 0041 03	" "	10KΩ
R139	8230 0041 04	" "	100KΩ
R140	8230 0041 81	" "	180Ω
R141	8230 0044 73	" "	47KΩ
R142,143	8230 0042 23	" "	22KΩ
R144		(Deleted)	
R145	8230 0041 81	Vertical mtg,	180Ω
R146	8230 0041 03	" "	10KΩ
R147	8230 0041 04	" "	100KΩ
R148	8230 0042 23	" "	22KΩ
R149~152	8230 0044 73	" "	47KΩ
R153	8230 0042 23	" "	22KΩ
R154	8230 0044 73	" "	47KΩ
R155,156	8230 0041 04	" "	100KΩ
R157	8230 0041 03	" "	10KΩ
R158	8230 0041 02	" "	1KΩ
R159	8230 0041 03	" "	10KΩ

Ref. No.	Parts No.	Nomenclature
R160	8230 0042 24	Vertical mtg, 220KΩ
R161,162	8230 0041 02	" " 1KΩ
R163	8230 0042 23	" " 22KΩ(E-8)
R163	8230 0042 73	" " 27KΩ(E-16)
R164,165	8230 0043 33	" " 33KΩ
R166	8230 0041 02	" " 1KΩ
R167	8230 0044 73	" " 47KΩ
R168	8230 0041 03	" " 10KΩ
R169	8230 0041 04	" " 100KΩ
R170	8230 0041 02	" " 1KΩ
R171	8230 0046 81	" " 680Ω
R172	8230 0041 03	" " 10KΩ
R173~175	8230 0042 23	" " 22KΩ
R176	8230 0041 04	" " 100KΩ
R177	8230 0043 32	" " 3.3KΩ
R178	8230 0041 03	" " 10KΩ
R179	8230 0041 04	" " 100KΩ
R180	8230 0042 23	" " 22KΩ
R181	8230 0041 03	" " 10KΩ
R182,183	8230 0041 04	" " 100KΩ
R184	8230 0041 51	" " 150Ω
R185	8230 0571 51	Flat mtg, 1/2W, 150Ω
R186	8230 0041 03	Vertical mtg, 10KΩ
R187	8230 0042 23	" " 22KΩ
R188	8230 0041 03	" " 10KΩ
R189	8230 0043 02	" " 3KΩ(E-8)
R189	8230 0041 22	" " 1.2KΩ(E-16)
R190,191	8230 0044 72	" " 4.7KΩ
R192,193	8230 0041 04	" " 100KΩ
R194	8230 0044 73	" " 47KΩ
R195	8230 0041 00	" " 10Ω
R196	8230 0043 02	" " 3KΩ
R197	8230 0041 02	" " 1KΩ
R198	8230 0042 22	" " 2.2KΩ
R199	8230 0044 74	" " 470KΩ
R200		(Deleted) (E-8)
R200	8230 0043 32	Vertical mtg, 3.3KΩ (E-16)
R201	8230 0042 23	" " 22KΩ
R202	8230 0041 52	" " 1.5KΩ
R203	8230 0044 70	" " 47Ω
R204	8230 0042 23	" " 22KΩ
R205	8230 0041 53	" " 15KΩ(E-8)
R205	8230 0041 03	" " 10KΩ(E-16)
R206	8230 0041 04	" " 100KΩ
R207	8230 0041 03	" " 10KΩ
R208	8230 0041 04	Vertical mtg, 100KΩ
R209	8230 0043 32	" " 3.3KΩ
R210	8230 0044 73	" " 47KΩ
R211	8230 0041 04	" " 100KΩ
R212	8230 0044 73	" " 47KΩ
R213	8230 0041 53	" " 15KΩ(E-8)
R213	8230 0041 03	" " 10KΩ(E-16)
R214	8230 0041 04	" " 100KΩ
R215	8230 0042 23	" " 22KΩ
R216	8230 0043 32	" " 3.3KΩ
R217	8230 0041 04	" " 100KΩ
R218	8230 0042 23	" " 22KΩ
R219	8230 0041 03	" " 10KΩ
R220	8230 0048 22	" " 8.2KΩ
R221	8230 0041 04	" " 100KΩ
R222	8230 0042 23	" " 22KΩ
R223	8230 0048 22	" " 8.2KΩ
R224	8230 0042 22	" " 2.2KΩ
R225	8230 0041 52	" " 1.5KΩ
R226	8230 0044 70	" " 47Ω
R227	8230 0042 22	" " 2.2KΩ
R228	8230 0045 62	" " 5.6KΩ
R229	8230 0041 04	" " 100KΩ
R230	8230 0043 32	" " 3.3KΩ
R231,232	8230 0041 03	" " 10KΩ
R233	8230 0045 60	" " 56Ω
R234	8230 0041 09	" " 1Ω
R235	8230 0042 22	" " 2.2KΩ
R236	8230 0044 74	" " 470KΩ
R237	8230 0041 04	" " 100KΩ
R238	8230 0045 62	" " 5.6KΩ
R239		(Deleted) (E-8)
R239	8230 0045 62	Vertical mtg, 5.6KΩ (E-16)
R240	8230 0041 09	" " 1Ω
R241	8230 0041 00	" " 10Ω
R242	8230 0043 02	" " 3KΩ
R243	8230 0042 23	" " 22KΩ
R244	8230 0042 22	" " 2.2KΩ
R245	8230 0041 03	" " 10KΩ
R246	8230 0041 02	" " 1KΩ
R247	8230 0042 23	" " 22KΩ
R248	8230 0041 04	" " 100KΩ
R249	8230 0041 02	" " 1KΩ
R250	8230 0041 03	" " 10KΩ
R251	8230 0041 02	" " 1KΩ

Ref. No.	Parts No.	Nomenclature
R252	8230 0042 23	Vertical mtg, 22KΩ
R253	8230 0041 03	" " 10KΩ
R254	8230 0044 72	" " 4.7KΩ
R255	8230 0044 73	" " 47KΩ
R256		(Deleted) (E-8)
R256	8230 0041 09	Vertical mtg, 1Ω(E-16)
R257	8230 0042 20	" " 22Ω
R258	8230 0043 02	" " 3KΩ
R259	8230 0044 72	" " 4.7KΩ
R260		(Deleted) (E-8)
R260	8230 0045 60	Vertical mtg, 56Ω(E-16)
R261	8230 0044 73	" " 47KΩ
R262	8230 0042 24	" " 220KΩ
R263~265	8230 0041 04	" " 100KΩ
R266	8230 0041 02	" " 1KΩ
R267		(Deleted) (E-8)
R267	8230 0041 09	Vertical mtg, 1Ω(E-16)
R268	8230 0041 24	" " 120KΩ
R269		(Deleted) (E-8)
R269	8230 45 62	Vertical mtg, 5.6KΩ(E-16)
R270	8230 0041 51	Vertical mtg, 150Ω
R271	8230 0326 88	Power, 5W, 0.68Ω, 10% (E-8)
R271	8230 0353 38	" 2W, 0.33Ω, " (E-16)
R272	8230 0041 01	" " 100Ω
R273	8230 0581 01	Flat mtg, 100Ω, flame proof
R274	8230 0326 88	Power, 5W, 0.68Ω, 10% (E-8)
R274	8230 0353 38	" 2W, 0.33Ω, " (E-16)
R275	8230 0041 04	Vertical mtg, 100KΩ (E-8)
R275	8230 0044 73	" " 47KΩ(E-16)
R276,277	8230 0041 81.	Vertical mtg, 180Ω
R278	8230 0042 23	" " 22KΩ
R279	8230 0335 15	Flat mtg, 5.1MΩ, metal film
R280	8230 0043 32	Vertical mtg, 3.3KΩ
R281	8230 0041 03	" " 10KΩ
R282	8230 0571 51	Flat mtg, 1/2W, 150Ω
R283~286	8230 0572 71	" " " 270Ω
R287	8230 0041 03	" " " 10KΩ

CAPACITORS

ALU = Electrolytic
CER = Ceramic
PES = Mylar
PPR = Polypropylene

Ref. No.	Parts No.	Nomenclature
C01	8232 0401 04	CER, 12v, 0.1μF, 20%, Y5U
C02	8232 0263 92	PES, 50V, 0.0039μF, 5%, AMZ
C03		(Deleted)
C04	8232 0261 04	PES, 50V, 0.1μF, 5%, AMZ
C05		(Deleted)
C06	8232 0351 03	CER, 50V, 0.01μF, +80-20%, YF
C07,08	8232 0323 00	" " 30pF, 5%, NPO
C09	8232 0351 03	" " 0.01μF, +80-20%, YF
C10	8232 0264 72	PES, " 0.0047μF, 5%, AMZ
C11	8232 0351 03	CER, " 0.01μF, +80-20%, YF
C12	8232 0054 75	ALU, 35V, 4.7μF, 20%, SM
C13	8232 0061 05	" 50V, 1μF, " "
C14,15	8232 0261 03	PES, " 0.01μF,
C16	8232 0351 03	CER, " " +80-20%, YF
C17	8232 0261 04	PES, " 0.1μF, 5%, AMZ
C18,19	8232 0351 03	CER, " 0.01μF, +80-20%, YF
C20,21	8232 0321 51	" " 150pF, 5%, NPO
C22,23	8232 0351 03	" " 0.01μF, +80-20%, YF
C24	8232 0401 04	" 12V, 0.1μF, 20%, Y5U
C25	8232 0061 05	ALU, 50V, 1μF, 20%, SM
C26	8232 0062 25	", " 2.2μF, " "
C27	8232 0063 35	", " 3.3μF, 20%, SM
C28,29	8232 0351 03	CER, 50V, 0.01μF, +80-20%, YF
C30,31	8232 0323 00	" " 30pF, 5%, NPO
C32	8232 0351 03	" " 0.01μF, +80-20%, YF
C33	8232 0261 04	PES, " 0.1μF, 5%, AMZ
C34	8232 0351 03	CER, " 0.01μF, +80-20%, YF
C35	8232 0064 75	ALU, " 4.7μF, 20%, SM
C36	8232 0022 26	" 10V, 22μF, " "
C37	8232 0264 73	PES, 50V, 0.047μF, 5%, AMZ
C38	8232 0061 05	ALU, " 1μF, 20%, SM
C39	8232 0062 25	" " 2.2μF, " "
C40,41	8232 0054 75	" 35V, 4.7μF, " "
C42,43	8232 0351 03	CER, 50V, 0.01μF, +80-20%, YF
C44	8232 0261 04	PES, " 0.1μF, 5%, AMZ
C45	8232 0061 04	ALU, " " 20%, SM
C46,47	8232 0401 04	CER, 12V, 0.1μF, " Y5U
C48	8232 0051 06	ALU, 35V, 10μF, " SM
C49	8232 0054 75	" " 4.7μF, " "
C50		(Deleted)
C51	8232 0021 07	ALU, 10V, 100μF, 20%, SM
C52	8232 0063 35	" 50V, 3.3μF, " "
C53	8232 0262 22	PES, " 0.0022μF, 5%, AMZ
C54	8232 0051 06	ALU, 35V, 10μF, 20%, SM, (E-16)
C54	8232 0022 26	" 10V, 22μF, " " (E-8)
C55	8232 0313 91	PPR, 100V, 390pF, 5%, APS
C56	8232 0261 03	PES, 50V, 0.01μF, 5%, AMZ

Ref. No.	Parts No.	Nomenclature
C57	8232 0321 50	CER, 50V, 15pF, 5%, NPO
C58	8232 0263 32	PES, " 0.0033µF, 5%, AMZ
C59		(Deleted)
C60		(")
C61	8232 0351 03	CER, 50V, 0.01µF, +80-20%, YF
C62	8232 0031 07	ALU, 16V, 100µF, 20%, SM
C63	8232 0266 83	PES, 50V, 0.068µF, 5%, AMZ (E-8)
C64		(Deleted) (E-16)
C65	8232 0051 06	ALU, 35V, 10µF, 20%, SM
C66~68	8232 0261 03	PES, 50V, 0.01µF, 5%, AMZ
C69	8232 0031 07	ALU, 16V, 100µF, 20%, SM
C70		(Deleted)
C71	8232 0063 34	ALU, 50V, 0.33µF, " "
C72	8232 0053 36	" 35V, 33µF, " "
C73	8232 0261 03	PES, 50V, 0.01µF, 5%, AMZ
C74		(Deleted) (E-8)
C74	8232 0261 03	PES, 50V, 0.01µF, 5%, AMZ (E-16)
C75	8232 0351 03	CER, " 0.01µF, +80-20%, YF
C76	8232 0054 75	ALU, 35V, 4.7µF, 20%, SM
C77	8232 0351 03	CER, 50V, 0.01µF, +80-20%, YF
C78	8232 0261 03	PES, " " 5%, AMZ
C79	8232 0266 83	" " 0.068µF, " "
C80	8232 0064 74	ALU, 50V, 0.47µF, 20%, SM
C81	8232 0051 06	" 35V, 10µF, " "
C82	8232 0315 62	PPR, 100V, 0.0056µF, 5%, APS
C82	8232 0318 22	" " 0.0082µF, " "
C83	8232 0261 02	PES, 50V, 0.001µF, " AMZ
C84		(Deleted) (E-8)
C84	8232 0064 74	PES, 50V, 0.47µF, 20%, SM (E-16)
C85	8232 0042 26	ALU, 25V, 22µF, 20%, SM
C86	8232 0063 34	" 50V, 0.33µF, " "
C87	8232 0261 03	PES, " 0.01µF, 5%, AMZ
C87	8232 0264 72	" " 0.0047µF, " "
C88, 89	8232 0351 03	CER, " " +80-20%, YF
C90	8232 0062 24	ALU, " 0.22µF, 20%, SM
C91		(Deleted)
C92	8232 0022 26	ALU, 10V, 22µF, 20%, SM
C93	8232 0064 74	" 50v, 0.47µF, 20%, SM
C94	8232 0264 72	PES, " 0.0047µF, 5%, AMZ
C95	8232 0351 03	CER, " 0.01µF, +80-20%, YF
	MISCELLANEOUS	
J01	8245 0530 04	Jack, 8263, 4, wht
J02	8245 0530 02	" " 2, "
J03	8245 0530 08	" " 8, "

Ref. No.	Parts No.	Nomenclature
J04	8245 0530 23	Jack, 8263, 3, red
J05	8245 0530 25	" " 5, red
J06	8245 0530 04	" " 4, wht
J07	8245 0530 03	" " 3, "
J08	8245 0530 32	" " 12, red
J09	8245 0530 63	" " 3, yel
J10	8245 0530 12	" " 12, wht
J11	8245 0530 24	" " 4, red
J12	8245 0530 43	" " 3, blk
J13	8245 0530 43	" " 3, "
J14	8245 0530 04	" " 4, "
J15	8245 0530 05	" " 5, "
J16	8245 0530 25	" " 5, red
J17	8245 0530 27	" " 7, "
J18	8245 0530 08	" " 8, wht
J19	8245 0530 22	" " 2, red
J20, 21	8245 0530 02	" " 2, wht
J22	8245 0530 07	" " 7, "
J23	8245 0530 03	" " 3, "
J24	8245 0530 04	" " 4, "
J25	8245 0530 05	" " 5, "
J26	8245 0530 24	" " 4, red
J27	8245 0530 25	" " 5, "
J28	8245 0530 03	" " 3, wht
J29		(Deleted) (E-8)
J29	8245 0530 62	Jack, 8263, 2, yel (E-16)
J30	8245 0530 23	Jack, 8263, 3, red
J31	8245 0530 44	" " 4, blk
J32	8245 0530 62	" " 2, " (E-16)
J32		(Deleted) (E-8)
R500, 501	8231 0032 24	Pot, trimmer, 220KΩ, B
R502	8231 0034 73	" " 47KΩ, "
R503	8231 0031 04	" " 100KΩ, "
R504	8231 0031 03	" " 10KΩ, " (E-8)
R504	8231 0034 73	" " 47KΩ, " (E-16)
R505	8231 0031 04	" " 100KΩ, " (E-8)
R505	8231 0034 73	" " 47KΩ, " (E-16)
R506	8230 0041 00	Res, carbon, 1/4W, 10Ω, 5%
R507	8231 0034 72	Pot, trimmer, 4.7KΩ, B
R508	8231 0031 03	" " 10KΩ, " (E-8)
R508	8231 0034 73	" " 47KΩ, " (E-16)
R509	8231 0031 04	" " 100KΩ, "
R510	8230 0041 00	Res, carbon, 1/4W, 10Ω
R511	8231 0034 72	Pot, trimmer, 4.7KΩ, B
T01	8242 0940 00	Transformer, master OSC

Ref. No.	Parts No.	Nomenclature
L01	8242 0530 00	Inductor, 150µH
	8276 0020 04	Wire, jumper, IPS-1041-4
	8239 0001 00	Fuse holder, SN5051
	8239 0025 00	Elapsed time indicator,TM3
	8276 0010 00	Pin, header

E-8 POWER SUPPLY PCB ASS'Y
E-16 POWER SUPPLY PCB ASS'Y

E-8 POWER SUPPLY PCB ASSEMBLY

Assy No. 8273 3070 07 FCA/CND
Assy No. 8273 3070 08 EUR/UK/AUS
Assy No. 8273 3070 09 DM

E-16 POWER SUPPLY PCB ASSEMBLY

Assy No. 8273 3070 04, FCA/CND
" " 8273 3070 05, EUR/UK/AUS
" " 8273 3070 06, DM

Ref. No.	Parts No.	Nomenclature
	8251 2210 01	PCB, power supply
		TRANSISTORS
Q01	8234 0050 03	2SD1406Y
Q02		(Deleted)
Q03		(")
Q04	8234 0003 04	2SA1015GR
Q05	8234 0094 02	2SB1015Y
		DIODES
D01	8234 0084 02	Stack, 15D4B41
D02	8234 0083 02	" KBU4D
D03,04	8234 0686 02	" KBU6D

Ref. No.	Parts No.	Nomenclature
	CARBON RESISTORS	

All resistors 1/4W, ±5% unless noted otherwise.

Ref. No.	Parts No.	Nomenclature
R01	8230 0061 02	Flat mtg, 1KΩ
R02		(Deleted)
		(")
R04	8230 0321 09	Power, 5W, 1Ω, 10%
R05	8230 0392 20	Flat mtg, 22Ω, flame proof
R06	8230 0321 09	Power, 5W, 1Ω, 10%

Ref. No.	Parts No.	Nomenclature
	CAPACITORS	
ALU = Electrolytic		
C01	8232 1384 78	ALU, 63V, 4700µF, 20%
C02	8232 1363 38	" 50V, 3300µF, "
C03	8232 1352 28	" 50V, 2200µF, 20%
C04	8232 1384 78	" 63V, 4700µF, "
C05	8232 1344 78	" 35V, " "
C06	8232 0051 07	" " 100µF, "
	MISCELLANEOUS	
J01	8245 0530 03	Jack, 8263, 3, wht
J02	8245 0530 23	" " " red
J03	8245 0530 43	" " " blk
J04		(Deleted)
J05	8245 0530 05	Jack, 8263, 5, wht
	8220 4060 00	Heat sink, power supply
	8207 0015 00	" " OSH-1625-SP
	8239 0001 00	Holder, fuse, FCA/CND/DM
	8239 0012 00	" " EUR/UK/AUS
F01	8239 0006 80	Fuse, UL/CSA,anti-rush,8A
F02	8239 0006 40	" " " 4A
F03	8239 0006 80	" " " 8A
F04	8239 0006 40	Fuse, UL/CSA,anti-rush,4A
F05	8239 0006 80	" " " 8A
F01	8239 0007 63	" SEMKO " 6.3A
F02	8239 0007 40	" " " 4A
F03	8239 0007 50	" " " 5A
F04	8239 0007 40	" " " 4A
F05	8239 0007 63	" " " 6.3A
F01	8239 0011 80	" Dentori, " 8A
F02	8239 0011 40	" " " 4A
F03	8239 0011 80	" " " 8A
F04	8239 0011 40	Fuse,Dentori,anti-rush,4A
F05	8239 0011 80	" " " 8A
	8276 4370 60	Cable assy, 7P, wht, 600mm
	8276 4321 48	" " 2P, blk, 480mm
	8276 4340 62	" " 4P, wht, 620mm
	8276 4322 40	" " 2P, red, 400mm
	8276 4340 30	" " 4P, wht, 300mm
	8276 4341 62	" " 4P, blk, 470mm
	8276 5001 47	" " 2P, blk, 660mm
	8276 5020 66	" " 4P, wht, 400mm
	8276 5000 63	" " 2P, wht, 630mm
	8276 5002 55	" " " red, 550mm

E-16 REMOTE CONNECTOR PCB ASS'Y
E-8 REMOTE CONNECTOR PCB ASS'Y

E-16 REM. CON'CTOR PCB ASSY, Assy No. 8273 3250 00
E-8 " " " " Assy No. 8273 3540 00

Ref. No.	Parts No.	Nomenclature
	8251 2480 01	PCB, cnctr, remote, E-series
	8245 0670 02	Jack, FC, 40P
	8276 2070 14	Cable, flat, 5 cond, 140mm
	8276 4422 42	Cable assy, 9073, 12P, red
	8276 4380 50	" " " 8P, wht
	8276 4331 60	" " " 3P, blk
	8276 4333 30	" " " 3P, yel
	8276 4341 26	" " " 4P, blk
	8276 3750 18	" " GND lug, D3, 180mm
	8276 4341 97	" " 9073, 4P, blk
	8276 4342 80	" " " " red
	8276 5012 85	" " " 3P, "
	8276 4343 80	" " " 4P, yel
	8276 4341 75	" " " " blk

SYNCHRO CONNECTOR PCB ASS'Y

SYNCHRO CNCTR PCB ASSY, Assy No. 8273 3280 00

Ref. No.	Parts No.	Nomenclature
	8251 2480 02	PCB, connector, synchro, E-2
	8245 0670 01	Jack, FC 20P
	8276 4323 50	Cable assy, 9073, 2P, yel
	8276 4372 55	" " " 7P, red

CONTROL SWITCH PCB ASS'Y

CONTROL SWITCH PCB ASSY, Assy No. 8273 3010 00

Ref. No.	Parts No.	Nomenclature
	8251 2200 00	PCB, control SW, E
D01,02	8234 0062 00	LED, grn, GL-9NG24
D03	8234 0063 00	" grn-red, GL-9ND24
D04~06	8234 0018 00	Diode, MA-150
S01~12	8253 0490 00	Switch, push, KHH 10910
	8276 4332 52	Cable assy, 9073, 3P, red
	8276 4350 65	" " " 5P, wht
	8276 4420 60	" " " 12P, "

8308 PCB ASSEMBLY
8316 PCB ASSEMBLY

8308 PCB ASSEMBLY, Assy No. 8273 2540 01
8316 PCB ASSEMBLY, Assy No. 8273 2540 02

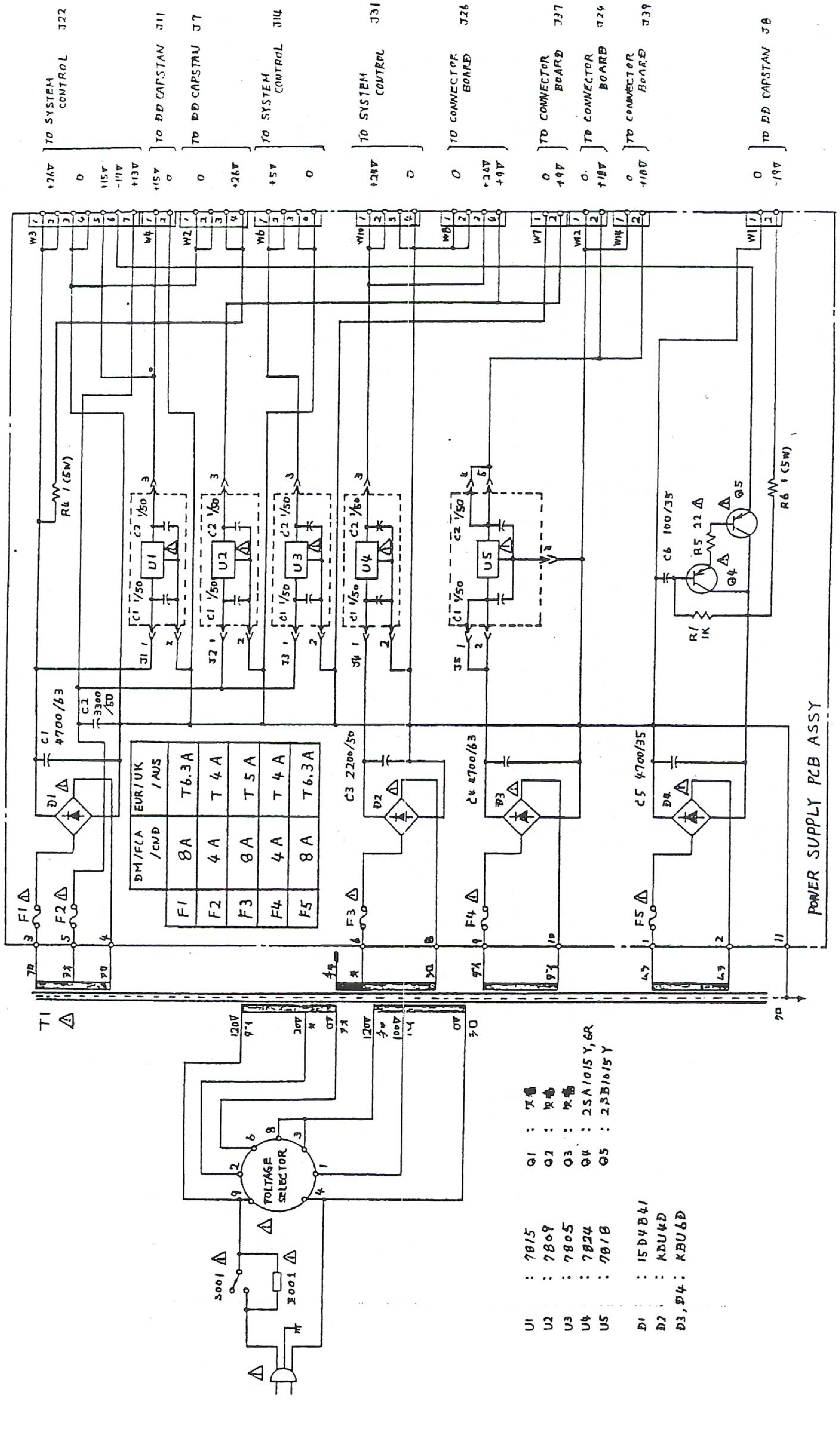
Ref. No.	Parts No.	Nomenclature
	8251 2390 00	PCB, remote control, 8308
	IC's	
U01	8236 0001 01	Digital, CMOS, 4001B
U02	8236 0029 01	" " 4050B
U03	8236 0031 01	" " 4069B
U04	8236 0523 00	" 80C49HC
U05	8236 0072 00	" CMOS, 4511B
U06	8236 0195 00	Tr array, TD62504P
U07	8236 0517 00	Driver array, TD62306P
U08,09	8236 0505 02	Driver, digital, UN1212
U10~12	8236 0510 03	" " UN1113
U13	8236 0510 04	" " UN1114
U14,15	8236 0505 03	" " UN1213
U16,17	8236 0505 04	" " UN1214
U18	8236 0196 05	" " UN1005
	TRANSISTORS	
Q01~11	8234 0003 03	2SA1015GR
Q12	"	" (8316)
	DIODES	
D01~03	8234 0040 00	Array, MA154WA
D04,05	8234 0080 00	DS442VB5
D06	8234 0019 07	Zener, 4.3V, 05AZ4.3Y
D07,08	8234 0080 00	DS442VB5
D09~21	8234 0039 00	Array, MA154WK
D22	"	" " (8316)
D23~25	"	" "
D26~29	8234 0080 00	DS442VB5
D30,31	8234 0040 00	Array, MA154WA
D50~52	8234 0052 00	LED, green, GL-2NG5
D53~60	8234 0051 00	" red, GL-2PR5
D61	"	" " " (8316)
D62~68	"	" " "
D69,70	8234 0052 00	" green, GL-2NG5
D71~75	8234 0045 00	" 7 segment, GL-8P03
D76	8234 0051 00	" red, GL-2PR5

Ref. No.	Parts No.	Nomenclature
		CARBON RESISTORS
All resistors 1/4W, ±5% unless noted otherwise.		
R01	8230 0372 23	Array, 1/8W, 22KΩx8, 5%, RKC
R02, 03	8230 0381 04	" 100KΩx4, 5%, RKC-S
R04	8230 0373 32	" 3.3KΩx8, 5%, RKC
R05, 06	8230 0041 04	Vertical mtg, 100KΩ
R07	8230 0042 71	" " 270Ω
R08, 09	8230 0041 04	" " 100KΩ
R10	8230 0041 05	" " 1MΩ
R11	8230 0042 71	" " 270Ω
R12, 13	8230 0041 04	" " 100KΩ
R14	8230 0041 05	" " 1MΩ
R15	8230 0044 71	" " 470Ω
R16	8230 0041 04	" " 100KΩ
R17	8230 0041 03	" " 10KΩ
R18, 19	8230 0042 23	" " 22KΩ
R20	8230 0042 71	" " 270Ω
R21	8230 0041 04	" " 100KΩ
R22	8230 0041 03	" " 10KΩ
R23	8230 0041 04	" " 100KΩ
R24	8230 0364 72	Array, 1/8W, 4.7KΩx4, 5%, RKC
R25	8230 0381 04	" 100KΩx4, 5%, RKC-S
R26~28	8230 0041 04	Vertical mtg, 100KΩ
R29	8230 0044 71	" " 470Ω
R30~32	8230 0042 22	" " 2.2KΩ
R33, 34	8230 0041 04	" " 100KΩ
R35	8230 0041 03	" " 10KΩ
R36	8230 0522 23	Array, 1/8W, 22KΩx5, 5%, RKC
R37~43	8230 0041 51	Vertical mtg, 150Ω
R44	8230 0041 04	" " 100KΩ
R45	8230 0042 22	" " 2.2KΩ
R46	8230 0523 32	Array, 1/8W, 3.3KΩx5, 5%, RKC
R47	8230 0362 23	" " 22kΩx4, " "
R48	8230 0041 61	Vertical mtg, 160Ω
R49	8230 0041 42	" " 1KΩ
R50	8230 0041 03	" " 10KΩ
R51	8230 0041 61	" " 160Ω(8316)
R52	8230 0041 02	" " 1KΩ(")
R53	8230 0041 03	" " 10KΩ(")
R54	8230 0043 92	" " 3.9KΩ
R55	8230 0041 81	" " 180Ω
R56	8230 0042 71	" " 270Ω
R57	8230 0044 72	" " 4.7KΩ
R58, 59	8230 0042 71	" " 270Ω

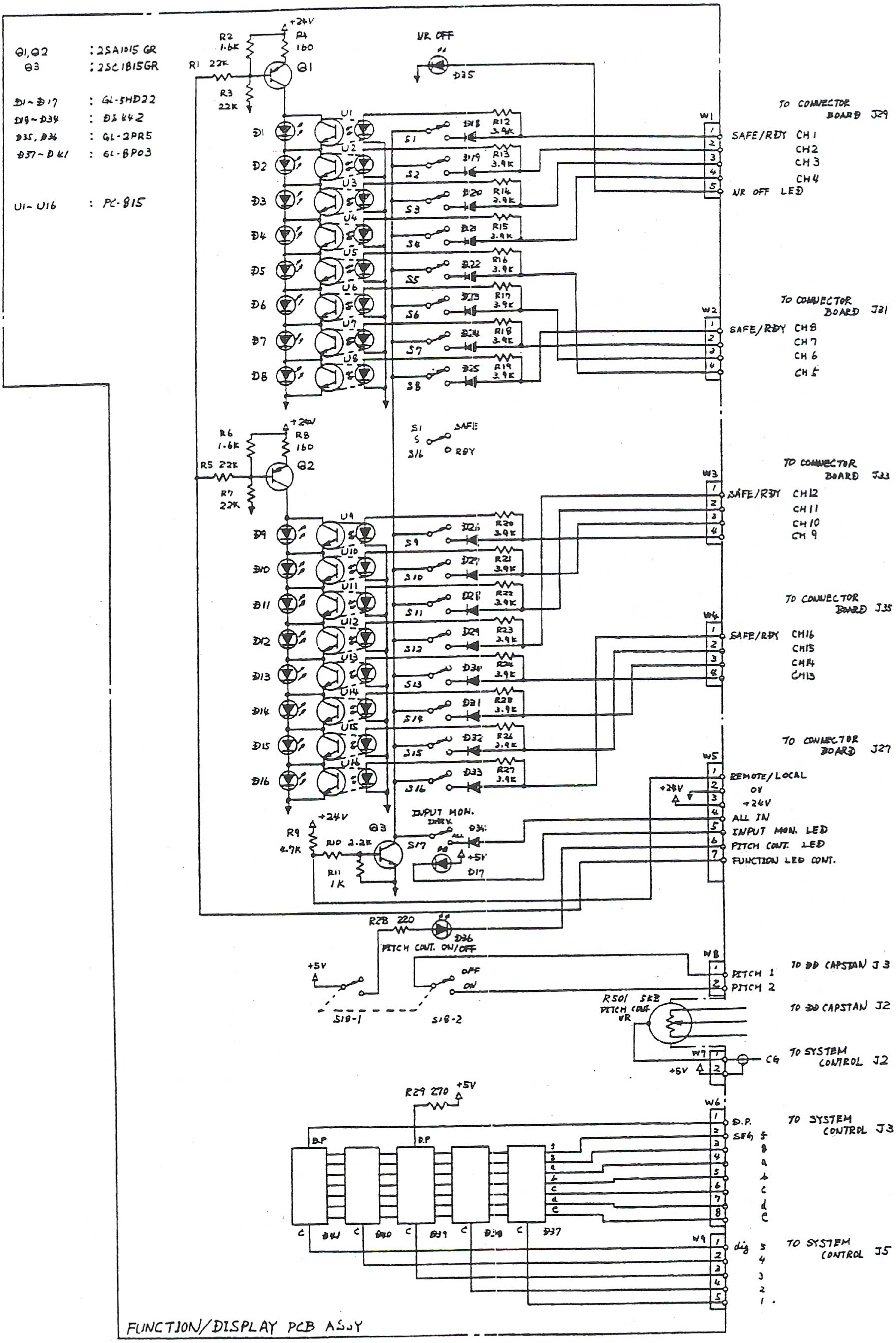
Ref. No.	Parts No.	Nomenclature
R60		(Deleted)
R61	8230 0041 53	Vertical mtg, 15KΩ
	CAPACITORS	
ALU = Electrolytic		
CER = Ceramic		
PES = Mylar		
PPR = Polypropylene		
C01, 02	8232 0323 00	CER, 50V, 30PF, 5%, NPO
C03	8232 0264 72	PES, " 0.0047μF, 5%, AMZ
C04	8232 0061 05	ALU, " 1μF, 20%, SM
C05	8232 0062 25	" " 2.2μF, " "
C06	8232 0061 04	" " 0.1μF, " "
C07	8232 0264 72	PES, " 0.0047μF, 5%, AMZ
C08	8232 0351 03	CER, " 0.01μF, +80-20%, YF
C09 (8316)	"	" " " " "
C10	8232 0401 04	" 12V, 0.1μF, 20%, Y5U
C11	8232 0021 07	ALU, 10V, 100μF, " SM
C12	8232 0054 76	" 35V, 47μF, " "
C13~16	8232 0351 03	CER, 50V, 0.01μF, +80-20%, YF
	MISCELLANEOUS	
X001	8256 0290 00	Oscillator, ceramic, 8MHz
J01	8245 0900 03	Jack, FC, 40P
J02, 03	8245 0910 00	" phone, mono, 1802J047
J04~08	8245 0700 02	Socket, IV, 14P
S01	8253 0980 00	Switch, push, SPEA82
S02(8316)	"	" " "
S03, 04	8253 0600 00	" " SEA12A
S05~16	8253 0650 02	" " KHH15910
S17	8253 0970 00	" slide, SSSY142
S18	8253 0570 00	" " SSSY323
	8212 0520 00	Spacer, LED
	8212 1221 00	" " VV

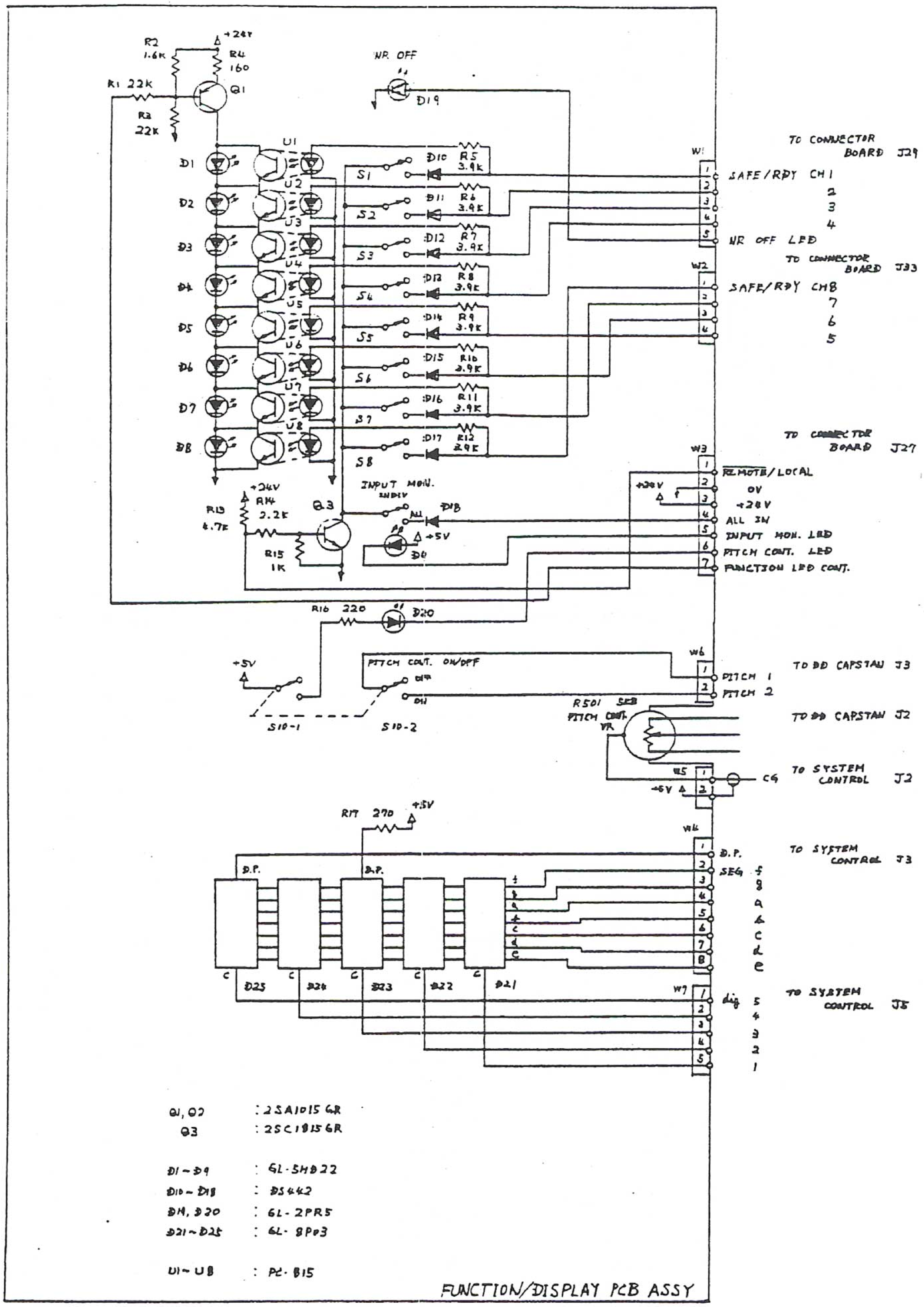
8. CIRCUIT SCHEMATICS

POWER SUPPLY, E-8/E-16

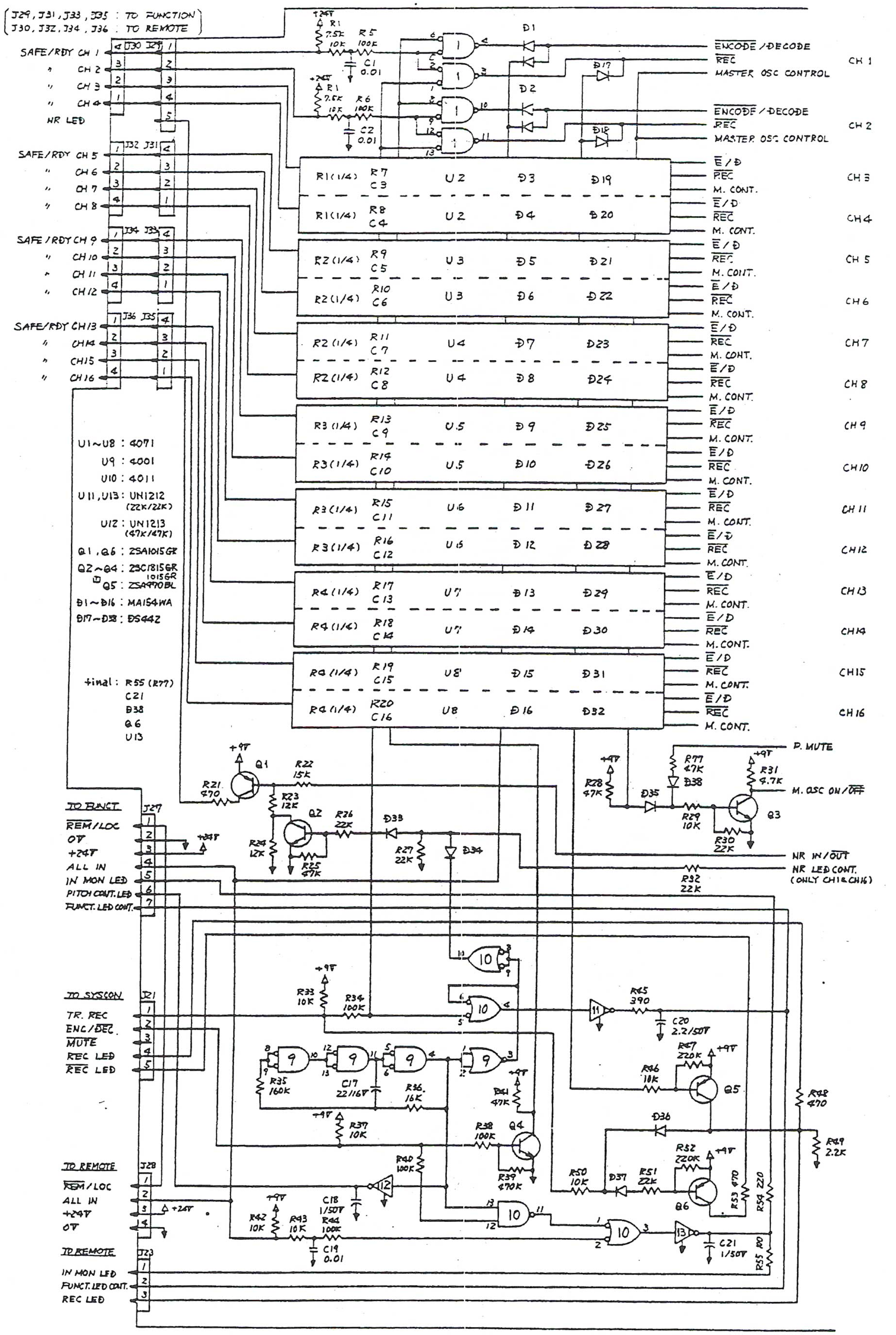


FUNCTION/DISPLAY, E-16

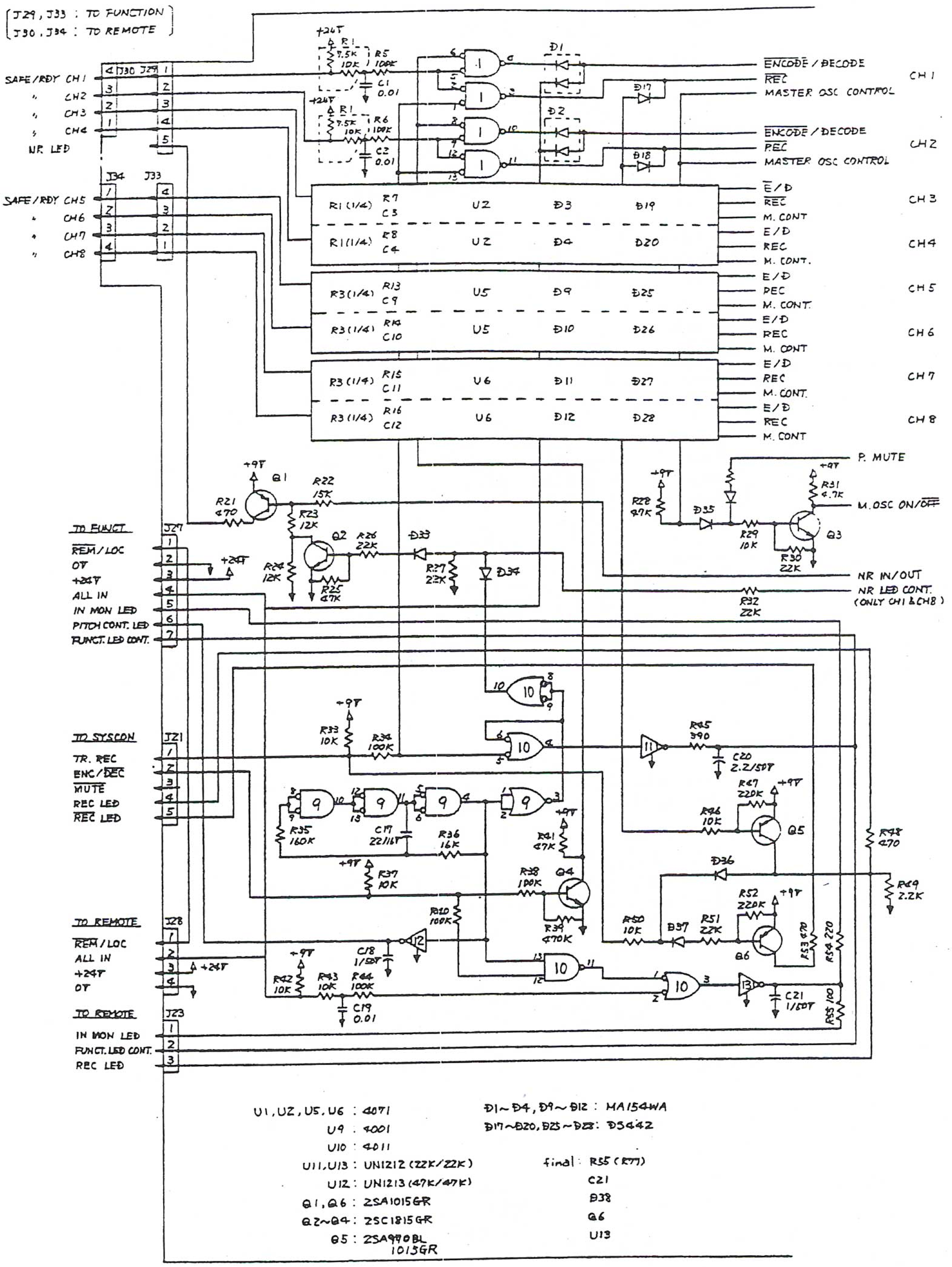



TO CONNECTOR BOARD J29
SAFE/RDY CH 1
2
3
4
NR OFF LED
TO CONNECTOR BOARD J33
SAFE/RDY CH8
7
6
5
TO CONNECTOR BOARD J27
REMOTE/LOCAL
0V
+24V
ALL SW
INPUT MON. LED
PITCH CONT. LED
FUNCTION LED CONT.
TO DD CAPSTAN J3
PITCH 1
PITCH 2
TO DD CAPSTAN J2
TO SYSTEM CONTROL J2
TO SYSTEM CONTROL J3
TO SYSTEM CONTROL J5
Q1, Q2 : 2SA1015 GR
Q3 : 2SC1815 GR
D1 ~ D9 : GL-5HD22
D10 ~ D18 : DS442
DH, D20 : GL-2PR5
D21 ~ D25 : GL-8PB3
U1 ~ U8 : PC-815
FUNCTION/DISPLAY PCB ASSY

CHANNEL SELECTOR, E-16



CHANNEL SELECTOR, E-8

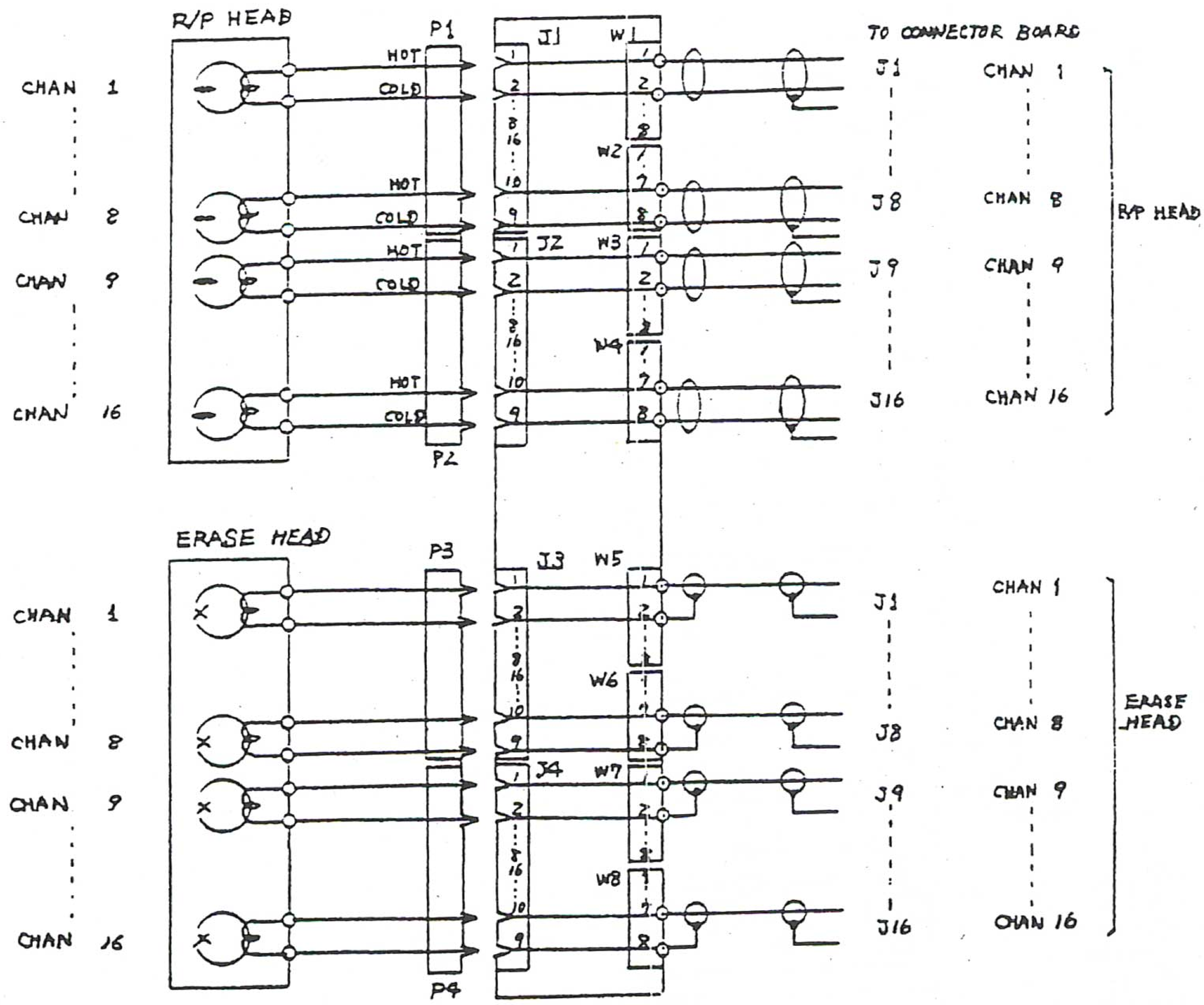


U1, U2, U5, U6 : 4071
U9 : 4001
U10 : 4011
U11, U13 : UN1212 (22K/22K)
U12 : UN1213 (47K/47K)
Q1, Q6 : 2SA1015GR
Q2~Q4 : 2SC1815GR
Q5 : 2SA970BL 1015GR

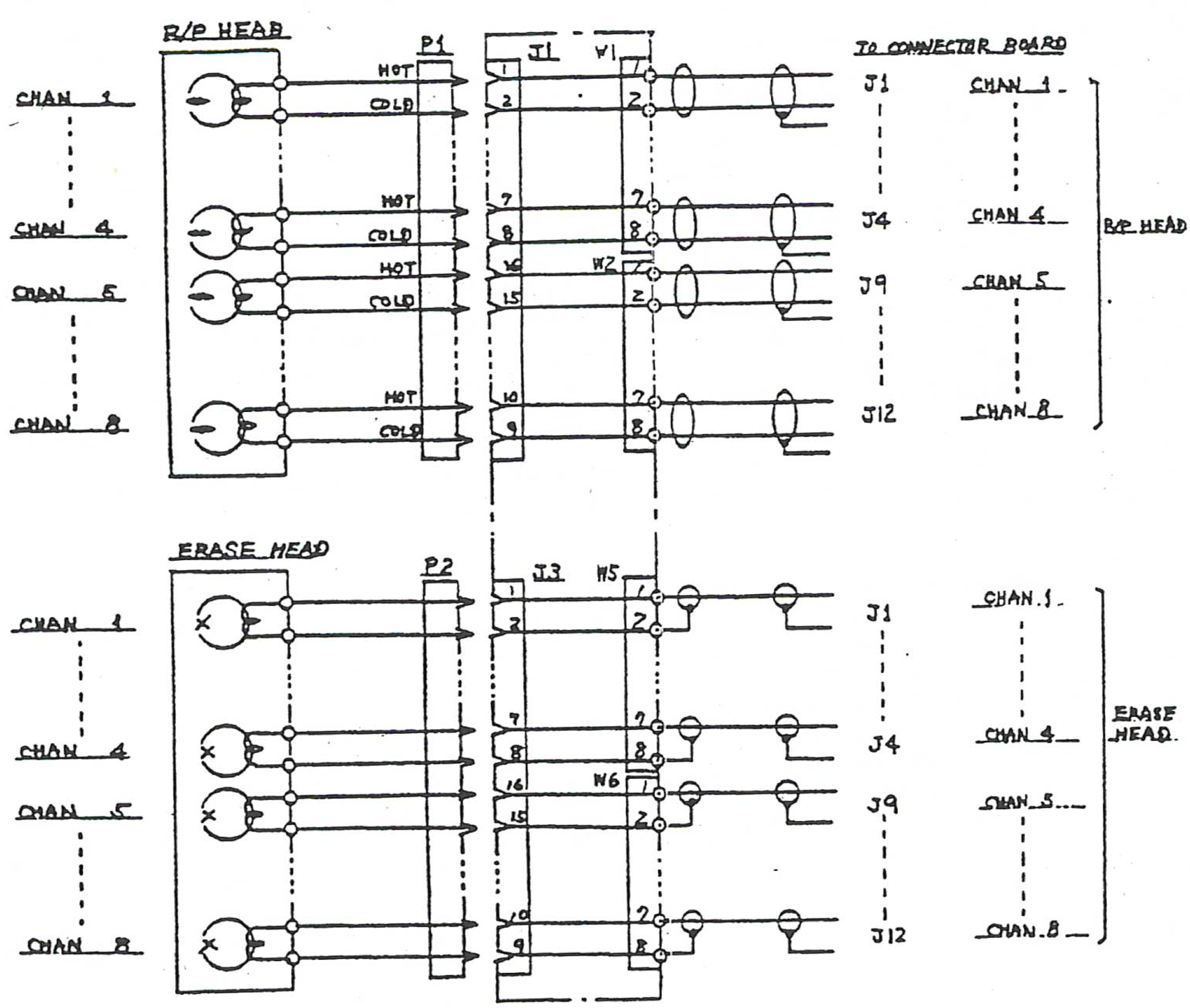
D1~D4, D9~D12 : MA154WA
D17~D20, D25~D28 : DS442

final : R55 (R77)
C21
D38
Q6
U13

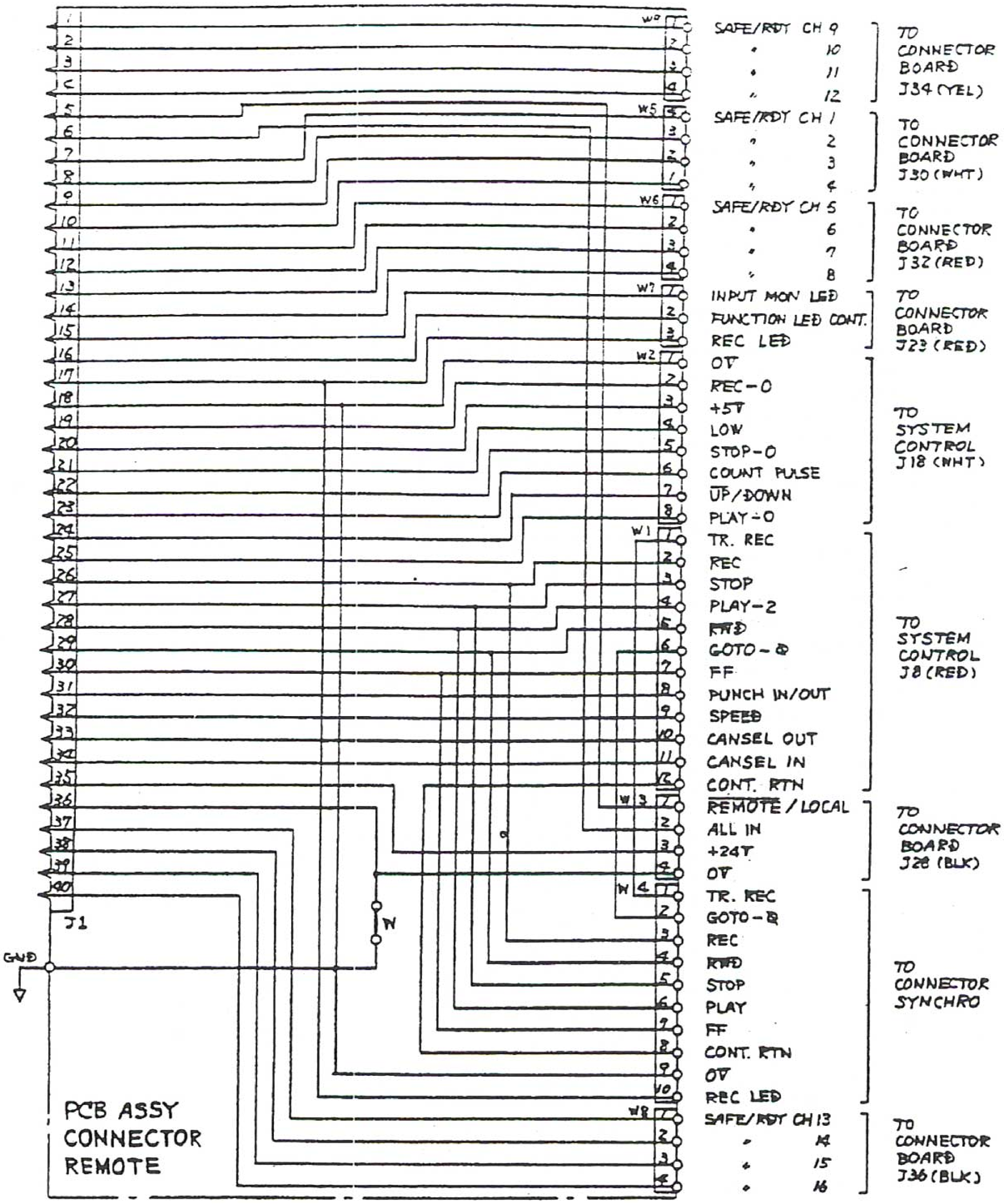
HEAD TERMINAL, E-16



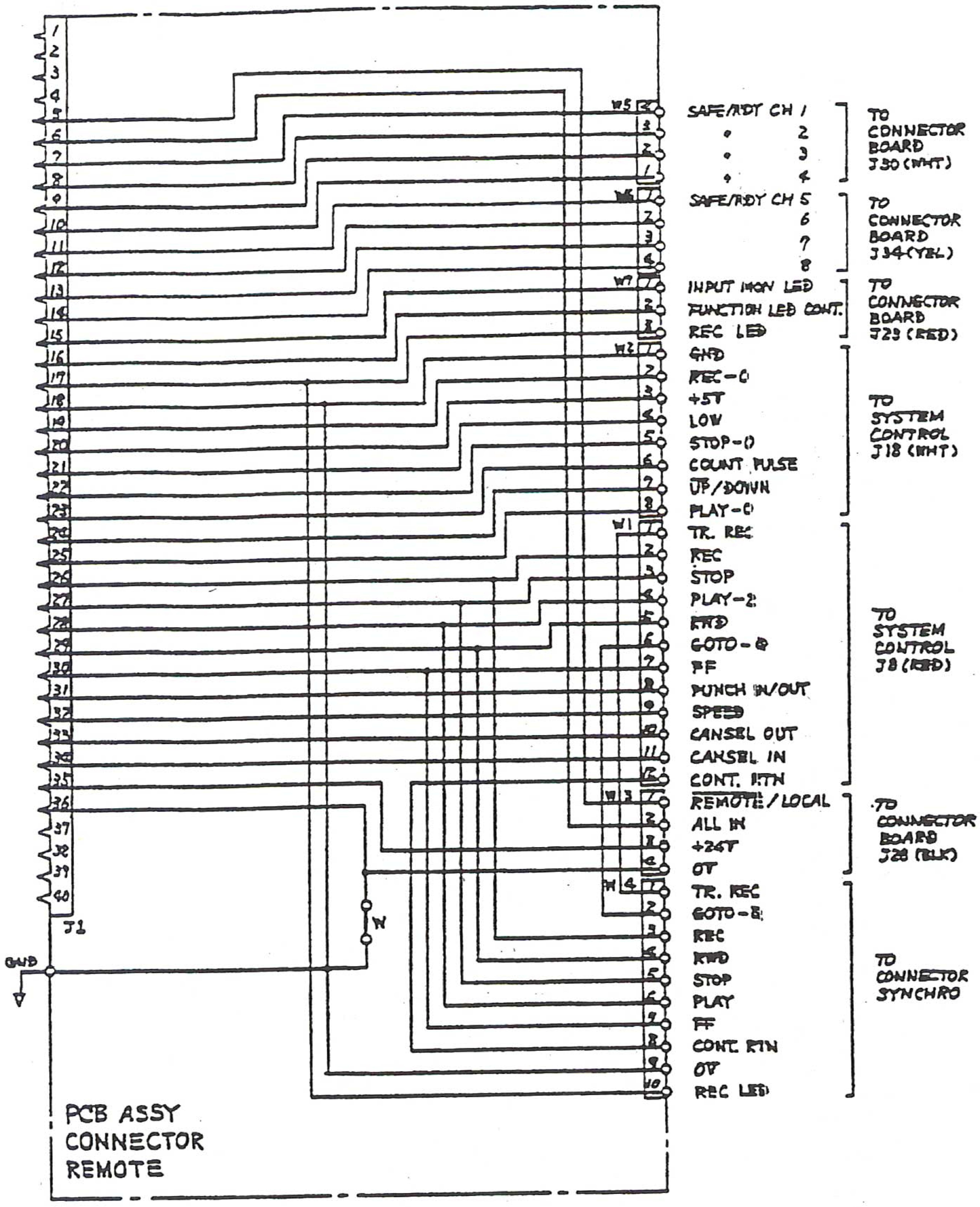
HEAD TERMINAL, E-8



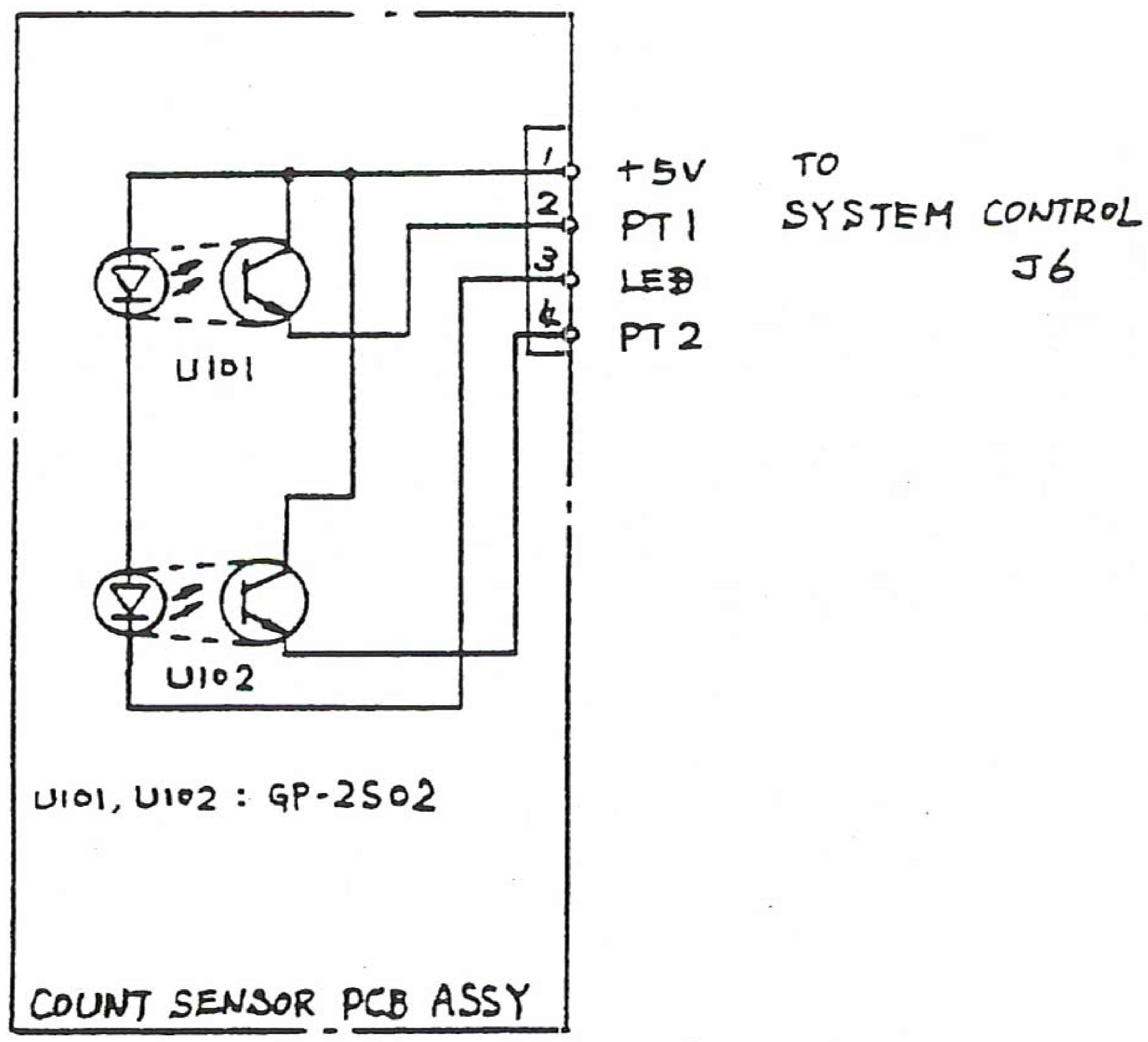
CONNECTOR, REMOTE, E-16



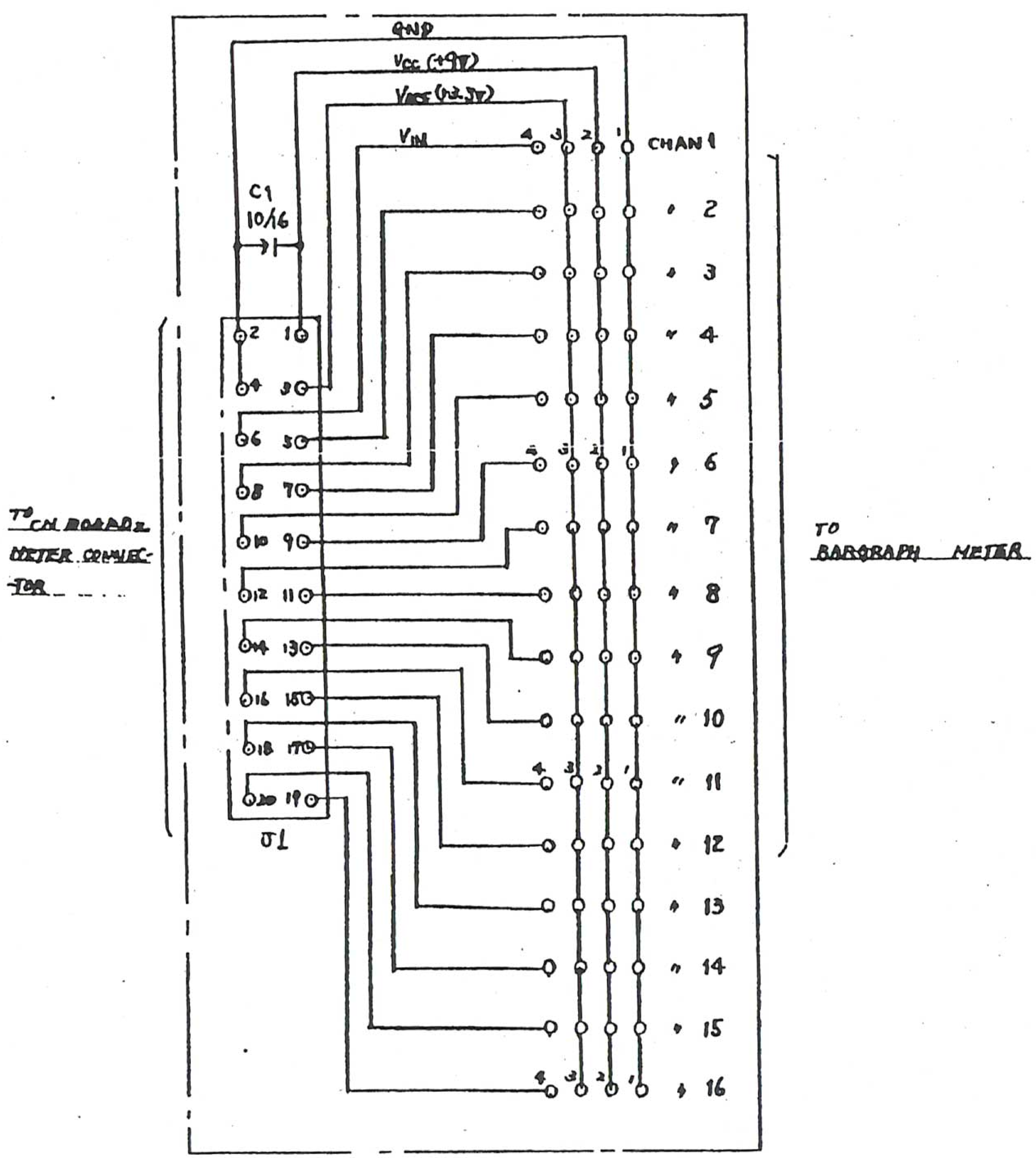
CONNECTOR, REMOTE, E-8



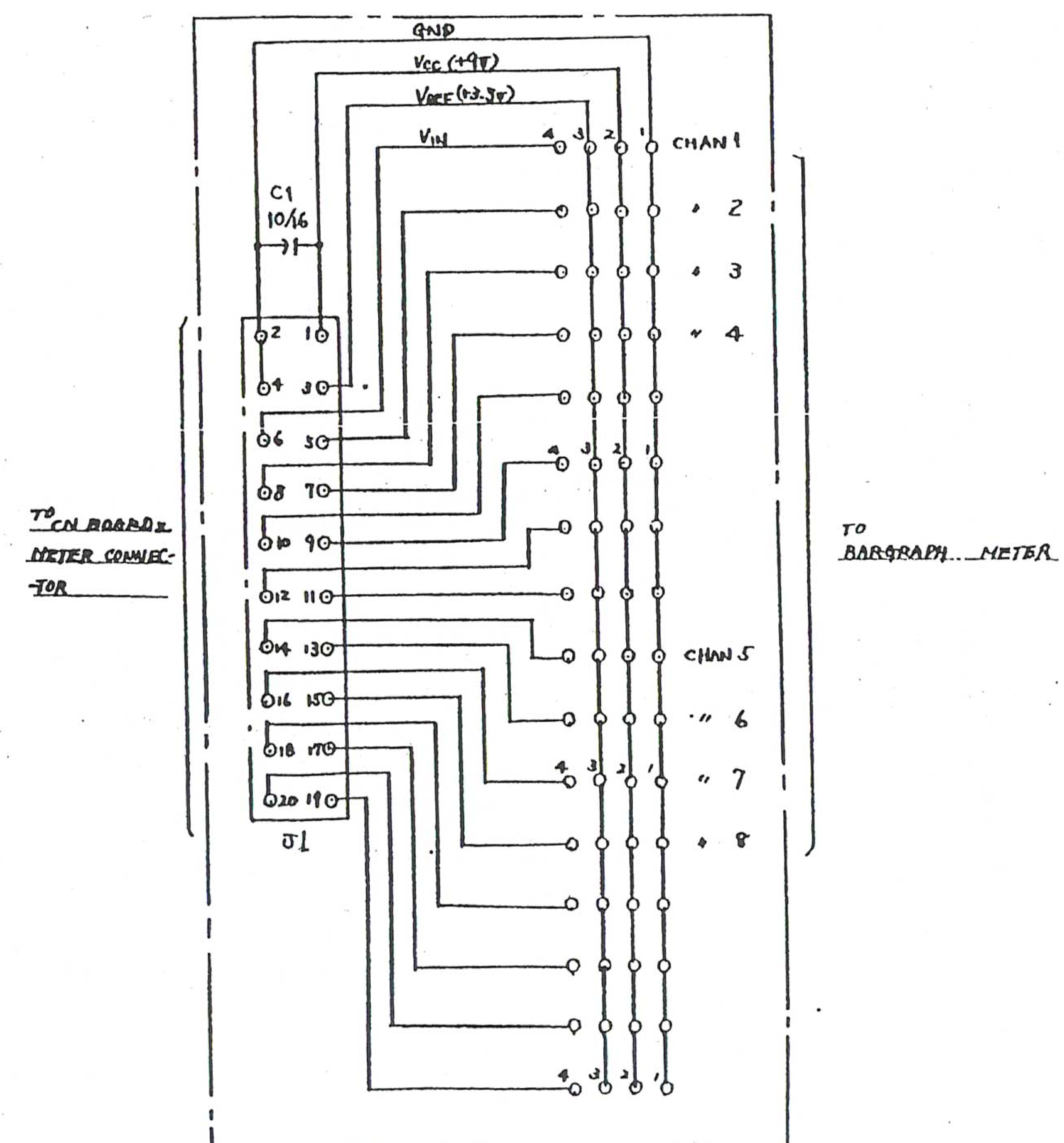
COUNT SENSOR, E-16/E-8



METER CONNECTOR, E-16

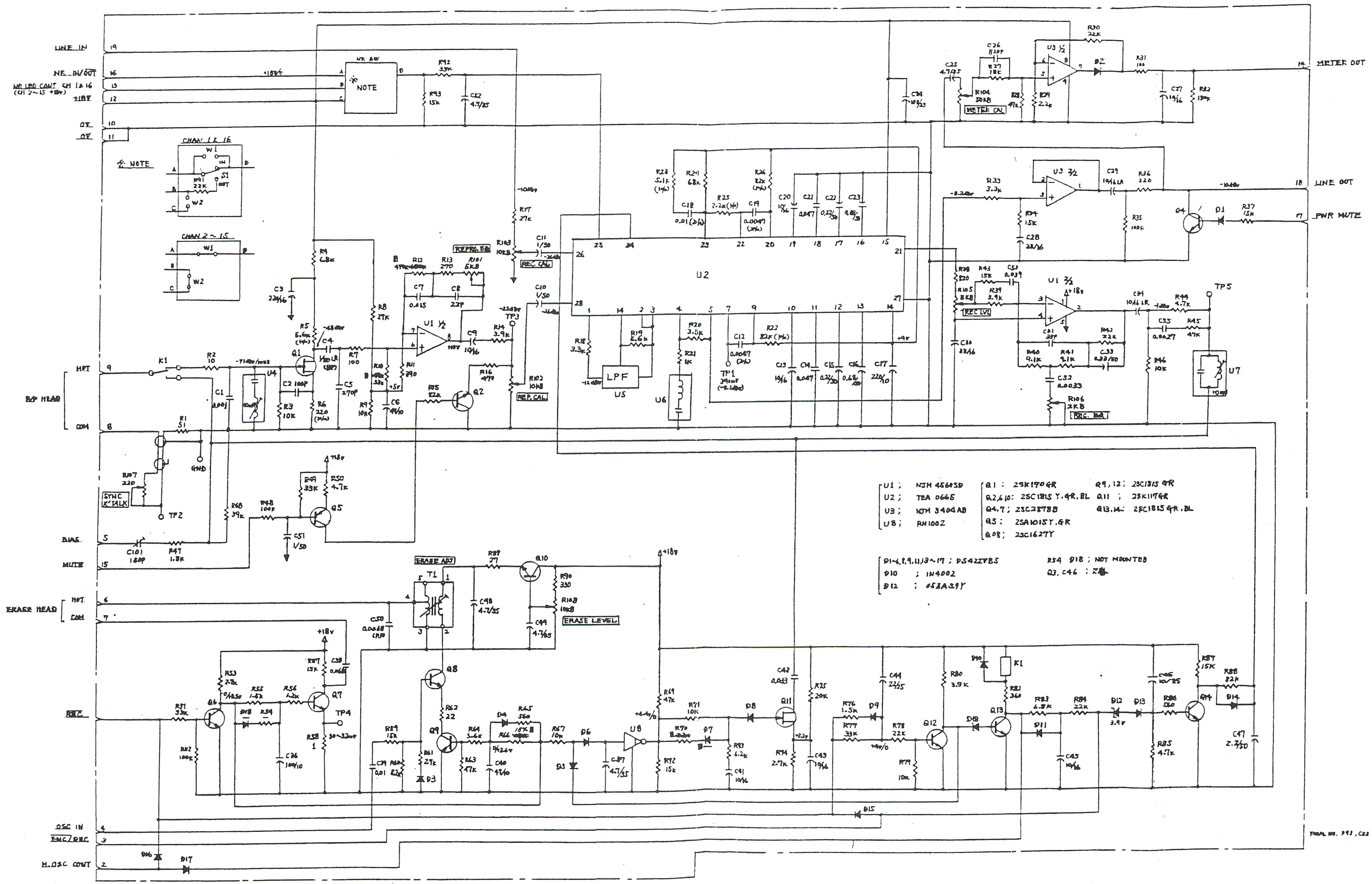


METER CONNECTOR, E-8

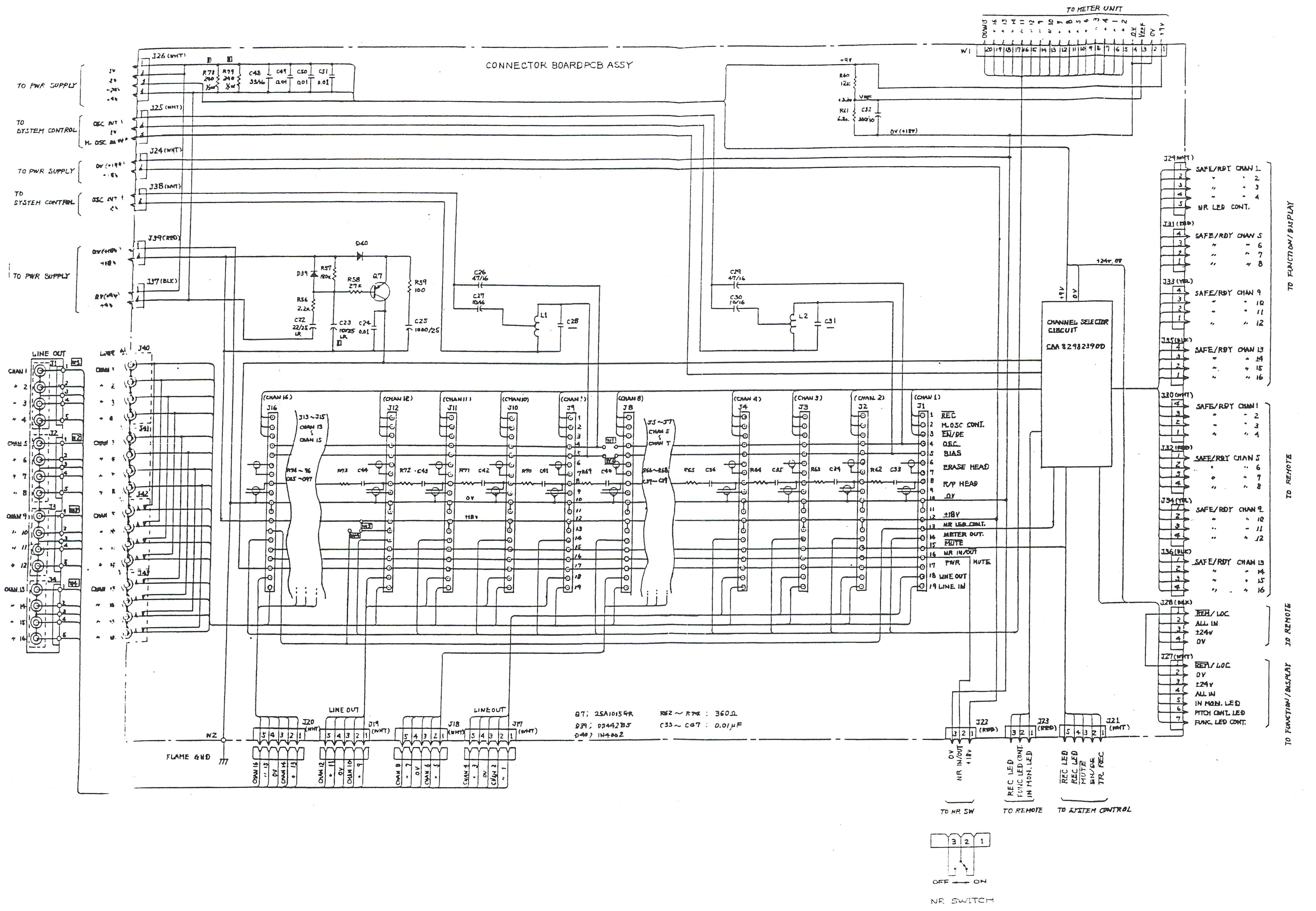


DD CAPSTAN, E-2/E-22

R/P AMPLIFIER, E-16



CONNECTOR BOARD. E-16



REMOTE CONTROL 8308/8316