

Model B-16

RECORDER/REPRODUCER

Service Manual

Fostex®

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NOTES

- * Adjustment procedures are given in this manual which also includes a Parts List and schematic diagrams to assist the service technician in maintaining the Model B-16.
Please feel free to contact the nearest Fostex Dealer and Distributor, or write directly to a Fostex office, the addresses of which are printed on the back cover of this manual.
- * Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation. 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

CAUTION

△ 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.

1. INTRODUCTION

Model B-16 is a 1/2 inch tape, 16 track 16 channel recorder/reproducer.

The function of each control are explained in Section 3 of this manual. If you need more details on their use, please refer to the Owner's Manual included in the Model B-16.

With the Model B-16 in the vertical position, behind the meter panel on the lower section of the transport are located 16 record/reproduce amplifiers - 1 channel/1 PC card - and, the power supply and system control section on the rear side of the transport.

Routine maintenance is explained in the Owner's Manual but for periodical checks, alignment and adjustments after making repairs, refer to Section 5 of this Manual.

Operation of each circuit is explained in Section 4, Theory of Operation.

Should it become necessary to exchange parts, refer to Section 6 for procedures on dismounting and assembling.

In making orders for replacement parts, please be sure to refer to the Parts List and check for the correct parts number.

2. SPECIFICATIONS

Tape	1/2 inch tape width, 1.5 mil base (Ampex 456, Scotch 226 or equivalent)
Format	16 track, 16 channel
Reel size	10 1/2 inch, NAB hub
Tape speed	Fixed : 15 ips (38 cm/s) Variable : 15 ips \pm 15%
Inputs (x16)	-10dBV (0.3V) Impedance: 25K ohm, unbal.
Outputs (x16)	-10dBV (0.3V) Load impedance: 10K ohm, unbal.
System operating level	0dB referenced to 320nWb/m of tape flux
Equalization	IEC (infinite + 35 μ s)
Overall frequency response	40Hz - 18KHz, \pm 3dB
Signal to noise ratio	80dB weighted, 60dB unweighted (With built-in Dolby C) Referenced to 3% T.H.D. level (10dB above operating level) at 1 KHz
T.H.D.	1% at 1 KHz
Erasure	70dB at 1 KHz
Crosstalk	55dB at 1 KHz
Wow & flutter	\pm 0.06% peak weighted (ANSI) measured with flutter tape
Power requirements	120V, 60Hz, 170W (U.S.A./Canadian model) 220V, 50Hz, 170W (European model) 240V, 50Hz, 170W (UK/Australian model)
Dimensions	445(W) x 430(H) x 235(D) mm [17 1/2"(W) x 17"(H) x 9 1/4"(D)]
Weight	30kg (67 lbs)

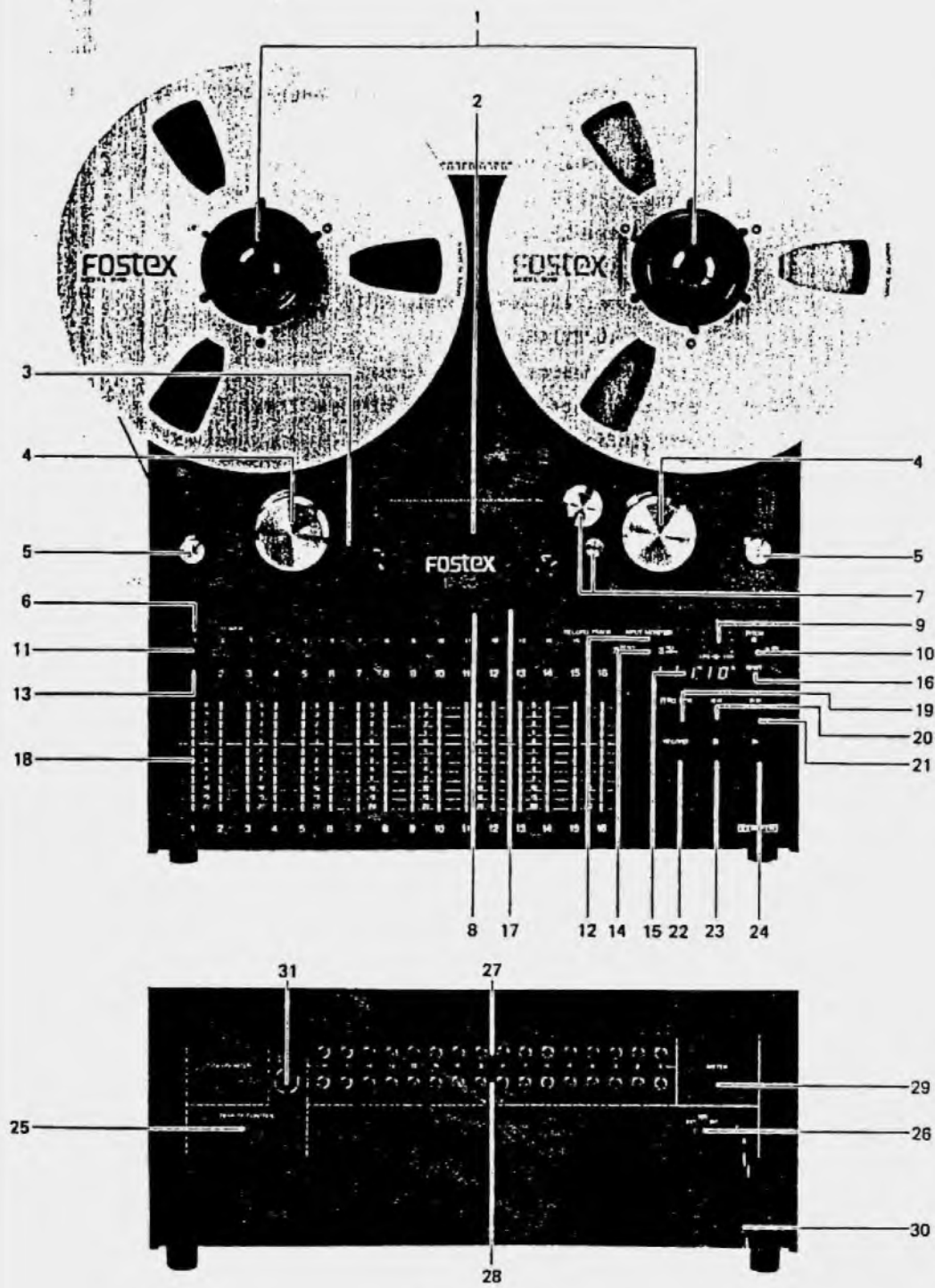


Fig. 3.1

3. THE CONTROLS AND THEIR FUNCTIONS

1) Reel clamper

2) Head assembly

3) Tape presence sensor

If tape is completely wound onto the other reel or if it is broken during operation, this sensor will be activated to put the transport in the STOP mode.

4) Idler roller

5) Tension roller

6) POWER switch

7) Capstan and pinch roller

8) Head shield gate

This head shield gate located in front of the head can be manually raised or lowered. If it is in the lowered position, it can be raised by slightly depressing it to release the catch.

9) PITCH control knob

Tape speed can be changed over a range of $\pm 15\%$ for sound pitch control during play or record. This control is a dual concentric - the outer knob is for large changes and the inner knob is for trimming.

10) PITCH control switch

NORMAL SPEED or VARIABLE SPEED of tape is selected by this switch.

11) RECORD TRACK selector

These 16 pushbuttons determine whether recording can commence on a given track.

The specific function also depends on whether or not tape is stopped or is advancing in the record ready mode.

- a) If tape is stopped, depressing a RECORD TRACK button places the corresponding track in the record READY mode, and the LED above that track's LED meter will blink.

If the RECORD button only is depressed, the VU meter indications and signals from the OUTPUT jacks will change from tape out to input monitor only for those channels whose RECORD TRACK buttons are depressed, and if the INPUT MON switch is set to INDIV, the INPUT MON LED will change to blinking.

This mode will be cancelled again by depressing the RECORD button but will not be cancelled by depressing any other buttons.

If the RECORD and PLAY buttons are subsequently depressed, recording begins,

the RECORD TRACK LED stops blinking and remains on, and the RECORD LED also turns on.

The VU meter indications will read the input signal of the channels placed in the record mode; the other channels will remain in the tape out signal monitor mode.

- b) If tape is rolling in the PLAY mode, depressing a RECORD TRACK button has the same effect as in a), above; it readies the track for recording.

In this condition, the VU meter indications and signals from the output jacks will be tape out signal monitor for all channels.

- c) If tape is rolling in the record ready mode (i.e. RECORD and PLAY buttons have been depressed), the RECORD LED adjacent to the RECORD button will blink.

Subsequent depression of a RECORD TRACK button immediately causes that track to enter record mode; both the RECORD LED and the RECORD TRACK LED now remains on.

12) INPUT MONITOR LED (Green)

13) RECORD LED (Tracks 1 ~ 16)

14) INPUT MONITOR selector

- a) If the ALL function of this switch is depressed, all channels will go to INPUT MONITOR and the green LED (12) will be lit.
- b) If this switch is set at INDIV, individual channels can monitor the inputs in the following way:

Place the RECORD TRACK selector (11) to READY; when LED (13) is blinking, depressing the REC (22) button only will make LED (12) blink and the B-16 output for that channel only will change from TAPE OUT to INPUT.

- c) Subsequent depressing of REC (22) button again will change the B-16 output from INPUT to TAPE OUT.
- d) Should the REC button only be depressed when the RECORD TRACK selector (11) is at safety, LED (12) will blink but the B-16 output will not change to INPUT.

NOTE: While a certain channel is in the RECORD mode, depressing the RECORD TRACK selector button for another channel to put that track in the READY mode will make the B-16 output change to INPUT, but this track will also enter the RECORD mode.

15) Counter display

A five digit counter displays the hour, minute and second of tape travel. For positions below the zero point, a "-" is displayed before the hour digit.

16) RESET button

The counter display is set to zero by depressing this button.

17) CUE lever

Pushing this lever forward toward the head makes the tape lifters retract, allowing tape cueing during F.FWD or REW modes.

18) Bar graph meters

These are peak indicating meters.

19) ZERO RETURN

Depressing this button stops the tape at the "0" position of the tape counter.

20) REWIND button

Tape is wound at high speed from the takeup reel to the supply reel by depressing this button.

21) F,FWD button

Tape is wound at high speed from the supply reel to the takeup reel by depressing this button.

22) REC button

This button has the function of putting the tape deck in RECORD mode when simultaneously depressed with the PLAY button and also to individually switch each channel to INPUT MONITOR (See above 14-b).

23) STOP button

Depressing this button once stops tape; depressing this button a second time releases both left and right reel brakes (both reels will pull tape in opposite directions and the tape will be stopped in a balanced state). This function allows manual editing of the tape but the CUE lever must be pushed forward.

24) PLAY button

Depressing this button puts the tape deck in the PLAY mode and PLAY LED (green) will be lit. When both the ZERO RETURN button and then the PLAY button are depressed, the tape will rewind to the counter "0" position and will automatically enter the PLAY mode (the PLAY LED will then be lit). The PLAY LED will blink while tape is being rewound.

25) Remote control connector

Remote control is possible by using the Model 8090 Remote Control Unit.

6) NOISE REDUCTION INT/EXT selector

The Dolby C noise reduction circuit contained in the B-16 is switched in by setting this switch to INT. If this switch is set to EXT, this internal noise reduction circuit is bypassed and an external NR system can then be connected.

7) INPUT jack

8) OUTPUT jack

9) Meter

The LED bar graph meter on the front panel can be lifted out and installed at another location such as a mixing console or video switcher. In choosing this method, the optional Model 9082 cable must be used.

0) AC cord

1) REMOTE PUNCH IN/OUT jack

Remote PUNCH IN/PUNCH OUT is accomplished by using the Model 8050 Foot Switch.

Model 8090 Remote Control Unit

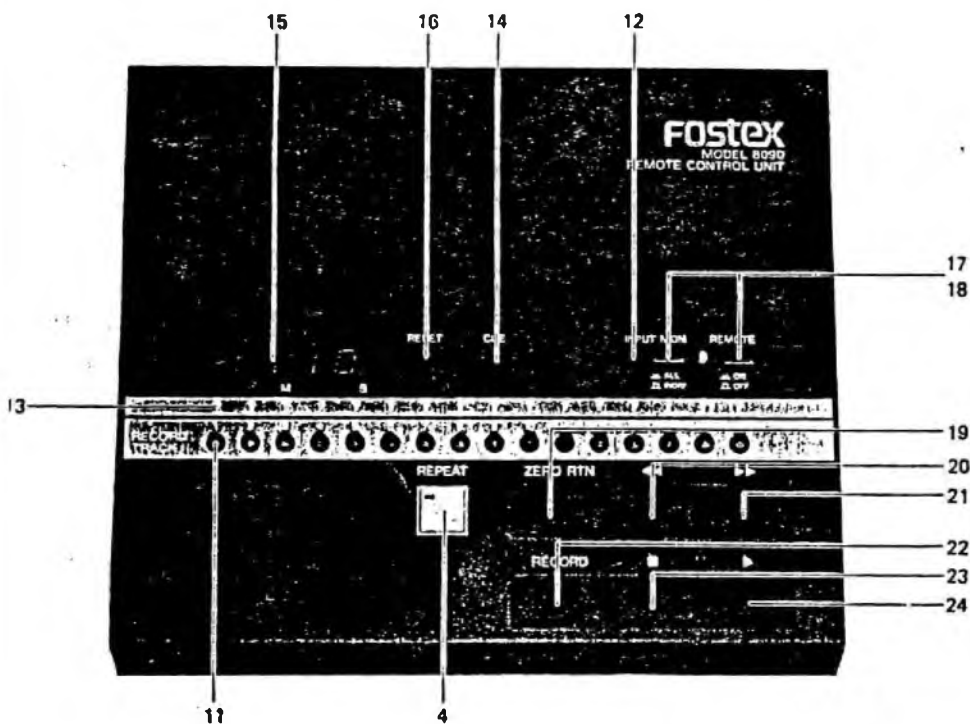


Fig. 3.2

All functions are the same with B-16 except for (4), (14), (17) and (18).

(4) REPEAT switch

This control has the function of repeating the tape between the ZERO position and the CUE point memorized by the CUE button (14).

When this REPEAT button is depressed, the tape rewinds to the ZERO position and immediately enters the PLAY mode. Upon reaching the CUE position, the tape will again rewind to the ZERO position and then enter the PLAY mode.

If the tape is at "-" display position of the counter, depressing this REPEAT button will have no effect.

The REPEAT mode can be cancelled by any transport button other than RECORD (ZERO RTN, F.FWD, REWIND, STOP and PLAY).

(14) CUE button

This button is for memorizing the tape position at which the REWIND mode is entered from PLAY during the REPEAT mode.

This memorized CUE position will be renewed each time the CUE button is depressed.

Although the CUE button can be depressed during any mode to enter a new tape position, this function is not possible if the counter is showing a "-" position.

(17), (18) REMOTE switch

This selects whether the control should be at the B-16 or the Remote Control Unit in terms of the RECORD TRACK selector and the INPUT MONITOR selector.

When LED (18) is lit, the RECORD TRACK and INPUT MONITOR selectors can be controlled at the Remote Control Unit but not at the B-16.

The other control switches, however, can be operated at either the B-16 or the Remote Control Unit, as they are wired in parallel.

4. THEORY OF OPERATION

4.1 LSI peripheral control circuits

Control signals which are basic fundamentals in tape transport operation are generated by a TTL type LSI, U14.

1) CR 1 (U14-5)

This is the reset signal input pin of U14. During the short period after switch ON of power until Q3 switches on, U14-5 is kept at "L" level and thus U14 is reset.

During the period when C12 is being charged, U11-10 and U6-4 go to "H" level via D13 and D14, to reset each D flip-flop. At the same time, the CR-1 input signal puts U6-10 to "H" level which resets this flip-flop.

2) EBR IN (U14-4)

When the STOP button is depressed during the F.FWD or RWD mode, the transport temporarily goes into the reverse tape travel mode. Then, "L" level is input to EBR IN and then into STOP mode to apply the mechanical brakes. When tape speed decelerates to about 38 ips, an "L" level is applied to EBR IN from U7-6. This is due to the nature of the circuit such that the height of the saw tooth wave at the collector of Q4 generated by the motion pulse becomes higher with progressively slower tape speeds. The timing chart is shown in Fig. 4.1.

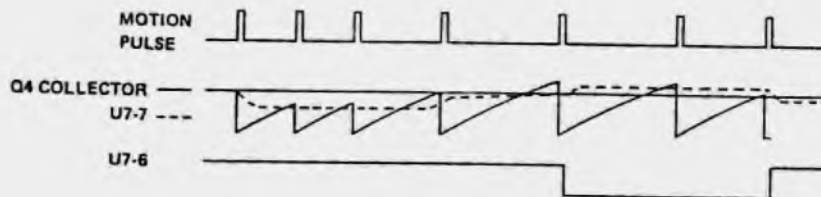


Fig. 4.1

3) ZERO RTN

When the ZERO RTN button is depressed, the transport goes into RWD or F.FWD and when the counter reaches "0", it will go into the PLAY or STOP mode. When the ZERO RTN button is depressed, U6-8 goes to "H" level by U3-11, flip-flop U6 is set, U6-13 goes to "H" and U6-12 goes to "L". At the same time, U3-5 and U3-2 goes to "H" level and if the counter display is "+", then U3-1 will be "H" level, an "L" level will be input at U14-2 and the transport will go into REWIND. If the display is "-", U3-6 will be "H", an "L" level will be input at U14-3 and the transport will go into F.FWD.

After going into the REWIND or F.FWD mode, tape will go to mid-speed when the counter reaches ± 1 minute, low speed at ± 10 seconds, and when it

reaches ±1 second to 0 second, a ZERO signal from the counter LSI (U23) is input to U4-2 at "L" level. If the tape speed at this instant is such that U7-6 goes to "L" level, then U4-3 goes to "L" level. If tape speed is still fast and U7-6 is at "H" level, then the above operation after depressing the ZERO RTN button, is repeated.

If U4-3 goes to "L" level and the mode is RTN TO PLAY, then, U5-9 goes to "L" level and thus enters the PLAY mode. At the same time, "L" is output from U4-10 and passing through U3-8, becomes "H" level at U6-10 to reset the flip-flop and thus ZERO RTN is cancelled.

If the mode is RTN TO STOP, U2-12 goes to "L" and thus enters STOP mode. Then, Q16 switches ON, the collectors goes to "L" and passing through D69 and U3-8, resets flip-flop U6 and ZERO RTN is cancelled.

4) EDIT mode

EDIT mode means the condition whereby the transport reel servos are active and tape is stopped by balanced tension from the left and right reel motors.

While the transport is in the STOP mode, depressing the STOP button an odd number of times will put the D flip-flop output U8-13 to "H" level and an "H" level will be output from U10-3. The FAST SOL is activated by this output, the brakes released, the collector of Q16 becomes open and the reel servo circuit goes into the EDIT mode.

If the STOP button is depressed while in the EDIT mode, the D flip-flop U8-13 output goes to "L" and the transport will enter STOP mode.

4.2 Remote Punch In/Out, REC-PLAY

The latching type foot switch is plugged into the rear panel REMOTE PUNCH IN/OUT phone jack.

The signal obtained by repeated charge and discharge of C17 each time the foot switch is depressed, is applied to U1-6 and the same delayed signal is also applied to U1-5 and a pulse is output from U1-4. U8-4 is at "L" level when in the PLAY mode and D flip-flop U8 is inverted by U1-4. Due to this, U8-1 alternates between "H" and "L" and thus send or cut off a transport REC signal to J10-1. (Refer to Fig. 4.2)

When in the REC-PLAY modes, U8-6 goes to "H", and regardless to output level of U1-4, U8-1 goes to "H" and a transport REC signal is output to J10-1.

4.3 Input monitor

An ENCODE/DECODE output which is an individual input monitor control signal,

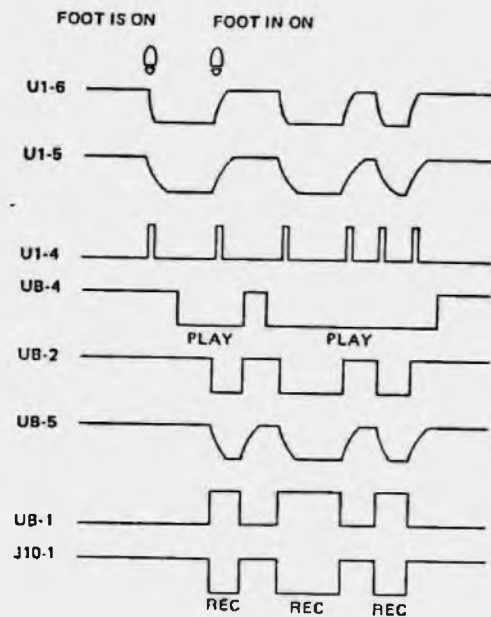


Fig. 4.2

is output from J10-2.

When the REC button is depressed, "L" level is input to U1-8 and U1-10 goes to "H" level. D flip-flop U6 is inverted by this output, U6-2 goes to "L" level, Q13 switches off and an ENCODE signal is output from J10-2. When the REC button is depressed again, D flip-flop will invert again and Q13 switches on and a DECODE signal is output from J10-2. When the ENCODE signal is output and the INPUT MON switch is at INDIV (not depressed), the INPUT MON LED will blink and the input signal of the channel whose RECORD SELECTOR switch is depressed, will be monitored.

4.4 Capstan motor drive circuit

When the transport is in other than the PLAY and REC modes, Q25 will be ON, and therefore Q27 will also be ON, Q28 is then switched OFF and U13-3 will go to approximately 0V. Therefore, the capstan motor will not be driven. When the transport enters the PLAY or REC mode, Q25 switches OFF, Q28 switches ON, a high voltage will be applied to J24-3 and the capstan motor will be driven. A tach generator output of about 2400Hz is applied to U13-12 and output from U12-14 as a square wave. This square wave is differentiated by C32 and R132, and Q26 is switched ON by the rising edge of this waveform.

As Q21 and Q22 are constantly in the ON state, the integration circuits of R309, R136 and C331, C34 are always functioning. Therefore, the saw tooth wave generated by this integration circuit and by the on/off of Q26, is applied

to comparator U13-9. Output U13-8 which is compared with the reference voltage U13-10 is smoothed by the integration circuit consisting of R142, R143 and C35, passed through Q28 and applied to the DC amplifier. This is then current amplified by Q29 to control the capstan motor.

When Q29 switches OFF, Q30 switches ON to absorb the inverse electromotive power from the motor which thus serves as a braking circuit.

4.5 Solenoid intermittent circuit

There are two plunger solenoids in this transport. One is used to draw in the pinch roller and release the brakes when in the PLAY mode. The other is used to push out the tape lifter and also release the brakes during the FAST WINDING modes.

When the PLAY button is depressed, U9-11 goes to "H" level and this signal passing through the differential circuit of C23 and R78, momentarily switches ON Q6 for a duration of 5 ~ 10msec.

When Q6 switches ON, C24 is discharged and when Q6 switches OFF, the signal passing through the integration circuit of R81, C24 and R83, momentarily switches on Q7 for a duration of 100 ~ 180msec. By switch ON of Q7, Q8 is switched ON and +26V is applied to the solenoid. Then, at the moment Q8 is switched OFF, +13V is applied to the solenoid via D68. During this time, at about the same instant that U19-11 goes to "H", U7-12 also goes to "H", and as Q9 and Q10 is already ON, the PLAY solenoid will be activated.

In the same way, when the transport is put in the FAST WINDING and EDIT modes, U9-4 goes to "H", and by charging of C22, +26V and +13V are applied to the solenoid, Q11 and Q12 are switched ON and the FAST solenoid is activated.

4.6 Counter section

The major component of the counter circuit in this system is the P-MOS type LSI, U23.

1) Count pulse input circuit

In the following is explained the circuit from count pulse detection up to the UP/DOWN input and COUNT input of U23.

The circuit and timing chart is shown in Fig. 4.3. The frequency divider circuit have been omitted for simplification.

Linear tape motion is transferred to the footage roller, at right side of the transport, by rotating it. This rotation is detected by two photo-

sensors and their outputs applied to J1 on the System Control PCB. After wave shaping, the two outputs are input to U28-6 and U20-5, a count pulse output at U22-11, and an UP/DOWN output to indicate tape travel direction, at U25-13 and U25-12.

Since the indications are "+/-", the UP/DOWN input at U23-40 must all be "UP" in directions leading away from 0 sec., and "-" indication, it must be in reverse to UP/DOWN of tape travel. This operation is done by using the outputs of U25-13, U25-12 and U23-39 and output at U19-4.

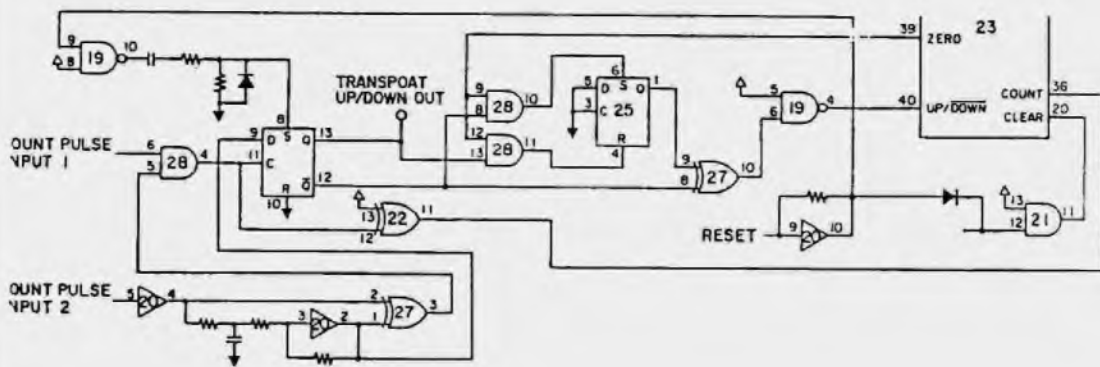
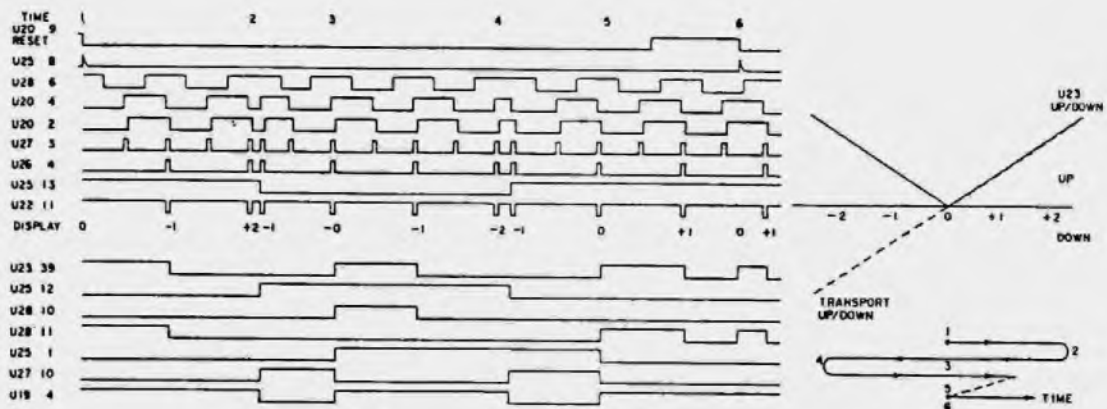


Fig. 4.3

2) Frequency divider circuit

A count pulse of 64 pulse/sec. is output from U22-11 at a tape speed of 15 ips. As the count input of U23-36 is a 1sec. indication for each pulse, the signal must be frequency divided by 1/64 by U1 and U2 on the Divider PCB before it is applied to the above. This timing chart is shown in Fig. 4.4.

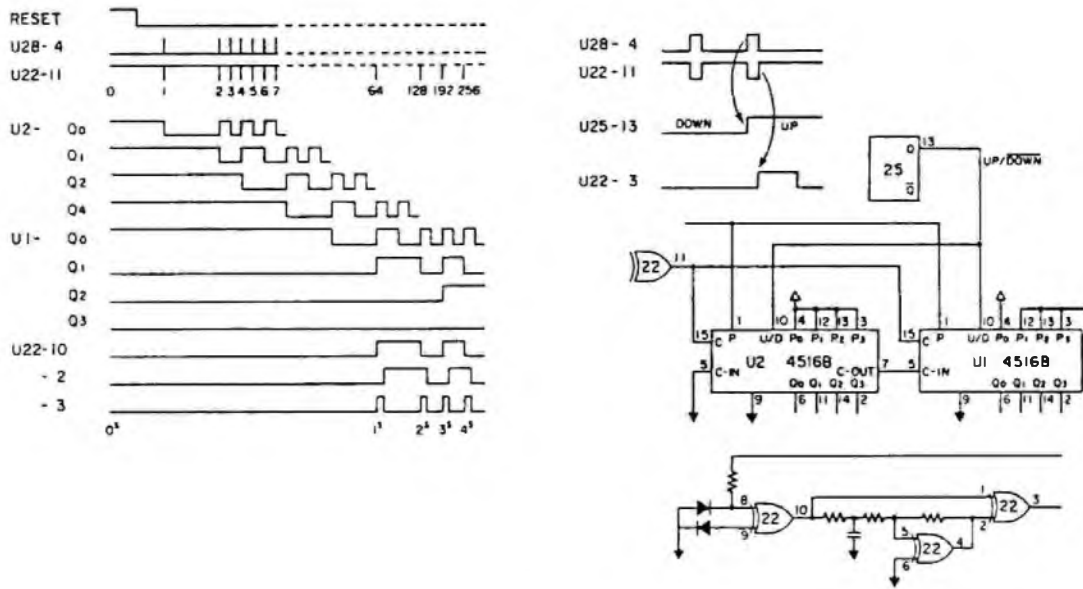


Fig. 4.4

3) Display

The counter display is the dynamic scan type and can indicate from -1H59M 59S up to 9H59M59S. "-" is indicated by using the "g" segment of digit 5. This timing chart is shown in Fig. 4.5.

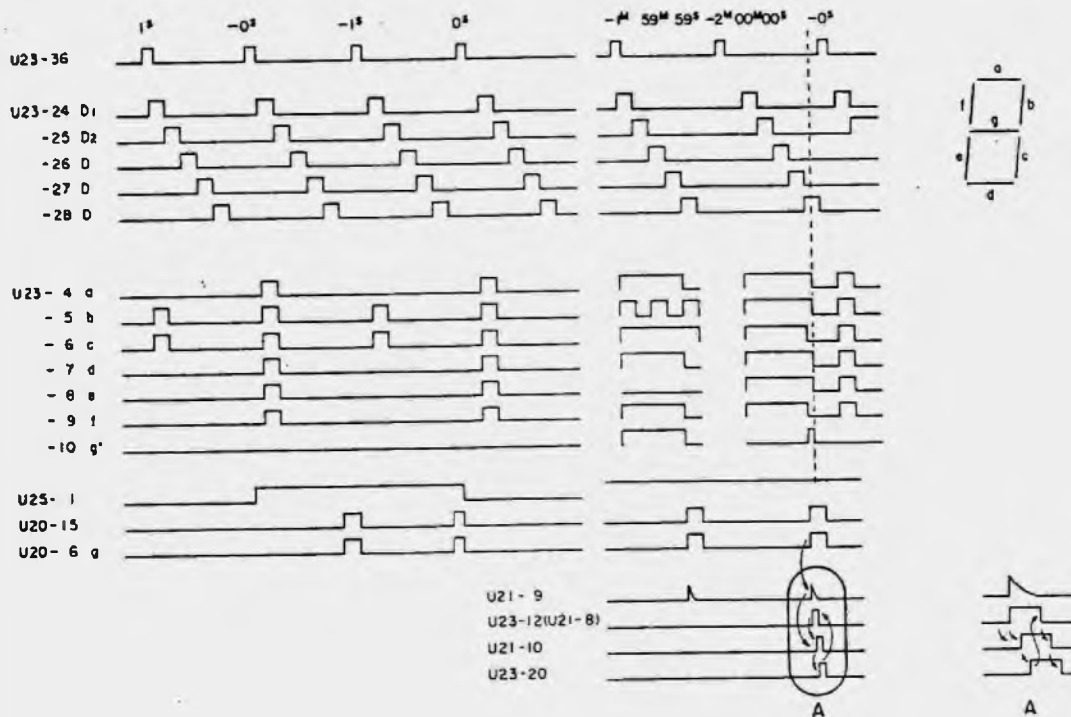


Fig. 4.5

4) Counter LSI, U23

BCD out: When the digit codes are output by dynamic scanning from D1 through D5, each display number is converted to BCD and output by approximately the same timing as with the digit output. For instance, if the D1 display number is "7", the BCD codes will be output in the following order from LSB throughout the duration when D1 is at "H" level: A=H, B=H, C=H, D=L.

$R_A R_B R_C$: Input terminal of the U23 internal register for storing the BCD counter codes. R_D pin is not used.

Load register : The R_A, R_B, R_C, R_D codes are stored in the register when

this input pin is at "H" level. In other words, the BCD codes, RA through RD representing the number that is output, is stored in the register.

EQUAL : A signal is output here whenever the values of the register and counter agree.

5) Area output for ZERO RTN

As the specifications for this system are as presented in 4-1, item 3, above, outputs for middle speed area and low speed area are required. The middle speed area are set to ± 1 minute and the low speed area to ± 10 seconds. The circuit for this operation is shown in Fig. 4.6 and the timing chart in Fig. 4.7.

± 10 second is detected by U31 and ± 1 minute is output by storing one minute in the U23 memory, then setting the U26-13 flip flop by the equal output from U23-23.

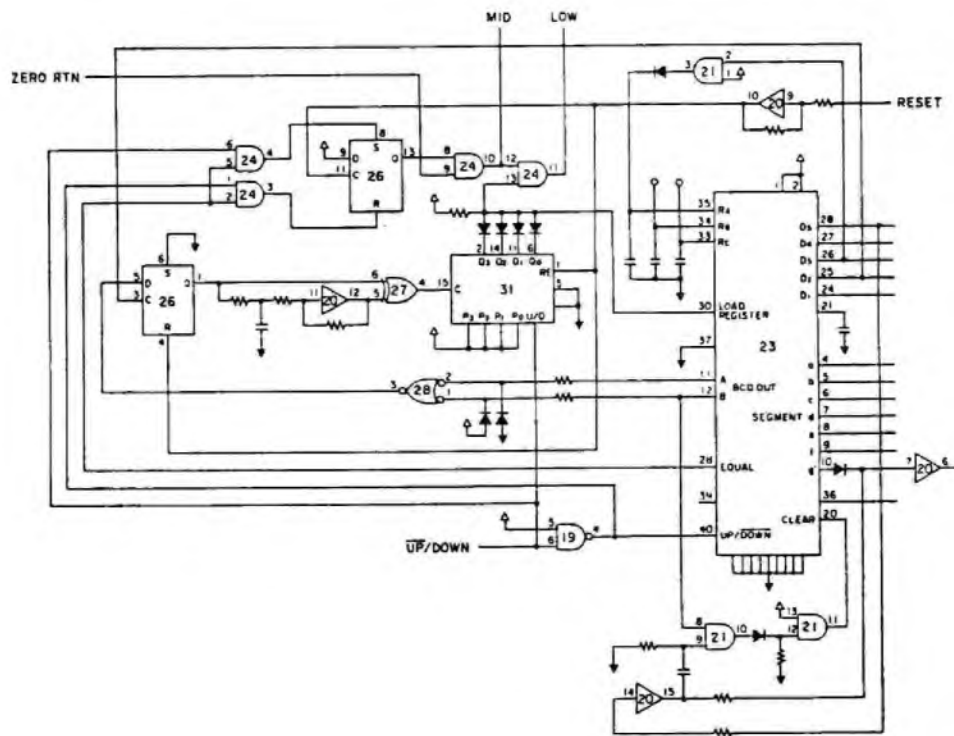


Fig. 4.6

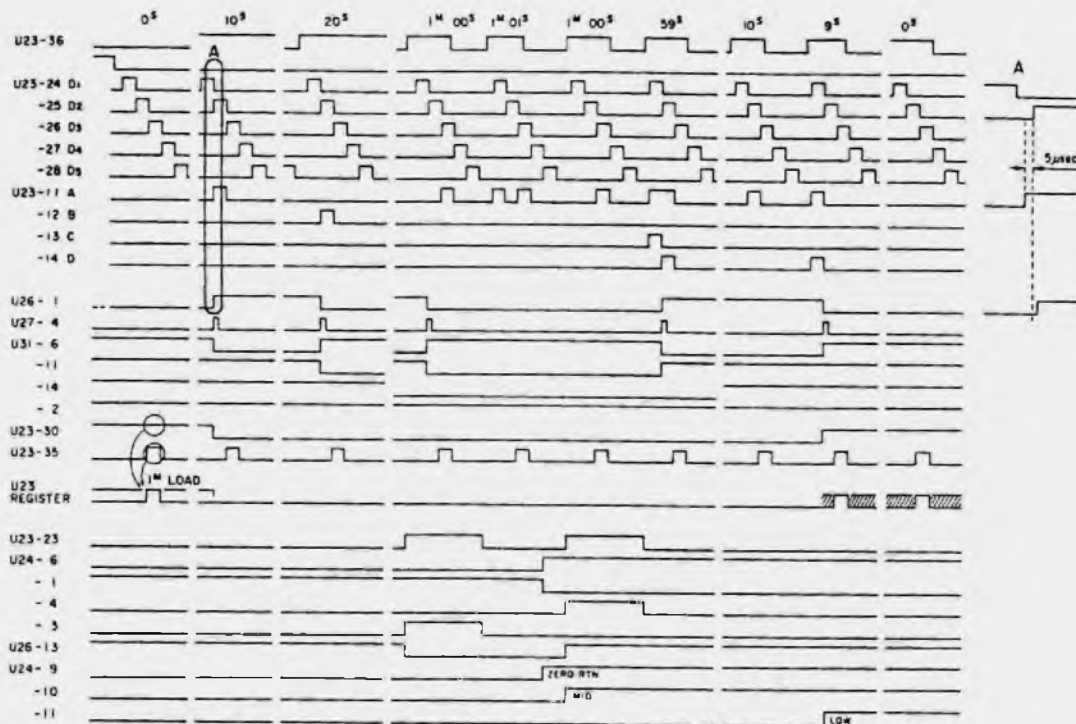


Fig. 4.7

6) Display LED

D36 through D40 on the function/display PCB are the count display LED and are connected to J2 and J3 on the system control PCB by a flat cable. Dot D38 is lit as the dividing point between the Minute and Second LED's.

4.7 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 ZERO RTN modes.

1) Tension control circuit

Tape tension is detected by the photo-interrupter whose output is proportionate to movement of the tension arm and the output response is as shown in Fig. 4.8.

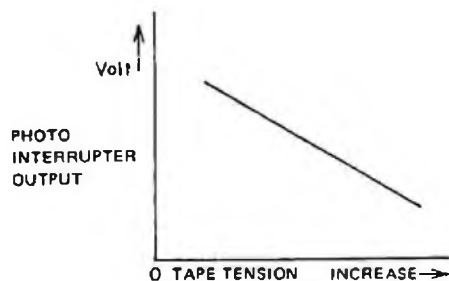


Fig. 4.8

For the takeup side, the photo-interrupter output fed to U16-3, is compared with U16-2 and output at U16-1. Then, passing through a phase advance circuit, is applied to the motor drive circuit consisting of U17, Q38 and Q101 (current feedback is applied by R188) 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 photo-interrupter. As shown in Fig. 4.8, when tape tension rises, the photo-interrupter output drops and U16-1 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 U16-2. In other words, the emitter output of Q37 is the reference voltage by which tape tension is established.

This reference voltage is set by R302 for the EDIT mode, by R300 for the PLAY mode when Q15 is ON, and by R301 for F.FWD mode when Q36 is ON.

It must be noted that since R300 and R301 are wired in parallel with R302, the adjustments of the former two pots will be affected by any change of the latter pot. The situation is the same for the SUPPLY side.

2) FAST WINDING speed control circuit

Tape speed is controlled by the motion pulse signal from the counter section. Q44 is switched by the motion pulse and a saw tooth wave generated by the integration circuit of C51 and a resistor. The peaks of this saw tooth wave is detected by D46 and C52, then output from the emitter of Q45.

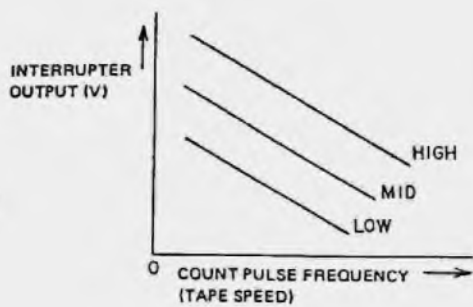


Fig. 4.9

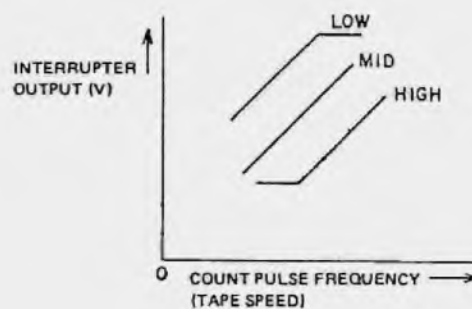


Fig. 4.10

Resistances in the integration circuit for generating the saw tooth wave differs according to tape speed and, for LOW, resistors R308 and R221 are used; for MID, Q42 is switched ON to put R306 and R219 in parallel with the LOW resistors; and for HIGH, both Q42 and Q43 are switched ON to put R307 and R220 in parallel with the resistor combinations for the MID speed. Therefore, the emitter output levels of Q45 will be as shown in Fig. 4.9. The saw tooth waveform will be the same as in Fig. 4.1 and the Q45 emitter output waveform will be the same as from U7-7 shown in Fig. 4.1.

The output of Q45 passing through U18 is applied in parallel with the tension control voltage to the takeup side fast winding servo circuit. Therefore, when tape speed rises, output of Q45 decreases to reduce motor torque of the takeup side and the speed drops. On the other hand, when tape speed goes down, the circuit reacts to raise the speed.

The output of Q45 is inverted by Q46 resulting in an output shown in Fig. 4.10. This output passing through U18, is applied in parallel with the tension control voltage to the supply side fast winding servo circuit. The output of Q46 rises in proportion to rise in tape speed and this raises motor torque of the supply side, thus acting to reduce tape speed but will react to raise the speed if it goes down.

As explained above, speed controlling circuits in the reel supply side and takeup side operate to maintain tape speed at HIGH, MID and LOW with the least effect from differences in amount of tape on either reel.

3) 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, U1-1 goes to "L" level and if channel 1 of the record selector switch is depressed, U1-2 will also go to "L" level. Then, U1-3 and U2-9 will also 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 input at "L" level from the system control PCB, U1-13 goes to "L" level, and when the channel 1 of the record selector switch is depressed, U1-12 goes to "L" level. As a result, U1-11 goes to "L" level, U2-6 and U2-9 also to "L" level, and the R/P amplifier will go to the ENCODE mode. Simultaneously, the output of U1-11 passes through the integration circuit of R4 and C2, and after a certain delay, an "H" level is output from U1-10. This switches ON the REC relay in the R/P amplifier.

The output of U1-10 is delayed by R7 and C3, and since U1-5 is "L", and "L" level is output from U1-4 to switch ON the BIAS ON/OFF in the R/P amplifier. At the same time, this signal passing through D4 switches OFF Q6 to switch ON the MASTER BIAS.

When either the TRANSPORT REC signal goes to "H" or the RECORD SELECTOR is switched OFF, U1-11 goes to "H", U1-5 goes to "H", and U1-4 also to "H", and thus the R/P amplifier BIAS ON/OFF signal goes to OFF. After a certain delay of the U1-11 "H" level by R4 and C2, it makes U1-10 go to "H" level. As a result, the REC relay is switched OFF. The output of U1-10 also delayed by R7 and C3, goes to U2-3, 4 which results in "H" level output from U2-6 and U2-9. Due to this, R/P amplifier goes to the DECODE mode.

The operation is the same for channels 2 through 16.

4.8 Function switch (Function/Display)

S1 through S16 are the RECORD SELECTOR switches and the numbers correspond to the channel numbers 1 through 16.

D1 through D16 are the mode display LED's for the RECORD SELECTOR switches. S1 through S16 are 2 circuit 2 contact switches with one circuit used for the SAFE/RDY signal and the other used for LED control. Q1 and Q2 make up a constant current circuit and is controlled by the FUNCTION LED CONT

signal. Q3 and Q4 are for REMOTE/LOCAL switching and when ON, the transport RECORD SELECTOR switch becomes effective.

4.9 Remote control

Using the system control signal and counter signal from the transport, a repeat function in addition to operations possible by the control buttons on the transport are provided and channel selecting for recording, etc. is possible by using the FUNCTION signal.

1) Switch/Display PCB

Signals from the transport are received by J1, the 40 pin connector on this PCB, and distributed to the Control/Counter PCB.

All functions are controlled by switches S1 through S17 which are wired in parallel via diodes with the transport function switches. However, priority of the function switches on either the transport or the remote control unit is selected by S18. When S18 is switched ON, a single pulse is generated by U2 to null the transport controls.

Control of the transport is done by S19 through S24 which are wired in parallel with the transport control switches. It must be noted here that the Repeat Switch S101 and the Cue Switch S26, not provided on the transport, are sole features added to this unit.

2) Control/Counter PCB

The repeat function is such that by depressing the CUE button at the "4" count area, then depressing the REPEAT switch makes the transport go to the ZERO RTN TO PLAY mode, lets it PLAY to the CUE point, then repeat the ZERO RTN TO PLAY mode again.

3) Control circuit

When the repeat switch is depressed, flip-flop U3 is set and U3-13 goes to "H" level. As U7-8 will go to "L" level at the same time, Q4 switches ON to make the ZERO RTN input go to "L" and the transport thus goes to ZERO RTN. Then, upon the counter reaching 0 second, a ZERO output of "H" level is output from the counter circuit and applied to U4-5. An "H" level indicating LOW tape speed is also received by U4-4 from the transport. This results in "H" level of U4-6, U4-9 also to "H", Q5 switching ON, PLAY input going to "L" and the transport goes to the PLAY mode.

Upon reaching the CUE point, an "H" level EQUAL output signal from the count circuit is applied to U7-3. Therefore, U7-6 goes to "L", U7-9 to "H", Q4

switches ON to enter the ZERO RTN mode.

This operation will be repeated continuously but if it is to be cancelled, it is only necessary to depress any button except REC or REPEAT. U7-10 will then go to "H", flip-flop U3 reset and U3-13 to "L" to cancel the repeat mode.

4) Counter circuit

The count pulse and UP/DOWN signal from the transport are used. In the main part is used the same P-MOS type LSI used in the transport main unit, designated U8, and since the display is the "+/-" type, it is driven by U1, U2, U3, etc. For details, refer to the counter section, 4-6.

There is, however, one point which differs from that in the transport main unit and that is repeat function. Due to this additional feature, it must output an EQUAL signal at the CUE point. For this purpose, the EQUAL function of U8 is utilized. When the CUE button is depressed, C13 is discharged through R49 and D19, but charged again through R48 and R50 when the button is released. Then, during the period until U5-14 reaches threshold potential, U5-15 goes to "L" level and U8-30 (LOAD REGISTER) goes to "H" level. The counter display number is output from BCD OUT and this is sent to the register inputs RA ~ RD via D22 ~ D25. During the period when U8-30 is at "H" level, the signals from BCD OUT are input to RA ~ RD and latched by the register. In this way, the counter display time at the instant the CUE button is depressed and released is latched by the register and when the counter reaches the time that was latched in the register, an EQUAL signal is output from U8-23.

5. ALIGNMENT AND ADJUSTMENTS

5.1 Test equipment required

Spring scale	0 ~ 4kg. (0 ~ 8 lbs.) 0 ~ 300g. (0 ~ 10 ozs.)
Flutter meter	Meguro Denpa Sokki Co., Model MK-668B (Japan)
Audio oscillator	
Frequency counter	Range: 0 ~ 1MHz; sensitivity: 0.1Vrms; impedance: >1M Ω , <25pF
Band-pass filter	General purpose frequency analyzer
AC voltmeter	Range: -80dB ~ +40dB; impedance: >1M Ω , <25pF
Oscilloscope	General purpose
Test tapes	For reproduce alignment: Fostex Model 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 Scotch 226 or equivalent

5.2 Transport check and adjustment

1) Pinch roller pressure

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

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

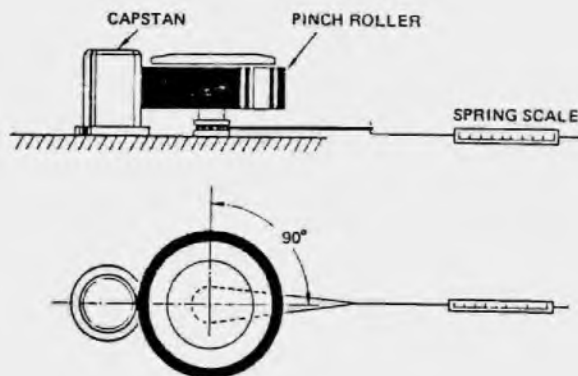


Fig. 5.1

b) 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 opaque paper between the LED and sensor so as to deactivate the Tape Presence Sensor.

c) The spring scale should indicate 2.5kg ~ 3kg (5.5lbs ~ 6.6lbs).

d) 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.

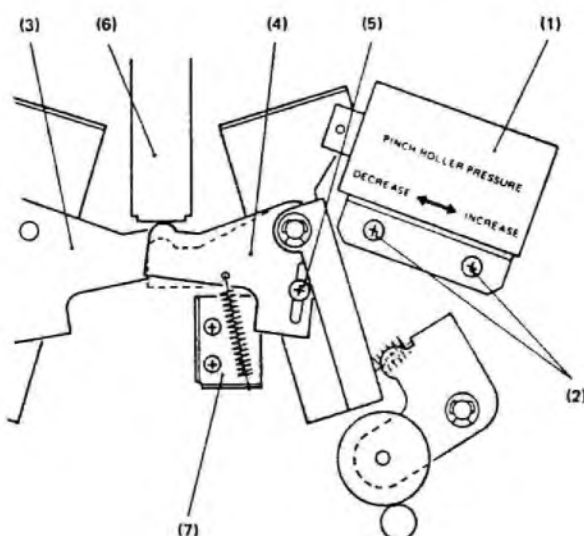


Fig. 5.2

e) 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).

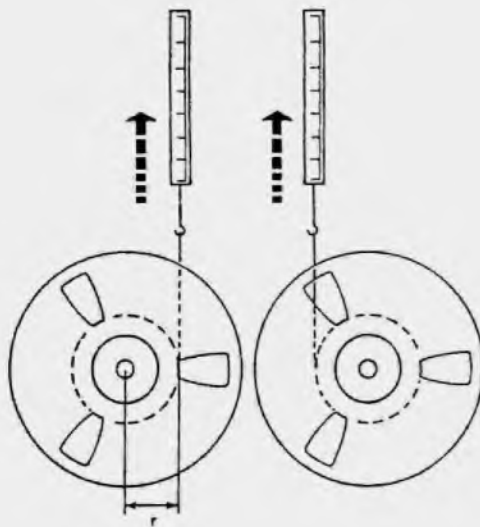
f) Loosen the two screws securing the stopper (7) bracket and fix the stopper position so that the top side of both arm end of levers (3) and (4) are at the same distance from lever slide (6), then tighten the two screws.

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.

- a) Place an empty reel on the left reel table, and fasten one end of a 30" length of twine to the reel anchor.
- b) Wind several turns of twine CCW around the hub and attach a suitable spring scale to the free end of the twine.
- c) 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.
- d) The reading should be 1800 ~ 2200 g-cm (25 ~ 30.5 in-oz).



*FORMULA FOR TORQUE CALCULATION
 $T(\text{g.cm/in.oz}) = R \times W$

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

Fig. 5.3

• If the measurements do not comply with the specs, brake torque is adjusted by changing the hook position of spring (4).

Brake torque can be changed in five steps by different combinations of the hook positions for spring (4) as listed below:

Maximum tension	c & a'
Strong	c & b'
Standard tension	b & b'
Weak	a & b'
Minimum tension	a & c'

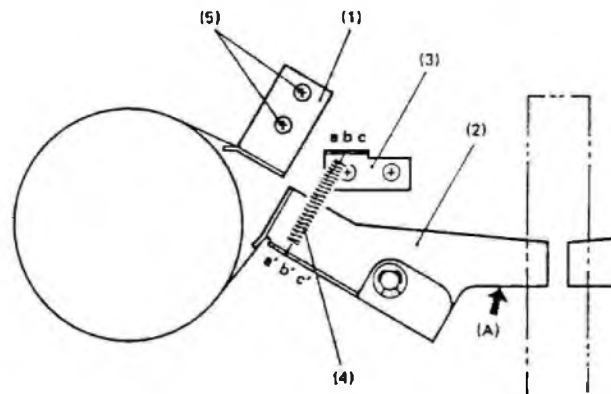


Fig. 5.4

NOTE: a) Referring to Fig. 5.6, loosen the two screws holding 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).

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.

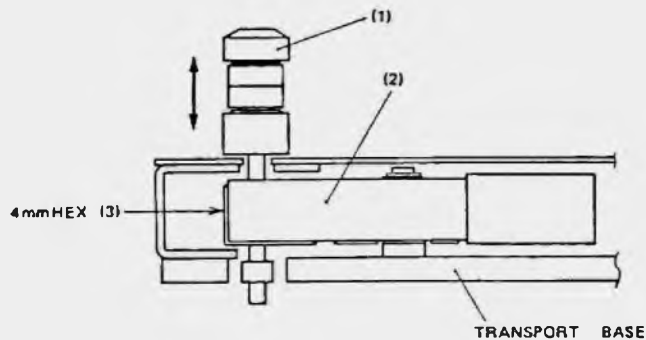


Fig. 5.5

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) Tape lifter adjustment

a) 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 2 ~ 3mm.

b) With the plunger still bottomed as before, the lifter stopper (6) is moved left or right so that the gap between the rubber sleeve on the lifter pin (8) on the lifter arm (7) and the shield plate (9) is 1.5 ~ 2.5mm.

c) With the plunger of solenoid (1) bottomed, push Lever (17) upward by 5mm, then tighten screw (15).

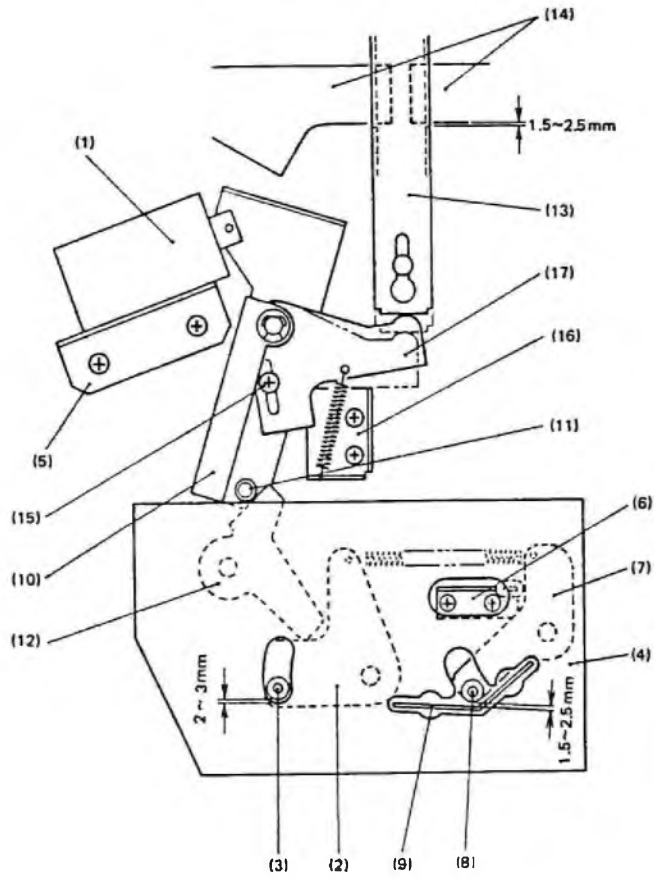


Fig. 5.6

5.3 Reel Servo Adjustment

1. Necessary equipment

Oscilloscope

Tape tension gauge Tentel Model T2-H20-ML

Blank tape 1/2" width, Ampex 456 or Scotch 226

2. Adjusting procedure

2-1 Tension sensor adjustment

- 1) Swing out the System Control PCB.
- 2) Connect an oscilloscope or voltmeter to the System Control PCB test point 2 (Takeup side) or test point 3 (Supply side) to measure the voltage.
- 3) Loosen screw A, on the Tension Sensor mounting plate (Fig. 5.7), for the takeup side.
- 4) Make sure the tension arm is at its lowest point.
- 5) Move the tension sensor until the test point voltage is 8V, $\pm 0.2V$ (14V, $\pm 0.2V$ when changed to the NEW Tension Arm Ass'y), then tighten screw A. Check the voltage again after tightening this screw.
- 6) Loosen screw B, for the supply side tension sensor, and follow the above procedures 2) through 5) while checking the voltage at test point 3.

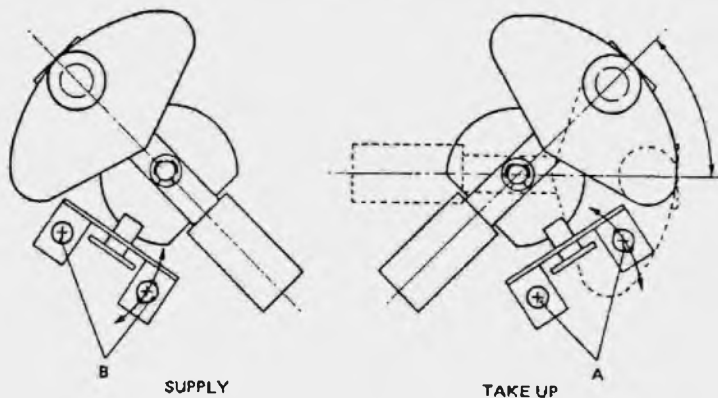


Fig. 5.7

2-2 Tape tension adjustment (Refer to Fig. 5.8 for connector and pot locations)

- 1) Load a 10-1/2 inch blank tape on the transport and wind tape so that both supply and takeup reels hold approximately the same amount of tape.
- 2) Pull out connectors J11 and J12, on the System Control PCB, and plug J12 into J29.

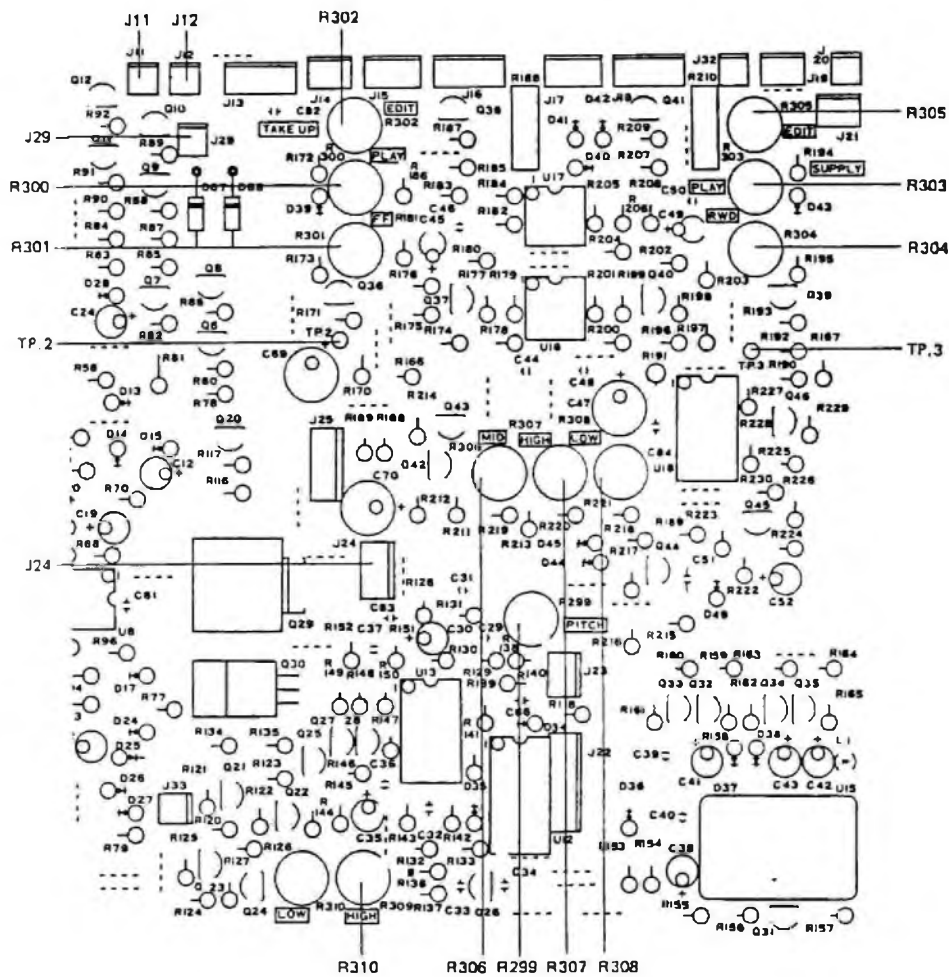


Fig. 5.8

- 3) Pull out J24 (J33 for B-16D) to prevent the capstan motor from running at PLAY mode.
- 4) Looking from the component side of the System Control PCB, rotate all trimmer pots R300 through R305 to extreme CW position.
- 5) Put transport in EDIT mode by depressing the STOP button.
- 6) Insert the tension gauge into point A and set tape tension to 30g, $\pm 2g$ by adjusting EDIT pot R302 on the System Control PCB.
Next, insert the tension gauge into point B and in the same way, set tape tension to 30g, $\pm 2g$ by adjusting EDIT pot R305.
- 7) Put transport in the PLAY mode.

- 8) Adjust tape tension at point A to 115g, $\pm 5g$ by PLAY pot R300, and tape tension at point B to 80g, $\pm 5g$ by the PLAY pot R303.
 - 9) Put transport in the F.FWD mode.
 - 10) Adjust F.F R301 for a 150g, $\pm 5g$ tape tension at point A.
This is a rough adjustment - refer to Item 16), 2-3 for final precise adjustment.
 - 12) Adjust RWD R304 for a 150g, $\pm 5g$ tape tension at point B.
 - 13) Put transport in the STOP mode.
 - 14) Remove connector from J29 and plug into J12. Also return connectors J11 and J24 into their original receptacles.
- NOTE: Procedures from step 7) and later can be conducted in any order.

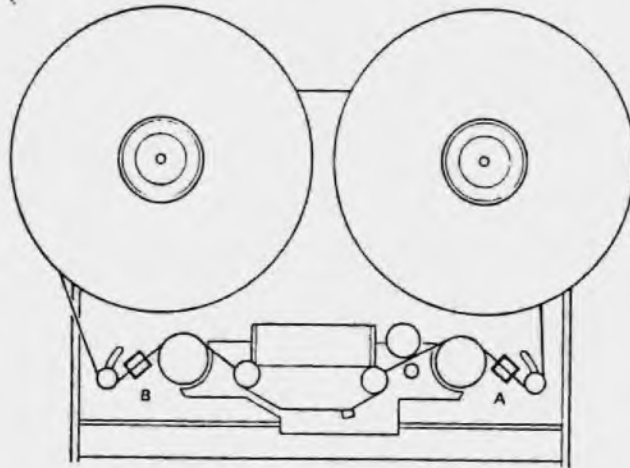


Fig. 5.9

- 2-3 Fast wind speed adjustment (To be done only after completing 2-2)
- 1) Monitor the System Control PCB test point 1 (Fig. 5.10) signal with an oscilloscope (square wave footage roller output).
 - 2) Wind tape to about equal amount on both reels.
 - 3) RESET the counter.
 - 4) Put transport in F.FWD mode until counter reads +8 ~ +9S.
 - 5) Set the oscilloscope TIME/DIV to about 2msec. to enable monitoring of a 10msec. waveform.

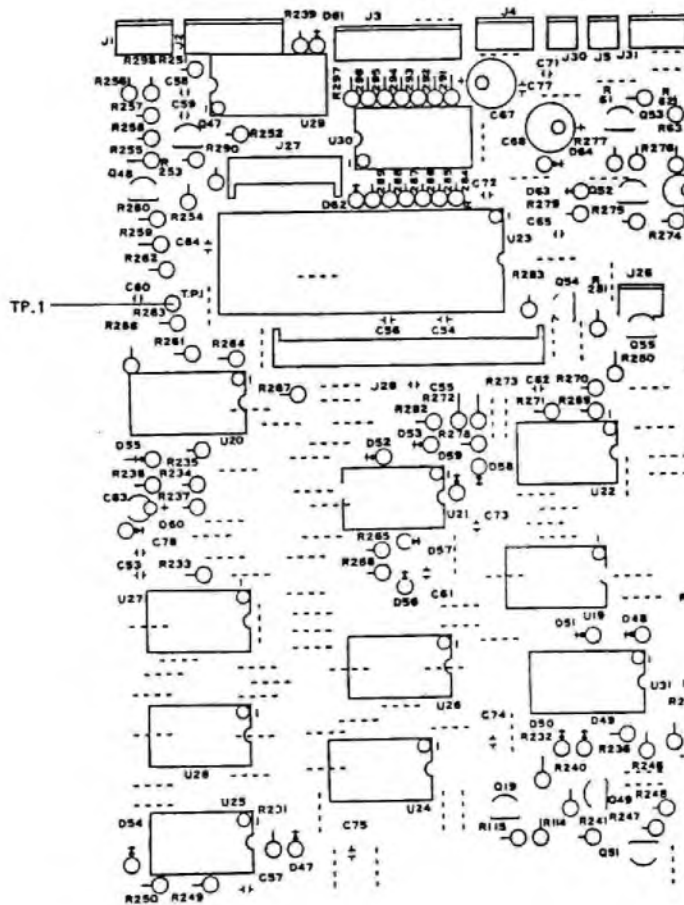


Fig. 5.10

- 6) Depress the ZERO RTN button. (NOTE: Do not depress ZERO RTN directly from F.F mode. Depress STOP and then ZERO RTN only after tape has stopped completely.)
- 7) Adjust LOW R308 so that one cycle length of the square wave at test point 1 until tape comes to a complete stop is a minimum 10 ± 0.4 msec.
- 8) Repeat above 4) ~ 7) and adjust R308 until a minimum 10 ± 0.4 msec. is obtained.
- 9) Reset the oscilloscope TIME/DIV to about 0.5msec to enable monitoring a waveform of 2.5msec.
- 10) Put transport in F.FWD mode until counter reaches +40 ~ +59S.

- 11) Depress the ZERO RTN button. (NOTE: Do not directly depress ZERO RTN during F.F mode. Depress STOP and then ZERO RTN only after tape has completely stopped.)
- 12) Adjust MID R306 so that one cycle length of the square wave is a minimum $2.5 \pm 0.1\text{msec}$.
- 13) Repeat 10) ~ 12) until $2.5 \pm 0.1\text{msec}$ is obtained.
- 14) Put transport in RWD mode until counter reads $-40 \sim -59\text{S}$.
- 15) Depress ZERO RTN button. Observe same NOTE: as in 6), above.
- 16) Adjust F.F R301 so that one cycle length of the square wave is a minimum $\pm 0.1\text{msec}$ of the adjustment results of above 13).
Looking at R301 from the component side of the PCB, the cycle will become shorter by CCW rotation and longer by CW rotation. Also, rotate the pot very slowly as cycle change response is slow in regards to resistance change.
- 17) Repeat 14) ~ 16) until one cycle length of the square wave is $\pm 0.1\text{msec}$ of the adjustment results of above 13).
- 18) Wind a maximum amount of tape on the supply reel. Put transport in the F.FWD mode and set the oscilloscope TIME/DIV to about 0.1msec .
- 19) Repeatedly adjust HIGH pot R307 so that the square wave cycle becomes $0.75 \sim 0.80\text{msec}$ at maximum F.FWD speed (when square wave cycle is minimum).
- 20) Put an empty reel on the supply side, thread tape on transport, put in RWD mode and when maximum tape speed is reached, confirm the square wave cycle to be $\pm 0.05\text{msec}$ of the results of 19) and in addition, that it is

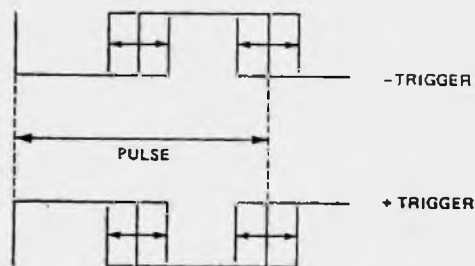


Fig. 5.11

within 0.72 ~ 0.83msec. If these figures are off spec, repeat the procedures from 9), above.

NOTE: 1. Go through the above procedures in order listed.

2. Although the square wave jitters sideways, measurements are taken at the center of the jitter. Measurements will be easier with less jitter, obtained by experimenting with +trigger or -trigger signals.

2-4 Tape Speed Adjustment

2.4.1 Necessary equipment

Counter	Frequency counter or Wow/Flutter Meter w/counter
Test tapes	Fostex 9201 (for wow/flutter measurement, Fostex P/N 8266 0340 01 or STL #62-1 (1/2 inch, 15 ips, 3000Hz)

2.4.2 Adjusting procedure

NOTE: Always conduct the following only after PLAY Tape Tension Adjustment as tape speed will be affected by tape tension during the PLAY mode.

- 1) Swing out the System Control PCB.
- 2) One OUTPUT from among channels 2 ~ 15 is monitored the counter.
- 3) Thread test tape on transport.
- 4) The pitch control pot (R14), on the Function/Display PCB, is set to approximate center and the pitch control ON/OFF switch at right of R14 is switched ON.
- 5) Adjust HIGH pot R309, on the System Control PCB, for a counter reading of 3000Hz \pm 5Hz.
- 6) Switch OFF the pitch control.
- 7) Adjust PITCH pot R299, on the same PCB, for a counter reading of 3000Hz \pm 1Hz.

5.4 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.

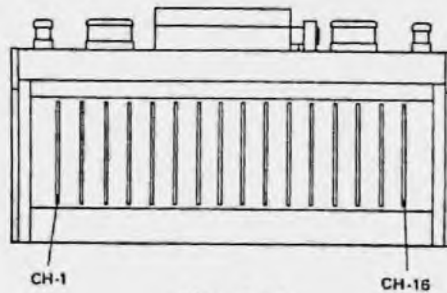


Fig. 5.12

5.4.1 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 INT/EXT switch on the recorder rear panel to EXT, connect a level meter to test point TP-1 and adjust REC CAL (R-101, 10K Ω B) 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) \pm 1dB.
- 5) After checking the OUTPUT jack level, adjust METER CAL (R-102, 50K Ω B) for a 0dB reading on the recorder BAR GRAPH METER.
- 6) Calibrate tracks 2 ~ 16 in the same way.

5.4.2 Calibrating the Dolby decode mode

- 1) Set the NR INT/EXT switch on the recorder rear panel to EXT 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 upon the CHAN 1 PCB of the record/reproduce amplifier, and adjust REP CAL (R-104, 10K Ω B) 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) \pm 1dB.
- 5) After check of the OUTPUT jack level, confirm that the meter reading is 0dB, \pm 1dB.

- If the reading is not 0dB, ± 1 dB, repeat the adjustments in the previous section, Item 5.4.1.
- Calibrate tracks 2 ~ 16 (CHAN 2 ~ 16) by the same procedures for TRACK 1, above.
- In completing the above adjustments, return to INT the NR INT/EXT switch on the recorder rear panel.

5.4.3 Adjusting the reproduce frequency response

- Set the NR INT/EXT switch on the recorder rear panel to EXT and switch off all RECORD TRACK buttons.
- Playback the Head Azimuth and Frequency Response sections of the Reproduce Alignment Tape.

The Azimuth and Phase Adjusting Screw is adjusted for this alignment as shown in Fig. 5.13

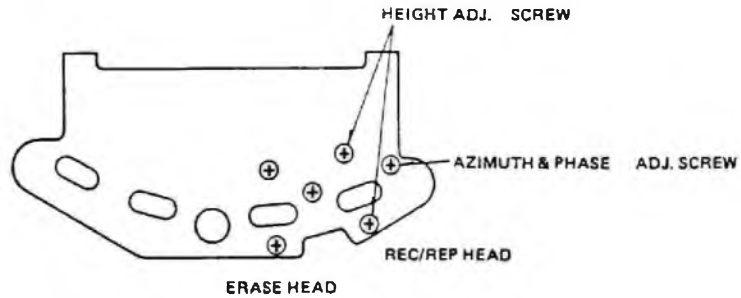


Fig. 5.13

- 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 TRACK 1 output and the horizontal input to one among TRACKS 2 ~ 16; set the oscilloscope to XY mode to obtain a lissajous waveform to check the phase.

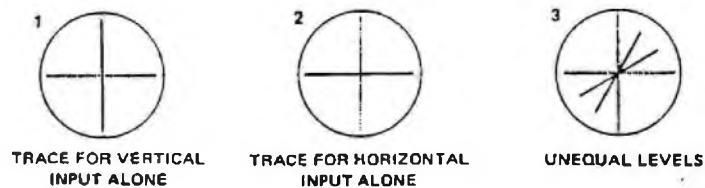


Fig. 5.14

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 for equal lengths by the oscilloscope controls.

If the playback head azimuth is out of alignment, the following patterns will result:

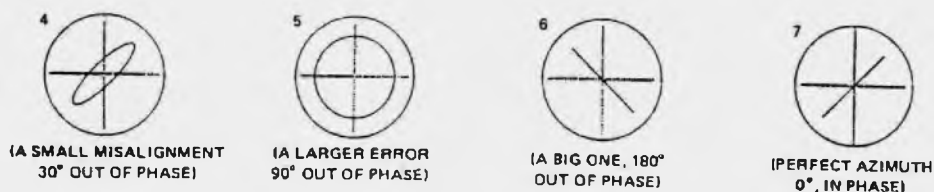


Fig. 5.15

As a result of phase check with a 10KHz signal, the adjustment is finished if difference in phase is less than 90° 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 BAR GRAPH 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 ~ 16 OUTPUT jacks and the levels are then measured here.

The normal playback frequency response should be within ± 3 dB for a frequency range of 40 ~ 18,000Hz.

If response is not within spec, adjust REP EQ R103, 5K Ω B.

- 5) Whenever R103 is adjusted, the Dolby encode must be recalibrated.

5.4.4 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, U5

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 and check bias leakage at TP-3 and trim the slug of U5 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 slug of U5 but before doing this, check the frequency (100KHz, ± 0.5 KHz) of the erase/bias master oscillator. To check the oscillator frequency, the record/reproduce amplifier PCB is pulled out from the B-16 and the frequency at connector pin No. 4 is checked.

If the oscillator frequency is off spec, replace the erase/bias master oscillator module (U15).

2) Record bias trap module, U9

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, ± 0.5 KHz) of the bias/erase master oscillator. Then rotate the center core of U9 to adjust bias leakage.

5.4.5 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 at rear of U6, L.P.F. Set the core of L-1 so that the voltage at TP-4 is 1.7V P-P.

Adjust the remaining tracks 2 ~ 16 in the same way. $1.6 V_{pp}$

5.4.6 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 J-1, and the ground clip to the GND pin.

Then, set the BIAS LVL trimmer capacitor C42, 150pF, for a level of approximately 450mV P-P.

For an accurate adjustment, load a blank tape (Ampex #456, Scotch #226) on the recorder, record a test signal, set the NR switch to INT, 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, R-106, 2K Ω B so that this slot is parallel with the PCB plane, then trim it for a flatter overall frequency response.

5.4.7 Recording level adjustment

- 1) Proceed to the following adjustments only after checks and adjustments in the previous Sections 5.4.1 ~ 5.4.6 have been completed.
Set the front panel NR INT/EXT switch to EXT.
- 2) Load a blank tape (Ampex #456 or Scotch #226) 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 of the position of the input button.
Check to see that the reading of this meter is 0dB \pm 1dB.
- 4) It will be convenient to rewind the tape to the start if the tape index counter reset button is depressed, at start of recording, to return the display to 0000.
- 5) After recording a certain length of 1KHz, 0dB signal, depress the ZERO RTN button to rewind tape to the starting point, put the transport in the PLAY mode and check the meter reading. The MONITOR switch must be at TAPE.
In normal condition, the meter reading is 0dB \pm 1dB.
If response is off spec, correct by adjusting REC LVL R-105, 5K Ω B.
Repeat this procedure for the remaining tracks 2 ~ 16.

5.4.8 Overall frequency response

- 1) With the rear panel NR INT/EXT switch at EXT and under the measurement setup of the previous Section 5.4.7, apply signals from 40Hz through 18KHz at -10dBV (0.3V) to the recorder INPUT jack and set the NR switch to INT.
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 normal condition, the frequency response in reference to 1KHz is within +1dB and -1dB.

If response does not fall within spec in the high frequency region, correct it by a slight rotation of the REC EQ pot R-106, 2K Ω B .
- 2) Check and adjust the remaining tracks in the same way.

5.4.9 Overall S/N measurement

- 1) Set the front panel NR INT/EXT switch at INT.
- 2) Upon completing checks up to Section 5.4.8, 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, play back 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

5.4.10 T.H.D. measurement

- 1) Set the front panel NR INT/EXT switch to INT.
- 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 5.4.6.
- 4) When the Section 5.4.6 adjustments are made, it is necessary to go through procedures in Sections 5.4.7 and 5.4.9.

5.4.11 Erase measurement

- 1) Set the rear panel NR INT/EXT switch to INT.
- 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 5.4.5. 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.

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, please 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.
- * Adjusting of trim pots for METER CAL and REC CAL on the R/P AMP can be done from the bottom by removing the six screw (B) and removing the bottom cover.

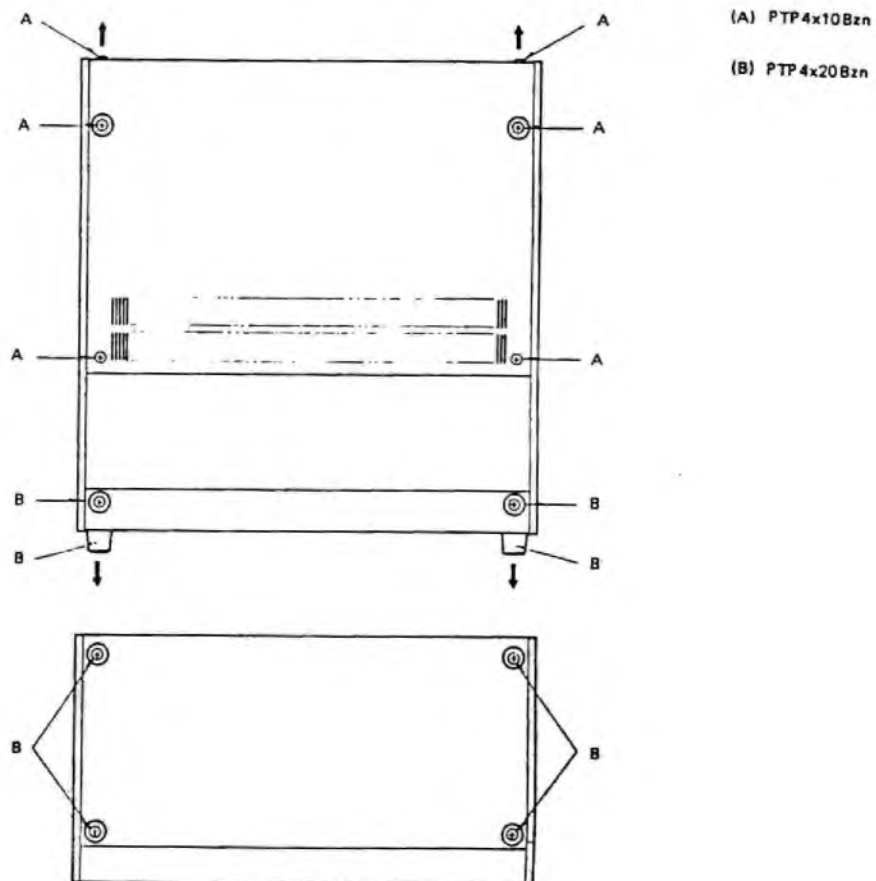


Fig. 6.1

6.2 TAPE TRANSPORT PANEL (Fig. 6.2)

- * Remove the head housing by unscrewing the two housing screws (A) with a coin.
- * Rotate the pinch roller cap (B) CCW to remove it and then take off the pinch roller.
- * Remove the four screw (C) and the head base panel can be lifted out.
- * Loosen screw (D) and the panel display and the panel function unit can be lifted out.
- * Remove four screw (E).

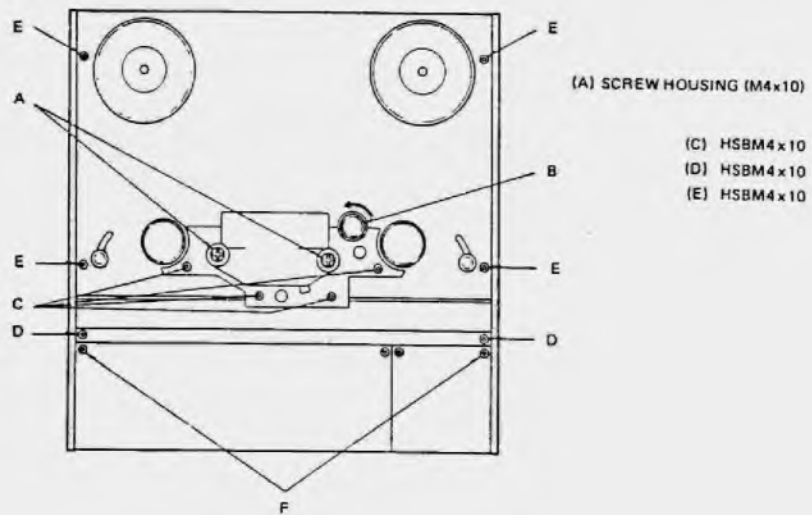


Fig. 6.2

- * 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 23, 25 and 27.

6.3 AMPLIFIER PANEL (Figs. 6.2 and 6.3)

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

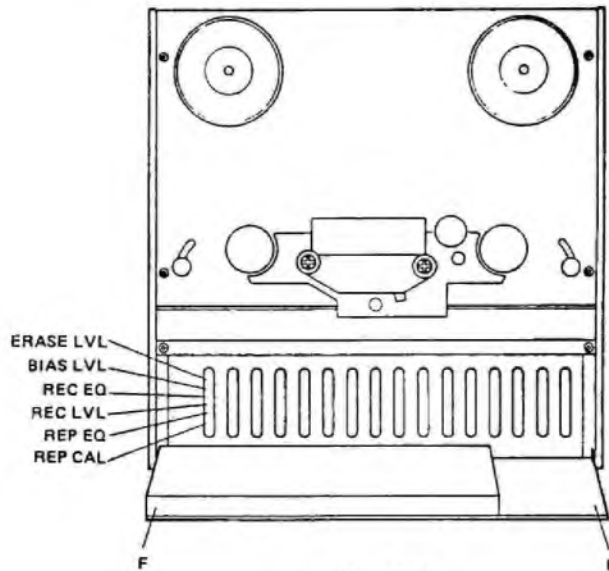


Fig. 6.3

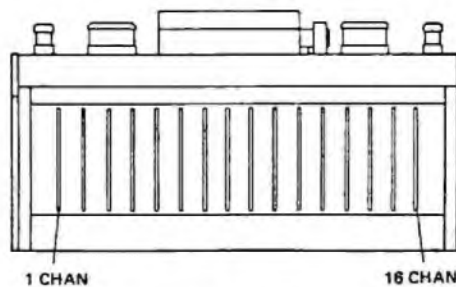


Fig. 6.4

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 8286012000).

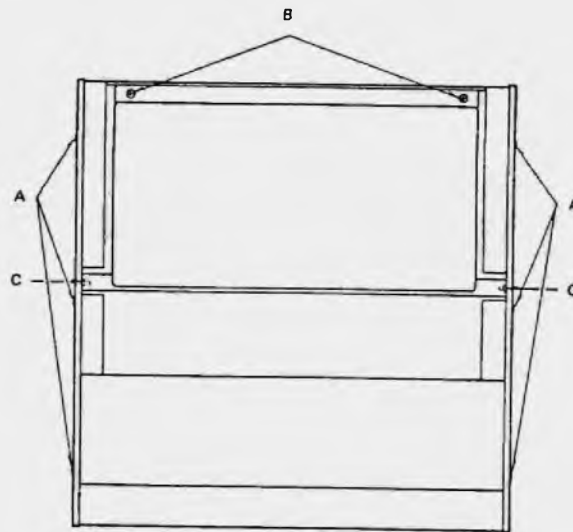
6.5 SYSTEM CONTROL PCB ASSEMBLY (Fig. 6.5)

* 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 screw (C). If the System Control PCB must be removed from the B-16, the side boards must be removed by unscrewing (A), then removing screw (C).

6.6 POWER TRANSFORMER (Fig. 6.6)

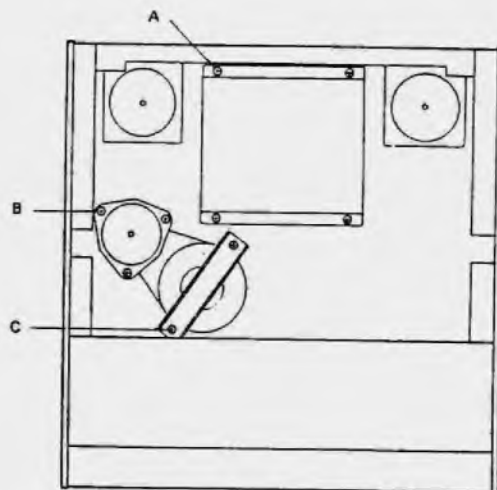
* Remove the four screw (A).

* Unsolder the primary wires at the power switch and the secondary wires at the rectifier PCB assembly.



- (A) PTP 4x10Bzn
- (B) PTP 3x8Bzn
- (C) PTP 4x10Bzn

Fig. 6.5



- (A) PTT 5x10Czn
- (B) P4x12Czn
- (C) P4x12Czn

Fig. 6.6

6.7 CAPSTAN MOTOR ASSEMBLY (Fig. 6.6)

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

6.8 REPLACING THE CAPSTAN BELT (Fig. 6.6)

- * Remove the two (C) screws and take off the bracket to replace the capstan belt.

6.9 REEL MOTOR ASSEMBLY (Figs. 6.7 and 6.8)

- * Loosen the two (A) screws at left and right to remove the reel drums. Then, removing 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.

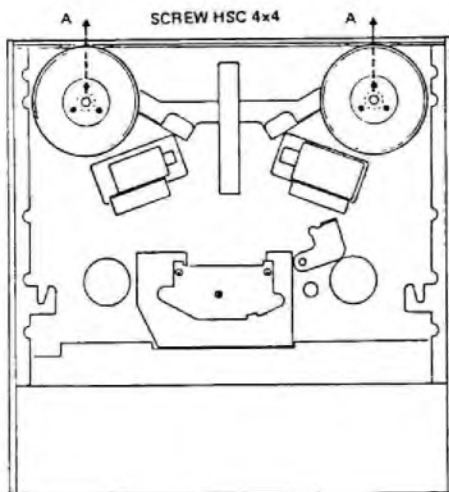


Fig. 6.7

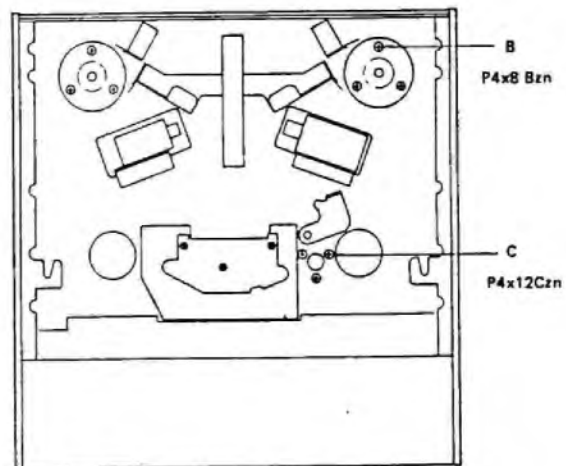


Fig. 6.8

6.10 CAPSTAN ASSEMBLY (Figs. 6.6 and 6.8)

- * Remove the bracket by removing two screw (C) shown in Fig. 6.6.
- * Remove three of screw (C), in Fig. 6.8 and the capstan assembly can be lifted out.

CAUTION: Whenever the capstan assembly is replaced, loosen screw (A) and adjust thrust play to 0.1 ~ 0.5mm (Fig. 6.9)

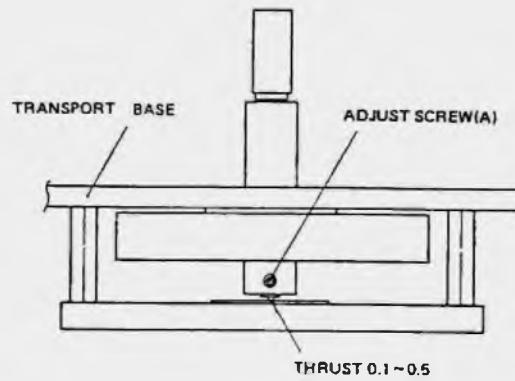


Fig. 6.9

6.11 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 51), remove the two screws securing the Head Shield Sheet, Ref. No. 26, 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.

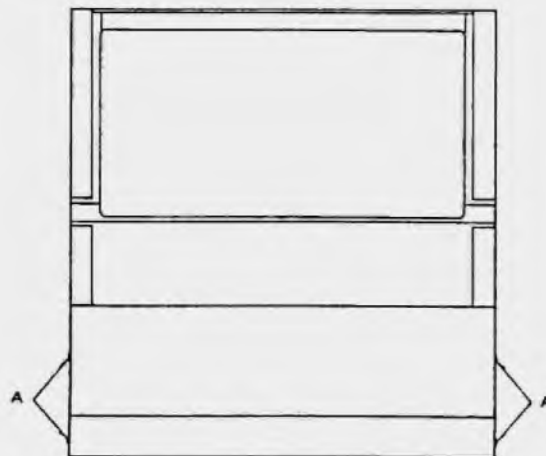


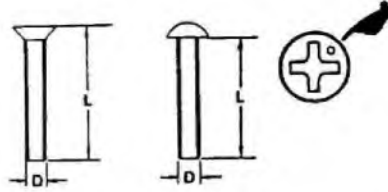
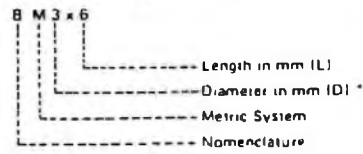
Fig. 6.10

7. EXPLODED VIEWS, PCB ASSEMBLIES AND PARTS LIST

ASSEMBLING HARDWARE CODING LIST

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

FOR EXAMPLE:

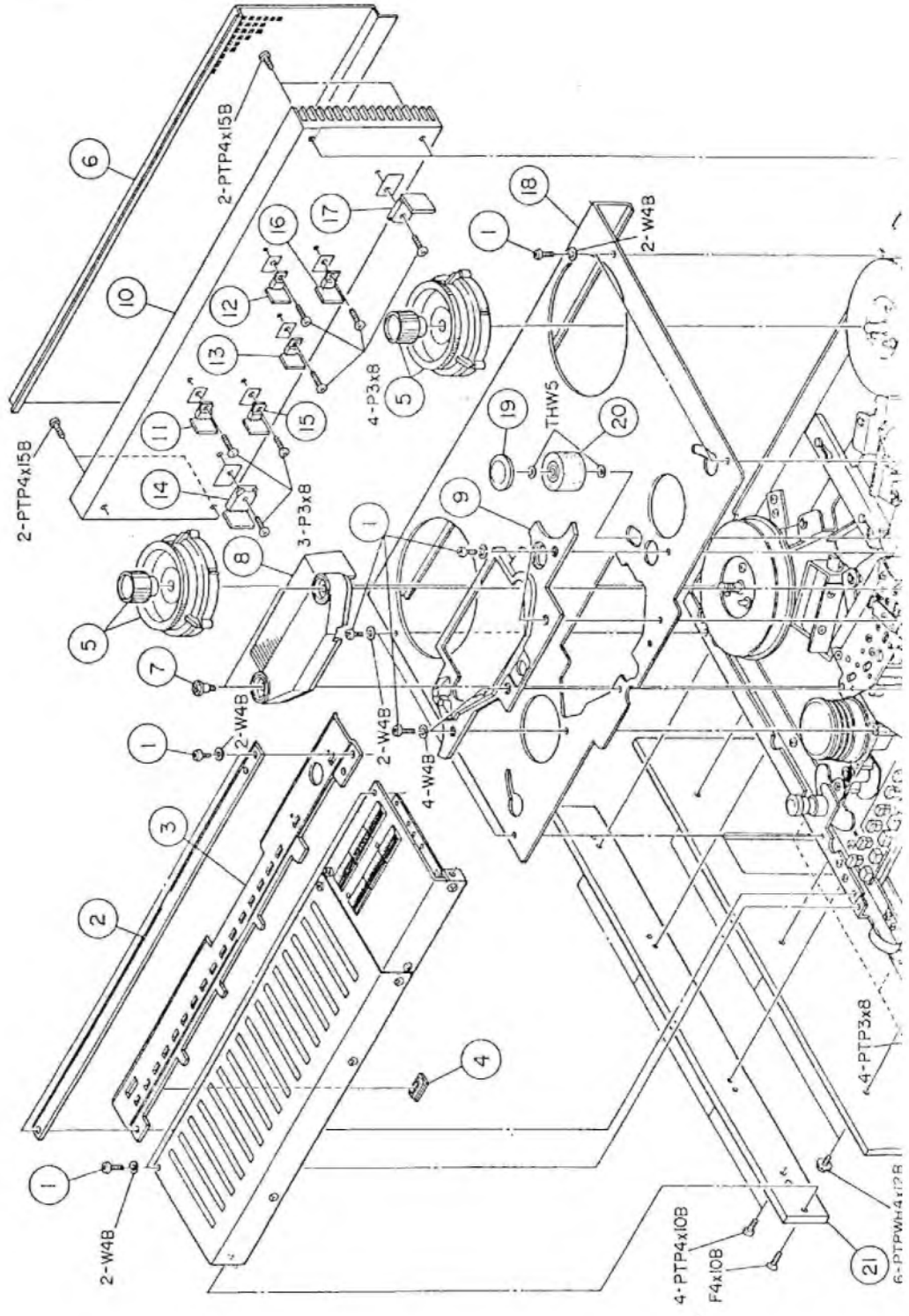


* Inner dia. for washers and nuts

	CODE	NAME	TYPE		CODE	NAME	TYPE
MACHINE SCREW	P	Pan Head Screw		WASHER, LUG, NUT	TW	Trim Washer (Countersunk)	
	T	Slotted Head Screw (Truss)			N	Hex Nut	
	B	Binding Head Screw			L	Lug	
	F	Flat Countersunk Head Screw			THW	Thru-Lug Washer (Poly Washer)	
	O	Oval Countersunk Head Screw			HSF	Hex Socket Screws (Flat Point)	
	PWH	Pan Washer Head Screw			HSC	Hex Socket Screws (Cup Point)	
WOOD SCREW	RW	Round Head Wood Screw		SETScrew	SSF	Slotted Socket Screws (Flat Point)	
	FW	Flat Countersunk Wood Screw			SSC	Slotted Socket Screws (Cup Point)	
	OW	Oval Countersunk Wood Screw			BOLT	MSB	Hex Socket Head Bolt
TAPPING SCREW	PTP	Pan Head Self Tapping Screw (B type)		HB		Hex Head Bolt	
	PTPWH	Pan Washer Head Self Tapping Screw (B type)		RING, PIN	ER	E-Ring (Resilient Washer)	
	TTP	Slotted Head Self Tapping Screw (B type)			CRR	C-Ring (Inner)	
	FTP	Flat Countersunk Head Self Tapping Screw (B type)			CRS	C-Ring (Outer)	
PTT	Pan Head Tapping Screw		GR		Gage Ring		
PTTWH	Pan Washer Head Tapping Screw		SP		Spring Pin		
TTT	Slotted Head Tapping Screw		SR		Slide Ring		
SEMI-SCREW	PTT	Flat Countersunk Head Tapping Screw		FINISH	Zn	Zinc plating	
	PS	Pan Head Screw with Spring Washer			CZn	Colored zinc plating	
WASHER, LUG, NUT	PSW	Pan Head Screw with Washer and Spring Washer			BZn	Black zinc plating	
	W	Flat Washer			Ni	Nickel plating	
	LW	Spring Washer			BNI	Black nickel plating	
	LWI	Internal Tooth Lock Washer			Cr	Chrome plating	
LWE	External Tooth Lock Washer		BCr		Black chrome plating		

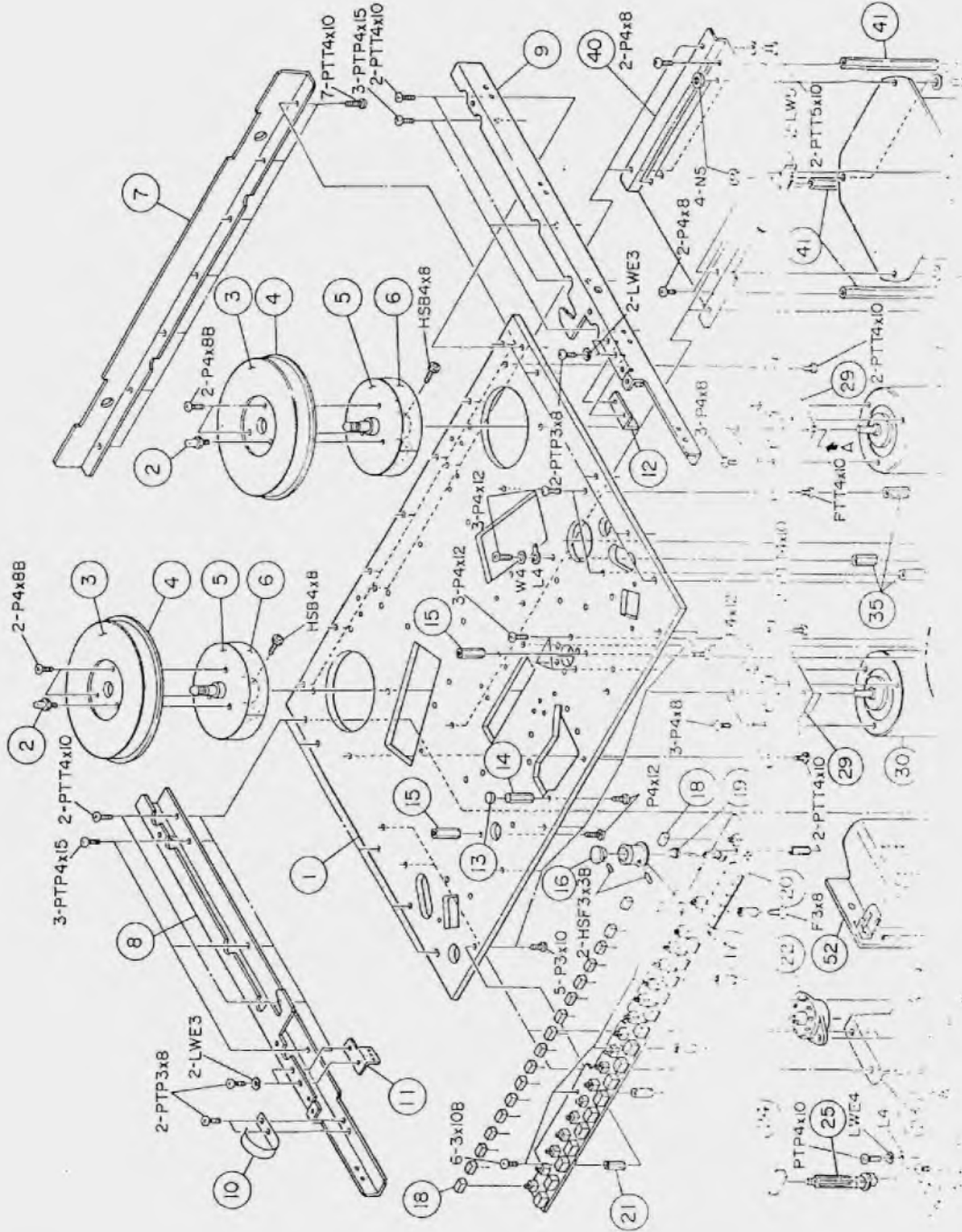
Ref. No.	Parts No.	Nomenclature
1	8204 0190 00	Screw, button head, M4x10
2	8212 0780 00	Panel, display
3	8220 1690 00	Panel, function
4	8226 0191 00	Escutcheon B
5	8260 1270 00	Reel clamper ass'y, 1/2
6	8220 2381 00	Cover, heat sink
7	8214 1100 00	Screw, housing
8	8212 0773 00	Housing, head
9	8212 0760 00	Panel, head base
10	8223 1010 00	Heat sink B
11	8273 1190 00	PCB ass'y, regulator, U1
12	8273 1220 00	" " " U4
13	8273 1210 00	" " " U3
14	8273 1180 00	" " , power transistor, supply
15	8273 1200 00	" " , regulator, U2
16	8273 1170 00	" " , power transistor, takeup
17	8273 1230 00	" " , regulator, U5
18	8220 1681 00	Panel, transport
19	8223 0670 00	Cap, pinch roller
20	8260 1340 00	Pinch roller, 1/2
21	8223 0600 00	Side sash
22a	8216 0752 01	Panel, side (R)
22b	8216 0752 02	" " (L)
23	8207 0016 01	Foot, tranleg, TL-016
24	8220 1710 00	Cover, bottom
25	8216 0741 00	Cushion, PCB
26	8220 1702 00	Cover, rear
27	8216 0900 00	Screen, counter

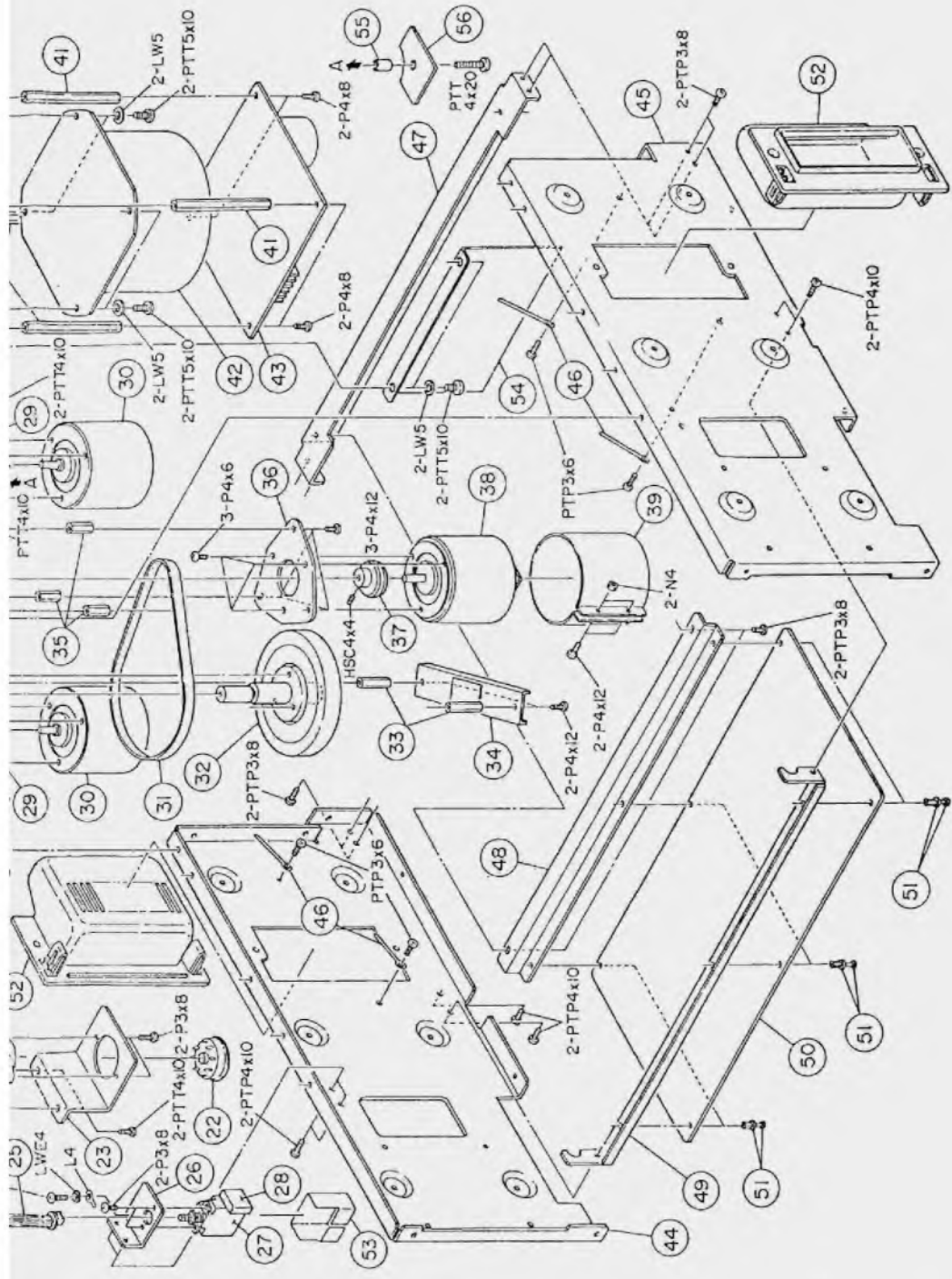
OVERALL EXPLODED VIEW



Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
1	82731300 00	PCB ass'y, shut-off	51	8214 0950 00	Spring, tension
2	8204 0130 04	Spacer, 3x5	52	8216 0070 00	Tube, rubber
3	8223 0881 00	Guide, tape A	53	8223 0691 00	Shaft, arm S
4	8223 0870 00	Guide, 1/2	54	8273 1250 00	PCB ass'y, sensor, supply
5	8214 0970 00	Spring, guide	55	8220 1840 00	Bracket, photo-coupler
6	8223 0851 00	Guide, tape B	56	8223 0740 00	Cap, tension roller
7	8223 0680 04	Stay, 40	57	8214 0960 00	Spring, bearing
8	8220 2041 00	Base, guide	58	8204 0200 00	Bearing, 6962Z
9	8223 0860 00	Shaft, guide	59	8223 0730 00	Roller, footage L
10	8223 1710 00	Stay, base guide	60	8260 1510 00	Base ass'y, footage roller
11	8223 0840 00	Stay, head	61	8249 0120 00	Solenoid, B
12	8204 0050 01	Sholdek, M2.6x4	62	8220 1920 00	Bracket, solenoid B
13	8220 0471 00	Lock	63	8204 0130 04	Spacer, 3x5
14	8214 0160 00	Spring	64	8220 1930 00	Lever, solenoid L
15	8260 1460 00	Base ass'y, shield	65	8220 1960 00	Nut
16	8220 2570 00	Plate, shield C	66	8220 1951 00	Lever, A
17	8220 2071 00	Bracket ass'y, shield B	67	8249 0120 00	Solenoid, B
18	8214 0980 00	Spring, shield	68	8220 1920 00	Bracket, solenoid B
19	8223 0900 00	Washer, spring	69	8220 1940 00	Lever, solenoid R
20	8223 0891 00	Button, shield	70	8214 0120 00	Spring
21	8223 0170 00	Collar, 2.6x4x1.1	71	8214 0100 00	Spring, solenoid arm
22	8214 0060 00	Spring	72	8260 1410 00	Arm ass'y, joint
23	8220 2091 00	Arm, cue B	73	8220 1810 00	Bracket, stopper L
24	8223 0921 00	Knob, cue B	74	8220 1820 00	" " R
25	8220 2083 00	Base, head B	75	8223 0660 00	Shaft, pinch roller
26	8216 0761 00	Sheet, head shield	76	8210 0110 00	Arm, pinch roller
27	8273 1310 00	PCB ass'y, head terminal, B-16	77	8260 1520 00	Roller ass'y, footage R
28	8204 0130 02	Spacer, 3x3	78	8218 1540 00	Sticker, strobe
29	8220 2101 00	Bracket, cue	79	8273 1160 00	PCB ass'y, count sensor
30	8214 0990 00	Spring, head B	80	8223 0611 00	Base, transport
31	8220 0341 00	Bracket, head	81	8223 0700 00	Shaft, lifter
32	8279 0090 00	Head ass'y, E, B-16	82	8260 1420 00	Arm ass'y, lifter A
33	8279 0080 00	" " R/P, B-16	83	8214 1040 00	Spring, lifter B
34	8220 1781 00	Lever, slide	84	8260 1430 00	Arm ass'y, lifter B
35	8214 1050 00	Spring	85	8220 1831 00	Stopper, lifter
36	8223 0650 00	Shaft, slide	86	8214 0931 00	Spring, arm
37	8214 1030 00	Spring, brake	87	8273 1250 00	PCB ass'y, sensor, supply
38	8220 1790 00	Bracket, spring L	88	8223 1130 00	Collar, cue
39	8220 1800 00	Bracket, spring R	89	8214 1050 00	Spring
40	8260 1290 00	Band ass'y, brake L, B-16	90	8216 0840 00	Felt, stopper
41	8260 1300 00	" " " R, "	91	8204 0130 09	Spacer, 3x10
42	8223 1120 00	Shaft, arm L	92	8214 0031 00	Washer
43	8260 1500 00	Shaft ass'y, tension roller	93	8204 0220 00	Nut, M12x0.75xT2
44	8204 0210 00	Bearing, 6242Z	94	8204 0290 00	Nut, flange M4
45	8223 0941 00	Base, tension roller			
46	8220 2470 00	Screen, tension roller			
47	8260 1650 01	Arm sub ass'y, tension L			
48	8260 1650 02	" " " R			
49		(Deleted)			
50	8220 2481 00	Plate, servo			

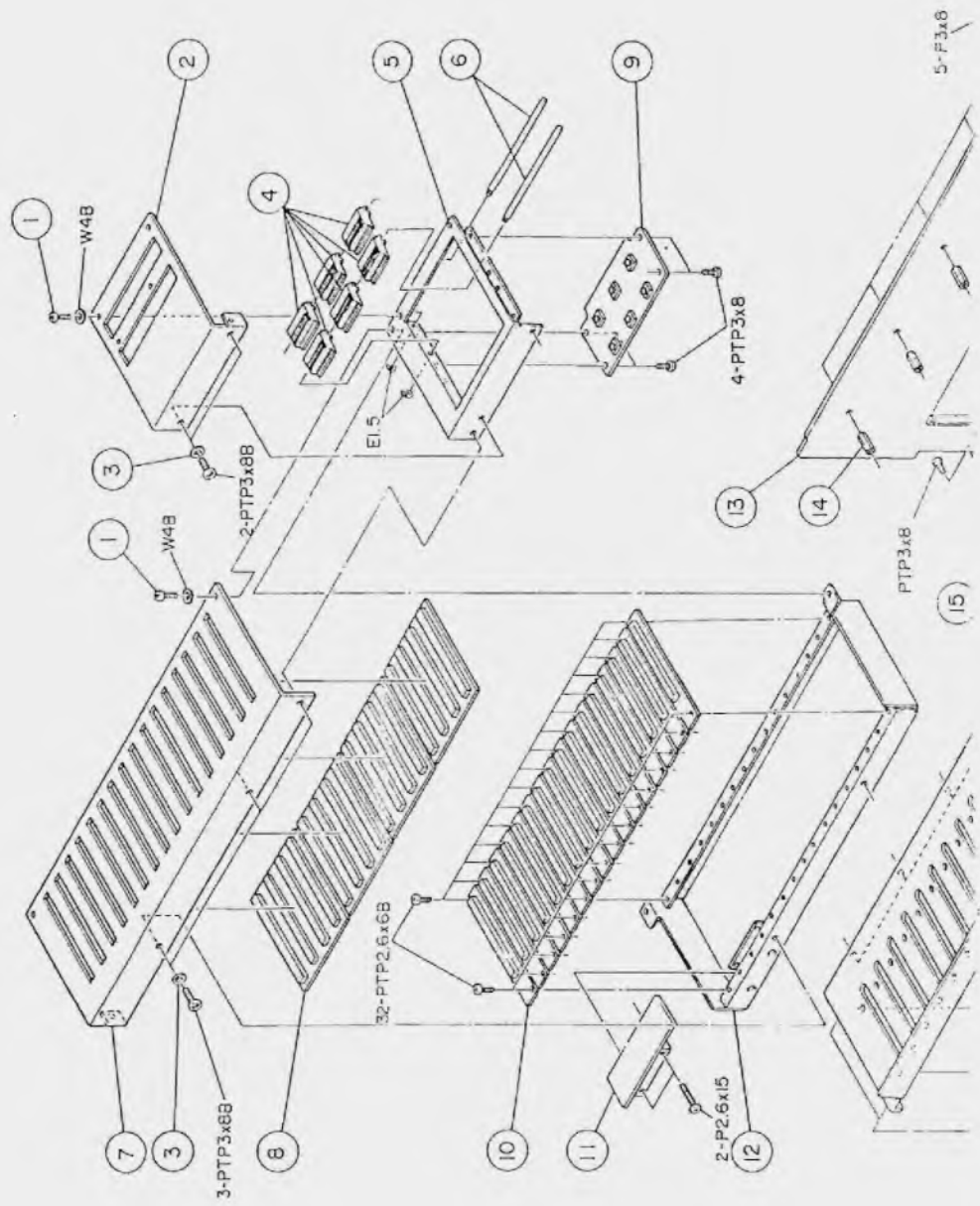
TRANSPORT EXPLODED VIEW 2

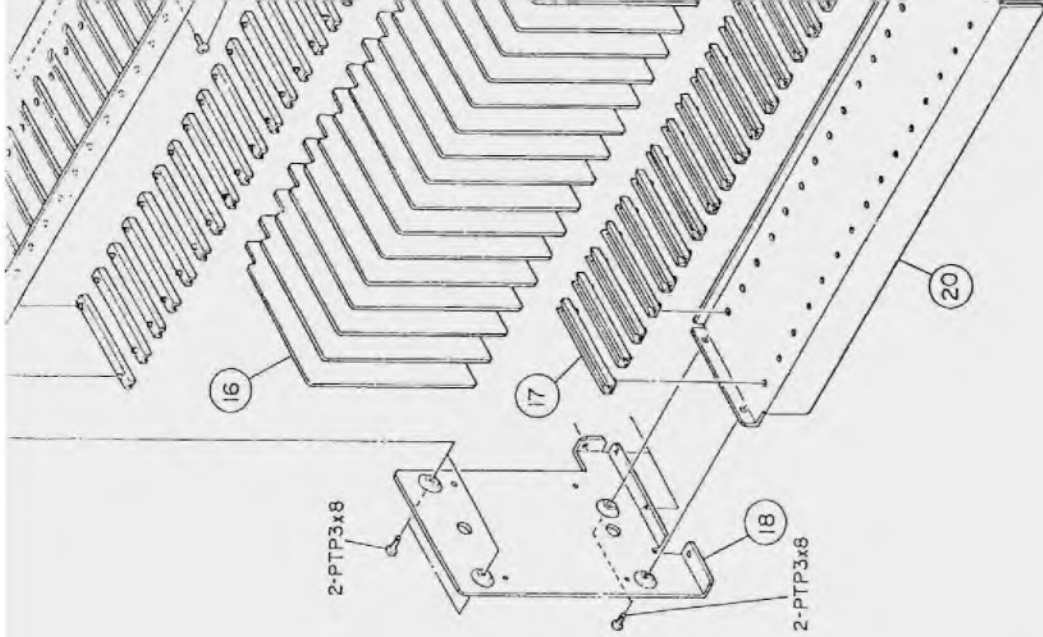




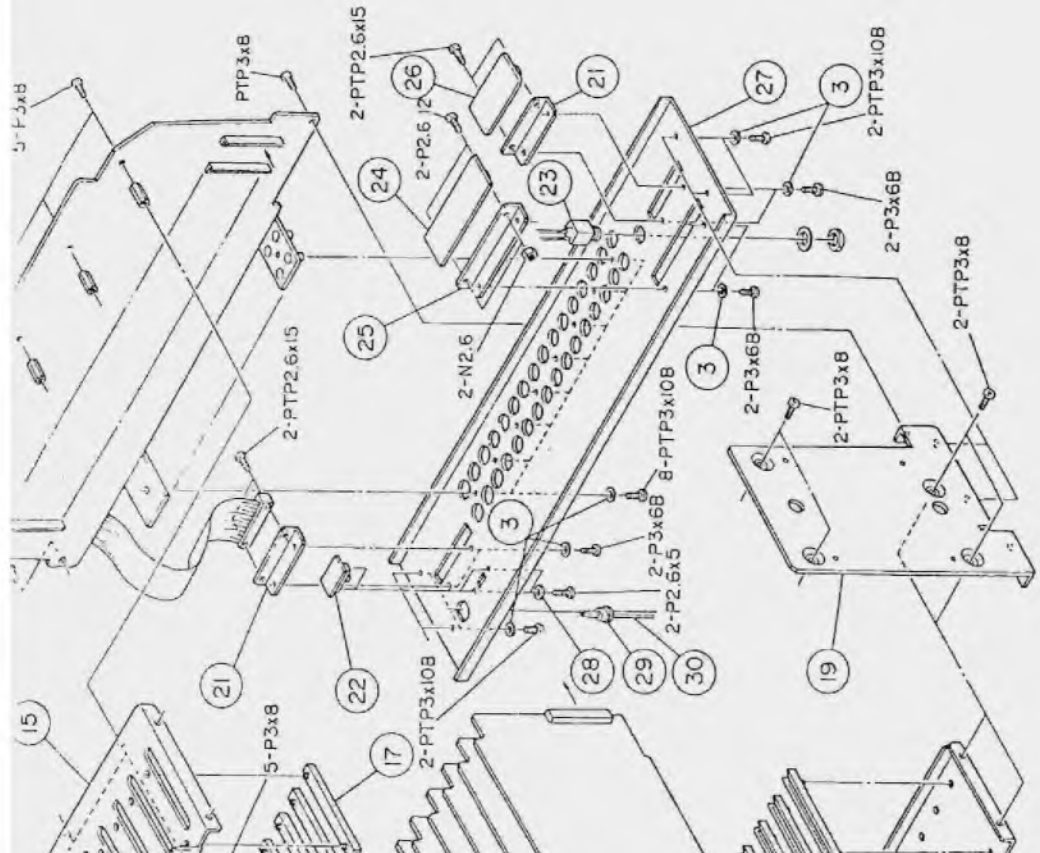
Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
1	8223 0610 00	Base, transport	44	8220 1743 00	Chassis, side L
2	8223 0630 00	Pin, stopper	45	8220 1753 00	Chassis, side R
3	8216 0780 00	Sheet, reel	46	8207 0005 00	Cord retainer, SCF50226
4	8223 0620 00	Base, reel	47	8220 1760 00	Angle, rear
5	8260 1281 00	Drum ass'y, reel	48	8220 2160 00	Bracket, control A
6	8216 0770 00	Felt, brake	49	8220 2170 00	Bracket, control B
7	8220 1770 00	Angle, transport	50	8273 1140 00	PCB ass'y, system contr., B-16
8	8220 1720 00	Angle, side L	51	8207 0004 00	Plasti-rivet, 201-00-981
9	8220 1730 00	Angle, side R	52	8212 1130 00	Grip
10	8214 0910 00	Spring, open	53	8216 0270 00	Cover, switch A
11	8220 1790 00	Bracket, spring L	54	8220 2560 00	Plate, shield L
12	8220 1800 00	Bracket, spring R	55	8204 0280 01	Spacer, 4x10
13	8216 0130 00	Foot, D12	56	8273 1470 00	PCB ass'y, sensor A0J
14	8223 0720 00	Stay			
15	8223 0680 02	Stay, 22			
16	8226 0390 00	Knob, double A			
17	8226 0380 00	Knob, double B			
18	8226 0370 00	Button, push D			
19	8226 0401 00	Button, counter reset			
20	8273 1120 00	PCB ass'y, function/display			
21	8223 0750 01	Spacer, M3x15.4			
22	△ 8245 0630 00	Connector, voltage selector			
23	8220 2140 00	Bracket, voltage selector			
24	8226 0130 02	Button, push B, blk			
25	8212 0810 00	Arm, joint			
26	8220 2150 00	Bracket, power switch			
27	△ 8253 0350 00	Switch, push, power, 50GA3P			
28	△ 8256 0090 00	Sparkiller, UL, NSK135			
	△ 8256 0100 00	" CSA, NSK132			
	△ 8256 0110 03	" SENC0, 4700pF, PME265			
	△ 8256 0090 00	" DM, NSK115			
29	8220 1850 00	Bracket, reel motor			
30	8249 0100 00	Motor, reel B			
31	8216 0790 00	Belt, capstan			
32	8260 1360 00	Capstan ass'y, 1/2			
33	8223 0680 03	Stay, 28.5			
34	8260 1400 00	Bracket ass'y, thrust			
35	8223 0680 01	Stay, 19			
36	8220 1980 00	Bracket, capstan motor			
37	8223 0800 00	Pulley, capstan motor			
38	8249 0130 00	Motor, capstan			
39	8220 1990 00	Cover, motor shield			
40	8220 2130 00	Bracket, transformer			
41	8223 0680 05	Stay, 92			
42	△ 8242 0670 00	Transformer, power, B-16			
43	8273 1130 01	PCB ass'y, power supply, B-16, FCA/CND			
	8273 1130 02	" " " " EUR/UK/AUS			
	8273 1130 03	" " " " EX/DM			

AMPLIFIER EXPLODED VIEW



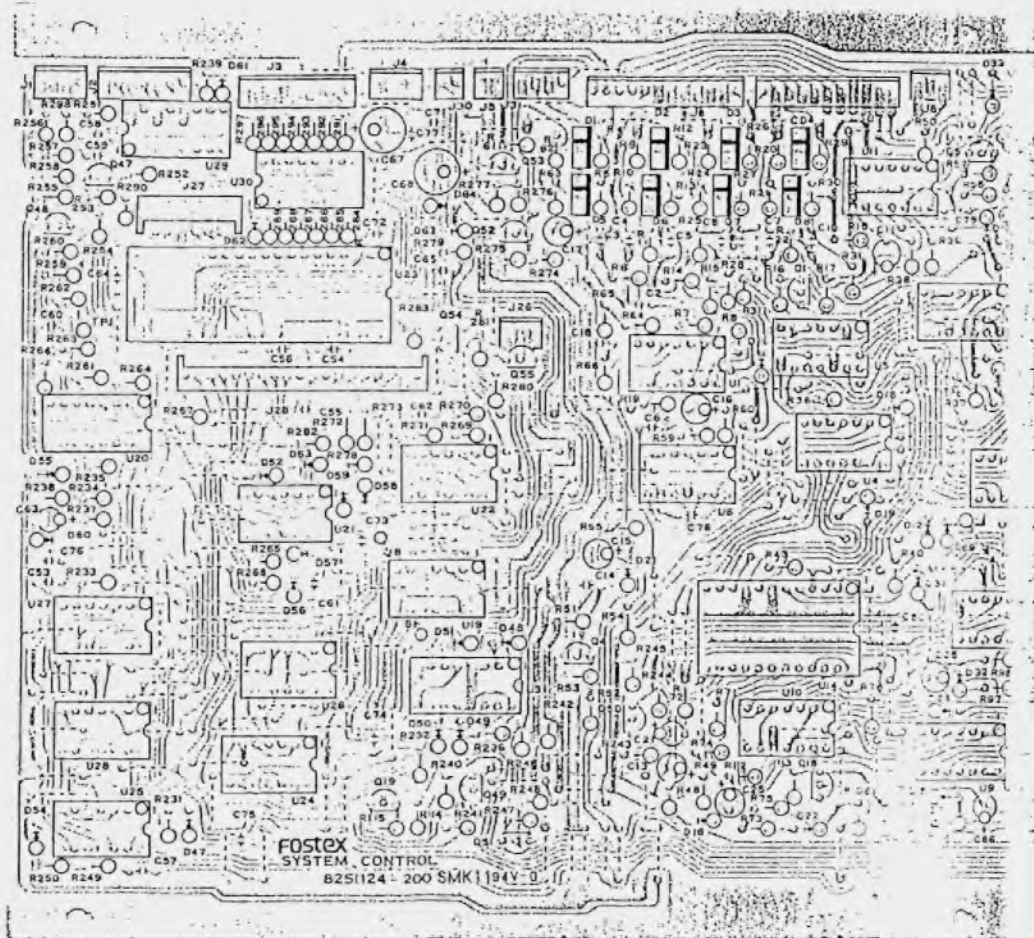


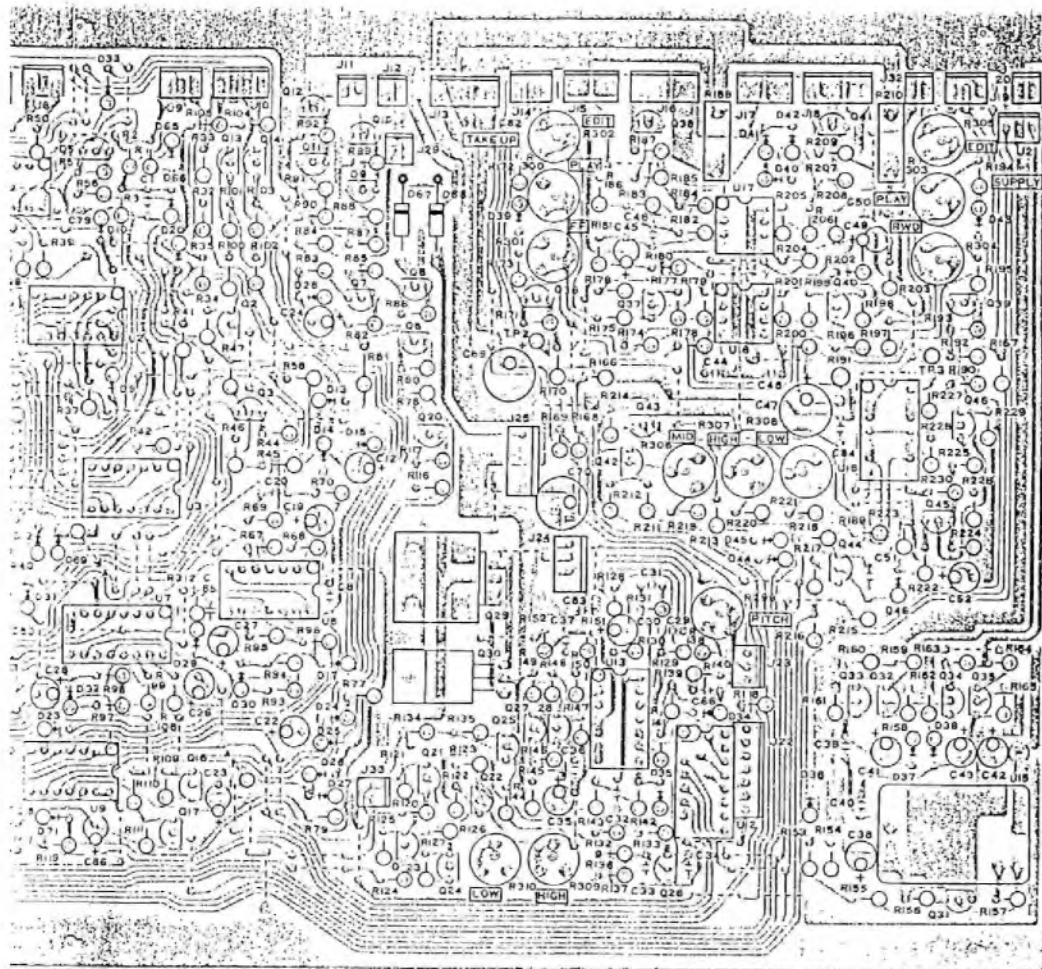
4-1984 FOSTEX CCRP 8258.0361 00



Ref. No.	Parts No.	Designation
1	8204 0190 00	Screw, button head, MSB M4x10
2	8220 2270 00	Panel, control
3	8204 0140 01	Washer, Mylar, #3
4	8226 0411 00	Button, control
5	8220 2281 00	Bracket, control
6	8223 1020 00	Shaft, button
7	8220 2251 00	Panel, meter
8	8212 0790 00	Window, panel
9	8273 1260 00	PCB ass'y, control switch, B-16
10	8256 0190 00	Module, bar graph, 12 dot
11	8273 1290 00	PCB ass'y, meter connector A
12	8220 2263 00	Cover, meter panel
13	8273 1100 00	PCB ass'y, connector board, B-16
14	8223 0750 01	Spacer, M3x15.4
15	8220 2200 00	Bracket, R/P amp. A
16	8273 1090 00	PCB ass'y, R/P amp. B-16
17	8212 0280 00	Guide, PCB
18	8220 2181 00	Bracket, R/P amp. L
19	8220 2191 00	Bracket, R/P amp. R
20	8220 2210 00	Bracket, R/P amp. B
21	8220 2230 00	Bracket, connector, 20P
22	8273 1110 00	PCB ass'y, NR switch
23	8276 3160 00	Cable ass'y, punching, B-16
24	8273 1270 00	PCB ass'y, connector, remote
25	8220 2240 00	Bracket, connector, 40P
26	8273 1280 00	PCB ass'y, connector, synchro
27	8220 2220 00	Panel, rear
28	8204 0140 02	Washer, Mylar, #2.6
29	8207 0002 14	Dushing, SR5N-4, HYDRO
	8207 0002 08	Dushing, SR4N-4, EX/DM
30	8276 0050 00	Cord, power, HYDRO
	8276 3130 00	" " 3 wire, EUR
	8276 3140 00	" " " UK
	8276 3150 00	" " " AUS
	8276 0030 00	" " 2 wire, EX/DM

SYSTEM CONTROL PCB





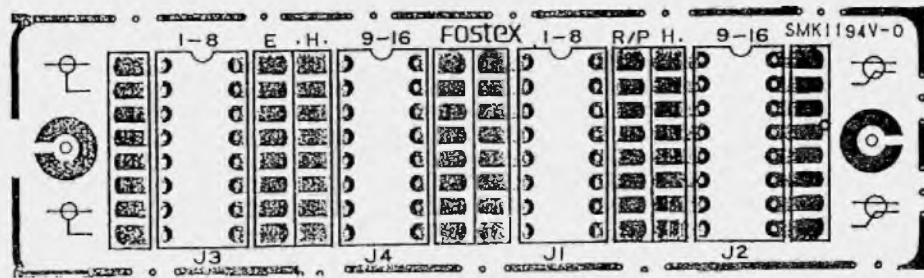
SYSTEM CONTROL PCB ASSEMBLY, Ass'y No. 8273 1140 00

Ref. No.	Parts No.	Nomenclature
B001	8251 1242 00	PCB, system control, B-16
A001	8273 1150 00	PCB assembly, voltage divider
		IC's
U001	8236 0032 01	Digital, CMOS, 4070B
U002	8236 0041 00	" " , 4082B
U003	8236 0035 01	" " , 4011B
U004	8236 0033 01	" " , 4071B
U005	8236 0040 01	" " , 4081B
U006	8236 0007 01	" " , 4013B
U007	8236 0028 01	" " , 4049UB
U008	8236 0007 01	" " , 4013B
U009	8236 0005 01	" " , 4011B
U010	8236 0033 01	" " , 4071B
U011	8236 0007 01	" " , 4013B
U012	8236 0195 00	Transistor array, TD62504P
U013	8236 0259 02	Analog, LM324
U014	8236 0190 00	Digital, syscon, AN6251
U015	8256 0171 00	Module, OSC, 100KHz, LR
U016, 017	8236 0215 00	Analog, NJM29040
U018	8236 0270 00	Analog, switch, 4066B
U019	8236 0005 01	Digital, CMOS, 4011B
U020	8236 0029 01	" " , 4050B
U021	8236 0040 01	" " , 4081B
U022	8236 0032 01	" " , 4070B
U023	8236 0193 00	" , counter, MK50396N
U024	8236 0040 01	" , CMOS, 4081B
U025, 026	8236 0007 01	" " , 4013B
U027	8236 0032 01	" " , 4070B
U028	8236 0040 01	" " , 4081B
U029	8236 0195 00	Transistor array, TD62504P
U030	8236 0194 00	" " , TD62506P
U031	8236 0059 00	Digital, CMOS, 4516B
		TRANSISTORS
Q01	8234 0002 03	2SC1815GR
Q02	8234 0003 03	2SA1015GR
Q03 ~ 07	8234 0002 03	2SC1815GR
Q08	8234 0038 02	2SA1020Y
Q09	8234 0002 03	2SC1815GR
Q10	8234 0037 02	2SC2655Y
Q11	8234 0002 03	2SC1815GR
Q12	8234 0037 02	2SC2655Y
Q13 ~ 21	8234 0002 03	2SC1815GR (B-16)
Q13 ~ 20	"	" (U-16B)
Q22	8234 0003 03	2SA1015GR
Q23, 24		(Deleted)
Q25, 26	8234 0002 03	2SC1815GR
Q27, 28	8234 0003 03	2SA1015GR
Q29	8234 0008 02	2SD880Y
Q30	8234 0005 02	2SB834Y
Q31	8234 0002 03	2SC1815GR

Ref. No.	Parts No.	Nomenclature
Q32	8234 0037 02	2SC2655Y
Q33	8234 0038 02	2SA1020Y
Q34	8234 0037 02	2SC2655Y
Q35	8234 0038 02	2SA1020Y
Q36, 37	8234 0002 03	2SC1815GR
Q38	8234 0037 02	2SC2655Y
Q39, 40	8234 0002 03	2SC1815GR
Q41	8234 0037 02	2SC2655Y
Q42, 43	8234 0003 03	2SA1015GR
Q44 ~ 55	8234 0002 03	2SC1815GR
		DIODES
D01 ~ 04	8234 0039 00	Diode array, MA154WK
D05 ~ 08	8234 0040 00	" " , MA154WA
D09 ~ 43	8234 0035 00	MA150FVS
D44, 45	8234 0019 02	Zener, 11V, D5Z11Y
D46 ~ 66	8234 0035 00	MA150FVS
D67, 68	8234 0007 00	1N4002
D69	8234 0035 00	MA150FVS
D70	8234 0018 00	MA150
D73	8234 0035 00	MA-150 FVS
		CARBON RESISTORS
		All resistors $\pm 1\%$, $\pm 5\%$ unless otherwise noted.
R001	8230 0044 72	Vertical mounting, 4.7K Ω
R002	8230 0041 03	" " 10K Ω
R003	8230 0041 04	" " 100K Ω
R004	8230 0044 72	" " 4.7K Ω
R005	8230 0041 03	" " 10K Ω
R006	8230 0041 04	" " 100K Ω
R007	8230 0044 73	" " 47K Ω
R008	8230 0041 04	" " 100K Ω
R009	8230 0044 72	" " 4.7K Ω
R010	8230 0041 03	" " 10K Ω
R011	8230 0041 04	" " 100K Ω
R012	8230 0044 72	Vertical mounting, 4.7K Ω
R013	8230 0041 03	" " 10K Ω
R014, 015	8230 0041 04	" " 100K Ω
R016	8230 0044 73	" " 47K Ω
R017	8230 0041 04	" " 100K Ω
R018	8230 0041 03	" " 10K Ω
R019	8230 0041 04	" " 100K Ω
R020	8230 0044 72	" " 4.7K Ω
R021	8230 0041 03	" " 10K Ω
R022	8230 0041 04	" " 100K Ω
R023	8230 0044 72	" " 4.7K Ω
R024	8230 0041 03	" " 10K Ω
R025	8230 0041 04	" " 100K Ω
R026	8230 0044 72	" " 4.7K Ω
R027	8230 0041 03	" " 10K Ω
R028	8230 0041 04	" " 100K Ω
R029	8230 0044 72	" " 4.7K Ω
R030	8230 0041 03	" " 10K Ω
R031	8230 0041 04	" " 100K Ω

No.	Parts No.	Nonenclature	Ref. No.	Parts No.	Nonenclature
R033	8230 0041 81	" "	R099	8230 0041 04	" " 100KΩ
R034	8230 0042 22	" "	R100	8230 0044 73	" " 47KΩ
R035	8230 0041 23	" "	R101	8230 0041 04	" " 100KΩ
R036 ~ 038	8230 0041 04	" "	R102	8230 0044 73	Vertical mounting, 47KΩ
R039	8230 0044 73	" "	R103, 104	8230 0041 04	" " 100KΩ
R040, 041	8230 0041 04	" "	R105	8230 0041 03	" " 10KΩ
R042	8230 0044 73	" "	R106	8230 0044 73	" " 47KΩ
R043, 044	8230 0041 04	" "	R107	8230 0041 04	" " 100KΩ
R045	8230 0041 03	" "	R108	8230 0044 73	" " 47KΩ
R046	8230 0044 74	" "	R109	8230 0041 04	" " 100KΩ
R047	8230 0041 03	" "	R110	8230 0041 03	" " 10KΩ
R048	8230 0047 53	" "	R111	8230 0041 04	" " 100KΩ
R049	8230 0041 01	" "	R112	8230 0041 03	" " 10KΩ
R050	8230 0046 81	" "	R113	8230 0041 04	" " 100KΩ
R051 ~ 054	8230 0041 04	" "	R114	8230 0044 73	" " 47KΩ
R055	8230 0044 74	" "	R115	8230 0041 04	" " 100KΩ
R056	8230 0046 83	Vertical mounting, 68KΩ	R116	8230 0041 03	" " 10KΩ
R057 ~ 059	8230 0041 04	" "	R117	8230 0041 04	" " 100KΩ
R060	8230 0044 73	" "	R118	8230 0041 52	" " 1.5KΩ
R061	8230 0041 00	" "	R119	8230 0042 03	" " 20KΩ
R062	8230 0046 81	" "	R120 ~ 123	8230 0041 04	" " 100KΩ
R063	8230 0041 02	" "	R124 ~ 127		{Deleted}
R064	8230 0041 04	" "	R128, 129	8230 0041 04	Vertical mounting, 100KΩ
R065	8230 0044 73	" "	R130	8230 0041 02	" " 1KΩ
R066, 67	8230 0041 04	" "	R131	8230 0042 24	" " 220KΩ
R068	8230 0041 03	" "	R132, 133	8230 0041 03	" " 10KΩ
R069	8230 0044 71	" "	R134, 135	8230 0041 04	" " 100KΩ
R070	8230 0042 24	" "	R136	8230 0047 53	" " 75KΩ
R071	8230 0041 01	" "	R137		{Deleted}
R072	8230 0041 04	" "	R138	8230 0048 22	Vertical mounting, 8.2KΩ
R073	8230 0041 02	" "	R139	8230 0041 04	" " 100KΩ
R074	8230 0041 04	" "	R140	8230 0045 62	" " 5.6KΩ
R075	8230 0044 73	" "	R141, 142	8230 0041 03	" " 10KΩ
R076	8230 0041 04	" "	R143	8230 0041 02	" " 1KΩ
R077 ~ 079	8230 0041 02	" "	R144 ~ 146	8230 0041 04	" " 100KΩ
R080	8230 0041 04	" "	R147 ~ 150	8230 0044 72	" " 4.7KΩ
R081	8230 0041 02	" "	R151	8230 0041 03	" " 10KΩ
R082	8230 0041 01	" "	R152	8230 0044 71	" " 470Ω
R083	8230 0042 22	" "	R153	8230 0041 51	Vertical mounting, 150Ω
R084	8230 0041 04	" "	R154	8230 0049 12	" " 9.1KΩ
R085	8230 0041 02	" "	R155	8230 0041 03	" " 10KΩ
R086, 087	8230 0041 03	" "	R156	8230 0041 04	" " 100KΩ
R088	8230 0041 04	" "	R157	8230 0042 20	" " 22Ω
R089	8230 0041 02	" "	R158	8230 0045 62	" " 5.6KΩ
R090	8230 0041 03	" "	R159, 160	8230 0041 09	" " 1Ω
R091	8230 0041 04	" "	R161, 162	8230 0045 62	" " 5.6KΩ
R092	8230 0041 02	" "	R163, 164	8230 0041 09	" " 1Ω
R093	8230 0044 73	" "	R165	8230 0045 62	" " 5.6KΩ
R094, 095	8230 0041 04	" "	R166	8230 0044 72	" " 4.7KΩ
R096, 097	8230 0044 73	" "	R167, 168	8230 0041 52	" " 1.5KΩ
R098	8230 0041 02	" "	R169	8230 0044 72	" " 4.7KΩ

Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
C18	8232 0351 03	Ceramic, 50V, 0.01uF, YF	R308	8231 0032 24	" " " " , 220KΩ, B
C19	8232 0054 75	Electrolytic, 35V, 4.7uF, 20%, SM	R309	8231 0012 23	" " flat mtg., metal film, 22KΩ, B
C20	8232 0351 03	Ceramic, 50V, 0.01uF, YF	R310		(Deleted)
C21	8232 0024 76	Electrolytic, 10V, 47uF, 20%, SM	R299	8231 0033 32	Trimmer, flat mtg., 3.3KΩ, B
C22, 23	8232 0064 74	" , 50V, 0.47uF, 20%, SM	R300	8231 0034 73	" , " , 47KΩ, "
C24	8232 0031 06	" , 16V, 10uF, 20%, SM	R301	8231 0033 13	" , " , 33KΩ, "
C25	8232 0061 05	" , 50V, 1uF, 20%, SM	R302	8231 0031 03	" , " , 10KΩ, "
C26, 27	8232 0054 75	" , 35V, 4.7uF, 20%, SM	R303	8231 0034 73	" , " , 47KΩ, "
C28	8232 0022 26	" , 10V, 22uF, 20%, SM	R304	8231 0033 33	" , " , 33KΩ, "
C29	8232 0263 33	Mylar, 50V, 0.033uF, 5%, AMX		MISCELLANEOUS	*
C30	8232 0062 25	Electrolytic, 50V, 2.2uF, 20%, SM		8242 0530 00	Inductor, 150uH
C31, 32	8232 0313 31	Polypropylene, 100V, 330pF, 5%, APS	L001		
C33	8232 0266 02	Mylar, 50V, 0.0068uF, 5%, AMX	J001	8245 0530 04	Jack, 8263, 4, straight, wht
C34	8232 0313 92	Polypropylene, 100V, 0.0039uF, 5%, APS	J002	8245 0530 07	" " " " " "
C35	8232 0054 75	Electrolytic, 35V, 4.7uF, 20%, SM	J003	8245 0530 09	" " 9, " "
C36	8232 0263 33	Mylar, 50V, 0.033uF, 5%, AMX	J004	8245 0530 04	" " 4, " "
C37	8232 0261 52	" , " , 0.0015uF, 5%, AMX	J005	8245 0530 02	" " 2, " "
C38	8232 0024 76	Electrolytic, 10V, 47uF, 20%, SM	J006	8245 0530 12	" " 12, " "
C39, 40	8232 0261 03	Mylar, 50V, 0.01uF, 5%, AMX	J007	8245 0530 11	" " 11, " "
C41	8232 0064 74	Electrolytic, 50V, 0.47uF, 20%, SM	J008	8245 0530 03	" " 3, " "
C42	8232 0041 06	" , 25V, 10uF, 20%, SM	J009	8245 0530 23	" " " " " red
C43	8232 0064 74	" , 50V, 0.47uF, 20%, SM	J010	8245 0530 04	" " 4, " wht
C44	8232 0262 23	Mylar, 50V, 0.022uF, 5%, AMX	J011	8245 0530 22	" " 2, " red
C45	8232 0265 63	Mylar, 50V, 0.056uF, 10%, AMX	J012	8245 0530 02	" " " " " wht
C46	8232 0261 03	Mylar, 50V, 0.01uF, 5%, AMX	J013	8245 0530 05	" " 5, " "
C47	8232 0041 07	Electrolytic, 25V, 100uF, 20%, SM	J014	8245 0530 03	" " 3, " "
C48	8232 0262 23	Mylar, 50V, 0.022uF, 5%, AMX	J015	8245 0530 04	" " 4, " "
C49	8232 0265 63	Mylar, 50V, 0.056uF, 10%, AMX	J016	8245 0530 05	" " 5, " "
C50	8232 0261 03	Mylar, 50V, 0.01uF, 5%, AMX	J017	8245 0530 24	" " 4, " red
C51	8232 0261 04	" , " , 0.1uF, 5%, AMX	J018	8245 0530 25	" " 5, " "
C52	8232 0062 25	Electrolytic, 50V, 2.2uF, 20%, SM	J019	8245 0530 03	" " 3, " wht
C53	8232 0351 03	Ceramic, 50V, 0.01uF, YF	J020	8245 0530 02	" " 2, " "
C54 ~ 56	8232 0501 51	" , " , 150pF, 5%, SL	J021	8245 0530 23	" " 3, " red
C57	8232 0506 81	" , " , 680pF, 5%, SL	J022	8245 0530 07	" " 7, " wht
C58, 59	8232 0261 03	Mylar, 50V, 0.01uF, 5%, AMX	J023	8245 0530 03	" " 3, " "
C60	8232 0264 72	Mylar, 50V, 0.0047uF, 5%, AMX	J024	8245 0530 04	" " 4, " "
C61	8232 0501 81	Ceramic, 50V, 180pF, 5%, SL	J025	8245 0530 05	" " 5, " "
C62	8232 0351 03	" , " , 0.01uF, YF	J026	8245 0530 03	" " 3, " "
C63	8232 0064 74	Electrolytic, 50V, 0.47uF, 20%, SM	J027	8245 0020 08	" , 3024-08CH, wht
C64	8232 0268 21	Mylar, 50V, 820pF, 5%, AMX	J028	8245 0020 19	" , 3024-19CH, "
C65, 66	8232 0351 03	Ceramic, 50V, 0.01uF, YF	J029	8245 0530 02	" , 8263, 2, straight, wht
C67	8232 0021 07	Electrolytic, 10V, 100uF, 20%, SM	J033	8245 0530 02	" " " " " "
C68, 69	8232 0041 07	" , 25V, " , " "			
C70	8232 0051 07	" , 35V, " , " "			
C71 ~ 84	8232 0351 03	Ceramic, 50V, 0.01uF, YF			
C85	8232 0501 51	" , " , 150pF, 5%, SL			
C86	8232 0610 05	Electrolytic, 50V, 1uF, 20%, SM			
CARBON PDTS					
R305	8231 0031 03	Trimmer, flat mounting, 10KΩ, D			
R306	8231 0032 24	" " " " , 220KΩ, B			
R307	8231 0034 73	" " " " , 47KΩ, B			



HEAD TERMINAL PCB ASSEMBLY, Ass'y No. 8273 1310 00

Ref. No.	Parts No.	Nomenclature
J001	004	8251 1381 04 PCB, head terminal, 0-16
W001		8245 0700 03 Connector, IC socket, 16P
W002		8276 3200 35 Cable ass'y, 2 cond., 8P, wht, 350mm
W003		8276 3210 30 " " " " red, 300mm
W004		8276 3200 30 " " " " wht, "
W005		8276 3210 35 " " " " red, 350mm
W006		8276 3220 35 " " , shield, " wht, "
W007		8276 3230 30 " " " " red, 300mm
W008		8276 3220 30 " " " " wht, "
		8276 3230 35 " " " " red, 350mm

PCB ASSEMBLY, Ass'y No. 82731100 00

Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
82511381 01	PCB, connector board, B-16	R006		{Deleted}
IC's		R007	8230 0042 03	Vertical mounting, 20K Ω
8236 0033 01	Digital, MC14071B	R008	8230 0041 04	" " 100K Ω
8236 0035 00	" MC14073B	R009	8230 0044 72	" " 4.7K Ω
8236 0033 01	" MC14071B	R010	8230 0041 03	" " 10K Ω
8236 0035 00	" MC14073B	R011	8230 0041 04	" " 100K Ω
8236 0033 01	" MC14071B	R012	8230 0041 83	" " 18K Ω
8236 0035 00	" MC14073B	R013	8230 0041 04	" " 100K Ω
8236 0033 01	" MC14071B	R014		{Deleted}
8236 0035 00	" MC14073B	R015	8230 0042 03	Vertical mounting, 20K Ω
8236 0033 01	" MC14071B	R016	8230 0041 04	" " 100K Ω
8236 0035 00	" MC14073B	R017	8230 0044 72	" " 4.7K Ω
8236 0033 01	" MC14071B	R018	8230 0041 03	" " 10K Ω
8236 0035 00	" MC14073B	R019	8230 0041 04	" " 100K Ω
8236 0033 01	" MC14071B	R020	8230 0041 83	" " 18K Ω
8236 0035 00	" MC14073B	R021	8230 0041 04	" " 100K Ω
8236 0033 01	" MC14071B	R022		{Deleted}
8236 0035 00	" MC14073B	R023	8230 0042 03	Vertical mounting, 20K Ω
8236 0001 01	" MC14001B	R024	8230 0041 04	" " 100K Ω
8236 0005 01	" MC14011B	R025	8230 0044 72	" " 4.7K Ω
TRANSISTORS		R026	8230 0041 03	" " 10K Ω
8234 0002 03	2SC1815GR	R027	8230 0041 04	" " 100K Ω
8234 0003 03	2SA1015GR	R028	8230 0041 83	" " 18K Ω
DIODES		R029	8230 0041 04	" " 100K Ω
8234 0035 00	MA-150FVS	R030		{Deleted}
"	"	R031	8230 0042 03	Vertical mounting, 20K Ω
"	"	R032	8230 0041 04	" " 100K Ω
"	"	R033	8230 0044 72	" " 4.7K Ω
"	"	R034	8230 0041 03	" " 10K Ω
"	"	R035	8230 0041 04	" " 100K Ω
"	"	R036	8230 0041 83	" " 18K Ω
"	"	R037	8230 0041 04	" " 100K Ω
"	"	R038		{Deleted}
"	"	R039	8230 0042 03	Vertical mounting, 20K Ω
"	"	R040	8230 0041 04	" " 100K Ω
"	"	R041	8230 0044 72	" " 4.7K Ω
"	"	R042	8230 0041 03	" " 10K Ω
"	"	R043	8230 0041 04	" " 100K Ω
"	"	R044	8230 0041 83	" " 18K Ω
"	"	R045	8230 0041 04	" " 100K Ω
"	"	R046		{Deleted}
"	"	R047	8230 0042 03	Vertical mounting, 20K Ω
"	"	R048	8230 0041 04	" " 100K Ω
8234 0007 00	1N4002	R049	8230 0044 72	Vertical mounting, 4.7K Ω
CARBON RESISTORS		R050	8230 0041 03	" " 10K Ω
Colors: 1W, $\pm 5\%$ unless otherwise noted.		R051	8230 0041 04	" " 100K Ω
8230 0044 72	Vertical mounting, 4.7K Ω	R052	8230 0041 83	" " 18K Ω
8230 0041 03	" " 10K Ω	R053	8230 0041 04	" " 100K Ω
8230 0041 04	" " 100K Ω	R054		{Deleted}
8230 0041 83	" " 18K Ω	R055	8230 0042 03	Vertical mounting, 20K Ω
8230 0041 04	" " 100K Ω	R056	8230 0041 04	" " 100K Ω

Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
R057	8230 0044 72	" " 4.7KΩ	R108	8230 0041 83	" " 18KΩ
R058	8230 0041 03	" " 10KΩ	R109	8230 0041 04	" " 100KΩ
R059	8230 0041 04	" " 100KΩ	R110		(Deleted)
R060	8230 0041 83	" " 18KΩ	R111	8230 0042 03	Vertical mounting, 20KΩ
R061	8230 0041 04	" " 100KΩ	R112	8230 0041 04	" " 100KΩ
R062		(Deleted)	R113	8230 0044 72	" " 4.7KΩ
R063	8230 0042 03	Vertical mounting, 20KΩ	R114	8230 0041 03	" " 10KΩ
R064	8230 0041 04	" " 100KΩ	R115	8230 0041 04	" " 100KΩ
R065	8230 0044 72	" " 4.7KΩ	R116	8230 0041 83	" " 18KΩ
R066	8230 0041 03	" " 10KΩ	R117	8230 0041 04	" " 100KΩ
R067	8230 0041 04	" " 100KΩ	R118		(Deleted)
R068	8230 0041 83	" " 18KΩ	R119	8230 0042 03	Vertical mounting, 20KΩ
R069	8230 0041 04	" " 100KΩ	R120	8230 0041 04	" " 100KΩ
R070		(Deleted)	R121	8230 0044 72	" " 4.7KΩ
R071	8230 0042 03	Vertical mounting, 20KΩ	R122	8230 0041 03	" " 10KΩ
R072	8230 0041 04	" " 100KΩ	R123	8230 0041 04	" " 100KΩ
R073	8230 0044 72	" " 4.7KΩ	R124	8230 0041 83	" " 18KΩ
R074	8230 0041 03	" " 10KΩ	R125	8230 0041 04	" " 100KΩ
R075	8230 0041 04	" " 100KΩ	R126		(Deleted)
R076	8230 0041 83	" " 18KΩ	R127	8230 0042 03	Vertical mounting, 20KΩ
R077	8230 0041 04	" " 100KΩ	R128	8230 0041 04	" " 100KΩ
R078		(Deleted)	R129	8230 0044 72	" " 4.7KΩ
R079	8230 0042 03	Vertical mounting, 20KΩ	R130	8230 0041 04	" " 100KΩ
R080	8230 0041 04	" " 100KΩ	R131	8230 0041 64	" " 160KΩ
R081	8230 0044 72	" " 4.7KΩ	R132	8230 0041 63	" " 16KΩ
R082	8230 0041 03	" " 10KΩ	R133	8230 0044 72	" " 4.7KΩ
R083	8230 0041 04	" " 100KΩ	R134	8230 0041 04	" " 100KΩ
R084	8230 0041 83	Vertical mounting, 18KΩ	R135	8230 0044 74	" " 470KΩ
R085	8230 0041 04	" " 100KΩ	R136	8230 0041 03	" " 10KΩ
R086		(Deleted)	R137	8230 0041 04	" " 100KΩ
R087	8230 0042 03	Vertical mounting, 20KΩ	R138	8230 0044 72	" " 4.7KΩ
R088	8230 0041 04	" " 100KΩ	R139	8230 0041 03	" " 10KΩ
R089	8230 0044 72	" " 4.7KΩ	R140	8230 0041 04	" " 100KΩ
R090	8230 0041 03	" " 10KΩ	R141 ~ 143	8230 0043 61	" " 360Ω
R091	8230 0041 04	" " 100KΩ	R144	8230 0041 01	" " 100Ω
R092	8230 0041 83	" " 18KΩ	R145	8230 0044 72	" " 47KΩ
R093	8230 0041 04	" " 100KΩ	R146	8230 0041 04	" " 100KΩ
R094		(Deleted)	R147	8230 0044 73	" " 47KΩ
R095	8230 0042 03	Vertical mounting, 20KΩ	R148	8230 0041 04	" " 100KΩ
R096	8230 0041 04	" " 100KΩ	R149	8230 0041 01	" " 100Ω
R097	8230 0044 72	" " 4.7KΩ	R150	8230 0042 23	" " 22KΩ
R098	8230 0041 03	" " 10KΩ	R151	8230 0041 04	" " 100KΩ
R099	8230 0041 04	" " 100KΩ	R152	8230 0042 23	" " 22KΩ
R100	8230 0041 83	" " 18KΩ	R153	8230 0041 04	" " 100KΩ
R101	8230 0041 04	" " 100KΩ	R154, 155	8230 0041 81	" " 180Ω
R102		(Deleted)	R156	8230 0044 73	" " 47KΩ
R103	8230 0042 03	Vertical mounting, 20KΩ	R157	8230 0041 03	Vertical mounting, 10KΩ
R104	8230 0041 04	" " 100KΩ	R158, 159	8230 0041 04	" " 100KΩ
R105	8230 0044 72	" " 4.7KΩ	R160	8230 0042 23	" " 22KΩ
R106	8230 0041 03	" " 10KΩ	R161	8230 0041 04	" " 100KΩ
R107	8230 0041 04	" " 100KΩ	R162	8230 0041 84	" " 180KΩ

Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
R163	8230 0044 73	" " 47K Ω	C062	8232 0041 08	" " 1000uF, 20%, SM
R164	8230 0041 01	" " 100K	C063	8232 0031 06	" " 16V, 10uF, 20%, SM
R165 ~ 175	8230 0043 61	" " 360 Ω	C064	8232 0034 76	" " 47uF, " "
R176		(Deleted)	C065	8232 0313 91	Polypropylene, 50V, 390pF, 5%, APS
R177 ~ 179	8230 0043 61	Vertical mounting, 360 Ω	C066 ~ 080	8232 0261 23	Mylar, 50V, 0.012uF, 5%, AMX
R180	8230 0041 23	" " 12K Ω	C081	8232 0021 07	Electrolytic, 10V, 100uF, 20%, SM
R181	8230 0046 B2	" " 6.8K Ω			

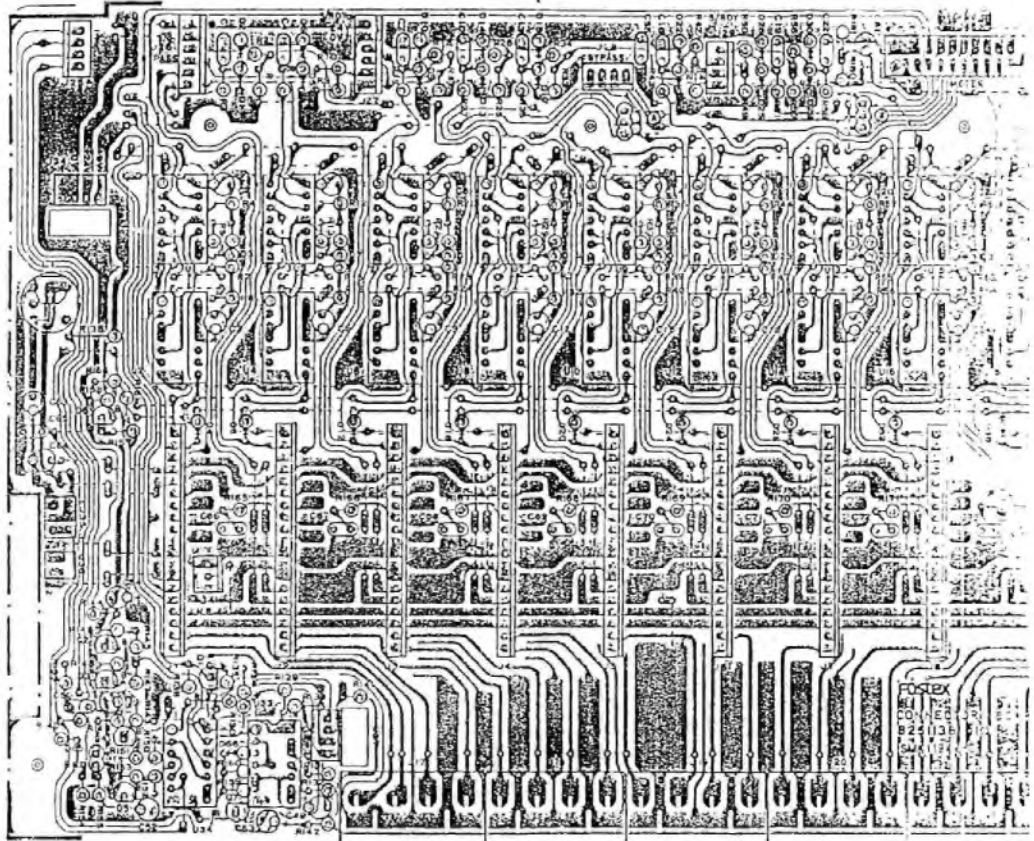
CAPACITORS

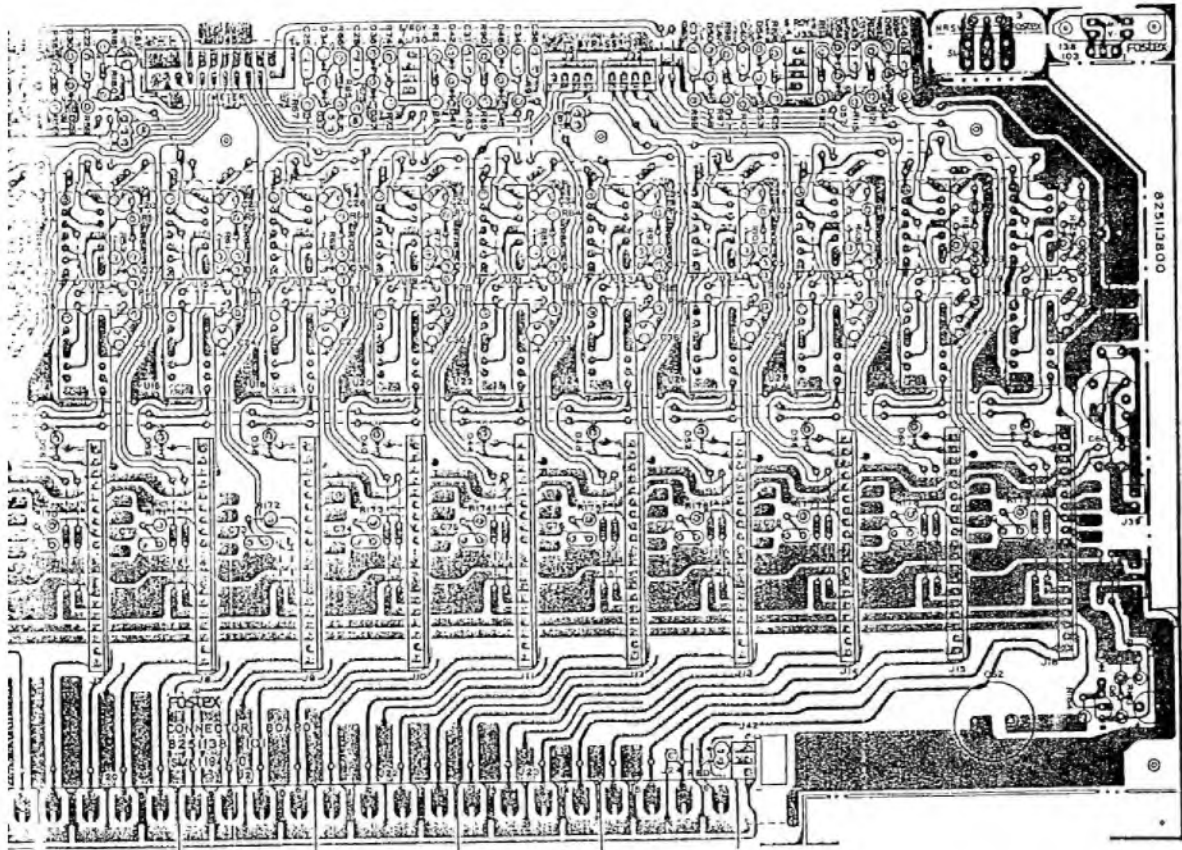
C001	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C002, 003	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C004	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C005, 006	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C007	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C008, 009	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C010	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C011, 012	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C013	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C014, 015	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C016	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C017, 018	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C019	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C020, 021	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C022	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C023, 024	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C025	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C026, 027	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C028	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C029, 030	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C031	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C032, 033	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C034	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C035, 036	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C037	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C038, 039	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C040	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C041, 042	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C043	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C044, 045	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C046	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C047, 048	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C049	8232 0032 26	" " 22uF, 20%, SM
C050	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C051 ~ 053	8232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C054	8232 0033 36	" " 16V, 33uF, 20%, SM
C055, 056	8232 0351 03	Ceramic, 50V, 0.01uF, YF
C057	8232 0033 36	Electrolytic, 16V, 33uF, 20%, SM
C058	8232 0313 91	Polypropylene, 50V, 390pF, 5%, APS
C059	8232 0031 06	Electrolytic, 16V, 10uF, 20%, SM
C060	8232 0034 76	" " 47uF, " "
C061	8232 0721 06	" " 25V, 10uF, " LR-VB

MISCELLANEOUS

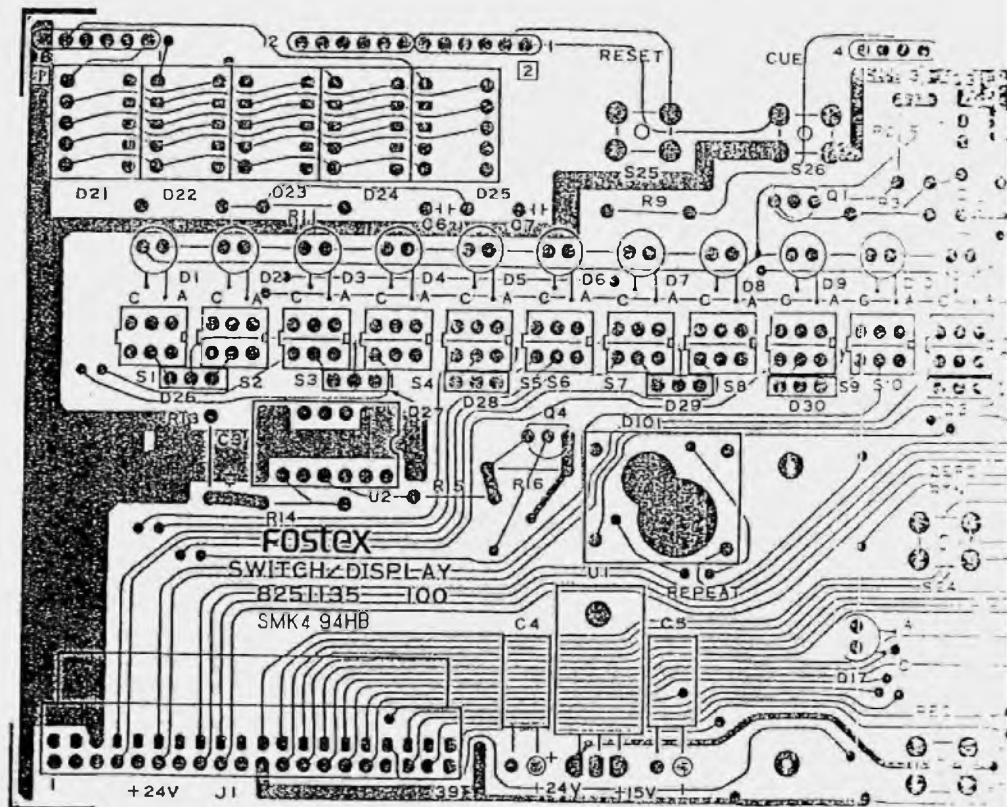
J001 ~ 016	8245 0490 19	Jack, 5256-19A, wht
J017 ~ 024	8245 0500 00	" " RCA, 4P, blk
J025	8245 0530 04	" " 8263, 4, straight, wht
J026	8245 0530 46	" " 8263, 6, " blk
J027	8245 0530 06	Jack, 8236, 6, wht
J028	8245 0530 44	" " " 4, blk
J029	8245 0530 24	" " " red
J030	8245 0530 04	" " " wht
J031	8245 0530 44	" " " blk
J032	8245 0530 24	" " " red
J033	8245 0530 04	" " " wht
J034	8245 0070 04	" " 5129-04A, wht
J035	8245 0070 03	" " 5129-03A, "
J036	8245 0070 02	" " 5129-02A, wht
J037	8245 0070 04	" " 5129-04A, "
J038	8245 0070 02	" " 5129-02A, "
J039	8245 0070 02	" " " " "
J040	8245 0070 03	" " 5129-03A, "
J041	8245 0530 23	" " 8263, 3, red
J042	8245 0070 03	" " 5029-03A, wht
W002	8276 1590 08	Cable, flat, red/wht, 80mm
W003	8276 1590 33	" " " " 330mm
W004	8276 1600 07	" " " 3 wire, 70mm
W005	8276 3110 00	Cable ass'y, meter, B-16
L1, 2	8242 0090 00	Inductor, bias

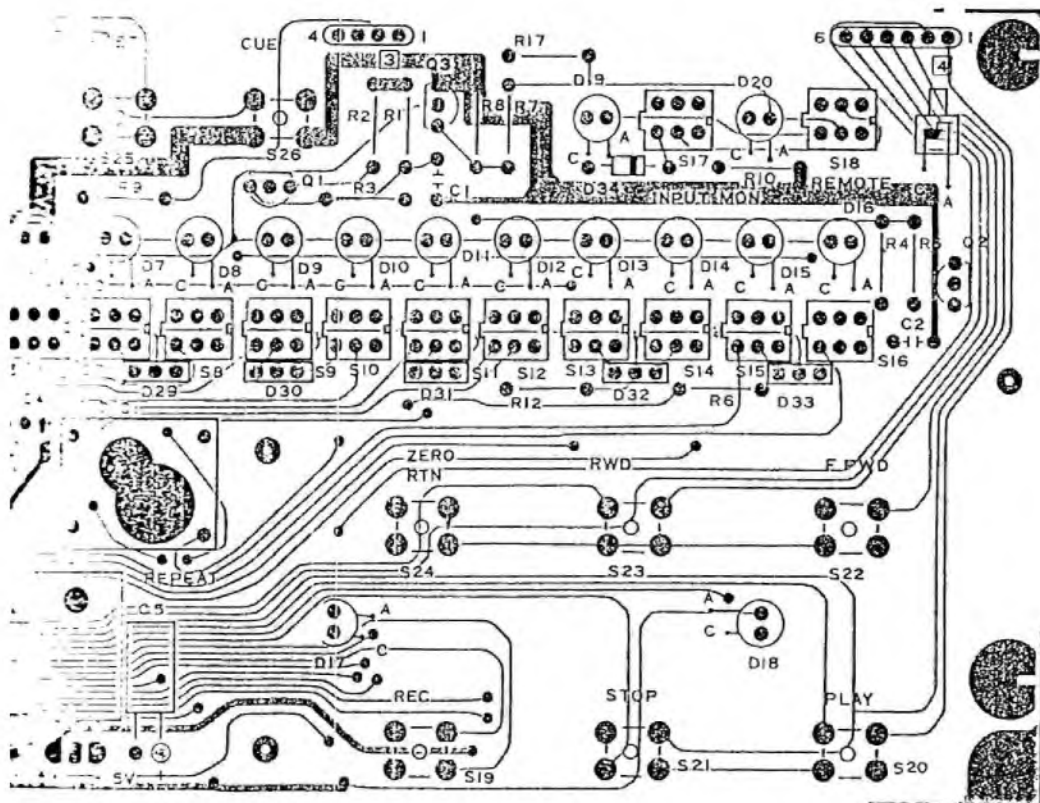
CONNECTOR BOARD PCB





SWITCH/DISPLAY PCB



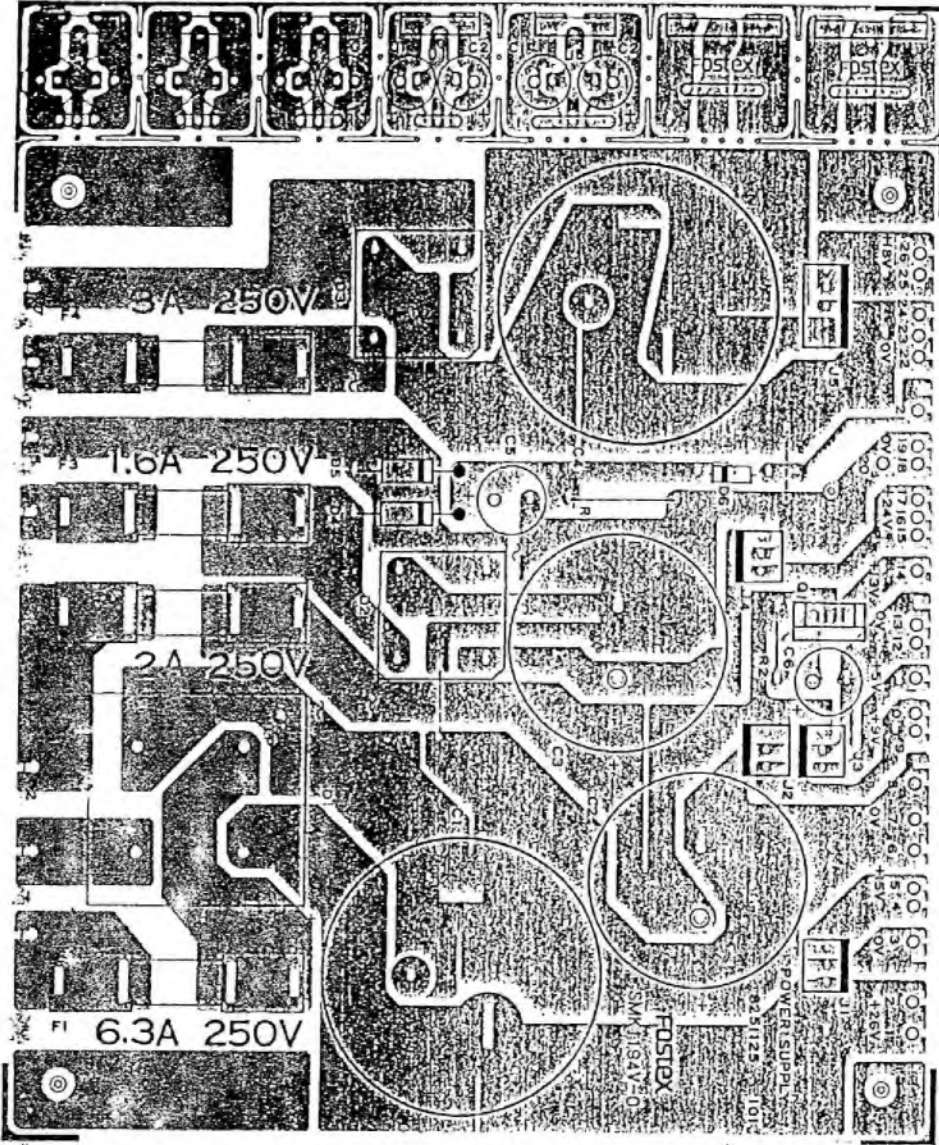


SWITCH/DISPLAY PCB ASSEMBLY, Ass'y No. 0273 1340 00

REPEAT PCB ASSEMBLY, Ass'y No. 0273 1350 00

Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
	8251 1351 00	PCB, switch/display	8251 1171 00	PCB, repeat	
		IC's	8276 0010 00	Pin, header	
U001	8236 0234 00	Analog, NJM79M15A	8253 0500 01	Switch, push. w/LED, gr	
U002	8236 0032 01	Digital, 4070B	8253 0520 01	" escutcheon, dar	
		TRANSISTORS	8253 0510 01	" button, dark gr	
Q001, 002	8234 0003 03	2SA1015GR			
Q003	8234 0002 03	2SC1815GR			
Q004	8234 0002 03	2SC1815GR			
		DIODES			
D01 ~ 17	8234 0051 00	Opto, LED, GL-2PRS			
D18, 19	8234 0052 00	" " GL-2NG5			
D20	8234 0051 00	" " GL-2PRS			
D21 ~ 25	8234 0045 00	" " GL-8PD3			
D26 ~ 33	8234 0039 00	Diode array, MA154HK			
D34	8234 0018 00	MA150			
		CARBON RESISTORS			
		All resistors 1/4W, 15% unless otherwise noted.			
R001	8230 0061 02	Flat mounting, 1K Ω			
R002	8230 0061 61	" " 160 Ω			
R003	8230 0061 03	" " 10K Ω			
R004	8230 0061 02	" " 1K Ω			
R005	8230 0061 61	" " 160 Ω			
R006	8230 0061 03	" " 10K Ω			
R007	8230 0064 73	" " 47K Ω			
R008	8230 0061 04	" " 100K Ω			
R009	8230 0062 21	" " 220 Ω			
R010	8230 0063 61	" " 360 Ω			
R011	8230 0062 21	" " 220 Ω			
R012	8230 0063 92	" " 3.9K Ω			
R013	8230 0064 73	" " 47K Ω			
R014	8230 0061 04	" " 100K Ω			
R015	8230 0061 03	" " 10K Ω			
R016, 017	8230 0061 04	" " 100K Ω			
		CAPACITORS			
C001 ~ 003	8232 0351 03	Ceramic, 50V, 0.01 μ F, YF			
C004	8232 0053 36	Electrolytic, 35V, 33 μ F, 20%, SM			
C005	8232 0061 05	" 50V, 1 μ F, 20%, SM			
C006, 007	8232 0351 03	Ceramic, 50V, 0.01 μ F, YF			
		MISCELLANEOUS			
J001	8245 0650 01	Jack, FC, male, 40P			
S01 ~ 18	8253 0480 00	Switch, push. SP1122111			
S19 ~ 26	8253 0490 00	" Tact, K11110910			
	8212 0800 00	Spacer, LED			
	8207 0004 00	Plasti-rivet, #980			

POWER SUPPLY PCB



POWER SUPPLY PCB ASSEMBLY, Ass'y No. B273 1130 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 01	PCB, power supply
Q001	△ B234 0050 03	Transistor, 2SD1406-Y
D001	△ B234 0044 01	Diode, stack, KBPC002
D002, 003	△ B234 0056 01	" " KBPC002
D004, 005	△ B234 0007 00	" , 1H4002
D006	△ B234 0018 00	" , MA-150
RESISTORS		
R001	B230 0071 03	Flat mtg., 1W, ±5%, 10KΩ
R002	B230 0063 31	" " 1W, " 330Ω
CAPACITORS		
C001	B232 0494 78	Electrolytic, 63V, 4700uF, +30-10%, BK-LISN
C002	B232 0463 30	" 50V, 330uF, " , BK-VNSN
C003	B232 0482 28	" " , 220uF, " ,
C004	B232 0494 78	" , 63V, 4700uF, " , BK-LISN
C005	B232 0062 25	" , 50V, 2.2uF, 20%, SM
C006	B232 0051 07	" , 35V, 100uF, 20%, SM
MISCELLANEOUS		
J001	B245 0530 03	Jack, D263, 3, straight, wht
J002	B245 0530 23	" " " " red
J003	B245 0530 43	" " " " blk
J004	B245 0530 63	" " " " yel
J005	B245 0530 05	" " 5, " wht
F001	△ B239 0011 63	Fuse, Dentori, anti-rush, 6.3A
"	△ B239 0006 63	" UL/CSA, " "
"	△ B239 0007 50	" SEMKO, " 5A
F002	△ B239 0011 20	" Dentori, normal, 2.0A
"	△ B239 0000 20	" UL/CSA, " , 2.0A
"	△ B239 0007 20	" SEMKO, time-lag, 2.0A
F003	△ B239 0011 16	" Dentori, anti-rush, 1.6A
"	△ B239 0006 16	" UL/CSA, " "
"	△ B239 0007 16	" SEMKO, time-lag, 1.6A
F004	△ B239 0011 30	" Dentori, normal, 3A
"	△ B239 0006 30	" UL/CSA, " , 3A
"	△ B239 0007 31	" SEMKO, time-lag, 3.15A
	B239 0001 00	Holder, fuse, SH5051
	B239 0012 00	" " SH5056
	B276 0010 00	Pin, header
	B207 0014 00	Heat sink, 1C3030-ST
	B276 2370 60	Cable ass'y, 5P, wht, 600mm
	B276 2370 69	" " " " 690mm
	B276 2360 60	" " 4P, " 600mm
	B276 3100 60	" " " " "
	B276 3070 57	" " 2P, " 570mm
	B276 3090 50	" " 3P, red, 500mm
	B276 3240 60	" " 2P, 5209, red, 600mm
	B276 3180 25	" " , ground lug, 250mm

U1 REGULATOR PCB ASSEMBLY, Ass'y No. B273 1130 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 04	PCB, regulator, U1
U001	△ B236 0282 00	IC, analog, NJM7815A
C001	B232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C002	B232 0041 07	" 25V, 100uF, 20%, SM
	B276 2800 25	Cable ass'y, 3P, wht, 250mm

U2 REGULATOR PCB ASSEMBLY, Ass'y No. B273 1200 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 05	PCB, regulator, U2
U002	△ B236 0284 00	IC, analog, NJM7809A
C001	B232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C002	B232 0031 07	" 16V, 100uF, 20%, SM
	B276 2400 17	Cable ass'y, 3P, red, 170mm

U3 REGULATOR PCB ASSEMBLY, Ass'y No. B273 1210 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 06	PCB, regulator, U3
U003	△ B236 0262 00	IC, analog, NJM7805A
C001	B232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C002	B232 0021 07	" 10V, 100uF, 20%, SM
	B276 2300 12	Cable ass'y, 3P, blk, 120mm

U4 REGULATOR PCB ASSEMBLY, Ass'y No. B273 1220 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 07	PCB, regulator, U4
U004	△ B236 0263 00	IC, analog, NJM7824A
C001	B232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C002	B232 0041 07	" 25V, 100uF, 20%, SM
	B276 2810 25	Cable ass'y, 3P, yel, 250mm

U5 REGULATOR PCB ASSEMBLY, Ass'y No. B273 1230 00

Ref. No.	Parts No.	Nomenclature
	B251 1250 03	PCB, regulator, U5
U005	△ B236 0260 00	IC, analog, NJM7818A
C001	B232 0061 05	Electrolytic, 50V, 1uF, 20%, SM
C002	B232 0041 07	" 25V, 100uF, 20%, SM
	B276 2370 23	Cable ass'y, 5P, wht, 230mm

B-16/B-16D TRANSFORMER ASSEMBLY, Ass'y No. B270 201000

Ref. No.	Parts No.	Nomenclature
A001	8270 2060 00	Transformer sub-assembly, D-16
"	8270 2060 01	" " " " " " B-16D
A002	8273 1130 01	PCB ass'y, pwr supply, D-16, FCA/CND
"	8273 1130 02	" " " " " " , EUR/UK/AUS
"	8273 1130 03	" " " " " " , EX/DM
"	8273 1130 04	" " " " " " B-16D, FCA
"	8273 1130 05	" " " " " " , EUR/UK/AUS
"	8273 1130 06	" " " " " " , EX/DM
S101	8253 0340 00	Switch, push, power, SDGA1P, EX/DM/FCA/CND
"	8253 0350 00	" " " " " " SDGA3P, EUR/UK/AUS
Z001	8256 0090 00	Sparkiller, UL, NSK135
"	8256 0100 00	" " " " " " CSA, NSK132
"	8256 0110 03	" " " " " " SEMCO, 4700pF, PHE265
"	8256 0080 00	" " " " " " DM, NSKB115
X001	8216 0720 00	Sheet, fiber
A003	8273 1520 01	PCB Ass'y, power minus, FCA/CND
"	8273 1520 02	" " " " " " , EUR/UK/AUS
"	8273 1520 03	" " " " " " , EX/DM

Ref. No.	Parts No.	Nomenclature
	8276 2370 60	Cable ass'y, 5P, wht, 600mm
	8276 2370 69	" " " " " " 690mm
	8276 2360 60	" " " " " " 4P, " 600mm
	8276 3100 60	" " " " " " " " "
	8276 3070 57	" " " " " " 2P, " 570mm
	8276 3090 50	" " " " " " 3P, red, 500mm
	8276 3240 60	Cable ass'y, 2P, 5209, red, 600mm
	8276 2360 42	" " " " " " 4P, wht, 420mm
	8276 2290 35	" " " " " " 2P, blk, 350mm
	8276 3180 25	" " " " " " ground lug, 25mm
	8207 0014 00	Heat sink, 1C3030-ST

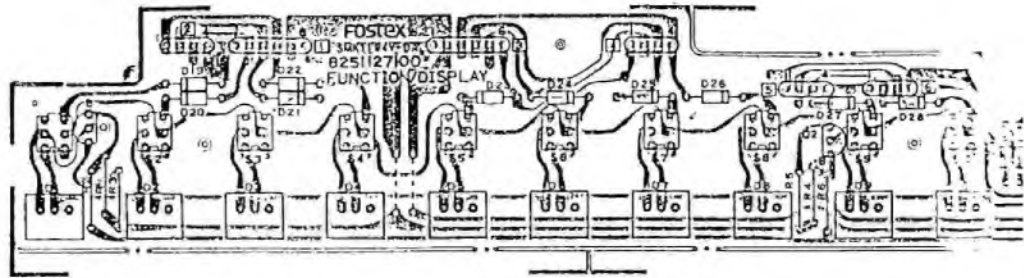
MINUS POWER PCB ASSEMBLY, Ass'y No. 8273 1520 00

Ref. No.	Parts No.	Nomenclature
	8251 1690 00	PCB, minus power
D001	8234 0055 01	Diode, stack KBPC602
C001	8232 0024 78	Cap., electrolytic, 35V, 470µF, 20%, MVMVSN
	8239 0001 00	Holder, fuse, SN5051
	8239 0012 00	" " " " " " SN5056
F005	8235 0011 00	Fuse, Denton1, anti-rush cur
"	8239 0005 00	" " " " " " UL/CSA, " "
"	8239 0007 00	" " " " " " SEMKO, time lag

POWER SUPPLY PCB SUB-ASSEMBLY, Ass'y No. 8273 1360 00

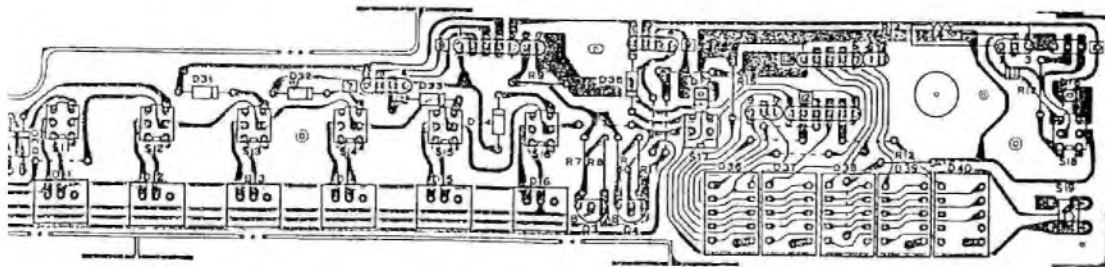
Ref. No.	Parts No.	Nomenclature
	8251 1251 01	PCB, power supply
		TRANSISTOR
Q001	8234 0050 03	2SD1406-Y
		DIODES
D001	8234 0044 01	Stack, KBPC802
D002	8234 0043 01	" " " " " " KBPC102
D003	8234 0056 01	" " " " " " KBPC602
D004, 005	8234 0007 00	1N4002
D006	8234 0018 00	MA-150
		RESISTORS
R001	8230 0071 03	Carbon, 1/4W, 10KΩ, 5%, vertical mounting
R002	8230 0063 31	" " " " " " 1W, 330Ω, " " flat mounting
		CAPACITORS
C001	8232 0494 78	Electrolytic, 63V, 4700µF, +30-10%, BK-L15N
C002	8232 0483 38	" " " " " " 50V, 3300µF, " " BK-VNSH
C003	8232 0482 28	" " " " " " " " " " " "
C004	8232 0494 78	" " " " " " 63V, 4700µF, " " BK-L15N
C005	8232 0062 25	" " " " " " 50V, 2.2µF, 20%, 5M
C006	8232 0051 07	" " " " " " 35V, 100µF, " " "
		MISCELLANEOUS
J001	8245 0530 03	Jack, 8263, 3, straight, wht
J002	8245 0530 23	" " " " " " " " red
J003	8245 0530 43	" " " " " " " " blk
J004	8245 0530 63	" " " " " " " " yel
J005	8245 0530 05	" " " " " " 5 " " wht

FUNCTION/DISPLAY PCB



FUNCTION/DISPLAY PCB ASSEMBLY, Ass'y No. 82731120 00

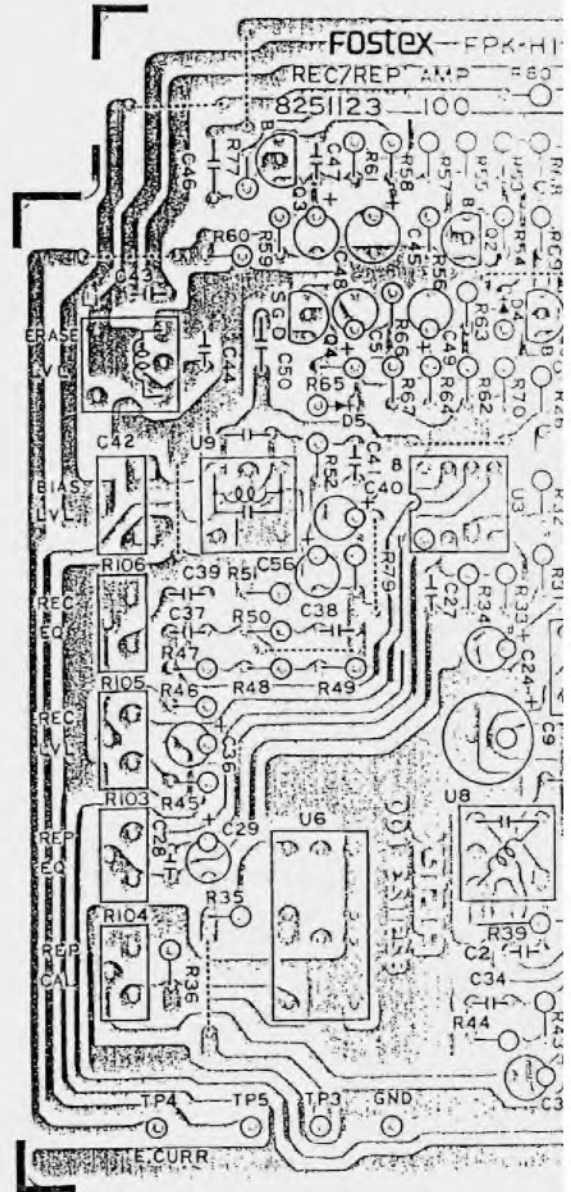
Ref. No.	Parts No.	Designation	Ref. No.	Parts No.	Designation
	82511271 00	PCB, function/display	R009	8230 0061 02	"
	TRANSISTORS		R010	8230 0062 23	"
Q001, 002	8234 0003 03	2SA1015GR	R011	8230 0062 24	"
Q003, 004	8234 0002 03	2SC1615GR	R012	8230 0063 92	"
	DIODES		R013	8230 0062 21	"
D01 ~ 16	8234 0046 00	Opto, LED, LT-9000D	R014	8240 0520 00	Pot, rotary, 10K
D17	8234 0052 00	" " GL-21G5	S01 ~ 18	8253 0480 00	Switch, push, 2P
D18	8234 0051 00	" " GL-2PR5	S019	8253 0490 00	"
D19 ~ 35	8234 0018 00	MA-150			
D36 ~ 40	8234 0045 00	Opto, LED, GL-8P03			
	8212 0800 00	Spacer, LED			
	CARBON RESISTORS				
	All resistors 1/4W, ±5% unless otherwise noted.				
R001	8230 0061 52	Flat mounting, 1.5KΩ			
R002	8230 0061 03	" " 10KΩ			
R003	8230 0061 61	" " 160Ω			
R004	8230 0061 52	" " 1.5KΩ			
R005	8230 0061 61	" " 160Ω			
R006	8230 0061 03	" " 10KΩ			
R007	8230 0062 23	" " 22KΩ			
R008	8230 0062 24	" " 220KΩ			



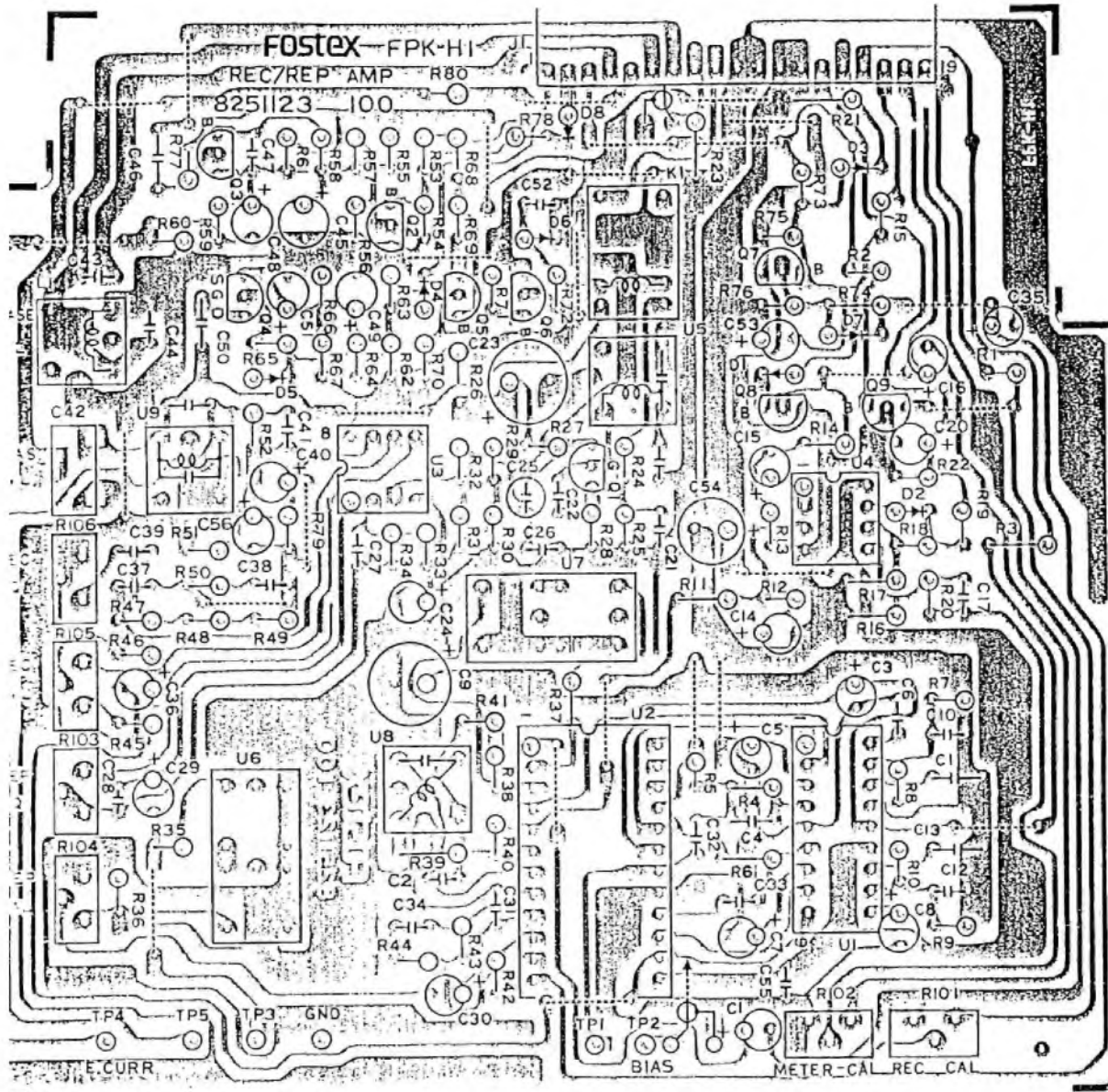
.ure

- 1KΩ
- 22KΩ
- 220KΩ
- 3.9KΩ
- 220Ω
- 6, vernier, 5KΩ
- PH221H
- JH10910

RECORD/REPRODUCE AMPLIFIER PCB



PCB



R/P AMPLIFIER PCB ASSEMBLY, Assy No. 8230193 00

Ref. No.	Parts No.	Description	Ref. No.	Parts No.	Description
		PCB, R/P amplifier	R025	8230 0041 03	"
		IC's	R026	8230 0046 B2	"
U001	8236 0276 00	Analog, Dolby, RE652	R027	8230 0235 62	" " , metal, 5.0K
U002	8236 0277 00	" " RE654	R028	8230 0041 51	" " 150K
U003	8236 0210 00	" NJM4559DD	R029	8230 0042 73	" " 27K
U004	8236 0283 00	" NJM1404AD	R030	8230 0041 03	" " 10K
U005	8256 0240 00	Module, trap, S, 100KHz, 10mH	R031	8230 0044 73	" " 47K
U006, 007	8256 0130 00	" filter, low-pass, 25KHz	R032	8230 0043 31	" " 330K
U008	8256 0120 00	" skewing	R033	8230 0045 61	" " 560K
U009	8256 0140 00	" trap, P, 100KHz	R034	8230 0044 74	Vertical mounting, 470K
		TRANSISTORS	R035	8230 0043 32	" " 3.3K
Q001	8234 0001 09	FET, 2SK117Y-3	R036	8230 0041 53	" " 15K
Q002	8234 0002 03	2SC1815GR	R037	8230 0043 32	" " 3.3K
Q003	8234 0006 02	2SC2878B	R038	8230 0045 62	" " 5.6K
Q004	8234 0001 11	FET, 2SK117GR	R039	8230 0041 02	" " 1K
Q005 ~ 007	8234 0002 03	2SC1815GR	R040, 041	8230 0046 B2	" " 6.8K
Q008	8234 0006 02	2SC2878B	R042	8230 0232 22	" " , metal film, 2.2K, 1%
Q009	8234 0002 03	2SC1815GR	R043	8230 0046 B3	" " 68K
		DIODES	R044	8230 0235 12	" " , metal film, 5.1K, 1%
D001 ~ 005	8234 0035 00	MA-150, FVS	R045	8230 0045 61	" " 560K
D006	8234 0007 00	1N4002	R046	8230 0043 92	" " 3.9K
D007, 008	8234 0035 00	MA-150, FVS	R047, 048	8230 0049 12	" " 9.1K
		CARBON RESISTORS	R049, 050		(Deleted)
All resistors 1/4W, ±5% unless otherwise noted.			R051	8230 0041 23	Vertical mounting, 12K
R001	8230 0042 73	Vertical mounting, 27K	R052	8230 0044 72	" " 4.7K
R002	8230 0047 53	" " 75K	R053	8230 0043 33	" " 33K
R003	8230 0046 B2	" " 6.8K	R054	8230 0041 04	" " 100K
R004	8230 0044 73	" " 47K	R055	8230 0044 72	" " 4.7K
R005	8230 0231 23	" " , metal film, 12K, 1%	R056	8230 0041 83	" " 18K
R006	8230 0237 53	" " 75K, #	R057	8230 0041 52	" " 1.5K
R007	8230 0043 34	" " 330K	R058	8230 0043 02	" " 3K
R008	8230 0043 94	" " 390K	R059	8230 0047 51	" " 750K
R009	8230 0043 34	" " 330K	R060	8230 0042 00	" " 20K
R010	8230 0043 94	" " 390K	R061	8230 0042 23	" " 22K
R011	8230 0041 23	" " 12K	R062	8230 0042 73	" " 27K
R012	8230 0048 22	" " 8.2K	R063	8230 0048 22	" " 8.2K
R013	8230 0041 04	" " 100K	R064	8230 0045 62	" " 5.6K
R014	8230 0042 01	" " 200K	R065		(Deleted)
R015	8230 0041 53	" " 15K	R066	8230 0042 72	Vertical mounting, 2.7K
R016	8230 0044 73	" " 47K	R067	8230 0042 03	" " 20K
R017	8230 0042 22	" " 2.2K	R068	8230 0045 63	" " 56K
R018	8230 0042 23	" " 22K	R069	8230 0041 04	" " 100K
R019	8230 0041 01	" " 100K	R070	8230 0043 33	" " 33K
R020	8230 0041 83	" " 18K	R071	8230 0041 04	" " 100K
R021	8230 0041 04	" " 100K	R072	8230 0043 61	Vertical mounting, 360K
R022	8230 0041 84	" " 180K	R073	8230 0043 33	" " 33K
R023	8230 0041 01	" " 100K	R074	8230 0043 34	" " 330K
R024	8230 0041 00	" " 10K	R075	8230 0041 04	" " 100K

Ref. No.	Parts No.	Nomenclature	Ref. No.	Parts No.	
R076	8230 0042 73	" " 27K Ω	C047	8232 0262 23	"
R077	8230 0041 53	" " 15K Ω	C048	8232 0054 75	Electrolytic
R078	8230 0043 33	" " 33K Ω	C049	8232 0031 06	"
R079	8230 0042 23	" " 22K Ω	C050	8232 0263 33	Mylar, 50V
	CAPACITORS		C051	8232 0054 75	Electrolytic
C001	8232 0061 05	Electrolytic, 50V, 1 μ F, 20%, SM	C052	8232 0351 03	Ceramic, 50V
C002	8232 0314 71	Polypropylene, 100V, 470pF, 5%, APS	C053	8232 0721 06	Electrolytic, 25V
C003	8232 0041 06	Electrolytic, 25V, 10 μ F, 20%, SM	C054	8232 0041 07	"
C004	8232 0264 72	Mylar, 50V, 0.0047 μ F, 5%, AMX	C055	8232 0351 03	Ceramic, 50V, 0.1 μ F
C005	8232 0031 06	Electrolytic, 16V, 10 μ F, 20%, SM	C056	8232 0196 84	Electrolytic, 50V
C006	8232 0264 73	Mylar, 50V, 0.047 μ F, 5%, AMX		CARBON POTS	
C007	8232 0031 05	Electrolytic, 16V, 10 μ F, 20%, SM	R101	8231 0041 03	Trim, vertical mtg.
C008	8232 0062 24	" 50V, 0.22 μ F, 20%, SM	R102	8231 0045 03	" " "
C009	8232 0023 37	" 10V, 330 μ F, 20%, SM	R103, 104	8231 0045 02	" " "
C010	8232 0263 33	Mylar, 50V, 0.033 μ F, 5%, AMX	R105	8231 0045 02	Trim, vertical mtg.
C011	8232 0261 04	" " 0.1 μ F, 5%, AMX	R106	8231 0042 02	" " "
C012	8232 0263 33	" " 0.033 μ F, 5%, AMX	R107		
C013	8232 0261 04	" " 0.1 μ F, 5%, AMX		MISCELLANEOUS	
C014	8232 0033 36	Electrolytic, 16V, 33 μ F, 20%, SM	J001	8245 0110 19	Jack, 3024-19AH, 1/8"
C015	8232 0711 06	" " 10 μ F, " LR-V8	K001	8248 0060 06	Relay, sub-mini, 5V
C016	8232 0054 75	" 35V, 4.7 μ F, " SM	L001	8242 0660 00	Inductor, 0.8mH, 10%
C017	8232 0318 21	Polypropylene, 100V, 820pF, 5%, APS			
C018, 019		(Deleted)			
C020	8232 0032 26	Electrolytic, 16V, 22 μ F, 20%, SM			
C021	8232 0261 02	Mylar, 50V, 0.001 μ F, 5%, AMX			
C022	8232 0511 01	Ceramic, 50V, 100pF, 10%, SL			
C023	8232 0032 27	Electrolytic, 16V, 220 μ F, 20%, SM			
C024	8232 0033 36	" " 33 μ F, " "			
C025	8232 0851 05	" 50V, 1 μ F, " LR-BP			
C026	8232 0502 21	Ceramic, 50V, 220pF, 5%, SL			
C027	8232 0261 53	Mylar, 50V, 0.015 μ F, 5%, AMX			
C028	8232 0512 20	Ceramic, 50V, 22pF, 10%, SL			
C029	8232 0031 06	Electrolytic, 16V, 10 μ F, 20%, SM			
C030	8232 0061 05	" 50V, 1 μ F, 20%, SM			
C031	8232 0514 70	Ceramic, 50V, 47pF, 10%, SL			
C032	8232 0303 33	Polypropylene, 100V, 0.033 μ F, 2%, APS			
C033	8232 0264 72	Mylar, 50V, 0.0047 μ F, 5%, AMX			
C034	8232 0301 03	Polypropylene, 100V, 0.01 μ F, 2%, APS			
C035	8232 0062 24	Electrolytic, 50V, 0.22 μ F, 20%, SM			
C036	8232 0033 36	" 16V, 33 μ F, 20%, SM			
C037	8232 0321 51	Ceramic, 50V, 150pF, 5%, NPO			
C038		(Deleted)			
C039	8232 0262 72	Mylar, 50V, 0.0027 μ F, 5%, AMX			
C040	8232 0724 75	Electrolytic, 25V, 4.7 μ F, 20%, LR-V8			
C041		(Deleted)			
C042	8232 0321 51	Trim, vertical mtg., C12 83K, 150pF			
C043	8232 0312 72	Polypropylene, 100V, 0.0027 μ F, 5%, APS			
C044	8232 0313 32	" " 0.0033 μ F, " "			
C045	8232 0021 07	Electrolytic, 10V, 100 μ F, 20%, SM			
C046	8232 0266 83	Mylar, 50V, 0.068 μ F, 5%, AMX			

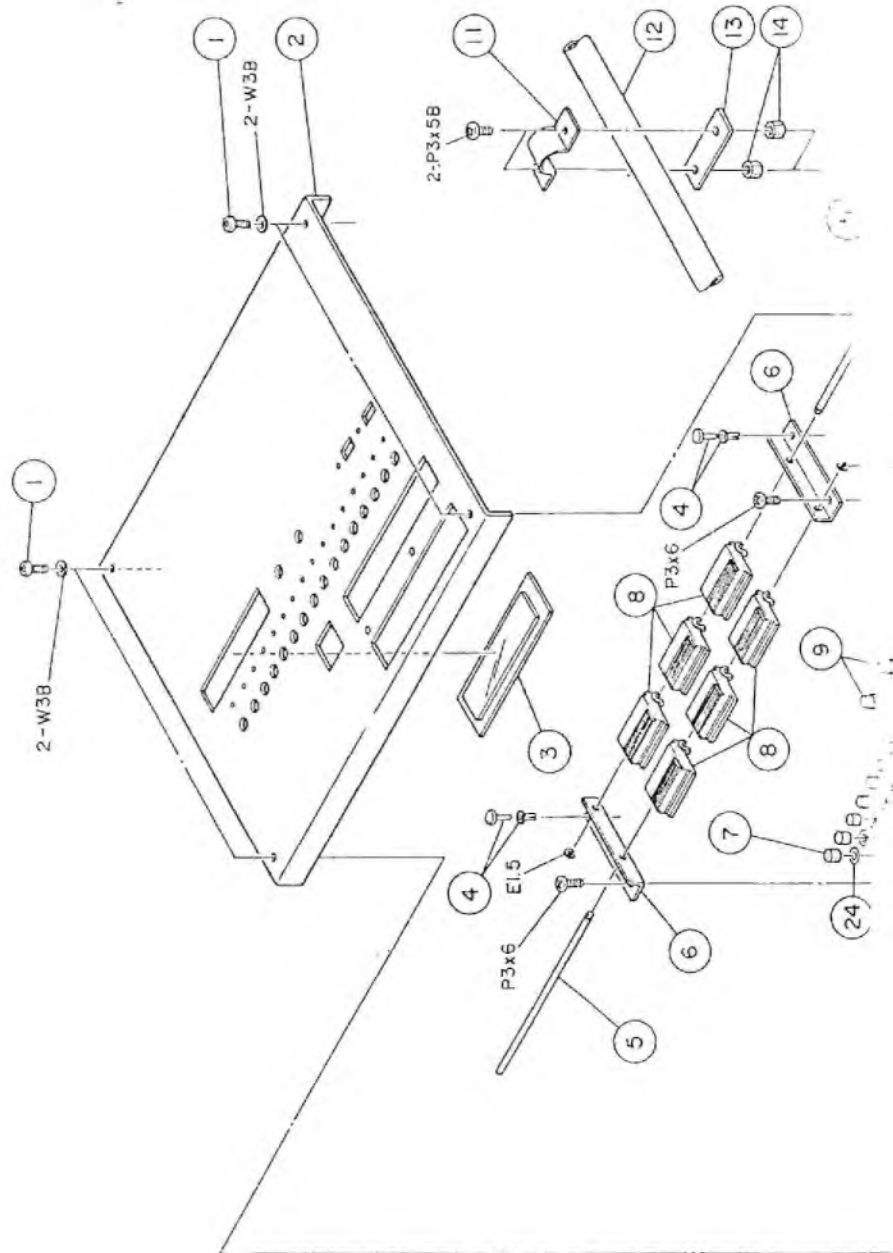
SYNCHRO CONNECTOR PCB ASSEMBLY, Ass'y No. B2731280 00

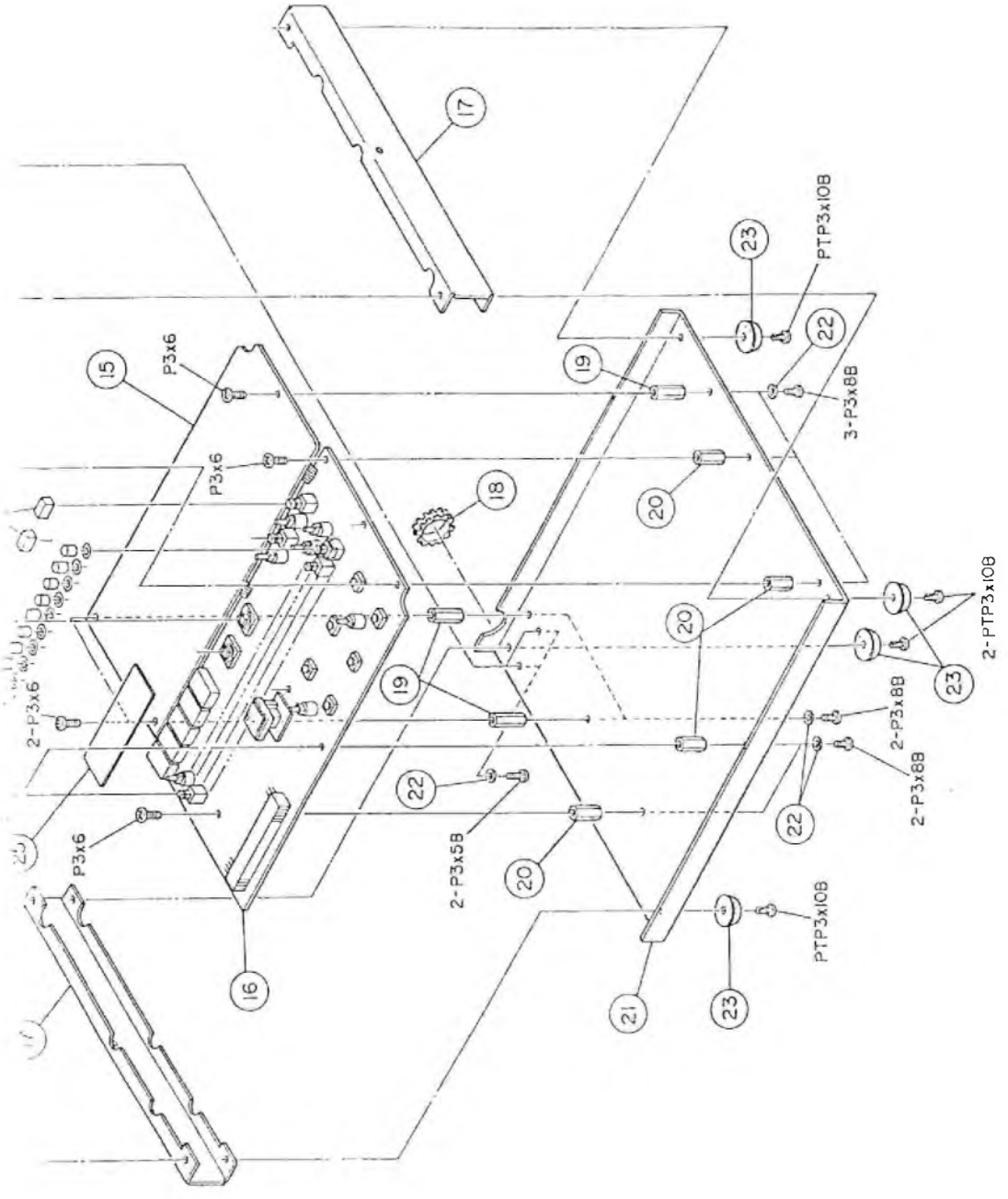
Ref. No.	Parts No.	Nomenclature
"	8251 1381 06	PCB, connector, synchro
20%, SM	J102 8245 0670 01	Jack, FC, 20P
" "	8276 1610 05	Cable, flat, 4 wire, 50mm
4MX	8276 2800 38	Cable ass'y, 3P, wht, 380mm
20%, SM	8276 2860 66	" " , 7P, wht, 660mm
, YF	8276 2360 54	" " , 4P, " "
20%, LR-VB	8276 3330 30	" " , 2P, red, 250mm
" SM		
, YF		
, 10%, XA		

, B
"
"
"
3
"

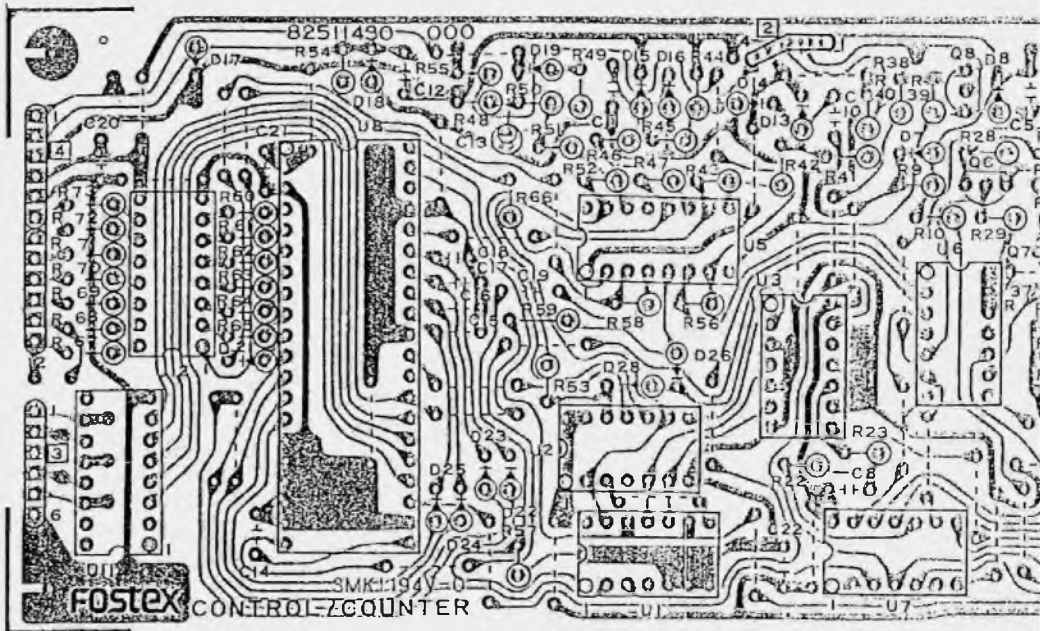
QTY	Part No.	Description
11	8204 0180 00	Screw, button head, 1150 M3x8
12	8220 0140 00	Panel, front
13	8270 0240 00	Window, panel B
14	8207 0004 00	Elasti-riivet, 201-00-980
15	8270 1000 00	Shaft, button
16	8270 0380 00	Bracket, shaft
17	8276 0480 00	Button, push F
18	8276 0410 00	Button, control
19	8226 0410 00	Button, counter B
20	8226 0370 00	Button, push D
21	8220 2310 00	Bracket, clamper B
22	8276 3250 00	Cable ass'y, remote control, 8090
23	8220 2300 00	Bracket, clamper A
24	8223 0750 03	Spacer, M3x4.5
25	8273 1320 00	PCB ass'y, control/counter
26	8273 1340 00	PCB ass'y, switch/display
27	8220 2330 00	Panel, side
28	8207 0017 00	Bushing, variable, KG-024
29	8223 0750 01	Spacer, M3x15.4
30	8223 0750 02	Spacer, M3x12
31	8220 2331 00	Panel, bottom
32	8204 0140 01	Washer, Mylar, #3
33	8207 0012 02	Foot, rubber, 136
34	8214 1060 00	Washer
35	8216 0090 00	Screen, counter

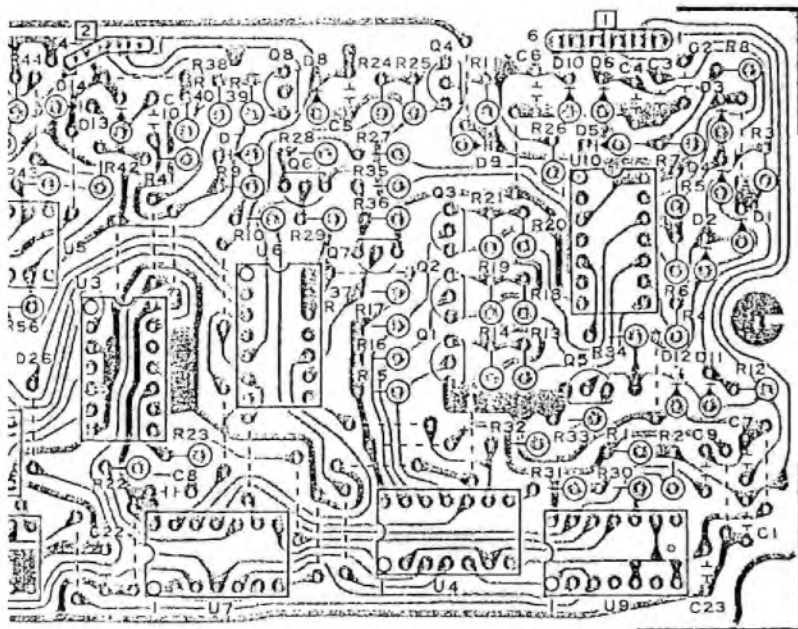
REMOTE CONTROL EXPLODED VIEW





COUNTER PCB



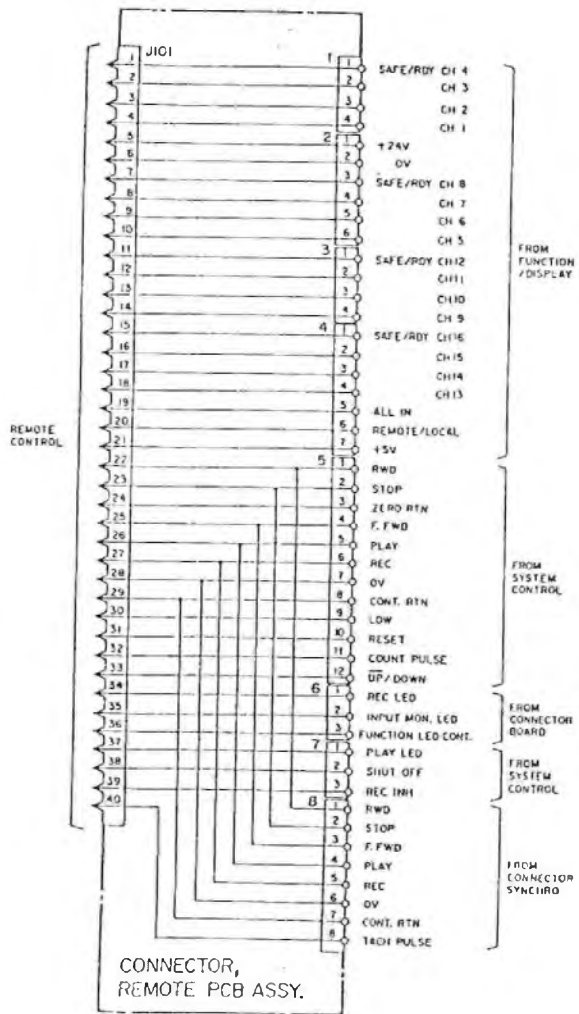


CONTROL/COUNTER PCB ASSEMBLY, Ass'y No. 8273 1320 00

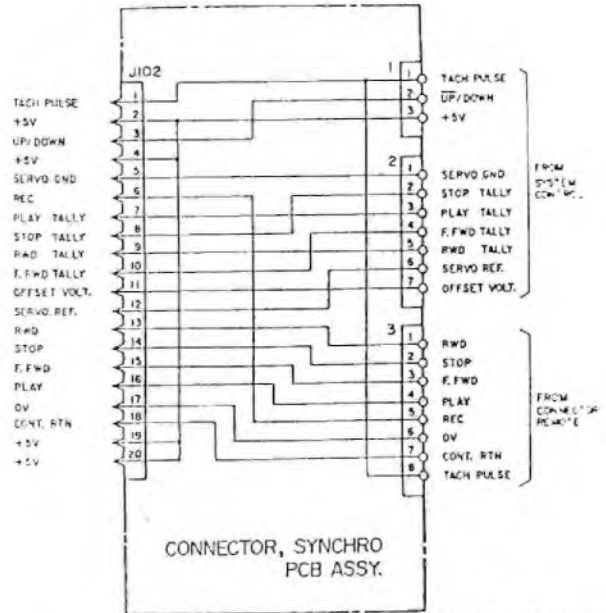
Parts No.	Parts No.	Nomenclature	Ref. No.	Parts No.	Nomenclature
	8251 1430 00	PCB, control/counter	R036	8230 0041 04	" " 100
		IC's	R037	8230 0041 03	" " 11
U001	8236 0040 01	Digital, 4081B	R038, 039	8230 0041 04	" " 100
U002	8236 0032 01	" 4070B	R040	8230 0041 02	" " "
U003	8236 0007 01	" 4013B	R041	8230 0043 33	" " 33
U004	8236 0035 00	" 4073B	R042	8230 0041 04	" " 100
U005	8236 0029 01	" 4050B	R043	8230 0041 05	" " 1
U006	8236 0033 01	" 4071B	R044	8230 0041 02	" " 1
U007	8236 0015 01	" 4023B	R045	8230 0043 33	" " 33
U008	8236 0193 00	" counter, MK50396N	R046	8230 0041 04	" " 100
U009, 010	8236 0031 01	" 4069UD	R047	8230 0041 05	" " 1
U011	8236 0195 00	Transistor array, TD62504P	R048, 049	8230 0041 02	" " 1
U012	8236 0194 00	" " TD62506P	R050	8230 0044 73	" " 47
		TRANSISTORS	R051	8230 0041 04	" " 100
Q01 ~ 08	8234 0002 03	2SC1815GR	R052	8230 0041 05	" " 1
		DIODES	R053	8230 0041 03	" " 10
D01 ~ 26	8234 0031 00	1S158B, L0-10	R054		(Deleted)
		CARBON RESISTORS	R055	8230 0041 04	" " 100
All resistors		±W, ±5% unless otherwise noted.	R056	8230 0041 05	" " 1
R001	8230 0041 03	Vertical mounting, 10KΩ	R057 ~ 059	8230 0041 04	" " 100
R002	8230 0041 04	" " 100KΩ	R060 ~ 066	8230 0041 03	Vertical mounting, 10
R003	8230 0044 72	" " 4.7KΩ	R067 ~ 073	8230 0041 81	" " 18
R004	8230 0041 04	" " 100KΩ			CAPACITORS
R005	8230 0044 72	" " 4.7KΩ	C01 ~ 07	8232 0351 03	Ceramic, 50V, 0.01uF, "
R006	8230 0041 04	" " 100KΩ	C08	8232 0261 04	Mylar, 50V, 0.1uF, AMZ
R007	8230 0044 72	" " 4.7KΩ	C09	8232 0351 03	Ceramic, 50V, 0.01uF, "
R008	8230 0041 04	" " 100KΩ	C10, 11	8232 0511 01	" " 100pf, 1
R009	8230 0041 03	" " 10KΩ	C12		(Deleted)
R010	8230 0041 04	" " 100KΩ	C13	8232 0892 25	Electrolytic, 50V, 2.2
R011, 012	8230 0044 72	" " 4.7KΩ	C14	8232 0268 21	Mylar, 50V, 820pF, 5%
R013	8230 0044 73	" " 47KΩ	C15 ~ 18	8232 0501 51	Ceramic, 50V, 150pF, 5%
R014	8230 0041 04	" " 100KΩ	C19	8232 0501 81	" " 180pF, "
R015, 016	8230 0041 03	Vertical mounting, 10KΩ	C20 ~ 23	8232 0351 03	" " 0.01uF, "
R017	"	" " "			MISCELLANEOUS
R018	8230 0044 73	" " 47KΩ	8276 1630 04	Cable, flat, 6 wire, 40	
R019	8230 0041 04	" " 100KΩ	8276 1610 04	" " 4 " "	
R020	8230 0044 73	" " 47KΩ	8276 1630 09	" " 6 " "	90
R021	8230 0041 04	" " 100KΩ			
R022	8230 0044 73	" " 47KΩ			
R023, 024	8230 0041 04	" " 100KΩ			
R025, 026	"	" " "			
R027	8230 0044 73	" " 47KΩ			
R028	8230 0041 04	" " 100KΩ			
R029	8230 0041 03	" " 10KΩ			
R030	8230 0044 73	" " 47KΩ			
R031, 032	8230 0041 04	" " 100KΩ			
R033, 034	"	" " "			
R035	8230 0044 73	" " 47KΩ			

6 CIRCUIT SCHEMATICS

CONNECTOR REMOTE

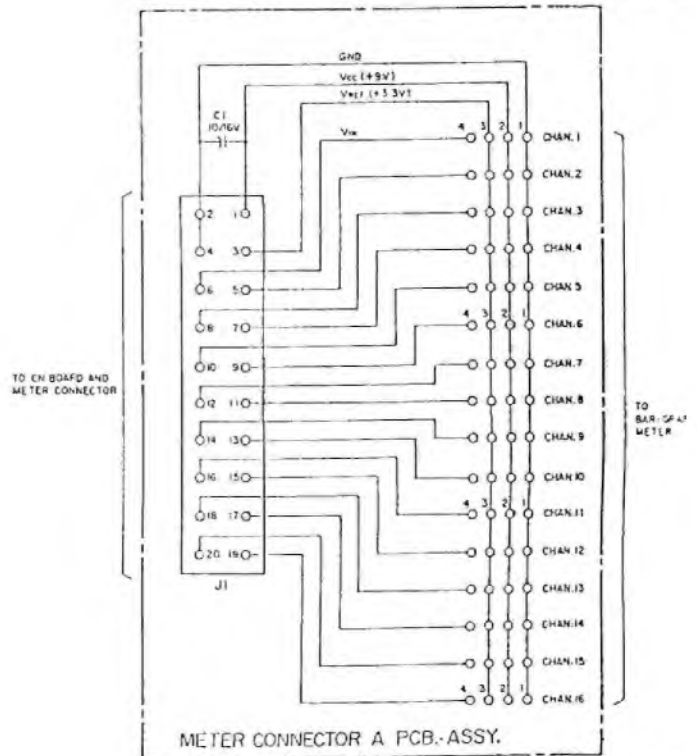


CONNECTOR SYNCHRO



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METER CONNECTOR

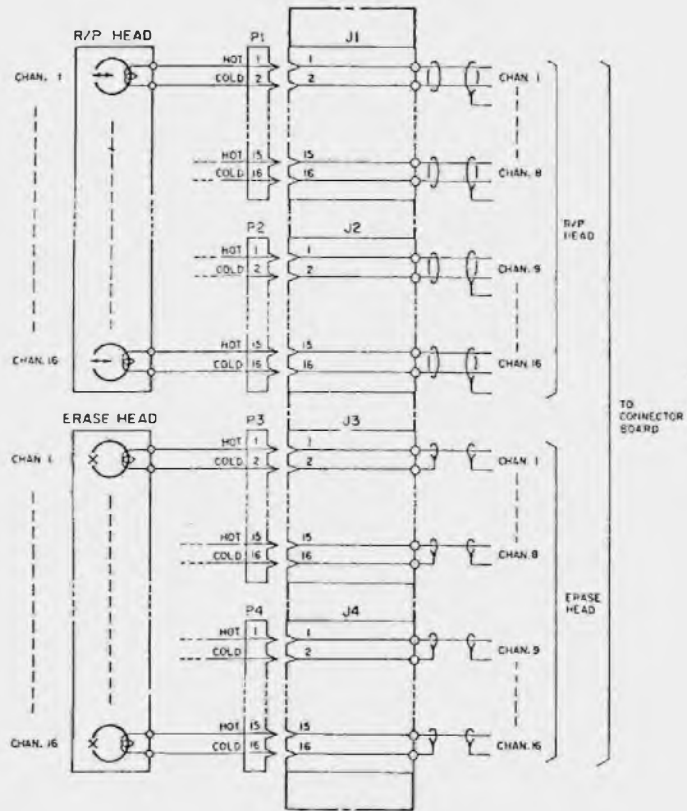


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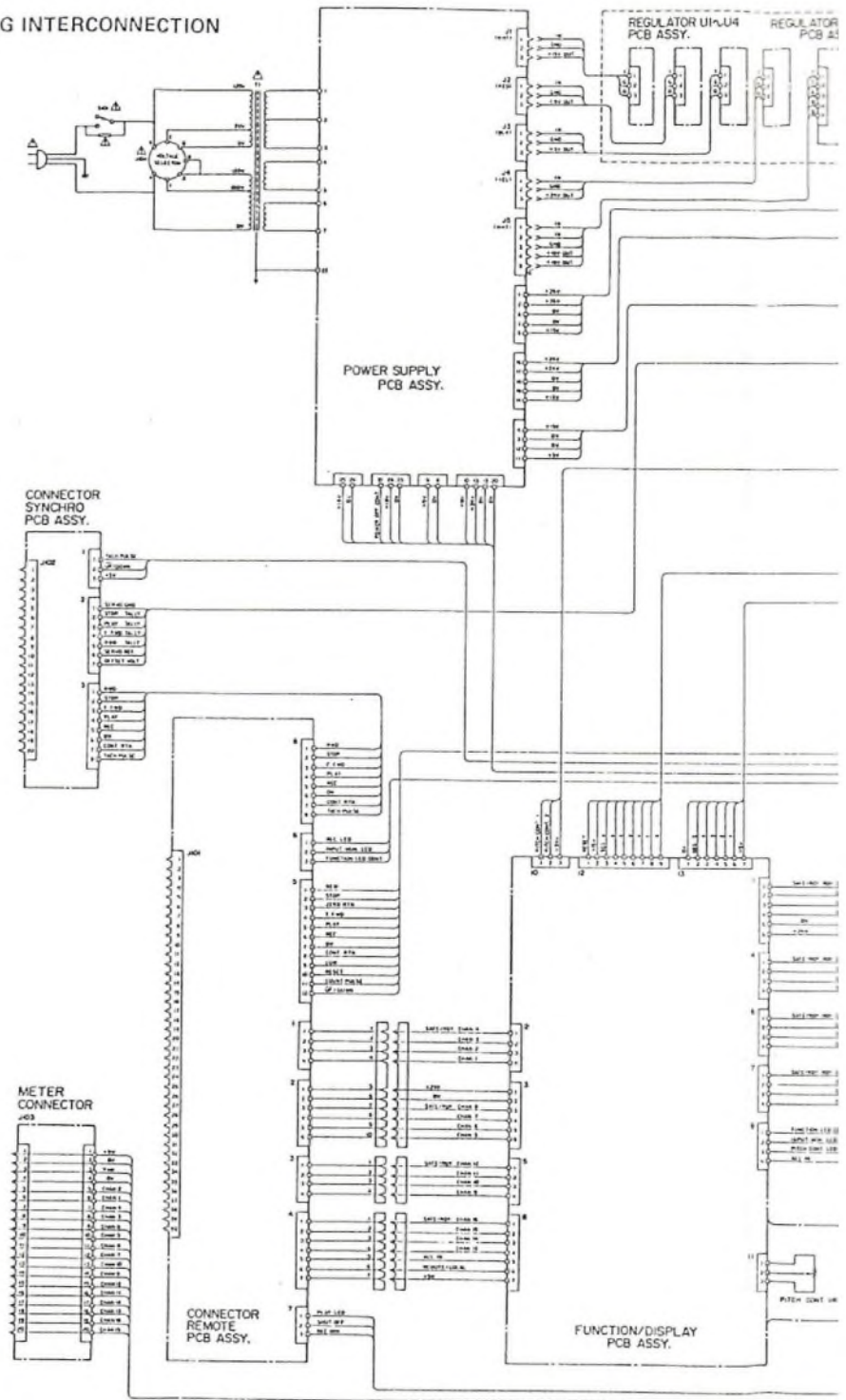
HEAD TERMINAL

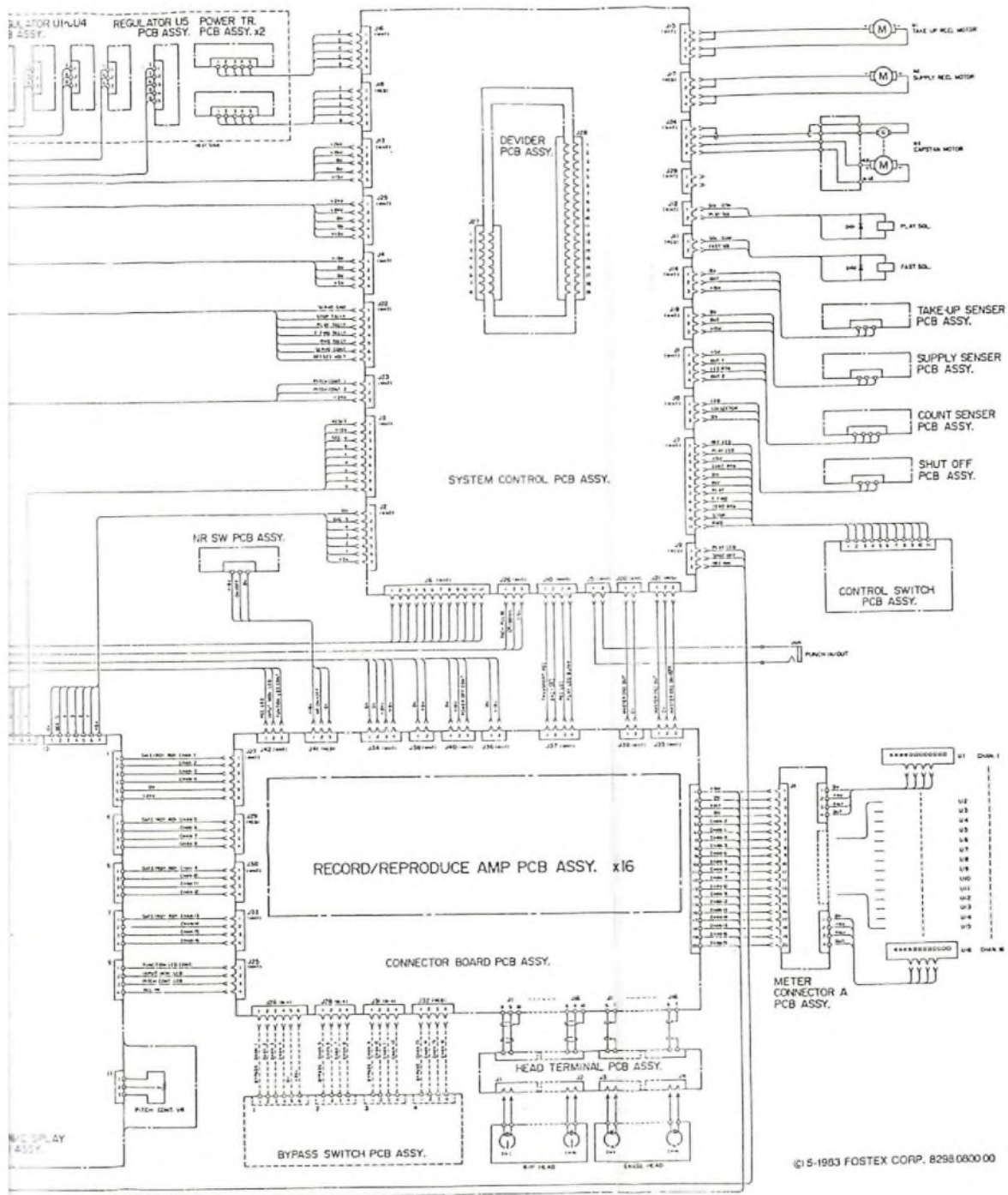
HEAD TERMINAL PCB ASSY.



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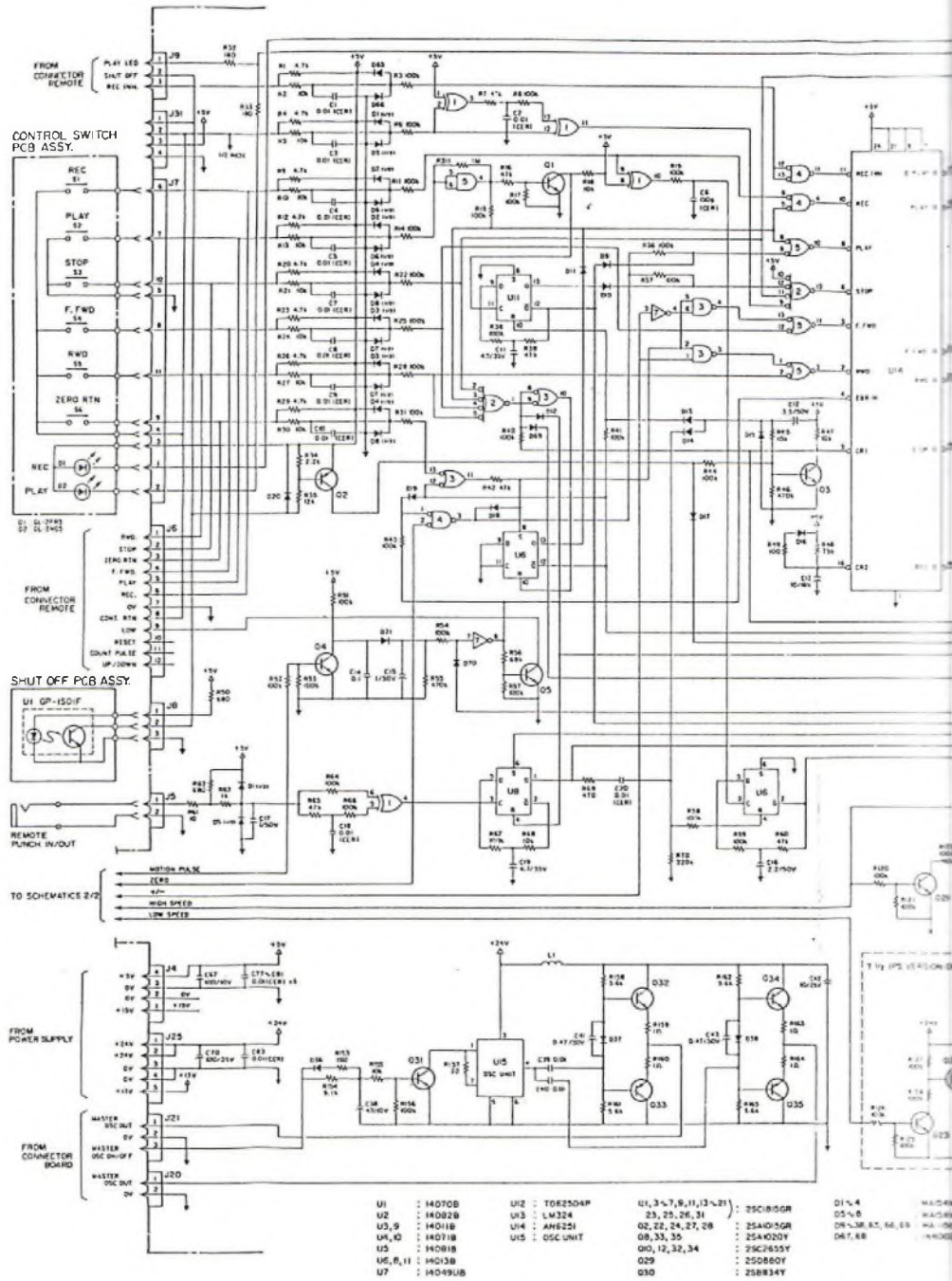
CABLING INTERCONNECTION



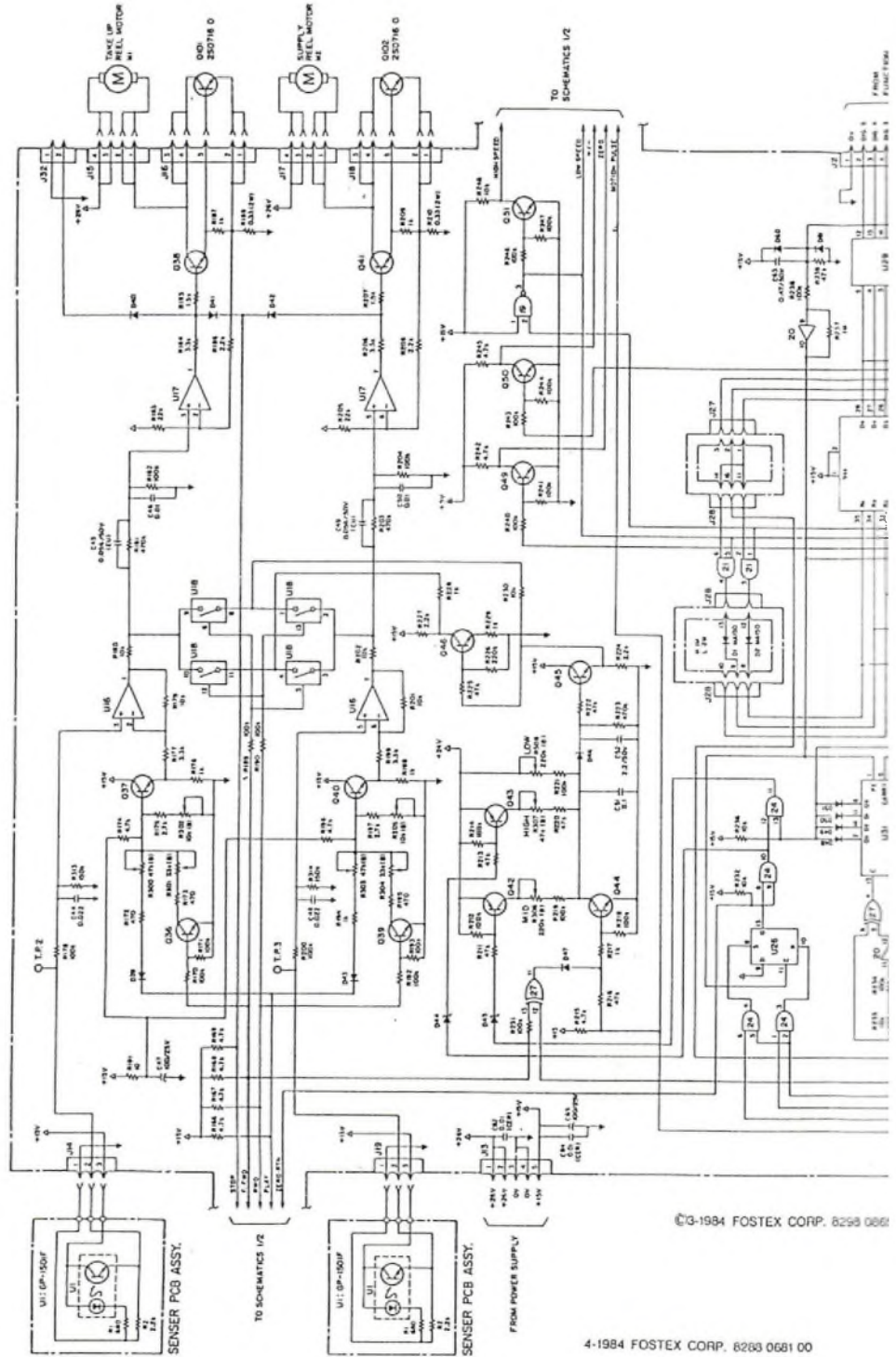


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SYSTEM CONTROL

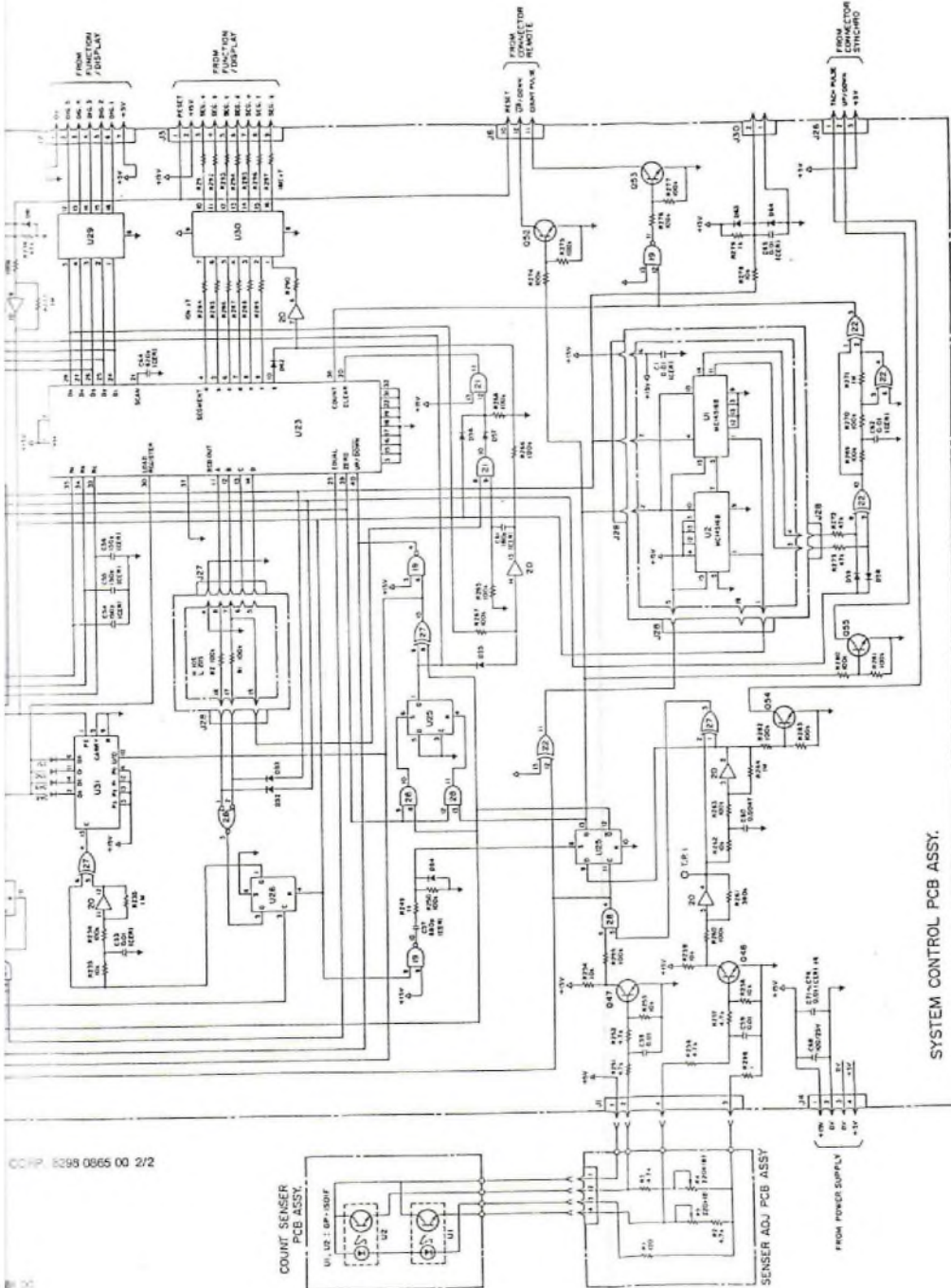


SYSTEM CONTROL

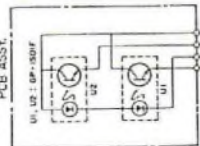


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COUNT SENSER PCB ASSY.



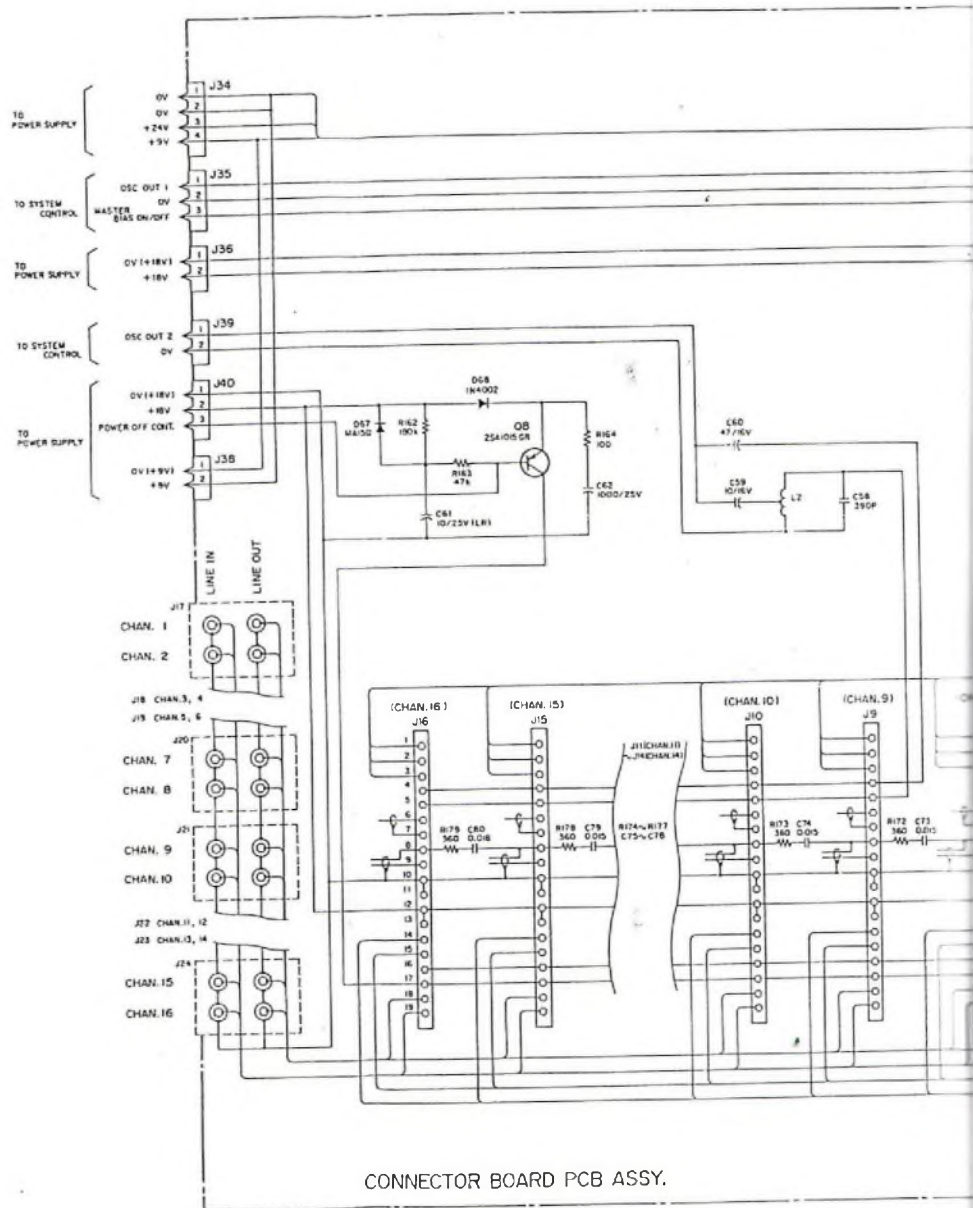
SENER ADJ PCB ASSY

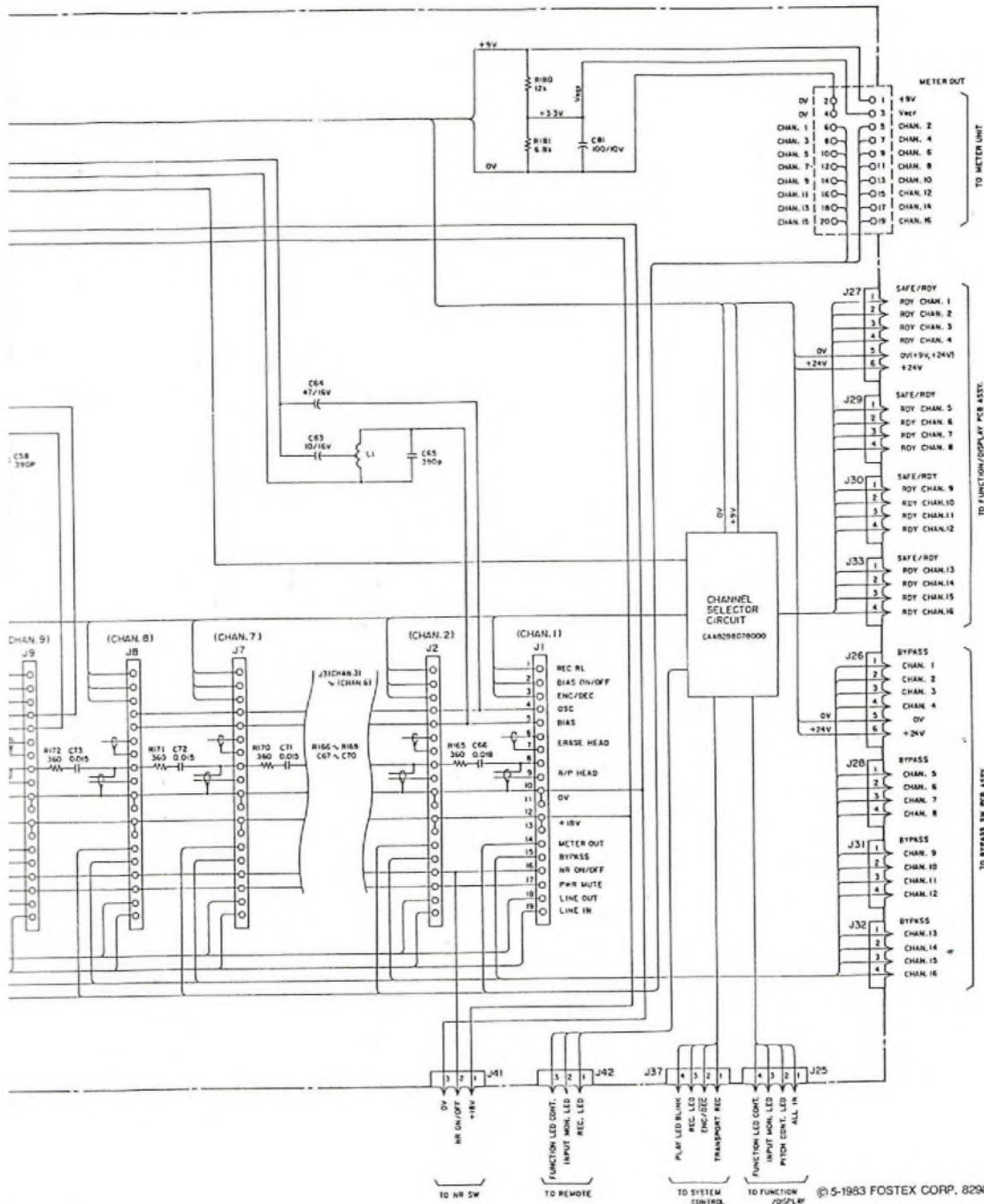


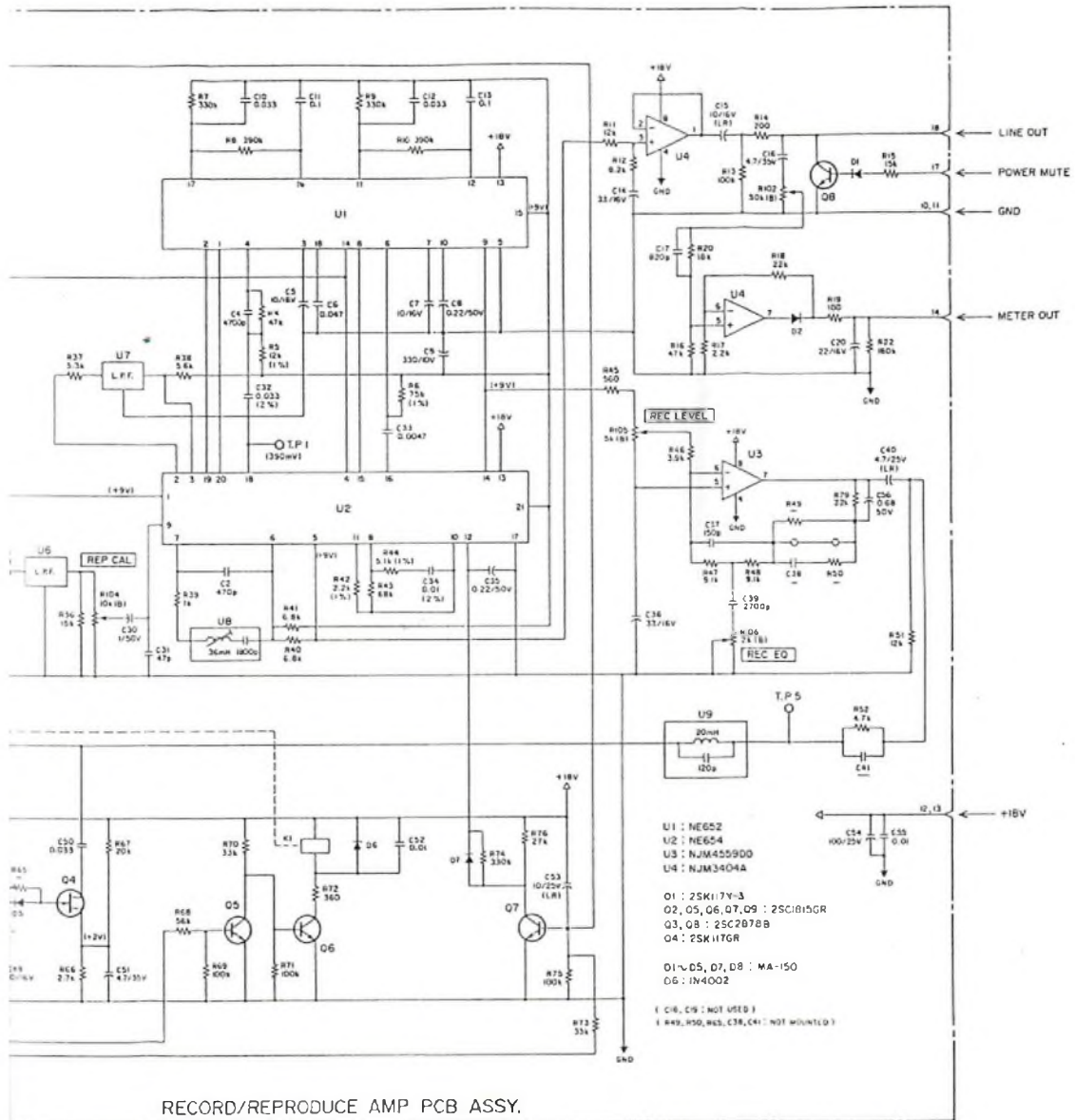
SYSTEM CONTROL PCB ASSY.

- U1, U2 : 78050
- U3 : M45039EN
- U4 : 7805
- U5 : 7805
- U6 : 7805
- U7 : 7805
- U8 : 7805
- U9 : 7805
- U10 : 7805
- U11 : 7805
- U12 : 7805
- U13 : 7805
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- U94 : 7805
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- U98 : 7805
- U99 : 7805
- U100 : 7805

CONNECTOR BOARD

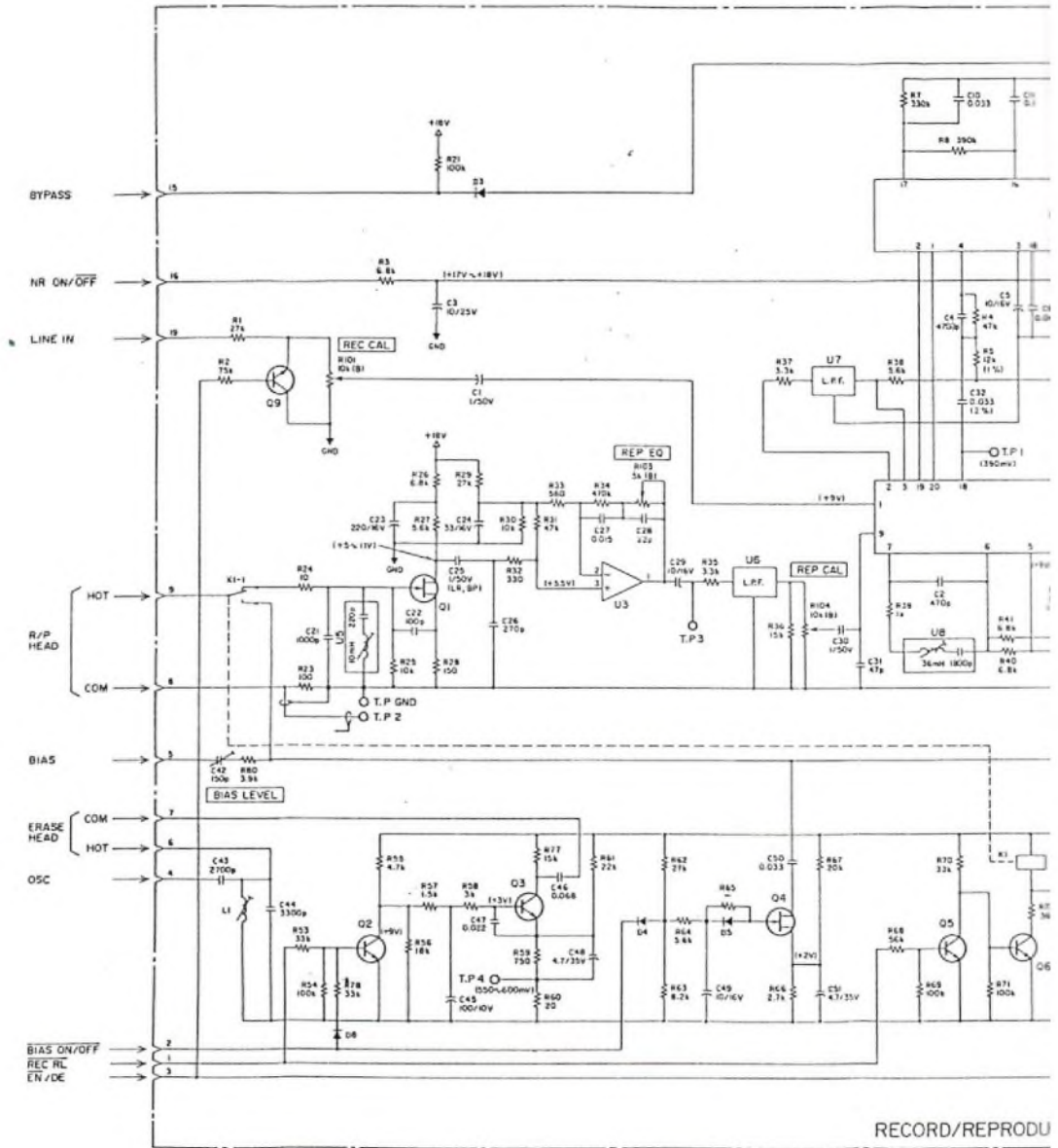


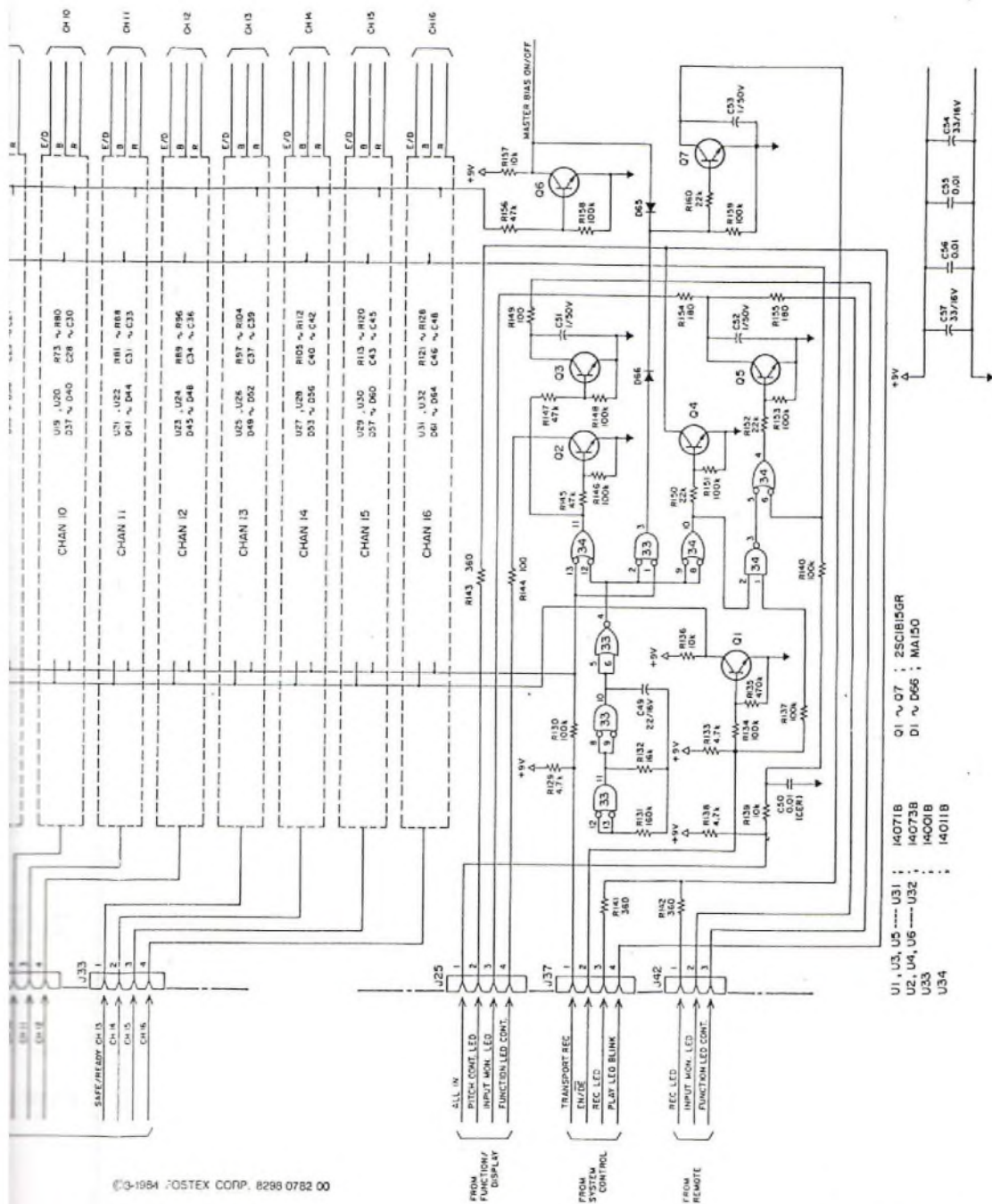




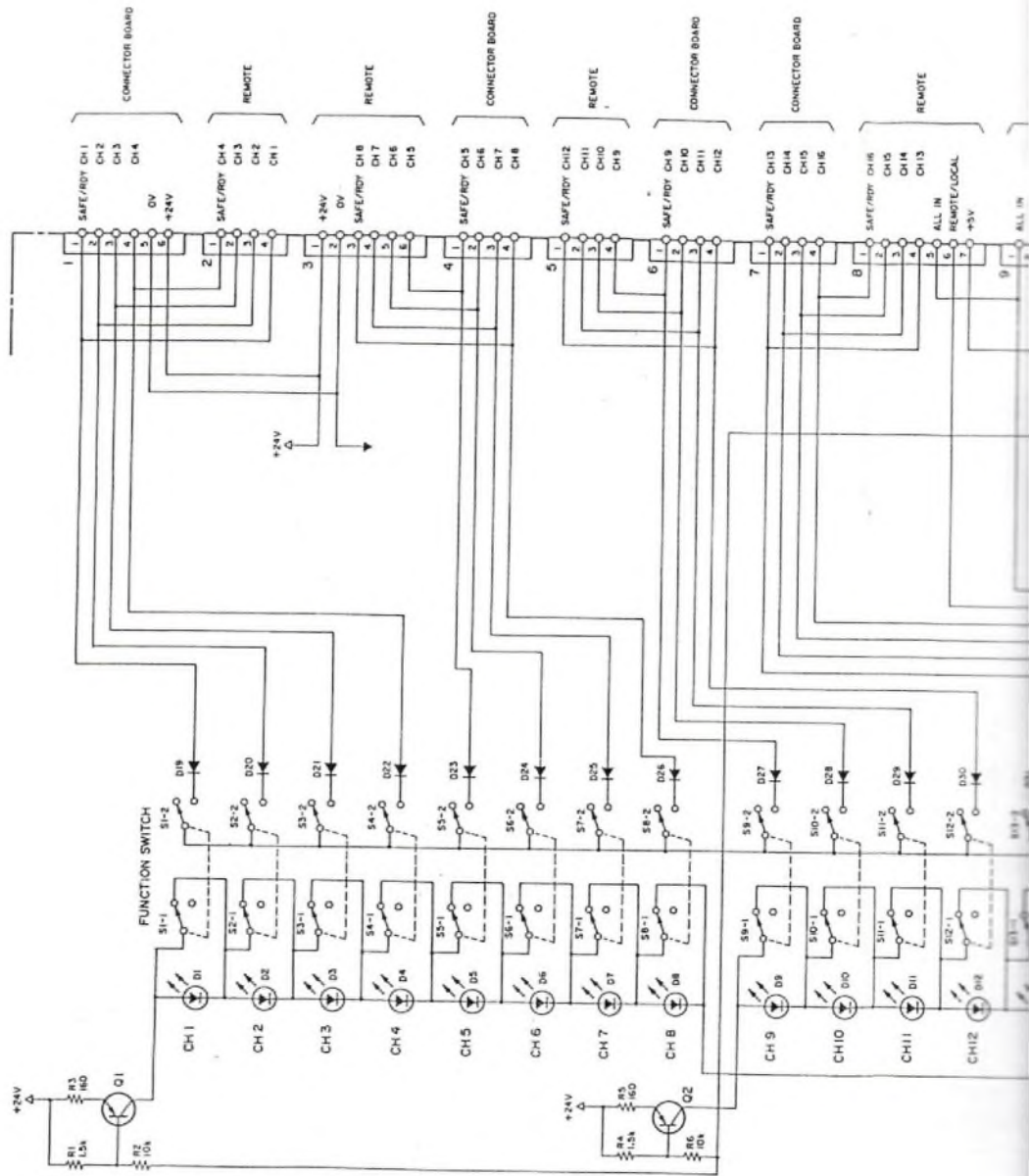
RECORD/REPRODUCE AMP PCB ASSY.

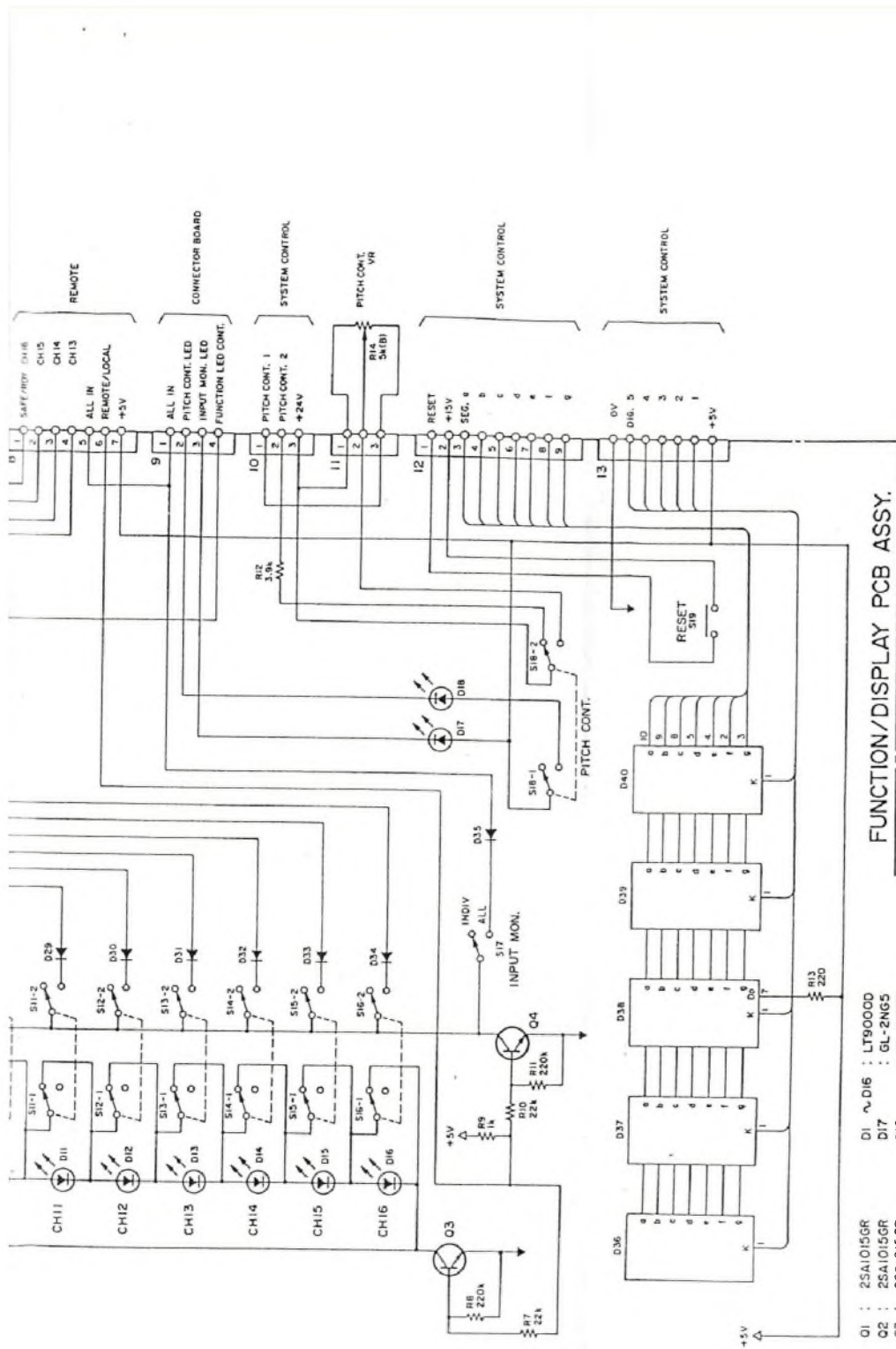
RECORD/REPRODUCE AMPLIFIER

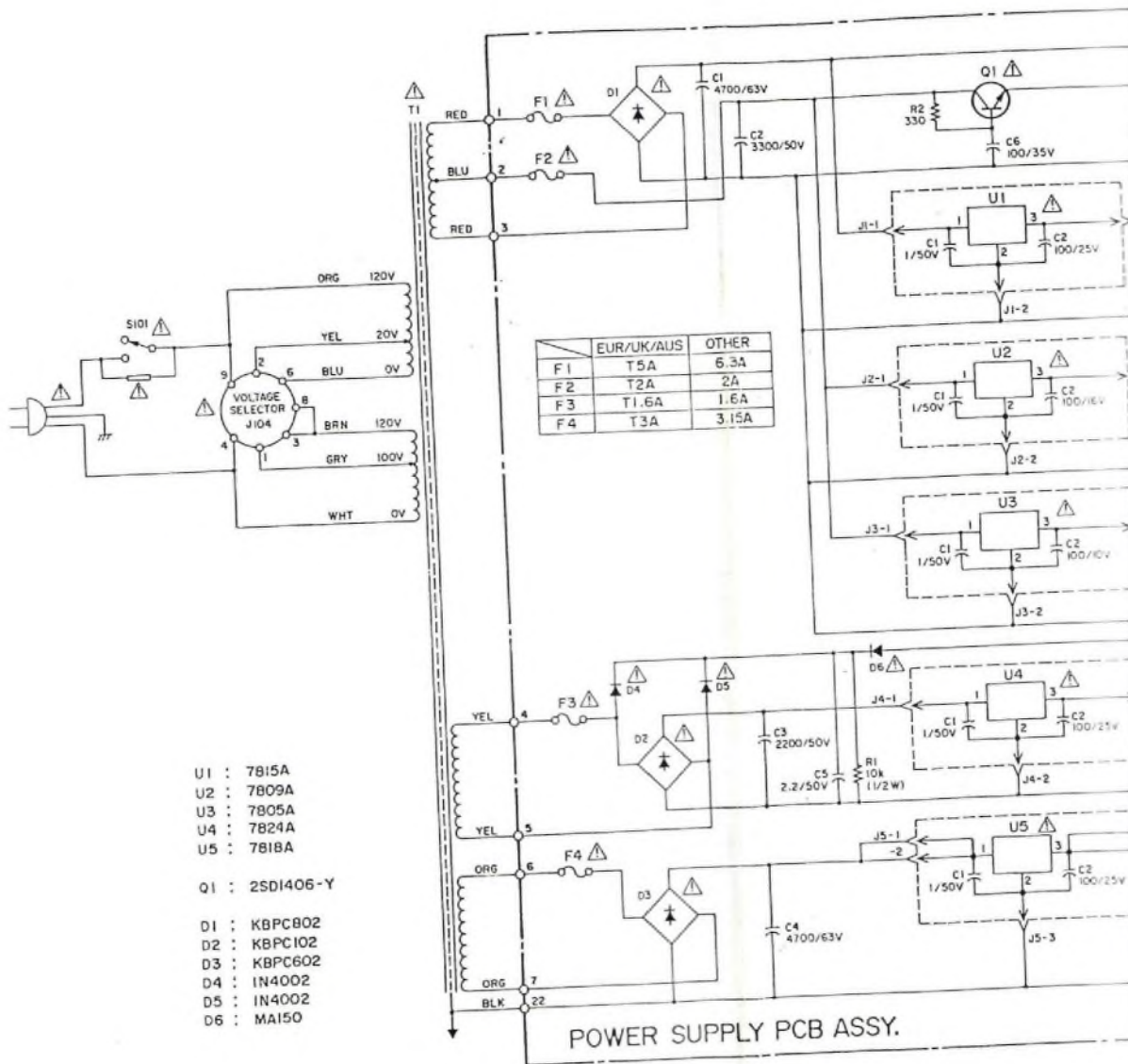


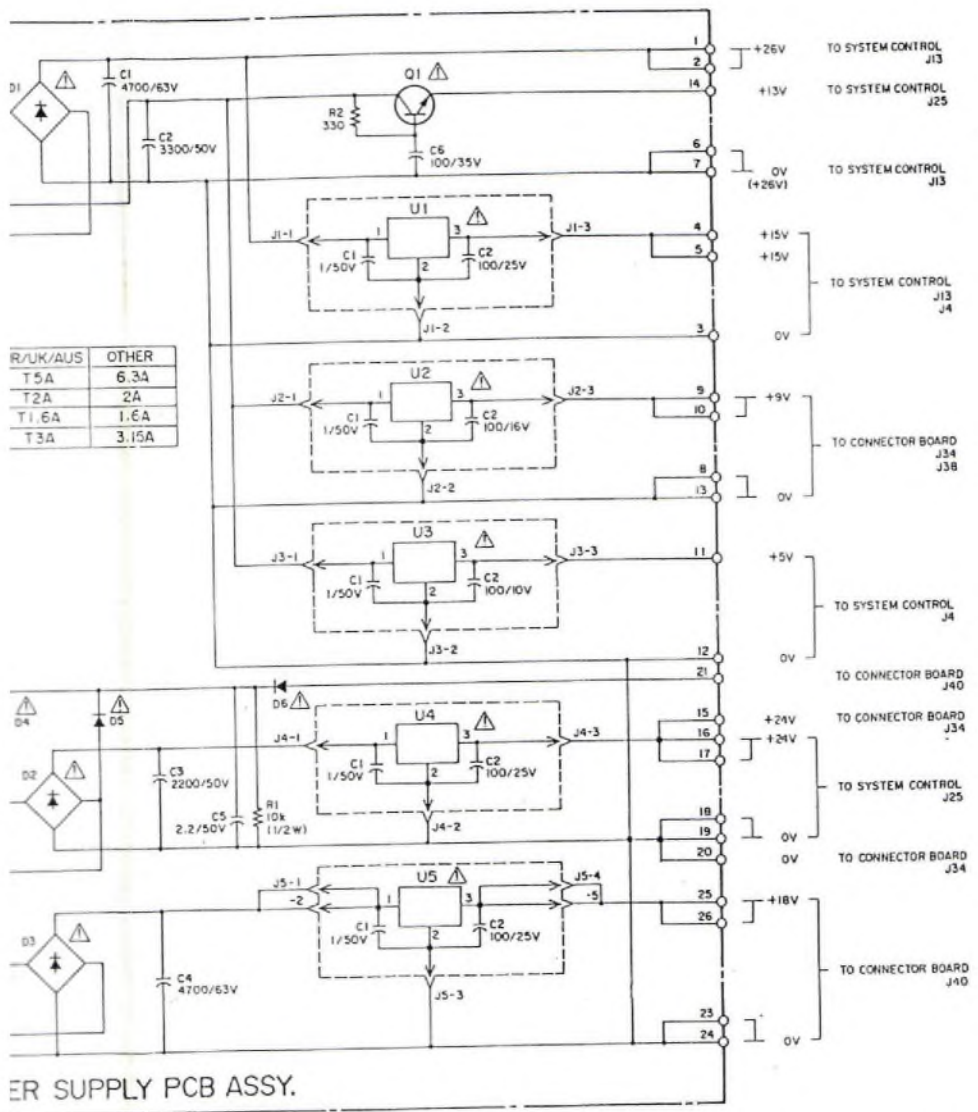


FUNCTION DISPLAY









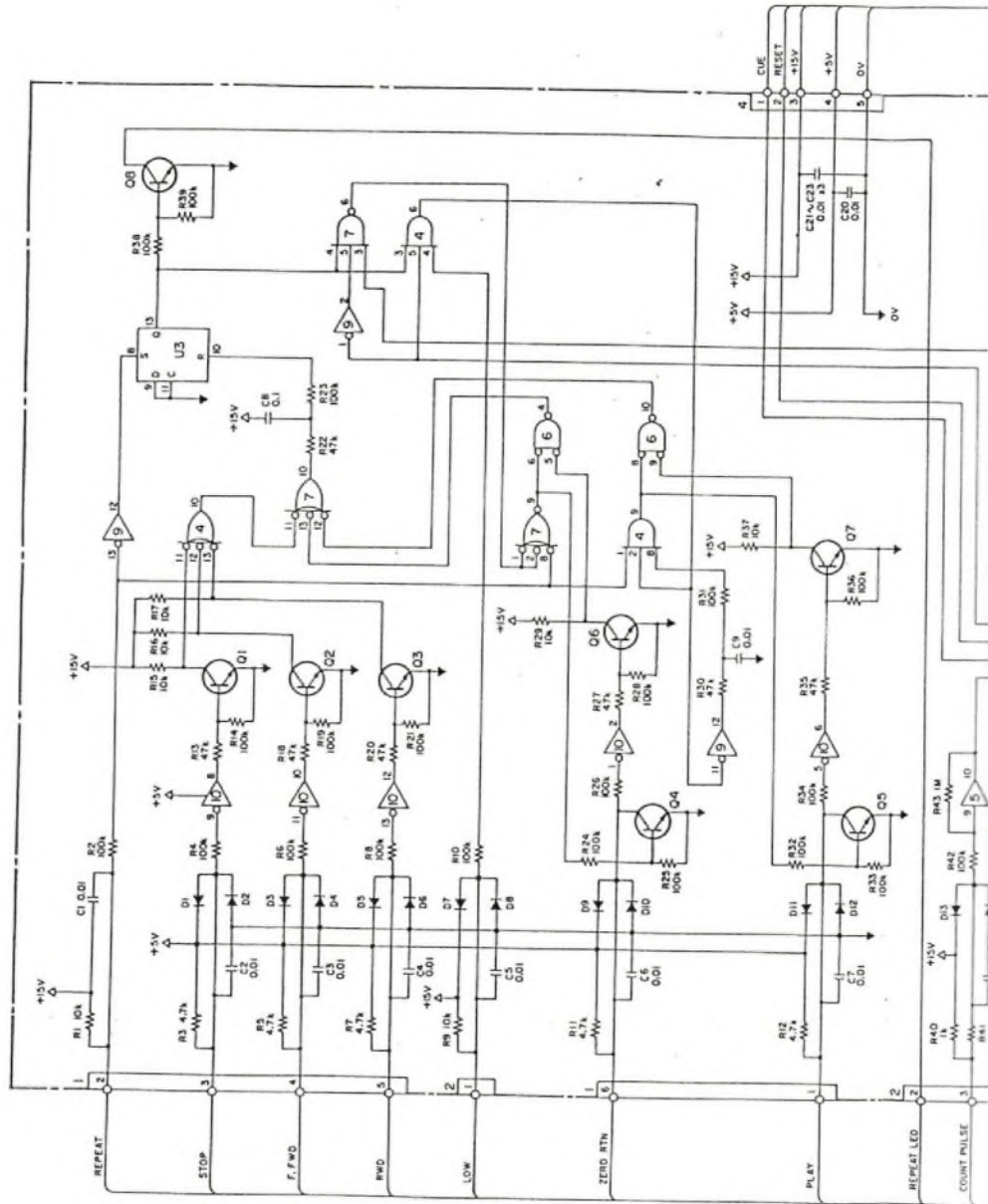
R/UK/AUS	OTHER
T 5A	6.3A
T 2A	2A
T 1.6A	1.6A
T 3A	3.15A

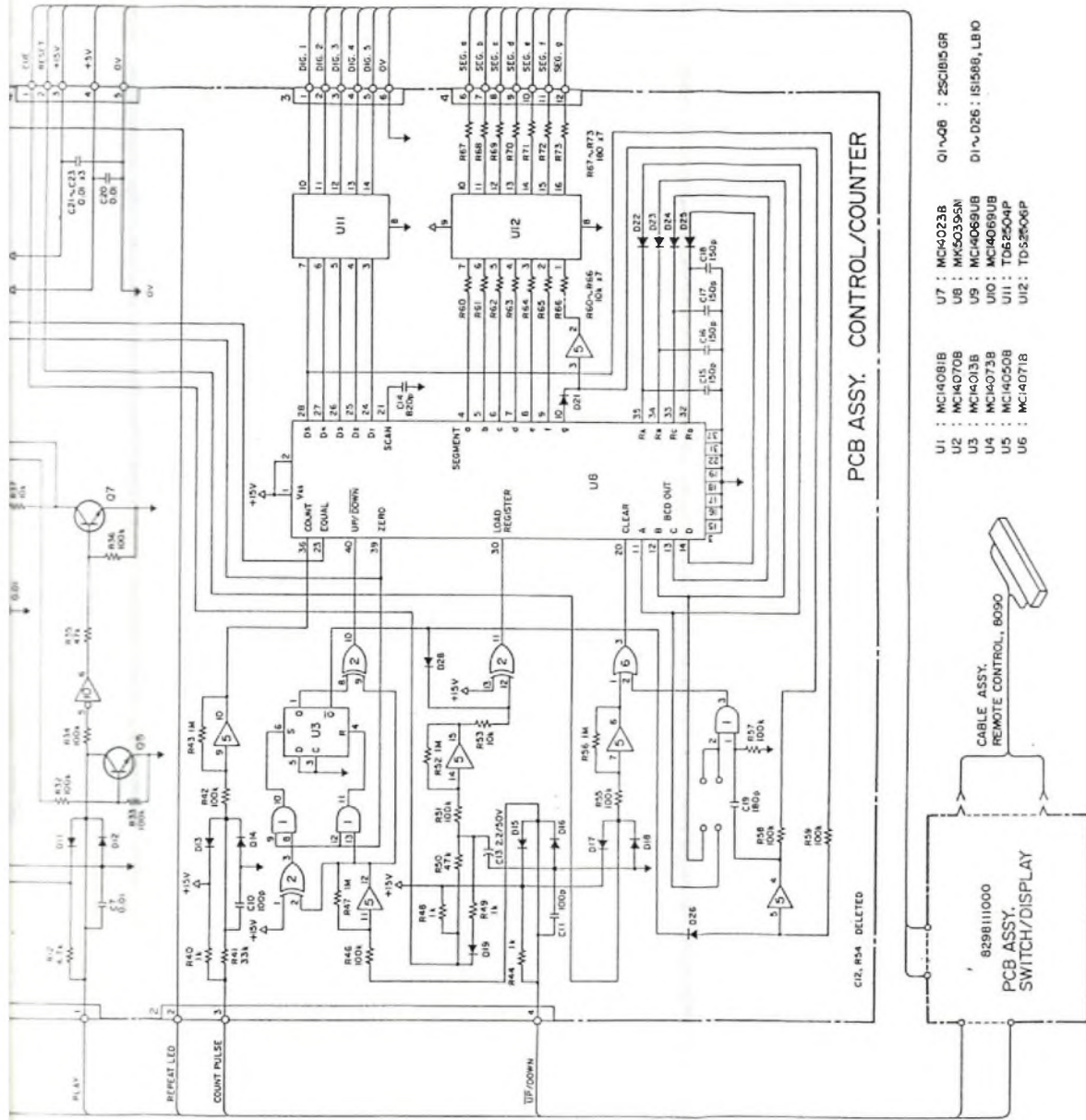
ER SUPPLY PCB ASSY.

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CONTROL/COUNTER

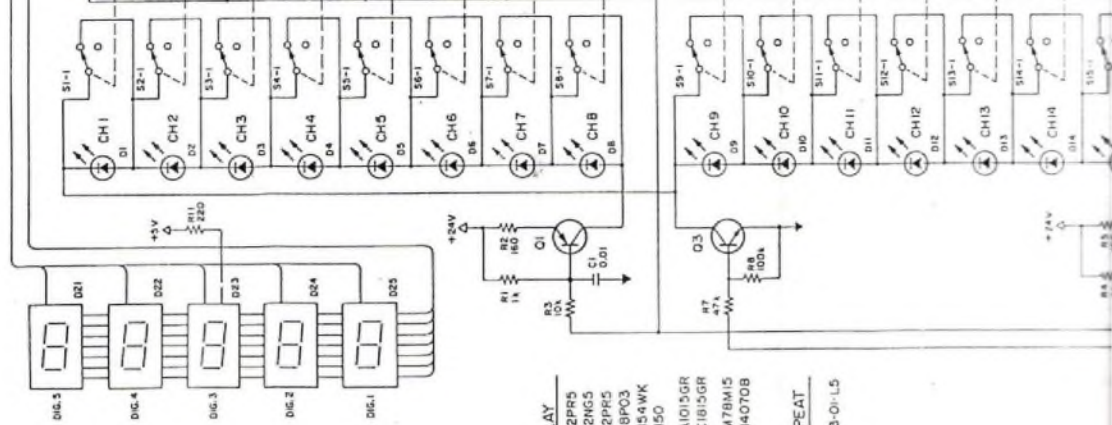




- U1 : MC14081B
- U2 : MC14070B
- U3 : MC14013B
- U4 : MC14073B
- U5 : MC14050B
- U6 : MC14071B
- U7 : MC14023B
- U8 : MK5035SN
- U9 : MC14069UB
- U0 : MC14069UB
- U11 : TB6604P
- U12 : TDS2R06P



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- PCB ASSY,
SWITCH/DISPLAY
- D1 ~ D17 : GL-2PR5
 - D18, D19 : GL-2HG5
 - D20 : GL-2PR5
 - D21 ~ D25 : GL-SPO3
 - D26 ~ D33 : MA154WK
 - D34 : MA150
 - O1, O2 : 25A1015GR
 - O3, O4 : 25C1015GR
 - U1 : NJM78M15
 - U2 : MC14070B
- PCB ASSY, REPEAT
- D101 } : TM3-01-L5
 - S101 }

SWITCH/DISPLAY

