Service Manual

Model G16

RECORDER/REPRODUCER

Dolby C VERSION

FOSTEX®

TABLE OF CONTENTS

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 G16.
  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.

* The following accessories are supplied with G16 as the standard accessories.

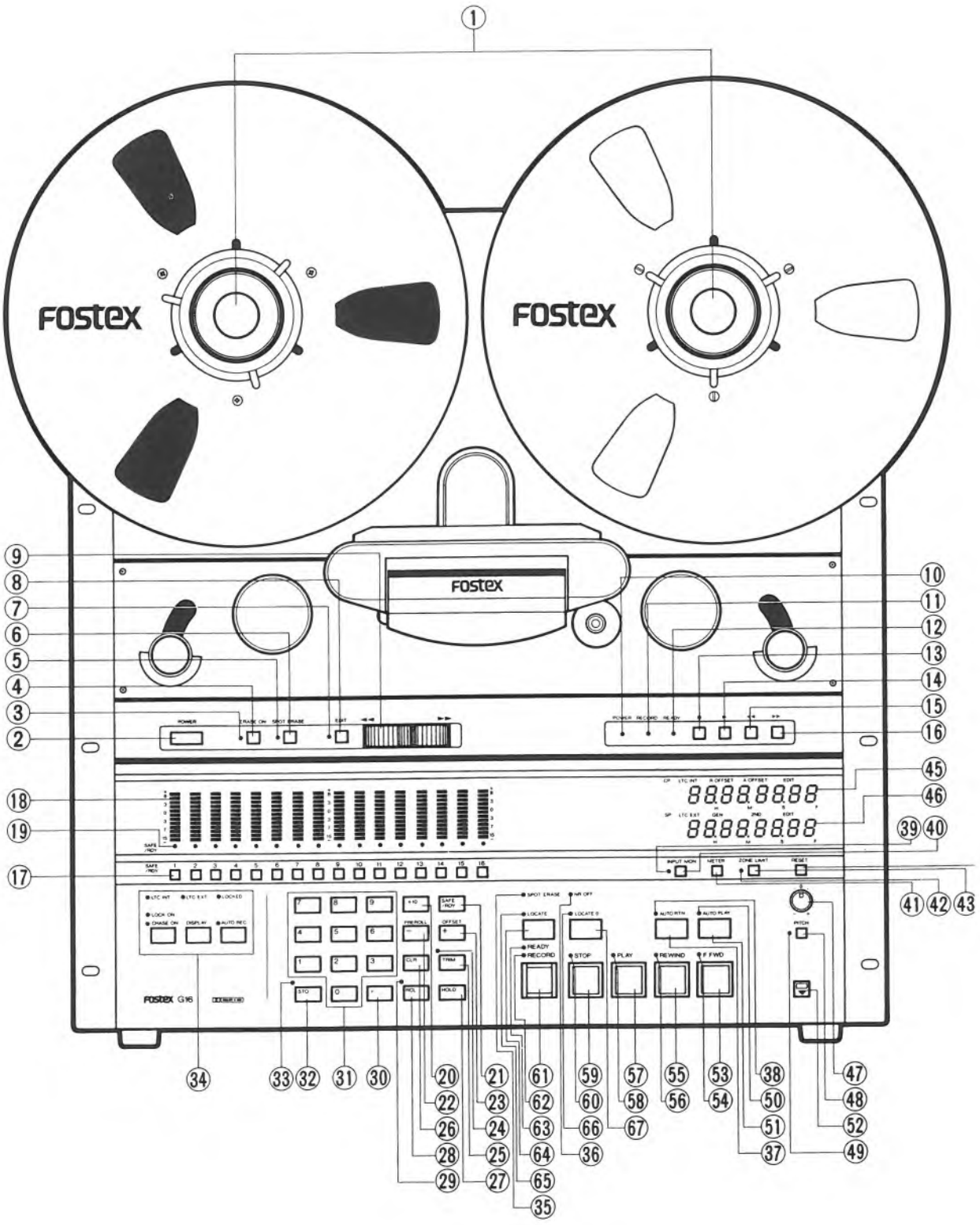
Owner's manual:	1 copy	(P/N 8288252000 export model)
		(P/N 8288253000 domestic model)
Wrench, Hex. 2	1 pc	(P/N 8204026001)

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. SPECIFICATIONS / SERVICE DATA

TAPE	1/2 inch (12.7mm) tape width, 2.0 mil (50μm) base AMPEX 456 or equivalent
FORMAT	16 track, 16 channel (16ch. record, 16ch. playback)
HEAD	Erase 16 track 16 channel Record/playback 16 track 16 channel
MOTOR	Capstan motor 1 pc DC print motor Reel motor 2 pcs DC motor Loading motor 1 pc DC motor
REEL SIZE	Up to 10-½ inch (27cm), NAB or EIA/CINE
TAPE SPEED	15 ips (38cm/sec) ±0.2%
PITCH CONTROL	±12%
LINE INPUT	-10 dBV (0.3V), imp. 30kΩ or higher, unbal.
LINE OUTPUT	-10 dBV (0.3V), load imp. 10kΩ or higher, unbal.
NOISE REDUCTION	Dolby C NR (ON/OFF switchable)
EQUALIZATION	15 ips; ∞ + 35 usec (IEC-1)
RECORD LEVEL CALIBRATION	0 dB referenced to 320 nWb/m of tape flux
WOW AND FLUTTER	±0.05% peak WTD (IEC/ANSI), ±0.10% UNWTD for 15 ips, measured with flutter test tape, FOSTEX 9201. Also 3150Hz test tape is recommended.
START UP TIME	Less than 0.5 sec
FAST WIND TIME	Less than 140 seconds for 2,500 ft. (740m) of tape
FREQUENCY RESPONSE (OVERALL)	40Hz ~ 18KHz, ±3 dB for 15 ips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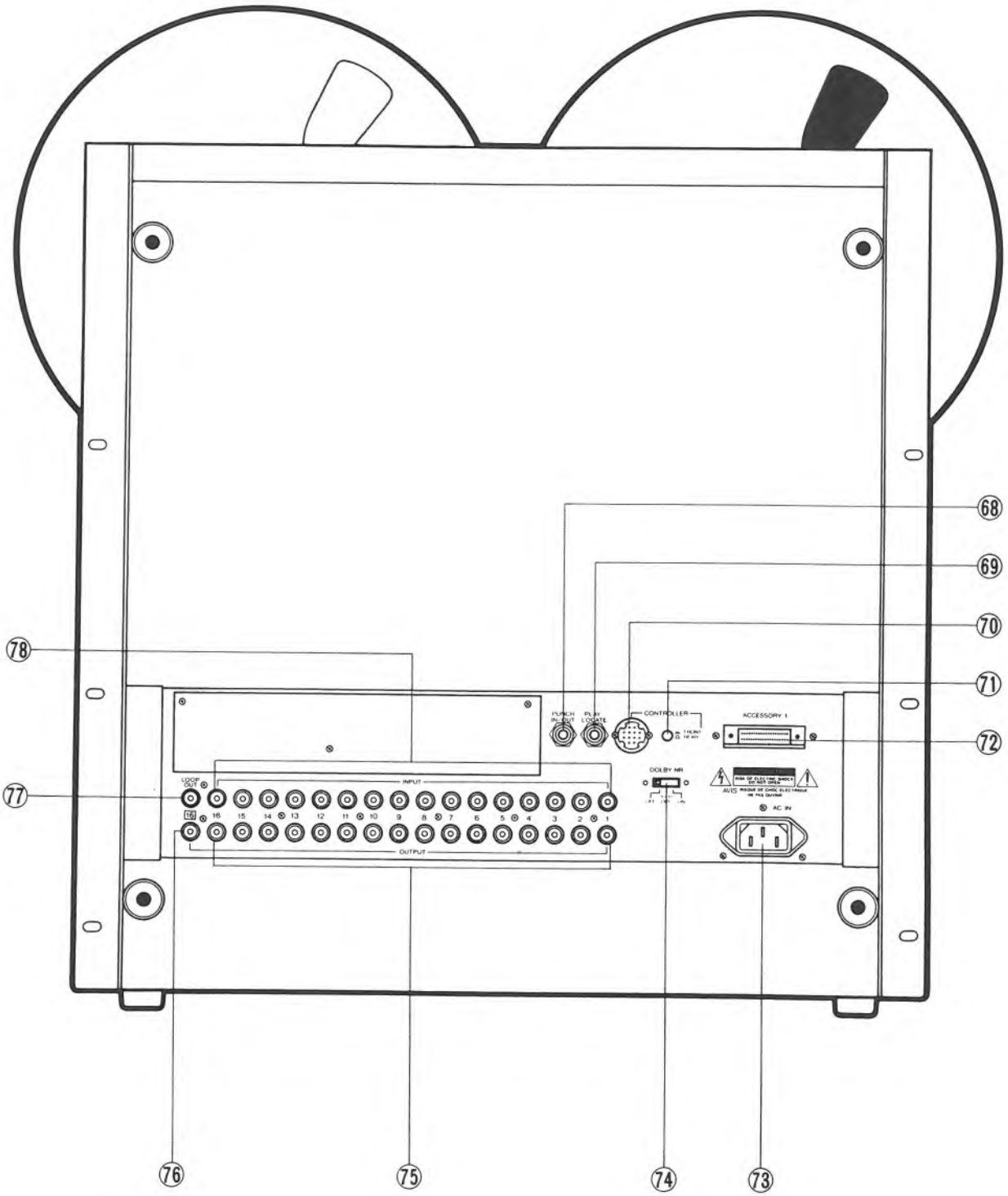
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69
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72
78
77
76
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74
73
PUNCH IN-OUT
PLAY LOCATE
CONTROLLER
ACCESSORY 1
LOOP OUT
INPUT
OUTPUT
DOLBY NR
AC IN

2. FUNCTIONS AND CONTROLS

1. REEL CLAMPER
2. POWER SWITCH
3. ERASE ON LED
4. ERASE ON BUTTON
5. SPOT ERASE LED
6. SPOT ERASE BUTTON
7. EDIT LED
8. EDIT BUTTON
9. EDIT DIAL
10. POWER LED
11. RECORD LED
12 READY LED
13. STOP BUTTON
14. PLAY BUTTON
15. REWIND BUTTON
16. FAST FORWARD BUTTON
17. SAFE/READY SELECTOR
18. BARGRAPH LEVEL METER
19. SAFE/READY LED
20. PLUS 10 KEY
21. SAFE/READY KEY
22. -/PREROLL KEY
23. +/OFFSET KEY
24. TRIM LED
25. TRIM KEY
26. CLEAR KEY
27. HOLD KEY
28. RECALL KEY
29. RECALL LED
30. PERIOD KEY
31. NUMERICAL KEYPAD (0, 1, 2, ..., 9)
32. STORE KEY
33. STORE LED
34. OPTION KEY AREA
35. SPOT ERASE LED
36. NOISE REDUCTION OFF LED
37. AUTO RETURN KEY
38. AUTO RETURN LED
39. INPUT MONITOR LED
40. INPUT MONITOR BUTTON
41. METER BUTTON
42. ZONE LIMIT LED
43. ZONE LIMIT BUTTON
44. RESET BUTTON
45. TAPE TIME DISPLAY
46. MEMORY DISPLAY
47. PITCH CONTROL KNOB
48. PITCH CONTROL BUTTON
49. PITCH CONTROL LED
50. AUTO PLAY LED
51. AUTO PLAY KEY
52. PANEL LOCK RELEASE KNOB
53. FAST FORWARD BUTTON
54. FAST FORWARD LED
55. REWIND BUTTON
56. REWIND LED
57. PLAY BUTTON
58. PLAY LED
59. STOP BUTTON
60. STOP LED
61. RECORD BUTTON
62. RECORD LED
63. READY LED
64. LOCATE KEY
65. LOCATE LED
66. LOCATE 0 LED
67. LOCATE 0 KEY
68. PUNCH IN/OUT JACK
69. PLAY/LOCATE JACK
70. REAR CONTROLLER RECEPTACLE
71. CONTROLLER UNIT SWITCHING BUTTON
72. ACCESSORY 1 RECEPTACLE
73. POWER CABLE CONNECTOR
74. DOLBY NR SWITCH
75. OUTPUT JACK
76. [16] OUT JACK
77. LOOP OUT 16 IN JACK
78. INPUT JACK

* Please take note the following modes on G16 as a service information since these functions are not described in the owner's manual.

DEMO FUNCTION MODE

1. Demo Function Mode 1

Graphic pattern appears on the Controller bargraph LED meter and "G16" is displayed a few seconds later when power is switched on to Model G16. This indicates proper operation of the followings:

1) CPU U1 on the Connector Board PCB
2) CPU U2 on the Controller PCB
3) Communication through the cable between U1 on the Connector Board PCB and U2 on the Controller PCB
4) Bargraph LED meter and drive circuit

2. Demo Function Mode 2

With power to G16 main unit switched on, when the Controller is connected to the main unit, a different graphic pattern (each line extended from both left and right ends connects at the center) will be displayed.
Due to this, it can be confirmed that the Controller is positively connected, CPU U2 on the Controller PCB has started functioning, and that serial data from CPU U1 on the Connector Board PCB is being received.

3. Demo Function Mode 3

1) The Demo function mode can be entered by switching ON the power while depressing the STOP button on the Controller.
   Every LED on the Controller (except for the bargraph LED meter and "NR OFF" LED) will be lit.

2) The Demo function will be proceeded by depressing the PLAY button on the Controller and the following can be checked.
   * Whether CPU U1 on the Controller PCB is functioning correctly or not.
   * Whether the 7 segments, LED's and the drive circuits are in normal condition.

3) The Demo function can be fast forwarded while the FF button on the Controller is kept depressed.

4) The Demo function can be reversed while RWD button on the Controller is kept depressed.

5) The Demo function can be stopped by depressing the STOP button on the Controller.

6) The Demo function mode can be cancelled by depressing the RESET button and enter Normal mode.

The Demo function test sequence continues forever, however, we understand it will be no problem as the Demo function mode can be cancelled by depressing the RESET button.

3. THEORY OF OPERATION

3.1 System control

3.1.1 CPU U101 (Refer to circuit diagram for System Control)

A large part of controlling are handled by the 16-bit C-MOS one chip CPU (U101), M37700. Loading motor, reel motor, amplifier mode setting, etc. are controlled by the serial input from the Controller and parallel input instructions from the main unit.

1) RESET (U101-28)
   This is the reset pulse input pin of the CPU. When power is switched on, Q7 is switched on by the charging current to C29, and a LOW level pulse is input to this pin and the CPU is reset. At this point, the transport enters the loading state. During normal operation, this RESET will be at HIGH level.

2) CP1 (U101-7), CP2 (U101-6), CP3 (U101-8), U/D (U101-52)
   These are the count pulse input pins and output pins of the up/down pulse generated from the count pulse input for the tape counter.

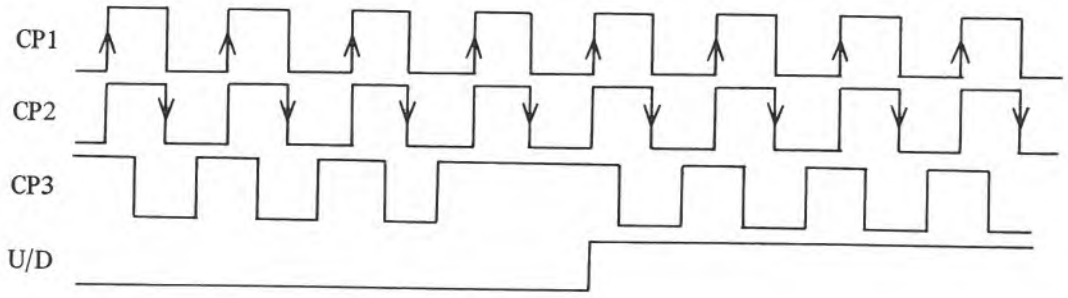


Fig. 3.1

The 90° phase shifted count pulse generated in the count sensor is input to the #2 and #4 pins of J25, waveform shaped by Q1, Q2, and U103, and input to CP1 and CP3. The CPU determines UP or DOWN from the CP1 ~ CP3 inputs, outputs HIGH level at forward, and LOW level at reverse from U/D.

3) SPLS (U101-14), TPLS (U101-16)
   SPLS is the supply side and TPLS is the takeup side reel table revolution pulse input pins. Together with the count pulse of 2), it is used for calculating ZONE LIMIT.

4) LM1 (U101-1), LM2 (U101-80), CAM0 (U101-77), CAM1 (U101-76), CAM2 (U101-75), CAM INT (U101-5)

CAM position	CAM0	CAM1	CAM2	CAM INT
LOADING	1	0	0	0
EDIT	0	1	0	0
FAST	0	0	1	0
STAND BY	0	1	1	0
PLAY	1	1	0	0

CAM0 ~ CAM2, CAM INT are the transport cam position detecting input pins and the position is input at LOW level.
LM1 and LM2 are output pins for controlling the loading motor which rotates the cam. When LM1 goes LOW, U14-10 goes to HIGH, and when U14-2 goes LOW, the loading motor starts rotating. When LM2 goes LOW, the rotation will reverse. The motor will stop when both LM1 and LM2 go to HIGH. When the STOP button is depressed during loading of the transport, a LOW level is output from LM2 and the loading motor will rotate. When the cam position detecting input CAM INT goes to LOW level, LM1 will go to LOW to apply the brake on the cam. If the CAM INT input goes to HIGH, both LM1 and LM2 pins will go to LOW and the cam will stop.

5) STOP-0 (U101-25), RWD-0 (U101-24), FF-0 (U101-23), PLAY-0 (U101-22)
These are tally output pins. LOW is output during the various modes.

6) LIFTER-I (U101-59), PLAY-I (U101-58), REC-I (U101-57), PLAY2-I (U101-56), FF-I (U101-55), RWD-I (U101-54), STOP-I (U101-53), EDIT-I (U101-51), ERASE-I (U101-50), SPOT-I (U101-49)
These are parallel input pins to the main unit switches. They are active at LOW level.

7) SHUT OFF (U101-60)
This is the shut off pulse input pin. A LOW level will be input when both left and right tension arms are down. The transport will then be in the loading state.

8) TR-STOP-O (U101-21), SR-STOP-O (U101-20)
Outputs to switch off the takeup and supply reels.
Reel is stopped at HIGH level output.

9) PUNCH I/O-I (U101-18), LOC/PLAY-I (U101-19)
Foot switch input port. Active at LOW level.

10) 2.4K-I (U101-4), 4.8K-I (U101-3), PITCH-O (U101-79)
HIGH level will be output when pitch control is switched on at PITCH-O. 2.4K-I and 4.8K-I are inputs for displaying of pitch by counting and displaying 4.8K-I using 2.4K-I as the reference.

11) POWER-OFF (U101-10), REEL-BOOST-O (U101-15)

LOW level is input to POWER-OFF at about the same instant when power is switched off and returns cam, which could be in standby or other than loading position, to the loading position.

REEL-BOOST-O is the output for controlling the voltage applied to the reel motors and a high voltage is applied when level is HIGH.

12) RC-PULSE1-O (U101-13), RC-PULSE2-O (U101-11), PWM-O (U101-9)

Speed controlling output ports at FAST WINDING of the reel motors. RC-PULSE1-O and RC-PULSE2-O output an approximately 10usec. pulse in sync with the count pulse. This pulse operates the Q8 and Q9 sample hold circuit.

PWM-O is the output for determining the speed at FAST WINDING, and the longer the cycle of HIGH level compared to the cycle of the LOW level, the faster it will be. This output is inverted by U8, integrated by C38, then applied to the Q10 constant current circuit to control the current.

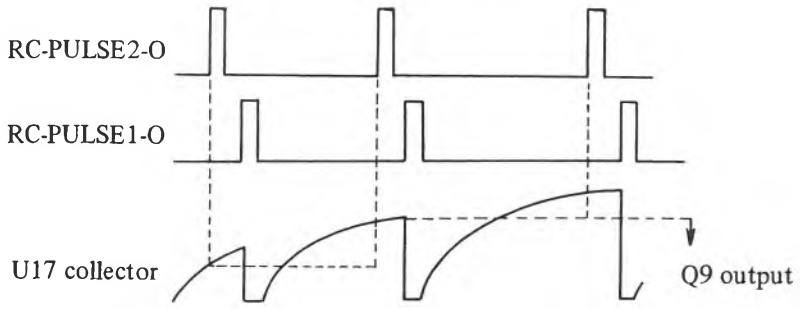


Fig. 3.2

Output of Q9 is applied to the takeup reel motor by U109-7 and U110, and voltage will fall to reduce the takeup reel torque, if speed is too fast. Again, output of Q9 is inverted by U109-1, and applied to the supply reel motor by U110, and voltage will rise to raise torque of the supply reel, thus reducing the speed.

13) EDIT-STOP-I (U101-12)

Q13 will switch off and a HIGH level is input to this pin when the jog knob is at the center. When in the EDIT mode, the jog knob center is detected by this input.

14) MT0-O (U101-33), MT1-O (U101-34), ALL IN-O (U101-35), TR-REC-O (U101-36)

	Normal	Tempo-rary	Perma-nent	Calibra-tion	2nd-METER
MT0-O	0	0	1	1	CLK
MT1-O	0	1	0	1	DATA

MT0-0 and MT1-0 are meter mode switching outputs and the above output signals are applied to the CPU (U1: UPD78C12AGF) on the Connector Board PCB. ALL IN-0 output a HIGH level when in the ALL IN mode. TR-REC-0 outputs a HIGH level when transport is in the REC mode.

15) OUTPUT PORTS: PORT 20 ~ 27 (U101-37 ~ 44)
Control output ports of the I/O expander IC, U102.

16) SPOT-LED-O (U101-48), EDIT-LED-O (U101-47)
Output ports for the main unit SPOT LED and EDIT LED.

17) S-DATA-O (U101-65), S-DATA-I (U101-62), S-CLK-O (U101-67)
These are the communication ports for the Controller and external serial connectors and are 8-bit synchronized serial ports.

18) TXD-O (U101-61), RXD-I (U101-62), RTS-D (U101-64)
Asynchronous communication ports for the optional synchronizer.

3.1.2 I/O EXPANDER U102, M50782SP (Refer to circuit diagram for System Control)

1) PORTS of CPU, U101 and U102 are connected as follows:

U101		U102		
P20 (pin 44)	———	R3 (pin 3)	⎫	
P21 (pin 43)	———	R2 (pin 2)	⎬	Data port
P22 (pin 42)	———	R1 (pin 40)	⎬	
P23 (pin 41)	———	R0 (pin 39)	⎭	
P24 (pin 40)	———	S2 (pin 37)	⎫	Address port
P25 (pin 39)	———	S1 (pin 36)	⎬	4-bit x 7 port address
P26 (pin 38)	———	S0 (pin 35)	⎭	of U102, 0~7.
P27 (pin 37)	———	STD (pin 6)		Strobe port (R0 ~ R3 data will be latched to U102 port when level is HIGH.

2) CH1 ~ CH16 (U102-15 ~ 30)
The SAFE/READY SELECTOR outputs. These are LOW active. When in the REC mode, INDIV-INPUT mode or SPOT ERASE mode, the selected channel goes to LOW level.

3) ERS-O (U102-34), REC-O (U102-33), MUTE1-O (U102-32), MUTE2–O (U102-31)

When in the SPOT ERASE mode and, at the same time, more than one SAFE/READY SELECTOR is ON, ERS-O will output HIGH level as long as ERASE-I or PUNCH I/O-I is at LOW level.
REC-O will output LOW level when in the REC mode and, at the same time, more than one SAFE/READY SELECTOR is ON.
MUTE1-O is an output for -12dB muting. It is active at HIGH level.
MUTE2-O is an output for perfect muting. It is active at HIGH level.
When REC-O is LOW or ERS-O is HIGH, U4 and Q14 will switch on and the master oscillator will be activated.

3.1.3 Reel Servo (Refer to circuit diagram for System Control, Regulator)
In this transport the reel servo circuit functions to apply constant tape tension during PLAY or EDIT modes, and maintain constant tape speed during FAST WINDING and LOCATE modes.

Tension Control Circuit
Tape tension is detected by the tension sensor circuit whose output is proportionate to movement of the tension arm and the output response is as shown in Fig. 3.3.

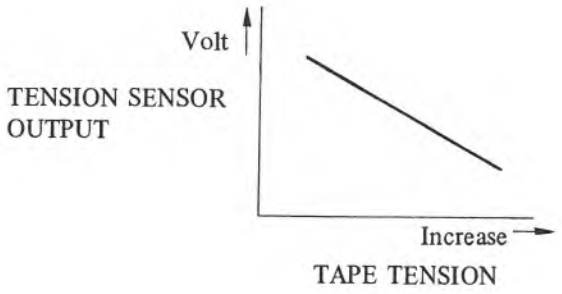


Fig. 3.3

For the takeup side, the tension sensor output fed to U113-10, is compared with U113-9 and output at U113-8. Then, passing through a phase advance circuit, is applied to the motor drive circuit consisting of U113, Q5, and Q7 (current feedback is applied by R116) to drive the motor. The motor torque thus created puts tension on the tape which moves the tension arm, and its position is detected and output by the tension sensor.
As shown in Fig. 3.3, when tape tension rises, the tension sensor output drops and U113-8 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 U113-9. In other words, U112-1 is the reference voltage by which tape tension is established. This reference voltage is set by R3 for the EDIT mode, by R2 for the PLAY mode when U122 is ON, and by R1 for F.FWD mode when Q12 is ON.

Q5 and Q7 are mounted on the Regulator PCB. R1 ~ R3 are mounted on the Tension Pod PCB.

3.1.4 Power Supply for Motors (Refer to circuit diagram for System Control and Regulator)

Power consumption is reduced by varying voltage and current supplied to the reel and capstan motors using the repeated ON/OFF action on the Regulator PCB Q2 and Q3.
When current to the motor becomes 5 ~ 6 amperes, Q4 and Q1 switches on which in turn, switches on Q2 and Q3 to raise voltage to the motor. Q2 and Q3 will also switch on when the signal from the System Control PCB (J9-1) goes to LOW. When Q2 and Q3 are switched off, a low voltage will be supplied to the motor through D1. Q2 and Q3 will switch on at the start of PLAY mode and during F.FWD/RWD mode.

3.2 Controller (Refer to circuit diagram for Controller)

CPU U1 on the Controller PCB has two main functions. One is in lighting the LED's on the Controller (except for the bargraph LED meter and "NR OFF" LED) by receiving serial data from System Control.
The other is to check ON/OFF of the Controller switches and to send this data to System Control in reply to its request.

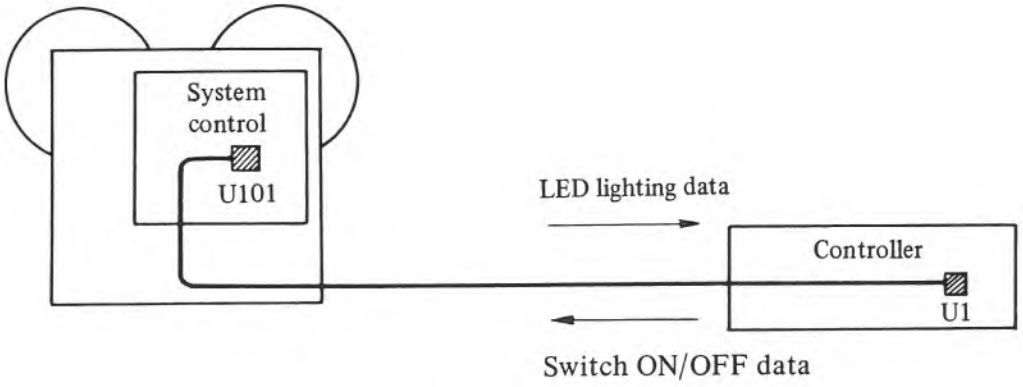


Fig. 3.4 Overall Schematic

3.2.1 Dynamic Scan

1) LED
LED's (except for the bargraph LED meter and "NR OFF" LED) are lit by dynamic scan.
LOW or HIGH level is output to each segment LED of SEGMENT E 0 ~ 7 and SEGMENT I 0 ~ 7 depending on which segment is to be lit. On the other hand, the digits are lit (by HIGH output) in order of 1 → 2 → . . . . → 12 → 1 → 2 → . . . . → 12 → 1 → 2 → . . . .
LED's of digit off (LOW) will not be lit regardless to whether the segments are HIGH or LOW.

When the digit is on (HIGH), segments at LOW will be lit and those at HIGH will not be lit.

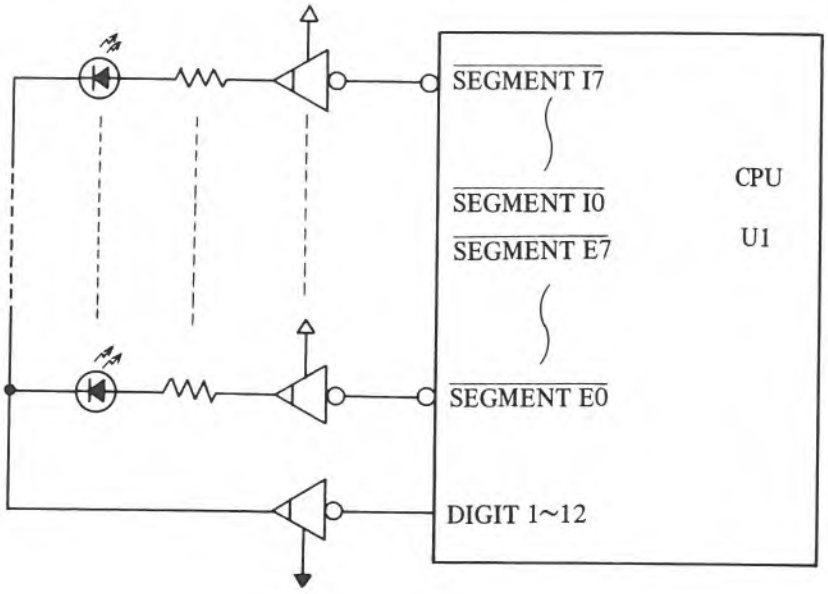


Fig. 3.5 Dynamic scan, LED

2) Switch

The switch ON/OFF information is also input in dynamic scan.

Regardless to switch position, HIGH level will be input to the KEY ports when the DIGIT is OFF (LOW).

When the DIGIT is switched ON (HIGH), the KEY port whose switch is ON (closed) will be input with a LOW level and the port whose switch is OFF (open) with a HIGH level.

Then, the digit will be sequentially switched ON in order of 1 → 2 → . . . . → 12 → 1 → 2 → . . . . → 12 → 1 → 2 → . . . .

The switch ON/OFF information are thus input sequentially .

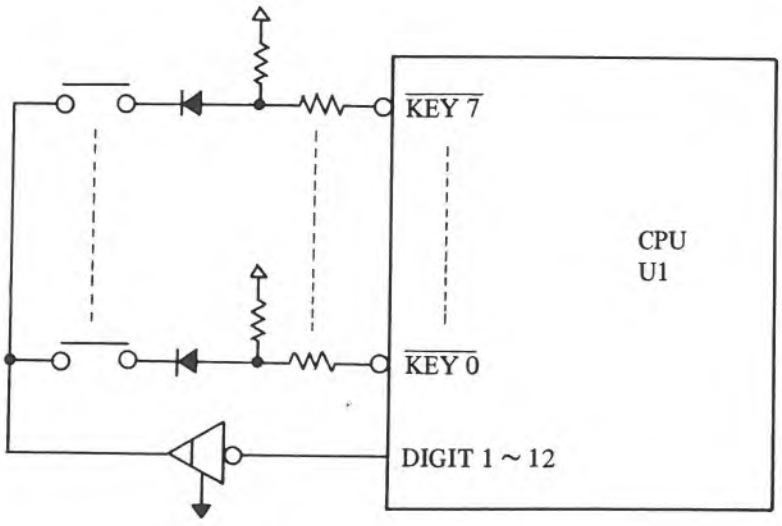
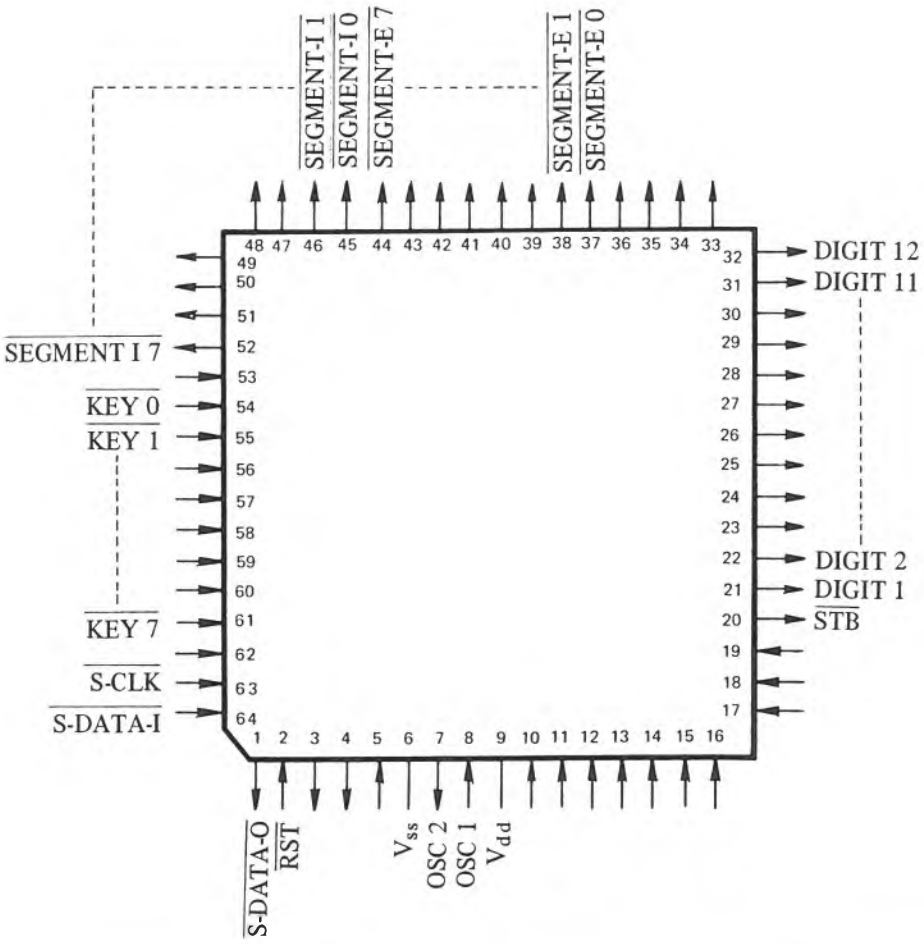


Fig. 3.6 Dynamic scan, Switch

3.2.2 CPU U1

The ports (pins) of CPU U1 are assigned as follows:



Terminal (I/O)	Pin Number	Function
S-DATA-I (I)	64	Port to receive serial data from System Control.
S-DATA-O (O)	1	Port for sending serial data to System Control.
S-CLK (I)	63	Clock signal input port to synchronize when sending or receiving serial data between System Control and Controller.
DIGIT 1 ~ 12 (O)	21 ~ 32	Refer to circuit diagram for connecting method.
SEGMENT E 0 ~ 7 (O)	37 ~ 44	
SEGMENT I 0 ~ 7 (O)	45 ~ 52	
KEY 0 ~ 7 (I)	54 ~ 61	

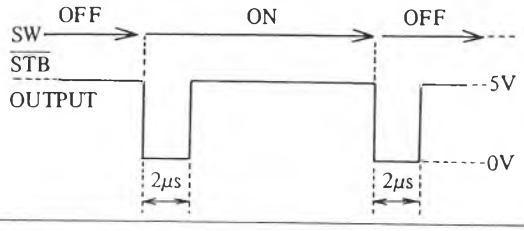
$\overline{STB}$ (O)	20	A strobe signal (LOW) will be output when any switch is set to ON or OFF. 
Vdd	9	Pin for power supply (+5V).
Vss	6	Ground pin.
OSC 1, 2	7, 8	The ceramic resonator connecting pin for the CPU internal oscillator clock (8 MHz).
$\overline{RST}$ (I)	2	Reset pin. Reset by LOW input.

Fig. 3.7 Ports of CPU U1

3.3 Bargraph LED meter

The signal level of each channel are A/D coverted by CPU U1 (NEC) on the Connector Board and serial transmitted to the Controller. Upon receiving this serial data, CPU U2 (NEC) on the Controller lights the bargraph LED meter in accordance to this data (Lighting is done by dynamic scan).

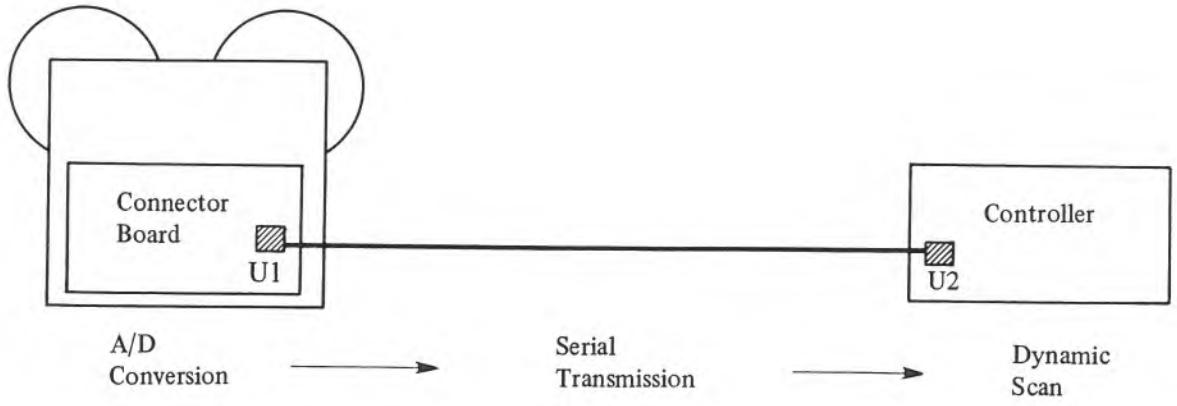


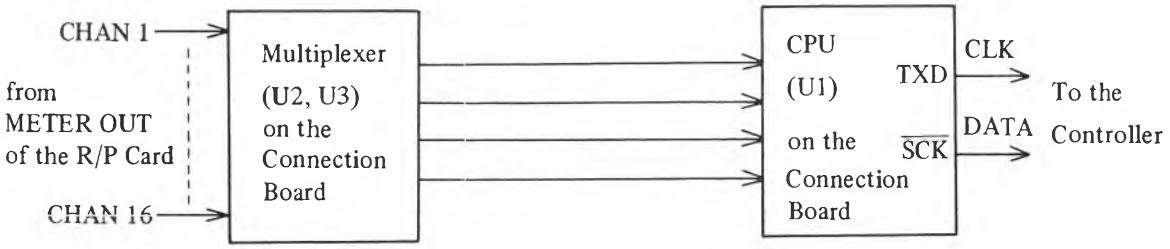
Fig. 3.8 Overall Schematic

Explanation in this manual is in two parts –

1. A/D conversion section (Operation by U1 on the Connector Board PCB) and
2. Bargraph LED meter lighting section (Operation by U2 on the Controller PCB)

3.3.1 A/D Conversion (Refer to circuit diagram for Connector Board)

Signal flow of the A/D conversion section is as follows:



(1) Parallel input of CH. 1 ~ 16 signal levels

(2) Time divide Parallel input to 4 channels and send to CPU analog input

(3) A/D convert analog input and process in peak hold, etc. Then, convert this into serial data and send to controller together with clock, etc.

Fig. 3.9 Signal Flow of the A/D conversion section

1. Multiplexer

Multiplexer U2, U3 and CPU U1 are connected as shown in Fig. 3.10

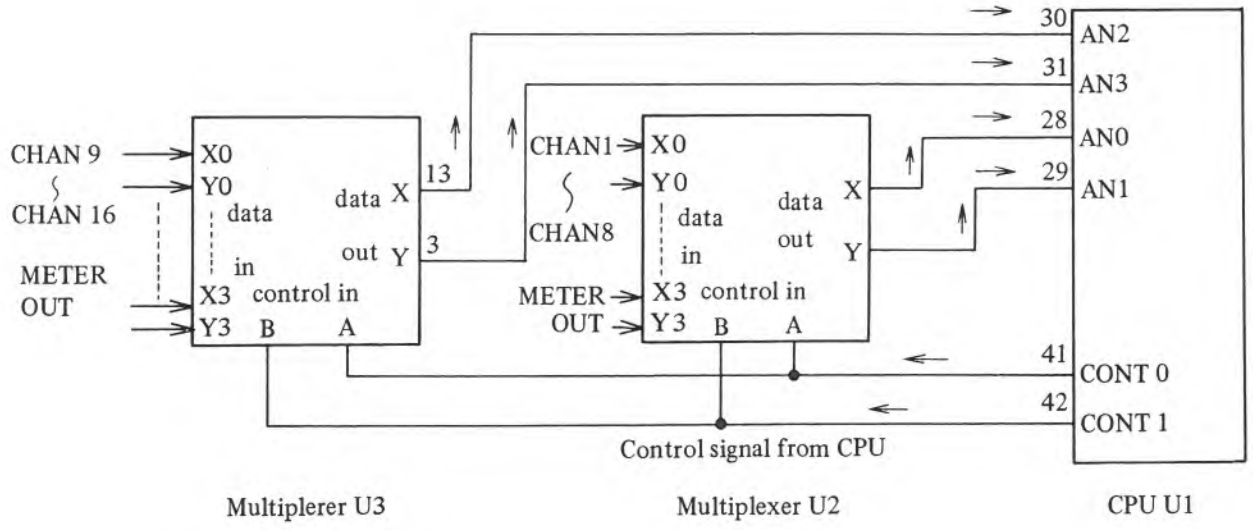


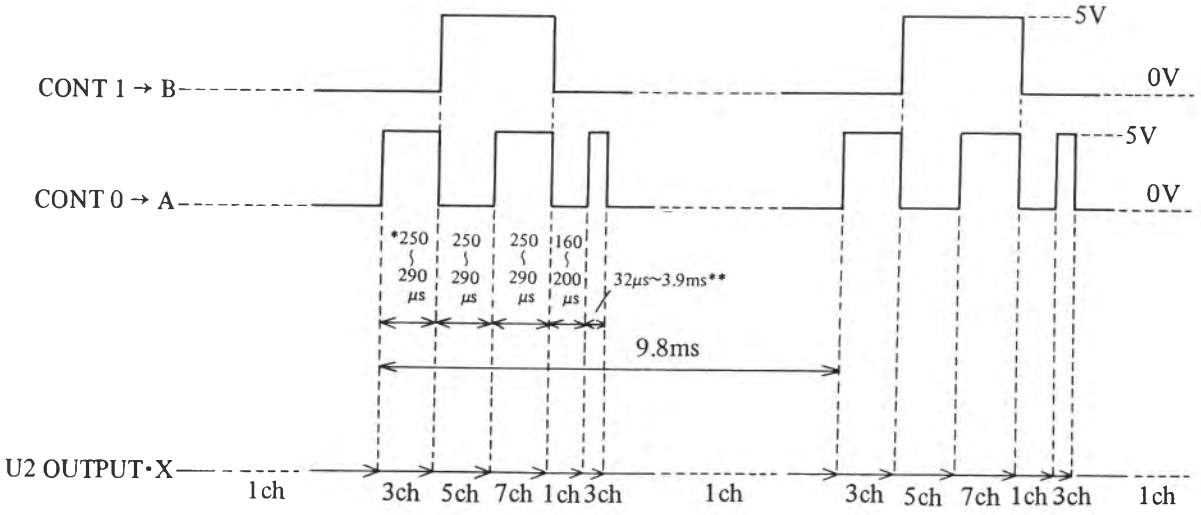
Fig. 3.10 Connection of Multiplexer U2, U3 and CPU U1

The relationship between control signal input A, B and data output X, Y is shown in table 3.1

Control signal input		B A 0 0	B A 0 1	B A 1 0	B A 1 1
U2 output	X	CH. 1	CH. 3	CH. 5	CH. 7
	Y	CH. 2	CH. 4	CH. 6	CH. 8
U3 output	X	CH. 9	CH. 11	CH. 13	CH. 15
	Y	CH. 10	CH. 12	CH. 14	CH. 16

Table 3.1

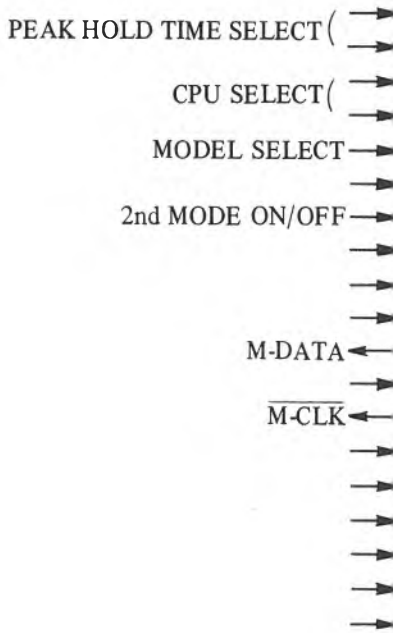
Following is control signal timing:



*Difference in pulse width is due to differences in software processing time governed by signal level input size.

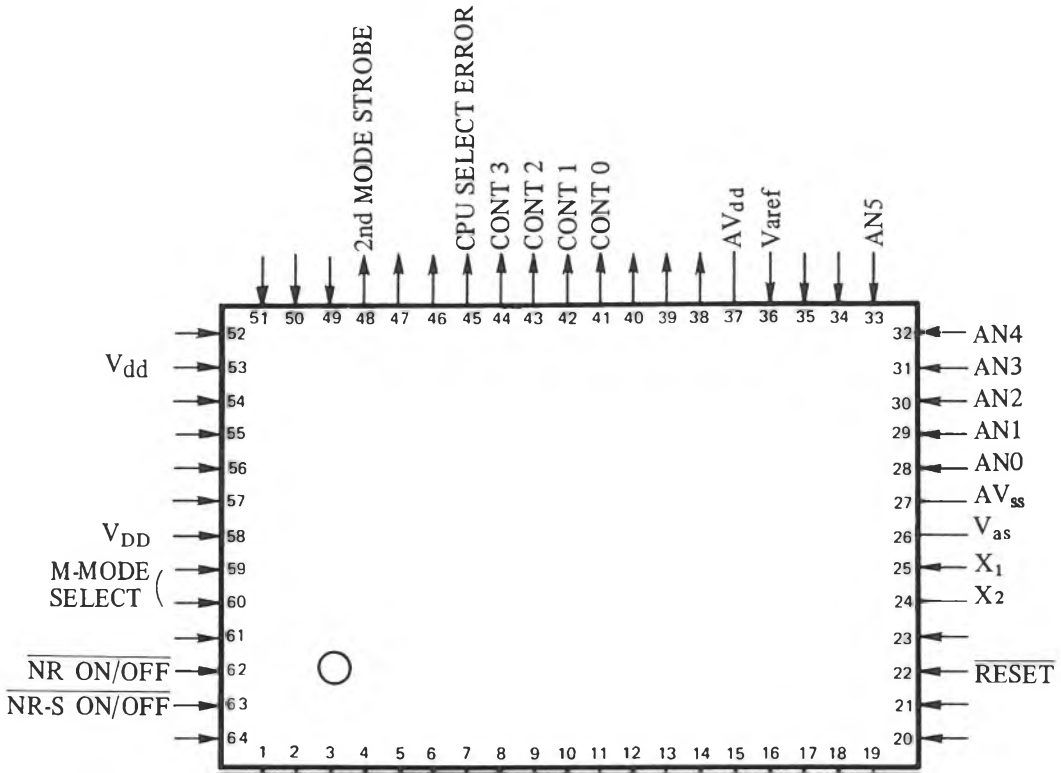
** Width will differ depending on meter mode.
Min. 32 μsec. (At NORMAL mode)
Max. 3.9 msec. (At TEMPORARY or PERMANENT PEAK HOLD mode)

Fig. 3.11 Control Signal Timing


PEAK HOLD TIME SELECT(
CPU SELECT(
MODEL SELECT
2nd MODE ON/OFF
M-DATA
M-CLK

2. CPU U1

Following are explanation on each port of CPU U1:



Terminal (I/O)	Pin Number	Function
CPU SELECT (I)	3, 4	This CPU can be used in both the Connector Board and Controller. When using as CPU in the Connector Board, set pins as follows: Pin 3 = HIGH Pin 4 = LOW (Already set on PCB. Cannot be changed)
MODEL SELECT (I)	5	Set to LOW when using in G16. (Already set on PCB. Cannot be changed.)
M-MODE SELECT (I)	59, 60	Selects the bargraph mode. (Changed by System Control) Pin 59 = LOW, Pin 60 = LOW — Calibration mode Pin 59 = HIGH, Pin 60 = LOW — Permanent peak hold mode Pin 59 = LOW, Pin 60 = HIGH — Temporary peak hold mode Pin 59 = HIGH, Pin 60 = HIGH — Normal mode This port is also used for communicating with System Control in the 2nd MODE (This, however, is on condition that "2nd mode ON/OFF" port is ON = HIGH). In this case, it will be – C-CLK (I) pin 59 C-DATA (I) pin 60 Refer to 3.3.1.2 for details.
CONT 0, 1 (O)	41, 42	Control signal output to the multiplexer U2, 3.
CONT 2, 3 (O)	43, 44	Not used in G16.
AN 0, 1, 2, 3 (I)	28 ~ 31	Analog input port for receiving multiplexer U2 and U3 output.
AN 4, 5 (I)	31, 32	Not used in G16.
$\overline{\text{RESET}}$ (I)	22	Reset input pin. Reset by LOW input.
X1, X2	24, 25	Ceramic resonator connecting pins for the CPU internal oscillator circuit (12 MHz).

Terminal (I/O)	Pin Number	Function
Vdd	58	Pin for power supply (+5V).
Vss	26	Ground pin.
AVdd	37	Power supply pin for CPU internal analog circuit (+5V).
AVss	27	Ground pin for analog circuit.
VAREF (I)	36	Reference voltage (+5V) input pin for A/D conversion.
2nd MODE ON/OFF (I)	7	ON/OFF of communication with System Control in 2nd MODE. ON = HIGH – Set at factory (can be changed by jumper wire) (OFF = LOW) Refer to 3.3.1.2
PEAK HOLD TIME SELECT (I)	1, 2	Set HOLD TIME when PEAK HOLD TIME is "PHn". Pin 7 = LOW, Pin 8 = LOW — HOLD TIME = 1.4 sec. set at factory (can be changed by jumper wire) Pin 7 = HIGH, Pin 8 = LOW — HOLD TIME = 0.3 sec. same as "PH1" Pin 7 = LOW, Pin 8 = HIGH — HOLD TIME = 1.0 sec. Same as "PH2" Pin 7 = HIGH, Pin 8 = HIGH — HOLD TIME = 2.5 sec. Same as "PH3"
NR ON/OFF (I)	62	Input port for information on lighting of the Controller LED "NR OFF" (Changed by NR SWITCH) HIGH = CH. 1 ~ 15 NR OFF LOW = CH. 1 ~ 15 NR ON
NR S ON/OFF (I)	63	Input port for information on lighting of the Controller LED "NR OFF" (Changed by NR SWITCH). HIGH = CH. 16 NR OFF LOW = CH. 16 NR ON
M-DATA (O)	11	Port for sending serial data to the Controller.
$\overline{\text{M-CLK}}$ (O)	13	Port for sending clock signal to the Controller.

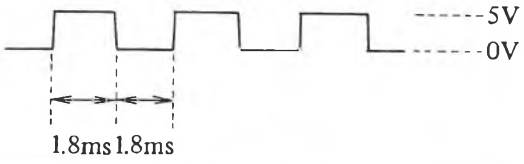
Terminal (I/O)	Pin Number	Function
CPU SELECT ERROR (O)	45	The following waveform will be output when the CPU cannot determine whether it should function as the Connector Board CPU or the Controller CPU. 
2nd MODE STROBE (I)	48	HIGH is output when in the 2nd mode (This is LOW in the normal mode.). Refer to 3.3.1.2 for details.

Fig. 3.12 Ports of CPU U1

(Explanation on 3.3.1.2 2nd MODE)

If the METER KEY is depressed while Model G16 is in the 2nd MODE, any desired character can be shown in the display. Characters will be shown on the bargraph LED meter through a series of functions whereby serial data (character data) sent from the System Control is received, converted into display data, then transferred to the Controller as serial data.

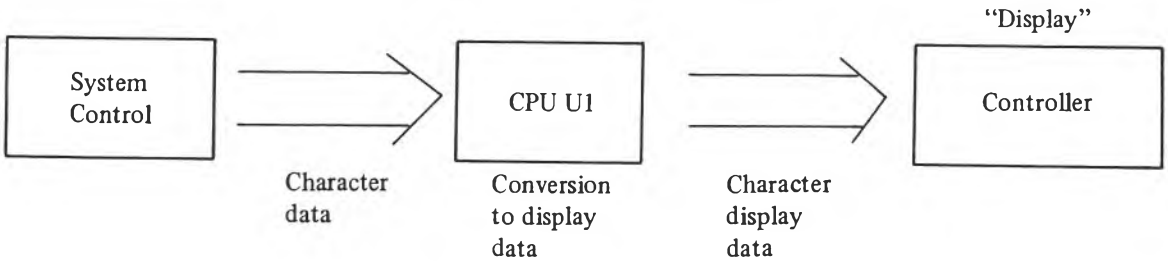


Fig. 3.13 Display of character by the 2nd MODE

When the 2nd MODE storobe port (pin 48) is HIGH, CPU U1 is in the 2nd MODE, indicating that the original bargraph function (A/D conversion, etc.) is stopped.

If the 2nd MODE ON/OFF port (Pin 7) is LOW, communication with System Control is cut off, and the 2nd MODE function of CPU U1 will cease (consequently, no character will be shown on the display).

3.3.2 Bargraph LED meter lighting section

Although two CPU's, U1 (Matsushita) and U2 (NEC) are contained on the Controller, U2 (NEC) functions to light the bargraph LED meter.

1. Dynamic Scan

Lighting is done by dynamic scan. As shown in the drawing below, digit 2 ~ 5 drive the 2 channels of the bargraph LED meter (however, digit 1, 6 ~ 12 drive only the 1 channel of the bargraph LED meter). The relationship between digit and the assigned channels of the bargraph LED meter to be driven are shown in the table 3.2.
And there are 24 segments (12 dot X 2 channels = 24).

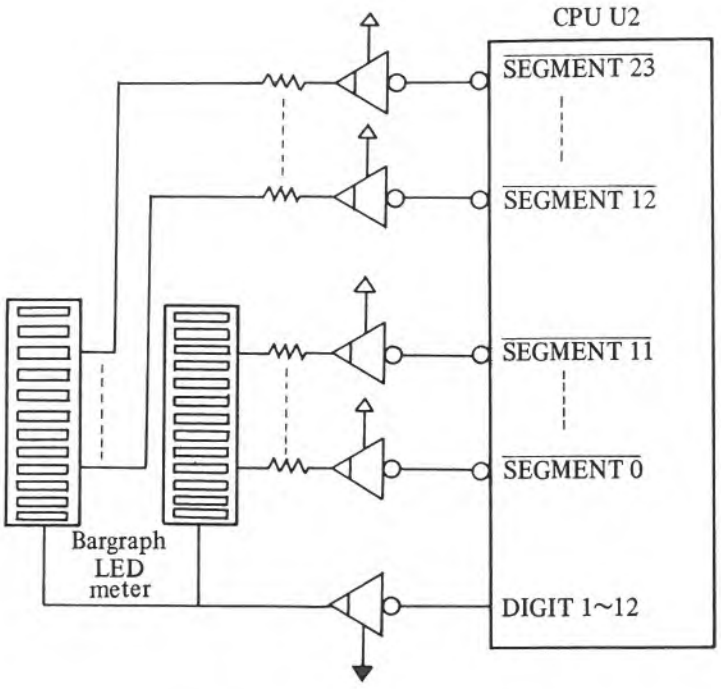


Fig. 3.14 Dynamic scan

digit	1	2	3	4	5	6	7	8	9	10	11	12
assigned channel	12	1, 13	2, 14	3, 15	4, 16	5	6	7	8	9	10	11

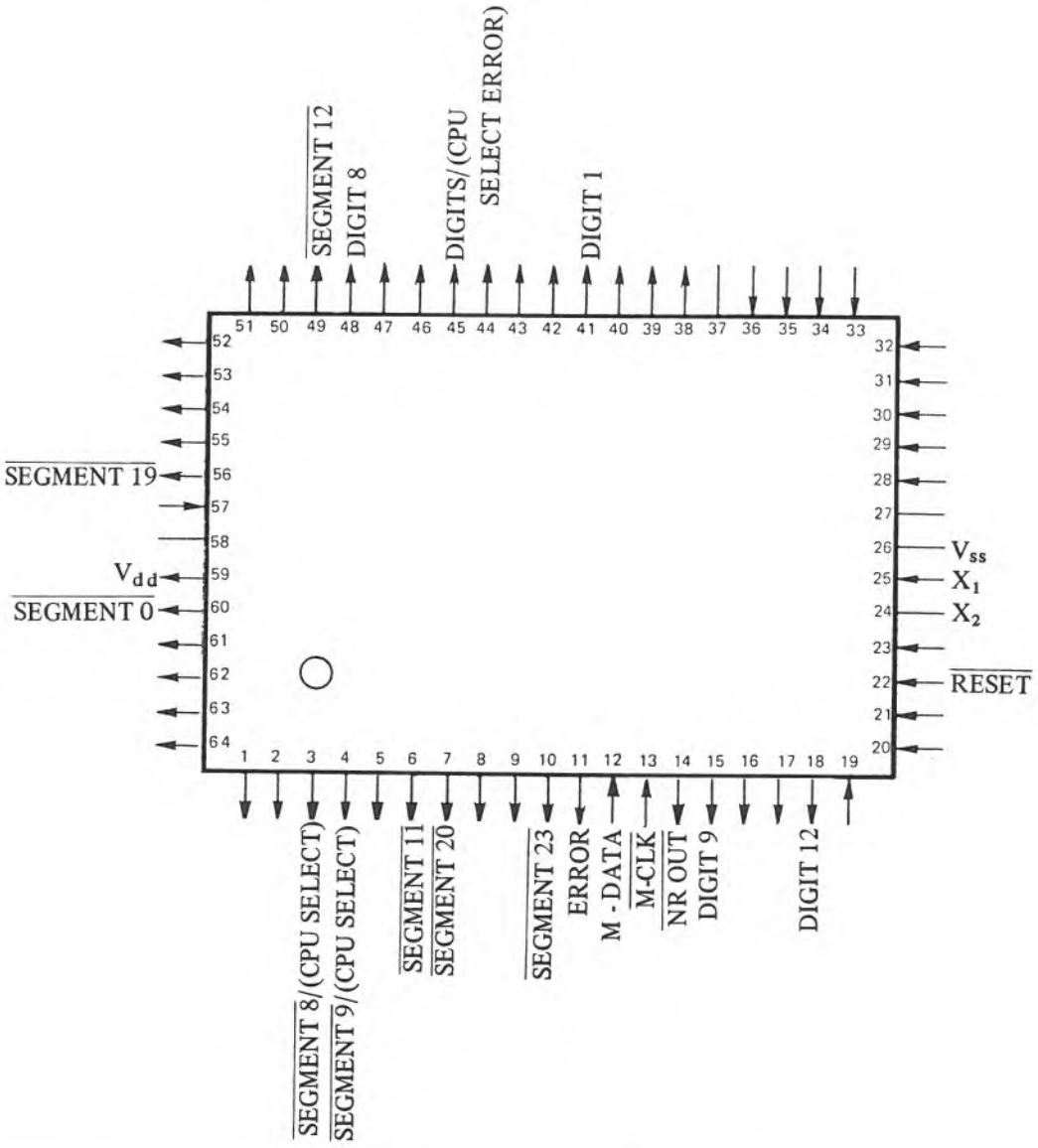
Table 3.2

Bargraph lighting pattern is output in LOW/HIGH levels to SEGMENTS 0 ~ 23. The digits are sequentially switched ON (HIGH output) in order of 1 → 2 → . . . . → 12 → 1 → 2. . . . .
Bargraph LED meter of the channel whose digit is off (LOW output), will not be lit whether

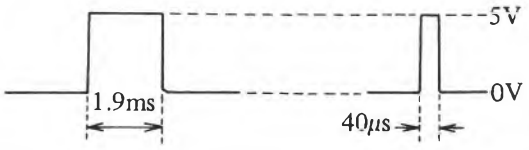
the SEGMENTS are HIGH or LOW.
The channel whose digit is ON, dot of the SEGMENT at LOW will be lit and dot of the SEGMENT at HIGH will not be lit.

2. CPU U2

Following are explanations on each port of CPU U2.:



Terminal (I/O)	Pin Number	Function
		Same as with the Connector Board, whether function should be done by the Connector Board or the Controller is selected. To make it function as the CPU in the Controller, set the level as

CPU SELECT (I)	3, 4	follows: Pin 3 = HIGH Pin 4 = HIGH (Pins 3 and 4 are connected to the base lead of U13 and U14, and these will be set to HIGH level at the instant power is switched ON.)
$\overline{\text{NR OUT}}$ (O)	14	This is connected to anode pin of the "NR OFF" LED (D291) and this LED will be lit when a LOW is output, and extinguished when a HIGH is output (This is not lit by dynamic scan.).
DIGIT 1 ~ 8 (O)	41 ~ 48	Refer to circuit diagram for connections.
DIGIT 9 ~ 12 (O)	15 ~ 18	
$\overline{\text{SEGMENT}}$ 0 ~ 11 (O)	59 ~ 64 1 ~ 6	
$\overline{\text{SEGMENT}}$ 12 ~ 23 (O)	49 ~ 64 7 ~ 10	
$\overline{\text{RESET}}$ (I)	22	This is the reset input pin and requires a longer than 10μsec. LOW input for resetting.
X1, X2	25, 24	The ceramic resonator connecting pins for the CPU internal oscillator circuit. (12 MHz)
Vdd	58	Power supply pin. (+5V)
Vss	26	Ground pin.
ERROR	11	When a receiving error occurs at receiving serial data from the main unit, a HIGH is output. This HIGH output time is in two types. (1) (2) 
		The following waveform will be output when the CPU cannot determine whether it should function as the Connector Board CPU or the Controller CPU. When CPU

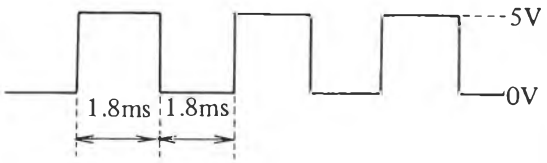
CPU SELECT ERROR (O)	45	SELECT is correct, this will function as the above SEGMENT port. 
M-DATA (I)	12	The port for receiving serial data from the main unit.
$\overline{\text{M-CLK}}$ (I)	13	The port for receiving clock signal from the main unit.

Fig. 3.15 Ports of CPU U2

3.4 DD CAPSTAN CIRCUIT

3.4.1 Block diagram

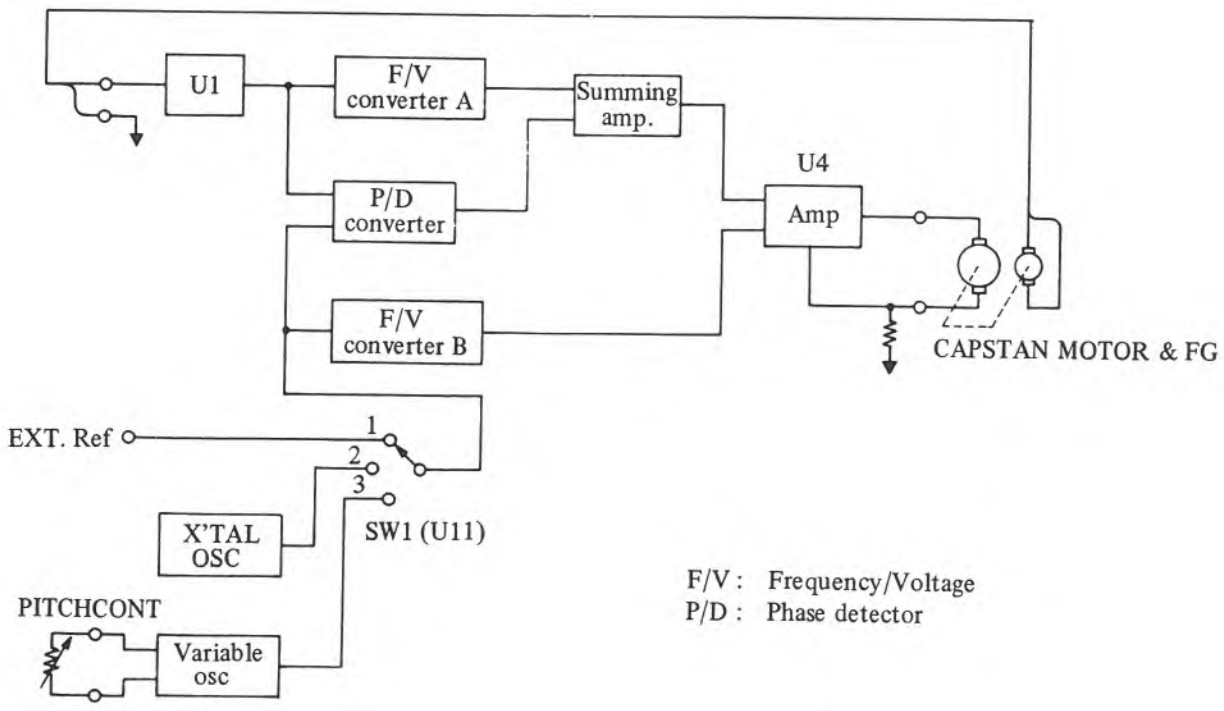


Fig. 3.16

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

3.4.2 Circuit details

1) F/V converter circuit

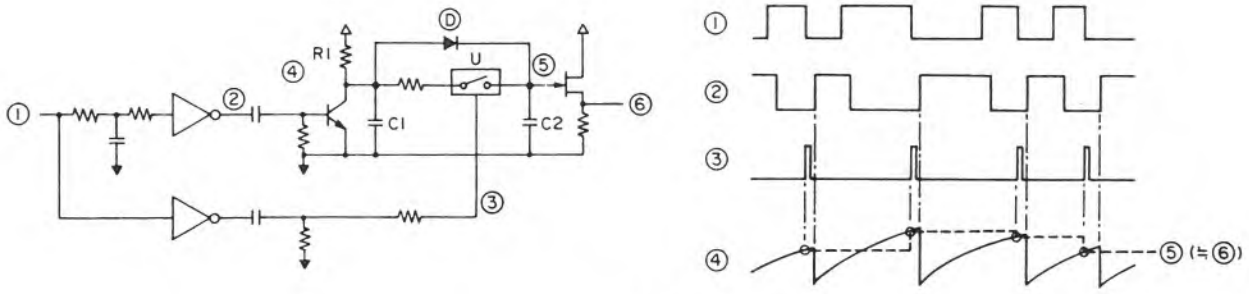


Fig. 3.17

A sawtooth wave is generated by R1 and C1, analog switch U is switched on by pulse (3), and the sawtooth peak level is held by C2. This level is output at (6).
Diode D is inserted in the F/V converter A circuit to start the motor by an output from (6) even when the motor is stopped and there is no input at (1).

2) P/D circuit
The outputs are as shown by the time chart of Fig. 3.18. D6 acts in the same way as Diode D in above 1.

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

4) Oscillator and frequency divider circuit
One stage of the CMOS is used for the crystal oscillator and the output is 38.4KHz. This is

divided to 1/4 by U12. The variable oscillator circuit uses the timer IC 555 (U9) and frequency varied by the pitch control pot. The oscillating center frequency is 9.6KHz.

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

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

5) Motor start/stop circuit

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

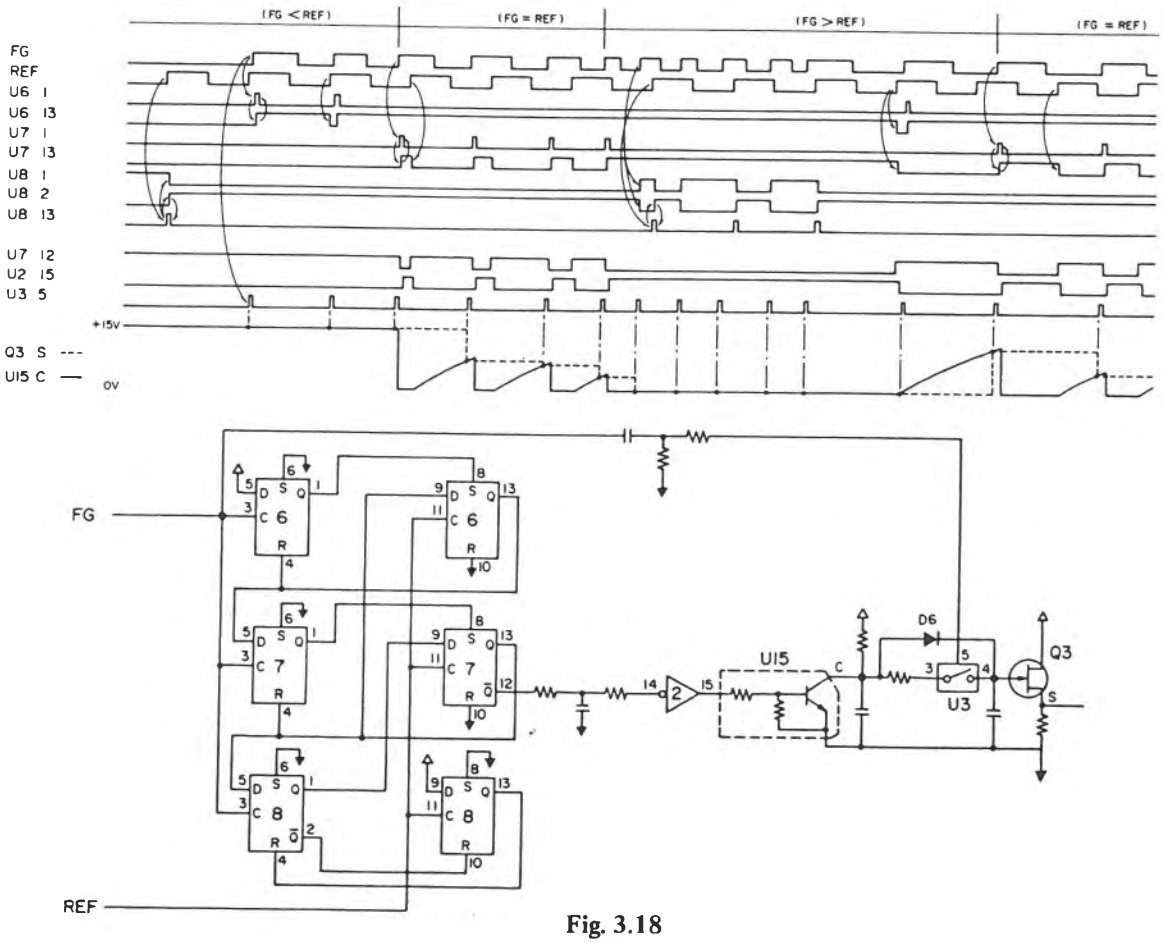


Fig. 3.18

4. ADJUSTING PROCEDURE

4.1. Test Equipment Required

Spring scale 0 ~ 4 Kg. (0 ~8 lbs.)
0 ~ 300g. (0 ~ 10 ozs.)
Wow and Flutter Meter
Audio Oscillator
Frequency Counter
Band-pass Filter
AC Volt Meter (Level Meter)
Distortion Meter
Oscilloscope
Test Tape For reproduce alignment : Fostex Model 9200
For speed, Wow and Flutter measurement: Fostex Model 9201 (or equivalent)
Blank Tape: Ampex 456 is recommended
Empty Reel : Small (2 inch) Hub Type
Tape Tension Gauge: Tentel Model T2-H20-ML
Extension Card : Fostex P/N 8273530000
R/P Card Extraction Jig (to pull out the R/P Card) : Fostex P/N 8214180000

4.2 Transport Check and Adjustment

Note. When dismounting "Panel, transport, G" (P/N 8220633000), dismount "Guide, tension roller, G (P/N 8212262000), "Pinch roller, B, ½" (P/N 8260203102), and "Panel, loading," (P/N 8220634200) first for easy dismounting.

4.2.1. Position of Brake Arm

The distance between Brake Arm (2) and Brake Slider (7) must be in 1 ± 0.5mm as shown in Fig. 4.1 below. The distance can be adjusted by adjusting the position of Brake Arm (2) with two screws (5).

4.2.2. Brake Torque

The brake torque is applied mechanically. The 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 alcohol.
Brake adjustment is made with no power to G16.

1) Place an empty 2" hub reel on the left reel table, and fasten one end of a 30" (1m) length of twine to the reel anchor.

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

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

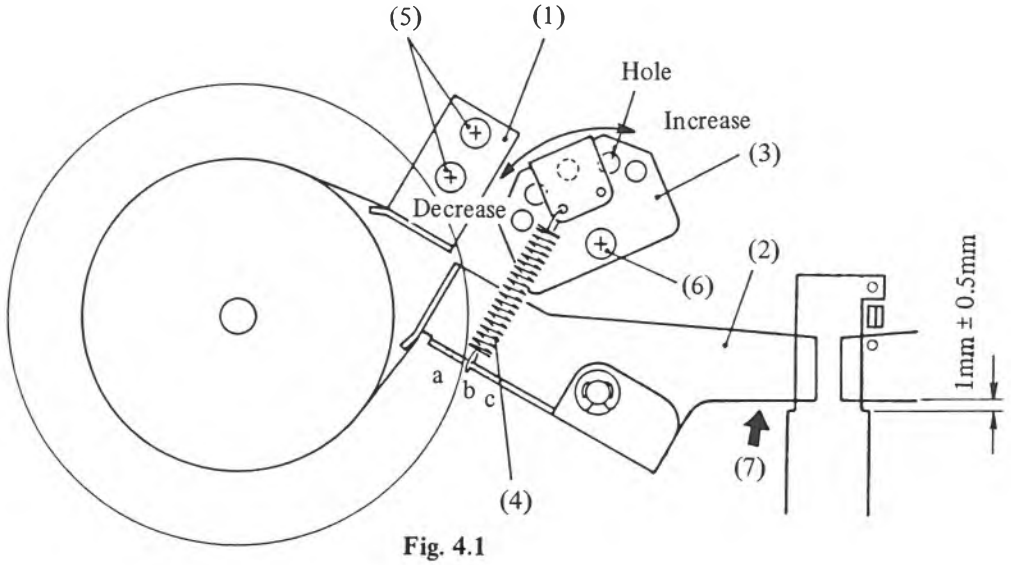
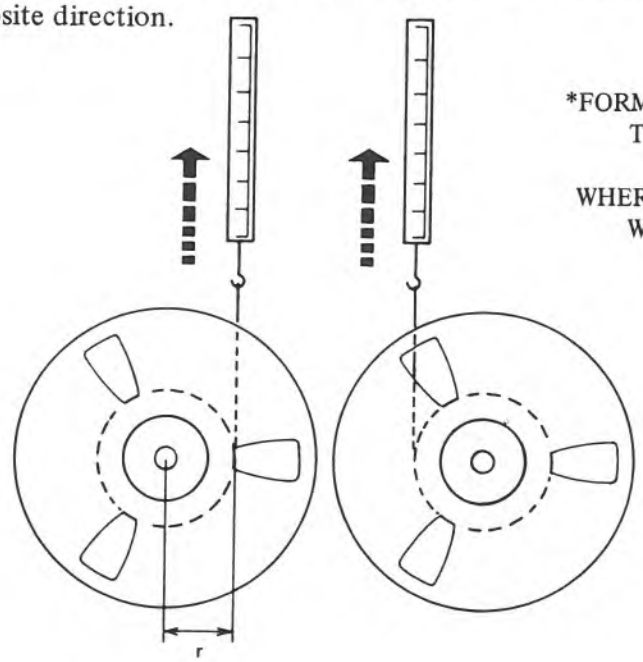


Fig. 4.1

4) The reading should be 1200 ~ 1800 g-cm (17 ~ 25 in. oz), and the difference of the torque at brake L and R is less than 20%.

5) If adjustment is required, loosen screw (6) of Fig. 4.1, and rotate the bracket (3) of Fig. 4.1. Rotate it to the right if torque is low and to the left if it is high for brake L.

6) The adjustment of brake R is the same with the exception that rotations are clockwise (wind string CLOCKWISE around the reel hub), and the rotation of the bracket is in opposite direction.



*FORMULA FOR TORQUE CALCULATION

$T\ (g\text{-}cm/in.oz) = R \times W$

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

Fig. 4.2

4.2.3. Pinch Roller Pressure

Pinch roller pressure is applied by the Pinch Roller Pressure Spring only.

1) Secure the left or right shut off arm in the ON position (tension arm raised) without loading a tape on the transport.

2) Attach a suitable spring scale to the pinch roller shaft with a short loop of twine. (shown in Fig. 4.3.)

3) Put the G16 in the PLAY mode, and positioning the scale as illustated in Fig. 4.3, slowly draw it in the direction opposite the capstan until the pinch roller stops rotating as shown in the Fig. 4.3.

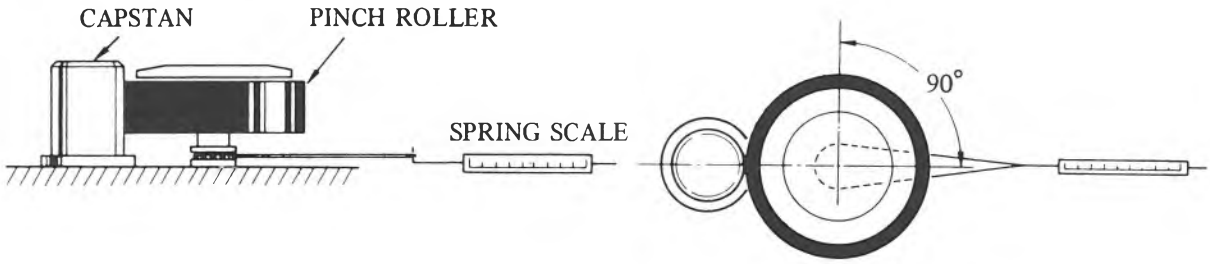


Fig. 4.3

4) The spring scale should inidcate 2.5 ~ 3.0 Kg. (5.5 lbs ~ 6.6 lbs).

5) If the reading is off specification, loosen the screw ② and move the Bracket, Spring ① in direction of arrow shown in Fig. 4.4.

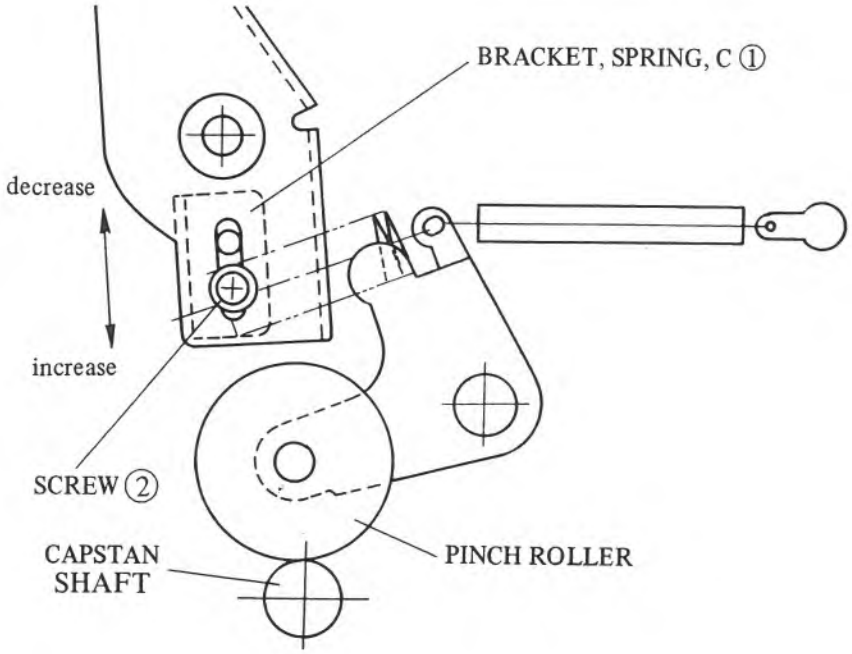


Fig. 4.4

4.2.4 Tension Roller Height Adjustment

If the tape travel is unsatisfactory due to a misaligned tension roller, its height must be corrected.

Load a tape and put the G16 in F. FWD and also in RWD modes.
If the tape moves up and down on the Guide roller (take up side) and the Footage roller (supply side) as shown in the Fig. 4.5 when repeated F. FWD and RWD modes, in other words, the position of tape path on the Rollers at F. FWD and RWD modes becomes different, the height of Tension arm will have to be adjusted by loosening the screw ① shown in the Fig. 4.5.
After the Tension arm height adjustment is completed, put the G16 in PLAY mode and confirm if the tape is travelling in the middle of the Reel.
If the Reel height adjustment is necessary, add or reduce the number of spacers (Spacer, reel table P/N 8220519001) placed between the Reel drum and Reel table.

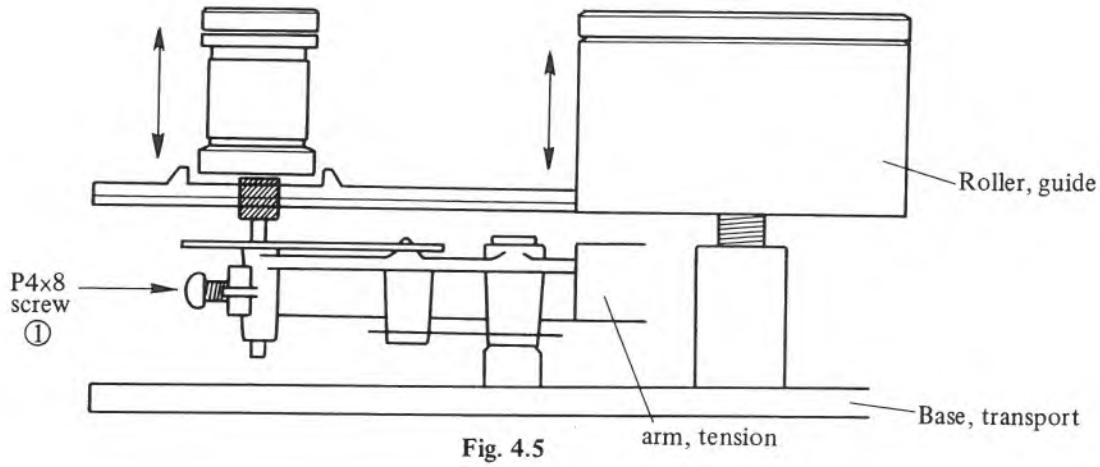


Fig. 4.5

4.2.5 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 the top of the guide with a 3mm box wrench while running a tape over a guide.

4.2.6 Reel Servo

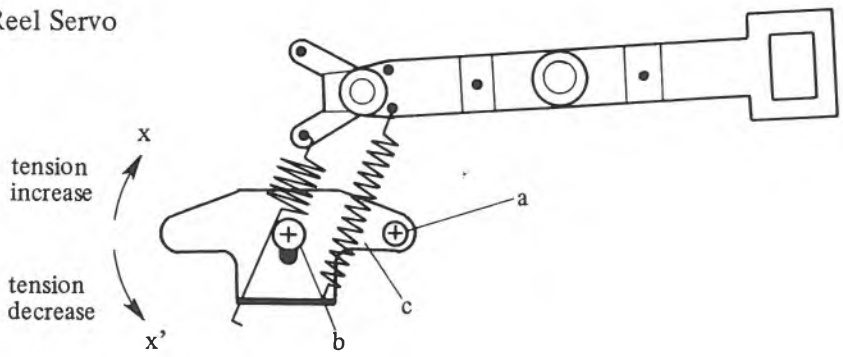


Fig. 4.6

4.2.6.1 Tools required for adjustment

Oscilloscope
Tape tension gauge : Tentel Model T2-H20-ML
Blank tape : 1/2'' width, Ampex 456

4.2.6.2 Procedure

1) Loosen the screws (a) and (b).

2) Tighten the screws (a) and (b) to hold the bracket (c) horizontally.

3) However, in case the optimum tension value cannot be obtained by adjusting the pots R1 thru R6 in the following tension adjustment procedures, loosen the screw (a) and (b) and adjust the position of the Tension arm bracket for x direction or x' direction for optimum tension value.
If the Tension arm bracket is adjusted too far x' direction, the shut off circuit may be activated.

4.2.6.3 Tape Tension Adjustment

Tape tension measurement will slightly differ due to scattered calibration figures of the tension gauge and ambient temperature differences from that at manufacture of the gauge. If the measurement is only for checking, it will be sufficient if preparations are made as in Item 4.2.6.4 and checked as explained in Item 4.2.6.9.

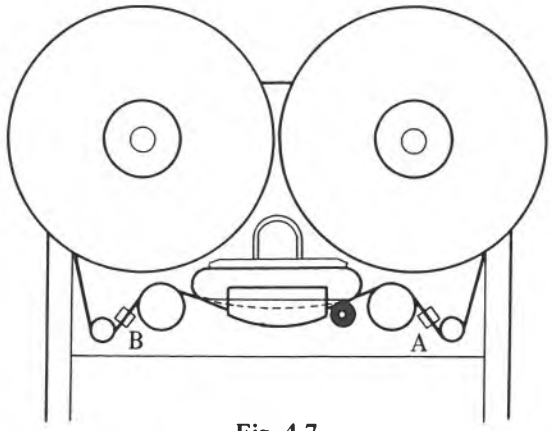


Fig. 4.7

4.2.6.4 Preparation

1) Load 10-½ inch reels wound with about the same amount of tape on both left and right reel turntables.

2) Disconnect the connector J4 on the DD CAPSTAN PCB to prevent the capstan motor from rotating.

3) Put the G16 in the 2nd mode by depressing the STO (store) button while holding down the RCL (recall) button. Then, put the G16 in MECHANISM-ADJUST mode by depressing the STOP button on the Controller while holding down the HOLD (hold) button.

4) With putting G16 on the horizontal position, pull the "Panel Lock Release Knob" on the Controller down to open up the Controller panel. (open the Controller panel fully to see and calibrate the pots of TENSION POD PCB) (shown in Fig. 4.8).

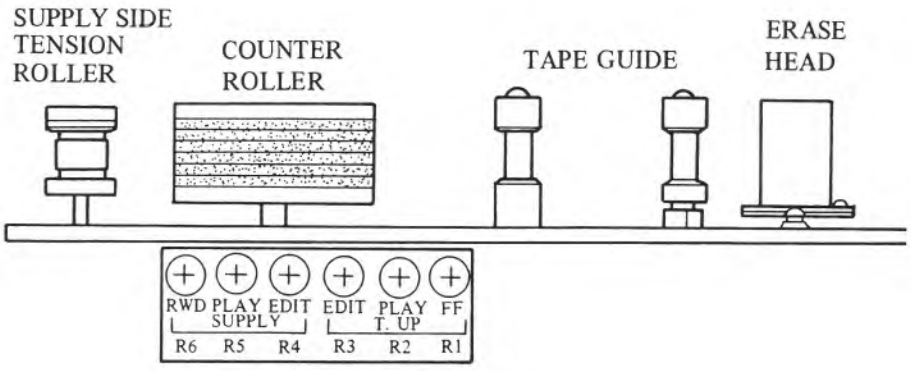


Fig. 4.8

4.2.6.5. At EDIT Mode

1) Under the MECHANISM-ADJUST mode, depress the STOP button on the main unit and put transport in the EDIT mode.

2) Insert the tension gauge at point "A" (shown in Fig. 4.7) and set R3 (EDIT-T. UP) for the reading of tape tension of 60g. Next, insert the tension gauge at point "B" and set R4 (EDIT-SUPPLY) so that the reading of tape tension is 60g.

4.2.6.6 At PLAY Mode

1) Put the transport in the PLAY mode by depressing the PLAY button on the main unit.

2) Set R2 (PLAY-T. UP) so that the reading of tape tension at "A" is 115g. In the same way, set R5 (PLAY-SUPPLY) so that the reading of tape tension at "B" is 80g.

4.2.6.7 At Fast Winding Mode

1) Put the transport in the F.FWD mode by depressing the F. FWD button on the main unit.

2) Set R1 (FF) so that the reading of tape tension at "A" is 240g.

3) Put the transport in the RWD mode by depressing the REWIND button on the main unit.

4) Set R6 (RWD) so that the reading of tape tension at "B" is 240g.

4.2.6.8 At EDIT mode

1) Put the transport into STOP mode by depressing STOP button on the main unit.

2) Depress CLR (clear) button of the controller to release the MECHANISM-ADJUST mode.

3) With putting G16 on the vertical position, put the connector J4 back on the DD CAPSTAN PCB.

4.2.6.9 Checking the Tape Tension (refer to Fig. 4.7)

1) Put the G16 in the MECHANISM-ADJUST mode (refer to 4.2.6.4 3))

2) Put the transport in the EDIT mode by depressing STOP button on the main unit.

3) Check the tension at "A" adn "B". Tension at "A" and "B" should be 45 ~ 65g. And the difference of the tension between at "A" and "B" should be less than 5g.

4) Put the transport in the PLAY mode by depressing the PLAY button on the main unit. And confirm that tension at "A" is 105g ± 5g and tension at "B" is 90 ± 5g. (Caution: since the capstan motor rotates at a speed of 3 ¾ ips in the MECHANISM ADJUST mode, T.UP side tension should be 10g lower than the adjusted value in item 4.2.6.6, and supply side tension should be 10g higher than the adjusted value in item 4.2.6.6.

5) Put the transport in the F.FWD or RWD mode by depressing the F.FWD or REWIND button on the main unit. Each tension at "A" or "B" should be 240 ± 10g.

6) Depress the CLR (clear) button to release the "MECHANISM-ADJ" mode.

7) Put the transport in EDIT mode by depressing the EDIT button of the G16. Then, confirm that both T.UP reel and SUPPLY reel are in a steady state at the beginning of the tape and at the end of the tape. Also confirm if the tape travels are made smoothy for backward and when rotating the "JOG (EDIT) DIAL"

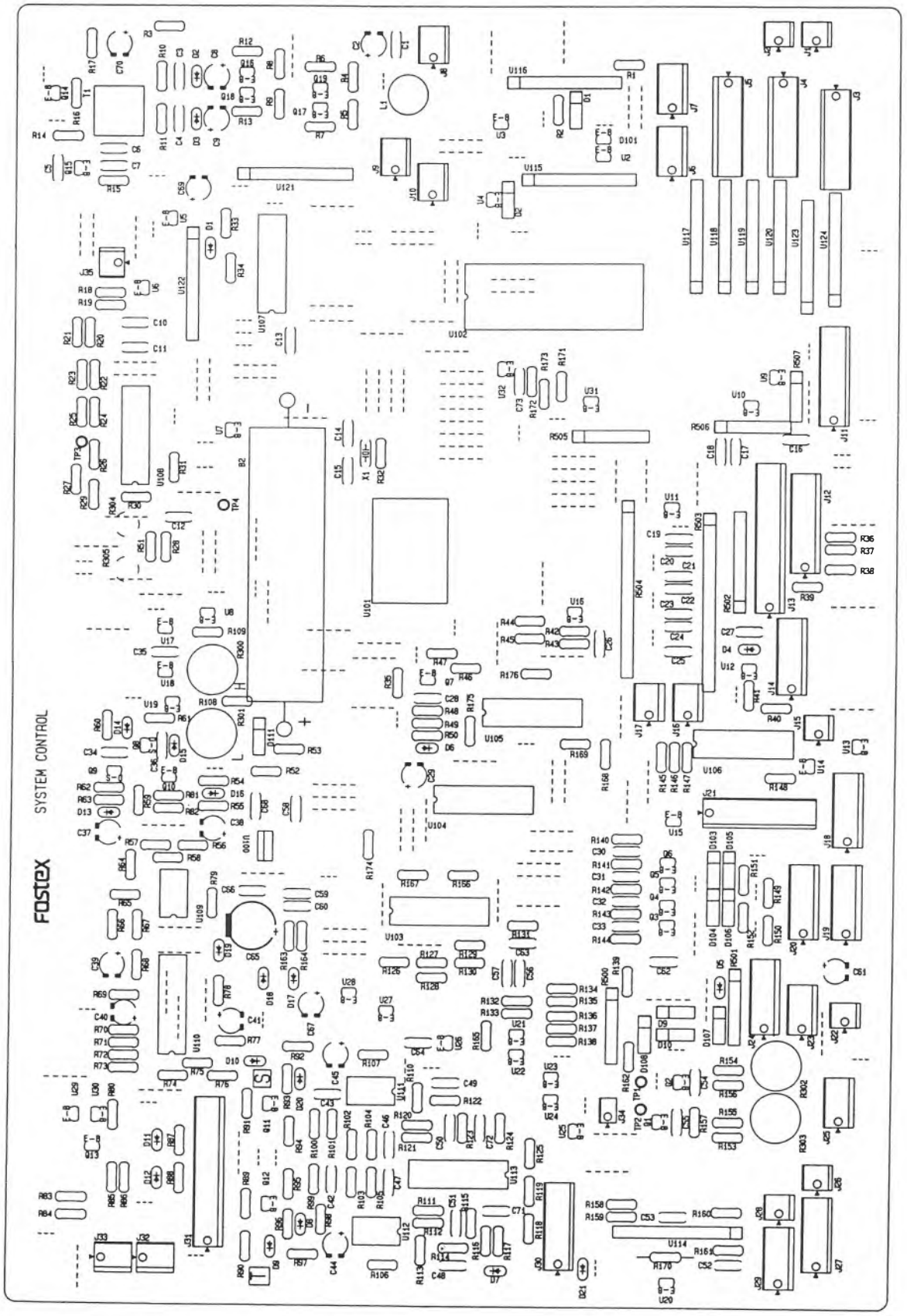


Fig. 4.9

4.2.6.10 Adjusting the Count Pulse Duty and Fast Winding Speed.

1) Swing open the SYSTEM CONTROL PCB by taking two screws out.

2) Rotate the R300 (H) fully CCW from the parts side of the PCB.

3) Put transport in the F. FWD or RWD mode.

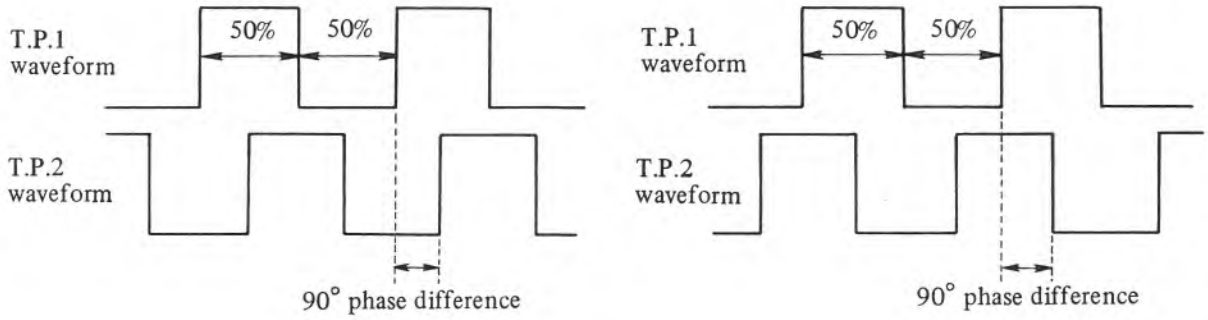
4) Monitor the testpoint 1 waveform with an oscilloscope.

5) Adjust R302 on the SYSTEM CONTROL PCB for a 50% duty of the testpoint 1 waveform (shown in Fig. 4.10)

6) Monitor the testpoint 2 waveform with an oscilloscope.

7) Adjust R303 on the SYSTEM CONTROL PCB for a 50% duty of the test point 2 waveform. (shown in Fig. 4.10)

8) Confirm that there is 90° (degree) phase difference between test point 1 waveform and test point 2 wave form during the F. FWD or RWD mode. (shown in Fig. 4.10)



F. FWD mode RWD mode

Fig. 4.10

9) Monitor the test point 1 waveform with an oscilloscope.

10) Put transport in F. FWD or RWD mode.

11) Adjust R300 (H) so that testpoint 1 wave length at maximum speed (winding the beginning of the tape in F. FWD or winding the end of the tape in RWD) is 0.65 msec. And confirm that the difference of the maximum winding speed in F. FWD and in RWD should be within 0.03 msec.

12) Holding the [F. FWD] or [REWIND] button of the controller down.

13) Adjust R301 (L) so that test point 1 wave length is 16 msec at the middle of the tape. And confirm that the difference of the winding speed in F. FWD and in RWD should be within 1 msec.

4.2.6.11 Adjusting the Reel Pulse Duty

1) Put transport in the F. FWD or RWD mode.

2) Adjust R304 on the SYSTEM CONTROL PCB for a 50% duty of the test point 3 waveform.

3) Adjust R305 on the SYSTEM CONTROL PCB for a 50% duty of the test point 4 waveform.

4.2.7 DD Capstan Servo Adjusting Procedure

4.2.7.1 Lock duty adjusting

1) Connect the oscilloscope probe to TP-2 on the DD CAPSTAN PCB.

2) Set transport in the PLAY mode and adjust R85 and R86 so that a square wave appears at TP-2.

3) Switch ON the PITCH CONT button and while watching the waveform of TP-2 on the oscilloscope, vary the SPEED by rotating the PITCH CONT KNOB from maximum through minimum. If the square wave duty changes as shown in Fig. 4.11, rotate R86 clockwise (CW), looking at it from the component side of the DD CAPSTAN PCB, so that duty is about 50%. If the waveform is opposite to that in Fig. 4.11, then rotate R86 for a less than 50% waveform and R85 for a 50% duty.

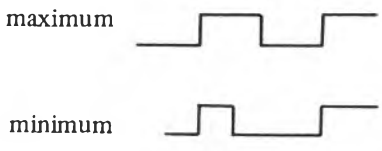


Fig. 4.11

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

4.2.7.2 Centering the Magnet FG and the Print Coil

This procedure is done at the factory and must not be done at routine maintenance and servicing.
When wow and flutter is extremely bad, it could be that the FG magnet and print coil are off center and therefore should be adjusted as follows:

1) Thread the Speed Tape (3KHz or 3150Hz) on the transport.

2) Loosen screws A and B just enough to allow shifting the PCB print coil.

3) Connect a wow and flutter meter to the reproduce output.

4) Put the transport in the PLAY mode and while reading the wow and flutter meter, slowly shift the PCB print coil to search for least amount of wow.

5) Carefully tighten screws A and B while checking the wow and flutter meters' best reading.

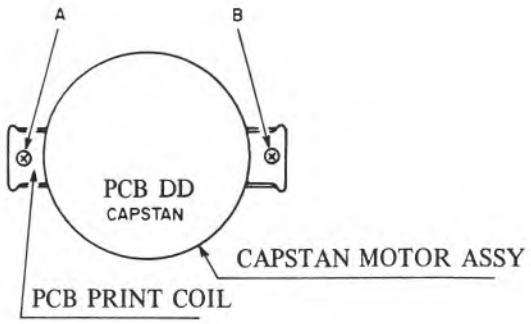


Fig. 4.12

6) It is considerd as a normal condition if the value of the WOW & FLUTTER is measured as ±0.05% peak WTD (IEC/ASI) or less.

4.2.7.3 Adjusting the PITCH CON. Oscillator

1) Depress [RCL] (recall) button and then [PITCH] button on the Controller to see the "PITCH" display.

2) Turn the FRONT/REAR sw on the rear panel to REAR. (at this condition, PITCH CON. VR. on the Controller is not in operative condition.

3) Depress the [PITCH] button again and then PITCH LED starts blinking. In this condition,

confirm that even if rotating the PITCH CON. KNOB, the PITCH value on the display never varies.

4) Adjust R87 on the DD CAPSTAN PCB assy so that the "PITCH" value on the display shows "0.0" ("-0.0" is no good).

5) Turn the FRONT/REAR SW to FRONT. Then, rotate and fix the PITCH CON. KNOB at the center position.

6) Adjust R101 on the CONTROLLER PCB (there is a holl provided on the back side of the Controller to rotate the pot) so that PITCH value shows "0.0".

ADJUSTMENT ITEMS		REF. CLAUSE
EDIT TENSION (T. UP)	EDIT R3 (4.7KΩB) on the TENSION POD PCB	4.2.6.5
EDIT TENSION (SUPPLY)	EDIT R4 (4.7KΩB) ↑	4.2.6.5
PLAY TENSION (T. UP)	PLAY R2 (47KΩB) ↑	4.2.6.6
PLAY TENSION (SUPPLY)	PLAY R5 (100KΩB) ↑	4.2.6.6
F.F. TENSION	F F R1 (22KΩB) ↑	4.2.6.7
RWD TENSION	RWD R6 (22KΩB) ↑	4.2.6.7
COUNT PULSE DUTY	R302 (33KΩB) on the SYSTEM CONTROL PCB	4.2.6.10
COUNT PULSE DUTY	R303 (33KΩB) ↑	4.2.6.10
WINDING SPEED H	H R300 (100KΩB) ↑	4.2.6.10
WINDING SPEED L	L R301 (330KΩB) ↑	4.2.6.10
REEL PULSE DUTY L	R304 (47KΩB) ↑	4.2.6.11
REEL PULSE DUTY R	R305 (47KΩB) ↑	4.2.6.11
PITCH CONTROL ADJ	R87 (1KΩB) on the D.D. CAPSTAN PCB	4.2.7.3
PITCH CONTROL ADJ	R101 (10KΩB) on the CONTROLLER PCB	4.2.7.3

4.3 Record / Reproduce Amplifier Checks and Adjustments

4.3.1 Checking and Adjusting of Head

The following adjustment should be proceeded after the checks and Adjustments described as section 4.2 have been completed.

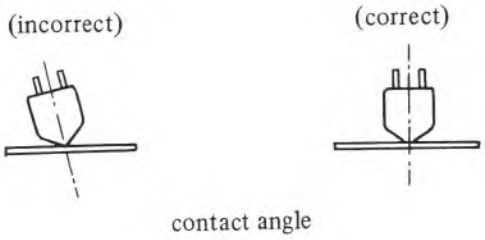
1) Connect a level meter and an oscilloscope to OUTPUT jack 1 and 16 for observing a

lissajous waveform.

2) Tangency adjustment

If the head gap does not face the tape correctly as shown in the drawing below, a correct recording and/or playback level cannot be obtained.

And also there is considerable deterioration occurs in the high frequency range.



Load a Reproduce Alignment tape, Fostex Model 9200 and playback the 12.5KHz section. And then, adjust the tangency screws as shown in the Fig. 4.13 so that the reading of played back 12.5KHz level will be the maximum. This is the point where the head gap faces the tape correctly.

3) Height/Tilt adjustment

The head height/tilt adjustment can be done with the two screws shown in the Fig. 4.13.

3)–1) Height adjustment

Incorrect adjustment of the head height will result in degraded Erasure, Crosstalk etc. The adjustment is as follows

Erase head . . . Head core edge slightly protrudes beyond the tape edge.

R/P head . . . . Head core edge slightly recessed within the tape edge (core edge cannot be seen).

3)–2) Tilt adjustment

Tilt adjustment means that the head surface is so adjusted as to be parallel with the tape surface.

Improper tilt adjustment will cause a difference in pressure being applied to the head between the upper and lower edge of the tape.

Consequently, the head is apt to become worn into a trapezoid form.

Therefore, the head must be so adjusted that the head surface is parallel with the tape guide adjacent to it.

4) Azimuth phase adjustment

Load a Reproduce Alignment Tape, Fostex Model 9200 and playback the Head Azimuth and Frequency Response section of the test tape.

The Azimuth and Phase can be adjusted with the adjusting screw as shown in the Fig. 4.13.

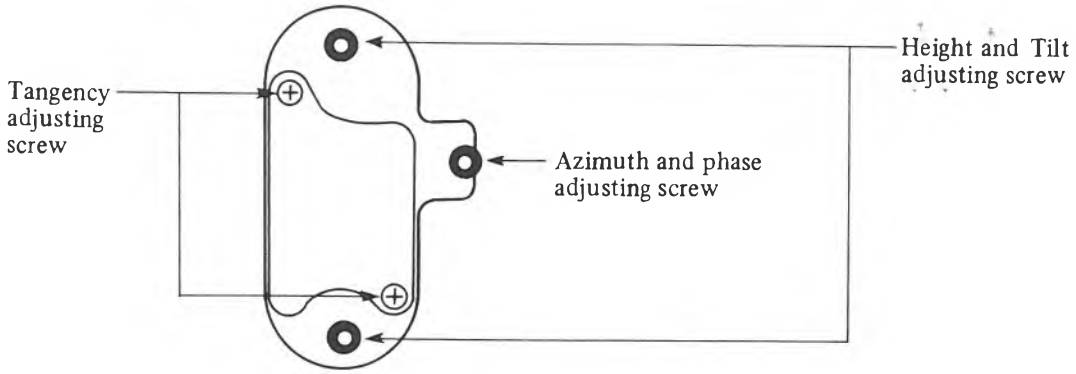
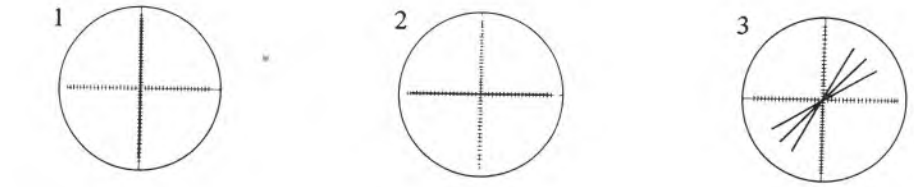


Fig. 4.13

Adjust the Azimuth and Phase Adjusting Screw for maximum reading on all sixteen LED bargraph meters of the recorder.

Then, set the oscilloscope to XY mode to obtain a lissajous waveform to check the phase.



Trace for vertical input alone

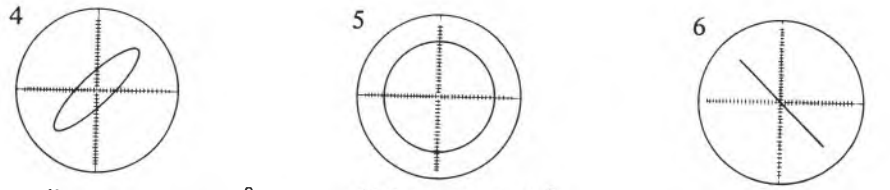
Trace for horizontal input alone

Unequal levels

Fig. 4.14

If the trace length between (X) and (Y) are not the same, it means that the two inputs to the oscilloscope are not of the same level. Correct for equal lengths by the oscilloscope controls.

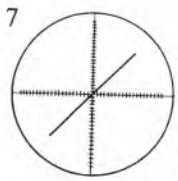
If the playback head azimuth is out of alignment, the following patterns will result:



(A small misalignment 30° out of phase)

(A larger error 90° outof phase)

(A big one, 180° out of phase)



(Perfect azimuth 0°, in phase)

Fig. 4.15

As a result of phase check with a 12.5KHz signal, the adjustment is finished if the difference in phase is less than 90 degrees between tracks, and azimuth adjustment is at the best point.

Note: Restoring the cumulative play time

When replacing the R/P head with new one for overhaul or replacing the SYSTEM CONTROL PCB assy for repair, restoring the cumulative play time is required.
The method of restoring the cumulative play time is as follows.

1) Turn off the power of the G16.

2) While holding down the ERASE ON, SPOT ERASE and EDIT buttons on the main unit, turn on the power of the G16.

(Refer to the G16 owner's manual, "2nd mode function" for the cumulative play time.)

4.3.2 Input Level and Meter Level Calibration

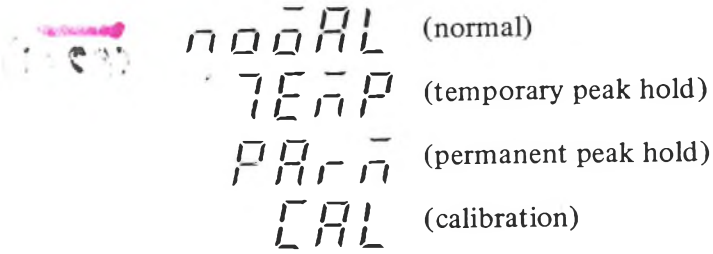
1) Put Dolby NR ON/OFF switch to "OFF" position and put Input Monitor Button to on position so that the R/P amp enters into Input Monitor mode.

2) Plug in an audio oscillator output to the recorder connector panel INPUT jack 1 and apply a 1KHz, -10dBV (0.3V) signal.

3) Connect a level meter to test point TP-4 on the TRACK 1 of the R/P amplifier PCB Assy, and adjust REC CAL (R203) so that the level here is 245mV (-12.2dBV).

4) On completing the above adjustments, connect the level meter to OUTPUT jack 1 on the rear panel and check that the level here is -10dBV (0.3V) ±1dB.

5) After checking the OUTPUT jack 1 level, depress the [RCL] (recall) and [METER] (meter) key on the Controller. Then depress the [·] (period) key to select the "CAL" mode. The Memory Display changes the meter mode to



(normal)
(temporary peak hold)
(permanent peak hold)
(calibration)

by depressing the [·] (period) key every time. To memorize the "CAL" mode, depress the [STO] (store) and then [METER] key. And adjust METER CAL (R206) for a 0dB reading on the recorder LED bargraph meter.

6) Calibrate tracks 2 ~ 16 in the same way.

7) Put the meter mode back to "normal" mode.

4.3.3 Reproduce Level Calibration

1) Put Dolby NR ON/OFF SW to OFF position.

2) Playback the Reference Level Section (1KHz, -10dBV) of the Reproduce Alignment Tape, such as Fostex Model 9200 test tape.

3) Connect a level meter to test point TP-4, on the TRACK 1 of the R/P amplifier PCB Assy, and adjust REP LVL (R202) so that the level is 245mV (-12.2dBV).

4) After these adjustments, connect the level meter to the recorder rear panel OUTPUT jack 1 and check that the level is -10dBV (0.3V) ±1dB.

5) After checking of the OUTPUT jack level, confirm that the meter reading is 0dB ±1dB. If the reading is not 0dB ±1dB, repeat the adjustments in the previous section, Item 4.3.2.5.

6) Calibrate tracks 2 ~ 16 in the same way.

4.3.4 Checking the Reproduce Frequency Response

1) Put Dolby NR ON/OFF SW to OFF position.

2) Playback the Frequency Response section of the Reproduce Alignment Tape.

3) Plug in a level meter to the OUTPUT jack.

The normal playback frequency response should be within ±3dB for a frequency range of 40Hz ~ 18 KHz. If it is not within the spec, adjust REP EQ (R201).

4.3.5 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 (U6)

To check bias leakage of TRACK 1, the oscilloscope probe is hooked to TP-2 and the probe ground clip to the GND pin. Put TRACK 1 in the reproduce mode, the adjacent TRACK 2 in the record mode and check bias leakage at TP-2.

It is considered as a normal condition if the bias leakage level is less than 280mV$_{p-p}$ (−20 dBV).

(At checking TRACK 2, put adjacent TRACK 3 in the record mode).

If the bias leakage level is higher than the spec, it is adjusted to the minimum bias leakage level by rotating the center core of U6. But before doing this, check the frequency (100 KHz ± 0.5 KHz) of the erase/bias master oscillator. To check the oscillator frequency, pull out the R/P card of the G16, and check the frequency at connector J 2-7 on the Connector Board PCB.

2) Record bias trap module (U10)

To check bias leakage of TRACK 1, the oscilloscope probe is hooked to TP-5 and the probe ground clip to GND pin. Put TRACK 1 in the record mode and check bias leakage at TP-5.

It is considered as a normal condition if the bias leakage level is less than 1.1V$_{p-p}$ (−8dBV).

If the bias leakage level is higher than the spec, it is adjusted to the minimum bias leakage level by rotating the center core of U10. But before doing this, check the frequency (100KHz ± 0.5KHz) of the master oscillator. To check the oscillator frequency, pull out the R/P card of the G16, and check the frequency at connector J2-7 on the Connector Board PCB Assy.

4.3.6 Erase Current Adjustment

1) In adjusting the erase current, put all the 16 tracks in the record mode.

2) Rotate all the 16 tracks of the ERASE LVL pot (R207) fully CW.

3) To adjust TRACK 1, for example, hook the hot side of the oscilloscope probe to TP-6 and ground clip of the probe to GND pin.

4) Set the core of T-1 (ERASE ADJ) so that voltage at TP-6 reaches the peak level point.

5) Then adjust ERASE LVL (R207) so that the voltage at TP-6 is 85mVp-p or 30mVr.m.s. (−30dBV).

6) Calibrate tracks 2 ~ 16 in the same way.

4.3.7 Bias Current Adjustment

Put all 16 tracks in the record mode.
Hook the oscilloscope probe hot side to TP-1, and the ground clip to the GND pin.
Then, set the BIAS LVL pot, C101, at approximately 300mVp-p or 100mV r.m.s. over the peak point.

Note: As a non-stopper type Trimmer is used for BIAS LVL adjustment, it might give you a confusion if it is under the peak BIAS point or over the peak BIAS point. Therefore, the adjustment position of the Trimmer should be set as shown in the Fig. 4.16 below.

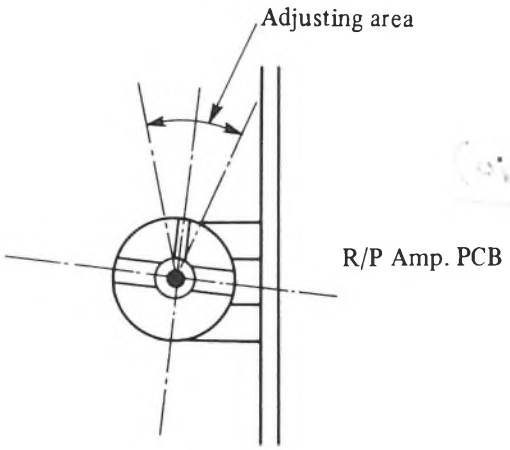


Fig. 4.16

4.3.8 Record Level Calibration

1) Put Dolby NR ON/OFF SW to OFF position.

2) Load the blank tape (Ampex 456) on the transport and apply an audio oscillator output of 1KHz, -10dBV (0.3V) to the INPUT jack on the recorder connector panel.
Also, plug in a level meter to the OUTPUT jack.
Taking 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 thus in the record mode, the meter will indicate the input level regardless of the position of the INPUT MON button. Check to see that the reading of this meter is 0dB, ±1dB.

4) After recording a certain length of 1KHz, -10dBV signal, rewind tape to the starting point, put the transport in the PLAY mode and check the output level. The INPUT MON switch

must be at INDIV.
It is considered as a normal condition if the output level is -10dBV ±1dB.
If it is off spec, correct by adjusting REC LVL (R204).
Calibrate tracks 2 ~ 16 in the same way.

4.3.9 Overall frequency response

1) With the connector panel NR ON/OFF switch at OFF and under the measurement setup of the previous Section 4.3.8, apply signals from 40Hz through 18KHz at -10dBV (0.3V) to the recorder INPUT jack. To adjust TRACK 1, for example, apply the signal to INPUT jack 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 point, and playback the tape. It is considered as a normal condition if the frequency response in reference to 1KHz is within ±3dB. If it does not fall within spec in the high frequency region, correct it by a slight rotation of REC EQ (R205).

2) Check and adjust tracks 2 ~ 16 in the same way.

3) Then put the Dolby NR ON/OFF SW to ON position. Apply signals from 250Hz through 14KHz at -35dBV (18mV r.m.s.) to the recorder INPUT jack. Record and playback the certain length of the signal. It is considered as a normal condition if the frequency response is within ±3dB between 250Hz and 10KHz, and within ±5dB when the higher end is 14KHz. If it does not fall within spec in high frequency region, correct it by a slight rotation of REC EQ (R205).

4.3.10 Overall S/N Measurement

1) Put NR ON/OFF switch to ON.

2) Upon completing checks up to Section 4.3.9 apply a 1KHz, -10dBV (0.3V) signal to the connector panel INPUT jack 1, for example, and 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 tape.

3) Plug a level meter into OUTPUT jack 1 and playback the recorded signal section to measure the noise level of the no-signal section against the 1KHz reference level. Calculate the difference between noise level and reference level, add 10dB to it and obtain the ratio between peak recording level and noise level.
Specification: 80dB weighted, 60dB unweighted

4.3.11 T.H.D. Measurement

1) Put NR ON/OFF switch to ON.

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 it is not within spec, demagnetize the head, check the bias trap adjustment and record level.
If it still does not fall within spec after making the corrective measures above, readjust the bias current by the procedures in Section 4.3.7.

4) When the Section 4.3.7 adjustments are made, it is necessary to go through procedures in Sections 4.3.8 and 4.3.9.

4.3.12 Erasure Measurement

1) Put NR ON/OFF switch to OFF.

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 the start point of the recording, playback the tape and insert a 1KHz band-pass 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. It is considered as a normal condition if Erasure is higher than 70dB.

5) If it is off the spec, increase Erase current about 10% by the procedure of Section 4.3.6.
Monitor the Erase current waveform on the oscilloscope at adjusting 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. And check the Head touch condition of tape.

4.3.13 Sync Crosstalk Check and Adjustment

1) Sync crosstalk is the relative figure, against the reference level, on how much of the

recording signal from the track in the recording mode is leaking into the track being reproduced.
When sync crosstalk is excessively high, playback output during overdubbing will sound muddy by effect of the recording signal leakage or cause oscillation at ping-pong recording (where the playback output is transferred to another track).

2) Put NR ON/OFF switch to OFF.

3) Open the Controller Panel up, and take the "Panel Extension" out by unscrewing two screws.

4) Prepare the insulated, long size screw driver to rotate the SYNC CROSSTALK CANCELLER POTS.

5) Rotate the TRACK 1 SYNC CROSSTALK CANCELLER POT (R101) on the CONNECTOR BOARD PCB Assy to a point slightly CCW from the center position.

6) Turn the RECORD TRACK SAFE/READY SELECTOR of TRACK 1 to "SAFE" position.

7) Rotate the TRACK 2 SYNC CROSSTALK CANCELLER POT (R102) to a point slightly CW from the full CCW position.

8) Plug in an audio oscillator output to the recorder connector panel INPUT jack 2 and apply a 1KHz, -10dBV (0.3V) signal.

9) Plug in a level meter to the recorder connector panel OUTPUT jack 1, and put TRACK 2 in the REC mode.

10) Rotate the TRACK 2 SYNC CROSSTALK CANCELLER POT (R102) CW slowly and fix it at a point 3 ~ 5 dB above minimum point to obtain minimum sync crosstalk in the high frequency region.

11) Measure the OUTPUT level of TRACK 1 while sweeping the test signal frequency 20 ~ 20KHz. It is considered as a normal condition if the leaking level is less than -35dBV (18mVr.m.s.) at 1KHz and less than -4dBV (625mV r.m.s.) at worst peak point in high frequency region.

12) The remaining tracks 2 ~ 16 are adjusted in the same way.

The crosstalk from	TRACK	3	to	TRACK	2	is adjusted by R103
"		4	"		3	" R104
"		5	"		4	" R105
"		6	"		5	" R106
"		7	"		6	" R107
"		8	"		7	" R108
"		9	"		8	" R109
"		10	"		9	" R110
"		11	"		10	" R111
"		12	"		11	" R112
"		13	"		12	" R113
"		14	"		13	" R114
"		15	"		14	" R115
"		16	"		15	" R116

4.2.8.14 Table of Adjustment Items and the Location/Typical Adjustment position of Pots on the R/P Amp.

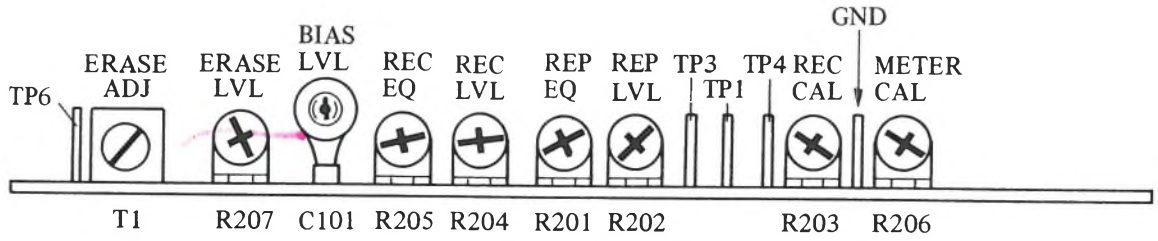


Fig. 4.17

ADJUSTMENT ITEMS	ADJUSTING PART	REF. CLAUSE
INPUT LEVEL	REC CAL (R203), 10KΩB	4.3.2
METER LEVEL	METER CAL (R206), 47KΩB	4.3.2
REPRO LEVEL	REP LVL (R202), 10KΩB	4.3.3
REPRO F RESPONSE	REP EQ (R201), 4.7KΩB	4.3.4
REPRO BIAS LEAKAGE	REPRO BIAS TRAP (U6)	4.3.5
REC BIAS LEAKAGE	REC BIAS TRAP (U10)	4.3.5
ERASE CURRENT	T-1, ERASE LVL (R207, 10KB)	4.3.6
BIAS CURRENT	BIAS LVL (C101)	4.3.7
REC LEVEL	REC LVL (R204), 4.7KΩB	4.3.8
OVERALL F RESPONSE	REC EQ (R205), 10KΩB	4.3.9
SYNC CROSSTALK	X'TALK ADJ (R101-R116), 220ΩB ON CONNECTOR BOARD PCB	4.3.13

5. EXPLODED VIEW, PCB ASSEMBLY AND PARTS LIST

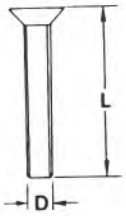
ASSEMBLING HARDWARE CODING LIST

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:

B M 3 x 6

- Length in mm (L)
- Diameter in mm (D) *
- Metric System
- Nomenclature



* Inner dia. for washers and nuts

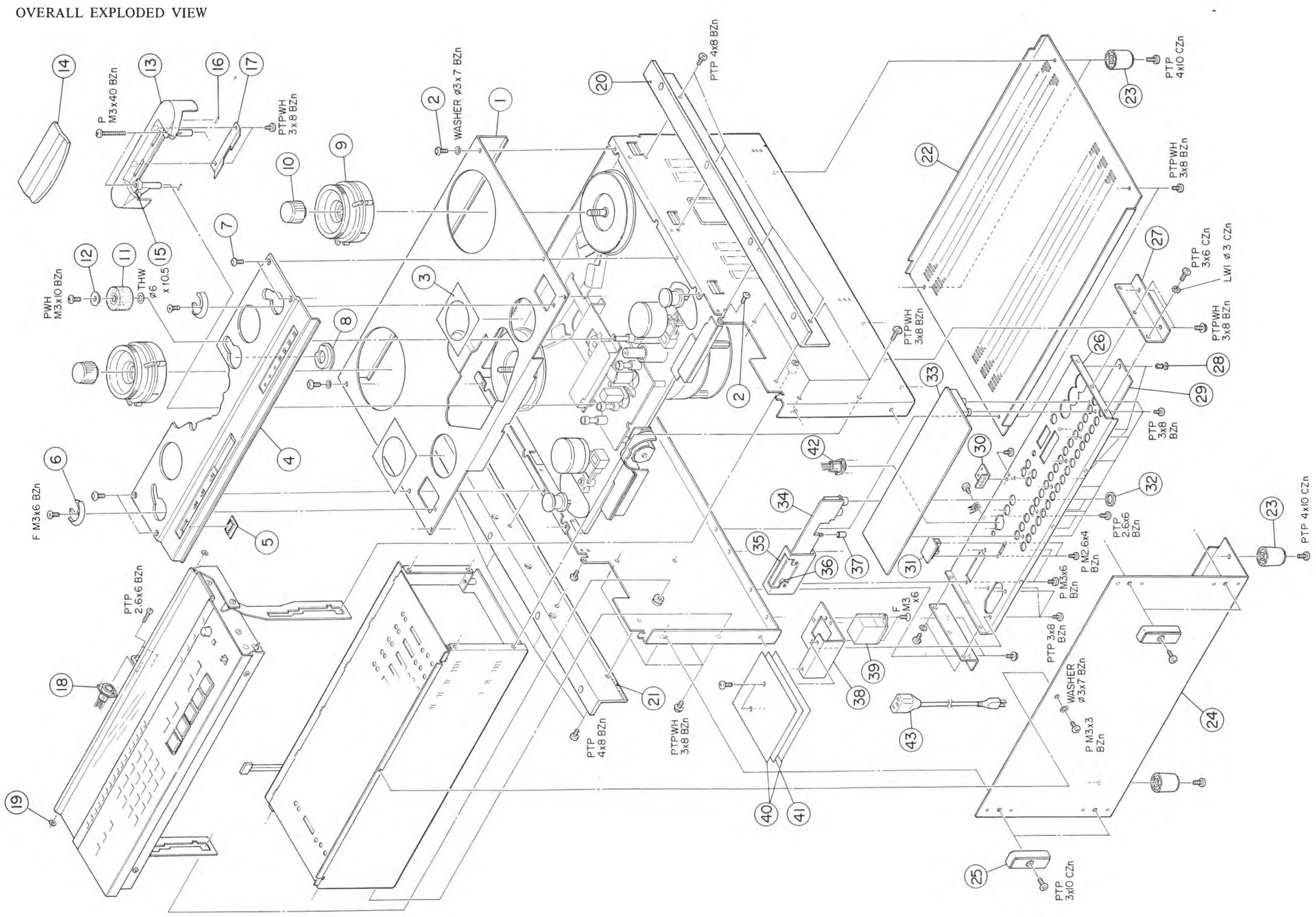
	CODE	NAME	TYPE
MACHINE SCREW	P	Pan Head Screw	
	T	Stove Head Screw (Truss)	
	B	Binding Head Screw	
	F	Flat Countersunk Head Screw	
	O	Oval Countersunk Head Screw	
	PWH	Pan-Washer Head Screw	
WOOD SCREW	RW	Round Head Wood Screw	
	FW	Flat Countersunk Wood Screw	
	OW	Oval Countersunk Wood Screw	
TAPPING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

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

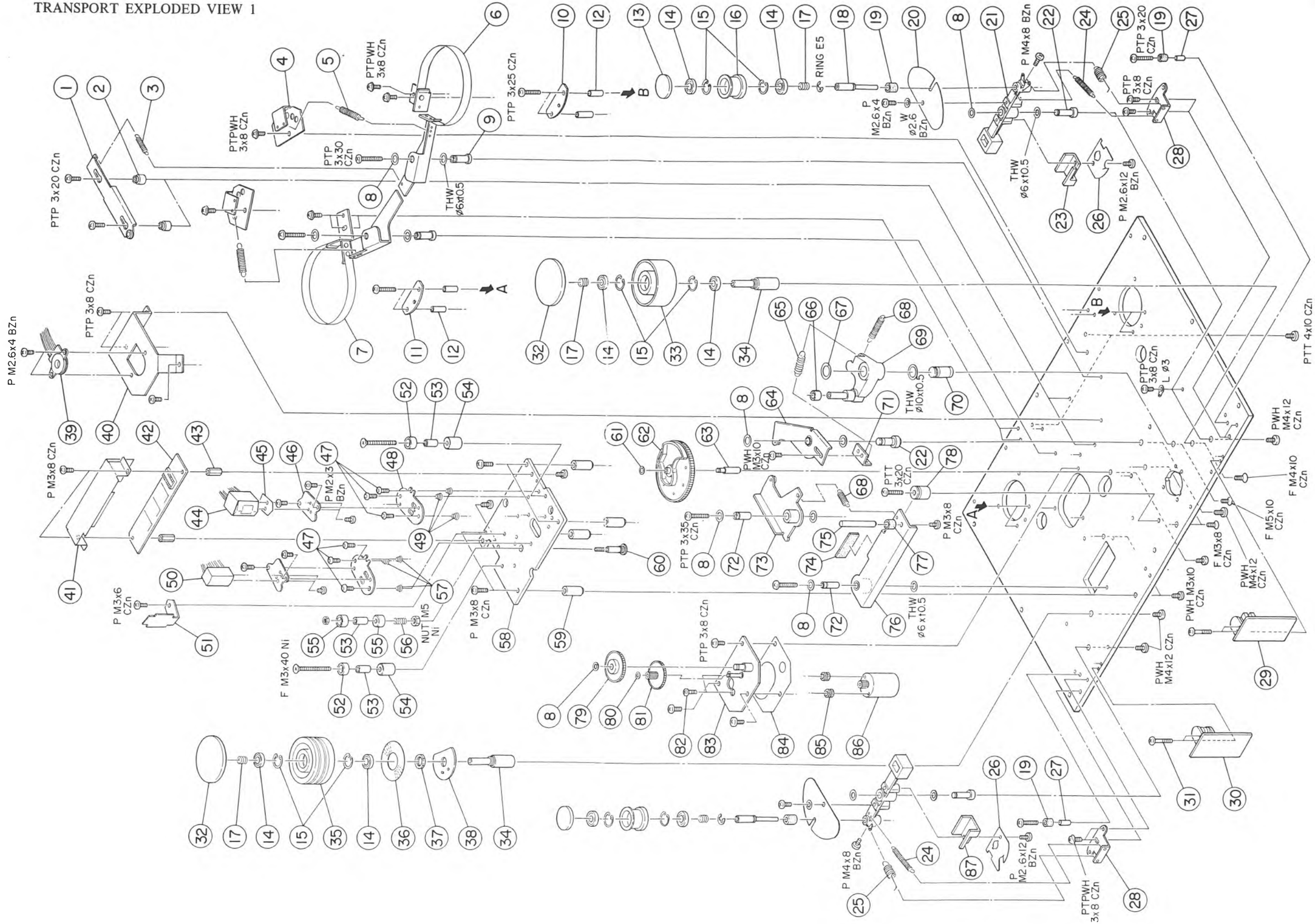
OVERALL EXPLODED VIEW

Ref. No.	Parts No.	Nomenclature
1.	8220 6330 00	Panel, transport, G
2.	8204 0230 05	Screw, buttonhead, HSB, M3×5, BZn
3.	8216 3240 00	Sheet, blind, roller
4.	8220 6342 00	Panel, loading, G
5.	8226 0191 00	Escutcheon, B
6.	8212 2620 00	Guide, tension roller, G
7.	8204 0230 08	Screw, buttonhead, HSB, M3×10, BZn
8.	8223 1850 00	Cover, capstan
9.	8260 2110 05	Reel clamper assy, 1/2
10.	8260 1750 02	Nut, reel clamper
11.	8260 2031 02	Pinch roller, B, 1/2
12.	8216 2300 00	Collar, tape guide
13.	8212 2631 00	Housing, head, G
14.	8212 2670 00	Panel, head, G
15.	8216 3030 00	Cushion, GF
16.	8204 0660 01	Pin, ϕ 2×10
17.	8214 1730 00	Spring, housing, G
18.	8276 6660 00	Cable assy, 12P, front, G
19.	8216 3340 00	Washer, controller
20.	8220 6320 00	Angle, 488
21.	8216 3330 00	Cushion, side, angle
22.	8220 6300 00	Cover, rear, G
23.	8207 0016 02	Foot, TL-027
24.	8220 6311 00	Cover, bottom, G
25.	8207 0049 00	Foot, TL-043TK
26.	8220 6452 00	Panel, rear, G-16
27.	8220 6440 00	Bracket, rear panel
28.	8207 0006 02	Plasti rivet, #920
29.	8216 2840 00	Panel, rear, blank
30.	8220 6410 00	Bracket, PCB
31.	8273 5270 00	PCB assy, NR Switch
32.	8245 3400 00	Nut, phone jack
33.	8273 5280 00	PCB assy, IN/OUT
34.	8273 5290 00	PCB assy, ACCESSORY, G
35.	8220 6210 00	Bracket, connector, 20P
36.	8204 0130 02	Spacer, 3×3
37.	8226 0621 00	Button, push, C-1
38.	8220 6361 00	Bracket, AC INLET
39.	⚠ 8245 1940 00	Connector, jack, inlet, ZUG 2206-12A
40.	8216 3080 00	Sheet, shield
41.	8220 5500 00	Plate, shield
42.	8276 6650 00	Cable assy, 12P, rear, G
43.	⚠ 8276 8160 00	Cord, power, detachable, DM
	⚠ 8276 8170 00	Cord, power, detachable, USA/CND
	⚠ 8276 8180 00	Cord, power, detachable, EUR
	⚠ 8276 8190 00	Cord, power, detachable, UK

OVERALL EXPLODED VIEW



TRANSPORT EXPLODED VIEW 1

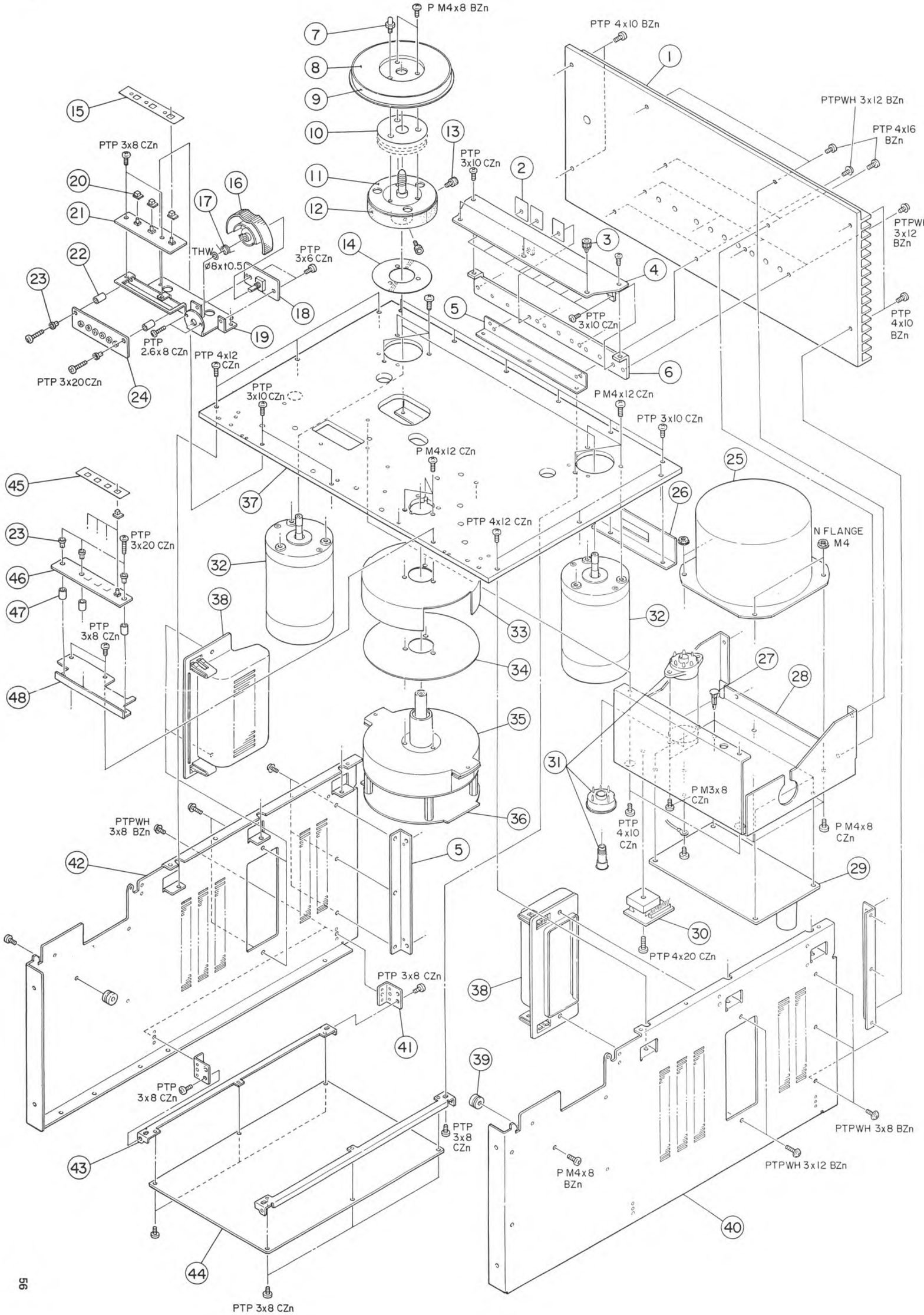


TRANSPORT EXPLODED VIEW 1

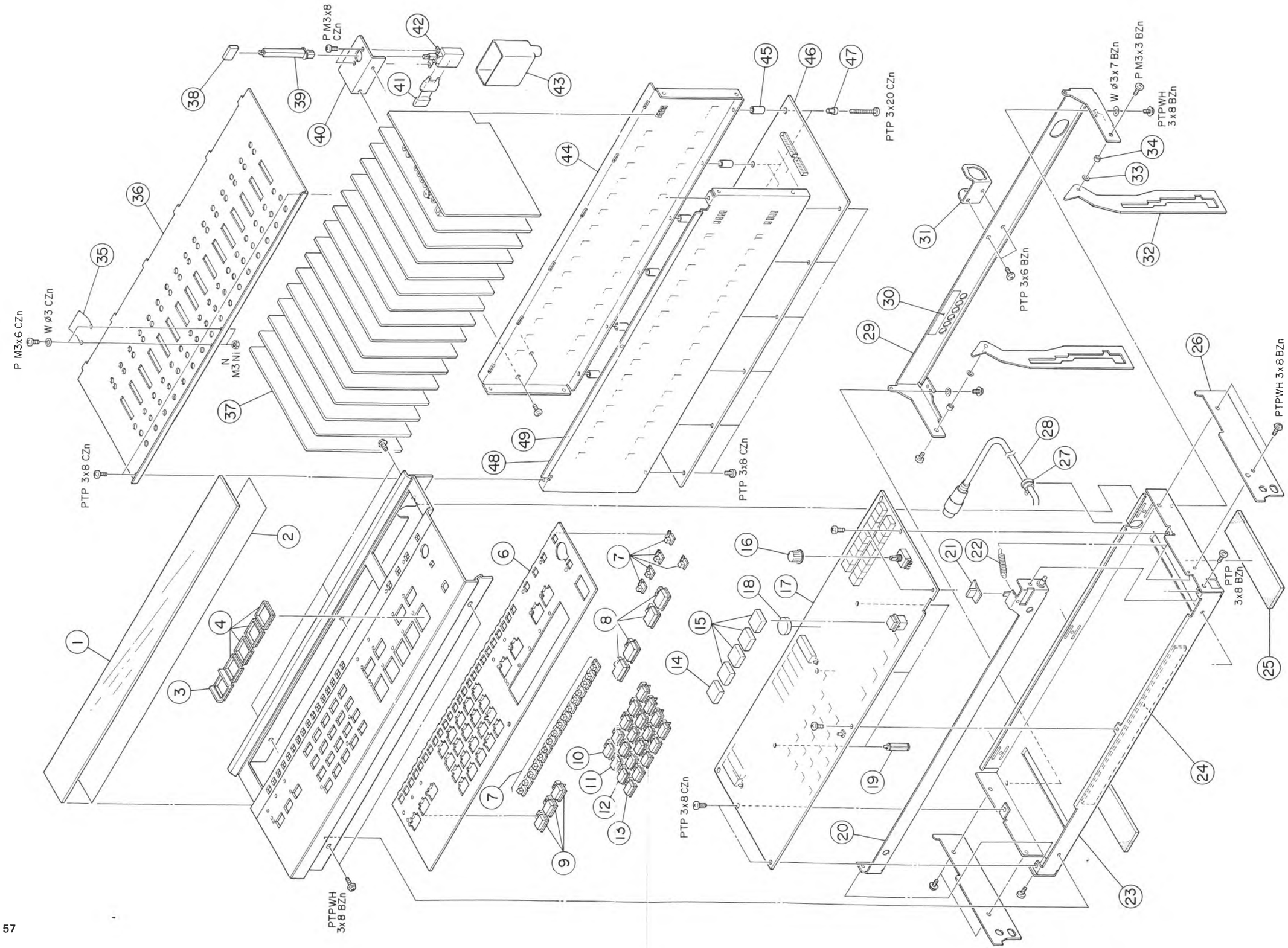
Ref. No.	Parts No.	Nomenclature
1.	8260 3251 00	Lever assy, slide, G
2.	8223 1880 00	Shaft, slide
3.	8214 1560 00	Spring, slide
4.	8220 3680 00	Bracket, spring, B
5.	8214 1030 00	Spring, brake
6.	8260 1301 00	Band assy, brake, R
7.	8260 1291 00	Band assy, brake, L
8.	8204 0560 03	Washer, slit, ϕ5
9.	8223 1870 00	Shaft, brake, arm
10.	8273 5420 00	PCB assy, REEL SENSOR/T, G
11.	8273 5430 00	PCB assy, REEL SENSOR/S, G
12.	8204 0130 15	Spacer, 3x16
13.	8223 2030 00	Cap, tension roller
14.	8204 0201 00	Bearing, 696ZZ
15.	8204 0240 01	Ring, CRR-15
16.	8223 2021 01	Roller, tension, A
17.	8214 1330 00	Spring, bearing, B
18.	8223 2010 00	Shaft, tension, A
19.	8216 2590 00	Tube, rubber, E
20.	8216 2880 00	Plate, tension arm
21.	8210 0102 00	Arm, tension
22.	8223 1900 00	Shaft, arm, E
23.	8220 6660 02	Weight, tension, R
24.	8214 1830 00	Spring, tension, D
25.	8214 1761 00	Spring, tension, C
26.	8220 3790 00	Plate, servo
27.	8204 0130 09	Spacer, 3x10
28.	8220 6560 00	Bracket, spring, D
29.	8273 5310 00	PCB assy, TENSION SENSOR/T, G
30.	8273 5320 00	PCB assy, TENSION SENSOR/S, G
31.	8204 0720 00	Screw, PTT, 2x20, CZn
32.	8223 1990 00	Cap, footage roller
33.	8223 2000 00	Roller, guide
34.	8223 1980 01	Shaft, footage roller, B
35.	8260 3310 00	Roller assy, footage
36.	8218 1541 00	Sticker, strobe
37.	8204 0160 00	Nut, M9x0.75xT2
38.	8273 5380 00	PCB assy, COUNT SENSOR, G
39.	8253 9530 00	Switch, mode
40.	8220 6540 00	Bracket, mode switch
41.	8216 2861 00	Sheet, shield, head
42.	8273 5370 00	PCB assy, HEAD TERMINAL, G
43.	8223 0750 10	Spacer, M3x17
44.	8279 0240 00	Head assy, R/P, G-16
45.	8220 7030 00	Shield base
46.	8220 6630 00	Bracket, head, D
47.	8204 0230 08	Screw, buttonhead, HSB, M3x10, BZn
48.	8220 6620 00	Bracket, head, B
49.	8214 1790 00	Spring, head, C
50.	8279 0250 00	Head assy, E, G-16
51.	8220 6610 00	Panel, blind
52.	8223 1970 00	Guide, tape, D
53.	8223 1960 01	Guide, C
54.	8223 1951 00	Guide, tape, E
55.	8223 2050 00	Guide, tape, F
56.	8214 0970 00	Spring, guide
57.	8214 0990 00	Spring, head, B
58.	8220 6600 00	Base, guide, C
59.	8223 1940 00	Spacer, 19
60.	8223 2110 00	Shaft, guide, C
61.	8204 0560 02	Washer, slit, ϕ2.5
62.	8260 2961 00	Cam assy, loading
63.	8223 1890 00	Shaft, cam, A
64.	8260 3271 00	Arm assy, joint, GA
65.	8214 1741 00	Spring, pinch roller
66.	8216 3350 00	Tube, rubber, G
67.	8204 0560 04	Washer, slit, ϕ8
68.	8214 1750 00	Spring, D
69.	8260 3282 01	Arm assy, pinch roller
70.	8223 1910 00	Shaft, arm, F
71.	8220 6550 00	Bracket, spring, C
72.	8223 1921 00	Shaft, lifter arm
73.	8260 3291 00	Arm assy, joint, GB
74.	8216 3320 00	Cushion, lifter
75.	8223 1930 01	Shaft, lifter, C
76.	8260 3300 00	Arm, lifter, G
77.	8216 3230 00	Tube, rubber, F
78.	8212 2660 00	Shaft, slide, E
79.	8212 2650 00	Gear, relay, B
80.	8204 0560 01	Washer, slit, ϕ2
81.	8212 2252 00	Gear, relay
82.	8204 0060 01	Sholdek, M3x4
83.	8260 3260 00	Bracket assy, gear
84.	8216 2850 00	Cushion, GB
85.	8216 0080 00	Bushing, rubber
86.	8270 5380 00	Motor assy, loading, G
87.	8220 6660 01	Weight, tension, L

TRANSPORT EXPLODED VIEW 2

Ref. No.	Parts No.	Nomenclature
1.	8220 6670 00	Heat sink, G
2.	8239 0014 00	Insulator, AC238
3.	8207 0008 03	Stay, tapping support, 8N
4.	8273 5390 00	PCB assy, REGULATOR
5.	8220 6400 00	Bracket, heat sink
6.	8220 6691 00	Heat sink, transistor
7.	8223 0630 00	Pin, stopper
8.	8216 1590 00	Sheet, reel, B
9.	8210 0133 00	Table, reel
10.	8220 5190 01	Spacer, reel table, 0.8
11.	8210 0122 00	Drum, reel
12.	8216 1090 00	Felt, brake, B
13.	8204 0270 04	Bolt, MSB, M4x10
14.	8218 2640 00	Sticker, strobe, reel
15.	8216 3300 00	Sheet, button, A
16.	8260 3371 00	Jog assy, shuttle
17.	8214 1920 00	Spring, jog, B
18.	8273 5340 00	PCB assy, JOG, G
19.	8220 6570 00	Bracket, PCB, L
20.	8226 1192 00	Button, tact, C
21.	8273 5330 00	PCB assy, SPOT/EDIT, G
22.	8207 0020 03	Collar, TA-310
23.	8207 0019 00	Bush, TB-300
24.	8273 5360 00	PCB assy, TENSION POD, G
25.	⚠ 8242 1371 00	Transformer, power, G
26.	8220 6530 00	Angle, transport
27.	8207 0046 02	Spacer, PCB, 14RT
28.	8220 6680 00	Bracket, transformer
29.	8273 5400 00	PCB assy, POWER SUPPLY, G16
30.	8273 5410 00	PCB assy, STACK
31.	⚠ 8245 0630 00	Voltage selector
32.	8249 0250 00	Motor, reel
33.	8220 2631 00	Shield, D motor
34.	8220 2690 00	Plate, shield
35.	8270 3580 05	Motor assy with PCB, direct capstan, E16/G16
36.	8273 2580 05	PCB assy, DIRECT CAPSTAN
37.	8220 6521 00	Base, transport, G
38.	8212 1131 00	Grip
39.	8212 2701 00	Boss, arm
40.	8220 6373 02	Chassis, side, R
41.	8220 6410 00	Bracket, PCB
42.	8220 6373 01	Chassis, side, L
43.	8220 6430 00	Bracket, system control
44.	8273 5250 01	PCB assy, SYSTEM CONTROL, G16
45.	8216 3310 00	Sheet, button, B
46.	8273 5350 00	PCB assy, CONTROL SW, G
47.	8207 0020 02	Collar, TA-307
48.	8220 6590 00	Bracket, PCB, R


P M4x8 BZn
PTP 4x10 BZn
PTPWH 3x12 BZn
PTP 4x16 BZn
PTP 3x8 CZn
PTP 3x10 CZn
PTPWH 3x12 BZn
PTP 4x10 BZn
THW Ø8x10.5
PTP 3x6 CZn
PTP 3x10 CZn
PTP 2.6x8 CZn
PTP 4x12 CZn
PTP 3x20CZn
PTP 3x10 CZn
P M4x12 CZn
PTP 3x10 CZn
P M4x12 CZn
PTP 4x12 CZn
N FLANGE M4
PTP 3x20 CZn
PTP 3x8 CZn
P M3x8 CZn
PTP 4x10 CZn
P M4x8 CZn
PTPWH 3x8 BZn
PTP 4x20 CZn
PTP 3x8 CZn
PTP 3x8 CZn
PTP 3x8 CZn
PTPWH 3x8 BZn
P M4x8 BZn
PTPWH 3x12 BZn
PTP 3x8 CZn

CONTROLLER/AMPLIFIER EXPLODED VIEW



CONTROLLER / AMPLIFIER EXPLODED VIEW

Ref. No.	Parts No.	Nomenclature
1.	8212 2691 00	Panel, window
2.	8216 3091 00	Sheet, counter, B
3.	8226 1273 00	Escutcheon, control, A
4.	8226 1281 00	Escutcheon, control, B
5.	8220 6711 00	Panel, controller
6.	8220 6720 00	Bracket, switch, A
7.	8226 1192 00	Button, tact, C
8.	8226 1251 00	Button, tact, B
9.	8226 1242 00	Button, tact, A
10.	8226 1242 04	Button, tact, A4
11.	8226 1242 03	Button, tact, A3
12.	8226 1242 02	Button, tact, A2
13.	8226 1242 01	Button, tact, A1
14.	8226 1231 01	Button, control, R
15.	8226 1231 00	Button, control
16.	8226 1210 00	Knob, pitch con.
17.	8273 5240 01	PCB assy, CONTROLLER, G
18.	8216 0130 00	Leg, D12
19.	8207 0048 00	Spacer, PCB, 2S29
20.	8260 3321 00	Arm assy, controller
21.	8226 1220 00	Knob, eject
22.	8214 1551 00	Spring, brake
23.	8220 6700 00	Cover, bottom, controller
24.	8216 2890 00	Cushion, GD
25.	8216 2900 00	Cushion, controller
26.	8220 6731 00	Panel, side, controller
27.	8207 0002 14	Bushing, SR-5N-4
28.	8276 6670 00	Cable assy, controller, G
29.	8220 6490 00	Arm, controller
30.	8218 6460 00	Label, tension pod
31.	8220 6510 00	Bracket, connector, 12P
32.	8220 6500 00	Arm, lock
33.	8216 2931 00	Cushion, GE
34.	8204 0130 10	Spacer, 3×1.6
35.	8214 1930 00	Spring, open
36.	8220 6461 00	Panel, extension
37.	8273 5220 00	PCB assy, R/P AMP, G16
38.	8226 0130 03	Button, push, B, N
39.	8212 0810 00	Joint arm
40.	8220 6420 00	Bracket, power sw
41.	⚠ 8256 0750 05	Sparkkiller, universal, 0.047μF
42.	⚠ 8253 4090 01	Switch, push, power, SDDF-3
43.	8207 0050 00	Cover, switch
44.	8220 6380 00	Bracket, amp, UP
45.	8207 0020 04	Collar, TA-314
46	8273 5260 01	PCB assy, CONNECTOR BOARD, G16
47.	8207 0019 00	Bush, TB-300
48.	8220 6391 00	Bracket, amp, DOWN
49.	8218 6450 00	Label, channel, G16

R/P AMPLIFIER PCB ASSEMBLY

PCB Ass'y No. 8273 5220 00

Ref. No.	Parts No.	Nomenclature
	8251 8711 01	Plain PCB, R/P Amplifier, G16
		IC's
U001	8236 0361 00	Analog, Ope-amplifier, BA4560N
U002	8236 0329 00	Analog, Dolby, CX20187
U003	8236 0283 00	Analog, NJM3404AD
U004	8236 0327 00	Analog, IR3702
U005	8236 0005 01	Digital, CMOS, 4011B
U006	8256 0790 00	Module, Trap, S, 100kHz, 10mH
U007,008	8256 0810 00	Module, Low-pass filter
U009	8256 0800 00	Module, Skewing
U010	8256 0790 00	Module, Trap, S, 100kHz, 10mH
U011	8236 0561 04	Driver, DTC314TF
U012	8236 0561 02	Driver, DTC343TF
		TRANSISTORS
Q001	8234 0091 01	FET, 2SK170GR
Q002-006	8234 0002 06	2SC1815Y/GR/BL
Q007,008	8234 0001 11	FET, 2SK117GR
Q009	8234 0076 02	2SC1627Y
Q010,011	8234 0002 06	2SC 1815Y/GR/BL
Q012	8234 0002 03	2SC 1815GR
		DIODES
D001-003	8234 0088 00	GMB01-BT
D004	8234 0088 00	GMB01-BT
D005	8234 0019 13	Zener, 9.1V, 05AZ9.1Y
D006-009	8234 0088 00	GMB01-BT
D010	8234 0196 02	DSK10C-BT
D011-013	8234 0088 00	GMB01-BT
		CARBON RESISTORS
		All resistors 1/6W, ±5% unless otherwise noted.
R001	8230 1385 10	Flat mtg., 51Ω
R002	8230 1381 00	Flat mtg., 10Ω
R003	8230 1381 03	Flat mtg., 10kΩ
R004	8230 1383 32	Flat mtg., 3.3kΩ
R005	8230 0235 12	Ver. mtg., 5.1kΩ, 1%, Metal, ¼W
R006	8230 0232 21	Ver. mtg., 220Ω, 1%, Metal, ¼W
R007	8230 1381 01	Flat mtg., 100Ω
R008	8230 1382 73	Flat mtg., 27kΩ
R009	8230 1386 82	Flat mtg., 6.8kΩ
R010	8230 1383 33	Flat mtg., 33kΩ
R011	8230 1383 91	Flat mtg., 390Ω
R012	8230 1384 74	Flat mtg., 470kΩ
R013	8230 1382 71	Flat mtg., 270Ω
R014	8230 1381 82	Flat mtg., 1.8kΩ
R015	8230 1388 23	Flat mtg., 82kΩ
R016	8230 1388 23	Flat mtg., 82kΩ
R017	8230 1384 71	Flat mtg., 470Ω
R018	(deleted)	
R019	8230 1382 73	Flat mtg., 27kΩ
R020	8230 1389 12	Flat mtg., 9.1kΩ
R021	8230 1382 72	Flat mtg., 2.7kΩ
R022	8230 1381 33	Flat mtg., 13kΩ
R023	8230 1383 02	Flat mtg., 3kΩ
R024	8230 1384 31	Flat mtg., 430Ω
R025	8230 1385 12	Flat mtg., 5.1kΩ
R026	8230 1386 82	Flat mtg., 6.8kΩ
R027	8230 1386 81	Flat mtg., 680Ω
R028	8230 1381 04	Flat mtg., 100kΩ
R029	8230 1388 21	Flat mtg., 820Ω
R030	8230 1381 23	Flat mtg., 12kΩ
R031	8230 1383 92	Flat mtg., 3.9kΩ
R032	8230 1382 23	Flat mtg., 22kΩ
R033	8230 1382 23	Flat mtg., 22kΩ
R034	8230 1381 53	Flat mtg., 15kΩ
R035	8230 1384 72	Flat mtg., 4.7kΩ
R036	8230 1381 52	Flat mtg., 1.5kΩ
R037	8230 1383 33	Flat mtg., 33kΩ
R038	8230 1381 03	Flat mtg., 10kΩ
R039	8230 1383 92	Flat mtg., 3.9kΩ
R040	8230 1382 73	Flat mtg., 27kΩ
R041	8230 1381 82	Flat mtg., 1.8kΩ
R042	8230 1383 93	Flat mtg., 39kΩ
R043	8230 1381 83	Flat mtg., 18kΩ
R044	8230 1384 73	Flat mtg., 47kΩ
R045	8230 1382 23	Flat mtg., 22kΩ
R046	8230 1382 24	Flat mtg., 220kΩ
R047	8230 1381 02	Flat mtg., 1kΩ
R048	(deleted)	
R049	8230 1383 92	Flat mtg., 3.9kΩ
R050	8230 1381 53	Flat mtg., 15kΩ
R051	8230 1381 04	Flat mtg., 100kΩ
R052	8230 1382 21	Flat mtg., 220Ω
R053	(deleted)	
R054-056	8230 1381 04	Flat mtg., 100kΩ
R057	8230 1382 23	Flat mtg., 22kΩ
R058	8230 1381 04	Flat mtg., 100kΩ
R059	8230 1384 72	Flat mtg., 4.7kΩ

Ref. No.	Parts No.	Nomenclature
R060	8230 1382 23	Flat mtg., 22kΩ
R061	(deleted)	
R062	(deleted)	
R063	8230 1381 09	Flat mtg., 1Ω
R064	8230 1384 73	Flat mtg., 47kΩ
R065	8230 1381 04	Flat mtg., 100kΩ
R066	8230 1384 72	Flat mtg., 4.7kΩ
R067	8230 1383 32	Flat mtg., 3.3kΩ
R068	8230 1381 03	Flat mtg., 10kΩ
R069	8230 1381 03	Flat mtg., 10kΩ
R070	8230 1389 12	Flat mtg., 9.1kΩ
R071	8230 1383 32	Flat mtg., 3.3kΩ
R072	8230 1382 23	Flat mtg., 22kΩ
R073	8230 1385 62	Flat mtg., 5.6kΩ
R074	8230 1381 04	Flat mtg., 100kΩ
R075	8230 1382 03	Flat mtg., 20kΩ
R076	8230 1382 22	Flat mtg., 2.2kΩ
R077	8230 1381 02	Flat mtg., 1kΩ
R078	8230 1383 31	Flat mtg., 330Ω
R079	8230 1381 03	Flat mtg., 10kΩ
R080	8230 1384 72	Flat mtg., 4.7kΩ
R081	(deleted)	
R082	8230 1384 73	Flat mtg., 47kΩ
R083	8230 1381 04	Flat mtg., 100kΩ
R084	8230 1382 03	Flat mtg., 20kΩ
R085	8230 1383 32	Flat mtg., 3.3kΩ
R086	8230 1381 34	Flat mtg., 130kΩ
R087	8230 1382 03	Flat mtg., 20kΩ
R088	8230 1381 52	Flat mtg., 1.5kΩ
R089	8230 1382 03	Flat mtg., 20kΩ
R090	8230 1388 22	Flat mtg., 8.2kΩ
R091	8230 1382 03	Flat mtg., 20kΩ
R092	8230 1383 02	Flat mtg., 3kΩ
R093	8230 1381 23	Flat mtg., 12kΩ
R094	8230 1386 82	Flat mtg., 6.8kΩ
R095	8230 1384 73	Flat mtg., 47kΩ
R096	8230 1384 72	Flat mtg., 4.7kΩ
R097	8230 1388 22	Flat mtg., 8.2kΩ
R098	8230 1382 72	Flat mtg., 2.7kΩ
R099	8230 1382 20	Flat mtg., 22Ω
R100	8230 1382 70	Flat mtg., 27Ω
R101	8230 1384 73	Flat mtg., 47kΩ
R102	8230 1381 04	Flat mtg., 100kΩ
R103	8230 1381 03	Flat mtg., 10kΩ
R104	(deleted)	
R105	8230 1382 23	Flat mtg., 22kΩ
R106	8230 1381 03	Flat mtg., 10kΩ
R107	8230 1381 03	Flat mtg., 10kΩ
R108	8230 1381 81	Flat mtg., 180
R109	8230 1384 73	Flat mtg., 47k
R110	8230 1383 33	Flat mtg., 33k
R111	8230 1381 53	Flat mtg., 15k

CARBON POTS

R201,204	8231 0154 72	Pot., semi-fixed, ver, 47kΩ, 639A
R202,203	8231 0151 03	Pot., semi-fixed, ver, 10kΩ, 639A
R205,207	8231 0151 03	Pot., semi-fixed, ver, 10kΩ, 639A
R206	8231 0154 73	Pot., semi-fixed, ver, 47kΩ, 639A

CAPACITORS

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

C001	8232 9011 02	PES, 50V, 0.001μF, 5%, AMZV
C002	8232 8021 01	CER, 50V, 100pF, 10%, SL
C003	8232 1432 27	ALU, 16V, 220μF, 20%, SME-VB
C004	8232 0851 05	ALU, 50V, 1μF, 20%, LR-BP
C005	8232 8022 71	CER, 50V, 270pF, 10%, SL
C006	8232 1424 76	ALU, 10V, 47μF, 20%, SME-VB
C007	8232 9011 53	PES, 50V, 0.015μF, 5%, AMZV
C008	8232 8022 20	CER, 50V, 22pF, 10%, SL
C009	8232 1431 06	ALU, 16V, 10μF, 20% SME-VB
C010	8232 9012 22	PES, 50V, 0.0022μF, 5%, AMZV
C011	8232 9013 92	PES, 50V, 0.0039μF, 5%, AMZV
C012	8232 1462 25	ALU, 50V, 2.2μF, 20%, SME-VB
C013	8232 1462 25	ALU, 50V, 2.2μF, 20%, SME-VB
C014	8232 9012 22	PES, 50V, 0.0022μF, 5%, AMZV
C015	8232 9013 92	PES, 50V, 0.0039μF, 5%, AMZV

Ref. No.	Parts No.	Nomenclature
C016	8232 1462 25	ALU, 50V, 2.2μF, 20%, SME-VB
C017	8232 9015 61	PES, 50V, 560pF, 5%, AMZV
C018	8232 1422 27	ALU, 10V, 220μF, 20%, SME-VB
C019	8232 1434 76	ALU, 16V, 47μF, 20%, SME-VB
C020	8232 0304 72	PPR, 100V, 0.0047μF, 2%, APS
C021	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB
C022	8232 1461 54	ALU, 50V, 0.15μF, 20%, SME-VB
C023	8232 9011 53	PES, 50V, 0.015μF, 5%, AMZV
C024	8232 1462 24	ALU, 50V, 0.22μF, 20%, SME-VB
C025	8232 9016 83	PES, 50V, 0.068μF, 5%, AMZV
C026	8232 9014 73	PES, 50V, 0.047μF, 5%, AMZV
C027	8232 0306 82	PPR, 100V, 0.0068μF, 2%, APS
C028	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C029	8232 1433 36	ALU, 16V, 33μF, 20%, SME-VB
C030	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C031	8232 9013 93	PES, 50V, 0.039μF, 5%, AMZV
C032	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C033	8232 0323 30	CER, 50V, 33pF, 5%, NPO
C034	8232 9012 22	PES, 50V, 0.0022μF, 5%, AMZV
C035	8232 1462 24	ALU, 50V, 0.22μF, 20%, SME-VB
C036	8232 1031 06	ALU, 16V, 10μF, 20%, LL
C037	8232 9012 22	PES, 50V, 0.0022μF, 5%, AMZV
C038	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB
C039	8232 9011 02	PES, 50V, 0.001μF, 5%, AMZV
C040	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C041	8232 1433 36	ALU, 16V, 33μF, 20%, SME-VB
C042	8232 1031 06	ALU, 16V, 10μF, 20%, LL
C043	8232 1432 26	ALU, 16V, 22μF, 20%, SME-VB
C044	8232 9016 83	PES, 50V, 0.068μF, 5%, AMZV
C045	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C046	8232 9018 23	PES, 50V, 0.082μF, 5%, AMZV
C047	8232 9011 04	PES, 50V, 0.1μF, 5%, AMZV
C048	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C049	8232 9011 04	PES, 50V, 0.1μF, 5%, AMZV
C050	8232 9011 53	PES, 50V, 0.015μF, 5%, AMZV
C051	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C052	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C053	8232 9013 33	PES, 50V, 0.033μF, 5%, AMZV
C054	8232 1431 06	ALU, 16V, 10μF, 20% SME-VB
C055	8232 0316 82	PPR, 100V, 0.0068μF, 5%, APS
C056	8232 1464 75	ALU, 50V, 4.7μF, 20%, SME-VB
C057	8232 1432 26	ALU, 16V, 22μF, 20%, SME-VB
C058	8232 1464 75	ALU, 50V, 4.7μF, 20%, SME-VB
C101	8256 0250 01	Trimmer, CTZ83K, 150pF

MISCELLANEOUS

E601	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
E602	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
J001	8245 2040 15	Connector, jack, IL-SDA-15S-S2L2

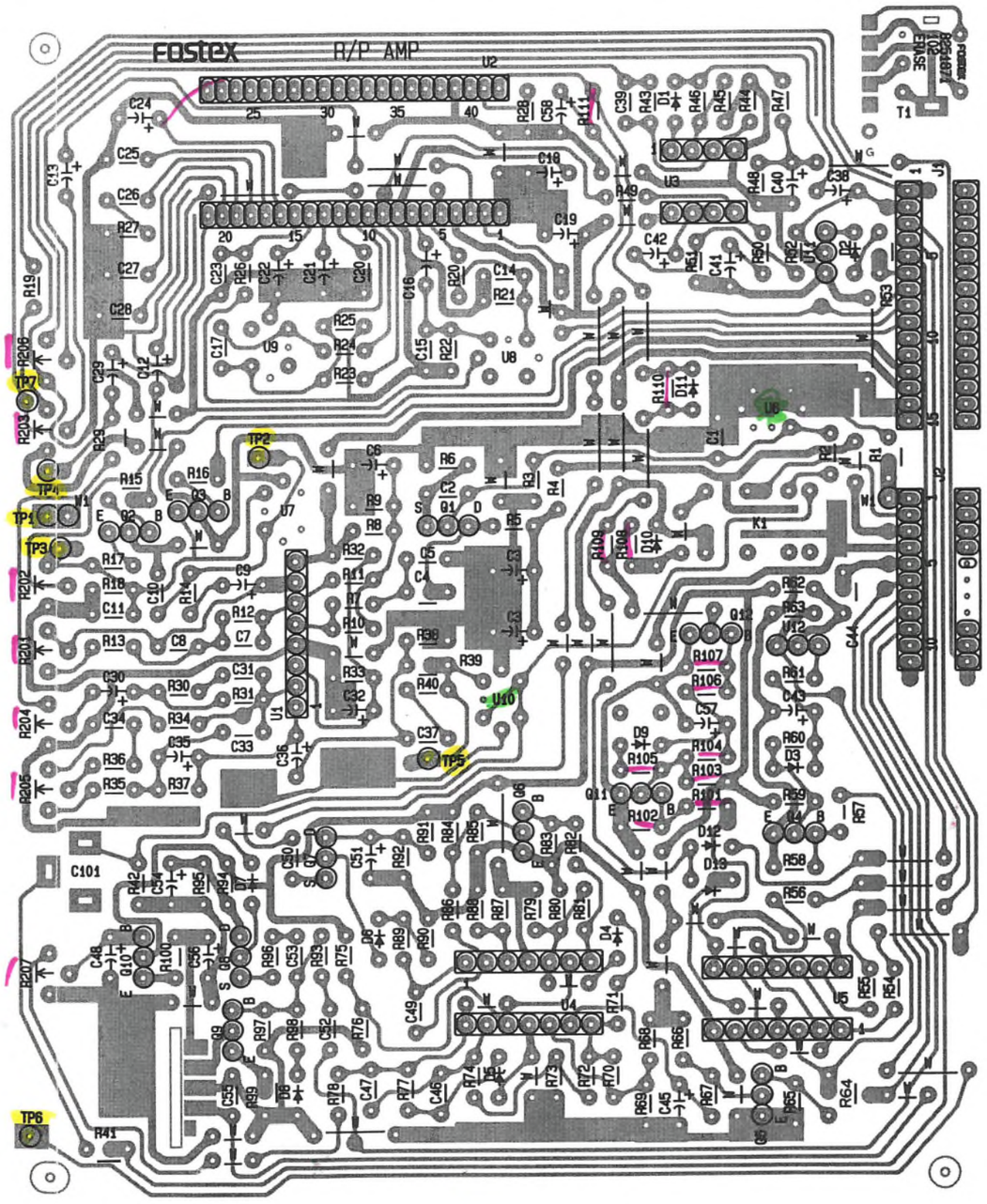
Ref. No.	Parts No.	Nomenclature
J002	8245 2040 11	Connector, jack, IL-SDA-11S-S2L2
K001	8248 0070 00	Relay, G5A-1002H
W001	8276 1570 12	Wire, wht., 120mm
Y1401	8276 0010 00	Pin, header
Y1402	8220 7010 00	Cover, coil

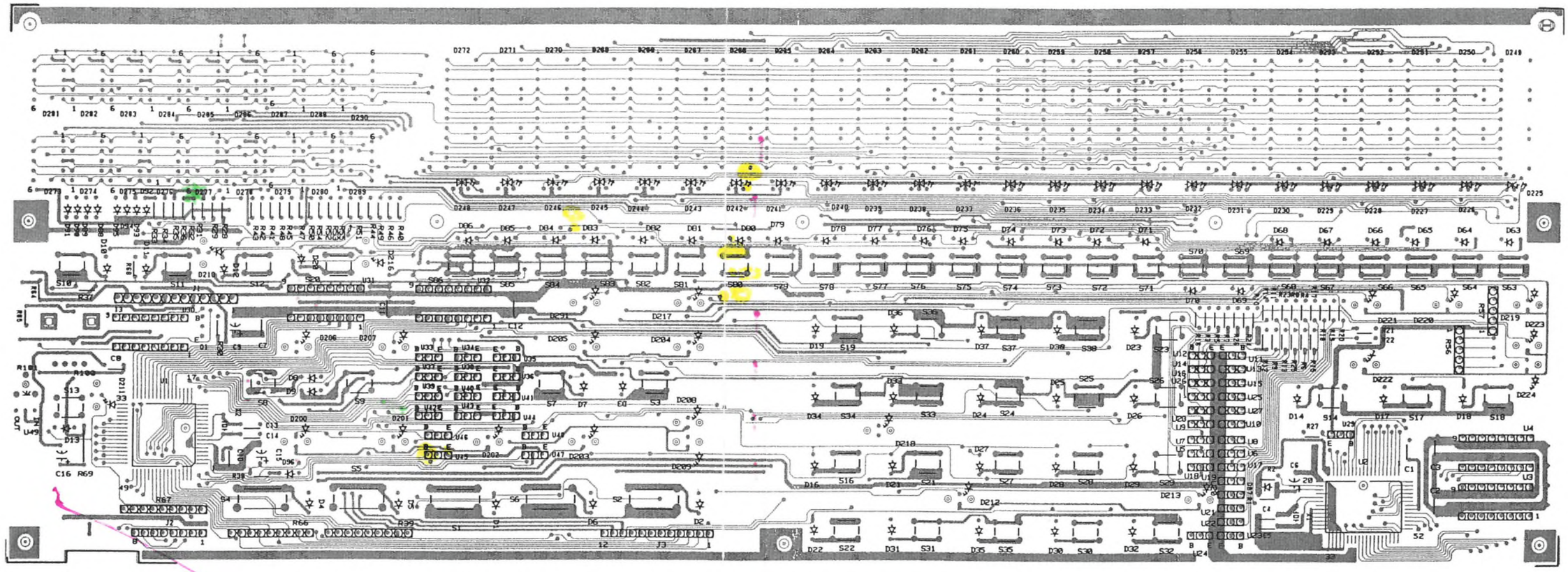
ERASE PCB ASSEMBLY

PCB Ass'y No. 8273 5230 00

Ref. No.	Parts No.	Nomenclature
	8251 8711 02	Plain PCB, Erase
T001	8242 1360 00	Transformer, erase

ERASE
R/P AMPLIFIER





CONTROLLER PCB ASSEMBLY

PCB Ass'y No. 8273 8920 00

Ref. No.	Parts No.	Nomenclature
	8251 3500 00	Plain PCB, controller, G
		IC's
U001	8236 0556 00	Digital, MTC1R, MN17581
U002	8236 0568 00	Digital, FCG1, UPD78C12AGF
U003-004	8236 0567 00	Digital, driver, array, TD62309P
U005-029	8236 0510 01	Digital, driver, UN1111
U030	8236 0028 01	CMOS, 4049UB
U031-032	8236 0567 00	Driver, array, TD62309P
U033-048	8236 0510 01	Driver, UN1111
U049	(deleted)	
		TRANSISTOR
Q001	8234 1422 01	2SC752G-Y
		DIODES
D001-014	8234 0088 00	GMB01-BT
D015	(deleted)	
D016-038	8234 0088 00	GMB01-BT
D063	8234 0088 00	GMB01-BT
D064-079	8234 0088 00	GMB01-BT
D080-086	8234 0088 00	GMB01-BT
D087-096	8234 0088 00	GMB01-BT
D200-203	8234 0191 00	Opt., LED, grn., GL-2EG6
D204-205	8234 0191 00	Opt., LED, grn., GL-2EG6
D206-207	8234 0191 00	Opt., LED, grn., GL-2EG6
D208	8234 0196 00	Opt., yel., GL-2HY6
D209-213	8234 0100 00	Opt., LED, org., GL-2HD6
D214-215	(deleted)	
D216-218	8234 0100 00	Opt., LED, org., GL-2HD6
D219-221	8234 0191 00	Opt., LED, grn., GL-2EG6
D222-223	8234 0100 00	Opt., LED, org., GL-2HD6
D224	8234 0196 00	Opt., LED, yel., GL-2HY6
D225	(deleted)	
D226-241	8234 2027 00	Opt., LED, grn.-red, GL3ED8
D242-248	8234 2027 00	Opt., LED, grn.-red, GL3ED8
D249	8234 2023 00	Opt., LED, bargraph, 12 dot, SLA-5672-10
D250-265	8234 2023 00	Opt., LED, bargraph, 12 dot, SLA-5672-10
D266-272	8234 2023 00	Opt., LED, bargraph, 12 dot, SLA-5672-10
D273-290	8234 2028 00	Opt., LED, 7 segment, red, GL8D040
D291	8234 0100 00	Opt., LED, org., GL-2HD6
		CARBON RESISTORS
		All resistors 1/6W, ±5% unless otherwise noted.
R001,038	8230 1387 53	Flat mtg., 75kΩ
R002	8230 1384 72	Flat mtg., 4.7kΩ
R003-010	8230 1384 70	Flat mtg., 47Ω
R011-014	8230 1384 70	Flat mtg., 47Ω
R015-022	8230 1384 70	Flat mtg., 47Ω
R023-026	8230 1384 70	Flat mtg., 47Ω
R027	8230 1389 11	Flat mtg., 910Ω
R028-029	8230 1381 02	Flat mtg., 1kΩ
R030	8230 1386 82	Flat mtg., 6.8kΩ
R031-032	8230 1381 02	Flat mtg., 1kΩ
R033-036	8230 1384 71	Flat mtg., 470Ω
R037	8230 1382 42	Flat mtg., 2.4kΩ
R039,066	8230 0950 01	Array, 1/8W, 22kΩ/100kΩ×4, 5%, RKL-E
R040-055	8230 1381 01	Flat mtg., 100Ω
R056-057	8230 0362 21	Array, 1/8W, 220Ω×4, 5%, RKC
R058-063	(deleted)	
R064-065	8230 1381 03	Flat mtg., 10kΩ
R067	8230 0372 23	Array, 1/8W, 22kΩ×8, 5%, RKC
R068	8230 1381 03	Flat mtg., 10kΩ
		CARBON POTS
R100	8240 1700 14	Pot., 10kΩB, flat
R101	8231 0141 03	Pot., semi-fixed, flat, 10kΩ
		CAPACITORS
		ALU = Electrolytic type
		CER = Ceramic type
		PES = Mylar type
		PPR = Polypropylene type
C001-003	8232 8001 04	CER, 16V, 0.1μF, +80 -20%, YF
C004-005	8232 0323 00	CER, 50V, 30μF, 5%, NPO
C006,015	8232 1604 74	ALU, 50V, 0.47μF, 20%, SRA
C007-008	8232 8001 04	CER, 16V, 0.1μF, +80 -20%, YF
C009	8232 1554 76	ALU, 6.3V, 47μF, 20%, SRA
C010-012	8232 8001 04	CER, 16V, 0.1μF, +80 -20%, YF
C013-014	8232 0323 00	CER, 50V, 30pF, 5%, NPO

Ref. No.	Parts No.	Nomenclature
C016	(deleted)	

MISCELLANEOUS

S001-002	8253 1150 00	Switch, push, SKEJAB
S003	8253 1130 11	Switch, tact, SOA-142HS
S004-006	8253 1150 00	Switch, push, SKEJAB
S007-014	8253 1130 11	Switch, tact, SOA-142HS
S015	(deleted)	
S016-038	8253 1130 11	Switch, tact, SOA-142HS
S039-062	(deleted)	
S063	(deleted)	
S064-079	8253 1130 11	Switch, tact, SOA-142HS
S080-086	(deleted)	
Y201	8207 0032 03	Spacer, LEDS-15
Y701	8207 0032 03	Spacer, LEDS-15
Y702	8212 2720 00	Spacer, LED, 8
W001	8276 6670 00	Cable ASSY, controller, G
X001	8256 0780 00	Ceramic resonator, 12MHz
X002	8256 0550 00	Ceramic resonator, 8MHz

SYSTEM CONTROL PCB ASSEMBLY

PCB Ass'y No. 8273 5250 01

Ref. No.	Parts No.	Nomenclature
	8251 3531 00	Plain PCB, system control, G

IC's

U001	8236 0197 03	Driver, RN2003
U002	8236 0197 03	Driver, RN2003
U003	8236 0197 04	Driver, RN2004
U004	8236 0197 03	Driver, RN2003
U005	8236 0196 04	Driver, RN1004
U006	8236 0196 04	Driver, RN1004
U007	8236 0196 03	Driver, RN1003
U008	8236 0196 03	Driver, RN1003
U009-010	8236 0197 03	Driver, RN2003
U011	8236 0196 03	Driver, RN1003
U012	8236 0196 03	Driver, RN1003
U013	8236 0196 03	Driver, RN1003
U014	8236 0196 03	Driver, RN1003
U015	8236 0196 03	Driver, RN1003
U016	8236 0196 03	Driver, RN1003
U017	8236 0196 03	Driver, RN1003
U018	8236 0196 03	Driver, RN1003
U019	8236 0197 03	Driver, RN2003
U020	8236 0196 04	Driver, RN1004
U021	8236 0197 03	Driver, RN2003
U022	8236 0196 03	Driver, RN1003
U023	8236 0196 03	Driver, RN1003
U024	8236 0196 03	Driver, RN1003
U025	8236 0196 03	Driver, RN1003
U026	8236 0196 03	Driver, RN1003
U027	8236 0197 03	Driver, RN2003
U028	8236 0197 03	Driver, RN2003
U029	8236 0196 03	Driver, RN1003
U030	8236 0197 04	Driver, RN2004
U031	8236 0196 03	Driver, RN1003
U032	8236 0196 03	Driver, RN1003
U100	8236 0330 02	Analog, L78LR05-MA
U101	8236 0569 00	Digital, M37700E2-FP
U102	8236 0571 00	Digital, M50782SP
U103	8236 0029 01	Digital, CMOS, 4050B
U104	8236 0028 01	Digital, CMOS, 4049UB
U105	8236 0028 01	Digital, CMOS, 4049UB
U106	8236 0005 01	Digital, CMOS, 4011B
U107	8236 0028 01	Digital, CMOS, 4049UB
U108	8236 0029 01	Digital, CMOS, 4050B
U109	8236 0215 00	Analog, NJM2904D
U110	8236 0270 00	Analog, switch, 4066B
U111-112	8236 0215 00	Analog, NJM2904D
U113	8236 0292 00	Analog, NJM3403AD
U114	8236 0302 00	Analog, motor driver, LB1645N
U115-122	8236 0508 03	Digital, driver array, TD62554S
U123-124		(deleted)

TRANSISTORS

Q001-002	8234 0002 07	2SC1815GR/BL
Q003-006	8234 1422 01	2SC752G-Y
Q007	8234 0002 07	2SC1815GR/BL
Q008-009	8234 0001 11	FET, 2SK117GR
Q010	8234 0003 03	2SA1015GR
Q011-012	8234 0002 07	2SC1815GR/BL
Q013	8234 0002 07	2SC1815GR/BL
Q014	8234 0002 07	2SC1815GR/BL
Q015	8234 0002 07	2SC1815GR/BL
Q016-017	8234 0037 02	2SC2655Y
Q018-019	8234 0038 02	2SA1020Y

DIODES

D001	8234 0088 00	GMB01-BT
D002-003	8234 0088 00	GMB01-BT
D004	8234 0088 00	GMB01-BT
D005	8234 0088 00	GMB01-BT

Ref. No.	Parts No.	Nomenclature
D006-016	8234 0088 00	GMB01-BT
D017-18	8234 0196 02	DSK10C-BT
D019-21	8234 0088 00	GMB01-BT
D101	8234 0039 00	Array, MA154WK
D102	8234 0040 00	Array, MA154WA
D103-104	8234 0040 00	Array, MA154WA
D105-106	8234 0039 00	Array, MA154WK
D107-108	8234 0040 00	Array, MA154WA
D109-110	8234 0039 00	Array, MA154WK
D111	8234 0040 00	Array, MA154WA

CARBON RESISTORS

All resistors 1/6W, ±5% unless otherwise noted.

R001	8230 1384 71	Flat mtg.,	470Ω
R002	8230 1382 23	Flat mtg.,	22kΩ
R003	8230 1381 81	Flat mtg.,	180Ω
R004-005	8230 1381 09	Flat mtg.,	1Ω
R006-007	8230 1385 62	Flat mtg.,	5.6kΩ
R008-009	8230 1381 09	Flat mtg.,	1Ω
R010-011	8230 1385 60	Flat mtg.,	56Ω
R012-013	8230 1385 62	Flat mtg.,	5.6kΩ
R014	8230 1382 20	Flat mtg.,	22Ω
R015	8230 1381 24	Flat mtg.,	120kΩ
R016	8230 1381 04	Flat mtg.,	100kΩ
R017	8230 1381 03	Flat mtg.,	10kΩ
R018-019	8230 1382 23	Flat mtg.,	22kΩ
R020-021	8230 1381 03	Flat mtg.,	10kΩ
R022	8230 1381 05	Flat mtg.,	1MΩ
R023	8230 1381 04	Flat mtg.,	100kΩ
R024	8230 1381 05	Flat mtg.,	1MΩ
R025	8230 1381 04	Flat mtg.,	100kΩ
R026	8230 1381 05	Flat mtg.,	1MΩ
R027	8230 1381 04	Flat mtg.,	100kΩ
R028	8230 1382 23	Flat mtg.,	22kΩ
R029	8230 1381 03	Flat mtg.,	10kΩ
R030	8230 1381 04	Flat mtg.,	100kΩ
R031	8230 1381 05	Flat mtg.,	1MΩ
R032	8230 1381 05	Flat mtg.,	1MΩ
R033	8230 1381 02	Flat mtg.,	1kΩ
R034	8230 1381 03	Flat mtg.,	10kΩ
R035	8230 1381 04	Flat mtg.,	100kΩ
R036-039	8230 1384 71	Flat mtg.,	470Ω
R040	8230 1381 02	Flat mtg.,	1kΩ
R041	8230 1382 23	Flat mtg.,	22kΩ
R042	8230 1382 23	Flat mtg.,	22kΩ
R043	8230 1382 23	Flat mtg.,	22kΩ
R044-047	8230 1382 23	Flat mtg.,	22kΩ
R048	8230 1381 03	Flat mtg.,	10kΩ
R049	8230 1381 03	Flat mtg.,	10kΩ
R050	8230 1381 02	Flat mtg.,	1kΩ
R051	8230 1381 03	Flat mtg.,	10kΩ
R052	8230 1384 73	Flat mtg.,	47kΩ
R053	8230 1384 71	Flat mtg.,	470Ω
R054	8230 1381 03	Flat mtg.,	10kΩ
R055	8230 1381 04	Flat mtg.,	100kΩ
R056	8230 1382 22	Flat mtg.,	2.2kΩ
R057	8230 1382 22	Flat mtg.,	2.2kΩ
R058	8230 1381 03	Flat mtg.,	10kΩ
R059	8230 1381 03	Flat mtg.,	10kΩ
R060	8230 1386 21	Flat mtg.,	620Ω
R061	8230 1381 03	Flat mtg.,	10kΩ
R062	8230 1382 22	Flat mtg.,	2.2kΩ
R063	8230 1381 02	Flat mtg.,	1kΩ
R064	8230 1382 23	Flat mtg.,	22kΩ
R065	8230 1382 23	Flat mtg.,	22kΩ
R066	8230 1384 73	Flat mtg.,	47kΩ
R067	8230 1381 03	Flat mtg.,	10kΩ
R068	8230 1382 22	Flat mtg.,	2.2kΩ
R069	8230 1381 52	Flat mtg.,	1.5kΩ
R070	8230 1382 23	Flat mtg.,	22kΩ
R071	8230 1381 04	Flat mtg.,	100kΩ
R072-074	8230 1382 23	Flat mtg.,	22kΩ
R075	8230 1381 04	Flat mtg.,	100kΩ
R076	8230 1381 04	Flat mtg.,	100kΩ
R077	8230 1382 23	Flat mtg.,	22kΩ
R078	8230 1381 02	Flat mtg.,	1kΩ
R079	8230 1382 23	Flat mtg.,	22kΩ
R080	8230 1382 22	Flat mtg.,	2.2kΩ
R081	8230 1382 23	Flat mtg.,	22kΩ
R082	8230 1382 23	Flat mtg.,	22kΩ
R083-084	8230 1382 21	Flat mtg.,	220Ω
R085	8230 1382 23	Flat mtg.,	22kΩ
R086	8230 1381 04	Flat mtg.,	100kΩ
R087-09	8230 1383 02	Flat mtg.,	3kΩ
R089	8230 1381 04	Flat mtg.,	100kΩ
R090	8230 1381 04	Flat mtg.,	100kΩ
R091	8230 1381 04	Flat mtg.,	100kΩ
R092	8230 1384 73	Flat mtg.,	47kΩ
R093	8230 1381 03	Flat mtg.,	10kΩ
R094-095	8230 1381 02	Flat mtg.,	1kΩ
R096	8230 1381 03	Flat mtg.,	10kΩ
R097	8230 1384 73	Flat mtg.,	47kΩ
R098	8230 1382 02	Flat mtg.,	2kΩ
R099-100	8230 1388 22	Flat mtg.,	8.2kΩ
R101	8230 1382 02	Flat mtg.,	2kΩ

Ref. No.	Parts No.	Nomenclature
R102-103	8230 1381 03	Flat mtg., 10kΩ
R104-105	8230 1381 04	Flat mtg., 100kΩ
R106-107	8230 1381 00	Flat mtg., 10Ω
R108	8230 1385 64	Flat mtg., 560kΩ
R109	8230 1381 03	Flat mtg., 10kΩ
R110	8230 1381 53	Flat mtg., 15kΩ
R111	8230 1384 73	Flat mtg., 47kΩ
R112	8230 1381 03	Flat mtg., 10kΩ
R113	8230 1381 53	Flat mtg., 15kΩ
R114	8230 1384 74	Flat mtg., 470kΩ
R115	8230 1381 04	Flat mtg., 100kΩ
R116	8230 1382 22	Flat mtg., 2.2kΩ
R117	8230 1383 32	Flat mtg., 3.3kΩ
R118-119	8230 1382 23	Flat mtg., 22kΩ
R120	8230 1381 03	Flat mtg., 10kΩ
R121	8230 1384 73	Flat mtg., 47kΩ
R122	8230 1384 74	Flat mtg., 470kΩ
R124	8230 1383 32	Flat mtg., 3.3kΩ
R125	8230 1382 22	Flat mtg., 2.2kΩ
R126	8230 1381 05	Flat mtg., 1MΩ
R127	8230 1381 05	Flat mtg., 1MΩ
R128	8230 1884 73	Flat mtg., 47kΩ
R129	8230 1381 05	Flat mtg., 1MΩ
R130	8230 1384 73	Flat mtg., 47kΩ
R131	8230 1381 04	Flat mtg., 100kΩ
R132	8230 1384 73	Flat mtg., 47kΩ
R133	8230 1384 73	Flat mtg., 47kΩ
R134	8230 1381 04	Flat mtg., 100kΩ
R135-139	8230 1382 23	Flat mtg., 22kΩ
R140-143	8230 1386 22	Flat mtg., 6.2kΩ
R144	8230 1381 02	Flat mtg., 1kΩ
R145-146	8230 1382 23	Flat mtg., 22kΩ
R147-148	8230 1381 04	Flat mtg., 100kΩ
R149-152	8230 1384 71	Flat mtg., 470Ω
R153	8230 1381 51	Flat mtg., 150Ω
R154-155	8230 1381 03	Flat mtg., 10kΩ
R156-157	8230 1381 02	Flat mtg., 1kΩ
R158-159	8230 1384 73	Flat mtg., 47kΩ
R160-161	8230 1381 04	Flat mtg., 100kΩ
R162	8230 1381 04	Flat mtg., 100kΩ
R163-164	8230 1381 04	Flat mtg., 100kΩ
R165	8230 1384 73	Flat mtg., 47kΩ
R166	8230 1381 05	Flat mtg., 1MΩ
R167	8230 1381 05	Flat mtg., 1MΩ
R168	8230 1381 01	Flat mtg., 100Ω
R170	8230 0411 00	Flat mtg., 10Ω, ¼W, nonflammable
R171	8230 1382 23	Flat mtg., 22kΩ
R172	8230 1381 03	Flat mtg., 10kΩ
R173	8230 1381 04	Flat mtg., 100kΩ
R169	8230 1384 74	Flat mtg., 470kΩ
R174	8230 1381 02	Flat mtg., 1kΩ
R175	8230 1382 23	Flat mtg., 22kΩ
R176	8230 1382 23	Flat mtg., 22kΩ

CARBON POTS

R300	8231 0031 04	Pot., semi-fixed, flat, 100kΩ, B
R301	8231 0033 34	Pot., semi-fixed, flat, 330kΩ, B
R302-303	8231 0033 33	Pot., semi-fixed, flat, 33kΩ, B
R304-305	8231 0174 73	Pot., semi-fixed, metal, flat, 47kΩ, RH0621C
R500	8230 0671 04	Array, 1/4W, 100kΩ×3, 5%, RKC-S
R501	8230 0522 23	Array, 1/8W, 22kΩ×5, 5%, RKC
R502	8230 0542 23	Array, 1/8W, 22kΩ×7, 5%, RKC
R503	8230 0701 03	Array, 1/4W, 10kΩ×7, 5%, RKC-S
R504	8230 0701 04	Array, 1/4W, 100kΩ×7, 5%, RKC-S
R505	8230 0671 04	Array, 1/4W, 100kΩ×3, 5%, RKC-S
R506	8230 0671 03	Array, 1/4W, 10kΩ×3, 5%, RKC-S
R507	8230 0602 23	Array, 1/8W, 22kΩ×3, 5%, RKC

CAPACITORS

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

C001	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C002	8232 1453 36	ALU, 35V, 33μF, 20%, SME-VB
C003-004	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C005	8232 9014 72	PES, 50V, 0.047μF, 5%, AMZV
C006	8232 0318 22	PPR, 100V, 0.082μF, 5%, APS
C007	8232 9011 02	PES, 50V, 0.001μF, 5%, AMZV
C008	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB

Ref. No.	Parts No.	Nomenclature
C009	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB
C010-011	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C012-013	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C014-015	8232 0323 00	CER, 50V, 30pF, 5%, NPO
C016-026	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C027	8232 9014 73	PES, 50V, 0.047μF, 5%, AMZV
C028	(deleted)	
C029	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C030-033	(deleted)	
C034	8232 9013 32	PES, 50V, 0.033μF, 5%, AMZV
C035	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C036	8232 0321 00	CER, 50V, 10pF, ±5pF, NPO
C037	8232 1462 25	ALU, 50V, 2.2μF, 20%, SME-VB
C038	8232 9011 04	PES, 50V, 0.1μF, 5%, AMZV
C039	8232 1441 06	ALU, 25V, 10μF, 20%, SME-VB
C040-041	8232 1463 34	ALU, 50V, 0.33μF, 20%, SME-VB
C042-043	(deleted)	
C044-045	8232 1441 06	ALU, 25V, 10μF, 20%, SME-VB
C046-047	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C048-049	8232 9016 83	PES, 50V, 0.068μF, 5%, AMZV
C050-051	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C052	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C053	8232 8041 04	CER, 25V, 0.1μF, +80-20%, YF
C054-055	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C056-058	(deleted)	
C059-060	8232 0324 70	CER, 50V, 47pF, 5%, NPO
C061	8232 1411 07	ALU, 6.3V, 100μF, 20%, SME-VB
C062-064	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C065	8232 1431 08	ALU, 16V, 1000μF, 20%, SME-VB
C066	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF
C067	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C068	(deleted)	
C069	(deleted)	
C070	8232 1453 36	ALU, 35V, 33μF, 20%, SME-VB
C071	8232 9011 03	PES, 50V, 0.01μF, 20%, AMZV
C072	8232 9011 03	PES, 50V, 0.01μF, 20%, AMZV
C073	8232 8031 03	CER, 50V, 0.01μF, +80-20%, YF

MISCELLANEOUS

E102	8239 0018 00	Battery, Ni-Cd, N-SB3
E501	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
E502	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
E503	8276 0010 00	Pin, header
J001	8245 0530 02	Connector, jack, 8263, 2, straight, wht.
J002	8245 0530 22	Connector, jack 8263, 2, straight, red
J003	(deleted)	
J004	8245 0530 28	Connector, jack, 8263, 8, straight, red
J005	8245 0530 48	Connector, jack, 8263, 8, straight, blk.
J006	8245 0530 24	Connector, jack, 8263, 4, straight, red
J007	8245 0530 64	Connector, jack, 8263, 4, straight, yel.
J008	8245 0530 63	Connector, jack, 8263, 3, straight, yel.
J009	8245 0530 43	Connector, jack, 8263, 3, straight, blk.
J010	(deleted)	
J011	8245 0530 08	Connector, jack, 8263, 8, straight, wht.

Ref. No.	Parts No.	Nomenclature
J012	8245 0530 28	Connector, jack, 8263, 8, straight, red
J013	8245 0530 12	Connector, jack, 8263, 12, straight, wht.
J014	8245 0530 06	Connector, jack, 8263, 6 straight, wht.
J015	8245 0530 62	Connector, jack, 8263, 2, straight, yel.
J016	8245 0530 23	Connector, jack, 8263, 3, straight, red
J017	8245 0530 23	Connector, jack, 8263, 3, straight, red
J018	8245 0530 46	Connector, jack, 8263, 6, straight, blk.
J019	8245 0530 26	Connector, jack, 8263, 6, straight, red
J020	8245 0530 66	Connector, jack, 8263, 6, straight, yel.
J021	8245 0530 69	Connector, jack, 8263, 9, straight, yel.
J022	8245 0530 02	Connector, jack, 8263, 2, straight, wht.
J023	8245 0530 24	Connector, jack, 8263, 4, straight, red
J024	8245 0530 26	Connector, jack, 8263, 6, straight, red
J025	8245 0530 44	Connector, jack, 8263, 4, straight, blk.
J026	8245 0530 42	Connector, jack, 8263, 2, straight, blk.
J027	8245 0530 66	Connector, jack, 8263, 6, straight, yel.
J028	8245 0530 22	Connector, jack, 8263, 2, straight, red
J029	8245 0530 05	Connector, jack, 8263, 5, straight, wht.
J030	8245 0530 07	Connector, jack, 8263, 7, straight, wht.
J031	8245 0530 32	Connector, jack, 8263, 12, straight, red
J032	8245 0530 23	Connector, jack, 8263, 3, straight, red
J033	8245 0530 63	Connector, jack, 8263, 3, straight, yel.
J034	8245 1761 02	Connector, jack, IMSA-9202B-102-T
J035	(deleted)	

Ref. No.	Parts No.	Nomenclature
L001	8242 0530 00	Coil, 150UH
T001	8242 0940 00	Transformer, Master OSC
X001	8256 0550 00	Ceramic resonator, 8MHz

CONNECTOR BOARD PCB ASSEMBLY

PCB Ass'y No. 8273 5260 01

Ref. No.	Parts No.	Nomenclature
	8251 3512 00	Plain PCB, Connector, board G

IC's

U001	8236 0568 00	Digital, FCG1, UPD78C12AGF
U002, 003	8236 0328 00	Analog, Multiplexer, 4052B

TRANSISTORS

Q001,002	8234 0003 03	2SA1015GR
Q003	8234 0096 02	2SC732TM-BL
Q004	8234 0003 03	2SA1015GR
Q005	8234 0096 02	2SC732TM-BL
Q006	8234 0003 03	2SA1015GR

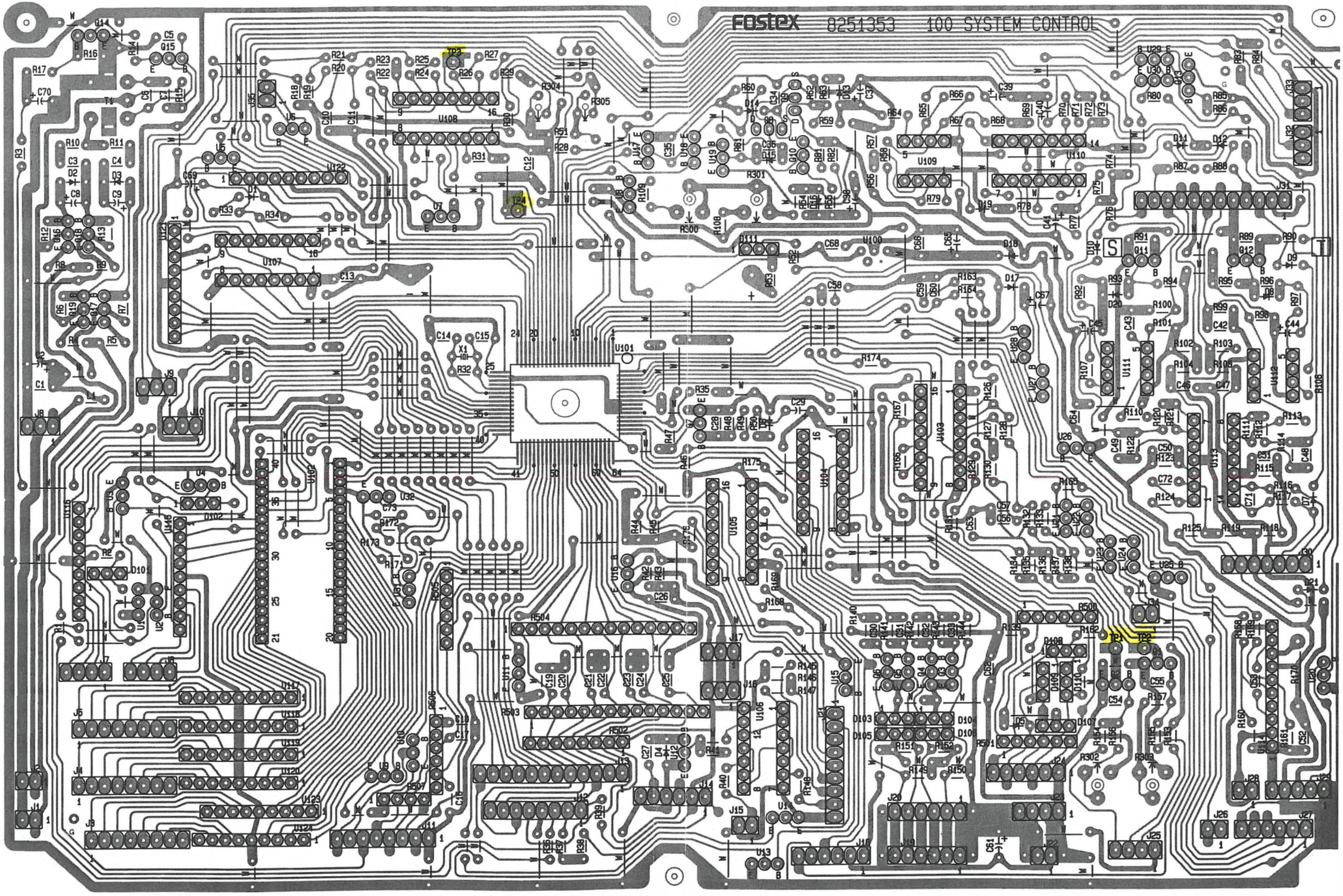
DIODES

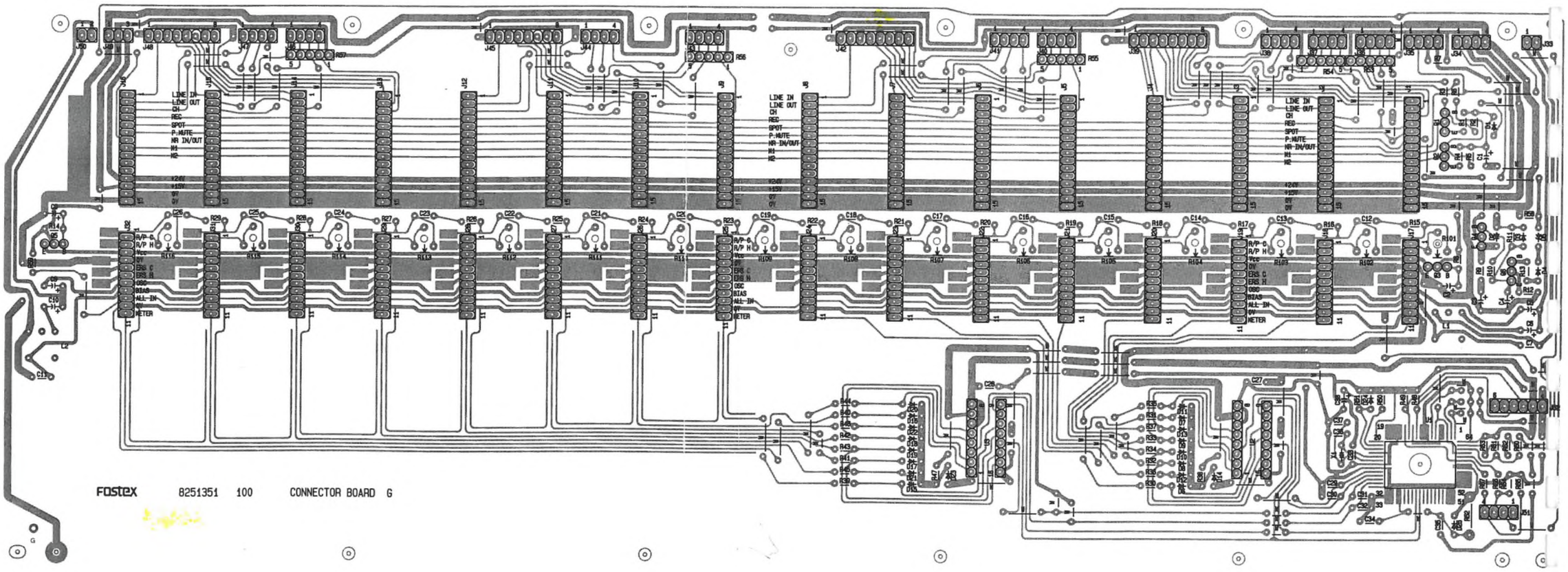
D001	8234 0088 00	GMB01-BT
D002	8234 0196 02	DSK10C-BT
D003-004	8234 0088 00	GMB01-BT
D005	8234 0019 14	Zener, 10V, 05AZ10Y
D006-025	8234 0088 00	GMB01-BT

CARBON RESISTORS

All resistors 1/6W, ±5% unless otherwise noted.

R001	8230 1382 72	Flat mtg.,	2.7kΩ
R002	8230 1381 04	Flat mtg.,	100kΩ
R003	8230 1381 04	Flat mtg.,	100kΩ
R004	8230 1382 72	Flat mtg.,	2.7kΩ
R005	8230 1381 04	Flat mtg.,	100kΩ
R006	8230 1381 04	Flat mtg.,	100kΩ
R007	8230 1381 03	Flat mtg.,	10kΩ
R008	8230 1382 22	Flat mtg.,	2.2kΩ
R009	(deleted)		
R010	8230 1382 23	Flat mtg.,	22kΩ
R011	8230 1381 24	Flat mtg.,	120kΩ
R012	8230 1384 71	Flat mtg.,	470Ω
R013	8230 1382 23	Flat mtg.,	22kΩ
R014	8230 1382 22	Flat mtg.,	2.2kΩ


FOSTEX 8251353 100 SYSTEM CONTROL


LINE IN
LINE OUT
CH
REC
SPOT
P-MUTE
NR IN/OUT
M1
M2
+24V
+15V
0V
0V
R/P G
R/P H
Vcc
0V
ERS C
ERS H
OSC
BIAS
ALL-IN
0V
METER
Fostex 8251351 100 CONNECTOR BOARD G

Ref. No.	Parts No.	Nomenclature
R015-029	8230 1381 02	Flat mtg., 1kΩ
R030-037	8230 1381 03	Flat mtg., 10kΩ
R038	8230 1381 02	Flat mtg., 1kΩ
R039-046	8230 1381 03	Flat mtg., 10kΩ
R047	8230 1381 02	Flat mtg., 1kΩ
R048	8230 1381 43	Flat mtg., 24kΩ
R049	8230 1382 43	Flat mtg., 24kΩ
R050	8230 1384 72	Flat mtg., 4.7kΩ
R051	8230 1387 53	Flat mtg., 75kΩ
R052	8230 0394 70	Flat mtg., 47Ω, 1/4W, nonflammable
R053-057	8230 0362 23	Array, 1/8W, 22kΩ x4, 5%, RKC
R058	8230 1381 04	Flat mtg., 100kΩ
R059	8230 1382 23	Flat mtg., 22kΩ
R060	8230 1381 04	Flat mtg., 100kΩ
R061	8230 1385 13	Flat mtg., 51kΩ
R062	8230 1381 04	Flat mtg., 100kΩ
R063	8230 1385 13	Flat mtg., 51kΩ
R064	8230 1382 23	Flat mtg., 22kΩ
R066	8230 1381 04	Flat mtg., 100kΩ
R065	8230 1382 22	Flat mtg., 2.2kΩ
R067	8230 1382 22	Flat mtg., 2.2kΩ
R068-082	8230 1385 61	Flat mtg., 560Ω

CARBON POT

R101-115	8231 0142 21	Pot., semi-fixed, flat mtg., 220Ω

CAPACITORS

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

C001	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C002	8232 1434 76	ALU, 16V, 47μF, 20%, SME-VB
C003	8232 1432 27	ALU, 16V, 220μF, 20%, SME-VB
C004	8232 1433 36	ALU, 16V, 33μF, 20%, SME-VB
C005	(deleted)	
C006	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C007	(deleted)	
C008	8232 1434 76	ALU, 16V, 47μF, 20%, SME-VB
C009	(deleted)	
C010	8232 1431 06	ALU, 16V, 10μF, 20%, SME-VB
C011	(deleted)	
C012-026	8232 9011 03	PES, 50V, 0.01μF, 5%, AMZV
C027,028	8232 8001 04	CER, 16V, 0.1μF, +80-20%, YF
C029-032	8232 8011 81	CER, 50V, 180PF, 6%, SL
C033-035	8232 8001 04	CER, 16V, 0.1μF, +80-20%, YF
C036,037	8232 0323 00	CER, 50V, 30PF, 5%, NPO
C038	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB

Ref. No.	Parts No.	Nomenclature

MISCELLANEOUS

E301	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
E302	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
J001-016	8245 2030 15	Connector, jack, IL-SDA-15P-S2T2
J017-032	8245 2030 11	Connector, jack, IL-SDA-11P-S2T2
J033	8245 0870 02	Connector, jack 8263, 2 right-angle, wht.
J034	8245 0870 44	Connector, jack 8263, 4, right-angle, blk.
J035	8245 0870 04	Connector, jack 8263, 4, right-angle, wht.
J036	8245 0870 24	Connector, jack, 8263, 4, right-angle, red.
J037	8245 0870 64	Connector, jack, 8263, 4, right-angle, yel.
J038	8245 0870 04	Connector, jack, 8263, 4, right-angle, wht.
J039	8245 0870 08	Connector, jack 8263, 8, right-angle, wht.
J040	8245 0870 24	Connector, jack, 8263, 4, right-angle, red
J041	8245 0870 44	Connector, jack, 8263, 4, right-angle, blk.
J042	8245 0870 48	Connector, jack, 8263, 8, right-angle, blk.
J043	8245 0870 04	Connector, jack, 8263, 4, right-angle, wht.
J044	8245 0870 24	Connector, jack, 8263, 4, right-angle, red
J045	8245 0870 28	Connector, jack, 8263, 8, right-angle, red
J046	8245 0870 44	Connector, jack, 8263, 4, right-angle, blk.
J047	8245 0870 64	Connector, jack, 8263, 4, right-angle, yel.
J048	8245 0870 68	Connector, jack, 8263, 8, right-angle, yel.
J049	8245 0870 03	Connector, jack, 8263, 3, right-angle, wht.
J050	8245 0870 22	Connector, jack, 8263, 2, right-angle, red
J051	8245 0530 64	Connector, jack, 8263, 4, Straight, yel.
J052	8245 0530 46	Connector, jack, 8263, 6, Straight, blk.
L001,002	8242 0090 00	Coil, bias
W001	8276 6510 15	Cable Assy, earth-lug, D3, 150mm
X001	8256 0780 00	Ceramic resonator, 12MHz

NR SWITCH PCB ASSEMBLY

PCB Ass'y No. 8273 5270 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 08	Plain PCB, NR switch
S001	8253 6630 01	Switch, slide, 2-3, non-shorting, SSSB023, L=6
W001	8276 2360 24	Cable Assy, 4P wht., 240mm

ACCESSORY PCB ASSEMBLY

PCB Ass'y No. 8273 5290 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 01	Plain PCB, accessory
E101	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
J001-002	8245 3390 03	Connector, phone jack, YKB21-5010
J003	8245 0530 43	Connector, jack, 8263, 3, Straight, blk.
J004	8245 0530 02	Connector, jack, 8263, 2, Straight, wht.
J005	8245 0530 62	Connector, jack, 8263, 2, Straight, yel.
J006	8245 0530 22	Connector, jack, 8263, 2, Straight, red
J007	8245 0530 03	Connector, jack, 8263, 3, Straight, wht.
J008	8245 0530 23	Connector, jack, 8263, 3, Straight, red
J009	8245 0530 63	Connector, jack, 8263, 3, Straight, yel.
J010	8245 0530 06	Connector, jack, 8263, 6, Straight, wht.
J011	8245 0530 12	Connector, jack, 8263, 12, Straight, wht.
J012	8245 2730 01	Connector, jack, FC, HIF3BA20PA-DS(11)
S001	8253 1180 01	Switch, push, SPUP
W001	8276 6510 15	Cable Assy, earth-lug, D3, 150mm

TENSION SENSOR/T,G PCB ASSEMBLY

PCB Ass'y No. 8273 5310 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 03	Plain PCB, tension sensor/T
		IC
U001	8234 0198 00	Opt., photo-interrupter, GP-1S52
		TRANSISTOR
Q001	8234 0001 21	FET, 2SK117GR, BL
		DIODE
D001-003	8234 0088 00	GMB01-BT
		CARBON RESISTORS
		All resistors 1/6W, ±5% unless otherwise noted.
R001	8230 1381 04	Flat mtg., 100kΩ
R002	8230 1282 22	Flat mtg., 2.2kΩ
R003	8230 1381 02	Flat mtg., 1kΩ
R004	8230 1388 23	Flat mtg., 82kΩ
R005	8230 1383 31	Flat mtg., 330Ω
		CAPACITORS
		ALU = Electrolytic type
		PES = Mylar type
C001	8232 9011 04	PES, 50V, 0.1μF, 5%, AMZV
C002	8232 1451 06	ALU, 35V, 10μF, 20%, SME-VB
		MISCELLANEOUS
J001	8245 0870 03	Connector, jack, 8263, 3, right-angle, wht.
J002	8245 0530 02	Connector, jack, 8263, 2, straight, wht.
L001-002	8242 0950 01	Coil, servo, E
W001	8276 6842 65	Cable Assy, 3P, 8263 red 9073, 650mm

TENSION SENSOR/S,G PCB ASSEMBLY

PCB Ass'y No. 8273 5320 00

Ref. No.	Parts No.	Nomenclatre
	8251 8701 02	Plain PCB, tension sensor/S
		IC
U001	8234 0198 00	Opt., photo-interrupter, GP-1S52

Ref. No.	Parts No.	Nomenclature
	TRANSISTORS	
Q001	8234 0002 03	2SC1815GR
Q002	8234 0001 21	FET, 2SK117GR, BL
	DIODE	
D001 003	8234 0088 00	GMB01-BT
	CARBON RESISTORS	
	All resistors 1/6W, ±5% unless otherwise noted.	
R001	8230 1386 83	Flat mtg., 68kΩ
R002	8230 1385 62	Flat mtg., 5.6kΩ
R003	8230 1382 20	Flat mtg., 22Ω
R004	8230 1381 04	Flat mtg., 100kΩ
R005	8230 1382 22	Flat mtg., 2.2kΩ
R006	8230 1381 02	Flat mtg., 1kΩ
R007	8230 1388 23	Flat mtg., 82kΩ
R008	8230 1383 31	Flat mtg., 330Ω
	CAPACITORS	
	ALU = Electrolytic type	
	PES = Mylar type	
	PPR = Polypropylene type	
C001	8232 9011 02	PES, 50V, 0.001μF, 5%, AMZV
C002	8232 9015 62	PES, 50V, 0.0056μF, 5%, AMZV
C003	8232 0312 22	PPR, 100V, 0.0022μF, 5%, APS
C004	8232 0311 23	PPR, 100V, 0.012μF, 5%, APS
C005	8232 9011 04	PES, 50V, 0.1μF, 5%, AMZV
C006	8232 1451 06	ALU, 35V, 10μF, 20%, SME-VB
	MISCELLANEOUS	
J001	8245 0870 23	Connector jack, 8263, 3, right-angle, red
L001-002	8242 0950 01	Coil, servo, E
L003	8242 0530 00	Coil, 150UH
T001	8242 1040 00	Transformer, OSC, 70KHz
W001	8276 6842 45	Cable Assy, 3P, 8263 red 9073, 450mm
W002	8276 3910 50	Cable Assy, Shield, wht. 2P 5395, 500mm

SPOT/EDIT.G PCB ASSEMBLY

PCB Ass'y No. 8273 5330 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 05	Plain PCB, spot/edit
D001-003	8234 0100 00	Opt., LED, org, GL-2HD6
R001	8230 1384 71	Resistor, carbon, 1/6W, 470, flat mtg., 5%
R002	8230 1384 71	Resistor, carbon, 1/6W, 470, flat mtg., 5%
E101	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
S001-003	8253 1130 11	Switch, tact, SOA-142HS
W001	8276 6890 40	Cable ASSY, 8P, 8263 wht. 9073, 400mm
Y101	8207 0051 01	Spacer, LED, 5

JOG PCB ASSEMBLY

PCB Ass'y No. 8273 5340 00

Ref. No.	Parts No.	Nomenclature
	8251 870106	Plain PCB, jog
R001	8240 1700 16	Pot., 11, 20kΩ, flat mtg.
W001	8276 7250 15	Cable ASSY, 4P, 9073-9073 flat mtg., 150mm

CONTROL SWITCH PCB ASSEMBLY

PCB Ass'y No. 8273 5350 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 07	Plain PCB, control SW
	DIODES	
D001	8234 0191 00	Opt., LED, grn., GL-2EG6
D002	8234 0100 00	Opt., LED, org., GL-2HD6
D003	8234 0196 00	Opt., LED, yel., GL-2HY6
S001-004	8253 1130 11	Switch, tact, SOA-142HS
W001	8276 6892 70	Cable Assy, 8P, 8263 red-9073, 700mm
Y101	8207 0051 01	Spacer, LED, 5

TENSION POD PCB ASSEMBLY

PCB Ass'y No. 8273 5360 00

Ref. No.	Parts No.	Nomenclature
	8251 8701 04	Plain PCB, tension pod
		METAL RESISTORS
R001	8231 0172 23	Pot., semi-fixed, metal, 22kΩ
R002	8231 0174 73	Pot., semi-fixed, metal, 47kΩ
R003	8231 0174 72	Pot., semi-fixed, metal, 4.7kΩ
R004	8231 0174 72	Pot., semi-fixed, metal, 4.7kΩ
R005	8231 0171 04	Pot., semi-fixed, metal, 100kΩ
R006	8231 0172 23	Pot., semi-fixed, metal, 22kΩ
		MISCELLANEOUS
E101	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
W001	8276 6932 65	Cable Assy, 12P, 8263 red 9073, 650mm
W002	8276 6840 50	Cable Assy, 3P, 8263 wht. 9073, 500mm
W003	8276 6842 17	Cable Assy, 3P, 8263 red 9073, 170mm

HEAD TERMINAL PCB ASSEMBLY

PCB Ass'y No. 8273 5370 00

Ref. No.	Parts No.	Nomenclature
	8251 3520 00	Plain PCB, head terminal, G
J001-004	8245 1950 01	Connector, IC Socket, 16P, N
W001,003	8276 3211 55	Cable Assy, shield 2 core, 8P red male-pin, 550mm
W002,004	8276 3201 55	Cable Assy, shield 2 core, 8P wht. male-pin, 550mm
W005,007	8276 3231 55	Cable Assy, shield, 8P red male-pin, 550mm
W006,008	8276 3221 55	Cable Assy, shield, 8P wht. male-pin, 550mm

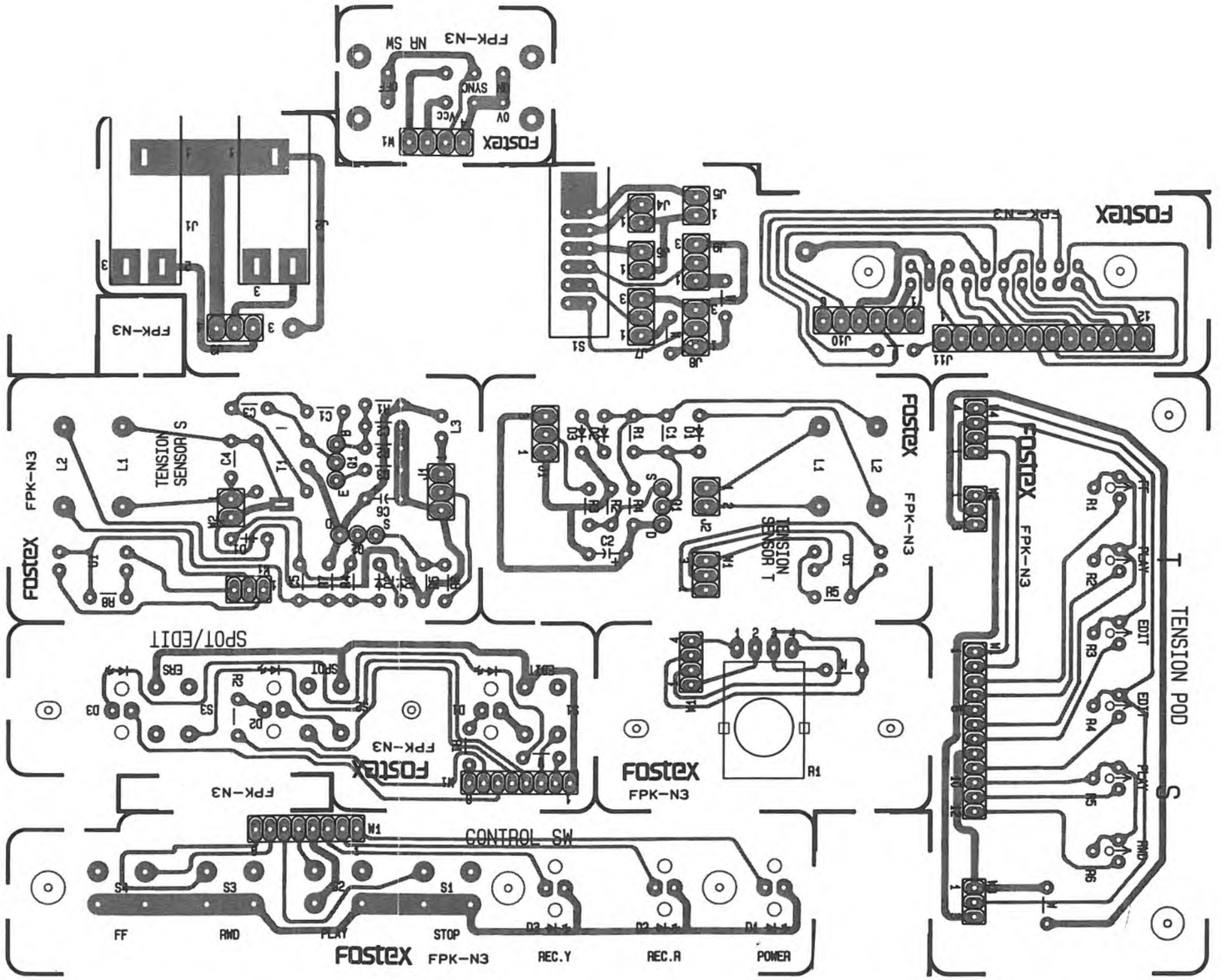
REGULATOR PCB ASSEMBLY

PCB Ass'y No. 8273 5390 00

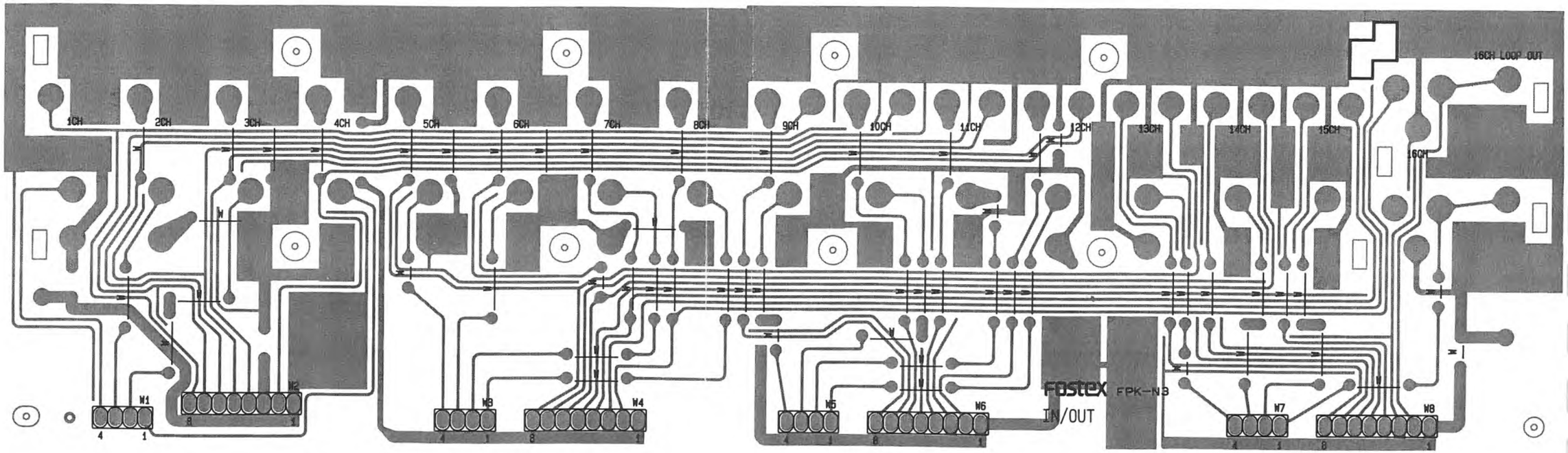
Ref. No.	Parts No.	Nomenclature
	8251 8691 02	Plain PCB, regulator
		IC's
U001	8236 0321 09	Analog, NJM7824FA
U002	8236 0332 08	Analog, L7815ML
U003	8236 0332 08	Analog, L7815ML
U004	8236 0362 02	Analog, PQ09RF2
U005	8236 0362 01	Analog, PQ05RF2
U006	8236 0348 06	Regulator, 7915FA
U007	8236 0570 01	Digital reset, PST523D
		TRANSISTORS
Q001	8234 0002 06	2SC1815Y/GR/BL
Q002	8234 1720 00	2SD1047-E
Q003	8234 0038 02	2SA1020Y
Q004	8234 0003 03	2SA1015GR
Q005-006	8234 1721 00	2SD1741-AP
Q007-008	8234 1720 00	2SD1047-E
		DIODE
D001	8234 0160 02	DSC30TC-FD1
		CARBON RESISTORS
		All resistors 1/6W, ±5% unless otherwise noted.
R001	8230 1381 03	Flat mtg., 10kΩ
R002	8230 1382 23	Flat mtg., 22kΩ
R003	8230 1381 00	Flat mtg., 10Ω
R004	8230 1381 02	Flat mtg., 1kΩ
R005	8230 1381 03	Flat mtg., 10kΩ
R006-007	8230 1381 52	Flat mtg., 1.5kΩ
R008-009	8230 0041 01	Vertical mtg., 100Ω, ¼W
R010	8230 1381 02	Flat mtg., 1kΩ
R011	8230 1383 92	Flat mtg., 3.9kΩ
R012	8230 1384 73	Flat mtg., 47kΩ
R013	8230 0321 08	Cement, 5W, 0.1Ω, 10%
R014-015	8230 0353 38	Cement, 2W, 0.33Ω, 10%

Ref. No.	Parts No.	Nomenclature
		CAPACITORS
		ALU = Electrolytic type
C001-012	8232 1461 05	ALU, 50V, 1μF, 20%, SME-VB
C013	8232 1464 76	ALU, 50V, 47μF, 20%, SME-VB
C014-015	8232 1462 24	ALU, 50V, 0.22μF, 20%, SME-VB
		MISCELLANEOUS
E201	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
E202	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
J001	8245 0530 63	Connector, jack, 8263, 3, straight, yel,
J002	8245 0530 03	Connector, jack, 8263, 3, straight, wht.
J003	8245 0530 44	Connector, jack, 8263, 4, straight, blk.
J004	8245 0530 05	Connector, jack, 8263, 5, straight, wht.
J005	8245 0530 24	Connector, jack, 8263, 4, straight, red
J006	8245 0530 42	Connector, jack, 8263, 2, straight, blk.
J007	8245 0530 04	Connector, jack, 8263, 4, straight, wht
J008	8245 0530 03	Connector, jack, 8263, 3, straight, wht
J009	8245 0530 07	Connector, jack, 8263, 7, straight, wht
J010	8245 0530 03	Connector, jack, 8263, 3, straight, wht
J011	8245 0530 65	Connector, jack, 8263, 5, straight, yel.
W001	8276 7310 09	Cable Assy, 7P, 8263, wht 5395, #22, 90mm
W002	8276 7330 09	Cable Assy, 9P, 8263, wht 5395, #22, 90mm
W003	8276 7310 09	Cable Assy, 7P, 8263, wht 5395, #22, 90mm

NR SWITCH
ACCESSORY
TENSION SENSOR/T, G
TENSION SENSOR/S. G
TENSION POD
SPOT/EDIT
JOG
CONTROL SWITCH



IN/OUT

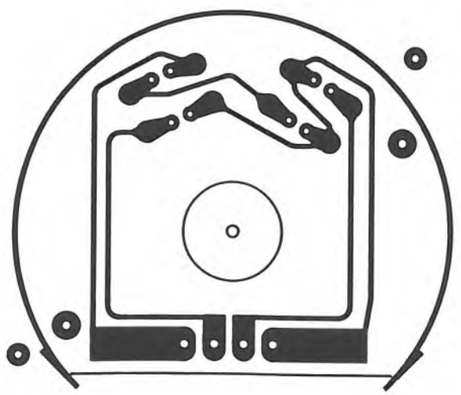


IN/OUT PCB ASSEMBLY

PCB Ass'y No. 8273 5280 00

Ref. No.	Parts No.	Nomenclature
	8251 3541 00	Plain PCB, IN/OUT, G16
E101	8276 0020 02	Wire, jumper, 5mm, IPS-1041-2
E102	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
J001-005	8245 2160 00	Connector, pin jack, 6P, blk., w/SW
J006,007	8245 2190 00	Connector, pin jack, 2P, blk., w/SW
W002	8276 3260 25	Cable Assy, 8P, wht. 250mm
W004	8276 3550 20	Cable Assy, 8P, blk. 200mm
W006	8276 3540 20	Cable Assy, 8P, red. 200mm
W008	8276 7240 20	Cable Assy, 8P, yel. 200mm
W001	8276 2360 24	Cable Assy, 4P, wht. 240mm
W003	8276 2820 20	Cable Assy, 4P, blk. 200mm
W005	8276 2410 20	Cable Assy, 4P, red, 200mm
W007	8276 2950 20	Cable Assy, 4P, yel. 200mm

COUNT SENSOR



COUNT SENSOR PCB ASSEMBLY

PCB Ass'y No. 8273 5380 00

Ref. No.	Parts No.	Nomenclature
	8251 3361 00	Plain PCB, count sensor, G
U001-002	8234 0182 04	Opt., photo-interrupter, GP-2S04, B
W001	8276 2820 50	Cable Assy, 4P blk, 500mm

STACK PCB ASSEMBLY

PCB Ass'y No. 8273 5410 00

Ref. No.	Parts No.	Nomenclature
	8251 8691 03	Plain PCB, stack
D001	8234 0084 02	Diode, stack, 15D4B41
W001	8276 6680 01	Cable Assy, 5395-5395, 12P, 80mm

POWER SUPPLY PCB ASSEMBLY

PCB Ass'y No. 8273 5400 00

Ref. No.	Parts No.	Nomenclature
	8251 8691 01	Plain PCB, power supply

DIODES

D001	8234 0086 02	Stack, KBU6D
D002-003	8234 0083 02	Stack, KBU4D
D004-005	8234 0160 02	DSC30TC-FD1
D006-007	8234 0088 00	GMB01-BT

CARBON RESISTORS

All resistors 1/6W, ±5% unless otherwise noted.

R001	8230 1384 73	Flat mtg., 47kΩ
R002	8230 1384 73	Flat mtg., 47kΩ
R003	8230 0321 09	Cement, 5W, 1Ω, 10%
R004	(deleted)	

CAPACITORS

ALU = Electrolytic type
PES = Mylar type

C001	8232 1384 78	ALU, 63V, 4700μF, 20%, SME-LISN-35B
C002	8232 1181 09	ALU, 25V, 10000μF, 20%, SME-VNSN-30B
C003	8232 1341 59	ALU, 35V, 15000μF, 20%, SME-LISN-40C
C004	8232 1334 78	ALU, 35V, 4700μF, 20%, SME-VNSN-22C
C005	8232 1384 78	ALU, 63V, 4700μF, 20%, SME-LISN-35B
C006	8232 1352 28	ALU, 50V, 2200μF, 20%, SME-VNSN-22B
C007	8232 9011 54	PES, 50V, 0.15μF, 5%, AMZV
C008	8232 0851 05	ALU, 50V, 1μF, 20%, BPLR
C009	8232 1464 74	ALU, 50V, 0.47μF, 20%, SME-VB
C010	8232 1463 34	ALU, 50V, 0.33μF, 20%, SME-VB

MISCELLANEOUS

E201	8276 0020 04	Wire, jumper, 10mm, IPS-1041-4
J001	8245 0530 07	Connector, jack, 8263, 7, Straight, wht.
J002	8245 0530 09	Connector, jack, 8263, 9, Straight, wht.
J003	8245 0530 22	Connector, jack, 8263, 2, Straight, red
J004	8245 0530 07	Connector, jack, 8263, 7, Straight, wht.
J006	8245 0530 02	Connector, jack, 8263, 2, Straight, wht.
J005	8245 0530 04	Connector, jack, 8263, 4, Straight, wht.
Y201	8239 0002 00	Holder, fuse, S-N5057
Y202	8218 0980 63	Label, fuse, T6.3A, EUR/UK
Y203	8218 0980 40	Label, fuse, T4A, EUR/UK
Y204	8218 0980 20	Label, fuse, T2A, EUR/UK
F001	⚠ 8239 1008 09	Fuse, multi, DM/USA/CND, anti-rush, 8A
	⚠ 8239 0007 63	Fuse, SEMKO, EUR/UK, time lag, 6.3A
F002	⚠ 8239 1008 09	Fuse, multi, DM/USA/CND, anti-rush, 8A
	⚠ 8239 0007 63	Fuse, SEMKO, EUR/UK, time lag, 6.3A
F003	⚠ 8239 1004 09	Fuse, multi, DM/USA/CND, anti-rush, 4A
	⚠ 8239 0007 40	Fuse, SEMKO, EUR/UK, time lag, 4A
F004	⚠ 8239 1004 09	Fuse, multi, DM/USA/CND, anti-rush, 4A
	⚠ 8239 0007 40	Fuse, SEMKO, EUR/UK, time lag, 4A
F005	⚠ 8239 1002 09	Fuse, multi, DM/USA/CND, anti-rush, 2A
	⚠ 8239 0007 20	Fuse, SEMKO, EUR/UK, time lag, 2A

REEL SENSOR / T, G PCB ASSEMBLY

PCB Ass'y No. 8273 5420 00

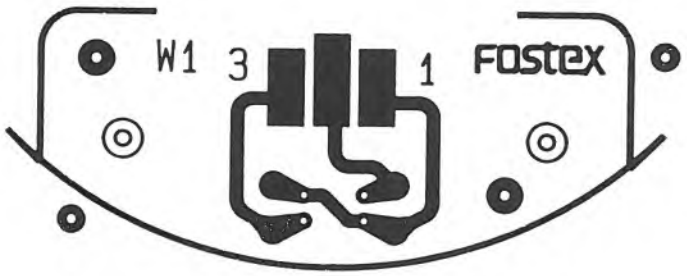
Ref. No.	Parts No.	Nomenclature
	8251 3370 00	Plain PCB, reel sensor G
U001	8234 0182 04	Opt., photo-interrupter, GP-2S04, B
W001	8276 2400 75	Cable Assy, 3P red, 750mm

REEL SENSOR/S, G PCB ASSEMBLY

PCB Ass'y No. 8273 5430 00

Ref. No.	Parts No.	Nomenclature
	8251 3370 00	Plain PCB, reel sensor
U001	8234 0182 04	Opt., photo interrupter, GP-2S04, B
W001	8276 2810 55	Cable Assy, 3P yel. 550mm

REEL SENSOR



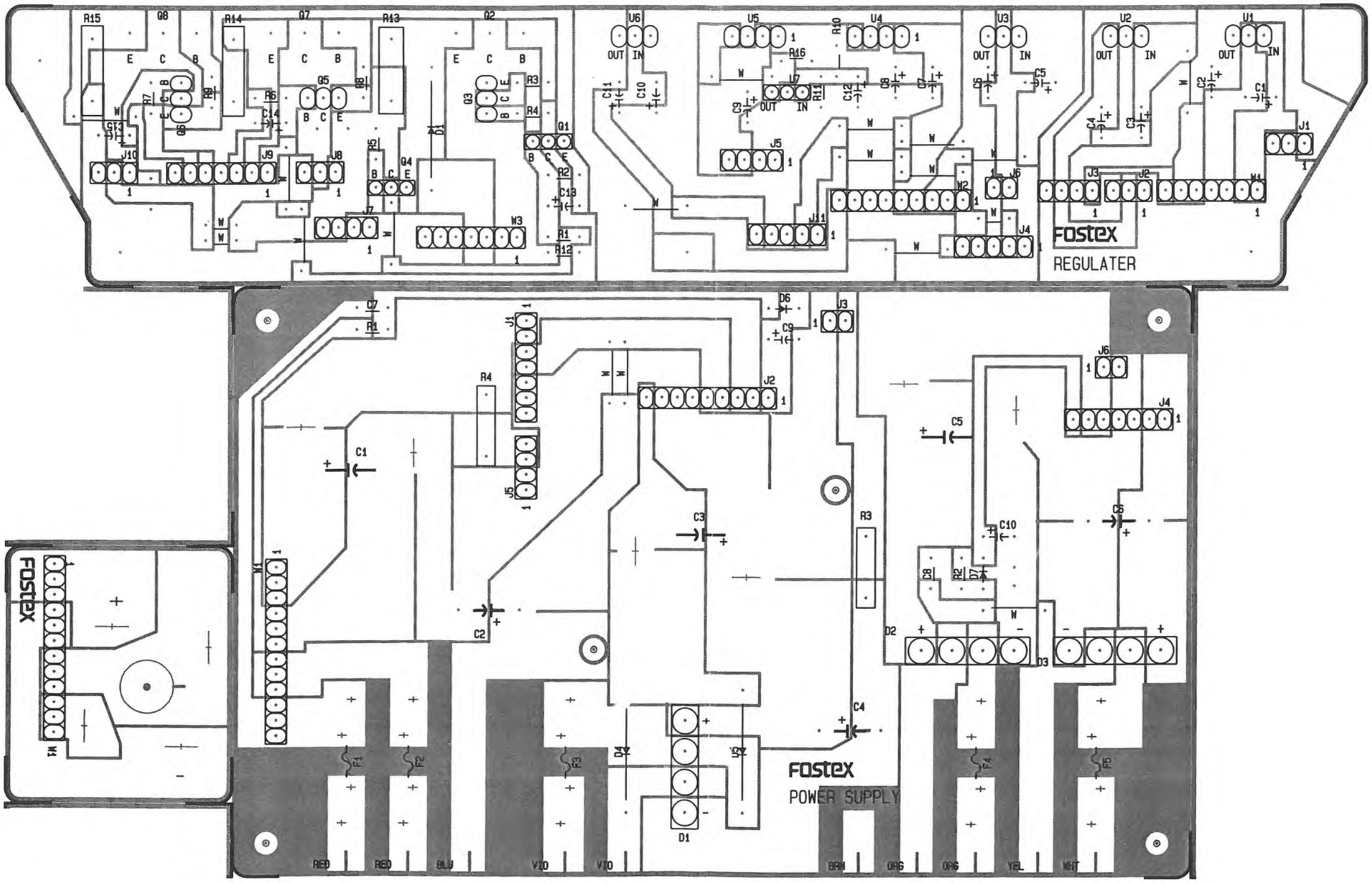
CABLES, SYSTEM CONTROL

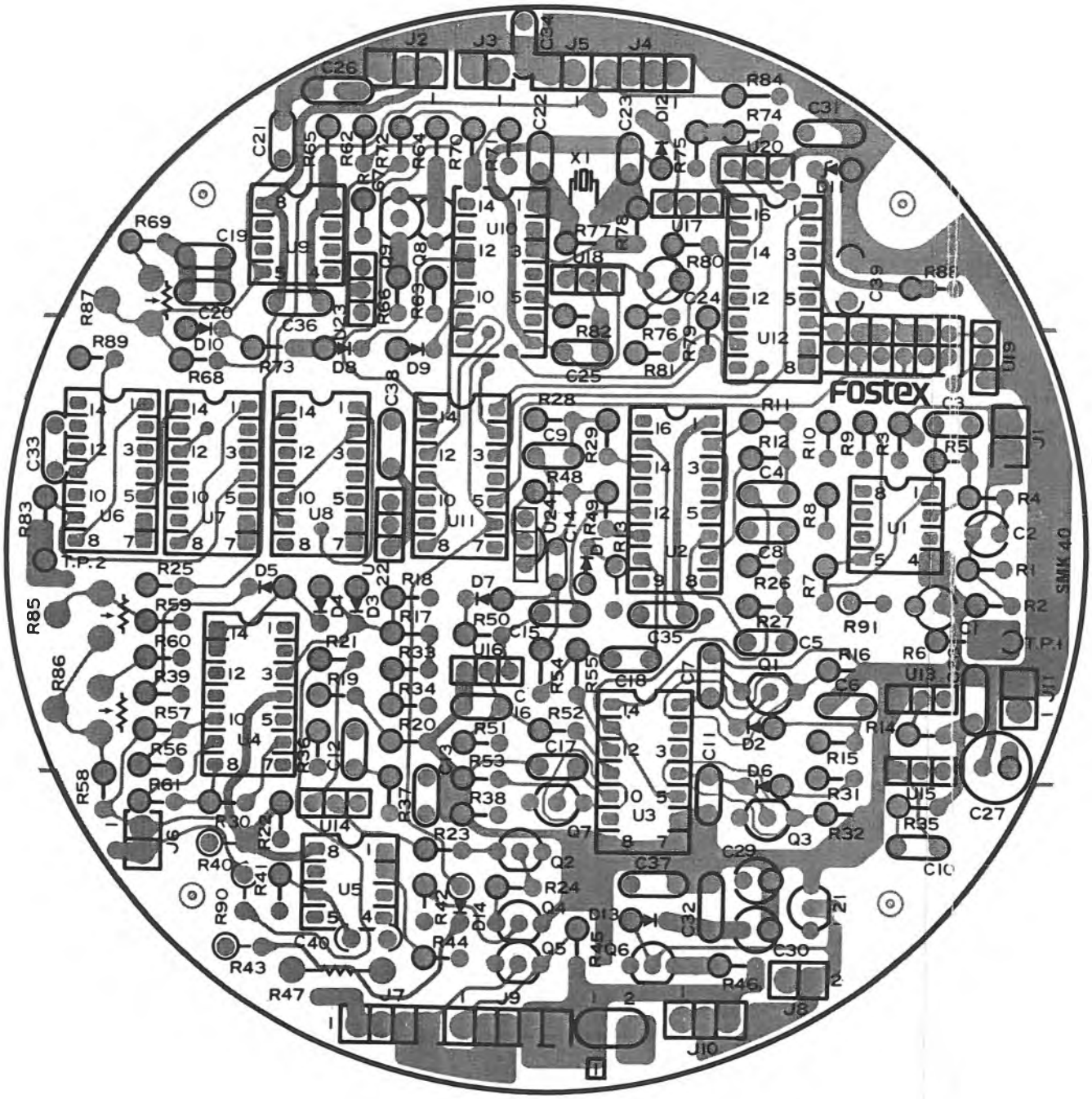
Ref. No.	Parts No.	Nomenclature
W001	8276 6040 15	Cable Assy, 2P, wht. #22, 150mm
W002	8276 6042 50	Cable Assy, 2P, red, #22, 500mm
W003	8276 7120 45	Cable Assy, 8 red, 4 blk. 4 wht. 450mm
W004	8276 7130 25	Cable Assy, 8 blk. 4 red 4 yel. 250mm
W005	8276 6992 15	Cable Assy, 4P, 8263 red-8263, 150mm
W006	8276 6993 30	Cable Assy, 4P, 8263 yel. 8263, 300mm
W007	8276 6053 65	Cable Assy, 3P, yel. #22, 650mm
W008	8276 6981 30	Cable Assy, 3P, 8263 blk. 8263, 300mm
W009	8276 7070 25	Cable Assy, 12P, 8263 wht. 8263, 250mm
W010	8276 7010 25	Cable Assy, 6P, 8263 wht. 8263, 250mm
W011	8276 6973 50	Cable Assy, 2P, 8263 yel. 8263, 500mm
W012	8276 7011 40	Cable Assy, 6P, 8263 blk. 8263, 400mm
W013	8276 6040 35	Cable Assy, 2P, wht. #22, 350mm
W014	8276 6062 30	Cable Assy, 4P, red, #22, 300mm
W015	8276 7140 55	Cable Assy, 6 yel. 4 wht. 2 red 550mm
W016	8276 6070 35	Cable Assy, 5P, wht. #22, 350mm
W017	8276 7150 25	Cable Assy, 7P, wht. #22, 250mm

CABLES, CAPSTAN

Ref. No.	Parts No.	Nomenclature
W001	8276 6060 50	Cable Assy, 4P, wht. #22, 500mm
W002	8276 6042 45	Cable Assy, 2P, red, #22, 450mm
W003	8276 6041 45	Cable Assy, 2P, blk. #22, 450mm
W004	8276 6980 30	Cable Assy, 3P, 8263 wht. 8263, 300mm

REGULATOR
POWER SUPPLY
STACK




Fostex
SMK 40
T.P.1
T.P.2

DD CAPSTAN PCB ASS'Y

Ass'y No. 8273 2580 05

Ref. No.	Parts No.	Nomenclature
	8251 2173 00	PCB, DD capstan
		IC's
U01	8236 0209 00	Analog, NJM4559DF
U02	8236 0028 01	Digital, CMOS, 4049UB
U03	8236 0270 00	Analog SW, 4066B
U04	8236 0292 00	Analog, NJM3403AD
U05	8236 0215 00	Analog, NJM2904D
U06-08	8236 0007 01	Digital, CMOS, 4013B
U09	8236 0288 00	Analog, timer, 555
U10	8236 0031 01	Digital, CMOS, 4069UB
U11	8236 0001 01	Digital, CMOS, 4001B
U12	8236 0062 00	Digital, CMOS, 4520B
U13	8236 0505 01	Driver, UN1211
U14	8236 0505 03	Driver, UN1213
U15, 16	8236 0505 01	Driver, UN1211
U17	8236 0505 02	Driver, UN1212
U18-20	8236 0505 03	Driver, UN1213
U21	8236 0313 00	Analog, 79L09A
U22, 23	8236 0505 03	Driver, UN1213
		TRANSISTORS
Q01	8234 0001 21	2SK117GR, BL
Q02	8234 0003 04	2SA1015Y, GR
Q03	8234 0001 21	2SK117GR, BL
Q04	8234 0006 02	2SC2878B
Q05	8234 0037 02	2SC2655Y
Q06	8234 0038 02	2SA1020Y
Q07	8234 0001 21	2SK117GR, BL
Q08,09	8234 0003 03	2SA1015GR
		DIODES
D01-10	8234 0080 00	DS442VB5
D11	8234 0019 10	Zener, 05AZ5.1Z
D12	8234 0080 00	DS442VB5
D13	8234 0007 00	1N4002
		CARBON RESISTORS
		All resistors 1/4W, ±5% unless noted otherwise.
		Metal = Metal film
R01,02	8230 0042 22	Vertical mtg, 2.2kΩ
R03	8230 0041 02	Vertical mtg, 1kΩ

Ref. No.	Parts No.	Nomenclature
R04	8230 0041 03	Vertical mtg, 10kΩ
R05	8230 0041 05	Vertical mtg, 1MΩ
R06	8230 0041 04	Vertical mtg, 100kΩ
R07,08	8230 0041 03	Vertical mtg, 10kΩ
R09	8230 0041 05	Vertical mtg, 1MΩ
R10	8230 0041 03	Vertical mtg, 10kΩ
R11, 12	8230 0042 23	Vertical mtg, 22kΩ
R13	8230 0041 02	Vertical mtg, 1kΩ
R14	8230 0042 24	Vertical mtg, 220kΩ
R15	8230 0046 81	Vertical mtg, 680Ω
R16	8230 0041 03	Vertical mtg, 10kΩ
R17, 18	8230 0041 04	Vertical mtg, 100kΩ
R19	8230 0044 73	Vertical mtg, 47kΩ
R20	8230 0043 33	Vertical mtg, 33kΩ
R21, 22	8230 0041 03	Vertical mtg, 10kΩ
R23	8230 0044 73	Vertical mtg, 47kΩ
R24	8230 0041 04	Vertical mtg, 100kΩ
R25-27	8230 0041 03	Vertical mtg, 10kΩ
R28, 29	8230 0042 23	Vertical mtg, 22kΩ
R30	8230 0041 04	Vertical mtg, 100kΩ
R31	8230 0046 81	Vertical mtg, 680Ω
R32	8230 0041 03	Vertical mtg, 10kΩ
R33	8230 0044 73	Vertical mtg, 47kΩ
R34	8230 0042 24	Vertical mtg, 220kΩ
R35	8230 0042 73	Vertical mtg, 27kΩ
R36	8230 0044 74	Vertical mtg, 470kΩ
R37	8230 0042 24	Vertical mtg, 220kΩ
R38	8230 0044 73	Vertical mtg, 47kΩ
R39	8230 0043 92	Vertical mtg, 3.9kΩ
R40	8230 0041 53	Vertical mtg, 15kΩ
R41	8230 0041 02	Vertical mtg, 1kΩ
R42	8230 0041 03	Vertical mtg, 10kΩ
R43		(Deleted)
R44	8230 0041 02	Vertical mtg, 1kΩ
R45, 46	8230 0041 01	Vertical mtg, 100Ω
R47	8230 0354 78	Cement, 2W, 0.47Ω, 10%
R48, 49	8230 0042 23	Vertical mtg, 22kΩ
R50	8230 0041 02	Vertical mtg, 1kΩ
R51	8230 0042 04	Vertical mtg, 200kΩ
R52	8230 0046 81	Vertical mtg, 680Ω
R53	8230 0041 02	Vertical mtg, 1kΩ
R54-56	8230 0041 03	Vertical mtg, 10kΩ
R57	8230 0048 22	Vertical mtg, 8.2kΩ
R58	8230 0044 71	Vertical mtg, 470Ω
R59	8230 0044 72	Vertical mtg, 4.7kΩ
R60	8230 0045 63	Vertical mtg, 56kΩ
R61	8230 0041 04	Vertical mtg, 100kΩ

Ref. No.	Parts No.	Nomenclature
R62	8230 0042 24	Vertical mtg, 220kΩ
R63	8230 0041 03	Vertical mtg, 10kΩ
R64, 65	8230 0041 04	Vertical mtg, 100kΩ
R66	8230 0231 03	Vertical mtg, 10kΩ, 1%, metal
R67	8230 0044 72	Vertical mtg, 4.7kΩ
R68	8230 0041 03	Vertical mtg, 10kΩ
R69	8230 0232 22	Vertical mtg, 2.2kΩ, 1%, metal
R70	8230 0042 23	Vertical mtg, 22kΩ
R71	8230 0041 04	Vertical mtg, 100kΩ
R72	8230 0042 23	Vertical mtg, 22kΩ
R73	8230 0041 03	Vertical mtg, 10kΩ
R74	8230 0042 23	Vertical mtg, 22kΩ
R75	8230 0041 04	Vertical mtg, 100kΩ
R76	8230 0041 02	Vertical mtg, 1kΩ
R77	8230 0331 06	Vertical mtg, 10MΩ, metal
R78	8230 0041 04	Vertical mtg, 100kΩ
R79, 80	8230 0041 03	Vertical mtg, 10kΩ
R81	8230 0042 24	Vertical mtg, 220kΩ
R82, 83	8230 0041 04	Vertical mtg, 100kΩ
R84	8230 0041 05	Vertical mtg, 1MΩ
R85, 86	8231 0031 53	Pot, trimmer, 15kΩ, B
R87	8231 0011 02	Pot, trimmer, 1kΩ, B, metal
R88	8230 0046 81	Vertical mtg, 680Ω
R89	8230 0044 72	Vertical mtg, 4.7kΩ
R90	8230 0041 04	Vertical mtg, 100kΩ
R91	8230 0044 72	Vertical mtg., 4.7kΩ

CAPACITORS

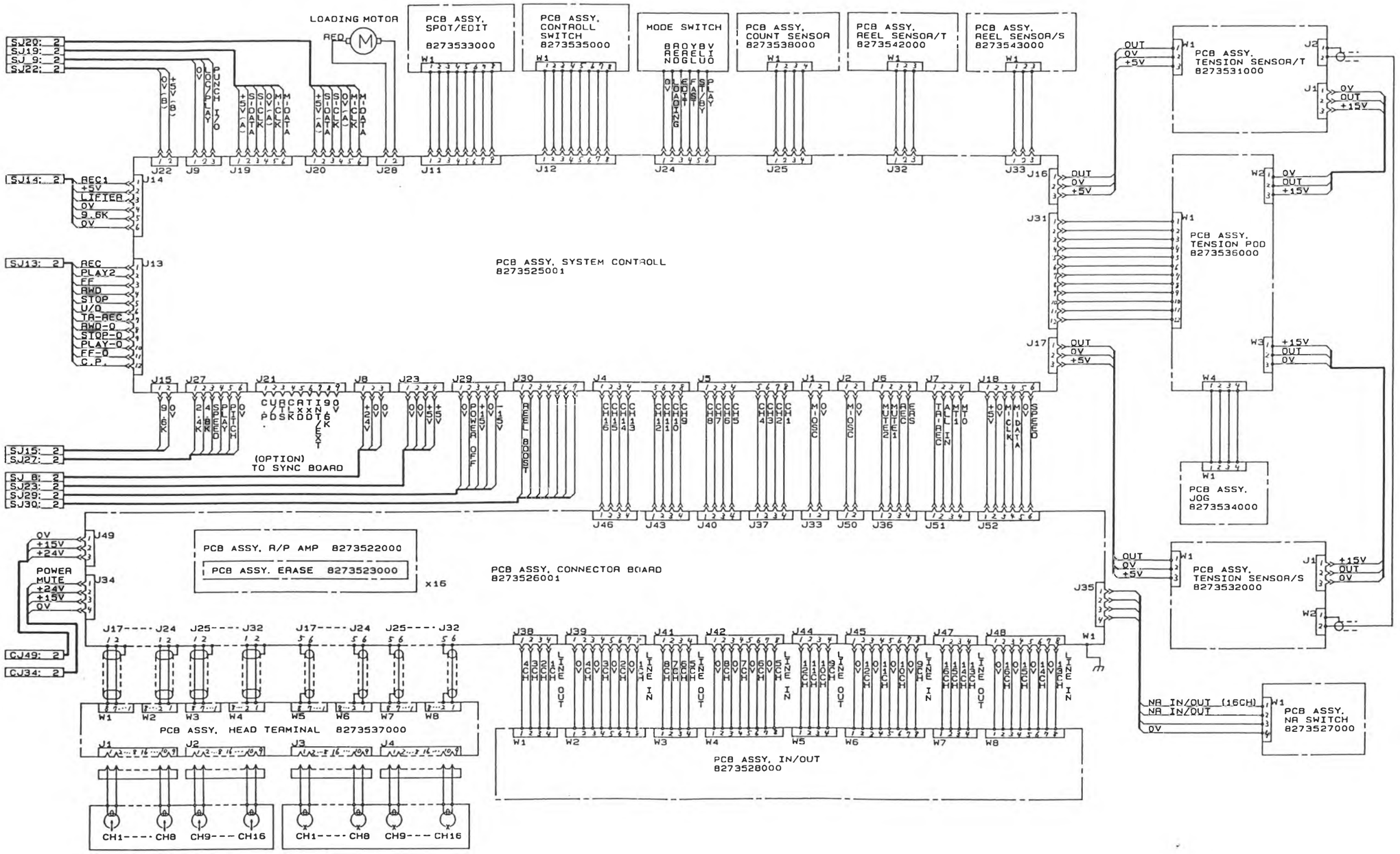
ALU = Electrolytic
CER = Ceramic
PES = Mylar
PPR = Polypropylene

C01	8232 0041 06	ALU, 25V, 10μF, 20%, SM
C02	8232 0541 06	ALU, 16V, 10μF, 20%, SMBP
C03		(Deleted)
C04	8232 0315 61	PPR, 100V, 560pF, 5%, APS
C05	8232 0322 21	CER, 50V, 220pF, 5%, NPO
C06	8232 0261 03	PES, 50V, 0.01μF, 5%, AMZ
C07	8232 0263 32	PES, 50V, 0.0033μF, 5%, AMZ
C08	8232 0313 31	PPR, 100V, 330pF, 5%, APS

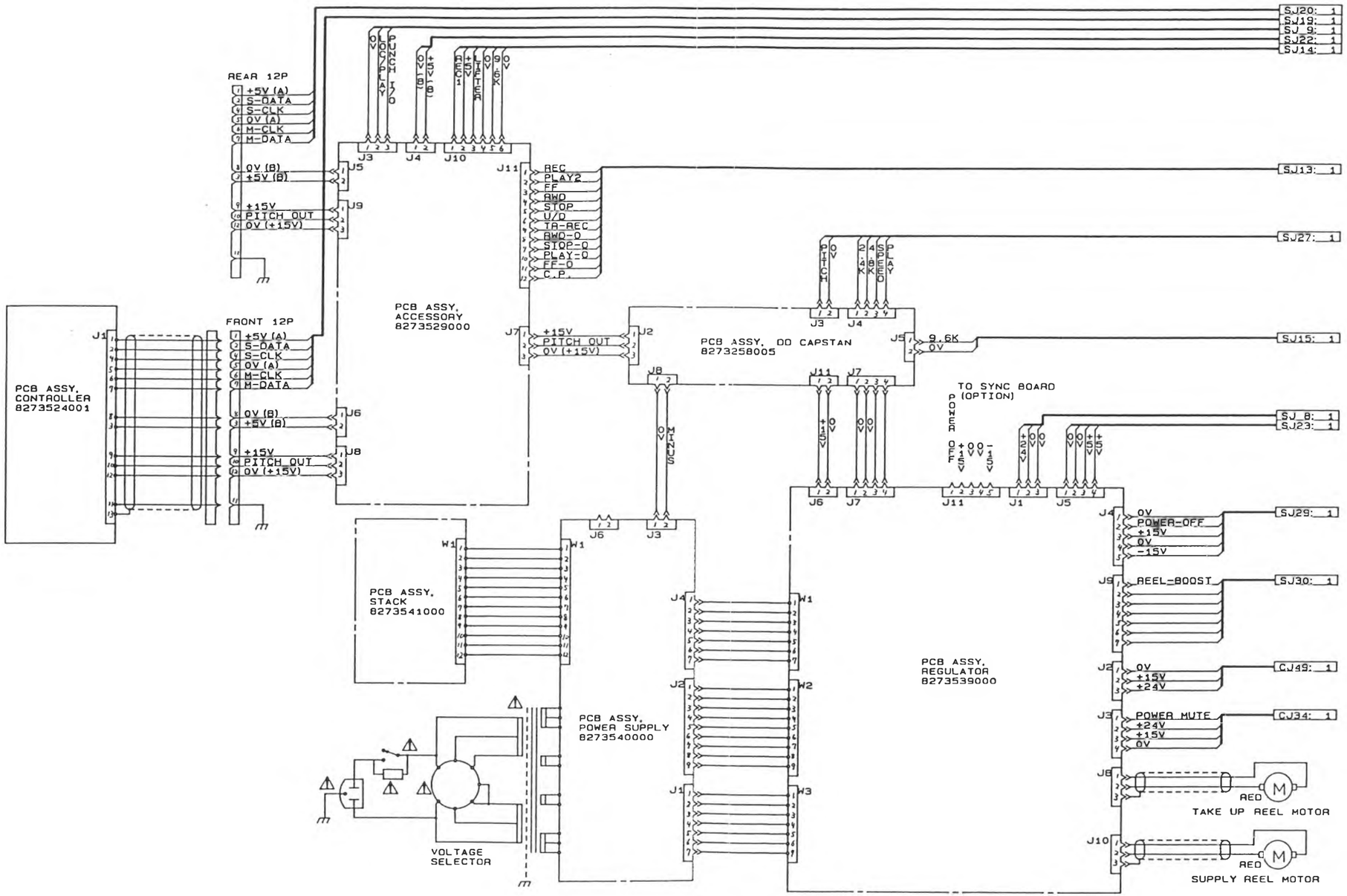
Ref. No.	Parts No.	Nomenclature
C09	8232 0315 61	PPR, 100V, 560pF, 5%, APS
C10	8232 0261 03	PES, 50V, 0.01μF, 5%, AMZ
C11	8232 0263 32	PES, 50V, 0.0033μF, 5%, AMZ
C12	8232 0261 02	PES, 50V, 0.001μF, 5%, AMZ
C13	8232 0261 83	PES, 50V, 0.018μF, 5%, AMZ
C14	8232 0315 61	PPR, 100V, 560pF, 5%, APS
C15	8232 0322 21	CER, 50V, 220pF, 5%, NPO
C16	8232 0261 03	PES, 50V, 0.01μF, 5%, AMZ
C17	8232 0263 32	PES, 50V, 0.0033μF, 5%, AMZ
C18	8232 0313 31	PPR, 100V, 330pF, 5%, APS
C19	8232 9001 52	PEP, 50V, 0.0015μF, 5%, AWS
C20	8232 0313 91	PPR, 100V, 390pF, 5%, APS
C21	8232 0351 03	CER, 50V, 0.01μF, YF
C22	8232 0320 50	CER, 50V, 5pF, 5%, NPO
C23	8232 0325 60	CER, 50V, 56pF, 5%, NPO
C24	8232 0061 05	ALU, 50V, 1μF, 20%, SM
C25	8232 0261 04	PES, 50V, 0.1μF, 5%, AMZ
C26	8232 0351 03	CER, 50V, 0.01μF, YF
C27	8232 0041 07	ALU, 25V, 100μF, 20%, SM
C28	8232 0351 03	CER, 50V, 0.01μF, YF
C29, 30	8232 0051 06	ALU, 35V, 10μF, 20%, SM
C31	8232 8001 04	CER, 16V, 0.1μF, +80 - 20, YF
C32-38	8232 0351 03	CER, 50V, 0.01μF, YF
C39	8232 0511 01	CER, 50V, 100pF, 10%, SL
C40	8232 0264 71	PES, 50V, 470pF, 5%, AMZ
C41	8232 0274 73	PES, 50V, 0.047μF, 10%, AMZ

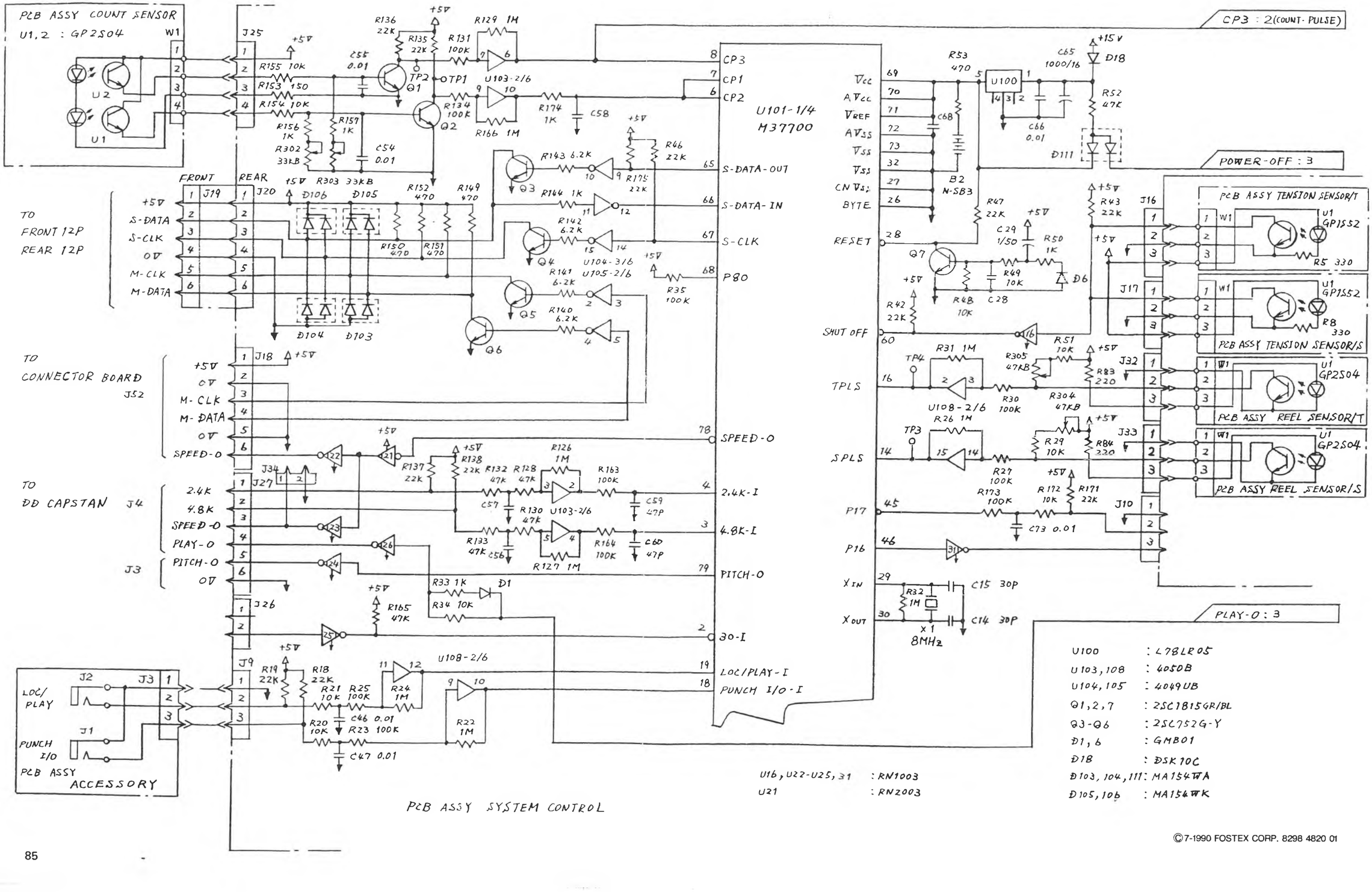
Ref. No.	Parts No.	Nomenclature
		MISCELLANEOUS
J01	8245 0530 62	Jack, 8263, 2, yel
J02	8245 0530 03	Jack, 8263, 3, wht
J03	8245 0530 22	Jack, 8263, 2, red
J04	8245 0530 04	Jack, 8263, 4, wht
J05	8245 0530 62	Jack, 8263, 2, yel
J06	8245 0530 42	Jack, 8263, 2, blk
J07	8245 0530 04	Jack, 8263, 4, wht
J08	8245 0530 22	Jack, 8263, 2, red
J09	8245 0530 05	Jack, 8263, 5, wht
J10	8245 0530 63	Jack, 8263, 3, yel
J11	8245 0530 42	Jack, 8263, 2, blk
	8245 0732 12	Jack, 12P, 9067, 2-ganged
	8245 0740 01	Plug, 9067
TP1, 2	8276 0010 00	Header, pin
X001	8239 0016 00	Crystal, 38.4KHz
Q10	8234 0092 02	Transistor, 2SD1148-0
	8276 2370 12	Cable assy, 5P, wht. 120mm
Q11	8234 0095 02	Transistor, 2SB863-0
	8276 2810 18	Cable assy, 3P, yel, 180mm
	8239 0014 00	Insulator, AC238

INTERCONNECTION 1/2



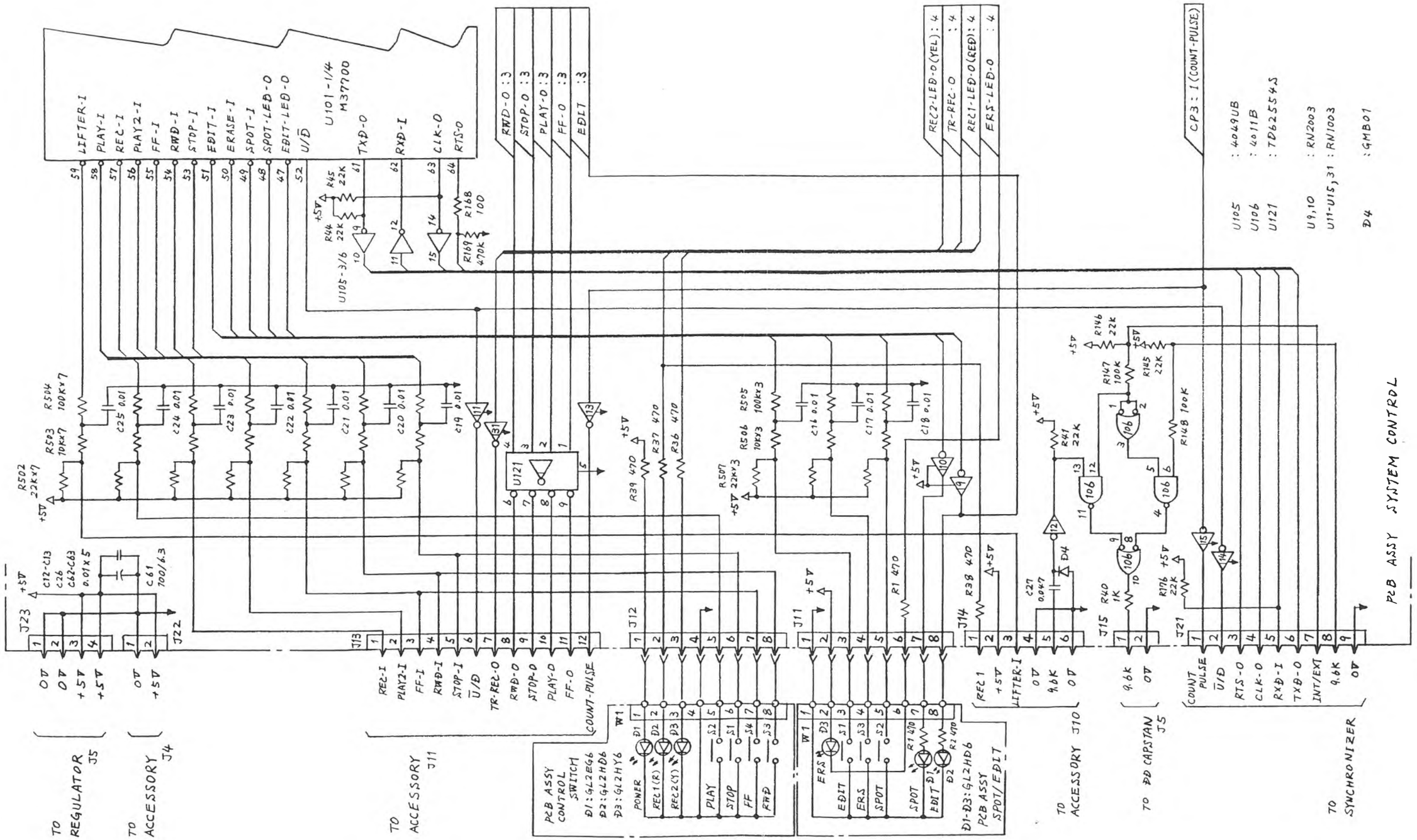
INTERCONNECTION 2/2

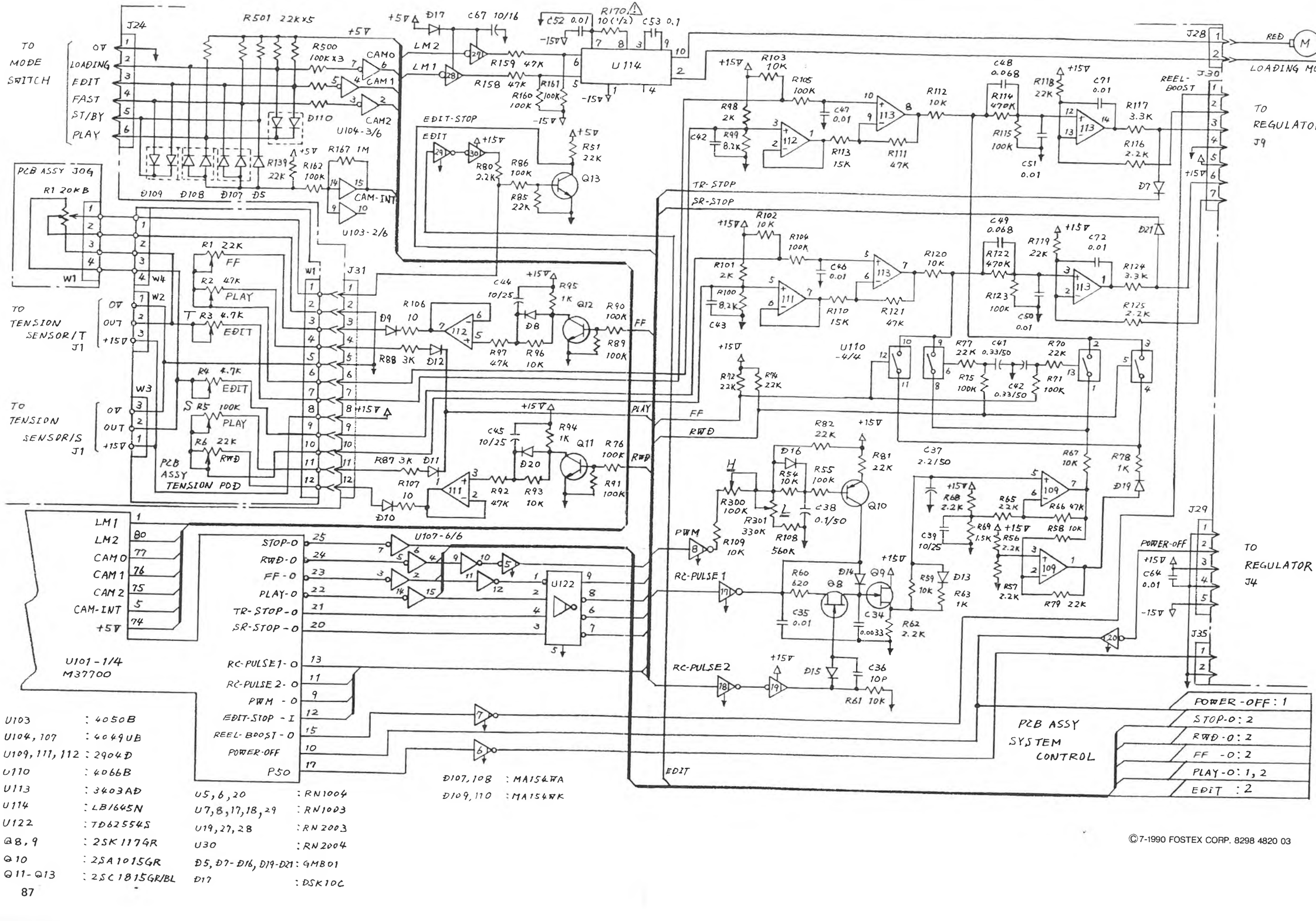




PCB ASSY SYSTEM CONTROL

U100	: L78L05
U103, 108	: 4050B
U104, 105	: 4049UB
Q1, 2, 7	: 2SC1815GR/BL
Q3-Q6	: 2SC752G-Y
D1, 6	: GMB01
D18	: DSK10C
D103, 104, 111	: MA154WA
D105, 106	: MA154WK
U16, U22-U25, 31	: RN1003
U21	: RN2003

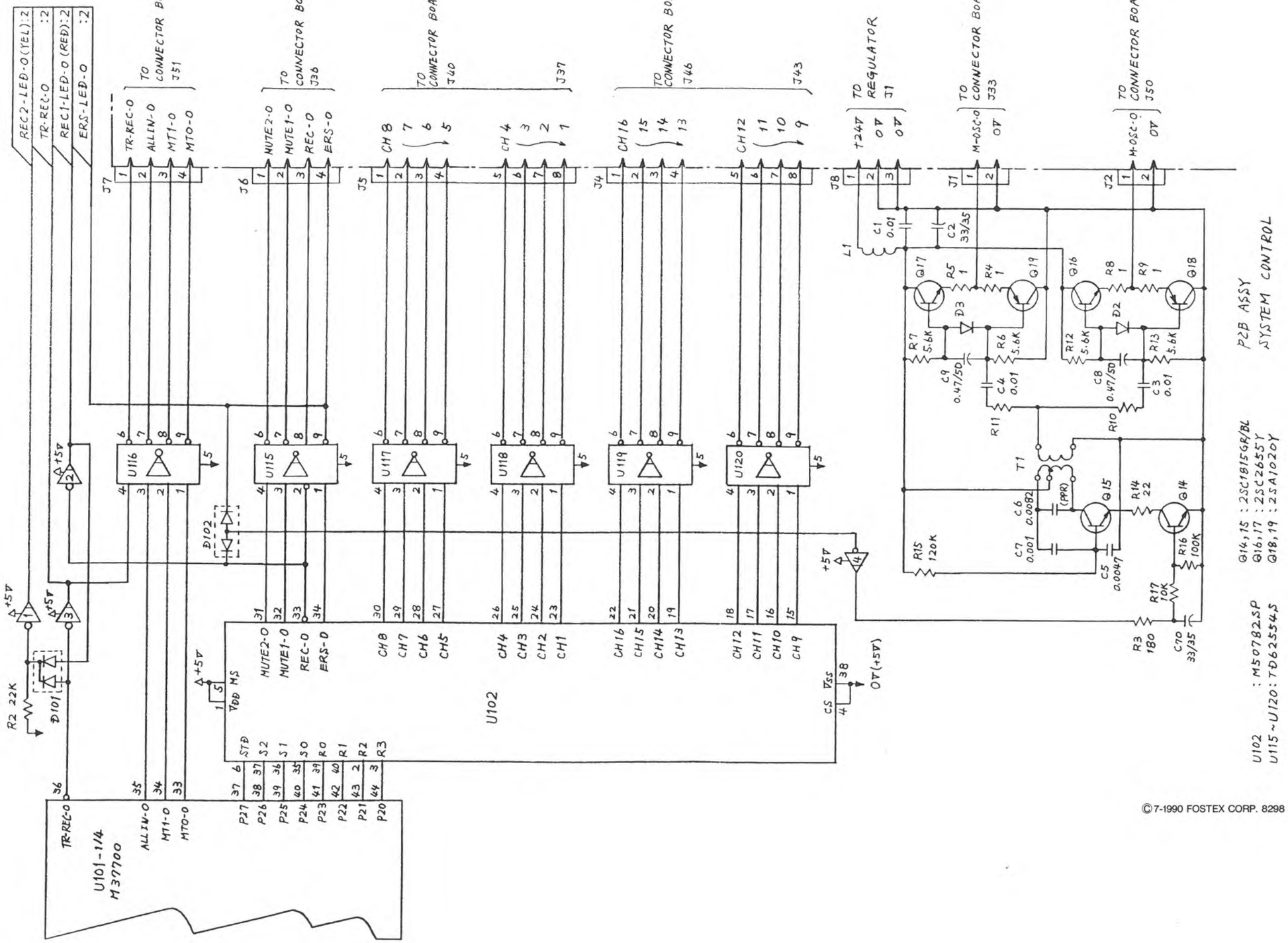




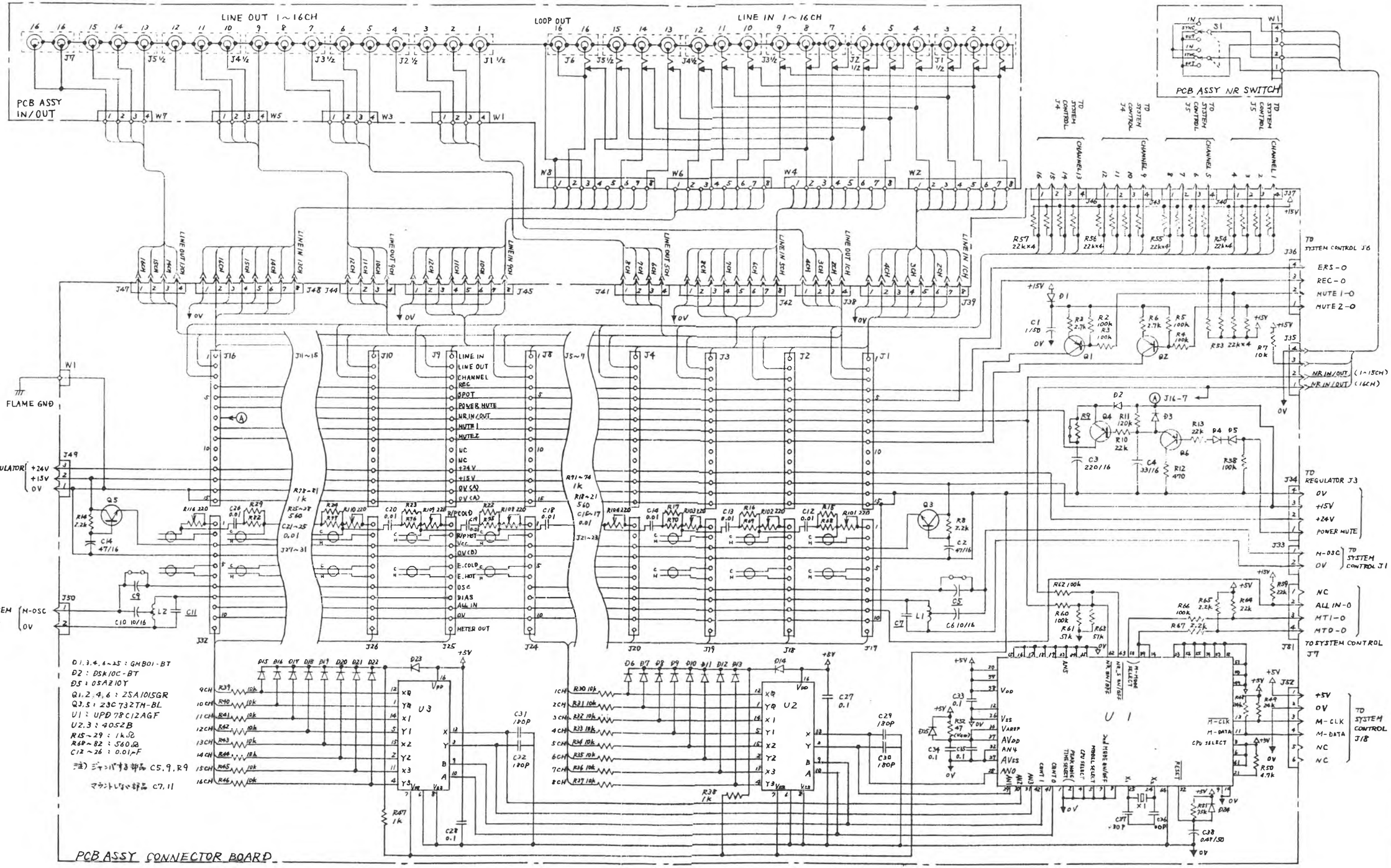
U103 : 4050B
U104, 107 : 4049UB
U109, 111, 112 : 2904D
U110 : 4066B
U113 : 3403AD
U114 : LB1645N
U122 : TD62554S
Q8, 9 : 2SK1174GR
Q10 : 2SA1015GR
Q11-Q13 : 2SC1815GR/BL

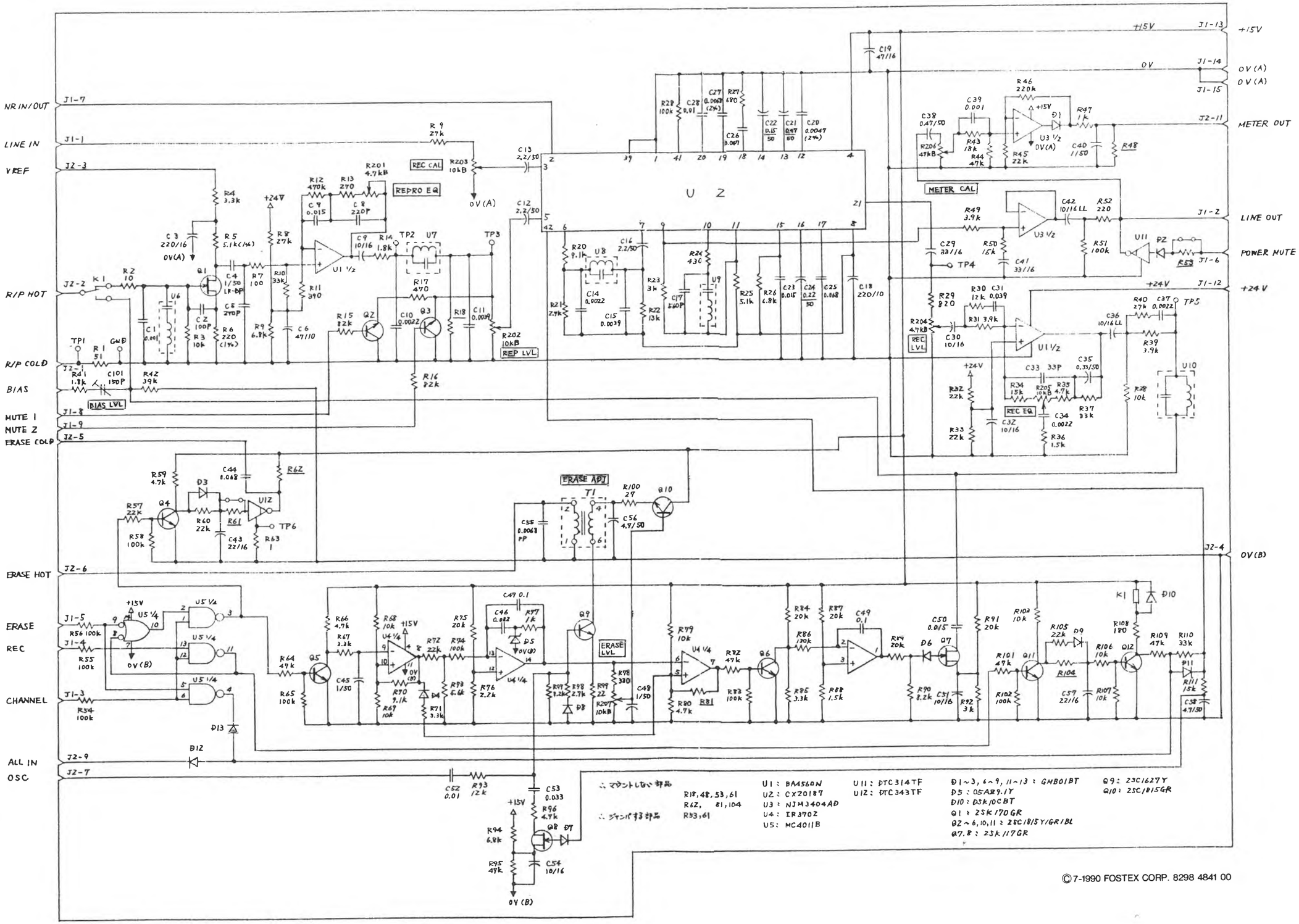
U5, 6, 20 : RN1004
U7, 8, 17, 18, 29 : RN1003
U19, 27, 28 : RN2003
U30 : RN2004
D5, D7-D16, D19-D21 : GMB01
D17 : DSK10C

D107, 108 : MA154WA
D109, 110 : MA154WK

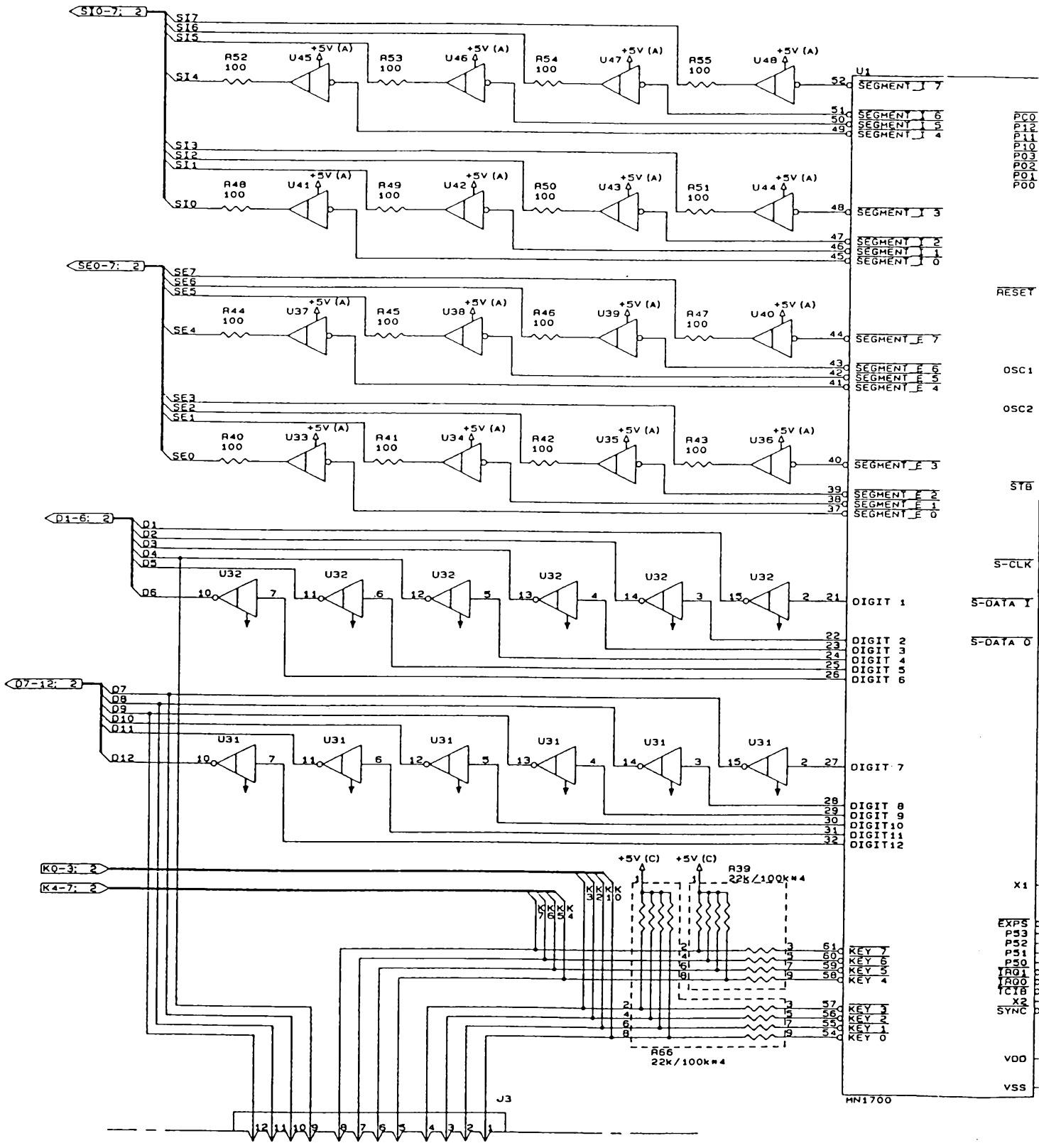


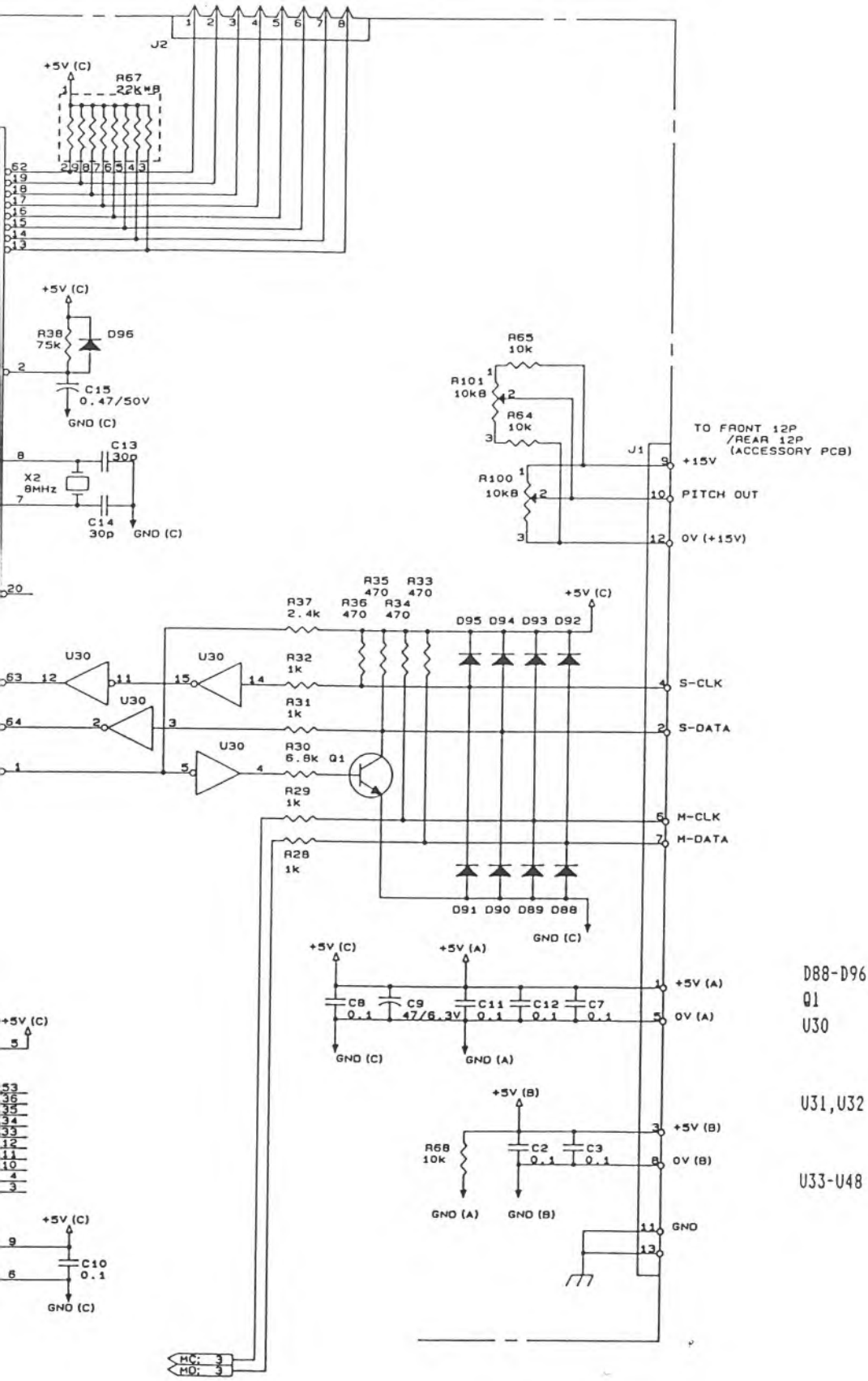
CONNECTOR BOARD



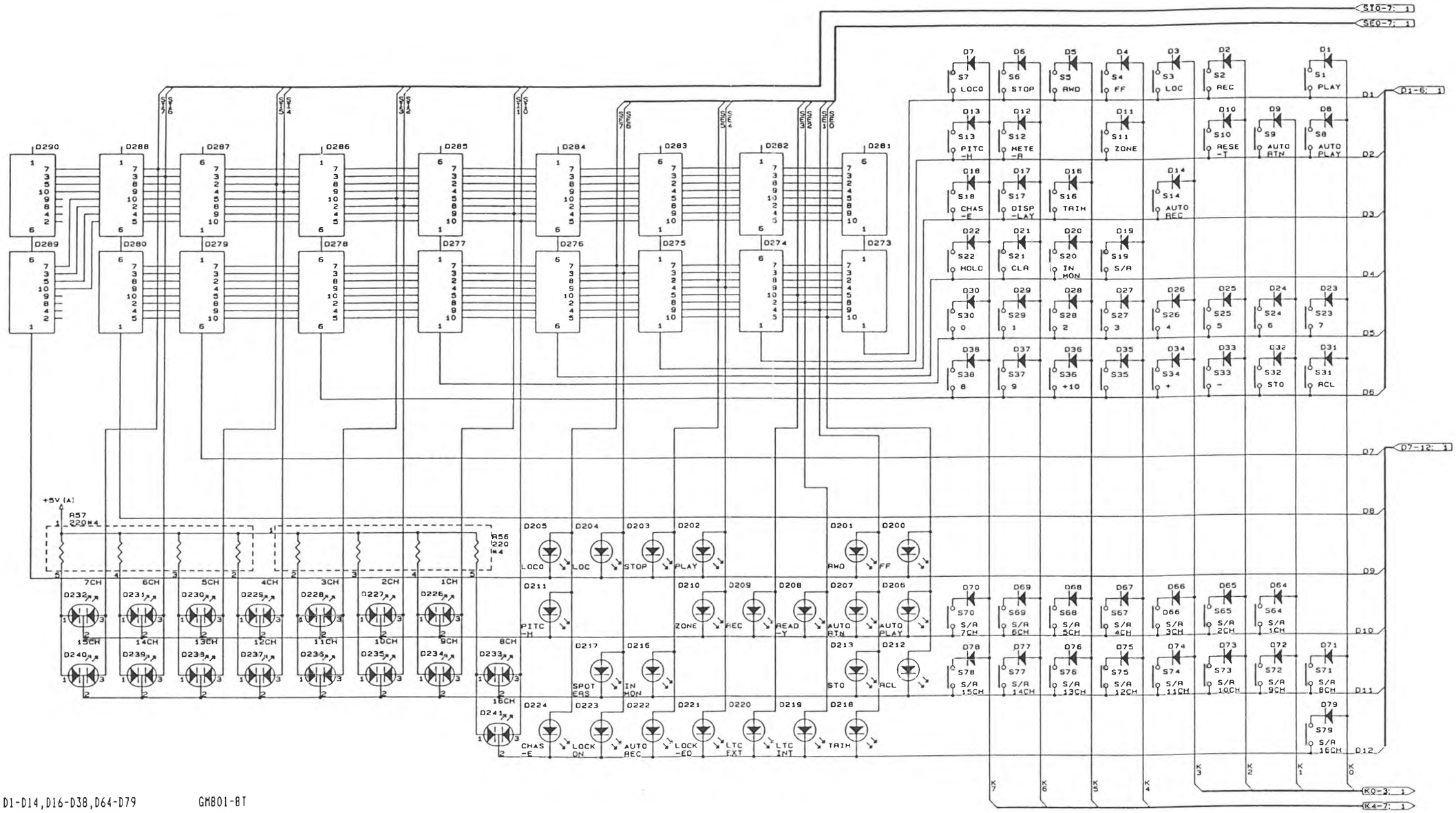


CONTROLLER 1/3



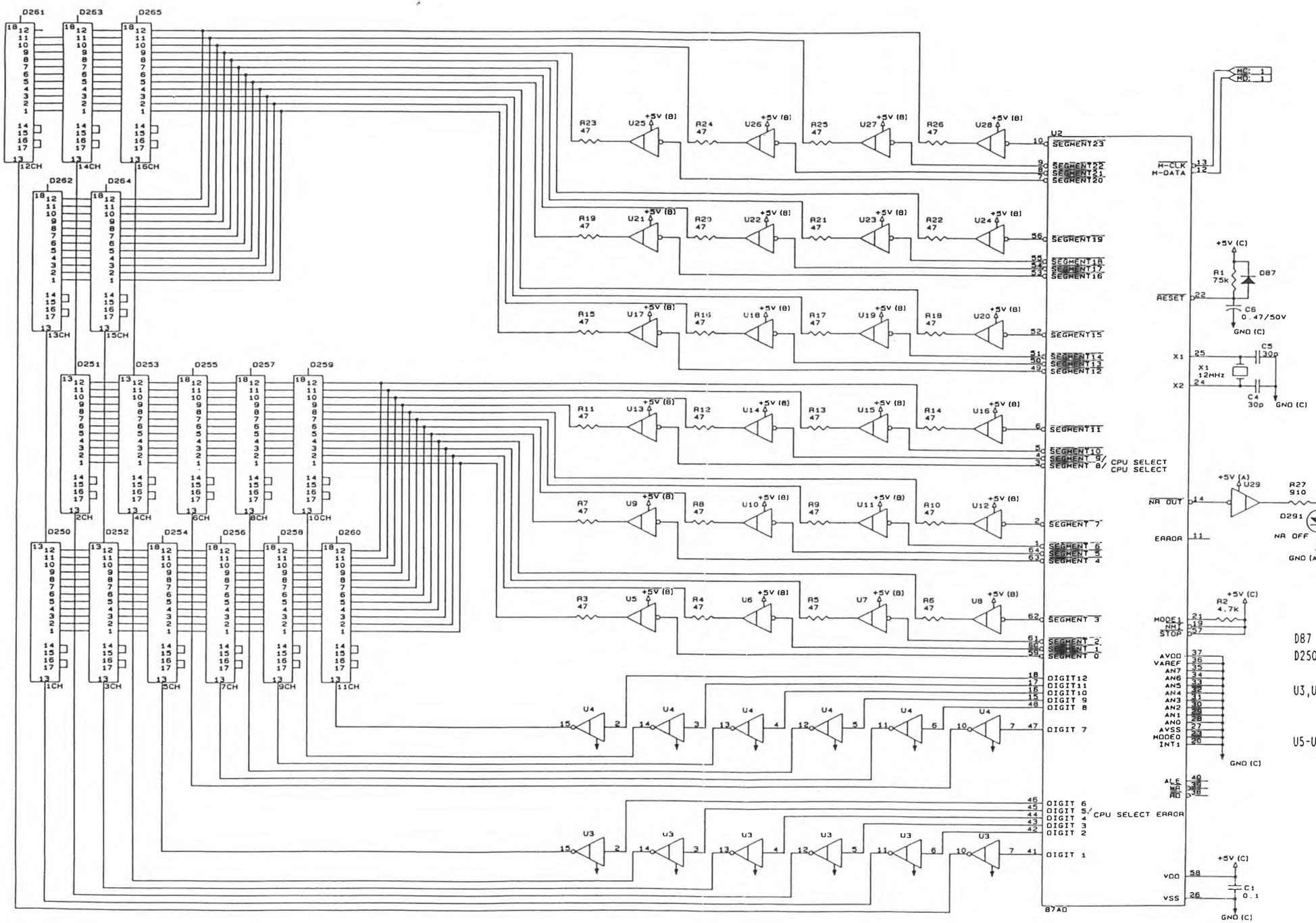


D88-D96	GM801-8T
Q1	2SC752G-Y
U30	4049UB (VCC=pin1 -> +5V(C), VSS=pin8 -> GND(C))
U31,U32	TD62309P (VCC=pin16 -> +5V(A), GND=pin8 -> GND(A))
U33-U48	UN1111



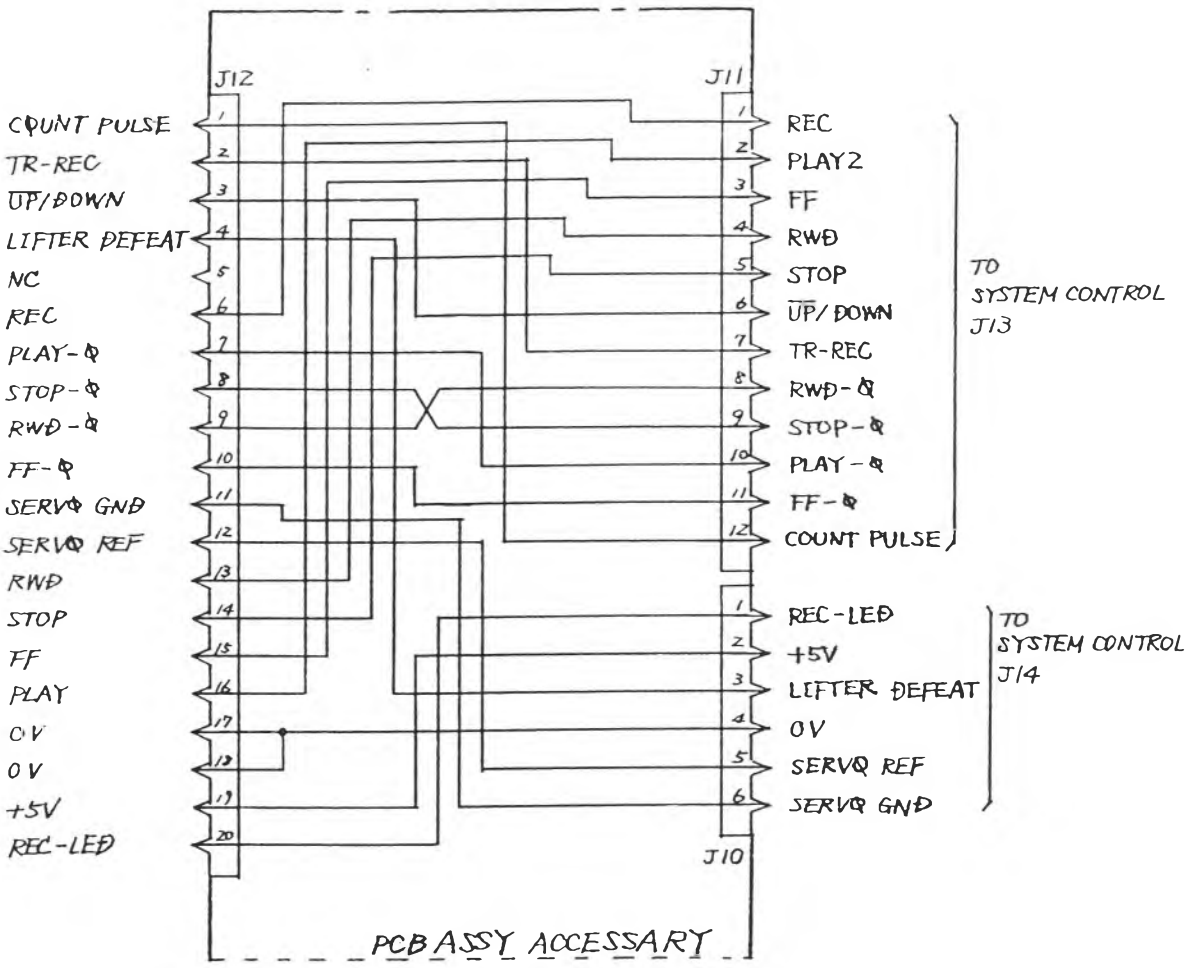
D1-D14,D16-D38,D64-D79	GM801-BT
D200-D207,D219-D221	GL2EG6
D209-D213,D216-D218,D222-D223	GL2HD6
D208,D224	GL2HY6
D226-D241	GL3ED8
D273-D290	GL8D040 (pin1,pin6=COMMON)

CONTROLLER 3/3

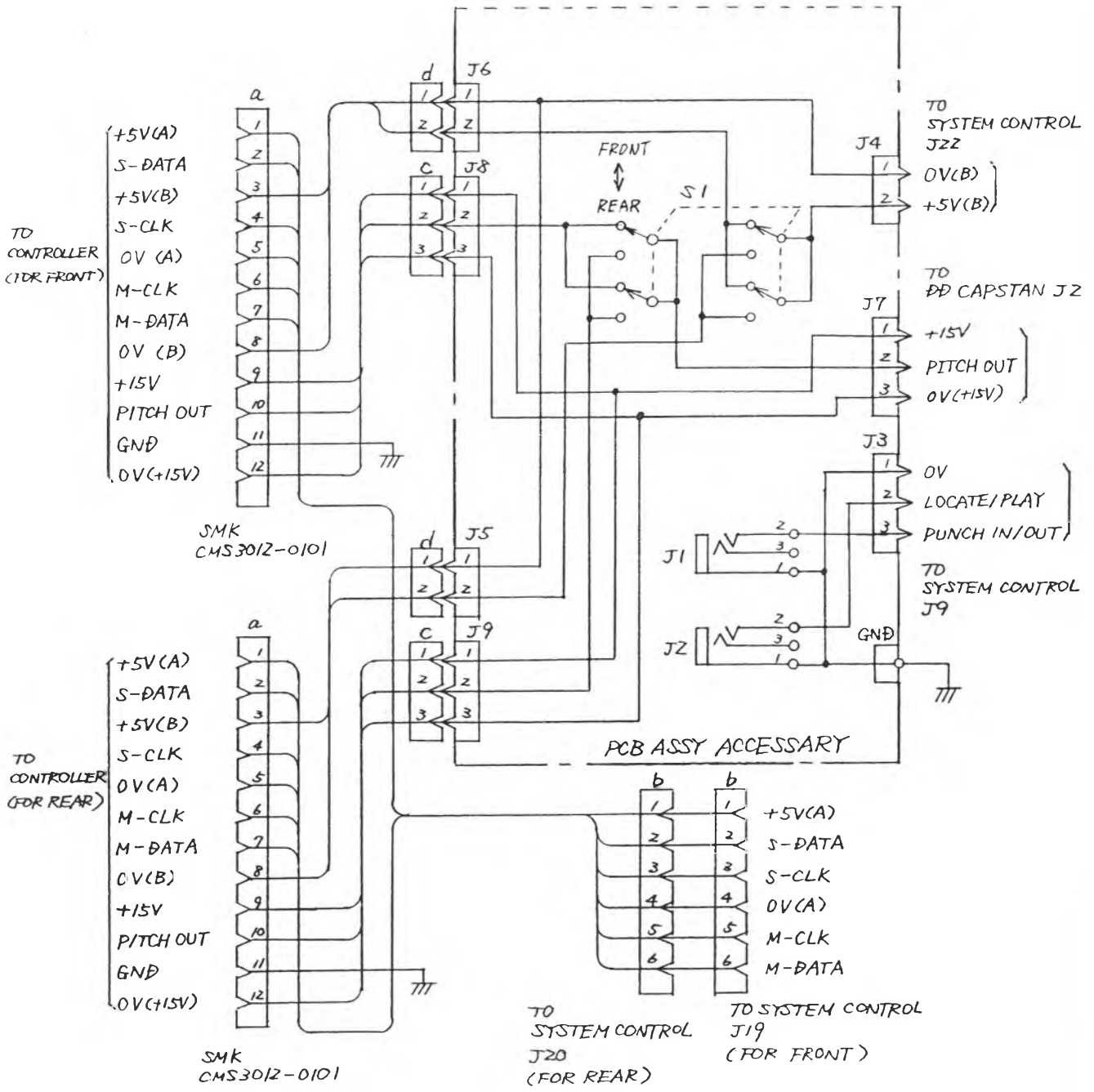


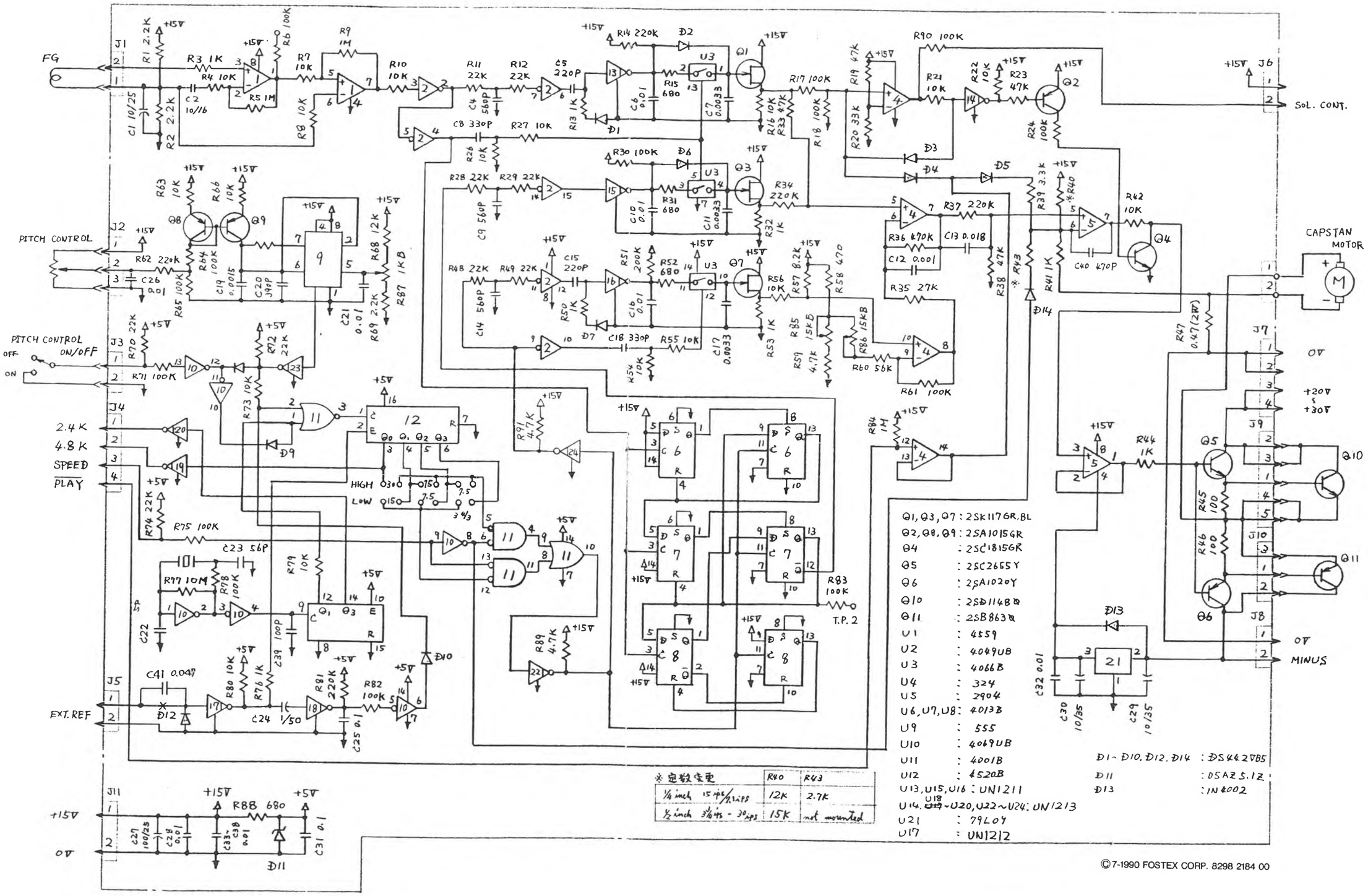
D87	GMB01-BT
D250-D265	SLA-5672-10
	(pin13,pin18=COMMON)
U3,U4	TD62309P
	(VCC=pin16 -> +5V(B),
	GND=pin8 -> GND(B))
U5-U29	UN1111

SYNCHRO



ACCESSORY





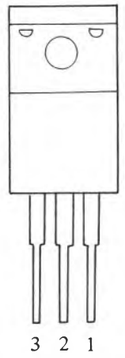
※定数変更	R40	R43
1/4 inch 15ips/1/2 30ips	12K	2.7K
1/2 inch 3 3/4ips - 30ips	15K	not mounted

Q1, Q3, Q7 : 2SK1176R, BL
Q2, Q8, Q9 : 2SA1015GR
Q4 : 2SC1815GR
Q5 : 2SC2655Y
Q6 : 2SA1020Y
Q10 : 2SD1148R
Q11 : 2SB863R
U1 : 4559
U2 : 4049UB
U3 : 4066B
U4 : 324
U5 : 2904
U6, U7, U8 : 4013B
U9 : 555
U10 : 4069UB
U11 : 4001B
U12 : 4520B
U13, U15, U16 : UN1211
U14, ~~U19~~ U18 ~U20, U22 ~ U24 : UN1213
U21 : 79L04
U17 : UN1212

D1 ~ D10, D12, D14 : DS4427B5
D11 : DSAZ5.1Z
D13 : IN4002

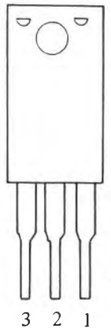
7. PIN INFORMATION FOR IC'S

NJM7824FA 8236 0321 09



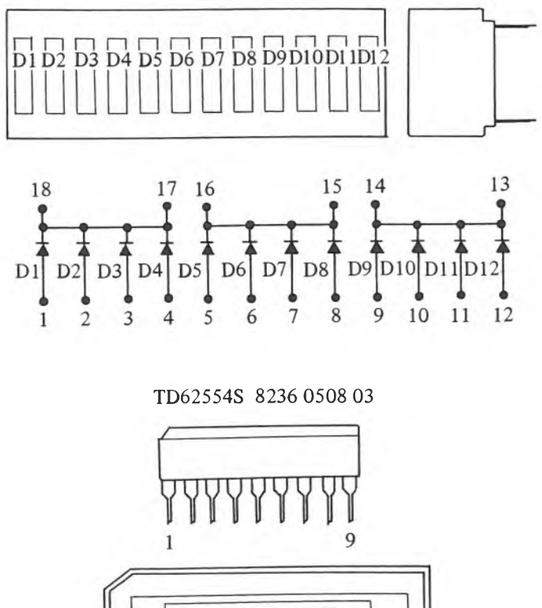
1. OUT
2. GND
3. IN

NJM7915FA 8236 0348 06



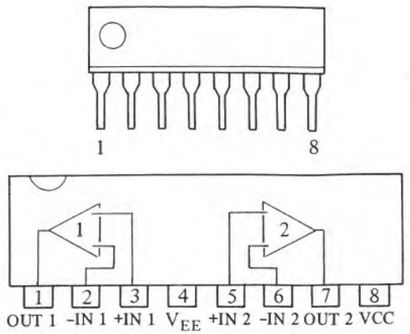
1. OUT
2. IN
3. GND

SLA-5672-10 8234 2023 00

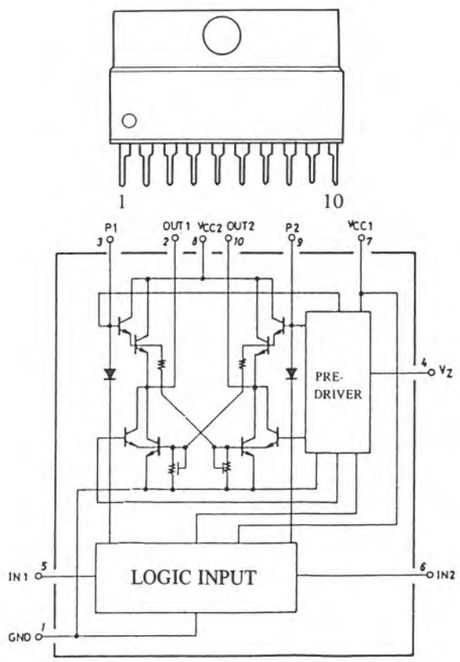


TD62554S 8236 0508 03

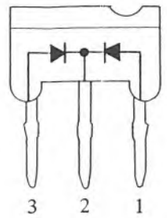
BA4560N 8236 0361 00



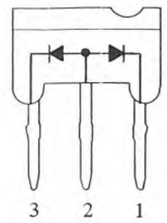
LB1645N 8236 0302 00



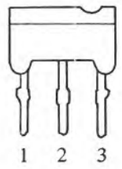
MA154WK 8234 0039 00



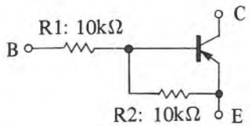
MA154WA 8234 0040 00



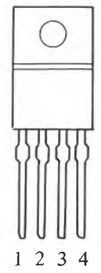
UN1111 8236 0510 01



1. BASE
2. COLLECTOR
3. EMITTER

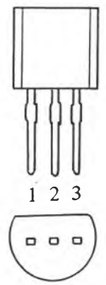


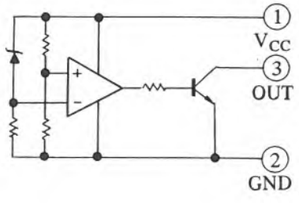
PQ05RF2 8236 0362 01
PQ09RF2 8236 0362 02



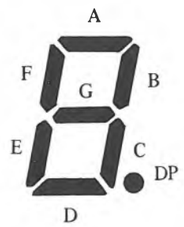
1. DC IN
2. DC OUT
3. GND
4. ON/OFF CONTROL terminal

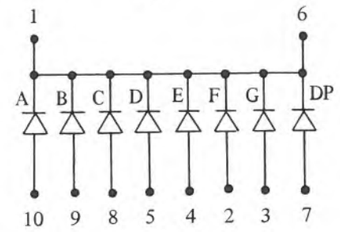
PST523D 8236 0570 01





GL8D 0404 8234 2028 00

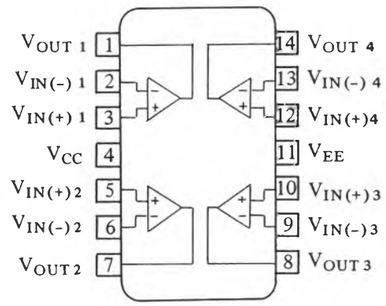




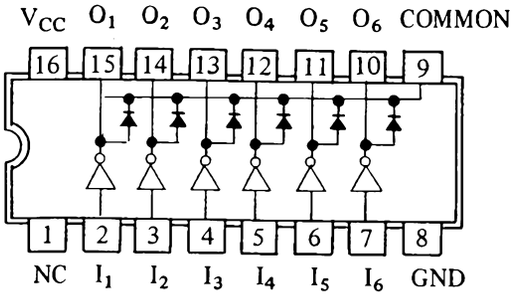
PIN CONNECTIONS

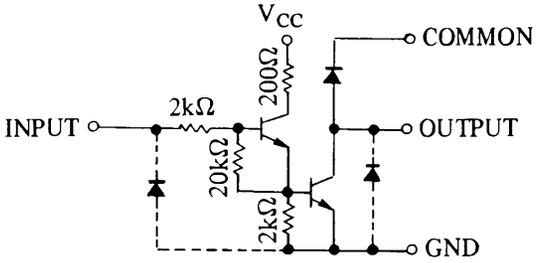
PIN	FUNCTION	PIN	FUNCTION
1	Cathode	10	A-Anode
2	F-Anode	9	B-Anode
3	G-Anode	8	C-Anode
4	E-Anode	7	DP-Anode
5	D-Anode	6	Cathode

IR3702 8236 0327 00

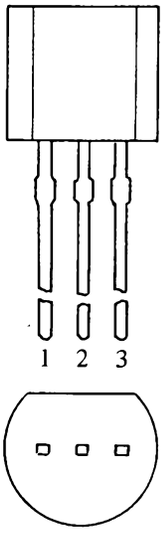


TD62309P 8236 0567 00

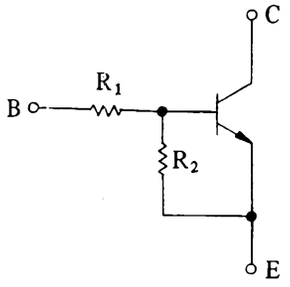




RN1003 8236 0196 03
RN1004 8236 0196 04

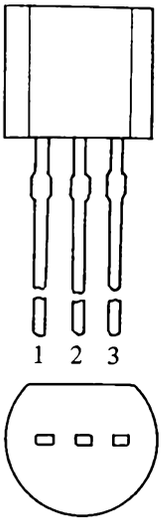


1. EMITTER
2. COLLECTOR
3. BASE

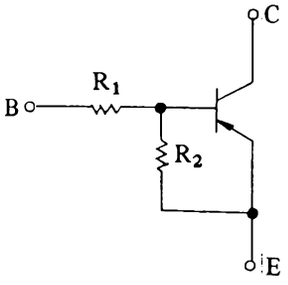


TYPE	R_1	R_2
RN1003	22kΩ	22kΩ
RN1004	47kΩ	47kΩ

RN2003 8236 0197 03
RN2004 8236 0197 04

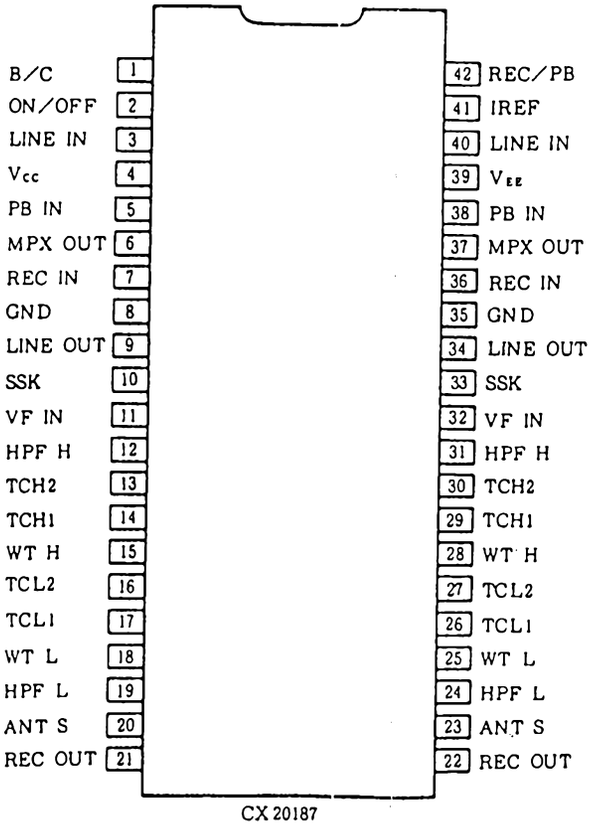


1. EMITTER
2. COLLECTOR
3. BASE

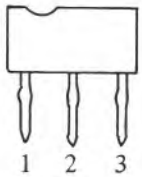


TYPE	R1	R2
RN2003	22kΩ	22kΩ
RN2004	47kΩ	47kΩ

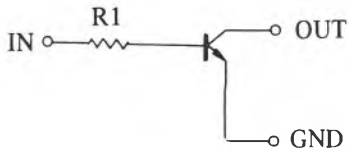
CX20187 8236 0329 00

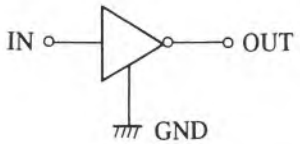


DTC 343TF 8236 0561 02
DTC 314TF 8236 0561 04



1. EMITTER/GND
2. COLLECTOR/OUT
3. BASE/IN

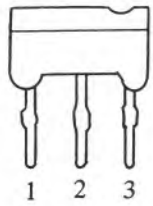




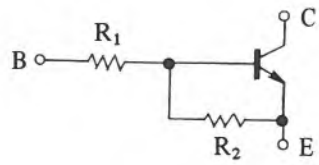
DTC Series

TYPE	R1
DTC343TF	4.7kΩ
DTC314TF	10kΩ

UN1211 8236 0505 01
UN1212 8236 0505 02
UN1213 8236 0505 03



1 : BASE
2 : COLLECTOR
3 : EMITTER



TYPE	R1	R2
UN1211	10kΩ	10kΩ
UN1212	22kΩ	22kΩ
UN1213	47kΩ	47kΩ

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