SERVICE MANUAL

TEAC Tascam Series

40-4

Recorder/Reproducer

MODEL DX-4 / MODEL MA-4

NOISE REDUCTION MODULE **MIC AMP UNIT**

TEAC CORPORATION

51032240

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SECTION 1
GENERAL DESCRIPTION

The TEAC TASCAM Series 40-4 Recorder/Reproducer is a 1/4 track, 4 channel deck which operates at 15 ips and 7-1/2 ips speeds.
The front panel control layout is designed with emphasis on simplicity without sacrifice in ease of operation for multi-track recording.
The Record/Reproduce amplifiers can be adjusted from the front and a plug in type PC Card is provided for each channel. An extender card is supplied which will provide free access to all the adjustments on the PC Cards.
The TEAC DX-4 dbx NOISE REDUCTION MODULE is also available which can be installed into the 40-4 to make one complete unit.
The TEAC MA-4 is a MIC AMPL UNIT accessory for those purchasers who require only a limited amount of input mixing flexibility. DX-4 and MA-4 information is also included in this manual.

1-1 SPECIFICATIONS

Tape Width	1/4 inch
Format	4-track, 4 channel
Reel Size	10-1/2" maximum
Tape Speed	15 ips and 7-1/2 ips
Line Input	−10 dB (0.3 V) impedance; greater than 20k ohm, unbalanced
Line Output	−10 dB (0.3 V) load impedance; greater than 10k ohms, unbalanced
Record level	0 VU referenced to 3 dB above 185 nWb/m of tape flux, adjustable
Speed Accuracy	±0.5%
Wow and Flutter	measured with flutter test tape 0.04% rms weighted (NAB), ±0.06% peak weighted (ANSI) at 15 ips 0.06% rms weighted (NAB), ±0.09% peak weighted (ANSI) at 7-1/2 ips
Starting Time	Less than 0.5 sec
Fast Wind Time	120 sec for 2,400 ft. of tape
Overall Frequency Response	40 Hz ~ 20 kHz, ±3 dB at 15 ips 40 Hz ~ 15 kHz, ±3 dB at 7-1/2 ips
Singal-to-Noise Ratio (Overall)	65 dB weighted, 60 dB unweighted referenced to 3% T.H.D. (9 dB above 0 VU) at 400 Hz
Distortion (Overall)	1% at 400 Hz, 0 VU 3% at 1 kHz, 9 dB above 0 VU
Crosstalk (Overall)	greater than 50 dB at 400 Hz
Erasure	greater than 65 dB at 1 kHz, +10 VU reference
Power Requirement	117 VAC, 60 Hz 160W (for U.S.A./CANADA models) 100/117/220/240 VAC, 50/60 Hz 160W (for General Export models)
Dimensions	17-1/4" (W) x 21" (H) x 12" (D), 445 x 535 x 305mm
Weight	71 lbs (32.4kg) net, for U.S.A./CANADA model 70 lbs (32.1 kg) net, for General Export models

NOTE:
- Changes in specifications and features may be made without notice.
- Value of "dB" in the Data refers to 0 dB = 1V, except where specified. If a Test Set or AC voltmeter calibrated to 0 dB = 0.775V is to be used, appropriate compensation should be made.
  For example, −10 dB (0.3V) is applied to the Line in jacks, the AC voltmeter which is connected at the line output jacks reads −7.8 dB (0.3V) instead of −10 dB (0.3V).
- Preformance measured with Ampex #456 tape for U.S.A./CANADA model, Scotch #206 tape for General Export models.

1-2 DIMENSIONS

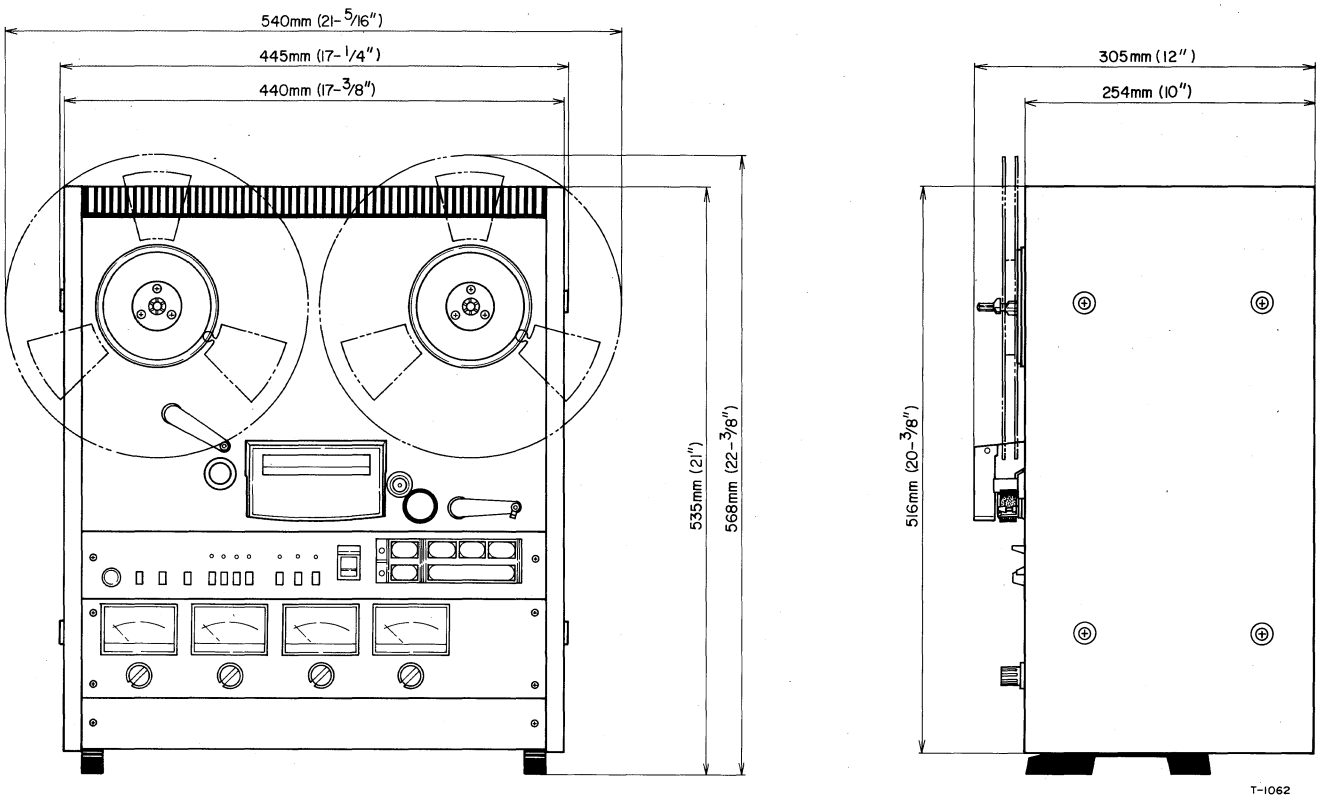


Fig. 1-1 Dimensions

1-3 OPENING THE PACKAGE

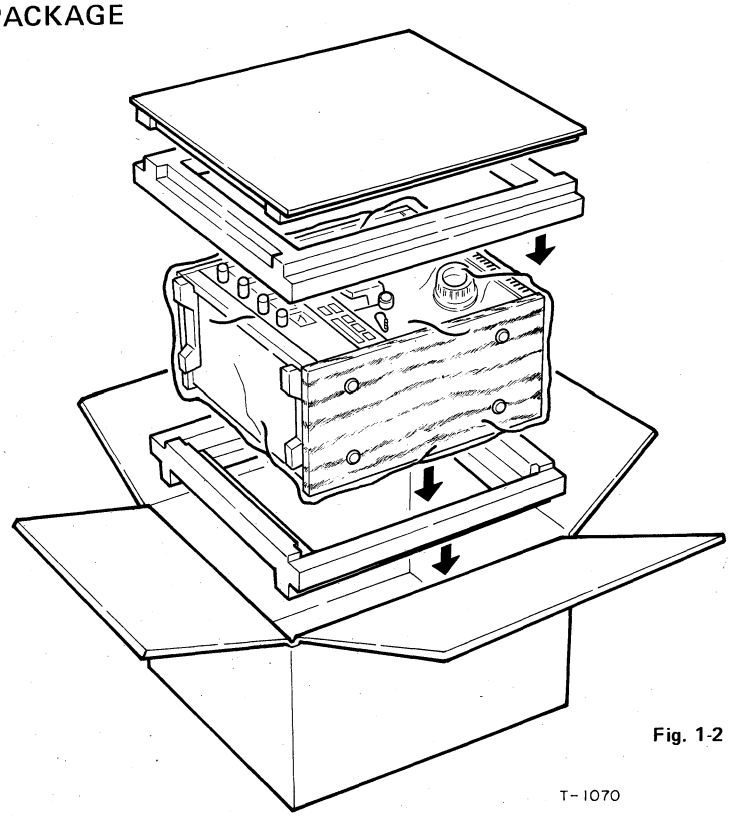


Fig. 1-2 Opening the Package

SECTION 2
OPERATION

2-1 FEATURES AND CONTROLS

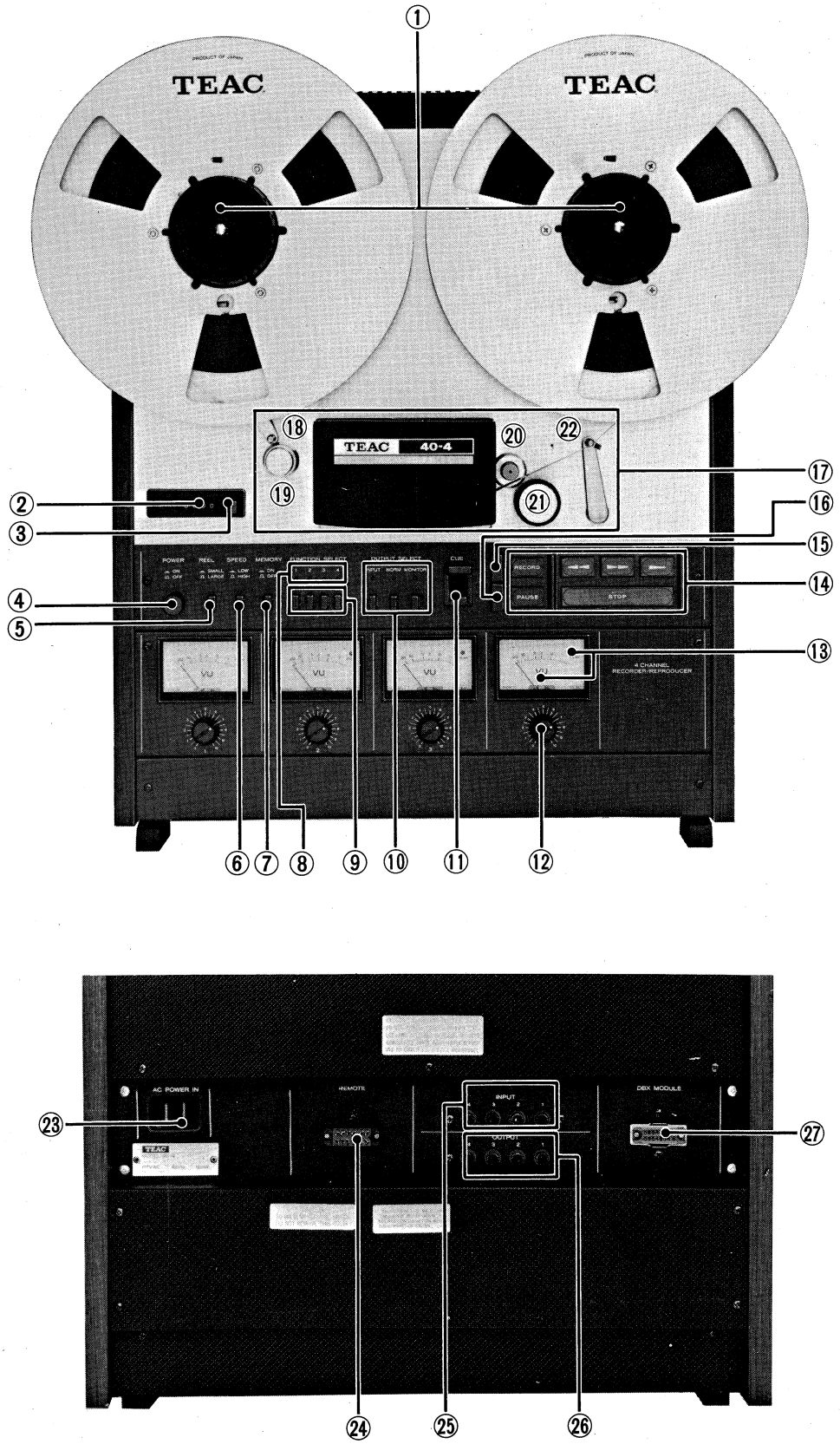


Fig. 2-1 Features and Controls

① **NAB-Hub Adaptors**
These can be installed to allow use of 10½" reels.

② **Index Counter**
4-digit counter indicates relative location of selections on tape. Used in conjunction with memory button for memory stop operation.

③ **Index Counter Reset Button**
Push to set counter to zero.

④ **POWER Switch**
Controls AC power to transport and electronics. Push again to shut off power.

⑤ **REEL Size Selector**
Controls back tension of reels. When using reels of dissimilar size, select take-up reel size as compromise.

⑥ **SPEED Selector Switch**
Controls the play/record speed of the transport. Selects the appropriate record equalization.

⑦ **MEMORY**
When depressed, transport will enter stop mode when counter reads 9999 during rewind operation. Actual stopping point of tape will depend on transport speed when counter triggers the stop operation.

⑧ **LED Record Status Indicators (FUNCTION SELECT)**
These lights show three states.
Light off – Safe, playback or input
Light blinks – Record ready, but not in progress
Light stays lit – Recording in progress (or RECORD/PAUSE Mode)

⑨ **FUNCTION SELECT Buttons (4)**
Determine record and play status.
Up – Safe, playback or source determined by OUTPUT SELECT buttons.
Down – Ready to record. If transport controls have selected "Record", depressing button will begin recording immediately. Output of recorder switches to source.

⑩ **OUTPUT SELECT Buttons**
Selects which of 3 possible sources will feed the output jacks and the meter circuits. LED's above buttons show selection.
INPUT – Meter reads line input to recorder, input signal appears at output jacks. Tape signal will not be heard.
NORM – Used for all normal operations, recording, sync/reproduce and playback. Meter reads input or head #2 play output depending on setting of function select buttons.
MONITOR – Selects head #3. Meter now reads tape playback. Does not prevent recording on head #2. Used in set-up to check performance and record/play monitoring of tape.

⑪ **CUE Lever**
This control will defeat the fast motion tape lifters. The more pressure you apply, the closer the tape will come to the heads. This will allow playback signal to be heard in fast motion for cueing. Use only enough pressure to hear the signal. Too much signal will damage the electronics, so be sure the cue lever is not engaged (locked) when in fast motion. The latch position is provided only for hand winding the tape to find an edit point. Push the lever all the way up a second time to release.

⑫ **Input Level Control (4)**
For adjusting the source of line level signal. Setting has no effect on playback.

⑬ **VU Type Averaging Meter with LED Peak Indicator**
For visual reference. Zero VU = 0.3 Volt (–10 dB) adjustable.
LED Ignition Level = Adjust for ignition at +10 dB above Spec. Level of 0.3V (–10 dB).

⑭ **Transport Motion Controls**
6 microswitches – Fast forward, rewind, stop, pause, play and record. The use of a remote control RC-170 will not disable the front panel controls.

⑮ **Master Record Status LED**
Shows record state.
Off – safe
Blinking – Record ready
On – Recording in progress (or RECORD/PAUSE)

⑯ **PAUSE LED**
This LED will blink for the first 10–15 seconds after the power is switched on. Transport will not operate until this LED goes out. Lights up in PAUSE.

⑰ **Tape Path**
Thread the tape as indicated on the diagram. Over the tape tension arm ⑱ (on reel side) under the impedance roller ⑲ (away from reel) across heads, between capstan ⑳ and pinch roller ㉑ and behind shut off arm ㉒ (away from reel side).
The shut off arm will drop power to the transport if the tape breaks. It's a good idea to allow it to drop when you take a break in the middle of a session. Doing this will stop the constant rotation of the capstan, and will lengthen the life of the capstan motor bearings. It is not necessary to unthread the tape. Just allow it to become slack so that shut off arm can drop.

㉓ **AC Socket**
For power input

㉔ **REMOTE Control Jack**
Needs no dummy plug when not in use.

㉕ **Line Inputs (INPUT) 1-4**

㉖ **Line Outputs (OUTPUT) 1-4**

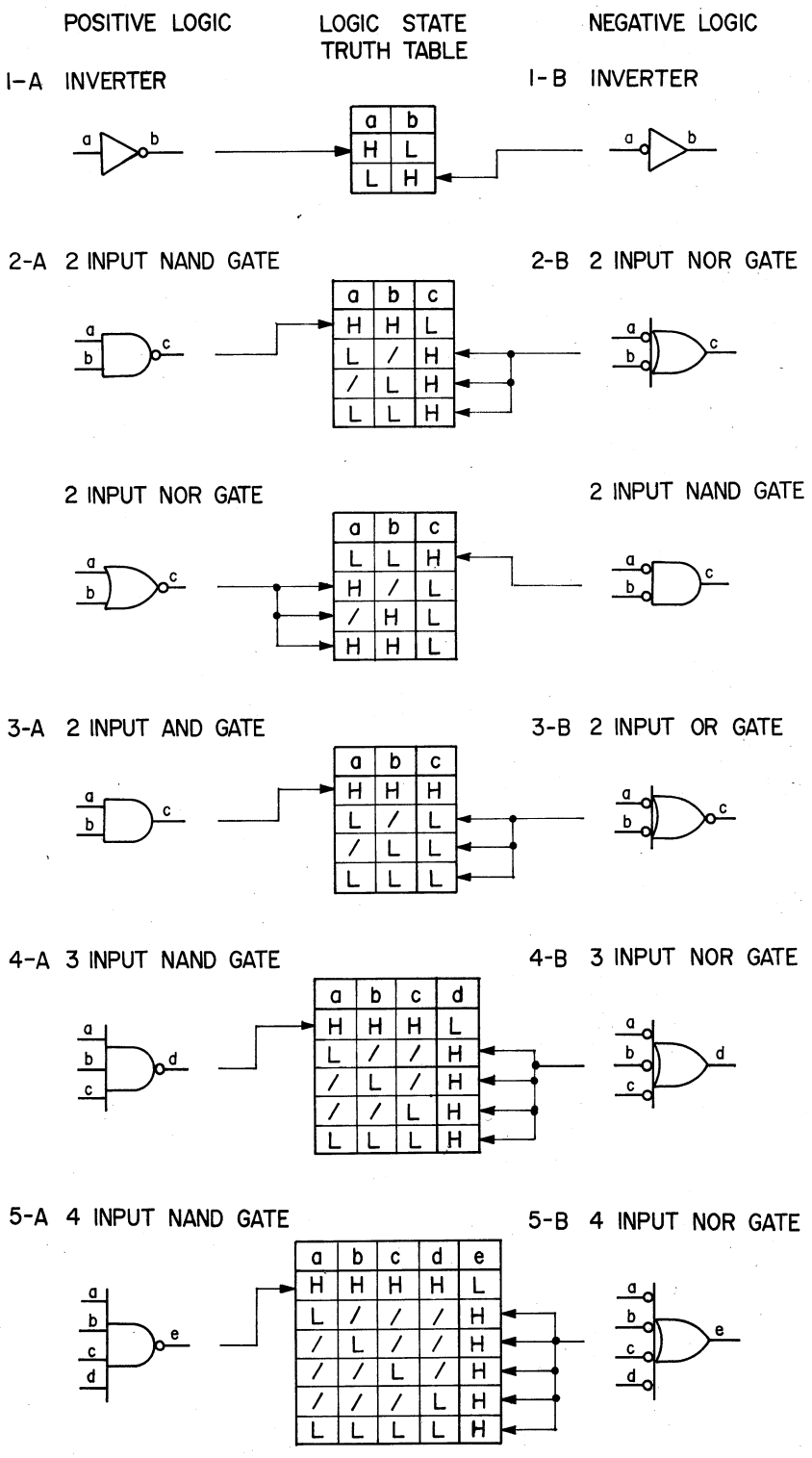
㉗ **DBX MODULE Connection**
Special connector socket to attach interface cable from DX-4. This plug will supply control signals to the DBX unit. Record or play will automatically follow tape recorder function select commands.

SECTION 3

THEORY OF OPERATION

Signal flow and function of the various control circuits in the Model 40-4 are explained in detail in this section. These should be of help in analyzing any trouble which may occur and in correcting the malfunctioning circuit.

3-1 LOGIC IC'S USED IN THE MODEL 40-4



NOTE:
1. High level: 3.4V ~ 5.0V
2. Low level: 0.0V ~ 0.6V
3. Slash (/) in truth table indicates it can be either H or L.
4. In the text on Operations, in circuit schematics, and in block diagrams, each intergrated circuit is expressed by letters "IC" followed by its reference number and output pin number. Combining the output pin number with the IC reference number allows positive indentification of each circuit although a number of multiple circuit IC's may be used in a single system.

Fig. 3-1 Logic IC'S Used in the Model 40-4

3-2 PULSE GENERATING CIRCUIT

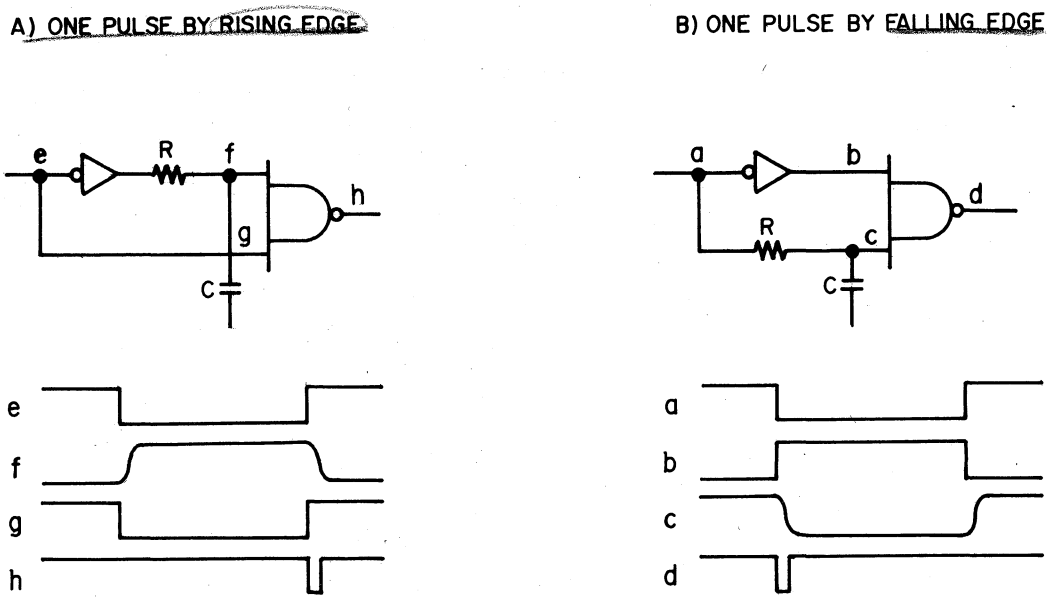


Fig. 3-2 Pulse Generating Circuit

3-3 POWER ON RESET AND SHUT OFF

The flip flops provided for each mode of the 40-4 tape transport functions will always be reset and the transport is put in the STOP mode when the 40-4 main power is switched on.

Also, if the tape should break or the tape is competely wound onto either the left or right reel, all operation modes will be canceled, the transport stopped, and the capstan motor will stop rotating.

3-4 POWER ON RESET

1. Q1 is for generating the Power-On-Reset signal. When the main AC power is switched on, +5V applied from the power supply passes through R11, and by the effect of R12 and the parallel impedance h_{ie} of Q1 coupled with the time constant of C9, a base current will flow for several hundred msec. until C9 is completely charged during which time Q1 will be conducting and its collector potential will be about 0.3 V. When C9 becomes fully charged, the collector potential will return to about 5V and Q1 will switch off. During this ON state of Q1, all flip flops will be reset, the Pause lamp will blink, and the POWER ON MUTE will be sent to the Record/Reproduce Amplifier.
2. U17-6 is a Schmitt trigger inverter, and during Power-On-Reset, its output pin #6 will go to a high logic level using the shaped output waveform of Q1.
   Due to this, input pin #2 of U5-3 goes to a high logic level, thus allowing Pause Lamp to blink.
3. U2-2 is an inverter, and changes a high logic level input to a low logic level output.
   This low logic level is sent to pin #13 of U22-11 whose output is sent to Record/Reproduce Amplifier as MUTE signal. (For MUTE, refer to paragraph 3-21 OUTPUT SELECT.)
4. U9-1 is a 2-input NOR gate, and its output pin #1 will go to low logic level during Power-On-Reset. This level is sent to reset terminal, pin #3 of U14-6 in PAUSE Flip Flop, thus allowing PAUSE Flip Flop to be reset.
5. U4-6 is a 2-input OR gate, and when its input pin #5 is a low logic level, its output pin #6 will be a low logic level.
6. U4-8 is a 2-input OR gate, and when its input pin #10 is a low logic level, output pin #8 will go to a low logic level. Therefore, both reset terminals, pin #1 of U13-3 in RECORD Flip Flop and pin #5 of U13-6 in PLAY Flip Flop will be at low logic levels and these Flip Flops will be reset.

7. U4-11 is a 2-input OR gate, and when its input pin #13 is a low logic level, its output pin #11 will go to a low logic level. This low logic level output is fed to input pins #5 and #9 of U6-6 and U6-8 respectively which are the input circuits for F.FWD and RWD respectively. Then, even if the F.FWD or RWD buttons are pressed during Power-On-Reset, F.FWD or RWD modes will not be achieved.
8. U2-12 is an inverter, and allows input pin #12 of U9-13 to be at a high logic level.
9. U9-13 is a 2-input NOR gate, and when its input pin #12 is a high logic level, its output pin #13 will go to a low logic level. Therefore both reset terminals, pin #2 of U14-12 in F.FWD Flip Flop and pin #11 of U14-8 in RWD Flip Flop will be at low logic level, and these Flip Flops will be reset.
10. Since U5-3 is a 2-input NAND gate which always has an approx. 2 Hz square wave signal applied to pin #1 (Flasher 2), therefore when input pin #2 is a high logic level (only during Power-On-Reset), output pin #3 of U5-3 has this approx. 2 Hz square wave output.
11. U5-6 is a 2-input NOR gate, and since pin #5 goes to a low logic level during PAUSE mode and also an approx. 2 Hz square wave signal is fed to pin #4 during Power-On-Reset, therefore, from output pin #6, a high logic level is sent out during Pause mode and an approx. 2 Hz square wave signal is sent out during Power-On-Reset.
12. Q12 is a Pause Lamp Driver, and it allows Pause Lamp to ignite continuously by the ON state of Q12 during PAUSE mode, and allows Pause Lamp to blink by repeating of ON and OFF states with an approx. 2 Hz square wave signal during Power-On-Reset.

3-5 SHUT-OFF

Two shut-off switches are interlocked to right Tension Arm.
One switch (S203) is used for reset of System Control Logic.
The other switch (S202) is employed for ON-OFF function of rotating Capstan Motor.

1. When Right Tension Arm is in lower right position, Shut-off switch (S203) in Tape Transport will be closed, thus making a short between J104-6 and J104-5.
2. Due to R7, J104-6 is held at a high logic level in any state other than Shut-off state, and goes to a low logic level during Shut-off state.
3. U17-10 is a Schmitt trigger inverter and makes the gradually rising waveform due to the effect of R7 and C5 into a sharp pulse. Then output pin #10 goes to a high logic level during Shut-off state.
4. U9-1 is a 2-input NOR gate, when input pin #2 is a high logic level, output pin #1 will go to a low logic level.
   Accordingly, output pin #1 of U9-1 goes to a low logic level during Power-On-Reset or Shut-off state.
   Since the following circuits use the same system as Power-On-Reset, refer to paragraph 3-3 for explanation of them also.

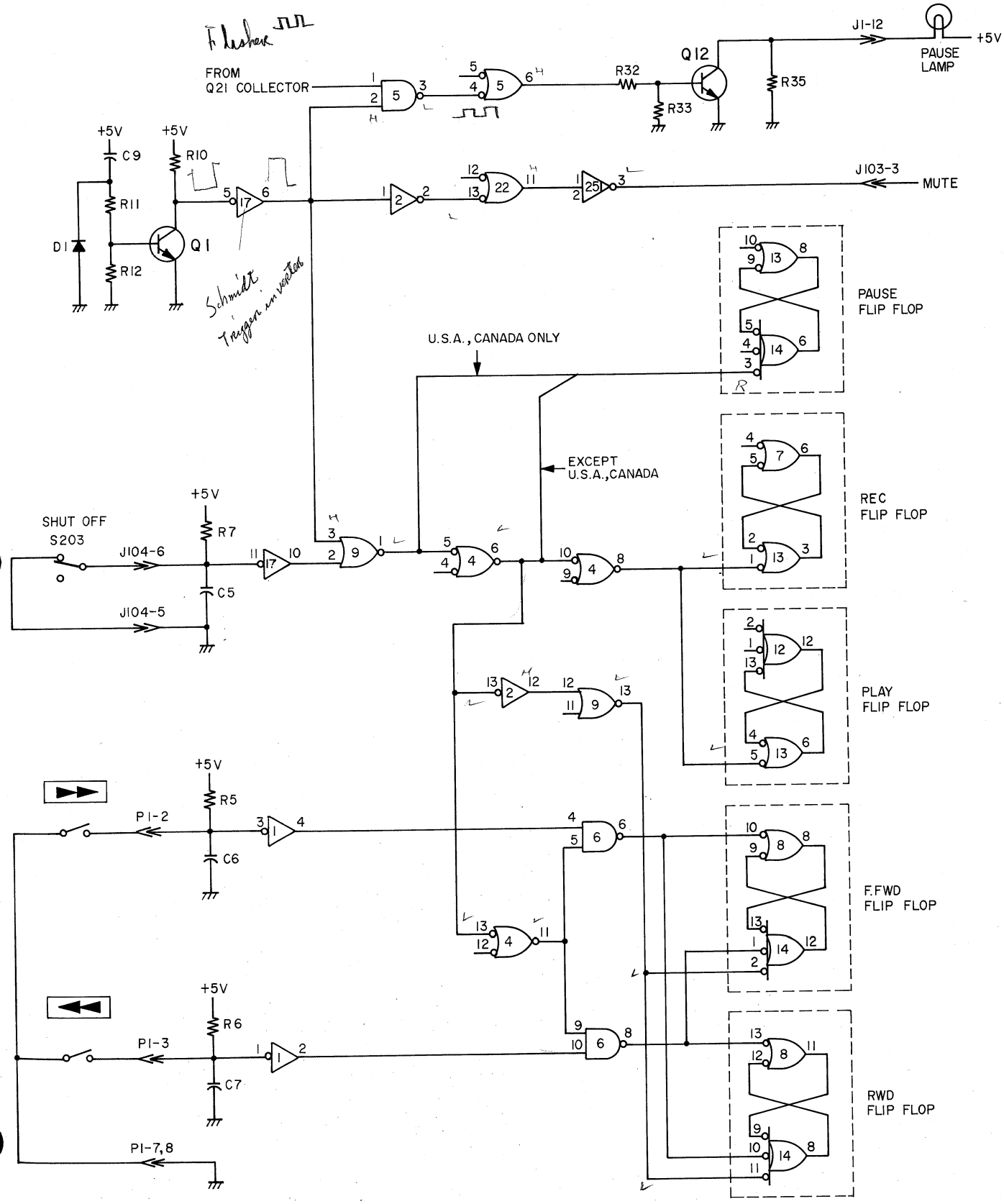


Fig. 3-3 System Control Circuit Diagram

3-6 PLAY MODE CONTROL FUNCTION

1. When the PLAY button is depressed, the input pin #5 of the Schmitt trigger U1-6, will go to a low logic level, and pin #6 of U1 will be at a high logic level only while the PLAY button is held depressed.
2. This high logic level output from that Schmitt trigger is applied to pin #1 of U6-3.
3. In addition to the high logic level to pin #1 of the 2-input NAND gate U6-3, when the remaining pin #2 (*) is also a high logic level, the output from pin #3 of U6-3 will be a low logic level.

* When the PLAY button is depressed during tape travel other than PLAY, pin #2 of U6-3 will remain at a low logic level. In other words, pin #2 is a high logic level only when tape is stopped (not tape run).

4. U12-12 and U13-6 form the PLAY Flip Flop, and at the moment the power supply is turned ON, the output at U-13 pin #6 will go to a high logic level by power-on-reset signal (low logic level) applied to pin #5 of U13-6.
   When a low logic level is applied to pin #1 or #2 of U12-12, the Flip Flop will change states and a low logic level will be output from pin #6 of U13-6.
   Since pin #6 of U13-6 and pin #13 of U12 are interconnected, as long as pin #6 of U13 is at low logic level, it will remain so unless reset signals from F.FWD, RWD, STOP, or SHUT OFF are input to pin #5 of U13-6.
5. Output pin #4 of inverter U3-4 will go to a high logic level when a low logic level is applied to pin #3. This feature is utilized for RECORD PUNCH IN mode explained on page 16.
6. U5-11 is a 2-input NAND gate. It will put out a low logic level to the inverter U3-12 only when the input #12 and #13 pins are both at a high logic level.
7. The high logic level output from pin #12 of inverter U3-12 is applied to the driver transistors Q2, Q13 and Q3, Q14 for the PLAY SOLENOID, page 26 and Q6 for the PLAY relay.
8. U5-8 is a 2-input NOR gate and when a low logic level output from the 2-input NAND gate, U5-11 is applied to pin #10 of U5-8, a high level will be output from pin #8. This high logic level is applied to the driver tansistors Q4, Q15 and Q5, Q16 for the BRAKE SOLENOID, page 26.
9. Q7 and Q8 also work in addition to their F.FWD and RWD functions, as circuit to lessen slackness of tape during acceleration in PLAY mode. When U3-12 output becomes a high logic level, base current will flow to Q7 and Q8 via C28.
   While C28 is charging, Q7 and Q8 will go to ON state, thus driving K2 and K1.

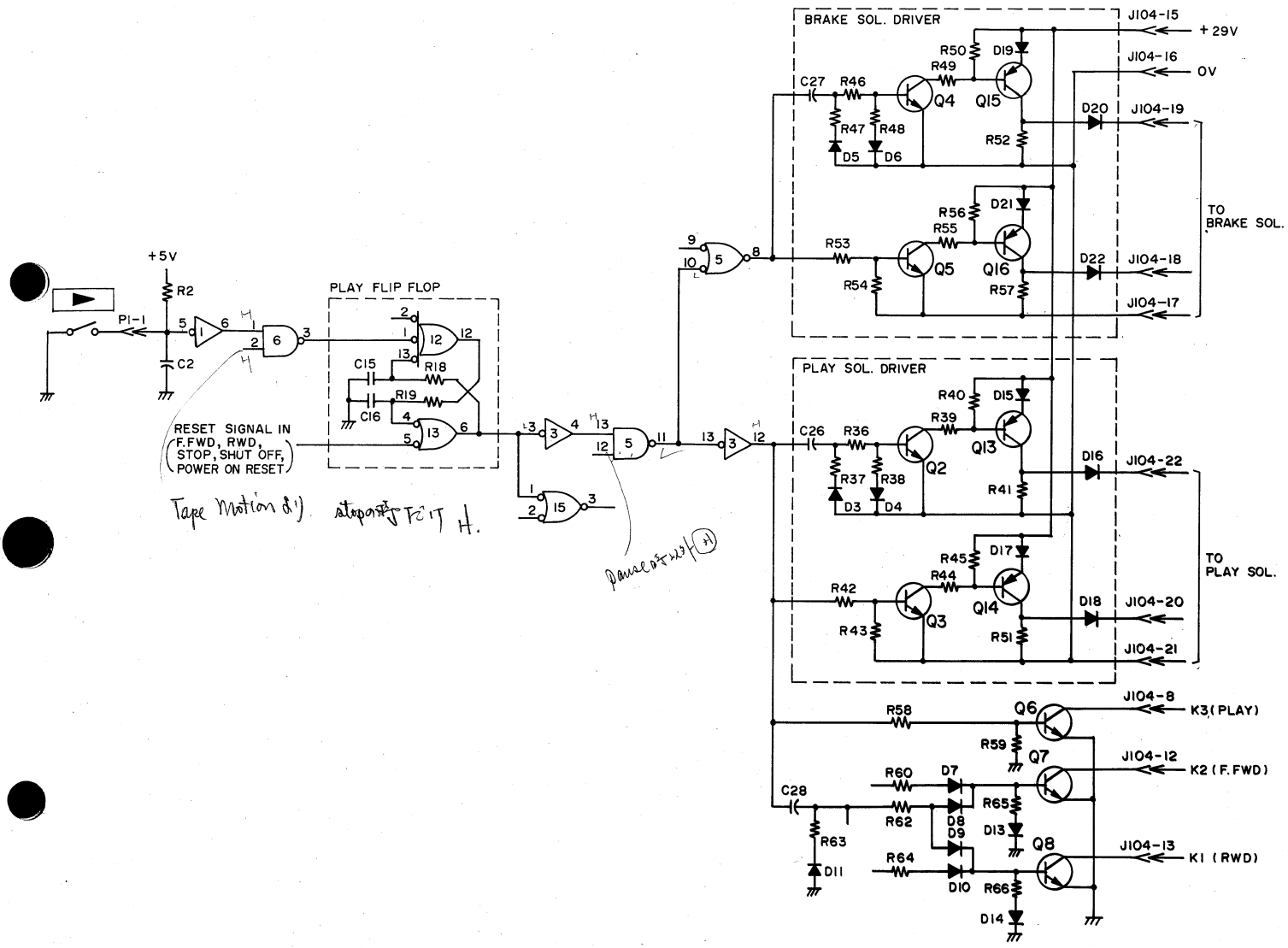


Fig. 3-4 Play Flip Flop, Brake Sol. Driver and Play Sol. Driver Circuit Diagram

3-7 RECORD

Four different recording modes can be selected on the 40-4 depending on how the RECORD, ► PLAY, PAUSE, or FUNCTION SELECT buttons on the Control Panel are depressed.

3-8 RECORDING MODES

1. Normal Recording; Press beforehand the FUNCTION SELECT button for channel you want to record, then depress RECORD button and PLAY button at the same time.
2. Punch-in Recording (I); Press FUNCTION SELECT button for the desired recording channel.
   Set deck in PLAY mode to run tape.
   When the running tape reaches the point to be punched-in, depress the RECORD button only.
3. Punch-in Recording (II); Depress RECORD button and PLAY button simultaneously with no FUNCTION SELECT buttons pressed to set deck in PLAY mode (Record Stand-By state).
   Depress FUNCTION SELECT button for the channel on which Punch-in recording is to be done.
4. Recording using PAUSE button; Depress beforehand FUNCTION SELECT button of the desired recording channel.
   Depress RECORD button and PAUSE button simultaneously.
   When you want to record, press PLAY button to release Record Pause mode and put 40-4 in Record mode.

Record mode on each channel will be achieved only when both signals in System Control, the READY signal (provided for each channel) which indicates the FUNCTION SELECT button is depressed and the REC DC signal which is generated by RECORD Flip Flop being in set state, are fed to terminals of each channel Record/Reproduce Amplifier. Then Record mode will be achieved in Record/Reproduce Amplifier.

3-9 OPERATION EXPLANATION

1. U1-8 is a Schmitt trigger inverter, and when RECORD button is depressed, output pin #8 will go to a high logic level.
2. U1-6 is a Schmitt trigger inverter, and when PLAY button is depressed, output pin #6 will go to a high logic level.
3. U1-10 is a Schmitt trigger inverter, and when PAUSE button is depressed, output pin #10 will go to a high logic level.
4. U6-11 is a 2-input NAND gate, and when RECORD button and either PLAY or PAUSE button are depressed, output pin #11 will go to a low logic level.
5. RECORD Flip Flop is made up of U7-6 and U13-3.
   This Flip Flop will go to the set state when a low logic level is fed to input pin #4 of U7-6. And it remains in this set state with output pin #3 of U13-3 at a low logic level, unless a low logic level is fed to pin #1 of U13-3. (The conditions for pin #1 of U13-3 to go to a low logic level is limited to when STOP, SHUT-OFF, Power-On-Reset, F.FWD or RWD mode are selected).
6. U13-11 is a 2-input NOR gate, and as long as RECORD Flip Flop is in the set state or RECORD button is held down in Play mode, this output pin #11 will be at a high logic level.
7. U26-3 is an open collector type inverter, and when input pins #1 and 2 are high logic levels (when in record mode), output pin #3 will go to a low logic level which is sent to Record/Reproduce Amplifier as REC DC signal.
8. U8-3 is a 2-input NAND gate. Pin #2 will always be at a high logic level during PLAY mode, and as long as RECORD button is being pressed, pin #3 will put out a low logic level. (Used for Punch-in Recording)
9. U2-6 is an inverter, and when PLAY button is depressed, output pin #6 will go to a low logic level.
10. U7-3 is a 2-input NOR gate, and when either PLAY or PAUSE button is depressed, output pin #3 will go to a high logic level.

11. U16-6 is a 2-input AND gate, and during Record mode (while RECORD Flip Flop is in set state or while RECORD button is held depressed with PLAY mode), input pin #4 is at a high logic level. As long as any one of the FUNCTION SELECT buttons is held depressed and RECORD Flip Flop is in set state, or as long as RECORD button is held depressed with PLAY mode, pin #5 will go to a high logic level. Consequently output pin #6 of U16-6 will go to a high logic level.
    However, since an approx. 2 Hz square wave signal is fed to input pin #5 of U16-6 as long as no FUNCTION SELECT buttons for any channel are selected, an approx 2 Hz square wave signal will be sent out from output pin #6 of U16-6 when RECORD Flip Flop is in set state or when RECORD Button is depressed with PLAY mode.
12. There are three sections of the switches for each channel operated by FUNCTION SELECT Buttons.
    (a) is circuit for use of Remote Control dbx Unit.
    (b) is circuit that will go to a low logic level when any one or more FUNCTION SELECT buttons is depressed, and is an OR circuit for all switches of each channel.
    (c) is circuit that sends Record READY signal output to each channel of Record/Reproduce Amplifier and for making Gate signal to ignite, blink or extinguish indicators above FUNCTION SELECT buttons.
13. U27-6 is an inverter, and input pins #4 and #5 are a high logic level due to R98 with condition of no FUNCTION SELECT button depressed.
    When any one or more buttons is depressed, input pins #4 and #5 will go to a low logic level and output pin #6 will send out a high logic level.
14. U27-8 is a 2-input NAND gate, and when any one or more of the FUNCTION SELECT buttons are depressed with input pin #10 being a high logic level, output pin #8 will go to a low logic level.
15. U27-11 is a 2-input NOR gate, and an approx. 2 Hz square wave signal is always fed to input pin #12. Accordingly when input pin #13 is a high logic level, output pin #11 will send out an approx. 2 Hz square wave signal.
    When input pin #13, however, is a low logic level, output pin #11 will send out a high logic level.
16. U20-11, -8, -6, -3 are 2-input NAND gates, and are drivers for indicators (LED) above FUNCTION SELECT buttons.
    Since respective input pins #12, 9, 5, 2 are connected to output pin #11 of U27-11, respective output of U20-11, -8, -6, -3, while any FUNCTION SELECT buttons is depressed, will change according to output state of U27-11, and will cause indicators (LED) to ignite or blink.
17. U21-2 is an inverter, and when any button other than MONITOR button in OUTPUT SELECT buttons is depressed, output pin #2 will go to a low logic level.
18. U27-3 is a 2-input NOR gate, and when any one or more FUNCTION SELECT buttons are depressed and output pin #11 of U13-11 is a high logic level, or when either INPUT or NORM button in OUTPUT SELECT buttons is depressed, output pin #3 of U27-3 will go to a high logic level.
19. U26-6 is an open collector type inverter, and sends out a REC DC signal at a low logic level to dbx unit by inverting the high logic level output of U27-3.

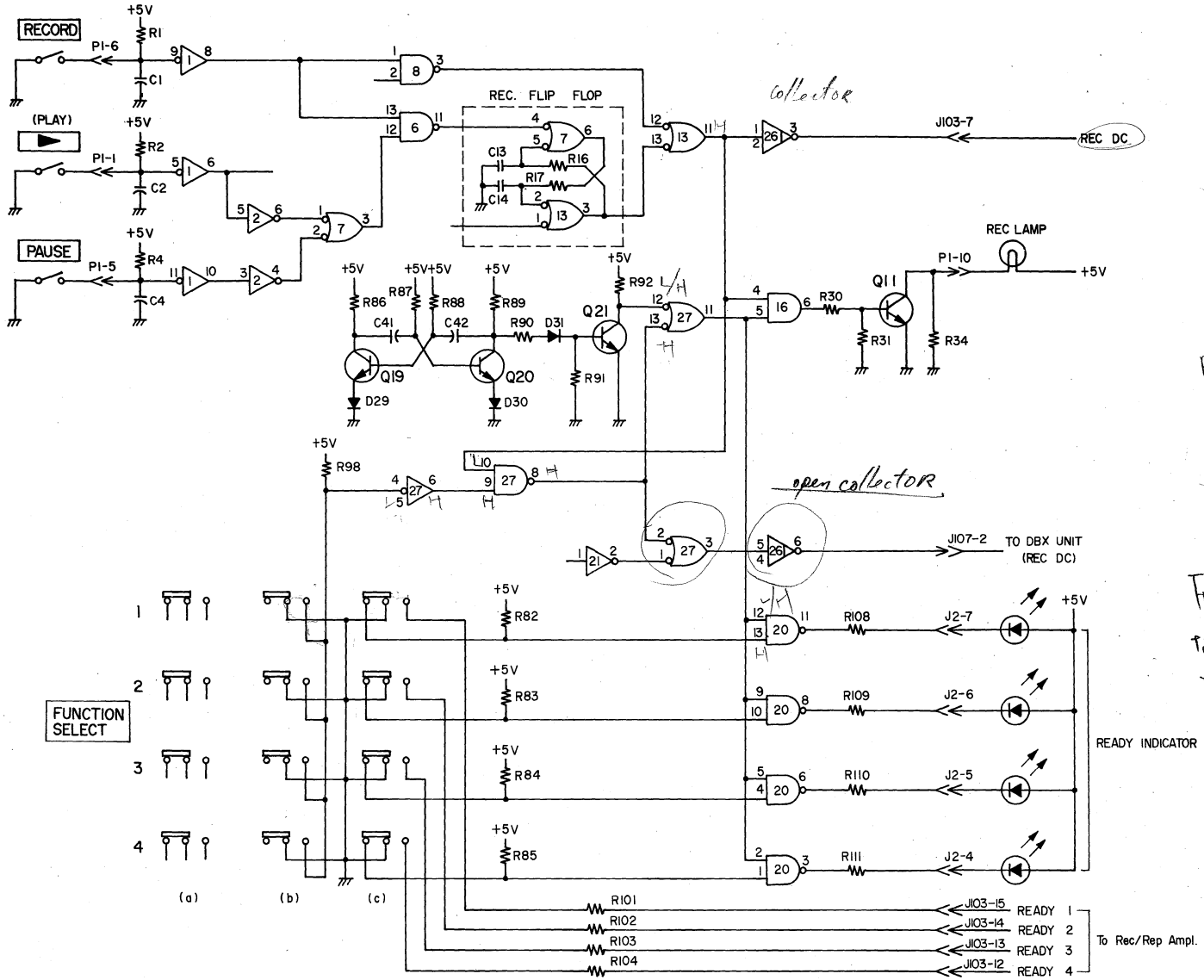


Fig. 3-5 Function Selector Circuit Diagram

3-10 PAUSE

1. When the PAUSE button is depressed, the input pin #11 of the Schmitt trigger inverter U1-10, will go to a low logic level and pin #10 of U1-10 will be at a high logic level only while the PAUSE button is held depressed.
2. This high logic level output from the Schmitt trigger is inverted by U2-4 and the resulting low level is applied to pin #2 of U7-3 and pin #10 of U13-8.
3. U7-3 is a 2-input NOR gate and when a low logic level output from U2-4 is applied to its pin #2, a high logic level will be output from pin #3. This high logic level is sent out to input pin #12 of U6-11 as Gate signal for REC-PAUSE mode.
4. The PAUSE Flip Flop is made up by U13-8 and U14-6 and will be set when the PAUSE button is depressed.
   Also, this Flip Flop will be reset when the PLAY or STOP button is depressed, and during fast winding modes, shut-off mode. On U.S.A. and CANADA models, PAUSE Flip Flop will not be reset when STOP button is depressed.
5. U16-11 is a buffer and when a low logic level is output from PAUSE Flip Flop U14-6 is applied to pin #12, 13, a low logic level will be output from pin #11 of U16-11.
   This low logic level reaches input pin #12 of U5-11 to release Play Solenoid and Brake Solenoid, and to stop Reel Motor rotation.
6. U5-6 is a 2-input NOR gate and when a low logic level output from U16-11 is applied to its pin #5, a high logic level will be output from pin #6.
7. When pin #6 of U5-6 goes to a high logic level, the base current of Q12 will flow to pin #6 of U5-6 via R32, and Q12 will be switched ON, and the PAUSE lamp will be ignited.

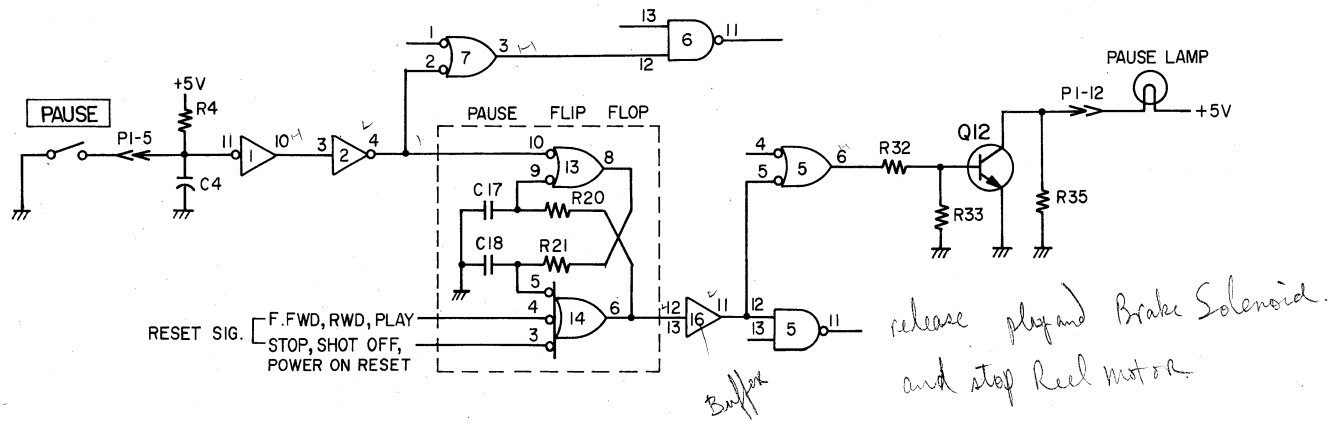


Fig. 3-6 Pause Flip Flop Circuit Diagram

3-11 FAST FORWARD AND REWIND

In the F.FWD and RWD modes of operation, one means of control is by the F.FWD button and the RWD button on the tape transport control panel, and the other is the automatic action controlled by the Motion Control Circuit. (See page 22 for Motion Control Theory.)

Also, when the F.FWD and RWD buttons are simultaneously depressed, the torque of both the TAKE-UP and SUPPLY reel motors will be equal to allow quick and easy CUE operation.

1. U1-4 is a Schmitt trigger inverter and as long as the F.FWD button is held down, output pin #4 will be at a high logic level.
2. U6-6 is a 2-input NAND gate and when the F.FWD button is depressed and the other input #5 is at a high logic level, (it will be at high when the PLAY or STOP buttons are not depressed and not in the Shut Off or Power-On-Reset state) a low logic level will be output from pin #6 of U6-6 to set the F.FWD Flip Flop and reset the RWD Flip Flop.
3. The F.FWD Flip Flop is made up of U8-8 and U14-12, and will be set when the F.FWD button is depressed.

   Also, this Flip Flop will be reset when the RWD button is depressed or a low logic level is being output from U9-13. A low logic level will be output from U9-13 when the PLAY or STOP buttons is depressed or SHUT OFF. (However, should Motion Sensor be broken due to any cause, F.FWD Flip Flop will not be reset even if PLAY button is depressed to protect the tape. Refer to paragraph 3-12 MOTION CONTROL.)
4. U15-11 is a 2-input OR gate, and its output pin #11 will be at a low logic level when the F.FWD Flip Flop is in the set state or as long as the F.FWD button is being depressed.
5. U17-4 is an inverter whose output pin #4 will be a high logic level during the F.FWD mode.
6. U16-3 is a 2-input OR gate. The output will be a low logic level when in the F.FWD or RWD mode.
7. U5-8 is a 2-input NOR gate, and its output pin #8 will be at a high logic level when the F.FWD/RWD or PLAY mode for operating the Brake Solenoid Driver. (See paragraph 3-14 PLUNGER SOLENOID DRIVER.)
8. U16-8 is the buffer and its output pin #8 will be at a low logic level when in the F.FWD or RWD mode.
9. Operation of the RWD mode is controlled by the RWD Flip Flop and operating theory of the various logic signals is approximately identical to those for the F.FWD mode control circuitry.
10. When the F.FWD and RWD button are simultaneously depressed, both F.FWD and RWD Flip Flops will reset each other and their outputs will both go to high logic levels. However, since input pin #13 of U15-11 and pin #10 of U15-8 will both be low logic levels as long as the F.FWD and RWD buttons are held depressed, their outputs will each be at a low logic level, and both circuits will be in the F.FWD and RWD modes. On the other hand, when the F.FWD and RWD buttons are released at the same time, the Flip Flops whose button is released last will be set and the transport will remain in that mode.

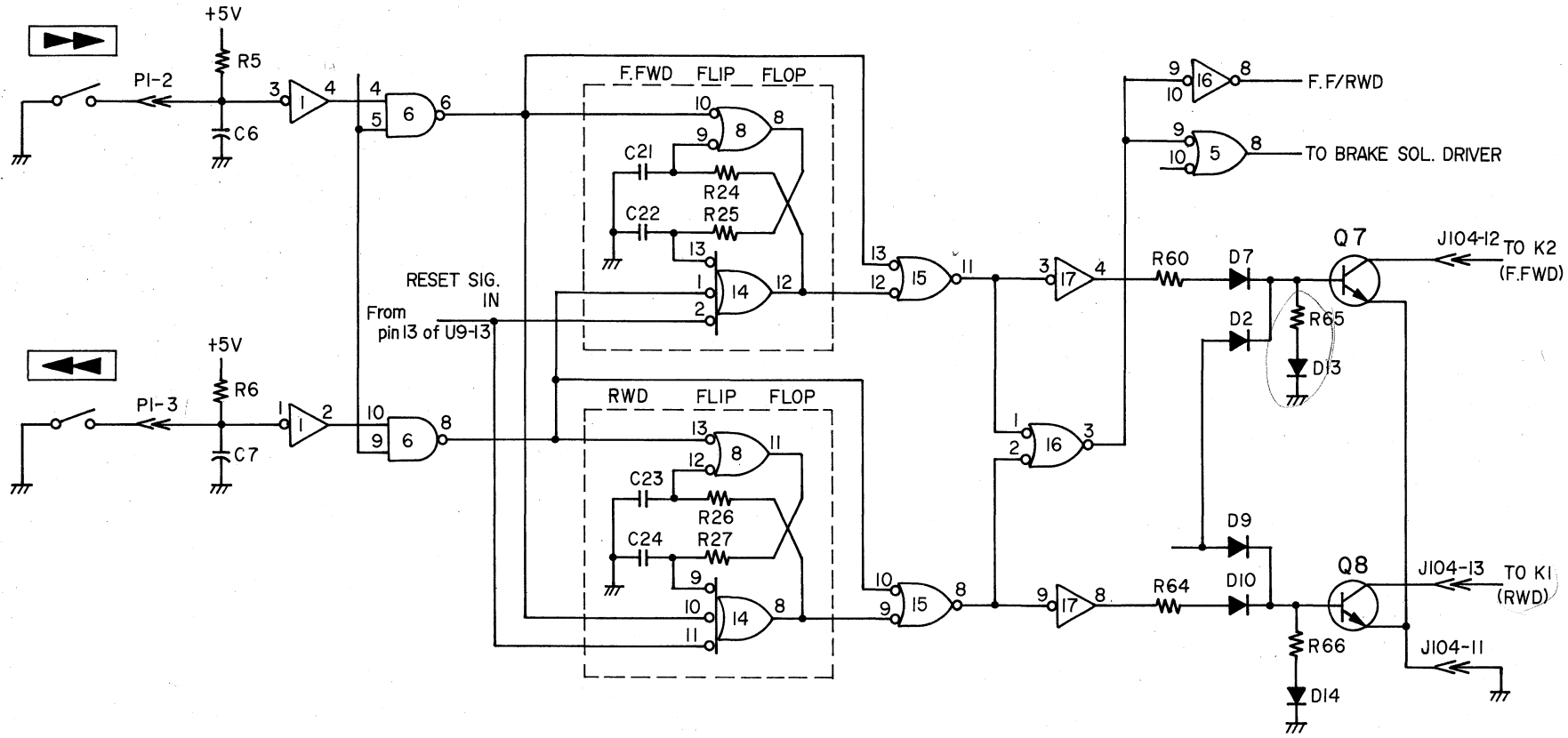


Fig. 3-7 Fast Forward and Rewind Circuit Diagram

3-12 MOTION CONTROL

Motion Control on the 40-4 is comprised of a Motion Sensor (for detecting Reel rotation) installed near Supply Reel Motor shaft on Tape Transport, Retriggerable Monostable Multi-vibrator U11-8 & -6, PLAY or STOP Flip Flop and Gate circuit. It operates so that PLAY mode is entered after several hundred milliseconds after the PLAY button is depressed during either Fast Wind mode (Fast Forward or Rewind) and the tape is completely stopped. Also a protection circuit is provided so that the deck cannot go directly to PLAY mode from a Fast Wind mode when it is impossible to detect reel motor rotation due to motor sensor breakdown. In this above case, PLAY mode cannot be achieved even if PLAY button is depressed unless the PLAY button is depressed after the STOP button is pressed the same as other Tape Recorders which have no Motion Control.

1. A ring type Magnet is attached to Supply Reel Motor shaft on the Tape Transport. This magnet rotation (reel shaft rotation) causes Reed Switch to turn ON and OFF repeatedly. TAPE RUN signal which is generated due to this Reed Switch function is sent out to J104-7.
2. TAPE RUN signal is formed by a +5V and 0V square waveform and is fed to input pin #1 of U17-2.
3. U17-2 is a Schmitt trigger inverter, and the shaped wave with the opposite polarity of input pin #1 is sent out from output pin #2.
4. U17-2 output is fed to the following Pulse Generating Circuit. Pulse Generating Circuit consists of U10-3, U10-11, U10-8 and the RC Time Constant circuit. The Pulses from output pin #2 of U17-2 having 2μ sec width from rising edge to falling edge are fed to U10-11 and U10-8. (Refer to paragraph 3-2 PULSE GENERATING CIRCUIT.)
5. U11-8, -6 is a Retriggerable Monostable Multivibrator. If pins #1 and #2 are fed low logic level pulses, during the time interval determined by the time constant of R15 and C12 (T sec.) a high logic level will be sent out from output pin #8 (Q) and a low logic level will be sent out from output pin #6 ($\overline{Q}$). Also, during the time that these Q and $\overline{Q}$ levels are being sent out of U11-8, -6, if input pulses are again received, these levels will be extended for an additional time of T sec. Therefore, if these input pulses are continued and are received within the T sec interval, the outputs of Q and $\overline{Q}$ will remain at the previous level. Accordingly, if the tape is moving and the reel motor turning, pin #8 (Q) will remain at a high logic level and pin #6 ($\overline{Q}$) will remain a low logic level to indicate that the tape is moving.
   The high logic level signal is used to gate the reset signal for the F.FWD and RWD Flip Flops when the PLAY button is depressed during either of these modes. This high logic level Q when it changes to a low logic level several hundred milliseconds after the tape stops is used to change the deck to the PLAY mode. Also, the low logic level $\overline{Q}$, in order to prevent changing directly from Fast Wind mode to PLAY mode, is applied to U6-3 input pin #2, which is the set input circuit for the PLAY Flip Flop. During this time, even if the PLAY button is pressed, the PLAY Flip Flop will not be set.
6. PLAY OR STOP Flip Flop which is composed of U7-11 and U7-8, memorizes whether the PLAY or the STOP button on tape transport was depressed, and thus decides whether the deck will go to PLAY mode or STOP mode from Fast Winding mode. Assume that now PLAY button is depressed. Set input pin #13 of U7-11 of PLAY OR STOP Flip Flop will go to a low logic level, and then this Flip Flop will be in set state, and thus output pin #8 of U7-8 will go to a low logic level. Also suppose that now STOP button is depressed, reset input pin #9 of U7-8 of PLAY OR STOP Flip Flop will go to a low logic level, and then this Flip Flop will be in reset state, and thus output pin #8 of U7-8 will go to a high logic level.
7. U2-10 is an inverter, and when PLAY button is depressed, output pin #10 will go to a low logic level to set PLAY OR STOP Flip Flop.
8. U15-6 is a 2-input AND gate, and since during Fast Winding mode, input pin #5 of U15-6 is at a high logic level due to Q output of U11-8, output pin #6 of U15-6, if PLAY button is depressed with this state, will go to a high logic level.
9. U9-13 is a 2-input NOR gate, and during Fast Winding mode if any one of the following three actions occur, PLAY button is depressed, STOP button is depressed or Shut-off state, output pin #13 of U9-13 will go to a low logic level and both F.FWD and RWD Flip Flops will be reset.
10. Pulse Generating Circuit consists of U2-8, U3-2 and U12-8.
    U2-8 is an inverter, and when PLAY button is depressed from Fast Winding mode, PLAY OR STOP Flip Flop will go to set state, output pin #8 will go to a high logic level so that input pin #11 of U12-8 will go to a high logic level. In the previous mode, then tape motion stops, thus U11-8, -6 output Q (pin #8) is changed to a low logic level from a high logic level, output pin #8 of U12-8 will send out a low logic level pulse of approx. 2 μsec to set PLAY Flip Flop.

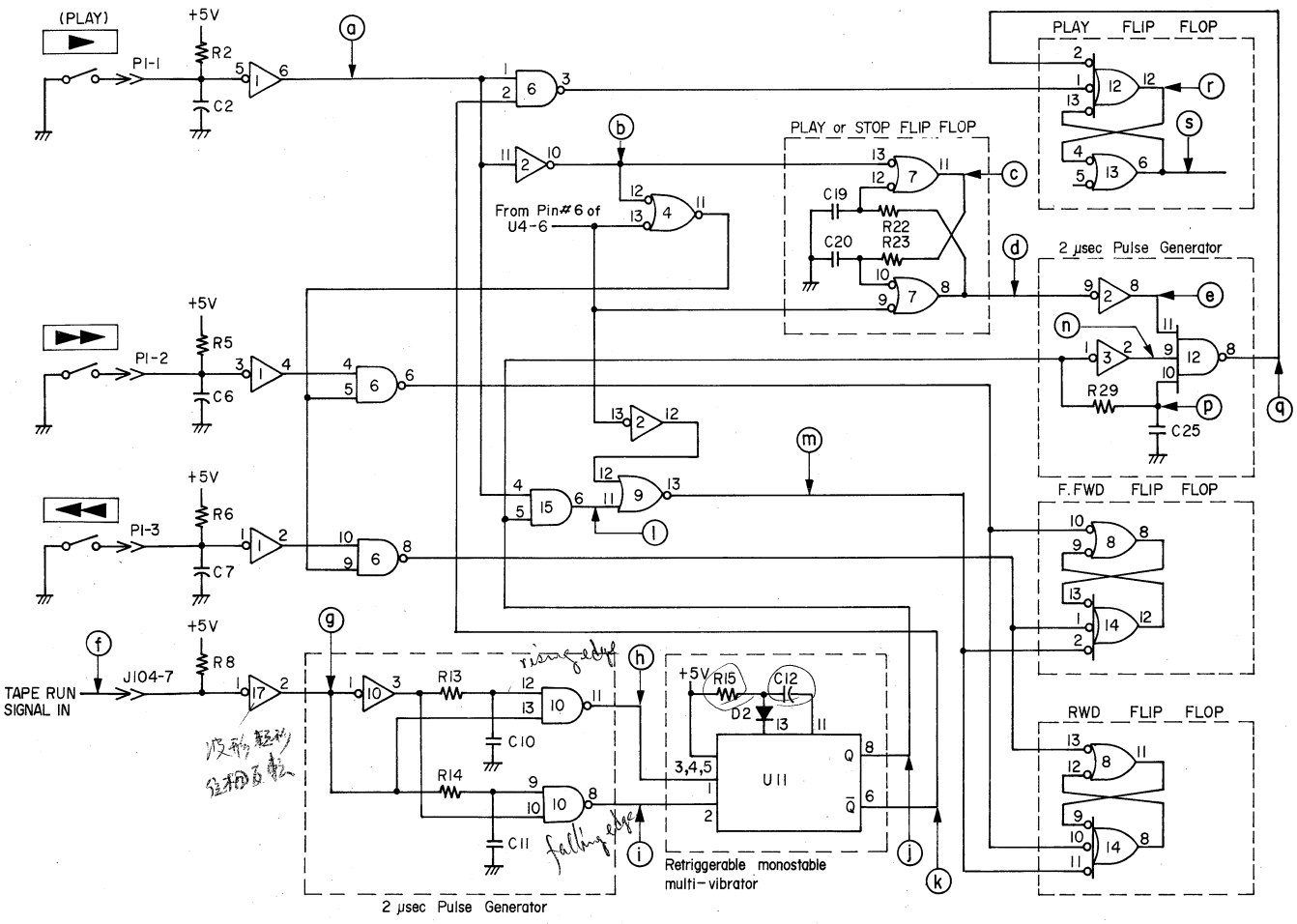


Fig. 3-8 Motion Control Circuit Diagram

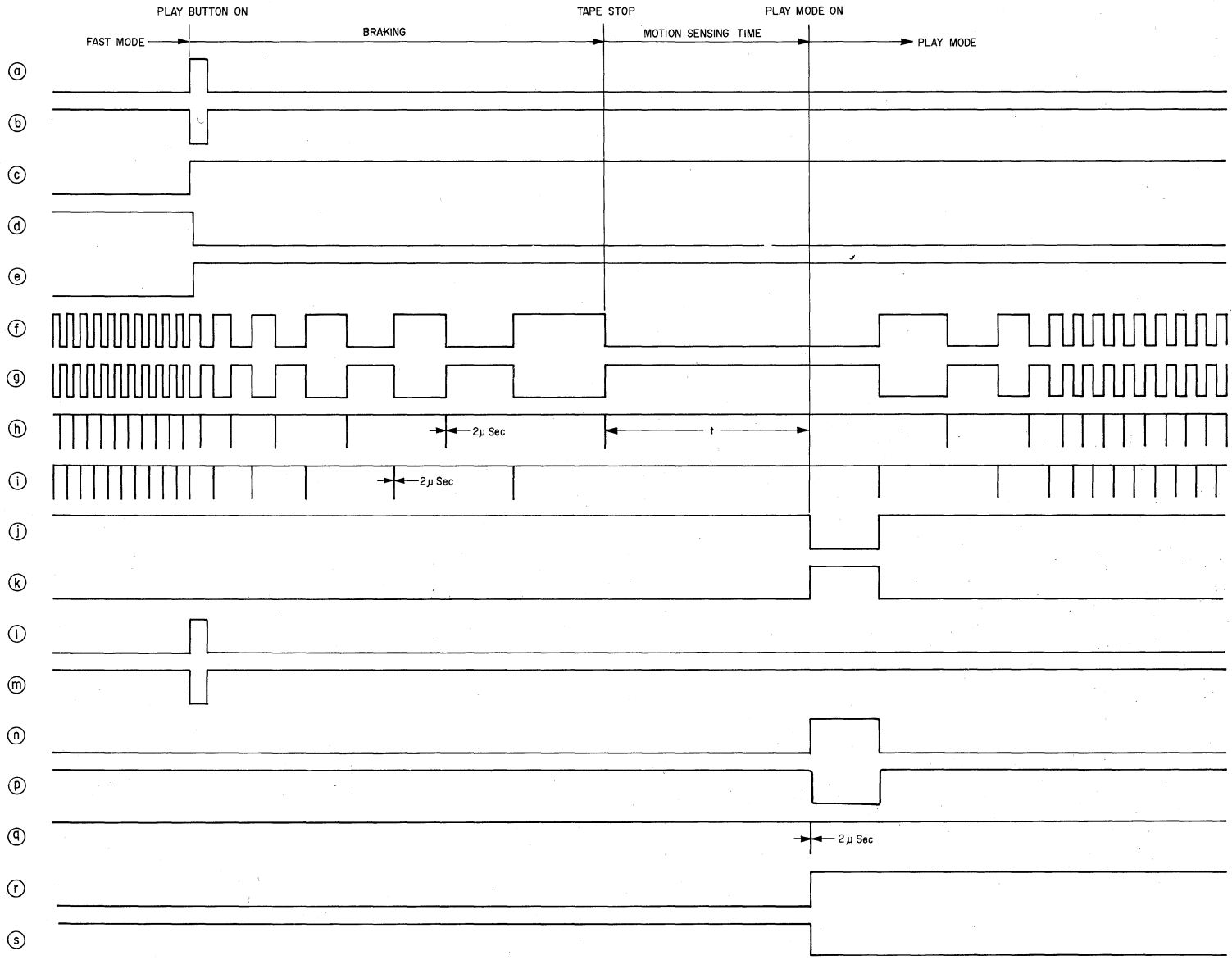


Fig. 3-9 Motion Controls Timing Chart

3-13 COUNTER STOP

The Tape Counter is a 4 digit counter which is constructed so that when the most significant (thousands) digit is a "9", a contact closes.

Therefore, since Tape Counter counts in accordance with tape movement, when the counter changes from '0000' to '9999', the contact closes and when the counter changes from '9000' to '8999' the contact opens.

Consequently the circuit is provided so that during the interval from the instant that the contact opens until the instant the contact closes, pulses will be generated. In addition to the above function, in order that Counter-stop operation is only achieved during the RWD mode, the following circuit is provided.

1. Now supposing that MEMORY button is depressed, when the counter counts and the most significant digit reaches a '9', the potential at point 'a' will go to 0V.
2. When the potential at point 'a' drops from +5V to 0V, Q17 will go from ON state to OFF state, thus the potential at point 'c' will go to approx. 5V.
3. Potential at point 'b' will gradually drop from +5V toward 0V.
4. Due to the reasons stated in steps '2' and '3', Q18 will go to ON state for several mSec.
5. U17-12 is an inverter, and changes a low logic level from Q18 to a high logic level.
6. U4-3 is a 2-input AND gate, and when input pin #2 is a high logic level, output pin #3 will go to a high logic level pulse of several mSec. (Pin #2 of U4-3 is a high logic level is any mode other than F.FWD and PLAY modes.)

   Accordingly, although a high logic level pulse, at the moment the counter changes from '8999' to '9000', is sent as far as point 'e', pin #2 of U4-3 is a low logic level (owing to F.FWD or PLAY mode) and output pin #3 of U4-3 will not go to a high logic level pulse.
7. Output pin #3 of U4-3 which is connected to input pin #5 of U9-4, when going to a high logic level pulse, releases RWD mode the same as STOP button function.
8. Also, when the potential at point 'a' changes from 0V to +5V, that is when counter changes from '9999' to '0000', Q18 will not create a pulse. This is why even if potential at point 'b' gradually rises from 0V toward +5V, Q18 will go to OFF state for the reason that Q17 changes from OFF state to ON state at the same time as potential at point 'a' changes.

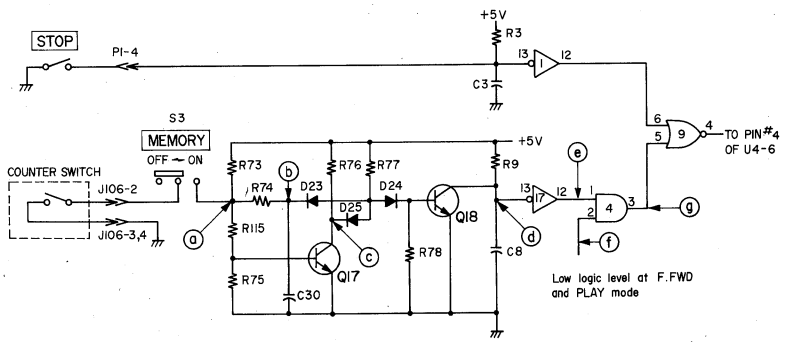


Fig. 3-10 Counter Stop Circuit Diagram

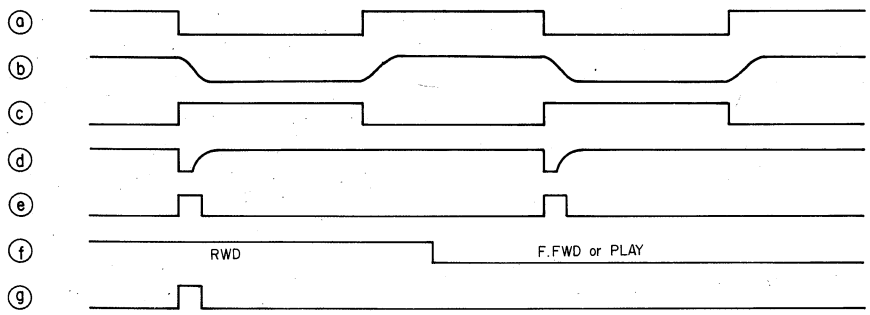


Fig. 3-11 Timing Chart

3-14 PLUNGER SOLENOID DRIVER

The explanation in this section uses reference numbers of the drive circuit for Play Solenoid. The Drive circuit for the Brake Solenoid works similar to the one for Play Solenoid.

1. Plunger Solenoid Driver circuit consists of the short term drive circuit of Q2 and Q13, and the continuous drive circuit of Q3 and Q14.
2. In the short term drive circuit, when the signal fed to point 'a' rises from low to high logic level, the signal is differentiated by the differentiation circuit consisting of C26, R36 and R37. For this reason, Q2 will momentarily (for several 100 mSec) go to ON state, then go to OFF state.
3. As the result of momentary ON state of Q2, Q13 will also go to ON state for a short time (several 100 mSec) then will go to OFF state.
4. When Q13 is in ON state, Collector potential at Q13 will go to approx. +29V for several 100 mSec from the +29V supply through D15 and current flows via D16 to Plunger Solenoid SL201.
5. In the continuous drive (hold) circuit, since a signal fed to point 'a' rises from a low logic level to a high logic level, Q3 remains in ON state.
6. On state of Q3 causes Q14 to go to ON state.
7. When Q14 is in ON state, Collector potential at Q14 will go to approx. +29V from the +29V supply through D17. Therefore current flows via D18 and R204 to Plunger Solenoid SL201.
   However, since, at this time, voltage drop occurs due to R204, terminal voltage across Plunger Solenoid becomes the difference between +29V and Voltage drop across R204. Consequently, voltage supplied from the short term drive circuit to Plunger Solenoid gradually drops from +29V.
   With both the potential of point 'g' and 'h' remaining at the same level, current to Plunger Solenoid will continues to flow.
   Finally when signal at point 'a' drops from high to low logic level, current to Plunger Solenoid will cease.

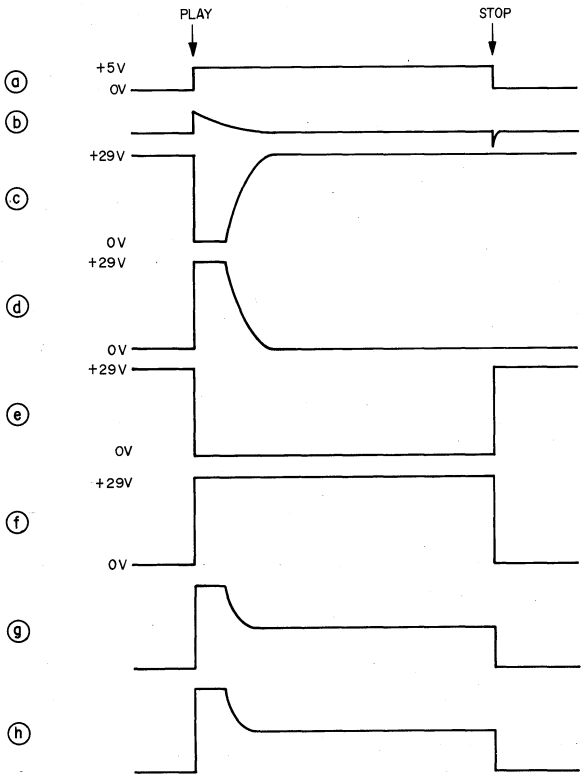


Fig. 3-13 Timing Chart

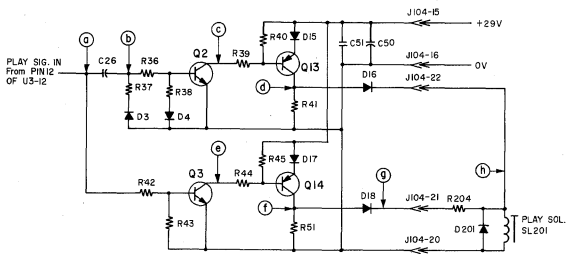


Fig. 3-12 Plunger Solenoid Driver Circuit

3-15 REEL MOTOR CONTROL

Reel Motor Control is operated by switching action (combinations) of relay circuits. In order to stabilize tape travel, especially during PLAY mode, control is employed so that at the instant PLAY button is depressed, voltage higher than that of stationary state of PLAY mode will momentarily be added to both reel motors, Take-up and Supply, thus motor torques will be increased. In the above case, operation is conducted so that all relays, K1 (RWD), K2 (F.FWD) and K3 (PLAY) will temporarily be energized to increase torque, then after a certain period of time, K1 and K2 will be released and only K3 remains energized to provide steady torque during PLAY mode.

1. Q6 to Q9 are transistors for relay drive, and when base currents flow, transistors will go to ON state so that current to each relay flows from the +24V supply to energize relays.
2. Q7 and Q8 are Drive Transistors for K1 and K2, and during PLAY mode K1 and K2, although they are for the purpose of F.FWD and RWD modes, will go to ON state for a while due to the time constant of C28, R61 and R62.

3-16 PLAY MODE

1. U3-12 is an inverter, and during PLAY mode output pin #12 will go to a high logic level.
2. When output pin #12 of U3-12 is at a high logic level, transistor Q6 in which base current will flow via R58, will go to ON state to energize K3.
   Also simultaneously, as transistors Q7 and Q8 will for a short time receive base currents through C28, R61 and R62, they will momentarily go to ON state to operate K1 and K2.
3. Since at the beginning of PLAY mode K1, K2 and K3 will operate at the same time, voltages higher than that of stationary state of PLAY mode are applied to both reel motors by the route of from 100V AC tap on Power Transfromer → K2-5 → K2-6 → K3-2 → K3-3 → Take-up Reel Motor, and by the path of from 80V AC tap on Power Transformer → R201 → K1-5 → K1-6 → K3-5 → K3-6 → Supply Reel Motor.
4. When K1 and K2 are de-energized, voltage of stationary state of PLAY mode is supplied to both reel motors from 80V AC tap on Power Transformer → R201 → K4-2 → K4-3 → K2-4 → K2-6 → K3-2 → K3-3 → Take-up Reel Motor, and in the sequence of 65V AC tap on Power Transformer → R202 → K4-5 → K4-6 → K1-4 → K1-6 → K3-5 → K3-6 → Supply Reel Motor.

3-17 F.FWD MODE

1. U17-4 is an inverter, and during F.FWD mode output pin #4 will go to a high logic level, then transistor Q7 will receive base current via R60 and D7, thus going to ON state.
2. When transistor Q7 is ON state, K2 will be operated in order that voltage for F.FWD mode is fed to both reel motors.
3. Both reel motors receive voltage for RWD mode from 100V AC tap → K1-2 → K1-3 → K3-4 → K3-6 → Take-up Reel Motor, also in the sequence of 30V AC tap on Power Transformer → R203 → K4-8 → K4-9 → K2-8 → K2-9 → K1-1 → K1-3 → K3-4 → K3-6 → Supply Reel Motor.

3-18 RWD MODE

1. U17-8 is an inverter, and during RWD mode output pin #8 will go to a high logic level, then transistor Q8 will receives base current through R64 and D10, thus going to ON state.
2. When transistor Q8 is in ON state, K1 will be energized so that voltage for RWD mode is applied to both reel motors.
3. Both reel motors receive voltage for RWD mode from 100V AC tap → K1-2 → K1-3 → K3-4 → K3-6 → Supply reel Motor, and in the sequence of 30V AC tap on Power Transformer → R203 → K4-8 → K4-9 → K1-8 → K1-9 → K2-1 → K2-3 → K3-1 → K3-3 → Take-up Reel Motor.

3-19 F.FWD AND RWD MODES

1. When F.FWD and RWD modes are both selected at the same time, K1 and K2 will simultaneously be actuated and both Reel Motors receive 100V AC at the same time.
2. 100V AC is simultaneously fed to both reel motors from 100V AC tap on Power Transformer → K1-2 → K1-3 → K3-4 → K3-6 → Supply Reel Motor, and in the sequence of 100V AC tap on Power Transformer → K2-2 → K2-3 → K3-1 → K3-3 → Take-up Reel Motor.

3-20 REEL SIZE SELECTOR

a. LARGE MODE

1. Since while REEL Size Selector is set in LARGE mode, S1 is put in OFF position, the potential at the junction of R67 and R68 will go to approx. +5V for transistor Q9 to go to ON state.
2. Since transistor Q9 becomes ON state, K4 will be energized to select the slide type center tap which has the higher potential on each resistor, R201 and R202.

b. SMALL MODE

1. Since while REEL Size Selector is set in SMALL mode, S1 is put in ON state, the potential at the junction of R67 and R68 will go to 0V for transistor Q9 to go to OFF state.
2. Since transistor Q9 becomes OFF state, K4 will be released to select the slide type center tap which has the lower potential on each resistor R201 and R202.

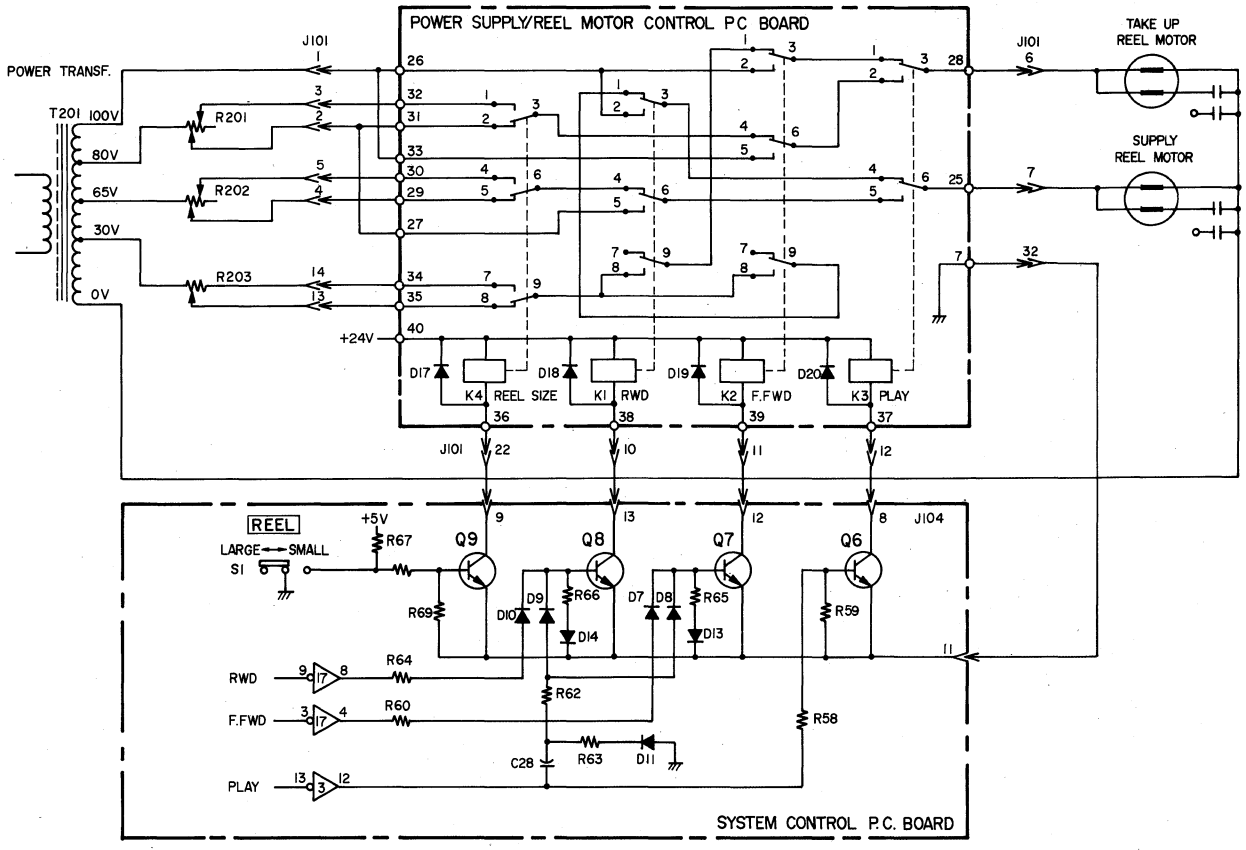


Fig. 3-13 Reel Motors and Reel Size Circuit Diagram

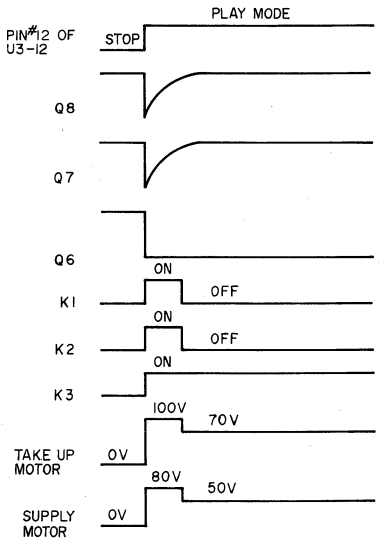


Fig. 3-14 Timing Chart

3-21 OUTPUT SELECT

Depressing either MONITOR, NORM or INPUT button of OUTPUT SELECT buttons allows control signal for selecting audio OUTPUT signal to be sent from System Control Unit to Record/Reproduce Amplifier. When the OUTPUT SELECT button is set to NORM, each channel depending on whether it is set in Record or PLAY mode, will have either the MONITOR head or the NORMAL head connected to the Reproduce Amplifier automatically.

1. OUTPUT SELECT buttons are devided into three selections, MONITOR, NORM and INPUT, and each of them has two sections of the switches. When any one button is depressed, the related inverter (U18-6, U18-4 or U18-2) input, as it is shorted to 0V, will go to a low logic level. Also since the cathode of the indicator (LED) above the designated button becomes 0V, current will flow through the associated resistor (R105, R106 or R107) to light the indicator (LED). Since INPUT button, however, employs one of the two sections of the switches for control signal to change over dbx unit to encode or decode operation, when INPUT button is selected, dbx unit is forced to change to ENCODE mode for all channels.
2. U18-6, U18-4 and U18-2 are inverters, and convert a low logic level into a high logic level for designated selection of OUTPUT SELECT buttons.
3. U19-8, U19-12 and U19-6 are 3-input NAND gates, and when any two OUTPUT buttons are depressed, none of these inverters will send out a low logic level, while when any one OUTPUT button is selected, output of the related inverter will go to a low logic level.
4. U21-10, U21-12 and U21-8 are inverters, and when any one or more OUTPUT SELECT button is depressed, output of the associated inverter will become a high logic level.
5. U28-6 is a 2-input NAND gate, and if F.FWD/RWD signal is sent out from System Control Unit due to Tape Transport being in F.FWD or RWD mode while OUTPUT SELECT button is set in NORM, U28-6 (via U28-8) will change Amp Control Signal to MONIT Signal and also convert Head from NORMAL to MONITOR even though NORM button is depressed. Timing in this time is shown in Timing Chart.
6. U28-8 is a 2-input NOR gate and when OUTPUT SELECT button is set to MONITOR or when OUTPUT SELECT button is set to NORM and tape transport is in F.FWD or RWD mode, output pin #8 becomes a high logic level.
7. U28-3 and U28-11 are 2-input NAND gates, and when NORM button on OUTPUT SELECT button is depressed or released, respective input pin, #2 of U28-3 and #12 of U28-11 will be supplied a low logic level for approx. 100 mSec. Therefore, if either MONITOR or INPUT button on OUTPUT SELECT buttons is depressed to release NORM button, either output pin, #3 of U28-3 or #11 of U28-11 will go to a low logic level after a short delay (approx. 100 mSec) from point of time when either of these button is pressed down.
8. U25 and U26 are open collector type inverters each of whose output is connected to Record/Reproduce Amplifier, and is sent out as a low logic level.
9. U22-11 is a 2-input NOR gate, and when OUTPUT SELECT button is changed or when POWER-ON-RESET, output pin #11 will go to a high logic level so that this level will be sent out via U25-3 to Record/Reproduce Amplifier as MUTE signal so as to mute LINE OUT of Reproduce Amplifier.

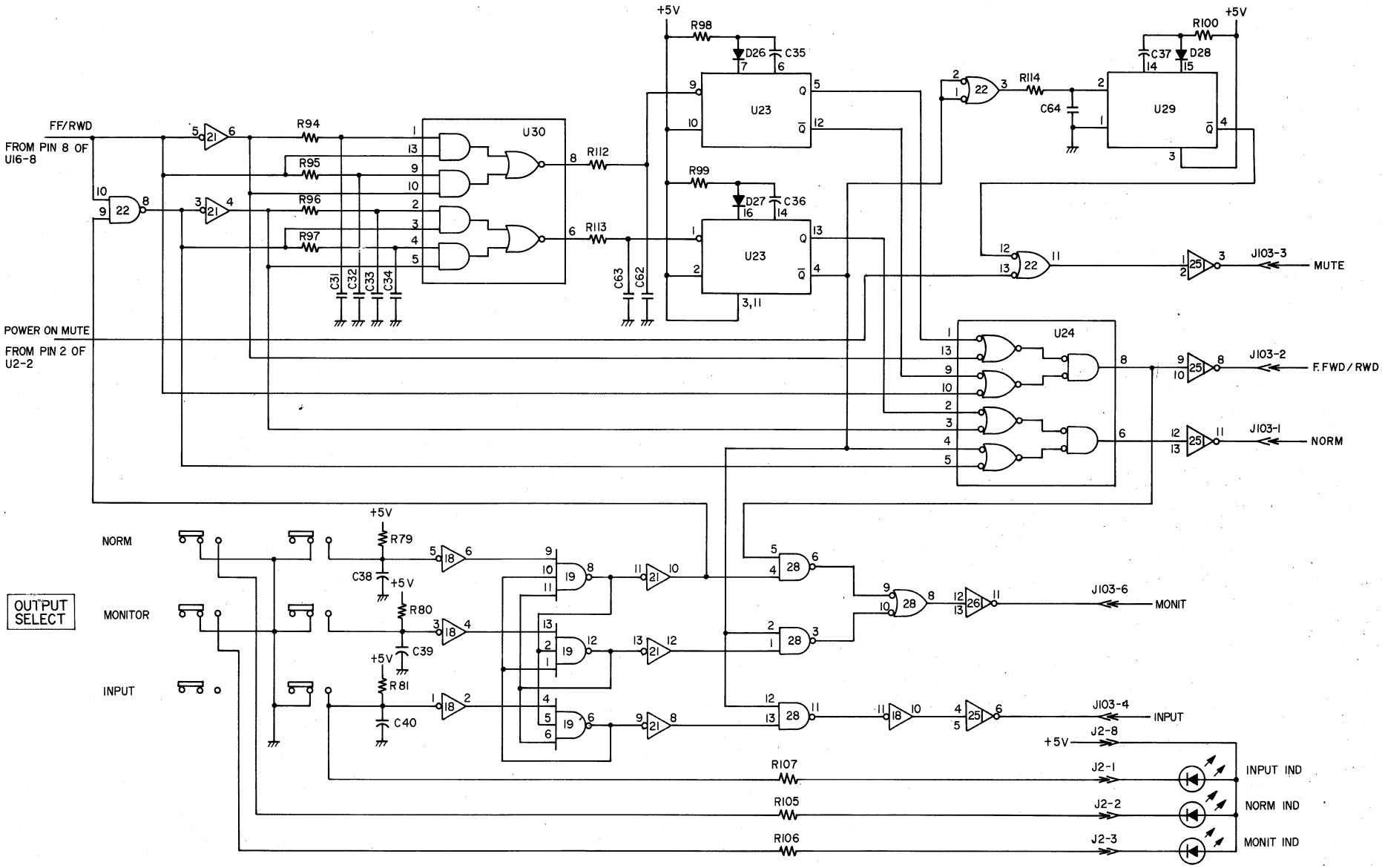


Fig. 3-15 Output Select Circuit Diagram

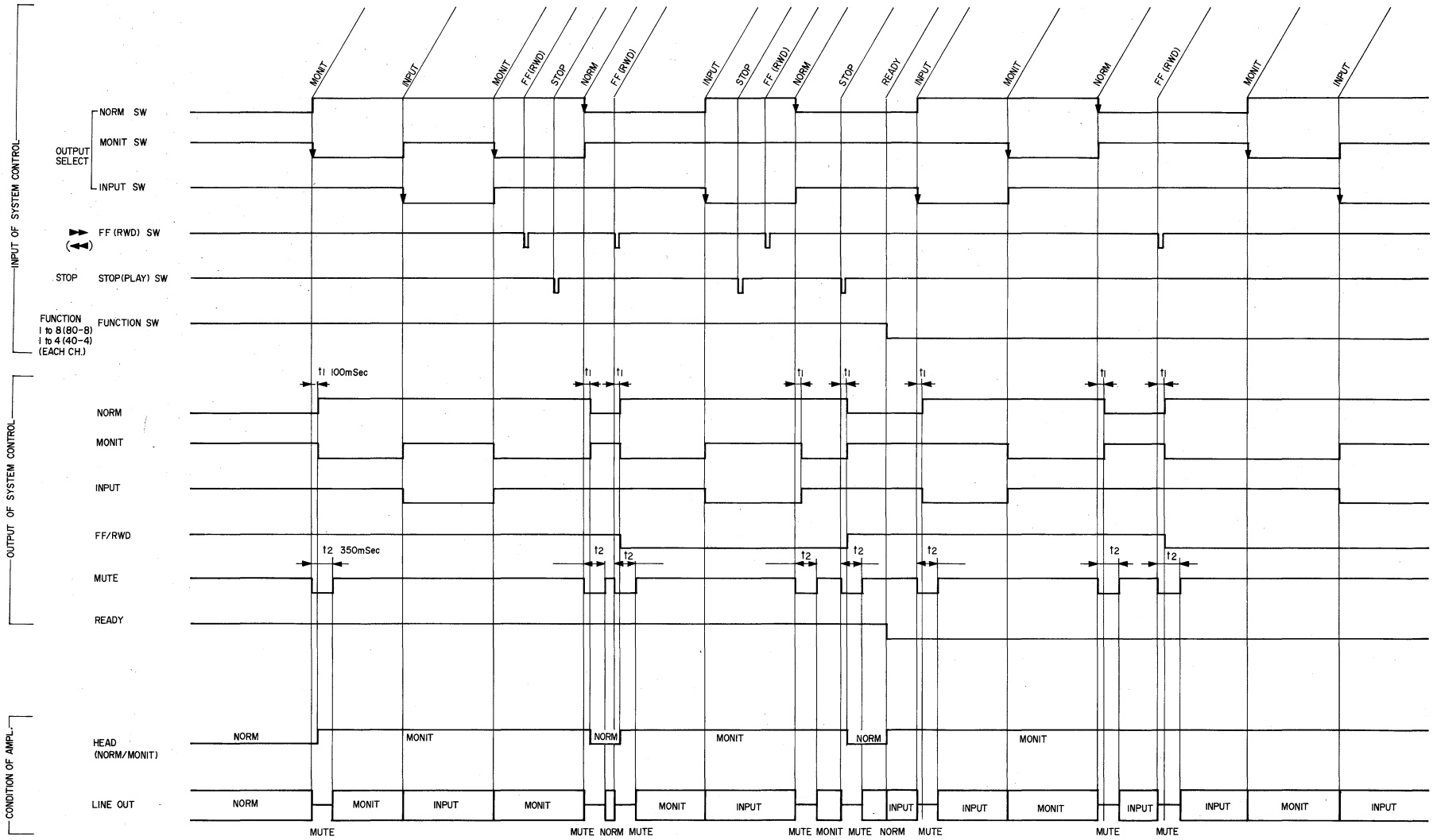


Fig. 3-16 Timing Chart

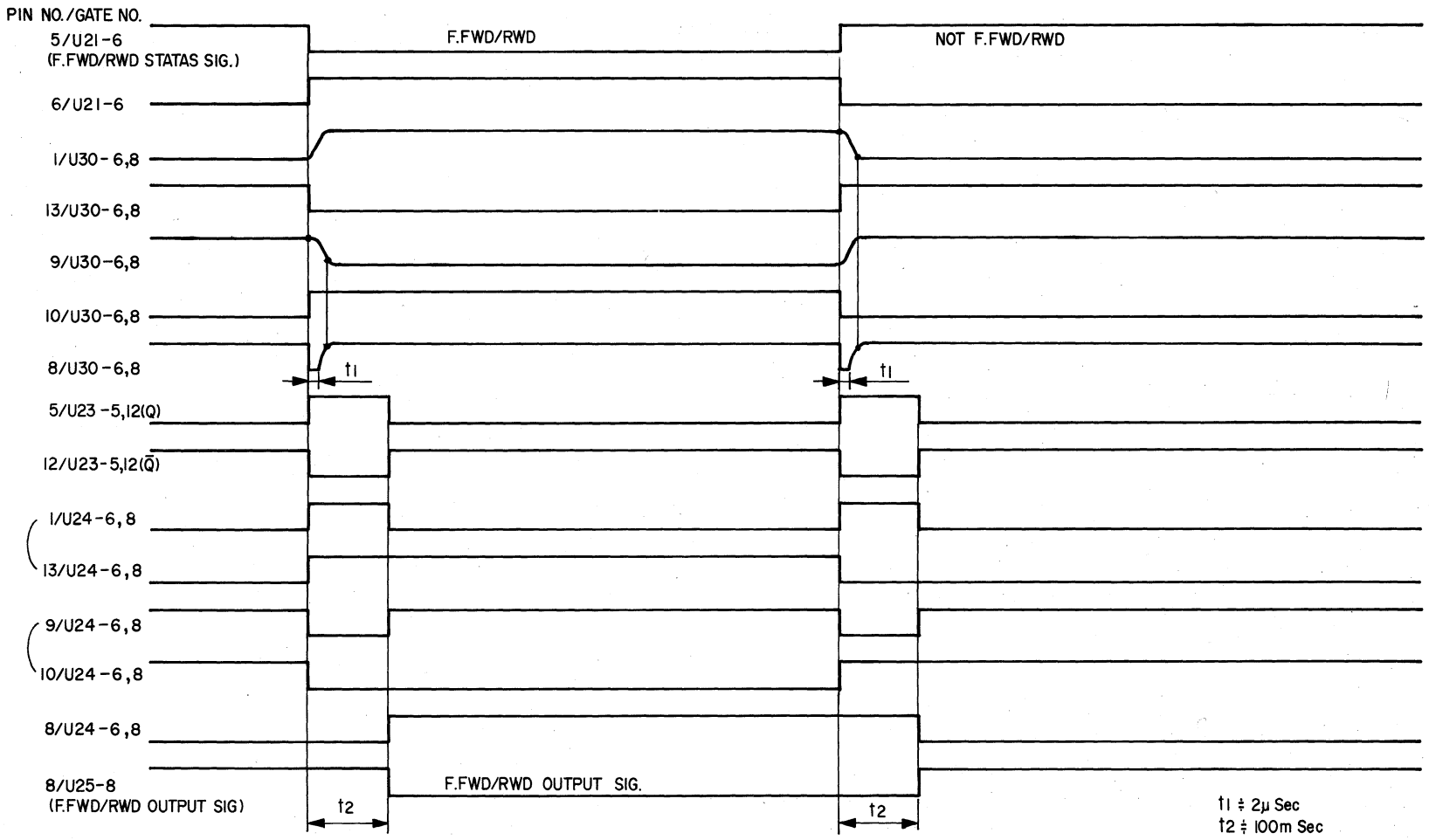


Fig. 3-17 Timing Chart

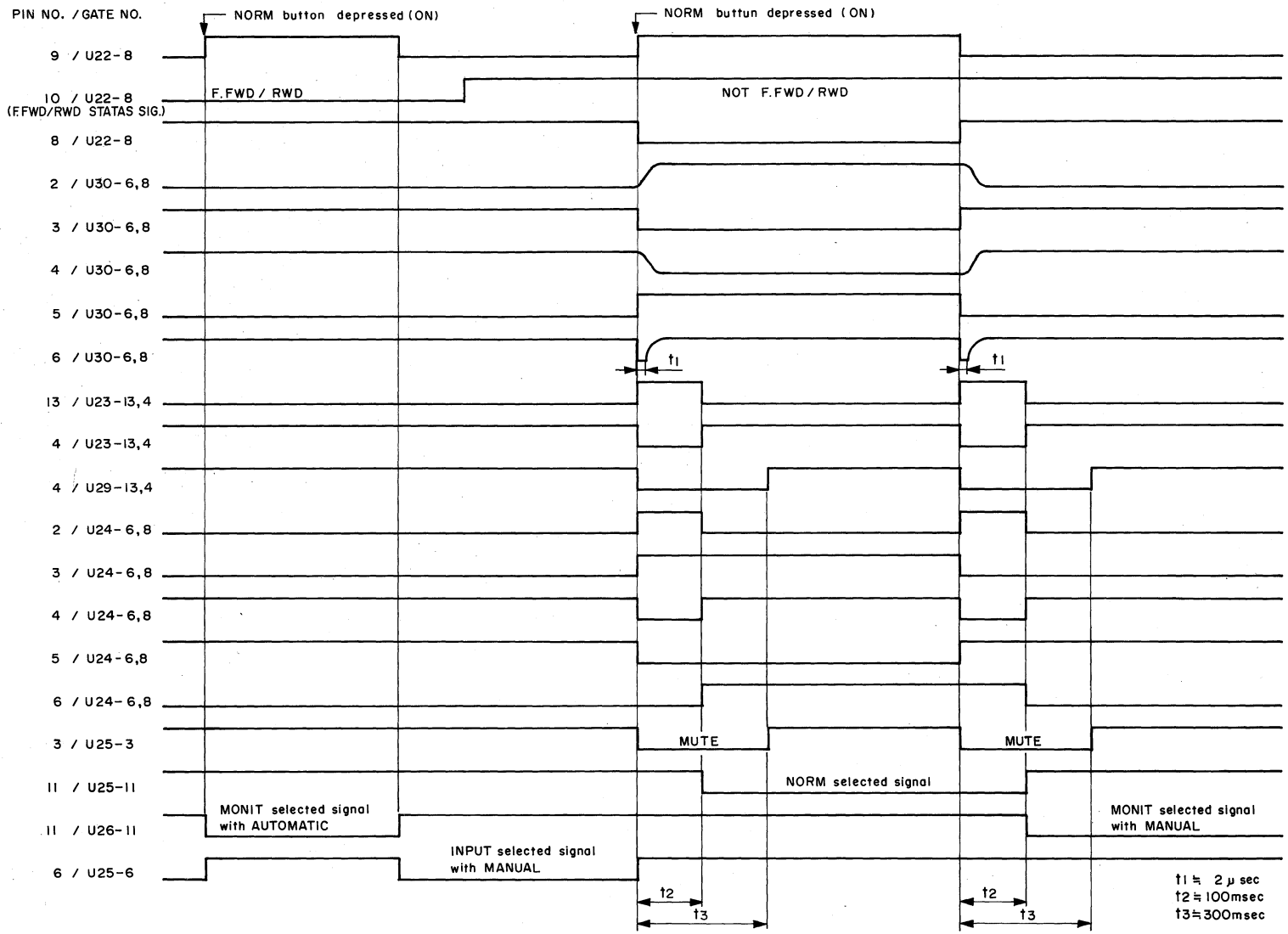


Fig. 3-18 Timing Chart

3-22 CONTROL OF THE DX-4 FROM THE 40-4

Since the DX-4 is designed to provide switchable encode-decode processing, the encode-decode switching is automatically done according to the condition of the OUTPUT SELECT buttons and FUNCTION SELECT buttons and by whether the 40-4 is in record mode or reproduce mode.

3-23 ENCODE MODE

There are 3 ways to set the DX-4 to encode mode.

1. When the INPUT button of the OUTPUT SELECT buttons is depressed all channels of the DX-4 will change to the encode mode.
2. When the NORM button of the OUTPUT SELECT buttons is depressed and any one or more FUNCTION SELECT button(s) is depressed. Only the channel(s) designated by the FUNCTION SELECT buttons can go to encode mode.
3. When the 40-4 is set to record mode, only the channel(s) designated for recording mode will go to encode mode.

3-24 DECODE MODE

When none of the FUNCTION SELECT buttons are depressed and INPUT button of the OUTPUT SELECT buttons is not depressed, the DX-4 will go to the decode mode.

As previously mentioned, the DX-4 goes to encode mode when the INPUT monitor is selected, during which time the signal from the INPUT jacks of the 40-4 is sent to the OUTPUT jacks of the 40-4.
While the DX-4 is in decode mode when the deck is in reproduce mode, during this time the playback signal from the tape will be sent to the OUTPUT Jacks of the 40-4.

1. U22-6 is a 2-input NOR gate and when either NORM or INPUT button of the OUTPUT SELECT buttons is depressed, output pin #6 of U22-6 will go to a HIGH logic level.
2. U21-2 is an inverter and it reverses a high logic level from U22-6 into a low logic level which is sent out to output pin #2 of U21-2.
3. U27-3 is a 2-input NOR gate and when either NORM or INPUT button of the OUTPUT SELECT buttons is depressed or when the deck is set in record mode output pin #3 of U27-3 will become a high logic level.
4. U26-6 is an Open Collector type inverter and when the output from U27-3 is a high logic level the signal at output pin #6 of U26-6 will go to a low logic level. This low logic level causes +5V supply current of 40-4 to flow through R23 in the DX-4 into the LED included in the Photo-coupler IC-4.
5. When current flows into the LED in the Photo-coupler in the DX-4, Q1 will go to the ON state. This causes the potential on the make (normally open) contacts of the FUNCTION SELECT buttons and those of the OUTPUT SELECT buttons to go to about 0V in the DX-4.
6. With the conditions of item 5, when any one or more of the FUNCTION SELECT buttons is depressed the associated encode-decode converting terminal (N) on the dbx AMP PCB ASSY will go to approx. 0V and this will cause the designated channel to go to the encode mode.
7. When the INPUT button of the OUTPUT SELECT buttons on the 40-4 is depressed with the conditions stated in item 5, the encode-decode converting terminal on all of the dbx AMP PCB ASSY will go to 0V approx and thus all channels will go to encode mode.

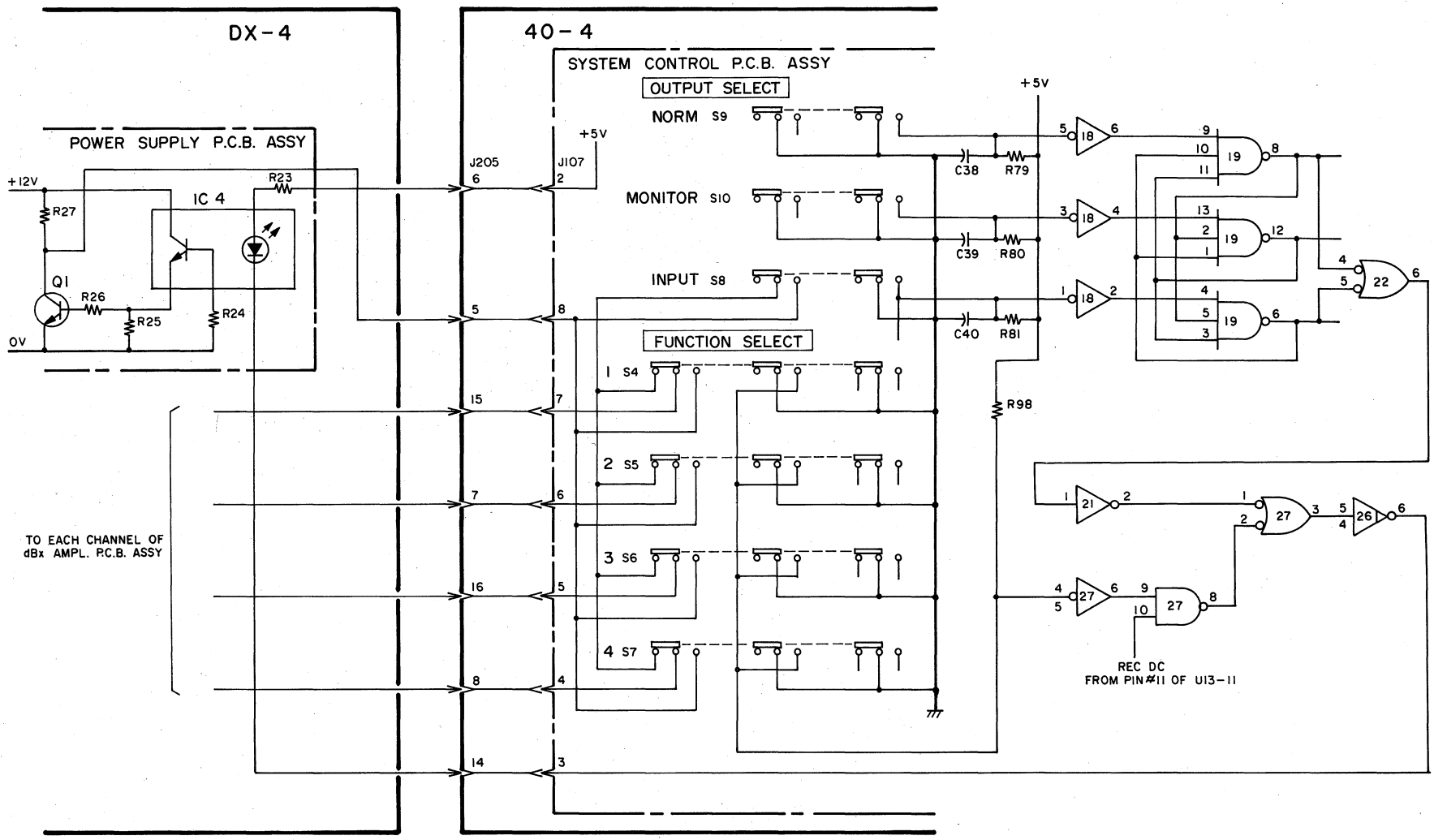


Fig. 3-19 Connection Diagram between 40-4 and DX-4 of Control Circuit

3-25 REC/REPRO AMPLIFIER

The Record/Reproduce Amplifier of the 40-4 consists of the Signal Select Circuits, Reproduce Amplifier, Record Amplifier, Bias Amplifier, Meter Amplifier and the PEAK Indicator Amplifier. All control of this Record/Reproduce Amplifier is sent by the Tape Transport System Control Unit. The Signal Select Circuits in the amplifier control the amplifier itself. Since in the Record/Reproduce Amplifier, Reproduce Amplifier for each channel is in common use with two heads (NORMAL, MONITOR), the two heads are automatically selected by pushing the OUTPUT SELECT and FUNCTION SELECT switches and by the tape transport operation mode.

3-26 SIGNAL SELECT CIRCUIT

1. U3-8 is an inverter which receives the EQ H/L signal from the TAPE SPEED switch on the tape transport control panel via the System Control Unit from which it is sent to pin #9 of U3-8. Pin #9 of U3-8 is a low logic level for LOW speed and a high logic level for HIGH speed. The output at pin #8 of U3-8 will be the opposite level of the input.
2. U3-10 is an inverter which inverts the MONIT signal which is sent out from the System Control Unit. When MONIT is selected, pin #10 the output of U3-10 goes to a high logic level.
3. U5-6 is an open-collector type inverter which receives the output of U10-3. When MONIT is selected, the output on pin #6 becomes a low logic level and turns ON FET switch Q5 which changes the reproduce amplifier to receive playback from the MONITOR head.
4. U5-8 is an open collector type 2-input NAND gate which, when low speed is selected and MONITOR on OUTPUT SELECT buttons is selected, has a low logic level at pin #8 that selects playback equalization for LOW speed and MONITOR.
5. U5-11 is an open collector type 2-input NAND gate which when HIGH speed is selected and MONITOR on OUTPUT SELECT buttons is selected, has a low logic level at output pin #11 that selects play equalization for HIGH speed and MONIT.
6. U3-2 is an inverter which has a high logic level at output pin #2 when OUTPUT SELECT is set to NORM.
7. U4-11 is a 2-input NAND gate which has a low logic level at output pin #11 when OUTPUT SELECT is set to NORM and no FUNCTION SELECT button is depressed (SAFE condition).
8. U3-6 is an inverter which inverts the low logic level from U4-11 output pin #11 to a high logic level output which causes the head relay K1 (through Q13) to change from MONITOR Head to NORMAL Head.
9. U6-8 is an open collector 2-input NAND gate whose output at pin #8 goes to a low logic level to select the reproduce equalization for LOW speed and NORMAL when tape speed is low, OUTPUT SELECT is set to NORM and no FUNCTION SELECT button is depressed.
10. U6-11 is an open collector type 2-input NAND gate whose output pin #11 goes to a low logic level to select the reproduce equalization for HIGH speed and NORMAL when tape speed is HIGH, OUTPUT SELECT is set to NORM and no FUNCTION SELECT button is depressed.
11. U3-4 is an inverter whose output at pin #4 goes to a high logic level when a FUNCTION SELECT button is depressed.
12. U4-8 is a 2-input NAND gate whose output at pin #8 goes to a low logic level when OUTPUT SELECT is set to NORM and one (or more) FUNCTION SELECT buttons is depressed. By U4-3 and U6-3, even if OUTPUT SELECT is at NORM, due to a FUNCTION SELECT button being depressed, FET switch Q7 is forced ON and INPUT mode is selected.
13. U4-3 is a 2-input NOR gate whose output at pin #3 goes to a high logic level and due to this it causes U6-3 to force FET switch Q7 ON to select INPUT mode when OUTPUT SELECT is at INPUT and when you have the conditions given in paragraph 12.
14. U3-12 is an inverter whose output pin #12 goes to a high logic when REC DC signal is supplied by the System Control Unit.
15. U5-3 is an open collector type 2-input NAND gate whose output pin #3 goes to a low logic level and changes the Record/Reprodure Amplifier to Record mode when a FUNCTION SELECT button is depressed and REC DC signal is applied.
16. U7-3, U7-6, U7-11 and U7-8 are open collector type inverters. These ICs are used to drive FET switches Q14 and Q15 and transistors Q16, Q17 and Q18 to change the record equalization for HIGH speed or LOW speed when the tape speed is changed.

3-27 REPRODUCE SECTION

1. K1-1 is used to connect the MONITOR or NORMAL head to the Reproduce Amplifier. The condition of K1 depends on the Signal Select output.
2. Whichever signal, the MONITOR head output or the NORMAL head output, that is selected by K1-1, is sent to transformer T1 where it is stepped up, and is then amplified by U1-7. Reproduce equalization is added at the output of U1-7. This equalization is determined by the condition of the Signal Select circuits. Also, this output depends on the setting of the MONIT gain or NORM gain potentiometers (R206 or R205) . In order to set the input level at pin #3 of U1-1 for approx. –40 dB, the signal passes through Q5, Q6 or Q7 analog switches. The signal is amplified by U1-1 to –10 dB (0.3V). Audio signal of either INPUT, NORM or MONITOR mode selected by the Signal Select Circuits is sent out to LINE OUT.
3. Q5, Q6 and Q7 which are the Analog Switches made of FET's, will be turned ON when approx. 0V input is applied to their gates, and will be turned OFF when about a +13V input is applied to them.
4. The MUTING circuit is made up of Q8 and Q9. The MUTE signal sent out from the System Control Unit will turn ON Q9 and this will short out the LINE OUT to 0V to accomplish the muting.
5. Q10 makes up the Meter Amplifier. When the LINE output level is –10 dB (0.3V) the meter indication will be 0VU.
6. Q11, U8-3 and U8-6 are the PEAK Indicator Amplifier. When the signal reaches +10VU, to light the LED in the VU meter current passes from the +5V supply through the path of the LED, R52, U8-6.

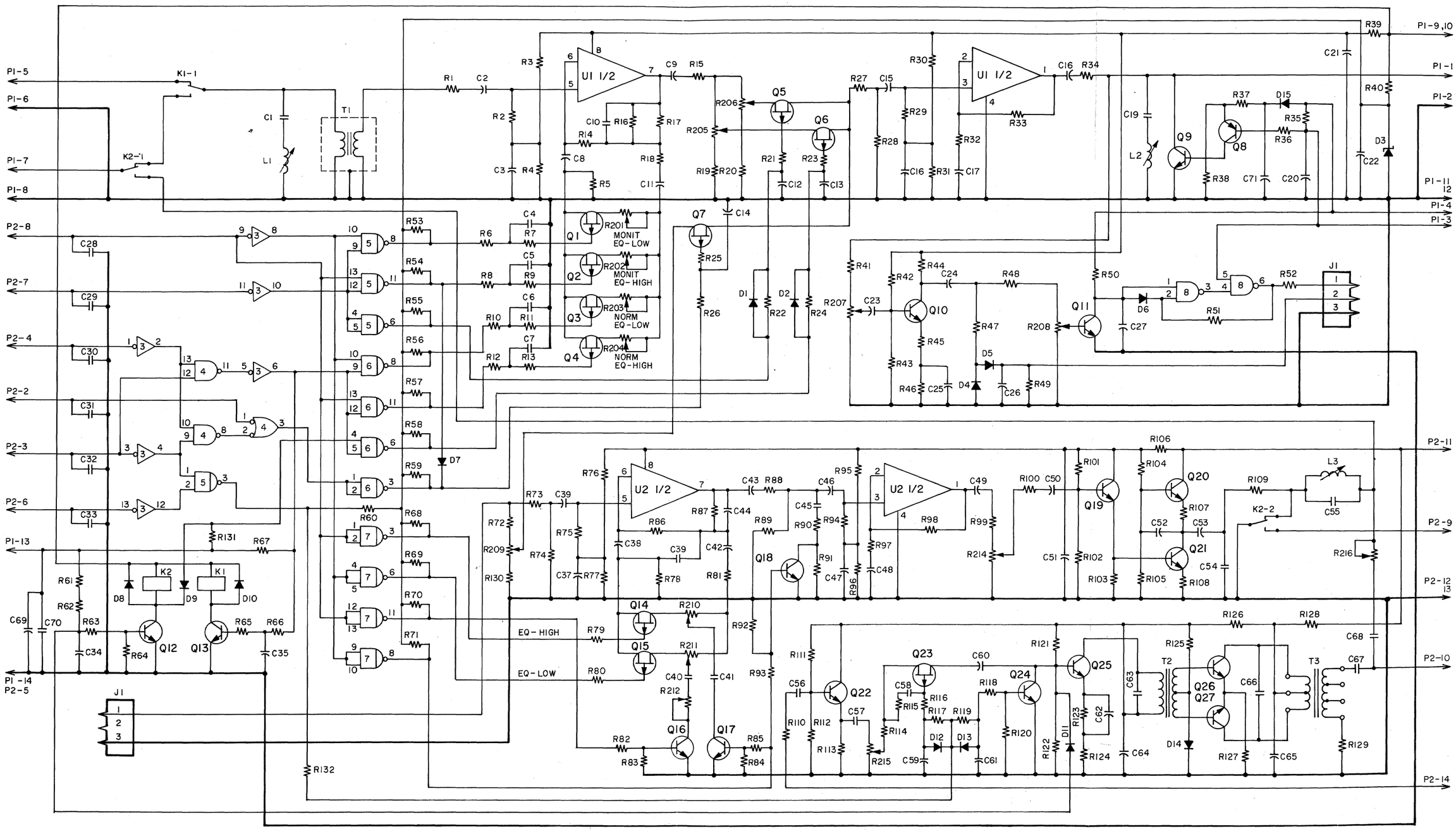
3-28 RECORD SECTION

1. One path of the LINE Input is to the record equalization of U2-7. The ON or OFF states of Q14, Q15, Q16, Q17 and Q18 are determined by the Signal Select circuits so that Equalization mode depending on the tape speed will be formed. The signal is again amplified by U2-1 and is sent to the following Constant Current Drive Circuit.
2. One other part of the LINE Input signal is sent through R209 to FET switch Q7. When the Signal Select circuits are set to INPUT, the LINE Input is sent to LINE OUT for monitoring of input signal.
3. The Constant Current Drive Circuit provides constant current drive to the RECORD head. The high output impedance circuit for this purpose is made up of Q19, Q20 and Q21. The signal from the LINE Input is equalized. At the Constant Current Drive Circuit bias is added in and the signal is supplied to the RECORD head.
4. K2-1 connects the NORMAL head to the record side or to the reproduce side as determined by the Signal Select circuits. When Q12 is in ON condition, the NORMAL head is connected to the Record Amplifier. When Q12 is in OFF condition, the NORMAL head will be connected to the Reproduce Amplifier.

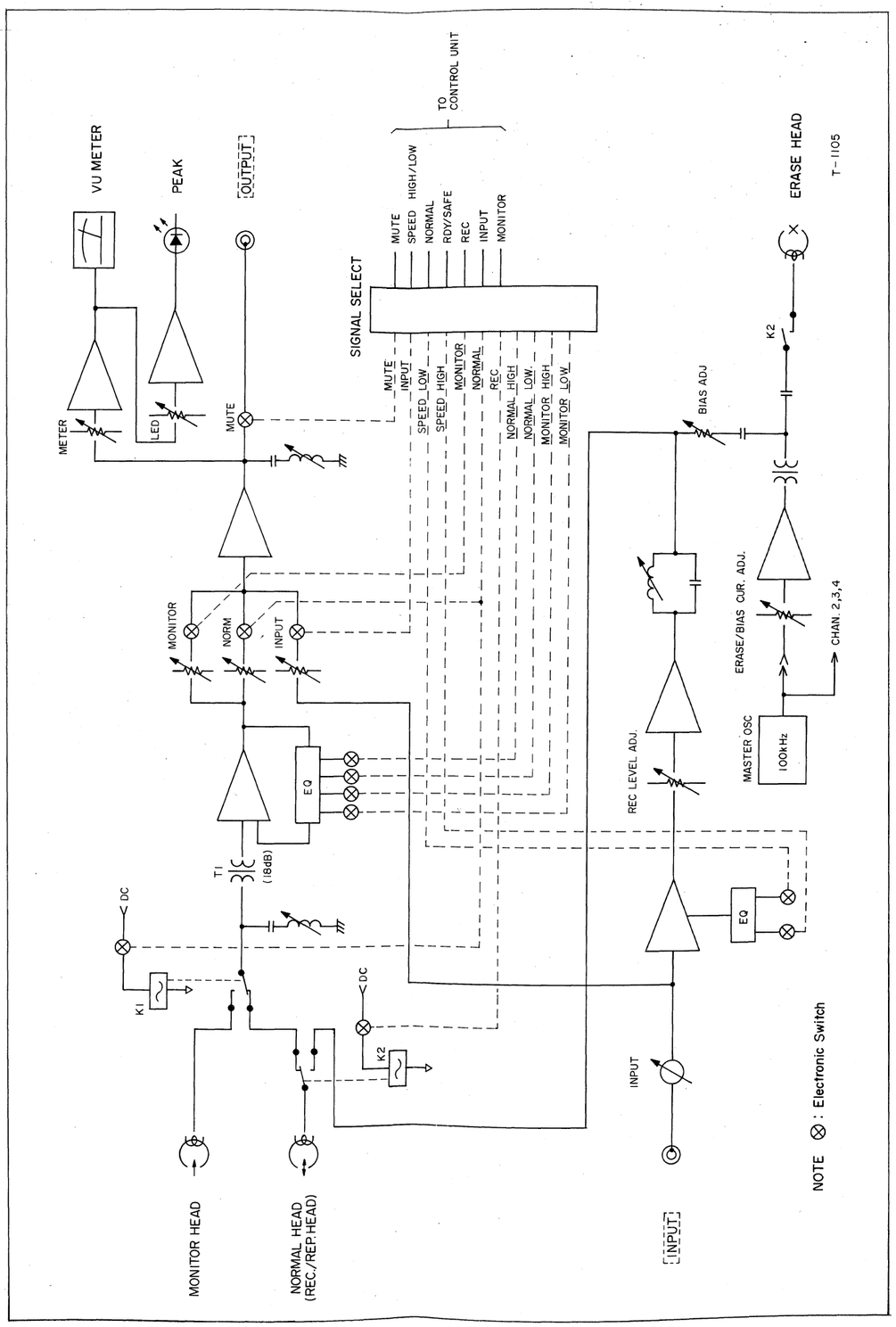
3-29 BIAS SECTION

1. The Bias Amplifier is always supplied with a 100 kHz signal at approx. 800mV p–p level from the Master Bias Oscillator located in the Power Supply Unit. This signal is supplied to C57 by the emitter follower amplifier Q22 and is always being sent out.
2. Q23 and Q24 form FET and Transistor switches which determines if the 100 kHz output signal from the Master Bias Oscillator gets in or not. Q23 cuts the circuit in series and Q24, in addition, shorts the Bias Amplifier input to 0V to insure that the 100 kHz signal output from the Master Bias Oscillator is not sent to the Bias Amplifier input when not in Record mode.
   Then, when the Signal Select circuits are set for Record mode, Q23 is turned ON, Q24 is turned OFF and the 100 kHz output from the Master Bias Oscillator is supplied to the input of the Bias Amplifier.
3. The Bias Amplifier is made up of Q25, Q26 and Q27 and it amplifies the output from the Master Bias Oscillator and supplies that signal to the Erase and Record (Normal) head. The 100 kHz signal that is amplified by Q25 is fed to the tank circuit of T2 and C63 where it is band amplified and causes base current to flow in Q26 and Q27. Q26 and Q27 and T3 form a push-pull amplifier circuit.
   The signal is amplified by the effect of resonance of the changed impedance of the head that is connected to the secondary of T3 and reflected to the primary and C66, and this signal is fed to the secondary of T3. The 100 kHz output signal can be adjusted by R215 to about 160V p–p.
4. K2-2 contacts are used to connect the Erase head to the Bias Amplifier. The Signal Select Circuits control the ON-OFF state of K2. During Record mode K2 is ON (energized) and the Erase head is connected to the Bias Amplifier.
5. R215 is the input adjusting potentiometer for the Bias Amplifier.
   R216 is the Record Bias adjusting potentiometer.

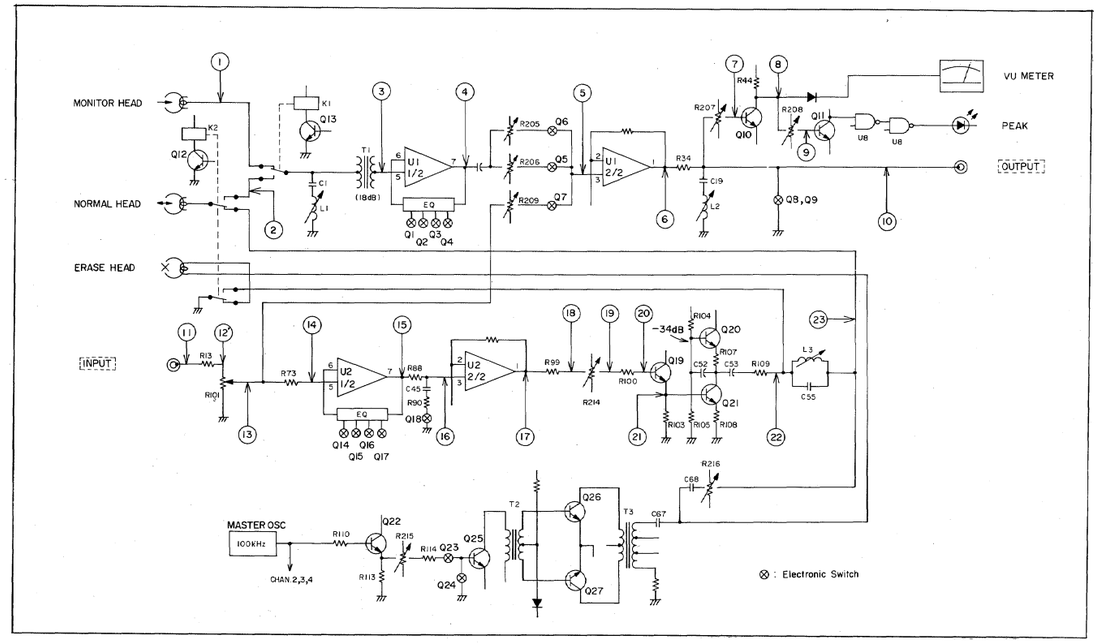
-REC/REPRO. AMPL. SCHEMATIC-



— BLOCK DIAGRAM —

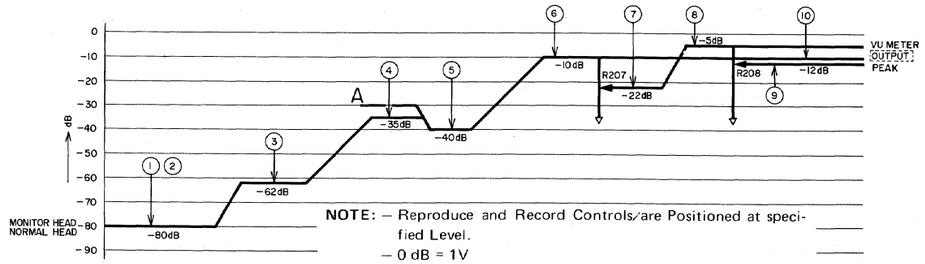


— 40-4 SIMPLIFIED SCHEMATIC —



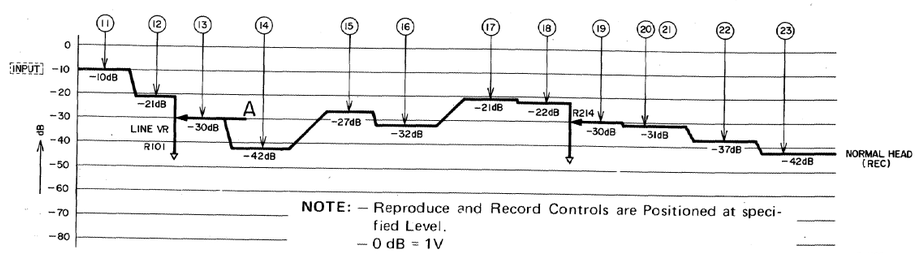
—LEVEL DIAGRAMS—

REPRODUCE



NOTE: — Reproduce and Record Controls are Positioned at specified Level.
— 0 dB = 1V
— Each level given in the diagram are values when 400 Hz specified Level is applied.
— REF. NOs. shown in the diagram relate only to the CHANNEL 1.

RECORD



NOTE: — Reproduce and Record Controls are Positioned at specified Level.
— 0 dB = 1V
— Each level given in the diagram are values when 400 Hz specified Level is applied.
— REF. NOs. shown in the diagram relate only to the CHANNEL 1.

T-1106

SECTION 4

MAINTENANCE

4-1 ROUTINE MAINTENANCE

Troubles and breakdown in the recorder can be prevented by scheduled checks and maintenance. Periodically follow the check items below:

CLEANING:

– **Cleaning the heads and tape guides**
All heads and metal parts in the tape path must be cleaned after each 6 hours of operation or before starting a new session of recording. The TEAC TZ-261A Cleaning Fluid is recommended.
– **Cleaning the Pinch Roller**
Clean this at least once after each full day of use.
The TEAC TZ-261B Cleaning Fluid is recommended.
– **Cleaning the Capstan Shaft and the Motor Pully**
Clean this at the same time the head is cleaned.
The TEAC TZ-261A Cleaning Fluid is recommneded.
– **Cleaning the Capstan belt**
The TEAC TZ-261B Cleaning Fluid is recommended.

LUBRICATION:

Under normal operating conditions, lubrication is required only once each year. Operate the deck for 30 minutes to 1 hour immediately prior to oiling. After oiling, keep the deck in the upright position for 3 to 4 houres to allow thorough penetration of the oil. Approximately once each year or after 2000 hours of use, apply TEAC TZ-255 Lubricating Oil to the following places only;

– **Pinch roller shaft** . . . . . **1 drop**
– **Capstan shaft** . . . . . **2 drops**
(Remove the dust cap for access to the oil pit)
– **Capstan motor** . . . . . **0.5 cc**
(Maximum to fill oiling tube)

NOTE: Apply 3 or 4 drops at a time through the oiling tube. The oil level can be seen to drop as the felt material in the motor bearings absorbs oil. When the level ceases to drop, no more oil is needed. Do not attempt to force oil into the motor nor exceed the maximum.

WARNING: Excessive oiling will scatter oil inside the deck. This oil will cause drive belt slippage and other difficulties. Check for slippage and clean all parts inside the deck before operating after lubrication. Check for oil emission after operation and before returning deck to the customer.

TEAC MAINTENANCE FLUIDS:

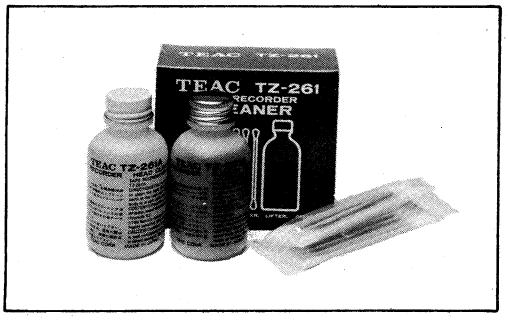


Fig. 4-1 TZ-261 Tape Recorder Kit

Fig. 4-2 TZ-255 Oil Kit

DEMAGNETIZING OF HEADS AND TAPE GUIDES:

All heads and tape guides should be demagnetized before starting a new session of recording.
The TEAC E-1 or E-3 Head Demagnetizer is recommended.
– After cleaning, turn machine OFF.
– Keep all tapes at least 5 or 6 feet away when demagnetizing because the demagnetizer's magnetic field will erase them.
– Slowly move the tip of the demagnetizer up and down in front of each head and slowly move it away (This is suggested because if you were to pull away quickly, remagnetizing of the head is possible). Slowly, demagnetize the second head and repeat the process. etc.
After you repeat this process for all heads, move the demagnetizer an arms-length away, turn it off, and unplug it.

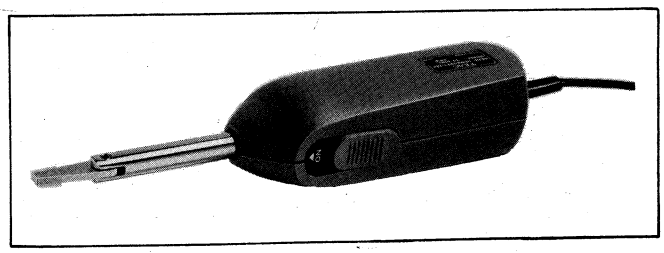


Fig. 4-3 TEAC E-3

4-2 TEST EQUIPMENT REQUIRED

Flutter Meter	Meguro Denpa Sokki K.K., Model MK-668C (JAPAN), or Mincom Division, 3M Co., Model 8155 (U.S.A.)
Audio Oscillator	Hewlett Packard, Model 204C or equivalent
Digital Frequency Counter	Range; 10 Hz ~ 100 kHz
Band-Pass-Filter	1 kHz narrow band pass type
AC voltmeter	Range; –80 dB ~ +40 dB; imp.: > 1MΩ, < 25pF (example-HP 400GL)
Oscilloscope	General Purpose
Attenuator	General Purpose
Tools	Spring scale: 0 ~ 8 lbs (0 ~ 4kg) 0 ~ 2.2 lbs (0 ~ 1kg) Hex Head Allen Wrenches, Plastic alignment tool, Extender card (No. 51685680)
Head Demagnetizer	TEAC E-3 or equivalent
Test Tapes	Reproduce Alignment Test Tapes:

Manufacturer	15 ips speed	7-1/2 ips speed	Ref. Fluxivity
TEAC	YTT-1004	YTT-1003	185 nWb/m
MRL (Magnetic Reference Lab)	21J 205	21T 204	250 nWb/m

Equalization Standard: NAB
Time Constant: 15 ips and 7-1/2 ips = 3180 μs + 50 μs

NOTE: If test tapes with 250 nWb/m fluxivity are used, all specs (reproduce) will be the same as when using the YTT-1004 and YTT-1003 tapes except that the reproduce output level will be 3 dB higher.

Blank Test Tape (Recording):
Ampex #456 (for U.S.A./CANADA models) and
Scotch #206 (for General Export models)

Wow and Flutter Test:
TEAC YTT-2004 (15 ips) and YTT-2003 (7-1/2 ips)

NOTE: Measurement and adjustments given in this Service Manual are for U.S.A./-CANADA model only.

4-3 TESTING AND ADJUSTMENT

4-4 TRANSPORT CHECK AND ADJUSTMENT

4-5 PINCH ROLLER PRESSURE CHECK

NOTE: Pinch roller pressure is supplied by the pinch roller spring arm and it is most important that the solenoid plunger be fully bottomed before taking pressure measurement.

1. Load tape or block the shut-off arm in the ON position.
2. Attach a suitable spring scale to the pinch roller shaft.
3. Place the deck in the Play (▶) mode, and holding the spring scale as illustrated, slowly draw it away from the pinch roller.
4. Do not allow the spring to rub against the pinch roller.
5. Note the reading on the spring scale at the instant the pinch roller stops rotating.
6. The scale should indicate 4.6 to 5.5 lbs (2.1 to 2.5kg)
7. If adjustment is necessary, loosen the 3 screws on the capstan solenoid and position the solenoid for optimum pressure.
8. Adjust solenoid-limit position so that the gap between capstan shaft and pinch roller is approx. 1.5mm when solenoid is not actuated. Also make sure pinch roller shaft does not contact Spring Arm (B). Limit is adjusted by loosening the mounting screw (A), then sliding limit until proper position is obtained.

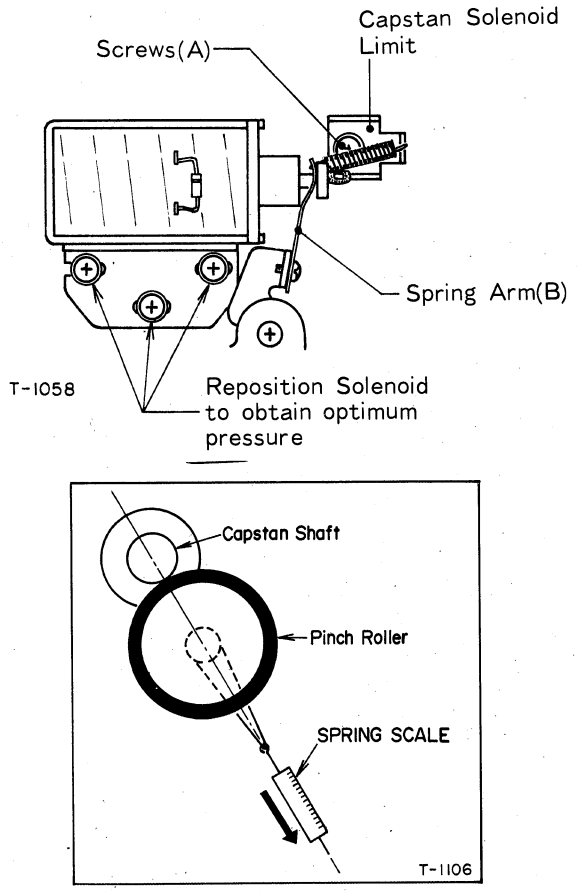


Fig. 4-4 Pressure Measurement and Adj. Locations

4-6 BRAKE TORQUE MEASUREMENT

NOTE: The brake torque is actuated mechanically. Torque is set by the variable Leaf Spring Force. While making these measurements and adjustments, be careful not to be bend the brake bands. Brake shoes should be cleaned only when absolutely necessary. If cleaning is required, use TEAC cleaner TZ-261A. After cleaning, operate the brakes by depressing the play and STOP buttons several times to completely dry out the brakes before performing the following procedure. Brake torque measurement is made with Power OFF.

1. Place an empty large hub reel on the left reel table, and fasten one end of a 30" length of string to the reel anchor.
2. Wind several turns of string counter clockwise around the hub and attach a suitable spring scale to the free end of the string.
3. Pull on the spring scale and take a reading only when the reel is in steady motion since the force required to overcome static friction will produce a false, excessively high initial reading.
4. The reading should be 22.4 to 28.0 oz inch (1600 to 2000 g-cm).
5. If adjustment is required, loosen the 2 screws shown and position the brake for optimum pressure.
6. The adjustment of the right brake is the same, with the exception that rotations are clockwise. (wind string CLOCKWISE around reel hub)

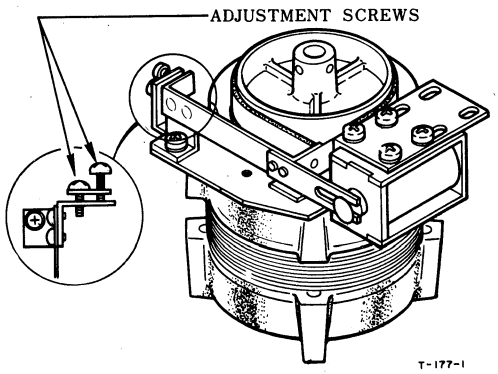


Fig. 4-5 Brake Torque Measurement and Adj. Location

NOTE: The following torque measurements should be made with a spring scale that is calibrated to read Torque in gram-cm, for a 7" reel with a small reel hub. If the spring scale you are using is calibrated to read Force of Weight in grams the Torque must be calculated using the Formula:

Torque (in gm· cm or oz·in) =
Weight or Force (in gr. or oz.) x
radius of hub (in cm or inches)

If you are using a reel with other than the standard 2.5" or 6.0 cm (approx.) diameter hub, the Torque must be calculated using the same formula and substituting the actual radius and Weight or Force reading.

All Torque and Tension measurements must be made with the automatic shut-off switch (right tension arm) held in the ON position.

Brake Torque Measurement should be made using large hub reel with a hub diameter of 4" or 10.2 cm.

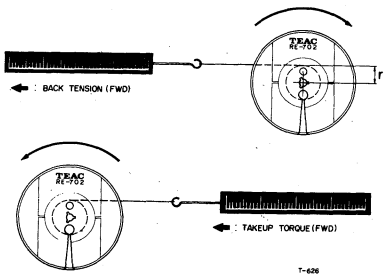


Fig. 4-6 Torque/Tension Measurement and Formula

4-7 TAKE-UP TORQUE MEASUREMENT

NOTE: Block shout-off arm in ON position and apply power.

1. Place the empty reel and attached spring scale on the right reel table.
2. Place the deck in the Play (▶) mode.
3. Allow the rotation of the reel to slowly draw the scale toward the hub.
4. Hold the spring scale with enough force to allow a steady reading.
5. The calculated value should be approx.:

REEL SW	TAKE-UP TENSION
LARGE	10.9 to 11.5 oz-in (780 to 820 g-cm)
SMALL	5.0 to 5.6 oz-in (360 to 400 g-cm)

4-8 BACK TENSION MEASUREMENT

1. Place an empty 7" reel with small hub on the left reel table, and fasten one end of a 30" length of string to the reel anchor.
2. Wind several turns of string counter-clockwise around the hub. Attach spring scale to string.
3. Place the deck in the Play (▶) mode.
4. Pull the scale away from the reel against the motor torque with a steady, smooth motion.
5. Note the scale reading while it is in steady motion. (The string must not rub the reel flanges)
6. The calulated value should be approx.:

REEL SW	BACK TENSION
LARGE	5.8 to 6.4 oz-in (420 to 460 g-cm)
SMALL	2.8 to 3.3 oz-in (200 to 240 g-cm)

4-9 FAST WIND BACK TENSION ADJ.

1. Turn off power to the deck before adjusting R203.
2. Confirm that the slide tap of R203 is set to the center position.
3. Load a 10-1/2" reel of blank test tape (approx 2,400 ft.) on the deck, apply power and select the fast forward mode. Confirm that the time required to completely wind the tape to the end is 120 seconds.

CAUTION: If the slide tap of R203 is incorrectly adjusted, the following problems may occur.

a. The right tension arm may drop down due to too little tension.
b. The reel rotation may be too slow at the beginning of fast wind operation.
c. If the tape tension is too large the tape may break or stretch when the STOP button is depressed.

NOTE: This one adjustment procedure completes the back tension adjustment for both the fast forward and rewind modes.

Resistors Adjustment Location:

If necessary, adjust slider of the resistors until you have the correct scale reading for optimum torque. Refer to adj. location below.

R201 . . . . . TAKE-UP
R202 . . . . . BACK TENSION
R203 . . . . . FAST WIND BACK TENSION

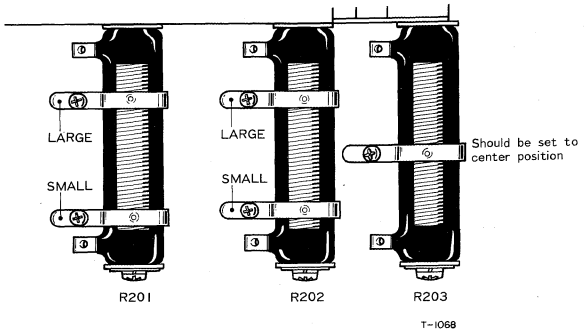


Fig. 4-7 Resistors Adjustment Location

4-10 WOW AND FLUTTER CHECK (REPRODUCE METHOD)

The Wow and Flutter is measured while reproducing a pre-recorded TEAC YTT Series Test Tape.
(YTT-2003 for 15 ips and YTT-2004 for 7-1/2 ips)

1. Connect a Wow and Flutter Meter such as Meguro Denpa Sokki Co. Model MK-668C (made in Japan) or Mincom Div., 3M Co. Model 8155 (made in U.S.A.) to the OUTPUT jack. These Meters will measure the ANSI peak value or the NAB rms value depending on the switch selection on the Meter.
2. Playback the appropriate Test Tape.
3. If the peak or rms weighted value is to be read, set the Wow and Flutter Meter for the "Weighted" readings and also make sure that the Meter is prosperly calibrated.
4. As the measured results may vary with respect to the location on the Tape at which the measurement is taken, at least two locations – at the beginning and near the end of the Tape – should be checked. There may also be slight differences in absolute values measured according to the brand of the Meter being used.

Values should be as shown:

Tape Speed	ANSI Peak Weighted	NAB rms Weighted
15 ips	± 0.06%	0.04%
7-1/2 ips	± 0.09%	0.06%

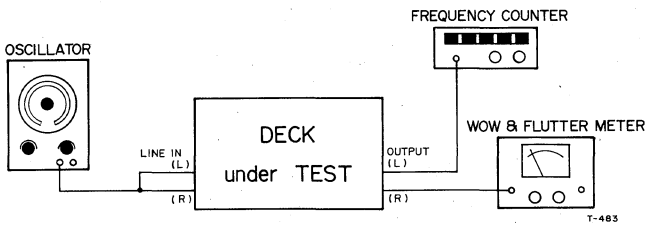


Fig. 4-8 Test Connections for Wow/Flutter and Tape Speed Test

4-11 TAPE SPEED CHECK

Tape speed is measured by using Flutter Test Tape, which contain a highly accurate, continuous 3 kHz tone. The Test Tape must match the speed of the deck being checked. Connect a digital frequency counter to any OUTPUT jack. The indicated frequency should be 3 kHz, ±0.5% for both speeds using the appropriate test tape. If tape speed is greatly offset from the specification, check pinch roller pressure and takeup tension for correct values, and see that the tape path is clean.

4-12 REEL TABLE HEIGHT ADJ.

Reel height adjustment is required only if a motor has been replaced or if tape rubs excessively against the reel flanges. Adjustment is accomplished by loosening the reel set screws and moving the reel table on the motor shaft as shown in Fig.
Remove the wooden side board on the left or right of the unit for access to the Set Screws (2) in the reel motor shaft. Reel table should be adjusted using standard NAB 10" reels. With a tape loaded on the machine, position the reel table height for smooth tape travel. Be sure to tighten the Set Screws after each adjustment is made.

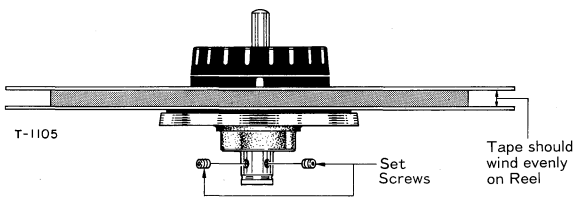


Fig. 4-9 Reel Height Adj.

4-13 VOLTAGE AND FREQUENCY CONVERSION (Only General Export Model)

This deck is adjusted to operate on an electric power source of the voltage and frequency specified on the reel tag and packing carton. If it is necessary to change the frequency or voltage requirements of this deck to match your area, use the following procedures.
Always disconnect Power Line Cord before making these changes.

Voltage Conversion:

1. Disconnect the power cord of the deck from the source.
2. Turn the deck around and locate the voltage selector on the rear of the deck.
3. To increase the selected voltage, turn the slotted center post clockwise using a screwdriver or other suitable tool.
4. To decrease the selected voltage, turn the slotted center post counter-clockwise.
5. The numerals that appear in the cut-out window of the voltage selector indicate the selected voltage.
6. If the desired voltage numerals do not appear in the cut-out window as you turn the slotted center post, your deck must be taken to an authorized TEAC Service Facility for voltage convension.

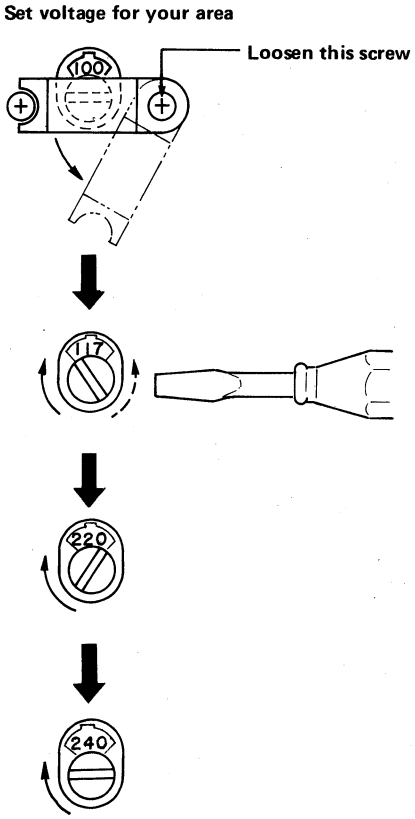


Fig. 4-10 Voltage Conversion

Frequency Conversion:

1. Remove the rear/top metal panel by removing 11 screws and then remove 4 screws from the Power Supply Chassis and fold it back for access to the Frequency Selector slide switch.
2. Set the power frequency selector slide switch (located next to the capstan motor) to the 50 or 60 position to match the power line frequency in your area.
3. Rotate the center (capstan) motor clockwise with your hand and re-position the belt onto the correct pulley as shown in the motor pulley illustration.
   The pulley can be seen by removing either side panel and looking through the cut-out in the metal frame to confirm proper positioning of the pulley belt. Continue to rotote the motor by hand approximately 10 revolutions to verify belt placement befc·e replacing the side and rear covers.

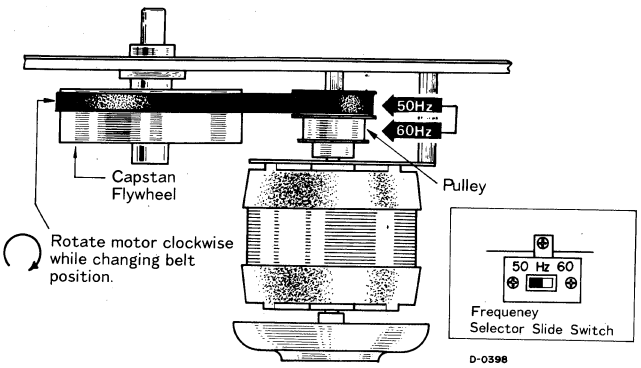
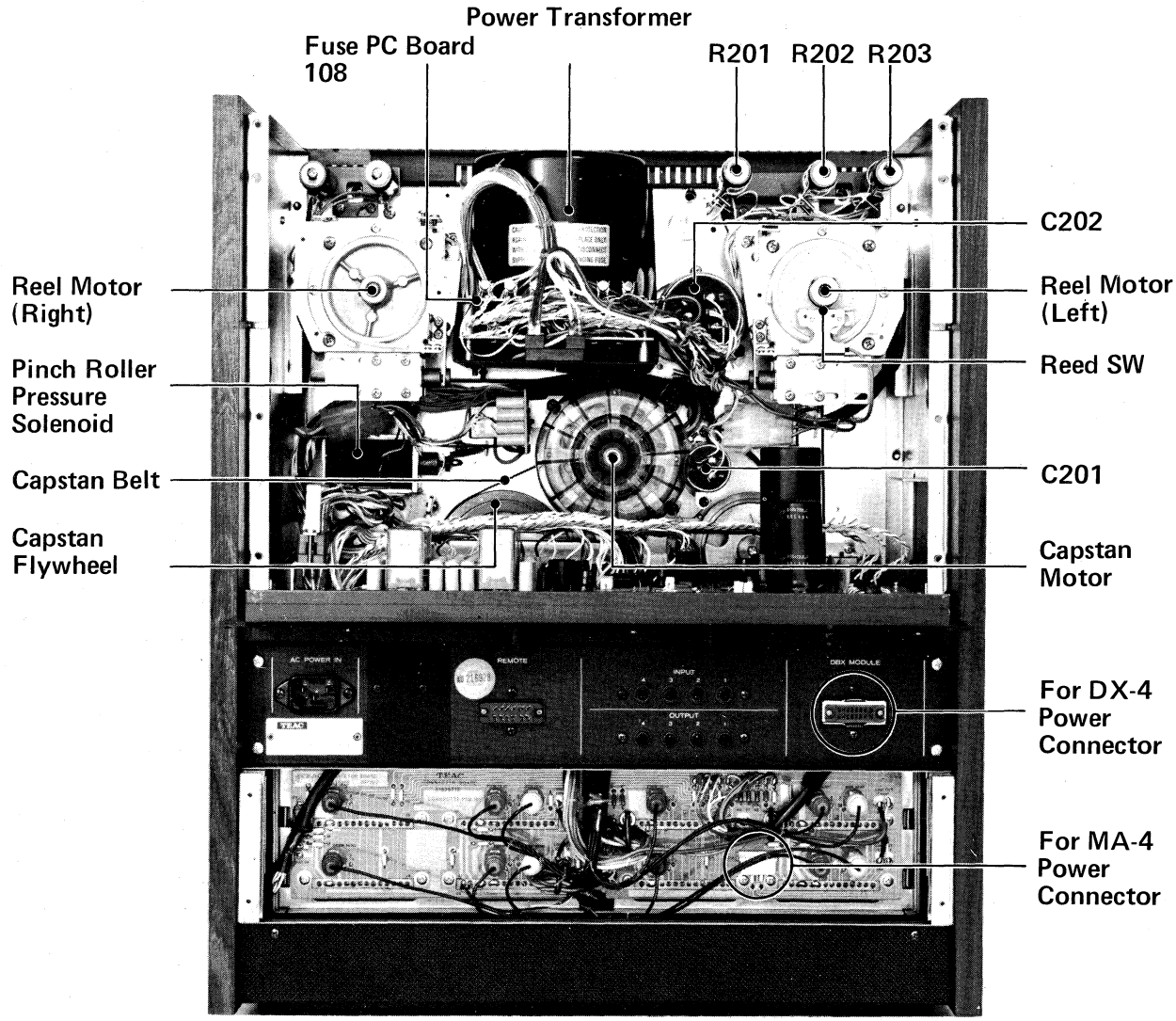


Fig. 4-11 Frequency Conversion

PARTS LOCATION



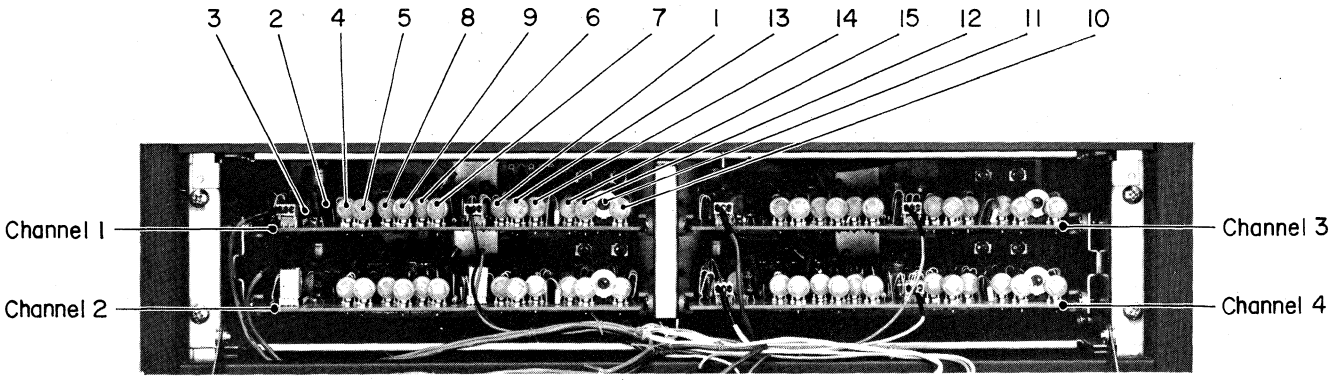
REAR VIEW

T-1053

Fig. 4-12 Parts Location –REAR VIEW–

4-14 RECORD/REPRODUCE AMPLIFIER CHECK AND ADJUSTMENT

4-15 AMPL. P.C. BOARD LOCATION AND ADJ. POINTS



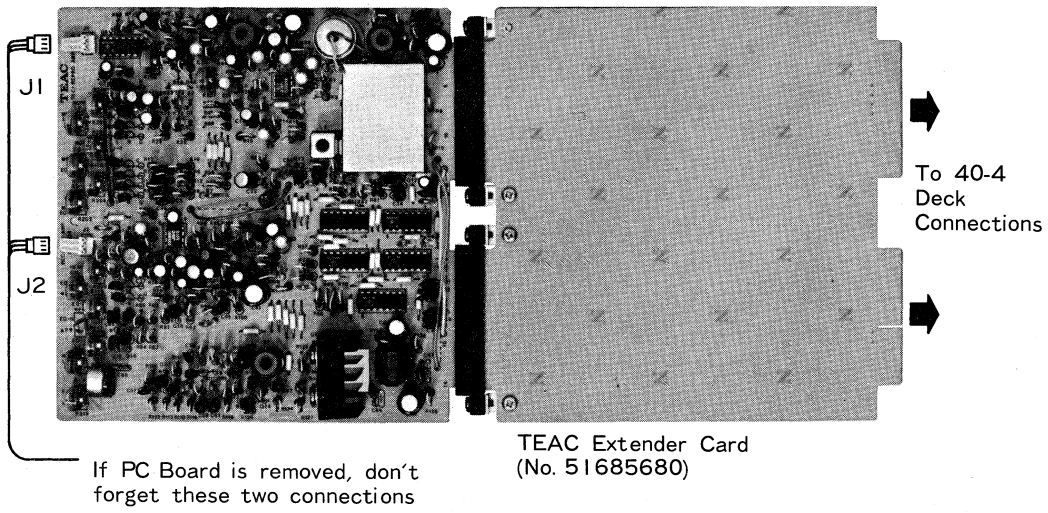
TRIM POT NO.	REF. NO.	ADJUSTMENT
#1	R209 (IN MON LVL)	Input Level
#2	R207	Meter Cal.
#3	R208	Peak Level
#4	R205 (NORM LVL)	Reproduce Level
#5	R206 (MON LVL)	Reproduce Level
#6	R204 (NORM EQ-H)	Repro. Equalizer
#7	R202 (MON EQ-H)	Repro. Equalizer
#8	R203 (NORM EQ-L)	Repro. Equalizer
#9	R201 (MON EQ-L)	Repro. Equalizer
#10	R215 (E/B LVL)	Erase voltage
#11	R216 (B LVL)	Bias
#12	R214 (REC LVL)	Record Level
#13	R210 (EQ-H◄P►)	Record Equalizer
#14	R211 (EQ-L◄ P►)	Record Equalizer
#15	R212 (EQ-L▲ P ▼)	Record Equalizer
	L3, L2, L1	Bias Trap

Fig. 4-13 Ampl. P.C. Board Location and Adj. Points

NOTE: ◄P► : (Shifting the High Frequency)
This adjustment changes the Resonance Frequency of the peak in the directions indicated.

▲P▼ : (Lowering the peak)
This adjustment changes the level of the peak in the directions indicated.

EXTENDER CARD CONNECTION AND ADJUSTMENT POINTS



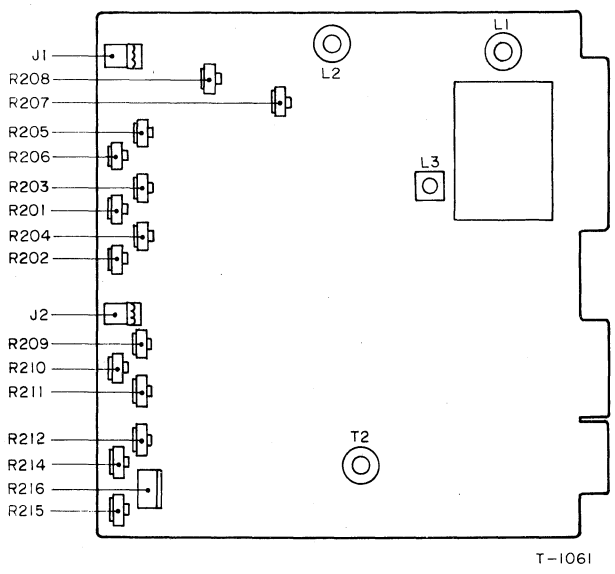


Fig. 4-14 Adjustments Points

POWER SUPPLY VOLTAGE TEST POINTS AND ADJ. LOCATION

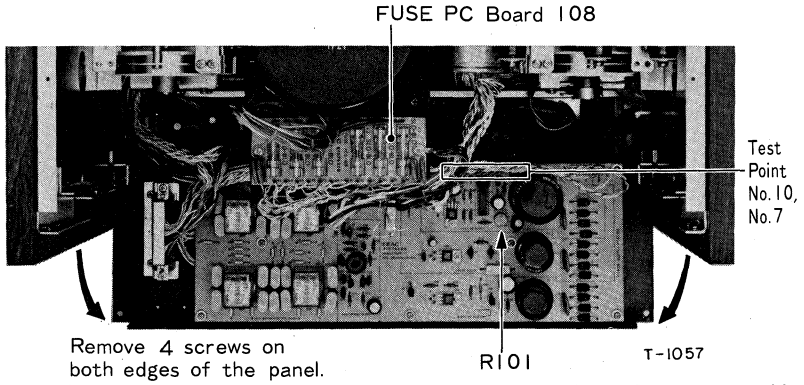


Fig. 4-15 Power Supply Voltage Test Points

NOTE: 1. Open the Service door by removing the 2 screws, one in each corner. (Lower Front Panel)
2. Turn off power to the deck.
3. Remove the REC/REPRO AMPLIFIER PCB. and install extender card. See Fig. 4-14.
4. Then replace PCB. Turn ON power. Watch the J1 and J2 connections.

Checking and adjusting can be most efficiently done by following each procedure in the order given.

4-16 POWER SUPPLY VOLTAGE CHECK

Tilt back the power supply PCB-110 components are all mounted behind the black aluminum panel on rear panel (chassis). The rear panel (chassis) can be swung out and down for easy access to the inner components by removing 4 screws on both edges of the panel.

1. Place the power SW to ON.
2. Connect a DC voltmeter across the Test Points No. 10 and No. 7 (on power Supply PCB-110).
3. Adjust R101 if needed to obtain 24 VDC.

4-17 INPUT LEVEL SETTING

OUTPUT SELECT Button . . . . . INPUT

1. Set the input Level volume controls to the 2 o'clock (7) positions.
2. Apply a 400 Hz signal at specified Input level −10 dB (0.3V) from AF oscillator to Line INPUT 1 pin jack (on rear panel).
3. Adjust the trim pot IN MON LVL R209 until the AC voltmeter reads −10 dB (0.3V).

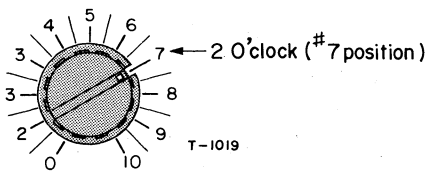


Fig. 4-16 Specified Input Level Setting

4-18 METER CALIBRATION

With controls set as described above;

4. Adjust R207 for 0 VU reading on VU Meter.

4-19 REPRODUCE HEAD AZIMUTH ADJ.

NOTE: Before proceeding with the following head alignments be sure that heads have been properly mounted as to HEIGHT, TILT, and TANGENCY (Item 4-42)

– COARSE ADJUSTMENT –

SPEED Selector SW . . . . . LOW
REEL Size Selector . . . . . SMALL
OUTPUT SELECT Button . . . . . NORM

1. Connect an AC voltmeter to OUTPUT 1 pin jack.
2. Open the Head Housing covering the head assembly.
3. Thread the TEAC YTT-1003 Test Tape on the unit.
4. Play the 16 kHz Test Tone in section 2 of the Test Tape.
5. Slowly rotate the azimuth screw until maximum indication is achieved on AC voltmeter.

– FINE ADJUSTMENT –

6. Connect an oscilloscope to the OUTPUT 1 and OUTPUT 4 pin jacks as shown in Fig. 4-17.
7. Play the YTT-1003 Tape and adjust the azimuth screw (If necessary) until the oscilloscope shows that the signals are less than 90° out of phase. Check at 125 Hz to 10 kHz signal.
8. If checking in MONITOR position, use signals of 125 Hz to 5 kHz for less than 90° out of phase. Secure this screw with a drop of locking paint.
9. Repeat same above procedure with OUTPUT SELECT button at the MONITOR position.

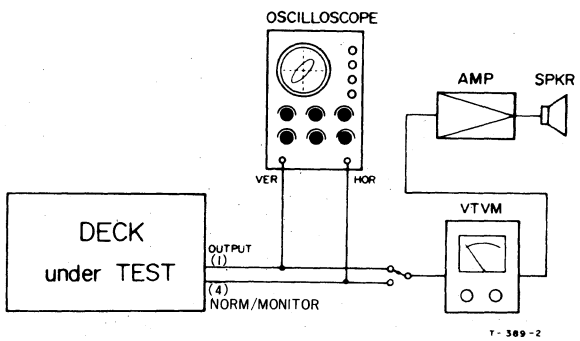


Fig. 4-17 Head Alignment Fine Adj. Set-up and Test Connections (Reproduce)

4-20 SETTING OF REPRODUCE LEVEL

OUTPUT SELECT Button . . . . . NORM

10. Play the 400 Hz/0 dB tone in section 1 of Test Tape.
11. Adjust the trim pot NORM LVL R205 until the AC voltmeter reads −13 dB (223 mV).
12. Set OUTPUT SELECT Button to the MONITOR position.
13. Check that the output reads −13 dB (223 mV). If necessary, adjust using the trim pot marked R206.

NOTE: If MRL (Magnetic Reference Lab.) tape MRL 21T204 (7-1/2 ips) is used in step 11 and 13, adjust NORM LVL R205, MON LVL R206 for −10 dB (0.3V) output readings.

4-21 REPRODUCE FREQUENCY RESPONSE

OUTPUT SELECT Button . . . . . NORM
SPEED Selector SW . . . . . HIGH

14. Play the Test Tape TEAC YTT-1004 after setting up levels in all 4 channels.
15. Connect an AC voltmeter to OUTPUT 1 pin jack.
16. Adjust the trim pot NORM EQ-H, R204. Trim the pot so that 20 kHz will be same level with the 400 Hz reference frequency. Then, see if the response is within ±3 dB at 125 Hz to 20 kHz.
17. Change the OUTPUT SELECT Button to the MONITOR position.
    Reproduce the same section of the Test Tape YTT-1004 and check the response. If adjustment is required, adjust the trim pot MON EQ-H, R202. See if the response is within +3 dB/−5 dB at 125 Hz to 20 kHz.

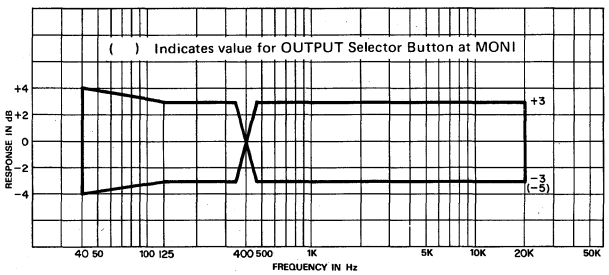


Fig. 4-18 Frequency Response —Reproduce 1—

OUTPUT SELECT Button . . . . . NORM
SPEED Selector SW . . . . . LOW

18. Reproduce the Test Tape YTT-1003 on the unit and check the response. If adjustment is required, adjust the trim pot NORM EQ-L, R203. Trim the pot so that 16 kHz will be flat with the 400 Hz reference frequency. Then, see if the response is within ±3 dB at 125 Hz to 16 kHz.
19. Change the OUTPUT SELECT Button to MONITOR position.
    If adjustment is required, adjust the trim pot marked MON EQ-L, 201. See if the response is within +3 dB/−5 dB at 125 Hz to 16 kHz.

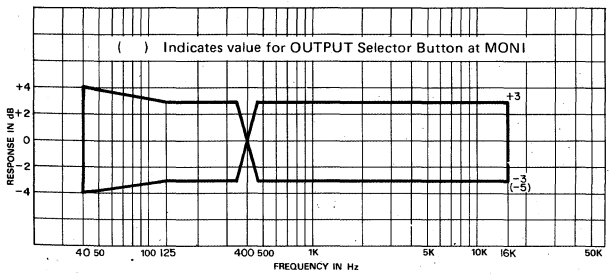


Fig. 4-19 Frequency Response —Reproduce 2—

4-22 SIGNAL-TO-NOISE RATIO — REPRODUCE —

20. Thread a blank Test Tape on the deck leaving the tape outside the capstan and pinch roller.
21. Hold the play supply reel stationary and depress the play (▶) button.
22. The AC voltmeter connected to the OUTPUT 1 pin jack should read −62 dB (0.8 mV) for both speeds and NORM or MONITOR position.

NOTE: This −62 dB (0.8 mV) corresponds to the signal-to-noise ratio of −52 dB (2.5 mV), the difference between residual noise of −62 dB (0.8 mV) and specified output level −10 dB (0.3V).

4-23 BIAS OSC ADJ.

FUNCTION SELECT Button . . 1 Down (depressed)

Select RECORD/PAUSE mode and Remove the Head housing.

23. Measure bias oscillator output. Connect an AC voltmeter or oscilloscope across the Erase head.
    Adjust T2 (Coil) for maximum Indication at OUTPUT.

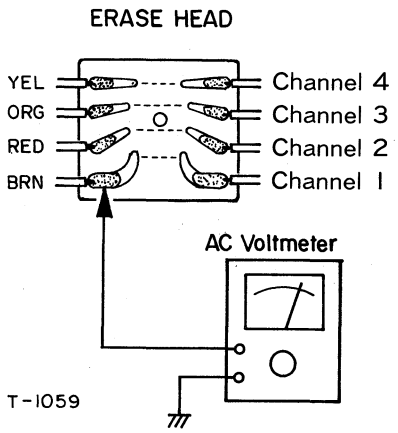


Fig. 4-20 Bias Osc. Adj. Points

4-24 ERASE VOLTAGE MEASUREMENT

24. Connect the AC voltmeter across the Erase head.
25. Initially set B LVL R216 (large blue one) for high or deep bias level.
26. Adjust E/B LVL R215 for normal bias reading of 160V P-P.

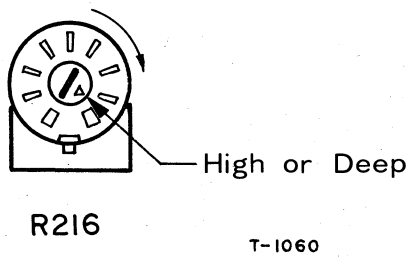


Fig. 4-21 Erase Voltage Measurement

4-25 BIAS TRAP ADJUSTMENT

OUTPUT SELECT Button . . . . . MONITOR

27. Load a Test Tape on the unit.
28. Remove all input signals.
29. Connect an AC voltmeter or oscilloscope across bias trap T.P. and ground. See Fig. 4-22.
30. Adjust L3 for minimum reading on AC voltmeter or scope.
31. Adjust L2 for minimum bias leakage reading at Output AC voltmeter or scope connected to applicable OUTPUT pin jack.
32. Set the FUNCTION SELECT Button for the channel being measured to OFF (out position), all others to ON (down position).
33. Adjust L1 for minimum leakage from other channel heads, leakage should be less than –40 dB. With –20 VU read on VU Meter.

NOTE: Use plastic alignment tool.

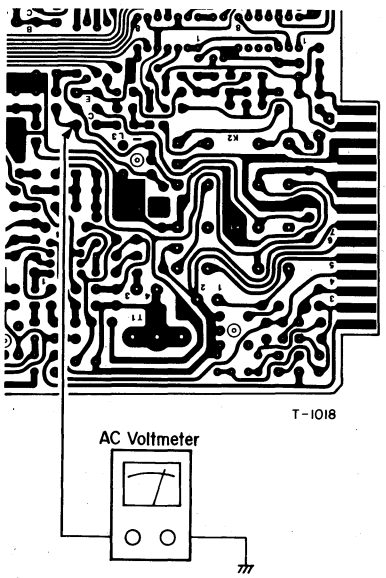


Fig. 4-22 Bias Trap Check Point

4-26 RECORD HEAD AZIMUTH CHECK

34. Make sure that the reproduce head azimuth is set properly according to item 4-19. Then, load a blank test tape on the deck and record. While recording, adjust the record head azimuth for the proper output level and phase relationship described in the reproduce head azimuth adjustment procedure. See REPRODUCE HEAD AZIMUTH ADJUSTMENT for more detailed procedure.

    The following checks are made at HIGH (15 ips) speed.

NOTE: The effect of turning the azimuth screw will not immediately register on the AC voltmeter. A slight delay will be noticed. Therefore, the screw must be rotated slightly with a Pause to see the effect.

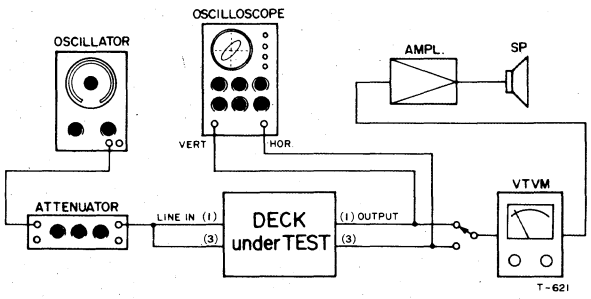


Fig. 4-23 Test Connection for Recording Check

4-27 BIAS LEVEL SETTING

Be sure the bias Trap has been adjusted per section "Bias OSC Adj.", "Erase voltage Adj." and "Bias Trap" before proceeding. The following Bias adjustments are made at HIGH (15 ips) tape speed.

NOTE: This setting depends on the type of tape being used. The deck has been factory adjusted as indicated below for the Serial Nos., market areas and type of tape.

Serial Number	Adjustment Over bias from peak	Area	Type of Tape
———	4 ~ 5 dB	U.S.A./ CANADA	AMPEX #456
5371 ~ 5420	2 ~ 3 dB	General Export	Scotch #206

NOTE: If you want to change the setting to match a different type of tape, use the adjustment (over bias from peak) values given in the chart using the indicated blank reference tape.

PROCEDURE:

35. Apply 10 kHz/–10 dB (0.3V) to the Line INPUT 1 jack.
36. While recording on the blank AMPEX #456 Test Tape, adjust trim pot B LVL R216 for peak reading on the AC voltmeter, then turn the trim pot clockwise (CW) until a decrease of 4 ~ 5 dB from the peak is obtained.
37. If you are using Scotch #206 blank tape, adjust for 2 ~ 3 dB decrease from the peak.

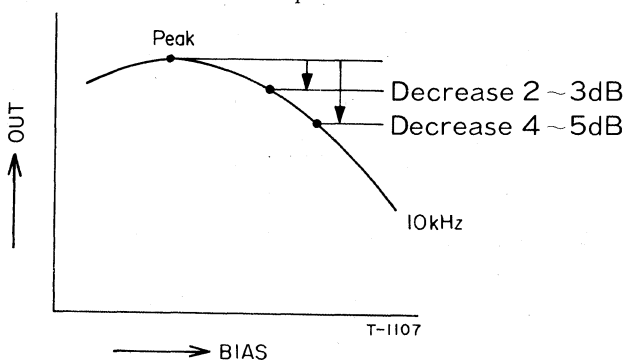


Fig. 4-24 Bias Limits Chart

4-28 RECORD LEVEL SETTING

SPEED Selector SW . . . . . HIGH

37. Apply a 400 Hz signal at –10 dB (0.3V) to the Line INPUT 1 pin jack.
38. Begin recording.
39. Adjust trim pot REC LVL R214 for –10 dB (0.3V) at OUTPUT 1 pin jack.

4-29 OVERALL FREQUENCY RESPONSE (RECORD EQUALIZATION)

NOTE: Any Bias signals feeding into the Test equipment should be filtered out by using an external Bias Trap.
There are three trim pots for Record Equalization on the 40-4. One, EQ-H ◀ P ▶ R210 is for shifting the High frequency peak, and the others, EQ-L ◀ P ▶ R211 and EQ-L ▲ P ▼ R212 is for lowering the peak adjustments.

SPEED Selector SW . . . . . HIGH
OUTPUT SELECT Button . . . . . MONITOR
FUNCTION SELECT Button . . 1 Down (depressed)

40. Before setting Record Equalization set EQ-H ◀ P ▶, R210, EQ-L ▲ P ▼ R211 and EQ-L ▲ P ▼ R212 for maximum (CW) position.
41. Apply signal swept from 40 Hz to 20 kHz, –10 dB (0.3V) to the line INPUT 1 pin jack and record on a blank test tape.
42. During recording, monitor the test signal and adjust EQ-H ◀ P ▶ R210, EQ-L ◀ P ▶ R211 and EQ-L ▲ P , R212 trim pots little by little in the CCW direction until the Frequency Response is within ±3 dB limits as illustrated in the Frequency Response Limits chart. Fig. 4-25.

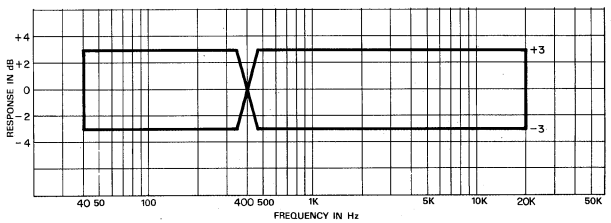


Fig. 4-25 Frequency Response –Overall 1–

43. Repeat the above procedure for LOW speed, using signal swept from 40 Hz to 16 kHz at –20 VU Level. Refer to response limits in Fig. 4-26.

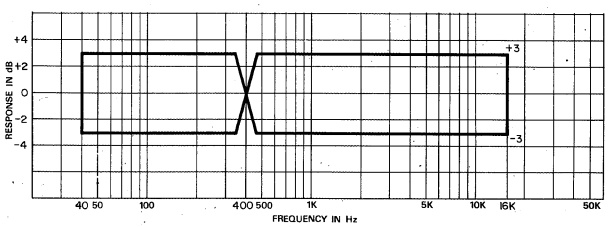


Fig. 4-26 Frequency Response –Overall 2–

NOTE: If the response is not unform, the heads should be cleaned of accumlated oxide and dirt. Then repeat the Bias adjustment procedures.

4-30 SIGNAL-TO-NOISE RATIO – OVERALL –

SPEED Selector SW . . . . . HIGH
OUTPUT SELECT Button . . . . . NORM

NOTE: Prior to measurement, demagnetize all heads and tape guides as described in MAINTENANCE section.

38. Before Signal-to-Noise Ratio measurement, be sure the Record/Reproduce amplifiers are checked out and properly adjusted.
39. Connect the AC voltmeter to OUTPUT 1 pin jack.
40. Record a certain length of 400 Hz signal at 0 VU level, then while still in the recording mode, disconnect the oscillator from Line INPUT 1 pin jack and make another no-signal recording.
41. Rewind the recording made in above step 40 to beginning and reproduce it.
42. Make sure the reproduce output of the previously recorded 400 Hz, 0 VU signal is –10 dB (0.3V), then raise sensitivity of the AC voltmeter and measure the level of the no-signal portion of the tape.
43. With 0 VU as the reference level, the signal-to-noise ratio as measured by the AC voltmeter should be 58 dB (1.2 mV).

NOTE: 62 dB (0.8 mV) weighted referenced to 3% T.H.D. (9 dB above 0 VU) at 400 Hz.

Spec. 48 dB (3.9 mV) Unweighted . . . . . 15 ips
50 dB (3.2 mV) Unweighted . . . . . 7-1/2 ips

If the output is connected to the AC voltmeter through a Band Pass Filter with cut-off frequencies of 20 Hz and 20 kHz S/N ratio will be improved. For example at 15 ips from 48 dB (3.9 mV) to 51 dB (2.8 mV).
The procedures give simple and easy to understand methodes of measurement.

4-31 OPTIMUM ERASURE CHECK

FUNCTION SELECT Button . . . . . 1, 2, 3, 4 Down (depressed)
OUTPUT SELECT Button . . . . . MONITOR

44. Apply a 1 kHz signal at 0 dB (10 dB above the operating level of −10 dB, 0.3V) to the LINE INPUT 1 pin jack.
45. Record this signal and while recording measure the output of channel 1 through a 1 kHz band pass filter and note this level for a reference value.
46. Disconnect the 1 kHz signal source from the LINE INPUT channel 1 and rewind the tape to the beginning of the 1 kHz recording.
47. Put the deck in record mode and "record" (erase) over this previous recording, then rewind to the beginning again.
48. Put the deck in the play mode and monitor the output from channel 1 through the 1 kHz band pass filter.
49. The difference between the reference value obtained in step 45 and the value in step 48 should be 65 dB or more.
50. Remove the band pass filter.

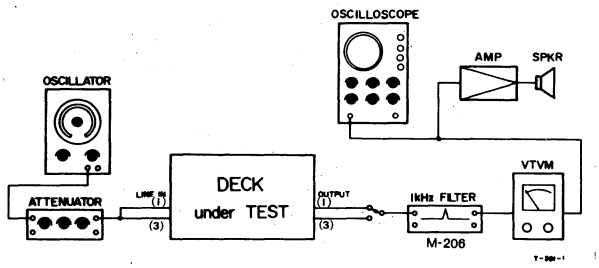


Fig. 4-27 Test Connection for Erase Measurement

4-32 CROSSTALK CHECK

SPEED Selector SW . . . . . HIGH

51. Apply a 1 kHz signal at −10 dB (0.3V) to tracks 1 and 3. (No signal to tracks 2 and 4).
52. Make an approx. 30 second recording of the 1 kHz signal.
53. Rewind the Tape to the beginning of the recording.
54. Play back the tape and measure the OUTPUT from track 2 through a 1 kHz band pass filter.
55. Apply the 1 kHz signal to track 2 and 4. (No signal input to track 1 and 3).
56. Make another recording for about 30 seconds.
57. Rewind the tape to the beginning of this recording.
58. Play back (at MONITOR position) the tape and measure the OUTPUT from track 3. Through a 1 kHz band pass filter.
59. Level measured in step 54 and 58 must be −40 dB or less.
60. Repeat the above Procedure with the OUTPUT SELECT Button set to NORM. Check level measured in step 54 and 58 must be 50 dB or less.

4-33 DISTORTION CHECK

1. Place the SPEED Selector SW to HIGH position.
2. Thread the blank Test Tape on the deck.
3. Apply a 1 kHz, −10 dB (0.3V) signal to Line INPUT 1 pin jack.
4. Place the unit in the record mode for about 10 seconds. Rewind and play this recorded section of the tape.
5. Read the indicated value on the distortion analyzer.
6. The distortion factor should be 1% or less.

4-34 PEAK LEVEL INDICATOR ADJ.

1. Apply a 400 Hz/−10 dB (0.3V) signal. Increase signal level to 10 dB above operating reference level (0 dB). Check that the PEAK LEVEL Indicator lights at full intensity. If necessary, adjust using R208.

4-35 DISASSEMBLY AND REPLACEMENT OF ASS'Y

4-36 REMOVING WOODEN SIDES AND REAR PANEL

See illustration for complete dis-assembly instructions.

1. Remove wooden side panels by removing 4 mounting screws each.
2. Remove Rear Panel by removing 11 screws.
3. Remove Power Supply PC Board-110 (black chassis) by removing 6 mounting screws. (2 screws (C) from sides)

NOTE: Watch for the 2 wire A and B connections.

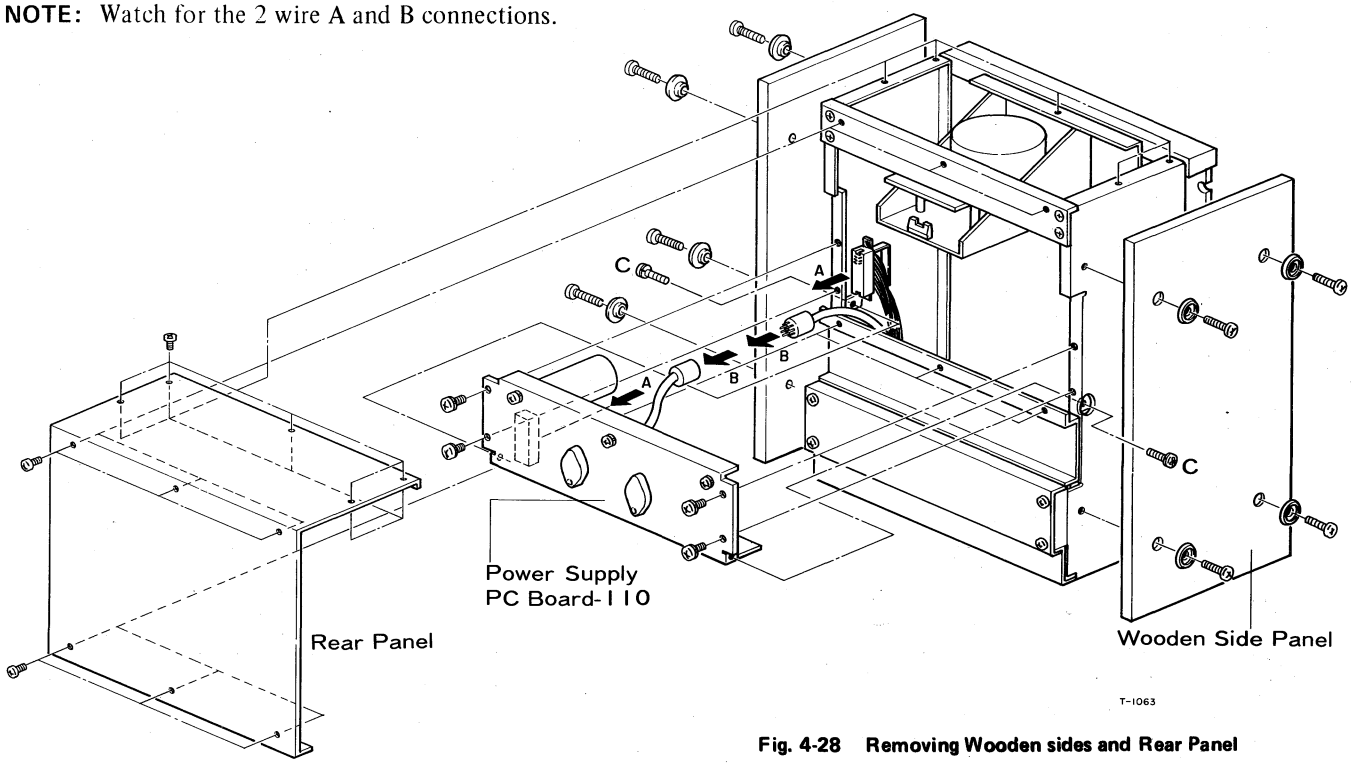


Fig. 4-28 Removing Wooden sides and Rear Panel

4-37 POWER TRANSFORMER REMOVAL

1. Remove the 4 mounting screws holding the Power Transformer.
2. Unsolder wires on FUSE PCB-108.

NOTE: Be sure to note original position of wires.

3. Lift off Power Transformer from top.

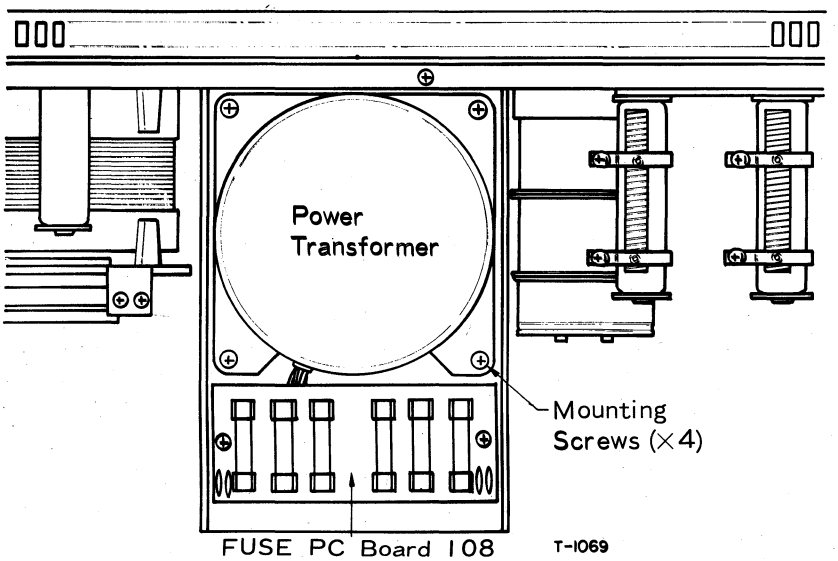


Fig. 4-29 Power Transformer Removal

4-38 REEL MOTORS REMOVAL

1. Remove Power from Deck.
2. Remove wooden side panels by removing 4 mounting screws each. Loosen 2 set screws (Hex head) in Reel Turntable ass'y (A) and in the Brake Drum (C). Lift off parts.
3. Disconnect the 4 motor wires from terminals and release wire harness straps.
4. Remove 3 screws securing the Brake Ass'y (D) to the motor.

NOTE: Use care not to bend the brake band or brake shaping retainer during removal.

5. Remove 5 screws securing Reel motor (B) to chassis through the front panel.

NOTE: When replacing the reed SW on the left Brake Ass'y, insure that there is a clearance of approx. 1 mm between the Reed SW and the magnet.

4-39 CAPSTAN ASS'Y REMOVAL

1. Unscrew Dust Cap (front panel).
2. Remove 3 screws from rear bracket (A) and allow it to descend toward floor of case.
3. Remove capstan belt (B). Carefully oil the reverse, non-driving surface of the belt.
4. Loosen 2 screws in flywheel (C). Remove flywheel.
5. Remove 3 screws in capstan ass'y (D).
6. Gently move capstan ass'y up and down until it slides out of panel.

NOTE: When replacing flywheel, position flywheel on capstan ass'y shaft so that end of shaft protrudes slightly from rear of flywheel. A clearance of approx. 0.01" must be maintained between the end of the capstan shaft and the rear bracket.

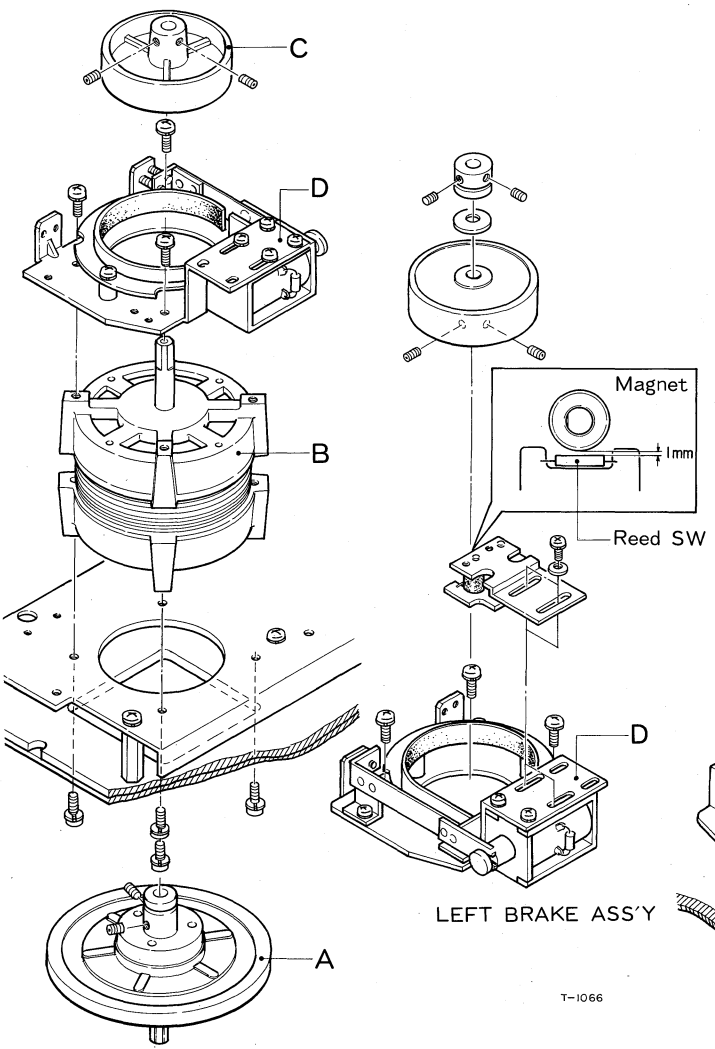


Fig. 4-30 Reel Motors Removal

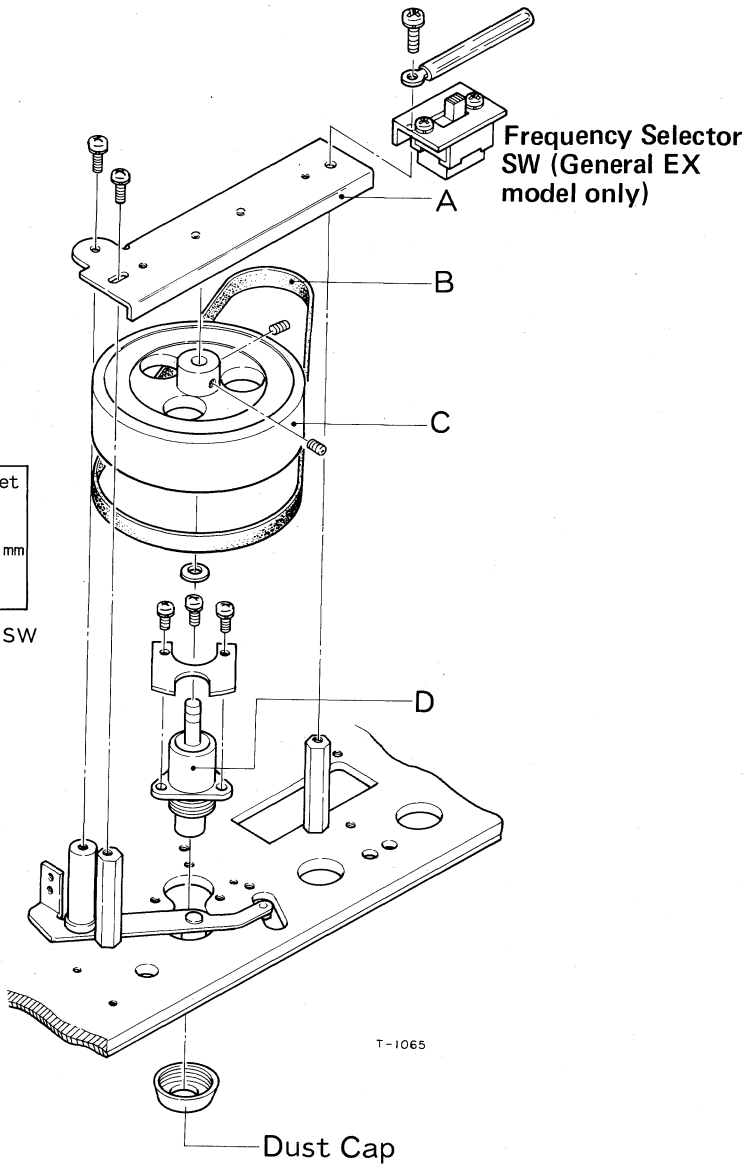


Fig. 4-31 Capstan Ass'y Removal

4-40 CAPSTAN MOTOR REMOVAL

1. Remove the 3 screws holding the capstan motor plate (A).
2. Remove capacitor C-201 (B) by removing 2 screws.
3. Remove the 4 screws holding the capstan motor (C) to the motor plate. Watch for Rubber Cushions.
4. Cut the motor wires at the bottom of P.C.B. (D) or remove the 2 screws from the bracket (E). Which holds the P.C.B. and remove motor with P.C.B. attached.

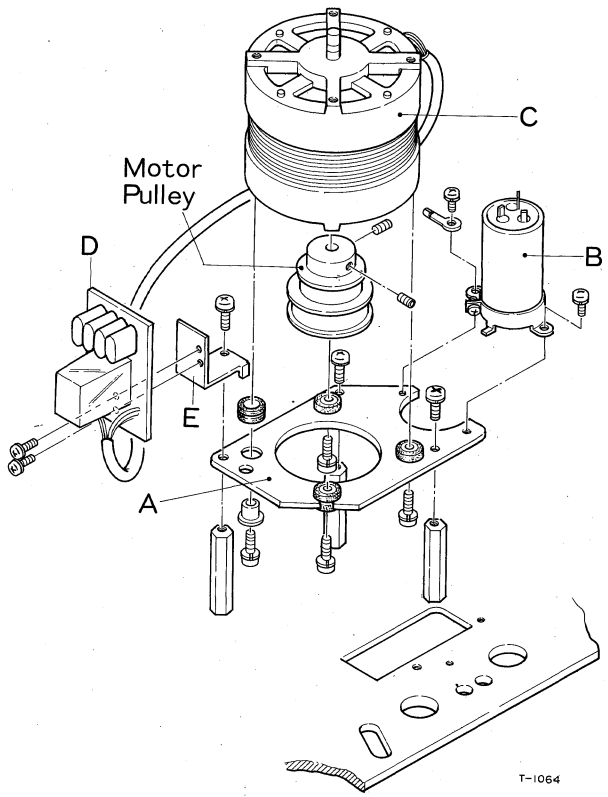


Fig. 4-32 Capstan Motor Removal

4-41 TENSION ARMS LEFT AND RIGHT REMOVAL

See illustration for complete dis-assembly instructions.

IMPORTANT: After re-assembly check clearance to ascertain that arm moves freely and is not binding.

CAUTION: Do not over-tighten screws holding micro-switches. Insulating spacer and micro-switches are easily broken by excess pressure.

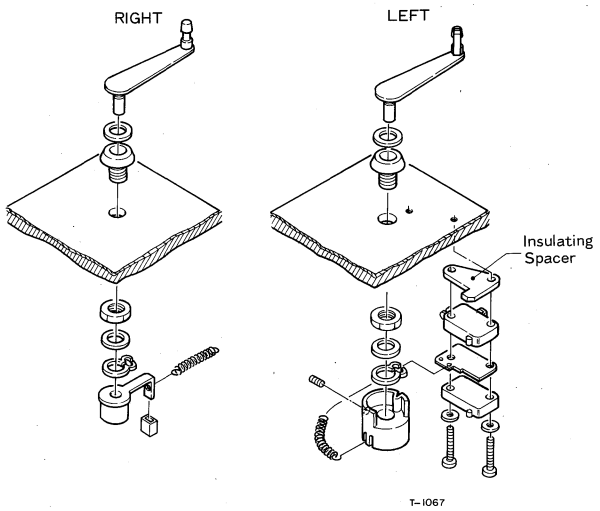


Fig. 4-33 Tension Arms L/R Removal

4-42 HEAD REPLACEMENT AND ALIGNMENT

1. HEAD REPLACEMENT

To replace a single head a special 2 mm nut driver is required. Remove the 2 nuts (A) on the defective head through the access hole provided. This releases the head from the mounting plate. Note the position of the wires on the circuit board. Connect the new head in the same manner. Replace the nuts securing the new head to the plate. Perform head alignment before operation.

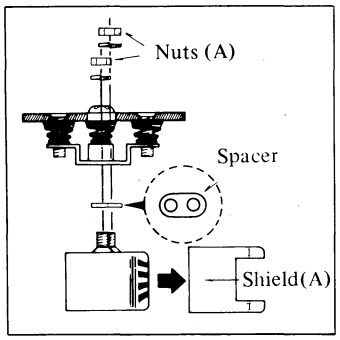
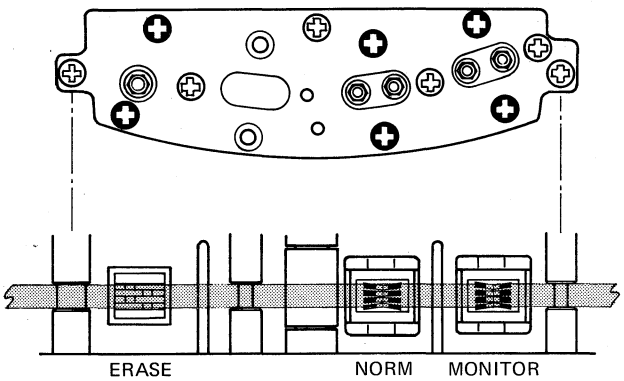


Fig. 4-34 Head Replacement

2. HEAD ADJ. SCREWS AND ALIGNMENT



⊕ AZIMUTH ADJ. SCREWS
⊖ HEIGHT AND TILT ADJ. SCREWS
◎ TANGENCY ADJ. NUTS

Fig. 4-35 Head Location and Adj. Screws

3. VISUAL HEAD ALIGNMENT

Since the property of head alignment affects the frequency response on both playback and recording, the head alignment should be done carefully. The head can be adjusted in TILT, TANGENCY, HEIGHT and AZIMUTH.
For head alignment, perform the following coarse adjustments first. Then fine alignment should be accomplished electrically while playing back the Test Tape.

Coarse Adjustment;
Without Tape
TILT . . . . . By Height and Tilt screws
This alignment is performed by viewing from the side without tape threaded.
Check that the head surface is parallel to the tape guide surface.
With Tape
TANGENCY . . . . . By Head mounting Nuts
Loosen the head mounting nuts. Adjust the head so that the vertical alignment of the head gap is perpendicular to the surface of the tape, then tighten the head mounting Nuts.
HEIGHT . . . . . By Height and Tilt Screws
This alignment is checked visually by looking at the position of the head.
The head core for track-1 (inner core) should be even with the inner edge of the tape.
AZIMUTH . . . . . By Azimuth adj. Screw
Adjust the azimuth adj. screw so that the gap of the head is perpendicular to the tape travel.

NOTE: After this coarse adjustment is made, the adj. screws and the Head mounting nuts should be re-aligned according to electrical head alignment paragraph which follows in this Service Manual.

4. MIS-ALIGNMENT OF THE HEADS

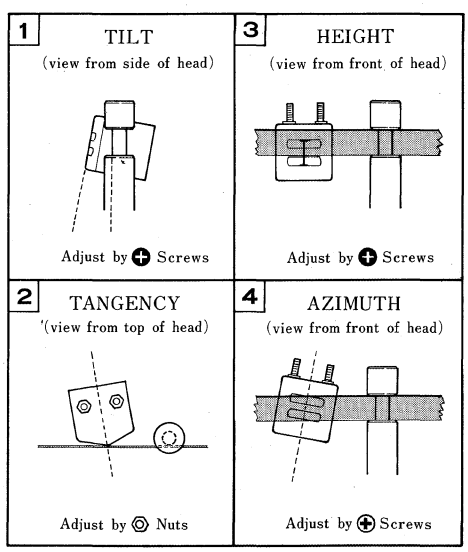


Fig. 4-36 Head Mis-Alignment —Example—

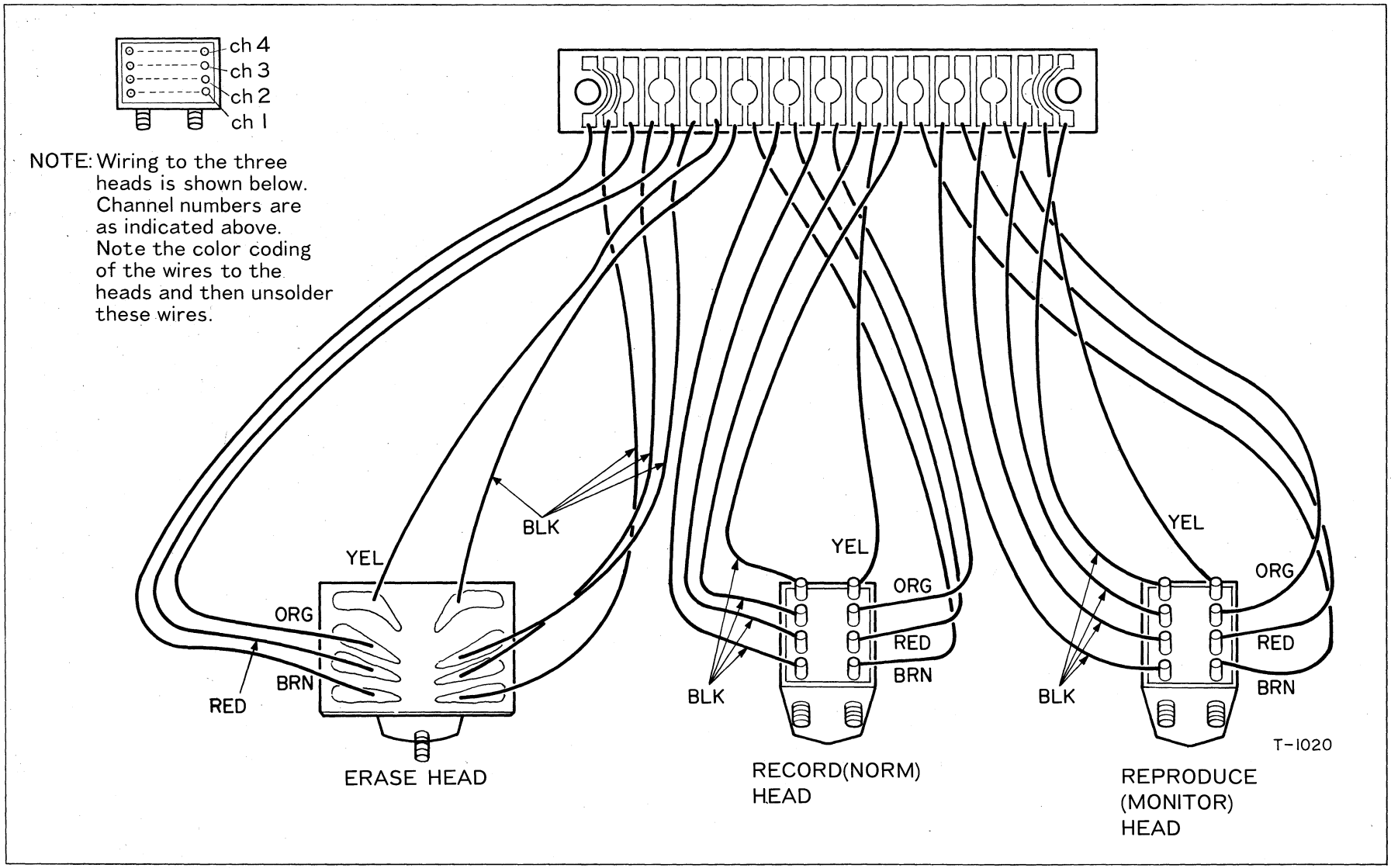


Fig. 4-37 Head Wiring

PARTS LIST AND SCHEMATICS

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PARTS ORDERING INFORMATION

Spare parts are available through your nearest TEAC Authorized Service Center or directly from the TEAC office, the address of which is written on the back cover. When ordering parts, always include the following information:

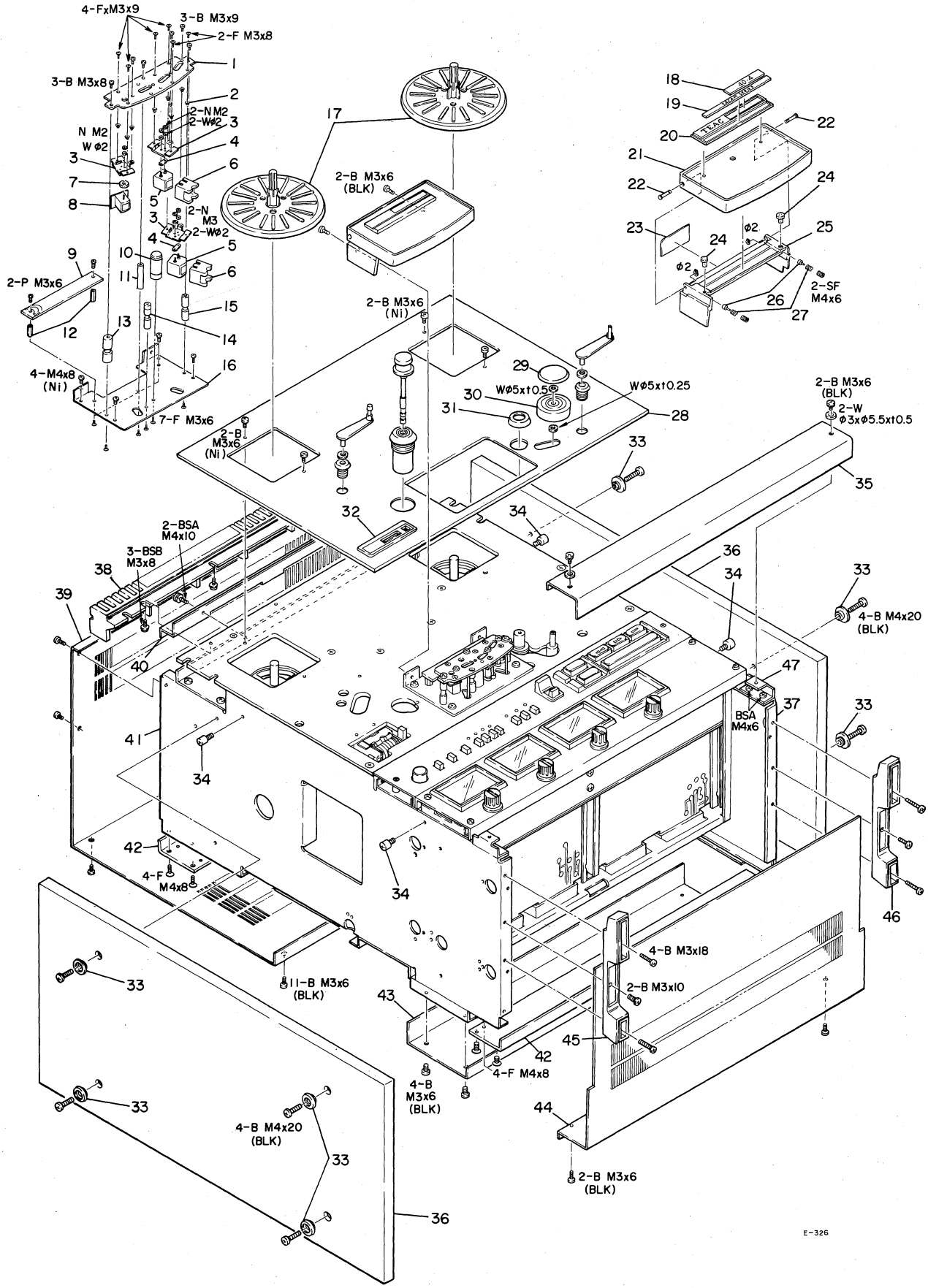
1. MODEL
2. REF. NO.
3. PARTS NO.
4. DESCRIPTION
5. UNIT SERIAL NO.
6. MANUAL CODE NO.

NOTICE REGARDING PARTS ORDERS

1. Do not order by only REF. NO.
2. In some instances, individual minor parts are not available. In such a case, the entire assembly including the part requested will be sent to you.
3. Parts are identical between the different models with the exceptions as coded by the designations in the REMARKS column.
4. PC boards are shown viewed from component side, and foil side is made visible through the PC board. If the PC board has components mounted on both sides, the side having the greater number of components will be shown viewed from the top.
5. Parts marked with * require longer delivery time than regular parts.
6. To understand shape coding of assembling hardwares in the exploded views, ASSEMBLING HARDWARE CODING LIST is provided on page 126.

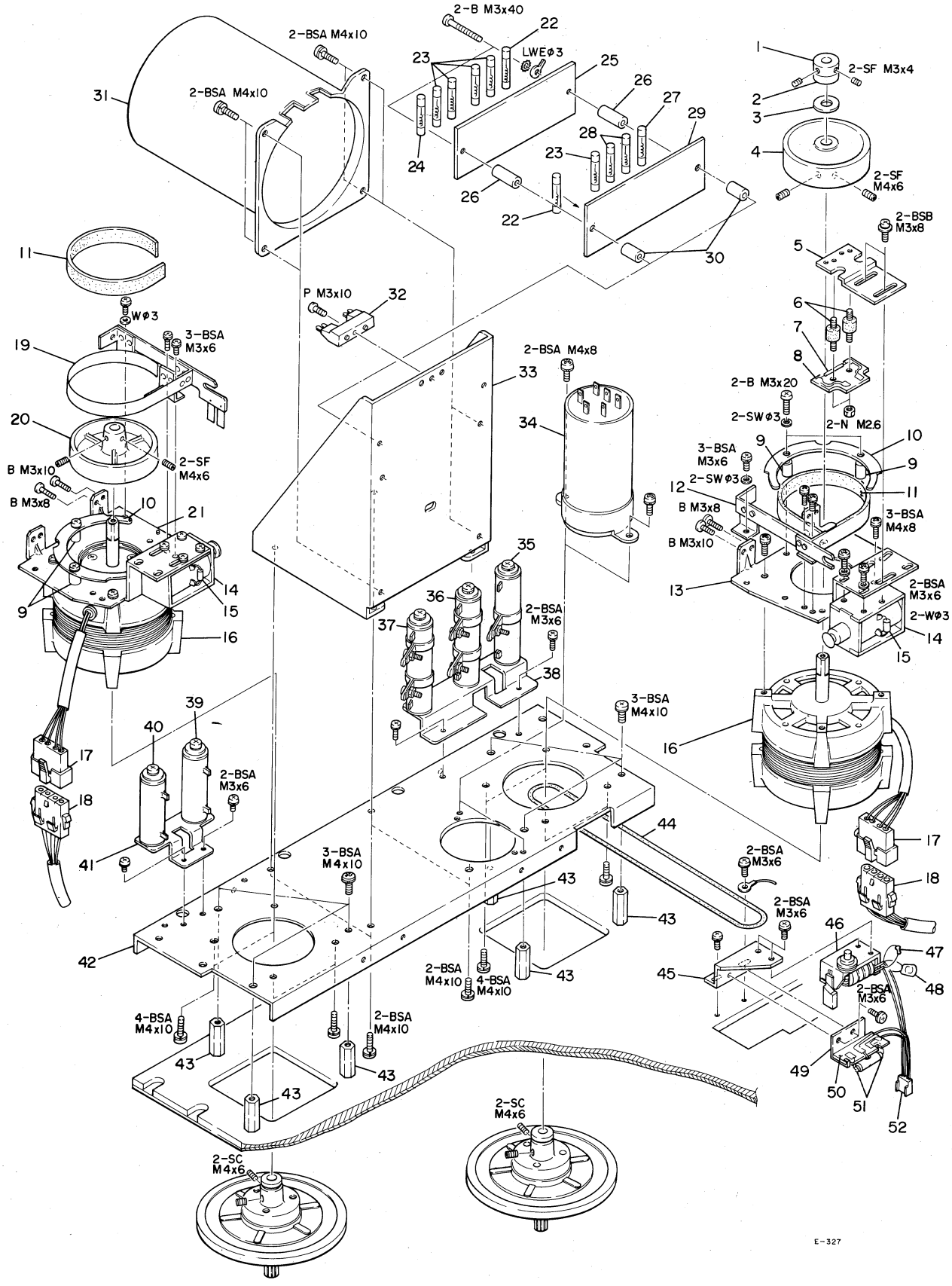
1. EXPLODED VIEWS AND PARTS LIST

EXPLODED VIEW–1



REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1 - 1	*55551100	Plate, Head Base	
1 - 2	50220500	Spring, B	
1 - 3	*50134371	Plate, Head	
1 - 4	*50134390	Spacer, Head	
1 - 5	55692410	Head, R/P; 4T-4CH	
1 - 6	*50136790	Head Shield, A	
1 - 7	*50136591	Spacer, Erase Head	
1 - 8	55692400	Head, Erase; 4T-4CH	
1 - 9	*60502691	PC Board, Head	
1 - 10	60130240	Roller Assy, Flutterless	
1 - 11	*50241140	Pole	
1 - 12	*60048870	Stud	
1 - 13	*55446920	Tape Guide, B	
1 - 14	*55444650	Tape Guide, Center	
1 - 15	*50182672	Pin, Guide	
1 - 16	*55531790	Plate, Housing Base	
1 - 17	55040871	Reel Table Assy	
1 - 18	*55345320	Name Plate	
1 - 19	*60071150	Plate, Series	
1 - 20	*55642490	Plate, TEAC	
1 - 21	*60132450	Head Housing, A	
1 - 22	*55440240	Shaft, Head Housing	
1 - 23	*55552151	Plate, Dummy	
1 - 24	*55305390	Cushion, Rubber	
1 - 25	*55330021	Head Housing, B	
1 - 26	*55340120	Shaft, Push	
1 - 27	*55202261	Spring, Push	
1 - 28	*55522430	Panel, Trim	
1 - 29	50142180	Cap, Pinch Roller	
1 - 30	50141751	Pinch Roller	
1 - 31	*55440200	Cap, Dust; ϕ12	
1 - 32	*55340250	Cover, Counter	
1 - 33	50276931	Washer, Side Board	
1 - 34	55810370	Screw, Guide	
1 - 35	*55031350	Plate, Lower Front	
1 - 36	*60382741	Sideboard	
1 - 37	*55021681	Panel Assy, Side; R	
1 - 38	*55320052	Grille, Top	
1 - 39	*55532050	Cover, Top	
1 - 40	*60146030	Bracket, Cover	
1 - 41	*55021671	Panel Assy, Side; L	
1 - 42	*50235312	Angle, Rear Cover	
1 - 43	*55531830	Rear Cover, Amplifier	
1 - 44	*55522060	Cover, Bottom	
1 - 45	*55330190	Leg, Case; L	
1 - 46	*55330180	Leg, Case; R	
1 - 47	*55551230	Spacer, Panel	

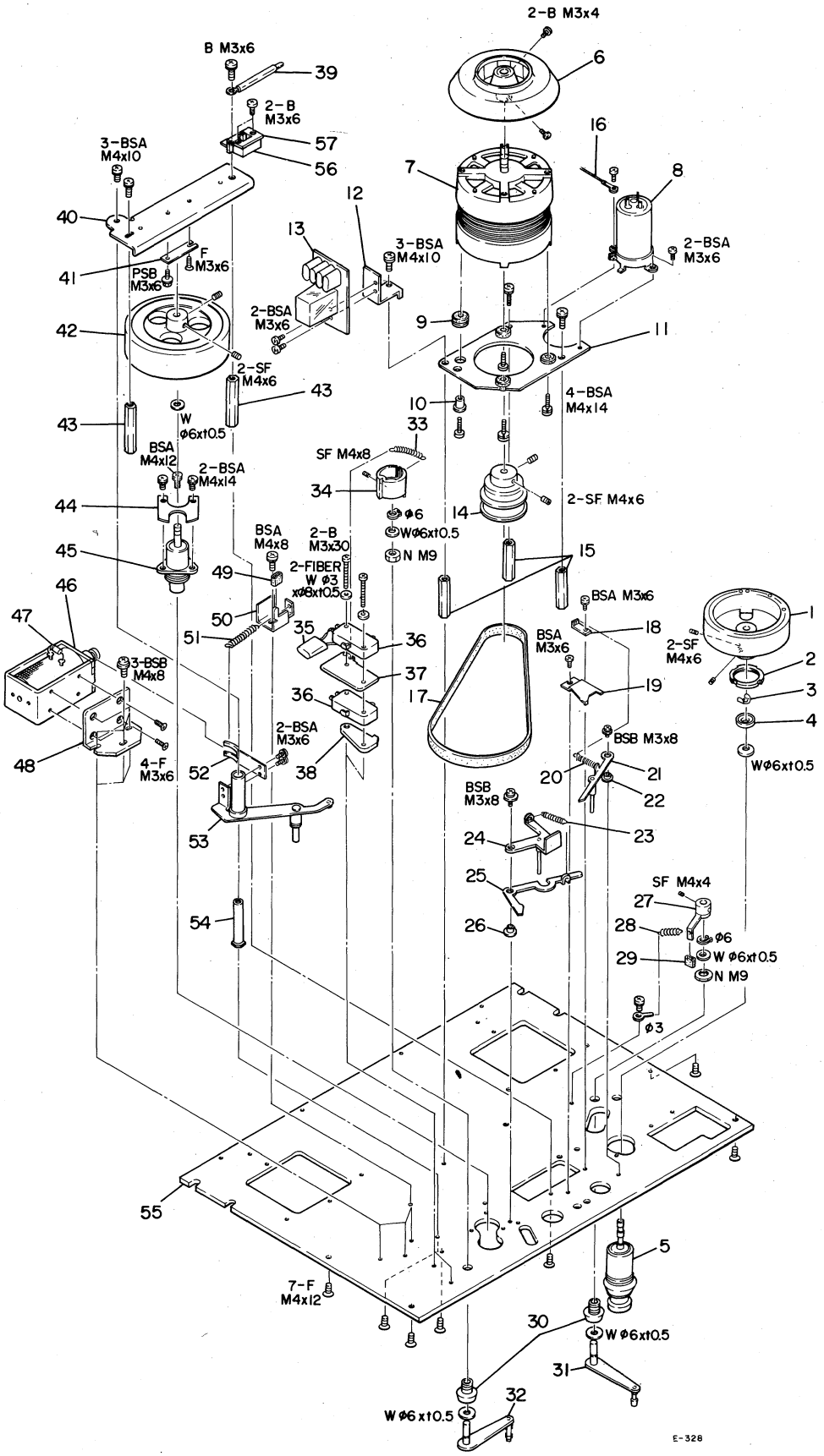
EXPLODED VIEW–2



REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 1	*60144570	Holder, Magnet	
2 - 2	*55344870	Magnet	
2 - 3	*60144590	Cushion, Magnet	
2 - 4	60122650	Drum, Brake; L	
2 - 5	*60144880	Bracket, Reed Switch	
2 - 6	*55447250	Cushion, Rubber	
2 - 7	50447350	Switch, Reed	
2 - 8	*60500510	PC Board, Reed Switch	
2 - 9	*50173490	Spacer, Brake Retainer	
2 - 10	*55552720	Retainer, Brake	
2 - 11	55552740	Felt, Brake	
2 - 12	*50173333	Band Assy, Brake; L	
2 - 13	*55551150	Plate, Brake Band Assy; L	
2 - 14	60475100	Solenoid, Brake	
2 - 15	50422570	Diode, S1B01-06	
2 - 16	71050140	Motor Assy, Reel	
2 - 17	*51222620	Connector Plug Housing, 4P	Part of 2 - 16
2 - 18	*51222610	Connector Socket Housing, 4P	
2 - 19	*50173393	Band Assy, Brake; R	
2 - 20	50173571	Drum, Brake	
2 - 21	*50173601	Plate, Brake Band Assy; P	
2 - 22	51421980	Fuse, Time Lag; 250V 2.5AT	JAPAN, GENERAL EXPORT
	51421900	Fuse, Time Lag; 250V 2.5AT	AUSTRARIA, U.K., EUROPE
	51421460	Fuse, Time Lag; 250V 2.5AT	CANADA, U.S.A.
2 - 23	51421950	Fuse, Time Lag; 250V 0.5AT	JAPAN, GENERAL EXPORT
	51411380	Fuse, Time Lag; 250V 0.5AT	AUSTRALIA, U.K., EUROPE
	51421330	Fuse, Time Lag; 250V 0.5AT	CANADA, U.S.A.
2 - 24	51421990	Fuse, Time Lag; 125V 3AT	JAPAN, GENERAL EXPORT
	51421910	Fuse, Time Lag; 250V 3.15AT	AUSTRALIA, U.K., EUROPE
	51421480	Fuse, Time Lag; 250V 3AT	CANADA, U.S.A.
2 - 25	*51685582	PC Board Assy, Fuse Holder A	JAPAN, GENERAL EXPORT
	*51685572	PC Board Assy, Fuse Holder A	AUSTRALIA, U.K., EUROPE
	*51685272	PC Board Assy, Fuse Holder A	CANADA, U.S.A.
	*51675271	PC Board, Fuse Holder A	
2 - 26	*55446950	Collar	
2 - 27	51421970	Fuse, Time Lag; 250V 2AT	JAPAN, GENERAL EXPORT
	*51421890	Fuse, Time Lag; 250V 2AT	AUSTRALIA, U.K., EUROPE
	51421440	Fuse, Time Lag; 250V 2.5AT	CANADA, U.S.A.
2 - 28	51421960	Fuse, Time Lag; 250V 1AT	JAPAN, GENERAL EXPORT
	50411400	Fuse, Time Lag; 250V 1AT	AUSTRALIA, U.K., EUROPE
	51421380	Fuse, Time Lag; 250V 1AT	CANADA, U.S.A.
2 - 29	*51685601	PC Board Assy, Fuse Holder B	JAPAN, GENERAL EXPORT
	*51685591	PC Board Assy, Fuse Holder B	AUSTRALIA, U.K., EUROPE
	*51685281	PC Board Assy, Fuse Holder B	CANADA, U.S.A.
	*51675281	PC Board, Fuse Holder B	
2 - 30	*55446940	Collar	
2 - 31	*51521251	Transformer, Power	JAPAN, CANADA, U.S.A.
	*51521261	Transformer, Power	AUSTRALIA, U.K., EUROPE GENERAL EXPORT
2 - 32	*50438350	Terminal Strip, 2P	
2 - 33	*60146910	Bracket, Power Transformer	
2 - 34	*51700490	Capacitor, MP; 7 + 1.5 mfd x 2	
2 - 35	*50524150	Resistor, Wire Wound; 200 ohm 30HA	
2 - 36	*50522450	Resistor, Wire Wound; 250 ohm 30HAA	
2 - 37	*50524510	Resistor, Wire Wound; 150 ohm 30HAA	
2 - 38	*60144802	Bracket, Resistor	
2 - 39	*50524490	Resistor, Wire Wound; 80 ohm 20H	
2 - 40	*50524420	Resistor, Wire Wound; 33 ohm 20H	
2 - 41	*55540571	Bracket, Resistor	
2 - 42	*60102742	Chassis, Motor	
2 - 43	*50161950	Stud, Reel Motor	
2 - 44	55340110	Belt, Counter	
2 - 45	*60145890	Bracket, Counter	

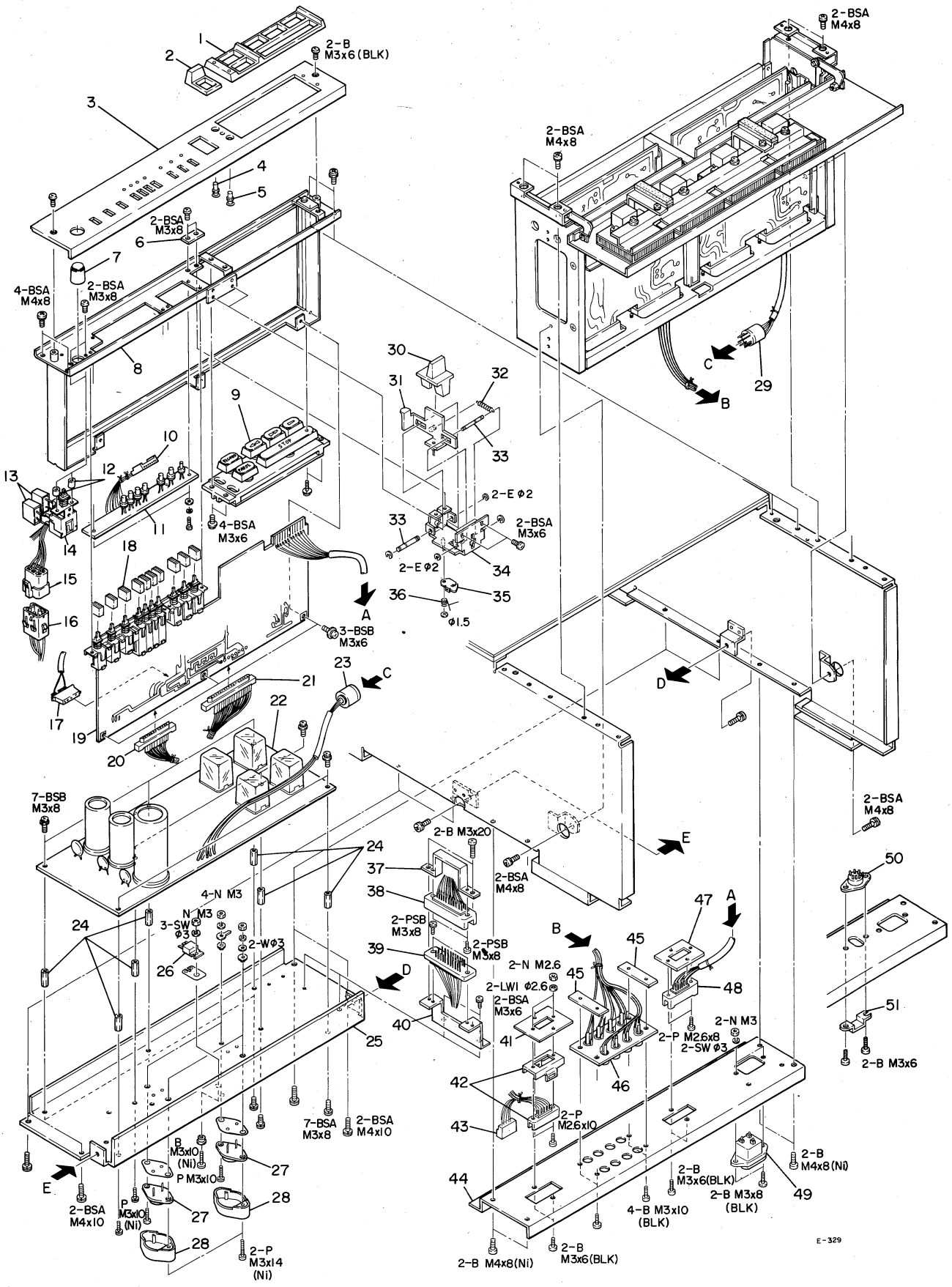
(Continued on page 73)

EXPLODED VIEW–3



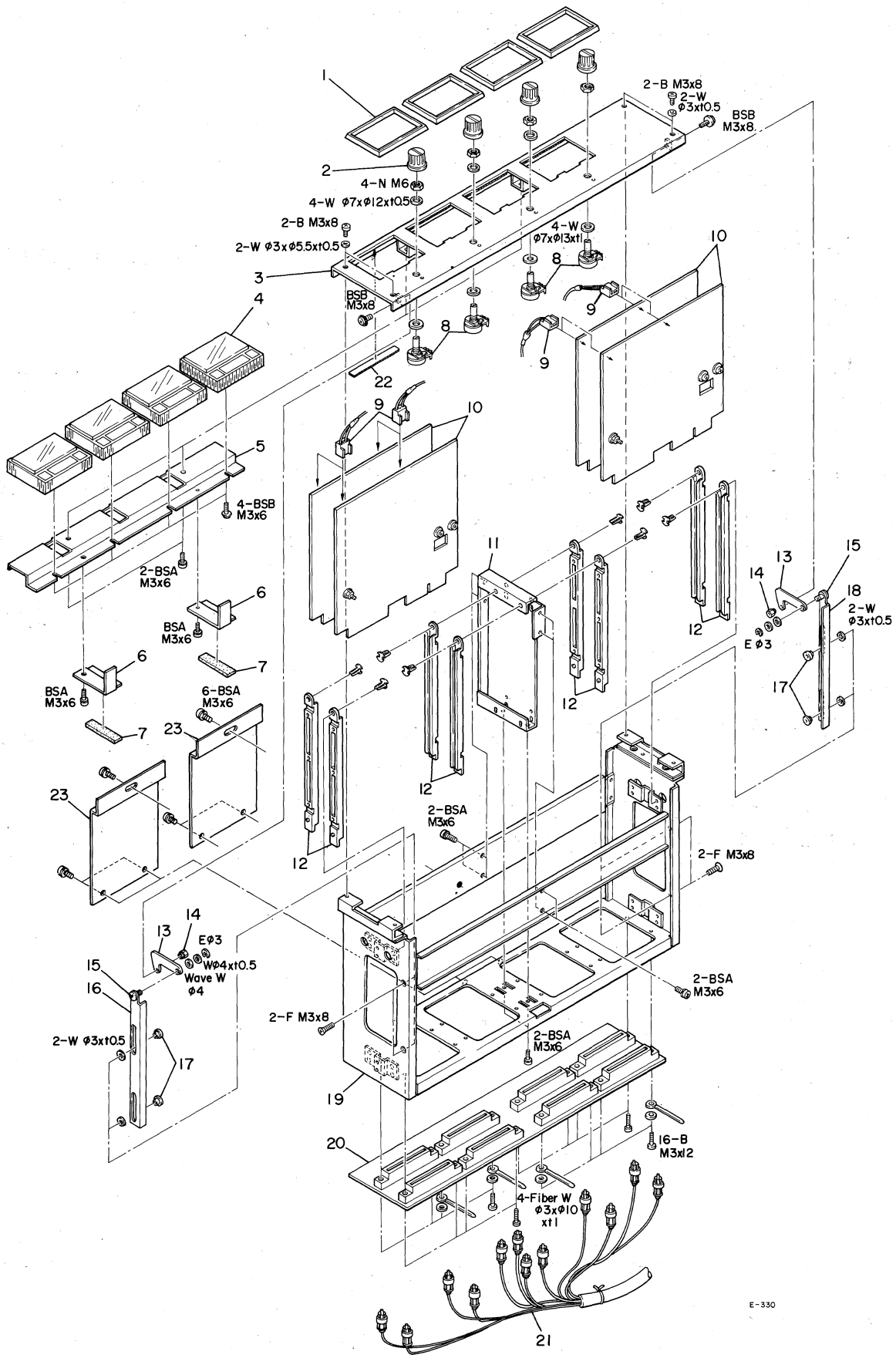
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
3 - 1	*55305060	Flywheel, Impedance	
3 - 2	*55447050	Nut, Impedance Roller	
3 - 3	*55202000	Washer, Wave	Part of 3 - 5
3 - 4	*55405070	Holder, Bearing	Part of 3 - 5
3 - 5	55044880	Roller Assy, Impedance	
3 - 6	*50123984	Fan, Motor	
3 - 7	50701341	Motor, Capstan	
3 - 8	50545650	Capacitor, MP; 2 + 0.8 mfd 250V	
3 - 9	*50706211	Cushion, Rubber	
3 - 10	*50332790	Spacer, Rubber Cushion	
3 - 11	*55552000	Plate, Capstan Motor Mounting	
3 - 12	*55551140	Bracket, PC Board	
3 - 13	*51685291	PC Board Assy, Speed Change	
3 - 14	50124003	Pulley, Motor; 50Hz/60Hz	All except CANADA, U.S.A.
	50125121	Pulley, Motor; 60Hz	CANADA, U.S.A.
3 - 15	*50123850	Stud, Capstan Motor	
3 - 16	*50477830	Wire, Motor Grounding	
3 - 17	50125340	Belt, Capstan Drive	
3 - 18	*55551120	Hook, Spring	
3 - 19	*60146060	Plate, Lifter	
3 - 20	50221100	Spring, A	
3 - 21	55044900	Arm Assy, Lifter; R	
3 - 22	*50152502	Shaft, Lifter Arm	
3 - 23	*60040400	Spring, Lifter	
3 - 24	55044910	Arm Assy, Cue Lifter	
3 - 25	*60144740	Arm, Cue	
3 - 26	*55440221	Shaft, Cue Lifter	
3 - 27	*55045500	Travel Limiter Assy, Tension Arm	
3 - 28	55202100	Spring, Left Tension Arm	
3 - 29	50276990	Collar, Rubber	
3 - 30	55300831	Bushing, Arm Assy; C	
3 - 31	55000720	Arm Assy, Tension; Left	
3 - 32	55044920	Arm Assy, Tension; Right	
3 - 33	55203110	Spring, Right Tension Arm	
3 - 34	*50183921	Drum, Tension Arm	
3 - 35	50529050	Spark Killer, 0.1 mfd + 120 ohm 400V	
3 - 36	51300010	Switch, Micro	
3 - 37	*50183932	Sheet, Insulator	
3 - 38	50182730	Limit Stop, Tension Arm	
3 - 39	*60144890	Retainer, Cord	
3 - 40	*55540580	Plate, Thrust; B	
3 - 41	*50277233	Plate, Thrust	
3 - 42	*50123802	Flywheel, Capstan	
3 - 43	*50123860	Stud, Flywheel	
3 - 44	*50142190	Plate, Arm Support	
3 - 45	50120451	Capstan Assy	
3 - 46	50422570	Diode, S1B01-06	
3 - 47	51630040	Solenoid, Pinch Roller	
3 - 48	*50616631	Bracket, Solenoid	
3 - 49	50275690	Cushion, Rubber	
3 - 50	*50141842	Limit Stop, Pinch Roller	
3 - 51	*55240080	Spring, Return	
3 - 52	*55200621	Spring, Pressure; B	
3 - 53	*55045200	Arm Assy, Pinch Roller	
3 - 54	*50141821	Shaft, Pinch Roller Arm	
3 - 55	*55522470	Panel, Chassis	
3 - 56	50444610	Switch, Slide	JAPAN, GENERAL EXPORT
3 - 57	*50332880	Bracket, Switch	JAPAN, GENERAL EXPORT

EXPLODED VIEW—4



REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
4 - 1	*55305310	Cover, Control Button	
4 - 2	*55305300	Hook, Cue Lever	
4 - 3	*55522140	Panel, Control	
4 - 4	*55002170	Lens Assy, Lamp; R	
	*55305260	Lens, Lamp	Part of 4 - 4
	*55507270	Color Disk, R	Part of 4 - 4
4 - 5	*55002180	Lens Assy, Lamp; G	
	*55305260	Lens, Lamp	Part of 4 - 5
	*55507280	Color Disk, G	Part of 4 - 5
4 - 6	*55552250	Plate, Cue Lever	
4 - 7	*60060190	Knob, Power Switch	
4 - 8	*55021650	Chassis Assy, Control	
4 - 9	50448611	Pushbutton Assy, Control; B	
4 - 10	*51221700	Connector Socket, 8P	
4 - 11	*51685560	PC Board Assy, Indicator	
	*60502830	PC Board, Indicator	Part of 4 - 11
	50425110	LED	Part of 4 - 11
4 - 12	*60048030	Stud, Panel	
4 - 13	50529060	Spark Killer, 0.033 mfd + 120 ohm 125VAC	JAPAN, CANADA, U.S.A.
	50529080	Spark Killer, 4700 pfd 250VAC	AUSTRALIA, U.K., EUROPE
4 - 14	51340460	Switch, Power	JAPAN, CANADA, U.S.A., GENERAL EXPORT
	51340110	Switch, Power	AUSTRALIA, U.K., EUROPE
4 - 15	*51273160	Wire Assy, Power Switch	
4 - 16	*51222490	Connector Socket Housing, 6P	
4 - 17	*60521690	Connector Socket, 4P	
4 - 18		(Not used)	
4 - 19	*51685252	PC Board Assy, System Control	
4 - 20	*51222520	Connector Socket, 15P	
4 - 21	*51222540	Connector Socket, 22P	
4 - 22	*51685260	PC Board Assy, Power Supply	
4 - 23	*51222550	Connector Socket, 7P	
4 - 24	*60048870	Stud, Power Supply PC Board	
4 - 25	*60372342	Chassis, Power Supply PC Board	
4 - 26	*51450640	Transistor, 2SD234O	
4 - 27	*51450650	Transistor, 2SD111Y	
4 - 28	*60530150	Cover, Transistor	
4 - 29	*51222550	Connector Plug, 7P	
4 - 30	*55305151	Lever, Cue	
4 - 31	*60140480	Link Assy, Cue	
4 - 32	*60040390	Spring, Cue	
4 - 33	*55440330	Shaft, Guide	
4 - 34	*60140470	Guide Assy, Cue	
4 - 35	*55500270	Plate, Lock	
4 - 36	*55200161	Spring, Lock Plate	
4 - 37	*50287490	Handle	
4 - 38	*50438200	Connector Socket, 34P	
4 - 39	*50436390	Connector Plug, 34P	
4 - 40	*60144940	Bracket, Connector	
4 - 41	*55551090	Plate, Connector	
4 - 42	*51222570	Connector Socket, 16P	
4 - 43		Connector	
4 - 44	*55522111	Chassis, Connector	All except GENERAL EXPORT
	*55522540	Chassis, Connector	GENERAL EXPORT
4 - 45	*55551520	Nut, Plate	
4 - 46	*51240410	Pin Jack, 8P	
4 - 47	*60144910	Plate, Connector	
4 - 48	*50438410	Connector Socket, 12P	
4 - 49	*51240140	Inlet, AC Power; 3P	All except JAPAN, GENERAL EXPORT
	*50432950	Socket, AC Power	JAPAN, GENERAL EXPORT
4 - 50	*51310070	Selector, Voltage	GENERAL EXPORT
4 - 51	*55541696	Plate, Voltage Selector	GENERAL EXPORT

EXPLODED VIEW–5



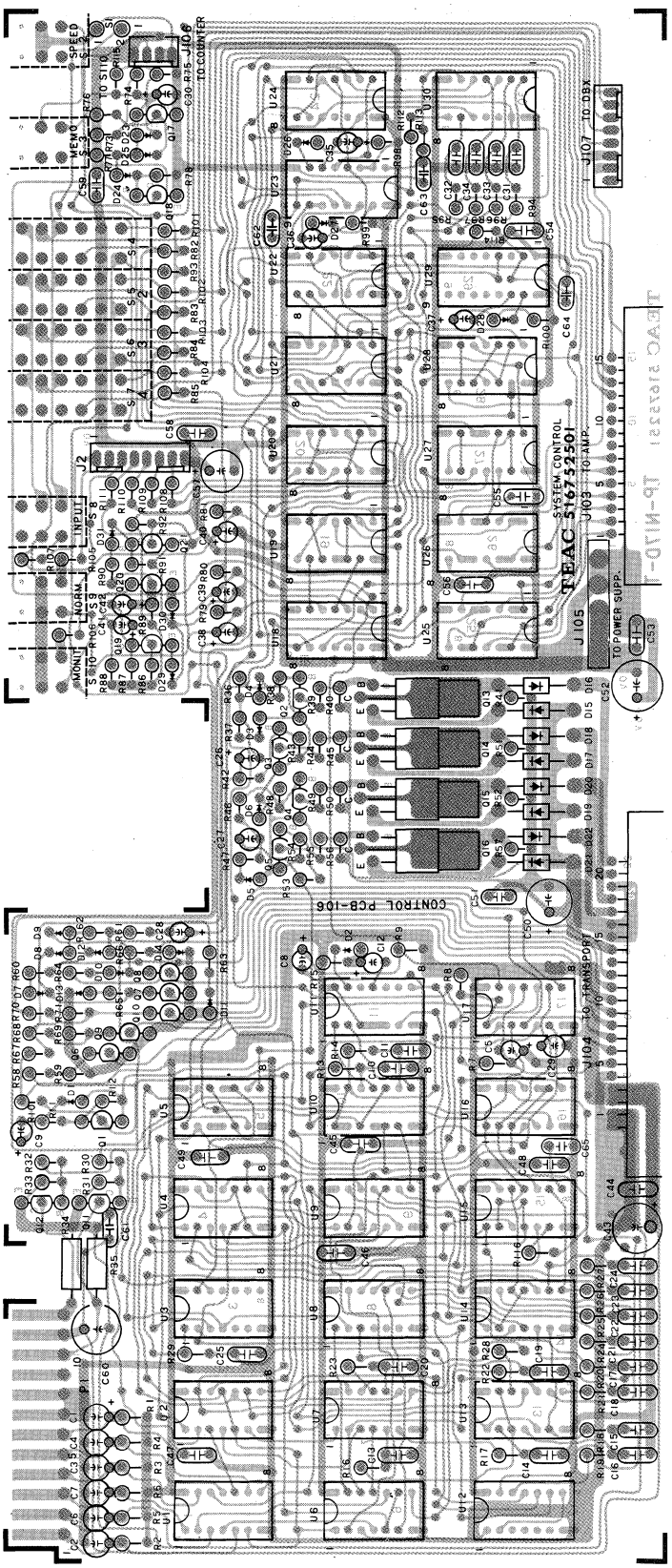
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
5 - 1	*55330281	Escutcheon, Meter	
5 - 2	50253750	Knob, B-20B	
5 - 3	*55522120	Panel, Amplifier	
5 - 4	51650471	Meter, VU	
5 - 5	*55531820	Bracket, Meter	
5 - 6	*55551820	Bracket, PC Board	
5 - 7	*55551830	Cushion, PC Board	
5 - 8	*51501990	Var. Res., 10k ohm - A	
5 - 9	*51221650	Connector Socket, 3P	
5 - 10	*51685301	PC Board Assy, Record/Playback	
5 - 11	*55531800	Plate, Shield	
5 - 12	*55345310	Guide, PC Board	
5 - 13	*55551220	Link	
5 - 14	*55446710	Shaft, Link; B	
5 - 15	*55446700	Shaft, Link; A	
5 - 16	*55551280	Rail, L	
5 - 17	*55446680	Shaft, Rail	
5 - 18	*55551270	Rail, R	
5 - 19	*55021661	Chassis Assy, Amplifier	
5 - 20	*51685310	PC Board Assy, Connector	
5 - 21	*51271900	Wire Assy	
5 - 22	*55551510	Spacer, Escutcheon	
5 - 23	*55532320	Shield Plate, Amplifier; C	

(Continued from page 67)

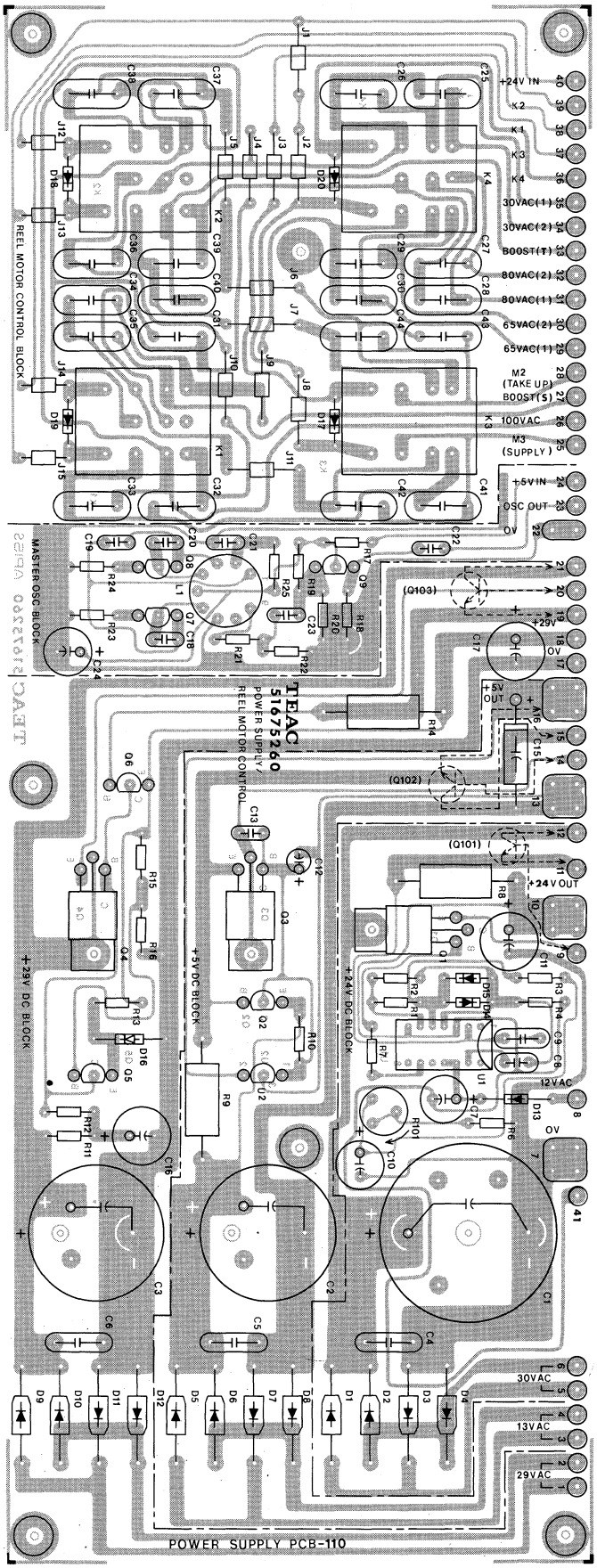
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 46	50585150	Counter, Index	
2 - 47	*51813060	Resistor, Carbon; 20 kohm ¼W	
2 - 48	*50548270	Capacitor, Mylar; 0.047 mfd 50V	
2 - 49	*60459000	Holder, Lamp	
2 - 50	*60503220	PC Board, Counter Lamp	
2 - 51	60468100	Lamp, Counter; 8V 60mA	
2 - 52	*51221660	Connector, Socket; 4P	

2. PC BOARD (Diagram)

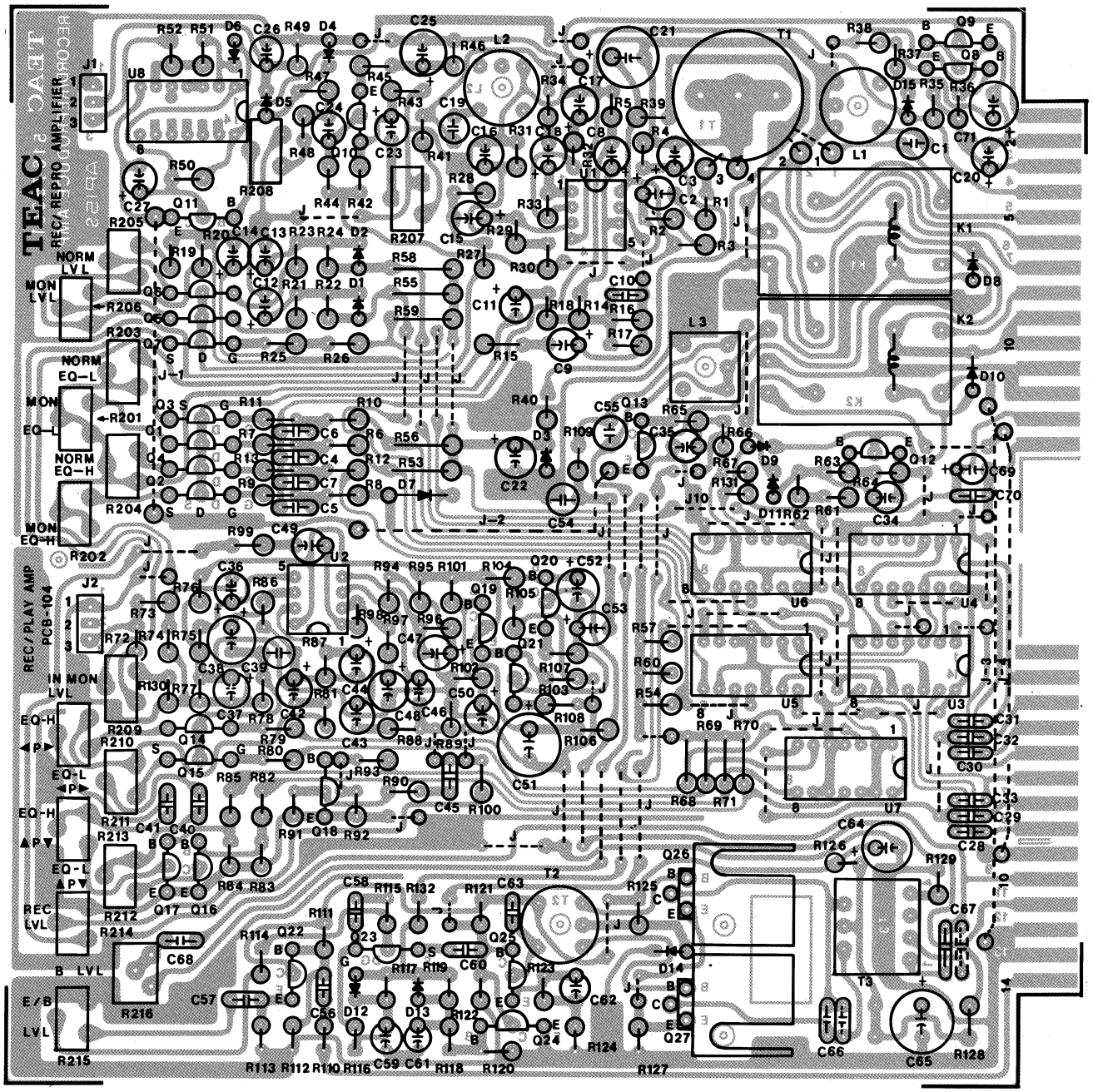
1. SYSTEM CONTROL PCB ASSY.



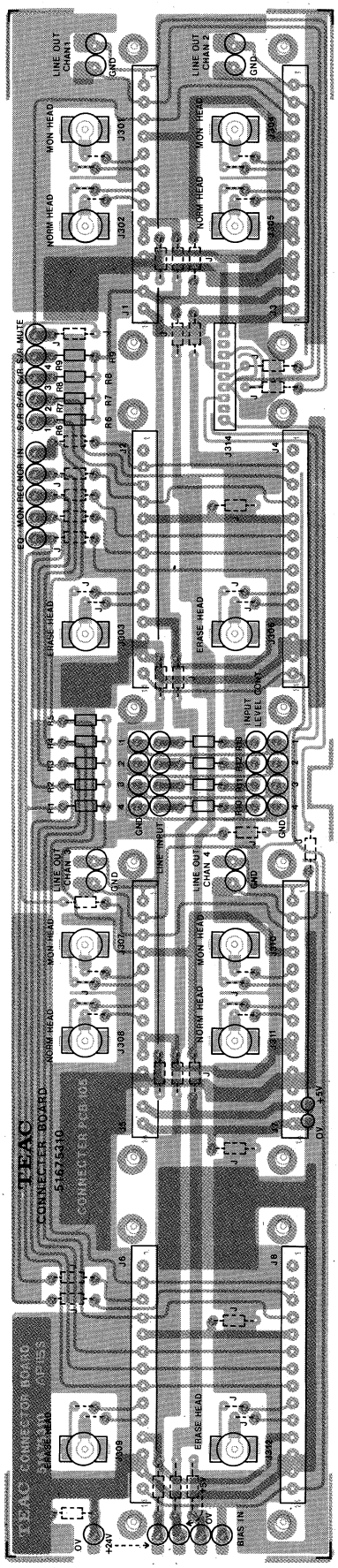
2. POWER SUPPLY AND MOTOR CONTROL PCB ASSY.



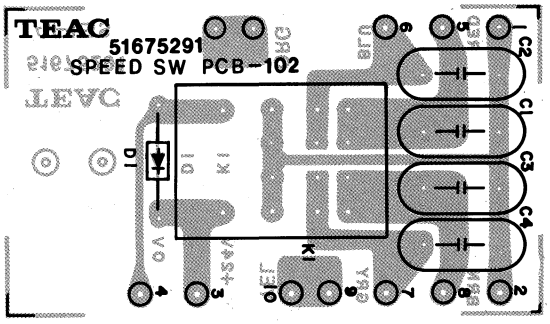
3. RECORD/REPRO. AMPL. PCB ASSY.



4. CONNECTOR BOARD PCB ASSY.



5. SPEED SW PCB ASSY.



2. PC BOARD (Parts List)

1. SYSTEM CONTROL PCB ASSY.

REF. NO.	PARTS NO.	DESCRIPTION
	51685251	PC Board Assy
	51675251	PC Board
	IC's	
U1	51470320	SN7414N
U2, U3	50427250	SN7404N
U4	51470310	SN7408N
U5~U8	50427120	SN7400N
U9	50427130	SN7402N
U10	50427120	SN7400N
U11	50427270	SN74122N
U12	50427140	SN7410N
U13	50427120	SN7400N
U14	50427140	SN7410N
U15, U16	51470310	SN7408N
U17	51470320	SN7414N
U18	50427250	SN7404N
U19	50427140	SN7410N
U20	50427120	SN7400N
U21	50427250	SN7404N
U22	50427120	SN7400N
U23	51470360	SN74123N
U24	51470240	SN7451N
U25, U26	51470330	SN7438N
U27, U28	50427120	SN7400N
U29	51470360	SN7412N
U30	51470340	SN7451N
	TRANSISTORS	
Q1	51450690	2SC711A F
Q2	51450710	2SC1312 YG
Q3	51450690	2SC711A F
Q4	51450710	2SC1312 YG
Q5~Q10	51450690	2SC711A F
Q11, Q12	51450700	2SC1211 D
Q13	51450630	2SB434 O
Q14	51450680	2SB514 D
Q15	51450630	2SB434 O
Q16	51450680	2SB524 D
Q17~Q21	51450690	2SC711A F
	DIODES	
D1~D11	50425360	1S953
D13, D14	50425360	1S953
D15~D22	51430890	W03C
D23~D31	50425360	
	CARBON RESISTORS	
	All resistors are rated ±5% tolerance and 1/4 watt unless otherwise noted.	
R1~R7	50570820	1k ohm
R8	50570980	4.7k ohm
R9	50570820	1k ohm
R10	50570980	4.7k ohm
R11	50571320	120k ohm
R12	50571340	150k ohm
R13, R14	50570640	180 ohm
R15	50571180	33k ohm

REF. NO.	PARTS NO.	DESCRIPTION
R16~R27	50570640	180 ohm
R28	50570340	10 ohm
R29	50570640	180 ohm
R30	50570840	1.2k ohm
R31	50571060	10k ohm
R32	50570840	1.2k ohm
R33	50571060	10k ohm
R34, R35	50574700	330 ohm 1/2W
R36	50571220	47k ohm
R37	50570460	33 ohm
R38	50571320	120k ohm
R39	50570840	1.2k ohm
R40	50570900	2.2k ohm
R41	50570980	4.7k ohm
R42	50571360	180k ohm
R43	50571460	470k ohm
R44, R45	50570900	2.2k ohm
R46	50571260	68k ohm
R47	50570460	33 ohm
R48	50571500	680k ohm
R49, R50	50570900	2.2k ohm
R51, R52	50570980	4.7k ohm
R53	50571360	180k ohm
R54	50571460	470k ohm
R55	50570960	3.9k ohm
R56	50570900	2.2k ohm
R57	50570980	4.7k ohm
R58	50571060	10k ohm
R59	50571300	100k ohm
R60	50571060	10k ohm
R62	50571020	6.8k ohm
R63	50570460	33 ohm
R64	50571060	10k ohm
R65, R66	50571300	100k ohm
R67	50570820	1k ohm
R68	50571060	10k ohm
R69	50571300	100k ohm
R70	50571060	10k ohm
R71	50571300	100k ohm
R73, R74	50570820	1k ohm
R75	50571380	220k ohm
R76, R77	50571220	47k ohm
R78	50571380	220k ohm
R79~R81	50570980	4.7k ohm
R82~R86	50570820	1k ohm
R87, R88	50571380	220k ohm
R89	50570820	1k ohm
R90	50570980	4.7k ohm
R91	50571220	47k ohm
R92, R93	50570820	1k ohm
R94~R97	50570640	180 ohm
R98, R99	50571120	18k ohm
R100	50571160	27k ohm
R101~R104	50570580	100 ohm
R105~R111	50570640	180 ohm
R112~R114	50570580	100 ohm
R115	50571300	100k ohm
R116	50570580	100 ohm

REF. NO.	PARTS NO.	DESCRIPTION		
		CAPACITORS		
C1~C4	50546891	Dip. tant.	1 mfd	25V
C5	50549660	Elec.	1 mfd	25V (KU)
C6, C7	50546891	Dip. tant.	1 mfd	25V
C8	50549660	Elec.	1 mfd	25V (KU)
C9	50546461	Dip. tant.	47 mfd	6.3V
C10, C11	50548290	Mylar	0.022 mfd	50V
C12	50546461	Dip. tant.	47 mfd	6.3V
C13~C24	50548570	Mylar	0.0068	50V
C25	50548290	Mylar	0.022 mfd	50V
C26	50549696	Elec.	4.7 mfd	25V (KU)
C27	50549660	Elec.	1 mfd	25V (KU)
C28	50546581	Dip. tant.	22 mfd	16V
C30	50546541	Dip. tant.	4.7 mfd	16V
C31~C34	50548020	Mylar	0.01 mfd	50V
C35, C36	50546500	Dip. tant.	22 mfd	10V
C37	50546461	Dip. tant.	47 mfd	6.3V
C38~C40	50549680	Elec.	3.3 mfd	25V
C41, C42	50546521	Dip. tant.	2.2 mfd	16V
C43	50554200	Elec.	100 mfd	16V
C44~C49	50542040	Ceramic	0.01 mfd	50V
C50	50554580	Elec.	47 mfd	50V
C51	50542040	Ceramic	0.01 mfd	50V
C52	50554200	Elec.	100 mfd	16V
C53~C56	50542040	Ceramic	0.01 mfd	50V
C57	50554200	Elec.	100 mfd	16V
C58, C59	50542040	Ceramic	0.01 mfd	50V
C60	50554200	Elec.	100 mfd	16V
C61	50542040	Ceramic	0.01 mfd	50V
C62~C65	50548570	Mylar	0.0068	50V
		MISCELLANEOUS		
S1~S7	51340601	Switch, Push; 7-gang		
S8~S10	60510652	Switch, Push; 3-gang		
J2	51221320	Connector, Plug; 8P		
J103	51222510	Connector, Plug; 15P		
J104	51222530	Connector, Plug; 22P		
J105	60521700	Connector, Plug; 4P		
J106	51221280	Connector, Plug; 4P		
J107	51221320	Connector, Plug; 8P		
	51470370	Socket, IC; 14P		
	51470380	Socket, IC; 16P		
	51271940	Wire Set , System Control		

2. POWER SUPPLY AND MOTOR CONTROL PCB ASSY.

REF. NO.	PARTS NO.	DESCRIPTION		
	51685260	PC Board Assy		
	51675260	PC Board		
		IC's		
U1	51470290	μA723PC or NJM723D		
U2	51470300	FS7805L		
		TRANSISTORS		
Q1	51450720	2SD361 D		
Q2	51450660	2SA696 D		
Q3	51450680	2SB524 D		
Q4	51450720	2SD361 D		
Q5~Q9	51450710	2SC1312 YG		
		DIODES		
D1~D12	51430180	U05E or		
	51430600	P-300D4		
D13	51430890	W03C		
D14, D15	50425360	1S953		
D16	51430580	Zener, RD-9.1 EB		
D17~D20	51430890	W03C		
		RESISTORS		
		All resistors are rated ±5% tolerance, 1/4 watt and of carbon type unless otherwise noted.		
R1~R4	51812940	3.3k ohm		
R6	51813120	18k ohm		
R7	51812580	100 ohm		
R8	50520600	Cement, 0.3 ohm	2W	
R9	50520590	Cement, 0.25 ohm	2W	
R10	51812620	150 ohm		
R11	51812820	1k ohm		
R12	51812660	220 ohm		
R13	51812940	3.3k ohm		
R14	50520600	Cement, 0.3 ohm	2W	
R15	51812980	4.7k ohm		
R16	51812900	2.2k ohm		
R17	51812340	10 ohm		
R18	51812720	390 ohm		
R19	51813040	8.2k ohm		
R20	51813080	12k ohm		
R21	51812820	1k ohm		
R22	51812780	680 ohm		
R23, R24	51812540	68 ohm		
R25	51813180	33k ohm		
		CAPACITORS		
C1	51700430	Elec.	4700 mfd	63V
C2	50557130	Elec.	4700 mfd	25V
C3	51700410	Elec.	2200 mfd	50V
C4~C6	50542230	Ceramic	0.01 mfd	500V
C7	50554170	Elec.	100 mfd	25V
C8	50548270	Mylar	0.047 mfd	50V
C9	50548040	Mylar	0.1 mfd	50V
C10	50554490	Elec.	47 mfd	25V

REF. NO.	PARTS NO.	DESCRIPTION		
C11	50554070	Elec.	100 mfd	50V
C12	50554220	Elec.	3.3 mfd	25V
C13	50548020	Mylar	0.01 mfd	50V
C15	50555220	Elec.	100 mfd	16V
C16	50554070	Elec.	100 mfd	50V
C17	50554580	Elec.	47 mfd	50V
C18	50548020	Mylar	0.01 mfd	50V
C19	50548270	Mylar	0.047 mfd	50V
C20	50548020	Mylar	0.01 mfd	50V
C21	50548240	Mylar	0.033 mfd	50V
C22	50548270	Mylar	0.047 mfd	50V
C23	50548020	Mylar	0.01 mfd	50V
C24	50554200	Elec..	100 mfd	16V
C25~C44	50549920	Met. Mylar	0.1 mfd	400V
	RELAYS			
K1, K2	50611120	MY-3	DC24V	
K3	50611160	MY-2	DC24V	
K4	50611120	YM-3	DC24V	
	VARIABLE RESISTORS			
R101	50533480	Semi-fixed, 10k ohm-B		
	TRANSFORMER			
L1	60466070	Oscillator		
	MISCELLANEOUS			
J1~J11	51812070	Jumper, JPW-02; 15 mm		
J12~J15	51812080	Jumper, JPW-02; 10 mm		

3. RECORD/REPRO. AMPL. PCB ASSY.

REF. NO.	PARTS NO.	DESCRIPTION
	51685301	PC Board Assy
	61675300	PC Board
	IC's	
U1	51470280	RC4558DD
U2	51470240	RC4558DF
U3	50427250	SN7404N
U4	50427120	SN7400N
U5~U7	51470350	SN7426N
U8	50427120	SN7400N
	TRANSISTORS	
Q1~Q7	60480710	FET, 2N5462
Q8	51450670	2SA725F
Q9	51450700	2SC1221 D
Q10	51450710	2SC1312 YG
Q11~Q13	51450690	2SC711 AF
Q14, Q15	60480710	FET, 2N5462
Q16~Q18	51450690	2SC711 AF
Q19	51450710	2SC1312 YG
Q20, Q21	51450700	2SC1211 D
Q22	51450690	2SC711 AF
Q23	60480710	FET, 2N5462
Q24, Q25	51450690	2SC711 AF
Q26, Q27	51450720	2SD361 D
	DIODES	
D1, D2	50425360	1S953
D3	51430860	Zener, RD13EK
D4, D5	50422130	1N60
D6, D7	50425360	1S953
D8	51430890	W03C
D9	50425360	1S953
D10	51430890	W03C
D11	50422130	1N60
D12, D13	50425360	1S953
D14	50422180	Varystor M8513A-R
D15	50425360	1S953
	CARBON RESISTORS	
	All resistors are rated ±5% tolerance and 1/4 watt.	
R1	50570820	1k ohm
R2	50571420	330k ohm
R3	50571220	47k ohm
R4	50571140	22k ohm
R5	50570860	1.5k ohm
R6	50571340	150k ohm
R7	50571400	270k ohm
R8	50571340	150k ohm
R9	50571400	270k ohm
R10	50571340	150k ohm
R11	50571400	270k ohm
R12	50571340	150k ohm
R13	50571400	270k ohm
R14	50571180	33k ohm
R15	50570580	100 ohm

REF. NO.	PARTS NO.	DESCRIPTION
R16	50571520	820k ohm
R17	50571440	390k ohm
R18	50570840	1.2k ohm
R19, R20	50570860	1.5k ohm
R21~R25	50571400	270k ohm
R26	50571300	100k ohm
R27	50570820	1k ohm
R28	50571200	39k ohm
R29	50571340	150k ohm
R30, R31	50571220	47k ohm
R32	50570820	1k ohm
R33	50571180	33k ohm
R34	50570780	680 ohm
R35	50571220	47k ohm
R36	50571140	22k ohm
R37	50570820	1k ohm
R38	50571060	10k ohm
R39	50570660	220 ohm
R40	50570860	1.5k ohm
R41	50571100	15k ohm
R42	50571360	180k ohm
R43	50571240	56k ohm
R44	50570900	2.2k ohm
R45	50570580	100 ohm
R46	50570820	1k ohm
R47	50570740	470 ohm
R48	50571040	8.2k ohm
R49	50571000	5.6k ohm
R50	50570820	1k ohm
R51	50570740	470 ohm
R52	50570680	270 ohm
R53, R54	50571180	33k ohm
R55	50571020	6.8k ohm
R56, R57	50571180	33k ohm
R58	50571020	6.8k ohm
R59	50571180	33k ohm
R60	50571000	5.6k ohm
R61	50570980	4.7k ohm
R62	50570960	3.9k ohm
R63	50570760	560 ohm
R64	50571300	100k ohm
R65	50570700	330 ohm
R66	50571100	15k ohm
R67	50570920	2.7k ohm
R68, R69	50571180	33k ohm
R70, R71	50571000	5.6k ohm
R72	50571100	15k ohm
R73	50571200	39k ohm
R74	50571100	15k ohm
R75	50571340	150k ohm
R76	50571220	47k ohm
R77	50571180	33k ohm
R78	50570860	1.5k ohm
R79, R80	50571400	270k ohm
R81	50570940	3.3k ohm
R82	50570980	4.7k ohm
R83, R84	50570920	2.7k ohm
R85	50570980	4.7k ohm
R86	50571360	180k ohm
R87	50570920	2.7k ohm
R88	50571020	6.8k ohm
R89	50571060	10k ohm
R90	50571020	6.8k ohm

REF. NO.	PARTS NO.	DESCRIPTION
R91	50571240	56k ohm
R92	50570960	3.9k ohm
R93	50571060	10k ohm
R94	50571340	150k ohm
R95, R96	50571220	47k ohm
R97	50570820	1k ohm
R98	50570900	2.2k ohm
R99	50570760	560 ohm
R100	50570820	1k ohm
R101	50571360	180k ohm
R102	50571160	27k ohm
R103	50570940	3.3k ohm
R104	50571200	39k ohm
R105	50571340	150k ohm
R106	50570660	220 ohm
R107, R108	50570580	100 ohm
R109	50570500	47 ohm
R110	50570820	1k ohm
R111	50571240	56k ohm
R112	50571080	12k ohm
R113	50570760	560 ohm
R114	50570580	100 ohm
R115	50571060	10k ohm
R116	50571300	100k ohm
R117	50571020	6.8k ohm
R118	50571060	10k ohm
R119	50571280	82k ohm
R120	50571300	100k ohm
R121	50571080	12k ohm
R122	50570900	2.2k ohm
R123	50570720	390 ohm
R124	50570340	10 ohm
R125	50570980	4.7k ohm
R126	50570700	330 ohm
R127~R129	50570340	10 ohm
R130	50571060	10k ohm
R131	50570980	4.7k ohm
R132	50570500	47 ohm

CAPACITORS

C1	60435340	Polyst.	1000 pfd	
C2	51700870	Elec.	2.2 mfd	50V (LR)
C3	51700770	Elec.	10 mfd	16V (LR)
C4~C7	50548020	Mylar	0.01 mfd	50V
C8,C9	51700770	Elec.	10 mfd	16V (LR)
C10	50548620	Mylar	0.012 mfd	50V
C11	50554970	Elec.	0.47 mfd	50V
C12, C13	50554540	Elec.	1 mfd	50V
C14	50554970	Elec.	0.47 mfd	50V
C15	51700870	Elec.	2.2 mfd	50V (LR)
C16	50554050	Elec.	10 mfd	16V
C17	50554880	Elec.	22 mfd	16V
C18	51700770	Elec.	10 mfd	16V (LR)
C19	60435340	Polyst.	100 pfd	50V
C20	50554970	Elec.	0.47 mfd	50V
C21	50554170	Elec.	100 mfd	25V
C22	50554880	Elec.	22 mfd	16V
C23	51700770	Elec.	10 mfd	16V (LR)
C24	50554530	Elec.	4.7 mfd	25V
C25	50554230	Elec.	100 mfd	6.3V
C26	50554720	Elec.	22 mfd	10V
C27	50554530	Elec.	4.7 mfd	25V

REF. NO.	PARTS NO.	DESCRIPTION		
C28~C33	50548320	Mylar	0.001 mfd	50V
C34	50546461	Dip. tant.	47 mfd	6.3V
C35	50546441	Dip. tant.	22 mfd	6.3V
C36	51700770	Elec.	10 mfd	16V (LR)
C37	50554050	Elec.	10 mfd	16V
C38	50554010	Elec.	47 mfd	16V
C39	60435520	Polyst.	330 pfd	50V
C40	50548420	Mylar	0.015 mfd	50V
C41	50548130	Mylar	0.0047 mfd	50V
C42	50554970	Elec.	0.47	50V
C43	50554050	Elec.	10 mfd	16V
C44	50554970	Elec.	0.47 mfd	50V
C45	50548130	Mylar	0.0047 mfd	50V
C46, C47	50554050	Elec.	10 mfd	16V
C48	50554880	Elec.	22 mfd	16V
C49, C50	50554050	Elec.	10 mfd	16V
C51	50554170	Elec.	100 mfd	25V
C52	50554030	Elec.	47 mfd	6.3V
C53	51700770	Elec.	10 mfd	16V (LR)
C54	60435020	Polyst.	820 pfd	50V
C55	60447610	Polyst.	1000 pfd	125V
C56, C57	50548020	Mylar	0.01 mfd	50V
C58	50548320	Mylar	0.001 mfd	50V
C59	50546581	Dip. tant.	22 mfd	16V
C60	50548020	Mylar	0.01 mfd	50V
C61, C62	50546441	Dip. tant.	22 mfd	6.3V
C63	51703130	Polypro.	0.047 mfd	50V
C64	50554490	Elec.	47 mfd	25V
C65	50554170	Elec.	100 mfd	25V
C66	51703120	Polypro.	0.01 mfd	50V
C67	51700480	Mylar	0.01 mfd	160V
C68	50547490	Mylar	0.001 mfd	100V
C69	50554720	Elec.	22 mfd	10V
C70	50548020	Mylar	0.01 mfd	50V
C71	50554330	Elec.	220 mfd	6.3V
C72	50547420	Dip. Mica	47 pfd	50V
C73	50548020	Mylar	0.01 mfd	50V

REF. NO.	PARTS NO.	DESCRIPTION	
	RELAYS		
K1, K2	50611280	Sub-miniature, LZN2	DC24V
	VARIABLE RESISTORS		
R201~R204	51501280	Semi-fixed, 6.8k ohm-B	
R205, R206	51501290	Semi-fixed, 10k ohm-B	
R207~R209	51501310	Semi-fixed, 22k ohm-B	
R210, R211	51501260	Semi-fixed, 3.3k ohm-B	
R212	51501210	Semi-fixed, 470 ohm-B	
R214	51501290	Semi-fixed, 10k ohm-B	
R215	51501260	Semi-fixed, 3.3k ohm-B	
R216	60410070	Semi-fixed, 50k ohm-B (1W)	
	COILS		
L1, L2	50566560	Trap, 2 mH	
L3	50566590	Trap, 3 mH	
	TRANSFORMERS		
T1	60466310	Step-up	
T2	60466080	Coupling	
T3	60466182	Output	
	MISCELLANEOUS		
	55551210	Shield, Relay	
J1, J2	51221460	Connector, Plug; 3P	
	51221270	Connector, Plug; 3P	
	51271951	Wire Set, Record/Playback	
	51812090	Jumper, JPW-02	
	55531320	Heatsink	

4. CONNECTOR BOARD PCB ASSY.

REF. NO.	PARTS NO.	DESCRIPTION
	51685310	PC Board Assy
	51675310	PC Board
D1	50425360	Diode, 1S953
R1~R9	51812900	Carbon Res., 2.2k ohm 1/4W 5%
R10~R13	51813140	Carbon Res., 22k ohm 1/4W 5%
	51812090	Jumper, JPW-02 (30 used)
J1~J8	51222500	Connector, 14P
J301~J312	50435000	Pin Jack
J314	51221520	Connector, Plug; 9P
P102	51222550	Connector, Plug; 7P
R103	51222520	Connector, Socket; 15P
	51271880	Wire Set, Ampl. Power Supply
	51271930	Wire Set, Input-output
	51271910	Wire Set, Function Select

5. SPEED SW PCB ASSY

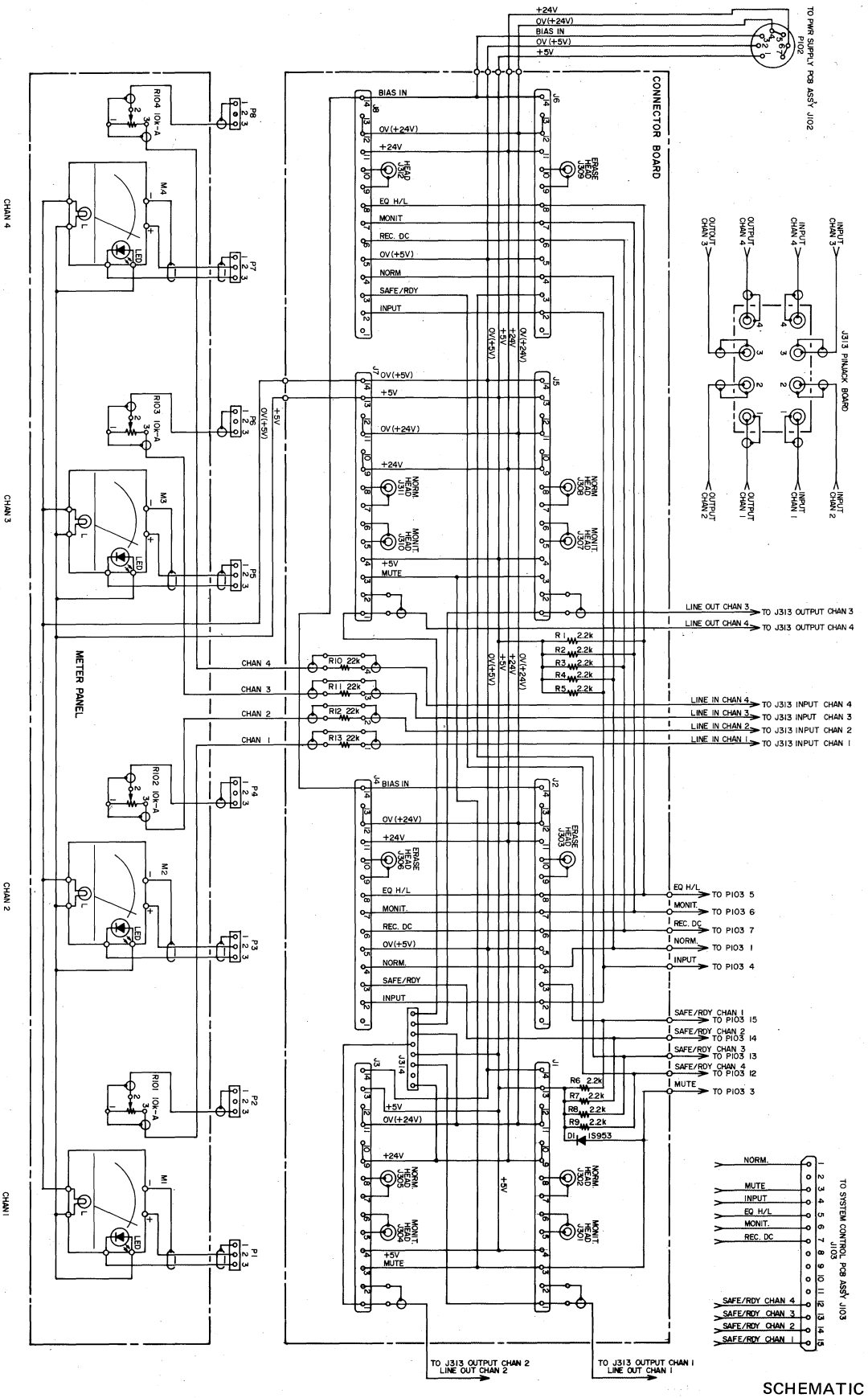
REF. NO.	PARTS NO.	DESCRIPTION
	51685291	PC Board Assy
	51675291	PC Board
D1	51430890	Diode, W03C
C1~C4	50549920	Cap, Met. Mylar, 0.1 mfd 400V
K1	50610690	Relay, MY-4 DC24V

INCLUDED ACCESSORIES

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
	51280320	Cord	JAPAN, GENERAL EXPORT
	51280300	Cord	AUSTRALIA
	51280570	Cord (w/Connector)	U.K.
	51280560	Cord	EUROPE
	51280120	Cord	CANADA, U.S.A.
	55980250	Reel Clamp Adapter (TZ-612)	
	50323011	Cushion, Rubber	
	*RE-1002	Empty Reel, 10 inch	All except CANADA, U.S.A.
	51280010	Cord, Input-output	JAPAN
	51014680	Owner's Manual	JAPAN
	51014670	Owner's Manual	CANADA, U.S.A.
	51014690	Owner's Manual	GENERAL EXPORT

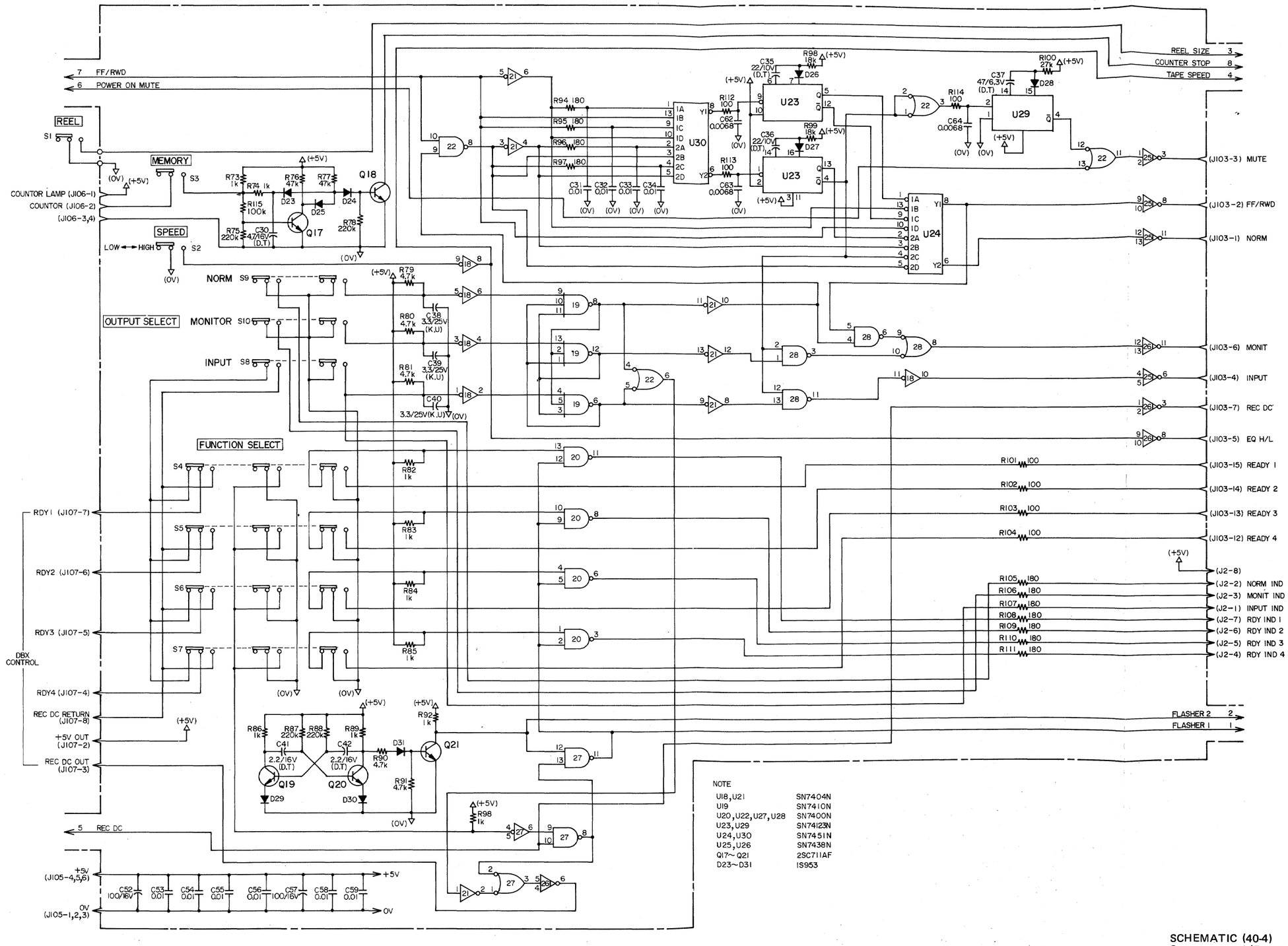
***NOTE:** The Empty Reel is available as an Optional Accessory and thus is not assigned a special TEAC parts number. Please order this by the MODEL CODE NUMBER (RE-1002). This number is included on the package.

3. SCHEMATICS



ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (40-4)
Connector board ass'y & meter unit
REV.
TEAC CORPORATION

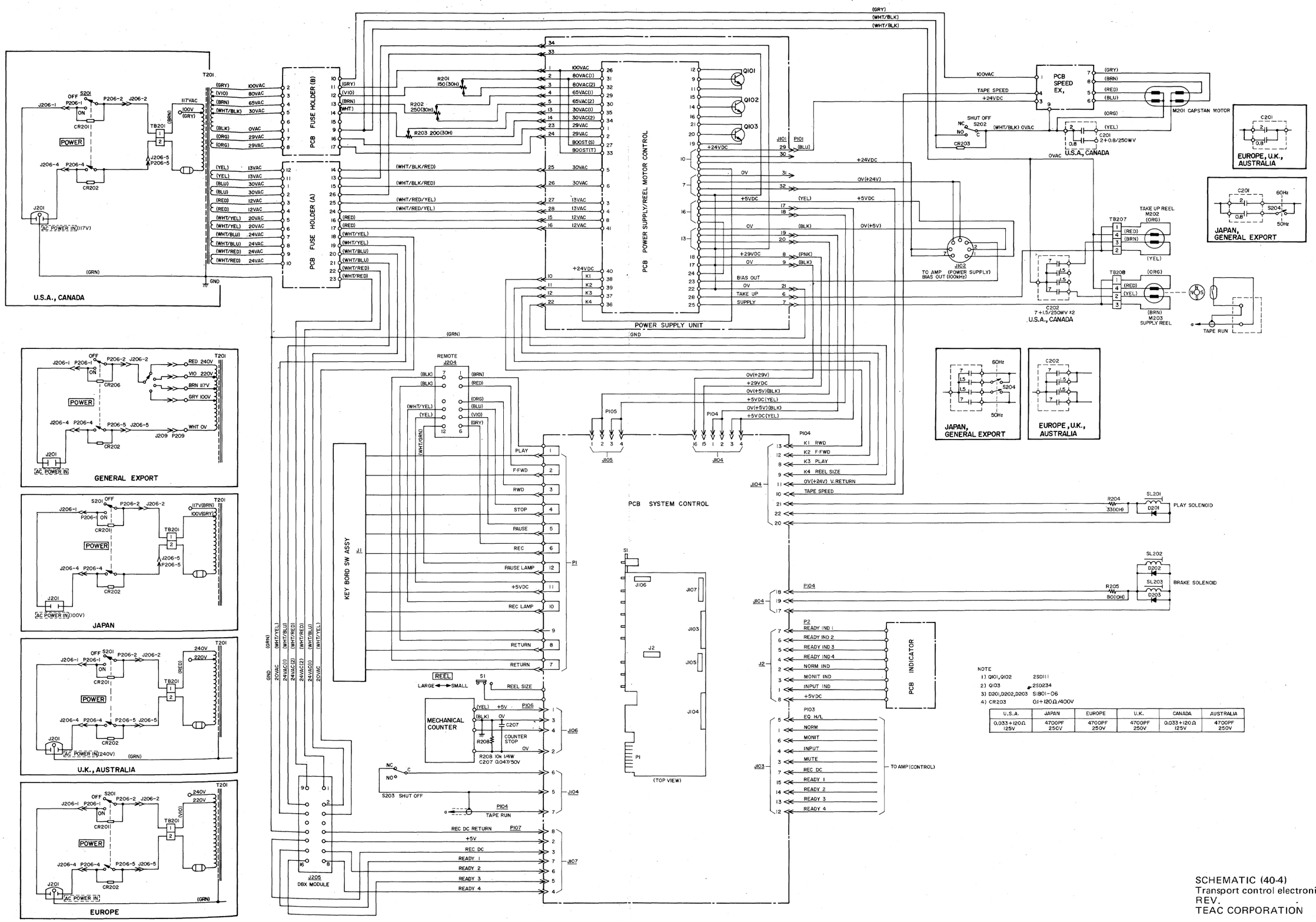


NOTE

U18,U21	SN7404N
U19	SN7410N
U20,U22,U27,U28	SN7400N
U23,U29	SN74123N
U24,U30	SN7451N
U25,U26	SN7438N
Q17~Q21	2SC711AF
D23~D31	1S953

ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

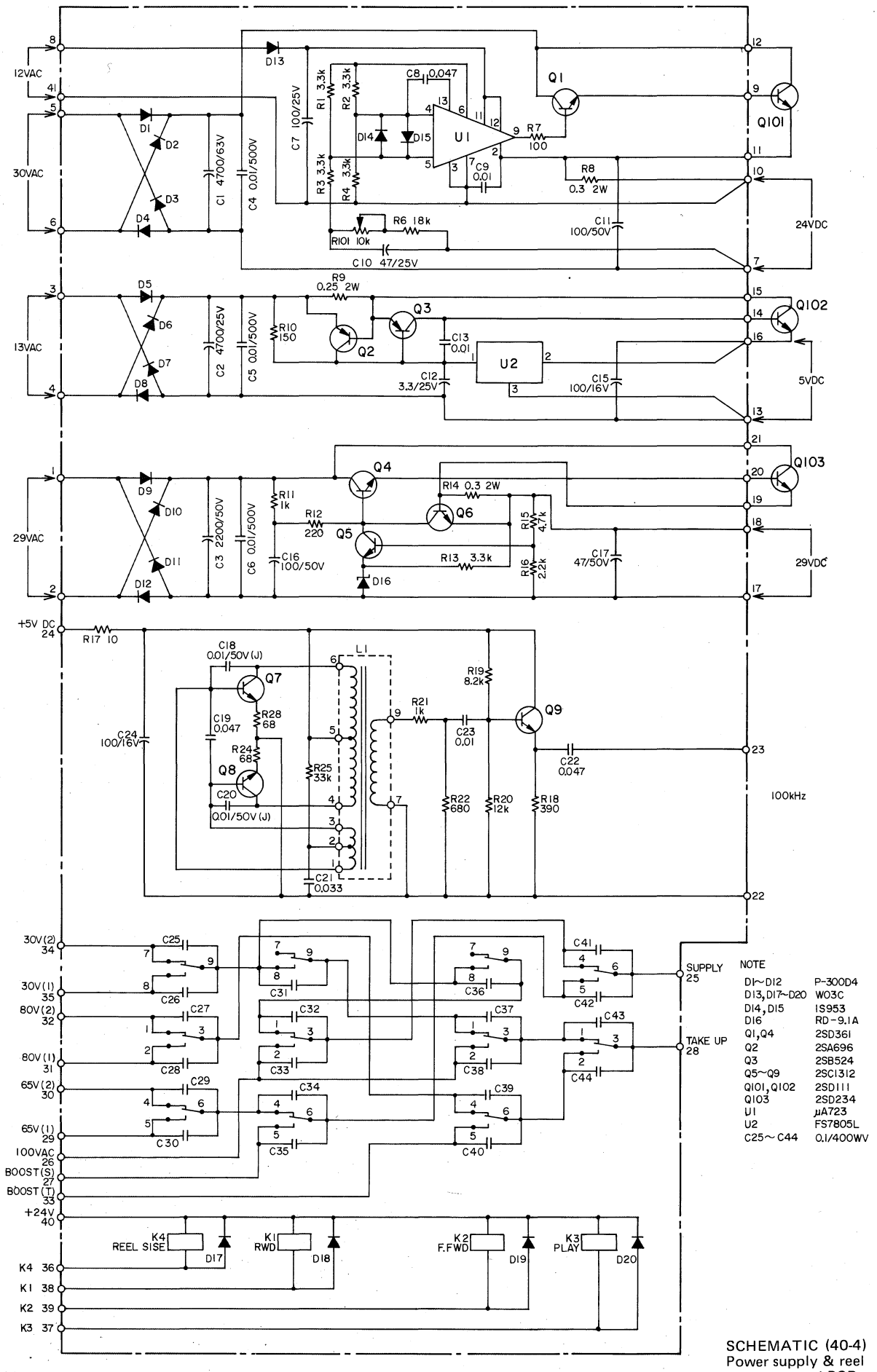
SCHEMATIC (40-4)
System control (Function select) PCB ass'y
REV.
TEAC CORPORATION



NOTE
1) Q101, Q102 2SD111
2) Q103 2SD234
3) D201, D202, D203 SIB01-06
4) CR203 01+120Ω/400V

U.S.A.	JAPAN	EUROPE	U.K.	CANADA	AUSTRALIA
0.033+120Ω 125V	4700PF 250V	4700PF 250V	4700PF 250V	0.033+120Ω 125V	4700PF 250V

SCHEMATIC (40-4)
Transport control electronics
REV.
TEAC CORPORATION

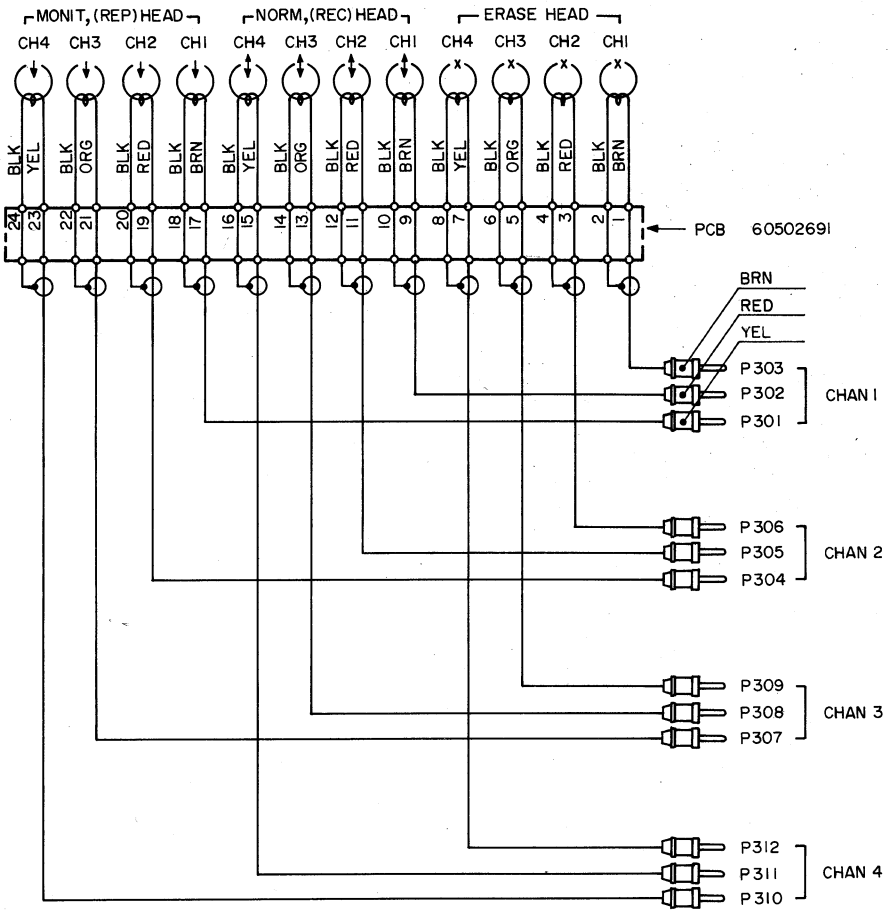


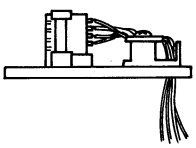
NOTE

D1~D12	P-300D4
D13, D17~D20	W03C
D14, D15	1S953
D16	RD-9.1A
Q1, Q4	2SD361
Q2	2SA696
Q3	2SB524
Q5~Q9	2SC1312
Q101, Q102	2SD111
Q103	2SD234
U1	μA723
U2	FS7805L
C25~C44	0.1/400WV

ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (40-4)
Power supply & reel motor control PCB ass'y
REV.
TEAC CORPORATION

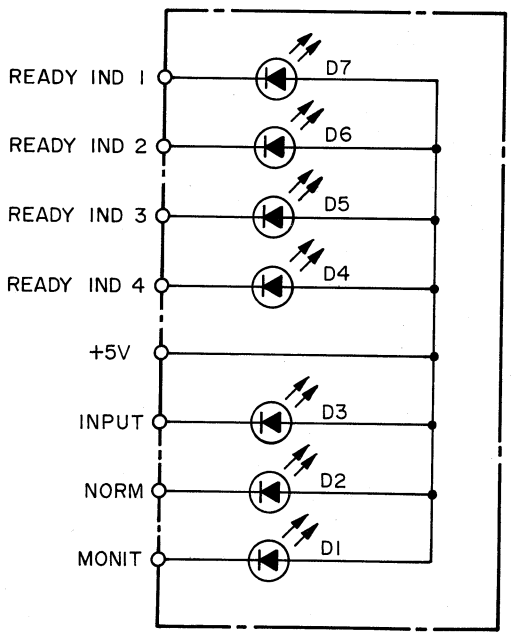




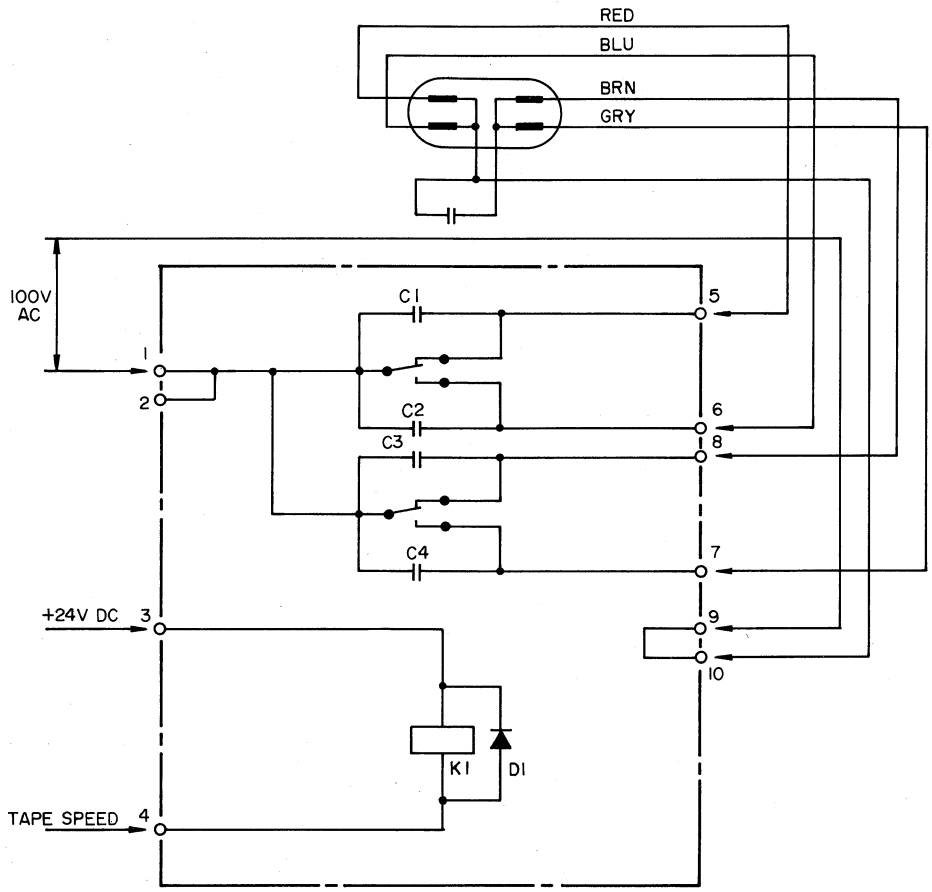
NOTE

MONIT. (REPRO.) HEAD ---- YEL
NORM. (REC) HEAD -----RED
ERASE HEAD --------BRN

SCHEMATIC (40-4)
Head ass'y
REV.
TEAC CORPORATION



SCHEMATIC (40-4)
Indicator PCB ass'y
REV.
TEAC CORPORATION

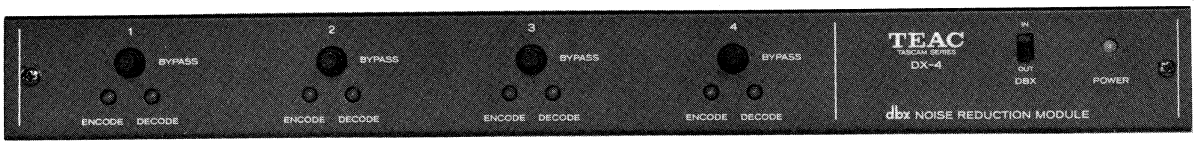


C1~C4 0.1/400V Metalized Mylar
D1 WO 3C

SCHEMATIC (40-4)
Speed select PCB ass'y
REV.
TEAC CORPORATION

SECTION 5

MODEL DX-4
NOISE REDUCTION MODULE



5-1 SPECIFICATIONS

Number of channels	4, switchable to encode or decode
Input	
Impedance	Greater than 50k Ohms
Nominal input level	–10 dB (0.3V)
Maximum input level	+16 dB (6.3V)
Output	
Load impedance	Greater than 50k Ohms
Nominal output level	–10 dB (0.3V)
Maximum output level	+16 dB (6.3V)
Frequency response (back to back)	100 Hz ~ 15 kHz ±0.5 dB 30 Hz ~ 20 kHz ±1.0 dB
Distortion (back to back)	0.2% max. at 1 kHz 0.6% max. at 100 Hz
Effect of the DBX system on recording	a 100 dB dynamic range is possible by the 30 dB noise reduction and 10 dB improvement in the saturation point.
Power requirement	24V AC x 2, 50/60 Hz, 18W [Included power cable is used to supply power from 40-4 tape deck]

*dbx noise reduction system made under license from dbx, Incorporated. The word dbx and the Symbol are trademarks of dbx, Incorporated.

PARTS LOCATION AND TEST POINTS

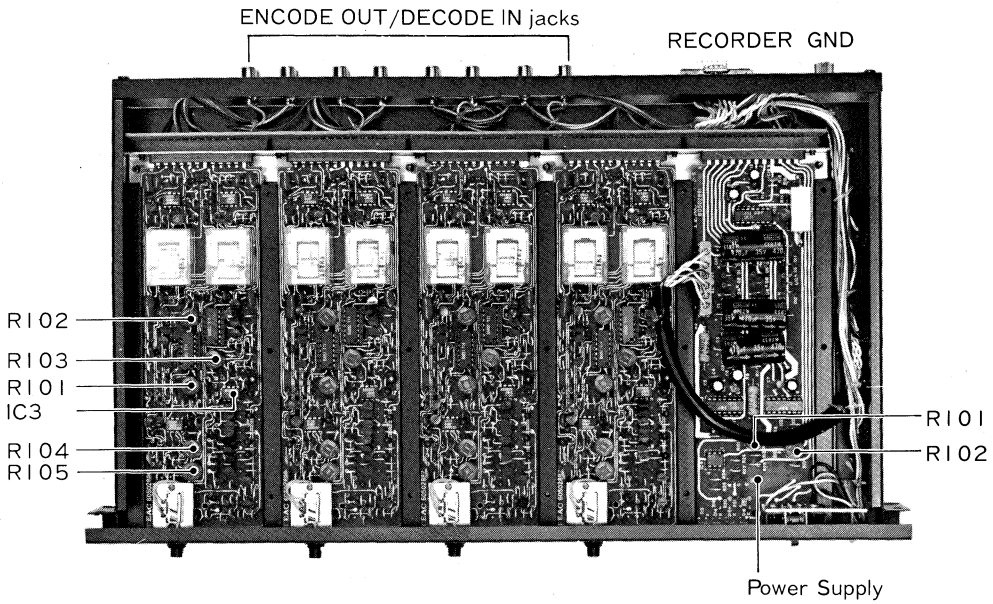


Fig. 5-1 Parts Location and Test Points

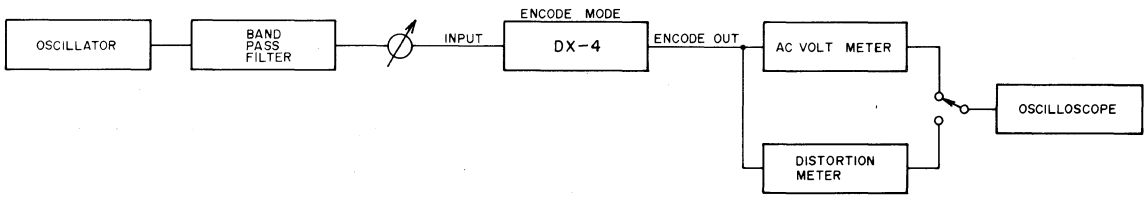


Fig. 5-2 Encode Test Connections

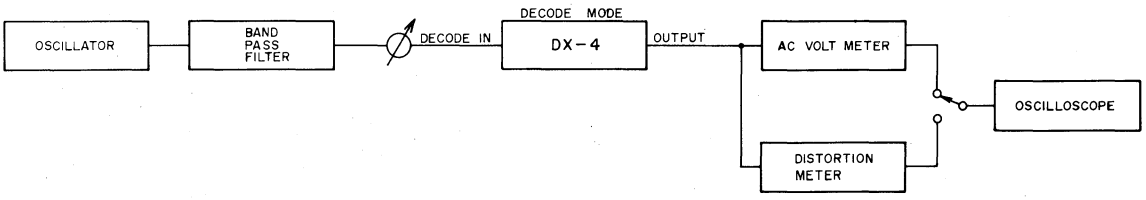


Fig. 5-3 Decode Test Connections

5-2 TEST EQUIPMENT REQUIRED

Oscillator	Audio use, distortion less than 0.1% (at 1 kHz)
Bandpass filter	Required when oscillator distortion is higher than 0.1% The bandpass filter is not necessary if the main objective is in setting distortion figure to the best point
AC voltmeter	−100 dB ~ +40 dB, imp. = >1MΩ, <25pF
Oscilloscope	General purpose
Distortion meter	100% ~ 0.3%, imp. = >10kΩ

5-3 TESTING AND ADJUSTMENT PROCEDURE

Outlined procedures are given for CHANNEL 1 only. However, the same procedures should be done for all channels unless noted.

0 dB = 1V

Connect Power cord to DBX MODULE (on 40-4) and RECORDER connector (DX-4).

5-4 POWER SUPPLY VOLTAGE CHECK

– Adjusting the –15 Volt Supply –

1. Connect DC voltmeter, between condenser C5 (–) terminal and C1 (–) ground on Power Supply PC Board.
2. If adjustment is necessary, adjust pot R102 for –15 ±0.1 VDC.

– Adjusting the +15 Volt Supply –

3. Change the Test Point to between Resistor R3 (C4 side) and C1 (–) ground. See Fig. 5-4.
4. If adjustment is necessary, adjust pot R101 for +15 ±0.1 VDC.

NOTE: The –15 Volt Supply must always be adjusted first as this is a voltage tracking type power supply. Since the +15 Volt Supply is referenced to the –15 volt supply, the +15 volt line must always be checked and adjusted when the –15 volt line is adjusted.

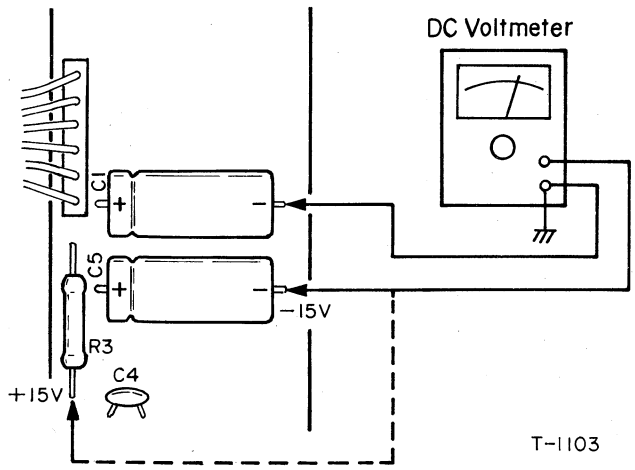


Fig. 5-4 Power Supply Voltage Test Points

5-5 ENCODE CIRCUIT CHECK AND ADJUSTMENT

NOTE: Each channel of the DX-4 is individually put into the ENCODE or DECODE mode by the control signal from the 40-4 tape deck.
However, when power is supplied to the DX-4 and its Front Panel DBX IN/OUT SW is set to IN, it will go to the DECODE mode but will not go to the ENCODE mode unless there is a control signal from the 40-4 tape deck.

5-6 PREPARATIONS OF 40-4 AND DX-4

NOTE: For following checks and adjustment always keep conditions as given below.

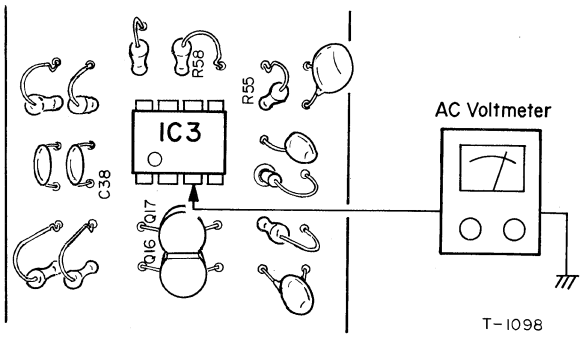
Depress RECORD/PAUSE mode
OUTPUT SELECT controls → Select MONITOR SW to ON position
FUNCTION SELECT → All ON position (LED Lighted)
DBX IN/OUT → IN position (on DX-4 Front Panel)

NOTE: Any desired channel of the dbx unit can be bypassed with the BYPASS button.
The dbx unit will be bypassed when the button is depressed and regardless of ON or OFF of the FUNCTION SELECT buttons of the model 40-4 tape deck, the ENCODE or DECODE LED will not be lighted.

5-7 ENCODE LEVEL SETTING

1. Hook-up the test equipment to the DX-4 as shown in the diagram. See Fig. 5-2.
2. Apply a –10 dB (0.3V), 1 kHz signal to the channel 1 INPUT pin jack on Rear Panel of the DX-4.
3. Connect the AC voltmeter to channel 1 ENCODE OUT pin jack.
4. Set all pots (5 each) on the PC Board to their center positions.
5. Adjust R105 for –10 dB ±0.1 dB (313mV ~ 320mV) reading on the AC voltmeter.
6. Connect an oscilloscope between IC-3 #3 terminal and ground, and feed a 100 Hz/–10 dB (0.3V) signal to INPUT pin jack.

NOTE: Turn off power on 40-4 before connecting probe to IC-3 to avoid shorting out IC Pin by accident, then reapply power to 40-4. Also turn off power prior to removing probe.



DX-4 Power Supply P.C.B.

Fig. 5-5 Encode waveform Check Point

7. Although DC output from the level sensor is obtained at this check point, monitor with the oscilloscope the DC output ripple content (200 Hz) and adjust R103 so that the ripple becomes less than 1mV, P–P.
   See Fig. 5-6, 5-7 Waveforms.
8. Reset the INPUT signal to 1 kHz, adjust R105 for –10 dB ±0.1 dB (313mV ~ 320mV) reading on the AC voltmeter.

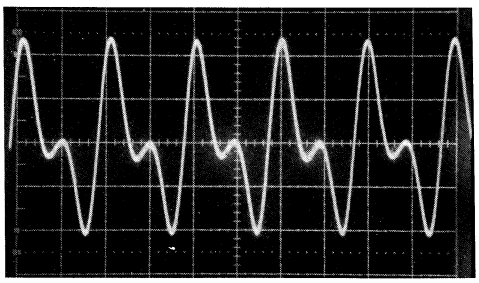


Fig. 5-6 Improper Setting of R103

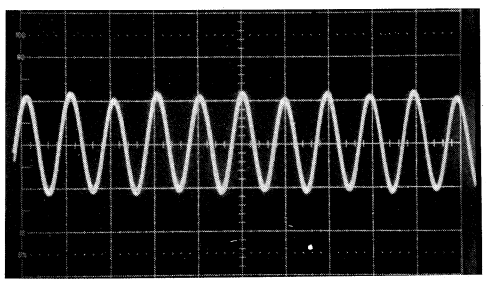


Fig. 5-7 Proper Setting of R103

5-8 DISTORTION CHECK

1. Connect Distortion meter to OUTPUT.
   Distortion should be less than 0.2%. See Fig. 5-8, 5-9 Waveform.

NOTE: If distortion is inferior to this, adjust R102 for an input level of –10 dB (0.3V), and R101 for an input level of –30 dB (31.6mV), until minimum distortion is obtained. Alternately repeat this process at both levels until best point is reached.

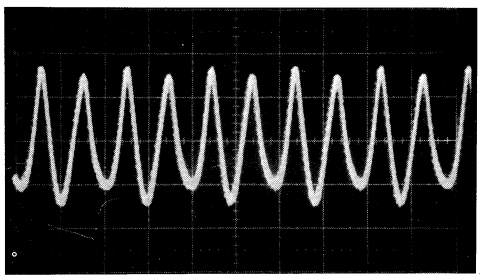


Fig. 5-8 Improper Setting of R101 or R102 0.5% distortion (at 1 kHz)

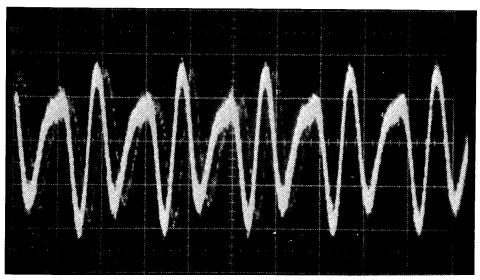


Fig. 5-9 Proper Setting of R101 or R102 - 0.16% distortion (at 1 kHz)

5-9 FREQUENCY CHARACTERISTICS CHECK

The normal, good condition reading should be –2.5 dB ±0.5 (794mV ~ 708mV) at 100 Hz, and –4.5 dB ±0.5 dB (630 mV ~ 560mV) at 10 kHz; both referenced to 1 kHz.

5-10 SIGNAL-TO-NOISE RATIO CHECK

1. Remove Input signal and measure the residual noise. Compare this level to the specified signal level –10 dB (0.3V) to obtain S/N ratio. Under normal conditions, S/N should be –45 dB (5.62mV) unweighted, and –48 dB (3.98mV) for weighted noise level.
2. Check the remaining channels 2 ~ 4 in the same way.
3. Faulty operation can also be corrected by comparing with the normal condition waveforms, Fig. 5-10, 5-11, 5-12, 5-13.

5-11 DECODE CIRCUIT CHECK AND ADJUSTMENT

5-12 DECODE LEVEL SETTING

1. Hook-up the test equipment to the DX-4 as shown in the diagram. See Fig. 5-3. Test equipment specifications are the same as listed for the ENCODE Circuit test.
2. Release all switches set in 5-6 Preparations on 40-4 Front Panel except DBX IN/OUT SW still IN position.
3. Apply a 1 kHz signal at −10 dB (0.3V) to the channel 1 DECODE IN pin jack.
4. Connect the AC voltmeter to the channel 1 OUTPUT pin jack.
5. Adjust R104 to obtain a −10 dB (0.3V) reading on the AC voltmeter.

5-13 DISTORTION CHECK

1. Connect Distortion meter to OUTPUT jack.
   Distortion should be less than 0.2% when properly aligned. If it is higher than 0.2%, adjust R101 and R102, by the same procedure outlined in Item 5-5 ENCODE CIRCUIT.

NOTE: Always check whether distortion is within specification again by resetting the circuit to the Encode mode whenever R101 and R102 are adjusted.

5-14 FREQUENCY CHARACTERISTICS CHECK

The normal, good condition reading should be +5 dB ±0.5 dB (1.77V ~ 1.88V) at 100 Hz; and +9.5 dB ±0.5 dB (2.8V ~ 3.16V) at 10 kHz; both referenced to 1 kHz.

5-15 SIGNAL-TO-NOISE RATIO CHECK

1. Remove Input signal.
   Measure the residual noise output and compare this to the specified signal level of −10 dB (0.3V) to obtain signal to noise ratio. AC voltmeter should reads −95 dB (17μV) unweighted, 100 dB (Using weighted noise level).
2. Check the remaining channels 2 ~ 4 in the same way.

Normal Condition Waveform:

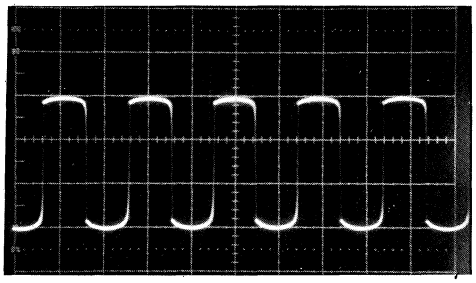


Fig. 5-10 At Pin #9 of BA652 (IC)

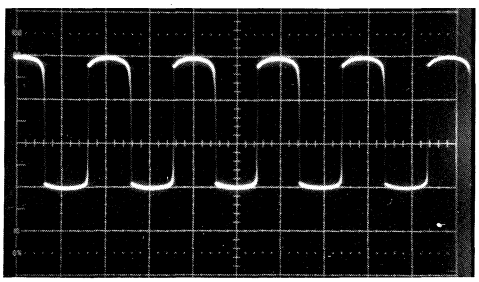


Fig. 5-11 At Pin #5 of BA652 (IC)

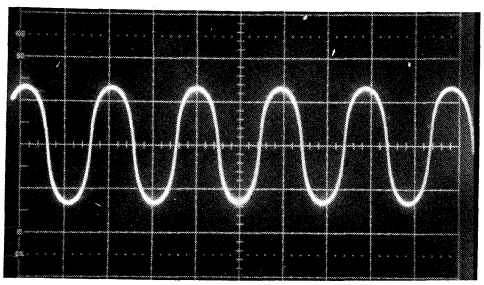


Fig. 5-12 At Collector of Q3

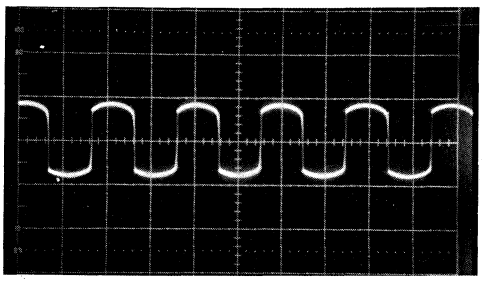


Fig. 5-13 At Drain of Q4

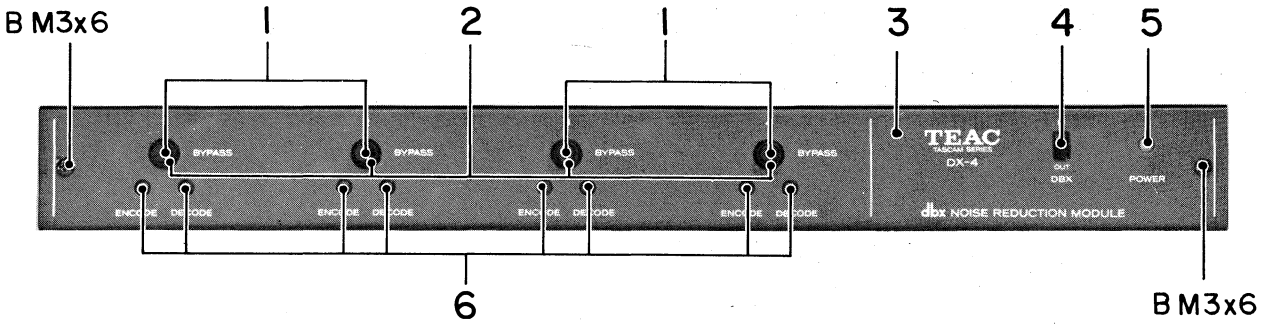
PARTS LIST AND SCHEMATICS

DX-4

TABLE OF CONTENTS

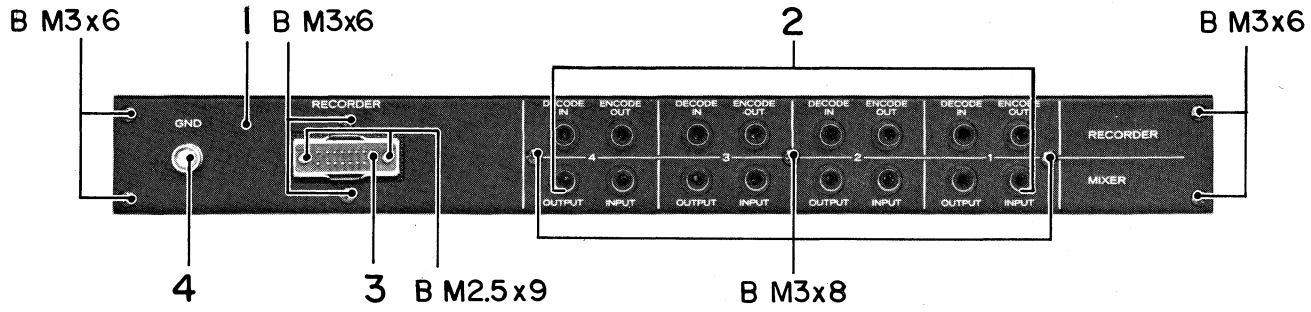
1. PARTS LOCATION AND PARTS LIST

PARTS LOCATION-1



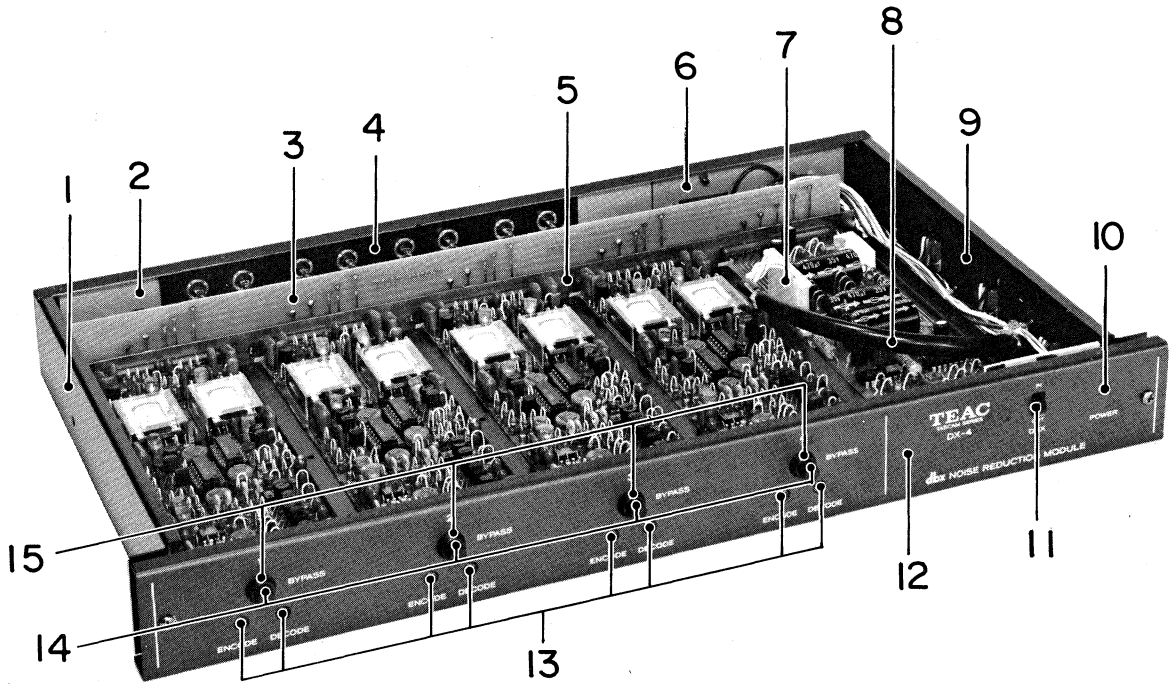
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1 - 1	60060450	Button, Push	
1 - 2	60060460	Escutcheon, Button	
1 - 3	60362240	Panel, Front	
1 - 4	60516070	Switch, Slide	
1 - 5	60483190	LED, TLR-106	
1 - 6	60362200	Cover, LED	

PARTS LOCATION-2



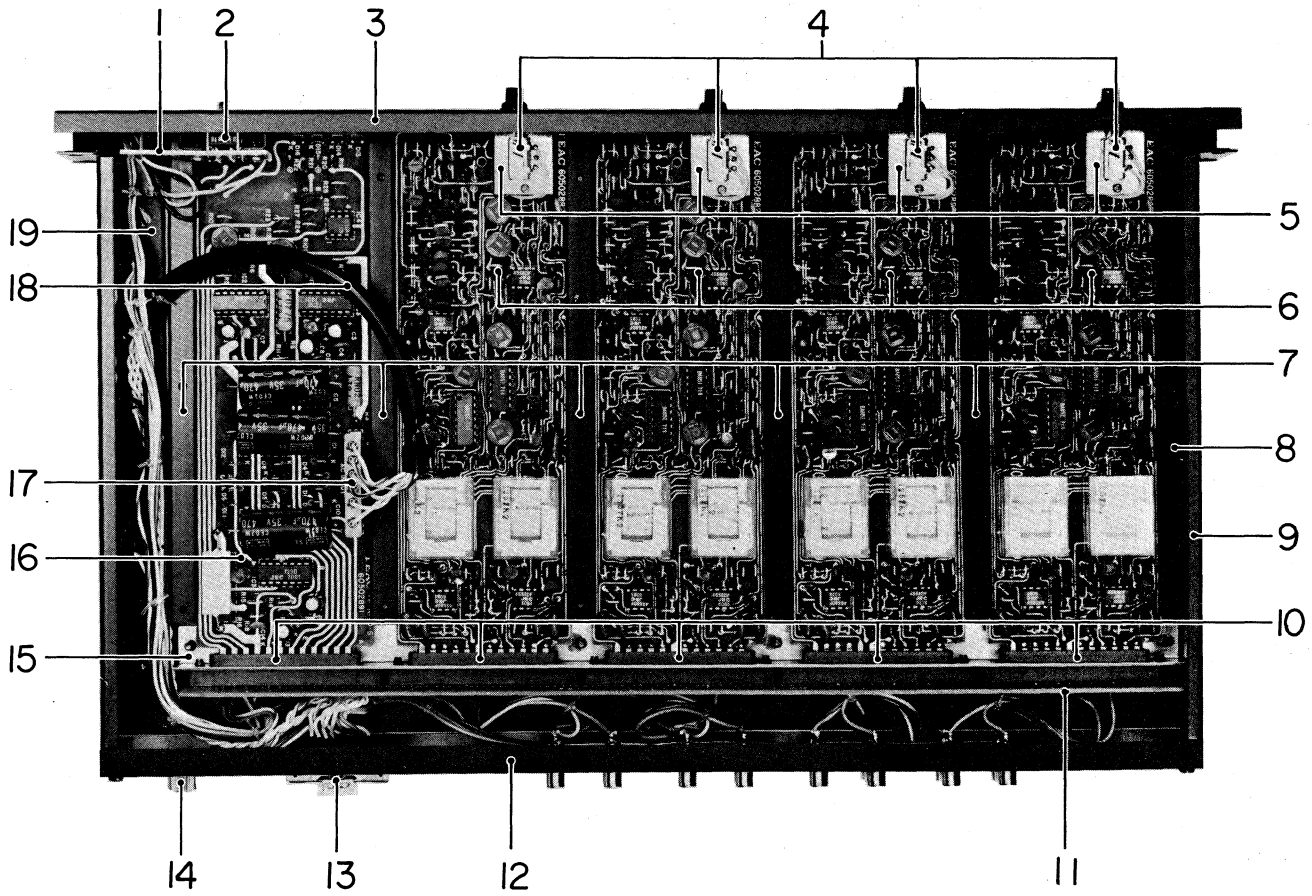
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 1	60362180	Panel, Rear	
2 - 2	60522160	Pin Jack Strip; 16P	
2 - 3	60521840	Connector; 16P P-1616-BA-C	
2 - 4	50454071	Terminal, Grounding	

PARTS LOCATION-3



REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
3 - 1	60374010	Chassis	
3 - 2	60362180	Panel, Rear	
3 - 3	60853810	PC Board Assy, CONNECTOR	
	60503440	PC Board, CONNECTOR	
3 - 4	60522160	Pin Jack Strip; 16P	
3 - 5	60374021	Bracket, Connector	
3 - 6	55551090	Bracket, Connector	
3 - 7	60522060	Connector, Plug; 6P	
3 - 8	60496350	Cord Assy,	
3 - 9	60374031	Heat Sink	
3 - 10	60483190	LED, TLA-106	
3 - 11	60516070	Switch, Slide	
3 - 12	60362240	Panel, Front	
3 - 13	60362200	Cover, LED	
3 - 14	60060450	Button, Push	
3 - 15	60060460	Escutcheon, Button	

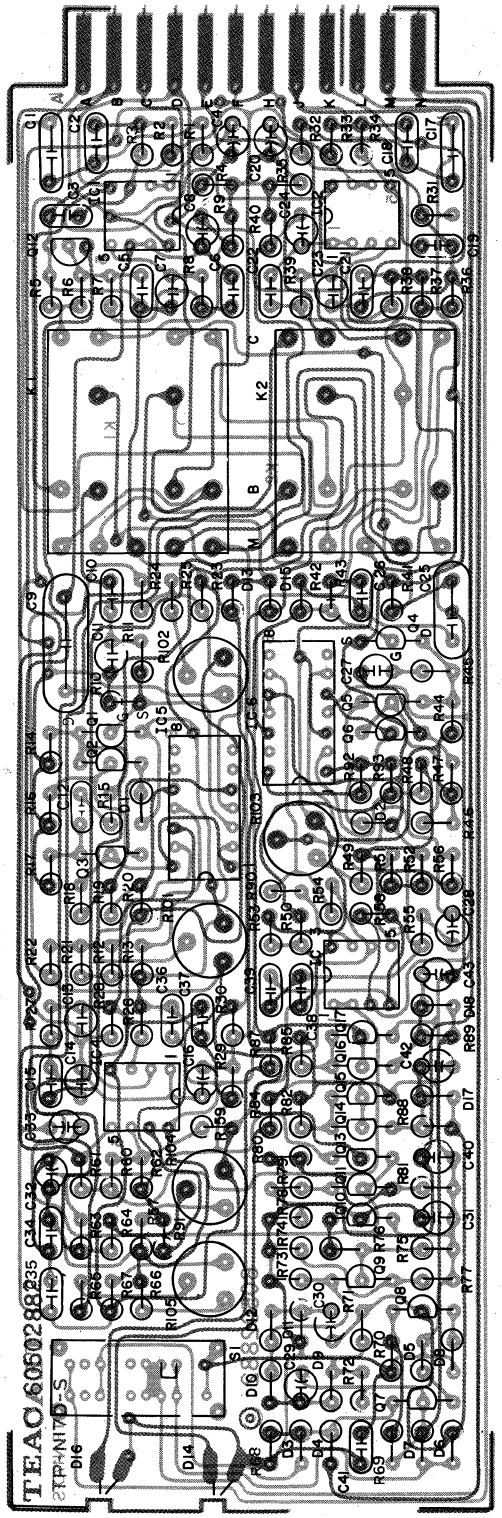
PARTS LOCATION-4



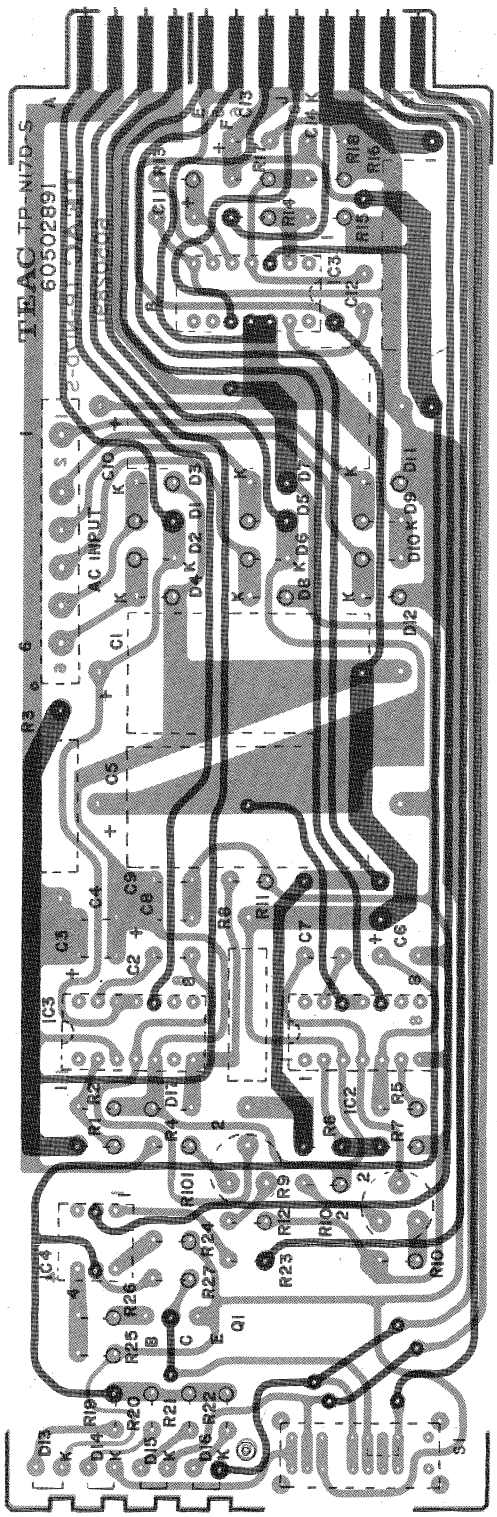
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
4 - 1	60853790	PC Board Assy, SWITCH	
	60503500	PC Board, SWITCH	
4 - 2	60516070	Switch, Slide	
4 - 3	60362240	Panel, Front	
4 - 4	60514290	Switch, Push	
4 - 5	60374090	Bracket, Switch	
4 - 6	60852881	PC Board Assy, DBX AMPL UNIT	
	60502882	PC Board, DBX AMPL UNIT	
4 - 7	60374040	Guide, PC Board; A	
4 - 8	60374050	Guide, PC Board; B	
4 - 9	60374010	Chassis	
4 - 10	60520890	Connector, 252-12-50-169M	
4 - 11	60853810	PC Board Assy, CONNECTOR BOARD	
	60503440	PC Board, CONNECTOR BOARD	
4 - 12	60362180	Panel, Rear	
4 - 13	60521840	Connector; 16P P-1616-BA-C	
4 - 14	50454071	Terminal, Grounding	
4 - 15	60374021	Bracket, Connector	
4 - 16	60852890	PC Board Assy, POWER SUPPLY	
	60502891	PC Board, POWER SUPPLY	
4 - 17	60522060	Connector, Plug; 6P	
4 - 18	60496350	Cord Assy,	
4 - 19	60374031	Heat Sink	

2. PC BOARD (Diagram)

1. dbx AMPLIFIER PC BOARD ASSY



2. POWER SUPPLY PC BOARD ASSY



2. PC BOARD (Parts List)

1. dbx AMPLIFIER PC BOARD ASSY

REF. NO	PARTS NO.	DESCRIPTION
	60852881	PC Board Assy
	60502882	PC Board
	IC's	
IC1~IC4	60486070	NJM4558D-F
IC5	51470200	BA-651
IC6	51470211	BA-652
	TRANSISTORS	
Q1	60480120	FET, 2SK34-B
Q2	60480760	2SC1312S-G
Q3	60480770	2SA725S-G
Q4	60480120	FET, 2SK34-B
Q5	60480760	2SC1312S-G
Q6	60480770	2SA725S-G
Q7, Q8	60480450	2SC1312Y-G
Q9	60480510	2SA725Y-G
Q10	60480450	2SC1312Y-G
Q11	60480510	2SA725-G
Q12, Q13	60480080	2SC1211-D
Q14	60480450	2SC1312Y-G
Q15	60480080	2SC1211-D
Q16	60480450	2SC1312Y-G
Q17	60480080	2SC1211-D
	DIODES	
D1, D2	60483370	1S2473VE
D4~D12	60483370	1S2473VE
D13	60483270	1N4002
D14	60483330	LED, SLP-214B (Green)
D15	60483270	1N4002
D16	60483340	LED, SLP-114B (Red)
D17, D18	60483370	1S2473VE

RESISTORS

All resistors are rated ±5% tolerance, 1/4 watt and of carbon type unless otherwise noted.

REF. NO	PARTS NO.	DESCRIPTION
R1		82k ohm
R2		220k ohm
R3		2.7k ohm
R4		47k ohm
R5		100k ohm
R6		4.7k ohm
R7		10k ohm
R8		15k ohm
R9		47k ohm
R10		Metal Film 33k ohm
R11		Metal Film 10k ohm
R12, R13		39 ohm
R14		22k ohm
R15		220 ohm
R16		3.3k ohm
R17, R18		390 ohm
R19		1k ohm
R20		10k ohm
R21~R24		Metal Film 82 ohm
R25		220k ohm
R26		1k ohm
R27		Metal Film 10k ohm
R28		Metal Film 33k ohm
R29		47k ohm
R30		680 ohm
R31		100k ohm
R32		30k ohm
R33		130k ohm
R34		2.7k ohm
R35		47k ohm
R36		100k ohm
R37		6.2k ohm
R38		10k ohm
R39		22k ohm
R40		47k ohm
R41		100k ohm
R42		Metal Film 24k ohm
R43		Metal Film 2.7k ohm
R44		22k ohm
R45		220 ohm
R46		3.3k ohm
R47		390 ohm
R48		6.8k ohm
R49		47k ohm
R50		Metal Film 10k ohm
R51		270k ohm
R52		1k ohm
R53		2.2M ohm
R54		Metal Film 20k ohm
R55		4.7 ohm
R56		1M ohm
R57		22k ohm
R58		100k ohm
R59		820k ohm
R60		Metal Film 3.9k ohm
R61, R62		Metal Film 4.7k ohm
R63		Metal Film 510 ohm
R64		56k ohm
R65		1M ohm 2%
R66		22k ohm
R67		27k ohm
R68		47k ohm
R69		220k ohm
R70		47k ohm
R71, R72		10k ohm
R73		100k ohm
R74		10k ohm
R75		47k ohm
R76		150k ohm
R77		10k ohm
R78		8.2k ohm
R79		22k ohm
R80		1k ohm
R81		10k ohm
R82		180 ohm
R84		1k ohm
R85		180 ohm
R87		1k ohm
R88, R89		220k ohm
R90		2.2k ohm
R92		180 ohm
R93		390 ohm

2. POWER SUPPLY PC BOARD ASSY

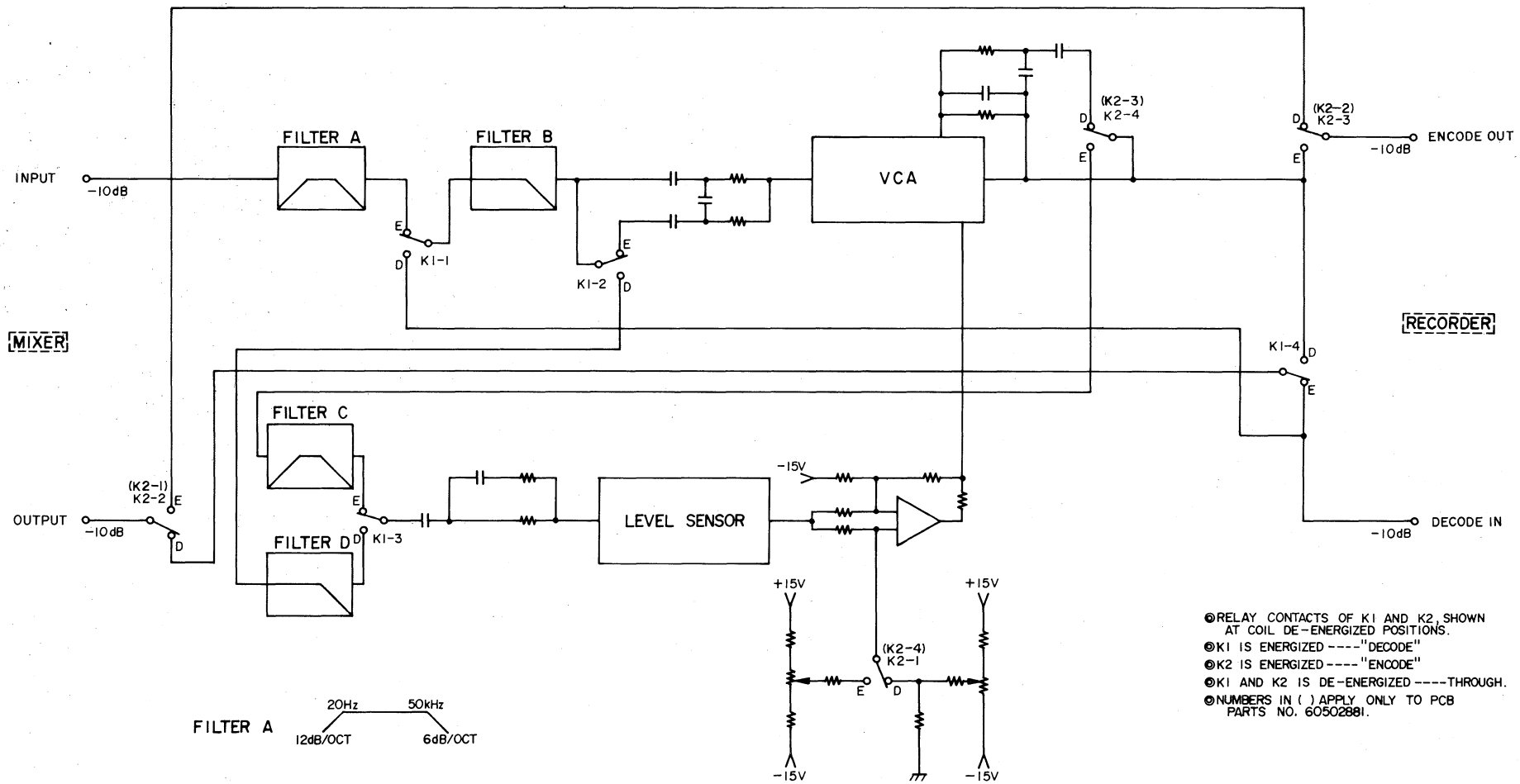
REF. NO	PARTS NO.	DESCRIPTION			
		CAPACITORS			
C1	60445620	Mylar	0.1 mfd	50V	5%
C2	60445080	Mylar	0.047 mfd	50V	5%
C3	60445220	Mylar	0.001 mfd	50V	5%
C4	60431710	Dip. Tant.	2.2 mfd	16V	
C5, C6	60445220	Mylar	0.001 mfd	50V	5%
C7	60435540	Polyst.	100 pfd	50V	5%
C8	60431710	Dip. Tant.	2.2 mfd	16V	
C9	60447700	Polypro.	0.33 mfd	50V	5%
C10	60445430	Mylar	0.01 mfd	50V	5%
C11	60435550	Polyst.	220 pfd	50V	5%
C12	60445220	Mylar	0.001 mfd	50V	5%
C13	60435560	Polyst.	33 pfd	50V	10%
C14	60435570	Polyst.	180 pfd	50V	5%
C15	60445430	Mylar	0.01 mfd	50V	5%
C16	60431750	Dip. Tant.	10 mfd	10V	
C17	60445620	Mylar	0.1 mfd	50V	5%
C18	60445080	Mylar	0.047 mfd	50V	5%
C19	60445220	Mylar	0.001 mfd	50V	5%
C20	60431750	Dip. Tant.	10 mfd	10V	
C21, C22	60445220	Mylar	0.001 mfd	50V	5%
C23	60435540	Polyst.	100 pfd	50V	5%
C24	60431750	Dip. Tant.	10 mfd	10V	
C25	60445620	Mylar	0.1 mfd	50V	5%
C26	60445280	Mylar	0.0033 mfd	50V	5%
C27	60435550	Polyst.	220 pfd	50V	5%
C28	50546780	Dip. Tant.	22 mfd	16V	10%
C29, C30	60431710	Dip. Tant.	2.2 mfd	16V	
C31	60432060	Dip. Tant.	4.7 mfd	16V	
C32, C33	60432090	Dip. Tant.	4.7 mfd	25V	
C34~C39	60440050	Ceramic	0.01 mfd	50V	
C40	60432060	Dip. Tant.	4.7 mfd	16V	
C41	60440050	Ceramic	0.01 mfd	50V	
C42, C43	60431700	Dip. Tant.	1 mfd	25V	
		VARIABLE RESISTORS			
R101	60410120-12	Semi-fixed,	10k ohm - B		
R102, R103	60410120-16	Semi-fixed,	47k ohm - B		
R104	60410120-12	Semi-fixed,	10k ohm - B		
R105	60410120-16	Semi-fixed,	47k ohm - B		
		RELAYS			
K1, K2	60470300	LZ-4 (DC 12V)			
		MISCELLANEOUS			
	60521790	Socket, IC 14P			
	60514290	Switch, Push			
	60374090	Bracket, Push Switch			
	60060450	Button, Switch			
	60496431	Wire, dbx PCB Assy			

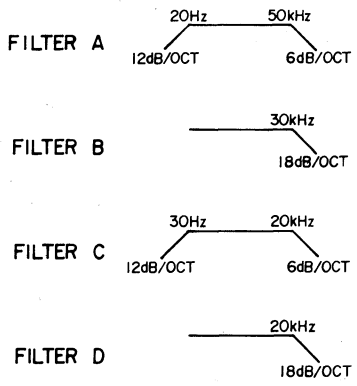
REF. NO	PARTS NO.	DESCRIPTION		
	60852890	PC Board Assy		
	60502891	PC Board		
		IC's		
IC1~IC3	60486060	μA723PC		
IC4	60488020	MCT2		
		TRANSISTOR		
Q1	60480450	2SC1312Y-G		
		DIODES		
D1~D12	60483270	1N4002		
D17	60483390	Zener, RD-6AN		
		RESISTORS		
		All resistors are rated ±5% tolerance, 1/4 watt and of carbon type unless otherwise noted.		
R1		2.7k ohm		
R2		12k ohm		
R3	60406060	Metal Film	4.7 ohm	2W
R4		10k ohm		
R5		3.3k ohm		
R6		2.7k ohm		
R7		12k ohm		
R8	60406060	Metal Film	4.7 ohm	2W
R9, R10		3.3k ohm		
R11		1k ohm		
R12		10k ohm		
R13		3.3k ohm		
R14		2.2k ohm		
R15		8.2k ohm		
R16	60408070	Cement,	2.2 ohm	5W
R17		5.6k ohm		
R18		8.2k ohm		
R21		1k ohm		
R23		180 ohm		
R24		100k ohm		
R25~R26		10k ohm		
		CAPACITORS		
C1	50555150	Elec.	470 mfd	35V
C2	60435540	Polyst.	100 pfd	50V
C3	50554040	Elec.	10 mfd	25V
C4	60440050	Ceramic	0.01 mfd	50V
C5	50555150	Elec.	470 mfd	35V
C6	50554040	Elec.	10 mfd	25V
C7	50435540	Polyst.	100 pfd	50V
C8	50554040	Elec.	10 mfd	25V
C9	60440050	Ceramic	0.01 mfd	50V
C10	50555150	Elec.	470 mfd	35V
C11	50554040	Elec.	10 mfd	25V
C12	60435540	Polyst.	100 pfd	50V
C13	50554040	Elec.	10 mfd	25V
C14	60440050	Ceramic	0.01 mfd	50V

REF. NO	PARTS NO.	DESCRIPTION
	VARIABLE RESISTORS	
R101, R102		1k ohm - B
	MISCELLANEOUS	
P1	60522050	Connector, Plug

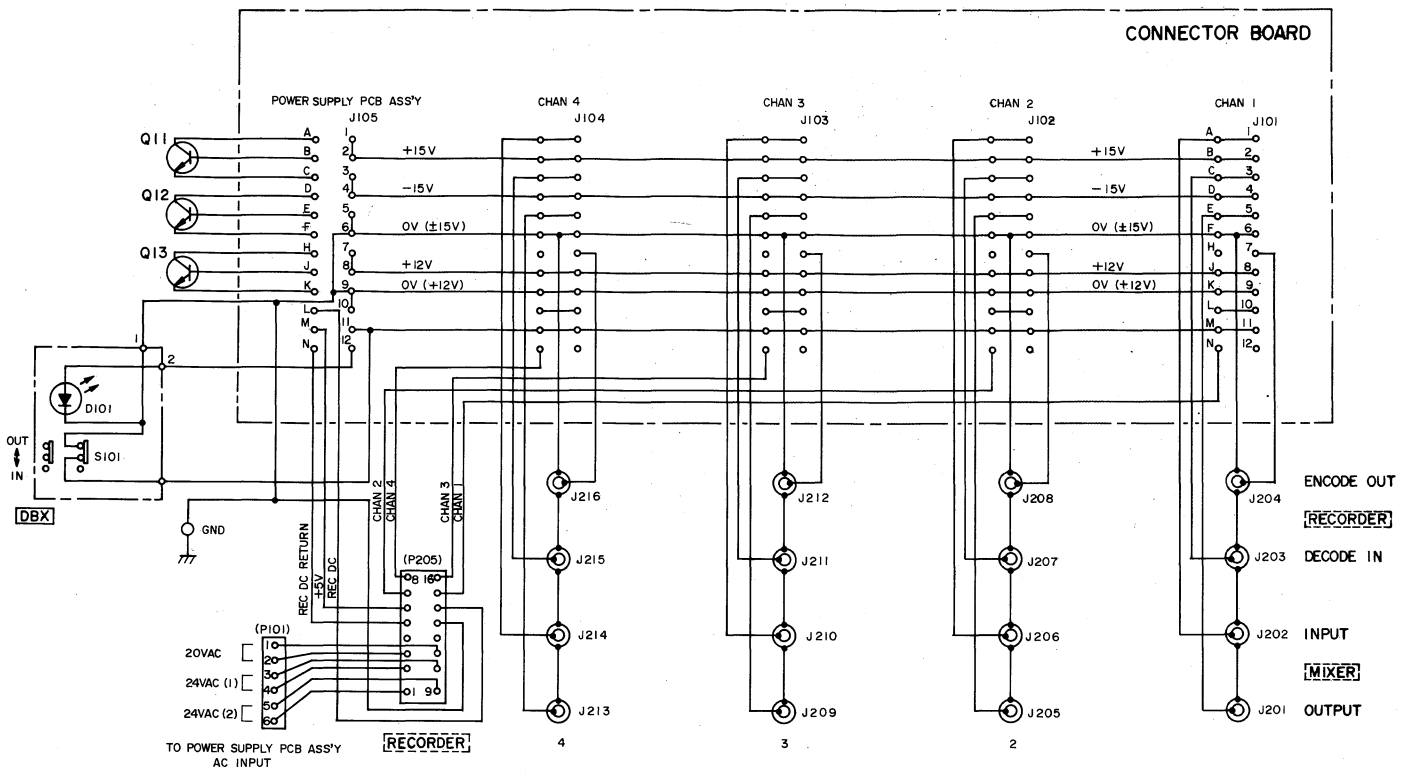
INCLUDED ACCESSORIES

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
	60492850	Cord Assy, REMOTE	
	51015260	Owner's Manual	
	60853820	Cords, Input-Output Connection	



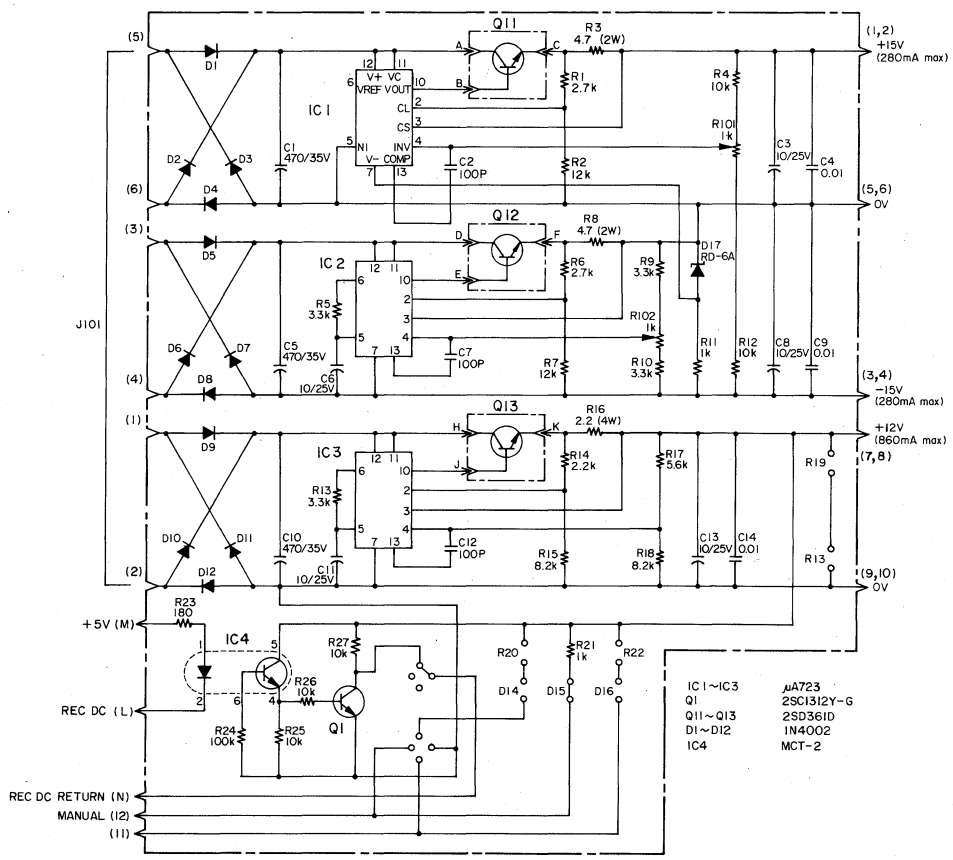


- RELAY CONTACTS OF K1 AND K2, SHOWN AT COIL DE-ENERGIZED POSITIONS.
- K1 IS ENERGIZED ----"DECODE"
- K2 IS ENERGIZED ----"ENCODE"
- K1 AND K2 IS DE-ENERGIZED ----THROUGH.
- NUMBERS IN ( ) APPLY ONLY TO PCB PARTS NO. 60502881.



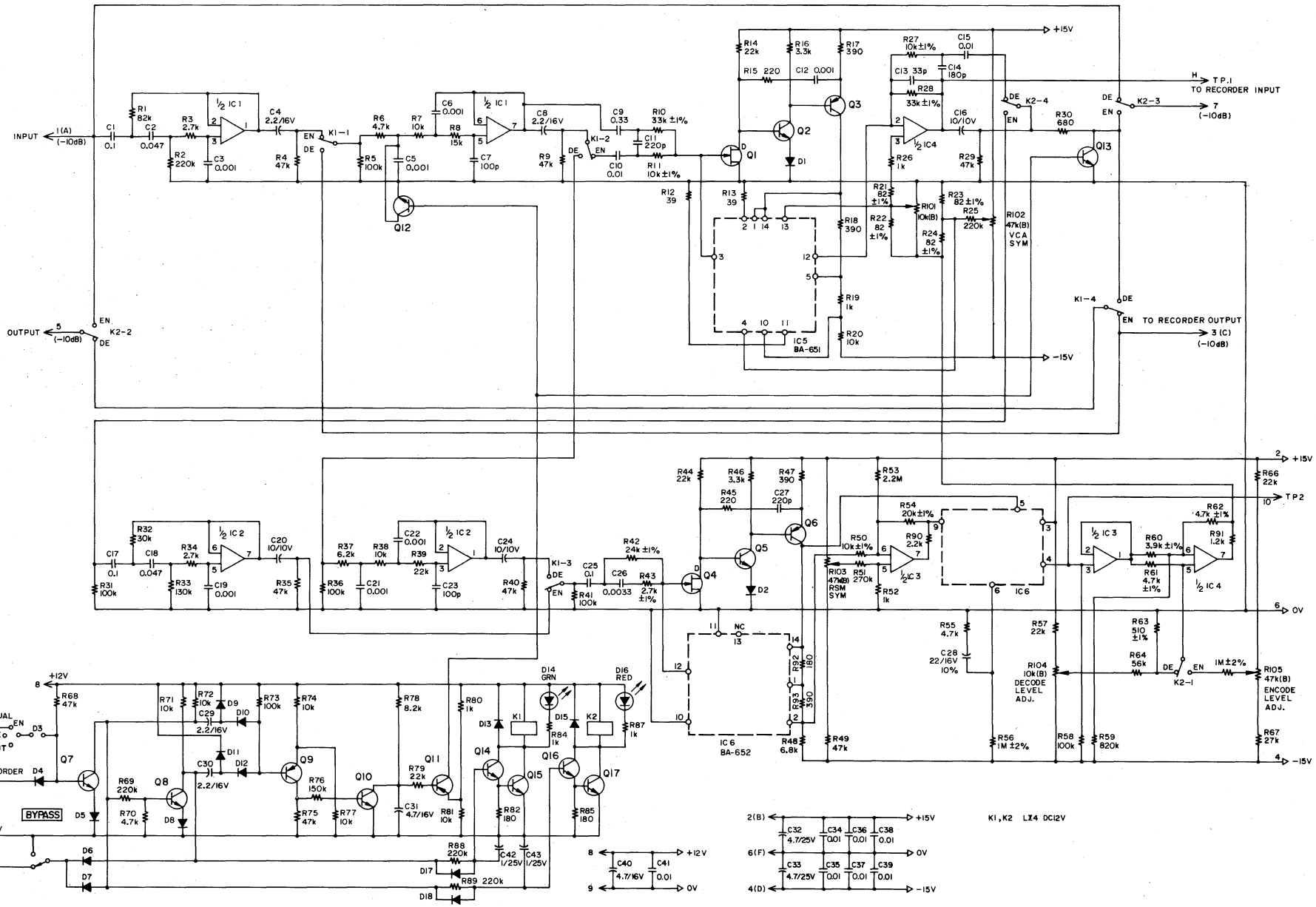
NOTE
Q11~Q13 2SD361D

SCHEMATIC (DX-4)
Rear panel
REV.
TEAM CORPORATION



ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (DX-4)
Power supply PCB ass'y
REV.
TEAC CORPORATION

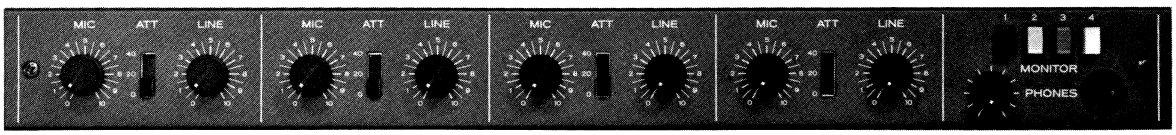


ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (DX-4)
dbx ampl. PCB ass'y
REV.
TEAC CORPORATION

SECTION 6

MODEL MA-4
MIC AMP UNIT



6-1 SPECIFICATIONS

Mic input (X4):	
Mic impedance	200 ohms, balanced
Nominal input level	–60 dB (1mV)
Line input (X4):	
Impedance	20k Ohms or higher, unbalanced
Nominal input level	–10 dB (0.3V)
Line output (X4):	
Load impedance	10k Ohms or higher, unbalanced
Nominal output level	–10 dB (0.3V)
Signal to noise ratio, overall mic in to line out	Greater than 65 dB, WTD
Frequency response	30 Hz ~ 20 kHz, ±1 dB
Power requirement	+24V DC and +5V DC power supplied from the amplifier mother board of the 40-4

PARTS LOCATION AND TEST POINTS

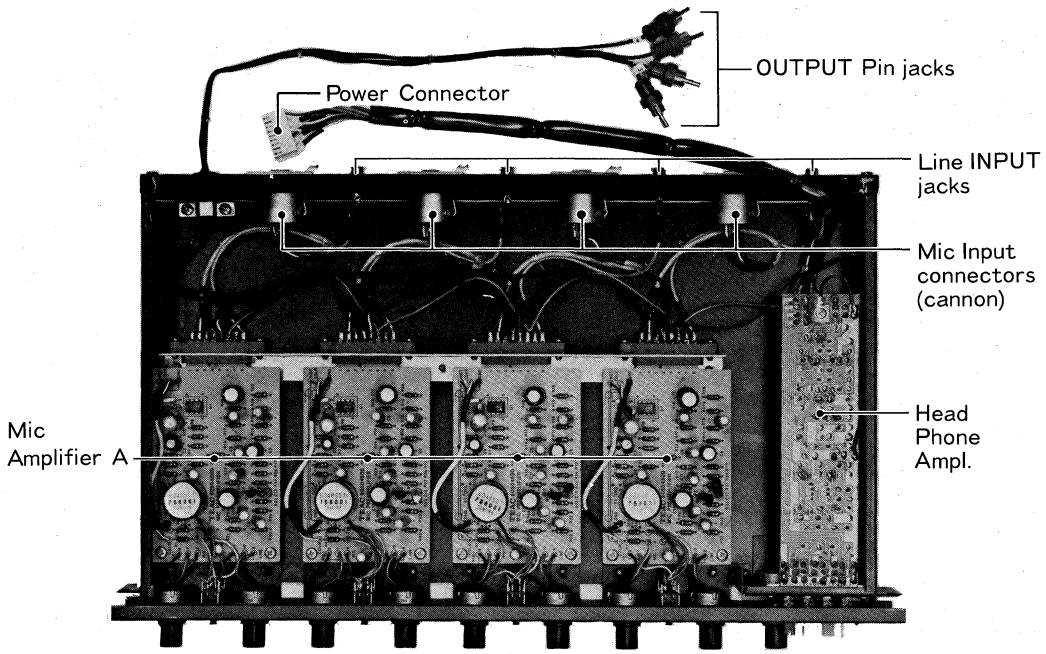
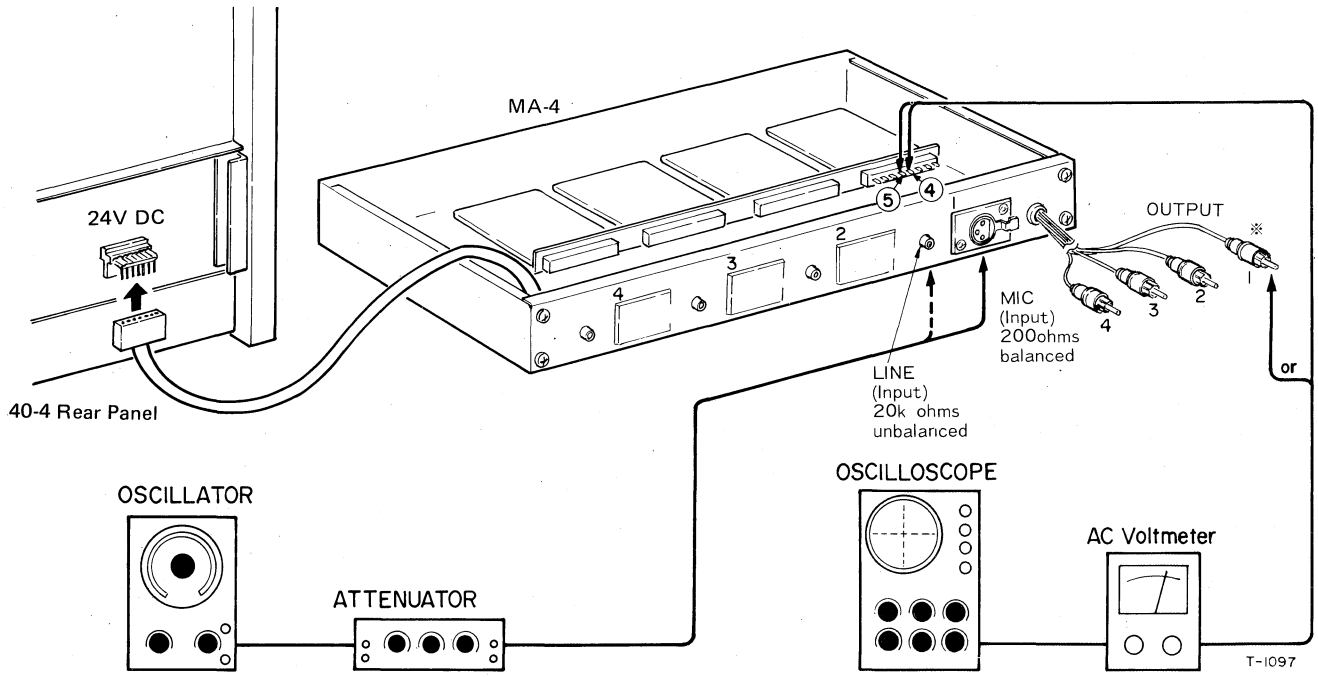


Fig. 6-1 Parts Location and Test Points

BASIC TEST EQUIPMENT CONNECTIONS



※Instead of making connections to OUTPUT cords as shown above the AC voltmeter can be connected to the P.C.Board for each channel using Terminals 4 and 5.

Fig. 6-2 Basic Test Equipment Connections

6-2 TEST EQUIPMENT REQUIRED

Oscillator	Audio use, distortion less than 0.1% (at 1 kHz)
AC voltmeter	−80 dB ~ +40 dB, imp. = >1M, <25pF
Oscilloscope	General purpose
Attenuator	General purpose
Headphone	8Ω or more
Tools	Resistors; 20 kohms, 300 ohms, 600 ohms

6-3 TESTING PROCEDURES

Outlined procedures are given for CHANNEL 1 only. However, the same procedures should be done for all channels unless noted.

0 dB = 1V

Connect Power cord to 40-4 J314 (rear panel). DC 24V. See Fig. 6-2. Test Equipment Connections.

– MIC PERFORMANCE –

6-4 MIC LEVEL CHECK

ATT SW to 0 position (on Front Panel):

1. Apply a 1 kHz/−60 dB (1mV) signal from the test oscillator to MIC cannon connector (Pins No. 3 and 2).

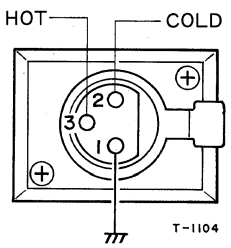


Fig. 6-3 Cannon Connector

NOTE: MIC Input Impedance is 200 ohms balanced. Therefore; Output Load Impedance of attenuator should be 300 ohms or more.

2. Set the MIC volume control so that the Output level at the OUTPUT jack or Terminal No. 5 and No. 4 is −10 dB (0.3V).

NOTE: Approx. Spec. position at #7 on volume control. Do not change this setting until the remaining checks are completed.

ATT SW to 20 position:

3. Apply a 1 kHz/−40 dB (10mV) signal to MIC connector. Check that level remains within ±1 dB of −10 dB (0.3V) level measured in step 2.

ATT SW to 40 position:

4. Apply a 1 kHz/−20 dB (100mV) signal to MIC connector.
   Check that level remains within ±2 dB of −10 dB (0.3V) level measured in step 2.

ATT SW to 0 position:

5. Apply a 1 kHz/−40 dB (10mV) signal to MIC connector. Check that level becomes +10 dB (3.16V) at OUTPUT jack.
   Check that the output waveform displayed on the oscilloscope is not distorted. (Is not clipping).
   The following waveform is correct, all other waveform are wrong.

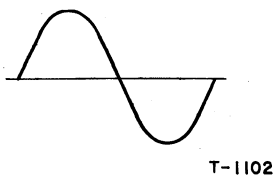


Fig. 6-4 Correct Waveform

6-5 FREQUENCY CHARACTERISTICS CHECK –MIC–

ATT SW at 0 position:

1. Set the input level to −60 dB (1mV). Output level will be −10 dB (0.3V) as measured in Item 6-4 (MIC LEVEL CHECK).
2. Apply signal swept from 30 Hz to 20 kHz from oscillator.
   Check that response is within ±1 dB of reference at 1 kHz.

6-6 SIGNAL-TO-NOISE RATIO CHECK

NOTE: 600 ohms Input Load resistor should be connected to pins No. 3 (Hot) and No. 2 (Cold) on Cannon Connector.

1. Remove the input signal.
2. The Noise level as indicated on the VTVM should be reading –65 dB. This corresponds to the Signal-to-Noise Ratio on –55 dB (minimum): the difference between residual noise of –65 dB and specified output level –10 dB. (–75 dB for Weighted noise level).

– LINE PERFORMANCE –

6-7 LINE LEVEL CHECK

1. Apply a 1 kHz/–10 dB (0.3V) signal from the test oscillator to LINE jack.
2. Set the LINE volume control so that the output level at OUTPUT jack is –10 dB (0.3V).

NOTE: Approx. Spec. position at #7 on volume control. Do not change this setting until the remaining checks are completed.

3. Change the input level to +10 dB (3.16V), check that level becomes +10 dB (3.16V) at OUTPUT jack.
4. Check that the output waveform displayed on the oscilloscope is not distorted (Is not clipping).
   The following waveform is correct, other waveforms are wrong.

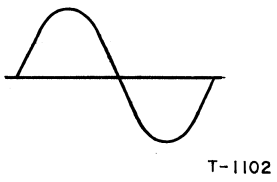


Fig. 6-5 Correct Waveform

6-8 FREQUENCY CHARACTERISTICS CHECK – LINE –

With control set as described above in Item 6-7;

1. Apply signal swept from 30 Hz to 20 kHz from oscillator.
   Check that response is within ±1 dB of reference at 1 kHz.

6-9 SIGNAL-TO-NOISE RATIO CHECK

With control set as described above in Item 6-7;

1. Place the MIC volume control to minimum position.
2. The Noise level as indicated on the VTVM should be reading –75 dB. This corresponds to the Signal-to-Noise Ratio of –65 dB (munimum): the difference between residual noise of –75 dB and specified output level –10 dB. (–85 dB for Weighted noise level).

– MONITOR PERFORMANCE –

Following connections from 40-4 to MA-4 are only for Monitor Performance testing procedure. Other test equipment connections are the same as basic connections.

PREPARATION OF 40-4 tape deck
FRONT PANEL . . . . OUTPUT SELECT SW → Select INPUT SW to ON position
REAR PANEL . . . . . Connect Pin jack to INPUT jack from MA-4

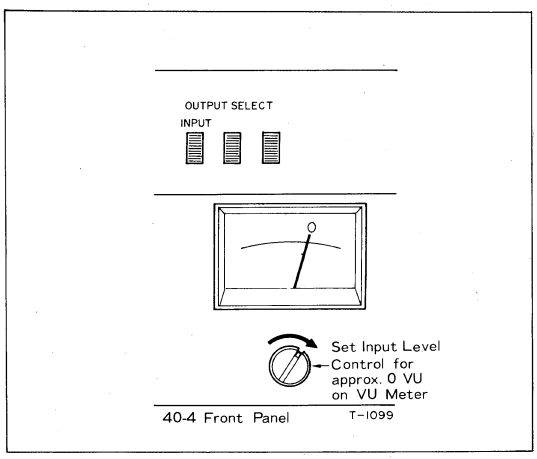
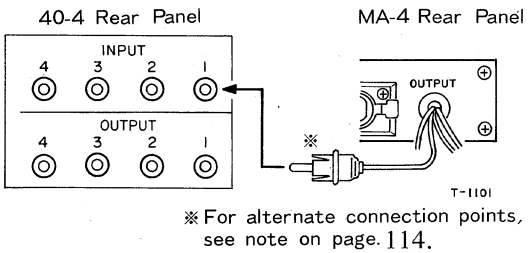


Fig. 6-6 40-4 Front Panel



※ For alternate connection points, see note on page. 114.

Fig. 6-7 40-4 and MA-4 Rear Panel

1. Repeat above MIC PERFORMANCE Section and LINE PERFORMANCE Section checks with Headphone (for a listening test).

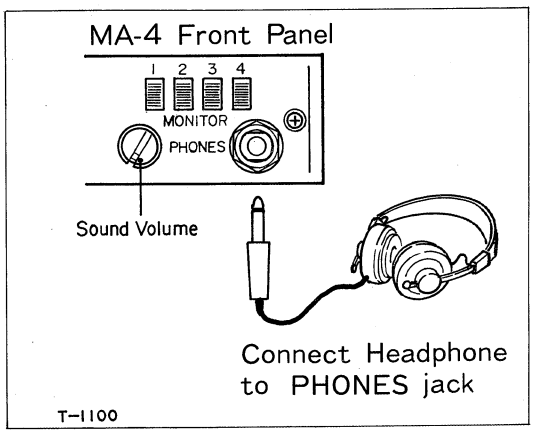


Fig. 6-8 MA-4 Front Panel

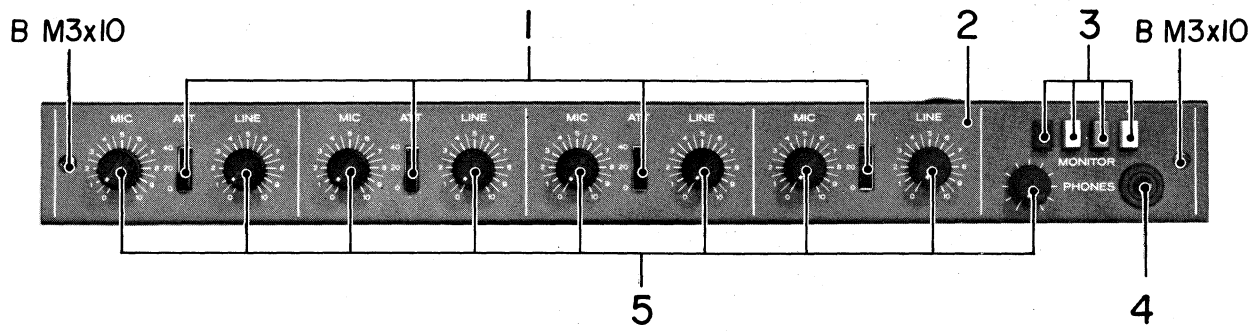
PARTS LIST AND SCHEMATICS

MA-4

TABLE OF CONTENTS

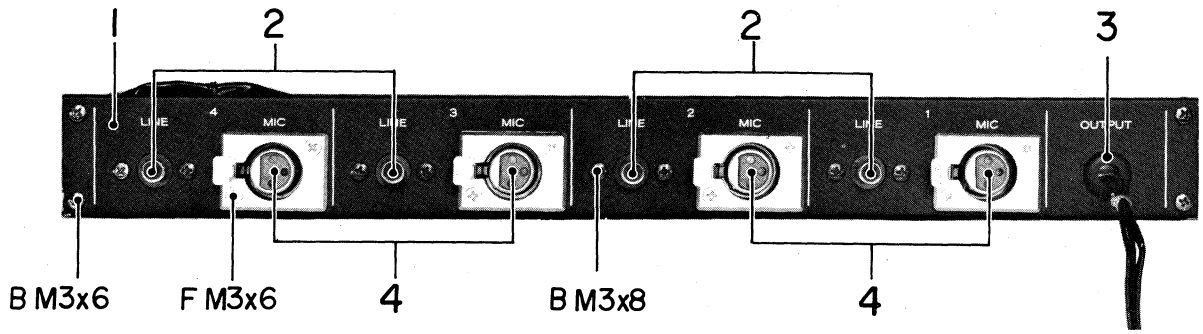
1. PARTS LOCATION AND PARTS LISTS

PARTS LOCATION-1



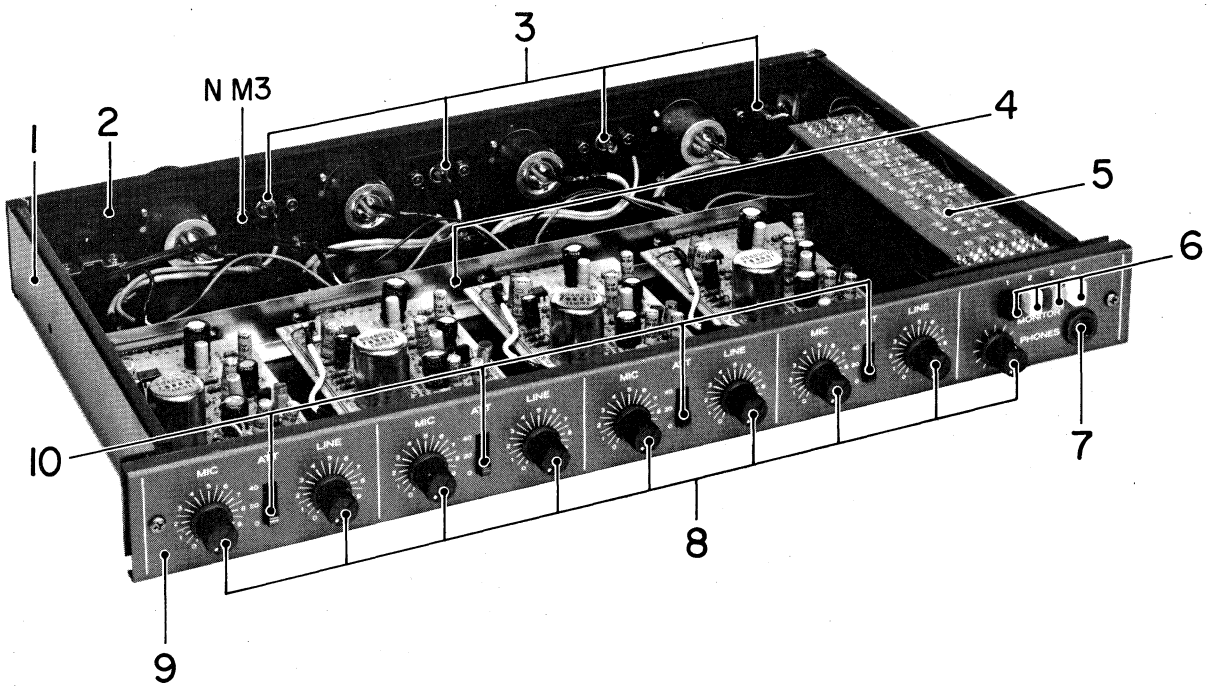
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1 - 1	60516020	Switch, Slide; SSB-023	
1 - 2	60362160	Panel, Front	
1 - 3	60514170	Push Switch, 4-gang SUB	
1 - 4	50432980	Jack, Head Headphones	
1 - 5	60060161	Knob, B-15S	

PARTS LOCATION-2



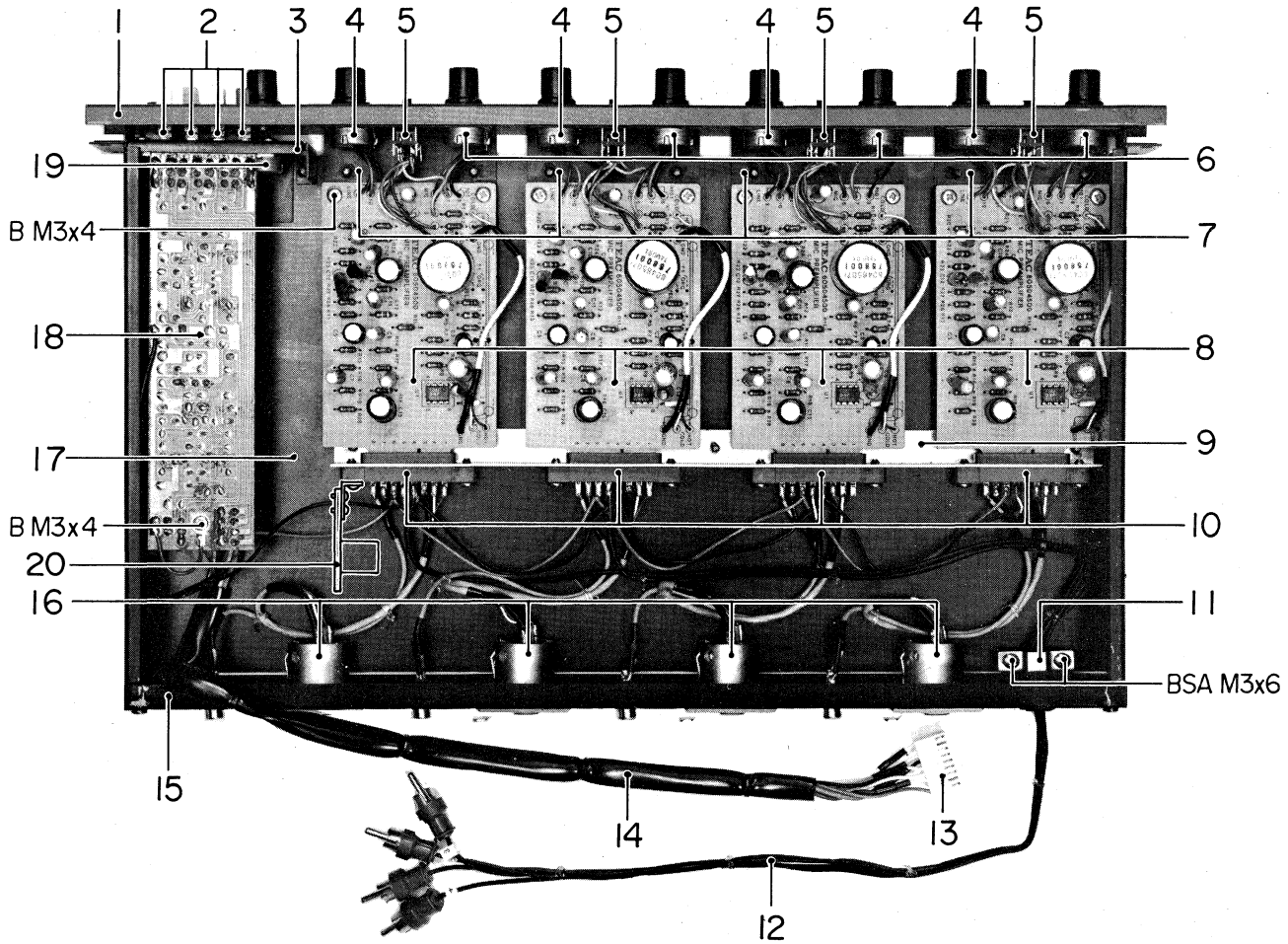
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 1	60362170	Panel, Rear	
2 - 2	50430180	Plate, Pin Jack; 1P	
2 - 3	50323010	Strain Relief	
2 - 4	60520070	Connector, XLR-3-31	

PARTS LOCATION-3



REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
3 - 1	60373970	Chassis	
3 - 2	60362170	Panel, Rear	
3 - 3	50430180	Plate, Pin Jack 1P	
3 - 4	60373980	Bracket, Connector	
3 - 5	60853750	PC Board Assy, HEADPHONE AMPL	
	60504173	PC Board, HEADPHONE AMPL	
3 - 6	60514170	Push Switch, 4-gang SUB	
3 - 7	50432980	Jack, Headphones	
3 - 8	60060161	Knob, B-15S	
3 - 9	60362161	Panel, Front	
3 - 10	60516020	Switch, Slide; SSB-023	

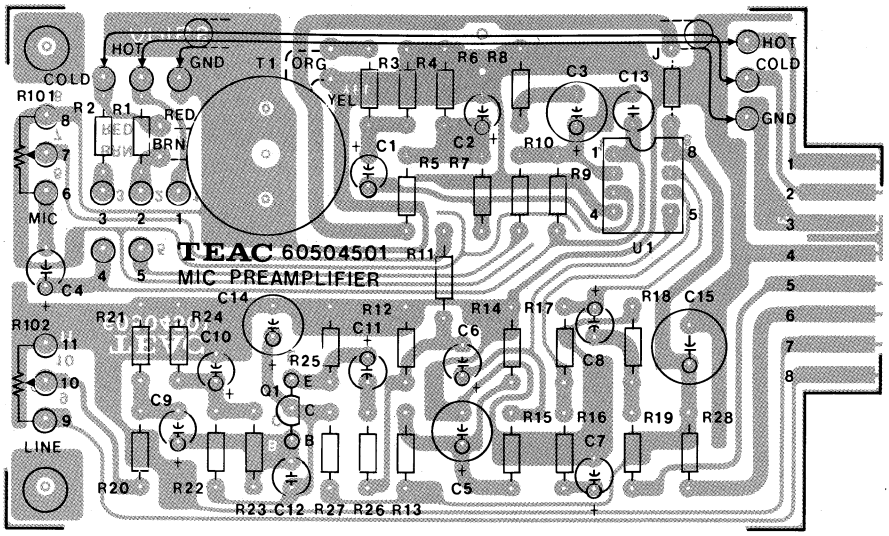
PARTS LOCATION-4



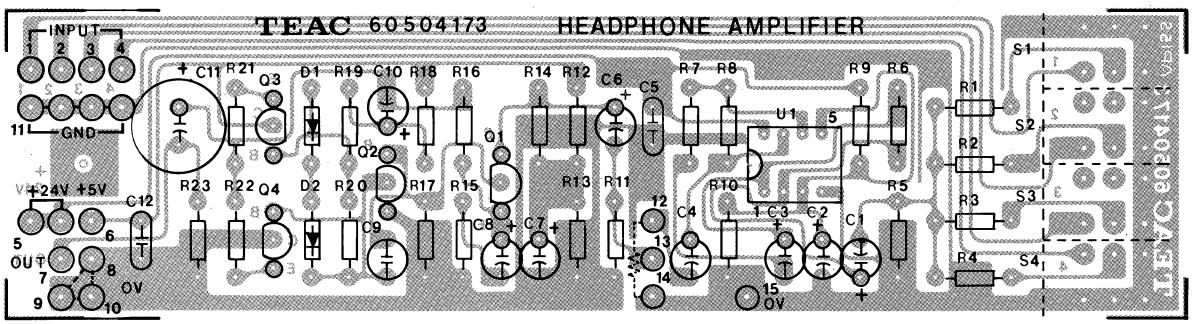
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
4 - 1	60362161	Panel, Front	
4 - 2	60514170	Push Switch, 4-gang SUB	
4 - 3	60374001	Bracket (B)	
4 - 4	60421130	Var. Res., VM10A 50k ohm - A	
4 - 5	60516020	Switch, Slide SSB-023	
4 - 6	60421120	Var. Res., VM10A 10k ohm - A	
4 - 7	60373990	Bracket (A)	
4 - 8	60853740	PC Board Assy, MIC AMPL	
	60504501	PC Board, MIC AMPL	
4 - 9	60373980	Bracket, Connector	
4 - 10	60522980	Connector, 250-08-50-170M	
4 - 11	50279480	Clamper (A)	
4 - 12	60496370	Cord Assy, Output	
4 - 13	60522270-09	Connector, Jack 9P 5051-09	
4 - 14	60496380	Cord Assy, Input	
4 - 15	60362170	Panel, Rear	
4 - 16	60520070	Connector, XLR-3-31	
4 - 17	60373970	Chassis	
4 - 18	60853750	PC Board Assy, HEADPHONE AMPL	
	60504173	PC Board, HEADPHONE AMPL	
4 - 19	60421090	Var. Res., 5k ohm - A	
4 - 20	60853920	PC Board Assy, FILTER	
	51015260	Owner's Manual	

2. PC BOARD (Diagram)

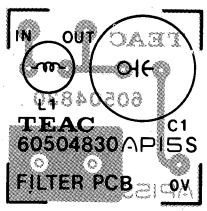
1. MIC PREAMPLIFIER PC BOARD ASSY



2. HEADPHONE AMPLIFIER PC BOARD ASSY



3. FILTER PC BOARD ASSY



2. PC BOARD (Parts List)

1. MIC PREAMPLIFIER PC BOARD ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	60853740	PC Board Assy
	60504501	PC Board
		IC
U1	60486260	RC4558D-D
		TRANSISTOR
Q1	60480450	2SC1312Y-G
		CARBON RESISTORS
		All resistors are rated ±5% tolerance and 1/4 watt.
R1		2.2k ohm
R2		270 ohm
R3		100 ohm
R4		100k ohm
R5, R6		15k ohm
R7		820k ohm
R8		1.8k ohm
R9		22k ohm
R10		560 ohm
R11		22k ohm
R12		470k ohm
R13, R14		15k ohm
R15		220k ohm
R16		2.2k ohm
R17		33k ohm
R18		47k ohm
R19		100 ohm
R20		91k ohm
R21		82k ohm
R22, R23		100k ohm
R24		47k ohm
R25		4.7k ohm
R26		22k ohm
R27		3.3k ohm
R28		330 ohm
		CAPACITORS
C1	60431770	Elec. 10 mfd 16V (LR)
C2	50554880	Elec. 22 mfd 16V
C3	60431890	Elec. 47 mfd 16V (LR)
C4	60431770	Elec. 10 mfd 16V (LR)
C5	50554010	Elec. 47 mfd 16V
C6~C11	60431770	Elec. 10 mfd 16V (LR)
C12	50544170	Polyst. 47 pfd 50V
C13	60435610	Polyst. 68 pfd 50V
C14	50554020	Elec. 47 mfd 25V
C15	50554170	Elec. 100 mfd 25V
		TRANSFORMER
T1	60465071	Mic Transformer
		MISCELLANEOUS
	60499150	Wire, Mic Ampl.
	60499140	Shield Wire, Mic Ampl. Jumper

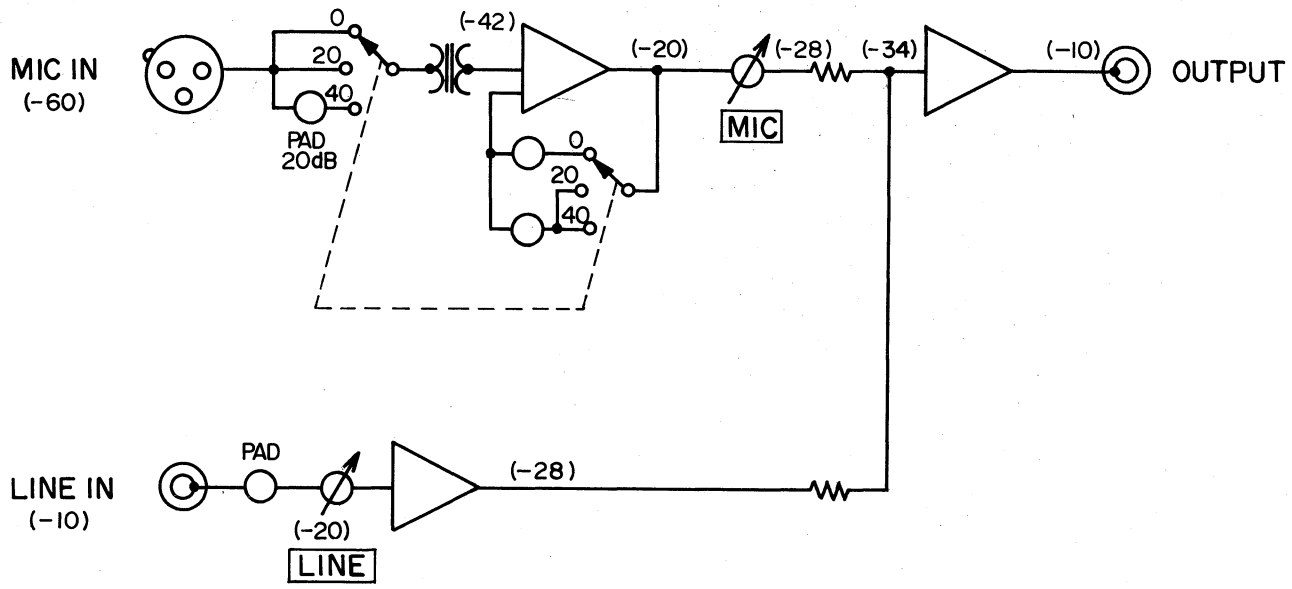
2. HEADPHONE AMPLIFIER PC BOARD ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	60853750	PC Board Assy
	60504173	PC Board
		IC
U1	60486070	RC4558D-F
		TRANSISTORS
Q1	60480520	2SA725-F
Q2	60480450	2SC1312Y-G
Q3	60480780	2SD355-D
Q4	60480790	2SB525-D
		DIODES
D1, D2	50422720	1S953
		CARBON RESISTORS
		All resistors are rated ±5% tolerance and 1/4 watt.
R1~R4		47k ohm
R5		100k ohm
R6		47k ohm
R7~R10		15k ohm
R11		100k ohm
R12		33k ohm
R13		12k ohm
R14		10k ohm
R15		1k ohm
R16		2.2k ohm
R17		1.5k ohm
R18		100 ohm
R19		220 ohm
R20		470 ohm
R21, R22		1 ohm
R23		1k ohm
		CAPACITORS
C1	60431770	Elec. 10 mfd 16V (LR)
C2	50554010	Elec. 47 mfd 16V
C3, C4	50554050	Elec. 10 mfd 16V
C5	60440050	Ceramic 0.01 mfd 50V
C6	50554050	Elec. 10 mfd 16V
C7	60430180	Elec. 47 mfd 10V
C8	60430160	Elec. 22 mfd 10V
C9	60435530	Polyst. 220 pfd 50V
C10	60430180	Elec. 47 mfd 10V
C11	60430140	Elec. 1000 mfd 6.3V
C12	60440050	Ceramic 0.01 mfd 50V
		MISCELLANEOUS
S1~S4	60514170	Push Switch, 4-gang
	60499171	Wire, Headphone

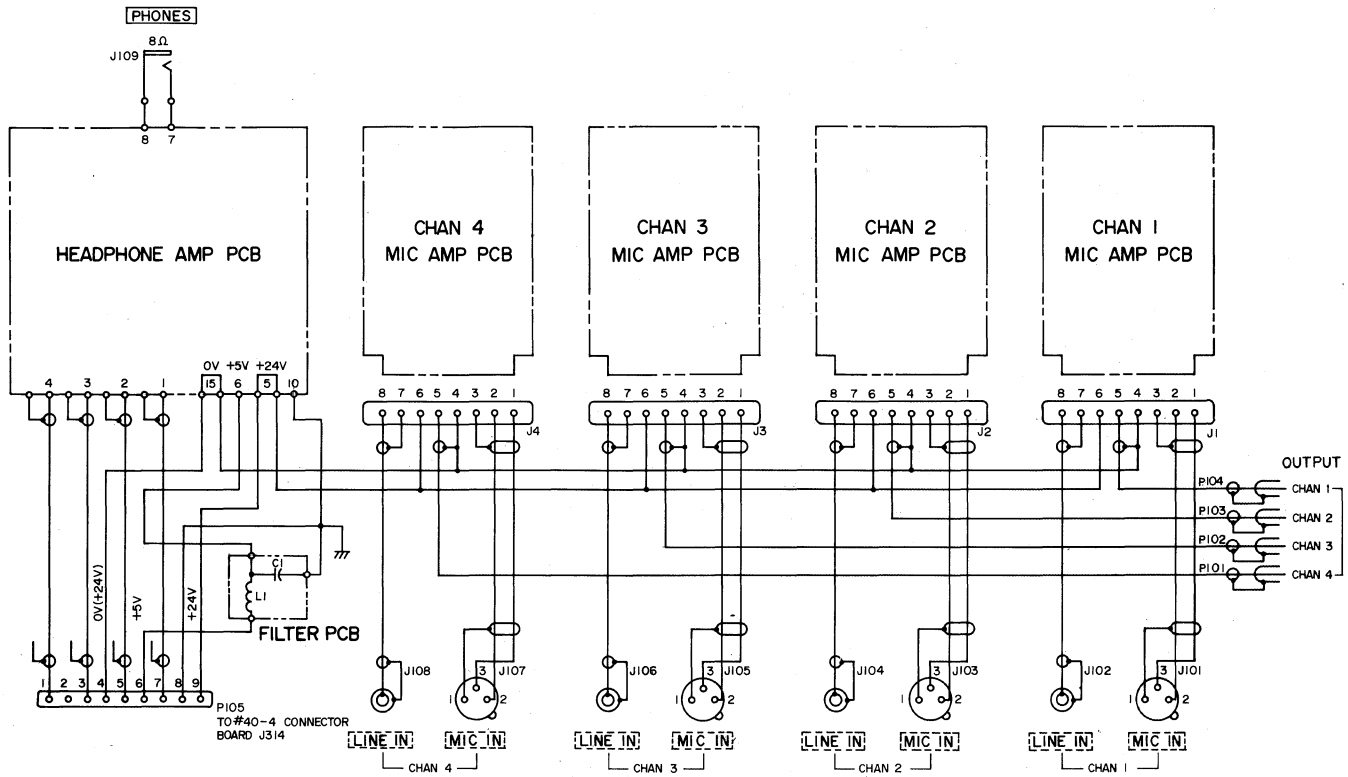
3. FILTER PC BOARD ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	60853920	PC Board Assy
	60504830	PC Board
L1	60466350	Coil, Choke 1.0 mH 10%
C1	50554800	Elec. Capacitor, 100 mfd 10V
	60386780	Bracket, Filter PCB

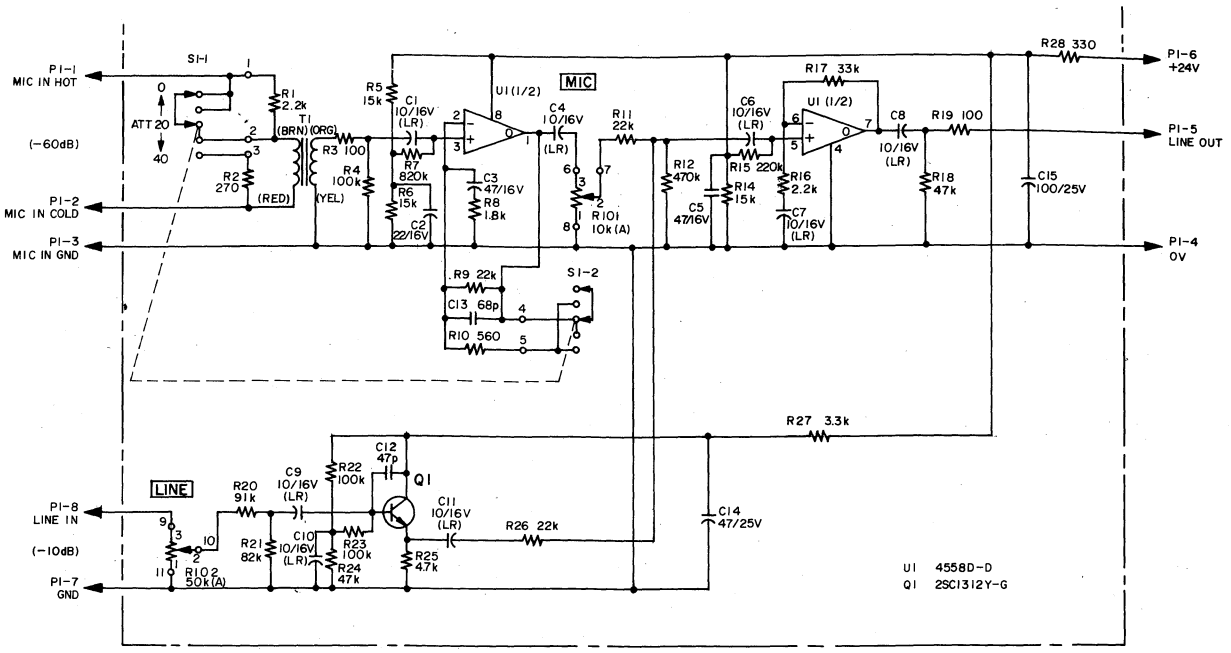
3. SCHEMATICS



BLOCK DIAGRAM (MA-4)

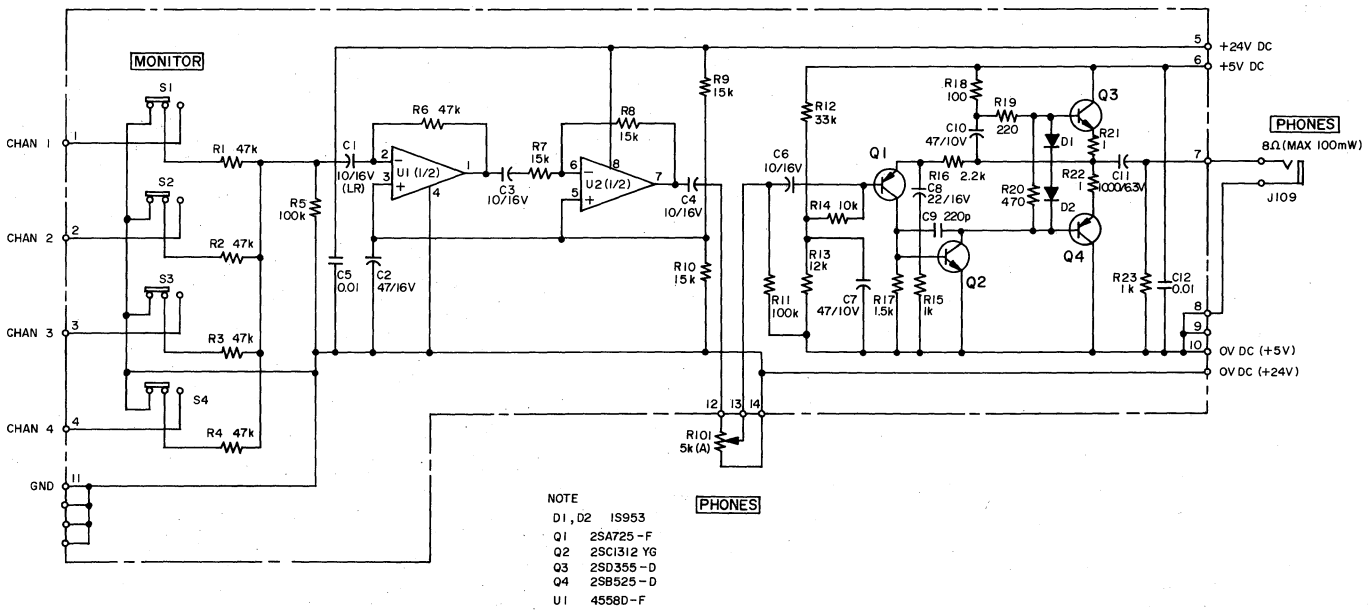


SCHEMATIC (MA-4)
Mic ampl. unit
REV.
TEAC CORPORATION



ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (MA-4)
Mic preampl. PCB ass'y
REV.
TEAC CORPORATION

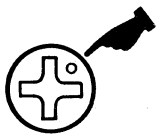


ALL RESISTORS ¼W, ±5% UNLESS OTHERWISE INDICATED.
ALL CAPACITORS IN MFD. AND 50WV UNLESS OTHERWISE INDICATED.
CURVED PLATE OF CAPACITOR SYMBOLS INDICATE NEGATIVE POLARITY.

SCHEMATIC (MA-4)
Headphone ampl. PCB ass'y
REV.
TEAC CORPORATION

ASSEMBLING HARDWARE CODING LIST

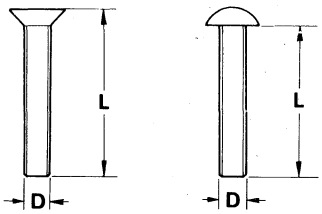
All screws conform to ISO standards, and have crossrecessed heads, unless otherwise noted. ISO screws have the head inscribed with a point as in the figure to the right.



FOR EXAMPLE:

B M 3 x 6

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



* Inner dia. for washers and nuts

	Code	Name	Type
MACHINE SCREW	**R**	Round Head Screw	
	P	Pan Head Screw	
	T	Stove Head Screw (Truss)	
	B	Binding Head Screw	
	F	Flat Countersunk Head Screw	
	O	Oval Countersunk Head Screw	
WOOD SCREW	**RW**	Round Head Wood Screw	
	FW	Flat Countersunk Wood Screw	
	OW	Oval Countersunk Wood Screw	
SEMS SCREW	**BSA**	Binding Head SEMS Screw(A Type)	
	BSB	Binding Head SEMS Screw(B Type)	
	BSF	Binding Head SEMS Screw(F Type)	
	PSA	Pan Head SEMS Screw(A Type)	
	PSB	Pan Head SEMS Screw(B Type)	

	Code	Name	Type
TAPPING SCREW	**BTA**	Binding Head Tapping Screw(A Type)	
	BTB	Binding Head Tapping Screw(B Type)	
	RTA	Round Head Tapping Screw(A Type)	
	RTB	Round Head Tapping Screw(B Type)	
SETSCREW	**SF**	Hex Socket Setscrew(Flat Point)	
	SC	Hex Socket Setscrew(Cup Point)	
	SS	Slotted Socket Setscrew(Flat Point)	
WASHER	**E**	E-Ring (Retaining Washer)	
	W	Flat Washer (Plain)	
	SW	Lock Washer (Spring)	
	LWI	Lock Washer (Internal Teeth)	
	LWE	Lock Washer (External Teeth)	
	TW	Trim Washer (Countersunk)	
NUT	**N**	Hex Nut	

TEAC®
Tascam Series

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