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Parts No.OS3-135

OTARI®

MX-80

PROFESSIONAL RECORDER

OPERATION AND MAINTENANCE MANUAL

Edition No.3
Printed:May 1987

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CAUTION

To prevent fire or shock hazard :

Do not expose this appliance to rain or moisture.

Do not remove cover.

No user-serviceable parts inside.

Refer servicing to qualified service personnel.

PLEASE READ THROUGH SAFETY INSTRUCTIONS

ON THE NEXT PAGE.

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SAFETY INSTRUCTIONS

1. Read Instructions - All the safety and operating instructions should be read before the appliance is operated.

2. Retain Instructions - The safety and operating instructions should be retained for future reference.

3. Heed Warnings - all warnings on the appliance and in the operating instructions should be adhered to.

4. Follow Instructions - All instructions should be followed.

5. Water and Moisture - The appliance should not be used near water - for example, near a bathtub, washbasin, kitchen sink, laundrytub, in a wet basement, or near a swimming pool, etc.

6. Carts and Stands - The appliance should be used only with a cart or stand that is recommended by the manufacturer.

7. Ventilation - The appliance should be situated so that its location or position does not interfere with its proper ventilation.
   For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation operatings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

8. Heat - The appliance should be situated away from near sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.

9. Power Sources - The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

10. Grounding or Polarization - Precautions should be taken so that the grounding or polarization means of an appliance are not defeated.

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11. Power-Cord Protection - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs. Convenience receptacles, and the point where they exit from the appliance.

12. Cleaning - The appliance should be cleaned only as recommended by the manufacturer.

13. Nonuse Periods - The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

14. Object and Liquid Entry - Care should be taken so that objects do not fall into and liquids are not spilled into the enclosure through openings.

15. Damage Requiring Service - The appliance should be serviced by qualified service personnel when:

    A. The power-supply cord or the plug has been damaged; or

    B. Objects have fallen, or liquid has been spilled into the appliance; or

    C. The appliance has been exposed to rain; or

    D. The appliance does not appear to operate normally or exhibits marked change in performance; or

    E. The appliance has been dropped, or the enclosure damaged.

16. Servicing - The user should not attempt to service the appliance beyond that described in the operating instructions.
    All other servicing should be referred to qualified service personnel.

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WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to ratio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at this own expense will be required to take whatever measures may be required to correct the interference.

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COMMUNICATION WITH OTARI
FOR SERVICE INFORMATION AND PARTS

The OTARI PRODUCTS are manufactured under strict quality control and each unit is carefully tested and inspected prior to shipment from our factory.

If, however, some adjustments or technical support become necessary, replacement parts are required, or technical questions arise, please contact your nearest OTARI dealer or write to:

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Suginami-ku, Tokyo, 167, Japan
Phone: (03) 333-9631
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Telex: 849453 OTARI G
Fax : (0753) 823707

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Another part of OTARI's continuous technical support program for our products, is the continuous revision of manuals as the equipment is improved or modified.

In order for you to receive our information and service applicable to your requirements, and for the technical support to function properly, please include the following information, most of which can be obtained from the name plate on the equipment in all correspondences.

1. Model Number
2. Serial Number
3. date of purchase
4. Name and address of dealer from whom machine was purchased
5. Power requirements (voltage and frequency) of the machine
6. Manual number to which you are referring

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SECTION 1: INTRODUCTION

The OTARI MX-80 Series machines are extremely versatile, high performance 16, 24 or 32 track recorder/reproducers using 2" wide tape and 10-1/2" NAB reels. The MX-80 Series consists of eight machines, each having a different combination of tape speed pairs (7-1/2 and 15 ips or 15 and 30 ips) and track configurations (16 tracks, 24 tracks, 24 tracks pre-wired for 32 tracks, or 32 tracks). Table 1-1 describes the various configurations and model numbers.

Table 1-1 MX-80 Series Configurations

Type	Tape Width	Tape Speed	Catalog Number	Note
MX-80	2"	30ips/ 15ips	MX-80-16-H	
			MX-80-24-H	
			MX-80-24/32-H	24ch pre-wired for 32ch
			MX-80-32-H	
		15ips/ 7-1/2ips	MX-80-16-L	
			MX-80-24-L	
			MX-80-24/32-L	24ch pre-wired for 32ch
			MX-80-32-L	

1.1 USING THIS MANUAL

This manual is intended for use with any of the models and configurations listed above. The descriptions and references refer to the MX-80-24-H model (the 24 track, high speed-pair version). If any differences exist between the referenced machine and another model, those differences will be explained fully.

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1.1.1 Organization

This manual is divided into eleven sections beginning with this INTRODUCTION which contains general information about the machine and about the manual.

The second section is the REFERENCE GUIDE which contains a keyed guide to the controls and indicators. This REFERENCE GUIDE provides detailed information about each control and its functions. You should use this section of the manual when you have a question about the function of a particular control or indicator.

Third is the OPERATIONS section which describes the operation of the machine. This section is divided into two parts, first, a list of all the operating modes of the machine, and second, "Recording with the MX-80", a tutorial organized by task, starting with threading tape on the machine and recording basic tracks, and continuing through overdubs, punch-ins, etc. You should use this section when you wish to learn "how to" perform a task or operation (like spot erase or spooling).

The fourth section of this manual covers ALIGNMENT AND CALIBRATION including the information needed to perform the routine alignments and calibrations associated with normal operation of the machine (like head azimuth, bias adjustment, or output level adjustment). You should refer to this section of the manual when you are performing the normal maintenance and calibration routines that must be done to keep the recorder operating at peak performance.

The fifth section of this manual is reserved for OPTIONAL EQUIPMENT AND FIELD UPGRADES that are available for use with the MX-80 series tape recorders. Included in this section are instructions for converting a 24 track version of the MX-80 to a 32 track version. You should place update information in this section as you received it during your ownership of the MX-80.

Section six, INSTALLATION, contains the information required when uncrating and installing the MX-80 for the first time, or when interfacing the machine to the recording mixer or other equipment.

The seventh section of the manual lists the SPECIFICATIONS of the MX-80 Series.

Section eight contains PRINTED CIRCUIT BOARD LAYOUTS, with two-color "x-ray" views of each printed circuit board showing the component locations and foil traces.

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Section nine, EXPLODED VIEWS AND PARTS LISTS, contains assembly drawings of the machine "exploded" to show internal parts and hardware, and the order of assembly. Each exploded view is keyed to an accompanying parts list showing OTARI part numbers for all mechanical components.

The final section of the manual contains the SCHEMATICS for all electronics and printed circuit boards.

1.1.2 Conventions within This Manual

The use of terms channel and track may require some clarification. This manual refers to the signal, or the path of the signal, recorded on the tape as a TRACK, and the electronics or controls for that path are referred to as a CHANNEL.

Generally, this manual uses all upper case type to describe a switch or control when that item is similarly labeled on the machine (e.g., the PLAY button). Where a switch or button is not labeled, or the reference is less clear, only the first letter of the item is capitalized (e.g., the Cue lever near the CUE button). Machine status or operating modes are described with an upper case first letter (e.g., you press the PLAY button to place the machine in Play mode). Normal parentheses ( ) are used for examples and parenthetic comments. Square brackets [ ] are used for reference to callouts in certain illustrations. The square brackets in a particular sub-section are either all referenced to the same figure, as noted in that sub-section, or are individually referenced (e.g., [Fig. 2-1,3], meaning callout "3" in Figure 2-1).

The information and procedure in Section 6, INSTALLATION should be followed very carefully when the machine is first uncrated and installed. Performing the inspection steps will familiarize you with the machine and its component parts if this is your first contact with the MX-80 series of tape recorders.

Please read Sections 2 and 3 carefully before using the machine. In the future, after you are more familiar with the machine, if you need information about a specific operation, or instructions on how to perform a particular function, refer to the Tutorial instructions in Section 3.

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1.2 OTARI MX-80 SERIES TAPE RECORDERS

The MX-80 Series tape transport is fully microprocessor controlled to provide precision tape handling characteristics while maintaining the high degree of reliability long associated with the OTARI line of professional tape recorders. The transport controls (PLAY, F.FWD, REWIND, STOP, CUE, EDIT/UNLOAD, etc.) direct commands to the microprocessor which, in turn, controls the activities of the Capstan and Reel Servo circuits to provide the desired operating mode or function. The microprocessor provides two-level illumination for the transport control buttons, dim when "off", flashing when "ready" to perform a function, and bright when "active" after a function has been selected, giving confirmation of the operating mode to the operator.

The plug-in multi-track head assembly allows replacement of a head assembly without having to perform time-consuming height, wrap, and zenith adjustments. Only the azimuth adjustment need be verified whenever changing heads, or optimizing the alignment for a tape recorded on another tape recorder. The head assembly is equipped with a scrape flutter roller located between the record and reproduce head stacks. A head shield, which is manually moved up and down, is provided in front of the head stacks. The head shield rises automatically in the Play and Record modes.

The capstan shaft is driven directly by a DC servo motor which is controlled by a quartz crystal-based phase-locked-loop servo system. A switch on the transport selects between the two operating speeds (7-1/2, 15 ips or 15, 30 ips). The Speed Mode Switch on the Remote Control Unit (CB-123, CB-124) selects between the tree available Speed modes; FIX - crystal controlled speed selected by the Speed switch on the transport, VARI - variable speed ± 50%, and EXT - variable speed controlled by an external speed reference signal (9,600 Hz nominal).

Constant tape tension is provided by the reel motor servo circuit. The tape tension arms utilize non-contact photo-optical sensors to generate feedback signals for the Reel Control Printed Circuit Board (PCB). Constant tension is applied to the tape in all but Edit/Unload mode to insure fast, accurate, stress free tape handling. Motion sensing and accurate tape speed information are provided by the Tachometer Roller to the transport control circuits in the form of tach pulses. These tach pulses are also used to control the Fast Forward and Rewind speeds, and to provide tape length information to the direct-reading Tape Timer.

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Located in the pedestal portion of the MX-80, the Audio section contains the Audio Control PCB, the Serial Remote Control PCB, the Audio Amplifier PCBs (16, 24 or 32), and the Power supplies for ;the various sections of the tape recorder. The Audio Control PCB contains the Test Signal jack (for application of a test signal to all channels simultaneously), a selector switch for High or Low Reference Flux density and indicators showing the level selected, the Bias switch which allows bias setting for two different tape formulations, EQ switch for selecting IEC or NAB equalizer, high/low select switch for output and input level, gapless function on/off switch, Dolby HX PRO* on/off switch and VU meter sensitivity selector switch.

The Serial Amplifier Remote Control PCB contains two on/off switches for the selection of Stop Standby and Fast Standby modes (Refer to Section 4.1).
The Audio Amplifier PCBs each contain the Record, Reproduce, Sel-Rep, and Bias electronics for one audio channel. Front panel adjustments are provided for Record and Reproduce Equalization at both currently selected speeds, Record, Reproduce and Sel-Rep gain, Record Phase Compensation and Repro Low Frequency Compensation for each speed of the current speed pair, and individual channel Bias adjustment. Each channel is provided with an individual LINE OUTPUT Jack on the front panel, for test purposes, in addition to the XL type OUTPUT connector provided on the rear of the machine.

A VU meter is provided for each channel. In each VU meter are two LED indicators, one to indicate signal level peaks that are too short to cause the VU meter to indicate accurately, and another to indicate the channel's Record status.

Each MX-80 Series tape recorder includes either the CB-124 (16 or 24 tracks) or the CB-123 (32 tracks) full function Remote Control Unit.
The Remote Control Unit provides control of monitor (Input/Sel-Rep/Repro) and Record Ready switching and indication; transport mode, Search-Cue, Search-Zero, Repeat, and Speed Control functions.
The Remote Control Unit also features four Channel Status memories to store and recall the mode status (Ready/Safe, Mute/Input/Sel-Rep/Repro) of all the Channels simultaneously.

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* HX PRO headroom extension originated by Bang and Olufsen and manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby", the Double-D symbol and HX PRO are trademarks of Dolby Laboratories Licensing Corporation.

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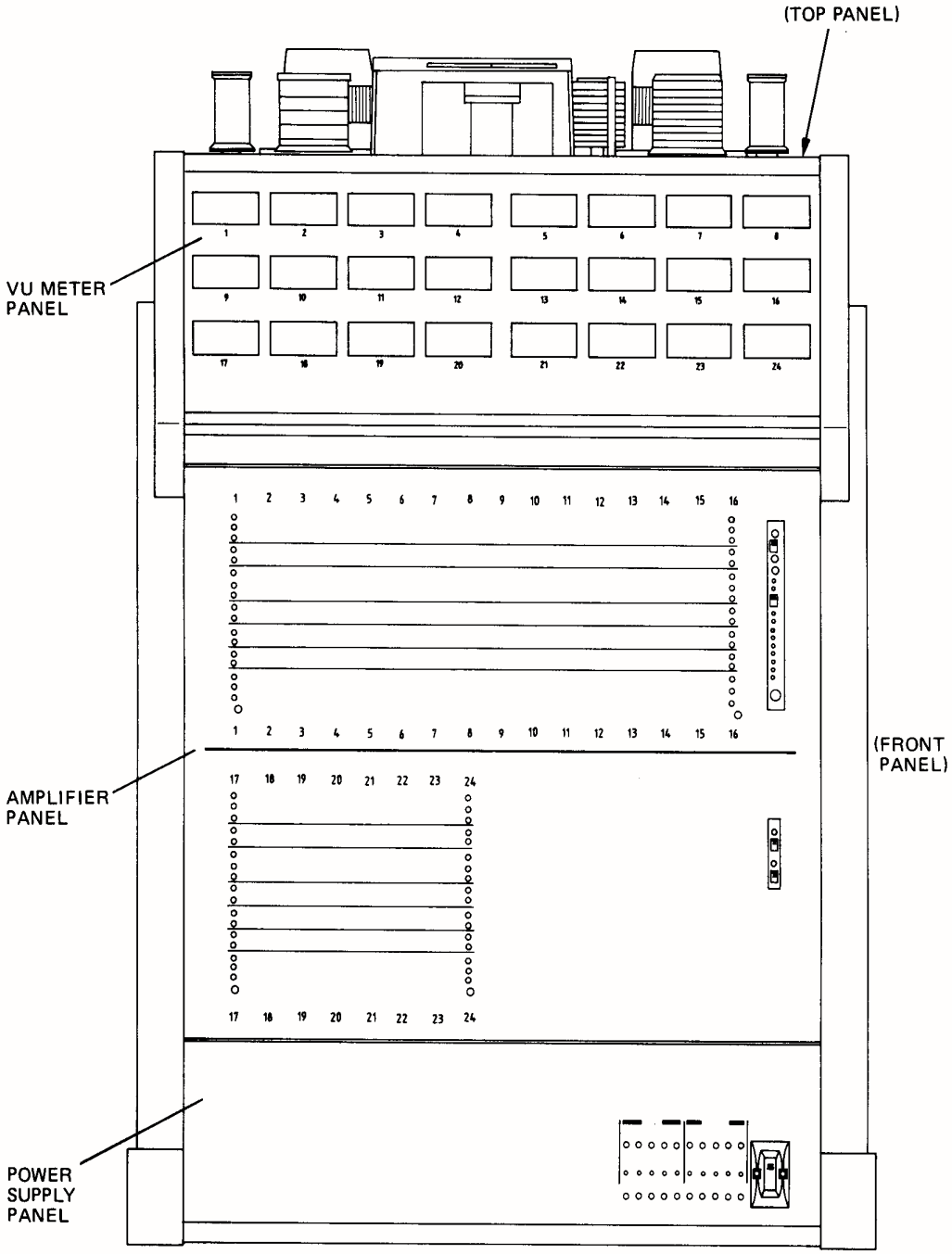

Figure 1-1 MX-80 Front Panel

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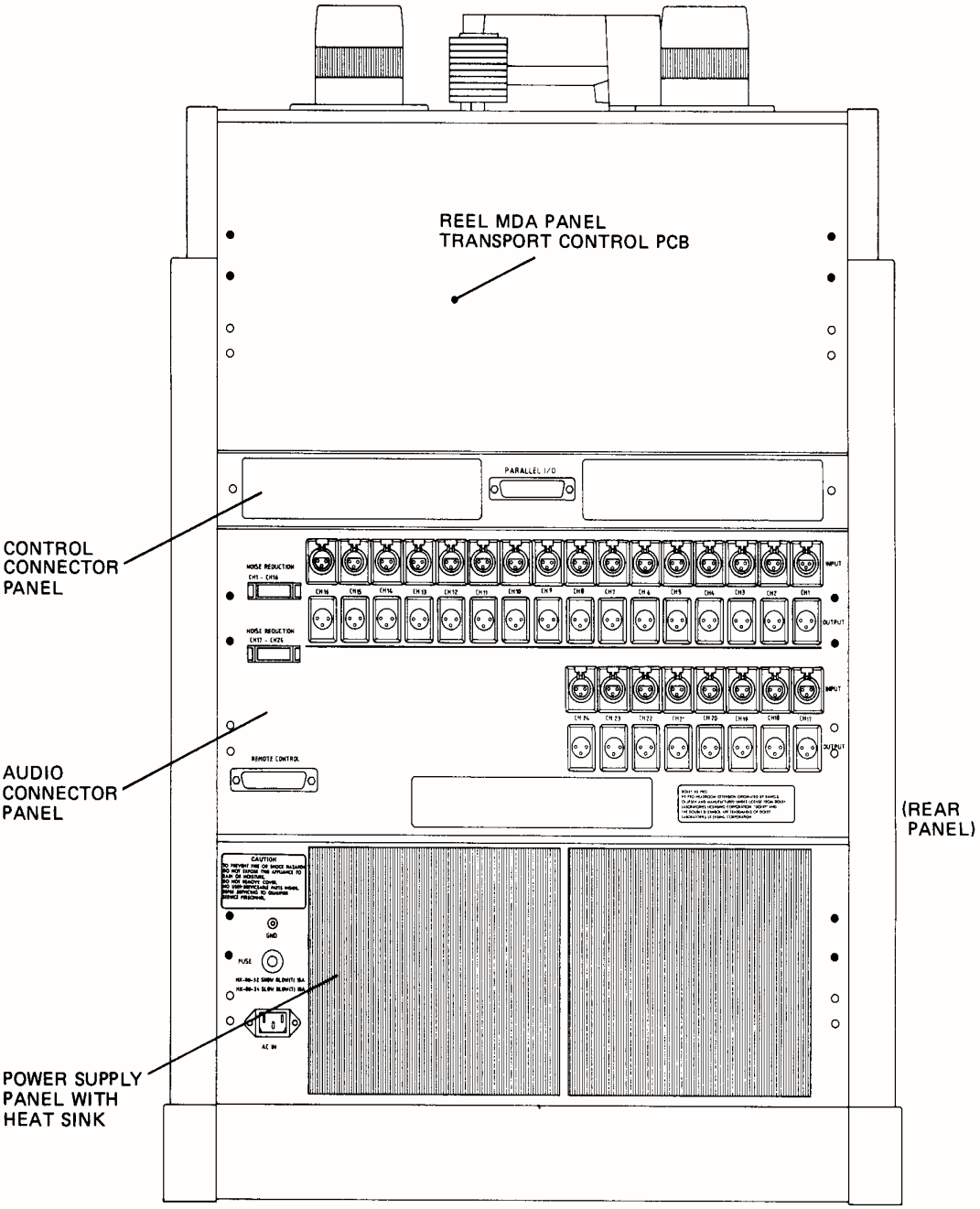

Figure 1-2 MX-80 Rear Panel

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SECTION 2:
CONTROLS AND INDICATORS: A Quick Reference Guide

NOTE: Numbers in brackets refer to the callouts in each figure of this section.

2.1 TRANSPORT CONTROLS AND INDICATORS

[1] F.FWD button

Pressing this button places the transport in Fast Forward wind mode. The button will be brightly illuminated (white).

Keeping the F.FWD button pressed, and then pressing the 2nd FUNCTION button places the transport in Forward Spooling mode for winding tape onto the take-up reel with a smoother tape pack than is achieved at full wind speed.

[2] REWIND button

Pressing this button places the transport in Rewind mode. The button will be brightly illuminated (white).

Keeping the REWIND button pressed, and then pressing the 2nd FUNCTION button places the transport in Reverse Spooling mode for winding tape onto the supply reel with a smoother tape pack than is achieved at full wind speed.

[3] STOP button

Pressing the STOP button when the transport is in Play, Reverse Play, F.Fwd, Rewind, Edit Play or Spooling mode, causes the tape motion to stop. The button will be brightly illuminated (blue).

Pressing this button when the transport is in Unload mode and the STOP button is flashing, (such as when tape has just been threaded, and the slack has been removed by turning the reels by hand) causes the transport to apply tension to the tape in preparation for other transport modes. The button will become brightly illuminated (blue).

Pressing the 2nd FUNCTION button simultaneously with the STOP button causes the capstan motor to reverse direction in preparation for Reverse Play mode.

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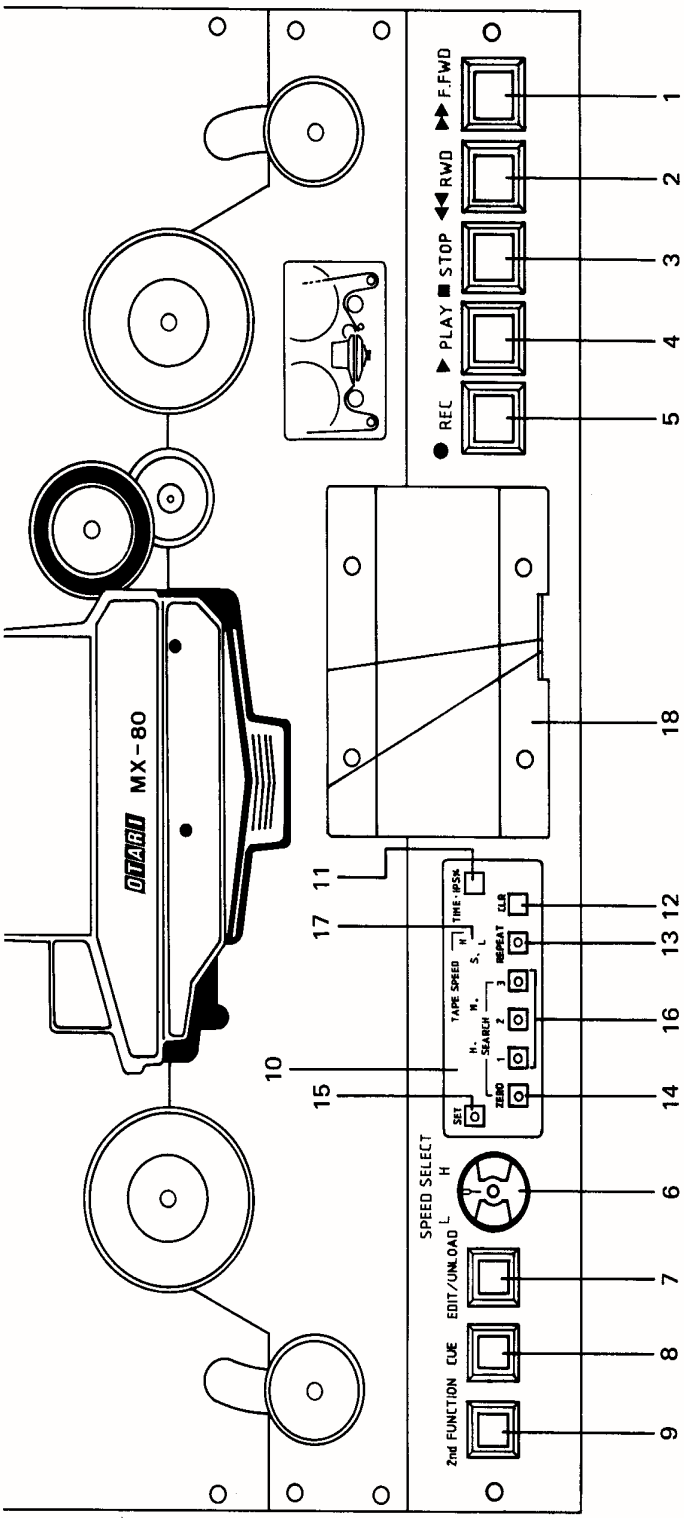

Figure 2-1 Transport Control Panel

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NOTE: There is a slight delay while the capstan motor achieves crystal-locked speed, when reversing.

[4] PLAY button

Pressing this button places the transport in Play mode, causing tape to wind onto the take-up reel at the selected speed (H or L). The button will become brightly illuminated (white).

Pressing the PLAY button while in F.Fwd or Rewind mode causes the tape to decelerate and then enter the Play mode.

Pressing this button while the transport is in Edit Ready mode (with the EDIT/UNLOAD button flashing) causes the transport to enter Dump Edit mode.

Pressing this button while the transport is in Search Cue or Search Zero mode causes PLAY button to flash and the transport to enter Play mode upon reaching the end of the Search.

Pressing the PLAY and 2nd FUNCTION buttons simultaneously causes the machine to enter Reverse Play mode.

[5] RECORD button

When a channel is in Record Ready mode the RECORD button will flash (red). You may select one of two methods of entering Record mode. The two methods are:

1. Pressing this button simultaneously with the PLAY button. The button will be brightly illuminated (red).

2. Pressing the RECORD button while the transport is in Play mode (also known as Punch-In). The button will be brightly illuminated (red).

The MX-80 is factory preset for method 2.

Similarly, you may select between two methods of exiting from Record mode:

1. Keeping the RECORD button pressed and pressing the STOP button (Punch-Out).

2. Pressing the PLAY button while in Record mode.

The MX-80 is factory preset for method 2.

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The selection of Punch-In and Punch-Out methods is made via switches DSW3-1 and DSW3-2 on the Transport Control PCB.

Pressing this button simultaneously with 2nd FUNCTION button causes the transport to enter Spot Erase mode. Pressing the RECORD button again, and holding it, while slowly moving the tape by hand, causes the erase circuitry to be activated to erase the tape at the Erase Head. Releasing the RECORD button will deactivate the Erase signal.

Pressing this button while the transport is in Reverse Play mode causes the MX-80 to enter Reverse Erase mode.

[6] SPEED SELECT switch and TAPE SPEED indicator

This switch selects between the High or Low speed of the speed pair selected internally. On high speed-pair machines the H setting is 30 ips and the L setting is 15 ips. On low speed-pair machines the H setting is 15 ips and the L setting is 7-1/2 ips.

[7] EDIT/UNLOAD button

Pressing this button while the transport is in Stop mode causes the transport to enter Edit Ready mode and the button will flash (white). Pressing the EDIT/UNLOAD button again causes the transport to enter Unload mode and remove the tension from the tape.

Pressing this button when the transport is in Play mode causes the machine to enter Edit Play mode (Dump Edit) in which the Take-up reel motor stops, allowing tape to "dump" over the side of the machine. In Edit Play (Dump Edit) mode the button will be brightly illuminated (white).

[8] CUE button

Holding the CUE button pressed causes the tape lifters to remain retracted only as long as the button is held pressed. Tapping the CUE button causes the tape lifters to remain retracted until the next time the CUE button is pressed. When the lifters are retracted, the audio output is attenuated and the high frequencies rolled-off to prevent damage to the monitor speakers.

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When the CUE button is pressed, and the lifters are not retracted, the audio is unmuted and is not attenuated, allowing you to listen for slate or marker tones without winding the tape across the heads. Press the CUE, STOP, or PLAY button to leave Cue mode.

Pressing this button while in Stop mode causes the machine to enter Stop Cue mode.

Pressing either the F.FWD or REWIND button while in Stop Cue mode allows the audio to be monitored and the tape to be wound in the direction indicated. Depending upon the setting of DSW3-3 on the Transport Control PCB, the lifters will remain retracted, and the audio attenuated, as described above, or the lifters will not retract, and the audio is unmuted and not attenuated.

[9] 2nd FUNCTION button

Pressing the 2nd FUNCTION button with other buttons provides access to additional functions, such as Reverse Play, which are not labeled on the machine. Each function is described with the appropriate button.

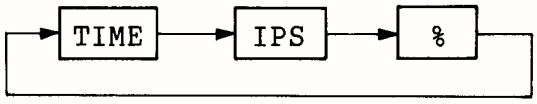
[10] Tape Timer display (H.M.S.)

The Tape Timer displays the current tape time in Hour, Minute, Second format. If the tape is located behind the 0.00.00 position the Tape Timer will display the time as negative (or -) time, relative to 0.00.00. If the SPEED SELECT switch is changed, the Tape Timer automatically recalculates the time displayed to be correct for the new speed.

The Tape Timer display is also utilized to display any error messages resulting from the Power-On self-test.

[11] TIME-IPS-% button

Pressing this button causes the Tape Timer display to show the Tape Time, the selected Play Speed in ips, or the Percentage of Play Speed, in turn.



[12] CLR button

Pressing this button simultaneously with another button clears the selected function as follows:

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CLR + SET ..... SET mode is canceled.

CLR + TIME-IPS-% .... The tape Timer display is cleared to 0.00.00.

CLR + SEARCH 1 - 3 .. The stored cue point is cleared

[13] REPEAT button

Pressing the REPEAT button, and then pressing any two illuminated Cue buttons (ZERO, 1, 2, 3), causes the machine to enter Repeat mode. Then pressing the PLAY button, causes the machine to play from the first location to the second, Rewind to the first location and Play again, repeating until Repeat mode is deactivated.

[14] SEARCH ZERO button

Pressing this button causes the transport to F. Forward or Rewind the tape, stopping when the tape timer reads 0.00.00.

Pressing the PLAY button while in Search Zero mode causes the PLAY button to flash and when the tape reaches 0.00.00, the transport enters Play mode.

Pressing the STOP, F.FWD, or REWIND button while in Search Zero mode causes the machine to leave Search Zero mode and take the action directed by the button.

[15] SET button

Pressing this button causes the MX-80 to enter Set mode, which is indicated by the flashing of the display's decimal points. Set mode allows the tape times for three cue points to be entered in the following manner:

SEARCH ZERO ..... + or - sign

SEARCH CUE 1 ..... Hours digit

SEARCH CUE 2 ..... Tens of Minutes digit

SEARCH CUE 3 ..... Units of Minutes digit

REPEAT ..... Tens of Seconds digit

CLR ..... Units of Seconds digit

The selected digit will increment each time the corresponding button is pressed.

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To store the tape time which has been entered onto the display in Set mode as a cue point, press and hold the SET button, and then press the desired SEARCH CUE button.

Simultaneously press the CLR and SET buttons for clearing the Set mode.

[16] SEARCH 1, 2, 3 buttons

If a button is not illuminated, there is no tape location stored for that Cue Point. Pressing an unlit SEARCH 1, 2, 3 button causes the current time shown on the Tape Timer display to be stored as that Cue Point, and that button to become illuminated.

If a SEARCH 1, 2, 3 button is illuminated, a tape location has been stored for that Cue Point. Pressing that button causes the transport to search to the location stored as that Cue Point. The location will be displayed or the Tape Timer display for approximately 2 seconds at the beginning of the search.

Pressing the PLAY button while in Search mode causes the PLAY button to flash, and when the tape reaches the location being searched to, the transport will enter Play mode.

Pressing the STOP button together with any SEARCH 1,2,3 button causes the Tape Timer display to show the location stored for that button.

Pressing the CLR button simultaneously with any SEARCH 1, 2 or 3 button causes the location stored for that cue point to be cleaned.

NOTE: There are different SEARCH 1,2,3 buttons on the Remote Control Unit which store the different Cue Points from those on Transport Control Panel. Another words, all together 6 Cue Points can be stored with the MX-80.

[17] TAPE SPEED(H/L) Indicator

This LED indicates the positon of the SPEED SELECT switch.

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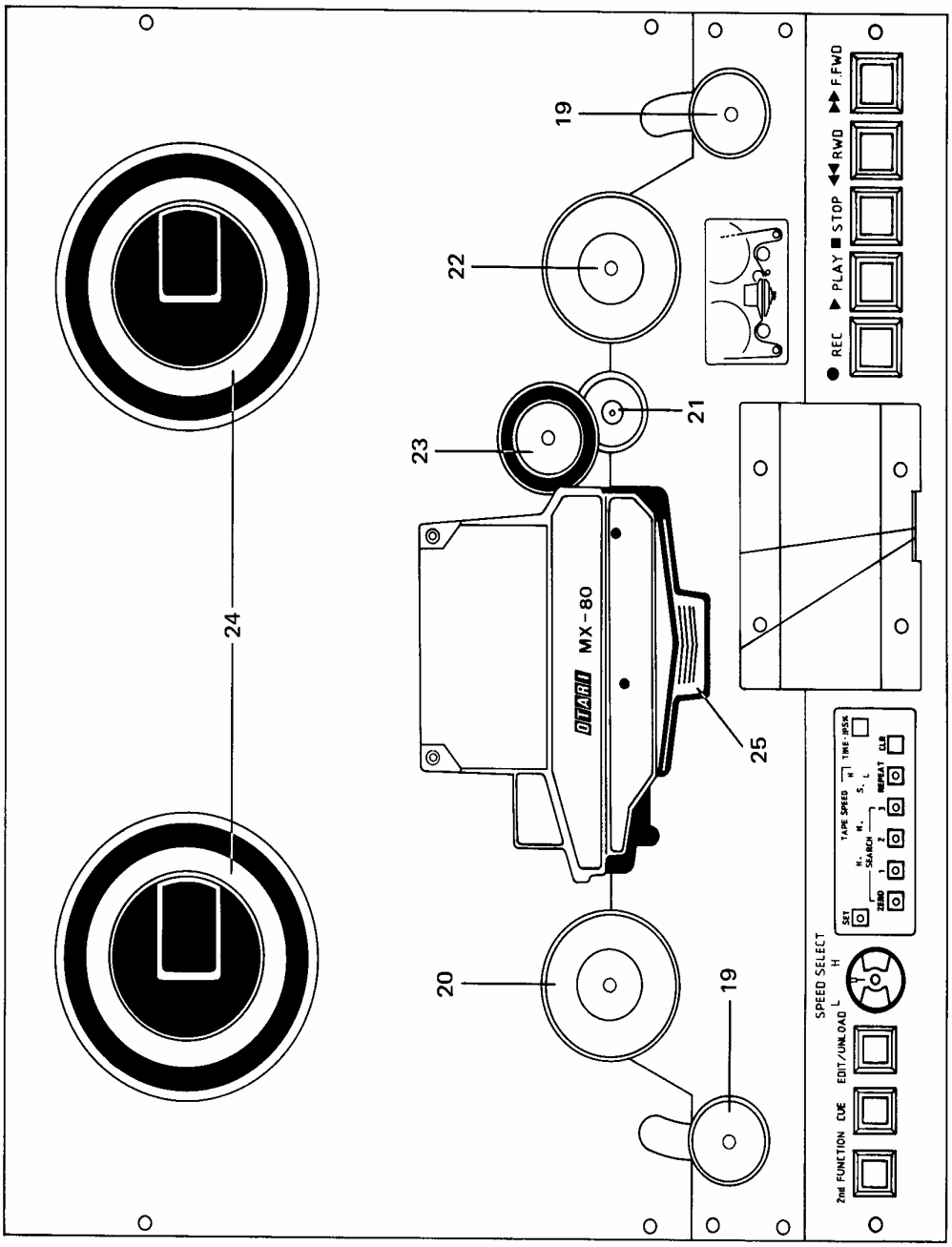

Figure 2-2 Tape Transport

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[18] Tape Splicing Block

This conveniently located splicing block has been provided to make tape editing easier. Lay the magnetic tape in the slot and cut it using the groove to guide your blade.

[19] Tape Tension Arms

These swing arms are connected to the sensor mechanisms that provide tension feedback information to the capstan and reel control circuits. The arms also activate the safety switches which stop all transport functions if too much slack develops in the tape path or if the tape becomes unthreaded from the reel.
After threading the tape, the take-up and supply reels should be turned by hand to remove the slack in the tape path, and to move the tape tension arms away from the bottom of their travel.

[20] Guide Roller

This rotating tape guide provides tape guidance during fast wind modes, and acts as an impedance roller during Play and Record modes to help damp out any fluctuations in tape speed caused by irregularities in the supply reel tape pack.

[21] Capstan Shaft

The capstan shaft is driven by a DC servo motor which is controlled by a quartz crystal reference in a phase-locked-loop circuit located on the Capstan Control PCB.

[22] Tachometer Roller

Tape motion across this roller causes it to rotate, generating tach pulses for accurate measurement of the tape length and speed by the microprocessor and tape timer circuits. In Stop mode you can move the tape for editing by turning the top of the tachometer roller by hand. The tape will follow the motion of the roller.

NOTE: Do not "jerk" the Tachometer Roller when moving tape by hand or the tape may slip against the roller.

[23] Pinch Roller

The tape is driven in Play, Reverse Play, Record, and Dump Edit modes by the rotation of the Capstan shaft against the Pinch Roller.

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[24] Reel tables

Reel tables with quick-release levers and locating pins.

[25] Head Shield

The Head Shield is manually retracted by pushing it down until it latches. When the Head Shield is in the retracted position, pressing it down causes the latch to be released and the shield will rise into position. The Head Shield will automatically rise, if retracted, whenever the MX-80 enters Record or Play mode if SW4-3 on the Transport Control PCB is in the On position.

2.2 VU METERS (UPPER FRONT PANEL)

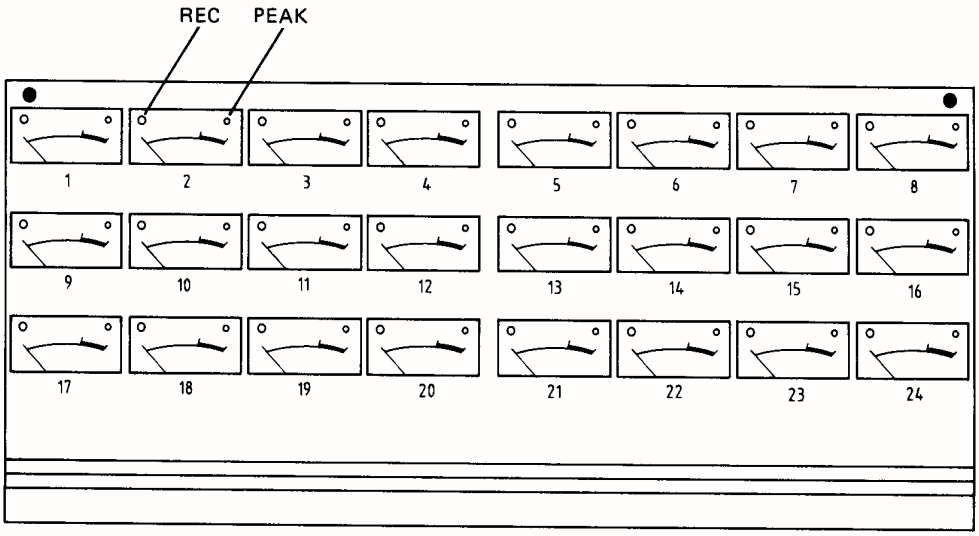

Figure 2-3 VU Meter Panel

The VU meters (16, 24 or 32 depending on the machine configuration) are located on the upper front panel of the machine. Each VU meter is calibrated to indicate 0 VU at the selected reference level (250 nWb/m or 320 nWb/m). Each meter incorporates two LED indicators, the PEAK indicator, which is set to illuminate if a signal peak reaches a level equivalent to 1,040 nWb/m (approximately 3% 3rd Harmonic Distortion), and the RECORD indicator, which flashes when the channel is in Record Ready mode, and is steadily illuminated when the channel is in Record or Spot Erase modes.

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The 0 VU reference level and the level at which the PEAK LED becomes illuminated are adjustable via trimmers on each Audio Amplifier PCB.

2.3 AMPLIFIER CONTROLS (LOWER FRONT PANEL)

2.3.1 Audio Control PCB

(Numbers in brackets, [ ], refer to callouts in Figure 2-4.)

[1] Master BIAS SELECT switch (SW1) and trimmers

This switch selects between two preset bias levels to facilitate changing the bias level for two different tape formulations. The associated trimmers adjust the bias level for each switch position. Refer to Table 2-1.

The A HI SPD trimmer (VR1) adjusts the bias for the A position of the BIAS SELECT switch at high tape speed. The bias level for the A position at the Low tape speed is fixed for AMPEX 456 tape.

The B HI SPD trimmer (VR2) adjusts the bias for the B position of the BIAS SELECT switch at high tape speed.

The B LOW SPD trimmer (VR3) adjusts the bias for the B position of the BIAS SELECT switch at high tape speed.

Table 2-1 Bias Setting

	HI SPEED	LOW SPEED
TAPE A	VR 1	fixed
TAPE B	VR 2	VR 3

[2] Reference flux level indicators (HI/LOW)

These Leds indicate the position of the REF FLUX switch [3]. The HI LED is illuminated when the selected reference level is 320 nWb/m*. The LOW LED indicates that the selected reference level is 250 nWb/m*.

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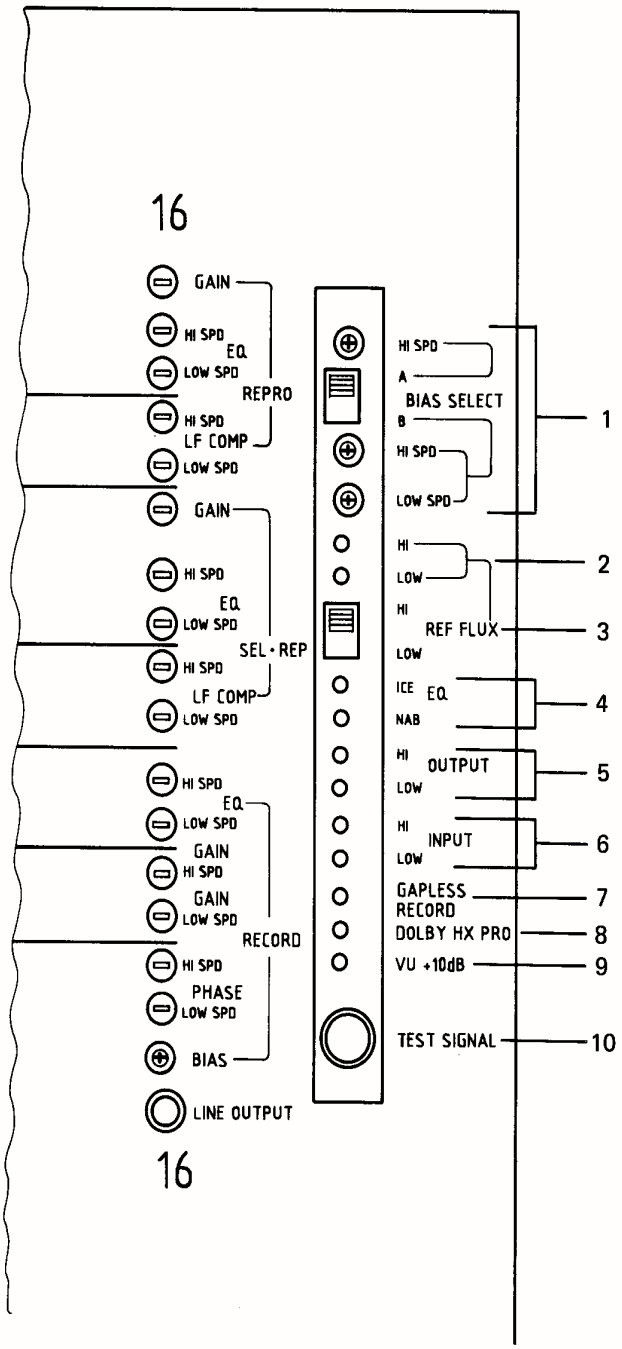

Figure 2-4 Audio Control PCB

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[3] REF FLUX switch (SW2)

This switch selects either HI (320 nWb/m*) or LOW (250 nWb/m*) reference flux level (the magnetic flux density applied to, or playing from the tape when operating at 0 VU). Selection of reference level does not affect the input or output signal level.

* NOTE: These values are default values at the time of shipment from the factory. They may be changed as required.

[4] EQualization indicators (IEC/NAB) and equalization select switch (SW3)

Selection of IEC or NAB equalization is made with SW3 on the Audio Control PCB. The indicator corresponding to the selected switch position will be illuminated.

[5] OUTPUT level indicators (HI/LOW) and level select switch (SW4)

Selection of the output level is made by SW4 located on the Audio Control PCB. At the time of shipment from the factory, the "HI" position corresponds to +4 dBm and the "LOW" position corresponds to -8 dBm. But these values can be changed as required.

The indicator corresponding to the selected switch position will be illuminated.

[6] INPUT level indicators (HI/LOW) and level select switch(SW5)

Selection of the input level is made by SW5 located on the Audio Control PCB. At the time of shipment from the factory, the "HI" position corresponds to +4 dBm and the "LOW" position corresponds to -8 dBm. But these values can be changed as required.

The indicator corresponding to the selected switch position will be illuminated.

[7] GAPLESS RECORD indicator and On/Off switch (SW6)

This switch controls the gapless record functrion. At the time of shipment from the factory, the switch is set to the On position. The indicator corresponding to the selected switch position will be illuminated.

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[8] DOLBY HX PRO indicator and On/Off switch (SW7)

This switch controls the Dolby HX Pro head room expansion function. At the time of shipment from the factory, the switch is set to the On position. The indicator corresponding to the selected switch position will be illuminated.

[9] +10dB VU indicator and On/Off switch (SW8)

When this switch is On, the sensitivity of the VU Meters is increased by +10dB. At the time of shipment from the factory, the switch is set to the Off position. The indicator corresponding to the selected switch position will be illuminated.

[10] TEST SIGNAL jack (PH1)

Any signal applied to this connector (1/4" phone jack) will appear at a test signal input to each audio channel. This connector is used to apply a test signal to all channels simultaneously for adjustment of gain, EQ, etc. The level of the signal applied to the TEST SIGNAL input should be the same as that applied to the rear panel input connectors (e.g., if the INPUT level select switch is set to LOW, an input signal of -8 dBm* will cause the VU meter to indicate 0 VU, if the switch is set to HI, the test signal input must be +4 dBm* for the VU meters to indicate 0 VU. (* Or a value set elsewhere)

2.3.2 Serial Remote Control PCB

[11] STOP STANDBY switch and indicator

Setting this switch to ON causes the Output of any channel that is in Record Ready mode to be fed from the Input whenever the tape stops, regardless of the position of the monitor switches.
The indicator is illuminated when Stop Standby mode is selected.

[12] FAST STANDBY switch and indicator

Setting this switch to ON causes the Output of any channel that is in Record Ready mode to be fed from the Input whenever the machine is in F.Fwd or Rewind or Spooling modes, regardless of the position of the monitor switches.
Pressing the CUE button during wind temporarily overrides the Standby function.

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The indicator is illuminated when Fast Standby mode is selected.

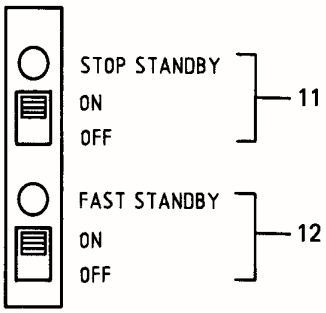

Figure 2-5 Serial Remote Control PCB

2.3.3 Audio Amplifier PCBs

The controls described here apply to one Audio Amplifier channel. Each audio channel has a corresponding set of controls.

[13] REPRO GAIN, EQ, LF COMP trimmers

These trimmers provide the following functions.

REPRO GAIN (VR5):
Adjustment of output level in playback.

REPRO EQ HI SPD (VR1):
Adjustment of playback equalizer in high speed.

REPRO EQ LOW SPD (VR2):
Adjustment of playback equalizer in low speed.

REPRO LF COMP HI SPD (VR3):
Compensation for the low frequency band characteristics at high speed.

REPRO LF COMP LOW SPD (VR4):
Compensation for the low frequency band characteristics at low speed.

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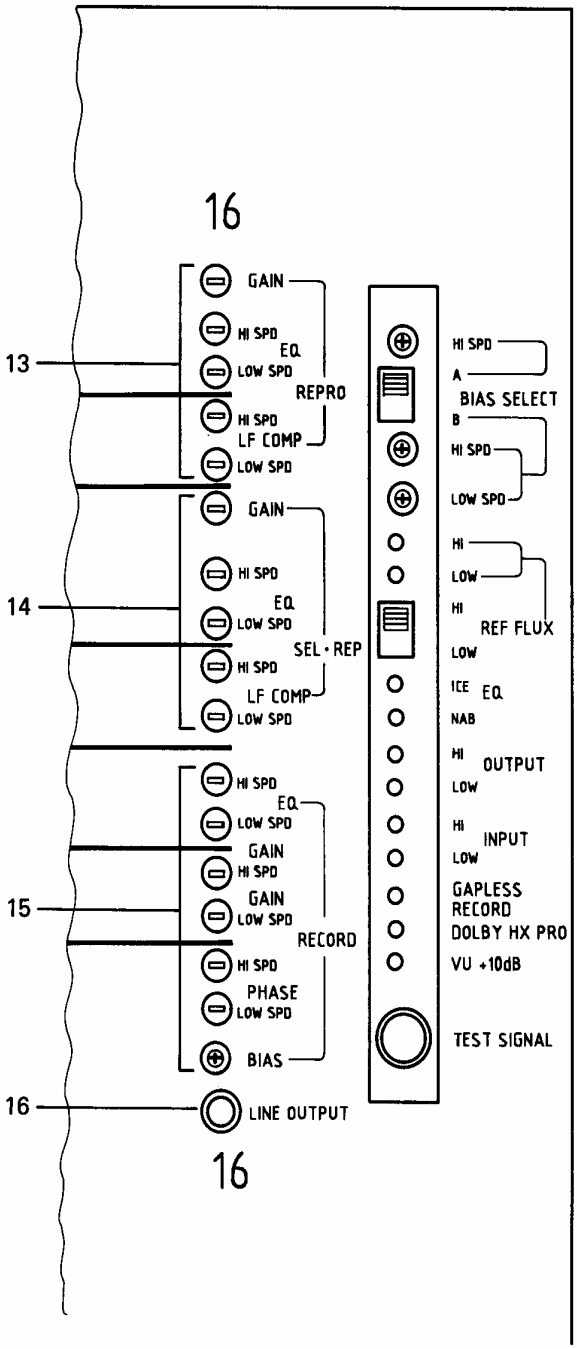

Figure 2-6 Audio Amplifier PCB

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[14] SEL-REP GAIN, EQ, LF COMP trimmers

SEL-REP GAIN (VR10):
Adjustment of output level in sel-rep.

SEL-REP EQ HI SPD (VR6):
Adjustment of sel-rep equalizer (at high speed).

SEL-REP EQ LOW SPD (VR7):
Adjustment of sel-rep equalizer (at low speed).

SEL-REP LF COMP HI SPD (VR8):
Compensation for the low frenquency band characteristics in sel-rep (at high speed).

SEL-REP LF COMP LOW SPD (VR9):
Compensation for the low frenquency band characteristics in sel-rep (at low speed).

[15] RECORD EQ, GAIN, PHASE, BIAS trimmers

RECORD EQ HI SPD (VR15):
Adjustment of record equalizer at high speed.

RECORD EQ LOW SPD (VR16):
Adjustment of record equalizer at low speed.

RECORD GAIN HI SPD (VR17):
Adjustment of record level at high speed.

RECORD GAIN LOW SPD (VR18):
Adjustment of record level at low speed.

RECORD PHASE HI SPD (VR19):
Adjustment of phase compensation at high speed.

RECORD PHASE LOW SPD (VR20):
Adjustment of phase compensation at low speed.

RECORD BIAS (VR21): Adjustment of bias current.

[16] LINE OUTPUT connector

This 1/8" (3 mm) 2-circuit (Tip-Ring-Sleeve) phone jack connector provides a "front panel" Line Output in parallel with the rear panel Output connector. The output is either balanced or unbalanced as selected by the BAL/UNBAL switch (SW1) on the Audio Amplifier PCB. This connector is most useful as a test connector when making Phase Comp adjustments.

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2.4 POWER SUPPLY PANEL

This panel contains the POWER switch, the Power Indicator, and the power supply circuit breakers. There is one circuit breaker for each of the supply voltages. When power is applied to the machine, and the POWER switch is in the On position, the VU Meters are illuminated. The Power Indicator changes color from Red to Green shortly after the Power is turned On, indicating that the power supply circuits are functioning normally.

The circuit brakers have been provided to protect the circuitry in case trouble should develop. If a circuit breaker should trip, turn off the machine, wait 30 seconds, press the circuit braker to reset it, and turn the machine back on. If the problem reoccurs or continues, contact your OTARI dealer or OTARI. See page iv for OTARI's location nearest you.

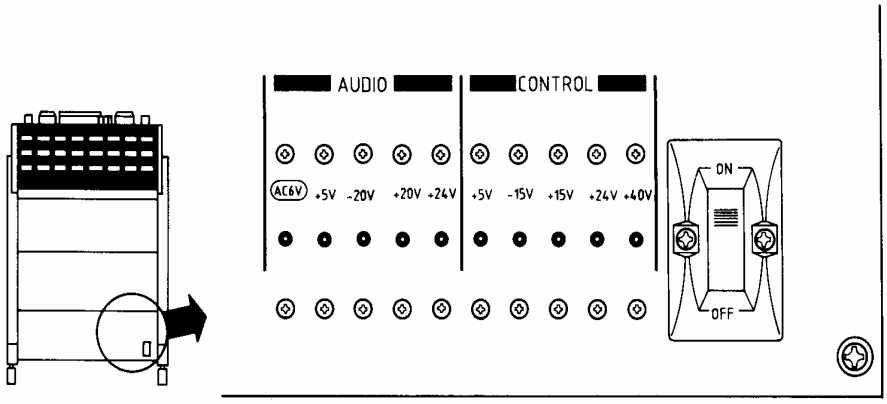

Figure 2-7 Power Supply Panel

2.5 INPUT AND OUTPUT CONNECTORS

All input and output connections except AC power, are made at the Connector Panel on the lower rear of the machine.

There are 3 pin XL type connectors for audio line Inputs and Outputs. Multi-pin connectors are provided for the Remote Control Unit and Noise Reduction system control. A Parallel I/O connector is provided for the optional CB-119 Auto Locator or other machine controller (e.g., SMPTE time code based synchronizer). Optional Serial I/O panels provide interfaces to RS-232C and RS-422A (SMPTE/EBU BUS) control systems.

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NOTE: Refer to Section 6.3 for further information about I/O connectors and pin assignments.

Numbers in brackets [ ] refer to callouts in Figure 2-8.

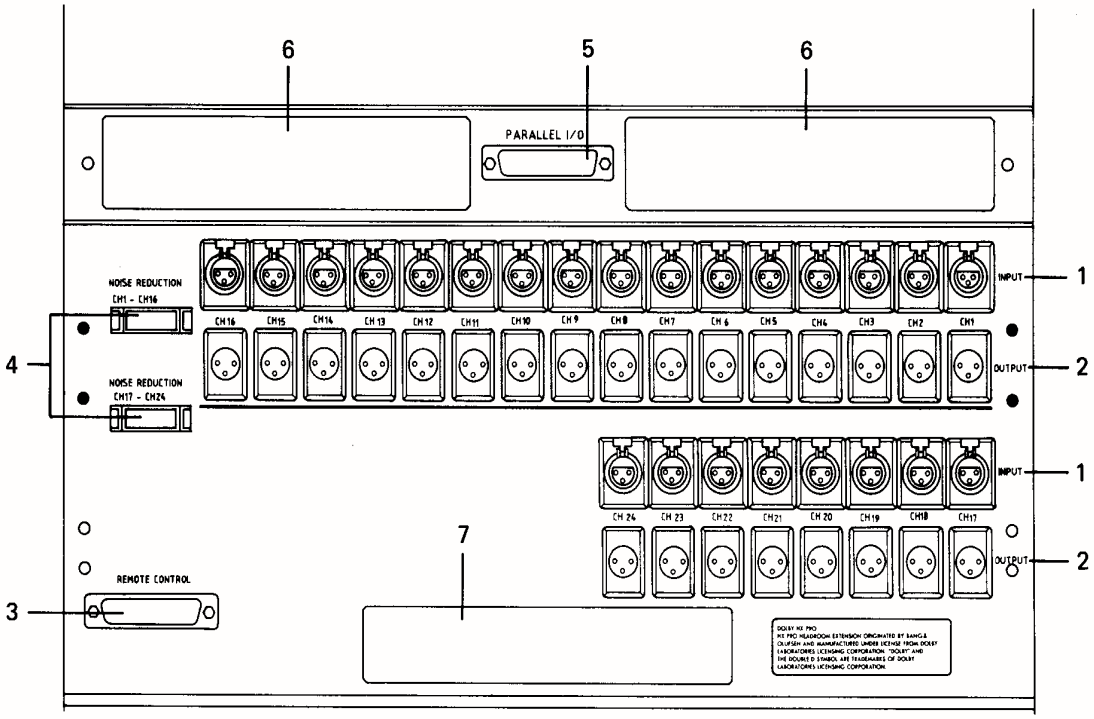

Figure 2-8 Rear Panel I/O connectors

[1] INPUT connectors

These 3-pin XL type connectors are the audio signal inputs to each channel of the recorder. Connect the buss or track outputs of the mixing console to these INPUT connectors. The MX-80 Inputs are designed for use with "line level" signals at either -8 dBm (-10 dBV) or +4 dBm (selectable via a switch on the Audio Control PCB).

[2] OUTPUT connectors

These 3-pin XL type connectors are the audio signal outputs from each channel of the recorder. Connect the track or monitor inputs of the mixing console to these OUTPUT connectors. The output from these connectors is at "line level", either -8 dBm (-10 dBV) or +4 dBm.

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[3] REMOTE CONTROL connector

This connector is used to connect the CB-123/124 Remote Control Unit to the tape recorder.

[4] NOISE REDUCTION connector

These 34-pin connectors are used to provide mode control of any non-simultaneous external noise reduction system which requires machine control of Encode/Decode modes. These connectors provide a "dry-contact" relay closure when the channel is in Input monitor or Record mode.

[5] PARALLEL I/O connector

This 37-pin connector is used to provide interface signals to the optional CB-119 Auto Locator or machine controller (e.g., synchronizer or resolver).

[6] Serial I/O Interface panel (Optional)

This optional Interface panel is used to connect the transport to control signals meeting RS-232C or RS-422A (SMPTE/EBU BUS) standards.

[7] (Optional I/O panel)

2.6 REMOTE CONTROL UNIT - CB-124 (16 or 24CH) OR CB-123 (32CH)

The CB-124 and CB-123 Remote Control Units are designed specifically to be used with the 16 or 24 track and 32 track versions of the MX-80 Series respectively. Many of the functions of the tape recorder such as the selection of a channel for recording, are controlled exclusively from the Remote Control Unit. Other functions, such as basic transport control, are available at both the transport and the Remote Control Unit. The numbers in brackets [ ] refer to callouts in Figure 2-9.

[1] F.FWD button

Pressing this button places the transport in Fast Forward wind mode. The button will be brightly illuminated (white).

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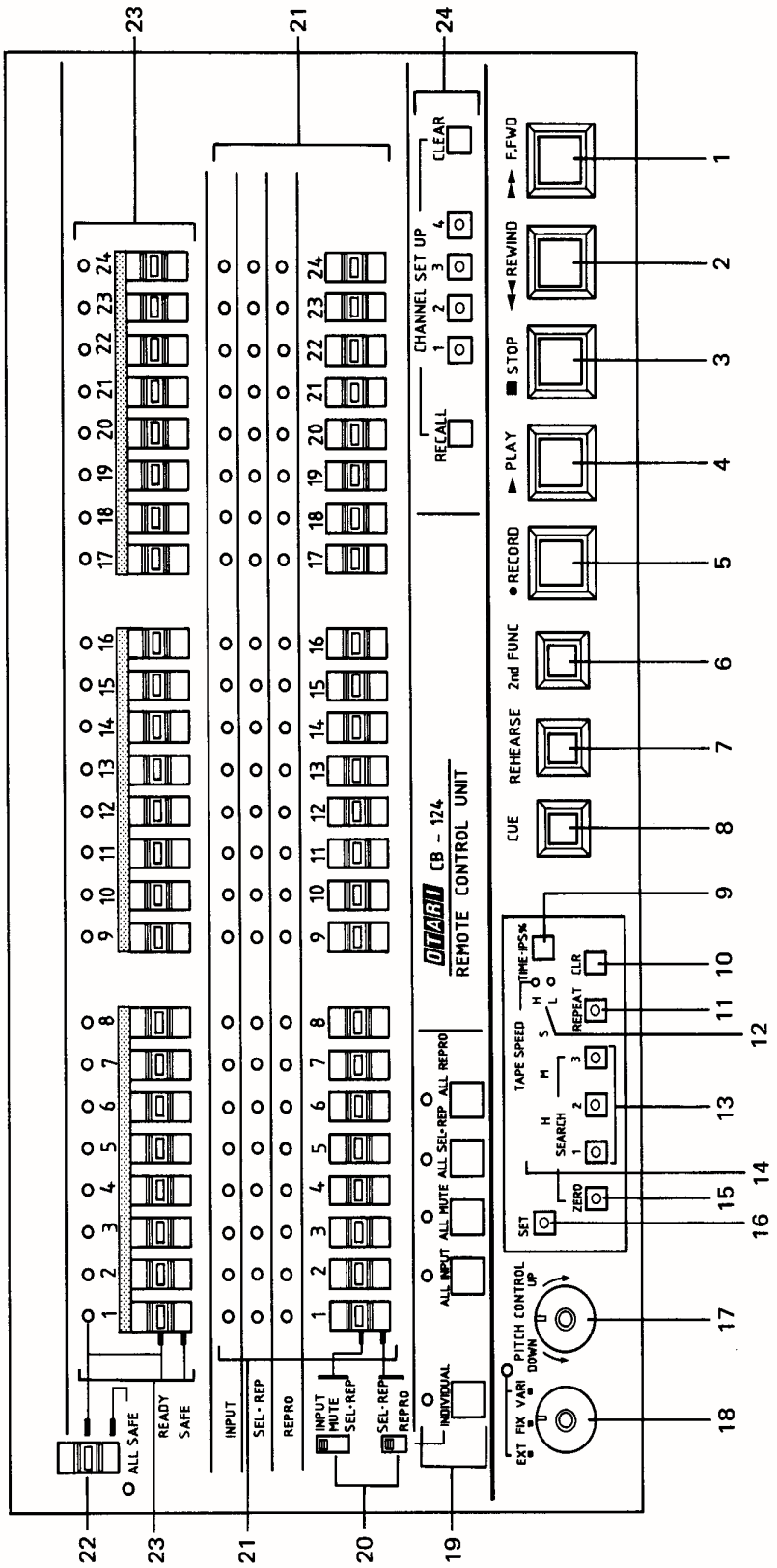

Figure 2-9 Remote Control Unit Controls and Indicators

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Keeping the F.FWD button pressed, and then pressing the 2nd FUNC button places the transport in Forward Spooling mode for winding tape onto the take-up reel with a smoother tape pack than is achieved at full wind speed.

[2] REWIND button

Pressing this button places the transport in Rewind mode. The button will be brightly illuminated (white).

Keeping the REWIND button pressed and then pressing the 2nd FUNC button places the transport in Reverse Spooling mode for winding the tape onto the supply reel with a smoother tape pack than is achieved at full wind speed.

[3] STOP button

Pressing the STOP button when the transport is in Play, Reverse Play, F.Fwd, Rewind, Edit Play or Spooling mode, causes the tape motion to stop. The button will become brightly illuminated (blue)

Pressing this button when the transport is in Unload mode and the STOP button is flashing, (such as when tape has just been threaded, and the slack has been removed by turning the reels by hand) causes the transport to apply tension to the tape in preparation for other transport modes. The button will become brightly illuminated (blue).

Pressing the 2nd FUNC button simultaneously with the STOP button causes the capstan motor to reverse direction in preparation for Reverse Play mode.

NOTE: There is a slight delay while the capstan motor achieves crystal-locked speed, when reversing.

[4] PLAY button

Pressing this button places the transport in Play mode, causing tape to wind onto the take-up reel at the selected Speed (H or L). The button will become brightly illuminated (white).

Pressing the PLAY button while in F.Fwd or Rewind mode causes the tape to decelerate and then enter the Play mode.

Pressing this button while the transport is in Edit Ready mode (with the EDIT/UNLOAD button flashing) causes the transport to enter Dump Edit (Edit Play) mode.

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Pressing this button while the transport is in Search Cue or Search Zero modes causes PLAY button to flash and the transport to enter Play mode upon reaching the end of the Search.

Pressing the PLAY and 2nd FUNC buttons simultaneously causes the transport to enter Reverse Play mode.

[5] RECORD button

When a channel is in Record Ready mode the RECORD button will flash (red). You may select one of two methods of entering Record mode. The two methods are:

1. Pressing this button simultaneously with the PLAY button. The button will be brightly illuminated (red).

2. Pressing this button while the transport is in Play mode (also known as Punch-In). The button will be brightly illuminated (red).

The MX-80 is factory preset for method 2.

Similarly, you may select between two methods of exiting from Record mode:

1. Keeping the RECORD button pressed and pressing the STOP button (Punch-Out).

2. Pressing the PLAY button while in Record mode.

The MX-80 is factory preset for method 2.

The selection of Punch-In and Punch-Out methods is made via switches DSW3-1 and DSW3-2 on the Transport Control PCB.

Pressing this button simultaneously with 2nd FUNC button causes the transport to enter Spot Erase Ready mode. Pressing the RECORD button again, and holding it, while slowly moving the tape by hand, causes the erase circuitry to be activated to erase the tape at the Erase Head. Releasing the RECORD button will deactivate the Erase signal.

Pressing this button while the transport is in Reverse Play mode causes the MX-80 to enter Reverse Erase mode.

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[6] 2nd FUNC button

Pressing the 2nd FUNC button with other buttons provides access to additional functions which are not labeled on the machine. Each function is described with the appropriate button.

[7] REHEARSE button

Pressing the REHEARSE button causes the machine to enter Rehearsal mode. When a Punch-In is preformed in Rehearsal mode, the monitor output of any channel which in Record Ready mode will be switched to Input monitor at the moment that the RECORD button is pressed, though actual recording is not performed. To exit from Rehearsal mode, press the REHEARSE button again.

[8] CUE button

Holding the CUE button pressed causes the tape lifters to remain retracted only as long as the button is held pressed. Tapping the CUE button causes the tape lifters to remain retracted until the next time the CUE button is pressed. When the lifters are retracted, the audio output is attenuated and the high frequencies rolled-off to prevent damage to the monitor speakers.

When the CUE button is pressed, and the lifters are <u>not</u> retracted, the audio is unmuted and is not attenuated, allowing you to listen for slate or marker tones without winding the tape across the heads. Press the CUE, STOP or PLAY button to leave Cue mode.

Pressing this button while in Stop mode causes the machine to enter Stop Cue mode.

Pressing either the F.FWD or REWIND button while in Stop Cue mode allows the audio to be monitored and the tape to be wound in the direction indicated. Depending upon the setting of DSW1-3 on the Transport Control PCB, the lifters will remain retracted, and the audio attenuated, as described above, or the lifters will not retract, and the audio is unmuted and not attenuated.

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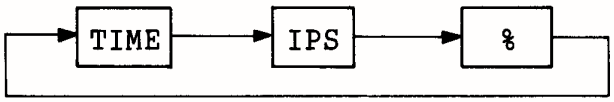
[9] TIME-IPS-% button

Pressing this button causes the Tape Timer display to show the Tape Time, the selected Play Speed in ips, or the Percentage of Play Speed, in turn.



[10] CLR button

Pressing this button simultaneously with another button clears the selected function as follows:

CLR + SET ..... Set mode is canceled.

CLR + TIME-IPS-% ... The Tape Timer display is cleared to 0.00.00.

CLR + SEARCH 1 - 3 .. The stored cue point is cleaned

[11] REPEAT button

Pressing the REPEAT button, and then pressing any two illuminated Cue buttons (ZERO, 1, 2, and 3), causes the machine to enter Repeat mode. Then pressing the PLAY button, causes the machine to play from the first location to the second, Rewind to the first location and Play again, repeating until Repeat mode is deactivated.

[12] TAPE SPEED (H/L) indicator

This LED indicates the position of the SPEED SELECT switch on the MX-80 transport.

[13] SEARCH 1, 2 and 3 buttons

If a button is not illuminated, there is no tape location stored for that Cue Point. Pressing an unlit SEARCH 1 - 3 button causes the current time shown on the Tape Timer display to be stored as that Cue Point, and that button to become illuminated.

If a SEARCH 1 - 3 button is illuminated, a tape location has been stored for that Cue Point. Pressing that button causes the transport to search to the location stored as that Cue Point. The location will be displayed on the Tape Timer display for approximately 2 seconds at the beginning of the search.

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Pressing the PLAY button while in Search mode causes the PLAY button to flash, and when the tape reaches the location being searched to, the transport will enter Play mode.

Pressing the STOP button together with any SEARCH 1 - 3 button causes the Tape Time display to show the location stored for that button.

Pressing CLR button together with any SEARCH 1 - 3 button will cause the location stored for that button to be cleared.

NOTE: There are different SEARCH 1,2,3 buttons on the Transport Control Panel which store the different Cue Points from those on the Remote Control Unit. Another words, all together 6 Cue Points can be stored with the MX-80.

[14] Tape Timer display (H.M.S.)

The Tape Timer displays the current tape time in Hour, Minute, Second format. If the tape is located behind the 0.00.00 position the Tape Timer will display the time as negative (or -) time, relative to 0.00.00. If the SPEED SELECT switch is changed, the Tape Timer automatically recalculates the time displayed to be correct for the new speed.

The Tape Timer display is also utilized to display any error messages resulting from the Power-On self-test.

[15] SEARCH ZERO button

Pressing this button causes the transport to F.Fwd or Rewind the tape, stopping when the Tape Timer reads 0.00.00.

Pressing the PLAY button while in Search Zero mode causes the PLAY button to flash and when the tape reaches 0.00.00, the transport enters Play mode.

Pressing the STOP, F.FWD, or REWIND button while in Search Zero mode causes the machine to leave Search Zero mode and take the action directed by the button.

[16] SET button

Pressing this button causes the MX-80 to enter Set mode, in which the tape times for three cue points can be entered using the following buttons:

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SEARCH ZERO	+ or - sign
SEARCH CUE 1	Hours digit
SEARCH CUE 2	Tens of Minutes digit
SEARCH CUE 3	Units of Minutes digit
REPEAT	Tens of Seconds digit
CLR	Units of Seconds digit

The selected digit will increment each time the button is pressed.

To store the tape time which has been entered onto the display is Set mode as a cue point, press and hold the SET button, and then press the desired SEARCH CUE button.

[17] PITCH CONTROL knob

When the Speed Mode Selector switch [18] is set to VARI, this multiturn control adjusts the tape speed ± 50%.

[18] Speed Mode Selector switch (EXT/FIX/VARI)

This switch selects the speed reference for the capstan motor from three options:

FIX: The tape speed is fixed at the speed selected by the SPEED SELECT switch on the transport. The speed is locked to the MX-80's internal crystal controlled speed reference.

EXT: The tape speed is determined by the frequency of an EXTernal speed reference signal. EXTernal control is used when the tape speed is to be controlled by a synchronizer, resolver or other similar device. The signal should be 9,600 Hz for nominal tape speed. If the Speed Mode Selector switch is set to EXT, and the PITCH ENABLE line (pin 23) of the Parallel I/O connector is set to low logic level, the speed of the Capstan Motor can be controlled by an external 9600 Hz signal applied to Pin 20 of the Parallel I/O connector. Refer to Section 3.2.14 for further information regarding external control of the Capstan Motor speed.

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VARI: The tape speed is determined by the setting of the PITCH CONTROL [17]. The tape speed is adjustable ± 50%.

The red LED illuminates when VARI is selected, and flashes when the PITCH ENABLE line on the Parallel I/O connector is at logic level Low.

[19] INDIVIDUAL, ALL INPUT, ALL MUTE, ALL SEL REP, ALL REPRO buttons

When the INDIVIDUAL button is pressed, the Monitor mode (Input, Sel-Rep, Repro, Mute) of each channel can be selected individually with the Output Selector Switches.

When the ALL INPUT button is pressed, all channels will change to Input mode regardless of the positions of their Output Selector switches.

When the ALL MUTE button is pressed, all channels will change to Mute mode regardless of the positions of their Output Selector switches.

When the ALL SEL-REP button is pressed, all channels will change to the Sel-Rep Monitor mode regardless of the positions of their Output Selectors.

When the ALL REPRO button is pressed, all channels will change to the Repro Monitor mode regardless of the positions of their Output Selectors.

[20] Output Preset switches

These switches preset the monitor modes which can be selected with the Output Selector switches [21].

NOTE: When Stop Standby or Fast Stadby modes are activated (with switches on the Serial Remote Control PCB), the Mute function is disabled. If a channel is set to Mute mode, or ALL MUTE is pressed, the channel will change to Input monitor mode when the machine is in Fast Wind or Stop.

[21] Output Selector switches and Mode Indicators

When the upper Output Preset switch has been set to INPUT, and the INDIVIDUAL button pressed, setting one of these switches to the upper position causes that channel's output to be the signal present at that channel's input (Input Monitor mode).

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When the upper Output Preset switch has been set to MUTE, and the INDIVIDUAL button pressed, setting one of these switches to the upper position causes that channel's output to be Muted.

When either Output Preset switch has been set to SEL-REP, and the INDIVIDUAL button pressed, setting one of these switches to the corresponding position causes that channel's output to be the signal on tape played back by the Record head (Sel-Rep Monitor mode).

When either Output Preset switch has been set to REPRO, and the INDIVIDUAL button pressed, setting one of these switches to the corresponding position causes that channel's output to be the signal on tape played back by the Repro head (Repro Monitor mode).

The MODE indicators show each channel's Monitor status. Table 2-2 below describes the relationship between Record mode, switch positon, and LED indicator.

Table 2-2 Monitor Mode Indicators

Switch Position	Mode	Indicator
INPUT	RECORD	INPUT (Yellow)
SEL-REP	RECORD	INPUT (Yellow)
	SAFE	SEL-REP (Green)
REPRO	----	REPRODUCE (Orange)

[22] ALL SAFE switch

Setting this switch to ALL SAFE position puts all channels into Record Safe mode and illuminates the green ALL SAFE LED (the Channel READY/SAFE switches have no effect on the channel's Record status). When the ALL SAFE position is not selected, the Record Ready status of a channel is determined by that channel's READY/SAFE switch.

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[23] READY/SAFE switches and mode indicators

When the ALL SAFE switch is not engaged, these switches determine the Record Ready status of each channel. If a channel's READY/SAFE switch is engaged (in the Ready position), the associated LED will flash, the RECORD button will flash, and the channel will enter Record mode when the RECORD button (or RECORD and PLAY) on the Remote Control unit or transport is pressed. When a channel is in Record mode, the LED indicator will be steadily illuminated.

Table 2-3 below describes the condition of the LED and RECORD button indicators for various combinations of switch position and transport mode.

Table 2-3 Record Indicator and Modes

Switch position	Transport mode	Indicator (red)	RECORD button lamp (red)
SAFE	Non-recording	Off	Off
	Recording	Off	On
READY	Non-recording	Flash	Flash
	Recording	On	On
	Recording	Flash	On

[24] CHANNEL SET-UP buttons

Pressing one of these buttons, when that button in not illuminated, causes the current READY/SAFE, MUTE/INPUT/SEL-REP/REPRO status of all channels to be stored in that memory and the button to become illuminated.

Pressing one of these buttons, when that button is illuminated, causes the channel status stored in that memory to be displayed.

Holding the RECALL button pressed and then pressing any of the illuminated CHANNEL SET-UP buttons causes all the channels to be set to the READY/SAFE, MUTE/INPUT/SEL-REP/REPRO status which was stored in that memory. The CHANNEL SET-UP button will flash.

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Holding the CLR button pressed and then pressing any of the illuminated CHANNEL SET-UP buttons causes the channel status stored in that memory to be cleared.

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SECTION 3: OPERATION

This section contains, first, a list and an accompanying explanation of each of the many operating conditions (or modes) of the MX-80, and second, a tutorial covering the tape recorder-related tasks involved in making recordings. You should read both parts of this Section when first becoming familiar with the machine, and again as a guide while you are learning to operate the machine. The portion describing the Operating Modes provides a quick reference, while the Tutorial portion provides hands-on instructions about how to operate the machine. Information regarding Installation and Hook-up of the machine is contained in Section 6 of this manual. If you are uncrating and hooking up the machine for the first time, please refer to the information in Section 6 before continuing with this Section.

3.1 MODES OF OPERATION

Mode	Control	Operation
Play	PLAY	Tape moves from Supply to Take-up at the currently selected speed.
Reverse Play	PLAY + 2nd FUNCTION	Tape moves from Take-up to Supply at the currently selected speed.
Record	RECORD (or RECORD & PLAY)	Any channel in Record Ready begins to record.
Ready	READY/SAFE	The selected channel will enter Record when the RECORD button is pressed.
Safe	READY/SAFE	The selected channel will not enter Record.
Stop	STOP	Tape motion stops.
Reverse Stop	STOP + 2nd FUNCTION	Tape motion stops and the Capstan reverses its rotation.
F.Fwd	F.FWD	Tape moves from Supply reel to Take-up at wind speed.

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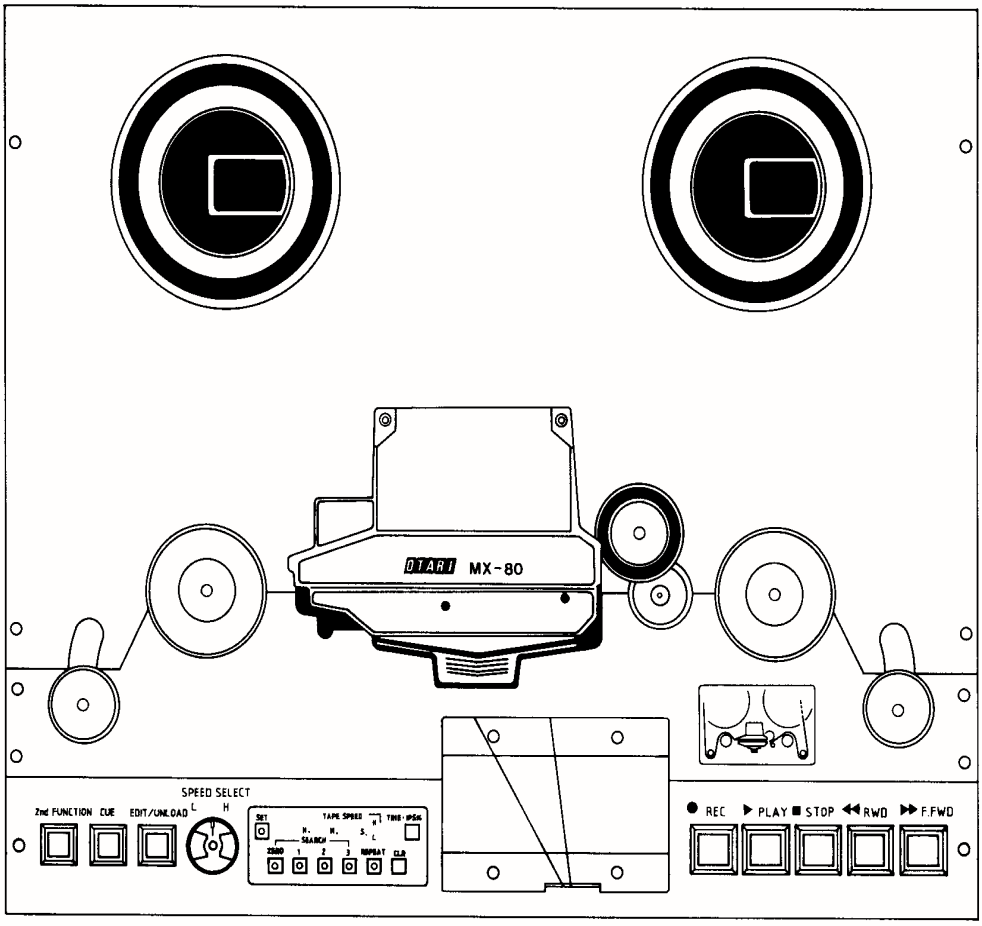

Figure 3-1 Transport Features

Mode	Control	Operation
Rewind	REWIND	Tape moves from Take-up reel to Supply reel at wind speed.
Edit Ready	EDIT + STOP	Transport is prepared for next Edit mode.
Dump Edit	EDIT + PLAY	Tape moves toward the Take-up reel but the Take-up motor does not turn.

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Mode	Control	Operation
Unload	EDIT/UNLOAD Twice	The tension on the tape is released.
Stop Cue	STOP + CUE	The lifters move out in preparation for another Cue mode.
Spooling Cue	Stop Cue + F.FWD or REW	Tape moves at 120 ips and audio can be monitored.
Fast Winding Cue	F.Fwd or Rew + CUE	The lifters retract and the tape contacts the heads for monitoring audio.
Spooling Wind	2nd FUNCTION + F.FWD or REW	Tape is wound in the direction selected at approximately 120 ips for library winding for storage. Audio is muted.
Input Monitor	ALL INPUT or INDIVIDUAL + INPUT	The signal at the MX-80 Output is the signal at the Input.
Sel-Rep	ALL SEL-REP or INDIVIDUAL + SEL-REP	The signal at the MX-80 Output is the signal on tape reproduced by the Record Head.
Repro	ALL REPRO or INDIVIDUAL + REPRO	The signal at the MX-80 Output is the signal on tape reproduced by the Repro Head.
Search Zero	SEARCH ZERO	Tape is moved at wind speed to the location corresponding to 0.00.00 on the Tape Timer.
Search Cue	SEARCH 1 - 3	Tape is moved at wind speed to the location corresponding to the Tape Timer reading stored with the SEARCH 1 - 3 button.
Search Play	SEARCH CUE + PLAY	Tape is moved at wind speed to the stored location, where the tape enters Play.

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Mode	Control	Operation
Stop Erase	2nd FUNCTION + RECORD Twice	The Erase head for the channel in Record Ready will be activated and the tape will move from Take Up to Supply.
Reverse Erase	2nd FUNCTION + PLAY + REC	The erase head for the channel in Record Ready will be activated and the tape will move from Take Up to Supply.
Stop Standby	STOP STANDBY On	All channels in Record Ready will be set to Input Monitor whenever tape stops.
Fast Standby	FAST STANDBY On	All channels in Record Ready will be set to Input Monitor whenever tape is in F.Fwd or Rewind.

3.2 RECORDING WITH THE MX-80 - A TUTORIAL

3.2.1 Threading the Tape on the Machine

(1) Set the POWER switch [Figure 2-6] to the On position. It is located on the Power Supply Panel at the bottom of the machine pedestal. The VU meter lamps will become illuminated.

(2) Lift up the clamp levers on the top surface of the reel turntables to unlock them so they will accommodate the reel.
Place an empty reel on the machine. If the tape is "heads" out, place the empty reel on the Take-up reel turntable. If the tape is "tails" out, place the empty reel on the Supply reel turntable.

NOTE: There is a locating pin near the bottom of each reel turntable. In order for the reel to be seated firmly against the reel turntable, be sure one of the slots in the reel hub is aligned with the locating pin. When the reel is seated, push down on the clamp lever causing the clamp ring to expand and firmly grip the reel hub. Check to be sure the reel is seated firmly against the reel turntable.

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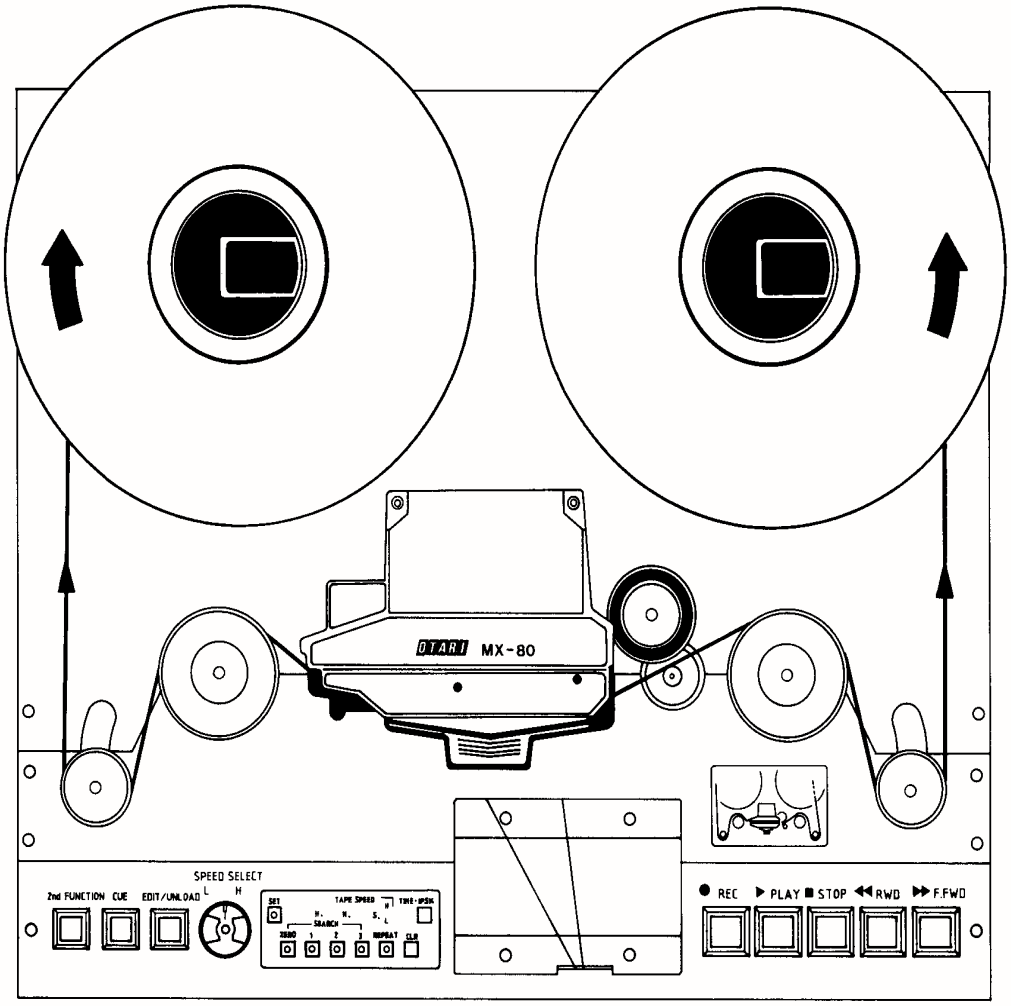

Figure 3-2 Tape Threading

(3) Pull about 4 feet of tape from the reel, and thread it around the left Tension Arm and Guide Roller, across the Head Assembly, between the Capstan and Pinch Roller, around the Tachometer Roller and the right Tension Arm, and onto the Take-up reel, exactly as shown in Figure 3-2 and on the transport of the MX-80.

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(4) Rotate the Take-up reel counterclockwise, and the Supply reel clockwise, by hand, to take up any slack in the tape and to lift the Tension Arms up toward the center of the transport. The STOP button will begin to flash.

(5) Press the STOP button [Figure 2-1, 3] to apply tension to the tape and prepare the transport for further functions. The STOP button will become brightly illuminated. It is not necessary to perform this step, (you can go directly from Unload to Play or Wind), but we recommend that you develop the habit of pressing STOP to insure there is no slack in the tape before proceeding to other operations to prevent any possible damage to tape or machine caused by the sudden movement of tape.

3.2.2 Recording the Basic Tracks

(1) Thread the tape on the transport as described in Section 3.2.1.

(2) Set the SPEED SELECT switch [Figure 2-1, 6] to the desired tape speed. On high speed-pair machines L is 15 ips and H is 30 ips. On low speed-pair machines, L is 7-1/2 ips and H is 15 ips. Set the Speed Mode Selector switch [Figure 2-9, 18] to the FIX position.

(3) Press the RESET button, either on the transport or on the Remote Control unit, to reset the Tape Timer to 0.00.00.

(4) Set the ALL SAFE switch on the Remote Control unit to the Ready position.

(5) Set the READY/SAFE switch for the track on which you wish to record to the Ready position. The READY LED above that switch will be illuminated, and the RECORD button will flash indicating that the channel is in Record Ready mode.

(6) Set the upper Outout Preset switch [Figure 2-9, 20] to the INPUT position. Set the Output Selector switches [Figure 2-9, 21] for the selected channel(s) to the upper (Input) position, or press the ALL INPUT button. The corresponding INPUT indicator(s) will become illuminated.

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(7) Adjust the signal level at the mixing console or signal source. The output of the console should be set for the same level range as the input of the MX-80. Refer to Section 6.4 for more information about setting console and MX-80 levels.

(8) It is good practice to record reference tones at the head of every session tape for later level matching. If you use reference tones, adjust the level at the console for a meter indication of 0 VU.

(9) Press the PLAY and RECORD buttons simultaneously to cause the MX-80 to begin recording on the selected tracks. See Section 2.1 for more information about selecting the method of entering and leaving Record mode.

(10) There are several ways to end recording.
To end the recording and stop the tape, press the STOP button.
To end the recording on all tracks and have the tape continue in Play (rolling punch-out), press the PLAY or PLAY and RECORD buttons (depending upon the setting of DSW1 on the Transport Control PCB, see Section 2.1), or set the ALL SAFE switch to the All Safe position.
To end the recording on one or more tracks, while other tracks continue to record, move the READY/SAFE switches for those tracks to the SAFE position.

3.2.3 Playing Back the Basic Tracks

(1) Rewind the tape to the beginning of the recording by pressing SEARCH ZERO (if the Tape Timer was reset at the beginning), or by pressing the REWIND button.

(2) Set the ALL SAFE switch to the All Safe position to avoid accidentally erasing recorded tracks. The ALL SAFE LED will become illuminated.

(3) Set the lower Output Preset switch [Figure 2-9, 20] to the REPRO position. Set the Output Selector switches [Figure 2-9, 21] for the selected channel(s) to the lower (Repro) position, or press the ALL REPRO button. The corresponding REPRO indicator(s) will become illuminated.

(4) Press the PLAY button. The signal on the tape will be reproduced by the Repro head and fed to the Output connectors.

(5) Adjust the monitor level at the mixing console.

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3.2.4 Recording Overdubs Using Sel-Rep Playback

Overdubs are performed when it is necessary to add additional tracks in sync with material already recorded on some of the tracks. During Sel-Rep playback the previously recorded material is reproduced by the record head making it possible to add (overdub) tracks without the delay caused, during normal playback, by the space between the Record and Repro heads. When overdubs are recorded, the previously recorded tracks are played in Sel-Rep and monitored by the performer through the mixing console. The new material is then recorded in sync with the existing tracks.

(1) Rewind the tape to the beginning of the section to be overdubbed.

(2) Set the ALL SAFE switch to the Ready position, and set the READY/SAFE switches to Safe for the all the tracks on which no new material will be recorded.

(3) Set the READY/SAFE switches to Ready for the tracks on which new material is going to be recorded. The READY LEDs for those tracks will flash.

(4) Set the upper Output Preset switch [Figure 2-9, 20] to the Input position. Set the lower Output Preset switch to the Sel-Rep position. Set the Output Selector switches [Figure 2-9, 21] to the lower (Sel-Rep) position for all the channels, or press the ALL SEL-REP button. The INPUT LEDs will be illuminated for the channels which are in Record Ready mode, if the STOP STANDBY switch [Figure 2-5, 11] is On.

(5) Press the PLAY and RECORD buttons simultaneously to begin overdubbing. Adjust the recording and monitor levels at the mixing console.

3.2.5 Recording Punch-In Overdubs

Punch-In overdubs are performed when it is necessary to insert new material into a track that has already been recorded, without re-recording the entire track. Punch-in overdubbing allows you to monitor the previously recorded material on the tracks selected for recording, right up to the instant the track is put into Record. At the moment that the track(s) enter Record mode, the MX-80 switches the outputs of the tracks being recorded to Input monitor to allow you to listen to the new material as it is being recorded in sync with the material recorded earlier.

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(1) Rewind the tape to the beginning of the section to be overdubbed.

(2) Set the ALL SAFE switch to the Ready position, and set the READY/SAFE switches for all the tracks that are not going to be recorded to Safe.

(3) Set the READY/SAFE switches for the tracks that are going to be overdubbed to Ready. The READY LEDs for those tracks will be illuminated.

(4) Press the ALL SEL-REP button. The SEL-REP LEDs for the tracks that are not being recorded will be illuminated. The INPUT LEDs for the tracks to be recorded will be illuminated if the STOP STANDBY switch is On.

(5) Press the PLAY button to listen to the existing tracks. At the moment that the new material is to be inserted, press the RECORD button (or the PLAY and RECORD buttons, depending upon the setting of DSW1 on the Transport Control PCB) to begin the punch-in. Adjust the recording and monitor levels at the mixing console.

(6) Press the PLAY (or RECORD and STOP buttons, depending on the setting of DSW1 on the Transport Control PCB) to punch-out (end the in). The output signal for the tracks being overdu ill return to Sel-Rep mode (e.g., being playe by the Record head), and the MX-80 will continue ay.

(7) To hear the results of the punch-in, rewind the tape to the beginning of the section, set the ALL SAFE switch to the All Safe position. Press the Play button and adjust the monitor level at the console.

Repeat the punch-in until you are happy with the results.

OTARI's gapless punch-in provides the capability to insert new material onto a previously recorded track without a gap or overlap being recorded on the tape.

Actually producing perfect punch-ins requires patience and practice to achieve accurate results.

3.2.6 Rehearsing the Punch-In

To rehearse a punch-in without actually recording anything on the tape:

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(1) Rewind the tape to the beginning of the section to be overdubbed.

(2) Press the REHEARSE button.

(3) Set the ALL SAFE switch to the Ready position, and set the READY/SAFE switces for all channels which are not going to be recorded to safe.

(4) Set the READY/SAFE switches for the channels that are going to be overdubbed to the Ready position. The READY LEDs for those channels will flash.

(5) Press the ALL SEL-REP button. The SEL-REP LEDs for the tracks which are not being overdubbed will be illuminated. The INPUT LEDs for the channels which are being overdubbed will be illuminated if the STOP STANDBY switch is On.

(6) Press the PLAY button to listen to the existing tracks. At the moment that the new recording is to begin, press the RECORD button (or the PLAY and RECORD buttons, depending upon the setting of DSW3 on the Transport Control PCB) to begin the Punch-in rehearsal.

3.2.7 Bouncing or "Ping-Ponging" Tracks

Bouncing or "Ping-Ponging" tracks involves recording several original tracks, mixing those tracks and recording them back on to other tracks of the same tape, and then, adding more tracks to the mixed tracks. In order to maintain the highest signal quality during "ping-ponging", the recorded material should be played back from the Repro head. This means that the mixed tracks will not be in sync with the rest of the tracks. It is possible to bounce tracks using Sel-Rep playback from the Record head, but the quality will not be as good as it will be when using the Repro head. However, using Sel-Rep to bounce tracks leaves the resulting mixed track(s) in sync with the rest of the tracks. When bouncing tracks using Sel-Rep we recommend that you leave a blank (empty) track between the tracks being recorded and the tracks being mixed. For example, if you have already recorded on tracks 1 through 12, and wish to mix and bounce them to another track, it is advisable to record the mixed tracks on tracks 14 and 15, leaving track 13 empty as a guard track. You can then come back and record additional tracks in sync with the mixed material on tracks 14 and 15.

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To "ping-pong" or bounce tracks:

(1) Rewind the tape to the beginning of the section of tape to be mixed, and determine which tracks will be mixed and which tracks will be recorded onto.

(2) Set the ALL SAFE switch to the Ready position.

(3) Press the INDIVIDUAL button.

(4) Set the individual INPUT/SEL-REP/REPRO switches to Repro for those tracks to be mixed, and to Input for those tracks to be recorded onto.

    The mixing console controls should be set to mix the tracks that are in Repro and send the resulting mix to the tracks that are in Record Ready.

(5) Press the RESET button to reset the Tape Timer so that Search Zero can be used to quickly return the tape to the beginning of the section.

(6) Press the PLAY button, and adjust the mixing console for the desired mix of tracks and for a suitable recording level.

(7) Press the SEARCH ZERO button to return the tape to the beginning.

(8) When the desired mix has been achieved, begin recording by pressing the PLAY and RECORD buttons simultaneously.

The previously recorded tracks will be played by the Reproduce head, mixed together, and recorded on the tape at the Record head. You may now go back and record over (thereby erasing) the original tracks with new material in sync with the "ping-ponged" tracks, giving you the ability to record many more channels of material than the tape recorder has tracks.

3.2.8 Using the Spot Erase Feature

The Spot Erase feature utilizes time-ramp bias switching to enable you to erase small areas of the tape without leaving the usual assortment of clicks, pops, and chirps that are caused by short bias turn-on and turn-off times. To Spot Erase a small section of one track:

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(1) Mark the head (or beginning) and tail (or end) of the area to be erased using grease pencil or china marker. Position the tape so that the head mark is several inches to the left of the Erase head.

(2) Set the ALL SAFE switch to the Ready position.

(3) Set the READY/SAFE switches for the tracks to be erased to the Ready position.

(4) Press the 2nd FUNCTION button and begin to move the tape toward the marked points, then press the RECORD button to enter Spot Erase mode without leaving a pop or thump recorded on the tape.

(5) Move the tape by hand from the head mark to the tail mark. When the tail mark reaches the Erase head, release the RECORD button to terminate the function.

NOTE: Spot Erase feature can not be made through the Remote Control Unit, CB-123 and CB-124.

3.2.9 Playing Back the Tracks for Mixdown

The basic tracks, overdubs, and punch-ins must all be played back into the mixing console to be combined and balanced for the final master tape. To play the tracks that have been recorded:

(1) Rewind the tape to the beginning of the section of tape to be mixed.

(2) Press the RESET button to reset the Tape Timer to 0.00.00.

(3) Set the ALL SAFE switch to the All Safe position.

(4) Press the ALL REPRO button.

(5) Press the PLAY button to begin playback.

(6) Adjust the level and balance of the individual tracks at the mixing console.

(7) To return to the beginning of the tape for another pass, press the SEARCH ZERO button.

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3.2.10 Library Winding the Tape

At the completion of a session the tape is generally stored "tails" out, for two good reasons, (1) to avoid audible "pre-echoes" resulting from tape print-through, and (2) to lessen the possibility of edge damage because the just played tape is wound much smoother than would result from fast winding the tape. The MX-80 includes a Spooling mode which provides a smooth Library Wind in only 1/4 the time required to play the tape onto the reel.

(1) To Spool the tape onto the Take-up reel, press the F.FWD button, and then, keeping the F.FWD button pressed, press the 2nd FUNCTION.

(2) To Spool the tape onto the Supply reel, press the REWIND button, and then, keeping the REWIND button pressed, press the 2nd FUNCTION.

(3) To end the Spooling operation, press the STOP button.

3.2.11 Moving the Tape by Hand for Editing

The constant tape tension system used in the MX-80 allows the tape to be moved from one reel to the other by hand very easily. When the transport is in Stop mode, the tape lifters are retracted and the audio is not muted, making it possible to simply move the Tachometer Roller manually to locate the correct place on the tape.

To monitor the tape at the Repro head, press the ALL REPRO button, to monitor the tape at the Record head press the ALL SEL-REP button.

3.2.12 Editing the Tape

Often it is necessary to cut the tape to remove unwanted material. This involves selecting two points on the tape, separated by the segment to be removed, cutting the tape at those "edit points", removing the unwanted piece of tape, and rejoining the cut ends of the tape with adhesive splicing tape. The MX-80 Constant Tension System does not allow you to pull the tape away from the head assembly and cut it, as on some older machines, so the MX-80 features an Edit mode for releasing the reel brakes and dumping unwanted tape.

(1) Press the ALL REPRO button, and wind the tape to the beginning of the section to be edited.

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(2) Press the STOP button, and move the tape by hand to locate the exact edit point at the head of the segment.

(3) Mark the head edit point with grease pencil or china marker. Press one of the SEARCH 1 - 3 buttons to store this location.

(4) Move the tape to the tail edit point, and carefully locate and mark the point.

(5) Rewind the tape to the head edit point. If you stored the location using the SEARCH 1 - 3 button, press the SEARCH 1 - 3 button to quickly go to that point on the tape. Move the tape to place the head edit point between the Tach roller and the Take-up reel.

(6) Press the EDIT/UNLOAD button and the PLAY button.

(7) Allow the tape to "dump" to the tail edit point. When the tail edit point reaches the heads, stop the tape.

(8) Pull the tape out away from the head assembly, and fit it into the Splicing Block. Position the tail edit point over the groove in the splicing block, and carefully cut the tape with a sharp blade.

(9) Pull the head edit point from the Take-up reel to the splicing block, position it over the groove in the splicing block, and carefully cut the tape and join the ends with splicing tape.

CAUTION:
When in the Edit Play mode, direct the tape off the side of the transport with your hand to prevent the tape from being caught in the pinch roller.

3.2.13 Using the Variable Speed Feature

The MX-80 allows you to change the speed of the tape, as it is being Recorded or Played, by ± 50% (about ± two whole tones). This feature makes it possible to compress or extend material to fit it into a time slot, or to change the pitch for special effects, etc.

To manually adjust the speed of the MX-80:

(1) Set the Speed Mode selector switch on the Remote Control Unit to the VARI position.

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(2) Use the PITCH CONTROL knob on the Remote Control Unit to vary the capstan speed as desired. Turning the PITCH CONTROL knob counterclockwise causes the speed to decrease, turning it clockwise causes the speed to increase.

3.2.14 Controlling the Capstan Speed with an External Device

The capstan speed of the MX-80 can be controlled by an external device such as a resolver or synchronizer. The Parallel I/O connector on the rear panel provides an input for an External Speed Reference signal. This signal should be a square wave, TTL level (+5 V when on, 0 V when off), or a sine wave of 10 V peak to peak from a generator having a source impedance of less than 50 ohm at 9600 Hz for nominal speed. Refer to Table 6-4 for Parallel I/O connector pin assignments and signal descriptions.

To use an external speed reference signal connected to the Parallel I/O connector, set the Speed Mode Selector switch on the Remote Control Unit to EXT position. If the External Reference signal is lost, or falls below 6 V (sine wave signal) the machine will revert to its Fix speed mode.

The range of speed control possible from the Parallel I/O connector is -50%, +100% at 15 ips and +40, -50% at 30 ips.

3.2.15 Changing the Machine Speed Pairs

The MX-80 is a three speed machine with two of the speed available for selection at the SPEED switch on the transport. Changing the speed pair involves changing one switch on the Capstan Control PCB and changing the equalization jumpers on each of the Audio Amplifier PCBs.

(1) Open the upper rear panel by removing the 2 upper screws on each side of the panel, and allowing it to fold down to horizontal.

(2) On the Transport Control PCB, change the setting of SW2. If your machine was initially configured for 15/30 ips, the switch will be in the H position, if initially configured for 7.5/15 ips, the switch will be in the L position. Set the switch to correspond to the desired speed pair (H or L).

(3) Perform the Routine Audio Alignment procedures described in Section 4.2.

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(4) Perform the Routine Transport Alignment procedures described in Section 4.1.

(5) Close the upper rear panel and replace the 4 screws removed in Step 1.

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SECTION 4: ALIGNMENT AND CALIBRATION

This section contains the instructions and information required to perform the routine reel control, tape tension, head alignment, audio channel calibration, bias and erase adjustments associated with normal maintenance of the MX-80.

When you are performing these procedures for the first few times, proceed slowly and carefully. Soon you will be familiar with them, but initially it is better to be cautious and avoid accidents.

4.1 TRANSPORT ALIGNMENT

The MX-80 transport should not require frequent adjustment of tape tension and wind speeds, but these procedures should be performed whenever track format or tape width is changed, or if any mechanical component in the tape path has been replaced.

4.1.1 Tools and Equipment Required

(1) DC voltmeter capable of 0.05 V resolution while measuring ± 5 V.

(2) Frequency counter capable of 50 Hz resolution while measuring 9.6 kHz.

(3) A general purpose dual-trace oscilloscope such as those made by Tektronics, Leader, Hitachi, Hewlett-Packard, etc. The oscilloscope is necessary for Tacho quadrature, and Capstan duty cycle adjustments.

(4) A Wow and Flutter meter capable of 0.01% resolution, DIN 45504 weighted.

(5) A reel of tape of the type normally used for sessions.

(6) A small non-magnetic alignment screwdriver with a blade small enough to fit the trimmers on the Reel and Transport Control PCBs.

(7) 1.5 mm, 2 mm, 2.5 mm, and 4 mm hex keys (allen wrenches).

(8) A calibrated, direct reading tape tension meter such as Tentelometer Model T2-H2O-2.

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4.1.2 Opening the Transport and Removing the Deck Skin Panels

(1) Turn Off the Power to the machine and wait 30 seconds to allow the power supply capacitors to discharge, Remove any tape and/or empty reels from the transport.

(2) Open the upper rear panel to gain access to the Reel Control PCB by removing the uppermost two screws on each side of the panel, and folding it down to a horizontal position.

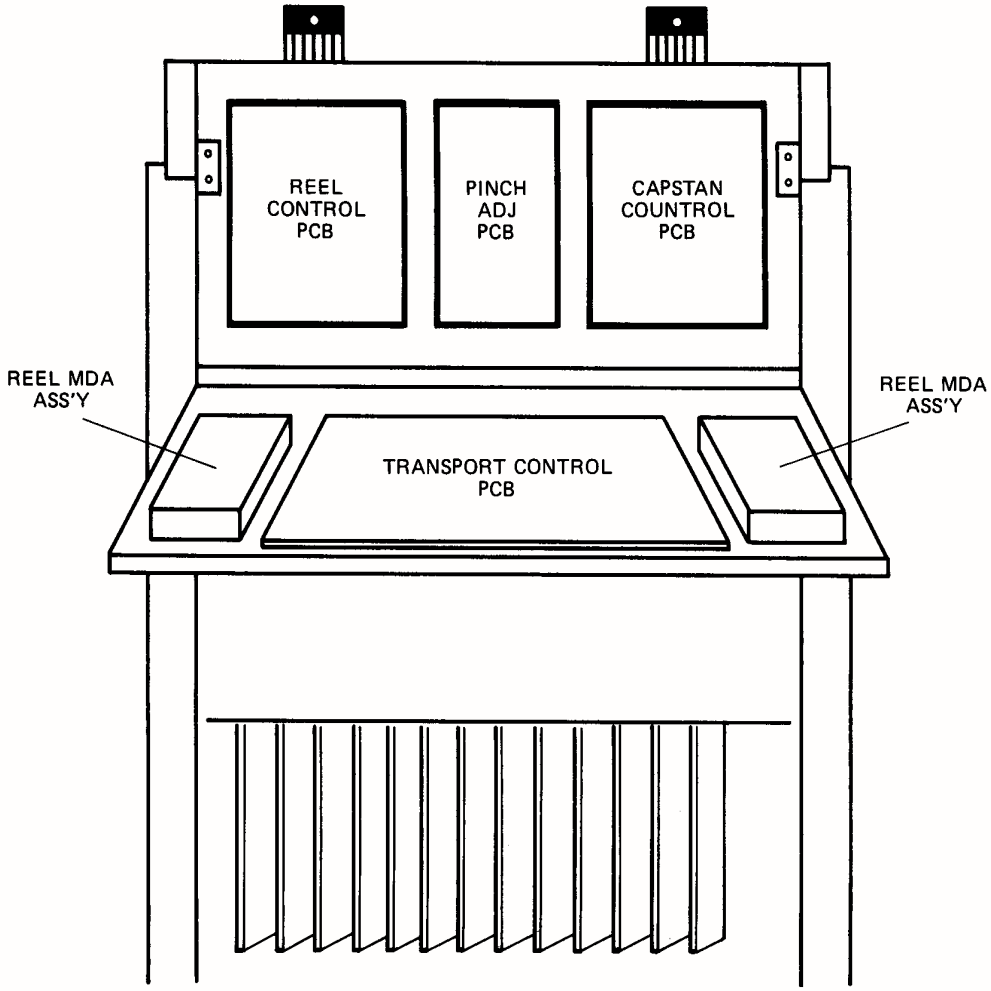

Figure 4-1 Location of Transport, Capstan, and Reel Control PCBs

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(3) Open the VU Meter panel by removing the outer two screws from the top of the panel, and folding it down to a horizontal position.

(4) Remove the Splicing Block by removing the four socket head screws which attach it to the transport deck top.

(5) Loosen the Capstan Shaft Dust Cap by turning it counterclockwise.

(6) Remove the four socket head screws which attach the front Deck Skin Panel, and while holding the Tension Arm Rollers at their uppermost position, carefully remove the front Deck Skin Panel.

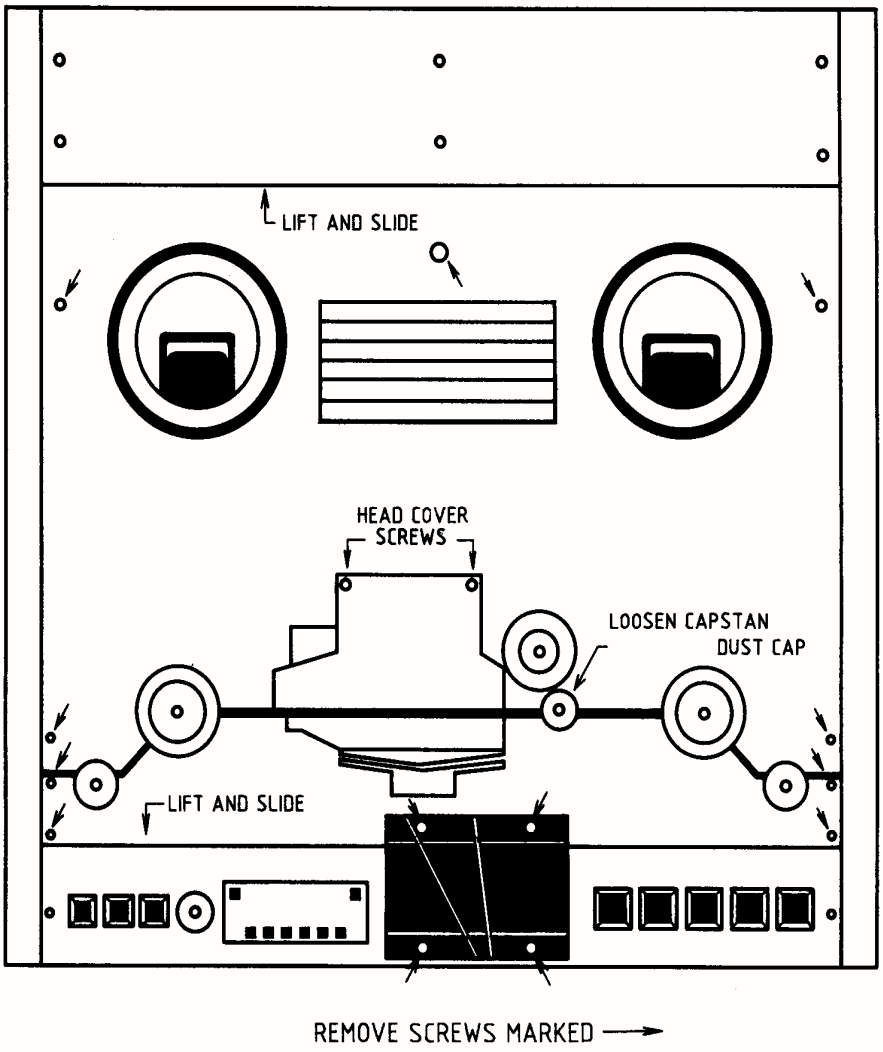

Figure 4-2 Deck Skin Panel removal

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(7) Remove the Pinch Roller assembly from its shaft by removing the socket head screw in the center of the top of the Roller assembly and lifting the Pinch Roller assembly off its shaft.

(8) Remove the Head Assembly Cover by removing the two socket head cap screws which attach it to the Transport Deck, and lifting the Head Assembly Cover off the machine.

(9) Remove the rear Deck Skin Panel by first removing the five socket head screws from the perimeter of the rear Deck Skin. Then life the real of the Panel and carefully slide it toward the real of the machine until it can be lifted off the machine.

4.1.3 Reel Tension Servo Adjustment

The constant tape tension system employed on the MX-80 utilizes Tension Arms in the tape path to provide feedback information to the Reel Control PCB. These circuits adjust the torque and speed of the Take-up and Supply reel motors to keep the tension on the tape constant regardless of operating mode, tape speed, and amount of tape on the reels.

4.1.3.1 Tension Arm Spring Tension Adjustment

The running tape tension is set by the balance of Reel Motor torque against the tension of the Tension Arm springs. Therefore it is important that the Tension Arm Spring Tension be set accurately.

(1) Attach the 0 - 2000 gram spring scale to the Tension Arm Roller with a loop of string.

(2) Pull the spring scale toward the rear of the machine until the Tension Arm is in the middle of its travel, and measure the spring tension. Refer to Figure 4-3.

(3) If the spring tension is not 500 grams ± 10%, then loosen the lock nut on the Spring Adjusting Screw by holding the portion closest to the Anchor Bracket and unscrewing the outer portion. Adjust the inner nut as necessary to obtain 500 grams ± 10% tension reading on the spring scale. It is good practice to adjust both Supply and Take Up Tension Arms to the same tension within ± 10 grams.

(4) Tighten the outer portion of the double nut to lock the adjusting screw in place.

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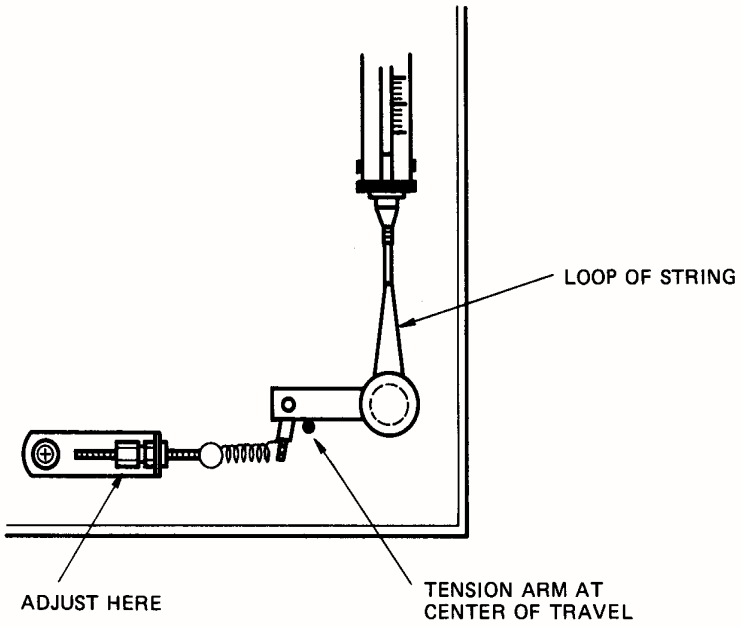

Figure 4-3 Tension Arm Spring Tension Measurement

4.1.3.2 Tachometer Quadrature/Phase Adjustment

(1) Connect CH1 of the dual channel oscilloscope to TP2 on the Transport Control PCB.

(2) Connect CH2 of the oscilloscope to TP3. Use TP1 for Ground for the oscilloscope.

(3) Connect the Tach Roller to the Capstan Shaft with a rubber band, so that the Tach Roller turns when the Capstan Shaft turns.

(4) Secure both Tension Arms at the top of their travel.

(5) Adjust the position of the Tacho II PCB (the PCB with two sensors) so the waveform at TP3 leads the waveform at TP2 by 90 degrees.

NOTE: The waveforms do not have 50% duty cycle. Refer to Figure 4-5. Remove the rubber band when adjustment is completed.

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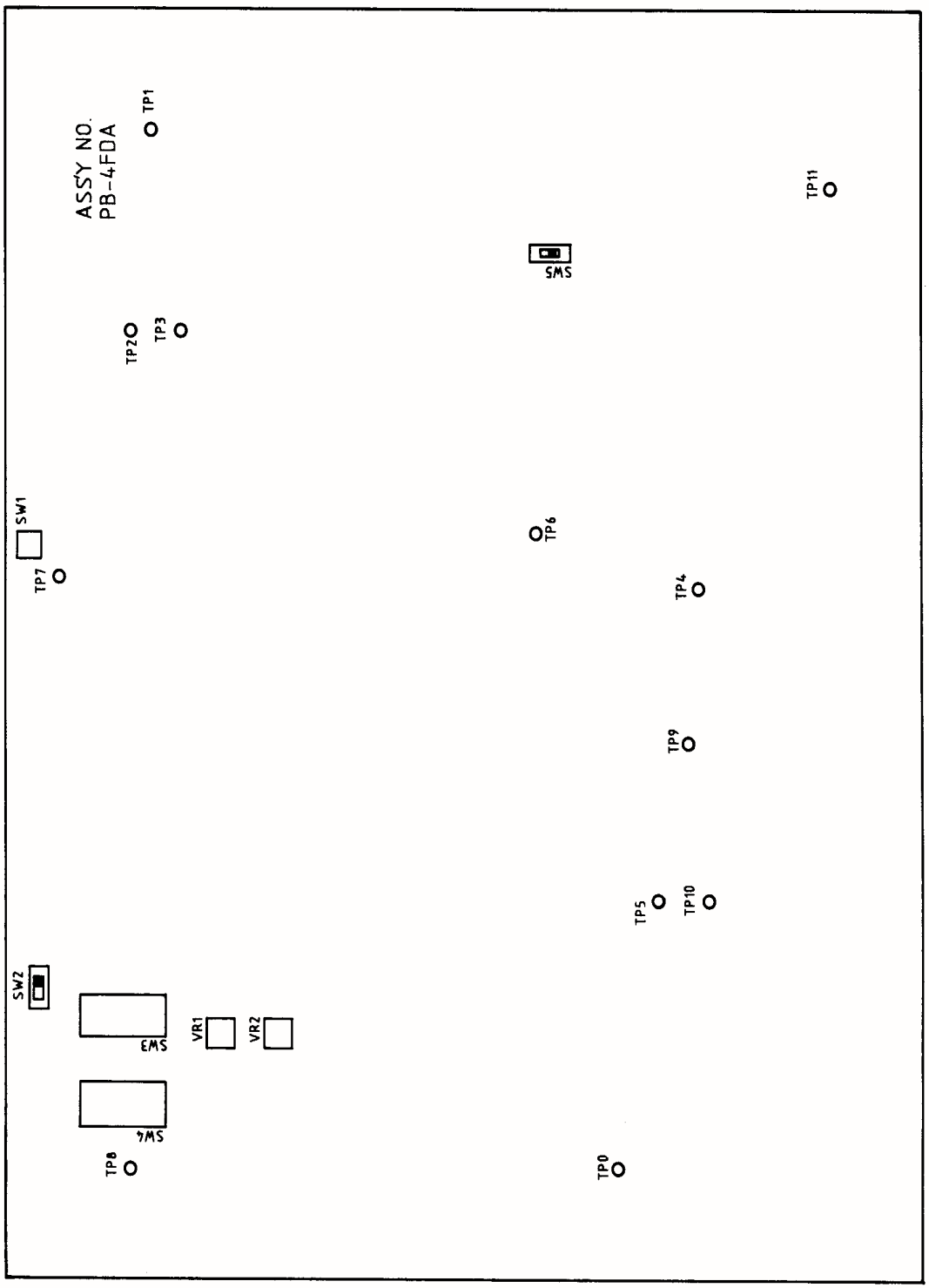

Figure 4-4 Location of Trimmers and Check Points on Transport Control PCB

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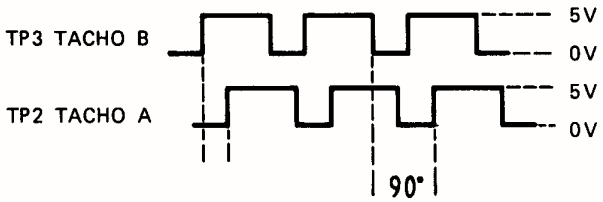

Figure 4-5 Tach Waveforms

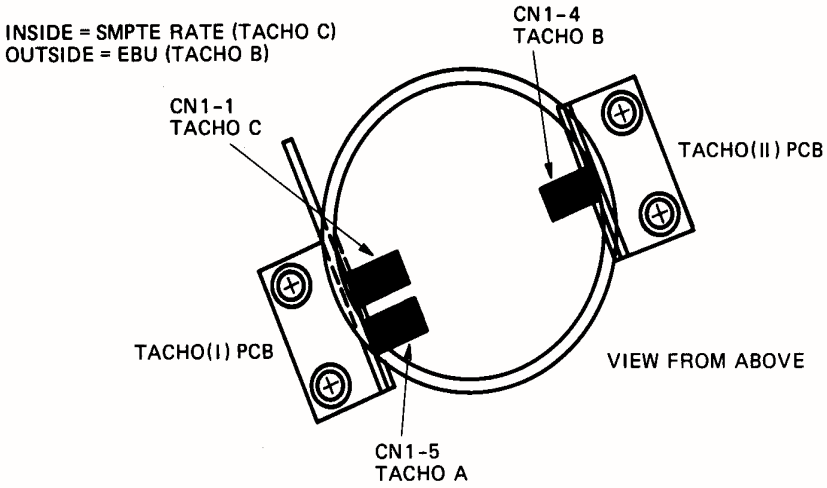

Figure 4-6 Location of Tacho I and Tacho II PCBs

4.1.3.3 Fast Wind Speed Reference Voltage Adjustment

(1) Adjust VR2 for 0.0 V at TP5 on the Transport Control PCB in Unload mode.

(2) Secure both Tension Arms at the top of their travel.

(3) Adjust VR1 for 7.0 V at TP5 on the Transport Control PCB in Fast Forward mode.

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4.1.3.4 Tension Sensor Position

(1) Remove and Tape and Reels from the Transport, and raise the Transport to its open position (Refer to Section 4.1.6). Turn On the Power to the machine.

(2) With the Supply Tension Arm at the bottom of its travel, adjust the position of the Safety Sensor so that its centerline is aligned with the center of the Tension Arm Shaft.

(3) With the Supply Tension Arm at the bottom of its travel, adjust the position of the Sensor Vane, by loosening the two screws which attach the Vane to the mounting collar, so that the edge of the vane lines up with the edge of the Safety Sensor. Tighten the Vane mounting screws.

(4) Adjust the position of the Supply Tension Sensor so that its centerline is aligned with the center of the "C" screw. Tighten its mounting screw securely.

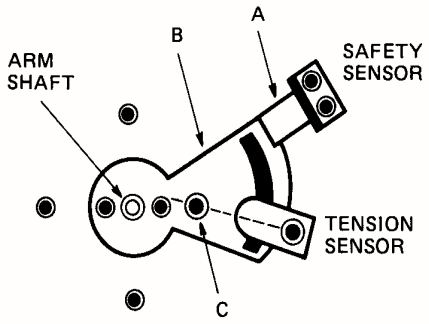

Figure 4-7 Location of Tension Sensor Adjustments

(5) Connect the DC Voltmeter to CP1 (Supply) and CP11 (Ground) on the Reel Control PCB.

(6) Slowly move the Supply Tension Arm from the bottom to the top of its travel while observing the voltage on the DC Voltmeter. The voltage will decrease as the Tension Arm its raised. If the voltage reaches its minimum before the Tension Arm reaches its upper limit, then the Tension Sensor position must be adjusted.
Repeat the observation and adjustment until the Sensor Voltage is linear with Tension Arm travel. Refer to Figure 4-9.

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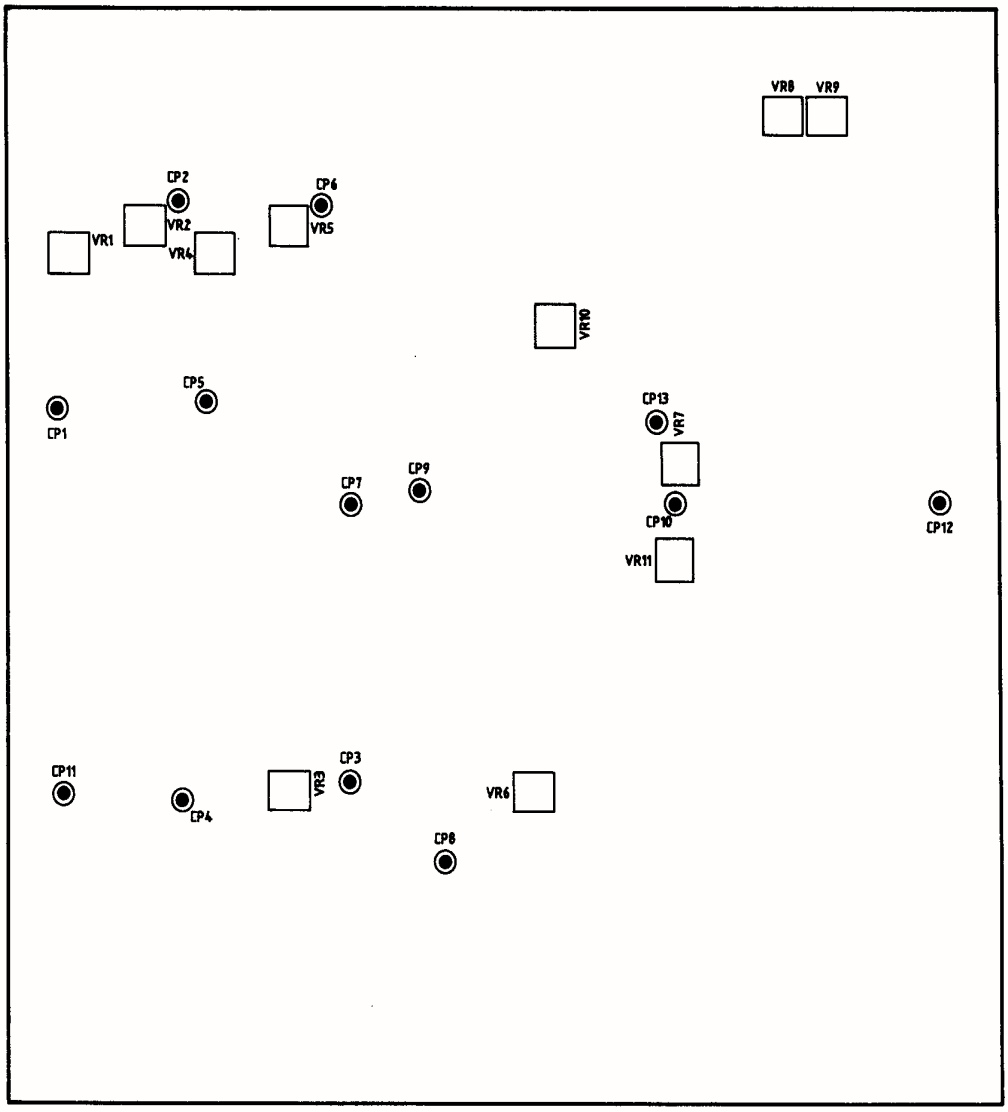

Figure 4-8 Location of Trimmers and Check Points on Reel Control PCB

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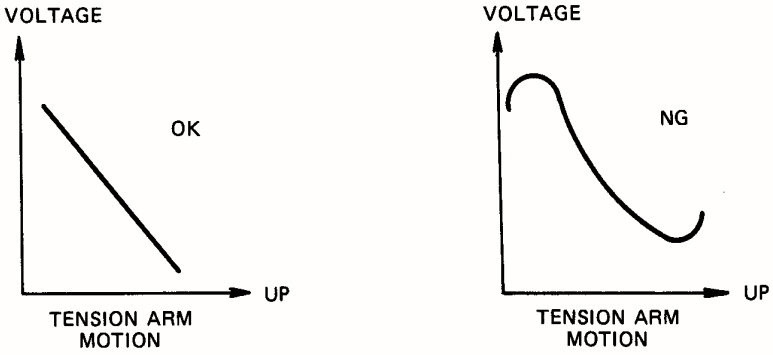

Figure 4-9 Tension Sensor Voltage Adjustment

(7) Repeat Steps 1 through 6 for the Take Up Tension Arm Sensor assembly using CP 5 on the Reel Control PCB.

4.1.3.5 Tension Arm Sensor Gain Adjustment

(1) Hold the Take Up Tension Arm at the top of its travel and adjust VR4 on the Reel Control PCB for 0.0 V at CP6.

(2) Let the Take Up Tension Arm return to the bottom of its travel and adjust VR5 for 10.0 V at CP6.

(3) Hold the Supply Tension Arm at the top of its travel and adjust VR1 for 0.0 V at CP2.

(4) Let the Supply Tension Arm return to the bottom of its travel and adjust VR2 for 10.0 V at CP2.

4.1.3.6 Play Acceleration Preliminary Adjustment

(1) Hold both Tension Arms at the top of their travel.

(2) Adjust VR11 of the Reel Control PCB for 7.0 V at CP10 in Play mode.

NOTE: Adjust VR11 within the first two seconds after pressing the PLAY button because the voltage will decrease rapidly after a short time.

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4.1.3.7 Fast Forward and Rewind Torque Adjustment

(1) Remove Tape and Reels from the Transport and secure both Tension Arms at the top of their travel.

(2) Connect the DC Voltmeter to the top of R27 (or IC4 Pin 1) on the Reel Control PCB, and place the MX-80 in Rewind mode.

(3) After about 10 seconds (after the voltage has stabilized), adjust VR8 to obtain a reading of -9.0 V +0.5/-0.25 V on the DC Voltmeter. Press the STOP button.

(4) Connect the DC Voltmeter to the top of R71 (or IC10 Pin 1), and place the MX-80 in Fast Forward mode.

(5) After about 10 seconds (after the voltage has stabilized), adjust VR9 to obtain a reading of -9.0 V +0.5/-0.25 V on the DC Voltmeter. Press the STOP button.

4.1.3.8 Reel Motor Torque Adjustment

(1) Secure both Tension Arms at the top of their travel.

(2) Connect the DC Voltmeter to CP4 on the Reel Control PCB.

(3) Hold the Supply reel firmly by hand to prevent it from turning, and place the MX-80 in Rewind.

(4) After about 10 seconds (after the voltage has stabilized), adjust VR 3 to obtain a reading of + 7.5 V $\pm$ 0.5 V on the DC Voltmeter. Press the STOP button.

(5) Connect the DC Voltmeter to CP8.

(6) Hold the Take Up reel firmly by hand to prevent it from turning, and place the MX-80 in Fast Forward.

(7) After about 10 seconds (after the voltage has stabilized), adjust VR 6 to obtain a reading of + 7.5 V $\pm$ 0.5 V on the DC Voltmeter. Press the STOP button.

4.1.3.9 Tension Arm Position Adjustment

(1) Thread the machine with tape and wind until there is an equal amount of tape on each reel.

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(2) Adjust VR4 on the Reel Control PCB until the front edge of the Take Up Tension Arm is even with the drill mark in the deck plate, while in Load mode. Refer to Figure 4-10.

(3) Place the machine in Play briefly to confirm the position of the Tension Arm.

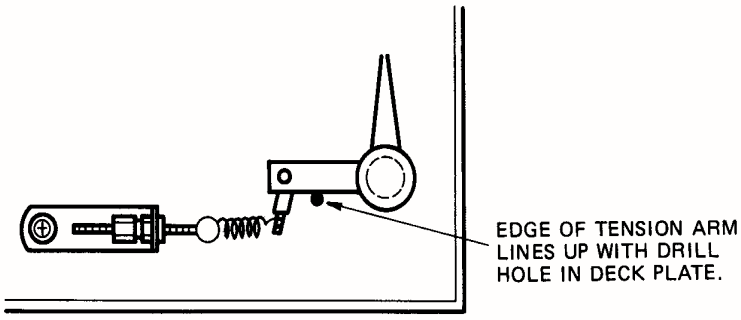

Figure 4-10 Tension Arm Position Adjustment

(4) Adjust VR1 until the front edge of the Supply Tension Arm is even with the drill mark in the deck plate, while in Load mode.

(5) Place the machine in Play briefly to confirm the position of the Tension Arm.

4.1.3.10 Fast Wind and Spooling Wind Speed Adjustment

(1) Connect the Frequency Counter to CP13 on the Reel Control PCB.

(2) Thread the machine with tape and wind until there is an equal amount of tape on each reel.

(3) Place the machine in Fast Forward mode.

(4) After the frequency has reached its maximum (about 10 seconds), adjust VR 10 to obtain a frequency reading of 3000 Hz $\pm$ 30 Hz.

(5) Rewind the tape until there is an equal amount on each reel.

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(6) Place the machine in Forward Spooling Wind mode (by pressing 2nd FUNCTION and F.FWD buttons).

(7) Readjust VR7 to obtain a frequency reading of 1000 Hz ± 10 Hz.

(8) Place the machine in Fast Forward mode and note the frequency reading.

(9) Place the machine in Rewind and note the frequency reading. If the Fast Forward and Rewind readings are not within 60 Hz of each other adjust VR3 and VR6 until they are.

4.1.3.11 Tape Tension Check

Thread the machine with tape and wind until there is an equal amount of tape on each reel. With the MX-80 in Stop mode, measure the tape tension between the Take Up Tension Arm Roller and the Take Up Reel, using a calibrated Tentelometer (or equivalent). The tape tension should be 320 grams ± 20 grams. If the tape tension is not correct, check the tension of the Tension Arm springs (Section 4.1.3.1), and check the setting of the Tension Arm position trimmers VR1(Supply) and VR4 (Take Up). Refer to Section 4.1.3.9.

4.1.4 Capstan Servo Adjustment

Refer to Figure 4-1 for the location of the Capstan Control PCB. If you have just completed adjustments to the Reel Control PCB, the necessary panels will already be open, and you may disregard any instruction relating to opening the panels to gain access to the PCBs. These procedures should be performed in the order presented here because the correct adjustment of one parameter may depend upon the previous correct adjustment of another parameter.

4.1.4.1 Preliminary Adjustment

(1) Turn Off the Power to the machine and wait 30 seconds to allow the power supply capacitors to discharge. Remove any tape and/or empty reels from the transport.

(2) Open the upper rear panel to gain access to the Capstan Control PCB by removing the uppermost two screws on each side of the panel, and folding it down to a horizontal position.

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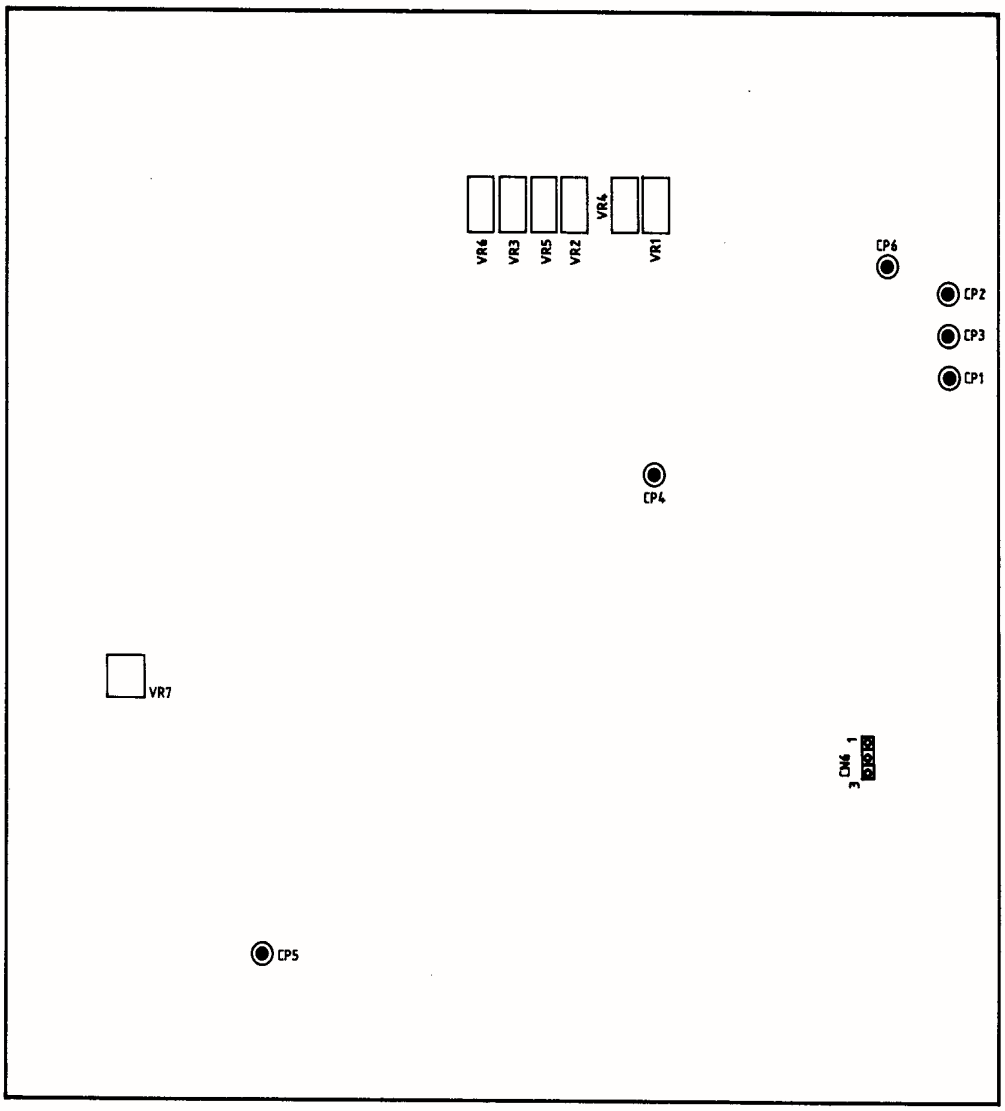

Figure 4-11 Location of Trimmers and Test Points on Capstan Control PCB

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(3) On the Capstan Control PCB, turn VR1, VR2, VR3, VR4, VR5, and VR6 fully counterclockwise until the trimpot clicks on each revolution (NOTE: These are 30-turn trimpots), then turn each trimmer clockwise 15 full revolutions.

(4) Set VR7 on the Capstan Control PCB to the center of its rotation.

4.1.4.2 Phase Locked Loop Duty Cycle Adjustment

(1) Connect an oscilloscope to CP3 and Ground on the Capstan Control PCB.

(2) Set the SPEED switch on the Transport Control Panel to the H position. Set SW2 on the Transport Control PCB (the H/L Speed Pair switch) to the H position. Set the SPEED MODE switch on the Remote Control unit to the Fix position.

(3) Secure both Tension Arms at the top of their travel.

(4) Turn On the Power to the MX-80.

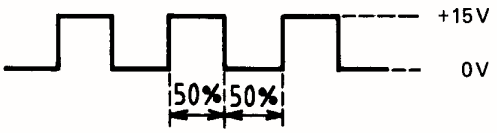

Figure 4-12 Capstan Waveforms

(5) Adjust VR7 so that the waveform displayed on the oscilloscope has a duty cycle of approximately 50%.

4.1.4.3 Gain Adjustment

(1) With the oscilloscope still connected to CP3 on the Capstan Control PCB and the SPEED switch still set for 30 ips, adjust VR4 (30 ips Gain) so that the waveform displayed on the oscilloscope has a duty cycle of exactly 50%.

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(2) Set the SPEED switch on the Transport Control Panel to the L position (15 ips).

(3) Adjust VR5 (15 ips Gain) so that the waveform displayed on the oscilloscope has a duty cycle of exactly 50%.

(4) Set SW2 on the Transport Control PCB (the H/L Speed Pair switch) to the L position.

(5) Adjust VR6 (7.5 ips Gain) so that the waveform displayed on the oscilloscope has a duty cycle of exactly 50%.

4.1.4.4 Capstan Servo Damping Adjustment

NOTE: If a Wow and Flutter meter is not available, do not change the setting of VR1, VR2, or VR3 (Capstan Damping trimmers).

(1) Thread the MX-80 with tape and wind until there is less than 1/2" (1.25 cm) of tape pack remaining on the Supply Reel.

(2) Connect the (3150 Hz) output of the Wow and Flutter meter to the TEST SIGNAL input on the Audio Control PCB.

(3) Connect the input of the Wow and Flutter meter to the CH8 rear panel Line Output connector.

(4) Set SW2 on the Transport Control PCB (the H/L Speed Pair switch) to the H position. Set the SPEED switch on the Transport Control Panel to the H position (30 ips).

(5) Set the CH8 READY/SAFE switch on the Remote Control unit to the Ready position. Set the ALL SAFE switch to the Ready position.

(6) Press the ALL REPRO button on the Remote Control unit, and press the RECORD and PLAY buttons to place the machine in Record mode.

(7) Adjust VR1 a small amount (one or two revolutions) and observe the Wow and Flutter meter. If a change in Wow and Flutter performance is observed, continue adjusting VR1 until the best performance is observed. If no change is observed in the first one or two revolutions of the trimmer, return the trimmer to its initial position and continue with the next step.

(8) Set the SPEED switch on the Transport Control Panel to the L position (15 ips).

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(9) Place the machine in Record mode, and repeat step 7 using VR2 for adjustment.

(10) Set SW2 on the Transport Control PCB (the H/L Speed Pair switch) to the L position.

(11) Place the machine in Record mode, and repeat step 7 using VR3 for adjustment.

The capstan motor should lock (as indicated by the bi-color LED on the Capstan Control PCB changing from Red to Green) quickly and smoothly when the Capstan Motor speed or direction is changed.

4.1.5 Pinch Roller Timing

Switch SW1 on the Pinch Roller PCB adjusts the delay time between pressing the PLAY button and the Pinch Roller pulling in against the Capstan Shaft. These switches have been preset at the OTARI factory and do not require adjustment.

4.1.6 Tape Lifter Adjustment

Adjustment of the Tape Lifter position should not be necessary unless a Tape Lifter is changed or a Head is replaced

(1) Turn Off the Power to the machine and wait 30 seconds to allow the power supply capacitors to discharge. Remove any tape and/or empty reels from the transport.

(2) Open the VU Meter panel by removing the outer two screws from the top of the panel, and folding it down to a horizontal position.

(3) Cut a piece of recording tape approximately 10 ft (3 meters) long, and thread it on the machine, wrapping it around the Reel Tables by hand to hold it in position across the heads.

NOTE: This is necessary because the Tape Lifter adjustment must be made with tape on the machine, but the Transport cannot be opened while Reels are on the Reel Tables.

(4) Remove the 4.5 mm socket head cap screw from the underside of each side of the Transport Deck Plate, and carefully lift the Transport Deck Plate until it latches in the open position.

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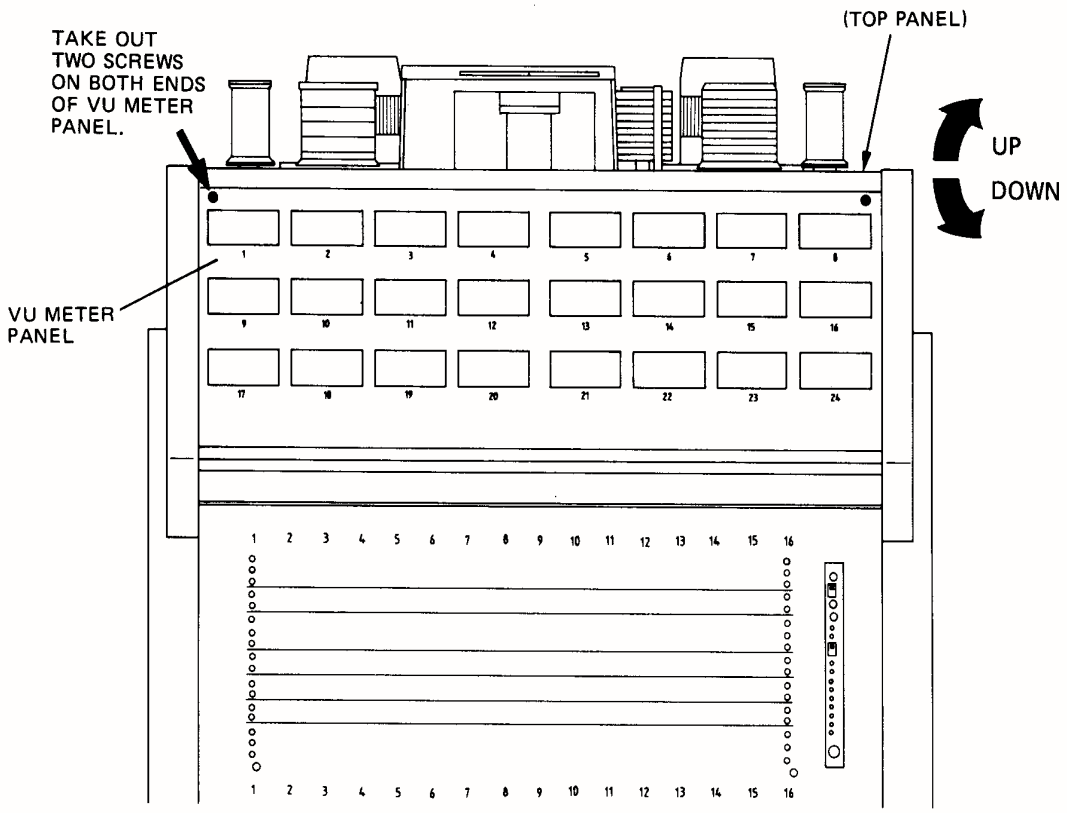

Figure 4-13 Opening the Transport

(5) Loosen the four screws which attach the Lifter Solenoid to the Deck Plate, and move the Lifter Solenoid as far toward the left side of the machine as it will go. Refer to Figure 4-14.

(6) Push the right Tape Lifter toward the front of the machine, and adjust Stopper A so that the right Tape Lifter (between the Repro Head and the Flutter Filter Roller) moves the tape 0.5 mm (0.02 in) away from the Repro Head.

NOTE: Be sure that the Tape Lifter Arm does not hit the Head Shield Plate, when the Shield Plate is in its retracted position.

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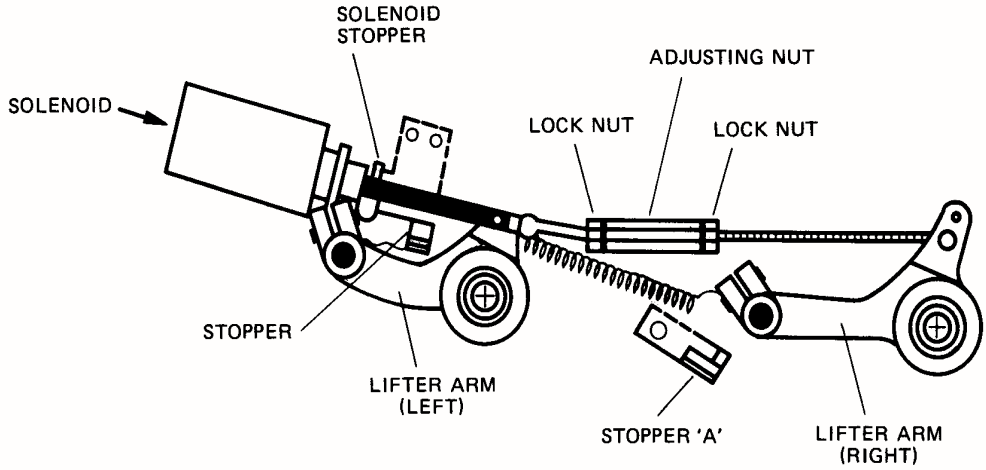

Figure 4-14 Tape Lifter Adjustments

(7) Hold the right Tape Lifter so that it is extended fully (against Stopper A), and adjust the threaded standoff so the left Tape Lifter (between the left Tape Guide and the Impedance Roller) holds the tape 0.5 mm (0.02 in) away from the Record Head.

NOTES:

a) The lock-nuts at each end of the standoff must be loosened before adjusting the standoff.

b) Turn the standoff clockwise to decrease the clearance between the tape and the Record Head.

c) If the standoff is turned too far counterclockwise, the left Tape Lifter will hit the Deck Plate when extended, and the right Tape Lifter will not be able to be adjusted properly.

(8) Tighten the locknuts on each end of the standoff when adjustment is correct.

(9) Push the Lifter Solenoid plunger into the solenoid body, and adjust the position of the solenoid until the left Tape Lifter holds the tape 0.5 mm from the Record Head when it is extended. Tighten the screws to hold the solenoid in position.

(10) Secure both Tension Arms at the top of their travel.

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(11) Set Switch 3-3 on the Transport Control PCB to the On position.

(12) Apply Power to the MX-80. Press the STOP button to place the Transport in Load mode. Press the CUE button to cause the Tape Lifters to be extended.

(13) Carefully check the position of the Tape Lifters. If the tape is not 0.5 mm from the Repro and Record Heads, repeat the adjustment procedure.

(14) Press the CUE button to retract the Tape Lifters, and check to see that the left Tape Lifter is approximately 1 mm behind the tape. If it is not, adjust the position of Stopper B until the retracted position is correct.

(15) Adjust the position of the Solenoid Plunger Stopper so that the solenoid plunger contacts it at the same time that the left Tape Lifter Arm contacts Stopper B.

4.1.7 Pinch Roller Position and Pressure Adjustment

(1) Adjust the position (from beneath the Transport Deck Plate) of the Solenoid Stopper so the Pinch Roller is 4 - 5 mm from the Capstan Shaft when it is its disengaged position.

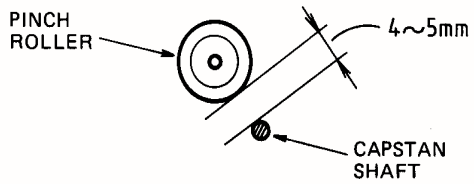

Figure 4-15 Pinch Roller Pressure Measurement

(2) Secure both Tension Arms at the top of their travel.

(3) Attach the 0 - 4000 gram spring scale to the Pinch Roller with a loop of string.

(4) Place the MX-80 in Play mode.

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(5) Pull the spring scale toward the rear of the machine until the Pinch Roller just loses contact with the Capstan Shaft (and stops turning), and measure the Pinch Roller pressure.

(6) If the Pinch Roller pressure is not 2500 grams ± 300 grams, adjust the position of the Pinch Roller solenoid slightly and repeat the measurement.

4.1.8 Brake Adjustment

Some of these adjustments can be performed with the Reel Motor Assembly installed in the MX-80, or with the Reel Motor Assembly on the work bench. If the adjustments are performed at the bench, the final adjustments for tension must be made after the Assembly is re-installed in the MX-80.

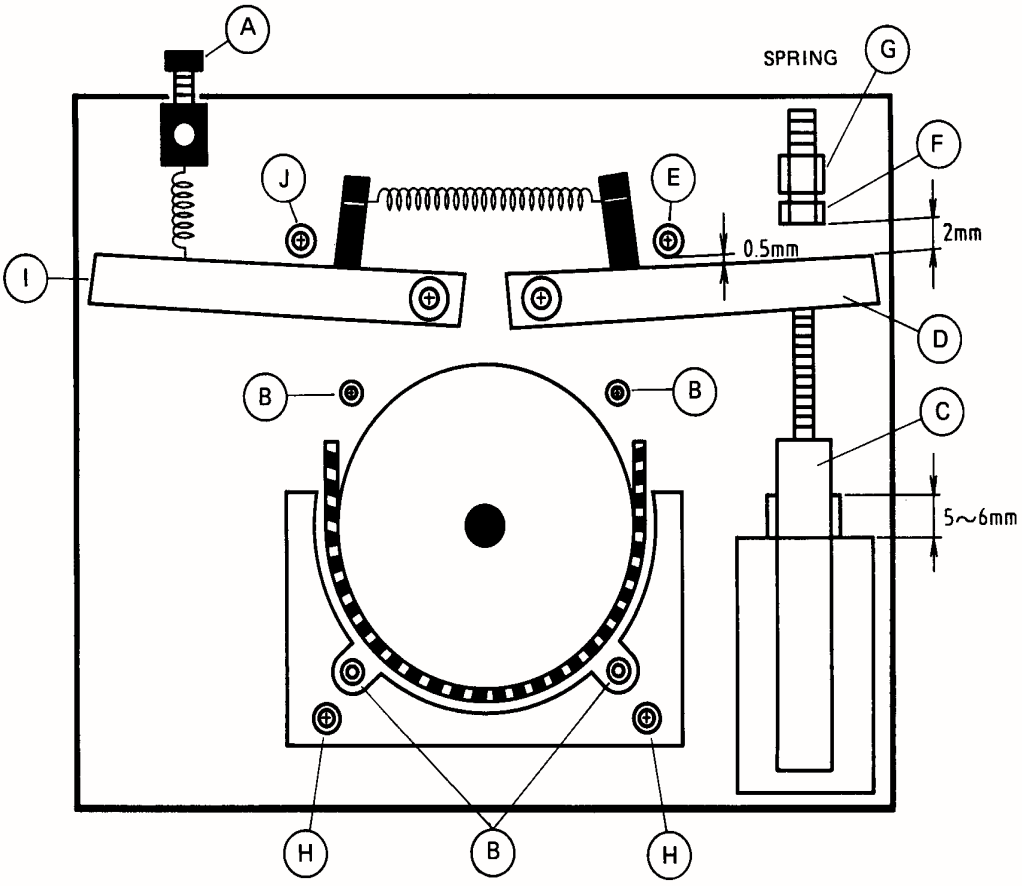

Figure 4-16 Brake Adjustments

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(1) Loosen the screws marked "B" in Figure 4-16 and adjust the Brake Assembly on the motor so that there is 0.5 mm clearance between arm "D" and post "E". Securely tighten the screws.

(2) Adjust the double-nut "F" so that 5-6 mm of plunger body protrudes from the solenoid body, while pushing in on "G" to remove any slack in the linkage.

(3) Adjust bracket "C" for 1 mm clearance between the fiber washer "F" and the arm "D" while pulling out on "G" to remove any slack in the linkage.

(4) Loosen the screws marked "H" and adjust the guide so that the band does not rub on the brake drum when the solenoid is energized (push "G" all the way in to check).

(5) Check the Holdback tension by winding the free end of a piece of string or twine around an NAB reel hub (clockwise for the Supply reel, counterclockwise for the Take-up reel), and pulling on the string with a spring scale to unwind the string. Since the reading on the spring scale is dependent on the speed at which the string is pulled, it is recommended that two or three readings be made and the results averaged.

(6) If the tension is not approximately 1200 - 1500 grams, loosen the tension bracket locking screw and adjust the screw marked "A" so that the tension in the "holdback" direction is within that range.

NOTE: Adjust the brake tension so that both Take-up and Supply sides show the same tension ± 100 grams in the "holdback" direction.

(7) Check the feed tension by repeating the above procedure with the string wound on the hub in the opposite direction.

The brake tension in the feed direction is not separately adjustable, and should be approximately one-half of the value measured in the "holdback" direction (i.e., 600 - 750 grams).

If correct holdback tension cannot be obtained after replacing Brake Bands, it may be necessary to rotate the drum against the brake band to "wear in" the brake bands.

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4.2 ROUTINE AUDIO ALIGNMENT

4.2.1 Tools, Materials, and Test Equipment Required

Speed	EQ	Ref. Flux	MRL Cat. No.
30 ips	AES	250 nWb/m	51L214
15 ips	NAB	250 nWb/m	51J213
7.5 ips	NAB	250 nWb/m	51T212
15 ips	IEC	320 nWb/m	51J323
15 ips	IEC	250 nWb/m	51J223
7.5 ips	IEC	320 nWb/m	51T322
7.5 ips	IEC	250 nWb/m	51T222

NOTE: Standard equalization for 2" 24 track machines at 15 and 7.5 ips is NAB. Standard equalization for 2" 32 track machines at 15 and 7.5 ips is IEC. Standard equalization at 30 ips is AES for all track formats.

4.2.2 Demagnetizing the Heads and Tape Path

Demagnetizing (sometimes called degaussing, although that term is more often applied to bulk tape erasure) is a necessary procedure, and should be performed prior to every alignment and before every recording session. Demagnetizing should always be done with extreme caution:

DEMAGNETIZING CAUTION:
To avoid damage to the MX-80, always make sure the POWER switch is Off before proceeding. Make sure that all recording tapes, especially alignment tapes, are removed from the vicinity of the MX-80. The AC field created by the demagnetizer is extremely powerful and could seriously damage the electronics if they are On.

Never turn On or Off the power to the demagnetizer unless it is at least 3 feet (1 meter) away from the MX-80. This would cause an extremely strong moving magnetic field which could possibly place a permanent magnetic charge on parts of the machine. The demagnetizer would not be powerful enough to remove these charges under normal circumstances, and the parts might have to be removed and discarded. USE ONLY A

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DEMAGNETIZER WITH HIGH FLUX DENSITY, INEXPENSIVE "HI-FI" TYPE DEMAGNETIZERS CAN LEAVE RESIDUAL FIELDS THAT WILL CAUSE MORE HARM THAN BENEFIT.

(1) Turn off the MX-80 POWER switch.

(2) With the demagnetizer at least 3 feet (1 meter) from the MX-80, plug the demagnetizer into the AC mains and turn it on.

(3) Slowly move the demagnetizer toward the supply swing arm roller until the tip is approximately 1/8" (3 mm) away from the roller.

(4) Slowly move the tip of the demagnetizer up and down along the roller so that the entire roller surface is exposed to the demagnetizing field. DO NOT TOUCH ANY PART OF THE MX-80 WITH THE DEMAGNETIZER.

(5) Slowly move the demagnetizer at least 3 feet (1 meter) away from the MX-80.

(6) Working from left to right repeat Steps 3, 4, and 5 for each of the following metal parts in the tape path:

A. Tension Arm Guide Roller (left)

B. Guide Roller (Impedance Roller)

C. Tape Lifter (left)

D. Fixed Tape Guide (left)

E. Erase Head

F. Record Head

G. Flutter Filter Roller

H. Tape Lifter (right)

I. Reproduce Head

J. Fixed Tape Guide (right)

K. Capstan Shaft

L. Tension Arm Guide Roller (right)

(7) When all the above parts have been demagnetized, slowly move the demagnetizer at least 3 feet (1 meter) away from the MX-80 and turn it off or unplug it.

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4.2.3 Cleaning the Tape Path

It is extremely important to clean the entire tape path regularly. Oxide and dirt will be shed from the tape and accumulate on these parts, causing a build-up that can degrade audio performance, cause slipping, and cause undue wear on the tape.

CAUTION: Never use any metallic item or abrasive to clean the heads or any other tape guidance parts. Never use spirits, lacquer thinner, acetone or other solvents on the tape heads. Rubbing alcohol should be avoided since it contains oil that will leave a residue.

You should clean and demagnetize the entire tape path before performing any adjustments in this section.

(1) Moisten a cotton swab in pure isopropyl alcohol, and wipe the entire surface of the Supply Tension Arm roller. Allow the roller to dry by evaporation.

(2) Moisten additional swabs and clean the following parts:

A. Tension Arm Guide Roller (left)

B. Guide Roller (Impedance Roller)

C. Tape Lifter (left)

D. Fixed Tape Guide (left)

E. Erase Head

F. Record Head

G. Flutter Filter Roller

H. Tape Lifter (right)

I. Reproduce Head

J. Fixed Tape Guide (right)

K. Capstan Shaft

L. Tension Arm Guide Roller (right)

CAUTION: Don't use alcohol moistened swabs to clean the Tachometer Roller or the Pinch Roller. To avoid embedding dust and lint particles in the surface of these rollers, use only an alcohol moistened Lint-Free cloth to gently clean the rollers.

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4.2.4 Input Level, Output Level and Peak Indicator Adjustment

NOTE: The MX-80 Outputs are set at the factory for balanced operation. If unbalanced operation is desired, set the BAL/UNBAL switch (SW1) on each Audio Amplifier PCB to the UNBAL position.

(1) Set the test oscillator to produce a 1 kHz sine wave at + 4 dBm, using the AC voltmeter.

(2) Connect the oscillator to the CH1 INPUT connector on the rear panel. Connect the AC voltmeter to the CH1 OUTPUT connector.

(3) Extend the CH1 Audio Amplifier PCB using the Extender PCB (PB-7JEA). Turn On the Power to the MX-80.

(4) Adjust VR14 (Input Level) on the Audio Amplifier PCB until the CH1 VU Meter indicates 0 VU.

(5) Adjust VR12 (Output Level) until the AC voltmeter indicates + 4 dBm at the OUTPUT connector.

(6) Connect the oscillator to the TEST SIGNAL input on the Audio Contol PCB, and adjust VR13 (Test Signal Level) until the CH1 VU Meter indicates 0 VU.

(7) Adjust the test oscillator to produce 1 kHz at + 12 dBm.

NOTE: This level causes the PEAK indicator to become illuminated at a level corresponding to 1040 nWb/m.

(8) Adjust VR11 (Peak Indicator Level) on the Audio Amplifier PCB until the PEAK indicator in the CH1 VU Meter is steadily illuminated.

(9) Repeat steps 2 through 8 for each remaining channel.

Preliminary Record and Erase Transformer Peaking Adjustment

NOTE: This procedure is necessary only when a semi-permanent head format conversion is made, or if the Record or Erase Head are changed. It is not necessary to perform this procedure as part of the routine maintenance procedures.

(10) Disconnect the test oscillator, and thread the machine with tape.

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(11) Connect the AC voltmeter to CP1 and CP2 (GND), and place the channel under alignment into Record mode.

(12) Adjust TF1 (Record Bias transformer) on the Audio Amplifier PCB for a peak reading on the AC voltmeter.

NOTE: Use a non-metallic alignment tool for these adjustments.

(13) With the machine still in Record mode, connect the AC voltmeter to CP3 and CP4 (GND), and adjust TF2 (Erase Bias transformer) for a peak reading on the AC voltmeter. For 24 and 32 CH machines the voltage at the peak should be 100 - 130 mV.

(14) Repeat Steps 11 through 13 for all remaining Audio Amplifier PCBs. Replace PCBs when completed.

4.2.5 Reproduce Head Azimuth Alignment

Refer to Figure 4-17 for the location and Reproduce Azimuth Adjustment screws.

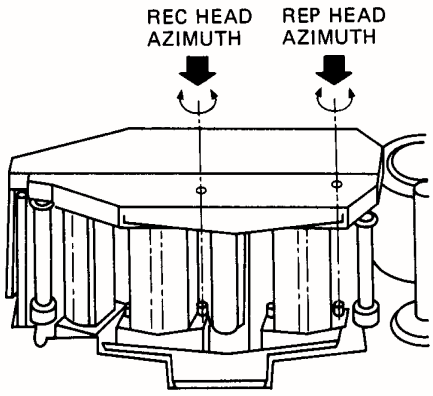

Figure 4-17 Record and Reproduce Azimuth Adjustment Screws

(1) Set the Speed Mode Selector on the Remote Control Unit to the FIX position, and set the SPEED selector on the MX-80 transport to the L position. Set the ALL SAFE switch to the All Safe position. Press the ALL REPRO button on the Remote Control Unit.

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(2) Thread the MX-80 with an appropriate Reproduce Alignment Tape for the L speed setting. Refer to Section 4.2.1 for suggestions.

(3) Connect one vertical input of the oscilloscope to the CH2 Output connector. Connect the other vertical input of the oscilloscope to the CH23 (CH15 on 16 channel versions, CH31 on 32 channel versions) Output connector. Adjust the oscilloscope vertical sensitivity so that the output signal from the MX-80 produces a usable display on the oscilloscope.

(4) Insert the 2.5 mm hex key through the right hand hole in the head cover to the azimuth adjustment screw below. Locate and play the 1 kHz portion of the reproduce alignment tape. Adjust the oscilloscope controls until at least two complete cycles are displayed for each channel.

(5) Adjust the Reproduce head azimuth adjustment screw (Figure 4-17) until the two signals displayed on the oscilloscope are in phase.

NOTE: The azimuth adjustment screw is on the right side of the head, and has a hex socket head. The slotted screw should not be adjusted.

(6) Locate and play the 2 kHz portion of the alignment tape. Adjust the Reproduce head azimuth adjustment screw until the two signals on the scope are in phase.

(7) Repeat Step 5 for each frequency on the alignment tape up to 16 kHz. The adjustment of the screw becomes more critical as the frequency increases.

4.2.6 Record Head Azimuth Adjustment

It is not possible to establish proper record head azimuth as a function of Record/Play phase response due to the record phase compensation circuits in the MX-80. The procedure given here adjusts the azimuth of the Record head in Sel-Rep mode, thus ensuring that the azimuth of the Record head is exactly matched to that of the Repro head.

(1) Press the ALL SEL-REP button on the Remote Control unit.

(2) Locate and play the 1 kHz portion of the reproduce alignment tape.

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(3) Adjust the Record head azimuth adjustment screw (the left hand hole in the head cover) until the two signals displayed on the oscilloscope are in phase.

(4) Repeat Step 3 for each frequency on the alignment tape up to 16 kHz. The adjustment of the screw becomes more critical as the frequency increases.

4.2.7 Reproduce Level Adjustment

NOTE: The MX-80 does not provide separate REPRO GAIN controls for each speed, therefore perform the Repro Level adjustment at the speed (H or L) which you will use most often. After performing the adjustments in Sections 4.2.7 through 4.2.15, when the tape speed is changed only the Repro Level adjustment needs to be re-adjusted. The Repro EQ adjustments will track the level adjustments.

(1) Press the ALL REPRO button on the Remote Control unit.

(2) Make sure the REF FLUX switch on the Audio Control PCB is set to correspond to the reference level of the Reproduce Alignment tape you are using. The H setting corresponds to 320 nWb/m, the L setting corresponds to 250 nWb/m.

(3) Locate and play the portion of the alignment tape containing the 1 kHz tone at Reference Level. Adjust the REPRO GAIN trimmer on the front of the CH1 Audio Amplifier PCB until the CH1 VU Meter indicates 0 VU.

(4) Repeat step 3 for each remaining Audio Amplifier PCB.

4.2.8 Low Speed Reproduce Equalization Alignment

(1) Set the SPEED selector on the MX-80 Transport to the L position. Press the ALL-REPRO button on the Remote Control unit.

(2) Thread the MX-80 with an appropriate Reproduce Alignment Tape for the Reference Flux level and Equalization you are using.

(3) Locate and play the 1 kHz portion of the alignment tape. If the VU Meter does not indicate 0 VU (it might not if Repro Gain was set at High speed), note the level which is indicated.

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(4) Play the equalization adjustment tones and adjust the REPRO EQ LOW SPD trimmer at 10 kHz for the same level as the 1 kHz tone in Step 3. You should adjust all the channels at the same time (writing down the results) to save wear on the reproduce alignment tape.

4.2.9 High Speed Reproduce Equalization Alignment

(1) Set the SPEED selector on the MX-80 Transport to the H position. Press the ALL-REPRO button on the Remote Control unit.

(2) Thread the MX-80 with an appropriate Reproduce Alignment Tape for the Reference Flux level and Equalization you are using.

(3) Locate and play the 1 kHz portion of the alignment tape. If the VU Meter does not indicate 0 VU (it might not if Repro Gain was set at Low speed), note the level which is indicated.

(4) Play the equalization adjustment tones and adjust the REPRO EQ HIGH SPD trimmer at 10 kHz for the same level as the 1 kHz tone in Step 3. You should adjust all the channels at the same time (writing down the results) to save wear on the reproduce alignment tape.

4.2.10 Sel-Rep Level Adjustment

NOTE: The MX-80 does not provide separate SEL-REP GAIN controls for each speed, therefore perform the Sel-Rep Level adjustment at the speed (H or L) which you will use most often.

(1) Press the ALL SEL-REP button on the Remote Control unit.

(2) Make sure the REF FLUX switch on the Audio Control PCB is set to correspond to the reference level of the Reproduce Alignment tape you are using. The H setting corresponds to 320 nWb/m, the L setting corresponds to 250 nWb/m.

(3) Locate and play the portion of the alignment tape containing the 1 kHz tone at Reference Level. Adjust the SEL-REP GAIN trimmer on the front of the CH1 Audio Amplifier PCB until the CH1 VU Meter indicates 0 VU.

(4) Repeat step 3 for each remaining Audio Amplifier PCB.

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4.2.11 Low Speed Sel-Rep Equalization Adjustment

(1) Set the SPEED selector on the MX-80 Transport to the L position. Press the ALL-SEL-REP button on the Remote Control unit.

(2) Thread the MX-80 with an appropriate Reproduce Alignment Tape for the Reference Flux level and Equalization you are using.

(3) Locate and play the 1 kHz portion of the alignment tape. If the VU Meter does not indicate 0 VU (it might not if Sel-Rep Gain was set at High speed), note the level which is indicated.

(4) Play the equalization adjustment tones and adjust the SEL-REP EQ LOW SPD trimmer at 10 kHz for the same level as the 1 kHz tone in Step 3. You should adjust all the channels at the same time (writing down the results) to save wear on the reproduce alignment tape.

4.2.12 High Speed Sel-Rep Equalization Alignment

(1) Set the SPEED selector on the MX-80 Transport to the H position. Press the ALL-SEL-REP button on the Remote Control unit.

(2) Thread the MX-80 with an appropriate Reproduce Alignment Tape for the Reference Flux level and Equalization you are using.

(3) Locate and play the 1 kHz portion of the alignment tape. If the VU Meter does not indicate 0 VU (it might not if Sel-Rep Gain was set at Low speed), note the level which is indicated.

(4) Play the equalization adjustment tones and adjust the SEL-REP EQ HIGH SPD trimmer at 10 kHz for the same level as the 1 kHz tone in Step 3. You should adjust all the channels at the same time (writing down the results) to save wear on the reproduce alignment tape.

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4.2.13 Low Speed Record Bias, Equalization, and Record Level Adjustment

The MX-80 provides switch selectable bias settings for two different tape formulations. At the Low tape speed, the Bias level for switch position A is fixed for AMPEX 456 tape. The Bias level for switch position B is adjustable for both speeds. Once the BIAS control on each Audio Amplifier PCB has been properly adjusted, a single control can reset the bias for all channels simultaneously.

NOTE: If the Low speed is 7-1/2 ips, set the oscillator level for -6 dBm and use 5 kHz for adjustment instead of 10 kHz.

(1) Set the BIAS SELECT switch on the Audio Control PCB to the A position.

(2) Set the test oscillator to produce a 10 kHz sine wave at +4 dBm, or whatever standard operating level you have chosen for your system, e.g., -10 dBv (-8 dBm).

(3) Connect the test oscillator to the TEST SIGNAL input on the Audio Control PCB. Connect the AC voltmeter to the CH1 Output connector.

(4) Thread the MX-80 with the tape ;you will use for sessions.

(5) Press the ALL INPUT button on the Remote Control Unit.

(6) Set the ALL SAFE switch to the Ready position.

(7) Set the READY/SAFE switch to the Ready position for all channels.

(8) Set the SPEED SELECT switch on the Transport to the L position, and set the Speed Mode Selector switch on the Remote Control Unit to the Fixed position.

(9) Press the RECORD and PLAY buttons simultaneously to begin recording.

(10) Press the ALL REPRO button on the Remote Control Unit.

(11) Turn the RECORD BIAS trimmer on the CH1 Audio Amplifier PCB counterclockwise until the level on the AC Voltmeter begins to decrease.

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(12) Turn the RECORD BIAS trimmer clockwise until the indication on the AC Voltmeter peaks; then continue clockwise rotation until the AC Voltmeter reading decreases (overbias). Refer to Table 4-1 BIAS CHART the amount of overbias that is appropriate for the tape type and speed.

(13) Set the oscillator to 1 kHz and adjust the RECORD GAIN LOW SPD trimmer for 0 VU (-10 VU for 7-1/2 ips).

(14) Set the oscillator to 10 kHz and adjust the RECORD EQ LOW SPD trimmer for 0 VU (-10 VU for 7-1/2 ips).

(15) Repeat Steps 11 through 14 for all remaining channels.

NOTE: If you wish to use a different tape formulation at Low speed, set the BIAS SELECT switch on the Audio Control PCB to the B position, thread the machine with the desired tape, and adjust the LOW SPD B trimmer for the desired bias level. This trimmer will adjust the bias for all channels simultaneously.

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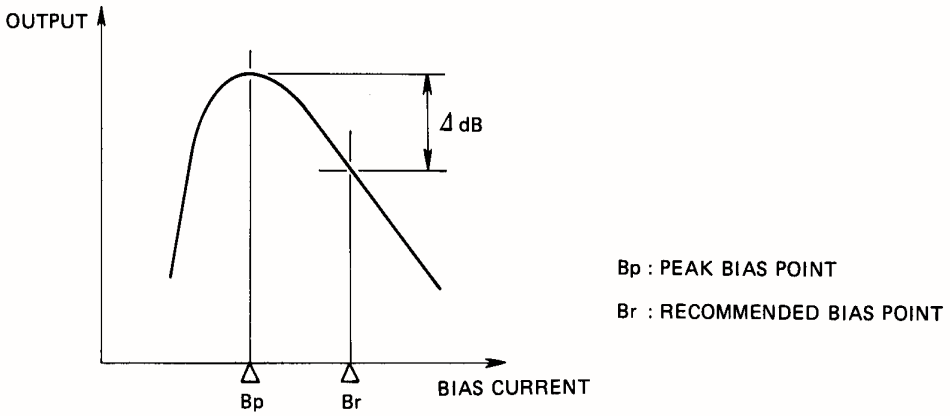
Table 4-1 Recommended Record Bias Setting

Record Head: GH6R016 (32CH)
GH6R017 (24CH) (Wg = 6 um)

		Bias Setting Δ dB			
	Speed (ips)	3-3/4	7-1/2	15	30
	Frequency (Hz)	10k	10k	10k	10k
Type of Tape	AGFA PEM468				
	AGFA PEM169				
	AMPEX 406/407				
	AMPEX 456		7.0	3.5	1.7
	BASF LGR50P				
	BASF SPR50LH/50LHL				
	SCOTCH(3M) 206/207				
	SCOTCH(3M) 226/227		7.0	3.5	1.7
	SCOTCH(3M) 250				

(Unit:dB)



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4.2.14 High Speed Record Bias, Equalization, and Record Level Adjustment

(1) Reset the BIAS SELECT switch on the Audio Control PCB to the A position, set the SPEED SELECT switch on the transport to the H position, thread the machine with a reel of the desired tape, and repeat Steps 7 through 12 of Section 4.2.13 (Low Speed Record Bias adjustment) using the HIGH SPD A trimmer on the Audio Control PCB for the desired amount of overbias.

(2) Repeat Steps 13 through 15 of Section 4.2.13 using the RECORD GAIN HIGH SPD and RECORD EQ HIGH SPD trimmers.

To set the machine for an alternate tape type, having different bias requirements, at High speed, set the BIAS SELECT switch on the Audio Control PCB to the B position and repeat Step 2 above for all channels. Thereafter, whenever that tape type is to be used, set the BIAS SELECT switch to the B position, and the bias level for all channels is automatically adjusted for that tape type.

4.2.15 Low Frequency Compensation Adjustment

(1) Connect the test oscillator to the TEST SIGNAL input on the Audio Control PCB. Set the oscillator to produce 100 Hz at + 4 dBm.

(2) Set the SPEED SELECT switch on the transport to the H position.

(3) Press the ALL REPRO button on the Remote Control unit. Set the ALL SAFE switch to the Ready position.

(4) Set the READY/SAFE switches for all channels to the Ready position.

(5) Press the RECORD and PLAY buttons simultaneously to begin recording.

(6) Adjust the REPRO LF COMP HI SPD trimmer for 0 VU on the MX-80 VU Meter. Repeat for each channel.

(7) Rewind the tape to the beginning of the recorded section.

(8) Press the ALL SEL-REP button on the Remote Control PCB.

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(9) Play the tape and adjust the SEL-REP LF COMP HI SPD trimmer for 0 VU on the MX-80 VU Meter. Repeat for each channel.

(10) Set the SPEED SELECT switch on the transport to the L position.

(11) Repeat Steps 3 through 9 using the REPRO and SEL-REP LF COMP LOW SPD trimmers.

4.2.16 Record Phase Compensation Adjustment

(1) Set the SPEED SELECT switch on the transport to the H position. Press the ALL REPRO button on the Remote Control unit.

(2) Set the test oscillator to produce a 10 kHz square wave, and connect it to the TEST SIGNAL input on the Audio Control PCB.

(3) Connect the oscilloscope to either the CH1 OUTPUT on the rear panel, or to the 1/8" mini-jack LINE OUTPUT connector on the front of the CH1 Audio Amplifier PCB.

(4) Press RECORD and PLAY to begin recording.

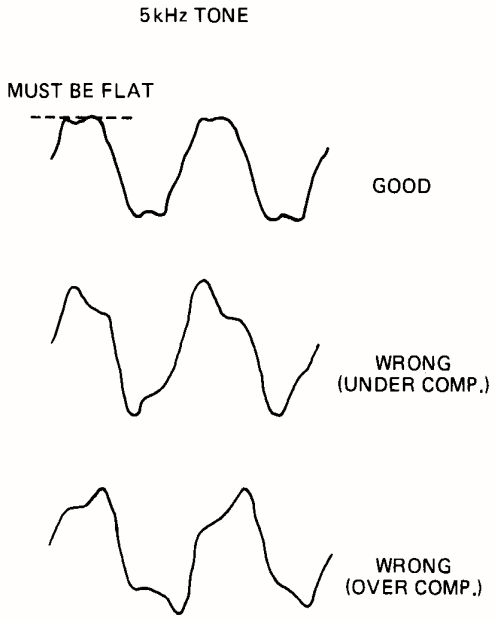

Figure 4-18 Record Phase Compensation Waveform

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(5) While recording the square wave, adjust the RECORD PHASE HI SPD trimmer for the best square wave response shown on the oscilloscope. (Refer to Figure 4-18).

(6) Repeat for all remaining channels.

(7) Set the SPEED SELECT switch on the transport to the L position and repeat Steps 3 through 6 using the RECORD PHASE LOW SPD trimmers. NOTE: Use 5 kHz for 7-1/2 ips adjustment.

4.2.17 Erase Bias Symmetry Adjustment

NOTE: This adjustment is necessary only to minimize Punch In/Punch Out noise. It is not necessary to perform this procedure as part of normal maintenance procedures.

(1) Clean and demagnetize the Heads and tape path.

(2) Turn Off the power to the MX-80 and wait 30 seconds for the power supply capacitors to discharge.

(3) Remove the Head Assembly Cover.

(4) Unplug the Record Head connectors. The left-hand connector is for the upper tracks.

(5) Thread the machine with a reel of the tape which is usually used for sessions. Set the SPEED SELECT switch on the transport for 15 ips operation.

(6) Extend the CH1 Audio Amplifier PCB with the Extender PCB (PB-7JEA). Turn On the power to the machine.

(7) Press the ALL REPRO button on the Remote Control unit, set the ALL SAFE switch to the Ready position, and set the CH1 READY/SAFE switch to the Ready position.

(8) Connect an amplifier and monitor speaker to the CH1 OUTPUT connector on the rear panel.

(9) Press PLAY and RECORD to begin recording.

(10) While listening to the monitor speaker, repeatedly Punch In and Punch Out of Record. If any click or thump noise is heard, adjust VR23 (Erase Symmetry) on the Audio Amplifier PCB to minimize the noise.

(11) Repeat Steps 6 through 10 for each remaining channel.

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(12) Reconnect the Record Head connectors and replace the Head Assembly Cover when the procedure is completed.

4.2.18 Record Bias Symmetry Adjustment

NOTE: This adjustment is necessary only to minimize Punch In/Punch Out noise. It is not necessary to perform this procedure as part of normal maintenance procedures.

(1) Clean and demagnetize the Heads and tape path.

(2) Turn Off the power to the MX-80 and wait 30 seconds for the power supply capacitors to discharge.

(3) Remove the Head Assembly Cover.

(4) Unplug the Erase Head connectors. The left-hand connector is for the upper tracks.

(5) Thread the machine with a reel of the tape which is usually used for sessions. Set the SPEED SELECT switch on the transport for 15 ips operation.

(6) Extend the CH1 Audio Amplifier PCB with the Extender PCB (PB-7JEA). Turn On the power to the machine.

(7) Press the ALL REPRO button on the Remote Control unit, set the ALL SAFE switch to the Ready position, and set the CH1 READY/SAFE switch to the Ready position.

(8) Connect an amplifier and monitor speaker to the CH1 OUTPUT connector on the rear panel.

(9) Press PLAY and RECORD to begin recording.

(10) While listening to the monitor speaker, repeatedly Punch In and Punch Out of Record. If any click or thump noise is heard, adjust VR22 (Record Symmetry) on the Audio Amplifier PCB to minimize the noise.

(11) Repeat Steps 6 through 10 for each remaining channel.

(12) Reconnect the Erase Head connectors and replace the Head Assembly Cover when the procedure is completed.

NOTE: If it is not possible to totally eliminate the thump or click noise, additional demagnetization might be necessary. Use a demagnetizer rated at 40 - 60 watts minimum.

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4.2.19 Gapless Punch-In/Punch-Out Test and Adjustment

NOTE: It is very important that the Erase Current and Record Bias adjustments be correctly performed prior to adjusting the Gapless timing.

(1) Record a 1 kHz tone at 0 VU at 15 ips on all channels for 10 minutes, and Rewind to the beginning of the recorded section.

(2) Set the GAPLESS RECORD switch (SW6) on the Audio Control PCB to the Off position.

(3) Connect the CH8 Output to the CH1 Input. Press the INDIVIDUAL button on the Remote Control unit. Set CH8 to Sel-Rep mode. Set CH1 to Repro mode. Set the CH1 READY/SAFE switch to the Ready position, and set the ALL SAFE switch to the Ready position.

(4) Connect the oscilloscope to the CH1 OUTPUT connector on the rear panel. Adjust the oscilloscope for a usable display (either 0.5 or 1.0 Sec/div).

(5) Repeatedly Punch In and Out of Record on Channel 1 while observing the oscilloscope. The oscilloscope should display a 100 - 200 mSec overlap when Punching In, and a 100 - 200 mSec gap when Punching Out.

(6) Repeat Steps 3 through 5 for all remaining channels. The results should be the same on all channels ± 20m Sec.

(7) Set the GAPLESS RECORD switch (SW6) on the Audio Control PCB to the On position, and repeat Steps 3 through 5. Set the oscilloscope timebase for 5 or 10 m Sec/div. The oscilloscope should display a maximum overlap of 15 m Sec on Punching In, and a maximum gap of 15 m Sec on Punching Out. If correct results are not obtained, adjust the position of SW2-3, 2-4, and 2-5 on <u>each</u> Audio Amplifier PCB, to adjust the Punch Out gap, and adjust SW2-6, 2-7 and 2-8 to adjust the Punch In overlap. The Factory settings of SW2 are shown in Section 6.2.2.

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SECTION 5:
OPTIONAL EQUIPMENT AND FIELD UPGRADES

5.1 WIDE BAND MODIFICATION

The following modification is required for reproducing SMPTE/EBU Time Code in Fast Wind and Spooling modes.

(1) Resolder J1 (located between IC3 and IC4) on the Audio Amplifier PCB Ass'y.

(2) Solder a jumper wire to J2 (in the vicinity of IC1) instead.

(3) Operate the following parts and solder them to the specified positions respectively.

R501	1/4W, 5%, 6.2k ohm carbon resistor
R502	1/4W, 5%, 3.6k ohm carbon resistor
R503	1/4W, 5%, 1.2k ohm carbon resistor
R504	1/4W, 5%, 360 ohm carbon resistor
R505	1/4W, 5%, 1 M ohm carbon resistor
R506	1/4W, 5%, 1 M ohm carbon resistor
R507	1/4W, 5%, 1 M ohm carbon resistor
Q501 - Q504	2SK336
C501	0.1 uF Mylar film capacitor (± 5%, 50V)

When this modification is made, the MX-80 can reproduce Time Code from normal Play speed up to 25 times of Play speed,(referenced to 15 ips).

5.2 UPGRADING THE MX-80-24/32 FROM 24 TO 32 CHANNELS

The MX-80-24/32 is shipped as a 24 channel machine prewired for 32 channel operation. The parts required for this upgrade are contained in a kit with OTARI part number ZA-5BA.

Refer the exploded view drawings in Section 9.

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(1) Remove the head assembly cover by removing the two screws securing it to the transport.

(2) Extract six head connectors, remove three hex socket screws retaining the head assembly to the deck plate, and remove the head assembly.

(3) Fix the 32 channel head assembly to the deck plate using three hex socket screws which were removed in step 2.

(4) Insert six head connectors, and return the head assembly cover to the original position.

(5) Open the rear I/O panel by removing the two uppermost phillips head screws on each side of the panel, and hinging it down to horizontal.

(6) Remove the blank panel covering the connector holes for 25th ch to 32nd ch attached to the I/O panel, and fix the XL-type connectors (16 pieces) by screws.

(7) Insert connectors (4 each, 8 in total) of two cables included in the kit into the header of the mother board. (See Figure 5-1.)

(8) Solder the cable to the pins of the XL-type connectors. (See Figure 5-1. Exercise care not to mix up hot, cold and GND.)

(9) Return the panel to the original position after confirmation that all cable connections are correct.

(10) Remove the Phillips type head screw locating at each of both upper ends of the panel and retaining the VU meter panel to the transport, and tilt the panel toward you.

(11) Extract the flat cables out of three VU meter PCBs. (Exercise care not to make erroneous connection at a later step.)

(12) Remove the inner panel to which VU meters are mounted.

(13) Replace the Lower Angle (which masks 25ch - 32ch VU meters) with narrower width panel included in the kit.

(14) Mount the VU meters (8 pieces) with nuts to the inner panel.
Fix the RECORD IND PCBs and PEAK IND PCBs (8 pieces each) to the inner panel by screws.

(15) Mount the inner panel to the VU meter panel.

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(16) Fix the VU meter PCB (contained in the kit) to the VU meters by screws. (4 screws per VU meter)

(17) Insert the connectors of RECORD IND PCBs and PEAK IND PCBs into the headers on the VU meter PCB.

(18) Insert the flat cable included in the kit to the connector on the VU meter PCB, and insert another end of the cable to CN38 on the mother board.

(19) Mount the VU meter panel to the transport.

(20) Insert eight Audio Amplifier PCBs into the card frame.

Installation has been completed as a result. Then;

(21) Align the Audio Amplifier PCB using the procedures described in Section 4.2.

5.3 INSTALLATION OF OVERBRIDGE CASE FOR DOLBY NOISE REDUCTION SYSTEM

(1) Mount trim plates A(No.3) to the top and bottom of side trims 2. Secure each with two M3x10 hex socket head screws. Secure trim plate B(No.4) to side trims 2 using M3x10 flat countersunk head scrtews on each side.

(2) Mount the parts assembled in step 1 in the overbridge case 1. Secure with four M4x10 hex socket head screws on each side.

(3) Insert two spacers 9 and two casters 10 into the bottom support 8. Secure side panel L(No.5) and side panel R(No.6) to the bottom support 8 with two M4x10 hex socket head screws on each side.

(4) Mount the parts assembled in step 3 to the MX-80 case frame from the rear. Secure with five M8x10 hex socket head screws. These screws should not be tightened completely at this time.

(5) Mount the cover 7 between side panel L5 and side panel R6. Secure with M3x6 hex socket head screws from the inside of the cover. Tighten M4x10 and M8x10 hex socket head screws form steps 3 and 4 completely.

(6) Mount the overbridge case 1 onto side panel L5 and side panel R6. Secure with two M5x8 binding head screws on each side.

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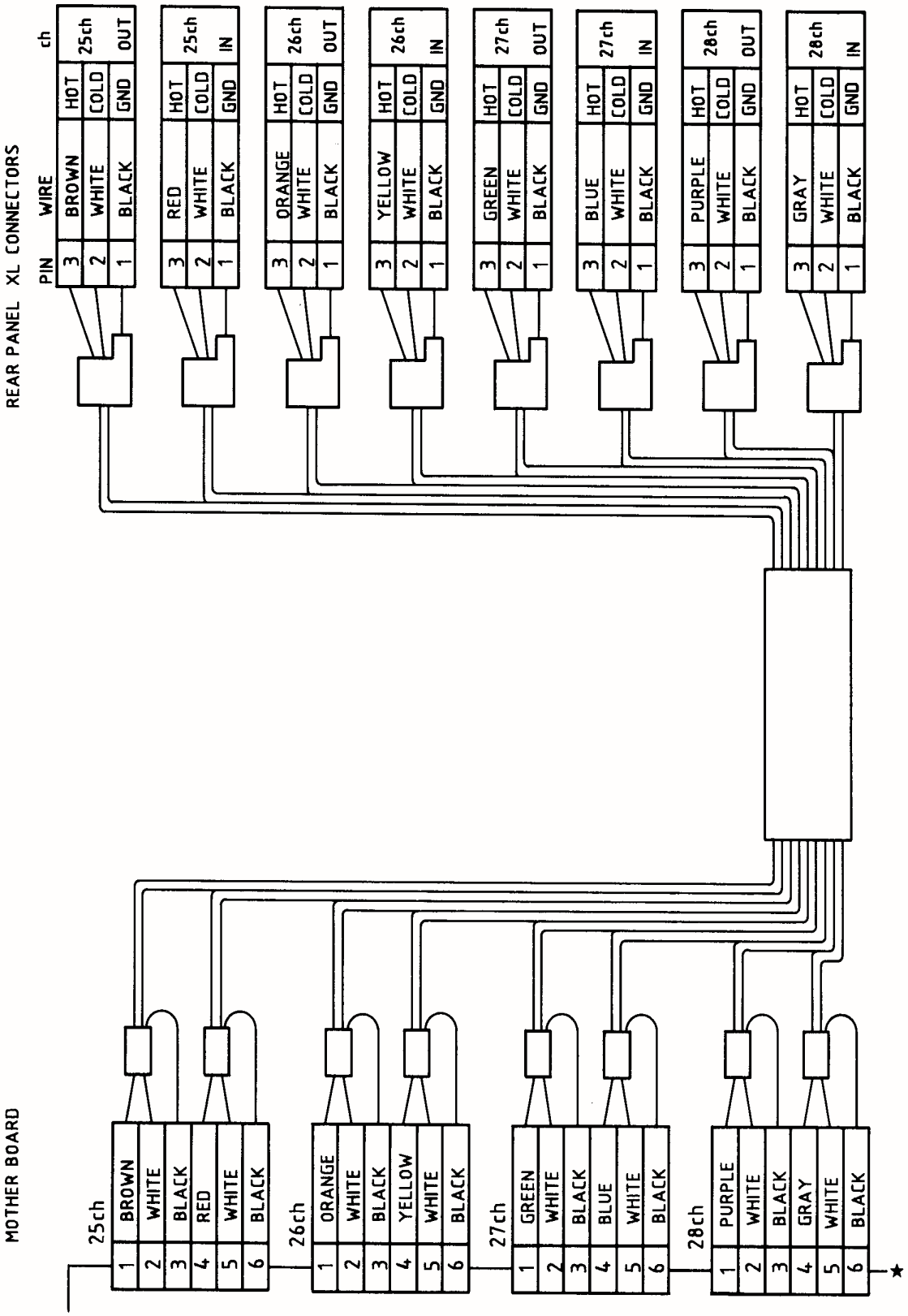

Figure 5-1a Upgrade Modification

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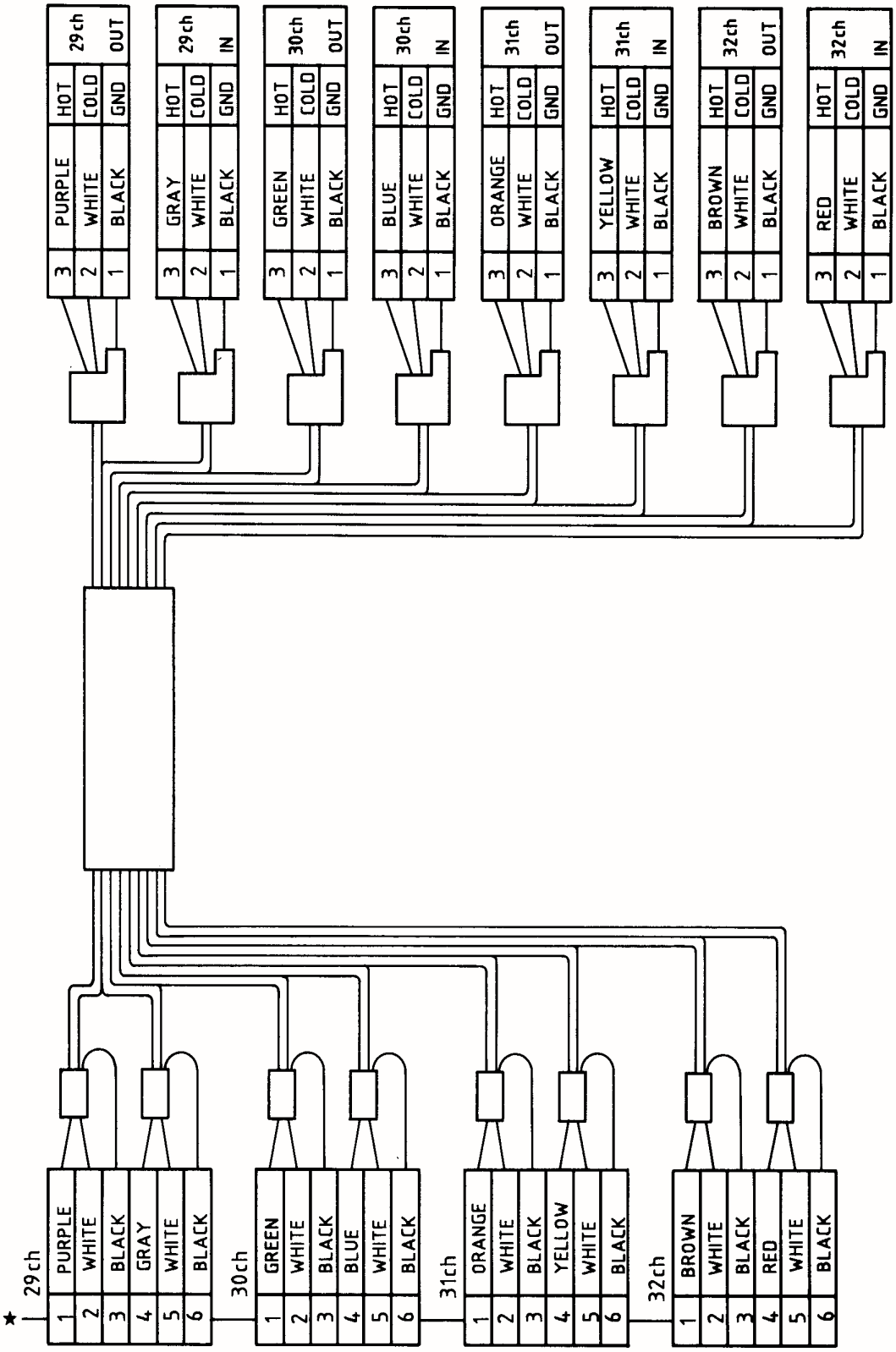

Figure 5-1b Upgrade Modification

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(7) Attach the floating nuts from the rear of trim plates 2 as illustrated.

(8) Mount the blank panel 11 from the front. Secure with eight M4x12 binding head screws.

(9) Mount the noise reduction system and power supply unit from the front. Secure with four M4x12 binding head screws.

(10) Verify that all screws have been completely tightened.

NOTE: Due to weight of this assembly, we suggest that this installation be done with the help of another person.

PARTS LIST

Ref. No.	Description	Quantity
1	Overbridge Case	1
2	Side Trim	2
3	Trim Plate A	2
4	Trim Plate B	2
5	Side Panel L	1
6	Side Panel R	1
7	Cover	1
8	Bottom Support	1
9	Spacer	2
10	Caster	2
11	Blank Panel	2

LIST OF SCREWS

	Type	Quantity	Code
M3x 6	Hex Socket Head Screw	6	C3x 6B
M3x10	Hex Socket Head Screw	4	C3x10B
M3x10	Flat Countersunk Head Screw	4	F3x10N
M4x10	Hex Socket Head Screw	12	C4x10B
M5x 8	Binding Head Screw	10	B5x 8B
M5x20	Binding Head Screw	20	B5x20B
	Floating Nut	20	F951Z004
M8x10	Hex Socket Head Screw	16	C8x10B

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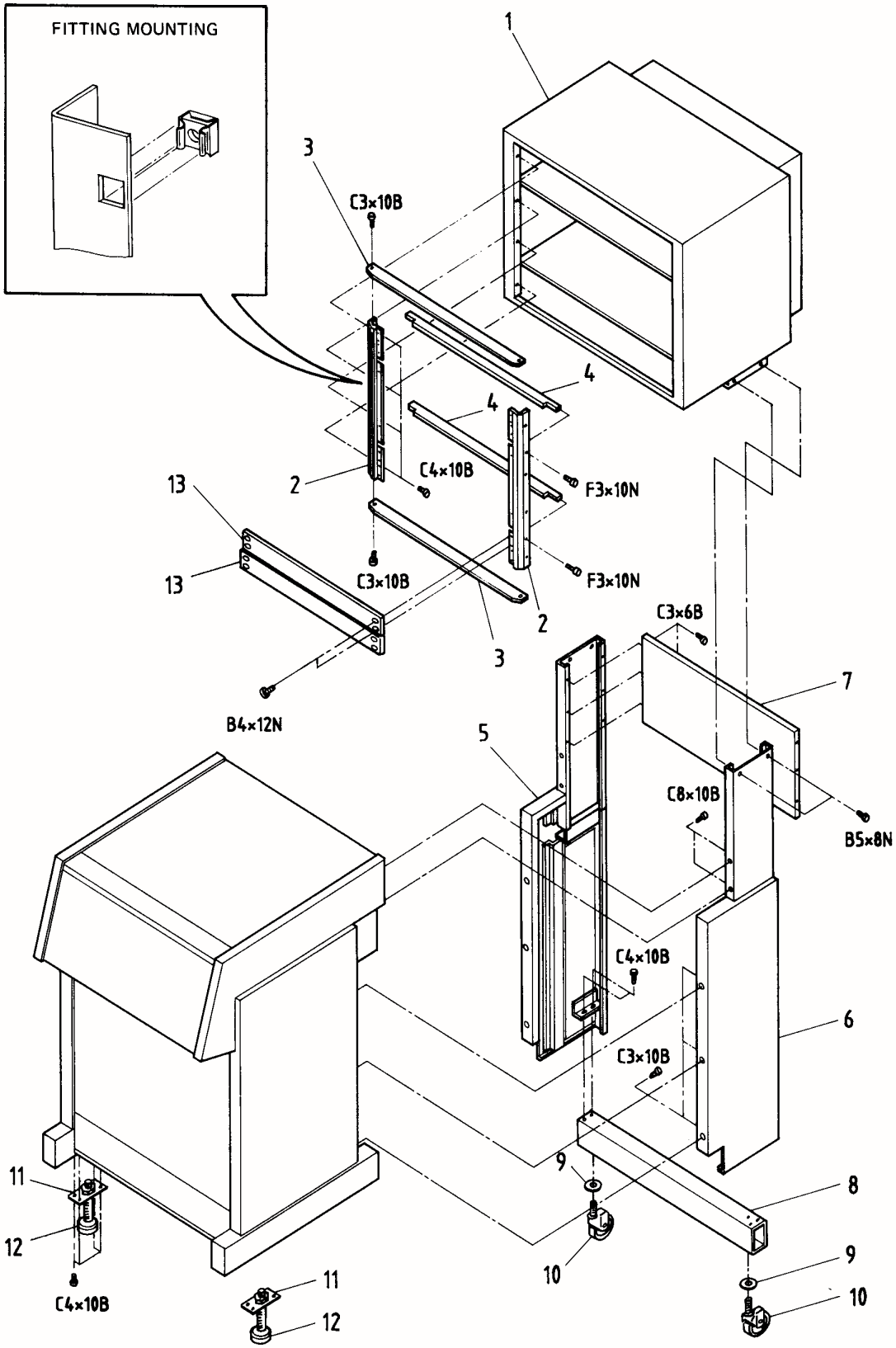

Figure 5-2 Overbridge Case Assembling

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SECTION 6: INSTALLATION INSTRUCTIONS

6.1 UNCRATING THE MACHINE

MX-80 Series Recorders are shipped fully assembled (including casters) on a wood pallet, with a heavy cardboard carton containing a form-fitting foam packing insert surrounding the machine, strapped to the pallet. A separate box, under the machine, contains an AC power cord, spare lamp assemblies for control buttons, and a spare fuse. We recommend that you open the carton carefully and retain the packing materials at least until proper operation of the machine has been established.

NOTE: MX-80 machines delivered in the United States have been uncrated and checked by OTARI Corporation and the dealer, making these steps necessary only if the machine has been recrated for delivery to your facility. Even so, you may wish to perform the checks and inspections in this Section to become familiar with the machine.

6.2 INSPECTION

Before you make any electrical connections, the MX-80 should be inspected visually. If there is any evidence of damage due to rough handling in shipping, you must notify the transportation carrier and submit a claim. Do not connect or use the MX-80 until you have successfully completed this inspection.

6.2.1 Audio Control PCB

Release the six nylon latches that hold the Amplifier panel in place on the front of the machine by pulling out on the buttons. The buttons will "pop" out about 1/8" (3 mm), releasing their hold on the chassis behind the panel. The panel will then remove to reveal the Audio Control and Audio Amplifier PCBs.

Grasp the edges of the PCB front panel at the top of and bottom of the Audio Control PCB (the leftmost PCB), and pull straight out to extract the board.

NOTE: Numbers in brackets [ ] refer to callouts in Figure 6-1.

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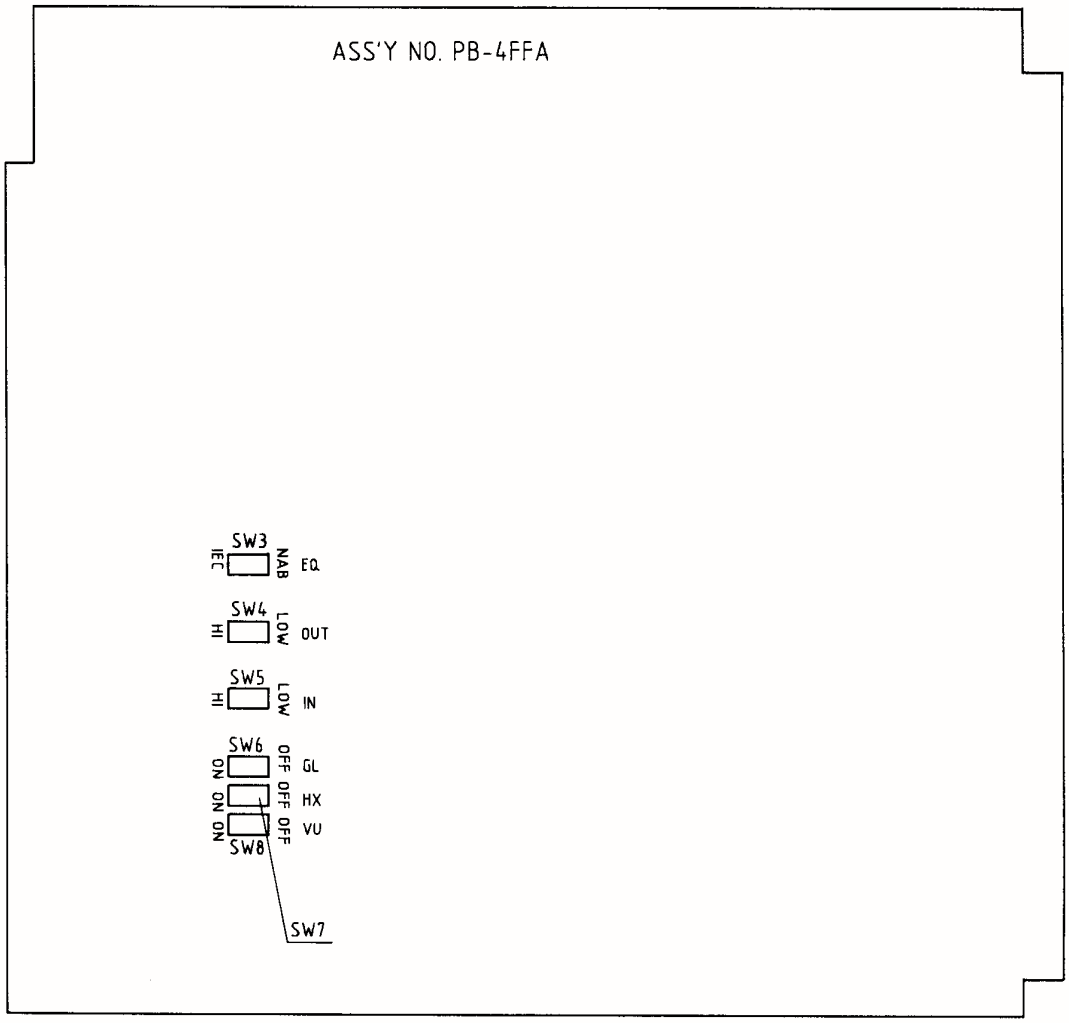

Figure 6-1 Location of Switches on Audio Control PCB

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[1] SW3 EQ IEC/NAB switch

It should be set to the EQ position required for the type of machine you ordered.

[2] SW4 OUTPUT LEVEL +4dBm/-8dBm switch

It is set to +4 dBm at the time of shipment from the factory.

[3] SW5 INPUT LEVEL +4dBm/-8dBm switch

It is set to +4 dBm at the time of shipment from the factory.

[4] SW6 GAPLESS RECORD ON/OFF switch

It is set to the "ON" position at the time of shipment from the factory.

[5] SW7 DOLBY HX PRO ON/OFF switch

It is set to the "ON" position at the time of shipment from the factory.

[6] SW8 VU +10dB ON/OFF switch

It is set to the "OFF" position at the time of shipment from the factory.

6.2.2 Audio Amplifier PCBs

Grasp the intermost edge of the white extractor tab at the top of the Channel 1 Audio Amplifier PCB and pull outward to extract the board. Refer to Figure 6-2 for the location of the various controls on the Audio Amplifier PCB. Check the following switches on the PCB:

(1) SW1: BAL/UNBAL switch - Set to BAL at the factory.

(2) SW2: Gapless Punch-In switch

A. Erase/Record Head Distance Compensation
SW2-1 on, SW2-2 on

B. Punch-Out Timing
SW2-3 on, SW2-4 on, SW2-5 off

C. Punch-In Timing
SW2-6 on, SW2-7 on, SW2-8 off

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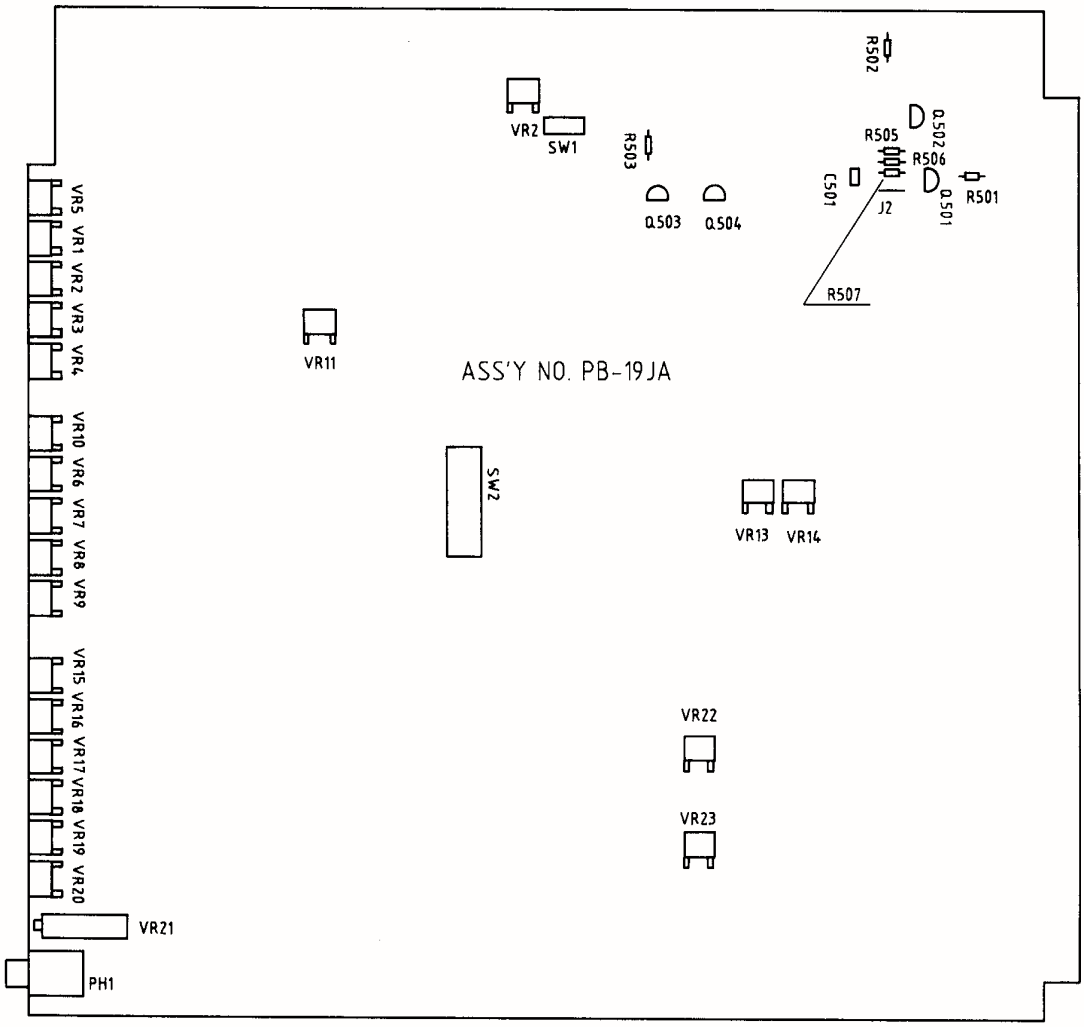

Figure 6-2 Audio Amplifier PCB

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6.2.3 Serial Remote Control PCB

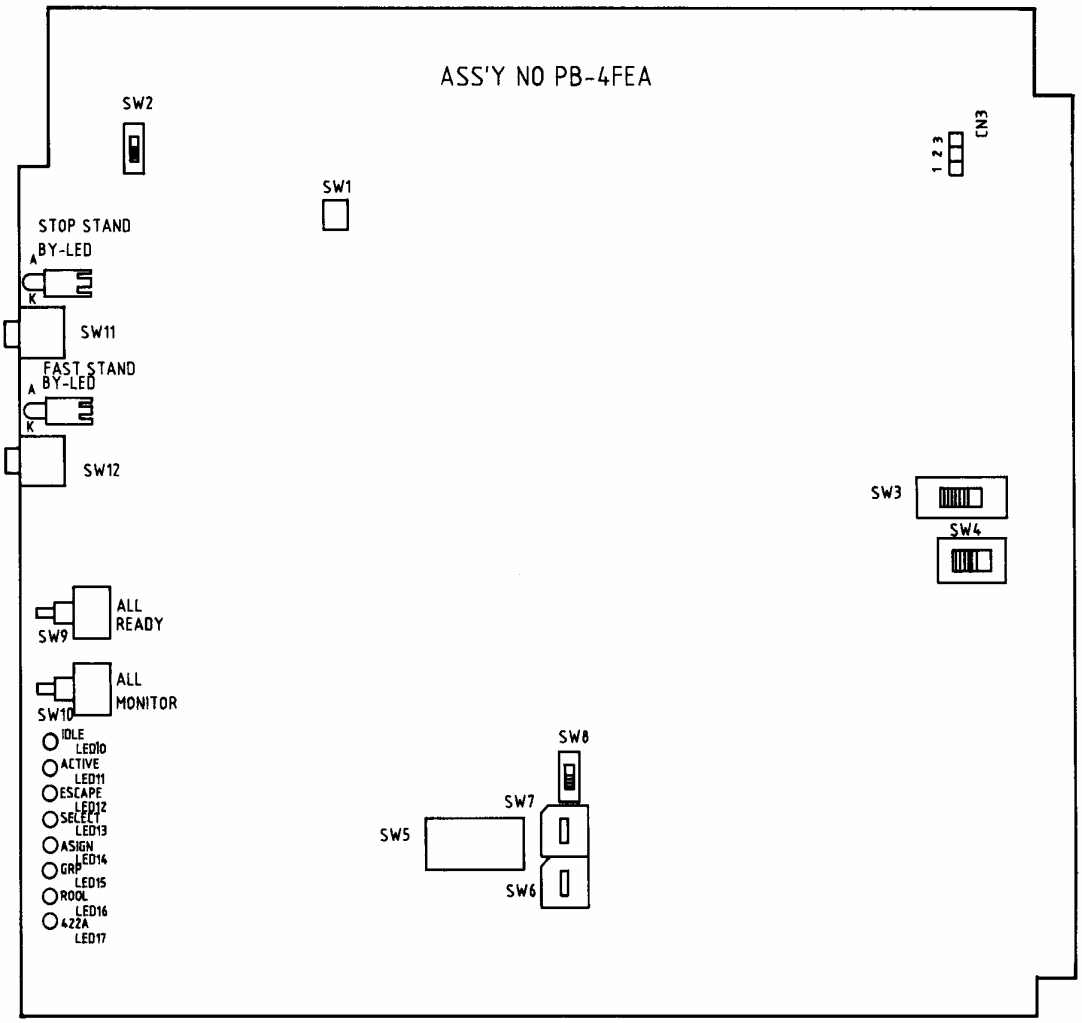

Figure 6-3 Serial Remote Control PCB

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This PCB is located at the right-hand end of the lower card cage.
The following controls are located on this PCB.

SW1: CPU Reset switch.

SW2: Test switch which should be normally on.

SW3: Switch for selection of whether MX-80 becomes the system's terminal or the host (RS-232C).

SW4: Switch for selection of whether MX-80 becomes the system's terminal or the host (RS-422A).

SW5: Switch for selection of whether MX-80 becomes the system's terminal or the host (RS-422A).

SW6, 7: Switches for setting the address No. of the machine that controls with RS-422A. SW6 is for the digit of 10 and SW7 is for the digit of 1. However, the maximum setting value shall be 32.

SW8: Not used.

SW9: Switch for selecting whether to set all channels in the Ready mode or in the Safe mode (for test).

SW10: Switch for selecting the monitor mode of all channels (for test).

SW11: ON/OFF switch for the Stop Standby mode.

SW12: ON/OFF switch for the Fast Standby mode.

CN3: Jumper connector for setting whether to output tach pulses to the Serial I/O connector or not.

Inquire OTARI for detail information regarding external control of the recorder with RS-232C or RS-422A.

6.2.4 Transport Control PCB

Open the upper rear panel of the MX-80 by removing two phillips head screws on each side of the panel and hinging it down to horizontal.

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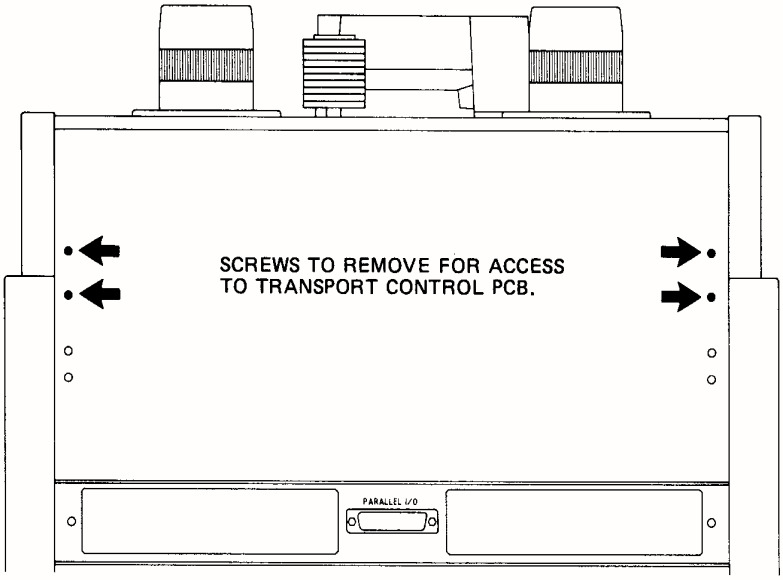

Figure 6-4 Screws to Remove for Access to Transport Control PCB

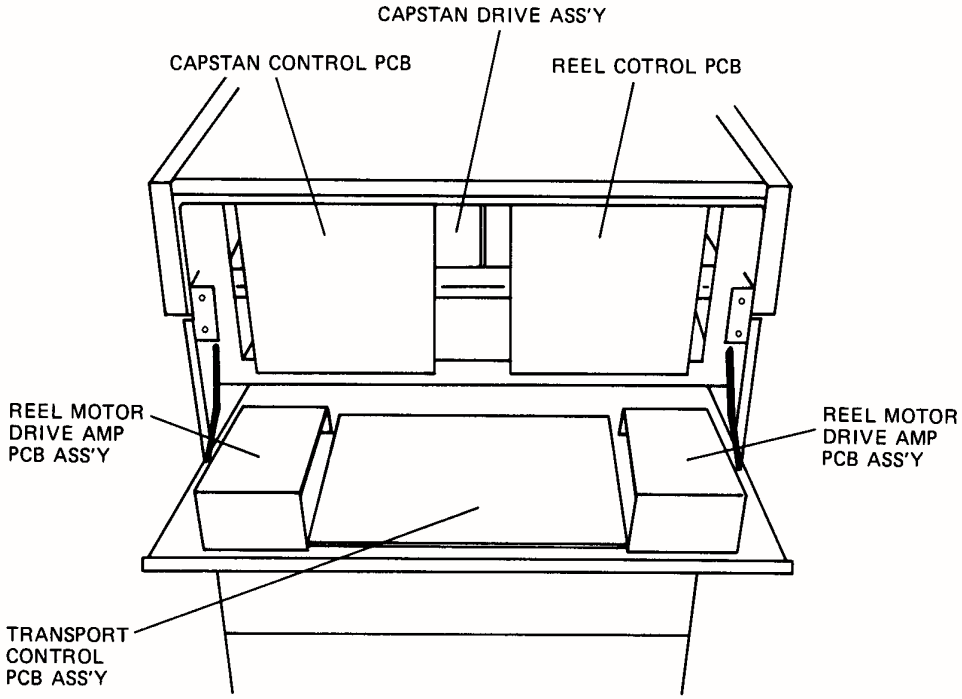

Figure 6-5 Inside View of Rear MX-80

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Check the following PCBs for loose or damaged connectors or components:

1. Transport Control PCB
2. Reel Control PCB
3. Capstan Control PCB
4. Reel Motor Drive Amplifier PCBs

There are many function selection switches on the control PCB assembly as described on the Table 6-1. Check each switches allocation or reset them as you like.

Close the rear panel and secure it with the four screws removed earlier.

NOTE: As for function selection switches on the Control PCB assembly, some switches are provided double on the Remote Control Unit PCB assembly. So some functions can be selected differently each other.

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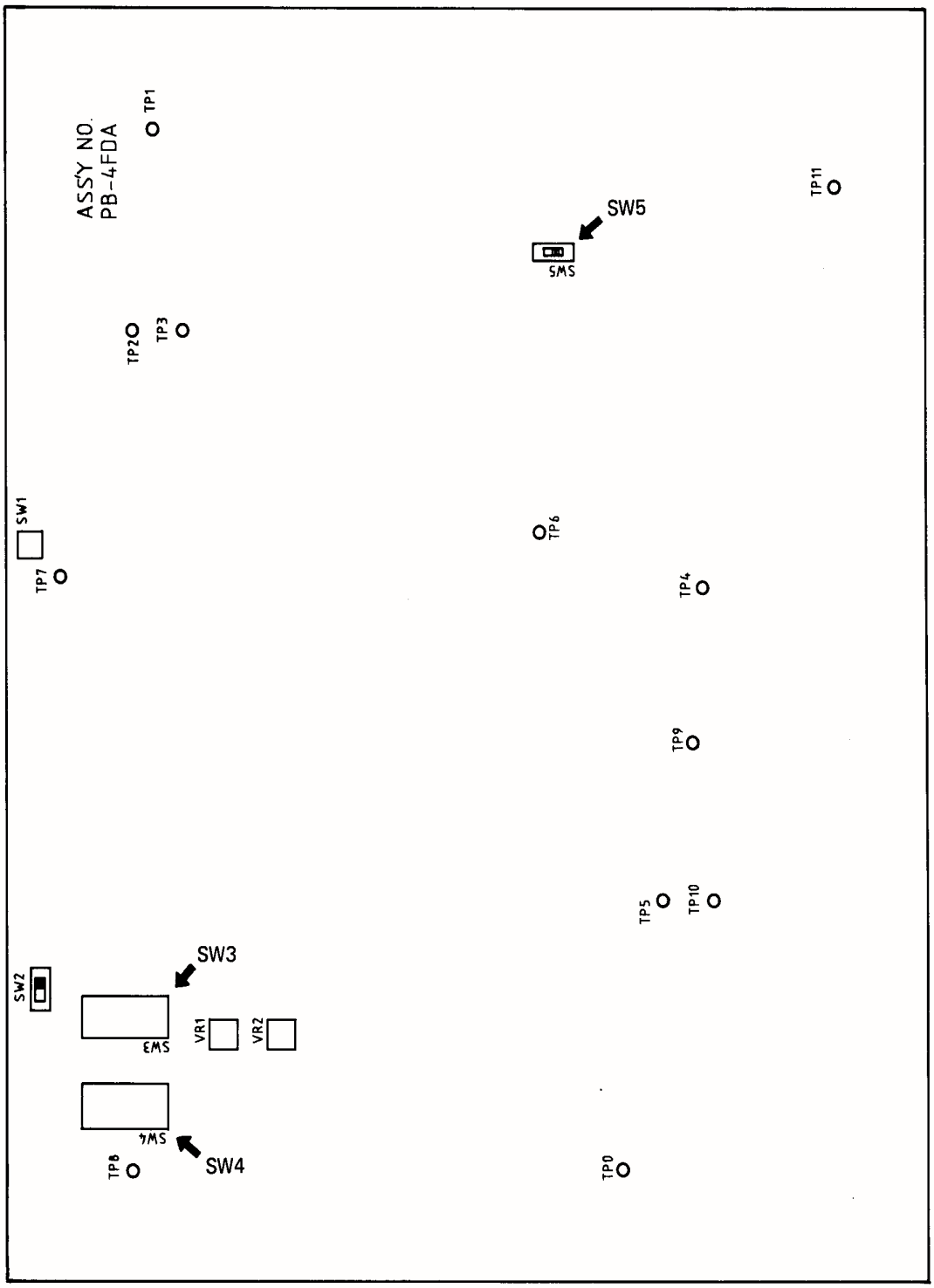

Figure 6-6 Transport Control PCB

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Table 6-1 Switches on the Transport Control PCB

SW No.	Function	Initial position
SW1	CPU Reset	---
SW2	Speed Pair Select	H or L depeding on model
SW3-1	Record Punch-In When in the Off position, pressing the RECORD button, when in Play mode, causes the MX-80 to enter Record. When in the On position, pressing the RECORD and PLAY buttons simultaneously, when in Play mode, causes the MX-80 to enter Record.	Off
SW3-2	Record Punch-Out When in the Off position, pressing the PLAY button, when in Record mode causes the MX-80 to leave Record. When in the On position, holding the RECORD button pressed and pressing the STOP button causes the MX-80 to leave Record.	Off
SW3-3	Lifter Defeat When in the Off position, the tape lifters do not retract when the CUE button is pressed. When in the On position, the tape lifters retract when the CUE button is pressed.	Off

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SW No.	Function	Initial position
SW3-4	Tach Pulse Rate Switch When in the Off position, the Tach Pulse rate at the Parallel I/O connector is 240 pulses per second at 30 ips (SMPTE rate). When in the On position, the Tach Pulse rate at the Parallel I/O connector is 200 pulses per second at 30 ips (EBU rate).	Off
SW3-5	Play-to-Stop Audio Mute When in the Off position, the audio output is briefly muted when the tape is stopped from Play mode. When in the On position, the audio output is not muted when the tape is stopped from Play mode.	Off
SW3-6	Stop-to-Play Audio Mute When in the Off position, the audio output is muted until the tape reaches play speed when entering Play from Stop mode. When in the On position, the audio output is not muted when entering Play from Stop mode.	Off
SW3-7	Auto Memory for Play Start When in the On position, the location at the transport was last placed in Play mode is automatically stored in Cue point 3. When in the Off position, the location is not stored.	Off

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SW No.	Function	Initial position
SW3-8	Add Channel into Record When in the Off position, you can add channels into Record by setting the channel's Ready/Safe switch to the Ready Position, when in Record mode. When in the On position, you must press RECORD (or RECORD and PLAY depending on the position of SW3-1)to add channels into Record.	Off
SW4-1	Parallel I/O Rehearsal Enable When in the Off position, the Rehearsal function cannot be accessed from the Parallel I/O connector. When in the On position, the Rehearsal function can be accessed from the Parallel I/O connector. NOTE: This switch should be in the On position to use the Rehearse function from the CB-120 Auto Locator.	Off
SW4-2	Automatic Memory Back-up When in the Off position, the Cue Locations stored will be lost whenever the Power to the MX-80 is turned Off or disconnected. When in the On position, the Cue Locations stored will remain in memory even when the Power to the MX-80 is turned off or disconnected.	Off

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SW No.	Function	Initial position
SW4-3	Head Shield When in the Off position, the Head Shield plate is manually operated. When in the On position, the Head Shield Plate will "pop up" automatically each time the MX-80 enters Play or Record mode, if it was retracted.	Off
SW4-4 | SW4-8	Not Used	

6.2.5 Power Supply Panel

Open the lower rear Power Supply panel (containing the regulator heat sinks) by removing two phillips head screws on each side of the panel and hinging it down to horizontal.

Check the connectors and wiring leading to the power supply PCB located on the panel. Also check the connectors on the Voltage Select PCB.

Close the lower rear Power Supply panel and secure it with the four screws removed earlier.

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6.2.6 Transport Assemblies

Remove any tape and empty reels from the machine. Open the VU Meter Panel by removing two phillips head screws located in the upper corners of the panel. Open the transport by removing the two socket head screws on the left and right sides under the deck plate, that attach the transport to the chassis. Lift the transport, and carefully check the following items:

(1) Switch PCB Ass'y #1 (PB-7AJB)
This PCB is connected to the Transport Control switches (PLAY, RECORD, F.FWD, REWIND, STOP).

(2) Switch PCB Ass'y #2 (PB-7AKA)
This PCB is connected to the 2nd FUNCTION, CUE, and EDIT/UNLOAD switches.

(3) Tape Timer PCB Assemblies (PB-7HTA, -7HUA)
This PCB is connected to the Tape Timer mechanism, and the SEARCH, SET, REPEAT, CLR, and TIME-IPS-% switches.

(4) Check the connectors on the Tach PCB assemblies #1 (PB-7DRA) and #2 (PB-7DSA).

(5) Check the connectors coming from both Tension Sensor Ass'ys (Left and Right).

(6) Check the connectors coming from the Safety Switch Ass'ys (Left and Right) (PB-4FHA).

(7) Check the connectors coming from each of two Reel drive PCBs (PB-4FCA) and from the Reel Control PCB (PB-4FBA).

(8) Check the connectors coming from the Capstan Control PCB (PB-4FAA).

(9) Check the connectors from the five solenoids; one each from Pinch Roller and Tape Lifters, one for each of the Reel Brakes, and one for the Head Shield Plate mechanism.

If all connections are correct, close the transport, re-install the four screws that hold the transport to the chassis, and close the VU Meter Panel and secure it with the two screws removed earlier.

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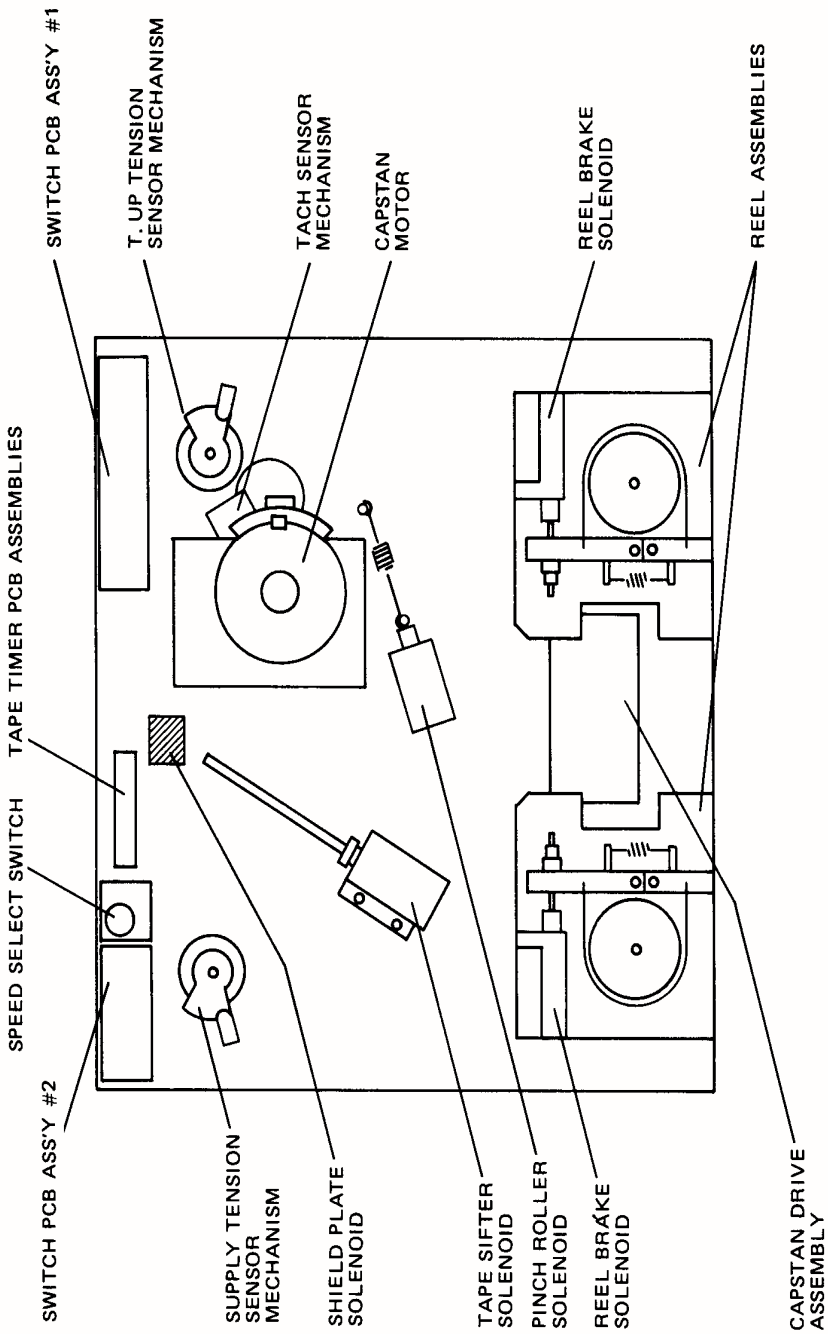

Figure 6-7 Location of Transport Assemblies

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6.2.7 Remote Control Unit

There are several function selection switches and jumpers on the CPU PCA(PB-4FGA) as described on the Table 6-2. Check each switches allocation or reset them as you like.

Table 6-2 Switches and Jumpers on the CPU PCA(PB-4FGA)

SW No.	Function	Initial position
SW1-1	Record Punch-In Same as SW3-1 on Transport Control PCB. Refer to page 6-10.	Off
SW1-2	Record Punch Out Same as SW3-2 on Transport Control PCB. Refer to page 6-10.	Off
SW1-3	SW Mode Selection When in the Off position, Amplifier Monitor mode can be changed directly when you press the button. When in the On position, monitor mode can be only changed by pressing Reset button before pressing the button of the mode you desire.	Off
SW1-4	Auto set-up Selection When in the Off position, channel set-up for the Audio channels is automatically stored when selection keys are controlled. When in the On position, channel set-up is not stored automatically.	On

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SW No.	Function	Initial position
SW1-5	Error Message Display When in the On position, Error Message will be displayed when malfunction has occurted(Refer to Table 6-3). When in the Off position, Error Message is not displayed on malfunction.	On
SW1-5 | SW1-8	Not used.	
J1,3,4	Not used.	
J2,5	Set when ROM 256 used type selection. No jumper for 24CH, jumpered for 32CH.	
J6,7	Always jumpered.	
SW2	CPU all reset.	

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Table 6-3 AMP Remote Control Uniot Error Message

Error code	Message
00	ROM Check SUM Error
01	RAM READ/WRITE Error
04	Back Up Error
90	Initial Commuinication Error
91	Time-out Error in Communication with Transport
92	Undefine Error
93	Check SUM Error on Receiving Command
94	No Acknowledge Signal was received
95	Parity Error
96	Double Data Error
97	Framing Error
98	Buffer Error
99	STX Signal is not found

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6.3 HOOKING UP THE MX-80

6.3.1 Hooking up the AC Power

The AC power is supplied to the MX-80 via a three-conductor IEC standard connector. Insure that voltage and frequency supplied to the MX-80 agree with the machine's power requirements printed on the serial number label on the rear panel of the machine, before applying power. Use the power cord supplied with the machine. Figure 6-8 describes the wiring of the AC input connector.

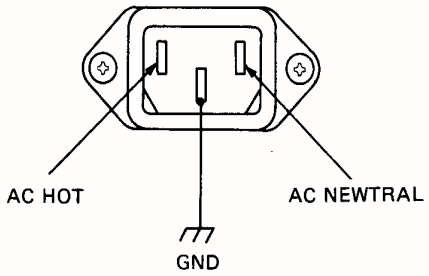

Figure 6-8 AC Power Connector

6.3.2 Hooking up the Audio Inputs and Outputs

Connect the buss or track outputs from the mixing console to the Inputs of the MX-80. Connect the Outputs from the MX-80 to the monitor or tape inputs of the mixing console.

The Input to each channel of the MX-80 is transformerless balanced and has an input impedance of 10k ohm. Pin 1 of the connector is connected to the shield or drain, Pin 2 is connected to the "Cold" side of the signal, and Pin 3 is connected to the "Hot" side of the signal. If unbalanced Input wiring is desired, connect only to Pin 1 (shield) and Pin 3 (hot). Do not connect Pin 2 to either Pin 1 or Pin 3. See Figure 6-9 and 6-10 for details of input connector wiring.

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The Output from each channel is transformerless, balanced or unbalanced, and has an output impedance of less than 5 ohm. Pin 1 of the connector is connected to the shield or drain, Pin 2 is connected to the signal "cold" or "low" conductor, and Pin 3 is connected to the signal "hot" or "high" conductor. When the Unbalanced operation is required, set the BAL/UNBAL switch (SW1) on the Audio Amplifier PCB to the UNBAL position. The OUTPUT connector for Unbalanced operation is wired with Pin 1 connected to the shield, and Pin 3 connected to the signal "hot" or high side (center conductor). Do not connect Pin 2 to either Pin 1 or Pin 3. The level of the Output signal will be approximately 6 dB lower than normal if the BAL/UNBAL switch is incorrectly set to BAL.

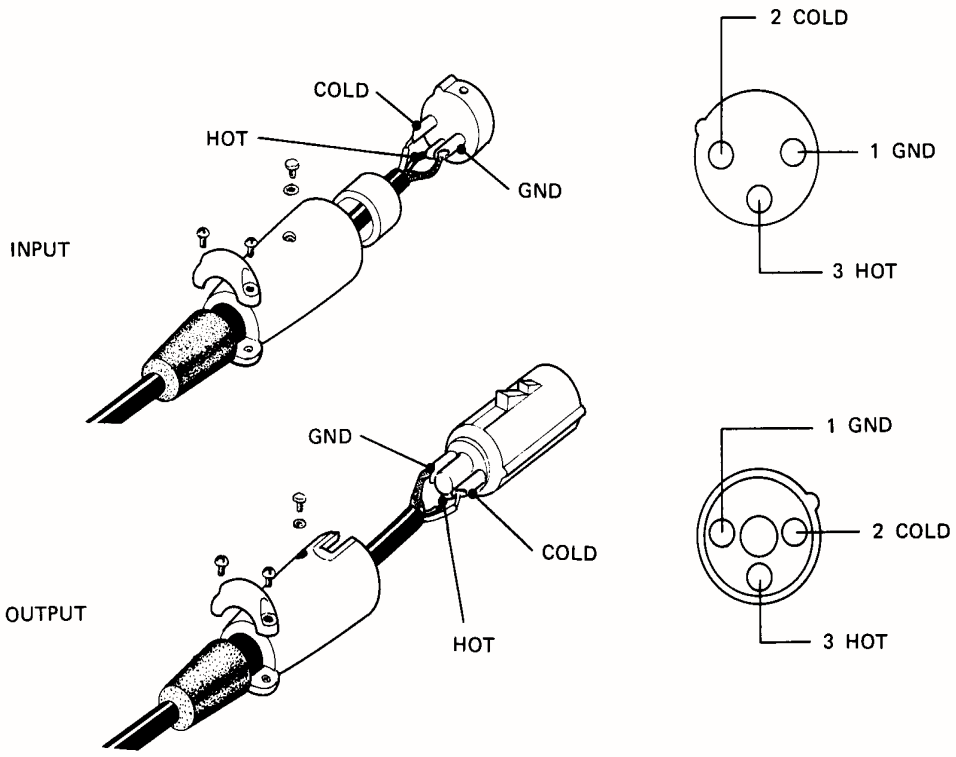

Figure 6-9 Balanced Input and Output Connector Wiring

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NOTE: To avoid ground loop induced hum, it is a good practice to follow a single point grounding plan, in which the cable shields are connected only at one end (usually at the console) and a single ground or drain wire connectors the tape machine to the mixing console.

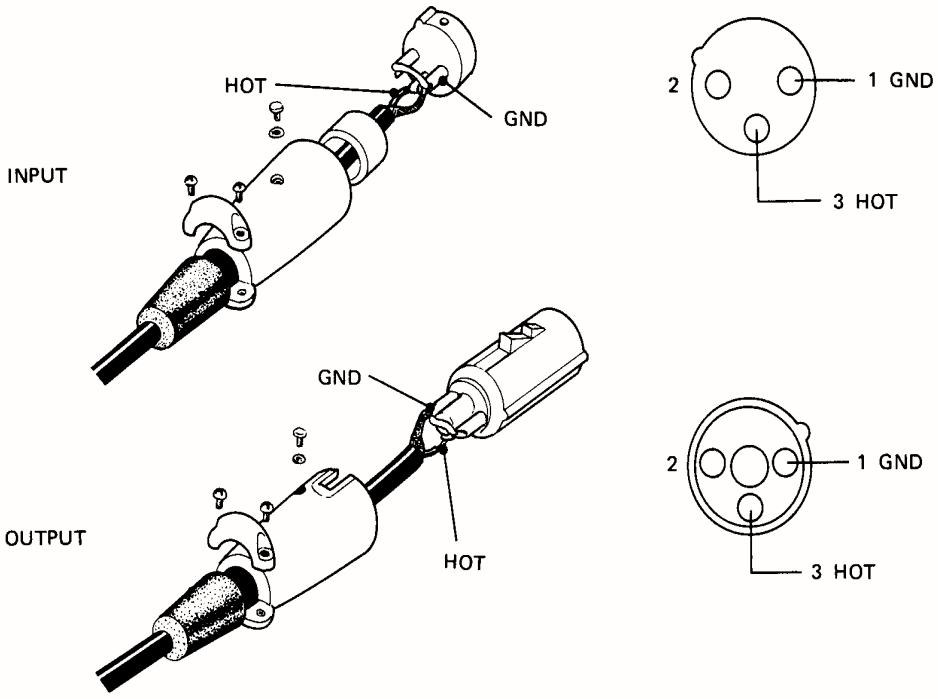

Figure 6-10 Unbalanced Input and Output Connector Wiring

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6.3.3 Hooking up the Remote Control Unit (CB-123/-124)

Connect the MX-80 and the Remote Control Unit together by the cable supplied with the machine.

NOTE: Make sure the Power to the machine is turned off before connecting the Remote Control Unit to the MX-80.

Table 6-4 describes the pin assignments for the REMOTE CONTROL connector.

Table 6-4 Remote Control Connector Pin Assignments

Pin No.	Description	Pin No.	Description
1	FRAME GND	16	POWER
2 - 7	N.C.	17	POWER
8	GND	18	N.C.
9	GND	19	TACH PULSE
10	TRANSMIT COMMON	20	N.C.
11	TRANSMIT A	21	FWD/REV
12	RECEIVE B	22	N.C.
13	RECEIVE COMMON	23	N.C.
14	FRAME GND	24	TRANSMIT B
15	N.C.	25	RECEIVE A

6.3.4 Using the Parallel I/O Connector

This 37-pin D-sub type connector is used to interface the optional CB-119 Locator, CB-120 series Locator or another synchronizer/controller to MX-80. The connector contains "tally" signals, indicating machine status, in addition to transport control, tachometer pulses, and capstan speed reference signals. Refer to Table 6-5 for a complete description of the signals and controls available at this connector.

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Table 6-5 Parallel I/O Connector Pin Assignments

Pin No.	Name	Level	IN/OUT	Functions
1	REC SW	Low	←	RECORD SWITCH
2	PLAY SW	Low	←	PLAY SWITCH
3	STOP SW	Low	←	STOP SWITCH
4	FF SW	Low	←	F.FWD SWITCH
5	REW SW	Low	←	REWIND SWITCH
6	LIFTER	Low	←	LIFTER DEFEAT COMMAND
7	2nd FUNC SW	Low	←	2nd FUNC SWITCH
8				
9	SHUT OFF	Low	→	SHUT OFF SWITCH
10	REC TALLY	Low	→	RECORD TALLY
11	PLAY TALLY	Low	→	PLAY TALLY
12	STOP TALLY	Low	→	STOP TALLY
13	FF TALLY	Low	→	F.FWD TALLY
14	REW TALLY	Low	→	REWIND TALLY
15	2nd FUNC TALLY	Low	→	2nd FUNC TALLY
16	SIG-GND	-	-	SIGNAL GROUND
17	TACH	-	→	TACH PULSE (Note 1)
18	REV/FWD	H/L	→	TAPE DIRECTION FWD = LOW
19	9.6K (FIX)	-	→	CAPSTAN CLOCK
20	CAPSTAN CLOCK	-	←	9,600 Hz (Nom) In
21	SPD-A	H/L	→	TAPE SPEED A (Note 2)

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Pin No.	Name	Level	IN/OUT	Functions
22	SPD-B	H/L	→	TAPE SPEED B (Note 2)
23	PITCH ENABLE	Low	←	EXTERNAL PITCH CONTROL ENABLE
24	PITCH TALLY	Low	→	EXTERNAL PITCH CONTROL TALLY
25	AMP REC READY TALLY	Low	→	AMP REC READY TALLY
26				
27				
28				
29				
30				
31				
32	REHEARSAL	Low	←	RECORD REHEARSAL COMMAND
33	+5V	±10%		REGULATED (MAX 150 mA)
34	+24V			UNREGULATED (MAX 500 mA)
35	+24V			"
36	POWER GND			POWER GROUND
37	POWER GND			"

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NOTE:

1. Output Tach Pulse Rate

Tape Speed (ips)	SMPTE (pulse/sec)	EBU (pulse/sec)
3.75	30	25
7.5	60	50
15	120	100
30	240	200

2. Tape speed is defined as follows.

SPD-A	SPD-B	Tape Speed (ips)
L	L	3.75
L	H	7.5
H	L	15
H	H	30

3. Type of Connector

   D-sub 37-pin Female (OTARI Parts No.: CN237367)

4. Output Signal

   Output Type : Open Collector

   V_{OL} : 0 - 0.5 V

   I_{OL} : 20 mA (MAX)

   V_{IL} : TTL Level

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Leak Current : 20 uA (MAX)

Pull Up : 10k ohm (Terminated to +5 V)

V_{OH} (High Level): +30 V (MAX)

5. Input Signal

   Fan-in : 1/5

   V_{IL} : 0 - 0.5 V (-2.4 mA)

   V_{IH} : 2.5 - 5.25 V (60 uA)

6. Cable Length : 10 m (32 ft)

7. Input Command Pulse Width: 10 mS (MIN)

8. Duty Cycle of Tach Pulse : 20 - 80%

6.3.5 Noise Reduction System Control

The NOISE REDUCTION connectors provide Input/Repro switching signals to control the Encode/Decode modes of a remote noise reduction unit such as Dolby "A" or dbx 216. Simultaneous Encode/Decode systems such as dbx 180 or dbx 208 do not require connection to the MX-80 switching. Refer to Table 6-6 for pin assignments for these connectors. The MX-80 provides a "dry-contact" closure for each channel. This contact is closed when that channel is in Record or Input mode, and is open when the channel is in Sel-Rep, or Repro modes. Some noise reduction units may require logic level signals to function properly. In this case you must provide any logic voltage supply and any external connections required.

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Table 6-6 Noise Reduction Control Connector Pin Assignments

Channel	Pins	Channel	Pins
1	1-2	17	1-2
2	3-4	18	3-4
3	5-6	19	5-6
4	7-8	20	7-8
5	9-10	21	9-10
6	11-12	22	11-12
7	13-14	23	13-14
8	15-16	24	15-16
9	19-20	25	19-20
10	21-22	26	21-22
11	23-24	27	23-24
12	25-26	28	25-26
13	27-28	29	27-28
14	29-30	30	29-30
15	31-32	31	31-32
16	33-34	32	33-34

Contacts are closed when channel is Input or Record mode; contacts are open in Repro and Sel-Rep modes.

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6.3.6 Serial I/O (Optional)

A pair of optional interface PCBs are available that allow control of the MX-80 transport functions through a serial interface meeting RS-232C or RS-422 (SMPTE/EBU) interface standards. The baud rates of the serial data is selectable by switches on the PCB. The baud rates available for the RS-232C interface are 110, 1200, 2400, and 4800. The baud rates available for the RS-422 (SMPTE/EBU) interface are 9600, 19,200, and 38,400. Contact OTARI for a list of the ASCII codes used for function control.

Table 6-7 Serial I/O Connector Pin Assignments

RS-232C SERIAL PORT

No.	Name	IN/OUT	Function
1	FRAME GND	-	FRAME GROUND
2	TXD	←	TRANSMIT DATA
3	RXD	→	RECEIVE DATA
4	RTS	←	REQUEST TO SEND
5	CTS	→	CLEAR TO SEND
6	DSR	→	DATA SET READY
7	SGND	-	SIGNAL GROUND
8			
9			
10			
11			
12			
13			
14			
15			
16			

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No.	Name	IN/OUT	Function
17			
18			
19	TACH	→	TACH PULSE
20	DTR	←	DATA TERMINAL READY
21			
22			
23			
24			
25			

NOTE 1. I/O specification conform to EIA-RS232C

NOTE 2. Baud Rate: 2.4k - 19.2k (110 - 1200 Baud is option)

NOTE 3. Type of Connector: D-sub 25 Female (System side)

SMPTE/EBU BUS (RS-422) SERIAL PORT

NO.	NAME	IN/OUT	FUNCTION
1	FRAME GND	-	FRAME GROUND
2	TXD A	→	TRANSMIT A
3	TXD B	←	RECEIVE B
4	R. COM	-	RECEIVE COMMON
5	TACH	→	TACH PULSE
6	T. COM	-	TRANSMIT COMMON
7	TXD B	→	TRANSMIT B

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NO.	NAME	IN/OUT	FUNCTION
8	RXD A	←	RECEIVE A
9	FRAME GND	-	FRAME GROUND

NOTE 1. I/O specification conform to SMPTE/EBU BUS (RS-422A)

NOTE 2. Baud Rate: 2.4k - 38.4k Baud

NOTE 3. Type of Connector: D-sub 9 Female (System side)

6.4 LEVEL MATCHING

It is important that the input and output level of the mixing console match those of the tape recorder, to insure the best balance of headroom and signal-to-noise ratio. The input and output levels of the MX-80 are switch selectable to match systems using either +4 dBm or -10 dBV signal levels.

NOTE: The MX-80 reference level and VU meter calibration must be adjusted properly in accordance with the instructions in Section 4 before proceeding with level matching.

Thread the machine with a reel of the tape normally used for sessions.

(1) Determine the nominal input and output levels of your mixing console. This can usually be found in the specifications section of the mixing console instruction manual.

(2) Set the Input and Output Level switches (SW5 and SW4 respectively) on the Audio Control PCB to match the mixing console input and output levels.

(3) Using the mixing console's test oscillator, or an external test oscillator connected to one of the mixing console's inputs, adjust the mixing console controls so that the console's output VU meter reads 0 VU.

(4) Extend the MX-80's CH1 Audio Amplifier PCB.

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(5) Patch or route the test signal to the MX-80's CH1 INPUT connector.

(6) Press the ALL INPUT button on the Remote Control Unit, and adjust the Input trimmer (VR14) on the CH1 Audio Amplifier PCB until the CH1 VU meter indicates 0 VU.

(7) Connect the oscillator to the TEST SIGNAL input on the Audio Control PCB, press the ALL INPUT button on the Remote Control Unit, and adjust the Test Signal trimmer (VR13) on the Audio Amplifier PCB until the CH1 VU meter reads 0 VU.

(8) Repeat Steps 4 through 7 for all remaining channels.

(9) Press the PLAY and RECORD buttons to place the transport in Record mode.

(10) Record several minutes of signal.

(11) Rewind the tape, and press the ALL REPRO button.

(12) Press the PLAY button.

(13) Put the mixing console into "mix-down" mode or connect the CH1 OUTPUT connector to a mixing console line input.

(14) Adjust the mixing console input trim control so that the channel fader will reach the desired position when the mixing console VU meter indicates 0 VU.

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SECTION 7: SPECIFICATIONS

7.1 TAPE TRANSPORT

TRACK CONFIGURATION :	MX-80-32-H, -32-L 2" (50.8 mm) wide tape 32 channel MX-80-24/32-H, -24/32-L MX-80-24-H, -24-L 2" (50.8 mm) wide tape 24 channel MX-80-16-H, -16-L 2" (50.8 mm) wide tape 16 channel
TAPE SPEEDS :	Switchable for speed version change. High speed version: 30 ips (76.2 cm/s) 15 ips (38.1 cm/s) Low speed version: 15 ips (38.1 cm/s) 7.5ips (19.05 cm/s)
FAST WIND TIME :	80 sec for 2,500 ft
REEL SIZE :	10-1/2" diameter (26.8 cm)
HEADS :	Plug-in head blocks with full access to independent head azimuth adjustment.
MOTORS :	Capstan Motor: Servo controlled Quartz PLL Direct drive DC motor Reel Motor: CPU controlled Tension servo DC motor
LIBRARY WIND SPEED :	120 ips
FAST WIND SPEED :	450 ips
PITCH CONTROL :	± 50% continuously variable control.

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EXTERNAL SPEED CONTROL RANGE :	30 ips = + 50 - -50% 15 ips = +100 - -50% 7.5ips = +100 - -50%
START TIME :	Play 30 ips ... Less than 0.8 sec. 15 ips ... Less than 0.6 sec. 7.5ips ... Less than 0.5 sec. Fast Wind Less than 8 sec.
STOP TIME :	Play 30 ips ... Less than 0.7 sec. 15 ips ... Less than 0.6 sec. 7.5ips ... Less than 0.5 sec. Fast Wind Less than 5 sec.
TAPE SPEED ACCURACY :	± 0.1 %
TAPE SPEED DEVIATION :	Within 0.07 %
WOW & FLUTTER :	CCIR (DIN) WTD. 2σ 30 ips ... Less than ± 0.04 % 15 ips ... Less than ± 0.06 % 7.5ips ... Less than ± 0.08 %
SWITCHES :	F.FWD, REWIND, STOP, PLAY, RECORD, 2nd FUNC, CUE, EDIT/UNLOAD, SPEED SELECT, SEARCH ZERO, SEARCH 1 - 3, SET, CLR, REPEAT, TIME-IPS-%
TAPE TIME COUNTER :	Five digit LED readout from tachometer/logic measurement circuit; indicates tape time in hours, minutes, and seconds.

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7.2 ELECTRONICS

NOTE: All specifications are measured with AMPEX 456.

LINE INPUT :	Active balanced (transformerless), 10k ohm impedance, Input level +4/-8 dBm switchable, maximum +30 dBm
LINE OUTPUT :	Active balanced, BAL/UNBAL switchable, Less than 5 ohm source impedance, +4 dBm output for 0 VU, maximum +28 dBm
LINE OUTPUT (THROUGH FRONT PANEL JACK) :	BAL/UNBAL switchable 1k ohm source impedance
EQUALIZATION :	30 ips ... AES 15 ips ... IEC or NAB switchable 7.5ips ... IEC or NAB switchable
BIAS FREQUENCY :	192 kHz
ERASE FREQUENCY :	192 kHz
CALIBRATION LEVELS :	Switchable, 320 nWb/m or 250 nWb/m
PEAK INDICATOR LEVEL :	1040 nWb/m adjustable
FREQUENCY RESPONSE :	Overall (24ch) 30 ips 50 - 22kHz ±2dB 15 ips 30 - 20kHz ±2dB 7.5ips 20 - 18kHz ±2dB Overall (32ch) 30 ips 60 - 22kHz ±2dB 15 ips 35 - 20kHz ±2dB 7.5ips 25 - 18kHz ±2dB Rec/Sel-Rep (24/32ch) 30 ips 60 - 22kHz ±2dB 15 ips 35 - 20kHz ±2dB 7.5ips 25 - 18kHz ±2dB
DISTORTION :	Less than 0.3% at 1 kHz 320 nWb/m
CROSSTALK :	More than 52 dB at 1 kHz (32ch) More than 55 dB at 1 kHz (24ch)

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DEPTH OF ERASURE : More than 75dB

SIGNAL-TO-NOISE RATIO : Unweighted with audio filter (30 Hz - 18 kHz) at 320 nWb/m

	32ch IEC	32ch AES	24ch IEC	24ch AES
30 ips	---	56 dB	---	57 dB
15 ips	56 dB	54 dB	57 dB	55 dB
7.5ips	54 dB	56 dB	55 dB	57 dB

7.3 PHYSICAL

POWER REQUIREMENTS : 100, 117, 200 or 240 volts
Single phase AC, 50 or 60 Hz
550 VA (24ch)
700 VA (32ch)

OPERATING ENVIRONMENT : 40° to 104°F (5° to 40°C), 20 - 80% RH

STORAGE ENVIRONMENT : -5° to 113°F (-20° to 45°C), 20 - 80% RH

MOUNTING : All models are in floor console.

WEIGHT : 135 kg (32ch)
3 kg (Remote)

DIMENSIONS (W x D x H): 640 x 658 x 1080

7.4 ACCESSORIES

STANDARD : Remote Control Unit with cable ass'y (CB-123 or CB-124), Operating Manual, Fuses, Power Cable, Lamps

OPTIONAL : PB-7JEA

OTARI reserves the right to change the specifications without notice or obligation.

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SECTION 8: PARTS LISTS AND P.C.B. ASSEMBLIES

8.1 GENERAL

The following P.C.B. pattern layout drawings and parts lists are provided for service reference. Parts list includes only main parts or the parts difficult to obtain in the field. Also the lists include the parts which should be replaced with the exact same parts supplied by OTARI to maintain the performance. Many diodes, transistors, and ICs are well described in the schematics attached to the machine, so to find out the correct parts number of those parts you need, refer to the schematics.

NOTE: In the parts lists, descriptions for capacitors have following meanings.

F-capacitor	Maylar film type capacitor
B-capacitor	Bypolar chemical capacitor
P-capacitor	Polypropylen film capacitor
M-capacitor	Mica capacitor
L-capacitor	Low leakage current chemical capacitor
T-capacitor	Tantalum electrolytic capacitor

NOTE: Ref. No. for the parts which are many used on a PCA such as capacitor diode, transistor and IC are only few given in the lists instead of being described all.

8.2 PARTS LISTS

You will find drawings for the following P.C.B.s in this section.

MX-80 P.C.B. ASSEMBLIES

Ref. No.	Description	Parts No.
1	Capstan Control P.C.B. Assembly	PB-4FAA
2	Reel Control P.C.B. Assembly	PB-4FBA
3	Reel Drive P.C.B. Assembly	PB-4FCA
4	Transport Control P.C.B. Assembly	PB-4FDA
5	Serial Remote Control P.C.B. Assembly	PB-4FEA
6	Audio Control P.C.B. Assembly	PB-4FFA
7	Audio Amplifier P.C.B. Assembly	PB-19JA
8	Power Supply P.C.B. Assembly	PB-62ZA
9	Display P.C.B. Assembly (24CH)	PB-7JAB
10	CPU P.C.B. Assembly	PB-4FGA

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[1]: PB-4FAA CAPSTAN CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC10,15-17	IC	I-0067	
D1	LED	PNSLP520	Red/Blue
D3,5,7	Diode	PN-0230	
D4,6	Diode	PN-0038	12V
D9	Diode	PNVD1222	
D10	Diode	PN-0026	8.2V
Q6-14	Transistor	Q-0008	
L1,2	Inductor	IN19073	470uH
VR1-6	Potentiometer	RV414312	10k
VR7	Potentiometer	RV453206	5k
R80	Resistor	R8CJ621M	620 ohm 2W
R92	Resistor	R8CJ101M	100 ohm 2W
C3	B-Capacitor	C11R067M	50V/1
C4,19	B-Capacitor	C110062M	25V/10u
C6	F-Capacitor	CFF3471	50V/470pF
C9	F-Capacitor	CFF3563	50V/0.056uF
C10	F-Capacitor	CFF3103	50V/0.1uF
C12	B-Capacitor	C133053M	10V/33u
C22	F-Capacitor	CFF3333	50V/0.33uF
RL1	Relay	RY1DC081	24V
RL2	Relay	RY1DC051	DC24V
CP1	Check Pin	CN901149	Red
CP5,6	Check Pin	CN901157	Black
CN1	Connector	CN408356	8P
CN2	Connector	CN402350	2P
CN3	Connector	CN411379	11P
CN4	Connector	CN410358	10P
CN5	Connector	CN409357	9P
CN6	Connector	CN402306	

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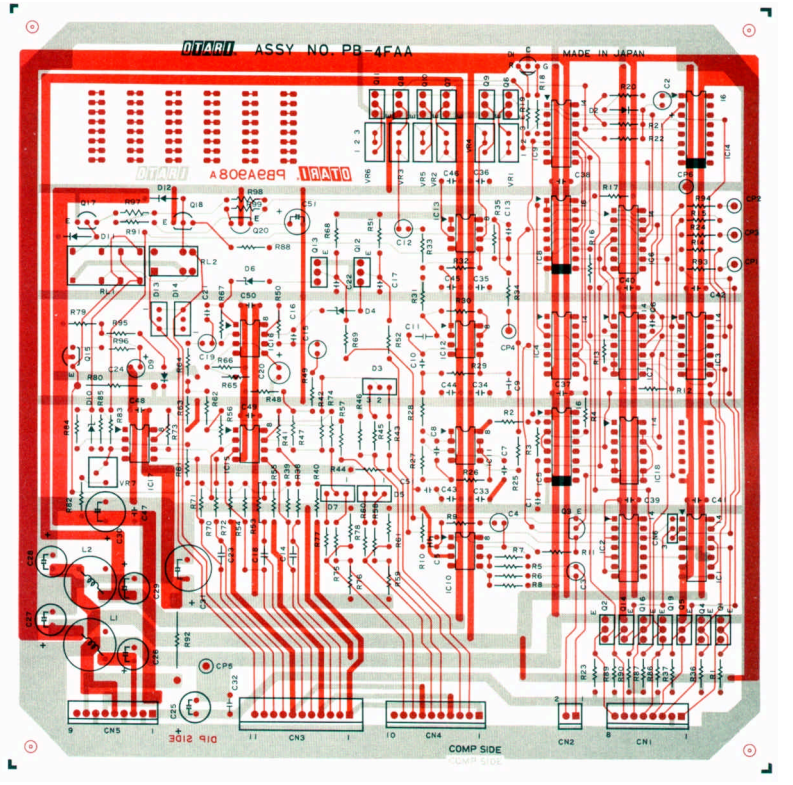

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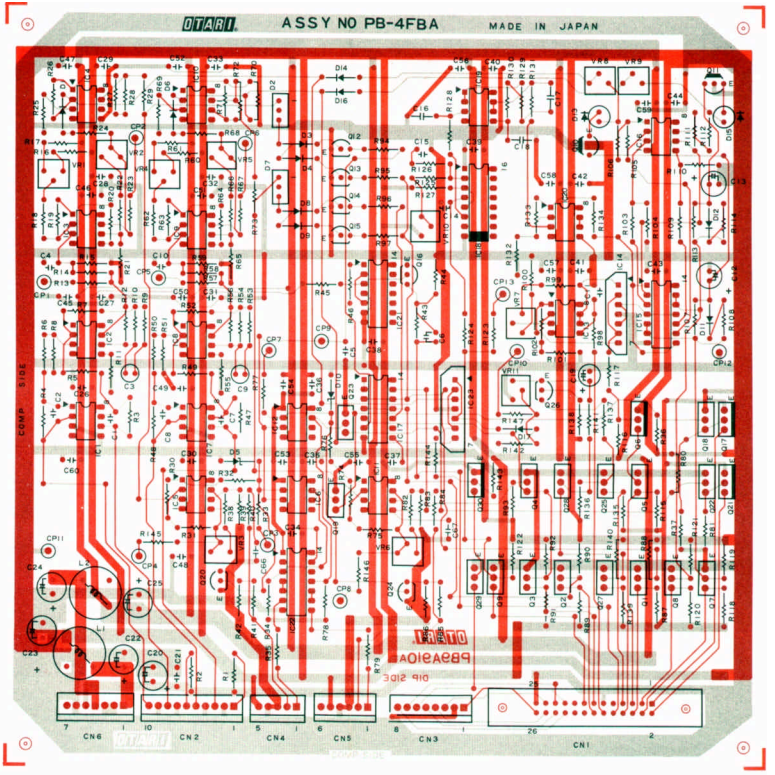
[2] : PB-4FAB REELCONTROL P.C.B. ASSEMBLY



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[2]: PB-4FBA REEL CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC14,23	IC	I-0053	
D1,3,5	LED	PNTLR124	Red
D2,7	Diode	PN-0230	
D5,18	Diode	PN-0035	
Q1-5	Transistor	Q-0008	
Q6,17	Transistor	Q-0004	
L1,2	Inductor	IN19073	470uH
VR1,2	Potentiometer	RV414207	10k
VR3,6	Potentiometer	RV453206	5k
VR8,9	Potentiometer	RV454210	50k
VR11	Potentiometer	RV415257	100k
C1	F-Capacitor	CFF3102	50V/0.001uF
C3,9	B-Capacitor	C110052M	16V/10uF
C4	F-Capacitor	CFF3103	50V/0.01uF
C5	P-Capacitor	CGI3151	100V/150pF
C15	F-Capacitor	CFF3472	50V/0.0047uF
CP1	Check Pin	CN901149	Red
CP11,12	Check Pin	CN901157	Black
CN1	Connector	CN326220	26P
CN2	Connector	CN410358	10P
CN3	Connector	CN408356	8P
CN4	Connector	CN405353	5P
CN5	Connector	CN406254	6P
CN6	Connector	CN407355	7P

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[3]: PB-4FCA REEL DRIVE P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
D3,4	Diode, Zener	PN1Z18	
D5	Diode	PNMA650	
Q3,4	Insulator	PZ4B068	
Q7	Insulator	PZ4B055	
L1,2	Ferite Core	PZ4Z003	
L3,4	Inductor	IN19080	140uH
R12,13	Resistor	R4DKR22M	0.22 ohm 7W
C2	F-Capacitor	CFF3102	50V/0.001uF
CN1	Connector	CN405353	5P
CN2	Connector, Header	CN402081	2P
CN3	Connector, S Header	CN404083	4P
	Heat Sink	CB73802	

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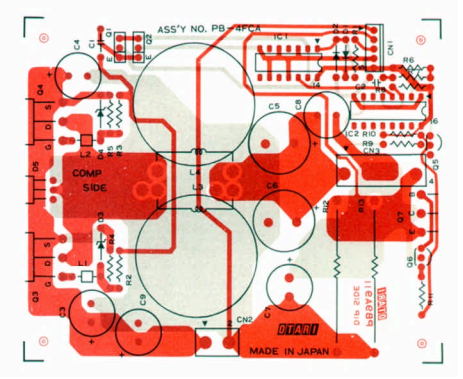

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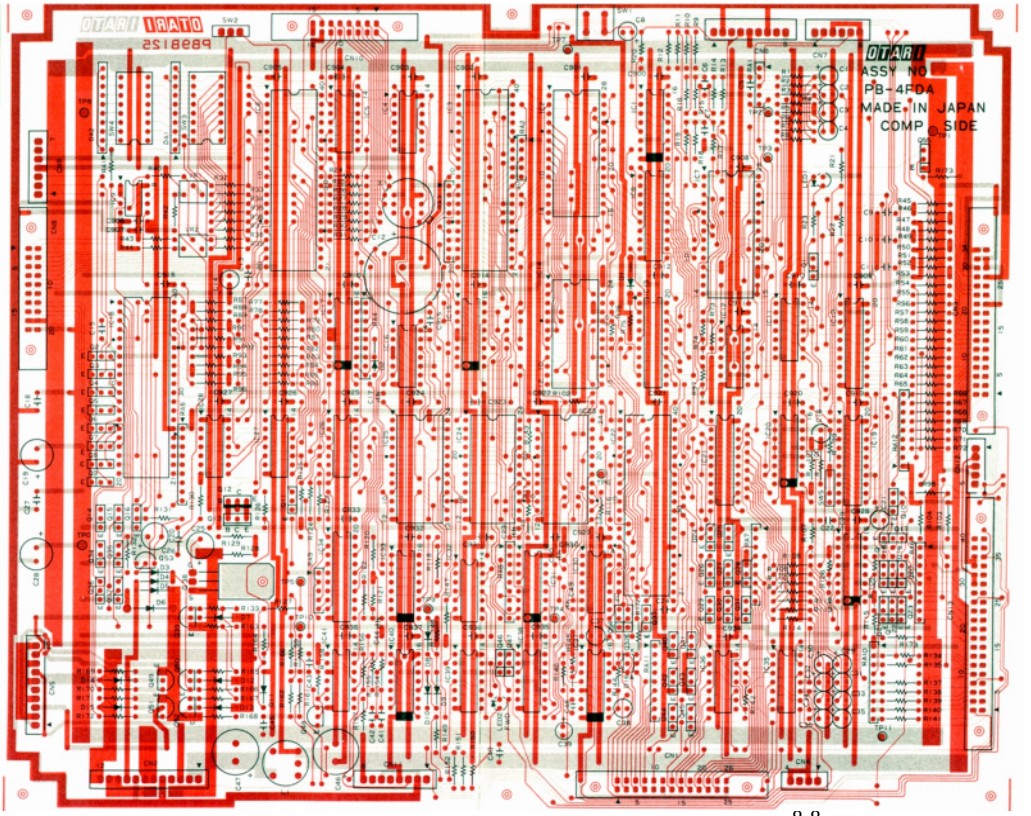
[4] : PB-4FDA TRANSPORT CONTROL P.C.B. ASSEMBLY



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[4]: PB-4FDA TRANSPORT CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC7	IC	I-0112	
IC9	IC	I-0002	
IC14	IC	I-0075	
DA1,2	Diode Array	PNNAL8CS	
Q1,10	Transistor	Q-0008	
Q2,9	Transistor	Q-0011	
L1	Inductor	IN19069	470uH
VR1	Potentiometer	RV424208	20k
VR2	Potentiometer	RV414207	10k
RA2	Resistor Array	R94-079	10k x4
RA3	Resistor Array	R94-132	4.7k x8
RA4	Resistor Array	R94-136	10k x8
C12	Capacitor	C1105184	5V/1F
C42	F-Capacitor	CFF3103	50V/0.01uF
C900	F-Capacitor	CFF3223	50V/0.022uF
TP5	Check Pin	CN901150	Orange
TP11	Check Pin	CN901157	Black
CN1	Connector	CN326220	26P
CN2	Connector	CN412380	12P
CN3	Connector	CN334222	34P
CN4	Connector	CN404352	4P
CN5	Connector	CN410358	10P
CN7	Connector	CN406354	6P
CN8	Connector	CN320219	20P
CN9	Connector	CN407355	7P
CN10	Connector	CN316218	16P
CN11	Connector	CN408356	8P
CN12	Connector	CN405353	5P
CN13	Connector	CN340223	40P
CN16	Connector	CN409357	9P
LED1	LED	PNTLG124	Green
LED2	LED	PNLN2G	
SW1	Switch	WH0B104R	Red
SW1	Switch	WH11181	Reset
SW2	Switch	WH31031	H/L
SW3,4	Switch	WH98012	Dip
SW5	Switch	WH91023	
X1	Crystal	PZ4C021	6.144MHz

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[5]: PB-4FEA SERIAL REMOTE CONTROL AMPLIFIER P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC19	IC	I-0021	
Q1,15-	Transistor	Q-0008	
Q16,19	Transistor	Q-0004	
L1	Inductor	IN19069	470uH
RA1	Resistor Array	R94-136	10k x8
RA7	Resistor Array	R94-079	10k x4
C37	F-Capacitor	CFF3103	50V/0.01uF
CP0,1	Connector	CN901157	Black
CP2	Connector	CN901150	Orange
	Connector	CN402328	2P for LED
CN1	Connector	CN3A0305	
CN2	Connector	CN412409	12P
CN	Connector	CN402306	2P
CN	Connector	CN403310	3P
CN26	Connector	CN628152	28P
CN27	Connector	CN640153	40P
LED1,10,19	LED	PNTLR124	Red
LED2,7,9	LED	PNLN2G	
LED8	LED	PNTLG124	Green
LED1-10	LED	PNTLO124	Orange
SW1	Switch	WH0B104R	Red
SW1	Switch	WH11181	
SW2,8	Switch	WH91023	
SW3	Switch	WH11253	
SW4	Switch, Slide	WH31032	
SW5	Switch	WH360441	
SW6,7	Switch	WH360431	
SW9,10	Switch	WH98012	
SW11,12	Switch, Dip	WH91058	
X1	Crystal	PZ4C033	
X2	Crystal	PZ4C017	
	Card Puller	PZ4E068	
	Dress Panel	PB4FE01	
	Shield Plate	ZA-93F	

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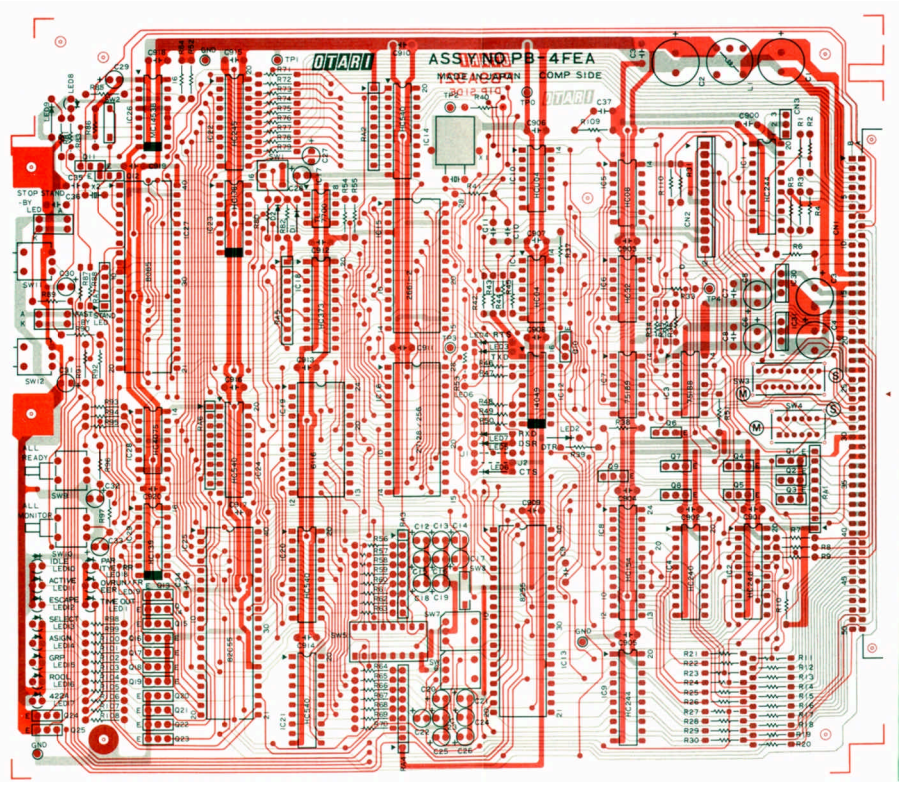

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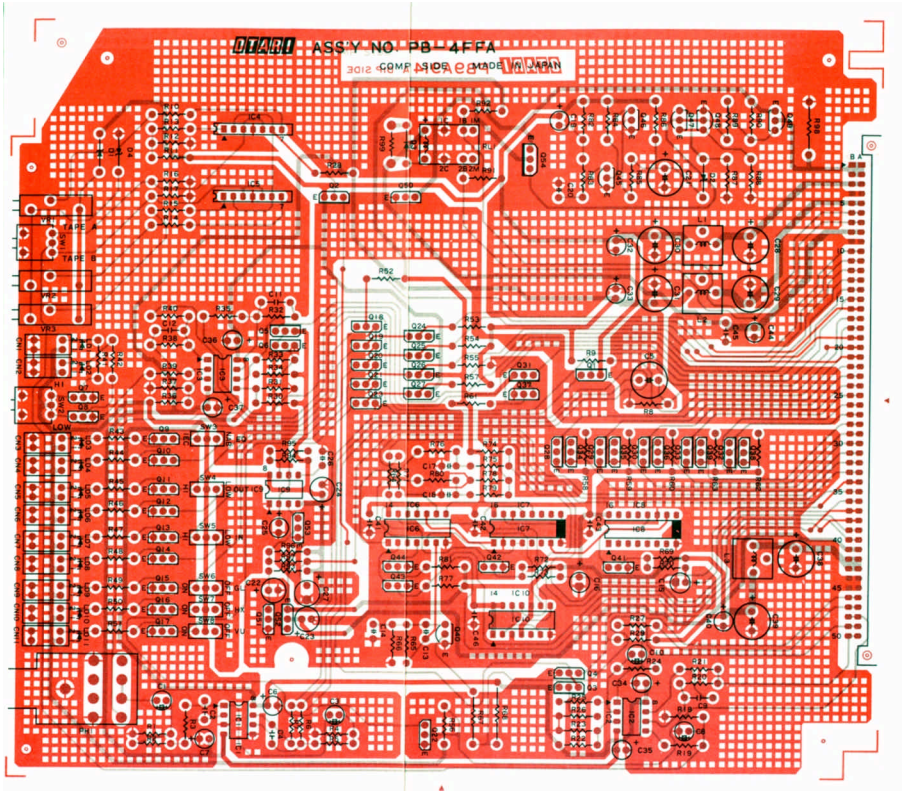
[6] : PB-4FFA AUDIO CONTROL P.C.B. ASSEMBLY



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[6]: PB-4FFA AUDIO CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC1-3	IC	I-0067	
IC4,5	IC	I-0053	
D1	Diode	PN-0011	
Q1-3	Transistor	Q-0004	
Q6-23	Transistor	Q-0008	
L1-3	Inductor	IN19078	470uH
VR1-3	Potentiometer	RV454174	50k
C1	B-Capacitor	C14R761M	25V/4.7
C5	B-Capacitor	C110165M	25V/100
C13	F-Capacitor	CFF3222	50V/0.0022uF
C14	F-Capacitor	CFF3822	50V/0.0082uF
RL1	Relay	RY2DC089	
SW1,2	Switch, Slide	WH31032	
SW3-8	Switch	WH31022	
LD1-17	LED	PNTL0124	Orange
CN1-10	Connector	CN402328	
PH1	Connector	CN601174	
	Dress Panel	PB4FF01	
	Card Puller	PZ4E068	

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[7]: PB-19JA AUDIO AMPLIFIER P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC1-6	IC	I-0067	
IC7	IC	I-0125	Line Out Amp.
IC8	IC	ITC9164N	
IC9	IC	I-0133	
IC11	IC	I-0053	Analog Switch
IC21,29	IC	I-0051	Analog Switch
IC22	IC	ITC9163N	
IC24	IC	I-0126	
IC33	IC	I-0056	Mode Controller
D6-	Diode	PN-0011	
D14	Diode	PN-0044	
Q3	Transistor	Q-0008	
Q6	Transistor	Q-0004	
L1,4	Inductor	IN19085	1.8MH
L2,3	Inductor	IN19112	
L5	Inductor	IN19123	1MH
VR1,2	Potentiometer	RV454285	50k
VR3-5	Potentiometer	RV424284	20k
VR11-14	Potentiometer	RV424297	20k
VR21	Potentiometer	RV454174	50k
VR22,23	Potentiometer	RV413293	1k
R1	Resistor Array	R94-091	100k x4
R2	Resistor Array	R94-095	220k x4
R4	Resistor Array	R94-144	47k x8
R29	Resistor	R7HF1742	17.4k 1/4W 1%
R30	Resistor	R7HF3743	374k 1/4W 1%
R31	Resistor	R7HF2671	2.67k 1/4W 1%
R32	Resistor	R7HF6981	6.98k 1/4W 1%
R33	Resistor	R7HF1182	11.8k 1/4W 1%
R85	Resistor	R7HF752M	7.5k 1/4W 1%
R86	Resistor	R7HF912M	9.1k 1/4W 1%
R87	Resistor	R7HF203M	20k 1/4W 1%
R93	Resistor	R7HF182M	1.8k 1/4W 1%
R94	Resistor	R7HF7680	768 ohm 1/4W 1%
R97	Resistor	R7HF392M	3.9k 1/4W 1%
R98	Resistor	R7HF273M	27k 1/4W 1%
R121	Resistor	R7HF103M	10k 1/4W 1%
R122	Resistor	R7HF332M	3.3k 1/4W 1%
R143	Resistor	R7HF104M	100k 1/4W 1%
R249	Resistor	R7AJ1ROM	1 ohm 1/2W 1%
C13	L-Capacitor	C110019M	25V/10uF
C23	B-Capacitor	C14R761M	25V/4.7
C26	P-Capacitor	CGI3271	100V/ 270pF
C33	B-Capacitor	C11R067M	50V/1
C38	F-Capacitor	C3103168	50V/0.01u 2%
C50	B-Capacitor	C110165M	25V/100uF
C66	P-Capacitor	CGI3391	100V/ 390pF
C72	B-Capacitor	C110062M	25V/10uF
C104	P-Capacitor	CGI3621	100V/ 620pF
C106	F-Capacitor	C3334169	50V/0.33u 2%
C115	P-Capacitor	CGI3471	100V/ 470pF
C123	P-Capacitor	CGI3182	100V/1800pF
C134	B-Capacitor	C122077M	25V/22uF
C137	P-Capacitor	CGI3821	100V/ 820pF
C138	P-Capacitor	CGP3681S	630V/ 680pF
C169	P-Capacitor	CGP3332S	630V/3300pF
C175	T-Capacitor	C71R012M	35V/1
RL1,3	Relay	RY1DC051	DC24V
RL2	Relay	RY2DC089	
SW1	Switch	WH31022	BAL/UNBAL
SW2	Switch	WH98095	DIP
CP3	Connector	CN901150	Orange
CP7,8	Connector	CN901157	Black
CN	Connector	CN3A0305	50P DIN
LD1	LED	PNTLY124	Yellow
LD2	LED	PNTLG124	Green
LD3	LED	PNTLO124	Orange
TF1,2	Transformer	TF31022	Bias
J1	Register	PZ4E001	0 ohm
	Stud	KZ71A101	for LED

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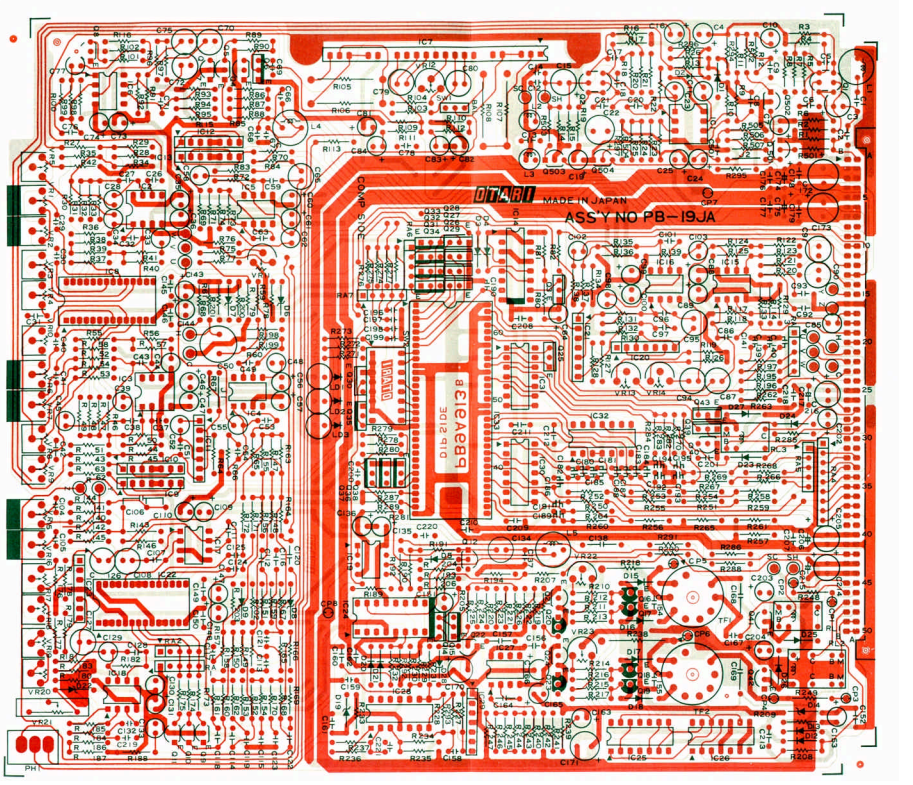

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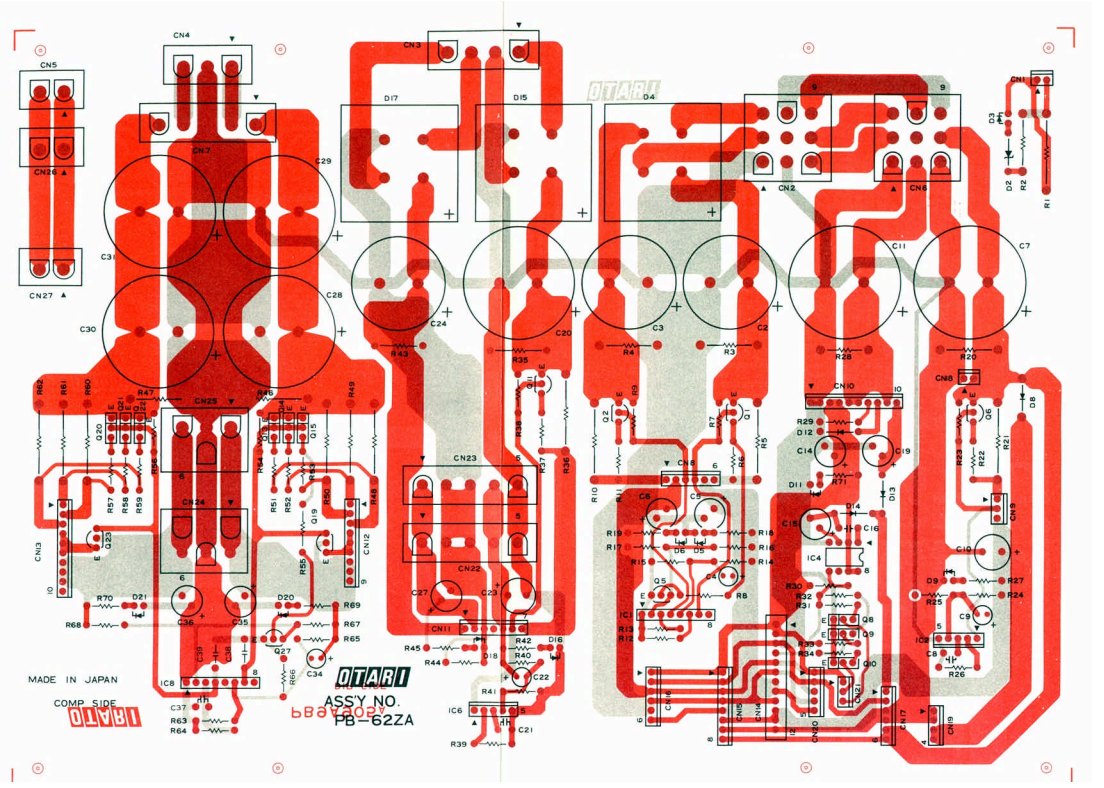
[8] : PB-62ZA POWER SUPPLY P.C.B. ASSEMBLY



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[8]: PB-62ZA POWER SUPPLY P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
IC1,8	IC	I-0062	
IC2,6	IC	I-0063	
D2	Diode	PN-0044	
D3,5,6	LED	PNTLG124	Green
D4,15,17	Diode, Bridge	PND5FB20	
D8	Diode	PNU05C	
D12-14	Diode	PN-0264	
R1	Resisotr	R8CJ242M	2.4k
R2	Resistor	R8BJ512M	5.1k
R3,4	Resistor	R8BJ122M	1.2k
R5,10	Resistor	R7CJR33M	0.33 ohm
R14	Resistor	R7HF243M	24k
R15	Resistor	R7HF332M	1/4W 3.3k
R16	Resistor	R7HF153M	15k
R20,35	Resistor	R8BJ202M	2k
R21	Resistor	R7CJR39M	0.39 ohm
R24,40	Resistor	R7HF393M	1/4W 39k
R36,48	Resistor	R7DJR22M	0.22 ohm
R46,47	Resistor	R8BJ152M	1.5k
R65	Resistor	R7HF3402	34k
C8,21,37	F-Capacitor	CFF3103	50V/0.01uF
CN1,18	Connector	CN402350	2P
CN2	Connector, Header	CN409085	
CN3	Connector, S Header	CN404083	
CN4	Connector, Header	CN403082	
CN5	Connector, Header	CN402081	
CN6	Connector, Plug	CN409078	1uM
CN7	Connector	CN405295	
CN8,16,17	Connector	CN406354	6P
CN9,21	Connector	CN403351	3P
CN10,13	Connector	CN410358	10P
CN11	Connector	CN407355	7P
CN12	Connector	CN409357	9P
CN14	Connector	CN412380	12P
CN15	Connector	CN408356	8P
CN19	Connector	CN404352	4P
CN20	Connector	CN405353	5P
CN22,23	Connector	CN405296	
CN24,25	Connector, Header	CN406084	
CN26,27	Connector	CN402074	

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[9]: PB-7JAB DISPLAY P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
	P.C.B., LED	PB9A932A	
D3-10	LED	PNTLR124	Red
D35-42	LED	PNTLY124	Yellow
D67-96	LED	PNTLG124	Green
D99-128	LED	PNTLO124	Orange
SW3-10	Lever, Switch	KN3002	Vermilion
SW3-10	Switch	WH42057	
SW35-42	Lever, Switch	KN3004	Light Gray
SW65	Switch	WH340463	
SW66	Switch	WH340433	
SW67	Stopper, Switch	PB7JA02	
CN3	Connector	CN403351	3P
RE1	Encoder	SR3Z030	50 Pulse
	Spacer	KZ71A110	
	Angle	PB7JA01	
	Plate, Shield	PB7JA03	

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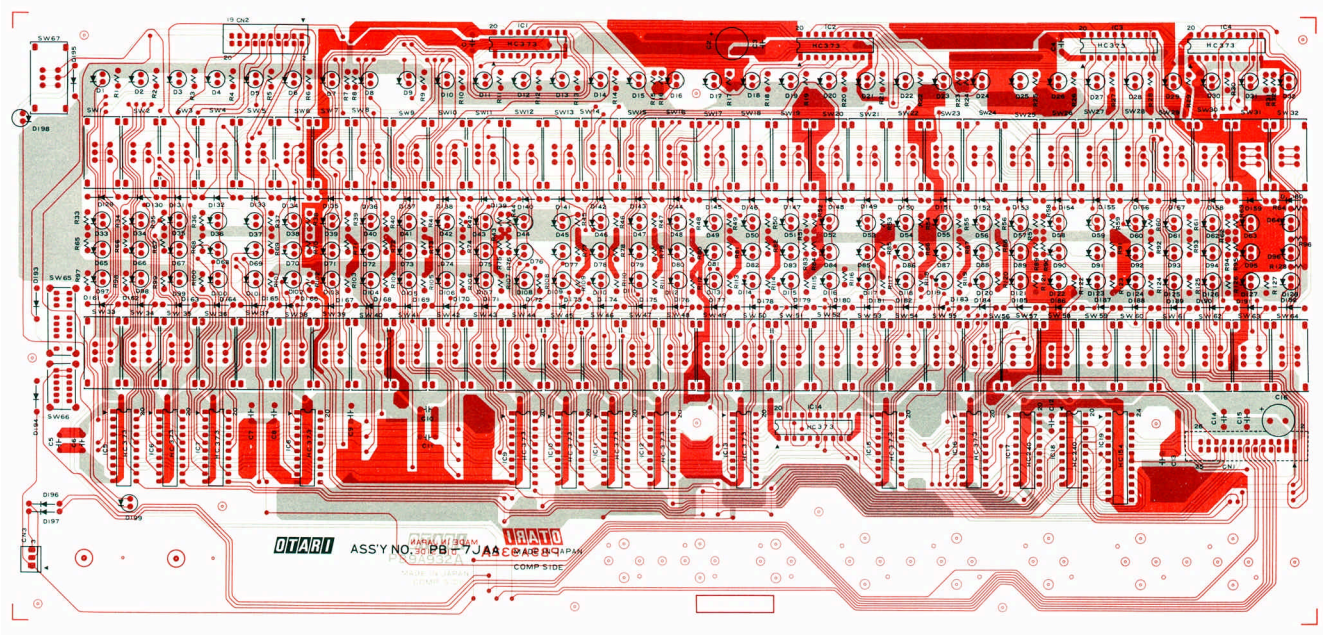

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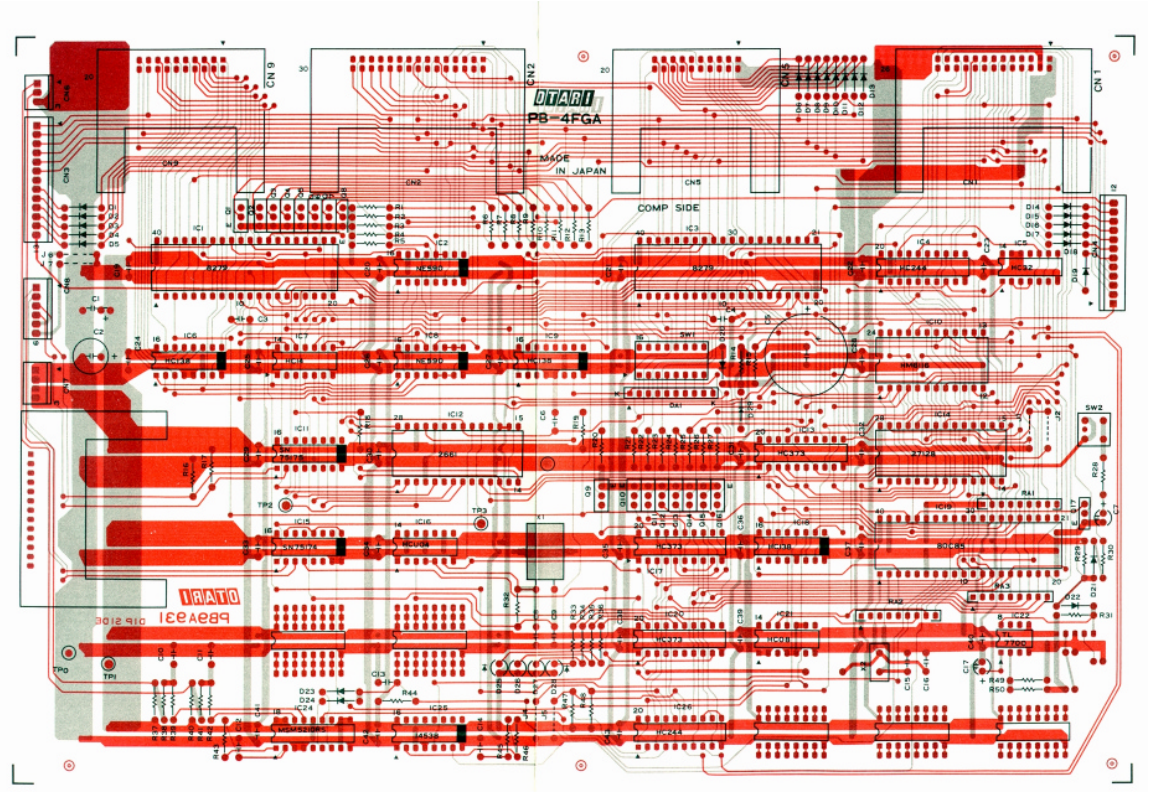
[10] : PB-4FGA CPU P.C.B. ASSEMBLY



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[10]: PB-4FGA CPU P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
	P.C.B., CPU	PB9A931	
	ROM Assembly	PG-0841	
IC10	IC	IC-0075	
Q1-8	Transistor	Q-0004	
Q9-16	Transistor	Q-0011	
Q17	Transistor	Q-0008	
RA1	Resistor	R94-136	10k
RA2,3	Resistor Array	R94-132	
C1,19-43	Capacitor	C622307M	50V/0.022uF
C3,4,6	F-Capacitor	CFF3103	50V/0.01uF
C5	Capacitor	C1105184	5V/1F
C10,11	Capacitor	C656142M	50V/560pF
C12,13	Capacitor	C622134M	50V/220pF
SW1	Switch, Dip	WH98137	
SW2	Switch	WH11181	
TP0	Connector	CN901157	Black
TP1	Connector	CN901149	Red
CN1	Connector	CN326220	26P
CN2	Connector	CN330221	
CN3	Connector	CN413381	13P
CN4	Connector	CN412380	
CN5,9	Connector	CN320219	20P
CN6	Connector	CN403351	3P
CN7	Connector	CN404352	4P
CN8	Connector	CN406354	
X1	Crystal	PZ4C033	
X2	Crystal	PZ4C017	

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SECTION 9:
EXPLODED VIEW DRAWINGS AND PARTS LISTS

9.1 GENERAL

The following exploded view drawings and parts lists are provided for service reference. Each drawing has own parts list followed with a same key number and title.

When ordering parts, give a full description, using both the part number and the name of the part. If there seems to be a discrepancy between the drawings herein and your MX-80, contact OTARI; we assume no liability for improper servicing due to changes and improvements which we make that subsequently render certain of those documents obsolete. Most all of exploded view drawings are not prepared for the parts which differ from those for the MX-80, please refer to the parts list in which you will find the proper information. Following are the lists of the exploded view drawings edited here.

9.2 PARTS LISTS

Ref. No.	Description		Parts No.	Notes
1	Reel Assembly		KW-6E	
2	Capstan Assembly		KC-6C	
	Pinch Roller Assembly		KP-6A	
3	Tachometer Roller Assembly		KI-6B	
	Impedance Roller Assembly		KI-6C	
	Tension Arm Assembly		KA-6D	
4	Shield Door Assembly		ZA-73Z	
	Tape Shifter Assembly		KR-6C	
5	Head Assembly (32ch)		KH-6C	
	(24ch)		KH-6D	
6	Control Panel Assembly		CB-20W	
7	VU Meter Assembly	(32ch)	CB-735	
		(24ch)	CB-736	
8	Amplifier Assembly	(32ch)	A1110	
		(24ch)	A1111	
9	Power Supply Assembly	(32ch)	DS-3J	
		(24ch)	DS-3K	
10	Rear Panel Assembly		CB-738	
	Ext. Panel Assembly		CB-749	
11	Audio I/O Panel Assembly	(32ch)	CB-732	
		(24ch)	CB-733	
12	Remote Control Assembly	(32ch)	CB-123	
		(24ch)	CB-124	

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[1]: REEL ASSEMBLY KW-6E

Ref. No.	Description	Parts No.	Notes
1- 1	Reel Table Assembly	KW0HGA	
2	Screw, Reel Location	KW0E042	
3	Moter, DC Reel	MR5A040	
4	Base, Brake Assembly	KW1F001	
5	Brake Drum	KW0A056	
6	Brake Band	KW-6B-A	
7	Stand off	KZ9H140B	
8	Guide, Brake Band	KW-6E-A	
9	Tach Disk	SR3Z024	
10	Bracket, Tach Sensor PCB	KW6E001	
11	PCB Assembly, Tach Sensor	PB-7BTA	
12	Solenoid, Brake	GP1B02	
13	Stopper, Solenoid Plunger	KZ2A015	
14	Link, Brake Adjustment	KZ6A063	
15	Pin, Solenoid Plunger	KZ5A003	
16	Bracket, Brake Band Mounting	KW6B004	
17	Lever, Brake	KW6B005	
18	Shaft, Brake Lever	KW6B009	
19	Stopper, Brake Lever	KW6B008	
20	Post, Spring Anchor	KZ5B010	
21	Spring	GS1088	
22	Spring	GS1089	
23	Post, Adjustment	KW6B007	
24	Link, Adjustment	KW6B006	
25	Retaining Ring, E-Type	F7502	
26	Retaining Ring, E-Type	F74TE18	
27	Nut, Adjustment	F517-4	
28	Connector, Plug Housing	CN402030	
29	Connector, Plug Contact	CN7B-041	
30	Connector, Plug Housing	CN402260	
31	Connector, Pin Housing	CN7B-206	

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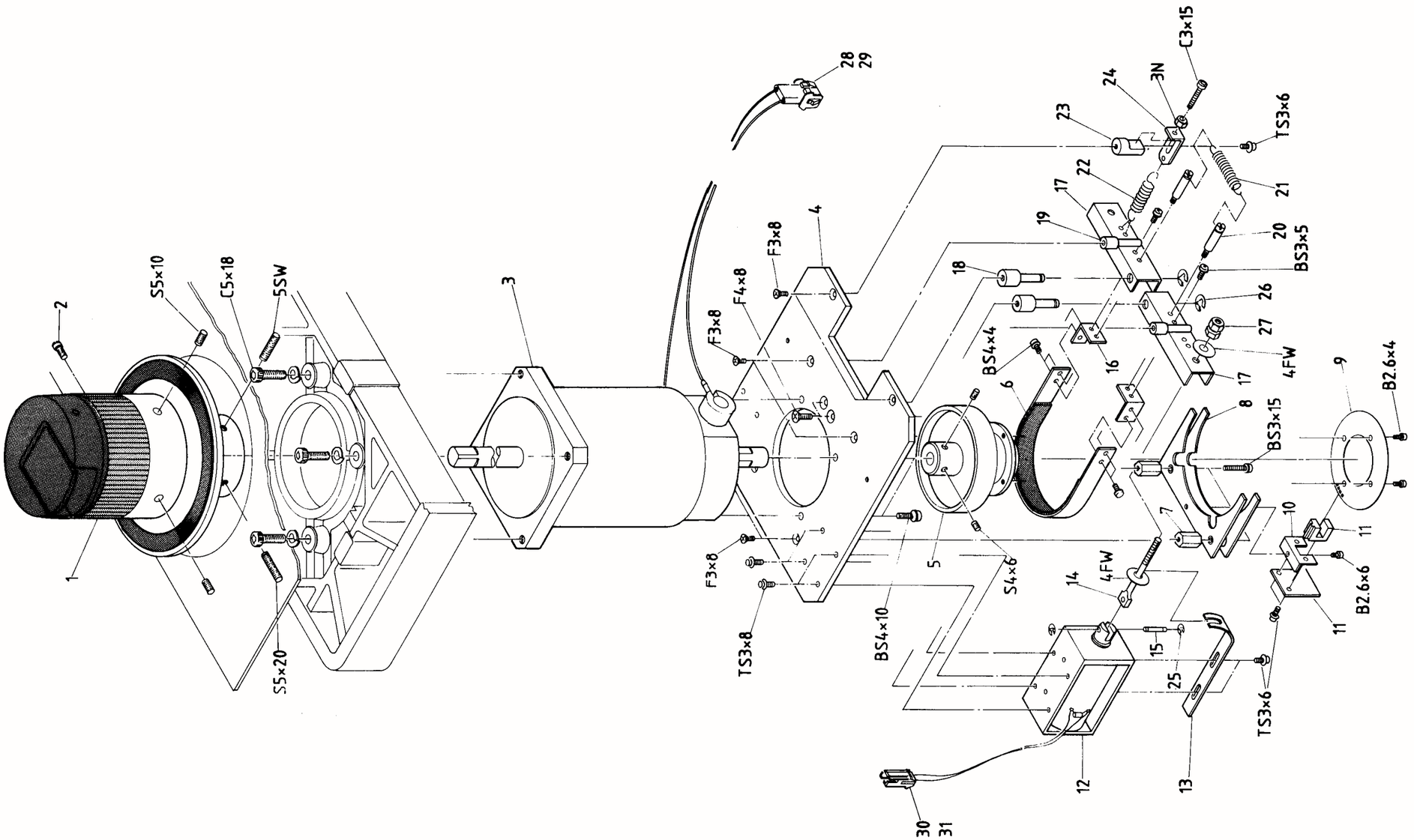
[1]: REEL ASSEMBLY KW-6E



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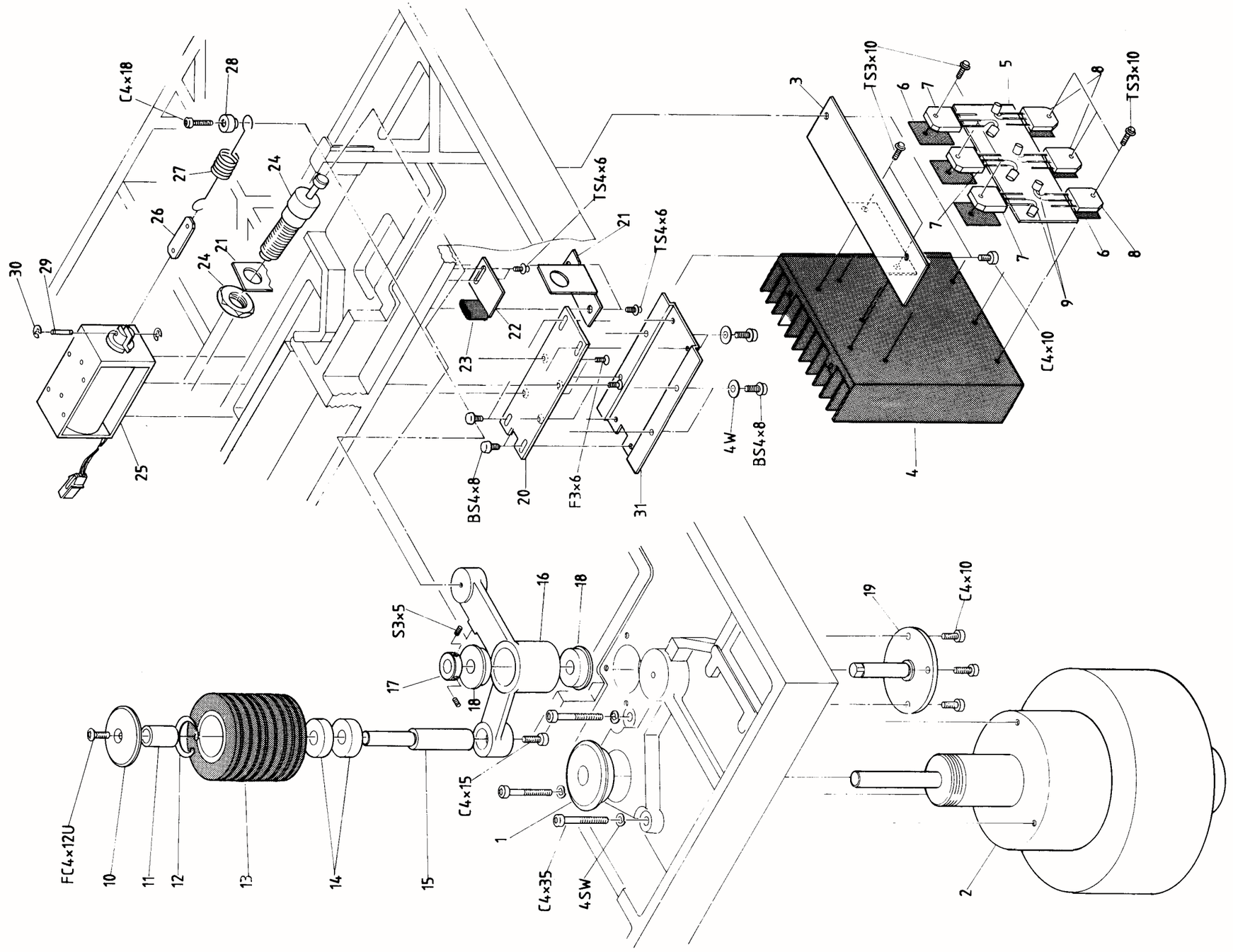
[2]: CAPSTAN ASSEMBLY RC-6C
PINCH ROLLER ASSEMBLY KP-6A



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[2]: CAPSTAN ASSEMBLY KC-6C
PINCH ROLLER ASSEMBLY KP-6A

Ref. No.	Description	Parts No.	Notes
2- 1	Cap, Capstan Dust	KC6C001	
2	Motor, DC Capstan	MR-1B	
3	Bracket, Heat Sink	ZA93G01	
4	Heat Sink	KZ1A071	
5	PCB, Transistor	PB9A906	
6	Insulator, Transistor	PZ4B068	
7	Transistor	QD1436K	
8	Transistor	QB1032K	
9	Capacitor	CFF3102	
10	Cap, Pinch Roller	KP0C023	
11	Spacer	KP6A008	
12	Retaining Ring, C-Type	F712207	
13	Roller Assembly, Pinch	KP0A037	
14	Bearing	BA1Z028	
15	Shaft, Pinch Roller	KP0B050	
16	Arm, Pinch Roller	KP6A005	
17	Boss	KP6A006	
18	Bearing	BAZ-608A	
19	Shaft, Pinch Roller Arm	KP6A004	
20	Base, Solenoid	KP6A009	
21	Bracket, Damper	KP6A001	
22	Stopper, Solenoid Plunger	KP6A002	
23	Tube, Rubber	KR6B011	
24	Damper, Pinch Roller	AS5096	
25	Solenoid	GP1B12	
26	Link, Solenoid	KP1D007	
27	Spring	GS1141	
28	Post, Spring Anchor	KP6A007	
29	Pin, Solenoid Plunger	KZ5A003	
30	Retaining Ring, E-Type	F7502	
31	Bracket, Solenoid	KP6A010	

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[3]: TACHOMETER ROLLER ASSEMBLY KI-6B
IMPEDANCE ROLLER ASSEMBLY KI-6C
TENSION ARM ASSEMBLY KA-6D

Ref. No.	Description	Parts No.	Notes
3- 1	Cap, Roller	KP0C023	
2	Retaining Ring, C-Type	F7208.0	
3	Bearing	BA1Z028	
4	Washer, Cup Type	F953A00	
5	Retaining Ring, C-Type	F7022.0	
6	Roller Assembly, Counter	KI0A059	
7	Tack Disk	SR3Z024	
8	Shaft, Counter Roller	KI0A060	
9	Bracket, Tach Sensor PCB	KI6B001	
10	PCB, Tach Sensor	PB-7LAA	
11	PCB, Tach Sensor	PB-7DSA	
12	Retaining Ring, C-Type	F7212.0	
13	Bearing	BA1Z011W	
14	Washer, Cup Type	F953A005	
15	Retaining Ring, C-Type	F7028.0	
16	Roller, Impedance	KI0A061	
17	Shaft, Impeadance Roller	KI0A062	
18	Roller Assembly, Tension	GR-6R	
	Roller, Tension	GR6R002	
	Cap, Roller	KP0C023	
	Shaft, Tension Roller	GR6R001	
	Spring	GS2115	
	Bearing	BA1Z028	
	Washer	KZ60055	
	Collar	KZ7C087	
	Retaining Ring C-Type	F7208.0	
19	Shield, Tension Arm	KA6D006	
20	Arm, Tension Roller	KA6D001	
21	Shaft, Tension Arm	KA6D002	
22	Bearing	BA2F608A	
23	Housing, Tension Arm	KA1E003	
24	Collar, Tension Vane	KA1E004	
25	Vane, Tension	SR3Z028A	
26	Post, Spring Anchor	KA6D004	
27	Spring	GS1142	
28	Screw, Tension Adjusting	KZ6A003	
29	Bracket, Spring	KA6D005	
30	Post, Cushion	KA6D003	
31	Cushion	CY5006	
32	Bracket, Damper	KP6A001	
33	Damper, Tension Arm	AS5096	
34	Holder, Tension Sensor	SR1W001	
35	PCB, Tension Sensor	PB-7AVA	
36	PCB, Safety Switch	PB-4FHA	

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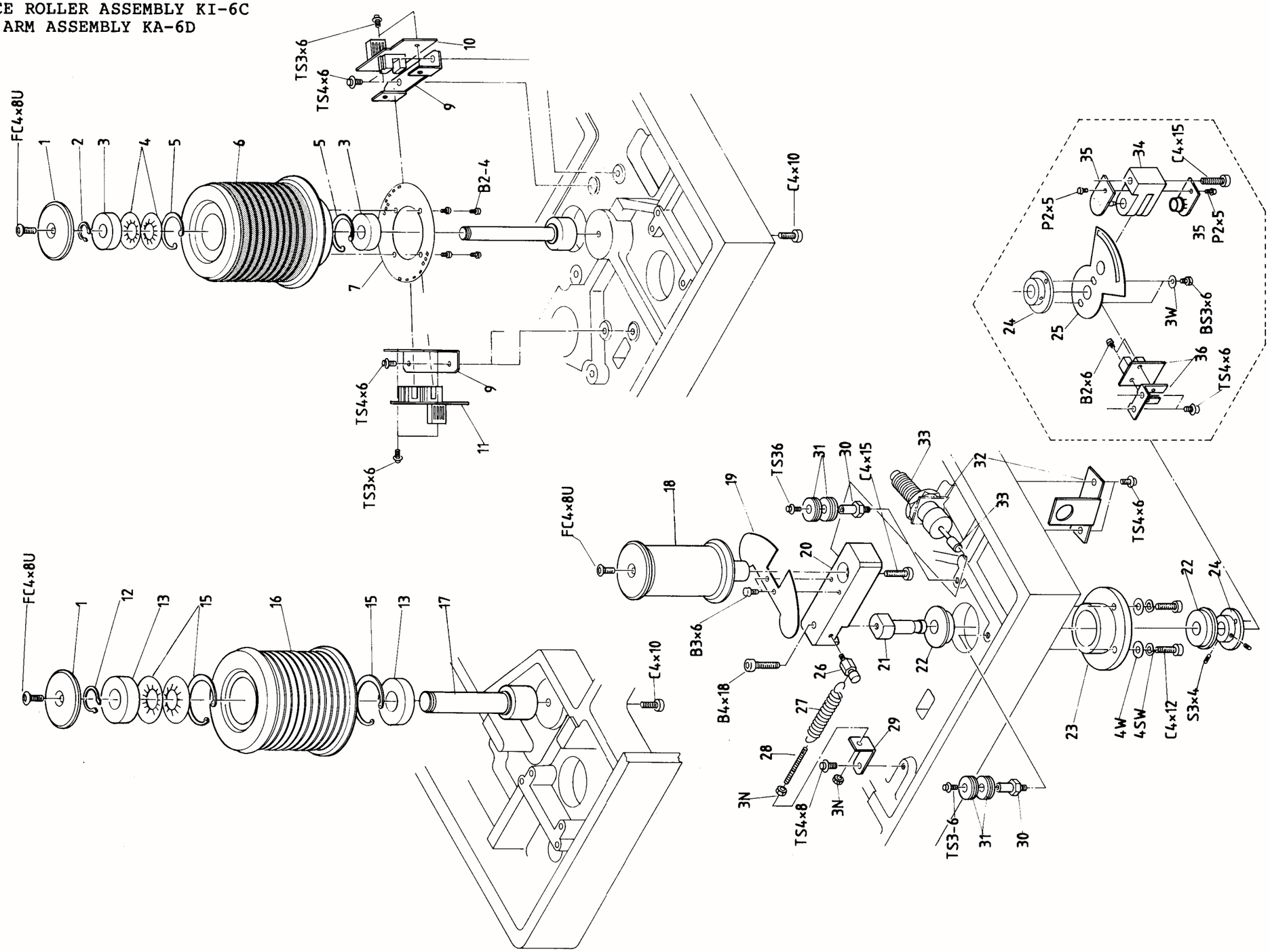
[3]: TACHOMETER ROLLER ASSEMBLY KI-6B
IMPEDANCE ROLLER ASSEMBLY KI-6C
TENSION ARM ASSEMBLY KA-6D



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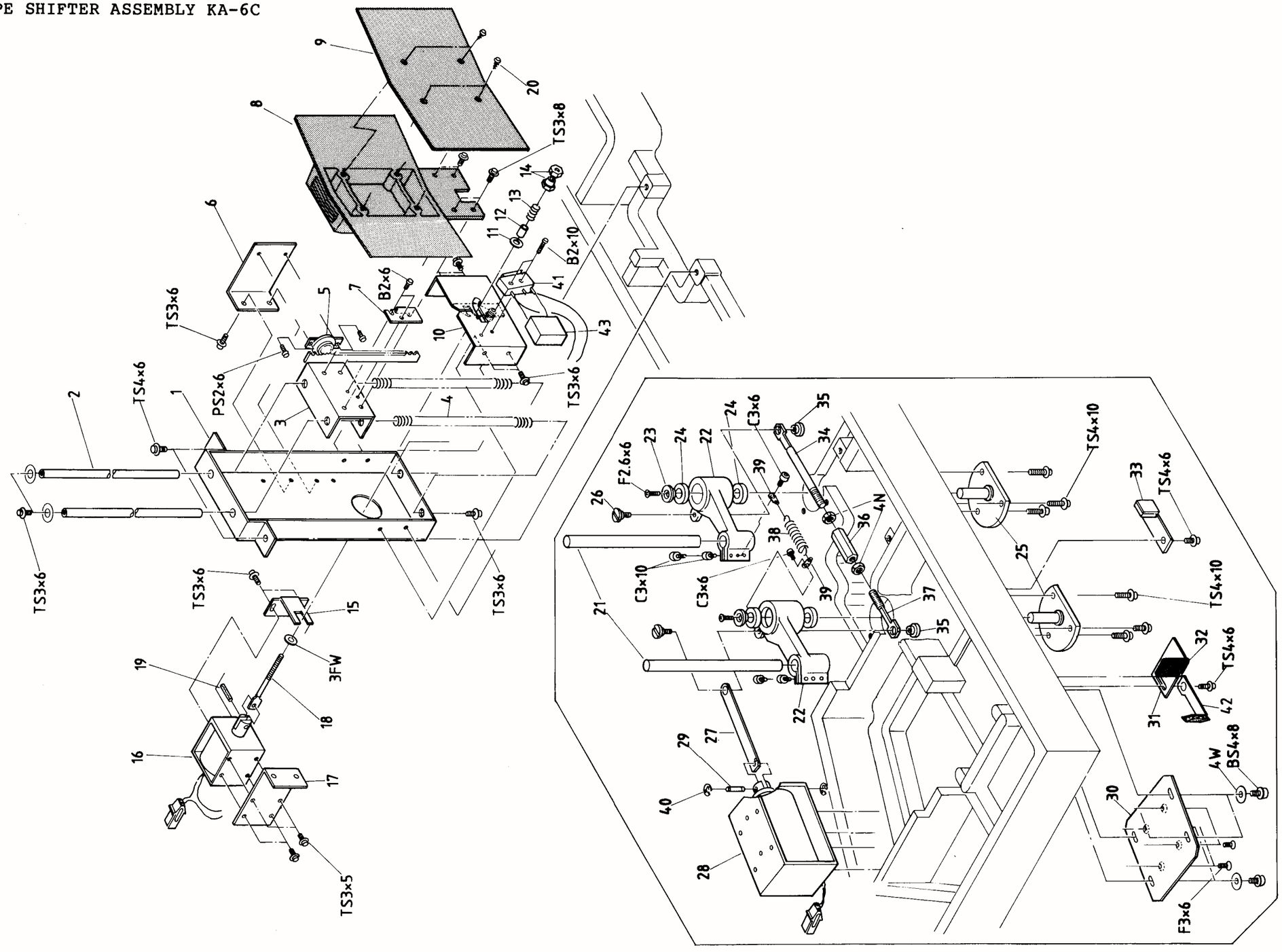
[4]: SHIELD DOOR ASSEMBLY ZA-73Z
TAPE SHIFTER ASSEMBLY KA-6C



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[4]: SHIELD DOOR ASSEMBLY ZA-73Z
TAPE SHIFTER ASSEMBLY KR-6C

Ref. No.	Description	Parts No.	Notes
4- 1	Base, Shield Plate Assembly	ZA73Z18	
2	Shaft	ZA73Z02	
3	Bracket, Shield Plate	ZA73Z19	
4	Spring	GS2116	
5	Damper, Shield Plate	PZ1Z011	
6	Bracket, Damper	ZA73Z17	
7	Hook	ZA73Z07	
8	Cover, Shield	ZA73Z01	
9	Plate, Shield	ZA73Z10	
10	Arm Assembly, Lock	ZA-73ZA	
11	Washer	ZA73Z06	
12	Collar	ZA73Z05	
13	Spring	GS2117	
14	Nut, Adjustment	F517-3	
15	Stopper, Solenoid Plunger	ZA73Z03	
16	Solenoid	GP1M04	
17	Bracket, Solenoid	ZA73Z08	
18	Link, Solenoid	ZA73Z04	
19	Pin, Solenoid Plunger	F62208	
20	Tapping Screw	F322.606	
21	Shifter	KR6C002	
22	Arm, Shifter	KR6C001	
23	Stopper, Bearing	KR6C004	
24	Bearing	BA11260L	
25	Shaft, Shifter Arm	KR6C003	
26	Screw	KR6C005	
27	Link, Solenoid	KR6C008	
28	Solenoid, Shifter	GP1B12	
29	Pin, Solenoid Plunger	KZ5A003	
30	Bracket, Solenoid	KP6A003	
31	Stopper, Solenoid Plunger	KP6A002	
32	Tube, Rubber	KR6B011	
33	Stopper	KR6C009	
34	Link, Shifter	KR6C010	
35	Collar	KR6C006	
36	Nut, Adjustment	KR1C003	
37	Link, Shifter	KR6C011	
38	Spring	GS1144	
39	Bracket, Spring	CN7D-003	
40	Retaining Ring, E-Type	F75020	
41	Switch	WH51002	
42	Stopper	KR-6C-C	
43	Spark Killer	CZ20001W	

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[5]: HEAD ASSEMBLY (32ch) KH-6C
(24ch) KH-6D

Ref. No.	Description	Parts No.	Notes
5- 1	Cover, Head	T003702	
2	Guide, Tape	KG6A001	
3	Head, 2" 32ch Erace	GH6E013A	
4	Head, 2" 24ch Erace	GH6E014A	
5	Head, 2" 32ch Record	GH6R016A	
6	Head, 2" 24ch Record	GH6R017A	
7	Head, 2" 32ch Reproduce	GH6P015A	
8	Head, 2" 24ch Reproduce	GH6R009A	
9	Roller Ass'y, Flutter Filter	GR-6J	
10	Base, Head Assembly	KH0C066	
11	Shield, Head Base	T003709	
12	Bracket, Head Connector	KH6C001	
13	Clamp, Cable (32ch)	KH6C002	
14	Clamp, Cable (24ch)	KH6C003	
15	Clamp, Cable (32ch)	KH6C004	
16	Clamp, Cable (24ch)	KH6C005	
17	Connector, MR-Type	CN234130	
18	Connector, MR-Type	CN234129	
19	Pin, Head Base Location	F63312	

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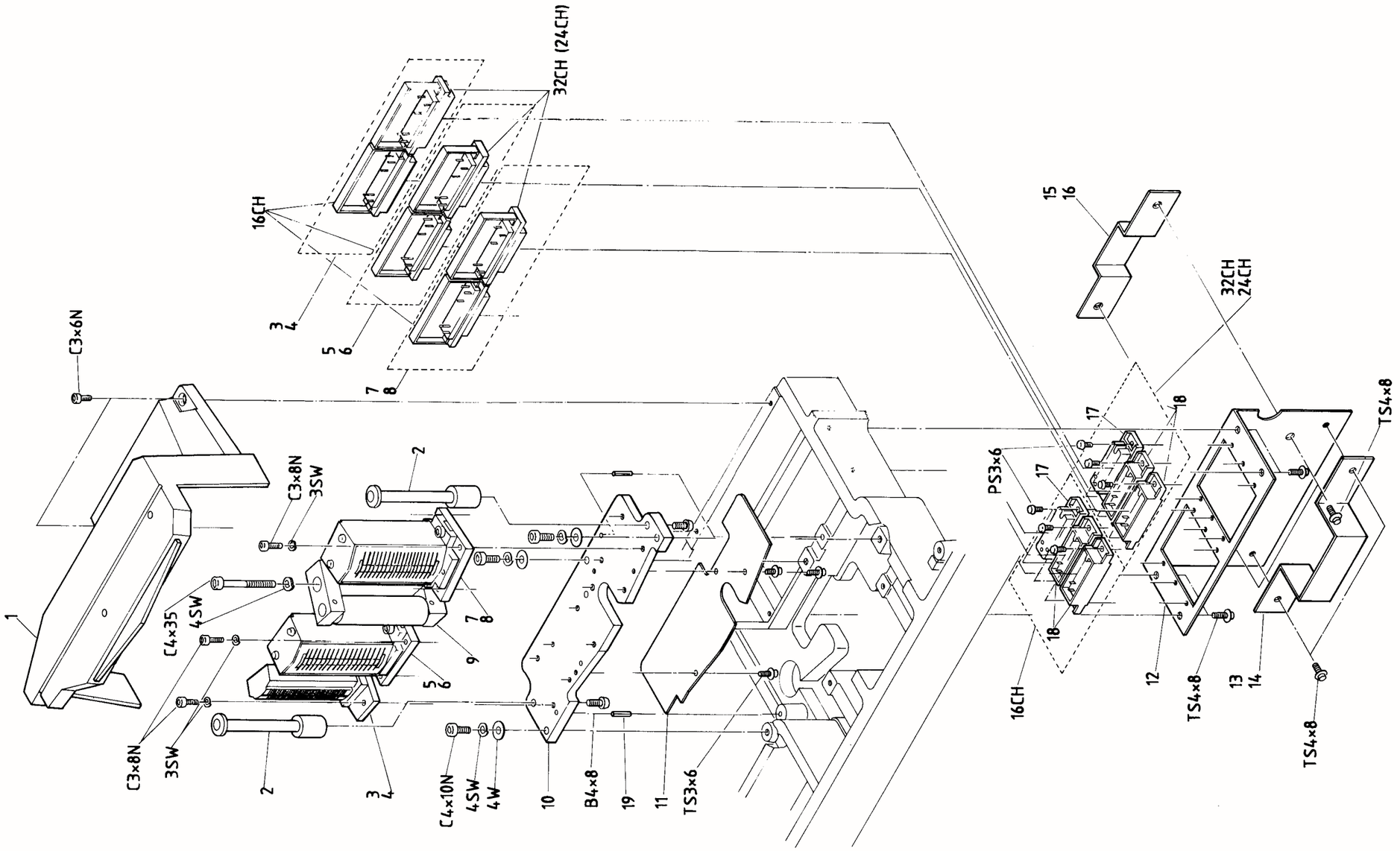
[5]: HEAD ASSEMBLY (32ch) KH-6C
(24ch) KH-6D



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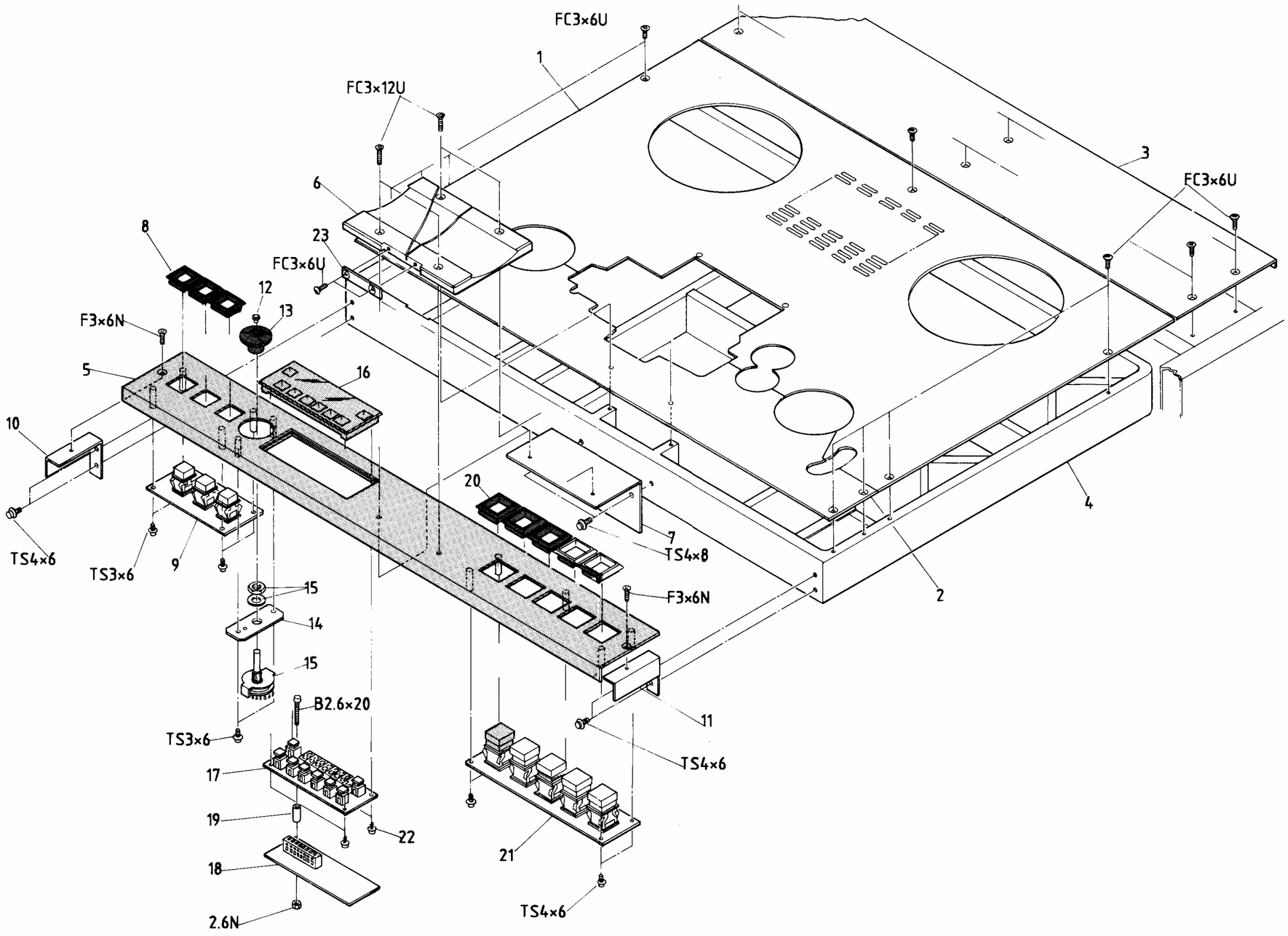
Section 9

[6]: CONTROL PANEL ASSEMBLY CB-20W



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[6]: CONTROL PANEL ASSEMBLY CB-20W

Ref. No.	Description	Parts No.	Notes
6- 1	Deck Skin	T003704	
2	Deck Skin, Front	T003705	
3	Deck Skin, Rear	T003706	
4	Deck Plate	T003701	
5	Panel, Transport Control	CB20W01	
6	Splicing Block, 2"	T003707	
7	Bracket, Splicing Block	CB20W06	
8	Escutcheon, Switch	PZ4A014	
9	PCB, Switch	PB-7AKA	
10	Bracket, Control Panel	CB20W02	
11	Bracket, Control Panel	CB20W03	
12	Cap, Knob	KN1058	
13	Knob	KN1059B	
14	Bracket, Switch	CB20W04	
15	Switch, Rotary	WH66067	
16	Lens, Tape Timer	KN5011	
17	PCB, Switch/Timer	PB-7HTA	
18	PCB, Timer Drive	PB-7HUA	
19	Spacer	KZ71A109	
20	Escutcheon, Switch	PZ4A013	
21	PCB, Switch	PB-7AJB	
22	Tapping Screw	F322.606	
23	Stopper, Blade	T003708	

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[7]: VU METER ASSEMBLY (32ch) CB-735
(24ch) CB-736

Ref. No.	Description	Parts No.	Notes
7- 1	Panel, VU Meter (32ch)	CB73502	
2	Panel, VU Meter (24ch)	CB73602	
3	VU Meter	ME11016	
	Lamp, Meter	LU2065	
4	Cover, VU Meter Panel (32ch)	CB73505	
5	Cover, VU Meter Panel (24ch)	CB73605	
6	Holder, Panel Cover	CB73507	
7	Holder, Panel Cover	CB73609	
8	Bracket, VU Meter Panel	K108906	
9	Collar, VU Meter Panel	K108935	
10	Stud	KZ9F100A	
11	Tube, Rubber	KR6B001	
12	PCB Assembly, LED, Record	PB-7ABA	
13	PCB Assembly, LED, Peak	PB-7AAA	
14	PCB Assembly, VU Meter	PB-7HXA	
15	Harness Assembly, VU Meter	PZ9D137	
16	Harness Assembly, VU Meter	PZ9D138	
17	Base, VU Meter Mounting (32ch)	CB73503	
18	Base, VU Meter Mounting (24ch)	CB73603	

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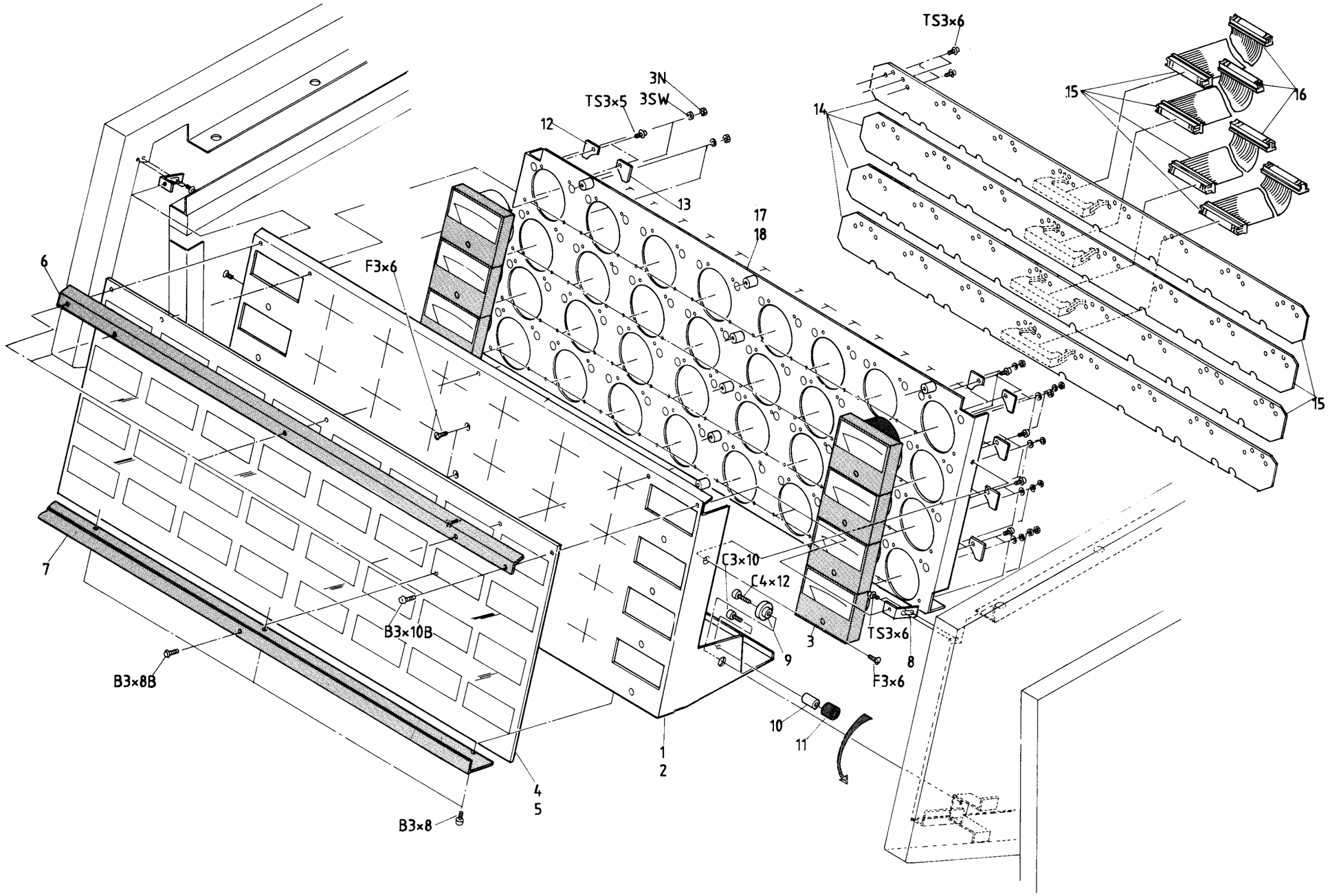
[7]: VU METER ASSEMBLY (32ch) CB-735
(24ch) CB-736



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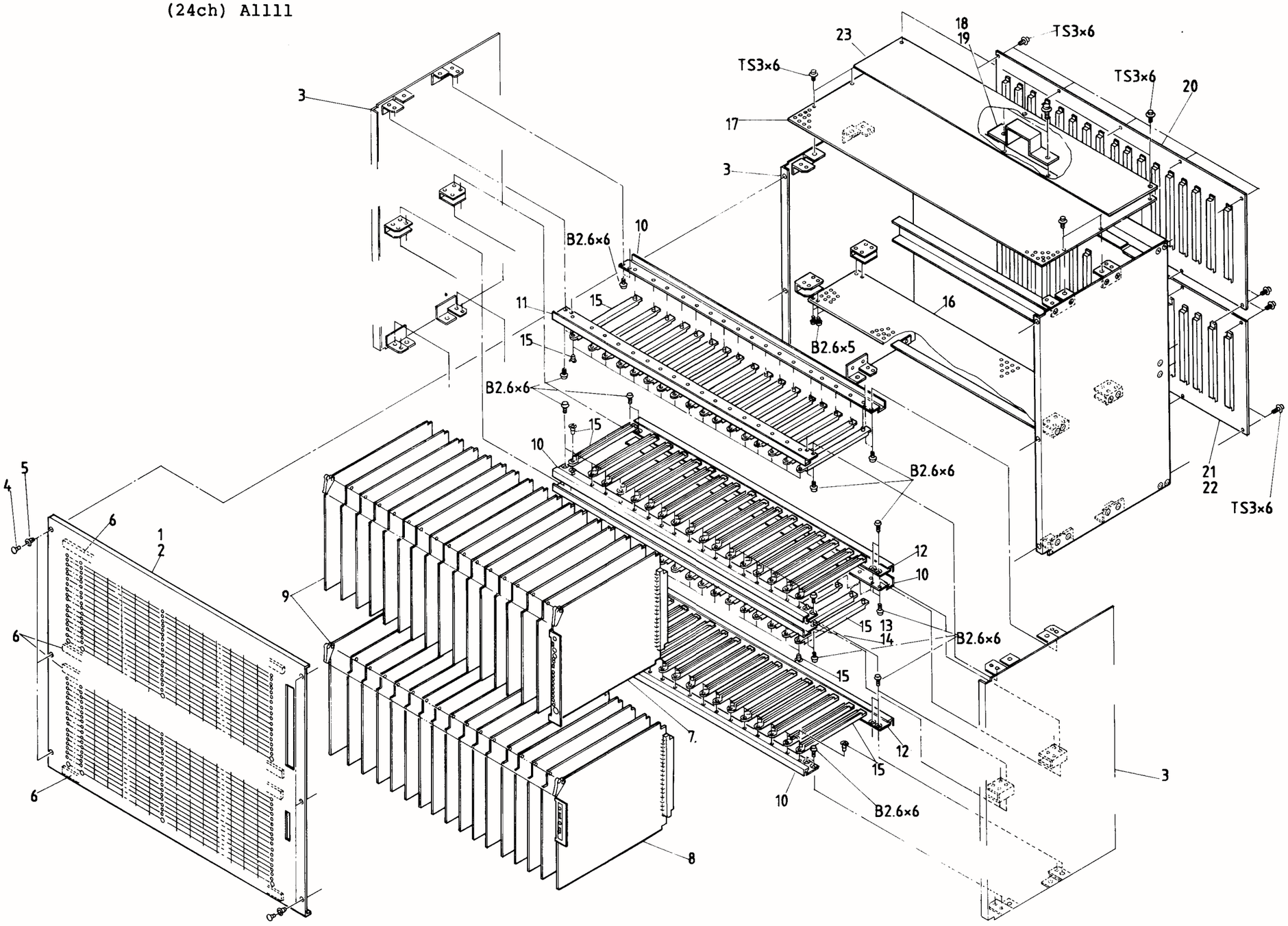
Section 9

[8]: AMPLIFIER ASSEMBLY (32ch) A1110
(24ch) A1111



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[8]: AMPLIFIER ASSEMBLY (32ch) A1110
(24ch) A1111

Ref. No.	Description	Parts No.	Notes
8- 1	Panel, Amp Ass'y Front (32ch)	A111006	
2	Panel, Amp Ass'y Front (24ch)	A111102	
3	Cord Cage Assembly	A1110-A	
4	Fastener, Quick Release	CY3036	
5	Collar, Fastener	CY3035	
6	Cushion	K109012	
7	PCB Assembly, Audio Control	PB-4FFA	
8	PCB Assembly, Serial Remote Control	PB-4EFA	
9	PCB Assembly, Audio Amplifier	PB-19SA	
10	Angle, PCB Guide	A111004	
11	Angle, PCB Guide	A111001	
12	Angle, PCB Guide	A111003	
13	Angle, PCB Guide	A111002	
14	Angle, PCB Guide	A111101	
15	Guide, PCB	CN7B-014	
16	Plate	A111008	
17	Cover, Card Cage Top	A111005	
18	Clamp, Cable	A111019	
19	Clamp, Cable	A111104	
20	PCB Assembly Mother A	PB-7HVA	
21	PCB Assembly Mother B1	PB-7HWA	
22	PCB Assembly Mother B2	PB-7HWB	
23	Plate, Shield	A111020	

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[9]: POWER SUPPLY ASSEMBLY (32ch) DS-3J
(24ch) DS-3K

Ref. No.	Description	Parts No.	Notes
9- 1	Heat Sink	KZ1A070	
2	Diode, Bridge	PN-0190	
3	Transistor	ISTR900	
4	PCB, Transistor	PB9A622	
5	Transistor	QB8630	
6	Transistor	QD11480	
7	Transistor	IHC7805H	
8	PCB, Transistor (L)	PB9A393	
9	PCB, Transistor (S)	PB9A385	
10	Collar, Transistor	PZ4B036	
11	Insulator, Transistor	PZ4B068	
12	Insulator, Transistor	PZ4B055	
13	Insulator, Transistor	PZ4B054	
14	Diode, Bridge	PN0005	
15	Transistor	QB8630	
16	Insulator, Transistor	ISTR9005	
17	Insulator, Transistor	CN603221	
18	Fuse Holder	FH1-034	
19	Fuse 15A (32ch)	FH9-019	
20	Fuse 10A (24ch)	FH9-011	
21	Terminal, Ground	CN901040	
22	Panel, Power Supply, Rear	DS3J003	
23	Stand off	KZ9L200A	
24	PCB Assembly, Power Supply	PB-62ZA	
25	Hinge, Front Panel (L)	CY2015	
26	Hinge, Front Panel (R)	CY2016	
27	Noise Filter	SF5009	
28	Transformer, Power	TF11107	
29	Transformer, Power (32ch)	TF11108	
30	Transformer, Power (24ch)	TF11109	
31	Capacitor	C1223180	
32	PCB Assembly, Voltage Select	PB-7HYA	
33	Stand Off	KZ9L100A	
34	Cap, Leg	CY5007	
35	Panel, Power Supply, Front	DS3J001	
36	Spacer	DS3J005	
37	Escutcheon	KN5007	
38	Switch, Power	WH92101	
39	Capacitor, Spark Arrestor	CZ20001W	
40	PCB Assembly, LED, Power	PB-7MZA	
41	Spacer	KZ7A183	
42	Spacer	KZ9A075B	
43	Circuit Braker 10A (32ch)	WH91092	
44	Circuit Braker 8A (32ch)	WH91091	
45	Circuit Braker 2.5A (32ch)	WH91086	
46	Circuit Braker 6.3A (32ch)	WH91090	
47	Circuit Braker 4A (32ch)	WH91088	
48	Circuit Braker 15A (32ch)	WH91093	
49	Circuit Braker 5A (32ch)	WH91089	
50	Circuit Braker 3.15A (24ch)	WH91087	
51	Circuit Braker 4A (24ch)	WH91088	
52	Caster, with Brake	CY4082	
53	Caster, without Brake	CY4081	
54	Collar	K108904	
55	Connector, Cap Housing	CN412040	
56	Connector, Cap housing	CN409038	
57	Connector, Pin Contact	CN7B-043	
58	Connector, Socket Contact	CN7B-041	

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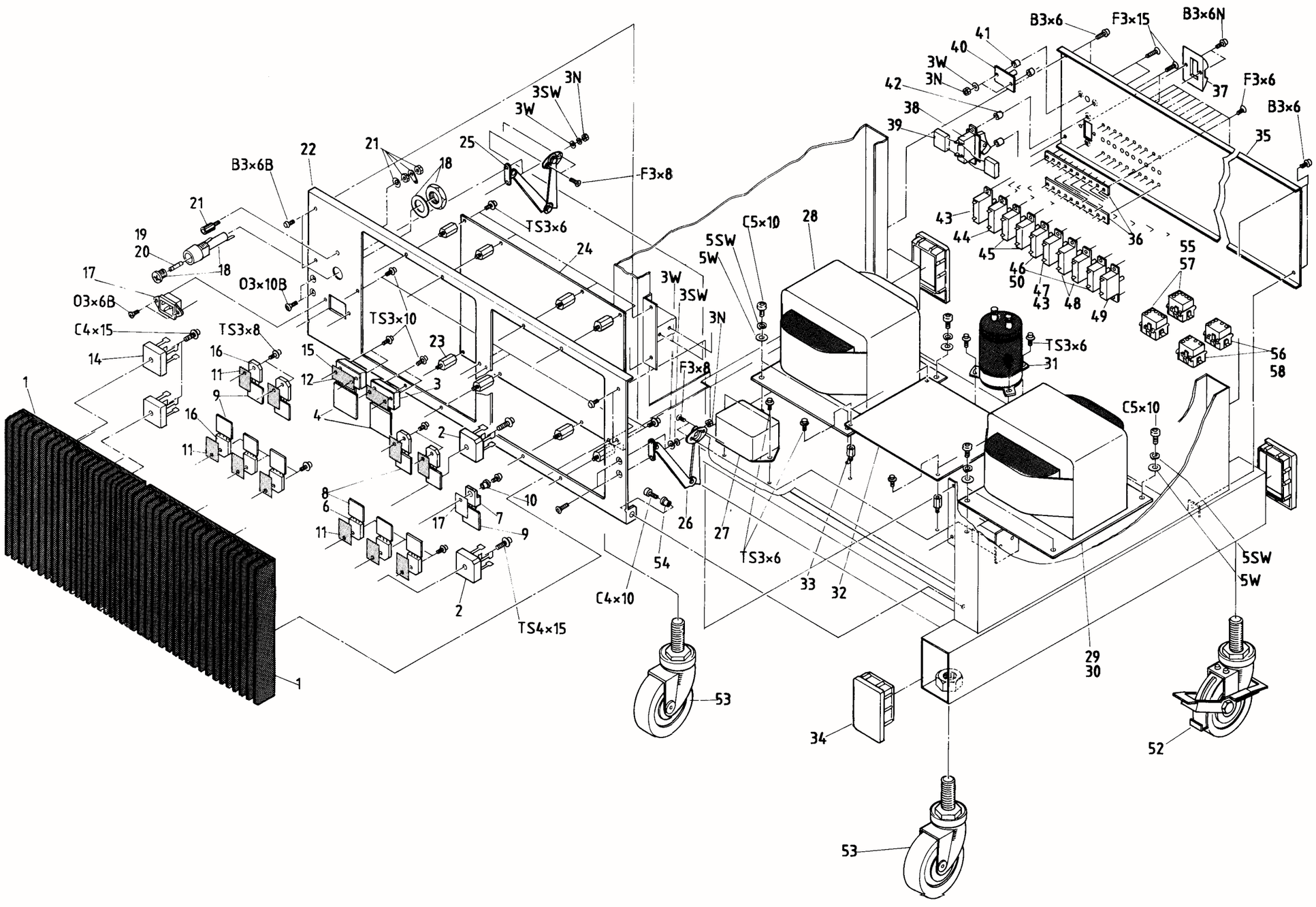
[9]: POWER SUPPLY ASSEMBLY (32ch) DS-3J
(24ch) DS-3K



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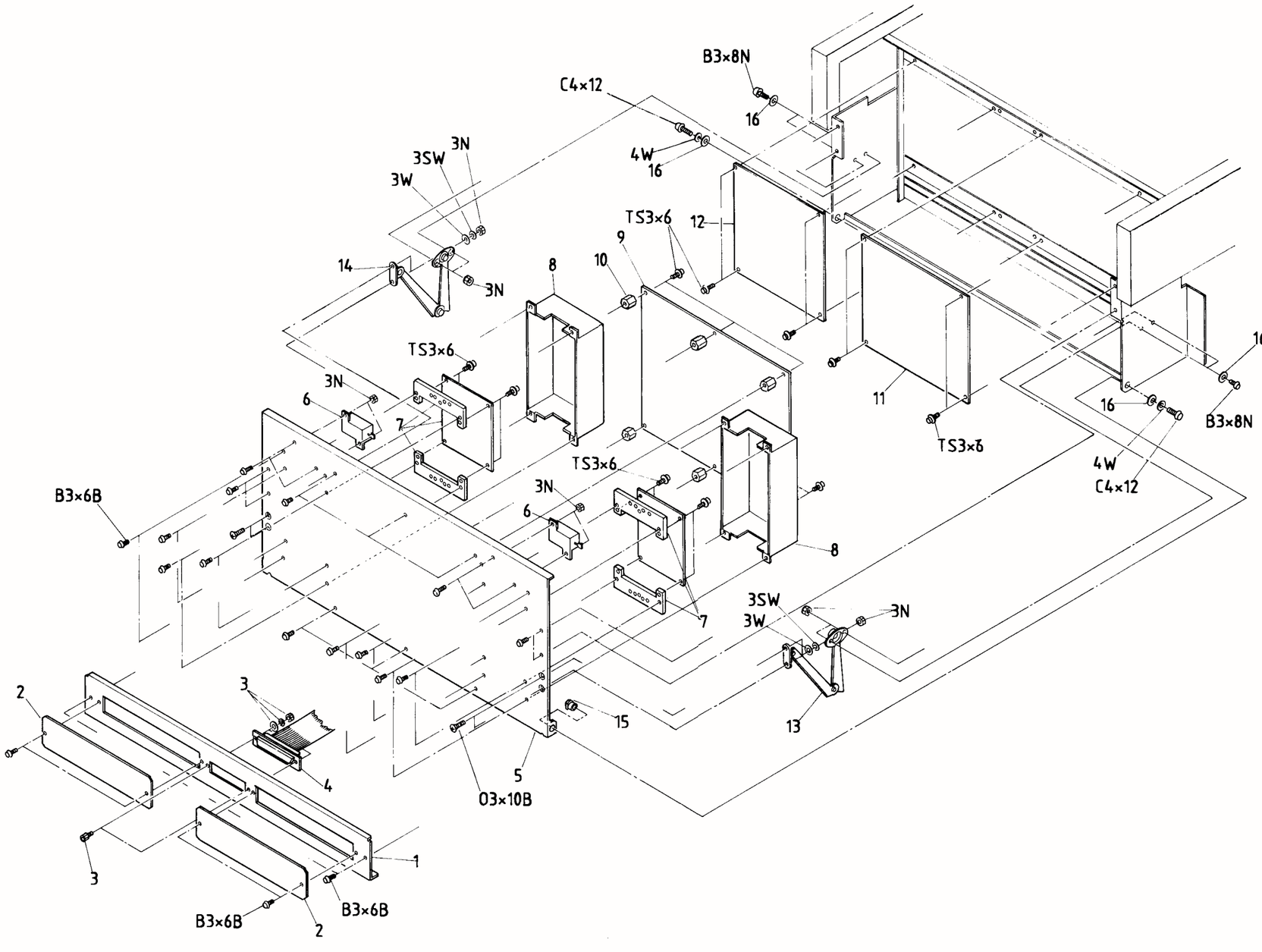
[10]: REAR PANEL ASSEMBLY CB-738
EXT. PANEL ASSEMBLY CB-749



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[10]: REAR PANEL ASSEMBLY CB-738
EXT. PANEL ASSEMBLY CB-749

Ref. No.	Description	Parts No.	Notes
10- 1	Panel, I/O	CB74901	
2	Panel, Blank	CB74903	
3	Lock, Connector	CN7B-212	
4	Connector Ass'y, Parallel I/O	PZ9D164	
5	Panel, Rear	CB73801	
6	Resistor 150 ohm	R97-002	
7	PCB Assembly, Reel Drive	PB-4FCA	
8	Shield Plate	CB73803	
9	PCB Ass'y, Transport Control	PB-4FDA	
10	Stand off	KZ9H100A	
11	PCB Ass'y, Capstan Control	PB-4FAA	
12	PCB Ass'y, Reel Control	PB-4FBA	
13	Hinge, Front Door (R)	CY2015	
14	Hinge, Front Door (L)	CY2016	
15	Collar	K108904	
16	Washer, Nylon	KZ6C043	

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[11]: AUDIO I/O PANEL ASSEMBLY (32ch) CB-732
(24ch) CB-733

Ref. No.	Description	Parts No.	Notes
11- 1	Panel, Audio I/O (32ch)	CB73201	
2	Panel, Audio I/O (24ch)	CB73301	
3	Connector, XL-Type Receptacle	CN103046	
4	Connector, XL-Type Plug	CN103045	
5	Panel, Blank	CB74903	
6	Cable Assembly, NR	ZA-6EF	
7	Cable Assembly, NR	ZA-6EG	
8	Lock, Connector	CN7B-061	
9	Hinge, Front Panel (R)	CY2016	
10	Hinge, Front Panel (L)	CY2015	
11	Collar	K108904	

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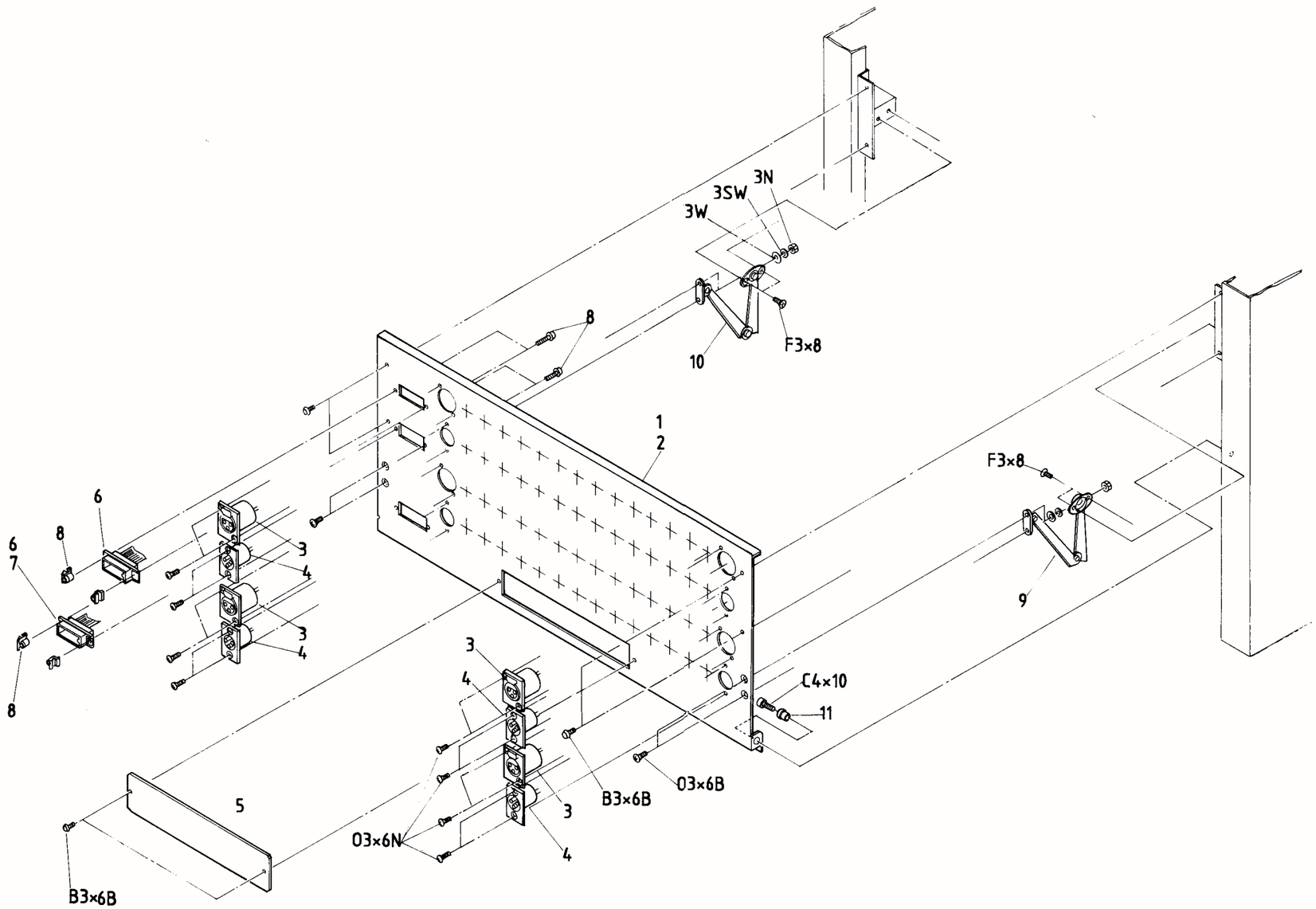
[11]: AUDIO I/O PANEL ASSEMBLY (32ch) CB-732
(24ch) CB-733



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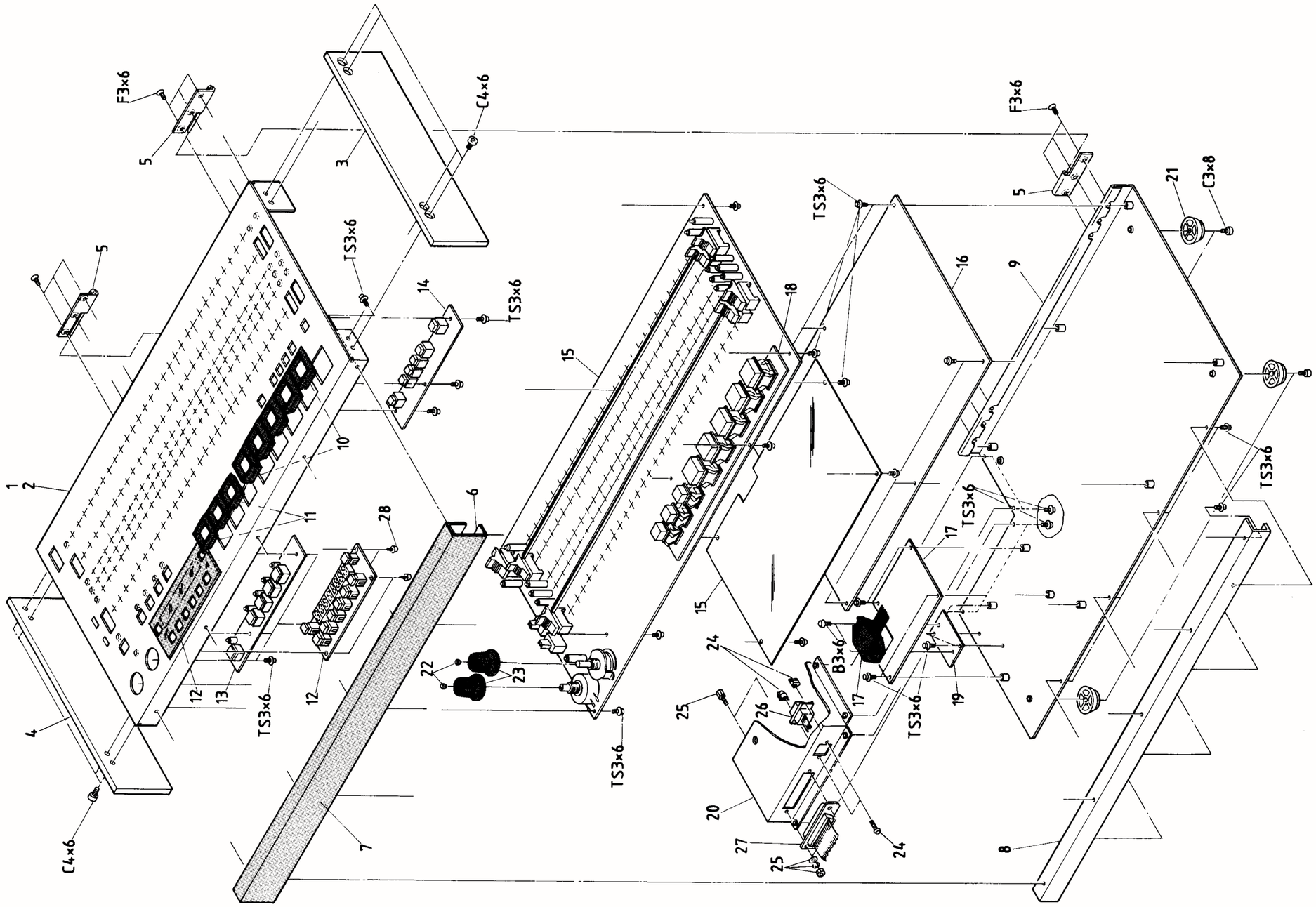
[12]: REMOTE CONTROL ASSEMBLY (32ch) CB-123
(24ch) CB-124



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[12]: REMOTE CONTROL ASSEMBLY (32ch) CB-123
(24ch) CB-124

Ref. No.	Description	Parts No.	Notes
12- 1	Panel, Top (32ch)	CB-123A	
2	Panel, Top (24ch)	CB-124A	
3	Plate, Side (R)	CB12302	
4	Plate, Side (L)	CB12303	
5	Hinge	CY2023	
6	Protector	CB12304	
7	Sheet, Leather	CB12310	
8	Protector	CB12309	
9	Panel, Bottom	CB12311	
10	Escutcheon	PZ4A013	
11	Escutcheon	PZ4A014	
12	PCB Ass'y, Timer/Switch	PB-7JGA	
13	PCB Ass'y, Master Switch	PB-7JCA	
14	PCB Ass'y, Channel Set Up	PB-7JDA	
15	PCB Ass'y, Display (32ch)	PB-7JAA	
	PCB Ass'y, Display (24ch)	PB-7JAB	
16	PCB Ass'y, CPU	PB-4FGA	
17	PCB Ass'y, Power Supply	PB-63AA	
18	PCB Ass'y, Transport Switch	PB-7JCA	
19	Heat Sink	CB12305	
20	Panel, Connector	CB12314	
21	Foot, Case	CY4063	
22	Cap, Knob	KN1048	
23	Knob	KN1046	
24	Lock, Connector	CN7B-061	
25	Lock, connector	CN7B-212	
26	Cable Assembly, Aux. Power	ZA-6EM	
27	Cable Assembly, Remote Control	ZA-6EL	
28	Tapping Screw	F32C06SZ	

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MX-80 SERIES TAPE RECORDER

SCHEMATIC DIAGRAMS (1/2)

TYPE C~

PART No.	DESCRIPTON	DWG No.
T00370B	Wiring Diagram (32ch)	3-12538
T00370C	Wiring Diagram (24ch)	3-12539
T00370D	Wiring Diagram (16ch)	3-12540
KH6C00B	Head Wiring Diagram (32ch)	3-12541
KH6D00B	Head Wiring Diagram (24ch)	3-12542
KH6E00B	Head Wiring Diagram (16ch)	3-12543
T00370E	Transport Wiring Diagram	3-12544
CB20W0B	Control Panel Assembly	3-12635
CB20W0C	Control Panel Assembly	3-12637
PB7AJ0A	Switch PCB Assembly (Ⅰ)	3-12641
PB7AK0A	Switch PCB Assembly (Ⅱ)	4-37429
ZA93E0A	Timer Display Assembly	3-12645
PB7HT0A	Timer Indicator PCB Assembly	3-12639
PB7HU0A	Timer Drive PCB Assembly	3-12643
SR1W00A	Tension Detect Assembly	4-37460
PB7LA0A	Tach (Ⅰ) PCB Assembly	4-42942
PB7DS0A	Tach (Ⅱ) PCB Assembly	4-42330
PB4FH0A	Safety PCB Assembly	4-42934
PB7MV0A	Reel Tach PCB Assembly	4-43028
PB4FD0B	Transport Control Brock Diagram	3-12633
PB4FD0A	Transport Control PCB Assembly (1/2)	3-12691
	Transport Control PCB Assembly (2/2)	3-12692
PB4HJ0A	Pinch ADJ PCB Assembly	3-12654
PB4FC0A	Reel Drive PCB Assembly	3-12617
PB4FB0A	Reel Control PCB Assembly	3-12608
ZA93G0A	Capstan Drive Assembly	4-42937
PB4FA0A	Capstan Control PCB Assembly	3-12607
PB4FE0A	Serial Remote Control PCB Assembly (1/2)	3-12651
	Serial Remote Control PCB Assembly (2/2)	3-12652
PB4EZ0A	422 DRV/RCV PCB Assembly	4-42796
PB7HX0A	VU Meter PCB Assembly	3-12519
PB7AA0A	Record Indicator PCB Assembly	4-36987
PB7AB0A	Peak Indicator PCB Assembly	4-36989

CONTINUED ON NEXT PAGE

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MX-80 SERIES TAPE RECORDER

SCHEMATIC DIAGRAMS (2/2)

TYPE C~

PART No.	DESCRIPTION	DWG No.
A11100B	Audio Wiring Diagram (32ch)	3-12545
A11110B	Audio Wiring Diagram (24ch)	3-12546
A11220B	Audio Wiring Diagram (16ch)	3-12547
PB4FF0A	Audio Control PCB Assembly (Command)	3-12548
	Audio Control PCB Assembly (Clock)	3-12549
PB19J0A	Audio Amplifier PCB Assembly (Playback)	3-12735
	Audio Amplifier PCB Assembly (Record)	3-12736
	Audio Amplifier PCB Assembly (Bias)	3-12739
	Audio Amplifier PCB Assembly (Control)	3-12738
PB7HV0A	Mother A PCB Assembly	3-12554
PB7HW0A	Mother B PCB Assembly	3-12555
PB7KG0A	Mother C PCB Assembly	3-12556
DS3J00B	Power Supply Assembly Wiring	3-12557
DS3J00A	Power Supply Assembly	3-12610
DS3J00C	Circuit Protector Assembly	4-42936
PB7HY0A	Voltage Select PCB Assembly	3-12609
PB7HZ0A	Power Indicator PCB Assembly	4-42935
CB1230B	Remote Controller Wiring Diagram	3-12630
PB4FG0A	CPU PCB Assembly	3-12619
PB63A0A	Power PCB Assembly	3-12622
PB7JA0A	Display PCB Assembly	3-12620
PB7JB0A	Transport Switch PCB Assembly	3-12625
PB7JC0A	Master Switch PCB Assembly	4-42946
PB7JD0A	Channel Set Up PCB Assembly	4-42943
PB7JG0A	Timer Indicator PCB Assembly	3-12624

Model	Note
MX-80-32-H	2" 32ch, High Speed Version
MX-80-32-L	2" 32ch, Low Speed Version
MX-80-24/32-H	2" 24ch Prewired for 32ch, High Speed Version
MX-80-24/32-L	2" 24ch Prewired for 32ch, Low Speed Version
MX-80-24-H	2" 24ch, High Speed Version
MX-80-24-L	2" 24ch, Low Speed Version
MX-80-16-H	2" 16ch, High Speed Version
MX-80-16-L	2" 16ch, Low Speed Version

High Speed : 30ips/15ips

Low Speed : 15ips/7.5ips

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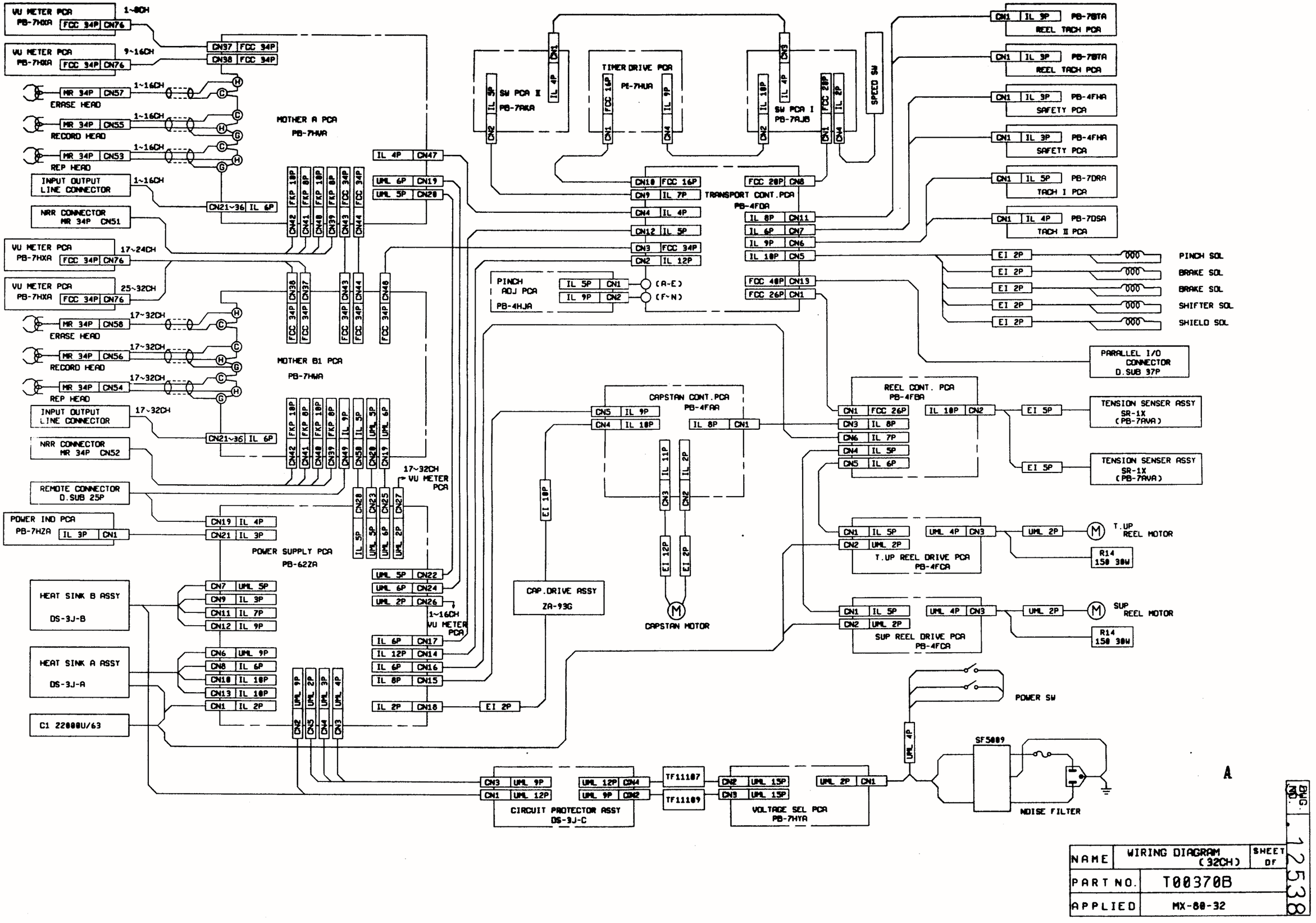

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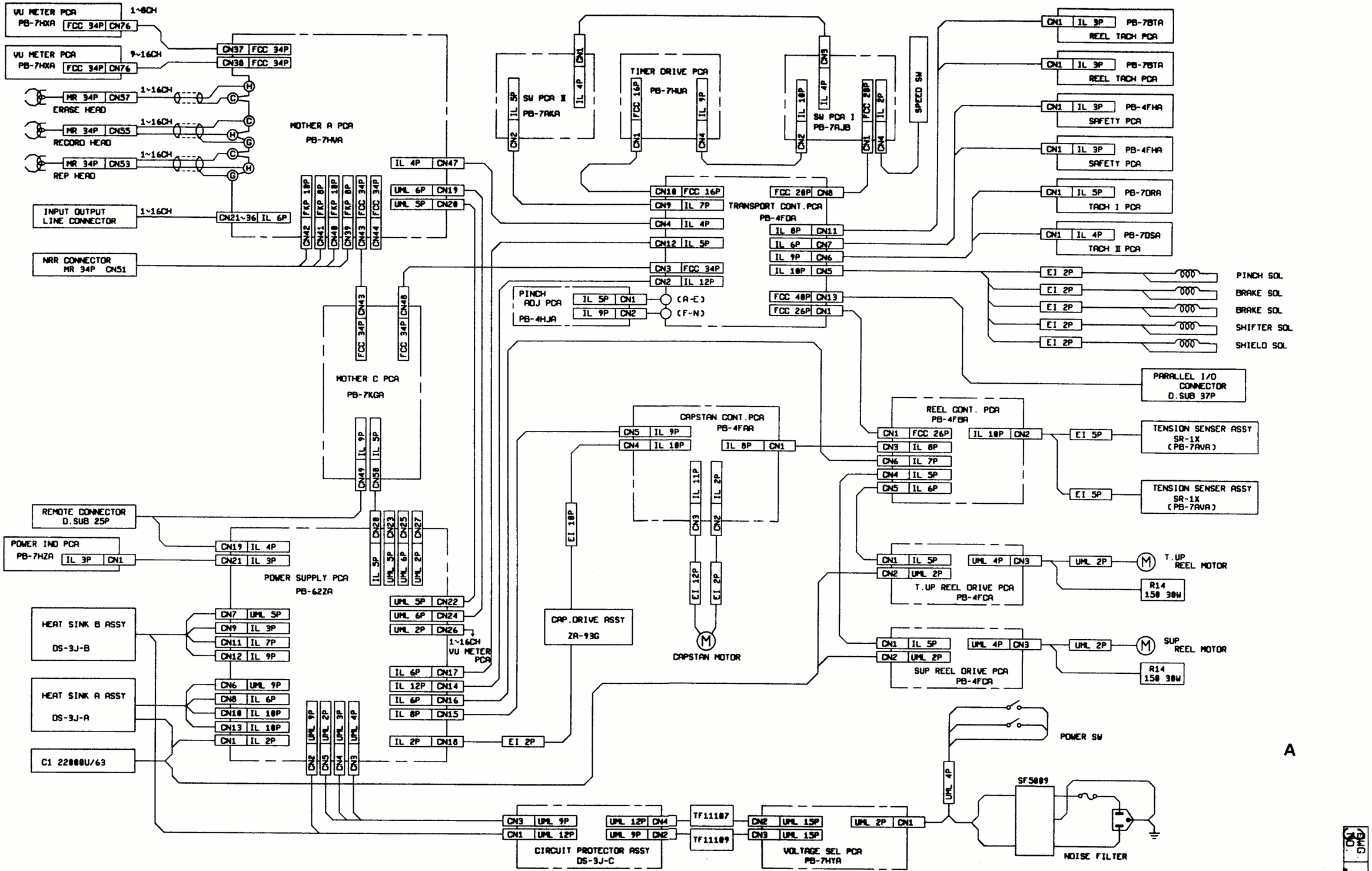

A

NAME	WIRING DIAGRAM (16CH)	SHEET OF
PART NO.	T00370D	
APPLIED	MX-80-16	

DWG. NO. 12540

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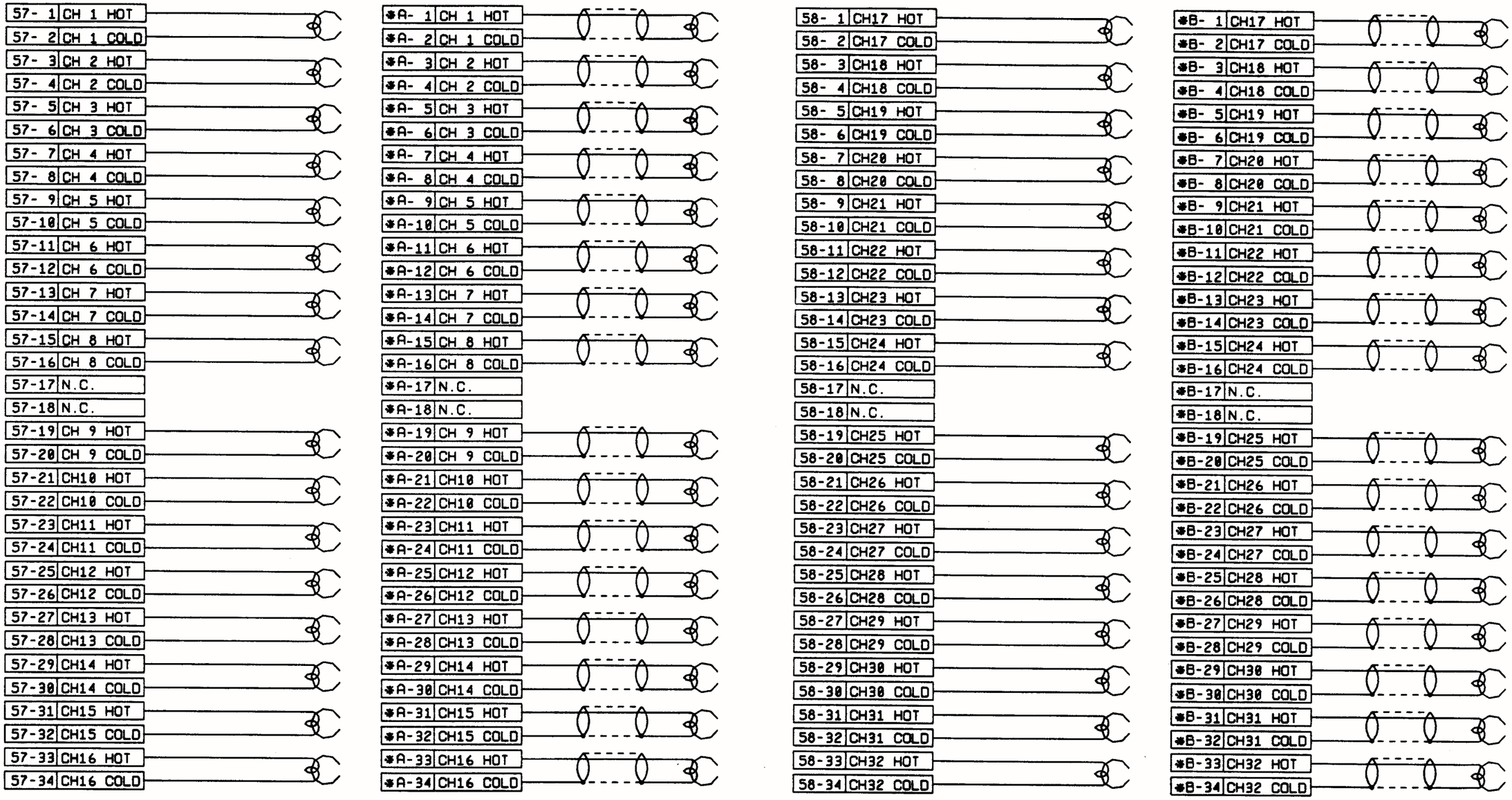

* A	* B	HEAD
CN53	CN54	REPRO
CN55	CN56	RECORD

CN	TO HEAD	OTARI PART NO.	DESCRIPTION
53,54	REPRO	CN23134130	MR-34F
55,56	RECORD	CN23134130	MR-34F
57,58	ERASE	CN23134129	MR-34M

A

NAME	HEAD WIRING DIAGRAM (32CH)	SHEET 1 OF1
PART NO.	KH6C00B	
APPLIED	KH-6C	

DWG. NO. 12541

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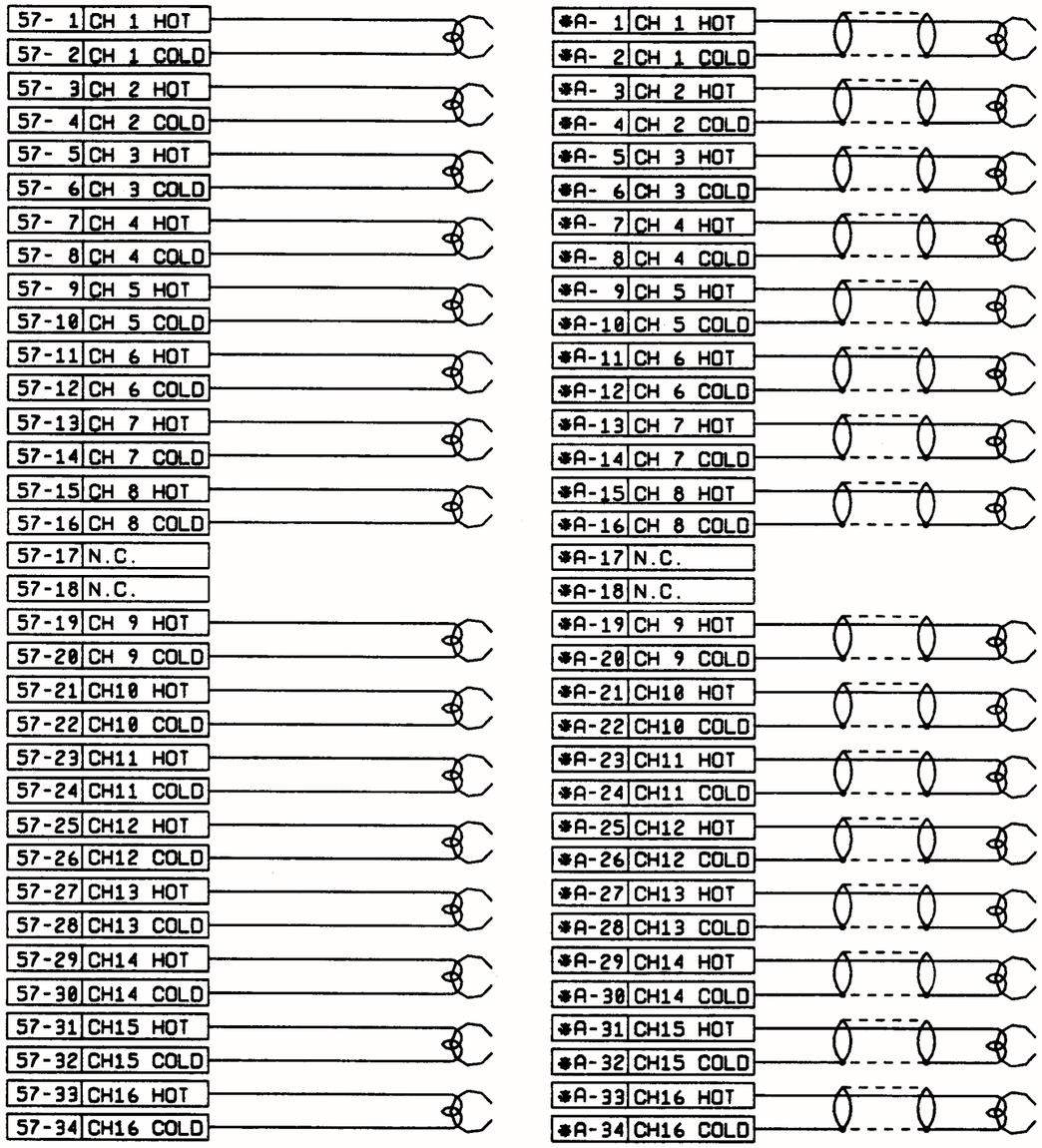

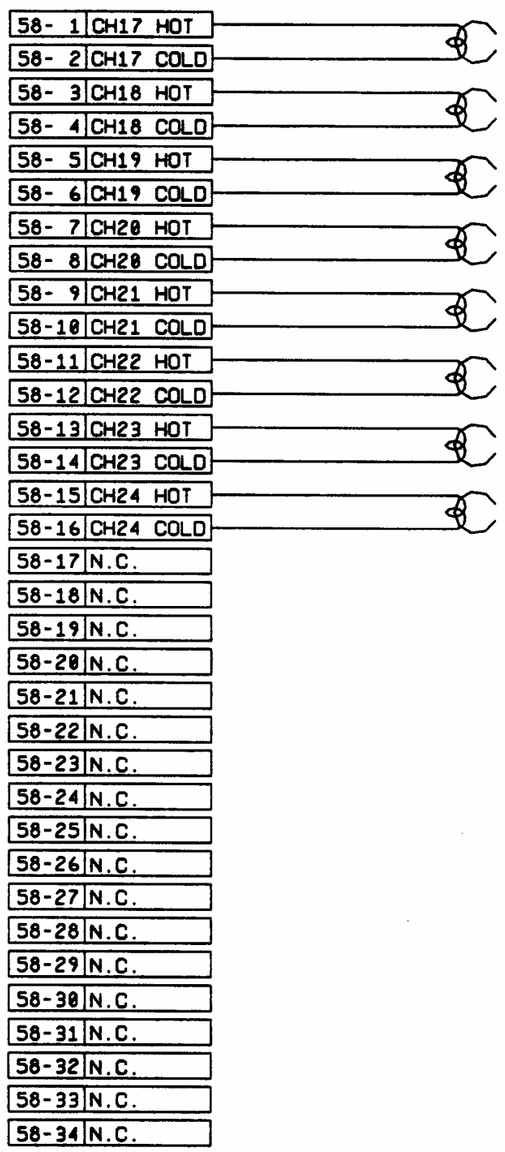

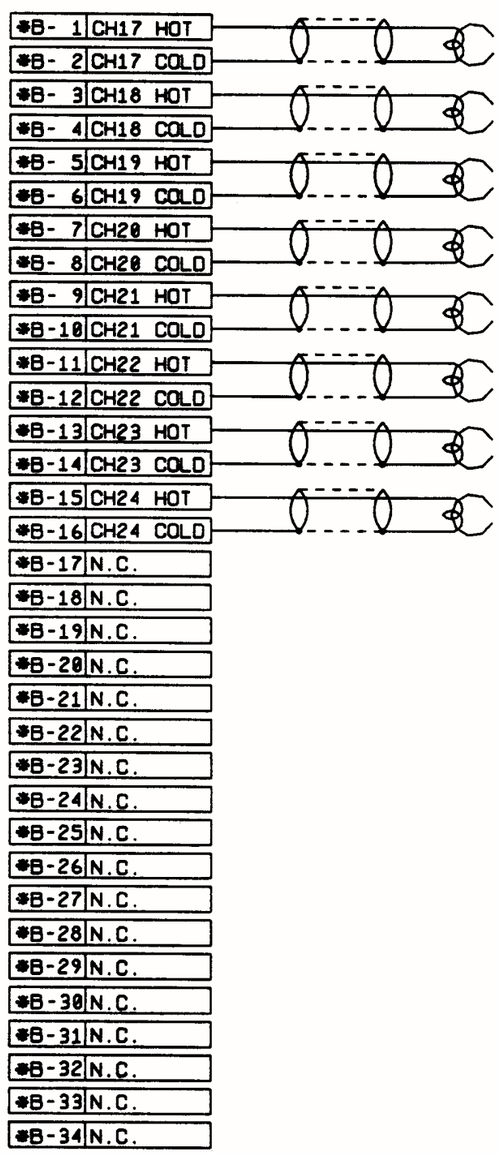

* A	* B	HEAD
CN53	CN54	REPRO
CN55	CN56	RECORD

CN	TO HEAD	OTARI PART NO.	DESCRIPTION
53,54	REPRO	CN234130	MR-34F
55,56	RECORD	CN234130	MR-34F
57,58	ERASE	CN234129	MR-34M

A

NAME	HEAD WIRING DIAGRAM (24CH)	SHEET 1 OF 1
PART NO.	KH6D00B	
APPLIED	KH-6D	

DWG. NO. 12542

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※	HEAD
CN53	REPRO
CN55	RECORD

CN	TO HEAD	OTARI PART NO.	DESCRIPTION
53	REPRO	CN234130	MR-34F
55	RECORD	CN234130	MR-34F
57	ERASE	CN234129	MR-34M

57- 1	CH 1 HOT
57- 2	CH 1 COLD
57- 3	CH 2 HOT
57- 4	CH 2 COLD
57- 5	CH 3 HOT
57- 6	CH 3 COLD
57- 7	CH 4 HOT
57- 8	CH 4 COLD
57- 9	CH 5 HOT
57-10	CH 5 COLD
57-11	CH 6 HOT
57-12	CH 6 COLD
57-13	CH 7 HOT
57-14	CH 7 COLD
57-15	CH 8 HOT
57-16	CH 8 COLD
57-17	N.C.
57-18	N.C.
57-19	CH 9 HOT
57-20	CH 9 COLD
57-21	CH10 HOT
57-22	CH10 COLD
57-23	CH11 HOT
57-24	CH11 COLD
57-25	CH12 HOT
57-26	CH12 COLD
57-27	CH13 HOT
57-28	CH13 COLD
57-29	CH14 HOT
57-30	CH14 COLD
57-31	CH15 HOT
57-32	CH15 COLD
57-33	CH16 HOT
57-34	CH16 COLD

※- 1	CH 1 HOT
※- 2	CH 1 COLD
※- 3	CH 2 HOT
※- 4	CH 2 COLD
※- 5	CH 3 HOT
※- 6	CH 3 COLD
※- 7	CH 4 HOT
※- 8	CH 4 COLD
※- 9	CH 5 HOT
※-10	CH 5 COLD
※-11	CH 6 HOT
※-12	CH 6 COLD
※-13	CH 7 HOT
※-14	CH 7 COLD
※-15	CH 8 HOT
※-16	CH 8 COLD
※-17	N.C.
※-18	N.C.
※-19	CH 9 HOT
※-20	CH 9 COLD
※-21	CH10 HOT
※-22	CH10 COLD
※-23	CH11 HOT
※-24	CH11 COLD
※-25	CH12 HOT
※-26	CH12 COLD
※-27	CH13 HOT
※-28	CH13 COLD
※-29	CH14 HOT
※-30	CH14 COLD
※-31	CH15 HOT
※-32	CH15 COLD
※-33	CH16 HOT
※-34	CH16 COLD

A

NAME	HEAD WIRING DIAGRAM (16CH)	SHEET 1 OF 1
PART NO.	KH6E00B	
APPLIED	KH-6E	

DWG. NO. 12543

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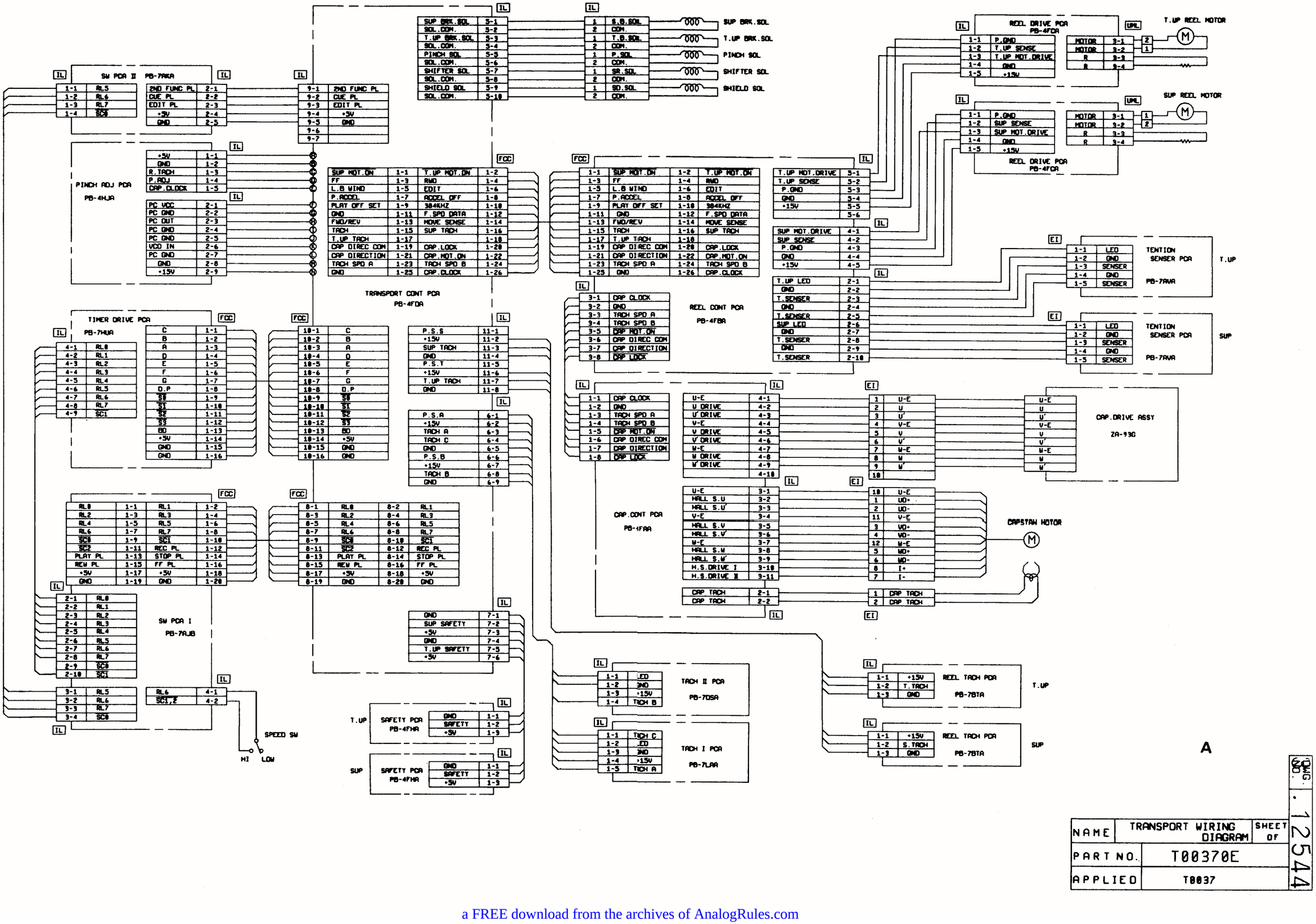

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CN1 DIP TYPE

1-2	C
1-4	B
1-16	A
1-14	D
1-12	E
1-10	F
1-8	G
1-6	D.P

1-18	DIG A
1-20	DIG 0
1-22	DIG 1
1-24	DIG 2
1-26	DIG 3
1-28	DIG 4
1-30	DIG 5
1-29	DIG B
1-27	DIG 6

1-1	RL 10
1-3	RL 11
1-5	RL 12
1-7	RL 13
1-9	RL 14
1-11	RL 15
1-13	RL 16
1-15	RL 17
1-17	S 14

HOUR: LD2, LD3 — MIN: LD4, LD5 — SEC: LD6, LD7

Each digit: pins 8, 9, 10, 5, 4, 2, 3, 7; pin 6 = DIG

LD10 TAPE SPD L
LD9 TAPE SPD H
SET
REPEAT
S.CUE3
S.CUE2
S.CUE1
S.ZERO

S.ZERO SW1 D1
S.CUE1 SW2 D2
S.CUE2 SW3 D3
S.CUE3 SW4 D4
REPEAT SW5 D5
SET SW6 D6
TIMER SW7 D7
CLR SW8 D8

FC SOKET

CN2

PIN NO=CN1

REF.NO.		OTARI PART NO.	DESCRIPTION
SW	1-6	WH11182Y	TM2-01-L8
		WH0B105C	TZ0104
	7	WH11181	TM1-01
		WH0B104C	TZ0004
	8	WH11181	TM1-01
		WH0B104U	TZ0006
LD	2-7	PN-0214	HDSP-7303
	9,10	PNTLR124	TLR124
D	1-8	PN-0199	MA171

A

3-12624 DWG.NO.

NAME	TIMER IND PCA
PART NO.	PB7JG0A
APPLIED	PB-7JGA

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CN1 DIP TYPE

1-2	C
1-4	B
1-16	A
1-14	D
1-12	E
1-10	F
1-8	G
1-6	D.P

1-18	DIG A
1-20	DIG 0
1-22	DIG 1
1-24	DIG 2
1-26	DIG 3
1-28	DIG 4
1-30	DIG 5
1-29	DIG B
1-27	DIG 6

1-1	RL 10
1-3	RL 11
1-5	RL 12
1-7	RL 13
1-9	RL 14
1-11	RL 15
1-13	RL 16
1-15	RL 17
1-17	S 14

HOUR: LD2, LD3 — MIN: LD4, LD5 — SEC: LD6, LD7

Each digit: pins 8, 9, 10, 5, 4, 2, 3, 7; pin 6 = DIG

LD10 TAPE SPD L
LD9 TAPE SPD H
SET
REPEAT
S.CUE3
S.CUE2
S.CUE1
S.ZERO

S.ZERO SW1 D1
S.CUE1 SW2 D2
S.CUE2 SW3 D3
S.CUE3 SW4 D4
REPEAT SW5 D5
SET SW6 D6
TIMER SW7 D7
CLR SW8 D8

FC SOKET

CN2

PIN NO=CN1

REF.NO.		OTARI PART NO.	DESCRIPTION
SW	1-6	WH11182Y	TM2-01-L8
		WH0B105C	TZ0104
	7	WH11181	TM1-01
		WH0B104C	TZ0004
	8	WH11181	TM1-01
		WH0B104U	TZ0006
LD	2-7	PN-0214	HDSP-7303
	9,10	PNTLR124	TLR124
D	1-8	PN-0199	MA171

A

3-12624 DWG.NO.

NAME	TIMER IND PCA
PART NO.	PB7JG0A
APPLIED	PB-7JGA

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CN76

1	GND A	2	
3	CH8(CH16,CH24,CH32) PEAK IND.		
		CH8(CH16,CH24,CH32) VU METER 4	J8
5	CH8(CH16,CH24,CH32) REC IND.		
		CH7(CH15,CH23,CH31) PEAK IND. 6	
7	CH7(CH15,CH23,CH31) VU METER		J7
		CH7(CH15,CH23,CH31) REC IND. 8	
9	CH6(CH14,CH22,CH30) PEAK IND.		
		CH6(CH14,CH22,CH30) VU METER 10	J6
11	CH6(CH14,CH22,CH30) REC IND.		
		CH5(CH13,CH21,CH29) PEAK IND. 12	
13	CH5(CH13,CH21,CH29) VU METER		J5
		CH5(CH13,CH21,CH29) REC IND. 14	
15	CH4(CH12,CH20,CH28) PEAK IND.		
		CH4,CH12,CH20,CH28) VU METER 16	J4
17	CH4(CH12,CH20,CH28) REC IND.		
		CH3(CH11,CH19,CH27) PEAK IND. 18	
19	CH3(CH11,CH19,CH27) VU METER		J3
		CH3(CH11,CH19,CH27) REC IMD. 20	
21	CH2(CH10,CH18,CH26) PEAK IND.		
		CH2(CH10,CH18,CH26) VU METER 22	J2
23	CH2(CH10,CH18,CH26) REC IND.		
		CH1(CH9,CH17,CH25) PEAK IND. 24	
25	CH1(CH9,CH17,CH25) VU METER		J1
		CH1(CH9,CH17,CH25) REC IND. 26	
27	GND A	28	J10
29	DLY 5V A	30	J9
31	GND A	32	
33		34	

C9 Ⓕ 0.33U

C10 + 47U/10

EACH CH DLY 5V A — 78-*-1

EACH CH PEAK IND. — 78-*-2

EACH CH PEAK IND. PCA PB-7ABA

EACH CH VU METER

C1-8 Ⓟ 390P

EACH CH VU METER

EACH CH GND A

EACH CH VU LAMP 6V

EACH CH VU LAMP 0V

EACH CH DLY 5V A — 77-*-1

EACH CH REC IND. — 77-*-2

EACH CH REC IND. PCA PB-7AAA

TO EACH CH GND A

TO EACH CH DLY 5V A

* : EACH CH NUMETER

NOTES : UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣‖⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓕ : MYLAR FILM CAPACITOR(±5%, 50V)
   - Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR(±5%)

Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
Ⓦ : METALLIZED PAPER CAPACITOR(±10%)
⊣‖⊢ : SPARK KILLER.
⚠ : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

A

NAME	VU METER PCA
PART NO.	PB7HX0A
APPLIED	PB-7HXA

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SPEED SW

H
L

PB-7AKA
SW PCA 2

2-1	2ND.F PL		
2-2	CUE PL		
2-3	EDIT PL		
2-4	+5V		
2-5	GND		

RL5	RL6	RL7	$\overline{SC0}$
1-1	1-2	1-3	1-4

RL6	$\overline{R2}$		
4-1	4-2		

RL5	RL6	RL7	$\overline{SC0}$
3-1	3-2	3-3	3-4

C	1-1	1-2	B
A	1-3	1-4	D
E	1-5	1-6	F
G	1-7	1-8	D.P
$\overline{S0}$	1-9	1-10	$\overline{S1}$
$\overline{S2}$	1-11	1-12	$\overline{S3}$
BD	1-13	1-14	+5V
GND	1-15	1-16	GND

3-1	C
3-2	B
3-3	A
3-4	D
3-5	E
3-6	F
3-7	G
3-8	D.P
3-9	DIG 8
3-10	DIG 9

RL0	4-1
RL1	4-2
RL2	4-3
RL3	4-4
RL4	4-5
RL5	4-6
RL6	4-7
RL7	4-8
$\overline{SC1}$	4-9

TIMER DISPLAY ASSY

ZA-93E

RL0	1-1	1-2	RL1
RL2	1-3	1-4	RL3
RL4	1-5	1-6	RL5
RL6	1-7	1-8	RL7
$\overline{SC0}$	1-9	1-10	$\overline{SC1}$
$\overline{SC2}$	1-11	1-12	REC PL
PLAY PL	1-13	1-14	STOP PL
REW PL	1-15	1-16	FF PL
+5V	1-17	1-18	+5V
GND	1-19	1-20	GND

RL0	1-1
RL1	1-2
RL2	1-3
RL3	1-4
RL4	1-5
RL5	1-6
RL6	1-7
RL7	1-8
$\overline{SC0}$	1-9
$\overline{SC1}$	1-10

SW PCA 1
PB-7AJB

TO TRANSP.CONT.PCA

TO TRANSP.CONT.PCA

A

3.12635.000

NAME	CONTROL PANEL ASSY
PART NO.	CB20W0B
APPLIED	CB-20WB

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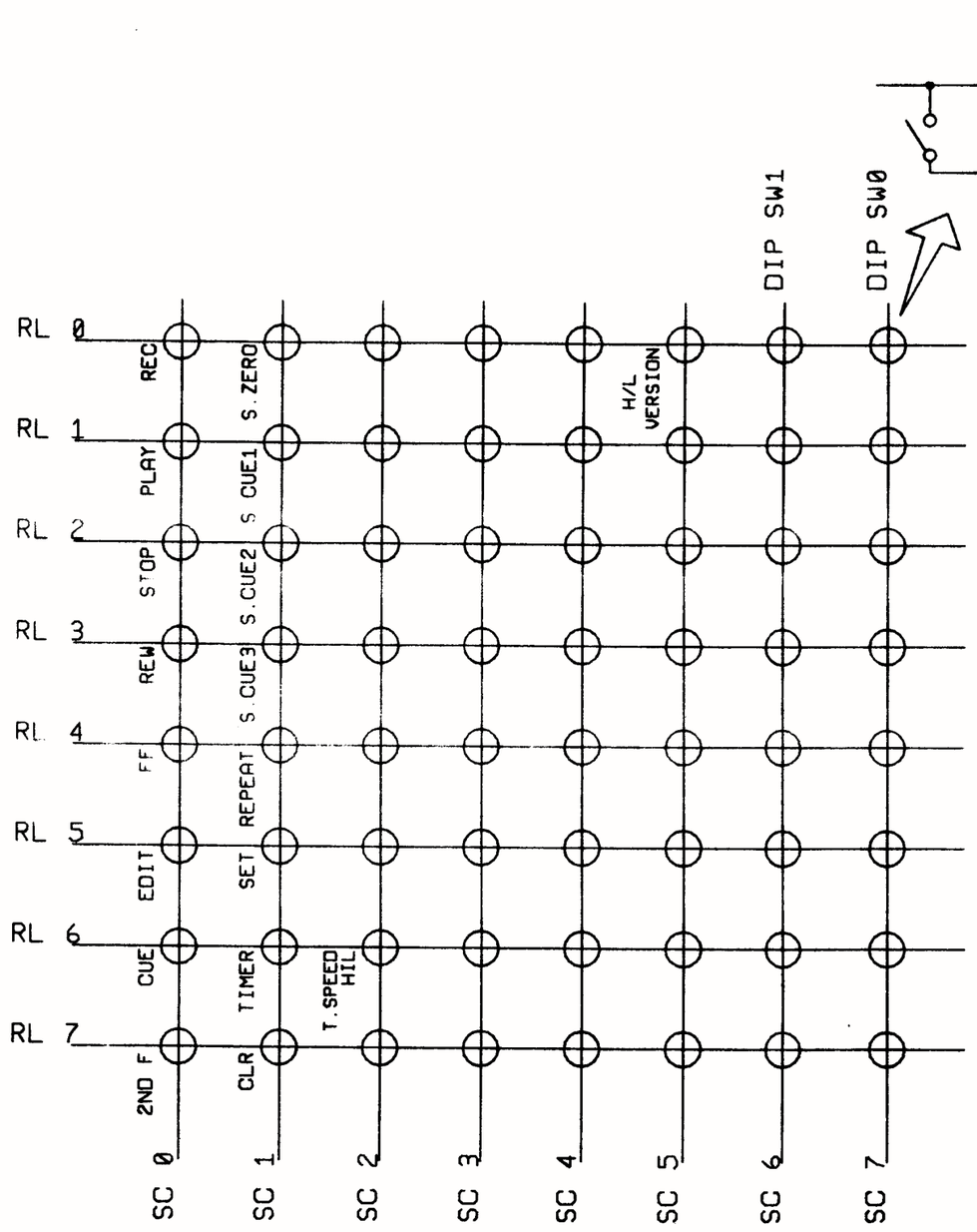

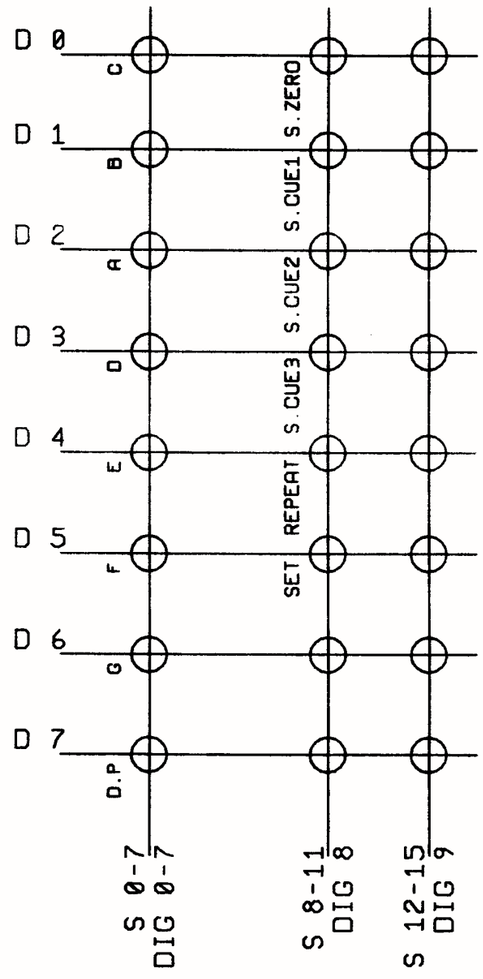

A

NAME	CONTROL PANEL ASSY
PART NO.	CB20W0C
APPLIED	CB-20WC

3-12637-0 DWG. NO.

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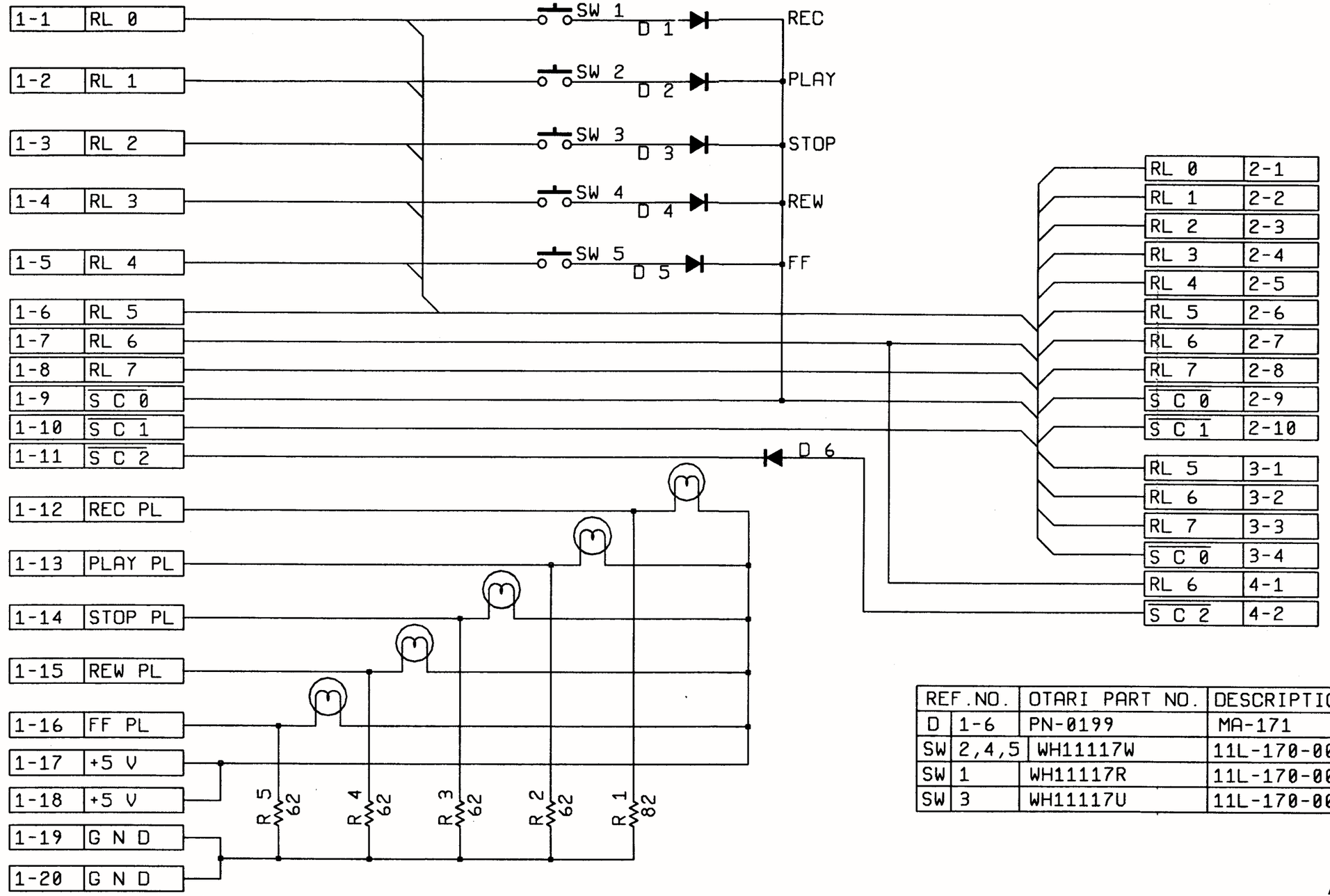

REF.NO.		OTARI PART NO.	DESCRIPTION
D	1-6	PN-0199	MA-171
SW	2,4,5	WH11117W	11L-170-0000
SW	1	WH11117R	11L-170-0000
SW	3	WH11117U	11L-170-0000

A

NAME	SW PCB ASSY 1
PART NO.	PB7AJ0A
APPLIED	PB-7AJA

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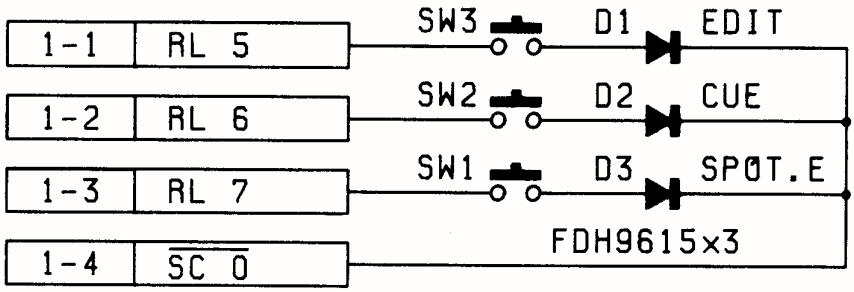

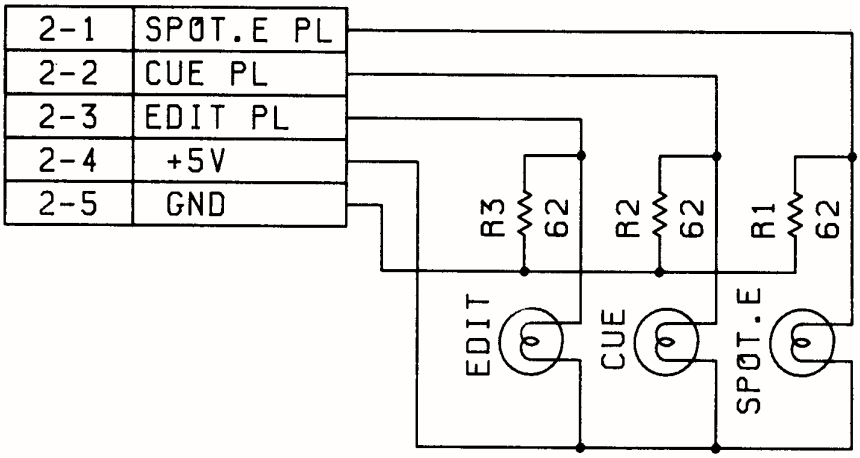

A

NAME	SW P.C.B. ASS'Y (II)
PART NO.	PB7AK0A
APPLIED	

DWG. NO. 4 . 37429

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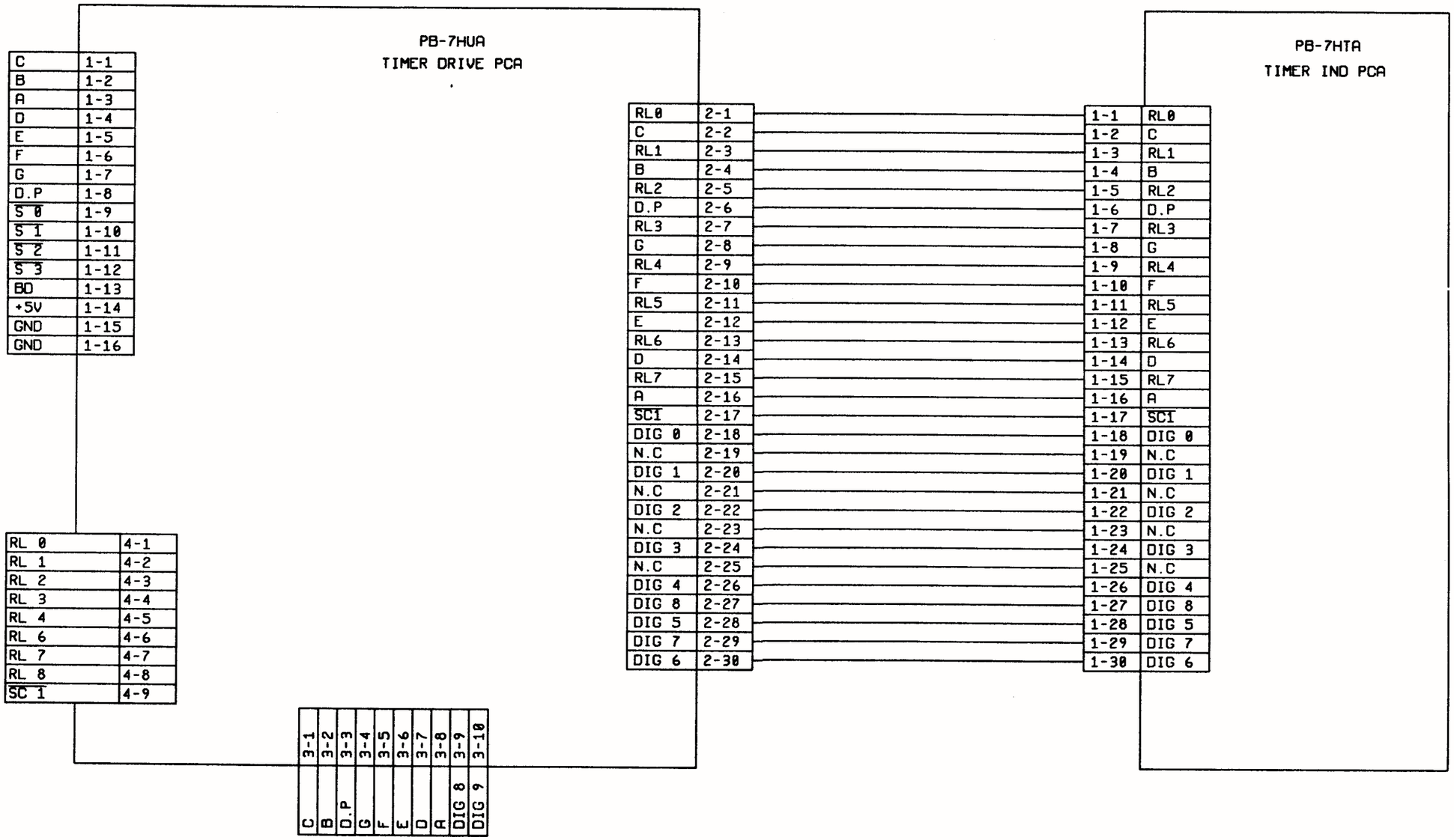

C

NAME	TIMER DISP ASSY	SHEET 1 OF 1	3-12645
PART NO.	ZA93E0A		DWG. NO.
APPLIED	ZA-93EA		

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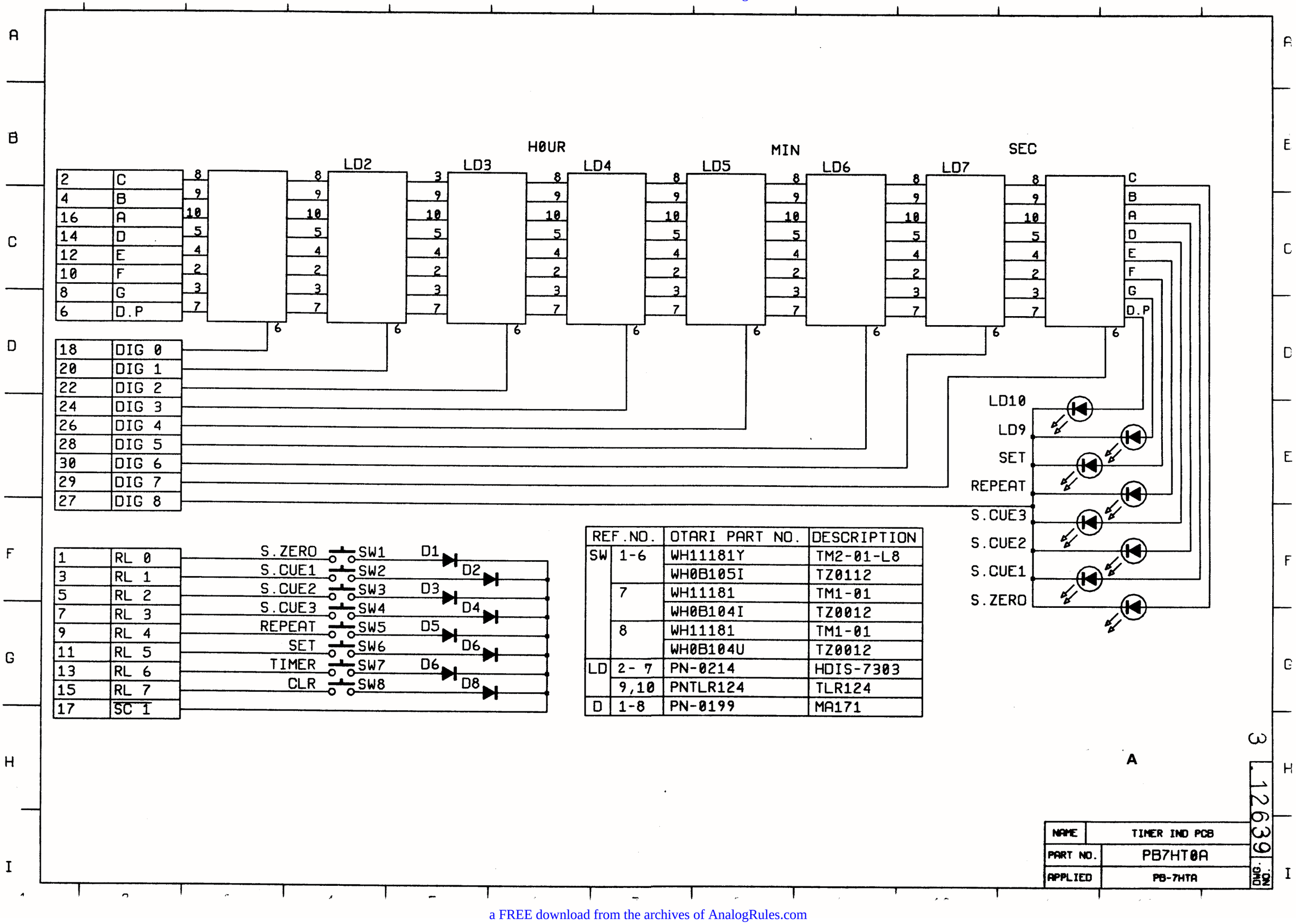

REF.NO.		OTARI PART NO.	DESCRIPTION
SW	1-6	WH11181Y	TM2-01-L8
		WH0B105I	TZ0112
	7	WH11181	TM1-01
		WH0B104I	TZ0012
	8	WH11181	TM1-01
		WH0B104U	TZ0012
LD	2- 7	PN-0214	HDIS-7303
	9,10	PNTLR124	TLR124
D	1-8	PN-0199	MA171

A

3

12639 .DWG

NAME	TIMER IND PCB
PART NO.	PB7HT0A
APPLIED	PB-7HTA

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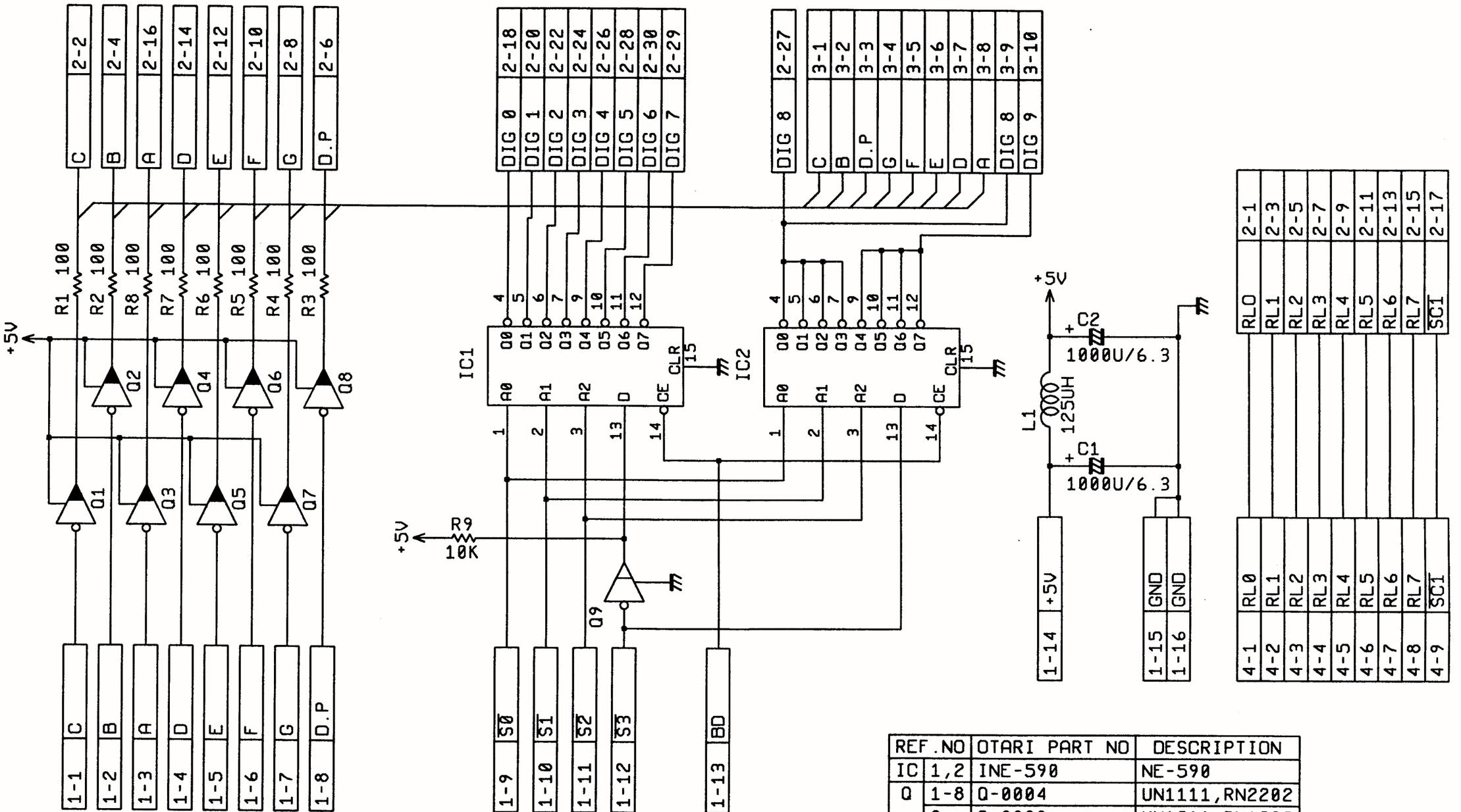

REF.NO		OTARI PART NO	DESCRIPTION
IC	1,2	INE-590	NE-590
Q	1-8	Q-0004	UN1111,RN2202
	9	Q-0008	UN1211,RN1202

NOTES:UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS,1/4W,5%.
2. CAPACITANCE VALUES ARE IN FARADS,50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ :ALUMINUM ELECTROLYTIC CAPACTOR.
   - (B) :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - (F) :MYLAR FILM CAPACITOR(±5%, 50V)
   - (S) :POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - (C) :CERAMIC CAPACITOR.
   - (M) :MICA CAPACITOR(±5%)

C

NAME	TIMER DRIVE PCA
PART NO.	PB7HU0A
APPLIED	PB-7HUA
DWG. NO.	3-12643

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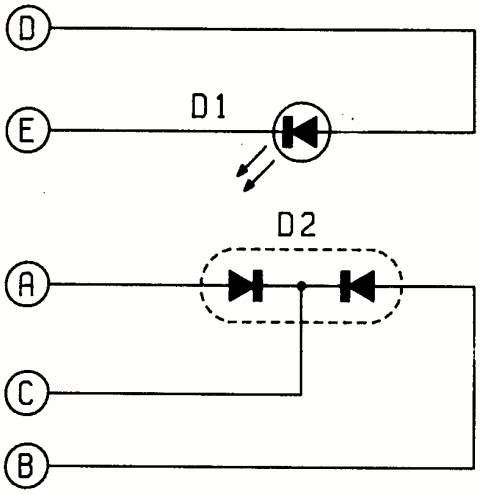

REF. NO.		ATARI PART NO.	DESCRIPTION
D	1	PNLN62S	LN62S
	2	PN-0213	MI-33H-2D

A

NAME	TENSION DET ASS'Y
PART NO.	SR1W00A
APPLIED	SR-1W

DWG. NO. 4 . 37460

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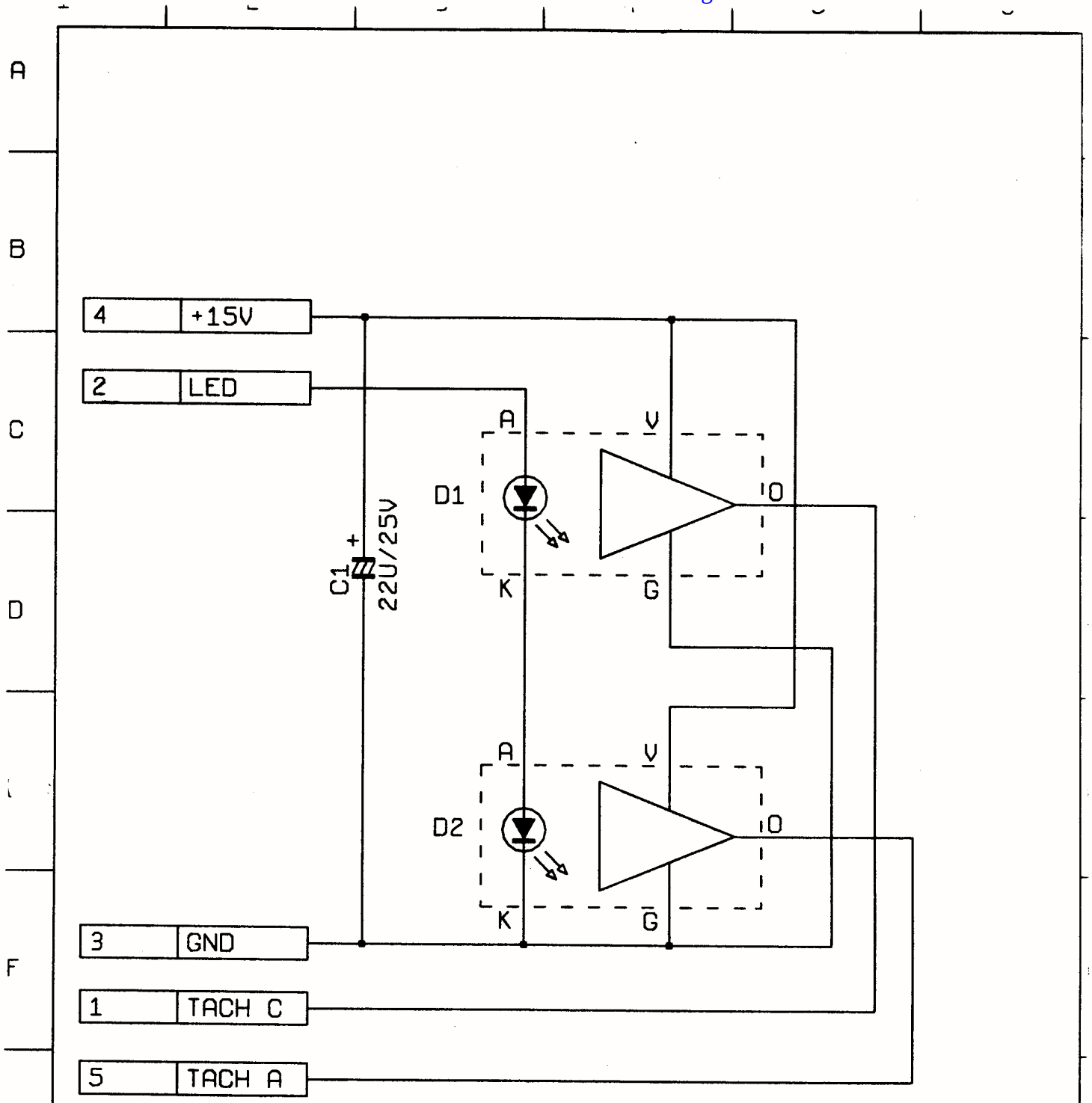

REF. NO.		OTARI PART NO.	DESCRIPTION
D	1.2	PN-0212	EE-SX401

NAME	ROLLER TACH I PCA
PART NO.	PB7LA0A
APPLIED	PB-7LAA

4 42942 DWG. NO.

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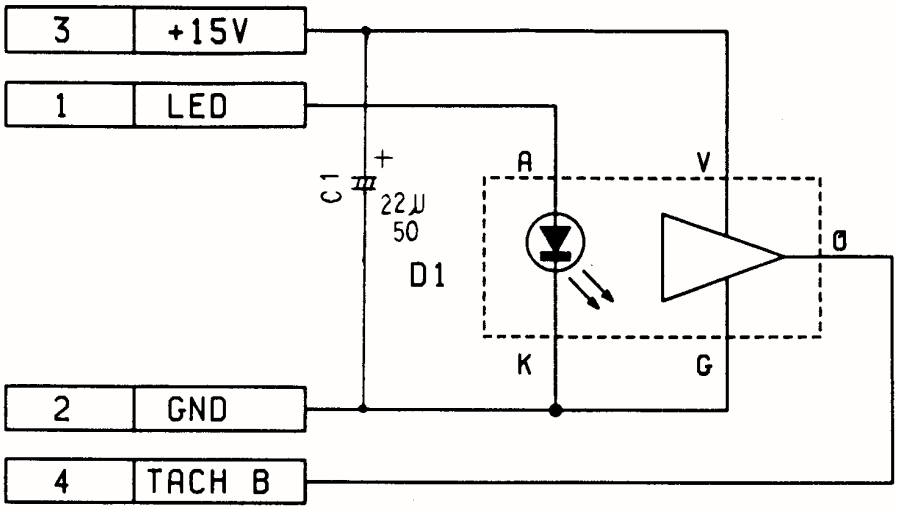

REF. NO.	ATARI PART NO.	DESCRIPTION
D 1	PN-0212	EE-SX401

TYPE NO(A
AT THE END

NAME	ROLLER TACH II PCA
PART NO.	PB7DSOA
APPLIED	PB-7DSA

DWG. NO. 4 . 42330

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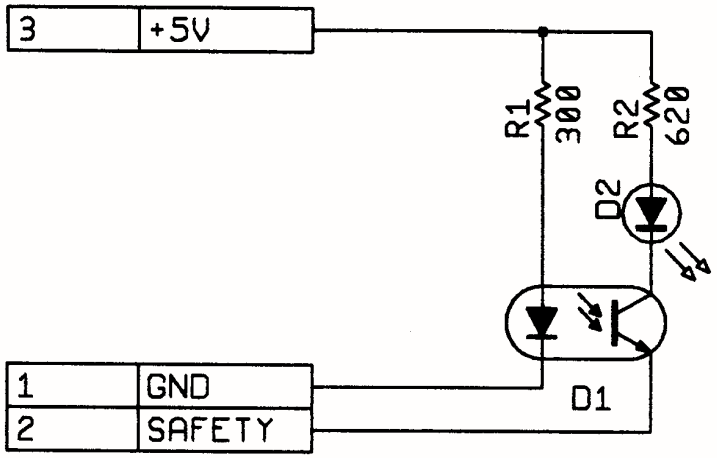

REF.NO		OTARI PART NO	DESCRIPTION
D	1	PN-0227	EE-SJ3W-B
	2	PNTLG124	TLG124

NAME	SAFETY PCA
PART NO.	PB4FH0A
APPLIED	PB-4FHA

4 | 42934 | DWG. NO.

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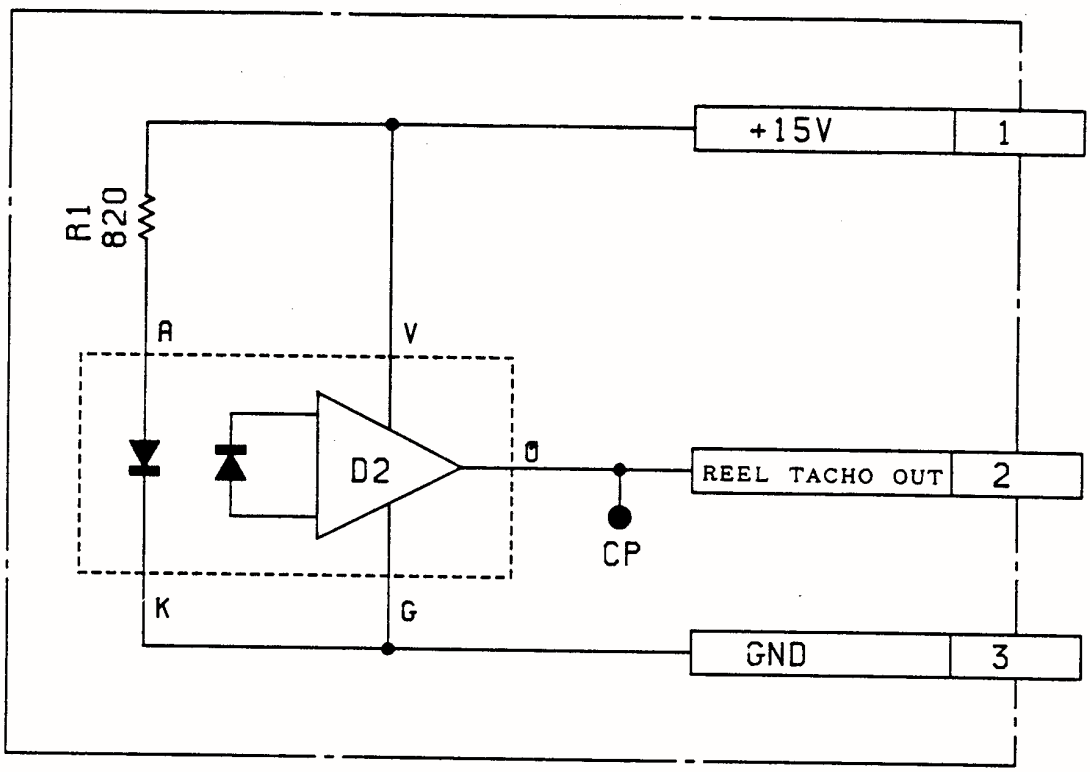

REF. NO.		ATARI PART NO.	DESCRIPTION
D			
	2	PN-0211	EE-SX301

TYPE NO(A)TO
( )AT THE END

NAME	REEL TACH PCA
PART NO.	PB7MV0A
APPLIED	PB-7MVA

DWG. NO. 4 . 43028

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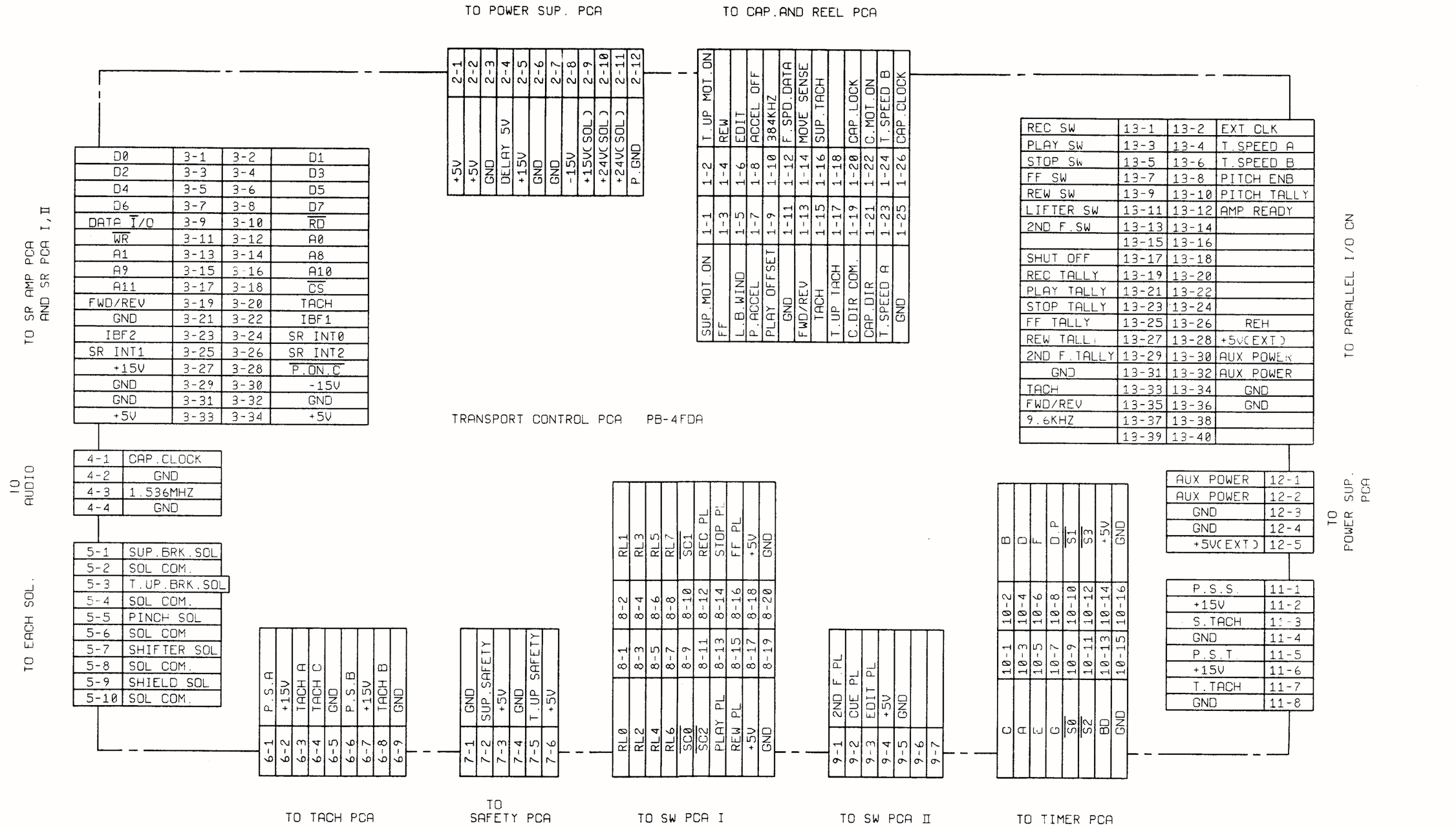

D0	3-1	3-2	D1
D2	3-3	3-4	D3
D4	3-5	3-6	D5
D6	3-7	3-8	D7
DATA I/O	3-9	3-10	RD
WR	3-11	3-12	A0
A1	3-13	3-14	A8
A9	3-15	3-16	A10
A11	3-17	3-18	CS
FWD/REV	3-19	3-20	TACH
GND	3-21	3-22	IBF1
IBF2	3-23	3-24	SR INT0
SR INT1	3-25	3-26	SR INT2
+15V	3-27	3-28	P.ON.C
GND	3-29	3-30	-15V
GND	3-31	3-32	GND
+5V	3-33	3-34	+5V

+5V	2-1	1-1	SUP.MOT.ON
+5V	2-2	1-2	T.UP MOT.ON
GND	2-3	1-3	FF
DELAY 5V	2-4	1-4	REW
+15V	2-5	1-5	L.B.WIND
GND	2-6	1-6	EDIT
GND	2-7	1-7	P.ACCEL
-15V	2-8	1-8	ACCEL OFF
+15V(SOL)	2-9	1-9	PLAY OFFSET
+24V(SOL)	2-10	1-10	384KHZ
+24V(SOL)	2-11	1-11	GND
P.GND	2-12	1-12	F.SPD.DATA
		1-13	FWD/REV
		1-14	MOVE SENSE
		1-15	TACH
		1-16	SUP.TACH
		1-17	T.UP TACH
		1-18	
		1-19	C.DIR COM.
		1-20	CAP.LOCK
		1-21	CAP.DIR
		1-22	C.MOT.ON
		1-23	T.SPEED A
		1-24	T.SPEED B
		1-25	GND
		1-26	CAP CLOCK

REC SW	13-1	13-2	EXT CLK
PLAY SW	13-3	13-4	T.SPEED A
STOP SW	13-5	13-6	T.SPEED B
FF SW	13-7	13-8	PITCH ENB
REW SW	13-9	13-10	PITCH TALLY
LIFTER SW	13-11	13-12	AMP READY
2ND F.SW	13-13	13-14	
	13-15	13-16	
SHUT OFF	13-17	13-18	
REC TALLY	13-19	13-20	
PLAY TALLY	13-21	13-22	
STOP TALLY	13-23	13-24	
FF TALLY	13-25	13-26	REH
REW TALLY	13-27	13-28	+5V(EXT)
2ND F.TALLY	13-29	13-30	AUX POWER
GND	13-31	13-32	AUX POWER
TACH	13-33	13-34	GND
FWD/REV	13-35	13-36	GND
9.6KHZ	13-37	13-38	
	13-39	13-40	

CAP.CLOCK	4-1	4-2	GND
GND	4-3	4-4	1.536MHZ

SUP.BRK.SOL	5-1	5-2	SOL COM.
T.UP.BRK.SOL	5-3	5-4	SOL COM.
PINCH SOL	5-5	5-6	SOL COM
SHIFTER SOL	5-7	5-8	SOL COM.
SHIELD SOL	5-9	5-10	SOL COM.

P.S.A	6-1	6-2	+15V
TACH A	6-3	6-4	TACH C
GND	6-5	6-6	P.S.B
+15V	6-7	6-8	TACH B
GND	6-9		

GND	7-1	7-2	SUP.SAFETY
+5V	7-3	7-4	GND
T.UP SAFETY	7-5	7-6	+5V

RL1	8-1	8-2	RL0
RL3	8-3	8-4	RL2
RL5	8-5	8-6	RL4
RL7	8-7	8-8	RL6
SC1	8-9	8-10	SC0
REC PL	8-11	8-12	SC2
STOP PL	8-13	8-14	PLAY PL
FF PL	8-15	8-16	REW PL
+5V	8-17	8-18	+5V
GND	8-19	8-20	GND

2ND F.PL	9-1	9-2	CUE PL
EDIT PL	9-3	9-4	+5V
GND	9-5	9-6	
	9-7		

B	10-1	10-2	
D	10-3	10-4	
F	10-5	10-6	
D.P	10-7	10-8	
S1	10-9	10-10	
S3	10-11	10-12	
+5V	10-13	10-14	
GND	10-15	10-16	
C	10-17	10-18	
A	10-19	10-20	
E	10-21	10-22	
G	10-23	10-24	
S0	10-25	10-26	
S2	10-27	10-28	
BD	10-29	10-30	
GND	10-31	10-32	

AUX POWER	12-1	12-2	AUX POWER
GND	12-3	12-4	GND
+5V(EXT)	12-5		

P.S.S.	11-1	11-2	+15V
S.TACH	11-3	11-4	GND
P.S.T	11-5	11-6	+15V
T.TACH	11-7	11-8	GND

A

NAME	TRANSPORT CONNECTION DIAGRAM	SHEET	OF
PART NO.	PB4FD0B		
APPLIED	PB-4FDB		

3.12633

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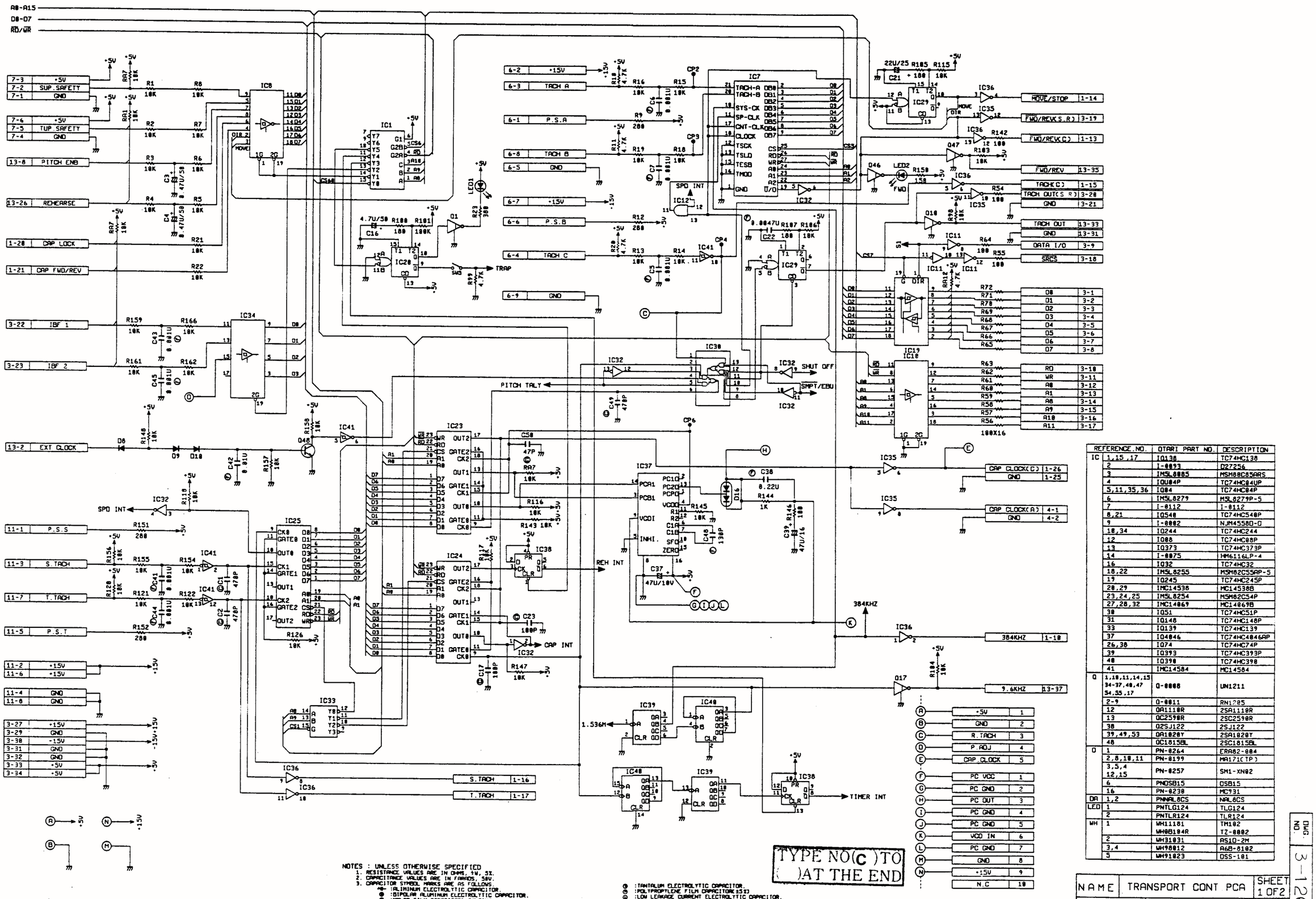

REFERENCE NO.		QTARI PART NO.	DESCRIPTION
IC	1,15,17	IQ138	TC74HC138
	2	I-0093	D27256
	3	IMSL8085	MSM80C85ARS
	4	IQU04P	TC74HC04UP
	5,11,35,36	IQ04	TC74HC04P
	6	IMSL8279	MSL8279P-5
	7	I-0112	I-0112
	8,21	IQ540	TC74HC540P
	9	I-0082	NJM4558D-D
	10,34	IQ244	TC74HC244
	12	IQ08	TC74HC08P
	13	IQ373	TC74HC373P
	14	I-0075	HM6116LP-4
	16	IQ32	TC74HC32
	18,22	IMSL8255	MSM82C55AP-5
	19	IQ245	TC74HC245P
	20,29	IMC14538	MC14538B
	23,24,25	IMSL8254	MSM82C54P
	27,28,32	IMC14069	MC14069B
	30	IQ51	TC74HC51P
	31	IQ148	TC74HC148P
	33	IQ139	TC74HC139
	37	IQ4046	TC74HC4046AP
	26,38	IQ74	TC74HC74P
	39	IQ393	TC74HC393P
	40	IQ390	TC74HC390
	41	IMC14584	MC14584
Q	1,10,11,14,15 34-37,40,42 54,55,17	Q-0006	UN1211
	2-9	Q-0011	RN1205
	12	QA1110R	2SA1110R
	13	QC2590R	2SC2590R
	38	Q2SJ122	2SJ122
	39,49,53	QA1020Y	2SA1020Y
	48	QC1815BL	2SC1815BL
D	1	PN-0264	ERA82-004
	2,8,18,11	PN-0199	MA171(TP)
	3,5,4 12,15	PN-0257	SM1-XN02
	6	PNOSB15	OSB15
	16	PN-0230	MC931
DA	1,2	PNNAL8CS	NAL8CS
LED	1	PNTLG124	TLG124
	2	PNTLR124	TLR124
WH	1	WH11181 WH08194R	TM102 TZ-0002
	2	WH31031	AS1D-2M
	3,4	WH90012	A6B-0102
	5	WH91023	OSS-101

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, +1%, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
:ALUMINUM ELECTROLYTIC CAPACITOR.
:BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
:MYLAR FILM CAPACITOR(±5%,50V)
:POLYSTYRENE FILM CAPACITOR(±5%,50V)
:CERAMIC CAPACITOR
:MICA CAPACITOR(±5%)

:TANTALUM ELECTROLYTIC CAPACITOR.
:POLYPROPYLENE FILM CAPACITOR(±5%)
:LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
:METALLISED PAPER CAPACITOR(±10%)
:SPARK KILLER.
:SAFETY COMPONENT :REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

NAME	TRANSPORT CONT PCA	SHEET	1 OF 2
PART NO.	PB4FD0A	DWG. NO.	3-12691
APPLIED	PB-4FDA		

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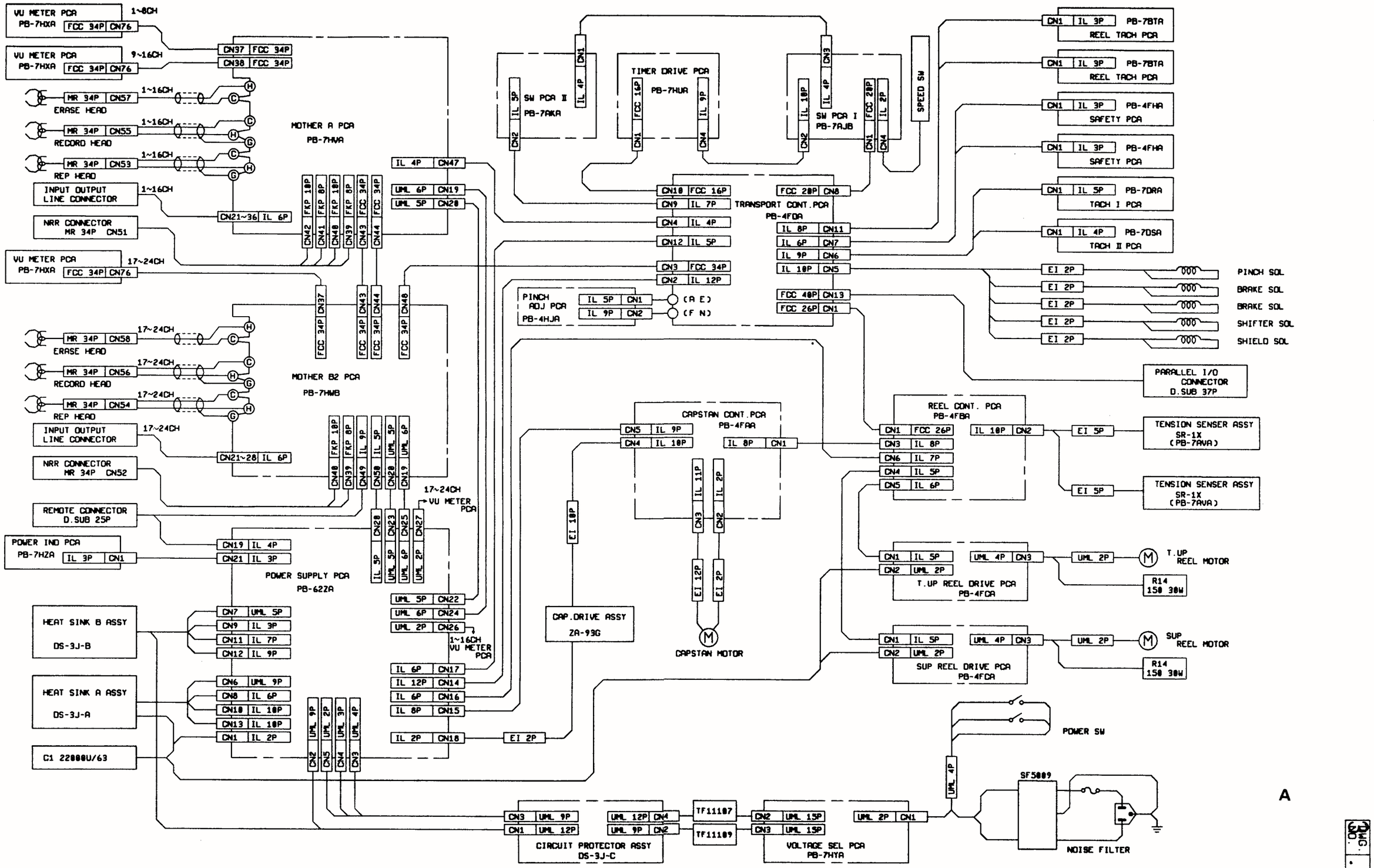

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CABLE

TO	FROM	DESCRIPTION
CH1~8 VU METER	MOTHER A CN37	PZ9D137
CH9~16 VU METER	MOTHER A CN38	PZ9D137
CH17~24 VU METER	MOTHER B2 CN37	PZ9D138
MOTHER B2 CN43	MOTHER A CN43	PZ9D139
MOTHER B2 CN44	MOTHER A CN43	PZ9D139
CN51 NR REMOTE	MOTHER A CN39~42	ZA-6EF
CN52 NR REMOTE	MOTHER B2 CN39,40	ZA-6EG

CN NUMBER OF EACH CHANNEL

	CH	CONNECTOR NUMBER				
MOTHER A	1	21	59	79	95	111
	2	22	60	80	96	112
	3	23	61	81	97	113
	4	24	62	82	98	114
	5	25	63	83	99	115
	6	26	64	84	100	116
	7	27	65	85	101	117
	8	28	66	86	102	118
	9	29	67	87	103	119
	10	30	68	88	104	120
	11	31	69	89	105	121
	12	32	70	90	106	122
	13	33	71	91	107	123
	14	34	72	92	108	124
	15	35	73	93	109	125
	16	36	74	94	110	126
MOTHER B2	17	21	59	79	95	111
	18	22	60	80	96	112
	19	23	61	81	97	113
	20	24	62	82	98	114
	21	25	63	83	99	115
	22	26	64	84	100	116
	23	27	65	85	101	117
	24	28	66	86	102	118
DESCRIPTION		LINE INPUT/OUTPUT	SEL.REP OUTPUT	RECORD TALLY	SOURCE FOR NOISE REDUCTION	PLAY BACK FOR NOISE REDUCTION

A

NAME	AUDIO WIRING DIAGRAM (24CH)	SHEET OF	3 12546
PART NO.	A11110B		
APPLIED			

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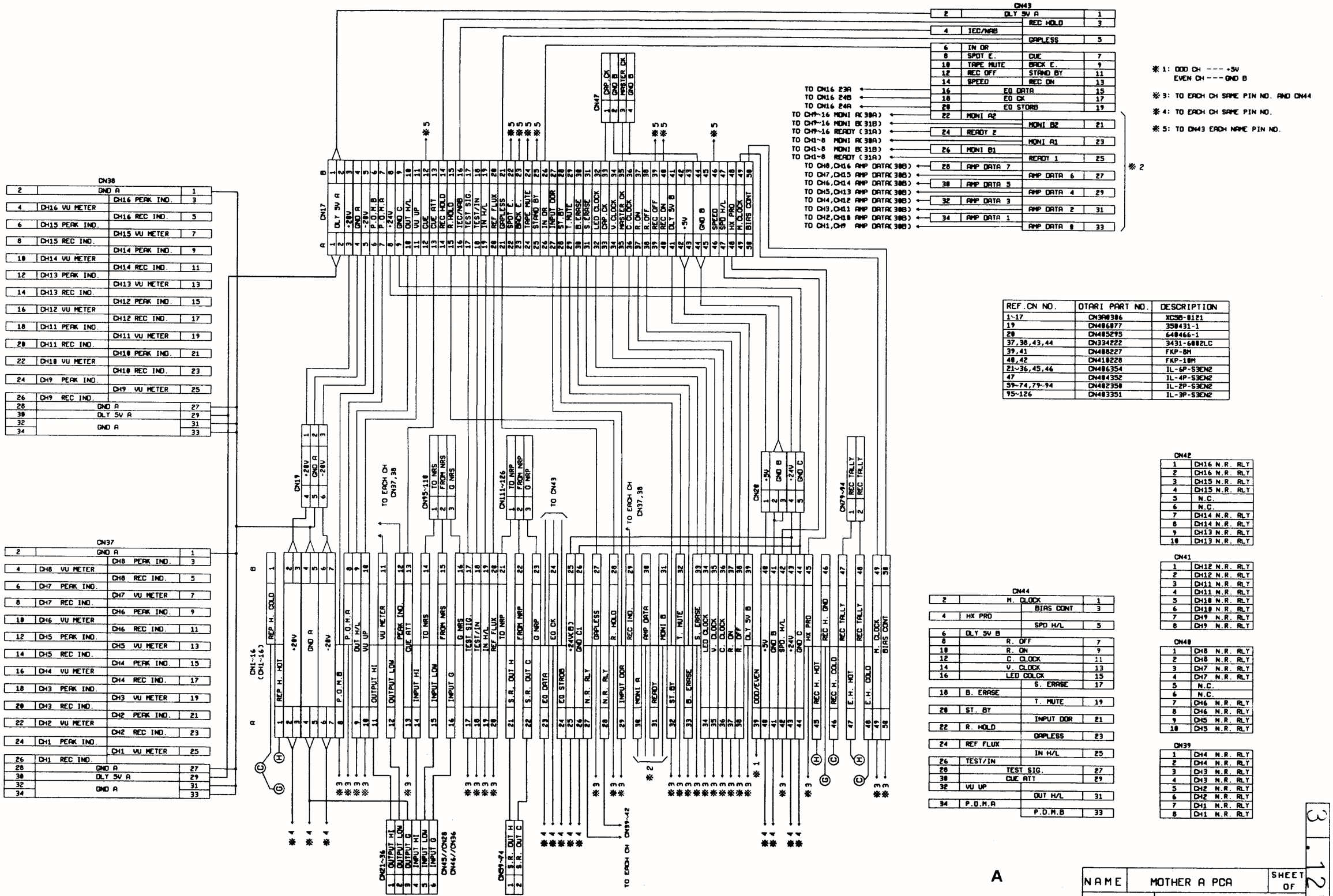

REF.CN NO.	OTARI PART NO.	DESCRIPTION
1~17	CN3A0386	XC50-0121
19	CN406077	350431-1
20	CN405295	640466-1
37,38,43,44	CN334222	3431-6002LC
39,41	CN408227	FKP-8M
40,42	CN410228	FKP-10M
21~36,45,46	CN406354	IL-6P-S3CN2
47	CN404352	IL-4P-S3CN2
59~74,79~94	CN402350	IL-2P-S3CN2
95~126	CN403351	IL-3P-S3CN2

A

NAME	MOTHER A PCA
PART NO.	PB7HV0A
APPLIED	PB-7HVA
SHEET OF	3 OF 12554

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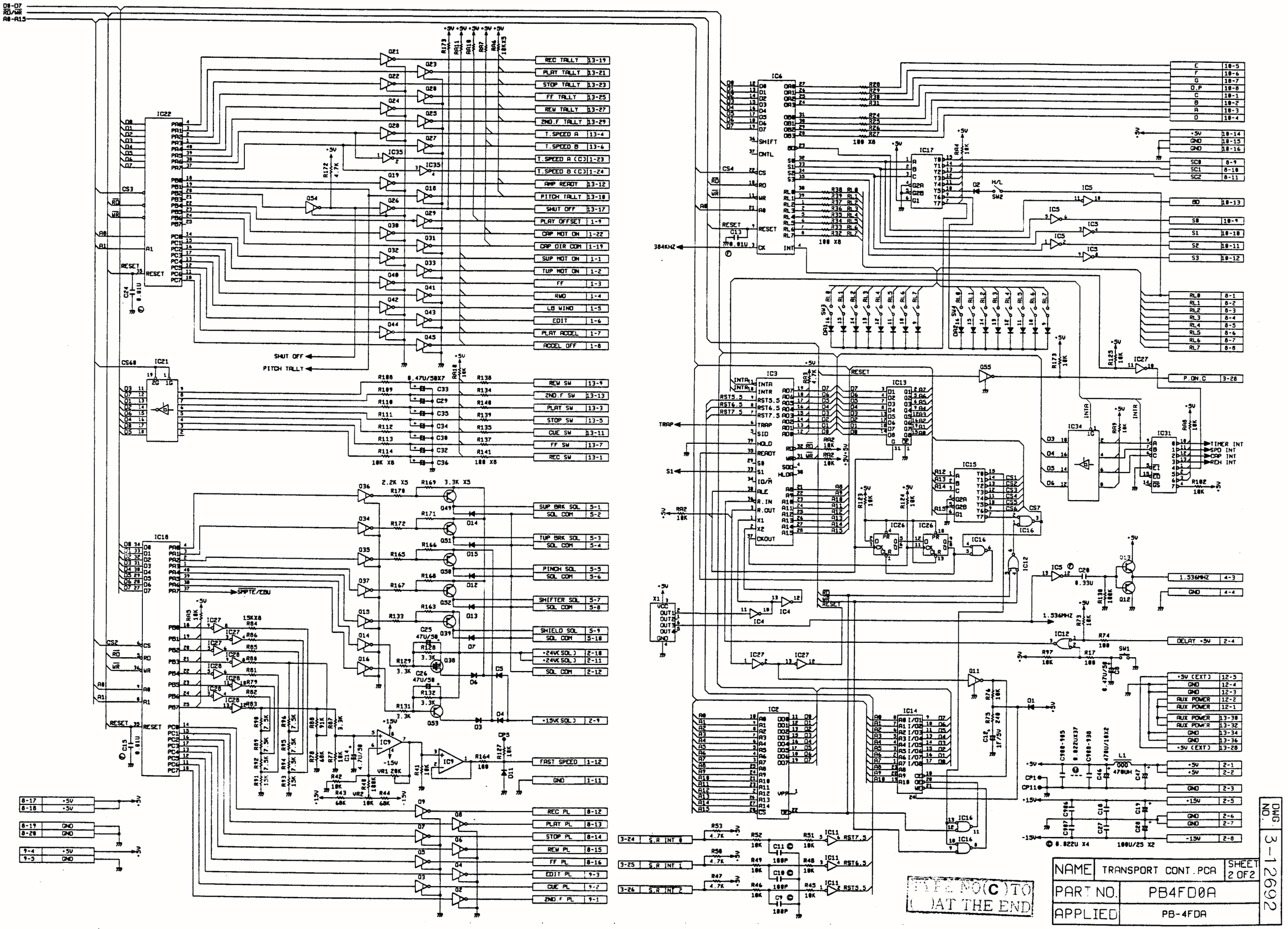

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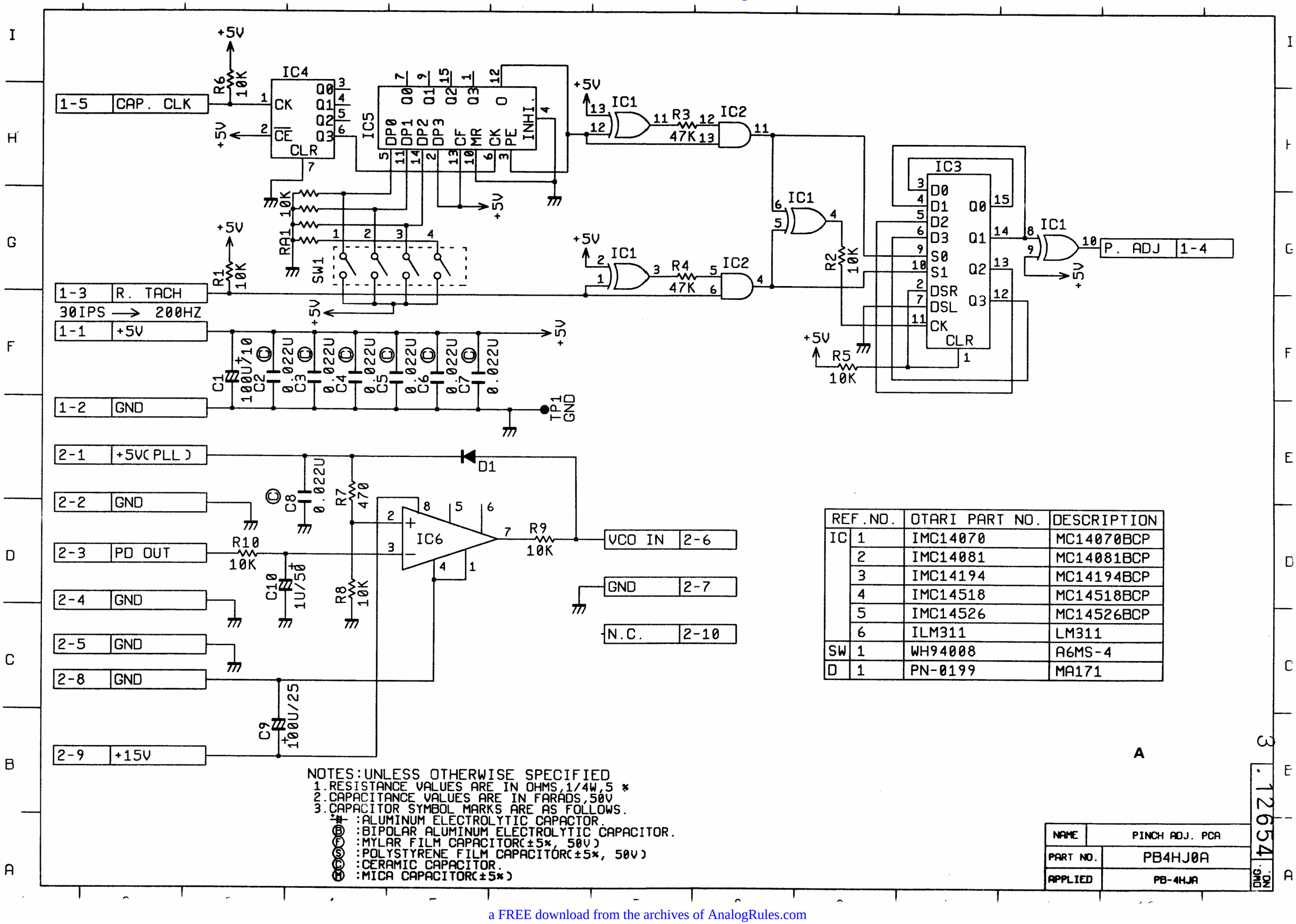

NOTES:UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS,1/4W,5 %
2. CAPACITANCE VALUES ARE IN FARADS,50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊕ :ALUMINUM ELECTROLYTIC CAPACTOR.
   - Ⓑ :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ :MYLAR FILM CAPACITOR(±5%, 50V)
   - Ⓢ :POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - Ⓒ :CERAMIC CAPACITOR.
   - Ⓜ :MICA CAPACITOR(±5%)

REF.NO.		OTARI PART NO.	DESCRIPTION
IC	1	IMC14070	MC14070BCP
	2	IMC14081	MC14081BCP
	3	IMC14194	MC14194BCP
	4	IMC14518	MC14518BCP
	5	IMC14526	MC14526BCP
	6	ILM311	LM311
SW	1	WH94008	A6MS-4
D	1	PN-0199	MA171

A

NAME	PINCH ADJ. PCA
PART NO.	PB4HJ0A
APPLIED	PB-4HJA

3-126541-0 DWG

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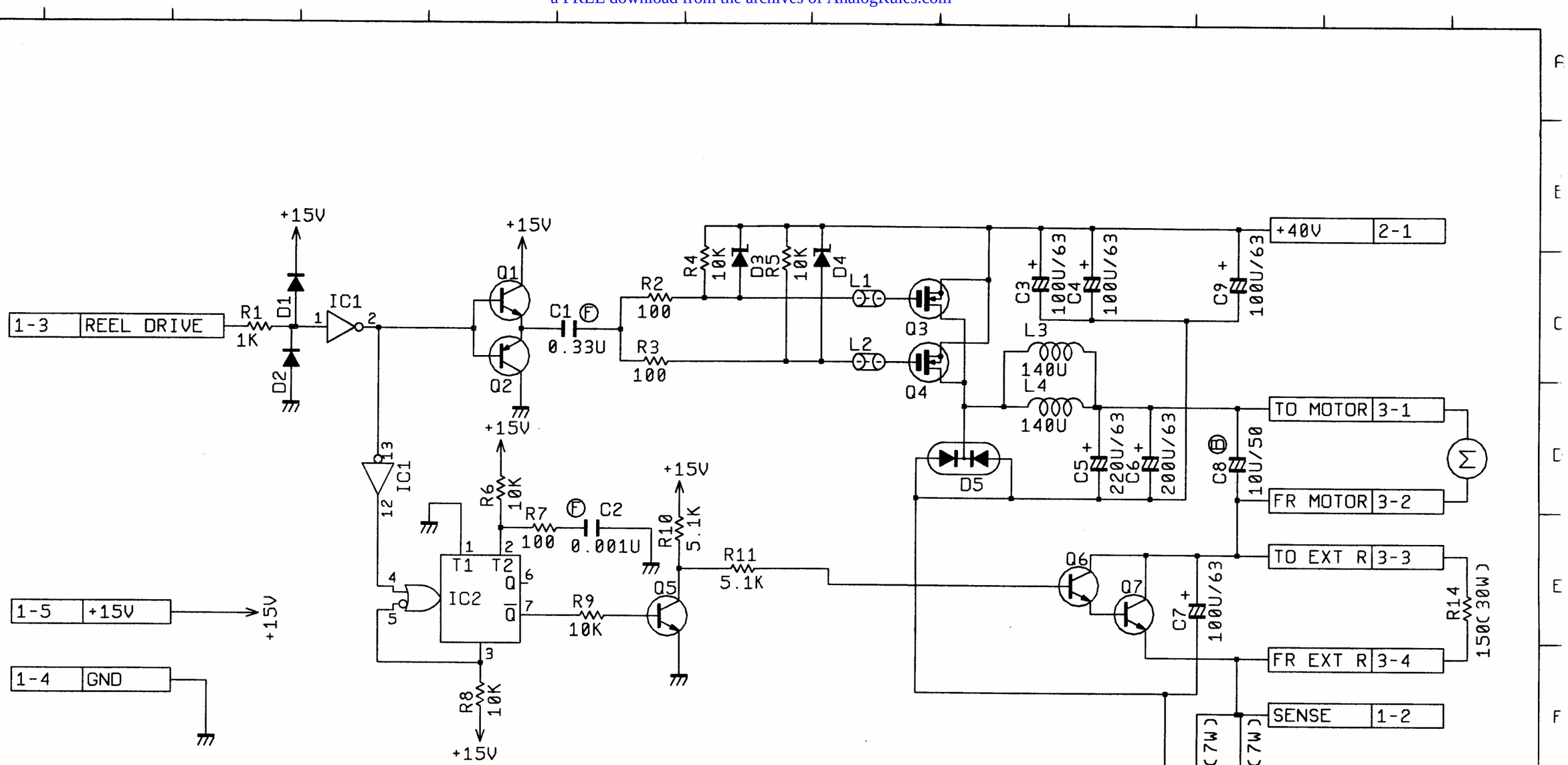

REF.NO.		OTARI PART NO.	DESCRIPTION
IC	1	IMC14069	MC14069
	2	IMC14538	MC14538
Q	1	QC2590R	2SC2590R
	2	QA1110R	2SA1110R
	3,4	Q2SJ115Y	2SJ115Y
	5	QC1815BL	2SC1815BL
	6	QC2655Y	2SC2655Y
	7	QC2565Y	2SC2565Y
D	1,2	PN-0199	MA171
	3,4	PN1Z18	1Z18
	5	PNMA650	MA650
L	1,2	PZ4Z003	B-20L-48B
	3,4	IN19080	HP-054S

NOTES:UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS,1/4W,5%.
2. CAPACITANCE VALUES ARE IN FARADS,50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - (#) :ALUMINUM ELECTROLYTIC CAPACTOR.
   - (B) :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - (F) :MYLAR FILM CAPACITOR(±5%, 50V)
   - (S) :POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - (C) :CERAMIC CAPACITOR.
   - (M) :MICA CAPACITOR(±5%)

A

NAME	REEL DRIVE PCA
PART NO.	PB4FC0A
APPLIED	PB-4FCA

DWG. NO. 3.12617

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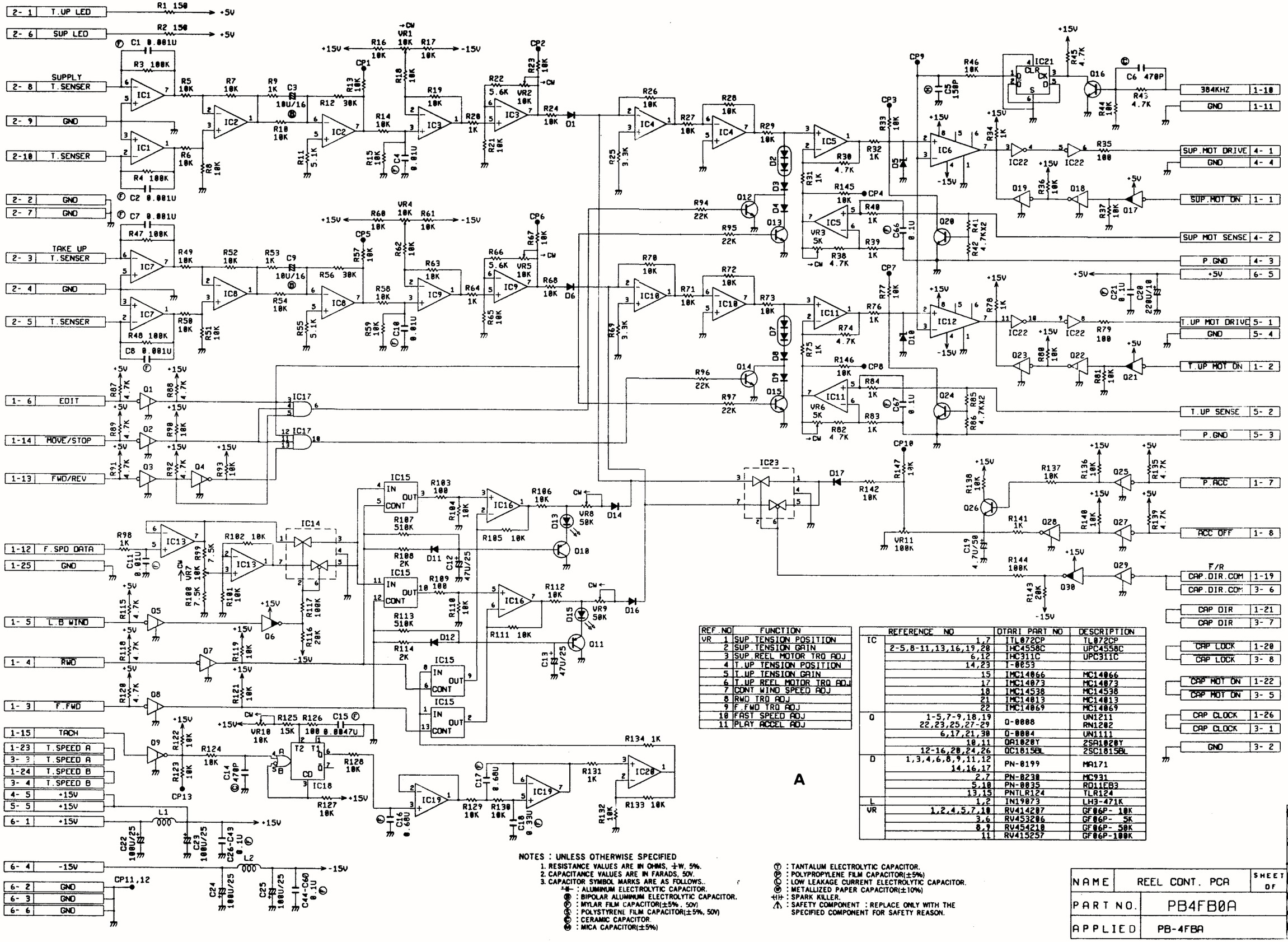

REF.NO		FUNCTION
VR	1	SUP.TENSION POSITION
	2	SUP.TENSION GAIN
	3	SUP.REEL MOTOR TRQ ADJ
	4	T.UP TENSION POSITION
	5	T.UP TENSION GAIN
	6	T.UP REEL MOTOR TRQ ADJ
	7	CONT WIND SPEED ADJ
	8	RWD TRQ ADJ
	9	F.FWD TRQ ADJ
	10	FAST SPEED ADJ
	11	PLAY ACCEL ADJ

	REFERENCE NO	OTARI PART NO	DESCRIPTION
IC	1,7	ITL072CP	TL072CP
	2-5,8-11,13,16,19,20	IHC4558C	UPC4558C
	6,12	IHC311C	UPC311C
	14,23	I-0053	
	15	IMC14066	MC14066
	17	IMC14073	MC14073
	18	IMC14538	MC14538
	21	IMC14013	MC14013
	22	IMC14069	MC14069
Q	1-5,7-9,18,19 22,23,25,27-29	Q-0008	UN1211 RN1202
	6,17,21,30	Q-0004	UN1111
	10,11	QA1020Y	2SA1020Y
	12-16,20,24,26	QC1815BL	2SC1815BL
D	1,3,4,6,8,9,11,12 14,16,17	PN-0199	MA171
	2,7	PN-0238	MC931
	5,18	PN-0035	RD11EB3
	13,15	PNTLR124	TLR124
L	1,2	IN19073	LH3-471K
VR	1,2,4,5,7,10	RV414207	GF06P- 10K
	3,6	RV453206	GF06P- 5K
	8,9	RV454210	GF06P- 50K
	11	RV415257	GF06P-100K

A

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS..
: ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
: MYLAR FILM CAPACITOR(±5%, 50V)
: POLYSTYRENE FILM CAPACITOR(±5%, 50V)
: CERAMIC CAPACITOR.
: MICA CAPACITOR(±5%)

: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR(±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
: METALLIZED PAPER CAPACITOR(±10%)
: SPARK KILLER.
: SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

NAME	REEL CONT. PCA	SHEET OF
PART NO.	PB4FB0A	
APPLIED	PB-4FBA	

3-12608

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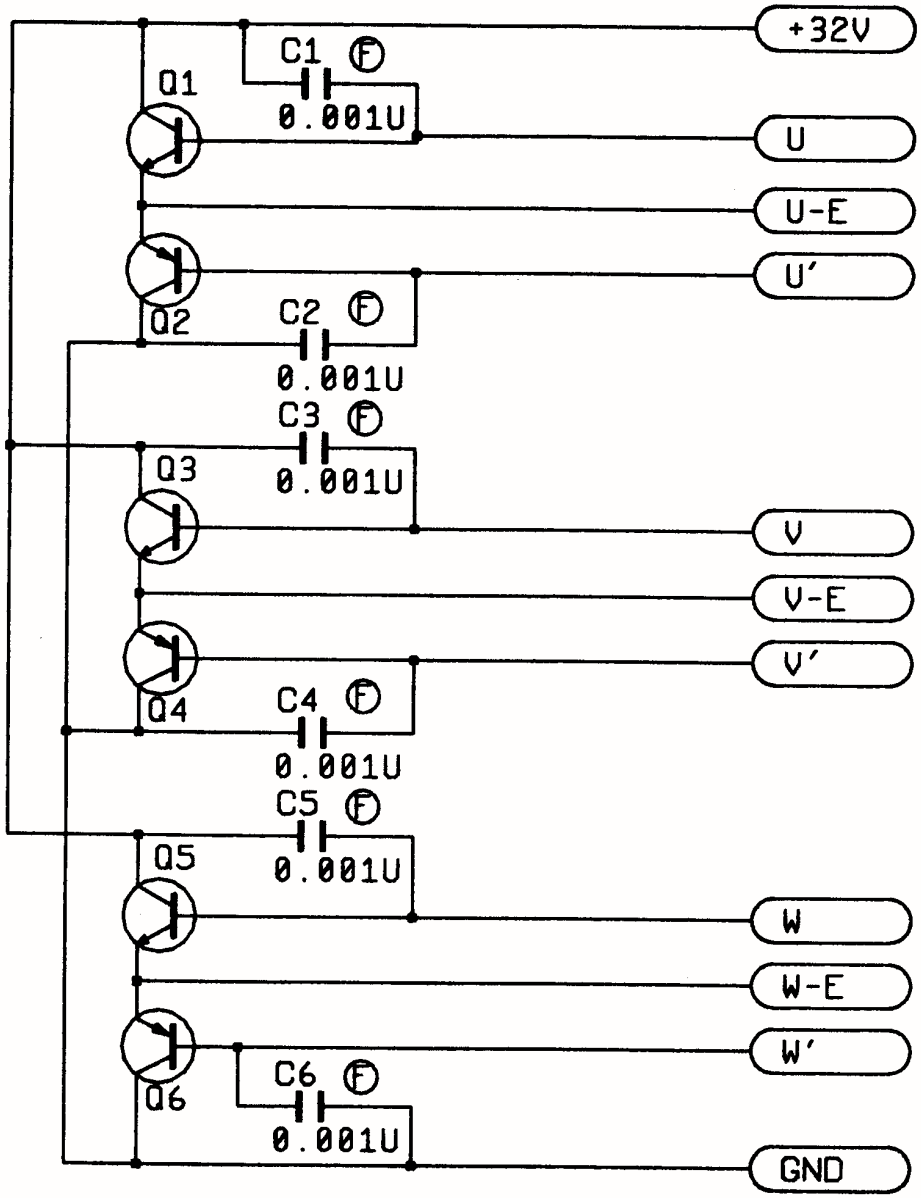

REF.NO.		OTARI PART NO.	DESCRIPTION
Q	1,3,5	QD1436K	2SD1436K
	2,4,6	QB1032K	2SB1032K

NAME	CAP DRIVE ASSY
PART NO.	ZA93G0A
APPLIED	ZA-93GA

4 42937 QNO.

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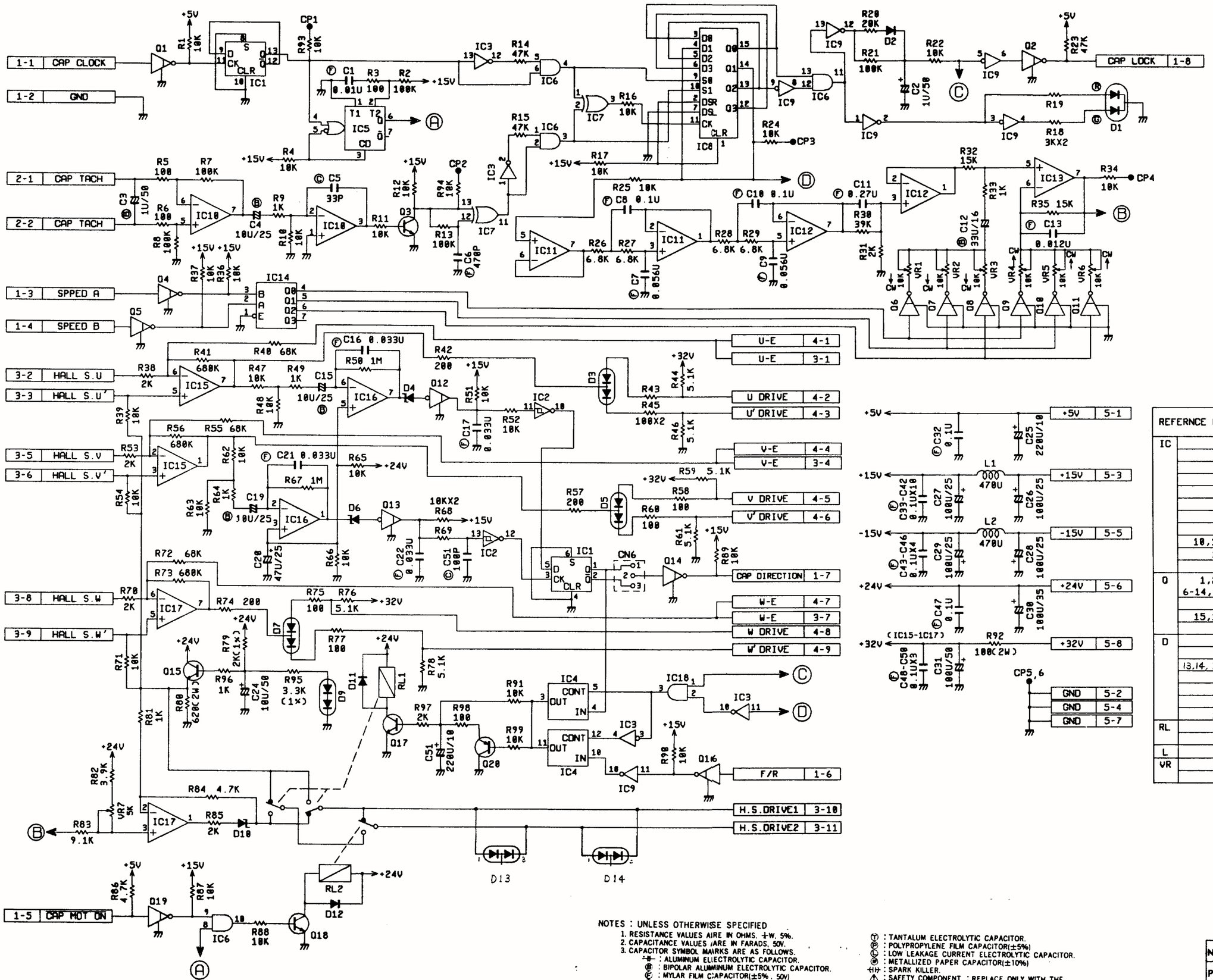

REFERNCE NO.		OTARI PART NO.	DESCRIPTION
IC	1	IMC14013	MC14013
	2	IMC14584	MC14584
	3,9	IMC14069	MC14069
	4	IMC14066	MC14066
	5	IMC14538	MC14538
	6,18	IMC14081	MC14081
	7	IMC14070	MC14070
	8	IMC14194	MC14194
	10,15-17	I-0067	M5219P
	11-13	IHC4558C	UPC4558C
	14	IMC14555	MC14555
Q	1,2,4,5 6-14,16,19	Q-0008	UN1211, RN1202
	3	QC2878	2SC2878
	15,17,18	QC2655Y	2SC2655Y
	20	QA1015GR	2SA1015GR
D	1	PNSLP520	SLP-520
	2	PN-0199	MA171
	13,14, 3,5,7	PN-0230	MC931
	4,6	PN-0038	RD12EB3
	9	PNVD1222	VD1222
	10	PN-0026	RD8.2EB3
	11,12	PN-0257	SM-1XN02
RL	1	RY2DC898	G6A-274P/24V
	2	RY1DC851	G2Q-1014B
L	1,2	IN19073	LH3-471K
VR	1-6	RV414312	3296W-1-103
	7	RV453206	GF06P-5K

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES AIRE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MAIRKS ARE AS FOLLOWS.
- ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓕ : MYLAR FILM CAPACITOR(±5%, 50V)
- Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
- Ⓒ : CERAMIC CAPACITOR.
- Ⓜ : MICA CAPACITOR(±5%)

- Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
- Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
- Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- Ⓜ : METALLIZED PAPER CAPACITOR(±10%)
- ⊣⊢ : SPARK KILLER.
- ⚠ : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

A

NAME	CAP. CONT. PCA	SHEET	OF
PART NO.	PB4FA0A		
APPLIED	PB-4FAA		

3-12607

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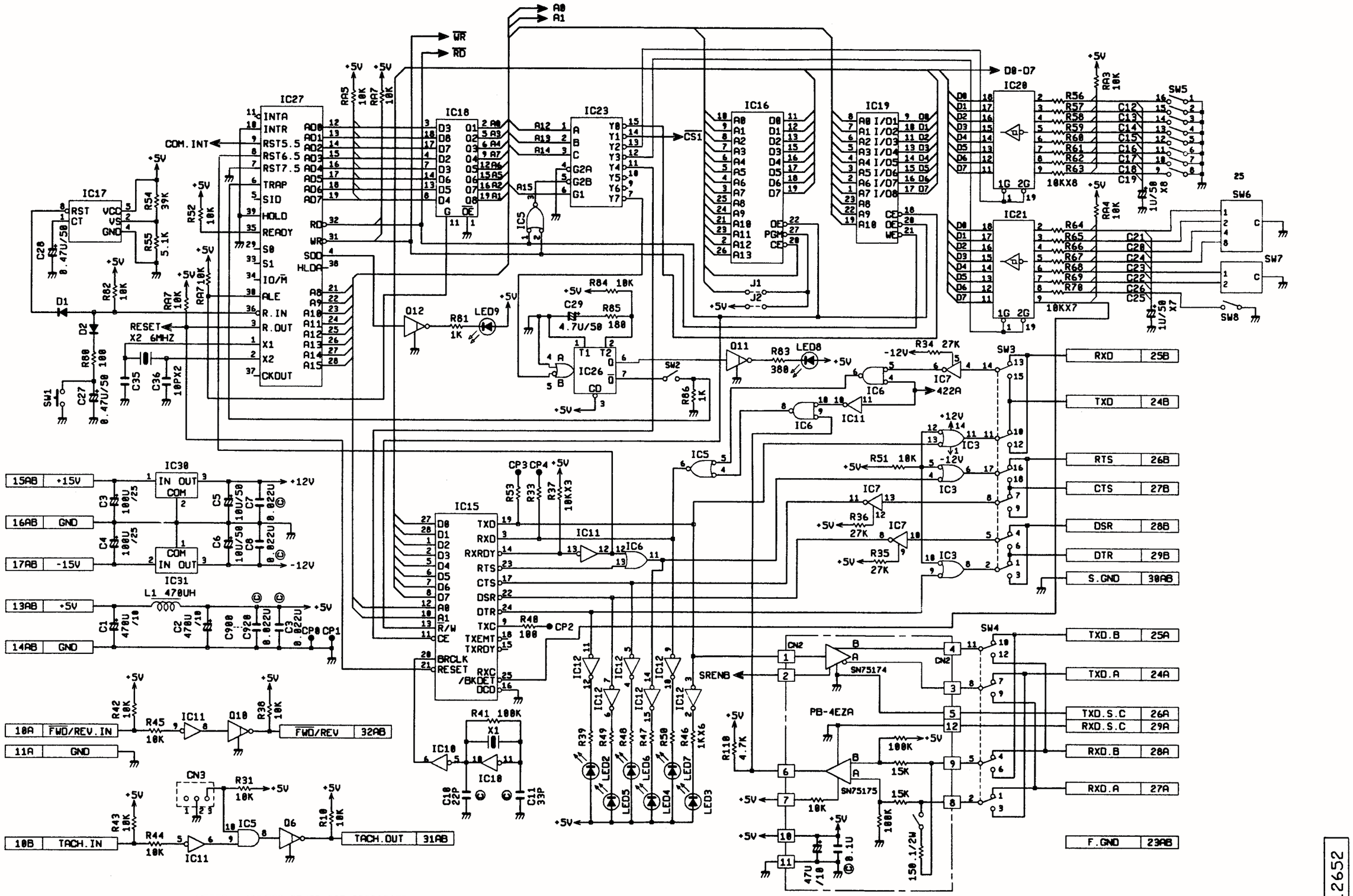

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ :ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ :MYLAR FILM CAPACITOR(±5%,50V)
   - Ⓟ :POLYSTYRENE FILM CAPACITOR(±5%,50V)
   - Ⓒ :CERAMIC CAPACITOR.
   - Ⓜ :MICA CAPACITOR(±5%)

Ⓣ :TANTALUM ELECTROLYTIC CAPACITOR.
ⓂⓅ :POLYPROPYLENE FILM CAPACITOR(±5%)
ⓁⓁ :LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
ⓂⓅ :METALLISED PAPER CAPACIITOR(±10%)
⊣⊢ :SPARK KILLER.
⚠ :SAFETY COMPONENT :REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

NAME	S.R AMP.PCA	SHEET	2 OF 2
PART NO.	PB4FE0A	DWG. NO.	3.12652
APPLIED	PB-4FEA		

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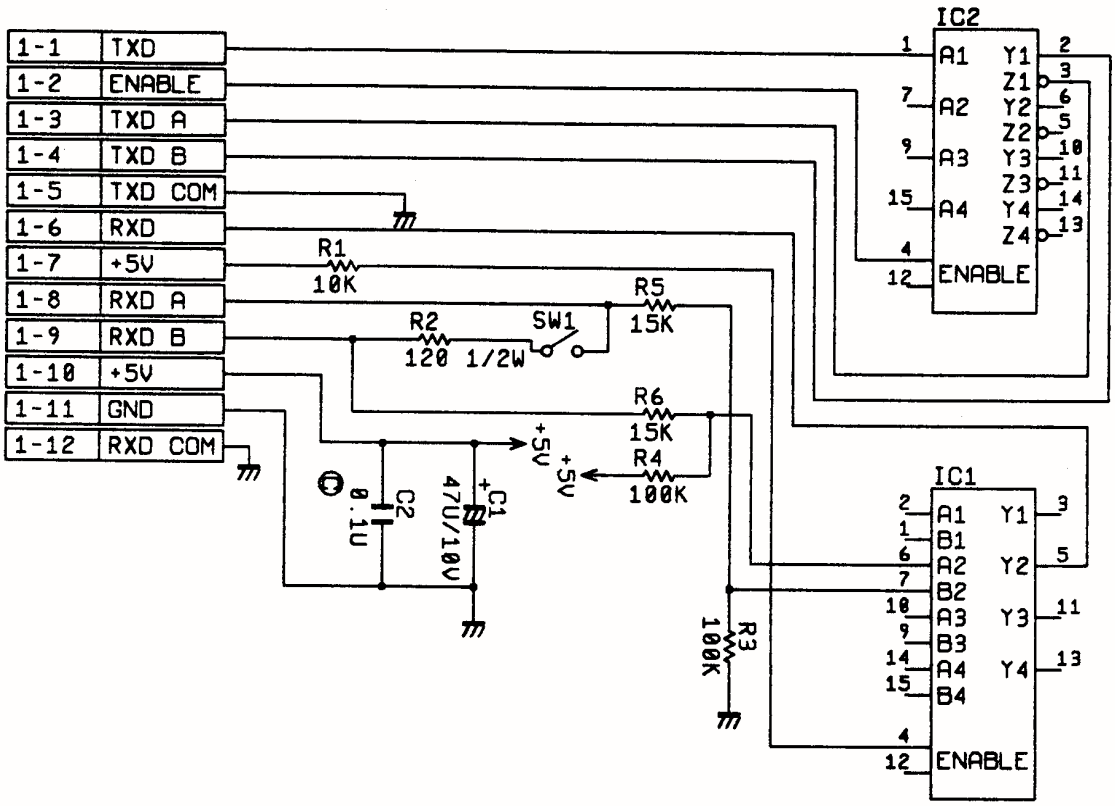

REF.NO.		OTARI PART NO.	DESCRIPTION
IC	1	IG175N	SN75175N
	2	IG174N	SN75174N
SW	1	WH31056	SSS1X2NB2X2

NOTES:UNLESS OTHERWISE SPECIFIED
1.RESISTANCE VALUES ARE IN OHMS,1/4W,5 %
2.CAPACITANCE VALUES ARE IN FARADS,50V
3.CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
:ALUMINUM ELECTROLYTIC CAPACTOR.
:BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
:MYLAR FILM CAPACITOR(±5%, 50V)
:POLYSTYRENE FILM CAPACITOR(±5%, 50V)
:CERAMIC CAPACITOR.
:MICA CAPACITOR(±5%)

NAME	422 DRV/RCV PCA	SHEET 1 OF 1	4.42796
PART NO.	PB4EZ0A		DWG. NO.
APPLIED	PB-4EZA		

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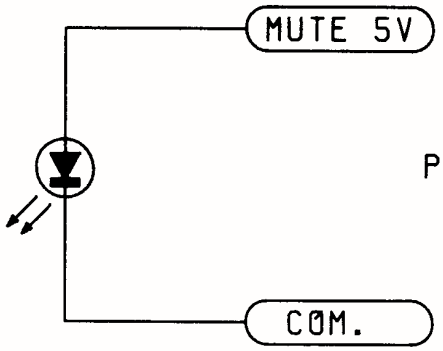

MUTE 5V FROM

CH1 (9)	CN77-1-1
CH2 (10)	CN77-2-1
CH3 (11)	CN77-3-1
CH4 (12)	CN77-4-1
CH5 (13)	CN77-5-1
CH6 (14)	CN77-6-1
CH7 (15)	CN77-7-1
CH8 (16)	CN77-8-1

COM. FROM

CH1 (9)	CN77-1-2
CH2 (10)	CN77-2-2
CH3 (11)	CN77-3-2
CH4 (12)	CN77-4-2
CH5 (13)	CN77-5-2
CH6 (14)	CN77-6-2
CH7 (15)	CN77-7-2
CH8 (16)	CN77-8-2

A

NAME	RECORD INDICATOR P.C.B. ASS'Y
PART NO.	PB7AA0A
APPLIED	PB-7AAA

DWG. NO. 4.36987

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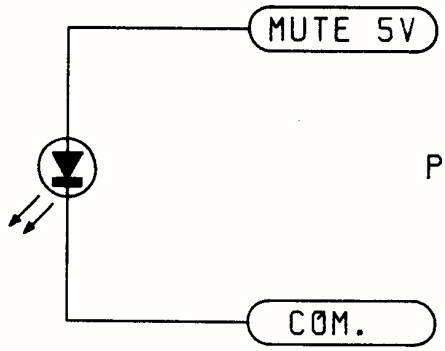

MUTE 5V FROM

CH1 (9)	CN78-1-1
CH2 (10)	CN78-2-1
CH3 (11)	CN78-3-1
CH4 (12)	CN78-4-1
CH5 (13)	CN78-5-1
CH6 (14)	CN78-6-1
CH7 (15)	CN78-7-1
CH8 (16)	CN78-8-1

COM. FROM

CH1 (9)	CN78-1-2
CH2 (10)	CN78-2-2
CH3 (11)	CN78-3-2
CH4 (12)	CN78-4-2
CH5 (13)	CN78-5-2
CH6 (14)	CN78-6-2
CH7 (15)	CN78-7-2
CH8 (16)	CN78-8-2

A

NAME	PEAK INDICATOR P.C.B. ASS'Y
PART NO.	PB7AB0A
APPLIED	PB-7ABA

DWG. NO. 4-36989

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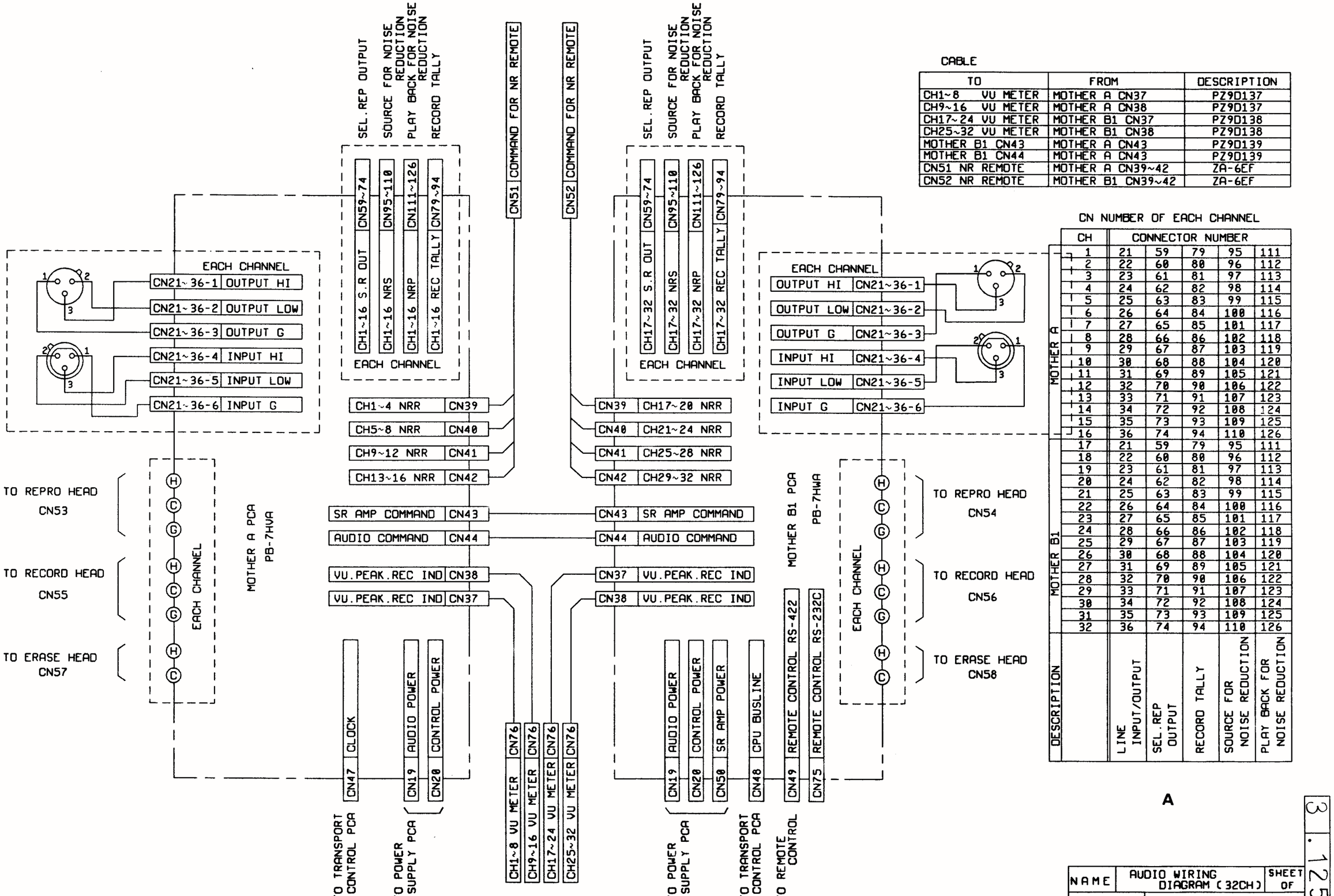

CABLE

TO	FROM	DESCRIPTION
CH1~8 VU METER	MOTHER A CN37	PZ9D137
CH9~16 VU METER	MOTHER A CN38	PZ9D137
CH17~24 VU METER	MOTHER B1 CN37	PZ9D138
CH25~32 VU METER	MOTHER B1 CN38	PZ9D138
MOTHER B1 CN43	MOTHER A CN43	PZ9D139
MOTHER B1 CN44	MOTHER A CN43	PZ9D139
CN51 NR REMOTE	MOTHER A CN39~42	ZA-6EF
CN52 NR REMOTE	MOTHER B1 CN39~42	ZA-6EF

CN NUMBER OF EACH CHANNEL

	CH	CONNECTOR NUMBER				
MOTHER A	1	21	59	79	95	111
	2	22	60	80	96	112
	3	23	61	81	97	113
	4	24	62	82	98	114
	5	25	63	83	99	115
	6	26	64	84	100	116
	7	27	65	85	101	117
	8	28	66	86	102	118
	9	29	67	87	103	119
	10	30	68	88	104	120
	11	31	69	89	105	121
	12	32	70	90	106	122
	13	33	71	91	107	123
	14	34	72	92	108	124
	15	35	73	93	109	125
	16	36	74	94	110	126
MOTHER B1	17	21	59	79	95	111
	18	22	60	80	96	112
	19	23	61	81	97	113
	20	24	62	82	98	114
	21	25	63	83	99	115
	22	26	64	84	100	116
	23	27	65	85	101	117
	24	28	66	86	102	118
	25	29	67	87	103	119
	26	30	68	88	104	120
	27	31	69	89	105	121
	28	32	70	90	106	122
	29	33	71	91	107	123
	30	34	72	92	108	124
	31	35	73	93	109	125
	32	36	74	94	110	126
DESCRIPTION		LINE INPUT/OUTPUT	SEL.REP OUTPUT	RECORD TALLY	SOURCE FOR NOISE REDUCTION	PLAY BACK FOR NOISE REDUCTION

A

NAME	AUDIO WIRING DIAGRAM (32CH)	SHEET	OF
PART NO.	A11100B		
APPLIED			

3.12545

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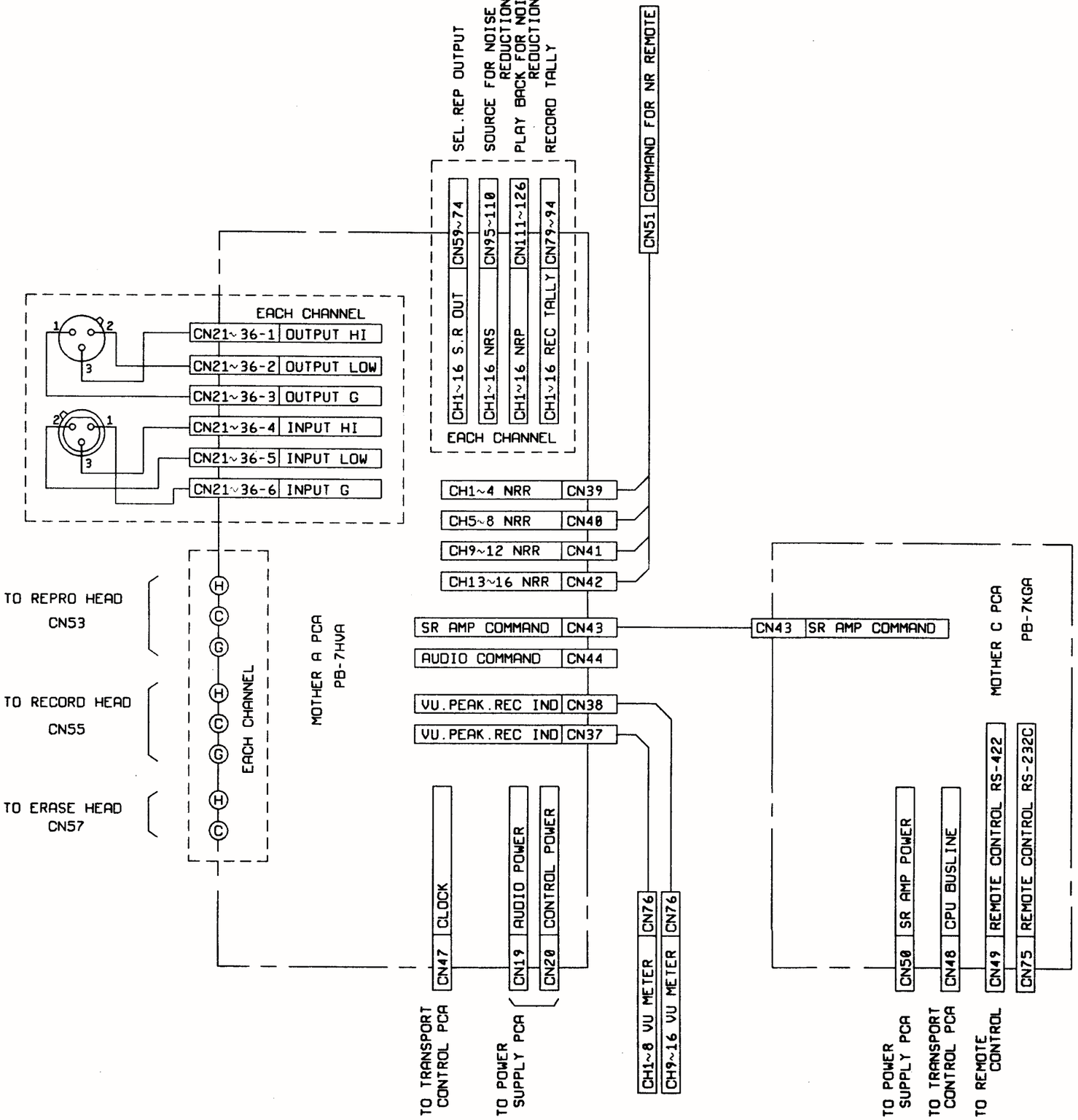

CABLE

TO	FROM	DESCRIPTION
CH1~8 VU METER	MOTHER A CN37	PZ9D137
CH9~16 VU METER	MOTHER A CN38	PZ9D137
MOTHER C CN43	MOTHER A CN43	PZ9D139
CN51 NR REMOTE	MOTHER A CN39~42	ZA-6EF

CN NUMBER OF EACH CHANNEL

	CH	CONNECTOR NUMBER				
MOTHER A	1	21	59	79	95	111
	2	22	60	80	96	112
	3	23	61	81	97	113
	4	24	62	82	98	114
	5	25	63	83	99	115
	6	26	64	84	100	116
	7	27	65	85	101	117
	8	28	66	86	102	118
	9	29	67	87	103	119
	10	30	68	88	104	120
	11	31	69	89	105	121
	12	32	70	90	106	122
	13	33	71	91	107	123
	14	34	72	92	108	124
	15	35	73	93	109	125
	16	36	74	94	110	126
DESCRIPTION		LINE INPUT/OUTPUT	SEL.REP OUTPUT	RECORD TALLY	SOURCE FOR NOISE REDUCTION	PLAY BACK FOR NOISE REDUCTION

A

NAME	AUDIO WIRING DIAGRAM (16CH)	SHEET OF
PART NO.	A11220B	
APPLIED		

3.12547

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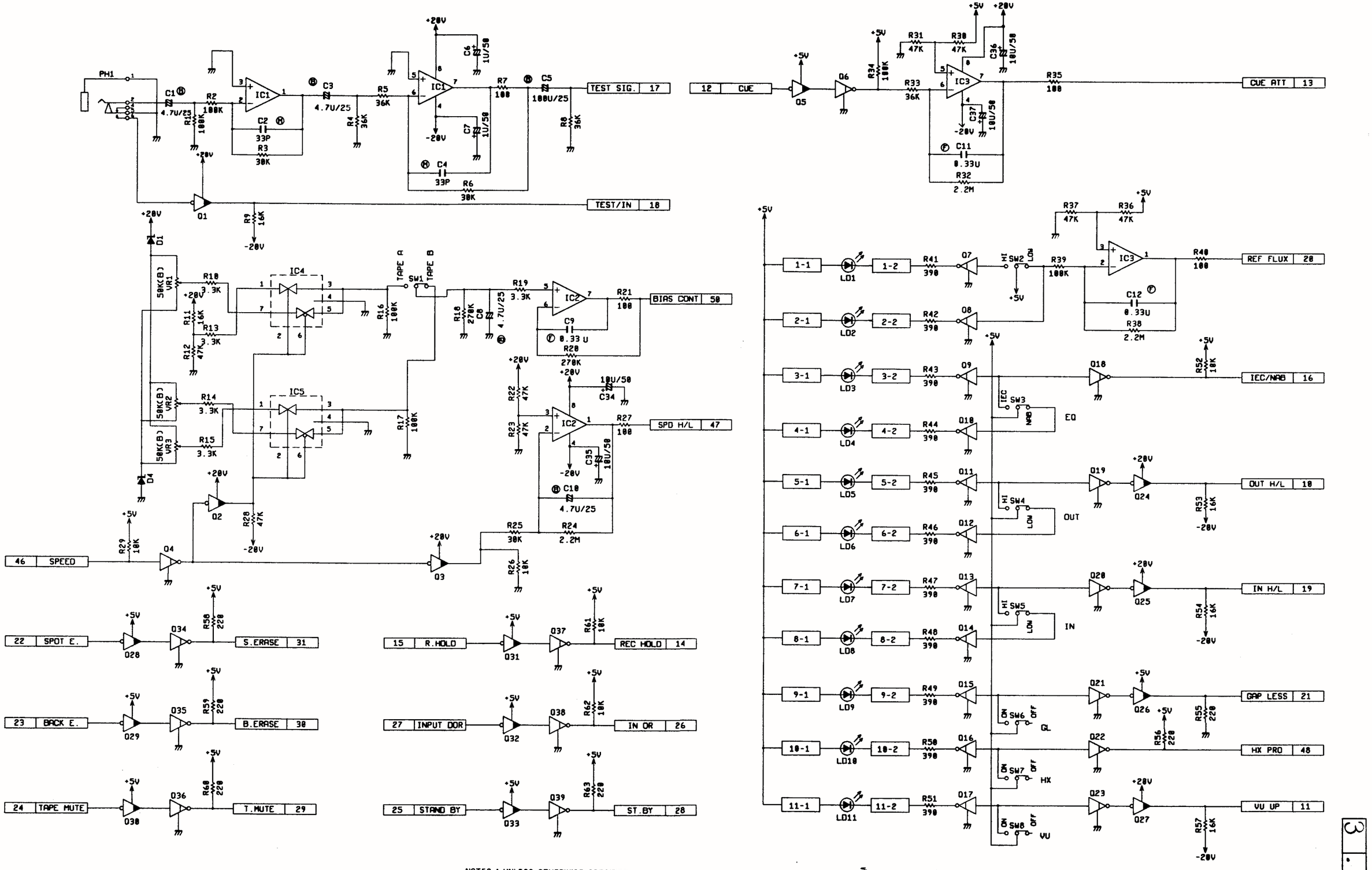

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   Ⓜ : MYLAR FILM CAPACITOR(±5% , 50V)
   Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   Ⓒ : CERAMIC CAPACITOR.
   Ⓜ : MICA CAPACITOR(±5%)

Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
Ⓜ : METALLIZED PAPER CAPACITOR(±10%)
⊣⊢ : SPARK KILLER.
⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

A

NAME	AUDIO CONT. PCA (COMMAND)	SHEET 1 OF 2
PART NO.	PB4FF0A	
APPLIED	PB-4FFA	

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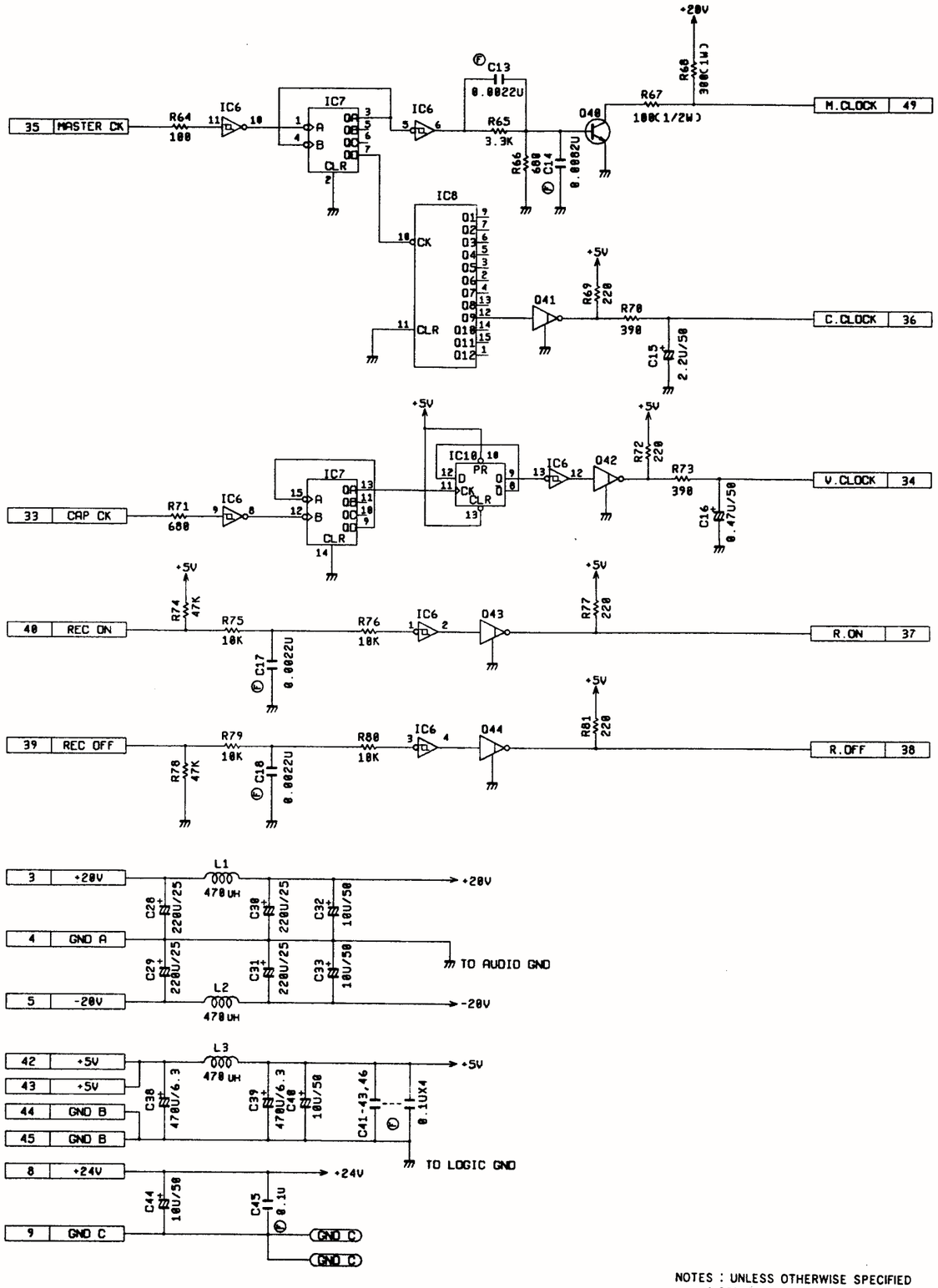

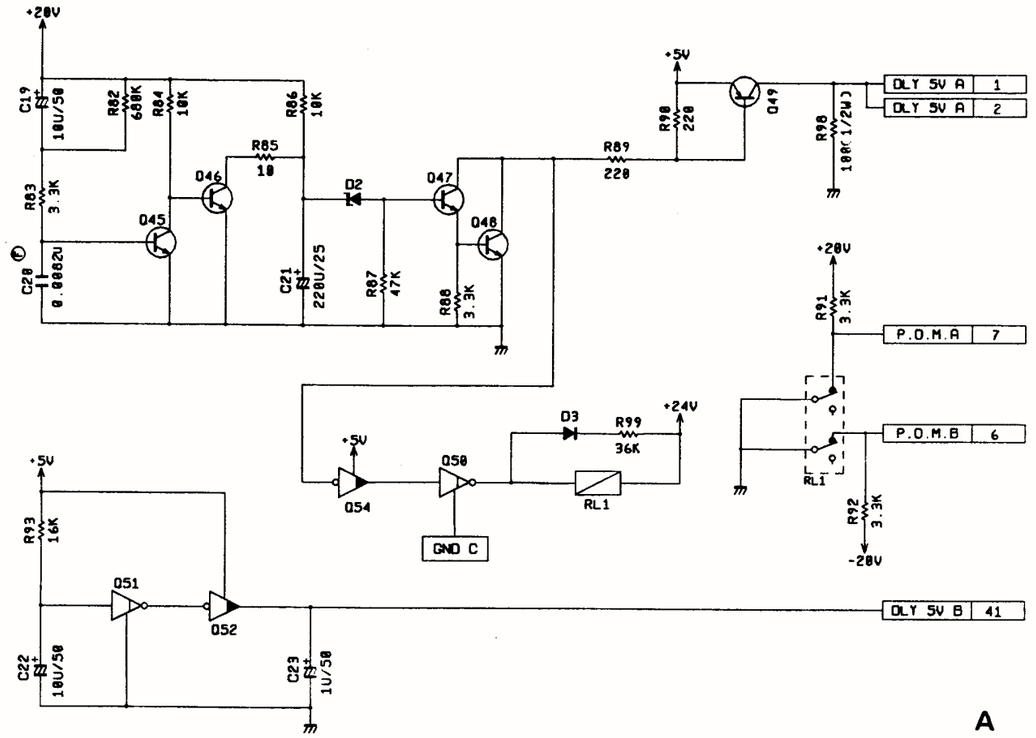

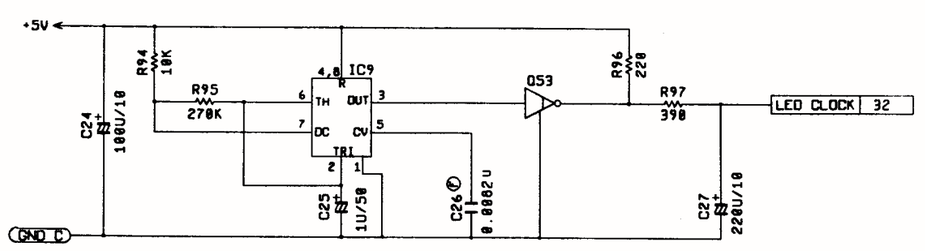

REFERENCE NO.		OTARI PART NO.	DESCRIPTION
IC	1-3	I-0867 OR I-0817	M5219P OR NJM4560DX
	4,5	I-0853	FET SW NP
	6	IQ14	TC74HC14P
	7	IQ390	TC74HC390P
	8	IQ4040	TC74HC4040P
	9	I-NE555V	NE555V
	10	IQ74	TC74HC74P
Q	1-3,5 24-39,52,54	Q-0004	UN1111 OR UN4111
	4,6-23,34-39 41-44,50,51,53	Q-0006	UN1211 OR UN4211
	48,45-48	QC1815BL	2SC1815BL
	49	QA1020Y	2SA1020Y
D	1	PN-0011	RD5.1EB3
	2	PN-0044	RD15EB3
	3	PN-0257	SM1-XN02
	4	PN-0032	RD10EB3
L	1-3	IN19078	LM1-471K

REF NO.		OTARI PART NO.		DESCRIPTION	
VR	1				TAPE A HI SPD
	2	RV454174	EVMC1GA01B54	MASTER BIAS LVL	TAPE B HI SPD
	3				TAPE B LOW SPD
RL	1	RY2DC009	G5A-1083F	POWER ON MUTE RELAY	
SW	1			MASTER BIAS SELECT TAPE A/B	
	2	WH31032	ASID-6M	REFERENCE FLUX HI/LOW	
	3			EQ IEC/NAB	
	4			OUTPUT LEVEL +4DBM / -8DBM	
	5	WH31022	A802-A	INPUT LEVEL +4DBM / -8DBM	
	6			GAP LESS RECORD ON/OFF	
	7			DOLBY HX PRO ON/OFF	
	8			VU +10DB ON/OFF	
PH	1	CN601174	HLJ0306-01-030	EXTERNAL TEST OSCILLATOR JACK	
LD	1				
	2			REFERENCE FLUX	HI
	3				LOW
	4			EQ	IEC
	5				NAB
	6	PNTL0124	TL0124	OUTPUT LEVEL	+4DBM
	7				-8DBM
	8			INPUT LEVEL	+4DBM
	9				-8DBM
	10			GAP LESS RECORD	ON
	11			DOLBY HX PRO	ON
				VU +10DB	ON

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓕ : MYLAR FILM CAPACITOR(±5% 50V)
   - Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR(±5%)

Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
Ⓜ : METALLIZED PAPER CAPACITOR(±10%)
⊣⊢ : SPARK KILLER.
⚠ : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

NAME	AUDIO CONT. PCA (CLOCK)	SHEET 2 OF 2
PART NO.	PB4FF0A	
APPLIED	PB-4FFA	

3-12549

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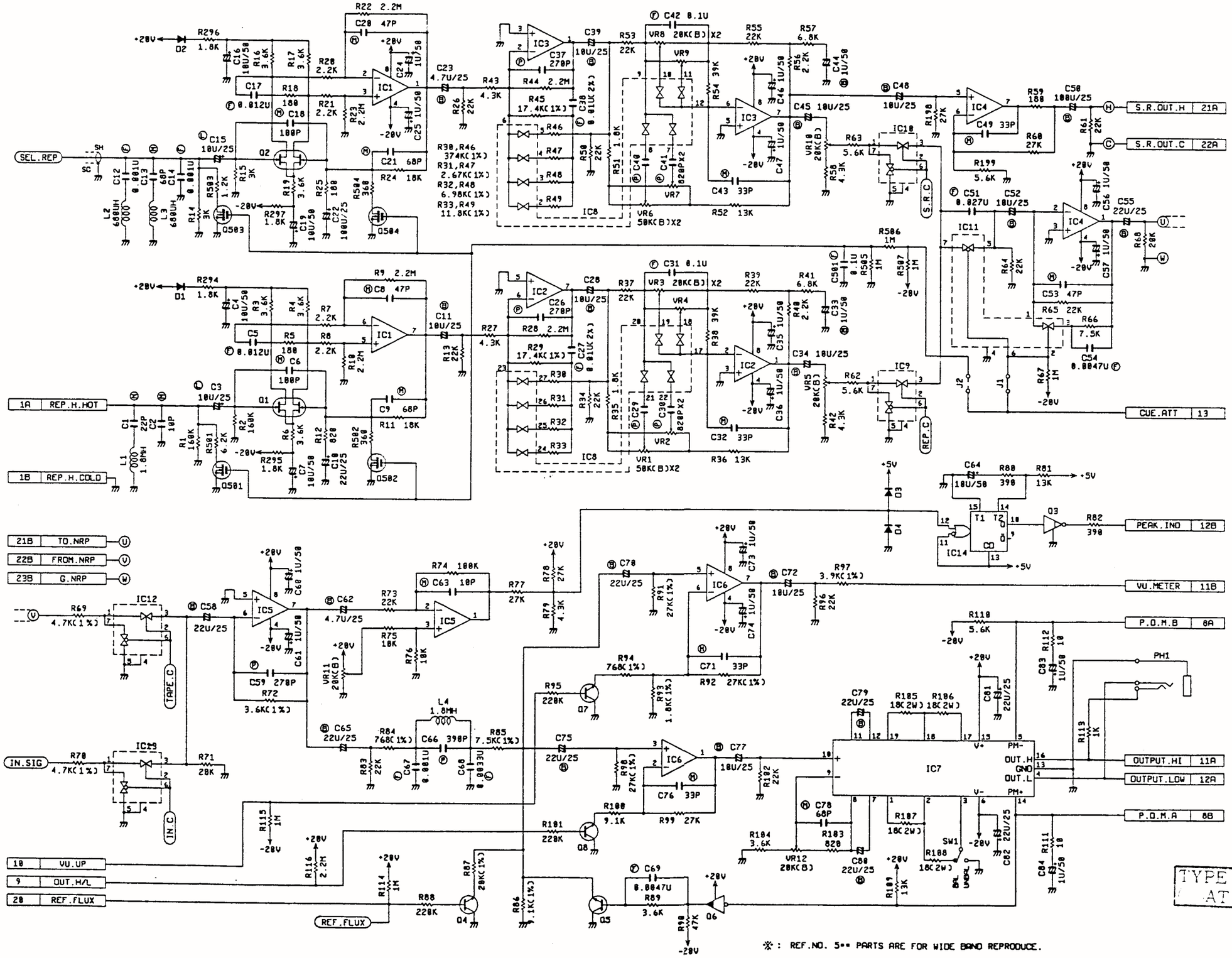

REF NO.	OTARI PART NO.	DESCRIPTION
Q501 4	02SK336	2SK336

TYPE NO(C)TO AT THE END

NAME	AUDIO AMP PCA (PLAY BACK)	SHEET 1 OF 4
PART NO.	PB19J0A	
APPLIED	PB-19VA	

DWG. NO. 3.12735

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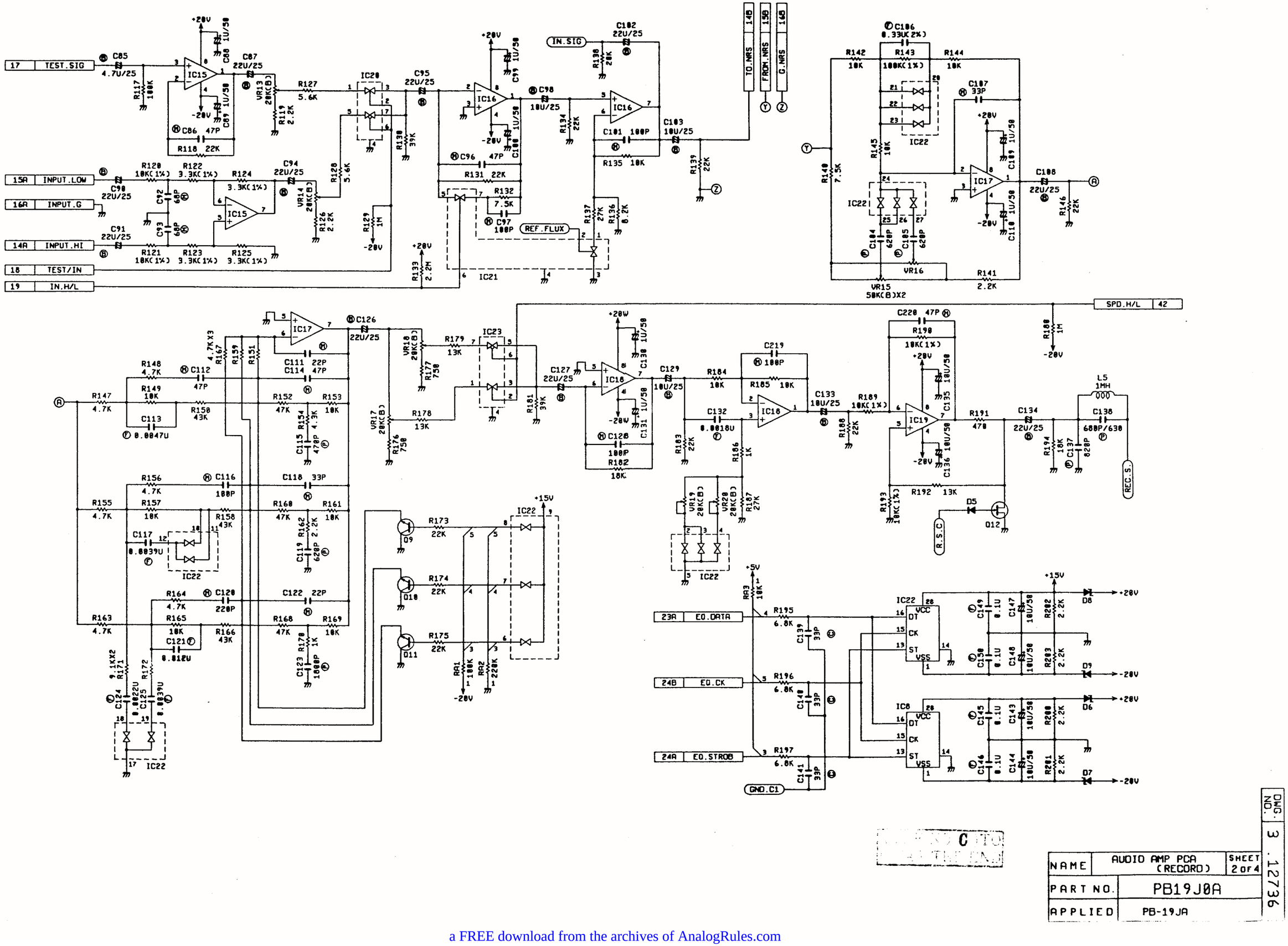

NAME	AUDIO AMP PCA (RECORD)
PART NO.	PB19J0A
APPLIED	PB-19JA
SHEET	2 OF 4
DWG. NO.	3 .12736

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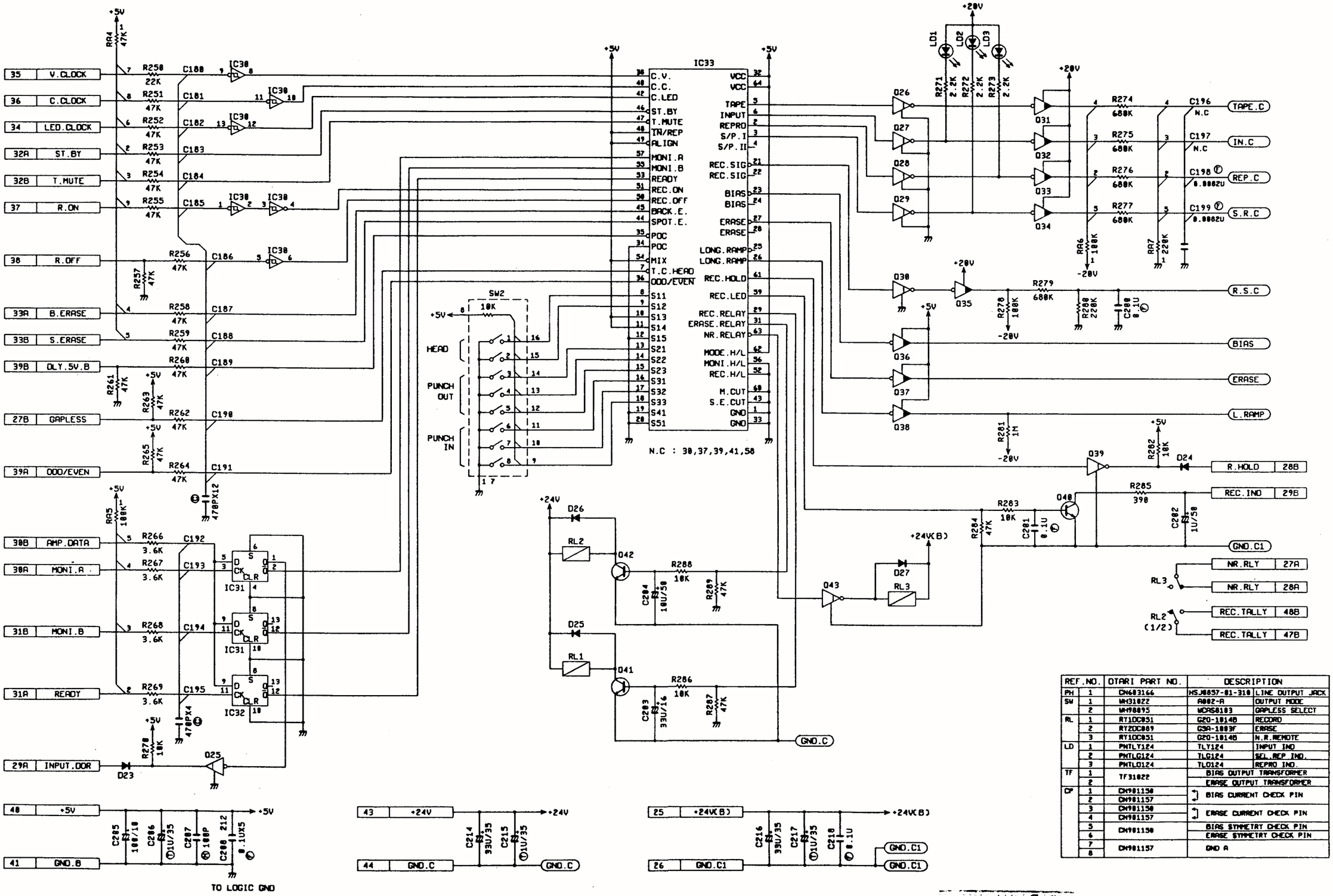

REF.NO.		OTARI PART NO.	DESCRIPTION	
PH	1	CN6831166	MSJ8857-81-310	LINE OUTPUT JACK
SW	1	WH31022	A802-A	OUTPUT MODE
	2	WH98895	WCRS8103	GAPLESS SELECT
RL	1	RY1DC051	G2O-1014B	RECORD
	2	RY2DC069	G3A-1003F	ERASE
	3	RY1DC051	G2O-1014B	N.R.REMOTE
LD	1	PNTLY124	TLY124	INPUT IND
	2	PNTLG124	TLG124	SEL.REP IND.
	3	PNTLO124	TLO124	REPRO IND.
TF	1	TF31022	BIAS OUTPUT TRANSFORMER	
	2		ERASE OUTPUT TRANSFORMER	
CP	1	CN981150	BIAS CURRENT CHECK PIN	
	2	CN981157		
	3	CN981150	ERASE CURRENT CHECK PIN	
	4	CN981157		
	5	CN981150	BIAS SYMMETRY CHECK PIN	
	6		ERASE SYMMETRY CHECK PIN	
	7	CN981157	GND A	
	8			

NAME	AUDIO AMP PCA (CONTROL)
SHEET	4 OF 4
PART NO.	PB19J0A
APPLIED	PB-19JA
DWG NO.	3-12738

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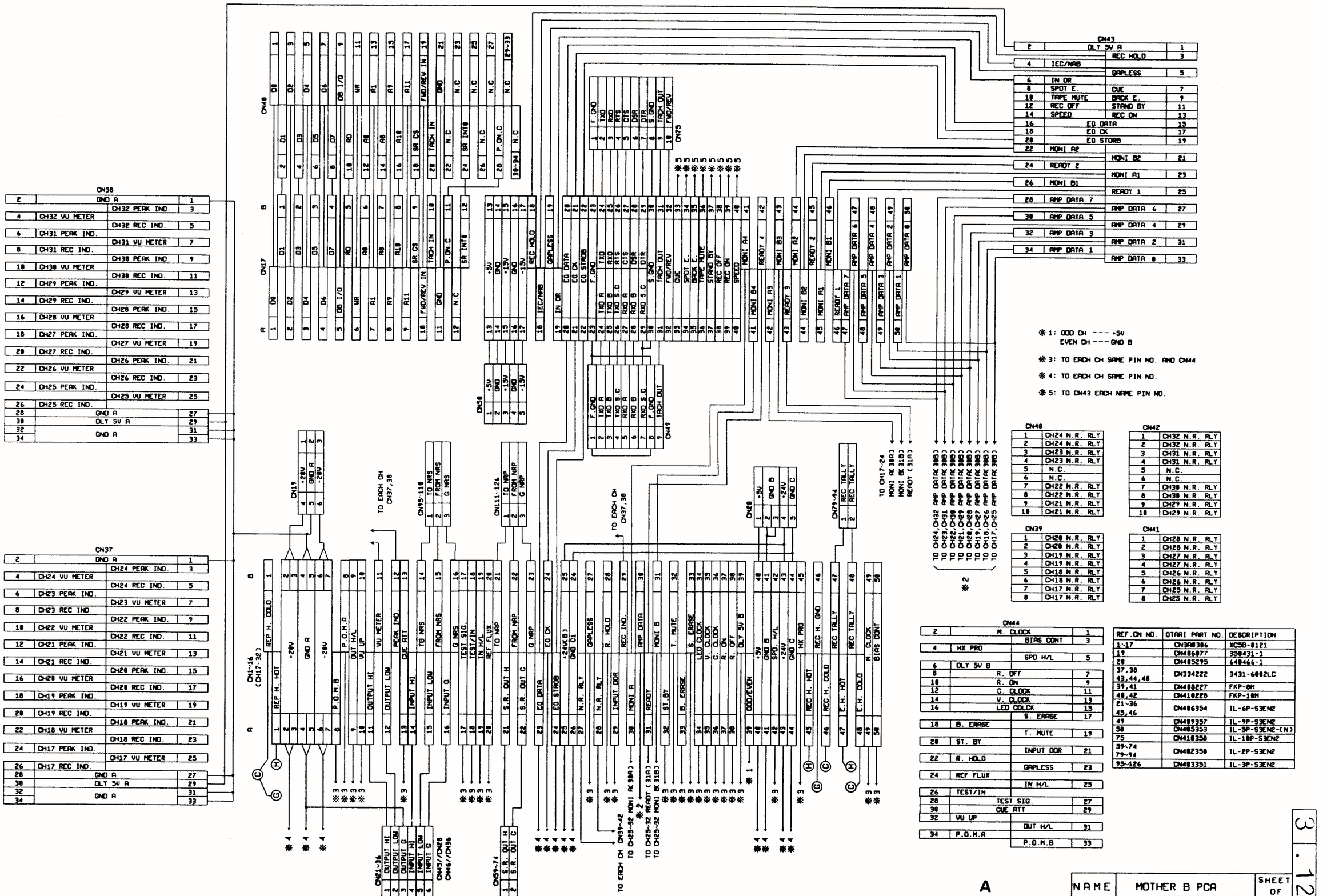

REF.DN NO.	OTARI PART NO.	DESCRIPTION
1~17	CN3A0386	XC50-0121
19	CN486077	350431-1
28	CN485295	640466-1
37,38 43,44,48	CN334222	3431-6002LC
39,41	CN488227	FKP-8M
40,42	CN410228	FKP-10M
21~36 45,46	CN486354	IL-6P-S3EN2
47	CN489357	IL-9P-S3EN2
50	CN485353	IL-5P-S3EN2-(N)
75	CN410358	IL-10P-S3EN2
59~74 79~94	CN482358	IL-2P-S3EN2
95~126	CN483351	IL-3P-S3EN2

A

NAME	MOTHER B PCA
PART NO.	PB7HW0A
APPLIED	PB-7HWA
SHEET OF	

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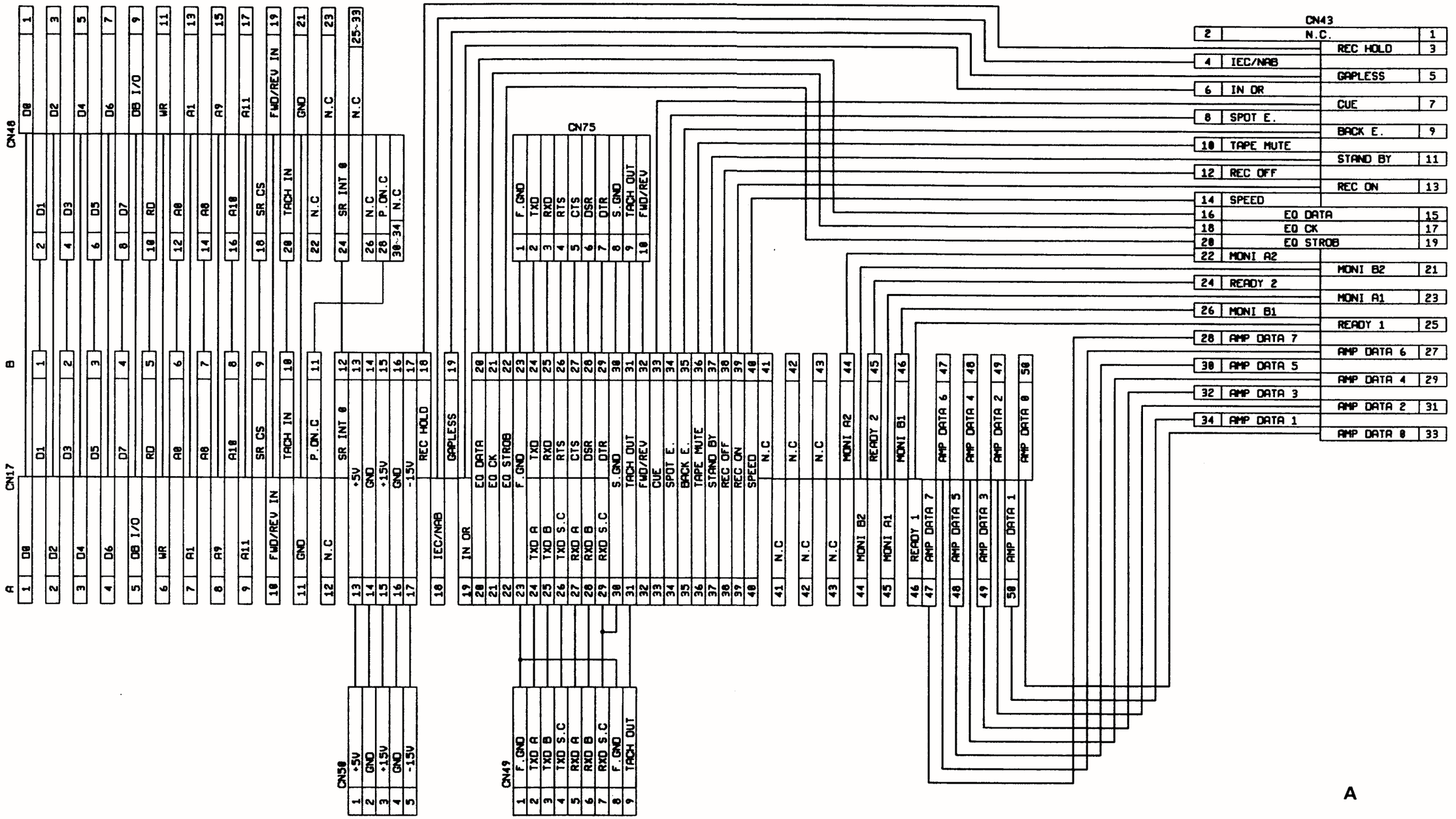

REF.CN NO.	OTARI PART NO.	DESCRIPTION
17	CN3A0306	XC5B-0121
43,48	CN334222	3431-6002LC
49	CN409357	IL-9P-S3EN2
50	CN405353	IL-5P-S3EN2-(N)
75	CN410356	IL-10P-S3EN2

A

NAME	MOTHER C PCA	SHEET OF
PART NO.	PB7KG0A	
APPLIED	PB-7KGA	

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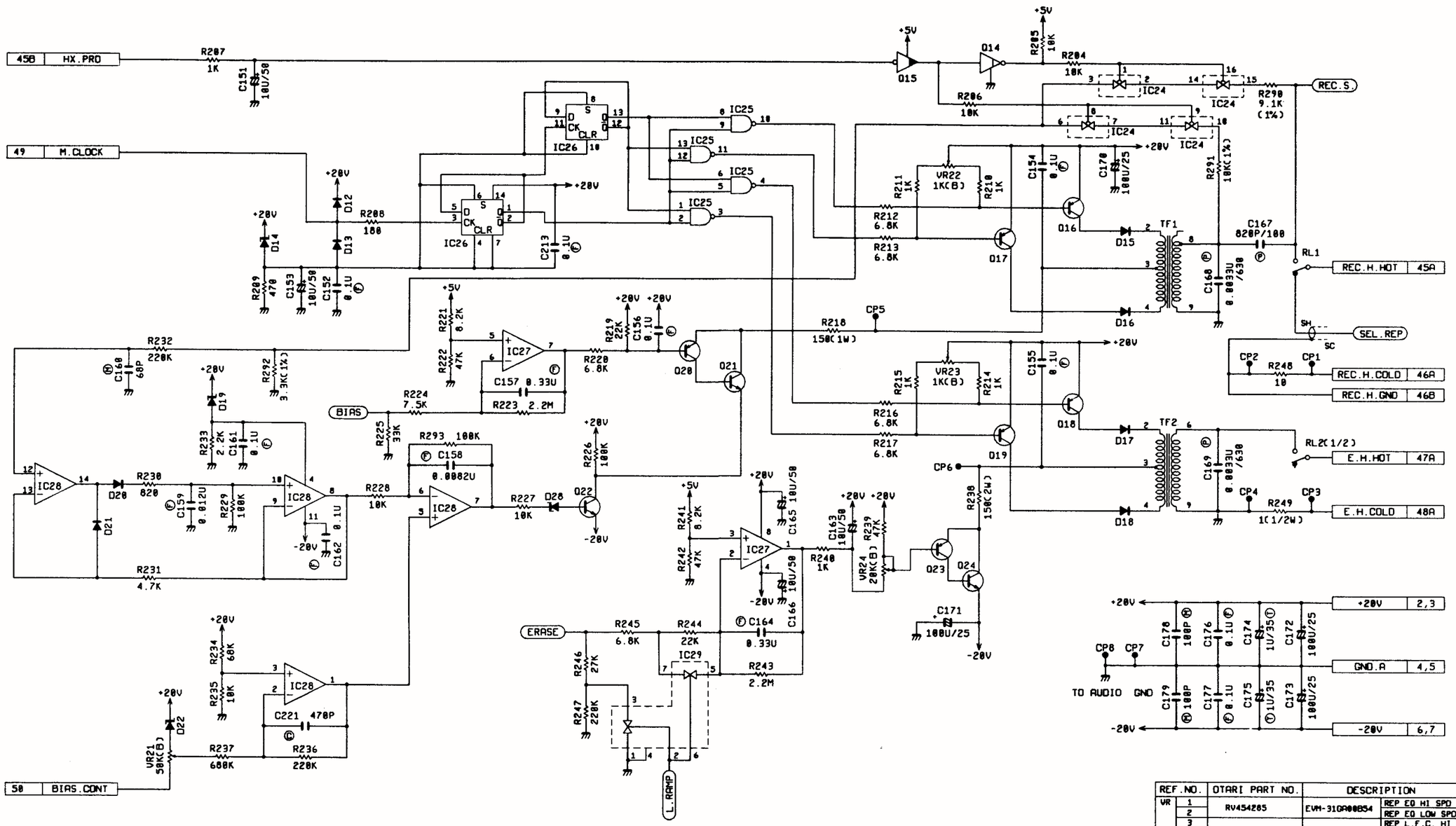

REFERENCE NO.		OTARI PART NO.	DESCRIPTION
IC	1 6,15 19	I-0067	MS219P
	27	I-0017	NJM4560DX
	7	I-0125	LINE OUTPUT AMPLIFIER
		I-0058	
	8	ITC9164N	TC9164N
	9,10,12,13	I-0133	FET SW NP
	11,20,23	I-0053	FET SW NP
	14	IMC14538	MC14538B
	21,29	I-0051	FET SW NN
	22	ITC9163N	TC9163N
	24	I-0126	NJU7301
	25	IMC14011	MC14011B
	26,31,32	IMC14013	MC14013B
	28	ITL084CN	TL084CN

REFERENCE NO.		OTARI PART NO.	DESCRIPTION
IC	38	IMC14584	MC14584B
	33	I-0056	MODE CONT.
Q	1,2	02K2480L	2SK2480L
	3,14 25 30,39,43	0-0008	UN1211 UN4211
	4,5,7 11	0C3327B	2SC3327B
	6,15,31 36	0-0004	UN1111 UN4111
	12	02K372BL	2SK372BL
	16 19	QA720R	2SA720R
	20,23	QA1015QR	2SA1015QR
	21,22,24	QC2655Y	2SC2655Y
	40 42	QC1815L	2SC1815L

REFERENCE NO.		OTARI PART NO.	DESCRIPTION
D	1,2,25 27	PN-0257	SM1-XW02
	3 5,12,13 20,21,23,24	PN151588	1S1588
	6 9,19,22,26	PN-0011	RD5.1EB3
	14	PN-0044	RD15EB3
	15 18	PN-0199	MA171(TA)
L	1,4	IN19005	3508-102
	2,3	IN19112	3640-681
	5	IN19123	3508-182
RA	1,5,6	R94-091	MRMSA05P104J
	2,7	R94-095	MRMSA05P224J
	3	R94-079	MRMSA05P103J
	4	R94-144	MRMSA09P473J

REF.NO.		OTARI PART NO.	DESCRIPTION	
VR	1	RV454285	EVM-31GA00B54	REP EQ HI SPD
	2			REP EQ LOW SPD
	3	RV424284	EVM-31GA00B24	REP L.F.C. HI SPD
	4			REP L.F.C. LOW SPD
	5			REP LEVEL
	6	RV454285	EVM-31GA00B54	S.REP EQ HI SPD
	7			S.REP EQ LOW SPD
	8	RV424284	EVM-31GA00B24	S.REP L.F.C. HI SPD
	9			S.REP L.F.C. LOW SPD
	10			S.REP LEVEL
	11	RV424297	EVM-36GA00B24	PEAK IND.LEVEL
	12			OUTPUT LEVEL
	13			TEST SIG.LEVEL
	14			INPUT LEVEL
	15	RV454285	EVM-31GA00B54	REC EQ HI SPD
	16			REC EQ LOW SPD
	17	RV424284	EVM-31GA00B24	REC LEVEL HI SPD
	18			REC LEVEL LOW SPD
	19			PHASE COMP HI SPD
	20			PHASE COMP LOW SPD
	21	RV454174	EVMC1GA01B54	BIAS LEVEL
	22	RV413293	EVM-36GA00B13	BIAS SYMMETRY
	23			ERASE SYMMETRY
	24	RV424297	EVM-36GA00B24	ERASE CURRENT

TYPE NO(B)TO
( )AT THE END

NAME	AUDIO AMP PCA (BIAS)	SHEET	3 OF 4
PART NO.	PB19J0A		
APPLIED	PB-19JA		

DWG. NO. 3.12739

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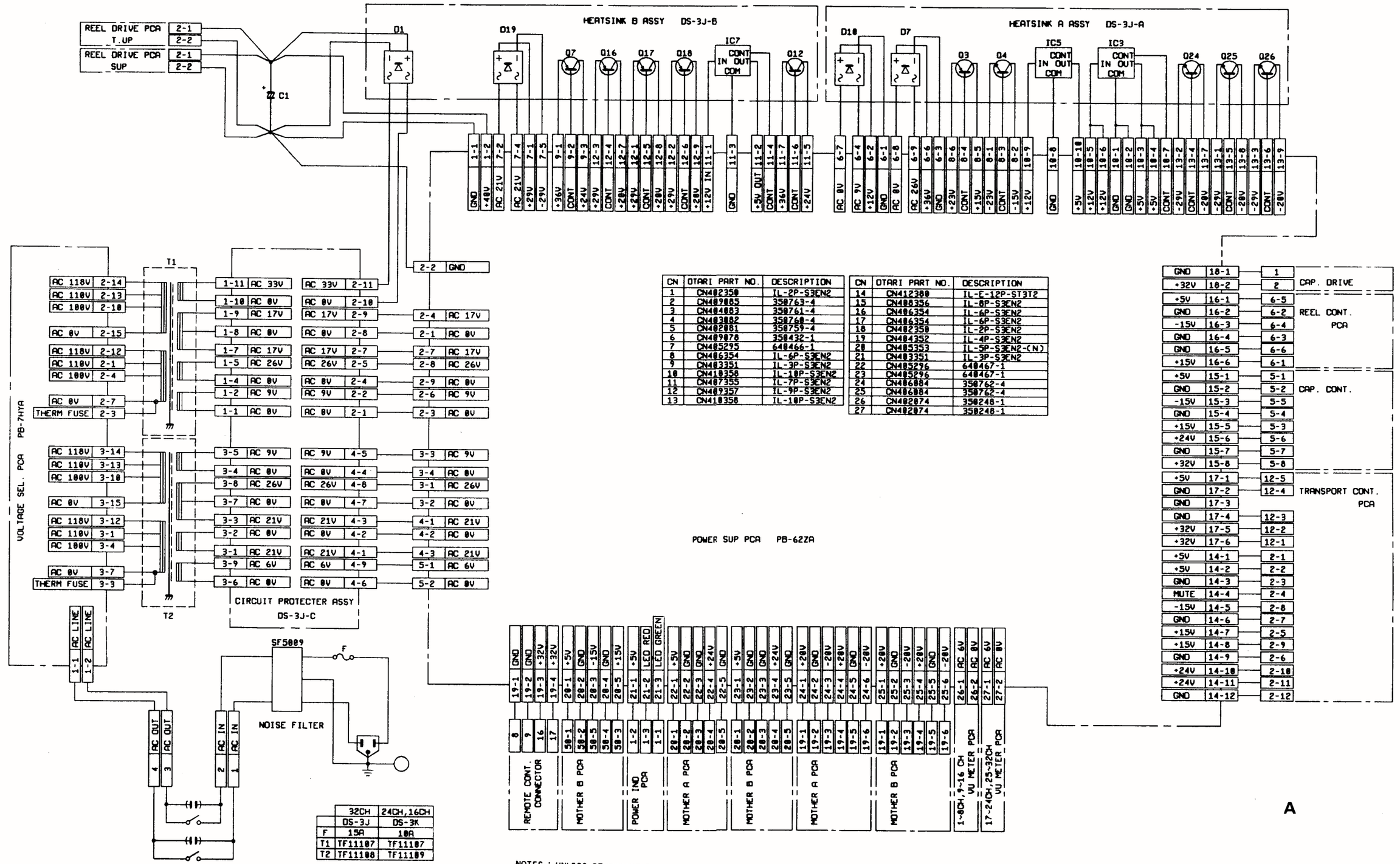

CN	OTARI PART NO.	DESCRIPTION
1	CN402350	IL-2P-S3EN2
2	CN409865	350763-4
3	CN404883	350761-4
4	CN403882	350760-4
5	CN402081	350759-4
6	CN409878	350432-1
7	CN405295	640466-1
8	CN406354	IL-6P-S3EN2
9	CN403351	IL-3P-S3EN2
10	CN410358	IL-10P-S3EN2
11	CN407355	IL-7P-S3EN2
12	CN409357	IL-9P-S3EN2
13	CN410358	IL-10P-S3EN2

CN	OTARI PART NO.	DESCRIPTION
14	CN412380	IL-E-12P-ST3T2
15	CN408356	IL-8P-S3EN2
16	CN406354	IL-6P-S3EN2
17	CN406354	IL-6P-S3EN2
18	CN402350	IL-2P-S3EN2
19	CN404352	IL-4P-S3EN2
20	CN405353	IL-5P-S3EN2-(N)
21	CN403351	IL-3P-S3EN2
22	CN405296	640467-1
23	CN405296	640467-1
24	CN406884	350762-4
25	CN406884	350762-4
26	CN402074	350248-1
27	CN402074	350248-1

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   ⏚ : ALUMINUM ELECTROLYTIC CAPACITOR.
   ⏚ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   ⏚ : MYLAR FILM CAPACITOR(±5%, 50V)
   ⏚ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   ⏚ : CERAMIC CAPACITOR.
   ⏚ : MICA CAPACITOR(±5%)

Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
Ⓜ : METALLIZED PAPER CAPACITOR(±10%)
SK : SPARK KILLER.
⚠ : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

A

NAME	POWER SUP. ASSY WIRING	SHEET OF
PART NO.	DS3J00B	
APPLIED	DS-3J . DS-3K	

3.12557

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	REFERENCE NO.	ATARI PART NO.	DESCRIPTION
IC	1,8	I-0862	M5239L
	2,6	I-0863	M5231L
	3,7	ISTR9005	STR9005
	4	I-0844	TL7705C
	5	IHC7805H	UPC7805H
C	1,6,11,13-15,19	DB1028Y	2SA1028Y
	2,20-23	DC2655Y	2SC2655Y
	3,7,12,16-18	DB8630	2SB630
	4,24,25,26	DD11480	2SD1480
	5,27	DC2878	2SC2878
	8,9,10	DC1815BL	2SC1815BL
D	1,19	PN-0005	KBPC25-02
	2	PN-0044	RD15EB3
	3,5,6,9,11,16,18,20,21	PNTLG124	TLG124
	4,15,17	PND5FB20	D5FB20
	7,10	PN-0198	1SD484
	8	PNVB5C	VB5C
	12,13,14	PN-0264	ERB82-004

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   Ⓕ : MYLAR FILM CAPACITOR(±5% , 50V)
   Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   Ⓒ : CERAMIC CAPACITOR.
   Ⓜ : MICA CAPACITOR(±5%)

Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
Ⓜ : METALLIZED PAPER CAPACITOR(±10%)
⊣⊢ : SPARK KILLER.
⚠ : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(A)TO AT THE END

NAME	POWER SUP. ASSY
PART NO.	DS3J00A
APPLIED	DS-3J DS-3K
SHEET	1 OF 1

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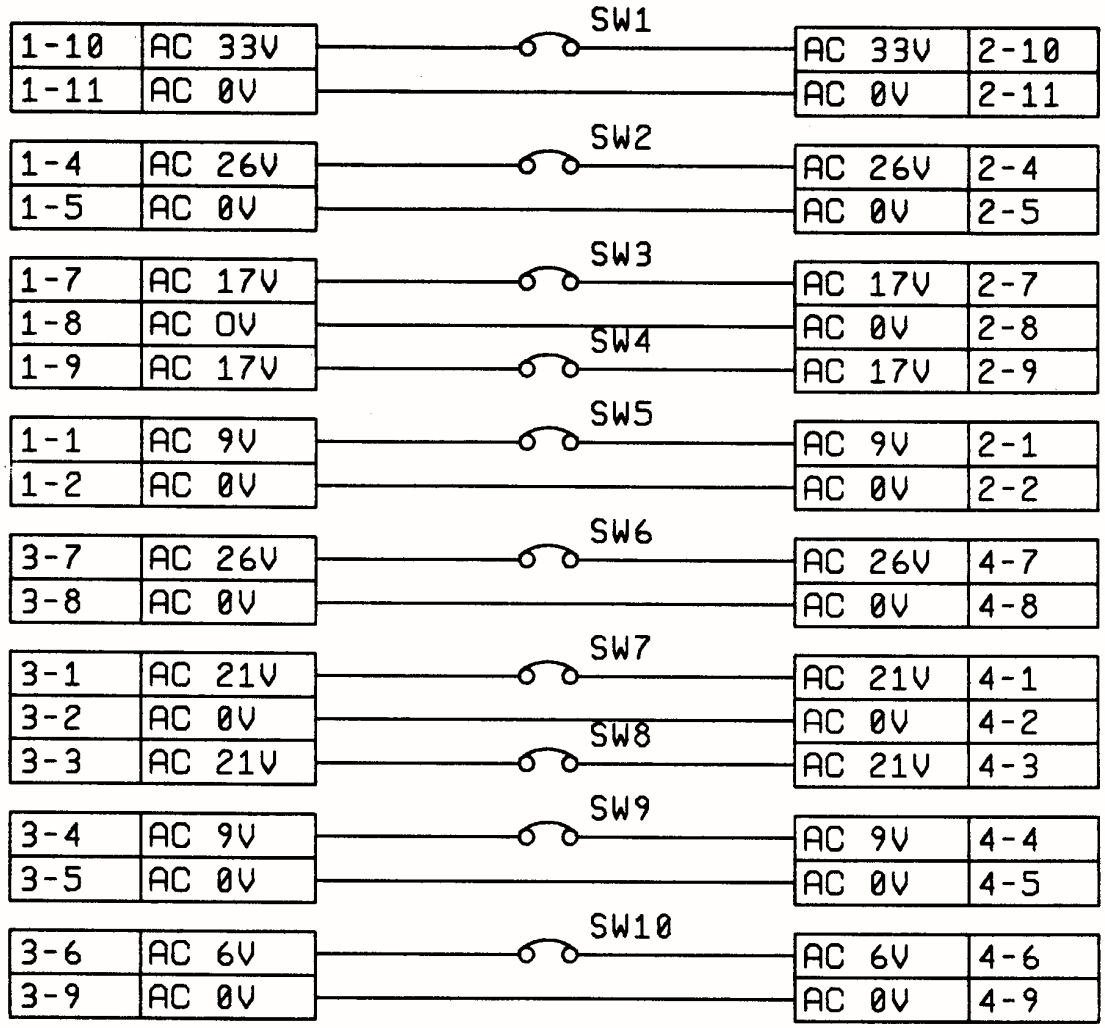

REFERENCE NO			OTARI PART NO	DESCRIPTION	I[A]
	DS-3K-A	DS-3J-C			
SW	1,7,8	1	WH91092	TBC5001-01-1410	10A
	2	2	WH91091	TBC5001-01-1310	8A
	3,4	3,4	WH91086	TBC5001-01-0810	2.5A
	5	5	WH91090	TBC5001-01-1210	6.3A
	6,9		WH91087	TBC5001-01-0910	3.15A
	10	6,9	WH91088	TBC5001-01-1010	4A
		10	WH91089	TBC5001-01-1110	5A
		7,8	WH91093	TBC5001-01-1510	15A

NAME	CIRCUIT PROTECTOR ASSY
PART NO.	DS3J00C
APPLIED	DS-3J-C

4-429936 DWG. NO.

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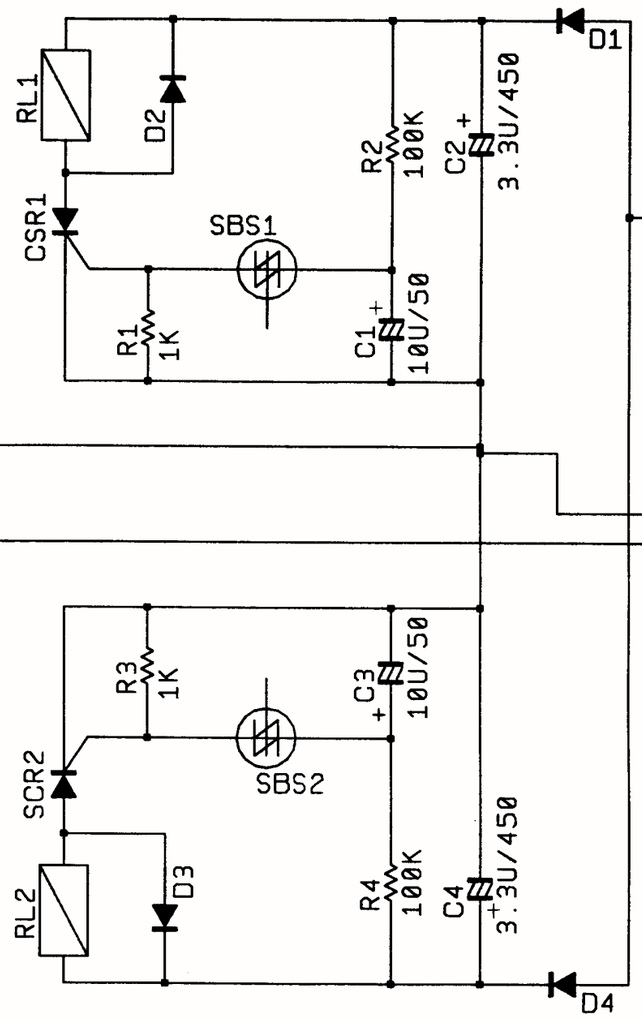
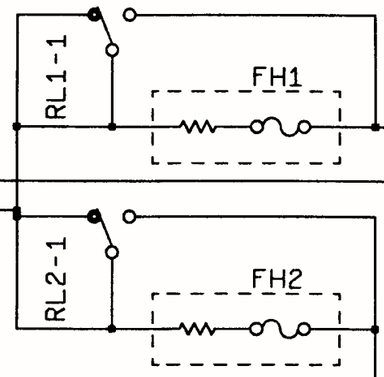
	CONNECT
100V	1-2, 7-9
110V	10-11, 5-3
117V	5-6, 9-12
200V	2-7
220V	3-10
240V	6-12



1-1	AC IN
1-2	AC IN



4-6	118V
4-3	110V
4-2	100V
4-9	0V
4-12	118V
4-10	110V
4-7	100V
4-4	0V
4-1	0V
4-5	0V
4-8	0V
4-11	0V

118V	2-14
110V	2-13
100V	2-10
0V	2-15
118V	2-12
110V	2-1
100V	2-4
0V	2-7
THRM.F	2-3

5-11	0V
5-8	0V
5-5	0V
5-1	0V
5-4	0V
5-7	100V
5-10	110V
5-12	118V
5-9	0V
5-2	100V
5-3	110V
5-6	118V

THRM.F	3-3
0V	3-7
100V	3-4
110V	3-1
118V	3-12
0V	3-15
100V	3-10
110V	3-13
118V	3-14

REF.NO.		OTARI PART NO.	DESCRIPTION
SCR	1,2	PN-0235	CR03AM-10
SBS	1,2	PNBS08A	BS08A
D	1-4	PNDSA10J	DSA10J
RL	1	RY1RC047	LY10-1208E
FH	1,2	R95-001	A53K-220J

NOTES:UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS,1/4W,5%.
2. CAPACITANCE VALUES ARE IN FARADS,50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   ⊕ :ALUMINUM ELECTROLYTIC CAPACTOR.
   Ⓑ :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   Ⓕ :MYLAR FILM CAPACITOR(±5%, 50V)
   Ⓢ :POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   Ⓒ :CERAMIC CAPACITOR.
   Ⓜ :MICA CAPACITOR(±5%)

A

3.12609

NAME	VOLT. SEL. PCA
PART NO.	PB7HY0A
APPLIED	PB-7HYA

DWG. NO.

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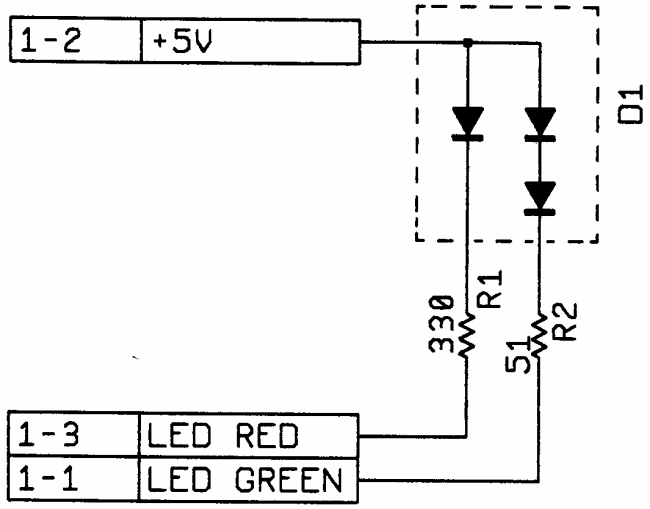

REF.NO.		OTARI PART NO	DESCRIPTION
D	1	PN-0276	MU09-9101

NAME	POWER IND PCA
PART NO.	PB7HZ0A
APPLIED	PB-7HZA

DWG. NO. 4 429035

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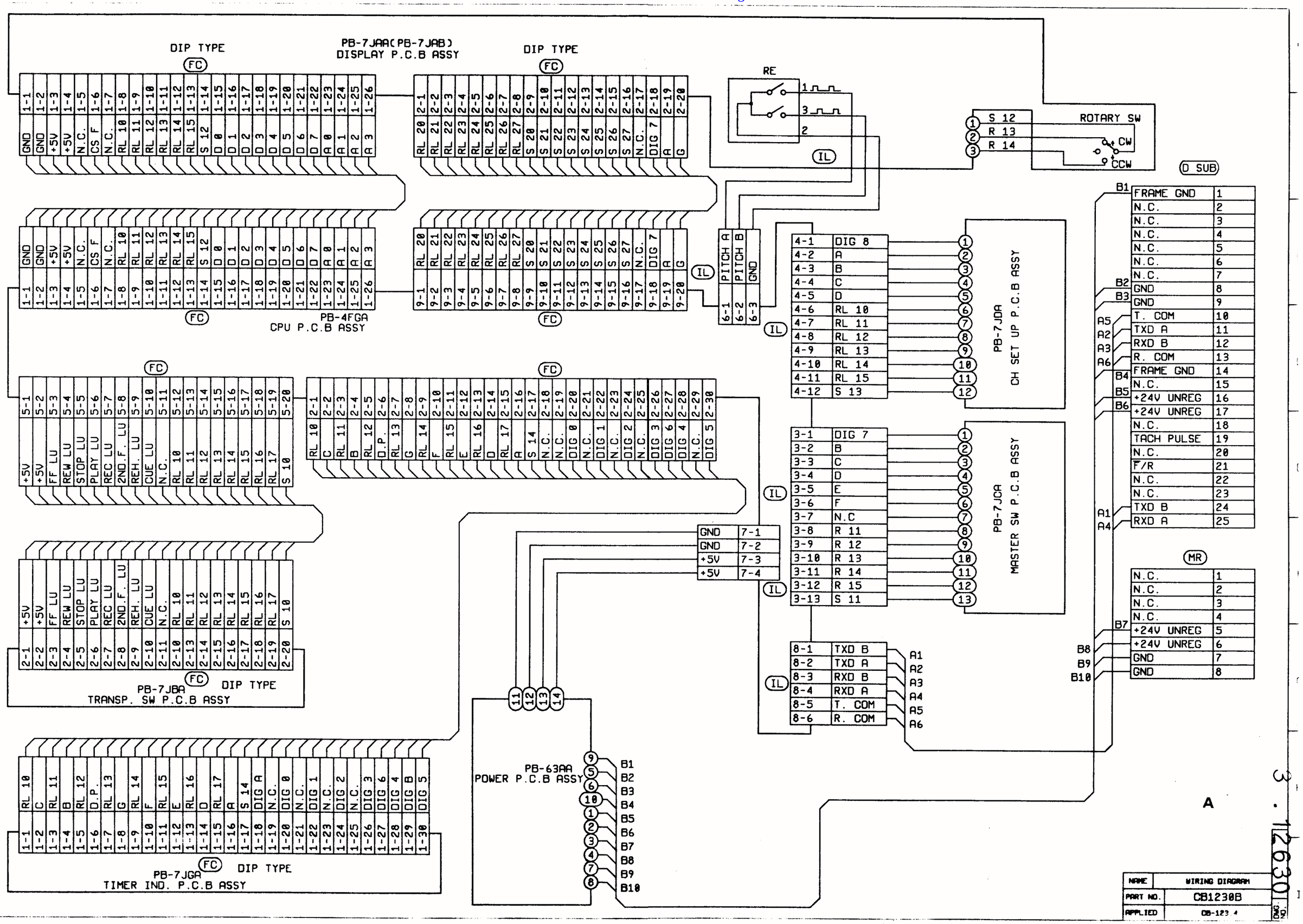

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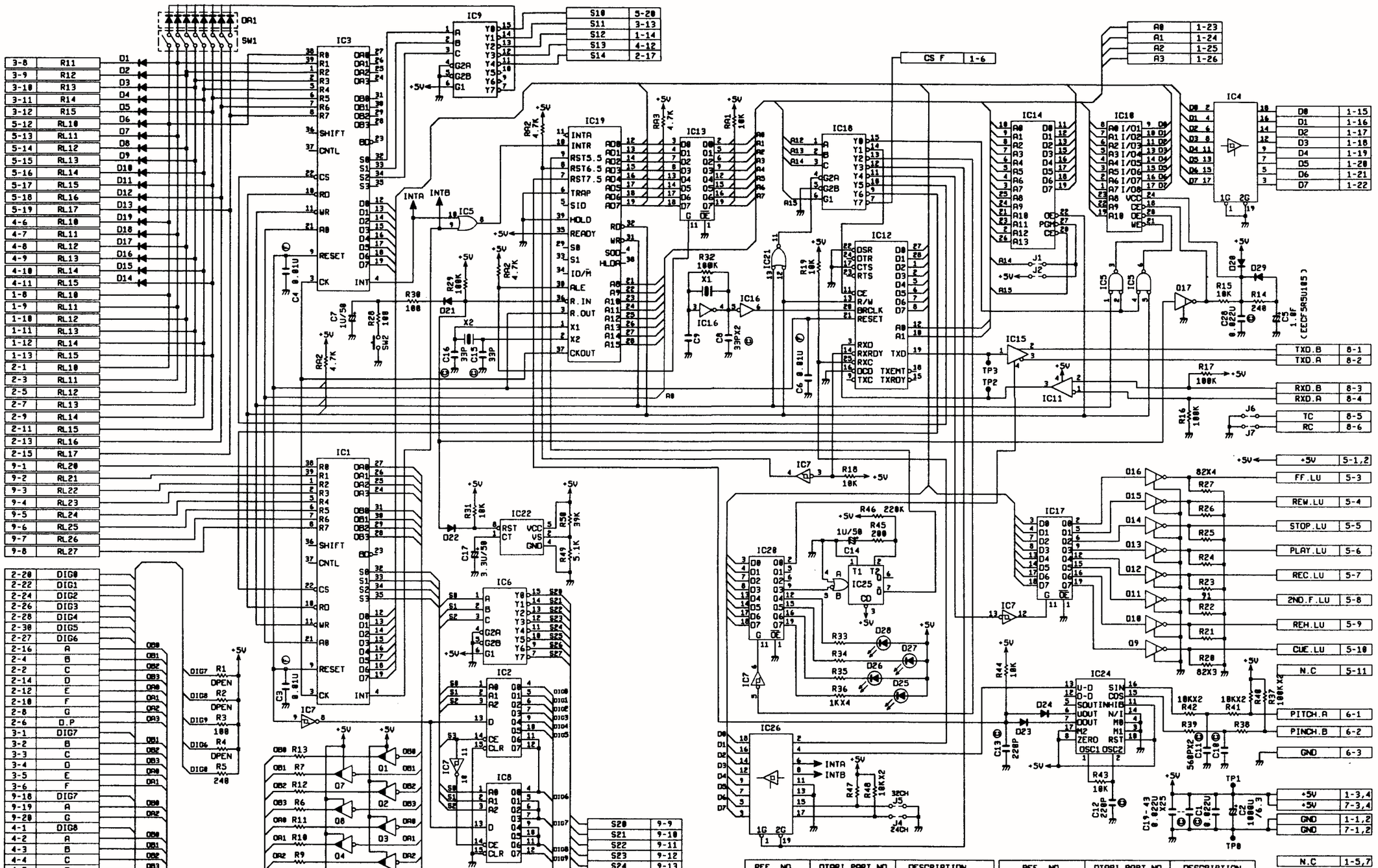

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- :ALUMINUM ELECTROLYTIC CAPACITOR.
- :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- :MYLAR FILM CAPACITOR(±5%,50V)
- :POLYSTYRENE FILM CAPACITOR(±5%,50V)
- :CERAMIC CAPACITOR.
- :MICA CAPACITOR(±5%)
- :TANTALUM ELECTROLYTIC CAPACITOR.
- :POLYPROPYLENE FILM CAPACITOR(±5%)
- :LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- :METALLISED PAPER CAPACITITOR(±10%)
- :SPARK KILLER.
- :SAFETY COMPONENT :REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

REF. NO.		OTARI PART NO.	DESCRIPTION
IC	1,3	IM5L8279	M5L8279P-5
	2,8	INE590N	NE590N
	4,26	IO244	TC74HC244
	5	IO32	TC74HC32
	6,9,18	IO138	TC74HC138
	7	IO14	TC74HC14P
	10	I-0075	HM6116LP-4
	11	IG175N	SN75175N
	12	I-0081	SCN2661BC1N28
	13,17,20	IO373	TC74HC373P
	14	I-0065	M5L27128K
	15	IG174N	SN75174
	16	IQU04	TC74HCU04P
	19	IM5L8085	M5M80C85ARS
	21	IO88	TC74HC08P
	22	I-0105	TL7700CP
	24	I-0108	M5M5218RS
	25	IMC14538	MC14538B

REF. NO.		OTARI PART NO.	DESCRIPTION
D	1-19, 21-24	PN-0199	MA171
	20,29	PN-0264	ERA82-004
	25-28	PNTLR124	TLR124
O	1-8	O-0004	UN1111
	9-16	O-0011	RN1205
	17	O-0006	UN1211
DA	1	PNNAL8C5	NAL8C5
SW	1	WH98137	DSS108
	2	WH11101	TM1-01
		WH08104R	TZ-0002
X	1	PZ4C033	4.9152MHZ
	2	PZ4C017	KBR-6.0M

C

NAME	CPU PCA	SHEET OF
PART NO.	PB4FG0A	
APPLIED	PB-4FGA	

DWG NO. 3.12619

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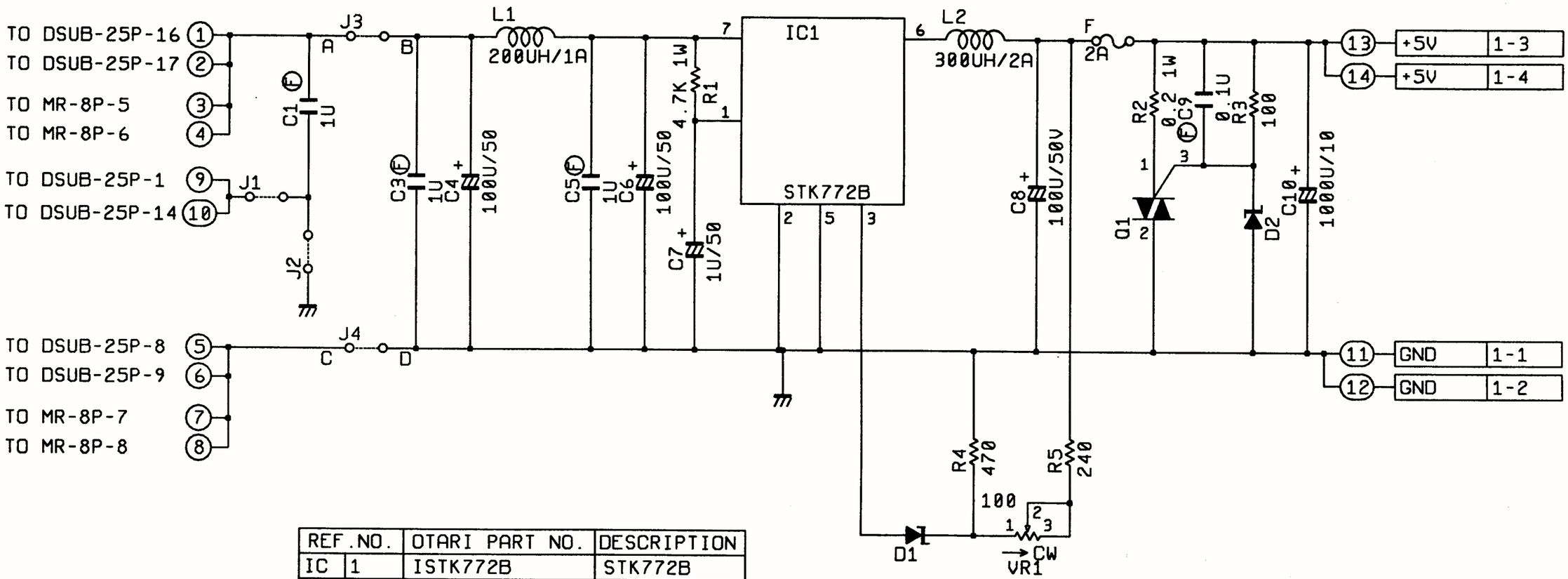
J1	OPEN
J2	SHORT
J3	SHORT
J4	SHORT



REF.NO.		OTARI PART NO.	DESCRIPTION
IC	1	ISTK772B	STK772B
L	1	IN19143	HP-012
	2	IN19079	HP-023
Q	1	Q-0016	BCR6AM-8L
D	1	PNHZ2CLL	HZ2CLL
	2	PN-0013	RD.6EB2
F		FH1-014	85PN0819
		FH9-021	CEA-0002

NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣+⊢ : ALUMINUM ELECTROLYTIC CAPACTOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓕ : MYLAR FILM CAPACITOR(±5%, 50V)
   - Ⓢ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR(±5%)

C

NAME	POWER SUP PCA
PART NO.	PB63A0A
APPLIED	PB-63AA
DWG. NO.	3 .12622

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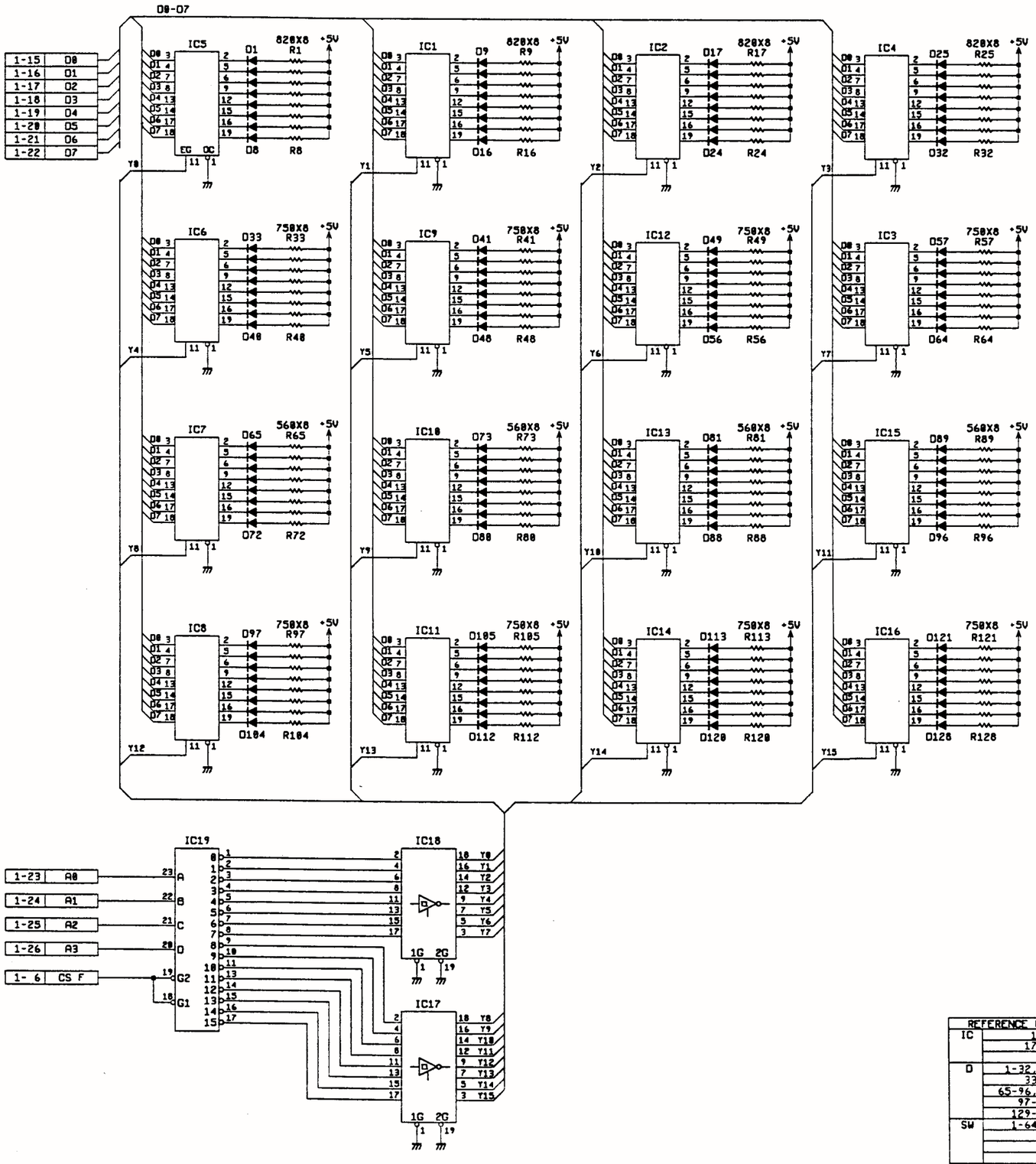

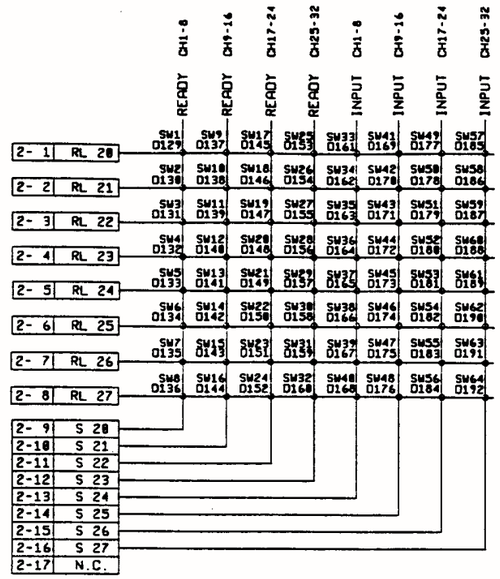

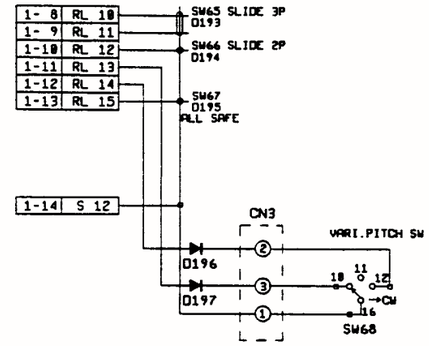

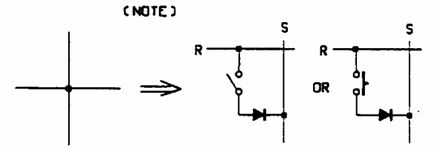

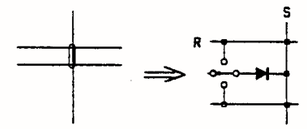

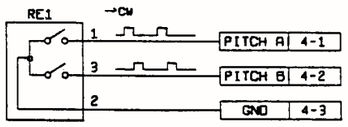

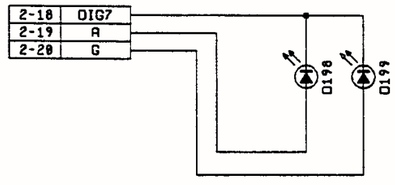

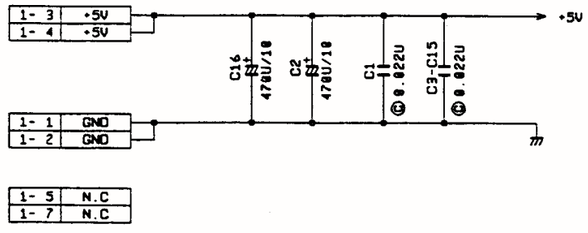

REFERENCE NO.		OTARI PART NO.	DESCRIPTION
IC	1-16	10373	TC74HC373P
	17,18	10240	TC74HC240
	19	10154	TC74HC154P
D	1-32,199	PNTLR124	TLR124
	33-64	PNTLY124	TLY124
	65-96,198	PNTLG124	TLG124
	97-128	PNTLO124	TLO124
	129-197	PN-0199	MA171
SW	1-64,67	WH42057	LBXCJ-22M-095
	65	WH340463	SSSA04-3-L12
	66	WH340433	SSSA04-2-L12
	68	WH64070	SRM1043S
RE	1	SR3Z038	EC24B

TYPE NO(C)TO
AT THE END

DWG. NO. 3-12620

NAME	DISPLAY PCA	SHEET 1 OF 1
PART NO.	PB7JA0A	
APPLIED	PB-7JAA	

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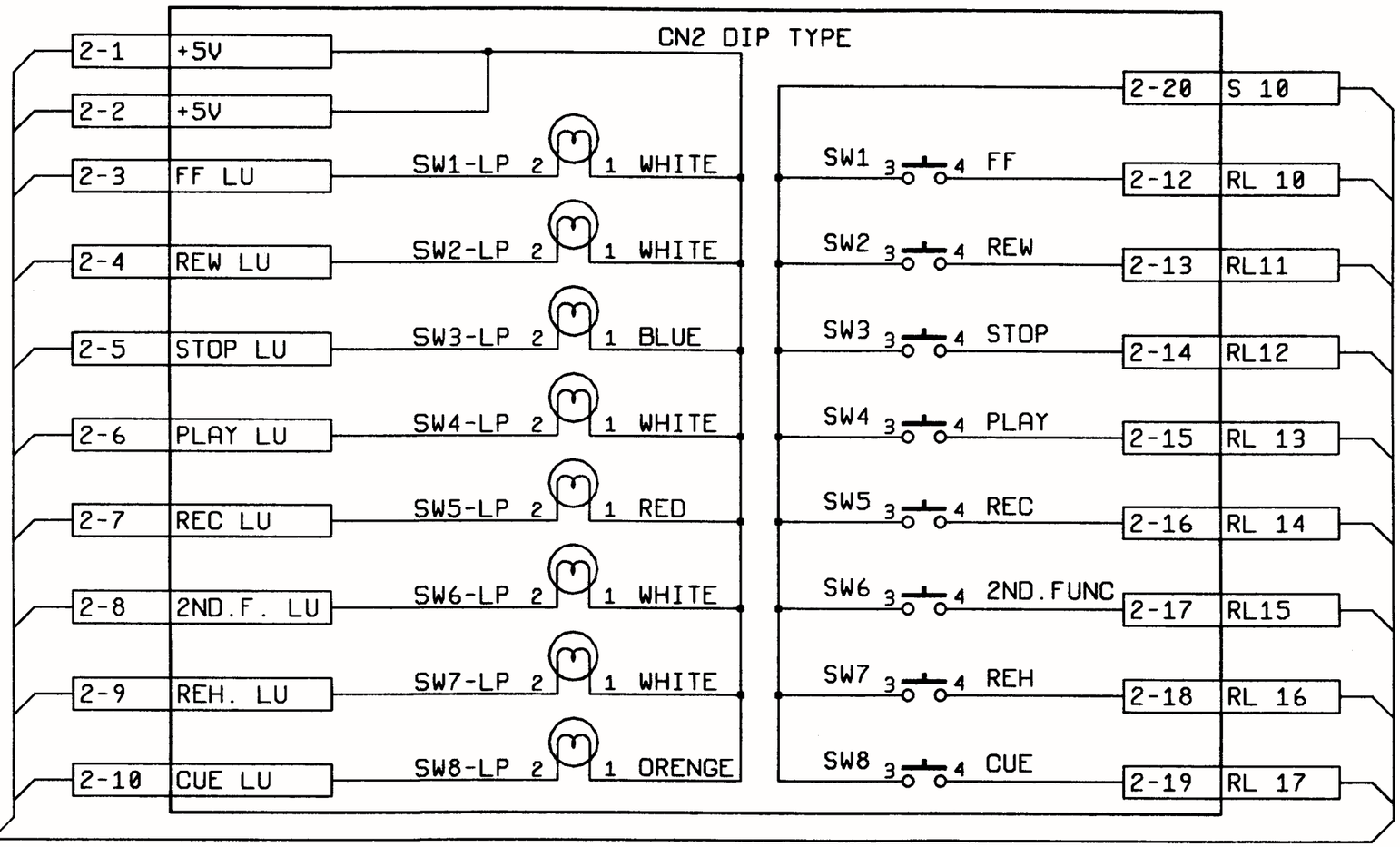
1-1	+5V
1-2	+5V
1-3	FF LU
1-4	REW LU
1-5	STOP LU
1-6	PLAY LU
1-7	REC LU
1-8	2ND F. LU
1-9	REH. LU
1-10	CUE LU
1-11	N.C.
1-12	RL 10
1-13	RL 11
1-14	RL 12
1-15	RL 13
1-16	RL 14
1-17	RL 15
1-18	RL 16
1-19	RL 17
1-20	S 10



REF.NO.		OTARI PART NO.	DESCRIPTION
SW	1-2	WH11118W	11L-120-0000
	3	WH11117U	11L-170-0020
	4,6,7	WH11117W	11L-170-0000
	5	WH11117R	11L-170-0010
	8	WH111180	11L-120-0040

A

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NAME	TRANSP. SW PCA
PART NO.	PB7JB0A
APPLIED	PB-7JBA

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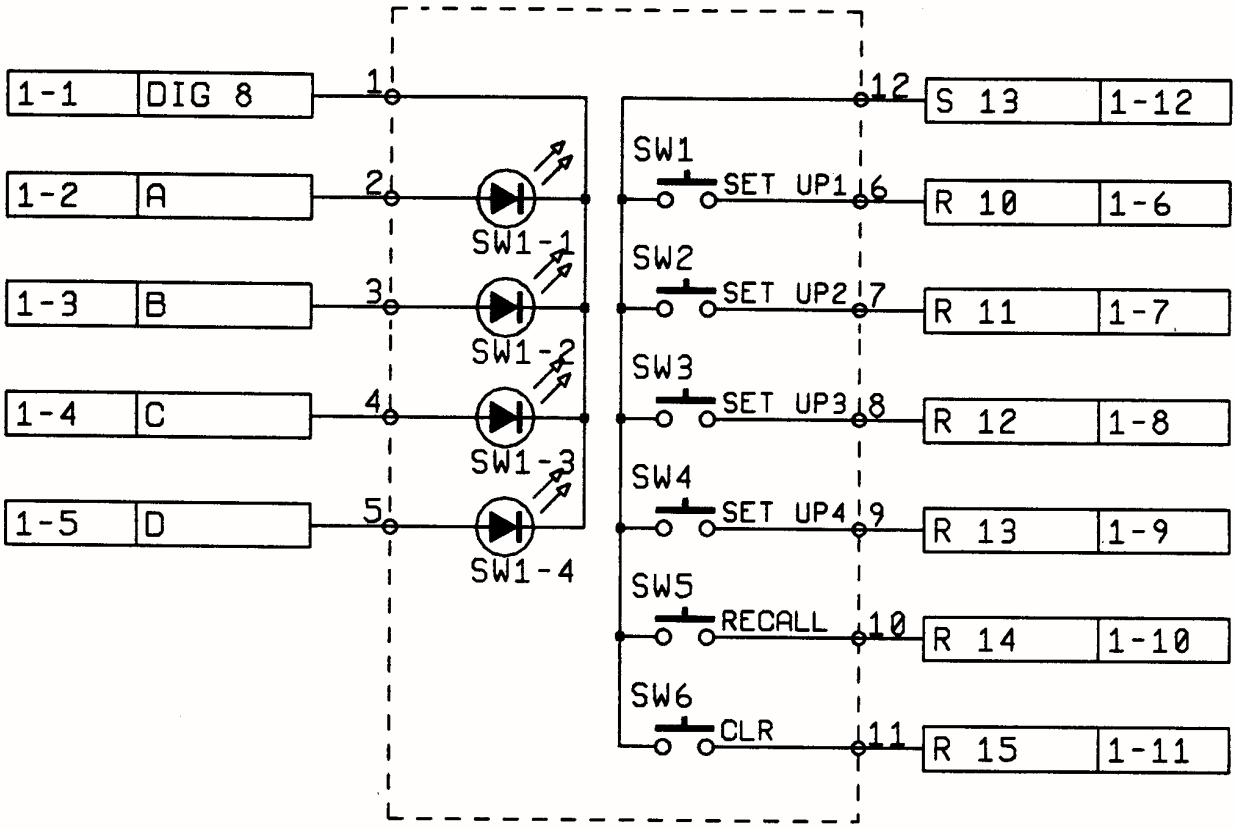

REF.NO.		OTARI PART NO.	DESCRIPTION
SW	1-4	WH11182Y WH0B105C	TM2-01-L8 TZ-0104
	5	WH11181 WH0B104C	TM1-01 TZ-0004
	6	WH11181 WH0B104U	TM1-01 TZ-0006

C

NAME	CH SET UP PCA
PART NO.	PB7JD0A
APPLIED	PB-7JDA

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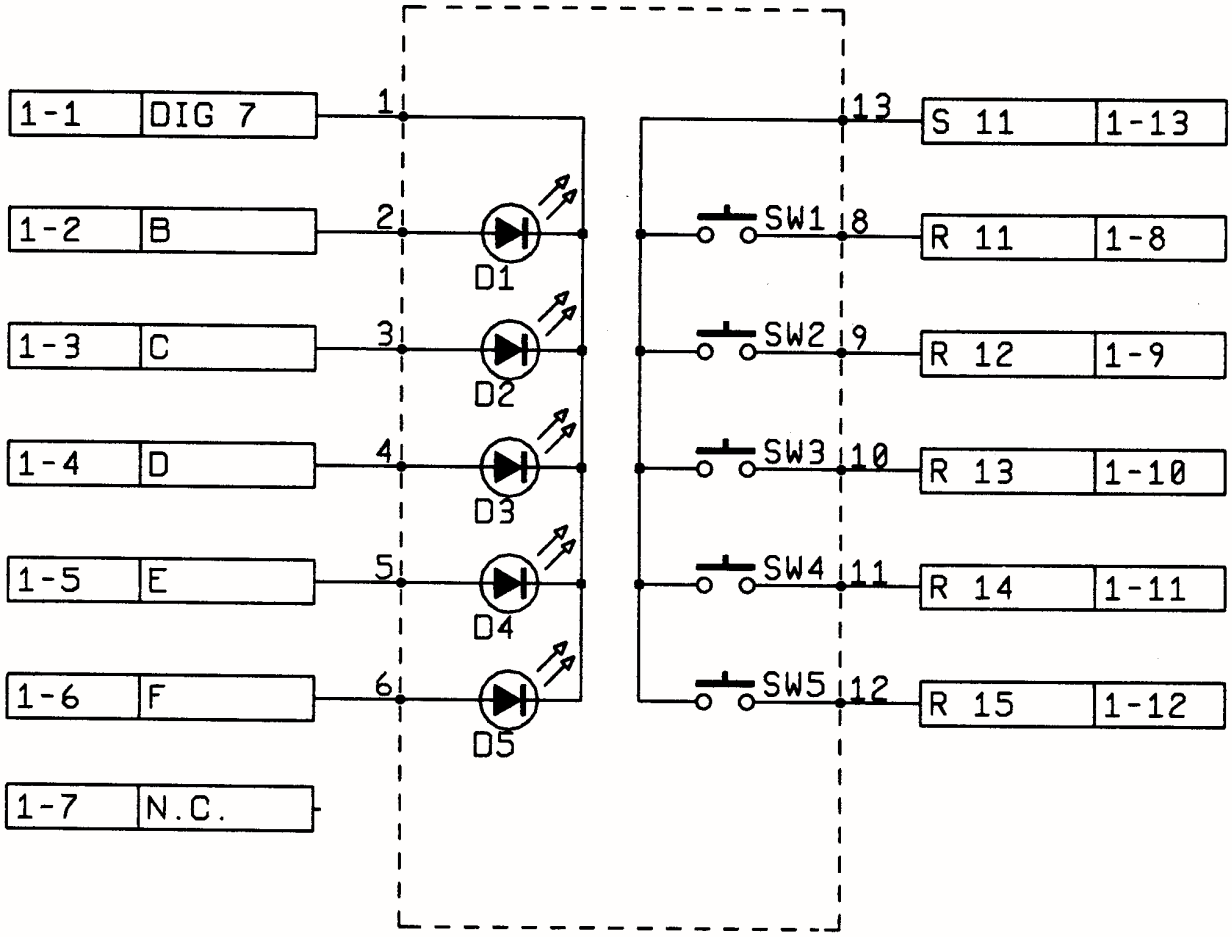

REF.NO.		OTARI PART NO.	DESCRIPTION
D	1,4	PNTLG124	TLG124
	2	PNTLY124	TLY124
	3,5	PNTLO124	TLO124
SW	1-5	WH11200B	320E1-1

C

NAME	MASTER SW PCA
PART NO.	PB7JC0A
APPLIED	PB-7JCA

4-42946 DWG. NO.

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