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Clarion Service Manual

Published by Service Administration Section

DAT
Digital Audio Tape

DAT (DIGITAL AUDIO TAPE) PLAYER

Model DAC2010
(PE-5510A)

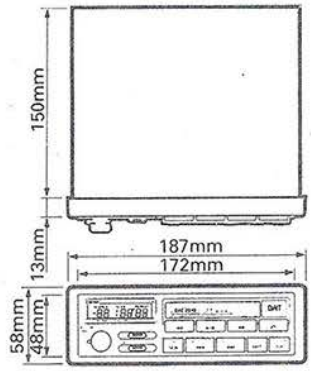
TABLE OF CONTENTS

SPECIFICATIONS:

Model:	Rotating head type digital audio tape
Number of channels:	2, stereo playback
Tape speed:	8.15mm/s
Number of quantization bits:	16, linear
Sampling frequency:	48kHz or 44.1kHz (automatic selection)
Frequency response:	20 — 20,000Hz (±1.0dB)
S/N ratio:	92dB or greater
Dynamic range:	92dB or greater
Harmonic distortion:	0.05% or less (1kHz)
Wow & flutter:	Below measurable limits
Frequency adjust range:	Bass — 100Hz ±10dB Treble — 10kHz ±10dB
Rated voltage:	14.4V (10.8 — 15.6V) (— ground)
Power consumption:	Approx. 20W (play mode)
Weight:	Main unit 1.6kg Power unit 0.3kg

External Dimensions:

•Main Unit



FEATURES:

1 Digital Audio Tape Player

This set is a car tape player for playing pre-recorded DATs (digital audio tapes). It offers excellent resistance to vibration, temperature, and humidity, stable mechanisms, and is specially designed for operation in a car.

2 Scan

The beginning of the following program is found automatically and played for 8 seconds, after which the beginning of the next program is found.

3 Repeat

One program can be repeated any number of times.

4 Auto All Repeat

When the tape end or lead out is detected during playback, the tape is automatically rewound to the beginning and playback begins.

5 Music Search

Any program can be searched for at an average speed 200 times the normal speed.

6 Manual Search

Fast-forwarding and rewinding at 2.5 times the normal speed can be used to find sections within a program. Sound, attenuated by about 12dB (about 1/4), is produced while searching.

7 Top Function

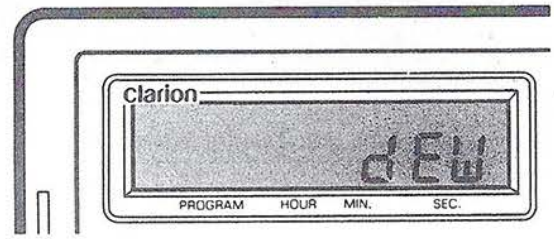
All operations are stopped, the tape is automatically rewound to the tape start position, and playback starts.

8 ACC Off Eject Function

Even if the ACC switch is turned off while a tape is loaded in the set, the tape can still be ejected by pressing the eject button.

9 Condensation

- Dew forms on the windows when the temperature in the car is low and the car is heated abruptly, or if there is steam or humidity in the car. When this happens, water droplets may form in the set. This is called condensation. If the set is used as such, the tape may get stuck on internal parts, the set may not operate properly, and the tape and parts may be damaged. This set includes a device for protecting against condensation.
- With this set, when the ACC switch is turned on, a heater automatically turns on to prevent condensation.
  The heater turns off automatically when the internal temperature reaches approximately 50°C.
- When condensation forms, "dEW" appears on the display when the car's ACC switch is turned on.



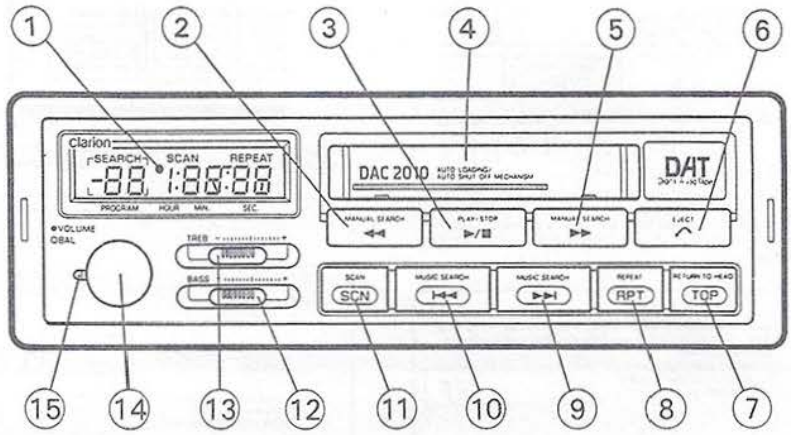
- When "dEW" is displayed, the protector is activated, and if a tape is inserted it is ejected automatically. The tape cannot be inserted until "dEW" turns off.
- Internal parts may not be completely dry even when "dEW" turns off.
  Wait 10 minutes before using the set.
- In winter in particular, the temperature and humidity in the car may rise abruptly if many people get in, and the response of the condensation sensor may be slow. Wait for several minutes after getting in the car before using the set.

COMPONENTS:

• PE-5510A-A

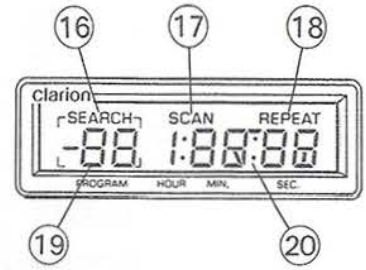
Main unit		1
Demonstration tape	CTE-001-100	1
Mounting bracket	300-6954-00	1
Mounting bracket (Universal)	300-7110-00	1
Parts bag	921-8541-00	1
{ Hook plate	330-8216-00	2
{ Cushion	345-2934-00	1
{ Spacer	345-3653-01	1
{ Tap screw	700-4016-81	2
{ Tap screw	700-5016-80	1
{ Machine screw	714-3005-89	2
{ Screw	716-0726-01	1
{ Nut	722-0314-00	1
{ Plate nut	725-0216-00	1
Parts bag	922-1470-00	1
{ Escutcheon	370-3981-00	1

■OPERATION:



① Digital Indicator Display
② MANUAL SEARCH Button (backward direction)
③ PLAY/STOP Button
④ Cassette Insertion Slot
⑤ MANUAL SEARCH Button (forward direction)
⑥ EJECT Button
⑦ RETURN TO HEAD (TOP) Button
⑧ REPEAT Button
⑨ MUSIC SEARCH Button (forward direction)
⑩ MUSIC SEARCH Button (backward direction)
⑪ SCAN Button
⑫ BASS Control
⑬ TREBLE Control
⑭ VOLUME Control
⑮ BALANCE Control

■ DIGITAL DISPLAY



■ DIGITAL DISPLAY
⑯ SEARCH Indicator
⑰ SCAN Indicator
⑱ REPEAT Indicator
⑲ Program Number, Search Number, "no" Digital Display
⑳ Operation (LOAD, PLAY, STOP, FF, REW, TOP, "REC"), Program Time Digital Display

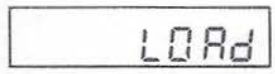
Playback

- Turn the car's ACC switch on.
- Insert the cassette into the cassette insertion slot with the side on which the tape is visible facing up. The cassette will be drawn in automatically and playback will start.

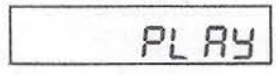
NOTE:
If the cassette is inserted in the wrong direction it will be ejected automatically. Do not force it out.

(1) Insert the cassette into the cassette insertion slot with the side on which the tape is visible facing up.

1-1 The display will be as shown at the right, and the tape will be drawn in and loaded automatically.

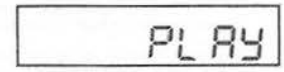


1-2 When the cassette enters the set and tape loading begins, the display will be as shown at the right.

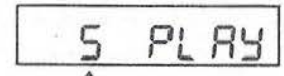


(2) Once the tape is loaded, playback will begin automatically and the display will change according to the subcodes recorded on the tape.

(A) When no start ID is detected or no start IDs are recorded:

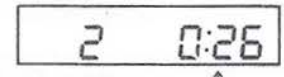


(B) When only program numbers are recorded: (After start ID detection)



Program number

(C) When both program numbers and program times are recorded (after start ID detection), or for pre-recorded tapes:



Program time

■ VOLUME Control

Adjust to the desired volume. The volume increases when the control is turned clockwise ( ).

NOTE:
The digital audio tape has a wider dynamic range than the cassette player, so if the volume is turned too high in non-recorded sections, the sound may be very loud when playback starts, possibly damaging the speakers.

■ BALANCE Control

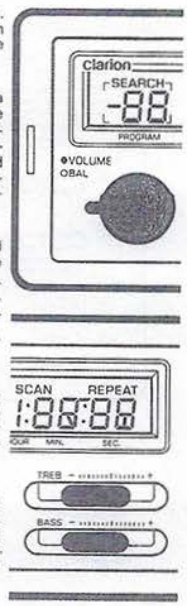
When the control is turned clockwise ( ), the volume of the right speaker is emphasized, and when turned counterclockwise ( ), the volume of the left speaker is emphasized.

■ BASS Control

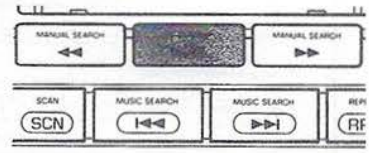
The sound is flat when at the center (click) position. When slid to the right, the bass is emphasized, and when slid to the left, the bass is reduced.

■ TREBLE Control

The sound is flat when at the center (click) position. When slid to the right, the treble is emphasized, and when slid to the left, the treble is reduced.



■ PLAY/STOP Button



- When pressed during playback, playback stops. Press again to resume playback.

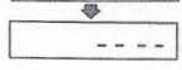
NOTE:
In the stop mode, the tape is wound in the cassette, and only the PLAY/STOP and EJECT buttons will function.

- When pressed during the music search, scan, repeat, or top functions, the function is stopped and playback begins automatically.

* When PLAY/STOP button is pressed during playback:

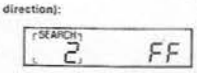
(1) The display will be as shown at the right and the tape will move away from rotating parts.

(2) When the tape has moved away from rotating parts, the display will change as shown at the right.

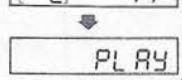


* During music search (forward direction):

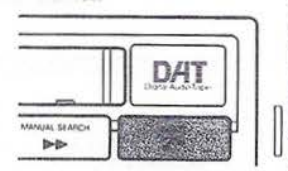
(1) During music search, the display will be as shown at the right.



(2) When the PLAY/STOP button is pressed (playback starts):



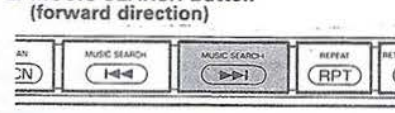
■ EJECT Button



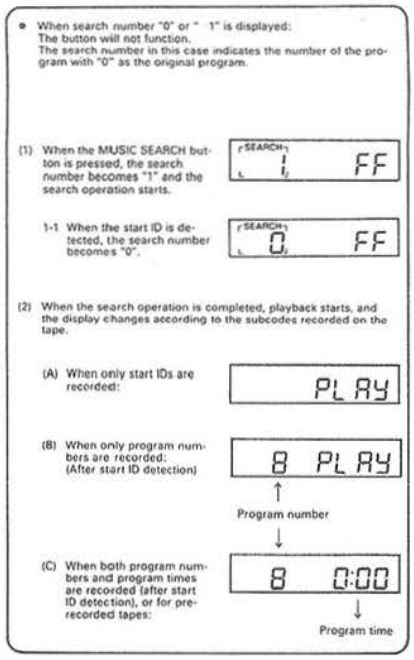
When the EJECT button is pressed, all operations stop and the cassette is ejected.

NOTE:
The cassette can be ejected by pressing the EJECT button even if the ACC switch (the car key) is turned off.

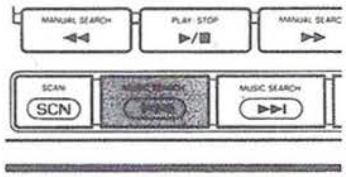
■ MUSIC SEARCH Button (forward direction)



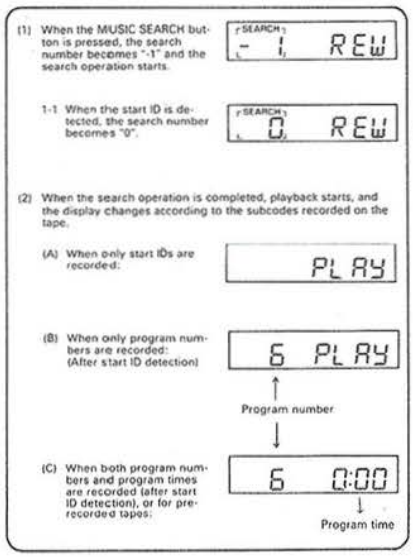
- When the MUSIC SEARCH button is pressed, the beginning of the following program is found. If pressed continuously, the search number increases one at a time up to 99 or until the button is released.
- If the end of the tape is reached during the search operation, the search function is stopped, the tape is automatically rewound, and playback begins from the start of the tape.
- This button will not function during the stop, scan, or eject operations.



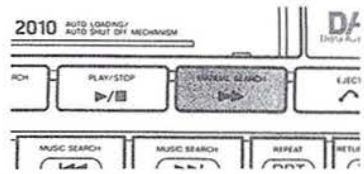
■ MUSIC SEARCH Button (backward direction)



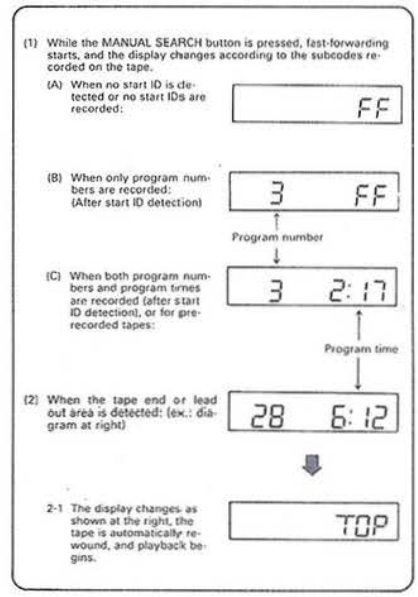
- When this MUSIC SEARCH button is pressed, the beginning of a previous program is found (or the beginning of the currently playing program if the button is only pressed once).
  If pressed continuously, the search number decreases one at a time to −99 or until the button is released.
- If the beginning of the tape is reached during the search operation, the search function is stopped, the tape is automatically rewound, and playback begins from the start of the tape.
- This button will not function during the stop, scan, or eject operations.
- When search number "0" or "1" is displayed:
  The button will not function.
  NOTE:
  If no start IDs are recorded, the music search operation will not function (either backward or forward).



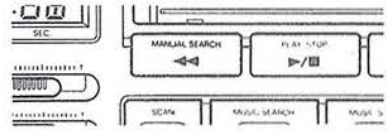
■ MANUAL SEARCH Button (forward direction)



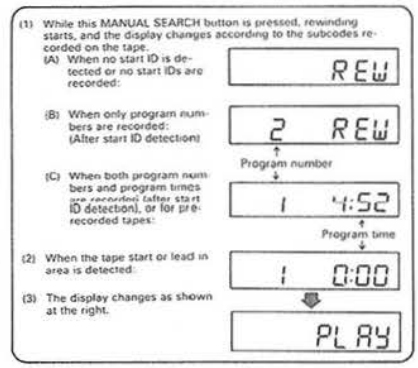
- While the MANUAL SEARCH button is pressed, the volume is cut to 1/4 and the tape is fast-forwarded at 2.5 times the normal speed.
- When the tape end or lead out area is detected, fast-forwarding stops, the tape is automatically rewound, and playback starts.



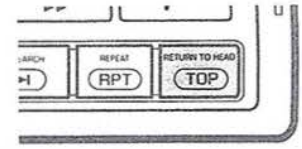
■ MANUAL SEARCH Button (backward direction)



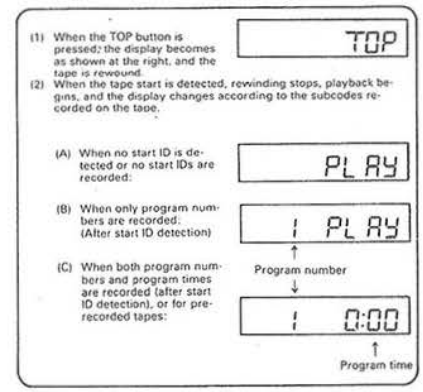
- While this MANUAL SEARCH button is pressed, the volume is cut to 1/4 and the tape is rewound at 2.5 times the normal speed.
- When the tape start or lead in area is detected, rewinding stops, and playback begins automatically.



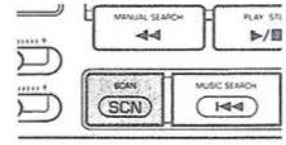
■ RETURN TO HEAD (TOP) Button



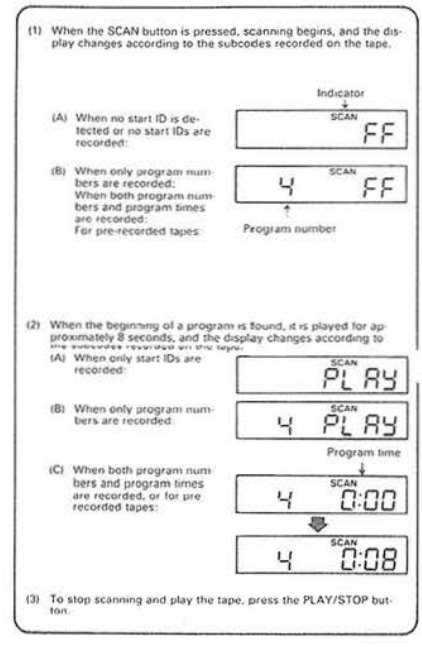
When the TOP button is pressed, the current operation is stopped, the tape is automatically rewound to the tape start position, and playback begins. (200 times the normal speed)



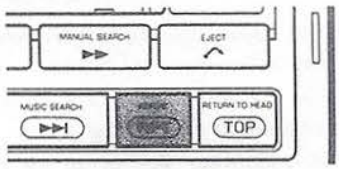
■ SCAN Button



- When the SCAN button is pressed, the beginning of the following program is found automatically and played back for approximately 8 seconds, after which the beginning of the next program is found.
- When set to the scan mode, the "SCAN" indicator lights.
- When the tape reaches the end during scanning, it is rewound to the beginning of the first program and scanning resumes.
- Scanning continues until the scan mode is cancelled. (For playback, press the PLAY/STOP button.)
- The MUSIC SEARCH buttons will not function during scanning.
  NOTE:
  Scanning is not possible if no start IDs are recorded on the tape.



■ REPEAT Button



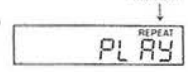
- When the REPEAT button is pressed, the program at that point is repeated.
- When the repeat function is turned on, the "REPEAT" indicator lights.
- The REPEAT button will not function during the music search operation (except when searching as part of the repeat function).
- The program is repeated until the repeat function is cancelled.
- The repeat function can be cancelled by pressing the REPEAT button.

NOTE:
Repeating is not possible if no start IDs are recorded.

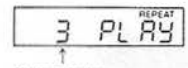
(1) When the REPEAT button is pressed, the "REPEAT" indicator lights, and the display changes according to the subcodes recorded on the tape.

Indicator

(A) When no start ID is detected or no start IDs are recorded:

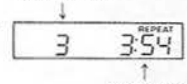


(B) When only program numbers are recorded: (After start ID detection)



Program number

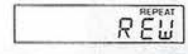
(C) When both program numbers and program times are recorded (after start ID detection), or for pre-recorded tapes:



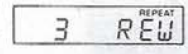
Program time

(2) When the following start ID is detected or when the lead out area or tape end is detected, the beginning of the currently playing program is found.
(The tape is rewound automatically)

(A) When only start IDs are recorded:



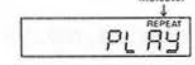
(B) When only program numbers are recorded:
When both program numbers and program times are recorded:
For pre-recorded tapes:
(In this case, the program is not displayed.)



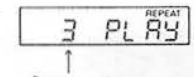
(3) When the beginning of a program is found, playback begins, and the display changes according to the subcodes recorded on the tape.

Indicator

(A) When only start IDs are recorded:

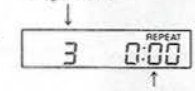


(B) When only program numbers are recorded:



Program number

(C) When both program numbers and program times are recorded, or for pre-recorded tapes:



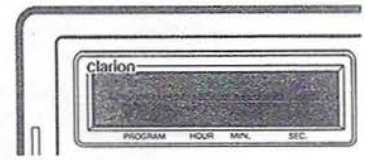
Program time

■ Auto All Repeat Function

If the tape end or lead out area is detected during playback, the tape is automatically rewound to the beginning and playback resumes.

■ Non-recorded Section Detection and Display Function

When the beginning of a section on which no signals have been recorded is detected, the display becomes as shown below.

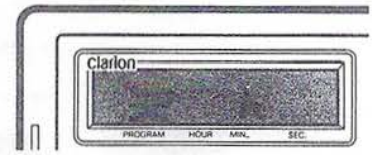


■ Sampling Frequencies

There are three types of sampling frequencies (the frequency at which analog audio signals are converted into digital signals), 48kHz, 44.1kHz, and 32kHz.

48kHz...	Used when recording on DAT decks for home use.
44.1kHz...	Used for commercial DAT music tapes and CDs.
32kHz...	Used for satellite broadcasts, etc.

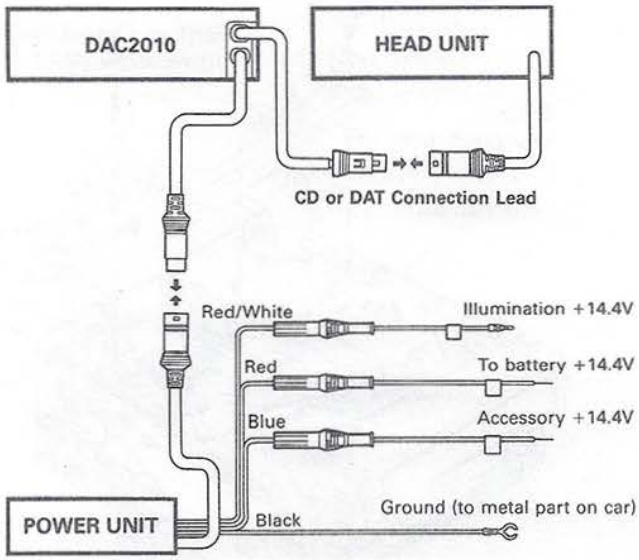
This product is for playback of tapes recorded with a sampling frequency of 48 kHz or 44.1kHz.
It cannot play tapes recorded with a sampling frequency of 32kHz.
(If such a tape is loaded, "32k" will appear on the display and the tape will be automatically ejected.)



■WIRING:

WIRE CONNECTION —1

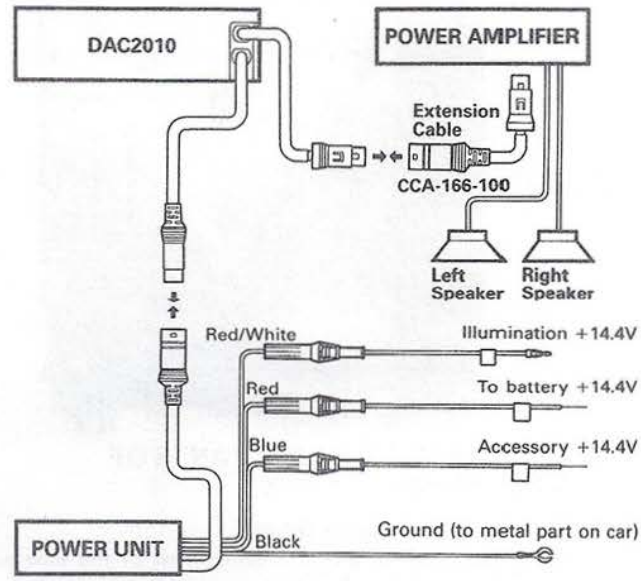
Make sure you disconnect the negative (—) lead from the (—) terminal of the battery before installing the unit.
This will prevent any accidental short circuiting during installation.



The ignition lead is a positive power input. It shoud be connected to a circuit which is turned on when the ignition key is in the "ACC" position.

WIRE CONNECTION —2

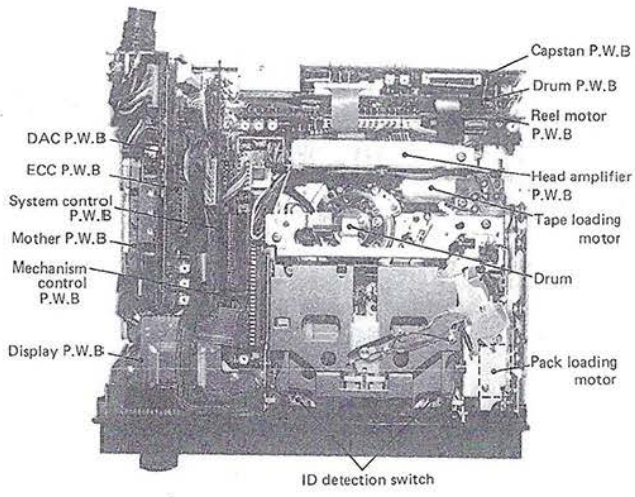
Make sure you disconnect the negative (—) lead from the (—) terminal of the battery before installing the unit.
This will prevent any accidental short circuiting during installation.



The ignition lead is a positive power input. It shoud be connected to a circuit which is turned on when the ignition key is in the "ACC" position.

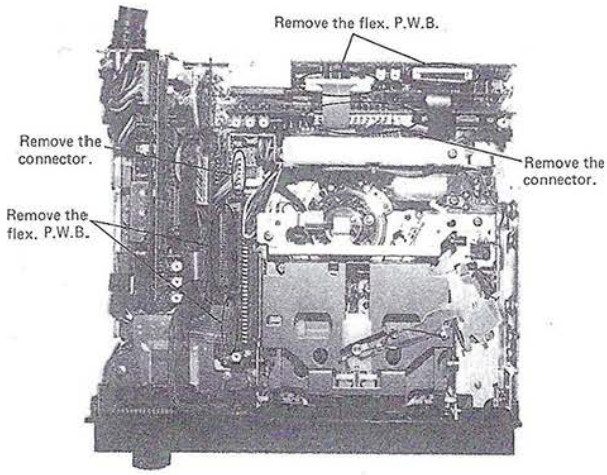
■ SET DISASSEMBLY METHOD

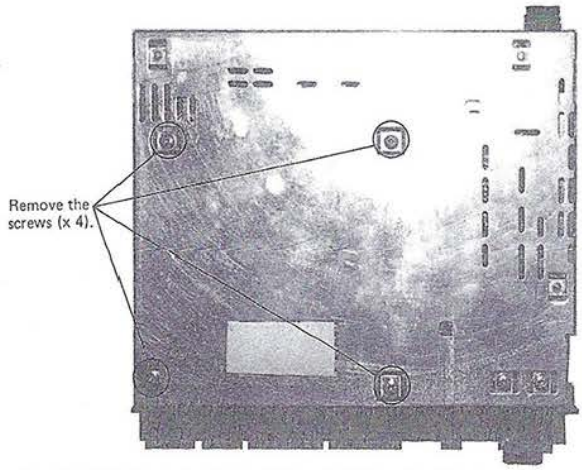
■ Name of Each Part



■ Dismounting the Mechanism

1) Remove the escutcheon. (machine screw x 4, flex. x 1)





■ EXCHANGE OF MAJOR PARTS OF MECHANISM

1 Method of Exchange of Drum

Upon exchange of a drum, adjustment of the tape pass (incl. DPG phase confirmation and ATF pilot level confirmation) and confirmation of error rate become necessary.

(As for details, refer to Adjustment of Mechanism.)

When handling the drum, the following should be noted.

NOTE) **1 Do not touch the drum with empty hands. Be sure to use specified gloves.**

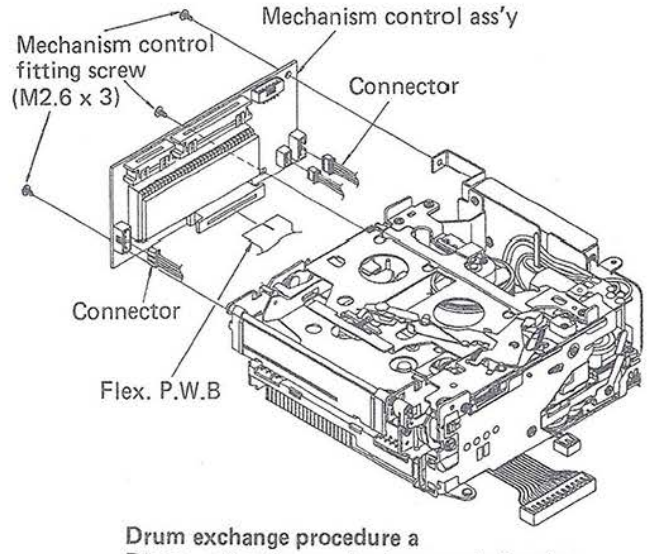
2 Handle the drum with care so that it may not be damged or hit other parts.

3 When mounting the drum ass'y, confirm that the ass'y is tightly fit on the surface.

Carry out the drum exchange, following the drum exchange procedure.

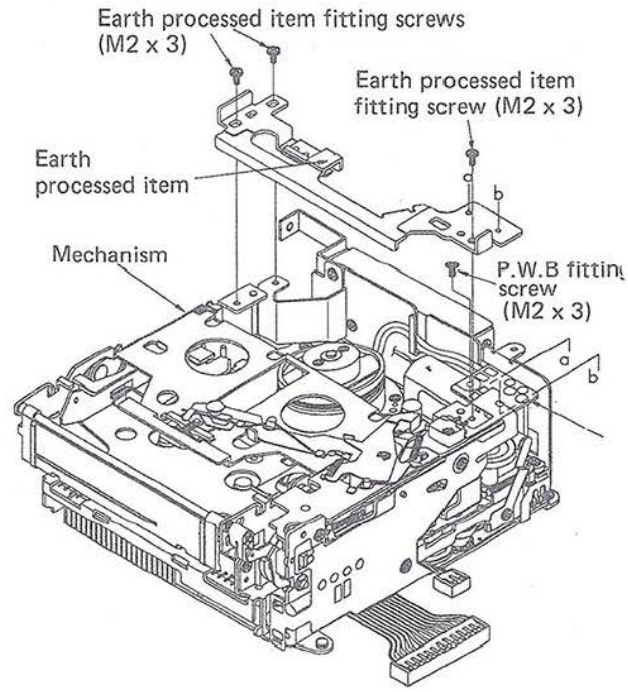
The drum exchange procedure (Dismounting Procedure)

1. Dismount the mechanism control ass'y from the mechanism. (machine screw x 3)
2. Pull out, with care, three connectors and the flex. P.W.B connected to the mechanism control ass'y so that they may not be damaged.



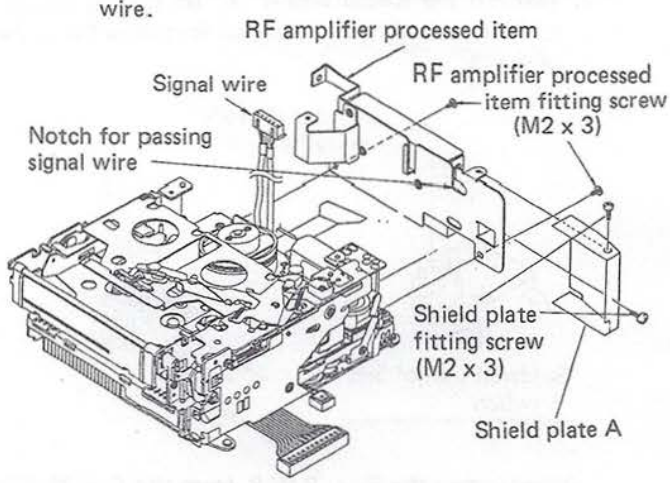
Drum exchange procedure a
Dismounting the mechanism control ass'y

3. Removing the lead wire of the dew sensor (soldered spots x 2), take off the earth processed item from Mechanism (machine screws x 4) Positional adjustment of fitting is explained separately.



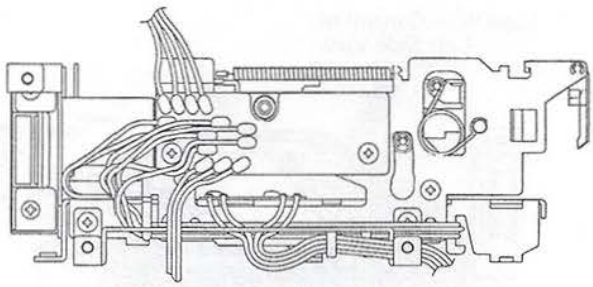
Drum exchange procedure b
Dismounting the earth processed item

4. 1 Remove the shield plate A. (machine screws x 2)
   2 Remove the RF amplifier processed item. (machine screws x 2)
   3 Extracting the connector of the drum signal wire, remove the lead wire from the RF amplifier. Be sure, at this time, not to damage the drum signal wire.

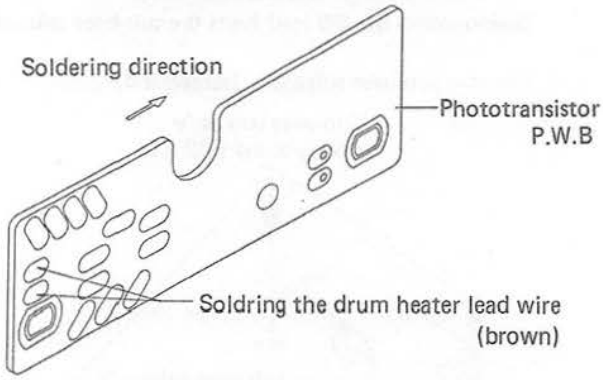


Drum exchange procedure c
Dismounting the RF amp. processed item

5. 1 Remove the drum heater lead wire (brown) from the phototransistor P.W.B. (soldered spots x 2)



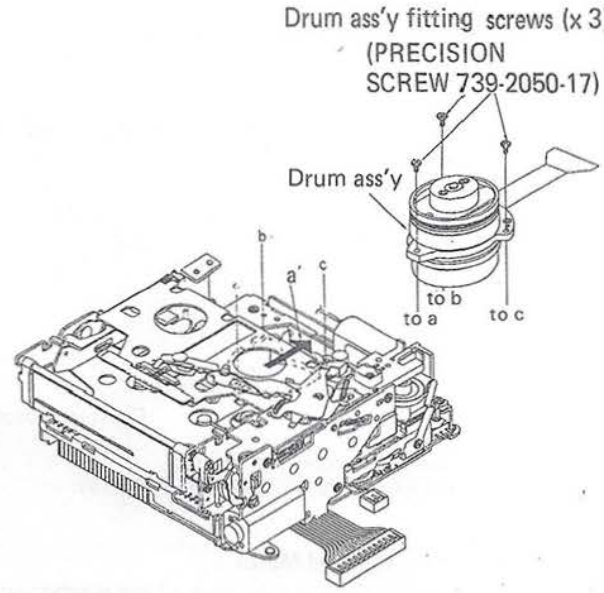
Lead Wire Control of Left Side View



Soldered Spots of END Sensor P.W.B

Drum exchange procedure d
Dismounting the drum heater lead wire

6. 1 Remove the drum ass'y. (machine screws x 3)
   2 Lifting the drum ass'y, pull out the flex. P.W.B from a'.

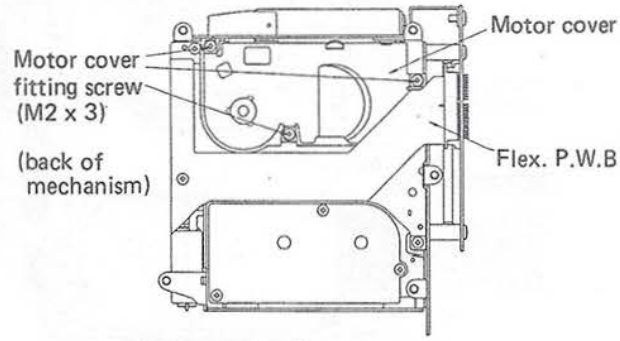


Drum exchange procedure e
Dismounting the Drum ass'y

7. Mounting procedure → Reverse procedure of that for mounting

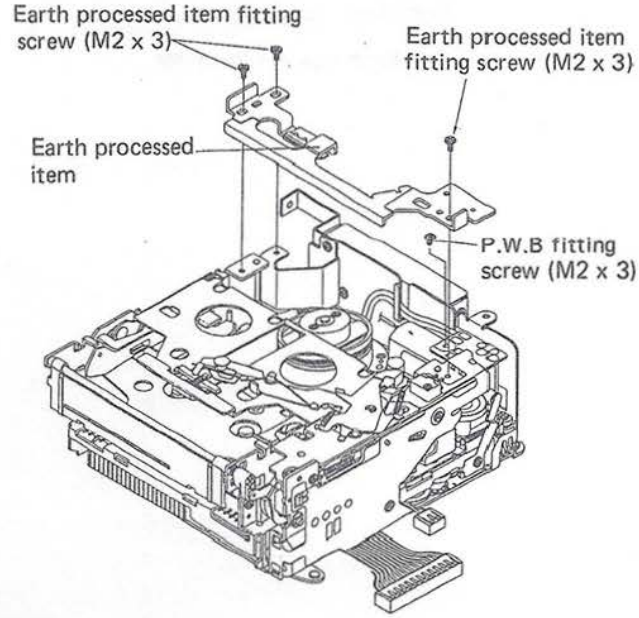
2 Dismounting the capstan motor

1. Remove the motor cover. (machine screws x 3)
2. Remove careful not to damage the flex. P.W.B.



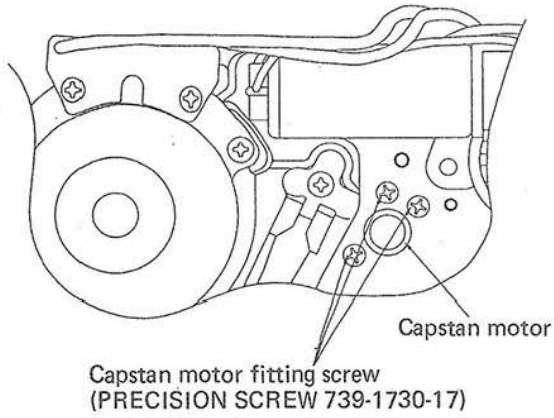
Dismounting the capstan motor

3. Removing lead wire of the dew sensor (soldered spots x 2), dismount the earth processed item. (screws x 4)



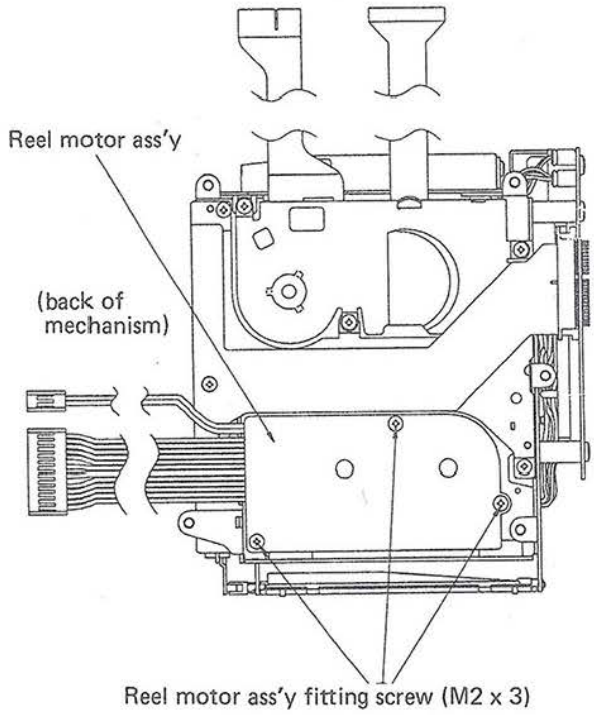
Dismounting the capstan motor

4. Remove the capstan motor. (screws x 3)



3 Dismounting the Reel Motor

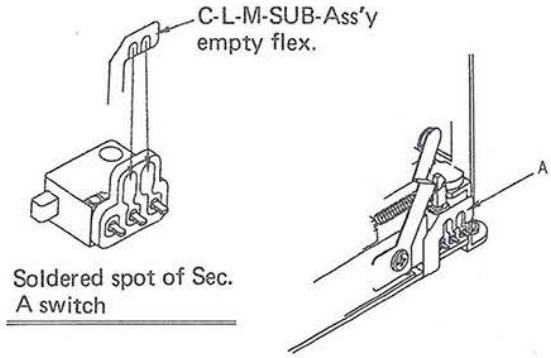
1. Remove three screws on the back of the mechanism.



Exchange of reel motor

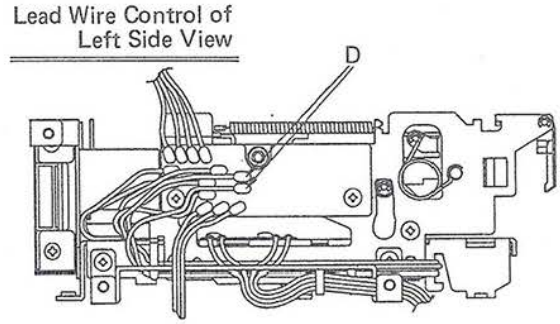
4 Mounting and Dismounting the sub-base sub-ass'y (dismounting)

1. Remove the capstan motor. (Refer to Dismounting the capstan motor. The flex. P.W.B. should also be dismounted from the connector.)
2. Take off the special washer E (in the fig. of page 9) at the tape loading end position to remove the soldering of Sec. A.



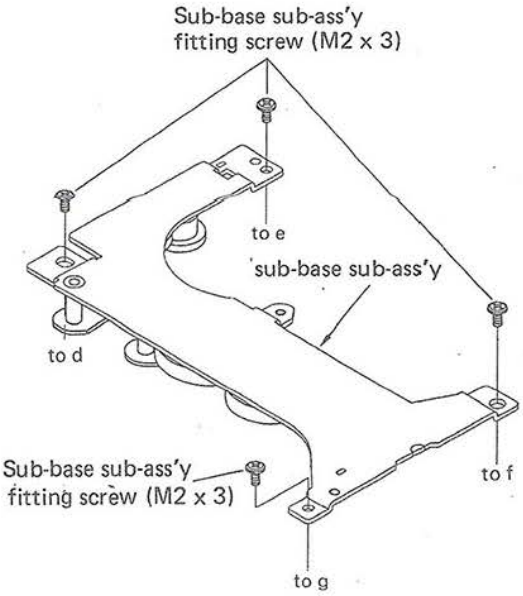
Dismounting the Flex. P.W.B from the C-L-M-SUB Ass'y

3. Taking off the mechanical control ass'y of the left side (refer to Procedure a of Drum Ass'y Exchange), remove soldered spots (2) of Sec. D.



Dismounting the SW lead from the sub-base sub-ass'y

4. Remove sub-base sub-ass'y (screws x 4)

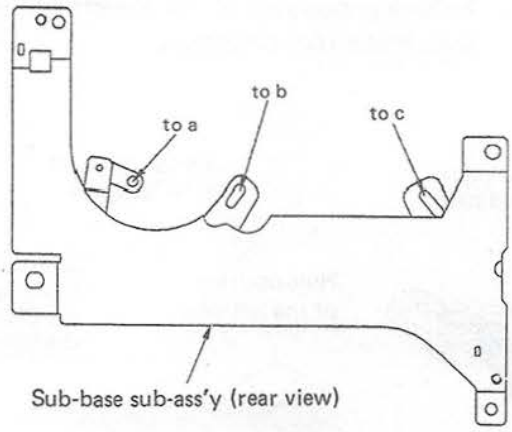


Dismounting the sub-base sub-ass'y

(Mounting)

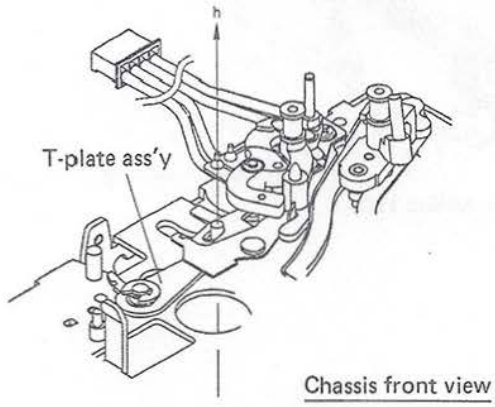
1. After confirming that the hole of the sub-base sub-ass'y and the shaft are fit to three shafts (a, b, c) of the part fit on the chassis and the hole of the T plate ass'y on the chassis, mount in the reverse procedure of that for dismounting.

①



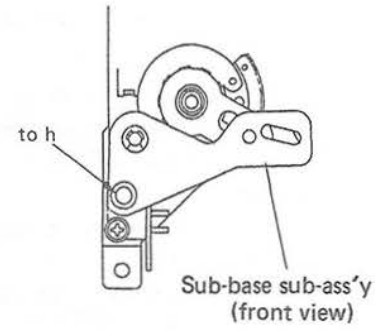
Fitting hole of sub-base sub-ass'y against shaft on chassis

②

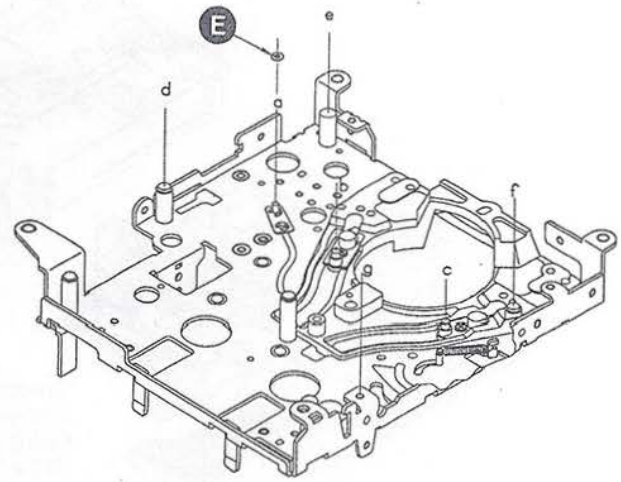


Fitting hole of sub-base sub-ass'y shaft against chassis (T-plate ass'y)

③



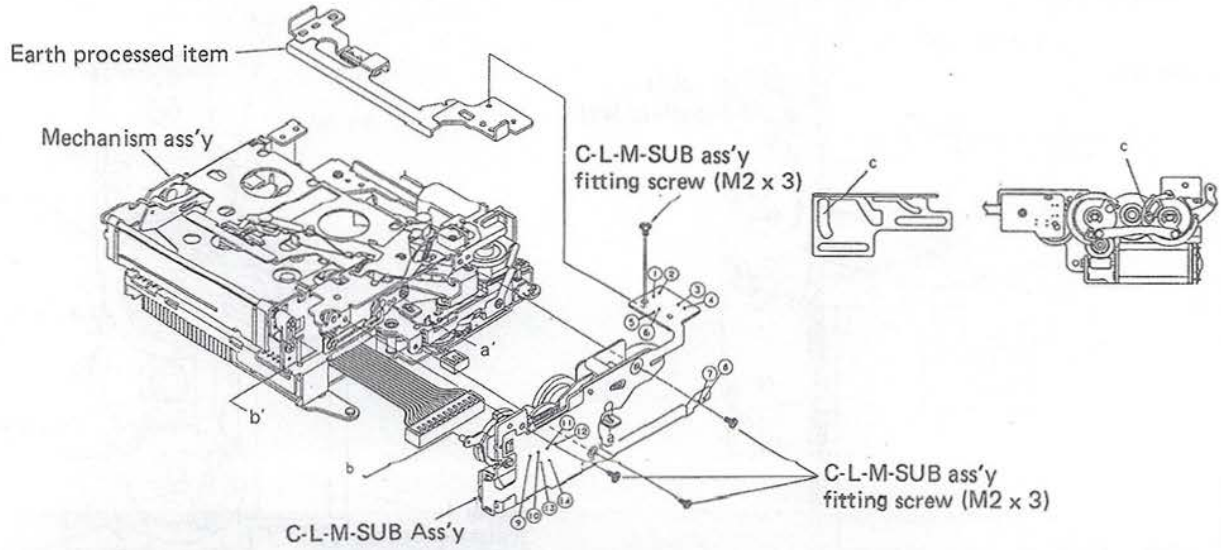
Fitting shaft on the chassis side of sub-base sub-ass'y.



Special Washer Position and Shaft Position on Chassis for Dismounting Sub-Base Sub-Ass'y

5 Exchange of C-L-M-Sub-ass'y

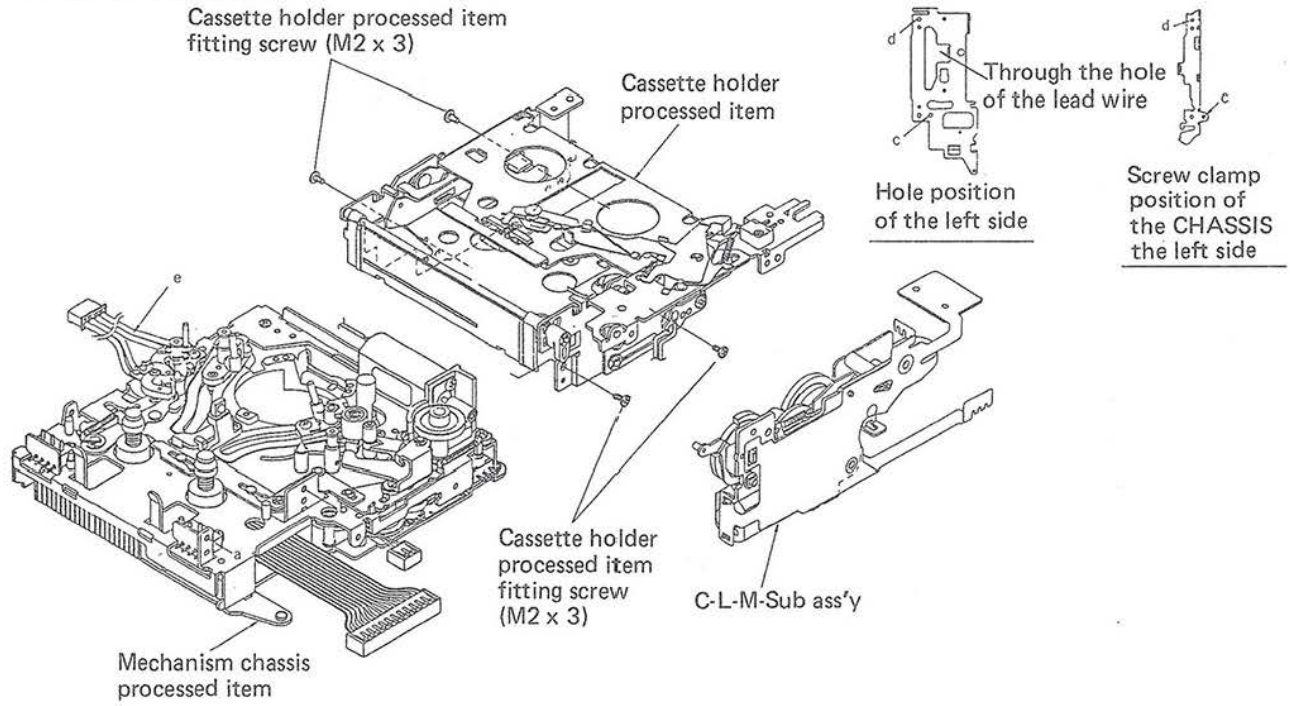
1. Take off solders from 1 to 14.
2. Remove the C-L-M-SUB ass'y from the mechanism ass'y A and the earth processed item B. (machine screws x 4)
3. On mounting, fit a, b and c to a', b' and c' respectively.



Exchange of C-L-M-SUB Ass'y.

6 Exchange of Cassette Holder Processed Item

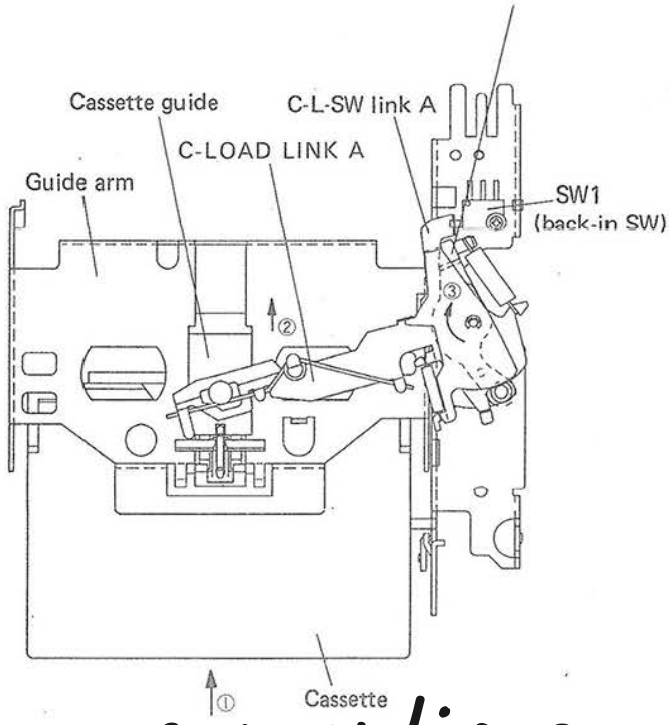
1. Remove the earth processed item.
2. Remove the mechanism control ass'y.
3. Remove the mechanism control bracket.
4. Remove the photo-transistor P.W.B.
5. Remove C-L-M-SUB ass'y.
6. Remove the cassette holder processed item fitting screws. (x 4) (a, b, c, d)
7. Remove the cassette holder processed item from the mechanism chassis processed part.
8. On mounting, pass the lead wire e through the hole on the left side of the cassette holder processed item. Following mounting of the cassette holder processed item, confirm dowel tightness.



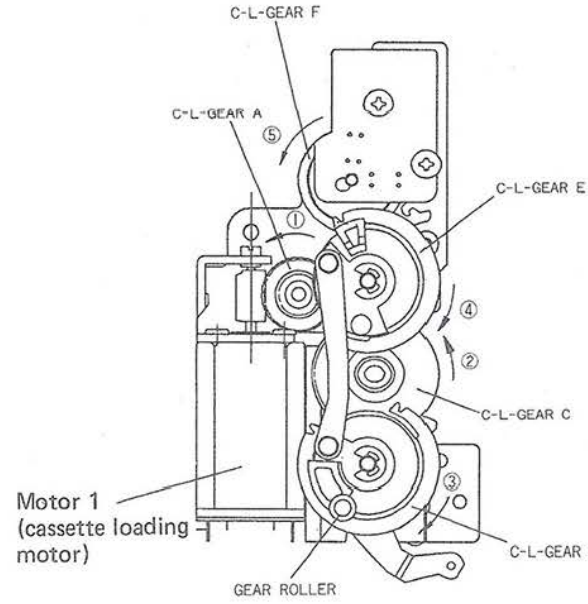
■ MECHANISM OPERATION

1. Loading

1. Cassette Loading
   i) When the cassette is inserted, SW1 is turned on via Cassette guide, the C-LOAD LINK A and C-L-SW LINK A. (① → ③)

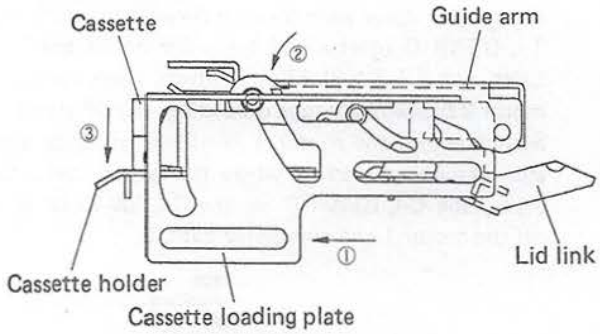


   ii) When SW1 is on, the cassette loading motor 1 rotates, where, through C-L-GEAR A, C-L-GEAR B (not indicated in the fig.) and C-L-GEAR C, C-L-GEAR D rotates. At the same time, the cassette loading plate is shifted by GEAR ROLLER which rotates C-L-LINK B and, through C-LOAD LINK A and the cassette guide, horizontally loads a cassette (① → ③).

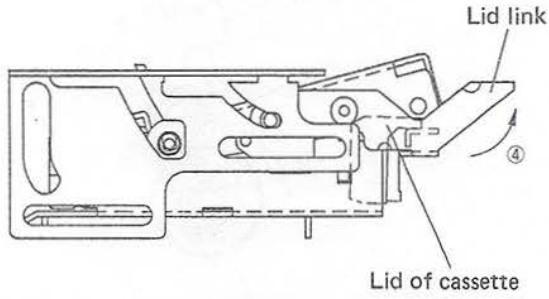


iii) Upon operational completion of cassette loading in horizontal position, the cassette loading plate shifts by the motor 1, which rotates the corresponding guide arm and lowers the cassette holder having a cassette. Simultaneously, the lid link corresponding to the cassette loading plate is rotated and opens the lid of the cassette. (① → ④)
Further, by optical detection attached on the C-L-gear F, the motor 1 is turned off to complete cassette loading. (Fig. ii) ④ → ⑤)

Cassette vertical loading started



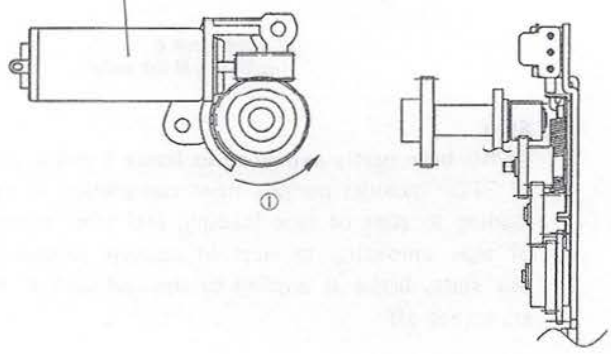
Cassette vertical loading completed

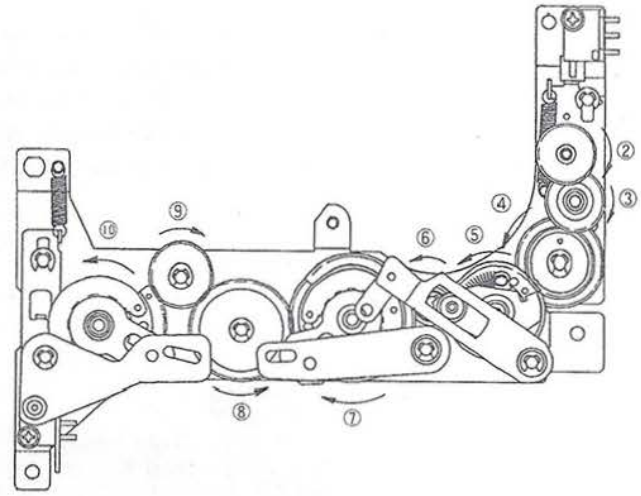


2. Tape Loading

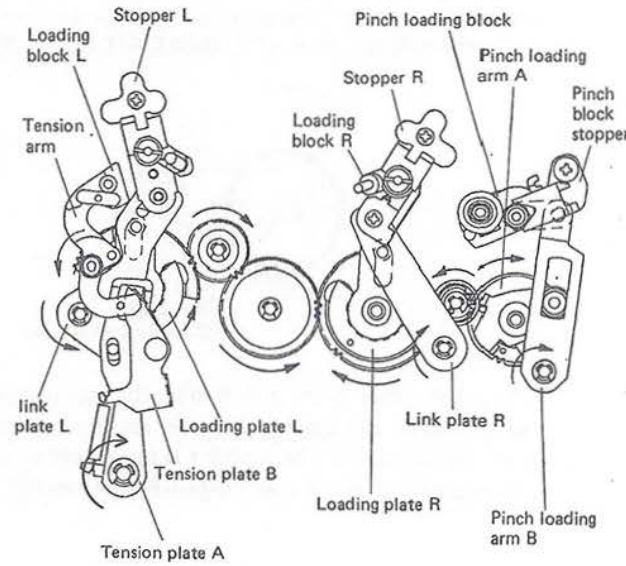
i) After completion of cassette loading, the motor 2 is turned on and driving force is transmitted to the gear array indicated in the figure via a worm. (① → ⑩)

Motor 2 (tape loading motor)

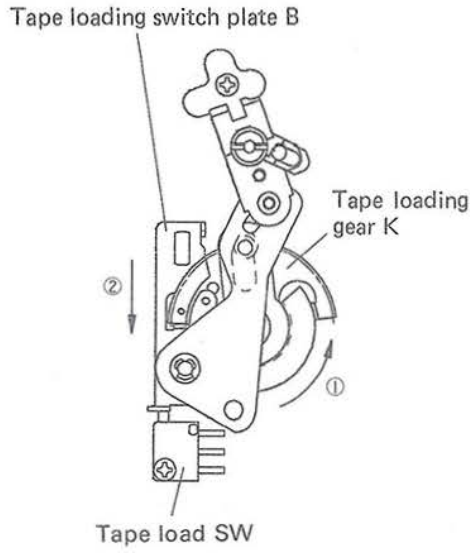




ii) Driving force of the gear shifts the pinch loading block to a position of the pinch block stopper via the pinch loading arms A and B; the loading block R to the stopper R via the loading plate R and the link plate R; the loading block L to the stopper L via the loading plate L and the link plate L. The link plate L, at the same time, shifts the tension arm via the tension plate A and the tension plate B.
Tape, at this time, is held being wound round the drum by 90°.

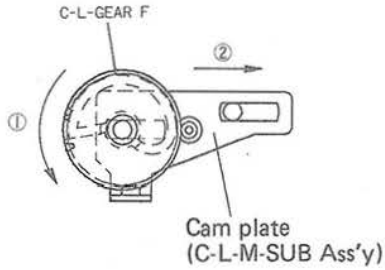


iii) After these shifting, the gear array continues to rotate which tightly retains each corresponding block via spring. Then, the tape load SW is turned on by the tape loading gear K via the tape loading switch plate B, which stops the motor 2 to complete tape loading. (① → ②)

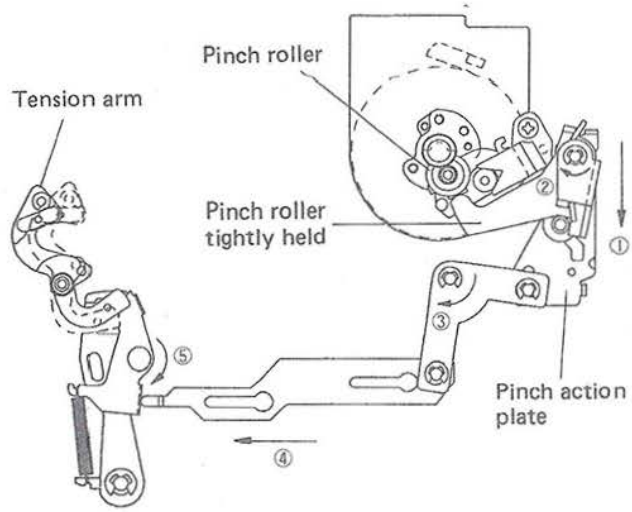


2. Play

When the tape load SW is on, the motor 2 stops and instead, the motor 1 rotates which shifts the cam plate along the cam face of the C-L-GEAR F. (① → ②)



The pinch action plate is shifted by the cam plate which tightly holds the pinch roller and set the tension arm free. Subsequently, the motor 1 is turned off by optical detection provided on the C-L-gear F. (① → ⑤)

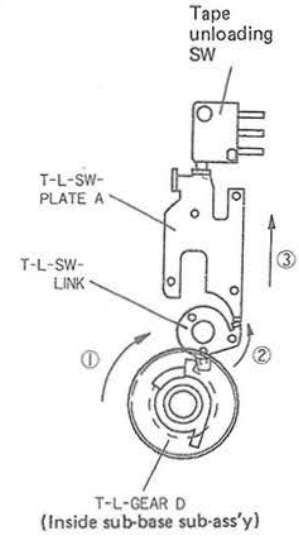


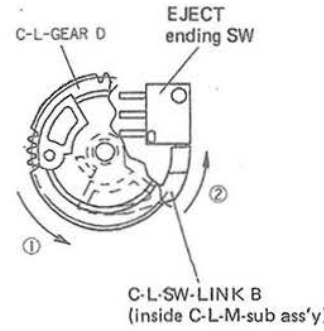
3. FF/REW

Since this involves driving of the drum reel motor when the tape loading has been completed (in PAUSE state), explanation for the operation is omitted here.

4. EJECT

This, corresponding to reverse operation of Play, Tape Loading, and Cassette Loading, is carried out with motors 1 and 2 being reversely rotated. While in Play, the motor 1 is turned on, the completion of tape loading (PAUSE state) is detected optically on the C-L-GEAR F, the motor 1 is turned off and, then, the motor 2 is turned on. After each block is taken into a cassette, the T-L-GEAR D rotates and turns SW on via the T-L-SW-LINK and T-L-SW-PLATE A, which, then, turns off the motor 2 to complete tape unloading. (STOP state)
Subsequently, the motor 1 is turned on once again to start cassette unloading, where the switch, being turned on by the C-L-GEAR D via the C-L-SW-LINK B, turns off the motor 1 and completes EJECT.





5. Stop

As has been partly explained in Items 1 and 4, the state of STOP includes periods from completion of cassette loading to start of tape loading, and from completion of tape unloading to start of cassette unloading. In this state, brake is applied to the reel and all motors are turned off.

□ ADJUSTMENT OF MECHANISM

1. Fitting the Start Phototransistor

The start/end phototransistors detect the starting and ending time of tape.

When fitting is not appropriate, even during tape running, the device may come to a stop.

Adjusting Method

Tightly fitting the phototransistor P.W.B processed item as is shown in "Photo TR Fitting Drawing" so that there is no clearance, fix with machine screws. (M2 x 3)

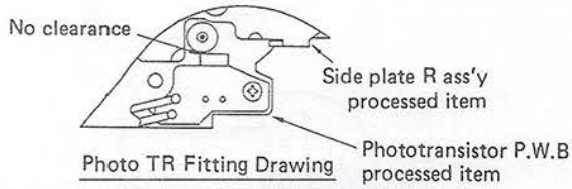
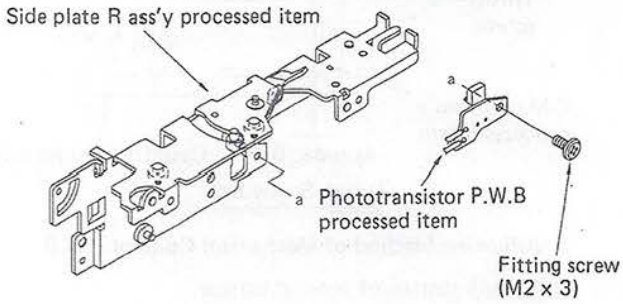


Photo TR Fitting Drawing



2. Fitting the End Phototransistor

Adjusting Method

Tightly fitting the phototransistor P.W.B processed item to the hole a of the side plate L ass'y as is shown in "Photo TR Fitting Drawing" so that there is no clearance, fix it with two machine screws. (M2 x 3)

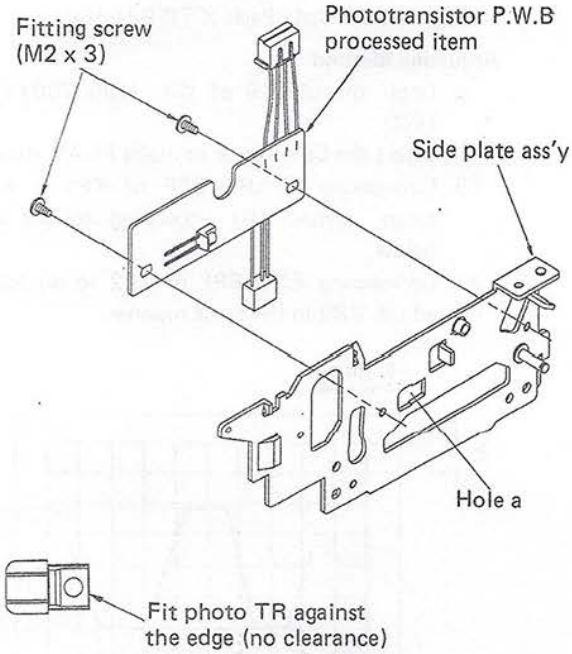


Photo TR Fitting Drawing (hole a sec.)

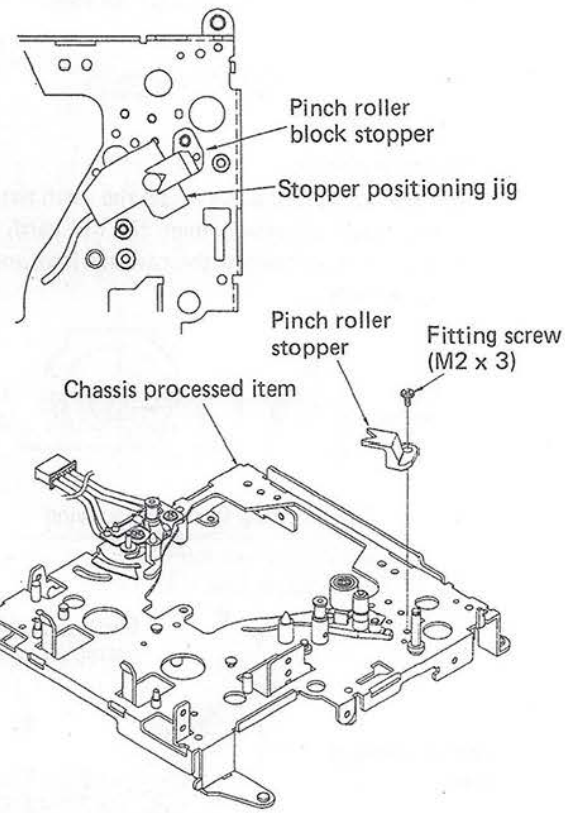
3. Fitting the Pinch Block Stopper

The tape block stopper serves to retain normal running condition of tape.

When fitting is not appropriate, tape is led to abnormal running (tape rolling or up/down movement)

Adjusting Method

Confirming the shaft center of jig at the V groove center of the pinch roller block stopper, fix it with machine screws. (M2 x 3)

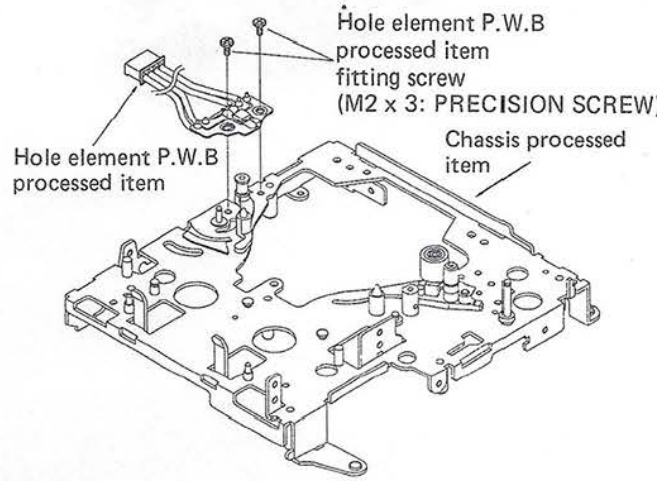


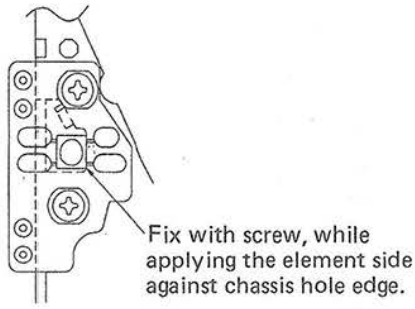
4. Fitting the Hole Element for Tension Detection

The hole element for tension detection serves to correctly carry out back tension control. When fitting is not appropriate, tape running gets unstable.

Adjusting Method

Fix the hole element P.W.B with machine screws (M2 x 3: PRECISION SCREW 738-2030-17), by applying the hole element side against the chassis hole side as is shown in the hole element P.W.B. fitting drawing.



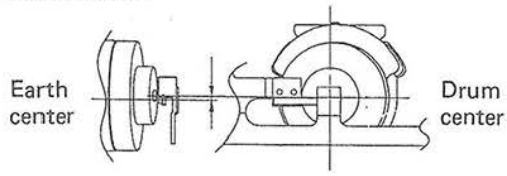


Hole Element P.W.B Fitting Drawing

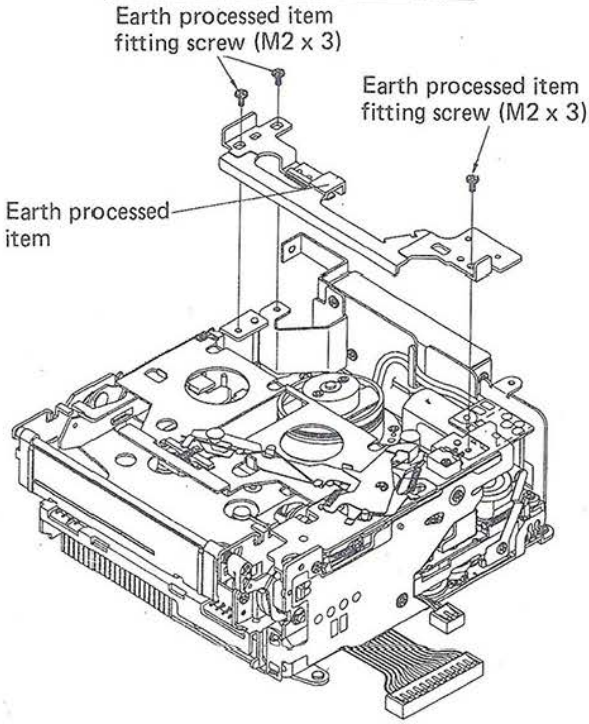
5. Earth Fitting

Adjusting Method

In order to prevent earth noise, the earth fitting location of the earth processed item fix the earth by shifting the earth center toward the cassette insertion gate from the drum center.



Earth Fitting Location Drawing

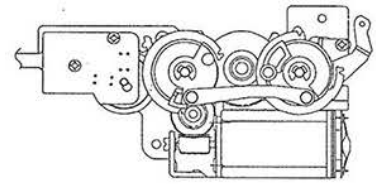


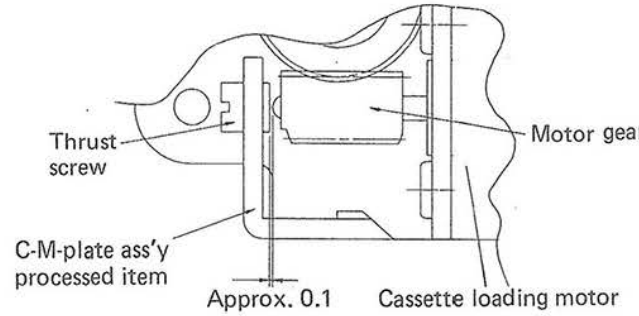
6. Adjustment of Thrust Screw

Adjusting Method

In order not to apply abnormal load to the motor bearing, provide clearance of about 0.1 mm between the thrust screw and the DC motor tip.

Following adjustment, apply adhesive (CL Locktight FIG).





Thrust Screw Sec.

7. Adjusting Method of Mechanism Control P.W.B.

(1) Adjustment of tension torque:
Tape used: Torque Pack (CTR-911-100)

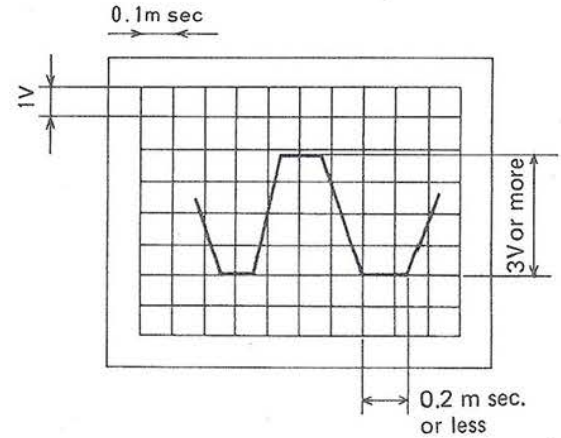
Adjusting Method

i) Insert Torque Pack to make PLAY state.
ii) Adjusting VR3 inside the mechanism control P.W.B., set 6-8g·cm back tension torque of the supply side reel motor.

(2) Adjustment of start/end sensor:
Tape used: Empty Pack (CTR-921-100)

Adjusting Method

i) Drop the pin 19 of IC1, HD637B01YOPJ into GND.
ii) Insert the Color Pack to make PLAY state.
iii) Connecting START BPF of TP1 to an oscilloscope, adjust VR1 according to the waveform below.
iv) Connecting END BPF of TP2 to an oscilloscope adjust VR2 in the same manner.



8. Adjustment Concerning Drum Exchange

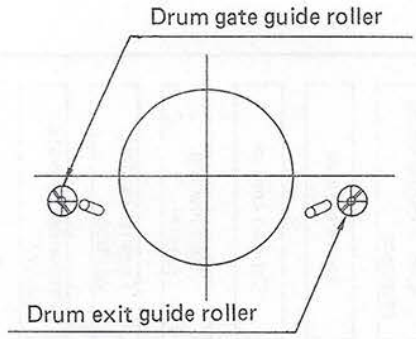
Following drum exchange, it is necessary to adjust tape pass (incl. confirmation of DPG phase and confirmation of ATF pilot level) and to confirm error rate.

① Adjustment of tape pass (to retain normal tape running):

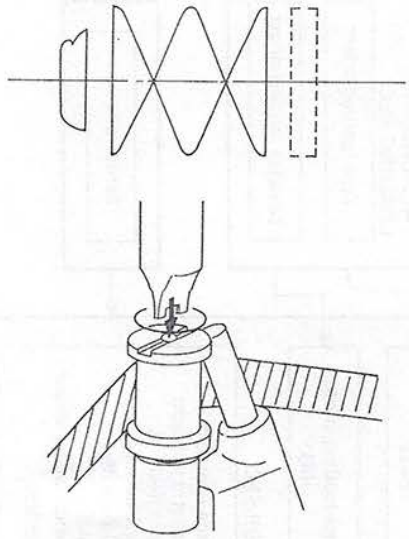
Tape used: Ach CTR-101-200
Bch CTR-101-300

Adjusting Method

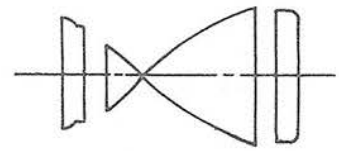
1. Connect an oscilloscope to TP601 (6 dB OUT) and TP302 (SWP).
2. Turn on the POWER switch and mount the torque adjustment cassette (TW-7131) to make PLAY mode.
   Confirm that back tension is 7g-cm±1g-cm and take-up torque is 11-16g-cm.
3. Next, turning off the POWER switch in state of 2, loosen the drum gate/exit guide rollers fitting screw until it is halfway opened.
4. Turning on the switch once more, take out the torque cassette and mount the pass adjusting tape to make PLAY mode.



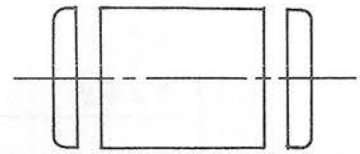
5. Push down the drum exit side guide roller until waveform of the sub-code area of the envelope disappears.



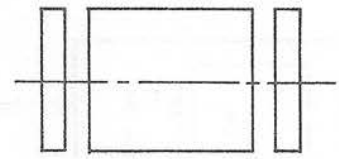
6. Turning the guide roller from the above state to loosen, adjust so that waveform of exit side sub-code becomes as follows.



7. Pushing the gate side guide roller as in 5, gradually loosen it to adjust as follows.



8. Finely adjust the right/left guide rollers to obtain waveform which is as rectangular as possible.



9. From that state, slightly loosen the right/left guide rollers. (Confirm that waveform make no change.)

10. As in 3, tighten the fitting screws.

2 DPG phase confirmation . . Refer to Electrical Adjustment on page 32.

3 ATF pilot level confirmation . . Refer to Electrical Adjustment on page 32.

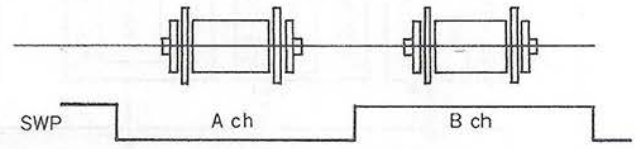
4 Error rate confirmation
Tape used: MUSIC tape

Adjusting Method

i) Connect an oscilloscope to TP601 (6 dB OUT) and TP302 (SWP).

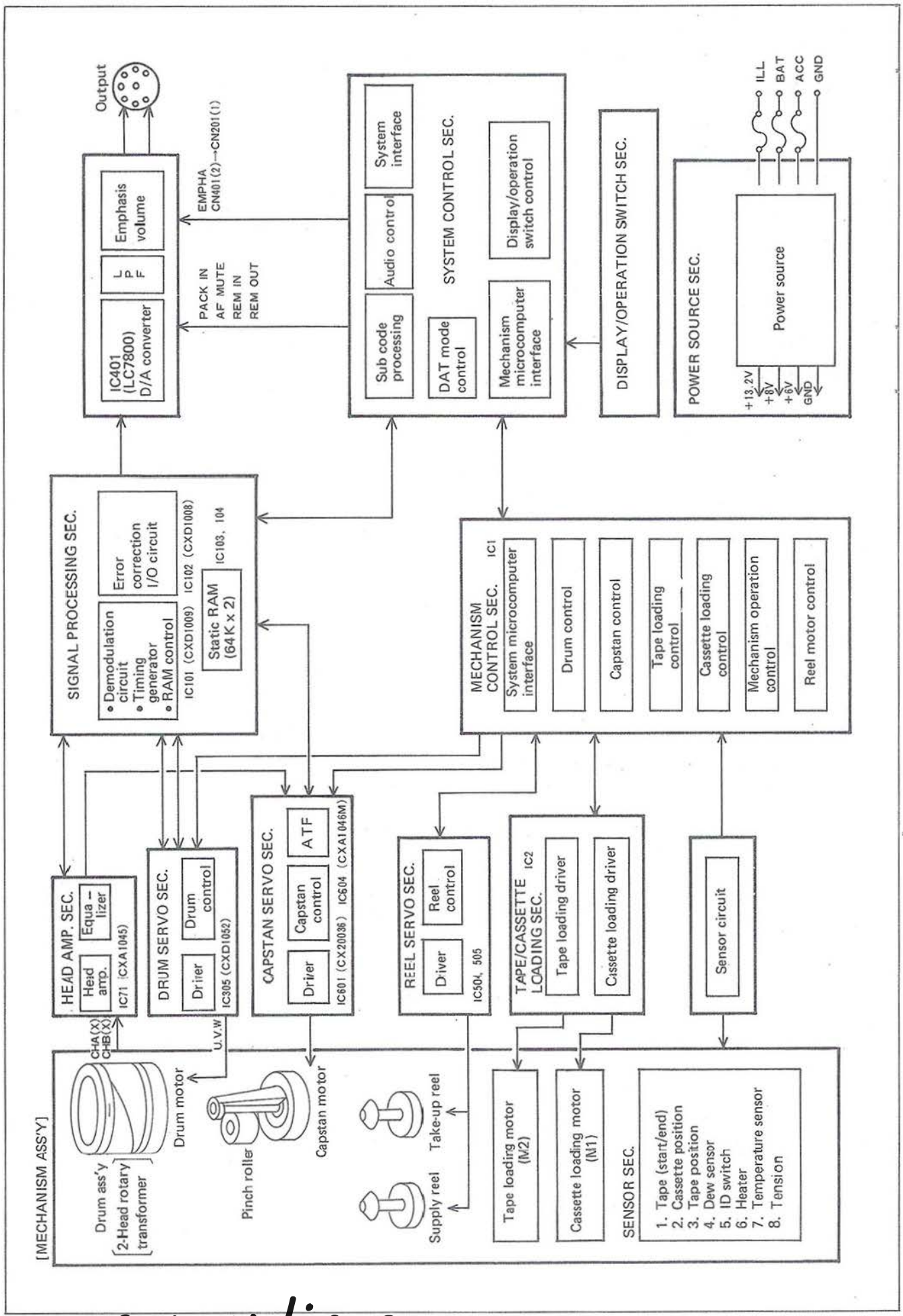
ii) Connect the error rate counter to ECC P.W.B CN103 (13P) connector.

iii) Confirm the waveform shown below.



iV) Adjust, with the head amplifier P.W.B LPF VR VR71 (Ach) and VR72 (Bch) so that a value (error rate) which gets as minimum as possible.

BLOCK DIAGRAM:



□ OUTLINE OF CIRCUITS

① Power Source

Receiving power source from a vehicle side, generate power supply voltage needed for the set (+13.2V, +8V and +6V) and supply it to the set.

② Description of Head Amp. Block Circuit

The head amp. BLOCK (hereinafter referred to as BLK) uses IC71 (CXA1045Q) and adopts only PB mode.
The signal which supply for the head upon reproduction, the head amp. BLK only having very weak signal of several tens of 10 μVp-p which, on the other hand, deals with a wind band of frequency of 100 kHz-10 MHz, enough attention should be paid to noise, etc..
Also, this BLK, being a digital/analog mixture block, has been designed with particular considerations concerning stabilization of noise preventive circuit.
The PB mode of the head amp. BLK consists of the H. AMP. (head AMP.), 2nd RF AMP., PB LPF, SW AMP., PCM equalizer, and PB limiter.

③ Operation of DAC Block

1. Audio

Clock and data received from signal treatment (ECC) are converted into analog signals by the D/A converter IC401 (LC7880M). The signals pass through OP-AMP. IC402 (NJM4560) of the buffer and, at the 7th passive low pass filer LPF401 and 402, eliminate useless high-pass element generated by sampling. Signals out of the low-pass filter, after pssing through de-emphasis circuit IC403 (TA7415P), bass/tremolo circuit and VOL, are output from the output buffer IC404 (NJM4560).
Circuits provided in relation with the audio circuit include the 5V type power circuit, the 12V type power filter circuit, de-emphasis changeover circuit, the audio mute circuit, the external sound changeover circuit, etc..

2. System Microcomputer Power Source

The power circuit of the system microcomputer is included in DAC BLOCK.

3. Illumination Power Circuit

This circuit controls the operation knob and the vol ring illumination, which is lit when DAT is in play, when the vehicle illumination is on, or when the head unit is in operation.

④ ECC Section

This block mainly consists of the IC101 (RAM control),
the IC 102 (ECC, error correction) and the IC103 & 104 (RAM) LSIs. As its major operation, RF signals output from the head amp. sec. are input in the IC101 46 Pin. In IC101, splitting of PCM data and sub-code data as well as modulation of PCM data (10-8 bit convertion) are carried out, which are, then, output to RAM. Subsequently, data are transferred from RAM to IC102 for error correction which are output from the IC102 Pin 20 as DADT signals.

⑤ System Control Section

This block consists of the system microcomputer (IC201) and its peripheral equipment. The system microcomputer IC201 controls the overall operation of this machine, which is connected mainly to the mechanism control microcomputer (IC1), the ECC block and the DAC block, and receives instructions and signals from the microcomputer and other LSIs concerning their states to send corresponding instructions. IC1 (mechanism control) conducts exchange of operational instructions in 6 bit parallel data. It also is connected to the operation sec./LCD display sec., which receives key input signals and send out instructions to each block and serial data signals for LCD display.
In addition to the above, IC202 serves as a reset circuit upon reduction of power supply voltage or upon voltage recovery. IC204 and 203 make up the EJECT acceptance circuits upon ACC OFF.

⑥ SW. DISP

This drives, by IC701, the operation switch (key matrix structure) and operation sec. dust-proof door illumination LCD display.

⑦ REEL Block

The reel block (hereinafter referred to as BLK) controls the reel motor for R-DAT (020-2003-00) according to the instructions of the mechanism control (IC1). It also drives the brake plunger mounted on the reel motor. The major operation concerning each IC is explaines as follows.

(1) IC501, 502: FG signal waveform shaping and F/V conversion sec.

FG signals from the reel motor sec. are input in pin 3 of each of IC501 (take-up reel side) and IC502 (supply reel side) whose waveforms are shaped at the operation amplifier and the comparator inside the IC. Following waveform shaping, they are subjected to F/V conversion at the saw tooth generator circuit and the sample hold circuit inside the IC to be output from the pin15 of both IC501 and 502. This output is used for tape speed control at high-speed searching.

(2) IC503: Composite Amplifier Sec.

The F/V conversion output from IC501 and 502 are input in IC503 pin 2. Search operation of almost constant tape speed is available here since a sum of rotation speed of both reels of the take-up supply is maintained constant.
Tape speed is set by bias voltage impressed in IC503 (pin3).
This machine sets max. approx. 180 times of speed for C-120 tape and max. approx. 140 times of speed for C-46 tape.

(3) IC504/505: Multiplexer sec.

IC504 and 505 serve as 8ch multiplexers to change input to drive amps. (IC506) of the take-up and of the supply sides respectively. Switching is controlled by three mode signals (MODE A, B, C) from the mechanism control (IC1).

(4) IC506: Drive Amplifier Sec.

Two amplifiers inside IC506 serve to drive reel motors of the take-up and the supply side.

(5) Q507/508: Attraction · Retention Drive Sec.

SOL-P/H signals from the mechanism control (IC1) turns on Q507/508 and supplies current to the brake plunger involved the reel motor. Also to prevent burning of the plunger, attraction is controled by the mechanism control to max. 50 ms.

Q507 : ON → Brake release

Q508 : ON → Retention after attraction

8 DRUM

Drum servo is divided into the normal servo at normal reproduction and the search servo at AMS. In the normal servo, three servos including speed, phase and bias function so that the drum rotation is set to 2000 r.p.m.. In the search servo, two servos including speed and bias function so that relative speed of a tape and the head is set to 3.133 m/s.

Operation of each section is described as follows.

(1) PG Amp. Sec. (IC302/303)

Rotation phase detection output (PG signal) from the drum motor is amplified and output via the comparator as pulse (LPG) (IC303 PIN 7). At this time, LPG cycle becomes 30 ms on normal reproduction (2,000 r.p.m.)

(2) FG Amp. Sec. (IC302/303)

Rotation frequency (FG signal) from the drum motor is amplified and output via the comparator as pulse (DFG) (IC303 PIN 1). At this time, DFG frequency becomes 800 Hz on normal reproduction (2000 r.p.m.).

(3) Servo Control Sec. (IC305)

IC305, being the servo control IC for R-DAT, has the following functions. (As for details, refer to Explanation of IC's.)

1. Drum servo output
2. Capstan phase comparator output
3. Switching pulse output
4. RF WINDOW output

(4) Motor Drive Sec. (IC301)

Servo signals from the servo control section (IC305) (speed servo/phase servo/bias servo) are input via the filter (IC306/307) as drum error signals (DRUM ERR IC306 PIN 7). Further, from the drum motor, 3-phase hole element output (HV/HW/HU) are input. Inside the IC, motor driving output is controlled and 3-phase drum motor driving output (U: PIN 16, V: PIN 14, W: PIN 17) is supplied to the motor.

⑨ MECH

This is a block which controls mechanism operation with CPU as its center.

The mechanism operation microcomputer IC1 (051-1059-01) plays the central role which detects instructions from the system microcomputer and current states of the dew/temperature sensors, the cassette and tape, the tension servo positional switch and hole elements of each motor in order to give appropriate instructions to the system microcomputer.

○ Motor Driving Section

Two motors, one for tape loading and the other for cassette loading, are controlled by three units of control signals from IC1 mechanism control and driven by IC2 (TA7288P).

○ Mechanism Control Microcomputer

IC1 (051-1059-01) uses a microcomputer of 8 bit and 1 chip. As for details, refer to Explanation of ICs.

○ Tension Servo

The tension servo serves so that a tape and the drum maintain a touch of a constant tension from tape start to end and to assure correct tape running against external disturbance.

○ Tape Start/End Detecting Section

A tape when it comes to the start position or to the end position is detected and the information is sent to the mechanism control.

Q7	Q8	State
ON	ON	tape unloading
ON	OFF	tape at start position
OFF	ON	tape at end position
OFF	OFF	tape at PLAY position

□ EXPLANATION OF DEW/TEMPERATURE SENSOR CIRCUITS

The dew sensor and temperature sensor circuits have been made into HIC and are IC4 (051-1057-70). Both circuits adopt comparators. The following is the outline of each circuit.

1) Dew Sensor Circuit

The dew sensor circuit detects humidity inside the device and prevents winding of tape around the drum which tends to occur under high humidity.

Dew sensor elements are used for humidity detection. These elements increase resistance value as humidity gets high and reduce the value as humidity gets lower. These changes in resistance value are converted into changes in voltage, which are then compared with reference voltage by the comparator and are made into circuit output.

Humidity	Dew sensor circuit output (IC4 Pin 5)
High	High (5V)
Low	Low (0V)

Output of this circuit is sent to IC1 (mechanism control microcomputer). With high humidity, IC1 makes the state under which no all key operation of the set is accepted. In case a tape is mounted under such state, procedure as such EJECT is to be carried out.

■ START/END SENSOR

The start/end sensor circuits mainly consist of two sections, the oscillator and BPF. These circuits serve to prevent occurrence of malfunction when light is taken in from outside. The oscillator generates square wave of approx. 2 kHz which lights up LED. Thus, if any light should be taken in, by passing BPF in between, only the optical output from LED can be received. BPF output (Refer to the table) is linked to the mechanism control through the comparator.

Comparator Output	Tape State
H	START or END position
L	Not at START or END position

10 CAPSTAN BLOCK

The capstan block consists of the speed servo section and the ATF servo section.

1) Speed Servo Sec.

This makes the motor rotation (tape speed) constant.

FG signals (≒50mVp-p) generated from the capstan motor are changed into pulse wave in FG Amp. (IC603 CX20115). The FG signals are either output to the drum block as CFG and 16 divided with the inside of IC (CX1052) or output as it is or select as they are, which are then returned as CFGO signals. CFGO signals are divided by the programmable counter (IC602 TC74HC161F). After being output from the counter, it is input in the F-V converter (IC602 BA 6302AF) and, through the internal inverter, is output to the counter and also to the F-V convertion section. This FG can be monitored by T. P604 and CFG. This frequency, in general, is 559Hz. The F-V convertion section output voltage is output to the motor driver (IC601 CX20036) as speed error voltage.

2) ATF Servo Sec.

This servo serves to drive the head at the center of the track.

Reproduction signals (RF signals) output from the head amp. block are supplied into ATF IC (IC608 CX1046M) through the amplifier of 6dB consisted of transistors. This IC outputs ATF error, SYNC, and RF DET. SYNC is output in the ECC block, RF DET in the drum block, and the capstan block uses the ATF error signals.

The ATF error signals are made from the ATF. PILOT signals of 130kHz which are recorded on a tape track. The signals output from the IC pass through the filter and the reverse rotation amp. and are output in the motor driver at the analog SW (IC604 TC4066F).

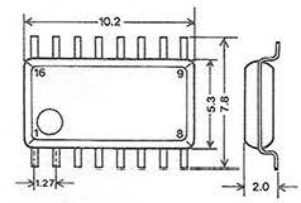
"Draw circuit" Q604 (2SK536) changes the filter on drawing, in about one second following ATF ON, from the state with quick drawing but less stability to the state with slower drawing but better stability.

The above speed error singls and the ATF error signals are made into PWM signals at the mixing amplifier of the driver IC (IC601) to determine the driving voltage of the motor.

■EXPLANATION OF IC's:

■ BA6302AF 051-1073-00
IC for FG System Speed Control

Outward Form



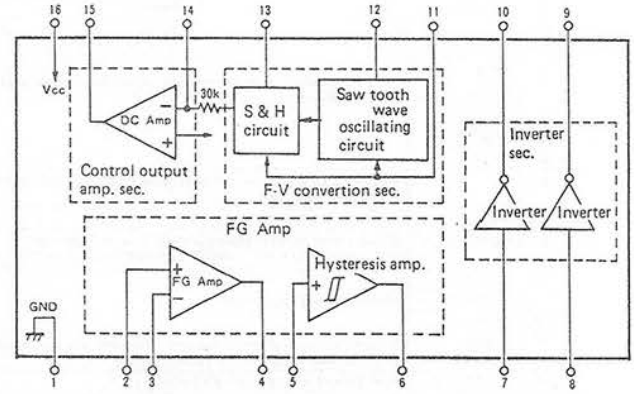
Outline

FG system speed servo control IC which consists of four blocks; the FG amp. sec. with hysteresis, the S & H system F/V convertion sec., the error amp. sec. and the inverter sec..

The motor control speed is set at the externally provided CR, which has high-speed start circuit to obtain stable starting characteristics.

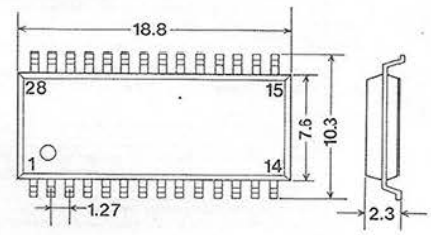
Since the program counter being provided between the FG amp. output and the F/V convertion input, various levels of motor speed can be controlled with high precision by a program.

Block diagram



■ CX20036 051-1103-00 Capstan Motor Drive

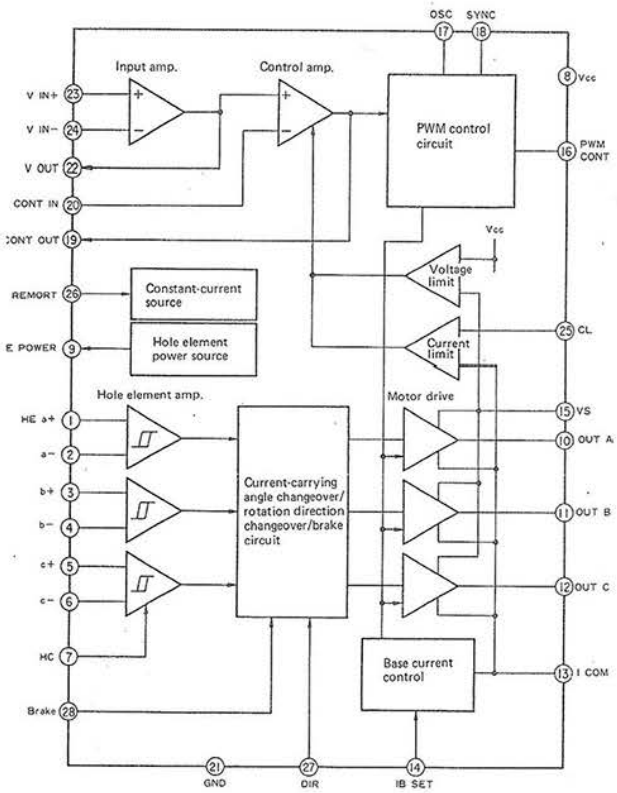
Outward Form



Outline

This IC, being a bipolar IC for driving a brushless motor of 3-phase bidirectional current-carrying system, consists of the following functions.

Hole element amp., current-carrying angle changeover circuit, motor driver, hole element power source input amp., control amp., PWM control circuit, current limiting circuit, voltage limiting circuit, power save circuit, rotation direction changeover circuit.

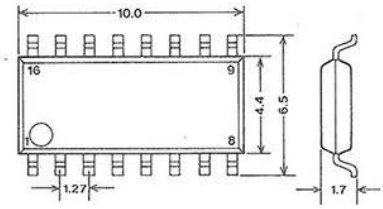


Description of Terminals

Terminal No.	Terminal Name	Function
1	HE a+	Input terminals of hole element amp. which forms three-phase differential input.
2	HE a−	
3	HE b+	
4	HE b−	
5	HE c+	
6	HE c−	
7	HC	Hysteresis cancel terminal, which cancels with Vcc connection. Generally, kept open.
8	Vcc	Power source terminal.
9	HE POWER	Power source for hole elements which is turned off with power save state (26 → GND). Provided with current limiter.
10	OUTPUT A	Motor connection terminal
11	OUTPUT B	
12	OUTPUT C	
13	I COM	Monitor terminal of motor current. This voltage is used for power Tr to set base current or for current limiter.
14	I_B SET	Base current setting terminal of power Tr.
15	VS	Motor input voltage terminal. Voltage after PWM output is passed through LPF is applied.
16	PWMCONT	Output terminal of PWM control signals. Externally fits controlling power Tr,.
17	OSC	Condenser connecting terminal for setting oscillation frequency of PWM oscillator.
18	SYNC	Signal I/O terminal to synchronize PWM oscillation frequency with external signals or with external oscillation frequency.
19	CONT OUT	I/O terminal for loop gain setting amp. of PWM loop, which sets loop gain with externally provided resistance.
20	CONT IN	
21	GND	GND terminal.
22	V OUT	Buffer for servo signal which sets servo gain with externally provided resistance.
23	V IN+	
24	V IN−	
25	CL	Max. current setting terminal of motor. Voltage is applied from outside.
26	REMORT	Connected to Vcc for proper operation of circuit. Standby state is made when connected to GND, thus attaining power saving.
27	DIR	Rotation direction control terminal for motor. When connected to GND, motor rotates reversely. In general, kept open.
28	BRAKE	Brake terminal. Current is supplied only to a phase with motor. With H level input, being set to operate and to have a flow of approx. 50 μA.

■ CX20115 051-1075-00 Motor Sense amp.

Outward Form

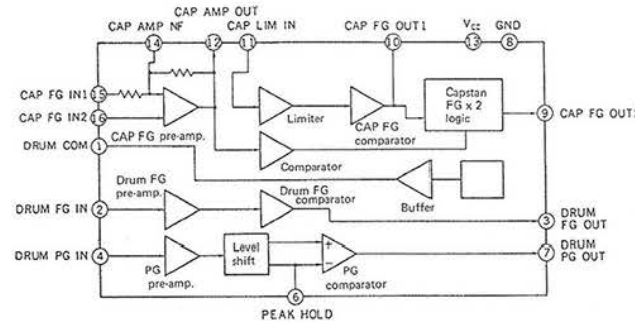


Outline

This IC, being the bipolar IC developed for phase detection of 8mm video using variable reluctance system, has the capstan and drum type FG. PG sense amplifier.

- 5V single power source operation (5.0±0.5V)
- Capstan FG amp., drum FG amp and PG amp. can be constituted only with this IC.
- AM fluctuation circuit is built in the drum FG amp. Capstan FG
- Capstan FG. Built-in double increased output. (Enabling improvement of servo system)
- Highly sensitive capstan FG amp. is buit in.
- Applicable to use of magnetic resistance element as capstan FG.

Block diagram

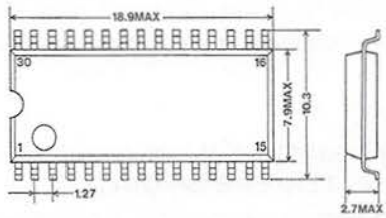


Description of Terminals

Terminal No.	Terminal Name	I/O	Function
1	DRUM COM	–	Reference voltage
2	DRUM FG IN	I	Drum FG input
3	DRUM FG OUT	O	Drum FG output
4	DRUM PG IN	I	Drum PG input
5	NC	–	Unused
6	PEAK HOLD	–	Drum PG condenser terminal
7	DRUM PG OUT	O	Drum PG output
8	GND	–	Earthing terminal
9	CAP FG OUT2	O	Capstan FG double increased output
10	CAP FG OUT1	O	Capstan FG reference output
11	CAP LIM IN	I	Capstan limiter input
12	CAP AMP OUT	I	Capstan pre-amp. output
13	Vcc	–	Power supply terminal
14	CAP AMP NF	–	Capstan pre-amp. NF
15	CAP FG IN1	I	Capstan FG reverse rotation input
16	CAP FG IN2	I	Capstan FG non-reverse rotation input

CX20174 051-1104-00
Three-Phase Linear BSL Motor Driving IC

Outward Form



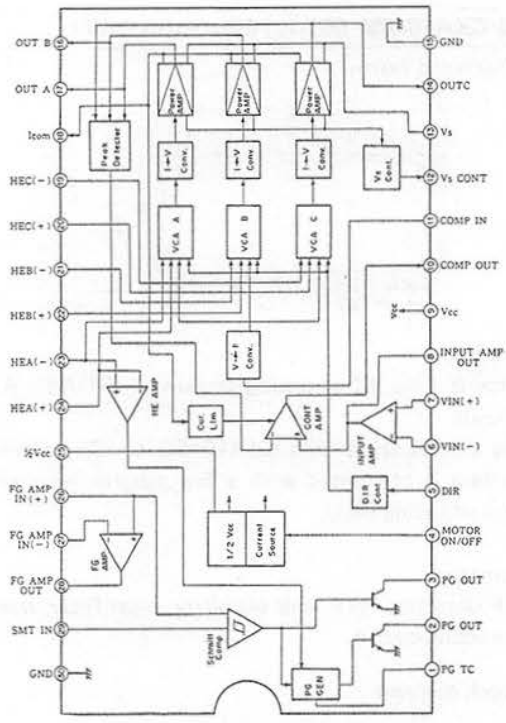
Outline

This IC is for driving of three phase linear BSL motor. It drives motor, controls driving output and generates frequency pulse and phase pulse.

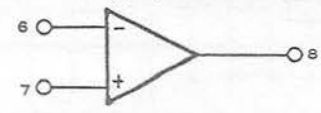
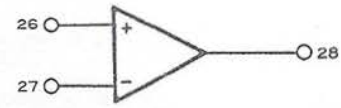
Function:

- ○Motor drive power amplification
- ○Power amplification gain control
- ○Rotary changing
- ○Start/stop switching
- ○Motor current limiter
- ○FG pulse generation circuit
- ○PG pulse generation circuit

Block diagram

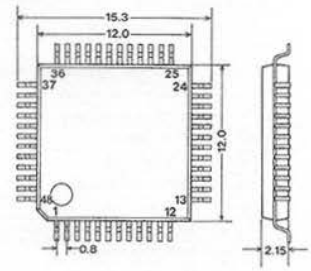


Description of Terminals

Terminal No.	Terminal Name	Function
1	PG TC	PG pulse width setting terminal.
2	PG OUT	PG (Phase Generator) signal output terminal.
3	FG OUT	FG signal output terminal.
4	MOTOR ON/OFF	Turns OUT A.B.C. into Hi impedance by switching off current source inside IC.
5	DIR	Terminal for rotation direction changing of motor. Threshold voltage 1/2Vcc. Connected to GND.
6	VIN (−)	Motor control voltage amplification AMP.
7	VIN (+)	
8	INPUT AMP OUT	
9	Vcc	Power source terminal.
10	COMP OUT	Phase compensating terminal for stabilizing of amplitude control feedback loop of motor driving circuit.
11	COMP IN	
12	VsCONT	Outer trangister control terminal for Vs control to prevent heating inside IC.
13	Vs	Motor driving power source terminal.
14	OUTC	Motor coil connecting terminal.
16	OUTB	
17	OUTA	
18	Icom	Grand-side terminal for motor driving. Detects motor current with outward resistance.
19	HEC (−)	Hole element input terminal. Phase in each hole element output is shifted by resistance addition, therefore each terminal's impedance is approx. 2·4kΩ. Hole element's bias potential.
20	HEC (+)	
21	HEB (−)	
22	HEB (+)	
23	HEA (−)	
24	HEA (+)	
25	1/2Vcc	1/2Vcc terminal for setting of operating point.
26	FG Amp IN (+)	FG amplification AMP.
27	FG Amp IN (−)	
28	FG Amp OUT	
15 30	GND	GND terminal.

CXA1045Q-Z 051-1055-00
R-DAT REC/PB Equalizer AMP.

Outward Form

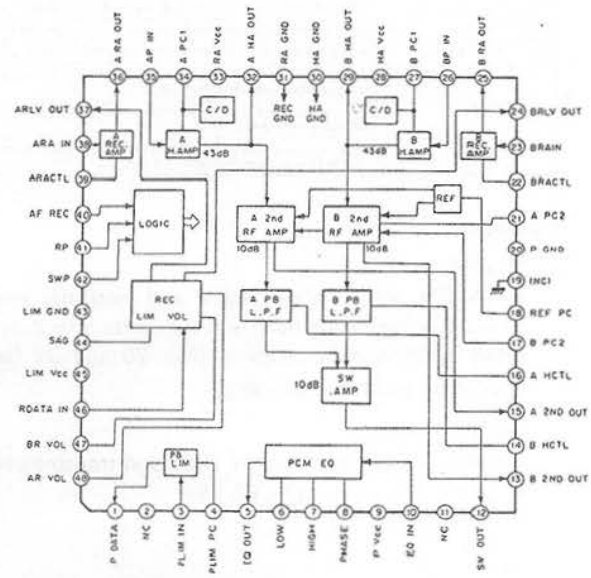


Outline

This is multi-functional bipolar IC necessary for R-DAT's head. Its function is the following.

- ●PB mode: head AMP. (2CH) PCM equalizer limiter
- ●REC mode: REC AMP. (2CH) limiter (2CH independent output amplitude variable)
- ●Mode transformation logic and signal switch are built in.

Block Diagram



Description of Terminal

Terminal No.	Terminal Name	Function
1	PDATA	Regenerative signal output terminal.
2	NC	Unused terminal.
3	PLIM IN	PB limiter input terminal.
4	PLIM PC	Bypass condenser terminal of PB limiter.
5	EQ OUT	PCM equalizer output terminal
6	LOW	Connection terminal of resistance determining PCM equalizer low-pass characteristic.
7	HIGH	Connection terminal of resistance determining PCM equalizer high-pass characteristic.
8	PHASE	Connection terminal of resistance determining PCM equalizer phase-pass characteristic.
9	P Vcc	Regenerative and control logic power source terminal except head AMP limiter.
10	EQ IN	PCM equalizer input terminal.
11	NC	Unused terminal.
12	SW OUT	Switch AMP output terminal bringing 2 CH output together.
13	B 2ND OUT	BCH 2ND RF AMP output terminal.
14	B HCTL	Connection terminal of resistance determining BCH PB L.P.F cut-off frequency.
15	A 2ND OUT	ACH 2ND RF AMP output terminal.
16	A HCTL	Connection terminal of resistance determining ACH PB L.P.F cut-off frequency.
17	B PC2	BCH 2ND RF AMP bypass condenser terminal.
18	REF PC	REF block bypass condenser.
19	NC	Terminal connected to GND at the inside of it. (Open)
20	P GND	Regenerative GND terminal except for head AMP limiter.
21	A PC2	ACH 2ND RF AMP bypass condenser terminal.
22	B RACTL	Usually unused. (Connected to power source)
23	B RA IN	BCH REC AMP input terminal.
24	B RLV OUT	BCH output terminal of REC limiter volume (REC output amplitude variable limiter).
25	B RA OUT	BCH REC AMP output terminal.
26	B PIN	BCH head AMP input terminal.
27	B PC1	BCH head AMP bypass condenser terminal.
28	HA Vcc	Head AMP power source terminal.
29	B HA OUT	BCH head AMP output terminal.
30	HA GND	Head AMP GND terminal.
31	RA GND	REC AMP GND terminal.
32	A HA OUT	ACH head AMP output terminal.
33	RA Vcc	REC AMP power source terminal.
34	A PC1	ACH head AMP bypass condenser terminal.
35	A PIN	ACH head AMP input terminal.
36	A RA OUT	ACH REC AMP output terminal.
37	A RLV OUT	ACH output terminal of REC limiter volume (REC output amplitude variable limiter).
38	A RA IN	ACH REC AMP input terminal.
39	A RACTL	Usually unused. (Connected to power source)
40	AF REC	Logic control terminal for after-recording mode. H: over 4V (After-record) L: under 1V (Normal) OPEN corresponds to L.
41	RP	Control terminal appointing REC mode and PB mode. H: over 4V (REC) L: under 1V (PB) OPEN corresponds to L.
42	SWP	Control terminal switching ACH and BCH. H: over 4V (B) L: under 1V (A) OPEN corresponds to L.
43	LIM GND	GND terminal of PB limiter and REC limiter volume.
44	SAG	REC condenser connection terminal for SAG compensation.
45	LIM Vcc	Power source terminal of PB limiter and REC limiter volume.
46	RDATA IN	Terminal inputting recorded data into REC limiter volume (REC output amplitude variable limiter).
47	BR VOL	BCH amplitude adjusting terminal of REC limiter volume (variable amplitude limiter).
48	AR VOL	ACH amplitude adjusting terminal of REC limiter volume (variable amplitude limiter).

Operation

① H. AMP:
H. AMP's gain is about 43dB and amplifies with high gain signal sent from head and transmits it to 2nd AMP. Head AMP. output terminal (No. 29 and 32 terminal) is used by feedback damping.

② 2nd RF AMP:
2nd RF AMP's gain is about 10dB and transmits H. AMP output to the next stage, PB LPF.

③ PB LPF:
PB LPF is primary battery worth.
2CH of its cut-off frequency is separately adjusted by the outside half-fixed VR and is used for adjusting of frequency characteristic difference of A-CH, B-CH and head.

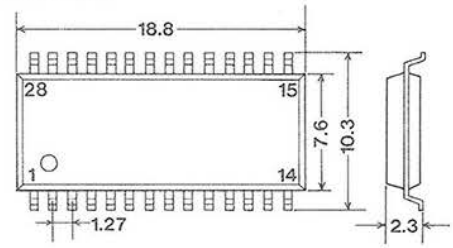
④ SW AMP:
SW AMP. switches 2CH head output timely and output it into No. 12 terminal (SW OUT).
This output is transmitted simultaneously to PCM equalizer and ATF circuit as ATF OUT.

⑤ PCM Equalizer:
For detecting of data information from regenerative head output, equalizing is necessary.
Its frequency has low-pass and high-pass compensati characteristic. It has linear phase characteristic.
Cosine roll-off is characteristically set to meet distortionless transmitting condition of digital data.

⑥ PB Limiter:
PB Limiter converts PCM equalizer output into such signal level as signal management LSI can manage.
PB DATA output is transmitted to signal management circuit.

■ CXA1046M 051-1076-00 R-DAT ATF

Outward Form



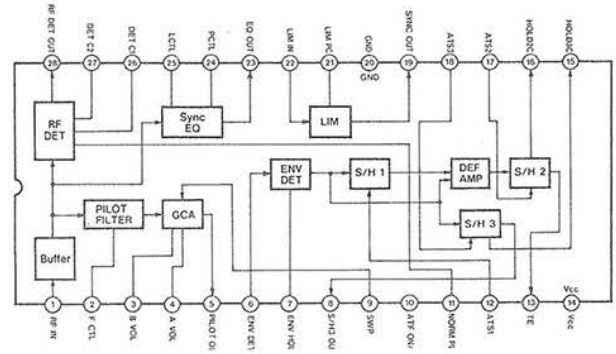
Outline

This is 1-tip IC of analog section of R-DAT's ATF-related circuit.
By combination with CXA1045Q or CXD1009Q, R-DAT system is composed with a few externally provided parts and adjusting parts.

Function

RF detector, ATF sink equalizer, pilot filter, tracking error detecting circuit.

Block diagram



Description of Terminals

Terminal No.	Terminal Name	Function
1	RF IN	RF input terminal.
2	F CTL	Externally provided resistance connection terminal for characteristic determination of pilot filter (L.P.F).
3	B VOL	Resistance bypass condenser connecting terminal for BCH gain adjusting of gain control AMP.
4	A VOL	Resistance bypass condenser connecting terminal for ACH gain adjusting of gain control AMP.
5	PILOT OUT	Output terminal of pilot signal.
6	ENV DET IN	Envelope detector input terminal.
7	ENV HOLD	Envelope detector hold condenser connecting terminal.
8	S/H 3 OUT	Output terminal of sample hold 3.
9	SWP	Management signal ACH and BCH switching control terminal. H: BCH, L: ACH
10	ATF ON/OFF	Terminal for turning ON/OFF ATF block (except RF DET). ON at L.
11	NORM PLAY	Choosing NORMAL MODE or others. NORMAL MODE at L.
12	ATS1	Sample pulse input terminal of sample hold 1.
13	TE	Tracking error output terminal.
14	Vcc	Power source terminal (5V).
15	HOLD3C	Hold condenser externally provided terminal of sample hold 3.
16	HOLD2C	Hold condenser externally provided terminal of sample hold 2.
17	ATS2	Sample pulse input terminal of sample hold 2.
18	ATS3	Sample pulse input terminal of sample hold 3.
19	SYNC OUT	Output terminal of ATF Sync.
20	GND	GND terminal.
21	LIM PC	Bypass condenser terminal for limiter block. (Exchangable with No. 22 terminal). – input
22	LIM IN	Limiter input terminal. (Exchangable with No. 21 terminal). + input
23	EQ OUT	Output terminal of ATF Sync. equalizer.
24	PCTL	Externally provided resistance connecting terminal determining phase characteristic of Sync. equalizer.
25	LCTL	Externally provided resistance connecting terminal determining low-pass characteristic of Sync. equalizer.
26	DET C1	Condenser connecting terminal for smoothing filter determining threshold level of RF detector.
27	DET C2	Externally condenser connecting terminal for wave-form adjusting of RF envelope wave.
28	RF DET OUT	RF detector output terminal.

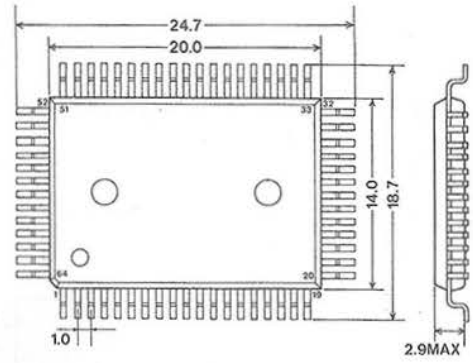
Operation (See Block diagram)

CXA1046M outputs three signals according to RF regenerative signal from head AMP.

1. Takes out ATF (Automatic Track Finding) pilot signal from RF regenerative signal and outputs tracking error signal for capstan servo control.
   Takes out 130kHz fundamental wave with pilot filter.
   Adjusts GCA (Gain Control Amp.) Gain according to characteristic of A and B head to bring its output to about 200mVpp and produces envelope in envelope detector section.
   In sample hold 1, holds cross talk quantity from the front track (neighboring) of tracing track. Detects the difference between the quantity and cross talk quantity from the back track (neighboring) of tracing track with differential amplitude (DIF AMP.) and hold it in sample hold 2. This output is tracking error signal.
   In sample hold 3, detects the level of pilot signal on tracing track.
2. Equalizes RF regenerative signal and outputs ATF Sync signal as limiter output.
   ATF Sync signal equalizes 520kHz/780kHz Sync signal with Sync EQ (Equalizer).
   Insertion loss of Sync equalizer is about –1dB, and its frequency characteristic is under 130kHz and over a few MHz. Limiter output is about 1.5Vpp short wave signal centering 2.5V DC potential.
3. Detects signalling of RF signal and outputs discrimination signal.
   Passes RF signal into simple PCM band equalizer and detects envelope wave. After this, gets discrimination signal through the comparator, 1/4 level (No. 11 terminal for Low level) or 1/2 level (No. 11 terminal for high level) of envelope can be chosen in this threshold.
   The output of comparator is 0-5V level.

■ CXD1008Q 051-1099-00
R-DAT Signal Management (ECC)

Outward Form

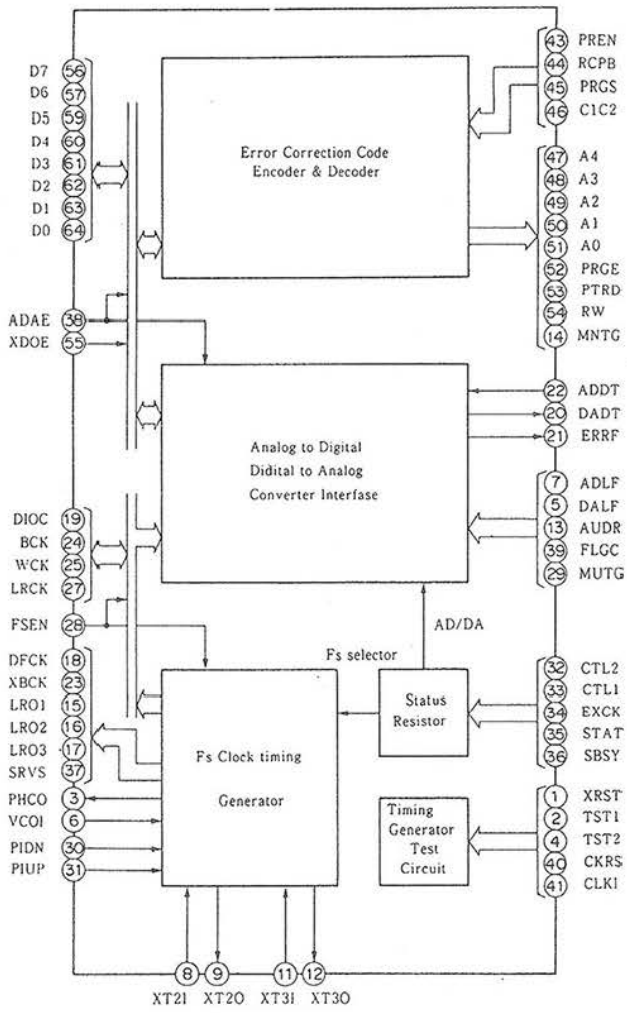


Outline

This IC is R-DAT signal management silicon gate CMOS LSI. Its function is the following.

- Error correction code management based on R-DAT format
  a. C1 encode, generation of P parity flag
  b. C2 encode, generation of Q parity flag
  c. C1 decode, max. 2 error correction
  d. C2 decord, max. 6 error correction
  e. Error correction condition monitor output
- Interface with AD/DA system
  a. Each serial of AD/DA data → Parallel, Parallel → Serial conversion
  b. Mean value and front value hold inerpolation (No interpolation is possible).
  c. Error flag output of DA data (16/8 bit unit changing is possible).
  d. MSB/LSB first conversion of AD/DA serial data.
  e. Zero cross mute.
  f. DA output in variable speed regeneration–12dB attenuation.
- FS timing signal output.
  a. Generation of 256Fs-Fs timing signals to Fs (48k, 44.1k, 32kHz) by X'tal.
  b. Generation of servo reference signal (12.8 kHz) by X'tal.
  c. Generation (correspond with a, b) of timing signals by 256Fs (VCOI) for variable pitch regeneration.
  d. Gneration of phase comparison signal for 256Fs Gneration for variable pitch regeneration.

Block diagram



Description of Terminals

Terminal No.	Terminal Name	Function
1	XRST	Reset terminal. Reset at "L".
2	TST1	Test terminal. Fixed at "L" during normal operating time.
3	PHCO	Phase comparison signal output (3-state) for generation of variable pitch 256Fs.
4	TST2	Test terminal. Fixed at "L" during normal operating time.
5	DALF	Select LSB first or MSB first as DADT serial data output. LSB first at "H".
6	VCOI	VCO input (256Fs for variable pitch). Variable range of Fs is under reference Fs ± 12%.
7	ADLF	Select MSB first or LSB first as ADDT serial data input. LSB first at "H".
8	XT21	X'tal oscillation circuit 2 input (Oscillation frequency 44.1kHz 512 = 22.5792MHz).
9	XT20	X'tal oscillation circuit 2 output.
10	Vss	GND (0V).
11	XT31	X'tal oscillation circuit 3 input (Oscillation frequency 48kHz x 512 = 24.576MHz).
12	XT3O	X'tal oscillation circuit 3 output.
13	AUDR	Selects Audio 16 bit or other as regenerative data. Audio 16 bit mode at "H".
14	MNTG	"H" indicates error correction condition monitor data is in output into D7-D0.
15	LR01	Signal indicating 15BCK delayed LRCK.
16	LR02	Signal indicating 16BCK delayed LRCK.
17	LR03	Signal indicating "H", "L" inverted LR02.
18	DFCK	256Fs output terminal. Output at FSEN = "H", High impedance at "L".
19	DIOC	128Fs input/output terminal. Output at FSEN = "H", Input at "L".
20	DADT	DA serial data output. (Regenerative data at PB. REC monitor data at REC). Lch data is input/output at LRCK = "L", and Rch data at LRCK = "H" from ADDT and DADT respectively.
21	ERRF	DA serial data output error flag. "H" indicates error.
22	ADDT	AD serial data input (record data input). Lch data is input/output at LRCK = "L", and Rch data at LRCK = "H" from ADDT and DADT respectively.
23	XBCK	Signal indicating "H", "L" inverted BCK.
24	BCK	64Fs input/output terminal. Output at FSEN = "H", Input at "L".
25	WCK	2Fs input/output terminal. Output at FSEN = "H", Input at "L".
26	V_{DD}	Power source (+5V).
27	LRCK	Fs I/O terminal. Output at FSEN = "H", Input at "L".
28	FSEN	Determines DFCK, DIOC, BCK, WCK, LRCK terminals are output or not. Each terminal is output at "H".
29	MUTG	Muting control signal of regenerative and recorded data. MUTE ON at "H", MUTE OFF at "L".
30	PIDN	Variable pitch control signal. 0.1% pitch down every rise edge (0.1% down at reference Fs).
31	PIUP	Variable pitch control signal. 0.1% pitch down every rise edge (0.1% down at reference Fs).
32	CTL2	Status data input control signal. Status data is shifted in at CTL2 = CTL1 = "H".
33	CTL1	Status data input control signal. Status data is shifted in at CTL2 = CTL1 = "H".
34	EXCK	Status data shift in clock. Status data is shifted in by rise edge.
35	STAT	Status data serial input terminal.
36	SBSY	Status data load signal. Shifted-in status data is loaded in status register by decay edge.
37	SRVS	Servo reference signal 12.8kHz (In variable pitch mode, variable in the range of 12.8kHz ± 12%).
38	ADAE	Indicates AD, DA data is input/output cycle from D7-D0 at "H".
39	FLGC	Inputs three kinds of control signal, forced error flag, no eraser correction and muting per minute and hour.
40	CKRS	Master clock reset signal. Reset at "H".
41	CLKI	Master clock (18.816MHz).
42	Vss	GND (0V).
43	PREN	No ECC data input/output requirement signal. Requirement is prohibited at "L".
44	RCPB	Controls ECC management of ENCODE (in recording) or DECODE (in regeneration). ENCODE is carried out at "H".
45	PRGS	ECC management start signal. Starts at decay.
46	C1C2	Controls ECC management of C1 code or C2 code. C1 code management is carried out at "H".
47	A4	ECC data location A4 (MSB).
48	A3	ECC data location A3.
49	A2	ECC data location A2.
50	A1	ECC data location A1.
51	A0	ECC data location A0 (LSB).
52	PRGE	"H", "L" inverting signal at every code of management of ECC.
53	PTRD	Indicates ECC data input/output requirement is by error pointer or code data. Error pointer at "H".
54	RW	Indicates ECC data input/output requirement is by input (READ from RAM) or output (WRITE to RAM). Input at "H".
55	XDOE	Controls output or not of D7-D0 terminals. Output at "L".
56	D7	External data bus terminal (MSB).
57	D6	External data bus terminal (2SB).
58	V_{DD}	Power source (+5V).
59	D5	External data bus terminal (3SB).
60	D4	External data bus terminal (4SB).
61	D3	External data bus terminal (5SB).
62	D2	External data bus terminal (6SB).
63	D1	External data bus terminal (7SB).
64	D0	External data bus terminal (LSB).

Functional Outline

§ 1. Error Correction Code (ECC) Block

ECC block functions as the following.

1. C1 (32, 28, 5) encode parity flag P_0-P_3 generation
2. C2 (32, 26, 7) encode parity flag Q_0-Q_5 generation
3. C1 decode 2 error correction
4. C2 decode 2 error correction
   - 2 eraser +1 correction
   - 3 eraser correction
   - 3 eraser +1 correction
   - 4 eraser correction
   - 4 eraser +1 correction
   - 5 eraser correction
   - 6 eraser correction
5. Error correction condition monitor output

In ECC block, selects C1 encode, C2 encode, C1 decode or C2 decode by C1C2 and RCPB, and starts management by decay of PRGS. In once management is compleed with 2 codes of C1, and 28 codes of C2. In 1 track, management of C1 is repeated 64 times with PCM, and 8 times with Sub Code, and C2 management is repeated 4 times.

RAM data access of ECC block is given requirement to CXD1009Q by means of RW, PTRD, A4-A0 and PRGE, and managed. Input/output indication to ECC block is given by ADAE and XDOE.

§ 2. AD, DA Interface Block

AD, DA interface block functions as AD interface at PCM REC and as DA interface at PCM PB.

Reads data from RAM at PCM PB and interpolates according to needs and then outputs it as serial DA data from DADT. This serial DA data can be output from LSB/MSB first by switching DALF. Outputs error flag of PCM data from ERRF and carries out PB mute (zero cross mute) by control of MUTG.

AD, DA interface block operates by input of BCK, WCK and LRCK at each timing. CXD1008Q outputs XBCK, LR01-LR03 and etc. from BCK, WCK and LRCK to be connected with various kinds of AD, DA system.

§ 3. Fs Clock Generation Block

This block generation outputs Fs-256Fs clocks necessary for AD converter, DA converter and etc. and drum servo reference signal. 10 kinds of clocks are generated.

1	DFCK (256Fs)	6	XBCK (64Fs)
2	DIOC (128Fs)	7	LR 01 (Fs)
3	BCK (64Fs)	8	LR 02 (Fs)
4	WCK (2Fs)	9	LR 03 (Fs)
5	LRCK (Fs)	10	SRVS (normal 12.8kHz)

§ 4. Status Register

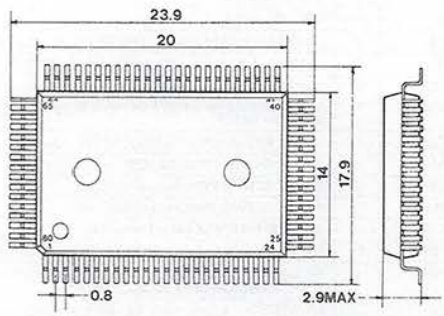
Status register is a register for state setting in R-DAT signal management section and also provided in CXD1008Q and CXD1009Q.

In CXD1008Q, it is used to control AD, DA interface block for AD or DA and select Fs in Fs generation block. ECC block is controlled by way of CXD1009Q, not by status register directly.

As to status register interface timing, EXCK is shift-in clock at CTL1 = CTL2 =1, and STAT data is shifted in by its rise. Load to status register is carried out by means of load signal produced from SBSY decay.

■ CXD1009Q 051-1100-00
R-DAT Signal Management (RAM Control)

Outward Form

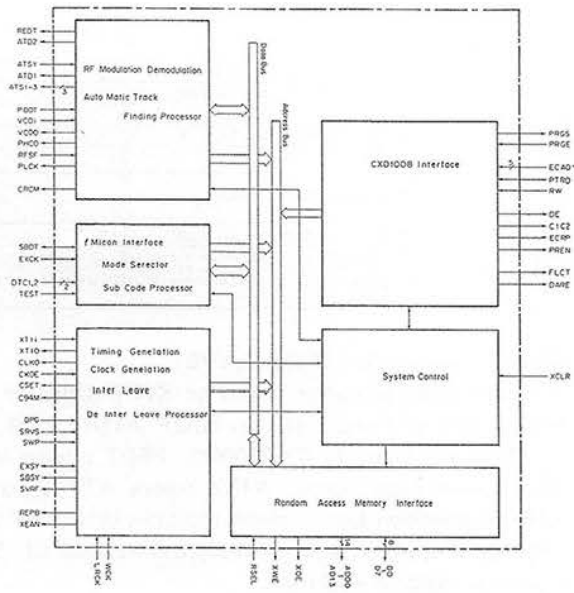


Outline

This IC is R-DAT signal management cilicon gate CMOS LSI. Its function is the following.

- Partly built-in PLL circuit to take out regenerative clock from RF regenerative signal.
- Built-in modulation, demodulation circuit for 8-10 bit conversion.
- Built-in ATF generation, ATF Sync Detection circuit.
- Built-in interleave/deinterleave circuit.
- Built-in servo LSI, RF, LSI, CXD1008Q interface signal management circuit.
- Built-in microcomputer interface circuit.
  a. System operation mode setting
  b. Sub code management

Block diagram



Description of Terminals

Terminal No.	Terminal Name	I/O	Function
1	PTRD	I	Input from CXD1008Q (ECC data discriminates between pointer and data).
2	PRGE	I	From CXD1008Q (ECC program end signal).
3 ~ 7	ECA0 ~ ECA4	I	From CXD1008Q (ECC code language address).
8	C1C2	O	To CXD1008Q (C1/C2 management discrimination).
9	PRGS	O	To CXD1008Q (ECC program start signal).
10	ECRP	O	To CXD1008Q (ECC encode/decode discrimination).
11	PREN	O	To CXD1008Q (ECC external RAM I/O management Enable).
12	Vss	—	0V
13	CLKO	I/O	To CXD1008Q (18.816MHz output).
14	CSET	O	To CXD1008Q (CXD1008, CXD1009 synchronous signal).
15	FLCT	O	To CXD1008Q (Control signal).
16	DARE	O	To CXD1008Q (DA data Read Enable).
17	SRVS	I	From CXD1008Q (Servo reference signal 12.8kHz).
18	C94M	O	9.408MHz output.
19	PLCK	O	RF PLL regeneration clock 9.408MHz ±Δ
20	CRCM	O	AT PB, W1 + W2 + Parity CRC monitor
21	SWP	I	Switching pulse input.
22	DPG	I	PG pulse input.
23	SVRF	O	Servo reference signal 100/3Hz.
24	RSEL	I	External RAM selection L: SRAM, H: DRAM.
25	SBSY	O	Sub code sync.
26	SBDT	I/O	Operation mode setting and Sub Data I/O microcomputer interface.
27	EXCK	I	SBDT I/O clock (From microcomputer).
28	DTC1	I	SBDT control 1.
29	DTC2	I	SBDT control 2.
30	LRCK	I	LR clock L: left, H: Right.
31	WCK	I	Word clock.
32	EXSY	I/O	System synchronous signal. Output at master, input at slave.
33	V_{DD}	—	5V
34	ATD2	O	ATF signal. Pilot signal at Rec, Window pulse.
35	ATD1	O	Tracking information of whole track.
36	ATSY	I	From CXD1046M, PB, ATF signal.
37	ATS3	O	On-track pilot, sampling pulse.
38	ATS2	O	Neighboring track pilot, sampling pulse.
39	ATS1	O	Neighboring track pilot, sampling pulse.
40	RFSF	I	RF, PB signal, envelope detection signal.
41	PHCO	O	Phase comparison signal for RF and PLL.
42	TEST	I	Usually "L".

Terminal No.	Terminal Name	I/O	Function
43	VCOI	I	VCO oscillation terminal, input side.
44	VCOO	O	VCO oscillation terminal, output side.
45	CKOE	I	Usually "L". CLKO is input pin at H.
46	PBDT	I	RF, PB signal input.
47	XCLR	I	System clear at "L" (Power ON Reset).
48	REDT	O	RF, REC signal output.
49	REPB	O	Rec section, window pulse.
50	XT1O	O	X'tal 18.816MHz oscillation terminal, output side.
51	XT1I	I	X'tal 18.816MHz oscillation terminal, input side.
52	Vss	–	0V
53	XEAN	O	External addressing Enable of external RAM.
54	XWE	O	External RAM WE.
55	XOE	O	External RAM OE.
56	AD00	O	External RAM address (LSB).
57 ~ 68	AD01 ~ AD12	O	External RAM address.
69	AD13	O	External RAM address (MSB).
70	D0	I/O	External RAM Data bus (LSB).
71	D1	I/O	External RAM Data bus.
72	D2	I/O	External RAM Data bus.
73	V_{DD}	–	5V
74 ~ 77	D3 ~ D6	I/O	External RAM Data bus.
78	D7	I/O	External RAM Data bus (MSB).
79	DE	O	CXD1008Q outputs external Data bus, enable signal.
80	RW	I	Discriminating signal indicating CXD1008Q reads or write ECC Data.

Normal Regeneration (PCM, Sub PB)

Drum servo is locked based on SVRF signal of CXD-1009Q, and as a result of this, PBDT, ATSY, RFSF, DPG and SWP are input to CXD1009Q. PBDT is wave-formed regeneration head signal. ATSY means ATF signal, and RFSF is envelope signal, which indicates H with RF signal. DPG is pulse, which generates before A track (0°C). SWP is switching signal of A/B head.

Clock synchronized to PBDT is regenerated, Phase comparison between PBDT and clock is output from PHCO. By integrating PHCO, VCO voltage can be gained. As a result of this, PLL is formed. PHCO outputs invariable cycle of PBDT, and RFSF outputs High Z in "L" section (without PBDT). Regenerated PLL clock is frequency centering 18.816MHz. It is divided into half and output to PLCK.

PBDT is NRZ-converted by means of PLCK and block-sink-detected and 10 to 8 bit converted.

W1, W2 are parity-checked, and the result of parity check is output to CRCM terminal. Regenerated W1, W2 and 32 Data (per block) are written on the external side RAM.

ATF signal input from ATSY enters ATF Sync detection circuit and generates pulse (ATS1, ATS2) sampling pilot signal from neighboring track and sampling pulse (ATS3) of on-track pilot signal. Tracking can be adjusted by this sampling pulse.

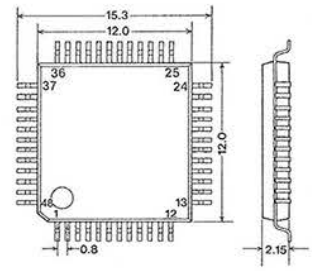
Regenerated data of W1 and W2, CRC and OK are written on the external RAM. This W1, W2 data can be read by means of microcontroller.

PCM and Sub of 32 Data are separated and written to the external RAM.

Following this RF Write, CXD1008Q carries out error correction. Corrected Data is output as PCM Data from CXD1008Q. Pack Sub Code is interfaced by microcomputer and output.

■ CXD1052Q 051-1101-00 R-DAT Servo Controll

Outward Form

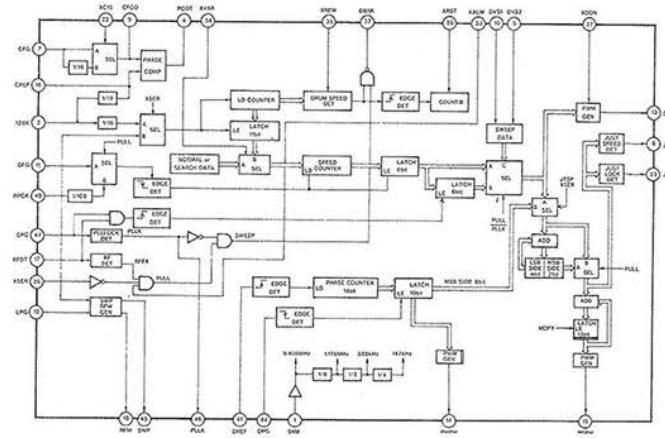


Outline

This IC is for R-DAT servo motor and used with CXD-1008Q, CXD1009Q and CXA1046M. Its function is the following.

- Provided with DRUM SPEED SERVO LOOP, PHASE SERVO LOOP and BIAS SERVO LOOP, and outputs by PWM (Pulse Width Modulation).
- Besides normal servo, search mode servo is possible.
- Outputs phase comparison signal for CAPSTAN SERVO.
- Generates and outputs SWITCHING PULSE from DRUM PG (Phase Generator) and FG (Frequency Generator).

Block diagram



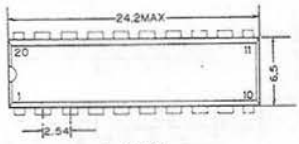
Description of Terminals

Terminal No.	Terminal Name	I/O	Function
1	94M	I	MASTER CLOCK input terminal. (9.408MHz)
2	128K	I	SERVO REFERENCE input terminal. (12.8kHz)
3	XCLR	I	RESET input terminal. RESET at "L".
4	PCOT	O	CAPSTAN PHASE COMPARATOR output terminal. 3. STATE output.
5	DVS2	I	Voltage setting for DRUM motor in SERVO leading-in at SEARCH MODE.
6	Vss	–	GND terminal.
7	CFG	I	CAPSTAN FREQUENCY GENERATOR input terminal.
8	JTSP	O	JUST SPEED monitor output terminal. JUST SPEED at "H".
9	CFGO	O	CAPSTAN FREQUENCY GENERATOR output terminal.
10	DVS1	I	Voltage setting for DRUM motor in SERVO leading-in at SEARCH MODE.
11	DFG	I	DRUM FREQUENCY GENERATOR input terminal.
12	LPG	I	DRUM PHASE GENERATOR input terminal.
13	SPPW	O	SPEED SERVO PWM output terminal.
14	PHPW	O	PHASE SERVO PWM output terminal.
15	BSPW	O	BIAS SERVO PWM output terminal.
16	CREF	O	CAPSTAN FREQUENCY REFERENCE output terminal.
17	RFDT	I	RF signal input terminal. (Converts signalling/unsignalling to I/O wave form to be IC input signal).
18	BFW	O	RF WINDOW output terminal. RF's original territory at "L".
19	V_{DD}	–	+5V power source terminal.
20	TST1	I	TEST input terminal. Usually fixed to "L".
21	TIO1	I/O	TEST input/output terminal. Usually fixed to "L".
22	XC16	I	CAPSTAN MODE switching. 16-multiplied speed mode at "L".
23	JSTL	O	JUST LOCK monitor terminal. JUST at "H".
24	TIN4	I	TEST input terminal. Usually fixed to "L".

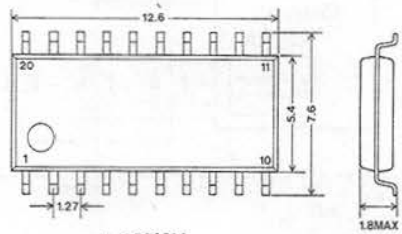
Terminal No.	Terminal Name	I/O	Function
25	TIN1	I	TEST input terminal. Usually fixed to "L".
26	ARST	I	ALARM cancelling input terminal at SEARCH. Cancel at "L".
27	XDON	I	DRUM ON, OFF switching input terminal. ON at "L".
28	TIN3	I	TEST input terminal. Usually fixed to "L".
29	TOU3	O	TEST output terminal.
30	TOU4	O	TEST output terminal.
31	Vss	–	GND terminal.
32	TIO2	I/O	TEST input/output terminal. Usually fixed to "L".
33	XALM	O	ALARM output terminal at SEARCH. ALARM at "L".
34	XVAR	I	No. 2 terminal's external REFERENCE setting terminal. Usually fixed to "H".
35	XREW	I	FAST FOWARD, REWIND setting terminal. REWIND at "L".
36	XSER	I	SEARCH MODE setting terminal. SEARCH at "L".
37	DBRK	O	DRUM BREAK output terminal. BREAK ON at "H".
38	TOU1	O	TEST output terminal.
39	TOU2	O	TEST output terminal.
40	TIN5	I	TEST input terminal. Usually fixed to "L".
41	DREF	I	DRUM PG REFERENCE input terminal.
42	TST2	I	TEST input terminal. Usually fixed to "L".
43	V_{DD}	–	+5V power source terminal.
44	DPG	I	DELAY PG input terminal.
45	SWP	O	SWITCHING PULSE output terminal.
46	PLLK	O	DRUM LOCK monitor output terminal at SEARCH. LOCK at "H".
47	CRC	I	CYCLIC REDUNDANCY CHECK signal input terminal. CRC OK at "H".
48	RPCK	I	REFERENCE input terminal at SEARCH.

■ LC7880 051-1098-00
LC7880M 051-1098-05
Dynamic Level Shift D/A Converter

Outward Form



LC7880



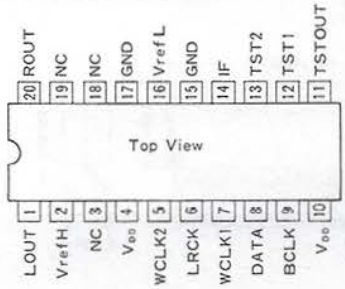
LC7880M

Outline

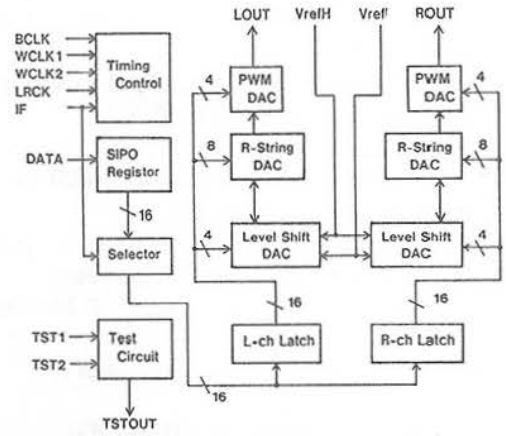
This IC is 16 bit CMOS D/A converter for digital audio and takes dynamic level shift conversion form together with resistance string, PWM (pulse modulation) and level shift. It has the following caracteristics.

- 2'S complement code equivalence
- Built-in D/A converter of 2 channels
- R-ch, L-ch in-phase output, possible
- Max. conversion frequency, 88.2kHz (Over sampling equivalence).
- Digritch circuit, unnecessary.

Terminal position diagram



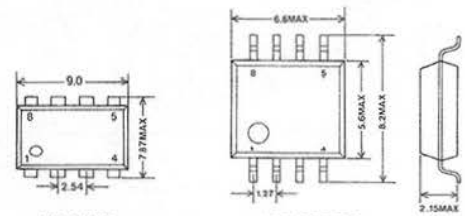
Block diagram



Terminal No.	Terminal Name	Function
1	LOUT	L-ch output terminal
2	VrefH	Reference voltage "H" input terminal.
3	NC	Unused terminal
4	V_{DD}	Power source voltage terminal (+5V).
5	WCLK2	Word clock 2 input terminal. Produces internal signal latching L-ch data of digital audio data by used of WCLK2 decay at IF = "L" level. At If = "H" level, WCLK2 should be "L" level.
6	LRCK	LR clock input terminal. Indicates L-ch and R-ch of Input digital audio data. L-ch at LRCK = "H" level R-ch at LRCK = "L" level
7	WCLK1	Word clock input terminal. Produces internal signal latching R-ch data of digital audio data by use of WCLK1 decay at IF = "L" level. Produces internal signal latching L-ch and R=ch data by use of WCLK1 decay at IF = "H" level.
8	DATA	Digital audio data input terminal. At IF = "L" level, input from LSB side by bit serial. At IF = "H" level, input from MSB side by bit serial.
9	BCLK	Bit clock terminal. Clock to read digital audio data into bit serial of internal LSI, or clock of PWMDAC.
10	V_{DD}	Power source voltage terminal (+5V).
11	TSTOUT	Test output terminal. (Usually open).
12 13	TST1 TST2	Test input terminal. (Usually connected to GND).
14	IF	Interface switching terminal. Input form of digital audio data: LSB first at IF = "L" level MSB first at IF = "H" level
15	GND	GND terminal.
16	VrefL	Reference voltage "L" input terminal.
17	GND	GND terminal.
18 19	NC	Unused terminal.
20	ROUT	R-ch output terminal.

■ MB3771P 051-0869-00
MB3771PF 051-0869-05
Power Source Voltage Supervisory IC

Outward Form



MB3771P MB3771PF

Outline

This IC is power source voltage supervisory IC generating reset signal on power interruption and lowering, and power-on reset signal on powe reset.

Besides detect for 5V power source, optional voltage detection input is available and 2 systems of power source voltage supervision are easily conducted.

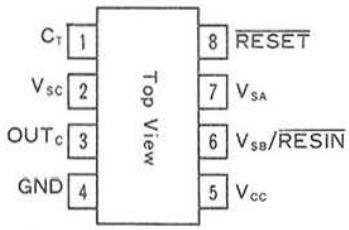
Characteristics

- ○Accurate detection of power source voltage lowering. (V_{SA} = 4.1V-4.3V)
- ○Optional voltage lowering detection by external provided 2-resistance, possible. (V_{SB} = 1.24V-)
- ○Power source and voltage lowering detection in 2 systems, possible. (+5V and optional voltage (≧1.23V))
- ○Over-voltage detection, possible.
- ○Low reset guaranteed voltage. (Vcc = 0.8V typ)
- ○Few external provided parts. (1 condenser)
- ○Low consumption of current (Icc = 0.35mAtyp, Vcc = 5V)
- ○Detection voltage provided with hysteresis.

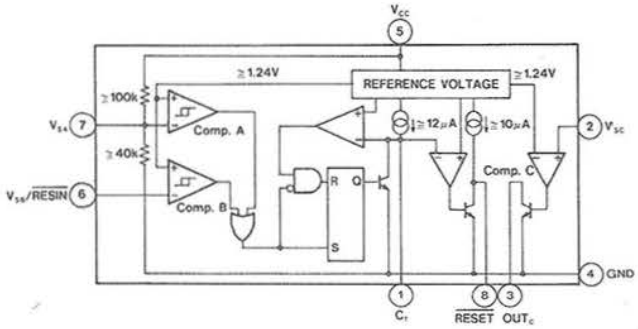
Electrical Features (DC characteristic) (Vcc = 5V, Ta = 25°C)

Item	Symbol	Condition	Minimum	Standard	Maximum	Unit
Power source current	I_{CC1}	V_{SB}=5V, V_{SC}=0V	–	350	500	μA
	I_{CC2}	V_{SB}=0V, V_{SC}=0V	–	400	600	
Detection voltage	V_{SAL} (DOWN)	V_{CC} ↘	4.10	4.20	4.30	V
	V_{SAH} (UP)	V_{CC} ↗	4.20	4.30	4.40	
	V_{SB}	V_{SB} ↘	1.212	1.230	1.248	
	V_{SC}		1.225	1.245	1.265	
"H" level output voltage	V_{OHR}	I_{RESET}=−5μA, V_{SB}=5V	4.5	4.9	–	V

Terminal connection

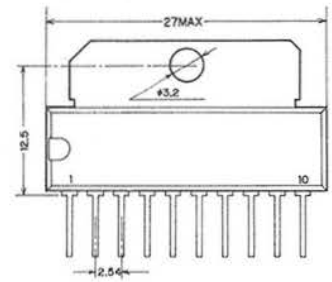


Block diagram



■ TA7288P 051-1060-00
DC Motor Dualful Bridge Driver (Positive, negative Switching Driver)

Outward Form

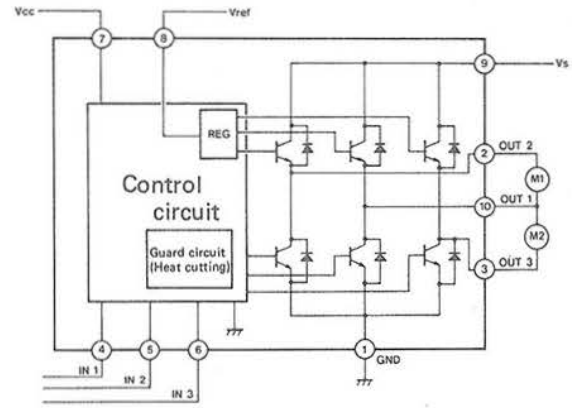


Outline

This IC is a bridge driver best for positive, negative switching and controls positive, negative, stop and brake.

Output current, 1.0A (AVE.) or 2.0A (Peak) can be picked out. Especially its circuit is best formed for front loading and tape loading of VTR, and 2 power source terminals are in output side and control side, and also by Vref terminal of output side controlling motor voltage, motor voltage is easily adjusted.

Block diagram



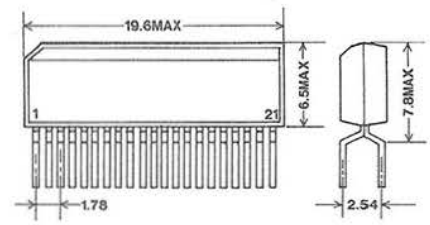
Operation Mode Table

INPUT			OUTPUT			MODE	
IN 1	IN 2	IN 3	OUT 1	OUT 2	OUT 3	M1	M2
0	0	1/0	L	L	L	BRAKE	BRAKE
1	0	0	H	L	∞	CW/CCW	STOP
1	0	1	L	H	∞	CCW/CW	STOP
0	1	0	H	∞	L	STOP	CW/CCW
0	1	1	L	∞	H	STOP	CCW/CW
1	1	1/0	L	L	L	BRAKE	BRAKE

∞ : High Impedance, CW: clockwise, CCW: counter-clockwise
(Note) Input: "H" active

■ TA7415P 051-1023-00
Output Amp. for CD Player

Outward Form

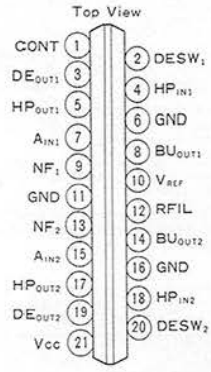


Outline

This IC is audio output (de-emphasis) AMP. of CD player.

- ○Built-in right and left. 2-channel headphone driver AMP.
- ○Built-in de-emphasis on/off switch.
- ○5V uni-power switch (3-8V operation enable).

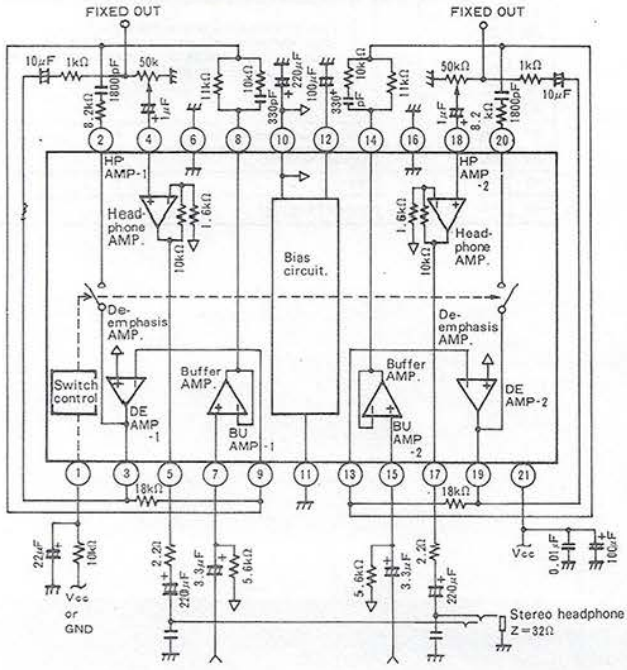
Terminal connection



Description of Terminals

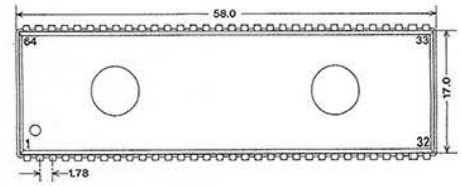
Terminal No.	Terminal Name	I/O	Specification
1	CONT	I	De-emphasis on/off switching terminal. De-emphasis on at "H" level.
2	$DESW_1$	I	De-emphasis on/off switch terminal −1.
3	DE_{OUT1}	O	De-emphasis AMP. output terminal −1.
4	HP_{IN1}	I	Headphone AMP. input terminal −1.
5	HP_{OUT1}	O	Headphone AMP. output terminal −1.
6	GND	–	Ground terminal.
7	A_{IN1}	I	Audio signal input terminal −1.
8	BU_{OUT1}	O	Buffer AMP. output terminal −1. Buffer output of Aini signal.
9	NF_1	I	De-emphasis AMP. antiphase input terminal −1.
10	V_{REF}	–	Reference voltage source terminal.
11	GND	–	Ground terminal.
12	RFIL	I	Ripple filter connecting terminal.
13	NF_2	I	De-emphasis AMP. antiphase input terminal −2.
14	BU_{OUT2}	O	Buffer AMP. output terminal −2. Buffer output of Ain signal.
15	A_{IN2}	I	Audio signal input terminal −2.
16	GND	–	Ground terminal.
17	HP_{OUT2}	O	Headphone AMP. output terminal −2.
18	HP_{IN2}	I	Headphone AMP. input terminal −2.
19	DE_{OUT2}	O	De-emphasis AMP. output terminal −2.
20	$DESW_2$	I	De-emphasis on/off switch terminal −2.
21	Vcc	–	Power source terminal.

Block diagram (Applied circuit example)



■ HD637B01YOPJ-DAT1-M1 051-1059-01
DAT Mechanism Controller

I. Outward Form

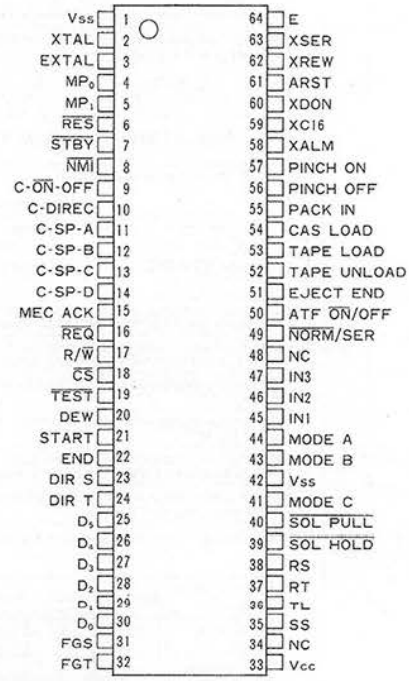


II. Outline

This IC is 8-bit, 1-tip microcomputer for R-DAT mechanism control. Its function is the following.

(1) Detection of mechanism position by switch and photo sensor. Tape loading and cassette pinch roller loading motor driving circuit control.
(2) Capstan speed setting, starting and rotation direction control and ATF ON-OFF.
(3) Drum starting, search mode setting.
(4) Reel motor each mode setting and solenoid absorption, retaining.
(5) System control interface by parallel data.
(6) Start/end management by combination with tape start end sensor IC.
(7) Disposition of drop by combination with drop sensor IC.

III. Terminal position diagram



IV. Description of Terminals

Terminal No.	Terminal Name	I/O	Function
1	Vss	–	Earth.
2	XTAL	–	Vibrator connecting terminal. Oscillates at 3.58MHz.
3	EXTAL		
4	MP_0	I	Built-in ROM selecting terminal. Both are fixed to "H" in this IC.
5	MP_1		
6	$\overline{RES}$	I	Reset at "L" and initialized.
7	$\overline{STBY}$	I	Stan-by input terminal. Fixed to "H" and stand-by is prohibitted.
8	$\overline{NMI}$	I	Non-maskable interrupt input terminal. Fixed to "H".
9	C-$\overline{ON}$/OFF	O	Capstan motor control: Rotation and stop control terminal. "L" → rotation, "H" → stop. When pinch roller is attached to capstan, "L" is output.
10	C-DIREC	O	Capstan motor control: Rotation direction control terminal. "L" → rotation, "H" → inversion.
11 12 13 14	C-SP-A C-SP-B C-SP-C C-SP-D	O	Capstan motor control: Speed selection terminal. Capstan multiplying speed setting by 4 terminals.

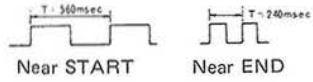
	1 times	1.5 times	Double	2.5 times	4 times	8 times	16 times
C-SP-A	L	H	L	H	L	L	L
C-SP-B	H	L	L	H	L	L	H
C-SP-C	H	H	H	L	L	L	H
C-SP-D	H	H	H	H	H	L	H

16-multiplied speed is set by 59 pin, XC16.

19	$\overline{TEST}$	I	Test terminal for mechanism check. Test mode at "L", operation possible without cassette. Usually "H".
20	DEW	I	Drop detection output/input terminal. When this terminal is "H" because of drop, mechanism moves into EJECT. During drop and ten minutes after cancelling, loading is not carried out even if cassette is inserted. OFF → L
21	START	I	Tape start detection output/input terminal. When "H" is input to reader section, mechanism moves into PAUSE. Other than reader section → "L".
22	END	I	Tape end detection output/input terminal. When "H" is input to reader section, mechanism moves into PAUSE. Other than reader section → "L".
45 46 47	IN1 IN2 IN3	O	Controlls 2 power motors with 3 terminals.

Mode / Terminal	Cassette pinch loading	Cassette pinch unloading	Tape loading	Tape unloading	Stop
IN1	H	H	L	L	H
IN2	L	L	H	H	H
IN3	H	L	H	L	H

31	FGS	I	Reel motor control: SUPPLY side reel motor FG input. Pulse shown in the below is input at PLAY 1 speed.



32	FGT	I	Reel motor control: TAKE UP side reel motor FG input.

35	SS	O	Reel motor control: Condenser discharge terminal in reel control circuit. "L" at FF SEARCH, REW SEARCH. Others "H"
36	TL	O	Reel motor control: TAKE UP side reel motor lock terminal. "H" at TAPE LOAD, TAPE UNLOAD and PINCH LOAD. Reel lock.
37	RT	O	Reel motor control: Determines rotation direction of TAKE UP reel motor. Fixed to "H".
38	RS	O	Reel motor control: Determines rotation direction of SUPPLY reel motor. Fixed to "H".
39	$\overline{SOL\ HOLD}$	O	Reel motor control: Solenoid retaining terminal. "L" at PLAY, FF and REW. "H" at STOP and EJECT, and break is made.
40	$\overline{SOL\ PULL}$	O	Reel motor control: Solenoid absorption terminal. During absorption, "L" in 50 msec. Usually "H".
41 43 44	MODE C MODE B MODE A	O	Reel motor control: Mode of reel motor is selected with 3 terminals.

Mode / Terminal	MODE A	MODE B	MODE C
FORWARD PLAY	L	L	L
FF SEARCH	H	L	L
REW SEARCH	L	H	L
TAPE LOAD	H	H	L
REVERSE PLAY	L	L	H
TAPE UNLOAD	H	L	H
TAPE UNLOAD (NOTE 1)	L	H	H
STOP EJECT	H	H	H

(Note 1) Last 0.6 seconds of TAPE UNLOAD.

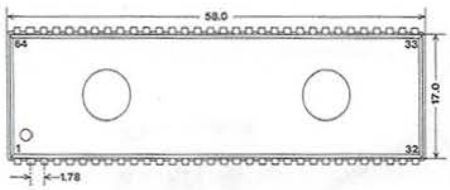
23	DIR S	I	Reel motor control: SUPPLY side reel motor rotation direction input terminal. "H" counter-clockwise. "L" clockwise.
24	DIR T	I	Reel motor control: TAKE UP side reel motor rotation direction input terminal. "H" clockwise. "L" counter-clockwise.
50	$\overline{ATF\ ON/OFF}$	O	ATF control: Terminal turning ATF block ON/OFF. "L" at PLAY 1 and 1.5 speed, and ATF ON. When other PLAY mode and no-record tape reduce, "H" at STOP, EJECT, FF and REW, and ATF OFF.
49	$\overline{NORM/SER}$	O	ATF control: Determines RF envelope detection value. Fixed to "L" (NORMAL MODE).
51	EJECT END	I	Mechanism position detection: EJECT completion detection switch input terminal. "L" at EJECT completion. "H" at STOP, PLAY, FF and REW.
52	TAPE UNLOAD	I	Mechanism position detection: TAPE UNLOADING (STOP) completion detection switch input terminal. "L" at EJECT and STOP. "H" at FF, REW, PLAY and TAPE LOADING (UNLOADING).
53	TAPE LOAD	I	Mechanism position detection: TAPE LOADING completion detection switch input terminal. "H" at EJECT, STOP, TAPE LOADING (UNLOADING). "L" at PAUSE, FF, REW and PLAY.
54	CAS LOAD	I	Mechanism position detection: Inputs discrimination switch to see that cassette is normally loaded from EJECT to STOP. "H" at EJECT. "L" at STOP, PLAY, FF and REW.
55	PACK IN	I	Mechanism position detection: Cassette insertion detection switch input terminal. "H" without cassette and "L" with cassette inserted, and cassette loading starts.
56 57	PINCH OFF (A) PINCH ON (B)	I	Mechanism position detection: By 2 photo sensors, cassette loading, PINCH LOADING and PINCH UNLOADING completion position detection are carried out.

Terminal / Position	PINCH ON (B)	PINCH OFF (A)
EJECT, CASSETTE LOAD-UNLOAD	H	L
STOP	L	L
PINCH LOAD-UNLOAD	L	H
PLAY	H	H

58	XALM	I	Drum control: ALARM input terminal.
59	XC16	O	Drum control: Capstan 16-multiplied speed selection terminal. Usually "H". "L" while movement from search to PLAY and while winding back to the top of music after completion.
60	XDON	O	Drum control: Start and stop signal. "H" at STOP and EJECT. "L" at PLAY, FF and REW. When setting DRUM from search to NORMAL, outputs "H" in 40 μsec.
61	ARST	O	Drum control: Cancelling of ALARM. "H" at STOP and EJECT. "L" at PLAY, FF and REW. Outputs "L" in search state.
62	XREW	O	Drum control: Selection for DRUM sweeping at 2000-3600 rpm or 360-2200 rpm. "L" at REW SEARCH and 16-multiplied speed REVERSE PLAY. At other modes, "H".
63	XSER	O	Drum control: Search mode selection. "L" at FF SEARCH, REW SEARCH and 16-multiplied speed PLAY, and SEARCH. "H" at other modes.
64	E	O	1/4 pin ③ clock is output.
15	MEC ACK	O	Interface: MECH ACKNOLAGE. Terminal indicating that command from system control is received by mechanism microcomputer and status data from mechanism control is effective.
16	$\overline{REQ}$	O	Interface: REQUEST. Terminal requiring mechanism control to read mechanism status into system control.
17	R/$\overline{W}$	I	Interface: READ/WRITE. Terminal discriminating control input from system control to mechanism control and status sending from mechanism control to system control. "L" at system control → mechanism control. "H" at mechanism control → system control.
18	$\overline{CS}$	I	Interface: CHIP SELECT. Input when system control sends command to mechanism control or mechanism control sends status to system control.
25 26 27 28 29 30	D_5 D_4 D_3 D_2 D_1 D_0	I/O	Interface: Command data and status data wire. When system control sends out command, D_0-D_5 are input, and when mechanism control sends out status, those are output. Usually input.
33	Vcc	–	Power source terminal. +5V.
34	NC	–	Unused terminal.
42	Vss	–	Earth.
48	NC	–	Unused terminal.

■ HD637B01YOPJ-PA5500S 051-1102-00
DAT Player System Controller

Outward Form



II. Outline

This IC is a 8-bit 1-tip microcomputer controlling and managing mechanism microcomputer, signal mangeing IC, LCD indication, KEY operation, and external input switching of DAT system.

III. Terminal connection

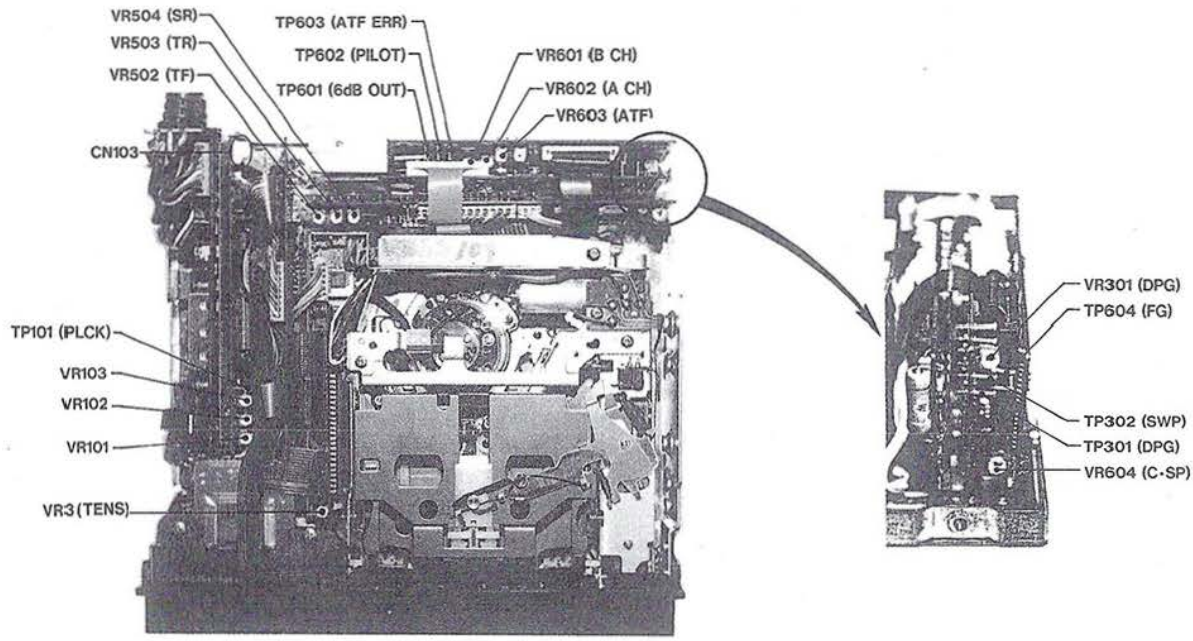
IV. Description of Terminals

Terminal No.	Terminal Name	I/O	Function
1	Vss	–	GND terminal.
2 3	XTAL EXTAL	–	8MHz cristal oscillator connecting terminal.
4 5	MP0 MP1	–	Connected to +5V.
6	$\overline{RES}$	I	This microcomputer reset signal input. L: reset.
7	STBY	–	Connected to 5V.
8	NMINT	I	Offerring signal input from CXD1009 (Decay edge).
9	$\overline{XCLR}$	O	Reset signal output to external IC. L: reset.
10	MUTG	O	Digital mute signal output to CXD1008 and 1009. H: mute.
11	EXCK	O	Serial CLOCK signal output to CXD1008 and 1009.
12 13	SBDT SBDT	I O	Serial DATA signal input/output to CXD1008 and 1009.
14	NC	–	Unused terminal.
15 16	DTC1 DTC2	O	Data control signal output. Connected to CXD1008 and 1009.
17	NC	–	Unused terminal.
18	$\overline{REQ}$	I	Offerring request signal input from Mechanism microcomputer L: offering.
19 〜 24	D0 〜 D5	I/O	Mechanism microcomputer, interface DATA line.
25	$\overline{CS}$	O	Offerring request signal output from this microcomputer to mechanism microcomputer. L: Offerring.
26	R/$\overline{W}$	O	Input/output switching signal output of DATA line.
27	N.C	–	Unused terminal (Connected to GND).
28	MECACK	I	Mechanism microcomputer, interface ACKNOLEDGE signal (Discrimination signal) input.
29	ATD1	I	Tracking information input from CXD1009. OK: L, NG: H.
30	JSTL	I	Lock information input of drum from CXD1052. OK: H, NG: L.
31	PLLK	I	Lock information input of PLL from CXD1009. OK: H, NG: L.
32	N.C	–	Unused terminal.
33	Vcc	–	Positive power source supply terminal (+5V).
34	N.C	–	Unused terminal.
35	TEST	–	Unused terminal.
36	N.C	–	Unused terminal.
37	PACK IN	O	PACK IN detection signal input. H: PACK IN.
38	REMOTE IN	I	When external set connected to the main body is ON, H is input.
39	REMOTE OUT	O	When DAT is on PLAY, H is output, and on STOP, EJECT, L is output.
40	ACC DETECT	I	ACC detection terminal. H: ACC ON.
41	RESET W.D.T	O	Control signal output to external IC for this microcomputer reset.
42	Vss	–	GND terminal.
43	ID-HOLE4	I	Detecting signal input to see pre-record tape or non-pre record tape. H: pre-record tape, L: non-pre-record tape.
44	ID-HOLE3	I	Detecting signal input to see wide track tape or not. H: wide track tape, L: normal track tape.
45 46	N.C	–	Unused terminal.
47 〜 50	KEY IN3 〜 KEY IN0	I	Key return signal input of key matrix.
51 〜 53	KEY SCAN2 〜 KEY SCAN0	O	Key scan signal output of key matrix.
54	LCD ($\overline{INH}$)	O	Indication extinction signal output of LCD indicating IC (LC7582), L: extinction
55	LCD (CE)	O	Serial data output to LCD indicating IC (LC7582).
56	LCD (CLK)	O	
57	LCD (DATA)	O	
58	N.C	–	Unused terminal.
59	NMI CONTROL	O	NMI offerring control terminal. H: offerring permitted, L: No offerring.
60	BEEP	O	Unused terminal.
61	POWER ON/OFF	O	ON/OFF terminal of external IC. H: ON.
62	AF MUTE	O	Analog signal mute output. H: mute.
63	EMPHA	O	When emphasis is ON, H is output, and when OFF, L is output.
64	N.C	O	Unused terminal.

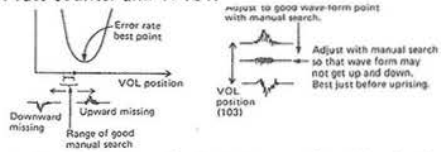
V. Key Matrix

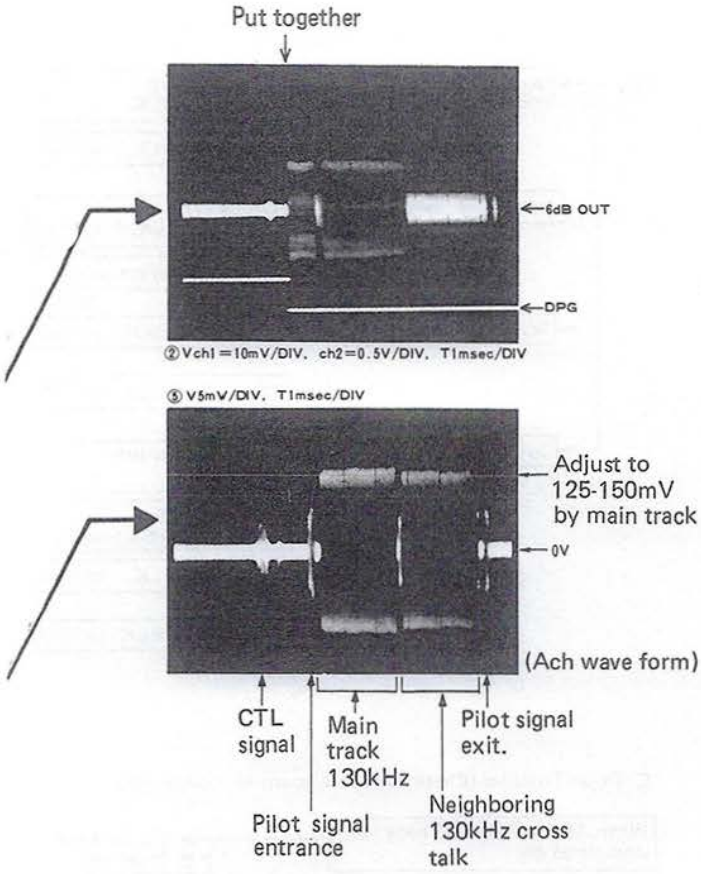
IN \ OUT	KEY SCAN 0 (Pin53)	KEY SCAN 1 (Pin52)	KEY SCAN 2 (Pin51)
KEY IN 0 (Pin50)	PLAY/STOP	SEARCH FF	TOP
KEY IN 1 (Pin49)	EJECT	SEARCH RWD	——
KEY IN 2 (Pin48)	SKIP FF	SCAN	——
KEY IN 3 (Pin47)	SKIP RWD	REPEAT	——

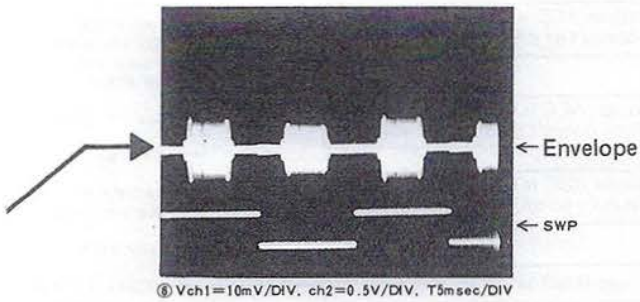
■ ELECTRICAL ADJUSTMENT ● Adjusting Point



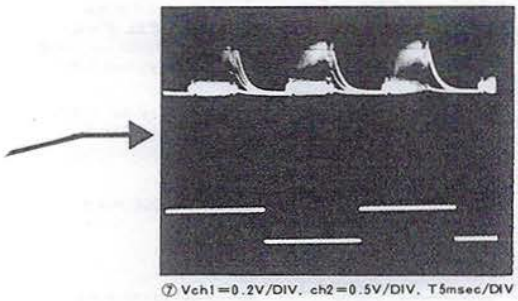
■ Adjustment

Item	Specification	Measure
① Reel torque adjustment, Reel P.W.B	● Insert torque cassette. ● Adjust VR502 (TF) at PLAY mode. 11-16g-cm (T side) ● Adjust VR503 (TR) at MANUAL REW mode. 11-13g-cm (T side) ● Adjust VR504 (SR) at MANUAL REW mode. 10-12g-cm (S side)	● Torque cassette (CTR-911-100)
② Drum DPG adjustment	● Connect oscilloscope to TP301 (DPG drum P.W.B) and TP601 (6dB OUT capstan P.W.B) ● So adjust that DPG sink and envelope top will meet at VR301 (DPG)	● Oscilloscope ● PG reference tape (CTR-141-100)
③ ATF adjustment (Automatic tracking finding) Capstan P.W.B	● Connect digital voltmeter to TP603 (ATF ERR capstan P.W.B). ● Adjust VR603 (ATF) to 2.6 ± 0.05V.	● No recorded tape (CTR-803-100) ● Digital voltmeter
④ Capstan speed adjustment Capstan P.W.B	● Connect frequency counter to TP604 (FG). ● Adjust VR604 (C·SP) to 559 ± 1Hz.	● Frequency counter ● No recorded tape (CTR-803-100)
⑤ ATF PILOT adjustment Capstan P.W.B	● Connect oscilloscope to TP602 (PILOT). ● Adjust PILOT level to 125-150mVp-p with VR602 (A CH) and VR601 (B CH).	● Oscilloscope ● PG reference tape (CTR-141-100)
⑥ Envelope checking TP601: capstan P.W.B TP302: drum P.W.B	● Connect oscilloscope to TP601 (6dB OUT) and TP302 (SWP). Adjust envelope wave form. For details, see Mechanism Adjustment.	● Oscilloscope ● Envelope tape Ach CTR-101-200 Bch CTR-101-300
⑦ VCO adjustment ECC P.W.B	ECC circuit adjustment 1. Connect RFSF to GND, adjust free run with VR101. After adjusting 9.40MHz, take out RFSF from GND. 2. Error rate adjustment Adjust with VR103, monitoring with oscilloscope connected to error rate counter and TP101.  Best point of error rate gets a little out of position in the range of good search, so that point just before uprising of TP wave from within the range of good manual research is best position for the both. After this, check adjusted error rate. 3. After this adjustment, freerun gets out of position. So repeat 1 one more time. 4. Check error rate of SUB signal. If it is bad, adjust with VR102. (Usually VR102 is in center).	● Frequency counter ● Error rate counter ● M tape (CTR-111-100) ● Oscilloscope
⑧ Checking for function and operation	● Check for function in operation.	● Operation checking tape (CTR-571-100)

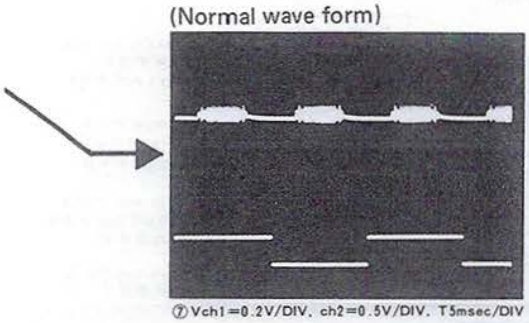




(Abnormal wave form)



(Normal wave form)



● Adjustment Description

1. Reel Torque Adjustment

3 places in reel BLOCK need separate adjustment. When exchanging reel BLOCK or reel motor (mechanism), adjust them as the following.

1 Insert torque cassette (CTR-911-100).
2 Adjust TF-VR at PLAY mode so that take-up side torque may become 13.5±2.5g-cm.
3 Adjust TR-VR at MANUAL REW mode so that take-up side (tape supply side at REW) torque may become 12±1g-cm.
4 Adjust SR-VR at MANUAL REW mode so that supply side (tape rewinding side at REW) torque may become 11±1g-cm.

When torque cassette is given big torque or shock, indicating value becomes inaccurate. Please be careful in adjusting. Don't rewind at high speed with MUSIC SEARCH key, but do that with MANUAL REW from the end of tape.

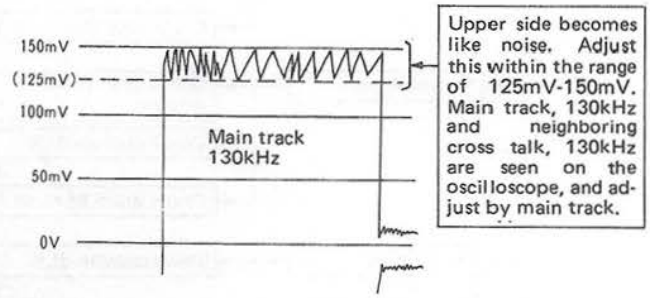
VR is not half-fixed to reel BLOCK, but in case supply side torque is not 6-7g-cm in 2 , adjust VR3 of mechanism controller P.W.B.

Tape speed is adjusted in reel BLOCK P.W.B-ASS'Y at high-speed search, and readjustment is not necessary after exchanging reel motor. But, after fixing up BLOCK-related parts, make a brief adjustment as the following. In accurate adjustment, connecting with adjusting tool is necessary, and it is difficult to make adjustment of a mounted set.

1 Insert C-120 tape.
2 Adjust SER-VR at PLAY mode so that SBVV test land (SER-VR . . . VR501 slider terminal) voltage may become about 2.6V.
3 Connect frequency counter to FGT or FGS test land (CN503 pin 9 or pin 10), make searching at high speed by MUSIC SEARCH key and adjust SER-VR so that FG frequency may become 400-420Hz at the center of tape.
4 Make sure that it takes about 45 seconds for rewinding of a whole tape.

2. ATF Pilot Signal Adjustment

Make an adjustment by connecting oscilloscope to PILOT T.P above P.W.B by means of PG reference tape CTR-141-100.



See wave form at PLAY.

The range of oscilloscope is 1mS/DIV, 50mV/DIV. Observe output by AC.

When adjustment shown in the above picture is done, ATF pilot level is adjusted to about 250-300mVp-p.

Survey example is shown above.

■TROUBLE SHOOTING:

◎CIRCUIT DIAGRAM

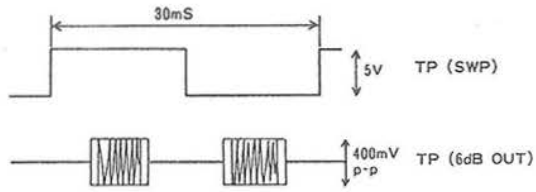
PE-5510A-A is plug-in-structured by module function considering mendability, so checking is necessary according to conditions of each trouble.

Note: Please refer to Trouble Shooting about each block for checking of each BLK.

When set is in trouble, Please check as the following.

- Make sure that it is loading, and that drum is rotating and tape is running. — Something wrong → to. Ⓐ
- Connect oscilloscope to TP (SWP) and TP (6dB OUT) and make sure that envelope wave form is normal. — Something wrong → to. Ⓑ
- Connect error rate counter and make sure that normal value is put out. — Something wrong → to. Ⓒ
- Connect AMP and speaker, and operate KEY and make sure of its operation. → to. Ⓓ
- Other troubles → to. Ⓔ

Normal envelope waveform



Standard error rate

M randum tape B.E.R 10^{-3} order (PCM C1)

Ⓐ
- Not loading. → Check for mechanism section. to. P42
- Drum doesn't rotate. → Check for mechanism section. to. P42; Check drum BLK. to. P38
- Tape doesn't run. → Check for mechanism section. to. P42; Check capstan BLK. to. P36; Check reel BLK. to. P40

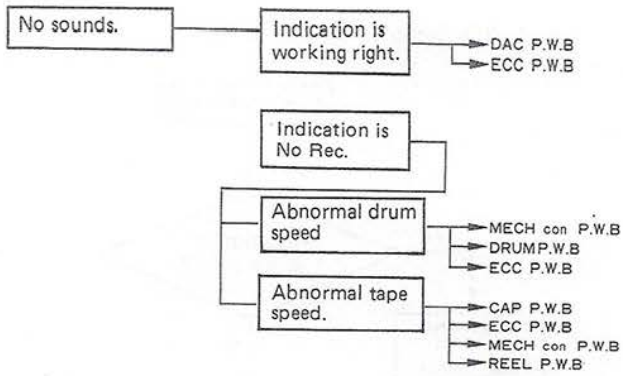
Ⓑ
- No envelope. → Check mechanism section. to. P42; Check capstan BLK. to. P36; Check drum BLK. to. P38
- No tracking. → Check capstan BLK. to. P36

Ⓒ
- Error rate is extremely bad. → Check mechanism section. to. P42; Check ECC BLK. to. P35

Ⓓ
- Key is not input. → Check system controller BLK. to. P35; Check SW BLK. to. P37
- No correct indication. → Check system controller BLK. to. P35; Check indication BLK. to. P37
- Sound is not normal. → Check ECC BLK. to. P35; Check DAC BLK. to. P39
- Quick-search, inable → Check mechanism section. to. P42; Check system controller BLK. to. P35; Check reel BLK. to. P40; Check drum BLK. to. P38

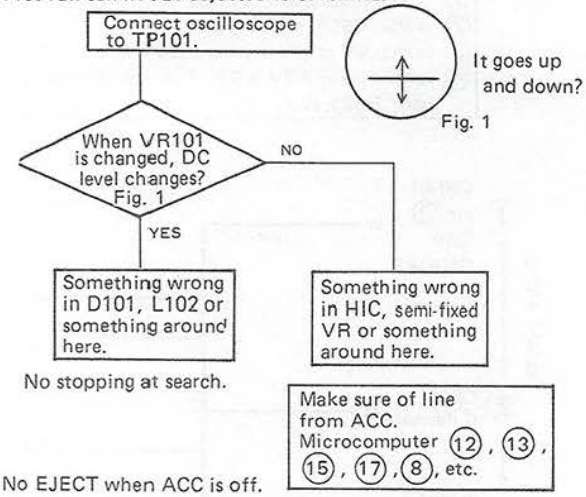
Ⓔ Other Troubles (Check each base board for conditions)

- When ACC is ON, LCD back light doesn't go on. → Sys con P.W.B; Power unit; DISP P.W.B
- When ACC is ON. button light doesn't go on. → DAC P.W.B; Sys con P.W.B; Power unit; SW P.W.B
- When ACC is ON, dust-proof door light doesn't go on. → Sys con P.W.B; SW P.W.B
- When ACC is ON, VOL ring light doesn't go on. → DAC P.W.B; Sys con P.W.B; DISP P.W.B
- Tape is not set in. → MECH con P.W.B; Sys com P.W.B
- Tape goes to ejection just after inserted. → CAP P.W.B; REEL P.W.B; MECH con P.W.B; Sys com P.W.B
- Abnormal sound sounds.
  - Sampling frequency is not right. → Sys con P.W.B; ECC P.W.B
  - Error rate is bad. → ECC P.W.B
- Search, SCAN and REPEAT, inable.
  - DRUM is in sweep. → DRUM P.W.B; ECC P.W.B
  - KEY is not effective. → MECH con P.W.B; SW P.W.B; Sys con P.W.B
- It takes long time for searching. → DRUM P.W.B; ECC P.W.B; REEL P.W.B
- ACC off, Eject, unable → Sys con P.W.B; MECH con P.W.B; SW P.W.B
- KEY doesn't operate operate. → Sys con P.W.B; SW P.W.B
- It takes long time for rewinding. → REEL P.W.B



ECC Block

Free run can not be adjusted to 9.40MHz.



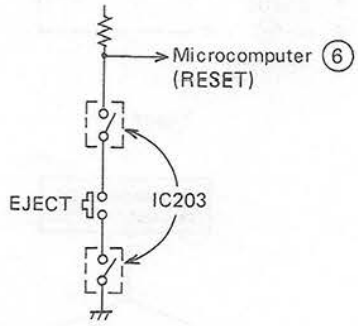
No stopping at search.

Make sure of line from ACC. Microcomputer (12), (13), (15), (17), (8), etc.

No EJECT when ACC is off.

Check IC203 and around it.

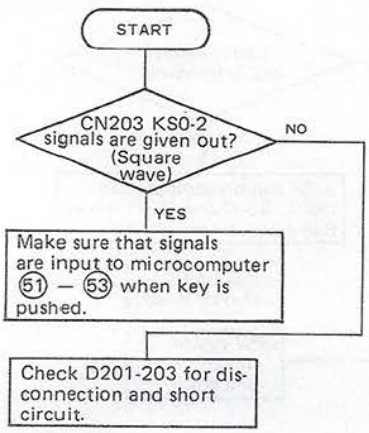
When ACC is off, EJECT key goes like the below.



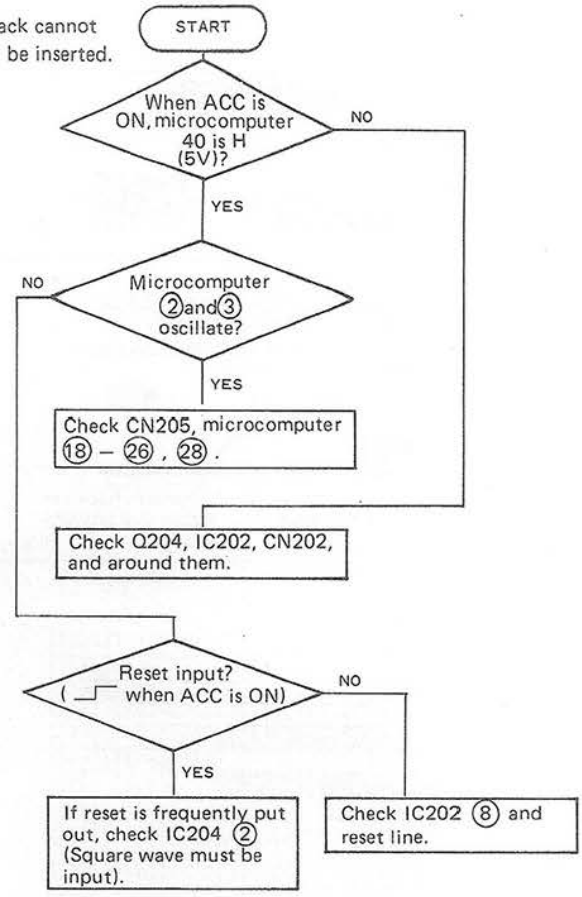
(When ACC is on, EJECT key goes into matrix.)

System Controller

Key doesn't operate.



Pack cannot be inserted.



Reel rotation is getting fast. (Envelope flows)

Check ATF-related signals, ATS1, ATS2, ATS3, SYNC, RF DET.

Drum doesn't lock. (No rotation at 2000RPM during PLAY)

Check drum-related signals, 128k and 94M.

Search stops but No Rec is indicated.

Check JSTL and PLLK line.

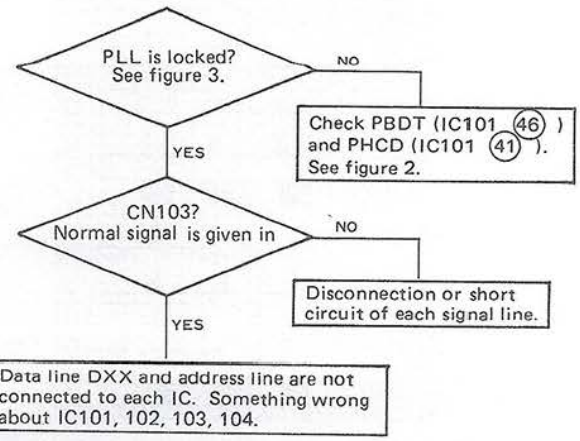
User's recording tape sounds right, but pre-recording tape (including testing tape) makes a rattling sound.

- Check mechanism ID switch microcomputer ID detecting port.
- Make sure that ID hole of pre-recording tape is proper.

EJECT a little after loading.

Check reset terminal (microcomputer (6)) for pull-up circuit.

Error rate is extremely bad. (10^{-1} bodies)



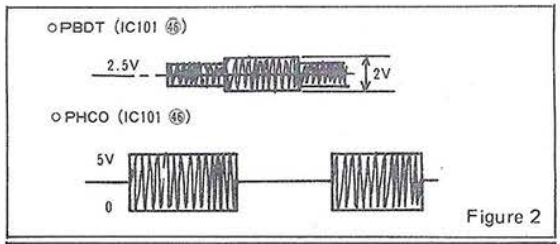


Figure 2

PLAY music tape, or input signal from data generator, and see TP101 waveform with oscilloscope. When VR101 is changed and becomes like the below figure. TP101 waveform is locked.

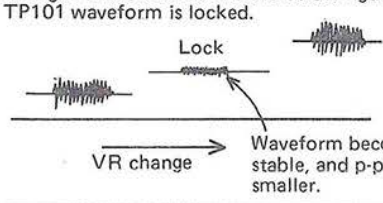
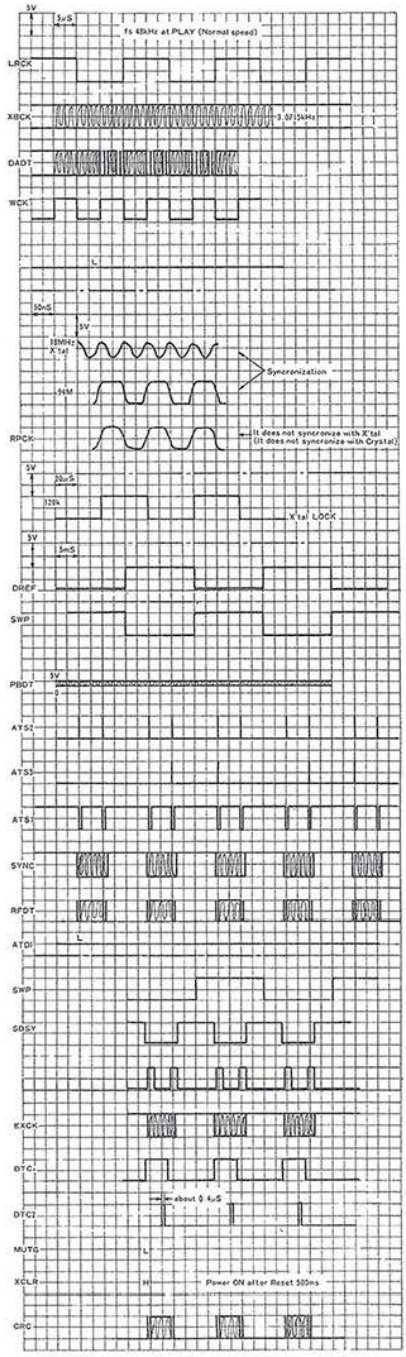
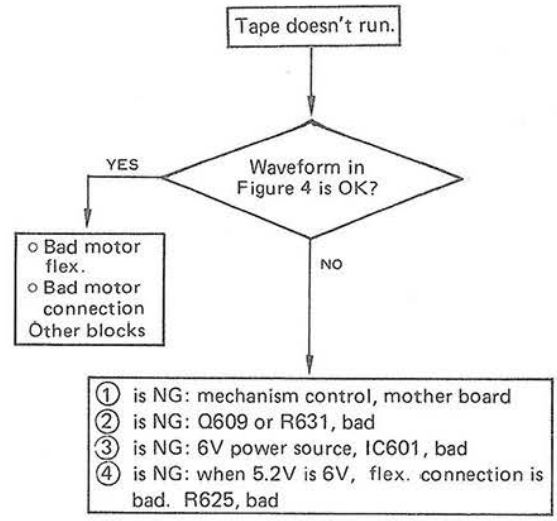


Figure 3



Timing Chart of ECC Block and Its Surrounding

Capstan BLK Section



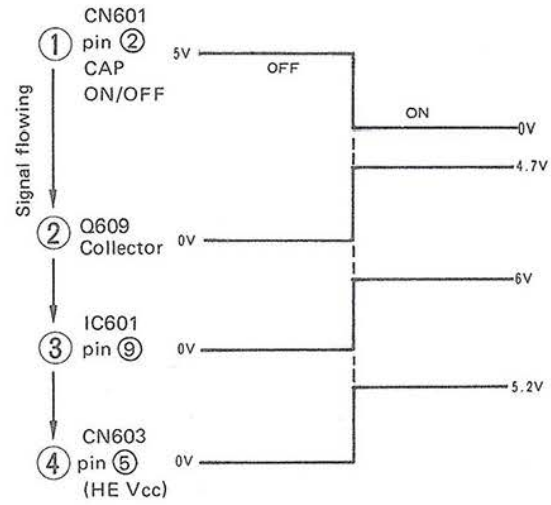
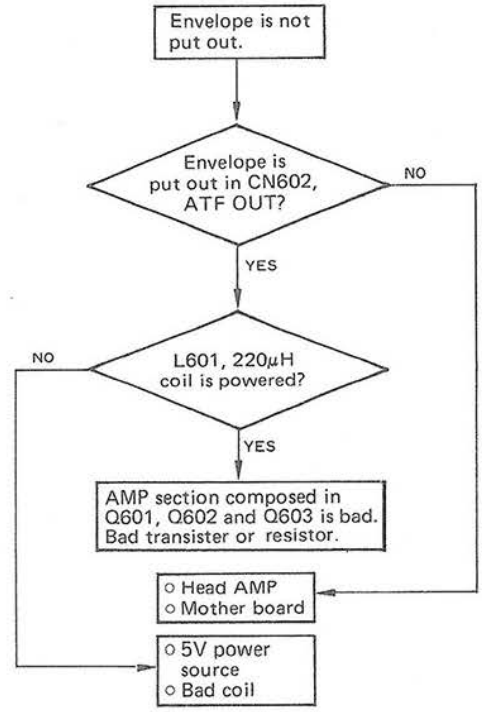
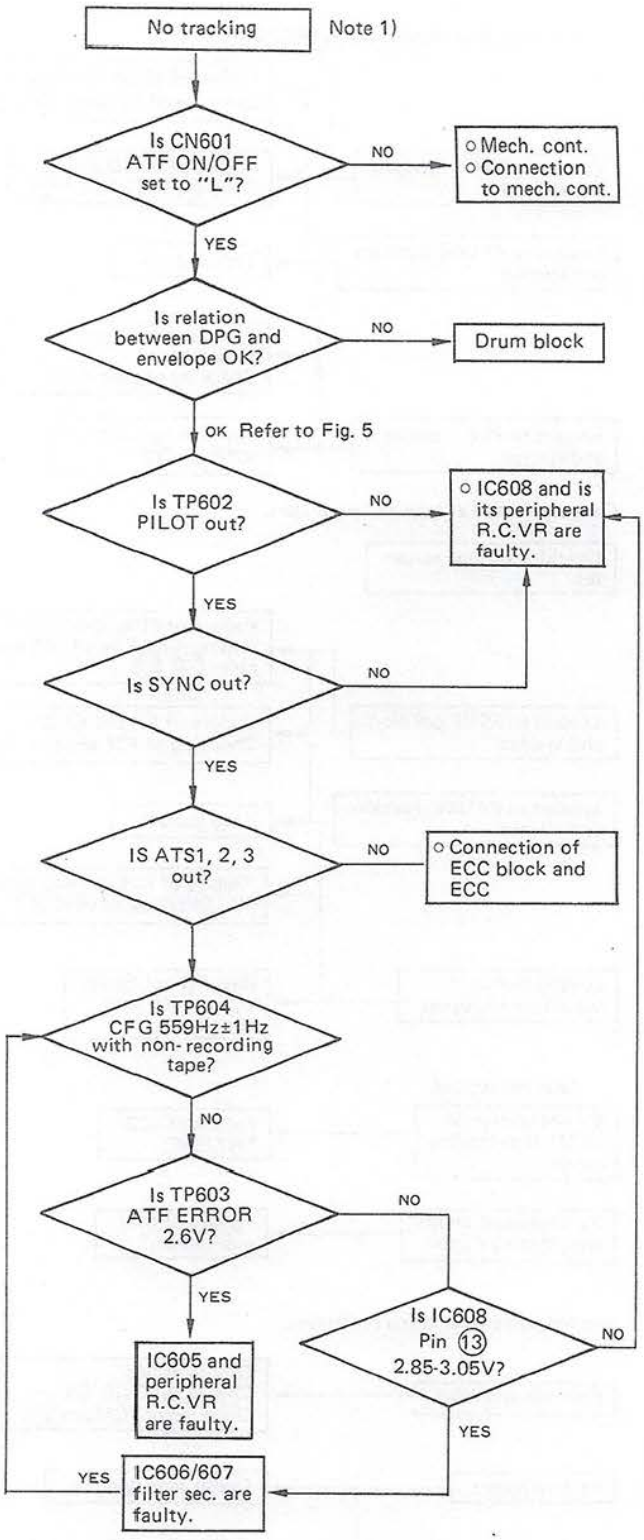


Figure 4





Note 1)
[Depending on a tape used, tracking may not be taken. Tape check, therefore, may be needed.]

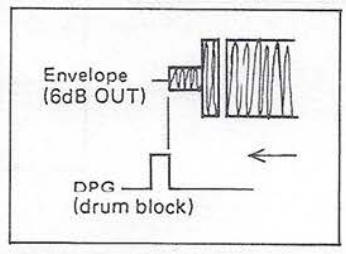
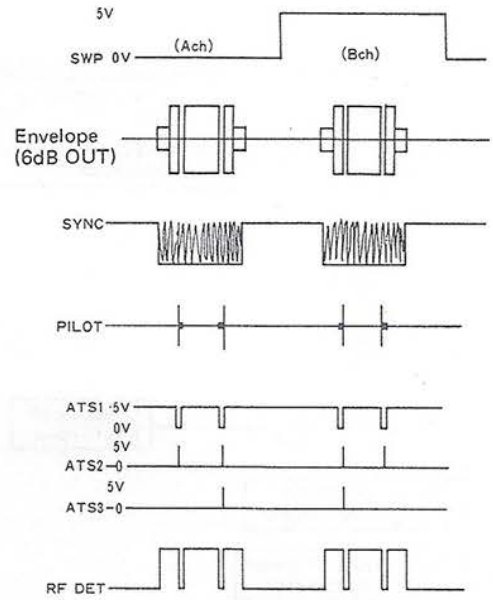
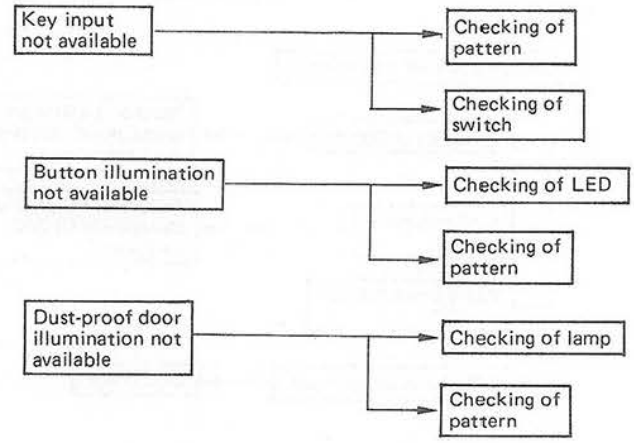


Figure 5

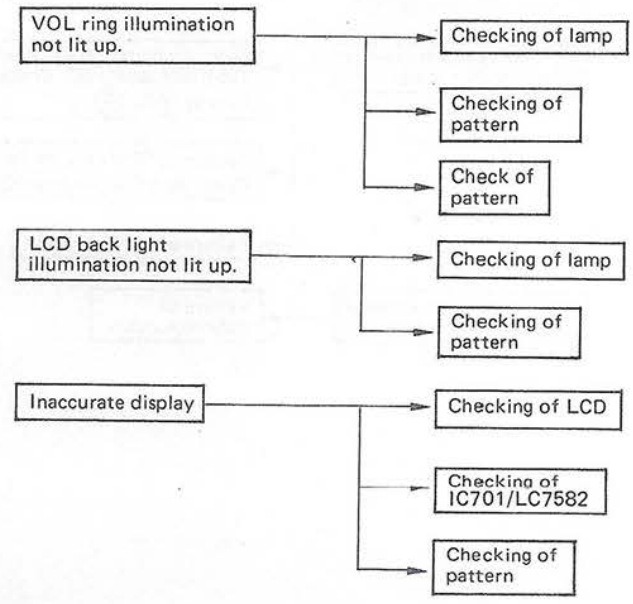
Waveform of each sec.



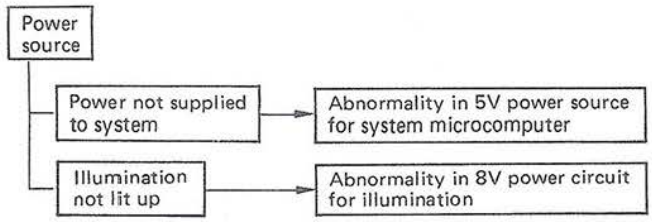
SW BLK troubleshooting



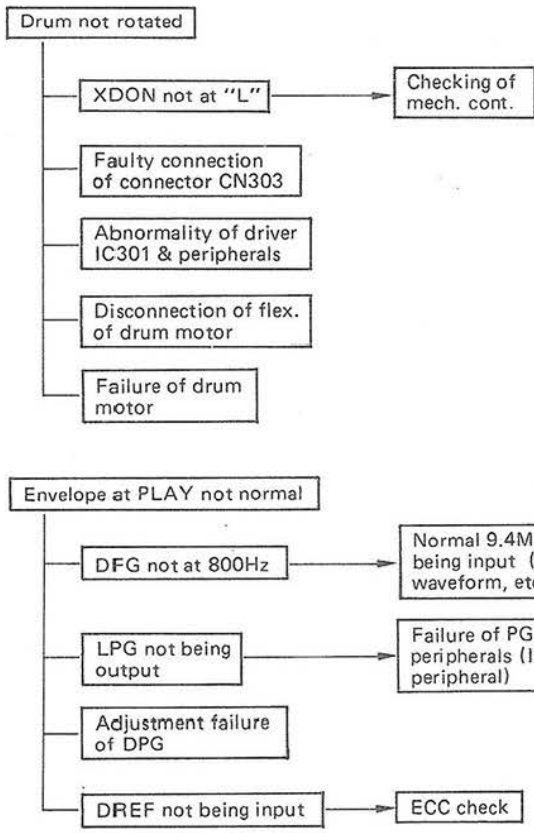
Display BLK check



Troubleshooting of Power Source BLK

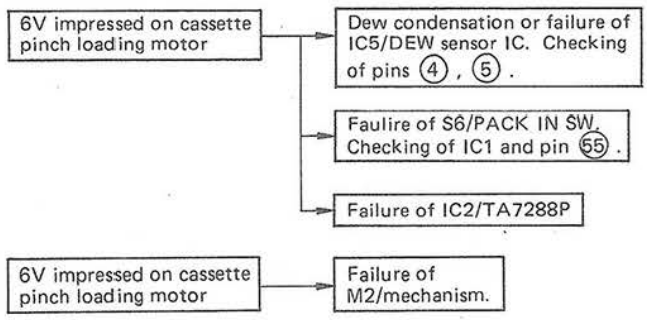


Troubleshooting (drum)

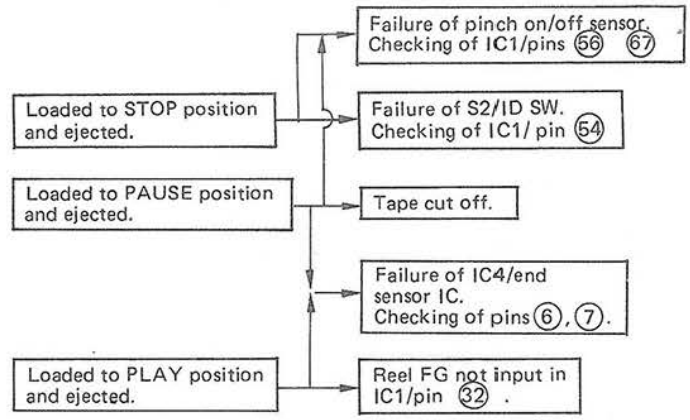


Mech. cont. P.W.B Troubleshooting

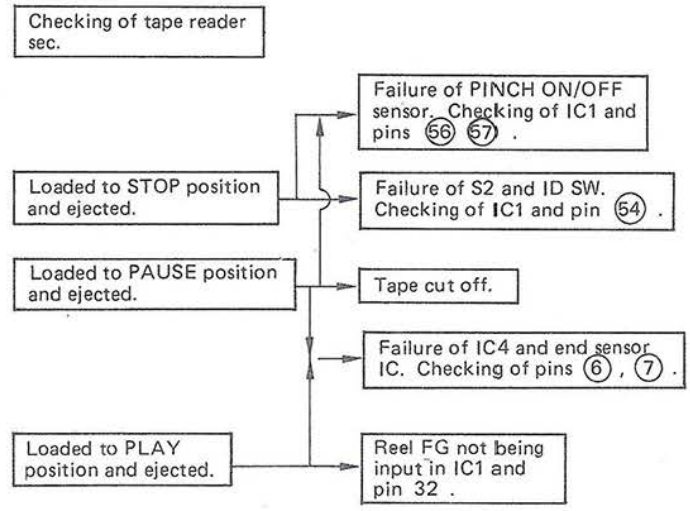
Cassette not being loaded



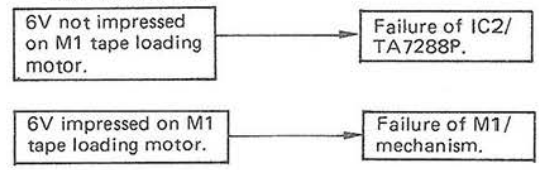
Cassette, loaded, and, soon, ejected.



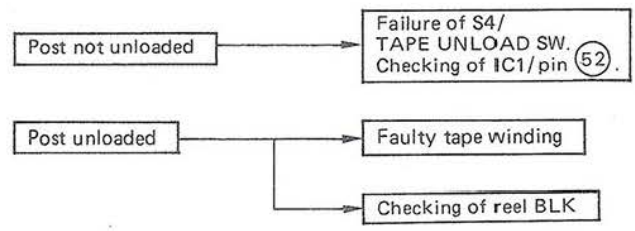
Cassette ejected at tape end or at start.



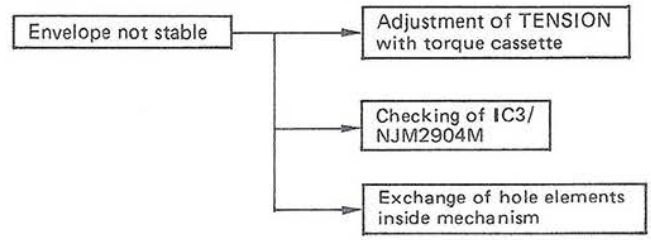
Tape not loaded.



Ejected while tape being protruded.



Sound cut off/Abnormal sound.



"DEW" Display Not Disappeared

- Outside air dried
  - → Failure of IC5/ DEW sensor. Checking of pins ④, ⑤.
  - → Exchange of DEW sensor inside mechanism

Also confirm that the flex. has been fully inserted into the socket of the mech. control P.W.B..

Troubleshooting of Head Amp. BLK

- SWA OUT (envelope) not out
  - Neither A or B channel not available. → Failure of IC71 or failure of power supply line.
  - A channel only not available. → Failure of C76 surrounding or of VR71 surrounding
  - B channel only not available → Failure of C71 surrounding or of VR71 surrounding
- EQ OUT not available
  - → Failure of IC71. Failure of C83, C77.
  - → Failure of VR73, 74, 75.
  - → Failure of C85.
- PB DATA not available
  - → Failure of IC71
  - → Failure of C86.
- Extremely poor error rate
  - → Failure of C77, C78, C80, C84, C90, etc.
  - → Poor adjustment of adjustment VR

Special Remarks on Exchange of Head Amp

VR71, VR72 have been adjusted according to mechanism. Upon exchange of them, readjust so that error rates get minimum. VR73, VR74, VR75, having been present, should not be touched.

Troubleshooting of DAC P.W.B

- No sound
  - Even with Op-AMP output of output buffer, no sound available
    - → Output changeover relay not having been switched.
    - → Audio mute left engaged.
  - Even with emphasis AMP output, no sound available. → Failure of bass/tre. circuit. disconnection of interruption flex.
  - Even with low-pass filter output, no sound available → Failure of emphasis AMP surrounding
  - Even with DAC output, no sound available. → Failure of low-pass filter.
  - No DAC output. → Failure of DAC. Data and clock not having been input.

Upon confirming failure of each IC, confirm, first, that normal voltage is supplied to each terminal.

- Abnormal noise
  - Abnormality of data input in DAC → Poor error rate. Tape damaged. Incorrect sampling frequency.
  - Waveform normal up to emphasis AMP output, but, then, with noise → Abnormality in bass/ tre circuit
  - Waveform normal up to low-pass filter output, but, then, with noise. → Abnormality in emphasis AMP AMP peripheral circuits
  - Even with DAC output, noise observed. → Failure of output buffer and its surrounding

As a cause of noise, waveform clip is considered. Check if proper voltage is impressed to each IC.

- Sound getting heavy
  - With emphasis OFF tape, emphasis remaining in operation
    - → Abnormal emphasis circuit

Troubleshooting of Reel BLK

1. Ejected while in PLAY

- Abnormal plunger voltage (CN504 pin 2 SOL–) → Attraction drive sec. (Q507 surrounding)/ retaining drive sec. (Q508 surrounding)/ mech. cont. P.W.B/ reel motor plunger
- Take-up reel and supply reel rotating on PLAY time → FG waveform shaping sec. of take-up side (IC501 surroundings)/mech. cont. P.W.B/reel motor
- Abnormal reel motor voltage on PLAY time (CN504 pin 3 VT, pin 7 VS) →
  - Take-up side: Reference voltage sec. (VR502 surroundings) Multi-plexer sec. (IC504 surroundings) Drive amp. sec. (IC506 surroundings)
  - Supply side: Voltage limit sec. (D503 surroundings) Multi-plexer sec. (IC505 surroundings) Drive amp. sec. (IC506 surroundings)
  - Mech. cont. P.W.B
  - Reel motor
- With normal plunger voltage, and reel motor voltage, both reels not rotating on PLAY. → Capstan BLK reel motor

2. Ejected with tape protruded

- Ejected during PLAY → Refer to item 1. reel motor
- Abnormal reel motor voltage of supply side on tape un-loading. (CN504 pin 7 VS) →
  - Supply side: Reference voltage sec. (R535, R537 surroundings) Multi-plexer sec. (IC505 surroundings) Drive amp. sec. (IC506 surroundings)
  - Mech. cont. P.W.B
  - Reel motor
- Normal reel motor voltage → Reel motor cassette

3. Abnormal tape speed on high speed searching

- Abnormal FG waveform (IC501 pin 6 COT/IC502 pin 6 COS) → FG waveform shaping sec. (IC501, IC502 surroundings) Reel motor
- Abnormal reel motor voltage (CN504 pin 3 VT, pin 7 VS) →
  - Take-up side: F/V conversion sec. (IC501 surrounding) Multi-plexer sec. (IC504 surrounding) Drive amp. sec. (IC506 surrounding)
  - Supply side: F/V conversion sec. (IC502 surrounding) Multi-plexer sec. (IC505 surrounding) Drive amp. sec. (IC506 surrounding)
  - Composite amp. sec. (IC503 surrounding)
  - Mech. cont. P.W.B
  - Reel motor

4. Sound cut off on PLAY time

- Abnormal reel motor torque →
  - Take-up side: Reference voltage sec. (VR502 surrounding) Multi-plexer sec. (IC504 surrounding) Drive amp. sec. (IC506 surrounding)
  - Supply side: Voltage limit sec. (D503 surrounding) Multi-plexer sec. (IC505 surrounding) Drive amp. sec. (IC506 surrounding)
  - Mech. cont. P.W.B
  - Reel motor

5. Poor reproduction on MANUAL REW. time

- Abnormal reel motor torque →
  - Take-up side: Reference voltage sec. (VR503 surrounding) Multi-plexer sec. (IC504 surrounding) Drive amp. sec. (IC506 surrounding)
  - Supply side: Reference voltage sec. (VR504 surrounding) Multi-plexer sec. (IC505 surrounding) Drive amp. sec. (IC506 surrounding)
  - Mech. cont. P.W.B
  - Reel motor

6. Nearest music dropped on high search time

- Rapid rising of tape speed → Slow start control sec. (Q502 surrounding) Composite amp. sec. (IC503 surrounding) Mech. cont. P.W.B

7. Noise observed on tape loading (unloading)

- Abnormal reel motor voltage on tape loading (unloading) (CN504 pin 3 VT, pin 7 VS) →
  - Take-up side: Reference voltage sec. (R525, R528, R530, VR503 surrounding) Multi-plexer sec. (IC504 surrounding) Drive amp. sec. (IC506 surrounding)
  - Supply side: Reference voltage sec. (R532, R535, R537, VR504 surrounding) Multi-plexer sec. (IC505 surrounding) Drive amp. sec. (IC506 surrounding)
  - Mech. cont. P.W.B
  - Reel motor

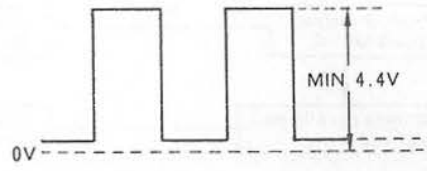
8. Tape position shifted on tape loading (unloading)

- Noise observed → Refer to item 7.
- Take-up side reel smoothly rotating on tape loading (unloading) → TL relating sec. (Q501 surrounding/ mech. cont. P.W.B/ reel motor

■ TROUBLESHOOTING OF HIC (051-1057-70) END SENSOR

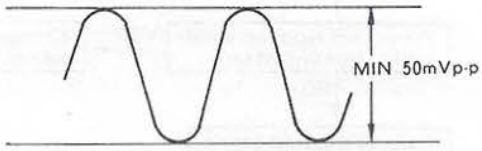
Upon occurrence of any trouble in the START/END sensor, HIC is going to be changed as a whole. Prior to exchange, check for the cause of the trouble. The following is the list of check items.

1. **LED oscillation frequency and amplitude**
   Examine output waveforms of HIC pin 8, LED. If normal, they should be as in Fig. 1. Signal frequency is 2kHz±0.4kHz and the minimum value of amplitude is 4.4V.



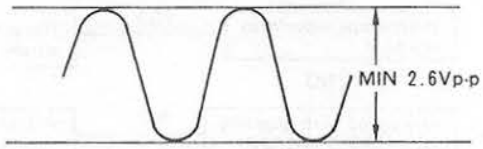
[Fig. 1]

2. **BPF gain**
   Observe first the output waveforms HIC pin 2 START side PTR collector-emitter (pin 3 for END side). If normal, they should be as in Fig. 2.



[Fig. 2]

Signal frequency is 2kHz±0.4kHz and the minimum value of amplitude is 50mVp-p.
Clipping of waveform, if it happens, is negligible.
Observe, next, the output waveforms of START side BPF output of pin 4 of HIC (pin 5 for END side). If normal, they should be as in Fig. 3.

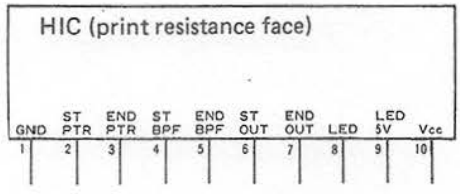


[Fig. 3]

Signal frequency is 2kHz±0.4kHz and the minimum amplitude is 2.6Vp-p.
Clipping of waveform, if it happens, is negligible.
BPF gain is calculated as follows.

20 log (output voltage/input voltage) [dB]

If normal, a value gets 37±2dB. (Except when BPF output is clipped.)

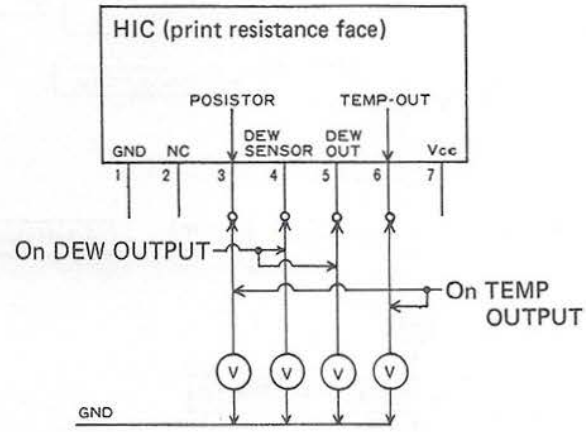


[Fig. 4] HIC pin names

■ TROUBLESHOOTING OF HIC (051-1057-70) DEW SENSOR

Since circuits for the temperature sensor and the DEW sensor having been made in HIC, upon occurrence of any trouble, they are replaced as a whole HIC. The following is the list of check items for possible troubles.

1. **DEW OUTPUT**
   Examine pin 5 of HIC, pin 4 when output of DEW OUT changes from low to high and input voltage of the DEW SENSOR. If normal, the value indicates 0.33-0.40[V].



[Fig. 5] HIC pin names

Observe, then, input voltage of the DEW SENSOR when output of DEW OUT changes from high to low. If normal, a value indicates between 0.11 and 0.19[V].

	MIN	TYP	MAX
DEW OUT Low → High	0.336[V]	0.365[V]	0.404[V]
High → Low	0.115[V]	0.170[V]	0.186[V]

[Table 1] DEW SENSOR input voltage upon switching of DEW-OUT output

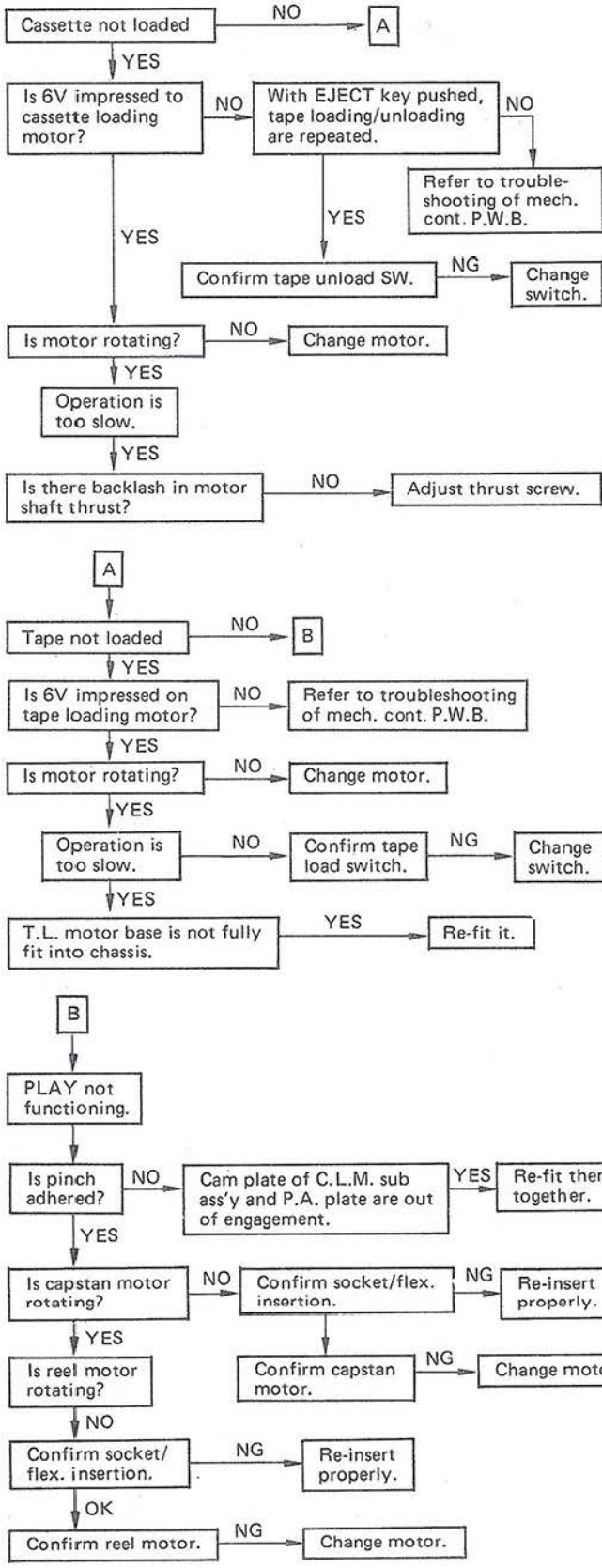
2. **TEMP OUTPUT**
   Observe pin 3 and the POSISTOR for input voltage when HIC pin 6, TEMP OUT output changes from low to high. If normal, a value indicates 1.32-1.49[V]. Observe, then, input voltage of the POSISTOR when TEMP OUT output changes from high to low. If normal, a value indicates 1.07-1.25[V].

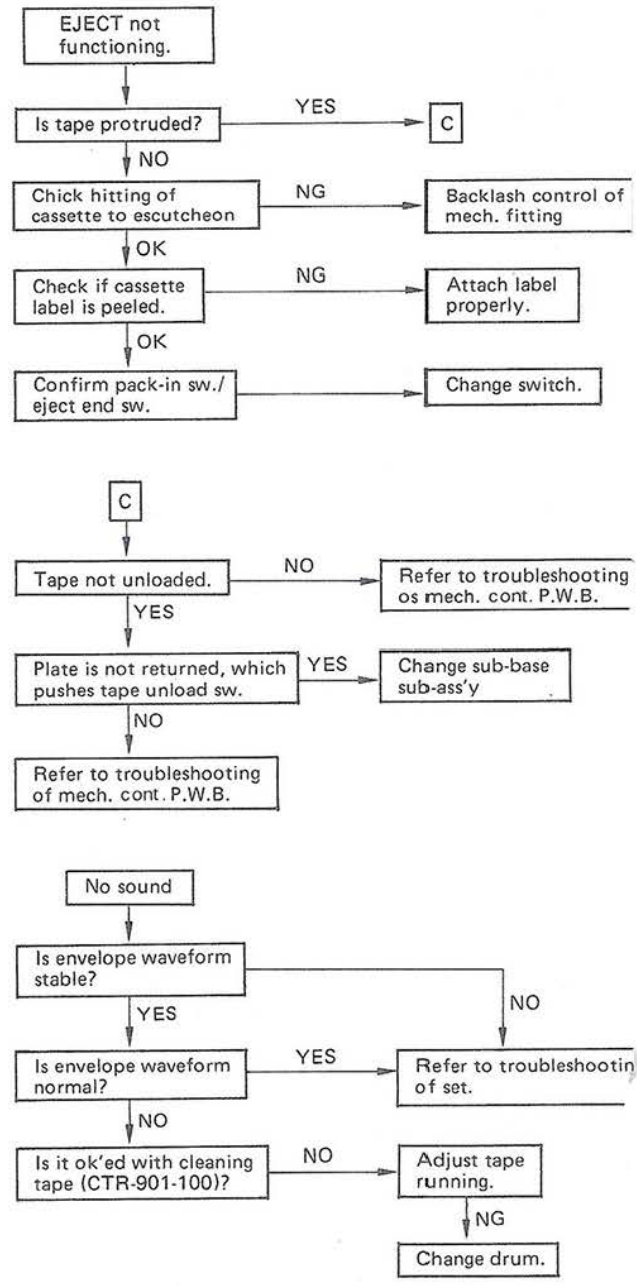
	MIN	TYP	MAX
TEMP OUT Low → High	1.32[V]	1.38[V]	1.49[V]
High → Low	1.07[V]	1.15[V]	1.25[V]

[Table 2] POSISTOR input voltage upon switching of TEMP-OUT output

■TROUBLE SHOOTING:

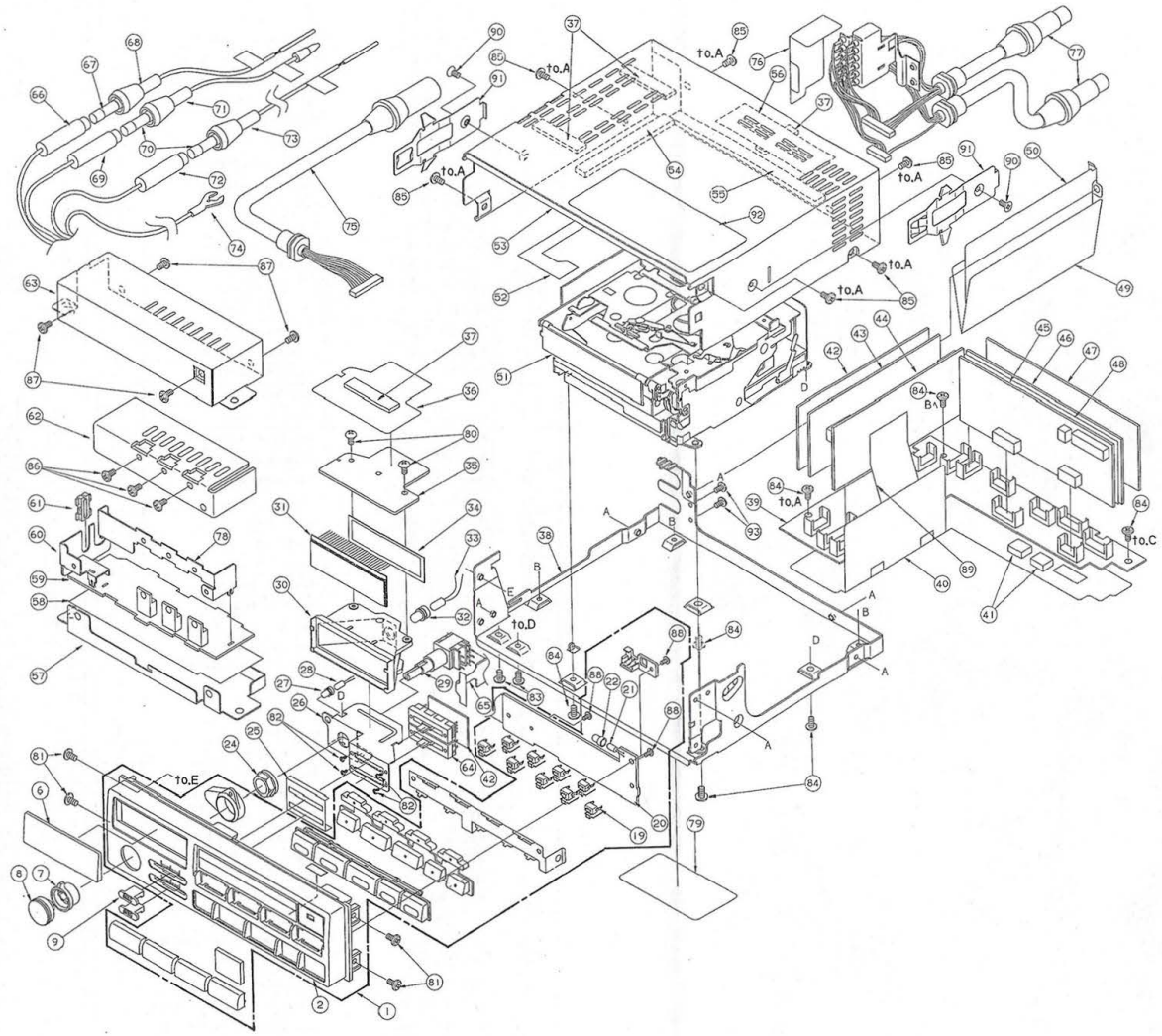
◎MECHANISM





EXPLODED VIEW • PARTS LIST:

◎Main section



REF.NO.	PART NO.	DESCRIPTION	Q'TY
1	940-0970A	Escutcheon ass'y	1
6	373-0535-00	Dial cover	1
7	380-5013-00	Knob (BAL)	1
8	380-5012-00	Knob (VOL)	1
9	380-5017-00	Knob (BASS/TRE)	2
18	001-0482-03	Diode	9
19	013-3741-02	Switch	9
20	099-8421-00	P.W.B	1
21	017-0373-00	Pilot lam	1

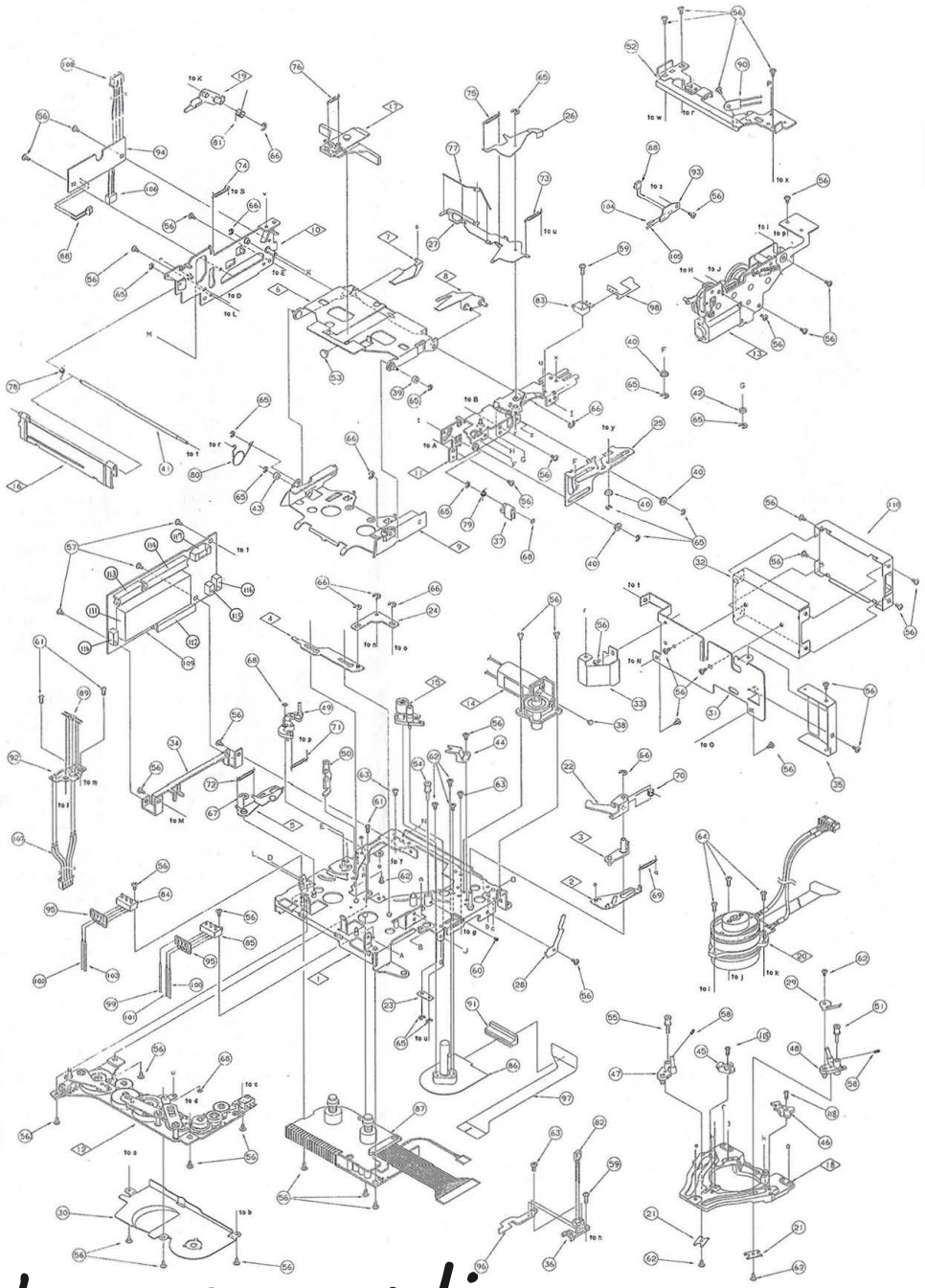
REF.NO.	PART NO.	DESCRIPTION	Q'TY
22	345-4441-01	P.L. cap	1
24	722-0417-00	Nut	1
25	353-0312-00	Shade	1
26	330-9004-00	VR holder	1
27	345-4157-26	Lamp holder	1
28	017-0338-00	Pilot lamp	1
29	012-4760-01	Variable resistor	1
30	335-2551-01	LCD holder	1
31	379-0216-00	Indicator	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
32	345-3436-38	Lamp holder	1
33	017-0346-04	Pilot lamp	1
34	371-3536-00	Trim plate	1
35	099-8384-00	P.W.B	1
36	347-2724-00	Insulator	1
37	345-4816-00	Cushion	4
38	311-1300-02	Lower case	1
39	099-8386-01	MOTHER-P.W.B	1
40	347-2722-00	Insulator	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
41	345-4815-00	Cushion	2
42	099-8381-00	DAC-P.W.B	1
43	099-8378-01	ECC-P.W.B	1
44	099-8379-01	SYS-CONT-P.W.B	1
45	099-8376-00	REEL-P.W.B	1
46	099-8377-01	DRUM-P.W.B	1
47	099-8375-00	CAP-P.W.B	1
48	347-2727-00	Insulator	1
49	347-2725-00	Insulator	1
50	330-8865-00	Shield case	1
51	929-2000-01	DAT mechanism	1
52	099-8380-00	P.W.B	1
53	310-1342-03	Upper case	1
54	345-4818-00	Cushion	1
55	345-4817-00	Cushion	1
56	347-2726-00	Insulator	1
57	311-1300-03	Lower case	1
58	347-2723-00	Insulator	1
59	099-8382-00	P.W.B	1
60	944-0751-00	Filter ass'y	1
61	335-0580-00	Lead holder	1
62	313-1336-00	Heat sink	1
63	310-1343-00	Upper case	1
64	012-4505-00	Variable resistor	2
65	099-8383-00	P.W.B	1
66	850-2489-00	A-lead (MAIN)	1
67	120-0030-00	Fuse (3A) (MAIN)	1
68	850-2488-00	A-lead (MAIN)	1
69	850-2057-00	A-lead (ILLUMI)	1
70	120-0010-00	Fuse (1A) (ACC-ILL)	2
71	850-2479-01	A-lead (ILLUMI)	1
72	850-2487-00	A-lead (ACC)	1
73	850-2486-00	A-lead (ACC)	1
74	840-0468-00	Bonding wire (EARTH)	1
75	854-0613-00	Extension lead	1
76	347-2782-00	Insulator	1
77	854-0765-00	Extension lead (8P/12P)	1
78	330-8861-00	IC holder	1
79	286-7106-00	Set plate	1
80	702-2606-81	Tap screw (2.6x6)	2
81	714-3006-81	Machine screw (M3x6)	4
82	738-2030-17	Screw	4
83	714-3003-81	Machine screw (M3x3)	2
84	714-3005-81	Machine screw (M3x5)	7
85	714-3004-81	Machine screw (M3x4)	6
86	714-3006-81	Machine screw (M3x6)	3
87	714-3006-89	Machine screw (M3x6)	4
88	702-2006-81	Tap screw (2x6)	3
89	099-8387-00	P.W.B	1
90	714-3006-41	Machine screw (M3x6)	2
91	750-2486-00	Spring	2
92	285-0915-00	Guide label	1
93	714-2604-81	Machine screw (M2.6x4)	2

■EXPLODED VIEW:

◎Tape mechanism section



■PARTS LIST:

◎Tape mechanism section

REF.NO.	PART NO.	DESCRIPTION	Q'TY
1	966-0001-04	Chassis ass'y	1
2	966-0002-01	Pinch action plate ass'y	1
3	966-0003-01	Pinch action link A ass'y	1
4	966-0004-01	Tension power plate ass'y	1
5	966-0005-02	Tension plate ass'y	1
6	966-0006-01	Guide arm ass'y	1
7	966-0007-02	Spring plate L ass'y	1
8	966-0008-02	Spring plate R ass'y	1
9	966-0011-03	Cassette holder ass'y	1
10	966-0012-03	Side plate L ass'y	1
11	966-0013-02	Side plate R ass'y	1
12	966-0015-06	Sub-base sub ass'y	1
12-1	013-3808-01	Switch	2
12-2	099-8053-00	P.W.B (Loading)	1
12-3	099-8054-01	P.W.B (Unloading)	1
13	966-0016-05	Cassette loading motor sub ass'y	1
13-1	SMA-117-100	Cassette loading motor	1
14	966-0017-04	Tape loading motor sub ass'y	1
14-1	SMA-116-100	Tape loading motor	1
15	966-0018-05	Pinch sub ass'y	1
16	966-0053-00	Dust cover ass'y	1
17	966-0044-03	Cassette guide ass'y	1
18	966-0050-00	Drum base ass'y	1
19	966-0052-00	Lid link L ass'y	1
20	967-0002-01	Drum ass'y	1
20-1	854-0251-00	Head lead	1
21	620-0004-00	Slide plate	2
22	620-0005-00	Pinch action link B	1
23	620-0006-00	Pinch loading plate	1
24	620-0007-00	Tension power link	1
25	620-0008-01	Cassette loading plate	1
26	620-0009-02	Cassette loading switch link A	1
27	620-0023-01	Cassette loading link A	1
28	620-0048-01	Thrust plate	1
29	620-0049-01	Block plate	1
30	620-0058-01	Motor cover	1
31	620-0061-01	Head amp bracket	1
32	620-0063-00	Lower shield	1
33	620-0064-01	Shield plate B	1
34	620-0065-01	Mechanism control bracket	1
35	620-0066-00	Shield plate A	1
36	621-0003-02	Sensor stand	1
37	621-0040-01	Dust cover link	1
38	621-0034-01	Thrust holder	1
39	622-0008-01	Cassette loading roller A	1
40	622-0009-01	Cassette loading roller B	4
41	622-0010-02	Dust cover shaft	1
42	622-0106-00	Cassette loading roller C	1
43	622-0107-00	Cassette loading roller D	1
44	623-0002-04	Pinch block stopper	1
45	623-0019-01	Stopper L-B	1
46	623-0020-01	Stopper R-B	1
47	627-0021-00	Loading block L	1
48	627-0022-00	Loading block R	1
49	627-0023-01	Tension arm	1
50	627-0024-02	Guide post block	1
51	629-0005-03	Guide roller	1
52	629-0006-03	Earth	1
53	629-0012-00	Cap	1
54	629-0013-01	Guide plate ass'y A	1
55	629-0015-01	Guide roller	1
56	714-2003-81	Machine screw (M2x3)	44
57	714-2604-81	Machine screw (M2.6x4)	3
58	716-0741-00	Screw	2
59	716-0791-00	Screw	2
60	738-1420-17	Precision screw	1
61	738-2030-17	Precision screw	5
62	739-1730-17	Precision screw	7
63	739-2040-17	Precision screw	3
64	739-2050-17	Precision screw	3
65	743-1200-10	E-ring (M1.2)	13
66	743-1500-10	E-ring (M1.5)	8
67	743-2000-10	E-ring (M2.0)	1
68	746-0724-00	Washer	3
69	750-2597-01	Pinch return spring	1
70	750-2598-01	Pinch action spring	1
71	750-2599-02	Tension spring	1
72	750-2600-02	Tension plate spring	1
73	750-2601-02	Cassette loading link spring	1
74	750-2602-02	Spring plate spring	1
75	750-2603-01	Cassette switch loading spring	1
76	750-2604-02	Grip arm spring	1
77	750-2605-01	Cassette loading spring	1
78	750-2606-02	Dust cover spring	1
79	750-2607-01	Dust cover link spring	1
80	750-2656-01	Guide arm spring	1
81	750-2683-00	Indicator spring	1
82	001-0475-00	Diode (GL450)	1
83	013-3808-01	Switch	1
84	013-3832-00	Switch	1
85	013-3832-01	Switch	1
86	020-2002-03	DC motor	1
87	020-2003-00	DC motor	1
88	060-0138-00	Photo transistor (PT430FI)	2
89	060-0141-00	Whole element	1
90	060-0158-00	Dew sensor	1
91	074-0856-15	Outlet socket	1
92	099-8048-02	P.W.B	1
93	099-8049-01	P.W.B	1
94	099-8050-02	P.W.B	1
95	099-8052-00	P.W.B	2
96	099-8262-00	P.W.B	1
97	099-8476-00	P.W.B	1
98	099-8477-00	P.W.B	1
99	801-4908-60	Vinyl coating wire (Brown)	1
100	802-4921-60	Vinyl coating wire (Red)	1
101	803-4908-60	Vinyl coating wire (Orange)	1
102	803-4914-60	Vinyl coating wire (Orange)	1
103	804-4914-60	Vinyl coating wire (Yellow)	1
104	805-4907-60	Vinyl coating wire (Green)	1
105	806-4907-60	Vinyl coating wire (Blue)	1
106	852-9839-01	Extension lead	1
107	852-9840-01	Extension lead	1
108	854-0286-00	Extension lead	1
109	099-8478-00	Control P.W.B	1
110	099-8364-00	Head amp P.W.B	1
111	072-0092-00	Socket (64P)	1
112	074-0847-24	Outlet socket (24P)	1
113	074-0855-14	Outlet socket (14P)	1
114	074-0855-28	Outlet socket (28P)	1
115	076-0312-03	Plug (3P)	1
116	076-0312-04	Plug (4P)	2
117	076-0313-06	Plug (6P)	1
118	738-2050-17	Precision screw	2

■PARTS LIST:

◎Electrical section

◎HEAD AMP P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
L72	010-2174-12	Coil 10μH	1
L71	010-2174-26	Coil 150μH	1
VR73~75	012-4744-50	Variable resistor 47kΩ	3
VR71,72	012-4744-51	Variable resistor 100kΩ	2
C79	042-0397-00	Tantalum chip capacitor 16V1μF	1
C87,91	042-0403-00	Tantalum chip capacitor 6.3V22μF	2
C72,75	043-0228-00	Ceramic chip capacitor 0.15μF B	2
IC71	051-1055-00	IC CXA1045Q-Z	1
R75,76	117-1031-10	Chip resistor 1/16W10kΩ S	2
R72,73	117-1831-10	Chip resistor 1/16W18kΩ S	2
R71,74	117-2231-10	Chip resistor 1/16W22kΩ S	2
R77	117-4721-10	Chip resistor 1/16W4.7kΩ S	1
C83,85,86	176-4711-00	Ceramic chip capacitor 470pF CH TC,S	3
C73,74,84	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	3
C71,76,77,88 89,90,92,93	178-1045-06	Ceramic chip capacitor 0.1μF HD,S	8
C81,82	178-4735-06	Ceramic chip capacitor 0.047μF HD,S	2
C78,80	178-8222-05	Ceramic chip capacitor 8200pF HD,S	2

◎MECHA-CON P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
TH1	002-0206-00	Thermistor 2.2kΩ	1
VR1,2,3	012-4745-04	Variable resistor 10kΩ	3
IC3	051-0350-54	IC NJM2904	1
IC4	051-1057-70	IC HIC	1
IC1	051-1059-01	IC HD637B01Y0PJ-DAT1-M1	1
IC2	051-1060-00	IC TA7288P	1
X1	060-0162-00	Resonator 3.58MHz	1
Q2,3,4	100-1162-00	Transistor 2SA1162	3
	(101-0709-00)	Transistor (2SB709)	3
Q6	100-1428-00	Transistor 2SA1428-O,Y	1
	(101-0911-00)	Transistor (2SB911MPQR)	1
Q5	102-2712-00	Transistor 2SC2712	1
	(103-0601-00)	Transistor (2SD601)	1
Q1	125-0001-01	Transistor UN2111	1
	(125-0002-02)	Transistor (RN2402)	1
R53	111-5611-81	Film resistor 1/2W560Ω	1
R3	114-2291-21	Film resistor 2W2.2Ω OM	1
R46~48,51	117-1001-10	Chip resistor 1/16W10Ω S	4
R34,42,44,49 50	117-1021-10	Chip resistor 1/16W1kΩ S	5
1,10~12 R15~20 23~33	117-1031-10	Chip resistor 1/16W10kΩ S	21
R40,41	117-1041-10	Chip resistor 1/16W100kΩ S	2
R54	117-1211-10	Chip resistor 1/16W120Ω S	1
R8,9	117-1231-10	Chip resistor 1/16W12kΩ S	2
R4,6	117-1531-10	Chip resistor 1/16W15kΩ S	2
R56	117-1811-10	Chip resistor 1/16W180Ω S	1
R37,38	117-2711-10	Chip resistor 1/16W270Ω S	2
R5,7	117-3311-10	Chip resistor 1/16W330Ω S	2
2,13,21,22 R35,36,39,52 55	117-4721-10	Chip resistor 1/16W4.7kΩ S	9
R45	117-4741-10	Chip resistor 1/16W470kΩ S	1
C1,5~10,14	177-4735-06	Ceramic chip capacitor 0.047μF HD	8
C12	179-2273-23	Electrolytic capacitor 10V220μF S	1
C4	183-1063-52	Electrolytic capacitor 35V10μF USS	1
C11,13	183-2263-12	Electrolytic capacitor 6.3V22μF USS	2

◎MECHANISM P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D1	001-0475-00	LED GL450	1
IC6,7	051-0927-00	IC GP2S04B	2
Q7,8	060-0138-00	Photo transistor PT-430FI	2
HE1	060-0141-00	Whole element THS102A	1
DW1	060-0158-00	Dew sensor	1
C2,3	171-4733-06	Ceramic capacitor 0.047μF SC	2

◎ECC P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D101	001-0253-00	Diode FC52M	1
D102~104	001-0356-01	Diode 1SS184	3
L102	010-2095-01	Coil	1
L101	010-2174-28	Coil	1
VR101,103	012-4745-04	Variable resistor 10kΩ	2
VR102	012-4745-07	Variable resistor 47kΩ	1
C103	042-0403-01	Tantalum chip capacitor 16V10μF	1
IC105	051-1062-70	IC HIC	1
IC106	051-1079-00	IC NJM2930L	1
IC103,104	051-1085-67	IC MB8464A-10LL-X	2
IC102	051-1099-00	IC CXD1008Q	1
IC101	051-1100-00	IC CXD1009Q	1
X101	061-1075-00	Crystal 18.816MHz	1
X103	061-1076-00	Crystal-OSC 22.5792MHz	1
X102	061-1077-00	Crystal-OSC 24.576MHz	1
Q101	102-2712-00	Transistor 2SC2712	1
	(103-0601-00)	Transistor (2SD601)	1
R101,104,108 112	117-1031-10	Chip resistor 1/16W10kΩ S	4
R105~107	117-1041-10	Chip resistor 1/16W100kΩ S	3
R102,103,110	117-2231-10	Chip resistor 1/16W22kΩ S	3
R109,111,113	117-4721-10	Chip resistor 1/16W4.7kΩ S	3
C109,110 114~117	175-1007-00	Ceramic chip capacitor 10pF TC	6
C107	175-1011-00	Ceramic chip capacitor 100pF CH TC	1
C106	175-1021-00	Ceramic chip capacitor 1000pF CH TC	1
C119,121,122	176-1012-00	Ceramic chip capacitor 100pF B TC,S	3
C118	177-1045-06	Ceramic chip capacitor 0.1μF HD	1
C105	177-2222-05	Ceramic chip capacitor 2200pF HD	1
C102,108,111 112,113	177-4735-06	Ceramic chip capacitor 0.047μF HD	5
C120,123	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	2
C101	183-1063-32	Electrolytic capacitor 16V10μF USS	1

◎SYS-CON P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D201~203	001-0356-01	Diode 1SS184	3
IC203	051-0267-05	IC TC4066BF	1
IC204	051-0403-01	IC TD6308AP	1
IC202	051-0869-05	IC MB3771PF	1
IC201	051-1102-00	IC HD637B01Y0PJ-PA5500S	1
X201	060-0171-51	Ceramic resonator	1
	(060-0171-01)	Ceramic resonator	1
Q201	102-2532-00	Transistor 2SC2532	1
Q202~204	102-2712-00	Transistor 2SC2712	3
	(103-0601-00)	Transistor (2SD601)	3
Q205,206	125-2004-03	Transistor RN1403	2
	(125-2005-02)	Transistor (UN2212)	2
R201,202	116-1011-10	Chip resistor 1/8W100Ω	2
R234	117-1011-10	Chip resistor 1/16W100Ω S	1
R207,227,229 230,233	117-1031-10	Chip resistor 1/16W10kΩ S	5
R218,240	117-1041-10	Chip resistor 1/16W100kΩ S	2
R239	117-1541-10	Chip resistor 1/16W150kΩ S	1
R208~217 219~226 228,232,237 238	117-2231-10	Chip resistor 1/16W22kΩ S	22
R236	117-2731-10	Chip resistor 1/16W27kΩ S	1
R235	117-4731-10	Chip resistor 1/16W47kΩ S	1
R241	117-5621-10	Chip resistor 1/16W5.6kΩ S	1
R203~206 231	117-5631-10	Chip resistor 1/16W56kΩ S	5
C202,205	177-1022-05	Ceramic chip capacitor 0.001μF HD	2
C207	177-1032-05	Ceramic chip capacitor 0.01μF HD	1
C201	177-1045-06	Ceramic chip capacitor 0.1μF HD	1
C203	177-4732-05	Ceramic chip capacitor 0.047μF HD	1
C204,206	183-1063-32	Electrolytic capacitor 16V10μF USS	2

◎DRUM P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D301,302	001-0356-01	Diode 1SS184	2
D303	001-0503-02	Diode HZS2CLL	1
VR301	012-4745-08	Variable resistor 100kΩ VR	1
C301,305	042-0397-00	Tantalum chip capacitor 16V1μF	2
C323	042-0397-01	Tantalum chip capacitor 35V0.22μF	1
C325	042-0397-02	Tantalum chip capacitor 35V0.33μF	1
C313	042-0397-05	Tantalum chip capacitor 4V3.3μF	1
C310,321	042-0398-02	Tantalum chip capacitor 4V10μF	2
C319	042-0403-01	Tantalum chip capacitor 16V10μF	1
302~304 C306,311,317 318	043-0229-03	Ceramic chip capacitor 0.1μF B	7
IC309	051-0172-05	IC TC4011BF	1
	(051-0172-65)	IC (HD14011BFP)	1
IC308	051-0175-05	IC TC4069UBF	1
	(051-0175-65)	IC (HD14069UBFP)	1
IC306	051-0350-54	IC NJM2904M	1
IC303	051-0599-51	IC NJM2903M	1
IC304	051-0616-65	IC HD14538BFP	1
	(051-0616-05)	IC (TC4538BF)	1
IC302,307	051-1078-00	IC NJM3403AM	2
IC305	051-1101-00	IC CXD1052Q	1
IC301	051-1104-00	IC CX20174	1
Q302	100-1162-50	Transistor 2SA1162	1
Q301	101-1205-65	Transistor 2SB1205	1
Q306~308	125-2004-03	Transistor RN1403	3
	(125-2005-02)	Transistor (UN2212)	3
Q303,304	125-2004-04	Transistor RN1404	2
	(125-2005-03)	Transistor (UN2213)	2
Q305	125-2014-00	Transistor FMW2	1
R305~307 323	117-1001-10	Chip resistor 1/16W10Ω S	4
R341	117-1011-10	Chip resistor 1/16W100Ω S	1
R319,321,324 326	117-1021-10	Chip resistor 1/16W1kΩ S	4
317,325 R348~350 354	117-1031-10	Chip resistor 1/16W10kΩ S	7
R301	117-1211-10	Chip resistor 1/16W120Ω S	1
R308	117-1221-10	Chip resistor 1/16W1.2kΩ S	1
R313	117-1231-10	Chip resistor 1/16W12kΩ S	1
R343,346,352 353	117-1531-10	Chip resistor 1/16W15kΩ S	4
R303,304	117-2211-10	Chip resistor 1/16W220Ω S	2
R310	117-2221-10	Chip resistor 1/16W2.2kΩ S	1
R358	117-2231-10	Chip resistor 1/16W22kΩ S	1
R302	117-2711-10	Chip resistor 1/16W270Ω S	1
R330	117-2721-10	Chip resistor 1/16W2.7kΩ S	1
R318	117-2731-10	Chip resistor 1/16W27kΩ S	1
R351	117-3321-10	Chip resistor 1/16W3.3kΩ S	1
R331,355,357	117-3331-10	Chip resistor 1/16W33kΩ S	3
R344	117-3341-10	Chip resistor 1/16W330kΩ S	1
R316	117-3921-10	Chip resistor 1/16W3.9kΩ S	1
R314	117-4711-10	Chip resistor 1/16W470Ω S	1
R312,322,329 337,345	117-4721-10	Chip resistor 1/16W4.7kΩ S	5
R311,315,332	117-4731-10	Chip resistor 1/16W47kΩ S	3
R334,335,347	117-5621-10	Chip resistor 1/16W5.6kΩ S	3

REF.NO.	PART NO.	DESCRIPTION	Q'TY
R359	117-5631-10	Chip resistor 1/16W56kΩ S	1
R342	117-6811-10	Chip resistor 1/16W680Ω S	1
R320	117-6821-10	Chip resistor 1/16W6.8kΩ S	1
R309,328,356 360	117-6831-10	Chip resistor 1/16W68kΩ S	4
R333	117-6841-10	Chip resistor 1/16W680kΩ S	1
C316	173-1042-10	Polyester capacitor 0.1μF S	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
C312	177-2222-05	Ceramic chip capacitor 2200pF HD	1
C324	177-3932-05	Ceramic chip capacitor 0.039μF HD	1
C320,322	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	2
C314	182-1066-22	Electrolytic capacitor 10V10μF SS	1
C307	182-1073-22	Electrolytic capacitor 10V100μF SS	1
C308,309,315	183-1073-12	Electrolytic capacitor 6.3V100μF USS	3

◎DAC P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D407~409	001-0356-01	Diode 1SS184	3
	(001-0354-01)	Diode (MA151WA)	3
D401~403	001-0367-01	Diode 1SS226	3
	(001-0413-01)	Diode (MA153)	3
D405	001-0377-33	Diode MA4056H	1
	(001-0376-33)	Diode (MTZ5.6JC)	1
	(001-0400-33)	Diode (HZS5.6JB3)	1
D406	001-0423-23	Diode MA4082	1
	(001-0421-23)	Diode (MTZ8.2J)	1
	(001-0425-23)	Diode (HZS8.2J)	1
D404,410,411	001-0466-00	Diode S5688B	3
	(001-0499-00)	Diode (ERA15-01)	3
L401	010-1970-00	Coil 3.6mH	1
L402	010-2046-24	Coil 220μH	1
RY401	014-0510-03	Relay	1
C425,426	042-0403-01	Tantalum capacitor 16V10μF	2
405,406,417 C418,429,430 432,433	042-0405-00	Electrolytic capacitor 16V10μF	8
IC406	051-0352-00	IC TA78L005AP	1
	(051-0259-00)	IC (μPC78L05)	1
	(051-0456-00)	IC (NJM78L05A)	1
IC403	051-1023-00	IC TA7415P	1
IC402,404	051-1080-00	IC NJM4560M	2
IC405	051-1081-00	IC NJM082BM	1
IC401	051-1098-05	IC LC7880M	1
LPF401,402	060-0170-00	LC filter	2
Q412	101-0709-00	Transistor 2SB709A-Q,R,S	1
	(100-1162-00)	Transistor (2SA1162-O,Y,G)	1
Q414	102-2712-00	Transistor 2SC2712-O,Y,GL	1
	(103-0601-00)	Transistor (2SD601A-Q,R,S)	1
Q404	102-3420-00	Transistor 2SC3420-Y,GR,BL	1
	(103-1683-00)	Transistor (2SD1683R,S,T,U)	1
Q403,415	103-1225-00	Transistor 2SD1225M,P,Q,R	2
	(103-0973-00)	Transistor (2SD973A-Q,R,S)	2
Q401,402	103-1306-00	Transistor 2SD1306	2
	(102-3326-00)	Transistor (2SC3326A-B)	2

REF.NO.	PART NO.	DESCRIPTION	Q'TY
Q405	125-0002-01	Transistor RN2401	1
Q408~410	125-0002-03	Transistor RN2403	3
	(125-0001-02)	Transistor (UN2112)	3
Q406,407,411 413	125-2004-03	Transistor RN1403	4
	(125-2005-02)	Transistor (UN2212)	4
R442,444	116-1001-10	Chip resistor 1/8W10Ω	2
R441	116-1011-10	Chip resistor 1/8W100Ω	1
R453,454	116-1021-10	Chip resistor 1/8W1kΩ	2
R401,402,407 408,443 447~452 458	116-1031-10	Chip resistor 1/8W10kΩ	12
R405,406	116-1531-10	Chip resistor 1/8W15kΩ	2
R411,412	116-1831-10	Chip resistor 1/8W18kΩ	2
R433,434	116-2211-10	Chip resistor 1/8W220Ω	2
R429,430,455 456	116-2231-10	Chip resistor 1/8W22kΩ	4
R413,414	116-3321-10	Chip resistor 1/8W3.3kΩ	2
R437,438,446	116-4721-10	Chip resistor 1/8W4.7kΩ	3
R435,436,439 440,457	116-4731-10	Chip resistor 1/8W47kΩ	5
R403,404,431 432	116-5621-10	Chip resistor 1/8W5.6kΩ	4
R445	116-6811-10	Chip resistor 1/8W680Ω	1
R409,410	116-8221-10	Chip resistor 1/8W8.2kΩ	2
R419,420	117-1531-10	Chip resistor 1/16W15kΩ S	2
R415~418 423~426	117-2231-10	Chip resistor 1/16W22kΩ S	8
R421,422	117-4721-10	Chip resistor 1/16W4.7kΩ S	2
C403,404	175-3096-00	Ceramic chip capacitor 3pF TC	2
C409,435,438 441	177-1045-06	Ceramic chip capacitor 0.1μF HD	4
C415,416	177-1822-05	Ceramic chip capacitor 1800pF HD	2
C411~414	177-6812-05	Ceramic chip capacitor 680pF HD	4
C419,420,423 424	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	4
C421,422	178-2222-05	Ceramic chip capacitor 0.0022μF HD,S	2
C437	179-4773-33	Electrolytic capacitor 16V470μF S	1
C407,408	182-2273-02	Electrolytic capacitor 4V220μF SS	2
401,402,410 C433,434,436 439,440,442 445	183-1063-32	Electrolytic capacitor 16V10μF USS	10
C444	183-2263-32	Electrolytic capacitor 16V22μF USS	1
C431	183-4763-32	Electrolytic capacitor 16V47μF USS	1

◎REEL P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D503	001-0367-01	Diode 1SS226	1
D504	001-0466-00	Diode S5688B	1
D501,502	001-0503-06	Diode HZS4ALL	2
VR501	012-4745-00	Variable resistor 1kΩ	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
VR502~504	012-4745-05	Variable resistor 22kΩ	3
508,514,516 C517,518,520 522,523	042-0403-01	Tantalum chip capacitor 16V10μF	8
C504,510	043-0239-00	Ceramic chip capacitor 0.01μF COG	2

REF.NO.	PART NO.	DESCRIPTION	Q'TY
IC503,506	051-0350-54	IC NJM2904M	2
IC504,505	051-0625-05	IC TC4051BF	2
IC501,502	051-1073-00	IC BA6302AF	2
Q504,506	100-1307-00	Transistor 2SA1307O,Y	2
Q503,505	102-2712-00	Transistor 2SC2712	2
	(103-0601-00)	Transistor (2SD601)	2
Q507,508	102-2873-00	Transistor 2SC2873	2
Q501,502	125-2005-02	Transistor UN2212	2
	(125-2004-03)	Transistor (RN1403)	2
R554	114-1891-11	Film resistor 1W1.8Ω OM	1
R557	114-2001-31	Film resistor 3W20Ω OM	1
R539	116-1011-10	Chip resistor 1/8W100Ω	1
R553	116-1811-10	Chip resistor 1/8W180Ω	1
R556	116-4711-10	Chip resistor 1/8W470Ω	1
R546,550	117-1011-10	Chip resistor 1/16W100Ω S	2
R540	117-1021-10	Chip resistor 1/16W1kΩ S	1
501,502,508 514,535 R541~545 547~549 551,552,555	117-1031-10	Chip resistor 1/16W10kΩ S	16

REF.NO.	PART NO.	DESCRIPTION	Q'TY
R522	117-1821-10	Chip resistor 1/16W1.8kΩ S	1
506,507,512 513,519,524 R525 527~530 536,537	117-2231-10	Chip resistor 1/16W22kΩ S	13
R538	117-2711-10	Chip resistor 1/16W270Ω S	1
R523,526,533	117-2731-10	Chip resistor 1/16W27kΩ S	3
R504,510,531	117-3331-10	Chip resistor 1/16W33kΩ S	3
R503,509,517	117-3341-10	Chip resistor 1/16W330kΩ S	3
R532	117-3921-10	Chip resistor 1/16W3.9kΩ S	1
R534	117-3931-10	Chip resistor 1/16W39kΩ S	1
R521	117-4711-10	Chip resistor 1/16W470Ω S	1
R518,520	117-4731-10	Chip resistor 1/16W47kΩ S	2
R515,516	117-6831-10	Chip resistor 1/16W68kΩ S	2
R505,511	117-8221-10	Chip resistor 1/16W8.2kΩ S	2
C503,505,509 511	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	4
C501,507,513 515,519,521	178-2232-05	Ceramic chip capacitor 0.022μF HD,S	6
C506,512	178-6822-05	Ceramic chip capacitor 0.0068μF HD,S	2

◎CAPSTAN P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
D601	001-0367-01	Diode 1SS226	1
	(001-0413-01)	Diode (MA153)	1
D603	001-0466-00	Diode S5688B	1
D602	001-0501-00	Diode D1NS04	1
L601	010-2096-01	Coil 220μH	1
L602	010-2165-02	Coil 560μH	1
VR601~603 605	012-4745-05	Variable resistor 22kΩ	4
VR604	012-4745-08	Variable resistor 100kΩ	1
C606,618,619	042-0397-00	Tantalum chip capacitor 16V1μF	3
C634,635	042-0397-03	Tantalum chip capacitor 20V0.47μF	2
C624	042-0397-04	Tantalum chip capacitor 6.3V2.2μF	1
C639~641	042-0398-01	Tantalum chip capacitor 10V4.7μF	3
C605,613,629 636	042-0403-01	Tantalum chip capacitor 16V10μF	4
C602,621	042-0406-00	Tantalum chip capacitor 6.3V33μF	2
C601,603,620 626,633	043-0229-03	Ceramic chip capacitor 0.1μF	5
C631	043-0240-00	Ceramic chip capacitor 4700pF COG	1
IC604	051-0267-05	IC TC4066	1
IC602	051-0862-05	IC TC74HC161	1
IC605	051-1073-00	IC BA6302AF	1
IC603	051-1075-00	IC CX20115	1
IC608	051-1076-00	IC CXA1046M	1
IC606,607	051-1077-00	IC NJM062M	2
IC601	051-1103-00	IC CX20036	1
Q610	100-1243-00	Transistor 2SA1243	1
Q601~603	102-2712-00	Transistor 2SC2712	3
	(103-0601-00)	Transistor (2SD601)	3
Q604,605	108-0536-00	FET 2SK536	2
Q609	125-2005-01	Transistor UN2211	1
	(125-2004-02)	Transistor (RN1402)	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
Q606~608	125-2005-03	Transistor UN2213	3
R646	111-1091-91	Film resistor 1Ω	1
R642~644	117-1001-10	Chip resistor 1/16W10Ω S	3
R603,604,608 631,645	117-1021-10	Chip resistor 1/16W1kΩ S	5
R602,614,621 624,638	117-1031-10	Chip resistor 1/16W10kΩ S	5
R601,647	117-1531-10	Chip resistor 1/16W15kΩ S	2
R610,615	117-1831-10	Chip resistor 1/16W18kΩ S	2
R607,639,641	117-2221-10	Chip resistor 1/16W2.2kΩ S	3
R625	117-2231-10	Chip resistor 1/16W22kΩ S	1
R616	117-2241-10	Chip resistor 1/16W220kΩ S	1
R634	117-2721-10	Chip resistor 1/16W2.7kΩ S	1
R635	117-2741-10	Chip resistor 1/16W270kΩ S	1
R605,606	117-3321-10	Chip resistor 1/16W3.3kΩ S	2
609 R617~619 626,630,632 633,636,637	117-3331-10	Chip resistor 1/16W33kΩ	10
R622,623,628	117-4721-10	Chip resistor 1/16W4.7kΩ S	3
R611,620,627	117-4731-10	Chip resistor 1/16W47kΩ S	3
R629	117-4741-10	Chip resistor 1/16W470kΩ S	1
R640	117-5611-10	Chip resistor 1/16W560Ω S	1
R612,613	117-6831-10	Chip resistor 1/16W68kΩ S	2
C604,607,612 628	178-1022-05	Ceramic chip capacitor 1000pF HD,S	4
C608~610 614,615	178-1032-05	Ceramic chip capacitor 0.01μF HD,S	5
C616,617,622 627,630	178-2232-05	Ceramic chip capacitor 0.022μF HD,S	5
C611,632	178-4722-05	Ceramic chip capacitor 4700pF HD,S	2
C638	178-5612-05	Ceramic chip capacitor 560pF HD,S	1
C625	178-6822-05	Ceramic chip capacitor 6800pF HD,S	1
C623	181-4763-22	Electrolytic capacitor 10V47μF LL	1
C637	182-1073-22	Electrolytic capacitor 10V100μF SS	1

◎DISPLAY P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
C701	043-0206-46	Ceramic capacitor 680pF	1
C703	043-0206-60	Ceramic capacitor 0.01μF	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
IC701	051-0836-00	IC LC7582	1
C702	182-1063-32	Electrolytic capacitor 16V10μF SS	1

◎MOTHER P.W.B

REF.NO.	PART NO.	DESCRIPTION	Q'TY
IC802,803	051-0388-00	IC μPC7805H	2
	(051-0166-00)	IC (TA78005P)	2
	(051-0717-00)	IC (NJM7805A)	2
IC801	051-0456-00	IC NJM78L05A	1
	(051-0259-01)	IC (μPC78L05J)	1

REF.NO.	PART NO.	DESCRIPTION	Q'TY
C802,805,806 C808	173-1042-10	Polyester capacitor 0.1μF S	4
C810~817	177-2222-05	Ceramic chip capacitor 2200pF HD	8
C801,803,804 C807,809	182-1063-32	Electrolytic capacitor 16V10μF SS	5

◎POWER SUPPLY P.W.B

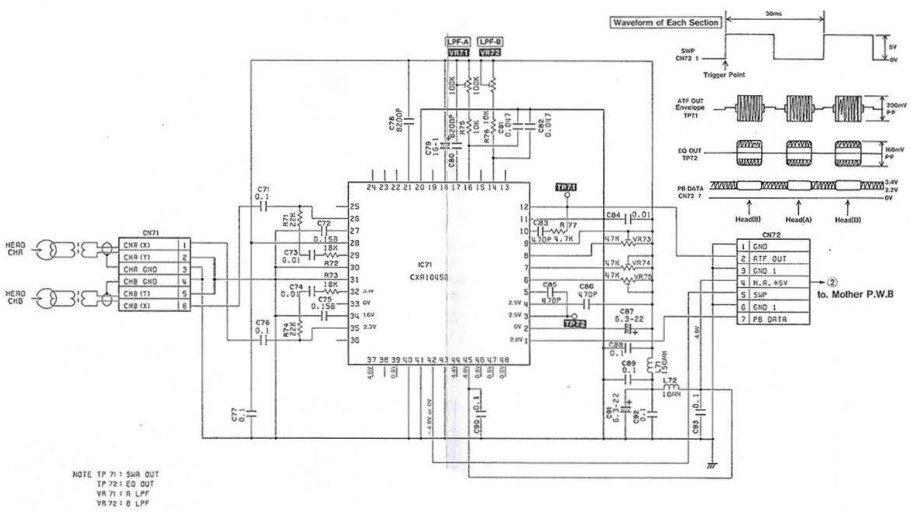
REF.NO.	PART NO.	DESCRIPTION	Q'TY
D901~904	001-0466-00	Diode S5688B	4
L 903	009-0621-00	Choke	1
RY901	014-0532-00	Relay	1
C905~907	042-0334-22	Electrolytic capacitor 16V10μF	3
C909,910	042-0334-24	Electrolytic capacitor 16V22μF	2
C911	042-0334-25	Electrolytic capacitor 16V47μF	1
C908	042-0385-00	Electrolytic capacitor 16V470μF	1
C901~904	043-0165-20	Ceramic capacitor 0.1μF	4

REF.NO.	PART NO.	DESCRIPTION	Q'TY
IC901,902	051-0624-00	IC TA78008AP	2
IC903	051-0726-00	IC TA78006AP	1
Q902	102-2240-00	Transistor 2SC2240GR,BL	1
	(102-2362-00)	Transistor (2SC2362)	1
Q901	102-2458-00	Transistor 2SC2458	1
	(102-3330-00)	Transistor (2SC3330)	1
	(102-3390-00)	Transistor (2SC3390)	1

NOTE : OM (Oxidized Metal) SS (Super Small)
S (Small) TC (Temperature-Compensating)
HD (Higher Dielectric) LL (Low Leak)
SC (Semi-Conductor) USS (Ultra Super Small)

■CIRCUIT DIAGRAM:

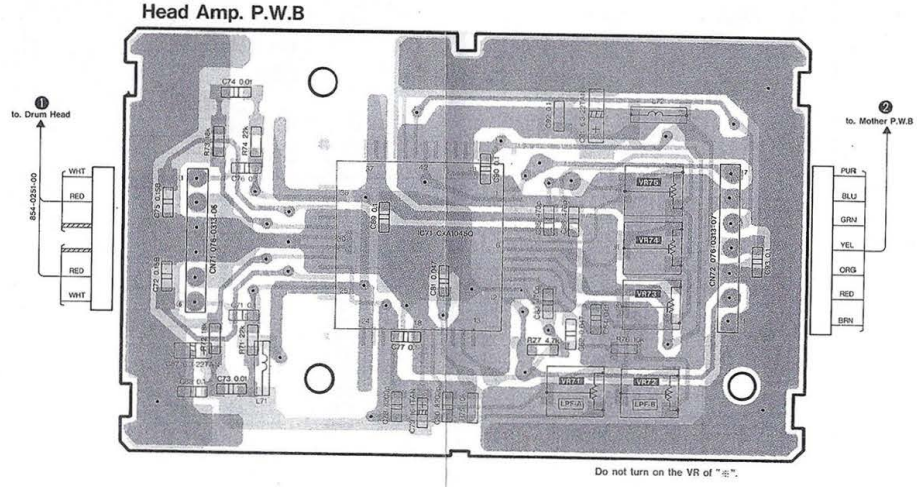
◎Head Amp. P.W.B



■PRINTED WIRING BOARD:

◎Head Amp. P.W.B

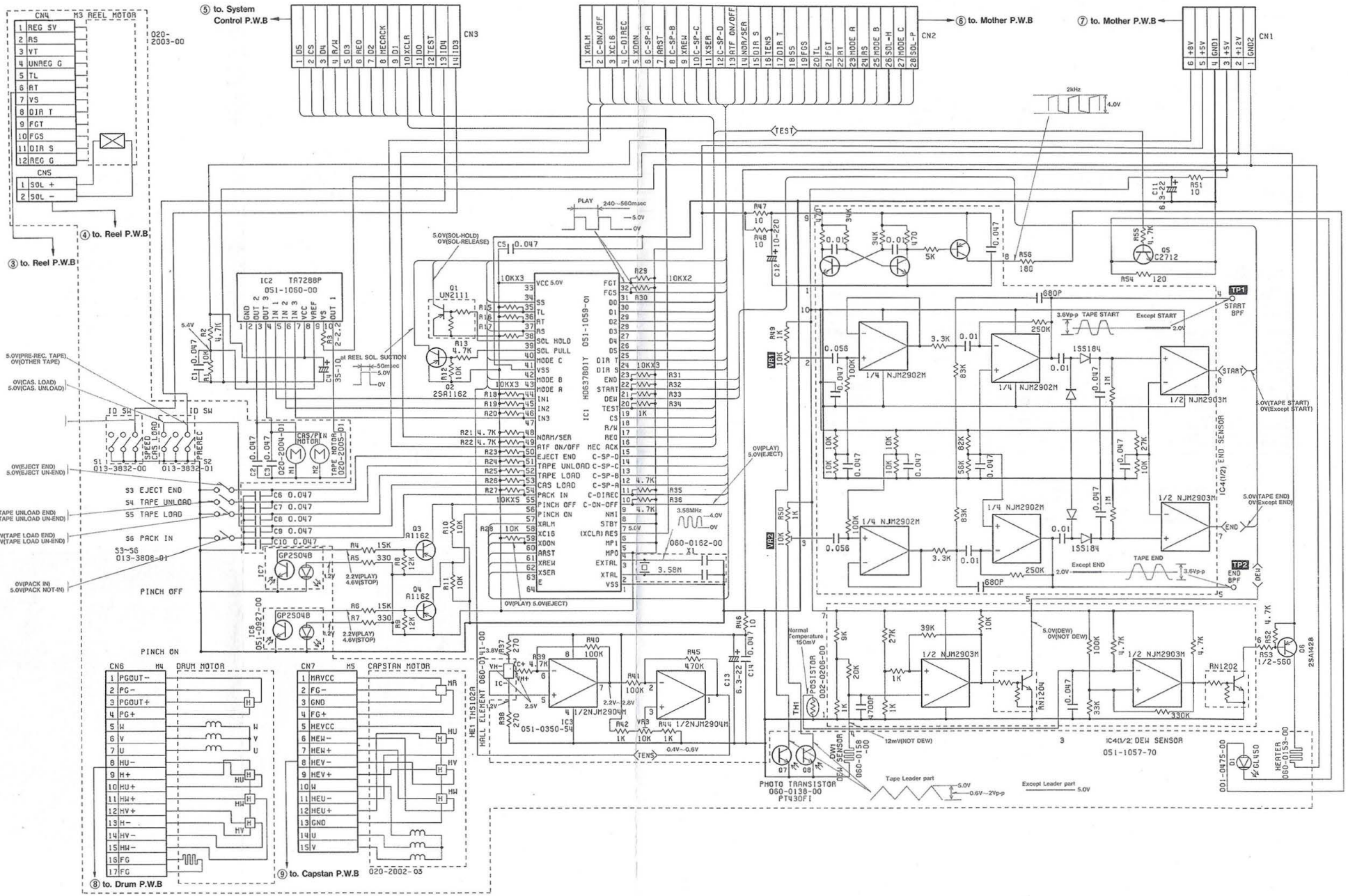
Head Amp. P.W.B



Do not turn on the VR of "☆".

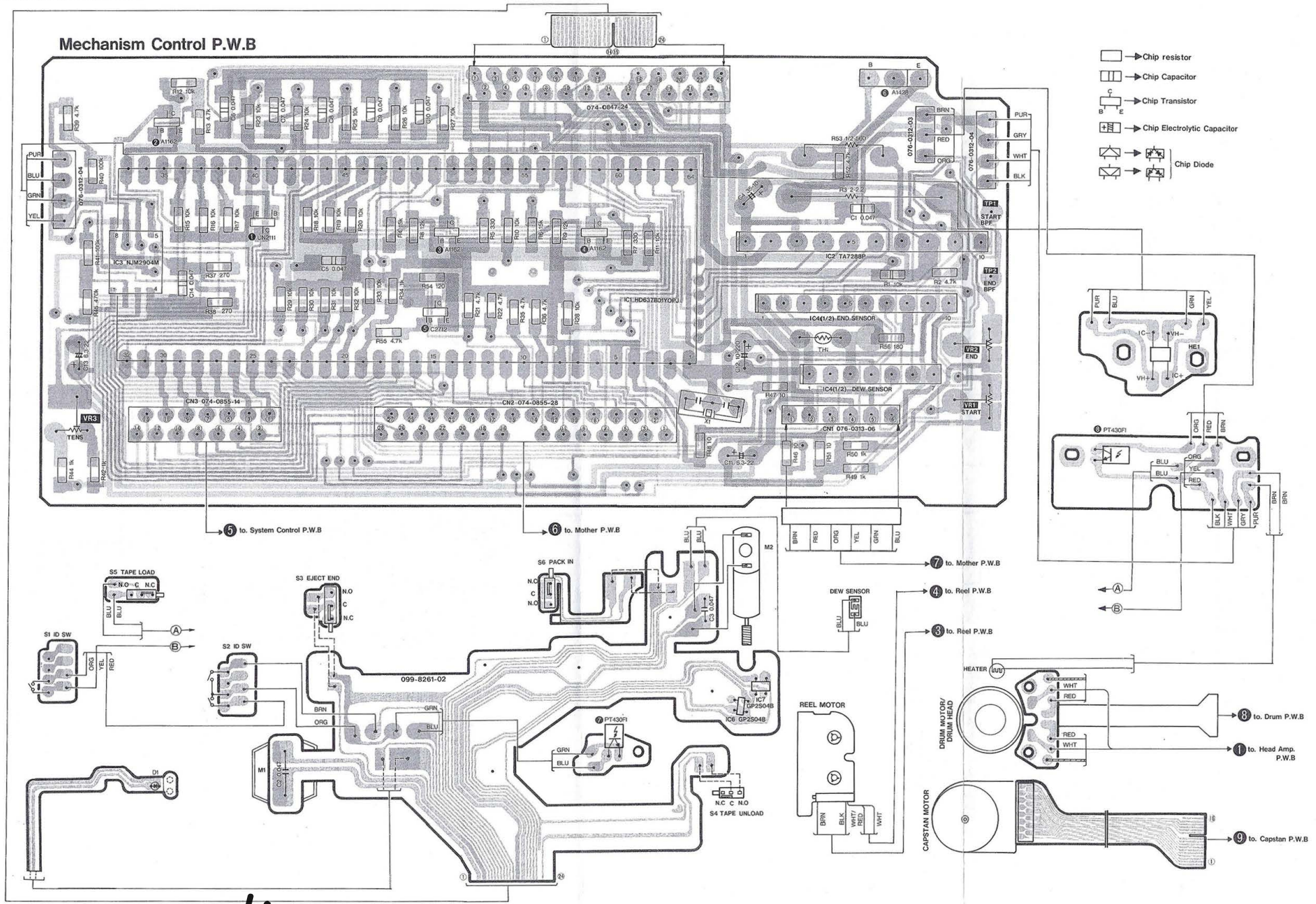
■CIRCUIT DIAGRAM:

◎Mechanism Control P.W.B



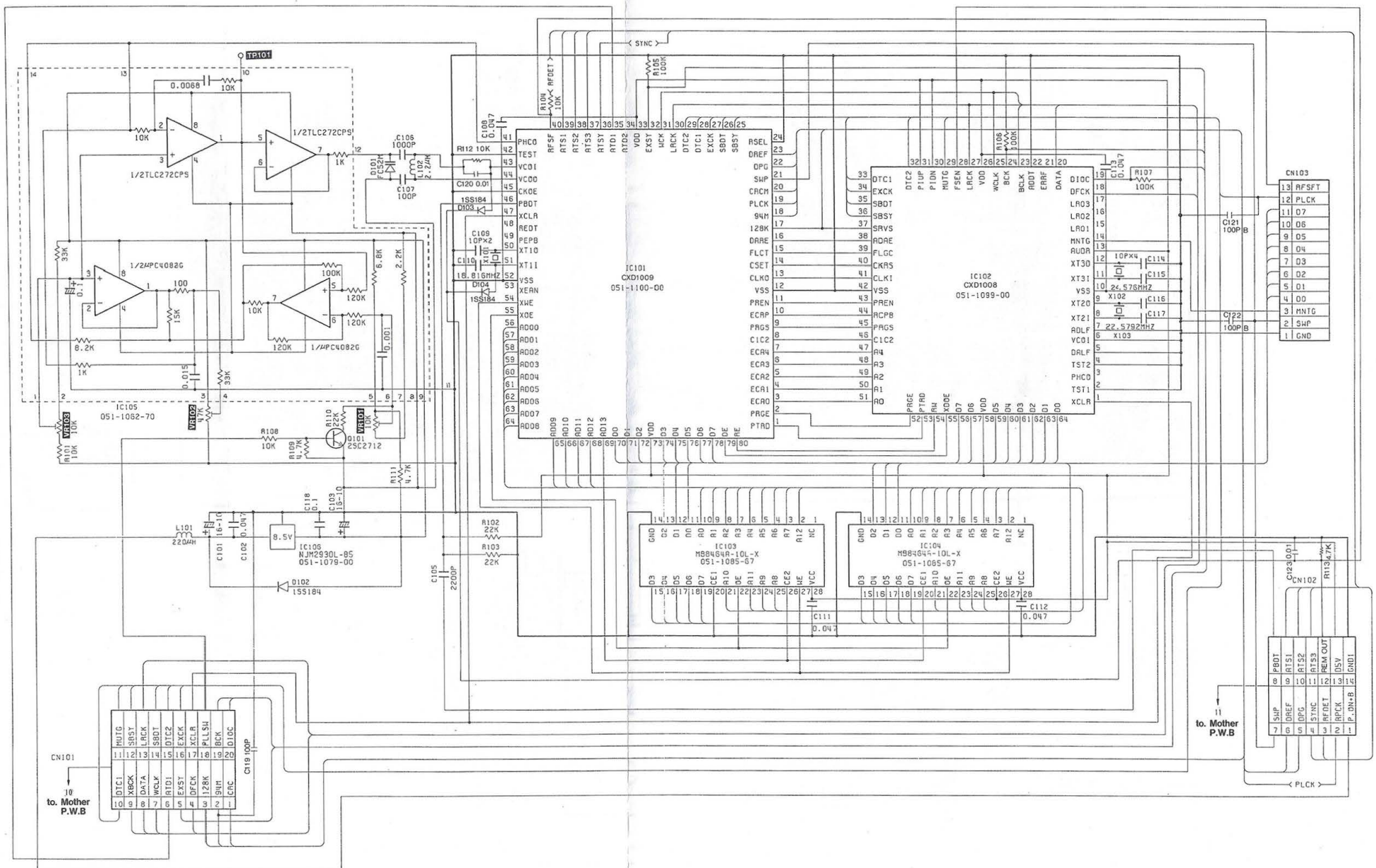
■PRINTED WIRING BOARD:

◎Mechanism Control P.W.B



■CIRCUIT DIAGRAM:

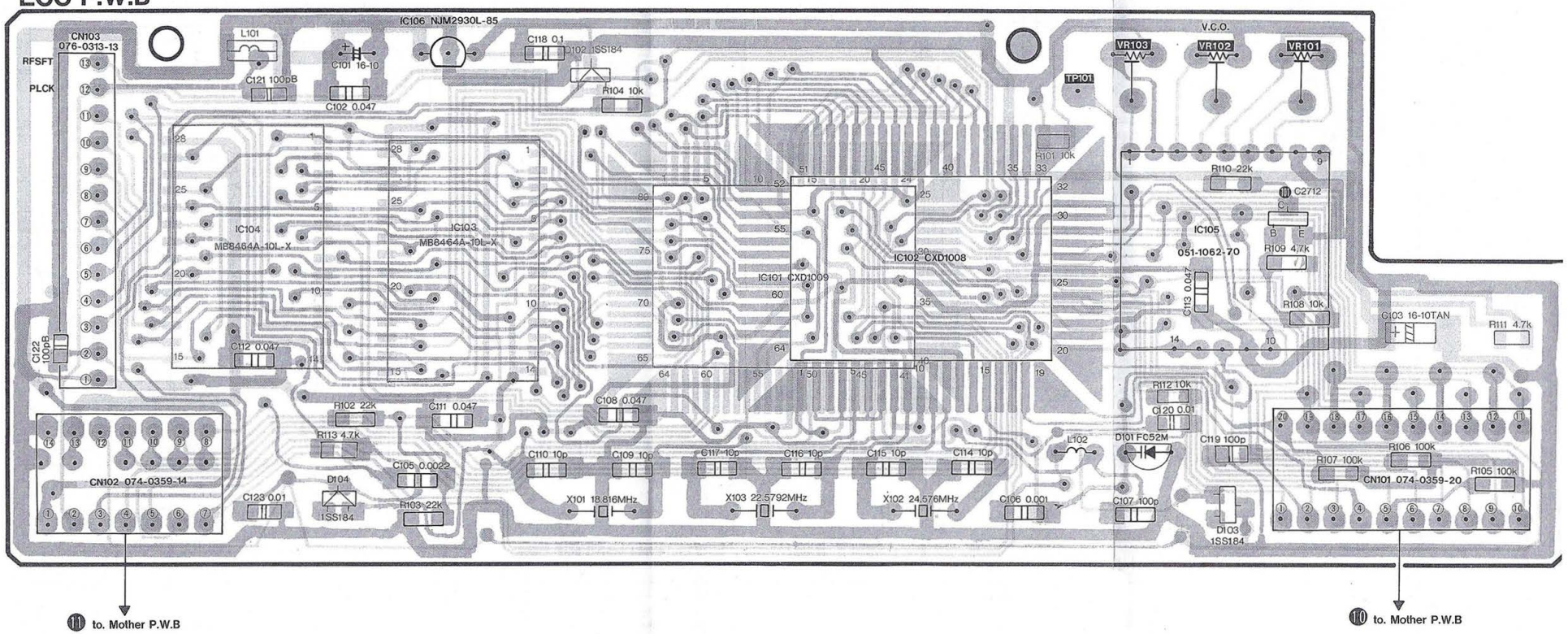
◎ECC P.W.B



■PRINTED WIRING BOARD:

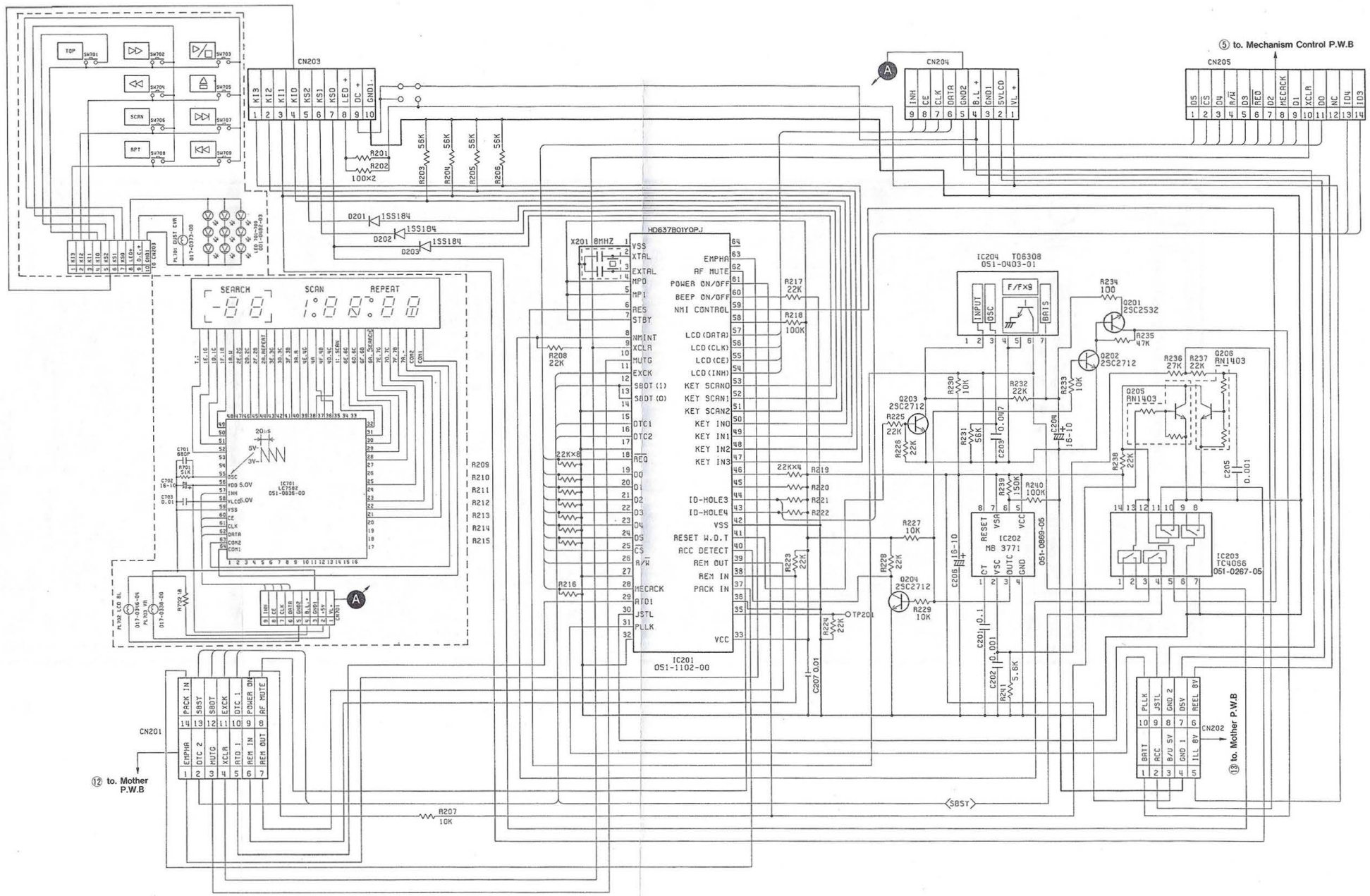
◎ECC P.W.B

ECC P.W.B



■CIRCUIT DIAGRAM:

◎System Control P.W.B



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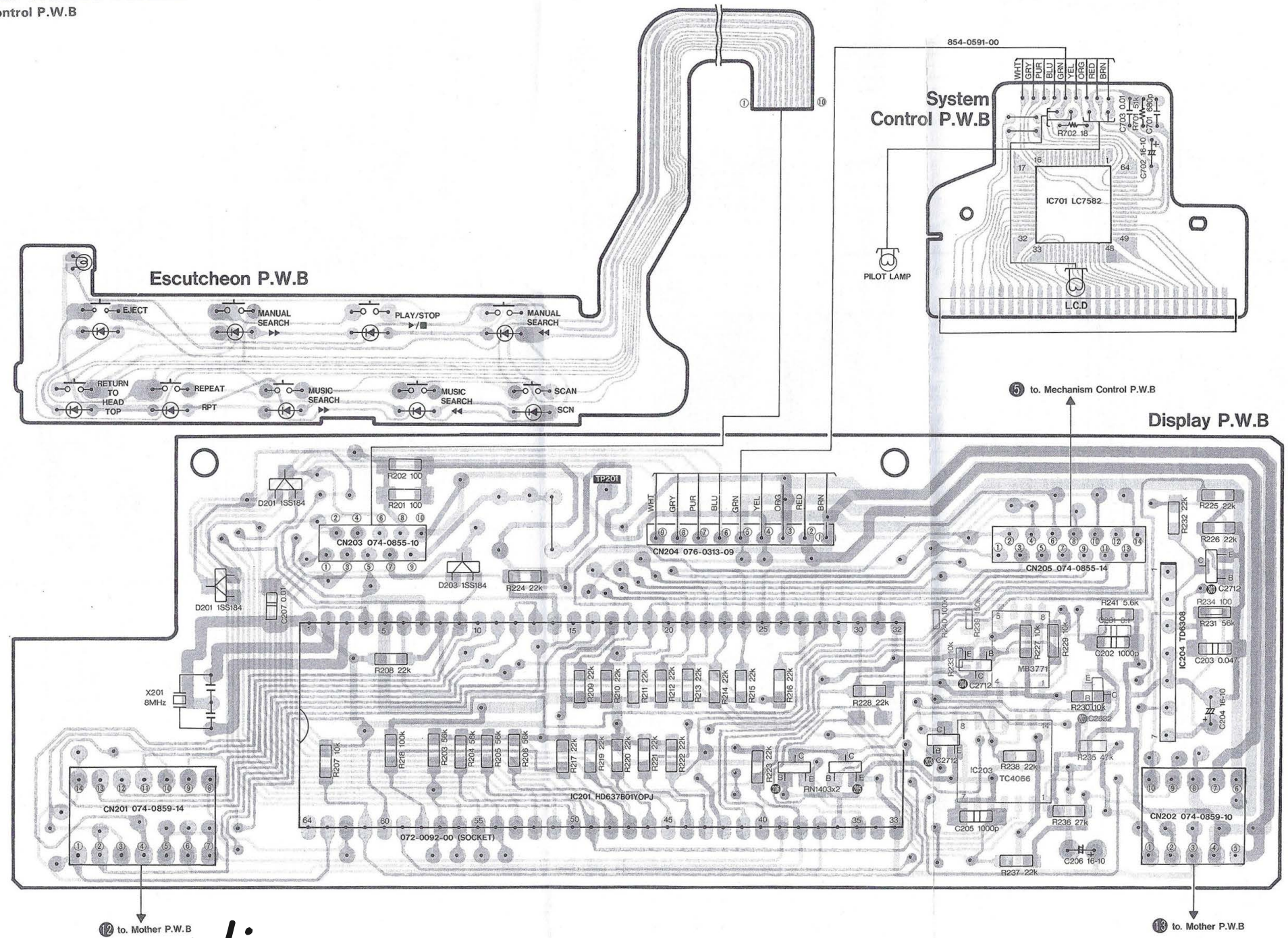
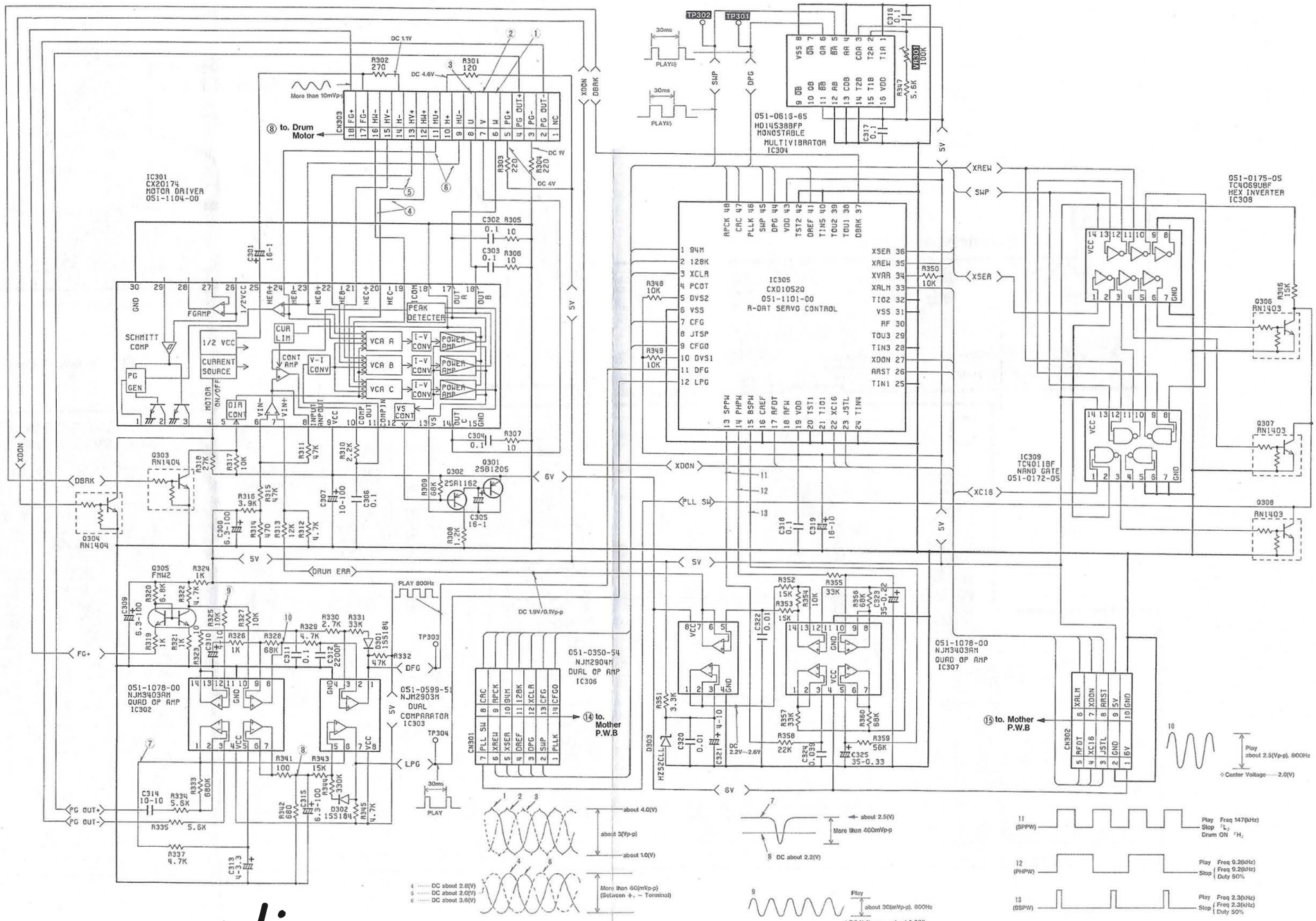
◎System Control P.W.B



■CIRCUIT DIAGRAM:

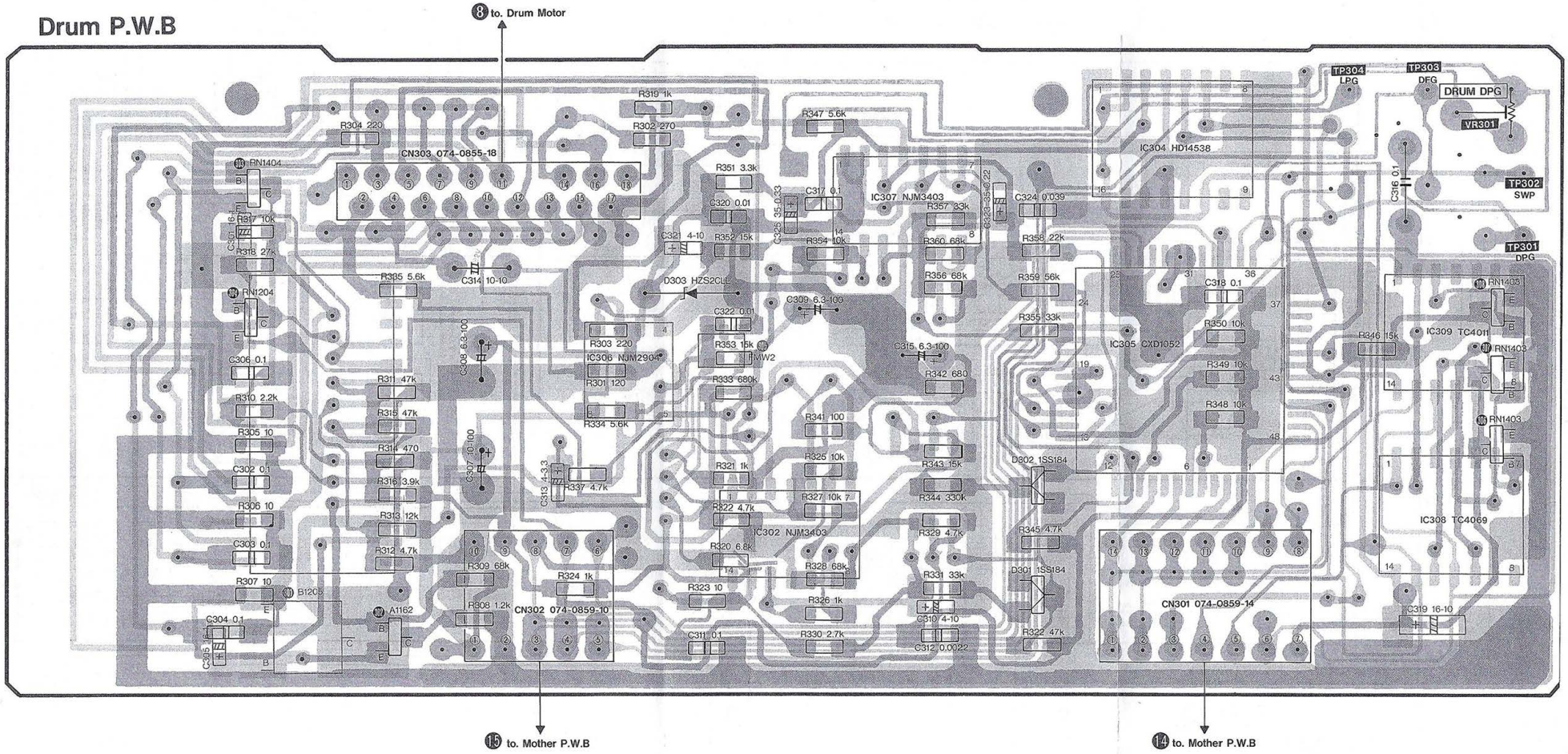
◎Drum P.W.B



■PRINTED WIRING BOARD:

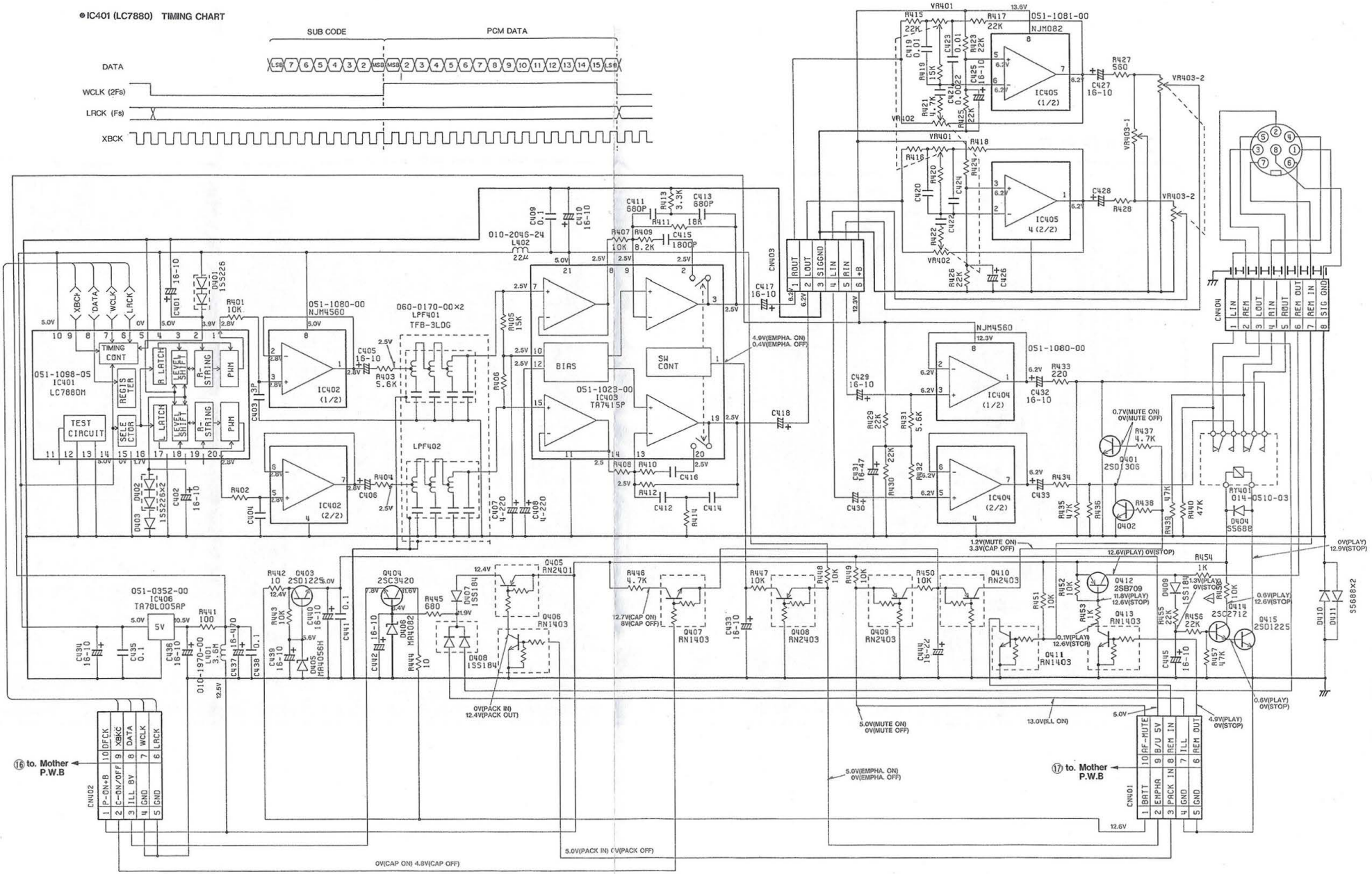
◎Drum P.W.B

Drum P.W.B



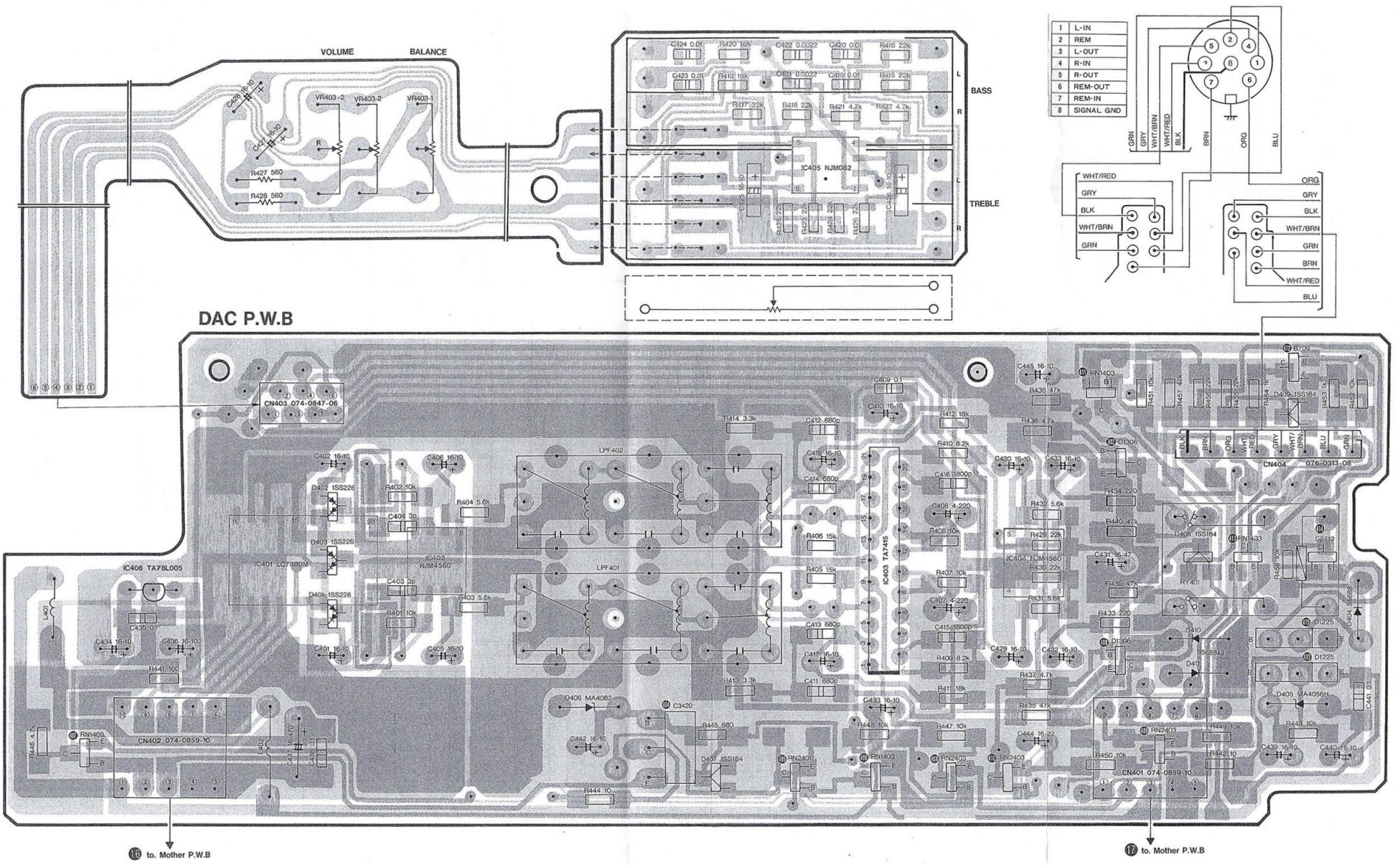
■CIRCUIT DIAGRAM:

◎DAC P.W.B



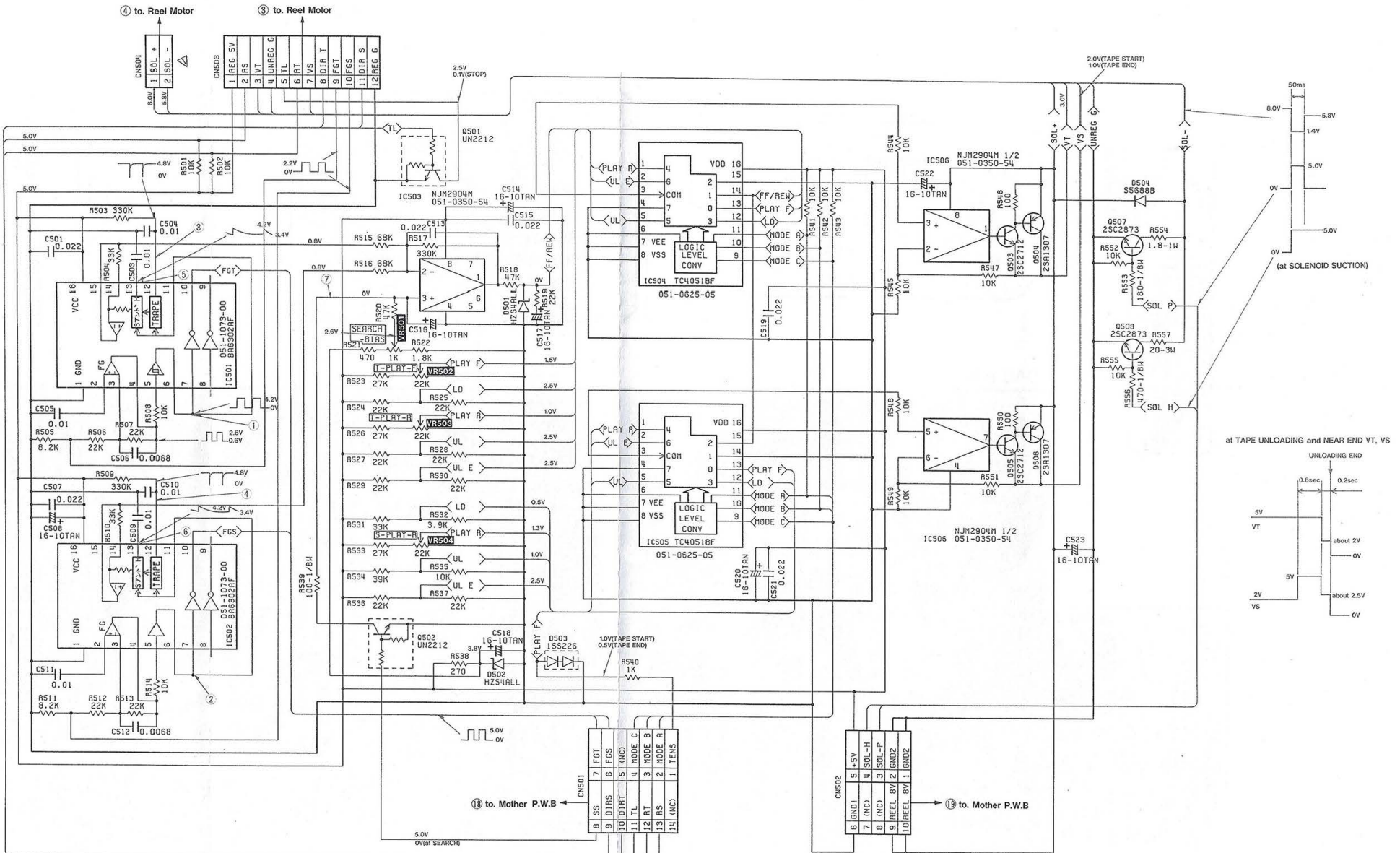
■PRINTED WIRING BOARD:

◎DAC P.W.B



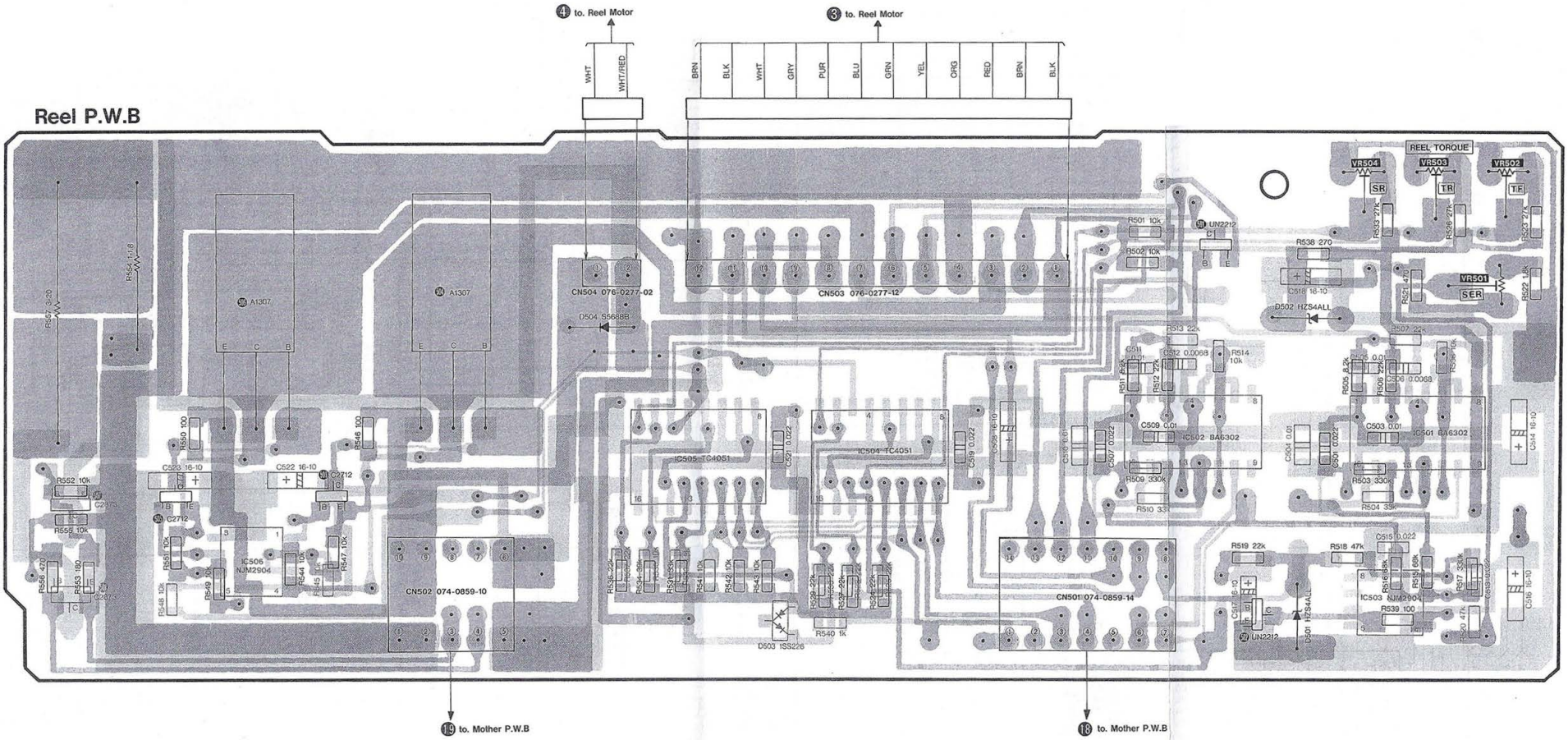
■CIRCUIT DIAGRAM:

◎Reel P.W.B



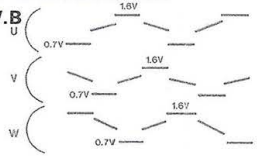
■PRINTED WIRING BOARD:

◎Reel P.W.B



■CIRCUIT DIAGRAM:

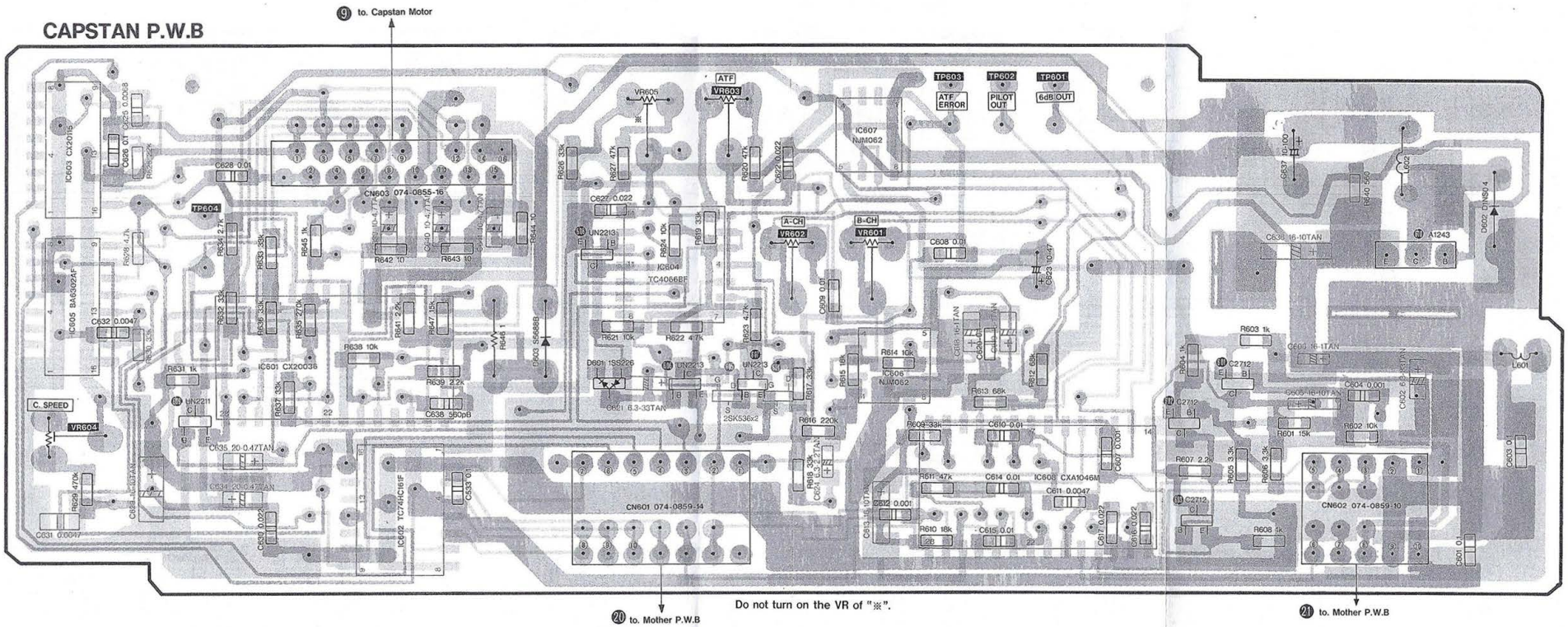
◎Capstan P.W.B



Waveform of Motor Drive

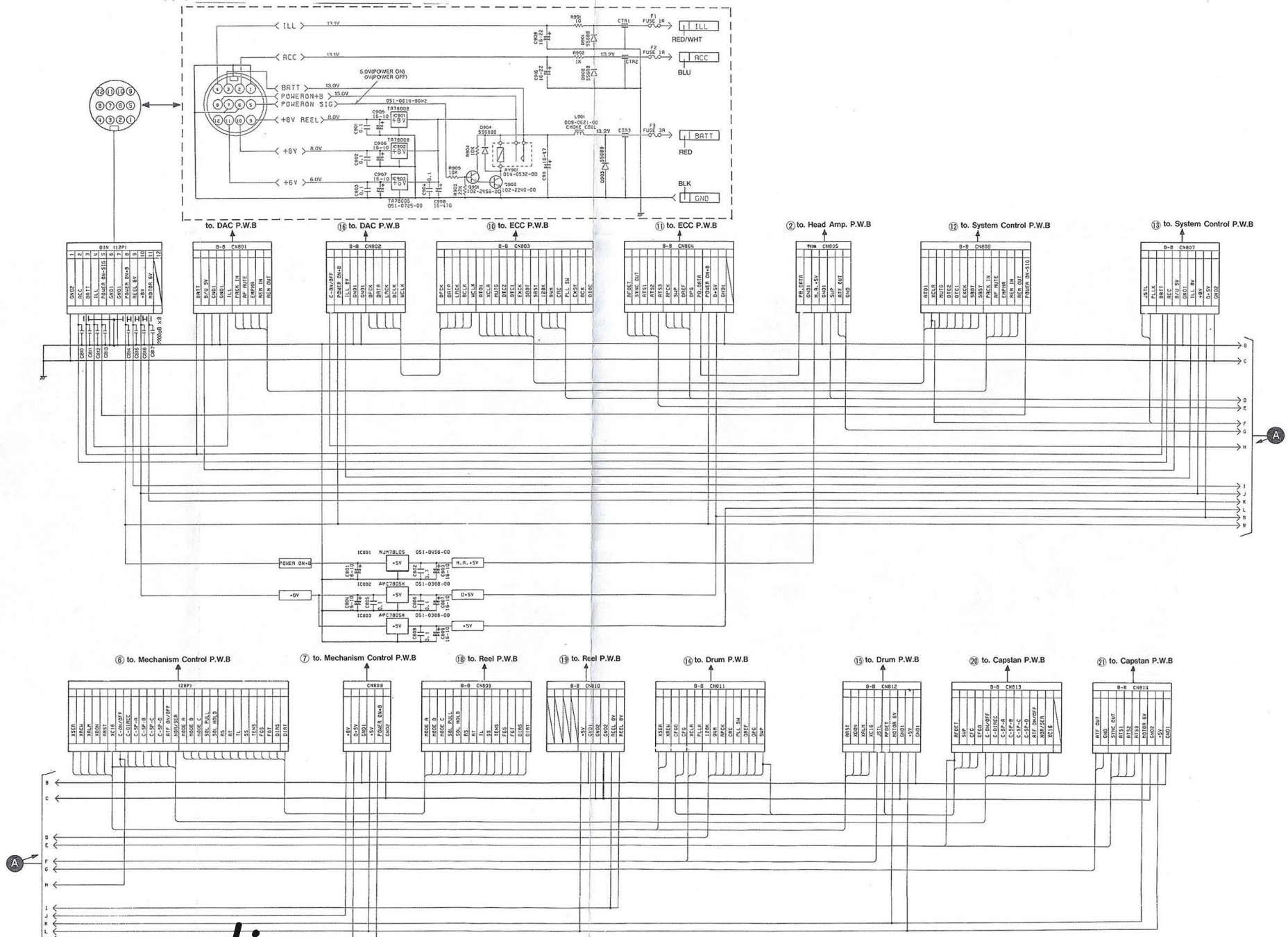
■PRINTED WIRING BOARD:

◎Capstan P.W.B



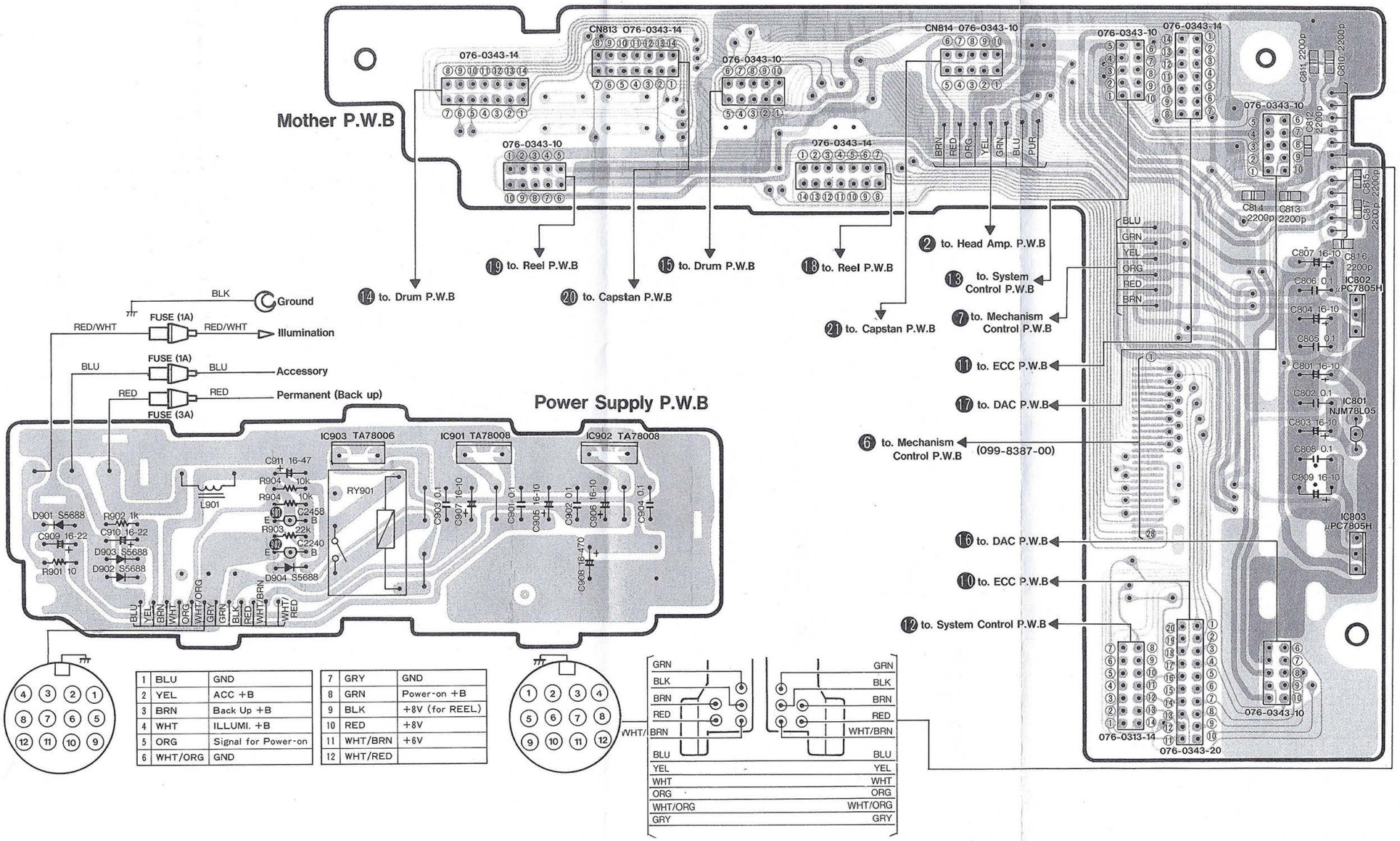
■CIRCUIT DIAGRAM:

◎Mother P.W.B & Power Supply P.W.B



■PRINTED WIRING BOARD:

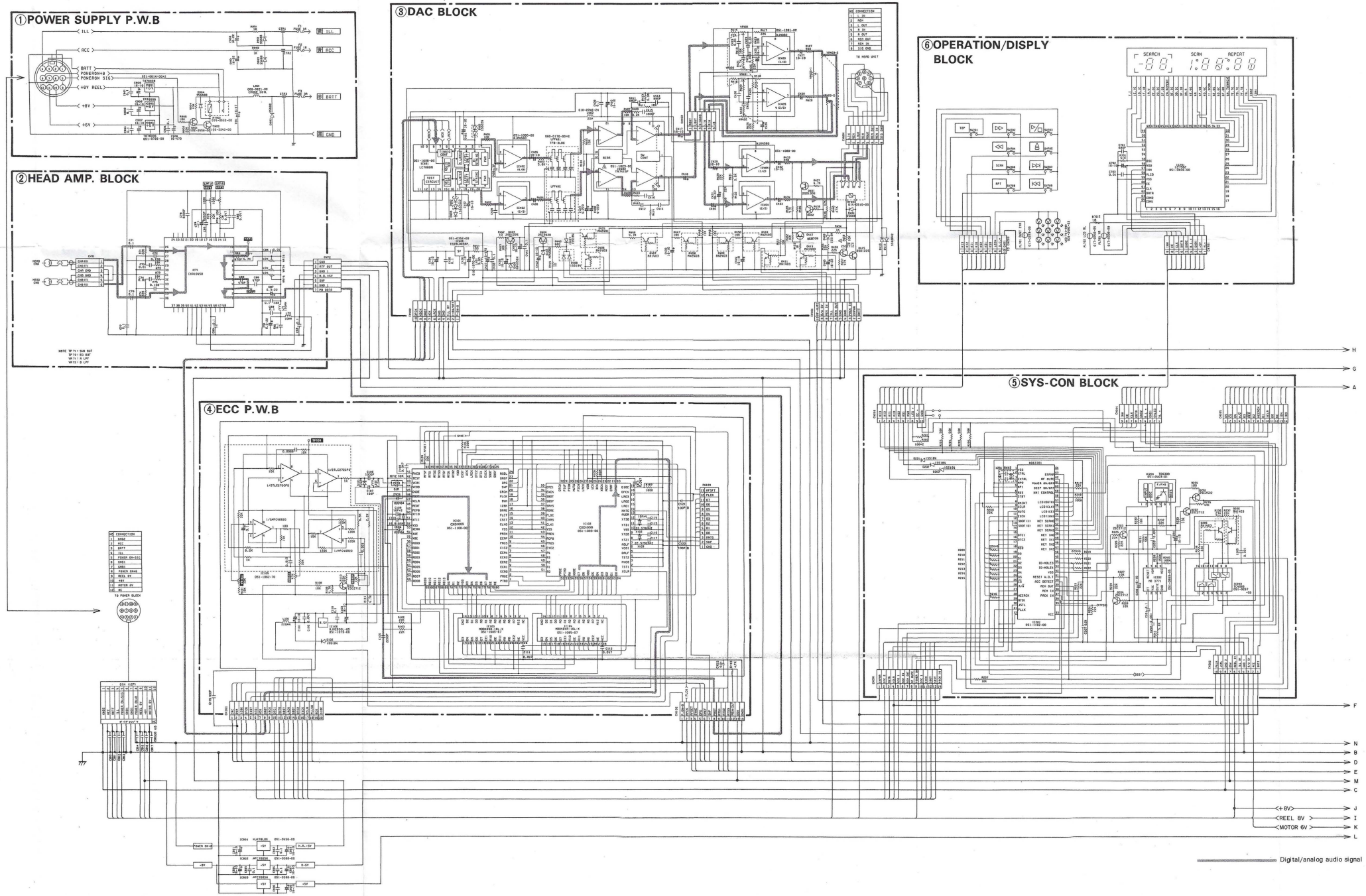
◎Mother P.W.B & Power Supply P.W.B



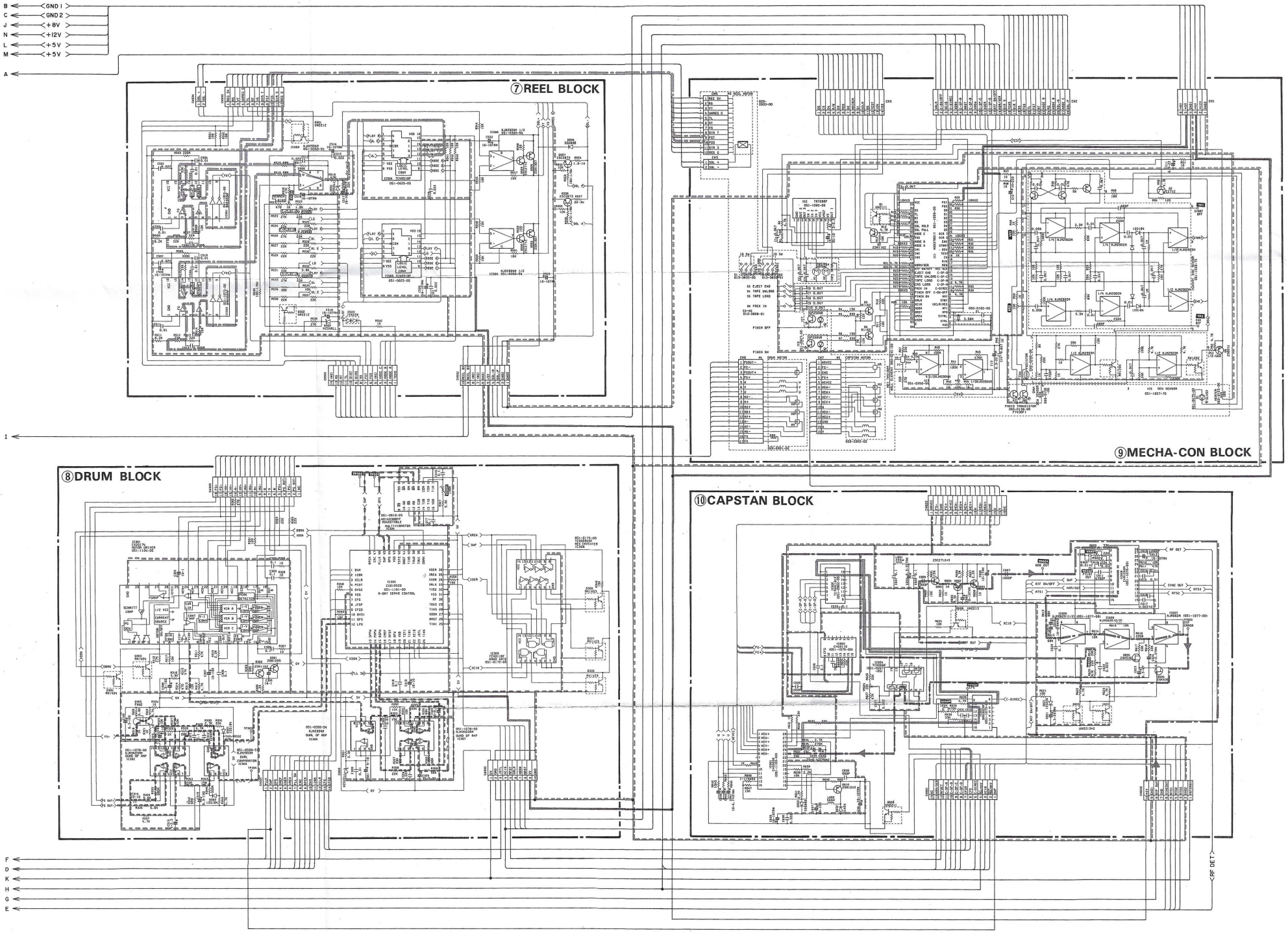
1	BLU	GND
2	YEL	ACC +B
3	BRN	Back Up +B
4	WHT	ILLUMI. +B
5	ORG	Signal for Power-on
6	WHT/ORG	GND

7	GRY	GND
8	GRN	Power-on +B
9	BLK	+8V (for REEL)
10	RED	+8V
11	WHT/BRN	+6V
12	WHT/RED	

■SCHEMATIC DIAGRAM(1)



■SCHEMATIC DIAGRAM(2)



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