TEAC MT-2ST/20D-10
STREAMING CASSETTE MAGNETIC TAPE UNIT
MAINTENANCE MANUAL

TEAC®

REV. A

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STREAMING CASSETTE MAGNETIC TAPE UNIT
MAINTENANCE MANUAL

TEAC CORPORATION

P/N : 10180354 - 01

CONTENTS

FIGURES AND TABLES

- How to Display Model Classification -

More than one model is available according to specifications in the MT-2ST Series. Sections 3 and 4 of this maintenance manual provide the descriptions in common to all the models, unless otherwise specified. However, partially there are special descriptions whose application is limited only to particular models represented by the following symbols:

"90 ips"	Applied only to the models in which the tape speed is 90 ips (inch per second) during data write/read operation.
"30 ips"	Applied only to the models in which the tape speed is 30 ips during data write/read operation.
"Permalloy head"	Applied only to a model on which the parmalloy head is mounted.
"Ferrite head"	Applied only to a model on which a ferrite head is mounted.
"D/CAS"	Applied only to the D/CAS interface model.
"SCSI"	Applied only to the SCSI interface model.
"BASIC"	Applied only to the BASIC interface model.

Model Classification Table

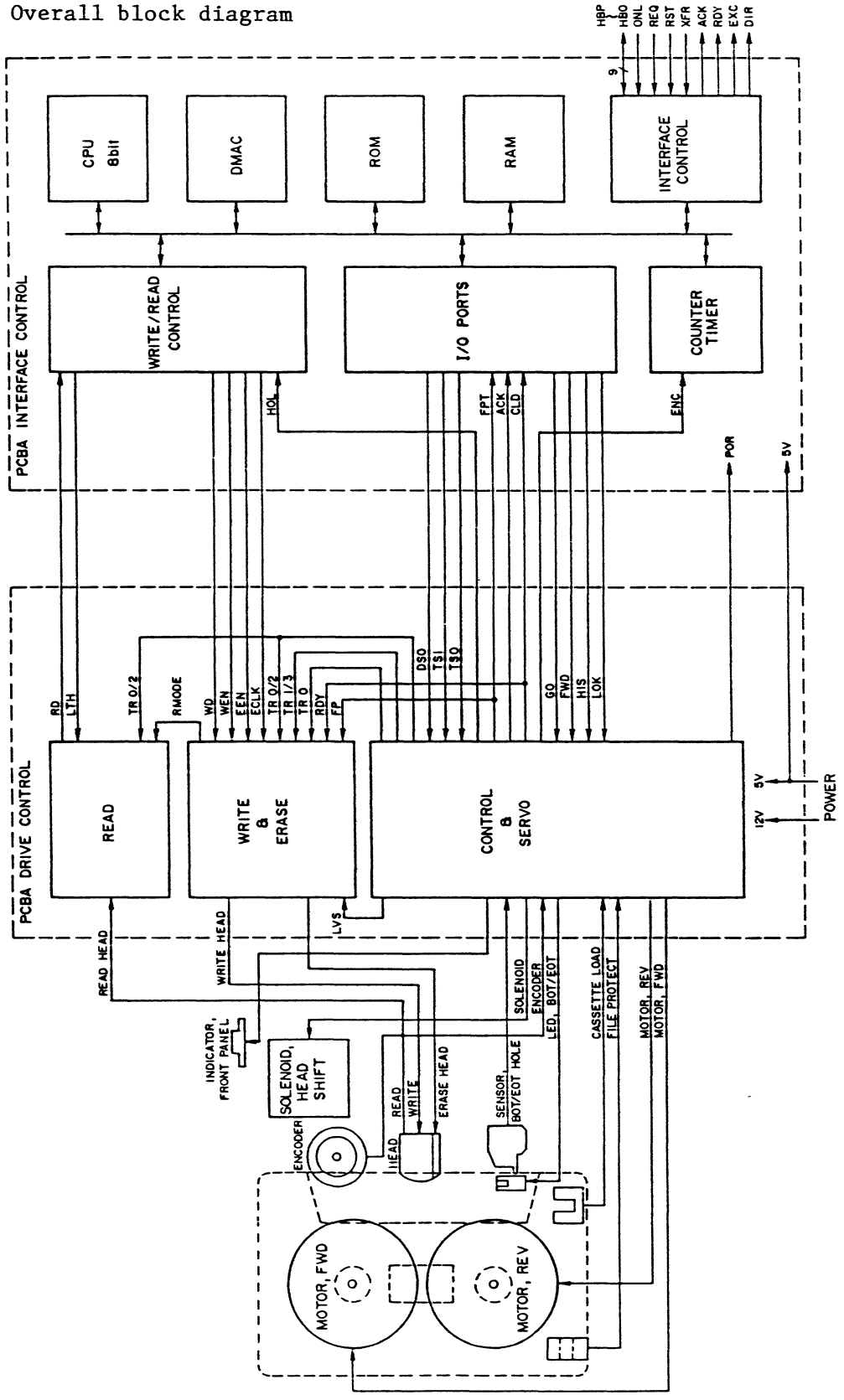
Designation	Part No.	Tape speed	Head	Interface
MT-2ST/20D-10	19305060-10	90 ips	Permalloy head	D/CAS
MT-2ST/20D-11	19305060-11	30 ips		
MT-2ST/20D-12	19305060-12	90 ips	Ferrite head	
MT-2ST/20S-13	19305060-13	30 ips		
MT-2ST/20S-20	19305060-20	90 ips	Permalloy head	SCSI
MT-2ST/20S-21	19305060-21	30 ips		
MT-2ST/20S-22	19305060-22	90 ips	Ferrite head	
MT-2ST/20S-23	19305060-23	30 ips		
MT-2ST/20B-30	19305060-30	90 ips	Permalloy head	BASIC
MT-2ST/20B-31	19305060-31	30 ips		
MT-2ST/20B-32	19305060-32	90 ips	Ferrite head	
MT-2ST/20B-33	19305060-33	30 ips		

SECTION 3

THEORY OF OPERATION

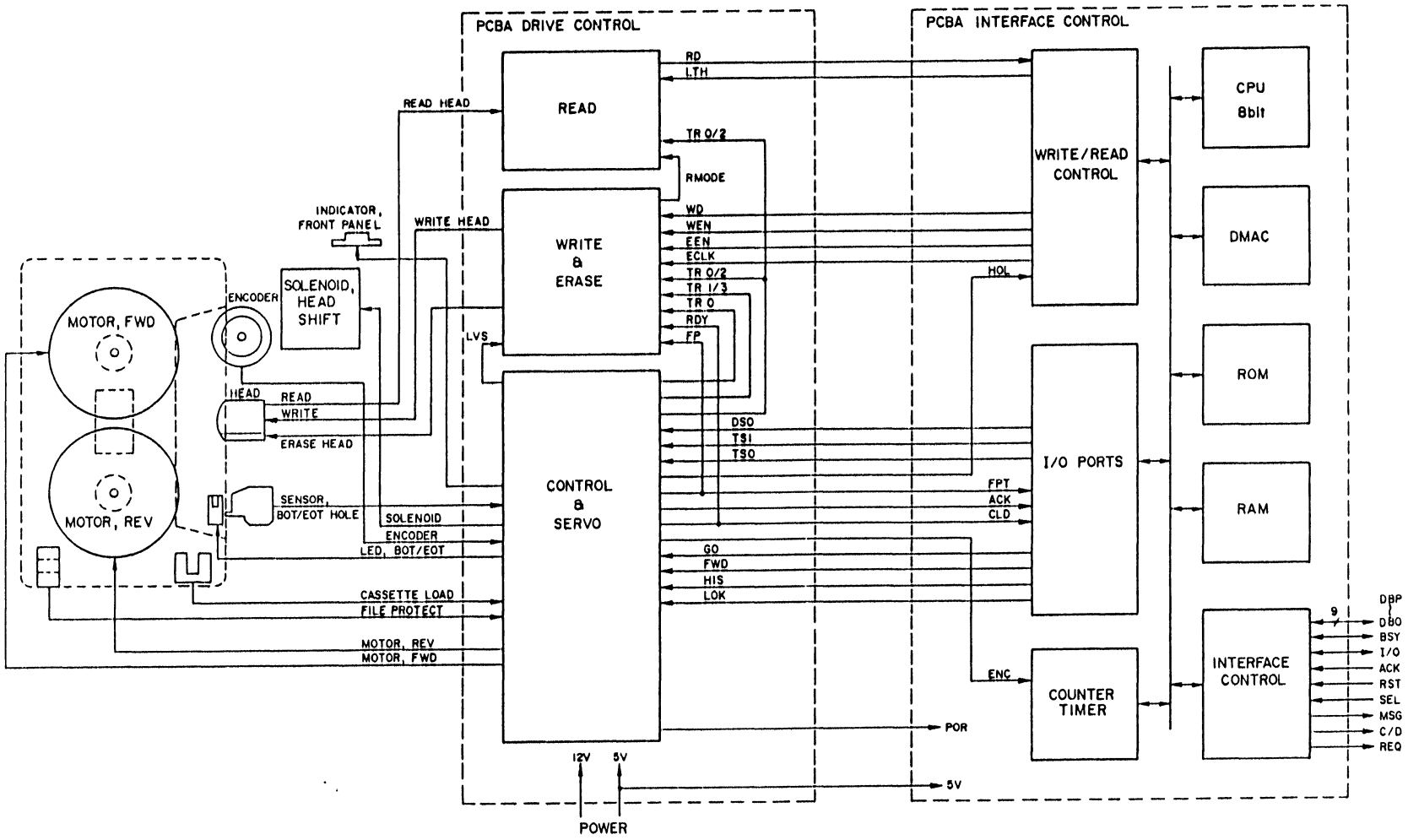
3-1 Outline of construction and functions

3-1-1 Overall block diagram



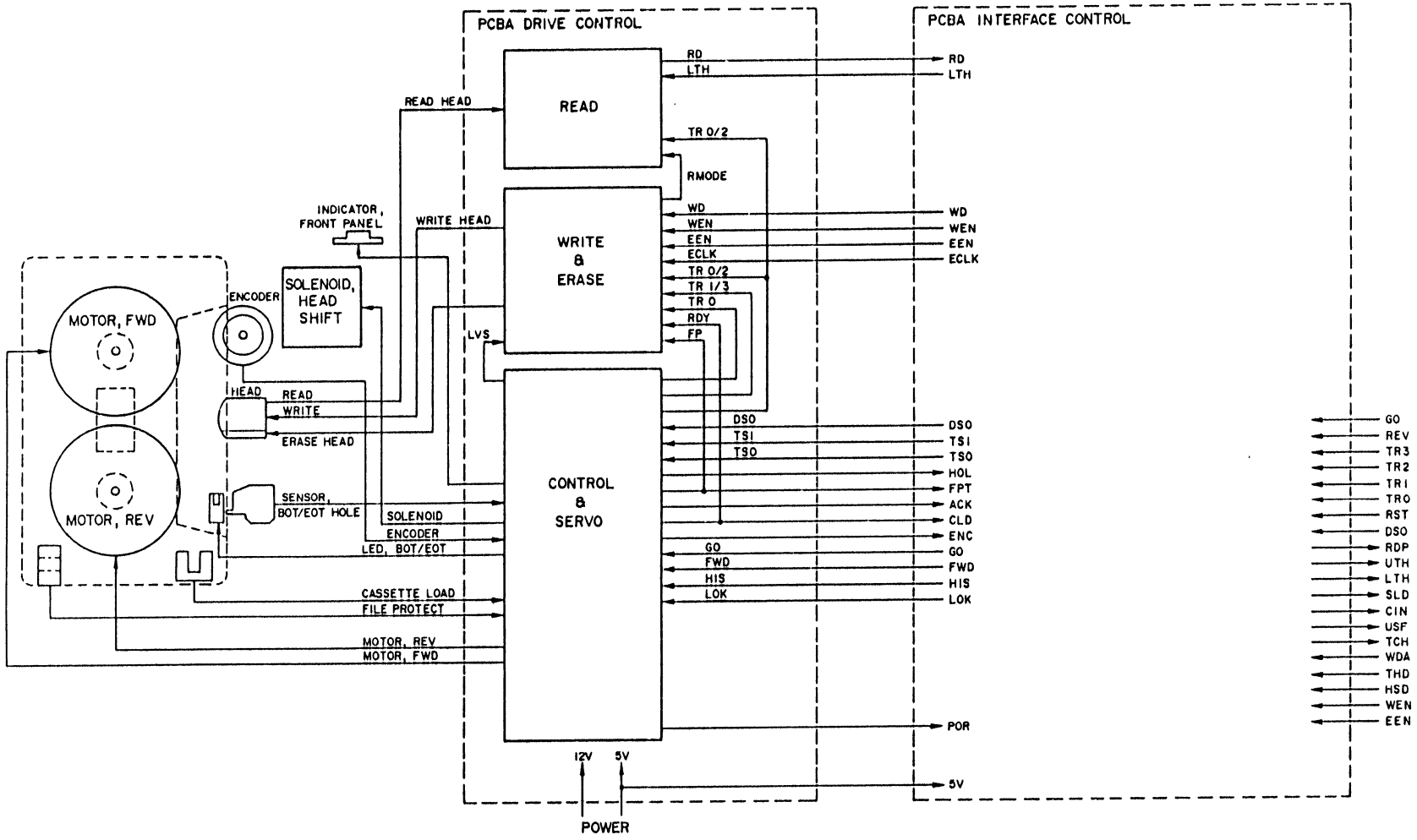
(a) "D/CAS"

Fig. 301 Overall Block Diagram



(b) "SCSI"

Fig. 301 Overall Block Diagram



(c) "BASIC"

Fig. 301 Overall Block Diagram

3-1-2 Outline of mechanical section

The mechanical section of this MTU (Magnetic Tape Unit) consists of a magnetic head moving mechanism, tape drive mechanism, and various detection mechanism, mainly the transport Sub Ass'y (sub assembly).
Each mechanism is assembled so as to keep the stable quality using high precision parts, since compatibility is required between MTUs.
During maintenance, only the maintenance experts subjected to the specified maintenance training should access the internal mechanisms.
In any case, never give excessive shocks to the main unit, but handle it very carefully.

(1) Transport Sub Ass'y

The transport Sub Ass'y is the main frame to mount each mechanism or PCB with the cassette tape loading/unloading mechanism as a center. It consists of a loading base (C) Ass'y, loading base (M) Ass'y, lever base Ass'y and loading arm Ass'y, etc. centering around the chassis.

The loading/unloading operation of the cassette tape is performed as shown below.

(a) Loading operation

When the cassette tape is pushed in up to the front bezel, the ejector on the loading base (C) Ass'y is moved in the direction of insertion, and the cassette tape is attracted automatically together with the ejector by the rotary force of the loading arm. When the stopper of the ejector is released, the loading arm begins to push the cassette tape and the loading base (C) Ass'y at the right angle to the direction of insertion. When the loading base (C) Ass'y reaches the predetermined position, the stopper of the cam lever roller is released, and the reel motor within the chassis is lifted together with the loading base (M) Ass'y, and then the MTU is placed in the cassette loading status (Fig. 302, 303).

(b) Eject operation

When the eject button located at the lower right of the front bezel, the loading base (M) Ass'y is pushed down, and at the same time, the stopper of the loading base (C) Ass'y is released, and the reverse action to item (a) is performed continuously, and the cassette tape gets out up to halfway from the front bezel, and then the MTU is placed in the cassette unloading status (Fig. 302, 303).

(c) Cassette tape face identifier mechanism

If the cassette tape is inserted into MTU with the face B of the cassette tape up, the selector on the ejector is turned clockwise. When the cassette tape is pushed in further in such status, the selector touches the stopper of the chassis, and it is not able to insert the cassette further (Fig. 304).

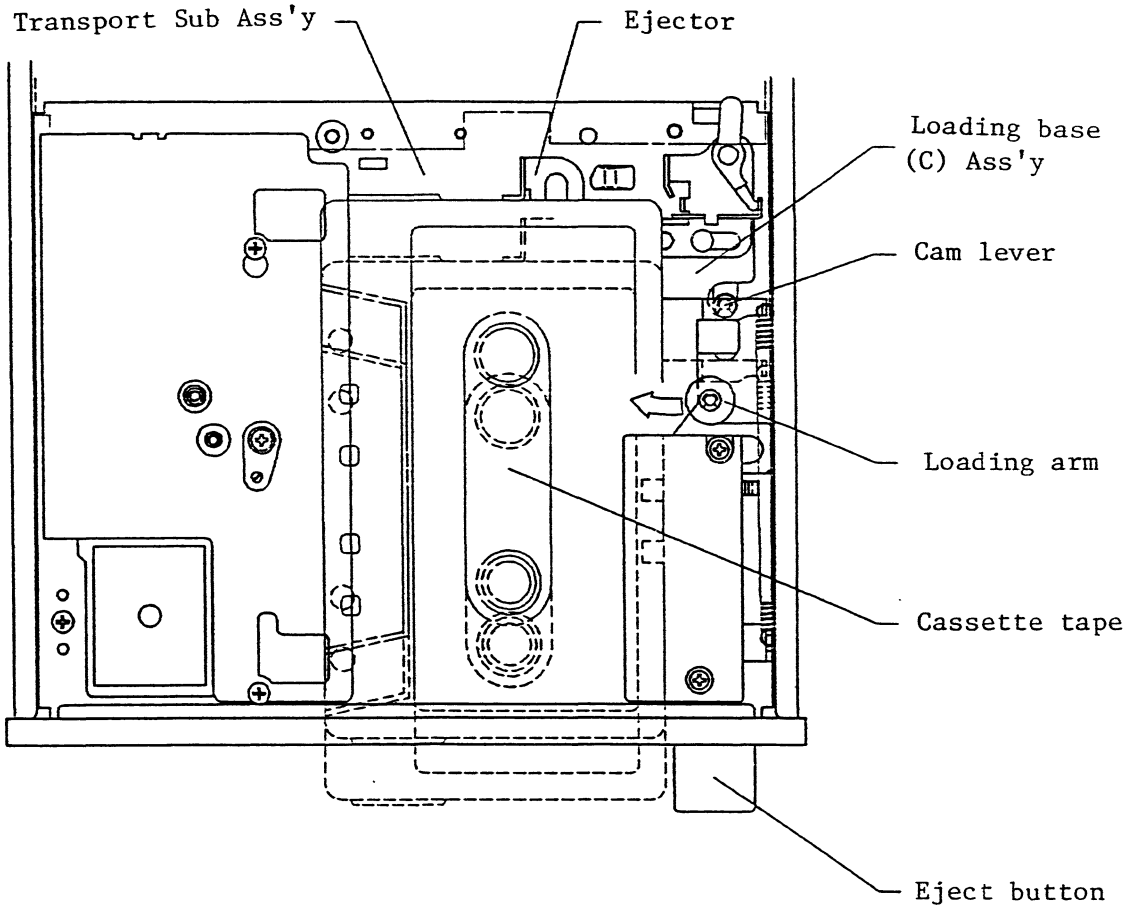


Fig.302 Cassette tape loading/unloading mechanism

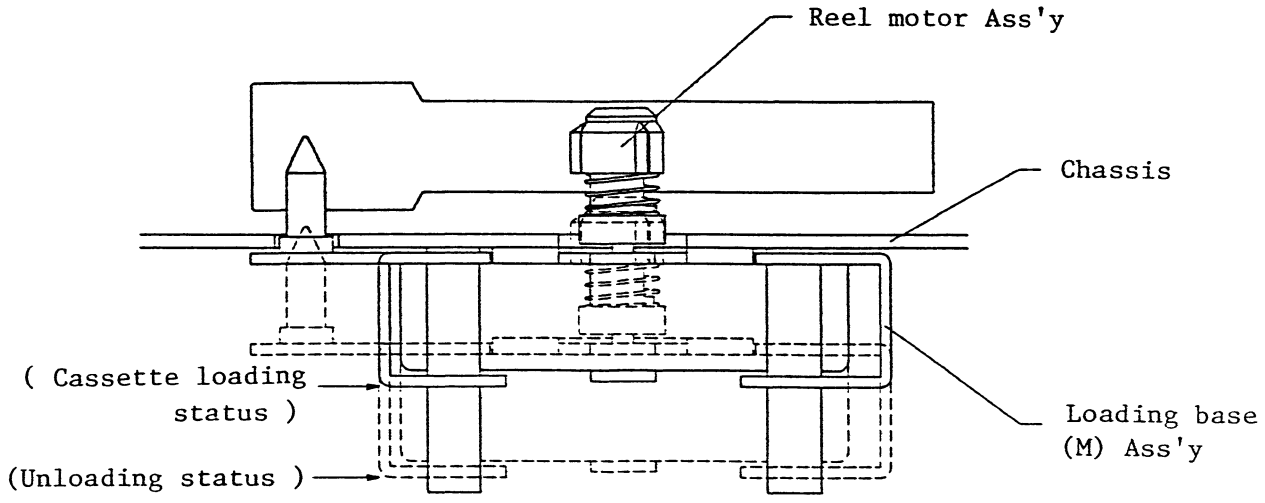
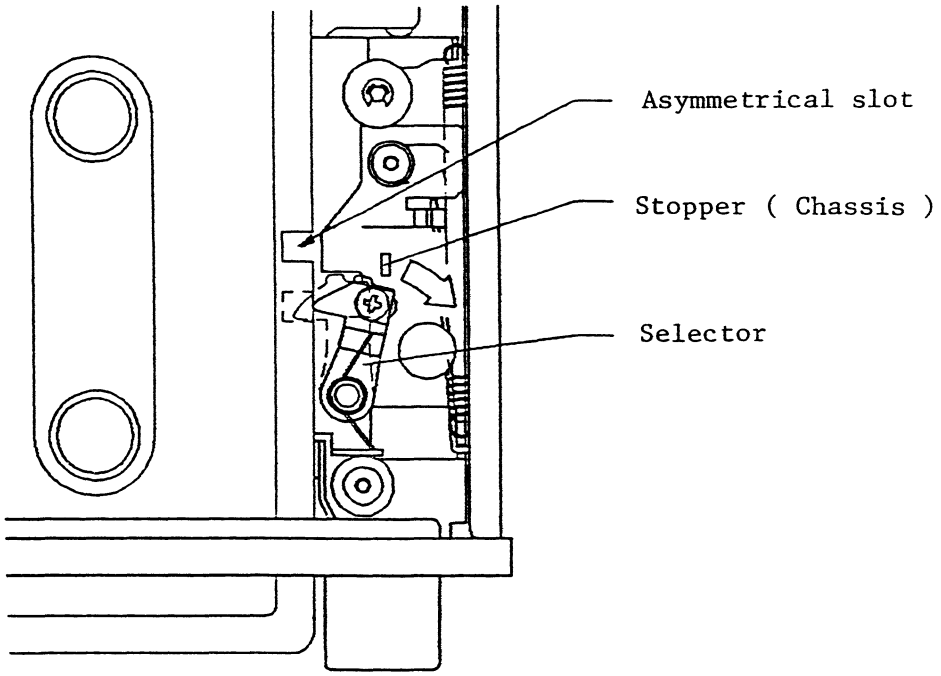


Fig.303 Cassette loading, and unloading



(With face B inserted)

Fig.304 Cassette tape face identifier mechanism

(2) Magnetic head shift mechanism

The main components of the magnetic head shift mechanism are a head base Ass'y and solenoid Ass'y. A magnetic head is mounted on the head base of the head base Ass'y.

The head base is shifted up and down (two positions) by the DC solenoid. The head base Ass'y contains three kinds of adjusting screws to adjust the appropriate head positions with respect to the tape winding position (Fig. 305).

(3) Tape drive mechanism

The tape drive mechanism consists of two reel motor assemblies, encoder and encoder roller.

The tape causes the encoder roller fixed to the shaft of encoder to be rotated by friction. A feedback signal from the encoder is sent to the reel motor to apply servo effect to it so that the tape speed is kept always constant.

(4) Various detection mechanisms

(a) Cassette loading detection mechanism

This mechanism consists of a photo interrupter and a loading arm (M) to detect the loading condition of the cassette tape. When the cassette tape is loaded onto the MTU, the optical detection path of the photo interrupter is interrupted by the tip of the loading arm (M). In this status, data can be written or read (Fig. 306).

(b) Write inhibit hole detection mechanism

This mechanism consists of a photo interrupter and file protector to detect the wire inhibit hole on the cassette half rear face. When a cassette tape whose write inhibit hole is open is loaded, the optical detection path of the photo interrupter is interrupted by the file protector. In this status, the data write function is deactivated and new write operation is inhibited, and then the recorded data is protected (Fig. 307).

(c) Marker detection mechanism

This mechanism consists of LED hole sensor Ass'y and sensor guide Ass'y to detect the BOT/EOT holes (markers) of cassette tape.

LED built in the LED hole sensor Ass'y and photo transistor in the sensor guide Ass'y detect the holes (markers) provided at both ends of magnetic tape (Fig. 308).

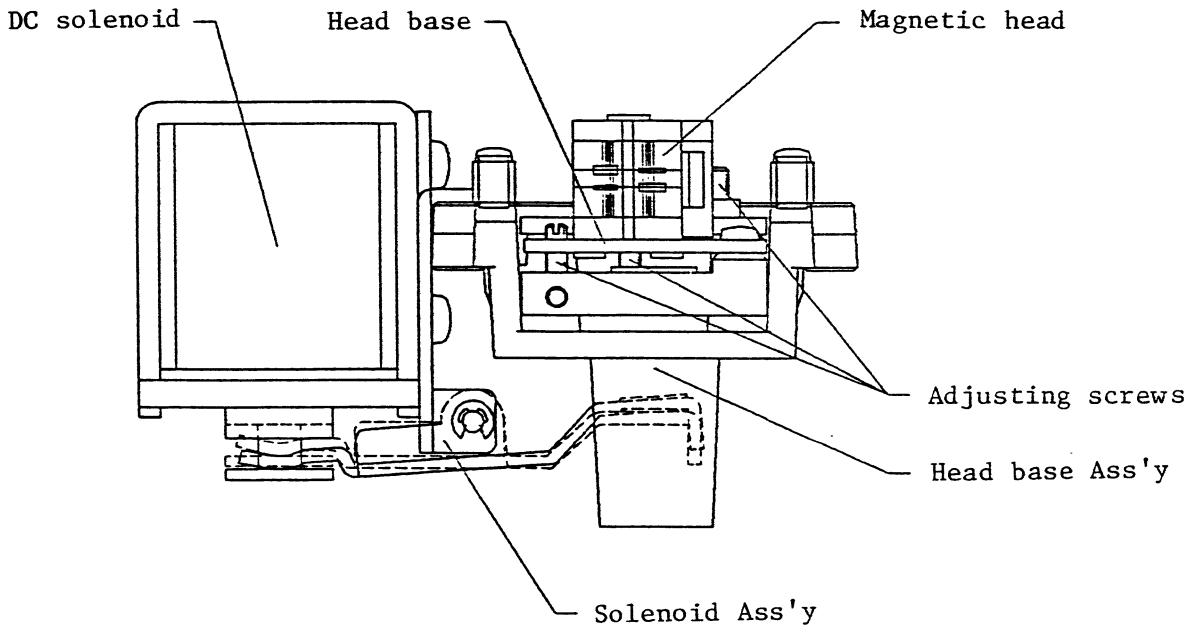


Fig. 305 Head shift mechanism

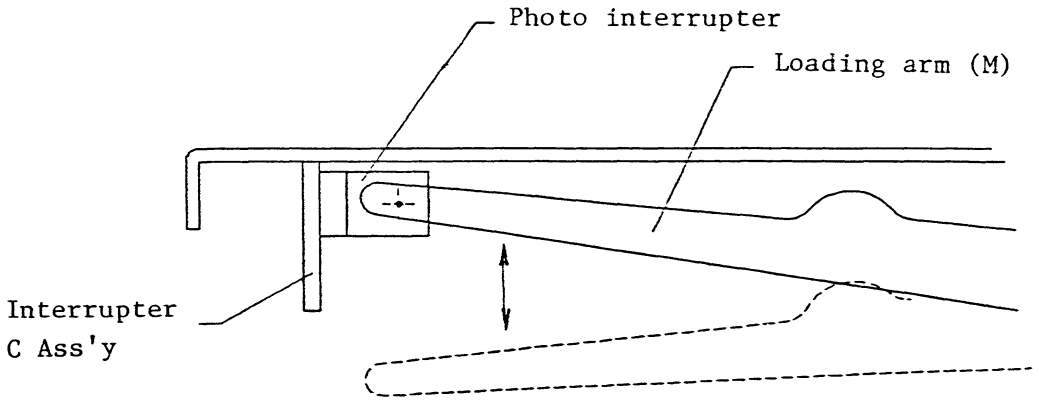


Fig.306 Cassette tape loading detection mechanism

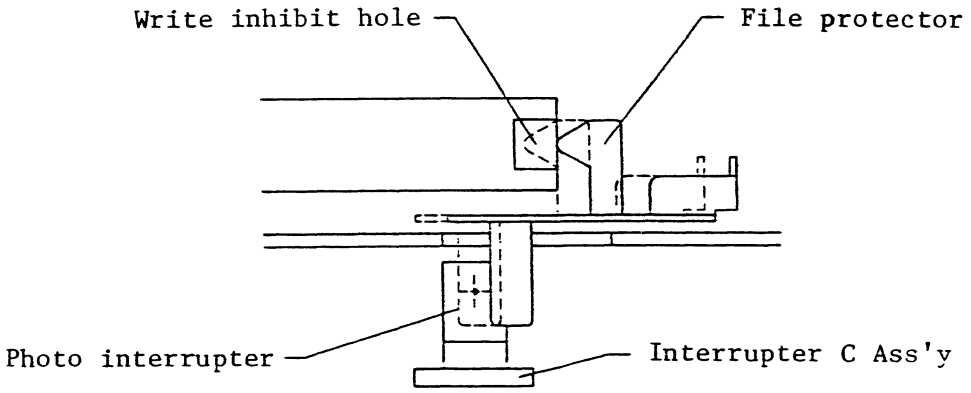


Fig.307 Write inhibit hole detection mechanism

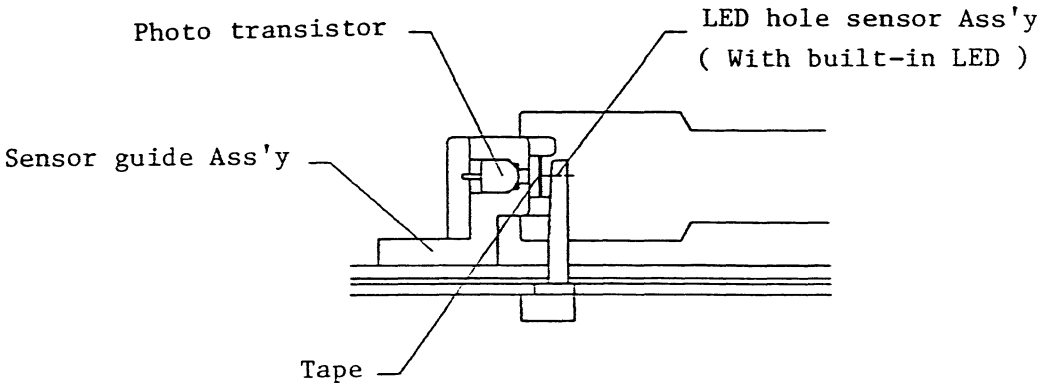


Fig.308 Marker detection mechanism

3-2 Operation of data recording/reproducing system (PCBA Drive Control)

3-2-1 Read circuit

The block diagram of the read circuit is shown in Fig. 309.

The read circuit consists of preamplifier, track select, AGC (Automatic Gain Control) amplifier, low-pass filter, differentiator, zero crossing detector, time domain filter, threshold detector, and read gate, etc.
The outout signal of several mV from the read head is amplified by the preamplifier of differential input/output type. Two channels of pre-amplifiers are prepared to correspond to the number of channels of the read head. The output signals of the preamplifiers are led to the track select circuit through attenuators to adjust the read preamplifier level.
The track select circuit performs changeover between the track 0/2 side and track 1/3 side according to the track to be accessed. The output signal of the track select circuit is amplified by a one-stage voltage-controlled amplifier, and applied to the AGC amplifier.
The AGC amplifier adjusts automatically its own gain so that the sensitivity difference of the magnetic tape used is corrected and the read level is kept nearly constant. The output signal of the AGC amplifier is led to the low-pass filter to reject the unwanted noise components. The output signal of the low-pass filter is phase shifted by the differentiator so that the peak position of the reproduced signal is set to the zero cross position, and the phase-shifted signal is led to the zero crossing detector and time domain filter. The zero crossing detector consists of two comparators, pulse delay circuit, and flip-flop circuit, etc. to convert the output signal of the differentiator into a pulse signal.
The output signal of the zero crossing detector is made free through the time domain filter from the bad influence of the saddle generated during reading of 1F signal (1001 data pattern) to be led to the read gate circuit. Meanwhile, the output signal of the low-pass filter is applied to the differentiator and at the same time, led to the level detect amplifier through an attenuator to adjust the read level.

Since the frequency characteristic of the level detect amplifier is determined so that the level difference between the 1F signal (1001 data pattern) and 3F signal (1111 data pattern) may be controlled, the even threshold level is set even during random data pattern. The threshold detector monitors the output signal of the level detect amplifier by a comparator to keep it at the constant level or more.

When the signal is applied to the threshold detector at the specified level or more (threshold level), the following stage retriggerable monostable multivibrator is retriggered continuously. If the input signal level of the threshold detector is reduced due to drop-out, etc., the trigger pulse signal to the retriggerable monostable multivibrator is interrupted, and the output signal of the retriggerable monostable multivibrator is inverted, and then read gate is closed.

The timing of this retriggerable monomultivibrator is set to the data length of 7 - 15 bits.

Therefore, when the readout signal from the read head is dropped out over the length of 7 - 15 bits or more, the transfer of the RD signal is stopped.

The threshold level is changed over by the threshold control circuit so that the threshold level becomes 35% during write operation (read after write), 10% during gap read operation (read only), and 0% during data read operation (read only).

Fig. 310 shows an example of the operational waveforms of the above-mentioned read circuit.

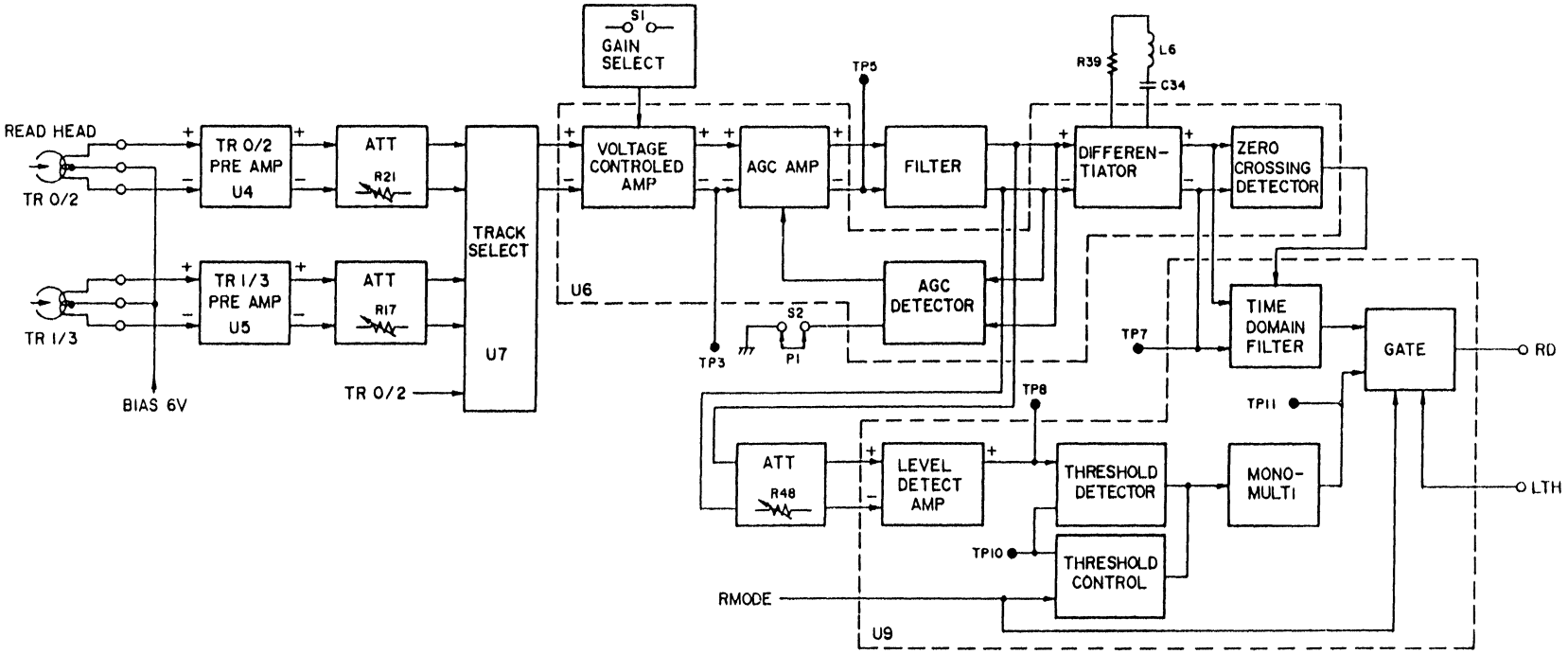


Fig. 309 Read circuit block diagrma

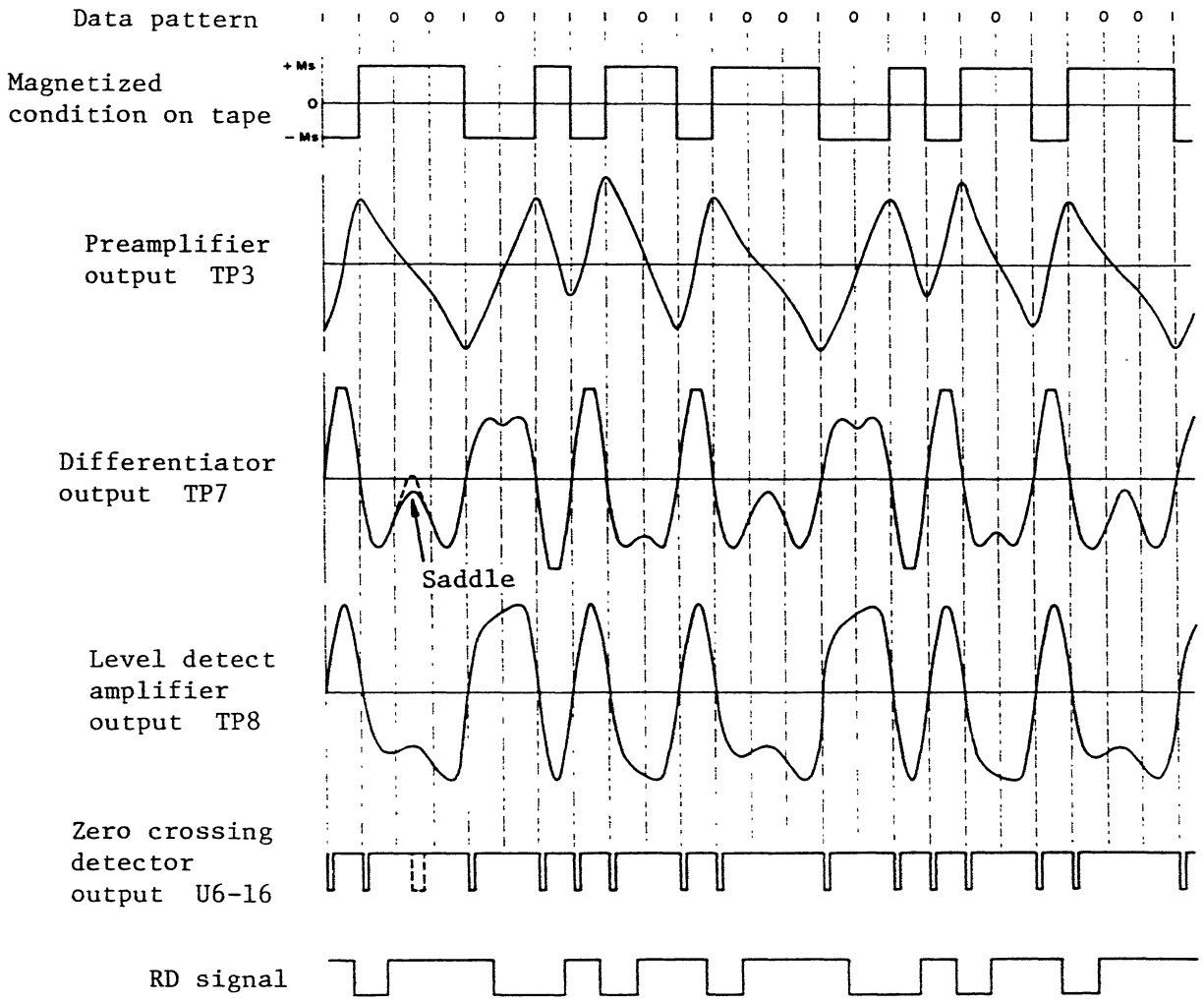


Fig. 310 Example of operational waveforms of read circuit

3-2-2 Write circuit and erase circuit

Fig. 311 shows the block diagram of the write circuit and erase circuit.

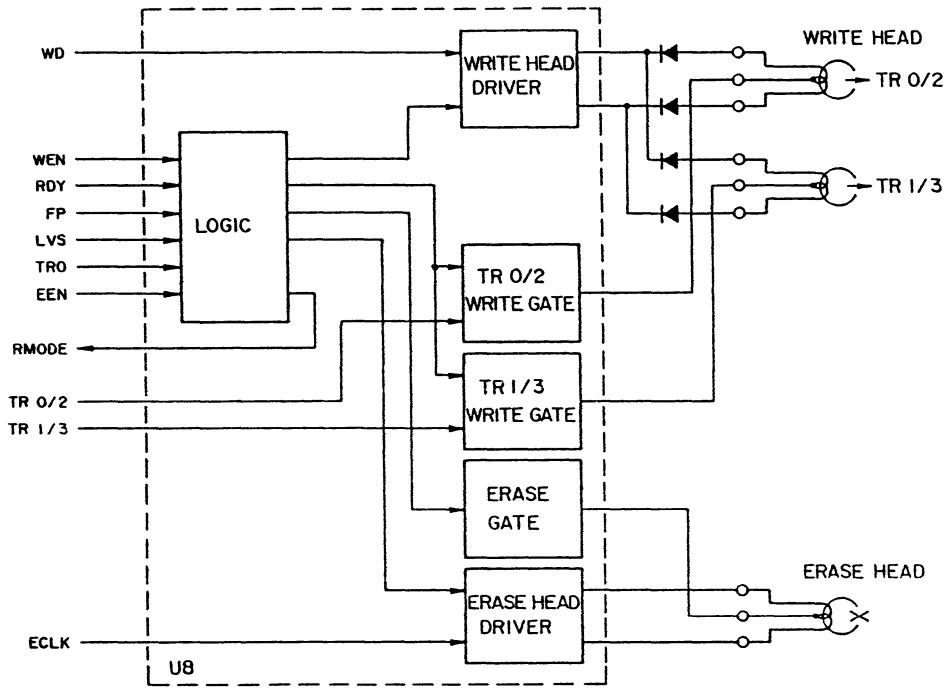


Fig. 311 Write circuit and erase circuit block diagram

The write circuit and erase circuit consist of a write head driver, write gate, erase head driver, erase gate, and logic circuit for the above circuits, etc.

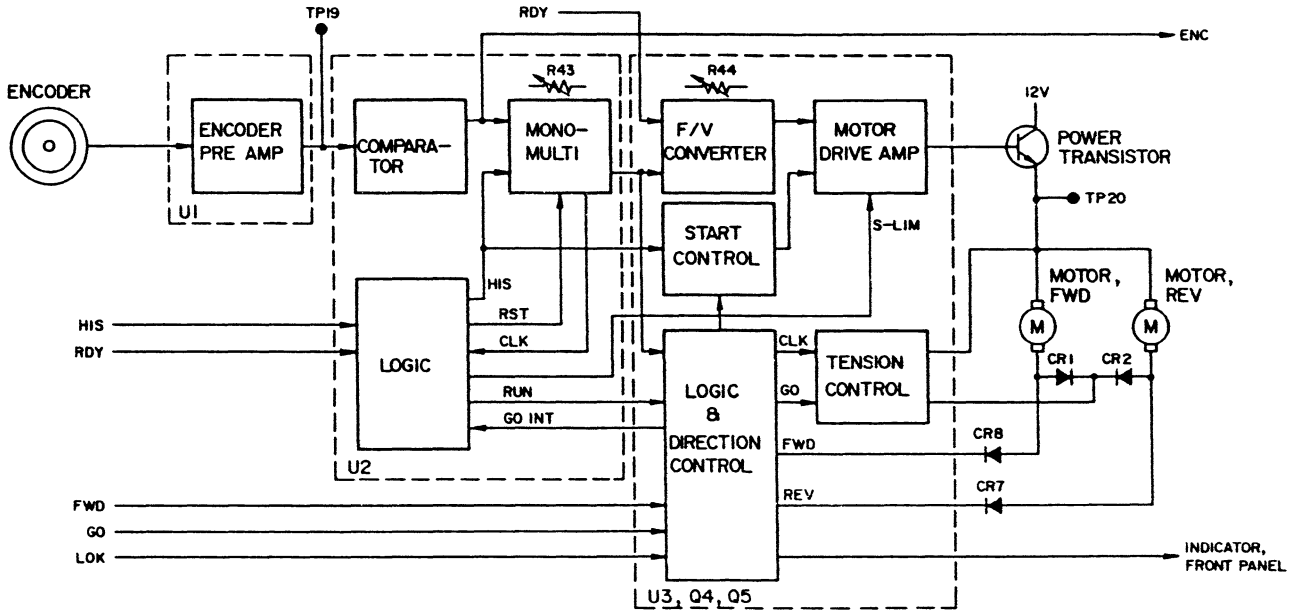
The write head driver feeds the write current to the write head according to the write data given from the PCBA interface control. The write gate changes over the supply current between the track 0/2 side and track 1/3 side according to the track to be data recorded.

The erase head driver feeds the erase current to the erase head according to the erase clock signal given from the PCBA Interface Control. At this time, the erase current is supplied from the erase gate.

3-3 Operation of tape drive system (PCBA Drive Control)

3-3-1 Servo circuit

Fig. 312 shows the block diagram of the servo circuit.



Note: There is a model in which a fixed resistor is used as R43.

Fig. 312 Servo circuit block diagram

The servo circuit consists of an encoder preamplifier, comparator, monostable multivibrator, F/V converter, motor drive amplifier, start controller, tension contorller, direction controller, and logic circuit for controlling the above.

The output signal from the encoder, which is turned in contact with the tape, is amplified by the encoder amplifier, and converted into a pulse signal by the following stage comparator. The monostable multivibrator is triggered by the output pulse signal of the comparator, and its setting time is set nearly to 1/2 of the encoder output signal period. Therefore, the pulse duty of the output signal of the monostable multivibrator is approx.

50% during tape movement. The output signal of the monomultivibrator is converted by the following stage F/V (frequency/voltage) converter into a voltage proportional to the rotary speed. The motor drive amplifier changes the base current of the power transistor according to the output voltage of the F/V converter, and finally controls the motor current.

Since the rotary speed of the motor is transmitted to the encoder via the tape, a servo loop is formed to move the tape at a constant speed by the above-mentioned signal flow.

The tape speed is changed over between 90 ips and 30 ips by changing the setting time of the monostable nultivirator. The start controller generates lamp waveform to determine the rise time at the start of the tape. As for the direction controller, the direction of tape movement is determined by changing over the FWD side motor and REV side motor to each other, and at the same time, the brake is also controlled at stop time.

As for the tension controller, the current of the feed side reel motor is controlled to keep the tape tension constant during tape movement.

3-3-2 Other control circuits

Fig. 313 shows the block diagram of the other control circuits.

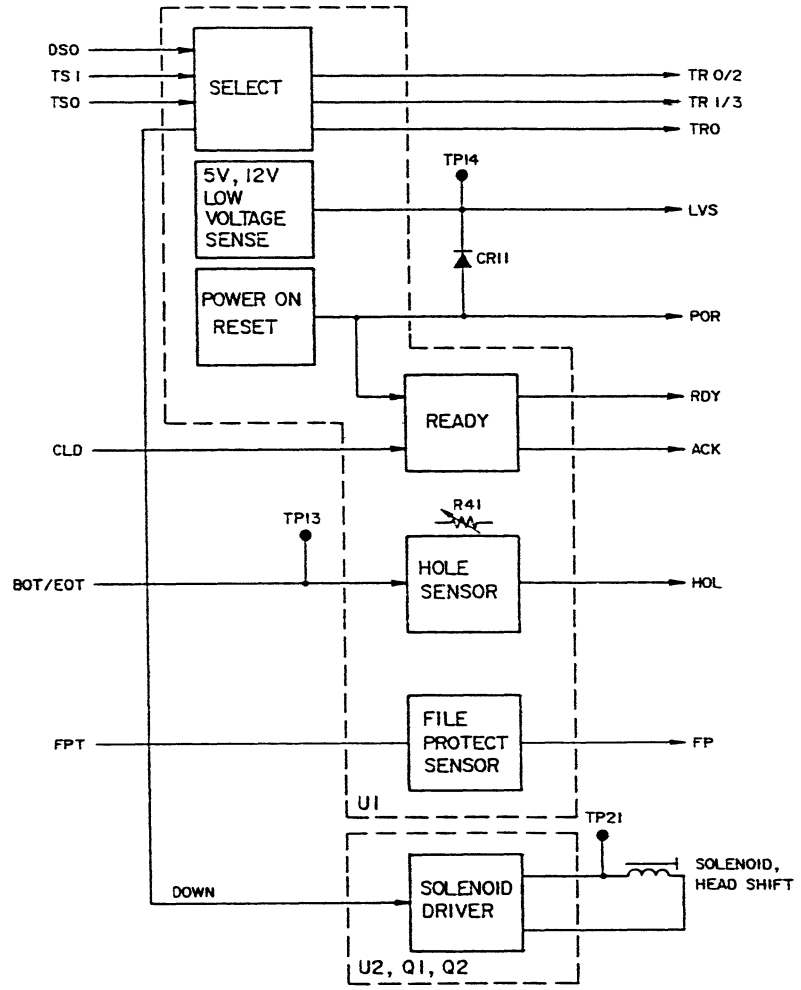


Fig. 313 Other control circuits block diagram

There are a select, low voltage sens, power ON reset, ready, hole sensor, file protect sensor, and solenoid driver as the other control circuits.
The select outputs a head shift solenoid control signal and track changeover signal according to the drive select signal and track select signal given from the PCBA interface control. The low voltage sense monitors both the power voltages of 5 V and 12 V, and outputs an LVS signal when an excessive

voltage drop occurs. The power ON reset outputs a POWER ON RESET signal of approx. 50 ms during power ON time. The ready detects the POWER ON RESET signal and the loading of a cassette tape, and outputs the RDY signal and ACK signal. The hole sensor converts the output signal of the phototransistor for the hole sensor into a pulse signal and outputs it.
The file protect sensor converts the output signal of the photo interrupter for detecting the write protect hole into a pulse signal and oututs it. The solenoid driver feeds the drive current to the head shift solenoid when track 1 and track 2 are selected. The solenoid driver drives that solenoid for 200 ms by the power supply of 12 V to attract it, and after that, holds it by the power supply of 5 V.

"D/CAS"

3-4 Interface control (PCBA Interface Control)

The PCBA interface control (hereinafter, referred to as MTC) controls the transfer of command/status and read/write data with the host system (hereinafter, referred to as HOST), or performs data processing or tape position control with respect to the PCBA drive control (hereinafter, referred to as CMT). The main functions of MTC are controlled by CPU (U9/80C85A microprocessor), while the data system requiring high speed transfer is controlled by DMAC (U7/82C37 DMA controller).

The data transfer between the individual blocks within MTC as shown in Fig. 301(a) is performed by DMAC in competition with CPU on the CPU bus (cycle stealing mode). At this time, however, this system is programmed so that the CPU bus is released to CPU once on every DMA cycle to prevent the CPU bus from being occupied for a long time, when data transfer requests are concentrated, thereby assuring the worst operating ratio of CPU.

Description is given below on the operation of each block of MTC (PCBA interface control) shown in Fig. 301(a).

3-4-1 CPU

The microprocessor 80C85A is used as the CPU. The CPU controls the operation of each LSI within MTC. It also controls directly controls the moving system and write system signals GO, FWD, HIS WEN, and EEN, etc. with respect to CMT via the output port, or monitors the ouptut signals CLD, FPT, and HOL, etc. from CMT via the input port and feeds them back to the tape motion control.

While, as for the data system, the CPU generates a data block by adding a header (such as track No. and block address) to the data received from the HOST during write operation, or generates File Mark Write, and control block, and controls Rewrite, etc. during error occurrence. During read operation, it also checks the header, and identifies the data block, file mark block and control block, and then transfers only the data part of the data block to the HOST.

3-4-2 ROM

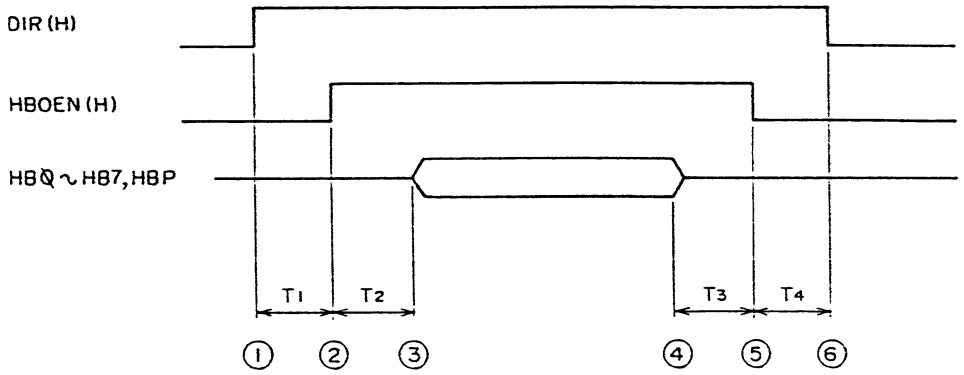
This memory is an ROM of 8 K bytes in which the program is stored to realize the CPU operations mentioned in Item 3-4-1.

3-4-3 RAM

This memory is a static RAM of 2 K bytes used as a data buffer of 3 blocks.

3-4-4 Host interface control

The hardware of the host interface control consists of one gate array logic IC (U11/2310 IC, interface control) and driver/receiver.
For the details of the interface signal timing, refer to the "MT-2ST/20D Specifications".
Description is given below on the major operations of this IC.
HB0 to HB7, and HBP are a bidirectional bus.
To prevent the bus competition between the driver IC and HOST side driver, there is the timing relation as shown in Fig. 314 among this bus, DIR and HBOEN.



T1 ≳ 139ns

T2 > 138ns

T3 > 138ns

T4 ≳ 139ns

(Note) DIR(H) : Indicates the transfer from MTU to HOST, when signal level goes high.
HBOEN(H): Indicates that the driver of MTC is validated when the signal level goes high, and the receiver is validated when the signal level goes low.

Fig. 314 Interface bus timing

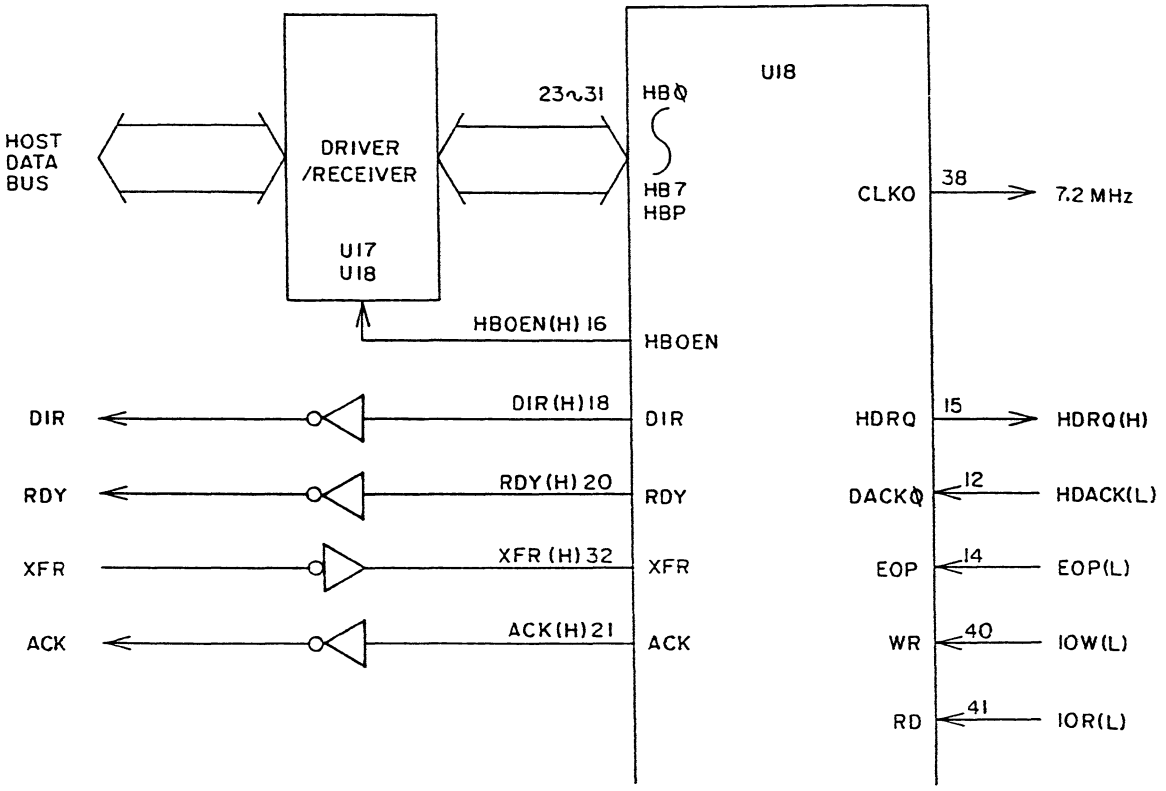


Fig. 315 Host interface control circuit

HDRQ(H), HDACK(L) and EOP(L) are interface signals with DMAC. During write operation, these signals have the timing relation with the host interface signals ACK(H), XFR(H), and RDY(H) as shown in Fig. 316; during read operation, they have the timing relation with ACK(H), XFR(N) and RDY(H) as shown in Fig. 317.

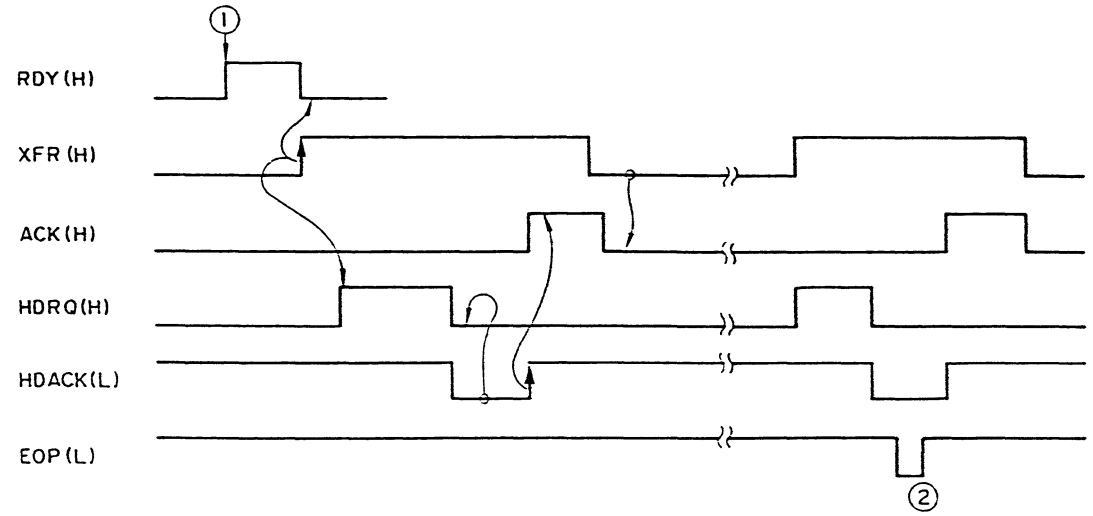


Fig. 316 Timing in write operation

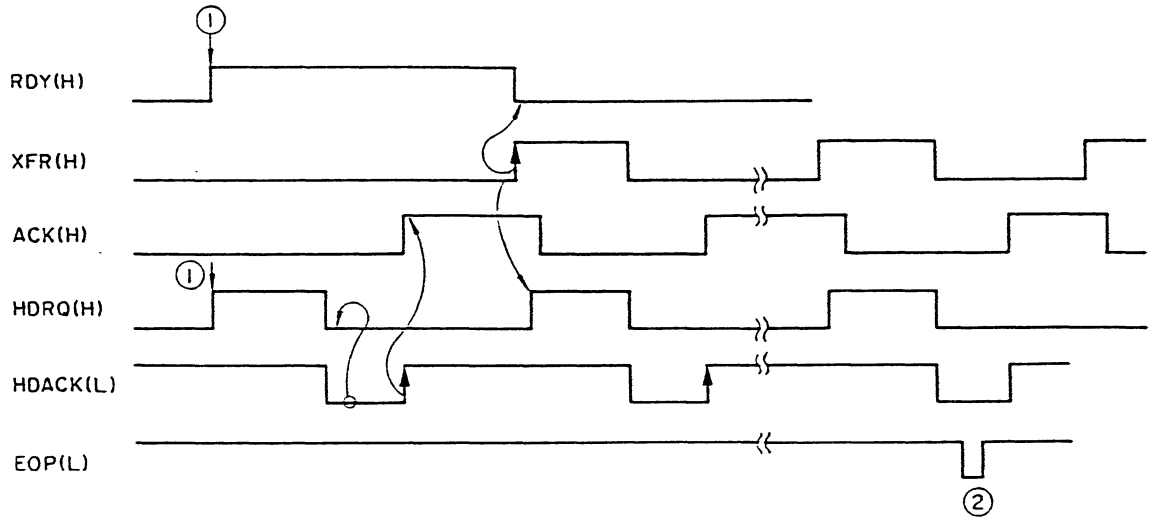


Fig. 317 Timing in read operation

In each case, the RDY(H) signal is set by CPU prior to the transfer of each block. During read operation, the HDRQ(H) signal is also set simultaneously (timing ①).

During write operation, the data from the HOST is latched in the register within this IC by the leading edge of HDRQ(H), and the data is stored in RAM by the IOR(L) and NW(L) signals outputted from DMAC together with HDACK(L).

During read operation, the beginning data request of each block to DMAC is set by CPU (timing ①). MR(L) and IOW(L) are outputted from DMAC, and the data is written in the register within this IC.

In any case, the data block is transferred in 512 bytes units, and the RDY signal is set by CPU prior to the transfer of each block (timing ①).

When end data of each block is transferred, the EOP(L) signal is outputted from DMAC together with the HDACK(L) signal, and F/F within this IC is set (timing ②), and thereby the CPU identifies the transfer of one block to be ended.

3-4-5 DMAC

The DMAC consists of an IC 82C37 DMA controller (U7) and 8 bit address latch.

The channel 0 is assigned with host interface control, and the channel 1 with write control, and then the channel 2 with read control.

During write/read operation, the relevant two channels are always operated simultaneously. During write operation, the channel 2 is also operated only for the beginning 4 bytes of each block on the tape in read after write operation.

Namely, the three channels are operated simultaneously only in such a case.

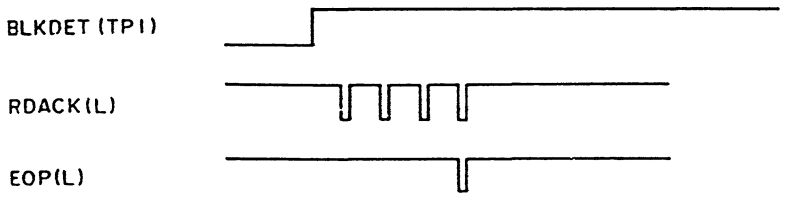


Fig. 318 Channel 2 timing in write operation

Note that the I/O system and memory system of the write/read signal of DMAC are connected reversely to those of CPU as shown in Table 301 below.

Table 301 Write/read signal corresponding table

CPU bus signal name	82C37 signal name
MW(L)	$\overline{IOW}$
MR(L)	$\overline{IOR}$
IOW(L)	$\overline{MW}$
IOR(L)	$\overline{MR}$

3-4-6 Counter/timer

The counter/timer consists of timers within an IC 82C54(U4) and IC 81C55-(U6). The timer within IC 81C55 divides the frequency of the CPU clock to generate the clock of 50 kHz.

Among the three counters within IC 82C54, the counter 0 (the output from Pin No. 10) generates the write clock (TP3) by dividing the frequency of the 3.6 MHz clock, and supplies the resultant write clock to the write control logic (U14/2309).

The coulter 1 receives the above-mentioned 50 kHz clock as the input, and uses it as a timer for monitoring the various times.

The counter 2 receives the encoder pulses (J4-12) outputted from CMT as the input, and controls the tape position by counting these pulses.

3-4-7 Write/read control

The hardware of the write/read control consists of a gate array logic (U14/IC, W/R control) and VFO circuit.
Fig. 319 shows the block diagram of the write/read control including the internal logic of this IC.

(1) Write control logic

The write data is transferred byte by byte from RAM by DMAC. The write control logic converts this data into GCR code in 4 bits units while generating a CRC character, and further converts the resultant code into serial data in phase with the write clock to be outputted to CMT.

The CRC character generated is outputted in the same format in succession to the end data of one block.

(2) Read control logic

The read clock in phase with the serial Read Data (RD) outputted from CMT is generated in the VFO circuit. The serial Read Data (RD) is sampled by this read clock, and parallel GCR code is set up in the shift register. This code is subjected to GCR reverse conversion, and the resultant code is inputted to the CRC checker and at the same time, it is transferred byte by byte to RAM under the control of DMAC.

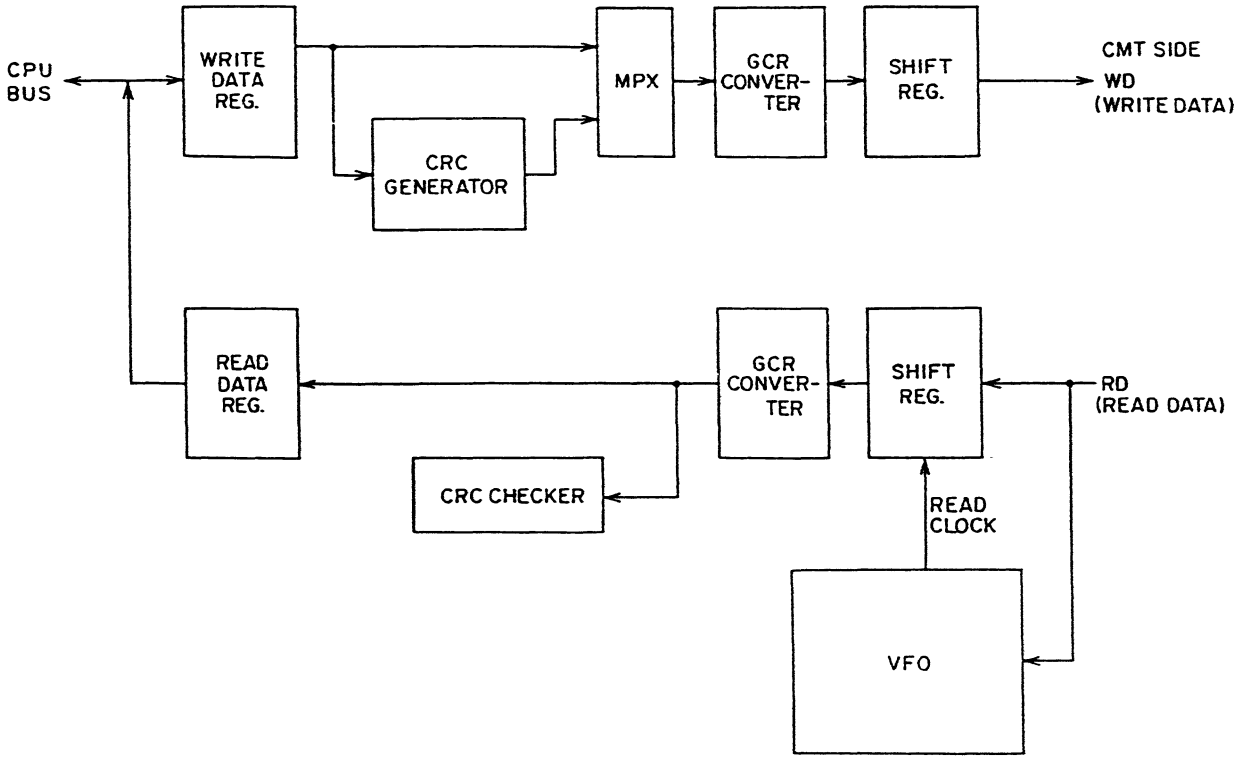


Fig. 319 Write/read control logic block diagram

(3) VFO circuit

In order to sample properly the serial read data, whose period changes dynamically with fluctuation in the tape speed, the VFO circuit controls the read clock to keep always the synchronization with the serial read data.

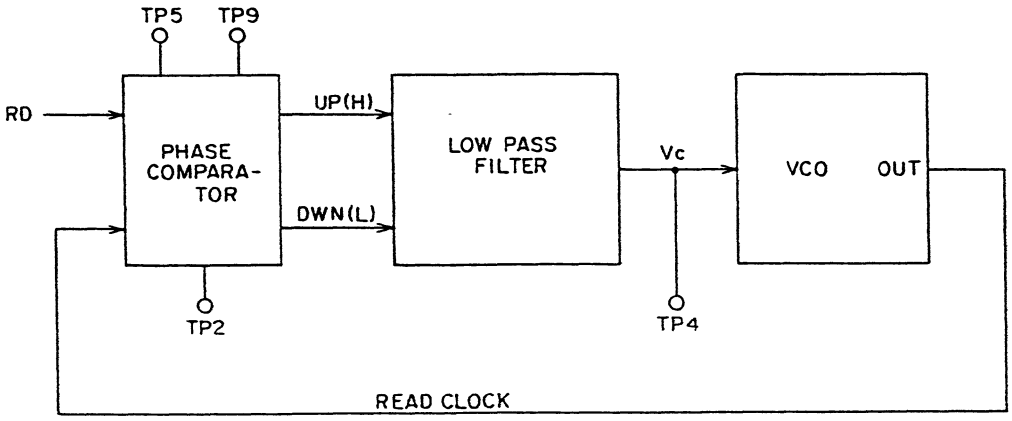


Fig. 320 VFO circuit block diagram

Reference timing (TP5 and TP9) is generated from the serial read data (RD). Data sample timing (TP2) is also generated by dividing the frequency of the read clock. The phase difference between these two timings is detected by the phase comparator. When the data sample timing lags behind the reference timing, UP(H) pulse is outputted to the following stage; when the former leads the latter, DWN(L) pulses is outputted to it.

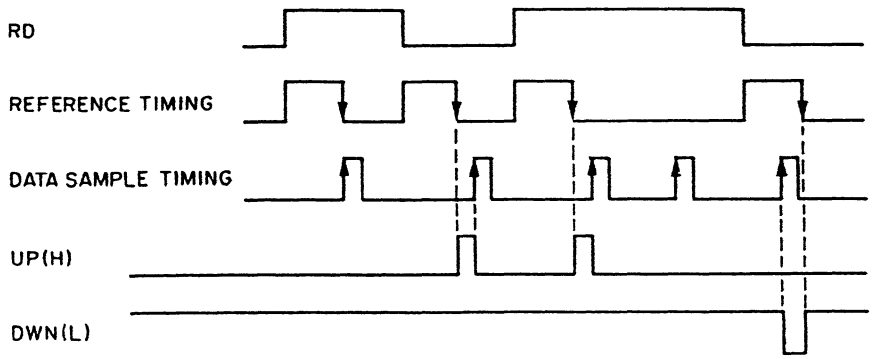


Fig. 321 VFO circuit timing

In the low-pass filter, each integral time is converted into level output Vc potential so that it becomes higher against UP(H) and lower against DWN(L), and thereby the oscillation frequency of the following stage VCO is controlled.

The reference timing in read operation appears at TP5, and that in write operation (read after write) appears at TP9.

3-4-8 I/O port

The I/O port consists of 81C55(U6). The CPU controls CMT directly via this I/O port, and monitors the various status signals outputted from CMT.

SCSI

"SCSI"

3-5 Interface control (PCBA Interface Control)

The PCBA interface control (hereinafter, referred to as MTC) controls the transfer of command, sense data, read/write data, and other information with the host system (hereinafter, referred to as HOST), or performs data processing or tape position control with respect to the PCBA drive control (hereinafter, referred to as CMT).

The main functions of MTC are controlled by CPU (U7/80C85A microprocessor), while the data system requring high speed transfer is controlled by DMAC (U8/82C37 DMA controller).

The data transfer between the individual blocks within MTC shown in Fig. 301(b) is performed by DMAC in competition with CPU on the CPU bus (cycle stealing mode). At this time, however, this system is programmed so that the CPU bus is released to CPU once on every DMA cycle to prevent the CPU bus from being occupied for a long time, when data transfer requests are concentrated, thereby assuring the worst operating ratio of CPU.

Description is given below on the oepration of each block of MTC (PCBA interface control) shown in Fig. 301(b).

3-5-1 CPU

The microprocessor 80C85A is used as the CPU. The CPU controls the operation of each LSI within MTC. it also controls directly the moving system and write system signals GO, FWD, HIS WEN, and EEN, etc. with respect to CMT via the ouptut port, or monitors the output signals CLD, FPT, and HOL, etc. from CMT via the input port, and feeds them back to the tape motion control. While, as for the data system, the CPU generates a data block by adding a header (such as track No. and block address) to the data received from the HOST during write opeeration, or generates File Mark and control block, and controls Rewrite, etc. during error occurrence. During read operation, it also checks the header, and identifies the data block, file mark block and control block, and then transfers only the data part of the data block to the HOST.

3-5-2 ROM

This memory is an ROM of 8 K bytes in which the program is stored to realize the CPU operations mentioned in Item 3-5-1.

3-5-3 RAM

This memory is a static RAM of 8 K bytes used as a data buffer of 15 blocks.

3-5-4 Host interface control

The hardware of the host interface control consists of a gate array logic IC (U12/2557 IC, SCSI control) and TTL logic IC (U21, U22) and driver/receiver. For the details of the interface signal timing, refer to the "MT-2ST/20S Specifications".

(1) selection operation

After setting DMAC for command transfer, the CPU sets the READY F/F within the 2557 SCSI control (hereinafter, referred to as 2557), and waits for selection from the HOST.

When such status that SEL is outputted from the HOST together with the correct ID code and correct parity bit, and none of I/O and BSY are outputted is maintained during 2.5 to 3.5 clocks BSY is outputted. Then, after SEL is set to FALSE by the HOST, C/D is outputted in synchronization with the following clock, and command phase is generated.

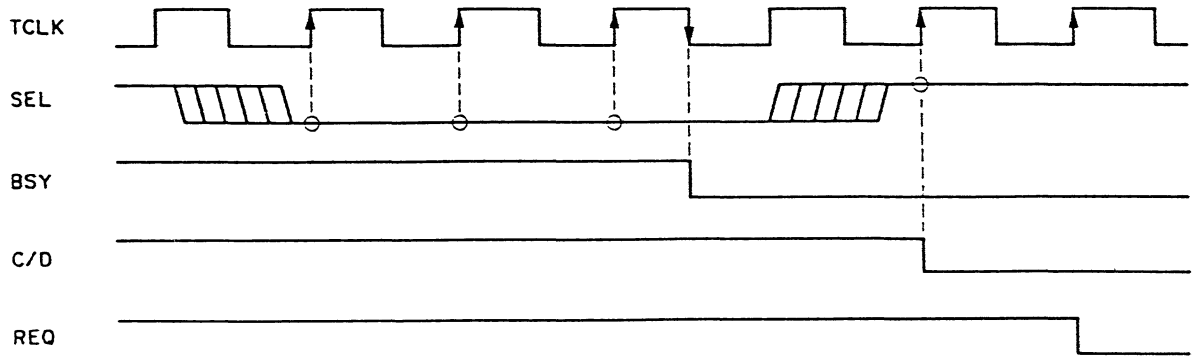


Fig. 322 Selection operation timing

(2) Command transfer

REQ is outputted one clock after C/D is outputted upon receipt of selection. The command transfer is performed by handshakeing between REQ and ACK.

Fig. 323 shows this status including the relation with DMAC.

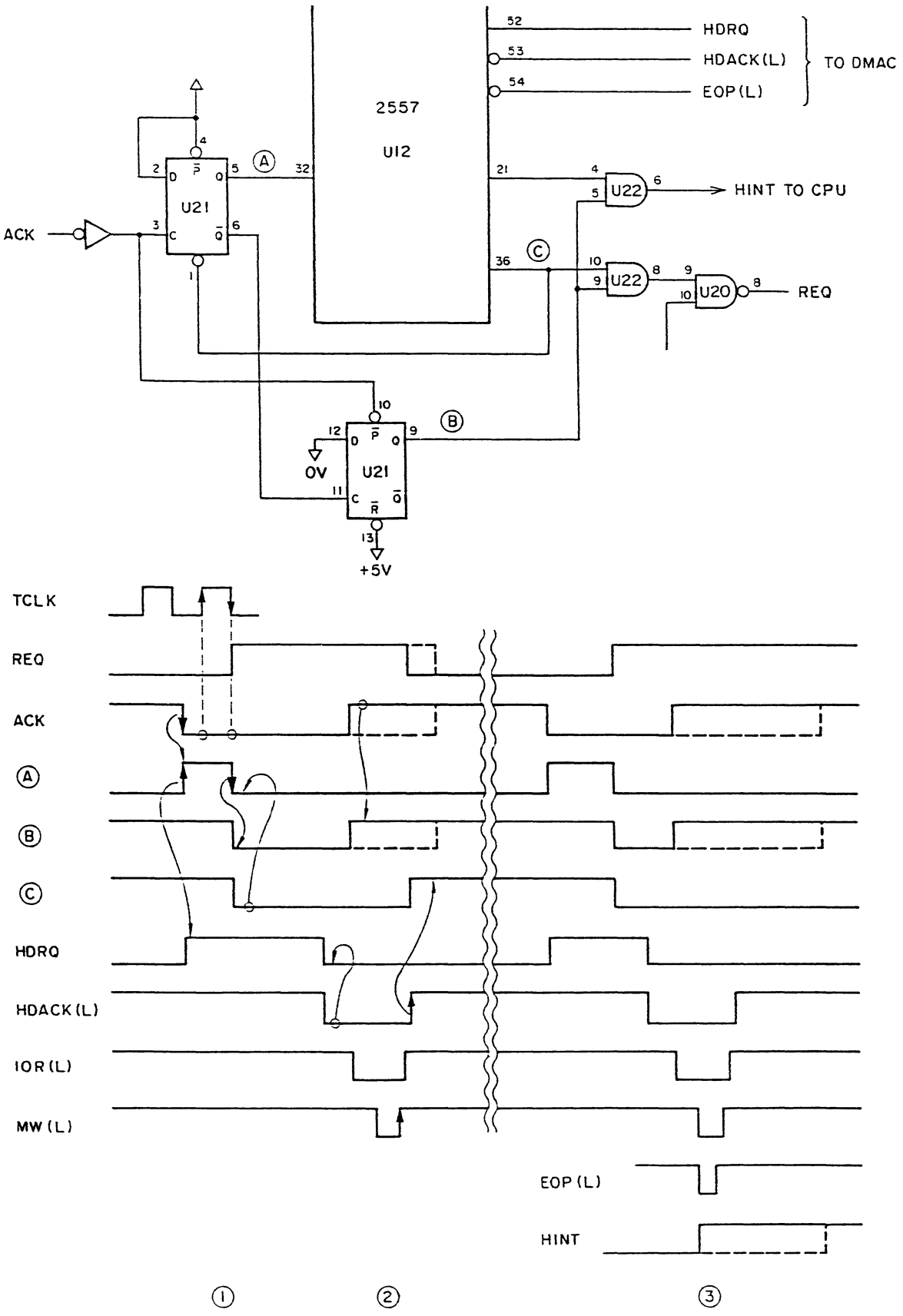


Fig. 323 Command transfer timing

① REQ is set to FALSE 0.5 to 1.5 clock after ACK is outputted. At this timing, the contents on the data bus (HB0 - HB7, HBP) are latched in the internal data register of 2557.

② Data (command) is written from 2557 to RAM by IOR(L) and MW(L).

③ EOP(L) is outputted from DMAC together with HDACK(L) of the end byte (6th byte) of command, and thereby the interrupt request HINT to CPU is outputted.

Remark The signal Ⓑ is a gate signal to prevent the following REQ or HINT from being outputted earlier, when the ACK response is late. U21 and U22 are logic circuits for such purpose.

(3) Write data transfer

This transfer timing is exactly the same as in the command transfer. For the write data transfer, DMAC is operated in 512 bytes units. The beginning REQ of each data block is outputted by an instruction from CPU.

(4) Read data transfer

This timing is nearly the same as in the write data transfer. The beginning HDRQ of each data block is set by an instruction from CPU. The beginning REQ is outputted by DACK(L) with respect to the above. Fig. 324 shows the read data transfer timing.

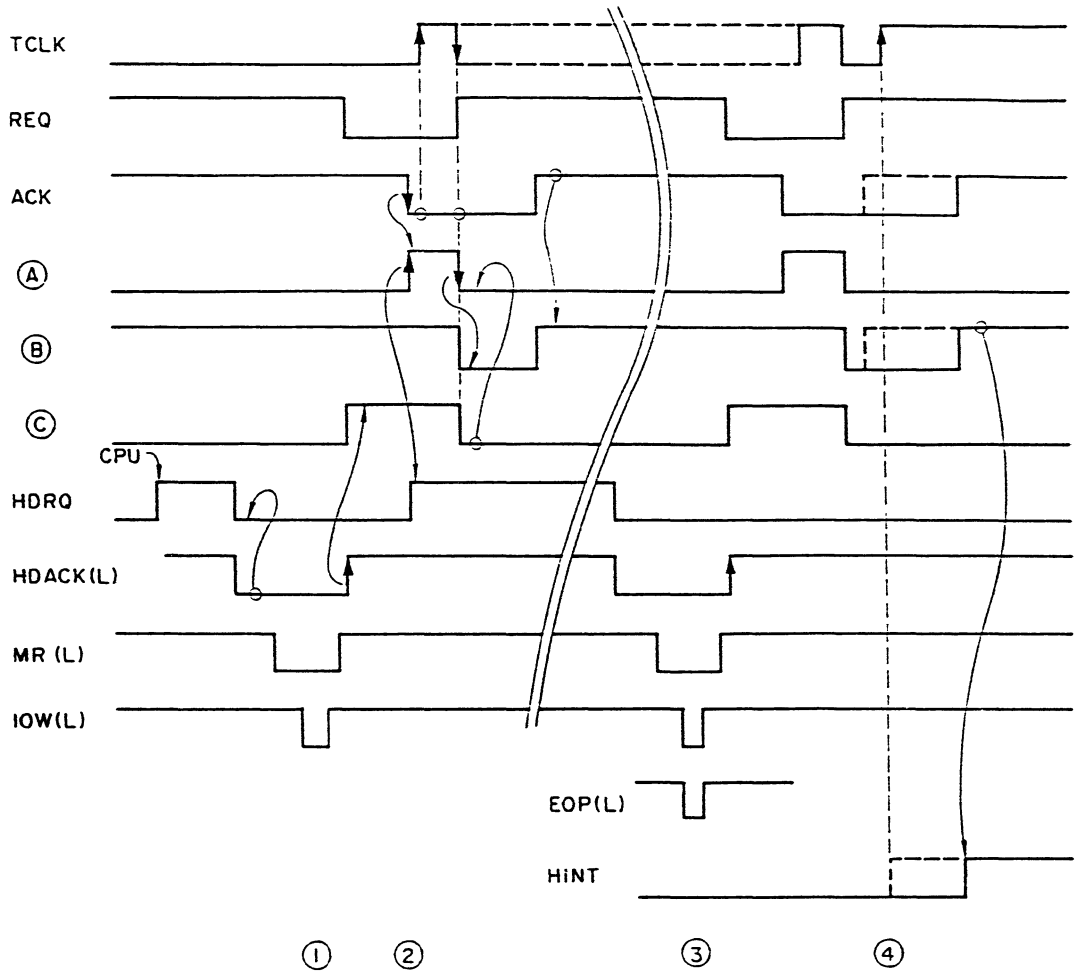


Fig. 324 Read data transfer timing

① The data is written from RAM into the internal register of 2557 by the MR(L) and IOW(L) outputted from DMAC, and its contents are outputted over the interface bus (HB0 to HB7).

② The HOST fetches the data on the interface bus, and outputs ACK. The handshake timing of REQ and ACK is the same as in Fig. 323.

③ DMAC transfers the end byte of one block.

④ When the ACK response is very fast, REQ is set to FALSE, and interrupt request HINT to CPU is outputted 0.5 clock after (indicated in break line in the figure).

(5) Other transfers

EAch transfer of sense data, status and message is the same as in the read data transfer, except for the number of transfer bytes.

3-5-5 DMAC

The DMAC consists of an IC 82C37 DMA controller (U8) and 8-bit address latch.
The channel 0 is assigned with host interface control, and the channel 1 with write control, and then the channel 2 with read control.
During write/read operation, the relevant two channels are always operated simultaneously. With the 30 ips model, during write operation, the channel 2 is also operated only for the beginning 4 bytes of each block on the tape in read after write operation.
Namely, the three channels are operated simultaneously only in such a case.

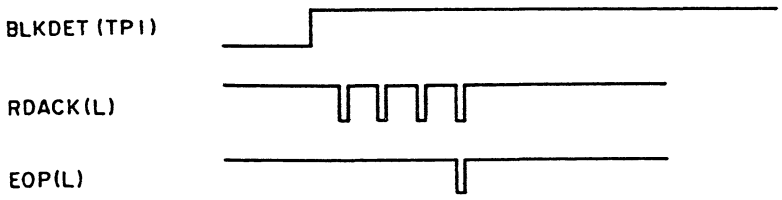


Fig. 325 Channel 2 timing in write operation (30 ips)

Note that the I/O system and memory system of the write/read signal of DMAC are connected reversely to those of CPU as shown in Table 302 below.

Table 302 Write/read signal corresponding table

CPU bus signal name	82C37 signal name
MW(L)	$\overline{IOW}$
MR(L)	$\overline{IOR}$
IOW(L)	$\overline{MW}$
IOR(L)	$\overline{MR}$

3-5-6 Counter/timer

The counter/timer consists of timers within an IC 82C54(U5) and IC 81C55-(U4).

The timer within IC 81C55 divides the frequency of the CPU clock to generate the clock of 50 kHz.

Among the three counters within IC 82C54, the counter 0 (the output from Pin No. 10) generates the write clock (TP3) by dividing the frequency of the 3.6 MHz clock, and supplies the resultant write clock to the write control logic (U9/2309).

The counter 1 receives the above-mentioned 50 kHz clock as the input, and uses it as a timer for monitoring the various times.

The counter 2 receives the encoder pulses (J4-12) outputted from CMT as the input, and controls the tape position by counting these pulses.

3-5-7 Write/read control

The hardware of the write/read control consists of a gate array logic (U9/IC, W/R control) and VFO circuit. Fig. 326 shows the block diagram of the write/read control including the internal logic of this IC.

(1) Write control logic

The write data is transferred byte by byte from RAM by DMAC. The write control logic converts this data into GCR code in 4 bits units, while generating a CRC character, and further converts the resultant code into serial data in phase with the write clock to be outputted to CMT.

The CRC character generated is outputted in the same format in succession to the end of one block.

(2) Read control logic

The read clock in phase with the serial Read Data (RD) outputted from CMT is generated in the VFO circuit. The serial Read Data (RD) is sampled by this read clock, and parallel GCR code is set up in the shift register. This code is subjected to GCR reverse conversion, and the resultant code is inputted to the CRC checker and at the same time, it is transferred byte by byte to RAM under the control of DMAC.

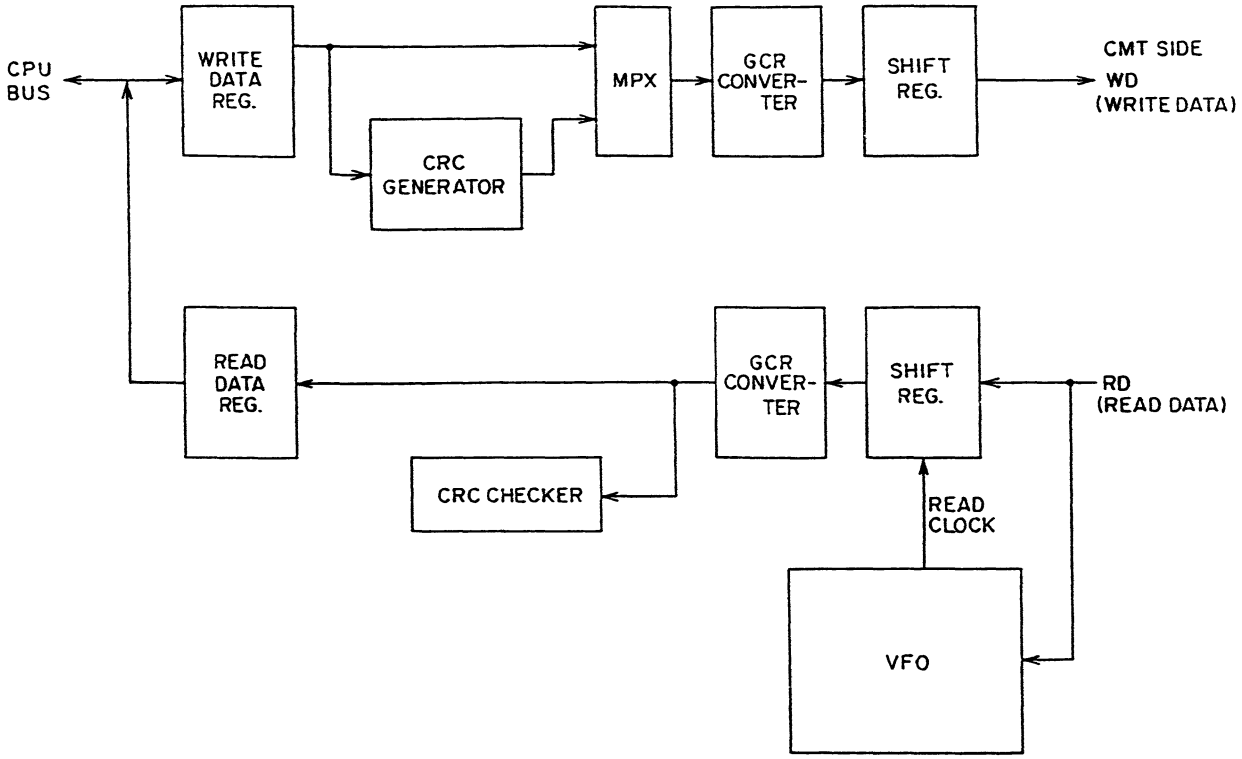


Fig. 326 Write/read control logic block diagram

(3) VFO circuit

In order to sample properly the serial read data, whose period changes dynamically with fluctuation in the tape speed, the VFO circuit controls the read clock to keep always the synchronization with the serial read data.

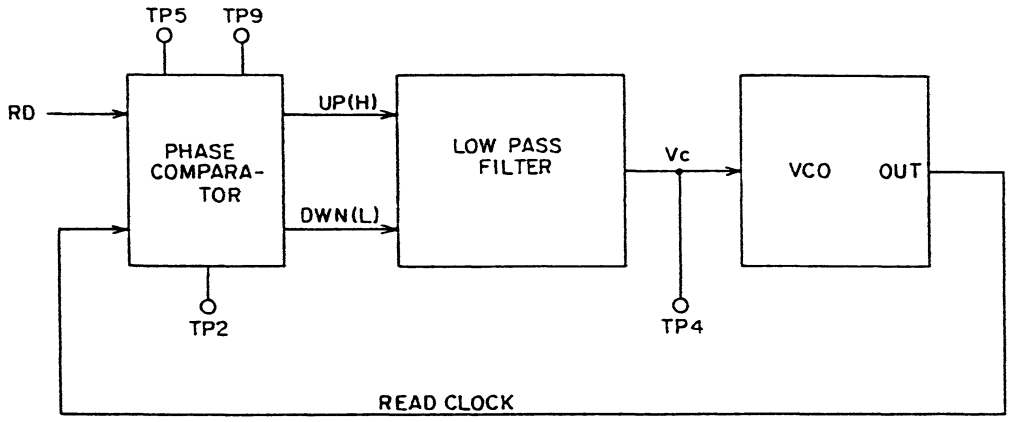


Fig. 327 VFO circuit block diagram

Reference timing (TP5) is generated from the serial Read Data (RD). Data sample timing (TP2) is also generated by dividing the frequency of the read clock. The phase difference between these two timings is detected by the phase comparator. When the data sample timing lags behind the reference timing, UP(H) pulse is outputted to the following stage; when the former leads the latter, DWN(L) pulse is outputted to it.

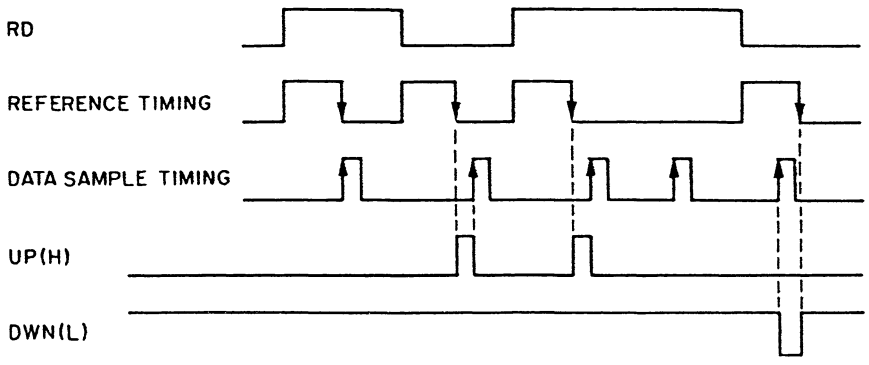


Fig. 328 VFO circuit timing

In the low-pass filter, each integral time is converted into level output Vc potential so that it becomes higher against UP(H) and lower against DWN(L), and thereby the oscillation frequency of the next stage VCO is controlled.

The reference timing differs betwen the write operation and read operation.

3-5-8 I/O port

The I/O port consists of IC 81C55(U4). The CPU controls CMT directly via this I/O port, and monitors the various status signals outputted from CMT.

"BASIC"

3-6 Interface control (PCBA Interface Control)

3-6-1 Configuration

There are two types of interface controls; one is of a discrete type (exclusive for 4 tracks) and the other is of a LSI type (in common to 4 tracks and 9 tracks). The discrete type interface control consists of individual circuits of INITIAL CONTROL, MOTION CONTROL, TAPE POSITION MANAGEMENT, RDP CONVERTER, CASSETTE LOAD DELAY, TACH PULSE CONVERTER (1/16) and CLOCK GENERATOR, etc., and all the I/O signals are of TTL level.

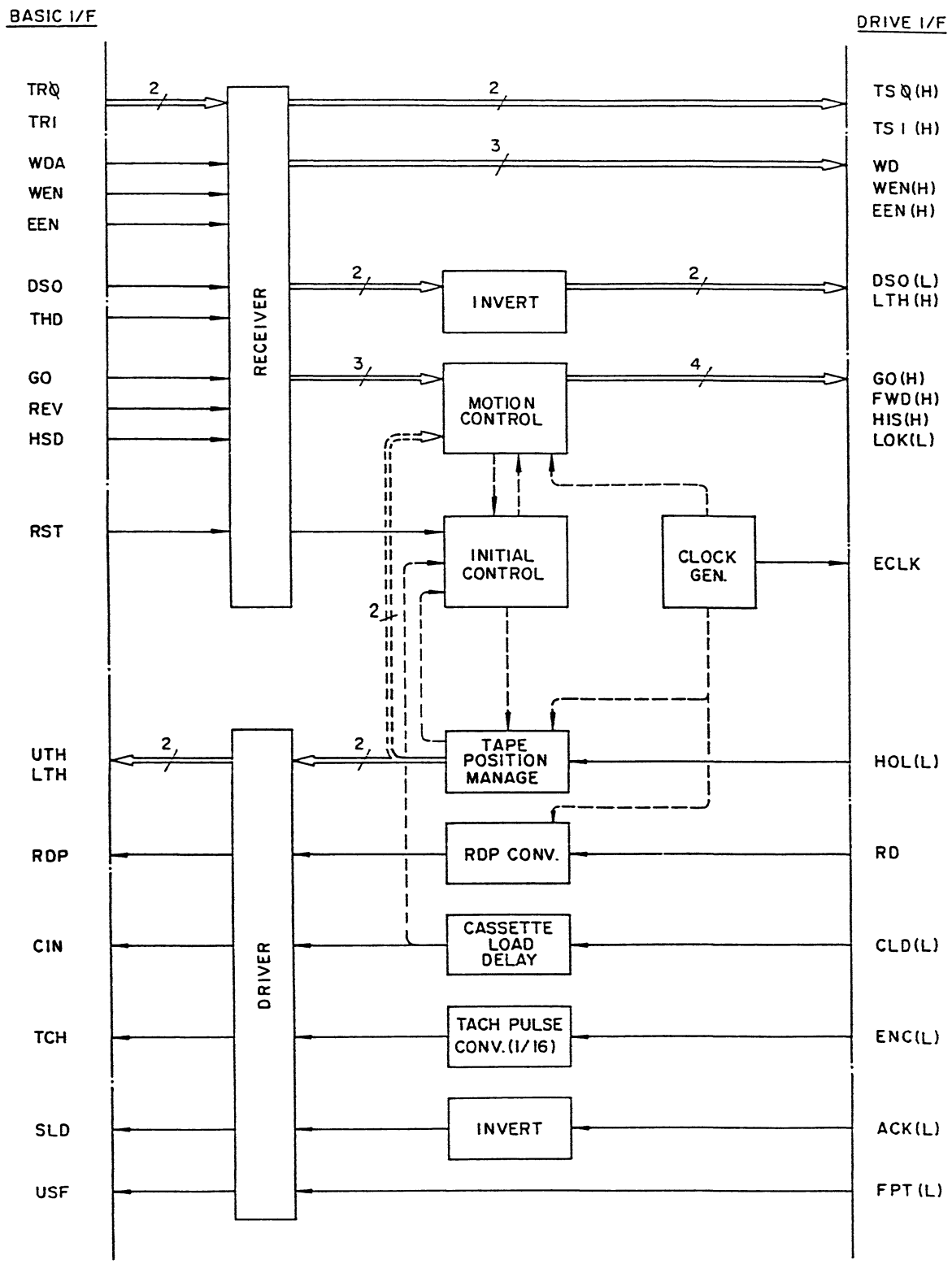
The LSI type interface control (PCBA interface control P/N 1553207300, applied to issue D onward) is a LSI version of the discrete type interface control. There is not operational difference between these two types except with the track select signal added.

This interface control consists of a peripheral circuit and driver/receiver, etc., centering around the interface control LSI (hereinafter, referred to as LSI).

The BASIC I/F side input/output is of TTL level, and the DRIVE I/F side input is of TTL level, and its output is of CMOS level.

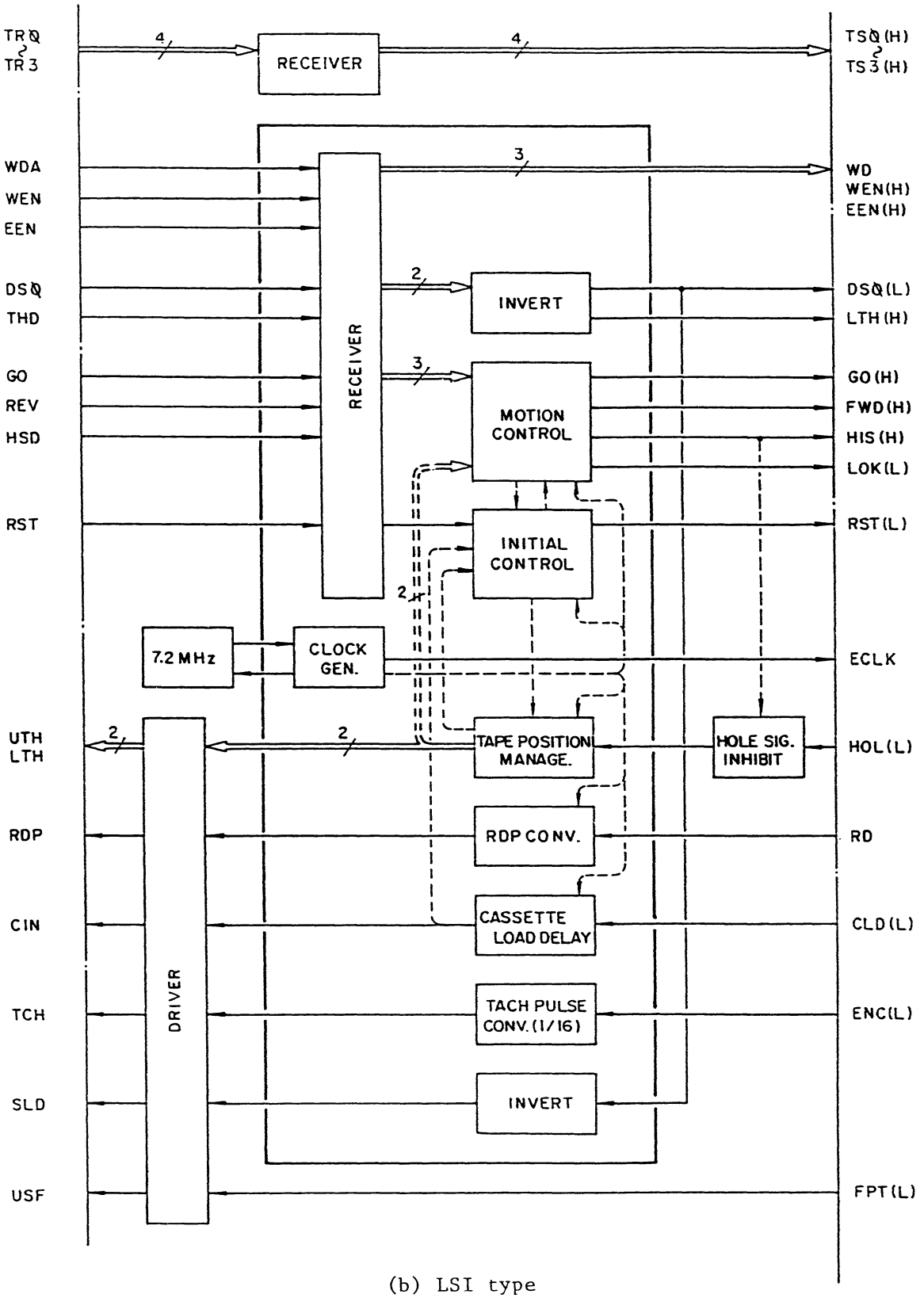
The LSI is a CMOS type Gate Array, in which almost all processings required for interface control are performed.

Fig. 329 shows the hardware block diagram of each type of interface control.



(a) Discrete type

Fig. 329 Hardware block diagram



(b) LSI type

Fig. 329 Hardware block diagram

3-6-2 Theory of operation

Description is given below on the circuit operation of each block shown in Fig. 329(a).
The circuit description of the LSI type is omitted herein, because it is nearly the same as in the discrete type.

(1) Initial control

The INITIAL CONTROL CIRCUIT controls the initialization of each part of MTU, and subsequent operations due to Power ON (with the cassette loaded), cassette loading, or by a reset signal from the BASIC I/F. After the completion of initialization, it is not operated until the following reset conditions are met.

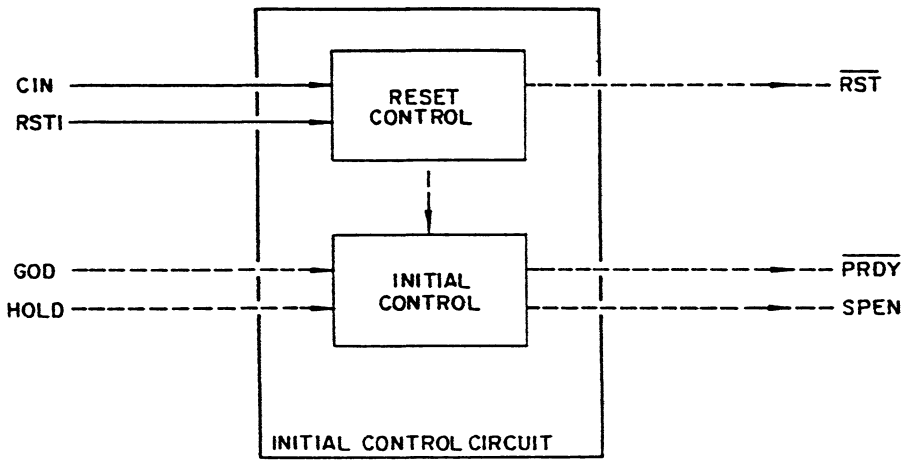


Fig. 330 Initial control

(2) Motion control

The motion control circuit consists of a CLEAR-LEADER CONTROL part, DIRECTION CONTROL part, SPEED CONTROL part, STOP CONTROL part, and GO CONTROL part.

THE CLEAR-LEADER CONTROL part is a circuit to control the tape motion within the clear reader.

The CIRECTION CONTROL part is a circuit to control the tape motion by the tape winding direction changeover (REV signal change).

The SPEED CONTROL part is a circuit to control the tape motion by the tape speed changeover (HSD signal change).

The STOP CONTROL part is a circuit to control the tape motion when any of the REV signal, HSD signal and GO signal from the BASIC I/F changes. The REV signal, HSD signal and GO signal are inhibited during stop motion.

The GO CONTROL part controls the GO(H) signal to the DRIVE I/F according to the tape motion control signals from the above-mentioned two control parts.

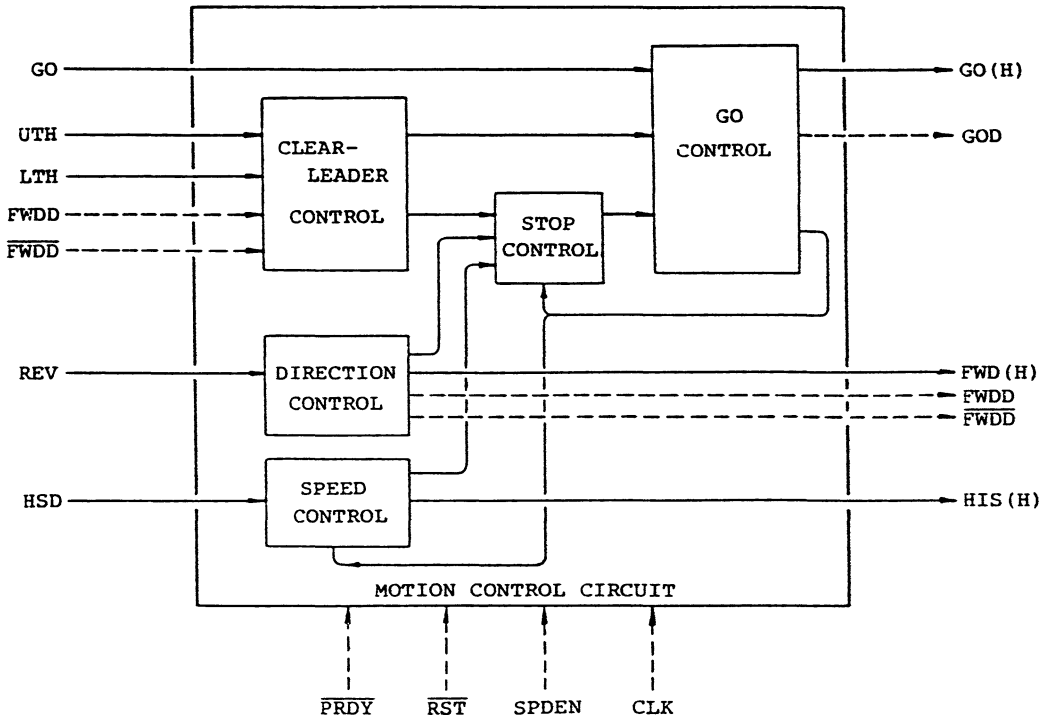


Fig. 331 Motion control

(3) Tape position manangement

The TAPE POSITION MANAGEMENT CIRCUIT is a circuit to convert hole information from the DRIVE I/F into tape position code. This circuit becomes operable after initialization has been completed.

After Power ON (with the cassette loaded), cassette loading, or resetting, this circuit is inhibited by the $\overline{\text{PRDY}}$ signal until the EOT or BOT side clear leader is detected.

After the EOT or BOT side clear leader is detected and the tape position is initialized (each signal of UTHI and LTHI is set to either EOT position or BOT position status), the inhibit of this circuit is released. Then, this circuit is placed in operable status.

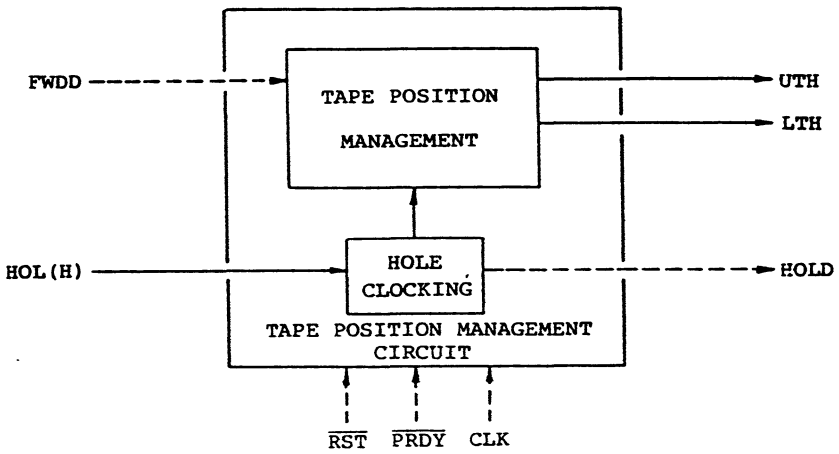


Fig. 332 Tape position management

(4) RDP conversion

The RDP CONVERSION CIRCUIT is a circuit to detect the leading and trailing edges of the RD signal of the DRIVE I/F, and convert it into pulses.

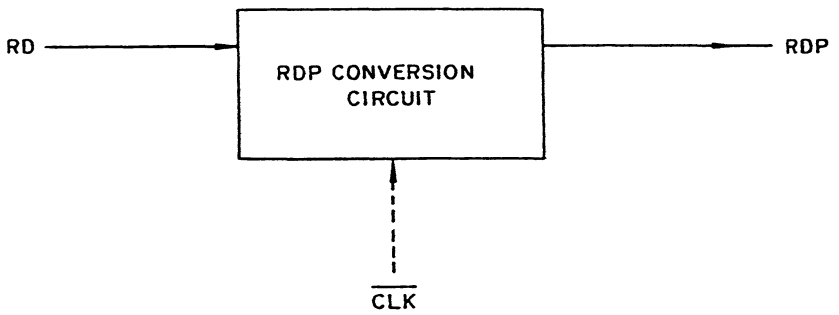


Fig. 333 RDP conversion

(5) Cassette load delay

The CASSETTE LOAD DELAY CIRCUIT is a circuit to assure the retention time after cassette loading.

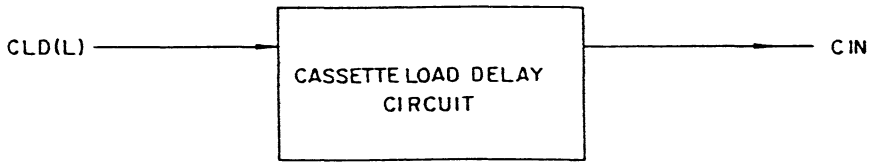


Fig. 334 Cassette load delay

(6) Tach pulse conversion

The TACH PULSE CONVERSION CIRCUIT is a circuit to divide the frequency of the ENC(L) signal from the DRIVE I/F by 16, and supply the resultant signal to the BASIC I/F as tach pulses.

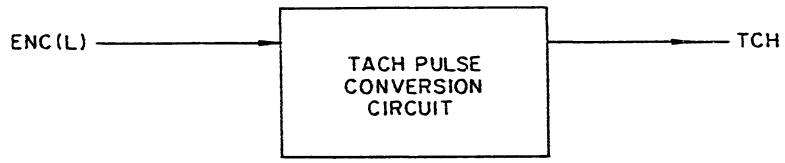


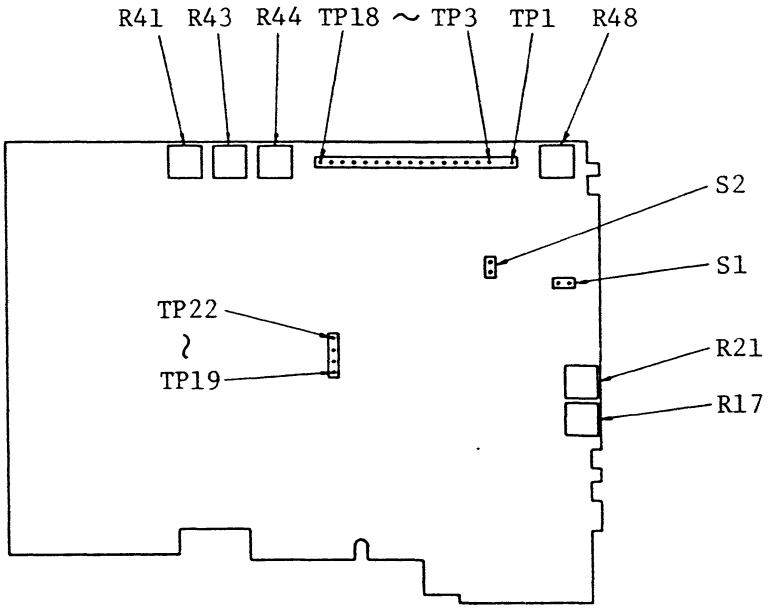
Fig. 335 Tach pulse conversion

(7) Clock generator

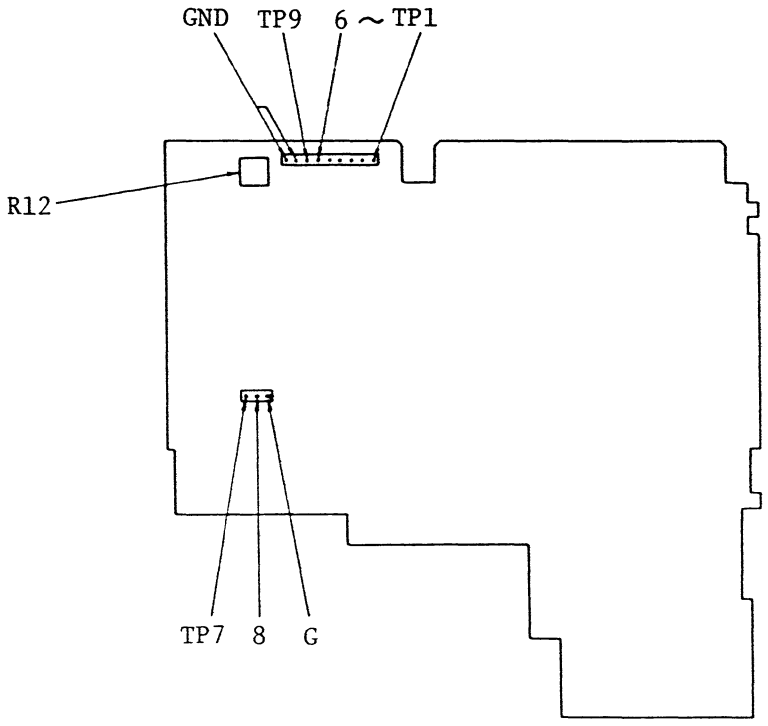
The CLOCK GENERATOR is a circuit to make the master oscillator of 7.2 MHz generate clocks (3.6 MHz) in order to provide the internal control clock to the interface control and the erase clock to the DRIVE I/F.

3-7 Functions of test points, variable resistors and straps

The positions of the test points, variable resistors and straps are shown in Fig. 336.

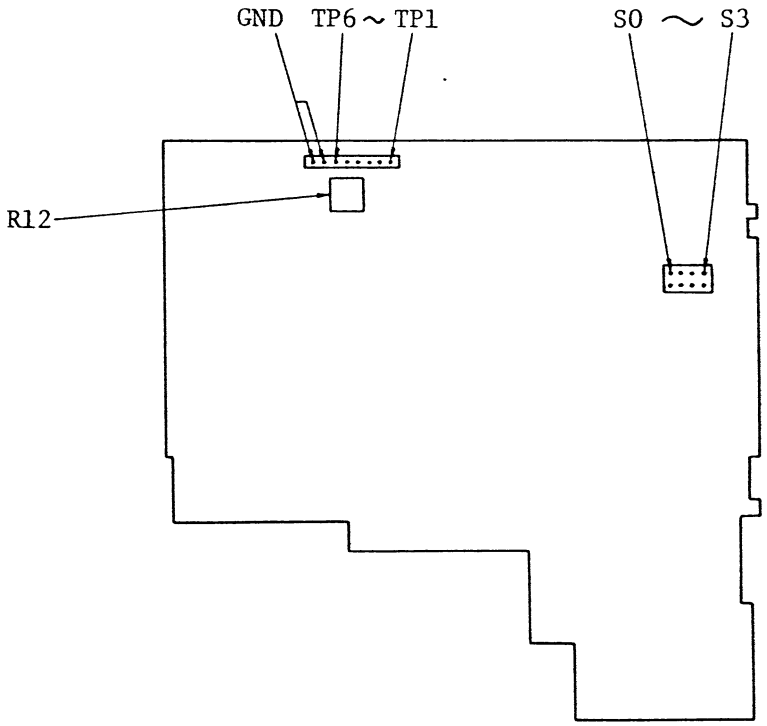


(a)PCBA Drive Control

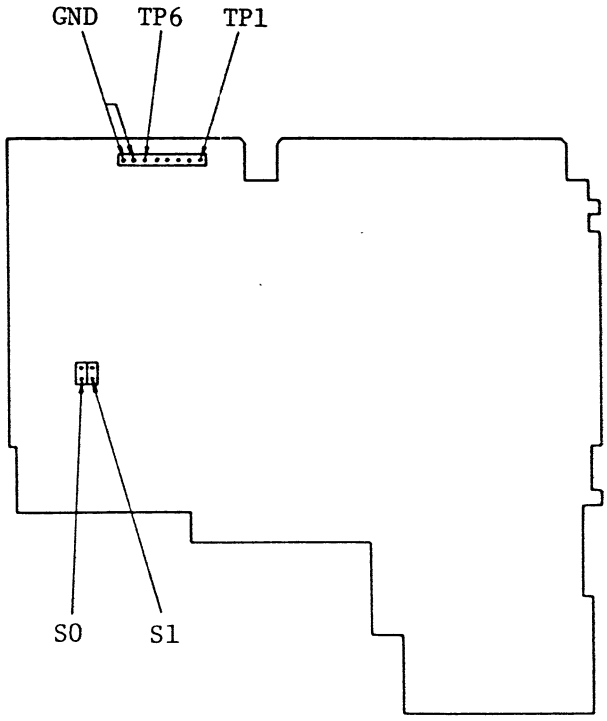


(b) PCBA Interface Control "D/CAS"

Fig. 336 Positions of test points, variable resistors and straps



(c) PCBA Interface Control "SCSI"



(d) PCBA Interface Control "BASIC"

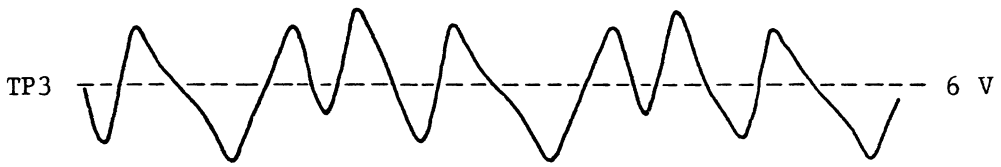
Fig. 336 Positions of test points, variable resistors and straps

3-7-1 Functions of test points

The PCBA Drive Control and PCBA Interface Control are provided with the following test points to facilitate observing the waveforms required during MTU adjustment and test.

(1) TP1 (GND) PCBA Drive Control
This point is connected to 0 V.

(2) TP3 (output of read preamplifier) PCBA Drive Control
Test point for measuring the output of the read preamplifier.
TP3 is used to adjust the level of the read preamplifier, and check the various characteristics of the head Ass'y, etc.



Signal level: 200 to 600 mVp-p

Fig. 337 Example of waveform at TP1

(3) TP4 (6 V bias) PCBA Drive Control
This test point is connected to the 6 V bias power supply generated within MTU.
TP4 is used to measure the various characteristics by using SOA (Simulator OA).

(4) TP5 (AGC output) PCBA Drive Control
Test point for measuring the output of the AGC amplifier.
TP5 is used to check the operation of the AGC amplifier. Since TP5 is a test point used during manufacturing of MTU, it is not used for maintenance usually.

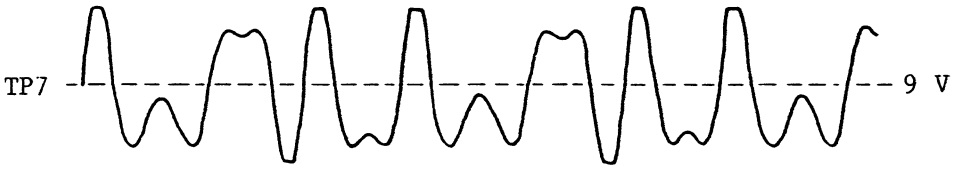
(5) TP6 (GND) PCBA Drive Control

This point is connected to 0 V.

(6) TP7 (output of differential amplifier) PCBA drive control

Test point for measuring the output of the differentiator.

TP7 is used to check the operation of the read amplifier.



Signal level: 1.5 to 4 Vp-p

Fig. 338 Example of waveform at TP7

(7) TP8 (output of the level detect amplifier) PCBA Drive Control

Test point for measuring the output of the level detect amplifier.

TP8 is used to adjust the read level, and check the various characteristics of the head Ass'y.

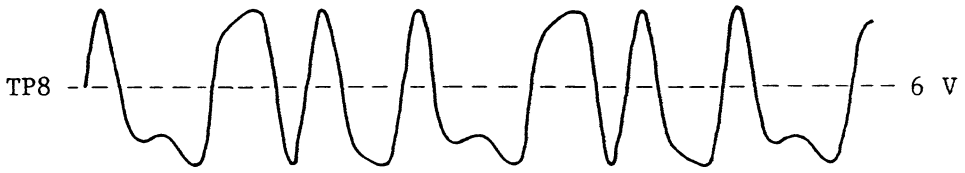


Fig. 339 Example of waveform at TP8

(8) TP9, 10 (threshold level) PCBA Drive Control

TP10 is a test point for measuring the threshold level. TP9 is the output terminal of the 2.5 V bias power supply which is used as a reference during threshold level measurement. The threshold level is represented by the voltage difference (DC voltage) between TP9 and TP10.

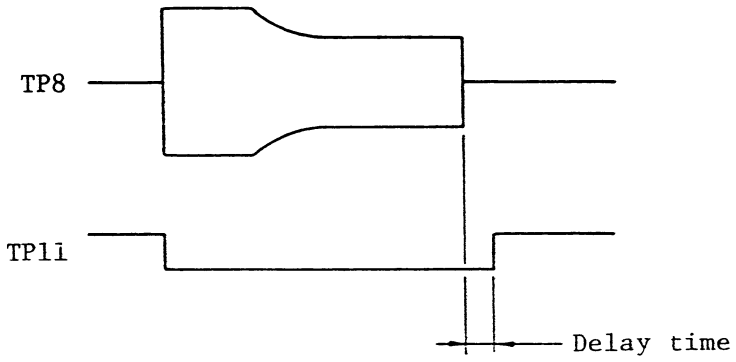
TP9 and TP10 are used to check the threshold level.

The voltage difference (DC voltage) between TP9 and TP10 is approx. 450 mV during write operation, and approx. 330 mV during read operation. (However, each value is that obtained when the write mode and read mode are changed over to each other by turning ON/OFF the WEN signal without moving the tape.)

(9) TP11 (output of read level detecting monostable multivibrator) PCBA Drive Control

Test point for measuring the output of the read level detecting monostable multivibrator.

TP11 is used to check the read level detection delay time. The signal is the $\overline{Q}$ output of the monostable multivibrator.



Example of reading the short block

Fig. 340 Example of waveform at TP11

(10) TP12 (GND) PCBA Drive Control

This point is connected to 0 V.

(11) TP13 (input of hole sensor) PCBA Drive Control

Test point for measuring the input of the hole sensor.

TP13 is used to adjust the sensitivity of the hole sensor.

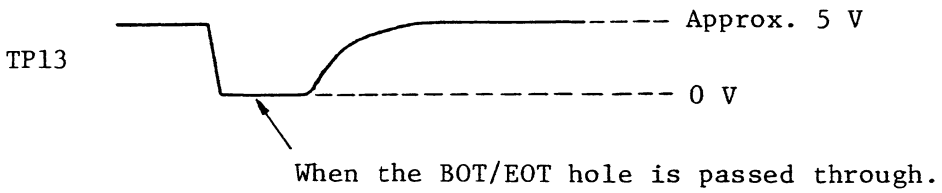


Fig. 341 Example of waveform at TP13

(12) TP14 (output of low voltage sense) PCBA Drive Control

The point for measuring the output of the low voltage sense.

TP14 is used to check the low voltage sense voltage.

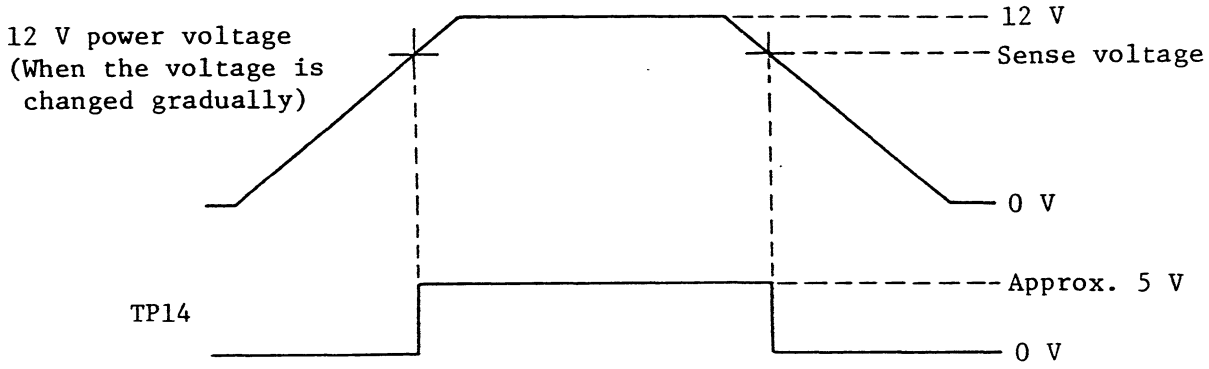


Fig. 342 Example of waveform at TP14

(13) TP15 (12 V) PCBA Drive Control

Test point for measuring the power voltage of 12 V.

(14) TP16 (5 V) PCBA Drive Control

Test point for measuring the power voltage of 5 V.

(15) TP17, 18 (GND) PCBA Drive Control

These points are connected to 0 V.

(16) TP19 (output of encoder preamplifer) PCBA Drive Control

Test point for measuring the output of the encoder preamplifier. TP19 is used to check the operation of the encoder. Since TP19 is the test point used during manufacturing of MTU, it is not used for maintenance usually.

(17) TP20 (servo output) PCBA Drive Control

Test point for measuring the servo output.

TP20 is used to check the operation of the servo circuit. Since TP20 is the test point used during manufacturing of MTU, it is not used for maintenance usually.

(18) TP21 (output of solenoid drive) PCBA Drive Control

Test point for measuring the output of the solenoid drive.

TP21 is used to check the operation of the solenoid driver. Since TP21 is the test point used during manufacturing of MTU, it is not used for maintenance usually.

(19) TP22 (RD output) PCBA Drive Control

Test point for measuring the RD (Read Data) output.

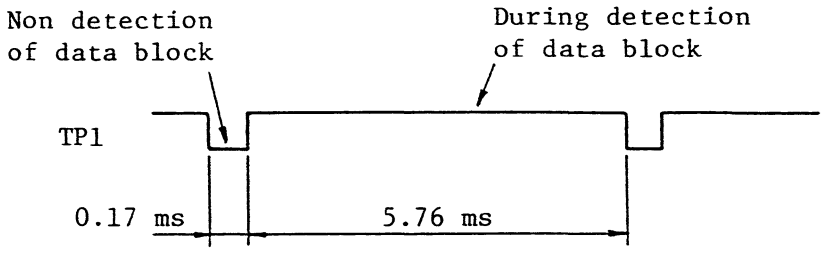
TP22 is used to check the operation of the read circuit. Since TP22 is the test point used during manufacturing of MTU, it is not used for maintenance usually.

"D/CAS"

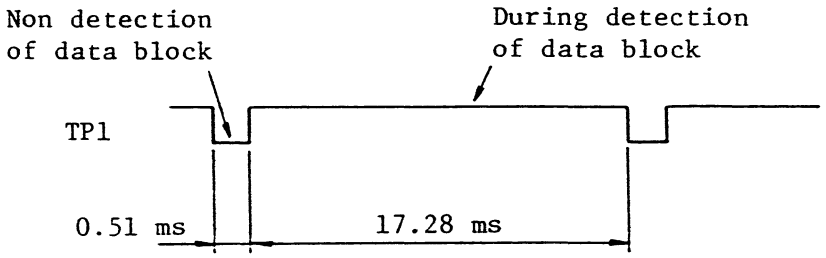
(20) TP1 (block detect) PCBA Interface Control

Test point for measuring the block detect signal.

Since this signal is synchronized with the data block, it can be used as a trigger signal during measurement of the read signal (TP3, 7, 8 on PCBA Drive Control), etc.



(a) "90 ips"



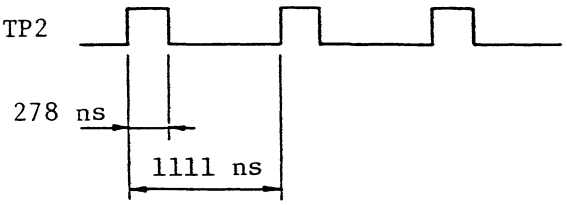
(b) "30 ips"

Fig. 343 Example of waveform at TP1

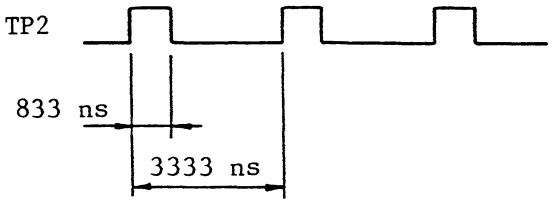
(21) TP2 (data sampling clock) PCBA Interface Control

Test point for measuring the data sampling block signal.

TP2 is used to check the operation of the write/read system.



(a) "90 ips"



(b) "30 ips"

Fig. 344 Example of waveform at TP2

(22) TP3 (write clock) PCBA Interface Control

Test point for measuring the write control signal.

TP3 is used to check the write clock frequency.

Frequency = 1.8 MHz

(a) "90 ips"

Frequency = 600 kHz

(b) "30 ips"

Fig. 345 Example of waveform at TP3

(23) TP4 (frequency control) PCBA Interface Control

Test point for measuring the frequency control signal within the read data separator.

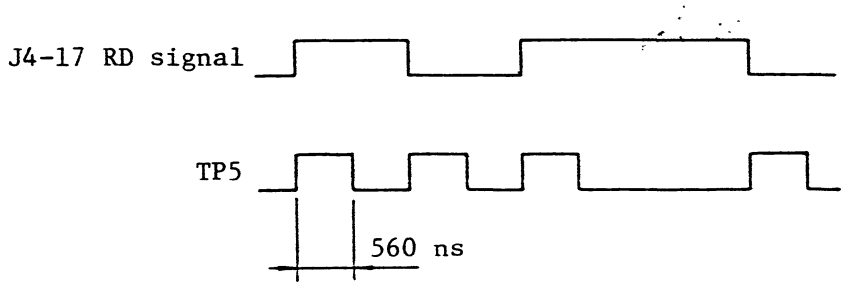
TP4 is used to adjust the VFO operating point.

Fig. 346 Example of waveform at TP4

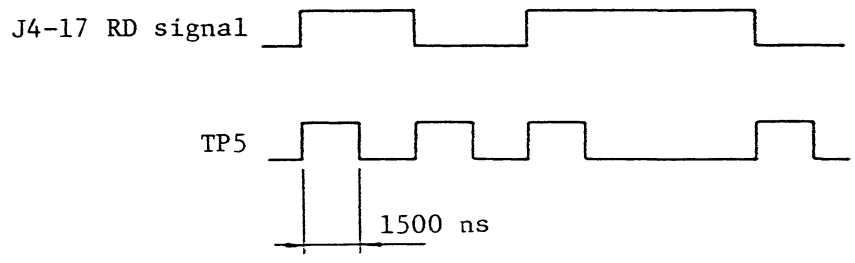
(24) TP5 (read data pulse R) PCBA Interface Control

Test point for measuring the read data pulse R signal.

TP5 is used to check the operation of the write/read system.



(a) "90 ips"



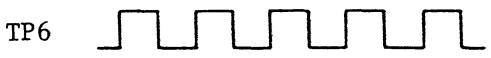
(b) "30 ips"

Fig. 347 Example of waveform at TP5

(25) TP6 (CPU clock) PCBA Interface Control

Test point for measuring the CPU clock signal.

TP6 is used to check the CPU clock frequency.



Frequency = 3.07 MHz

(a) "90 ips"

Frequency = 1.5 MHz

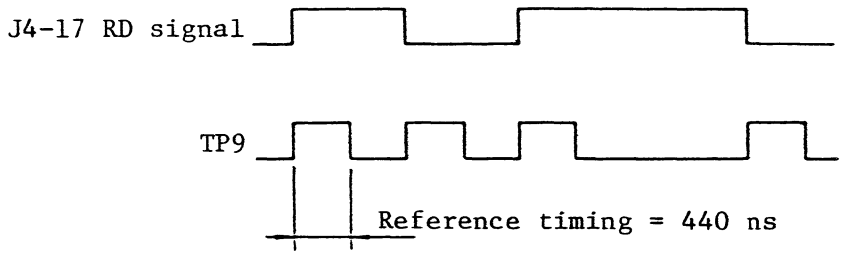
(b) "30 ips"

Fig. 348 Example of waveform at TP6

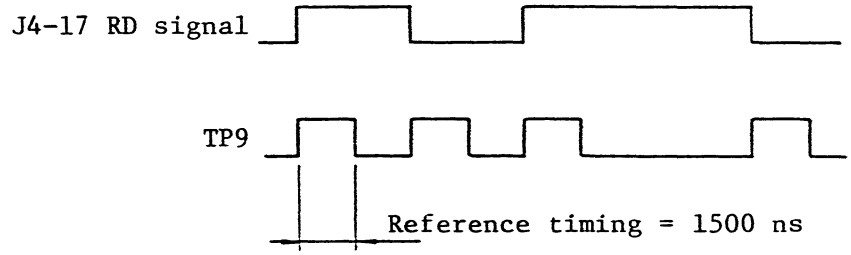
(26) TP9 (read data pulse W) PCBA Interface Control

Test point for measuring the read data pulse W signal.

TP9 is used to adjust the reference timing.



(a) "90 ips"



(b) "30 ips"

Fig. 349 Example of waveform at TP9

(27) GND PCBA Interface Control

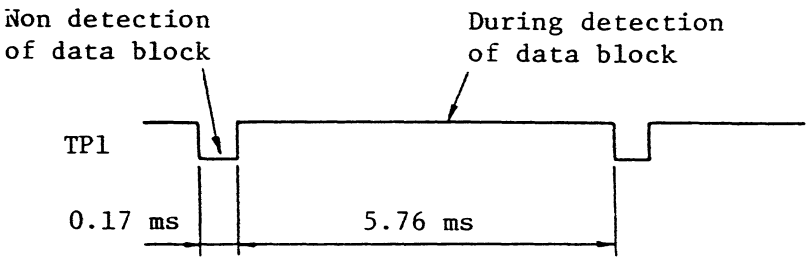
This point is connected to 0 V.

"SCSI"

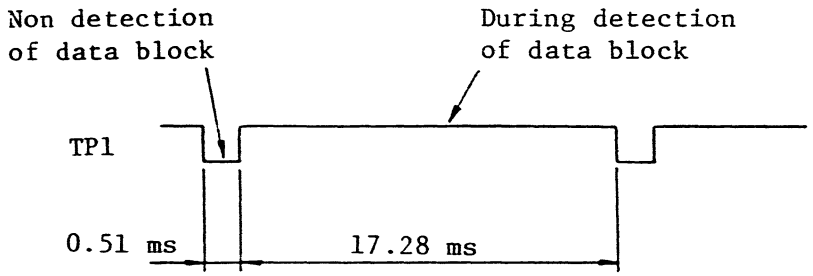
(28) TP1 (block detect) PCBA Interface Control

Test point for measuring the block detect signal.

Since this signal is synchronized with the data block, it can be used as a trigger during measurement of the read signal (TP3, 7, 8 on PCBA Drive Control), etc.



(a) "90 ips"



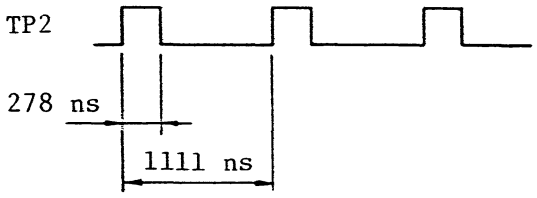
(b) "30 ips"

Fig. 350 Example of waveform at TP1

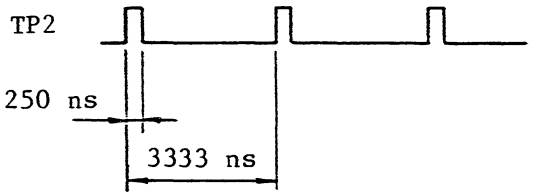
(29) TP2 (data sampling clock) PCBA Interface Control

Test point for measuring the data sampling clock signal.

TP2 is used to check the operation of the write/read system.



(a) "90 ips"



(b) "30 ips"

Fig. 351 Example of waveform at TP2

(30) TP3 (write clock) PCBA Interface Control

Test point for measuring the write clock signal.

TP3 is used to check the write clock frqeuency.

Frequency = 1.8 MHz

(a) "90 ips"

Frequency = 600 kHz

(b) "30 ips"

Fig. 352 Example of waveform at TP3

(31) TP4 (frequency control) PCBA Interface Control

Test point for measuring the frequency control signal within the read data separator.

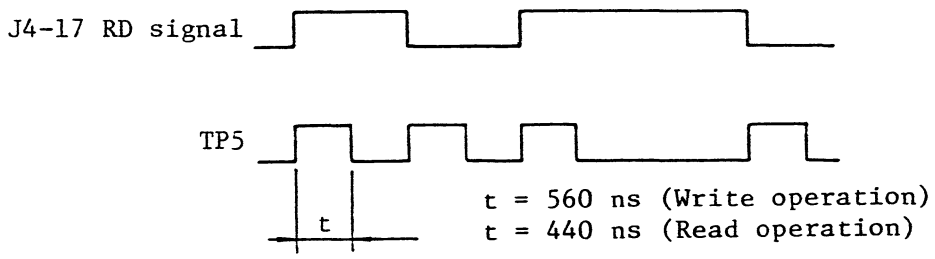
TP4 is used to adjust the VFO operating point.

Fig. 353 Example of waveform at TP4

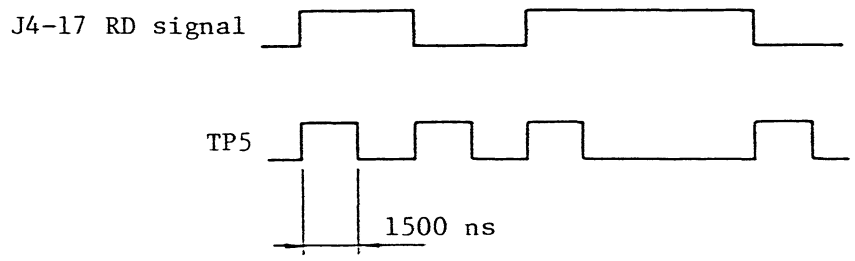
(32) TP5 (read data pulse R) PCBA Interface Control

Test point for measuring the read data pulse R signal.

TP5 is used to check the operation of the write/read system.



(a) "90 ips"



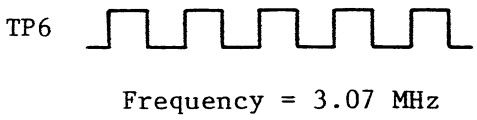
(b) "30 ips"

Fig. 354 Example of waveform at TP5

(33) TP6 (CPU clock) PCBA Interface Control

Test point for measuring the CPU clock signal.

TP6 is used to check the CPU clock frequency.



Frequency = 3.07 MHz

Fig. 355 Example of waveform at TP6

(34) GND PCBA Interface Control

This point is connected to 0 V.

"BASIC"

(35) TP1 (CLK) PCBA Interface Control

Test point for measuring the clock signal for internal control.

TP1 is used to check the clock frequency.

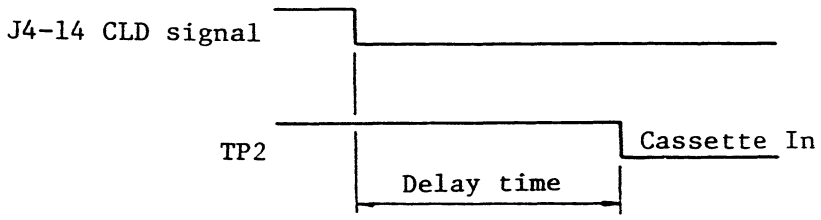
Frequency = 3.6 MHz

Fig. 356 Example of waveform at TP1

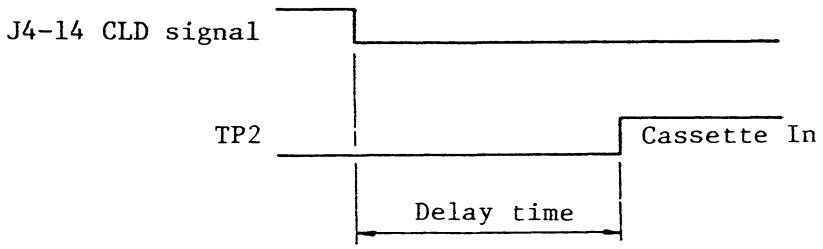
(36) TP2 (CIN) PCBA Interface Control

Test point for measuring the Cassette In signal.

TP2 is used to check the cassette-in detecting operation.



(a) PCBA issue A~C



(b) PCBA issue D~

Fig. 357 Example of waveform at TP2

(37) TP3 (TCH) PCBA Interface Control

Test point for measuring the tachometer pulses.

TP3 is used to check the tachometer pulse frequency.

1/16 frequency division signal
of ENC signal at J4-12

Fig. 358 Example of waveform at TP3

(38) TP4 (RD) PCBA Interface Control

Test point for measuring the read data signal.

TP4 is used to monitor the read data signal transferred from the drive to the PCBA Interface Control.

(39) TP5 (RDP) PCBA Interface Control

Test point for measuring the read data pulses.

TP5 is used to check the read data pulse width, etc.

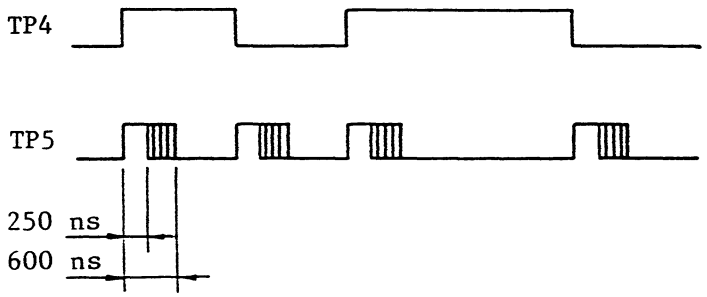


Fig. 359 Example of waveforms at TP4 and TP5

(40) TP6 (WD) PCBA Interface Control

Test point for measuring the write data signal.

TP6 is used to monitor the write data signal transferred from the PCBA Interface Control to the drive.

(41) GND PCBA Interface Control

This point is connected to 0 V.

3-7-2 Functions of variable resistors

The PCBA Drive Control and PCBA Interface Control are provided with variable resistors for various adjustments.

(1) R21, 17 (adjustment of read preamplifier level) PCBA Drive Control
R21 and R17 are variable resistors to adjust the levels of the read amplifiers for the track 0/2 and track 1/3, respectively.
While monitoring the read amplifier levels, adjust R21 and R17 until they become the specified values.

(2) R48 (adjustment of read level) PCBA Drive Control
Variable resistor for adjusting the read level.
While monitoring the read level at TP8, adjust R48 until it becomes the specified value.

(3) R41 (adjustment of hole sensor sensitivity) PCBA Drive Control
Variable resistor for adjusting the sensitivity of the hole sensor. Adjust R41 until the voltage at TP13 becomes the specified value when the hole sensor test tape is loaded.

(4) R44 (adjustment of 90 ips tape speed) PCBA Drive Control
Variable resistor for adjusting the tape speed of 90 ips. Adjust R44 until the frequency of ENC signal (J4-12) becomes the specified value during tape movement at high speed (HIS signal at J4-26 is true).

(5) R43 (adjustment of 30 ips tape speed) PCBA Drive Control
Variable resistor for adjusting the tape speed of 30 ips.
Adjust R43 until the frequency of the ENC signal (J4-12) becomes the specified value during tape movement at low speed (HIS signal at J4 - 26 is false).
At this time, it is necessary that the adjustment of R44 (90 ips tape speed) has been completed prior to the adjustment of R43.
If R44 is adjusted later than R43, the 30 ips tape speed may also be changed.

Remark The 30 ips tape speed is fixed in some model of MTU. In such a model, not a variable resistor but a fixed resistor is mounted as R43.

"D/CAS" "SCSI"

(6) R12 (adjustment of VFO operating point) PCBA Interface Control
Variable resistor for adjusting the VFO operating point.
Adjust R12 until the DC voltage at TP4 on the PCBA interface control becomes the specified value.

3-7-3 Functions of straps

The PCBA drive control and PCBA interface control are provided with straps to change over the MTU functions, or make adjustment and check.

(1) S1 (changeover of read amplifier gain) PCBA Drive Control
Strap for changing over the gain of the read amplifier.
The read amplifier is set to AGC OFF status during check and adjustment for head alignment. This strap is used to prevent the gain of the read amplifier from becoming excessively high in such a case.
The gain of the read amplifier is reduced by shorting S1. Normally, S1 is used in open status.

(2) S2 (AGC ON/OFF) PCBA Drive Control
Strap for turning ON/OFF the AGC of the read amplifier. When S2 is shorted, AGC is turned ON; when opened, it is turned OFF.
Normally, S2 is used in shorted status.

"D/CAS"

(3) TP7, 8, GND (parity strap) PCBA Interface Control
For the contents, refer to Item 1-13-2 in the specifications.

"SCSI"

(4) S0, 1, 2 (device address) PCBA Interface Control
For the contents, refer to Item 1-13-3 in the specifications.

(5) S3 (parity strap) PCBA Interface Control
For the contents, refer to Item 1-13-2 in the specifications.

"BASIC"

(6) SO (changeover of indicator) PCBA Interface Control
For the contents, refer to Item 1-12-1 in the specifications.

(7) S1 (changeover of tape speed) PCBA Interface Control
For the contents, refer to Item 1-12-2 in the specifications.
However, S1 is not mounted on the PCBA's in and after Issue D.

SECTION 4

MAINTENANCE

4-1 Outline of maintenance

4-1-1 Routine maintenance

The routine maintenance is required for the MTU to keep its operational performance at the specified level or more, and prevent an error generation as much as possible.

There are various routine maintenance items from cleaning of the magnetic head to be made at short intervals by the user, to replacement of the head to be made at long intervals by maintenance experts.

The magnetic head cleaning is intended to remove the dirt and dust generated by the movement of tape or under the severe environmental conditions as much as possible, and thereby prevent data dropout or damage to the tape, thus enhancing the reliability.

Therefore, the magnetic head should be cleaned periodically at the intervals shown in Table 401 in order to secure the reliability of data.

For how to clean the magnetic head, refer to Item 2-1-6 of the instruction manual.

The parts with service lives used for the MTU are recommended to be replaced in assembly units every time they reach the recommended periods shown in Table 403.

The parts should be replaced according to the individual relevant items given in Para. 4-4 on referring to the precautions shown in Para. 4-2.

Table 401 Routine maintenance items

Routine Maintenance Item	Recommended Periods	Required Time	Remarks
Cleaning of magnetic head	Monthly or once every 200 passes	2 min.	In case of standard operation method
Replacement of maintenance parts	Refer to item 4-1-3 and Para. 4-4.		

4-1-2 Check and adjustment

Table 402 lists all the check and adjustment items.
Unlike the routine maintenance items, each item of this table need not be executed at the specified periods. Execute these items during replacement of the maintenance parts or at the time of fault occurrence as required on referring to the precautions given in Para. 4-2 and the individual relevant items listed in Para. 4-3.
The maintenance order in Table 402 applies to the case where all items of check and adjustment in this table are to be executed.

Table 402 Check and adjustment items

Maintenance Order	Check and Adjustment Items	Required Time		Descriptive Item of Maintenance
		90ips	30ips	
1	Positional adjustment of reel motor (F), (R) Ass'y	5 min.		4-3-1
2	Height adjustment of encoder roller	5 min.		4-3-2
3	Check of rotary direction of reel motor	2 min.		4-3-3
4	Check of file protect sensor	2 min.		4-3-4
5	Check of cassette loading and unloading	2 min.		4-3-5
6	Check of head shift	2 min.		4-3-6
7	Check and adjustment of tape winding	10 min.		4-3-7
8	Check and adjustment of head alignment	10 min.		4-3-8
9	Check of AGC operation	2 min.		4-3-9
10	Check and adjustment of BOT/EOT hole sensor	3 min.		4-3-10
11	Check and adjustment of tape speed	3 min.		4-3-11
12	Check of start/stop time	4 min.		4-3-12

Maintenance Order	Check and Adjustment Items	Required Time		Descriptive Item of Maintenance
		90ips	30ips	
13	ISV check	2 min.		4-3-13
14	Check and adjustment of read preamplifier level	3 min.		4-3-14
15	Check and adjustment of read level	2 min.		4-3-15
16	Check of feed through	2 min.		4-3-16
17	Resolution check	2 min.		4-3-17
18	Check of erase level	2 min.		4-3-18
19	Check of peak shift	2 min.		4-3-19
20	Asymmetry check	2 min.		4-3-20
21	Check and adjustment of VFO operating point	12 min.		4-3-21
22	Overall check	12min	30min	4-3-22

4-1-3 Maintenance parts

When the MTU is operated at specially heavy duty or MTU it operated over a long period, it is recommended to replace the parts periodically according to the list given below.
Table 403 shows the maintenance parts list. Replace the parts, whose replacement periods recommended are shown in this table, every time their replacement periods recommended are reached.

Precautions in maintenance parts list

Notes:

(1) The parts whose replacement periods recommended are not shown need not shown need not be replaced periodically. Replace them at the time of fault occurrence, etc. as required.
(2) The replacement time required includes the time required for the basic function check and adjustment after the replacement of parts.
(3) The reel motor (F) Ass'y and reel motor (R) Ass'y should be replaced at the same time without fail.
(4) When the encoder Ass'y and the encoder roller is to be replaced, at the same time.
(5) Part Nos. of the PCBA Drive Control and PCBA Interface Control change depending upon model. Therefore, when ordering them, be sure to specify them with Part Nos. given on the nameplates of the PCB's.
(6) Part Nos. of the front bezel Ass'y and eject button given in the table apply to the standard color (black) ones as an example. When any other color one is to be specified, check its Part No. and order the relevant part with that Part No.
(7) When ordering maintenance parts, be sure to specify their TEAC part Nos.
(8) The required time indicated herein does not include the time required for the overall check mentioned in Item 4-3-22.

Table 403 Maintenance parts list

(a) "Permalloy Head"

Maintenance Parts		Replacement of Parts		
Parts Name	TEAC Part No.	Recommended Replacement Period	Required Time (Note 8)	Reference Item
Head Ass'y	14130870-00	9000 passes	25 Min.	4-4-1
Reel motor (F) Ass'y	17061057-00	15000 passes (Note 3)	25 Min.	4-4-2
Reel motor (R) Ass'y	17061058-00	15000 passes (Note 3)		4-4-2
Interrupter C Ass'y	15532062-01	-	10 Min.	4-4-3
LED hole sensor Ass'y	17070500-00	-	15 Min.	4-4-4
Sensor guide Ass'y	17070510-00	-	10 Min.	4-4-5
Encoder Ass'y	17967494-00	- (Note 4)	35 Min.	4-4-6
Encoder roller	16792371-00	- (Note 4)		4-4-6
Solenoid Ass'y	14770910-00	200000 passes	10 Min.	4-4-7
Head base Ass'y	16153032-01	-	30 Min.	4-4-8
PCBA Drive Control	15532057-XX (Note 5)	-	15 Min.	4-4-9
PCBA Interface Control	15532058-XX (Note 5) 15532-68-XX 15532073-XX	-	15 Min.	4-4-10
Front bezel Ass'y	17967210-00 (Note 6)	-	5 Min.	4-4-11
Eject button	16787276-01 (Note 6)	-	1 Min.	4-4-12

Table 403 Maintenance parts list

(b) "Ferrite Head"

Maintenance Parts		Replacement of Parts		
Parts Name	TEAC Part No.	Recommended Replacement Period	Required Time (Note 8)	Reference Item
Head Ass'y	14130960-00	20000 passes	25 Min.	4-4-1
Reel motor (F) Ass'y	17061057-00	15000 passes (Note 3)	25 Min.	4-4-2
Reel motor (R) Ass'y	17061058-00	15000 passes (Note 3)		4-4-2
Interrupter C Ass'y	15532062-01	-	10 Min.	4-4-3
LED hole sensor Ass'y	17070500-00	-	15 Min.	4-4-4
Sensor guide Ass'y	17070510-00	-	10 Min.	4-4-5
Encoder Ass'y	17967494-00	- (Note 4)	35 Min.	4-4-6
Encoder roller	16792371-00	- (Note 4)		4-4-6
Solenoid Ass'y	14770910-00	200000 passes	10 Min.	4-4-7
Head base Ass'y	16153032-01	-	30 Min.	4-4-8
PCBA Drive Control	15532069-XX (Note 5)	-	15 Min.	4-4-9
PCBA Interface Control	15532058-XX (Note 5) 15532068-XX 15532073-XX	-	15 Min.	4-4-10
Front bezel Ass'y	17967210-00 (Note 6)	-	5 Min.	4-4-11
Eject button	16787276-01 (Note 6)	-	1 Min.	4-4-12

4-1-4 Maintenance articles

The measuring instruments, jigs, and tools required for maintenance of MTU are listed below.

(1) Measuring instruments
   (a) Oscilloscope (two-channel trace type)
   (b) Digital voltmeter (for measurement of DC voltage

(2) Tools
   (a) Phillips screwdriver No. 0
   (b) Phillips screwdriver No. 1
   (c) Conventional type screwdriver, small size
   (d) Torque driver 1.5 kg.cm
   (e) Torque driver 2.5 - 4 kg.cm
   (f) Hexagonal wrench 1.5 mm
   (g) Nipper
   (h) Radio pliers
   (i) Tweezers

(3) Exclusive simulators and DC power supply
   (a) Simulator OA (TEAC Part No. 19800020-00)
      (hereinafter, referred to as SOA)
      Remark The model of SOA to be used should be Version 3.22 onwards. The version of SOA is indicated to the display by keying in EF command.

   "D/CAS"

   (b) Simulator OB (TEAC Part No. 19800021-00)
      (herienafter, referred to as SOB)

   "SCSI"

      (Simulator OD (TEAC Part No.)
      (hereinafter, referred to as SOD)

"BASIC"

(d) Simulator OE (TEAC Part No.)
(hereinafter, referred to as SOE)
(e) DC power supply (+12 V, 2 A, and +5 V, 5 A)

(4) Exclusive jigs

(a)	Reel motor jig	(TEAC Part No. 17852575-00)
(b)	FPT jig	(TEAC Part No. 17852581-00)
(c)	FPT check jig	(TEAC Part No. 17952582-00)
(d)	Roller height jig	(TEAC Part No. 17853275-00)
(e)	Tilt adjusting jig	(TEAC Part No. 17853274-00)
(f)	Height adjusting jig	(TEAC Part No. 17852572-00)
(g)	Connector jig	(TEAC Part No. 17853041-00)

(5) Test tapes

(a)	Work tape	(TEAC Part No. 19800022-50)
(b)	Mirror cassette	(TEAC Part No. 14800093-00)
(c)	Alignment tape	(TEAC Part No. 14800090-10)
(d)	Speed tape	(TEAC Part No. 14800091-10)
(e)	Hole sensor test tape	(TEAC Part No. 14800087-00)
(f)	Level test tape	(TEAC Part No. 14800088-00)

(6) Consumables for maintenance etc.
(a) Gauze
(b) Adhesive (Cemedine's Hisuper)
(c) Screw lock (Three Bond's 1401C)
(d) Cable tie (TEAC Part No. 16362294)
(e) Screws and washers (refer to Table 504)
(f) TZ-380 (TEAC Part No. 17930340-00)

(7) Others
(a) Bulk eraser
(b) Head eraser

Note The measuring instruments and measuring tapes to be used should have been calibrated properly.

4-2 Precautions on maintenance

4-2-1 Screw tightening torque and screw lock (red)

Each screw should be tightened with the torque shown in Table 404, unless otherwise specified.

Table 404 Screw tightening torque

Screw Size	Screw Tightening Torque
M2	2.5 kg.cm
M26	4 kg.cm
M3	6 kg.cm
M2 setscrew	2.5 kg.cm

During the replacement or adjustment of maintenance parts, the application of screw lock (red) is limited only to the following four places. At this time, remove the old screw lock (red) as much as possible.

(1) Encoder tilt adjusting screw (Fig. 422)
(2) Off track adjusting screw A (Fig. 426)
(3) Off track adjusting screw B (Fig. 426)
(4) Azimuth adjusting screw (Fig. 426)

4-2-2 Connector handling methods

(1) Types of connectors

The following connectors are used for MTU (Fig. 401).

(a) J1 : Interface connector

(b) J2 : Power connector

(c) J4 : Connector between PCBA's

(d) J5 : LED connector

(e) J6 : Head connector

(f) J7 : Sensor guide connector

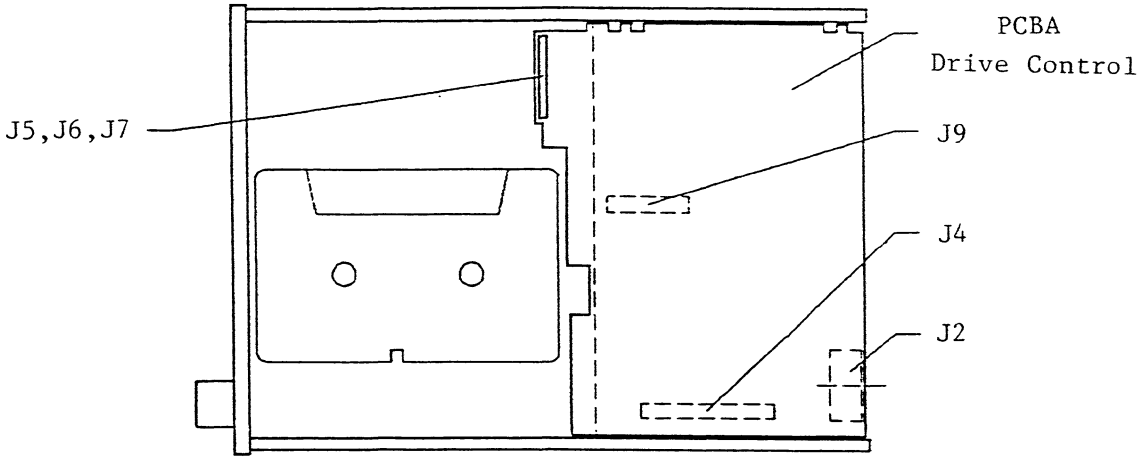
(g) J8 : Reel motor, solenoid and hole sensor connector

(h) J9 : Interrupter connector

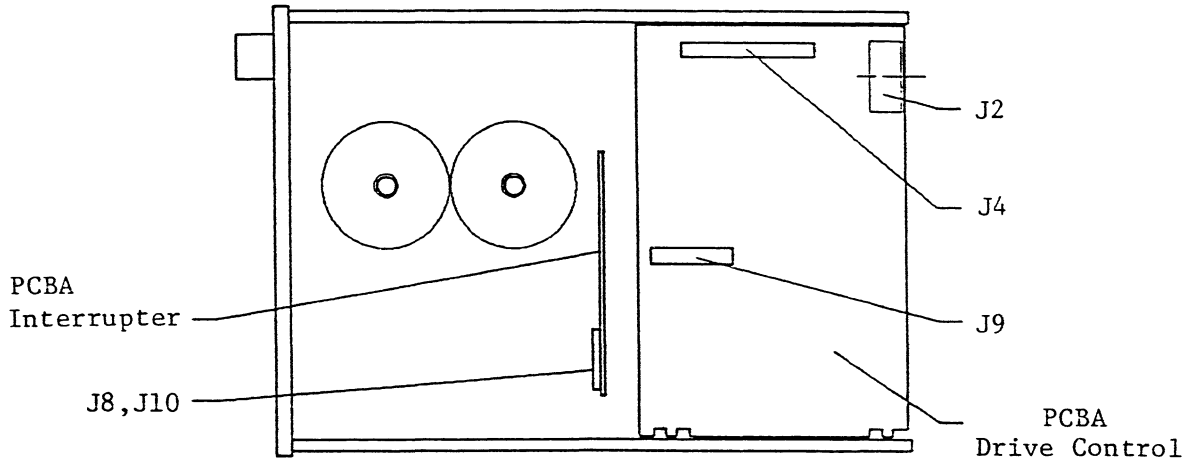
(i) J10: Encoder connector

(2) Extraction and insertion of connector

When each connector is to be extracted or inserted, firstly turn off the power supply. Then, extract or insert it straightly and exactly while exercising utmost care not to exert unreasonable force to the cable or post pins.

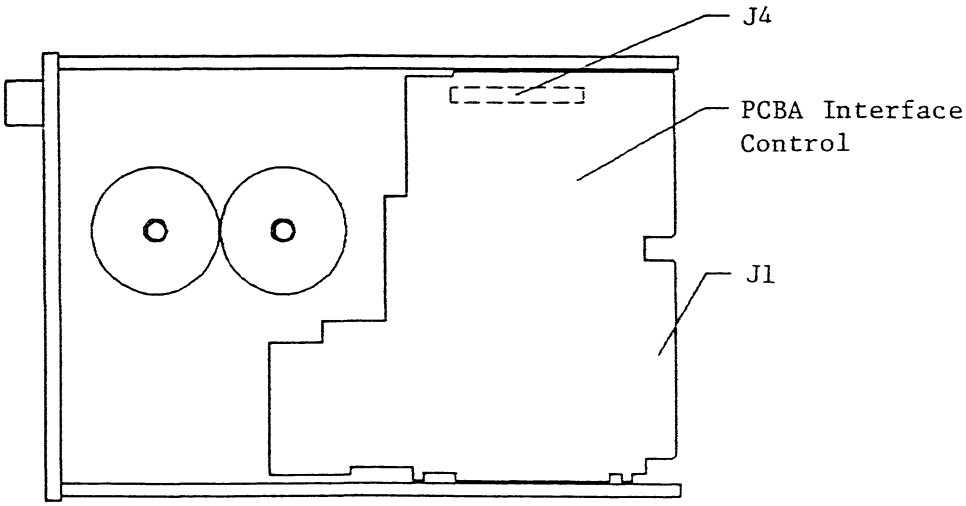


Top view of MTU



(Without PCBA Interface Control)

Bottom view of MTU



Bottom view of MTU

Fig. 401 Connector types

(3) Precautions on handling of black connectors (J5, J6, J7, J8, J10)

(a) How to extract the connector

Insert the tips of tweezers into the opening part of the connector at the rear of the housing, and extract the connector straightly.

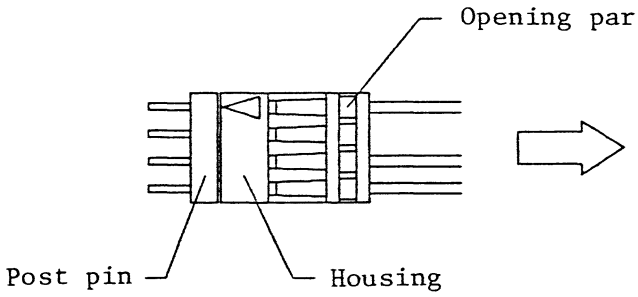


Fig. 402 How to extract the connector

(b) How to insert the connector

Set the housing to the position of the post pin, and push in the rear of the housing with the finger.

In this case, beware of the following items to prevent mis-insertion.

(i) Insert each 2P connector (J5, J7) with the connector label up.

(ii) With J6, J8 and J10 connectors, the position of the polarizing key should agree with the post pin on the housing side.

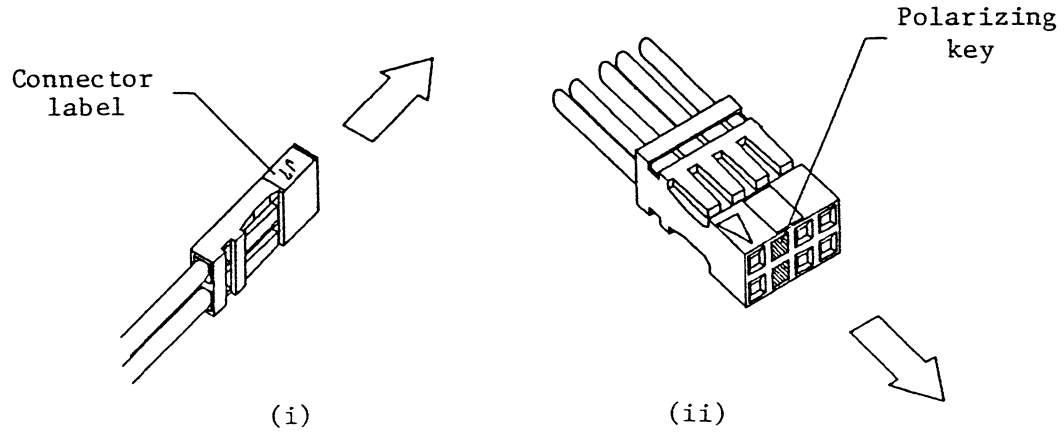


Fig. 403 How to insert the connectors

(c) How to extract the contacts

To extract the contacts inserted into the housing, pull out the cable with tweezers, while opening the stopper of the housing with the edge of a cutter knife.

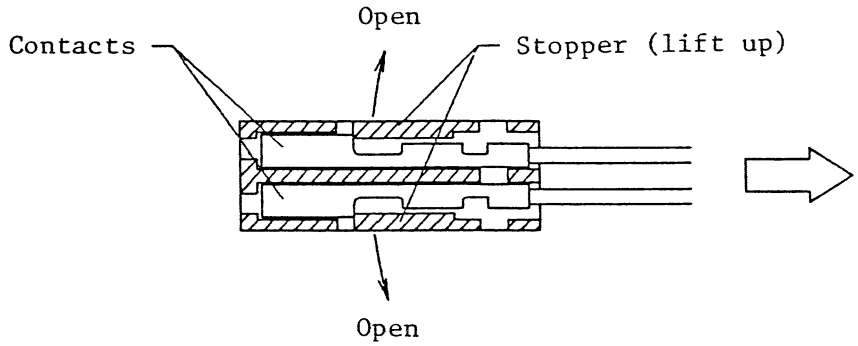


Fig. 404 Sectional view of housing (black connector)

(d) How to insert the contacts

Insert each contact in such a direction that its projection is placed on the stopper side of the housing.

After insertion, pull the cables lightly with tweezers to make sure that the contact is inserted exactly.

The terminals of the housing are assigned with odd numbers on the triangular mark side, and with even numbers on the opposite side with the triangular mark as No.1.

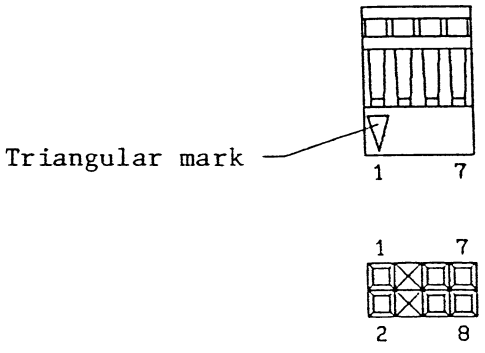


Fig. 405 Terminal numbers

(4) Handling methods for FPC connector J9

(a) How to extract the FPC

Lift up the upper projection of the socket with the connector jig. Then, grip FPC with the fingers, and extract it from the socket. At this time, grip the reinforced portion of FPC. If any other part than the reinforced portion is pulled forcibly, there is a danger that FPC may be damaged.

(b) How to insert the FPC

While setting the groove of FPC to the partition of the socket, insert FPC into the socket. Then, while depressing FPC to prevent it from being disengaged from the socket, push in the top of the socket with the finger.

After the completion of connection, lift FPC upward slightly with the fingers, and check if the two are connected tight with each other.

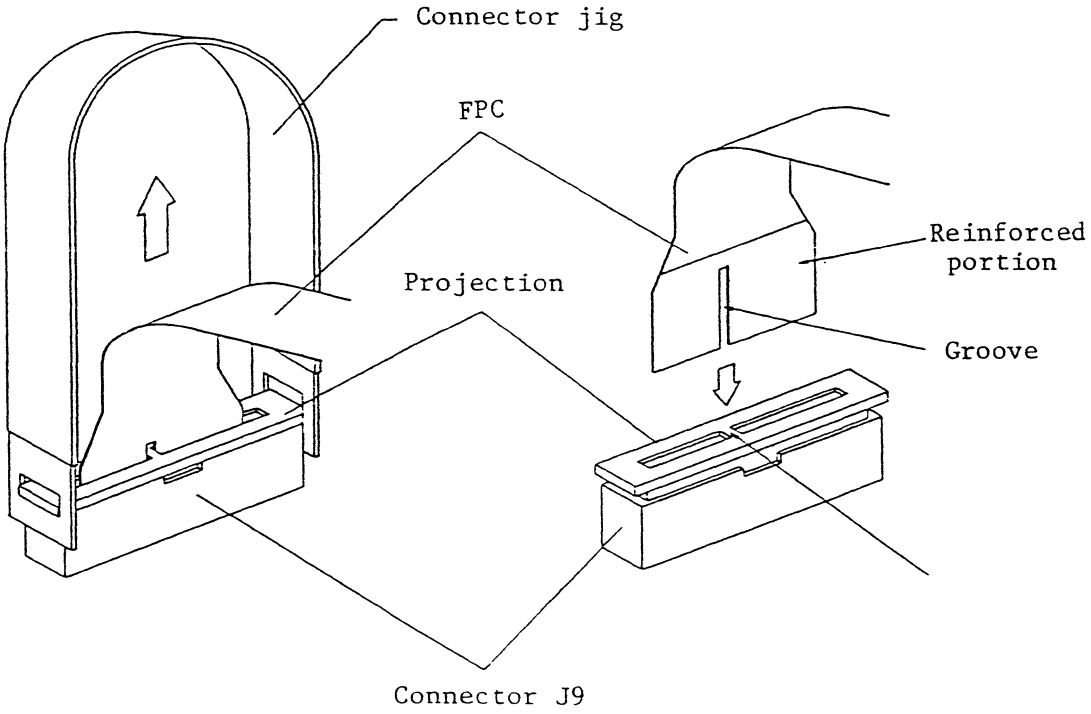


Fig. 406 Handling methods for connector J9

4-2-3 How to handle the protector guide

(1) Detaching method

Loosen the two mounting screws of the protector guide until it can move back and forth. While sliding the protector guide by hand in the arrow direction, remove it from the main unit (Fig. 407).

(2) Attaching method

Attach the protector guide to the main unit in the reverse procedure to the above, while bewaring of the following items.

(a) The projection of the protector guide is to be engaged exactly with the notch of chassis (Fig. 408).

(b) Any cable is not to be caught by the protector guide.

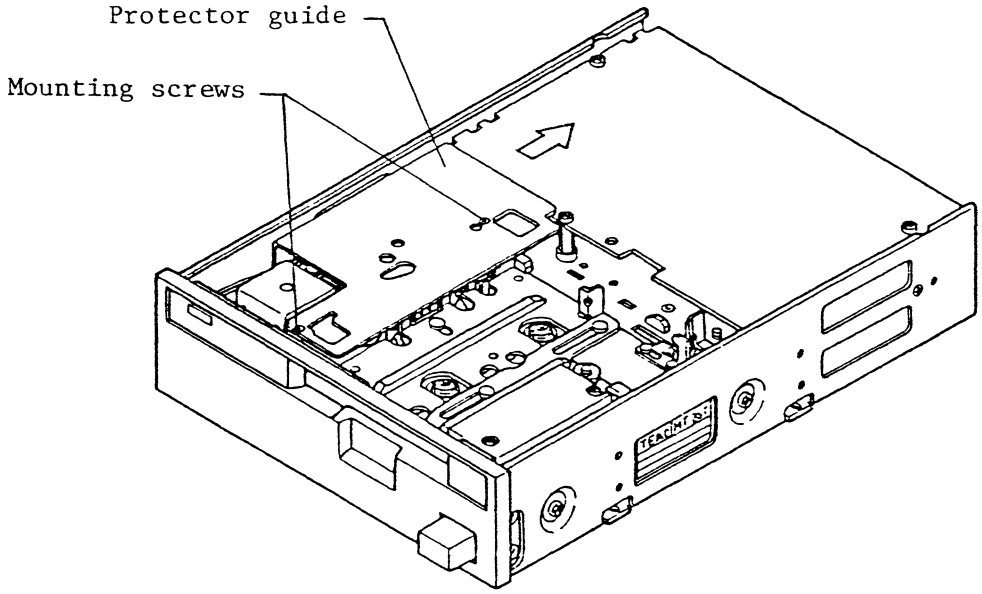


Fig.407 How to detach the protector guide

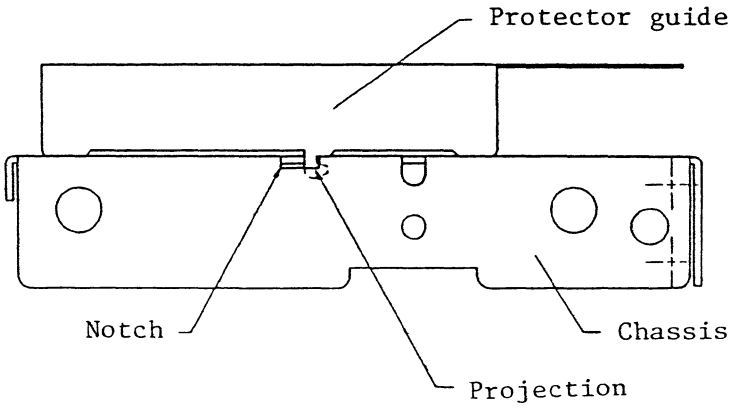


Fig.408 How to attach the protector guide

4-2-4 Cable treatment within chassis

Since the reel motor Ass'y and LED hole sensor Ass'y are mounted on the sliding parts, it is necessary to clamp each cable at the specified position so that the cassette tape can always be loaded or unloaded normally.
When replacing the reel motor (F), (R) Ass'y or LED hole sensor Ass'y, perform cable treatment in the following procedure:

(1) Push in the ejector with the finger to set the main unit to the cassete loading status (Fig. 302).
(2) Perform cable forming in accordance with Fig. 409.
(3) Clamp the cables of the reel motor (R) Ass'y and LED hole sensor Ass'y from the outside of the tube with the cable tie at the position which is kept approx. 10 mm away from the end of the tube.
At this time, place the LED hole sensor side tube as near to the terminal part as possible.
(4) Clamp the individual cables of the encoder Ass'y, reel motor (F), (R) Ass'y, and hole sensor Ass'y between the bead and solenoids stopper.
(5) Push the cables into the PCBA holder.
(6) Push the eject button to return to the cassette unloading status.
(7) Repeat the cassette loading/unloading operation several times by using the work cassette, and check for the following items:
  (a) The reel motor is not to be lifted when the back of the reel motor is pushed in cassette loading status.
  (b) Any cable is not to be caught by sliding parts.
  (c) Any cable is not to be protruded from the drive body.

Note Be very careful about the cable clamping, since such trouble as disconnection or malfunction may occur if a cable is stretched too tight.

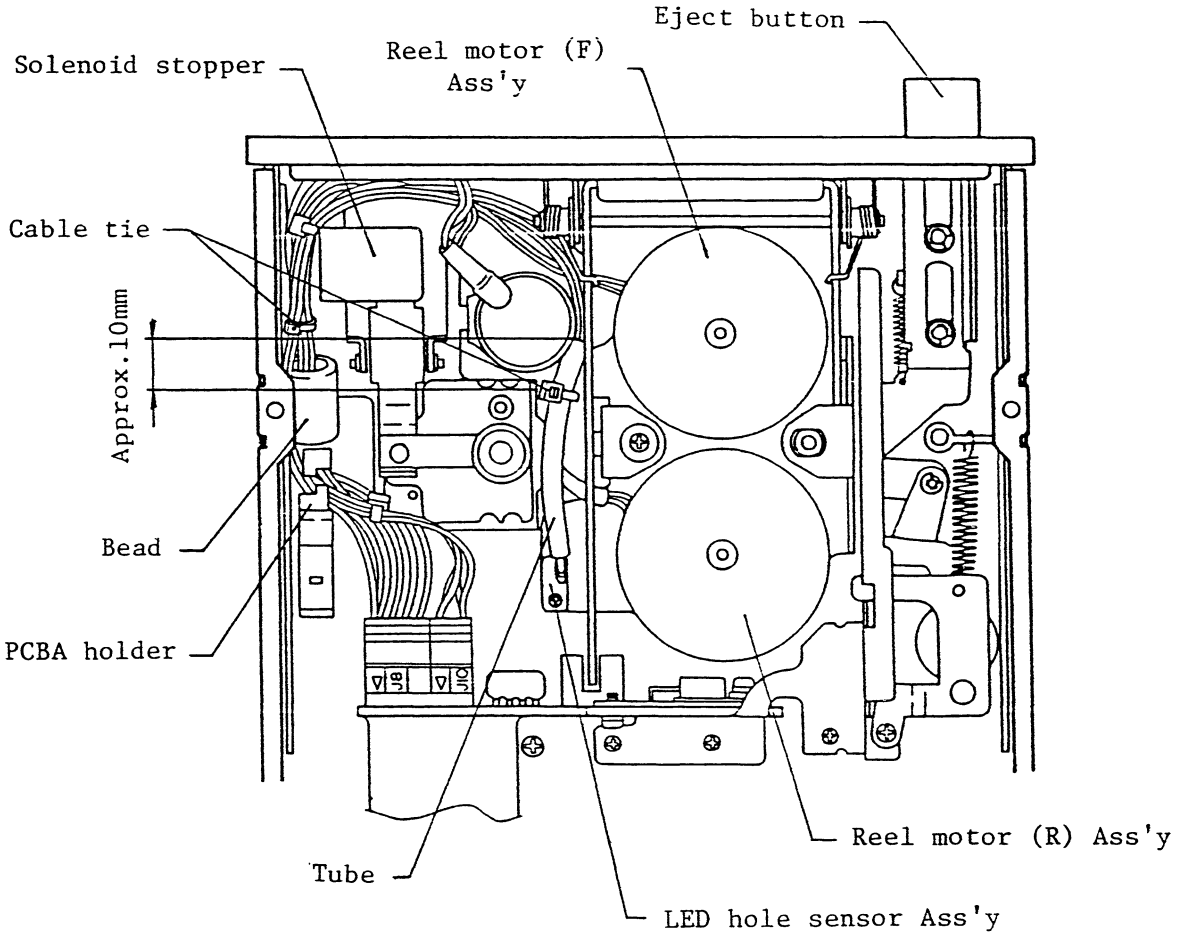


Fig.409 Cable treatment within chassis

4-2-5 Initialization of SOA

The SOA (Simulator OA) is a simulator to adjust and test only the drive portions except for PCBA Interface Control in MTU.
Prior to the use of SOA, perform the following initialization.

(1) Detach the PCBA Interface Control from MTU in accordance with Item 4-4-10.

(2) Set the MODE switch mounted on the right side face of SOA as shown in Fig. 410.

(a) "90 ips" (b) "30 ips"

Fig. 410 Setting of SOA MODE switch

(3) Preset the output voltages of the DC power supply to +12 V and +5 V.

(4) Set the POWER switch of SOA to OFF.

(5) Turn off the DC power supply, and connect the power cable to the PSA connector of SOA.

(6) Connect the interface cable between the MT2ST INTERFACE connector of SOA and the SOA adapter B. Connect the interface cable coming out of the SOA adapter to the J4 of MTU, so that the triangular mark of the connector is set to the terminals 1 and 2 side.

(7) Connect the check cable C between the MT2ST TP connector of SOA and check terminals TP1 to TP18 of MTU.

(8) Turn on the DC power supply, and set the POWER switch of SOA to the PSA side.

(9) Key in "E3" to SOA. (Hereinafter, the key-in operation performed withthe keyboard of the simulator is represented by such that Key in "E3".

(10) Key in "D5".

(11) The +5 V power voltage is indicated to the display DATA 1 of SOA, and the +12 V power voltage to the display DATA 2. Readjust the DC power voltages until the +5 V power voltage is within the range of 4.95 V to 5.05V, and the +12 V power voltage is within the range of 11.88 V to 12.12V.

(12) Key in "F".

(13) Key in "E3".

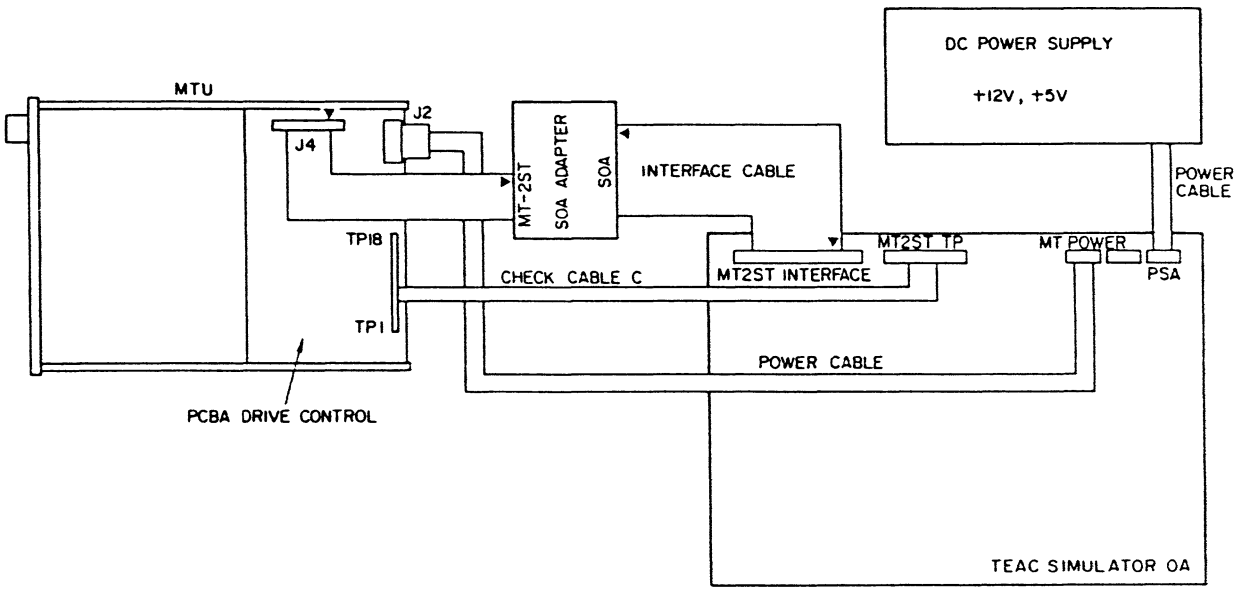


Fig. 411 Connections of SOA

"D/CAS"

4-2-6 Initialization of SOB

The SOB (Simulator OB) is a simulator to test the overall MTU including the PCBA Interface Control.
This simulator permits the error rate, etc. to be checked with MTU set to online status.
The PCBA Interface Control can also be adjusted and tested by connecting SOB.
Prior to the use of SOB, perform the following initialization.

(1) Preset the output voltages of the DC power supply to +12 V and +5 V.
(2) Turn off the DC power supply, and connect the power cable to the DC PWR connector of SOB.
(3) Connect the power cable to the POWER connector J2 of MTU.
(4) Connect the interface cable between the MT-2ST INTERFACE connector of SOB and J1 of MTU, so that the triangular mark of the connector is set to the terminals 1 and 2 side.
(5) Turn on the DC power supply.
(6) Check if the power voltage supplied to MTU is within the range of -5% to +5% of the rated voltage, using a digital voltmeter (DCV).

Between TP15 and TP18 of PCBA Drive Control: +12 V power voltage (11.4 to 12.6 V)

Between TP16 and TP18 of PCBA Drive Control: +5 V power voltage (4.75 to 5.25 V)

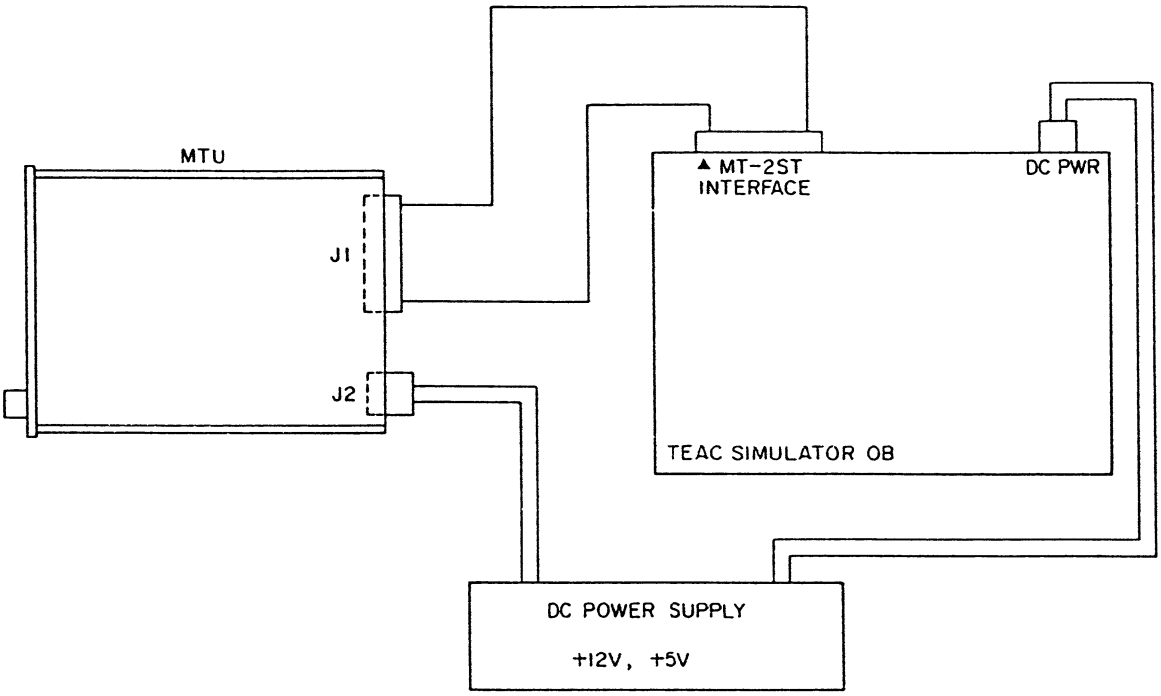


Fig. 412 Connections of SOB

"SCSI"

4-2-7 Initialization of SOD

The SOD (Simulator OD) is a simulator to test the overall MTU including the PCBA Interface Control
This simulator permits the error rate, etc. to be checked with MTU set to online status.
The PCBA Interface Control can also be adjusted and tested by connecting SOD.
Prior to the use of SOD, perform the following initialization.

(1) Preset the output voltages of the DC power supply to +12 V and +5 V.
(2) Turn off the DC power supply, and connect the power cable to the PWR connector of SOD.
(3) Connect the power cable to the POWER connector J2 of MTU.
(4) Connect the interface cable between the MT2-ST I/F connector of SOD and J1 of MTU, so that the triangular mark of the connector is set to the terminals 1 and 2 side.
(5) Turn on the DC power supply.
(6) Check if the power voltage supplied to MTU is within the range of -5% to +5% of the rated voltage, using a digital voltmeter (DCV).

Between TP15 and TP18 of PCBA Drive Control: +12 V power voltage (11.4 to 12.6 V)

Between TP16 and TP18 of PCBA Drive Control: +5 V power voltage (4.75 to 5.25 V)

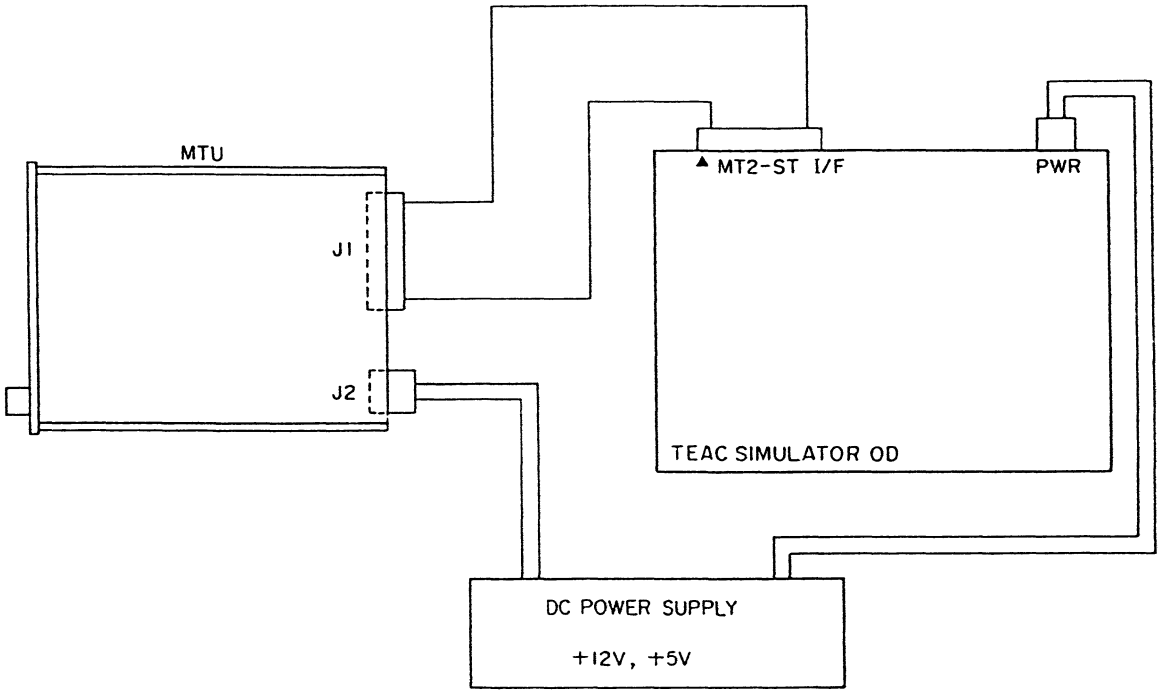


Fig. 413 Connections of SOD

"BASIC"

4-2-8 Initialization of SOE

The SOE (Simulator OE) is a simulator to test the overall MTU including the PCBA Interface Control.
The SOE permits a simulation of the BASIC interface by switch operation.
Prior to the use of SOB, perform the following initialization.

(1) Preset the output voltages of the DC power supply to +12 V and +5 V.
(2) Turn off the DC power supply, and connect the power cable to the POWER connector of SOE.
(3) Connect the power cable to the POWER connector J2 of MTU.
(4) Connect the interface cable between the INTERFACE connector of SOE and J1 of MTU, so that the triangular mark of the connector is set to the terminals 1 and 2 side.
(5) Turn on the DC power supply.
(6) Check if the power voltage supplied to MTU is within the range of -5% to +5% of the rated voltage, using a digital voltmeter (DCV).

Between TP15 and TP18 of PCBA Drive Control: +12 V power voltage (11.4 to 12.6 V)

Between TP16 and TP18 of PCBA Drive Control: +5 V power voltage (4.75 to 5.25 V)

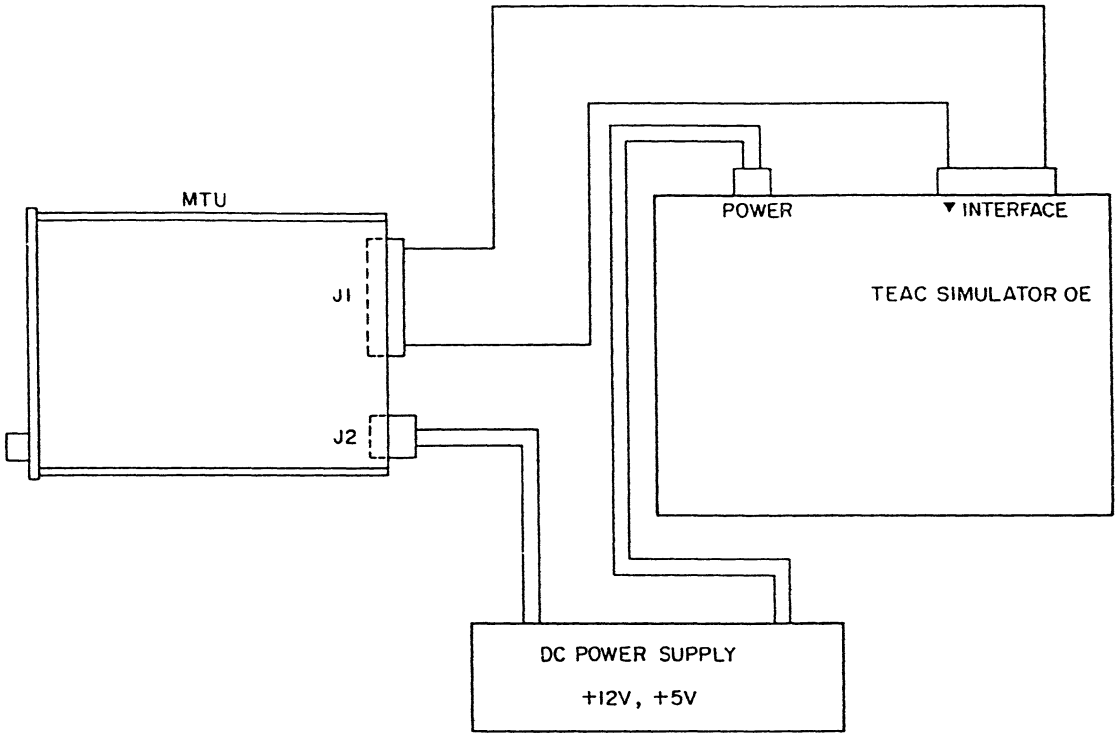


Fig. 414 Connections of SOE

4-3 Check and adjustment procedures

4-3-1 Positional adjustment of reel motor (F), (R) Ass'y

(1) Articles to be used

(a) Phillips screwdriver (No. 0)

(b) Tweezers

(c) Reel motor jig

(2) Adjustment procedure

(a) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(b) Loosen the two mounting screws each of the reel motor (F), (R) Ass'y until the reel motor can be moved easily (Fig. 415).

(c) Set the reel motor jig. While pushing the loading arm in the arrow direction, put the reel motor jig on the MTU body with the guide pins as reference, and return the arm gradually. In this case, check if the reference plane touches the two guide pins (Fig. 415).

(d) Move the reel motor to the position.
Where the reel hub stopper can be moved up and down smoothly while pushing it by the tweezers.

(e) Tighten the two mounting screws each of the reel motor with the specified torque.

(f) Detach the reel motor jig in the reverse procedure to step (c).

(g) Push the eject button to return the cassette unloading status.

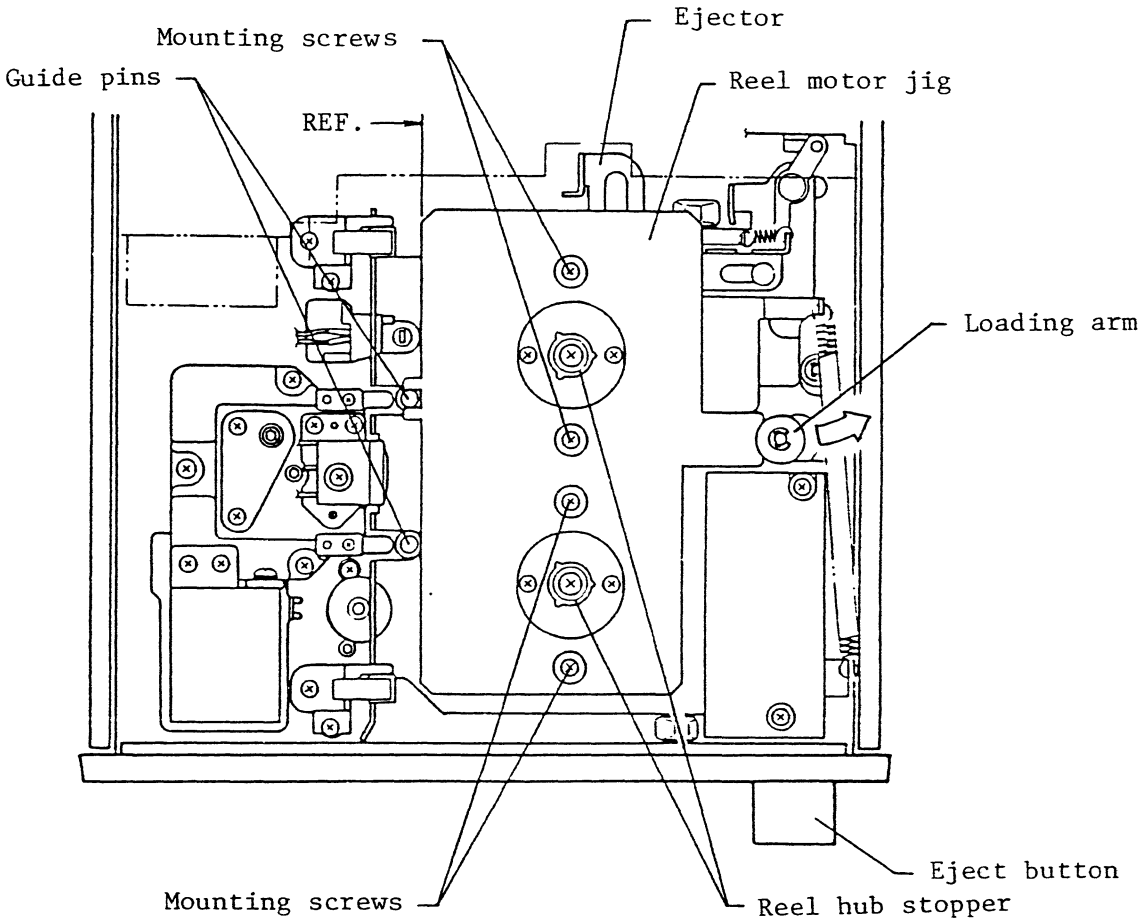


Fig.415 Positional adjustment of reel motor (F),(R) Ass'y

4-3-2 Height adjustment of encoder roller

(1) Articles to be used

(a) Hexagonal wrench 1.5 mm

(b) Height adjusting jig

(c) Roller height jig

(d) Adhesive (Cemedine's Hisuper)

(2) Adjustment procedure

(a) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(b) Set the height adjusting jig to the unit. While pushing the loading arm with the finger, put the height adjusting jig on the MTU with the guide pins as reference, and return the arm gradually. In this case, check if the jig is pressed exactly to the pressure spring (Fig. 416).

(c) Put the roller height jig on the height adjusting jig, and slide it to the encoder roller side. Move the encoder roller up and down until the inner side face of the flange touches the top face of the roller height jig (Fig. 417).

Note When moving the encoder roller up and down, exercise utmost care not to exert unreasonable force to the tip of the flange. Otherwise, the flange may be deformed.

(d) Slide the roller height jig until it is removed.

(e) Remove the height adjusting jig in the reverse procedure to item (c).

(f) Push the eject button to return to the cassette unloading status.

(g) Stick the top of the shaft to that of the flange (Fig. 418).

"Note" After sticking, avoid loading the cassette for five min.

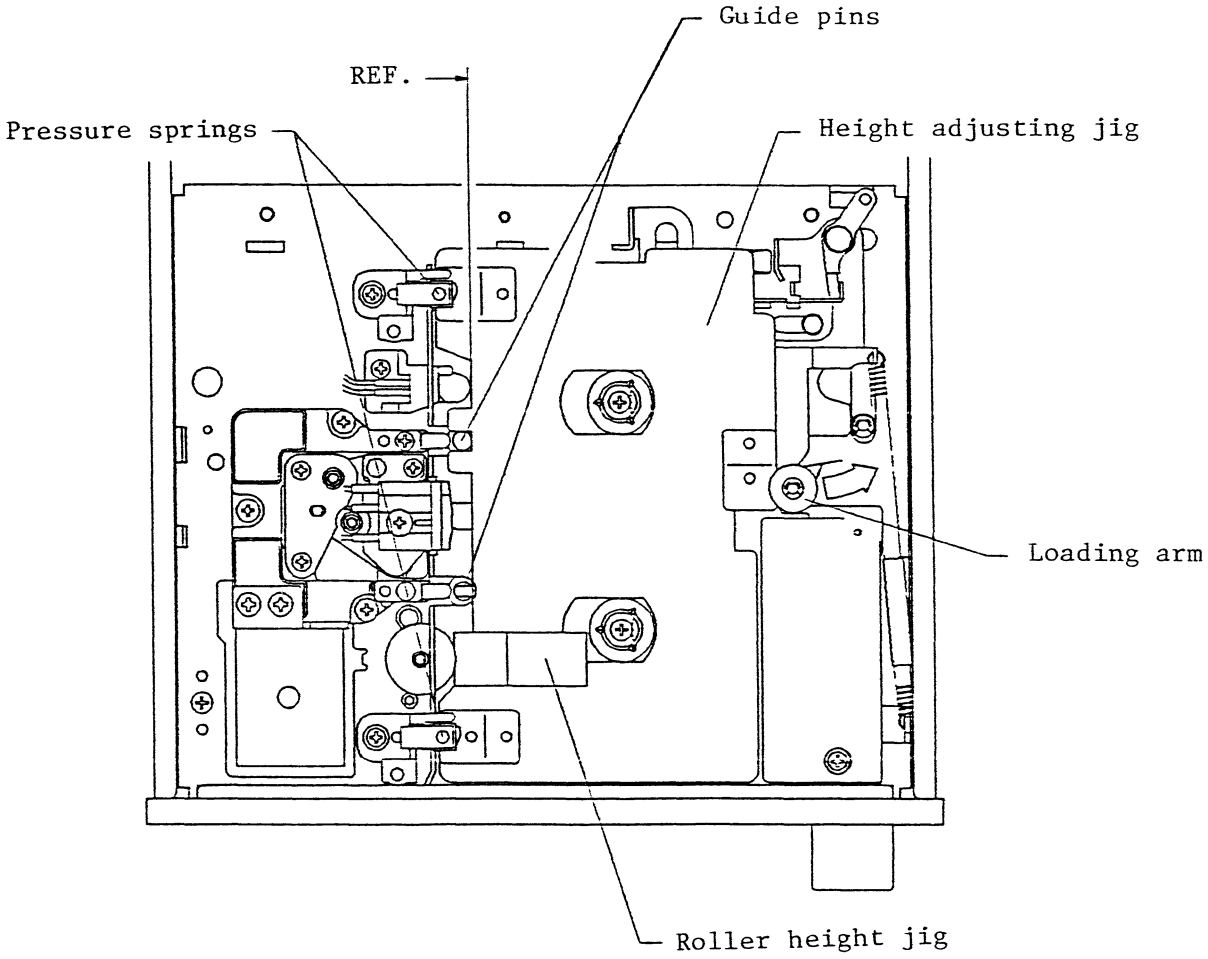


Fig.416 Setting of jigs

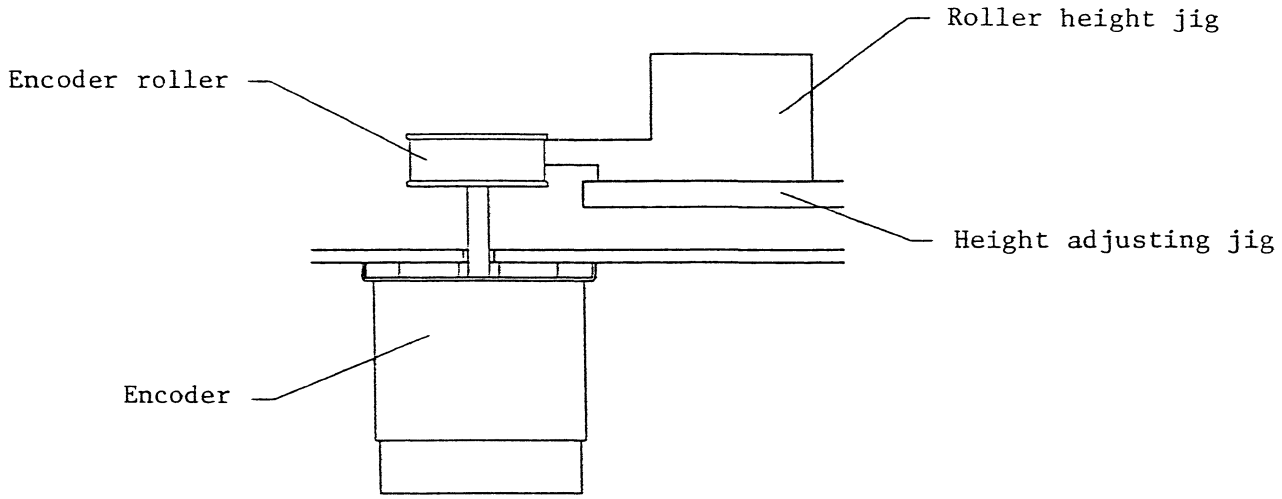


Fig.417 Height adjustment of encoder roller

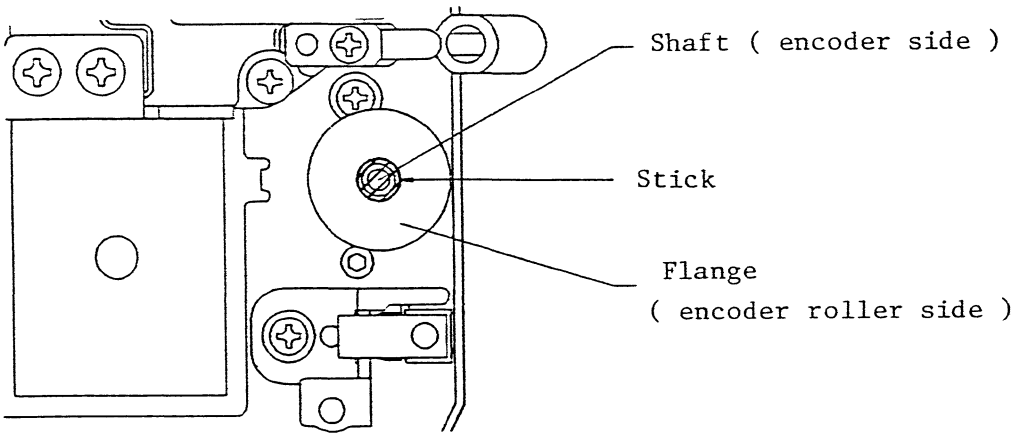


Fig.418 Bonding of encoder roller

4-3-3 Check of rotary direction of reel motor

(1) Article to be used

(a) SOA

(b) DC power supply (+12 V, +5 V).

(2) Check procedure

(a) Connect the SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(c) Make sure that the indicator CLD of SOA lights up.

(d) Check if each reel motor is turned in the correct rotary direction (Fig. 419).

(e) Push the eject button to return to the cassette unloading status.

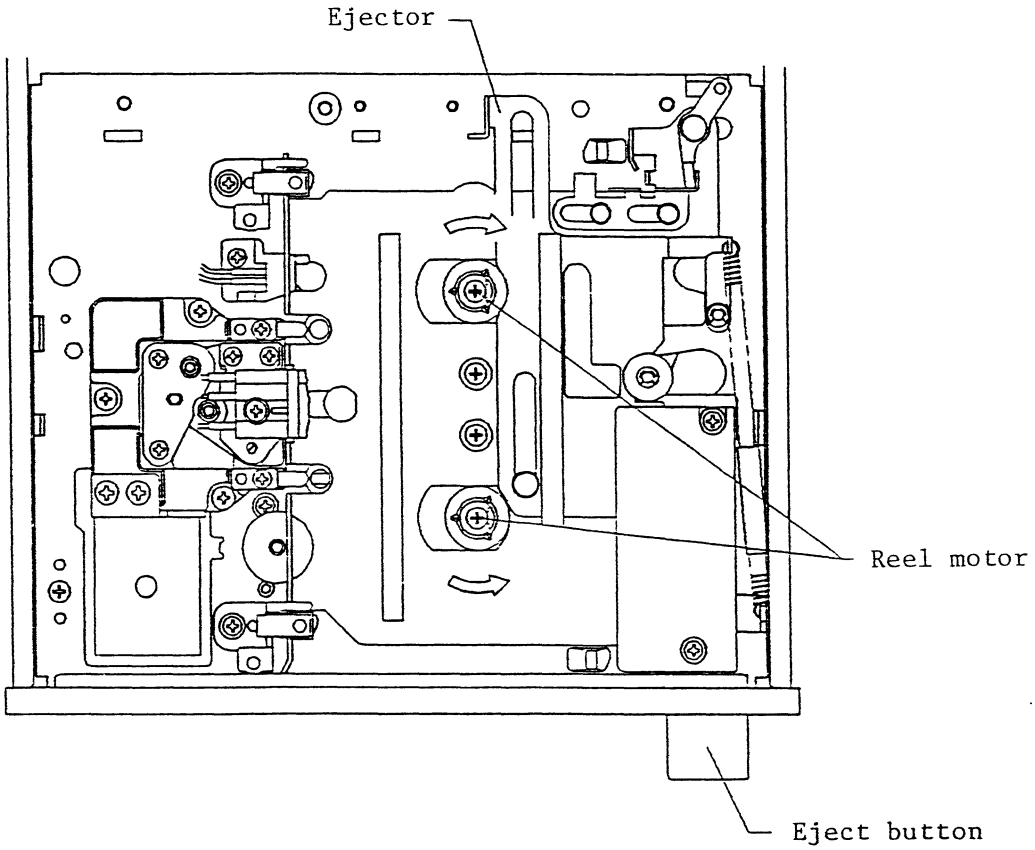


Fig.419 Check of rotary direction of reel motor

4-3-4 Check of file protect sensor

(1) Articles to be used

(a) FPT jig

(b) FPT check jig

(c) SOA

(d) DC power supply (+12 V, +5 V)

(2) Check procedure

(a) Connect the SOA in accordance with Item 4-2-5 (it is not required to connect a check cable C).

(b) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(c) Attach the FPT jig. While pushing the loading arm with the finger in the arrow direction, place the FPT jig on the holder base with reference to the guide pins, and return the arm gradually. Then, check if the reference plane touches the two guide pins (Fig. 420).

(d) Set the POWER switch on SOA to the PSA side.

(e) Make sure that the indicator CLD of SOA and the indicator FPT light up.

(f) Put the FPT check jig on the FPT jig, check if the FPT indicator goes out with the tip of the file protector touching the jig. At this time, be careful not to allow a gap between the FPT jig and FPT check jig (Fig. 421).

(g) Turn off the POWER switch on SOA.

(h) Remove the checking jig, and detach the FPT jig in the reverse procedure to step (c).

(i) Push the eject button to return to the cassette unloading status.

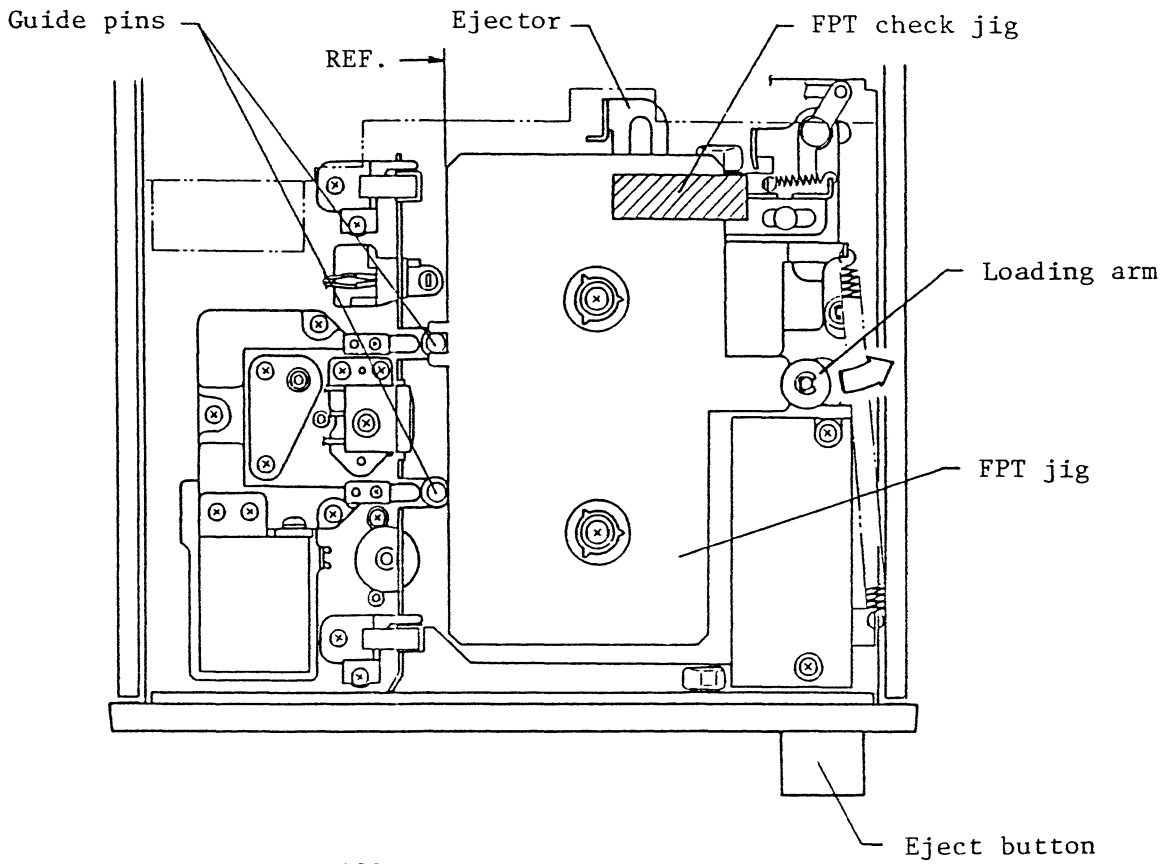


Fig.420 Setting of FPT jig

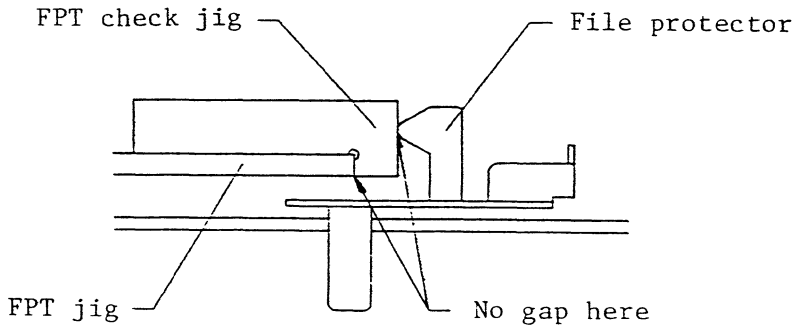


Fig.421 Check of file protect sensor

4-3-5 Cassette loading/unloading check

(1) Articles to be used

(a) SOA

(b) DC power supply (+12 V, 5 V)

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(c) Make sure that the indicator CLD of SOA lights up.

(d) Push the eject button to return to the cassette unloading status.

(e) Make sure that the indicator CLD of SOA goes out.

4-3-6 Check of head shift

(1) Articles to be used

(a) SOA

(b) DC Power supply (+12 V, +5 V)

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Push in the ejector with the finger to bring about the cassette loading status (Fig. 302, 303).

(c) Make sure that the indicator CLD of SOA lights up.

(d) Key in "A21" to shift the head to the lower side. Push the top of the shifted head with the finger, and make sure that the head does not move downward.

(e) Key in "A20" to restore the head to the upper side. Push the head lightly with the finger, and release the finger touch from the head, and then check if the head touches the upper stopper.

(f) If steps (d) and (e) are unsuccessful, recheck the position of the shift spring in accordance with Item 4-4-7,(2),(j).

(g) Push the eject button to return to the cassette unloading status.

4-3-7 Check and adjustment of tape winding

(1) Articles to be used

(a) Hexagonal wrench 1.5 mm

(b) Mirror cassette

(c) Screw lock (red)

(d) SOA

(e) DC power supply (+12 V, +5 V)

(2) Check and adjsutment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Key in "E3", and set it to the repeat mode (the indicator REPEAT lights up).

(c) Key in "E2", and set it to the hole skip mode (the indicator HOLE SKIP lights up).

(d) Load the mirror cassette on MTU. (Fig. 422)

(e) Make sure that there is no curl in the flange part of the encoder roller in the tape stop status. If the tape is curled, adjust the height of the encoder roller until the curl is sliminated.

Note When making the height adjustment, eject the mirror cassette once, and push the top of the encoder roller with the finger to remove the adhesive.

(f) Key in "0" or "1" to wind the tape forward and reversely, over the total length of the tape and then visually check for the following items:

(i) At the flange part of the tape guide on the encoder roller side, there is no tape curl in both forward and reverse directions (Fig. 423).

(ii) At the flange part of the encoder roller, there is no tape curl in both forward and revers directions (Fig. 424).

Note 1. Key in either "0" or "1" according to the winding status of the tape; "0" for the forward winding, and "1" for the reverse winding.

2. Since a tape curl status is identified by the reflection of light, this check should be performed at a well-illuminated place.

(g) Key in "F" to stop the tape winding.

(h) If step (e) is unsuccessful, adjust the tilt of encoder roller with the adjusting screw.

(i) Key in "E0", and 1.0 will be indicated to the display DATA 1. Successively key in "30F" to set the tape winding time to 3 sec.

(j) Key in "E1", and 1.0 will be indicated to the display DATA 1. Successively, key in "05F" to set the tape stop time to 0.5 sec.

(k) Key in "0" or "1" and wind the tape nearly to the winding center position.

(l) Key in "2" to wind the tape forward and reverse continuously, and then turn the adjusting screw until the specification of step (e) is satisfied. When the tape is shifted upwards with respect to the guide during the forward winding, and downwards during the reverse winding, turn the adjusting screw counterclockwise. In the reverse case to the above, turn the adjusting screw clockwise.

(m) Key in "F" to stop the tape winding.

(n) Key in "0" or "1", and wind the tape continuously forward or reversely over the total length of the tape, and then check for step (e).

(o) When the results of adjustment are unsatisfactory, repeat steps (k) to (m).

(p) Key in "F" to stop the tape winding.

(q) Eject the mirror cassette.

(r) Apply acrew lock (red) to the adjusting screw.

(s) When the height of the encoder roller has been adjusted in step (e), stick the encoder roller in accordance with Item 4-3-2 (g).

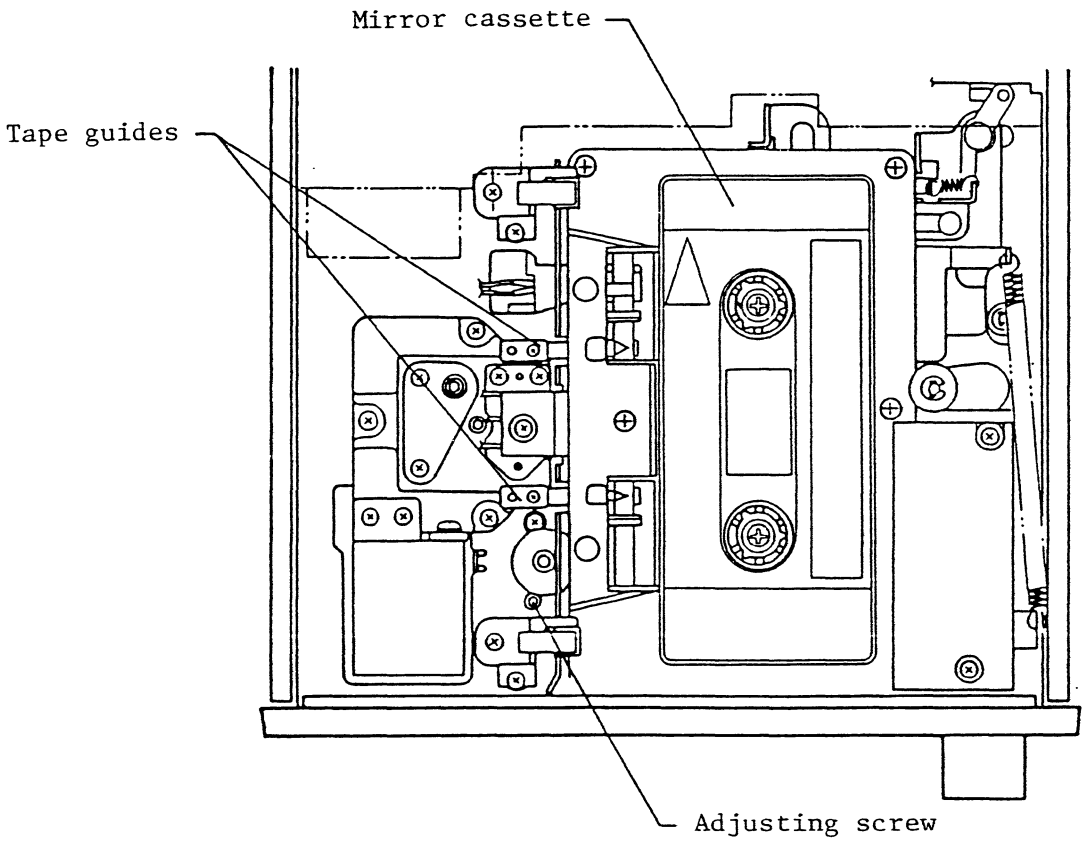


Fig.422 Loading of mirror cassette

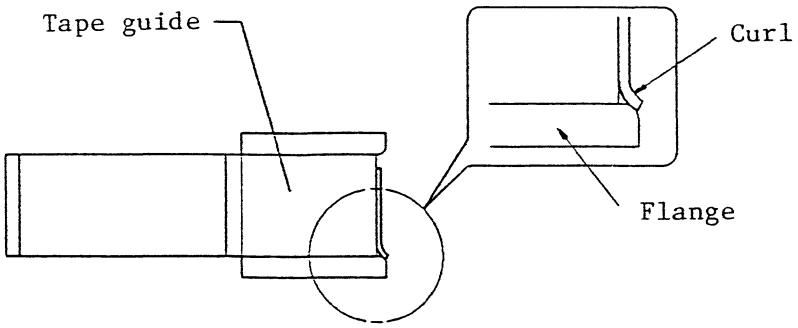


Fig.423 Check of tape winding (tape guide)

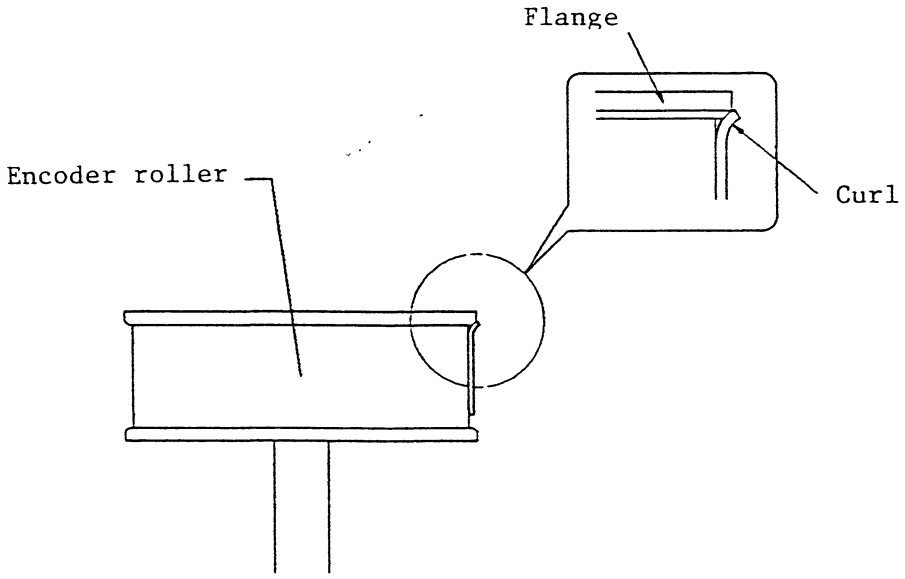


Fig.424 Check of tape winding (encoder roller)

4-3-8 Check and Adjustment of head alignment

(1) Articles to be used

(a) Conventional type screwdriver small size
(b) Hexagonal wrench 1.5 mm
(c) Radio pliers
(d) Screw lock (red)
(e) Alignment tape
(f) Head eraser
(g) TZ-380
(h) Oscilloscope
(i) SOA
(j) DC power supply (+12 V, +5 V)

(2) Check and adjustment procedures

(a) Prior to the check and adjustment, initialize MTU in the following procedure.

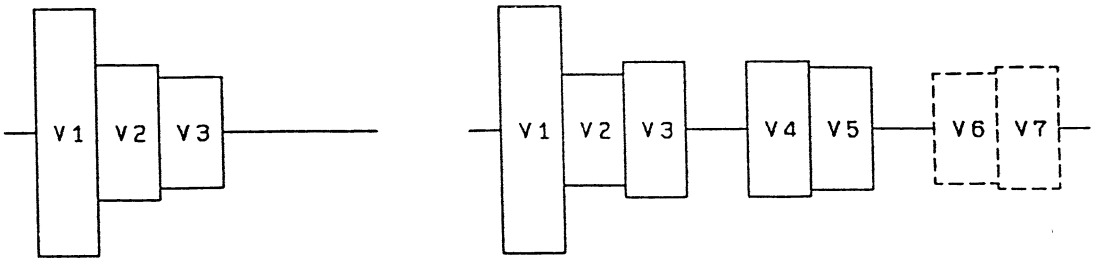
1 Switch over the shorting plug on the PCBA Drive Control from strap S2 to S1 by using the radio pliers in accordance with Fig. 336.

Remark A metal shield may be attached to the PCBA Drive Control in some issue of PCBA. In such a case, remove the metal shield for the strap changeover.

2 Demagnetize the magnetic head using the head eraser.
3 Clean the magnetic head using TZ-380.
4 Connect SOA to MTU in accordance with Item 4-2-5, and set the POWER switch to PSA side.
5 Connect the TP1 (PRE) of SOA to CH1 of the oscilloscope. Setting of oscilloscope : DC mode, 0.5 V/div, 1 msec/div
6 Load the alignment tape on MTU.
7 Key in "A22", and further "1", and adjust the variable resistor R21 (Fig. 336) on the PCBA Drive Control until the output level of the burst signal V1 displayed on the oscilloscope is within 1.3 to 2 Vpp (Fig. 425).

8 Key in "F" to stop the operation.

9 Key in "A21", and further "1", and adjust the variable resistor R17 (Fig. 336) until the burst signal V1 is within 1.3 to 2 Vpp (Fig. 425).



(i) Track 0 (ii) Track 1,2

Fig. 425 Burst signal

Note Be careful since the measuring range of the alignment becomes narrower, if V1 does not reach 1.3 V according to the characteristics of the head and alignment tape.

(b) Check for the head alignment in the following procedure:

1 Key in "0" or "1" to wind the tape nearly to the winding center, and then key in "F".

2 Key in "A20".

3 Key in "B5", and read the DATA on display of track 0.
Display DATA 2 : Off track |±.| | | |(mm)

4 Key in "A21".

5 Key in "B5", and read the DATA on display of track 1.
Display DATA 1 : Azimuth |±| | .| |(MINT)
Display DATA 2 : Off track |±.| | | |(mm)

6 Key in "A22".

7 Key in "B5", and read the DATA on display of track 2.
Display DATA 1 : Azimuth |±| | .| |(MINT)
Display DATA 2 : Off track |±.| | | |(mm)

8 Check if the individual values measured in steps 3 , 5 and 7 are within the following ranges.

i) Azimuth : -9 to +9 minutes (each track)

ii) Off track : -50 to +50 micrometers (each track)

9 When only check may be made, successively follow the procedure given in item (d).

Note 1: As for the above-mentioned check, key in "F" successively, and repeat measurement on each track three times or more, and then decide the measurement values.

2: When the check is made with the burst signal V1 less than 1.3 Vpp, no data may be displayed on SOA. Since this means that the value is out of the specification, execute the alignment adjustment.

3: As for the values displayed on SOA, DATA 1 |±| |2.|3| means 2.3 minutes, and DATA 2 |±|0|1|9| means 19 micrometers.

4: If the measured azimuth value are out of the specification, |±| |0|F| is indicated on the DATA 1 display.

(c) If the results of measurement in item (b) are out of the specifications, make the alignment adjustment with the adjusting screws in the following procedure (Fig. 426).

1 Key in "5" on rewind the tape.

2 Key in "A22", and further "0", and adjust each burst signal of tack 2 displayed on the oscilloscope as follows (Fig. 425).

(i) Azimuth : Turn the azimuth adjusting screw until the difference between V4 and V5 is minimized.

(ii) Off track: Turn the offtrack adjusting screw A until the difference between V2 and V3 is minimized.

3 Key in "F" to stop the operation.

4 Key in "A21" and further "1", and make the same adjustment for track 1 as in step 2 .

5 Repeat steps 2 to 4 and make adjustment for both tracks 1 and 2 until the contents of (i) and (ii) above are satisfied.

6 Key in "A22", and further "B5", and repeat the measurement of track 2 three times, and then calculate the mean value of off track (DATA 2).

7 Key in "E2", and further "E3" to set the MTU to HOLE SKIP and REPEAT modes.

8 Key in "A20", and further "B5", and turn the offtrack adjusting screw B until the sequentially varying DATA 2 on display is nearly equal to the mean value calculated in step 6 .

9 According to item (b), check if the measurement values of each track meet the specifications.

10 After the completion of adjustment, successively follow the procedure mentioned in item (d).

Remark 1: If the measurement by SOA is started from the clear leader part, the tape runs away.
By sure to start the measurement after winding the tape up to the magnetic face. If the tape runs away, push the RESET switch on SOA to stop the operation.

2: After the completion of adjustment, make the check of the alignment in the winding center of the tape.

(d) After the completion of check and adjustment, reset the MTU to the status before the work.

1 Eject the alignment tape.

2 Turn off the POWER switch on SOA.

3 Apply the screw lock (red) to each adjusting screw.

4 Return the shorting plug from strap S1 to S2.

5 Check and adjust of the read preamplifier level in accordance with Item 4-3-14.

Remark 1: For the specifications of the alignment tape, refer to those corresponding to the Part No. of the alignment tape used.

2: The alignment tape contains tracks on which the burst signal is not recorded. Therefore, the following measurements cannot be made.

i) Azimuth of track 0

ii) Off track and azimuth of track 3

3: The burst signals V6 and V7 shown in Fig. 425 is not necessary for the maintenance.

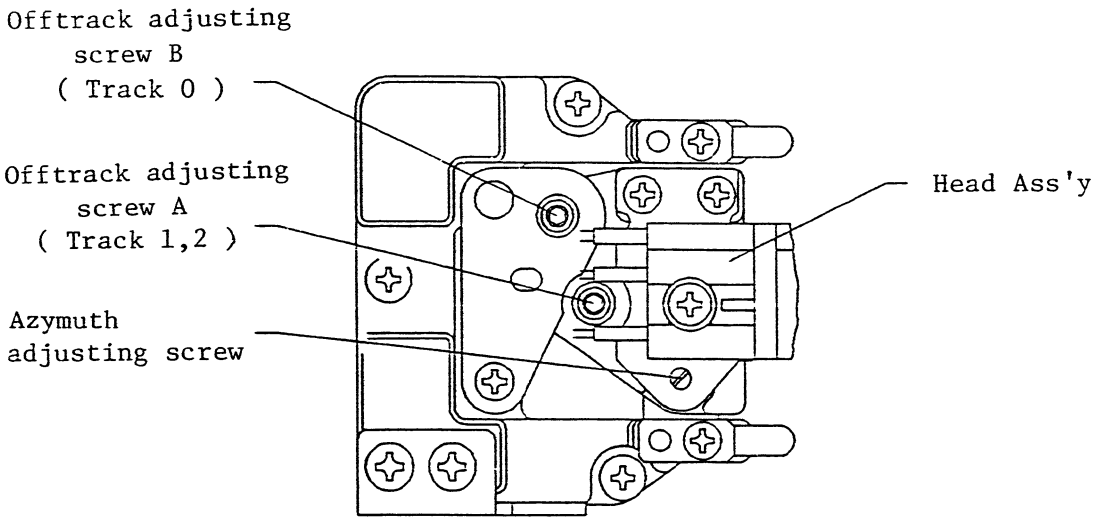


Fig.426 Adjusting screws of head alignment

4-3-9 Check of AGC Operation

(1) Articles to be used

(a) Work tape

(b) Oscilloscope

(c) SOA

(d) DC power supply (+12 V, +5 V)

"90 ips"

(2) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Connect the oscilloscope to TP8 on the PCBA Drive Control.

(d) Key in "A63F".

(e) Check if the waveform shown in Fig. 427 appears at TP8.

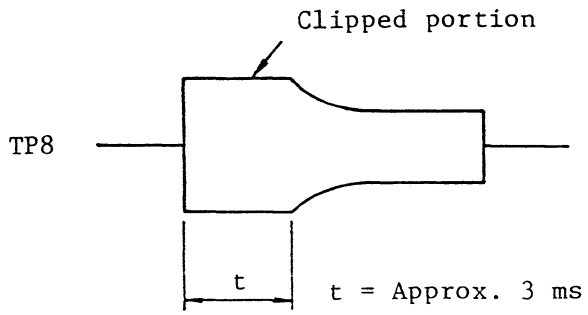


Fig. 427 Check of AGC operation

(f) If any clipped portion shown in Fig. 427 does not appear, check if the strap S1 is open and S2 is shorted on the PCBA Drive Control.

"30 ips"

(3) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Connect the oscilloscope to TP8 on the PCBA Drive Control.

(d) Key in "A63F".

(e) Check if the waveform shown in Fig. 428 appears at TP8.

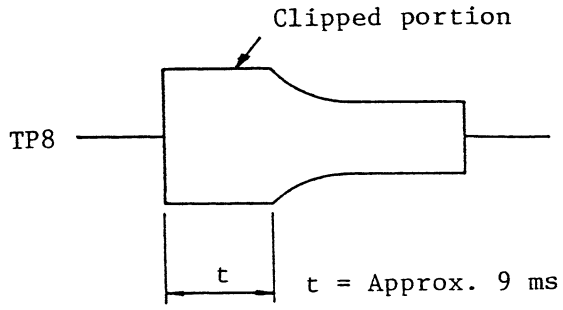


Fig. 428 Check of AGC operation

(f) If the clipped portion shown in Fig. 428 does not appear, check if the strap S1 is open and S2 is shorted on the PCBA Drive Control.

4-3-10 Check and adjustment of BOT/EOT hole sensor

(1) Articles to be used

(a) Hole sensor test tape

(b) Conventional type screwdriver small size

(c) SOA

(d) DC power supply (+12 V, +5 V)

"90 ips"

(2) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the hole sensor test tape on MTU.

(c) Wind the tape 1 to 2 seconds past the BOT hole in the forward direction.

(d) Key in "B7". The tape is wound forward and reversely.

(e) The hole sense time is indicated to the display DATA 1 of SOA during the reverse winding and to the display DATA 2 during the forward.

(f) Check if both hole sense times are more than 400 microseconds each.

(g) Key in "B8" to wind the tape forward and reversely.

(h) The voltage level is displayed to the display DATA 1 of SOA during hole detection, and to th display DATA 2 during non hole detection.

(i) Check if the voltage level at hole detection is less than 0.35 V and that at non hole detection is more than 4.55 V.

(j) If the result of the check in steps (f) and (i) are out of the specifications, make the following adjustment.

(k) Connect the (+) terminal of the digital voltmeter (DCV) to TP13 on the PCBA Drive Control, and the (-) terminal to TP18.

(l) Key in "B8". The tape is wound reversely and forward, and then stops.

(m) Keep the tape stopped, and adjust R41 on the PCBA Drive Control until the reading voltage of the digital voltmeter is equal to the voltage entered on the label of the hole sensor test tape.

Example When the voltage entered on the label of the hole sensor test tape is 4.85 V, adjust R41 until the reading voltage of the digital voltmeter becomes 4.85 V.

(n) Disconnect the digital voltmeter, and connect the oscilloscope to TP13 on the PCBA Drive Control.

(o) Key in "E2" and "E3". The indicators HOLE SKIP and REPEAT on SOA light up.

(p) Key in 2 . The tape is wound forward and reversely alternately with the BOT hole as a center.

(q) When the BOT hole passes through the front of the hole sensor, observe the hole detection waveform at TP13, and check if the time of the portion where the low level at the hole detection time is 0.5 V or less is 200 microseconds or more (Fig. 429).

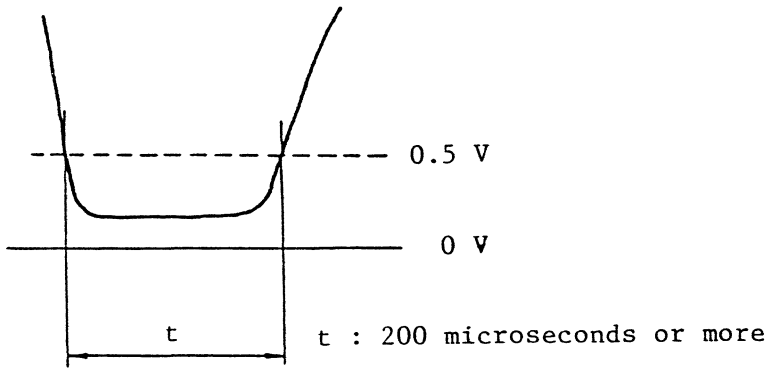


Fig. 429 Hole detection waveform at TP13

(r) Key in F to stop the operation.

"30 ips"

(3) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the hole sensor test tape to MTU.

(c) Key in "8". The indicator HIS of SOA lights up, and SOA is switched to high speed mode. As for this item, even the MTU of 30 ips model is checked and adjusted at the tape speed of 90 ips.

(d) Wind the tape 1 to 2 seconds past the BOT hole in the forward direction.

(e) Key in "B7". The tape is wound forward and reversely.

(f) The hole sense time is indicated to the display DATA 1 of SOA during the reverse winding, and to the display DATA 2 during the forward.

(g) Check if both hole sense times are more than 400 microseconds each.

(h) Key in "B8". The tape is wound forward and reversely.

(i) The voltage level is displayed to the display DATA 1 of SOA during hole detection, and to the display DATA 2 during non hole detection.

(j) Check if the voltage level at hole detection is less 0.35 V and that at non hole detection is more than 4.55 V.

(k) If the result of the check in steps (g) and (j) are out of the specifications, make the following adjustment.

(l) Connect the (+) terminal of the digital voltmeter (DCV) to TP13 on the PCBA Drive Control, and the (-) terminal to TP18.

(m) Key in "B8". The tape is wound reversely and forward, and then stops.

(n) Keep the tape stopped, and adjust R41 on the PCBA Drive Control until the reading voltage of the digital voltmeter is equal to the voltage entered on the label of the hole sensor test tape.

"Example" When the voltage entered on the label of the hole sensor test tape is 4.85 V, adjust R41 until the reading voltage of the digital voltmeter becomes 4.85 V.

(o) Disconnect the digital voltmeter, and connect the oscilloscope to TP13 on the PCBA Drive Control.

(p) Key in "E2" and "E3". The indicators HOLE SKIP and REPEAT on SOA light up.

(q) Key in 2 . The tape is wound forward and reversely alternately with the BOT hole as a center.

(r) When the BOT hole passes through the front of the hole sensor, observe the hole detection waveform at TP13, and check if the time of the portion where the low level at the hole detection time is 0.5 V or less is 200 microseconds or more (Fig. 430).

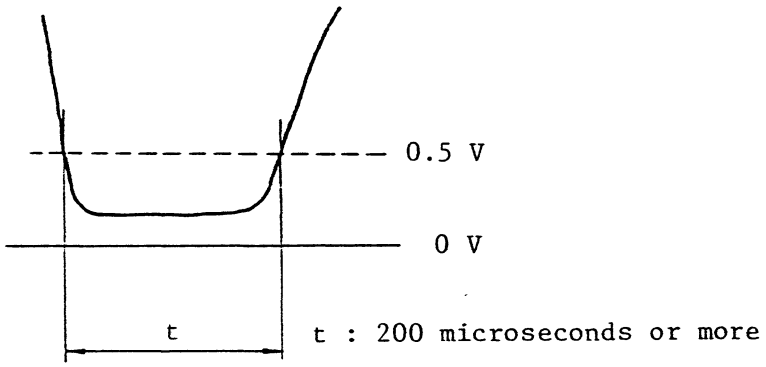


Fig. 430 Hole detection waveform at TP13

(s) Key in "F" to stop the operation.

(t) Key in "8".

4-3-11 Check and adjustment of tape speed

(1) Articles to be used

(a) Speed tape

(b) Conventional type screwdriver small size

(c) SOA

(d) DC power supply (+12 V, +5 V)

"90 ips"

(2) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the speed tape on MTU.

(c) Wind the tape nearly in the winding center.

(d) Key in "B4". The tape is wound forward and reversely.

(e) The 90 ips forward tape speed is indicated to the display DATA 1 of SOA, and the 90 ips reverse tape speed to the DATA 2 in ips (inch per second) units.

(f) Check if both the tape seeds are within the range of 90 ips -4% to +4% (86.4 ips to 93.6 ips).

(g) Key in "8". The indicator HIS on SOA goes out (low speed mode).

(h) Key in "BA". The tape is wound forward and reversely at 30 ips.

(i) The forward winding encoder frequency is displayed to the display DATA 1 on SOA, and the reverse winding encoder frequency to the DATA 2.

(j) Check if each encoder frequency is within the range of 2.865 kHz -10% to +10% (2.579 kHz to 3.152 kHz).

(k) If the results of checks at steps (e) and (i) are out of the specifications, make the following adjustment.

(l) Key in "8". The indicator HIS on SOA lights up (high speed mode).

(m) Key in "E3". The indicator REPEAT on SOA lights up.

(n) Key in "BA". The tape is wounds forward and reversely.

(o) The forward winding encoder frequency is indicated to the display DATA 1 on SOA, and the reverse one to DATA 2 (90 ips winding).

(p) Adjust R44 on the PCBA Drive Control until both the encoder frequencies are within 8.58 kHz to 8.60 kHz (center value: 8.594 kHz).

(q) Key in "F" to stop the operation.

(r) Key in "8". The indicator HIS on SOA goes out (low speed mode).

(s) Key in "BA". The tape is wound forward and reversely at 30 ips.

(t) The forward winding encoder frequency is indicated to the DATA 1 display on SOA, and the reverse one to the DATA 2.

(u) Adjust R43 on the PCBA Drive Control until both the encoder frequencies are within 2.86 to 2.88 kHz (tne center frequency: 2.865 kHz).

(v) Key in "F" to stop the operation.

(w) Key in "8". The indicator HIS on SOA lights up.

Remark 1. The tape speed should be adjusted in the order of 90 ips (R44) and 30 ips (R43) without fail. If R44 is adjusted later than R43, the tape speed of 30 ips is also changed.

2. There is such a MTU that a fixed resistor is used for R43. In such a case, R43 need not be adjusted.

"30 ips"

(3) Check and adjustment procedures

(a) Connect S0A in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the speed tape on MTU.

(c) Wind the tape nearly in the winding center.

(d) Key in "B4". The tape is wound forward and reversely.

(e) The 30 ips for ward tape speed is indicated to the display DATA 1 of S0A, and the 30 ips reverse tape speed to the DATA 2 in ips (inch per second) units.

(f) Check if both the tape speeds are within the range of 30 ips -4% to +4% (28.8 ips to 31.2 ips).

(g) Key in "8". The indicator HIS on S0A goes out (high speed mode).

(h) Key in "BA". The tape is wound forward and reversely at 90 ips.

(i) The forward winding encoder frequency is displayed to the display DATA 1 on S0A, and the reverse one to the DATA 2.

(j) Check if each encoder frquency is within the range of 8.594 kHz -5% to +5% (8.14 kHz to 9.024 kHz).

(k) If the results of checks at steps (e) and (i) are out of the specifications, make the following adjustment.

(l) Key in "E3". The indicator REPEAT on S0A lights up.

(m) Key in "BA". The tape is wound forward and reversely at 90 ips.

(n) The forward winding encoder frequency is indicated to the display DATA 1 on S0A, and the reverse one to DATA 2 (90 ips movement).

(o) Adjust R44 on the PCBA Drive Control until both the encoder frequencies are within 8.58 kHz to 8.60 kHz (center value: 8.594 kHz).

(p) Key in "F" to stop the operation.

(q) Key in "8". The indicator HIS on S0A goes out (low speed mode).

(r) Key in "BA". The tape is wound forward and reversely at 30 ips.

(s) The forward winding encoder frequency is indicated to the DATA 1 display on S0A, and the reverse one to the DATA 2.

(t) Adjust R43 on the PCBA Drive Control until both the encoder frequencies are within 2.86 kHz to 2.88 kHz (tne center frequency: 2.865 kHz).

(u) Key in "F" to stop the operation.

Remark The tape speed should be adjusted in the order of 90 ips (R44) and 30 ips (R43) without fail. If R44 is adjusted later than R43 the tape speed of 30 ips is also changed.

4-3-12 Check of start/stop time

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC power supply (+12 V, +5 V)

"90 ips"

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Key in "5". The tape is rewound up to the BOT leader tape.

(d) Key in "B0". The tape is wound forward.

(e) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2.

(f) Check if the start time is less than 300 ms and the stop time is less than 250 ms.

(g) Key in "B1". The tape is wound reversely.

(h) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2. Make the same check as in step (f).

(i) Key in "0". The tape is wound to the EOT leader tape.

(j) Key in "B1". The tape is wound reversely.

(k) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2.
Make the same check as in step (f).

(l) Key in "B0". The tape is wound forward.

(m) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2. make the same check as in step (f).

"30 ips"

(3) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Key in "5". The tape is rewound up to the BOT leader tape.

(d) Key in "B0". The tape is wound forward.

(e) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2.

(f) Check if the start time is less than 100 ms and the stop time is less than 100 ms.

(g) Key in "B1". The tape is wound reversely.

(h) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2. Make the same check as in step (f).

(i) Key in "80". The tape is wound to the EOT leader tape.

(j) Key in "8B1". The tape is wound reversely.

(k) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2. Make the same check as in step (f).

(l) Key in "B0". The tape is wound forward.

(m) The start time is indicated to the display DATA 1 on SOA, and the stop time to the DATA 2. Make the same check as in step (f).

4-3-13 Check of ISV

(1) Articles to be used

(a) Speed tape

(b) Oscilloscope

(c) SOA

(d) DC power supply (+12 V, +5 V)

(2) Check procedure

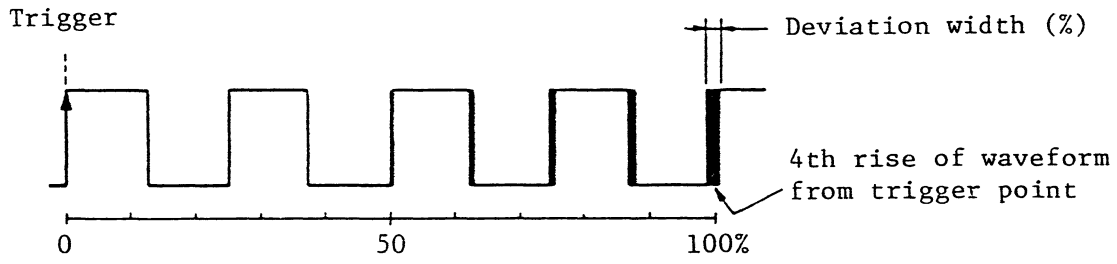
(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the speed tape on MTU.

(c) Wind the tape nearly in the winding center.

(d) Connect the oscilloscope to J4-17 on the PCBA Drive Control.

(e) Key in "0" to SOA. The tape is wound forwards. Measure the deviation width (Fig. 431) of the waveform at J4-17 as shown in Fig. 431.



Express the deviation width of the 4th rise of waveform from the trigger point in percentage, defining the 10 divisions of the horizontal axis as 100%. Adjust the waveform with the TIME/DIV of the oscilloscope set to variable.

Fig. 431 ISV measuring method

(e) Check if the deviation width of the waveform at J4-17 is less than 10%.

(f) key in "F" to stop the operation.

(g) Key in "1". The tape is wound reversely. Measure the deviation width of the waveform at J4-17 and perform the same check as in step (e).

(h) Key in "F" to stop the operation.

4-3-14 Check and adjustment of read preamplifier level

(1) Articles to be used

(a) Level test tape

(b) Conventional screw driver small size

(c) SOA

(d) DC power supply (+12 V, +5 V)

(2) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Erase the level test tape by the bulk eraser or erase the portion of tape to be used for test over some length by using MTU.

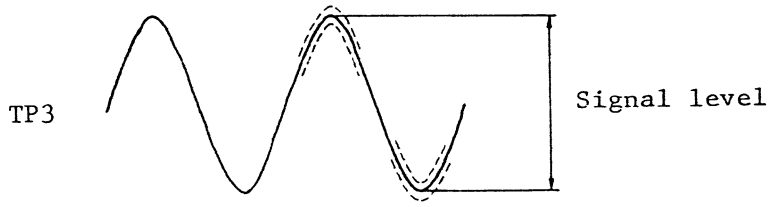
(c) Load the erased level test tape on MTU.

(d) Wind the tape nearly in the winding center.

(e) Connect the oscilloscope to TP3 on the PCBA Drive Control.

(f) Key in "A22".

(g) Key in "A63F". Measure the signal level on the oscilloscope.



Since the signal contains large noise, triger the signal appropriately changing the triger level until the picture shown in the above is obtained.

Fig. 432 Measurement of read preamplifier level

(h) Check if the signal level is within the range of -150 mV to +150 mV for the calibrated value of the level test tape used.

Example When the calibrated value is 250 mV, the abovementioned range is from 100 mV to 400 mV.

(i) Key in "F" to stop the operation.

(j) Key in "A21".

(k) Key in "A63F". Measure the signal level on the oscilloscope.

(l) Perform the same check as in step (h).

(m) If the result of the check mentioned in step (h) are out of the specification, make the following adjustment.

(n) Erase again the level test tape used in the same procedure as in step (a). Load the erased level test tape on MTU again.

(o) Key in "A22".

(p) Key in "A63F". Adjust R21 on the PCBA Drive Control until the signal level becomes equal to the calibrated value of the level test tape used.

(q) Key in "F" to stop the operation.

(r) Key in "A21".

(s) Key in "A63F". Adjust R17 on the PCBA Drive Control until the signal level becomes equal to the calibrated value of the level test tape used.

(t) Key in "F" to stop the operation.

Remark When the calibrated value of 1.0 V to 2.0 V is indicated on the level test tape, find the calibrated value to be used in the following method:
For example, assuming that 1.71 V is indicated on the level test tape,

the calibrated value = 250 x 1.71/1.5 = 285 mV

Namely, the calibrated value to be used is 285 mV.

4-3-15 Check and adjustment of read level

(1) Articles to be used

(a) Work tape

(b) Conventional screw driver small size

(c) SOA

(d) DC power supply (+12 V, +5 V)

"Permalloy Head"

(2) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the work tape on MTU.

(c) Wind the work tape nearly in the winding center.

(d) Key in "C0". The read level is displayed to the display DATA 1 on SOA.

(e) Check if the read level is within the range of 1.22 V to 1.72 V. (center value: 1.47 V)

(f) Key in "F" to stop the operation.

(g) Key in "A21". The write/read track on MTU is changed over to Track 1. Perform the same check as in steps (d), (e) and (f).

(h) If the result of step (e) is out of the specification, make the following adjustment.

(i) Key in "A20". The write/read track on MTU in changed over to Track 0.

(j) Key in "E3". The indicator REPEAT on SOA lights up.

(k) Key in "C0". The read level is indicated to the display DATA 1 on SOA. Adjust R48 on the PCBA Drive Control until the read level is 1.47 V.

(l) Key in "F" to stop the operation.

"Ferrite Head"

(3) Check and adjustment procedures

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the work tape on MTU.

(c) Wind the work tape nearly in the winding center.

(d) Key in "CO". The read level is displayed to the display DATA 1 on SOA.

(e) Check if the read level is within the range of 0.9 V to 1.30 V. (center value: 1.1 V)

(f) Key in "F" to stop the operation.

(g) Key in "A21". The write/read track on MTU is changed over to Track 1. Perform the same check as in steps (d), (e) and (f).

(h) If the result of step (e) is out of the specification, make the following adjustment.

(i) Key in "A20". The write/read track on MTU is changed over to Track 0.

(j) Key in "E3". The indicator REPEAT on SOA lights up.

(k) Key in "CO". The read level is indicated to the display DATA 1 on SOA. Adjust R48 on the PCBA Drive Control until the read level is 1.10 V.

(l) Key in "F" to stop the operation.

4-3-16 Check of feed through

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC Power supply (+12 V, +5 V)

(2) Check procedure

(a) Connect S OA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the work tape on MTU.

(c) Key in "C8". The tape is wound forward.

(d) The value of feed through is displayed to the display DATA 1 on SOA.

(e) Check if the value of feed through is 12% or less.

(f) Key in "A21" to SOA. The write/read track on MTU is changed over to Track 1.

(g) Key in "C8". The tape is wound reversely.

(h) Perform the same check as in steps (d) and (e).

4-3-17 Check of resolution

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC power supply (+12 V, +5 V)

"Permalloy Head"

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Erase the work tape used with the bulk eraser, or erase the portion to be used for check over some length by using MTU.

(c) Load the erased work tape on MTU.

(d) Key in "A22". The write/read track of MTU is changed over to Track 2.

(e) Key in "C5". The measured value of resolution is indicated to the display DATA 1 on SOA.

(f) Check if the resolution is 35% or more.

(g) Key in "A21". The write/read track on MTU is changed over to Track 1.

Perform the same check as in steps (e) and (f).

"Ferrite Head"

(3) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Erase the work tape used with the bulk eraser or erase the portion of tape to be used for check over some length by using MTU.

(c) Load the erased work tape on MTU.

(d) Key in "A22". The write/read track on MTU is changed over to Track 2.

(e) Key in "C5". The measured value of resolution is indicated to the display DATA 1 on SOA.

(f) Check if the resolution is 40% or more.

(g) Key in "A21". The write/read track on MTU is changed over to Track 1.

Perform the same check as in steps (e) and (f).

4-3-18 Check of erase level

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC power supply (+12 V, +5 V)

"Permalloy Head"

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the work tape on MTU.

(c) Key in "C91F". The tape is wound forward and reversely.

(d) The erase level is indicated to the display DATA 1 on SOA.

(e) Check if the erase level is less than 0.161 V.

"Ferrite Head"

(3) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side.

(b) Load the work tape on MTU.

(c) Key in "C91F". The tape is wound forward and reversely.

(d) The erase level is indicated to the display DATA 1 of SOA.

(e) Check if the erase level is less than 0.223 V.

4-3-19 Check of peak shift

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC power supply (+12 V, +5 V)

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Key in "C6".

(d) The peak shift value is indicated to the display DATA 1 on SOA.

(e) Check if the peak shift is less than 20%.

(f) Key in "A21". The write/read track of MTU is changed over to Track 1.

(g) Perform the same check as in steps (c) to (e).

4-3-20 Check of asymmetry

(1) Articles to be used

(a) Work tape

(b) SOA

(c) DC power supply (+12 V, +5 V)

(2) Check procedure

(a) Connect SOA in accordance with Item 4-2-5, and set the POWER switch to the PSA side (it is not required to connect a check cable C).

(b) Load the work tape on MTU.

(c) Key in "C7F".

(d) The asymmetry value is indicated to the display DATA 1 on SOA.

(e) Check if the asymmetry is less than 5 %.

(f) Key in "A21". The write/read track on MTU is changed over to Track 1.

(g) Perform the same check as in steps (c) to (e).

"D/CAS" "SCSI"

4-3-21 Check and adjustment of VFO operating point

(1) Articles to be used

(a) Work tape

(b) Digital voltmeter

(c) Conventional type screwdriver Small size

(d) "D/CAS" SOB

(e) "SCSI" SOD

(f) DC power supply (+12 V, +5 V)

"D/CAS"

(2) Check and adjustment procedure

(a) Connect SOB in accordance with Item 4-2-6.

(b) Prior to the start of this item of check and adjustment, allow a warmup time of 10 min or more.

(c) Load the work tape on MTU.

(d) Connect the (+) terminal of the digital voltmeter (DCV) to TP4 on the PCBA interface control, and its (-) terminal to GND.

(e) Key in "D0F", "D51", "B2", and "AA". The tape is wound.

(f) Check if the voltage at TP4 is within the range of 2.25 V to 2.75 V (center value: 2.50 V) during the forward winding.

(g) When the measured value in step (f) is out of the specification, adjust R12 on the PCBA Interface Control until the voltage at TP4 is set to 2.5 V.

"SCSI"

(3) Check and adjustment procedures

(a) Connect SOD in accordance with Item 4-2-7.

(b) Prior to the start of this item of check and adjustment, allow a warmup time of 10 min or more.

(c) Load the work tape on MTU.

(d) Connect the (+) terminal of the digital voltmeter (DCV) to TP4 on the PCBA interface control, and its (-) terminal to GND.

(e) Key in "B2", "A3", "D41", and "AA". The tape is wound forward.

(f) Check if the voltage at TP4 is within the range of 2.25 V to 2.75 V (center value: 2.5 V) during the forward winding.

(g) When the measured value in step (f) does not meet the specification, adjust R12 on the PCBA Interface Control until the voltage at TP4 is set to 2.5 V.

4-3-22 Overall check

The overall check is the final error rate test to be applied to MTU for which various checks and adjustments have been made. This test can be made on the user system side, if test program, etc. is available there.

Description is given below on the overall check procedure using SOB (D/CAS interface) and SOD (SCSI interface).

As for the MTU of BASIC interface, the interface signal can be checked by using SOE. however, the SOE has not the error rate test function. As for the MTU of BASIC interface, execute the overall check by using the user system.

(1) Articles to be used

(a) Work tape

(b) "D/CAS" SOB

(c) "SCSI" SOD

(d) DC power supply

"D/CAS"

(2) Check procedure

(a) Connect SOB in accordance with Item 4-2-6.

(b) Load the work tape on MTU.

(c) Key in "BE", B2", and "A4". The tape is rewound up to BOT, and the indicator DRY on SOB lights up.

(d) Key in "D51", and "AB". The MTU starts the write error test.

(e) After the completion of the write error test, the transfer block count is indicated in hexadecimal notation to the display of SOB. Record this value. (This data is necessary to check if the transfer block count matches when read error test is made by using the same tape.)

(f) Key in "B2", and "B3". Then, EXCEPTION STATUS is indicated to the display of SOB. Check if the display is "8800".

Key in "B4". Then the write error count (write retry count) is indicated in hexadecimal notation to the display of SOB.

(g) Check if the write error count is less than 80 in hexadecimal notation (128 in decimal notation).

Remark The write error count changes greatly depending upon the status of the work tape used. Therefore, the above-mentioned value is a reference value.

(h) Key in "A4". The tape is rewound up to BOT and the indicator RDY on SOB lights up.

(i) Key in "B0". The MTU starts a read error test.

(j) After the completion of the read error test, the transfer block count is indicated in hexadecimal notation to the display of SOB. Therefore, check if it agrees with the transfer block count obtained in the write error test.

(k) Key in "B2", and "B3". Then, EXCEPTION STATUS is indicated to the display of SOB. Check if the display is "8EA0".

Key in "B4". Then, the read error count (read retry count) is indicated in hexadecimal notation to the display of SOB.

(l) Check if the read error count is less than 1.

Remark The read error count changes greatly depending upon the status of the work tape used. Therefore, the above-mentioned value is only a reference value.

"SCSI"

(3) Check procedure

(a) Connect SOD in accordance with Item 4-2-7.

(b) Load the work tape on MTU.

(c) Key in "BE", "B2", and "A4". The tape is rewound up to BOT.

(d) Key in "D51", and "AA". The MTU starts the write error test.

(e) After the completion of the write error test, key in "B2" and "B3". Then, SENSE DATA 0, 1, and 2 are indicated to the display of SOD. Check if the display is "F0, 00, 4D".

(f) Key in "BB". The, the transfer block count is indicated in hexadecimal notation to the display of SOD.
Record this value. (This data is necessary to check if the transfer block count matches when read error test is made by using the same tape.)
Key in "B2", "B6", "B7". Then, most significant one byte of the error count is indicated in hexadecimal notation to the least significant two digits of the display on SOD.
Key in "B8". Then, the least significant one byte is indicated in hexadecimal notation to the most significant two digits on the display of SOD.

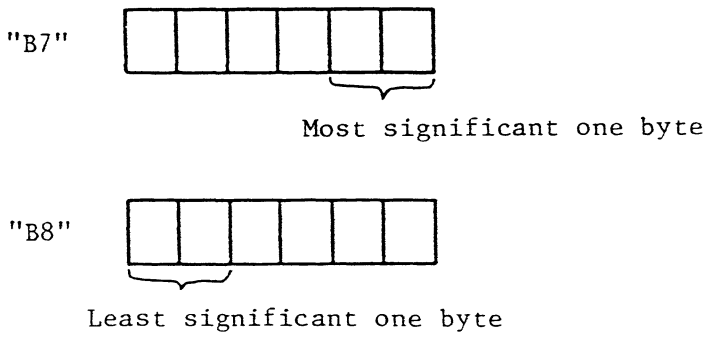


Fig. 433 Indication of Error Count on SOD

(g) Check if the write error count is less than 80 in hexadecimal notation (128 in decimal notation).

Remark The write error count changes greatly depending upon the status of the work tape used. Therefore, the above-mentioned value is a reference value.

(h) Key in "A4". The tape is rewound up to BOT.

(i) Key in "B0". The MTU starts a read error test.

(j) After the completion of the read error test, the transfer block count is indicated in hexadecimal notation to the display of SOD. Therefore, check if it agrees with the transfer block count obtained in the write error test.

(k) Key in "D50". Then, the compare error count and parity error count are indicated to the display of SOD. Check if both counts are 0 each.

(l) Key in "B2", and "B3". Then, SENSE DATA 0, 1, and 2 are indicated to the display of SOD. Check of this display is "F0, 00, 48".
Key in "B6", "B7", and "B8", and read the read error count (read retry count).

(m) Check if the read error count is less than 1.

Remark The read error count changes greatly depending upon the status of the work tape used. Therefore, the above-mentioned value is only a reference value.

4-4 Replacement of maintenance parts

4-4-1 Replacement of head Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Tweezers

(d) Other articles required in "Check and Adjustment" item

Permalloy Head

(2) Replacement procedure

(a) Remove the protector guide in accordance with item 4-2-3.(1).

(b) Extract the connector J6.

(c) Remove the head screws, detach the head Ass'y and head collar (Fig. 434).

At this time, keep the insulation sheet between the head and base attached onto the base.

Remark If the insulation sheet is attached to the head Ass'y together, strip it with tweezers.

(d) Attach the new head Ass'y in the reverse procedure to the above.

Remarks
1. Attach the head Ass'y so that it is pressed to the cassette side against the positioning pins on the base.
2. Since the head collar has directivity for installation, attach it so as to meet the slots in the head.
3. Be sure to tighten screws with the tightening torque of 1.5 kg-cm. If they are tightened with greater torque, there is a danger that the head collar may be damaged.

(e) Connect the connector J6.

(f) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(g) Check and adjust the head alignment in accordance with Item 4-3-8.

(h) Check the AGC operation in accordance with Item 4-3-9.

(i) Check and adjust the read preamplifier level in accordance with Item 4-3-14.

(j) Check and adjust the read level in accordance with Item 4-3-15.

(k) Check the feed through in accordance with Item 4-3-16.

(l) Check for the resolution in accordance with Item 4-3-17.

(m) Check for the erase level in accordance with Item 4-3-18.

(n) Check the peak shift in accordance with Item 4-3-19.

(o) Check the asymmetry in accordance with 4-3-20.

(p) Attach the PCBA Interface Control in accordance with 4-4-10.

(q) Attach the protector guide in accordance with Item 4-2-3.(2).

(r) Perform the overall check in accordance with Item 4-3-22.

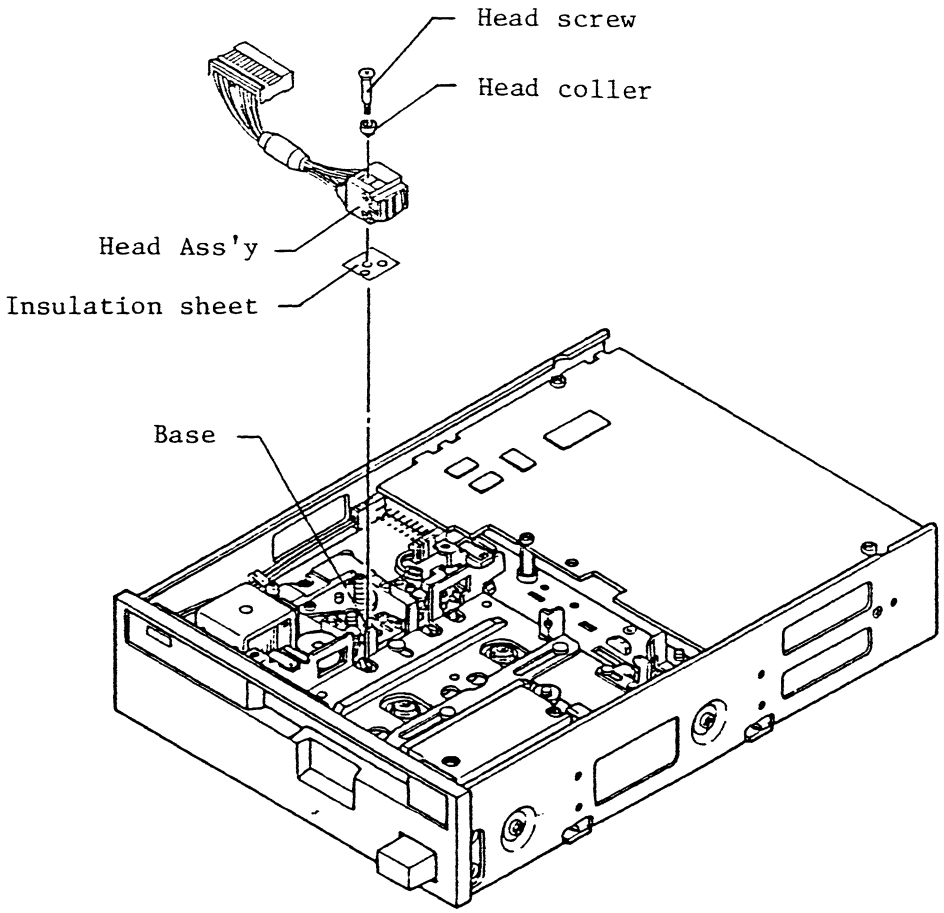


Fig.434 Replacement of head Ass'y

Ferrite head

(3) Replacement procedure

(a) Remove the protector guide in accordance with item 4-2-3 (1).

(b) Extract the connector J6.

(c) Remove the head screws, detach the head Ass'y from the base (Fig. 435).

At this time, keep the insulation sheet between the head and base attached onto the base.

Remark If the insulation sheet is attached to the head Ass'y together, strip it with tweezers.

(d) Attach the new head Ass'y in the reverse procedure to the above.

Remarks 1. Attach the head Ass'y so that it is pressed to the cassette side against the positioning pins on the base.

2. Be sure to tighten screws with the tightening torque of 1.5 kg.cm.

(e) Connect the connector J6.

(f) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(g) Check and adjust the head alignment in accordance with Item 4-3-8.

(h) Check the AGC operation in accordance with Item 4-3-9.

(i) Check and adjust the read preamplifier level in accordance with Item 4-3-14.

(j) Check and adjust the read level in accordance with Item 4-3-15.

(k) Check the feed through in accordance with Item 4-3-16.

(l) Check for the resolution in accordance with Item 4-3-17.

(m) Check for the erase level in accordance with Item 4-3-18.

(n) Check the peak shift in accordance with Item 4-3-19.

(o) Check the asymmetry in accordance with 4-3-20.

(p) Attach the PCBA Interface Control in accordance with 4-4-10.

(q) Attach the protector guide in accordance with Item 4-2-3.(2).

(r) Perform the overall check in accordance with Item 4-3-22.

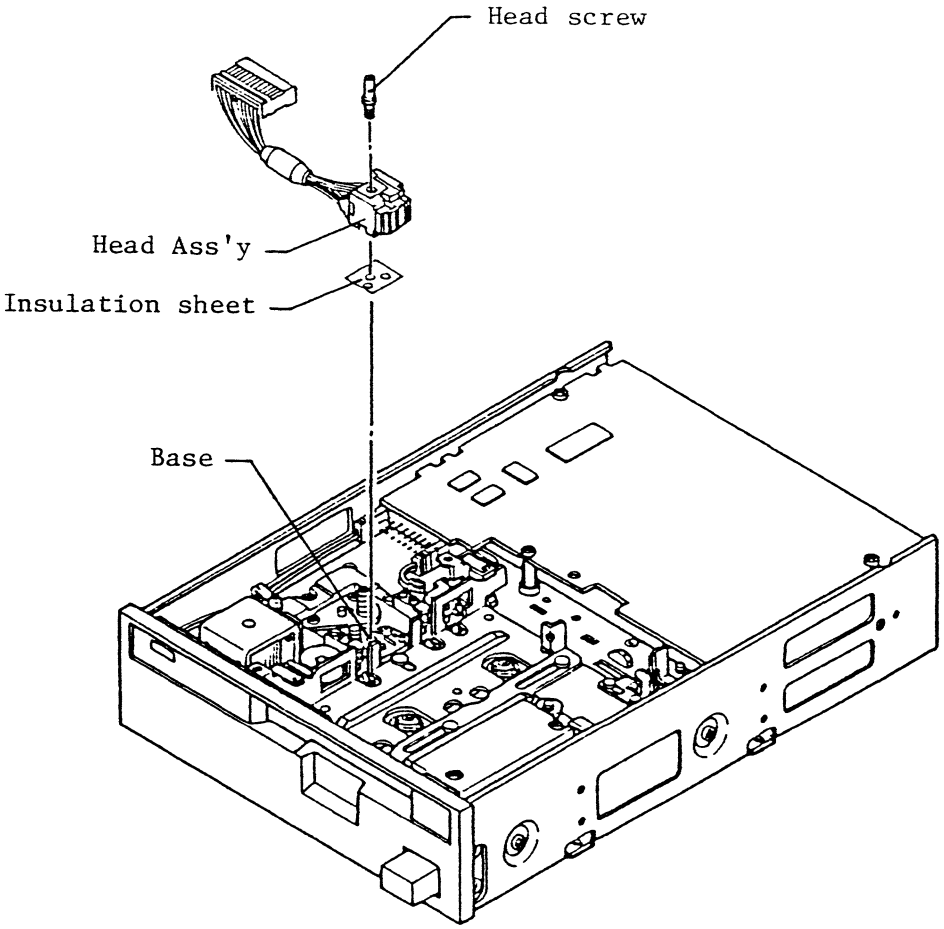


Fig.435 Replacement of head Ass'y

4-4-2 Replacement of reel motor (F), (R) Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Nipper

(d) Tweezers

(e) Other articles required in the "Check and Adjustment" item.

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(c) Push in the ejector with the finger to bring about the cassette load status (Figs. 302, 303).

(d) Extract the connector J8.

(e) Cut with the nipper the cable tie, which clamps the cables of the reel motor (F), (R) Ass'y (Fig. 436).

(f) Extract the contacts of the reel motor (F), (R) Ass'y from the connector housing (terminal Nos. 5, 6, 7, and 8).

(g) Remove the cables of both the reel motors from the PCBA holder and bead to make them free (Fig. 436).

(h) Remove the two reel motor mounting screws each from the reel motors, and detach the reel motors (F), (R) Ass'y from the main unit. Then, remove the tube from the reel motor (R) Ass'y. (Fig. 437)

(i) Attach the new reel motors (F), (R) Ass'y to the main unit in the reverse procedure to the above.

Then, thread the cables of reel motor (R) Ass'y through the tube removed in step (h).

Remark Thread each cables of the reel motors under the loading arm (M) (Fig. 436).

(j) Insert the contacts of both the reel motors into the connector housing after threading their cables through the bead (Table 405).

Table 405 Connection of reel motors

	Lead Color	Pin No.
Reel motor (F)	Red	5
	Black	6
Reel motor (R)	Red	7
	Black	8

(k) Connect the connector J8.

(l) Perform cable treatment within the chassis in accordance with Item 4-2-4.

(m) Adjust the positions of the reel motor (F), (R) Ass'y in accordance with Item 4-3-1.

(n) Check the rotary direction of each reel motor in accordance with Item 4-3-3.

(o) Check and adjust the tape speed in accordance with Item 4-3-11.

(p) Check the start/stop time in accordance with Item 4-3-12.

(q) Check the ISV in accordance with Item 4-3-13.

(r) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(s) Attach the protector guide in accordance with Item 4-2-3.(2).

(t) Perform the overall check in accordance with Item 4-3-22.

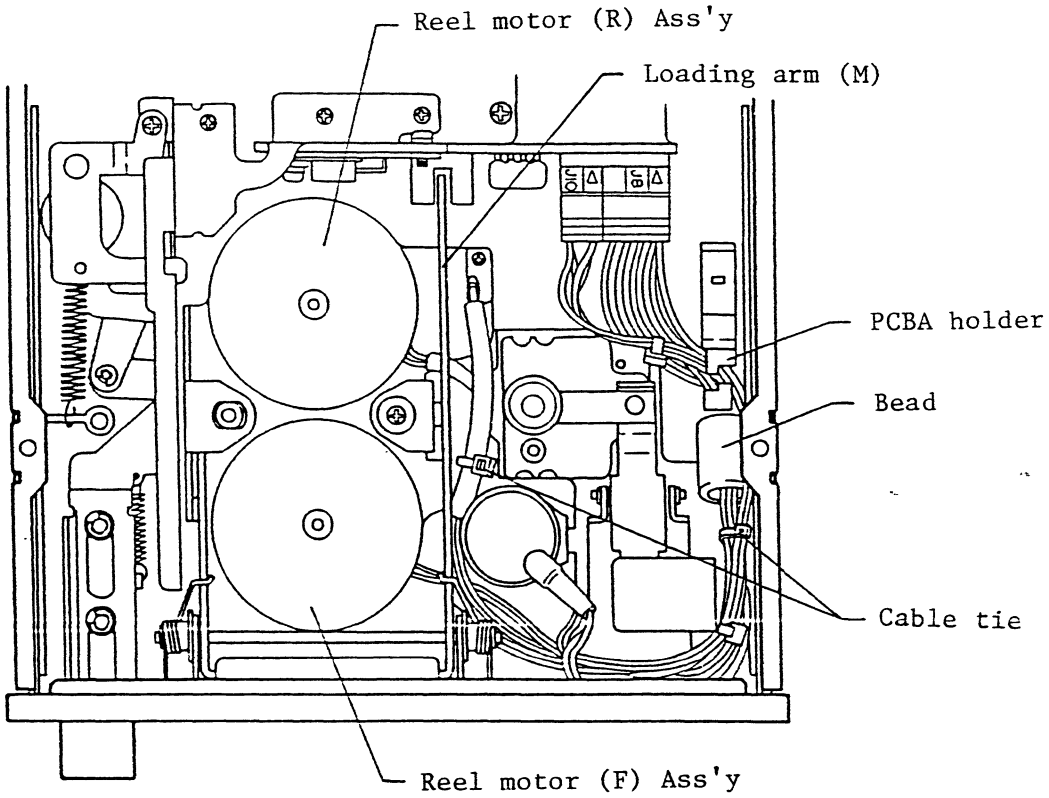


Fig.436 Replacement of reel motor (F),(R) Ass'y (1)

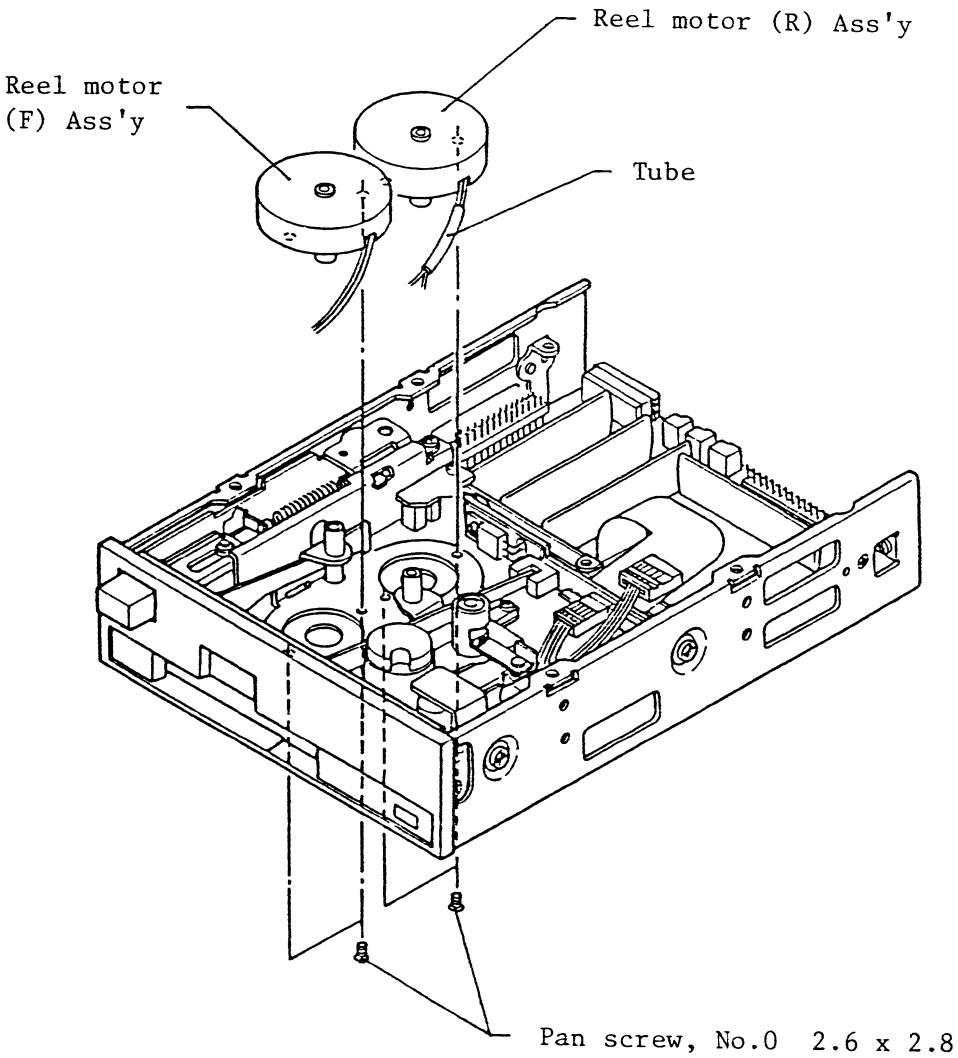


Fig.437 Replacement of reel motor (F),(R) Ass'y (2)

4-4-3 Replacement of interrupter C Ass'y

(1) Articles to be used
   (a) Phillips screwdriver No. 0
   (b) Phillips screwdriver No. 1
   (c) Tweezers
   (d) Connector jig
   (e) Other articles required in the "Check and Adjustment" item.

(2) Replacement procedure
   (a) Detach the protector guide in accordance with Item 4-2-3.(1).
   (b) Detach the PCBA Interface Control in accordance with Item 4-4-10.
   (c) Push in the ejector with the finger to bring about the cassette load status (Figs. 302, 303).
   (d) Extract the connector J9.
   (e) Extract the connectors J8 and J10.
   (f) Remove the three mounting screws from the interrupter C Ass'y, and detach the interrupter C Ass'y (Fig. 438).
   (g) Attach the new interrupter C Ass'y in the reverse procedure to the above.
      At this time, beware of the following items:
      (i) Insert the three positioning parts of the interrupter C Ass'y exactly into the chassis holes. (Fig. 439)
      (ii) Attach the interrupter C Ass'y so that the face A touches the side face of the lever base (Fig. 440).
      (iii) Check if there is a clearance between the photo interrupter of the interrupter C Ass'y and the loading arm (M) (Fig. 440).
   (h) Connect the connector J9.
   (i) Connect the connectors J8 and J10.
   (j) Check the file protect sensor in accordance with Item 4-3-4.
   (k) Check the cassette loading/unloading operation in accordance with Item 4-3-5.
   (l) Attach the PCBA Interface Control in accordance with Item 4-4-10.
   (m) Attach the protector guide in accordance with Item 4-2-3.(2).
   (n) Perform the overall check in accordance with Item 4-3-22.

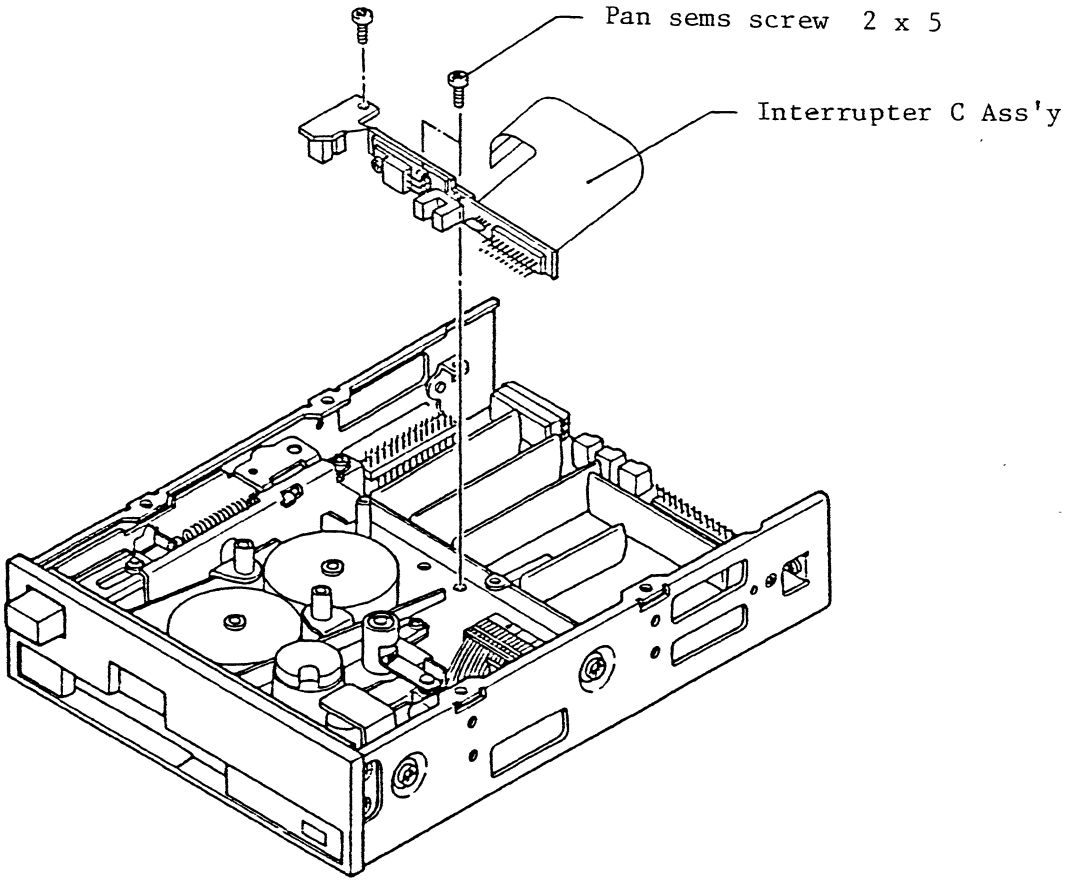


Fig. 438 Replacement of interrupter C Ass'y (1)

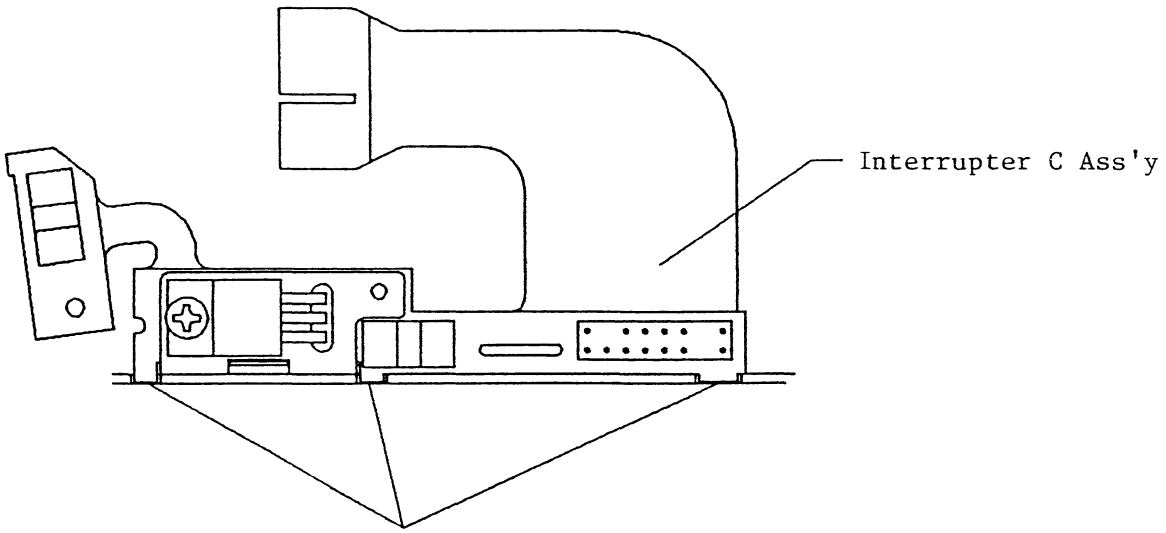


Fig.439 Replacement of interrupter C Ass'y (2)

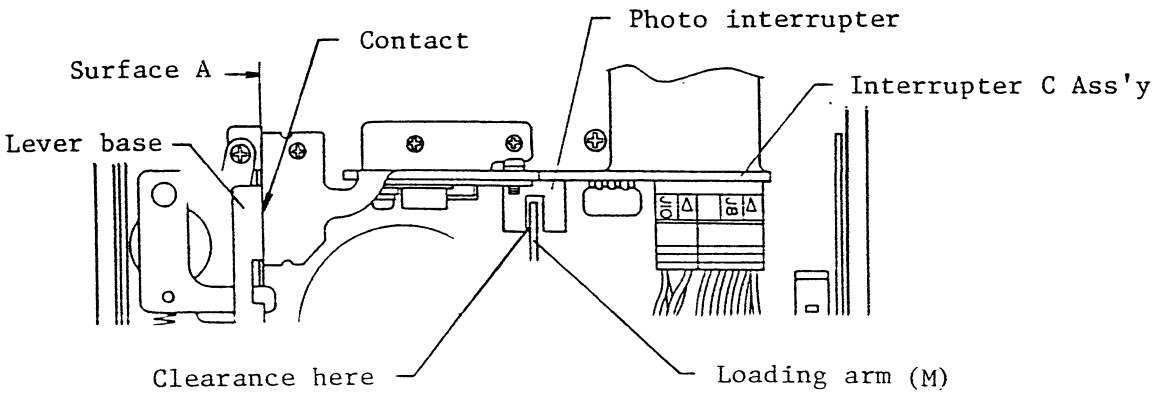


Fig.440 Replacement of interrupter C Ass'y (3)

4-4-4 Replacement of LED hole sensor Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 1

(b) Nipper

(c) Tweezers

(d) Other articles required in "Check and Adjustment" item.

(2) Replacement procedure

(a) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(b) Push in the ejector with the finger to bring about the cassette loading status (Figs. 302, 303).

Remark If the cassette unloading status is kept as it is, there is a danger that the motor base is bent during installation of the LED hole sensor Ass'y.
Be sure to proceed with work in the cassette loading status.

(c) Extract the connector J8.

(d) Cut with the nipper the cable tie, which clamps the cables of the LED hole sensor Ass'y (Fig. 436).

(e) Extract the contacts (terminal Nos. 9, 10) of the LED hole sensor Ass'y from the connector housing.

(f) Remove the two cables of the LED hole sensor Ass'y from the PCBA holder and bead to make them free (Fig. 436).

(g) Remove the mounting screws of the LED hole sensor Ass'y, and detach the LED hole sensor Ass'y. At this time, remove the tube from the cables (Fig. 441).

(h) Attach the new LED hole sensor Ass'y in the reverse procedure to the above. Then, thread the cables through the tube removed in step (g).

(i) Thread the cables of the hole sensor Ass'y through the beads, and insert the contacts into the connector housing.

Remark The white cable and blue cable of the LED hole sensor Ass'y correspond to pins 9 and 10, respectively.

(j) Connect the connector J8.

(k) Perform cable treatment within the chassis in accordance with Item 4-2-4.

(l) Check and adjust the BOT/EOT hole sensor in accordance with Item 4-3-10.

(m) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(n) Perform the overall check in accordance with Item 4-3-22.

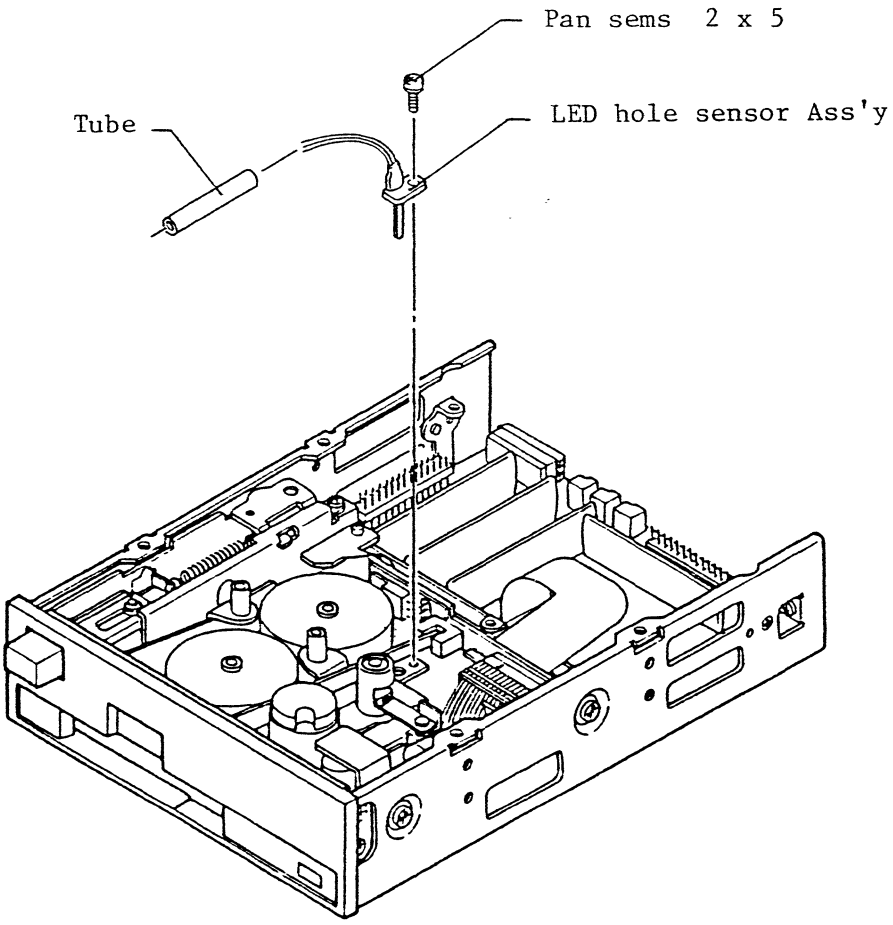


Fig.441 Replacement of LED hole sensor Ass'y

4-4-5 Replacement of sensor guide Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Tweezers

(d) Other articles required in "Check and Adjustment" item

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Extract the connector J7.

(c) Remove the mounting screws from the sensor guide Ass'y, and detach the sensor guide Ass'y (Fig. 442).

(d) Attach the new sensor guide Ass'y in the reverse procedure to the above. When there is the shim between the sensor guide and chassis, attach the sensor guide Ass'y with the shim kept as it is.

(e) Connect the connector J7.

(f) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(g) Check and adjust the BOT/EOT hole sensor in accordance with Item 4-3-10.

(h) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(i) Attach the protector guide in accordance with Item 4-2-3.(2).

(j) Perform the overall check in accordance with Item 4-3-22.

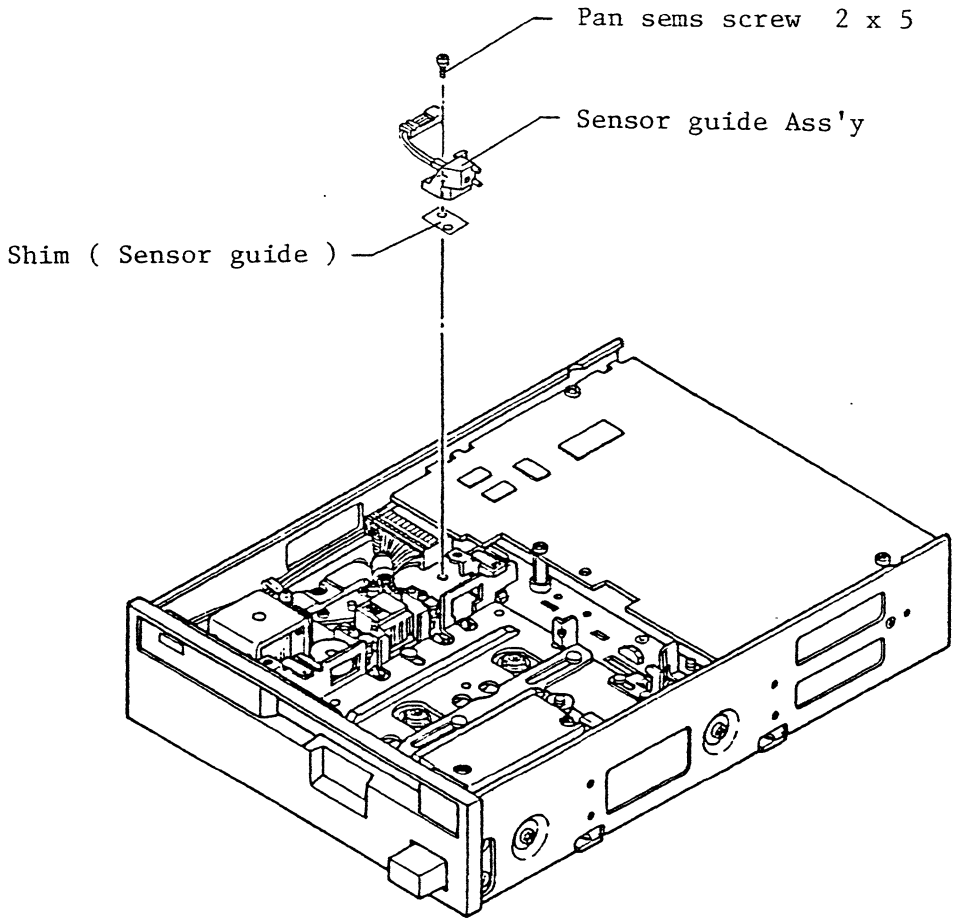


Fig.442 Replacement of sensor guide Ass'y

4-4-6 Replacement of encoder Ass'y, encoder roller

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Hexagonal wrench 1.5 mm

(d) Tweezers

(e) Tilt adjusting jig

(f) Other articles required in "Check and Adjustment" item

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(c) Push down the encoder roller with the finger.

(d) Extract the encoder roller from the shaft of the encoder Ass'y. (Fig. 443)

(e) Extract the connector J10.

(f) Cut with the nipper the cable tie, which clamps the cables between the solenoid stopper and bead (Fig. 436).

(g) Remove the two mounting screws from the encoder Ass'y, and detach the encoder Ass'y, encoder spring, and pin spring (Fig. 444).

(h) Attach the new encoder Ass'y in the reverse procedure to the above. Then, turn the cap screw until the shaft of the encoder Ass'y is placed nearly at the right angle to the mounting surface.

(i) Insert the tilt adjusting jig into the encoder shaft by sliding it (Fig. 445).

(j) Turn the screw until the bottom face of the tilt adjusting jig is in close contact with the chassis (Fig. 446).

(k) Insert the new encoder roller into the shaft, and push up the encoder roller until its top face agrees with the top face of the shaft. At this time, be careful not to make the flange of the roller touch the holder base.

(l) Connect the connector J10.

(m) Clamp the cables of the encoder Ass'y between the beads and solenoid stopper, and push them into the PCBA holder.

(n) Adjust the height of the encoder roller in accordance with Item 4-3-2.

(o) Check and adjust the tape winding in accordance with Item 4-3-7.

(p) Check and adjust the head alignment in accordance with Item 4-3-8.

(q) Check the AGC operation in accordance with Item 4-3-9.

(r) Check and adjust the read level in accordance with Item 4-3-15.

(s) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(t) Attach the protector guide in accordance with Item 4-2-3.(2).

(u) Perform the overall check in accordance with Item 4-3-22.

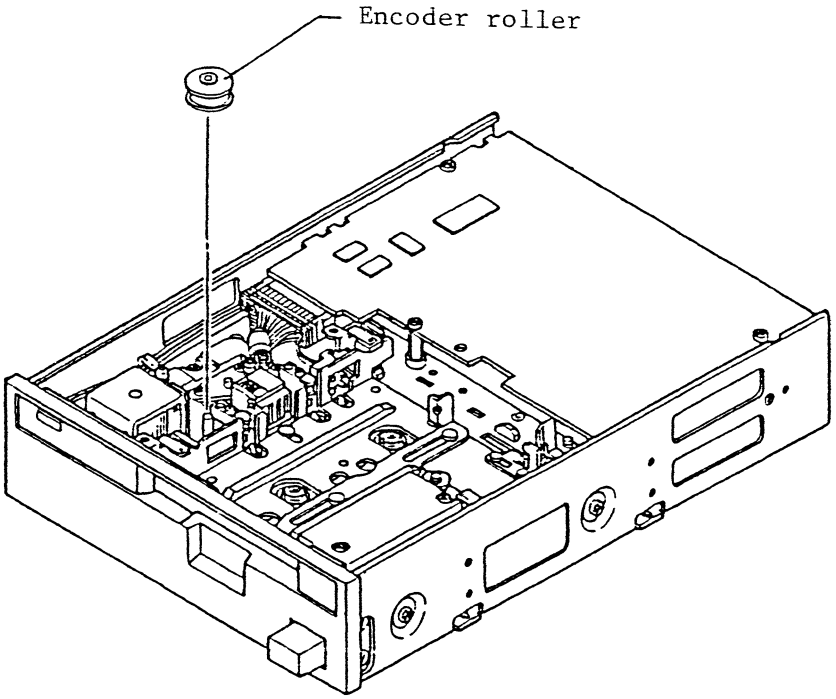


Fig.443 Replacement of encoder roller

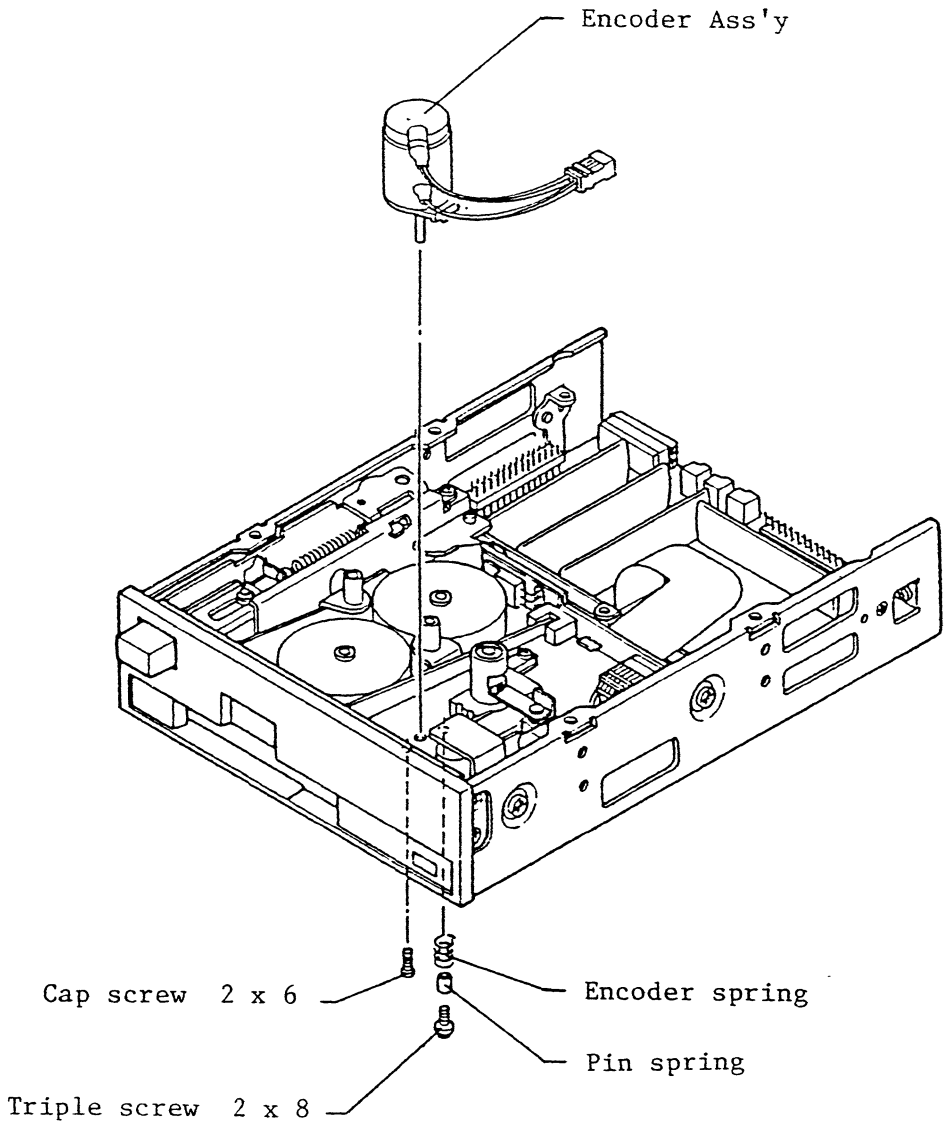


Fig.444 Replacement of encoder Ass'y

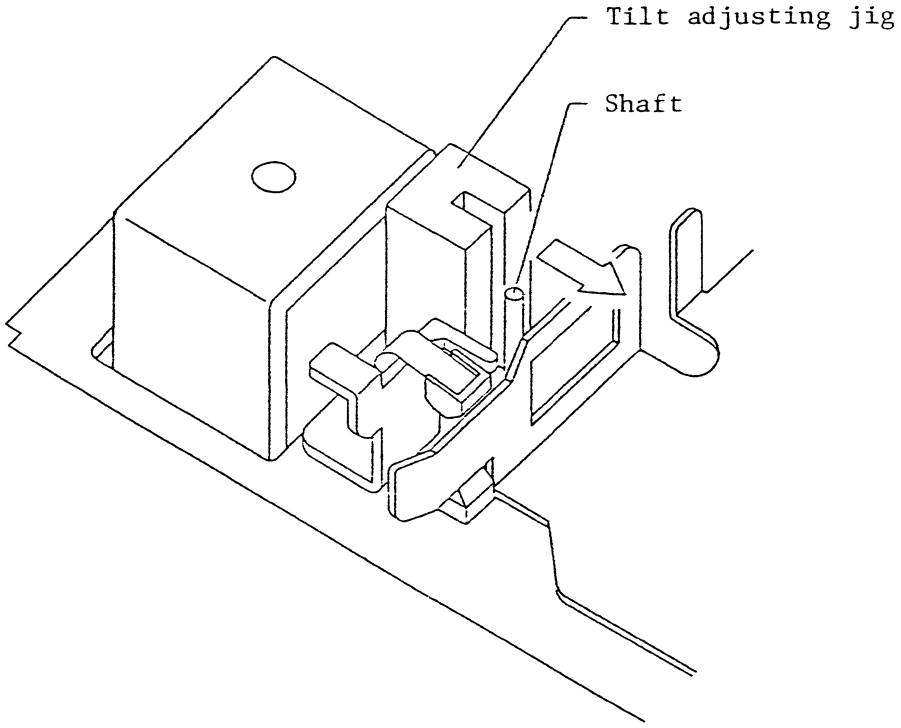


Fig.445 Setting of tilt adjusting jig

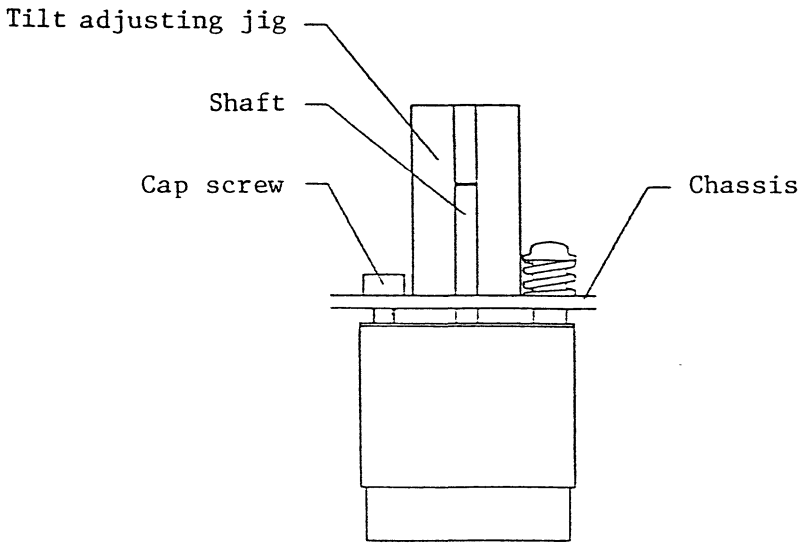


Fig.446 Tilt adjustment

4-4-7 Replacement of solenoid Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Other articles required in "Check and Adjustment" item

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(c) Extract the connector J8.

(d) Extract the contacts (terminals 1, 2) of the solenoid Ass'y from the connector housing.

(e) Remove the cables of the solenoid Ass'y from the PCBA holder to make them free (Fig. 436).

(f) Disconnect the cables of the LED indicator from the cord clamper (Fig. 447).

(g) Extract the connector J6.

(h) Remove the three mounting screws from the head base Ass'y. Lift the head shift Ass'y with the head Ass'y kept attached, and detach it from the main unit (Fig. 447).

(i) Remove the two mounting screws from the solenoid Ass'y, and detach the solenoid Ass'y and cord clamper from the head base Ass'y (Fig. 448).

As for the head base Ass'y detached, be careful not to damage the front face of the head Ass'y.

(j) Attach the new solenoid Ass'y to the head base Ass'y in the reverse procedure to step (i). At this time, be sure to set the shift spring (solenoid Ass'y) to the curved face side of the shift collar (head base Ass'y) (Fig. 448).

(k) Attach the parts assembled in step (j) in the reverse procedure to step (h) so that the three positioning portions of the head base Ass'y are pressed to the cut face of the chassis (Fig. 449).

(l) Insert the cable tip contacts of the solenoid Ass'y into the connector housing. At this time, the red and white cables of the solenoid Ass'y correspond to the pin 1 and pin 2, respectively.

(m) Connect the connector J8.

(n) Push the cables of the solenoid Ass'y into the PCBA holder.

(o) Fix the cables of the LED indicator to the cord clamper.

(p) Check the head shift in accordance with Item 4-3-6.

(q) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(r) Attach the protector guide in accordance with Item 4-2-3.(2).

(s) Perform the overall check in accordance with Item 4-3-22.

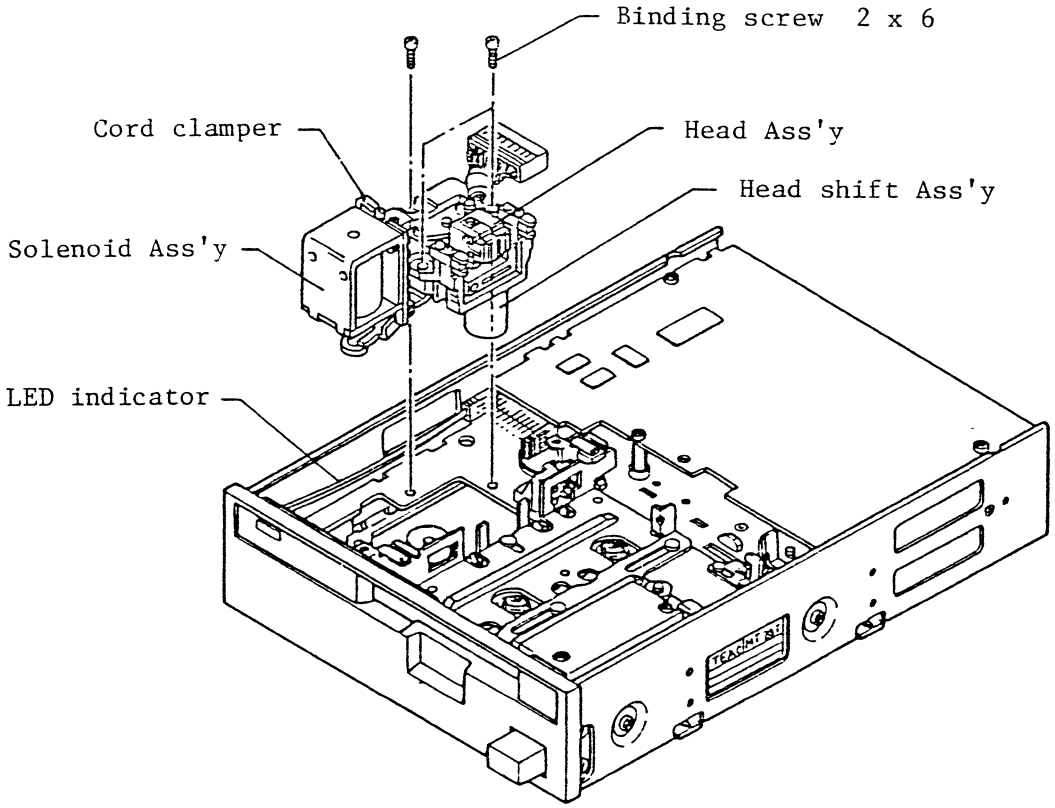


Fig.447 Replacement of solenoid Ass'y (1)

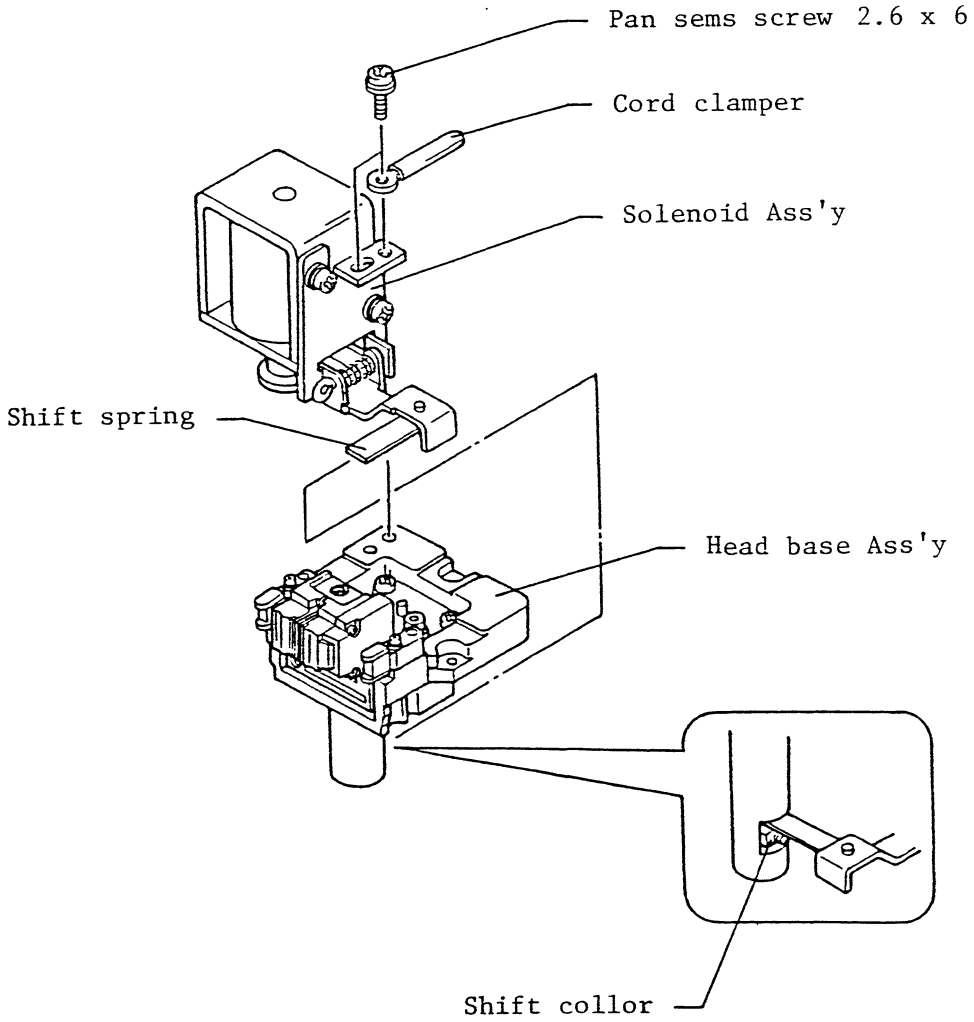
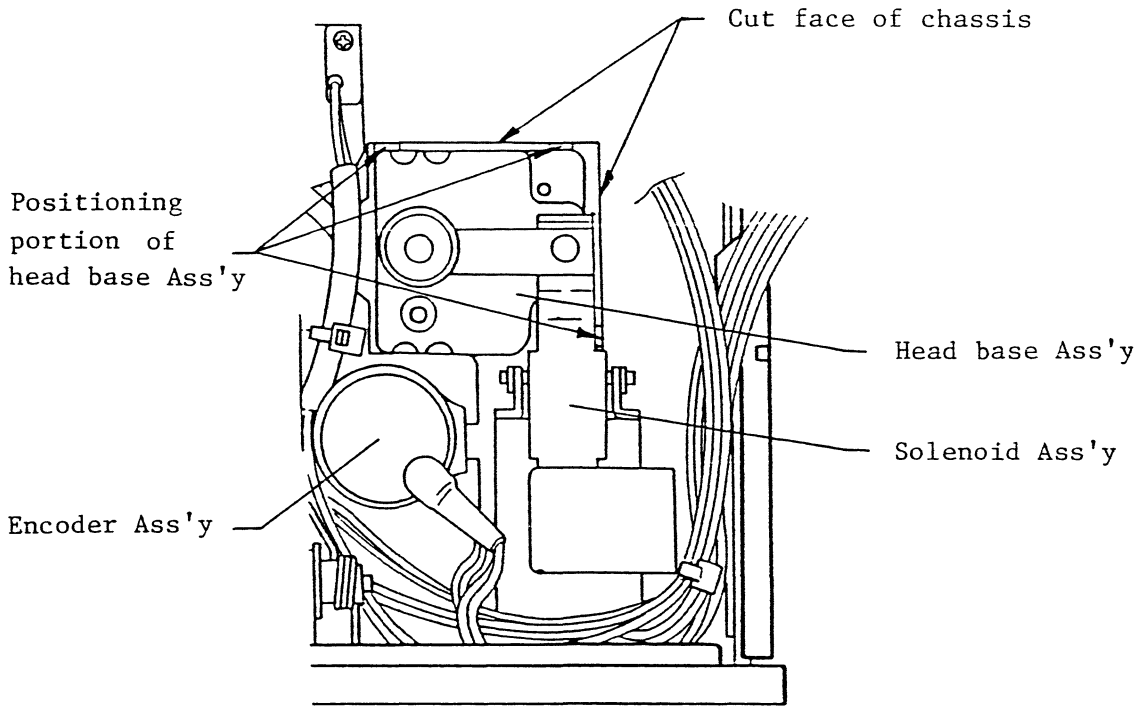


Fig.448 Replacement of solenoid Ass'y (2)



(As viewed from the rear of main unit)

Fig.449 Positioning of head base Ass'y

4-4-8 Replacement of head base Ass'y

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Other articles required in "Check and Adjustment" item

Permalloy Head

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(c) Extract the connector J8.

(d) Extract the contacts (terminal Nos. 1, 2) of the solenoid Ass'y from the connector housing.

(e) Remove the cables of the solenoid Ass'y from the PCBA holder to make them free (Fig. 436).

(f) Remove the cables of the LED indicator from the cord clamper.

(g) Extract the connector J6.

(h) Remove the mounting screws from the head Ass'y, and detach the head Ass'y, head collar and insulation sheet. Be careful not to damage the front face of the head Ass'y detached. (Fig. 434)

(i) Remove the two mounting screws from each tape guide, and detach the two tape guides and shims (tape guide) (Fig. 450).

(j) Remove the three mounting screws from the head base Ass'y, and detach the head shift Ass'y from the main unit by lifting it (Fig. 451).

(k) Remove the two mounting screws from the solenoid Ass'y, and detach the solenoid Ass'y and cord clamper (Fig. 452).

(l) Reattach the solenoid Ass'y and cord clamper, which were detached in step (k), to the new head base Ass'y.
At this time, be sure to set the shift spring (solenoid Ass'y) to the curved side of the shift collar (head base Ass'y) (Fig. 452).

(m) Attach the parts, which have been assembled in step (l), in the reverse procedure to step (j) so that the three positioning portion of the head base Ass'y are pressed to the cut face of the chassis (Fig. 449).

(n) Perform the treatment of the cables of the solenoid Ass'y in accordance with steps (l) to (n) of Item 4-4-7.

(o) Fix the cables of the LED indicator to the cord clamper.

(p) Attach the head Ass'y and insulation sheet detached at step (h), while observing the remarks given in Item 4-4-1.(d).

(q) Connect the connector J6.

(r) Attach the tape guide and shims (tape guide) detached in step (i).

Remarks
1. Attach the tape guide straight. If the tape guide is attached otherwise, it touches the cassette tape window, thus preventing the cassette loading from being made normally.
2. Reuse the same shims at the same place as used before replacement of the head base Ass'y. Use of other shims may affect the moving performance of tape.

(s) Check the head shift in accordance with Item 4-3-6.

(t) Check and adjust the head alignment in accordance with Item 4-3-8.

(u) Check the AGC operation in accordance with Item 4-3-9.

(v) Check and adjust the read level in accordance with Item 4-3-15.

(w) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(x) Attach the protector guide in accordance with Item 4-2-3.(2).

(y) Perform the overall check in accordance with Item 4-3-22.

"Ferrite head"

(3) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(c) Extract the connector J8.

(d) Extract the contacts (terminal Nos. 1, 2) of the solenoid Ass'y from the connector housing.

(e) Remove the cables of the solenoid Ass'y from the PCBA holder to make them free (Fig. 436).

(f) Remove the cables of the LED indicator from the cord clamper.

(g) Extract the connector J6 of the head Ass'y.

(h) Remove the mounting screws from the head Ass'y, and detach the head Ass'y and insulation sheet. At this time, be careful not to damage the front face of the head Ass'y detached. (Fig. 435)

(i) Remove the two mounting screws from each tape guide, and detach the two tape guides and shims (tape guide) (Fig. 450).

(j) Remove the three mounting screws from the head base Ass'y, and detach the head shift Ass'y from the main unit by lifting it (Fig. 451).

(k) Remove the two mounting screws from the solenoid Ass'y, and detach the solenoid Ass'y and cord clamper (Fig. 452).

(l) Reattach the solenoid Ass'y and cord clamper, which were detached in step (k), to the new head base Ass'y.
At this time, be sure to set the shift spring (solenoid Ass'y) to the curved side of the shift collar (head base Ass'y) (Fig. 452).

(m) Attach the parts, which have been assembled in step (l), in the reverse procedure to step (j) so that the three positioning portions of the head base Ass'y are pressed to the cut face of the chassis (Fig. 449).

(n) Perform the treatment of the cables of the solenoid Ass'y in accordance with steps (l) to (n) of Item 4-4-7.

(o) Fix the cables of the LED indicator to the cord clamper.

(p) Attach the head Ass'y and insulation sheet tetached at step (h), while observing the remarks given in Item 4-4-1.(d).

(q) Connect the connector J6.

(r) Reattach the tape guide and shims (tape guide) detached in step (i).

Remarks
1. Attach the tape guide straight. If the tape guide is attached otherwise, it touches the cassette tape window, thus preventing the cassette loading from being made normally.
2. Reuse the same shims at the same place at used before replacement of the head base Ass'y. Use of other shims may affect the moving performance of tape.

(s) Check the head shift in accordance with Item 4-3-6.

(t) Check and adjust the head alignment in accordance with Item 4-3-8.

(u) Check the AGC operation in accordance with Item 4-3-9.

(v) Check and adjust the read level in accordance with Item 4-3-15.

(w) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(x) Attach the protector guide in accordance with Item 4-2-3.(2).

(y) Perform the overall check in accordance with Item 4-3-22.

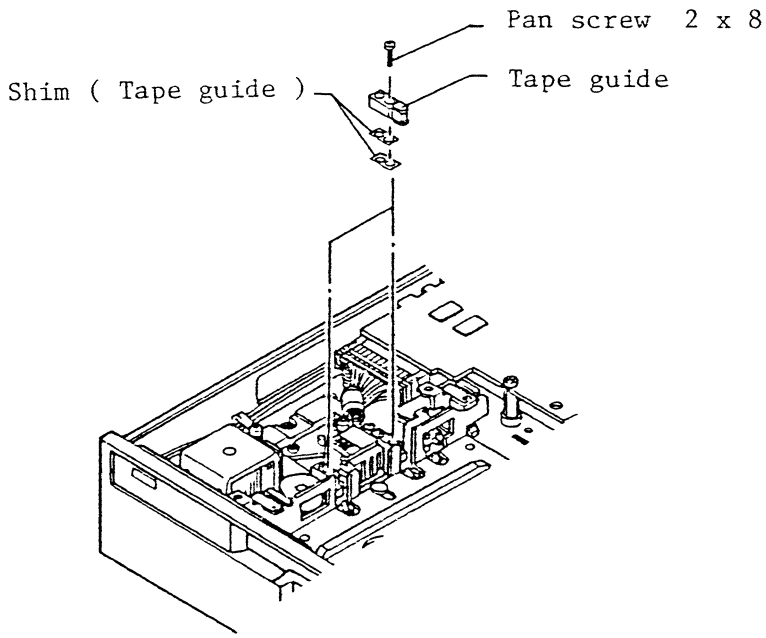


Fig.450 Replacement of head base Ass'y (1)

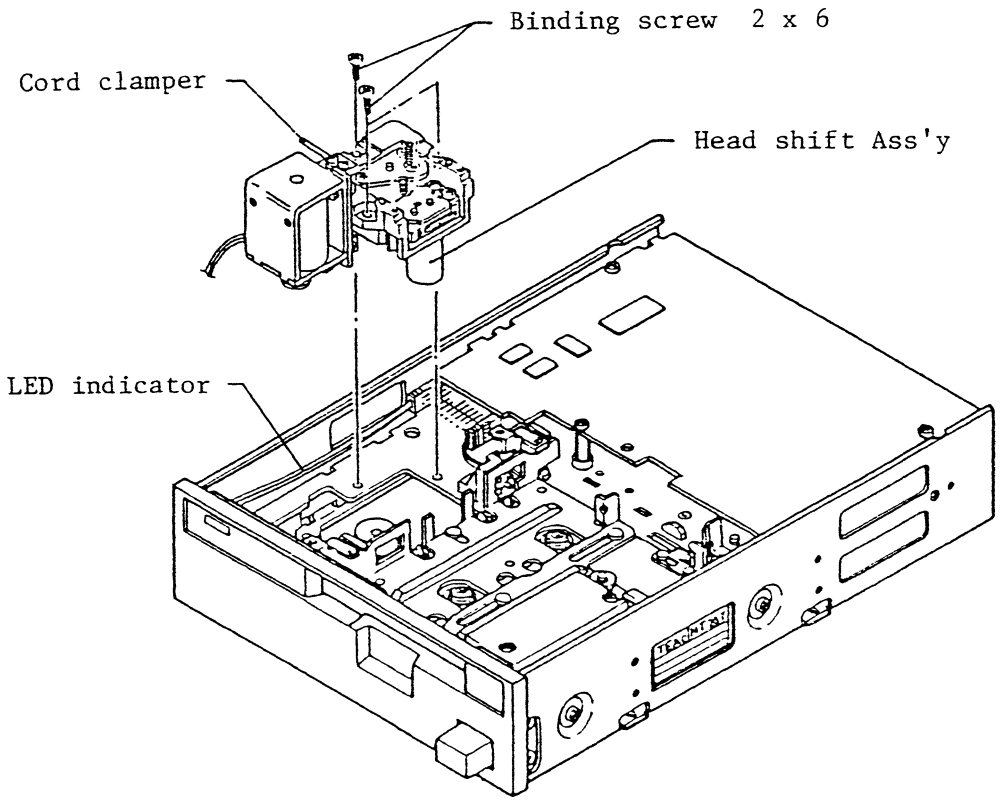


Fig.451 Replacement of head base Ass'y (2)

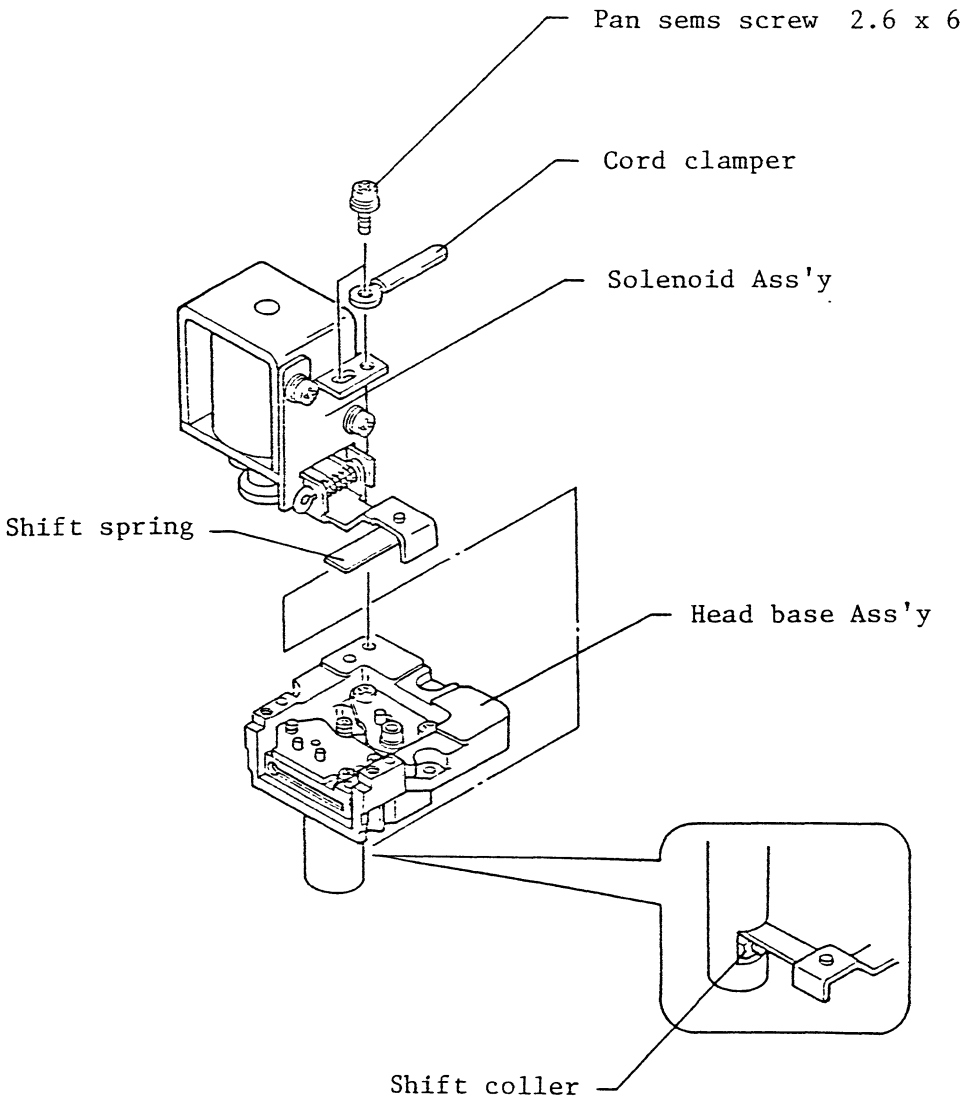


Fig.452 Replacement of head base Ass'y (3)

4-4-9 Replacement of PCBA Drive Control

(1) Articles to be used

(a) Phillips screwdriver No. 1

(b) Conventional type screwdriver small size

(c) Connector jig

(d) SOA

(e) DC power supply (+12 V, +5 V)

(f) Other articles required in "Check and Adjustment" item.

(2) Replacement procedure

(a) Detach the PCBA Interface Control in accordance with Item 4-4-10.

(b) Detach the protector guide in accordance with Item 4-2-3.(1).

(c) Extract all the connectors from the PCBA Drive Control in accordance with Item 4-2-2.

(d) Remove the three clamping screws from the PCBA Drive Control, and detach the PCBA Drive Control from MTU.

(e) Attach the new PCBA Drive Control in the reverse procedure to the above.

(f) Check and adjust the BOT/EOT hole sensor in accordance with Item 4-3-10.

(g) Check and adjust the tape speed in accordance with Item 4-3-11.

(h) Check and adjust the read preamplifier level in accordance with Item 4-3-14.

(i) Check and adjust the read level in accordance with Item 4-3-15.

(j) Attach the PCBA Interface Control in accordance with Item 4-4-10.

(k) Attach the protector guide in accordance with Item 4-2-3.(2).

(l) Perform the overall check in accordance with Item 4-3-22.

4-4-10 Replacement of PCBA Interface Control

(1) Articles to be used

(a) Work tape

(b) Phillips screwdriver No. 1

(c) Conventional type screwdriver small size

(d) "D/CAS" SOB

(e) "SCSI" SOD

(f) DC power supply (+12 V, +5 V)

(g) Other articles required in the "Check and Adjustment" item.

"D/CAS" "SCSI"

(2) Replacement procedure

(a) Remove the two fixing screws from the PCBA Interface Control, and detach the PCBA Interface Control from MTU.

(b) Attach the new PCBA Interface Control in the reverse procedure to the above.

(c) Check and adjust the VFO operating point in accordance with Item 4-3-21.

(d) Perform the overall check in accordance with Item 4-3-22.

"BASIC"

(1) Replacement procedure

(a) Remove the two clamping screws from the PCBA Interface Control and detach the PCBA Interface Control from MTU.

(b) Attach the new PCBA Interface Control in the reverse procedure to the above.

(c) Perform the overall check in accordance with Item 4-3-22.

4-4-11 Replacement of front bezel

(1) Articles to be used

(a) Phillips screwdriver No. 0

(b) Phillips screwdriver No. 1

(c) Tweezers

(2) Replacement procedure

(a) Detach the protector guide in accordance with Item 4-2-3.(1).

(b) Extract the connector J5 and remove the cables from the cord clamper (Fig. 453).

(c) Remove the four mounting screws from the front bezel Ass'y, and extract the front bezel Ass'y from the main unit (Fig. 453).

(d) Attach the new front bezel Ass'y in the reverse procedure to the above. At this time, while pressing both the longitudinal ends of the front bezel Ass'y to the main unit side, fix it with the specified tightening torque.

(e) Connect the connector J5.

(f) Fix the cables of the LED indicator to the cord clamper.

(g) Attach the protector guide in accordance with Item 4-2-3.(2).

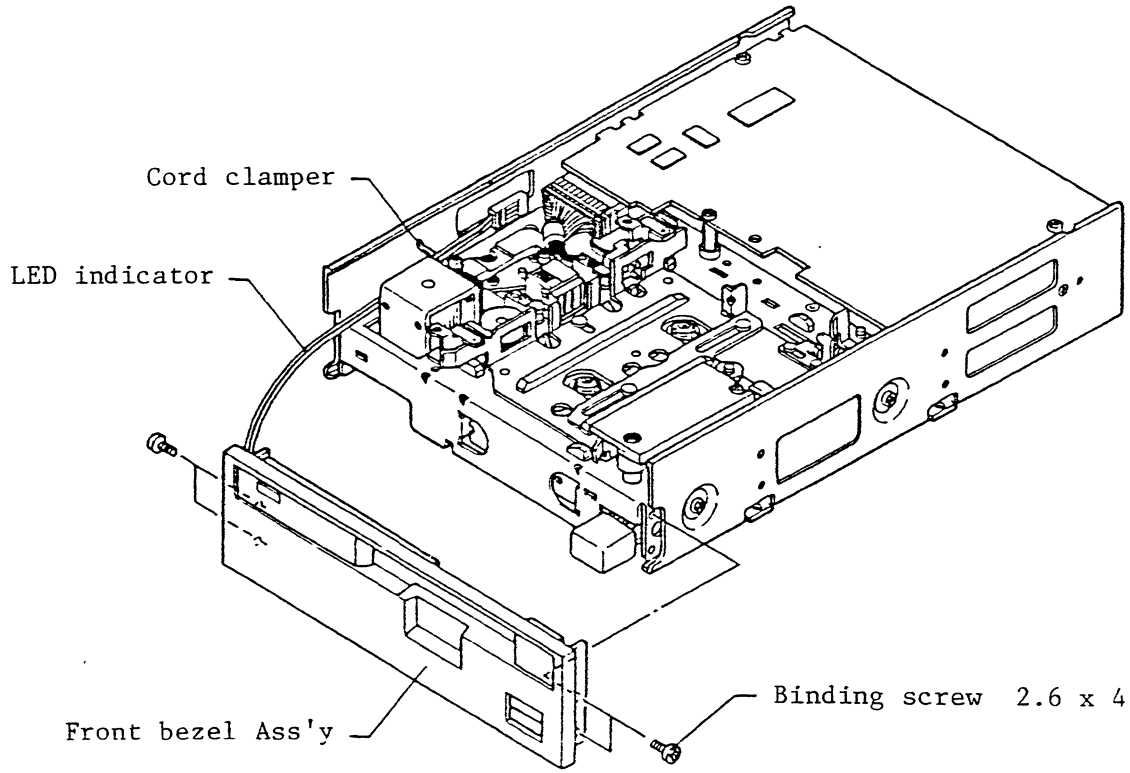


Fig.453 Replacement of front bezel Ass'y

4-4-12 Replacement of eject button

(1) Articles to be replaced

None

(2) Replacement procedure

(a) Extract the eject button from the main unit with the fingers (Fig. 454).

(b) Attach the new eject button to the eject lever, and push in the eject button up to the end.

After attaching the eject button, make sure that it won't be disengaged from the eject lever easily.

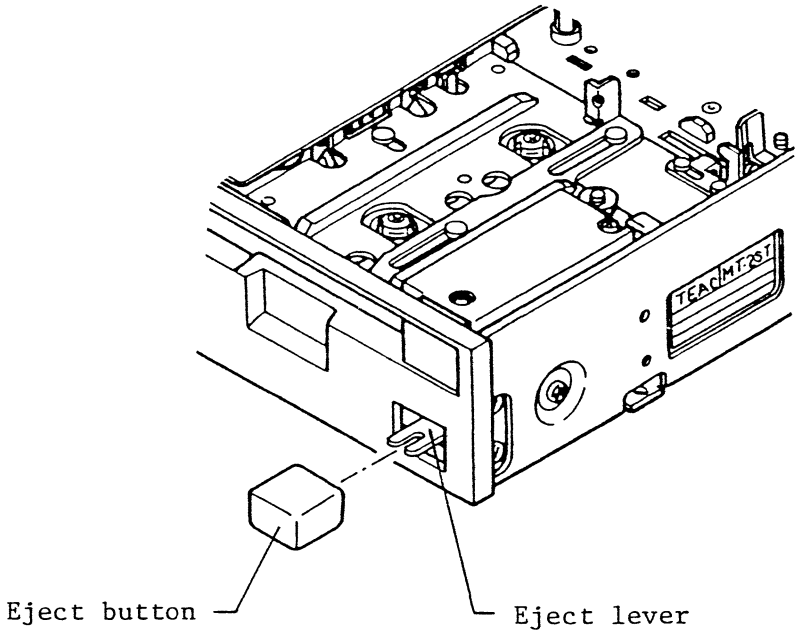


Fig. 454 Replacement of eject Button

SECTION 5

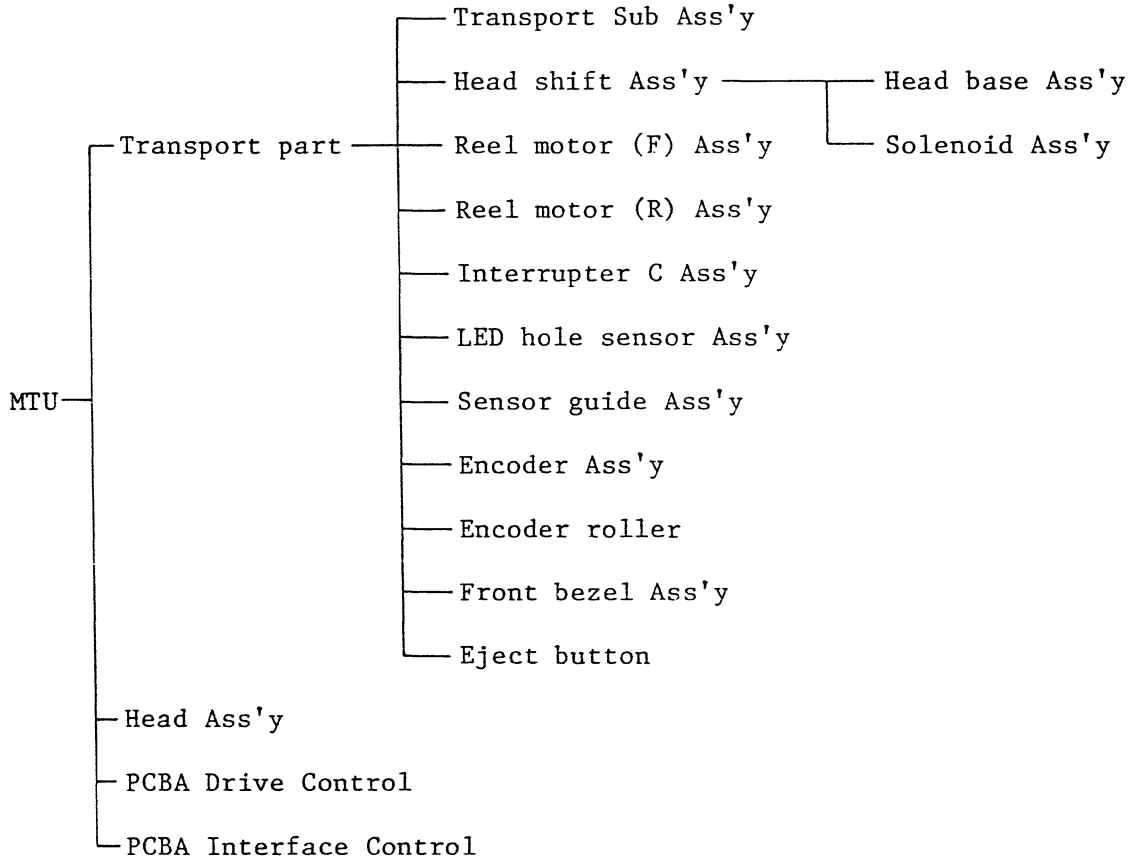
DRAWINGS AND PARTS LISTS

5-1 Configuration

The configuration of the main components of MTU is shown below (Figs. 501 to 504).

The detailed parts lists are shown in para 5-2 and para 5-3.

Table 501 Main components configuration of MTU



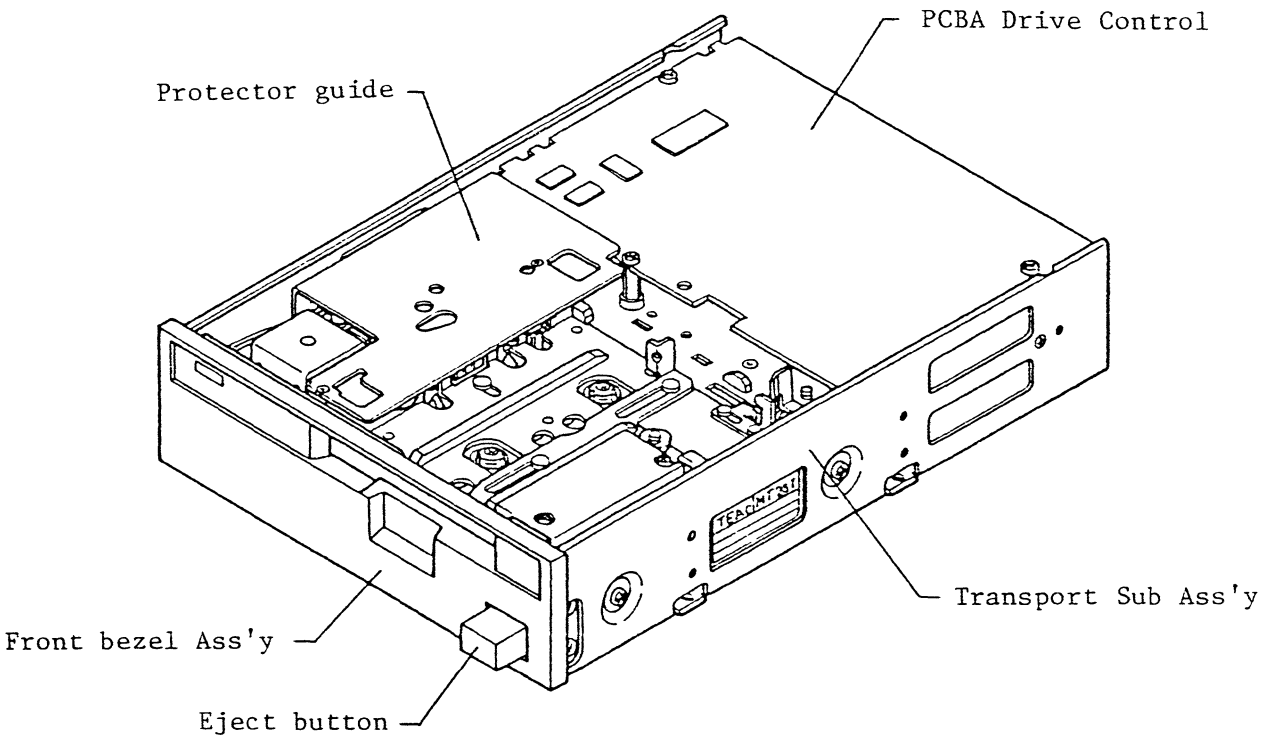


Fig.501 External view (1)

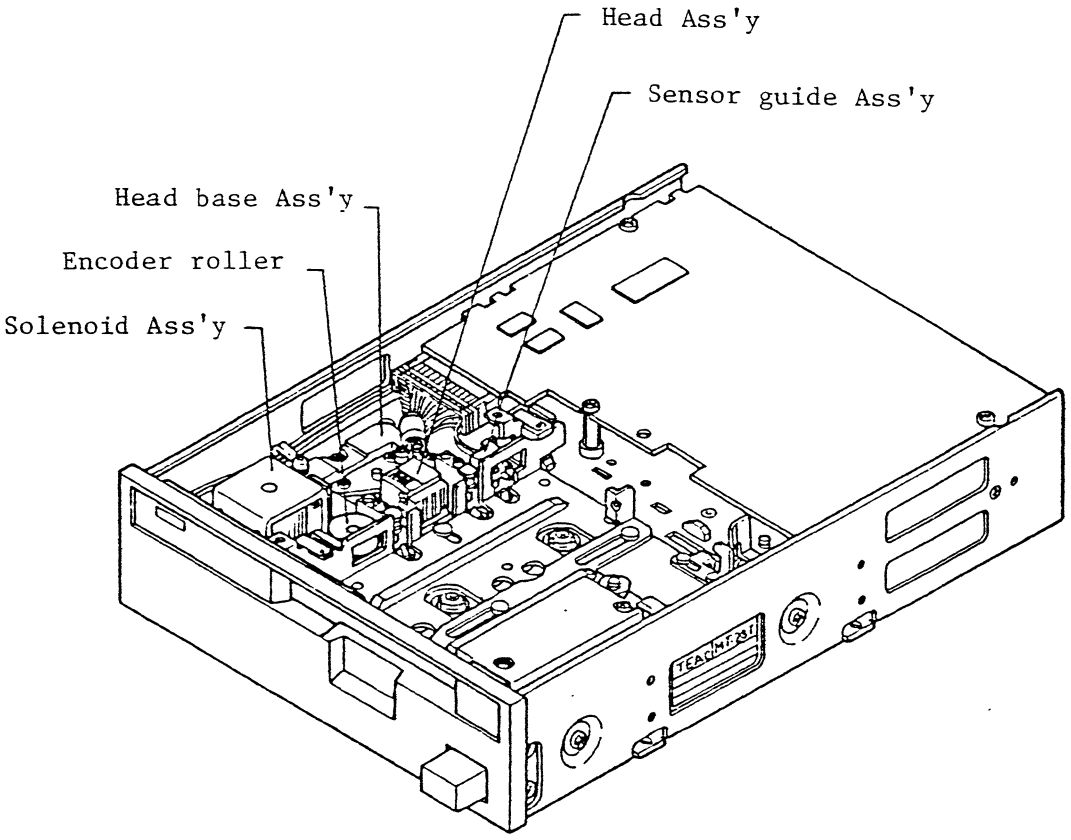


Fig.502 External view (2)

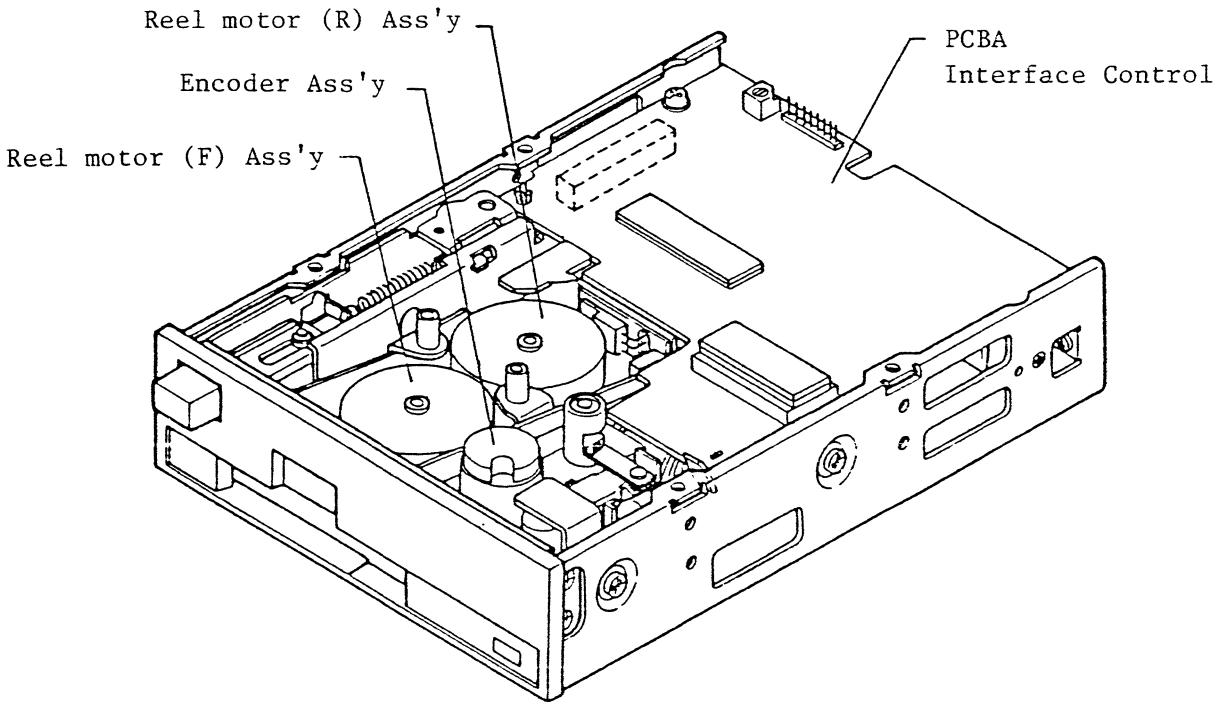


Fig.503 External view (3)

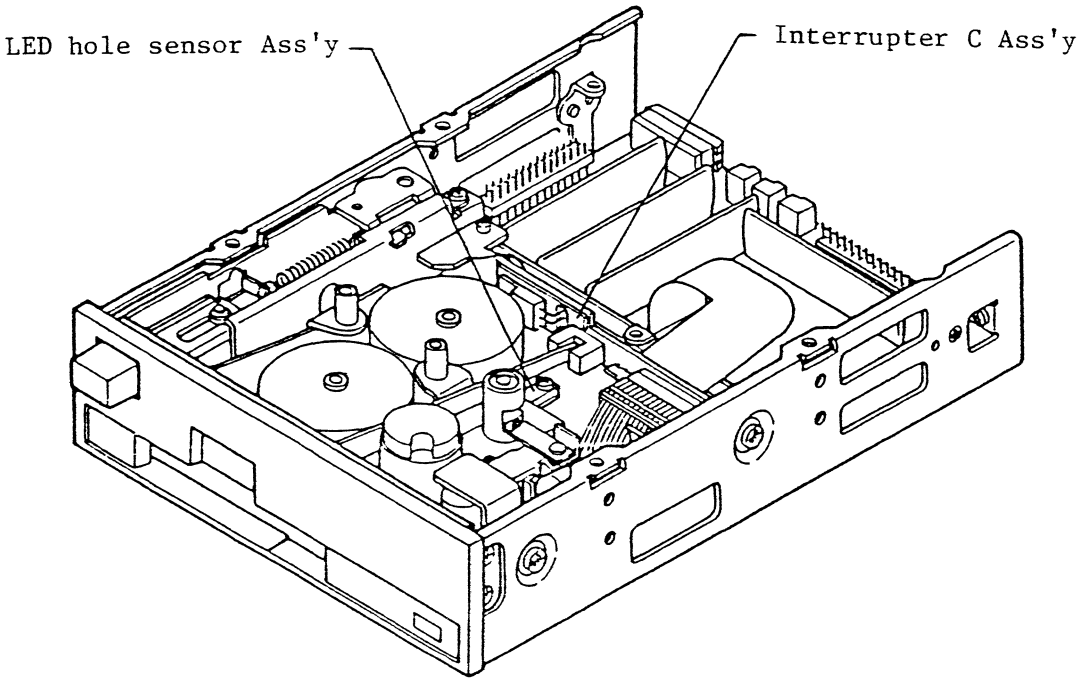


Fig.504 External view (4)

5-2 Disassembly drawings and parts lists of mechanical section

5-2-1 Mechanical parts of MTU

Table 502 Parts list of MTU (1/2)

Symbol No.	TEAC Part No.	Part Name	Q'ty	Remarks
1	17730370-00	Transport Sub Ass'y	1	
2	16787511-00	PCBA holder	1	
3	16803145-00	PCBA bracket (2)	2	
4	16803146-00 -02	PCBA stud PCBA stud	1	Note 1:L=7 Note 1:L=10
5	15532062-01	Interrupter C Ass'y	1	
6	17070500-00	LED hole sensor Ass'y	1	
7	13090495	Tube 2.5	1	
8	17061057-00	Reel motor (F) Ass'y	1	
9	17061058-00	Reel motor (R) Ass'y	1	
10	13090495	Tube 2.5	1	
11	17967412-00	Bead	1	
12	17967297-00	Connector (10P) J8	1	
13	17967494-00	Encorder Ass'y	1	
14	16385151-00	Encorder spring	1	
15	16359281	Pin spring	1	
16	16792371-00	Encorder roller	1	
17	17070510-00	Sensor guide Ass'y	1	
18	16766823-XX	Shim (sensor guide)	-	Note 2: Adjusting parts
19	16153032-01	Head base Ass'y	1	
20	14770910-00	Solenoid Ass'y	1	

Table 502 Parts list of MTU (2/2)

Symbol No.	TEAC Part No.	Part Name	Q'ty	Remarks
21	16322401	Cord clamper	1	
22	16792325-00	Tape guide	2	
23	16766813-XX	Shim (tape guide)	-	Note 2: Adjusting parts
24	16766860-00	Protector guide	1	
25	14130870-00	Head Ass'y	1	
26	16787362-00	Insulation sheet	1	
27	16787337-00	Head collar	1	
28	16498909-00	Head screw	1	
29	15532057-00	PCBA Drive Control	1	
30	15532058-00	PCBA Interface Control	1	
31	17967210-00	Front bezel Ass'y	1	Note 3
32	16787276-01	Eject button	1	Note 3

Note
1. The PCBA stud changes in the length of the hexagonal part, depending upon the transport Sub Ass'y.
   When ordering the PCBA stud, check its length, and specify the relevant stud.
2. As for the shims used as adjusting parts, ones attached to the main unit should be used as they are during replacement of maintenance parts.
3. Parts Nos. of the front bezel Ass'y and eject button are described in the standard color (black).

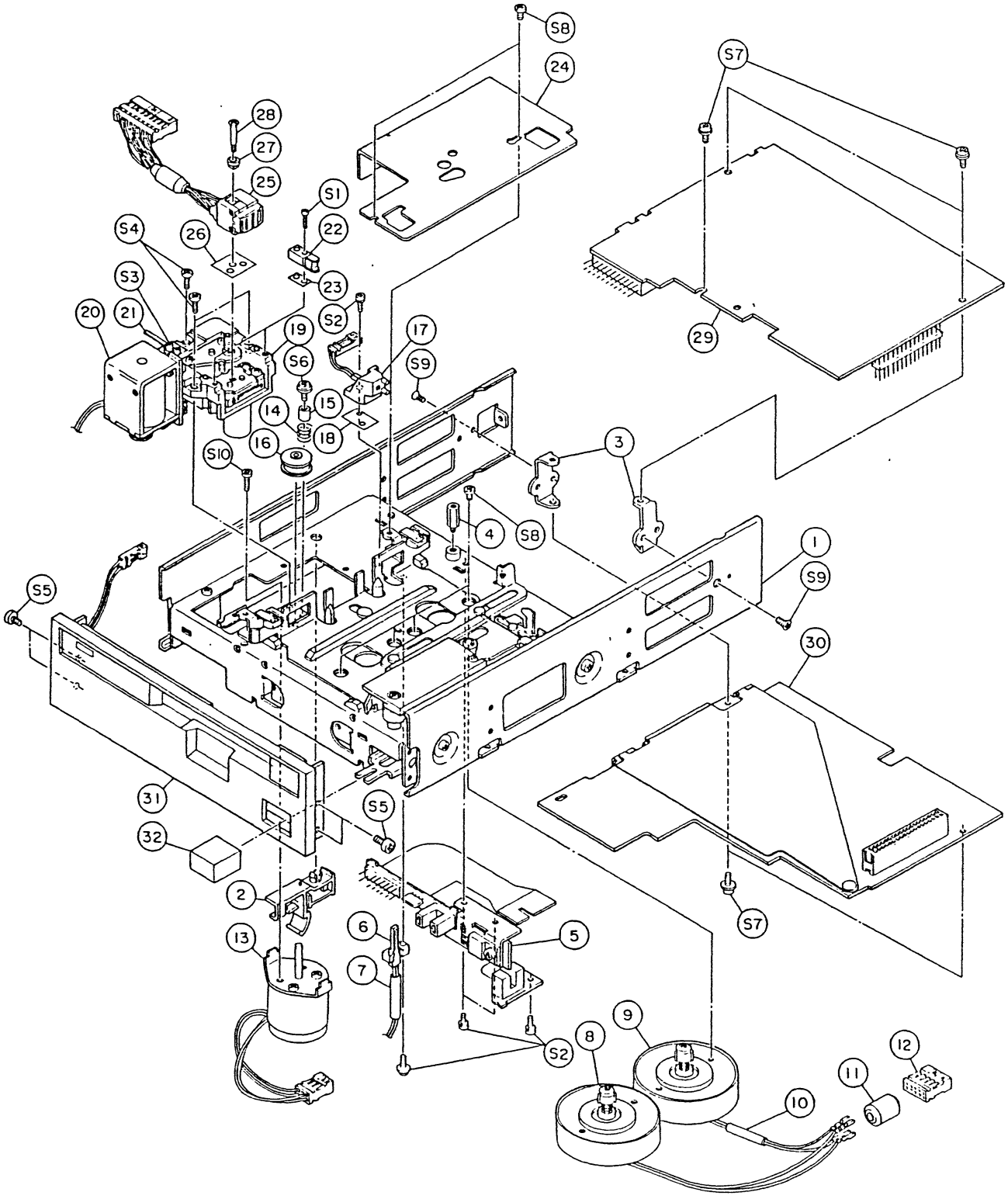


Fig.505 Disassembly drawing of mechanical section

5-2-2 Screws and washers

Table 503 List of screws and washers

Symbol No.	TEAC Part No.	Part Name	Remarks
S1	16401208	Pan screw 2 x 8 S ZMC	
S2	16470205	Pan sems screw 2 x 5 S ZMC	
S3	16470006	Pan sems screw 2.6 x 6 S ZMC	
S4	16410206	Binding screw 2 x 6 S ZMC	
S5	16410004	Binding screw 2.6 x 4 S ZMC	
S6	16498559	Triple screw 2 x 10 S ZMC	
S7	16475005	Pan washer screw 2.6 x 5 S ZMC	
S8	16498881	Pan screw, No. 0 2.6 x 2.8 Black	
S9	16498836	Flat screw, No. 0 2.6 x 4 Black	
S10	16498288-03	Cap screw 2 x 6	

5-3 Parts list of PCB Ass'y

Remarks

1. The resistors and capacitors used are classified by symbols as shown below.

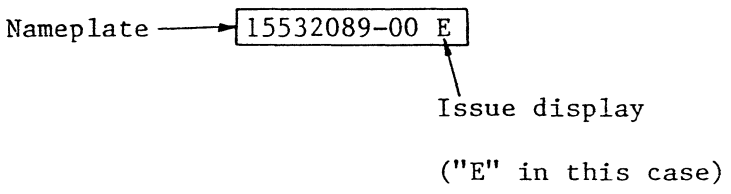
   Resistor RD : Carbon-film resistor
   Resistor RN : Fixed metal film resistor
   Capacitor CC: Ceramic capacitor (for temperature compensation)
   Capacitor CE: Aluminum foil dry type electrolytic capacitor
   Capacitor CK: Ceramic capacitor (high dielectric power factor)
   Capacitor CQ: Plastic film capacitor
   Capacitor CS: Tantalum solid state electrolytic capacitor
   Capacitor CG: Ceramic capacitor (semiconductor)

2. In the part name/rating column, the percentage display indicating the tolerance has the following meaning:
   1%: ±1%, 2%: ±2%, 5%: ±5%, 10% ±10%, 20%: ±20%, 80%: +80%-20%

3. In the remarks column, the design revision history has the following meaning:

   ex. Before issue D: Applied to PCB Ass'y of issue A to D.
   ex. After issue E : Applied to PCB Ass'y of issue E onwards.

   The issue (revision history) of each PCB Ass'y is expressed as shown below.



5-3-1 PCBA Drive Control (Part No. 15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating		Remarks
-	13332057-00	PCB Drive control		Before issue H
-	13332069-00	PCB Drive control		After issue J
U1	13442528-00	IC	Control logic	
U2	13442537-00	IC	Encoder amplifier	
U3	13442529-00	IC	Driver	
U4	13441245	IC	74LS74A	Before issue H
U4	13447452	IC	592	After issue J
U5	13441346	IC	74LS123	Before issue H
U5	13447452	IC	592	After issue J
U6	13447564	IC	M51836FP	
-	16191162	Heat sink		For U6, before issue H
-	16191164-00	Heat sink		For U6, after issue J
-	16401206	Pan-head screw	2x6 B BNM	X2, for attaching heat sink, after issue J
-	16490000	Nut	2 B BNM	X2, for attaching heat sink, after issue J
U7	13441231	IC	74LS00	Before issue H
U7	13442516	IC	uPD4052BG	After issue J
U8	13442527-00	IC	Write	amplifier
U9	13442526-00	IC	Read amplifier	Before issue H
U9	13442749-00	IC	Read amplifier	After issue J

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
Q1	13423140	Transistor 2SB822	
Q2	13427140	Transistor 2SD1055	
Q4	13427140	Transistor 2SD1055	
Q5	13427140	Transistor 2SD1055	
CR1	13411183	Diode F14A	
CR2	13411183	Diode F14A	
CR3	13411183	Diode F14A	
CR4	13411441	Diode DAN201	
CR5	13411441	Diode DAN201	
CR6	13411183	Diode F14A	
CR7	13411183	Diode F14A	
CR8	13411183	Diode F14A	
CR9	13411405	Diode DA203	
CR10	13411405	Diode DA203	
CR11	13411260	Diode 1SS97	
R1	11186751	Resistor RD 1/5W 750 OHM 5%	Issue A
R1	11176751	Resistor RD 1/2W 750 OHM 5%	After issue B
R2	11186751	Resistor RD 1/5W 750 OHM 5%	Issue A
R2	11176751	Resistor RD 1/2W 750 OHM 5%	After issue B
R3	11186101	Resistor RD 1/5W 100 OHM 5%	
R4	11186103	Resistor RD 1/5W 10K OHM 5%	Issue A,B,C,D
R4	11186182	Resistor RD 1/5W 1.8K OHM 5%	Issue BE, CE, and after E
R5	11186103	Resistor RD 1/5W 10K OHM 5%	Issue A,B,C,D

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
R5	11186182	Resistor RD 1/5W 1.8K OHM 5%	Issue BE, CE, and after E
R6	11186472	Resistor RD 1/5W 4.7K OHM 5%	
R7	11054622	Resistor RN 1/4W 6.2K OHM 1%	
R8	11054433	Resistor RN 1/4W 43K OHM 1%	
R9	11050390	Resistor RS 1W 39 OHM 5%	Issue A
R9	11061390	Resistor RS 3W 39 OHM 5%	Issue B,C,D,E, BE,CE,EA,F,FA
R9	11072270	Resistor RS 3W 27 OHM 5%	Issue EB,EG,FB, and after G
R10	11050390	Resistor RS 1W 39 OHM 5%	Issue A
R10	11061390	Resistor RS 3W 39 OHM 5%	Issue B,C,D,E, BE,CE,EA,F,FA
R10	11072270	Resistor RS 3W 27 OHM 5%	Issue EB,EG, FB,G,H
R11	11983048	Resistor RN 1/4W 20K OHM 1%	
R12	11983042	Resistor RN 1/4W 17.4K OHM 1%	
R13	11186105	Resistor RD 1/5W 1MOHM 5%	
R14	11176750	Resistor RD 1/2W 75 OHM 5%	Issue A,B,C,D, E,BE,CE,EB,F, FB
R14	11186201	Resistor RD 1/5W 200 OHM 5%	Issue EA,EG,FA, and after G
R16	11983132	Resistor RN 1/4W 150K OHM 1%	
R17	13256714	Variable resistor 1/2W 10K OHM 20%	Before issue H
R17	13256665	Variable resistor 1/2W 10K OHM 20%	After issue J
R18	11982827	Resistor RN 1/4W 100 OHM 1%	
R19	11186102	Resistor RD 1/5W 1K OHM 5%	
R20	11186472	Resistor RD 1/5W 4.7K OHM 5%	
R21	13256714	Variable resistor 1/2W 10K OHM 20%	Before issue H
R21	13256665	Variable resistor 1/2W 10K OHM 20%	After issue J
R22	11054512	Resistor RN 1/4W 5.1K OHM 1%	
R23	11186103	Resistor RD 1/5W 10K OHM 5%	

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Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
R24	11983045	Resistor RN 1/4W 18.7K OHM 1%	Issue A,B,C,D, E,BE,CE,EB,F, FB
R24	11983047	Resistor RN 1/4W 19.6K OHM 1%	Issue EA,EG,FA, and after G
R27	11186105	Resistor RD 1/5W 1M OHM 5%	
R28	11054621	Resistor RN 1/4W 620 OHM 1%	
R29	11054512	Resistor RN 1/4W 5.1K OHM 1%	
R30	11186103	Resistor RD 1/5W 10K OHM 5%	
R31	11054303	Resistor RN 1/4W 30K OHM 1%	
R33	11186753	Resistor RD 1/5W 75K OHM 5%	Issue A
R33	11186433	Resistor RD 1/5W 43K OHM 5%	After issue B
R34	11983132	Resistor RN 1/4W 150K OHM 1%	
R35	11054182	Resistor RN 1/4W 1.8K OHM 1%	
R36	11054302	Resistor RN 1/4W 3K OHM 1%	
R37	11186202	Resistor RD 1/5W 2K OHM 5%	
R38	11186102	Resistor RD 1/5W 1K OHM 5%	
R39	11054221	Resistor RN 1/4W 220 OHM 1%	Issue A,B,C,D
R39	11054331	Resistor RN 1/4W 330 OHM 1%	Issue BE,CE, and after E
R40	11186102	Resistor RD 1/5W 1K OHM 5%	
R41	13256668	Variable resistor 1/2W 100K OHM 20%	
R42	11186102	Resistor RD 1/5W 1K OHM 5%	
R43	13256666	Variable resistor 1/2W 20K OHM 20%	
R44	13256663	Variable resistor 1/2W 2K OHM 20%	
R45	11054913	Resistor RN 1/4W 91K OHM 1%	Before issue H
R45	11186103	Resistor RD 1/5W 10K OHM 5%	Issue J
R45	11186622	Resistor RD 1/5W 6.2K OHM 5%	After issue K
R46	11932844	Resistor RN 1/4W 150 OHM 1%	
R47	11982844	Resistor RN 1/4W 150 OHM 1%	
R48	13256665	Variable resistor 1/2W 10K OHM 20%	Before issue C
R48	13256666	Variable resistor 1/2W 20K OHM 20%	After issue D
R49	11186202	Resistor RD 1/5W 2K OHM 5%	After issue J

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Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
R50	11186202	Resistor RD 1/5W 2K OHM 5%	After issue J
R51	11186202	Resistor RD 1/5W 2K OHM 5%	After issue J
R52	11186202	Resistor RD 1/5W 2K OHM 5%	After issue J
R53	11186471	Resistor RD 1/5W 470 OHM 5%	After issue J
R54	11186471	Resistor RD 1/5W 470 OHM 5%	After issue J
R55	11186223	Resistor RD 1/5W 22K OHM 5%	After issue J
R56	11982997	Resistor RN 1/4W 5.9K OHM 1%	After issue J
R57	11186472	Resistor RD 1/5W 4.7K OHM 5%	After issue J
R58	11186472	Resistor RD 1/5W 4.7K OHM 5%	After issue K
R59	11186124	Resistor RD 1/5W 120K OHM 5%	After issue K
C1	12903408	Capacitor CK 50V 470pF 10%	
C2	12901900	Capacitor CE 16V 10UF 20%	Before issue H
C2	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C3	12903377	Capacitor CK 500V 0.01UF 80%	
C4	12903377	Capacitor CK 500V 0.01UF 80%	
C5	12901900	Capacitor CE 16V 10UF 20%	
C6	12901900	Capacitor CE 16V 10UF 20%	
C7	12904097	Capacitor CE 16V 100UF 20%	Issue B to H
C7	12904500	Capacitor CE 25V 100UF 20%	Issue A, and after issue J
C8	12901900	Capacitor CE 16V 10UF 20%	
C9	12903080	Capacitor CG 25V 0.1UF 20%	
C10	12906135	Capacitor CK 50V 0.022UF 80%	
C11	12903402	Capacitor CK 50V 150pF 10%	
C12	12903997	Capacitor CQ 50V 1000pF 2%	
C13	12901900	Capacitor CE 16V 10UF 20%	
C14	12901900	Capacitor CE 16V 10UF 20%	
C15	12904002	Capacitor CQ 50V 2700pF 2%	

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
C16	12901910	Capacitor CE 50V 0.33UF 20%	
C17	12906135	Capacitor CK 50V 0.022UF 80%	
C18	12903080	Capacitor CG 25V 0.1UF 20%	
C19	12901900	Capacitor CE 16V 10UF 20%	
C20	12901906	Capacitor CE 35V 4.7UF 20%	
C21	12901900	Capacitor CE 16V 10UF 20%	
C22	12903080	Capacitor CG 25V 0.1UF 20%	
C23	12903993	Capacitor CQ 50V 470pF 2%	
C24	12903080	Capacitor CG 25V 0.1UF 20%	
C25	12396333	Capacitor CK 50V 0.033UF 10%	Issue A
C25	12901496	Capacitor CS 35V 0.68UF 10%	After issue B
C26	12903080	Capacitor CG 25V 0.1UF 20%	
C27	12903080	Capacitor CG 25V 0.1UF 20%	
C28	12901911	Capacitor CE 50V 0.47UF 20%	
C29	12901910	Capacitor CE 50V 0.33UF 20%	
C30	12903080	Capacitor CG 25V 0.1UF 20%	
C31	12901900	Capacitor CE 16V 10UF 20%	
C32	12901895	Capacitor CE 6.3V 33UF 20%	
C33	12903080	Capacitor CG 25V 0.1UF 20%	
C34	12903993	Capacitor CQ 50V 470pF 2%	
C35	12903939	Capacitor CQ 50V 220pF 2%	
C36	12901899	Capacitor CE 10V 47UF 20%	
C37	12903080	Capacitor CG 25V 0.1UF 20%	
C38	12901906	Capacitor CE 35V 4.7UF 20%	
C39	12903080	Capacitor CG 25V 0.1UF 20%	
C40	12903993	Capacitor CQ 50V 470pF 2%	
C41	12904097	Capacitor CE 16V 100UF 20%	
C42	12904500	Capacitor CE 25V 100UF 20%	
C43	12903080	Capacitor CG 25V 0.1UF 20%	

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
C44	12903080	Capacitor CG 25V 0.1UF 20%	
C45	12903439	Capacitor CC 50V 22pF 5%	
C46	12903080	Capacitor CG 25V 0.1UF 20%	
C47	12903080	Capacitor CG 25V 0.1UF 20%	
C48	12904500	Capacitor CE 25V 100UF 20%	
C49	12903449	Capacitor CC 50V 56pF 5%	
C50	12903449	Capacitor CC 50V 56pF 5%	
C52	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C53	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C54	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C55	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C56	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C57	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C58	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C59	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C60	12903080	Capacitor CG 25V 0.1UF 20%	After issue J
C61	12903989	Capacitor CQ 50V 220pF 2%	After issue J
C62	12903439	Capacitor CC 50V 22pF 5%	After issue C
C63	12901906	Capacitor CE 35V 4.7UF 20%	After issue J
C64	12901913	Capacitor CE 50V 2.2UF 20%	Issue H,J
C64	12906135	Capacitor CK 50V 0.022UF 80%	After issue K
C66	12903080	Capacitor CG 25V 0.1UF 20%	After issue K
L1	14723477	Coil 100UH 5%	Before issue J
L1	14724209	Coil 100UH 5%	After issue K
L2	14723609	Coil 150UH 10%	
L3	14723609	Coil 150UH 10%	
L4	14724010	Coil 10UH 10%	
L5	14724150	Coil 10UH 20%	

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
L6	14723609	Coil 150UH 10%	
L7	14723477	Coil 100UH 5%	Before issue J
L7	14724209	Coil 100UH 5%	After issue K
L8	13040255	Wire jumping	After issue K
W1	13040255	Wire jumping	
J2	13121109	Connector 4P	
-	16322368	Clamp	Clamp for J2
J4	13122509-00	Connector 30P	
J5 to 7	13122510-00	Connector 22P	
J9	13122463	Connector 14P	
TP1 to 18	13122469-00	Connector 18P	
TP19 to 22	13121360	Connector S4P	Before issue G and after issue K
S1	13122468	Connector 2P	
S2	13122468	Connector 2P	
P1	13152467	Connector	Plug for S2
-	16803149-00	Shield case DC	Before issue H
-	16498555	Triple screw 2x4	X2, for shield case DC

(15532057-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
-	16271176-04	Nameplate	

5-3-2 PCBA Interface Control (Part No. 15532058-00)

Symbol No.	TEAC Part No.	Part Name/Rating		Remarks
-	13332058-00	PCB Interface Control		
U1	13441531	IC	74LS373N	
U2	13441531	IC	74LS373N	
U3	13700052-00	IC	D/CAS2	
XU3	13299245	IC socket	28P	For U3, issue A,B
U4	13442562	IC	82C54FP-6	
U5	13442571	IC	HM6116LFP-4	
U6	13442382	IC	81C55GS	
U7	13442563	IC	82C37AP	
U8	13441636	IC	74LS257AN	
U9	13442574	IC	80C85AGS	
U10	13441233	IC	74LS02N	
U11	13442310-00	IC	Interface Control	
U12	13441463	IC	74LS42N	
U13	13441464	IC	74LS221N	
U14	13442309-00	IC	W/R control	
U15	13441235	IC	74LS04N	
U16	13441245	IC	74LS74AN	
U17	13442386	IC	74ALS240-1N	

(15532058-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
U18	13442375	IC 74LS640-1N	
U19	13447292	IC TL061C	
U20	13442386	IC 74ALS240-1N	
U21	13441510	IC 74LS14N	
U22	13441819	IC 74LS024N	
CR1	13411384	Diode 1SS133	
CR2	13411384	Diode 1SS133	
CR3	13411384	Diode 1SS133	
R1	11186472	Resistor RD 1/5W 4.7K OHM 5%	
R2	11186510	Resistor RD 1/5W 51 OHM 5%	
R3	11186472	Resistor RD 1/5W 4.7K OHM 5%	
R4	11054682	Resistor RN 1/4W 6.8K OHM 1%	Before issue B
R4	11982997	Resistor RN 1/4W 5.9K OHM 1%	After issue C
R5	11186391	Resistor RD 1/5W 390 OHM 5%	
R6	11186102	Resistor RD 1/5W 1K OHM 5%	
R7	11054105	Resistor RN 1/4W 1M OHM 1%	
R8	11186471	Resistor RD 1/5W 470 OHM 5%	

(15532058-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
R9	11186472	Resistor RD 1/5W 4.7K OHM 5%	
R10	11054105	Resistor RN 1/4W 1M OHM 1%	
R11	11186681	Resistor RD 1/5W 680 OHM 5%	
R12	13256650	Variable resistor 1/2W 2K OHM 20%	
R13	11983007	Resistor RN 1/4W 7.5K OHM 1%	After issue C
RA1	13492290	Resistor network 5.1K OHM x 4	
RA2	13497250	Resistor network 220/330 OHM x14	
C1	12903080	Capacitor CG 25V 0.1UF 20%	
C2	12903080	Capacitor CG 25V 0.1UF 20%	
C3	12903080	Capacitor CG 25V 0.1UF 20%	
C4	12903080	Capacitor CG 25V 0.1UF 20%	
C5	12903080	Capacitor CG 25V 0.1UF 20%	
C6	12903080	Capacitor CG 25V 0.1UF 20%	
C7	12903080	Capacitor CG 25V 0.1UF 20%	
C8	12903080	Capacitor CG 25V 0.1UF 20%	
C9	12902521	Capacitor CK 50V 470pF 10%	
C10	12903080	Capacitor CG 25V 0.1UF 20%	

(15532058-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
C11	12903080	Capacitor CG 25V 0.1UF 20%	
C12	12474101	Capacitor CQ 50V 100pF 1%	
C13	12901116	Capacitor CK 50V 3300pF 10%	
C14	12904222	Capacitor CQ 50V 0.1UF 5%	
C15	12903080	Capacitor CG 25V 0.1UF 20%	
C16	12902526	Capacitor CS 16V 3.3UF 20%	
C17	12902015	Capacitor CE 16V 47UF 20%	
C18	12903991	Capacitor CQ 50V 330pF 2%	
C19	12902526	Capacitor CS 16V 3.3UF 20%	
C20	12902526	Capacitor CS 16V 3.3UF 20%	
C21	12902526	Capacitor CS 16V 3.3UF 20%	
C22	12903080	Capacitor CG 25V 0.1UF 20%	
C23	12474101	Capacitor CQ 50V 100pF 1%	After issue C
CA1	12902529	Capacitor network 30pFx2	
CA2	12902529	Capacitor network 30pFx2	
Y1	13295070	Ceramic resonator 6.14MHz	
Y2	13295119	Ceramic resonator 7.20MHz	

(15532058-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
J4	13152620	Connector 30P	
TP1 to GND	13121364	Connector S8P	Before issue B
TP1 to GND	13121365	Connector S9P	After issue C
TP7 to GND	13121705	Connector 3P	
-	13152467	Connector	Plug for TP7, 8, G
-	16787534-00	Shield sheet IC	
-	16359289-00	Spacer	For shield sheet IC
-	16355024	Rivet bush 3.5x5.5	For shield sheet IC
-	16271176-05	Nameplate	

MEMO:

5-3-3 Interrupter C Ass'y (Part No. 15532062-00)

Symbol No.	TEAC Part No.	Part Name/Rating	Remarks
1	13332062-00	PCB Interrupter C	
2	13419234	Photo interrupter	
3	13419234	Photo interrupter	
4	13427141	Transistor 2SD288	
5	16362140	Insulation sheet	
6	16191158-01	Heat-sink (2)	
7	16470310	Pan-head sems screw 3x10 S ZMC	
8	16490004	Nut 3 B BNM	
9	16470205	Pan-head sems screw 2x5 S ZMC	
10	13494310	Resistor network 120 OHMx3	
11	13122511-00	Connector 16P	

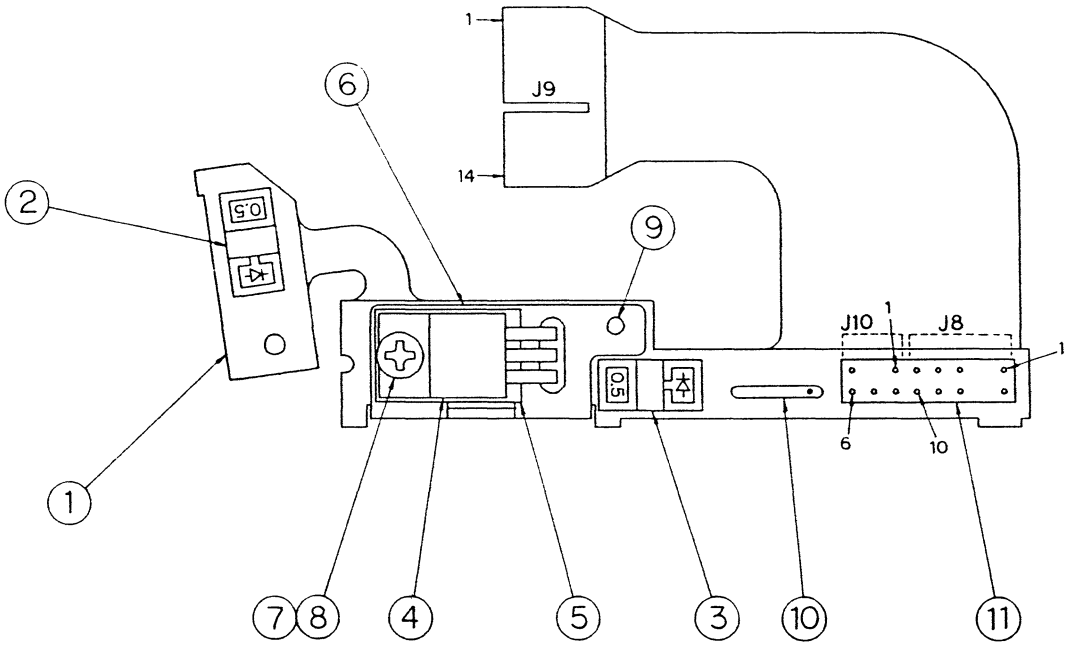


Fig. 506 Interrupter C Ass'y

5-4 Circuit diagrams and parts location diagrams

Remarks in circuit diagram

1. Resistance unit of resistor: The resistance of each resistor is given in ohm.
2. Resistance tolerance of resistor: The resistance tolerance of each resistor is -5% to +5% (J), unless otherwise specified, -1% to +1% when specified with symbol F, and -20% to +20% when specified with symbol M.
3. Rated power of resistor: The rated power of the resistor whose resistance tolerance is -5% to +5% is 1/5 W, unless othersise specified.

   The rated power of the resistor whose resistance tolerance is -1% to +1% is 1/4 W.

   The rated power of each variable resistor is 1/2 W.
4. Capacity unit of capacitor: The unit of capacity of each capacitor is micro farad, unless otherwise specified, and pF (picofarad) when specified with p.
5. Capacity tolerance of capacitor: The capacity tolerance of each capacitor is +80% to -20% (Z), unless otherwise specicifed, and it is as shown below, when specified with symbol.

   Symbol G: -2% to +2%, Symbol J: -5% to +5%,

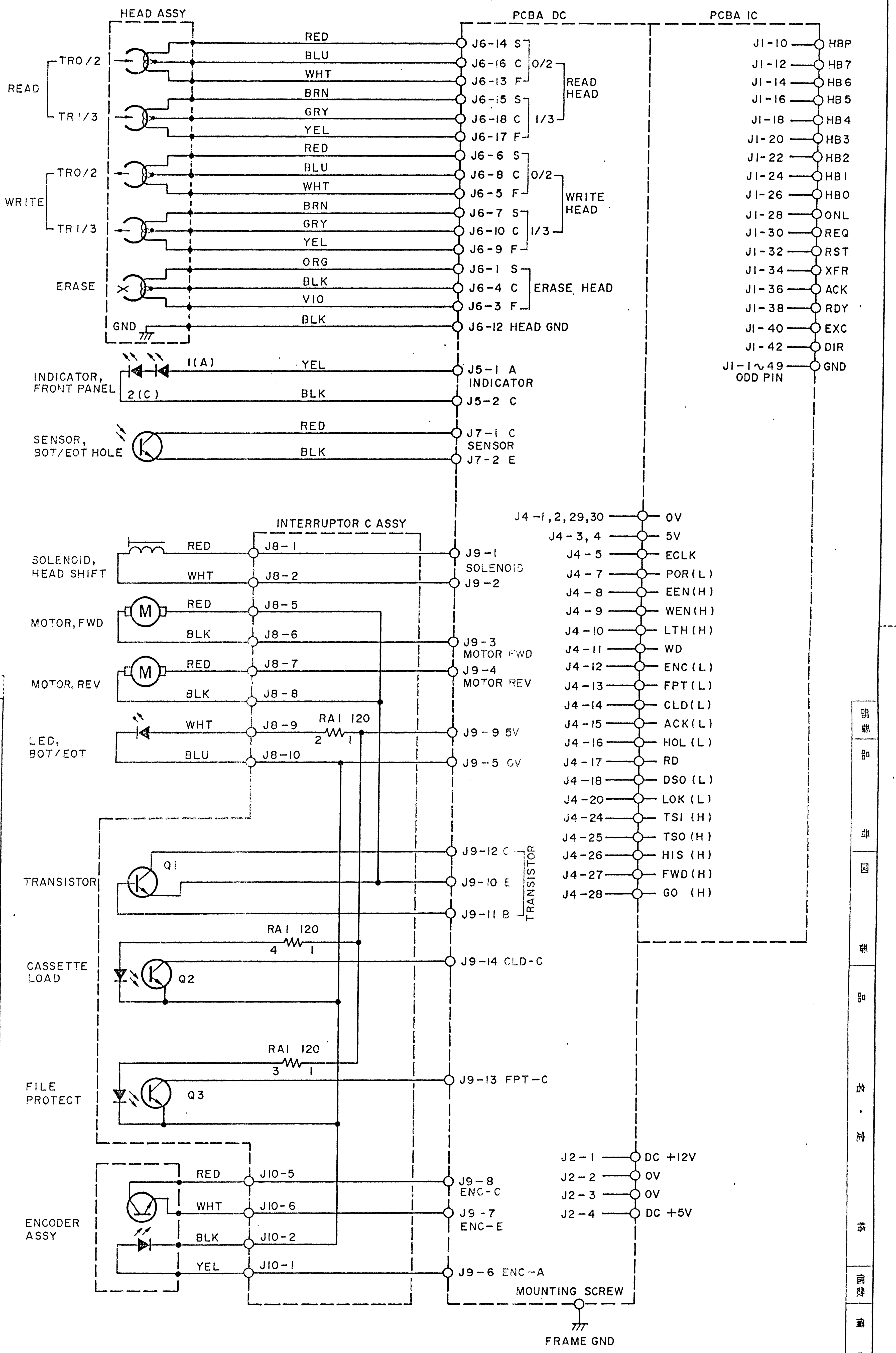
   Symbol K: -10% to +10%, Symbol M: -20% to +20%
6. Rated voltage of capacitor: The rated voltage of capacitor is 50 V, unless otherwise specified.
7. Inductance unit of coil: The inductance of each coil is given in micro henry.
8. Inductance toerance of coil: The tolerance of inductance is -10% to +10% (K), unless otherwise specified, and it is as shown below when specified with a symbol.

   Symbol J: -5% to +5%, Symbol M: -20% to +20%

5-4-1 Overall circuit diagram

Circuit board interconnections

10010230 00



図番		
図名	Circuit Diagram	1/1
品名	Circuit Board Interconnections	
形式	MT-2ST/20D	
TEAC ティアック株式会社		

記号 改訂番号 年月日 担当 承認

製図 設計 検図 承認

尺度 / 第三角法 / 単位 mm

普通寸法差 TS-E (級)

処理 / 仕上 / 材料

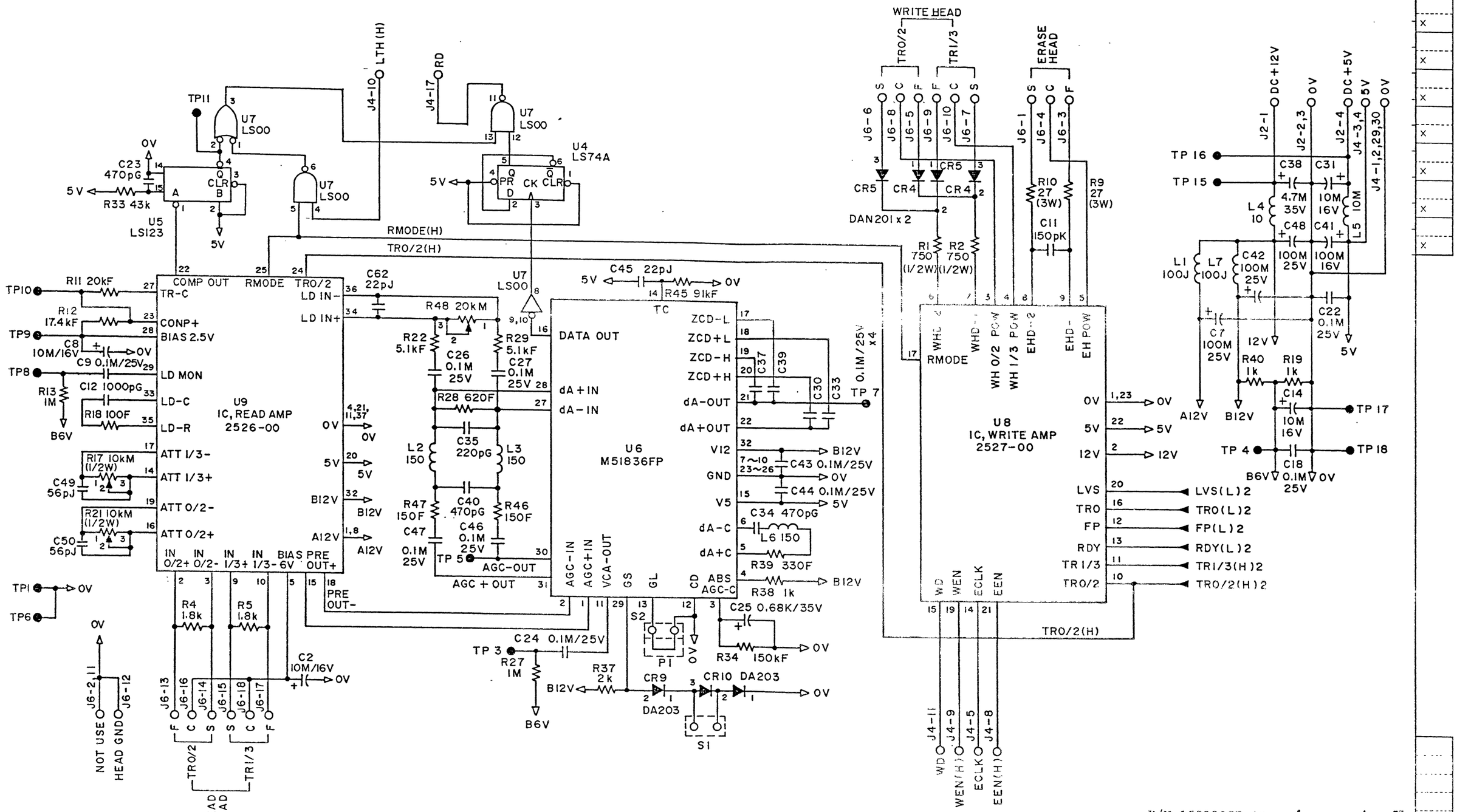
指定以外のエッジはイトメのこと

整理番号

530頁

部番 / 品番 / 図番 / 品名・定格 / 個数 / 備考 / 適用

部番	品番	図番	品名・定格	個数	備考	適用



P/N 15532057-00 issue A～H

記号	改訂番号	年月日	担当	承認	
承認				尺度	
検図					
設計				第三角法	
製図				単位 mm	

材料
仕上　指定以外のエッジはイトメのこと
処理
普通寸法差 TS-E ..... (級)

TEAC ティアック株式会社

形式	MT-2ST/20,90,Permalloy
品名	PCBA Drive Control
図名	Circuit Diagram 1/2
図番	

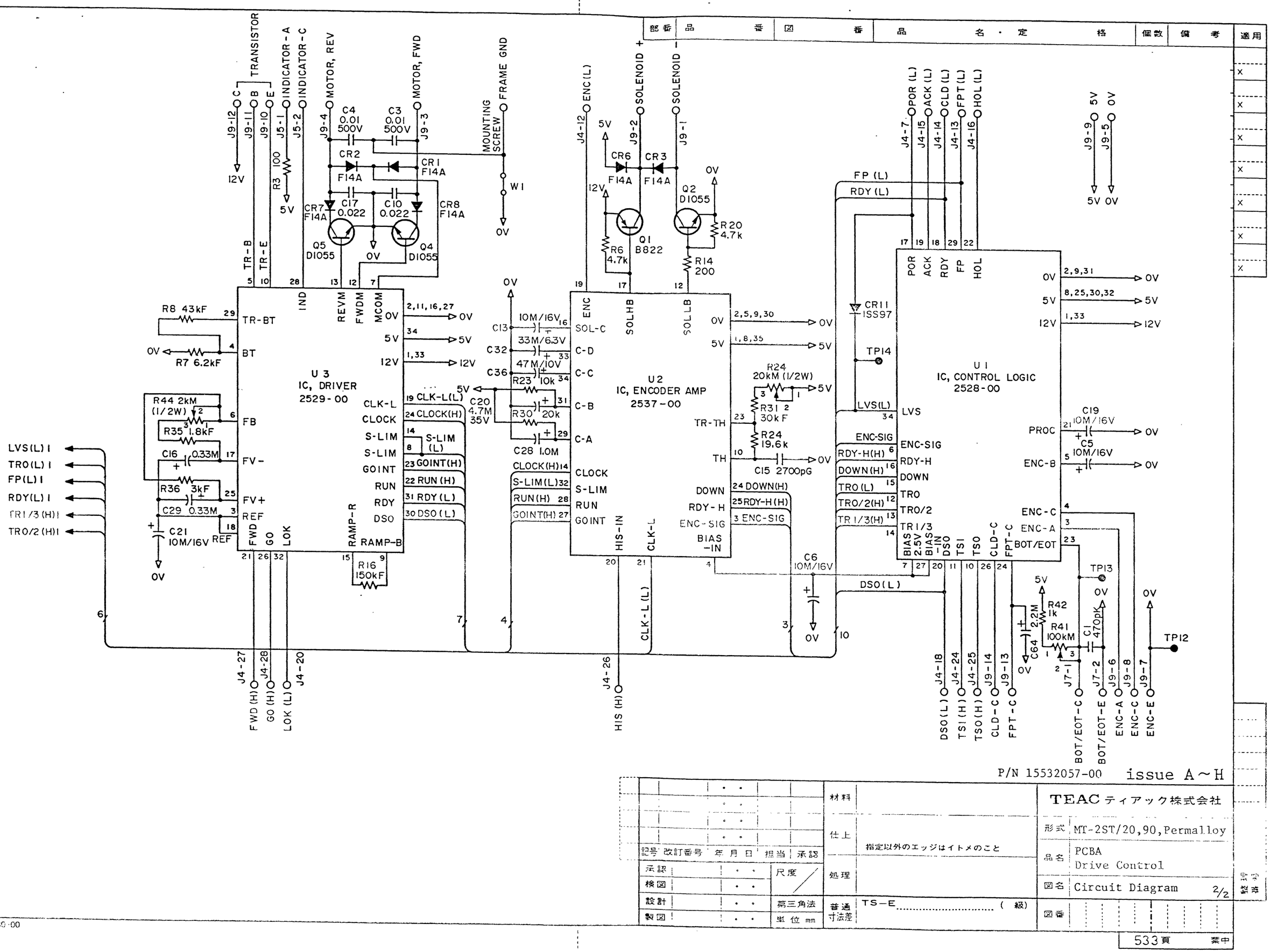
製番

M P

入 図

10010230 00

部番	品番	図番	品名・定格	個数	備考	適用

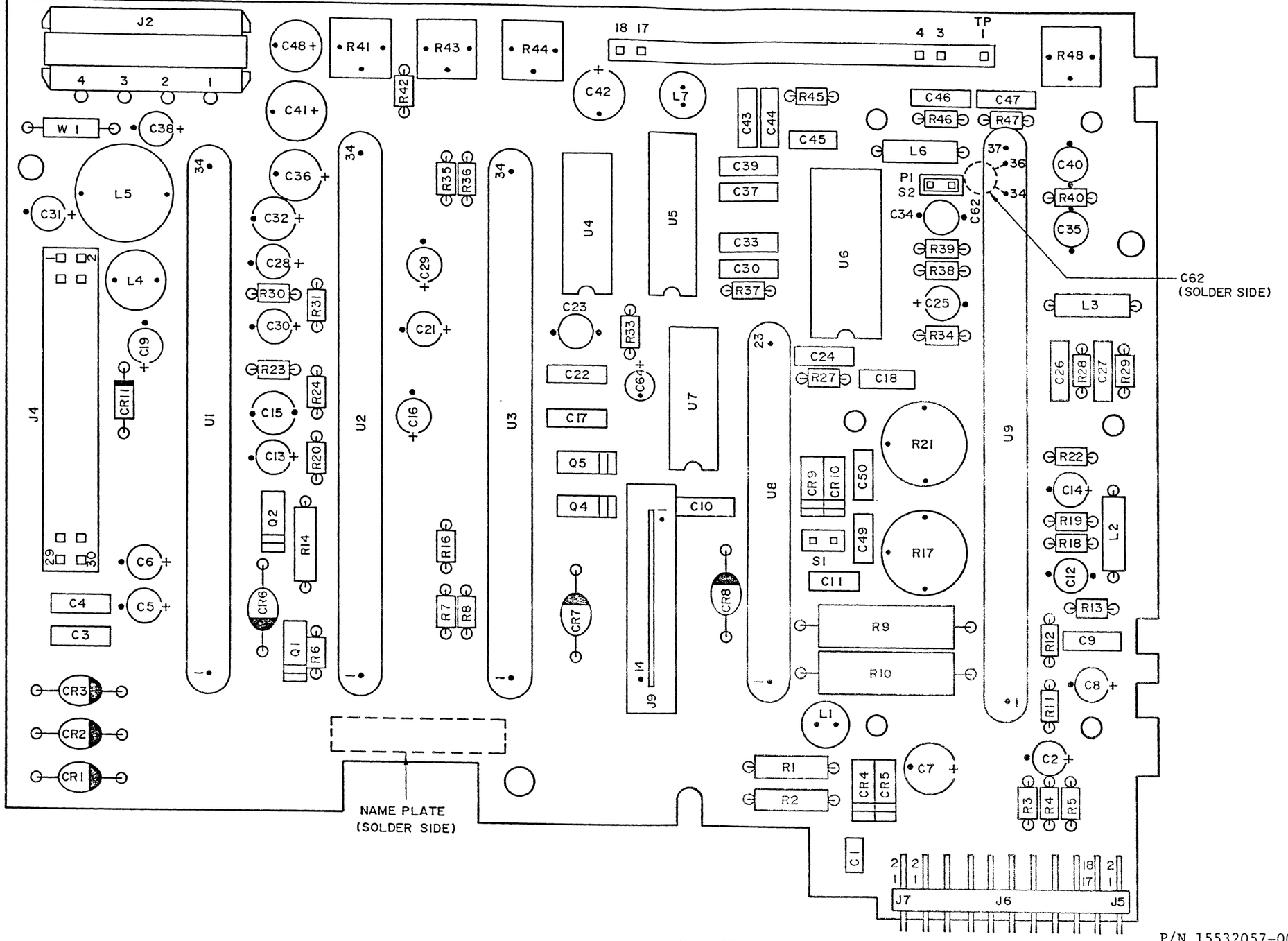


P/N 15532057-00 issue A～H

記号	改訂番号	年月日	担当	承認	
承認				尺度	
検図					
設計				第三角法	
製図				単位 mm	

材料		TEAC ティアック株式会社	
仕上	指定以外のエッジはイトメのこと	形式	MT-2ST/20,90,Permalloy
処理		品名	PCBA Drive Control
普通寸法差	TS-E (級)	図名	Circuit Diagram 2/2
		図番	

部番	品番	図番	品名・定格	個数	備考	適用
						x
						x
						x
						x
						x
						x



P/N 15532057-00 issue A～H

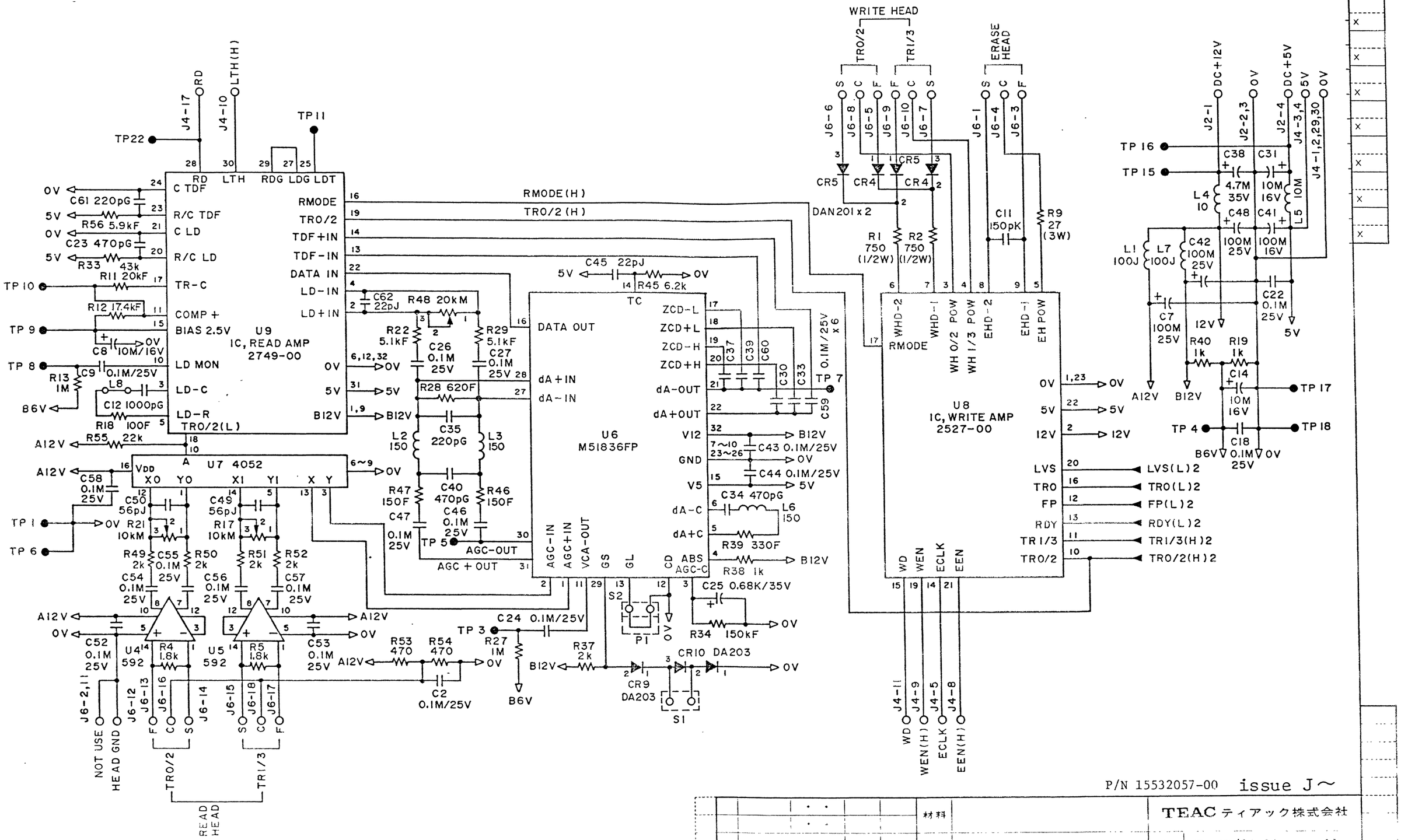
記号 改訂番号 年月日 担当 承認	材料	TEAC ティアック株式会社	
承認	仕上 指定以外のエッジはイトメのこと	形式	MT-2ST/20,90,Permalloy
検図 尺度	処理	品名	PCBA Drive Control
設計 第三角法	普通寸法差 TS-E (級)	図名	Parts Location Diagram
製図 単位 mm		図番	

M P

10010230-00

入 図

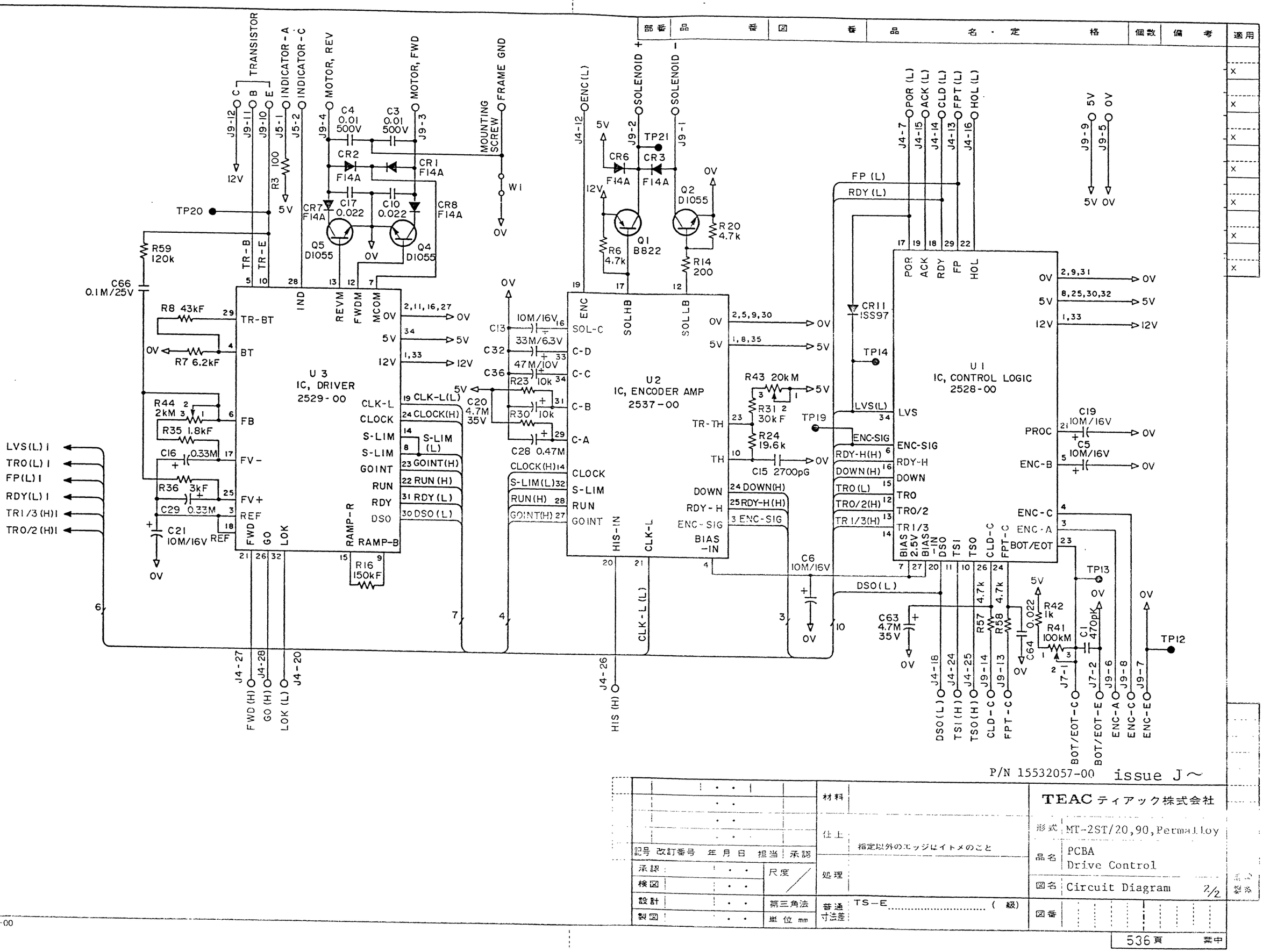
部番	品番	図番	品名・定格	個数	備考	適用



P/N 15532057-00 issue J～

記号	改訂番号	年月日	担当	承認	材料	TEAC ティアック株式会社
					仕上 指定以外のエッジはイトメのこと	形式 MT-2ST/20,90,Permalloy
					処理	品名 PCBA Drive Control
承認					尺度	図名 Circuit Diagram 1/2
検図						
設計					第三角法	普通寸法差 TS-E.....(級)
製図					単位 mm	図番

部番	品番	図番	品名・定格	個数	備考	適用



記号	改訂番号	年月日	担当	承認
承認				
検図				
設計				
製図				

尺度

第三角法

単位 mm

材料	
仕上	指定以外のエッジはイトメのこと
処理	
普通寸法差	TS-E (級)

TEAC ティアック株式会社

形式	MT-2ST/20,90,Permal.loy
品名	PCBA Drive Control
図名	Circuit Diagram 2/2
図番	

536頁 案中

10010230-00

入図

部番	品番	図番	品名・定格	個数	備考	適用
						×
						×
						×
						×
						×
						×
						×

COMPONENT SIDE

SOLDER SIDE

NAME PLATE (SOLDER SIDE)

P/N 15532057-00 issue J～

記号	改訂番号	年月日	担当	承認
承認			尺度	
検図				
設計			第三角法	
製図			単位 mm	

材料	
仕上	指定以外のエッジはイトメのこと
処理	
普通寸法差	TS-E ..... (級)

TEAC ティアック株式会社

形式	MT-2ST/20,90,Permalloy
品名	PCBA Drive Control
図名	Parts Location Diagram
図番	

1/1

M P

入 図

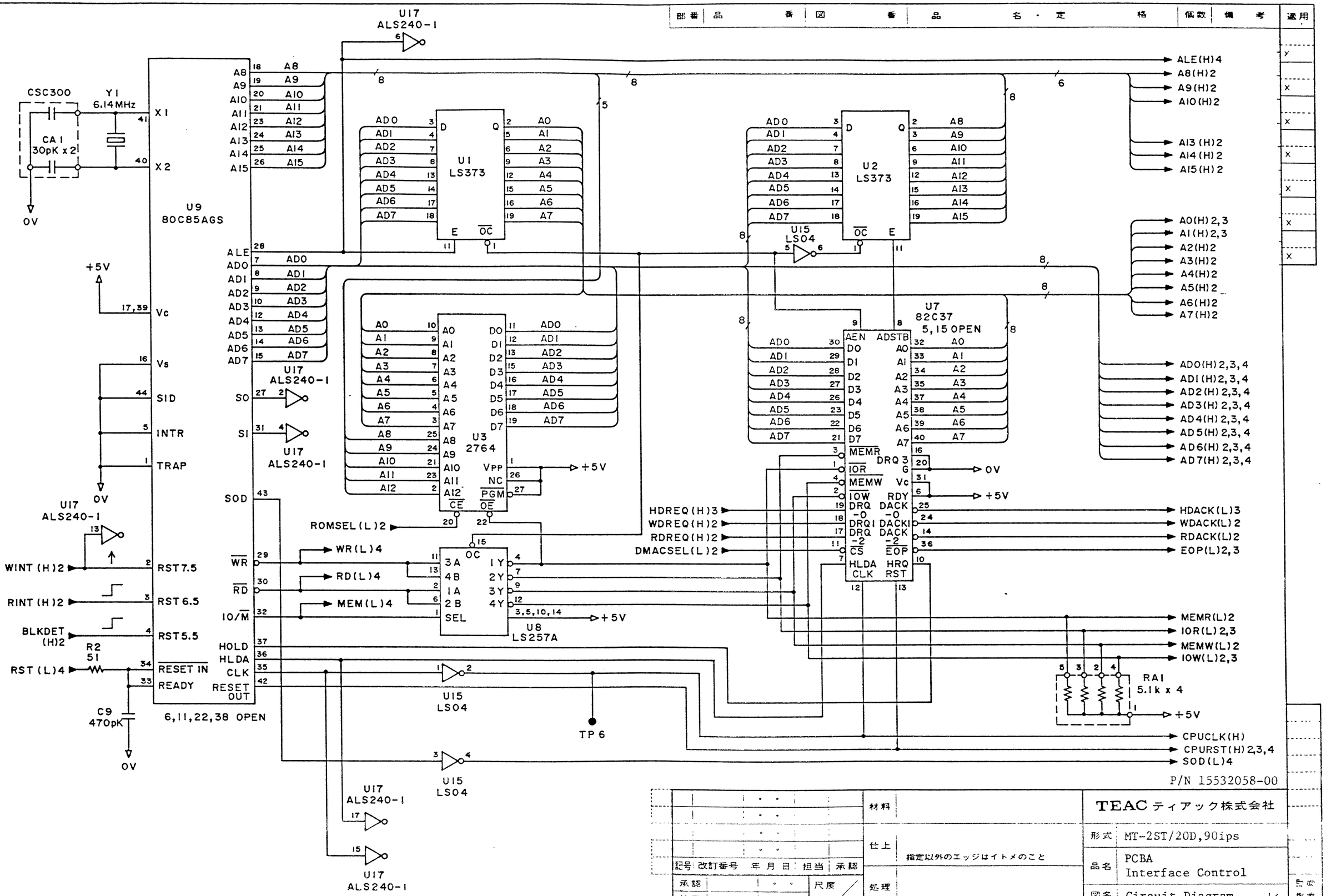
10010230-00

5-4-2 PCBA drive control

Circuit diagram

Parts location diagram

部番	品番	図番	品名・定格	個数	備考	適用



P/N 15532058-00

記号	改訂番号	年月日	担当	承認
承認			尺度	
検図				
設計			第三角法	
製図			単位 mm	

材料	
仕上	指定以外のエッジはイトメのこと
処理	
普通寸法差	TS-E ..... (級)

TEAC ティアック株式会社

形式	MT-2ST/20D,90ips
品名	PCBA Interface Control
図名	Circuit Diagram 1/4
図番	

10010230-00

入図

部番	品番	図番	品名・定格	個数	備考	適用

AD0(H)1
AD1(H)1
AD2(H)1
AD3(H)1
AD4(H)1
AD5(H)1
AD6(H)1
AD7(H)1
A0(H)1
A1(H)1
A2(H)1
A3(H)1
A4(H)1
A5(H)1
A6(H)1
A7(H)1
A8(H)1
A9(H)1
A10(H)1

U5 5117 (A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 / CS WE OE / D0 D1 D2 D3 D4 D5 D6 D7)

MEMW(L)1
MEMR(L)1

TCLK(H)3
IFCLK(H)4
ENC(H)4

IOW(L)1
IOR(L)1

U4 82C54-6 (D0 D1 D2 D3 D4 D5 D6 D7 / WR RD CS A0 A1 / CO GO C1 G1 C2 G2 / OO O1 O2)

+5V

TP3

TIMOUT(H)4
EPCEND(H)4

R1 4.7k

WDACK(L)1
RDACK(L)1
EOP(L)1

BOT/EOT(L)4
RDATA(L)4

CPURST(H)1

U14 2309 (Vc / AD0 AD1 AD2 AD3 AD4 AD5 AD6 AD7 / WR RD CS A0 A1 / RCLK / RST RDP / DSP)

+5V

34～39

0V

WENA(H)4
EENA(H)4
WDATA(H)4
WINT (H)1
RINT (H)1
BLKDET(H)1,4

U15 LS04

DCER
DROP
SYNC

TP2 TP1

WDREQ(H)1
RDREQ(H)1

UP(H)
DWN(L)

R4 6.8kF
C12 100pG

U13 LS221 (C B A / Q Q)

TP5

DLYR(L)

A13(H)1
A14(H)1
A15(H)1

U12 LS42 (A B C D / 0 1 2 3 4 5 6)

ROMSEL(L)1
IFCSEL(L)3
8155SEL(L)4
DMACSEL(L)1

0V

9,10,11 OPEN

+5V
R13 7.5kF
C23 100pG
TP9

U13 LS221 (R/C C B A / Q Q)

UP(H)

R11 680
R10 1MF
U19 TL061 1,5,8 OPEN
CR1 CR2 1SS133 x 3
CR3
C13 3300pK
R5 390
R7 1MF
C14 0.1J
R8 470
DWN(L)

R9 4.7k
TP4
R6 1k
R12 2kM
C22 0.1M 25V

C18 330pG
U22 LS624 6,10,11,12 OPEN
Vcc CX1 CX2 FC Vcc RANGE Z G GND EN
C21 3.3M/16V

+5VA
0VA

P/N 15532058-00

記号	改訂番号	年月日	担当	承認
承認				
検図				
設計				
製図				

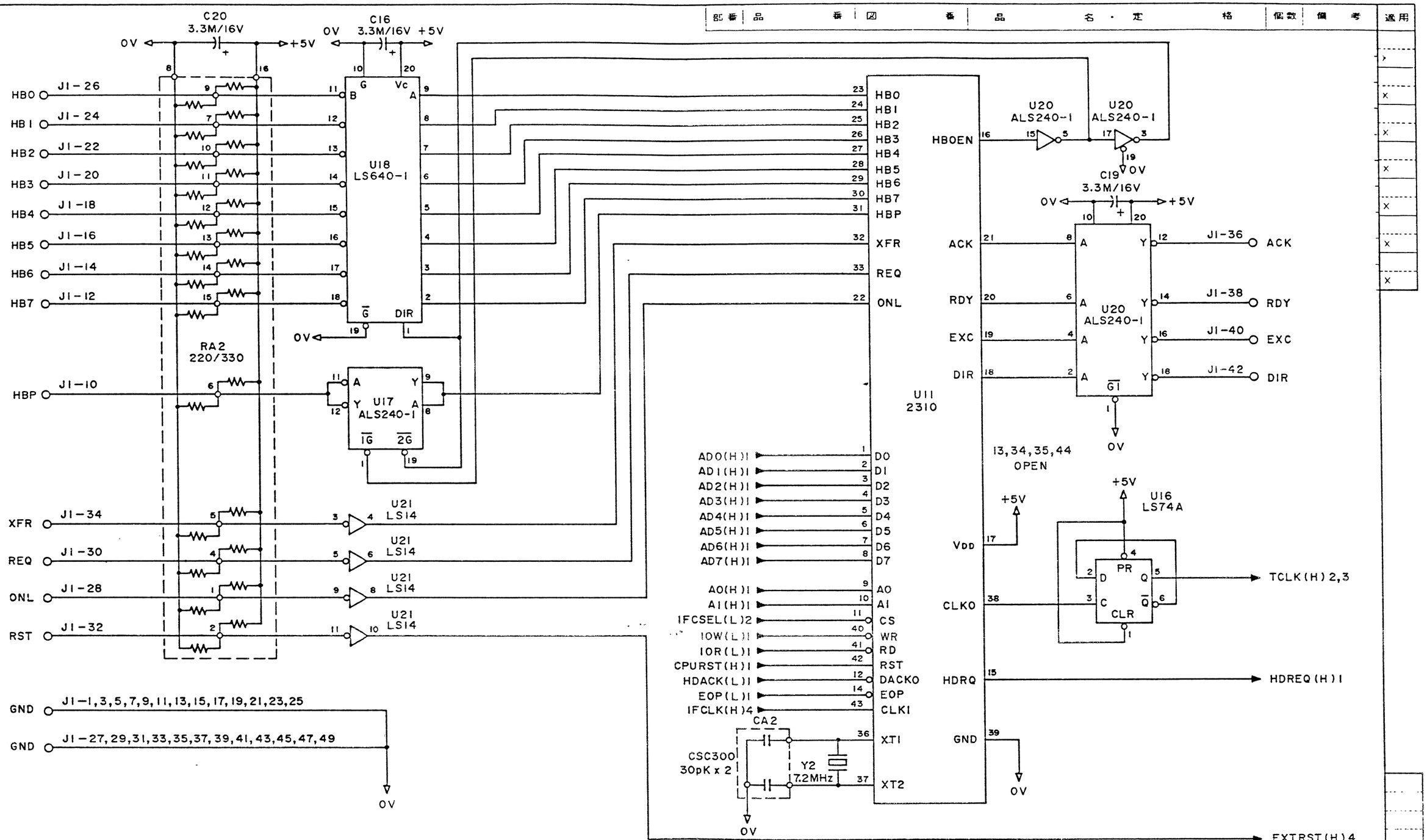
尺度 /
第三角法
単位 mm

材料
仕上 指定以外のエッジはイトメのこと
処理
普通寸法差 TS-E (級)

TEAC ティアック株式会社

形式	MT-2ST/20D,90ips
品名	PCBA Interface Control
図名	Circuit Diagram 2/4
図番	

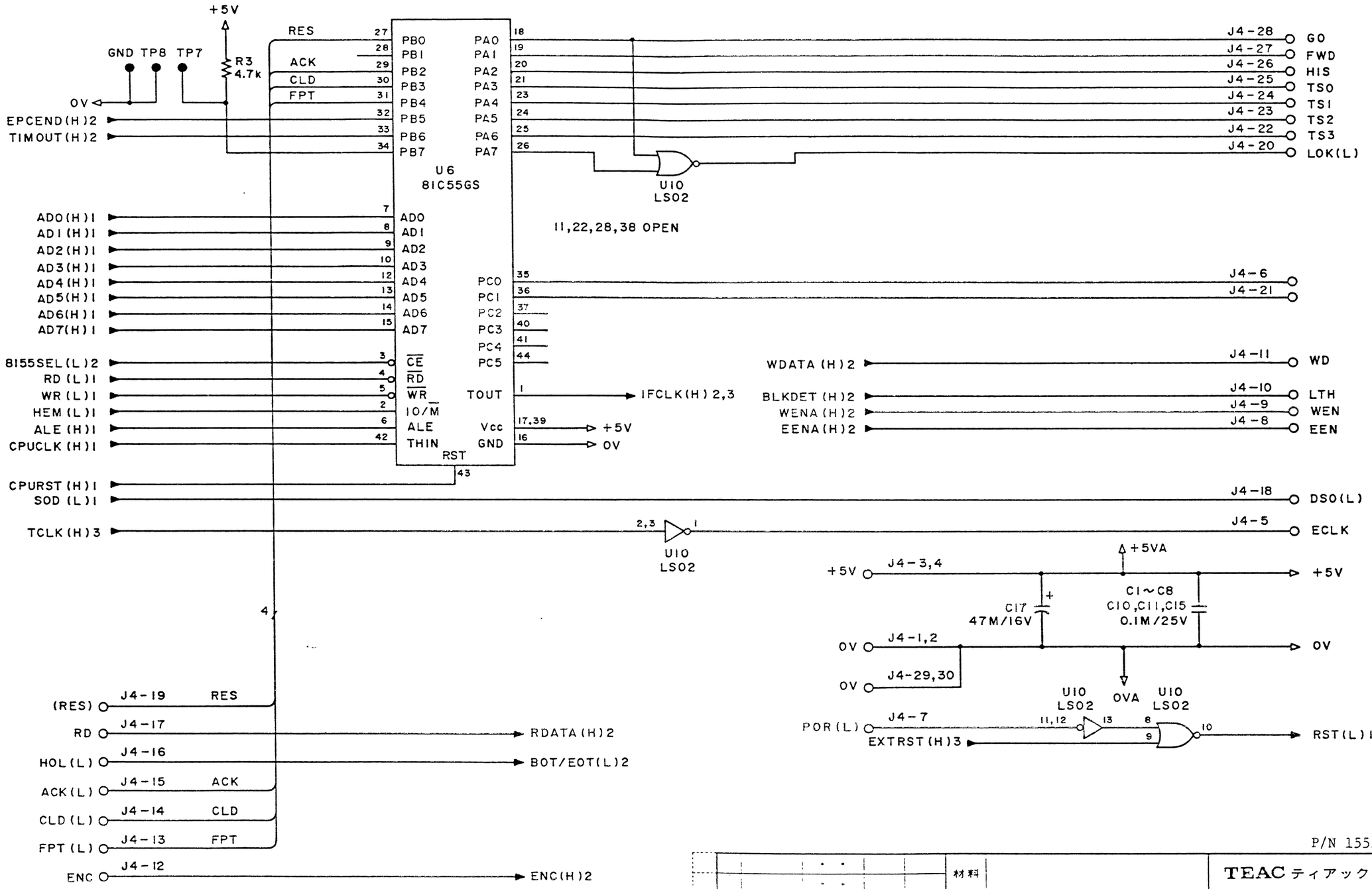
部番	品番	図番	品名・定格	個数	備考	適用



P/N 15532058-00

記号 改訂番号 年月日 担当 承認	材料		TEAC ティアック株式会社	
承認 / 検図 / 設計 / 製図	仕上	指定以外のエッジはイトメのこと	形式	MT-2ST/20D,90ips
尺度 / 第三角法 / 単位 mm	処理		品名	PCBA Interface Control
	普通寸法差	TS-E..... (級)	図名	Circuit Diagram 3/4
			図番	

部番	品番	図番	品名・定格	個数	備考	適用



P/N 15532058-00

記号	改訂番号	年月日	担当	承認
承認				
検図				
設計				
製図				

尺度 /

第三角法

単位 mm

材料

仕上 指定以外のエッジはイトメのこと

処理

普通寸法差 TS-E..... (級)

TEAC ティアック株式会社

形式	MT-2ST/20D,90ips
品名	PCBA Interface Control
図名	Circuit Diagram 4/4
図番	

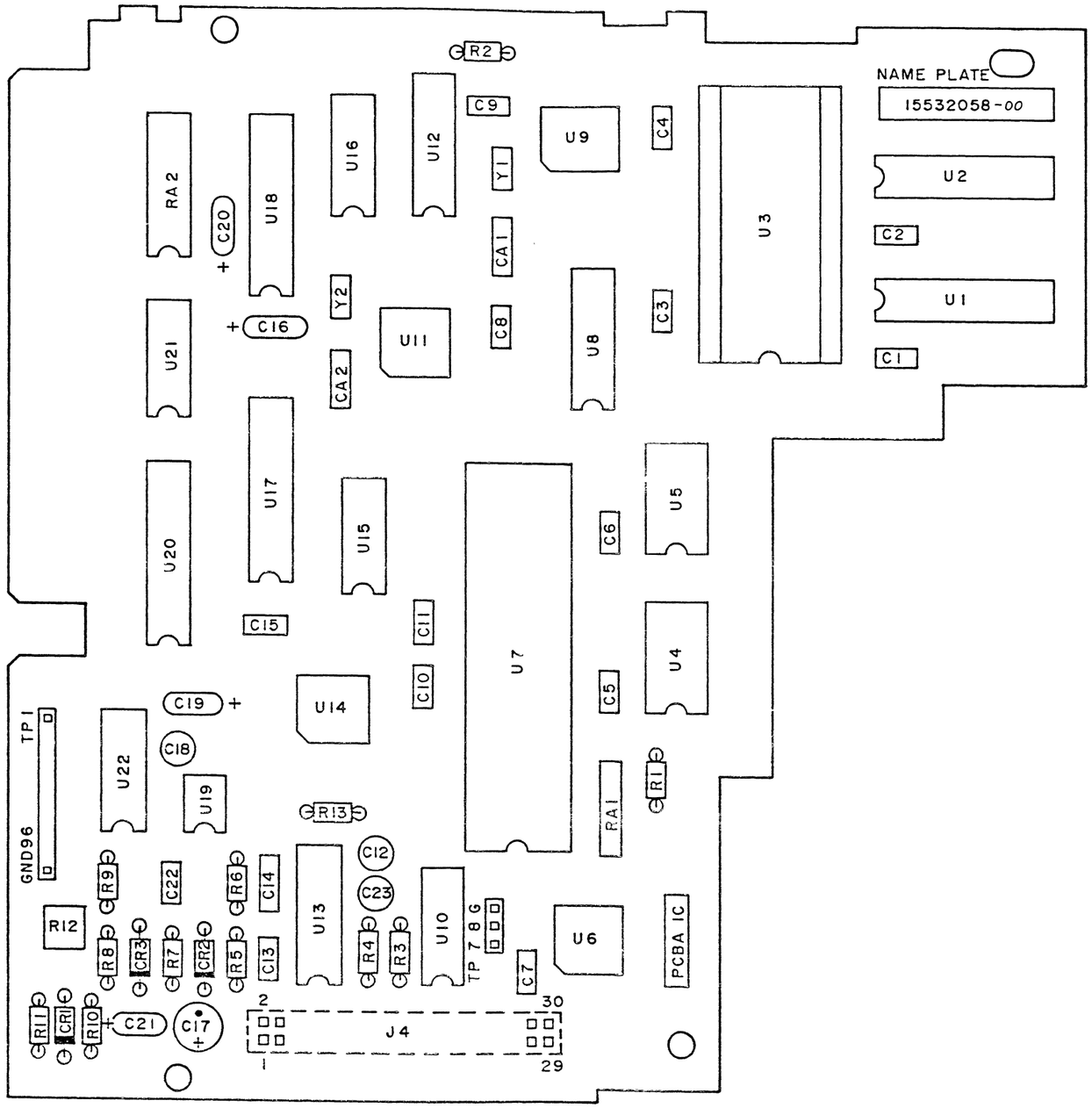
製図

M P

10010230-00

入図

記号	部品番号	品名・規格	個数	備考	適用
					y
					x
					x
					x
					x
					x
					x



P/N 15532058-00

記号 改訂番号 年月日 担当 承認	材料	TEAC ティアック株式会社	
承認 / 検図 / 設計 / 製図	仕上 指定以外のエッジはイトメのこと	形式	MT-2ST/20D,90ips
尺度 / 第三角法 / 単位 mm	処理	品名	PCBA Interface Control 1/1
	普通寸法差 TS-E (級)	図名	Parts Location Diagram
		図番	

M P

10010230 00

入図

5-4-3 PCBA interface control

Circuit diagram

Parts location diagram

営業品目

- ディジタル磁気テープ記憶装置
- フロッピーディスクドライブ
- ハードディスクドライブ
- データレコーダ
- パーソナルコンピュータ
- ビデオレコーダ
- レーザービデオディスクプレーア
- 各種センサ
- 直流増幅器

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電話 大阪（06）384－6041代
名古屋営業所　464・名古屋市千種区東山通り3－2－3
電話 名古屋（052）782－4581代
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電話 広島（082）294－4751代
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