



Garden Grove Division

## QUARTERBACK™ 1/4" CARTRIDGE TAPE DRIVE INSTALLATION, OPERATION, AND REPAIR INFORMATION

This information applies to all models of Cipher Data Products Quarterback 1/4" Cartridge Tape Drive which includes the following:

- Model F420-90 – Formatted 90 inches per second (IPS)
- Model F420-30 – Formatted 30 inches per second
- Model 420-90 – Unformatted 90 inches per second
- Model 420-30 – Unformatted 30 inches per second

### INSTALLATION

The Quarterback can be mounted using the standard drive mounting (Refer to Figure 1 for hole locations), or it can be mounted using the 8" floppy disk mount. The Quarterback should not be installed on its left side or with the cartridge insertion slot facing down. Free air flow is required to prevent the drive ambient temperature from rising above 35 degrees C (95 degrees F) under operating conditions. Otherwise, forced cooling should be used to achieve the operating temperature requirements.

All connections between the central processing unit (CPU) and the Quarterback are made directly to the Quarterback Formatter printed wiring board (PWB) by using a ribbon cable for input/output (I/O) connections and an AMP connector for DC power supply connections. Refer to Figure 1 for cable connection information.

### I/O RIBBON CABLE

The I/O ribbon cable is connected to the 50 pin edge connector (J1) on the Quarterback Formatter PWB. The recommended mating connector is a 50 pin 3M type connector (part number 3415-0001). The pins are numbered 1 through 50 with the even numbered pins located on the component side of the PWB. All odd numbered pins are connected to signal ground (GND) in the Quarterback Formatter and should be connected to signal GND in the CPU.

All interface signals from the Quarterback Formatter to the CPU are standard TTL levels as follows:

- FALSE, logic 0 (high) = 2.4 to 5.25 VDC
- TRUE, logic 1 (low) = 0 to 0.55 VDC

All interface signals from the CPU to the Quarterback Formatter are standard TTL level as follows:

FALSE, logic 0 (high) = 2.0 to 5.25 VDC  
 TRUE, logic 1 (low) = 0 to 0.8 VDC

These levels are measured on connector P1 at the Quarterback Formatter.

I/O ribbon cable signals from the CPU to the Quarterback Formatter are terminated in the formatter. Signals from the Quarterback formatter to the CPU must be terminated in the CPU. The bidirectional data bus (HB0-HB7) is terminated in the Quarterback Formatter and must also be terminated in the CPU. Refer to Figure 2 for signal termination information.

The I/O ribbon cable signals between the CPU and the Quarterback Formatter are connected as follows:

PIN NO.	SIGNAL NAME	DESCRIPTION
02	SPR	SPARE
04	SPR	SPARE
06	SPR	SPARE
08	SPR	SPARE
10	SPR	SPARE
12	HB7	BUS BIT 7 (BI-DIRECTIONAL)
14	HB6	BUS BIT 6 (BI-DIRECTIONAL)
16	HB5	BUS BIT 5 (BI-DIRECTIONAL)
18	HB4	BUS BIT 4 (BI-DIRECTIONAL)
20	HB3	BUS BIT 3 (BI-DIRECTIONAL)
22	HB2	BUS BIT 2 (BI-DIRECTIONAL)
24	HB1	BUS BIT 1 (BI-DIRECTIONAL)
26	HB0	BUS BIT 0 (BI-DIRECTIONAL)
28	ONL	ON LINE (CPU TO FORMATTER)
30	REQ	REQUEST (CPU TO FORMATTER)
32	RST	RESET (CPU TO FORMATTER)
34	XFR	TRANSFER (CPU TO FORMATTER)
36	ACK	ACKNOWLEDGE (FORMATTER TO CPU)
38	RDY	READY (FORMATTER TO CPU)
40	EXC	EXCEPTION (FORMATTER TO CPU)
42	DIR	DIRECTION (FORMATTER TO CPU)
44	SPR	SPARE
46	SPR	SPARE
48	SPR	SPARE
50	SPR	SPARE

The following Quarterback programmer's instruction set is useful as an aid in establishing bit patterns for Quarterback commands. In this instruction set, M is a Modifier bit.

QUARTERBACK PROGRAMERS AID CARD

STATUS BYTES SUMMARY

QUARTERBACK INSTRUCTION SET			QB STATUS BYTE BIT VALUES		
COMMAND	HEX	BIT PATTERN	BYTE #	BIT #	BIT MEANING
COMMAND		MSB      LSB 7654-3210	0	7	BIT ON IN BYTE 0. CART NOT IN. UNSELECTED DRIVE. WRT PROT (SAFE). END OF MEDIA. UNRECOVERABLE DATA. BAD BLOCK NOT LOC. FILEMARK DETECTED.
SELECT	0M	0000-MMMM		6	
SELECT DR 0	01	0000-0001		5	
SELECT DR 1	02	0000-0010		4	
SELECT DR 2	04	0000-0100		3	
SELECT DR 3	08	0000-1000		2	
POSITION	2M	0010-0MMM	1	7	BIT ON IN BYTE 1. ILLEGAL COMMAND. NO DATA DETECTED. RESERVED. BEGINNING OF MEDIA. RESERVED. RESERVED. POWER ON RESET.
POSITION TO BOT	21	0010-0001		6	
ERASE TAPE	22	0010-0010		5	
RETENSION	24	0010-0100		4	
WRITE DATA	40	0100-0000		3	
WRITE FL MK	60	0110-0000		2	
READ DATA	80	1000-0000	2&3	7	ERROR COUNT, 7-BIT COUNTER INCREMENTED ON EVERY RETRY (READ OR WRITE). WRITE ERROR INCREMENTS COUNTER TWICE FOR EVERY WRITE ERROR. (BYTE 2 MSB)
READ FL MK	A0	1010-0000			
READ STATUS	C0	1100-0000			
			4&5	16	BUFFER UNDERRUN COUNT. THIS IS A 16-BIT COUNT OF BUFFER UNDERRUNS, EVERY TIME THE HOST FAILS TO RESPOND TO DATA TRANSFER WITHIN TIME, IT INCREMENTS THE COUNTER.

DC POWER CABLE

The DC power cable is connected to J2 on the Quarterback Formatter. J2 is an AMP type connector (part number 1-480426-0). The mating connector (P2) requires an AMP part number 1-480424-0 and uses AMP part number 60619-1 female contacts. A connector kit is available from Cipher Data Products (part number 160601-438).

The Quarterback requires the following DC voltages:

+24 VDC  $\pm$  10% - Max. ripple of 500 MV

+ 5 VDC  $\pm$  5% - Max. ripple of 100 MV

The DC power connections on J2 at the Quarterback Formatter are connected as follows:

- Pin 1 +24VDC
- Pin 2 +24VRET
- Pin 3 +5VRET
- Pin 4 +5VDC

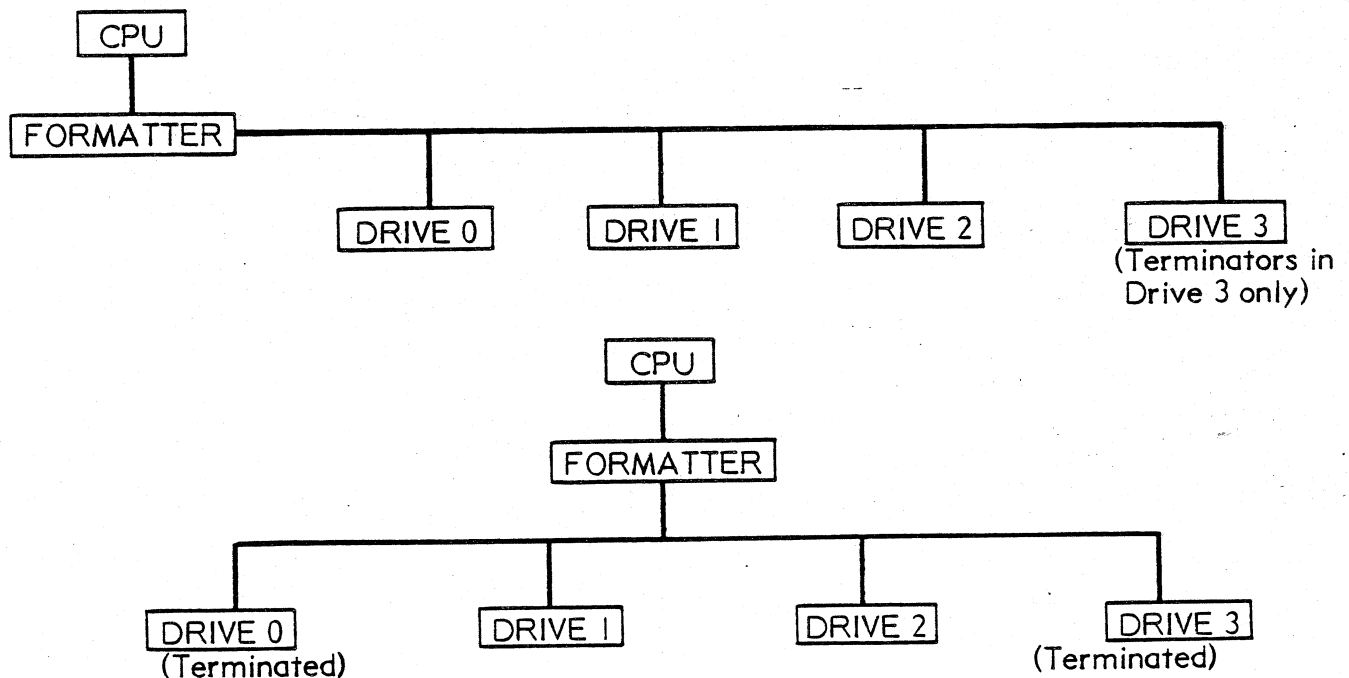
### MULTIPLE DRIVE CONFIGURATIONS

For multiple drive configurations using a common formatter, each Quarterback must be of the same recording speed and strapped for the correct address. The shunt plug-in integrated circuit (IC) location 2B on the Drive Electronics PWB must be strapped for the correct address as follows:

UNIT NO.	FROM	STRAP TO
DRIVE 0	PIN 4	PIN 11
DRIVE 1	PIN 3	PIN 12
DRIVE 2	PIN 2	PIN 13
DRIVE 3	PIN 1	PIN 14

If pins 7 and 8 on the shunt plug in IC location 2B on the Drive Electronics PWB are strapped, the unit will always be selected regardless of the drive select lines.

IC locations 1A and 3A on the Drive Electronics PWB contain 220/330 ohm resistor network DIPs (Refer to Figure 2) which must be present only in the last drive or drives on the bus as shown in the following two configurations.



BOTH DRIVE 0 and DRIVE 3 ARE TERMINATED IN THIS CONFIGURATION

The recommended mating connector between the Quarterback Formatter and the tape drive is the same 50 pin 3M type connector (part number 3415-0001) that is used between the Quarterback Formatter and the CPU.

## OPERATION AND CLEANING

The Quarterback is designed to operate properly with a certified data cartridge (Cipher part-number 160601-433). The cartridge can be ordered directly from Cipher Data Products (See below).

The cartridge is loaded by pushing it to a hard stop through the opening in the front of the Quarterback. The cartridge can be inserted and loaded only with the proper side up.

To unload the cartridge, simply pull it from the drive. Unloading should never be done when the Quarterback's select light (The red LED on the front of the tape drive) is illuminated.

Normal cleaning should be done after every 8 hours of tape movement. To clean the recording head and the tape cleaner, use a lintless cotton swab moistened with freon degreaser type TF (or isopropyl alcohol if freon TF is unavailable). Refer to Figure 3 for the location of the head and tape cleaner.

## REPAIR AND PARTS ORDERING

When repairs are needed, telephone one of the Cipher Data Products Repair Centers are (714) 891-3711 in the United States or 0276-682912 in Europe and ask for a return authorization. Be prepared to provide your Quarterback's model number and serial number, the reason for the return, and your purchase order number. A Quarterback in need of repair must be shipped postpaid in its original carton to:

CIPHER DATA PRODUCTS, INC.  
OEM Marketing Division  
7221 Orange Avenue  
Garden Grove, CA 92641

OR

CIPHER DATA PRODUCTS, INC.  
Repair Center  
Compton Place, Surrey Avenue  
Camberly, Surrey GU15 3DX  
England

A complete maintenance manual is available for the Quarterback, including Theory of Operation, parts replacement information, and schematics. To order a manual or to order any Cipher parts listed in this publication, telephone one of the Cipher Data Products Spares Order Entry Departments at (714) 578-9100 in the United States or 0276-682912 in Europe or write to:

CIPHER DATA PRODUCTS, INC.  
Spares Order Entry  
P.O. Box 85170  
San Diego, CA 92138

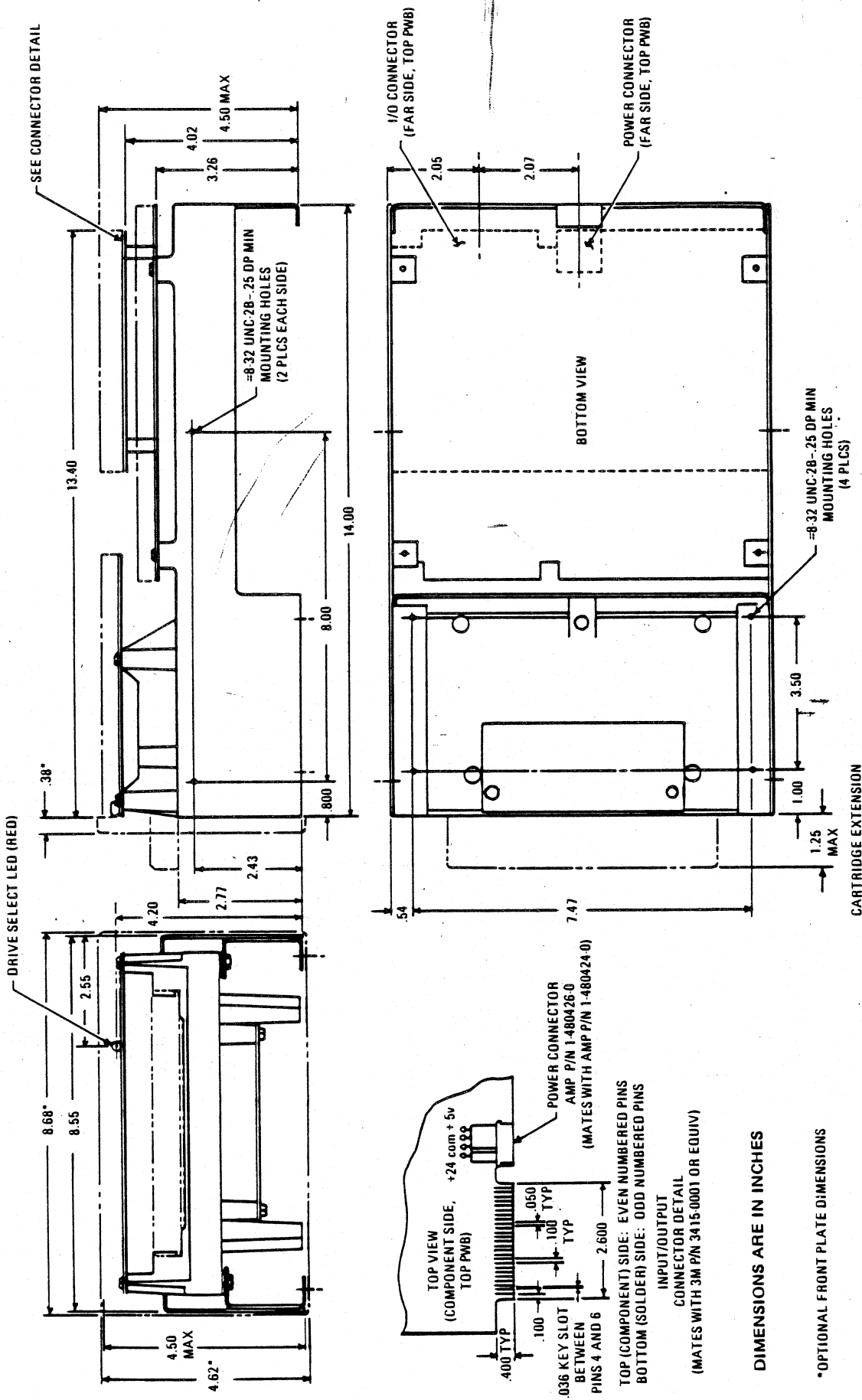
OR

CIPHER DATA PRODUCTS, INC.  
Spares Order Entry  
Compton Place, Surrey Avenue  
Camberly, Surrey GU15 3DX  
England

*Cipher Information*

*800-424-7437*

*Part numbers*



DIMENSIONS ARE IN INCHES

\*OPTIONAL FRONT PLATE DIMENSIONS

Figure 1. Outline Dimensions

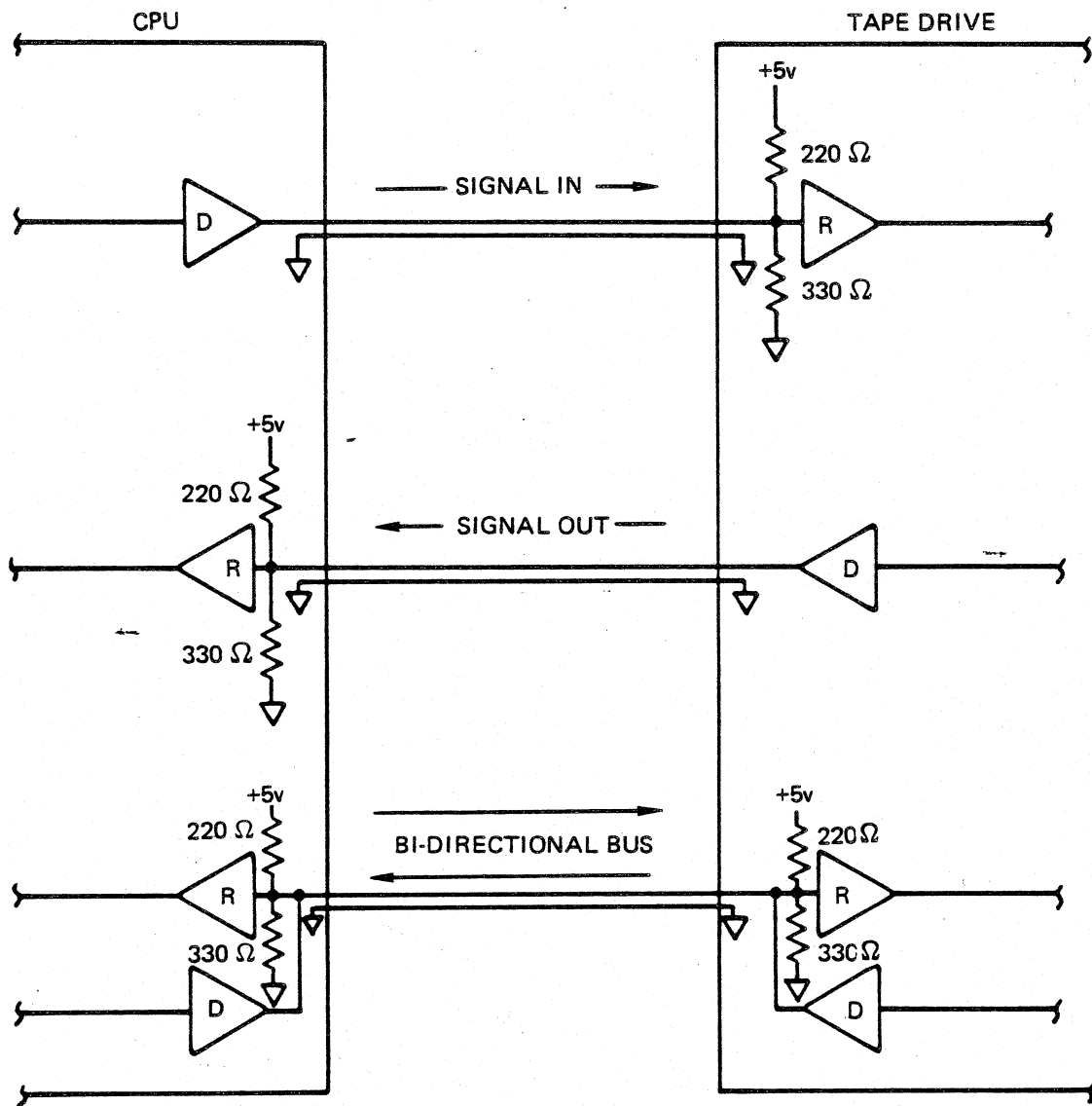


Figure 2. Driver/Receiver Interconnects

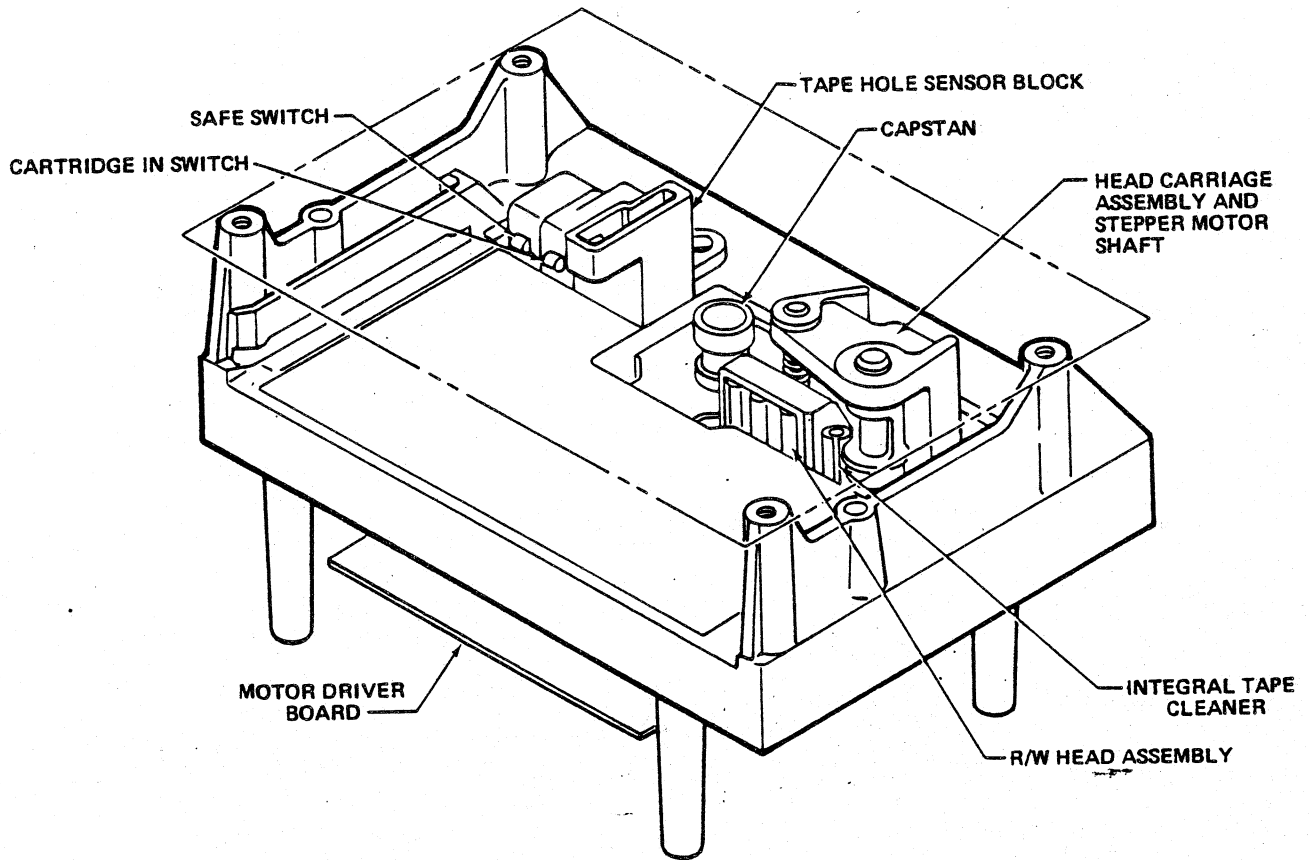


Figure 3. Main Frame Subassemblies