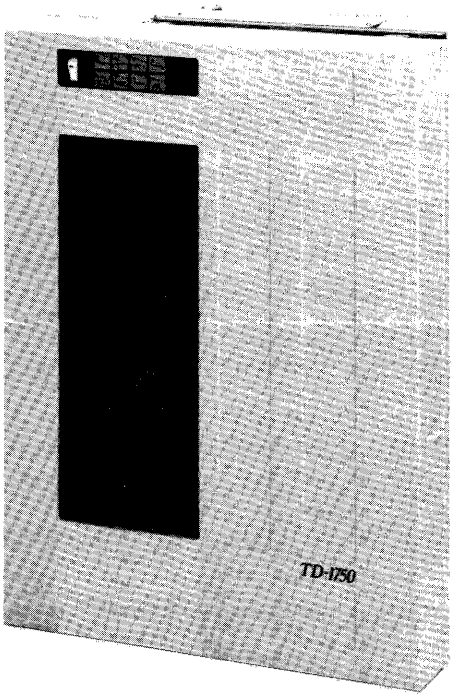
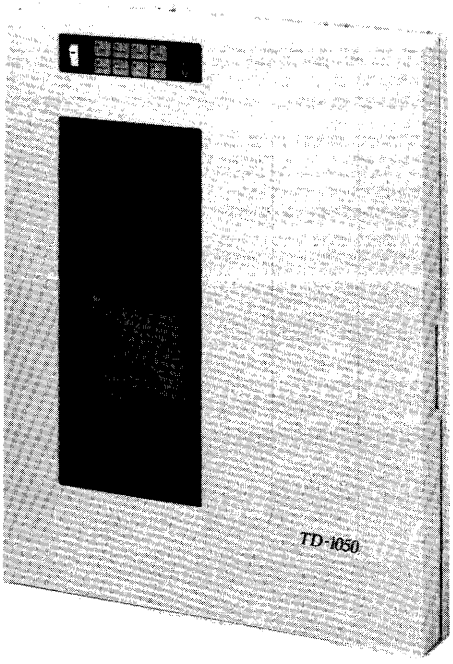
PUBLICATION NO. 00-10053

TECHNICAL MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS

SERIES 1050/1750 SYNCHRONOUS TAPE TRANSPORTS





TD-1750 **TD-1050**

INNOVATIVE DATA TECHNOLOGY

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This document contains information required by personnel at all levels of involvement to understand functions, internal operations, and maintenance requirements of the Innovative Data Technology Series 1050/1750 Synchronous Tape Transports.

The information presented pertains to the standard Series 1050/1750 Tape Transports. Certain parameters and specifications peculiar to the formatter or controller/interface are provided in their respective manuals.

STANDARD WARRANTY AND SERVICE POLICY

Innovative Data Technology (IDT) assures the reliability of its products by providing a warranty to each user. During this period, IDT will repair or replace any equipment, or part thereof, in which a factory defect becomes apparent.

The Service Department at the IDT factory in San Diego, California, will provide telephone callers with advice anytime during the IDT business day. Whether in-warranty or out of warranty, an IDT Service Engineer can often pinpoint the problem. Even when the user has no technical background, many problems can be isolated to a specific area through questions asked by the IDT Engineer.

1. CUSTOMER CLASSIFICATION
   A. OEM
      A system supplier who purchases tape drive equipment for ultimate resale to an end-user on a large order price discount. This classification of customer may or may not maintain his own field service organization.
   B. End-User
      A system user who purchases tape drive equipment for his own internal use. This classification of customer may call upon the seller for service support.

2. STANDARD IN-WARRANTY
   A. Duration
      1. Six (6) months, starting from the date unit is shipped from IDT factory to user. (An OEM may be restricted to a limited warranty, depending upon contract.)
   B. Repair Location
      1. Return unit to factory for repair.
      2. When possible and can be determined, an exchange replacement board or module will be sent to the user to correct problem.
   C. Repair Charge
      1. Repair or exchange on defective equipment during the six month period is on a no-charge basis, as long as equipment returned has not been mishandled, modified or damaged in shipment due to inadequate packing by the user.
      2. Equipment returned to IDT by the user, for repair which is found to be free of factory defects and operates as specified in the unit manual, will be subject to charge for the time expended to check out the returned item (charge is at prevailing hourly rate) and any freight costs.
      3. Repair of defects determined to be directly related to a previous repair service by IDT and performed within the past sixty (60) days will be considered in-warranty and not subject to repair charges.
   D. Shipping Charges
      1. IDT will pay freight charges, in both directions, for equipment that fails within thirty (30) days of initial delivery to the user.
      2. The user will prepay any returning items to IDT after the initial thirty (30) day period. Equipment shipped to the user by IDT will be prepaid by IDT.
      3. Equipment received by IDT which tests to be free of defect and functions correctly will be returned to the user freight collect.
      4. Any item being returned to IDT must be referenced with a "Return Authorization Number" (RA), which can be obtained by calling the IDT Service Department. The equipment must be packaged in the original container with original packing or a satisfactory equivalent. The mode of shipping can be selected by the user, although IDT recommends Deferred Air (2 to 3 day delivery) or UPS Blue if size and weight will allow. Truck delivery from long distances can take up to 10 days.
      5. Items received by the user that have incurred damage during shipment *must* be reported to the freight company *immediately* by the *user*. Failure to comply with this will void IDT warranty and responsibility.
   E. On-Site Service
      1. In an emergency situation, IDT can provide the user with on-site maintenance service. At IDT's discretion, either a company Service Engineer or a third-party Maintenance Engineer are available.
         IDT on-site service rates are as follows:
         a) Travel time = $50.00 per hour (during regular working hours).
         b) Site repair time = **$90.00 per hour.**
         c) All travel, meals, lodging expenses applicable.
         Third-Party on-site service rates:
         a) Contact IDT Service Department for rate in your area. (See "Service Options" section at end of policy.)

3. OUT OF WARRANTY
   A. Duration
      1. Any unit that has been purchased and shipped from IDT longer than six (6) months is considered out of warranty.
   B. Repair Location
      1. The unit can be returned to the IDT factory.
      2. See "Service Options."
   C. Repair Charge
      1. Charges are calculated on IDT's prevailing hourly service rate plus parts required.
   D. Shipping Charge
      1. All "out of warranty" equipment shipped to IDT is to be prepaid by the user. Equipment returned to the customer will be sent freight collect or prepaid and billed to the user.
   E. On-Site Service
      1. Refer to "Warranty On-Site Service" section.

4. SERVICE OPTIONS
   A. Third Party Maintenance
      1. IDT uses MSI Data Corp. for its "Third Party Maintenance." MSI has approximately 110 service locations throughout the U.S. and Canada.
         In addition to maintenance on IDT equipment, MSI also does service on IBM-PC and XT systems.
      2. MSI can provide yearly on-site maintenance contracts or on-site service on an hourly basis. In additon, installation and integration on certain IDT systems are available through MSI.
      3. MSI yearly contracts and hourly rates are gauged to the mileage distance from the user and closest MSI service location. These distances are divided into various zones.
         For exact rates, contact the IDT Service Department.

WARNING

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

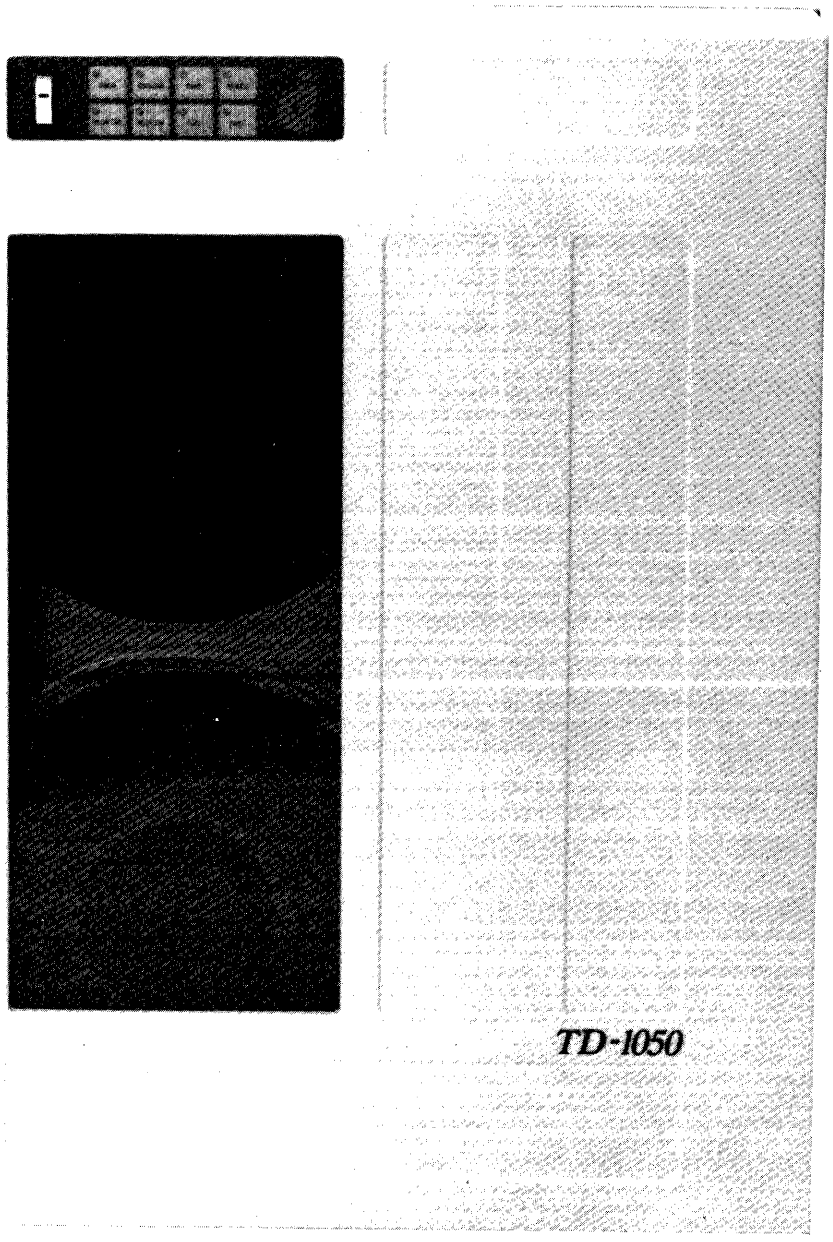


FIGURE 1-1. DIGITAL MAGNETIC TAPE TRANSPORT SERIES 1050

SECTION I
INTRODUCTION

This section contains general information relating to the Innovative Data Technology Series 1050 Synchronous Tape Transports. Included in this section are a general description, physical description, and functional description. An outline of the options appears at the end of the section. A separate section describing the 1750 Series, when different from the 1050 Series, is covered in Section XII. .

1.1 GENERAL DESCRIPTION

The Innovative Data Technology Series 1050 Synchronous Tape Transports consist of industry-compatible half-inch magnetic tape drives, formatter, interface adapters and interconnecting cables. The IDT Series 1050 drive is a compliance-arm buffered, 12.5 ips-45 ips, dual-density (NRZI/PE) drive machine of the newest design available today.

The IDT Series 1050 consists of the following models:

- Model 1051 Standard Drive/Standalone or Last Unit in Daisy-Chain Configuration
- Model 1052 Standard Drive/Intermediate Unit-Daisy-Chainable
- Model 1053 Standard Drive/Formatter/Master Unit-Daisy-Chainable
- Model 1054 Standard Drive/Formatter/Standalone Unit-Not Daisy-Chainable

Formatted transports with interfaces that insert in host CPU:

- Model 1054/INTL with MULTIBUS Interface
- Model 1054/PC-STP with PARALLEL Interface for IBM-PC or XT
- Model 1054/120 with DATA GENERAL Interface
- Model 1054/130 with DEC UNIBUS Interface
- Model 1054/150 with DEC Q BUS Interface
- Model 1054/TI-990 with TI Interface
- Model 1054/APPLE II and III with IEEE-488 Interface

Formatted transports with interfaces embedded on transport.

- Model 1054/BDL with ASYNC RS-232C Interface (no user commands)
- Model 1054/SCDR with ASYNC RS-232C Interface (with user commands and statuses)
- Model 1054/GPIB with IEEE-488 Interface
- Model 1054/DB with Double Buffer PARALLEL I/O Interface (Centronic Connector)
- Model 1054/SCSI with "Small Computer System Interface"

NOTE: All systems, with exception of SCDR and BDL, are available in 1053 (Daisy-Chain) configuration.

These models, used in various configurations, will produce tape drive systems from a single non-formatted drive to multiple drive systems, including tape formatting for generation and reading of ANSI, IBM and ECMA-compatible tapes. The formatted version is designed to work with 9-track 1600 bpi and 800 bpi NRZI tape drives and 7-track 200/556/800 bpi NRZI tape drives.

The functional objective of the Series 1050 is to provide easy system configuration by means of compatible and interchangeable modules, consisting of industry standard tape transports, interface boards, formatter electronics and associated cabling. Any Series 1050 unit can be easily configured from the basic drive mechanism (Model 1051) to master drive arrangement (Model 1053), consisting of the transport mechanism, interface board, formatter, and daisy-chain capabilities.

Two typical systems are shown in Figure 1-2. One is a minimal single non-formatted drive and the other is comprised of a master tape drive with integral formatter (Model 1053); up to three slave tape drives (Model 1051/1052); interface adapter, and associated cables. The interfaces are industry compatible for either system configuration.

When used in conjunction with the integral formatter or with a compatible external tape formatter, the Series 1050 is capable of either writing or reading a 9-track IBM-or-industry compatible tape in the NRZI or phase encoded (PE) formats; the 7-track NRZI format can also be accommodated. The Series 1050 offers complete compatibility with ISO, ANSI, ECMA or IBM formats. Single tape speeds between 12.5 and 45 ips are provided. The formatter can handle intermixed drives of the same speed or at half speed as shown in Table 1.1.

The system can read and write both NRZI and PE at both standard and half speeds.

TABLE 1.1 TAPE SPEEDS

Standard Speed	Measurement	Half Speed
45	ips	22.5
37.5	ips	18.75
25	ips	12.5

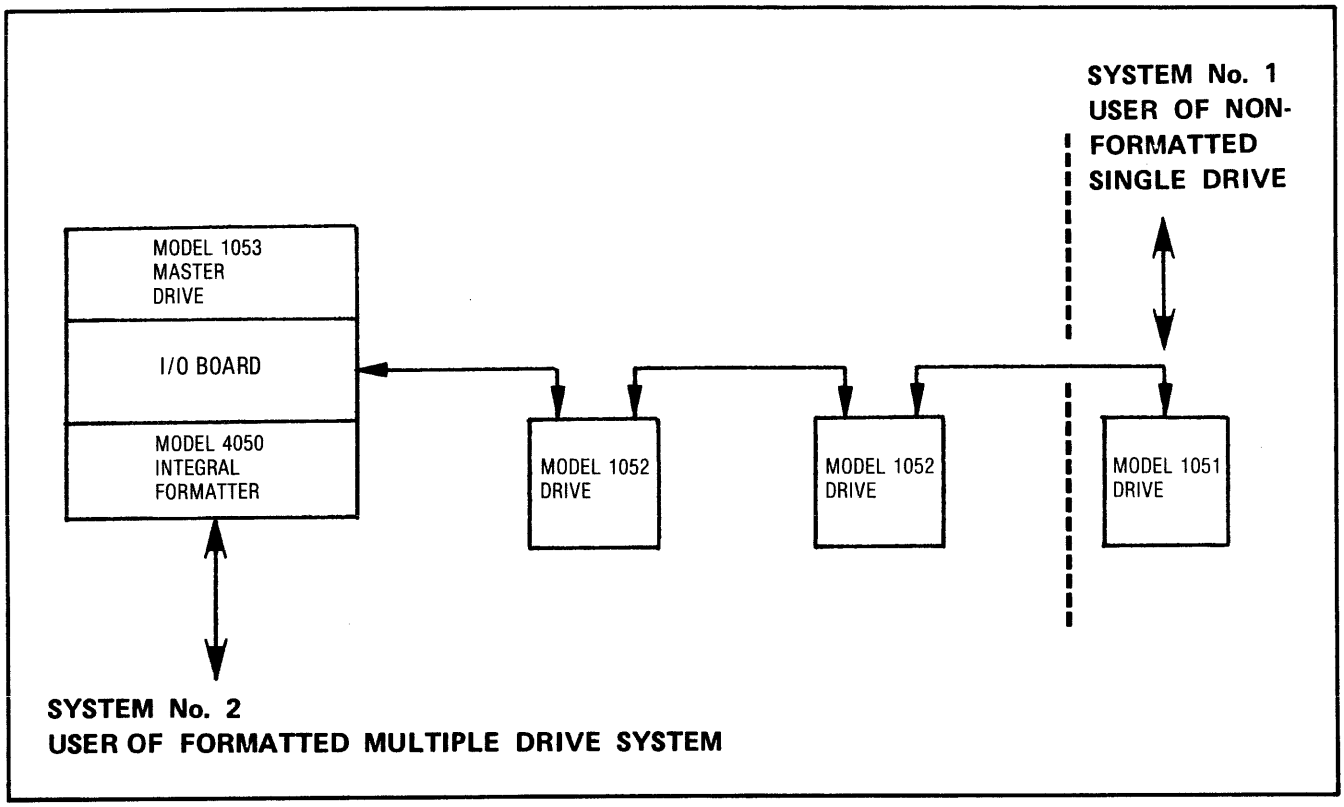


Figure 1-2. MASTER/SLAVE CONFIGURATION

1.2 PHYSICAL DESCRIPTION (See Figure 1.1)

The Series 1050 Tape Transports are self-contained units designed to hinge mount in a standard 19-inch RETMA rack. Figure 1-1 shows the physical configuration of the tape transport. The design provides shallow box mounting with the standard hinge assemblies. Other mounting requirements can be accommodated. An attractive vacuum-formed plastic facade covers the entire top plate. The facade incorporates dust door with a see-through tinted panel and nine operational controls with indicators. These controls provide the necessary switching and starter indication functions for the system. For detailed information refer to Section III Operation.

1.2.1 TOP PLATE (See Figure 1-3.)

The top assembly is the main support for the other assemblies and sub-assemblies. The top plate is a rugged, thick (13 mm), stress relieved cast aluminum structure providing an extremely stable platform for the tape path, and all components.

To the back surface are attached the capstan and reel motors, the compliance arm assemblies, the AC power transformer, power supply, two rectifier bridges and the main electronic assembly. A 48vdc power supply is also available and mounts to this surface.

To the front surface of the top plate attach all the critical tape components, the head, End of Tape/Beginning of Tape sensors (EOT/BOT) and tape cleaner assemblies, the facade and the control panel (membrane switch assembly).

1.2.2 CAPSTAN MOTOR

The capstan motor is a basket wound motor-tachometer combination with silver-graphite brushes for exceptionally long life. The low-inertia rotor motor uses little power. The steel shaft is supported by dual precision ball bearing sleeves. Run out, end play and shaft dimensions are all tightly held tolerances.

The capstan motor is mounted to a precision plate which is three-point mounted against the back of the top plate. This arrangement permits precise adjustment of the capstan perpendicularity to the tape path, eliminating tolerance build-up.

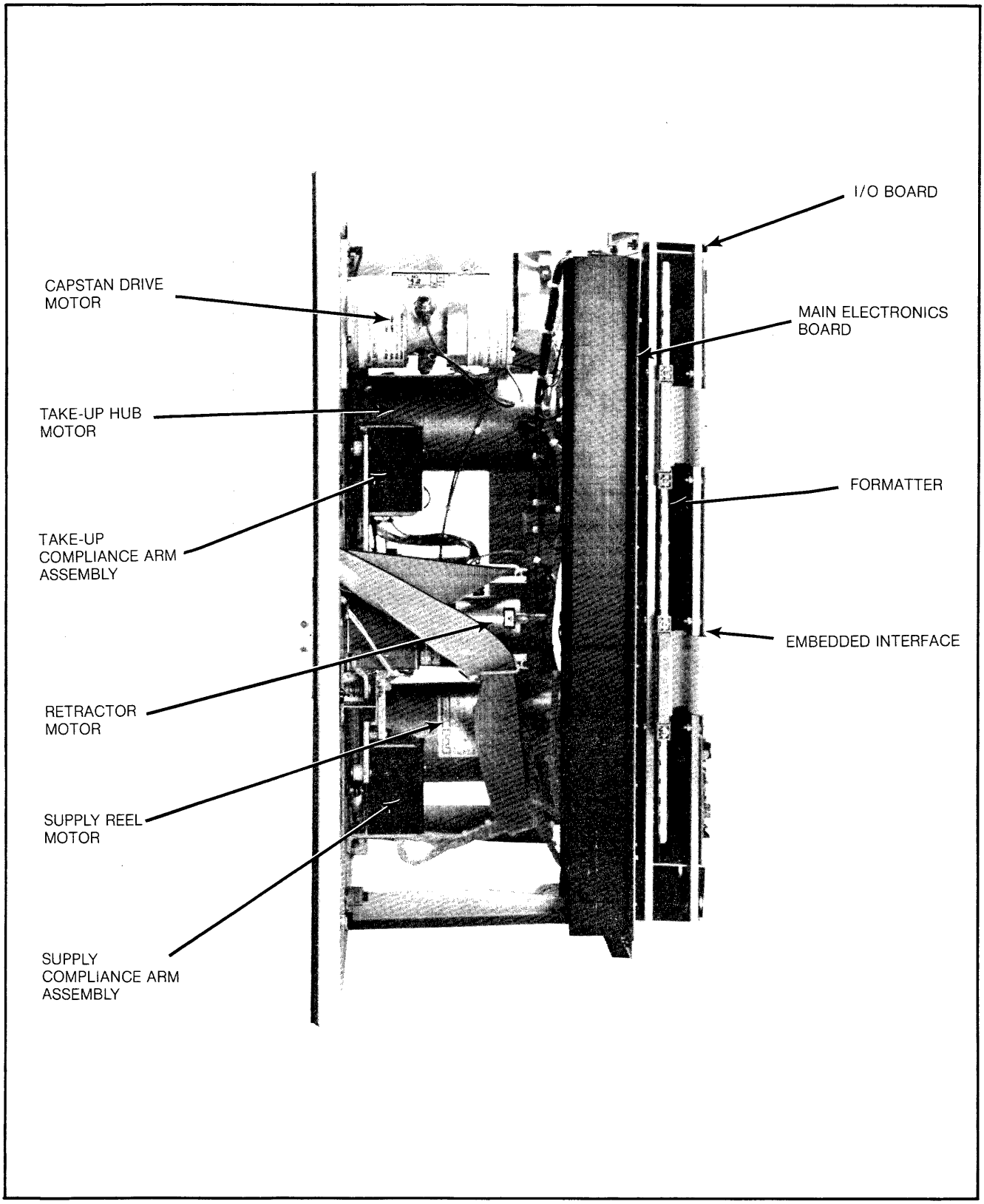


FIGURE 1-3. TAPE TRANSPORT DRIVE MOTORS & ELECTRONICS

1.2.3 REEL MOTORS

The reel motors are conventional, permanent magnet DC motors with replaceable brushes. The Series 1050 45 ips top speed limit and dynamic servo offset enables the use of a small-frame motor with inherent power savings.

As part of the supply-reel subassembly, a 360° reflecting surface is provided for WRITE RING detection. The 360° surface is sensed optically to detect the presence of the Tape Write-Enable Ring when it is installed on the tape reel.

1.2.4 RETRACTOR MOTOR

The retractor motor is a DC motor used at low duty cycle which operates through a gear train to drive the compliance arms to the load position. This feature simplifies tape threading.

1.2.5 COMPLIANCE ARM ASSEMBLY

The compliance arm assembly is contained in a cast aluminum housing, mounted to the flat back surface of the top plate. The assembly contains a ball-bearing-supported shaft holding the compliance arm on which is mounted the arm position optical encoder. An aperture directs the light, from a 100,000 hour rated incandescent bulb (operated at 60% of rated voltage), to a pair of differential photo resistive cells.

1.2.6 SUPPLY REEL HUB

The supply reel hub is an assembly of cast parts that applies pressure radially outward through a resilient pad to the supply reel. The hub locking device is designed for easy operation, while providing firm holding. Reels can be mounted and dismounted quickly and conveniently.

1.2.7 TAKE UP REEL

The take up reel consists of a hub with a single flange, securely clamped to the take up reel motor. The absence of the outside flange allows easy tape threading onto the take up reel. As the tape is wound with constant tension onto the take up reel, a rigid disc results which prevents the tape from being dislodged. A double flanged reel is available upon request.

1.2.8 ROLLER GUIDES

There are two rollers which guide the magnetic tape over the supply and take up reels. These guides are made of Delran™* and mount to precision ground reference surfaces. The guides are adjusted during alignment to compensate for tape path component tolerances.

1.2.9 CROWNED ROLLER GUIDES

The crowned roller guides are part of the compliance arms. Based upon arm position, these guides buffer movement of the tape between the capstan and the reels. Perpendicularity is fixed by the compliance arm assembly and height adjustment is provided to compensate for tolerance build-ups. The crowned surfaces of these guides prevent tape-edge damage. Tape tracking more readily centers on the roller crown. If the roller surface were flat, the tape would shift and ride against the flange of the guide.

1.2.10 CAPSTAN DRIVE WHEEEL

The capstan drive wheel is an aluminum wheel with a coating of neoprene rubber. A collar, mounted behind the wheel, prevents tape from falling behind the capstan during threading. Capstan height is adjustable. The design places the capstan in close proximity to the head, while still providing sufficient spacing to produce excellent forward and reverse skew performance. As a result, the tape path has optimum dimensioning in this critical area, thus providing excellent instantaneous speed variations (ISV) and skew characteristics for new or old tapes.

1.2.11 HEAD GUIDES

The head guides are critically-spaced, single-edge, chrome-plated guides precisely located about the head which direct the tape into and out of the head area. These guides are equipped with a "floating flange," i.e., lightly spring-loaded in order to keep the reference edge of the tape against the tape reference plane of the transport. Each tape has a "signature" as a result of its slitting by the slitting machine, which results in varying tape width (within the standard tolerance). The floating flange is designed to compensate for this variation and to assure that the reference edge of the tape is always in contact with the fixed edge of the guide. It is to the fixed edge of the guides (the reference plane) that the vertical position of all other tape guides is adjusted.

*Delran is a registered Trade Mark.

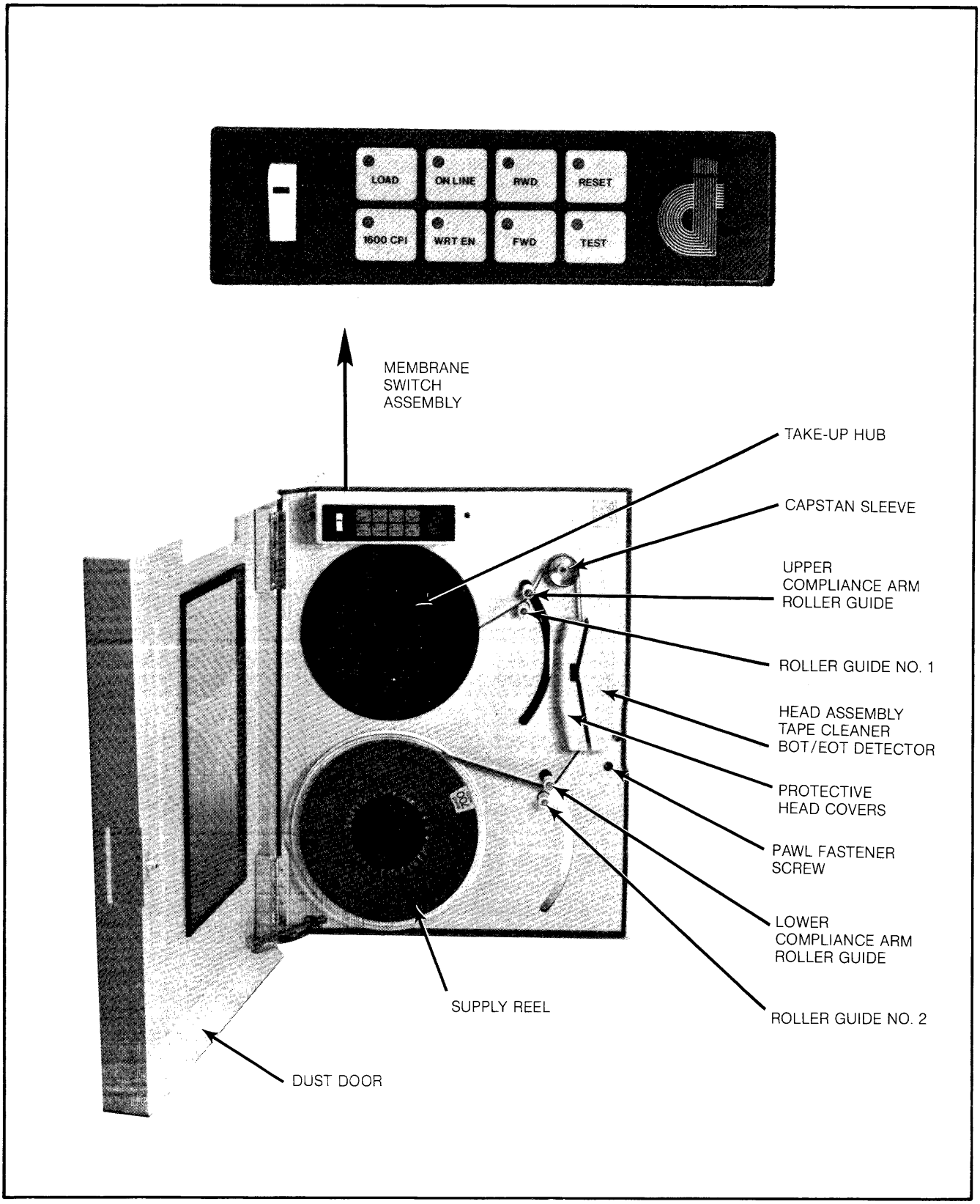


Figure 1-4. TAPE TRANSPORT FRONT PANEL COMPONENTS

1.2.12 HEAD ASSEMBLY (See Figure 1-5.)

The head assembly, shielded by protective dust covers, consists of the read, write and erase heads. Also located in this area are dual-edge ceramic tape cleaners, the reference plane tape guides, the photoelectric end and the beginning of tape (EOT/BOT) detectors, flux gate, and head azimuth adjusting screw.

The head, a compatible 9-track NRZI/Phase Encoded unit, has both a write gap and a read gap to permit read-after-write verification. A full-width erase head is also provided to erase the tape by dc saturation in the reference direction before passing over the write head. A seven track read-after-write head is also available.

The dual-blade ceramic tape cleaner contacts the oxide side of the tape, removing any deposited debris which would cause head-to-tape separation and result in data dropouts.

EOT/BOT detection is accomplished optically. Photo transistors detect light reflected from the EOT or BOT markers. A reflective surface (normally blocked by the tape) is attached to the top of the tape cleaner and is sensed by the EOT and BOT photo transistors when no tape is present.

The flux gate is a copper-ferrite material mounted in a spring tensioned plastic housing. Purpose of the flux gate is to minimize any cross feed from the write to read head.

1.2.13 ELECTRONICS

With the exception of the power supply assembly and associated parts, and various sensor P.C. boards the entire transport electronics package of the Series 1050 is contained on one main electronics board. The main electronics assembly includes: write electronics, read electronics, control logic, servo systems for the take-up, supply, capstan and arm retractor motors and voltage regulators for the various electronic power supply requirements. The board is labeled to show the functional organization of the circuitry. Hinge mounting provides complete access to components after the two retaining screws are removed. I/O optional interfaces are attached directly to the main electronics board.

1.2.14 FORMATTER (Optional)

The formatter is an electronic unit designed to be mounted with the Series 1050. It is included in Models 1053 and 1054. This formatter provides generation and reading of ANSI, IBM, and ECMA-compatible tapes. The dual-mode formatter is designed to work with 9-track 1600 bpi PE and 800 bpi NRZI tape drives and 7-track 200/556/800 bpi NRZI tape drives.

In all cases the formatter performs the basic functions of formatting data written on tape and decoding data read from tape. Error checking is performed on data read from tape. The formatter can control from one to four tape transports. The transports must be of same or half speed, but can be a mix of different formats, 9- or 7-track and PE or NRZI.

Interfacing and operation of the formatter is compatible with industry standard. However, it is possible to reprogram the formatter to suit customer requirements. The formatter is contained on one PC board 18 inches by 10 inches.

All timing during start and stop and during read and write operation is controlled by one master crystal oscillator. There is no monostables and no R-C timing networks. See 4050 formatter manual for details.

1.2.15 POWER SUPPLY AND VOLTAGE REGULATORS

The power supply consists of the filter subassembly, power transformer and rectifiers. A second rectifier is installed and is used to generate the power boost for formatted units. Each element is individually mounted to the rear of the top plate. The main line circuit is fused and an input power line filter is provided for noise reduction. Unregulated + 20vdc power is generated by the supply for unregulated requirements and for application to the voltage regulators. In addition an unregulated voltage is generated for the formatter power boost circuit. Individual fuses, mounted on the main electronics board, are provided for the 20 volt lines and formatter boost voltage. A 5 amp fuse is also installed to protect the retractor motor circuit.

The voltage regulators, power boost transistor and motor-drive power transistors are mounted on a heat sink assembly on the main electronics board. The regulators produce ± 15vdc and +5 vdc power outputs, the power boost transistor enhances current capability of the + 5vdc for the additional requirement of the formatter unit when installed. DC power for all interfaces which mount on the transport are supplied from these regulators.

The input power filter assembly enables easy change of the input voltages (100, 120, 220 and 240vac). All components are designed to meet U.L. and C.S.A. standards. the Series 1050 system meets standards set for component recognition under UL478, and for certification under C.S.A. C22.2 No. 154.

An optional 48vdc converter is available. See Section 2.7.2 and Section 4.8.

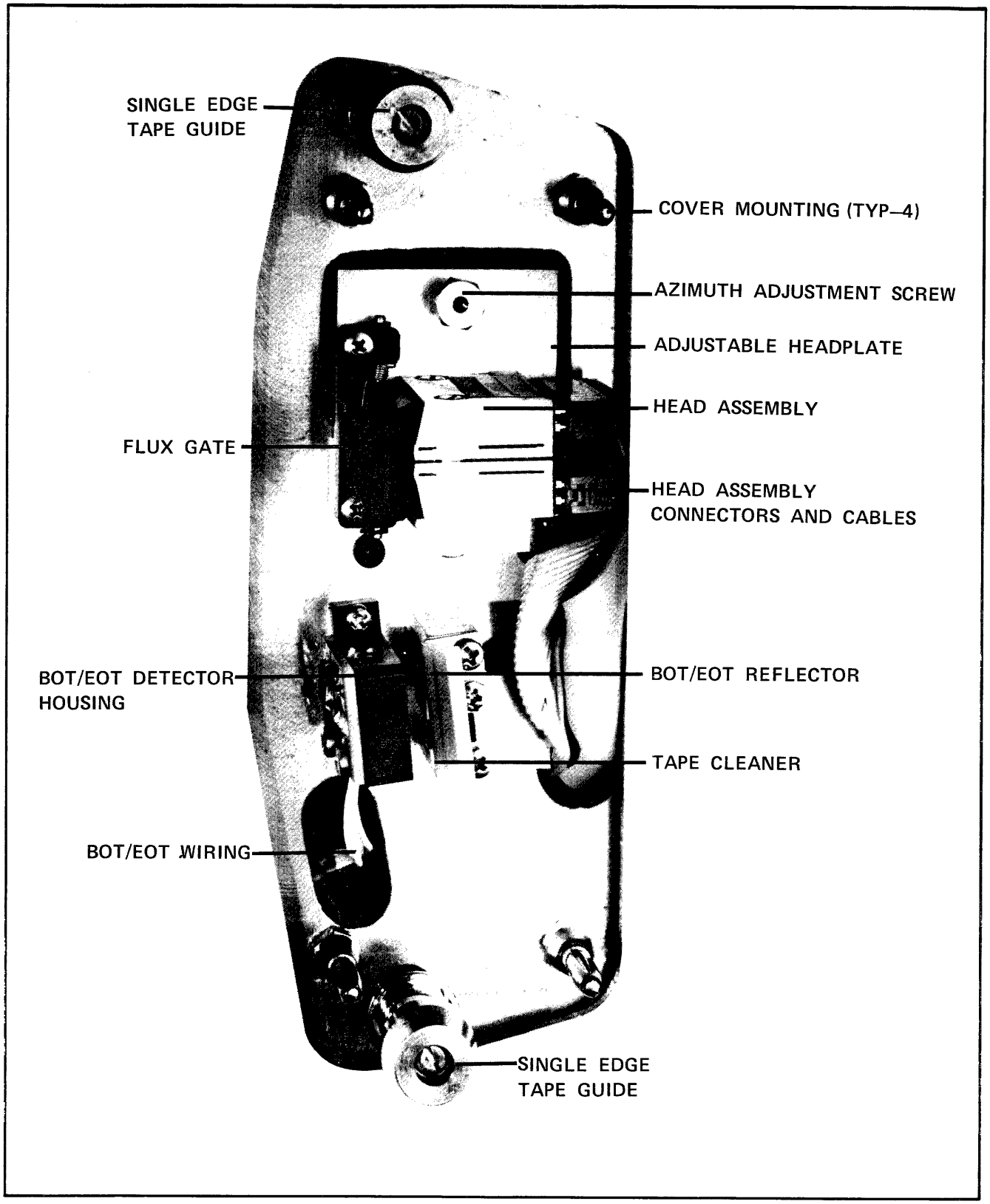


FIGURE 1-5. HEADPLATE ASSEMBLY DETAILS

1.3 FUNCTIONAL DESCRIPTION OF BASIC SERIES 1050 DRIVE (See Figure 1-6)

This section provides a functional description for the transport portion of the tape system. See 4050 manual for formatter operation.

1.3.1 WRITE ELECTRONICS

The write electronics network receives NRZI or PE data from the formatter and converts the signals to write current levels for application to the write head. A write deskew feature provides variable delays in each channel to compensate for head mechanical tolerances. Write deskew is performed for both NRZI and PE modes.

1.3.2 READ ELECTRONICS

The read electronics receives analog signals from the read head via a shielded flat cable. The read signals are then amplified, detected and converted to NRZI and PE digital wave trains for transfer to the tape formatter or external controller. Read deskew is performed in the NRZI mode.

1.3.3 CONTROL LOGIC

A single F8 microprocessor chip serves as the primary control element in the Series 1050. The program is stored in 2K of on-chip ROM and uses a 4 MHz crystal for primary clock pulses.

An added feature of the microprocessor is built-in-diagnostics which allows set-up and exercising of the Series 1050. (See Section VII, Testing, for complete description.) It should be noted, that this microprocessor control provides superior reliability and reduces mean time to repair (MTTR) to unplug and plug the microprocessor.

1.3.4 POWER-FAIL

A power fail relay is mounted to the main board assembly. When power fails, a sensor lamp/LED fails or the compliance arms go into limit, the relay disconnects the motors and the servo amplifier and short circuits the motor terminals, giving a dynamic braking effect. The relay is initially switched on when the load switch is pushed and remains on during normal operation.

1.3.5 I/O CONNECTORS

The I/O connectors on the main electronic board, J111 (Control), J112 (Write) and J113 (Read) interface to TTL logic level signals, converted to industry compatible or special interfaces by the I/O board assembly.

1.4 DATA FORMATTING

For information on data formatting refer to formatter manual. The data formatting of the Series 1050 System conforms to industry standards. Figures 1-7 and 1-8 illustrate basic format followed for PE and NRZI methods respectively. Figure 1-9 illustrates the organization of blocks on the tape and the track spacing for 9-track PE and NRZI and 7-track NRZI.

1.5 OPTIONS

Options for the Series 1050 fall into two categories:

a. Configuration at time of order.
b. Jumper Selectable.

1.5.1 OPTIONS AVAILABLE AT TIME OF ORDER

Basic Models:

See Page I-I

Basic Configurations:

12.5 ips 18.75 ips	These low speeds require component changes.
25. ips 37.5 ips 45. ips	These speeds are settable by electrical adjustments only.

Cables:

Multiple Transport Cables
One set is required for each additional drive.

Interface:

"3M Type" flat ribbon cable

1.5.2 OPTIONS AVAILABLE THROUGH SWITCH SETTINGS OR JUMPER PLACEMENT

See Tables 2.3 and 2.4

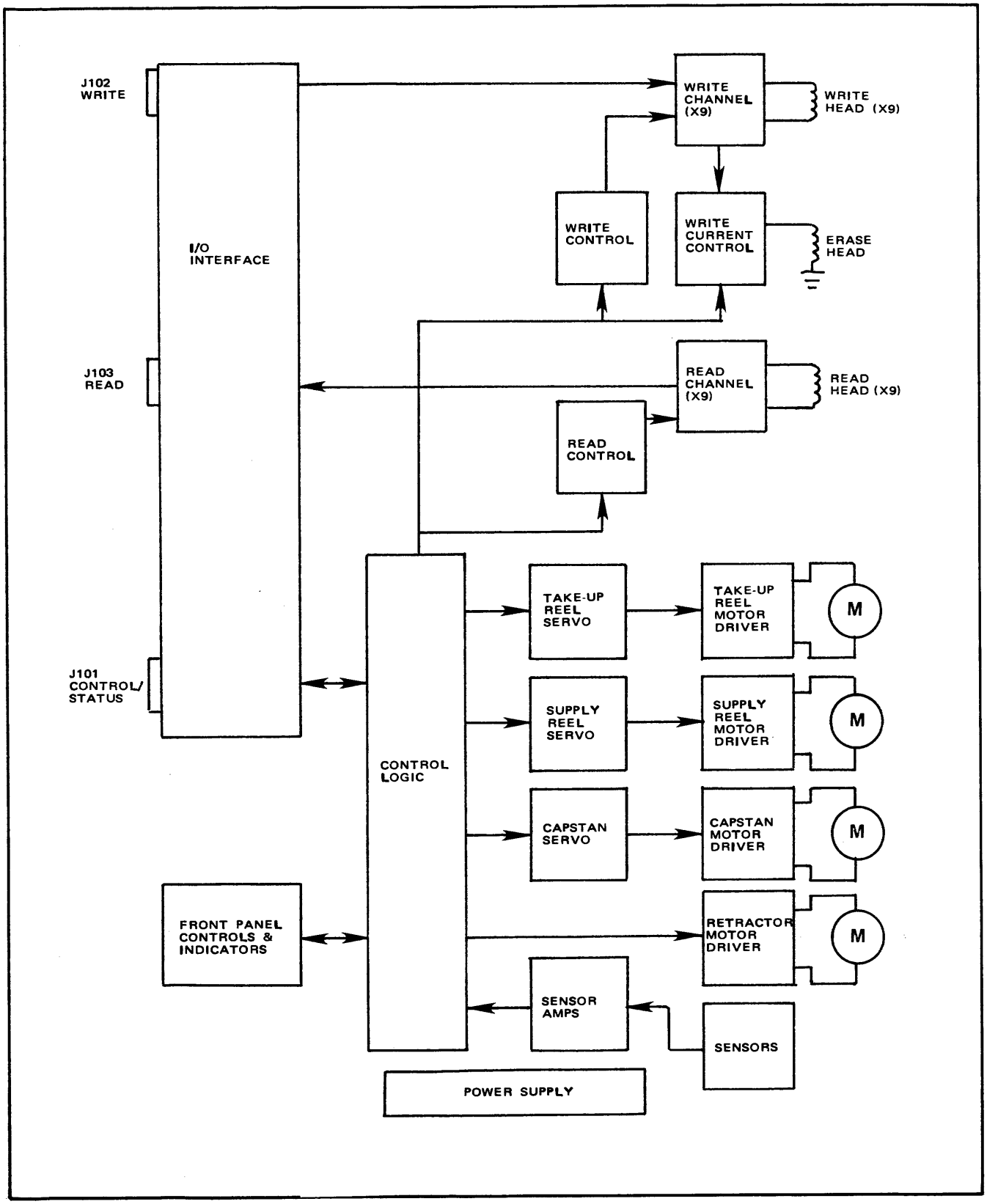
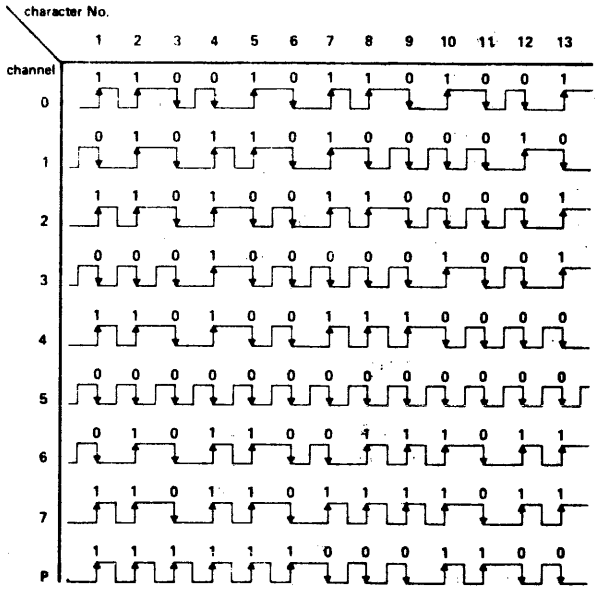
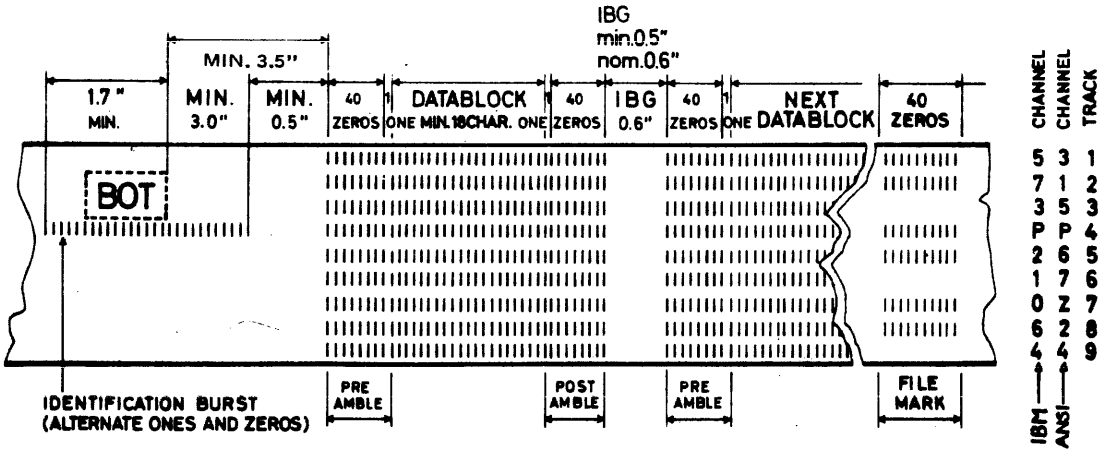


FIGURE 1-6. FUNCTIONAL BLOCK DIAGRAM, SERIES 1050

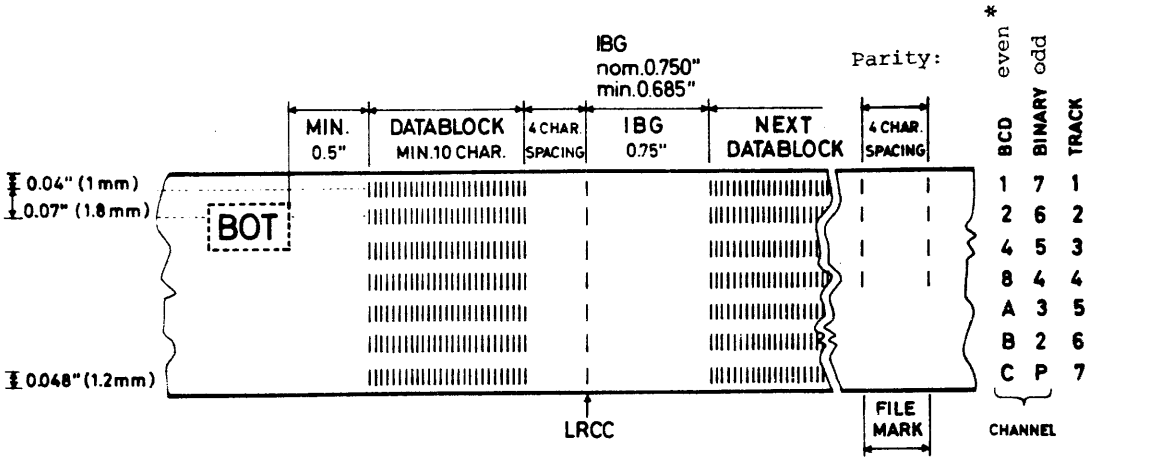


PE, Basic Principle



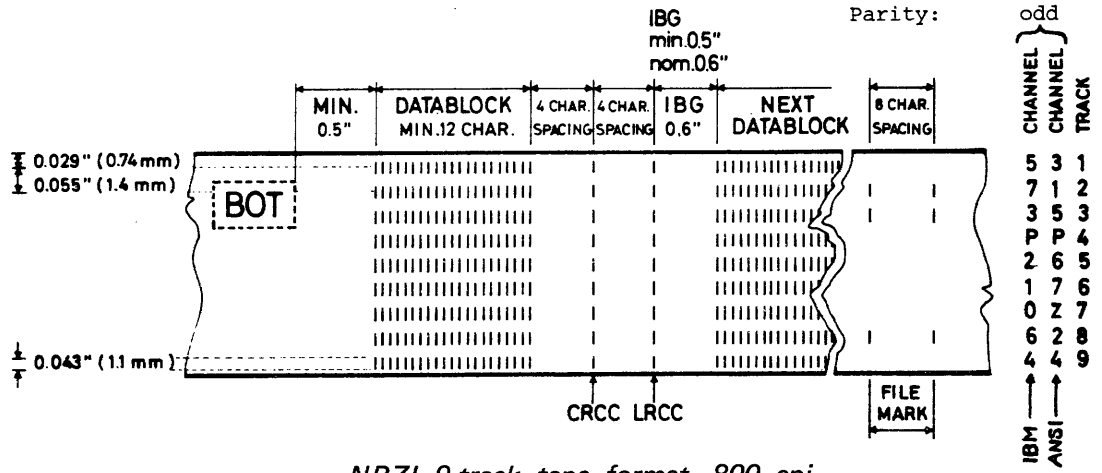
PE 9-track format. 1600 cpi

FIGURE 1-7. PHASE ENCODED TAPE FORMAT



*no all "0" character allowed

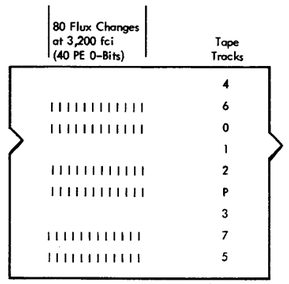
NRZI 7-track tape format. 200/556/800 cpi.



NRZI 9-track tape format. 800 cpi.

FIGURE 1-8. NRZI TAPE FORMAT

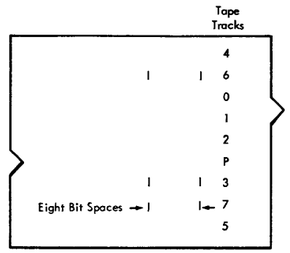
NINE-TRACK PE TAPE MARK



A PE tape mark is a special control block that consists of at least 80 flux reversals at 3,200 fci in data tracks P, 0, 2, 5, 6, and 7. Tracks 1, 3, and 4 are dc-erased. For recognition, the tape mark must contain at least 64 flux reversals in data tracks P, 0, and 5 (zone 1) or tracks 2, 6, and 7 (zone 2), with tracks 1, 3, and 4 (zone 3) dc-erased. Although the tape mark is preceded by approximately 3.75* inches of erased tape, this gap is not a requirement.

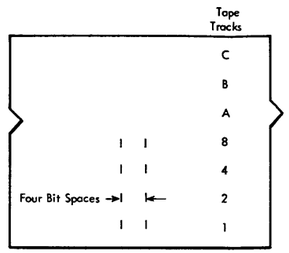
* Varies with tape unit speed and mechanical adjustment.

NINE-TRACK NRZI TAPE MARK



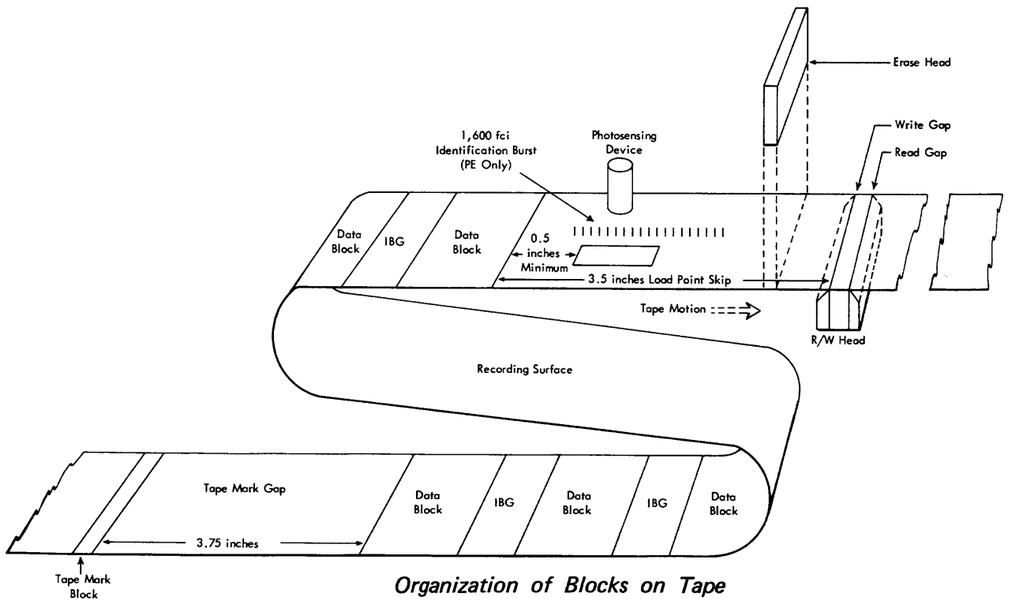
A nine-track NRZI tape mark is a special control block that consists of a character with 1-bits in data tracks 3, 6, and 7, and an identical LRC character eight bit spaces from it. No CRC character is written. Although the tape mark is preceded by approximately 3.75* inches of erased tape, this gap is not a requirement.

SEVEN-TRACK NRZI TAPE MARK



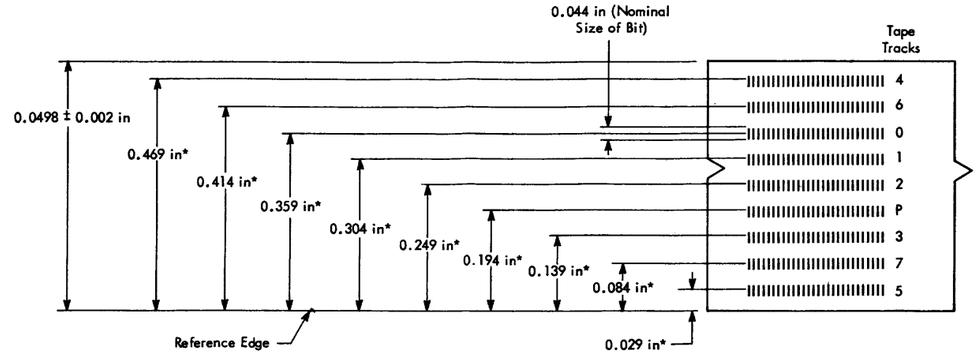
A seven-track NRZI tape mark is a special control block that consists of a character with 1-bits in data tracks 8, 4, 2, and 1, and an identical LRC character four bit spaces from it. Although the tape mark is preceded by approximately 3.90* inches of erased tape, this gap is not a requirement.

Tape Mark Block Format



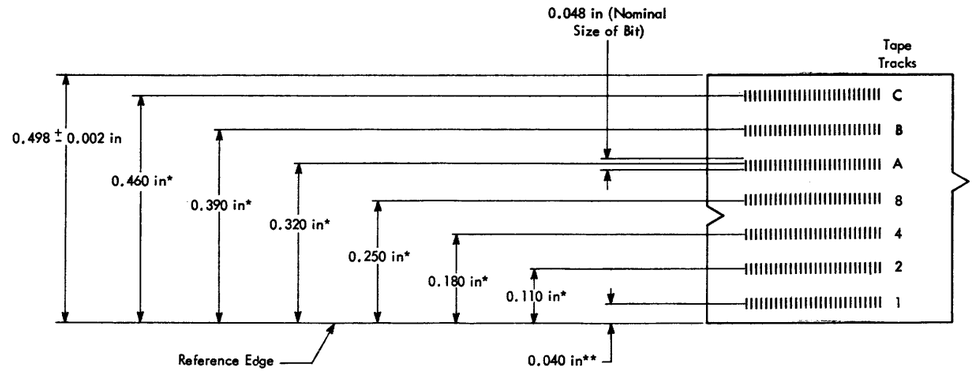
Organization of Blocks on Tape

NINE-TRACK TAPE



*All track locations ± 0.003 in.

SEVEN-TRACK TAPE



*Track locations 2-C: +0.0040 in.
-0.0035 in.

**Track location 1: ± 0.0025 in.

Track Spacing for Seven-and Nine-Track Tape

FIGURE 1-9. TAPE ORGANIZATION

SECTION II
INSTALLATION AND HANDLING

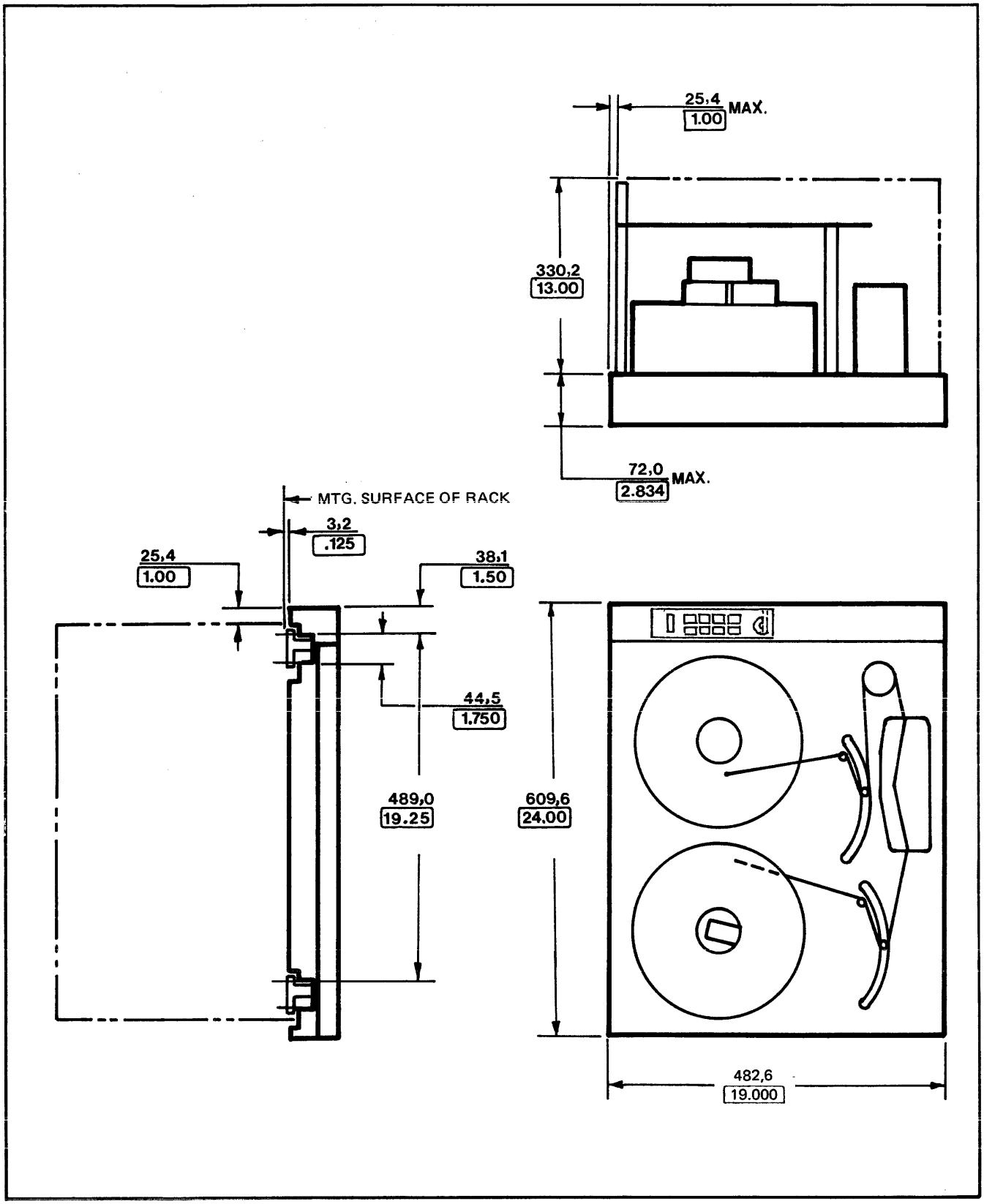


FIGURE 2-1. DIMENSIONAL OUTLINE

2.1 INTRODUCTION

This section contains installation information relating to the Series 1050 Tape Transports. Included in this section are the physical description, space requirements, unpacking, assembly and installation procedures, required installation tools and equipment, interface requirements and unit repacking procedures.

2.2 PHYSICAL DESCRIPTION

The Series 1050 Tape Transport is contained in a single unit. Overall dimensions are illustrated in Figure 2-1. Host systems will connect either to the I/O board (1051 or 1052), the formatter connectors P124 and P125 (1053 or 1054) or the optional interface mounted on transport. The control panel is mounted on the front of the unit. (See Figure 2-5.)

2.3 ACCEPTANCE OF DELIVERY

Prior to accepting delivery, a careful inspection of the shipping container must be made. Innovative Data Technology ships all tape transports in single box containers. A severe gouge, abrasion or scratch, a badly battered corner or edge, constitutes evidence of mishandling that may have damaged the unit. If there is any damage to the shipping container, a note of such must be signed by the carrier's representative acknowledging the damage before delivery can be accepted. FAILURE BY THE USER TO REPORT THIS TO THE CARRIER WILL VOID IDT'S RESPONSIBILITY IN CASE OF DAMAGE.

2.4 UNPACKING INSTRUCTIONS

Each tape transport system is shipped in a container 29½ inches wide by 28 inches deep by 36½ inches high. The shipping container is a 350-lb. test weight box with a top and a bottom molded foam insert.

NOTE

In preparing to unpack the tape transport, provisions should be made to retain the shipping containers and packing materials if it should become necessary to repack the unit for shipment to another installation site or return it to manufacturer for repair. FAILURE TO SHIP THE TRANSPORT WITHOUT THE SHIPPING FRAMER CAN CAUSE SERIOUS DAMAGE WHICH WILL *NOT* BE COVERED BY IDT WARRANTY.

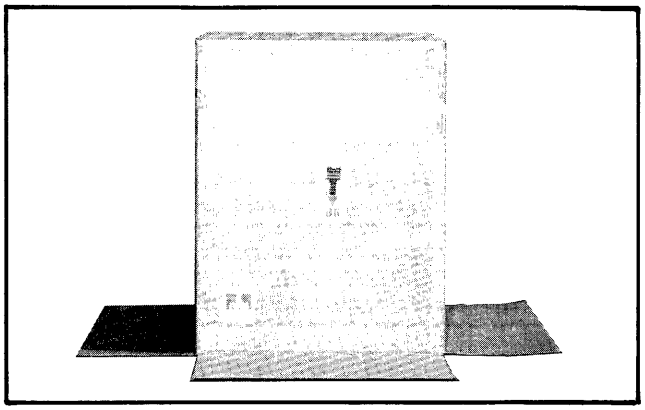


Figure 2-2.

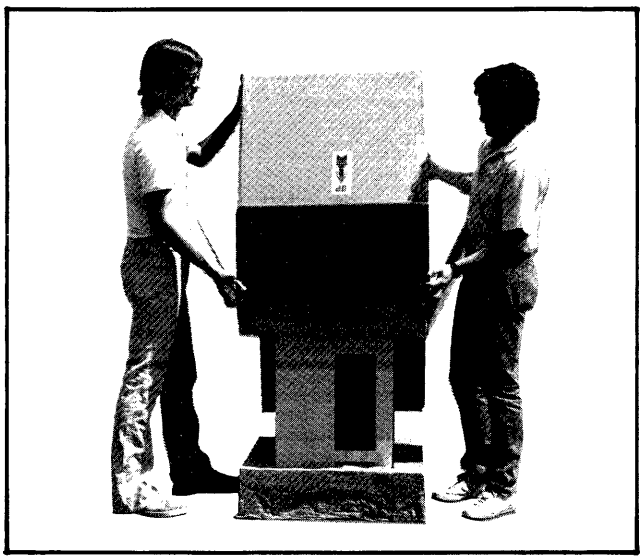


Figure 2-3

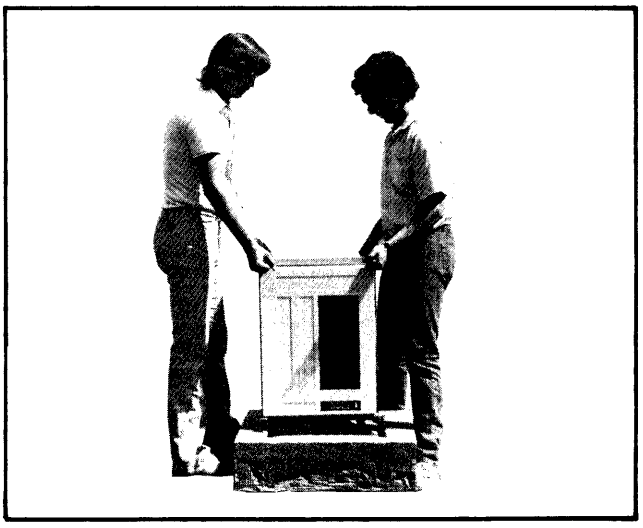


Figure 2-4.

NOTE

Due to the size and weight of the shipping container it is recommended that the unpacking procedure be performed by two men.

The following procedure is recommended for unpacking:

1. Move the packaged unit into the room where it will be installed or tested.
2. Select an area of sufficient size to allow two persons to freely handle the container.
3. Open the carton, fold back the flaps, and turn carton over. (See Figure 2-2)
4. Lift off carton. (See Figure 2-3) (SAVE)
5. Remove foam blocks and lift out. (See Figure 2-4) (SAVE)

CAUTION

Observe Caution notice.

6. Save carton, foam blocks and shipping frame for possible reshipment.
7. Tape transport is now sitting in the shipping frame, ready for receiving inspections. NOTE: Shipping frame is connected to transport by **3** allen head screws M5×35. **DO NOT** add a fourth screw although hole is available.

2.5 RECEIVING INSPECTION

Whether or not any damage to the shipping container was noted, a thorough inspection of the tape transport is essential prior to the application of power.

Visually examine:

- Facade for scratches, cracks or abrasions.
- Control panel for broken indicators or damaged switches.
- Rear assemblies for damaged connectors.
- Bent brackets.

If any scratches, abrasions, dents, cracks or evidence of damage is noted, notify the responsible carrier and Innovative Data Technology immediately.

NOTE

To avoid cancellation of the Warranty, DO NOT apply power to a unit that has been dropped or damaged. Notify Innovative Data Technology requesting information as to disposition of the damaged unit.

In the event that a claim for reimbursement of damaged cost becomes necessary, the following should be noted:

- All shipping materials should be retained for evidence of damage.
- Claims for reimbursement must be filed BY THE USER with the carrier immediately after arrival of shipment.

2.6 SPACE, ENVIRONMENT AND POWER REQUIREMENTS

2.6.1 SPACE REQUIREMENTS

As indicated in Figure 2-1, allowance should be made for working access. There should be sufficient space to the left and front of the unit to allow for full opening of the unit on the mounting hinges. The unit is designed to fit vertically in a standard 19-inch equipment rack. The unit may also be mounted horizontally in a 24-inch equipment rack. Mounting holes are provided for either position in the top plate casting.

2.6.2 ENVIRONMENT

The tape transport is to be operated in an ambient temperature range of +36 degrees F to +122 degrees F (+2°C to +50°C). It is recommended that any heat dissipating devices be mounted above the unit to avoid exceeding their temperature limits. The device may be exposed non-operationally to temperatures between -50 degrees F and +160 degrees F (-45°C to +71°C). Humidity conditions from 15% to 95% (non-condensing) are suitable for operation of the Tape Transport System.

The Series 1050 has been tested and found to comply with FCC requirements for Class "A" devices. The tests were conducted utilizing shielded output cables with the cable shield attached to the chassis ground of tape transport.

The ultimate obligation for compliance of any system lies with the user of the system; therefore, any deviation from the use of shielded cables should be fully tested to insure against non-compliance.

2.6.3 POWER

The input power requirements for the Series 1050 Tape Transport are selectable from 100/120/220/240 +10% at a power rating of 300 watts maximum for 1051 or 1052, 500 watts maximum for 1053 or 1054, and 600 watts maximum with mounted interfaces. For DC units, power requirement is 48 vdc, -6 +8v 10 AMPS peak.

2.7 INITIAL CHECKOUT PROCEDURE

Initial procedures for power-up and system checkout are as follows. It is not necessary to mount the tape transport in the equipment rack for these tests. The following tests may be performed with the tape transport mounted in the shipping frame.

2.7.1 PRIMARY POWER APPLICATION (AC)

AC primary power line is applied to the tape transport via the power cord included with shipment. This cord should be connected between the receptacle at the rear of the power supply and the appropriate power source (100, 120, 220, 240 volts). If the wrong line voltage is specified on the identification label as shown in Figure 2-7-2, Item 9, refer to Figure 2-6 and perform the following procedure.

1. Slide the protective fuse cover (located at the rear of the power supply) upwards to uncover the line power fuse.
2. Remove the fuse by pulling the FUSE PULL tab.
3. Remove the voltage selection PC board. Re-orientate the board so that the desired voltage value appears at the upper left side (See Figure 2-6). Reinstall the board in the slot.
4. Reinstall a fuse of the proper value (See Fig. 2-6), then slide the protective cover back in place.

2.7.2 PRIMARY POWER APPLICATION (DC)

This option provides operation with 48 Volt DC power source. The drive's configuration is as the standard AC unit, but with the usual power input, filter, power transformer, and rectifiers replaced with a 48 Volt DC-to-DC converter. This converter is located in the place of the usual AC power transformer and provides the terminals for input power and housing for the switch-circuit breaker.

2.7.2.1 INSTALLATION AND HANDLING

Figure 2.5.1 shows the power terminal strip, including terminals for: Power latch, -48V source, chassis ground, and −48V return connections. These connections are located approximately in the center of the tape drive. It may be necessary to open the main electronics circuit board to gain access.

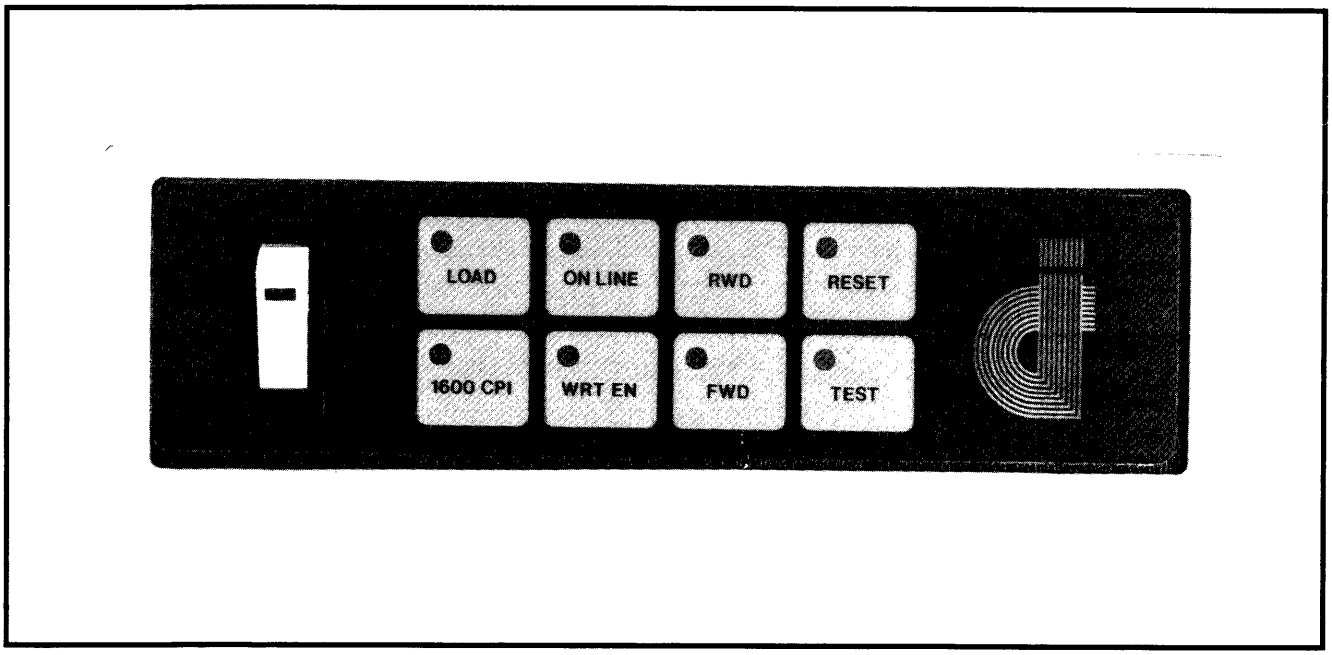


FIGURE 2-5 CONTROL PANEL

2.7.2.2 INPUT POWER CONNECTIONS

—48vdc *return* on drive connects to positive of external power supply.

—48vdc on drive connects to negative of external power supply.

If external power supply has a chassis ground, connect it to chassis ground of tape drive.

Power latch (optional) connects to -48vdc return to disable power On/Off switch on tape transport control panel.

2.7.2.3 INPUT POWER REQUIREMENTS

-42 to -56 volts DC, -50 volts DC nominal.

10 amps peak, 3 to 8 amps average, depending on input voltage and tape motion.

2.7.3 INITIAL CHECKOUT

The functions of all controls and indicators are described in Section III, Operations. The following procedure is provided to verify that basic transport functions are operational, either before the unit is installed in the equipment rack, or before system interface cables are connected.

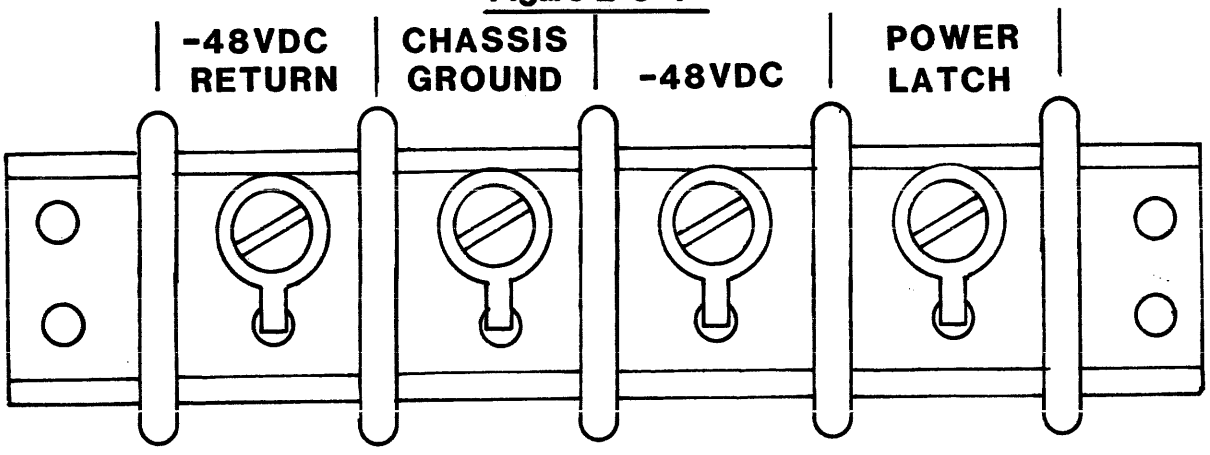
1. Check the identification label at the rear of the top plate (See Figure 2-7-2) to verify that the primary power requirements coincide with the line voltage at the installation site. If power requirements must be altered, refer to Figure 2-6. (For AC input)
2. Connect the power cord between the receptacle at the rear of the power supply and the appropriate line power outlet. Connect DC lines per Figure 2-5-1 for DC units and switch circuit breaker to ON.
3. Apply primary power by depressing PWR switch.
4. Enter Operation Quick-Check by depressing WRT EN and LOAD switches together with no tape mounted.

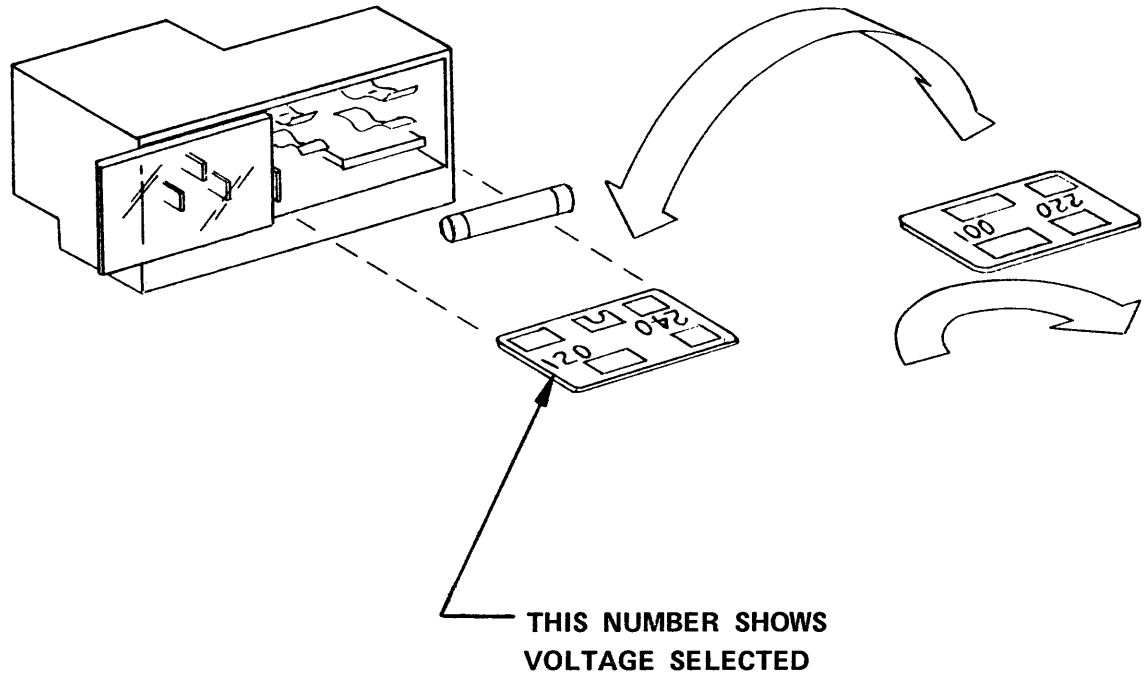
NOTE

DO NOT install tape before or during Operation Quick-Check sequence.

5. Observe the operation of the various servos. The reels will run forward for approximately five seconds, then reverse. During the above check, the retractors will retract and the capstan will rotate forward and reverse. The object of this check is to verify that all servos are functioning. (See 7.2.1c. for exact motions.)
6. Momentarily depress RESET to exit check. (Hold in RESET for a few seconds.)
7. Install a magnetic tape on the transport as described in Section III.
8. Depress LOAD switch. Verify that the tape advances to load point and halts. The LOAD and ON LINE indicators should now be illuminated. The 1600 LED will be on if transport is jumpered for P.E. only. The WRT EN LED will also be on if a tape with Write-Ring was installed.
9. Depress the RESET switch and verify that the ON LINE lamp extinguishes.
10. Depress the FORWARD switch and verify that forward tape motion occurs.
11. Depress the REWIND switch. Verify that the tape returns to load point and halts. The ON LINE indicator should remain extinguished.
12. Depress the ON LINE switch and verify that the ON LINE indicator lights.
13. Depress RESET and verify that the ON LINE indicator extinguishes.
14. Depress REWIND switch, the tape unloads. Depress the POWER switch. The initial checkout procedure is now complete.

Figure 2-5-1





VOLTAGE SELECTED

1. Slide open fuse cover and pull fuse tab.
2. Select operating voltage by orienting PC Board to desired position by flipping and/or rotating Board so that is voltage shown on top left side, and push Board back into module slot.
3. Rotate fuse — pull back into normal position and reinsert fuse into holder, using caution to select correct fuse value.
4. For **100** and **120** VAC use **6¼ AMP** SloBlo Fuse.
5. For **220** and **240** VAC use **3 AMP** SloBlo Fuse.

FIGURE 2-6. INPUT POWER VOLTAGE SELECTIO

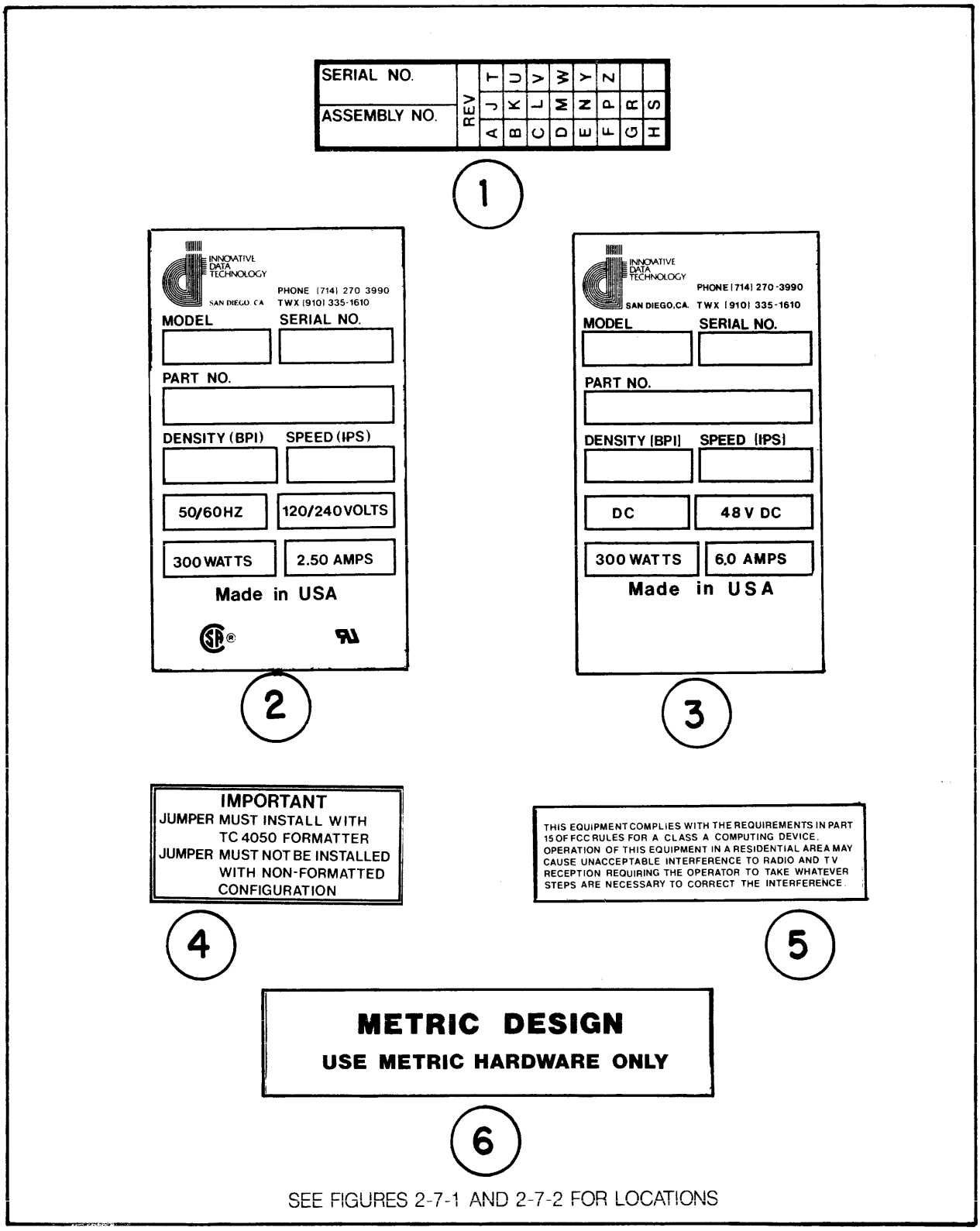
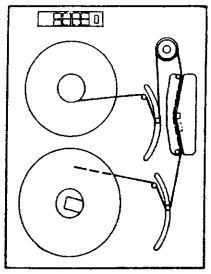


FIGURE 2-6-1. LABEL TYPES



7

HEAD SERIAL NO. _____ SKEW SETTINGS

CHAN.	0	3	6	1	4	7	P	2	5
1 2 3 4 5									

8

MULTIPLE VOLTAGE EQUIPMENT

VOLTAGE LEVEL
[select one]

100V 120V 220V 240V

9

WARNING
REMOVE LINE CORD
LINE VOLTAGE IS CONNECTED TO COMPONENTS BENEATH THIS SHIELD EVEN WHEN POWER SWITCH IS IN THE OFF POSITION

10

CAUTION FOR PROTECTION AGAINST FIRE HAZARD, REPLACE FUSE WITH SAME TYPE
•TO AVOID ELECTRICAL SHOCK, DISCONNECT SUPPLY BEFORE CHANGING FUSE /• POUR PREVERIER LE CHOC ELECTRIQUE DEBRANCHER L'ALIMENTATION AVANT DE CHANGER DE FUSIBLE.

11

GRN/YEL WIRE
SAFETY EARTH
TERMINAL

12

SEE FIGURES 2-7-1 AND 2-7-2 FOR LOCATIONS

FIGURE 2-6-2. LABEL TYPES (CONTINUED)

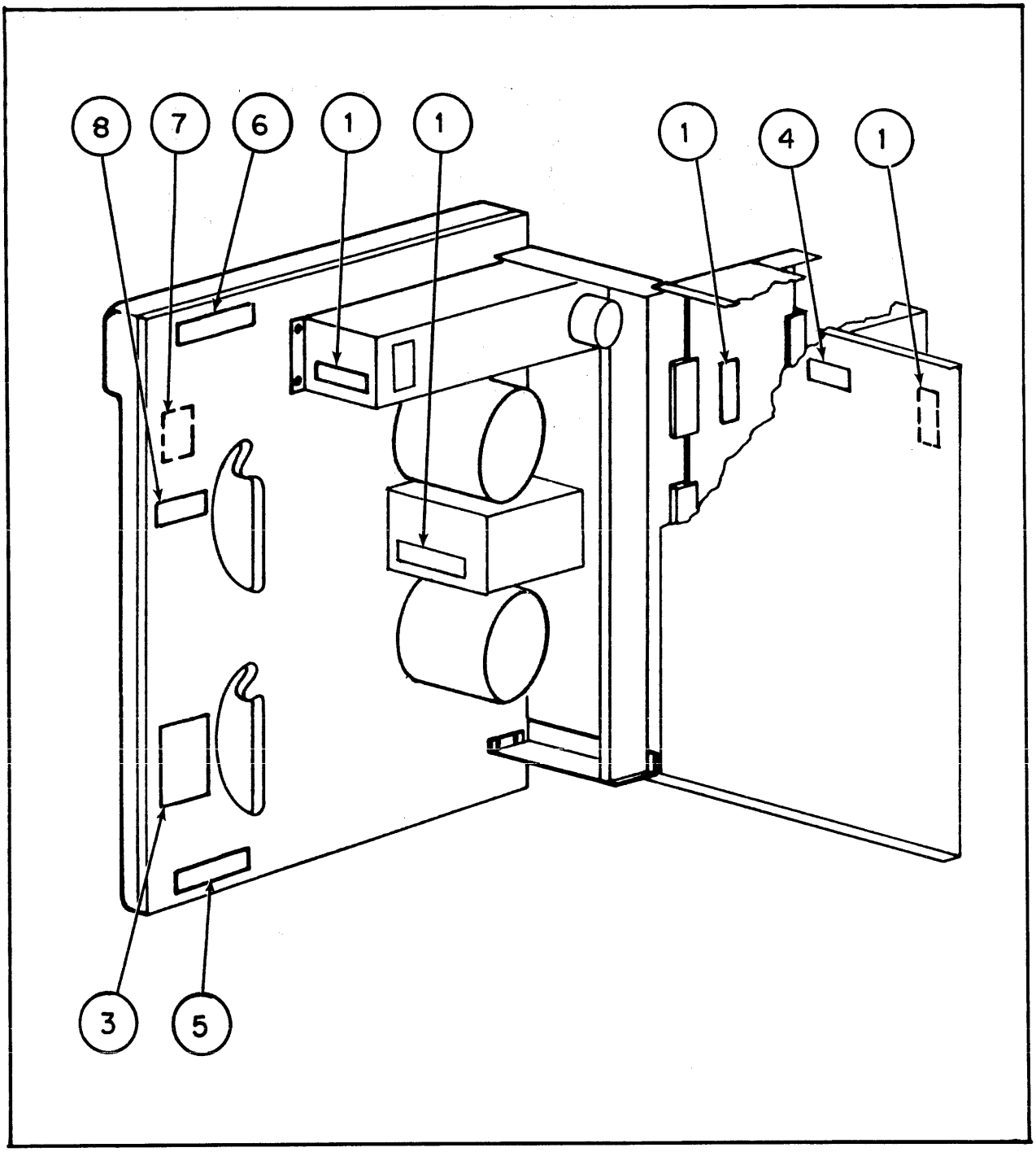


FIGURE 2-7-1. LABEL LOCATIONS DC MODEL

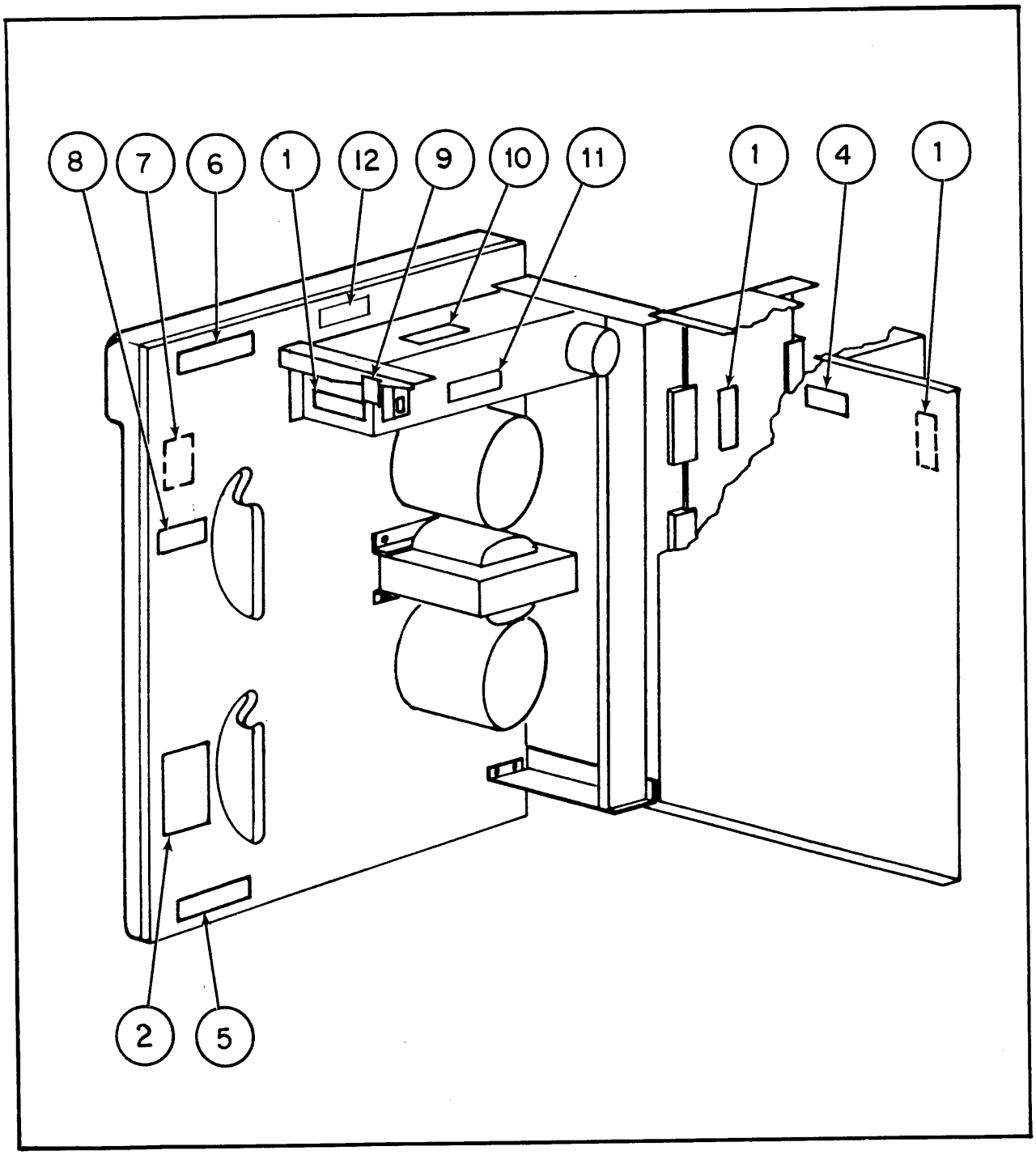


FIGURE 2-7-2. LABEL LOCATIONS AC MODEL

2.8 MOUNTING PROCEDURE

The tape transport is designed for installation in a standard 19-inch RETMA rack. The unit is supported by two hinge assemblies attached to the left side of the top plate assembly, and is held in place by a single pawl fastener. This is referred to as a three point mounting (2 at mounting hinge and one at locking pawl). DO NOT attempt a four point mounting. Mounting details are shown in Figure 2-8. The following procedure is recommended for installation:

1. Bolt support rack hinges to RETMA rack as necessary. See Figure 2-8.
2. Remove Safety Block from plastic bag.
3. Place tape transport in horizontal position (on its back). Remove three allen head screws to detach transport from shipping support frame. (See Figure 2-15.)

CAUTION

Ensure that the equipment rack is secure against movement or tipping. To avoid damage, lift the transport only by the top plate. Do not support the weight of the transport by using the PC board mounting frame or other components as lift points.

4. Install nylon spacers on rack hinges. (See Figure 2-8.)
5. Hoist tape transport onto mounting hinges in RETMA rack, then install safety block under lower hinge. (See Figure 2-9.)
6. Latch tape transport chassis into place by rotating pawl fastener in clockwise direction. (See Figure 1-4.)
7. Perform cleaning procedures described in Section V.
8. Check installation to verify completeness.

NOTE

The safety block in Step 5 is not a structural support member. Its purpose is to prevent the transport from being inadvertently lifted from the mounting.

2.9 RESHIPMENT

When reshipment of a IDT System becomes necessary, it should be packed in the shipping containers in which it was delivered in accordance with the following procedure:

1. Remove unit from system installation.
2. Attach shipping frame. See Figure 2-15 for pictorial.

CAUTION

When attaching the tape transport to the shipping frame, remove all obstructing objects (pawl fastener; interface cables; etc.) between the top plate and the shipping frame. If the attaching screws are tightened when an obstruction is present, breakage or severe warping of top plate may occur.

3. If the tape transport is to be packed for shipping purposes, use the original shipping carton and foam pads.
4. Secure outer carton. Prepare for shipment.

2.10 SUBSTITUTE SHIPPING CONTAINER

If the shipping frame but not the original container is available, a suitable substitute may be constructed as follows:

1. Select a heavy carton of correct size to snugly accept the transport and foam pads.
2. Seal outer carton, prepare for shipment.

WARNING

DO NOT attempt to ship the transport without the shipping frame.

IMPORTANT

The tape transport can be SEVERELY damaged if it is shipped, even a short distance, in a cabinet.

IDT's warranty is automatically voided when damage is detected from this type of shipment.

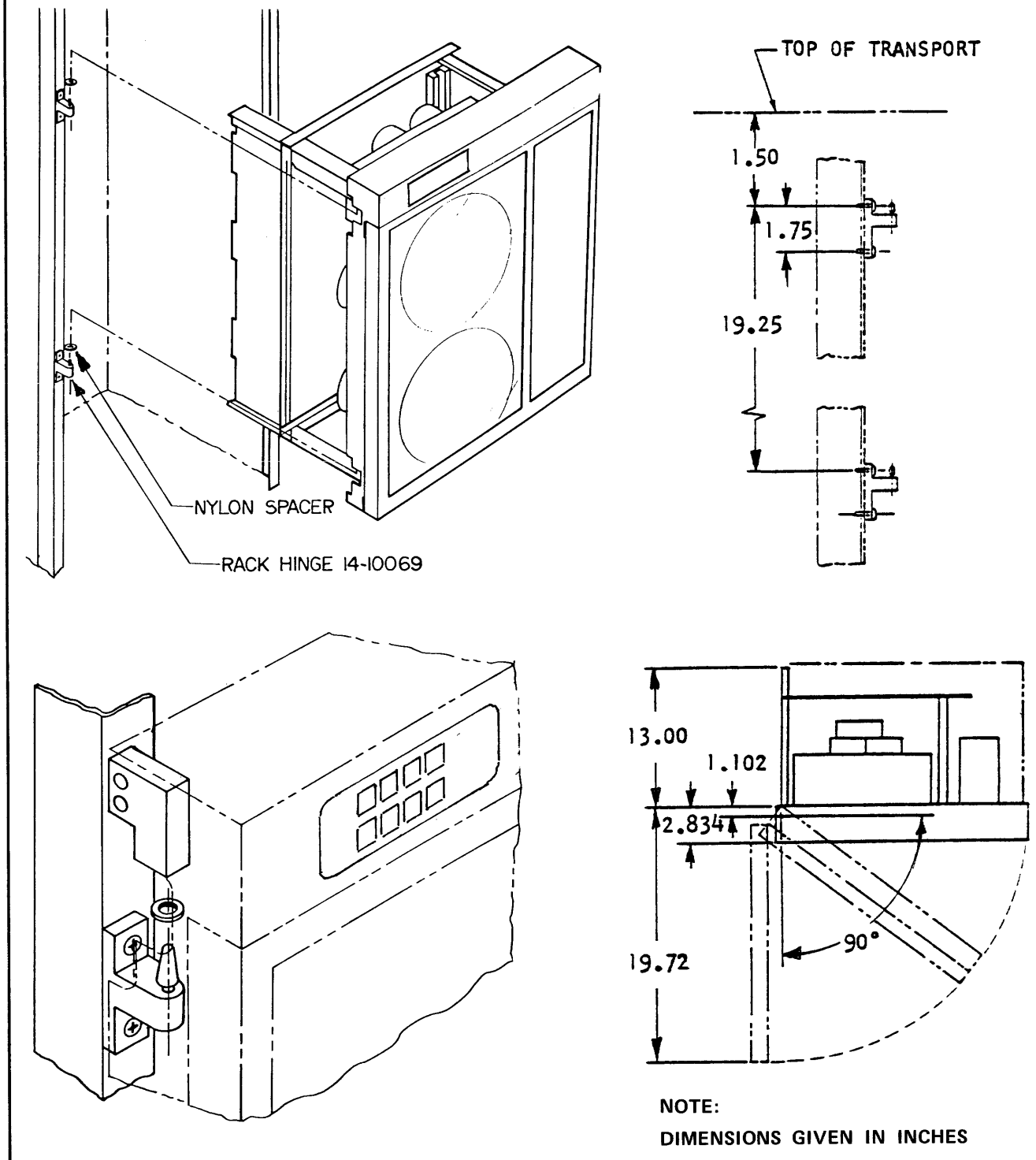


FIGURE 2-8. MOUNTING DETAILS SERIES 1050

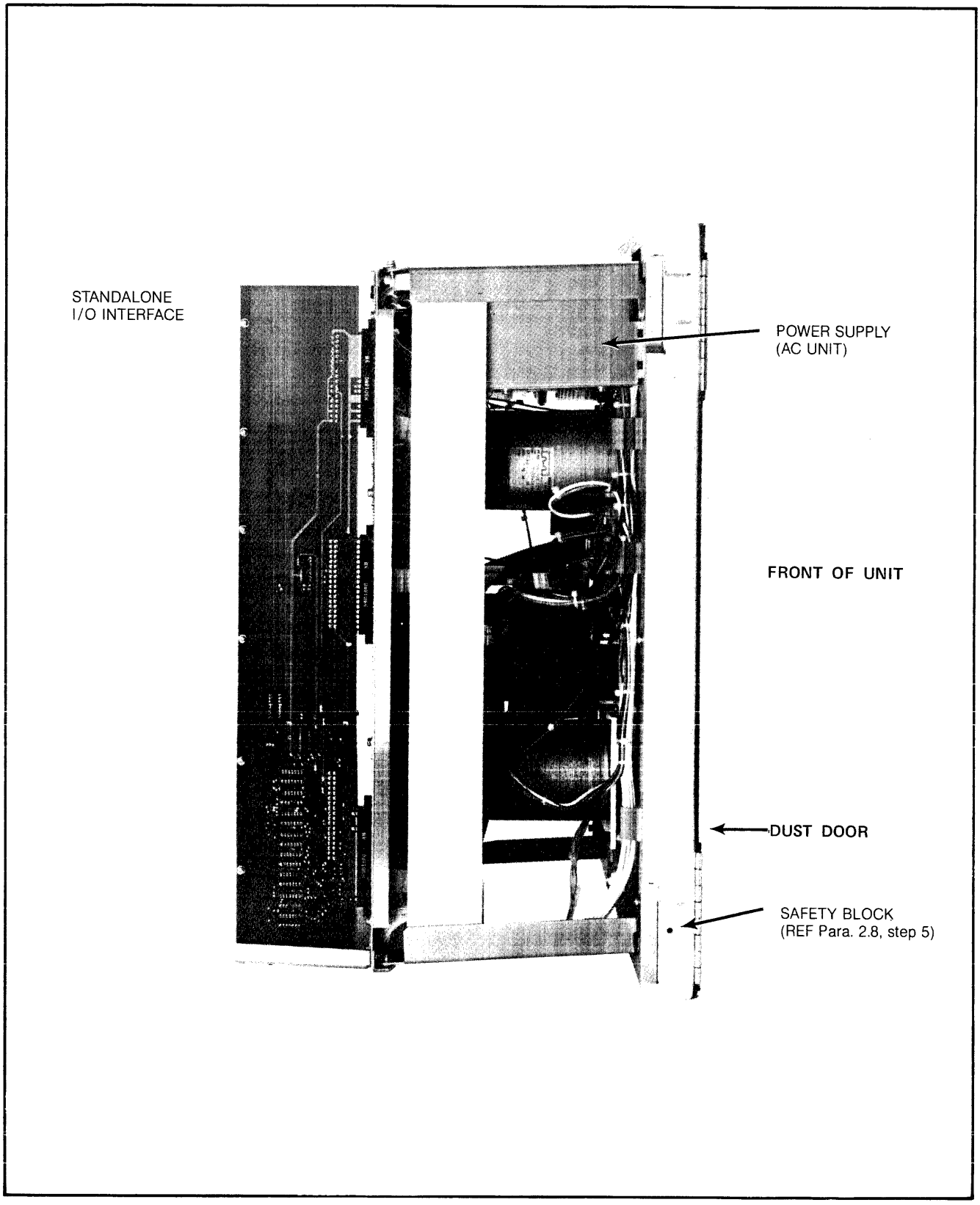


FIGURE 2-9. TRANSPORT MOUNTING SAFETY BLOCK AND INTERFACE DETAILS

2.11 INTERFACE

The Model 1051 or 1052 uses three cables for interconnection between the tape transport and external controller. These cables are installed on the card-edge connectors on the I/O interface board,
and their pin assignments are specified in Table 2- .

2.11.1 INTERFACE DESCRIPTION

The Series 1050 has several interface options available to the user. They vary from the minimal drive control, unformatted data, and low power T^2L levels to full operational control with complete formatted data, low impedance line drivers and multiple drive interface. In all cases, the electronics associated with the interface are housed within the envelope of the Series 1050 tape transport eliminating the need for additional external modules within the system. The Series 1050 system conforms to IBM, ANSI and ECMA formats, however, the channel identification used by IBM and ANSI/ECMA is different. Table 2.1 shows the connection between the formatter input data lines (FWD0-FWD7) and the track number.

Within the Series 1050 system, three interfaces are of general user interest. They are: (1) between the user's interface and the Model 1053 or 1054 formatter; (2) between the user's formatted control and the Model 1051 and 1052 driver and (3) between IDT mounted (1053/1054) interface and host system.

The remainder of this section gives the specification for the interface between the user and the Model 1051 or 1052 tape drives. This is the industry standard interface for non-formatted tape drives. See Diagram section for all (1051-52-53-54) I/O schematics and assemblies. .

For users of Model 1053 or 1054 interfacing refer to 4050 Formatter Reference Manual. See IPS 2600 Manual for IDT interfaces and connection to host systems.

Interface drivers and receivers for 1051/1052 consist of the networks shown in Figure 2-10.

Interface Logic convention is low = true (0.7 Volts max.), false = high (2.0 Volts min.). Pulses are held true for a minimum of 2.0 micro seconds.

2.11.2 DRIVE INTERFACE

Table 2.2 gives the signal names and pin assignments for the interface between the Model 1051, 1052 drive and the user. The same interface is used between slave drives and between the master 1053 drive and the first drive.

2.11.3 DRIVE INTERFACE DESCRIPTION

Load on Line (LOL) (Option):
This is a pulse command which is enabled by removing standard jumper E26-E27 and inserting in E24-E25. If tape is threaded, the drive will be made ready to receive controls from the interface.

Overwrite (OVW):
This is a level which must be true for a minimum of 20 microseconds after the leading edge of a FORWARD or REVERSE command and in conjunction with the WRITE ENABLE (WRT), causes the drive to perform an overwrite operation (sometimes called edit function).

TABLE 2.1. CHANNEL IDENTIFICATION COMPARISON

INTERFACE LINES	9-TRACK			
	IBM CHANNEL	ANSI/ECMA ENVIRONMENT	ANSI TRACK NO.	ANSI ASII CHANNEL
$\overline{FWDO}$	0	E8	7	Z
$\overline{FWD1}$	1	E7	6	7
$\overline{FWD2}$	2	E6	5	6
$\overline{FWD3}$	3	E5	3	5
$\overline{FWD4}$	4	E4	9	4
$\overline{FWD5}$	5	E3	1	3
$\overline{FWD6}$	6	E2	8	2
$\overline{FWD7}$	7	E1	2	1

Forward (FWD):

This is a level. When true and the transport is ready and on line, the tape moves forward at the specified speed. When the level goes false, tape forward motion ceases. The start/stop velocity profile (ramp) is trapezoidal, with nominally equal rise and fall times.

Data Density Select (DDS):

This drive option is active only when the option is enabled by inserting jumper in E30-E31. This allows density control from host CPU. The level when true causes the transport to operate in the high density mode. When false, transport operation will be in the low-density mode. If the remote density select option is not enabled the drive will operate in one of two modes, front panel control E28-E29 or permanent high density mode (E32-E33). On 11-00200 and 11-00273 main electronic boards, a jumper options is available that allows the drive to power-up in 1600 bpi and can be switched on front panel to 800 (NRZI) density. (See Table 2.4.)

Reverse (REV):

This is a level. When true and the transport is ready and on line, the tape moves in a reverse direction at the specified speed. When the level goes false, tape reverse motion ceases. If the BOT marker is detected during a reverse, the reverse will be terminated. If a reverse command is given when the tape is at load point, it will be ignored.

NOTE

When BOT is detected during reverse, the tape will not come to rest with the BOT marker in the same position as after a load sequence. The maximum variation possible is 1 inch.

Data Density Indicator (DEN):

This level is true only when the transport is set for high-density operation.

Rewind Command (RWD):

This is a pulse which, if the transport is ready and on line, causes the tape to move in reverse at 200 ips (average). When the tape passes the BOT tab. the rewind tape drive mode will cease, and the load sequence will be initiated automatically. If the tape is already at load point when the REWIND command is given, the command will be ignored by the transport. If the remote unload option is enabled by removing jumper E21-E22 and inserted in E21-E23; and if the tape is at load point, a REWIND command will unload the tape.

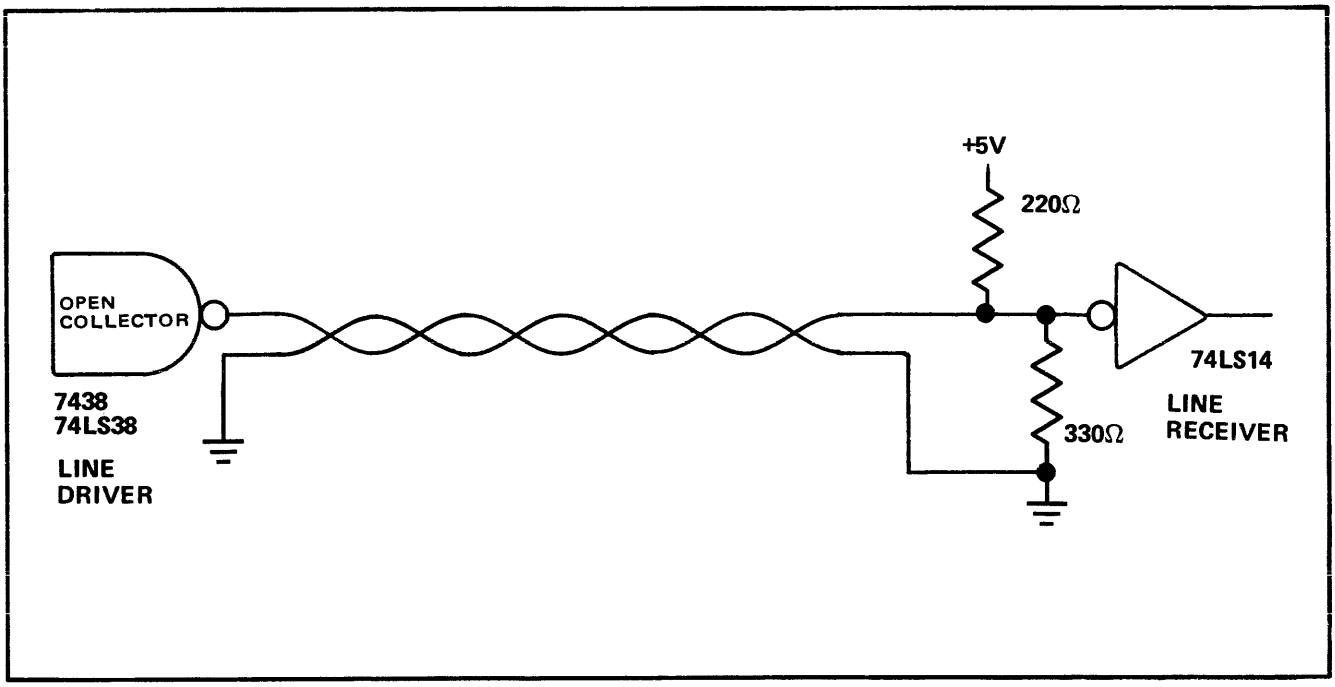


FIGURE 2-10. USER AND/OR IDT DRIVERS AND RECEIVERS

TABLE 2.2. INTERFACE CONNECTOR PIN ASSIGNMENTS, MODEL 1051, 1052 CONTROLS AND STATUS

PIN ASSIGNMENT LIVE	PIN ASSIGNMENT RETURN	SIGNAL
CONNECTOR J101 - CONTROL		
1	-	LOAD ON LINE ($\overline{\text{LOL}}$)
B	2	OVERWRITE ($\overline{\text{OVW}}$)
C	3	FORWARD Command ($\overline{\text{FWD}}$)
D	4	DATA DENSITY SELECT ($\overline{\text{DDS}}$)
E	5	REVERSE Command ($\overline{\text{REV}}$)
F	6	DATA DENSITY INDICATOR ($\overline{\text{DEN}}$)
H	7	REWIND Command ($\overline{\text{RWD}}$)
K	9	WRITE ENABLE ($\overline{\text{WRT}}$)
L	10	OFF-LINE Command ($\overline{\text{OFL}}$)
M	11	ON-LINE STATUS ($\overline{\text{ONL}}$)
N	12	REWIND STATUS ($\overline{\text{REW}}$)
P	13	FILE PROTECT STATUS ($\overline{\text{FPT}}$)
R	14	BEGINNING OF TAPE STATUS ($\overline{\text{BOT}}$)
T	16	READY STATUS ($\overline{\text{RDY}}$)
U	17	END OF TAPE STATUS ($\overline{\text{EOT}}$)
J	8	DRIVE SELECT 0 ($\overline{\text{SLT 0}}$)
A	-	DRIVE SELECT 1 ($\overline{\text{SLT 1}}$)
18	-	DRIVE SELECT 2 ($\overline{\text{SLT 2}}$)
V	-	DRIVE SELECT 3 ($\overline{\text{SLT 3}}$)
CONNECTOR J102 - WRITE		
A	1	WRITE DATA STROBE ($\overline{\text{WDS}}$)
C	3	WRITE AMPLIFIER RESET ($\overline{\text{WRS}}$)
E	5	READ THRESHOLD 1 ($\overline{\text{TH1}}$)*
F	6	READ THRESHOLD 2 ($\overline{\text{TH2}}$)
L	10	WRITE DATA PARITY ($\overline{\text{WDP}}$)
M	11	WRITE DATA 0 ($\overline{\text{WD0}}$)
N	12	WRITE DATA 1 ($\overline{\text{WD1}}$)
P	13	WRITE DATA 2 ($\overline{\text{WD2}}$)
R	14	WRITE DATA 3 ($\overline{\text{WD3}}$)
S	15	WRITE DATA 4 ($\overline{\text{WD4}}$)
T	16	WRITE DATA 5 ($\overline{\text{WD5}}$)
U	17	WRITE DATA 6 ($\overline{\text{WD6}}$)
V	18	WRITE DATA 7 ($\overline{\text{WD7}}$)

* Given for reference only.

TABLE 2.2. INTERFACE CONNECTOR PIN ASSIGNMENTS, MODEL 1051, 1052 CONTROLS AND STATUS (CONTINUED)

PIN ASSIGNMENTS LIVE	RETURN	SIGNAL
CONNECTOR J103 - READ		
1	A	READ DATA PARITY ($\overline{RDP}$)
2	B	READ DATA STROBE ($\overline{RDS}$)
3	C	READ DATA 0 ($\overline{RD0}$)
4	D	READ DATA 1 ($\overline{RD1}$)
8	J	READ DATA 2 ($\overline{RD2}$)
9	K	READ DATA 3 ($\overline{RD3}$)
14	R	READ DATA 4 ($\overline{RD4}$)
15	S	READ DATA 5 ($\overline{RD5}$)
17	U	READ DATA 6 ($\overline{RD6}$)
18	V	READ DATA 7 ($\overline{RD7}$)
10	L	NRZI STATUS (NRZI)
11	M	7-TRACK STATUS (7TK)**
12	N	SINGLE GAP STATUS (SGL)**
13	P	LOW SPEED STATUS (LSP)
**Applicable to NRZI Operation only.		

Write Enable (WRT):

This level must be true for a minimum of 20 microseconds after the leading edge of a FORWARD command, when the write mode of operation is required. The leading edge of the FORWARD command (delayed 20 microseconds) initiates a sample of the WRITE ENABLE signal which results in turning on the write current. The read circuits are enabled 4 milliseconds after the command. The write current will be turned off by any of the following:

a. Rewind command while in the on-line mode.
b. Switching to off-line mode.
c. Power fail or broken tape.
d. Reverse command while in on-line mode.
e. A motion command with WRT false.

Off-Line Command (OFL):

This is a level or pulse which sets the transport to the off-line condition, placing the transport under manual control. It is gated on the Interface Board only by SELECT, allowing an OFF-LINE command to be given while a rewind is in progress. An OFF-LINE command should be separated from a REWIND command by at least 2 microseconds.

On-Line Status (ONL):

This is a line which is true when the drive is on-line. When true, the transport is under remote control. When false, the transport is under local control at the front panel.

Rewind Status (REW):
This level is true only when the transport is engaged in any rewind operation including the load sequence following the BOT marker detection.

File Protect Status (FPT):
This level is true if a supply reel is installed on the transport which has the write ring removed.

Beginning of Tape Status (BOT):
This level is true when the BOT marker is under the photosensor, the transport is on-line, and not rewinding. After receipt of a FORWARD command, the signal will remain true until the BOT tab leaves the photosensor area.

Ready Status (RDY):
This level is true only when the initial load sequence is complete, the transport is on-line and not rewinding. The transport is ready to receive a remote command.

NRZI Status (NRZI):
This line when true indicates that the transport is operating in the NRZI mode. When false, this line indicates that tape transport is operating in the PE mode.

7-Track Status (7TK):
This level when true identifies the selected tape transport as a unit configured for 7-track operation.

Low Speed Status (LSP):
This level when true identifies the selected tape transport as a unit set to the lower speed of two possible speeds within a multiple drive system.

End of Tape Status (EOT)
This level is true when the EOT marker is sensed by the photo-electric detector.

Drive Select (SLT 0, SLT 1, SLT 2 and SLT 3):
Drive selection is accomplished when either SLT 0, SLT 1, SLT 2 or SLT 3 is true. All interface drivers and receivers in the addressed transport are connected to the controller. Only one drive select signal may be valid at a time. The address of a drive is determined via DIP (dual-in-line package) switch settings as described in Section II, Table 2.3.

Write Data Strobe (WDS):
This is a pulse generated by the controller (NRZI mode only) for each flux reversal to be written. The standard drive accepts data present on the write data line at the trailing edge of WDS. Write logic then converts the NRZI format data and writes the character. In the Phase Encoded mode, data is presented on the write data lines and a write data strobe is required for each flux reversal to be written. The selected edge of this pulse starts the write process in the transport. It is assumed that the data lines have settled at least 0.5 microsecond before the selected edge of the pulse occurs and will remain steady until 0.5 microsecond after the selected edge of the WDS pulse.

Write Amplifier Reset (WRS):
This is a pulse. When true, it resets the write amplifier circuits on the leading edge. The purpose of this signal is to write the LRCC at the end of a record in the NRZI mode, causing the inter-record-gap (IRG) to be erased in reference direction. The leading edge of the WRS pulse will occur after eight character periods on a nine-track transport (four character times on a seven-track transport), after the selected edge of the write strobe associated with the last character. WRS is used in the writing process for the Phase Encoded mode only for overwrite operations.

Read Threshold 1 (TH1) and Single Gap Status (SGL):
These levels are given for reference only. Series 1050 drives are available in READ-AFTER-WRITE configurations only. Within the industry these lines are used with READ-WRITE (single gap) configurations only.

Read Threshold (TH2):
This level is used during read to select a lower than normal threshold. It is intended to be used when trying to recover data from tapes which cannot be read without error at the normal threshold level. It must be made true prior to the forward command. In no case should it be used for all reading since noise in the IRG may be detected causing positioning errors.

Write Data (WDO through WPD):
These are levels which, if true from 0.5 microsecond before the selected edge of the write strobe to 0.5 microsecond after the selected edge of the write strobe will result in the recording of data if the transport is in the write mode.

NOTE

For the NRZI mode the CRCC is written by providing the correct character, together with a write strobe, four character times after the last data character of the record. The LRCC is written using the WRITE RESET (WRS) signal.

Read Data (RDP, RDO through RD7):

In the NRZI mode the individual bits of each data character are assembled into parallel from by a one-stage deskewing register. The complete character can be obtained by sampling these read data interface lines simultaneously during the read strobe period (RDS). The read data lines are prepared for the next character by resetting 0.5 microseconds after the trailing edge of the RDS. In PE mode these lines contain the phase encoded data read from tape. Although when reading new tapes on the same transport on which they were generated produces transition spacing within the drives tolerances, considerable variation should be expected when reading tapes of unknown age, use and origin. For NRZI mode the RDS and the corresponding read data lines can indicate, for any two adjacent characters, spacing from approximately 50% to +150% of the nominal spacing. For phase encoded tapes, deskewing logic should be capable of tracking variations up to +50% of the average spacing beween two adjacent flux reversals.

Read Data Strobe (RDS):

This is a pulse for each data character read from tape. Note for the NRZI mode that the nominal time between adjacent RDS pulses averages $\frac{1}{DV}$, where D = density and V = tape velocity. When phase-encoded data is being read, a read data strobe is not available.

2.12 INTERNAL SWITCH AND JUMPERS

The Series 1050 transport is equipped with two DIP switches on the I/O Interface board and a series of lift-off jumpers on the main electronics board and I/O board. The positions of these switches and jumpers are preset at the factory and normally require no further attention by the user. I/O DIP switch and jumper options are defined in Table 2.3. Main electronic board jumper connections are listed in Table 2.4. Both tables show the as-delivered configuration unless specified differently at time of order. Figures 2-11, 2-12, 2-13 and 2-14 show jumper positions for different configurations.

TABLE 2.3
JUMPER FUNCTIONS ON I/O BOARD

JUMPER SELECTION	JUMPER FUNCTION	STANDARD JUMPER CONFIGURATION
E1-E2-E3	Latched or Normal EOT Status	E2-E3 (Normal) 11-00266 I/O ASSY 11-00092 I/O ASSY 11-00003 I/O ASSY
E4-E5-E6	Latched or Normal EOT Status	E5-E6 (Normal) 11-00025 I/O ASSY
E1-E2-E3	Special Dual Speed or	E1-E2 (Normal) 11-00025 I/O ASSY
E4-E5-E6	Normal Single Speed	E4-E5 (Normal) 11-00003 I/O ASSY
E4-5/E6-7	Automatic Load - On Line (Normal)	E4-E5 (Normal) E6-E7 (Normal) 11-00266 I/O ASSY

TABLE 2.3 (CONTINUED)
STANDARD SERIES 1050 I/O BOARD DIP SWITCHING FUNCTIONS

SWITCH LOCATION	SWITCH POSITION	FUNCTION WHEN IN **ON** POSITION	STANDARD POSITION
1M (11-00003) ASSY B14 (11-00092) (11-00266) ASSY B19 (11-00025) ASSY	1	For special factory use	Off
	2	Provides On-Line and Select Gating	On
	3	Unused	Off
	4	Unused	Off
	5	Enables Select Transport 0	On
	6	Enables Select Transport 1	Off
	7	Enables Select Transport 3 (NOTE	Off
	8	Enables Select Transport 2	Off
1E (11-00003 I/O) ASSY A7 (11-00025 I/O) ASSY B9 (11-00266 I/O) (11-00092 I/O) ASSY	1	Unused	On
	2	Disables Low Speed Status	On
	3	Disables Single Gap Status	On
	4	Disables 7 Track Status*	On
	*Off for 7 Track Transport		

TABLE 2.4 STANDARD SERIES 1050 MAIN ELECTRONIC JUMPER FUNCTIONS

JUMPER SELECTION	JUMPER FUNCTION	SPECIAL CONFIGURATION	STANDARD 9 TRACK CONFIGURATION
E1-E2-E3	Special factory testing (not for use by user)	E1-E2	E2-E3
E13-E14-E15	Special factory testing	E13-E15	E13-E14
E16-E17-E18	Selects "OFF LINE" operational tests (Section VII)	E16-E18	E16-E17
E21-E22-E23	Tape Remote Unload (special for BDL/GPIB and SCSI interfaces)	E21-E23	E21-E22
E24-25-26-27.	Load ON-LINE remote capability (special for BDL interface)	E24-E25	E26-E27
E28-E29*	800/1600 density select from front control SW. (Powers up in 800)		E28-E29
E30-E31*	Density select from the host system - special configuration	E30-E31	Open
E32-E33*	1600 density at all times (No Control) special configuration	E32-E33	Open
E34-E35	Read after write head configuration		E34-E35
E36-E37	This jumper required for 7 TRACK operation only	E36-E37	Open
E35-E46	This jumper must be in for 7 TRACK operation only (See Fig. 2-14)	E35-E46	E46 Open
E47-E48-E49	1600 density on Power-Up. 800 selectable from front control switch	E48-E49	E47-E48
E-50-E51	Jumper required for all formatted transports (Open for 1051 and 1052)		

*Only one of these functions can be selected on each transport

SPECIAL MANUAL CONTROL INHIBIT

The "Manual Control Inhibit" (M.C.I.) is designed to eliminate operator interference while the tape drive is on-line and under computer control.

To initiate M.C.I. two conditions are required from the computer:

1. **FLOL** input to the tape drive is a continuous low (True).
2. **FTADO** and **FTADI** inputs to the formatter are a continuous high or open. The high on these input lines indicates to the transport that drive "O" is being selected.

Two parameters are also required on the tape drive:

1. The 8 position dipswitch on the I/O board has switch **5 On** (selecting drive "O").
2. The remote on-line option is initiated by installation of a jumper plug in E24-E25 (no jumper in E26-E27), at location 16-S, on the component side of the main electronic board.

Upon completion of the four stated parameters, the tape will no longer respond to the transport reset control switch while it is commanded on-line via the computer. In addition, if the transport is a DC type (48vdc) then the transport power switch can also be locked-out via the power latch option incorporated in the DC/DC power supply (see DC power supply description).

FIGURE 2-11. MAIN ELECTRONIC BOARD (COMPONENT SIDE) 9 TRACK JUMPERS CONFIGURATION FOR **1051/52/53/54 AND SCDR** TRANSPORTS

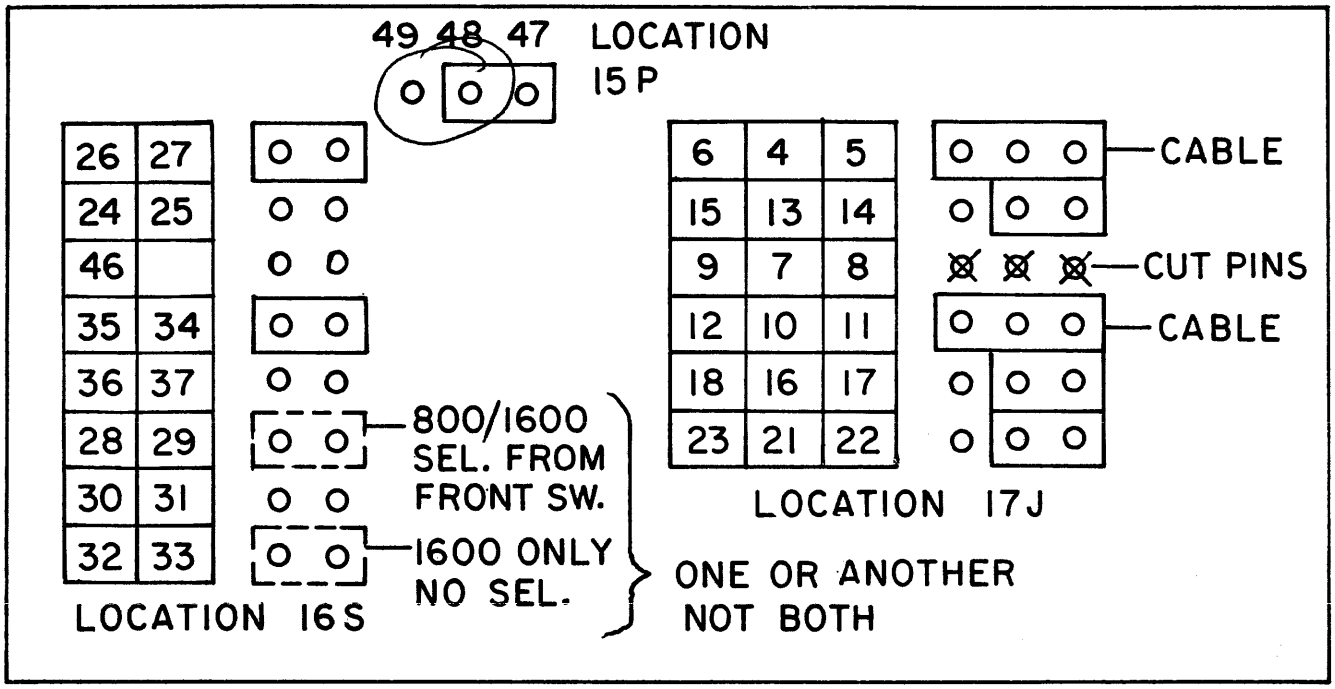


FIGURE 2-12. MAIN ELECTRONIC BOARD (COMPONENT SIDE) 9 TRACK JUMPERS CONFIGURATION FOR **1053/1054 BDL**

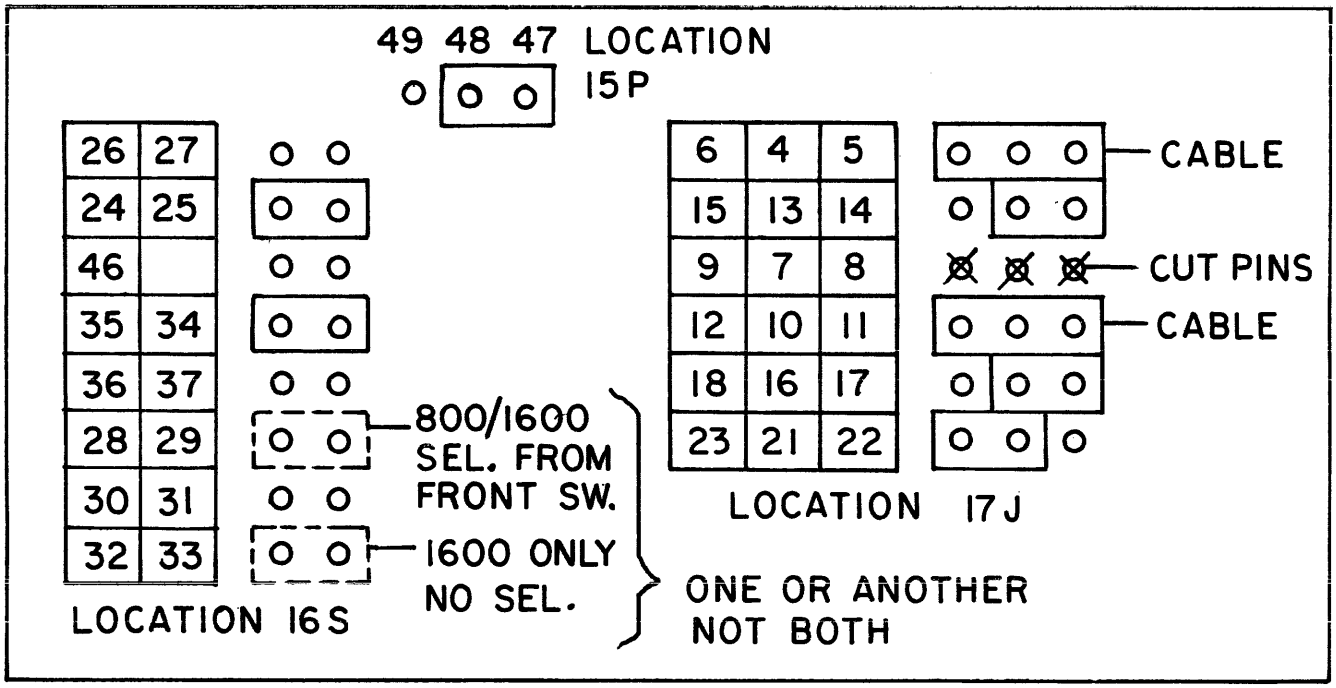


FIGURE 2-13. MAIN ELECTRONIC BOARD (COMPONENT SIDE) 9 TRACK JUMPERS CONFIGURATION FOR **1054 SERIES GPIB AND SCSI** INTERFACE

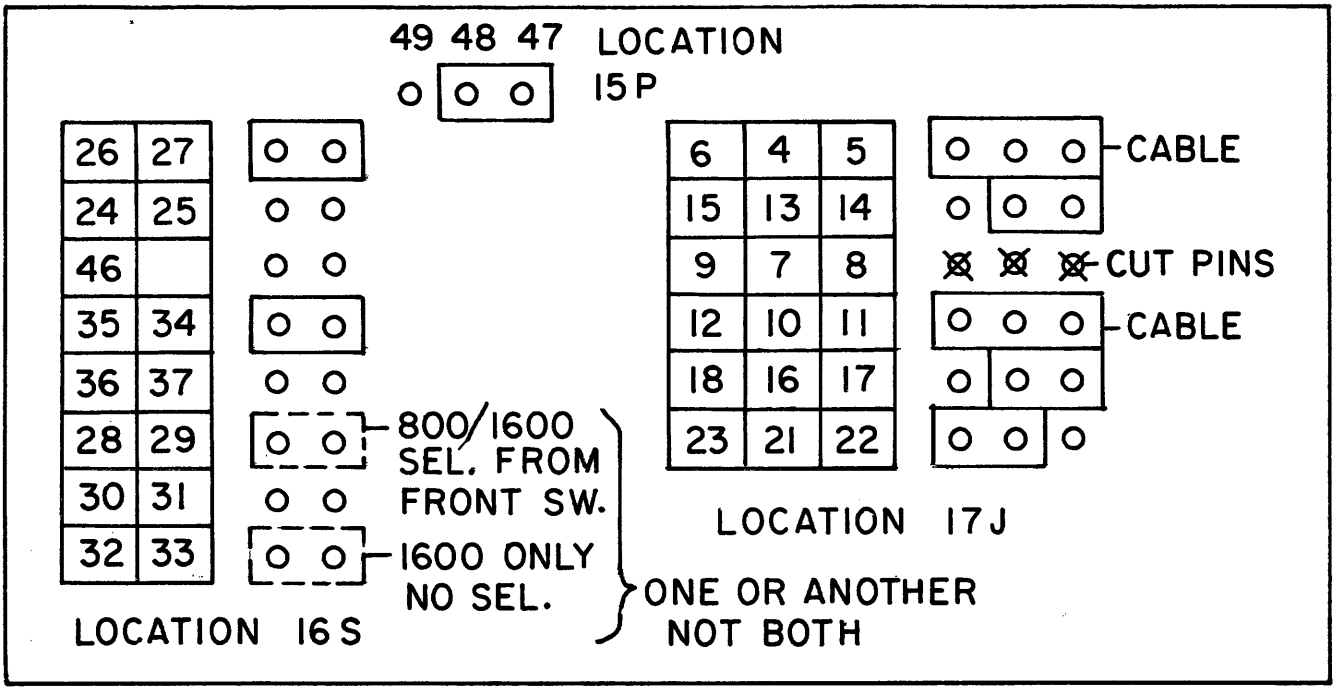
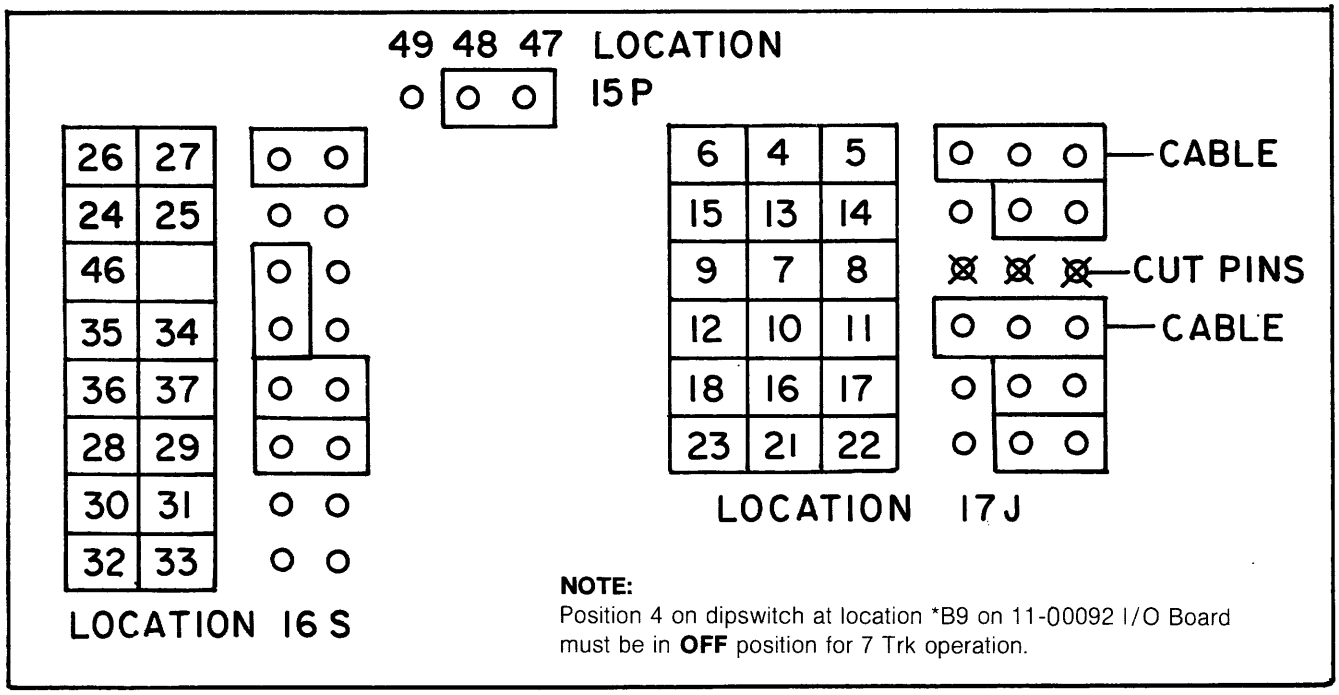
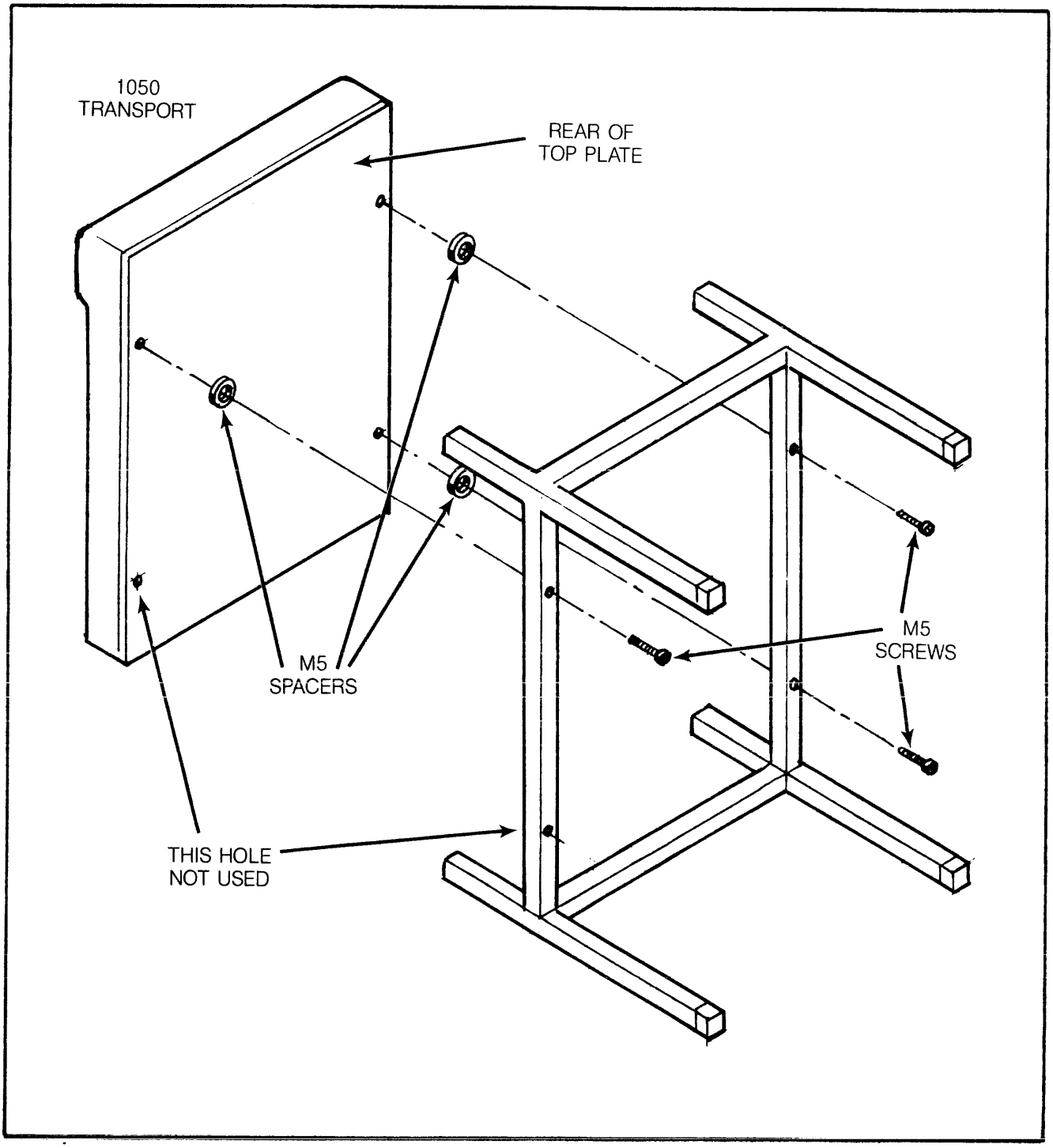


FIGURE 2-14. MAIN ELECTRONIC BOARD (COMPONENT SIDE) 7 TRACK JUMPERS CONFIGURATION FOR **1051/52/53/54** TRANSPORTS



*A7 location on 11-00025 I/O Bd.
*IE location on 11-00003 I/O Bd.

FIGURE 2-15. SHIPPING FRAME ATTACHMENT



PICTORIAL OF ATTACHING SHIPPING FRAME TO
TRANSPORT WHEN SHIPMENT IS REQUIRED

SECTION III
OPERATIONS

3.1 INTRODUCTION

This section contains a description of the controls and indicators and the operating instructions for the Series 1050. A thorough knowledge of this section will enhance the user's operational and maintenance capabilities.

3.2 CONTROLS AND INDICATORS

The Series 1050 is equipped with a complete set of controls and indicators for local operation. The switch assembly is shown in Figure 3-1. The power switch is a U.L. approved device which is a toggle-in-position, lighted-when-on switch. Additional momentary membrane switches are provided for: LOAD, ON LINE, REWIND, 1600 CPI, FORWARD, RESET, and TEST. WRITE ENABLE is an indicator which illumines when write ring is installed on the supply reel and an initial load operation is entered. The functions of these switches and indicators are defined in Table 3.1. It should be noted, when in the test mode, the function of these switches are redefined. (Test functions are described in the Test Section.)

3.3 TAPE LOADING PROCEDURE

When loading tape on the Model 1050, the supply reel is mounted on the bottom hub, and the upper hub serves as the take-up reel. The maximum supply reel size is 10.5 inches in diameter. Recording can be accomplished only when the write-enable ring is installed in the supply reel. Figure 3-2 illustrates the required tape path.

3.3.1 TO LOAD TAPE

a. Open the dust cover door and lift the reel retention lever on the lower hub.
b. Press the supply reel against the back flange of the hub and push the reel retention lever back into position.
c. Thread the magnetic tape over the path shown in Figure 3-2. It will be necessary to push the flux gate to the left when routing the tape through the head assembly.
d. Wrap the tape leader onto the take-up hub to allow winding with a clockwise rotation. Wind 5 or 6 turns on the take-up hub, otherwise tape will unwind during load sequence.

3.3.2 ADVANCING TAPE TO LOAD POINT

After the magnetic tape has been threaded in accordance with paragraph 3.3.1, it must be advanced to the load point using the following procedure:

a. Toggle PWR to ON, then touch LOAD switch. The tape will move in the forward direction until the load point is detected.
b. Verify that the tape halts and the LOAD and ON LINE indicators are lighted. The tape is now positioned at the load point and the transport is ready to receive external commands. WRT EN will be lighted if write ring is installed on tape reel.

CAUTION

The dust cover door should remain closed while the tape is loaded. Performance may be adversely affected by contamination.

3.3.3. TAPE REMOVAL PROCEDURE

To unload the magnetic tape from the transport, perform the following procedure:

NOTE

If the PWR indicator is lighted, begin at step b.

a. Depress the PWR switch and verify that the PWR indicator lights. Press the LOAD switch and allow load sequence to terminate.
b. Press RESET, then REWIND switch. After the tape halts at the load point, press REWIND again; tape will rewind onto the supply reel, then motion will halt.
c. Depress the PWR switch. Remove the supply reel by lifting the reel retention lever.

TABLE 3.1 CONTROL AND INDICATOR FUNCTIONS

NOTE: All switches, except power, are pressure sensitive membrane type.

INDICATOR/CONTROL	DESCRIPTION
POWER	Toggle type indicator switch. Lighted button signifies that line power is applied, switch remains toggled when activated.
LOAD	Momentary-closure indicator switch. Lighted indicator (LED) signifies that tape is positioned at load point. Activation of switch immediately after power application initiates the following actions: 1. Compliance arm retractor lowers arms to the operating position and tension is applied to the tape. 2. Forward tape motion occurs at approximately 60 inches per second. (Load speed) 3. Tape motion halts upon detection of load point with the BOT mark in the photo sensor. If the BOT mark is not found within 10 seconds, motion switches to rewind until load point is detected. Load mode is then re-entered and tape is positioned at load point. (No marker on tape will cause tape to rewind off.) 4. Tape transport is now on-line and ready to accept external commands. LOAD and ON LINE indicators should be lighted. LOAD switch is disabled after the initial load sequence. Load sequence may be halted by pressing RESET.
ON LINE	Momentary-closure indicator switch. Indicator lights at end of initial load sequence to indicate that transport is on-line and ready to accept external commands. When ON LINE is activated, all controls except RESET and POWER are disabled. To make the Drive off-line and activate panel controls, press the RESET switch. Transport can be return to an on-line condition by pressing ON LINE switch. (For BDL and RDL operation this light indicator will also verify power on check.) (See IPS 2600 Manual)
REWIND	Momentary-closure indicator switch. Indicator lights during rewind sequence. If tape is not at load point, activation of switch causes tape to rewind until load point is detected. Motion halts, then tape is repositioned to load point and rewind sequence is terminated. If tape is at load point activation of REWIND causes the unloading of tape to the supply reel. REWIND switch can be activated only while ON LINE indicator remains unlighted. Rewind operation can be halted by pressing RESET switch.
1600 CPI	Momentary-closure indicator switch. Lighted indicator signifies that transport is operating in 1600 CPI (characters per inch) phase-encoded mode. Unlighted indicator signifies that transport is operating in NRZI mode. The switch is enabled by first depressing RESET then 1600 CPI. NRZI mode can also be reselected by pressing RESET then 1600 (indicator will be off).

TABLE 3.1 CONTROL AND INDICATOR FUNCTIONS (CONTINUED)

INDICATOR/CONTROL	DESCRIPTION
WRITE ENABLE	Indicator only. Signifies that write enable ring is present in tape supply reel. (Active switch in test mode only.)
FORWARD	Momentary-closure indicator switch. Indicator lights when tape motion is in forward direction. When transport is off line, FORWARD switch can be used to initiate forward tape motion. Tape will stop when EOT mark is detected. Tape motion will also be halted when RESET is depressed.
RESET	Momentary-closure switch. Used to activate following functions: 1. Take transport off line. 2. Use with 1600 CPI switch to change density mode. 3. Halt tape motion, except during unload. 4. Use with test switch to initiate test modes.
TEST	Momentary-closure indicator switch. Indicator lights when pressed after RESET has been pressed. Switch is used only during "Self Test" and Operational Tests. (See Section VII)

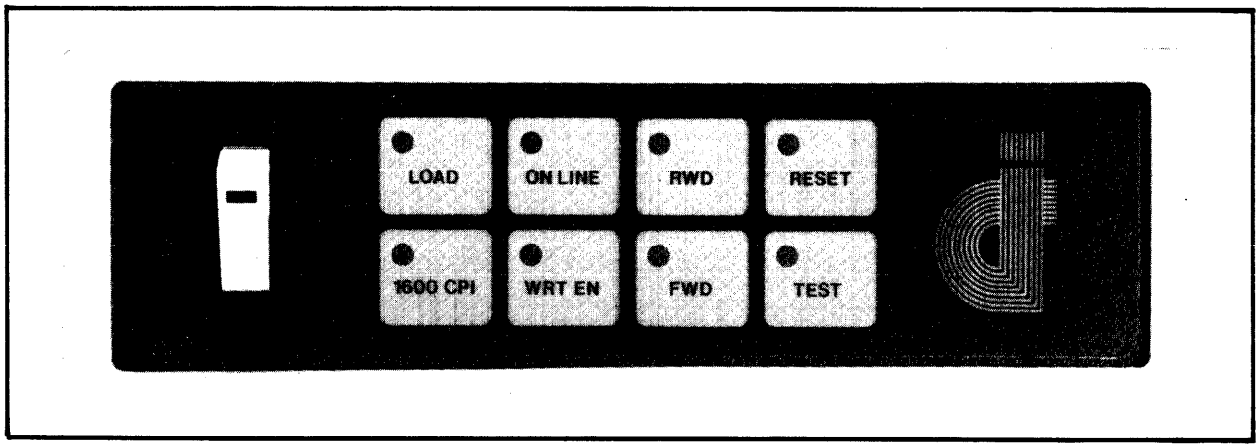


FIGURE 3-1. CONTROLS AND INDICATORS

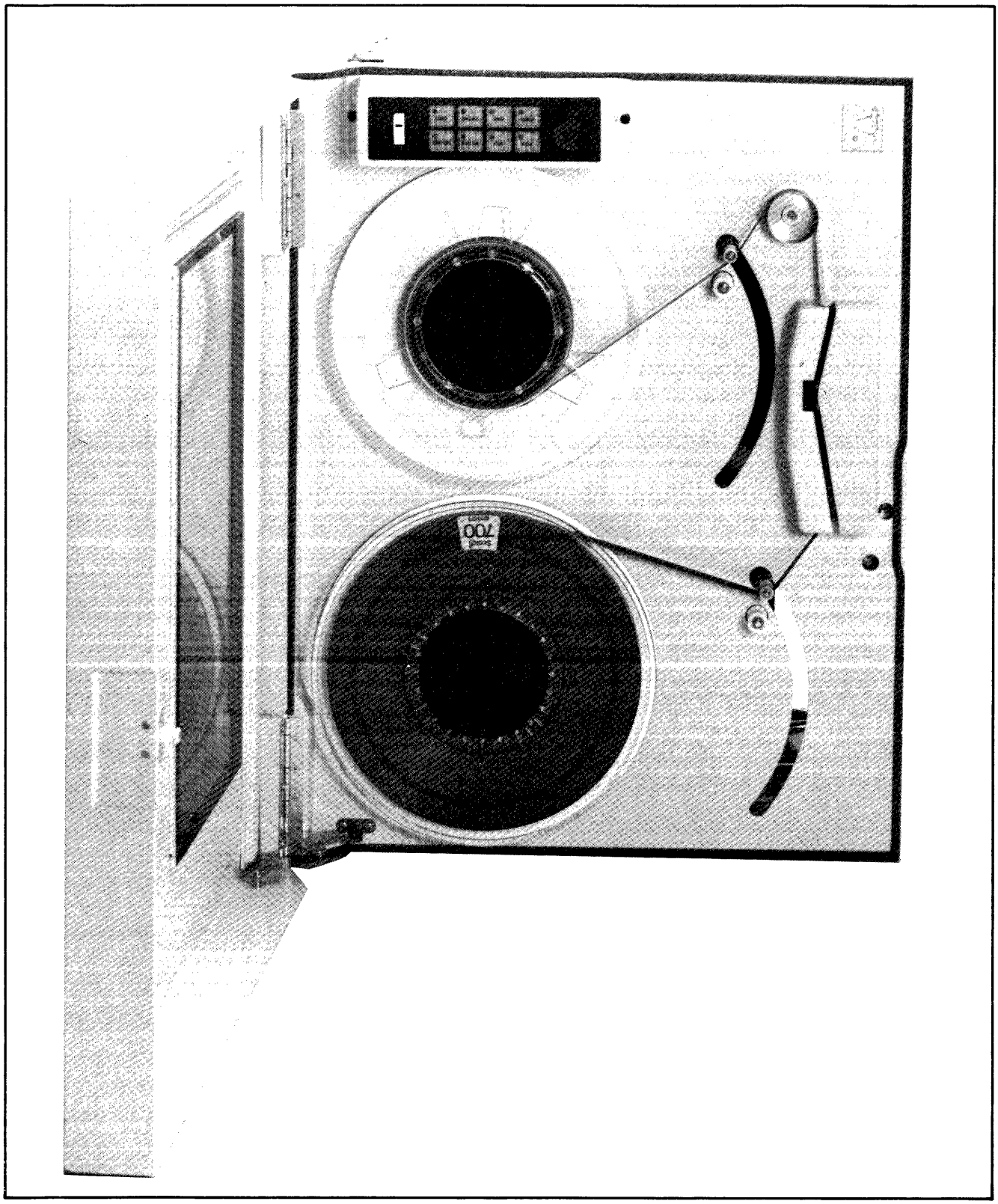


FIGURE 3-2. MAGNETIC TAPE PATH DURING THREADING
(Compliance arm retracted)

SECTION IV
THEORY OF OPERATION

4.1 INTRODUCTION

Basic operational theory describing the Series 1050 is given in this section.

The Series 1050 is a compliance-arm type synchronous digital tape transport which generates and reads ANSI, IBM, and ECMA compatible tapes in both PE and NRZI formats and in both 7-track and 9-track versions. In all cases, data format and computer interface requirements are performed by electronics not provided with the basic model. However, an integral formatter is incorporated with the Models 1053 and 1054. The scope of this discussion is limited to the transport electronics.

4.2 DESCRIPTION

Performance specifications applicable to the Series 1050 are shown in Table 4.1. Provisions within the unit permit operations with or without daisy-chain capabilities.

Magnetic tape units are peripheral components in data processing systems requiring storage and retrieval of vast amounts of data without errors. The Series 1050 has been designed for easy operation with industry compatible interface standards and simple maintenance. Safeguards are built-in for tape handling protection during normal operation.

Mechanical and structural integrity are developed by a single-casting, strain relieved top plate, which supports all mechanical and electrical components. Uniform tape tension is maintained over all dynamic operating ranges up to tape speeds of 45 inches-per-second (IPS) by two compliance arms and reel control servo loops of superior performance.

Normal operation of the tape unit is under computer control. When the tape unit is off-line, tape motion may be locally controlled by the operator with push buttons on the front of the machine. Indicator lights provide status information which identify specific system operating conditions.

Speed and tape movement direction is determined by the capstan servo in response to computer or local commands. For proper operation, the tape must be accelerated, traversed, and decelerated in a precise manner. The inertia of the tape on the reels prevents the reels from starting as quickly as the capstan, therefore a length of tape is stored in two loops over spring actuated compliance arms. Rapid tape acceleration or deceleration is compensated by shift in position of the low-inertia compliance arms during the time required for reels to match capstan motion, while maintaining tape tension across the head.

Reflective markers affixed near either end of the tape are photo-electrically sensed to prevent either end from being pulled from the reel, except when the tape is unloaded by the operator. This sensor station indicating end-of-tape (EOT) or beginning-of-tape (BOT) is located near the read/write head assembly. Status lines are provided, indicating the type of marker to the computer.

To assure that data on tape will be read correctly, the tape is cleaned just before passing over the head. The tape cleaner is a pair of ceramic blades which scrape dirt or oxide deposits from the tape.

Series 1050 operating principles are covered by the following paragraphs in order of the major functional blocks, which are:

1. Power Supply
2. Capstan Drive
3. Reel Drive
4. Control Electronics
5. Data Electronics

4.3 POWER SUPPLY (DWG. No. 01-30273, Sheet 1)

Developing power for the complete synchronous tape transport for AC input power are the following power supply subassemblies:

- External AC power input filters — Provides common-mode powerline noise filtering and selectable voltage taps.
- Transformer (T1) and Rectifier (CR1) — Which develop the raw DC power.
  Filters (PCB Assy. 11-10034-0 — DC filters.
- Regulators — Located on a heat sink mounted to the main electronics printed circuit board.
- Power Switch (PCB Assy.) — Located on the control panel.

AC power is switched by a front panel switch through a TRIAC (Q1) located on the Power Supply PCB Assembly. Regulators provide the necessary source voltage levels for the entire unit. The formatter is supplemented with an independent transformer winding (9 VAC, 6 Amps), separate rectifier (CR167) and power boost transistor 3A (2N4398). See Section 4.8 for DC power supply theory of operation.

4.4 CAPSTAN DRIVE (DWG. No. 01-30273, Sheet 2)

Tape motion is implemented by a DC-motor driven capstan. When the motor is running, tachometer DC voltage feedback stabilizes tape velocity with the capstan servo. Tape velocity is set to standard speed by potentiometer R6 and R15 for forward and reverse motions respectively. Steady state tachometer output voltage levels measured during initial adjustments establish the exact potentiometer settings for the specific standard tape speed. When stopped, capstan drift is nulled by potentiometer R28 (Refer to Section 7.2 for setting procedures.)

Initial tape loading motion is developed by switching a fixed offset voltage level into the capstan servo summing point. Tape velocity is about 60 IPS (inches per second) during loading and tape velocity ramp circuits are not used.

One bidirectional ramp generator is used in the capstan servo. Forward motion is developed by switching a positive reference voltage into the ramp generator. A precision integrator computes the ramp slope, based on the setting of R22. This establishes the start and stop distances which partially determines the inter-block-gap (IBG) dimension in accordance with tape format standards. Once the ramp generator sets the capstan in motion, slack tape is collected by the compliance arms. Differential photo-electric sensor elements read the change of compliance arm position, which is converted into a proportional drive to both takeup and supply reel servos. Since the compliance arm and reel servo loop stiffness is relatively low, start and stop commands result in larger compliance arm excursions. Therefore, reel motor action is started simultaneously with the ramp function using the compliance arm offset (COS) generator (Refer to device 9H). Operation of the COS generator is such that compliance arm position during tape motion is optimized to an offset from nominal which provides greater arm travel during stopping dynamics.

Either a forward or reverse command (FWC or REC) to the interface is sampled by the 3870 microprocessor, which sets the FWDA or REVA Analog Switches (Refer to 11J), which switch the appropriate reference voltage into the ramp generator. Figure 4-1 shows typical capstan servo waveforms.

Rewind action, when commanded, occurs through the 3870 supervising control. Analog switches are activated in the rewind circuit, initiating capstan action. Signals CAPN and RWHA (Capstan ON and Rewind Halt) are normally logic TRUE, except during rewind. To initiate rewind, CAPN and RWHA are set FALSE while CAPR and RWDA are TRUE, feeding a reference voltage level via the transistor switch at 10J-16 through integrator 12J-8 and switch 10J-8 into the capstan servo summing point at 9J-2. Rewind drive voltage continues to increase and the reels gain speed until at least one compliance arm moves to a position which trips the half-arm-travel-limit (HATL) sensing circuit (6J-8). The HATL polarity counterbalances the rewind reference voltage to prevent reel speed increase without bound. Average rewind speed is about 200 IPS.

When the BOT marker crosses the sensor, the 3870 detects the event and immediately returns RWHA logic signals to normal ON state, which also turns RWDA off. The reels slow to a stop under control of the decaying control voltage provided by integrator 12J-8. Tape motion condition is indicated by a window comparator (8H-1) operating on the capstan tachometer output. Motion logic (MO) is FALSE when the tape has stopped, whereupon CAPR is turned OFF and CAPN ON enabling LOAD, forward motion as commanded by the 3870 until BOT is sensed and the tape stopped at loadpoint, completing the rewind sequence.

At loadpoint, it is possible to unload the tape when the transport is OFF LINE. OFF LINE condition is obtained by manually depressing RESET on the front panel, which branches the 3870 into a subprogram that monitors other panel switches. Depressing REW while at loadpoint (LOAD is illuminated) activates the unload position output (ULP, 8J-5) from the 3870. Capstan reverse motion is initiated and the compliance arms are lowered close to the lower bumpers. The arms fall lightly on the bumpers when tape slacks from the takeup reel. Withdrawal of the tape through the EOT/BOT sensor station near the head is sensed and the ULP turned OFF. At this time the fail-safe-relay (FSR, K1) is de-energized, which shorts the reel motor windings, providing dynamic braking. Following this, the retractor motor is started to move the compliance arms to the initial loading position. The unload sequence is complete and the tape may be manually dismounted from the supply reel.

TABLE 4.1 MECHANICAL AND ELECTRICAL SPECIFICATIONS

Tape Recommended	Scotch 700 (6250 CPI)
Width	12.649 ± 0.051 mm (0.498 ± 0.002 inch)
Thickness	38.1 microns (1.5 mil (also 1 mil)
Tape Tension	2.224 ± 0.139N (8.0 ± 0.5 ounces)
Reel Diameter	26.67 cm (10.5 inches) maximum
Reel Capacity (38.1 micron tape)	731.52 m (2,400 feet)
Recording Mode (IBM, ECMA and ANSI)	9-track 630 c/cm (1600 cpi) PE or 315 c/cm (800 cpi) NRZI 7-track = NRZI (200/556/800 cpi) 2 of 3
Standard Tape Speeds	45, 37.5, 25, 18.75, 12.5 IPS
Instantaneous Speed Variation	± 3%
Long Term Speed Variation	± 1%
Rewind Speed	5 m/s (200 ips) average, 10.5 inch reel
Interchannel Displacement Error	
Read	2.54 microns (100 μ in)
Write	Electronically Compensated
Stop/Start Displacement	4.826 ± 0.5080 mm (0.19 ± 0.02 inches)
Beginning of Tape (BOT) and End of Tape (EOT) Detectors	Photoelectric IBM Compatible
Weight	41 kg (90 lbs)
Dimensions	
Height	60.96 cm (24.0 inches)
Width	48.26 cm (19.0 inches)
Depth (from mounting surface)	40.64 cm (16.0 inches)
Cable Clearance	5.08 cm (2.0 inches)
Operating Temperature	2°C to 50°C (36°F to 122°F)
Non-Operating Temperature	-45°C to 71°C (-50°F to 160°F)
Operating Altitude	0 to 6,096 m (0 to 20,000 feet)
Non-Operating Altitude	0 to 15,240 m (0 to 50,000 feet)
Power	
Volts ac	100, 120, 220, 240 ± 10% (selectable) Optional 48vdc (42 to 56vdc)
Power (maximum on high line and worst case command rate)	300 Watts/1051-52 500 Watts/1053-54
Frequency	48 to 420 Hz (single Ø for 400 Hz)
Mounting	Standard EIA Rack, 19-inch vertical or 24-inch horizontal (User supplied)
Electronics	All Solid State, Standard Parts
Relative Humidity	15 to 95% non-condensing
Certification	FCC Class "A"
MTBF	10,000 hours
MTTR	45 minutes
Data Transfer Rate @ 45 ips	PE = 72 KBytes per second NRZI = 36 KBytes per second

4.5 REEL DRIVE (DWG. No. 01-30273, Sheet 3)

Two servo loops control the supply and takeup reels. Storage of reserve tape lengths is provided by the compliance arms, which permit the capstan to accelerate more rapidly than the higher-inertia reels.

Compliance arms positions are sensed photo-electrically for input to the reel servos. During loading, the FSR is turned on and the retractor motor started to lower the compliance arms. During this time, the reel servos tension the tape in place due to a control voltage supplied from transistor switch Q52. Completion of the retractor cycle turns Q52 OFF and asserts the normal reel servos operation. The loading sequence continues as the 3870 initiates a search forward motion until the BOT marker is sensed. At BOT, tape motion sequence is terminated and ON LINE mode is initiated, which places the transport under computer control and deactivates all but RESET and POWER panel switches. Reel servos are controlled in ON LINE made by capstan action.

4.6 CONTROL ELECTRONICS (DWG. No. 01-30273, Sheet 4)

The block diagram for the Series 1050 control system is shown in Figure 4-2. Commands and status at the external interface are interpreted in accordance with the digital control section. Refer to Section 2.11 for interface signal description.

The purpose of this section is to describe the conversion process between the digital interface controls given in Section 2.11 and the analog components which respond to control stimuli.

Principal components which implement the transport control functions are the 3870, single chip, 8-bit Central Processor Unit (CPU). The 3870 executes F8 instructions, consisting of a set of more than 70 commands. Integrated on the single MOS circuit device are 2048 bytes of read-only memory (ROM), 64 bytes of scratch pad random-access memory (RAM), a programmable timer and 32 basic I/O lines arranged as four 8-bit ports. The I/O capability of these four ports is expanded using multiplexing devices to include 30 input lines and 23 discrete output control lines, totaling 53 I/O lines. The functions of the control program stored in the 2048 bytes of ROM is to sense each input and manipulate each output line in accordance with the current machine state. Figure 4-3 shows all the digital control section inputs and outputs, identified by appropriate mnemonics.

Principles of operations may be examined by referring to the program flow diagram (Figure 4-4) for the condition when the transport is ON LINE and under computer control. Tape loading procedures conclude with the BOT marker positioned just in front of the head and the transport ON LINE, which enters the program flow at the point identified by the READY label in Figure 4-4. Initialization of the various control lines is performed, following which the GO input line is continously sampled until either a reverse or forward command is activated at the external interface. Tape motion is immediately started. The write enable command line is tested and then the write enable ring is tested. If the command is write and the ring not installed, the write head current switch is disabled and normal read mode executed. If the ring is installed, read threshold is automatically set high for stringent read-after-write testing.

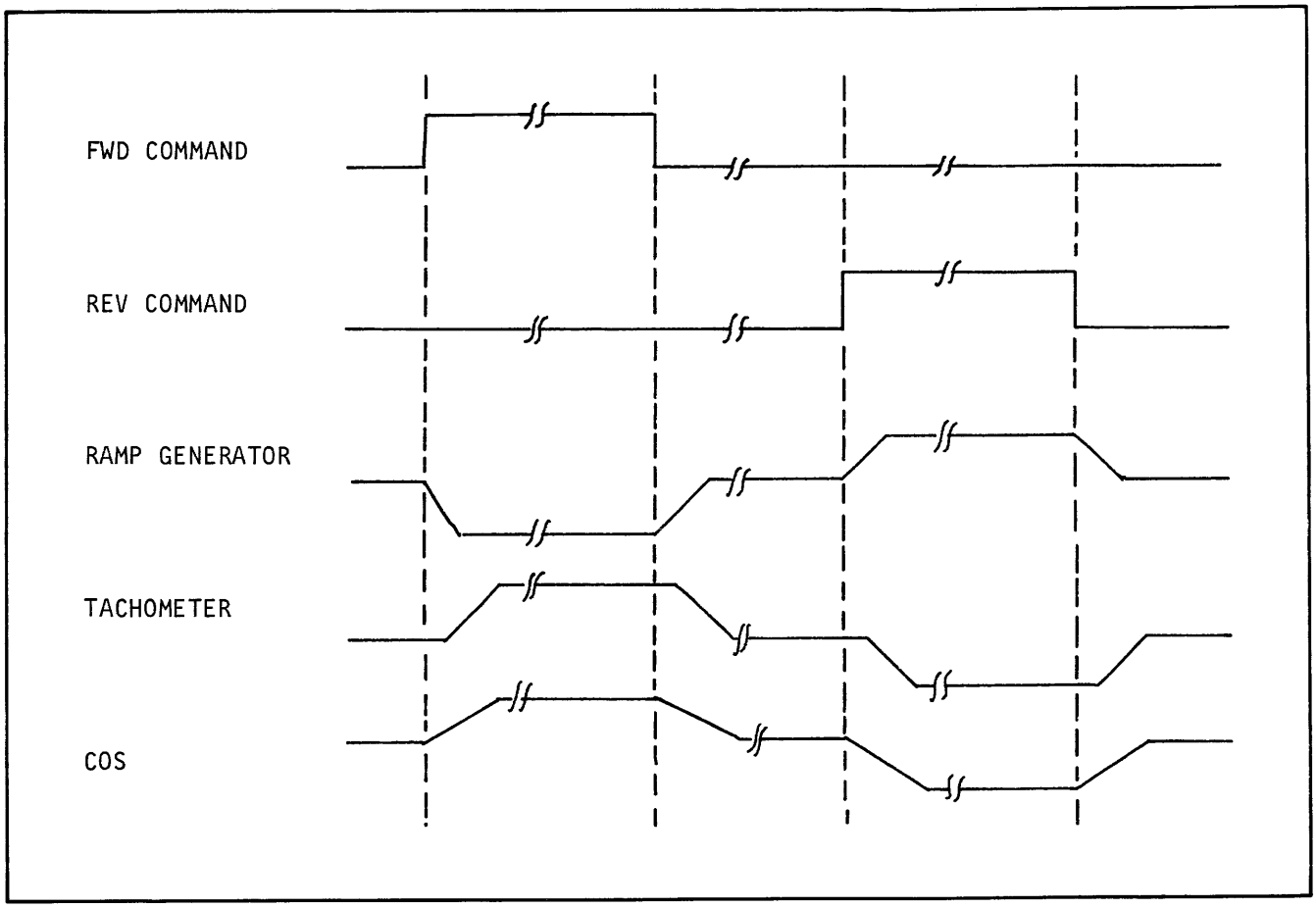
After read threshold setting, the CPU waits until the 4 millisecond timer has expired, sets the READ circuits ON and samples the FORWARD command line. If tape motion is forward, no check for BOT is performed; otherwise the tape is moving in reverse direction and must stop if BOT is sensed. GO is always checked for both directions to stop motion at end-of-record. Verification of GO = FALSE loops the program to the initialize block, ready for the next command.

Control outputs from the CPU to the analog control section are the result of program operation which sets each particular output either ON or OFF. Analog controls respond and analog-to-digital conversion is performed by various limit comparators and input to the program as status bits, forming a closed-loop, microprogrammable control system. Various self-protective features are integrated with the status. Broken or misthreaded tape will result in out-of-range compliance arm travel which will interrupt the program and stop the system. Loss of power or failure of a tape position sensor will also stop the system.

Power-fail/recovery is possible with the load-on-line (LOL) command option. In the event of a power outage and return the computer may issue LOL. This causes the transport to automatically regain tape tension and go ON LINE, ready for normal operation without rewinding to load point.

Supplementary off-line testing capability is provided within the 2048 bytes of ROM program. (Refer to Section VII, Testing.) These tests exercise all portions of the Series 1050 and enhance field service capabilities with minimum external test equipment.

FIGURE 4-1. CAPSTAN SERVO WAVEFORMS



4.7 DATA ELECTRONICS (WRITE) (DWG. No. 01-30273, Sheet 8)

A dual gap read-after-write head is supplied with a full width erase head. The write and read stacks are center tapped.

Write data waveforms are developed and electronically deskewed prior to transferring the waveforms to the head. The trailing edge of the write strobe (WDC) loads the write register, the contents of which are converted into individual track write currents when clocked for the deskewing circuit. Taps, set at the factory, determine the write current timing per character on each track; compensating for write gap lateral position variations on tape from track to track.

The write register is DC reset at certain times to ensure that the writing currents are always initially in the erase conditions. The logic created for this is such that a FALSE condition for Write Enable (WEC) or TRUE for Write Reset Command (WRC) will perform the DC reset.

Flow of power to write and erase heads is controlled by the CPU as discussed previously.

DATA ELECTRONICS (READ) (DWG. No. 01-30273, Sheets 5, 6 & 7)

Read heads convert magnetic flux changes on tape to low level analog signals proportional to tape speed. The read recovery electronics shape the analog signals into digitized signals. This is accomplished by linearly amplifying the read head signal to a suitable operating level and then differentiating to convert peaks to zero crossover points. Next, zero crossover detection is accomplished by hard limiting. The limiter output is routed directly to the output for PE mode. NRZI mode limiter outputs are electronically deskewed prior to generating the read strobe (RSB) to the external interface. (Read strobes are not necessary for PE data.)

Envelope detection is done in parallel with the limiting process. The purpose of this is to disable data output while in the inter-record gap.

The read threshold circuit generates reference levels for the envelope detector. In the write enable mode, the threshold is set for 28 percent of the peak-to-peak read signal amplitude, corresponding to the ANSI definition for tape dropout. In read mode, the threshold is dropped to 15 percent. Selectable lower threshold (TH2) is provided at the 7 percent level. This control line has no effect in write mode.

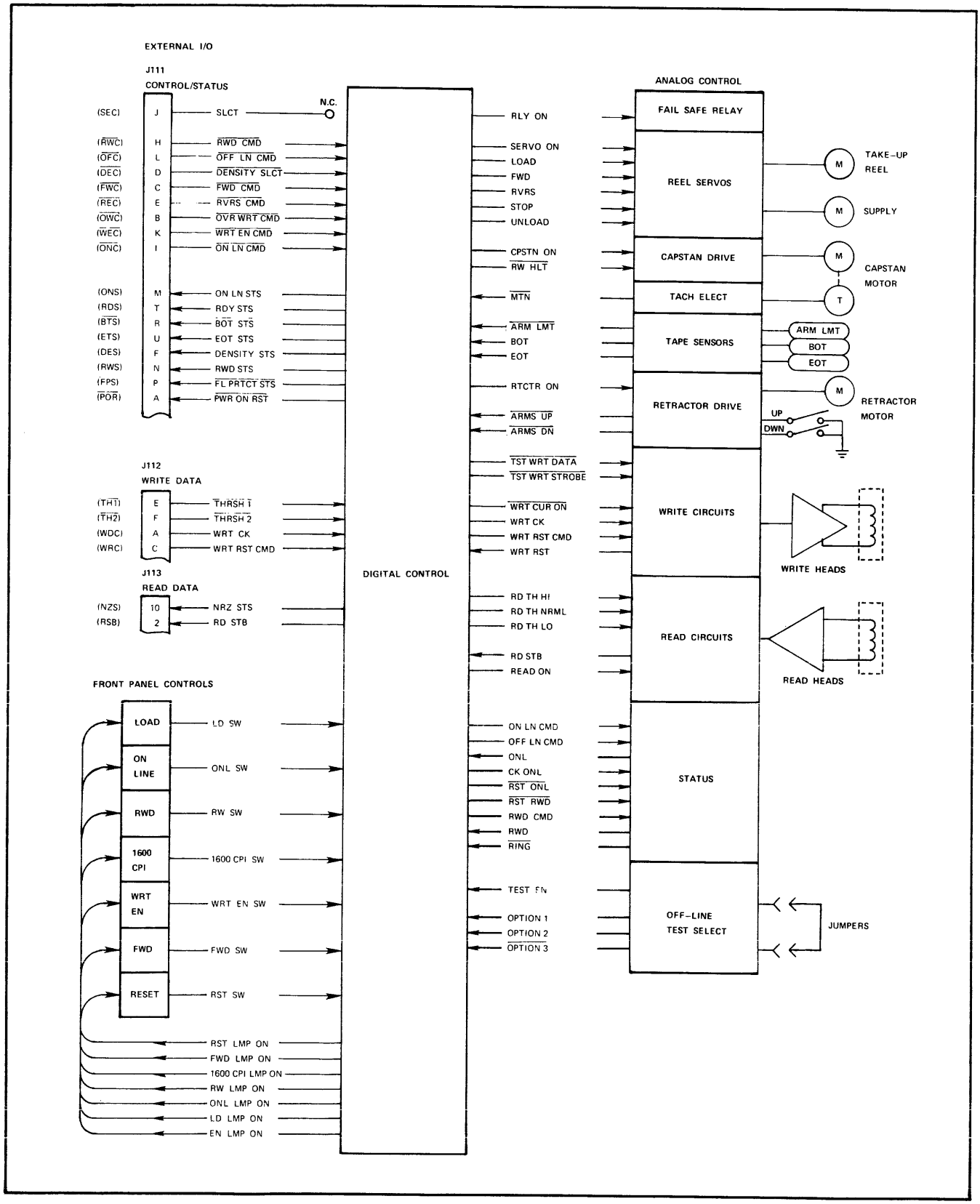


FIGURE 4-2. SERIES 1050 CONTROL

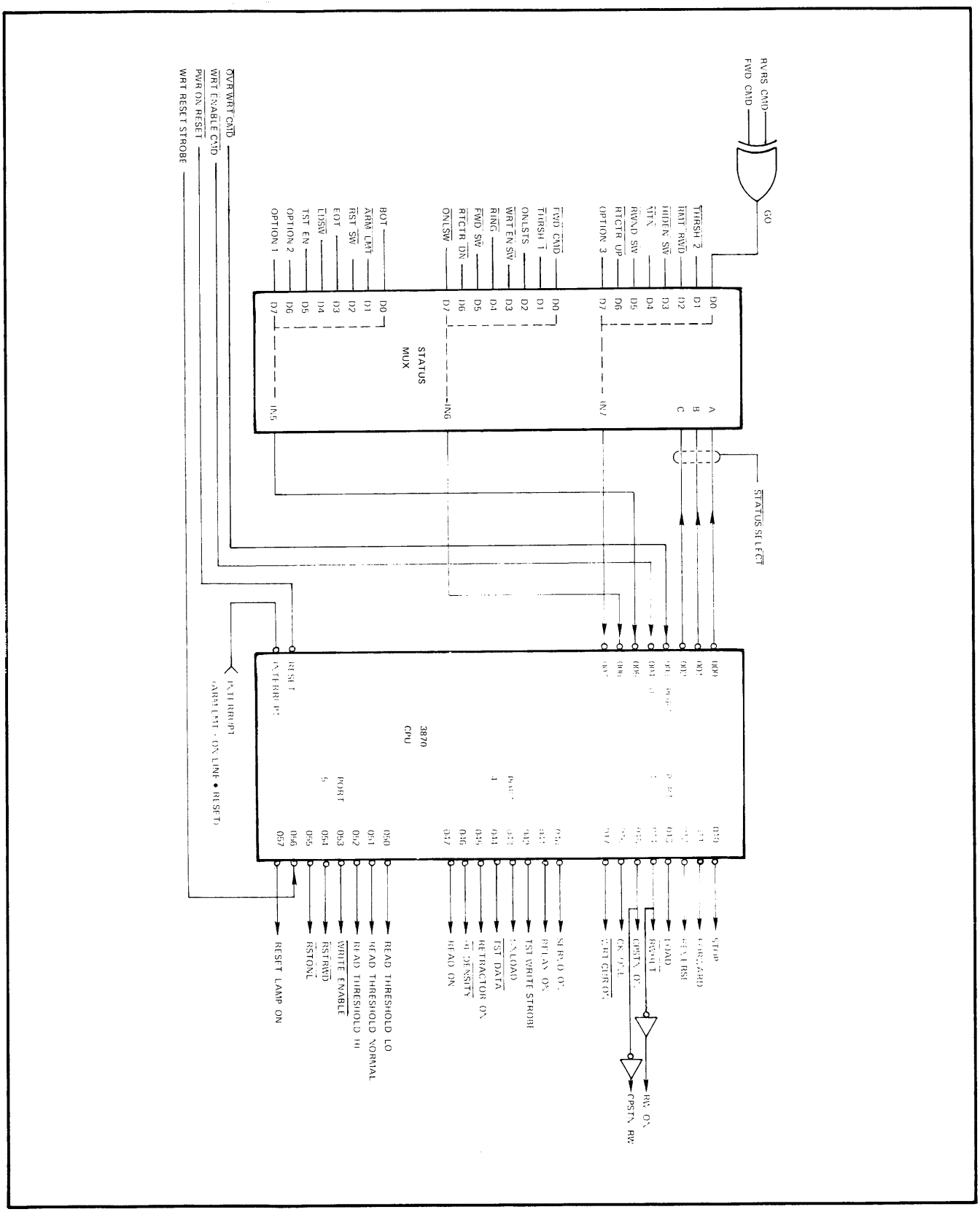


FIGURE 4-3. MICROPROCESSOR I/O FUNCTIONS

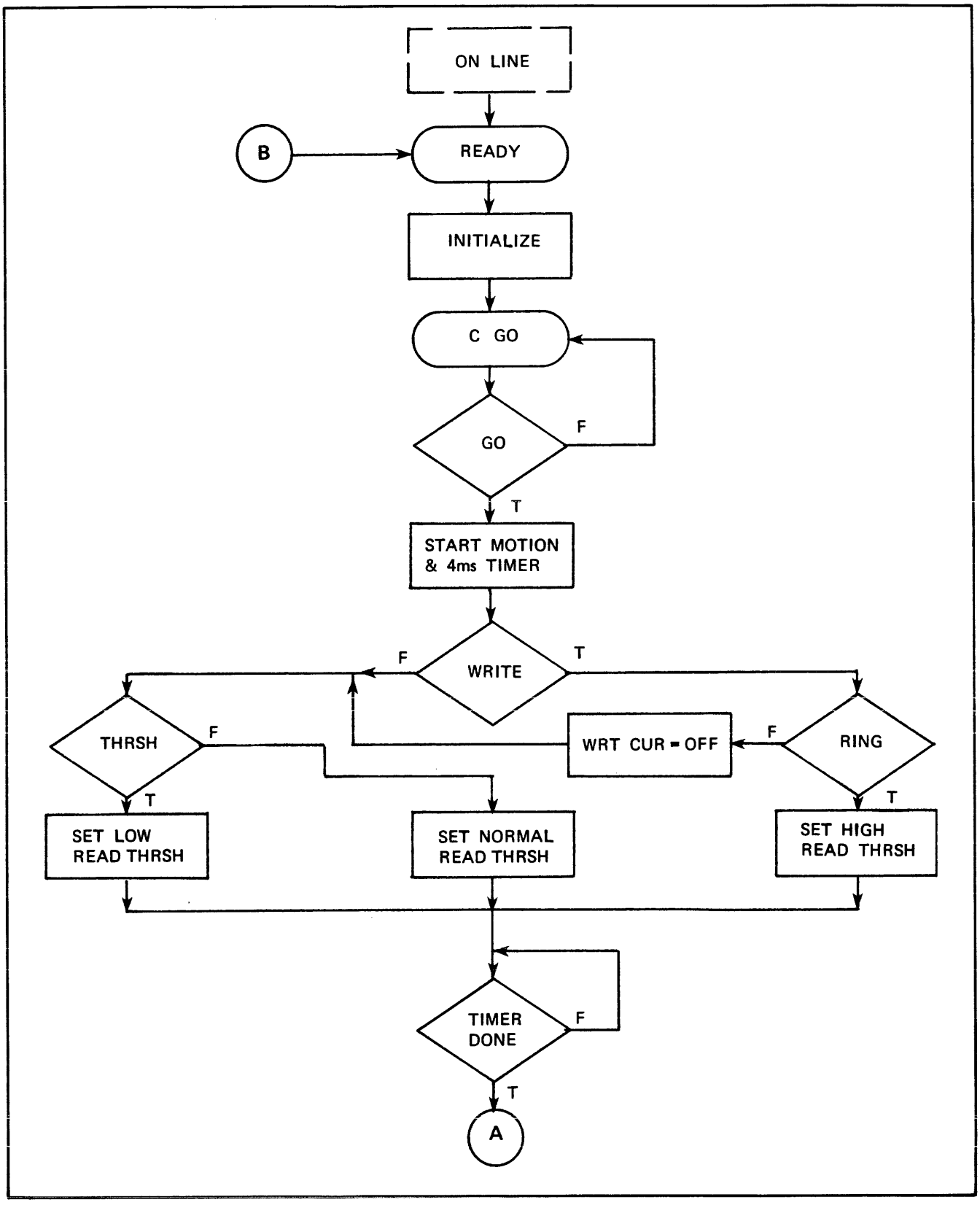


FIGURE 4-4. PROGRAM FLOW, ON LINE

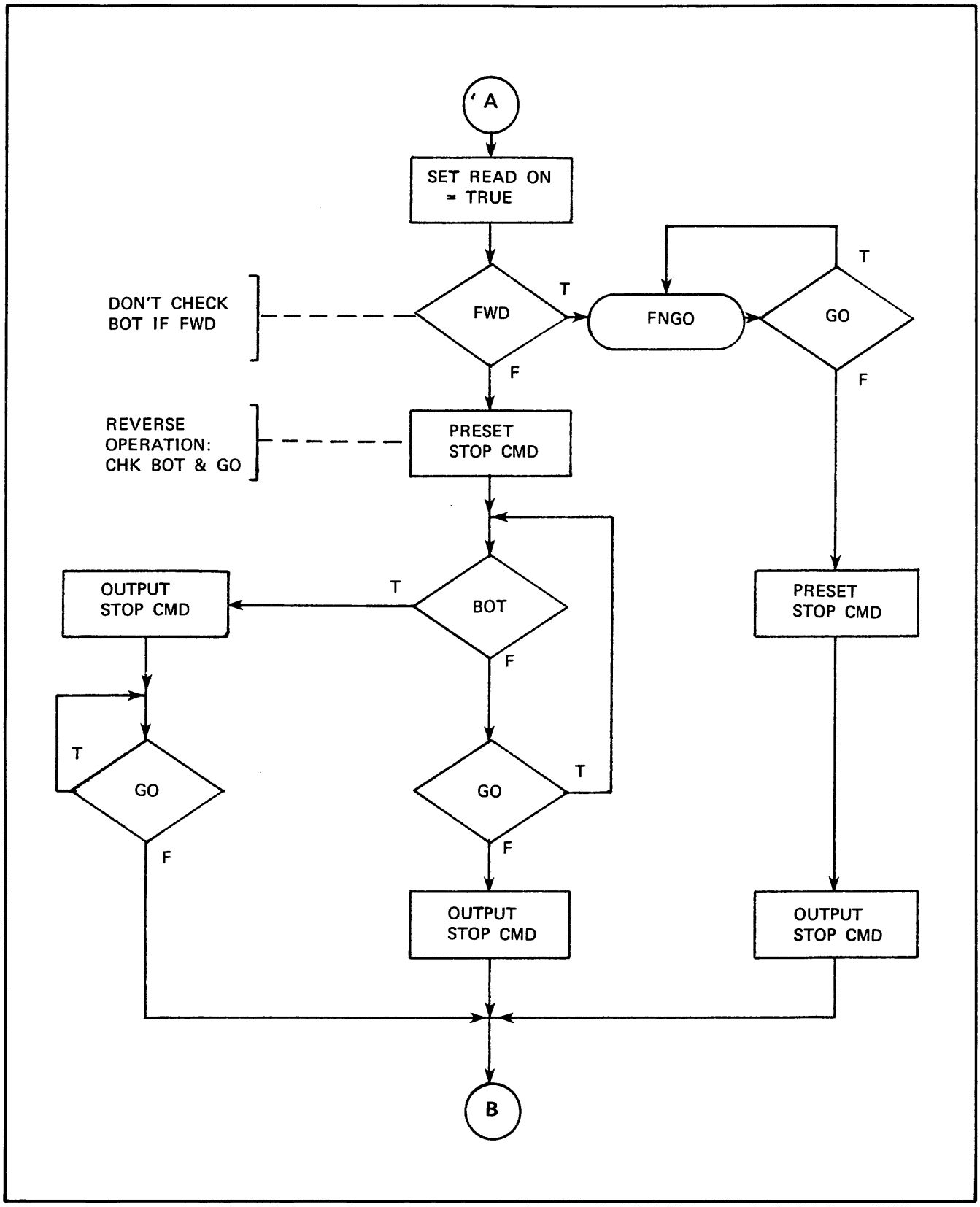


FIGURE 4-4. PROGRAM FLOW, ON LINE (CONTINUED)

4.8 DC-DC CONVERTER 48V POWER SUPPLY (DWG No. 01-30196)

The DC-to-DC converter for the Series TD-1050 Magnetic Tape Transports has been electrically designed to meet the power requirements of the drive in all its configurations. The package is physically interchangeable with the AC power transformer. The 48V volt input, power latch, and mechanical ground terminals are on the converter enclosure, along with the circuit breaker/master power switch. The front panel power switch controls power On/Off as it does for the AC powered drive.

Figure 4-5 is a block diagram of the DC-to-DC converter. Each block contains an encircled number referenced in this text. Also, the schematic IDT Drawing Number 01-30196 should be referred to when reading this section.

The input filters 1 and 2 provide conducted noise isolation.

The circuit breaker SW1 provides mains protection at 10 amps and manual master power On/Off. CR1 provides reverse polarity protection in the case of inadvertent reverse connection of the 48V mains.

The 48V DC is chopped by high speed Darlington switches Q7 and Q8 (Block 3). C6 and R40 function as a damper (snubbing) network to limit the peak collector voltage.

Transformer T2 and rectifier/filter block 4 and 5 provide the isolated transformation of the 48V input to output of +20V, -20V, and +8V. These outputs are then applied to the Series TD-1050 Tape Drive in the same manner as the AC power supply. (DWG 01-30273, Sht. 1 of 8).

A power latch or power hold feature is implemented within this converter. It provides the option which, once the drive has been turned on, remotely holds the power on whether or not the front panel power switch is turned off.

The power latch input line is referenced to the 48V input mains. Power latch is enabled if the power latch input is connected to the positive 48V level and disabled if open circuited, or connected to the negative 48 volt terminal. The worse case current required by this power latch input, when connected to the positive terminal, is 3 ma.

Block 6 , comprised of Q1, Q2 and associate components, provides the level shifting required to refer the power hold input to the negative 48 volt level.

Block 7 is the power hold switch which effectively hold the manual front panel switch closed when power hold is enabled.

Block 8 raw 48V main power conditioning and level sensing.

Plus 15 volts is generated to supply the various control circuits in the converter via Q6, CR7 and the base-to-emitter diode of Q5.

By adding Q5's base-to-emitter diode to the regulator reference, Q5 can be used to detect input voltage levels above approximately 32 volts. This voltage sense output is then used as a conditioner that allows the converter to be turned on.

Once the minimum input of 32 volts condition is met and the unit is turned on, Q4 and its associated components reduce the minimum output requirement to approximately 22 volts. The converter is automatically disabled, should the input fall below this level.

The 32 volt to 22 volt hysteresis provides protection from power-on/power-off cycling due to high 48 volt supply source resistance.

Block 9 , consisting of Q9, C21, and R27 associated circuitry, provides a slowly rising voltage ramp to the pulse width regulator. This input causes slow start for the converter. This controlled starting minimizes current surges on the 48V input and eliminates excessive stress on the converter's components.

Block 10 provides the drive required by the input 48V chopper. The low level outputs of the pulse width regulator are inadequate to drive the chopper directly.

Transistors Q10, 11, 12 and Q13, 14 and 15 provide the application of voltage swing and power output necessary to drive the chopper.

Components C26, CR14 and C28, CR15 provide the voltage translation necessary to drive the bases of the output choppers below the emitter levels.

Zener diode CR10 provides the voltage control reference for the converter outputs. As the Zener's voltage is exceeded, current flows through the light emitting diode of the optic coupler of block 12 , causing a current in the phototransistor proportional to the output voltage.

This "feed-back" current representing the output voltage is then applied to the pulse width regulator.

The optoisolator provides absolute isolation between the 48V power source and the converter's outputs.

The remaining block, block 11 , is a single integrated circuit (generic part no. 3524). Detailed operation of this integrated circuit is not given here. Excellent descriptions of operation are available in various integrated circuit manufacturer's handbooks.

In general, this monolithic integrated circuit contains all the control circuitry for a regulating power supply inverter or switching regulator. Included in a 16-pin dual-in-line package is the voltage reference, error-amplifier, oscillator, pulse width modulator, pulse steering flip-flop, dual alternating output switches and current limiting and shut-down circuitry.

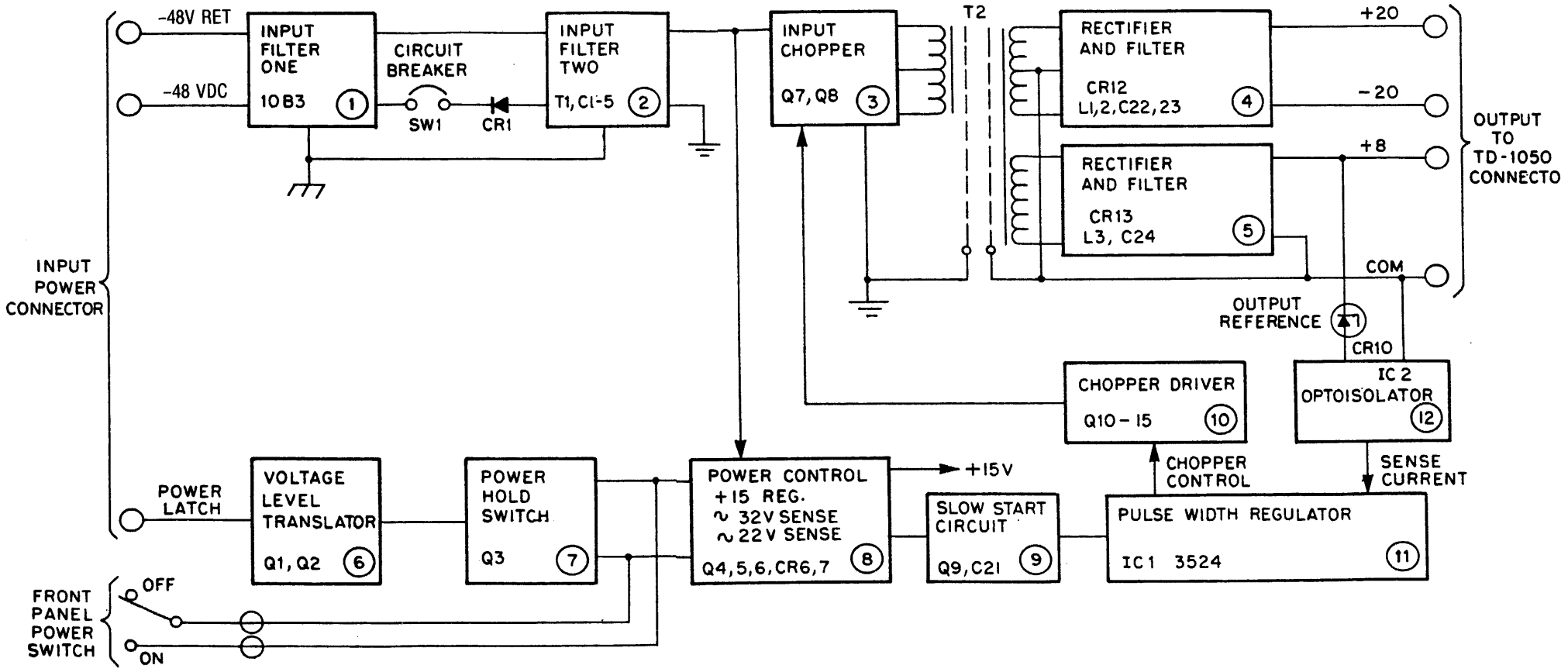


FIGURE 4-5. BLOCK DIAGRAM — DC TO DC CONVERTER FOR IDT TD-1050 SERIES

SECTION V
PREVENTATIVE MAINTENANCE

5.1 INTRODUCTION

This section contains procedures for maintaining the equipment in optimum working condition. Corrective maintenance procedures involving disassembly, re-assembly, etc., of the transport are provided in Section VI.

5.2 PREVENTATIVE MAINTENANCE SCHEDULE

The Series 1050 should be cared for on a regular basis as shown in Table 5-1.

TABLE 5-1
PREVENTATIVE MAINTENANCE SCHEDULE

Maintenance Operation	Frequency	Paragraph
1. Clean head assembly, tape guides and capstan.	Daily	5.3 5.5
2. Clean ceramic tape cleaner.	500 hours	5.4
3. Clean housing and dust cover door.	As required	5.6

5.3 HEAD ASSEMBLY AND TAPE GUIDE CLEANING

NOTE

To gain access to the head assembly and tape guides, lift off the two-part head assembly dust cover.

Clean the components with a lint-free, non-abrasive swab moistened with isopropyl alcohol or head cleaner (Miller-Stephenson MS200 or equivalent). Wipe off excess cleaner and allow components to dry before replacing dust covers. Clean areas shown in Figure 5-1.

Clean Roller Guides 1 and 2, upper and lower compliance arm guides with a lint-free, non-abrasive wipe or a cotton swab moistened with isopropyl alcohol or head cleaner (Miller-Stehpenson MS200 or equivalent).

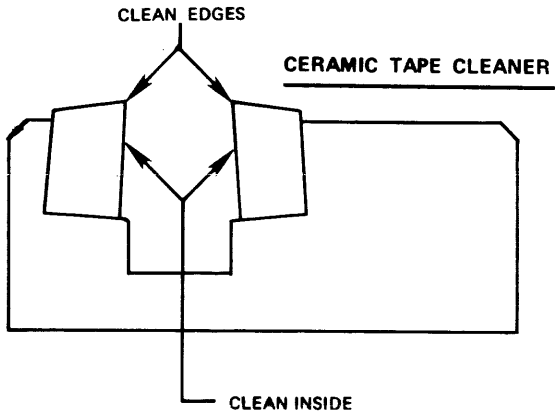
CAUTION

Do not soak the guide with cleaner. Excess solvent may break down the bearing lubricant.

5.4 TAPE CLEANER

1. To gain access to the tape cleaner, lift off the head assembly dust cover. Remove the upper screw that secures the BOT/EOT sensor assembly to the top plate and slightly loosen the lower screw of this assembly (sensor). Slide the BOT/EOT assembly in a downward direction to gain access to the ceramic tape cleaner.
2. Slightly moisten a cotton swab with grade 38-1200 (2-3 microns) lapping compound, and gently clean the inside and edges of the ceramic cleaner until all traces of oxide are removed.
3. Moisten another cotton swab with head cleaner fluid or alcohol and remove all traces of the lapping compound.
4. Resecure the screws retaining the BOT/EOT sensor assembly and reinsert the head covers.

The grade 38-1200 lapping compound is available from:
United States Products Co.
518 Melwood Avenue
Pittsburgh, PA 15213



5.5 CAPSTAN CLEANING

CAUTION

DO NOT use alcohol, head cleaner or other solvents to clean capstan sleeve.

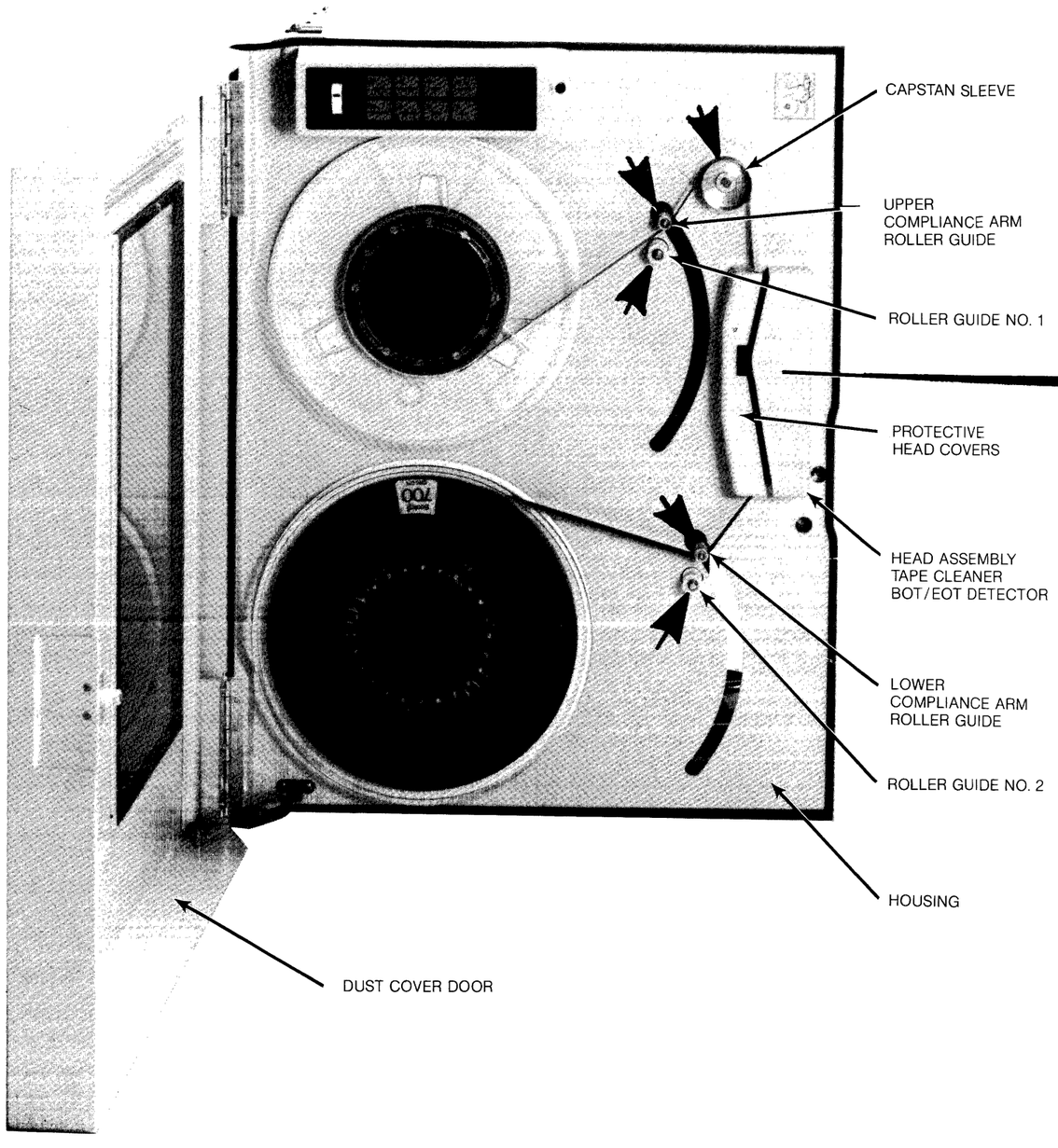
Clean capstan sleeve with lint-free, non-abrasive wipe moistened with a non-solvent degreaser such as FREON, Type TF or use a slightly moistened, clean-lint free cloth, with water.

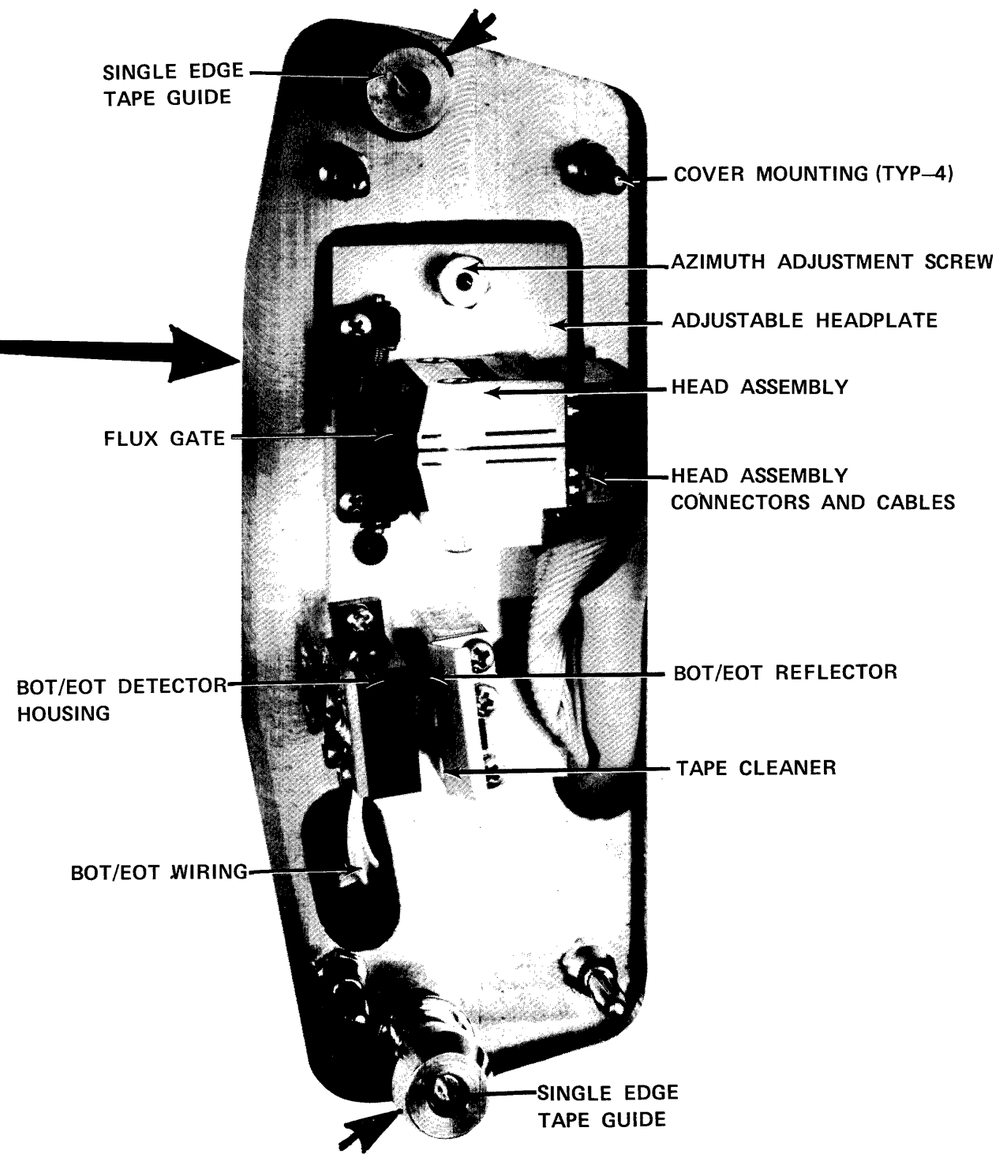
5.6 HOUSING AND DUST COVER CLEANING

CAUTION

DO NOT use rough or abrasive material to clean the dust cover door as permanent scratches may result.

Clean the housing, dust cover door, and control panel with Miller-Stephenson MS 260 or equivalent commercial grade cleaner.





CLEANING POINTS

FIGURE 5-1. CLEANING POINTS

SECTION VI
MAINTENANCE

6.1 INTRODUCTION

This section contains Series 1050 Tape Transport maintenance and mechanical subassembly replacement procedures. Included are corrective maintenance procedures, recommended tools and test equipment and recommended spare parts. Refer to Section IX for diagrams.

CAUTION

These procedures should be performed by trained personnel. Alteration or repair of equipment except by IDT personnel or IDT-trained customer personnel may void the Warranty.

CAUTION

Equipment rack must be secured if unit is to be swung open. Weight of transport may upset an inadequately balanced equipment rack.

Recommended tools and test equipment are listed in Table 6.2.

6.2 FUSE REPLACEMENT

There are five fuses used in the Series 1050. Three eight-ampere (Type AGC-8) are located at zone C-D/18 on the main electronics board. A sloblo fuse is located in the power input receptacle on the back of the power supply (Refer to Fig. 2-6 in Section II for the correct fuse selection). A fifth fuse, a 5 amp (AGC-5) is located at 2-E on the main electronic board. This fuse is to protect the drivers for the retractor motor.

6.3 TAPE ALIGNMENT (READ SKEW) AND WRITE DESKEW

This procedure is to be used only if a major tape component has been replaced, i.e., roller guides, hubs, capstan sleeve, etc., or a maladjustment of tape path is observed. Figure 6-1 details all of the components of the tape path. To align the path the following procedure is used. If in doubt regarding the method of removal of any part listed see appropriate paragraph in this section.

REQUIRED TOOLS AND EQUIPMENT

Quantity	Description
1	Pericomp or IBM Master Skew Tape 800 BPI
1	Oscilloscope
-	Assorted Hand Tools
-	Spacers (Shims) .002, 006. 010 and .016
1	Micrometer

6.3.1 PRELIMINARY

A. Prior to starting this procedure the speed, read gate and write deskew pulse width adjustments must be performed per the "Operational Self Test" procedure (Section 7.2).

B. Disconnect all cables connected to INPUT/OUTPUT P.C.B. and/or formatter input connectors.

C. Move blue jumper as follows:
E16-E17 to E16-E-18 (at location 17J)

D. To perform skew, transport must be in 800 bpi (NRZI) density. Verify that jumper E28-29 is IN (Location 16-S). If transport is set for 1600 (PE) only then move jumper from E32-33 or possibly E30-31 (remote density sel) to E28-29. Remember to return all jumpers to original locations at end of testing.

2. READ/WRITE HEAD AZIMUTH ADJ.

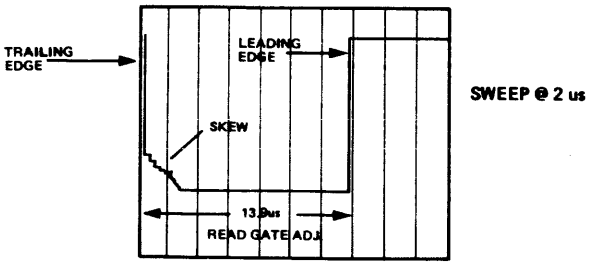
A. Load "800 bpi Master Skew Tape" (IBM or Pericomp) on drive and press LOAD SW. Tape will move forward to load point (BOT) and stop.

B. Press RESET SW, then press TEST SW (both will light). Press FWD SW and tape should move at normal speed.

C. Attach a scope to test point 52 (location 6-P) ground lead to COM T.P. (at location 11-D of main PCB).

D. Set scope volt scale to 1 volt and sweep to 2μ S for 45 and 37.5 ips or 5μ S for 25 -18.75 -12.5. Using automatic trig. mode sync scope on trailing edge of pulse and position waveform to center of scope as shown:

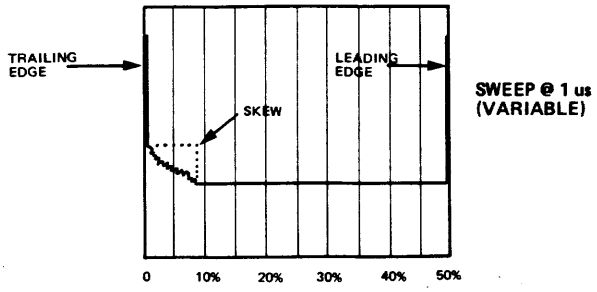
SCOPE WAVEFORM



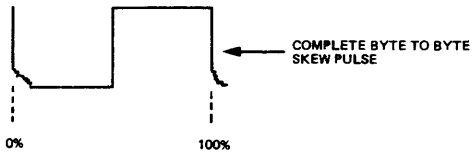
(SHOWN FOR 45 ips)

E. After noting that display is similar to above drawing, switch the scope sweep to the next faster sweep (at 45 ips to 1μ s). Using the scope variable sweep, adjust the waveform so the trailing edge triggers on the left of scope and the leading edge is on the right of scope (10th graticule) as shown next:

SCOPE WAVEFORM



F. With scope and waveform adjusted as above, each major graticule (10 total) equals 5% of the complete byte to byte skew pulse.

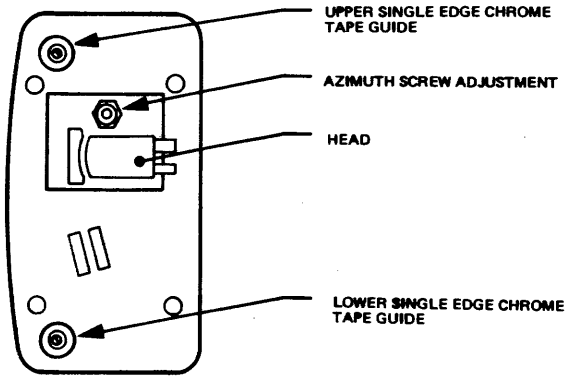


G. The actual skew is that portion on the trailing edge that is jagged and bouncy. This skew should not exceed 10% in forward and reverse directions. To operate drive in Reverse simply push Reset to Stop drive and then push WRT EN for Reverse.

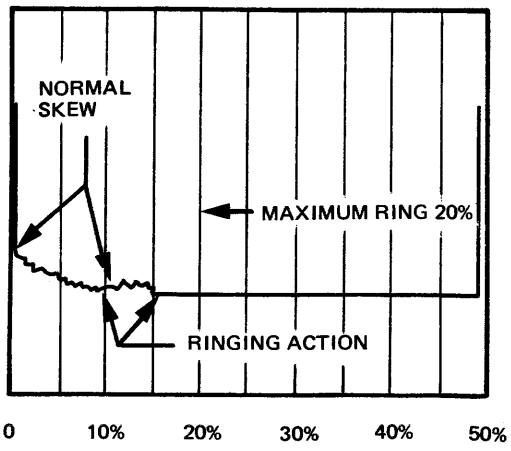
H. If skew is in excess of 10%, then while monitoring scope, slightly turn the azimuth screw, located directly above the head on front head plate, in either CW or CCW direction. Field adjustment should not normally require more than a ¼ turn to decrease skew to its mininum deflection. Check forward and reverse upon completion of adjustment.

3. SKEW RINGING ACTION (FORWARD)

A. With skew tape running in FWD, depress the spring loaded chrome washer on the upper single edge chrome tape guide. Do not touch tape.

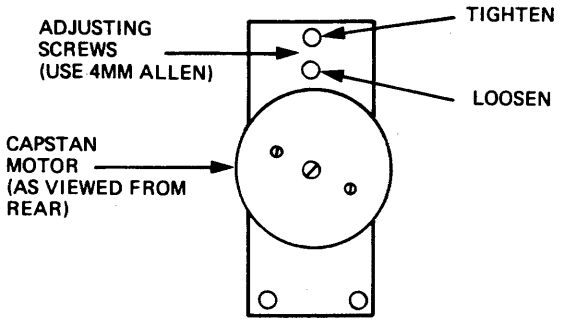


B. The skew waveform should increase on scope from a normal 10% or less to a range of between 15 and 20% (see below). If it does not fall in this range, then proceed as follows:



1) No Ringing Action (or less than minimum)

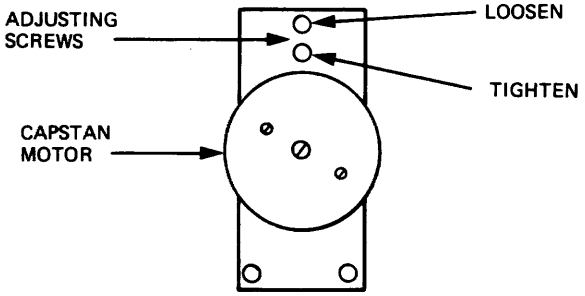
While depressing guide spring and monitoring ring on scope, loosen and tighten screws slightly (as marked) to increase ringing to approximately minimum value of 5% over normal skew pattern.



2) Excessive Ringing Action (more than 20%)

Loosen and tighten screws slightly (as marked, opposite of prior action).

Decrease skew ringing to approximately 15%. When ring is correct, make sure both screws are tight and secure from their pushing and pulling action.



C. Upon satisfactory completion and tape is still moving FWD, depress the spring load chrome washer on the lower chrome guide. (See Drawing at 3A.)

D. The skew ringing should again increase to between 15 and 20% marks. If it does not fall in this range, then proceed as follows:

1) No Ringing Action (or less than minimum)

A) Stop Drive = Push Reset Switch.

B) Push PWR Switch = to Off.

C) Remove the lower fixed roller guide by unscrewing (from rear) the screw that retains guide. (use 2.5MM Allen wrench.)

DO NOT REMOVE SCREW. Instead, allow the screw to stay in hole and gently, from front lift out the Delrin roller. Extreme care should be taken since there may be shims at the base of roller mount. These shims will either be resting on screw or sticking to base of metal frame.

D) Using a micrometer, decrease the total (there may be 2 or 3 shims) width of the shims in .002 steps until the desired 15 to 20% ring action is noted on scope.

E) To restart drive (without going into rewind in mid-tape)

1. Push Power SW = ON
2. Push Load SW = Drive starts in FWD
3. Immediately push RESET tape stops then push TEST
4. Push Forward = Tape runs at normal speed.

2) Excessive Ringing Action (more than 20%)

A) Increase shims on same guide in .002 steps until correct percentage is noted on scope.

B) Upon completion of above, recheck ringing on both chrome guides with tape in FWD direction and touch up accordingly since there is interaction between adjustments. Also recheck the azimuth screw adjustment for minimum possible skew.

4. SKEWING RINGING ACTION (REVERSE)

A. Run skew tape in REVERSE (WRT EN pushed). Depress the spring loaded chrome washer on the upper chrome tape guide.

B. The skew waveform should increase on scope once again from normal to between the 15 and 20% marks. If it does not fall in this range, then proceed as follows:

1) No Ring Action (or less than mininum)

A) Follow step 3.D.1 except decrease shims from upper (Delrin) fixed roller guide in .002 steps until skew ringing falls in the 15 to 20% range.

2) Excessive Ringing Action (more than 20%)

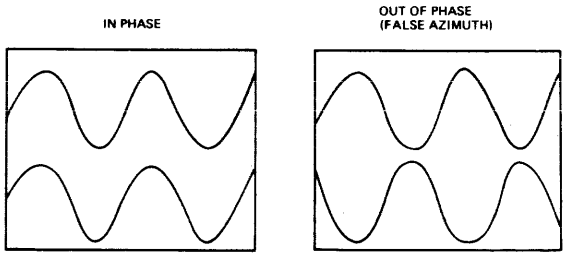
A) Follow step 3.D.2 except increase shims from upper fixed guide to correct range.

C. While tape is moving in Reverse, depress the spring loaded washer on the lower chrome guide. In most cases there will be no ringing action; however, ringing up to 20% is permissible.

5. CONCLUSION

A. Recheck skew azimuth adj. and ringing action in both Forward and Reverse on Upper and Lower chrome guide. Ascertain that skew is 10% or less (lesser % is desirable) and that ringing action falls in its 15-20% range (with exception of lower guide in Rev.). Allow tape to run in Forward.

B. Connect one channel of scope to TP6 at location 14-K (read input TP for Track 7) and other channel of scope to TP7 (loc. 14-L). Display both signals (18 KHz @ 45 ips) on scope and ascertain that both sine waves are in phase.



C. Keep one scope channel on TP6 and switch other scope channel to each read channel (TP7 through TP14) while monitoring for in phase condition. If one or more channels are out of phase (approximately 90°), then the head azimuth is set on a false Azimuth. Readjust head azimuth screw (may require turning screw a number of turns in either direction) until an in phase condition exists and recheck skew.

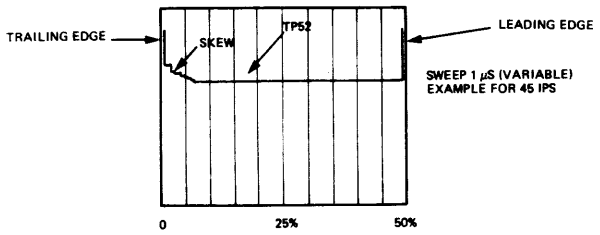
D. This concludes the mechanical read skewing in field locations.

6.3.2 PRELIMINARY — WRITE DESKEWING

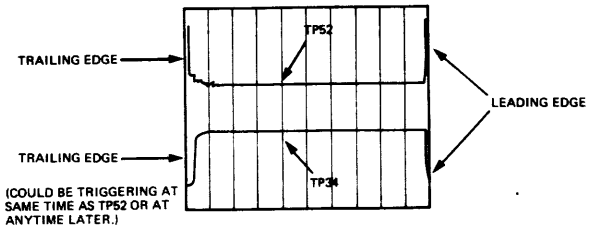
A. Write deskewing in the field should normally be rechecked under the following conditions:
   1) Replacement of magnetic head.
   2) Replacement of one or both compliance arms.
   3) Replacement of capstan motor.
   4) Changing of shims in roller guides.
   5) Adjusting of head azimuth position.
   6) Failure to interchange written tapes between various drives.

2. PROCEDURE

A. Operate drive skew tape in Test Mode in FWD direction (E16-E18). Connect channel one of scope to TP52 and adjust scope waveform as in skew procedure (see below) using sweep variable adjustment. However, instead of 1 volt per division, use 2 volts per division and adjust scope position to display waveform on upper portion of scope face.

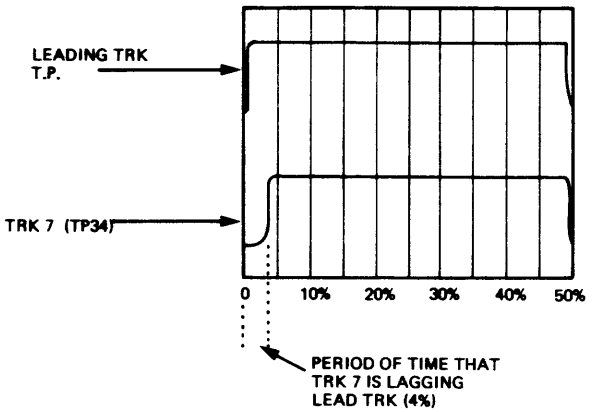


B. Connect Channel two of scope to TP34 (location 8-K). This is essentially the Read output from Track 7 and position waveform on lower portion of scope face. Switch scope mode to chop. Waveforms should appear as follows:



C. TP34 through TP42 is the last stage for each track (7-6-5-4-3-2-1-0 and P) in that order. Trigger scope on Channel 1 of scope and switch Channel 2 of scope to each of the track TP's to determine which track is appearing first. Most of the time either of the end tracks (on head), these being Track 4 or Track 5, will be the leading track. The waveform for these tracks will also be somewhat jittery so close scrutiny should be adhered to.

D. Once the leading track has been determined, move the scope Channel 1 probe from TP52 to that TP and the Channel 2 probe to TP34 (if 34 is leading track then move Channel 2 probe to TP35). Switch the slope adjustment on scope from (-) to (+) and waveform should appear as follows: (Trigger holdoff if available on scope, should be increased to maximum stability of waveforms.)



E. Move the Channel 2 probe to each track TP and record on a pad of paper the amount each track lags from the lead track. See example below:
   1 - TRK 4 (Lead track in this example.)
   2 - TRK 7-4%
   3 - TRK 6-5% TYPICAL
   4 - TRK 5-2% EXAMPLE
   5 - TRK 3-10%
   6 - TRK 2-5%
   7 - TRK 1-0%
   8 - TRK 0-7%
   9 - TRK P-3%

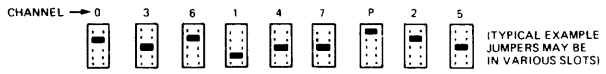
F. The above is performed only in Forward direction. Upon completion unload skew tape and replace with a normal tape with Write ring in.

G. After tape has loaded and is at BOT. Press RESET then TEST.

H. Press FWD and then ON-LINE (LED will not light) (to generate NRZI Write data). Turn SCOPE INTENSITY to nearly full CW direction (max.). Switch vertical mode of scope from chop to ALT.

I. Channel 1 scope probe should still be on lead TRK and return Channel 2 probe to TP34 (TRK 7).

J. At location 4-M through 4-T there are a group of 9 blue jumpers as follows:



Each of these jumpers will vary the time that its respective channel (as marked) will clock data on the Write head. There are 5 positions for each track.

K. By moving the jumper within a channel, you are electronically deskewing that track on the Write head. The purpose is to match the Write head to the Read head. The read head characteristics have already been recorded on paper during step E.

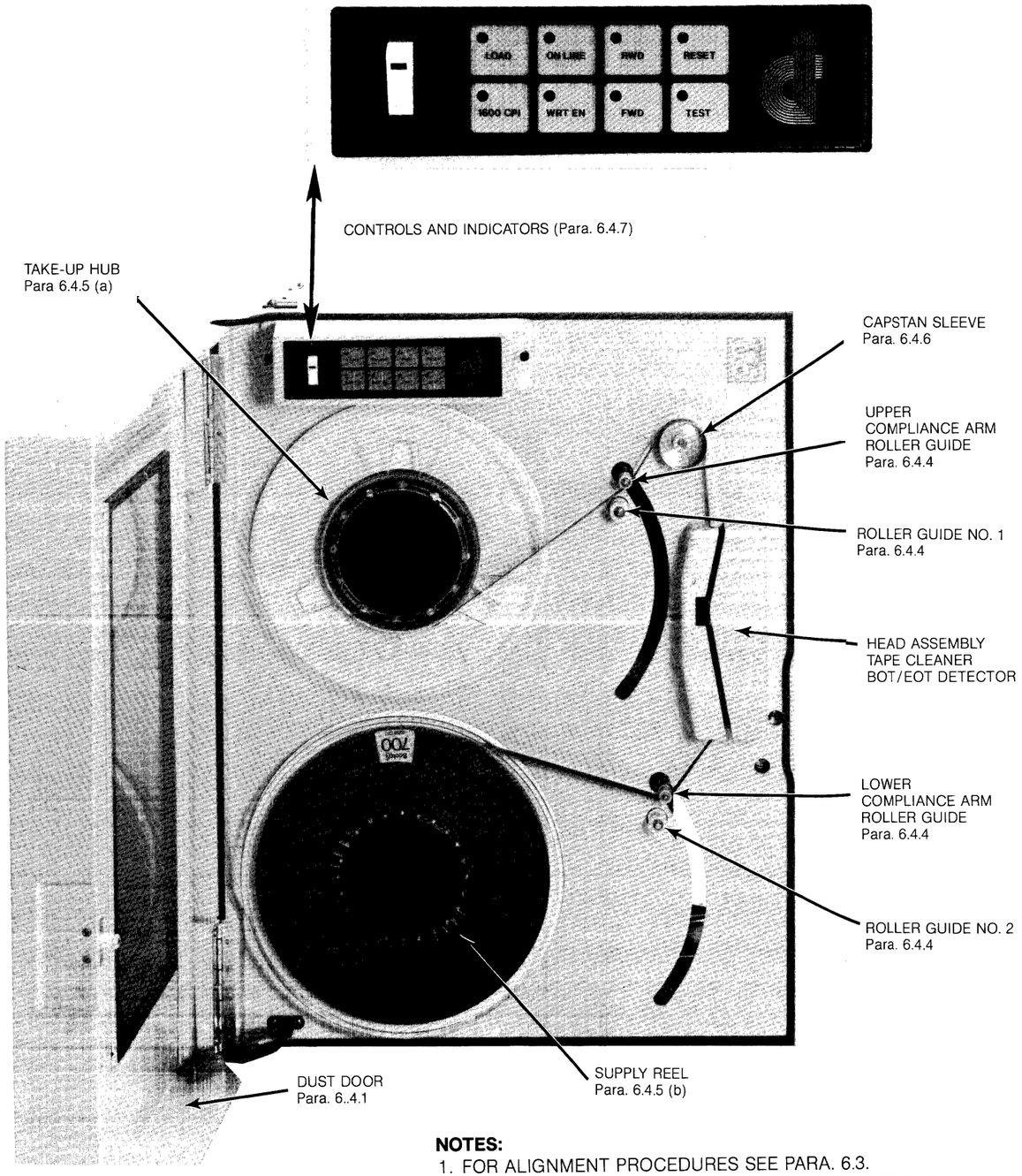
L. Match each track to the same lagging as recorded during the Read section (step E). To do this simply remove jumper for that particular track and moving it to the next lower pin will increase lag, moving to a higher location will decrease lag. In many instances the exact lag cannot be attained; try and get as close as possible.

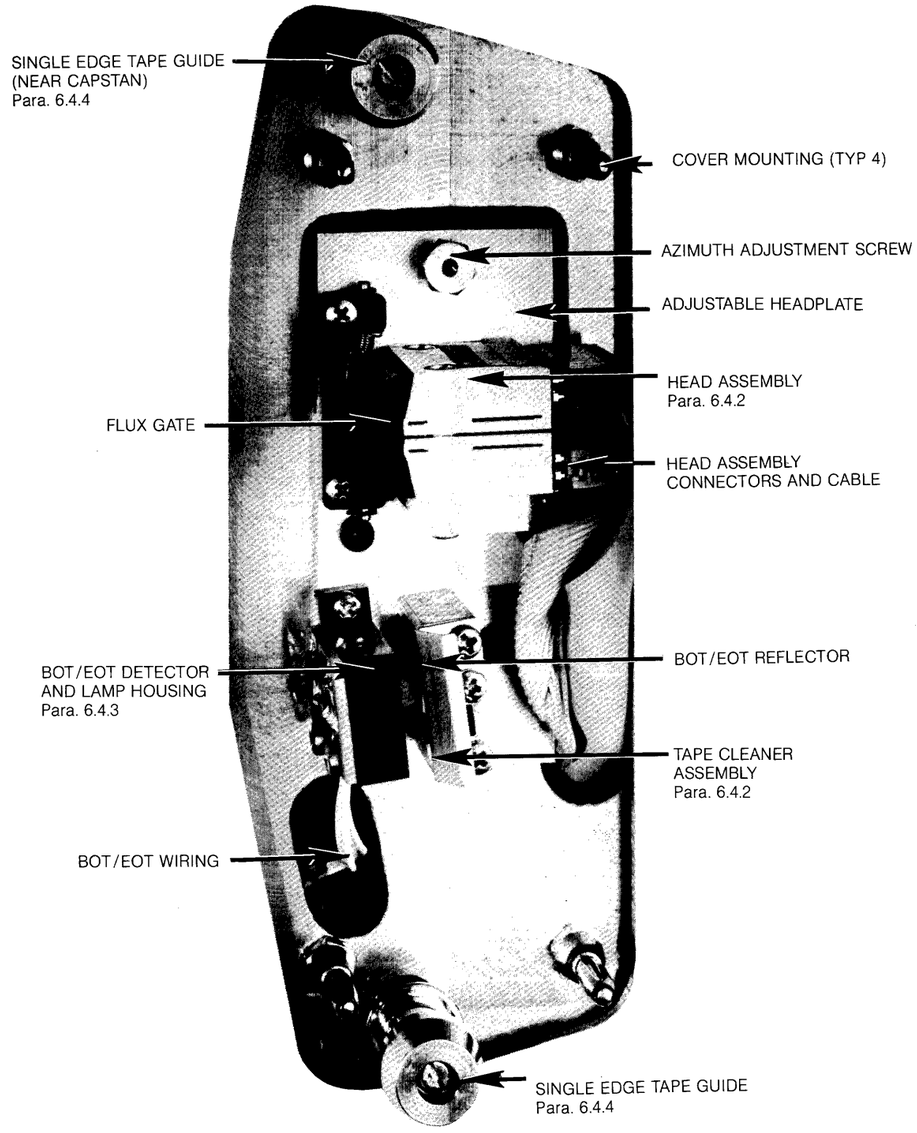
M. Upon completion rewind tape to BOT, press RESET, TEST, FWD and ON-LINE and make a short recording. Rewind once again to BOT. Press RESET, TEST and FORWARD. Switch slope on scope to minus and move Channel 1 scope probe to TP52. Verify that skew portion of waveform is 10% or less in FWD and reverse of that portion of tape just written.

N. Return E16-E18 to E-16-E17 and E28-E29 to E32-E33 if PE (1600 BPI) only is desired. This completes the Write deskewing portion.

TABLE 6.1 READ AMPLIFIER PARAMETERS

DENSITY (bpi)	SPEED (ips)	DATA RATE (ch/s)	BYTE TO BYTE PERIOD (μs)	READ GATE (μs)	READ GATE TOLERANCE (μs)
800	45	36K	27.8	13.9	±0.1
	37.5	30K	33.3	16.6	±0.1
	25.	20K	50.	25.	±0.2
	18.75	15K	66.6	33.3	±0.3
	12.5	10K	100.	50.	±0.5
556	45	25K	40.	20.	±0.2
	37.5	20.85K	48.	24.	±0.2
	25.	13.9K	72.	36.	±0.3
	18.75	10.4K	96.	48.	±0.5
	12.5	6.95K	144.	72.	±0.7
200	45.	9K	111.	55.5	±0.5
	37.5	7.5K	133.3	66.1	±0.6
	25	5K	200.	100.	±1.0
	18.75	3.75K	266.7	133.3	±1.0
	12.5	2.5K	400.	200.	±2.0





NOTES:

1. FOR ALIGNMENT PROCEDURES SEE PARA. 6.3.
2. FOR REMOVAL AND REPLACEMENT PROCEDURES SEE PARAGRAPH NUMBER LISTED NEXT TO PART.

FIGURE 6-1. TAPE PATH COMPONENTS

TABLE 6.2 RECOMMENDED TOOLS FOR MAINTENANCE

DESCRIPTION	P/N	SUGGESTED MANUFACTURER
Handle	99-1	Xcelite
Nut Driver 5.5MM	99-5.5MM	Xcelite
Nut Driver 7MM	99-7MM	Xcelite
Nut Driver 8MM	99-8MM	Xcelite
Extension 4"	99-X5	Xcelite
Extension 7"	99-X10	Xcelite
Allen Hex Socket 2MM	99-73MMBP	Xcelite
Allen Hex Socket 2.5MM	99-74MM	Xcelite
Allen Hex Socket 3MM	99-75MM	Xcelite
Allen Hex Socket 4MM	99-76MM	Xcelite
Phillips Screw Drivers		
0 Point	X100	Xcelite
1 Point	X101	Xcelite
2 Point	X102	Xcelite
Flat Blade Screwdriver 5/32" × 4"	R5324	Xcelite
Snap Ring Pliers - Ext. 0.35 Dia. Tips	Model 397	Proto
Needle Nose Pliers	V-16415	Utica
Oscilloscope	465	Tektronix
Digital Voltmeter/Freq Counter	4004	Valhalla Scientific
Cotton Swabs		
Loctite Sealant	#242	Locite
Lint Free Cloth		
Master Skew Tape		IBM or Pericomp
Spare Tape	700	Scotch

6.4 REMOVAL AND REPLACEMENT

Many parts and subassemblies can be removed and replaced using standard tools (Refer to Table 6.2), the procedures outlined herein and the assembly drawings in Section IX. Replacement parts and subassemblies should be selected from parts list Section XI.

6.4.1 DUST DOOR

The following procedure should be followed in the removal of the dust door:

1. Using a pair of external snap ring pliers, remove snap ring on the lower hinge stay.
2. Remove M3 pan head phillips screws attaching hinges to dust door.
3. Remove angle bracket with door catch strike and install on replacement door. Note that the slots on the angle bracket allow adjustment of the strike to connect with the catch correctly.
4. Attach replacement door to hinges, aligning door with facade before tightening screws.
5. Install snap ring over hinge stay on door retainer post.

6.4.2 READ/WRITE HEAD SUBASSEMBLY

The following procedure should be followed in the removal of the head assembly:

1. Open the dust cover, remove left and right head covers.

CAUTION

Remove connectors carefully to avoid bending pins.

2. Disconnect the two ribbon cable connectors from the head. Identify wires for reassembly and remove the wires on the erase bar (2). These wires are polarized and must be reinserted on the bar studs as they originally were.
3. Remove the two screws retaining the BOT/EOT and put assembly aside.
4. Loosen, do not remove, the three M3 socket head screws that attach the head plate assembly.
5. From the back side of the top plate, remove the M2.5 slotted screw in the center of the azimuth screw.
6. Remove the three M3 socket head screws and remove the head plate assembly.

NOTE

The head assembly is a modular replacement item which is pre-aligned at the factory, on the head plate assy.

7. Install the new head assembly using the reverse procedure above.
8. Assembly realignment and adjustments are detailed in paragraph 6.3.

6.4.3 BOT/EOT SENSOR

The BOT/EOT sensor is a modular replacement item. Do not attempt disassembly of sensor subassembly.

1. Remove the two M2.5 pan-head phillips screws that secure the sensor to the head assembly mounting surface.
2. Remove the "P" clip from the backside of the unit and clip the tie-wrap as required to remove cable assembly back to the main electronics board (P/J10).
3. To install, reverse the procedure above.
4. Check electrical Adj. per Section 7.3.4.

6.4.4 ROLLER GUIDES

1. Drum guides (Refer to Figure 6-1 Roller Guides 1 and 2)
   a. Remove M3 socket head screws in back with an M2.5 hex driver.

NOTE

Retain shims on each guide for reassembly.

   b. Install new guide taking care to replace the original shims.
2. Crown Roller Guides (Refer to Figure 6-1 Compliance Arm)
   a. The crown roller guide is mounted on a post. This is a complete assembly and should be removed and replaced as an assembly.
   b. Remove retaining hardware and shims from compliance arm guides and replace with new assembly using the original shims.
3. Single-Edge Tape Guides (Refer to Figure 6-1)
   a. Remove M3 slotted head screw in top of guide to remove guide.
   b. Install new guide and spring by attaching M3 screw in plate.
4. NOTE: Replacement of any of these guides should be followed with alignment per Section 6.3.

6.4.5 HUBS

To remove or replace hubs the following procedures should be followed:

1. Take-Up Hub (Upper)
   a. The take up hub is accessible from the backside and is retained by a clamp held in place by two M4 socket head screws.

NOTE

To reach the clamp screws the compliance arms must be down; this is accomplished as follows: Turn power ON, thread the end of a piece of tape through head assembly and depress LOAD. When the arms are down switch power OFF.

   b. Using a 3MM socket driver loosen the two M4 socket head screws in the clamp and remove hub.
   c. During replacement, care must be taken to maintain the proper hub position. Thread tape through the path and spool it onto the reel. Adjust the clearance between the hub and the edge of the tape to a gap of 0.050 inch $\pm$0.015 inch. Tighten screws uniformly without excessive torque which would deform the hub assembly.

2. Supply Hub (Lower)

   To replace the supply hub it is necessary to remove the supply motor assembly to which the hub is attached.
   a. Remove the four M5 cap screws holding the motor mounting plate and back the entire assembly out of the backside of the unit.

NOTE

Before removing or loosening the supply hub, measure the distance between the motor mounting plate and the back surface of the hub. Record values for reassembly.

   b. Loosen the two M4 cap screws and remove hub.
   c. Install new supply hub on motor assembly. Set hub to proper height (as recorded earlier) and secure the two M4 cap screws.
   d. Reinstall motor assembly.

SUPPLY HUB GRIPPING ADJUSTMENT

   e. If the hub does not appear to grip the tape tight enough or seems to be too tight then proceed as follows.
   f. Open the supply locking handle. This reveals two (2) M2 Allen head screws on the black plastic cover. On newer units screws are Phillip-head type.
   g. Remove screws and maneuver plastic cover off from hub.
   h. The locking device is now visible. Extending down from the handle is a 4MM Allen screw with an 8MM nut on the end of the screw (screw is 1½ inches long).
   i. Loosening the nut (while holding the screw head) will cause the gripping surface to grip tighter (expanding outward).
   j. Tightening the screw will lessen the gripping action.
   k. Reassemble unit when completed.

CAUTION

Do not adjust gripping action too loose or mounted tape may move on hub during operation.

6.4.6 CAPSTAN SLEEVE

CAUTION

Extreme care should be exercised when handling the capstan sleeve. Sleeve should be gripped lightly with pressure distributed evenly around the circumference.

1. The sleeve is held in place by an M4 flat-headed phillips screw. Hold the capstan sleeve as close to the base of the sleeve as possible, to prevent distorting the sleeve. Remove screw.

NOTE

Retain height adjustment shims located between the inner race front bearings and the capstan sleeve for reassembly. (There may or may not be shims installed.)

2. When replacing sleeve, care should be exercised to replace the height adjustment shims.
3. Installation is reverse of removal.
4. Readjust per Section 6.3.

6.4.7 CONTROL PANEL (MEMBRANE SW. ASSY)

NOTE

Disconnect Power Cord.

1. Remove screen on top of power supply at rear of unit. Retain hardware for reassembly.
2. Disconnect the three pin connector (J26) from the power supply.
3. On the front of the drive, remove the two button head socket screws that attach to the control panel housing to the facade.
4. Disconnect the three control cable connectors, J12M, J13M and J3M.
5. Reverse the above procedure for reassembly.

6.4.8 TAKE-UP MOTOR (UPPER) (Refer to Figure 6-2)

1. Remove hub (See paragraph 6.4.5.1)
2. Remove the four M5 socket-head cap screws holding the motor.
3. Remove harness assembly by disconnecting "P" clip on the bottom of the power supply and tie-wraps and "P" clip on main electronics board. (P/J-1 motor driver take-up circuit.)
4. To reinstall motor reverse procedure. Align hub per paragraph 6.4.5.1.

6.4.9 SUPPLY MOTOR (LOWER) (Refer to Figure 6-2)

The procedure for removal of the motor is part of the supply hub removal procedure (paragraph 6.4.5.2). Follow procedure outlined in paragraph 6.4.5.2 plus the following:

1. Remove harness assembly to main electronics board (P/J2).
2. Reverse procedure to install new unit.
3. Align per paragraph 6.4.5.2.

6.4.10 CAPSTAN MOTOR

1. Remove capstan sleever per paragraph 6.4.6.

NOTE

Remove shims, if any, from shaft and retain for reassembly.

2. Disconnect wiring from motor.
3. There are four cap screws on the mounting plate. The upper two are tilt adjustment screws which affect the mechanical alignment of the drive. The tilt adjustment screw next to the motor must be removed. The bottom two screws are mounting screws which must be removed to replace the assembly.
4. Remove motor from mounting plate by removing four-M4 socket head cap screws. Install new motor on mounting plate.
5. Reinstall mounting plate.
6. Connect wiring.
7. Install capstan sleeve and shims per paragraph 6.4.6.
8. Motor assembly must be aligned per alignment procedure in paragraph 6.3, Tape Path Alignment.

6.4.11 COMPLIANCE ARMS (Refer to Figure 6-2)

1. When removing either compliance arm, be sure the compliance arm retractor is in the arms down position. (See Note 6.4.5.)
2. Remove the crowned roller guide from the end of the compliance arm shaft, retaining the shims and M3 cap screw for reassembly.
3. Disconnect tension spring.
4. Remove the three M3 cap screws that attach the compliance arm housing to the top plate.
5. Remove assembly by cutting harness tie wraps back to connector.
6. Reverse procedure to install unit.

NOTE

A Tape Path Alignment must be performed after replacement of these parts, see paragraph 6.3.

6.4.12 COMPLIANCE ARM RETRACTOR (Refer to Figure 6-2)

The compliance arm retractor assembly is a modular replacement. Do not attempt to disassemble the unit except as outlined within this procedure.

1. Be sure that the compliance arm retractor unit is in the arms up position before beginning this procedure.
2. Disconnect the two spade lugs on the motor terminals and clip the tie wrap holding wires to motor. Open cable clamps and release the flat read and write ribbon cables.
3. Remove the M4 pan head phillips screw attaching the end of the cast crank arm to the connecting link.
4. Cut tie wraps and remove "P" clips in order to remove the retractor sensor cable to main board (P11).
5. Remove the four M4 mounting screws attaching assembly to top plate. Lift assembly from back of tape drive.
6. To install new unit, first install assembly with hardware removed in step 5, then re-connect the crank arm and connecting link.
7. Install other cables and wires.

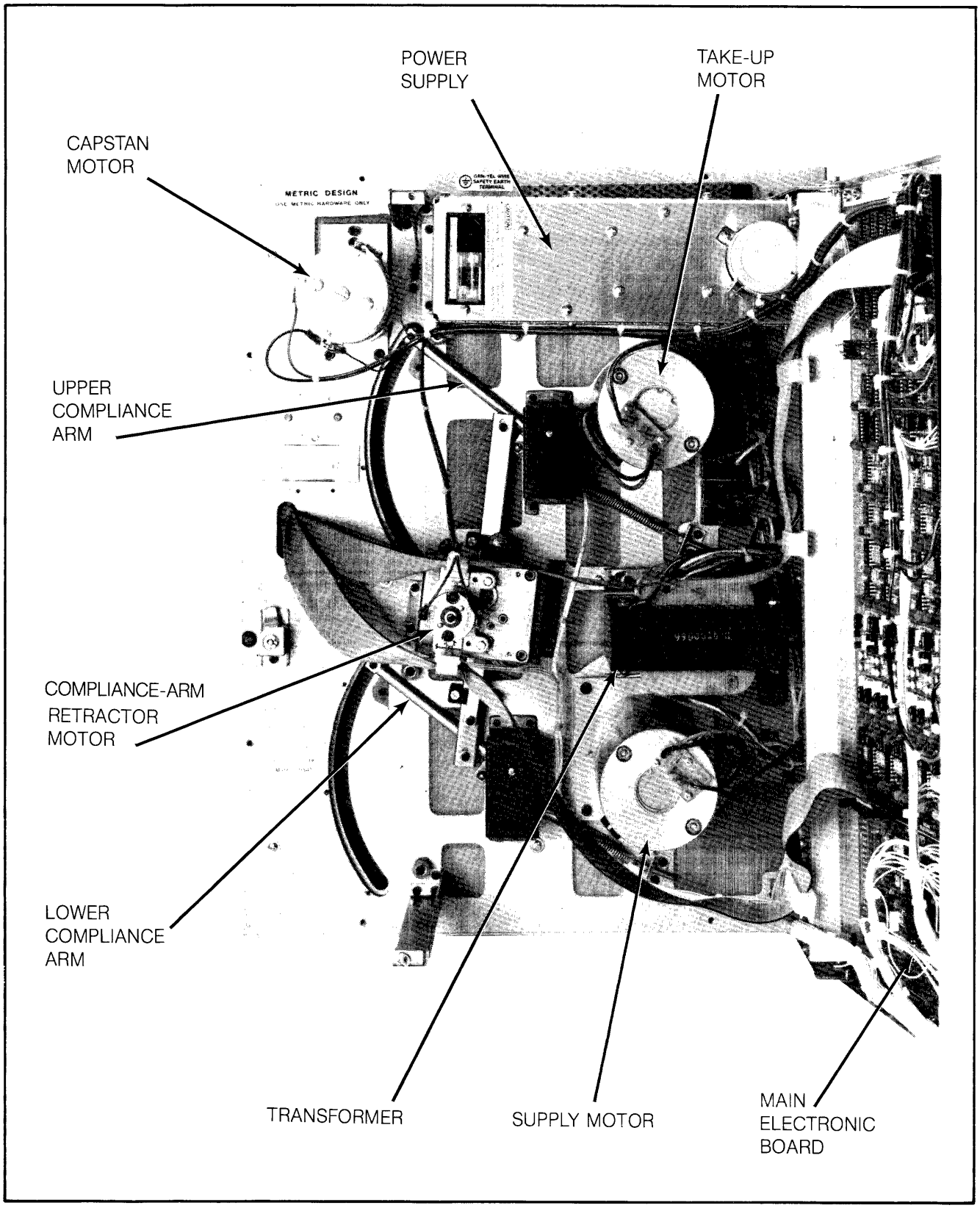


FIGURE 6-2. REAR PANEL LOCATION

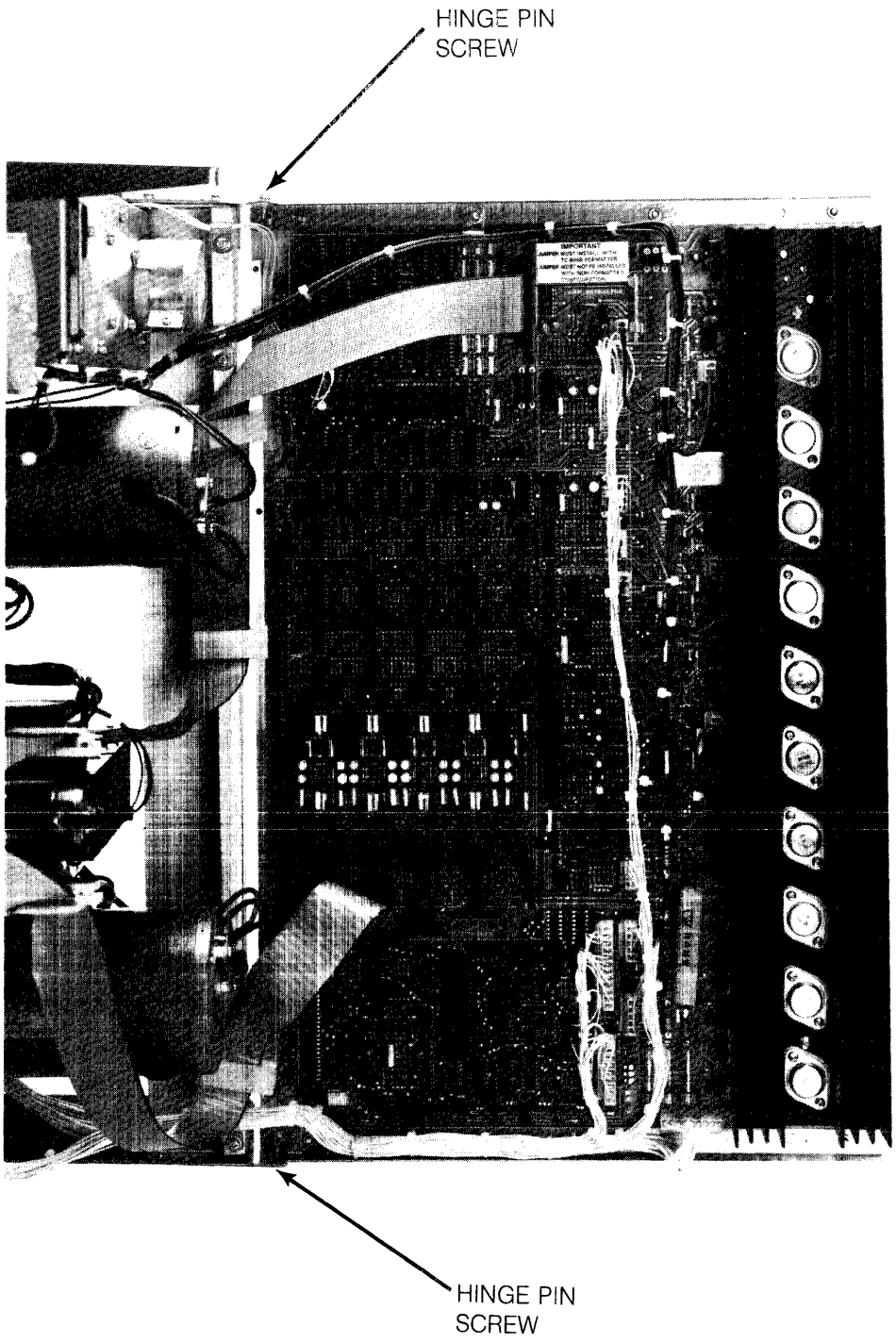


FIGURE 6-3. MAIN ELECTRONIC BOARD

6.4.13 POWER SUPPLY (Refer to Figure 6-2)

The power supply assembly is removed as a complete unit by using the following procedure:

1. Remove power cord.
2. Remove ground wire to left of unit.
3. Remove top cover, disconnect all cable connections.
4. Remove two screws on bottom of unit that holds "P" clips.
5. Remove the four M4 socket head screws on the flanges holding the unit.
6. Remove the unit.
7. Reverse procedure to install unit.

6.4.14 MAIN TRANSFORMER (Refer to Figure 6-2)

1. Remove power supply as in 6.4.13 and remove cable connectors to transformer.
2. Disconnect cable from harness (clip tie wraps).
3. Remove four M4 socket head cap screws.
4. Remove and identify quick disconnect clips to the diode bridges for proper placement.
5. Remove transformer.
6. Reverse procedure to install.

6.4.15 MAIN ELECTRONIC BOARD (Refer to Figure 6-3)

The main electronics board is removed as an assembly by the following procedure:

1. Remove all connectors.
2. Remove tie wraps and "P" clips.
3. Remove the upper and lower M4 pan-head phillips hinge pin screws. Retain teflon washers.
4. Reverse procedure to install.

TABLE 6.3

RECOMMENDED FIELD REPLACEMENT
SPARE PARTS LIST — 1050 SERIES

IDT P/N	DESCRIPTION	QTY FOR 1-3 SYSTEMS
11-00273-0	Main Electronic Board (designate speed)	1
11-00023-0	4050 Formatter (for 1053-1054)	1
11-00003-0	I/O Board (for 1051)	
11-00090-0	I/O Board (for 1052) Only 1 type req.	1
11-00025-0	I/O Board (for 1053)	
11-00092-0	I/O Board (for 1054)	
11-00028-0	EOT/BOT Sensor Assembly	1
11-00029-0	File Protect Sensor Assembly	1
11-10043-0	Retractor Motor Assembly with Sensor	1
11-10040-1	Compliance Arm Assembly with Sensor	1
99-00002	Reel Motor - Take-up/Supply	1
99-00058	Capstan Motor	1
14-00185	Flipper - For Supply Hub	1
14-00190	Compression Rubber Band - For Supply Hub	1
11-10121-0	Control Switch Panel Assembly	1
24-40007	Fuse - 8 AMP (AGC-8)	2
24-40012	Fuse - 6¼ AMP (3AG-SB)	2
24-40010	Fuse - 5 AMP (AGC-5)	2
24-40014	Fuse - 3 AMP (3AG-SB) 220/240 VAC only	2
—	Interface/Coupler (if applicable)	1
—	Cables for Above (if applicable)	1
10-00204-0	DC/DC Converter - For 48vdc System Only	1

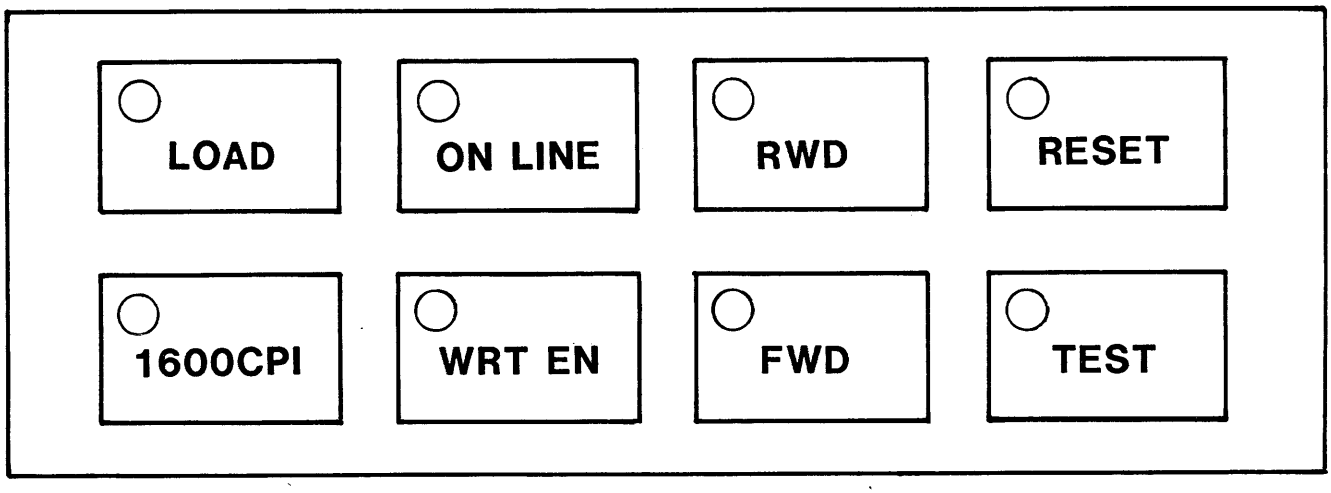
SEE SPARE PARTS LIST IN SECTION XI

SECTION VII
TESTING

Off-line diagnostic tests are provided with the Series 1050/1750. These tests are integrated into the F8 control program. Individual tests are selected through a combination of the Test SW and the other front panel control switches.

The purpose of the diagnostic tests is to facilitate equipment maintenance and fault isolation testing in the field without special test equipment. In many cases, the failure may be isolated to a component or replaceable assembly which may be repaired on-site. Other applications involve acquiring failure symptoms data which aid field service procedures and minimize system down-time.

1050 FRONT PANEL TEST



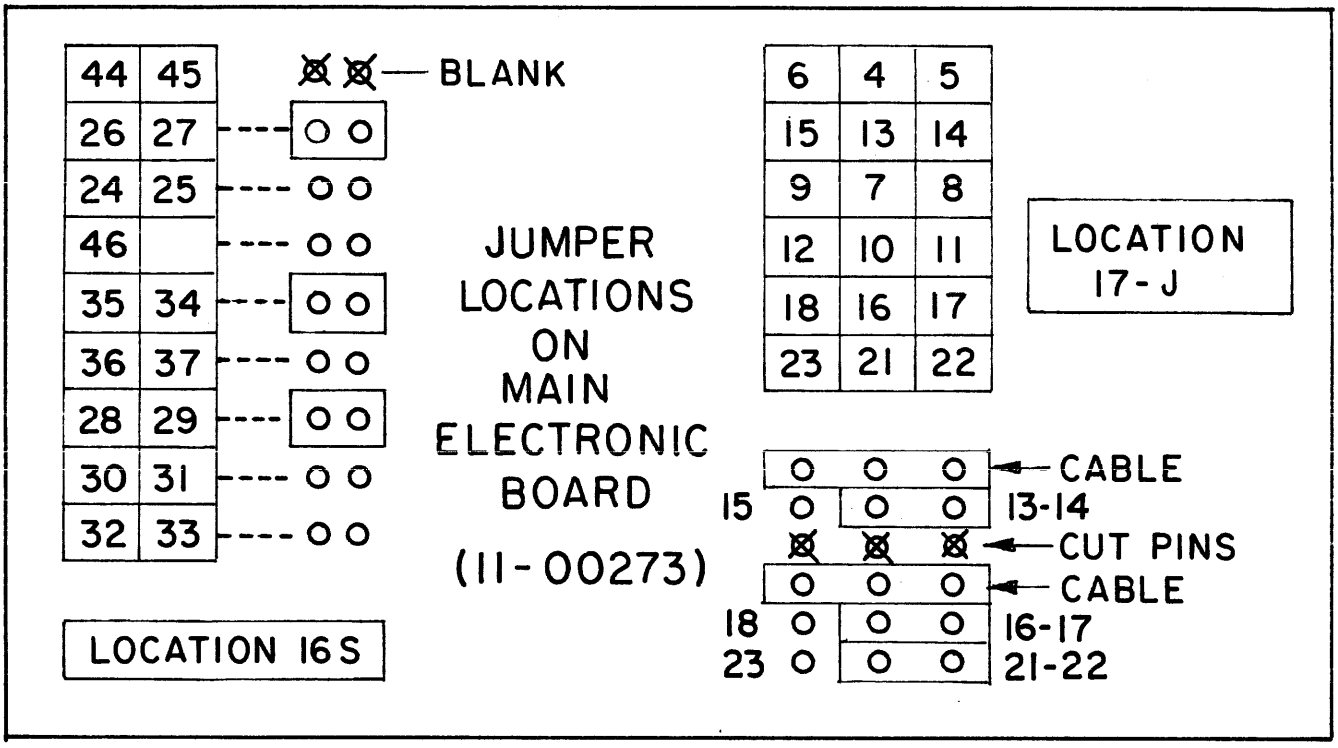
7.1 GENERAL

Located on the front panel is the Self-Test feature. The Self-Test feature is incorporated for ease of determining operational status of the tape transport system in an off line mode. The Front Panel Test performs the following tests. Prior to performing these tests:

1. Ascertain that all cables are disconnected from I/O board and from formatter if drive is connected to host system or daisy-chained. If drive has an embedded interface, disconnect cable connecting to host.
2. Verify or relocate jumpers on main electronic board (11-00273 or 11-00200 assy's) component side to the following configuration (not required for 7-track transport):

TO BEGIN TESTING FROM FRONT PANEL:

1. Turn power on drive.
2. Install and thread a blank or scratch tape (with Write Ring) on transport. Follow tape threading diagram and make certain 4 or 5 complete turns of tape are threaded on take-up reel.
3. Press LOAD SW, tape will tension, then move forward and stop. LOAD, ON-LINE and WRT EN light should be on.
4. DePress RESET switch.
5. DePress TEST switch...both will light.
6. Transport is now ready to perform one of the following tests.



IMPORTANT

3. Make note where jumpers are at prior to moving and return to original locations when "Self Test" is completed.

TESTS PERFORMED

1. Unload Limit Test
2. NRZI Write/Read Data Test
3. PE Write/Read Data Test
4. Servo Limit Test

UNLOAD LIMIT TEST

1. Press FWD SW.
2. Tape will begin to unload. Load light will go out. After a short time tape will move forward to load point. Load light will come on. Test will continue in this mode.
3. If test fails, motion will cease and RESET will flash.
4. To exit test press RESET for approximately 2 seconds. Tape will stop. (Repeat if tape does not stop.)
5. Press FWD, tape will move forward and after a few seconds press RESET again. Tape will stop. Press REWIND and tape will return to load point (load light on).

NRZI WRITE/READ DATA TEST

1. Press RESET then TEST (both lights come on).
2. Press WRT EN.
3. Flux reversals are recorded in NRZI mode beginning at BOT. Tape is then rewound and read forward, looking for flux reversals for a short period. If flux reversals are seen, WRT EN remains illuminated, if reversals are not detected, the test is aborted and RESET indicator will flash during test.

   NOTE: To exit test press RESET. RESET light may flash at this time. This does **not** indicate a problem. If it does flash press RESET again to stop flashing.
4. Press FWD, run tape a short distance then press RESET again. Press REWIND to return tape to load point (load light on).

PE WRITE/READ DATA TEST

1. Press RESET then TEST (both lights come on).
2. Press 1600 CPI.
3. Flux reversals are recorded in PE mode beginning at BOT. Tape is then rewound and read forward, looking for flux reversals for a short period. If flux reversals are seen, WRT EN remains illuminated, if reversals are not detected, the test is aborted and RESET indicator will flash during test.

   NOTE: To exit test press RESET. RESET light may flash at this time. This does **not** indicate a problem. If it does flash press RESET again to stop flashing.
4. Press FWD, run tape a short distance then press RESET again. Press REWIND to return tape to load point (load light on).

SERVO LIMIT TEST

1. Press RESET then TEST (both lights come on).
2. Press LOAD.
3. Tape runs forward for approximately five seconds, then reverse for a shorter time. This forward/reverse continues until the interval becomes zero.
4. At this time the tape runs continuous forward until EOT.
5. At EOT the forward/reverse procedure will continue until the interval again gets to zero. At this time the tape will rewind to BOT (load point) and once again restart the complete test.
6. Should arm limit circuitry become TRUE (failed) during this test, the test will abort and the RESET light will flash.
7. Press RESET to exit test.
8. Press REWIND to return to load point (load light on).

COMPLETION OF TESTING

1. Press REWIND once again and tape will unload.
2. Retractor arms will return to up position.
3. Turn off power.
4. Return any jumpers to operational configuration as when received.
5. This completes the "Self Test" procedure.

NOTE

If any of these tests have failed or if the transport is suspect due to data reliability or diagnostic testing continue the next detailed "Operational Tests." (Section 7.2)

OPERATIONAL TESTS AND ALIGNMENT PROCEDURE FOR 9-TRACK

(See 7.4 for 7-Track procedure)

7.2.1 PROCEDURE

The following procedure should be followed in determining the working condition of the tape transport. These tests do not involve formatter operation and only relate to the transport electronic functions.

EQUIPMENT REQUIRED

Scope (dual trace)
Digital Voltmeter
Frequency Counter (not mandatory)
Skew Tape (800 bpi) (not mandatory)
Write Enabled Scratch Tape (fair quality)

NOTE

Logic ground (common) IS NOT connected to chassis ground on the tape transport electronics. Make certain that the ground lead on any test equipment (i.e. scope, VM) is connected to the COMMON TEST POINT (COM) on the main electronic board at location 11½-E. Do not use metal brackets or chassis.

A. Disconnect all cables connected to the I/O PCB. If drive is a formatted type then disconnect cables going to P124 and P125 of formatter.

B. VOLTAGE CHECKS - with the power ON check the following voltages at the respective test points on the main electronics board.

For AC Units

1. +20 volts and -20 volts = 23 to 27 volts with approximately 400 to 600 MV of ripple at 120 Hz, 100 Hz when using 50 cycle AC input. (Test at top of F1 and F2 fuses.) Input AC voltage should be nominal.
2. + 5 volts = +5.10 volts, adjust R66 if necessary (located at 15-C).
3. +R and -R = approximately equal to each other and between 8.57 and 9.65 volts (located between 10 and 12-D)
4. +15 and -15 volts = 14.25 to 15.75 volts (located at 12-D).
5. Bottom of formatter fuse (F3) = approximately +7.5 to 9.0VDC (for units with formatter installed) (located at 18-D). +10 to +11VDC with no formatter installed.

For DC Units

1. ±20 volts = 18.0 to 22VDC on top of F1 and F2.
2. Bottom of F3 fuse +7.3 to 9.0VDC.
3. Ripple not to exceed 600MV, peak to peak.
4. All other DC voltages same as AC voltage, check above.
5. NOTE: On DC units formatter board MUST be plugged in to properly load down the DC P.S. for correct voltage readings at F1, F2, F3.

C. SERVO CHECK - with NO TAPE on transport, press WRT EN and LOAD simultaneously. All motors (take-up, supply, capstan and retractor) should start operating.

1. The Take-Up and Supply motors will change direction as the retractor arm moves through the center position in both upward and downward direction.
2. The Capstan motor will turn in a CW direction as the retractor arms are moving in the upward direction and oscillate CW and CCW while the retractor arms are moving in a downward direction.
3. Press RESET SW to end test. This test assures that the majority of the servo systems are working.

D. JUMPER CONFIGURATION - In order to conduct the operational tests it is necessary to relocate the following jumpers.

At Location 17-J on component side of main electronic board there are a group of jumper blocks. Move Jumper E16-E17 to E16-E18. Check E28-E29 at location 16-S. If vacant remove jumper from E32-E33 and install in E28-E29.

7.2.2 SPEED TEST WITH SKEW TAPE

A. Install an "800 BPI Skew Tape" on the tape transport and press LOAD SW. Tape should move forward to load point (BOT) and stop.

B. Press RESET SW then TEST SW (both SWs will light). Press FWD SW. Tape should move forward at normal speed.

C. Connect a frequency counter to TP6 (CH#7 Read) located at 14-K and monitor for frequency as follows:

Speed	Frequency
12.5 IPS	5 KHz ± 1%
18.75 IPS	7.5 KHz ± 1%
25 IPS	10 KHz ± 1%
37.5 IPS	15 KHz ± 1%
45 IPS	18 KHz ± 1%

E. Adjust R6 (located at 12-F) if forward frequency is not per chart.

F. Press RESET to stop forward motion of tape.

G. Press WRT EN to move tape in the reverse direction.

H. Frequency in reverse should be the same as in forward; if not, adjust R15 (located directly above R6) for correct frequency (See chart).

NOTE

NEVER allow SKEW TAPE to run at REWIND speed. This would shorten the usable life of the tape.

7.2.3 ALTERNATE SPEED TEST (W/O Skew Tape)

A. Thread a normal tape on the tape transport and press LOAD. Tape should move forward to load point (BOT) and stop.

B. Press RESET then TEST switch (switches should light). Press FWD switch, tape should move forward at normal speed.

C. Connect a D.C. Digital Voltmeter to TP1 (Tach Output) located at 8-F and adjust R6 (Forward) and R15 (Reverse) as required to obtain values listed in chart as follows:

Speed	Volt. (FWD)	Volt. (REV)
12.5 IPS	+ 0.43	-0.43
18.75 IPS	+ 0.64	-0.64
25 IPS	+ 0.86	-0.86
37.5 IPS	+ 1.29	-1.29
45 IPS	+ 1.55	-1.55

(For REV = Press WRT-EN.)

NOTE

R6 = FWD (Press FWD) + Volts
R15 = REV (Press WRT EN) - Volts

This method should allow a setting near the 1% speed tolerance. However, it is recommended ONLY as an emergency measure and should be rechecked as soon as possible with an "800 BPI Skew Tape" per paragraph 7.2.2.

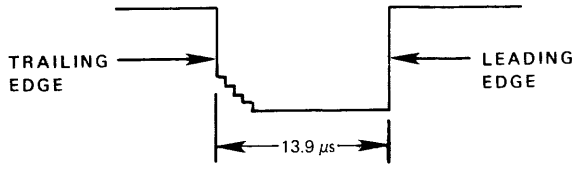
7.2.4 READ GATE TEST (W/Skew Tape)

A. Install "800 BPI Skew Tape" on drive and press LOAD switch. Tape will move forward to load point (BOT) and stop. Press RESET then TEST SW.

B. Connect oscilloscope to TP52 (Skew) located at 6-P and set the scope sweep to 10 μ sec (for 12.5 IPS) 5 μ sec (for 18.75 or 25 IPS) or 2 μ sec (for 37.5 or 45 IPS). Set scope voltage scale for two (2) volts.

C. Press FWD switch moving skew tape in a forward direction.

D. Trigger scope on TRAILING EDGE of wave form.



EXAMPLE AT 45 IPS

Check that pulse width from START of TRAILING EDGE to LEADING EDGE is as follows:

Speed	Width
12.5 IPS	50 μ sec
18.75 IPS	33.3 μ sec
25 IPS	25 μ sec
37.5 IPS	16.6 μ sec
45 IPS	13.9 μ sec

E. If the "Read Gate Pulse Width" is not correct - Adjust R498 (located at 6-L) for the correct width. If correct width cannot be attained with R498 alone, adjust R496 (located to the left of R498) in conjunction with R498 to obtain the correct width.

F. Press RESET switch and then WRT EN switch. Skew tape should now move in the reverse direction.

G. When tape reaches load point (BOT) it will stop. Press REWIND switch and the tape will unload.

NOTE

REMOVE the skew tape and DO NOT use for any of the following tests.

7.2.5 ALTERNATE READ GATE TEST (W/O Skew Tape)

A. Install a normal test tape on the tape transport and press LOAD switch. Tape should move forward to load point (BOT) and stop. Press RESET and TEST then FWD (tape motion will start). Press ON LINE (NRZI data will now be written on tape.)

B. Connect a scope to TP52 (Skew) located at 6-P, set scope sweep to 10 μ sec for 12.5 IPS, 5 μ sec for 18.75 or 25 IPS, or 2 μ sec for 37.5 or 45 IPS. Set scope voltage scale for two (2) volts. Turn Scope Intensity close to maximum.

C. Trigger scope on TRAILING EDGE of wave form (see paragraph 7.2.4 D).

D. If the "Read Gate Pulse Width" is not correct adjust as stated in paragraph 7.2.4 E.

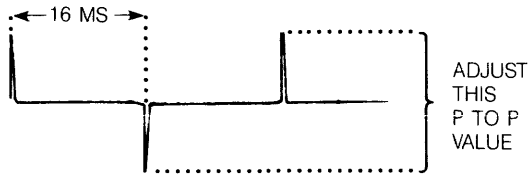
7.2.6 READ LEVEL TEST - NRZI 800 BPI

NOTE

Jumper (E16-E18) (E28-E29) in place for this test.

A. With a normal test tape on the tape transport at the load point (BOT), press RESET then TEST (switches light) then press FWD (tape motion starts). Press ON LINE to generate NRZI data. (Switch will not light.)

B. Connect scope to TP6 (Read Ch#7) located at 14-K. NRZI analog READ DATA should appear at a rate of approximately one (1) pulse every 16 Msec.

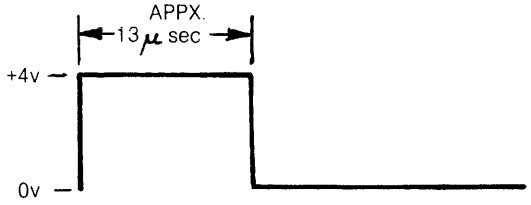


C. If required, adjust R335 (located at 12-L) for the following peak-to-peak voltages. NOTE: NRZI Pots are the lower Pots.

Speed	Volts P-P	
12.5	11 volts	
18.75	11 volts	PEAK TO PEAK
25	11 volts	NRZI
37.5	12 volts	LEVEL
45	12 volts	

D. Perform the above level test on each read channel (TP-6 thru TP-14), adjusting as required (R335 thru R343), for the correct read level.

E. Connect scope to TP-34 (location 8K). Set scope sweep to 5 μ sec and trigger scope to display the following single pulse.



Pulse width at 45 IPS should be approximately 13 μ sec.

F. Check TP-35 thru TP-42 (location 8M thru 8V) for similar wave form. Exceptional wide or narrow pulses from normal indicate a problem area.

G. Pulses at all other speeds will be a different width. However each channel should be identical to each other.

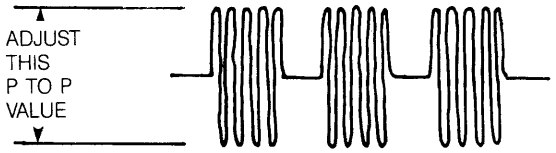
7.2.7 READ LEVEL TEST - P.E. (1600 BPI)

NOTE

Always adjust NRZI level per above prior to adjusting P.E. levels.

A. When the prior NRZI level adjustment is completed (paragraph 7.2.6) press the 1600 CPI switch while the tape is moving and the NRZI data will be replaced by P.E. data. 1600 CPI switch will light. If RESET was pressed after NRZI test then press RESET, TEST, FWD, ON-LINE and then 1600 CPI to get in P.E. mode.

B. Connect a scope to TP-6 - P.E. analog data should appear as BURST of data.



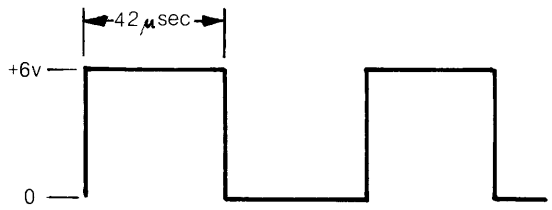
C. If required, adjust R326 (located at 11.5-L) directly above the NRZI potentiometer for that channel-

Adjust the above for the following voltage(s):

Speed	Volts P-P	
12.5 IPS	18 volts	
18.75 IPS	18 volts	Peak to Peak 1600 BPI Level
25 IPS	18 volts	
37.5 IPS	18 volts	
45 IPS	18 volts	

D. Perform the above level test (steps B and C) on each channel (TP-6 thru TP-14), adjusting as required (R326 thru R334) for the correct P.E. READ level.

E. Connect scope to TP-43 (located at 7-K). Set scope sweep to 20 μ sec. Trigger scope to display approximately 2 pulses as follows:



Pulse width should be approximately 42 μ sec wide at 45 IPS. Amplitude from slightly below 0v (ground) to approximately +6vdc.

F. Check TP-44 thru TP-51 (location 7-L thru 7-V) for similar wave forms on each channel. Exceptional wide or narrow pulses indicate a problem area.

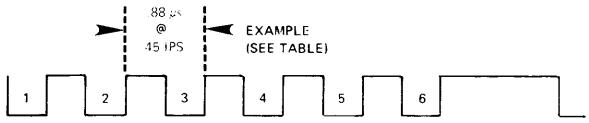
G. Pulses at all other speeds will be a different width. However each channel should be identical to each other.

7.2.8 WRITE DESKEW PULSE WIDTH (FWD-ON-LINE-1600 CPI)

A. At completion of the above P.E. level test, connect a scope to the IC located at 5P (pin 8). Set scope sweep to 1 μ sec.

B. Press RESET, TEST, FWD, ON-LINE and 1600 CPI switches.

C. A series of six (6) short pulses should appear and one (1) pulse of wider duration as shown:



D. Check that the duration of one complete pulse, from the leading edge of one pulse to the leading edge of the next pulse is as follows (change scope sweep as required). Do not use wider pulse.

Speed	Pulse
12.5 IPS	2.13 μ s
18.75 IPS	1.86 μ s
25 IPS	1.6 μ s
37.5 IPS	1.07 μ s
45 IPS	.88 μ s

E. If pulse duration is not correct, adjust R516 (located at 4-V) for proper duration.

F. Press RESET at completion

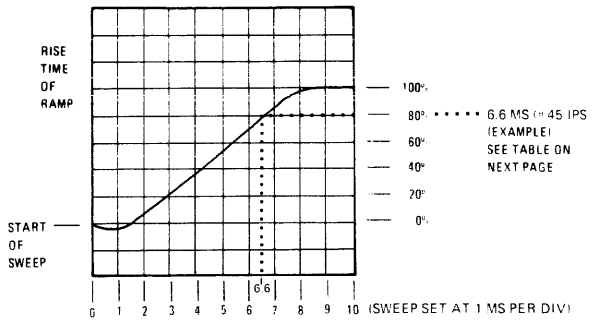
7.2.9 RAMP TEST (FWD-LOAD)

A. Connect and adjust the scope as follows:
   1. Vertical Input
      Connect to TP1 (located at 8-F)
   2. External Sync
      Connect to Pin 36 of Microprocessor IC (40 pin chip located at 17-N) or 16P - Pin 5.
   3. Sweep Scale
      5 millisec for 12.5 IPS, 2 millisec for 18.75 and 25 IPS, 1 millisec for 37.5 and 45 IPS. Make certain sweep variable is in calib. position.
   4. Scope Volt Scale
      0.1 volts for 12.5, 18.75 and 25 IPS, 0.2 volts for 37.5 and 45 IPS.
   5. Trig. Mode.
      Norm

B. Press RESET, TEST, FWD and LOAD switches. Tape motion on tape transport should be in a forward - stop - forward - stop sequence.

C. Adjust scope controls (Volts Variable and Position) for 100% deviation (5 major divisions). Use Position for 0% (Ground) and Volts Variable for 100% (top of trace), scope trace should appear as follows:

SCOPE TRACE



D. The rise time of the Ramp is measured at the 80% deviation mark (linear portion of curve) and should be as follows:

Speed	80% of Full Ramp
12.5 IPS	24 MS
18.75 IPS	16 MS
25 IPS	12 MS
37.5 IPS	8 MS
45 IPS	6.6 MS

E. If RAMP rise time is not correct, adjust R22 (the bottom potentiometer located at 12-F).

F. Switch scope trigger slope and check RAMP FALL time for the same value or slightly less (value should not be less than 1 MS from rise time).

G. Press RESET switch to stop motion of tape. Disconnect external sync at 17-N and return scope to automatic sync. Remove scope probe from TP-1.

H. Return the scope variable potentiometer to CALIB position and position the scope for ground at center of trace.

7.2.10 STOP ADJUSTMENT

A. Touch scope probe to case (collector) of the capstan driver transistor (2N6052 located at 13-A). Drive should be stopped at this time.

B. Voltage should be less than 300 MV; if not, adjust R28 (located at 10-F). Noise and spikes are acceptable but should not exceed 300 MV P to P.

7.2.11 THRESHOLD VOLTAGE CHECK — NRZI

A. Press RESET, TEST, FWD then ON-LINE.

B. Data is now being written in NRZI.

C. Connect scope to TP58 (located at 5½-T).

D. Voltage should be +0.8vdc ± .2 and at a steady level.

E. Connect scope to TP59 (located at 10-V).

F. Voltage should be -0.8vdc ± .2 and at a steady level.

G. If these voltages are not within tolerance replace plug in IC at location 6-V. If problem still exists replace IC at location 6-T (LM-324).

H. Press RESET at completion.

7.2.12 THRESHOLD VOLTAGE CHECK — PE

A. Press RESET, TEST, FWD, ON-LINE then 1600 CPI (1600 CPI light comes on).

B. Data is now being written in PE (1600 CPI).

C. Repeat steps C thru H of 7.2.11 (NZRI Threshold Check), except voltage at TP58 should be +0.65 ± .2 and voltage at TP59 should be -0.65 ± .2vdc.

7.2.13 CLAMPING VOLTAGE CHECK — NRZI

A. Press RESET, TEST, FWD and then ON-LINE.

B. Data is now being written in NRZI.

C. Connect scope to emitter (top wire) of transistor Q49 at location 13-J.

D. Voltage should be -0.25vdc ± 0.1.

E. Connect scope to emitter (top wire) of transistor Q50 at location 14-J.

F. Voltage should be +0.3vdc ± 0.1.

G. Press RESET at completion.

7.2.14 CLAMPING VOLTAGE CHECK — PE

A. Press RESET, TEST, FWD, ON-LINE and then 1600 CPI (light comes on).

B. Data is now being written in PE.

C. Connect scope to emitter (top wire) of transistor Q49 at location 13-J.

D. Voltage should be -0.4vdc ± 0.1.

E. Connect scope to emitter (top wire) of transistor Q50 at location 14-J.

F. Voltage should be +0.3vdc ± 0.1.

G. Should either voltage (Q49 or Q50) in NRZI or PE check be out of tolerance replace both transistors (2N4124 and 2N4126) as first step in troubleshooting.

H. Press RESET at completion.

7.2.15 PEMOA VOLTAGE CHECK — NRZI/PE

A. Press RESET, TEST, FWD and then ON-LINE.

B. Pemoa line is now in NRZI mode.

C. Connect scope to emitter (top wire) of Q42 (location 7-M).

D. Voltage should be +5vdc ± 1.

E. Press 1600 CPI — Pemoa line is now in PE mode.

F. Voltage at same point should be −12vdc ± 2.

G. If voltage is not within tolerance change both Q42 (2N4124) and Q43 (2N4126) as first step in troubleshooting.

H. Press RESET at completion.

7.2.16 ERASE AND WRITE VOLTAGE CHECKS

A. Press RESET, TEST, FWD and then ON-LINE.

B. Data is being written in NRZI.

C. Connect scope to top lead of R524 (130 OHM 1 Watt resistor) at location 4-K.

D. Voltage should be +5.5.vdc ± 1v (ERASE voltage).

E. Move scope to top lead of R525 (next to R524) 56 OHM, 1 Watt.

F. Voltage should be +14vdc ±2v (WRITE voltage NRZI).

G. Press 1600 CPI (light comes on).

H. Data is now being written in PE.

I. The top lead of R525 (resistor on left) should now indicate +7.5vdc ± 1v (WRITE voltage PE).

J. R524 (130 OHM) should still indicate +5.5vdc ±1v.

K. Press RESET at completion. Then RWD. Tape will return to load point (LOAD light on). Press RWD once again and tape will unload.

M. **Return all test jumpers (E16-E18 to E16-E17 and possibly E28-E29 to E32-E33 if P.E. only is desired). Any other jumpers moved should also be returned to original configuration.**

This completes the self-test operational test and adjustments. If all tests have been successfully completed and the tape transport is operational, return to system.

7.3 SENSOR CHECKS AND ADJUSTMENTS

7.3.1 SENSOR CHECKS

A. Lamp Out
   1. TP 61, Lamp out (L) is FALSE = HIGH.
   2. Disconnect J11.
   3. TP 61, Lamp out (L) is TRUE = LOW.
   4. Connect J11.

B. Retractor Motor Sensors

   Arms Up - No Tape in Path
   1. RUP (L) is TRUE. (13F pin 1) = LOW.
      RDN (H) is FALSE. (13F pin 2) = HIGH.
   2. Thread tape, depress LOAD switch. Upon completion of load sequence,
      RDN (L) is TRUE. (13F pin 2) = LOW.
      RUP (H) is FALSE. (13F pin 1) = HIGH.

C. EOT/BOT
   1. With no tape in path
      a. 13F pin 14 = HIGH (BOT)
      b. 13F pin 13 = HIGH (EOT)
      c. Connector P10 pin 2 = Less than +0.9 volts (Do not disconnect connector)
      d. Connector P10 pin 5 = Less than +0.9 volts (Do not disconnect connector)
   2. Tape without Marker in Path
      a. 13F pin 14 = LOW
      b. 13F pin 13 = LOW
      c. P10 pin 2 = More than +2.5 volts
      d. P10 pin 5 = More than +2.5 volts

D. File Protect Ring Sensor
   1. Ring normal = 13H pin 1 = HIGH.
   2. Ring depressed = 13H pin 1 = LOW.

7.3.2. COMPLIANCE ARM SENSOR ADJUSTMENTS

Install a normal test tape and load tape. Move tape in forward direction past BOT marker. Press RESET to stop tape.

B. Press Power Switch to OFF (arms will drop).

C. Turn power ON only, DO NOT PRESS LOAD.

D. Adjust TAKE-UP COMPLIANCE CIRCUIT as follows:
   1. Connect DVM to J6 pin 2. Connect ground of DVM to COMMON TP. Connect scope to TP3 (voltage scale on 5V per). Remove compliance arm sensor cover by removing cover screw and lifting cover straight out from housing.
   2. Check the two screws that attach sensor plastic block to metal housing to insure tightness.
   3. Manually move take-up arm from lower rest position, which must be a NEGATIVE voltage of approximately 4.0 to 7.5 VDC on DVM, to the first reference mark which is approximately ⅜ inch from the lower resting position. (There are a total of three (3) reference marks on the frame; lower, center and upper.) Note this negative voltage.
   4. Continue to move the take-up arm upward to the upper reference mark (1½ inches from the top) and note the positive voltage on the DVM.
   5. The voltage readings taken in steps 3 and 4 should be opposite polarity.
   6. If the above readings are not equal to within + 0.5 volt, gently adjust the shutter by hand until this tolerance is met.
   7. Upon completion of the prior step, move the arm until the DVM indicates zero (0) volts. At this voltage the arm should be within ⅜ of an inch from the center reference mark.
   8. Should the prior step not fall within tolerance, let the arm go to the lowest position. Loosen the two screws that attach the plastic sensor housing to the metal casting and gently shift the plastic slightly. Retighten the two screws and repeat steps 3 thru 7. Ideally, the lower and upper reference marks will be equal and opposite and the center reference mark will be zero (0) volts (within ⅜ of an inch of the mark.)
   9. Install metal cover over compliance housing and recheck references. Voltages may be slightly higher, but still within tolerance.
   10. Move arm slowly from lower rest to upper rest and monitor on scope for a smooth transition from approximately -12V to +12VDC. (This voltage could be as high as 15V or as low as 10V.)

E. Supply Compliance Circuit
   1. Connect DVM to J7 pin 2. Connect ground of DVM to common TP. Connect scope to TP4.
   2. Perform steps 2 thru 10 above. All readings and tolerances should be the same.

7.3.3 ARM LIMIT ADJUSTMENTS

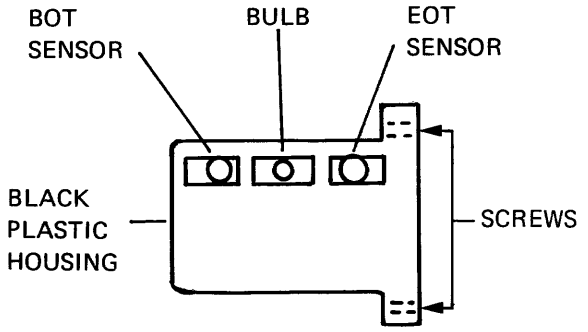
A. TAKE-UP ARM Limit Adjustments
   1. Manually lock SUPPLY ARM in the upward position at least two (2) inches into the upward travel.
   2. Connect scope to TP 60 (set scope at 2 volts per division).

3. With TAKE-UP ARM on the lower rest, scope should indicate a LOW, if not, adjust R85 (on take-up servo) in the CW direction.
4. Gently move TAKE-UP ARM until bottom portion of arm metal is in-line with LOWER reference mark. Scope should switch to a HIGH, if not, adjust R85 in a CCW direction until voltage just does switch to a HIGH.
5. Continue moving TAKE-UP ARM toward UPPER reference mark while monitoring scope. Voltage should stay at HIGH level until center of take-up arm is in line with UPPER reference mark, at this time voltage should switch to a LOW once again.
6. Should voltage switch to a LOW prior to arm in line with UPPER reference mark, turn R77 slightly in a CW direction and restart procedure at step 4 above. Recheck R85 adjustment with LOWER reference mark.
7. When adjustment is correct between reference marks, ascertain that when the arm is extended above the UPPER reference mark the scope voltage remains at a LOW, while the arm travels to the uppermost physical position.

B. SUPPLY ARM Limit Adjustments
1. Manually lock TAKE-UP ARM in upward position at least two (2) inches in the upward travel.
2. Connect scope to TP60 (sets at 2 volts per division).
3. With SUPPLY ARM on the lower rest, scope should indicate a LOW, if not, adjust R105 (on supply servo) toward CW direction.
4. Gently move SUPPLY ARM until bottom portion of arm metal is in line with LOWER reference mark. Scope at this instance should switch to a HIGH, if not, adjust R105 in a CCW direction until voltage just does switch to a HIGH.
5. Continue moving SUPPLY ARM toward UPPER reference mark while monitoring scope. Voltage should remain at HIGH level until center of supply arm is in line with UPPER reference mark; at which time voltage should switch to a LOW once again.
6. Should voltage switch to a LOW prior to arm in line with UPPER reference mark, adjust R97 slightly in a CW direction and restart this procedure at step 4 above. Recheck R105 adjustments with LOWER reference mark.

7.3.4 BOT/EOT SENSOR ADJUSTMENT

A. With tape removed from the transport, turn on power.
B. Connect a scope to Connector P10 Pin 2 on Main Electronics P.C.B. (not the sensor P.C.B.). (P10 connector is mounted at location 16-F). Do not disconnect P10.
C. Voltage at this time should be +0.9 volts or less. (This is checking the output of the BOT sensor as the light is reflected off a metal strip mounted on the top of the tape cleaner.) If voltage is greater than +0.9 volts then remove head covers and push the BOT sensor to its extreme center position (sensor pointed into transport); voltage should be in tolerance. (See sensor DWG below).
D. Move scope to P10 Pin 5 (EOT sensor output). Voltage should again be +0.9 volts or less. If not, remove upper screw that holds the sensor black plastic housing and loosen lower screw. Tilt the housing and push EOT sensor toward center (away from transport). Resecure housing and head covers, voltage should be in tolerance.
E. Thread a tape on transport (do not load). Voltage at P10 Pin 2 and 5 should be greater than +2.5 volts. If not, move sensors away from center. Recheck voltage with no tape in path for 0.9 volts or less.
F. When above conditions are met, and load switch is depressed, tape should run to "Load Point" (load light on) and then stop while awaiting further instructions.
G. Voltage on P10 Pin 2 at load point should be less than +0.9 volts (BOT) while the voltage on P10 Pin 5 should be greater than +2.5 volts (EOT).
H. By adding a metal strip to your tape at the EOT position a few feet in the Forward direction, the tape can quickly be cycled from BOT to EOT (at EOT Pin 5 will be less than +0.9 volts and BOT will be greater than +2.5 volts at Pin 2) to verify correct system operation.
I. If sensors are not adjusted correctly, tape will not load correctly.



BOT / EOT SENSOR ASSEMBLY

OPERATIONAL TESTS AND ALIGNMENT PROCEDURE 7-TRACK

7.4.1 7 TRACK TRANSPORTS

In most cases the adjustments and procedures relating to the 9 track operational tests and alignment procedure will be the same for 7 track transports. Differences in procedure are defined in this section.

7.4.2 FOLLOW SECTION 7.2 THRU 7.2.1 C. (9 TRACK)

7.4.3 JUMPER CONFIGURATION

In order to conduct the operational tests it is necessary to relocate the following jumper:

At location 17-J on component side of Main Electronic Board there are a group of jumper blocks. Move jumper E16-E17 to location E16-E18. (See Figure 2-14 for pictorial.)

7.4.4 SPEED TEST (With Skew Tape)

A. Follow Section 7.2.2 (9 track).

B. Remove skew tape and do not use for any other tests following.

7.4.5 ALTERNATE SPEED TEST (Without Skew Tape)

A. Follow Section 7.2.3 (9 track).

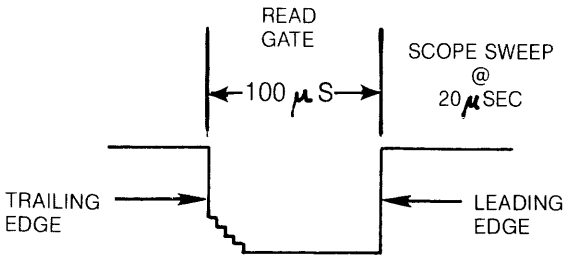
7.4.6 READ GATE TEST

A. Install a normal test tape on the transport (write enabled) and press LOAD SW. Tape will move forward to load point and stop.

B. Press RESET, TEST, FWD and ON-LINE (low density data will now be written on tape). (Low density can either be 200 or 556 BPI depending on density requested at time of order.)

C. Connect a scope to TP 52 (skew) located at 6-P, set scope voltage to 2 volts. Turn intensity of scope to fairly HIGH. Set scope sweep (CALIB) to chart that follows and check low density read gate.

D. Trigger scope on TRAILING EDGE of wave form. (Use - Slope on Scope)



EXAMPLE AT 25 IPS
200 BPI DENSITY

E. To check high density, press HI DEN switch (switch LED will light), adjust scope sweep according to chart and check for correct read gate.

F. If "Read Gate Pulse Width" is not correct according to chart proceed as follows:

G. To adjust LOW DENSITY (HI DEN LED off), press RESET, TEST, FWD and ON-LINE. Connect scope to TP 52 and adjust scope sweep to correct speed and density.

H. Adjust R498 POT (located at 6-L) for the correct width.

I. To adjust HI-DENSITY press all above switches and then HI-DEN (last). The LED on this switch will now come on. Set scope sweep to correct density and speed.

J. Adjust R496 POT (located to left of R498) for correct width.

K. Recheck both densities when adjustment is completed. Press RESET to stop tape.

READ GATE CHART

DENSITY (bpi)	SPEED (ips)	READ GATE (μs)	SCOPE SWEEP (μs)
800	45.	13.9	2
	37.5	16.6	2
	25.	25.	5
	18.75	33.3	5
	12.5	50.	10
556	45.	20.	5
	37.5	24.	5
	25.	36.	5
	18.75	48.	10
	12.5	72.	10
200	45.	55.5	10
	37.5	66.1	10
	25.	100.	20
	18.75	133.3	20
	12.5	200.	50

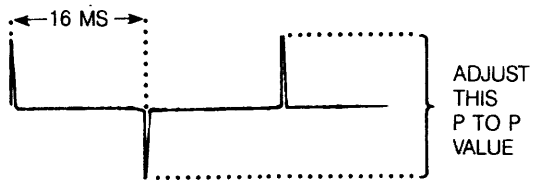
7.4.7 READ LEVEL TEST (Low Density)

NOTE

Jumper (E16-E18) in place for this test.

A. With a normal test tape on the tape transport at the load point (BOT), press RESET then TEST (switches light) then press FWD (tape motion starts). Press ON-LINE to generate LO DENSITY data. (Switch will not light.)

B. Connect scope to TP6 (Read Ch#7) located at 14-K. Analog READ DATA should appear at a rate of approximately one (1) pulse every 16 Msec.



C. If required, adjust R335 (located at 12-L) for the following peak-to-peak voltages.

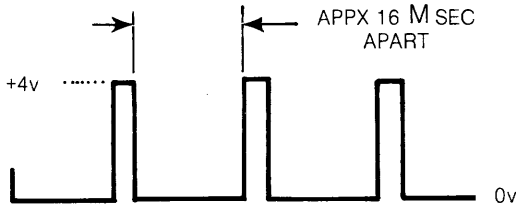
D. NOTE: This is the lower POT. Both LOW DENSITY and HIGH DENSITY use the same POT to adjust levels. The upper POT is not used on a 7-track system.

Speed	**Volts P-P**	
12.5	11 volts	
18.75	11 volts	
25	11 volts	PEAK TO PEAK
37.5	12 volts	LEVEL
45	12 volts	

Perform the above level test on each read channel (TP-6 thru TP-14), adjusting as required (R335 thru R343), for the correct read level. NOTE: TP-12 and TP-13 (POTS R348 and R342) will be at a straight +15VDC level. These correspond to read channels 1 and 0 which are not used in 7 track tape systems.

E. Check for digital output pulses on TP-34 thru TP-42 (located at 8-K thru 8-V). NOTE: TP-40 and 41 will be at ground level (channels 0 and 1).

F. Pulses will be as follows:



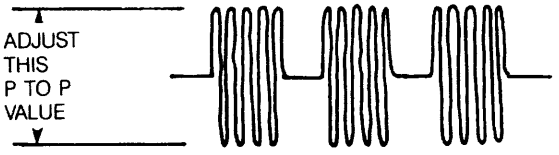
G. Press RESET to stop test.

7.4.8 READ LEVEL TEST (High Density)

A. Press RESET, TEST, FWD, ON-LINE and HI DEN to generate high density data.

B. Check same test points as performed in low density.

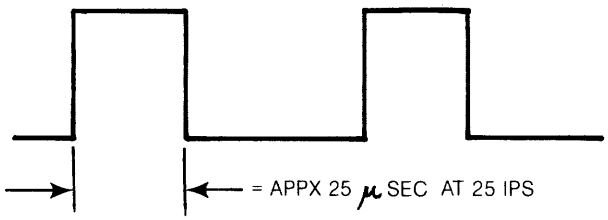
C. The analog signals on TP-6 thru TP-14 will be different than those noted during low density test. These signals will be as follows:



D. Peak to Peak levels should be approximately same amplitude as measured on low density test.

E. Check TP-34 thru 42 for similar digital output pulses. Exceptionally wide or narrow pulses on a particular channel indicates a problem area. Set scope for 20 μsec to exhibit 2 or 3 pulses as follows:

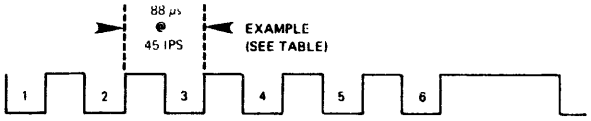
NOTE: TP 41 and 40 not used.



7.4.9 WRITE DESKEW PULSE WIDTH

A. At completion of prior test while transport is still operating in high density mode, connect scope to IC located at 5-P (Pin 8). Set scope sweep to 1 μ sec and display as follows:

B. A series of six (6) short pulses should appear and one (1) pulse of wider duration as shown:



C. Check that the duration of one complete pulse, from the leading edge of one pulse to the leading edge of the next pulse, is as follows (change scope sweep as required) (Do not trigger on wider pulse)

Sweep	Pulse
12.5 IPS	2.13 μs
18.75 IPS	1.86 μs
25 IPS	1.6 μs
37.5 IPS	1.07 μs
45 IPS	.88 μs

D. If pulse duration is not correct, adjust R516 (located at 4V) for proper duration.

E. Press RESET at completion.

7.4.10 RAMP TEST

A. Follow Section 7.2.9 (9 track).

7.4.11 STOP ADJUSTMENT

A. Follow Section 7.2.10 (9 track).

7.4.12 THRESHOLD VOLTAGE CHECK

A. Follow Section 7.2.11 (9 track).

7.4.13 CLAMPING VOLTAGE CHECK

A. Follow Section 7.2.13 (9 track).

7.4.14 ERASE AND WRITE VOLTAGE CHECK

A. Follow Section 7.2.16 A thru F (9 track).

B. Press RESET at completion then REWIND. At load point press REWIND once again and tape will unload.

C. Return test jumpers E16-E18 to E16-E17.

D. This completes the self-test operational test and adjustments. If all tests have been successfully completed and the tape transport is operational, return to system.

For sensor checks and adjustments follow 9 track sections starting at 7.3.

SECTION VIII
TROUBLESHOOTING

8.1 INTRODUCTION

This section contains instructions for determining the cause of the more common tape transport malfunctions. If a malfunction occurs which cannot be isolated with these instruction, use standard troubleshooting procedures in conjunction with the built-in diagnostic and operational test programs.

NOTE

Before performing any troubleshooting check to see that the equipment is connected properly and that all associated equipment is in good operating condition.

In order to locate a malfunction, the troubleshooter should establish a logical approach to the problem. It is important that he follows instructions and understands the theory of operation and the built-in diagnostic test program.

One of the first approaches to locating the malfunction should be to visually inspect the unit for damaged components. Many times mechanical malfunctions can be isolated by listening for unusual noises while the transport is operating. When a defective component is located, identify it by referring to Section IX to get the part number and/or its value. If a replacement part is available, substitute it for the suspected defective part.

NOTE

If replacement of the defective component requires major alignment, it is recommended that the unit be returned to IDT for factory repair and adjustment.

8.2 COMMON PROBLEMS

Table 8.1 lists the common problems associated with tape transport operation together with the probable cause and remedy.

8.3 SYSTEM TROUBLESHOOTING

Table 8.2, used in conjunction with the schematic diagrams in Section IX, provides an aid to the isolation and repair of faults.

8.4 TROUBLESHOOTING WITH OFF-LINE DIAGNOSTIC TESTS

The Series 1050 troubleshooting philosophy is one of isolation and repair. The troubleshooting chart in Table 8.1 will help identify the more complex problems. When used in conjunction with the off-line diagnostic tests, isolation of the failure should be possible in most cases to a single component or circuit. Table 8.1 has been developed to show the common failures in order of frequency of occurrence.

8.5 WAVEFORMS

Table 8.2 contains waveform pictorials and testing points for the take-up, supply and capstan servos. In addition there is a schematic and sequence for the retractor motor circuit and loading operation.

8.6 DATA GENERATION PATTERNS

Figure 8-1 thru 8-7 provide write and read data genera tion information for NRZI and P.E. data.

Figure 8-8 shows Daisy-Chain/Terminator configuration.

8.7 Figure 8-9 consists of 3 sheets. These are CONTROL, WRITE and READ schematics when troubleshooting from formatter inputs/outputs to the main electronic board (thru I/O board).

TABLE 8.1 COMMON PROBLEMS

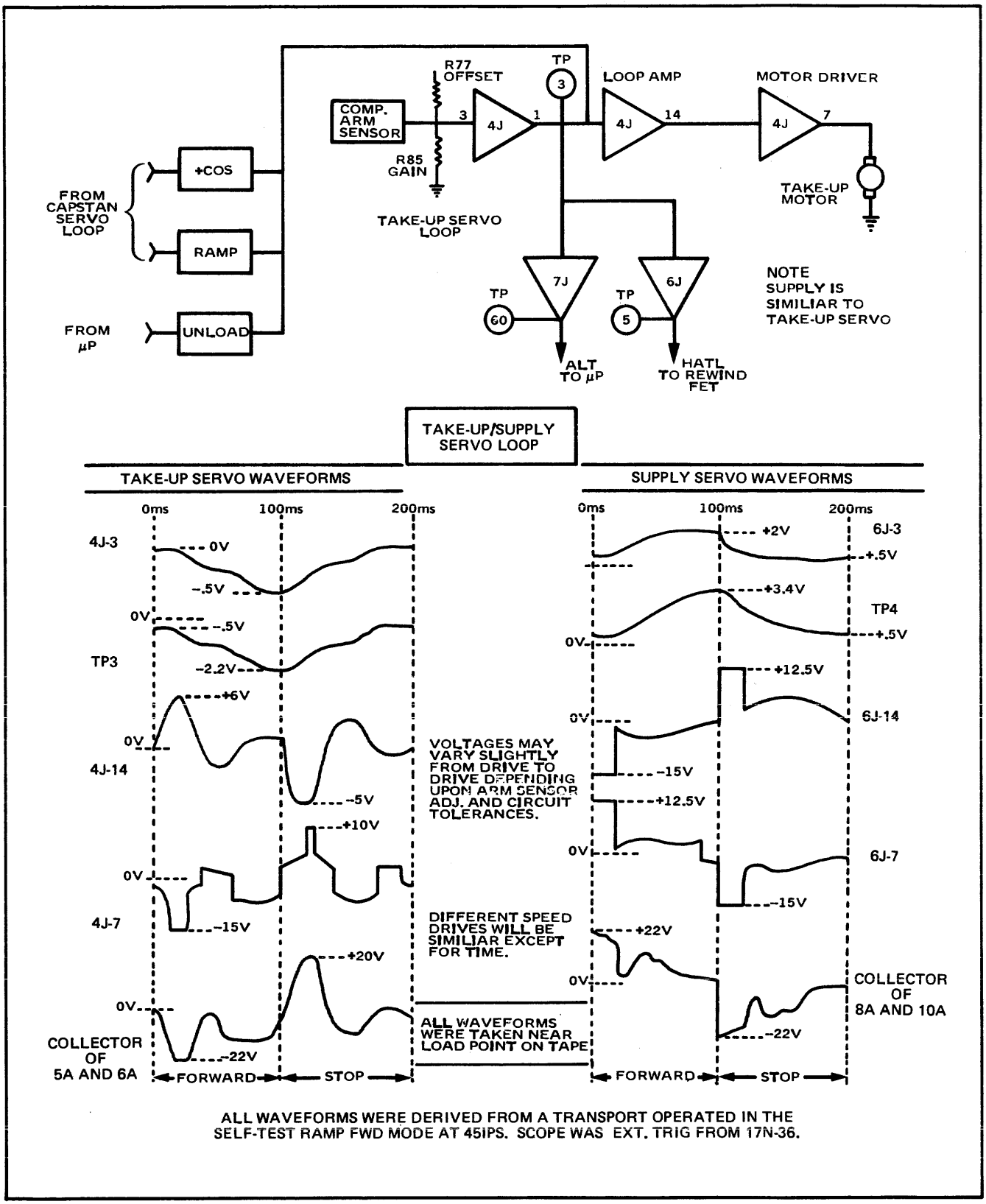
TROUBLE	PROBABLE CAUSE	REMEDY
All control panel switches not operative when touched.	Flex-cable in membrane sw. assy not making connection.	Reinstall flex-cable inside sw. assembly
Power to transport does not come on when control panel switch toggled on.	+20V Fuse F1 blown	Replace F1 on main elect. board, 8 AMP.
	Triac (Q1) in unregulated power supply is defective	Remove power supply and replace triac
	Primary power fuse (6¼ AMP) in unreg. power supply defective	Replace fuse
	LED in power sw. defective	Replace LED
One or another control panel sw. indicator does not light when required	LED for switch is bad	Replace LED
	Inverter/driver (7406) is bad	Replace 7406
Take-up reel flange scrapes tape	Reel improperly mounted	Loosen reel and reposition (See Sec. 6.4.5)
Supply hub does not grip tape reel tightly	Adjustment inside hub not set correctly	Readjust supply hub locking mechanism (See Sec. 6.4.5) or replace compression band
Extremely difficult to mount tape reel onto supply hub	Adjustment inside hub not set correctly	Readjust supply hub locking mechanism (See Sec. 6.4.5)
Tape, when mounted to supply hub, scrapes against its own flanges (while tape is moving).	Supply hub improperly mounted	Remove supply reel from top plate and remount hub to motor shaft (See Sec. 6.4.5) or bad tape reel
Retractor motor runs continuously	Run-up (RUP) or Run-down (RDN) sensor defective	Replace sensor
	Q2 or Q3 defective in retractor motor circuit	Replace both transistors if one is suspected
	IC 8J (7407) is defective	Replace IC
	Microprocessor IC (3870) is defective	Replace 3870 IC at location 17-N

TABLE 8.1 COMMON PROBLEMS (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Reset LED comes on during normal operation	+5V boost circuit is faculty causing +5V on main board to drop to 3 or 4 volts	Check F3 Fuser. Check 2N4398 on main board. Check +5 volt Reg. on main board
Compliance arms go into limit when LOAD switch is activated	IC 10J (SD-5000) or IC 12J is defective	Replace IC
	Compliance arm limit not adjusted correctly	Readjust per Sec. 7.3.3
Tape moves slowly in STOP mode	Stop adjustment R28 not set correctly	Readjust per Sec. 7.2.10
	IC 11J (SD-5000) is defective	Replace IC
Tape does not stop at BOT (Load Point) or rewind at EOT	Sensors not adjusted correctly	Readjust per Sec. 7.3.4
Read or Write Parity or data errors	Read levels not adjusted to correct value	Adjust levels per Section 7.2.6 and 7.2.7
	Tape Path alignment not correct	Adjust tape path with calib. skew tape per Sec. 6.3
	Ramp not adjusted correctly	Adjust ramp per Sec. 7.2.9
	Head or Guides need cleaning	Clean head and guides
Continuous Write or Read errors	Write or Read circuits defective	Check per Sec. 7.2
Retractor motor will not run	A sensor bulb or LED is defective	Check TP 61 (Lamp Out), if T.P. is Low this indicates a defective bulb/LED. Check compliance arm sensors BOT/EOT sensor, ring sensor or RUP/RDN sensors for defective light source
	BOT/EOT sensors not adjusted correctly	Readjust sensors per Section 7.3.4
	One of the regulated voltages is low causing Q51 to turn on	Check power supply voltage circuits. Per Section 7.2.1
	Q2 or Q3 is defective	Replace both transistors if one is suspected
	Retractor motor is defective. Contacts of motor with wires disconnected should read approx. 6Ω (motor winding)	Replace motor
	Wire on motor has come loose	Reinsert wire

TABLE 8.1 COMMON PROBLEMS (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Tape does not tension or spills in load sequence	Supply or take-up driver servo circuit defective	Most likely failed output drivers (2N6052 and 2N6059) for either of the servo motors. Check Section 7.2.1 C
	A sensor bulb or LED is defective	Replace
	Fail/Safe relay does not activate	Check FSR circuit on 01-30273 schematic
Arms drop in middle of rewind and will not retension when load switch is pushed	Supply or take-up driver servo circuit defective	Most likely the output drivers for either of the servo motors. (2N6052 or 2N6059) Check with DC voltmeter or scope with power ON **only**, the following: 2N6059 (5A-8A-12A) Base to Com = -25V Emitter to Com = -25V Collector to Com = 0V 2N6052 (6A-10A-13A) Base to Com = +25V Emitter to Com = +25 V Collector to Com = 0V
Transport does not move tape in response to Forward or Reverse command	Transport is not ready or On Line	Troubleshoot control logic or servo amplifier
Transport responds to remote FORWARD command, but tape is not written	Write current in not enabled	Check presence of Write Enable ring on supply reel, WRT EN indicator should be lit.
	Write Enable signal is not correct	Troubleshoot control logic
	Write Data or Write Data Strobe is not received correctly from interface	Check interface
Tape cannot be read	Interface cable fault	Replace or repair interface cable
	Read skew out of adjustment Head and guides need cleaning	Readjust in accordance with Section VI Clean head and guides
	Read amplifier gains are incorrectly adjusted	Check and adjust amplifier gains (Sec. 7.2.6 & 7.2.7)
	Read Data Storage Register faulty	Check that duration of positive section of waveform is one-half bit time
	Other component fault in read channel	Check test point data. Repair Read/Write board.



ALL WAVEFORMS WERE DERIVED FROM A TRANSPORT OPERATED IN THE SELF-TEST RAMP FWD MODE AT 45IPS. SCOPE WAS EXT. TRIG FROM 17N-36.

TABLE 8.2. WAVEFORM PICTORIALS AND TESTING POINTS

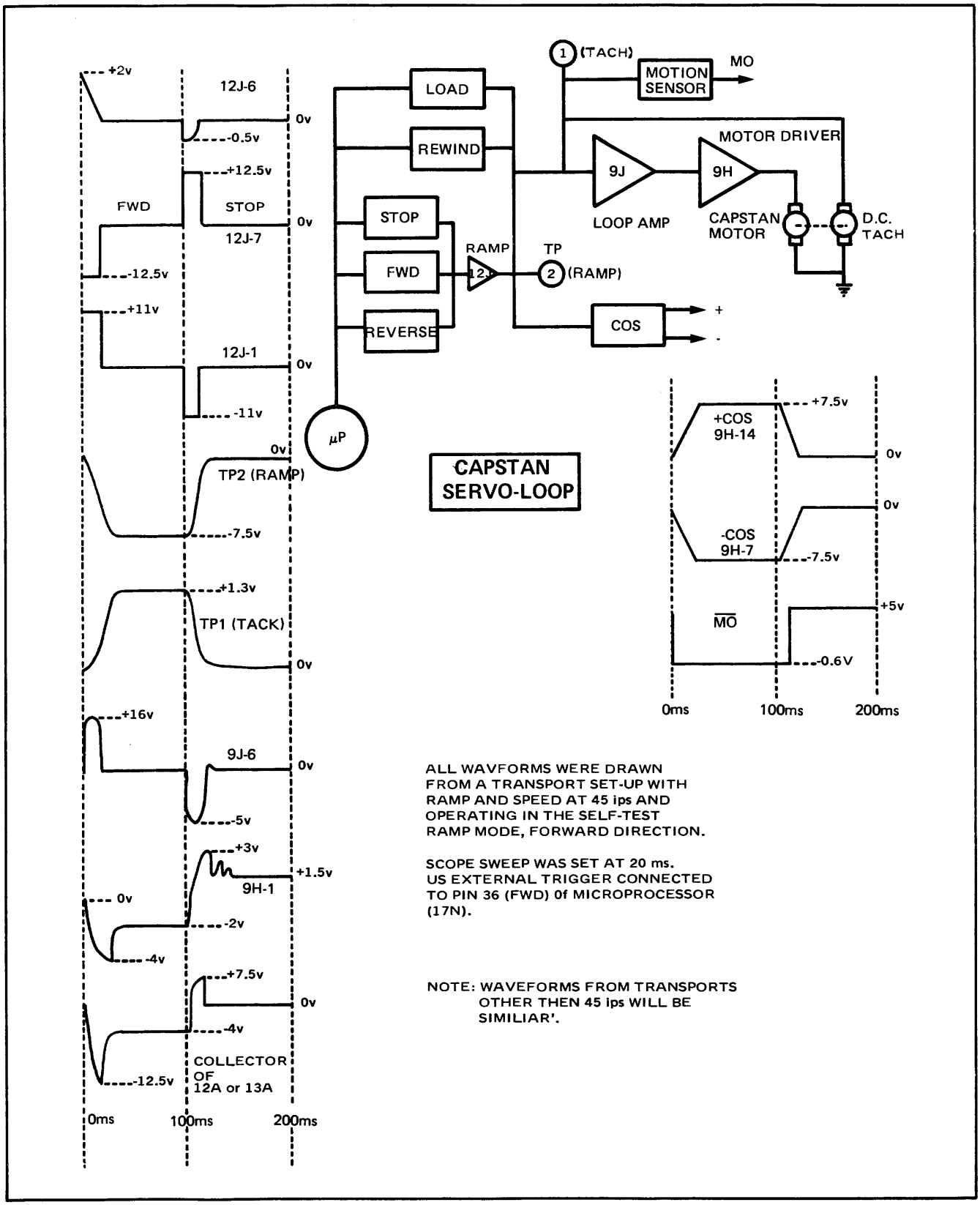
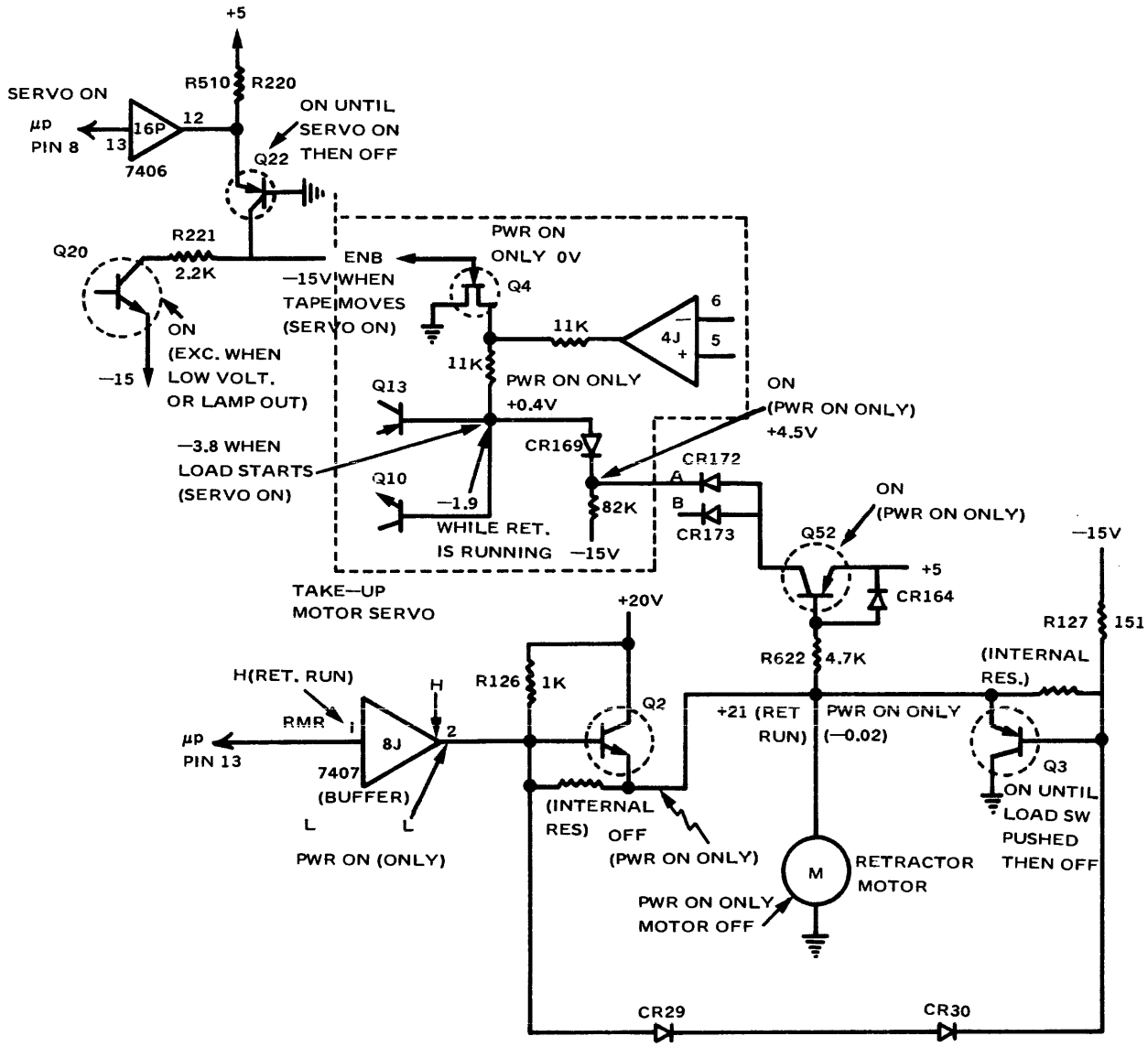


TABLE 8.2. WAVEFORM PICTORIALS AND TESTING POINTS



RETRACTOR MOTOR CIRCUIT

TABLE 8.2. WAVEFORM PICTORIALS AND TESTING POINTS

LOADING SEQUENCE FOR SERIES 1050

Condition 1 = Pwr On-Arms Up-Tape Wound on T.U. Reel by Hand.

Circuit = 8J1 (RMR) is Low. 8J2 is Low.
Q3 and Q52 turned On
Q2 is Off
Q4 (FET) is On
4J-7 (Junction of 11K resistors is at ground potential thru Q4.)
Q22 is On
(Servo on is false (low).)
Q20 is On
FSR is Off (No rely on signal to 18P-1)
Retractor Motor Off

Condition 2 = Load Switch Pushed

Circuit = Rly On signal from MP goes H (true.) This causes 8J8 to go Low. Turns On FSR to Servo's. RMR signal from MP goes H (true). 8J1 and 8J2 goes H
Q2 turns On
Q3 and Q52 turns off
Retractor Motor runs
Voltage at bases of Q10 & Q13 goes to -1.9V. Q13 to On slightly and turns on Q5 (2N6059). This tensions tape while arms are moving toward center and Retractor Motor is still running.

Condition 3 = Retractor Motor Stops

Circuit = When Retractor Motor Arm reaches bottom it covers the RDN (Run Down) Sensor.
RMR then goes False (Low)
Q3 and Q52 turn On again
Q2 turns Off
Motor Stops
Servo On from MP goes H (true)
16P-12 goes Low
Q22 turns Off
Q4 turns Off from -15V (ENB) from Q20.
Output of 4J now controls Take-Up Servo Driver Loop.
Tape moves to Load Point (BOT).

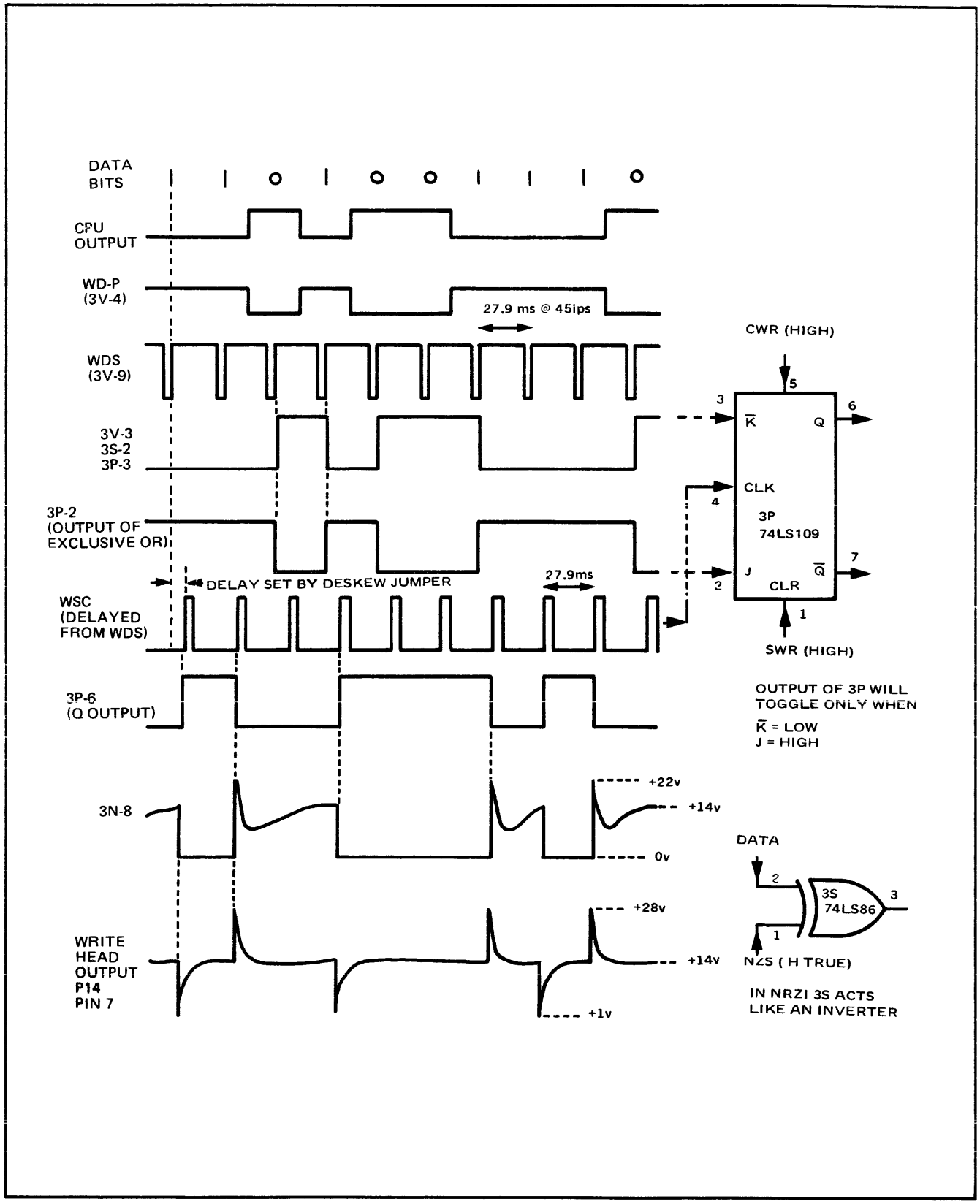


FIGURE 8-1. NRZI WRITE DATA WAVEFORM

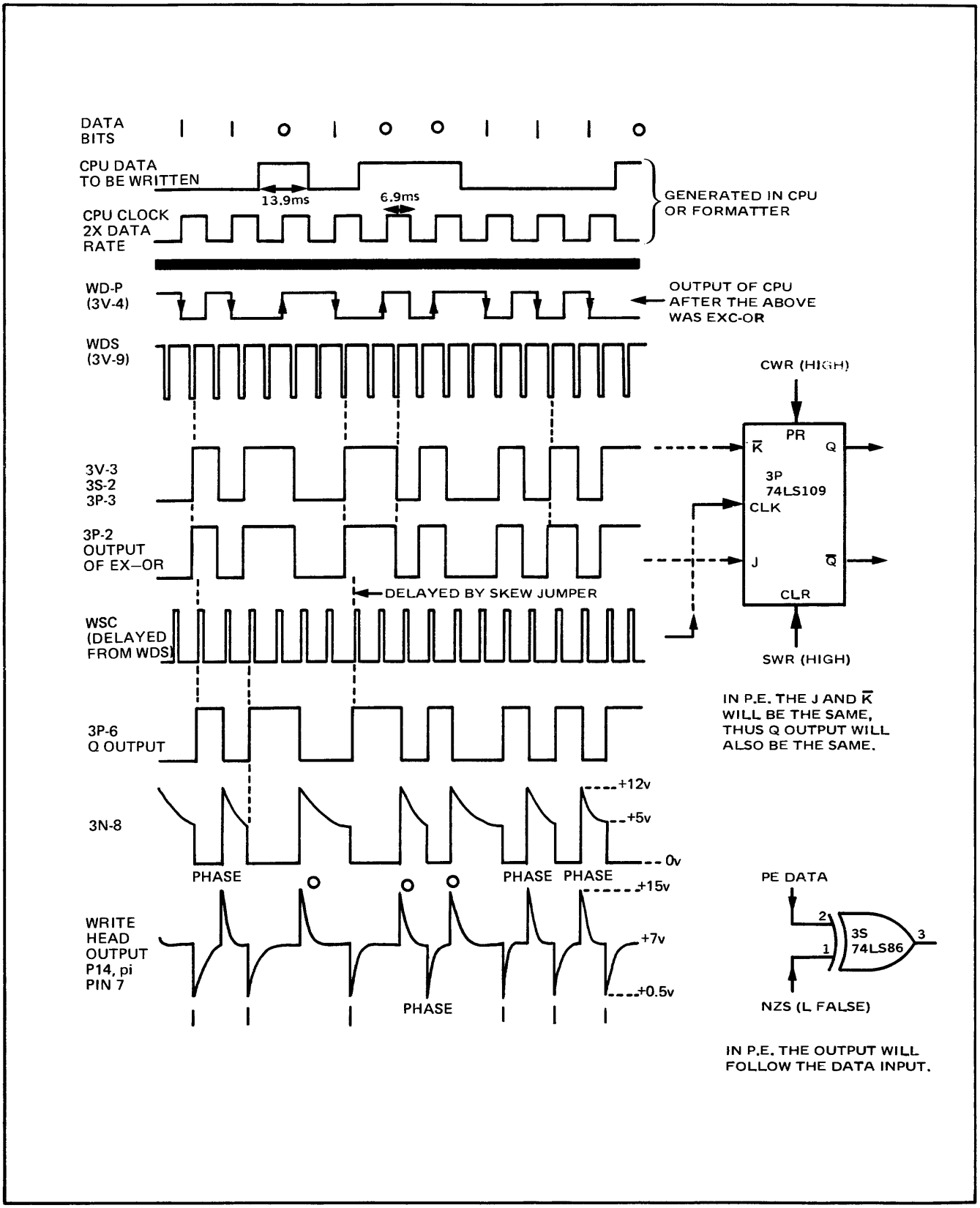


FIGURE 8-2. P.E. WRITE DATA WAVEFORMS

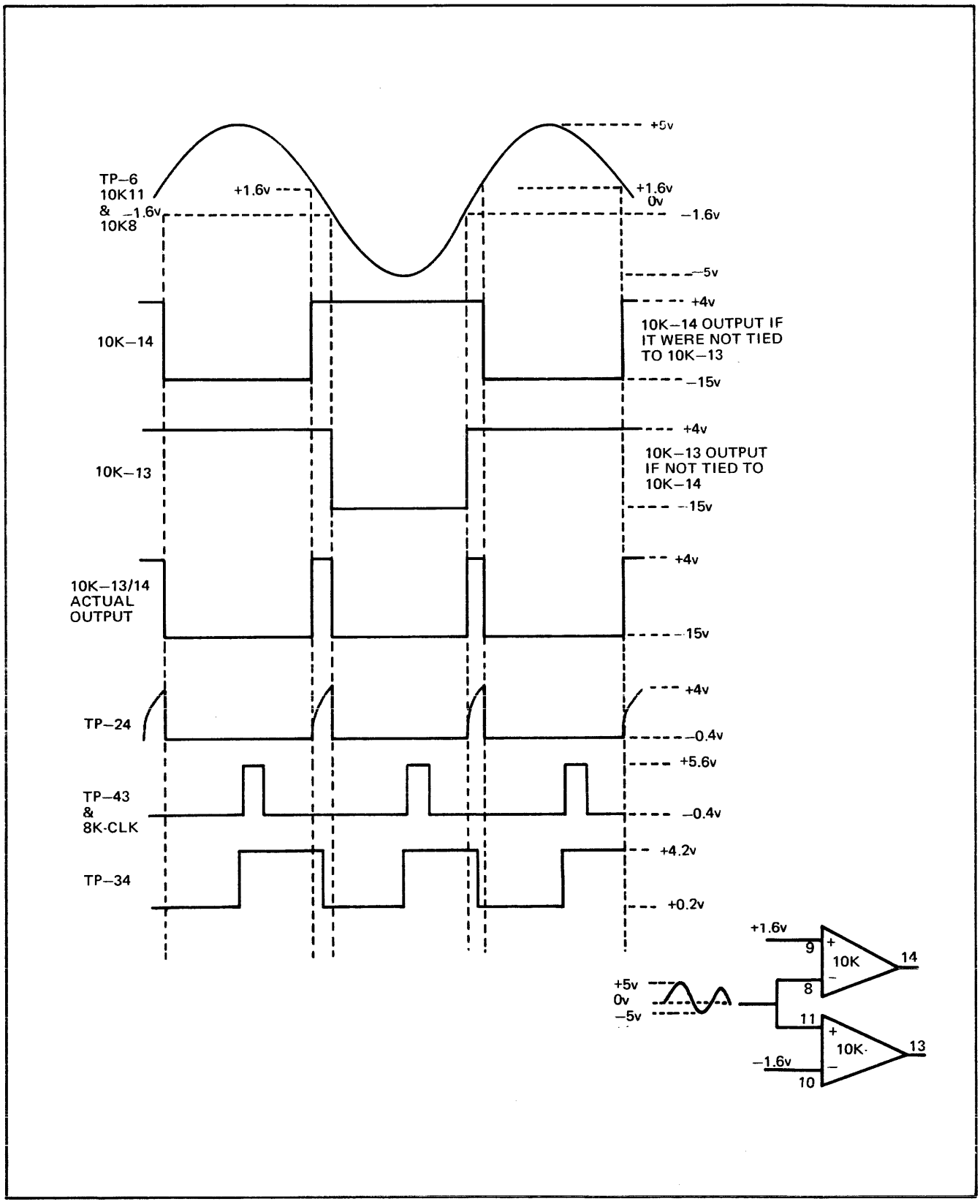


FIGURE 8-3. NRZI 800 BPI DATA GENERATION WAVEFORM

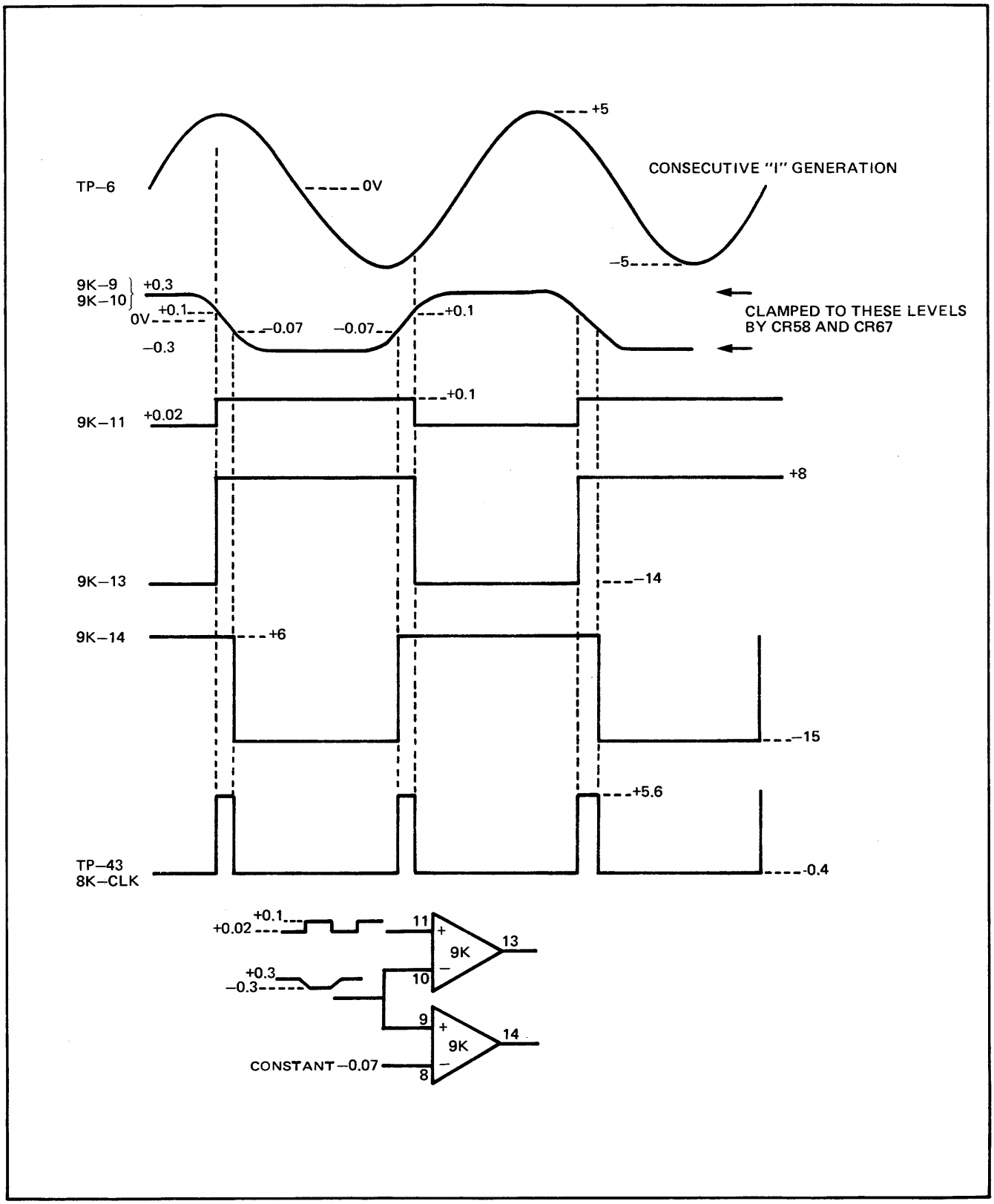


FIGURE 8-4. NRZI WAVEFORMS FOR GENERATING CLOCK PULSES FOR READ REGISTER

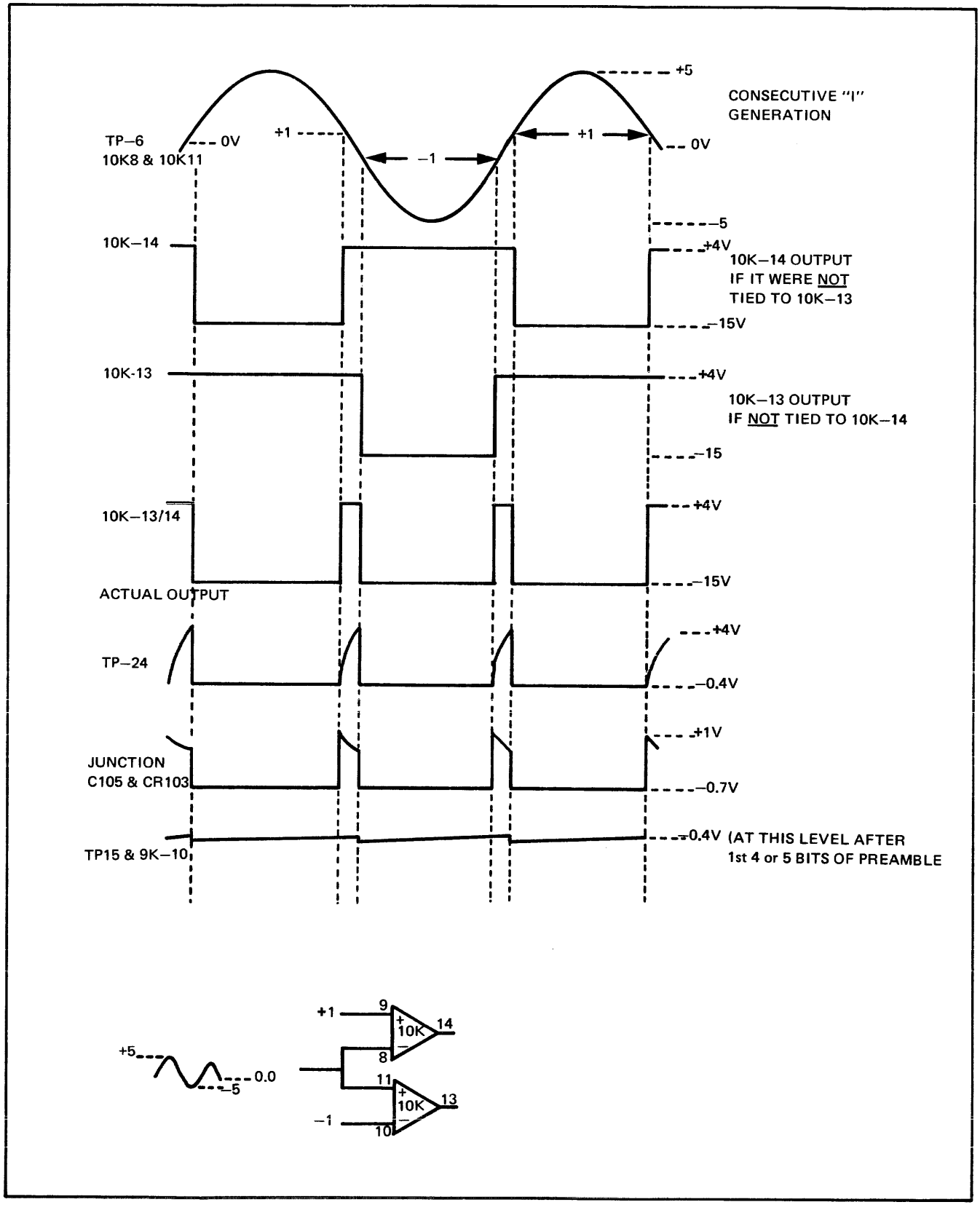


FIGURE 8-5. P.E. WAVEFORMS GENERATED TO BIAS DATA COMPARATOR (9K)

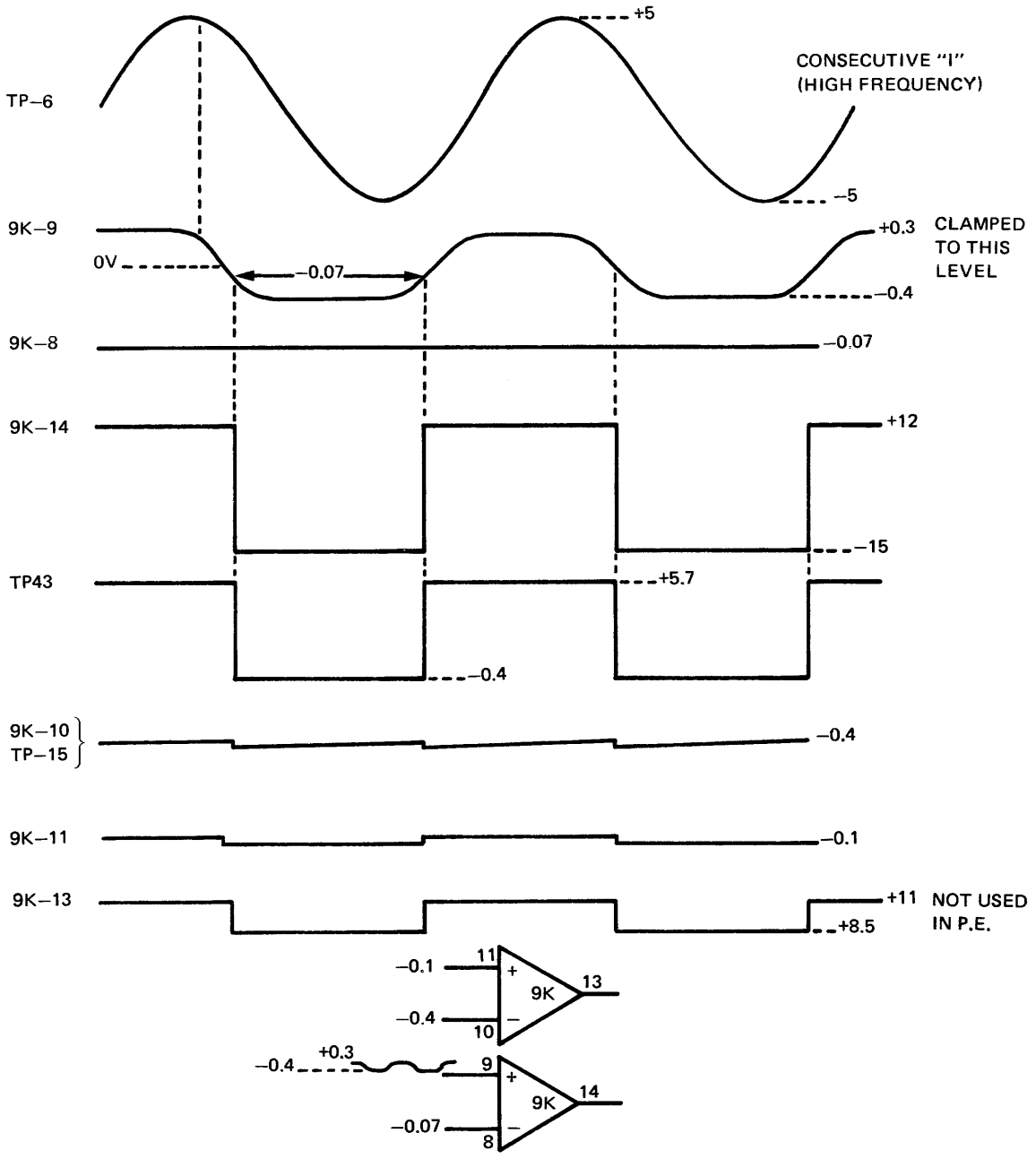


FIGURE 8-6. P.E. READ DATA OUTPUT WAVEFORMS

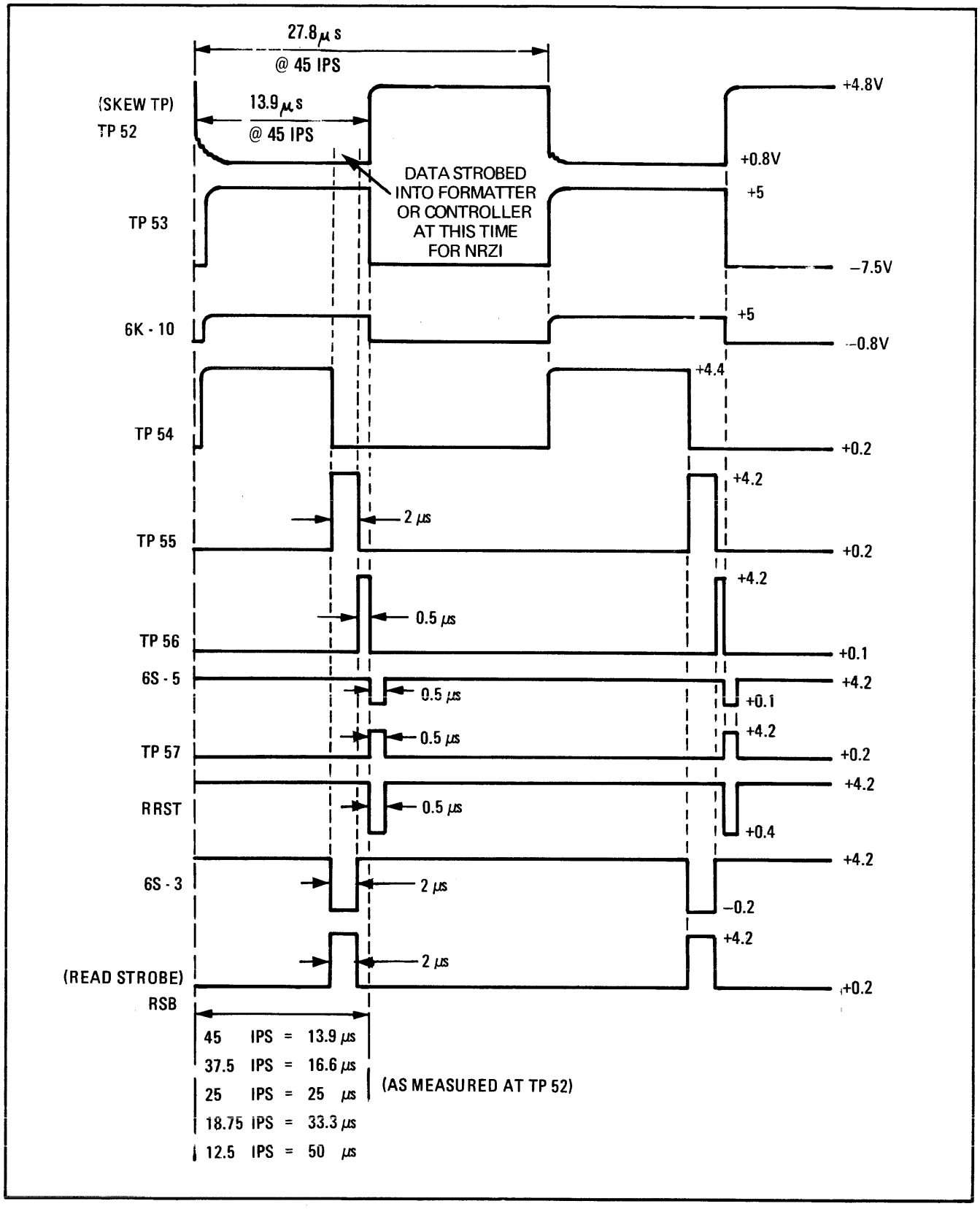


FIGURE 8-7. READ CONTROL TIMING GENERATION AT 45 IPS, 800 BPI

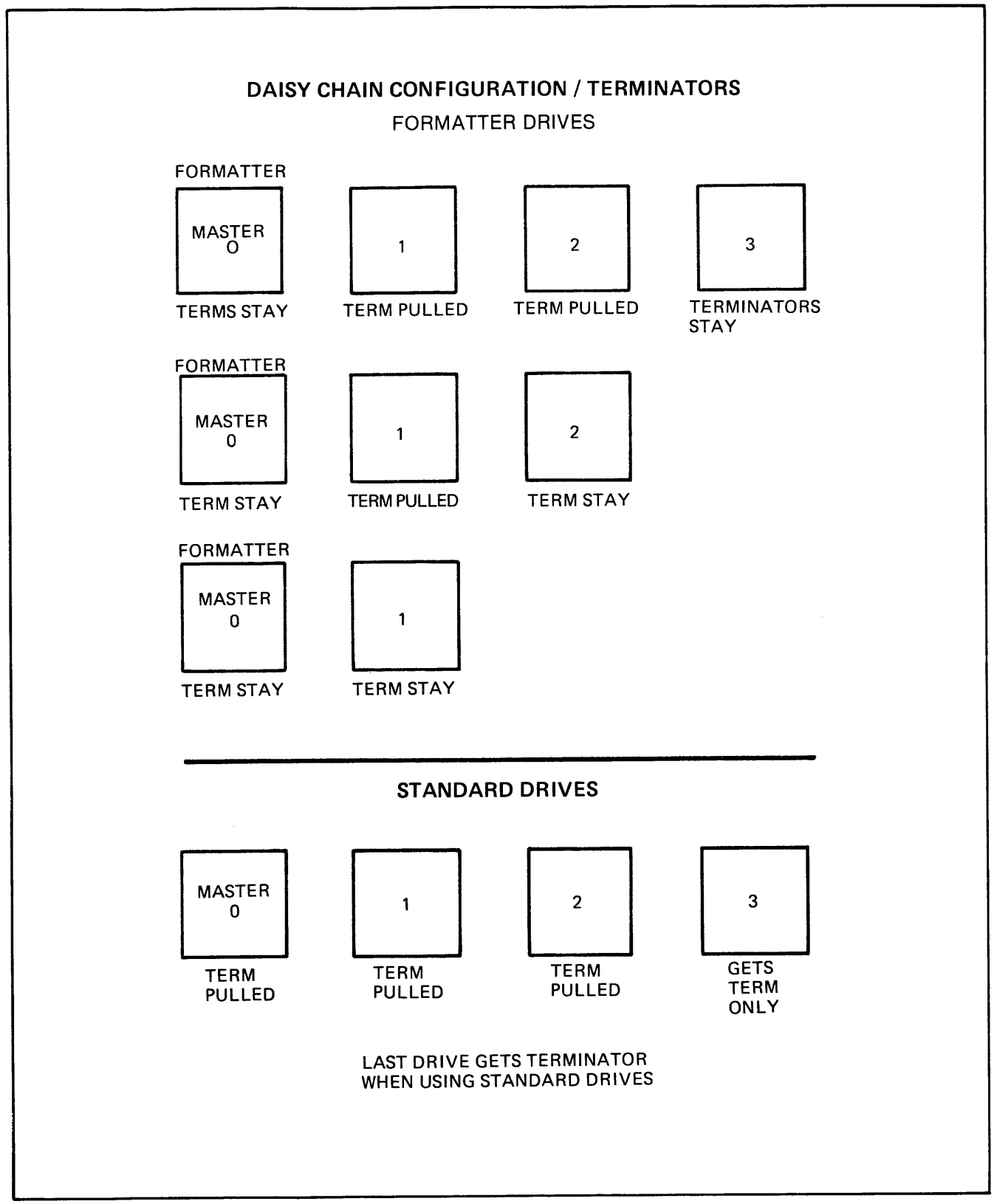


FIGURE 8-8. DAISY CHAIN CONFIGURATION/TERMINATORS

FORMATTER—I/O—TRANSPORT

CONTROL INTERFACE

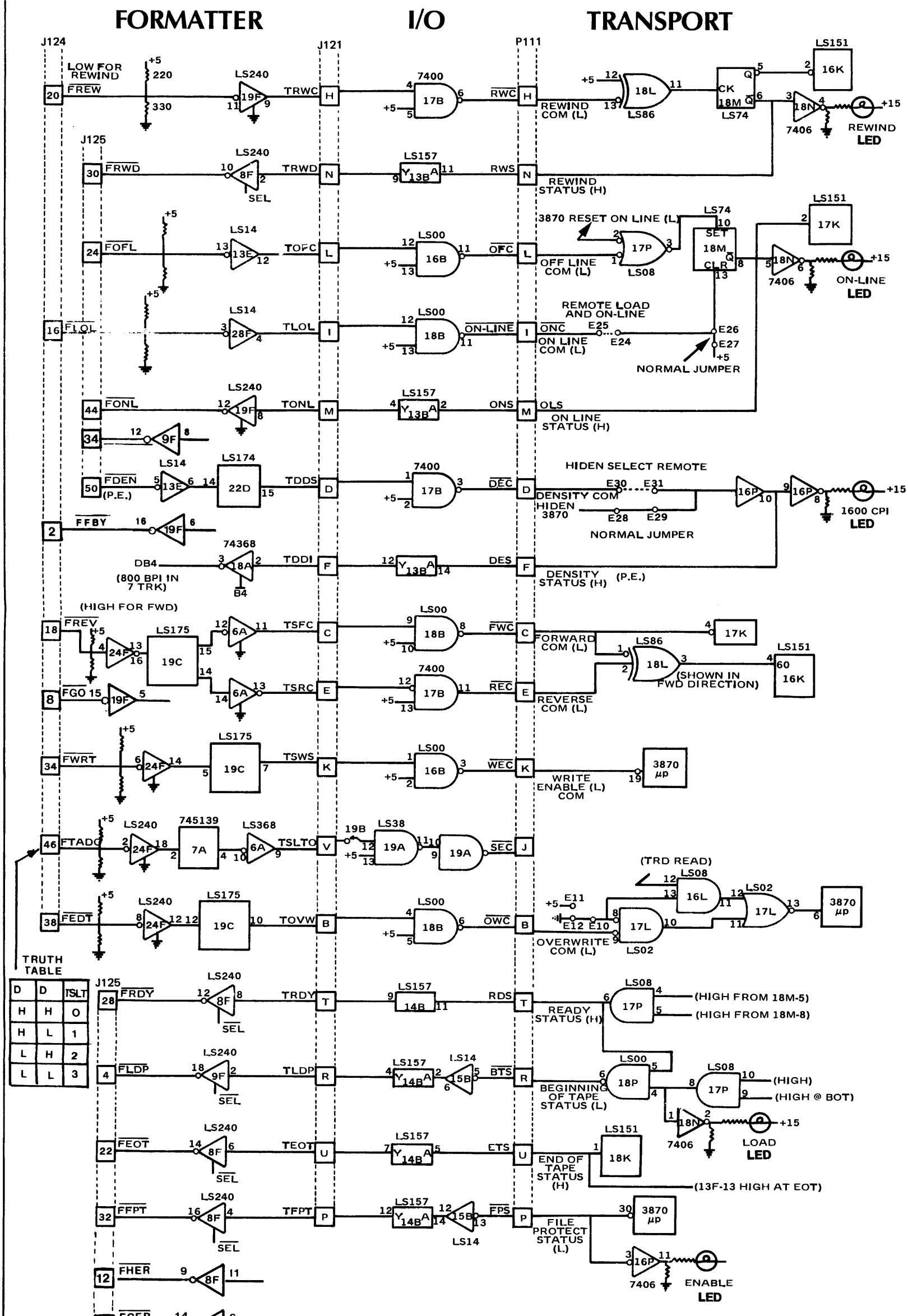


FIGURE 8-9

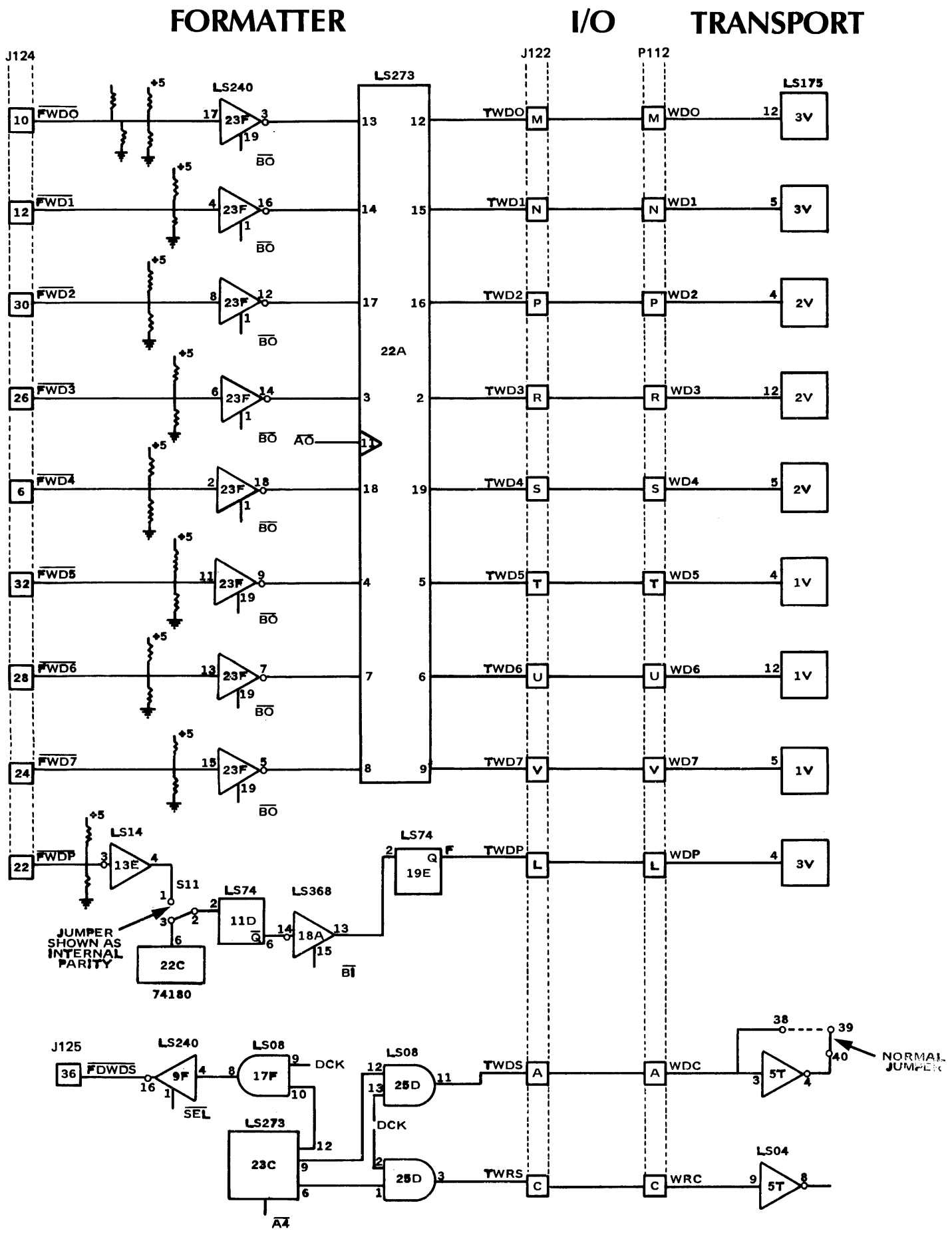
CONTROL INTERFACE

FORMATTER—I/O—TRANSPORT

SHEET 1 of 3

FORMATTER—I/O—TRANSPORT

WRITE INTERFACE



WRITE INTERFACE

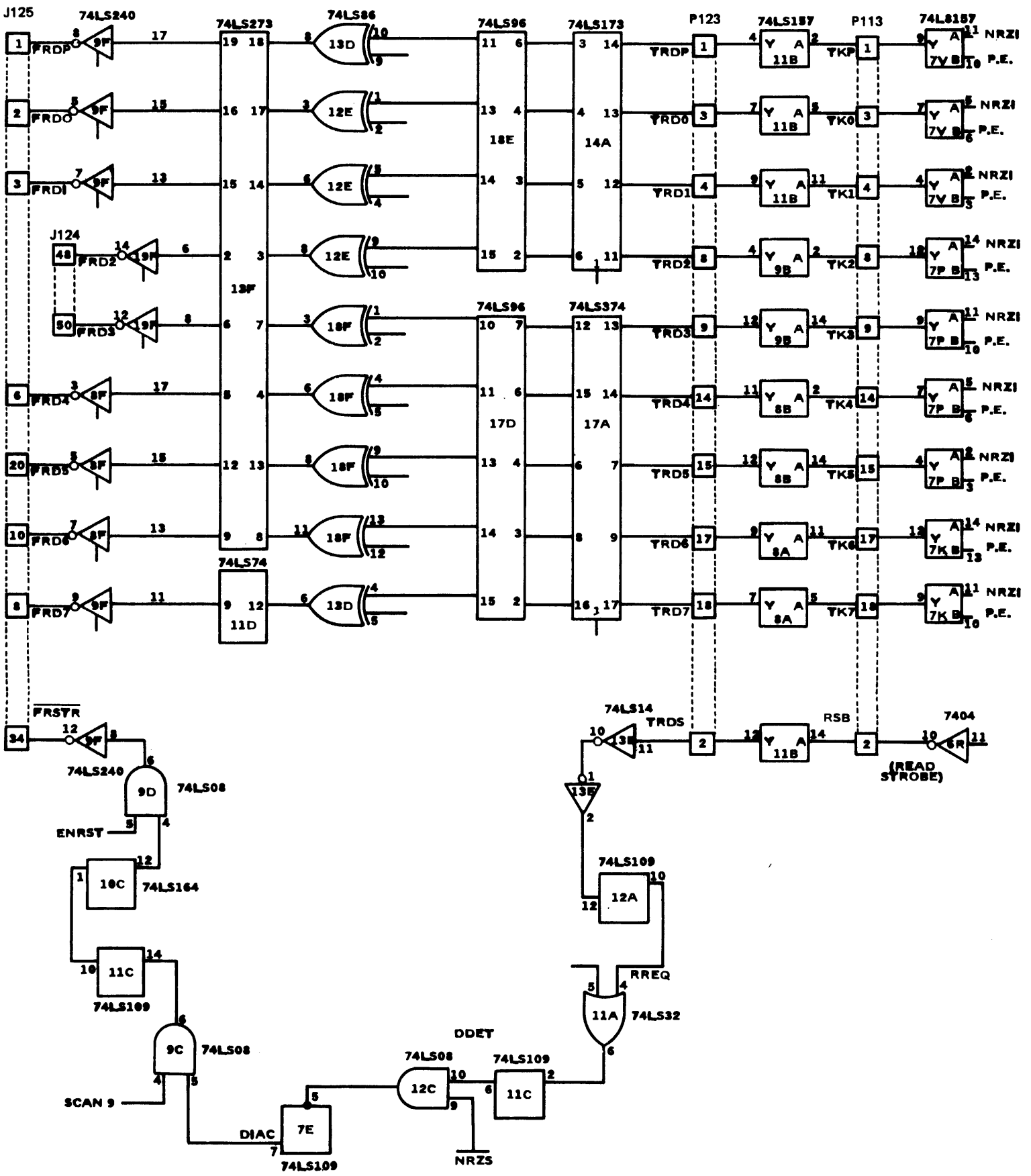
FORMATTER—I/O—TRANSPORT

SHEET 2 of 3

FIGURE 8-9

FORMATTER—I/O—TRANSPORT

READ INTERFACE



READ INTERFACE

FORMATTER—I/O—TRANSPORT

FIGURE 8-9

SHEET 3 of 3

SECTION IX
DIAGRAMS

9.1 INTRODUCTION

This section contains the logic, schematic and assembly diagrams necessary for maintenance and/or troubleshooting the tape transport.

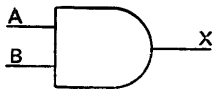
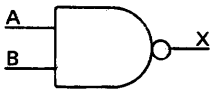
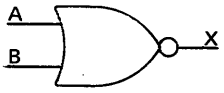
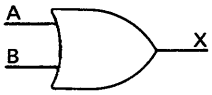
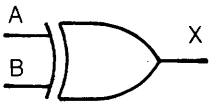
9.2 LOGIC SYMBOLS

Table 9.1 shows the logic symbols, including truth tables, for the IC's used in the Series 1050. Table 9.2 and 9.3 show the logic symbols and truth tables for the D-type and JK flipflops respectively.

9.3 LISTING

The Engineering drawings contained herein are listed below in the order of their appearance.

TABLE 9.1. LOGIC SYMBOLOGY AND TRUTH TABLES

TYPE	SYMBOL	A	B	X
AND		H	H	H
		H	L	L
		L	H	L
		L	L	L
NAND		H	H	L
		H	L	H
		L	H	H
		L	L	H
NOR		H	H	L
		H	L	L
		L	H	L
		L	L	H
OR		H	H	H
		H	L	H
		L	H	H
		L	L	L
EXCL, OR		H	H	L
		H	L	H
		L	H	H
		L	L	L

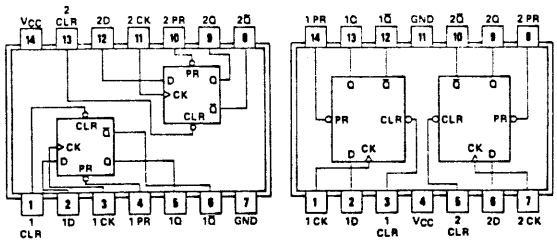
DRAWING NO.	TITLE	NO. OF PAGES
11-00273	PCB Assembly, Main	1
01-30273	Schematic, Main Elect. AC PWR	8
00-30045	Block Diagram	1
01-30226	Schematic Membrane Switch	1
11-00226	PCB Assembly, Membrane Switch	1
01-30276	Schematic, Main Elect. DC PWR	1
01-30196	Schematic, AC/DC Converter	1
01-30003	Schematic I/O Interface	1
11-00003	PCB Assembly, I/O Interface	1
01-30025	Schematic, I/O Interface w/Formatter	1
11-00025	PCB Assembly, I/O Interface w/Formatter	1
01-30092	Schematic I/O Interface, FMTR STD Alone	1
11-00092	PCB Assembly, I/O Interface, FMTR STD Alone	1
01-30266	Schematic, I/O STD Alone, w/PWR Up	1
11-00266	PCB Assembly, I/O STD Alone, w/PWR Up	1
10-00204	Final Assembly, DC/DC Converter	2
117-9900-00	Mech. Assembly, Top Plate 1050/1750	4

TABLE 9.2. D-TYPE FLIPFLOP

74 DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

FUNCTION TABLE

INPUTS				OUTPUTS	
PRESET	CLEAR	CLOCK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q_0	$\bar{Q}_0$



74LS74

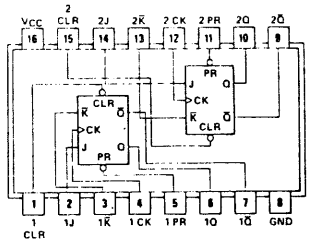
H = high level (steady state), L = low level (steady state), X = irrelevant
⎍ = high-level pulse; data inputs should be held constant while clock is high; data is transferred to output on the falling edge of the pulse.
↑ = transition from low to high level, ↓ = transition from high to low level
Q_0 = the level of Q before the indicated input conditions were established.
TOGGLE: Each output changes to the complement of its previous level on each active transition (pulse) of the clock.
*This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

TABLE 9.3. JK FLIPFLOP

109 DUAL J-$\bar{K}$ POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

FUNCTION TABLE

INPUTS					OUTPUTS	
PRESET	CLEAR	CLOCK	J	$\bar{K}$	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H*	H*
H	H	↑	L	L	L	H
H	H	↑	H	L	TOGGLE	
H	H	↑	L	H	Q_0	$\bar{Q}_0$
H	H	↑	H	H	H	L
H	H	L	X	X	Q_0	$\bar{Q}_0$



74LS109

H = high level (steady state), L = low level (steady state), X = irrelevant, ↑ = transition from low to high level
⎍ = high-level pulse; while the clock is high, changes at the J and K inputs after the specified hold time have no effect. Data is transferred to output on the falling edge of the pulse.
Q_0 = the level of Q before the indicated input conditions were established.
TOGGLE: Each output changes to the complement of its previous level on each active transition (pulse) of the clock.
*This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

REVISIONS			
LTR	DESCRIPTION	DATE	APPV
A-D	SEE RECORD COPY	11-82	
E	ECN 2164	11-82	C.C.
F	ECN 2172	12-7-82	C.C.
	2196 DCN	3-3-83	C.C.
	DCN 2209	4-22-83	C.C.
	ECN # 2239D	8-1-83	CC
	ECN # 2244C	8-2-83	C.C.
G	ECN 2260A	8-1-83	CC
H	ECN 2261A	8-25-83	CC
	DCN 2266	9-28-83	C.C.
J	ECN 2294	1-84	CC
K	ECN 2314A	4-2-84	
L	ECN 2332A	3-29-84	
M	ECN 2369	8-15-84	

(H1) SCREW
(H5) WASHER, FLAT
(H5) WASHER, LOCK
(H7) NUT HEX
2 PLACES

(MP4) HEADER 3PIN

3A 5A 6A 8A 10A 12A 13A 14A 16A 18A

(MP9) INSULATOR HEATSINK
(MP8) HEATSINK
(MP11) INSULATOR FLAT
(MP10) INSULATOR, BUSHING
TYP. TRANSISTOR INSTALLATION (10 PLACES)

(H2) SCREW(2)
(H4) WASHER, FLAT (2)
(H6) WASHER, LOCK (2)
(H8) NUT HEX (2)

HEADER 2PIN

(H1) SCREW
(H5) WASHER FLAT
(H7) NUT HEX
(MP18) P.CLIP 3/8"

(MP5) HEADER 6PIN
(MP6) HEADER 6PIN(DUAL)

OPTION - CHASSIS GND TO DIGITAL COMM. ADD SCREW

(MP16) SOCKET
(MP4) HEADER 3PIN
(MP19) 4.

J112 WHITE
J113 READ
J111 CONTROL

(MP15) BRACKET
(MP2) HEADER 5PIN
(MP5) HEADER 5PIN (DUAL)
(MP14) STIFFENER
(MP1) PCB DRILLED

J112 J113 J111
(H12) SCREW (9)
(H8) FIBER WASHER

CONFIGURATION CHART FOR 12,5 IPS. 11-00273-1

REF DES	DESCRIPTION	PART NO	QTY
R380-388	LEAVE OPEN		9
R290-298	RES CAR 150K ¼W 5%	47-01115	9
R281-289	RES CAR 82K ¼W 5%	47-01109	9
C301-309	CAP DM 680 PF 5%	15-10019	9
C137	CAP DM 470PF 5%	15-10017	1
C132	CAP PC .01uF 50V	15-40024	1
C310-318	CAP PC .01uF 50V	15-40024	9
C69-77 C96-104	CAP PC .0039uF 50V	15-40035	18

CONFIGURATION CHART FOR 18.75 I.P.S.

REF DES	DESCRIPTION	PART NO.	QTY
R634-642	REMOVE & REPLACE W/ 1.2K, 1/4W, 5%		9
R380-388	REMOVE & LEAVE OPEN		9
C310-318	REMOVE & REPLACE W/ .01uF, 50V, PC		9
C69-C77	REMOVE & REPLACE W/ .0056 uF, 50V, PC		9
C96-104	REMOVE & REPLACE W/ .0056 uF, 50V, PC		9
C301-309	REMOVE & REPLACE W/ 820pF, 50V, D.M.		9

4. ADHERE RUBBER BUMPER MP19 1/4" FROM END OF BRACKET

3. USING CALIBRATED TORQUE DRIVER TIGHTEN SCREW TO 6.0 IN/LBS.

2. REF: MANUAL NO. 00-10001 FOR JUMPER SELECTION

1. RAISE RESISTOR MARKED ⊗ 3/4 IN OFF BOARD
RAISE RESISTOR MARKED * 1/2 IN. OFF BOARD
RAISE RESISTOR MARKED ⊞ 1/4 IN OFF BOARD

NOTES:

MATERIAL
CONTRACT NO
P.C. DWG F-FF
FINISH
CHECK
PROJ
ENG
DESIGN RELEASE
UNLESS OTHERWISE SPECIFIED
UNITS ARE XXX = INCH, XX = INCH
TOLERANCES ARE ± .010 INCH, ± .05 INCH
X.XX MM ± 0.25 MM
X.X MM ± 0.8 MM
DO NOT SCALE DRAWING
NEXT ASSY
USED ON
SIMILAR TO/MAKE FROM

INNOVATIVE DATA TECHNOLOGY SAN DIEGO CA. USA

TITLE
PCB ASSEMBLY
MAIN ELECTRONICS

DWG SIZE	CODE IDENT	DWG/PART NO	REV
	56031	11-00273	M
SCALE 1/1	MODEL 1050	SH 1 OF 1	

11-00200-1

REVISIONS			
LTR	DESCRIPTION	DATE	APPV
A	ECN 2073, 2074, 2086	8-09-82	C.C
~~A~~	ECN 2086, 2087	8-09-82	C.C.
B	ECN 2113	8-9-82	C.C
C	ECN 2147	10-20-82	C.C
D	ECN 2150	10-25-82	C.C
E	ECN 2164	11-18-82	C.C.
F	ECN 2239 A	8-01-83	C.C.
~~G~~	~~ECN 2244 A~~	8-02-83	C.C.

CONFIGURATION CHART FOR 12,5 I.P.S.

REF DES.	DESCRIPTION	PART NO	QTY
R380-388	LEAVE OPEN		
R290-298	RES CAR 150K ¼W 5%	47-01115	9
R281 - 289	RES CAR 82K ¼W 5%	47-01109	9
C301 - 309	CAP DM 680 PF 5%	15-10019	9
C137	CAP DM 470PF 5%	15-10017	1
C132	CAP PC .01uF 50V	15-40024	1
C310-318	CAP PC .01uF 50V	15-40024	9
C69-77 C96-104	CAP PC .0039uF 50V	15-40035	18

TDI SPEC CONTROL
DWG NO. 99-00014 -FORMATTER

EXTERNAL POWER INPUT 120V AC
WHT
GRN
BLK
F4
6/4 A SLO-BLO FOR 100-120V
3A SLO-BLO FOR 220/240V
CORCOM CABLE ASSY 12-30001 (REF)
100V 120V 220V 240V
GND TAB
CHASSIS GND TO TOP PLATE
POWER SWITCH
NO
NC
COM
MEMBRANE CONTROL PANEL ASSY 11-10121 (REF)

T1
RED
W/RED
BRN.
ORN.
YEL
BLK
W5
W/BLC
W7
W/GRN
W6
GRN W2
BLUE W4
VIO
WHT
GRY
W13
N1
W15
W14
W16
CR1 MDA 980-1
W3
W10
CR16T MDA 980-1
W11
FORMATTER
W12
W8
W17
W9
COM
+9V
-20V
+20V
J30 P30
C279 83,000 / 15V FORMATTER
C2 32,000 / 25V
C1 32,000 / 25V
P25 J25
J27 P27
NC
J28 P28
Q1 2N6345A
R2 240
R1 330
P26 J26
POWER SUPPLY PCB ASSY 11-00086 (REF)

+20
R568 15Ω 7.5W
+15V INTFC PWR (5-C1)
CR14 IN4001
+15V
J5 P5
F1 8A
7815G 16A
C9 1.0μF 35V DT
C10 4.7μF 35V DT
CR15 IN 4001
-20V
R569 60Ω 3.75W
-15V INTFC PWR (5-C1)
CR16 IN4001
-15V
F2 8A
7915C 18A
C11 1.0μF 35V DT
C12 1.0μF 35V DT
CR17 IN 4001
R570 20Ω/5W
R219 15Ω 1W
CR18 IN4001
+5V
CR19 IN4001
POWER REGULATOR
LM317K 14A
R64 240
R65 590
R66 200 POT
C13 1.0μF 35V DT
C14 4.7μF 35V DT
E51
E50
TO R647 (4-D2)
R67 1.1K
R70 4.99K
C226 1.0μF 35V DT
CR177 IN 821 6.2V
R596 6.81K
R69 10K
R71 10K
LM324 13B
R73 180 1/2 W
R74 10K
R68 6.49K
R72 200 1/2 W
±20 RET
DIG. COM
2N4398
F3 8A
+5V FORMATTER
J112
CR179
CR168
C277 15μF 20V DT
CR178
CR174 IN 4001 (TYP 6 PLACES)
CR175
CR176
R585 20 5W
C278 15μF 20V DT
FORMATTER REGULATOR
MAIN ELECTRONICS PCB ASSY 11-00200 (REF)

POWER AVAILABLE ON BOARD

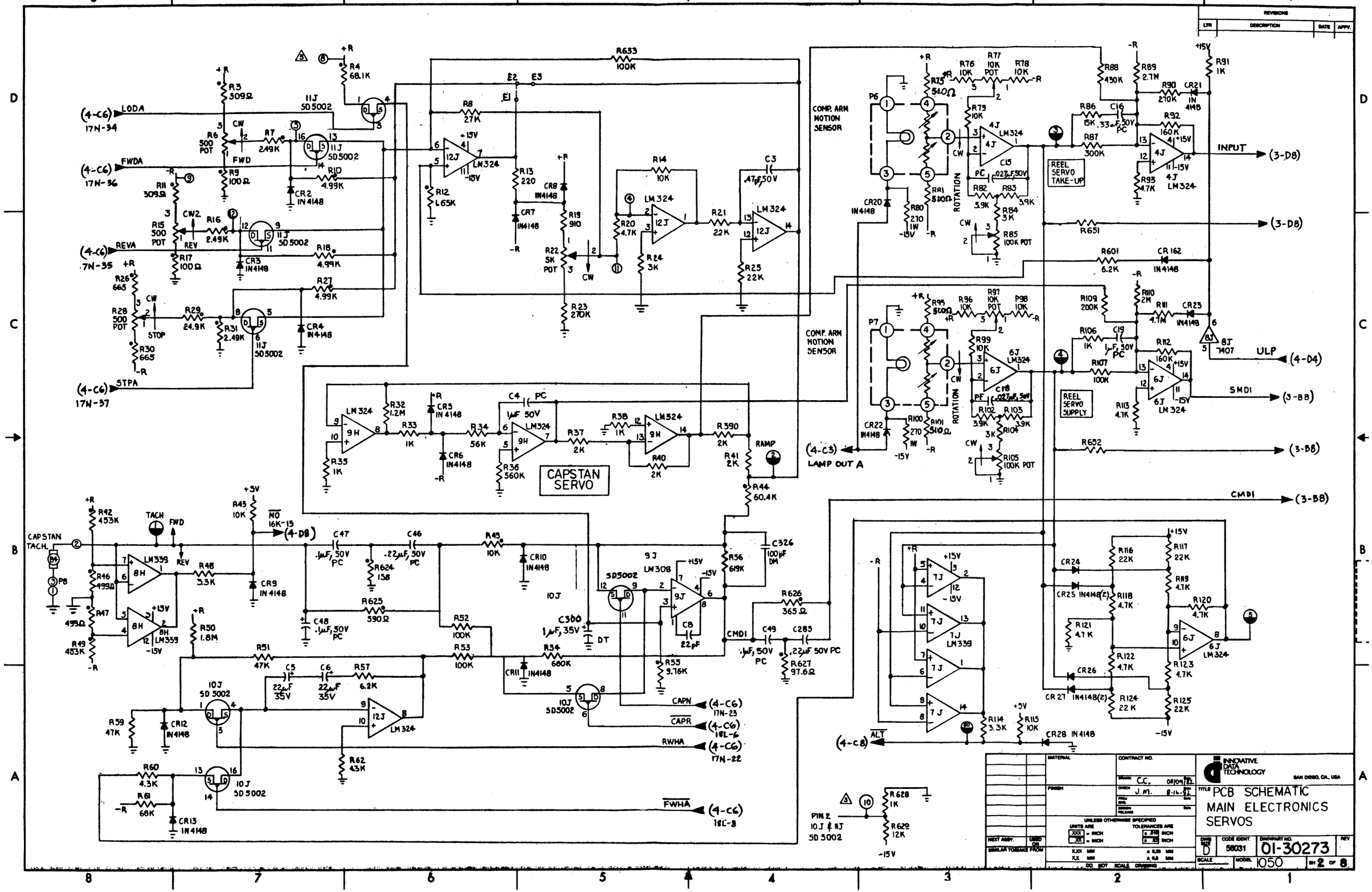
12. HIGHEST REFERENCE DESIGNATOR FOR RESISTORS IS R655
⚠ DARLINGTON POWER TRANSISTOR
10. ALL RESISTORS ARE IN OHMS
9. ~~W~~ INDICATES METAL FILM RESISTOR
8. FOR OPERATION AT 18 3/4 & 2 1/2 IPS
7. ALL CAPACITORS ARE IN MICROFARADS.
6. ALL DIODES ARE IN4148/914.
5. CONNECTOR FOR AUTO-SPEED CHANGE OPTION.
4. ALL EVEN PINS IN J28 & P28 ARE NOT USED.
2. ADD SCREW ON MAIN ELECTRONICS PCB ASSY 11-00200 LOGIC GROUND TO CHASSIS GND OPTIONAL.
1. COMPONENT REQUIRES HEATSINK.

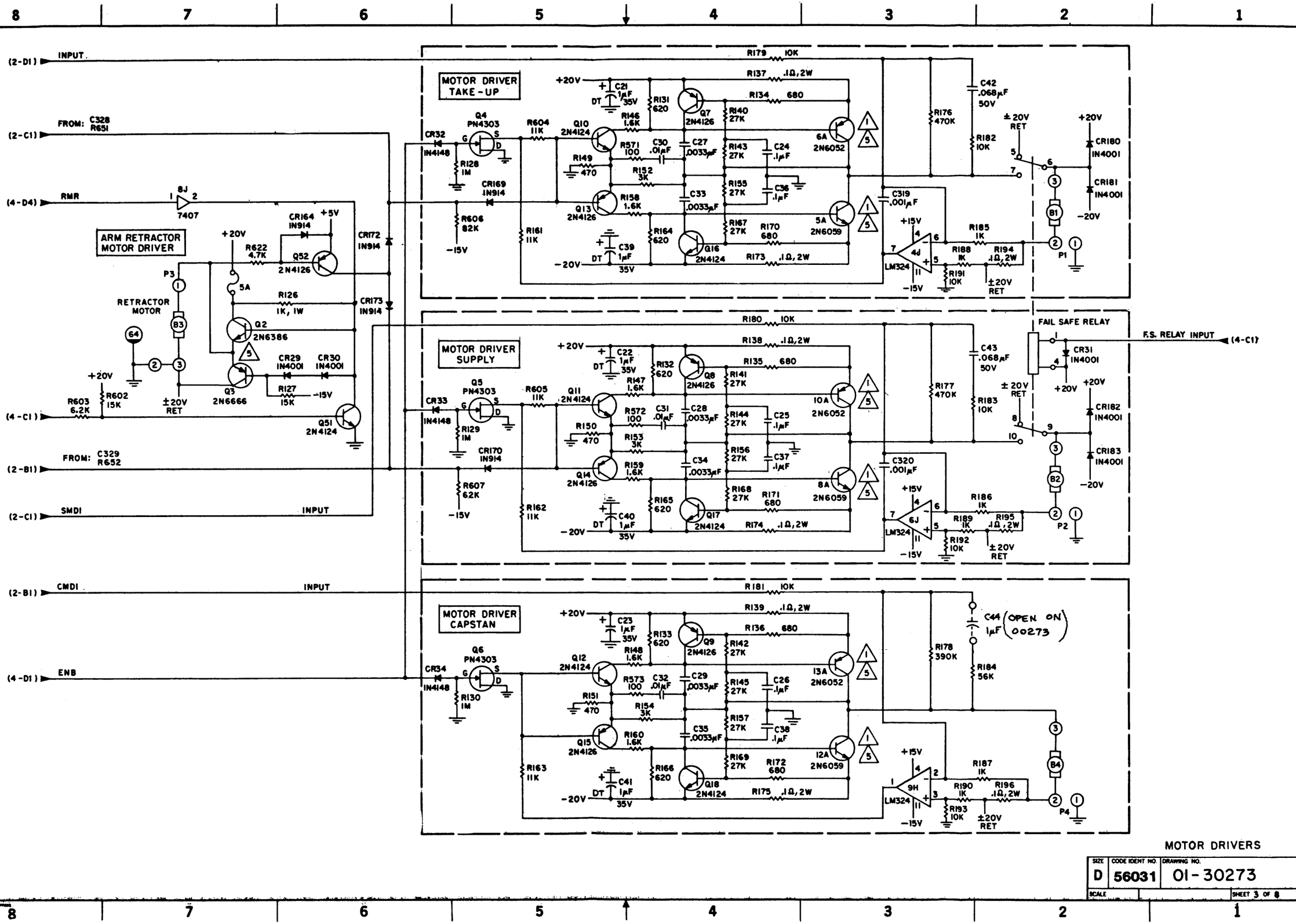
REMOVE R634-642 AND REPLACE WITH 1.2K 1/4 W 5%
REMOVE R380-388 AND LEAVE OPEN.
REMOVE C310-318 AND REPLACE WITH .01UF 50V P.C
REMOVE C69-77 AND REPLACE WITH .0056MFD 50V/P.C.
REMOVE C96-104 AND REPLACE WITH .0056MFD 50V/P.C.
REMOVE C301-309 AND REPLACE WITH 820 PFD. 50V, DIPPED MICA

NOTES: UNLESS OTHERWISE SPECIFIED

MATERIAL	CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C.C. 08/03/82	TITLE	PCB SCHEMATIC MAIN ELECTRONICS AC POWER SUPPLY-REGULAT.
NEXT ASSY	USED ON	CHECK J.M. 8-10-82	
SIMILAR TO/MAKE FROM		PROJ ENG	
		DESIGN RELEASE	
		DWG SIZE D	CODE IDENT. 58031
		DWG/PART NO. 01-30273	REV G
		SCALE	MODEL 1050
		SH 1	OF 8

UNLESS OTHERWISE SPECIFIED
UNITS ARE: .XXX = INCH ± .010 INCH; .XX = INCH ± .030 INCH
X.XX MM ± 0.25 MM; X.X MM ± 0.8 MM
DO NOT SCALE DRAWING


REVISIONS
LTR DESCRIPTION DATE APPV.
(4-C6) LODA 17N-34
(4-C6) FWDA 17N-36
(4-C6) REVA 17N-35
(4-C6) STPA 17N-37
R3 309Ω
R4 68.1K
R6 500 POT
R7 2.49K
R9 100Ω
R10 4.99K
CR2 IN4148
R11 309Ω
R15 500 POT
R16 2.49K
R17 100Ω
CR3 IN4148
R18 4.99K
R26 665
R28 500 POT
R29 24.9K
R30 665
R31 2.49K
CR4 IN4148
R27 4.99K
11J SD5002
R633 100K
R8 27K
R12 1.65K
R13 220
CR8 IN4148
CR7 IN4148
R19 910
R22 5K POT
R14 10K
R20 4.7K
R24 3K
R21 22K
C3 .47µF 50V
R25 22K
R23 270K
COMP. ARM MOTION SENSOR
R75 5.10Ω
R76 10K
R77 10K POT
R78 10K
R79 10K
R88 430K
R89 2.7M
R90 270K
CR21 IN 4148
R91 1K
R86 15K
C16 .33µF 50V PC
R87 300K
R92 160K
R93 4.7K
R80 270 1W
R81 5.10Ω
CR20 IN4148
R82 3.9K
R83 3.9K
R84 3K
R85 100K POT
C15 .027µF 50V PC
4J LM324
REEL SERVO TAKE-UP
INPUT (3-D8)
R651 (3-D8)
R601 6.2K
CR 162 IN4148
R95 5.10Ω
R96 10K
R97 10K POT
R98 10K
R99 10K
R100 270 1W
R101 5.10Ω
CR22 IN4148
R102 3.9K
R103 3.9K
R104 3K
R105 100K POT
C18 .027µF 50V PC
6J LM324
R109 200K
R110 2M
R111 4.7M
CR23 IN4148
R106 1K
C19 .1µF 50V PC
R107 100K
R112 160K
R113 4.7K
8J 7407
ULP (4-D4)
REEL SERVO SUPPLY
SMDI (3-B8)
R652 (3-B8)
CMDI (3-B8)
(4-C3) LAMP OUT A
CAPSTAN SERVO
LM324 9H
R32 1.2M
R33 1K
R34 56K
R35 1K
R36 560K
R37 2K
R38 1K
R40 2K
R390 2K
R41 2K
RAMP
R44 60.4K
CR5 IN4148
CR6 IN4148
C4 .1µF 50V PC
CAPSTAN TACH.
TACH
FWD
REV
R42 453K
R43 10K
+5V
NO 16K-15 (4-D8)
LM339 8H
R46 499Ω
R47 499Ω
R49 453K
R48 3.3K
CR9 IN4148
C47 .1µF, 50V PC
C46 .22µF, 50V PC
R624 158
R45 10K
CR10 IN4148
C48 .1µF, 50V PC
R625 590Ω
R50 1.8M
R51 47K
R52 100K
R53 100K
R54 680K
CR11 IN4148
C5 22µF 35V
C6 22µF 35V
R57 6.2K
R59 47K
CR12 IN4148
R60 4.3K
R61 68K
CR13 IN4148
R62 43K
10J SD 5002
9J LM 308
C300 1µF, 35V DT
C8 22pF
R56 619K
C326 100pF DM
R626 365Ω
C49 .1µF, 50V PC
C285 .22µF 50V PC
R627 97.6Ω
R55 9.76K
CAPN (4-C6) 17N-23
CAPR (4-C6) 18L-6
RWHA (4-C6) 17N-22
FWHA (4-C6) 18L-3
CMDI
R628 1K
R629 12K
PIN 2 10J & 11J SD 5002
-15V
7J LM339
R116 22K
R117 22K
R118 4.7K
R119 4.7K
R120 4.7K
R121 4.7 K
R122 4.7K
R123 4.7K
R124 22 K
R125 22K
CR24
CR25 IN4148(2)
CR26
CR 27 IN4148(2)
R114 3.3K
R115 10K
CR28 IN4148
ALT (4-C8)
INNOVATIVE DATA TECHNOLOGY SAN DIEGO, CA., USA
TITLE PCB SCHEMATIC MAIN ELECTRONICS SERVOS
CONTRACT NO.
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
DWG SIZE D
CODE IDENT. 58031
DWG/PART NO. 01-30273
REV
SCALE
MODEL 1050
SH 2 OF 8
DO NOT SCALE DRAWING


(2-D1) INPUT
FROM: C328 R651
(2-C1)
(4-D4) RMR
(4-C1)
FROM: C329 R652
(2-B1)
(2-C1) SMDI INPUT
(2-B1) CMDI INPUT
(4-D1) ENB
ARM RETRACTOR MOTOR DRIVER
RETRACTOR MOTOR
MOTOR DRIVER TAKE-UP
MOTOR DRIVER SUPPLY
MOTOR DRIVER CAPSTAN
FAIL SAFE RELAY
F.S. RELAY INPUT (4-C1)
C44 (OPEN ON 00273) 1μF
MOTOR DRIVERS
SIZE D
CODE IDENT NO. 56031
DRAWING NO. 01-30273
SCALE
SHEET 3 OF 8

CONTROL LOGIC, SENSOR AMPS AND CONTROL PANEL

SIZE	CODE IDENT NO	DRAWING NO
D	56031	01-30273
SCALE		SHEET 4 OF 8

THIS CIRCUITRY LOCATED ON PCB NO. 11-00226 MEMBRANE SWITCH P.C.B.

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.

READ RECORD HEAD I.D.T SPEC. NO. 99-00004

TK7 — CASE

R245 3.3K, R263 47K, C51 DM 150 pF, R272 2.2K, C212 10µF 35V, R518 10K, C211 .10UF 35V, C60 5pF DM, R254 3.3K, R281 47K, R290 47K, R308 680Ω, C78 1µF,35V, R634 2K, R326 (P.E.) 2K POT, C310 .0039µF/50V PC, R317 270Ω, R335 2K POT (NRZI), CR76 IN914, Q23 P108TE

R299 680Ω, C69 .001µF PC, C257 .01µF, CR58 IN914, C301 200pF DM, C266 .01µF 100V, CR67 IN914, 14K MC1437

R344 100Ω, R389 22K, R425 7.5K, CR121 IN914, CR130 IN914, R353 7.5K, R362 10K, R434 3.6K +15V, 9K, R398 2.2M, R443 7.5K, R407 22K, R452 3.6K +15V, 9K LM339, R371 10K, R416 100Ω, C114 .01µF,100V, R461 2.7K, 10K LM339, C96 .001µF 50V PC, C123 .01µF,100V, C105 100 pF DM, C87 .047 µF 50V PC, R380 10K, CR103 IN914, CR112 IN914, CR94 IN914, Q32 P108TE, CR85 IN914, R470 7.5K, CR139 IN914, R488 1K +5V

7K 74LS157, TK7, PEMO, RRST, 8K CLK, 74LS109, CR148 IN914, SKEW, R479 1K, R480 1K

CR171 IN914, R590 160K, R591 1K, C283 10µF,35V, R650 330Ω ¼W, Q49 2N4124, R597 1K, C284 10µF 35V, R592 1K, R599 24.9K, R598 1K, R589 1K, C275 4.7µF 35V D.T., R588 1K, R593 1K, Q50 2N4126, R651 330Ω ¼W, C276 4.7µF 35V D.T., 2J LM324

(6-C1) (6-D1) (7-D7) (7-B8)

READ J113: TK7 18, TK6 17, (6-D5) TK5 15, (6-B5) TK4 14, (6-D1) TK3 9, (6-B1) TK2 8, (7-D5) TK1 4, (7-B5) TK0 3, (7-D1) TKP 1

16P-2 (4-C1) NZS 10 WRITE CHANEL

PWR FOR INTERFACE +15V (1-D3) E; -15V PWR FOR INTERFACE (1-C3) H

R490 1K, R489 1K, TTK HIDEN, E37 OPTION (4-C1), 6R, Q41 2N4126, R496 100K POT, R498 100K POT, R503 1K ("1")

R491 4.7K, R492 5.1K, R497 5.11K, R499 2.87K, R500 28.7K, R501 7.5K, R502 7.5K, C132 .0047 µF, C133 100 pF DM, C134 100 pF DM, C135 100 pF DM, 6K LS221, 6N LS221

R495 10K, R494 3.9K, 6P LM339, R493 5.11K, TRD 16L-12 (4-D6), PEMOA, R504 1K, R505 10K, Q42 2N4124, CR157 IN914, CR165 IN4148, CR166 IN914, R587 560K, Q43 2N4126

74LS00: 6S, 6R 7404

(4-D5) RRDY, (4-C1) NZS E36 OPTION, RRST (7-C8) (6-D1) (6-B1) (6-A4), R5B 2, PEMO (6-C4) (6-D1) (7-B8)

(6-A1) (6-C1) (7-C8), (6-C1), (6-A1) (7-C8)

R643 560K, R576 180K, R506 210K, R508 100K, R507 10K, R509 10K, CR159, CR160, R511 10K, C280 .01µF, R644 100Ω, R514 10K, R513 10K, R515 4.99K, 6T LM324, R645 100Ω

LOT 17N-33 (4-D5), MET 17N-32 (4-D5), HIT 17N-31 (4-D5), 6V 5D5002

PEMOA (6-A2) (7-A4)

8V-1 (7-A4) (6-A4) 8P-1

R631 1K, R632 12K, PIN2 (6V) 5D5002, -15V

P15 READ CONNECTOR — VIEW FROM COMPONENT SIDE OF PCB AFTER INSTALLATION

TK6 — CASE

R246 3.3K, R264 47K, C52 DM 150 pF, R273 2.2, C214 .01µF, R519 10K, C213 .01µF 35V, C61 5PM DM, R255 3.3K, R282 47K, R291 47K, R309 680Ω, C79 1µF,35V DT, R635 2K, R327 2K POT (PE.), C311 .0039µF/50V PC, R318 270Ω, R336 2K POT (NRZI), CR77 IN914, Q24 P108TE

R300 680Ω, C70 .001µF 50V PC, C258 .01µF, CR59, CR68 IN914, C302 200pF DM, C267 .01µF 100V, 14M MC1437

R345 100Ω, R390 22K, R426 7.5K, CR122 IN914, CR131 IN914, R354 7.5K, R363 10K, R435 3.6K +15, 9M, R399 2.2M, R444 7.5K, R408 22K, R453 3.6K +15, 9M LM339, R372 10K, R417 100Ω, C115 .01µF100V, R462 2.7K, 10M LM339, C97 .001µF 50V PC, C124 .01µF100V, C106 100 PC, C88 .047 µF 50V, R381 10K, CR104 IN914, CR113 IN914, CR95 IN914, Q33 P108TE, CR86 IN914, R471 7.5K, CR140 IN914, R480 1K SKEW

74LS157, 7K, TK6, PEMO, 8M, 74LS109, CR149 IN914

PEMOA

MATERIAL	CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C.C. 08-09-82	TITLE	PCB SCHEMATIC MAIN ELECTRONIC READ
NEXT ASSY	USED ON	CHECK J.M. 8-16-82	
SIMILAR TO/MAKE FROM		PROJ ENG DESIGN RELEASE	
		UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .03 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING	
		DWG SIZE D	CODE IDENT. 58031
		DWG/PART NO. 01-30273	REV.
		SCALE	MODEL 1050
		SH 5 OF 8	

REVISIONS			
LTR	DESCRIPTION	DATE	APPV

TK5 R247 3.3K R265 47K C53 150 pF DM R274 2.2K 14M MC1437 C62 5pF DM R580 10K R256 3.3K R283 47K R292 47K R310 680Ω CASE 1 C80 1μF,35V DT R636 2K CW R328 2K POT (P.E.) C312 .0039μF 50V PC R319 270Ω CW R337 2K POT (NRZI) CR78 IN914 Q25 P1087E C301 .001μF PC 50V CR60 IN914 C259 .01μF C303 200pF DM C268 .01μF 100V CR69 R301 680Ω

R346 100Ω R391 22K R427 7.5K CR123 IN914 +5V CR132 IN914 R395 7.5K R364 10K R436 +15V 3.6K LM339 9M R400 2.2M R409 -15V 22K R418 100Ω R445 7.5K R454 +15V 3.6K R373 10K C116 .01μF,100V C98 .001μF,50V PC C125 .01μF,100V C107 100pF DM R472 7.5K CR141 IN914 "1" LM339 10M R463 +5V 2.7K Q34 P1087E CR87 IN914 C89 .047 μF 50V PC R382 10K CR 96 IN914 CR105 IN914 CR114 IN914 74LS157 TK5 (5-D1) PEMO RRST 74LS109 8M CR150 IN914 R481 1K

TK3 R249 3.3K R267 47K C55 150 pF R276 2.2K 14P MC1437 C64 5pF DM R582 10K R258 3.3K R285 47K R294 47K R312 680Ω C82 1μF 35V D.T R638 2K CW R330 2K POT P.E. C314 .0039μF,50V PC R321 270Ω CW R339 2K POT (NRZI) CR80 IN914 Q27 P1087E C261 .01μF C73 .001μF PC 50V CR62 IN914 C305 200pF DM C270 .01μF 100V CR71 IN914 R303 680Ω

R348 100Ω R393 22K R429 7.5K +15V CR125 IN914 +5V CR134 IN914 R357 7.5K R365 10K R438 3.6K LM339 9P R402 2.2M R411 -15V 22K R420 100Ω R447 7.5K +15V R456 3.6K R375 10K C118 .01μF,100V C100 .001μF,50V PC C127 .01μF 100V C109 100pF DM R474 7.5K CR143 IN914 "1" LM339 10P R465 +5V 2.7K Q36 P1087E CR89 IN914 C91 .047 μF CR 98 IN914 R384 10K CR107 IN914 CR116 IN914 74LS157 TK3 (5-D1) PEMO RRST 74LS109 8P CR152 IN914 R483 1K SKEW

TK4 R248 3.3K R266 47K C54 150 pF R275 2.2K 14P MC1437 C63 5pF DM R581 10K R257 3.3K R284 47K R293 47K R311 680Ω CASE 1 C81 1μF 35V DT R637 2K CW R329 2K POT (P.E.) C313 .0039μF, 50V PC R320 270Ω CW R338 2K POT (NRZI) CR79 IN914 Q26 P1087E C260 .01μF C72 .001μF PC 50V CR61 IN914 C304 200pF DM C269 .01μF 100V CR70 IN 914 R302 680Ω

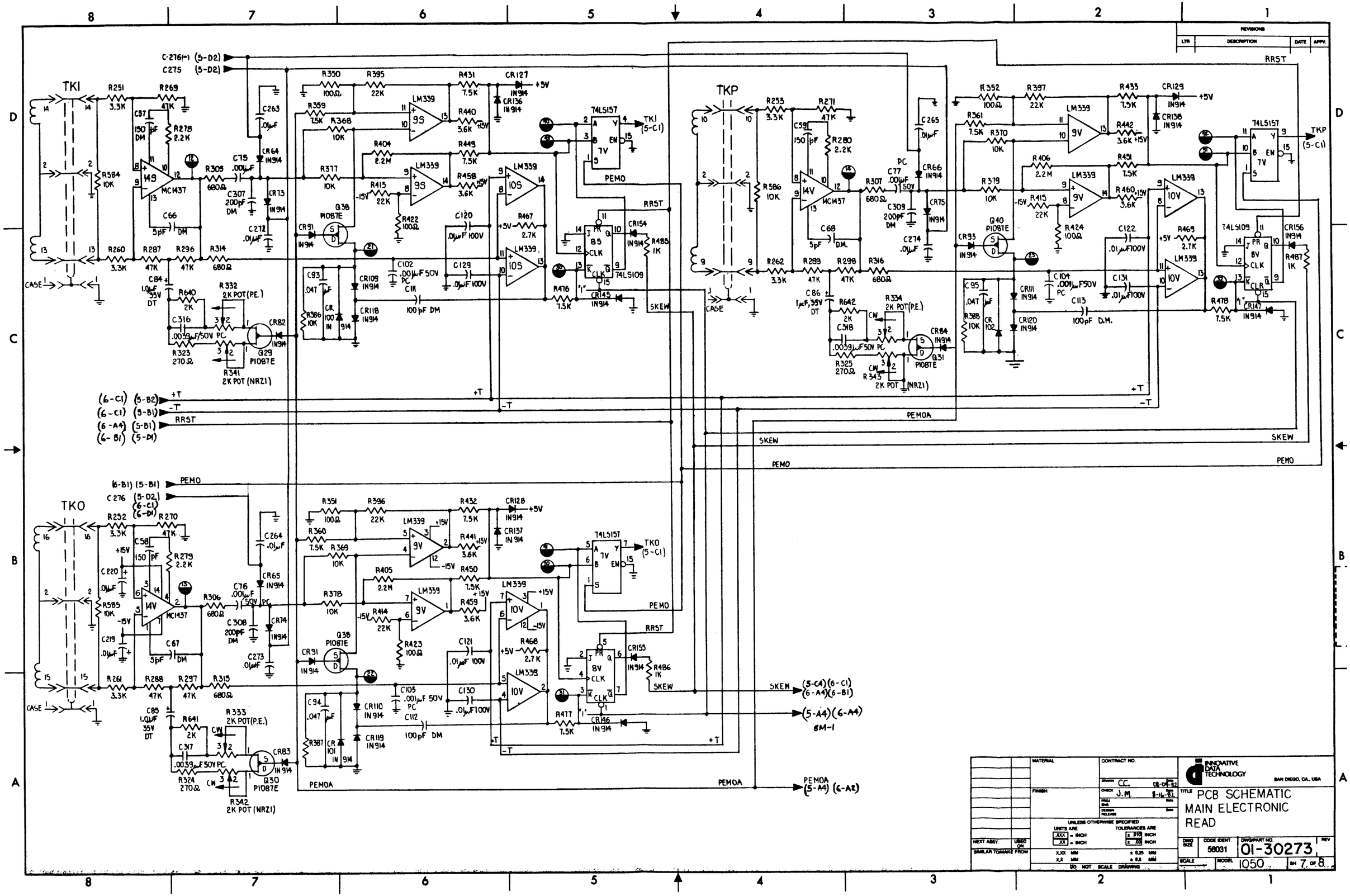
R347 100Ω R392 22K R428 7.5K CR124 IN914 +5V CR133 IN914 R356 7.5K R365 10K R437 +15V 3.6K LM339 9P R401 2.2M R410 -15V 22K R419 100Ω R446 7.5K R455 +15V 3.6K R374 10K C117 .01μF,100V C99 .001μF,50V PC C126 .01μF,100V C108 100pF DM R473 7.5K CR142 IN914 "1" LM339 10P R464 +5V 2.7K Q35 P1087E CR88 IN914 C90 .047 μF 50V PC R383 10K CR 97 IN914 CR106 IN914 CR115 IN914 74LS157 TK4 (5-D1) PEMO RR5T 74LS109 8P CR151 IN914 R482 1K SKEW 6P-4 (5-C4) (5-A4) (7-A4) 1M-1 RR5T (5-B1) (7-C8) PEMOA

TK2 R250 3.3K R268 47K C56 150 pF +15V C218 .01μF R583 10K -15V C217 .01μF 14S MC1437 C65 5pF DM R259 3.3K R286 47K R295 47K R313 680Ω C83 1μF,35V DT R639 2K CW R331 2K POT (PE) C315 .0039μF 50V PC R322 270Ω CW R340 2K POT (NRZI) CR81 IN914 Q28 P1087E C262 .01μF C74 .001μF 50V CR63 IN914 C306 200pF DM C271 .01μF 100V CR72 IN914 R304 680Ω

R349 100Ω R394 22K R430 7.5K CR126 IN914 +5V CR135 IN914 R358 7.5K R367 10K R439 3.6K LM339 9S R403 2.2M R412 -15V 22K R421 100Ω R448 7.5K R457 3.6K LM339 10S R376 10K C119 .01μF 100V C101 .001μF 50V PC C128 .01μF, 100V C110 100pF DM R475 7.5K CR144 IN914 "1" LM339 10S R466 2.7K Q37 P1087E CR90 IN914 C92 .047 μF CR 99 IN914 R385 10K CR107 IN914 CR117 IN914 74LS157 TK2 (5-D1) PEMO RR5T 74LS109 8S CR153 IN914 R484 1K SKEW (5-C4) (5-B1) (7-B8) (5-A4) (7-A4) PEMOA (5-A4) (5-B1) (5-B2) (7-A4)

C276 (5-D2) (7-D7)
C275 (5-D2) (7-D7)
-T (5-B1) (7-C8)
+T (5-B2) (7-C8)
C276 (5-D2) (7-D7)
C275 (5-D2) (7-D7)
-T (5-B1)
+T (5-B2) (7-A4)

MATERIAL	CONTRACT NO	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C.C. 08-01-91	TITLE PCB SCHEMATIC MAIN ELECTRONIC READ	
NEXT ASSY / USED ON / SIMILAR TO/MAKE FROM	CHECK J.M. 8-8-91		
UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .03 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING		DWG SIZE D / CODE IDENT 56031 / DWG/PART NO 01-30273 / REV	
		SCALE / MODEL 1050	SH 6 OF 8


TKI
TKP
TKO
RRST
PEMO
SKEW
PEMOA
+T
-T
CASE
MC1437
74LS157
74LS109
LM339
(6-C1) (5-B2) +T
(6-C1) (5-B1) -T
(6-A4) (5-B1) RRST
(6-B1) (5-D1)
(6-B1) (5-B1) PEMO
C276 (5-D2) (6-C1) (6-D1)
C275 (5-D2)
(5-C4)(6-C1) (6-A4)(6-B1)
(5-A4)(6-A4) 8M-1
(5-A4) (6-A2)
UNLESS OTHERWISE SPECIFIED
UNITS ARE
TOLERANCES ARE
INNOVATIVE DATA TECHNOLOGY
SAN DIEGO, CA., USA
PCB SCHEMATIC
MAIN ELECTRONIC
READ
CODE IDENT. 58031
DWG/PART NO. 01-30273
MODEL 1050
SH 7 OF 8
DO NOT SCALE DRAWING

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.

WRITE
RECORD HEAD
IDT SPEC NO 99-00004

WRITE
J112

L WDP
M WD0
N WD1
P WD2
R WD3
S WD4
T WD5
U WD6
V WD7

H +5V FORMATTER ONLY
J

E THI → 17K-3 (4-C8)
F TH2 → 16K-3 (4-D8)

C WRC
A WDC
NORMAL → (TRAILING EDGE) TRIGGER

WRT (4-C6) 17N-25

W5C1
W5C2
W5C3
W5C4
W5C5
CHP

WDP
WDC

TYPICAL CONNECTIONS PER ALL CHANNELS

R531 1K +5V
"1"
WTLRC

NZS
SWR
CWR

TWD (4-D4)

TYPICAL WRITE CHANNEL

R519 330Ω +5V
C256 .001μF
7407

WRITE DESKEW

+5V
R516 5K POT
R517 100Ω
RNG
FREQ
EN
5R
C137 150pF DM
5R 74LS624
CR61 IN4148

R518 1K
5P
5P 74LS164

74LS32
74LS04
74LS109
74LS157
74LS175
74LS86

WDC
WTLRC
WRC(L)
TWS (4-D4)
E43 E44
E38 E39
E40

R517 1K
7400
7407

Q46 2N6666
R524 130Ω 1W
R525 56Ω 1W
C139 4.7μF/35V
R528 2.2K
C140 .047μF 50V PC
R529 2.2K
R530 8.2K
WRC
Q47 MPS 6562
R526 1K
Q48 2N4124
WARS LATCH (4-C4)
NC

R520 1.6K
Q44 2N4124
R521 1.6K
R621 2.7K (4-C1) Q20-C
Q45 2N4124
R522 470Ω
R523 2.2K
CR163 IN4148
C138 .68μF 50V

R527 1K
WRITE HEAD CENTER TAPS

NZS (4-C1) 16P-2

PC C141-149 .012μF/50V 560Ω R532-540
R541-549 560Ω
R550-558 560Ω
R559-567 560Ω
C150-158 .012μF/50V PC

PH/J14
TRACK P
TK0
TK1
TK2
TK3
TK4
TK5
TK6
TK7
CENTER TAP
A+
ERASE HEAD
B-
SHIELD

PI4
WRITE CONNECTOR
VIEW FROM COMPONENT
SIDE OF PCB

MATERIAL	CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C.C. 09-09-82	TITLE PCB SCHEMATIC MAIN ELECTRONICS WRITE	
NEXT ASSY. USED ON	CHECK J.M. 8-16-82		
SIMILAR TO/MAKE FROM	PROJ ENG. DESIGN RELEASE		
UNLESS OTHERWISE SPECIFIED: UNITS ARE .XXX = INCH, .XX = INCH; TOLERANCES ARE ± .010 INCH, ± .05 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING		DWG SIZE D; CODE IDENT 56031; DWG/PART 01-30273; REV	
		SCALE; MODEL 1050; SH 8 OF 8	

REVISIONS

LTR	DESCRIPTION	DATE	APPV

POWER SWITCH (OFF / ON)

P2 J3M P3M

ON WRITE SECTION OF MAIN BOARD — E40, E43, E39

E10 E4

SENSOR — FILE PROTECT — J9 P9 — COM, -15V

MOTOR — J3 P3 — +20V RET — COMP. ARM RETRACTOR MOTOR DRIVER

RETR MOTOR SENSORS — UP, DOWN — -15V, -15V, COM

MOTOR — SUPPLY BLK, RED + — J2 P2 — SUPPLY MOTOR DRIVER

SENSOR (SUPPLY) — COMP. ARM MOTION — J7 P7 — COM, -15V

MOTOR — RED, BLK + — J1 P1 — TAKE-UP MOTOR DRIVER

SENSOR (TAKE UP) — COMP ARM MOTION — J6 P6 — COM, -15V

CAPSTAN ASSEMBLY — MOTOR (RED, BLK), TACH (BLK, RED) — J4 P4, J8 P8 — CAPSTAN MOTOR DRIVER

REEL SERVO - SUPPLY

REEL SERVO - TAKE UP

CAPSTAN SERVO

J5 P5 — PWR COM REGS
- FRMTR. CHASS. GND
- +9V
- -20V
- +20V
- o +15V
- o +20V
- o -20V
- o -15V
- o ± 20 RET
- o DIG COM
- o +R
- o -R
- o +5V

J25 P25 J26 P26 — AC POWER — AC RET, GND, AC IN

MAIN ELECTRONICS BOARD

J13M P13M — P13 J13 — INDICATORS (LED) — CONTROL PANEL MEMBRANE SWITCH ASSY
- (OPEN)
- ON LINE IND.
- WRT EN IND
- FWD IND
- 1600 CPI IND. *
- REWIND IND
- LOAD IND
- RESET IND
- (OPEN)

J12M P12M — B12 B12 — SWITCHES
- (OPEN)
- COMMON
- +15 V
- +15 V
- ON LINE SW.
- WRT EN SW.
- FWD SW.
- 1600 CPI SW. *
- REWIND SW.
- LOAD SW.
- RESET SW.
- (OPEN)

J10 P10 — COM, -15V — BOT, EOT — E.O.T. / B.O.T.

* = 1600 CPI SWITCH FOR 9 TRACK
HI DEN SWITCH FOR 7 TRACK

CONTROL LOGIC

READ

READ P15 J15

WRITE P14 P14

WRITE

FORMATTER ONLY

FOR INTERFACES ONLY

TAPE HEAD

J111 P111 — +5V +5V ONC OWC FWC DEC REC DES RWC WEC OFC OLS RWS FPS BTS +5V RDS ETS +5V
- SLT 2
- SLT 1
- OVERWRITE
- FORWARD COMMAND
- DATA DEN COMMAND
- REVERSE COMMAND
- DATA DEN STATUS
- REWIND COMMAND
- SELECT
- SET WRITE STATUS
- OFF-LINE COMMAND
- ON-LINE
- REWINDING
- FILE PROTECT
- LOAD POINT "BOT"
- +5V
- READY
- END OF TAPE "EOT"
- SLT 3

J113 P113 — TKP RSB TKØ TK1 +15V -15V TK2 TK3 N2S TK4 TK5 TK6 TK7
- READ P/C
- READ STROBE
- RD Ø
- RD 1
- RD 2/8
- RD 3/A
- NRZI
- 7 TK
- LOW SPEED
- RD 4/8
- RD 5/4
- RD 6/2
- RD 7/1
- 9 TRK/7 TRK TYP/TYP

J112 P112 — WDC WRC TH1 TH2 +5V +5V WDP WDO WD1 WD2 WD3 WD4 WD5 WD6 WD7
- WDS
- WRS
- THLD 1
- THLD 2
- TK P/C
- TK 0
- TK 1
- TK 2/8
- TK 3/A
- TK 4/8
- TK 5/4
- TK 6/2
- TK 7/1
- 9 TRK/7 TRK TYP/TYP

← IDT STD INTERFACE

I/O INTERFACE BOARD - STANDARD SCHEMATIC NO. 01-30003 PC BD. ASSY 11-00003

P101 J101 — P103 J103 — P102 J102 ← INDUSTRIAL STANDARD INTERFACE

INNOVATIVE DATA TECHNOLOGY — SAN DIEGO, CA. USA

BLOCK DIAGRAM
DIGITAL TAPE RECORDER

SIZE D — IDENT 56031 — DRAWING 00-30045

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.

TP1

PI2 ON 1050 MAIN PCB

PI2: 1 COM, 2 +15V, 3 +15V, 4 ON LINE, 5 WRT, 6 FWD, 7 1600 CPI, 8 RWD, 9 LOAD, 10 RESET

C3 1µF

Q2 78L05AZC

C2 .1µF

+5V

+4.3V

Q4 2N2222

R26 82Ω, 1W

P1: 2 ON LINE, 9 WRT EN, 8 FWD, 10 1600 CPI, 3 RWD, 1 LOAD, 4 RST, 7 TEST, 6 RET, 5 COM — TO MEMBRANE SWITCH

R3 10K

Q1 2N4124

+5V

R7 1K

C4 .1µF

R1 680

+15V

P2

PWR LED

P3: 3 E39, 1 E38/40, 2 E43, 5 E10, 4 E4 — JUMPER BLOCKS ON 1050 MAIN PCB

U3 LS04

U2 LS03

R9 10K +5V

R10 270

TEST

CR5

U4 4N26

+4.3V

P13 — TO LAMPS

P13				
1	NC			
2	ON LINE	R13, 2.7K	R12, 82Ω	CR2 ON LINE
3	ENABLE	R14, 2.7K	R15, 82Ω	CR7 WRT
4	FORWARD	R20, 2.7K	R21, 82Ω	CR6 FWD
5	1600 CPI	R16, 2.7K	R17, 82Ω	CR8 1600 CPI
6	REWIND	R22, 2.7K	R23, 82Ω	CR3 REWIND
7	LOAD	R18, 2.7K	R19, 82Ω	CR1 LOAD
8	RESET	R24, 2.7K	R25, 82Ω	CR4 RESET

+15V

+5V

+4.3V

R6 680

R8 100K

C1 47µF

CR9 IN5237B

R5 10K

Q3 2N4124

U1 LS10

C5 .01µF 50V

MATERIAL		CONTRACT NO	
FINISH		DRAWN P.C. DUIM 5-31-84	
		CHECK	
		PROJ ENG	
		DESIGN RELEASE	
NEXT ASSY	USED ON		
SIMILAR TO/MAKE FROM			

UNLESS OTHERWISE SPECIFIED

UNITS ARE	TOLERANCES ARE
XXX = INCH	± .010 INCH
XX = INCH	± .03 INCH
X.XX MM	± 0.25 MM
X.X MM	± 0.8 MM

DO NOT SCALE DRAWING

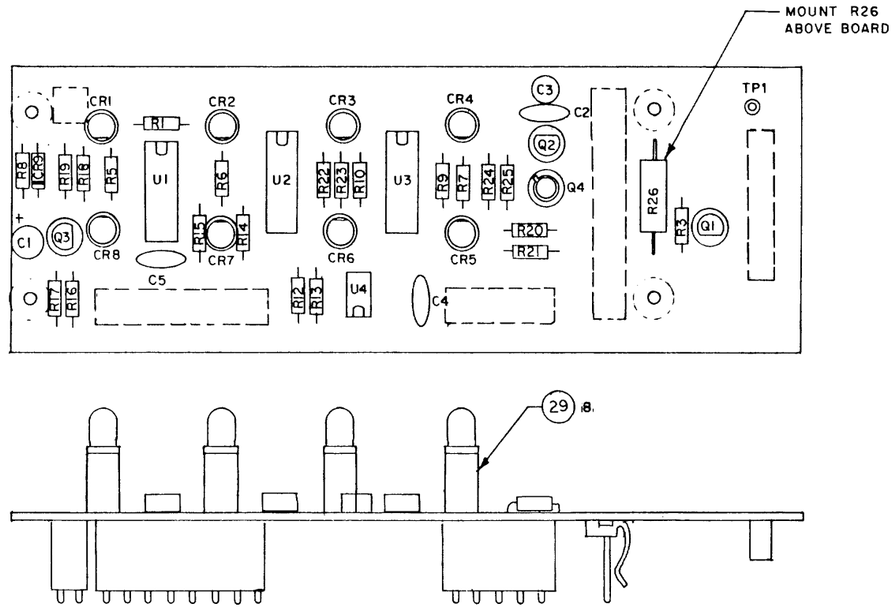
INNOVATIVE DATA TECHNOLOGY SAN DIEGO, CA., USA

TITLE

SCHEMATIC DIAGRAM MEMBRANE SWITCH PCB WITH TEST FUNCTION

DWG SIZE	CODE IDENT	DWG/PART NO.	REV
C	56031	01-30226	C
SCALE	MODEL 1050	SH 1 OF 1	

LTR	REVISIONS DESCRIPTION	DATE	APPV



REF. DESIG.	QTY REQD -01	PART NO.	DESCRIPTION	MFR - PART NO.	ITEM NO.
	B	28-22045	LED MOUNT (SPACER)	BIVAR 905-360	29
TP1	1	28-24002	TEST POINT	60803-2	28
R8	1	47-01111	100K		27
R13,14,16,18,20,22,24	7	47-01073	2.7K		26
R3,5,9	3	47-01087	10K		25
R7	1	47-01063	1K		24
R10	1	47-01049	470 Ω		23
R12,15,17,19,21,23,25	7	47-01037	82 Ω		22
R1,6	2	47-01059	1/4W, 680 Ω		21
R26	1	47-03037	RESISTOR, 1W, 82 Ω		20
C5	1	15-00017	CAPACITOR .01 μF, 50V		19
C3	1	15-70006	1 μF, 35V		18
C2,4	2	15-00025	" .1 μF, 50V		17
C1	1	15-70015	CAPACITOR, 47 μF, 10V	T362C476K020KS	16
CR1-8	8	50-02002	DIODE, LIGHT EMITTING, RED	MV 5052	15
CR9	1	48-10012	DIODE	IN5237B	14
Q4	1	49-20019	TRANSISTOR	2N2222	13
Q1, 3	2	49-20001	TRANSISTOR	2N4124	12
Q2	1	70-00063	VOLTAGE REGULATOR	LM78L05ACZ	11
U4	1	50-07001	I.C., DPT COUPLER/ISOLATOR	4N26	10
U3	1	80-10005	INTEGRATED CIRCUIT	74LS04	9
U2	1	80-10004	"	74LS03	8
U1	1	80-10009	INTEGRATED CIRCUIT	74LS10	7
P1	1	21-00150	CONNECTOR, 10 PIN (F).10 CTRS	15-24-2100	6
P12	1	21-00166	" 10 PIN	MOLEX 09-65-1101	5
P13	1	21-00129	" 8 PIN	MOLEX 09-65-1081	4
P3	1	21-00016	" 5 PIN	MOLEX 09-65-1051	3
P2	1	21-00128	CONNECTOR, 2 PIN	MOLEX 09-65-1021	2
	1	17-00226	PRINTED WIRING BOARD		1

MATERIAL
FINISH
NEXT ASSY USED ON
SIMILAR TO/MAKE FROM

CONTRACT NO
DRAWN C. Duim 6-4-87
CHECK
ENG APPV
PROD APPV
DESIGN RELEASE

UNLESS OTHERWISE SPECIFIED
UNITS ARE: XXX = INCH, XX = INCH
TOLERANCES ARE: ± .010 INCH, ± .03 INCH
X.XX MM ± 0.25 MM
X.X MM ± 0.8 MM
DO NOT SCALE DRAWING

INNOVATIVE DATA TECHNOLOGY
SAN DIEGO CA USA

TITLE
CIRCUIT BOARD ASSEMBLY
MEMBRANE SWITCH

DWG SIZE	CODE IDENT	DWG/PART NO	REV
D	56031	11-00226-0	
SCALE 2/1	MODEL 1050	SH 1 OF 1	

NOTES: UNLESS OTHERWISE SPECIFIED

1. COMPONENTS REQUIRE HEATSINK.
2. ADD SCREW ON MAIN ELECTRONICS PCB ASS'Y 11-00200, LOGIC GND TO CHASSIS GND OPTIONAL.
3. ALL EVEN PINS ON J28 & P28 ARE NOT USED.
4. CONNECTOR FOR AUTO SPEED CHANGE OPTION.
5. DARLINGTON POWER TRANSISTOR.
6. ALL RESISTORS ARE IN OHMS, ~^^^~ 1E METAL FILM RESISTORS.
7. ALL CAPACITANCES IN MICROFARADS.
8. ALL DIODES ARE IN4148 OR IN914.

DC/DC CONVERTER POWER SUPPLY

1 -48V RET
2 CHAS GND
3 -48V
4 POWER LATCH

POWER SWITCH ON
COM
NC
J2 P2
MEMBRANE ASSEMBLY
11-10121 (REF)

J30 P30
J30 P30
+8V RET
+20V RET
32,000μF,25V C1
C2
C279 83,000μF, 15V
FORMATTER
P25 J25
FILTER ASSEMBLY

+20V
-20V
COM
J5 P5
8A

+20 V
F1
F2
F3
R568 15Ω 75W
CR14 IN4001
-15V BDL PWR (5-C1)
7815C 16A
C9 1μF 35V DT
C10 4.7μF 35V DT
CR15 IN4001
-20V
R569 60Ω 3.75W
CR16 IN4001
7915C 18A
C11 1.0μF 35V DT
C12 10μF 35V DT
CR17 IN4001
R570 20Ω/5W
R219 15Ω 10W
CR18 IN4001
POWER REGULATOR
LM317K 14A
C13 1.0 35V
R66 200 POT
R65 590
R64 240
C14 4.7μF 35V DT
CR19 IN4001
CW TO R647 (4-D2)
R67 1.1K
R596 6.81K
R69 10K
R70 4.99K
R71 10K
LM324 13B
R73 180 1/2W
R74 10K
+15 V
CR177 IN821 6.2V
C226 1.0μF 35V
R68 6.49K
-15V
R72 200 1/2W
+20 RET
DIG COM
65
2N4398
CR179 IN4001
CR168 IN4001
CR178 IN4001
CR174 IN4001
CR175 IN4001
CR176 IN4001
C277 1.0μF 35V DT
C278 1.0μF 35V DT
R595 20 3W
FORMATTER REGULATOR
FORMATTER +5V
J112 H/J 7/8
+5V
+15V
+R
-R
POWER AVAILABLE ON BOARD.

MAIN ELECTRONICS
PCB ASSEMBLY 11-00200 (REF)

REVISIONS			
LTR	DESCRIPTION	DATE	APPV

MATERIAL		CONTRACT NO	
FINISH		DRAWN K. MITCHELL 5/Dec/84	
		CHECK	
		PROJ ENG	
		DESIGN RELEASE	
NEXT ASSY	USED ON		
SIMILAR TO/MAKE FROM			

UNLESS OTHERWISE SPECIFIED
UNITS ARE: XXX = INCH, XX = INCH
TOLERANCES ARE: ± .010 INCH, ± .03 INCH
X.XX MM ± 0.25 MM
X.X MM ± 0.8 MM
DO NOT SCALE DRAWING

INNOVATIVE DATA TECHNOLOGY
SAN DIEGO, CA., USA

TITLE
SCHEMATIC DIAGRAM
MAIN ELECTRONICS, DC/DC POWER SUPPLY REGULATOR

DWG SIZE	CODE IDENT	DWG/PART NO	REV
D	56031	01-30276	
SCALE NONE	MODEL 1050	SH 1 OF 1	

REVISIONS			
LTR	DESCRIPTION	DATE	APPV
X3	SEE CARD		
—	PROD RELEASE	9/82	
—	DCN 2189	2-83	EA
A	ECN 2191	2-83	CC
B	ECN 2193	2-83	CC

(ON HEATSINK)
Q7 MJ10020
Q8 MJ 10020
C6 3300pF
R40 200, 2W

C = CASE GND

P1 3 1 5 2 4
J1 3 1 5 2 4

TB1
-48VDC RET. (1)
-48 VDC (3)
CHASSIS GND (2)
POWER LATCH (4)

FILTER 10B3
F1
.01μF
(ON HEATSINK)
CB1
10A
CR1 MDA 980-1

P5 J5
+48V
C1 .02μF 500V
C2 .02μF 500V
C3 .02μF 500V
T1
CASE GND
C4 .02μF 500V
C5 1500μF 75V
T2
R7 .1Ω 2W
R8 .1Ω 2W

J4 P4
(ON HEATSINK)
CR12 MDA2500FR
CR13 MDA2500FR
P4 J4
J30
L1
L2
L3
+20V
±20V RET
-20V
+8V
+8V RET
R29 330 2W
R30 330 2W
R31 82 2W
C22 350μF 50V
C23 350μF 50V
C24 1600μF 15V
TO P30 ON FILTER ASSY

C15 .1μF,50V
+15V
IC2 CNY17-2
CR10 1N5527
7.5V
R21 100

R1 27K
R2 1K
R3 6.8K
R4 1K
R5 6.8K
R6 1K
C7 .01μF 100V
C8 .1μF,50V
C9 .1μF,50V
C10 .1μF,50V
CR3 1N914
CR4 1N914
Q1 2N4126
Q2 2N4124
Q3 2N4124
CR5 1N914
CR6 1N5232 5.6V
R11 3K, 1W
R12 1K
Q4 2N4126
R13 3.6K
CR7 IN5536 16V
R10 3K 1W
R9 120 5W
Q5 2N4124
R14 15K
R16 120
R15 2K
CR8 1N914
CR9 1N914
C11 .01μF 100V
C12 100μF 20V DT
C13 22μF,35V DT
R17 6.8K
R18 1.5K
R19 1.5K
C14 1 μF 35V DT
R20 2.21K
C17 .012μF 50V PC
R22 10K
C16 .1μF,50V
IC2 3524
R35 1K
C20 470pF DM
CR11 1N914
C19 .68μF 50V PC
R23 1K
Q9 2N4124
R24 10K
C18 2.2μF 20V DT
C21 10μF 35V DT
R26 20Ω
R27 1M
R28 30Ω
R36 1K
R32 1K
Q11 2N2222A
CR16 1N914
Q12 2N2907A
CR14 1N5520 3.9V
R33 1.8K
R34 82 1W
C25 .01μF, 100V
Q10 2N2222A
C26 2.2μF 20V DT
R37 1.8K
R38 82Ω 1W
C27 .01μF,100V
Q13 2N2222A
C28 2.2μF,20V DT
Q14 2N2222A
CR17 1N914
CR15 1N5520 3.9V
Q15 2N2907A
TP1

J2 P2
CONTROL PANEL 11-00032 PCB
ON
OFF

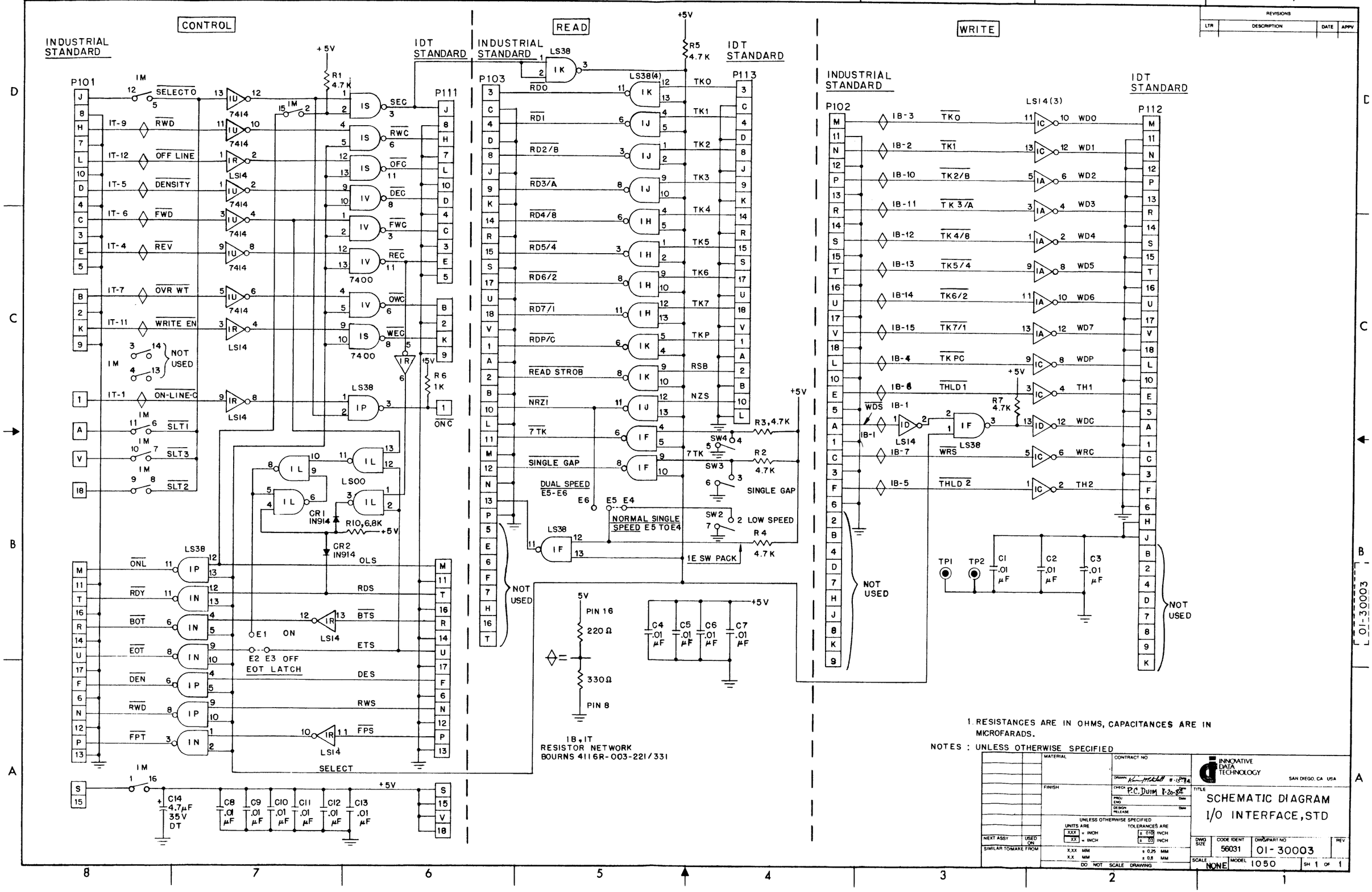
J3 P3
5V REG. (ON HEATSINK)
Q6 2N6388

PC BOARD ASSY 11-00196 (REF)

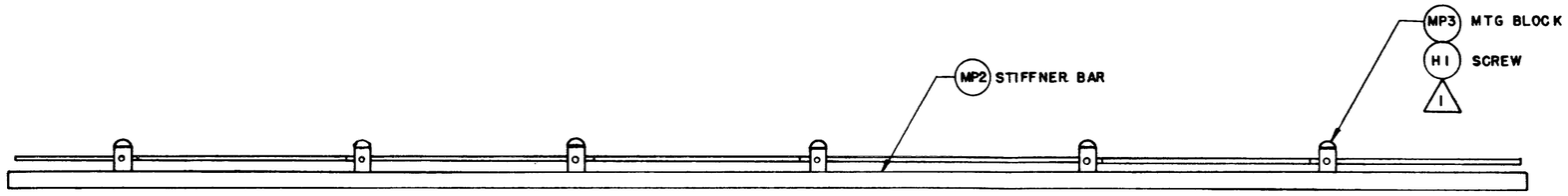
1. ALL RESISTANCES IN OHMS, RESISTORS ARE 1/4W, ±5%.

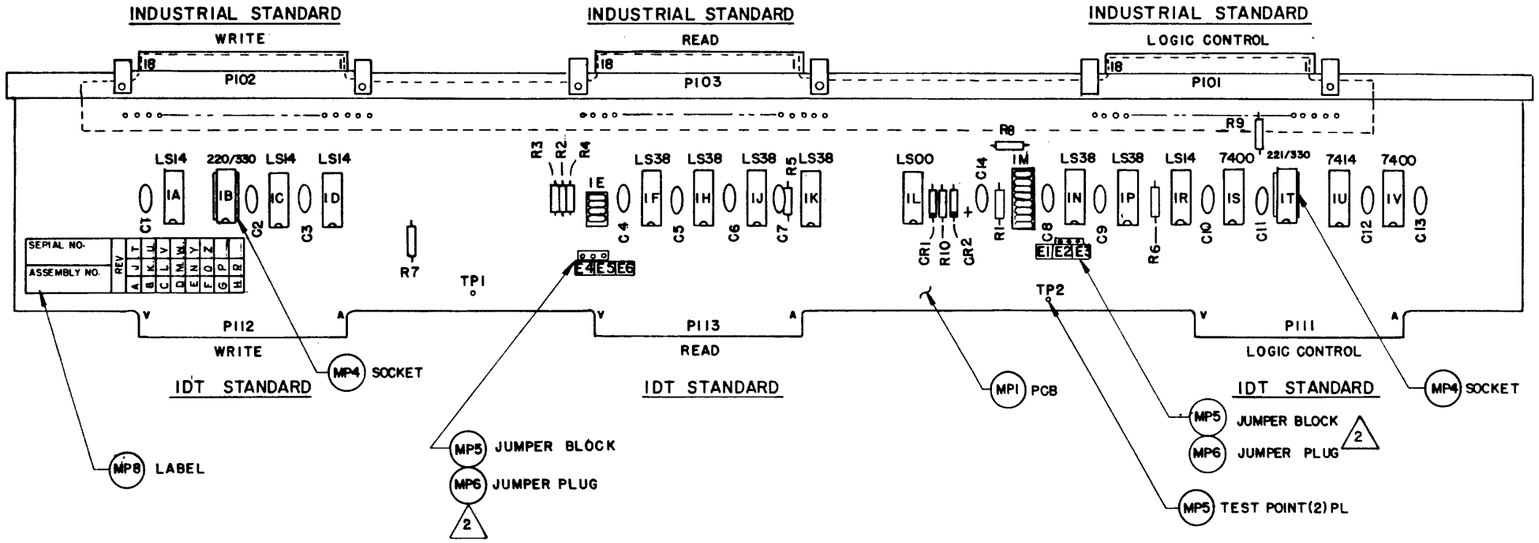
NOTES: UNLESS OTHERWISE SPECIFIED

MATERIAL	CONTRACT NO	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO CA USA
FINISH	DRAWN C.DUIM 8-27	TITLE	SCHEMATIC DIAGRAM DC/DC CONVERTER
NEXT ASSY / USED ON / SIMILAR TO/MAKE FROM	UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = ± INCH, XX = ± INCH, X.XX MM, X.X MM; TOLERANCES ARE ± .010 INCH, ± .03 INCH, ± 0.25 MM, ± 0.8 MM; DO NOT SCALE DRAWING	DWG SIZE D	CODE IDENT 56031
		DWG/PART NO 01-30196	REV B
		SCALE —	MODEL 1050
		SH 1 OF 1	


CONTROL
READ
WRITE
INDUSTRIAL STANDARD
IDT STANDARD
P101
P111
P103
P113
P102
P112
+5V
R1 4.7K
R5 4.7K
R6 1K
R3, 4.7K
R2 4.7K
R7 4.7K
R10, 6.8K
SELECTO
RWD
OFF LINE
DENSITY
FWD
REV
OVR WT
WRITE EN
ON-LINE-C
SLT1
SLT3
SLT2
NOT USED
SEC
RWC
OFC
DEC
FWC
REC
OWC
WEC
ONC
LS38
LS14
LS00
LS38(4)
LS14(3)
CR1 IN914
CR2 IN914
ONL
RDY
BOT
EOT
DEN
RWD
FPT
OLS
RDS
BTS
ETS
DES
RWS
FPS
SELECT
E1 ON
E2 E3 OFF
EOT LATCH
RDO
RD1
RD2/B
RD3/A
RD4/8
RD5/4
RD6/2
RD7/1
RDP/C
READ STROBE
NRZI
7 TK
SINGLE GAP
DUAL SPEED E5-E6
NORMAL SINGLE SPEED E5 TO E4
LOW SPEED
SINGLE GAP
1E SW PACK
SW4
SW3
SW2
TK0
TK1
TK2
TK3
TK4
TK5
TK6
TK7
TKP
RSB
NZS
IB-3 TK0 WD0
IB-2 TK1 WD1
IB-10 TK2/B WD2
IB-11 TK3/A WD3
IB-12 TK4/8 WD4
IB-13 TK5/4 WD5
IB-14 TK6/2 WD6
IB-15 TK7/1 WD7
IB-4 TKPC WDP
IB-6 THLD1 TH1
IB-1 WDS WDC
IB-7 WRS WRC
IB-5 THLD2 TH2
TP1
TP2
C1 .01 µF
C2 .01 µF
C3 .01 µF
C4 .01 µF
C5 .01 µF
C6 .01 µF
C7 .01 µF
C8 .01 µF
C9 .01 µF
C10 .01 µF
C11 .01 µF
C12 .01 µF
C13 .01 µF
C14 4.7µF 35V DT
5V
PIN 16
220 Ω
330 Ω
PIN 8
IB-IT
RESISTOR NETWORK
BOURNS 4116R-003-221/331
NOT USED
1. RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
NOTES : UNLESS OTHERWISE SPECIFIED
REVISIONS
LTR
DESCRIPTION
DATE
APPV
INNOVATIVE DATA TECHNOLOGY
SAN DIEGO, CA USA
SCHEMATIC DIAGRAM
I/O INTERFACE, STD
CONTRACT NO
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
UNITS ARE
TOLERANCES ARE
DO NOT SCALE DRAWING
NEXT ASSY
USED ON
SIMILAR TO/MAKE FROM
DWG SIZE
CODE IDENT
56031
DWG/PART NO
01-30003
REV
SCALE
NONE
MODEL
1050
SH 1 OF 1
01-30003

REVISIONS			
LTR	DESCRIPTION	DATE	APPV





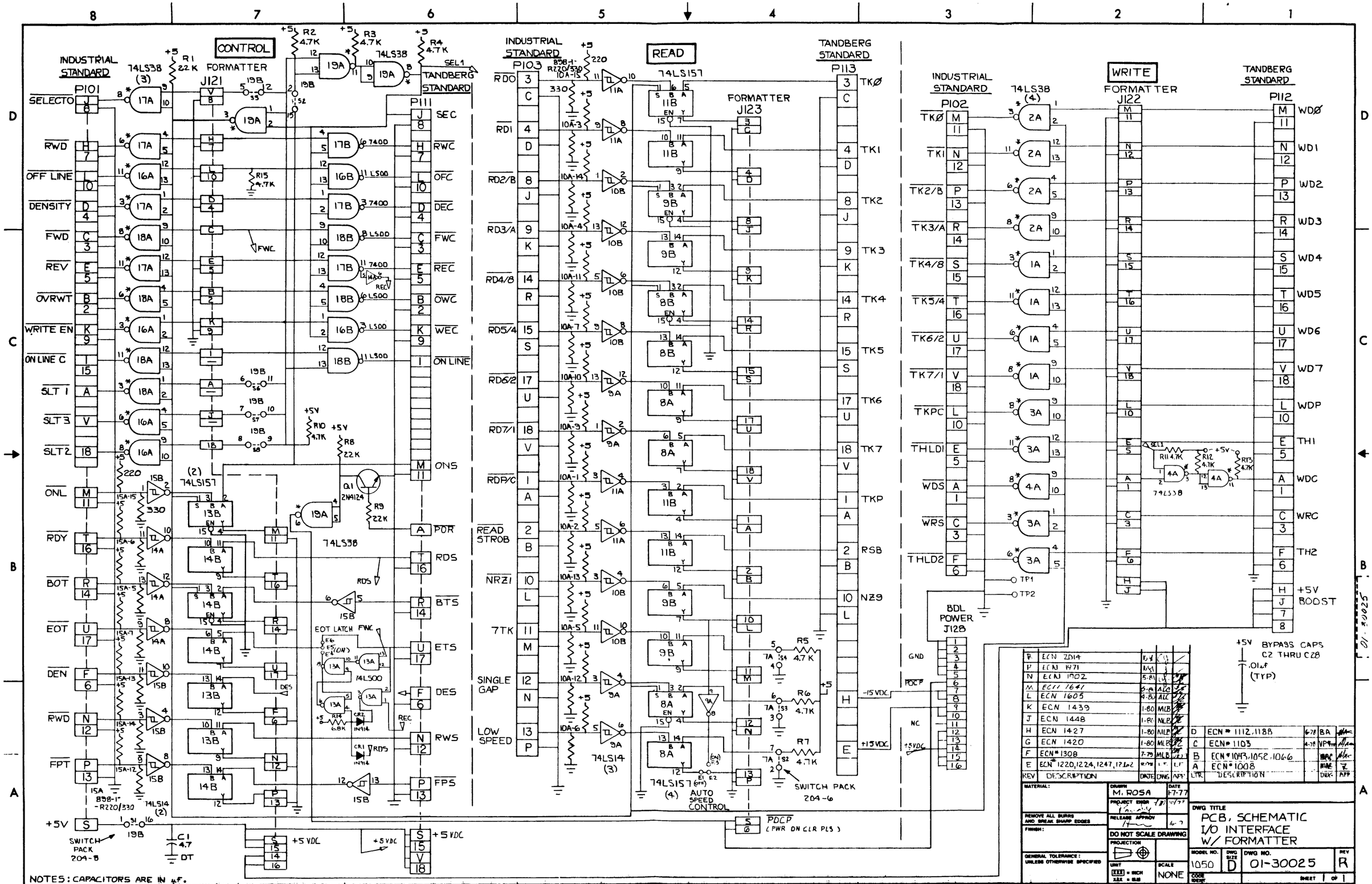
2 NORMAL POSITION FOR JUMPER PLUGS MP6 ARE ON E2,E3 & E4,E5.

1 APPLY SCREW LOCK LOCTITE 2222 TO H1. TIGHTEN SCREW UTIL MP3 IS SNUG, BUT CAN STILL BE MOVED FROM SIDE TO SIDE.

NOTES:

MATERIAL	CONTRACT NO	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN 8/4/84 · CHECK · PROJ ENG · DESIGN RELEASE	TITLE: PCB ASSEMBLY STANDARD I/O INTERFACE	
NEXT ASSY · USED ON · SIMILAR TO/MAKE FROM	UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .05 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING	DWG SIZE D · CODE IDENT 56031 · DWG/PART NO 11-00003-0 · REV K · SCALE 1/1 · MODEL · SH 1 OF 1	

11-00003-0



REV	DESCRIPTION	DATE	DWG	APP'D
R	ECN 2014	10-81	RM	
P	ECN 1971	8-81	RM	
N	ECN 1902	5-81	RM	
M	ECN 1641	6-80	ALC	
L	ECN 1605	4-80	ALC	
K	ECN 1439	1-80	MLB	
J	ECN 1448	1-80	MLB	
H	ECN 1427	1-80	MLB	
G	ECN 1420	1-80	MLB	
F	ECN# 1308	7-79	MLB	
E	ECN# 1220, 1224, 1247, 1282	9-78	LF	LF

LTR	DESCRIPTION	DATE	DWG	APP'D
D	ECN# 1112, 1188	6-78	BA	
C	ECN# 1103	4-78	VP	
B	ECN# 1049, 1052, 1066			
A	ECN# 1008			

MATERIAL:

REMOVE ALL BURRS AND BREAK SHARP EDGES

FINISH:

GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED

DRAWN: M. ROSA — DATE: 7-77

PROJECT ENGR: — DATE: 10/77

RELEASE APPROV: — DATE: 11-7

DO NOT SCALE DRAWING

PROJECTION

UNIT: XXX = INCH, X.XX = MM

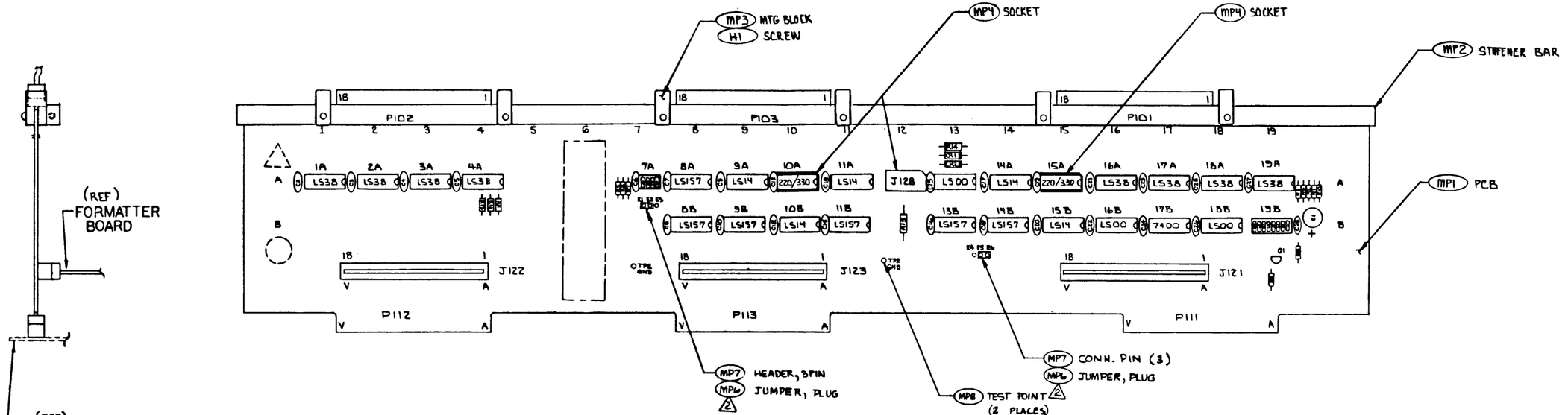
SCALE: NONE

DWG TITLE: PCB, SCHEMATIC I/O INTERFACE W/ FORMATTER

MODEL NO.	DWG SIZE	DWG NO.	REV
1050	D	01-30025	R

CODE IDENT

SHEET 1 OF 1



LTR	DESCRIPTION	DWG	APP
U	ECN 2367	9/14	
T	ECN 2014	CW	10-81
S	ECN 1971		
R	ECN 1930		
P	ECN 1795A	CW	
N	ECN 1702	CW	
M	ECN 1614	ALC	
L	ECN 1605	ALC	
K	ECN 1439	MLB	
J	ECN 1448	MLB	
H	ECN 1427	MLB	
G	ECN 1420	MLB	
F	ECN # 1308	MLB	
E	ECN # 1220, 1224, 1247, 1262	LF	
D	ECN # 1112	BA	
C	ECN # 1103	WPY	
B	ECN # 1024, 1043, 1052, 1066		
A	ECN # 1008		

OPTION A2

⚠2 NORMAL POSITION FOR JUMPER PLUGS (MP6) ARE ON E1, E2 AND E5, E6.

1. PLACE SOCKETS (MP4) AT LOCATIONS 10A, 12A & 15A.

NOTES:

MATERIAL:	DRAWN MAC 2-77		
REMOVE ALL BURRS AND BREAK SHARP EDGES	PROJECT ENGR JW 10-77	DWG TITLE: PCB ASSY- I/O INTERFACE WITH FORMATTER	
FINISH:	RELEASE APPROV 6-9		
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	DO NOT SCALE DRAWING	MODEL NO. 1053	DWG SIZE D
	PROJECTION	DWG NO. 11-00025-0	REV U
	UNIT XXX = INCH XXX = MM	SCALE FULL	SHEET 1 OF 1

IDT STANDARD

FORMATTER

P111 CONTROL

P113 — READ

P112 — WRITE

J121 — CONTROL

J123 — READ

J122 — WRITE

BYPASS CAPS

C2 THRU C10 .1μF/50V

ON LINE & SELECT

DEVICE ADDRESS

148

C1 4.7μF

SEL 0 SEL 1 SEL 2 SEL 3

R1 4.7K

R2 4.7K

R3 4.7K

R4 4.7K

R5 22K

R6 4.7K

R7 4.7K

R8 4.7K

R9 4.7K

R10 6.8K

R11 1K

Q1 2N4124

CR1 CR2 1N914 (2)

EOT LATCH

E1 (ON) E2 E3

TP1 TP2

LS08 (7)

PWR ON RST/CLR PULSE

LOW SPEED SGL GAP 7 TRK

98

BDL PWR J128

GND −15V +15V +5V

POCP NC

16 PIN DIP SOCKET

+5V BOOST

+15V −15V

LTR	DESCRIPTION	DATE	APPV.

REVISIONS

MATERIAL	CONTRACT NO.
FINISH	DRAWN P.C. Duim 8-2-82
NEXT ASSY.	USED ON
SIMILAR TO/MAKE FROM	

UNLESS OTHERWISE SPECIFIED
UNITS ARE .XXX = INCH .XX = INCH
TOLERANCES ARE ± .010 INCH ± .05 INCH
X.XX MM ± 0.25 MM X.X MM ± 0.8 MM
DO NOT SCALE DRAWING

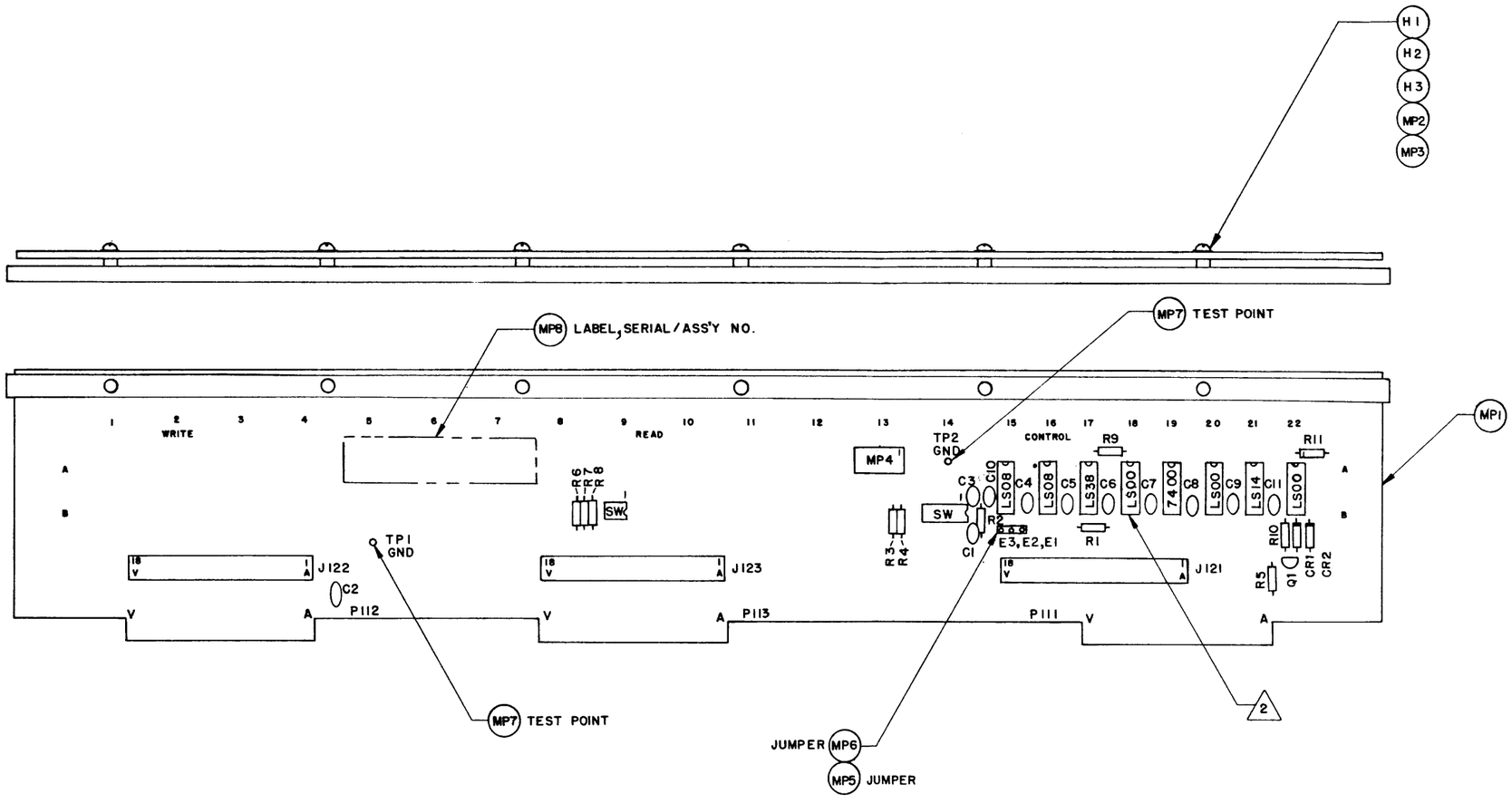
INNOVATIVE DATA TECHNOLOGY SAN DIEGO, CA., USA

TITLE
SCHEMATIC DIAGRAM
I/O INTERFACE BOARD
FORMATTER STAND ALONE

DWG SIZE	CODE IDENT.	DWG/PART NO.	REV.
D	58031	01-30092	

SCALE — MODEL 1054 SH 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPV



2 WHEN USING 17-00092E BOARDS ADD JUMPER FROM 18A PIN 7 TO GND.

1. NORMAL POSITION ON JUMPER PINS ARE ON E1, E2.

NOTES:

MATERIAL	CONTRACT NO	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN [signature] 8/Sept/84	TITLE	PCB ASSEMBLY-I/O INTERFACE, FORMATTER STAND-ALONE
	CHECK P.C. Duim 8-84		
	PROJ ENG Date		
	ED SPON RELEASE Date		
NEXT ASSY / USED ON	UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .03 INCH	DWNG SIZE D	CODE IDENT 56031
SIMILAR TO/MAKE FROM	X.XX MM, X.X MM; ± 0.25 MM, ± 0.8 MM	DWG/PART NO.	11-00092-0
	DO NOT SCALE DRAWING	REV	M
		SCALE 1/1	MODEL 1054
		SH 1 OF 1	

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.
A	PRODUCTION RELEASE	7-1-80	

P111 CONTROL

P113 READ

P112 WRITE

J121 CONTROL FORMATTER

J123 READ FORMATTER

J122 WRITE FORMATTER

PWR ON RESET / CLEAR PULSE

LOW SPEED

SINGLE GAP

7TRK

ON LINE SELECT

SELECT 0

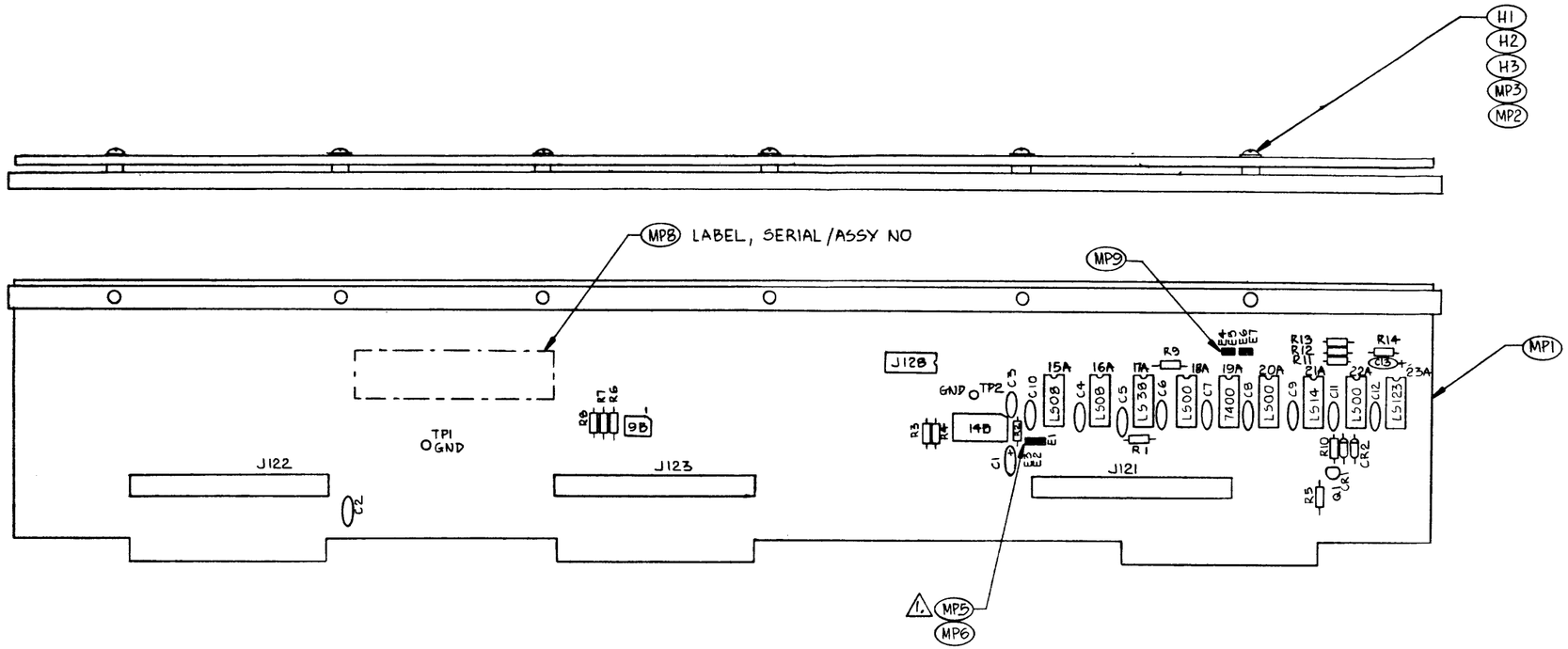
DEVICE ADDR.

1. BY PASS CAP C2-C12 .1uF/50V

NOTES:

MATERIAL	CONTRACT NO	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C. CHMIELOWSKI 11-16-83	TITLE	PCB SCHEMATIC 4050 I/O STANDALONE W/POWER UP
	CHECK		
	PROJ ENG		
	DESIGN RELEASE		
UNLESS OTHERWISE SPECIFIED UNITS ARE .XXX = INCH, .XX = INCH; TOLERANCES ARE ± .010 INCH, ± .05 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING		DWG SIZE D	CODE IDENT 56031
NEXT ASSY	USED ON	DWG/PART NO 01-30266	REV A
SIMILAR TO/MAKE FROM		SCALE	MODEL 1050
			SH 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.
X2	PCN 191	1-84	CC
X3	PCN 213	3-84	TC
X4	P/L CHANGE	4-23-84	CC
A	PRODUCTION RELEASE	7-19-84	TC



⚠1. NORMAL POSITION ON JUMPER PLUGS (MP5) ARE ON E1 E2

NOTES

MATERIAL	CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN C.MARTELLO 11-16-83	TITLE	FORMATTER I/O STANDALONE W/POWER UP
NEXT ASSY.	USED ON	CHECK	
SIMILAR TO/MAKE FROM		PROJ ENG	
		DESIGN RELEASE 6-15-84	

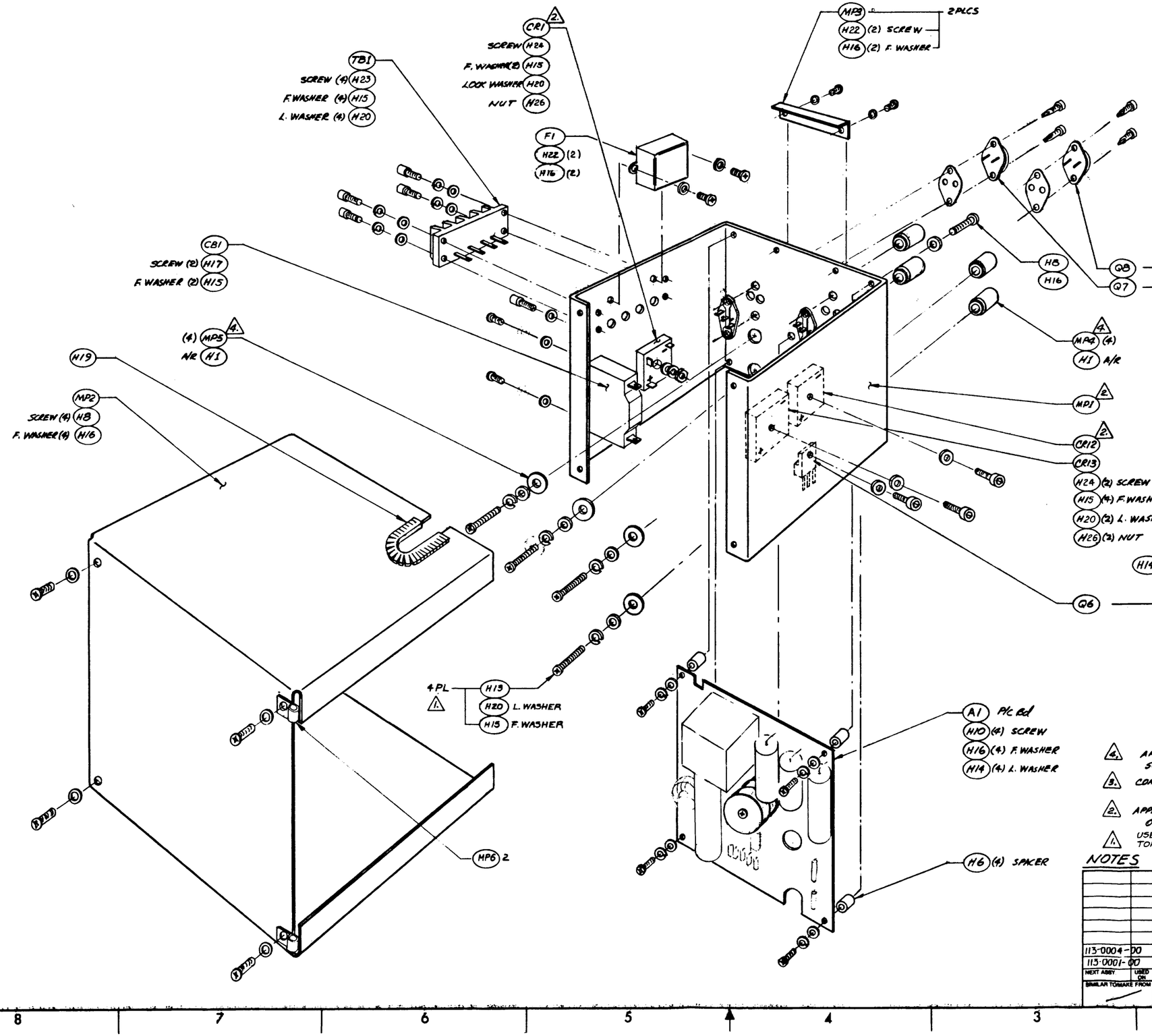
UNLESS OTHERWISE SPECIFIED
UNITS ARE: XXX = INCH, XX = INCH
TOLERANCES ARE: ± .010 INCH, ± .03 INCH, X.XX MM ± 0,25 MM, XX MM ± 0,8 MM
DO NOT SCALE DRAWING

DWG SIZE	CODE IDENT.	DWG/PART NO.	REV
	56031	11-00266 -01	A

SCALE 1:1 MODEL 1050 SH 1 OF 1

11-00266

REVISIONS			
LTR	DESCRIPTION	DATE	APPV



4. APPLY A THIN COAT OF ADHESIVE, H1 TO SHOULDER SURFACES OF BOTH MP4 & MP5 AND SECURE TO CASE.

3. COAT BOTH SIDES OF WAFERS WITH A THIN COAT OF HEATSINK COMPOUND, H2.

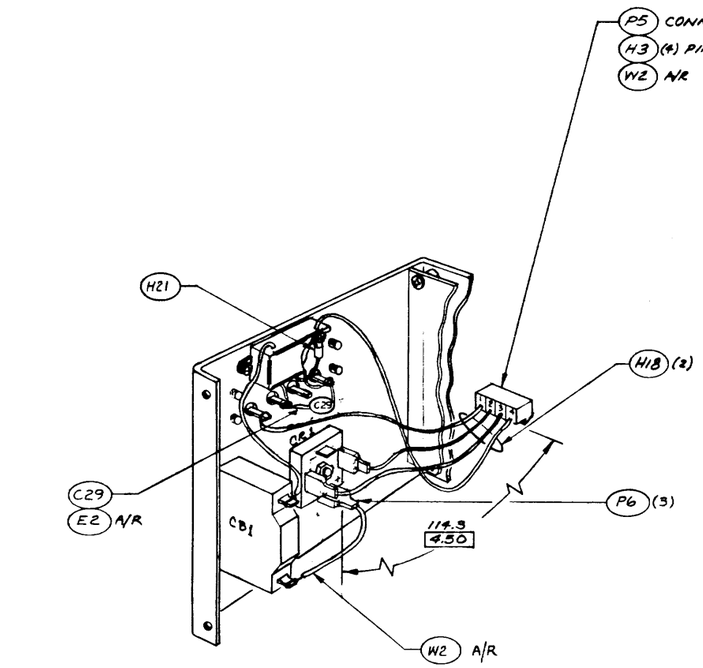
2. APPLY HEATSINK COMPOUND, H2, ON MOUNTING SURFACES OF CR1, CR12 & CR13 BEFORE INSTALLATION.

1. USED FOR MOUNTING DC/DC CONVERTER CHASSIS TO TOP PLATE.

NOTES

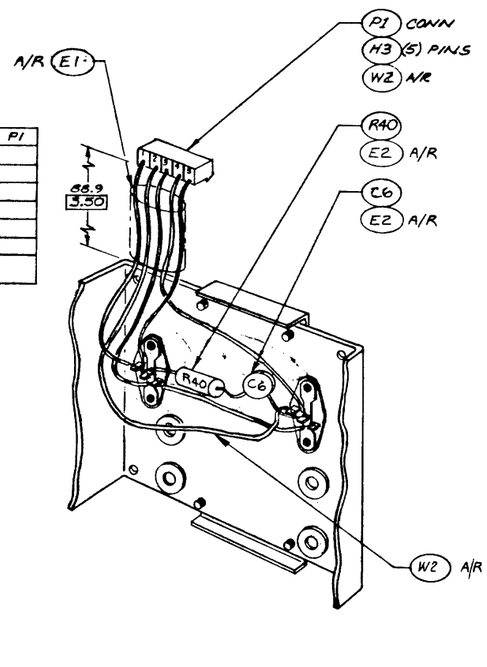
MATERIAL	CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY	SAN DIEGO, CA., USA
FINISH	DRAWN ELLERBY ENG. SECTION / CHECK / PROJ ENG / DESIGN RELEASE	TITLE: FINAL ASSEMBLY DC/DC CONVERTER	
113-0004-00	UNLESS OTHERWISE SPECIFIED: UNITS ARE .XXX = INCH, .XX = INCH; TOLERANCES ARE ± .010 INCH, ± .03 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING	SIZE D	CODE IDENT 58031
113-0001-00		DWG/PART NO. 10-00204	REV D
NEXT ASSY / USED ON		SCALE NONE	MODEL 1050
SIMILAR TO/MAKE FROM		SH 1 OF 2	

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.
	SEE SHEET 1		

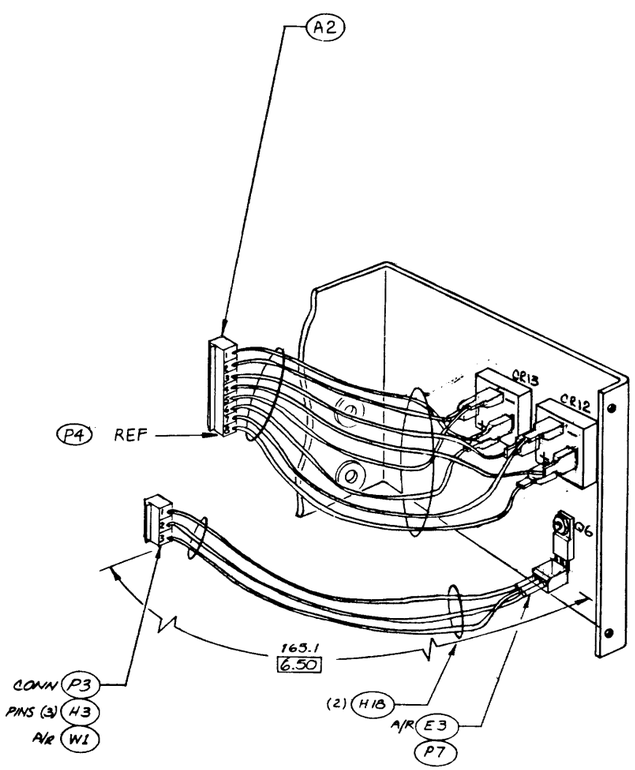


WIRING FOR P5
(TB1, CB1 & CR1)

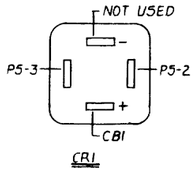
WIRE LENGTHS FOR P1	
PIN NO	LENGTH
1	6"
2	10"
3	7"
4	10 1/4"
5	7"
QTE TO Q8E	5"

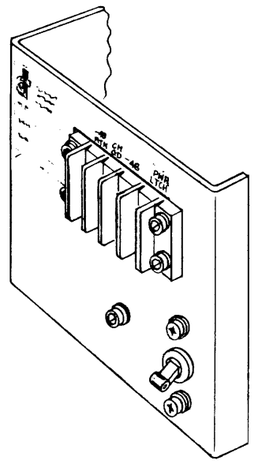


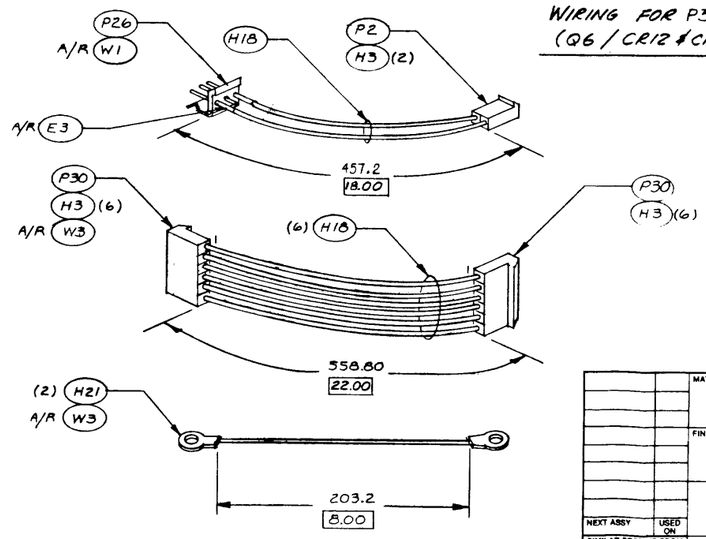
WIRING FOR P1
(Q7, Q8, C6 & R40)

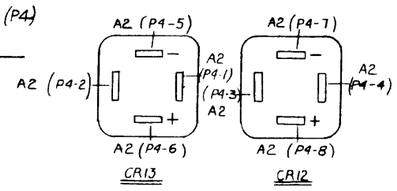


WIRING FOR P3 & A2(P4)
(Q6 / CR12 & CR13)









SEE SHEET 1.
NOTES:

NEXT ASSY	USED ON	MATERIAL	CONTRACT NO.
SIMILAR TO/MAKE FROM		FINISH	DRAWN ELLERBY ENG DEC 8/94
			CHECK
			PROJ ENG DESIGN RELEASE

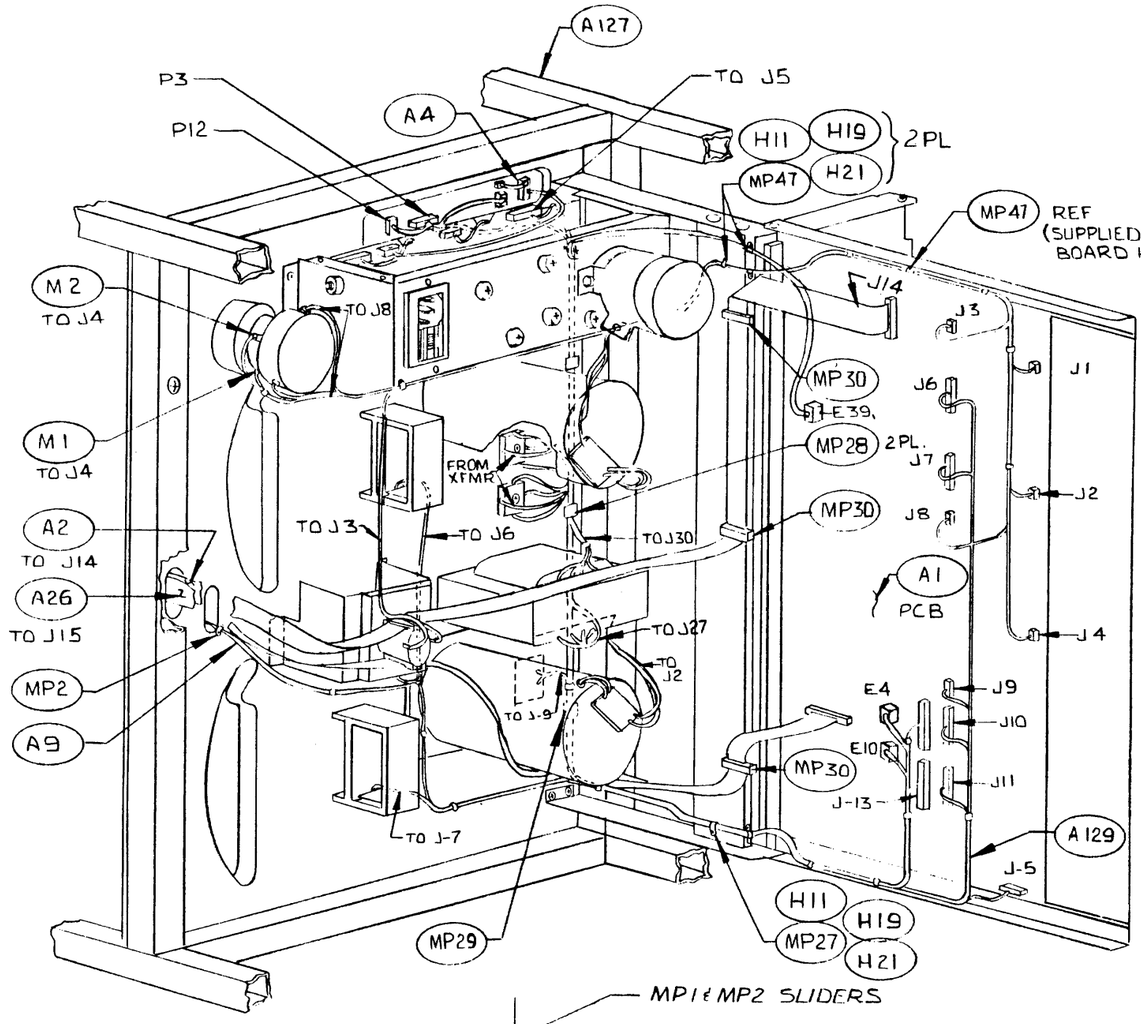
UNLESS OTHERWISE SPECIFIED
UNITS ARE: XXX = INCH, XX = INCH; XXX MM, XX MM
TOLERANCES ARE: ± .010 INCH, ± .03 INCH; ± 0,25 MM, ± 0,8 MM
DO NOT SCALE DRAWING

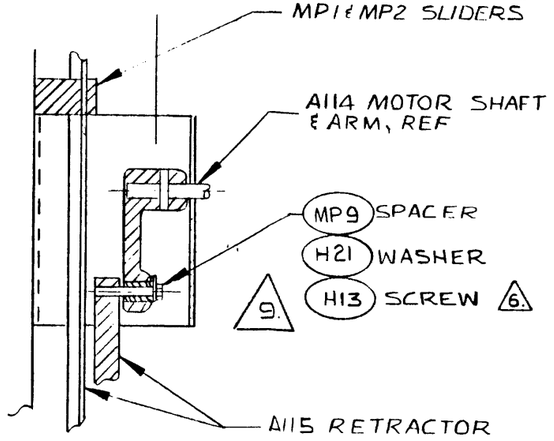
INNOVATIVE DATA TECHNOLOGY
SAN DIEGO, CA, USA

TITLE
FINAL ASSEMBLY DC/DC CONVERTER

DWG SIZE	CODE IDENT	DWG/PART NO	REV
-	56031	10-00204	D
SCALE NONE	MODEL	SH 2 OF 2	

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.





SECTION CC

(FROM PAGE 2)

NEXT ASSY	USED ON	MATERIAL	CONTRACT NO.
SIMILAR TO/MAKE FROM		FINISH	DRAWN K. MITCHELL 5/2/94 Date; CHECK Date; PROJ ENG Date; DESIGN RELEASE Date

UNLESS OTHERWISE SPECIFIED

UNITS ARE	TOLERANCES ARE
.XXX = INCH	± .010 INCH
.XX = INCH	± .03 INCH
X.XX MM	± 0,25 MM
X.X MM	± 0,8 MM

DO NOT SCALE DRAWING

INNOVATIVE DATA TECHNOLOGY — SAN DIEGO, CA., USA

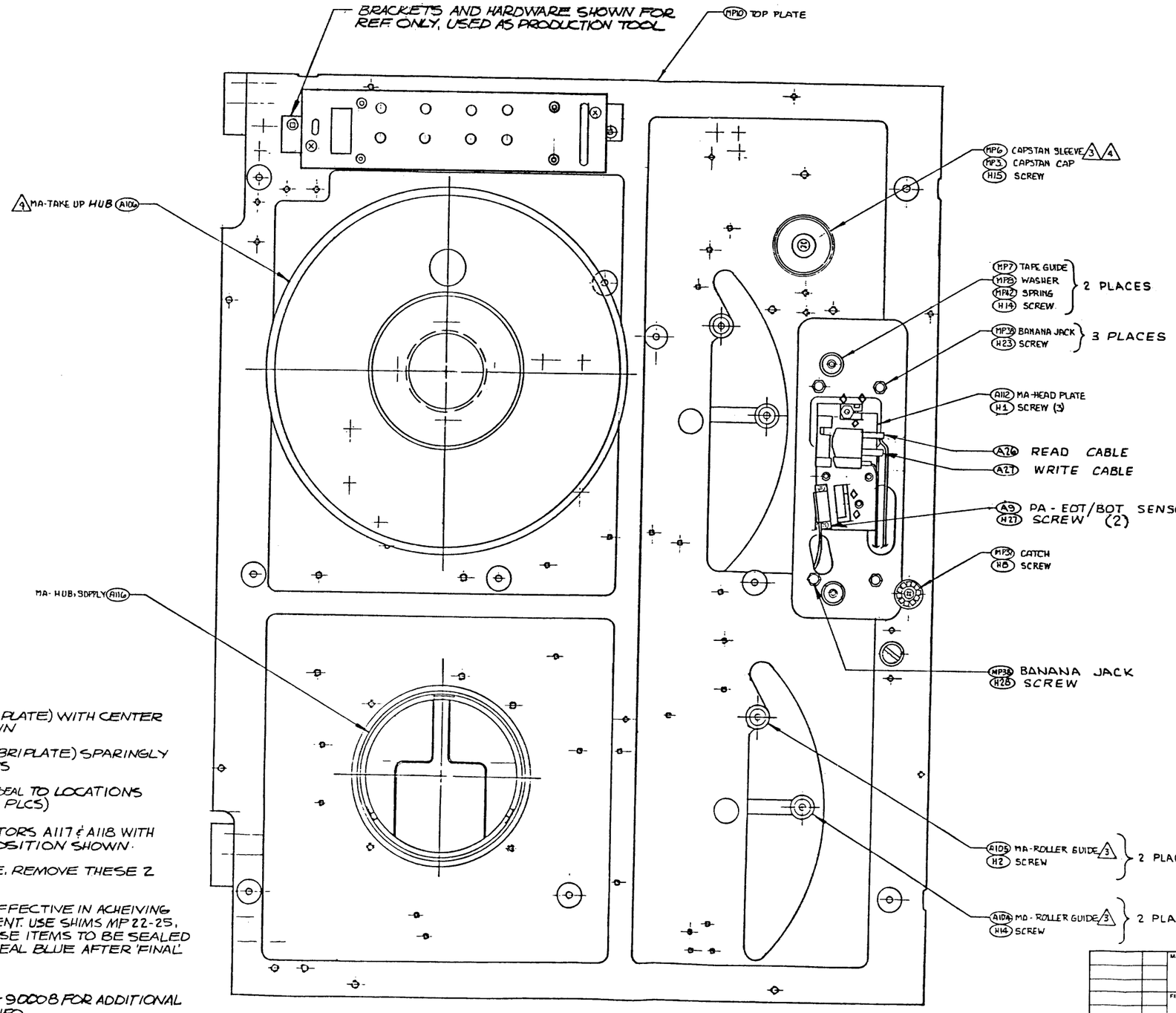
TITLE

MECHANICAL ASSEMBLY TOP PLATE

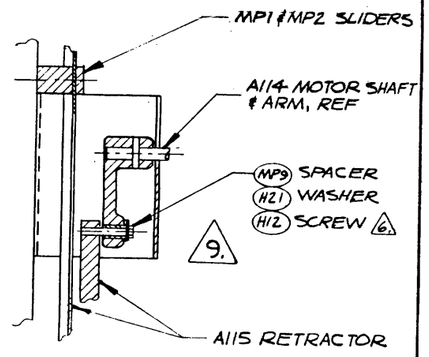
DWG SIZE	CODE IDENT	DWG/PART NO	REV
	56031	113-0001-0	

SCALE NONE | MODEL 1050 | SH 1 OF 1

LTR	DESCRIPTION	APPL	DATE
X1			8-3-83
X2	PCN 206	KM	2-23-84



FRONT VIEW



SECTION C C

(FROM PAGE 2)

10 MARK MP 10 (TOP PLATE) WITH CENTER MARKS AS SHOWN

9 APPLY MP 4 & 6 (LUBRIPLATE) SPARINGLY TO MOVING PARTS

6 APPLY MP 18 TORQSEAL TO LOCATIONS INDICATED ◇. (14 PLCS)

5 ORIENT REEL MOTORS A117 & A118 WITH P.C. BOARDS IN POSITION SHOWN.

4 TO REMOVE FACADE, REMOVE THESE 2 ITEMS ON SHT. 1

3 THESE ITEMS ARE EFFECTIVE IN ACHEIVING TAPE PATH ALIGNMENT. USE SHIMS MP 22-25, 44, 45, AS REQ. THESE ITEMS TO BE SEALED WITH MP18 TORQSEAL BLUE AFTER 'FINAL' ALIGNMENT.

2. SEE I.D.T. DWG. 00-90008 FOR ADDITIONAL CABLE & WIRING INFO

1 APPLY MP19 COMPOUND, HEAT SINK, PER MFR. STD. PROCEDURES, BEFORE MOUNTING TO TOP PLATE

NOTES:

MATERIAL

CONTRACT NO

DRAWN K. WALKER 7-83 Date

CHECK Date

PROJ Date

DESIGN RELEASE Date

FINISH

UNLESS OTHERWISE SPECIFIED
UNITS ARE XXX = INCH, XX = INCH
TOLERANCES ARE ± .010 INCH, ± .03 INCH
X.XX MM ± 0.25 MM
X.X MM ± 0.8 MM
DO NOT SCALE DRAWING

NEXT ASSY | USED ON

SIMILAR TO/MAKE FROM

INNOVATIVE DATA TECHNOLOGY SAN DIEGO, CA., USA

TITLE

MECHANICAL ASSEMBLY - TOP PLATE

DWG SIZE	CODE IDENT	DWG/PART NO	REV
D	56031	117-9900-00	X2

SCALE 3/4=1 MODEL 1050/1750 SH 1 OF 4

REVISIONS			
LTR	DESCRIPTION	DATE	APPV

POWER SUPPLY (A103)

(H26) SCREW(4)
(MP34) SPACER(4)
(A117) REEL MOTOR, TAKE UP
(MP40)
2PL. SCREW (H6)

(MP13) BRACKET
(H3) SCREW (3)

(H3) SCREW
(H18) WASHER

(CR1) BRIDGE RECTIFIER △1
(CR2) 2 PLCS
(H21) WASHER 2PLCS
(H1) SCREW 2PLCS
(H24) SCREW 2PLCS

(H3) SCREW(3)
(MP4) BRACKET
(MP20) CARD GUIDE
(MP21) CARD GUIDE (2)

CAPSTAN MOTOR (A119)
SCREW(2) (H5)
△10
SCREW (H13)
LABEL (MP43)
RETRACT MOTOR (A114)
WASHER(4) (H19)
WASHER(4) (H21)
SCREW(4) (H3)
P CLIP (MP26)
LATCH (MP36)
SCREW (H2)
BUMPER (MP32)
4PLCS { WASHER (H22), SCREW (H4), BUMPER (A113) }
RETRACTOR (A115)
△9
2PLCS { SLIDER (MP1), SLIDER (MP2), (2) SCREW (W16) }
△10

METRIC DESIGN
SEE METRIC HARDWARE ONLY

(MP14) BRACKET
(H18) WASHER(BRIDGE GND)
(MP34) SPACER (4)
(A20) TRANSFORMER
(H19) WASHER (3)
(H4) SCREW (4)
(A118) REEL MOTOR SUP.
(H25) SCREW(4)
(MP34) SPACER (4)
(MP35) WASHER(2)
(H9) SCREW(2)
(A8) FILE PROTECT
BRKT. CABLE SUPT (MP16)
SCREW(4) (H11)
WASHER LOCK(4) (H19)
WASHER, FLAT(4) (H21)
CARDGUIDE (MP21)
(MP20) CARDGUIDE

A

SECTION A-A
REAR VIEW OF TOP PLATE

(MP5) BRACKET
(H3) SCREW(3)

(A26) MA-SPRING
(H3) SCREW(2)
2PLCS

(A111) COMPLIANCE ARM, SUPPLY
(H1) SCREW (3)

(MP13) BRACKET
(H3) SCREW(3)

(MP15)

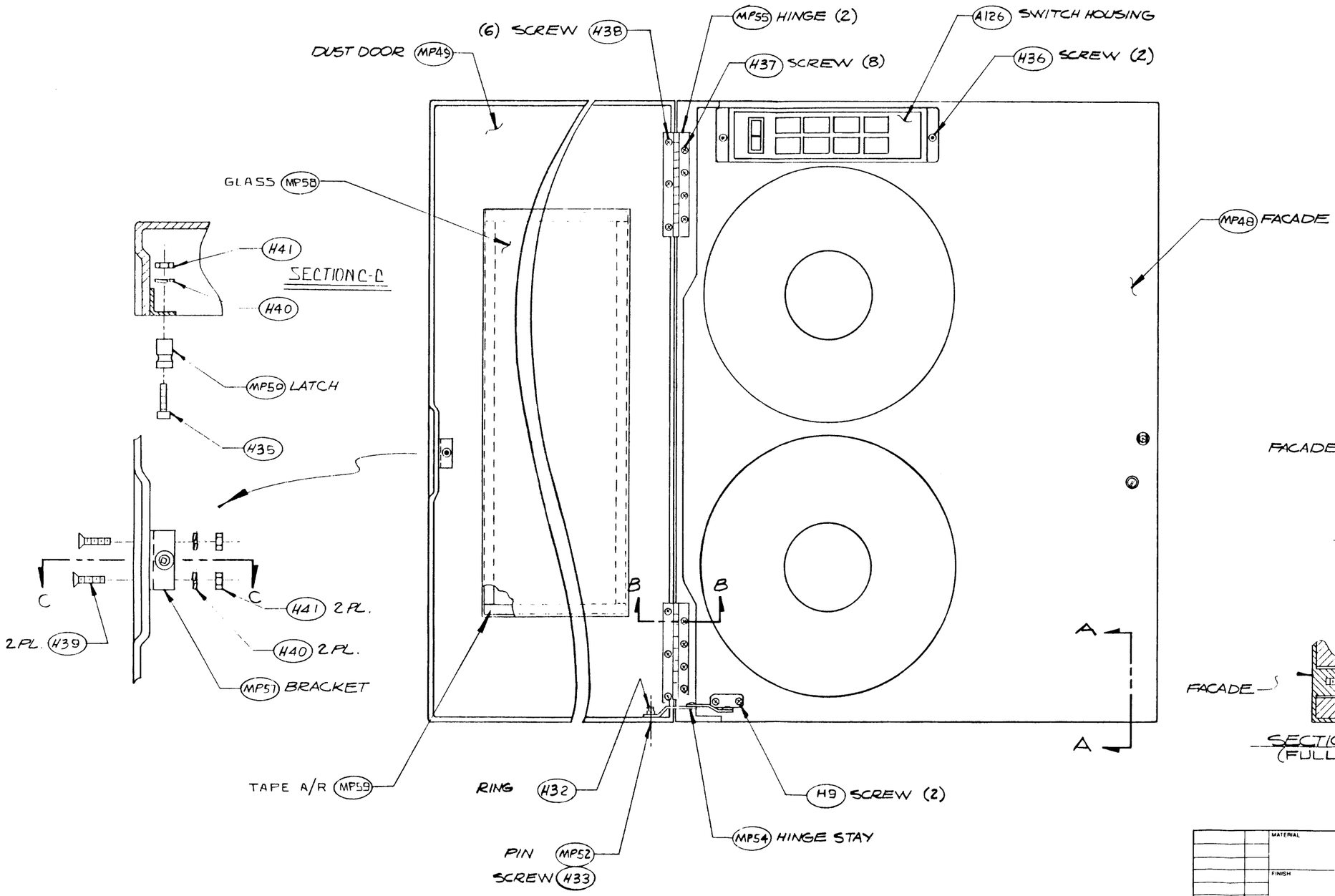
2PLCS { (MP33) WASHER, SHLDR, (H11) SCREW, (H21) WASHER, FLAT }

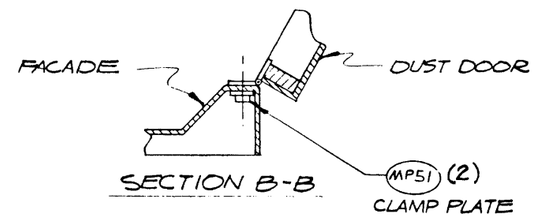
MP1 & MP2 SLIDERS
A114 MOTOR SHAFT & ARM REF
(MP9) SPACER
(H21) WASHER △9
(H12) SCREW △6
A115 RETRACTOR

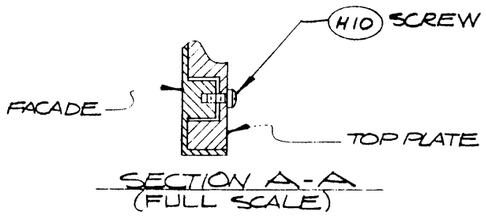
SECTION CC

MATERIAL		CONTRACT NO	
FINISH		DRAWN K. MITCHELL	INNOVATIVE DATA TECHNOLOGY, SAN DIEGO CA. USA
		CHK'D	TITLE
		PROJ ENG	MECHANICAL ASSY TOP PLATE
		DESIGN RELEASE	
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .03 INCH; X.XX MM ± 0.25 MM, X.X MM ± 0.8 MM; DO NOT SCALE DRAWING	DWG SIZE: CODE IDENT 56031, DWG/PART NO 117-9900-1050, REV X2, SCALE 1/4 = 1, MODIF, SH 2 OF 4
SIMILAR TO/MAKE FROM			

REVISIONS			
LTR	DESCRIPTION	DATE	APPV
X1		2/14	







NEXT ASSY	USED ON	MATERIAL	CONTRACT NO
SIMILAR TO/MAKE FROM		FINISH	R.WALKER 8-83

UNLESS OTHERWISE SPECIFIED
UNITS ARE: XXX = ± .010 INCH; XX = ± .03 INCH; XXX MM = ± 0.25 MM; XX MM = ± 0.8 MM
DO NOT SCALE DRAWING

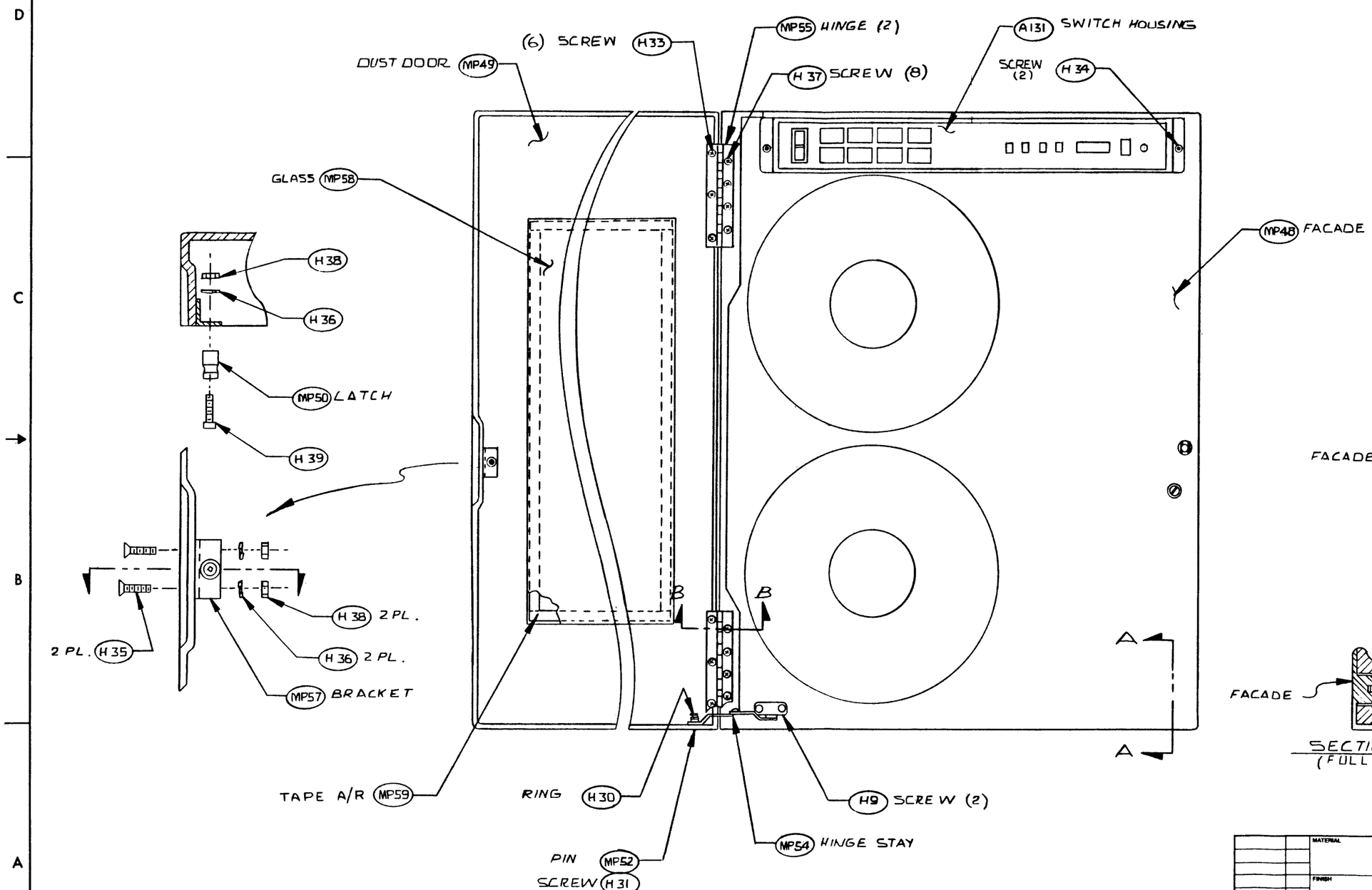
INNOVATIVE DATA TECHNOLOGY SAN DIEGO, CA. USA

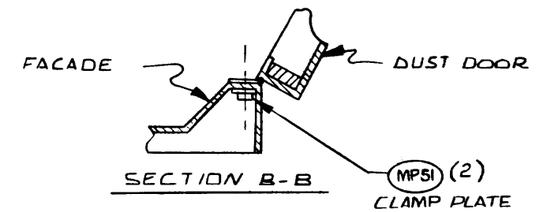
TITLE: MECHANICAL ASSY TOP PLATE

DWG SIZE	CODE IDENT	DWG/PART NO.	REV
D	56031	117-9900-0	

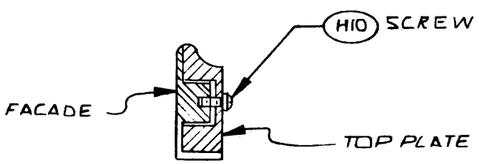
SCALE 1/2 | MODEL 1050/1750 | SH 3 OF 4

REVISIONS			
LTR	DESCRIPTION	DATE	APPV.





SECTION B-B



SECTION A-A
(FULL SCALE)

MATERIAL		CONTRACT NO.	INNOVATIVE DATA TECHNOLOGY, SAN DIEGO, CA., USA
		DRAWN K. MITCHELL 2/16/84	
FINISH		CHECK	TITLE: MECHANICAL ASSY TOP PLATE
		PROJ ENG	
		DESIGN RELEASE	
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED: UNITS ARE XXX = INCH, XX = INCH; TOLERANCES ARE ± .010 INCH, ± .05 INCH; XXX MM ± 0.25 MM; XX MM ± 0.1 MM; DO NOT SCALE DRAWING	DWG SIZE: D; CODE IDENT: 56031; DWG/PART NO: 117-9900-0; REV
SIMILAR TO/MAKE FROM			SCALE 1/2; MODEL 1050/1750; SH 4 OF 4

SECTION X
SERVICE BULLETINS/ APPLICATION NOTES

10.1 INTRODUCTION

This section is designed as a filing location for a continuing series of marketing and service bulletins designed to establish and maintain communications between Innovative Data Technology and its customers and dealers.

These bulletins will be published as required. They will be sequentially numbered for easy identification and reference, and punched for a three ring loose-leaf binder.

SECTION X
SERVICE BULLETINS/ APPLICATION NOTES

10.1 INTRODUCTION

This section is designed as a filing location for a continuing series of marketing and service bulletins designed to establish and maintain communications between Innovative Data Technology and its customers and dealers.

These bulletins will be published as required. They will be sequentially numbered for easy identification and reference, and punched for a three ring loose-leaf binder.

SECTION XI
SPARE PARTS LIST
SERIES 1050

SERIES 1050 SPARE PARTS LIST

IDT P/N	DESCRIPTION
	Electronic Assembly
11-00273-0 11-00200-0	Main Electronic Board (replaces 11-00075 or 11-00035)
11-000273-1	Main Electronic Board (12½ ips)
11-00003-0	I/O Board for 1051
11-00090-0	I/O Board for 1052
11-00025-0	I/O Board for 1053
11-00092-0	I/O Board for 1054
11-00266-0	I/O Board for 1054 (Special)
11-00023-0	4050 Formatter Board
11-00032	Control Switch Panel Assembly (pushbutton type)
11-10121-0	Control Switch Panel Assembly (membrane type)
11-10034-0	AC Power Supply Assembly
10-00204-0	DC/DC Converter Assembly (48VDC)
11-10115-0	DC/DC Filter Assembly (48VDC)
11-00026-0	Retractor Motor Sensor Assembly
11-00028-0	EOT/BOT Sensor Assembly
11-00029-0	File Protect Sensor Assembly
11-00034-1	Compliance Arm Sensor Assembly - Take-up
11-00034-2	Compliance Arm Sensor Assembly - Supply
11-00271	I/O Board Cts - Special for 1051/CTS
	Electronic Components
80-00437	Microprocessor - 3870
23-0006	Crystal -4MHz
24-40007	Fuse 8 AMP (AGC-8)
24-40012	Fuse 6¼ AMP (3AG-SB)
24-40010	Fuse 5 AMP (AGC-5)
24-40014	Fuse 3 AMP (3AG-SB) - For 220/240 VAC
24-10004	Lamp - For Pushbutton Switches
50-02002	LED - For Membrane Switches
24-10003	Lamp - For Compliance Arm Sensor
24-10001	Lamp - (GE682) - Older type BOT/EOT sensor
24-10009	Lamp - (GE680) - Standard type BOT/EOT sensor
50-01001	Photo-transistor - For BOT/EOT Sensor
49-00008	P1087E FET Transistor
49-00006	RCA 8203/2N6666 Transistor

49-20001	2N 4124 Transistor
49-20002	2N 4126 Transistor
49-20009	2N 6386 Transistor
49-20010	2N 6052 Transistor
49-20011	2N 6059 Transistor
49-20021	2N 4398 Transistor
70-00002	LM 317K Voltage Regulator
70-00003	LM 320K - 15/7915 Voltage Regulator
70-00023	UA78H15 Voltage Regulator (older boards only)
70-00062	7815 Voltage Regulator
70-00004	LM324 IC Op-Amp
70-00005	LM339 IC Op-Amp
70-00008	MC1437 IC Op-Amp
70-00056	SD5002 IC (Replacement for SD5000/5001)
49-00004	Rectifier, MDA 980-1
80-00257	74S240 IC (Formatter)
15-30001	Capacitor 32,000 MFD/25V
15-30014	Capacitor 83,000 MFD/15V
	Prog. Proms - For Formatter (each location)
45-00003	Relay - K1 (on Main Electronic Board)

Mechanical Components

99-00007	Tape Cleaner
12-10014-0	Crossfeed Shield
11-10088-0	9 Track Head-on Plate Assembly
11-10067-0	7 Track Head-on Plate Assembly
14-00096	Guide Cover
14-00097	Head Cover
11-10085-00	Dust Door - For older pushbutton switch type door
14-20371	Dust Door - For membrane switch type door
11-10087-00	Facade - For older pushbutton switch type
14-00368	Facade - For membrane switch type
11-10030-0	Roller Guide Assembly (Top Plate)
11-10031	Roller Guide Assembly (Compliance Arm)
12-30002-0	Cable Assembly - Read Head
12-30003-0	Cable Assembly - Write Head
14-10011-01	Capstan Sleeve
99-00058	Capstan Motor, Only
12-30123-0	Capstan Cable Assembly

11-10037-0	Reel Motor Assembly - Take-up (with Cable)
11-10047-0	Reel Motor Assembly - Supply (with Cable)
99-00002	Reel Motor Only For Take-up/Supply
11-10048-0	Reel Hub Assembly - Take-up
11-10046-0	Reel Hub Assembly - Supply
14-00185	Flipper for Supply Hub
14-00190	Compression Rubber Band for Supply Hub
11-10043-0	Retractor Motor Assembly with Sensor Board
11-10040-1	Compliance Arm Assembly with Sensor - Take-up
11-10040-2	Compliance Arm Assembly with Sensor - Supply
11-10056-0	Transformer Assembly
11-10049-0	Rack Mount Hardware
28-23005	Facade Door Spring-Clip
11-10096-0	Shipping Frame
60-34001	AC Power Cord

Miscellaneous

00-10001	Series 1050 Manual (Pushbutton switch type)
00-10053	Series 1050/1750 Manual (Membrane switch type)
00-10003	4050 Formatter Manual
00-10023	IPS 2600 Controller/Interface Manual
11-10110-0	FDTE Test Exercizer 1054/1754
11-10136-0	FDTE Test Exercizer 1054/1754/T4000

Interfaces/Couplers

11-00255-1	IPS System Controller - CPU (Std Buffer)
11-00256-1	GPIB (IEEE-488) Personality Module
11-00258-1	SCDR (RS-232C) Personality Module
11-00259-1	BDL (RS-232C) Personality Module
11-00260-1	DB (Centronics Conn.) Personality Module
11-00264-1	SCSI (Small Comp. Sys. Interface) Personality Module
11-00270-1	RDL (RS-232C) Personality Module
11-40086-01	ASCII to EBCDIC Code Conv. for Above
11-00268-2	Parallel I/O Coupler for IBM-PC or XT
11-00268-1	Parallel I/O Coupler for IBM-PC or XT with Code Conv.
11-00236-0	GPIB (IEEE-488) Coupler for APPLE II
11-00217-0	GPIB (IEEE-488) Coupler for APPLE III
11-00268-0	GPIB (IEEE-488) Coupler for IMB-PCor XT
11-00134-0	Datum/Wangco Interface
11-00193-0	TI-990 DX-10 Interface (IDT)
	TI-990 DX5-7-10 Interface with Cables (Custom Systems)
10-00234	INTEL MULTIBUS - TM08 Interface (Ciprico)
10-00223	Coupler UNIBUS TM-11
10-00220	Coupler UNIBUS TS-11
10-00222	Coupler Q-BUS TM-11
10-00221	Coupler Q-BUS TS-11
10-00237-0	Coupler w/Cables for Data General-ECLIPSE/NOVA

NOTE: All couplers/interfaces are WITHOUT cables unless noted.

SECTION XII
SPARE PARTS LIST
1750 SERIES

RECOMMENDED FIELD REPLACEMENT SPARE PARTS LIST — 1750 SERIES

IDT P/N	DESCRIPTION	QTY FOR 1-3 SYSTEMS
11-00240-0	Main Electronic Board	1
11-00023-0	4050 Formatter (for 1753-1754)	1
11-00003-0	I/O Board (for 1751)	
11-00090-0	I/O Board (for 1752) Only 1 type req.	1
11-00025-0	I/O Board (for 1753)	
11-00092-0	I/O Board (for 1754)	
11-00239-0	Active Compliance-Arm Driver Board	1
11-00028-0	EOT/BOT Sensor Assembly	1
11-00029-0	File Protect Sensor Assembly	1
11-10043-0	Retractor Motor Assembly with Sensor	1
11-10120-1	Motorized Compliance Arm Assembly -Take-up	1
11-10120-2	Motorized Compliance Arm Assembly -Take-up	1
99-00052	Reel Motor - Take-up/Supply	1
99-00003	Capstan Motor without Cable	1
14-00185	Flipper - For Supply Hub	1
14-00190	Compression Rubber Band - For Supply Hub	1
11-10121-0	Control Switch Panel Assembly	1
24-40007	Fuse - 8 AMP (AGC-8)	2
24-40012	Fuse - 6¼ AMP (3AG-SB)	2
24-40010	Fuse - 5 AMP (AGC-5)	2
24-40014	Fuse - 3 AMP (3AG-SB) 220/240 VAC only	2
—	Interface/Coupler (if applicable)	1
—	Cables for Above (if applicable)	1

IDT P/N	DESCRIPTION
	Electronic Assembly
11-00240-0	Main Electronic Board
11-00003-0	I/O Board - For 1751
11-00090-0	I/O Board - For 1752
11-00025-0	I/O Board - For 1753
11-00092-0	I/O Board - For 1754
11-00266-0	I/O Board - For 1754 (Special)
11-00023-0	4050 Formatter
11-10034-1	AC Power Supply Assembly
10-00204-0	DC/DC Converter Assembly (48VDC Only)
11-10115-0	DC/DC Filter Assembly (48VDC Only)
11-00239-0	Active Compliance Arm Driver Board
11-00026-0	Retractor Motor Sensor Assembly
11-00028-0	EOT/BOT Sensor Assembly
11-00029-0	File-Protect Sensor Assembly
	Electronic Components
80-00437	Microprocessor (3870)
23-00006	Crystal - 4MHz
24-40007	Fuse 8 AMP (AGC-8)
24-40012	Fuse 6¼ AMP (3AG-SB)
24-40010	Fuse 5 AMP (AGC-5)
24-40014	Fuse 3 AMP (3AG-SB) for 220/240 VAC
24-10009	Lamp (GE680) - For BOT/EOT Sensor
50-02002	LED - For Control Panel Switch Assembly
50-01001	Photo-Transistor - For BOT/EOT Sensor Assembly
49-00008	P1087E FET Transistor
49-00006	RCA 8203/2N6666 Transistor
49-20001	2N 4124 Transistor
49-20009	2N 4126 Transistor
49-20010	2N 6052 Transistor
49-20011	2N 6059 Transistor
49-20021	2N 4398 Transistor
70-00002	LM 317K Voltage Regulator
70-00003	LM 320K-15/7915 Voltage Regulator
70-00062	7815 Voltage Regulator
70-00004	LM324 IC Op-Amp
70-00005	LM339 IC Op-Amp

70-00008	MC1437 IC Op-Amp
70-00056	SD5002 IC
49-00004	Rectifier, MDA 980-1
80-00257	74S240 IC (Formatter)
15-30001	Capacitor 32,000 MFD/25V
15-30014	Capacitor 83,000 MFD/15V
	Prog. Proms - For Formatter (each location)
45-00003	Relay - K1 (Main Electronic Board)
45-00001	Relay - K1 (Active Compliance Arm Driver Board)
11-10122-01	Fan Assembly - 24VDC
11-10122-0	Fan Assembly - 115VAC

Mechanical Components

99-00007	Tape Cleaner
12-10014-0	Cross Feed Shield
11-	9 Track Head-on Plate Assembly
14-00096	Guide Cover
14-00097	Head Cover
14-20371	Dust Door
14-00368	Facade
11-10030-0	Roller Guide - Top Plate
11-10071-0	Roller Guide - Compliance Arm
14-10458	Capstan Sleeve
99-00003	Capstan Motor - Only (Microswitch)
99-00052	Reel Motor, Only (Supply or Take-up)
11-10137-0	Reel Hub Assembly - Take-up
11-10046-0	Reel Hub Assembly - Supply
11-10037-1	Reel Motor Assembly - Take-up (with Cable)
11-10047-1	Reel Motor Assembly - Supply (with Cable)
11-10043-0	Retractor Motor Assembly with Sensor Board
14-00185	Flipper - For Supply Hub
14-00190	Compression Rubber Band - For Supply Hub
11-10120-1	Motorized Compliance Arm Assembly - Take-up
11-10120-2	Motorized Compliance Arm Assembly - Supply
11-10123-0	Transformer Assembly
11-10049	Rack Mount Hardware
28-23005	Facade Door Spring-Clip
11-10096-0	Shipping Frame
60-34001	AC Power Cord

Miscellaneous

00-10053	1050/1750 Maintenance and Operations Manual
00-10003	4050 Formatter Manual
00-10023	IPS-2600 Controller/Interface Manual
11-10110	FDTE Test Exercizer

Interfaces/Couplers

10-00223	Coupler UNIBUS TM-11
10-00220	Coupler UNIBUS TS-11
10-00222	Coupler Q-BUS TM-11
10-00221	Coupler Q-BUS TS-11
10-00234	Intel MULTIBUS - TM08 (Ciprico)
10-00237	Coupler for Data General, ECLIPSE/NOVA*
	Coupler for TI-990, DX5-7-10*
11-00255	IPS System Controller - CPU (Standard Buffer)
11-00256	GPIB (IEEE-488) Personality Module
11-00260	DB (Centronic Conn.) Personality Module
11-00264	SCSI (Small Computer Sys. Interface) Personality Module
11-40086-01	ASCII to EBCDIC Code Converter for Above Pers. Modules

NOTE: All interfaces/couplers are WITHOUT cables except *

APPENDIX A
GLOSSARY OF TERMS

A

ALT	Arm Limit
ANSI	American National Standard Institute

B

BOT	Beginning of Tape
bpi	Bits per inch
bpi-NRZI	Bits per inch-Non-Return to Zero-Inverted
bpi-PE	Bits per inch-Phase Encoded
BTS	Beginning Tape Status

C

CAPN	Capstan Normal
CAPR	Capstan Rewind
CER	Corrected error indication line
CCG	Check Character Gate
CMDI	Capstan Motor Driver Input
COS ±	
CPU	Central Processing Unit
CRCC	Cyclic Redundancy Check Character
CRS	Clear Rewind Status
CSA	Canadian Standards Association
CWR	Clear Write Register

D

DEC	Density Command
DEN	Density
DES	Density Status
DDI	Data Density Indication
DDS	Data Density Select
DIP	Dual-in-line Package

E

ECMA	Electronic Computer Manufacturers Association European Computer Manufacturers Association
EIA	Electronic Industries Association
ENB	Enable
EOT	End of Tape
ETS	End of Tape Status

F

FAD	Formatter Address Line
FPS	File Protect Status
FRC	Fail-Safe Relay Command

FSR	Fail-Safe Relay
FWD	Forward Command
FWD	Forward
FWDA	Forward Analog

G

GCR	Group Coded Recording
GO	Motion Command

H

HATL	Half Arm Travel Limit
HER	Hard error indication line
HIDEN	High Density
HIT	High Threshold

I

IBG	Interblock Gap
IBM	International Business Machine
ID-Burst	Identification Burst
I/O	Input/Output
IPS	Inches Per Second
ISO	International Standards Organization
ISV	Instantaneous Speed Variations

J

K

L

LED	Light Emitting Diode
LDP	Load Point
LODA	Load Analog
LOL	Load On Line
LOT	Low Threshold
LRCC	Longitudinal Redundancy Check Character
LSP	Low Speed Status

M

MET	Medium Threshold
MO	Motion
MUX	Multiplex

N

NRS	NRZI Status
NRZ	NRZI mode indication
NRZI	Non-Return to Zero-Inverted

O

OFC	Off-Line-Command
OFL	Off-Line
OLS	On-Line Status
ONC	On-Line Command
ONL	On-Line
OVRWT	Overwrite
OVW	Overwrite

P

PC or PCB	Printed Circuit Board
PE	Phase Encode

PEMO	Phase Encode Mode
PEMOA	Phase Encode Mode Analog
POCL	Power-On-Clear Pulse
PROM	Programmable Read Only Memory
PSU	Program Storage Unit

Q

R

RAM	Random Access Memory
RDN	Retractor Down (Position)
RD0-7	Read Data Lines
RDP	Read Data Parity
RDS	Read Data Strobe
RDS	Ready Status
RDX	Ready
REC	Reverse Command
REV	Reverse
REVA	Reverse Analog
RETMA	Radio Electronics Television Manufacturing Assoc.
RING	File Protect Ring
ROM	Read-Only Memory
RMR	Retractor Motor Run
RRDY	Read Ready
RRST	Read Reset
RTH1	Read Threshold 1
RTH2	Read Threshold 2
RUP	Retractors Up
RVP	Retractors Up (Position)
RSB	Read Strobe
RWC	Rewind Command
RWD	Rewind or Rewinding
RWDA	Rewind Analog
RWS	Rewind Status

S

SFC	Synchronous Forward Command
SGL	Single Gap
SLT	Select
SMDI	Supply Motor Drive Input
SRC	Synchronous Reverse Command
STPA	Stop Analog
SWD	Set Write Data
SWR	Set Write Register
SWS	Set Write Status

T

TAD	Transport Address Line
TH	Threshold
TK	Track
TMDI	Take-Up Motor Driver Input
TRD	Test Read
TRK	Track
TWD	Test Write Data
TWS	Test Write Strobe

U

UL ..... Underwriters Laboratory, Inc.
ULP ..... Unload Position

V

W

WARS ..... Write Reset Status
WD ..... Write Data
WDC ..... Write Data Command
WD0-7 ..... Write Data Lines
WDP ..... Write Data Parity
WDS ..... Write Data Strobe
WEC ..... Write Enable Command
WRC ..... Write Reset Command
WRS ..... Write Reset
WRT ..... Write Enable

X

Y

Z