PERKIN-ELMER

HIGH PERFORMANCE TAPE DRIVE (HPTD) CONTROLLER

Installation and Maintenance Manual

47-028 R00

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TABLE OF CONTENTS

CHAPTERS (Continued)

FIGURES

TABLES

DRAWINGS

PREFACE

This manual provides the technician with the information necessary to install and maintain the High Performance Tape Drive (HPTD) Controller.

Chapter 1 provides an introduction and general information for the controller. Chapter 2 describes the installation of the controller, including unpacking, power requirements, configuration, strap options, and testing. Chapter 3 describes the operation and maintenance of the controller.

The following related manuals provide additional detailed information on the controller and the magnetic tape units and formatters:

MANUAL TITLE	PUBLICATION NUMBER
Magnetic Tape Unit Maintenance Manual (STC)	47-024
Formatter Control Unit Maintenance Manual (STC)	47-026
32-Bit Systems User Documentation Summary	50-003
High Performance Tape Drive (HPTD) Programming Manual	50-009
Magnetic Tape Unit Maintenance Manual (TELEX)	51-001
Formatter Control Unit Maintenance Manual (TELEX)	51-002

For further information on the contents of all Perkin-Elmer 32-bit manuals, see the 32-Bit Systems User Documentation Summary.

CHAPTER 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

The High Performance Tape Drive (HPTD) Controller provides the interface between a Perkin-Elmer Series 3200 selector channel (SELCH) and the formatter of either a TELEX or Storage Technology Corporation (STC) magnetic tape unit (MTU).

1.2 SCOPE

This manual describes the requirements of the controller and the functional operation of the tape subsystem. The configuration for the tape subsystem is shown in Figure 1-1.

1.3 SYSTEM COMPONENTS

The subsystem components are a 3200 SELCH, HPTD controller, formatter, and from one to four MTUs. The controller will be interfaced to a 3200 SELCH. This provides direct program control of the controller with standard Perkin-Elmer I/O instructions and direct access to memory via the extended direct memory access (EDMA) bus.

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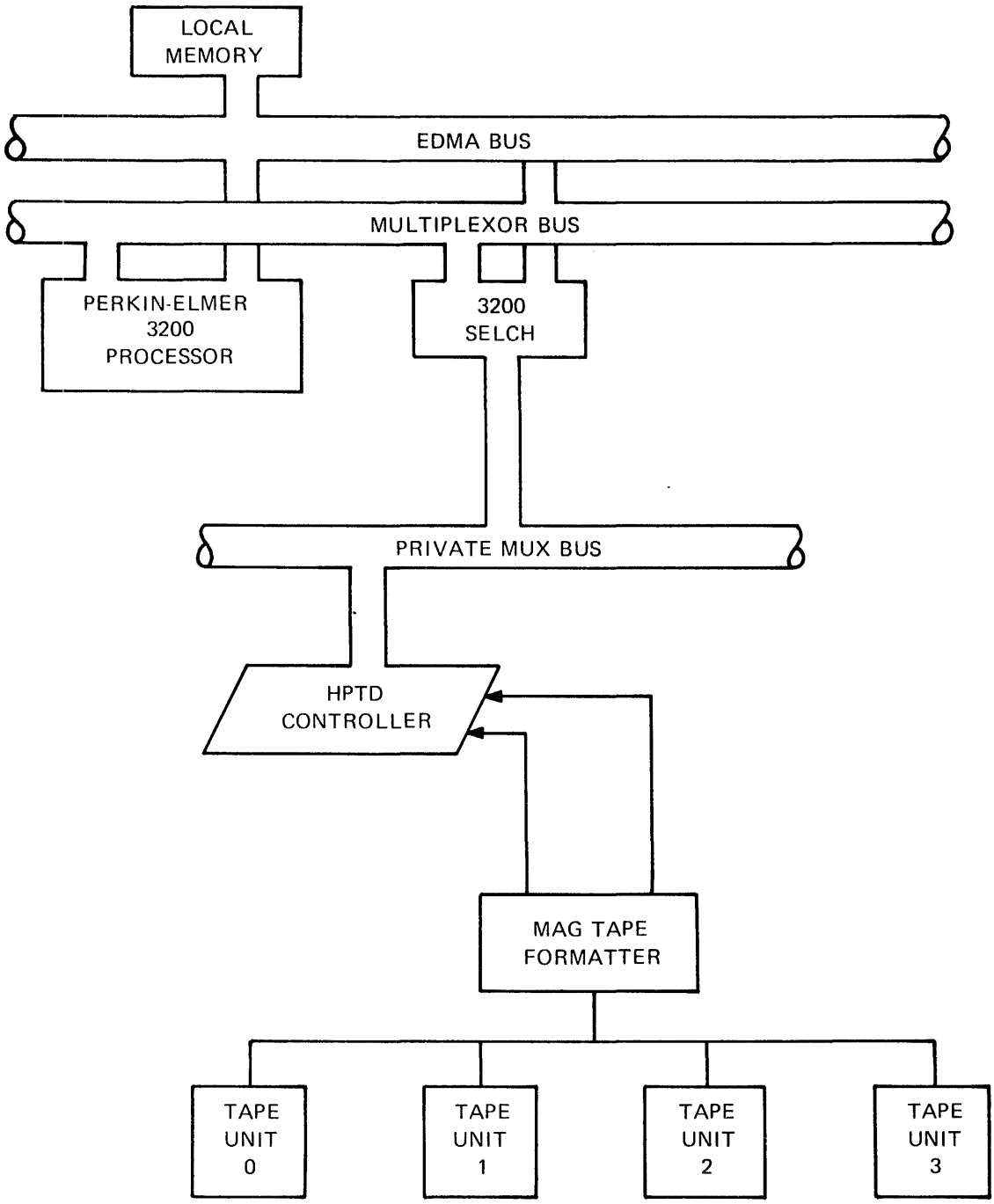


Figure 1-1 Tape Subsystem Block Diagram

CHAPTER 2
INSTALLATION

2.1 MECHANICAL ASSEMBLY

The HPTD controller consists of:

- 1 each 35-820 15-inch printed circuit controller
- 2 each 17-411M01 interconnecting cable between formatter control unit (FCU) and controller
- 1 each NRZI/PE/GCR encoded formatter
- One to four MTUs

2.2 UNPACKING

There are no special instructions for unpacking the 35-820 controller. However, proper care is necessary when handling tape units or formatters.

2.3 POWER REQUIREMENTS

All tape units and formatters are normally equipped for 120 V at 60 Hz. For 240 V at 50 Hz operation, a wiring change is required in the power supply of the formatter and tape units.

2.4 SYSTEM CONFIGURATION

The magnetic tape controller can be installed in any standard 15-inch I/O slot of a Perkin-Elmer 3200 Series processor or expansion chassis. RACK0/TACK0 must be removed between pins 122 and 222 on side 1 of the backpanel of the selected slot where the controller resides. The controller device addresses are normally set up for X'85', X'95', X'A5', and X'B5'. If a set other than the default value is desired, the hexadecimal address switches as locations 05M and 07M must be altered. See Functional Schematic 35-820D08.

2.5 STRAP OPTIONS

Tape strap options:

1. TELEX option - Remove strap 14K10 to 14K72
2. STC option - Add strap 14K10 to 14K72

For normal data transfer protocol to and from the 3200 SELCH:

1. Remove strap 00R-19 to 00R-02
2. Remove strap 00R-19 to 00R-01
3. Remove strap 00K-10 to 00K-72
4. Strap backpanel pin 224-1 of 3200 SELCH slot to pin 224-1 of controller slot

For new protocol data transfer to and from the 3200 SELCH and controller not under an I/O switch:

1. Strap 00K-10 to 00K-72
2. Strap 00R-19 to 00R-02
3. Strap backpanel pin 225-1 of 3200 SELCH slot to pin 225-1 of controller slot
4. Strap backpanel pin 224-1 of 3200 SELCH slot to pin 224-1 of controller slot
5. Strap backpanel pin 124-1 of 3200 SELCH slot to pin 124-1 of controller slot

For new protocol data transfer to and from the 3200 SELCH and controller under an I/O switch:

1. Strap 00K-10 to 00K-72
2. Strap 00R-19 to 00R-01
3. Strap backpanel pin 225-1 of 3200 SELCH slot to pin 225-1 of I/O switch 'A' slot
4. Strap backpanel pin 224-1 of 3200 SELCH slot to pin 224-1 of I/O switch 'A' slot

5. Strap backpanel pin 124-1 of 3200 SELCH slot to pin 124-1 of I/O switch 'A' slot

6. Strap backpanel pin 225-1 of I/O switch 'B' slot to pin 225-1 of controller slot

7. Strap backpanel pin 224-1 of I/O switch 'B' slot to pin 224-1 of controller slot

8. Strap backpanel pin 229-1 of I/O switch 'B' slot to pin 229-1 of controller slot

The error condition RDOVRN will be disabled unless SBSYO is connected to the controller at the backpanel. To enable this signal, connect jumper pin 224-1 of the SELCH slot to 224-1 of the magnetic tape interface. If operating under an I/O switch, connect jumper pin 224-1 of the I/O switch 'B' to 224-1 of the controller, and pin 224-1 of the 3200 SELCH slot to 224-1 of the I/O switch 'A' slot.

2.6 TESTING

Load test program 06-263 and run the tests as described in test program description 06-263A15.

CHAPTER 3
OPERATION AND MAINTENANCE

3.1 INTRODUCTION

This chapter provides the information necessary to maintain the HPTD controller. Included are block diagram analysis, controller timing, functional operation, control lines, and functional schematic analysis.

3.2 FORMATTER INFORMATION

The 1935 FCU is a self-contained electronics package for interfacing the controller and from 1 to 4 STC Model 1900 Series MTUs. The FCU is capable of formatting information in NRZI, PE, and GCR formats at speeds of 125 inches per second (IPS) during read and write modes.

The 1935 FCU, when operated in the 1935 magnetic tape system, will read and write ANZI compatible 9-track tapes.

3.3 TAPE UNIT SELECTION

The controller always responds to four sequential addresses. If the hexadecimal address switches at locations 05M and 07M are set up for address X'80', the controller will respond to addresses X'85', X'95', X'A5', and X'B5'. Each address selects a different tape unit as shown in Table 3-1.

TABLE 3-1 TAPE UNIT ADDRESSES

ADDRESS				TAPE UNIT SELECTED
X'0X'	X'4X'	X'8X'	X'CX'	TU 0
X'1X'	X'5X'	X'9X'	X'DX'	TU 1
X'2X'	X'6X'	X'AX'	X'EX'	TU 2
X'3X'	X'7X'	X'BX'	X'FX'	TU 3

X = don't care

It should be noted that the controller address switch at location 05M is designed to respond to four sequential addresses to the interface, but the most significant four bits of that address should be 0, 4, 8, or C. This is shown in Table 3-1.

Once a tape unit has been selected (flip-flop at 01R), it stays addressed until another tape unit is selected.

3.4 CONTROLLER OPERATION

A block diagram of the controller is shown in Figure 3-1. At the top of the figure is the private multiplexor (PMUX) bus, which interfaces to the 3200 SELCH with 16 bits of data and 12 control signals. At the bottom of the figure is the controller bus, which interfaces to the FCU with 8 bits of data, a parity bit, 15 control signals, and 9 bits of multiplexed error status. Data transfers, whether written from the processor or read from the controller bus, are loaded into the first-in/first-out (FIFO) memory via the input multiplexor.

Commands to the controller are stored in latches on the controller. When a motion-type command is issued - for example, Forward File - the controller stores this command and asserts START. The FCU upon receiving a START accepts the desired command and asserts FBUSY, which in turn resets START. The command process is carried out by the FCU until completed, FBUSY is reset, and ready status (RDYS) is set. No motion (NMTN) set signifies that the tape unit is stopped and ready for another command. Overlapping commands are not allowed and are ignored. The one exception is a rewind operation. During a rewind, FBUSY is asserted until the command is accepted. Operation to other tape units is allowed approximately 150ns after FBUSY is reset on rewinds.

During write-type operations, the controller calculates and sets the parity bit for odd parity and sends it with eight bits of data onto the controller bus. When a halfword of data reaches the FIFO output, the controller sends a delayed START signal to the FCU, which in turn causes the FCU to request data from the controller. The controller sends the data, a byte at a time, until the FIFO is empty. In read operations, the controller signals the processor of available data via the busy status bit. Parity is checked by the parity checker and the formatter during read operations.

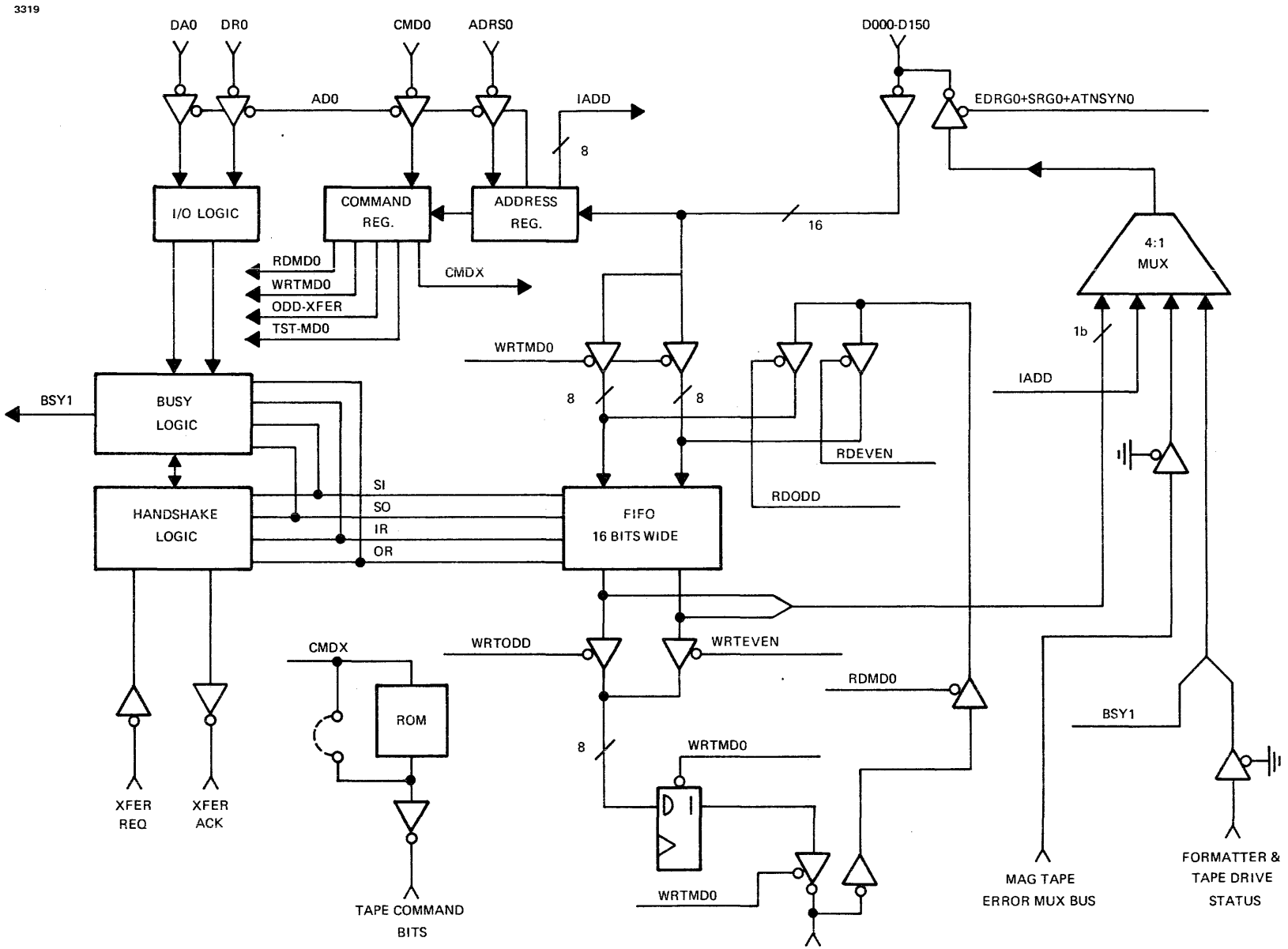


Figure 3-1 High Performance Tape Drive (HPTD) Controller Block Diagram

3.5 CABLE CONNECTIONS

There are two cables required to connect the STC formatter to the controller. See Figure 3-2. FCU Connector A4 is cabled with a 17-411M01 to interface Connector 4, and FCU Connector B4 is cabled with a 17-411M01 to interface Connector 3.

One double cable is used to connect the TELEX formatter to the controller. On one end of this cable, there are two 60 position connectors labeled Connector 3 and Connector 4. These connectors plug into the front edge of the controller. The other end of the cable has three 50 position D-type connectors labeled Connector I.O.-1, Connector I.O.-2, and Connector I.O.-3. Plug Connector I.O.-1 into the formatter connector labeled I.O.-1, Connector I.O.-2 into I.O.-2, and Connector I.O.-3 into I.O.-3. See Figure 3-3.

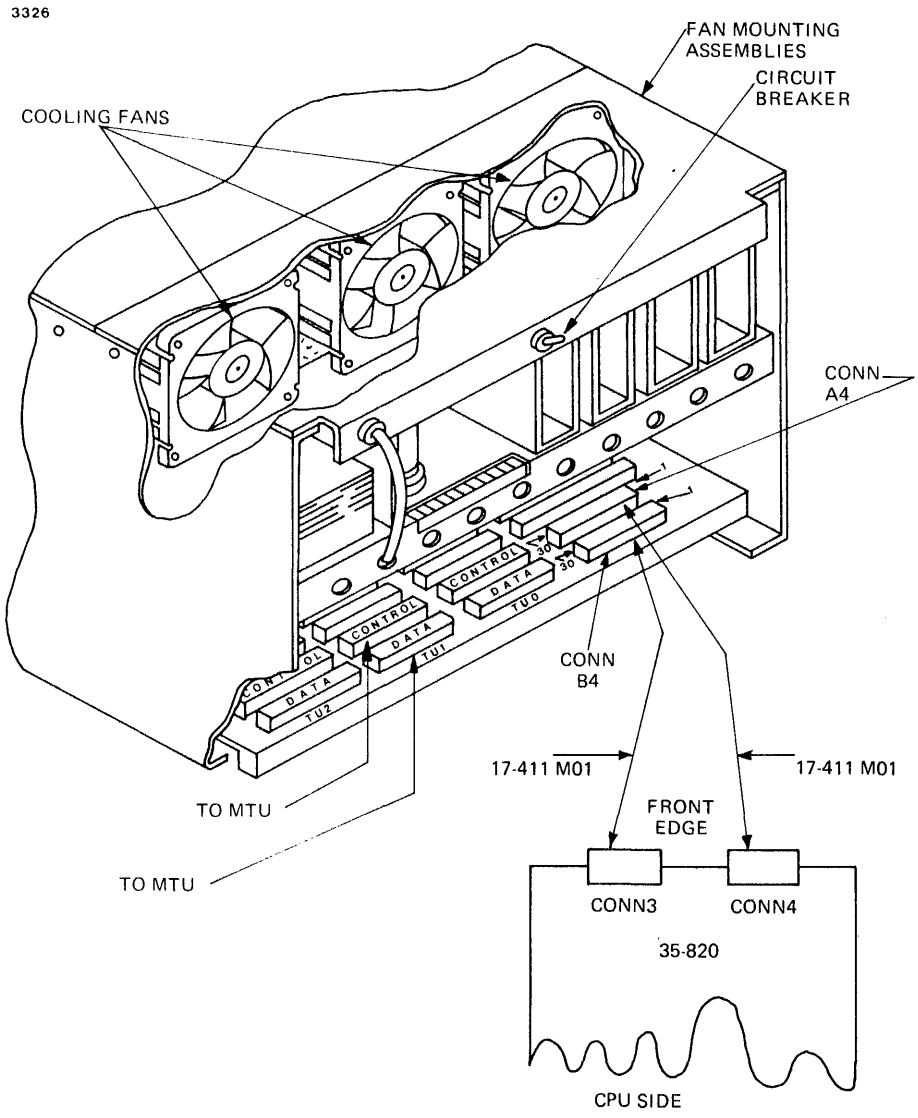


Figure 3-2 STC Formatter Physical Configuration

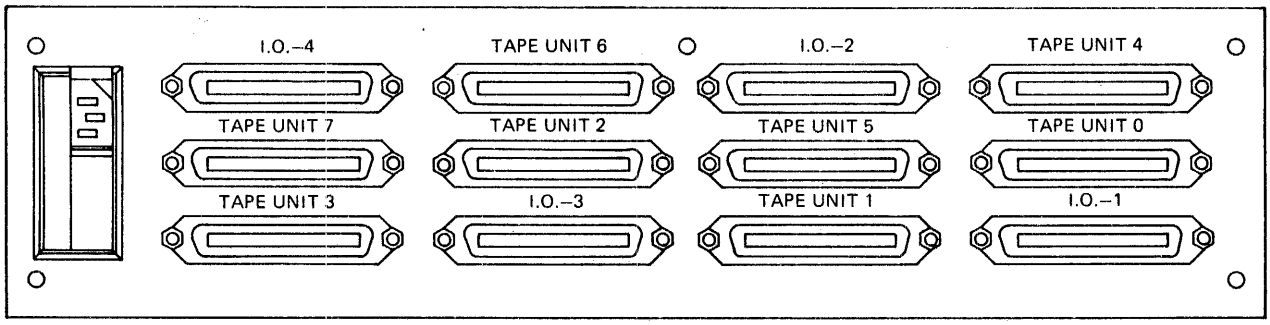


Figure 3-3 Connector Panel Detail for the TELEX Formatter

The I/O signals for the STC controller are shown in Tables 3-2 and 3-3.

External I/O adapter connections for the TELEX formatter are given in Table 3-4.

TABLE 3-2 INPUT SIGNALS FOR THE STC CONTROLLER

DESCRIPTION	MNEMONIC	NO.	FCU CONNECTOR SIGNAL PIN	FCU CONNECTOR GROUND PIN	TERMINATION RESISTANCE LOCATION
MTU Address 0	AD0	A4	A01	B01	FCU
MTU Address 1	AD1	A4	A02	B02	FCU
Command Select 0	CMD0	A4	A04	B04	FCU
Command Select 1	CMD1	A4	A04	B04	FCU
Command Select 2	CMD2	A4	A05	B05	FCU
Command Select 3	CMD3	A4	A05	B06	FCU
Density Select 0	DS0	A4	A07	B07	FCU
Initiate Command	START	A4	A08	B08	FCU
Terminate Command	STOP	A4	A09	B09	FCU
Transfer Acknowledge	TRAK	A4	A10	B10	FCU
Bi-Directional Data P	DATA-P	A4	A11	B11	BOTH
Bi-Directional Data 0	DATA-0	A4	A12	B12	BOTH
Bi-Directional Data 1	DATA-1	A4	A13	B13	BOTH
Bi-Directional Data 2	DATA-2	A4	A14	B14	BOTH
Bi-Directional Data 3	DATA-3	A4	A15	B15	BOTH
Bi-Directional Data 4	DATA-4	A4	A16	B16	BOTH
Bi-Directional Data 5	DATA-5	A4	A17	B17	BOTH
Bi-Directional Data 6	DATA-6	A4	A18	B18	BOTH
Bi-Directional Data 7	DATA-7	A4	A19	B19	BOTH
System Reset	RESET	A4	A20	B20	BOTH
Select Multiplex 0	SLX0	A4	A21	B21	FCU
Select Multiplex 1	SLX1	A4	A22	B22	FCU
Density Select 1	DS1	A4	A23	B23	FCU
Select Multiplex 2	SLX2	A4	A24	B24	FCU

TABLE 3-3 OUTPUT LINES FROM THE STC CONTROLLER

DESCRIPTION	MNEMONIC	NO.	FCU CONNECTOR SIGNAL PIN	FCU CONNECTOR GROUND PIN	TERMINATION RESISTANCE LOCATION
Slave Status Change	SSC	A4	A25	B25	USER
Oscillator	OSC	A4	A26	B26	USER
End of Tape Status	EOTS	A4	A27	B27	USER
Beginning of Tape Status	BOTS	A4	A28	B28	USER
File Protect Status	FPTS	A4	A29	B29	USER
Rewinding Status	REWS	A4	A30	B30	USER
Error Multiplex-P	ERRMX-P	B4	A1	B1	USER
Error Multiplex-0	ERRMX-0	B4	A2	B2	USER
Error Multiplex-1	ERRMX-1	B4	A3	B3	USER
Error Multiplex-2	ERRMX-2	B4	A4	B4	USER
Error Multiplex-3	ERRMX-3	B4	A5	B5	USER
Error Multiplex-4	ERRMX-4	B4	A6	B6	USER
Error Multiplex-5	ERRMX-5	B4	A7	B7	USER
Error Multiplex-6	ERRMX-6	B4	A8	B8	USER
Error Multiplex-7	ERRMX-7	B4	A9	B9	USER
Formatter Busy	BUSY	B4	A10	B10	USER
Transfer Request	TREQ	B4	A11	B11	USER
Expecting Data	RECV	B4	A12	B12	USER
Identification Burst	ID BRST	B4	A13	B13	USER
Operation Incomplete	OP INC	B4	A14	B14	USER
End of Data Pulse	ENDATP	B4	A15	B15	USER
Tape Mark Status	TMS	B4	A16	B16	USER
Command Reject	REJECT	B4	A17	B17	USER
Overrun Status	OVRNS	B4	A18	B18	USER
Data Check	DATA CHK	B4	A19	B19	USER
ROM Parity Error	ROMPS	B4	A20	B20	USER
Corrected Error	CRERR	B4	A21	B21	USER
Block Sensed	BLOCK	B4	A22	B22	USER
NRZI Status	NRZI	B4	A23	B23	USER
Data Bus Parity Error	BUPER	B4	A24	B24	USER
Online Status	ONLS	B4	A25	B25	USER
High Density Status	HDENS	B4	A26	B26	USER
Ready Status	RDYS	B4	A27	B27	USER
Write Status	WRTS	B4	A28	B28	USER
Reserved		B4	A29	B29	
Reserved		B4	A30	B30	

TABLE 3-4 TELEX FORMATTER EXTERNAL I/O ADAPTER CONNECTIONS

SIGNAL	RETURN	DESCRIPTION
1/01-01	1/01-26	TU ADDRESS 0 (MSB)
1/01-02	1/01-27	TU ADDRESS 1
1/01-03	1/10-28	TU ADDRESS 2 (LSB)
1/01-04	1/01-29	COMMAND 0 (MSB)
1/01-05	1/01-30	COMMAND 1
1/01-06	1/01-31	COMMAND 2
1/01-07	1/01-32	COMMAND 3
1/01-08	1/01-33	COMMAND 4 (LSB)
1/01-09	1/01-34	DENSITY 0 (MSB)
1/01-10	1/01-35	DENSITY 1 (LSB)
1/01-11	1/01-36	RESERVE
1/01-12	1/01-37	FORMATTER BUSY
1/01-13	1/01-38	COMMAND CLOCK
1/01-14	1/01-39	REJECT STATUS
1/01-15	1/01-40	LOAD POINT (BOT)
1/01-16	1/01-41	END-OF-TAPE
1/01-17	1/01-42	ONLINE
1/01-18	1/01-43	READY
1/01-19	1/01-44	FILE PROTECT
1/01-20	1/01-45	ROM PARITY ERROR
1/01-21	1/01-46	REVERSE
1/01-22	1/01-47	READ MODE
1/01-23	1/01-48	WRITE MODE
1/01-24	1/01-49	REWINDING
1/01-25	1/01-50	ERASE MODE
1/02-01	1/02-26	DATA 0 (MSB)
1/02-02	1/02-27	DATA 1
1/02-03	1/02-28	DATA 2
1/02-04	1/02-29	DATA 3
1/02-05	1/03-30	DATA 4
1/02-06	1/02-31	DATA 5
1/02-07	1/02-32	DATA 6
1/02-08	1/02-33	DATA 7 (LSB)
1/02-09	1/02-34	DATA P
1/02-10	1/02-35	INPUT BUS ENABLE
1/02-11	1/02-36	DATA BUSY
1/01-12	1/02-37	DATA REQUEST
1/02-13	1/02-38	DATA ACKNOWLEDGE
1/02-14	1/02-39	LAST BYTE
1/02-15	1/02-40	REWINDING OR NOT READY

TABLE 3-4 TELEX FORMATTER EXTERNAL I/O ADAPTER CONTROLLER (Continued)

SIGNAL	RETURN	DESCRIPTION
1/02-16	1/02-41	OVERRUN
1/02-17	1/02-42	ERROR
1/02-18	1/02-43	CORRECTED ERROR
1/02-19	1/02-44	ID BURST
1/02-20	1/02-45	DATA DENSITY 0 (MSB)
1/02-21	1/02-46	DATA DENSITY 1 (LSB)
1/02-22	1/02-47	FILEMARK (TAPE MARK)
1/02-23	1/02-48	SYSTEM RESET
1/02-24	1/02-49	DATA PARITY ERROR
1/02-25	1/02-50	ODD BYTE
1/03-01	1/03-26	NOT USED
1/03-02	1/03-27	ERROR 0
1/03-03	1/03-28	ERROR 1
1/03-04	1/03-29	ERROR 2
1/03-05	1/03-30	ERROR 3
1/03-05	1/03-31	ERROR 4
1/03-07	1/03-32	ERROR 5
1/03-08	1/03-33	ERROR 6
1/03-09	1/03-34	ERROR 7
1/03-10	1/03-35	ERROR STATUS CONTROL 0 (LSB)
1/03-11	1/03-36	ERROR STATUS CONTROL 1 (MSB)

3.6 INTERRUPT GENERATION

Interrupts are generated on the following signal transitions:

DU 0 ----> 1

NMTN 0 ----> 1

BUSY 1 ----> 0

ERR 0 ----> 1

TERR 0 ----> 1

- DU - A DEVICE UNAVAILABLE interrupt occurs if the device is taken offline.

- NMTN - NO MOTION interrupt occurs at the end of an operation involving the FCU and the tape drive. Conditions for NO MOTION to occur are: the drive must be online and ready, the formatter must not be busy, and the FIFO is empty when in the Read mode.

- BUSY - A BUSY interrupt occurs when data is presented on the FIFO outputs while the interface is in the Read mode and the absence of data is detected on the FIFO inputs while in the Write mode.

- ERR - An ERR interrupt occurs if either reject or data check status is asserted by the formatter.

- TERR - A TERR interrupt occurs if any of the following conditions exist:

  1. Formatter overrun

  2. Read parity error (in Non-gapless mode)

  3. Read overrun (in Non-gapless mode)

  4. Bus parity error (in Non-gapless mode)

  5. Write underflow

NOTE

ERR is inhibited until the formatter goes not busy or during gapless operations. The enabling and disarming of interrupts are under the control of a pair of D-type flip-flops (6M7-6M8). These flip-flops are controlled by the condition of data lines D081 and D091 during a command operation with data bit D121 set. Interrupt timing is shown in Figure 3-4.

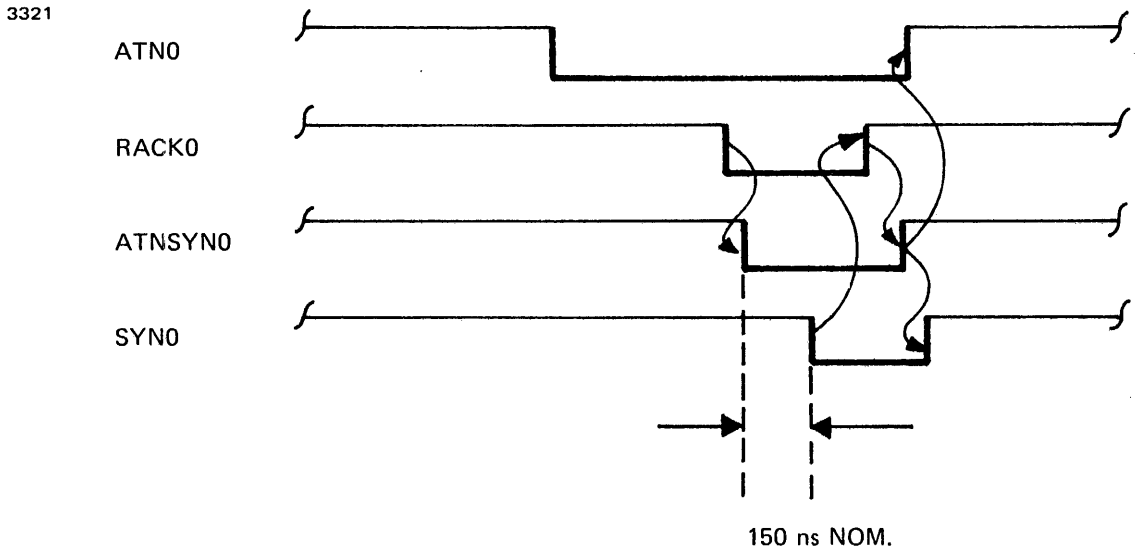


Figure 3-4 Interrupt Timing

3.7 COMMAND OPERATION

Two sets of control commands are used: Command 1 and Command 0. Command 1 is used to select tape density, Test mode, Gapless mode, enable/disable/disarm interrupts, clear the controller or FCU, set up the controller for Odd-Byte Write transfer, and to put the controller into the Byte-Read mode. A Command 1 occurs when an Output command instruction is issued to the controller with data bit D121 set in the command byte.

A Command 0 occurs when an Output command instruction is issued to the controller with data bit D121 reset in the command byte. Command 0 is used for FCU/tape motion operations such as Read, Write, Rewind, and Forward File. Command timing is shown in Figure 3-5.

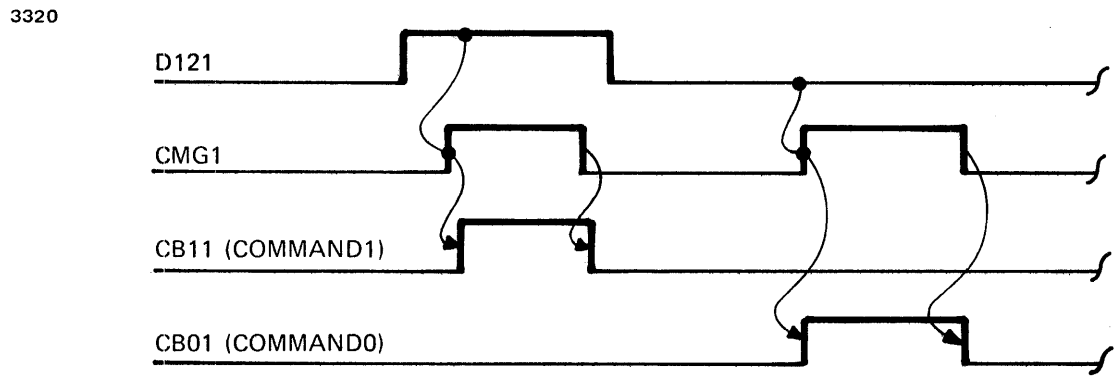


Figure 3-5 Command Timing

3.8 WRITE OPERATION

A write operation begins when a Write command is issued to the controller. Data bits D081, D091, D101, and D111 are latched in the Command 0 registers (3B5), then decoded by a 1 of 10 decoder (3D7) and a 3 to 8 decoder (3D8). The WRTMD0 signal goes low, enabling 16 bits of data (D001-D151) to the FIFO inputs (8B6,7,8), and 8 bits of data (MTDAT01-MTDAT71) to the FCU (5B2,3,4,5).

At this time, the FIFO is empty and the busy status (BSY1) is low, indicating that the FIFO is ready to accept a halfword of data from the host. When the host issues a write halfword, BSY1 sets, and the signals SIEVEN1 and SIODD1 go high to shift 16 bits of data into the FIFO.

When SIEVEN1 and SIODD1 go low, the data propagates through the FIFO until it reaches the FIFO outputs. The signal BOTHRDY1 indicates that data is available on the FIFO outputs. BOTHRDY1 is delayed for 1 microsecond to allow more data to fill the FIFO (3R7). At the end of the delay, START0 is sent to the FCU to begin the write-to-tape operation. The FCU issues TRFQ, which is latched to become LATREQ1 (5N7). If data is available at the output of the odd side of the FIFO (ORDYODD1) and LATREQ1 is active, then the one-shot (5G8) is triggered. The leading edge of SHFTPULS1 clocks the FIFO data into the output register (5B4, while the inverse of this signal clears the LATREQ1. After the trailing edge of SHFTPULS1, new data from the even side of the FIFO appears at the inputs of the output register. The second one-shot (5K8) is triggered at the trailing edge of SHFTPUIS1. This one-shot is used for data set up to the FCU and allows time for a correct condition to settle at the D-inputs of the D flip-flops at 5L8 and 5M6. A low condition causes a STOP pulse to be sent to the FCU with the intended last byte to be written on the tape. A high condition causes a transfer acknowledge (TRACK) to be sent to the FCU with each data byte to be written on the tape. For example, there is a halfword of data at the FIFO outputs: one byte even, one byte odd. The odd half is the first byte transferred to the FCU. If an Odd-Byte Write command was not issued before the Write command, the byte in the odd half of the FIFO would be sent to the FCU along with the signal TRACK, and then the byte in the even half of the FIFO would be sent to the FCU along with the signal STOP.

If an Odd-Byte Write command was issued before the Write command, the byte in the odd half of the FIFO would be sent to the FCU along with the signal STOP. The even byte is left in the FIFO, never to be transferred.

See Figures 3-6 and 3-7.

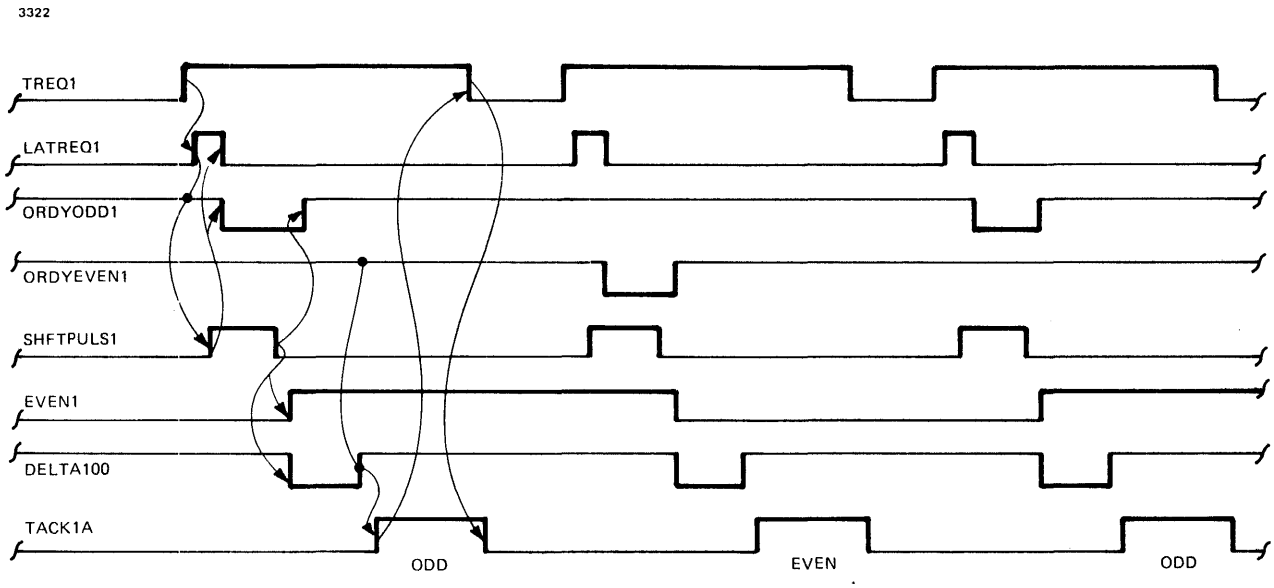


Figure 3-6 Typical Write Timing

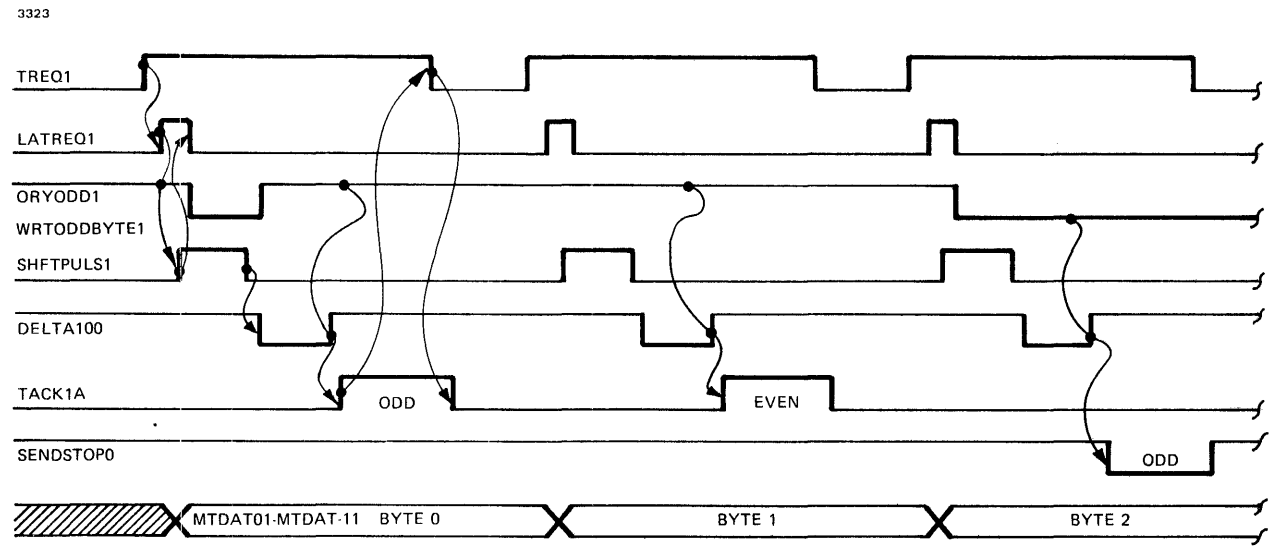


Figure 3-7 Odd-Byte Write Timing

3.9 READ OPERATION

See Figure 3-8. A read operation begins with a Read command to the controller. This command is latched in the Command 0 register (3B5), then decoded by the 1 of 10 decoder (3D7). The signals RDMD0 and RDMD1 allow the gating of 16 bits of data to the host and 8 bits of data from the FCU. START0 is sent to the FCU at the trailing edge of CB00. Formatter busy (FBSY1, 7C3) goes high, indicating that the FCU is processing the command. The FCU will present 8 bits of data on bus bits DOT000-DOT070, followed by a TREQ1. Data is clocked into the FIFO one byte at a time, beginning with the odd half of the FIFO.

If the corresponding input ready, even or odd, of the FIFO is active and a TREQ1 is present (6F3), then the shift in signal (SI1, 6H3) goes high. The signals ENBEVEN1 and ENBODD1 (6G4) gate SI0 to form the corresponding signals SIEVEN1 (6F5) and SIODD1 (6F6), shift in even and shift in odd, respectively. A halfword of data is assembled in the FIFO once two bytes are shifted in (one even, one odd). If the block read from the tape exhibits an odd number of bytes, then the interface generates a shift in signal in order to complete the last halfword to be sent to the host. This condition occurs if ENBEVEN1 is high, IRDYEVEN1 is high, SI0 is high, and LATEODATAP1 (latched-end of data pulse) is high. This means that if we are selecting the even half of the FIFO and the corresponding input is ready to accept data, and shift in is not active at the end of the data transfer of the FCU, then the signal LAST10 (last-one, 6N4) is generated. LAST10 causes the last data byte from the FCU to be shifted into the even half of the FIFO, thus assembling the last halfword to be sent to the host. This last halfword exhibits the most significant and least significant bytes equal.

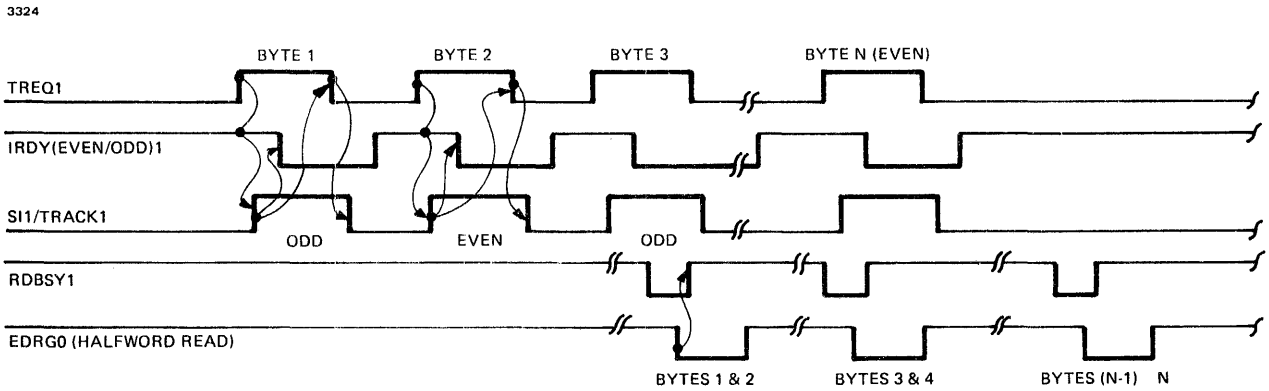


Figure 3-8 Read Timing

When a halfword of data is presented on the outputs of the FIFO, RDBSY1 (5H1) will go low. This is the busy status going to the host. The host then issues a data request (DR) to read the data. EDRG0 (5E1) sets RDBSY1, which remains set until the next halfword of data appears on the FIFO outputs.

3.9.1 Byte-Read Operation

The byte-read operation is the same as a normal read operation except:

1. All data from the FCU is shifted into the even half of the FIFO.

2. Either the board must be cleared by SCLR0 or given a Byte-Read Mode command before the command Read, to allow operation in the Byte-Read Mode (3C9).

3.10 STATUS AND COMMANDS

The following paragraphs describe status and commands.

3.10.1 Command Bytes

The controller has two command bytes, selected by bit 12. The controller responds to program command via the Output Command (OC) or Output Command Register (OCR) instructions. The command bytes and their definitions are discussed in the following paragraphs.

3.10.1.1 Command 1

8	9	10	11	12	13	14	15	
		DENSITY SELECT						
DIS	EN	DS1	DS0	1	X	X	X	
					0	0	0	Not Used
					0	0	1	CLR
					0	1	0	Gapless
					0	1	1	Odd Byte Transfer
					1	0	0	Test Mode
					1	0	1	Byte Read
					1	1	0	Not Used
					1	1	1	Not Used

- Bit 8 (DIS) - Disable: Allow queuing of interrupts without interrupting CPU.

- Bit 9 (EN) - Enables interrupts.

- Bits 8:9 (Disarm) - When bits 8 and 9 are both set, interrupts are not generated or queued.

- Bits 10:11 (Density Select) - During read or write operations off BOT, the controller reads or writes in the density selected as follows:

Bit: DS1	DS0	Density
0	0	PE
0	1	GCR
1	0	NRZI

- Bit 12 - Always one.

- Bits 13:14:15 - Bits 13, 14 and 15 are decoded to form the following commands:

X'X9' is the Clear command. This command initializes the controller and resets the FCU.

X'XA' is the Gapless Mode command. This command sets up the controller to operate in Gapless mode.

X'XB' is the Odd Byte Transfer command. This command, used only in the Write-To-Tape mode, notifies the controller that an odd number of bytes will be written to the tape.

X'XC' is the Test mode command. This command sets the controller to the Test mode. This mode is used for diagnostic purposes.

*X'XD' is the Byte-Read command. This command allows the controller to operate in Byte mode for the purpose of reading a tape via the autoload instruction.

3.10.1.2 Command 0

COMMAND SELECT					MUX ERROR		
CMD0	CMD1	CMD2	CMD3	0	MUX2	MUX1	MUX0
8	9	10	11	12	13	14	15

- Bit 8:11 (Command Select) - Selects one of sixteen commands that follow. Section 3.10.1.3 describes each command.

CMD0	CMD1	CMD2	CMD3	MNEMONIC	DESCRIPTION
0	0	0	0	NOP	NO-OPERATION
0	0	0	1	CLR	DRIVE CLEAR
0	0	1	0	DMS	DIAGNOSTIC MODE SET
0	0	1	1	SNS	SENSE DRIVE STATUS
0	1	0	0	RDF	READ FORWARD A BLOCK
0	1	0	1	RDB	READ BACKWARD A BLOCK
0	1	1	0	WRT	WRITE A DATA BLOCK
0	1	1	1	LWR	LOOP WRITE TO READ
1	0	0	0	BSF	BACKSPACE A FILE
1	0	0	1	BSB	BACKSPACE A BLOCK
1	0	1	0	FSF	FORWARD SPACE A FILE
1	0	1	1	FSB	FORWARD SPACE A BLOCK
1	1	0	0	WTM	WRITE A TAPE MARK BLOCK
1	1	0	1	ERG	ERASE A GAP
1	1	1	0	REW	REWIND TAPE TO BOT
1	1	1	1	RUN	REWIND AND UNLOAD TAPE

- Bit 12 - Always zero.
- Bit 13:15 (MUX Error) - Selects one of eight 9-bit registers, drive status bytes (DSB), to be multiplexed on the error multiplexor bus (ERRMX) output lines as follows. See Section 3.10.2 for a description of the DSBs.

STC (DSB)

MUX2	MUX1	MUX0	DSB	DESCRIPTION
0	0	0	0	DEAD TRACKS
0	0	1	1	READ/WRITE ERRORS
0	1	0	2	DIAGNOSTIC AIDS
0	1	1	3	DRIVE SENSE BYTE
1	0	0	4	CRD-F
1	0	1	5	RESERVED
1	1	1	6	RESERVED
1	1	1	7	RESERVED

MUX1	MUX0	DSB	DESCRIPTION
0	0	0	BYTE ZERO
0	1	1	BYTE ONE
1	0	2	BYTE TWO

3.10.1.3 Command Description (STC)

The following is a list of the commands and their descriptions for the MTU:

- No Operation (NOP) command - NOP command operations perform essentially no function. The FCU error status outputs do not change. The MTU status output lines change to those of the addressed MTU. FORMATTER BUSY is asserted only for a short time necessary to accept and process the command.

- Drive Clear (CLR) command - CLR resets the OVRNS, DATA CHK, REJECT, ID BRST, ROMPS, CRERR, BUPER and ERRMX status outputs if they are asserted from the previous operation. The MTU status output lines change to those of the addressed MTU. The MTU remains in online status if previously in that state.

- Diagnostic Mode Set (DMS) command - The DMS command causes the mode of operation within the FCU to be shifted from Functional mode to Diagnostic mode. Diagnostic mode to Functional mode transfer is accomplished when the controller issues a RESET input, or when the FCU automatically transfers mode after certain Diagnostic mode command sequences.

- Sense Drive Status (SNS) command - This command initiates the transfer of the various DSBs through the FCU and across the error MUX bus to the controller. Upon receiving an SNS command, the FCU signals the MTU and requests that the next DSB be placed on the controller. This DSB remains valid until the FCU is issued an NOP command. At this point, the FCU may be issued a CLR command to place DSB 0 on the error MUX bus and return the FCU to the idle mode or the FCU may be issued an SNS command to request the next DSB.

- Read Forward (RDF) command - The RDF command causes tape to be moved in the forward direction and the next block (only) to be read. Nondata characters of the block are detected, decoded, checked for validity, used for their specific purposes, but are not transferred across the controller. Data characters of the block are detected, decoded, checked for validity, corrected if appropriate and transferred serially across the controller. Data is transferred until end-of-data is detected or until STOP is asserted by the controller. Independent of the amount of data transferred, all characters within the block are checked for validity. Tape motion is then halted in the following interblock gap (IBG). Ending status signals reflect the validity check for the entire block.

- Read Backward (RDF) command - The same as for RDF except tape motion is backward and following the command tape is positioned in the IBG preceding (on the BOT side) of the data block.

- Write Data Block (WRT) command - The WRT command causes tape to be moved in the forward direction, the ending portion of the preceding IBG to be generated, the data block to be written, the data block to be read and checked for validity, and the beginning portion of the next IBG to be generated. The data block is written in the format as determined by the density status lines and switches.

  Nondata characters of the data block are automatically generated, encoded, formatted, and written. Data characters to be written are transferred serially across the interface, automatically encoded, formatted, and written.

- Loop Write to Read (LWR) command - The LWR command operation provides a means of testing the read and write data circuit paths within the FCU. Read signals are derived (looped) within the FCU from the write circuits. There is no tape motion and no MTU is required.

- Backspace a File (BSF) command - The BSF command causes tape to be moved backward, passing over data blocks encountered until a tape mark block is detected. Tape motion is halted in the IBG preceding (on the BOT side of) the tape mark. Tape mark status and block status are included in ending status and the operation is completed. No data characters are checked for validity or transferred across the interface. Block is not asserted for any data blocks passed over. For PE and GCR modes, a tape mark block is detected if the correct recording occurs in either Zone 1 or Zone 2 in conjunction with Zone 3 being correct. NRZI mode tape marks must have correct recording in all zones to be detected.

- Backspace a Block (BSB) command - The BSB command operation causes tape to be moved backward passing over data blocks until signaled to STOP by the user interface. When signaled to STOP, tape is positioned in the IBG preceding the last data block passed over. No data characters are checked for validity or transferred across the interface.

- Forward Space a File (FSF) command - Same as for BSF except tape motion is forward and, following the command, tape is positioned in the IBG following the tape mark block.

- Forward Space a Block (FSB) command - Same as for BSB except tape motion is forward and, following the command, tape is positioned in the IBG following the data block.

- Write a Tape Mark (WTM) command - The WTM command causes tape to be moved in the forward direction, the ending portion of a tape mark IBG to be generated, the tape mark block to be written, the tape mark block to be checked for validity, and the beginning portion of the next IBG to be generated. The tape mark block is written in the format as determined by the density status of the addressed MTU.

- Erase a Gap (ERG) command - The ERG command causes tape to be moved in the forward direction and a 3.6 inch nominal (PE or NRZI) or 3.4 inch nominal (GCR) section of tape to be erased. During the ERG operation, read checks are performed to verify that erasure has occurred. If read signals are detected, REJECT is asserted in ending status.

- Rewind Tape to BOT (REW) command - The REW command causes tape to move in the backward direction at rewind speed. Tape motion halts with tape position at BOT. BUSY is asserted only until the MTU accepts the REW command.

3.10.1.4 Command Description (TELEX)

The following is a list of commands and their descriptions for the TELEX MTU:

- No Operation (NOP) command - This command can be used to test the command handshake between the formatter and user's I/O adapter. The tape unit is not accessed by this command. Previous Status and Errors are not cleared by this command.

- CLEAR (CLR) command - This command causes all status to be cleared prior to setting FUBUSY. After setting FUBUSY, the formatter issues a sense reset command to the addressed TU, then updates tape unit status bits before dropping FUBUSY.

- Enable Diagnostic Mode (DIA) command - This command causes the tape subsystem to operate under diagnostic mode in conjunction with the diagnostic routines stored in the microprogram.

- Tape Unit Sense (TUS) command - This command has the same command select code as SNS for the STC formatter. This command functions the same as a Read command (RDF) except that five bytes of tape unit status are transferred instead of data. No tape motion occurs. See Section 3.10.2.12 for the details of tape unit status bytes.

- Read Forward (RDF) command - This command causes the selected tape drive to read the tape in the forward direction transferring data to the controller. Applicable drive and error status is reported.

- Read Reverse (RDR) command - This command causes the selected tape drive to read the tape in the reverse direction, transferring data to the interface. Applicable drive and error status is reported. A Read Reverse command at BOT or into BOT is rejected.

- Write (WRT) command - This command causes the selected tape drive, if not file protected, to write data on the tape at the density selected. A write command to a file protected drive will be rejected. A write operation only occurs in the forward direction. During write, the data is read and verified in the formatter. However, no data is transferred back to the computer adapter interface. Applicable drive and error status will be reported.

- Loop Write to Read #2 (LWR2) command - This command causes write data to be transferred through the formatter to the selected tape drive and back through the read data chain. No tape motion occurs during this command sequence. This command is terminated by the STOP signal.

- Reverse Space File (RSF) command - This command has the same command select code as BSF for the STC formatter. The command causes the selected tape drive to move reverse and stop in front of the next file mark. No data is transferred, however, file mark status is reported. When BOT is sensed, motion stops.

- Reverse Space Block (RSB) command - This command has the same command select code as BSB for the STC formatter. This command causes the selected tape drive to move reverse on block and stop in IBG. No data is transferred. When BOT is sensed, tape motion stops. A reverse space command at BOT or into BOT will be rejected.

- Forward Space File (FSF) command - This command causes the selected tape drive to move forward past the next file mark and stop. No data is transferred; however, file mark status is reported.

- Forward Space Block (FSB) command - This command causes the selected tape drive to move forward on block and stop in the interrecord gap. No data is transferred.

- Write File Mark (WFM) command - This command has the same command select code as WTM for the STC formatter. This command causes the selected tape drive to write an ANSI compatible file mark at the density selected. Successful completion of this operation is verified by the formatter and status reported to the controller. Other applicable drive and error status is also reported.

- Erase Three and One-Half Inch Gap (ERG) command - This command causes the selected tape drive to erase 3.5 inches of tape in the forward direction and then stop provided the drive is not file protected. No data is transferred; however, applicable drive and error status is reported.

- Rewind (RWD) command - This command has the same command select code as REW for the STC formatter. This command causes the selected tape drive to rewind to the load point (BOT) marker. The drive status indicates rewinding until BOT is sensed. Any command issued to a drive that is rewinding will be rejected.

- Rewind/Unload (RUN) command - This command causes the selected tape drive to rewind to the load point (BOT) marker and to then perform an unload sequence causing all tape to be wound onto the file reel, and if a cartridge is present, cause the cartridge to close. The drive status indicates NOT ON LINE and remains so until operator intervention.

3.10.2 Status Information

Status information is supplied in the following sections.

3.10.2.1 Status Byte

The controller status may be examined by the Sense Status (SS) instruction.

8	9	10	11	12	13	14	15
ERR	TERR	EOT	NMTN	BSY	EX	TMS	DU

NOTES

1. ERR and TERR bits are deferred until NMTN is set (NMTN=1).

2. The status byte reflects the current status of the selected MTU (last MTU addressed).

3. Each MTU has its own individual device address. Simultaneous operations can occur only if one MTU is rewinding, another is able to read or write.

- Bit 8 - Data error (ERR) - Set for the following data errors:

  1. MUX Byte 0, EMB0, see Section 3.10.2.4

  2. MUX Byte 1, EMB1, see Section 3.10.2.5

  3. MUX Byte 2, EMB2, see Section 3.10.2.6

- Bit 9 - Transfer error (TERR) - Set by the following transfer errors:

  1. Overrun, during a write operation, is set when TREQ/TRAK responses are not within timing requirements, or a STOP was not sent. During a read operation, overrun is set when controller is not accepting data characters at a high enough rate, or if any information remains in the FCU read buffer when the MTU is in the IBG.

  2. BUPER - indicates that an even parity data character was detected on the controller bus during a read or write operation. Data transmission is not halted for this error.

  3. FCU offline. Set in Diagnostic mode only.

  4. WUNFLW is set during a write operation indicating a STOP was sent to the formatter, but data was either detected at the controller output buffer or the processor was trying to write data to the controller without initiating a new command sequence.

  5. A 3200 SELCH read operation was terminated too early indicating SELCH read buffer parameters were not set up correctly.

  6. An even parity byte was detected during a read operation.

- Bit 10 - End of tape status (EOT) - Set when tape is positioned at the physical reflector markers BOT or EOT.

- Bit 11 - No motion (NMTN) - Set when the tape motion has stopped and the the FCU is in the idle state (ready to accept any valid command). All output commands given when NMTN=0 are ignored.

- Bit 12 - Busy (BSY) - Set when controller is not ready for a SELCH transfer. Reset when controller is ready for a SELCH transfer.

- Bit 13 - Examine (EX) - Set when one or more of the high order bits (ERR, TERR, or NMTN) have been set. Interrupts the processor if interrupts are enabled.

- Bit 14 - Tape mark status (TMS) - Set when tape is positioned on a tape mark block. Reset at the next motion command or clear.

- Bit 15 - Device unavailable (DU) - Set when FCU is offline.

3.10.2.2 Status Halfwords

When the read halfword has been given to the controller, a halfword of status consisting of error MUX bytes (EMB) and controller status is transferred to the user software. Depending upon which EMB has been requested, the halfword status is as shown in the following paragraphs. Note that bits 0-8 reflect the EMB from the FCU while bits 9-15 are a combination of FCU status and controller status. The upper bits were added to give the user a means by which they could more easily decipher STATUS BYTE information and FCU status. A discussion of the ERRMUX BYTES and upper halfword status information follows.

Note that the device status halfword of the STC tape drive is different from the device status halfword of the TELEX tape drive.

1. NOP COMMAND - with appropriate MUX byte.

2. READ HALFWORD - will read status halfword.

3. NOP COMMAND - with next MUX byte.

4. READ HALFWORD - will read status halfword.

3.10.2.3 Device Status Halfword (STC)

The following paragraphs describe the STC device status halfword. See Table 3-5.

3.10.2.4 EMB0 - Dead Tracks

- Bit 0:8 - Phase errors or dead tracks - If Sense Drive Status command is selected, then the FCU gates out phase errors for each track. If Sense Drive Status is not selected, then the byte contains dead track status during a read or write operation. A dead track is caused by low amplitudes on the MTU sense amps or at the start of each new command.

3.10.2.5 EMB1 (ERRMUX) Read/Write Errors

- Bit 0 - Write tape mark check (WTM CHK) - The FCU has been unable to cause a tape mark to be written correctly.

In PE or GCR mode, DATA CHK is also asserted when Zone 1 and Zone 2 in conjunction with Zone 3 do not meet tape mark requirements. REJECT is also asserted when Zone 1 or Zone 2 in conjunction with Zone 3 do not meet tape mark requirements.

In NRZI mode, DATA CHK is also asserted whenever a tape mark is incorrectly written.

- Bit 1 - Uncorrectable error (UCE) - An uncorrectable error has been detected. This error may occur during PE or GCR read or write commands. DATA CHK is also asserted.

- An uncorrectable error during NRZI mode operation is indicated by the assertation of DATA CHK and bits DTP, DT6, and DT7 of the dead track register.

- During NRZI mode operation, UCE is asserted during Write commands to indicate excess skew in the record just written.

- Bit 2 - Partial record (PART REC) - An IBG is detected before detecting the end of data characters. This error may occur during PE or GCR Read or Write commands. DATA CHK is also asserted.

- Bit 3 - Multiple track error (MTE) - Two or more tracks are detected in error. This error may occur during PE or GCR Read or Write commands. DATA CHK may also be asserted. During NRZI read or write operations, this line indicates an LRC error.

- Bit 4 - Not used

- Bit 5 - End of data check (END DATA CHECK) - The end of data characters are not detected, or the preambles and postambles do not meet format requirements. This error may occur during PE or GCR Read or Write commands. DATA CHK is also asserted.

- Bit 6 - Velocity error (VEL ERR) - The MTU speed indication was outside acceptable limits. This error may occur during PE, GCR or NRZI Write commands. DATA CHK is also asserted.

- Bit 7 - Diagnostic mode latch (DIAG MODE LTCH) - The Diagnostic mode of operation has been set in the FCU.

- Bit 8 - Cyclic redundancy character error (CRC ERR) - The internal checks of data character CRC registers indicate a loss of data integrity. This error may occur during Read or Write commands during PE, GCR or NRZI operations. DATA CHK is also asserted.

3.10.2.6 EMB2 - Diagnostic A/D Bits

MUX Byte 2

Bit 8 is the digital tachometer (TACH) from the drive and contains information concerning tape speed and distance. This line is used in certain diagnostic routines and is valid during commands as well as after the command is completed.

The following REJECT CODES are asserted on Bits 7 through 0 under their defining conditions. The REJECT code is the hexadecimal equivalent of Bits DA7 through DA0 with Bit DA7 being most significant and Bit DA0 being least significant. REJECT CODES and descriptions follow.

REJECT CODE	DESCRIPTION
01XX	The addressed MTU is not in Ready Status.
02XX	The FCU has detected on of its internal microprogram words having wrong parity.
03XX	The TRAK responses to initiating TREQs were not received within 75 milliseconds on a write-type command.
04XX	The FCU has detected an unimplemented word in its internal microprogram.
05XX	The addressed MTU is in File Protect Status when a write-type command is attempted.
06XX	The addressed MTU did not go to Erase Status only.
09XX	The MTU does not have NRZI capability and was unable to read a PE or GCR ID-BURST during either a read operation or during a read check after writing the ID-BURST. The MTU does have NRZI capability and was unable to read a PE or GCR ID-BURST during a read check after writing the ID-BURST.

3.10.2.7 EMB3 - Drive Sense Byte 0

- Bit 0 - EOT STAT - When set, the addressed MTU is positioned on or past the EOT reflective marker.
- Bit 1 - BOT STAT - When set, the addressed MTU is positioned at the BOT reflective marker.
- Bit 2 - WRT INHB - When set, the addressed MTU is not up to write speed.
- Bit 3 - FILE PROT - When set, the addressed MTU does not contain a write enable ring.
- Bit 4 - BKWD STAT - When set, the addressed MTU is in the process of rewinding its tape to BOT.
- Bit 5 - HI DEN - This line is decoded along with the NRZI status line to indicate the recording format (density in which the FCU is operating). In order to properly read the density of a tape, a Forward Record command should be issued so the formatter can decode the tape ID-BURST and assert the proper density status.

STATUS LINES

HI DENS	NRZI	MODE
0	0	PE
0	1	NRZI
1	0	GCR
1	1	GCR

- Bit 6 - RDY STAT - When set, the addressed MTU has its tape loaded and is not rewinding.
- Bit 7 - ON LINE STAT - When set, the addressed MTU is online. An MTU may be online when it is not ready.
- Bit 8 - WRT STAT - When set, the addressed MTU is in the Write mode.

3.10.2.8 EMB4 - CRC BYTE

Bits 0:8 contain the contents of the CRC-B generator and is used in certain STC diagnostic tests of NRZI mode operation.

3.10.2.9 EMB5:7

Not used.

3.10.2.10 Halfword Status (Upper Byte)

As mentioned previously, upper halfword status information is returned to the software along with error MUX information. As indicated in Tables 3-5 and 3-6, the upper byte is essentially the same no matter which EMB is requested. Since Bit 05 (HI DENS) and Bit 09 (NRZI) are normally used in conjunction, EMB3 is most suited with upper halfword status information.

- Bit 09 - NRZI (STC) - When Bit 09 is set and Bit 05 (HI DEN) of EMB 3 is reset, addressed MTU is set at the NRZI recording density. If Bit 09 is reset and Bit 05 (HI DEN) is reset, the recording density is PE.
- Bit 10 - Slave status change (SSC) STC only - This line is asserted by the FCU to indicate that one or more MTUs have either gone online, gone offline, or gone from not ready to ready. SSC is reset after all MTUs that had one of these status changes has been issued any command except NOP.

- Bit 10 - Data density 0 (DDS 0) TELEX

DDSO	NRZI	
0	1	800 bpi
0	0	1600 bpi
1	0	6250 bpi

- Bit 11 - Block status (BLOCK) - This is set during a forward or backward space block operation when a block status is detected from the FCU. It is reset at the next Command 0, or on a clear to the controller.

- Bit 12 - ODDBYTE - This is set when a transfer ends on an odd byte boundary. It is reset on the next command or a clear to the controller.

- Bit 13 - WRITE UNDERFLOW - This is another condition that sets TERR.

- Bit 14 - BUS PARITY error - One of the conditions for TERR. It is duplicated here to help the user separate it from other error conditions that may set TERR.

- Bit 15 - READ OVERRUN - Set during a SELCH read operation when the FIFO buffer is not empty and the read operation has been terminated.

TABLE 3-5 DEVICE STATUS HALFWORDS (STC)

	ERROR MUX STATUS									UPPER STATUS BYTE						
P-E DATA BUS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(EMB) ERROR MUX BYTE 0 DEAD TRACKS	DT 7	DT 6	DT 5	DT 4	DT 3	DT 2	DT 1	DT 0	DT P	NR ZI	SS C	BL OC K	ODD BYTE	WRITE UNDER FLOW	BUS PARITY	READ OVER RUN
(EMB1) READ/WRITE ERRORS	WTM CHK	UCE	PART RFC	MTE	NOT USED	END DATA CHECK	VEL ERR	DIAG MODE LTCH	CRC ERR	Same as above						
(EMB2) DIAGNOSTIC AID BITS	DA 7	DA 6	DA 5	DA 4	DA 3	DA 2	DA 1	DA 0	A	Same as above						
(EMB3) DRIVE SENSE BYTE 0	EOT STAT	BOT STAT	WRT INHB	FILE PROT	BKWD STAT	HI DEN	RDY STAT	ON LINE STAT	WRT STAT	Same as above						
(EMB4) CRC-F BYTE	CRC 7	CRC 6	CRC 5	CRC 4	CRC 3	CRC 2	CRC 1	CRC 0	CRC P	Same as above						
EMB5	Reserved															
EMB6	Reserved									Same as above						
EMB7	Reserved															

TABLE 3-6 DEVICE STATUS HALFWORDS (TELEX)

DATA BITS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(EMB0)	EQUIP FAIL TU	EQUIP FAIL FCU	NOISE	FILE MARK ERR	SAGC	MULTI TRACK	VRC	NOT CMPT	0	NRZI	DDSO	BLOCK	ODD BYTE	WRITE UNDER FLOW	BUS PARITY	READ OVER RUN
(EMB1)	CRC	SKEW	LOST BOB	PART REC	POST ERR	PREMB ERR	ENVLP CHECK	LRC	0	Same as above						
(EMB2)	DEAD TRACK	IBG OVFLW	NO DATA	LOOP OUT	ERASE WRITE FAIL	TACH FAIL	VELOC CHECK	ID CHECK	0	Same as above						
(EMB3)	DEAD TRACK 7	DEAD TRACK 6	DEAD TRACK 5	DEAD TRACK 4	DEAD TRACK 3	DEAD TRACK 2	DEAD TRACK 1	DEAD TRACK 0	0	Same as above						

3.10.2.11 TELEX Drive Sense Bytes

This section describes the TELEX Sense Bytes.

EMB0:

- Bit 7 - Not compatible - Indicates an 800 bpi tape is installed to be read on a 6250/1600 bpi drive or 6250 bpi tape is installed to be read on 1600/800 bpi drive or the drive is not capable of writing in the commanded density.
- Bit 6 - I/O bus vertical redundancy check (VRC) - Indicates a parity error on data bytes transferred on the data bus during a read or write operation.
- Bit 5 - Multi-track error - Indicates the number of tracks in error exceeds the error correction capability. This is set by 1 or more dead tracks in 1600 bpi write and 2 or more dead tracks in 6250 bpi write and 1600 bpi read, and 3 or more tracks in error in 6250 bpi read operation.
- Bit 4 - Set auto gain control (SAGC) check - Indicates that the read circuits have been unable to set the read gain to the proper level while reading the ARA burst.
- Bit 3 - File mark error - Indicates the file mark was not detected properly.
- Bit 2 - Noise - Indicates data is detected during an erase operation or data is detected during the erase portion of a write tape mark.
- Bit 1 - Equipment fail formatter - Indicates the formatter has failed or is malfunctioning. This is set if microprogram parity error occurs of if various parity errors in the data path occur out of sequence.
- Bit 0 - Equipment fail tape drive - Indicates the drive has failed or is malfunctioning. This is set by IBG overflow or tape unit fail. ID-BURST check, tape mark check, or velocity check in write operation also sets this bit.

EMB1:

- Bit 7 - Longitudinal redundancy check (LRC) - Indicates LRC error has been detected in 800 bpi operation.
- Bit 6 - Envelope check - Indicates that one or more tracks have fallen below a preset level. During a 1600 bpi write operation, this also sets error status.
- Bit 5 - Preamble error - Indicates that there is a preamble error in 1600 or 6250 bpi operation. The error is either too few bytes or the ones marker is missing.

- Bit 4 - Postamble error - Indicates that there is a postamble error in 1600 or 6250 bpi operation. The error indicates either too many bytes or the ones marker is missing.

- Bit 3 - Partial records - Indicates that an IBG is detected before the end of data.

- Bit 2 - Lost beginning of block - Indicates that BOB is lost during begin block time in 1600 or 6250 bpi operation.

- Bit 1 - Skew - Indicates excessive skew is detected on 6250 or 1600 bpi write or read operation.

- Bit 0 - Cyclical redundancy check (CRC) - Indicates that a CRC error was detected in 6250 or 800 bpi operations or in 1600 bpi write operation.

EMB2:

- Bit 7 - ID burst check - Indicates the 6250 or 1600 bpi ID - BURST is not written correctly or in 6250 bpi mode the ARA burst or its ID cannot be read.

- Bit 6 - Velocity check - Indicates that speed variation during write is beyond tolerance.

- Bit 5 - Tach fail - Indicates that tach pulses have not been received from the tape drive within a preset time.

- Bit 4 - Erase/write current failure - Indicates that one of these currents is not present when it should be, or is present during read.

- Bit 3 - Loopout - Indicates the tape loop has crossed the loopout sensor in the vacuum column.

- Bit 2 - No data read/word count zero - Indicates that no data was detected in read or that no data was transferred in a write operation.

- Bit 1 - IBG overflow - Indicates that an excessive IBG count was detected.

- Bit 0 - Dead track/track in error status track P.

EMB3:

- Bit 7 - Dead track/track in error status track 0

- Bit 6 - Dead track/track in error status track 1

- Bit 5 - Dead track/track in error status track 2

- Bit 4 - Dead track/track in error status track 3
- Bit 3 - Dead track/track in error status track 4
- Bit 2 - Dead track/track in error status track 5
- Bit 1 - Dead track/track in error status track 6
- Bit 0 - Dead track/track in error status track 7

This error status is latched and is not cleared even if the dead track is reset at resync time in GCR. The dead track error status is reset at the start of the command.

3.10.2.12 TELEX Tape Unit Status Description

The TELEX sense status bytes are shown in Table 3-7. A description of each bit follows the table.

TABLE 3-7 TELEX SENSE STATUS BYTES

SENSE BYTE	0	1	2	3	4	5	6	7
0	LOAD POINT	FILE	BKWARD STATUS	WRITE STATUS	TAPE (ECT)	LO DENSITY	READY	COMMAND REJECT
1	NOT USED	EQUIP FAIL	MODEL BIT 0	MODEL BIT 1	MODEL BIT 2	6250 CAPABL	IWR	NOT USED
2	IBG OVERFLOW	IBG BIT 0	IBG BIT 1	IBG BIT 2	IBG BIT 3	IBG BIT 4	IBG BIT 5	IBG BIT 6
3	LOAD CHECK	FORCE READ	DUAL DENSITY	NOT USED	ERASE FAIL	NOT USED	LOOP-OUT	NOT USED
4	ALTER DENSITY REQUEST	TRI-DENSITY	.1 in. HEAD	NOT USED	WRITE CURRENT FAIL	ERASE STATUS	SAGC CHECK	NOT USED

Sense Byte 0:

- Bit 0 - Load point - This is set when the tape unit is at load point (BOT).
- Bit 1 - File protected - This is set when the tape unit is file protected.

- Bit 2 - Backward status - This is set when the tape unit is performing or has performed a backward operation.

- Bit 3 - Write status - This indicates that the tape unit is not in read status.

- Bit 4 - Tape indicate - This is set when the leading edge of end of tape (EOT) marker is sensed during a forward operation. This is reset when the trailing edge of EOT marker is sensed during a backward operation.

- Bit 5 - Lo density - This is set when the dual density tape unit is operating in the lower density mode.

- Bit 6 - Ready - This is set when the tape is loaded and the tape unit is online.

- Bit 7 - Command reject - This is set if the command byte has even parity or if a write command is received in conjunction with a backward motion command (Backward, Rewind, or Rewind Unload).

Sense Byte 1:

- Bit 0 - Not used.

- Bit 1 - Equipment fail - This is set whenever write current fail, erase current fail, or loopout occurs.

- Bits 2-4 - Model bits - These bits define the tape unit model.

- Bit 5 - 6250 Capable - This bit is set if the selected tape unit is capable of handling 6250 bpi mode of operation.

- Bit 6 - Loop write (LWR) - This is set when the tape unit has performed a loop write to read operation.

- Bit 7 - Not used.

Sense Byte 2:

- Bit 0 - IBG Overflow - This bit is set whenever IBG counter overflows.

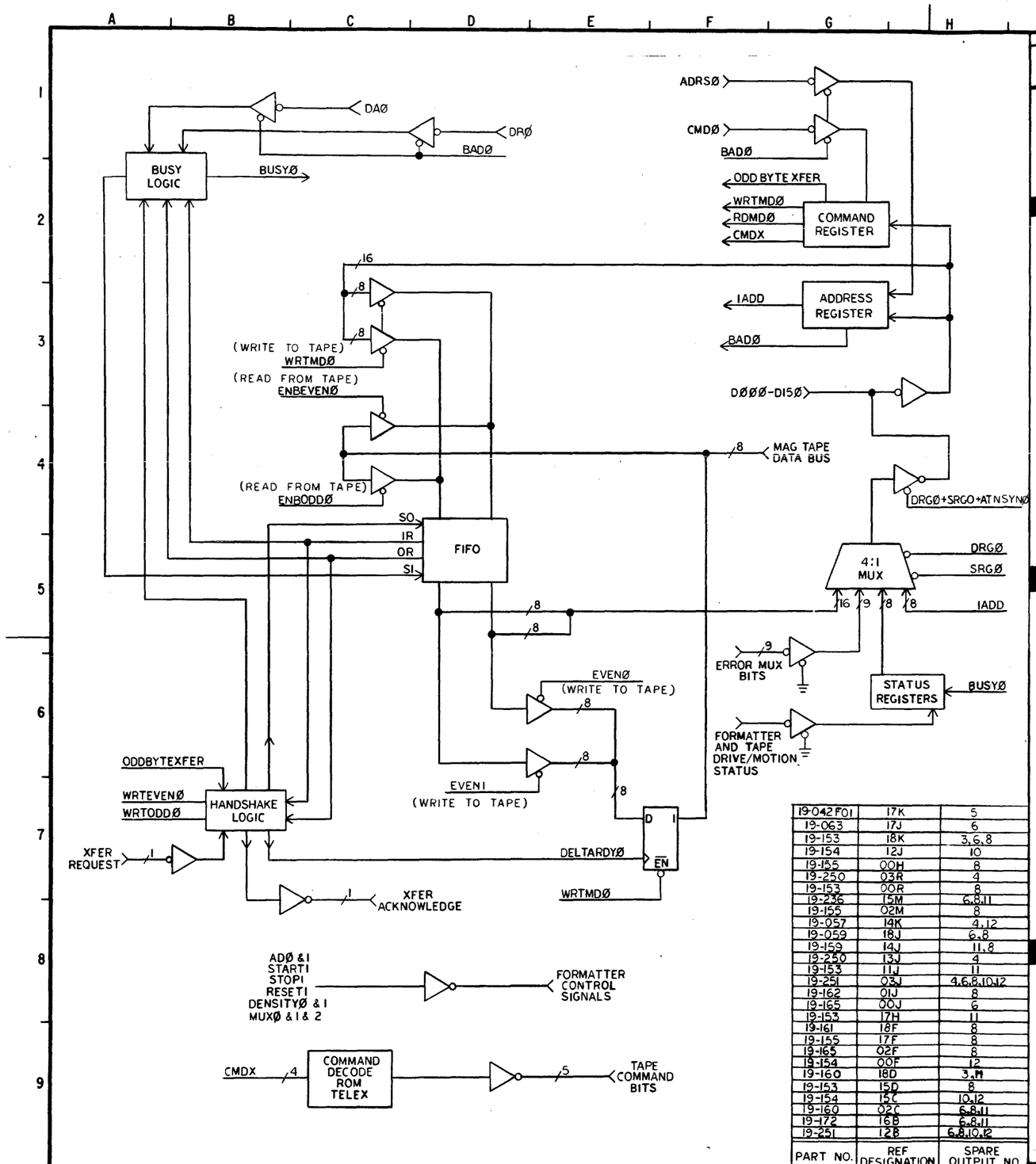
- Bits 1-7 IBG Bits 0-6 - These are the outputs of the IBG counter. This count is used by the formatter for generating proper IBG.

Sense Byte 3:

- Bit 0 - Load check - This bit is set if the tape unit fails to load the tape in two attempts (in one attempt with mini reel).
- Bit 1 - Forced read density - This bit is set to indicate to the formatter that read operations are to be performed in the density indicated by the dual density, 6250 capable and alternate density request sense bits.
- Bit 2 - Dual density - This bit is set if the tape unit is capable of handling two types of densities.
- Bit 3 - Not used.
- Bit 4 - Erase fail - This bit is set if erase current is not present during a write or if it is present during a read.
- Bit 5 - Not used.
- Bit 6 - Loopout - This bit is set if the tape goes out of the column control limits.
- Bit 7 - Not used.

Sense Byte 4:

- Bit 0 - Alternate density request
- Bit 1 - Tri-density - This indicates that the tape unit is capable of operating in all three density modes.
- Bit 2 - .1 Inch head - This indicates that read and write head spacing is .1 inch.
- Bit 3 - Not used.
- Bit 4 - Write current fail - This is set if write current is on for a read operation or if write current is off for a write operation.
- Bit 5 - Erase status - This indicates that the tape unit is in erase status.
- Bit 6 - SAGC check - This indicates that the read circuits have been unable to set the read gain to the proper level while reading the ARA burst.
- Bit 7 - Not used.



PART NO.	REF DESIGNATION	SPARE OUTPUT NO.
19-042 F01	17K	5
19-063	17J	6
19-153	18K	3,6,8
19-154	12J	10
19-155	00H	8
19-250	03R	4
19-153	00R	8
19-236	15M	6,8,11
19-155	02M	8
19-057	14K	4,12
19-059	18J	6,8
19-159	14J	11,8
19-250	13J	4
19-153	11J	11
19-251	03J	4,6,8,10,12
19-162	01J	8
19-165	00J	6
19-153	17H	11
19-161	18F	8
19-155	17F	8
19-165	02F	8
19-154	00F	12
19-160	18D	3,M
19-153	15D	8
19-154	15C	10,12
19-160	02C	6,8,11
19-172	16B	6,8,11
19-251	12B	6,8,10,12

CONN	TERM. NO.	CABLE CONNECTOR MAP ROW 2	CABLE CONNECTOR MAP ROW 1	BACK PANEL MAP ROW 1	BACK PANEL MAP ROW 2	TERM. NO.	CONN
				P5	GND	41	
				GND	GND	40	
						39	
						38	
						37	
						36	
						35	
						34	
						33	
						32	
						31	
	29	GND				30	
	28				SWSNS0	29	
	27		BOT0			28	
	26		EOT0			27	
	25			SCLR0	HW0	26	
	24		SSC0		SCHK0	25	
	23		MUXCMD0	SNS0	SBSY0	24	
	22		DS00	SYN0	ATN0	23	
	21		MUX10	RACK0	TACK0	22	
	20		MUX00		DA0	21	1
	19		RESET0	DR0	CMD0	20	
	18		DOT070	SR0	ADRS0	19	
	17		DOT060	D140	D150	18	
	16		DOT050	D120	D130	17	
	15		DOT040	D100	D110	16	
	14		DOT030	D080	D090	15	
	13		DOT020	D060	D070	14	
	12		DOT010	D040	D050	13	
	11		DOT000	D020	D030	12	
	10		PAROTPE0	D000	D010	11	
4	09		TRACK0			10	
	08		STOP0			09	
	07		START0			08	
	06		DS10			07	
	05		CMD030			06	
	04		CMD020			05	
	03		CMD010			04	
	02		CMD000			03	
	01		AD10			02	
	00	GND	AD00	GND	GND	01	
				P5	GND	00	
	29	GND		P5	GND	41	
	28			GND	GND	40	
	27					39	
	26		RDY0			38	
	25					37	
	24		ONLS0			36	
	23		BUPER0			35	
	22		NRZI0			34	
	21		BLOCK0			33	
	20		CERR0			32	
	19					31	
	18		DATCHK0			30	
	17		FOVRN0			29	
	16		REJECT0			28	
	15		TMS0			27	
	14		ENDATP0			26	
	13					25	
	12					24	
3	11					23	
	10		TREQ0			22	
	09		FBSY0			21	0
	08		ERRMX070			20	
	07		ERRMX060			19	
	06		ERRMX050			18	
	05		ERRMX040			17	
	04		ERRMX030			16	
	03		ERRMX020			15	
	02		ERRMX010			14	
	01		ERRMX000			13	
	00	GND	ERRMX0P0			12	
						11	
						10	
						09	
						08	
						07	
						06	
						05	
						04	
						03	
						02	
				GND	GND	01	
				P5	GND	00	

FROM	TO	MNEMONIC	SHEET
00K-10	00K-72	GND	6
00R-02	00R-19	SNS0	6
00R-01	00R-19	SWNS0	6
14K-10	14K-72	TELEX1	5

STRAPPING TABLE

NO.	MNEMONIC	SHEET
127-6	03K-13	2
125-6	GND	2
117-6	BBSY1	3
116-6	BWRTMD1	3
115-6	BRDMD1	3
114-6	TREQ1	7
113-6	TRACK1	3
112-6	STOP1	7
111-6	START1	3

TEST POINTS

THE REVISION LEVEL OF THIS SHEET IS CONSIDERED TO BE THE REVISION LEVEL OF THE DOCUMENT.

BOARD	REV LEVEL
35-820 F04	R00
03	R00
02	R00
01	R00

BOARDS AGREEING WITH THIS SCHEMATIC MUST BE AT LEAST THE FOLLOWING REVISION LEVEL.

PART NO.	DESCRIPTION	FOR VARIATION SEE SHEET
35-820 F04	6250 M.T.I. TELEX W/ 1K OPTION	5,6,8
03	S.T.C. W/ 1K OPTION	5,6,8
02	TELEX W/O 1K OPTION	5,6,8
01	S.T.C. W/O 1K OPTION	5,6,8

REVISION										
SHEET	1	2	3	4	5	6	7	8	9	10

USED IN MANUAL: 47-028

REVISIONS

	INIT	DATE
PRE PRODUCTION APPROVAL		
DEV	[illegible]	1/12/82
PROD	[illegible]	1/12/82

UNLESS OTHERWISE SPECIFIED

SCALE:

TOLERANCE:

DIMENSIONS ARE IN INCHES .XXX ±.005 .X ±.03 .XX ±.02 ANGLES ±1°

NAME	TITLE	DATE
V. TAHAMONT	DES/DFT	6-11-81
	SUPV	
	CHK	
	ENG	
	MGR	
	QC	

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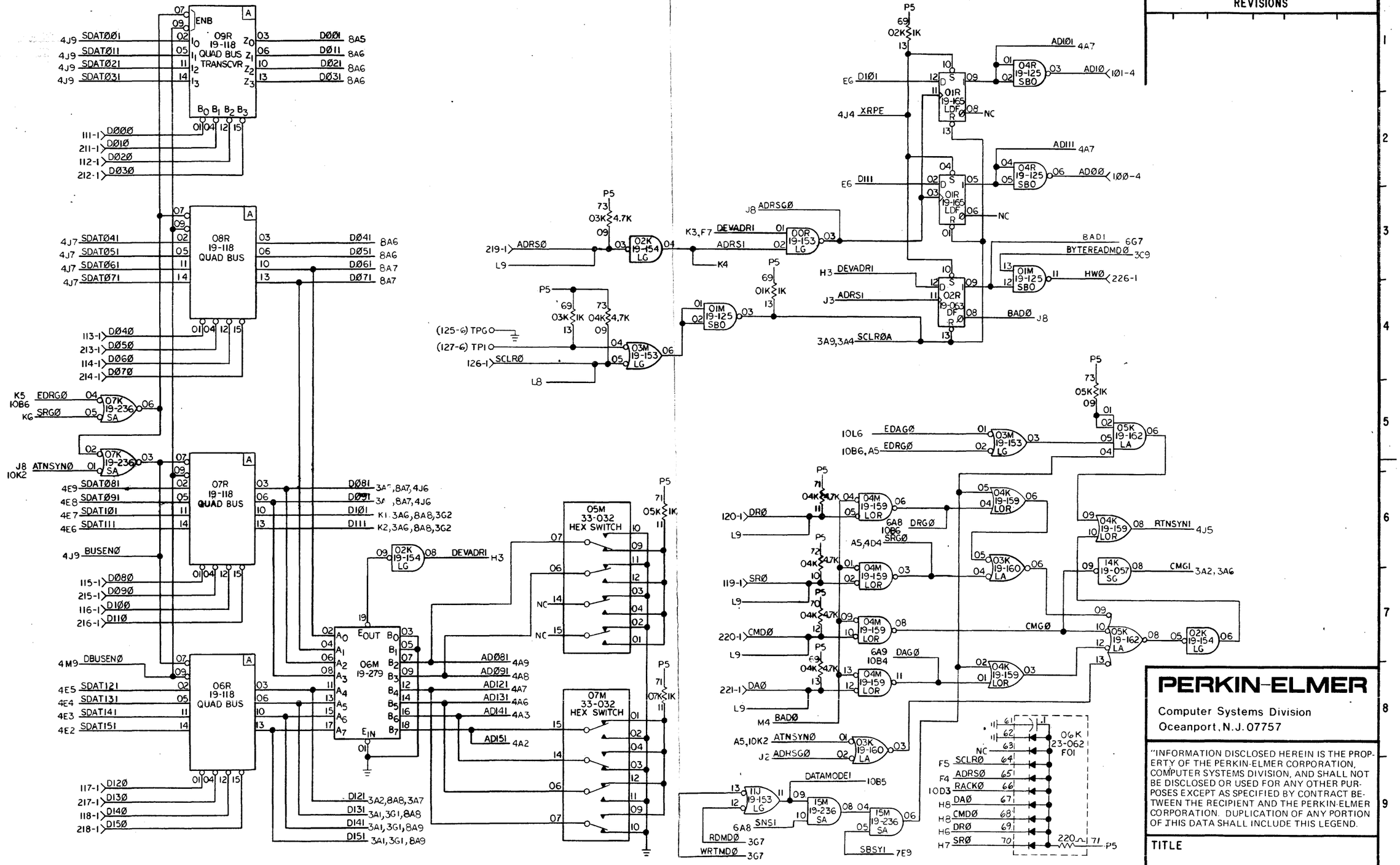
TITLE SCHEMATIC

6250 M.T.I.

TASK 03192

SHT 1 -12

DWG 35-820 D08


REVISIONS
09R 19-118 QUAD BUS TRANSCVR
ENB
SDAT00I
SDAT01I
SDAT02I
SDAT03I
D00I
D01I
D02I
D03I
8A5
8A6
8A6
8A6
D000
D010
D020
D030
08R 19-118 QUAD BUS
SDAT04I
SDAT05I
SDAT06I
SDAT07I
D04I
D05I
D06I
D07I
8A6
8A6
8A7
8A7
D040
D050
D060
D070
EDRG0
SRG0
07K 19-236 SA
ATNSYN0
07R 19-118 QUAD BUS
SDAT08I
SDAT09I
SDAT10I
SDAT11I
D08I
D09I
D10I
D11I
3A5,8A7,4J6
BUSEN0
D080
D090
D100
D110
06R 19-118 QUAD BUS
DBUSEN0
SDAT12I
SDAT13I
SDAT14I
SDAT15I
D12I
D13I
D14I
D15I
3A2,8A8,3A7
3A1,3G1,8A8
3A1,3G1,8A9
3A1,3G1,8A9
D120
D130
D140
D150
06M 19-279
E OUT
E IN
02K 19-154 LG
DEVADRI
H3
ADRS0
K3,F7
00R 19-153 LG
ADRS1
01M 19-125 SBO
(125-6) TP0
(127-6) TP1
SCLR0
03M 19-153 LG
05M 33-032 HEX SWITCH
07M 33-032 HEX SWITCH
AD081
AD091
AD121
AD131
AD141
AD151
01R 19-165 LDF R
04R 19-125 SBO
ADI0I
ADI11
AD00
DI0I
DI11
XRPE
NC
BAD1
BYTEREADMD0
HW0
02R 19-063 DF R
BAD0
DEVADRI
ADRSI
SCLR0A
05K 19-162 LA
EDAG0
EDRG0
03M 19-153 LG
04K 19-159 LOR
04M 19-159 LOR
03K 19-160 LA
14K 19-057 SG
RTNSYNI
CMGI
CMG0
DRG0
SRG0
DAG0
DRQ
SRQ
CMD0
DA0
ATNSYN0
ADHSG0
11J 19-153 LG
15M 19-236 SA
DATAMODEI
SNSI
RDMD0
WRTMD0
SBSYI
06K 23-062 F01
RACK0
ADRS0
CMD0
DA0
DR0
SR0
220
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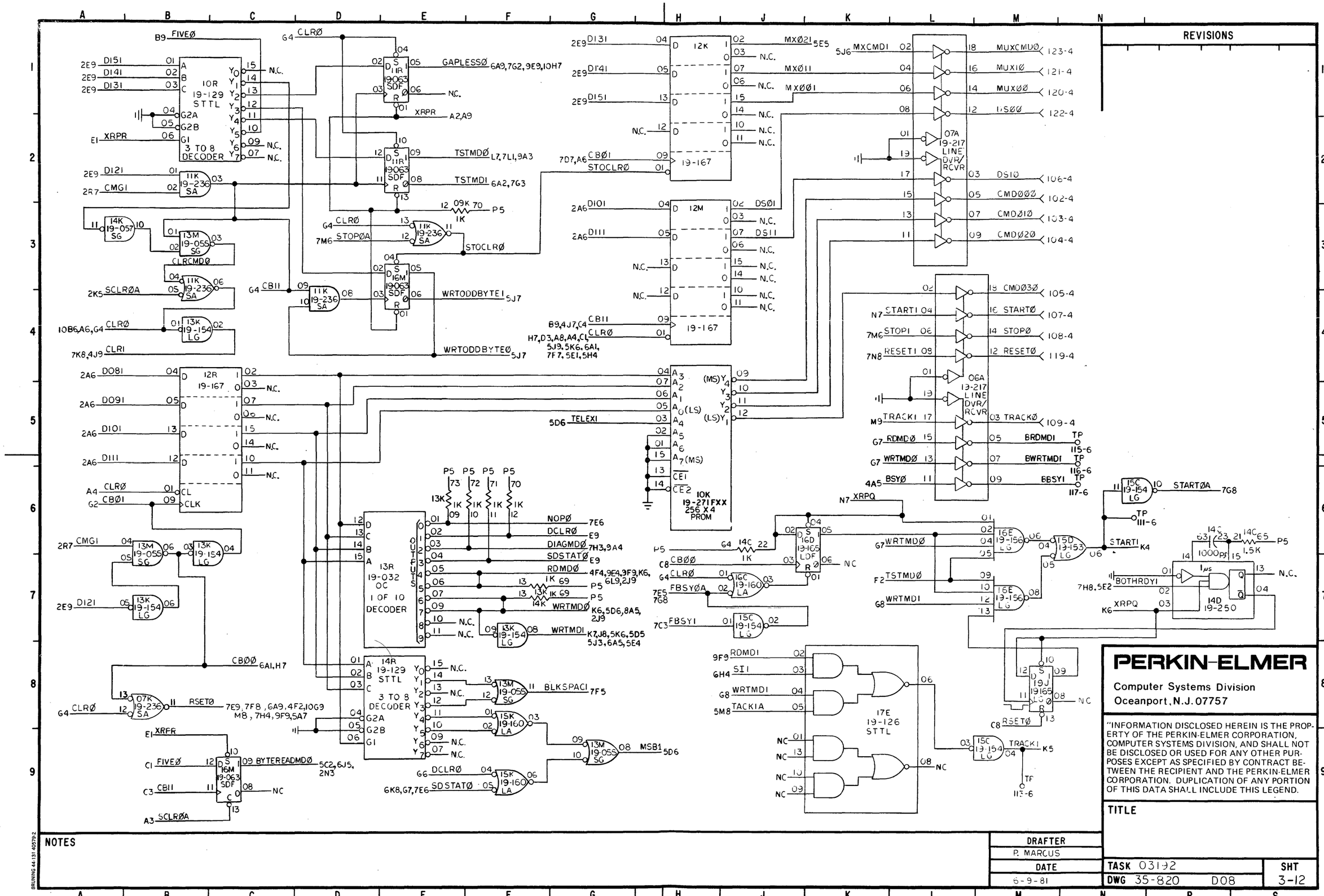
TITLE
NOTES PREFERRED ADDRESS IS X8S
DRAFTER
V TAHAMONT
DATE
6-4-81
TASK 03912
DWG 35-820 D08
SHT
2 - 12
BRUNING 44-131-40579-2


REVISIONS
B9 FIVEØ
G4 CLRØ
10R 19-129 STTL 3 TO 8 DECODER
11R 19-063 SDF
XRPR
GAPLESSØ 6A9,7G2,9E9,10H7
NC.
TSTMDØ L7,7L1,9A3
TSTMDI 6A2,7G3
09K 70 1K P5
WRTODDBYTE1 5J7
WRTODDBYTEØ 5J7
STOCLRØ
CLRCMDØ
CLRI
12R 19-167
13R 19-032 OC 1 OF 10 DECODER
14R 19-129 STTL 3 TO 8 DECODER
16M 19-063 SDF
BYTEREADMDØ 5C2,6J5, 2N3
MSB1 5D6
NOPØ 7E6
DCLRØ E9
DIAGMDØ 7H3,9A4
SDSTATØ E9
RDMDØ 4F4,9E4,9F3,K6, 6L9,2J9
WRTMDØ K6,5D6,8A5, 2J9
WRTMDI K7,J8,5K6,5D5 5J3,6A5,5E4
BLKSPACI 7F5
RSETØ 7E9,7F8,6A9,4F2,10G9 M8,7H4,9F9,5A7
CBØØ 6AI,H7
12M 19-167
MXØ21 5E5
MXØ11
MXØØ1
CBØI 7D7,A6
DSØI
DSII
B9,4J7,C4 CLRØ H7,D3,A8,A4,C1, 5J9,5K6,6AI, 7F7,5EI,5H4
10K 19-271FXX 256 X 4 PROM
TELEXI 5D6
17E 19-126 STTL
MUXCMDI 5J6
07A 19-217 LINE DVR/ RCVR
MUXCMDØ 123-4
MUXIØ 121-4
MUXØØ 120-4
DSIØ 122-4
DSIØ 106-4
CMDØØØ 102-4
CMDØIØ 103-4
CMDØ2Ø 104-4
CMDØ3Ø 105-4
STARTØ 107-4
STOPØ 108-4
RESETØ 119-4
06A 19-217 LINE DVR/ RCVR
TRACKØ 109-4
BRDMDI TP 115-6
BWRTMDI TP 116-6
BBSYI TP 117-6
STARTØA 7G8
TP III-6
STARTI K4
1μs
BOTHRDYI 7H8,5E2
XRPQ K6
14D 19-250
1000pf 1.5K
TRACKI K5
TP 113-6
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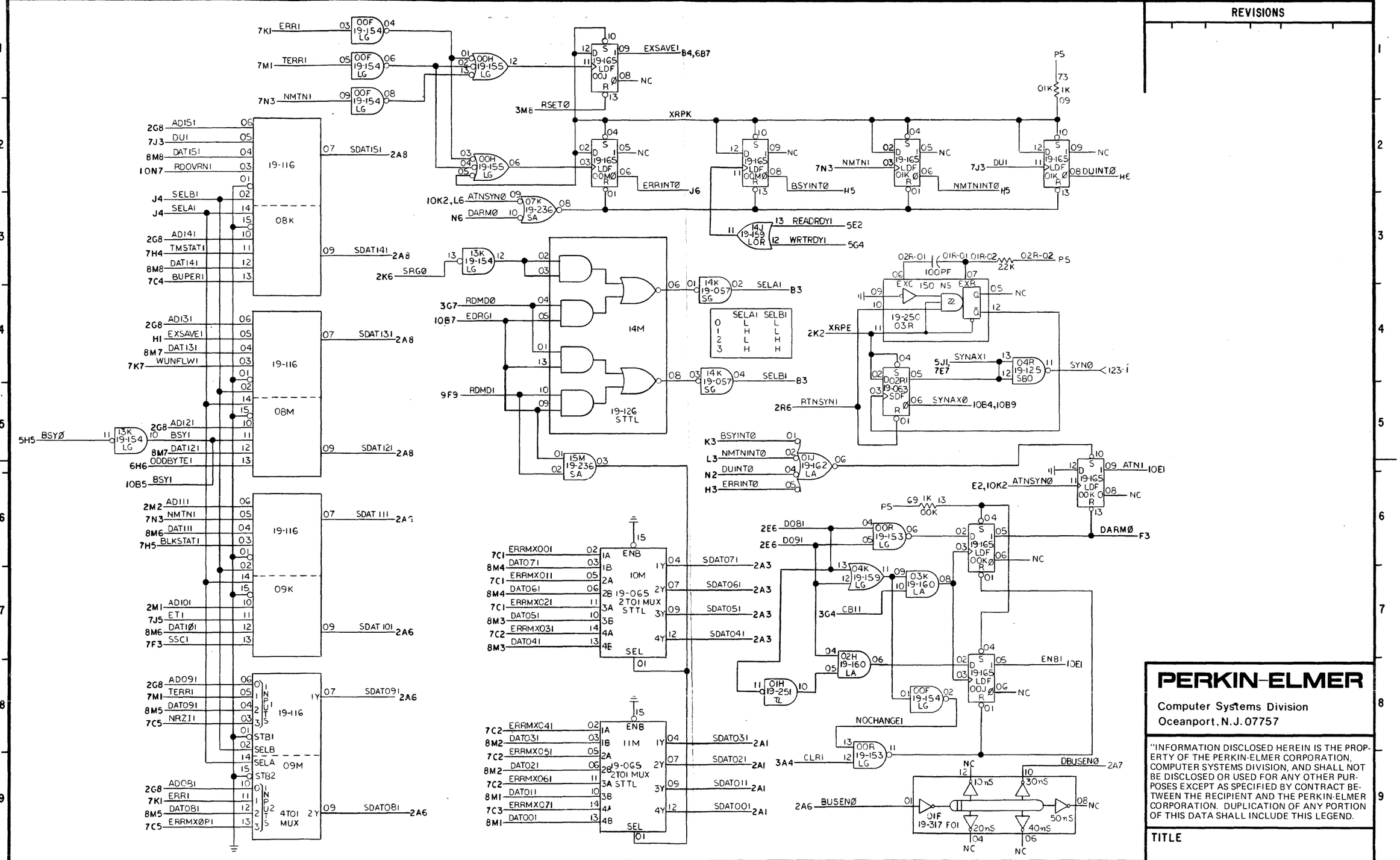
TITLE
NOTES
DRAFTER P. MARCUS
DATE 6-9-81
TASK 03192
DWG 35-820 D08
SHT 3-12
BRUNING 44-131 402792

REVISIONS



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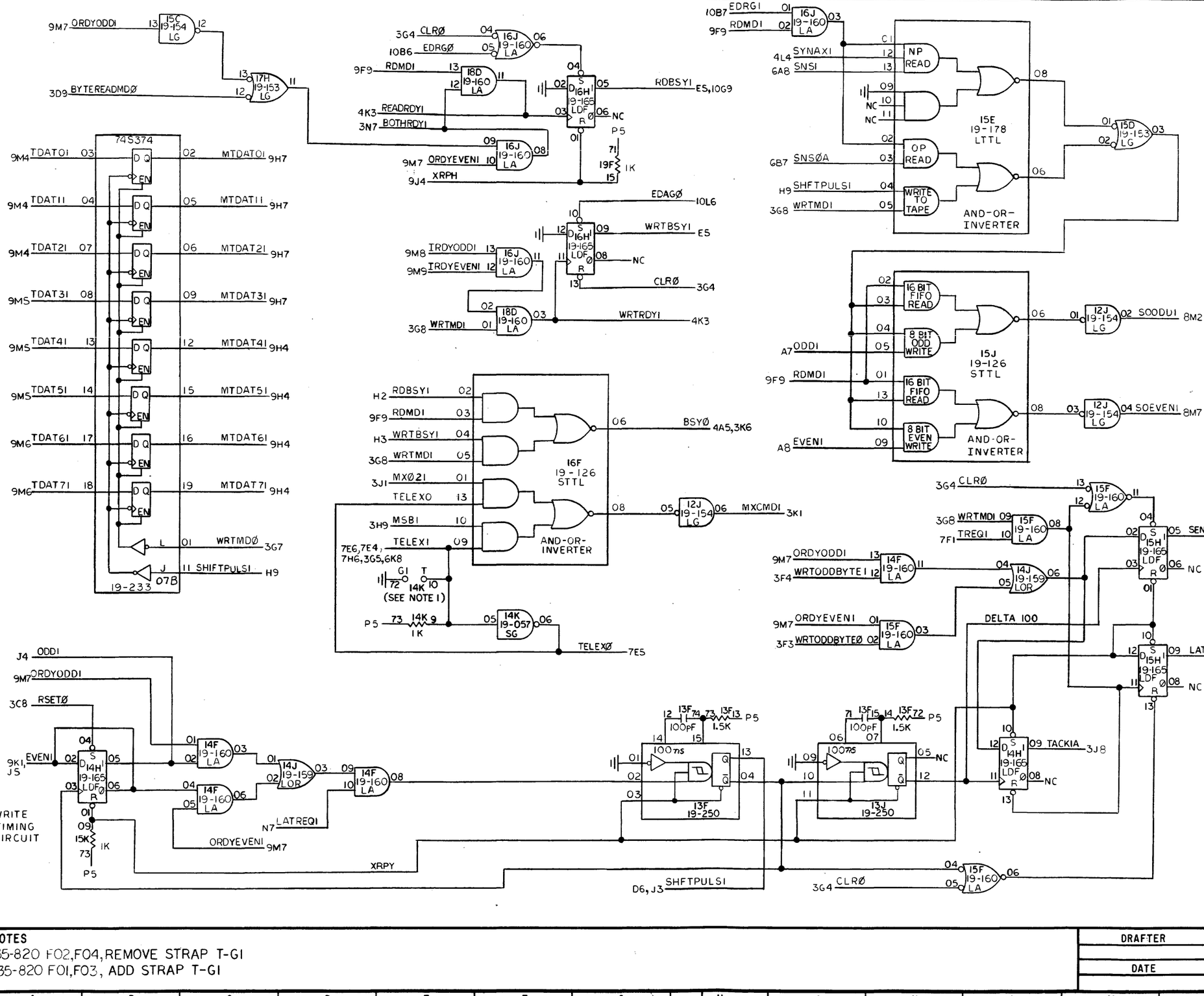
TITLE

NOTES

DRAFTER		
H NGUYEN		
DATE	TASK 03192	SHT
6-1-81	DWG 35-820 D08	4-12



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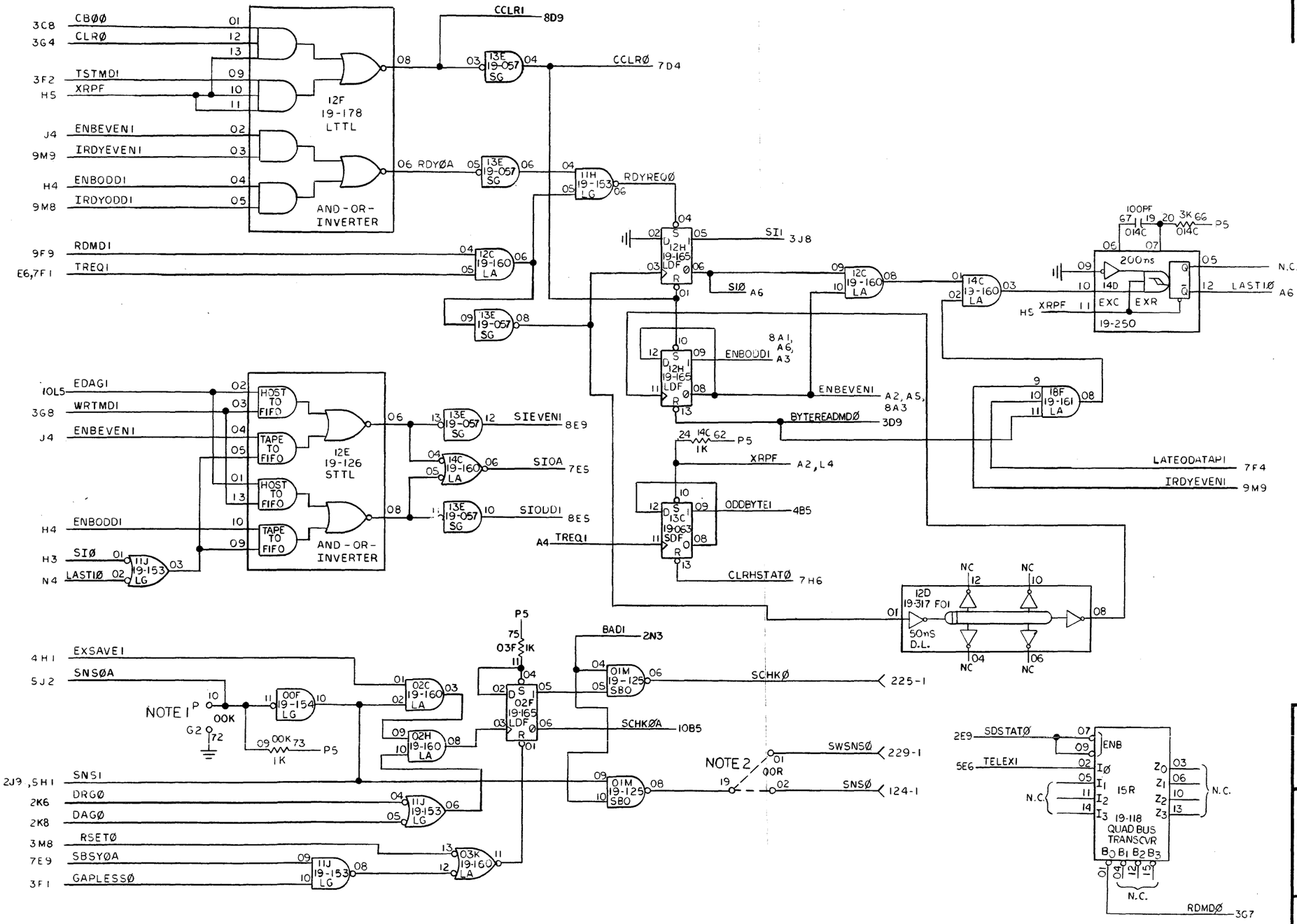
TITLE

NOTES
1. 35-820 F02, F04, REMOVE STRAP T-GI
   35-820 F01, F03, ADD STRAP T-GI

DRAFTER	
DATE	
TASK 03192	SHT 5 - 12
DWG 35-820 D08	



NOTES

1. STRAP P-G2 FOR NEW PROTOCOL OPERATION.
   REMOVE STRAP P-G2 FOR NORMAL PROTOCOL OPERATION.
2. STRAP X-B2 FOR NEW PROTOCOL OPERATION WITHOUT AN I/O SWITCH.
   STRAP X-B1 FOR NEW PROTOCOL OPERATION WITH AN I/O SWITCH.

REVISIONS

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TITLE

DRAFTER

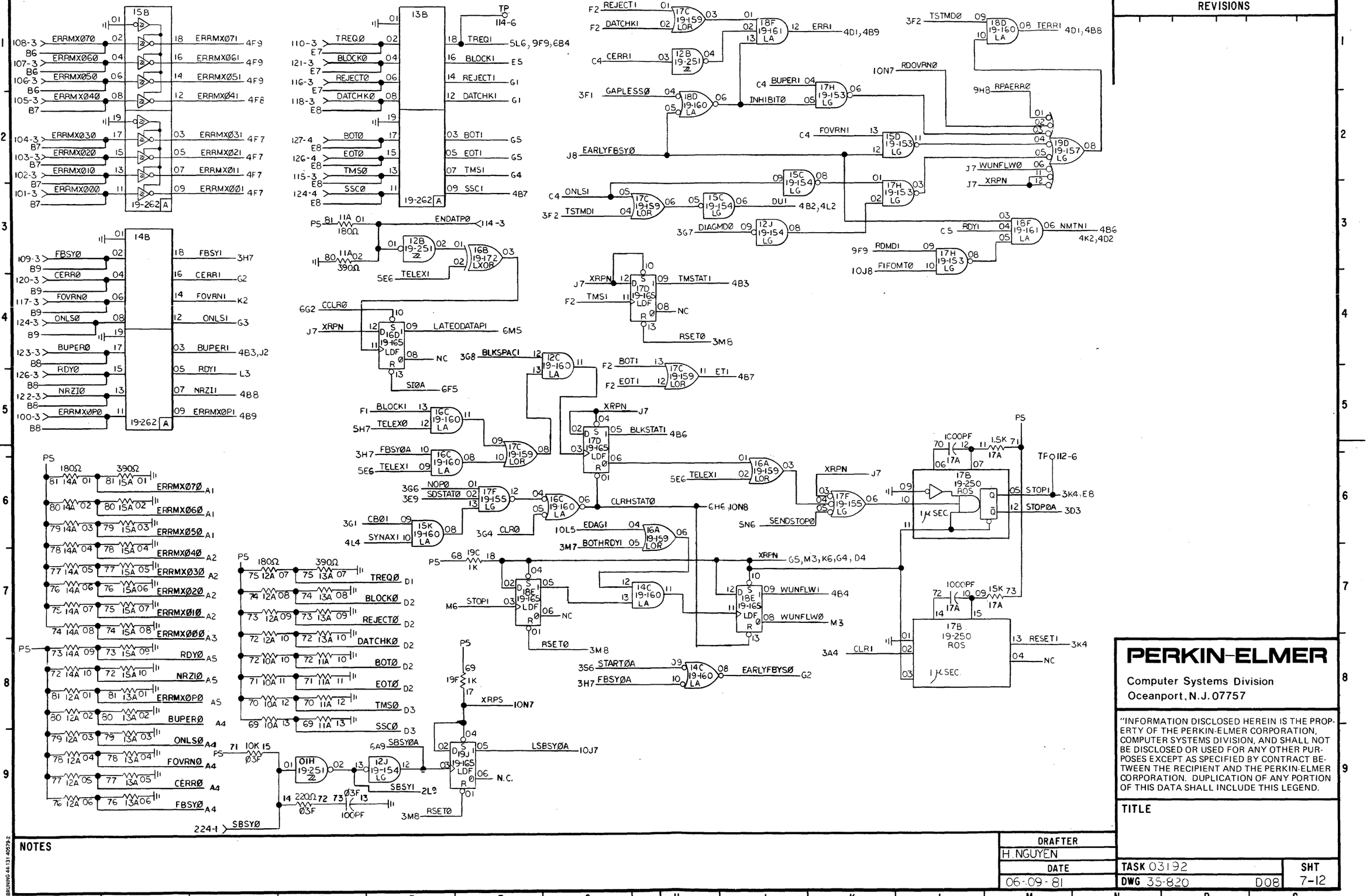
DATE

TASK 03192

DWG 35-820 D08

SHT 6-12

BRUNING 44-131 40579-2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TITLE
NOTES
DRAFTER
H. NGUYEN
DATE
06-09-81
TASK 03192
SHT
7-12
DWG 35-820 D08
BRUNING 44-131 40579-2
ERRMX070
ERRMX060
ERRMX050
ERRMX040
ERRMX030
ERRMX020
ERRMX010
ERRMX000
ERRMX071
ERRMX061
ERRMX051
ERRMX041
ERRMX031
ERRMX021
ERRMX011
ERRMX001
FBSY0
CERR0
FOVRN0
ONLS0
BUPER0
RDY0
NRZI0
ERRMX0P0
FBSYI
CERRI
FOVRNI
ONLSI
BUPERI
RDYI
NRZII
ERRMX0PI
TREQ0
BLOCK0
REJECT0
DATCHK0
BOT0
EOT0
TMS0
SSC0
TREQI
BLOCKI
REJECTI
DATCHKI
BOTI
EOTI
TMSI
SSCI
TP 114-6
ENDATP0
TELEXI
CCLR0
XRPN
LATEODATAPI
SI0A
NC
BLKSPACI
BLOCKI
TELEX0
FBSY0A
NOP0
SDSTAT0
CB0I
SYNAXI
CLR0
SBSY0A
SBSYI
RSET0
N.C.
LSBSY0A
BLKSTATI
CLRHSTAT0
BOTI
EOTI
ETI
REJECTI
DATCHKI
CERRI
GAPLESS0
INHIBIT0
BUPERI
EARLYFBSY0
ONLSI
TSTMDI
DIAGMD0
DUI
FOVRNI
RDOVRN0
RPAERR0
WUNFLW0
XRPN
RDYI
NMTNI
RDMDI
FIFOMT0
TSTMD0
TERRI
TMSTATI
TMSI
NC
RSET0
EARLYFBYS0
STARTØA
FBSY0A
STOPI
STOP0A
SENDSTOP0
CLR1
RESETI
WUNFLWI
WUNFLW0
XRPS
ION7
TF0 112-6
ERRMX07Ø
ERRMX06Ø
ERRMX05Ø
ERRMX04Ø
ERRMX03Ø
ERRMX02Ø
ERRMX01Ø
ERRMX00Ø
RDY0
NRZI0
ERRMX0P0
BUPER0
ONLS0
FOVRN0
CERR0
FBSY0
SBSY0
TREQ0
BLOCK0
REJECT0
DATCHK0
BOT0
EOT0
TMS0
SSC0
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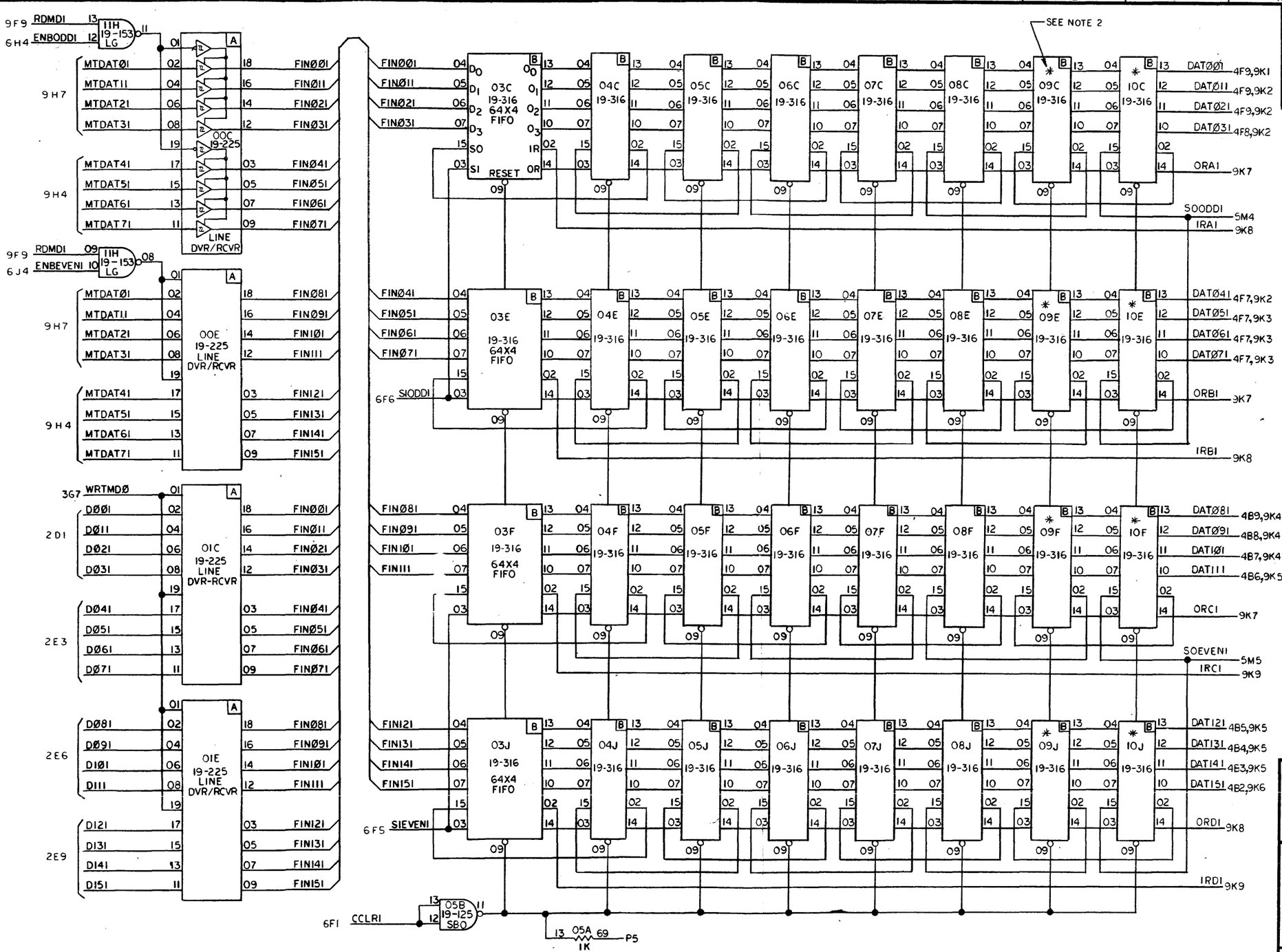
390Ω
1K
10K
220Ω
100PF
1000PF
1.5K
15K
17A
SEC



REVISIONS

PERKIN-ELMER

Computer Systems Division
Oceanport, N.J. 07757

TITLE

NOTES
1. AS SHOWN WITH ALL COMPONENTS FOR F03 & F04.
2. AS SHOWN WITH COMPONENTS MARKED WITH AN ASTERISK ONLY FOR F01 & F02.

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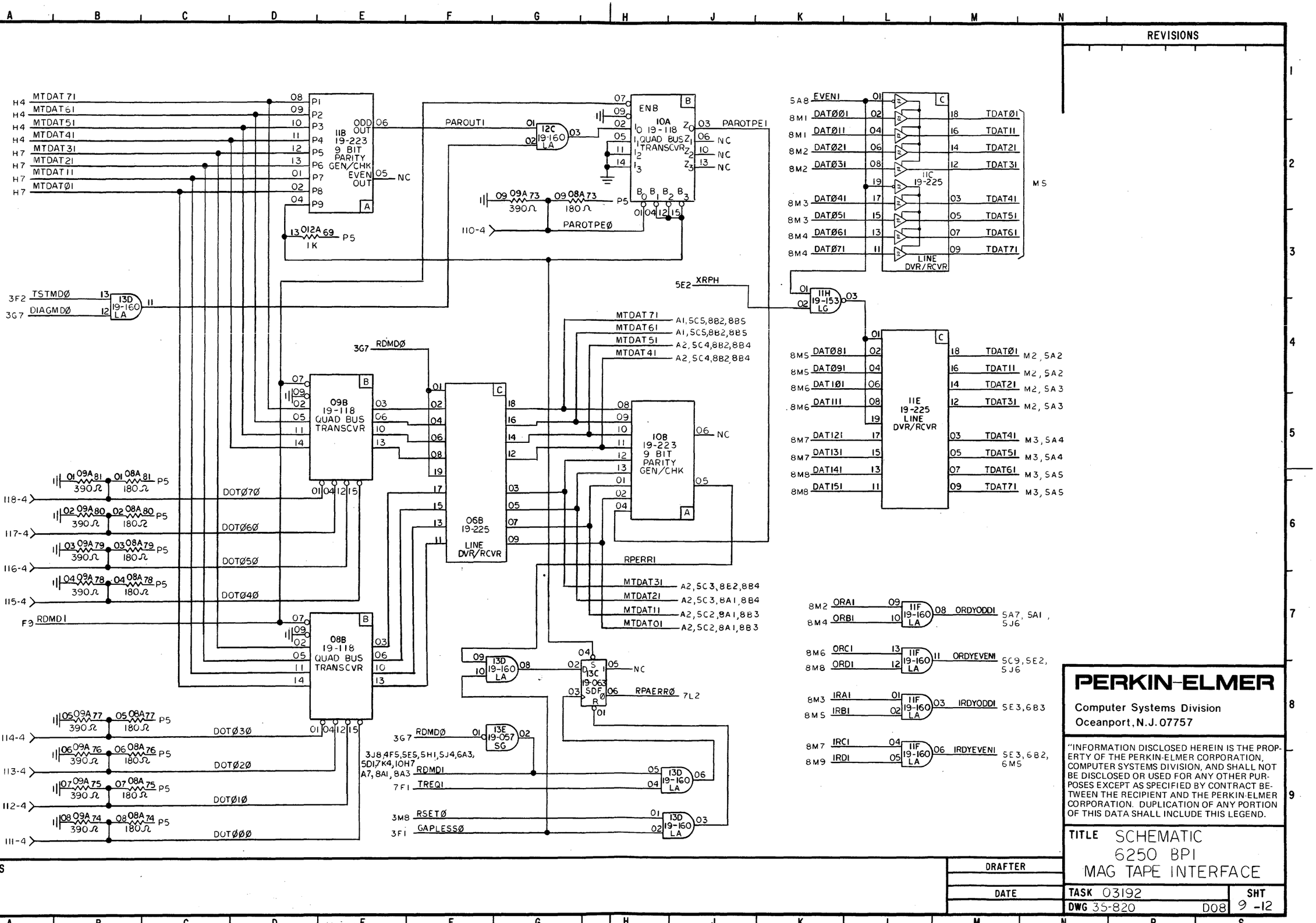
DATE

TASK
DWG 35-820 D08

SHT 8 -12


REVISIONS
MTDAT71
MTDAT61
MTDAT51
MTDAT41
MTDAT31
MTDAT21
MTDAT11
MTDAT01
11B 19-223 9 BIT PARITY GEN/CHK
ODD OUT
EVEN OUT
PAROUT1
12C 19-160 LA
10A 19-118 QUAD BUS TRANSCVR
ENB
PAROTPE1
PAROTPE0
09A73 390Ω
09B8A73 180Ω
12A69 1K
EVEN1
DAT001
DAT011
DAT021
DAT031
DAT041
DAT051
DAT061
DAT071
11C 19-225 LINE DVR/RCVR
TDAT01
TDAT11
TDAT21
TDAT31
TDAT41
TDAT51
TDAT61
TDAT71
M5
TSTMD0
DIAGMD0
13D 19-160 LA
XRPH
11H 19-153 LG
RDMD0
09B 19-118 QUAD BUS TRANSCVR
06B 19-225 LINE DVR/RCVR
10B 19-223 9 BIT PARITY GEN/CHK
RPERR1
A1,5C5,8B2,8B5
A2,5C4,8B2,8B4
A2,5C3,8E2,8B4
A2,5C3,8A1,8B4
A2,5C2,8A1,8B3
A2,5C2,8A1,8B3
11E 19-225 LINE DVR/RCVR
M2, 5A2
M2, 5A2
M2, 5A3
M2, 5A3
M3, 5A4
M3, 5A4
M3, 5A5
M3, 5A5
DOT7Ø
DOT6Ø
DOT5Ø
DOT4Ø
DOT3Ø
DOT2Ø
DOT1Ø
DOTØØ
08B 19-118 QUAD BUS TRANSCVR
13C 19-063 SDF
RPAERR0
7L2
13E 19-057 SG
RDMD1
TREQ1
RSET0
GAPLESS0
3J8,4F5,5E5,5H1,5J4,6A3, 5D1,7K4,10H7 A7,8A1,8A3
11F 19-160 LA
ORA1
ORB1
ORDYODD1
5A7, 5A1, 5J6
ORC1
ORD1
ORDYEVEN1
5C9, 5E2, 5J6
IRA1
IRB1
IRDYODD1
5E3, 6B3
IRC1
IRD1
IRDYEVEN1
5E3, 6B2, 6M5
NOTES
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Computer Systems Division
Oceanport, N.J. 07757
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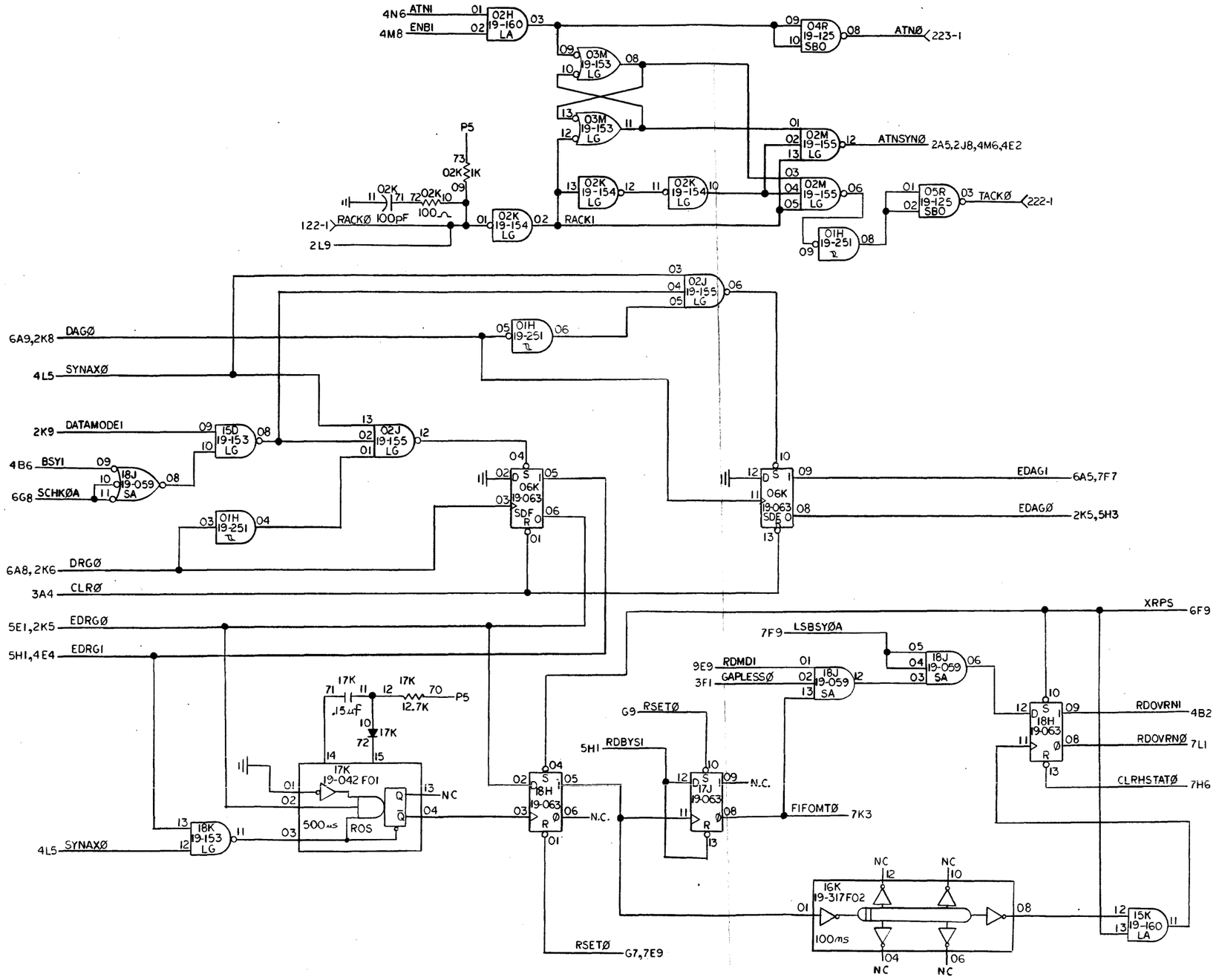
TITLE SCHEMATIC 6250 BPI MAG TAPE INTERFACE
TASK 03192
SHT 9 -12
DWG 35-820 D08
BRUNING 44-131 40579.2



NOTES

REVISIONS

UNLESS OTHERWISE SPECIFIED	
SCALE:	TOLERANCE:
DIMENSIONS ARE IN INCHES	.XXX ±.005 .X ±.03 .XX ±.02 ANGLES ±1°

NAME	TITLE	DATE
	DES / DFT	
	SUPV	
	CHK	
	ENG	
	MGR	
	QC	

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Oceanport, N.J. 07757

TITLE

TASK 03912	SHT
DWG 35-820 D08	10 - 12

BRUNING 44 131 4/25/79

NET	MNEMONIC	SHT
0001	00F02	04
0002	00F04	04
0003	00F06	04
0004	00F08	04
0005	00H06	04
0006	00K13	04
0007	00R06	04
0008	00R11	04
0009	01H04	10
0010	01H06	10
0011	01H08	10
0012	01H09	10
0013	01H10	04
0014	01J06	04
0015	01M08	06
0016	02C03	06
0017	02F05	06
0018	02H03	10
0019	02H06	04
0020	02H08	06
0021	02J06	10
0022	02J12	10
0023	02K06	02
0024	02K10	10
0025	02K12	10
0026	02K71	10
0027	03C10	08
0028	03C11	08
0029	03C12	08
0030	03C13	08
0031	03C14	08
0032	03C15	08
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0034	03E11	08
0035	03E12	08
0036	03E13	08
0037	03E14	08
0038	03E15	08
0039	03F10	08
0040	03F11	06
0041	03F11	08
0042	03F12	08
0043	03F13	08
0044	03F14	08
0045	03F15	08
0046	03F72	07
0047	03J10	08
0048	03J11	08
0049	03J12	08
0050	03J13	08
0051	03J14	08
0052	03J15	08
0053	03K03	02
0054	03K06	02
0055	03K08	04
0056	03K11	06
0057	03M03	02
0058	03M06	02
0059	03M08	10
0060	03M11	10
0061	03R06	04
0062	03R07	04
0063	03R12	04
0064	04C10	08
0065	04C11	08
0066	04C12	08
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0070	04E10	08
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0079	04F13	08
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0090	04K08	02
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0092	05B11	08
0093		
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0096	05C10	08
0097	05C11	08
0098	05C12	08
0099	05C13	08
0100	05C14	08
0101	05C15	08
0102	05E10	08
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0163	07F13	08
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0167	07J11	08
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0169	07J13	08
0170	07J14	08
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0238	10R14	03
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0257	12R02	03
0258	12R07	03
0259	12R10	03
0260	12R15	03
0261	13C08	06
0262	13D03	09
0263	13D06	09
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0265	13D11	09
0266	13E06	06
0267	13E08	06
0268	13F04	05
0269	13F14	05
0270	13F15	05
0271	13J06	05
0272	13J07	05
0273	13K06	03
0274	13K12	04
0275	14C03	06
0276	14C11	07
0277	14D04	03
0278	14D06	06
0279	14D07	06
0280	14D14	03
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0303	15F06	05
0304	15F08	05
0305	15F11	05
0306	15J06	05
0307	15J08	05
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0309	15K06	03
0310	15K08	07
0311	15K11	10
0312	15M03	04
0313	15M06	02
0314	15M08	02
0315	16A03	07
0316	16A06	07
0317	16B03	07
0318	16C03	03
0319	16C08	07
0320	16C11	07
0321	16D05	03
0322	16E06	03
0323	16E08	03
0324	16F08	05
0325	16J03	05
0326	16J06	05
0327	16J11	05
0328	16K08	10
0329	17B06	07
0330	17B07	07
0331	17B14	07
0332	17B15	07
0333	17C03	07
0334	17C06	07
0335	17C08	07
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0342	17H08	07
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0344	17K04	10
0345	17K11	10
0346	17K14	10
0347	17K15	10
0348	18E05	07
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0351	18J06	10
0352	18J08	10
0353	18K11	10
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0355	19J09	03
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0357	AD081	02
0358	AD091	02
0359	AD10	02
0360	AD101	02
0361	AD111	02
0362	AD121	02
0363	AD131	02
0364	AD141	02
0365	AD151	02
0366	ADRS0	02
0367	ADRS1	02
0368	ADRSG0	02
0369	ATN0	10
0370	ATN1	04
0371	ATNSYN0	10
0372	BAD0	02
0373	BAD1	02
0374	BBSY1	03
0375	BLKSPAC1	03
0376	BLKSTAT1	07
0377	BLOCK0	07
0378	BLOCK1	07
0379	BOT0	07
0380	BOT1	07
0381	BOTHRDY1	05
0382	BRDM1	03
0383	BSY0	05
0384	BSY1	04
0385	BSYINT0	04
0386	BUPER0	07
0387	BUPER1	07
0388	BUSEN0	02
0389	BWRTMD1	03
0390	BYTEREADMD0	03
0391	C300	03
0392	CB01	03
0393	CB11	03
0394	CCLR0	06
0395	CCLR1	06
0396	CERR0	07
0397	CERR1	07
0398	CLR0	03
0398	CLR0	03
0399		
0400	CLR1	03
0401	CLRCMD0	03
0402	CLRHSTAT0	07
0403	CMD0	02
0404	CMD000	03
0405	CMD010	03
0406	CMD020	03
0407	CMD030	03
0408	CMG0	02
0409	CMG1	02
0410	D000	02
0411	D001	02
0412	D010	02
0413	D011	02
0414	D020	02
0415	D021	02
0416	D030	02
0417	D031	02
0418	D040	02
0419	D041	02
0420	D050	02
0421	D051	02
0422	D060	02
0423	D061	02
0424	D070	02
0425	D071	02
0426	D080	02
0427	D081	02
0428	D090	02
0429	D091	02
0430	D100	02
0431	D101	02
0432	D110	02
0433	D111	02
0434	D120	02
0435	D121	02
0436	D130	02
0437	D131	02
0438	D140	02
0439	D141	02
0440	D150	02
0441	D151	02
0442	DA0	02
0443	DAG0	02
0444	DARM0	04

REVISIONS

NOTES

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PERKIN-ELMER

Computer Systems Division
Oceanport, N.J. 07757

TITLE

TASK 03192

DWG 35-820 D08

SHT 11-12

NET	MNEMONIC	SHT
0445	DAT001	08
0446	DAT011	08
0447	DAT021	08
0448	DAT031	08
0449	DAT041	08
0450	DAT051	08
0451	DAT061	08
0452	DAT071	08
0453	DAT081	08
0454	DAT091	08
0455	DAT101	08
0456	DAT111	08
0457	DAT121	08
0458	DAT131	08
0459	DAT141	08
0460	DAT151	08
0461	DATAMODE1	02
0462	DATCHK0	07
0463	DATCHK1	07
0464	DBUSEN0	02
0465	DCLR0	03
0466	DELTA100	05
0467	DEVADR0	02
0468	DEVADR1	02
0469	DIAGMD0	03
0470	DOT000	09
0471	DOT010	09
0472	DOT020	09
0473	DOT030	09
0474	DOT040	09
0475	DOT050	09
0476	DOT060	09
0477	DOT070	09
0478	DR0	02
0479	DRG0	02
0480	DS00	03
0481	DS01	03
0482	DS10	03
0483	DS11	03
0484	DU1	07
0485	DUINT0	04
0486	EARLYFBSY0	07
0487	EDAG0	10
0488	EDAG1	10
0489	EDRG0	10
0490	EDRG1	10
0491	ENB1	04
0492	ENBEVEN1	06
0493	ENBODD1	06
0494	ENDATP0	07
0495	EOT0	07
0496	EOT1	07
0497	ERR1	07
0498	ERRINT0	04
0499	ERRMX000	07
0500	ERRMX001	07

NET	MNEMONIC	SHT
0501	ERRMX010	07
0502	ERRMX011	07
0503	ERRMX020	07
0504	ERRMX021	07
0505	ERRMX030	07
0506	ERRMX031	07
0507	ERRMX040	07
0508	ERRMX041	07
0509	ERRMX050	07
0510	ERRMX051	07
0511	ERRMX060	07
0512	ERRMX061	07
0513	ERRMX070	07
0514	ERRMX071	07
0515	ERRMXOP0	07
0516	ERRMXOP1	07
0517	ET1	07
0518	EVEN1	05
0519	EXSAVE1	04
0520	FBSY0	07
0521	FBSY0A	03
0522	FBSY1	07
0523	FIFOMT0	07
0524	FIN01	08
0525	FIN101	08
0526	FIN11	08
0527	FIN111	08
0528	FIN121	08
0529	FIN131	08
0530	FIN141	08
0531	FIN151	08
0532	FIN21	08
0533	FIN31	08
0534	FIN41	08
0535	FIN51	08
0536	FIN61	08
0537	FIN71	08
0538	FIN81	08
0539	FIN91	08
0540	FIVE0	03
0541	FOVRN0	07
0542	FOVRN1	07
0543	GAPLESS0	03
0544	GND00K	04
0545	GND03R	04
0546	GND05M	02
0547	GND06A	03
0548	GND06K	02
0549	GND06M	02
0550	GND07A	03
0551	GND07M	02
0552	GND08B	09
0553	GND08K	04
0554	GND08M	04
0555	GND09B	09
0556	GND09K	04

NET	MNEMONIC	SHT
0557	GND09M	04
0558	GND10A	09
0559	GND10K	03
0560	GND10M	04
0561	GND10R	03
0562	GND11M	04
0563	GND12H	06
0564	GND13B	07
0565	GND13F	05
0566	GND13J	05
0567	GND14B	07
0568	GND14D	06
0569	GND14R	03
0570	GND15B	07
0571	GND15E	05
0572	GND16H	05
0573	GND17B	07
0574	GND17K	10
0575	HW0	02
0576	INHIBIT0	07
0577	IRA1	08
0578	IRB1	08
0579	IRC1	08
0580	IRD1	08
0581	IRDIEVEN1	09
0582	IRDIODD1	09
0583	LAST10	06
0584	LATEODATAP1	07
0585	LATREQ1	05
0586	LSBSY0A	07
0587	MSB1	03
0588	MTDAT01	09
0589	MTDAT11	09
0590	MTDAT21	09
0591	MTDAT31	09
0592	MTDAT41	09
0593	MTDAT51	09
0594	MTDAT61	09
0595	MTDAT71	09
0596	MUX00	03
0597	MUX10	03
0598	MUXCMD0	03
0599	MX001	03
0600	MX011	03
0601	MX021	03
0602	MXCMD1	05
0603	NMTN1	07
0604	NMTNINT0	04
0605	NOP0	03
0606	NRZ10	07
0607	NRZ11	07
0608	ODD1	05
0609	ODDBYTE1	06
0610	ONLS0	07
0611	ONLS1	07
0612	OOH12	04

NET	MNEMONIC	SHT
0613	ORA1	08
0614	ORB1	08
0615	QRC1	08
0616	ORD1	08
0617	ORDIEVEN1	09
0618	ORDIODD1	09
0619	PAROTPE0	09
0620	PAROTPE1	09
0621	PAROUT1	09
0622	RACK0	10
0623	RACK1	10
0624	RDBSY1	05
0625	RDMD0	03
0626	RDMD0	03
0627	RDMD1	09
0627	RDMD1	09
0628		
0629	RDOVRN0	10
0630	RDOVRN1	10
0631	RDTREQ0	06
0632	RDY0	07
0633	RDY0A	06
0634	RDY1	07
0635	READRDY1	05
0636	REJECT0	07
0637	REJECT1	07
0638	RESET0	03
0639	RESET1	07
0640	RPAERR0	09
0641	RPERR1	09
0642	RSET0	03
0643	RSET0	03
0644	SBSY0	07
0645	SBSY0A	07
0646	SBSY1	07
0647	SCHK0	06
0648	SCHK0A	06
0649	SCLR0	02
0650	SCLR0A	02
0651	SDAT001	04
0652	SDAT011	04
0653	SDAT021	04
0654	SDAT031	04
0655	SDAT041	04
0656	SDAT051	04
0657	SDAT061	04
0658	SDAT071	04
0659	SDAT081	04
0660	SDAT091	04
0661	SDAT101	04
0662	SDAT111	04
0663	SDAT121	04
0664	SDAT131	04
0665	SDAT141	04
0666	SDAT151	04
0667	SDSTAT0	03

NET	MNEMONIC	SHT
0668	SELA1	04
0669	SELB1	04
0670	SENDSTOP0	05
0671	SHIFTPULS1	05
0672	SIO	06
0673	SIOA	06
0674	SI1	06
0675	SIEVEN1	06
0676	SIODD1	06
0677	SNS0	06
0678	SNS0A	06
0679	SNS1	06
0680	SO1	05
0681	SOEVEN1	05
0682	SOODD1	05
0683	SR0	02
0684	SRG0	02
0685	SSC0	07
0686	SSC1	07
0687	START0	03
0688	START0A	03
0689	START1	03
0690	STOCLR0	03
0691	STOP0	03
0692	STOP0A	07
0693	STOP1	07
0694	SWSNS0	06
0695	SYN0	04
0696	SYNAX0	04
0697	SYNAX1	04
0698	TACK0	10
0699	TACK1A	05
0700	TDAT01	09
0701	TDAT11	09
0702	TDAT21	09
0703	TDAT31	09
0704	TDAT41	09
0705	TDAT51	09
0706	TDAT61	09
0707	TDAT71	09
0708	TELEX0	05
0709	TELEX1	05
0710	TERR1	07
0711	TMS0	07
0712	TMS1	07
0713	TMSTAT1	07
0714	TP1	02
0715	TRACK0	03
0716	TRACK1	03
0717	TREQ0	07
0718	TREQ1	07
0719	TSTMD0	03
0720	TSTMD1	03
0721	WRTBSY1	05
0722		
0723	WRTMD0	03

NET	MNEMONIC	SHT
0723	WRTMD0	03
0724	WRTMD1	03
0725	WRTODDBYTE0	03
0726	WRTODDBYTE1	03
0727	WRTRDY1	05
0728	WUNFLW0	07
0729	WUNFLW1	07
0730	XRPE	02
0731	XRPF	06
0732	XRPH	05
0733	XRPK	04
0733	XRPK	04
0734	XRPN	07
0734	XRPN	07
0735		
0736		
0737	XRPQ	03
0738	XRPR	03
0739	XRPS	07
0740	XRPY	05

NET	MNEMONIC	SHT

NET	MNEMONIC	SHT

REVISIONS

NOTES

DRAFTER

DATE

PERKIN-ELMER

Computer Systems Division
Oceanport, N.J. 07757

TITLE

TASK 03192

DWG 35-820 D08

SHT 12-12

REVISIONS		
	INIT	DATE
PRE PRODUCTION APPROVAL	DEV LPA	11/12/82
	PROD [illegible]	1/13/83

ITEM NUMBER	PART NO.	DESCRIPTION	I.C. LOCATION 35-820 F01/F02 W/250 OHM	35-820 F03/F04 W/250 OHM & 1K OPTION
1	70		47	47
2	70		47	47
3	70		47	47
4	70		47	47
5	70		47	47
6	70		47	47
7	70		47	47
8	70		47	47
9	70		47	47
10	70		47	47
11	70		47	47
12	70		47	47
13	70		47	47
14	70		47	47
15	70		47	47
16	70		47	47
17	70		47	47
18	70		47	47
19	70		47	47
20	70		47	47
21	70		47	47
22	70		47	47
23	70		47	47
24	70		47	47
25	70		47	47
26	70		47	47
27	70		47	47
28	70		47	47
29	70		47	47
30	70		47	47
31	70		47	47
32	70		47	47
33	70		47	47
34	70		47	47
35	70		47	47
36	70		47	47
37	70		47	47
38	70		47	47
39	70		47	47
40	70		47	47
41	70		47	47
42	70		47	47

NOTE: WHEN INSTALLING PROGRAM HEADER (ITEM 70), BRAKE CONNECTION BETWEEN PINS 1 & 16 AND CONNECTION BETWEEN PINS 8 & 9. SEE DETAIL 'C'

391.287

SEE NOTE 4

IN ALL ITEMS MARKED WITH AN ASTERICK (*) SEE VARIATION TABLE FOR ADDITIONAL ASSEMBLY INFORMATION.

68 (6 PLACES)

65

CONN 2

CONN 4

CONN 3

APP SIDE

377.825

25-719

69 (2 PLACES)

10 (4 PLACES)

BREAK CONNECTIONS 2 PLACES

ITEM 70

DETAIL 'C'

35-820 F[illegible] R

CONN 1

CONN 0

67 (2 PLACES)

NOTE 6

5,10 (2 PLACES)

63 (57 PLACES)

INSTALL JUMPER FOR F01 & F03 VARIATION ONLY. DELETE FOR F02 & F04.

MILLIMETER	INCH
1.57	.062
3.18	.125
13.46	.530
377.825	14.873
391.287	15.40

USED IN MANUAL 47-028

NOTES

1. ITEM 4 (PHN SCREW) TO BE MOUNTED TO CENTER STANDOFF OF FRONT & MIDDLE STIFFENERS ON SOLDER SIDE ONLY.
2. I.C. PACK LOCATIONS ARE GIVEN ON THE WIRE RUN LIST AS ROW A C F K OR R ONLY. TRANSLATE TO ACTUAL POSITIONS ON THIS ASSY BY USING THE FOLLOWING EXAMPLE;

RUN LIST LOCATION		SCHEMATIC ASSY LOCATION
00F13	=	00H08

COLUMN
ROW
PIN

ALSO - =

3. DIMENSIONS ARE IN MILLIMETERS.
4. ▲ DENOTES PIN 1 IN COLUMNS D E H.
5. FOR MOUNTING OF STANDARD HARDWARE SEE 16-642 DI2.
6. BEND PINS CLOSEST TO EDGE OF BOARD INWARD PRIOR TO SOLDERING.

7 (6 PLCS)
6 (6 PLCS)
3, 3 PLCS
1 REF.
4, NOTE 1

PARTIAL VIEW A-A
TYPICAL 2 PLCS

13.46 MAX.
1.57 REF.
3.18 MAX.

PARTIAL VIEW B-B
TYPICAL 3 PLACES

UNLESS OTHERWISE SPECIFIED			
SCALE: 2:1		TOLERANCE:	
DIMENSIONS (SEE NOTE 3)		.XXX ± .005 .X ± .03 .XX ± .02 ANGLES ± 1°	
NAME		TITLE	DATE
V. PERRI	H. NGUYEN	DES / DFT	
R. CERO		SUPV	
		CHK	
S. CHREPTA		ENG	
W. RICE		MGR	
R. A. BARKER		QC	

PERKIN-ELMER

Computer Systems Division
Oceanport, N.J. 07757

TITLE ASSEMBLY 6250 M.T.I.

(SEE EDITION)

TASK 03192

DWG 35-820 E03 SHT 1-1

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