

344
CASSETTE
MAGNETIC
TAPE
SYSTEM

OPERATION &
INTERFACE

PRELIMINARY

dicom
DICOM INDUSTRIES

344

CASSETTE

MAGNETIC

TAPE SYSTEM

DICOM INDUSTRIES
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SECTION 1

GENERAL DESCRIPTION

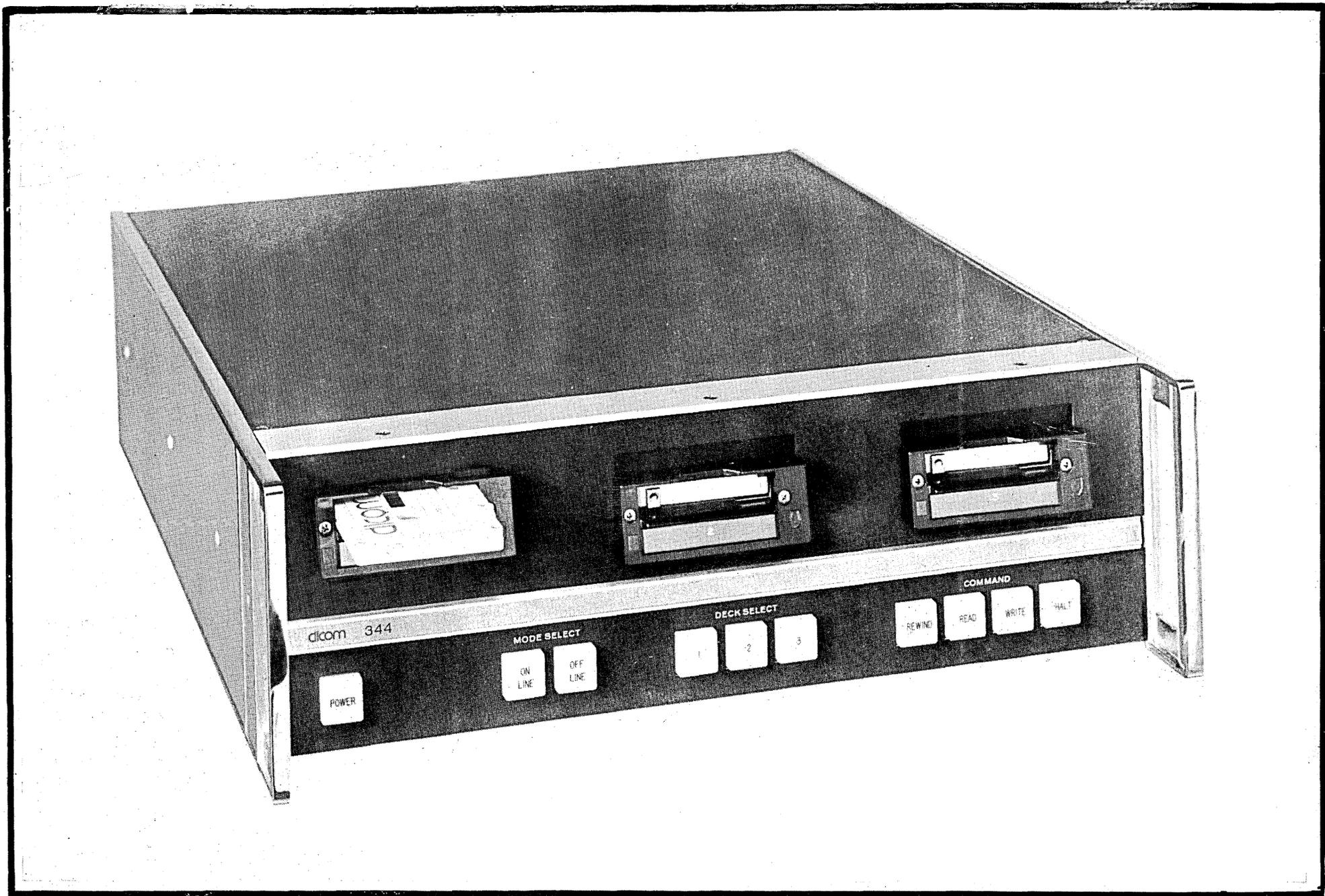


FIGURE 1-1

DICOM 344

SECTION 1

INTRODUCTION AND DESCRIPTION

1-1 INTRODUCTION

This manual contains description, installation, operation, interface and maintenance information for the DICOM 344 Cassette Magnetic Tape System (Figure 1-1) manufactured by DICOM Industries, Sunnyvale, California.

1-2 PURPOSE

The DICOM 344 three transport Cassette Magnetic Tape System provides a means of reading or writing data synchronously (ON-LINE mode) or asynchronously (OFF-LINE mode).

1-3 DESCRIPTION

The DICOM 344 contains a universal controller, three independent tape decks, plus shared read/write electronics and control logic. The DICOM 344 incorporates two major modes of operation: ON-LINE and OFF-LINE.

1-3.1 ON-LINE MODE

When the ON-LINE mode is selected, the On-Line device (such as a computer) can communicate through the universal controller, with any one of the three tape decks or the Off-Line device (Teleprinter).

The DICOM 344 is capable of On-Line synchronous data transfers at five hundred characters per second and remote control tape selection operation.

1-3.2 OFF-LINE MODE

When the OFF-LINE mode is selected, the Teleprinter communicates with the deck that is selected by the DECK SELECT switches on the front panel. A buffer is used to allow data to be entered asynchronously, then placed on the selected cassette in a block synchronous operation. The maximum number of characters in a block is equivalent to a full Teleprinter line. The Off-Line device used is a Teletype Model KSR33, ASR33, KSR35, or ASR35.

The DICOM 344 is capable of communications with either the Teleprinter Keyboard/Paper Tape Reader or Printer/Paper Tape Punch.

1-4.1 ON-LINE WRITE MODE

Figure 1-2 depicts a functional block diagram of the data flow through the DICOM 344 while in the ON-LINE WRITE mode of operation. The computer in Figure 1-2 will serve as the On-Line device for this simplified flow.

Initial Conditions: ON-LINE WRITE mode selected, the 344 INPUT and OUTPUT registers are in the reset condition (clear) and either the Teletype or any one of the three tape decks is selected as the output.

The computer (On-LINE device) parallel loads the first 8 bit data transfer into the 344 INPUT register. The INPUT register will then parallel load the OUTPUT register and is reset to receive new data from the computer. The second 8 bit parallel transfer from the computer will be loaded into the cleared INPUT register while the OUTPUT register serially outputs the previously stored data to either the Teleprinter (Off-Line device), tape deck 1, tape deck 2, or tape deck 3. When the OUTPUT register is clear, the INPUT register will again parallel transfer its data to the OUTPUT register, and be cleared ready to receive the next computer transfer.

The OUTPUT register, when loaded, will again serially transfer its 8 bit data to the Teleprinter or the selected tape deck. The above sequence will be repeated until the computer determines a record is completed and ceases data transfers.

The End of Record decision is determined by the computer program. The DICOM 344 will stop tape motion and terminate the Write mode when the computer stops transferring data. A detailed explanation, Programming Flow Diagram and a Timing Diagram of the On-Line Write mode is contained in the INTERFACE SECTION (Section 4).

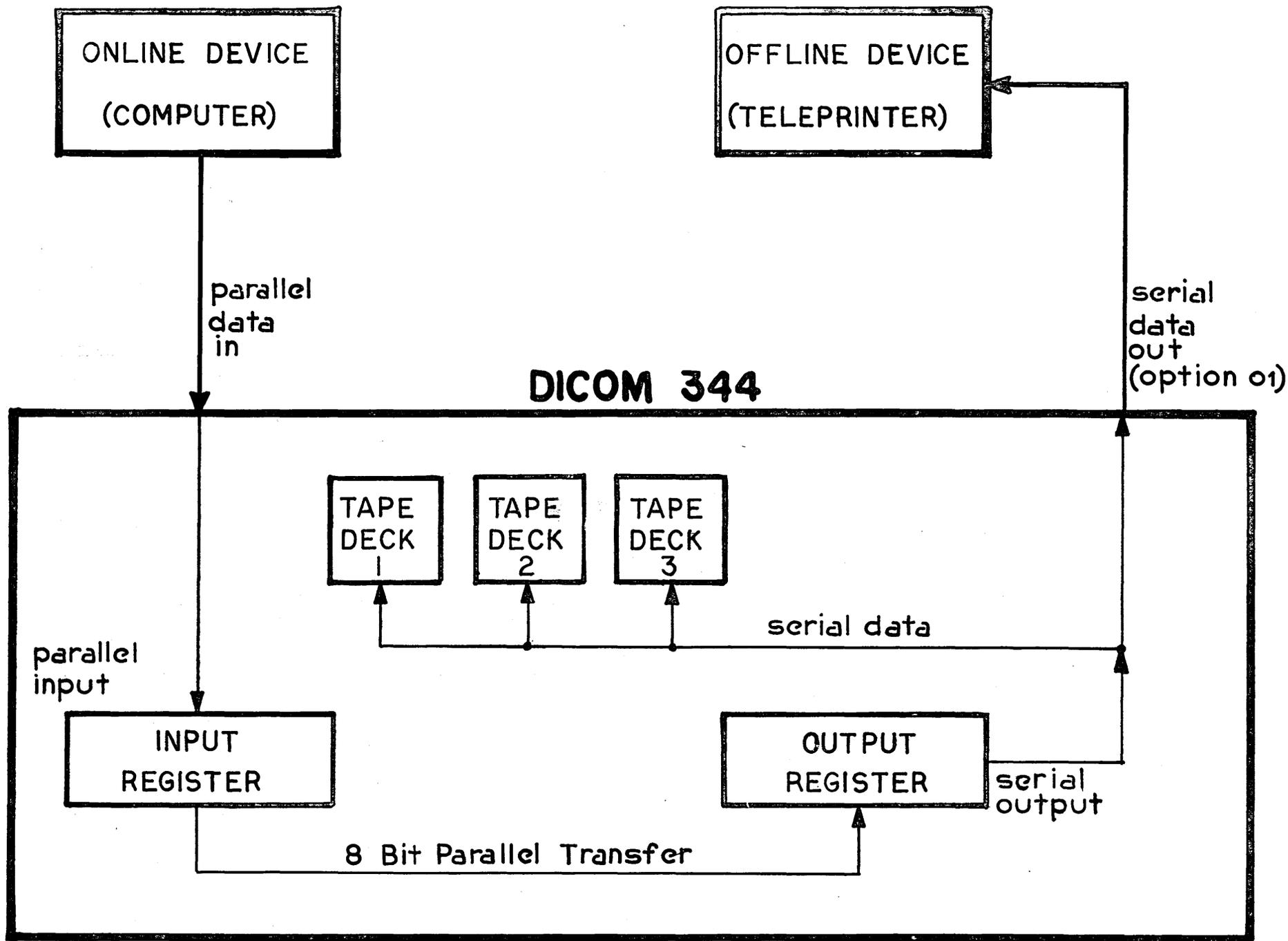


FIGURE 1-2 ONLINE WRITE

1-4.2 ON-LINE READ MODE

Figure 1-3 depicts a functional block diagram of the data flow through the DICOM 344 while in the ON-LINE READ mode.

Initial Conditions: ON-LINE READ mode selected, the 344 INPUT and OUTPUT registers are in the reset condition (clear), and either the Teletype or any one of the three tape decks is selected as the input source.

The Teletype (Off-Line device) or one of the selected tape decks serial loads the first 8 bit data transfer into the 344 INPUT register. The INPUT register will then parallel load the OUTPUT register and be reset to receive new data from the selected source. The second 8 bit serial transfer from the Teletype or selected tape deck will be loaded into the cleared INPUT register and the OUTPUT register will parallel output the previously stored data to the computer (On-Line device). When the OUTPUT register is clear, the INPUT register will again parallel transfer its data to the OUTPUT register, and be cleared to receive the next Teletype or selected deck transfer. The OUTPUT register, when loaded, will again parallel transfer its 8 bit data to the computer. The above sequence will be repeated until the teletype or selected deck ceases data transfers. The End of Transfer to the TTY will be determined by the computer and will be signified by a HALT command to the TTY. The End of Record from the selected tape deck is automatically sensed by the DICOM hardware and causes the tape to cease movement.

A detailed explanation, Programming Flow Diagram and a Timing Diagram of the On-Line Read mode is contained in the INTERFACE SECTION (Section 4).

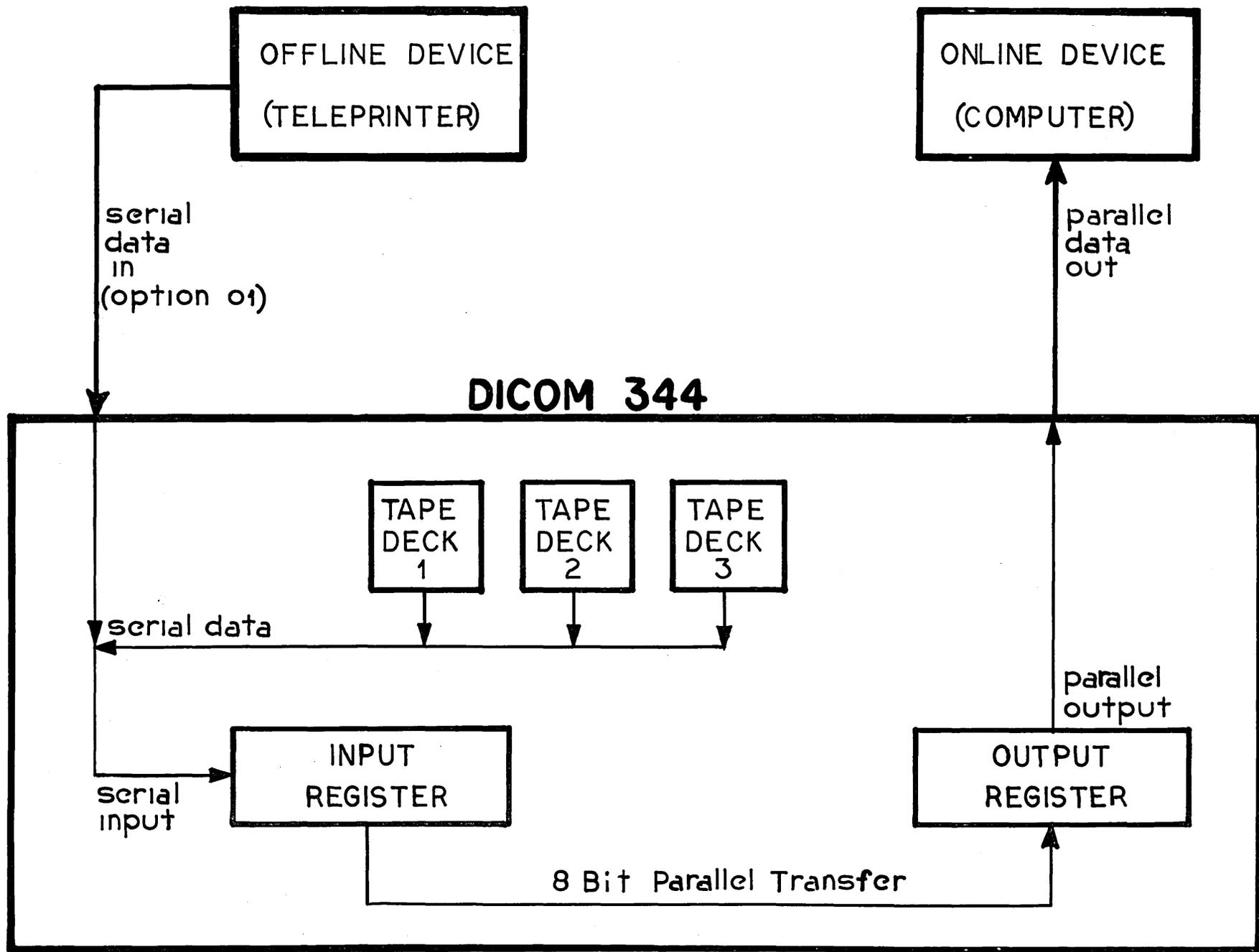


FIGURE 1-3 ON-LINE READ

1-4.3 OFF-LINE WRITE MODE

Figure 1-4 depicts a functional block diagram of the data flow through the DICOM 344 while in the OFF-LINE WRITE mode (Option 344-01-02 required).

In this mode the INPUT register receives a serial input from the Teleprinter. The INPUT register will parallel transfer to the MOS storage buffer each 8 bit character received from the Teleprinter. The MOS storage is capable of storing ninety-eight 8 bit characters which is greater than any possible line of the Teleprinter. The carriage return from the teleprinter will start tape motion on the selected deck and cause the MOS storage buffer to parallel load the OUTPUT register, one character at a time. The OUTPUT register will then serial output to tape deck 1, 2, or 3 as selected by the DECK SELECT switch on the front panel. The above sequence would be followed for each line (record) typed from the Teleprinter.

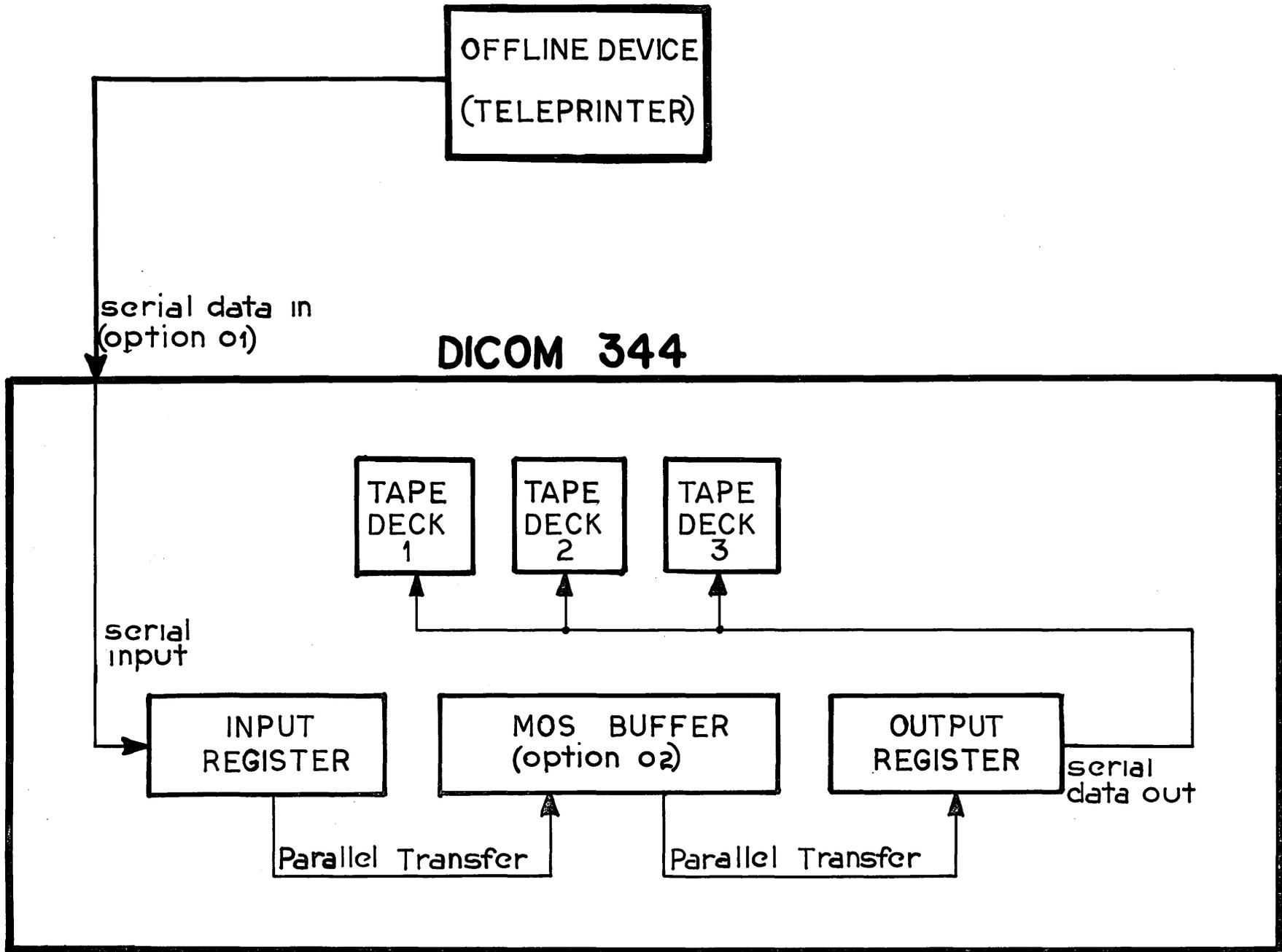


FIGURE 1-4 OFF-LINE WRITE

1-4.4 OFF-LINE READ MODE

Figure 1-5 depicts a functional block diagram of the data flow through the DICOM 344 while in the OFF-LINE READ mode. (Option 344-01-02 required.)

In this mode the INPUT register receives a serial input from the tape deck selected by the front panel DECK SELECT switches. The INPUT register will parallel load the MOS storage buffer after each 8 bit character is received. The MOS is capable of storing up to ninety-eight 8 bit characters. The MOS storage will parallel load the OUTPUT register upon detection of a carriage return character from the selected tape deck. The OUTPUT register will then supply a serial output to the Teleprinter. The above sequence would be followed for each line from the selected tape deck to be printed on the Teleprinter.

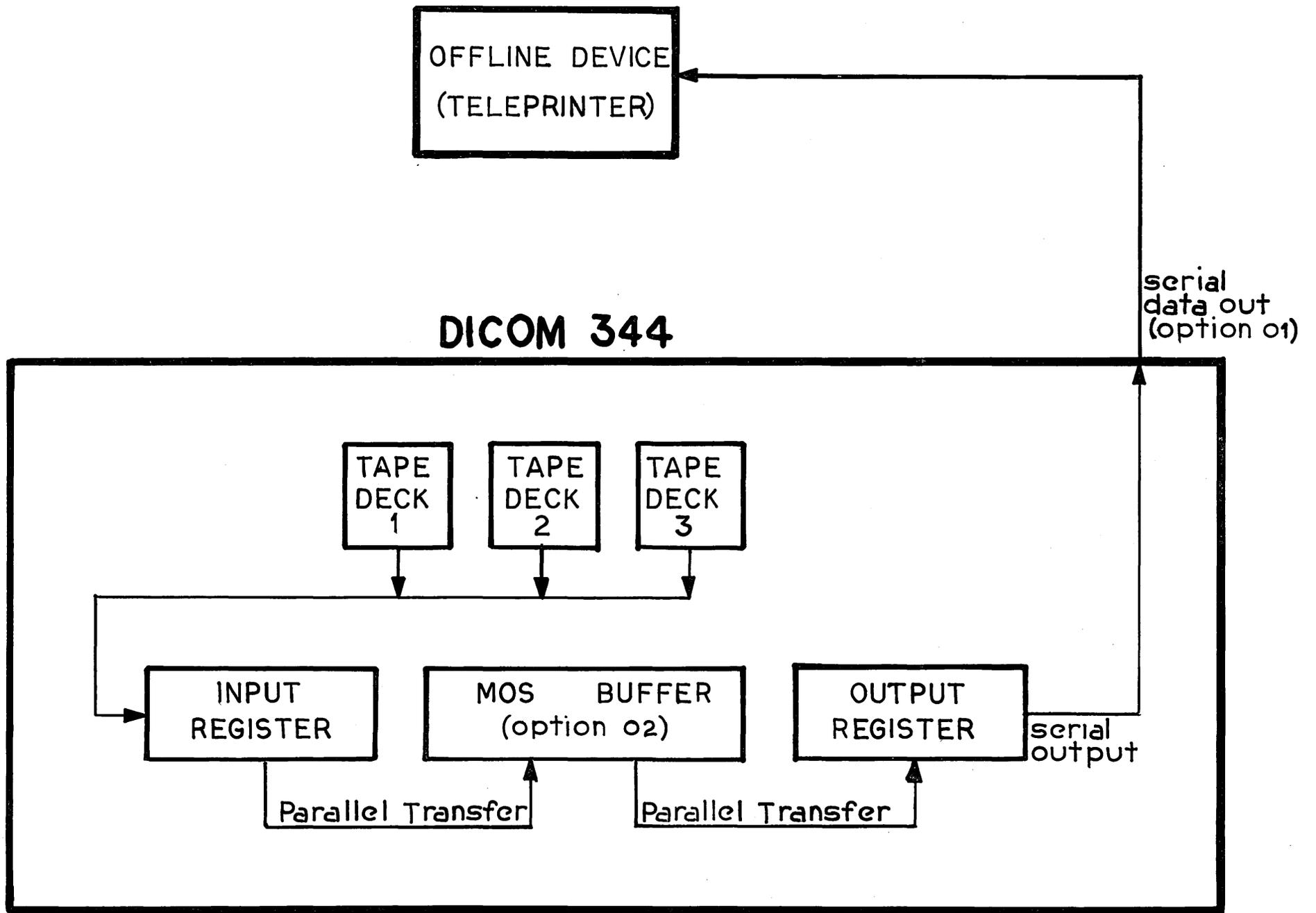


FIGURE 1-5 OFF-LINE READ

1-5 PHYSICAL
 PROPERTIES AND
 PERFORMANCE
 CHARACTERISTICS

Table 1-1 below lists the Physical Properties and Performance Characteristics of the DICOM 344 Cassette Magnetic Tape System.

TABLE 1-1

1-5.1 PROPERTIES

Mounting	Desk top or standard RETMA mounting, 5 1/4 inch vertical space.
Operating Temperature Range	+5 to 45°C
Operating Humidity Range	20% to 90% without condensation
Power Requirements	105 to 125 vac, 60Hz, 75 watts
Weight	Approximately 50 pounds

1-5.2 SYSTEM CAPACITY

Cassette Transports per System	1, 2, or 3
Cassette Capacity	180,000 characters (300 ft tape) or 360,000 characters both sides of tape.
Character Length	Eight Bits
Record Length	Variable
File Length	Variable

1-5.3 CHARACTERISTICS

Bit Packing Density	550 bits per inch
Transfer Rate	500 characters per second synchronous, 0 to 400 characters per second asynchronous.
Tape Speed	Ten inches per second
Start Time	Fifteen milliseconds
Stop Time	Ten milliseconds
Inter Record Gap	0.25 inches
File Mark Gap	0.75 inches
Rewind Time	Less than 60 seconds EOT to BOT
Recording Technique	Diphase™
Error Detection	Longitudinal parity check by character
Error Rate	Less than two errors in 10 ⁸ bits
BOT/EOT	Photo Sensed
Electrical Interface	DTL/TTL compatible
Control Functions (Manual, Programmable)	Write, Read, Rewind, Halt, Search and Write File Mark
Deck Select (Manual, Programmable)	Deck 1,2,3, or off-line device
Device Select (Manual, Programmable)	On-Line, Off-Line

1-6 MODEL
DESCRIPTION

The DICOM 344 Cassette Magnetic Tape System is available in one, two or three tape transport models including two TTY options.

1-6.1 MODEL 344 (Three transport system)

The Model 344 includes a universal controller, front panel controls/indicators, power supply, rack/desk top mounting chassis, and installation kit. (TTY interface and 100 character buffer not included.)

1-6.2 MODEL 344-01 (Three transport system)

The Model 344-01 is a basic 344 with TTY interface included in the universal controller. (100 character buffer not included.)

1-6.3 MODEL 344-01-02 (Three transport system)

The Model 344-01-02 is a basic 344 with TTY interface included in the universal controller and 100 character buffer for asynchronous Off-Line communication with TTY.

1-6.4 MODEL 344-03 (Two transport system)

The Model 344-03 is a basic two transport system (field expandable to three transports) which includes a universal controller, front panel controls/indicators, power supply, rack/desk top mounting chassis and installation kit. (TTY interface and 100 character buffer not included).

1-6.5 MODEL 344-01-03 (Two transport system)

The Model 344-01-03 is a basic 344-03 with TTY interface included in the universal controller. (100 character buffer not included.)

1-6.6 MODEL 344-01-02-03 (Two transport system)

The Model 344-01-02-03 is a basic 344-03 with TTY interface included in the universal controller and 100 character buffer for asynchronous Off-Line communication with the TTY.

1-6.7 MODEL 344-04 (Single transport system)

The Model 344-04 is a basic single transport system (field expandable to two or three transports) which includes a universal controller, front panel controls/indicators, power supply, rack/desk-top mounting chassis and installation kit. (TTY interface and 100 character buffer not included.)

1-6.8 MODEL 344-01-04 (Single transport system)

The Model 344-01-04 is a basic 344-04 with TTY interface included in the universal controller. (100 character buffer not included.)

1-6.9 MODEL 344-01-02-04 (Single Transport system)

The Model 344-01-02-04 is a basic 344-04 with TTY interface included in the universal controller and 100 character buffer for asynchronous Off-Line communication with the TTY.

1-7 OPTION
DESCRIPTION

The DICOM 344 Cassette Magnetic Tape System is available with four options.

1-7.1 OPTION 01 -- Teletype Interface

Allows On-Line computer to Teletype/Teletype to computer communications only. (100 character buffer not included)

1-7.2 OPTION 02 -- 100 Character Buffer

Allows Off-Line tape deck to Teletype/Teletype to tape deck communications. Option 01 is required with this option.

1-7.3 OPTION 03

Two tape transport model, field expandable to three transports.

1-7.4 OPTION 04

Single tape transport model, field expandable to two or three transports.

1-7.5 DATAPAK CASSETTE

300 foot certified computer grade digital tape cassette.

1-7.6 ALIGNMENT CASSETTE

300 foot certified 5KHz frequency standard, computer grade tape cassette.

SECTION 2
INSTALLATION

SECTION 2

INSTALLATION

2-1 INTRODUCTION

This section describes the installation of the DICOM 344 at a customer's facility. The instrument dimensions are shown in Figure 2-1.

2-2 ENVIRONMENTAL REQUIREMENTS

The DICOM 344 will operate over a temperature range of +5 to +45°C and a humidity range of 20% to 90% without condensation. Positive airflow is required for proper cooling.

2-3 POWER REQUIREMENTS

The input power requirement for the DICOM 344 is 105 to 125 VAC 60± 6Hz. 75 ± 7.5 watts.

2-4 CABLE REQUIREMENTS

2-4.1 INTERFACE MATING CONNECTOR J27

The J27 mating connector is a Winchester #XAC50PC1A706, furnished by DICOM. The DICOM 344 requirements and outputs are defined in Section 4 (Interface). Individual Computer Interface will be supplied by the user.

2-4.2 OFF-LINE MATING CONNECTOR J28 (Option 01)

The J28 connector is a Winchester #XAC9PC1A706, furnished by DICOM. The interface with the Teleprinter is shown in the Interface section. The cable assembly will depend on the Off-Line device used.

2-4.3 POWER CABLE

The power cable is a three lead 115 VAC connector furnished by DICOM.

2-5 MOUNTING PROCEDURE

2-5.1 STANDARD RELAY RACK MOUNTING

The DICOM 344 is supplied with two rack mounting ears and can be mounted in a standard relay rack.

2-5.2 FREE STANDING

The DICOM 344 can be set on a table or desk-top without making any changes to the equipment; rubber feet are supplied in the installation kit with each unit.

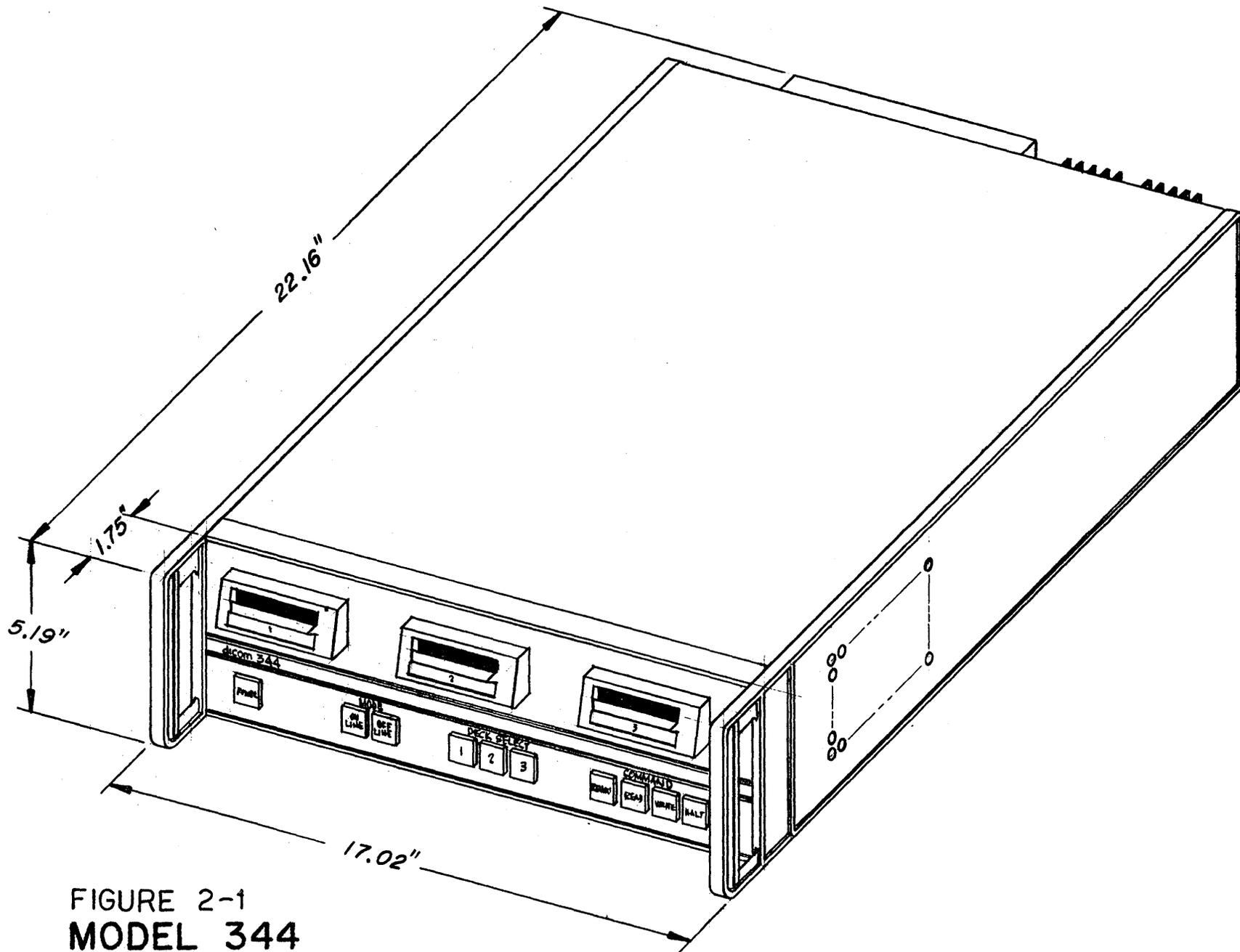


FIGURE 2-1
MODEL 344

SECTION 3
OPERATION

SECTION 3

OPERATION

3-1 INTRODUCTION

This section describes the basic machine operation and provides an easy reference for specific operating procedures. It also describes the front panel controls and indicators, operation of the ON-LINE and OFF-LINE modes, the four OFF-LINE command cycles, tape loading/unloading procedure, and cleaning procedure.

3-2 OPERATIONAL MODE DESCRIPTION

The DICOM 344 operates in two basic operating modes; ON-LINE and OFF-LINE.

3-2.1 ON-LINE MODE

When the MODE SELECT ON-LINE switch is depressed, the DICOM 344 will be put under control of the On-Line interface. All the front panel DECK SELECT and COMMAND switch/indicators will be disabled, except the OFF-LINE switch indicator. Subsequent control of the DICOM 344 will be determined by selected program. (Basic On-Line operation is described in Section 3-7).

3-2.2 OFF-LINE MODE

Depressing the MODE SELECT OFF-LINE switch enables the operator to select the desired cycle and tape deck by use of the front panel switches.

3-3 DEFINITION OF TERMS

3-3.1 OFF-LINE

A device (such as a Teleprinter) or mode capable of operating independently of computer control.

3-3.2 ON-LINE

A device (such as a computer) or mode capable of exercising control over the DICOM 344.

3-3.3 CHARACTER

The basic unit of recorded data in the DICOM 344. A character contains eight (8) bits and is recorded bit serially on tape.

3-3.4 RECORD

Since the DICOM 344 is designed to operate with a standard Teleprinter as the Off-Line device, a Record in this case is defined as a group of up to seventy-two (72)

characters. When operating in the Off-Line mode with the Teleprinter, End-of-Record is generated by receipt of the Carriage Return.

When operating with the On-Line device (such as a computer), a Record can contain any number of characters. End of Record is generated when the DICOM 344 has not received a new character for recording two milliseconds after requesting one. It should be noted that when preparing tapes with the On-Line device for subsequent playback to the Teleprinter, the maximum seventy-two characters (plus carriage return) length of record should be adhered to. If a Rub Out is contained in the Record, the Record will not output to the Teleprinter (see "Rub Out" below).

3-3.5 INTER-RECORD GAP

Records are separated on tape by a minimum 0.25 inch gap of blank tape; this gap is referred to as End-of-Record or Inter-Record Gap.

When operating with the On-Line device in the Read Mode, the selected deck stops on each Inter-Record gap; another Read Command is given to read the next record on tape. Inter-Record Gap, in the Write mode, is generated automatically by the DICOM 344 prior to writing the first character in a record.

3-3.6 FILE

When operating with the On-Line device, it is desirable to create various Files of data on the same tape. A File is defined as any number of characters in any number of records on a tape.

3-3.7 FILE GAP

A 0.75 inch gap of blank tape written on tape to define an End of File or a Beginning of File. (See "File Mark Record" below).

3-3.8 FILE MARK RECORD

A one or more character record written at the end of the File Gap which can be used to identify the preceding or subsequent file.

3-3.9 RUB OUT

When operating in the Off-Line mode with the Teleprinter, the detection of the Rub Out character will cause the contents of the buffer to be discarded. The Rub Out character (prior to the Carriage Return character) can

thus be used to delete an erroneous line of source data.

3-3.10 PARITY

The DICOM 344 employs a proprietary recording technique (DiphaseTM) which incorporates a longitudinal parity check by character. This parity check is dependent on two conditions: first, since data is recorded bit serially on tape, at least one flux reversal must occur each bit cell time; second, the total number of flux reversals in a character time must be an even number. If either of these conditions is not met, the Error Status bit is set.

3-3.11 BIT CELL TIME

The flux boundary on tape from the end of the preceding bit to the end of the present bit.

3-4 TAPE FORMAT

Figure 3-1 depicts a typical DICOM tape format in which data is recorded bit serially on tape.

The first and last six inches of tape are clear leader which allows Beginning-of-Tape (BOT) and End-of-Tape (EOT) sensing.

Data will not be written for the first ten inches of tape following the leader portion to insure that any spliced sections of tape have passed the READ/WRITE head. This inhibit function is done automatically by the DICOM hardware.

One or more Files of data can be recorded on tape. Each File will be preceded by a .75 inch File Gap and a File Mark. A File Gap and File Mark should never precede the first record on tape as the File Gap will not be detected.

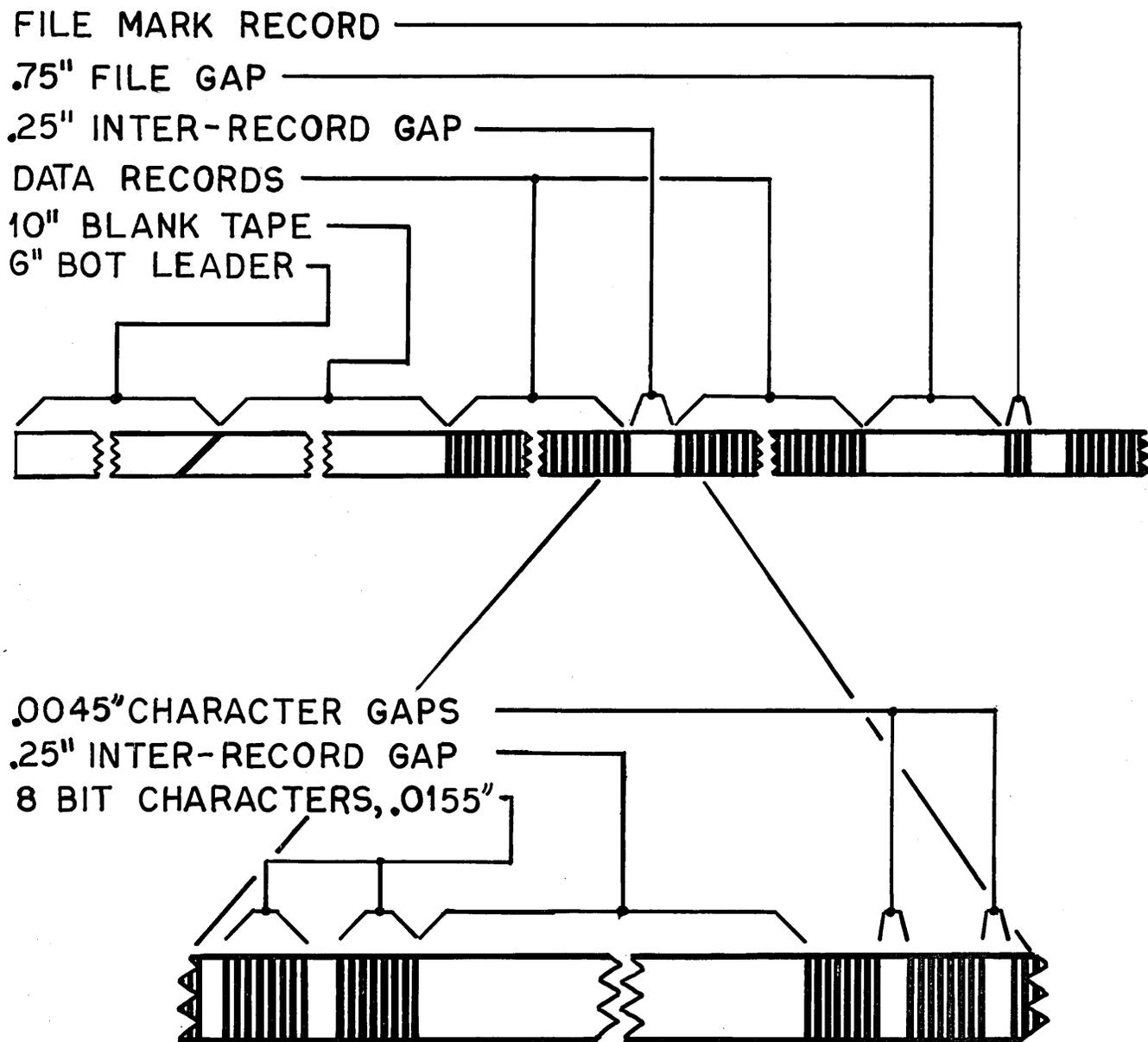
A File can contain one or more records. Each record will be separated by a .25 inch Inter-Record Gap of blank tape.

A Record can consist of one or more Characters. Each Character is .0155 inches in length. Characters are separated by a .0045 inch Character Gap of blank tape (approximately equal to 3 bit widths).

A Character consists of 8 bits. Each bit cell is .0018 inches in width.

FIGURE 3-1

TYPICAL TAPE FORMAT



	MINIMUM INCHES OF TAPE @ 10 ips	MINIMUM TIME
1 BIT CELL	.0018"	182 μ sec
8 BIT CHARACTER	.0155"	1.55 m sec
CHARACTER GAP	.0045"	450 μ sec
DATA RECORD	.020" X (n)	2.0 m sec X (n)
INTER-RECORD GAP	.25"	25 m sec
FILE GAP	.75"	75 m sec
FILE MARK RECORD	.020" X (n)	2.0 m sec X (n)

(n)=number of characters in a record

3-5 RECORDING TECHNIQUE

The DICOM 344 recording technique is a modified Manchester Technique (Phase encoded data) known as Diphase™.

3-5.1 MANCHESTER TECHNIQUE

The basic philosophy of the Manchester Magnetic Recording Technique is that the flux polarity on tape for a binary zero be opposite that of a binary one. This technique has two basic advantages over ordinary techniques:

- (1) The Definition between a binary one and a binary zero is easily determined.
- (2) Self Clocking of the read data due to the necessity of at least one flux change for each bit cell time. (See definition Section 3-3.11)

3-5.2 DIPHASe™ RECORDING TECHNIQUE

Figure 3-2 depicts a typical Write and Read sequence.

3-5.2.A WRITE SEQUENCE

The data to be written on tape is gated, by a 5.5 KHz Write Clock, into the WRITE DATA Flip-Flop. The Flip-Flop output is used to determine the direction of Flux on tape. The WRITE DATA Flip-Flop starts each character in the binary zero state and is always complemented at the beginning of each of the 8 bit cell times by the leading edge (negative going) of the Write Clock. The Data Bit is written on tape at half cell time by the trailing edge (positive going) of the Write Clock.

When a character is to be written on tape, the first tape flux change is always from a binary zero to a binary one. This first flux change is used as a starting reference point and is not considered as data. The primary flux change is accomplished by the WRITE DATA Flip-Flop being initially in the reset condition (binary zero) and then being complemented to a binary one by the leading edge of the Write Clock.

Half-way through the first bit cell time the first data bit to be written on tape is loaded into the WRITE DATA Flip-Flop by the trailing edge of the Write Clock. Since a zero is being written, the WRITE DATA Flip-Flop will complement again, causing a flux change

to the binary zero polarity at the half cell time. If the first bit to be recorded was a binary one, it would be loaded into the WRITE DATA Flip-Flop at half cell time, however, no flux change would occur since the Flip-Flop is already writing a binary one polarity on tape.

At the beginning of the second bit cell time, the WRITE DATA Flip-Flop is complemented by the Write Clock leading edge from the binary zero polarity to the binary one polarity. If the Flip-Flop were in the binary one polarity, it would change to the binary zero polarity (note that in either case a flux change at the beginning of the bit cell time always occurs).

At the beginning of the third bit cell time, the WRITE DATA Flip-Flop will again be complemented, in this case from a binary one to a binary zero.

The third data bit to be written (binary zero) will be loaded into the WRITE DATA Flip-Flop at half cell time. Since a binary zero is already being written from the beginning of the third bit cell time, no flux change will occur at half cell time.

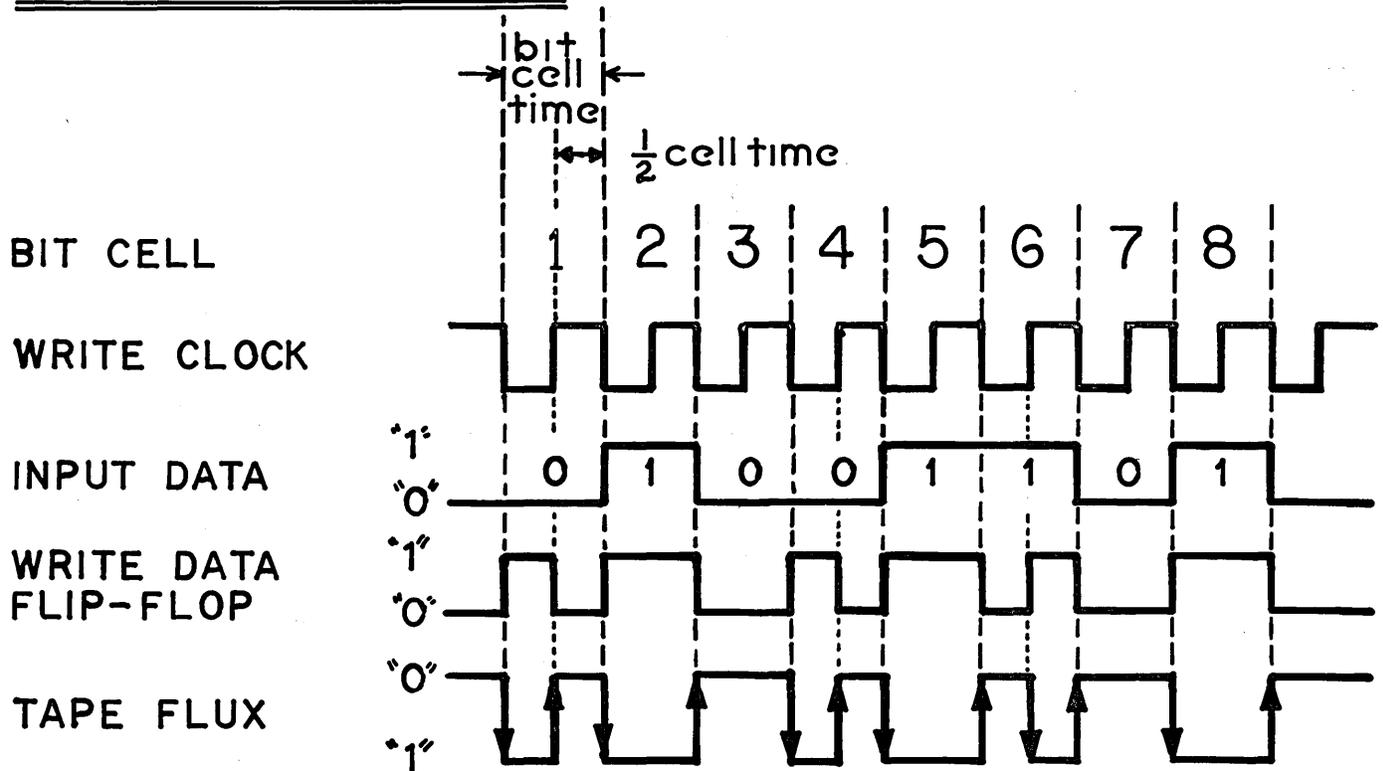
At the beginning of the fourth bit cell time, the WRITE DATA Flip-Flop is complemented from a binary zero to a binary one.

The fourth data bit to be written (binary zero) will be loaded into the WRITE DATA Flip-Flop at half cell time. In this case, the Flip Flop will be complemented from a binary one to a binary zero and a flux change will occur at half cell time.

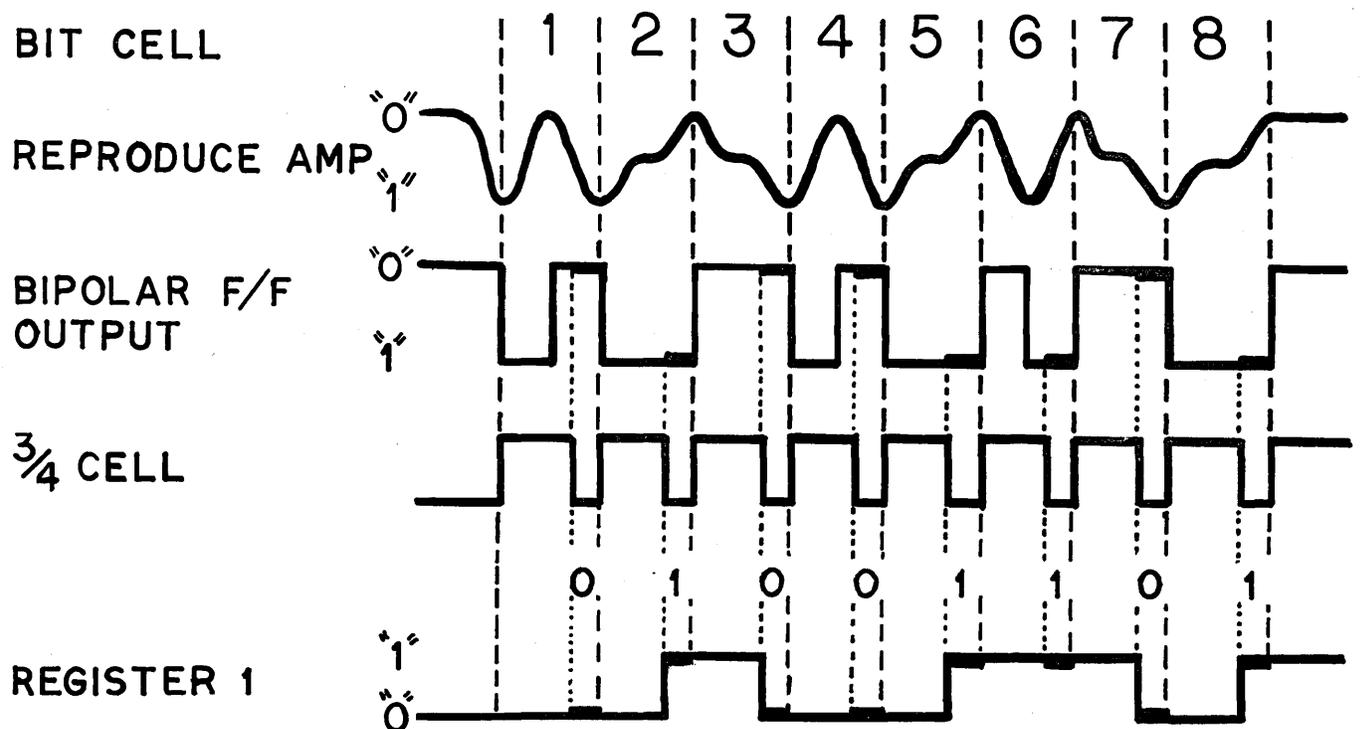
The above sequence will continue until the eight bit cell times are written on tape.

At the beginning of the ninth cell time the DICOM hardware automatically resets the WRITE DATA Flip-Flop to the binary zero polarity, regardless of the polarity of the previous bit cell time. Thus, the character will always begin and end with a binary zero polarity guaranteeing an even number of flux reversals.

FIGURE 3-2
 DIPHASE^(TM) RECORDING TECHNIQUE
WRITE SEQUENCE



READ SEQUENCE



3-5.2.B READ SEQUENCE (Refer to Read Sequence Figure 3-2.)

Each Flux reversal on tape sensed by the Read/Write head is amplified by the Reproduce Amplifier. Each flux reversal causes a polar change in the output of the Reproduce Amplifier which is presented to the input of a Bipolar Flip-Flop. The Bipolar Flip-Flop will set with a positive input corresponding to a binary one and reset with a negative input corresponding to a binary zero.

Two polar peaks occurred during the first bit cell time. The first peak is sensed by the Bipolar Flip-Flop which changes states from an initial binary zero state (reset) to the binary one state. This first change of state signifies the beginning of the first bit cell time of an eight bit character on tape. The second peak causes the Bipolar Flip-Flop to complement to the binary zero state at half cell time, signifying a binary zero data bit was written on tape (character bit one).

The next polar peak causes the Bipolar Flip-Flop to complement again (from a binary zero to a binary one), signifying the start of the second bit cell time. Since another polar peak does not occur until the beginning of the third bit cell time, the Bipolar Flip-Flop does not complement again during the second bit cell time.

No polar peak occurred at half cell time; hence, the Bipolar Flip-Flop remained at a binary one level. This signifies a binary one was written on tape during bit cell time two (character bit two). This sequence is continued until the end of the eighth cell time, where no further polar peaks are sensed from the Reproduce Amplifier. Flux changes will not be sensed again until the start of the next character.

The first polar peak (start of bit cell one) also triggers a one-shot that times out for approximately 124μ seconds. A full bit cell time is 182μ seconds; therefore, the 124μ second one-shot time out is designated as $3/4$ bit cell time. When the $3/4$ cell one-shot times out (goes false), the output is gated with the Bipolar Flip-Flop output and sent to the input of Register 1 (Input Register). The Bipolar Flip-Flop output to Register 1 is disabled until the $3/4$ cell one-shot times out, and the last quarter of the bit cell time (approximately 58μ seconds) is sampled for output. This operation masks any Bipolar Flip-Flop state reversal during $1/2$ cell time. Register 1 is initially reset (binary "0"), therefore, the binary 0 gated at $3/4$ cell time does not change the contents of Register 1. Register 1 is always shifted at the end of each $3/4$ cell time.

The peak polarity reversal at the start of the second bit cell time triggers the 3/4 cell one-shot again, which times out for approximately 124 μ seconds (3/4 of a bit cell time). The Bipolar Flip-Flop output for bit cell two (binary "1") will be gated to the input of Register 1 which will then complement from binary zero to binary one. This sequence will continue until bit cell 8 is sampled.

3-5.2.C ERROR DETECTION

Error detection is performed by two methods.

The first method is a longitudinal parity check for an even number of flux reversals occurring during the character read from tape. If an odd number of flux reversals is sensed, an ERROR signal (ERROS-1) is set true.

The second method checks for exactly eight bit cell times to occur during one character read from tape. If more or less than eight bit cell times are encountered, the ERROR signal (ERROS-1) is again set true.

3-6 CONTROLS AND INDICATORS

A description of the DICOM 344 front panel switches is contained in table 3-1 below.

TABLE 3-1

NOMENCLATURE	FUNCTION
POWER	Applies 115 VAC Power to the DICOM 344.
<u>MODE SELECT</u>	
ON-LINE	<ol style="list-style-type: none"> 1. Selects the On-Line mode of operation. 2. All front panel switches (except Off-Line and Power) will be disabled. 3. All front panel indicators will be controlled from the On-Line device.
OFF-LINE	<ol style="list-style-type: none"> 1. Selects the Off-Line mode of operation. 2. Front panel DECK SELECT and COMMAND switches are enabled for local control.
<u>DECK SELECT</u>	Note: The remaining switches can only be entered from the OFF-LINE HALT mode.
1	The left deck will be selected
2	The center deck will be selected
3	The right deck will be selected
<u>COMMAND</u>	
REWIND	The selected deck will enter the REWIND cycle.
READ	The selected deck will enter the READ cycle.

NOMENCLATURE	FUNCTION
WRITE	The selected deck will enter the WRITE cycle.
HALT	<ol style="list-style-type: none">1. Clears any OFF-LINE cycle in progress.2. DICOM 344 will enter the HALT cycle. <p>Note: Before any new cycle can be executed, the DICOM 344 must be in HALT.</p>

3-7 OFF-LINE CYCLE OPERATION

The OFF-LINE cycles available on the DICOM 344 are the HALT, REWIND, READ, WRITE, OFF-LINE SEARCH and OFF-LINE FILE GAP.

NOTE: When the OFF-LINE device used is an ASR33, ASR35, KSR33, or KSR35, the LINE/OFF/LOCAL switch on the Teleprinter must be in the LINE position.

3-7.1 HALT CYCLE

The HALT cycle can be selected manually by depressing the HALT switch or automatically at the completion of a REWIND or SEARCH cycle. HALT will clear any OFF-LINE cycle in progress and enable the operator to make a new deck selection or a new cycle selection. The only time an OFF-LINE deck selection or an OPERATIONAL COMMAND cycle selection can be made, is after the HALT cycle has been entered.

3-7.2 DECK SELECTION

When operating OFF-LINE in the HALT cycle, the operator may select Deck 1, 2, or 3 by depressing their respective switches. The selected deck will be under control of the COMMAND switches.

3-7.3 REWIND CYCLE

A REWIND cycle will occur if the REWIND switch is depressed and one of the three deck select switches is illuminated. If none of the DECK SELECT switches are illuminated, the operator should select HALT - Deck 1, 2, or 3 and then select REWIND. The selected deck will rewind at a rate of approximately 50 ips until the supply reel has accumulated all the tape and the leader tape is encountered. When the leader tape is encountered, the tape will stop, the READY light above the deck that was rewound will illuminate, and the HALT cycle will be entered.

3-7.4 WRITE CYCLE

The DICOM 344 will enter the WRITE cycle when the WRITE switch is depressed. No tape motion will take place unless the tape is at the BOT leader. If the tape is at BOT when WRITE is selected, it will drive forward at 10 ips for 10 inches past the leader portion, then stop. After the tape has stopped, the OFF-LINE device will be used to supply the 100 character MOS buffer (Option 01-02). The data is transferred asynchronously from the OFF-LINE device and accumulated by the MOS buffer until the operator selects carriage return on the OFF-LINE device (if a Teleprinter is used, up to 72 characters plus Line Feed and Carriage Return can be loaded). At this

point tape motion will begin and the MOS buffer will supply one character at a time to be recorded. When all the data from the buffer has been stored on tape, tape motion will stop; however, the unit will remain in the WRITE cycle until the HALT switch is depressed or the end of the tape is encountered.

3-7.5 READ CYCLE

Depressing the READ switch in the proper operating sequence will cause the selected deck to enter a READ cycle. In this cycle, the selected deck supplies the 100 character MOS Buffer (Option 01-02) until a unique code (ASCII, Carriage Return) is detected. Upon receipt of this code, the buffer will unload one character at a time to the Off-Line device. The DICOM 344 will continue to READ records until a FILE GAP and FILE MARK record is encountered, the HALT switch is depressed, or the end of tape is encountered.

If no carriage return code is received, or if the carriage return code is received after 98 characters have been accumulated (maximum MOS storage), the buffer will not unload into the Off-Line device.

3-7.6 OFF-LINE WRITE FILE GAP

The Off-Line Write File Gap cycle is entered by depressing both the OFF-LINE switch and the WRITE switch at the same time. The WRITE and HALT lamps will glow .75 seconds, indicating that the FILE GAP is being written. At the end of this time, tape motion will cease and the HALT lamp will extinguish, but the selected deck will remain in Write waiting for the File Mark record to be written. This cycle is terminated in the same manner as the Write cycle; (either the HALT switch is depressed or End-of-Tape is encountered).

3-7.7 OFF-LINE SEARCH CYCLE

The Off-Line Search cycle is entered by depressing both the OFF-LINE switch and the READ switch at the same time. The Read mode will be entered for the first record. There will be no data transferred from the 100 character Buffer to the Off-Line device. Upon the completion of reading the first record, the READ and HALT lamps will glow simultaneously, indicating that there was more than one record in the File. The selected deck will continue to move tape in the forward direction at 10 ips without data transfers to the Off-Line device until a File Gap, followed by a File Mark Record, is encountered, or until the HALT switch is depressed. Upon detection of a File Gap, the selected tape deck will pass over the File Mark Record and stop with the Read/Write head positioned in the Inter-Record Gap, following the File Mark Record.

The File Mark Record will not be transferred to the Teleprinter.

3-8 ON-LINE OPERATION

The DICOM 344 is capable of operating in five basic On-Line modes of operation; WRITE, WRITE FILE GAP, READ, SEARCH, and REWIND.

3-8.1 WRITE MODE

Upon command to enter the WRITE mode, the DICOM 344 will drive tape forward at 10 ips. After passing the clear leader and the first 10 inches of oxide, the data records presented by the On-Line device will be written on tape by the DICOM 344. At the completion of each data record transfer, tape motion will cease with the Read/Write head positioned in the Inter-Record Gap. The Write command must be initiated each time a new data record is to be written. (A detailed explanation of the Write cycle is contained in Section 4-4.5.)

3-8.2 WRITE FILE GAP MODE

Two different WRITE FILE GAP modes are available in the DICOM 344. The selection as to which mode should be used is a programming option.

OPTION 1: File Gap followed by a File Mark Record (see Definition of Terms, Section 3-3.7 and 3-3.8). To enter this mode, the Write Command (WRITC-1), File Mark Command (FLMKC-1) and the Command Strobe (CMDT-1) must be issued simultaneously. Upon receipt of the Write File Gap mode commands, the DICOM 344 will accept two characters, drive tape forward and write .75 inches of blank tape (File Gap). Upon completion of writing the File Gap, the DICOM 344 will accept further characters and write the data record from the On-Line device to be used as the File Mark Record. The DICOM 344 will cease tape motion with the Read/Write head positioned in the Inter-Record Gap upon completion of the record transfer. This option allows the operator to identify the preceding or succeeding File. The above sequence is a combination of two modes of operation: WRITE FILE GAP (which writes the File Gap) and WRITE (which writes the File Mark Record). A detailed explanation of WRITE FILE GAP is contained in Section 4-4.6.

OPTION 2: File Gap only (see Definition of Terms in Section 3-3.7). The DICOM 344 will drive tape forward and write .75 inches of blank tape upon receipt of the command to enter the Write File Gap mode. Upon completion of writing the File Gap, tape motion will cease and the DICOM 344 will then be ready to accept a new command. (A detailed explanation is contained in Section 4-4.6.)

3-8.3 READ MODE

The DICOM 344 will drive tape forward at 10 ips, upon command to enter the READ mode. The first DATA Record on tape will be read and presented to the On-Line interface. Upon reaching an Inter-Record Gap, tape motion will cease with the Read/Write head positioned in the Inter-Record Gap. The DICOM 344 will then be ready to accept another command. A Read operation should not be attempted immediately after a Write operation, since the data written (including the associated Inter-Record Gap) may have partially overlaid a previously recorded character will have been partially erased and, therefore, become invalid.

3-8.4 SEARCH MODE

The SEARCH mode can operate in two configurations, depending upon whether a File Gap followed by a File Mark Record, or a File Gap only, was written on tape (refer to WRITE FILE GAP Mode, Section 3-8.2).

In the Search Mode using the File Gap followed by a File Mark Record configuration, the DICOM 344 reads across Record boundaries until a File Gap is detected. It then reads the File Mark Record and terminates tape motion in the Inter-Record Gap following the File Mark Record.

In the Search Mode using the File Gap only configuration, the DICOM 344 reads across Record boundaries until a File Gap is detected. Tape motion terminates in the first Inter-Record Gap after the File Gap, unless a Halt Command is issued upon sensing the File Gap. This will terminate tape motion with the Read/Write head positioned somewhere in the File Gap.

3-8.5 REWIND MODE

The On-Line device can, prior to initiation or upon completion of a Read or Write sequence, place any or all of the decks in the Rewind mode and then select a particular deck or the TTY for a Read/Write sequence. The decks that were placed in the Rewind Mode will rewind to Beginning-of-Tape and stop automatically upon reaching the clear leader portion of tape. A Halt command can be issued to terminate Rewind at any time.

NOTE: The On-Line device can select any one of the three tape decks or the Teleprinter for operation; however, only one deck or the TTY can be communicating with the On-Line device at a given time. Once a Read or Write sequence is initiated on a particular deck or the TTY, the sequence must be completed before another deck or the TTY is selected and given a command. (A detailed explanation of the On-Line cycle is contained in Section 4-4.)

3-9 TAPE LOADING/
UNLOADING
PROCEDURE

3-9.1 TAPE LOADING

The DICOM cassette should be placed with the cassette tape opening to the right and in position with the label facing up. The cassette must be inserted into the loader opening until it has locked in place. The operator should then place his thumb on the deck loader lip and depress the deck down in a steady swift motion. When the tape is engaged, the cassette will automatically enter a rewind cycle until the leader is detected. When the leader is detected, the unit will enter the HALT cycle and the READY indicator will illuminate.

3-9.2 TAPE UNLOADING

To avoid tape damage, cassettes are automatically rewound prior to unloading. To unload a cassette, the operator should press up on the lever at the bottom of the deck loader lip. The deck will then rewind until the BOT leader on tape is reached. Pressing the lever again will cause the deck to pop to the up position and the cassette will be ejected.

NOTE: The cassette cannot be removed from the DICOM 344 unless the cassette is on the clear leader portion of tape.

SECTION 4
INTERFACE

SECTION 4

INTERFACE

4-1 INTRODUCTION

The DICOM 344 is designed for ease of interface and system integration. All time critical control functions normally associated with magnetic tape controllers are accomplished internal to the DICOM 344, and a straightforward interface is presented to the system designer. The various modes of operation are selected by the On-Line device, and the DICOM 344 responds to the commanded mode by presenting the appropriate status line to the On-Line device.

The interface consists of an eight-bit input data buss, an eight-bit output data buss, eight command lines, eight status lines and four strobe lines. Two additional control lines are provided for establishing a quiescent condition and for Off-Line Mode selection. Four additional status lines are provided for sensing the Off-Line condition and the Leader/Oxide or Rewind status on an individual deck basis.

4-2 ON-LINE INTERFACE CONNECTOR

This section describes the DICOM 344 Logic Convention, On-Line Interface lines and cable receivers and drivers.

4-2.1 LOGIC CONVENTION

The DICOM 344 employs DT μ L circuitry and the interface operates on Negative True Logic. ie; A logic "1" is defined as 0 to + 0.5 Vdc and a logic "0" is defined as a +2.5 to + 5Vdc.

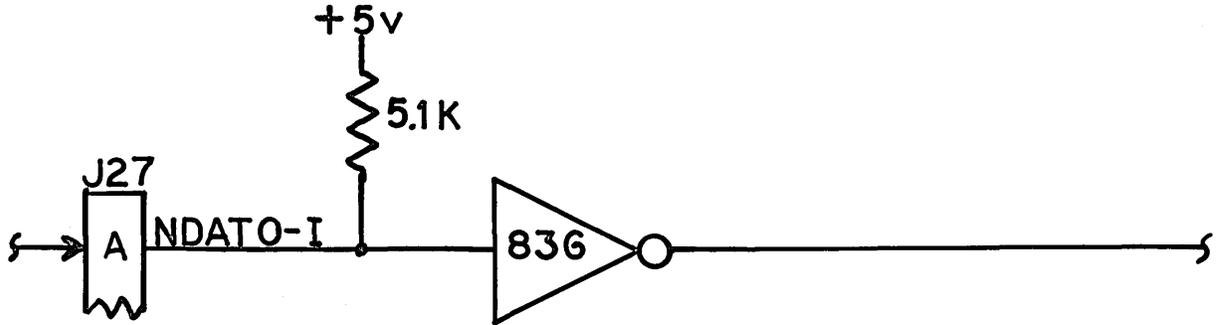
4-2.2 INTERFACE CABLE CHARACTERISTICS

The Interface Cable Receiver (shown in Figure 4-1) is a HEX INVERTER of the Motorola 836 series and is compatible with a DTL or TTL interface. The receiver presents a maximum input loading factor of one. The interface input logic signals must be negative true.

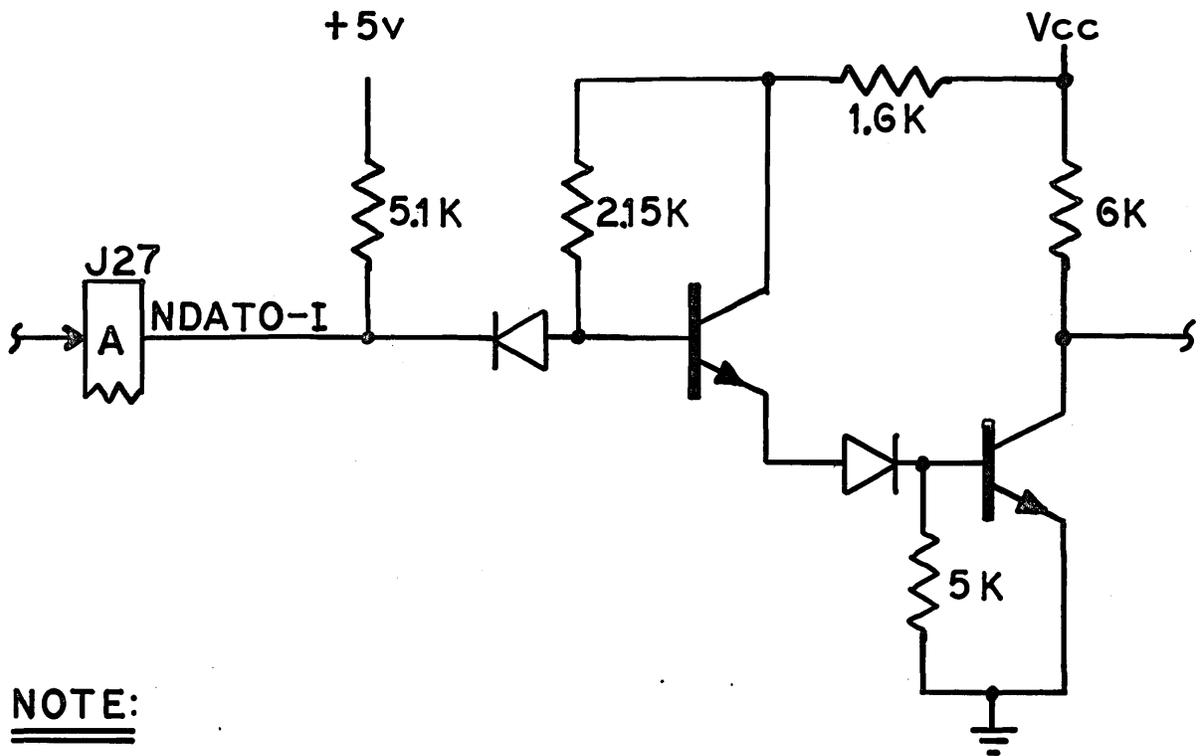
The Interface Cable Driver is a NAND power gate of the Motorola 858 series, and is compatible with a DTL or TTL Interface. This driver can be collector-tied with another driver to produce a negative-logic OR function output. The DICOM 344 inputs will be negative true logic levels.

FIGURE 4-1

DICOM 344 INTERFACE CABLE RECEIVER



836 EQUIVALENT CIRCUIT



NOTE:

0 vdc = Logic 1
+5 vdc = Logic 0

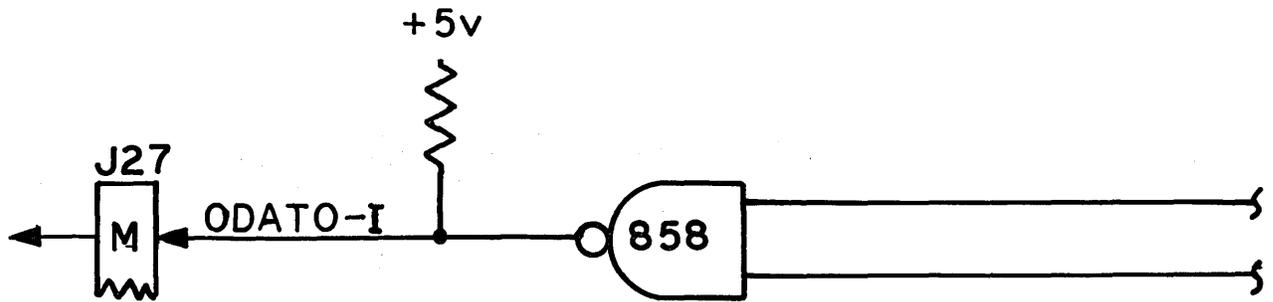
The Interface Cable may be any length up to a maximum of fifteen feet, and should be twisted pairs to insure minimum noise on the interface leads.

The user is required to provide the external pull-up register.

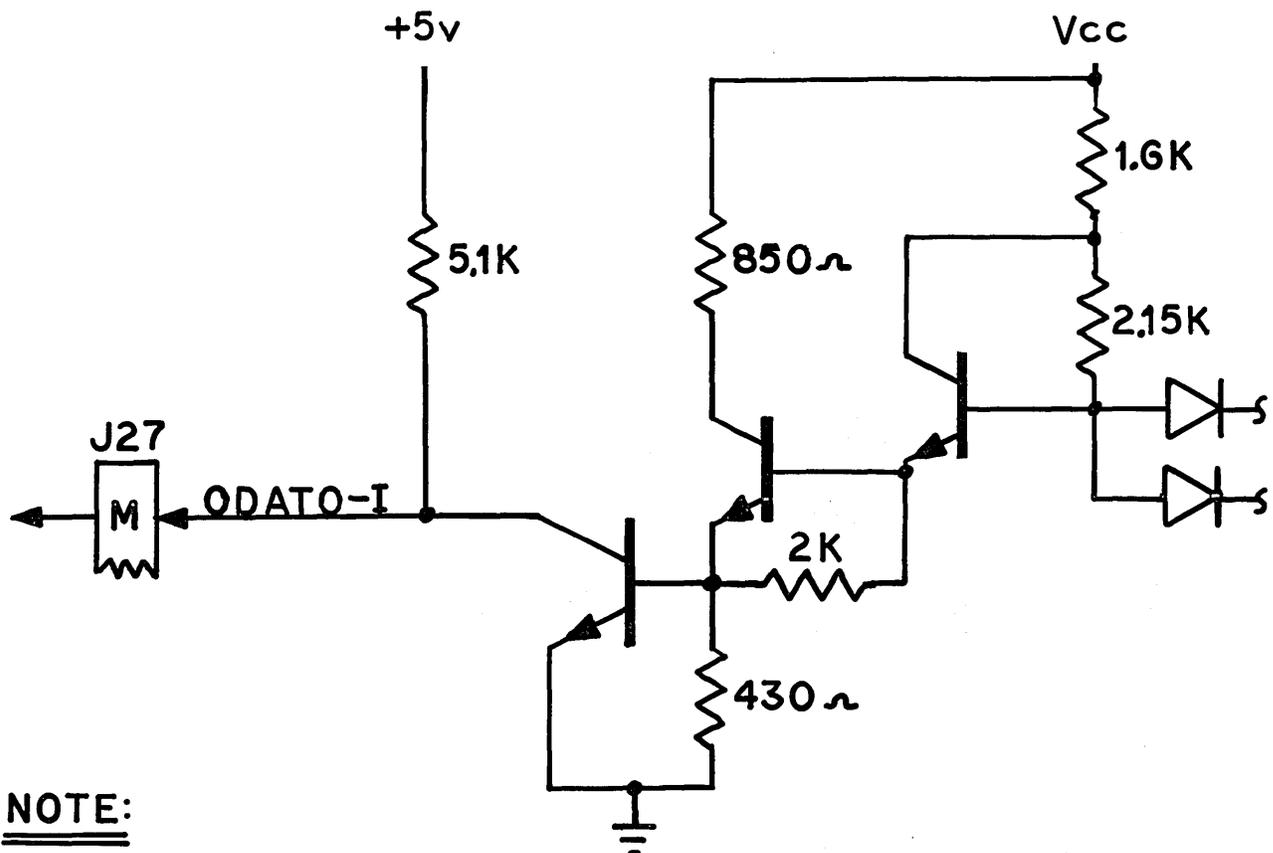
A typical internal DICOM Interface is depicted in Figures 4-2 and 4-3.

FIGURE 4-2

DICOM 344 INTERFACE CABLE DRIVER



858 EQUIVALENT CIRCUIT

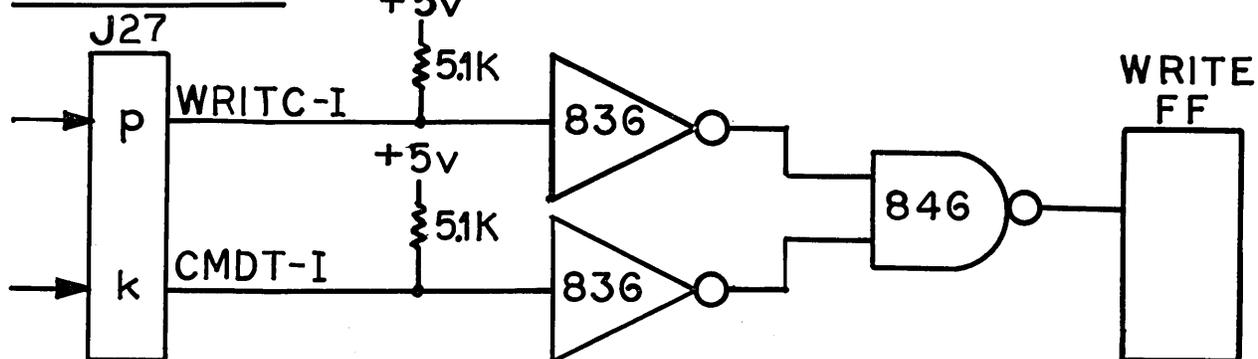


NOTE:

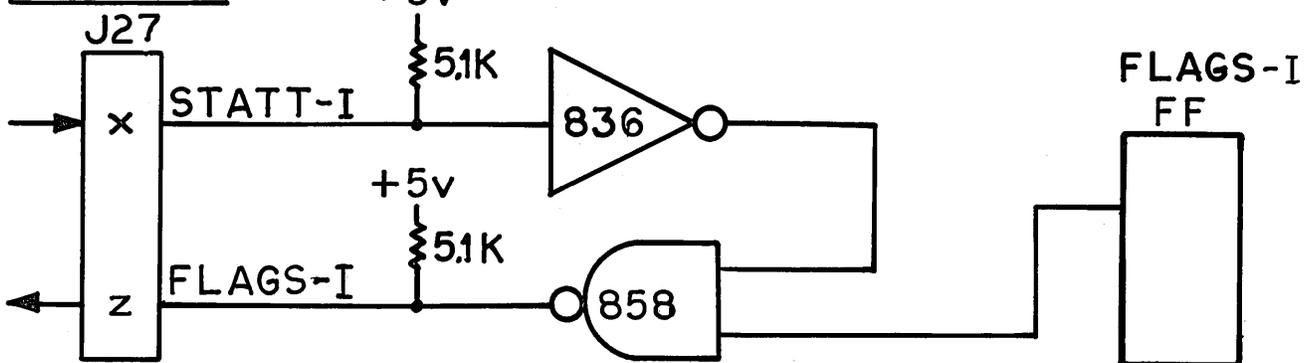
0 vdc = Logic 1
+5 vdc = Logic 0

FIGURE 4-3 TYPICAL DICOM 344 INTERFACE

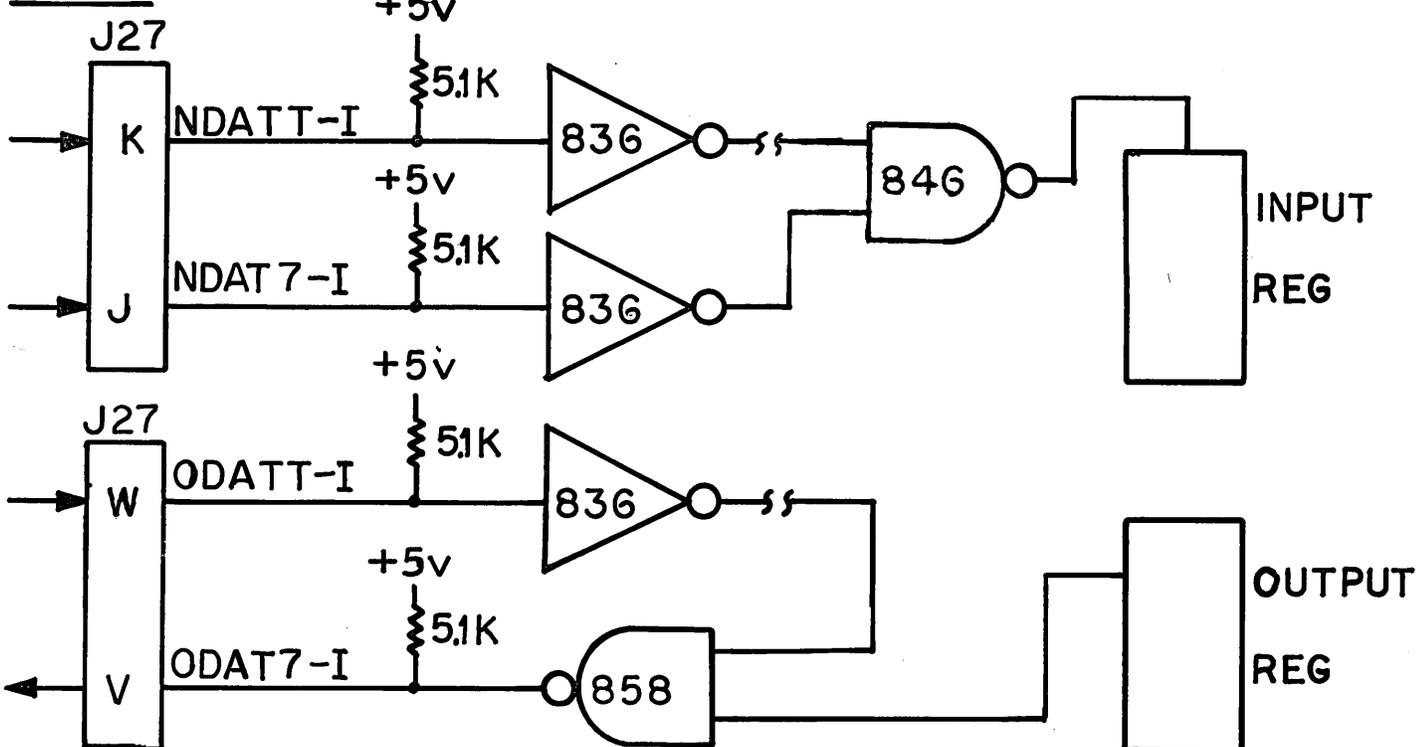
COMMAND



STATUS



DATA

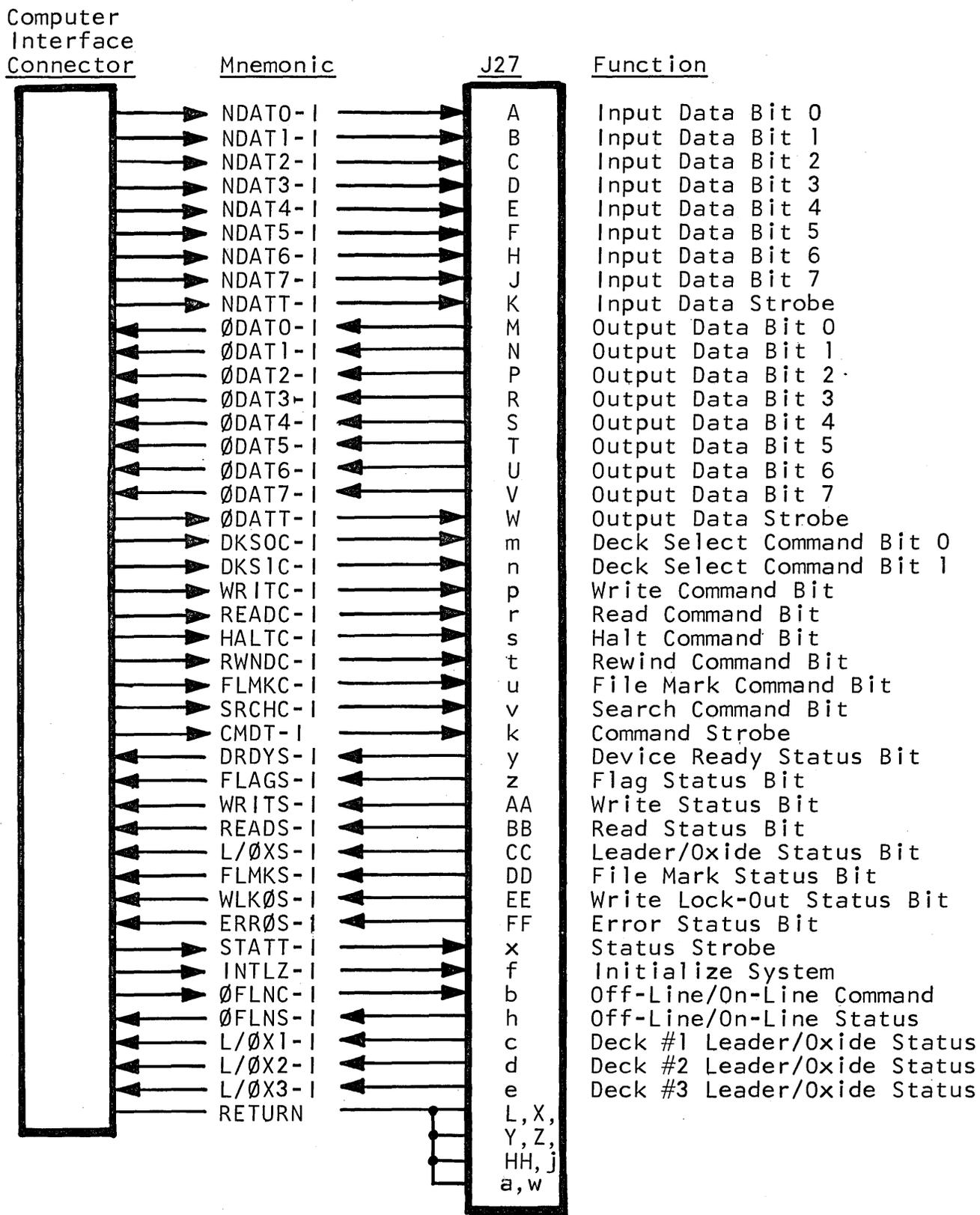


4-2.3 ON-LINE INTERFACE CONNECTOR J27

The J27 mating connector is a Winchester XAC50PC1A706 (furnished by DICOM). Figure 4-4 depicts the DICOM 344 input and output lines for the On-Line device. The mnemonic callouts on Figure 4-4 are defined in Table 4-1.

FIGURE 4-4

DICOM 344 ON-LINE INTERFACE CONNECTOR (J 27)



J27 mating connector is a Winchester XAC5ØPC1A7Ø6 (furnished by Dicom).

TABLE 4-1

DICOM 344 INTERFACE LINES

MNEMONIC	FUNCTION	DESCRIPTION															
NDAT0-1 thru NDAT7-1	8 PARALLEL DATA INPUT LINES	NDAT0-1 is the least significant bit. These input data lines must be stable during NDATT-1, and represent the character to be recorded on tape.															
NDATT-1	INPUT DATA STROBE	Used to strobe the NDAT(n)-1 lines into the DICOM 344. NDATT-1 must be at least 500 nanoseconds, but less than two milliseconds in duration; NDAT(n)-1 are sampled during NDATT-1. (See Section 4-2.4.A and 4-2.4.B)															
ODAT0-1 thru ODAT7-1	8 PARALLEL DATA OUTPUT LINES	ODAT0-1 is the least significant bit. These output data lines are stable during ODATT-1, and represent the character just read from tape.															
ODATT-1	OUTPUT DATA STROBE	Used to strobe the ODAT(n)-1 lines out of the DICOM 344. ODATT-1 must be at least 500 nanoseconds, but less than two milliseconds in duration. ODATT-1 also indicates to the DICOM 344 that the output character has been accepted by the computer. (See Section 4-2.4.C)															
DKS0C-1 and DKS1C-1	DECK SELECT COMMAND LINES ZERO AND ONE	<p>The binary configuration of these two lines designates one of the four possible devices for communication with the On-Line device as follows:</p> <table border="1"> <thead> <tr> <th>DKS0C-1</th> <th>DKS1C-1</th> <th>Deck Selected</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0 (TTY)</td> </tr> <tr> <td>0</td> <td>1</td> <td>Deck 1</td> </tr> <tr> <td>1</td> <td>0</td> <td>Deck 2</td> </tr> <tr> <td>1</td> <td>1</td> <td>Deck 3</td> </tr> </tbody> </table>	DKS0C-1	DKS1C-1	Deck Selected	0	0	0 (TTY)	0	1	Deck 1	1	0	Deck 2	1	1	Deck 3
DKS0C-1	DKS1C-1	Deck Selected															
0	0	0 (TTY)															
0	1	Deck 1															
1	0	Deck 2															
1	1	Deck 3															

TABLE 4-1 (Cont'd)

MNEMONIC	FUNCTION	DESCRIPTION
WRITC-1	WRITE COMMAND	A logic one on this line places the selected deck in the Write Mode, and the deck is driven up to speed.
READC-1	READ COMMAND	A logic one on this line places the selected deck in the Read Mode, and the selected deck is driven up to speed.
HALTC-1	HALT COMMAND	A logic one on this line stops the selected deck. The Halt command is normally used only in the Rewind, Search, and Deck 0 Read modes. In the Read mode the selected deck stops automatically upon detection of the Inter-Record Gap, therefore, a Halt Command is unnecessary. It is also unnecessary in the Write mode, as the selected deck stops automatically when data is no longer transmitted from the On-Line device.
RWND-1	REWIND COMMAND	A logic one on this line causes the selected deck to rewind to Beginning-of-Tape, or until a Halt Command is issued to the same deck (See note 1).
FLMKC-1	FILE MARK COMMAND	A logic one on this line causes the DICOM 344 to write a File Mark Gap on tape of the selected deck (See note 1).
SRCHC-1	SEARCH COMMAND	A logic one on this line causes the DICOM 344 to search for a File Mark Gap. Upon detection of a File Mark Gap, the FLMKS-1 status bit is set true and upon entering an Inter-Record Gap, the deck ceases motion (See note 1).

NOTE: If the Deck Select lines equal zero (Teleprinter selected) the following lines have no meaning; RWND-1, FLMKC-1, SRCHC-1, L/OXS-1, FLMKS-1 and WLKOS-1. The Teleprinter is controlled via the standard Teleprinter control codes.

TABLE 4-1 (Cont'd)

MNEMONIC	FUNCTION	DESCRIPTION
CMDT-I	COMMAND STROBE	Used to strobe the command lines into the DICOM 344. CMDT-I must be at least 500 nanoseconds in duration; the command bits are loaded on the leading edge of CMDT-I, and are executed on the trailing edge. The command bits must be stable during CMDT-I. (See Section 4-2.4.B)
DRDYS-I	DEVICE READY STATUS	The Device Ready Status line is set true if the DICOM 344 is On-line, has a cassette loaded in the selected deck, the selected deck loader is in the down and locked position, and none of the three decks is presently executing a forward motion command. DRDYS-I will go false upon receipt of the Write, Read, Write File Gap or Search Commands to the selected deck or the Read or Write Commands to the TTY. When DRDYS-I is false, the DICOM 344 is not capable of receiving another command (other than the Halt command in the Rewind or Search modes). Upon receipt of a Rewind Command, DRDYS-I will be effected only by the deck selected to rewind, all other decks and the TTY are capable of receiving commands.
FLAGS-I	FLAG STATUS	The Flag Status line is set true each time the DICOM 344 is ready for a data transfer. In the Write mode, FLAGS-I is set true when the DICOM 344 is ready to accept a new character for recording. FLAGS-I is set false when the On-Line device transfers a character to the DICOM 344. If the On-Line device does not transfer a character within two milliseconds of FLAGS-I being set true, the DICOM 344 automatically stops tape motion.

TABLE 4-1 (Cont'd)

MNEMONIC	FUNCTION	DESCRIPTION
<p>FLAGS-1 (Cont'd)</p>		<p>In the Read mode FLAGS-1 is set true when the DICOM 344 has a new character available for transfer to the On-Line device. When the On-Line device accepts the character FLAGS-1 is set false. If the On-Line device fails to accept the character within two milliseconds of FLAGS-1 being set true, the ERROR status bit (ERROS-1) is set true and the character not transferred to the On-Line device remains in the Output Data Register until a transfer is effected, ie: (an ODATT-1 is received by the DICOM 344).</p> <p>When the On-Line device has the Teleprinter (Deck Select bits=0) selected, FLAGS-1 is used for communication with the Teleprinter. When transferring to the Teleprinter, FLAGS-1 is set true when the Teleprinter is ready to receive another character, and is set false while the DICOM 344 is transmitting the character to the Teleprinter. When transferring from the Teleprinter, FLAGS-1 is set true when the DICOM 344 has a character available, and is set false when the On-Line device accepts the character.</p>
<p>WRITS-1</p>	<p>WRITE STATUS</p>	<p>The Write Status line is set true when the selected deck is commanded to the Write Mode, and is set false when data transfers are completed. The Write Status line is also set true when the selected deck is commanded to the File Mark Mode, and is reset when the File Mark Gap has been written.</p>

Table 4-1 (Cont'd)

MNEMONIC	FUNCTION	DESCRIPTION
READS-I	READ STATUS	The Read Status line is set true when the selected deck is commanded to the Read or Search Mode, and is set false upon detection of an Inter-Record Gap.
L/OXS-I	LEADER/ OXIDE STATUS	The Leader/Oxide Status line is set true when the clear leader portion of tape is under the head of the selected deck (this indicates that the cassette is at either Beginning-of-Tape or End-of-Tape). L/OXS-I is set false when Oxide is under the head of the selected deck (see note 1).
FLMKS-I	FILE MARK STATUS	The File Mark Status line is set true when the DICOM 344 detects a File Mark Gap on tape in the Search or Read Modes. The File Mark Status line is set false at the end of the Read or Search cycle (see note 1).
WLKOS-I	WRITE LOCK-OUT STATUS	The Write Lock-Out Status line is set true if the Write Lock-Out (file protect tab) is missing on the cassette in the selected deck, or if there is no cassette loaded in the selected deck. A Write Command will be totally ignored if this status bit is true.
ERROS-I	ERROR STATUS	The Error Status line is set true if the DICOM 344 detects an error in a character read from tape; that is, if a bit is lost when assembling a character (longitudinal parity check error). The ERROR Status line is also set true if the On-Line device fails to accept the new character within two milliseconds of FLAGS-I being set true. The Error Status line is set false when another command is received or at the end of a Search command.

TABLE 4-1 (Cont'd)

MNEMONIC	FUNCTION	DESCRIPTION
STATT-1	STATUS STROBE	Status Strobe is used to strobe the status lines out of the DICOM 344. STATT-1 must be at least 500 nanoseconds in duration, STATT-1 is not gated by CMDT-1. (See Section 4-2.4.D)
INTLZ-1	INITIALIZE SYSTEM	Initialize System is used to place the DICOM 344 in a quiescent condition. The On-Line mode Deck Select zero (Off-Line device) and HALT is selected; all status bits except DRDYS-1 are set false. INTLZ-1 is not gated by CMDT-1, therefore, must be at least 500 nanoseconds in duration.
OFLNC-1	OFF-LINE COMMAND	A logic one on this line causes the DICOM 344 to be placed in the Off-Line mode in the condition (Read mode, Write mode, or Halt mode) it was in prior to the Off-Line Command. OFLNS-1 is also set true. OFLNC-1 must be at least 500 nanoseconds in duration.
OFLNS-1	OFF-LINE STATUS	Off-Line Status line is set true if the DICOM 344 is in the Off-Line mode, and is set false if in the On-Line mode. OFLNS-1 is dynamic, i.e. it is not gated by STATT-1.
L/OX1-1 L/OX2-1 and L/OX3-1	LEADER/ OXIDE DECK 1, DECK 2, and DECK 3	These lines are available to indicate the status of Leader/Oxide on an individual deck basis; they are set true when the respective deck has Leader under the Read/Write head, and are set false when the respective deck has Oxide under the Read/Write head. These lines are dynamic, i.e. they are not gated by STATT-1. These lines can be optionally implemented to indicate Rewind status on an individual deck basis (See Section 4-2.4.E).

4-2.4 INTERFACE SIGNAL MODIFICATIONS

In some applications of the DICOM 344 as a computer peripheral, it may be desirable to perform certain easily performed modifications to the interface signals. The following is an explanation of the modifications available:

4-2.4.A In some applications it may be desirable to tie NDATT-1 and ODATT-1 together, thus requiring only one strobe source for the data transfers. This could be accomplished in the computer interface hardware, or by a jumper between pins K and W on J27 and using only one pin as an input.

4-2.4.B In other computer peripheral applications, it may be desirable to tie NDATT-1 and CMDT-1 together, thus requiring only one strobe source for input data transfers and command transfers; in this case, the strobe must be at least 500 nanoseconds, but less than two milliseconds in duration. This could be accomplished in the computer interface hardware or by a jumper between pins K and k on J27 using only one pin as an input.

NOTE: If this configuration is used, the first strobe transfers the command. The second and all subsequent strobes transfer data only, however, the Deck Select Lines (DKS(n)C-1) must remain as originally configured or a Jump Status Command will be executed (refer to Deck Selection Section 4-4.1).

4-2.4.C The DICOM 344 can be implemented with the ODAT(n)-1 lines in the dynamic or strobed configuration. The DICOM 344 is shipped with the ODAT(n)-1 lines in the DYNAMIC configuration, using ODATT-1 only to indicate that the character has been accepted by the computer. To create STROBED output lines, remove the P.C. board in J9 (with power off) of the DICOM unit. Remove the jumper on the P.C. board between E1 and E3 and install the jumper between E2 and E3. No other modification is necessary.

4-2.4.D The DICOM 344 can be implemented with the status lines in a strobed or dynamic configuration. The DICOM 344 is shipped with the status lines in the STROBED configuration. To create DYNAMIC status lines, STATT-1 can be tied to ground (logic one) internally in the computer interface hardware or by a jumper between pin X (STATT-1) and pin W (Return) on the DICOM interface connector J27.

4-2.4.E In some applications it may be desirable to have the L/OX(n)-I lines indicate Rewind status on an individual deck basis. To accomplish this modification for tape deck one, remove the P.C. board in J3 (with power off) of the DICOM unit. Remove the 2.7 ohm resistor connected between E2 and E3 and install a jumper between E1 and E3. To perform this modification for tape deck two and three, repeat the above steps with the P.C. board in J2 (tape deck two) and J1 (tape deck three).

4-2.4.F Some applications may require that the On-Line device be able to interrogate the DICOM 344 status OFF-LINE. To accomplish this, the P.C. board in J6 must be removed and the 2.7 ohm resistor between E1 and E2 be removed.

4-3 OFF-LINE
INTERFACE
CONNECTOR

The Off-Line Interface connector J28 is a Winchester XAC9PC1A706 (furnished by DICOM with Option 01). Figure 4-5 depicts the DICOM 344 input and output lines for an ASR/KSR 33 Teletype.

To interface with a DICOM 344, the KSR 33 or ASR 33 Teletype unit must be modified for 20 m amp neutral signal and full duplex operation as follows:

NOTE: Teletype Corporation wiring diagrams 6353WD (sheet 1) or 7833WD (sheet 1) are useful in making the above changes, but not mandatory.

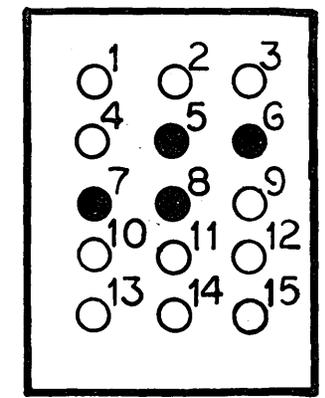
1. Remove cover of Teletype.
2. Move purple wire from terminal 8 to terminal 9 of terminal strip 151411 located at lower left of Teletype (viewed from rear).
3. Move white-blue wire from terminal 4 to terminal 5 of the same terminal strip.
4. Move brown-yellow wire from terminal 3 to terminal 5 of the same terminal strip.
5. Move blue wire from terminal 3 to terminal 4 of power resistor 181816. This resistor is located at the center of the right side of the Teletype (viewed from the front with the cover removed). When the cover is in place, the resistor can be seen centered under the removable plate on the right side.

4-4 ON-LINE
CYCLE
DESCRIPTION

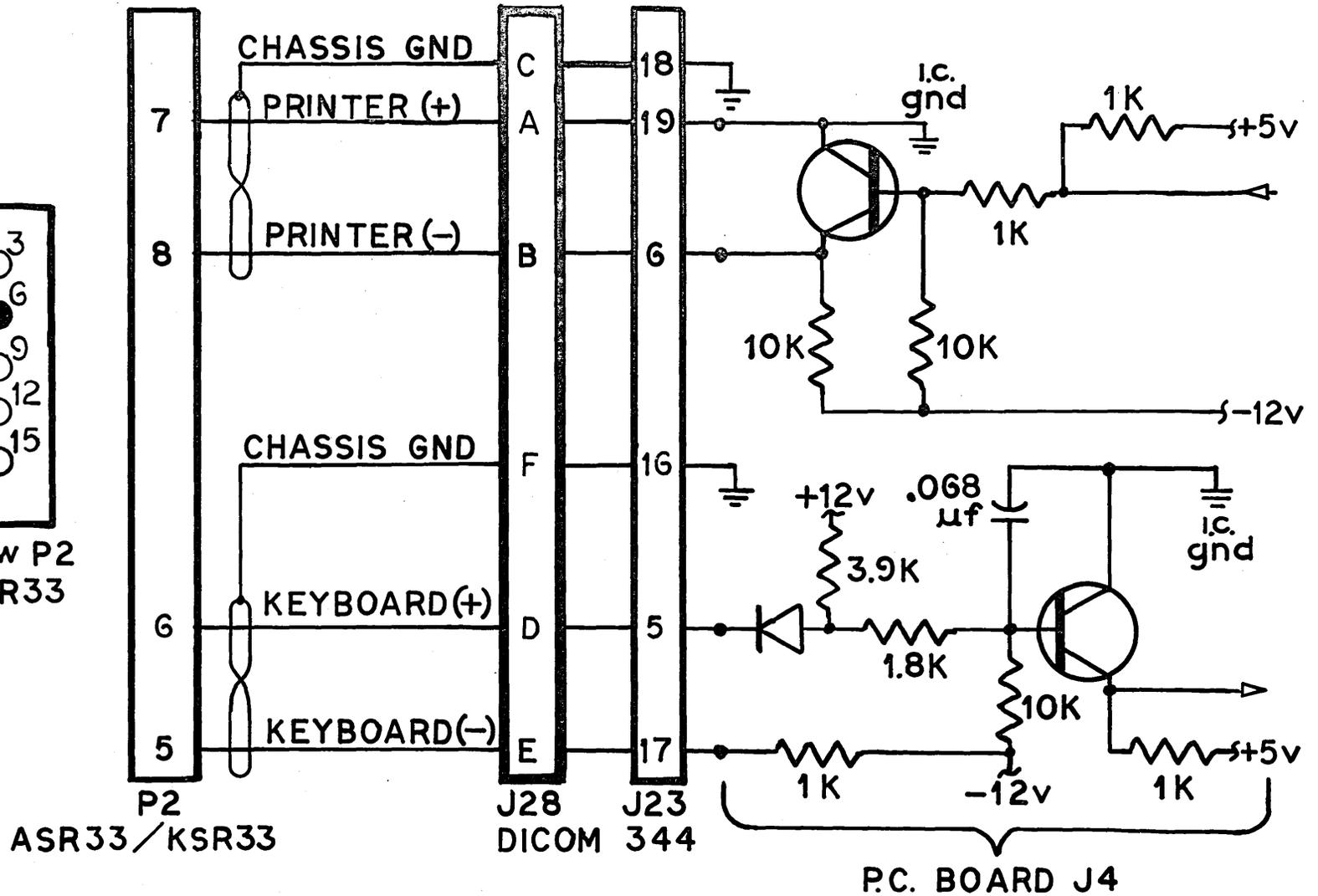
The following is a detailed explanation of the seven On-Line cycles available in the DICOM 344.

4-4.1 DECK SELECTION

Deck selection is accomplished by encoding the Deck Select Lines, DKS0C-1 and DKS1C-1 (MSB) into one of four possible binary combinations (0,1,2, or 3). Upon receipt of the deck select commands and the Command Strobe bit (CMDT-1) the selected deck will assume the Ready condition (DRDYS-1 true) and respond to any further commands intended for that deck.



front view P2
ASR33/KSR33



J28 mating connector is a Winchester # XAC9PC1A706 (furnished by Dicom)

FIGURE 4-5
DICOM 344 OFF-LINE INTERFACE CONNECTOR (J28)

NOTE: When any command (such as WRITC-1, READC-1, etc.) is issued to the DICOM 344, the desired deck selection bits must also be issued.

A special mode to acquire the status of the two unselected decks, while still operating with the selected deck, can be accomplished by a Jump Status operation. This is done by issuing the Command Strobe (CMDT-1) and the desired Deck Select bits (DKS0C-1, DKS1C-1) with no other command bits true. This will allow the deck status bits (DRDYS-1, L/OXS-1) for the interrogated deck to be examined without effecting the operating deck. The status of the examined deck can now be entered into the computer by either generating STATT-1 (strobed status configuration) or, if the status lines are dynamic, by loading them into the computer through the interface.

When changing back to the original operating deck, the Deck Select bits and Command Strobe must be issued again to restore the status of the already cycling deck in a maximum time of 2 milliseconds.

The above Jump Status operation would be useful in determining whether another deck has completed a rewind cycle or to determine if another deck is loaded with a cassette.

4-4.2 HALT CYCLE

Halt cycle is created by Halt Command (HALTC-1) and the Command Strobe (CMDT-1) being true simultaneously. This cycle clears all other cycles being executed by the selected deck. This command cycle can be issued at any time.

The Halt Command can be useful in the Search mode to stop tape transport motion when FLMKS-1 is detected, indicating a File Gap has been encountered. (See Search mode, Section 4-4.7.) This mode also becomes useful when it is desired to move tape in reverse and then re-read a File or Record. A rewind cycle, time out, and a Halt Command followed by a Read cycle can be used to re-acquire the data or to Read and compare the data. The Halt Command is used to clear the Deck zero Read mode.

NOTE: If this command is issued during a Read cycle, any data to be read following the command will be invalid. Since the Halt Command causes tape motion to cease almost immediately, the machine may stop in the middle of a Record. If this command is issued to a Write selected deck, an error will be written which will remain in error until the record is rewritten or erased, i.e., the tape may stop in the middle of a character, therefore, writing invalid data.

4-4.3 REWIND CYCLE

The Rewind cycle can be created by Rewind Command (RWND-1), the desired Deck Select bits (DKS0C-1, DKS1C-1) and the Command Strobe (CMDT-1) being true simultaneously. Before these commands will be accepted, the Deck Ready Status (DRDYS-1) must be true. This is done by initiating the desired Deck Select bits (DKS0C-1, and DKS1C-1) and the Command Strobe (CMDT-1) and then issuing a Status Strobe (STATT-1). As soon as DRDYS-1 is true for the selected deck, the Deck Select bits (DKS0C-1, DKS1C-1), RWND-1 and CMDT-1 commands can be initiated and will subsequently be accepted by the DICOM 344. All three decks can be placed into Rewind at the same time by following the aforementioned procedure, one deck at a time. The completion of the Rewind cycle is accomplished internally in the DICOM hardware, subsequently allowing all three decks to be in Rewind simultaneously. DRDYS-1 for the selected deck goes false and remains false until either a Halt Command is received or the Beginning-of-Tape is encountered.

A Deck 0 (zero) Rewind Command has no effect.

4-4.4 READ CYCLE

The Read cycle can be created by Read Command (READC-1) and the desired Deck Select bits (DKS0C-1 and DKS1C-1) and the Command Strobe (CMDT-1) being true simultaneously. DRDYS-1 for the selected deck must be true before these commands will be accepted by the DICOM 344.

Upon receipt of the Read command, tape motion will begin, the Read Status (READS-1) will go true and DRDYS-1 for the selected deck will go false. As soon as the first eight bit character read from tape is assembled in the OUTPUT register, FLAGS-1 will come true. FLAGS-1 and the Output data (ODAT0-1 through ODAT7-1) will be presented to the On-Line interface every 2 milliseconds. If the assembled character is not accepted by the On-Line device (acceptance being indicated by an ODATT-1 strobe to the DICOM 344) within 2 milliseconds, the input register will be overrun by the next character from the tape. This condition will cause ERROS-1 to be true. ERROS-1 will also occur if eight bit cell times or an even number of flux reversals are not present in the data read from tape. The Read mode will terminate when the Record Gap is detected, causing DRDYS-1 to come true and READS-1 to go false.

NOTE: The output data, ODAT(n)-I lines, may either be dynamic or strobed. If dynamic lines are selected, they contain valid new data only when FLAGS-I is true and ERROS-I is false. All output data accepted by the On-Line device must be acknowledged by an ODATT-I.

4-4.5 WRITE CYCLE

The Write cycle can be created by Write Command (WRITC-I), the desired Deck Select bits (DKS0C-I,DKS1C-I) and the Command Strobe (CMDT-I) being true simultaneously. DRDYS-I for the selected deck must be true before these commands will be accepted by the DICOM 344.

Upon receipt of the Write Command tape motion will begin, the Write Status bit (WRITS-I) will go true and DRDYS-I for the selected deck will go false. FLAGS-I will go true within 150 nanoseconds of the receipt of the Write Command and CMDT-I. The first eight bit character (NDAT0-I through NDAT7-I) along with NDATT-I can be sent immediately upon the first FLAGS-I going true. FLAGS-I will be reset upon receipt of NDATT-I. The second FLAGS-I will go true again 150 nanoseconds after the first NDATT-I is received in answer to the first FLAGS-I. The second eight bit character and NDATT-I can be sent immediately upon receipt of the second FLAGS-I going true.

NOTE: The first FLAGS-I can be answered at any time within 25 milliseconds of FLAGS-I going true. The second FLAGS-I can also be answered at any time before 27 milliseconds have elapsed from the occurrence of the first FLAGS-I.

Upon receipt of the second NDATT-I, FLAGS-I will reset and remain false until the Inter-Record Gap is written (25 milliseconds) and the first character is written on tape (2 milliseconds). The occurrence rate of FLAGS-I (following the first two) will then be 2 milliseconds until the On-Line device considers the Record complete.

When the On-Line device determines a Record is complete, FLAGS-I is ignored (NDATT-I is not sent to the DICOM 344 in response to the last FLAGS-I). After 2.2 milliseconds the write selected deck will cease tape motion, DRDYS-I will go true and FLAGS-I will be reset.

When tape motion ceases, a portion of the Inter-Record Gap (approximately 1/3) is written on tape due to the 2.2 milliseconds of no data being transferred and the shut down time of the deck.

If another record is to be written on tape, the Write Command would be required for each record to be written.

NOTE: If the first NDATT-1 is not received in a Write cycle, the selected deck will erase tape. This condition can be terminated by the On-Line device issuing an NDATT-1.

4-4.6 WRITE FILE GAP CYCLE

The Write File Gap can be configured one of two ways; a File Gap only, or a File Gap followed by a File Mark Record. The decision as to which configuration is used is a programming option.

The Write File Gap only option is created by the File Mark Command (FLMKC-1), and the desired Deck Select bits (DKS0C-1, DKS1C-1) and the Command Strobe (CMDT-1) being true simultaneously. DRDYS-1 for the selected deck must be true before these commands will be accepted by the DICOM 344. Upon receipt of the File Mark Commands, tape motion will begin, DRDYS-1 will go false and WRITS-1 go true. FLAGS-1 is not sent to the On-Line device in this program option. The selected deck will write a minimum of .75 inches of blank tape (File Gap) and then cease tape motion. Normal Records can now be written by issuing the Write Command.

The Write File Gap followed by a File Mark Record option is created by the File Mark Command (FLMKC-1), Write Command (WRITC-1), the desired Deck Select bits (DKS0C-1, DKS1C-1) and the Command Strobe (CMDT-1) being true simultaneously. DRDYS-1 for the selected deck must be true before these commands will be accepted by the DICOM 344. Upon receipt of the File Mark and Write Commands, DRDYS-1 will go false, tape motion will begin and the selected deck will write a minimum of .75 inches of blank tape (File Gap).

FLAGS-1 will go true 150 nanoseconds after the receipt of the File Mark Commands indicating the DICOM 344 is ready to accept the File Mark Record characters.

The sequence for writing the File Mark Record characters is the same as the normal WRITE CYCLE. The only exception is 77 milliseconds is required for the loading of the first two characters instead of 27 milliseconds. (75 milliseconds is required for the File Gap and 2 milliseconds for the first character to be written on tape.) Any length File Mark Record may be written and used as a header indicating the content of the next File; i.e. number of Records, type of File (ASCII, BINARY DATA, RE-locatable) absolute addresses, beginning address, end address, symbol tables, etc.

4-4.7 SEARCH CYCLE

The Search cycle can be created by Search Command (SRCHC-1), the desired Deck Select bits (DKS0C-1,DKS1C-1) and the Command Strobe (CMDT-1) being true simultaneously. DRDYS-1 for the selected deck must be true before these commands will be accepted by the DICOM 344.

Upon receipt of the commands, tape motion will begin, the Read Status bit (READS-1) will go true and DRDYS-1 will go false. FLAGS-1 will come true, when the first eight bit character is assembled in the output register. Each FLAGS-1 must be answered by an ODATT-1, if the entire file is to be read into the On-Line device. FLAGS-1 can be ignored, if only a portion or none of the File is to be read. ERROS-1 will come true, but can be ignored. The search mode will continue to move tape in the forward direction at 10 ips, reading across Inter-Record Gaps without stopping until a File Gap is detected. Upon detecting a File Gap, FLMKS-1 will come true, FLAGS-1 and ERROS-1 will be reset and the data registers will be prepared to Read the File Mark Record.

If a File Gap followed by a File Mark Record configuration was used, the DICOM 344 will continue (without stopping tape motion) across the File Gap and start reading the File Mark Record from tape. The File Mark Record will be read in the same manner as a normal read cycle. (FLAGS-1 will go true as each character is assembled for transfer to the On-Line device.) To read the File Mark Record, each FLAGS-1 must be answered by an ODATT-1. Upon reading the File Mark Record, the selected deck will cease tape motion with the Read/Write head positioned in the next Inter-Record Gap.

If a File Gap only configuration was used in the Write File Mark cycle a Halt Command (HALTC-1) would be issued when FLMKS-1 goes true. This will cause tape motion to cease with the Read/Write head positioned somewhere in the File Gap.

PROGRAMMING FLOW DIAGRAMS

4-5 PROGRAMMING
FLOW DIAGRAMS

Basic Programming Flow diagram examples are depicted in Figures 4-6 through 4-14.

NOTE: All Interface signals are depicted in the true state unless otherwise noted.

The following Flow diagram examples meet the basic programming requirements of the DICOM 344, however, the programmer is not restricted to these sequences. The modes of operation diagramed are; Deck Select (off-page connector 1), Write (off-page connector 2), Write File Gap (off-page connector 3), Read (off-page connector 4), Search (off-page connector 5), Rewind from End-of-Record (off-page connector 7), Rewind from End-of-Tape (off-page connector 8), TTY Write (off-page connector 9) and TTY Read (off-page connector 10).

4-5.1 DECK SELECT (Refer to Figure 4-6)

Two methods of entering the Deck Select mode are depicted.

4-5.1.A If entered after initially energizing the unit, the INITLZ-I Command can be issued to the DICOM unit and cause the Deck zero (TTY), On-Line and Halt modes to be selected.

4-5.1.B If entered from another mode (Input 1), the INITLZ-I Command will be bypassed.

4-5.1.C The status of DRDYS-I is checked to insure the DICOM 344 can accept commands (ie. Deck to be selected is not in motion or in the case of Deck 0, the TTY is not busy).

NOTE: A Deck status check is accomplished by issuing the desired Deck Select configuration (DKS(n)C-I) and the Status Strobe (STATT-I) to the DICOM interface. In the case of a Status check of FLAGS-I, FLMKS-I and ERROS-I, the status strobe (STATT-I) only is required.

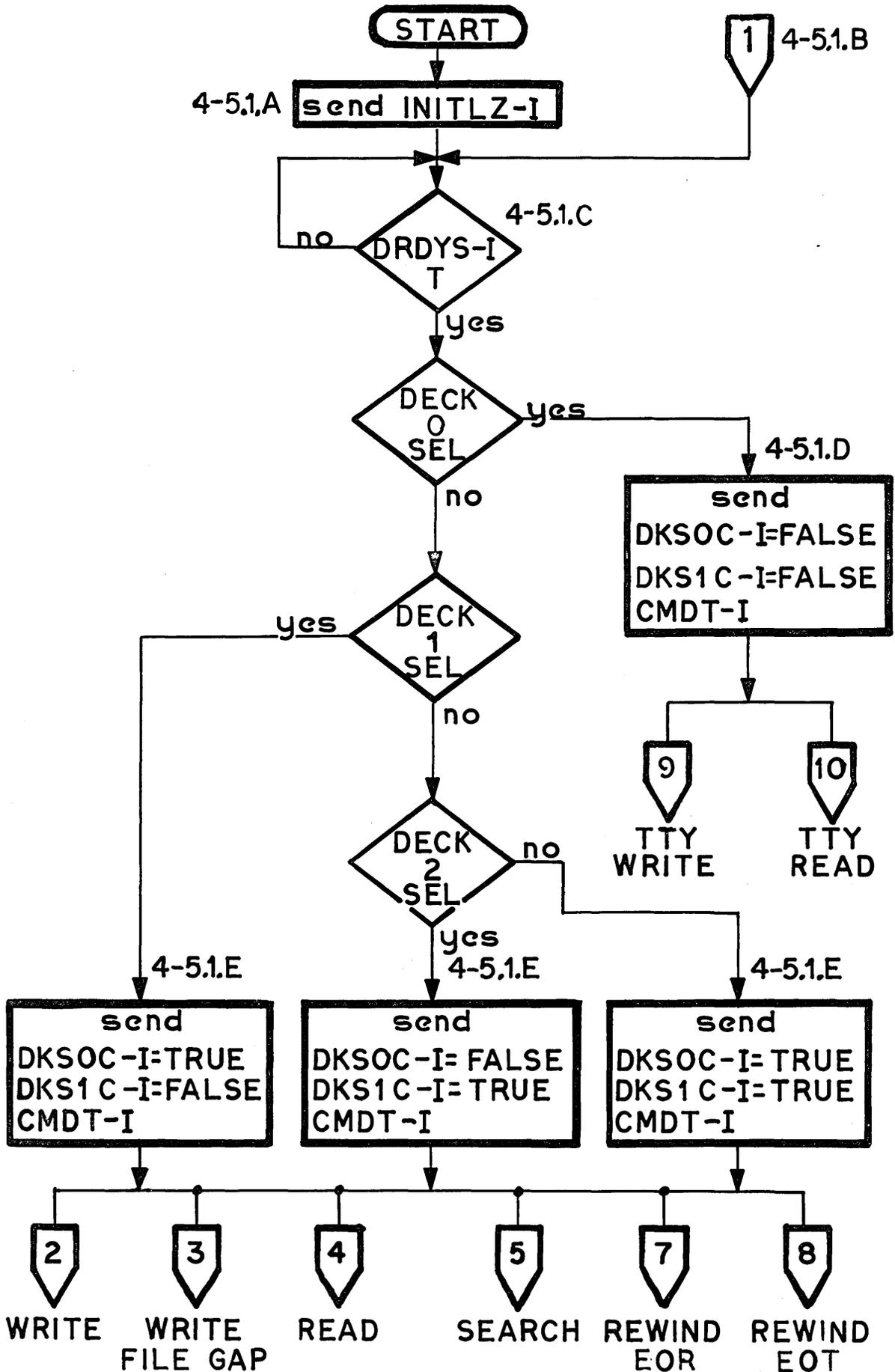
4-5.1.D If Deck 0 (TTY) is to be selected, the Deck Select bit inputs (DKS0C-I and DKS1C-I) must be at a false

level (+5v) and stable when CMDT-1 is issued. Upon receipt of DKSØC-1, DKS1C-1 and CMDT-1, Deck Ø (TTY) is selected and the program can enter either the TTY Write mode (off-page connector 9) or the TTY Read mode (off-page connector 10).

4-5.1.E If Decks one, two or three are to be selected, the Deck Select bits would be set to the appropriate levels and CMDT-1 issued. The program can then enter the Write, Write File Gap, Read, Search, Rewind from End-of-Record (EOR) or Rewind from End-of-Tape (EOT) modes.

FIGURE 4-6

DECK SELECT



4-5.2 WRITE MODE (Refer to Figure 4-7)

4-5.2.A The status of DRDYS-1 is checked to insure the selected deck is ready to accept a Write command. DRDYS-1 will go true as soon as the action status bit of the previous operation goes false (i.e., READS-1, WRITS-1, etc.).

4-5.2.B A status check of WLKOS-1 is made to insure a Write operation cannot occur with a Write protected cassette (i.e., cassette has the File Protect Tab removed).

4-5.2.C When DRDYS-1 is true and WLKOS-1 is false, the desired Deck Select lines, Write Command and Command Strobe are presented to the DICOM interface.

NOTE: Figures 4-7 through 4-12 are shown with Deck 1 as the selected deck. To select Deck 2 or 3, the appropriate Deck Select combination is substituted.

4-5.2.D A status check of WRITS-1 is made to insure the DICOM 344 accepted the Write Commands. WRITS-1 will go true and DRDYS-1 will go false no later than the fall of CMDT-1.

4-5.2.E A status check of L/OXS-1 is made to determine if the Read/Write head has passed the 6 inch BOT clear leader portion of tape. L/OXS-1 will be true for approximately 1 second.

4-5.2.F The first eight bit character (NDAT0-1 through NDAT7-1) along with NDATT-1 can be sent immediately upon the first FLAGS-1 going true. FLAGS-1 will be reset by the trailing edge of the NDATT-1 Strobe.

If the record consists of more than one character, the above operation would be repeated.

The second FLAGS-1 will go true 150 nanoseconds after the first NDATT-1 is received in answer to the first FLAGS-1. The second eight bit character and NDATT-1 can be sent immediately upon receipt of the second FLAGS-1 going true.

NOTE: If starting from BOT, the first FLAGS-1 can be answered at any time within 1.6 seconds of FLAGS-1 going true. The second FLAGS-1 can also be answered at any time before the 1.6 seconds have elapsed from the occurrence of the first FLAGS-1 (.6 seconds for clear leader and 1 second for the

10 inch blank section of tape). If starting from the oxide portion of tape, the first FLAGS-1 can be answered at any time within 27 milliseconds of FLAGS-1 going true. The second FLAGS-1 can be answered at any time before the 27 milliseconds have elapsed from the first FLAGS-1 going true.

Upon receipt of the second NDATT-1, FLAGS-1 will reset and remain false until the Inter-Record Gap is written (25 milliseconds) and the first character is written on tape (2 milliseconds). The occurrence rate of FLAGS-1 (following the first two) will then be every 2 milliseconds until the On-Line device considers the Record complete. FLAGS-1 (with the exception of the first two) must be answered by NDATT-1 within the 2 millisecond time period or ERRORS-1 will occur.

4-5.2.H A status check of L/OXS-1 is made to determine if the End-of-Tape leader has been encountered. This status check would be used only if long records or many files were to be written on tape. If the End-of-Tape is encountered, the Rewind from EOT mode (off-page connector 8) would be entered. From the occurrence of L/OXS-1, approximately 1/2 inch of oxide will pass across the Write head before the leader is encountered. The programmer can either write a logic EOT configuration in the last 1/2 inch of tape or consider the last record invalid.

4-5.2.J When the On-Line device determines a Record is complete, FLAGS-1 is ignored (NDATT-1 is not sent to the DICOM 344 in response to the last FLAGS-1). After 2.2 milliseconds, the Write selected deck will cease tape motion, DRDYS-1 will go true, FLAGS-1 and WRITS-1 will be reset.

4-5.2.K If another Record is to be written on tape, the Write mode would be repeated.

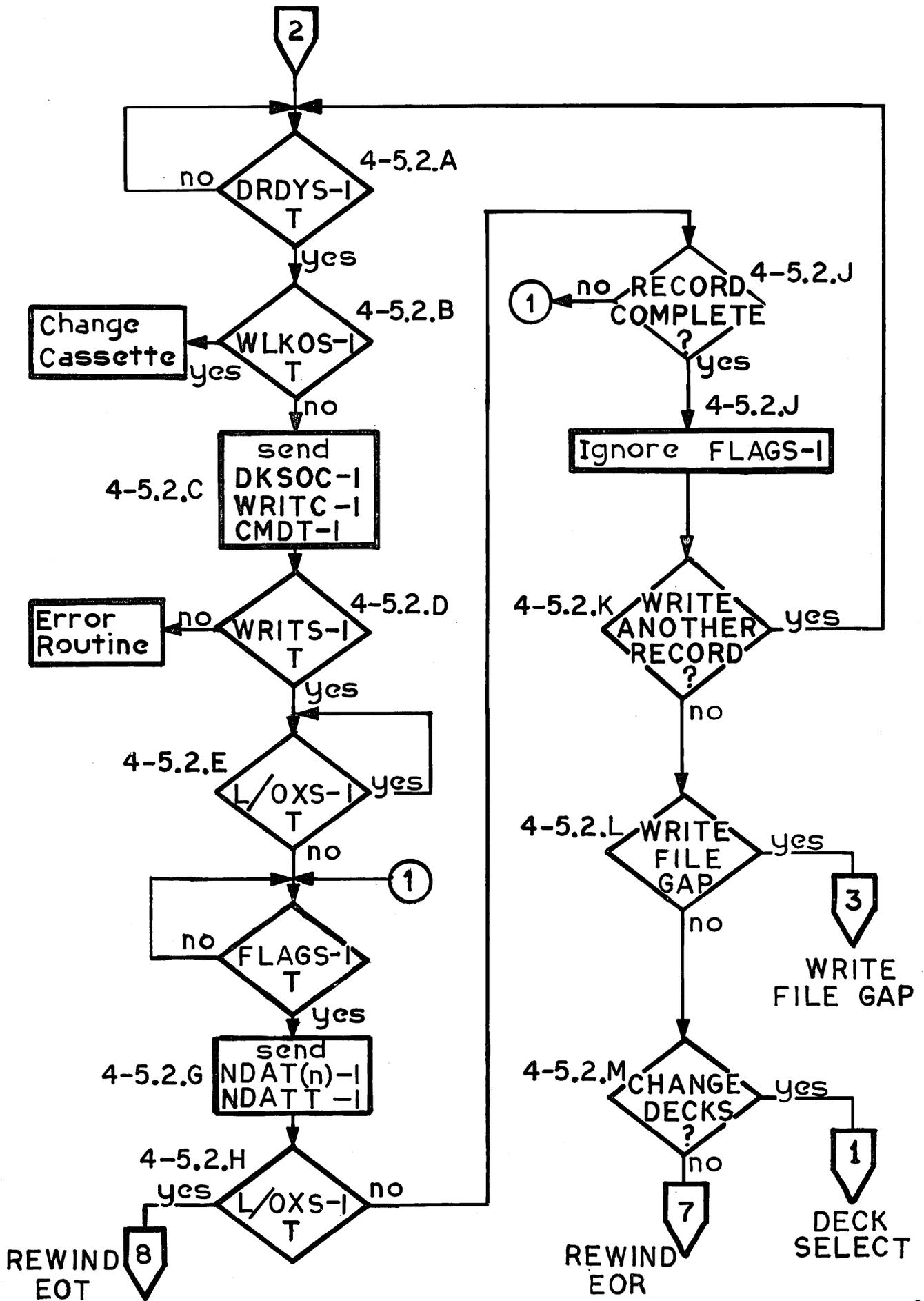
4-5.2.L If a File Gap is to be written on tape, the program would exit to the Write File Gap mode (off-page connector 3).

4-5.2.M If a change of decks or a switch to the TTY is desired, the program would exit to the Deck Select mode (off-page connector 1).

The Rewind from End-of-Record mode should be entered (off-page connector 7) if no further operations are to be performed.

FIGURE 4-7

WRITE MODE



4-5.3 WRITE FILE GAP MODE (Refer to Figure 4-8)

4-5.3.A The status of DRDYS-1 is checked to insure the selected deck is ready to accept a Write File Gap command.

4-5.3.B The Write File Gap can be configured one of two ways; a File Gap only, or a File Gap followed by a File Mark Record. (See Section 4-4.6) The decision as to which configuration is used is a programming option.

4-5.3.C If a File Gap only is to be written, the desired Deck Select lines, FLMKC-1, and CMDT-1 are presented to the DICOM interface.

4-5.3.D A status check of WRITS-1 is made to insure that the DICOM 344 has entered the Write File Gap mode. Upon receipt of the FLMKS-1 command, DRDYS-1 will go false, WRITS-1 will go true (no later than the trailing edge of CMDT-1), tape motion will begin, the selected deck will write a minimum of .75 inches of blank tape (File Gap) and stop tape motion. FLAGS-1 is not presented to the On-Line device in this program option.

4-5.3.E When tape motion ceases, WRITS-1 will go false and DRDYS-1 will go true indicating the writing of the File Gap is complete.

4-5.3.F If a change of decks is desired, the Deck Select mode (off-page connector 1) would be entered. If a deck change is not desired, the Write mode (off-page connector 2) or Rewind from End-of-Record (off-page connector 7) can be entered.

4-5.3.G If a File Gap followed by a File Mark Record is to be written, the desired Deck Select lines, FLMKS-1, WRITC-1 and CMDT-1 are presented to the DICOM interface.

4-5.3.H A status check of WRITS-1 is made to insure the DICOM 344 has entered the Write File Gap and File Mark Record modes. Upon receipt of the FLMKC-1 Commands, WRITS-1 will go true, DRDYS-1 will go false (no later than the trailing edge of CMDT-1), tape motion will begin and the selected deck will write a minimum of .75 inches of blank tape (File Gap). Tape motion will not cease as it did in the File Gap only mode.

4-5.3.J FLAGS-1 will go true 150 nanoseconds after the receipt of the File Mark Commands indicating the DICOM 344 is ready to accept the File Mark Record characters.

4-5.3.K The first eight bit character (NDAT0-I through NDAT7-I) of the File Mark Record along with NDATT-I can be sent immediately upon the occurrence of FLAGS-I.

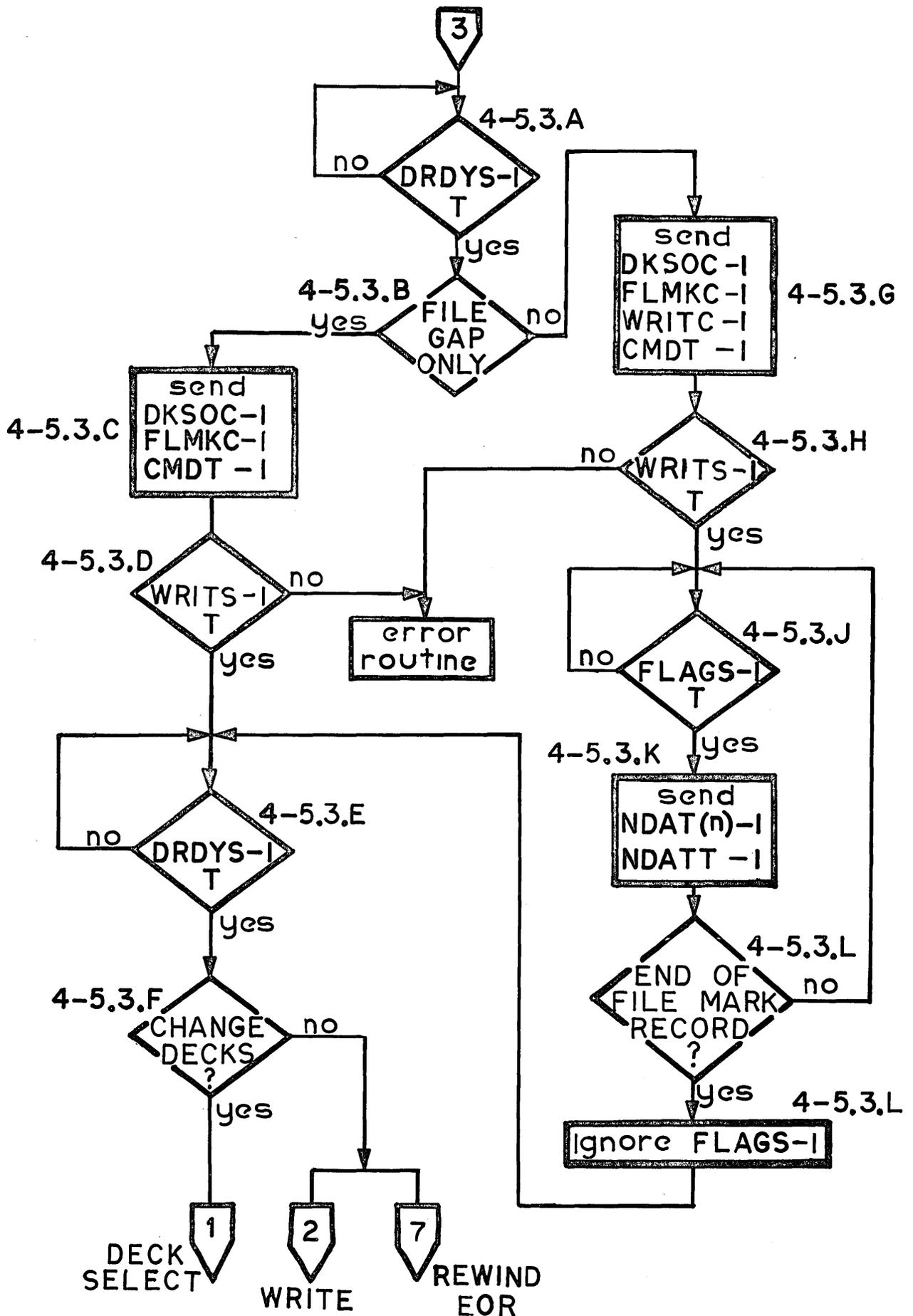
If more than one character is to be used in the File Mark Record, NDAT0-I through NDAT7-I and NDATT-I would be issued when the second FLAGS-I occurs. The second FLAGS-I will occur within 150 nanoseconds of the NDATT-I issued in response to the first FLAGS-I.

The third FLAGS-I will occur approximately 75 milliseconds after the acceptance of FLMKC-I. 75 milliseconds is required to write the File Gap. NDATT-I and NDAT(n)-I must be issued within 2 milliseconds of the third and all subsequent FLAGS-I going true.

4-5.3.L When the File Mark Record is completed, FLAGS-I is ignored (NDATT-I is not sent to the DICOM 344 in response to FLAGS-I). After 2.2 milliseconds, the write selected deck will cease tape motion, DRDYS-I will go true and FLAGS-I will be reset.

At this point a "Change Decks" decision would be made and the program would exit to the appropriate mode.

FIGURE 4-8 WRITE FILE GAP MODE



4-5.4 READ MODE (Refer to Figure 4-9)

4-5.4.A The status of DRDYS-1 is checked to insure the selected deck is ready to accept a Read Command.

4-5.4.B When DRDYS-1 is true, the desired Deck Select lines, READC-1 and CMTD-1 are presented to the DICOM interface.

4-5.4.C A check of READS-1 is made to insure the DICOM 344 accepted the READ Commands. READS-1 will go true and DRDYS-1 will go false no later than the fall of CMTD-1.

4-5.4.D A status check of L/OXS-1 is made to determine if the Read/Write head has passed the 6 inch BOT clear leader portion of tape. L/OXS-1 will be true for approximately .6 seconds.

4-5.4.E As soon as the first eight bit character read from tape is assembled in the OUTPUT register, FLAGS-1 will come true. If starting from BOT, FLAGS-1 and data (NDAT0-1 through NDAT7-1) will occur approximately 1.6 seconds after the receipt of the Read Commands. If starting from the oxide portion of tape, FLAGS-1 and data will occur approximately 27 milliseconds after the receipt of the Read Commands. FLAGS-1 and data will thereafter be presented to the On-Line interface every 2 milliseconds.

4-5.4.F The ODATT-1 response from the On-Line device (indicating acceptance of the data) must be presented to the DICOM interface within 2 milliseconds of FLAGS-1 going true. ODATT-1 resets FLAGS-1.

4-5.4.G If the On-Line device does not respond within 2 milliseconds, or a tape parity error is detected on tape, ERROS-1 will occur. If the error occurs due to no response, ERROS-1 will go true approximately 2.2 milliseconds after the FLAGS-1 is not answered. If the error is a tape parity error, ERROS-1 will go true coincident with the FLAGS-1 associated with the erroneous data.

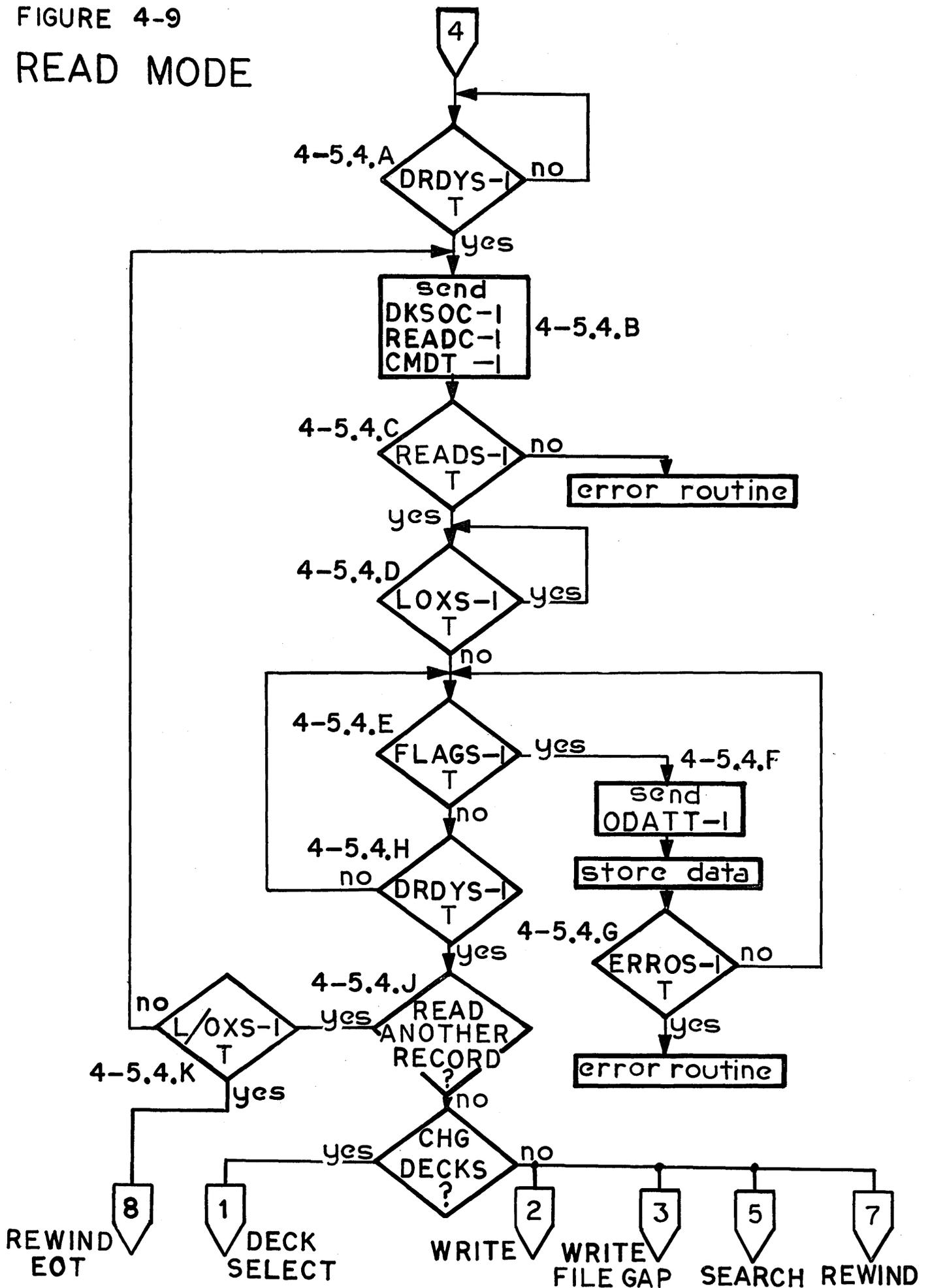
4-5.4.H The Read mode will terminate when the Record Gap is encountered, causing FLAGS-1 to remain false, DRDYS-1 to go true and READS-1 to go false.

4-5.4.j If the next record on tape is to be read, the Read mode would be repeated.

4-5.4.K When reading records of unknown length, a status check of L/OXS-1 can be made at this point to determine if the EOT clear leader has been reached.

4-5.4.L If a change of decks or a switch to the TTY is desired, the program would exit to the Deck Select mode. If a deck change is not desired, the Write, Write File Gap, Search, or Rewind mode can be entered for the presently selected deck.

FIGURE 4-9
READ MODE



4-5.5 SEARCH MODE (Refer to Figure 4-9)

4-5.5.A The status of DRDYS-I is checked to insure the selected deck is ready to accept a Read Command.

4-5.5.B When DRDYS-I is true, the desired Deck Select lines, SRCHC-I and CMDT-I are presented to the DICOM interface.

4-5.5.C A status check of READS-I is made to insure the DICOM 344 accepted the Search Commands. READS-I will go true and DRDYS-I will go false no later than the fall of CMDT-I.

4-5.5.D A check of L/OXS-I is made to determine if the Read/Write head has passed the 6 inch BOT clear leader portion of tape. (L/OXS-I would be true for approximately .6 seconds after tape motion begins if at BOT.)

4-5.5.E As soon as the first eight bit character read from tape is assembled in the Output register, FLAGS-I will come true.

4-5.5.F If the records in the File are to be read by the On-Line device, each FLAGS-I must be answered by an ODATT-I within 2 milliseconds. Tape motion will not stop when an Inter-Record Gap is encountered in the Search mode.

4-5.5.G ERROS-I will go true if an ODATT-I is not received within 2 milliseconds of the occurrence of FLAGS-I, or if a parity error is detected on tape. ERROS-I will not reset until FLMKS-I occurs.

4-5.5.H Upon detecting a File Gap, FLMKS-I will come true, FLAGS-I and ERROS-I will be reset. FLMKS-I will occur within approximately 50 milliseconds of the beginning of the File Gap on tape. When FLMKS-I goes true, the program would enter the Read File Mark Record mode. (Off-page connector 6.)

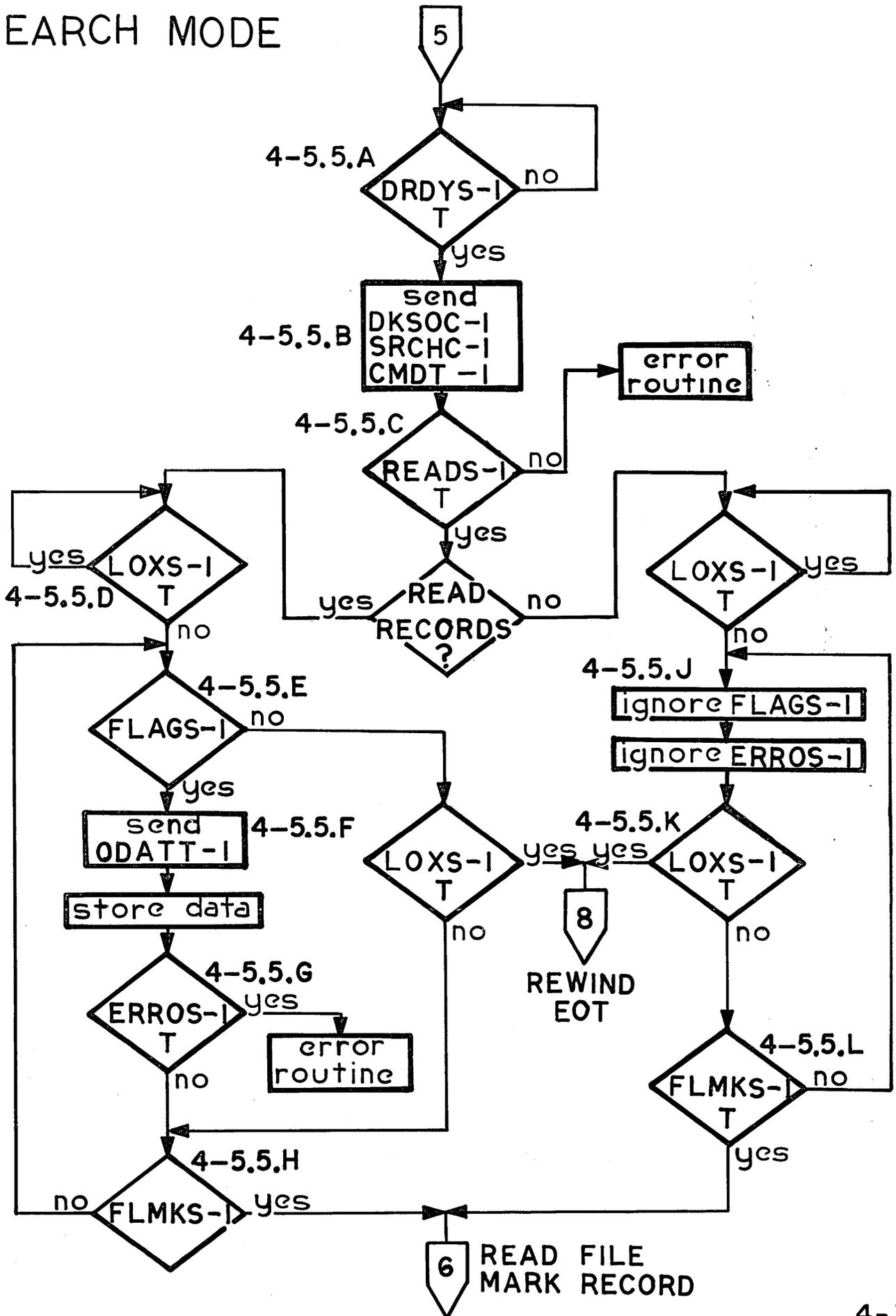
4-5.5.J If the File records are not to be read by the On-Line device, FLAGS-I will be ignored (ODATT-I is not issued in response to the FLAGS-I). ERROS-I will go true but can also be ignored.

4-5.5.K A status check of L/OXS-I (for the EOT clear leader portion of tape) can be made if records or files of an unknown length are to be read.

4-5.5.L Upon detecting a File Gap, FLMKS-I will go true and ERROS-I will be reset. The READ FILE MARK RECORD mode would then be entered by the program.

FIGURE 4-10

SEARCH MODE



4-5.6 READ FILE MARK RECORD (Refer to Figure 4-11)

NOTE: This mode can be entered only from the SEARCH MODE (off-page connector 6) upon detection of FLMKS-1 going true.

4-5.6.A If the File Gap only configuration is used the desired Deck Select lines, HALTC-1 and CMDT-1 are presented to the DICOM interface immediately upon detection of FLMKS-1 going true.

4-5.6.B The Halt operation will cause DRDYS-1 to go true, READS-1 to go false and tape motion to cease with the Read/Write head positioned somewhere in the File Gap.

4-5.6.C If the File Gap followed by a File Mark Record configuration is used, tape motion will continue (without stopping) across the .75 inch File Gap and start reading the File Mark Record. FLAGS-1 will go true as each File Mark character is assembled for transfer to the On-Line device. (READS-1 remains true while tape motion continues across the File Gap.)

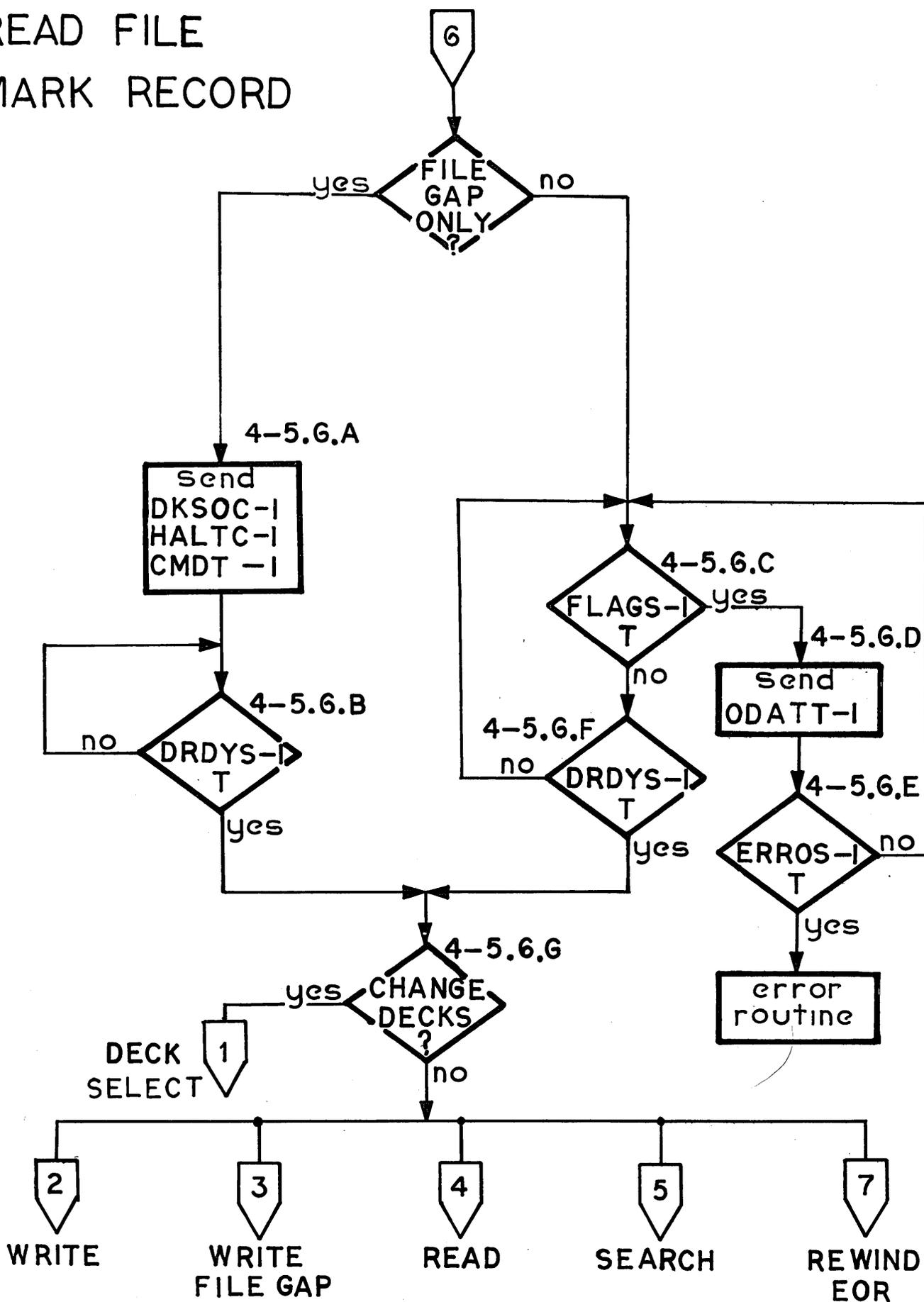
4-5.6.D Each FLAGS-1 must be answered by an ODATT-1 (indicating acceptance of the data) within 2 milliseconds. ODATT-1 resets FLAGS-1.

4-5.6.E If the On-Line device does not respond within 2 milliseconds or a tape parity error is detected, ERRORS-1 will occur. (Refer to Read Mode Section 4-5.5.G.)

4-5.6.F The Read File Mark Record mode will terminate when the .25 inch Inter-Record Gap following the File Mark Record is encountered, causing FLAGS-1 to be reset, DRDYS-1 to go true and READS-1 to go false.

4-5.6.G If a change of decks or a switch to the TTY is desired, the program would exit to the Deck Select mode (off-page connector 1). If a deck change is not desired, the Write, Write File Gap, Read, Search, or Rewind mode can be entered for the presently selected deck.

FIGURE 4-11
 READ FILE
 MARK RECORD



4-5.7 REWIND MODE (Refer to Figure 4-12)

The Rewind mode can be entered from an End-of-Record or File (off-page connector 7), or from the End-of-Tape (off-page connector 8).

4-5.7.A The status of DRDYS-1 is checked to insure the selected deck is ready to accept a Rewind Command.

4-5.7.B If the Rewind mode is entered from an End-of-Record (EOR) or End-of-File, the desired Deck Select lines, RWNDC-1 and CMTD-1 are presented to the DICOM Interface. Upon acceptance of the Rewind Command, DRDYS-1 will go false no later than the trailing edge of CMTD-1. If the L/OX(n)-1 lines are modified to indicate Rewind status on an individual basis (refer to Interface Signal Modifications Section 4-2.4.E), the appropriate L/OX(n)-1 line will go true no later than the trailing edge of CMTD-1.

4-5.7.C When entering the Rewind mode from the End-of-Tape (EOT), DRDYS-1 is checked to insure the selected deck is ready to accept the Rewind Command.

4-5.7.D To enter the Rewind mode, the desired Deck Select lines (RWNDC-1 and CMTD-1) are presented to the DICOM Interface. Upon acceptance of the Rewind Command, DRDYS-1 will go false.

4-5.7.E The status of L/OXS-1 is checked to determine if the tape has initially moved far enough to pass the 6 inch EOT clear leader portion of tape. If L/OXS-1 is still true, the Deck Select, RWNDC-1 and CMTD-1 commands should be re-issued. L/OXS-1 will go false when the tape has reached the oxide portion and is rewinding toward the Beginning-of-Tape (BOT).

4-5.7.F Upon entering the Rewind mode, a status check of the remaining decks can be made by entering a Jump Status Routine (refer to Deck Selection Section 4-4.1).

NOTE: Once a deck has entered the rewind mode, another deck can be selected and commanded into any of the available modes. Once the new deck has entered its selected mode, the rewinding deck should be checked periodically, with a Jump status routine, to determine when the Rewind mode has completed.

4-5.7.G If the Rewind mode is to be terminated prior to reaching the BOT clear leader (as in the case of a Record or character, re-read or re-write operation), a time out by the On-Line device would be accomplished. The duration of the time out is determined by the On-Line program.

4-5.7.H Upon completion of the time out, the Deck Select lines, HALTC-1 and CMDT-1 are presented to the DICOM Interface. Upon acceptance of the Halt command, tape motion will cease and DRDYS-1 will go true.

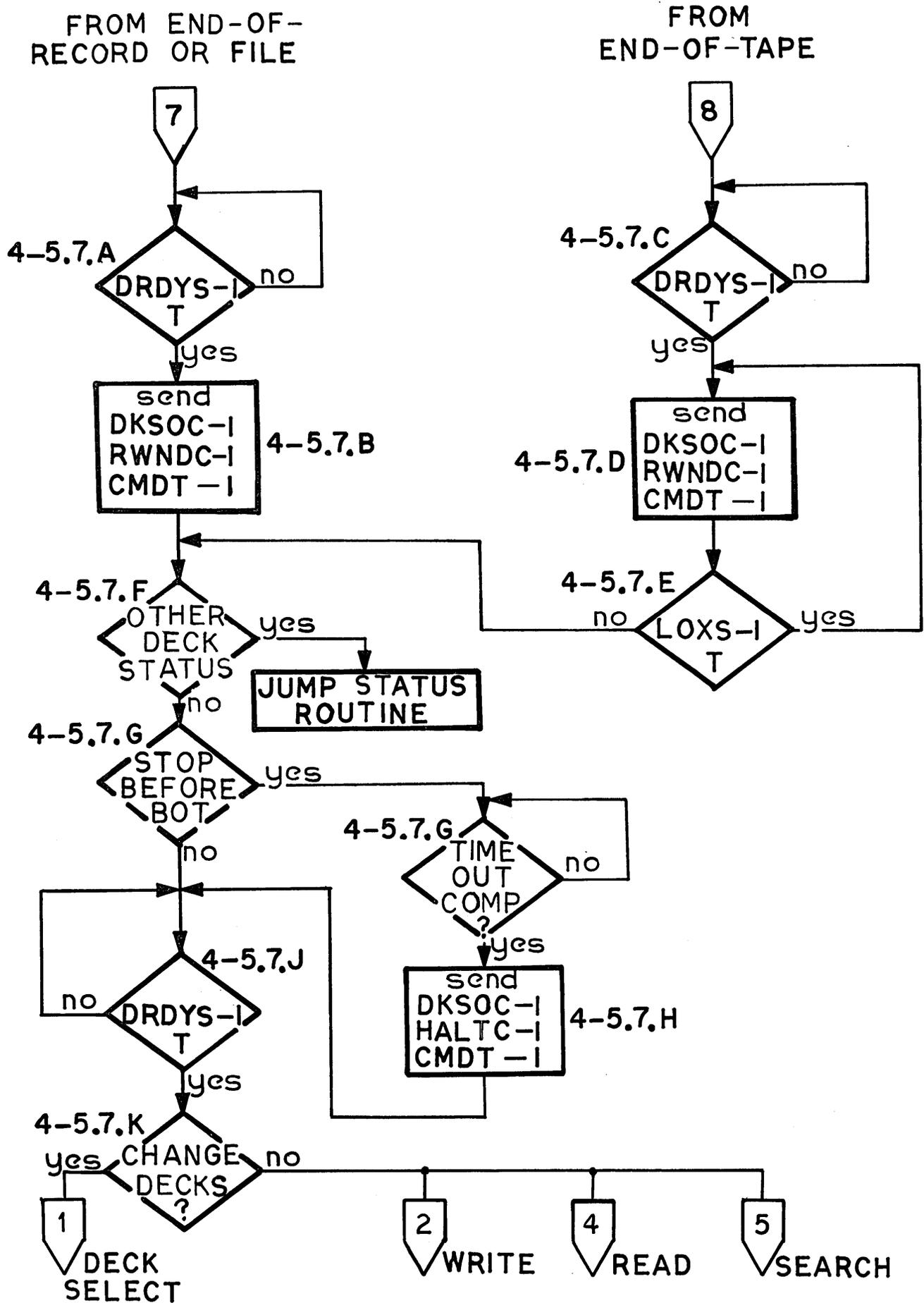
4-5.7.J Upon reaching the BOT clear leader, tape motion will cease, DRDYS-1 and L/OXS-1 will go true.

4-5.7.K If a change of decks or a switch to the TTY is desired, the program would exit to the Deck Select mode. If a deck change is not desired, the Write, Read, or Search modes can be entered for the presently selected deck.

NOTE: The Write File Gap mode should never be entered from the BOT section of tape. The DICOM hardware writes approximately 10 inches ($\pm 20\%$) of blank tape following the BOT leader; therefore, .75 inch File Gap would not be detected by the Read circuitry.

FIGURE 4-12

REWIND MODE



4-5.8 DECK 0 (TTY) WRITE MODE (Refer to Figure 4-13)

The Deck 0 (TTY) Write mode is used when the DICOM 344 is utilized as a controller for the TTY. (Option 01 is required.)

4-5.8.A A status check of DRDYS-I is made to insure the TTY is ready to accept a Write Command.

4-5.8.B When DRDYS-I is true, the Deck Select lines (DKS0C-I and DKS1C-I) are presented to the DICOM interface in the false state (+ 5vdc) along with WRITC-I and CMDT-I in the true state (0 vdc). DRDYS-I will go false and WRITS-I will go true no later than the trailing edge of CMDT-I.

NOTE: If Deck 0 (TTY) is selected, the RWNDC-I, FLMKC-I, SRCHC-I, L/OXS-I, FLMKS-I and WLKOS-I interface signals will have no meaning.

4-5.8.C FLAGS-I will go true when the TTY is prepared to receive a character.

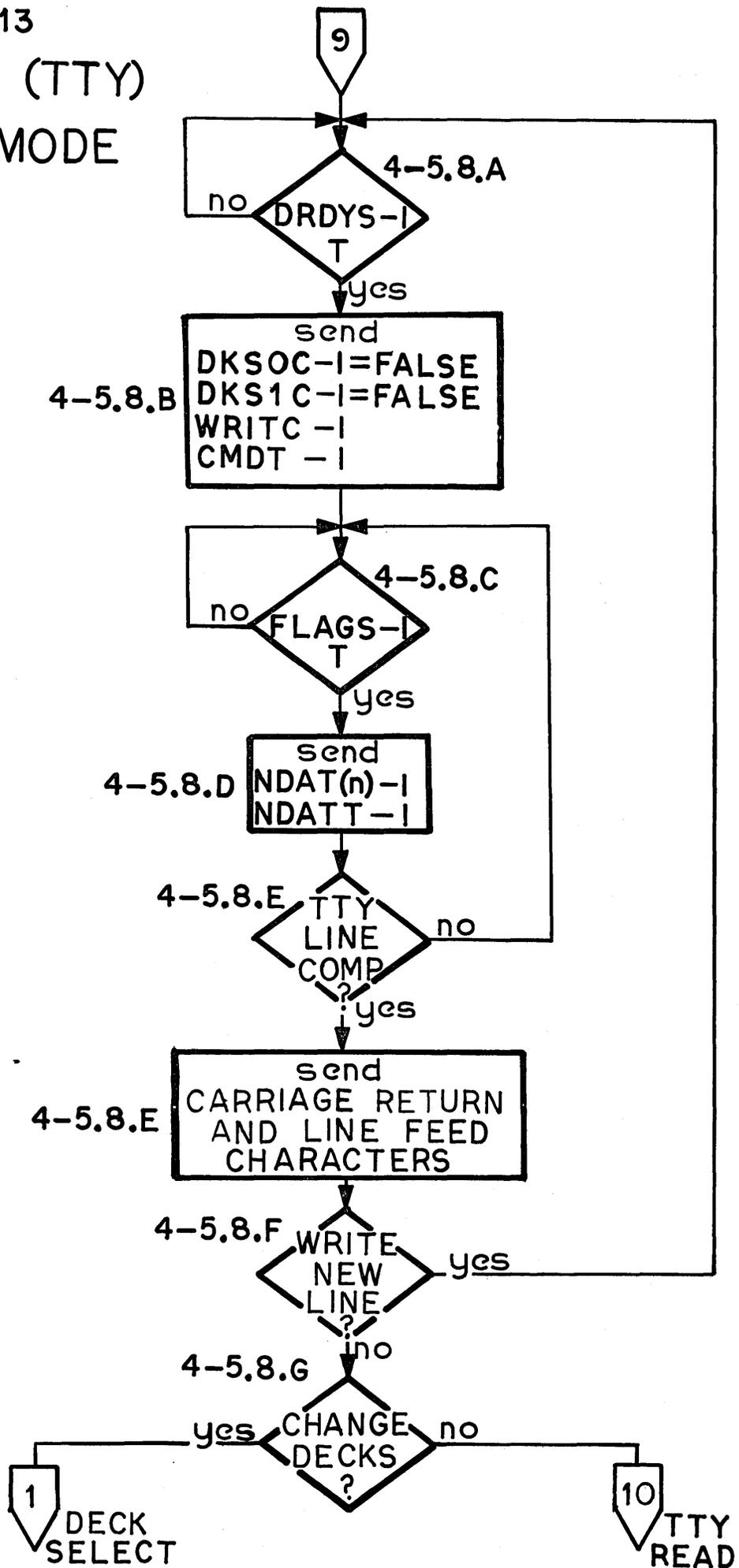
4-5.8.D The first 8 bit character (NDAT0-I through NDAT7-I) along with NDATT-I can be sent to the DICOM interface anytime after FLAGS-I goes true. The second and all subsequent FLAGS-I must be answered within 100 milliseconds. FLAGS-I will be reset upon receipt of NDATT-I. The occurrence rate of FLAGS-I (following the first two) will be approximately 100 milliseconds.

4-5.8.E When the On-Line device determines the TTY Record is complete (the last character has been transferred from the On-Line device), the program must wait until the last character is printed by the TTY (approximately 100 milliseconds in duration). This would be indicated by DRDYS-I coming true.

4-5.8.F If another Record is to be written on the TTY, the Deck 0 (TTY) Write mode would be repeated.

4-5.8.G If a change to the tape decks is desired, the program would enter the Deck Select mode (off-page connector 1). If a deck change is not desired, the TTY Read mode can be entered (off-page connector 10).

FIGURE 4-13
 DECK 0 (TTY)
 WRITE MODE



4-5.9 DECK Ø (TTY) READ MODE (Refer to Figure 4-14)

The Deck Ø Read mode is used when the DICOM 344 is utilized as a controller for the TTY (Option 01 is required).

4-5.9.A A status check of DRDYS-I is made to insure the TTY is ready to accept a Read Command.

4-5.9.B When DRDYS-I is true, the Deck Select lines (DKSØC-I and DKS1C-I) are presented to the DICOM interface in the False state (+5 vdc) along with READC-I and CMDT-I in the True state (Ø vdc). DRDYS-I will go false and READS-I will go true no later than the trailing edge of CMDT-I.

4-5.9.C FLAGS-I will go true when the DICOM 344 has assembled a TTY character and presented it on the NDAT(n)-I lines.

4-5.9.D The ODATT-I response from the On-Line device (indicating acceptance of the data) can be issued any time after FLAGS-I goes true. The occurrence rate of FLAGS-I will be dependent upon the speed of the keyboard operator or the transfer rate of the TTY paper tape reader. Each FLAGS-I must be answered by an ODATT-I until the TTY line or record is completed. Completion of a TTY line or record is indicated by receipt of a unique code (usually a ASCII, Carriage Return character) from the TTY. The recognition of the completion code is a program function.

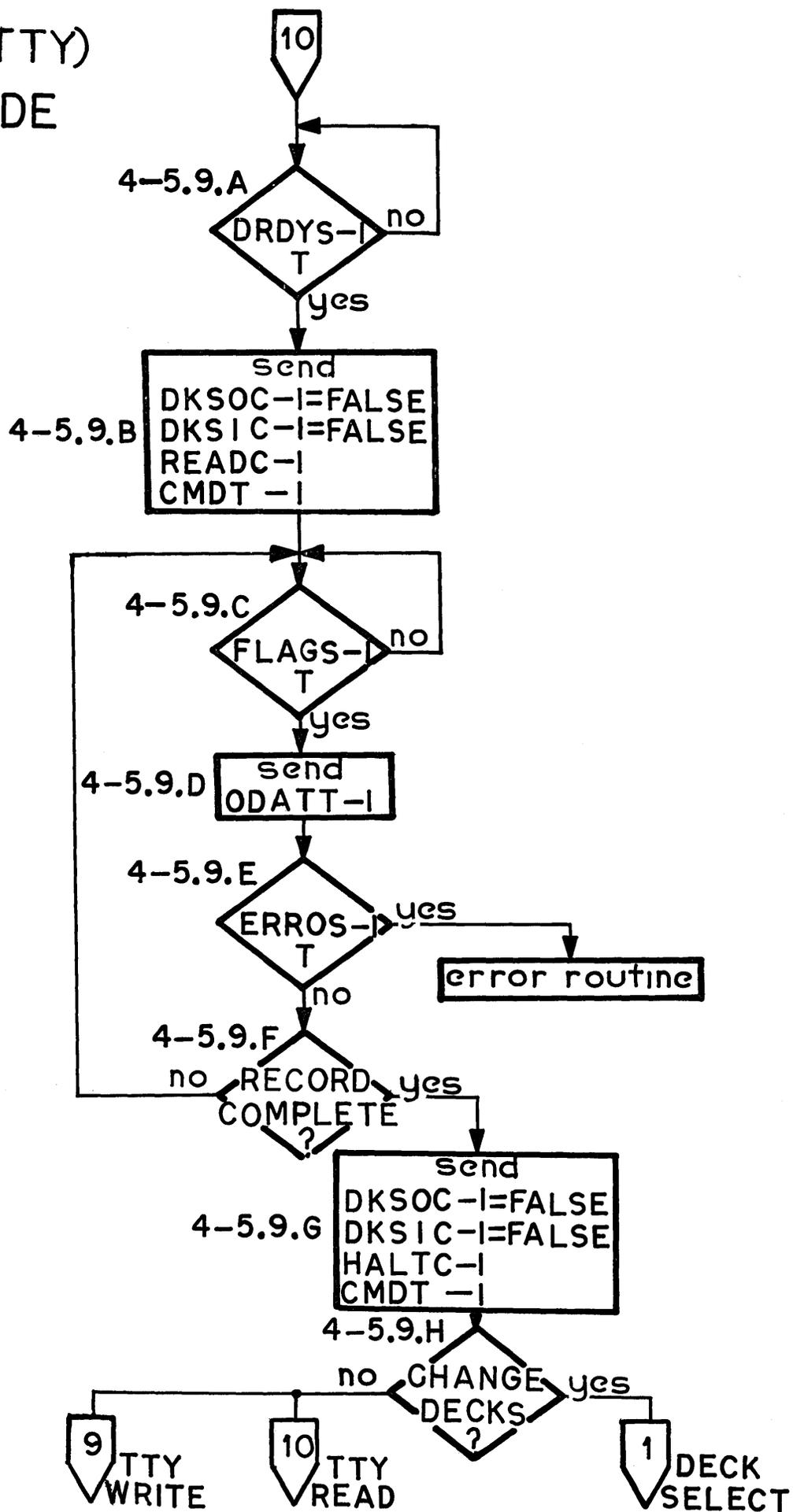
4-5.9.E If ERROS-I occurs, it indicates the On-Line device did not respond to FLAGS-I before another character was typed on the TTY.

4-5.9.F Each FLAGS-I must be answered by an ODATT-I until the TTY line or record is completed. Completion of a TTY line or record is indicated by receipt of a unique code (determined by the program) from the TTY. The recognition of the completion code is a program function.

4-5.9.G When the On-Line device recognizes the completion code, DKSØC-I (false), DKS1C-I (false), HALTC-I and CMDT-I are presented to the DICOM interface. Upon receipt of the Halt Command the DICOM 344 stops assembling characters from the TTY and DRDYS-I goes true no later than the trailing edge of CMDT-I.

4-5.9.H If a change to the tape decks is desired, the program would exit to the Deck Select mode (off-page connector 1). If a deck change is not desired, the TTY Write mode may be entered (off-Page connector 9) or the TTY Read mode may be repeated (off-page connector 10).

FIGURE 4-14
 DECK 0 (TTY)
 READ MODE



4-6 MODE TIMING
DIAGRAMS

Basic Mode Timing Diagrams are presented in Figures 4-15 through 4-23.

NOTE: Times shown are not proportional. Logic levels: true=0vdc; false=+5vdc (negative true logic).

4-6.1 WRITE MODE (Refer to Figure 4-15).

4-6.1.A Initial conditions; DRDYS-I is true, L/OXS-I (tape on oxide) and WLKOS-I are false, STATT-I is Dynamic (ie. tied to ground) and Deck 1 is selected.

NOTE: If L/OXS-I is true (tape at BOT) when the Write Command is issued, the selected deck will drive forward (with "erase" current on) for one second (ten inches) past the point that L/OXS-I goes false before data is recorded on tape. This insures that recording is not attempted on the leader/oxide splice, and that the Read mode is successfully entered (Refer to Section 4-6.4.A).

4-6.1.B The Deck Select lines (DKS0C-I, DKS1C-I) and WRITC-I are stable during CMDT-I. WRITS-I is set true and DRDYS-I is set false no later than the trailing edge of CMDT-I. CMDT-I must be at least 500 nanoseconds in duration.

4-6.1.C The first FLAGS-I occurs approximately 150 nanoseconds after the acceptance of WRITC-I and CMDT-I. NDAT(n)-I are set to their respective values by the On-Line device.

4-6.1.D The first NDATT-I is issued in response to the first FLAGS-I (NDATT-I must be at least 500 nanoseconds in duration). The NDAT(n)-I lines are sampled by the DICOM interface. FLAGS-I is reset by NDATT-I.

The first NDATT-I can be issued any time within 25 milliseconds of the first FLAGS-I going true.

4-6.1.E The second FLAGS-I will go true within 150 nanoseconds of the first FLAGS-I going false. NDAT(n)-I are set to their respective values.

4-6.1.F The second NDATT-1 is issued in response to the second FLAGS-1 going true. The NDAT(n)-1 lines are sampled by the DICOM interface. FLAGS-1 is reset by NDATT-1. The second NDATT-1 can be issued any time prior to 25 milliseconds after the first FLAGS-1 occurs.

4-6.1.G The third FLAGS-1 occurs approximately 25 milliseconds after the Write Command is accepted. NDAT(n)-1 are set to their respective values.

4-6.1.H The third NDATT-1 is issued no later than 2 milliseconds after the third FLAGS-1 goes true. The NDAT(n)-1 lines are sampled. FLAGS-1 is reset by NDATT-1.

4-6.1.J The occurrence rate of all subsequent FLAGS-1 will be approximately 2 milliseconds.

4-6.1.K NDATT-1 must be received within 2 milliseconds of all subsequent FLAGS-1.

4-6.1.L The DICOM 344 is ready to accept a character and FLAGS-1 is set true, but no further data is to be recorded in this record.

4-6.1.M The On-Line device has not transmitted a character for recording for more than 2 milliseconds. End-of-Record is initiated.

4-6.1.N Tape motion ceases and the Write mode is terminated, WRITS-1 goes false, and DRDYS-1 is set true. Another Write Command, a File Mark Command, or a Rewind Command can be issued at this time.

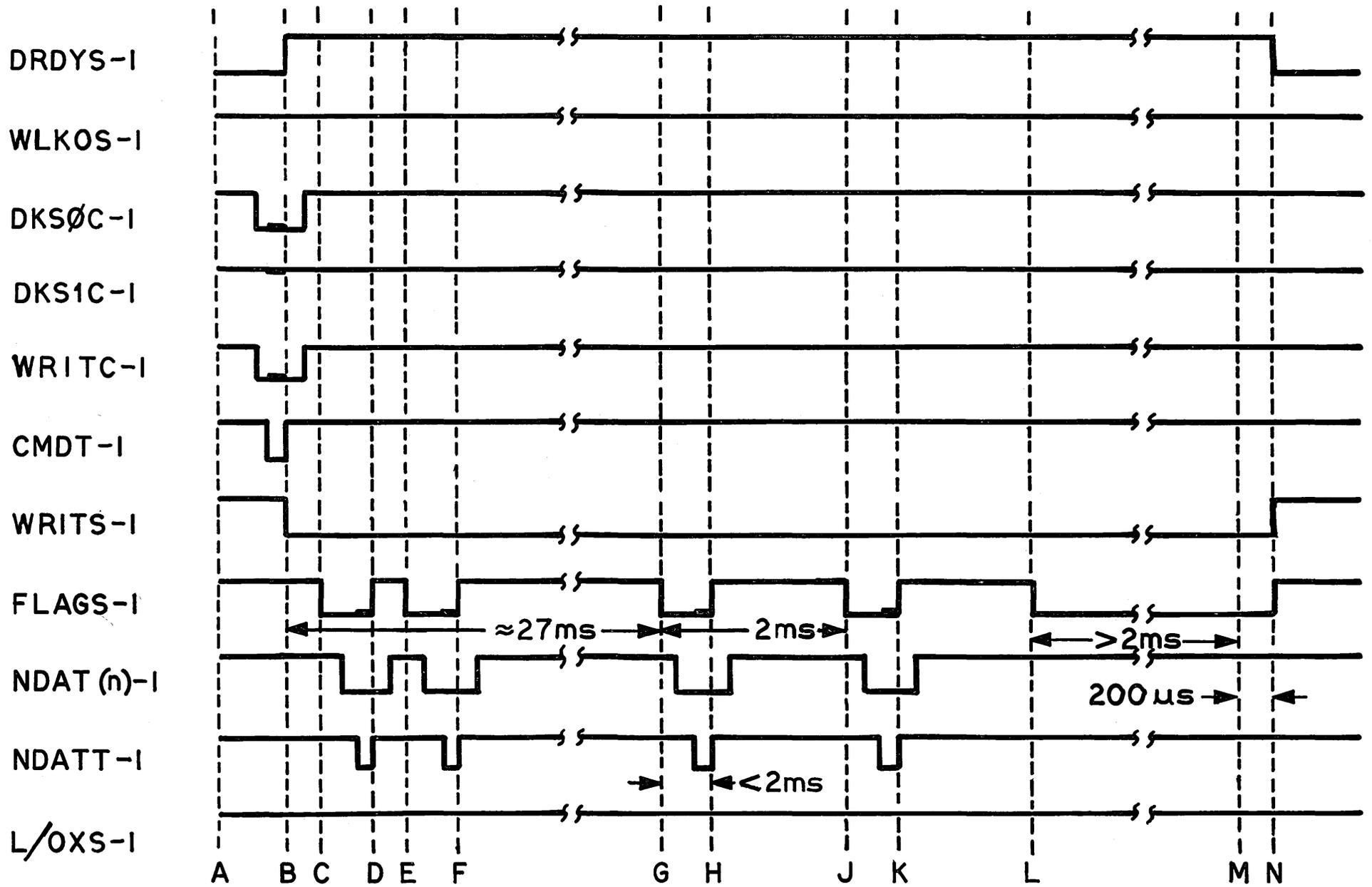


FIGURE 4-15 WRITE MODE

4-6.2 WRITE FILE GAP WITH FILE MARK RECORD MODE
(Refer to Figure 4-16).

NOTE: Times shown are not proportional. Logic levels:
true = 0vdc; false = +5vdc (negative true logic).

4-6.2.A Initial conditions: DRDYS-1 is true, L/OXS-1
and WLKOS-1 are false, and STATT-1 is tied to ground.

NOTE: Writing a File Mark Gap at Beginning-of-Tape is
not allowed. It may be desirable to write a
File Mark Record (or Records) at the end of the
File Mark Gap to label each file. This can be
accomplished by issuing the File Mark and Write
commands simultaneously. The DICOM 344 will
generate the .75 inch File Mark Gap, then imm-
ediately go into the normal Write Mode and write
the data presented to it by the On-Line device.

4-6.2.B The Deck Select lines (DKS0C-1, DKS1C-1),
FLMKC-1 and WRITC-1 are stable during CMDT-1. WRITS-1
is set True and DRDYS-1 is set False. The writing of
the File Mark Gap is initiated.

4-6.2.C The first FLAGS-1 occurs approximately 150
nanoseconds after CMDT-1 is issued. NDAT(n)-1 are
set to their respective levels.

4-6.2.D The first NDATT-1 is issued in response to
the first FLAGS-1. The NDAT(n)-1 lines are sampled by
the Dicom interface. FLAGS-1 is reset by NDATT-1.

4-6.2.E The second FLAGS-1 occurs approximately 150
nanoseconds after the first FLAGS-1 goes False.
NDAT(n)-1 are set to their respective values.

4-6.2.F The second NDATT-1 is issued in response to
the second FLAGS-1 going True. The NDAT(n)-1 lines
are sampled by the Dicom interface.

4-6.2.G The third FLAGS-1 occurs approximately 75
milliseconds after the FLMKC-1 is accepted. (Seventy
five milliseconds are required to write the File Gap.)
NDAT(n)-1 are set to their respective values.

4-6.2.H The third NDATT-1 is issued no later than two
milliseconds after the third FLAGS-1 goes True. The
NDAT(n)-1 are reset by NDATT-1. The occurrence rate of
all subsequent FLAGS-1 will be approximately two milli-
seconds.

4-6.2.J The DICOM 344 is ready to accept another character and FLAGS-1 is set true, but no further data is to be recorded.

4-6.2.K End-of-Record is initiated.

4-6.2.L Tape motion ceases and the Write File Gap Mode is completed; WRITS-1 and FLAGS-1 are set false, and DRDYS-1 is set true. A Write command, a File Mark command, or a Rewind command can be issued at this time.

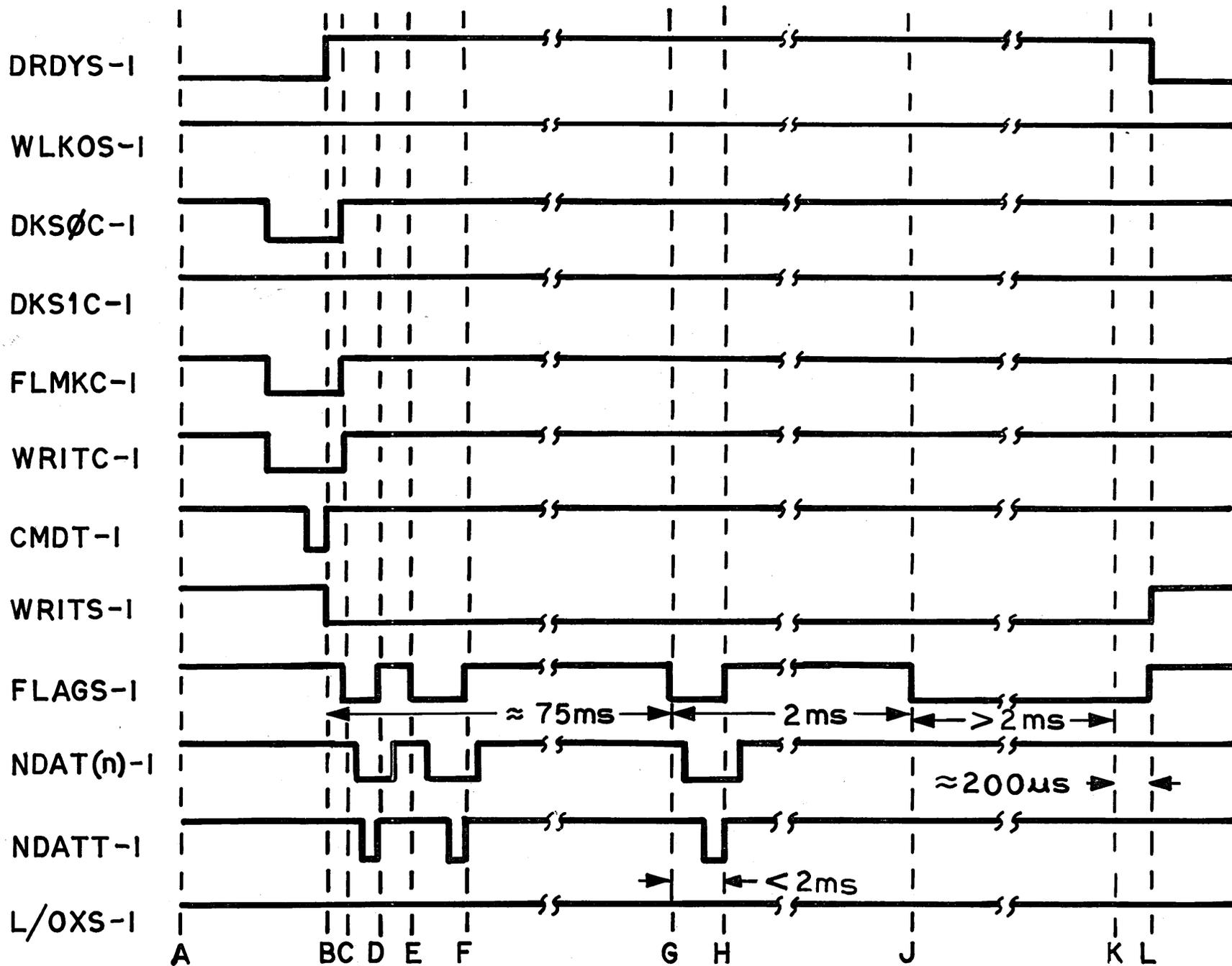


FIGURE 4-16 WRITE FILE GAP WITH FILE MARK RECORD

4-6.3 WRITE FILE GAP WITHOUT FILE MARK RECORD (Refer to Figure 4-17.)

This mode writes a .75 inch File Gap only. A File Mark Record is not written on tape during this mode. A File Mark Record can, however, be written using a separate Write cycle.

NOTE: Times shown are not proportional: Logic levels: true = \emptyset vdc; false = +5vdc (negative true logic).

4-6.2.A Initial conditions: DRDYS-1 is true, L/OXS-1 and WLKOS-1 are false, and STATT-1 is tied to ground.

NOTE: Writing a File Mark Gap at Beginning-of-Tape is not allowed, as a File Mark Gap at Beginning-of-Tape will not be recognized in the Search Mode.

4-6.3.B The Deck Select lines (DKS0C-1, DKS1C-1) and FLMKC-1 are stable during CMDT-1. WRITS-1 is set true and DRDYS-1 is set false. The writing of the File Mark Gap is initiated.

NOTE: FLAGS-1 and NDAT(n)-1 are not generated during this configuration.

4-6.3.C WRITS-1 is set false and DRDYS-1 is set true, indicating that the .75 inch File Mark Gap is completed. A Write command, another File Mark command (or a Rewind command) can be issued at this time. A Read command or a Search command should not be given at this time.

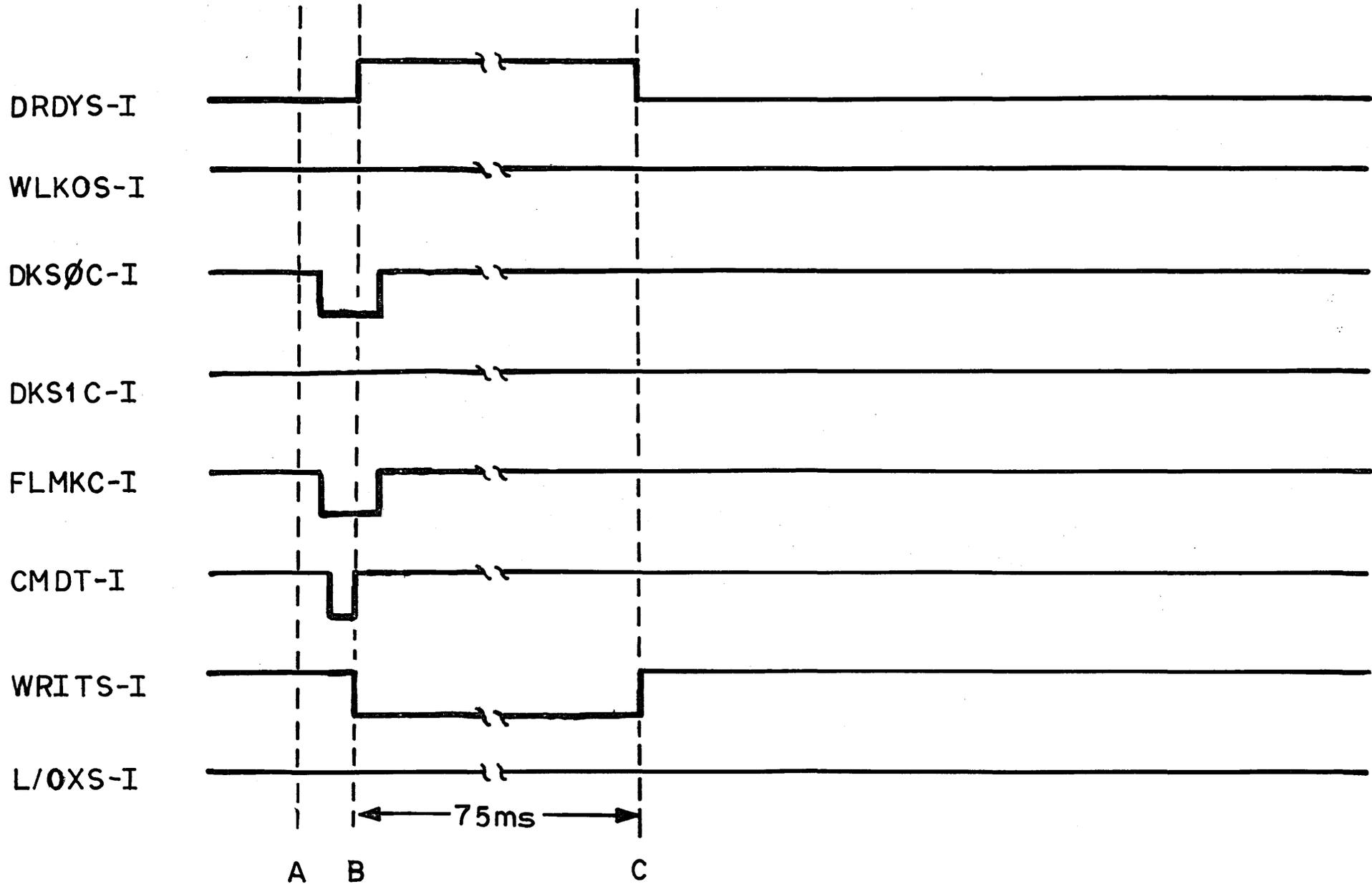


FIGURE 4-17 WRITE FILE GAP MODE WITHOUT FILE MARK RECORD

4-6.4 READ MODE (Refer to Figure 4-18.)

NOTE: Times shown are not proportional. Logic levels:
true = 0vds; false = +5vdc (negative true logic).

4-6.4.A Initial conditions: DRDYS-1 is true, L/OXS-1 is false, and STATT-1 is tied to ground.

NOTE: If L/OXS-1 is true (tape at BOT) when the Read command is issued, the selected deck will drive forward for .6 seconds (six inches) past the point that L/OXS-1 goes false before the Dicom read circuitry is enabled. Since the "read enable delay" is less than the "write enable delay," the reading of the first character recorded on tape is assured.

4-6.4.B The Deck Select lines (DKS0C-1, DKS1C-1) and READC-1 are stable during CMDT-1. READS-1 is set true and DRDYS-1 is set false.

4-6.4.C The DICOM 344 has read and assembled a character from tape and FLAGS-1 is set true. ODAT(n)-1 lines are stable at this time. The ODAT(n)-1 are shown in the dynamic configuration; i.e., ODATT-1 is not an enabling term for ODAT(n)-1. (See Section 4-4.4.C for this option.)

4-6.4.D ODATT-1 is issued by the On-Line device. ODAT(n)-1 lines are sampled and FLAGS-1 is set false. ODATT-1 must be issued within two milliseconds of FLAGS-1 being set true. If the character is not accepted by the On-Line device within two milliseconds, ERROS-1 is set true. (See 4-6.4.E below.)

4-6.4.E ERROS-1 is set true indicating that ODATT-1 was not issued within two milliseconds of FLAGS-1 being set true. The character that was not accepted by the On-Line device remains in the Output Data Register until after an ODATT-1 is received or until another command is issued.

4-6.4.F The DICOM 344 has read and assembled the last character of a Record from tape; FLAGS-1 is set true, ODAT(n)-1 lines are stable.

4-6.4.G Inter-Record gap is detected; READS-1 is set false, DRDYS-1 is set true, and Tape motion ceases. The DICOM 344 is capable of executing any other command at this time.

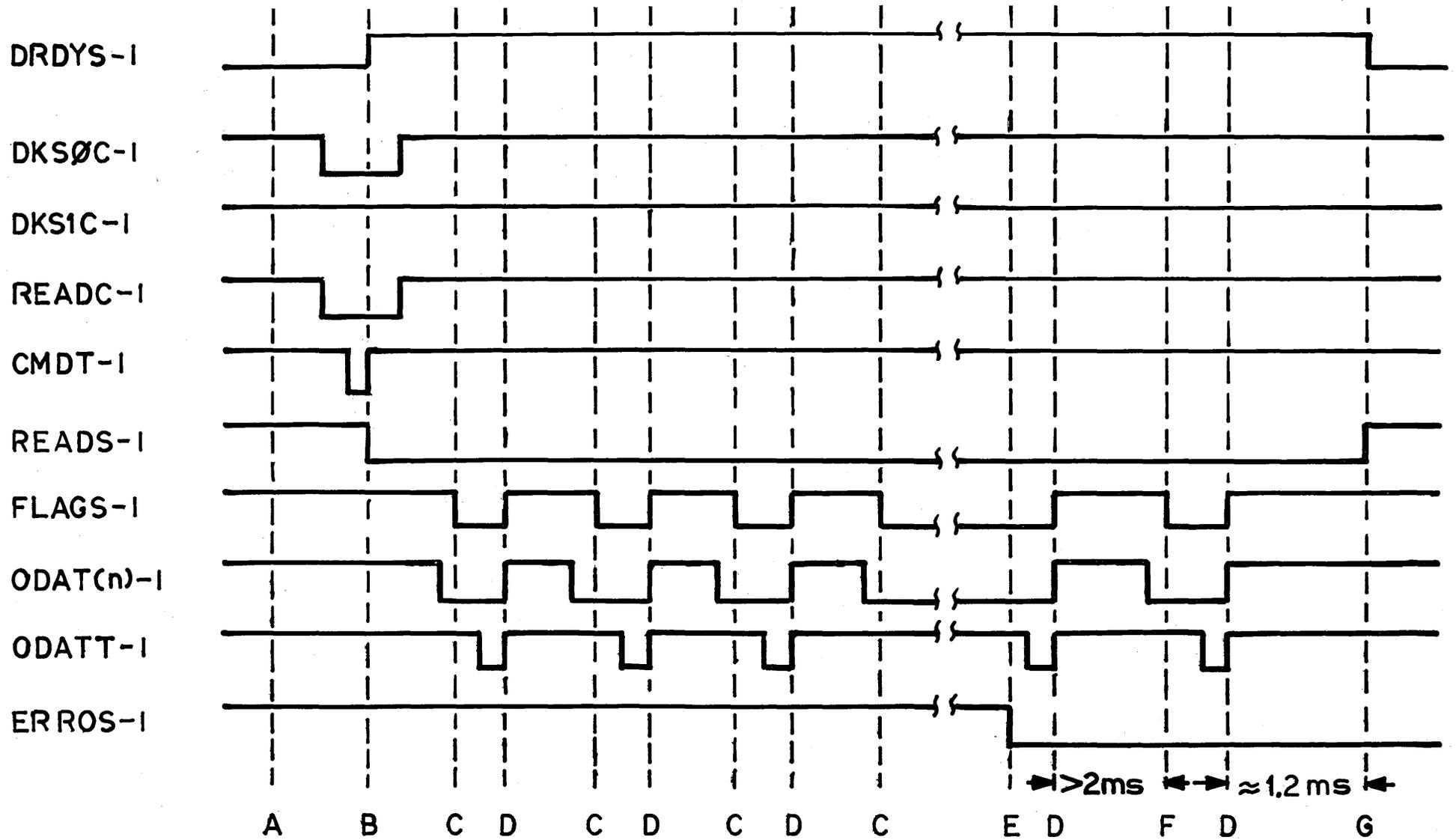


FIGURE 4-18

READ MODE

4-6.5 SEARCH MODE WITH FILE MARK RECORD (Refer to Figure 4-19.)

This mode is used when a Write File Gap followed by a File Mark Record configuration was used to write the .75 inch File Gap.

NOTE: Times shown are not proportional. Logic levels: true = 0vdc; false = +5vdc (negative true logic).

4-6.5.A Initial conditions: DRDYS-1 is true, L/OXS-1 is false, and STATT-1 is tied to ground.

NOTE: If L/OXS-1 is true (tape at BOT) when the Search command is issued, the selected deck will drive tape forward for .6 seconds (six inches) past the point that L/OXS-1 goes false before the Dicom Read circuitry is enabled. This insures the first character on tape is sensed.

4-6.5.B The Deck Select lines (DKS0C-1, DKS1C-1) and SRCHC-1 are stable during CMDT-1. READS-1 is set true and DRDYS-1 is set false.

4-6.5.C The DICOM 344 has read and assembled a character from tape; FLAGS-1 is set true and ODAT(n)-1 lines are stable at this time. Data is presented as it is read from tape, since the Search Mode is a normal read operation without stopping at the record boundaries (Inter-Record Gap). The user has the option of ignoring the data and looking only for FLMKS-1, or accepting the data as it is read from tape. The latter case could be used when it is desired to read an entire File of data without re-issuing the Read command upon completion of each record as is done in the normal Read Mode.

4-6.5.D If the data is to be ignored, ERROS-1 is set true, indicating that ODATT-1 was not issued within two milliseconds of FLAGS-1 being set true. The character that was not accepted by the On-Line device remains in the Output Data Register until the On-Line device accepts it or until the File Mark Gap is detected.

4-6.5.E A File Mark Gap is detected and FLMKS-1 is set true; FLAGS-1 is set false and the Output Data Register is initialized in preparation for receiving the first character of the File Mark Record.

4-6.5.F The first character of the File Mark Record has been read and assembled; FLAGS-1 is set true and the ODAT(n)-1 lines are stable at this time.

4-6.5.G ODATT-1 is issued; ODAT(n)-1 lines are sampled and FLAGS-1 is set false. ODATT-1 must be issued within two milliseconds of FLAGS-1 being set true; if the character is not accepted within two milliseconds, ERROS-1 is set true and the character remains in the Output Data Register until ODATT-1 is received or until another command is received.

4-6.5.H The Inter-Record Gap is detected; FLMKS-1 and Reads-1 are set false, and DRDYS-1 is set true. ERROS-1 and FLAGS-1 are also set false if they are true at this time (see Note 4-6.5.G). The DICOM 344 is capable of executing any other command at this time.

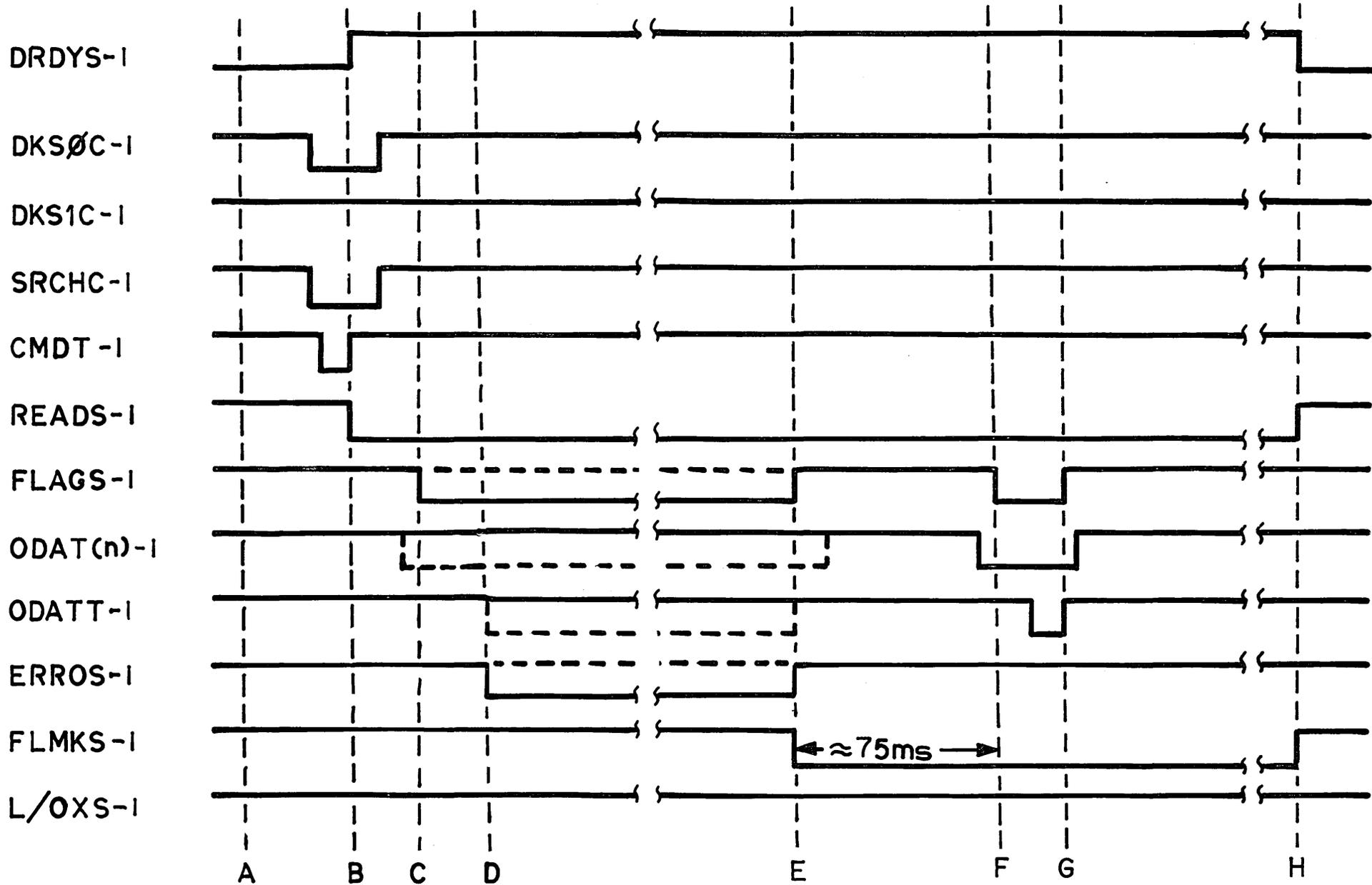


FIGURE 4-19

SEARCH MODE (WITH FILE MARK RECORD)

4-6.6 SEARCH MODE WITHOUT FILE MARK RECORD (Refer to Figure 4-20.)

This mode is used when a Write File Gap only configuration was used to write the .75 inch File Gap.

NOTE: Times shown are not proportional. Logic levels: true = 0vdc; false = +5vdc (negative true logic).

4-6.6.A Initial conditions: DRDYS-1 is true, L/OXS-1 is false, and STATT-1 is tied to ground.

NOTE: If L/OXS-1 is true (tape at BOT) when the Search command is issued, the selected deck will drive forward for .6 seconds (six inches) past the point that L/OXS-1 goes false before the Dicom Read circuitry is enabled. This insures the first character on tape is sensed.

4-6.6.B The Deck Select lines (DKS0C-1, DKS1C-1) and SRCHC-1 are stable during CMDT-1. READS-1 is set true and DRDYS-1 is set false.

4-6.6.C The DICOM 344 has read and assembled a character from tape; FLAGS-1 is set true and ODAT(n)-1 lines are stable at this time. Since the Search Mode is a normal read operation without stopping at the record boundaries (Inter-Record Gap), data is presented as it is read from tape. The user has the option of ignoring the data and looking only for FLMKS-1, or accepting the data as it is read from tape. The latter case could be used when it is desired to read an entire File of data without re-issuing the Read command upon completion of each record. Figure 4-20 depicts the Search Mode with FLAGS-1 ignored.

4-6.6.D If the data is to be ignored, ERROS-1 will go true, indicating that ODATT-1 was not issued within two milliseconds of FLAGS-1 being set true. The character that was not accepted by the On-Line device remains in the Output Data Register until the On-Line device accepts it, or until the File Mark Gap is detected. ERROS-1 may be ignored in this configuration.

4-6.6.E A File Mark Gap is detected and FLMKS-1 is set true; FLAGS-1 and ERROS-1 are set false, and the Output Data Register is initialized. If it is desired to terminate tape motion in the File Mark Gap, a Halt command would be issued at this time.

4-6.6.F The Deck Select bits (DKS0C-1, DKS1C-1), HALTC-1, and CMDT-1 are issued.

NOTE: If a Halt command is not issued, the first character of the next record (in the next file) will be read the same as in Section 4-6.5.F, G, and H.

4-6.6.G Tape motion terminates within 200 μ seconds after the Halt command is issued; FLMKS-1 and READS-1 are set false; DRDYS-1 is set true. The DICOM 344 is capable of executing any other command at this time.

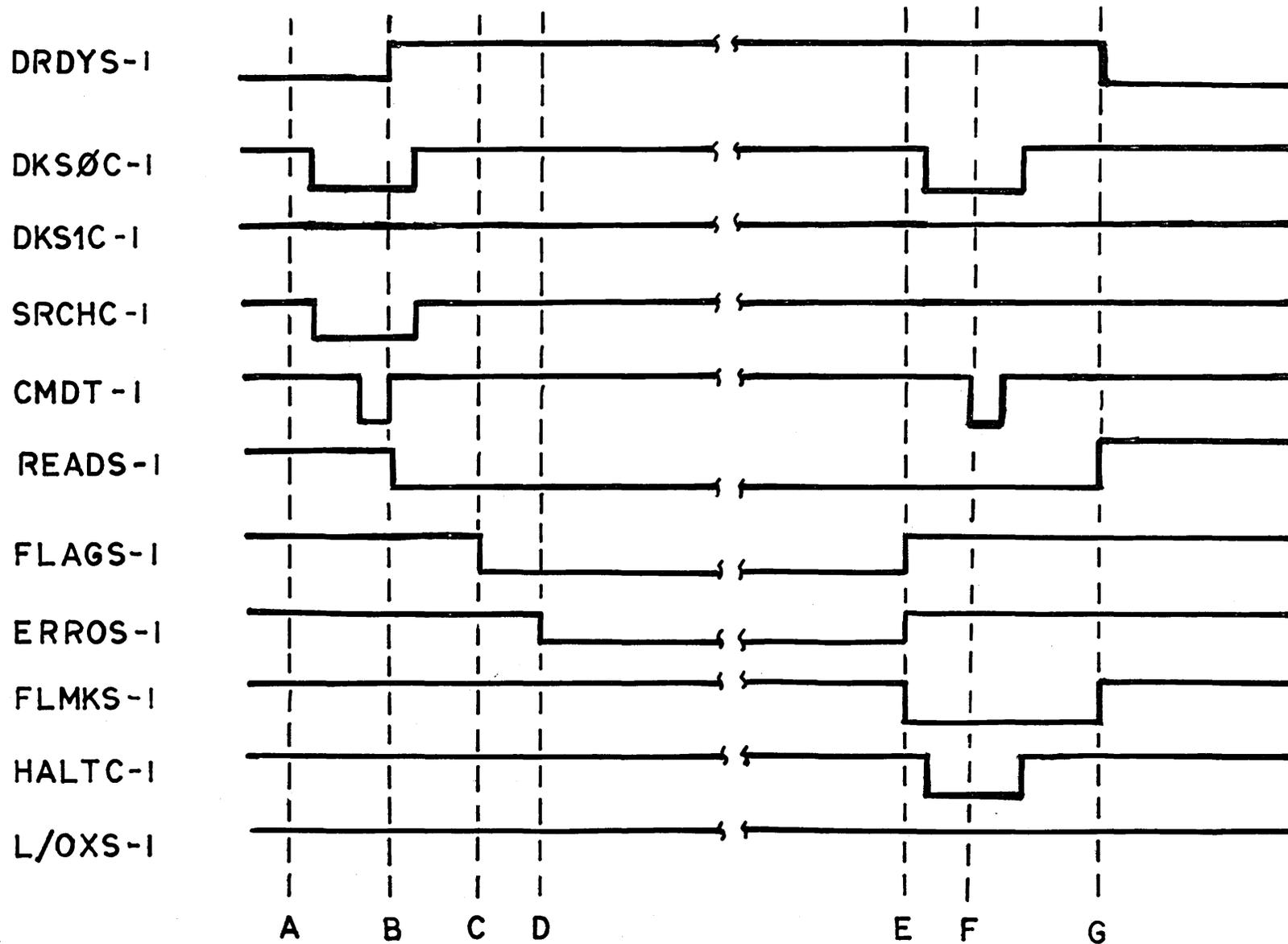


FIGURE 4-20 SEARCH MODE (WITHOUT FILE MARK RECORD)

4-6.7 REWIND MODE (Refer to Figure 4-21.)

Figure A represents a Rewind Cycle from EOT to BOT. Figure B represents a Rewind Cycle from EOT with a Halt command issued before BOT is reached.

NOTE: Times shown are not proportional. Logic levels: true = 0vdc; false = +5vdc (negative true logic).

4-6.7.A Initial conditions: Deck #1 is at End-of-Tape clear leader (L/OXS-1 true) and STATT-1 is tied to ground. (If Deck #1 is somewhere on the oxide portion of tape, L/OXS-1 will be false.)

4-6.7.B The Deck Select lines (DKS0C-1, DKS1C-1) and RWND-1 are stable during CMDT-1. DRDYS-1 is set false. Another deck can be selected and placed in any mode at this time. (Deck #1 will rewind to Beginning-of-Tape and will stop automatically, or it may be stopped by a Halt command - see Note 4-6.7.D below.)

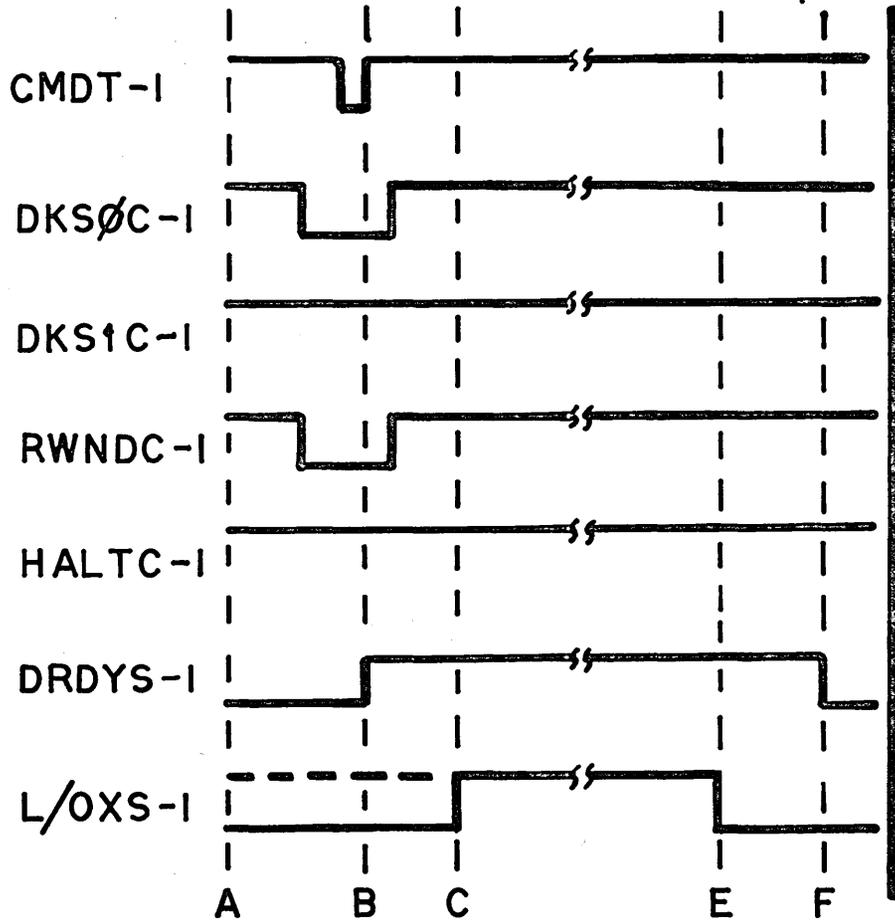
4-6.7.C L/OXS-1 is set false, indicating that oxide tape is under the read/write head.

4-6.7.D If the rewind mode is to be terminated before BOT is reached, a Halt command is issued; deck select lines and HALTC-1 are stable when CMDT-1 is issued.

4-6.7.E L/OXS-1 is set true, indicating that the clear leader is under the read/write head (Beginning-of-Tape).

4-6.7.F DRDYS-1 is set true, indicating that Rewind motion has stopped. The DICOM 344 is capable of executing any other command at this time.

EXAMPLE A



EXAMPLE B

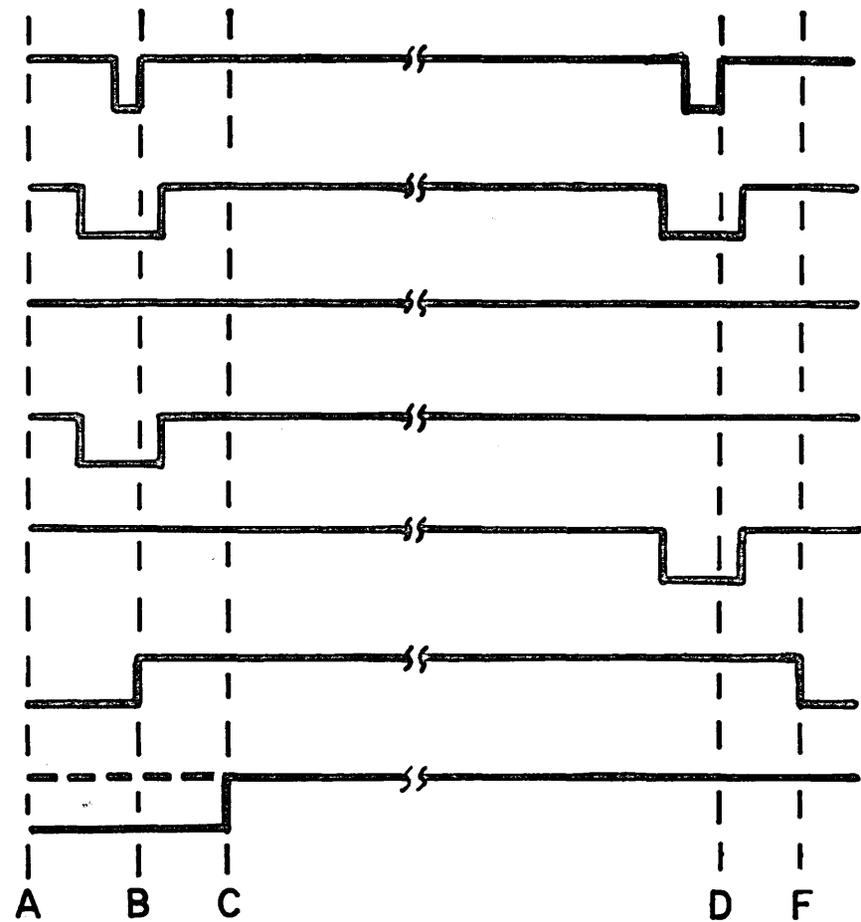


FIGURE 4-21 REWIND MODE

4-6.8 DECK Ø WRITE MODE (Refer to Figure 4-22.)

NOTE: Times shown are not proportional. Logic levels:
true = Øvdc; false = +5vdc (negative true logic).

4-6.8.A Initial conditions: DRDYS-1 is true and STATT-1 is tied to ground.

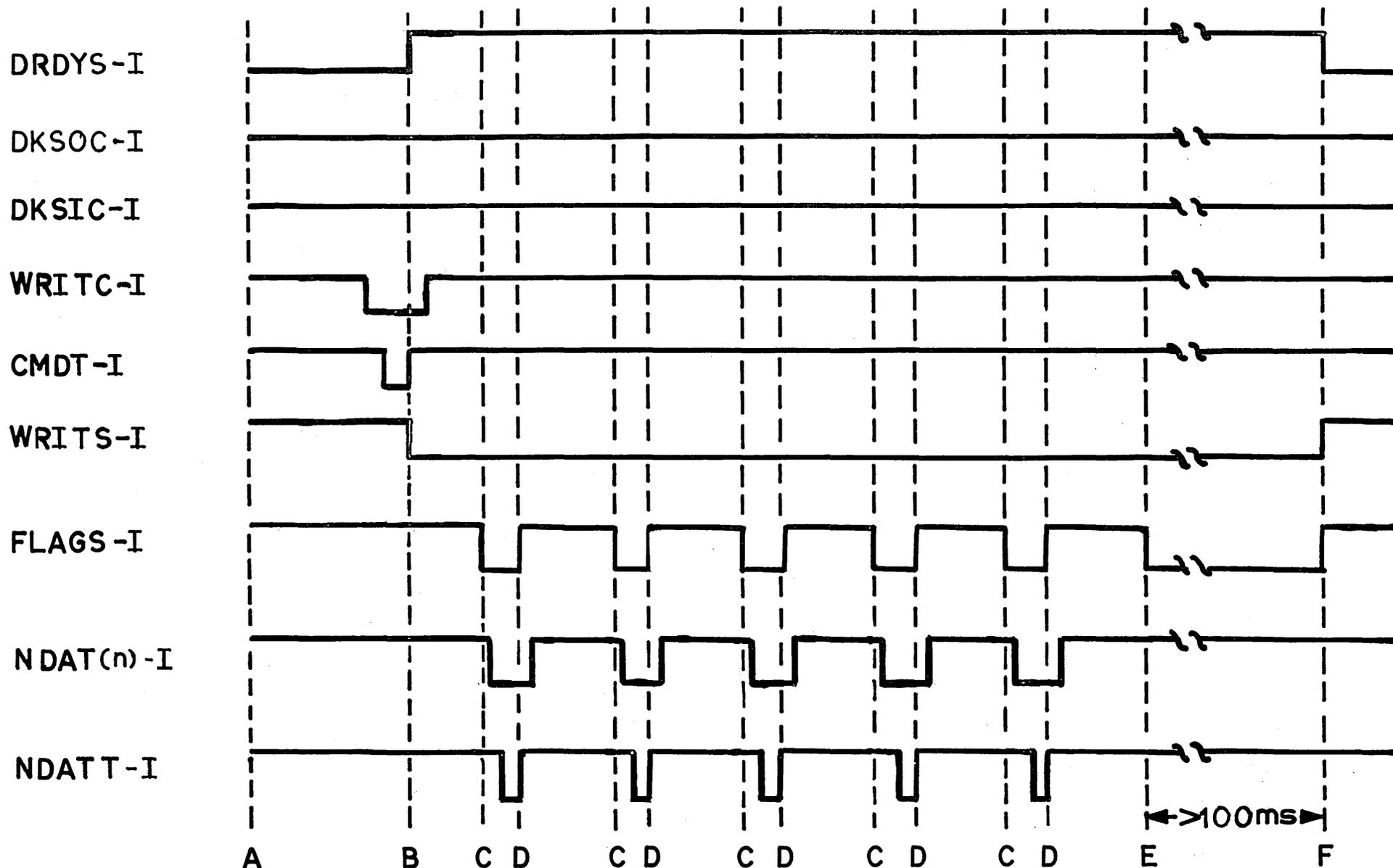
4-6.8.B The Deck Select Lines (DKSØC-1, DKS1C-1) and WRITC-1 are stable during CMDT-1. WRITS-1 is set true, and DRDYS-1 is set false.

4-6.8.C The DICOM 344 is ready to accept a character and FLAGS-1 is set true. NDAT(n)-1 are presented to the DICOM 344.

4-6.8.D NDATT-1 is issued; NDAT(n)-1 lines must be stable at this time and the lines are sampled. FLAGS-1 is set false. The first NDATT-1 may be issued at any time after the first FLAGS-1 goes true. The second and all subsequent NDATT-1 pulses must be issued within 100 milliseconds of FLAGS-1 going true.

4-6.8.E The DICOM 344 is ready to accept a character and FLAGS-1 is set true. No further data is to be sent to the Teleprinter.

4-6.8.F The On-Line device has not transmitted a character for output to the Teleprinter for more than 100 milliseconds since FLAGS-1 was set true; WRITS-1 and FLAGS-1 are set false, and DRDYS-1 is set true. The DICOM 344 is capable of executing any other command at this time.



4-6.9 DECK Ø READ MODE (Refer to Figure 4-23)

NOTE: Times shown are not proportional. Logic levels:
true - 0vdc; false = +5vdc (negative true logic).

4-6.9.A Initial conditions: DRDYS-1 is true and STATT-1 is tied to ground.

4-6.9.B The Deck Select lines (DKSØC-1, DKS1C-1) and READC-1 are stable during CMDT-1. READS-1 is set true and DRDYS-1 is set false.

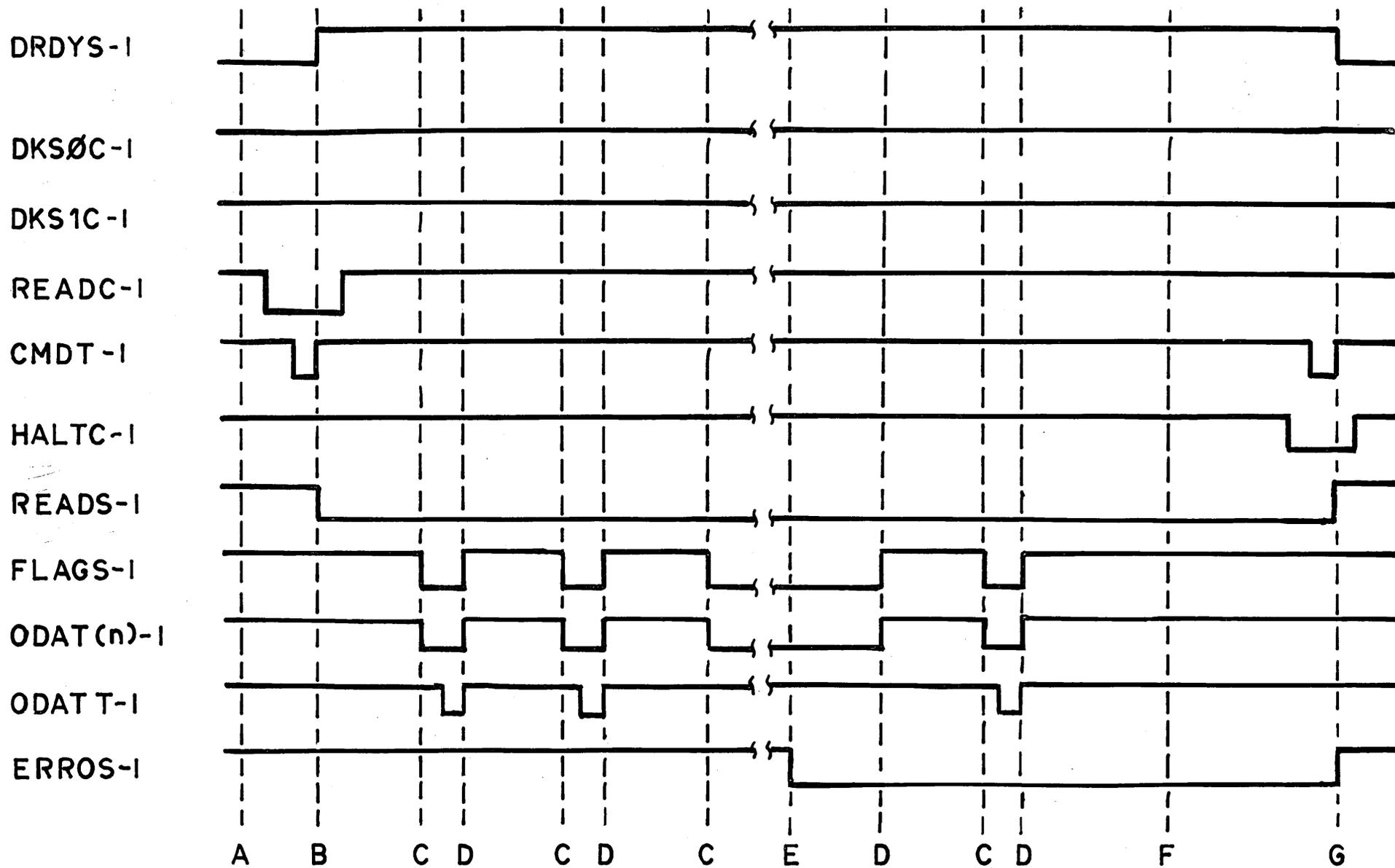
4-6.9.C The DICOM 344 has read and assembled a character from the Teleprinter; FLAGS-1 is set true and ODAT(n)-1 lines are sampled; FLAGS-1 is set false.

4-6.9.D ODATT-1 should be issued within 2 milliseconds of FLAGS-1 being set true. ERROS-1 is set true (see Note 4-6.9.E below).

4-6.9.E ERROS-1 will be set true if a new character is received from the Teleprinter before the On-Line device has signaled the receipt of the previous character by issuing ODATT-1. The character rate will be at the operators speed, but limited to a maximum of 2400 baud.

4-6.9.F No more data is to be read from the Teleprinter. This is a software decision, and no unique hardware function is used to terminate this mode. (See Deck Ø Read Programming, Note 4-5.9.)

4-6.9.G The Halt command is issued to reset the Deck zero Read mode; deck select lines and HALTC-1 are stable during CMDT-1. READS-1 is set false, and DRDYS-1 is set true; the DICOM 344 is capable of executing any other command at this time.



SECTION 5
MAINTENANCE

(TO BE SUPPLIED)

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