Model 133

Mag Tape Coupler

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600242-000 A

REVISION HISTORY		
ECO #	DATE	DESCRIPTION
0060	9/17/83	Added P/N and Revision History
0196	10/5/83	Released New Manual
0226	11/23/83	Typo's-Pages 3-3, 3-7, 3-9
0282	3/29/84	Changed Name from 130 to 133 and Miscellaneous Changes
0313	5/22/84	Typo's-Pages 3-2, 3-3, 3-7, 3-9, 3-10, 5-2, 6-1, 6-2
0328	6/28/84	New ZETACO Cover
0331	7/12/84	Pg. 3-10
0347	7/26/84	Rev. Manual
0380	9/25/84	See ECO
0392	10/2/84	See ECO

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1.0 INTRODUCTION

The Custom Systems' 133 Magnetic Tape Coupler interfaces to Tape Drives with "Industry Standard" embedded formatters which employ PE, NRZ, GCR and other recording formats. The Coupler transfers up to 64K word blocks of data and is totally transparent to Data General's Operational Software. The Coupler emulates Data General 6021 (used with RDOS or AOS) or Data General 6125 (used with AOS or AOS/VS) Tape Subsystems.

1.1 FEATURES

- Interfaces Data General's Minicomputers to Formatted Magnetic Tape Drives produced by popular Tape Drive Manufacturers.
- Microprocessor based controller adds flexibility and performance enhancements.
  - a) Dynamic inter-record gap
  - b) Read look ahead

  (These features enahance streaming capability using standard D.G. software.)
- Software compatibility to Data General operation software.
- FIFO buffering for data channel latency.
- Automatic Self-test with error reporting by visual light emitting diode.
- Memory addressing capability to 32K words (64K optional).
- Software selectable streamer modes
- Handles up to eight industry standard Half Inch Tape Drives.
- Requires +5 volts only with less power consumption than embedded type controllers.
- Automatic High Speed File Search.

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2.0 SPECIFICATIONS

2.1 INTERFACE

Electrical: Industry standard embedded formatter, open collector, low active, TTL

Driver: Logic Low = .4V Min.
Logic High = 2.4V Min.

Receiver: Schmidt Trigger

Cabling: Two 50 pin ribbon cables installed on computer backplane or FCC cabling.

(Maximum allowable cable length between Coupler and last formatter is 20 feet.)

Parity: Odd (Even parity for maintenance only)

Daisy Chain: 8 Drives or 3 Drives plus Formatted Drive (Refer to Diagram 2.1, Figures 1, 2 and 3)

Figure 1 - Up to 8 Streamer Drives

Figure 2 - 1 to 4 Streamers and a Formatted Drive

Figure 3 - 2 Formatters with 3 Drives on each Formatted Drive

2.2 POWER

Typically 3.0 Amps at +5 Volts.

2.3 PHYSICAL

Dimensions: 15 in. by 15 in. by 1/2 in.

Weight: 10 lbs. including cables and manuals

2.4 ENVIRONMENT

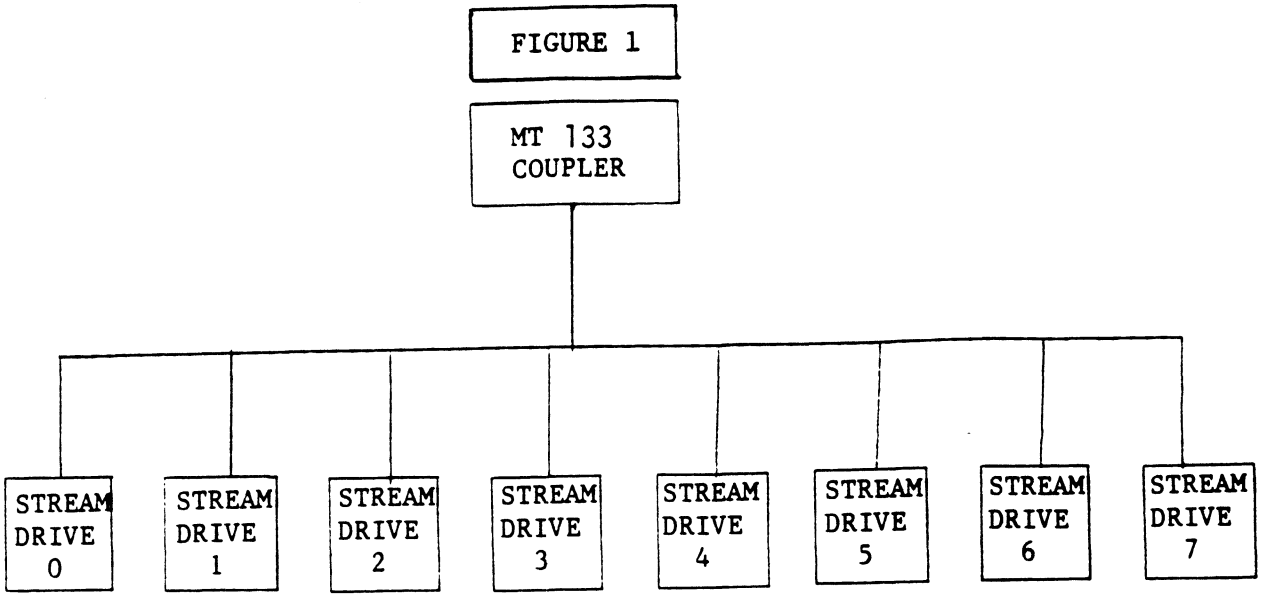
Operating Temp: 0 to 55 degrees C

Relative Humidity: 10% to 90% (non-condensing)

DIAGRAM 2.1

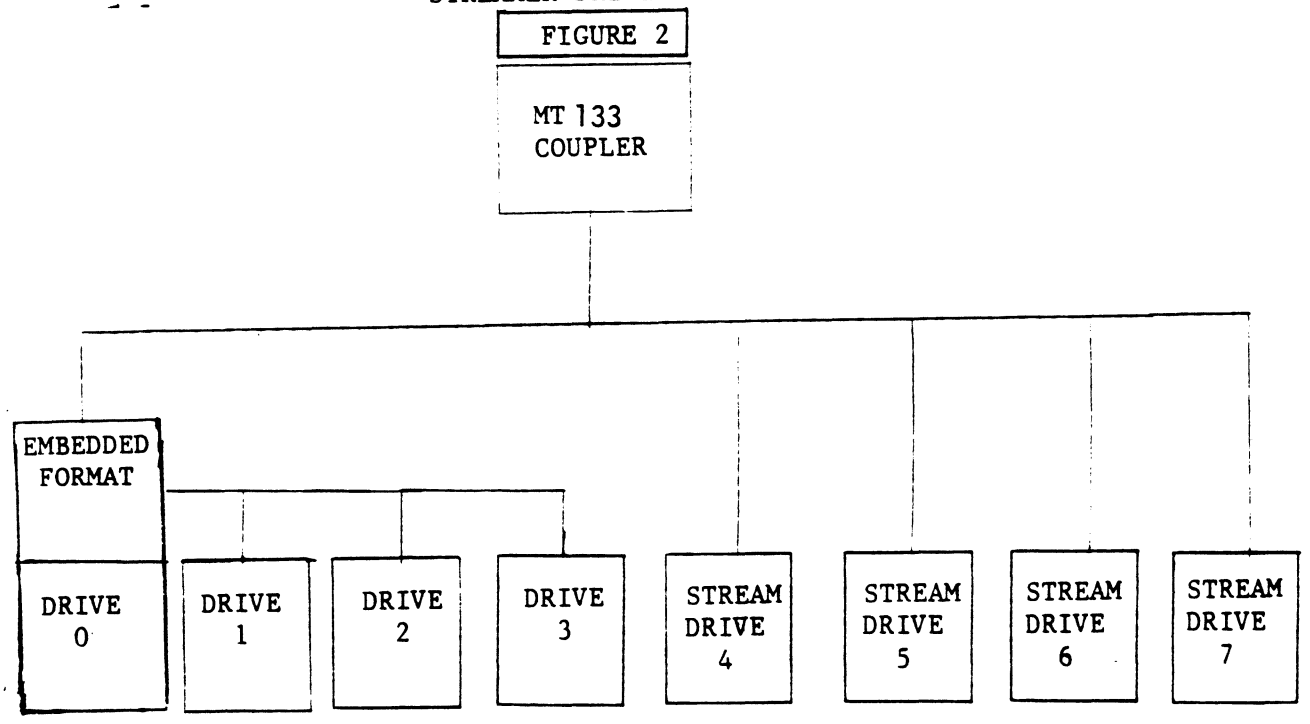
DAISY CHAINING

FIGURE 1



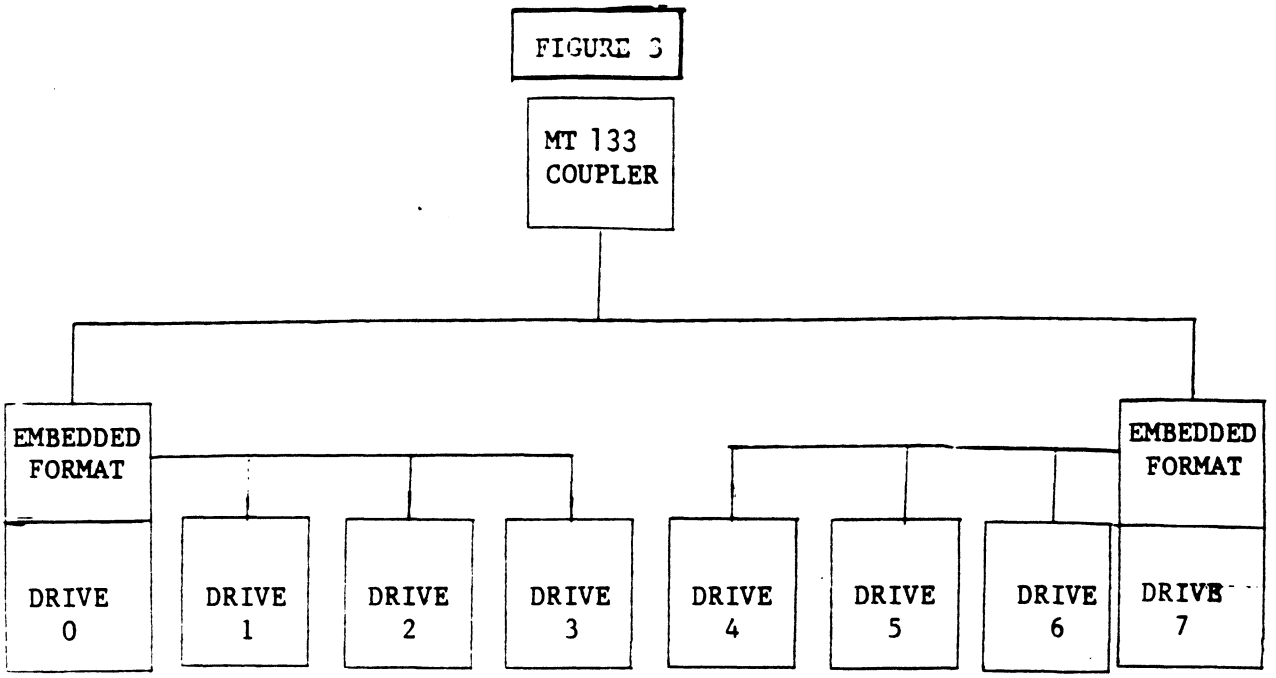
STREAMER DRIVES ONLY

FIGURE 2



EMBEDDED FORMATTER AND STREAMER DRIVES

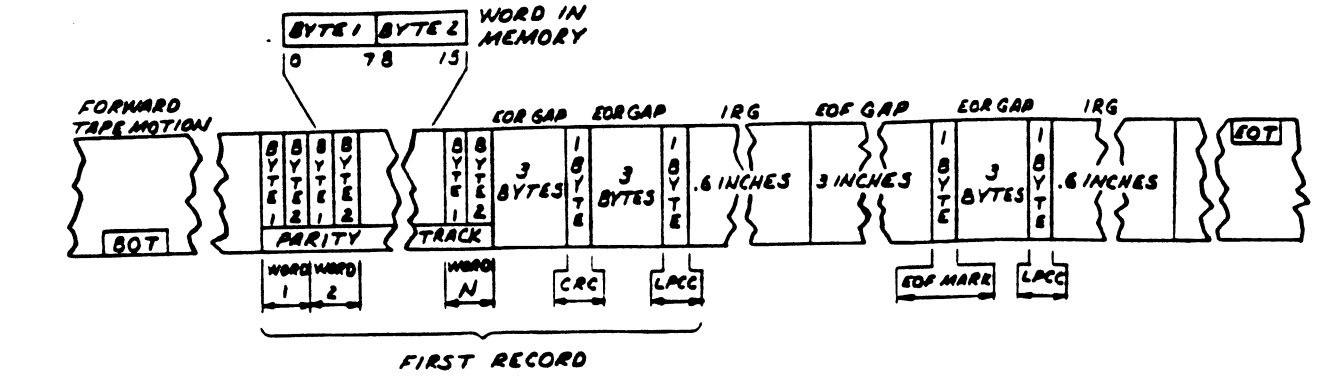
DIAGRAM 2.1 (continued) DAISY CHAINING



TWO EMBEDDED FORMATTERS

Example Tape Formats

Phase Encoded (PE)



Non-Return To Zero (NRZ)

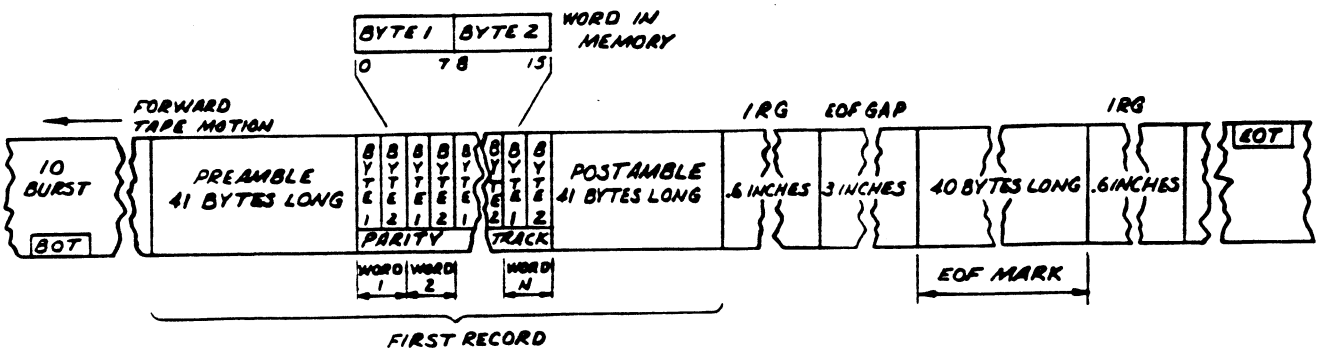


Figure 4

2.5 MAGNETIC TAPE MEDIA CAPACITY

The following formula will aid in determining how much data storage capacity in Bytes (Byte = 8 Bits) a length of tape will offer.

$$\#\ \text{OF BYTES/LENGTH OF TAPE} = \frac{(\text{TLEN} - 25)\ (\text{RLEN})\ (12)}{((\text{RLEN} + \text{TFD})/\text{BPI}) + \text{GAPL}}$$

TLEN = LENGTH OF TAPE IN FEET
RLEN = RECORD LENGTH IN BYTES
TFD = TAPE FORMAT DATA (PE = 82, NRZ = 8)
BPI = RECORDING DENSITY (PE = 1600, NRZ = 800)
GAPL = GAP LENGTH IN INCHES (NOMINAL = .6")

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3.0 INSTALLATION

Please read the following Installation Section carefully in addition to Sysgen Considerations (Section 8.1). We recommend running Diagnostics after the board has been configured for the correct jumper settings. Refer to Sections 4.0 thru 4.2. NOTE: If you plan on optimizing your streamer tape drive you must read Sections 7 and 8 of this manual.

3.1 UNPACKING AND INSPECTION

All parts comprising the Model 133 are shipped in one container consisting of:

a) Controller
b) Controller to Tape Drive Cabling or FCC Cabling
c) Diagnostic Software
d) Technical Manual

On receipt of the Model 133 from the carrier, inspect the shipping carton immediately for any evidence of damage or mishandling in transit.

If the shipping carton is water stained or damaged, contact the carrier and shipper immediately, specify the nature and extent of the damage and request that the carrier's agent be present when the carton is opened.

Custom Systems' warranty does not cover shipping damage.

For repair or replacement of any Custom Systems product damaged in shipment, call Custom Systems to obtain Return Authorization Instructions.

3.2 CONFIGURING THE MODEL 133

To properly configure the Coupler you must select one of two Emulations (determined by your Operating System), the device code to be used and other considerations. This Manual makes reference to a 133 (6021 Emulation) and a 133A (6125 Emulation). They are the same board only the jumpers are changed.

3.2.1 6021 EMULATION

The 6021 Emulation is used by RDOS (referenced to as MTX) and can be used by AOS (referenced to as MTA). The standard (STD) jumper settings are defaulted to this Emulation (6021). Section 8.1 refers to 6021 Emulation.

NOTE: J5 enabled for streamer drives and disabled for start/stop drives.

3.2.2 6125 EMULATION (MV SERIES COMPUTERS REQUIRES 6125 EMULATION)

The 6125 Emulation is used by AOS (referenced to as MTC). RDOS does not support the 6125 Emulation. Section 8.1 refers to 6125 Emulation. To properly select 6125 Emulation perform the following steps:

1. Select 64K Word Count J2 (C to A).
2. Select Maximum Address 177777$_8$ J6 (C to A IN).
3. Select IDENT Status Disable J10 (C to B IN).
4. Select Corrected Error Disable J11 (C to B IN).

NOTE: J5 enabled for streamer drives and disabled for start/stop drives.

3.2.3 JUMPER TABLE

Refer to Diagram 3.0.

The following jumpers are used to configure the 133 to meet a Customer's needs. (STD) indicates a Printed Circuit Line etched on the Printed Circuit Board.

Primary/Secondary Device Code

- J1 (IN) J7 (IN) = 22_8 Device Code (STD)
- J1 (OUT) J7 (IN) = 62_8 Device Code

Word Count Size

- J2 (C to B IN) (C to A OUT) = 4K Word Count Size (STD)
- J2 (C to A IN) (C to B OUT) = 64K Word Count Size

For 6021 Emulation select 4K Word Count Size.
For 6125 Emulation select 64K Word Count Size.

Density Select

- J3 (C to A IN) (C to B OUT) = DIA - 4 Bit always Hi (STD)
- J3 (C to B IN) (C to A OUT) = Drive Determines Status

CAUTION: If using RDOS, J3 C to A must be in otherwise RDOS sees the unit as being improperly selected.

- J4 Factory use Only

Read Look Ahead

- J5 (IN) Streamer = Read Look Ahead Enabled (STD)
- J5 (OUT) Start/Stop = Read Look Ahead Disabled

CAUTION: Streamer Drives should have Read Look Ahead enabled for optimum performance. Disable for Start/Stop drives (such as vacuum column or tension arm), cache drive, or more than one drive daisy-chained to the Coupler.

EXAMPLE OF TAPE DRIVES REQUIRING READ LOOK AHEAD DISABLE

Type of Tape Drive		CIPHER	KENNEDY	STC
Start/Stop	Without Vacuum Column	F100 Series	9000,9100 9600-9800	
Start/Stop	With Vacuum Column	F900 Series		
Start/Stop	Cache	F890, F891		
Start/Stop	GCR		9400	2920

Quantity of one per controller board.

Example of Streamer drives are the Cipher F880, CDC 92181, and CDC 92185 requiring read look ahead be enabled.

NOTE: Any tape drive in quantity of two or more connected to one model 133 requires read look ahead be disabled.

Extended Memory — J6 (C to B IN) (C to A OUT) = Max address = 77777_8 (STD)

Address — J6 (C to A IN) (C to B OUT) = Max address = 177777_8

For 6021 Emulation select Max Address = 77777_8

For 6125 Emulation select Max Address = 177777_8

Alternate Device — J7 (OUT) (J1 IN) = 20_8 Device Code(STD)

J7 (OUT) (J1 OUT) = 60_8 Device Code

Normal Rewind Status at BOT — J9 (IN) J8 (OUT) (STD)

Fast BOT and Ready Status — J8 (IN) J9 (OUT) (STD)

IDENT Status	J10 (C to A IN) (C to B OUT)	= Enabled IDENT Status, Bit 11 DIA (STD)
	J10 (C to B IN) (C to A OUT)	= Disable IDENT Status, Bit 11 DIA Always Zero

For "COPY" program and 6125 emulation disable IDENT Status.

Correctable Error Status	J11 (C to A IN) (C to B OUT)	= Enabled Correctable Error Status, Bit 12 DIA (STD)
	J11 (C to B IN) (C to A OUT)	= Disable Correctable Error Status, Bit 12 DIA Always Zero

For "COPY" program and 6125 emulation disable Correctable Error Status.

3.3 BOARD INSERTION

Carefully guide the coupler board into the desired slot by allowing the edges of the board to follow the guides evenly. Use the lock tabs on the two outside corners to provide leverage when the board meets the connector. Use equal pressure on both lock tabs until the board seats firmly into the backplane connectors.

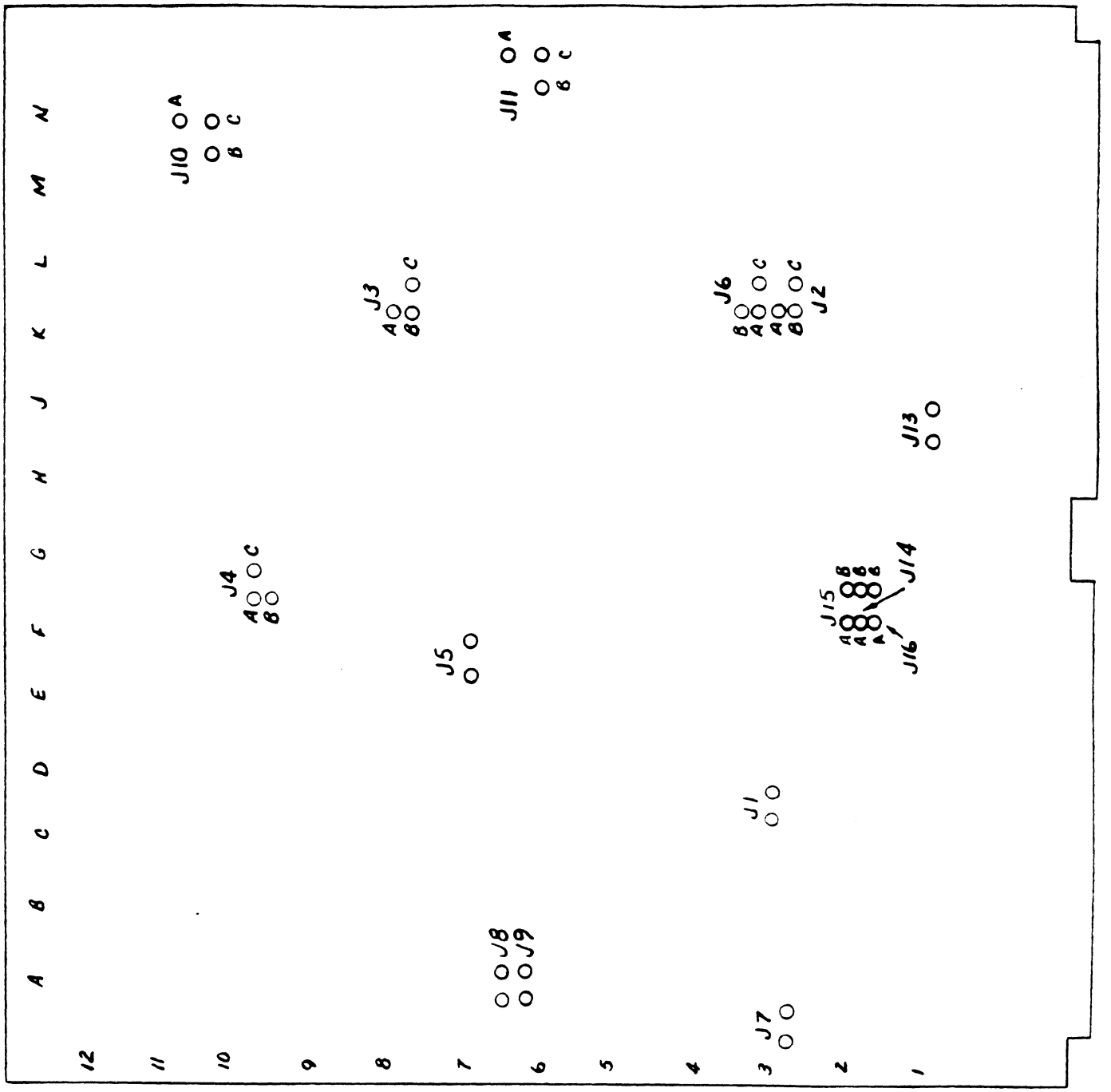

A B C D E F G H J K L M N
12 11 10 9 8 7 6 5 4 3 2 1
J10
J11
J3
J6
J2
J4
J5
J13
J15
J14
J16
J1
J8
J9
J7

DIAGRAM 3.0

3.4 PRIORITY SELECTION

The coupler must receive two priority signals from the Data General minicomputer backplane, data channel priority in (Pin A94) and interrupt priority in (Pin A96). If there are vacant slots between the coupler and the processor, priority jumper wires must be installed to obtain priority continuity between controllers. To jumper across unused slots, connect A93 (Data Channel Priority Out) to A94 (Data Channel Priority In) and A95 (Interrupt Priority Out) to A96 (Interrupt Priority In).

3.5 CABLING (MINICOMPUTER BACKPLANE TO TAPE DRIVES FORMATTER BOARD) NON-FCC CABING

The two ribbon cables that are necessary to interface the coupler to the tape drive's formatter board, are terminated with a board edge connector on one end and a paddle board assembly on the other end. The paddle board assembly ends connect onto the minicomputer backplane pins (observe which slot the coupler occupies in order to determine the correct set of backplane pins for connection) - one on the A backplane and one on the B backplane. (Reference Figure 3.1). Make sure the backplane pins are straight first, then reference Diagram 3.2 for proper installation. Also shown in the Diagram is a typical connection of the board edge connector end to the tape drives formatter board. It is suggested that the tape drive manufacturer's manual be referenced for proper connection to the formatter board.

NOTE: Remote Switching of Density Selection is not supported. Locally switching the density is required.

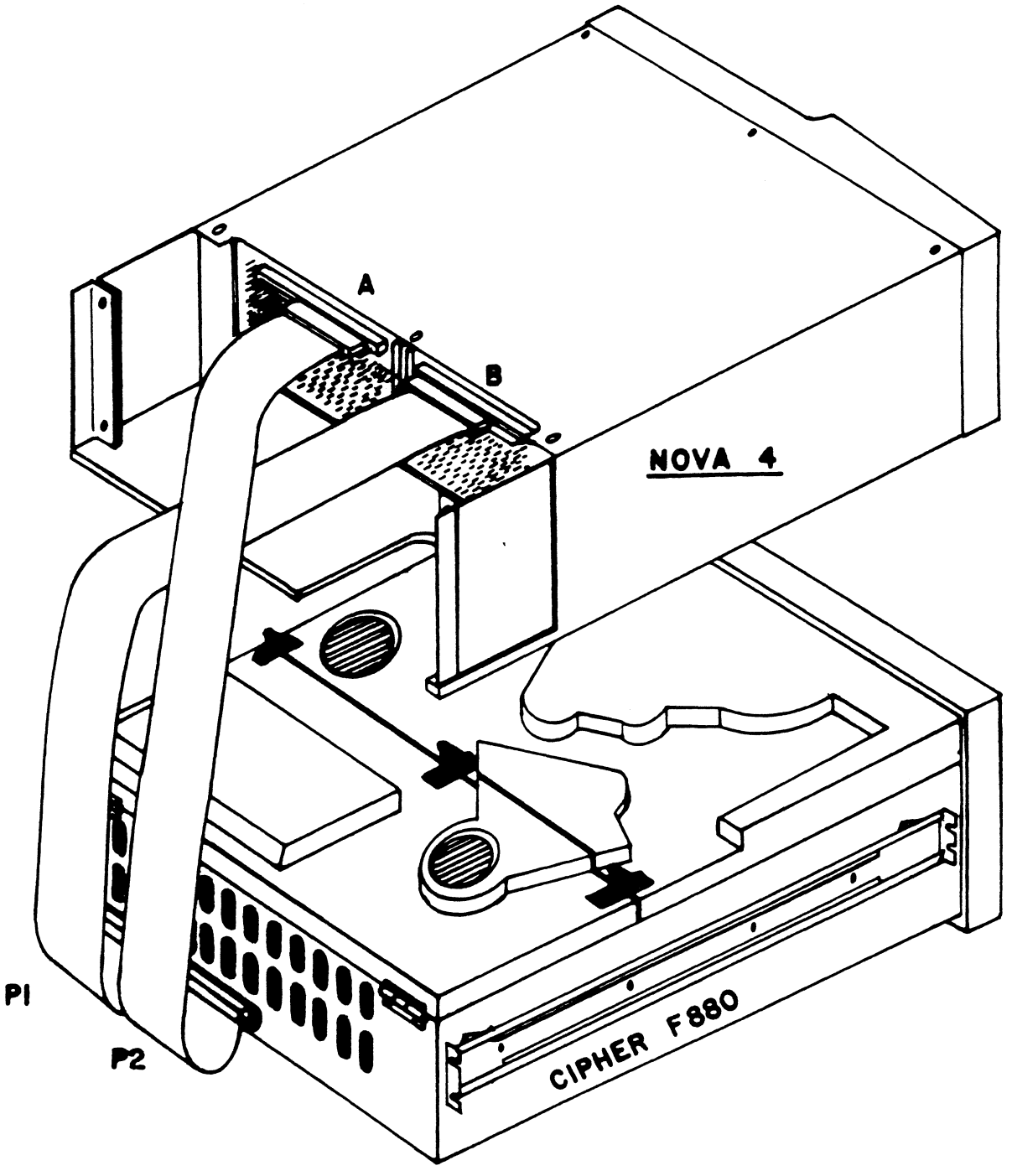
The following table can be referenced to ease the cable installation.

TAPE DRIVE	BACKPLANE A CONNECTOR	BACKPLANE B CONNECTOR
Cipher Streamer	P2	P1
*Cipher Formatter	P5	P4
Kennedy Streamer	P2	P1
Kennedy Formatter	J1	J5
Kennedy 9400 GCR	P200	P100
CDC Streamer	J5	J4
Pertec	P5	P4
CDC GCR	J3	J2
**STC 2920	P2	P1

*Requires Cipher 100 pin to two 50 pin Adapter Boards P/N 160006-001
**Requires ZETACO 2920A Adapter Board P/N 500395-000

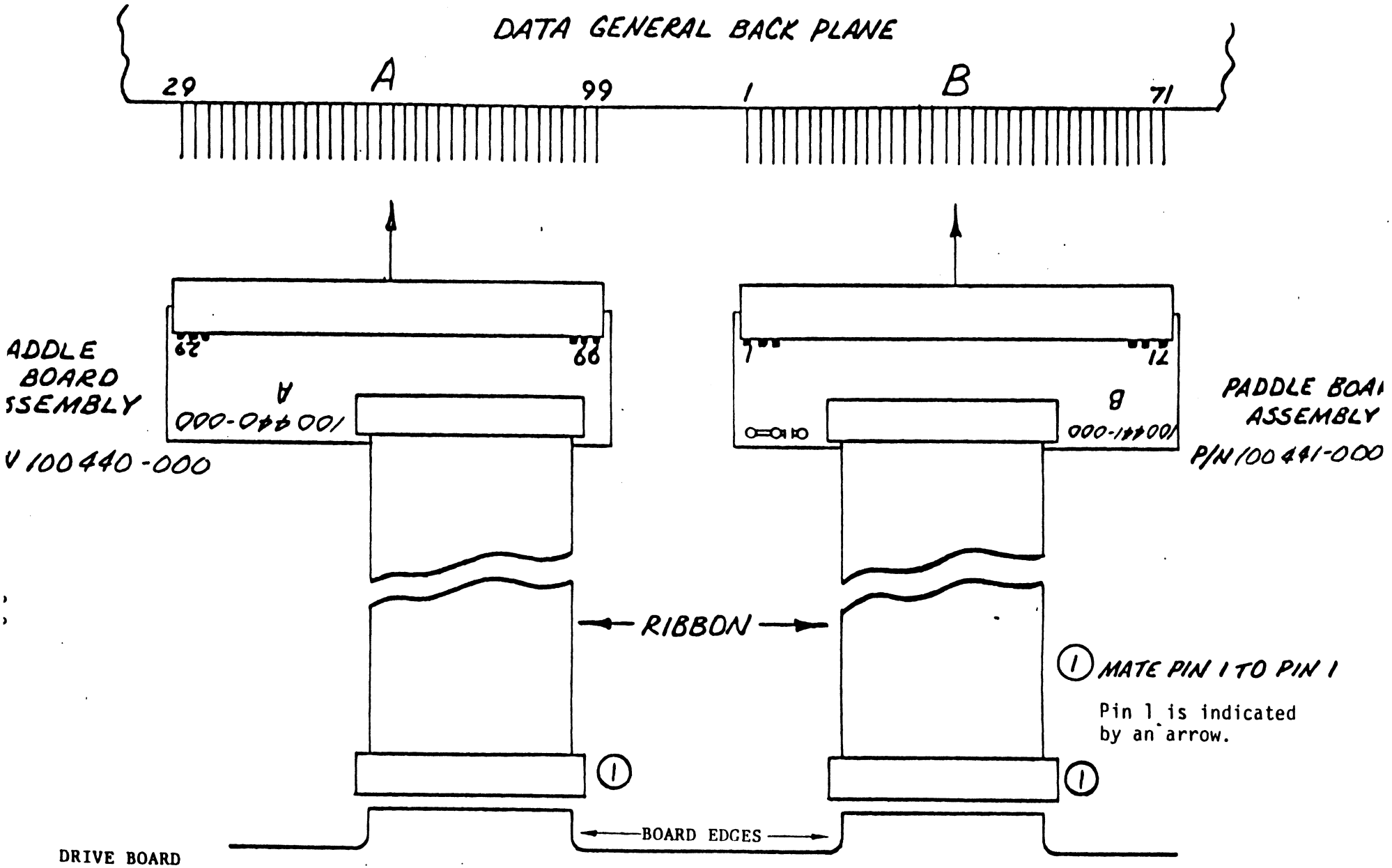
3.6 FCC CABLING

When using FCC Cabling refer to Diagram 3.3. When supplied with the External FCC Cabling marked 300001-000 mark on the white tab the "A" or "B" side as they associate with the correct side of the Backplane and its Internal Cable. Example: Take either 300001-000 Cable and connect it to the "A" side of the Bulk Head and to the appropriate Tape Formatter side A and mark the white tab of the 300001-000 as Cable "A". Take the remaining Cable and mark it Cable "B".



CABLE CONNECTION EXAMPLE

DIAGRAM 3.1



*Requires Cipher 100 Pin to two 50 Pin Adapter Boards P/N 160006-001.

**Requires ZETACO 2920A Adapter Board P/N 500395-000.

FCC CABLING

	"B" Side		"A" Side
	Cipher Streamer	P1	P2
	*Cipher Formatter	P4	P5
	Kennedy Streamer	P1	P2
DRIVE BOARD EDGE END	Kennedy Formatter	J5	J1
	Kennedy 9400 GCR	P100	P200
	CDC Streamer	J4	J5
	Pertec	P4	P5
	CDC GCR	J2	J3
	**STC 2920	P1	P2

*Requires Cipher 100 Pin to two 50 Pin Adapter Boards P/N 160006-001.

**Requires ZETACO 2920A Adapter Board P/N 500395-000.

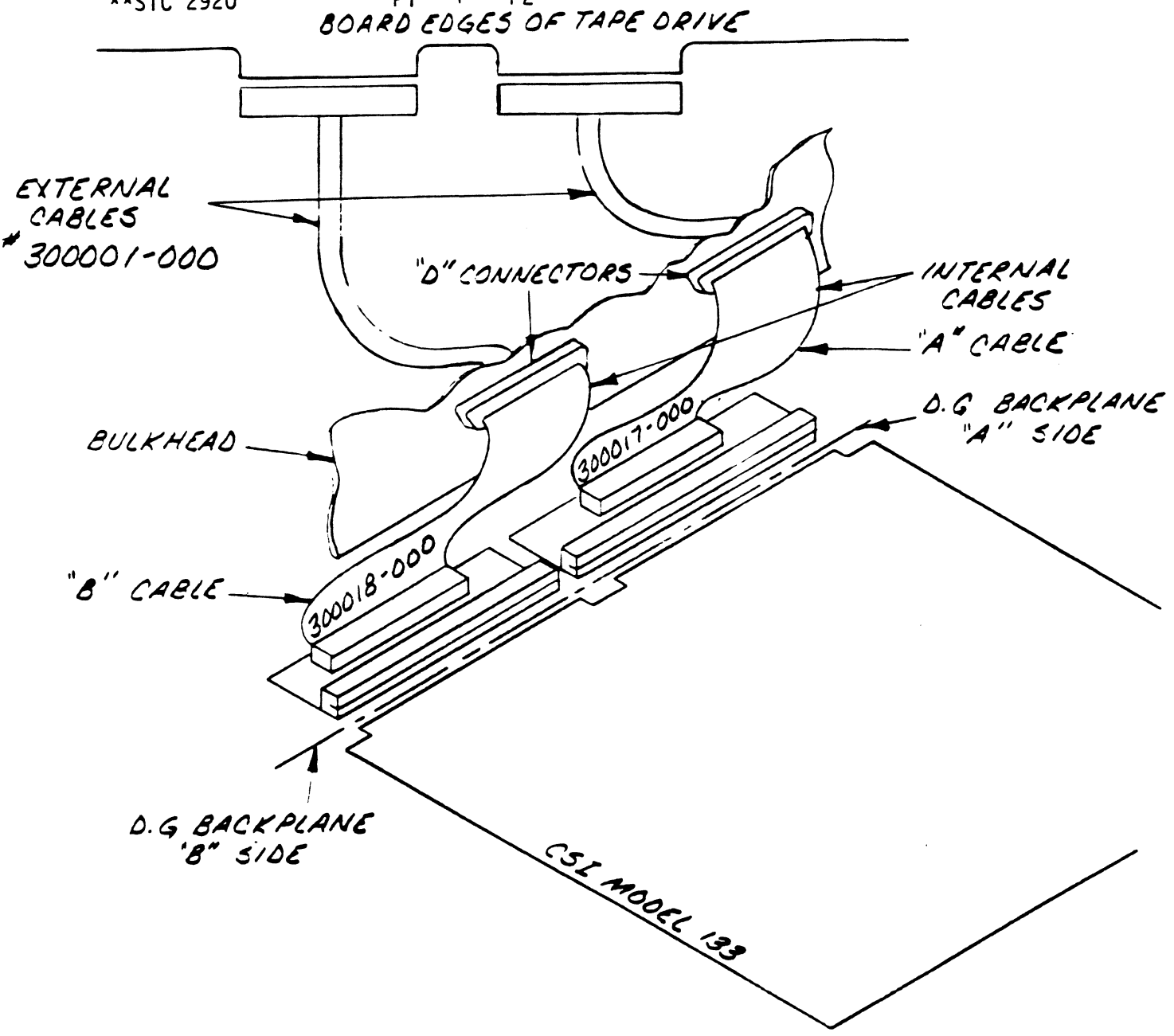


DIAGRAM 3.3

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4.0 DIAGNOSTIC SUPPORT PACKAGE (DSP)

4.1 DSP GENERAL INFORMATION

The Diagnostic Support Package includes a diagnostic program, a reliability program and utilities which will set a streaming tape to certain pre-defined values. In this section we will describe how to boot programs from this tape and how to load these programs onto your system disk. The operation of Diagnostics and Reliability are also described here. Please refer to the System Guidelines in Section 8 for information on the streaming mode utilities.

4.1.1 BOOTSTRAP PROCEDURES

1. Mount the M242 DSP Tape on your tape drive and put the drive on-line. Be sure that the BPI setting matches the tape that you received. If your CPU has a tape drive other than the one you are testing, you can use it to boot from.
2. Program Load - The method of program load varies for different processors. Some of the possibilities are described here.

   If your system has front-panel switches, set them to 100022 when loading from the primary tape drive, or to 100062 when loading from the secondary drive. Then press the program load switch.

   For the S140 virtual console, set 11A to 100022 for the primary tape drive, or 100062 for the secondary tape drive. Then enter 100022L or 100062L.

For the S120 virtual console, enter 22H for the primary tape drive or 62H for the secondary tape drive. For a Point 4 virtual console, set the switches on the CPU board and then enter P22 or P62 for the secondary drive.

3. M242 Menu Display is:

File #	Program
2	MT133 COUPLER DIAG
3	UNIVERSAL MAG TAPE RELIABILITY
4	TAPEMODE (STAND-ALONE)
5	".SV & .LS" Files and any Utilities in RDOS DUMP Format
6	".SV & .LS" Files and any Utilities in AOS DUMP Format

File Number?

You should enter the number of the program you wish to run. The last item on the menu is a description of the dump files contained therein, rather than an executable program.

4.1.2 LOADING PROGRAMS ONTO DISK

The last file on the DSP tape is an RDOS dump format of the previous files, along with some streaming mode utilities. This allows you to load the programs onto your disk. We encourage you to transfer the programs to some media other than 1/2 inch tape as soon as you can. If you have only one tape drive in your system, this will prevent having to load programs from a suspect tape drive at some later time. The following CLI commands can be used to perform the load:

For RDOS -

```
DIR %MDIR%
INIT MT0
LOAD/A/R/V MT0:5
RELEASE MT0
```

For AOS -

```
SUPERUSER ON
DIR :
LOAD/V/R @MTA0:6
REWIND @MTA0
SUPERUSER OFF
```

The files can now be booted from disk. For RDOS enter the program name in response to FILENAME?. For AOS enter the full pathname (including .SV) in response to PATHNAME?.

4.2 DIAGNOSITCS

The diagnostic program is provided to find failures that are related to the basic operations of tape control. The diagnostic assumes the magnetic tape media is not the cause of errors. You should use a good scratch tape for the testing. In the interest of saving time during the EOT portion of diagnostics, it is a good idea to use a small tape reel.

A. Boot the diagnostics program (MT133D) from tape M242 or disk. You should see the following:

```
-            MT133D  -  REVISION N
-    133 Tape Coupler Diagnostics
-    Product of Zetaco

-    Please mount a write-enabled error free scratch tape.
-    Only the drive you are testing can be on-line.
-    Press any key to continue.
```

B. Load a scratch tape on the drive being tested, put the drive on-line and then press RETURN. Program displays:

- Enter drive unit number:

C. After you have entered the unit number, the program will display:

- Specify the CSI model number of the unit being tested.
- (6021 = 0 or 6125 = 1):

If you have a Model 133 (6021 emulation), enter 0.

If you have a Model 133A (6125 emulation), enter 1.

D. Next you should select the recording mode to be tested:

- If the drive is set for NRZ (800 BPI), enter 0; otherwise enter 1.

E. As the tape drive can be either the primary or the secondary device, you must enter the device code:

- Enter device code [22]:

F. The last request before the tests are executed is:

- Set switch register to the desired value, then press RETURN to continue.

G. If you wish to set any switches, refer to the program text file in the back of the manual. To proceed with the test, you must enter RETURN (NEW LINE will not do it).

H. When diagnostics have successfully run, the word CYCLE, followed by PASS #, will display. When errors are encountered, an explanation will be displayed and the program will loop on the error. To continue beyond the error, turn on Switch 1.

4.3 RELIABILITY

The Reliability Program is provided to find intermittent and pattern sensitive problems.

A. Load the program from M242 tape or disk. (See DSP General Information.) Program displays:

```
-           UMTR - Release N
-   Universal Mag Tape Reliability
-   Product of Zetaco

-   Starting Addresses:

-   500-Reliability Test
-   501-Interchange Test (WRITE/READ)
-   502-Interchange Test (READ ONLY)
-   503-Command String Interpreter
-   504-Error Log Printout

-   Set Switch register to desired value, then press
    RETURN to continue.
```

B. Load scratch tape on all drives to be tested. Press RETURN (not NEW LINE). You will be asked to specify the Model Number of your Tape Coupler:

```
-   Specify the CSI Model Number of the unit(s)
    being tested.
-   (110=1, 120=2, 133(6021)=3, or 133(6125)=4):3
```

C. You should enter 3 if the Coupler is a 133 (6021 emulation), or 4 if it is a 133A (6125 emulation). All the drives being tested must be at the same device code.

```
-   Enter device code [22]:
```

D. Enter the device code. Program then asks:

```
-   Enter 0 to test CRC (NRZI only), otherwise enter 1.
```

E. Specify the recording mode. Program then asks:

   - Enter 1 if the controller will be run in an AOS system, otherwise enter 0.

F. The last message reminds you to mount your scratch tapes:

   - Mount scratch tape(s). Press RETURN to continue.

G. Press RETURN (not NEW LINE). The Reliability tests will begin. While the program is running, you should press the SPACE BAR to display the current statistics of READS, WRITES and ERRORS.

4.4 UTILITY PROGRAMS

The Utility Programs in the DSP for M242 all concern streaming mode drives. If you have a streaming tape, you should read the System Guidelines in Section 8 for information on optimizing the performance of the drive.

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5.0 TROUBLESHOOTING

Selftest tests all the internal functions of the controller board once for every time power is applied to the board. The test takes approximately 14 seconds to complete. If selftest passed the red LED will go out. If a failure was detected, the LED will blink a repetitious code indicating which circuit on the board has a problem. Looping on error is achieved by depressing the I/O reset switch while the error code is being reported. Reference Table 5.1 for Self Test Error Codes.

CODE	TEST	POSSIBLE FAILURE	SHEET # OF PRINTS
1	Micro Processor Ram Test	Read data did not compare with what was written 6810 (238 x 8 Ram)	8
4	FIFO Buffer Test	The READ data did not compare with what was written. 2114's (1024 x 8 Ram)	13,14,15 16,17
5	Address Turnover Test	Address turnover flip-flop did not set when expected. (Should set after 1024 RD/WT buffer references	14
7	Data Late Test	Data late flip-flop was set on power on or it did not set after one more reference with a full buffer	14
8	EPROM Check Sum	Check sum calculation did not agree with the data in the check sum location (replace EPROM)	8

SELF TEST ERROR CODES
TABLE 5.1

Any command issued to the Tape Coupler will cause self test to abort and if not aborted, the Coupler will appear not ready to the system until selftest successfully complete

CAUTION: When using questionable or marginal tape on GCR models you may encounter bad records. Insure any bad tapes are clearly marked. We recommend using high quality 6250 certified tape.

CUSTOMER SERVICE

Our warranty attests the quality of materials and workmanship in our products. If malfunction does occur, our service personnel will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions and technical advise is required, please phone Custom Systems giving the serial number, board name, model number and problem description. You will be placed in contact with the appropriate technical assistance.

PRODUCT RETURN

Pre-return Checkout.

If controller malfunction is suspected, the use of test software is needed to determine if the controller is the problem and what in particular is wrong with the controller. The tests applicable to this board are listed on the next page of the manual. Please run the test sequence BEFORE considering product return.

Returned Material Authorization.

Before returning a product to Custom Systems for repair, please ask for a "Returned Material Authorization" number. Each product returned requires a separate RMA number. Use of this number in correspondence and on a tag attached to the product will ensure proper handling and avoid unnecessary delays.

Returned Material Information.

Information concerning the problem description, system configuration, diagnostic program name, revision level and results (i.e. error program counter number) should be included with the returning material. A form is provided for this information on the next page of the manual.

Packaging.

To safeguard your materials during shipment, please use packaging that is adequate to protect it from damage. Mark the box "Delicate Instrument" and indicate the RMA number(s) on the shipping label.

(include with returning material)

MATERIAL RETURN INFORMATION

All possible effort to test a suspected malfunctioning controller should be made before returning the controller to Custom Systems, Inc. for repair. This will: 1) Determine if in fact the board is defective (many boards returned for repair are not defective, causing the user unnecessary system down-time, paperwork and handling while proper testing would indicate the board is working properly). 2) Increase the speed and accuracy of a product's repair which is often dependent upon a complete understanding of the user checkout test results, problem characteristics, and the user system configuration. Checkout results for the Magnetic Tape Coupler should be obtained by performing the following tests. (Include error program counter number's and accumulator contents if applicable.)

TEST	RESULTS
1. MT 133D DIAGNOSTIC	
2. UMTR RELIABILITY	

Other tests performed:

Please allow our service department to do the best job possible by answering the following questions thoroughly and returning this sheet with the malfunctioning board.

1. Does the problem appear to be intermittent or heat sensitive? (If yes, explain).

2. What operating system are you running under? (AOS, RDOS, DDOS, DTOS).

3. Describe the system configuration (i.e. peripherals, I/O controllers model of computer, etc.).

4. Has the controller been returned before? Same problem?

To be filled out by CUSTOMER:

Model #:
Serial #:
RMA #:

Retuned by.

(company name)

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6.0 PROGRAMMING NOTES

CAUTION: When using questionable or marginal tape on GCR models you may encounter bad records. Insure any bad tapes are clearly marked. We recommend using high quality 6250 certified tape.

6.1 INSTRUCTION FORMAT

Symbolic Form for I/O Instructions

DXXF AC,MTA

DXX = DOA, DOB, DOC, DIA, DIB

F = FUNCTION: C (CLEAR) - Clear all error flags (except EOT/BOT) and done and busy flip-flops. If for some chance that the system issues a clear pulse during the command operation, the Coupler will abort the command and done will not set.

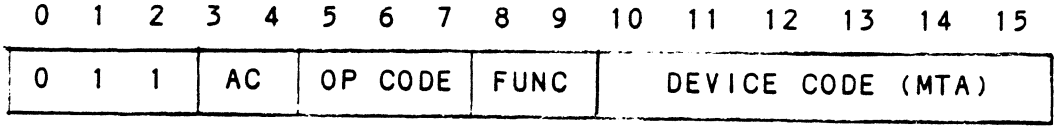
S (START) - Clears all errors except illegal, set busy and clear done. Command that was issued by a DOA will be executed.

P (PULSE) - Not used.

AC = ACCUMULATOR: 0, 1, 2 OR 3

MTA = DEVICE CODE: PRIMARY - 22 OCTAL
SECONDARY - 62 OCTAL

BINARY REPRESENTATION



INTERRUPT MASK BIT = 10

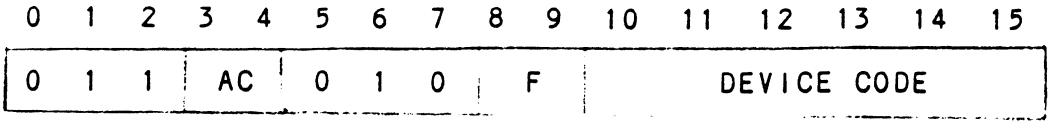
6.1.1 SKIP INSTRUCTIONS

Used to poll the state of the Coupler board (command is done or busy). If the skip condition is met the next instruction is skipped, else the next instruction is executed.

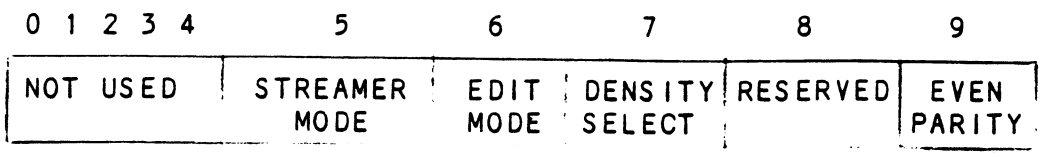
SKPBZ MTA - SKIP IF BUSY FLIP-FLOP IS CLEAR.
SKPBN MTA - SKIP IF BUSY FLIP-FLOP IS SET.
SKPDZ MTA - SKIP IF DONE FLIP-FLOP IS CLEAR.
SKPDN MTA - SKIP IF DONE FLIP-FLOP IS SET.

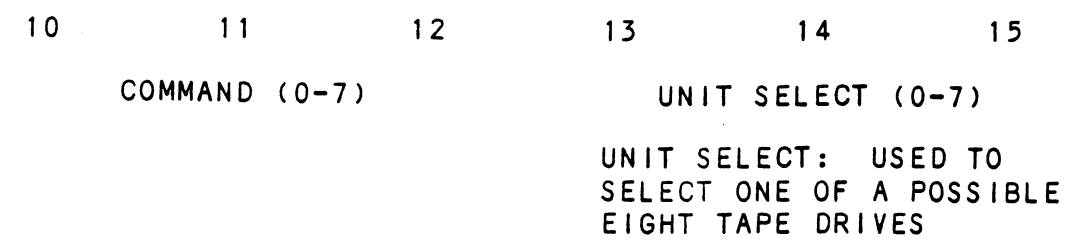
6.2 DOA - SEND COMMAND

DOAF AC,MTA



AC



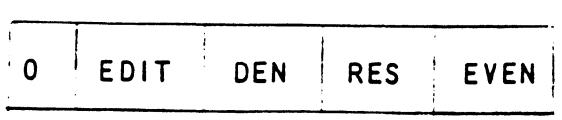


0 - READ
1 - REWIND
2 - NOT USED
3 - SPACE FORWARD
4 - SPACE REVERSE
5 - WRITE
6 - WRITE END OF FILE
7 - ERASE

The command and unit select will default to read and unit zero after a clear pulse or IORESET.

The Coupler may address up to eight tape drives but only one command can be done at a time with the exception of rewind.

STREAMER MODE SELECT BIT 5 = 0



EDIT MODE (BIT 6) - Use to re-write records within blocks. This bit is an option. It is generally not necessary unless the tape unit is a primary storage device or key to tape applications.

DENSITY SEL (BIT 7) (Disregard for RDOS, see Jumper (J3) Table Section 3.2.3) - Used when controller is connected to a dual formatter board. Selects PE if one, NRZI if zero. The formatted drive must accommodate this feature as well.

(BIT 8) - Reserved

EVEN PARITY (BIT 9) - Maintenance Use Only

STREAMER MODE SELECT BIT 5 = 1

5	6	7	8	9
1	LIMIT 1	LIMIT 0	HIGH SPEED	DYNAMIC GAP

Applicable to streamers only. NOTE: It is not necessary to re-issue streamer mode select if the same configuration is desired for successive commands. A start pulse is not required to select the streamer mode.

HIGH SPEED (BIT 8) - If set to a one, select high speed tape motion (100 IPS). If this bit is zero, low speed will be selected.

DYNAMIC GAP (BIT 9) - If set to a one, write dynamic inter-record written. This increases the re-instruct period. It should be noted that a loss of usable data media may result with this command. If this bit is zero, nominal inter-record gap is selected.

NOTE: If the Cipher F880 Microstreamer is selected, the gap will dynamically be lengthened depending upon when the next command is issued. The Kennedy 6809 Streamer will lengthen the gap by an additional .6 inch, thereby increasing the re-instruct period by 6 millisec.

If a Cipher Streamer is used, gap length limits (Bits 6 and 7) can be established by the controller. This may be useful if there is long time intervals occasionally before the next write command is issued (between 1 and 4 seconds). The time limits could prevent outrageously long record gaps. If the selected limit is not met, the unit will simply reposition back to a nominal gap length. The following table indicates the re-instruct limits.

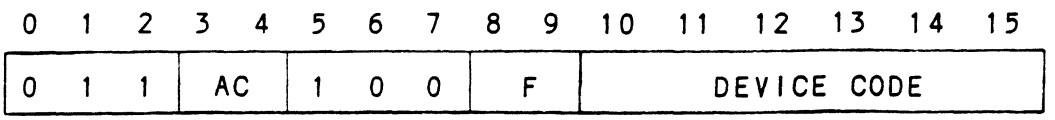
BIT 6	BIT 7	
LIMIT 1	LIMIT 0	LIMIT (MS = MILLISEC.)
0	0	75 MS
0	1	150 MS
1	0	300 MS
1	1	RESERVED

LIMIT TABLE

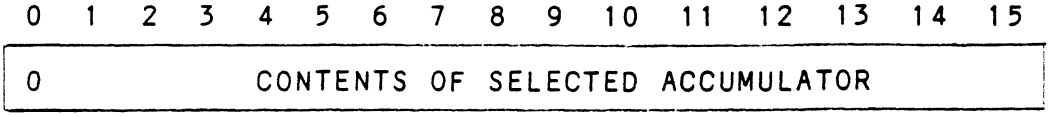
These modes, high speed and dynamic gap, will remain as selected until another DOA with streamer mode select (BIT 5) = 1 is issued again. The default condition is normal gap and low speed. Default is established on power on or IORESET switch depressed.

6.3 DOB - LOAD STARTING MEMORY ADDRESS

DOBF AC,MTA



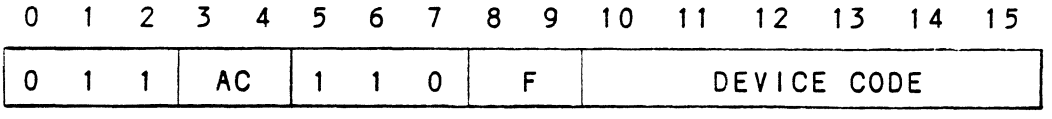
AC



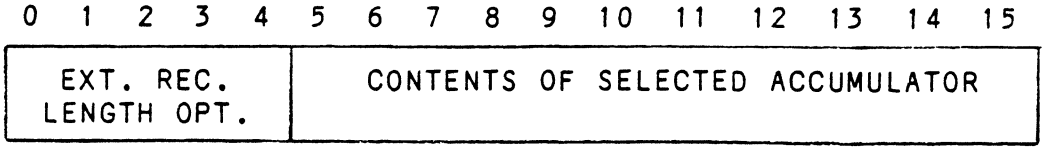
The contents of Selected Accumulator will be loaded into the controllers address counter. This will become the starting address for the next command that requires the data channel (READ or WRITE).

6.4 DOC - LOAD WORD COUNT

DOCF AC,MTA



AC



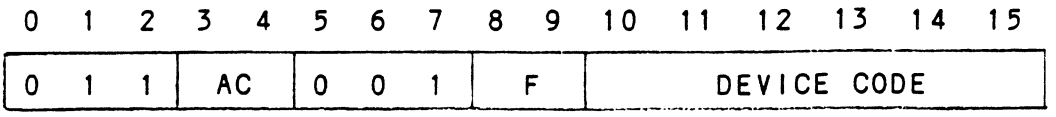
Jumper option on word counter allows record sizes of up to 64K (not standard with RDOS software).

Program must place two's complement of desired word count into selected accumulator before this instruction is executed.

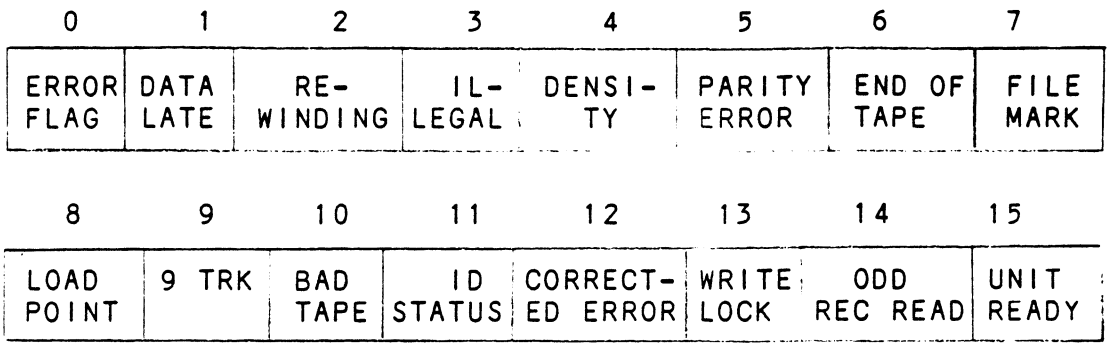
Spacing Forward/Reverse - Place two's complement of the maximum number of records to be spaced.

6.5 DIA - READ STATUS

DIAF AC,MTA



AC



Bits 11 and 12 are for phase encoded only.

STATUS BITS:

0 ERROR FLAG - A condition was detected by the controller board that may require attention. If Bit 1, 3, 5, 6, 7, 8, 10 or 14 are a one, the error flag will be set to a one.

1 DATA LATE - Data Channel requests were not honored in time to keep up with device, resulting in one or more lost data words. This condition will not occur until the FIFO buffer overflows.

2 REWINDING - Selected unit is rewinding.

3 ILLEGAL - A start function is asserted under one of the following cases:

1) Write protect is on (no write ring installed and the command that was issued prior to the start was a write, erase or write file mark.

2) Space reverse command was issued and unit is at load point.

3) Unit is not ready.

NOTE: No tape motion will take place and done will set. Only clear function or IORESET will clear illegal.

4 DENSITY - Always a one in a standard configuration. May be optionally used to differentiate between PE mode (one) or NRZI mode (zero) if controller is connected to a dual embedded formatter.

5 PARITY ERROR - One of two conditions possibly occurred. Even vertical parity was detected by the controller or a corrected error occurred during a write command.

6 END OF TAPE - The selected unit is at or beyond the EOT mark. A space reverse or rewind command will clear this bit.

7 FILE MARK - Will be set to a one when the unit detects the presence of a file mark during a write file mark command (READ AFTER WRITE) or when a read or spacing command passes over a previously written file mark.

8 LOAD POINT - Selected unit senses a load point marker (BOT).

9 9 TRACK - Always a one.

10 BAD TAPE - Set to a one by the occurrence of one of the following cases:

1) PE only, did not detect an ID burst when reading from load point.
2) PE only, tape was in a runaway condition (reading an erased tape).
3) PE only, multi-track dropout.
4) PE only, uncorrectable parity error.
5) PE only, non-zero character in postamble.
6) Excessive skew.
7) PE only, loss of data envelope prior to postamble detection.
8) Vertical parity on cable in error.
9) NRZ only, vertical parity error on data character.
10) NRZ only, longitudinal parity error.
11) NRZ only, CRCC parity error.
12) NRZ only, improper record format.
13) NRZ only, CRC error.

RETRIES MAY CORRECT THE ABOVE PROBLEMS

11 ID BURST - PE only, set to one if the unit detects an identification burst on a forward motion command from load point.

If detected during a READ command, the tape media was written by a phase-encoded transport.

A write command (write or write file mark) issued at load point will cause the unit to automatically write an ID Burst.

12 CORRECTED PAR ERROR - PE only, if this bit is a one after a write command, the parity error flag will also be set to a one and the software should backspace and re-write the record.

If it occurs after a READ command, it is not necessary to re-read the record, the error is probably caused by the media itself (such as dust, slightly damaged tape or it was poorly written), and the data has been corrected.

13 WRITE PROTECT - A write ring was not installed on the tape reel.

14 ODD RECORD READ - An odd number of characters were read within the record.

15 READY - The selected tape unit is ready. The following conditions must be satisfied before this bit is a one:

1) Unit is online.
2) Not rewinding.
3) Controller is not busy.
4) Ready line from unit must be received.
5) Selftest is done.

6.6 DIB - READ CURRENT ADDRESS

DIBF AC,MTA

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	1	AC		0	1	1	F		DEVICE CODE					

AC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	CURRENT CONTENTS OF THE ADDRESS COUNTER														

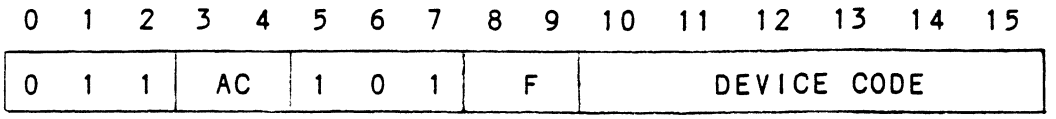
The seleted accumulator will contain the current contents of the address counter after the execution of this instruction.

READ WRITE RECORD - Contains the memory address to where the next data word transfer will take place. The memory address counter is incremented by one after each data channel transfer.

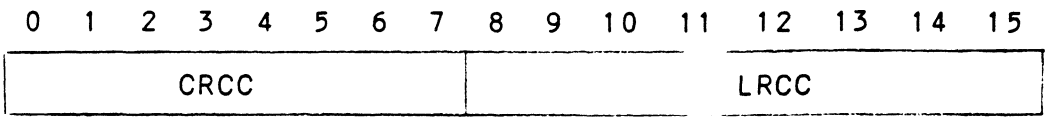
SPACING FORWARD/REVERSE - The address counter becomes a record counter on a space forward or reverse command. The difference between the contents of the counter before and after the space command will indicate the number of records spaced over.

6.7 DIC - READ CHECK CHARACTERS (MAINTENANCE USE ONLY)

DICF AC,MTA



AC



This command is useful for testing to make sure that a NRZ drive is generating the proper check characters. The check characters will be available (NRZ Only) after every read record command. This command will only be necessary for diagnostic purposes. Since a phase encoded drive does use check characters, a DIC will simply transfer the last two characters read from a record into the selected accumulator.

6.8 COMMAND DESCRIPTIONS

6.8.1 READ

DOA Command is read and a start pulse was issued.

Start sets busy, coupler then sends a read forward command to the tape unit. Tape unit will ramp up to speed and transfer data to the coupler when it reaches the data field. Every two bytes sent by the unit will be transferred to the mini's memory as one complete word. After the transfer the address and word counter will increase by one. Tape motion will continue until a record GAP is reached (unless "ON THE FLY" is achieved). Word transfer to the mini continues until the word count limit is met or the last word of the record is sent via the data channel.

If the record is a file mark, tape motion will cease and no data transfers on the data channel will take place.

Done will set when the command is finished or an error has occurred.

Possible Errors:

1) Selected unit is not ready (rewinding, off line coupler busy or drive not in system.
2) Hard or corrected error.
3) Data Late.

NOTE: READ LOOK AHEAD FEATURE

The probability of one Read record command following another is very high. To take advantage of this likelihood, the 133, once a Read command is received, will issue a second Read Command to the drive. This feature dramatically increases the amount of time that the minicomputer has to issue the actual Read Command. (The gap length, record postamble and 1024 character buffer is what contributes to the extend time.)

If the next command was not a Read, the coupler will abort the Read Look Ahead and reposition the tape and execute the desired command.

In all cases the Read Look Ahead feature is transparent to the User. It is accomplished automatically by the coupler.

6.8.2 WRITE

A Write Command is issued by doing a DOA with a Start Pulse.

Busy sets and the coupler asserts a write forward command to the tape unit. Tape unit ramps up to speed and continues to write bytes of data until the word count limit is reached and the FIFO is empty. Data channel operation is the same as a read except words are read from the mini's memory instead of written after the last byte is written. The tape unit will write its format data (postamble if PE, CRC/LRC is NRZ) and record gap if "ON THE FLY" is not achieved, tape motion will cease.

Done will set when the command is finished or an error has occurred.

Possible Errors:

1) Same as Read Command.

NOTE: Since, normally, a Read or Write Command will ultimately result in data channel activity, it is imperative that the word counter (DOC) and address counter (DOB) are initialized prior to the start pulse.

6.8.3 WRITE END OF FILE

Start will set busy (illegal and done sets if no write ring) and the tape unit will move forward and write one file mark.

PE FORMAT - A gap approximately 3.5 inches long before the file mark followed by a record gap.

NRZ FORMAT - A single character record with bits in tracks 3, 6 and 7 set for both the data character and the LRCC. The CRC character will contain all zero bits.

Done sets when the command is completed.

6.8.4 REWIND

Start does not set busy, selected tape unit will rewind at high speed. The unit will not be ready until the tape is stopped at the BOT marker. Other units are available for commands while this unit is rewinding. Done does not set when command is completed.

6.8.5 SPACE FORWARD

When start sets busy, forward tape motion starts. When unit reaches a record gap the coupler then makes the decision whether to continue onto the next record gap or to stop tape motion. It will stop under any of the following conditions - word count overflowed, file mark was detected or last record spaced contains EOT marker. The word counter should be loaded with two's complement of the desired number of records to be spaced prior to start pulse. The maximum number of records to be spaced is 4095 (64K is optional). Done will set after command completion and the file mark status bit will be set if a file mark was encountered. If the drive is a streamer type, high speed will be selected automatically after four records. This greatly increases file access time.

6.8.6 SPACE REVERSE

Start sets busy. If the selected tape unit is at load point, no tape motion will take place. Done and illegal will set. If not at a load point, tape motion will continue until the word count overflows, a file mark is encountered or load point is reached. The word counter is handled the same way as the space forward command. When the command is completed, Done will set. If the coupler is connected to a streamer type of drive, high speed will be selected automatically after ten records.

6.8.7 ERASE

When start sets busy and a write ring is on the reel, the tape unit will erase approximately 3.5 inches of tape. The amount of tape erased varies somewhat with different drive manufacturers. Refer to the drives manual for the actual amount. Done sets when the command is completed.

6.9 DATA CHANNEL OPERATION (RESULTING FROM A READ OR WRITE COMMAND)

Data Channel Operations take place during a read record (providing an end of file is not encountered) or write record. The word counter and address counter must be initialized before a start function (DXX S AC,MTA) is asserted (see 6.3 DOB and 6.4 DOC). If a legal (see DIA Status Bit 3) read or write command was issued prior to a start function, tape motion will commence. Data transfers will be encountered between the minicomputer and the magnetic tape drive. One data channel request is issued for every word (16 bits) transfers on the drive end. If the mini cannot respond to a request before the next word is tranferred by the drive, the coupler will store it into a FIFO buffer until the request is acknowledged. The size of the buffer covers the data channel latency period. But, if for some remote chance that the buffer overflows, the coupler will then abort the command and set done, error flag and data late (see 6.5 DIA). For each word transferred via the data channel, the word counter and address counter will increase by one data channel. Transfers will continue until the word counter overflows or an end of record is reached on a read command. A maximum word count may be used for a read command if the record size is unknown.

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7.0 STREAMING MODES

The most important issue when referring to streaming, is the term "RE-INSTRUCT PERIOD". This is the amount of time the specific mag tape drive gives the controller to assert the next command before tape motion stops. If the next command issued (provided it is of the same type and direction) is met, tape motion will continue at the same rate for the next record. This is normally referred to as "ON THE FLY" operations. If "ON THE FLY" is not established, then it is referred to as start/stop action (tape motion ceases within record gaps). With vacuum column or tension arm mag tape drives, start/stop times are rather fast in the order of about 8 millisec. However, with streamer drives, the high cost mechanisms necessary for fast start/stop ramp times are eliminated. Hence, start/stop times may take more than one second. If the next command is not issued during the re-instruct period with a streamer drive, it will then enter what is called a repositioning cycle. This cycle is necessary because the streamer cannot stop within the nominal inter-record gap length (approx. .6 inches). Therefore, after it decelerates forward it must accelerate in reverse, and finally decelerate in reverse. The repositioning cycle is longer the faster the tape speed, therefore, most streamers offer a low speed (25 IPS or 12.5 IPS) along with the high speed (100 IPS).

If the program that is controlling the data transfers to the mag tape does not issue commands during the normal re-instruct period, repositioning takes place. Options are available to remedy this situation to extend the re-instruct period. One option would be to use a lower speed. Another would be to lengthen the record gap after a write command, but this would sacrifice media (which may prove to be useful providing the gaps are not too long).

7.1 RE-INSTRUCT TABLE

CIPHER RE-INSTRUCT TIMES:

SPEED	GAP LENGTH	RE-INSTRUCT TIME
25 IPS	NORMAL (.6")	16 MS
100 IPS	NORMAL (.6")	4 MS
25 IPS	VAR. LENGTH	UP TO 4 SEC.
100 IPS	VAR. LENGTH	UP TO 4 SEC.

KENNEDY RE-INSTRUCT TIMES:

SPEED	GAP LENGTH	RE-INSTRUCT TIME
12.5 IPS	NORMAL (.6")	START/STOP ONLY
100 IPS	NORMAL (.6")	4.5 MS
100 IPS	LONG GAP (1.2")	10.5 MS

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8.0 SYSTEMS GUIDELINES

8.1 SYSGEN CONSIDERATIONS

The user must correctly specify the Tape Coupler Name at Sysgen time. The correct Tape Name depends on the Operating System and whether you are running with the coupler set as a 133(6021) or as a 133A(6125). The situation is as follows:

RDOS Sysgen
- CSI Tape Coupler 133(6021) is MTX.
- CSI Tape Coupler 133A(6125) is not supported.

AOS Sysgen
- CSI Tape Coupler 133(6021) is MTA.
- CSI Tape Coupler 133A(6125) is MTC.

Other
- CSI Tape Coupler 133(6021) should be the same as the emulation 6021.
- CSI Tape Coupler 133A(6125) should be the same as the emulation 6125.

8.2 STREAMING MODE UTILITIES

CSI provides utility programs which can help optimize the performance of streaming tape drives. These utilities are supplied on the M242 tape from Custom Systems. Please refer to Section 4 for information on loading these programs onto your disk. For Cache and Start/Stop drives, more than one drive daisy chained to the Coupler, or a utility other than a backup, these utilities are not useful and you should skip the rest of this section unless you have a streaming tape drive.

To decide how and when you want the streaming mode set, you should refer to the Performance Chart at the end of this section. For a particular System Tape Routine and your drive speed, the Chart shows the most efficient set of parameters to select. The programs described in the remainder of this section will set the tape

speed and inter-record gap to pre-defined values. The default settings are low speed and nominal gap. Be aware that resetting the CPU will cause any tape settings to be lost. Thus any time the CPU is reset it is initially set for low speed and nominal gap.

8.2.1 RDOS EXECUTABLE UTILITIES

There are five utility programs which run under RDOS. The programs will set the tape drive as follows:

```
LNG     = Low Speed, Nominal Gap
LDG75   = Low Speed, Dynamic Gap 75 MS, Min Gap Nominal
HNG     = High Speed, Nominal Gap
HDG75   = High Speed, Dynamic Gap 75 MS, Min Gap Nominal
HMG90   = High Speed, Dynamic Gap 300 MS, Min Gap 90 MS
```

There are three files associated with each of these programs: Executable Program File (-.SV), a Text File (-.TX) which describes the most recent configuration, and a Command Line File (-.MC) which runs the program and displays the configuration.

You must first load these programs from the M242 tape onto your disk. After determining which program you want to run, just enter the program name.

8.2.2 AOS EXECUTABLE UTILITIES

There are five utility programs which run under AOS.

The programs will set the tape drive as follows:

```
LNG     = Low Speed, Nominal Gap
LDG75   = Low Speed, Dynamic Gap 75 MS, Min Gap Nominal
HNG     = High Speed, Nominal Gap
HDG75   = High Speed, Dynamic Gap 75 MS, Min Gap Nominal
HMG90   = High Speed, Dynamic Gap 300 MS, Min Gap 90 MS
```

There are three files associated with each of these programs: Executable Program File (-.PR), a Text File (-.DC) which describes the most recent configuration, and a Command Line File (-.CLI) which runs the program and displays the configuration.

You must first load these programs from the M242 tape onto your disk. After determining which program you want to run, just enter the program name.

8.2.3 STAND-ALONE UTILITY

TAPEMODE is a stand-alone utility which will configure the Coupler without having to use an Operating System. This is useful prior to running DG stand-alones, such as PCOPY. TAPEMODE will configure the MT133 Coupler to any desired configuration.

To use TAPEMODE, load the program from M242 tape or disk (see DSP General Information Section 4). First you must answer the questions to configure the Coupler as desired. After the tape has been configured, TAPEMODE asks for the device code for re-booting. The auto-boot function is provided to prevent the operator from inadvertently cancelling the configuration (RESET switch).

8.2.4 OTHER OPERATING SYSTEMS

The user must create programs to configure the Coupler or a specific configuration must be added to the drivers. A Data Out A (DOA) instruction with the desired configuration bits set in the proper accumulator is all that is needed to configure/re-configure the Coupler. The DOA instruction is fully described in Section 6.2.

8.3 USER-WRITTEN PROGRAMS

If you have non-DG tape utilities which do not keep the drive streaming (drive repositions), then the following could be done.

For Streaming on Writing	- Increase gap dynamically
For Streaming on Read	- Increase minimum gap length when writing
If in High Speed	- Switch to low speed

NOTE: Increasing the gap length will use additional tape.

8.4 PERFORMANCE CHART

		25/100 TAPE	12.5/100 TAPE
RDOS	MDABS MDSAVE ETC.	Low Speed Nominal Gap	Low Speed Nominal Gap
RDOS	XFER	Low Speed Dynamic Gap 75 MS	Low Speed Nominal Gap
RDOS	DUMP LOAD	Low Speed Dynamic Gap 75 MS	Low Speed Nominal Gap
RDOS	FDUMP FLOAD	Low Speed Nominal Gap	Low Speed Nominal Gap
RDOS BURST	DUMP LOAD	High Speed Dynamic Gap 75 MS	High Speed Dynamic Gap 75 MS
AOS	COPY	Low Speed Nominal Gap	Low Speed Nominal Gap
AOS	DUMP LOAD	Low Speed Dynamic Gap 75 MS	Low Speed Nominal Gap
AOS PCOPY		High Speed Nominal Gap	High Speed Nominal Gap

```
0001  MT133    AOS ASSEMBLER REV 04.00        12:52:16 03/27/84
01              ;
02              ;
03              ;
04              ;*****************************************************************
05              ;
06              ;
07              ;
08              ; DESCRIPTION: MT133 TAPE COUPLER  DIAGNOSTIC
09              ;
10              ;
11              ; PRODUCT OF ZETACO 1984
12              ;*****************************************************************
                        .TITL   MT133D
14      000001          .DUSR   X=1
15      000001          NOMAC   X
16      000000          .TXTM   0
17              ;1.     PROGRAM NAME: MT133D.SR
18              ;2.     REVISION HISTORY:
19              ;
20              ;               REV.      DATE
21              ;               00      03/24/81
22              ;               01      05/27/81        DISK BOOTABLE
23              ;               02      12/10/81        ALLOW FOR STATUS OF OTHER
24              ;                                       DRIVES
25              ;               03      03/25/82        KGS
26              ;               04      06/20/83        GET RID OF AUTO INC STUFF
27              ;       (PREL.) 05.00   08/83           -UPGRADE TO USE DTOS REV 6.
28              ;                                       SOME TESTS RUN DIFFERENTLY.
29              ;                                       (BUILT FROM MT1100 PROGRAM)
30              ;                                       -ID BURST NO LONGER REQUIRED
31              ;                                       ON PE NOR EXCLUDED ON NON-PE.
32              ;                                       -MODS FOR 6125 EMULATION(120A):
33              ;                                       BIT 11 (ID BURST) MUST = 0
34              ;                                       DOB/DIB (TEST A4) USES ALL 16
35              ;                                              BITS.
36              ;               06       9/83           -------------------------
37              ;                                       INCLUDE TEST NUMBER AND SUBTEST
38              ;                                        CHARACTER FOR ALL TESTS.  USED
39              ;                                        TO DISPLAY CURRENT TEST NUMBER
40              ;                                        AND TO SUGGEST INSTALLATIONAL
41              ;                                        OR OPERATIONAL CAUSES FOR SOME
42              ;                                        ERRORS.  (SEE R1N SUGJEST.)
43              ;                                       FIXED BUGS:
44              ;                                       - WAIT EXPECTS THE IN-LINE PARM
45              ;                                         TO BE DIRECT NOT INDIRECT.
46              ;                                       - MODIFY ALL .MTA INSTRUCTIONS
47              ;                                         WAS NOT DOING SO TO THE LAST
48              ;                                         FEW INSTRUCTIONS.
49              ;                                       - SOFT SW 1 ON SHOULD NOT FORCE
50              ;                                         ERROR DISPLAY ON EACH ROUND.
51              ;
52              ;                                       - REVISED CAL?B (IN DLIB) TO
53              ;                                         ALLOW FOR ANY OF 3 CLOCKS:
54              ;                                         CLOCK 1,2 OR 3.  THIS PROGRAM
55              ;                                         USING CLOCK 1 (10 HERTZ).
56              ;                                       - MOVED MOST DATA TO END OF
57              ;                                         LISTING SO THAT THE MODIFY
58              ;                                         DEVICE CODE ROUTINE NOT DOING
59              ;                                         STUFF TO DATA FIELDS.
60              ;
```

```
0002  MT133
01              ;               07      03/22/84        ------------------------------
02              ;                                       130 TO 133 AND PROPER DEVICE
03              ;                                       CODE CHANGE ROUTINE.
04              ;3.     MACHINE REQUIREMENTS
05              ;       3.1     NOVA OR ECLIPSE FAMILY CPU'S.
06              ;       3.2     MINIMUM OF 16K MEMORY.
07              ;       3.3     ZETACO 133 (6021 OR 6125) MAG TAPE COUPLER BOARD,
08              ;               WITH A FORMATTED TAPE DRIVE.
09              ;       3.4     TELETYPE OR CRT AND CONTROLLER.
10              ;
11              ;4.     TEST REQUIREMENTS
12              ;       N/A
13              ;
14              ;5.     SUMMARY
15              ;       THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE ZETACO MODEL 133
16              ;       (6021 OR 6125) TAPE CONTROLLER.  THE DEVICE CODE CAN BE 20 THRU
17              ;       76.  ONLY ONE READY, WRITE ENABLED DRIVE CAN BE ON LINE AT A TIME.
18              ;
19              ;6.     RESTRICTIONS
20              ;
21              ;       ONLY ONE(1) DRIVE CAN BE ONLINE AT ANY TIME.  THE DEVICE
22              ;       CODE MUST BE 20 THRU 76.  ALL RESPONSES TO PROGRAM REQUESTS
23              ;       MUST BE ANSWERED PROPERLY TO CONTINUE THE SEQUENTIAL
24              ;       TESTING OF THE TAPE DRIVE.
25              ;7.     PROGRAM DESCRIPTION/THEORY OF OPERATION
26              ;       7.1     INITIALIZATION
27              ;               7.1.1   I/O MODULE INITIALIZED
28              ;               7.1.2   TEST SELB LINE SET, IF LINE SET IR-
29              ;                       RECOVERABLE ERROR.  PROGRAM HALTS AT
30              ;                       BHALT.
31              ;                               1.      SELECT UNIT NUMBER
32              ;                               2.      DEVICE CODE CHANGE
33              ;                               3.      SET SOFT SWITCH REGISTER
34              ;       7.2     PRELIMINARY TESTS
35              ;               7.2.1   TEST A1 - TEST SYSTEM SELD LINE.
36              ;               7.2.2   TESTS A2 AND A3 - TEST CONTROLLER BUSY
37              ;                       AND DONE STATUS
38              ;               7.2.3   TESTS A4 THRU A8 - TEST FOR UNIT SELECT
39              ;                       BY LOADING AND TESTING THE MEMORY
40              ;                       ADDRESS REGISTER.
41              ;               7.2.4   TESTS A9 THRU A14 - TEST FOR SETTING AND
42              ;                       RESETTING OF BUSY AND DONE BY START
43              ;                       COMMAND.
44              ;       7.3     FIRST TAPE MOTION
45              ;               7.3.1   TESTS A15 AND A16 - TEST REWIND AND
46              ;                       ERASE OPERATION AND STATUS.
47              ;       7.4     FIRST DATA TRANSFER
48              ;               7.4.4   TESTS A20 AND A21 - TEST FOR TOTAL DATA
49              ;                       DATA WRITE WITH INTERRUPT.
50              ;               7.4.5   TEST A22 - TEST WRITE ODD PARITY.
51              ;       7.5     STATUS BIT TESTS
52              ;               7.5.1   TEST A24 AND A25 - TEST FOR ILLEGAL
53              ;                       COMMAND STATUS BIT SETTING.
54              ;               7.5.2   TEST A26 - TEST FOR EOF STATUS BIT
55              ;                       SETTING.
56              ;               7.5.4   TESTS A28, A30, A31, A32- TEST STATUS BITS
57              ;                       AND MEMORY ADDRESS REGISTER DURING BACK
58              ;                       AND FORWARD SPACING.
59              ;       7.6     DATA TRANSFER TESTS
60              ;               7.6.1   TEST A33  - TEST WRITE AND READ ODD PARITY.
```

```
01              ;               7.6.2   TESTS A35 AND A36 - TEST WRITE AND READ
02              ;                       WITH DIFFERENT WORD COUNTS.
03              ;               7.6.4   TESTS A39 THRU A41 - TEST EOF WRITE AND
04              ;                       READ.
05              ;               7.6.6   TESTS A50 THRU A53 - TEST FOR SPACING
06              ;                       ERRORS BY GENERATING NOISE WITH I/O
07              ;                       COMMANDS.
08              ;       7.7     WRITE LOCK TEST
09              ;               THIS TEST DETERMINES IF WRITE RING OUT
10              ;               WILL DISABLE THE WRITE.  THIS TEST IS ONLY
11              ;               PERFORMED DURING THE FIRST PASS AND CAN BE DE-
12              ;               LETED BY SETTING SOFT SWITCH REGISTER BIT 15.
13              ;       7.8     END OF TAPE TEST
14              ;               THIS TEST WRITES 4K BLOCKS FROM BOT TO EOT.  DUR-
15              ;               ING THE TAPE WRITE ALL ERROR STATUS CONDITIONS
16              ;               ARE MONITORED.  WHEN THE EOT SENSOR IS DETECTED
17              ;               THE WRITE OPERATION IS TERMINATED AND THE TAPE IS
18              ;               COMMANDED TO REWIND.  IF THE EOT SENSOR IS NOT DE-
19              ;               TECTED THE WRITE WILL CONTINUE UNTIL THE TAPE
20              ;               COMES OFF THE SUPPLY REEL.  THIS TEST CAN BE DE-
21              ;               LETED BY SETTING SOFT SWITCH REGISTER BIT 14.
22              ;8.     SOFT SWITCH REGISTER SETTINGS
23                      $$WPD 8
24              ;       8.1     SWITCH OPTIONS
25              ;
26              ;               DIFFERENT SWITCH BITS AND THEIR INTERPRETATION
27              ;                AT LOCATION "SWREG" ARE AS FOLLOWS:
28              ;
29              ;               BIT     OCTAL   BINARY  INTERPRETATION
30              ;                       VALUE   VALUE
31              ;               14(E)   00002   0       ENABLE WRITE TO EOT TEST
32              ;                               1       INHIBIT WRITE TO EOT TEST
33              ;
34              ;               15(F)   00001   0       ENABLE WRITE LOCK TEST
35              ;                               1       INHIBIT WRITE LOCK TEST
36              ;
37              ;               NOTE.   SWITCH BITS 14 AND 15 CAN ONLY BE
38              ;                       ENABLED DURING THE FIRST PASS OF THE
39              ;                       DIAGNOSTIC.  IF THE TESTS ARE TO BE PER-
40              ;                       FORMED AFTER THE FIRST PASS, THEY CAN BE
41              ;                       DIRECTLY ENTERED.
42              ;9.     OPERATING PROCEDURES
43              ;       9.1     PROGRAM LOAD
44              ;               LOAD THE PROGRAM BY USING THE BINARY LOADER.
45              ;       9.2     STARTING ADDRESSES
46              ;               201     DIRECT ENTRY TO OCTAL DEBUGGER(ODT)
47              ;               500     START DIAGNOSTIC
48              ;               501     DIRECT ENTRY TO WRITE LOCK TEST
49              ;               502     DIRECT ENTRY TO WRITE TO EOT TEST
50              ;       9.3     PROGRAM OPERATION
51              ;
52              ;
53              ;       THE DIAGNOSTIC PROGRAM IS PROVIDED TO FIND FAILURES THAT
54              ;       ARE RELATED TO THE BASIC OPERATIONS OF TAPE CONTROL.  THE
55              ;       DIAGNOSTIC ASSUMES THAT THE TAPE MEDIA IS PERFECT AND NOT
56              ;       THE CAUSE OF ANY ERROR.
57              ;
58              ;       YOU SHOULD LOAD THE PROGRAM FROM RELEASE TAPE M242.  REFER
59              ;       TO APPENDIX A FOR INFORMATION ON PROGRAM LOADING.  ONCE THE
60              ;       PROGRAM HAS LOADED THE FOLLOWING MESSAGE WILL DISPLAY:
```

```
0004  MT13D
01              ;
02              ;       -          MT13ID RELEASE 7.0
03              ;       -       TAPE COUPLER DIAGNOSTIC
04              ;       -      PRODUCT OF ZETACO
05              ;       -
06              ;       - PLEASE MOUNT A WRITE-ENABLED ERROR FREE SCRATCH TAPE.
07              ;       - ONLY THE DRIVE YOU ARE TESTING CAN BE ON-LINE.
08              ;              PRESS ANY KEY TO CONTINUE.
09              ;
10              ;       THE TAPE UNIT NUMBER IS REQUESTED AS FOLLOWS:
11              ;
12              ;       - DRIVE UNIT #:
13              ;
14              ;       YOU SHOULD ENTER THE NUMBER OF THE UNIT YOU WANT TO TEST.
15              ;       (0,1,2 OR 3)
16              ;       ------------
17              ;
18              ;       THE NEXT REQUEST IS:
19              ;
20              ;       - IF DRIVE SET FOR NRZ (800 BPI), ENTER 0; OTHERWISE, ENTER 1.
21              ;
22              ;       YOU SHOULD ENTER 0 OR 1 IN ACCORDANCE WITH THE RECORDING MODE
23              ;                          -----
24              ;       SET FOR THE TAPE DRIVE.
25              ;
26              ;       YOU MUST NEXT RESPOND TO
27              ;
28              ;       - IF COUPLER IS A MT13D (6021 EMULATION), ENTER 0; FOR MT13D
29              ;       (6125 EMULATION), ENTER 1.
30              ;
31              ;       WHEN THE ZETACO MT13D COUPLER EMULATES DATA GENERAL'S 6125
32              ;       TAPE UNIT, IT WILL WRITE RECORD LENGTHS UP TO 77777(OCTAL) AND
33              ;       ALWAYS RETURNS BITS 11 AND 12 = 0 ON DIA.  DEPENDING ON WHICH
34              ;       EMULATION YOU ARE TESTING, ENTER 0 OR 1.
35              ;                                       -------
36              ;       NEXT YOU WILL NEED TO ENTER THE DEVICE CODE OF THE TAPE DRIVE.
37              ;
38              ;       - ENTER DEVICE CODE [22   ]
39              ;                           --------
40              ;       - SET SWITCH REGISTER TO DESIRED VALUE, THEN PRESS RETURN TO
41              ;                                                         ------
42              ;       CONTINUE.
43              ;
44              ;       REFER TO THE SWITCH OPTIONS IN THE MT13D PROGRAM LISTING IF
45              ;       YOU WISH TO SET THEM.
46              ;
47              ;       IF YOU ARE RUNNING THE WRITE LOCK TEST, THE FOLLOWING MESSAGE
48              ;       WILL BE DISPLAYED:
49              ;
50              ;       - REMOVE WRITE ENABLE RING.  DON'T STOP THE PROGRAM.
51              ;
52              ;       RESPOND BY DISMOUNTING THE TAPE, REMOVING THE WRITE RING, AND
53              ;       REMOUNTING THE TAPE.  THE PROGRAM WILL AUTOMATICALLY CONTINUE.
54              ;       VERY SHORTLY, THE PROGRAM WILL DISPLAY:
55              ;
56              ;       - PUT WRITE RING BACK ON TAPE.
57              ;
58              ;       WHEN THE LAST TEST HAS BEEN COMPLETED THE PROGRAM DISPLAYS:
59              ;
60              ;       - CYCLE
```

```
 0005  MT133
01              ;       - PASS 1
02              ;
03              ;       THE PROGRAM WILL CONTINUE INDEFINITELY, ALTHOUGH THE WRITE LOCK
04              ;       AND THE EOT TEST WILL ONLY BE PERFORMED ON THE FIRST PASS.
05              ;
06              ;10.    PROGRAM ERROR DESCRIPTION
07              ;       10.1    PRELIMINARY TEST ERRORS
08              ;               THE FOLLOWING IS A LIST OF PRELIMINARY CON-
09              ;               TROLLER AND DRIVE ERROR MESSAGES.
10              ;               10.1.1  BUSY AND DONE ERRORS
11              ;       "SELD LINE NOT RESET BY IORST, PC = XXXXX"
12              ;       "BUSY FLIP-FLOP NOT RESET ERROR, PC = XXXXX"
13              ;       "BUSY FLIP-FLOP NOT RESET BY IORST, PC = XXXXX"
14              ;       "BUSY FLIP-FLOP NOT SET ERROR, PC = XXXXX"
15              ;       "DONE FLIP-FLOP NOT RESET ERROR, PC = XXXXX"
16              ;       "DONE FLIP-FLOP NOT SET ERROR, PC = XXXXX"
17              ;               10.1.2  CONTROLLER DATA TRANSFER ERRORS
18              ;       "SEND CLOCK BIT ON TOO LONG ERROR, PC = XXXXX"
19              ;       "FIRST CHARACTER TIME OUT ERROR, PC = XXXXX"
20              ;       "DATA TRANSFER TIME OUT ERROR, PC = XXXXX"
21              ;       "NO INTERRUPT ERROR, PC = XXXXX"
22              ;       "ILLEGAL INTERRUPT WITH MASK BIT SET, MASK = XX,/
23              ;       PC = XXXXX"
24              ;       "MTU SELECT ERROR, DIB COMMAND = XXXXXX, PC = XXXXX"
25              ;       "MA REGISTER NOT RESET BY IORST"
26              ;       "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, PC = XXXXX"
27              ;       "MA REGISTER SETTING ERROR"
28              ;       "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, PC = XXXXX"
29              ;       "INTA DEVICE CODE ERROR"
30              ;       "DEVICE CODE = XX, UNIT DEVICE CODE = XX, PC = XXXXX"
31              ;       10.2    SYSTEM ERRORS
32              ;               THE FOLLOWING ERRORS OCCURE DURING COMBINED CON-
33              ;               TROLLER AND DRIVE OPERATIONS.
34              ;               10.2.1  DATA TRANSFER AND MA REGISTER ERRORS
35              ;       "MA REGISTER COUNTING ERROR"
36              ;       "GOOD VALUE = XXXXXX, BAD VALUE = XXXXXX, PC = XXXXX"
37              ;       "DATA COMPARE ERROR"
38              ;       "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, /
39              ;       MEMORY ADDRESS = XXXXXX, PC = XXXXX"
40              ;               10.2.2  STATUS ERRORS
41              ;       "EXPECTED STATUS = XXXXXX, ACTUAL STATUS = XXXXXX, /
42              ;       PC = XXXXX"
43              ;       10.3    STATUS WORD
44              ;               BIT     DESCRIPTION
45              ;               0       ANY ERROR, SET BY BITS 1,3,5,6,7,8,10,14
46              ;               1       DATA LATE
47              ;               2       REWINDING
48              ;               3       ILLEGAL COMMAND
49              ;               4       HIGH DENSITY
50              ;               5       PARITY ERROR
51              ;               6       EOT MARK SENSED
52              ;               7       EOF MARK SENSED
53              ;               8       BOT MARK SENSED
54              ;               9       9 TRACK TAPE
55              ;               10      BAD TAPE
56              ;               11      ID BURST (PE ONLY)
57              ;                       ALWAYS 0 FOR MT133 (6125 EMUALTION)
58              ;               12      CORRECTED PARITY ERROR (PE ONLY)
59              ;                       ALWAYS 0 FOR MT133 (6125 EMULATION)
60              ;               13      WRITE LOCKOUT
```

```
01              ;               14      CRC ERROR
02              ;               15      UNIT READY
03                      O?DTD   11
04              ;12.    SPECIAL NOTES
05              ;       12.1    MEDIA SELECTION
06              ;               IT IS IMPORTANT TO SELECT A KNOWN GOOD TAPE WHEN
07              ;               PERFORMING THE DIAGNOSTIC.  ANY ERRORS CAUSED BY
08              ;               THE MEDIA WILL BE CONSIDERED A CONTROLLER AND/OR
09              ;               DRIVE FAULT.
10              ;       12.2    SCOPE LOOPS
11              ;               WHEN A SCOPE LOOP IS BEING IMPLEMENTED TO LOCATE
12              ;               A FAILING MODULE AND FORWARD TAPE MOTION IS
13              ;               USED, THE TAPE WILL COME OFF THE SUPPLY REEL IF
14              ;               THE LOOP IS ALLOWED TO CONTINUE.  WHEN THE TAPE
15              ;               APPROACHES THE EOT SENSOR, ENTER THE ODT PROGRAM
16              ;               BY TYPING A CONTROL "O" CHARACTER, MANUALLY RE-
17              ;               WIND THE DRIVE AND TYPE A "P" CHARACTER TO CON-
18              ;               TINUE.
19              ;13.    RUN TIME
20              ;       THE PROGRAM RUN TIME DEPENDS ON THE LENGTH OF THE TAPE.
21              ;       IT IS RECOMMENDED THAT A 600 FOOT REEL BE USED TO SPEED
22              ;         UP THE WRITE TO EOT SENSOR TEST.
```

```
 0001  UMTR     AOS ASSEMBLER REV 04.20        12:54:18 03/27/84
01               ;
02               ;
03               ;
04               ;*******************************************************************************
05               ;
06               ; DECRIPTION: UNIVERSAL MAGNETIC TAPE RELIABILITY
07               ;
08               ;
09               ; PRODUCT OF ZETACO 1984
10               ;*******************************************************************************
                         .TITL   UMTR
12       000001          X=1
13       000001          .NOMAC  X
14               ;1.     PROGRAM NAME:   UMTR.SR
15               ;
16               ;2.     REVISION HISTORY:
17               ;
18               ;               REV.      DATE
19               ;       .REV     00.0   ;06/07/82
20               ;       .REV     01.0   ;08/83 BY P.A.N.  FOR CSI
21               ;                       TO HANDLE CSI MODEL 130A (6125 EMULATION)
22               ;                       ASK FOR MODEL NUMBER.
23               ;                       IF 130A BIT 0 OF DOB/DIB WONT'T BE MASKED.
24               ;                       9/83 - FOR 130A ALLOW FOR BIGGER RECORD.
25               ;                              (8K WORDS)
26               ;       .REV    02.0    ;03/22/84
27               ;                       120 TO 133 AND PROPER DEVICE CODE CHANGE
28               ;                       ROUTINE.
29               ;
30               ;3.     MACHINE REQUIREMENTS
31               ;
32               ;       3.1     NOVA OR ECLIPSE FAMILY CPU'S
33               ;       3.2     MINIMUM OF 16K MEMORY
34               ;       3.3     ZETACO MAG TAPE COUPLER (CONTROLLER) BOARD
35               ;       3.4     TELETYPE OR CRT AND CONTROLLER
36               ;       3.5     TAPE DRIVE (S)
37               ;4.     TEST REQUIREMENTS
38               ;
39               ;       N/A
40               ;
41               ;5.     SUMMARY
42               ;
43               ;       THE TAPE RELIABILITY PROGRAM IS A MAINTENANCE
44               ;       PROGRAM INTENDED TO VERIFY THE MAGNETIC TAPE
45               ;       SUB-SYTEM OPERATION.
46               ;
47               ;6.     RESTRICTIONS
48               ;
49               ;       ONLY THOSE TAPE DRIVES TO BE TESTED ARE TO
50               ;       BE ONLINE.  ALL ONLINE DRIVES MUST BE WRITE ENABLED.
```

```
!0002  UMTR
01              ;7.     PROGRAM DESCRIPTION/THEORY OF OPERATION
02              ;
03              ;       7.1     RANDOM RELIABILITY (SA 500)
04              ;
05              ;               THE RANDOM RELIABILITY TEST WRITES RANDOM
06              ;               LENGTH FILES. EACH FILE CONSISTS OF FROM
07              ;               1 TO 7 RANDOM LENGTH, RANDOM PATTERN REC-
08              ;               ORDS. THE RANDOM FILES ARE WRITTEN AND
09              ;               READ THE FULL LENGTH OF THE MEDIA. IF
10              ;               MORE THAN ONE(1) TAPE DRIVE IS AVAILABLE,
11              ;               A UNIQUE RANDOM FILE WILL BE WRITTEN ON EACH
12              ;               UNIT SEQUENTIALILY. WHEN EACH UNIT'S EOT
13              ;               SENSOR IS DETECTED, ITS ACCUMULATED
14              ;               HISTORY IS PRINTED AND THE UNIT IS COM-
15              ;               MANDED TO REWIND. ALL WRITE ENABLED,
16              ;               READY TAPE UNITS WILL BE TESTED. A UNIT
17              ;               CAN BE MADE READY AND WILL BE TESTED AFTER
18              ;               THE TEST HAS BEEN INITIATED. IF A UNIT
19              ;               BECOMES NOT READY DURING THE TEST, ITS
20              ;               HISTORY WILL BE PRINTED AND THE UNIT
21              ;               WILL BE REMOVED FROM THE AVAILABLE UNITS
22              ;               LIST. THE TEST WILL CONTINUE UNTIL STOPPED
23              ;               BY THE OPERATOR.
24              ;
25              ;       7.2     INTERCHANGE TEST, WRITE/READ (SA 501)
26              ;
27              ;               THE INTERCHANGE TEST IS USED TO VERIFY THE
28              ;               INTERCHANGABLITY OF THE TAPE UNITS. THIS
29              ;               TEST GENERATES 200. 2000 WORD RECORDS OF
30              ;               SKEW PATTERNS FOLLOWED BY 200, 2000 WORD
31              ;               RECORDS OF RANDOM DATA. AFTER ALL THE
32              ;               ONLINE, WRITE ENABLED UNITS HAVE BEEN
33              ;               WRITTEN, THEY ARE ALL READ TO INSURE
34              ;               PROPER WRITTING. THE OPERATOR THEN INTER-
35              ;               CHANGES THE TAPES AND PERFORMS ANOTHER
36              ;               READ VERIFICATION. THIS PROCEDURE IS CON-
37              ;               TINUED UNTIL EACH TAPE HAS BEEN READ BY
38              ;               ALL THE UNITS. AFTER EACH READ, A SUMMARY
39              ;               OF THE ACCUMULATED STATISTICS FOR EACH
40              ;               UNIT IS PRINTED. AFTER ALL THE UNITS HAVE
41              ;               BEEN READ, A TEST COMPLETE MESSAGE IS
42              ;               PRINTED. IF THE OPERATOR WISHES TO CON-
43              ;               TINUE THE TEST, TYPING A 'P' CHARACTER
44              ;               WILL REPEAT THE ENTIRE TEST.
45              ;
46              ;       7.3     INTERCHANGE, READ ONLY (SA 502)
47              ;
48              ;               THE READ ONLY INTERCHANGE TEST PROVIDES
49              ;               A MEANS OF TESTING TAPE UNITS WITH PRE-
50              ;               RECORDED TAPES. THE TAPES MUST BE RECORDED
51              ;               IN THE FORMAT DESCRIBIED BY SECTION 7.2.
52              ;               THE READ OPERATION IS IDENTICAL TO
53              ;               SECTION 7.2.
54              ;       7.4     COMMAND STRING INTERPRETER (SA 504)
55              ;
56              ;               THE COMMAND STRING INTERPRETER PROVIDES
57              ;               A TROUBLE SHOOTING AID TO ISOLATE A
58              ;               FAULT. THE OPERATOR CAN SELECT ALL POS-
59              ;               IBLE OPERATING MODES BY RESPONDING TO
60              ;               CONSOLE REQUESTS. ALL NUMBERS MUST BE
```

ENTERED IN OCTAL.

7.4.1 UNIT

UNIT NUMBER AND/OR CARRIAGE RETURN TO USE PREVIOUS COMMAND STRING. IF ONLY A CARRIAGE RETURN IS TYPED, NO OTHER REQUESTS WILL BE MADE AND THE LAST ENTERED COMMAND STRING WILL BE RUN. THE ENTRY IS IN THE RANGE OF 0 TO 7. THE DEFAULT UNIT NUMBER IS 0.

7.4.2 WC (WORD COUNT)

TYPE AN OCTAL NUMBER TO SELECT THE DATA BLOCK SIZE AND/OR A CARRIAGE RETURN TO USE THE PREVIOUS ENTRY. THE DEFAULT VALUE IS THE MAXIMUM BLOCK SIZE. THE ENTRY IS IN THE RANGE OF 2 TO THE MAXIMUM BLOCK SIZE.

7.4.3 DATA

SELECT ONE OF THE FOLLOWING DATA PATTERNS AND/OR A CARRIAGE RETURN TO USE THE PREVIOUS ENTRY. THE DEFAULT PATTERN IS RANDOM.

RAND - RANDOM
ALL1 - ALL ONE'S
ALL0 - ALL ZERO'S
ALT0 - ALTERNATING ZERO/ONE (000377)
ALT1 - ALTERNATING ONE/ZERO (177400)
FLT0 - FLOATING ZERO
FLT1 - FLOATING ONE
SKEW - SKEW
VARIABLE - THE VARIABLE PATTERN IS
ENTERED BY THE OPERATOR
AS OCTAL CHARACTER STRINGS.
UP TO 8, 16 BIT OCTAL NUMBERS
CAN BE ENTERED. THE DATA
BUFFER IS BUILT BY REPEATING
THE ENTERED CHARACTER STRINGS.

7.4.4 PARITY

TYPE 'EVEN' OR 'ODD' AND/OR CARRIAGE RETURN TO SELECT THE PARITY OR USE THE PREVIOUS ENTRY. THE DEFAULT PARITY IS ODD.

7.4.5 COMMAND STRING

THE OPERATOR CAN SELECT THE SUBSYSTEM OPERATION BY TYPING THE DESIRED COMMANDS AND/OR CARRIAGE RETURN. ALL N(NUMBER) ENTRIES MUST

```
01                ;                       BE IN OCTAL.  IF THE COMMAND STRING
02                ;                       EXCEEDS THE LINE LENGTH, TYPE A
03                ;                       LINEFEED TO CONTINUE ON THE NEXT
04                ;                       LINE.  THE FOLLOWING IS A LIST OF
05                ;                       AVAILABLE SUB-SYSTEM COMMANDS.
06                ;
07                ;                       RD N    READ N RECORDS
08                ;                       RW      REWIND
09                ;                       SB N    SPACE BACK N RECORDS
10                ;                       SF N    SPACE FORWARD N RECORDS
11                ;                       WT N    WRITE N RECORDS
12                ;                       WE      WRITE END OF FILE MARK
13                ;                       ER      ERASE 3" OF TAPE
14                ;                       RE      READ END OF FILE MARK
15                ;                       LOOP    LOOP BACK TO FIRST COMMAND
16                ;                       *       LOOP TO HERE
17                ;                       LOOP *  LOOP TO *
18                ;
19                ;                       SAMPLE COMMAND STRINGS
20                ;
21                ;                       RW WT 10 SB 10 RD 10 LOOP
22                ;
23                ;                       THE ABOVE COMMAND STRING WILL REWIND,
24                ;                       WRITE 8 RECORDS, SPACE BACK 8 RECORDS,
25                ;                       AND READ 8 RECORDS.  THIS TEST WILL
26                ;                       CONTINUE UNTIL STOPPED BY THE OPERATOR.
27                ;
28                ;                       RW,WT 10,WE * RW,SF,10,SB,10,RD,10,RE,
29                ;                       LOOP *
30                ;
31                ;                       THE ABOVE COMMAND STRING WILL REWIND,
32                ;                       WRITE 8 RECORDS, WRITE AN EOF MARK,
33                ;                       AND THEN LOOP ON REWIND, SPACE FORWARD
34                ;                       8 RECORDS, SPACE BACK 8 RECORDS, READ
35                ;                       8 RECORDS AND READ EOF MARK.
36                ;               NOTE:   EITHER A SPACE OR COMMA CAN BE
37                ;                       USED AS AN ARGUEMENT DELIMITER.
38                ;                       IF AN INCORRECT CHARACTER OR
39                ;                       CHARACTERS ARE TYPED, TYPE A RUB-
40                ;                       OUT CHARACTER TO DELETE THE PRE-
41                ;                       VIOUSLY TYPED CHARACTER.  THE DELE-
42                ;                       TED CHARACTER WILL BE PRINTED.
43                ;
44                ;               WHILE THE COMMAND STRING IS BEING EXECUTED,
45                ;               TYPE A 'R' CHARACTER TO CAUSE THE PROGRAM
46                ;               TO RETURN TO THE UNIT PROMPT.  THE ESCAPE
47                ;               KEY WILL CAUSE THE PROGRAM TO RETURN TO THE
48                ;               COMMAND STRING ENTRY POINT.
49                ;
50                ;       7.5     HISTORY RECOVERY (SA 504)
51                ;
52                ;               IF THE PROGRAM HAS STOPPED DURING AN OPERATION,
53                ;               THE ACCUMULATED ERROR AND PASS HISTORY CAN BE
54                ;               RECOVERED BY THIS PROGRAM.  THIS PROGRAM MUST
55                ;               BE RUN BEFORE ANY OTHER PROGRAM IS RESTARTED.
56                ;
57                ;               TO RETRIEVE THE ACCUMULATED ERROR AND PASS
58                ;               HISTORY WHILE THE RELIABILITY TEST IS RUNNING,
59                ;               TYPE A SPACE.  THIS WILL CAUSE THE ACCUM-
60                ;               ULATED HISTORIES OF ALL TESTED UNITS TO BE
```

```
 0005  UMTR
01              ;               PRINTED.
02              ;8.  OPERATING MODES/SWITCH SETTINGS.
03              ;               SWITCH OPTIONS
04              ;               BIT     OCTAL   BINARY  INTERPRETATION
05              ;                       VALUE   VALUE
06              ;
07              ;               2       20000   0       ENABLE PRINT ON CONSOLE
08              ;                               1       INHIBIT PRINT ON CONSOLE
09              ;
10              ;               5       02000   0       INHIBIT LINEPRINTER
11              ;                               1       ENABLE LINEPRINTER
12              ;
13              ;               7       00400   0       ENABLE PRINT PARITY ERRORS
14              ;                               1       INHIBIT PRINT PARITY ERRORS
15                      S?WPD   8
16              ;               "ESC"   THIS COMMAND GIVEN WHILE RUNNING THE
17              ;                       ENTERED COMMAND STRING WILL CAUSE THE
18              ;                       PROGRAM TO RESTART AT THE COMMAND STRING
19              ;                       ENTER PROMPT.
20              ;
21              ;9.     OPERATING PROCEDURES/OPERATOR INPUT
22              ;
23              ;       9.1     PROGRAM LOAD
24              ;
25              ;               LOAD THE PROGRAM BY USING THE BINARY LOADER.
26              ;
27              ;       9.2     STARTING ADDRESSES
28              ;
29              ;               SA      PROGRAM FUNCTION
30              ;
31              ;               500     START RELIABILITY TEST
32              ;               501     START INTERCHANGE TEST, WRITE/READ
33              ;               502     START INTERCHANGE TEST, READ ONLY
34              ;               503     START COMMAND STRING INTERPRETER
35              ;               504     DIRECT ENTRY FOR ERROR LOG RECOVERY
36              ;
37              ;       9.3     PROGRAM OPERATION
38              ;
39              ;               9.3.1   INITIALIZATION
40              ;
41              ;                       THE FOLLOWING MESSAGE IS PRINTED REQUESTING
42              ;                       THE SETTING OF THE SOFT SWITCH REGISTER.
43              ;
44              ;       "SET SWITCH REGISTER TO DESIRED VALUE, THEN PRESS RETURN TO CONTINUE"
45              ;       M
46              ;       0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
47              ;       1  -1   0   0   0   0   0   0   0   0   0   0   0   0   0   0
48              ;
49              ;       0
50              ;
51              ;                       MODIFY THE SWITCH REGISTER SETTING AS
52              ;                       DESCRIBED IN SECTION 8.3, FOLLOWED BY
53              ;                       A CARRIAGE RETURN.  THE FOLLOWING MESSAGES
54              ;                       WILL BE PRINTED.
55              ;
56              ;                       IF  A REAL TIME CLOCK IS NOT PRESENT IN
57              ;                       THE SYSTEM, THE FOLLOWING MESSAGE WILL
58              ;                       BE PRINTED.
59              ;
60              ;       "TTO BAUD RATE = ?..."
```

```
01              ;
02              ;                       RESPOND TO THE REQUEST BY TYPING THE
03              ;                       CORRECT CONSOLE DEVICE BAUD RATE FOR
04              ;                       I/O TIMING CALIBRATION.  IF THE RESPONSE
05              ;                       IS 110, THE FOLLOWING REQUEST MESSAGE
06              ;                       WILL BE PRINTED.
07              ;       "10 OR 11# BITS/CHAR = ?"
08              ;
09              ;                       RESPOND TO THE REQUEST BY TYPING 10 OR
10              ;                       11.
11              ;
12              ;
13              ;       "RELIABILITY TEST"
14              ;       "SPECIFY THE MODEL NUMBER OF THE ZETACO COUPLER(S) BEING TESTED."
15              ;       "(110=1, 120=2, 133 (6021)=3, 133 (6125)=4):"
16              ;
17              ;                       YOU SHOULD RESPOND TO THIS QUESTION BY
18              ;                       ENTERING THE NUMBER ASSOCIATED WITH THE
19              ;                       ZETACO MODEL NUMBER FOR THE COUPLER IN THE
20              ;                       TAPE UNIT(S) BEING TESTED.  FOR EXAMPLE,
21              ;                       IF YOU ARE RUNNING WITH ZETACO COUPLER 133
22              ;                       (6021) ENTER "3".
23              ;
24              ;
25              ;
26              ;       "ENTER DEVICE CODE [22  ]:"
27              ;
28              ;                       ANSWER THE REQUEST BY TYPING OCTAL DEVICE CODE.
29              ;                       IF ANY DEVICE CODE OTHER THEN 20 THRU 76 IS
30              ;                       SELECTED, THE DEVICE CODE ENTRY PROMPT
31              ;                       WILL BE PRINTED AGAIN.
32              ;
33              ;       "ENTER 0 TO TEST CRC (NRZI ONLY).  OTHERWISE, ENTER 1."
34              ;
35              ;       ANSWER 0 IF TAPE DRIVE IS 800 BPI NRZI OTHERWISE
36              ;       ENTER 1.NEXT A REQUEST IS MADE TO DETERMINE THE ERROR RECOVERY
37              ;       SEQUENCE THAT IS TO BE USED.THIS IS DETERMINED BY THE TYPE OF OPERATING
38              ;       SYSTEM THE CONTROLLER WILL BE USED IN.THE REQUEST IS MADE AS FOLLOWS:
39              ;
40              ;   "ENTER 1 IF CONTROLLER WILL BE RUN IN AN RSX SYSTEM.  OTHERWISE, ENTER 0."
41              ;
42              ;               9.3.2   PROGRAM ENTRY
43              ;
44              ;                       WHEN ENTERING THE RELIABILITY PROGRAM,
45              ;                       THE FOLLOWING MESSAGE WILL BE PRINTED
46              ;
47              ;       "MOUNT SCRATCH TAPE(S).  PRESS RETURN TO CONTINUE."
48              ;
49              ;                       THE OPERATOR SHOULD MAKE READY ALL TAPE
50              ;                       UNITS TO BE TESTED.  ANY TAPE UNIT THAT
51              ;                       IS ONLINE WILL BE TESTED.  AFTER ALL
52              ;                       UNITS ARE READY, ENTER CR.  ON THE CON-
53              ;                       SOLE TO CONTINUE.
54              ;
55              ;               9.3.3   INTERCHANGE TEST, WRITE/READ
56              ;
57              ;                       ENTRY TO THE INTERCHANGE TEST IS IDENT-
58              ;                       ICAL TO THE RELIABILITY TEST WITH THE
59              ;                       FOLLOWING EXCEPTION.
60              ;
```

```
;       "INTERCHANGE TEST(WRITE/READ)"
;                       AFTER THE INITIALIZATION SECTION, THE
;                       FOLLOWING MESSAGE IS PRINTED.
;
;       "MOUNT SCRATCH TAPE(S).  PRESS RETURN TO CONTINUE."
;
;                       MAKE READY ALL TAPE UNITS TO BE TESTED
;                       AND ENTER CR. TO CONTINUE.
;               9.3.4   INTERCHANGE TEST, READ ONLY
;
;                       ENTRY TO THE INTERCHANGE TEST IS
;                       IDENTICAL TO THE RELIABILITY TEST
;                       WITH THE FOLLOWING EXCEPTION.
;
;       "INTERCHANGE TEST(READ ONLY)"
;
;                       AFTER THE INTIALIZATION SECTION THE
;                       FOLLOWING MESSAGE IS PRINTED.
;
;       "MOUNT PRE-RECORDED TAPE(S), ENTER CR. TO CONTINUE."
;
;                       MOUNT PRE-RECORDED TAPES ON ALL TAPE
;                       UNITS TO BE TESTED AND ENTER CR..
;
;       9.4     COMMAND STRING INTERPRETER
;
;               3.4.1   INITIALIZATION
;
;                       ALL ERROR AND PASS COUNTERS ARE CLEARED
;                       AND THE FOLLOWING REQUEST MESSAGE IS
;                       PRINTED.
;
;       "SET SWITCH REGISTER TO DESIRED VALUE, THEN PRESS RETURN TO CONTINUE."
;
;                       NOTE:   THE "X" VALUE INDICATE THE UN-
;                               KNOWN STATE OF THE COMMMAND BITS.
;
;                       RESPOND TO THE REQUEST BY SETTING THE
;                       "SWREG" LOCATION AS DESCRIBED BY SECTION
;                       3.3, FOLLOWED BY A CARRIAGE RETURN.
;
;                       THE MEMORY IS SIZED NEXT AND THE TIME
;                       BASE IS CALIBRATED.  IF A REAL TIME CLOCK
;                       IS NOT PRESENT IN THE SYSTEM, THE FOL-
;                       LOWING REQUEST IS PRINTED.
;
;       "TTO BAUD RATE = ?"
;
;                       RESPOND TO THE REQUEST BY TYPING THE
;                       CORRECT CONSOLE DEVICE BAUD RATE.  IF THE
;                       RESPONSE IS 110, THE FOLLOWING REQUEST
;                       MESSAGE WILL BE PRINTED.
;
;       "# BITS/CHAR = ?"
;
;                       RESPOND TO THE REQUEST BY TYPING 10 OR
;                       11
;               9.4.2   PROGRAM ENTRY
;
;                       THE FOLLOWING MESSAGES ARE PRINTED
```

```
0000  UMTR
01              ;                       INDICATING THE ENTRY TO THE COMMAND
02              ;                       STRING INTERPRETER.
03              ;
04              ;       "COMMAND STRING INTERPRETER"
05              ;       "MAXIMUM WORD COUNT = XXXX"
06              ;
07              ;                       NOTE:   THE MAXIMUM WORD COUNT VALUE
08              ;                               INDICATES THE LARGEST DATA
09              ;                               BUFFER AVAILABLE.
10              ;
11              ;                       THE SUB-SYSTEM DEFAULT VALUES ARE SET
12              ;                       AS FOLLOWS:
13              ;
14              ;                       UNIT    0
15              ;                       WC      SET TO MAXIMUM WORD COUNT
16              ;                       DATA    RANDOM PATTERN
17              ;                       PARITY  ODD
18              ;
19              ;                       WHEN THE "UNIT" PROMPT IS TYPED, REFER
20              ;                       TO SECTION 7.4, FOR PROGRAM OPERATION.
21              ;10.    PROGRAM OUTPUT/ERROR DESCRIPTION
22              ;
23              ;       ALL ERRORS ARE IDENTIFIED, COUNTED AND PRINTED ON
24              ;       THE BASIS OF THE SETTING OF LOCATION "SWREG".
25              ;
26              ;       IF A UNIT GOES NOT READY, AN APPROPRIATE ERROR
27              ;       MESSAGE AND ITS ACCUMULATED STATISTICAL HISTORY
28              ;       IS PRINTED.  IF ONLY ONE(1) UNIT IS BEING TESTED,
29              ;       AN APPROPRIATE MEESAGE WILL BE PRINTED AND THE
30              ;       PROGRAM WILL WAIT FOR OPERATOR INTERVENTION.  IF
31              ;       MORE THAN ONE UNIT IS AVAILABLE, THE TEST PROCESS
32              ;       WILL CONTINUE.
33              ;
34              ;       ALL ERRORS ARE SOFT UNLESS SPECIFIED AS HARD OR
35              ;       FATAL.
36              ;
37              ;       10.1    STATISTICAL HISTORY PRINTOUT
38              ;
39              ;               THE STATISTICAL HISTORY IS PRINTED FOR
40              ;               EACH UNIT WHEN IT REACHES ITS EOT SENSOR.
41              ;               THE STATISTICAL HISTORY FOR ALL TESTED
42              ;               UNITS CAN BE REQUESTED BY TYPING A
43              ;               "SPACE" CHARACTER.  A SAMPLE OF THE
44              ;               PRINTOUT IS AS FOLLOWS:
45              ;
46              ;       "UNIT    0       1"
47              ;       "PAR WR  1       0"
48              ;       "PAR RD  1       1"
49              ;       "PERM WR 1       0"
50              ;       "PERM RD 0       0"
51              ;       "WDS RD  30348   1075827"
52              ;       "WDS WR  31345   1075827"
53              ;       10.2    STATUS WORD
54              ;
55              ;               BIT     DESCRIPTION
56              ;
57              ;               0       ANY ERROR, SET BY BITS 1,3,5,6,7,8,10,14
58              ;
59              ;               1(E)    DATA LATE
60              ;               2       REWINDING
```

```
 0009  UMTR
01                ;               3(E)    ILLEGAL COMMAND
02                ;
03                ;               4       HIGH DENSITY
04                ;               5(E)    PARITY ERROR
05                ;               6(E)    EOT MARK SENSED
06                ;
07                ;               7(E)    EOF MARK SENSED
08                ;               8(E)    BOT MARK SENSED
09                ;               9       9 TRACK TAPE
10                ;
11                ;               10(E)   BAD TAPE
12                ;               11      SEND CLOCK OR ID STATUS
13                ;               12      FIRST CHARACTER OR CORRECTED ERROR
14                ;
15                ;               13      WRITE LOCKOUT
16                ;               14(E)   CRC ERROR OR ODD REC READ
17                ;               15      UNIT READY
18                        O?OTD 11
19                ;12.    SPECIAL NOTES
20                ;
21                ;       12.1    MEDIA SELECTION
22                ;
23                ;               IT IS IMPORTANT TO SELECT KNOWN GOOD TAPES
24                ;               WHEN PERFORMING THE RELIABILITY TESTS. USING
25                ;               MARGINAL TAPE MEDIA WILL CAUSE SOFT AND HARD
26                ;               ERRORS TO OCCURE. TO VERIFIY THE SUB-SYSTEM
27                ;               RELIABILITY THE TAPE MEDIA SHOULD NOT INFLUENCE
28                ;               THE PASS OR FAIL CRITERIA.
29                ;
30                ;       12.2    DATA ENTRY
31                ;
32                ;               ALL NUMBER ENTRIES MUST BE ON OCTAL. ANY OTHER
33                ;               ENTRY WILL BE CONSIDERED AS AN ALPHA CHARACTER.
34                ;
35                ;13.    RUN TIME
36                ;
37                        THE PROGRAM RUN TIME IS DEPENDENT ON THE LENGTH OF THE
38                ;       TAPE MEDIA.
39                         EOT
```

```
 0001  LNG     AOS ASSEMBLER REV 04.00        10:00:50  05/28/84
01              ;
02              ;
03              ;
04              ;*******************************************************************************
05              ;
06              ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07              ;
08              ;
09              ; PRODUCT OF ZETACO, 1984
10              ;*******************************************************************************;
11              ;1.     PROGRAM NAME. LNG.SR
12              ;
13              ;2.     REVISION HISTORY.
14              ;
15              ;       REV       DATE
16              ;        00     11/12/81
17              ;  REV    01.0  ;03/27/84        ;ZETACO
18              ;3.     REQUIREMENTS
19              ;       SYSTEM EXECUTABLE
20              ;4.     SUMMARY
21              ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
22              ;       HIGH SPEED AND DYNAMIC GAP.
23              ;
24              ;       CONFIGURATION BITS OF DOA WITH BIT 0 = 1:
25              ;                10    MINIMUM GAP*
26              ;                9     DYNAMIC GAP
27              ;                8     HIGH SPEED
28              ;               6-7    LIMITS
29              ;                5     STREAMER MODE SELECT
30              ;                -
31              ;       LIMITS
32              ;       6   7   10      MAX             MIN
33              ;       0   0   0        75MS           NOMINAL
34              ;       0   1   0       150MS           NOMINAL
35              ;       1   0   0       300MS           NOMINAL
36              ;       1   1   0         4SEC          NOMINAL
37              ;       0   0   1        75MS           30MS
38              ;       0   1   1       150MS           60MS
39              ;       1   0   1       300MS           90MS
40              ;       1   1   1         4SEC         120MS
41              ;
42              ;       *NOTE. MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
43              ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                        .TITL   LNG
45                      .NREL
46 00000'020426 LOAD:   LDA     0,C22                  ;PRIMARY TAPE
47                      ?DEBL                          ;ENABLE         ;.SYSTM (RDOS)
48 00003'000401         JMP     .+1                    ;NO ERROR       ;.DEBL
49 00004'020424         LDA     0,CWORD                ;CONFIGURATION WORD
50 00005'061022         DOA     0,22                   ;CONFIGURE PRIMARY MT
51 00006'020420         LDA     0,C22
52                      ?DDIS                                          ;.SYSTM (RDOS)
53 00011'000401         JMP     .+1                                    ;.DDIS
54 00012'020415         LDA     0,C62
55                      ?DEBL                                          ;.SYSTM (RDOS)
56 00015'000401         JMP     .+1                                    ;.DEBL
57 00016'020412         LDA     0,CWORD
58 00017'061062         DOA     0,62                   ;CONFIGURE SECONDARY
59 00020'020407         LDA     0,C62
60                      ?DDIS                                          ;.SYSTM (RDOS)
```

```
 0002  LNG
01 00023'000401          JMP      +1                                    ;.DDIS
02                       .RETURN                                        ;.SYSTM (RDOS)
03 00026'000022 C22:     22                                             ;.RTN
04 00027'0000E2 C62:     62
05 00030'002000 CWORD:   2000                  ;NOMINAL GAP, LOW SPEED, AND STREAMER SELECT MODE.
06                       .END    LOAD
**000000 TOTAL ERRORS, 000000 FIRST PASS ERRORS
```

```
  0003 LNG

C22   000026'       1/46    1/51    2/03#
C62   000027'       1/54    1/59    2/04#
CWORD 000030'       1/49    1/57    2/05#
LOAD  000000'       1/46#   2/06
'0015 001711  MC    1/52    1/60
'0ESL 001671  MC    1/47    1/55
'RETU 006401  MC    2/02
'XCAL 000001        1/48    1/53    1/56    2/01    2/0C
```

```
 0001  LDG75    AOS ASSEMBLER REV 04 20        10 04 IC 01/28/84
01              ;
02              ;
03              ;
04              ;*****************************************************************************
05              ;
06              ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07              ;
08              ;
09              ; PRODUCT OF ZETACO, 1984
10              ;*****************************************************************************;
11              ;1.     PROGRAM NAME: LDG75.SR
12              ;
13              ;2.     REVISION HISTORY
14              ;
15              ;       REV.        DATE
16              ;        00     11/13/81
17              ;REV     01.0  ;03/27/84        ZETACO
18              ;3.     REQUIREMENTS:
19              ;       SYSTEM EXECUTABLE
20              ;4.     SUMMARY:
21              ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
22              ;       HIGH SPEED AND DYNAMIC GAP.
23              ;
24              ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
25              ;                 10    MINIMUM GAP*
26              ;                 9     DYNAMIC GAP
27              ;                 8     HIGH SPEED
28              ;                6-7    LIMITS
29              ;                 5     STREAMER MODE SELECT
30              ;                 -
31              ;       LIMITS:
32              ;       5   7   10      MAX             MIN
33              ;       0   0   0        75MS           NOMINAL
34              ;       0   1   0       150MS           NOMINAL
35              ;       1   0   0       300MS           NOMINAL
36              ;       1   1   0         45EC          NOMINAL
37              ;       0   0   0        75MS           30MS
38              ;       0   1   1       150MS           60MS
39              ;       1   0   1       300MS           90MS
40              ;       1   1   1         45EC         120MS
41              ;
42              ;       *NOTE: MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
43              ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                        .TITL   LDG75
45                      .NREL
46 00000'020426 LOAD:   LDA     0,C22                  ;PRIMARY TAPE
47                      ?DEBL                          ;ENABLE         ;.SYSTM (RDOS)
48 00002'000401         JMP     .+1                    ;NO ERROR       ;.DEBL
49 00004'020424         LDA     0,CWORD                ;CONFIGURATION WORD
50 00005'061022         DOA     0,22                   ;CONFIGURE PRIMARY MT
51 00006'020420         LDA     0,C22
52                      ?DDIS                                          ;.SYSTM (RDOS)
53 00011'000401         JMP     .+1                                    ;.DDIS
54 00012'020415         LDA     0,C62
55                      ?DEBL                                          ;.SYSTM (RDOS)
56 00015'000401         JMP     .+1                                    ;.DEBL
57 00016'020412         LDA     0,CWORD
58 00017'061062         DOA     0,62                   ;CONFIGURE SECONDARY
59 00020'020407         LDA     0,C62
60                      ?DDIS                                          ;.SYSTM (RDOS)
```

```
 0002  LDG75
01 00023'000401          JMP     .+1                     ;.DDIS
02                       ;RETURN                         ;.SYSTM (RDOS)
03 00026'000022 C22:     22                              ;.RTN
04 00027'000062 C62:     62
05 00030'002100 CWORD:   2100            ;75MS MAX GAP, MIN NOMINAL GAP, LOW SPEED,
06                                       ;AND STREAMER SELECT MODE.
07                       .END    LOAD
**00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS
```

0003 LOGTS

C22	000026'		1/46	1/51	2/03#		
C62	000027'		1/54	1/59	2/04#		
CWORD	000030'		1/49	1/57	2/05#		
LOHD	000000'		1/46#	2/07			
'DOIS	001711	MC	1/52	1/60			
'DEBL	001671	MC	1/47	1/55			
'RETU	006401	MC	2/02				
'XCAL	000001		1/48	1/53	1/56	2/01	2/03

```
 0001  HNG      AOS ASSEMBLER REV 04.20        10:05:31 03/28/84
01               ;
02               ;
03               ;
04               ;*******************************************************************************
05               ;
06               ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07               ;
08               ;
09               ; PRODUCT OF ZETACO, 1984
10               ;*******************************************************************************;
11               ;1.      PROGRAM NAME: HNG.SR
12               ;
13               ;2.      REVISION HISTORY:
14               ;
15               ;        REV.       DATE
16               ;         00     11/13/81
17               ;REV      01.0   03/27/84        ZETACO
18               ;3.      REQUIREMENTS.
19               ;        SYSTEM EXECUTATABLE
20               ;4.      SUMMARY.
21               ;        THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
22               ;        HIGH SPEED AND DYNAMIC GAP.
23               ;
24               ;        CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
25               ;                 10    MINIMUM GAP*
26               ;                 9     DYNAMIC GAP
27               ;                 8     HIGH SPEED
28               ;                6-7    LIMITS
29               ;                 5     STREAMER MODE SELECT
30               ;                 -
31               ;        LIMITS:
32               ;        6   7   10      MAX             MIN
33               ;        0   0   0        75MS           NOMINAL
34               ;        0   1   0       150MS           NOMINAL
35               ;        1   0   0       300MS           NOMINAL
36               ;        1   1   0         4SEC          NOMINAL
37               ;        0   0   0        75MS           30MS
38               ;        0   1   1       150MS           60MS
39               ;        1   0   1       300MS           90MS
40               ;        1   1   1         4SEC         120MS
41               ;
42               ;        *NOTE: MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
43               ;               REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                 .TITL   HNG
45               .NREL
46 00000'020426 LOAD:   LDA     0,C22                  ;PRIMARY TAPE
47                       ?DEBL                          ;ENABLE          ;.SYSTM (RDOS)
48 00003'000401          JMP     .+1                    ;NO ERROR        ;.DEBL
49 00004'020424          LDA     0,CWORD                ;CONFIGURATION WORD
50 00005'061022          DOA     0,22                   ;CONFIGURE PRIMARY MT
51 00006'020420          LDA     0,C22
52                       ?DDIS                                           ;.SYSTM (RDOS)
53 00011'000401          JMP     .+1                                     ;.DDIS
54 00012'020415          LDA     0,C62
55                       ?DEBL                                           ;.SYSTM (RDOS)
56 00015'000401          JMP     .+1                                     ;.DEBL
57 00016'020412          LDA     0,CWORD
58 00017'061062          DOA     0,62                   ;CONFIGURE SECONDARY
59 00020'020407          LDA     0,C62
60                       ?DDIS                                           ;.SYSTM (RDOS)
```

```
 0002  HNG
01 00023'000401          JMP      +1                                    ;.DDIS
02                       %RETURN                                        ;.SYSTM (RDOS)
03 00026'000022 C22:     22                                             ;.RTN
04 00027'000062 C62:     62
05 00030'002200 CWORD:   2200                  ;NOMINAL GAP, HIGH SPEED, AND STREAMER SELECT MODE.
06                       .END    LOAD
**00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS
```

C22	000026'		1/46	1/51	2/03#		
C62	000027'		1/54	1/59	2/04#		
CWORD	000030'		1/49	1/57	2/05#		
LOAD	000000'		1/46#	2/06			
?0013	001711	MC	1/52	1/60			
?DEBL	001671	MC	1/47	1/55			
?RETU	006401	MC	2/02				
?XCAL	000001		1/48	1/53	1/56	2/01	2/03

```
 0001  HDG75    AOS ASSEMBLER REV 04.20        10:05:00 03/28/84
01              ;
02              ;
03              ;
04              ;*******************************************************************************
05              ;
06              ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07              ;
08              ;
09              ; PRODUCT OF ZETACO, 1984
10              ;*******************************************************************************;
11              ;1.     PROGRAM NAME: HDG75.SR
12              ;
13              ;2.     REVISION HISTORY:
14              ;
15              ;       REV.       DATE
16              ;        00     11/13/81
17              ;REV     01.0  ;03/27/84        ZETACO
18              ;3.     REQUIREMENTS:
19              ;       SYSTEM EXECUTATABLE
20              ;4.     SUMMARY.
21              ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
22              ;       HIGH SPEED AND DYNAMIC GAP.
23              ;
24              ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
25              ;                10    MINIMUM GAP*
26              ;                9     DYNAMIC GAP
27              ;                9     HIGH SPEED
28              ;               6-7    LIMITS
29              ;                5     STREAMER MODE SELECT
30              ;                -
31              ;       LIMITS:
32              ;       6   7   10      MAX             MIN
33              ;       0   0   0        75MS           NOMINAL
34              ;       0   1   0       150MS           NOMINAL
35              ;       1   0   0       300MS           NOMINAL
36              ;       1   1   0         4SEC          NOMINAL
37              ;       0   0   0        75MS           30MS
38              ;       0   1   1       150MS           60MS
39              ;       1   0   1       300MS           90MS
40              ;       1   1   1         4SEC         120MS
41              ;
42              ;       *NOTE. MIMIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
43              ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                        .TITL   HDG75
45                      .NREL
46 00000'020426 LOAD:   LDA     0,C22                   ;PRIMARY TAPE
47                      ?DEBL                           ;ENABLE         ;.SYSTEM (RDOS)
48 00003'000401         JMP     .+1                     ;NO ERROR       ;.DEBL
49 00004'020424         LDA     0,CWORD                 ;CONFIGURATION WORD
50 00005'061022         DOA     0,22                    ;CONFIGURE PRIMARY MT
51 00006'020420         LDA     0,C22
52                      ?DDIS                                           ;.SYSTM (RDOS)
53 00011'000401         JMP     .+1                                     ;.DDIS
54 00012'020415         LDA     0,C62
55                      ?DEBL                                           ;.SYSTM (RDOS)
56 00015'000401         JMP     .+1                                     ;.DEBL
57 00016'020412         LDA     0,CWORD
58 00017'061062         DOA     0,62                    ;CONFIGURE SECONDARY
59 00020'020407         LDA     0,C62
60                      ?DDIS                                           ;.SYSTM (RDOS)
```

```
 0002  HDG75
01 00023'000401          JMP     .+1                                    ;.DDIS
02                       ?RETURN                                        ;.SYSTM (RDOS)
03 00026'000022 C22:     22                                             ; RTN
04 00027'000062 C62:     62
05 00030'002300 CWORD:   2300                    ;75MS MAX GAP, MIN NOMINAL GAP, HIGH SPEED,
06                                                ;AND STREAMER SELECT MODE.
07                       .END    LOAD
**00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS
```

0003 HDG75

C22	000026'		1/46	1/51	2/03#		
C62	000027'		1/54	1/59	2/04#		
CWORD	000030'		1/49	1/57	2/05#		
LOAD	000000'		1/46#	2/07			
?DDIS	001711	MC	1/52	1/60			
?DEBL	001671	MC	1/47	1/55			
?RETU	006401	MC	2/02				
?XCAL	000001		1/48	1/53	1/56	2/01	2/03

```
 0001  TAPEM    AOS ASSEMBLER REV 04.20        11:48:51 03/28/84
01              ;
02              ;
03              ;
04              ;
05              ;
06              ;*******************************************************************************
07              ;
08              ;
09              ; DESCRIPTION:  STAND-ALONE STREAMER MAG TAPE CONFIGURATOR(CONSOLE PARAMETERS)
10              ;
11              ;
12              ; PRODUCT OF ZETACO, 1981
13              ;*******************************************************************************
                        .TITL   TAPEM
15      000001          .DUSR   X=1
16      000000          .TXTM   0
17              ;1.     PROGRAM NAME TAPEMODE.SR
18              ;
19              ;2. REVISION HISTORY
20              ;
21              ;       REV.              DATE
22              ;        00             12/10/81
23              ;        01             03/27/84        130 TO 133 AND PROPER DEVICE
24              ;                                        CODE ROUTINE
25              ;
26              ;3.     MACHINE REQUIREMENTS:
27              ;3.1     NOVA/ECLIPSE FAMILY PROCESSOR
28              ;3.2     8K READ/WRITE MEMORY
29              ;3.3     CONSOLE DEVICE
30              ;3.4     ZETA 133 (6021 OR 6125) MAG TAPE COUPLER BOARD,
31              ;        WITH A FORMATTED STREAMER TAPE DRIVE.
32
33              ;4.     SUMMARY
34              ;       THIS PROGRAM IS INTENDED FOR USE WITH THE MT133 COUPLER TO SET
35              ;       CONFIGURATION AS DESIRED WHEN PROGRAM ASKS.
36              ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
37              ;                10     MINIMUM GAP*
38              ;                9      DYNAMIC GAP
39              ;                8      HIGH SPEED
40              ;               6-7     LIMITS
41              ;                5      STREAMER MODE SELECT
42              ;                -
43              ;       LIMITS:
44              ;       6   7   10      MAX             MIN
45              ;       0   0   0        75MS           NOMINAL
46              ;       0   1   0       150MS           NOMINAL
47              ;       1   0   0       300MS           NOMINAL
48              ;       1   1   0         4SEC          NOMINAL
49              ;       0   0   0        75MS           30MS
50              ;       0   1   1       150MS           60MS
51              ;       1   0   1       300MS           90MS
52              ;       1   1   1         4SEC         120MS
53              ;
54              ;       *NOTE: MIMIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
55              ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
```

REVISION HISTORY		
ECO #	DATE	AFFECTED SHEE
0020	5-27-82	1, 12, 13
0060	9-17-82	1, 4, 9, 13, 14, 11
0095	3-1-83	7, 17
0196	9-29-83	3,4,5,6,7,8,9,11,12,13,15,17
0226	11-1183	SHEET 4 & 18
0282	3-21-84	NAME CHANGE
0392	9-28-84	SHEETS 5, 7, 10, & 11
0424	12-18-84	SHEET 5

MT 133 COUPLER

NOTE:

1. NUMBERS FOUND WITHIN THE HEXAGON SYMBOLS INDICATE SHEETS WHERE CONTINUED LOGIC WILL BE FOUND

   EXAMPLE: ⬡2⬡ = SHEET 2.

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(SHEET 1-18)

ZETACO

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B.L.S.	3-30-81		
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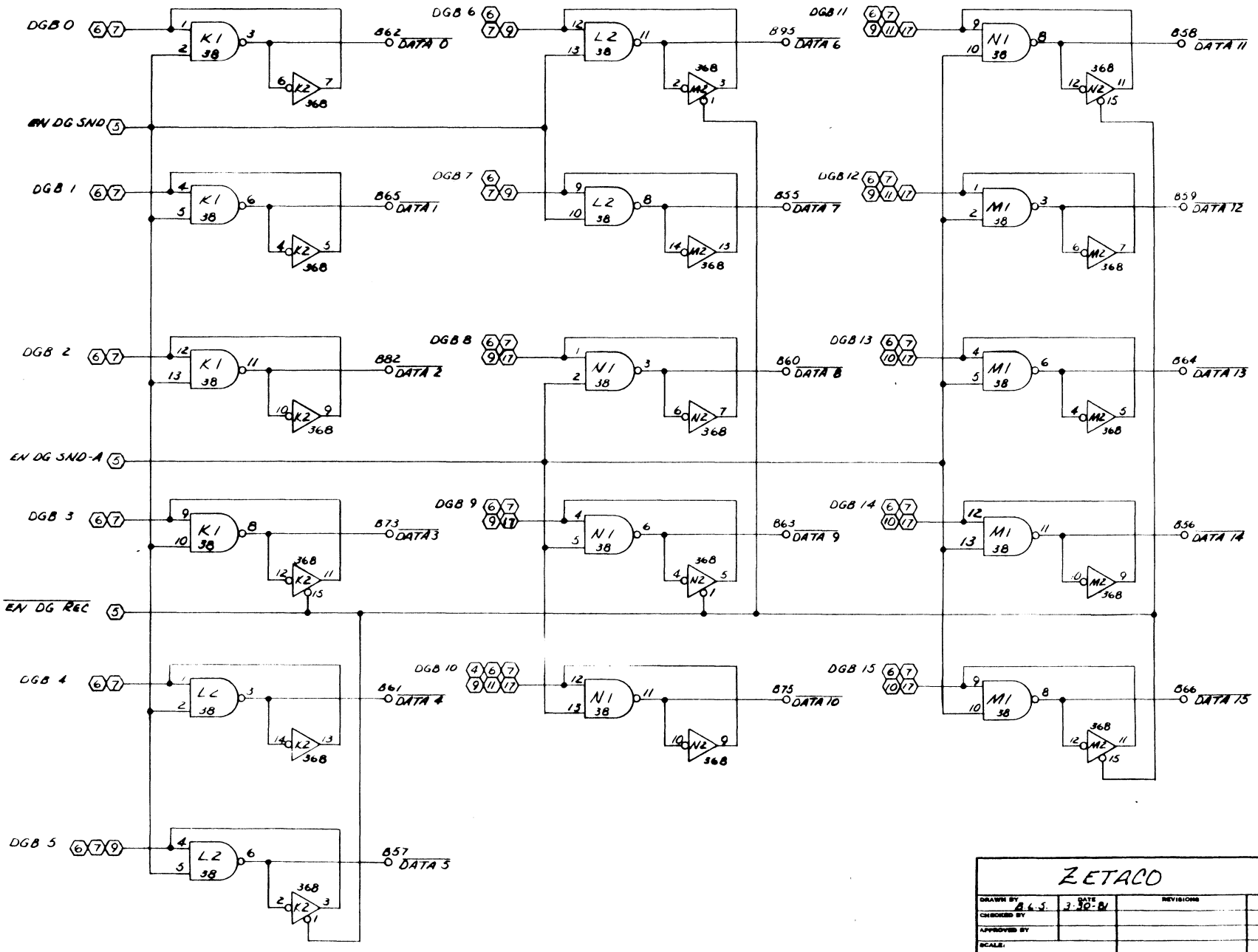
SCALE:			

TITLE	DRAWING NUMBER
MT133 COUPLER	700242-000 B

(SHEET 1 OF 17)



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TITLE EFC
DG INTERFACE

DRAWING NUMBER 700242-000 B

(SHEET 2)

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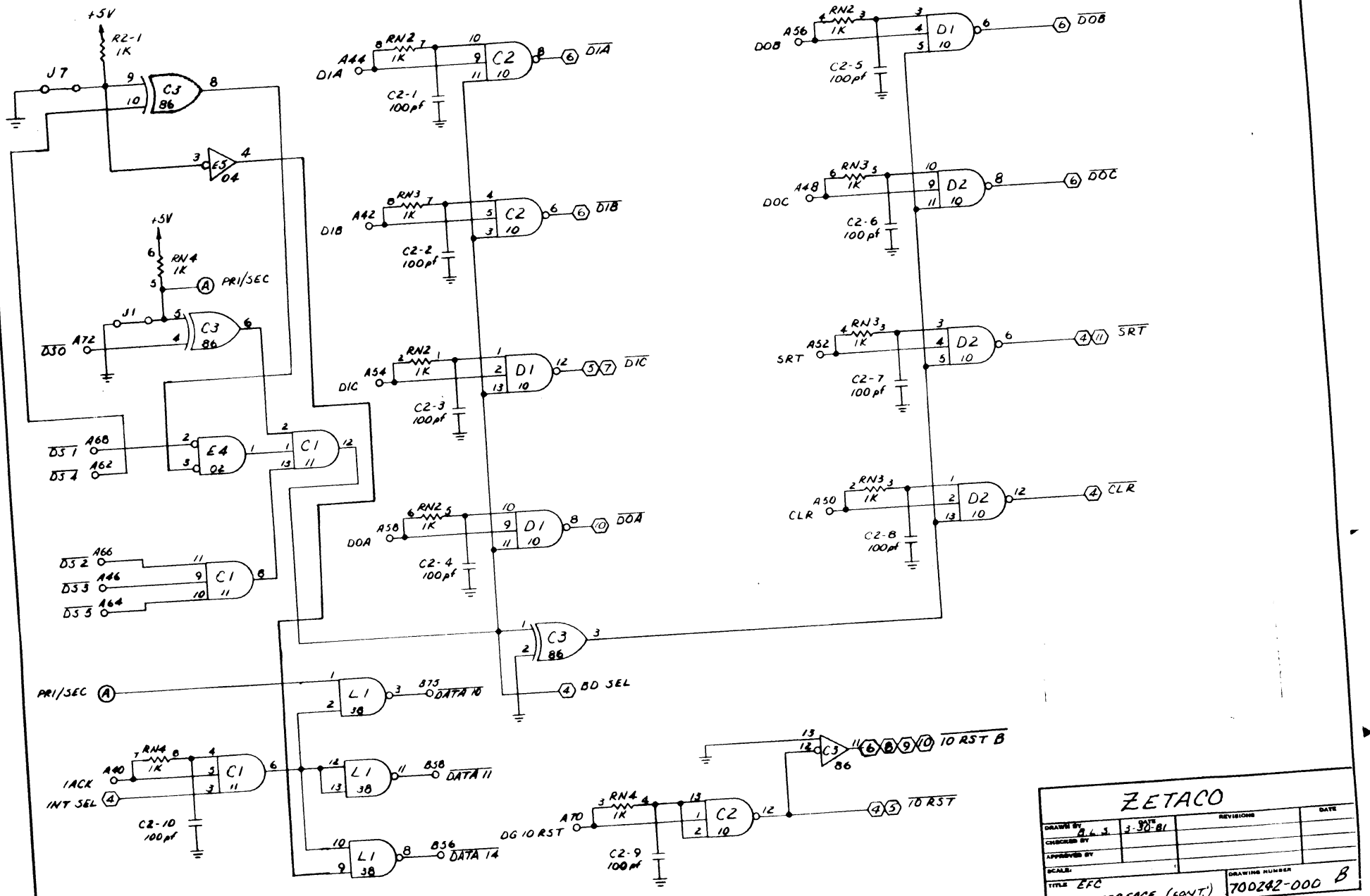

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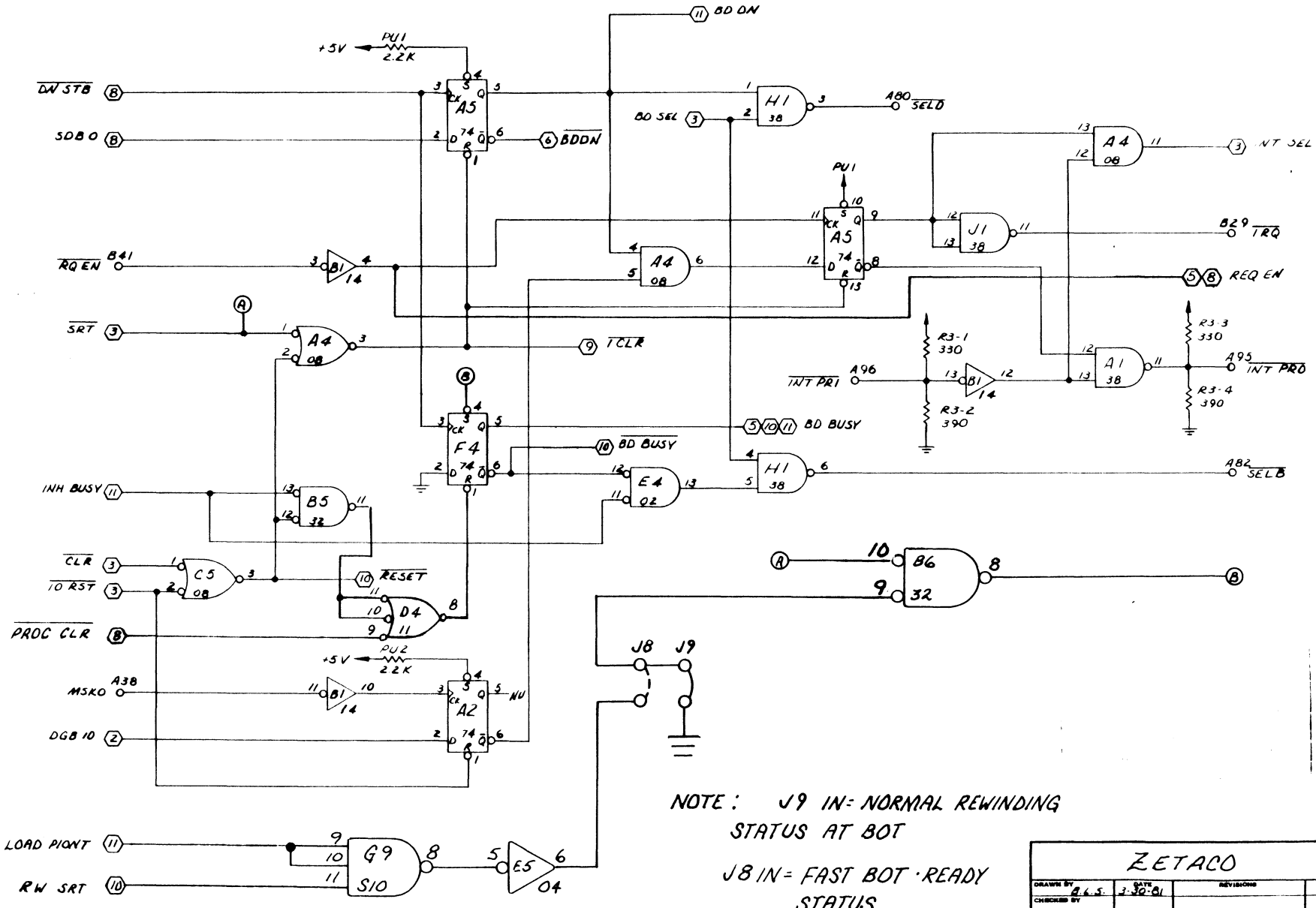

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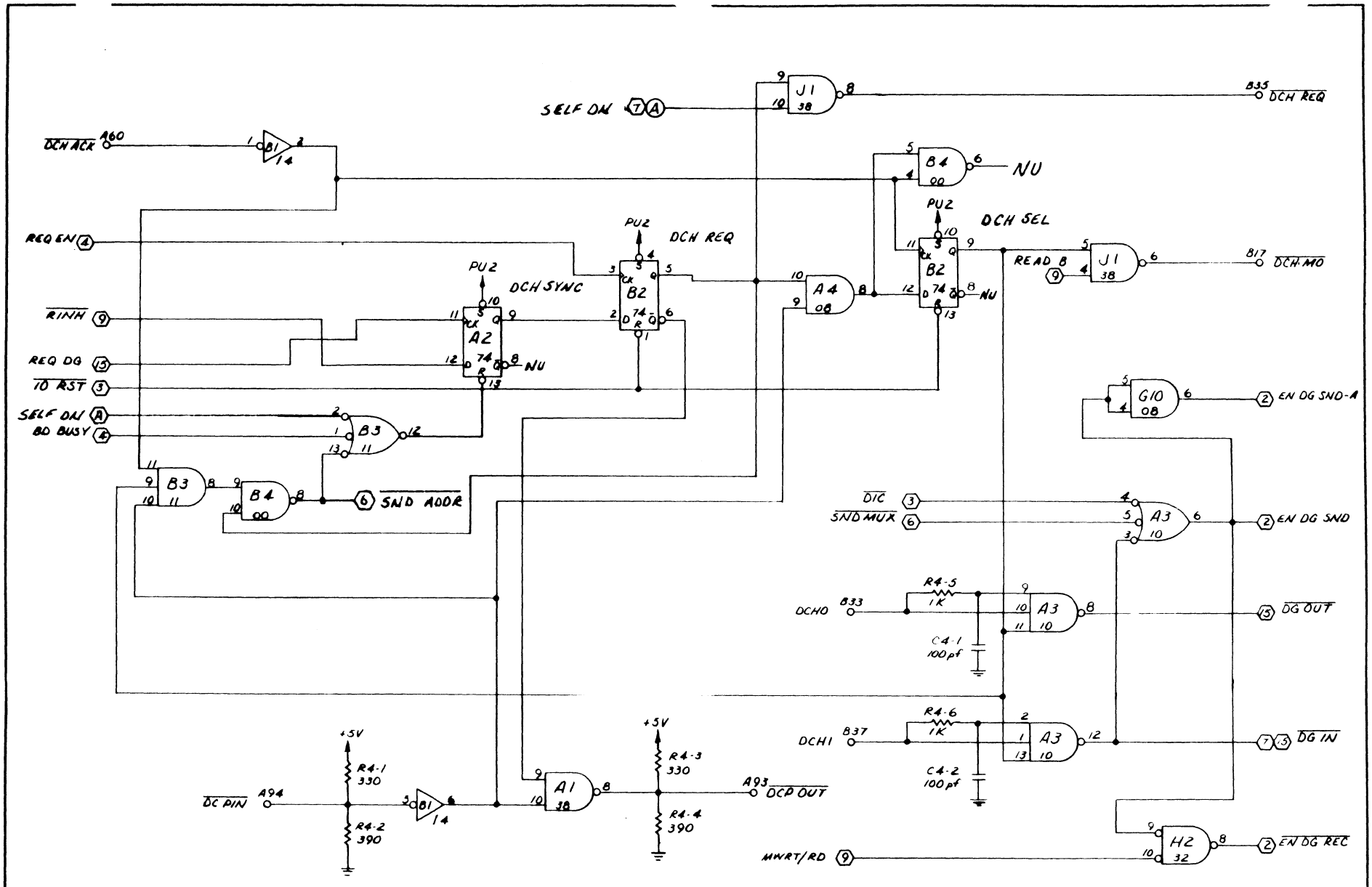

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SCALE:			

TITLE EFC
DG CONTROL (CONT.)

DRAWING NUMBER 700242-000-B

(SHEET 5)

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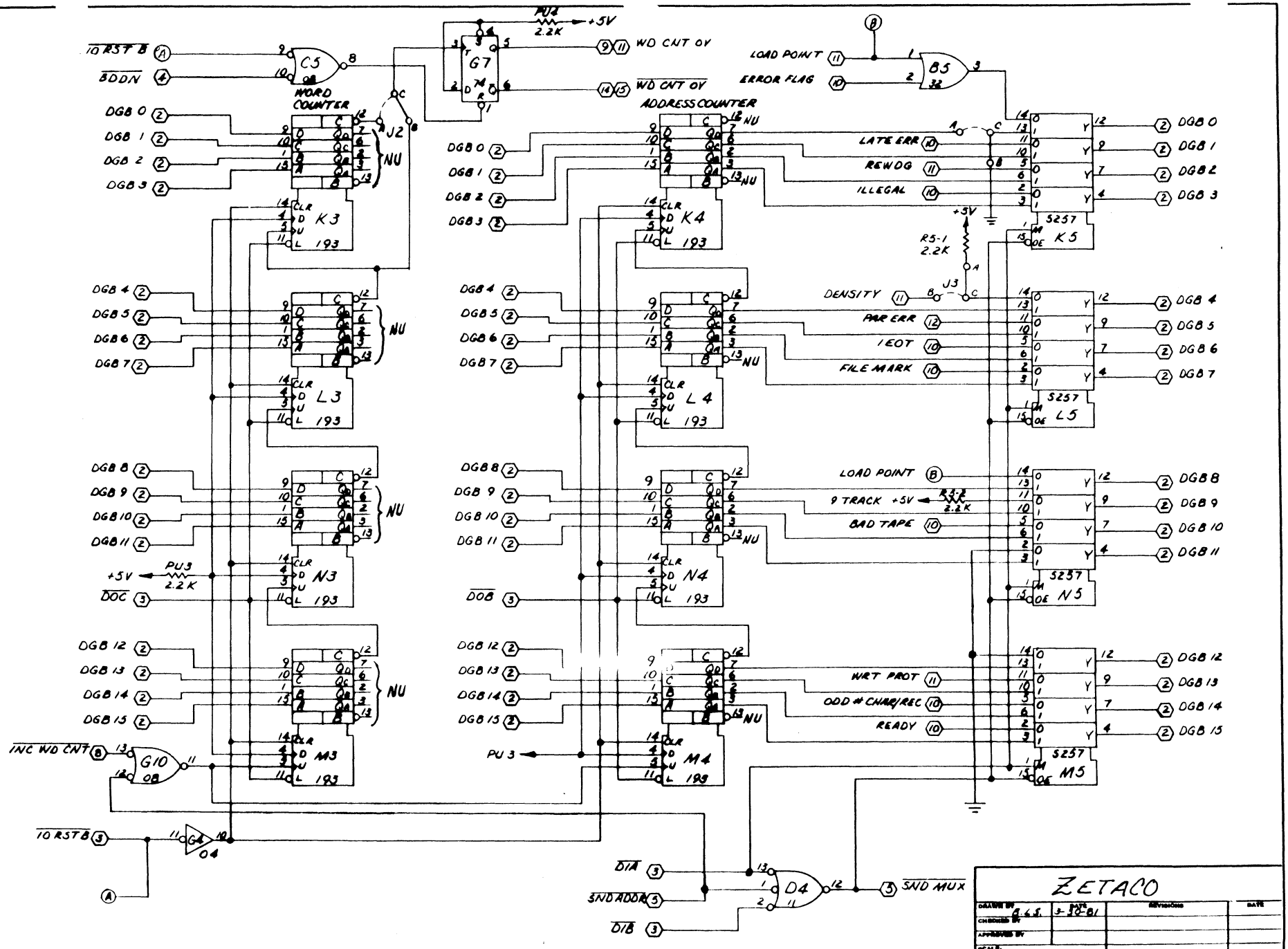

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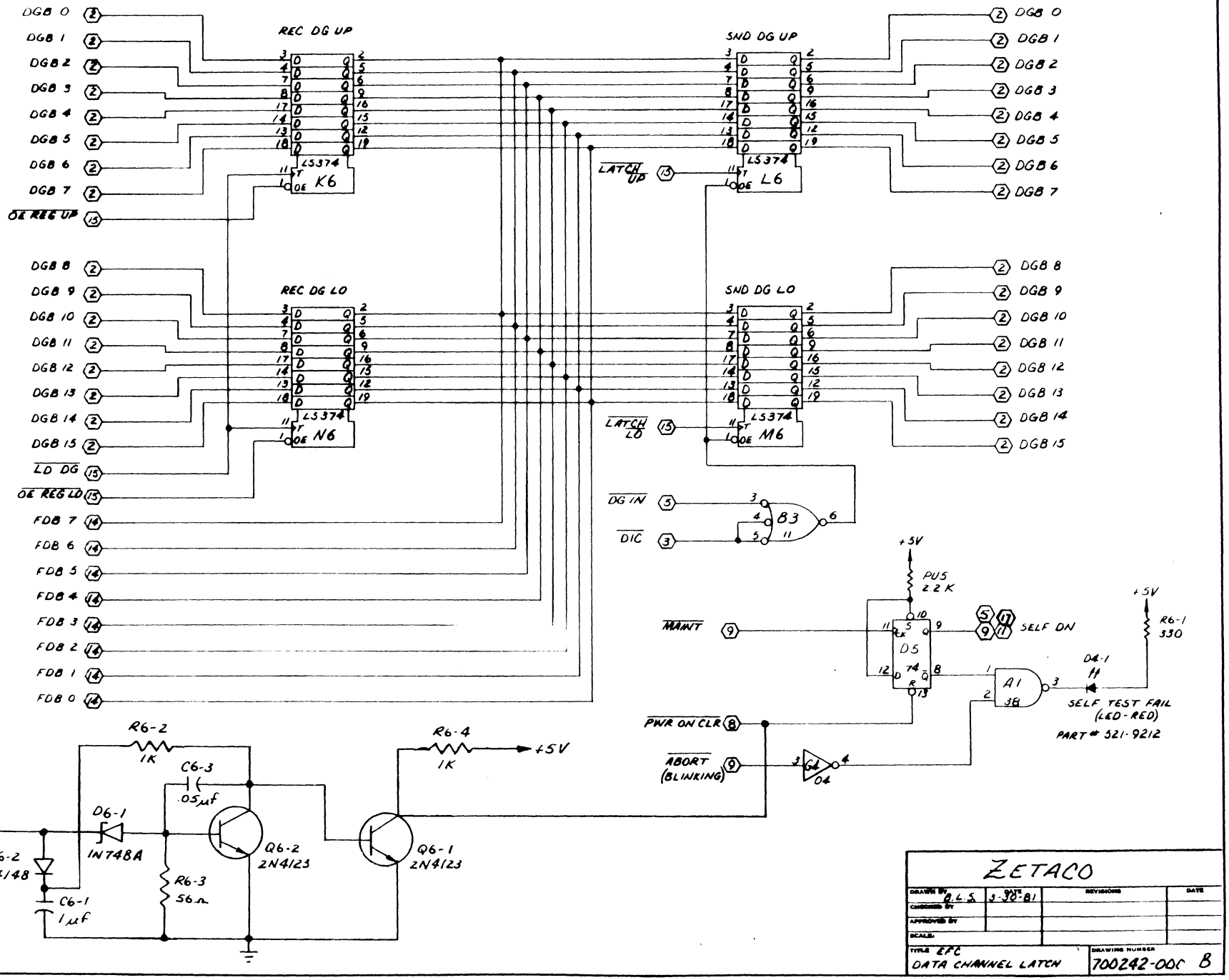
APPROVED BY			
SCALE			

TITLE EFC DG WORD/ADDR COUNT

DRAWING NUMBER 700242-0L0 B

(SHEET 6)



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SCALE:			

TITLE: EPC DATA CHANNEL LATCH

DRAWING NUMBER: 700242-000 B

(SHEET 7)

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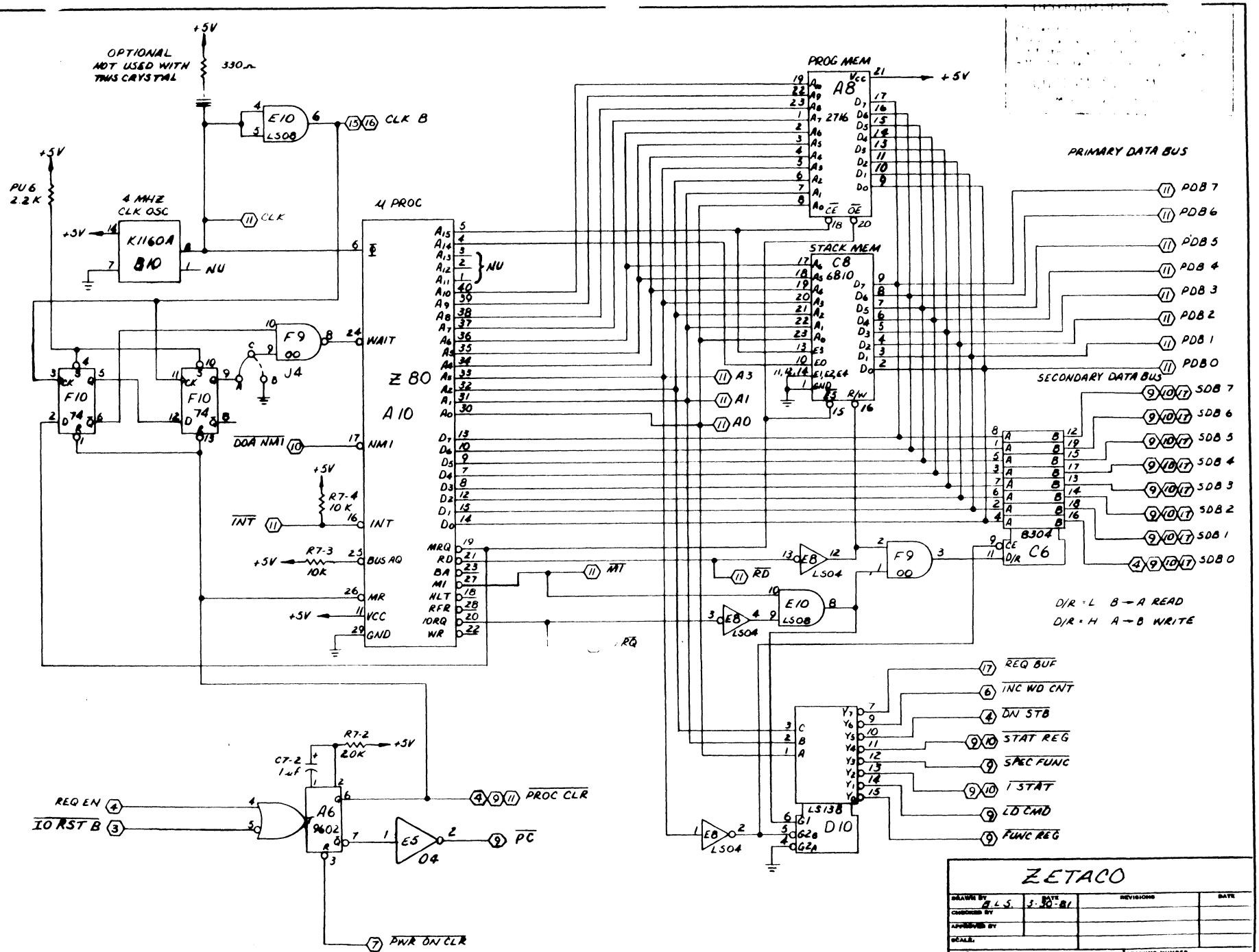

ZETACO

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SCALE:			

TITLE EFC μ PROCESSOR

DRAWING NUMBER 700242-000 B

(SHEET 8)

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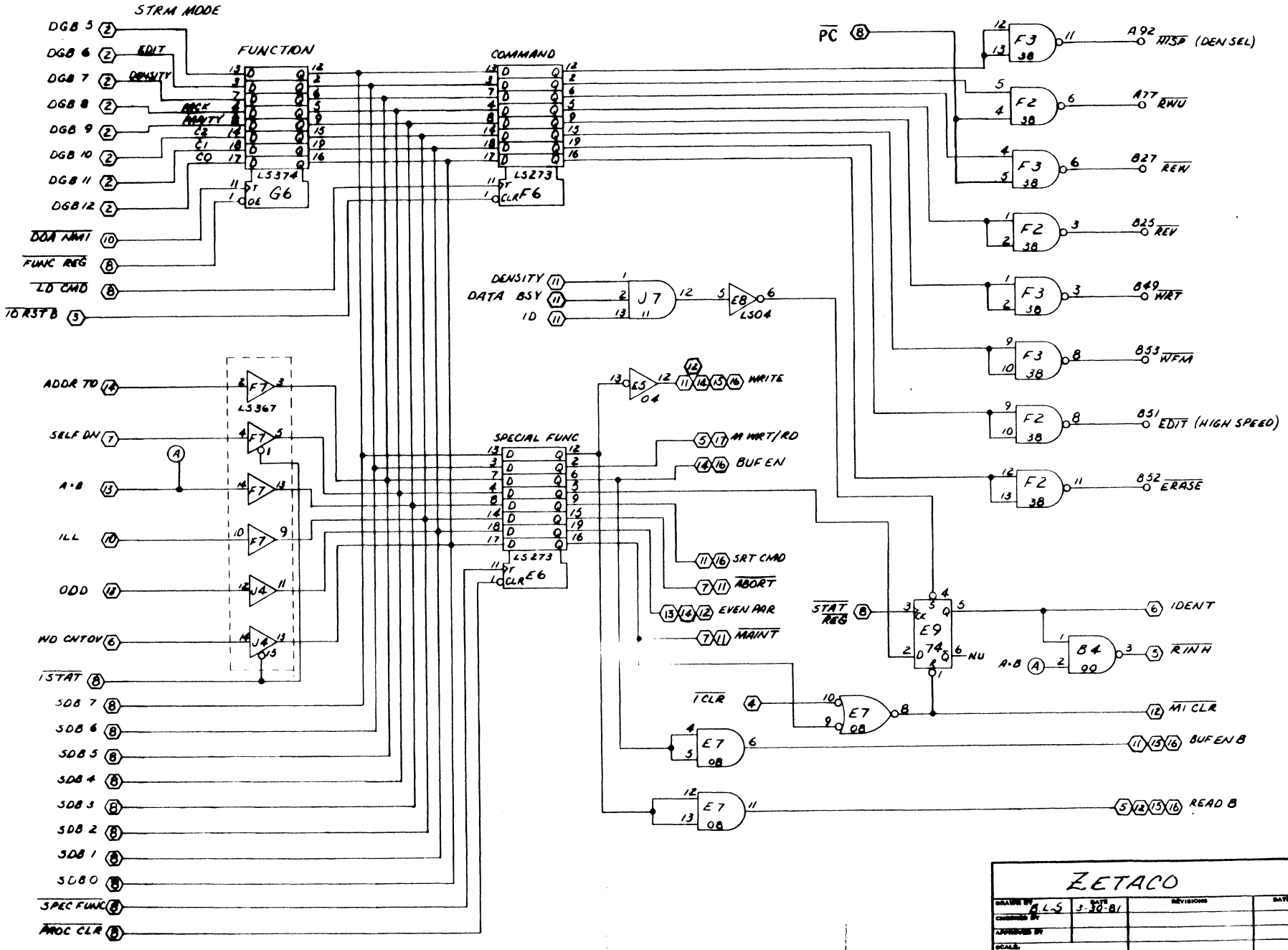

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SCALE			

TITLE: EFC FUNC/STATUS REG

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(SHEET 9)

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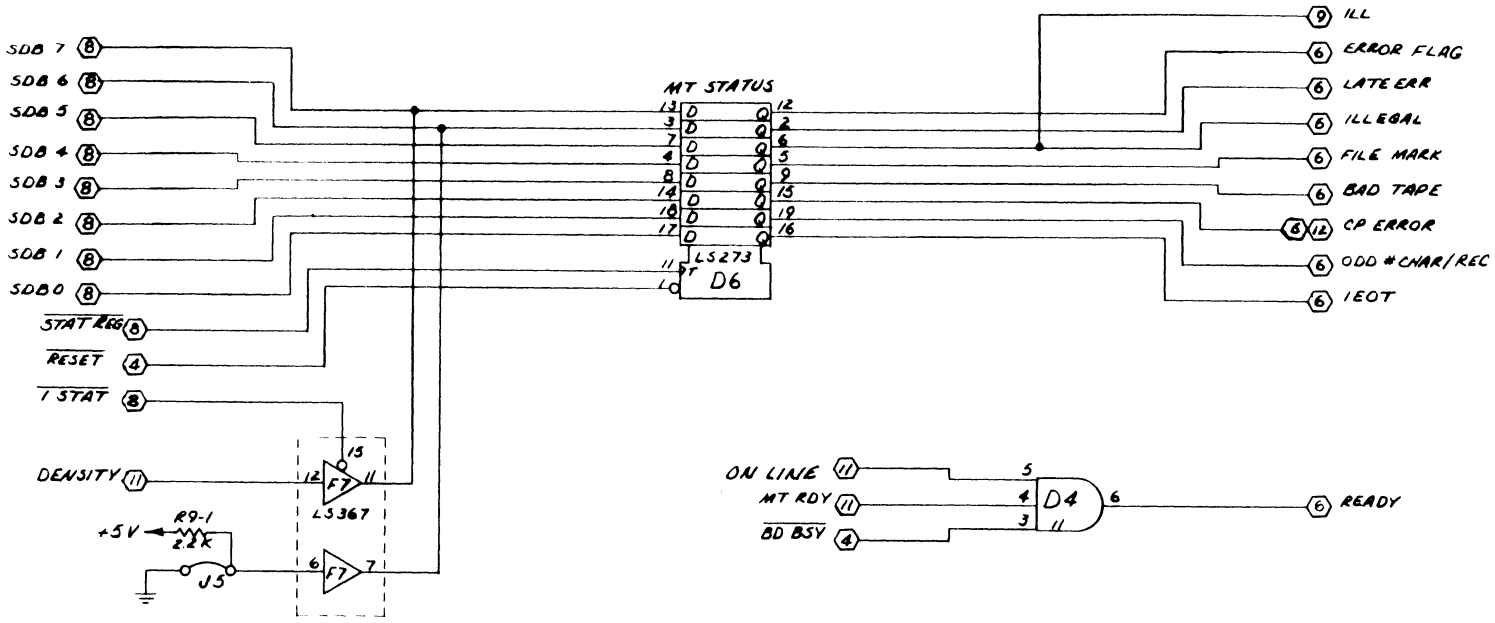

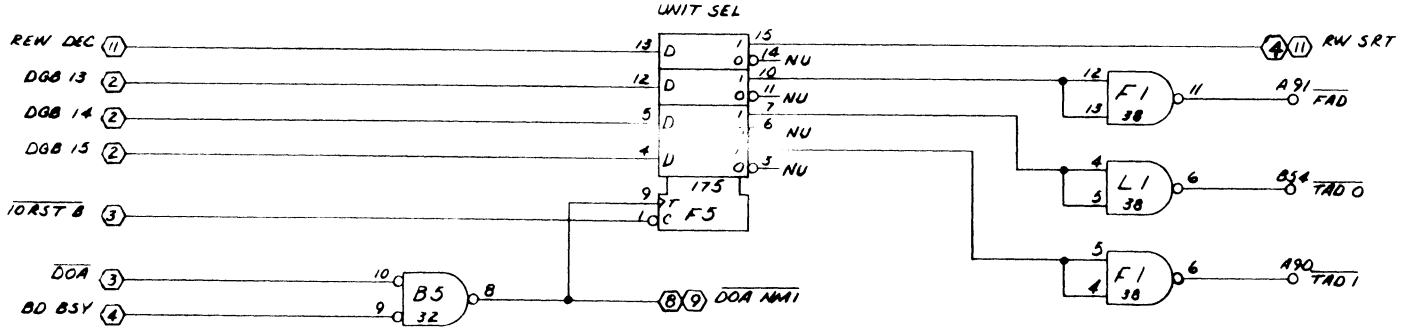

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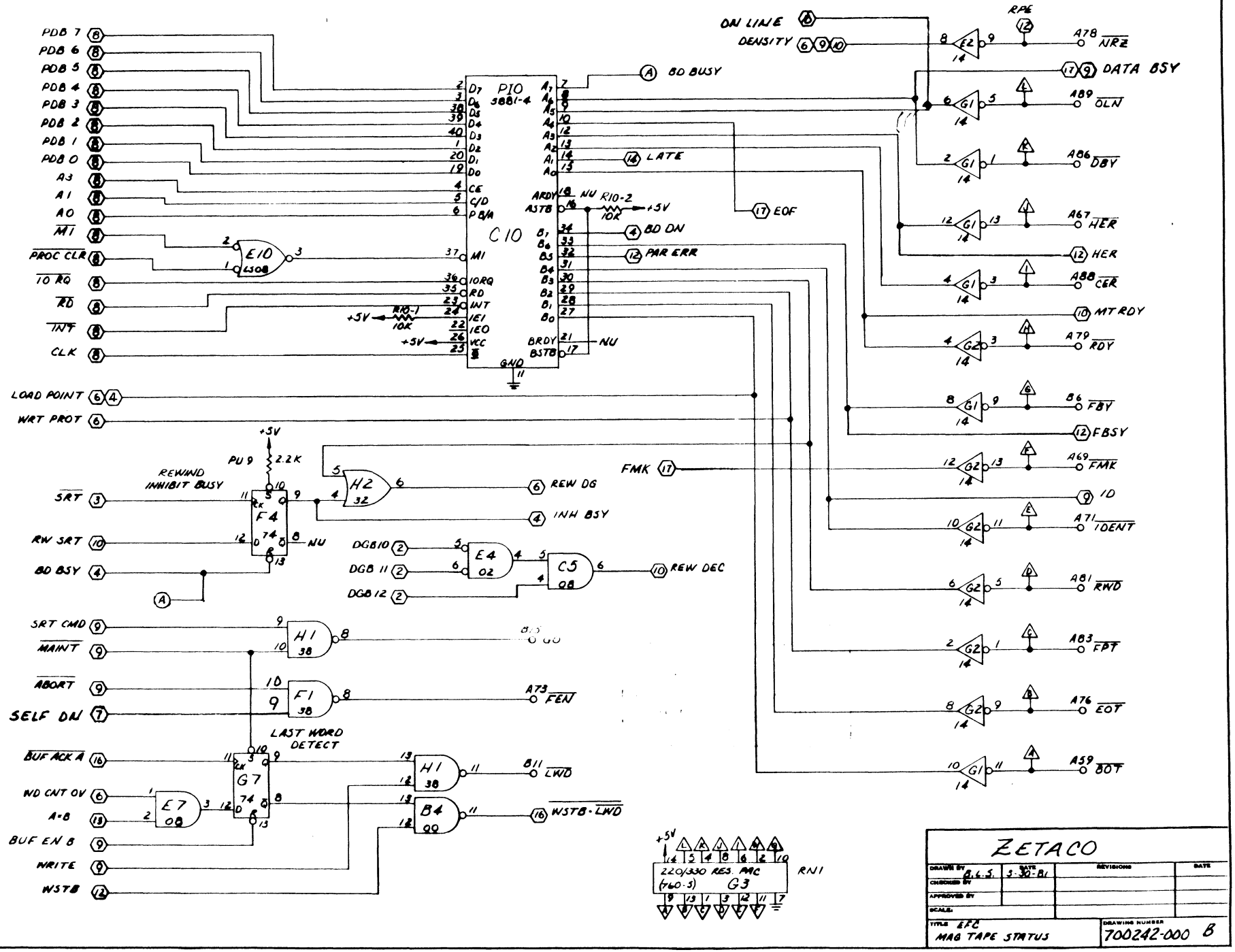
SCALE:			

TITLE EFC
FUNC/STATUS REG (CONT)

DRAWING NUMBER 700242-0C3 B



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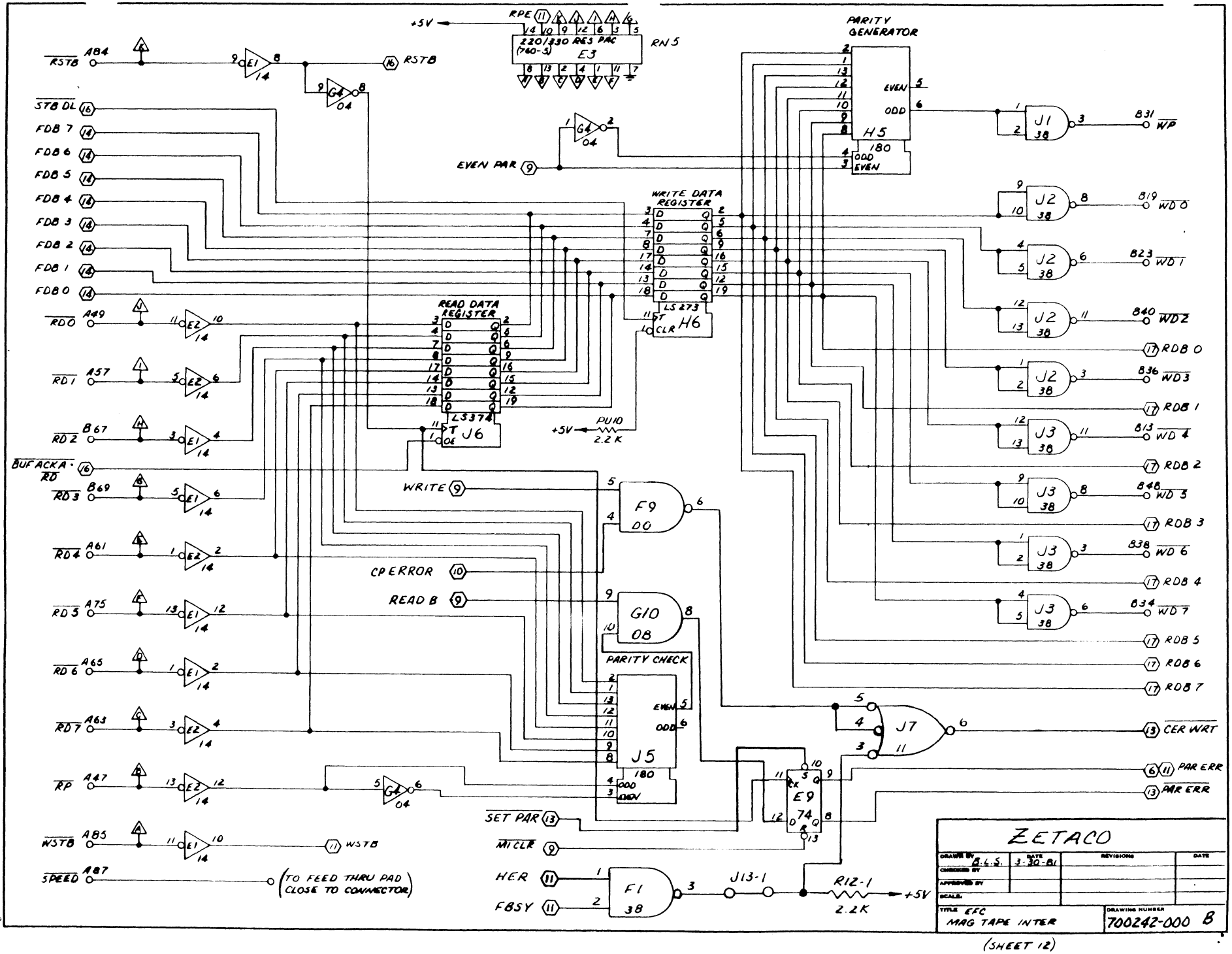

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APPROVED BY			
SCALE			
TITLE EFC MAG TAPE INTER		DRAWING NUMBER 700242-000	B

(SHEET 12)

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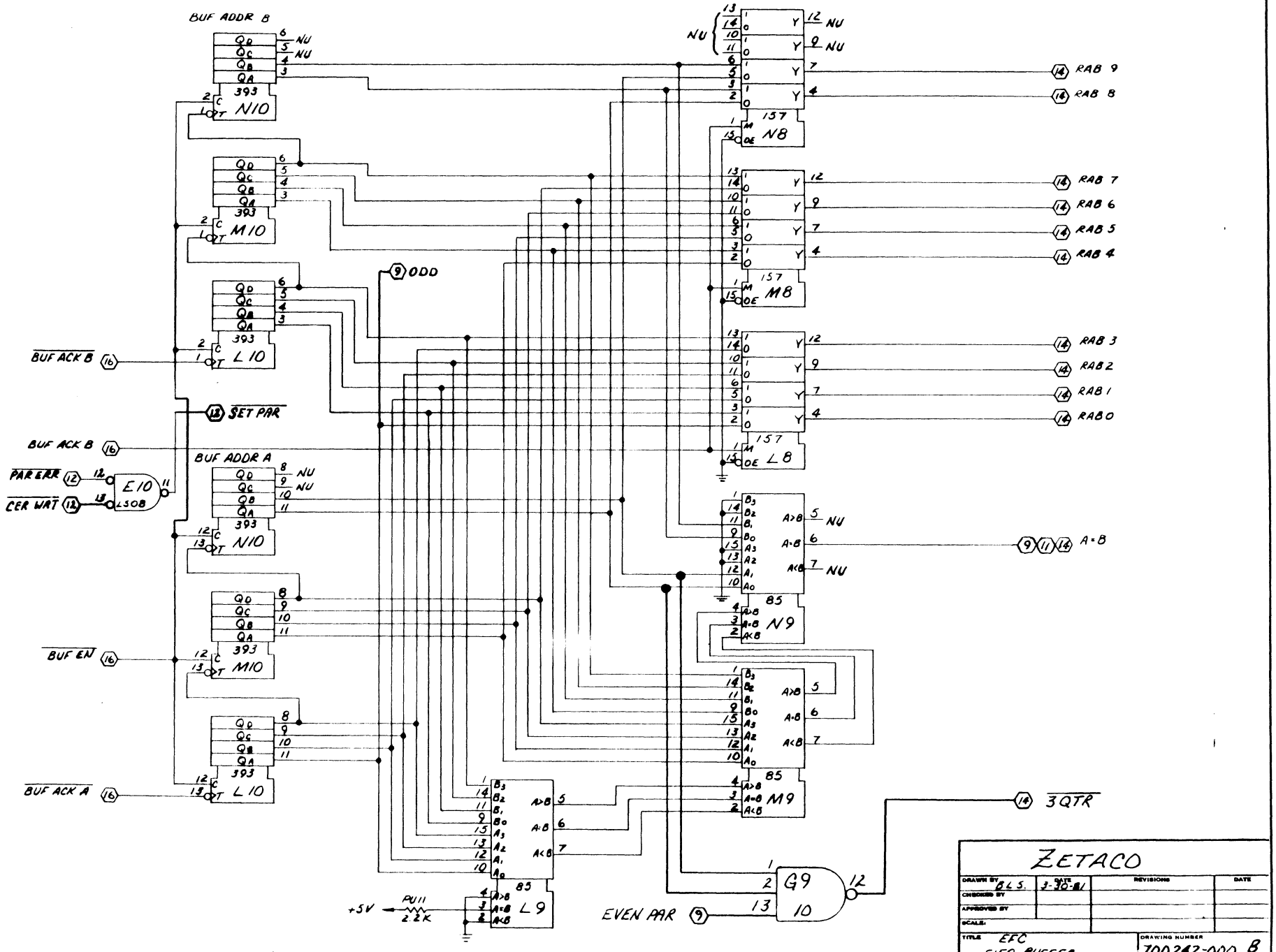

ZETACO

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SCALE:			

TITLE: EEC FIFO BUFFER

DRAWING NUMBER: 700242-000 B

(SHEET 13)

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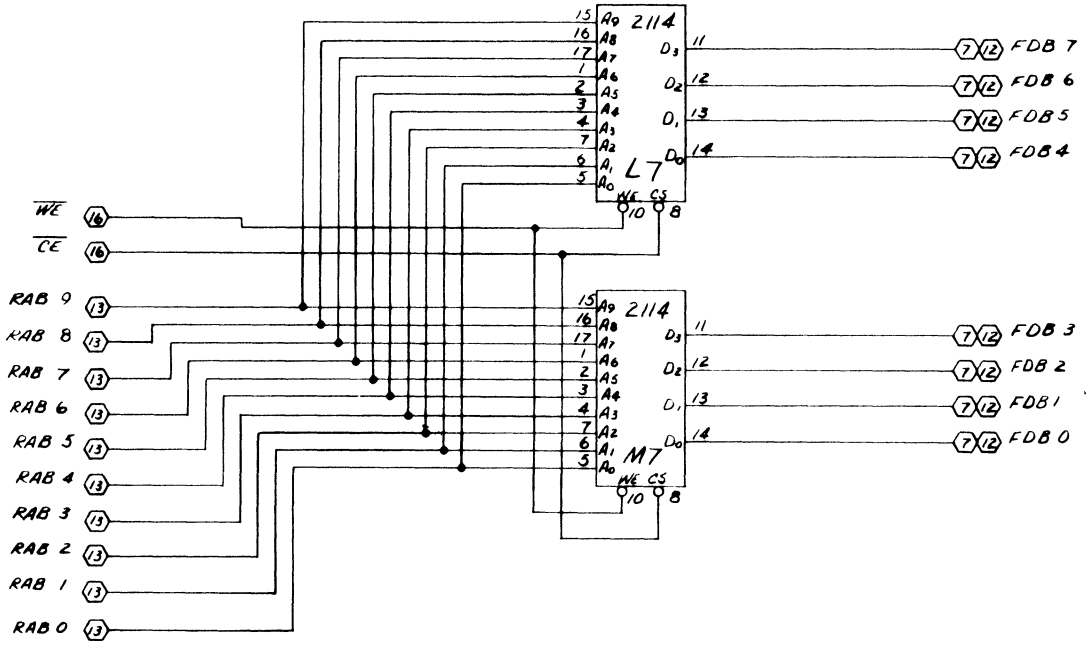

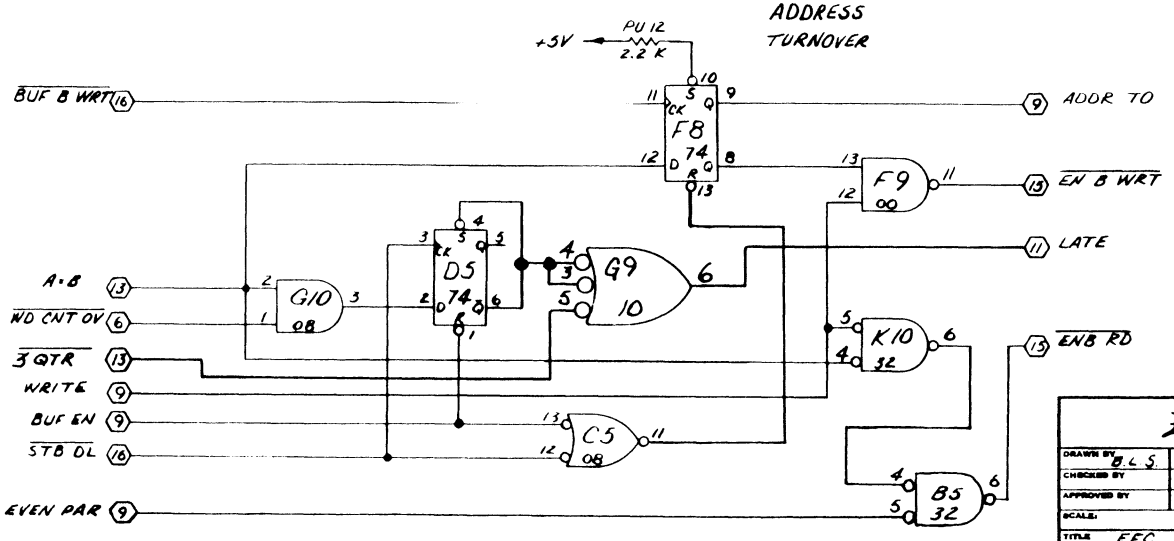

ZETACO

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D.L.S.	3-10-81		
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SCALE:			

TITLE: EFC FIFO BUFFER (CONT)

DRAWING NUMBER: 700242-000 B

(SHEET 14)

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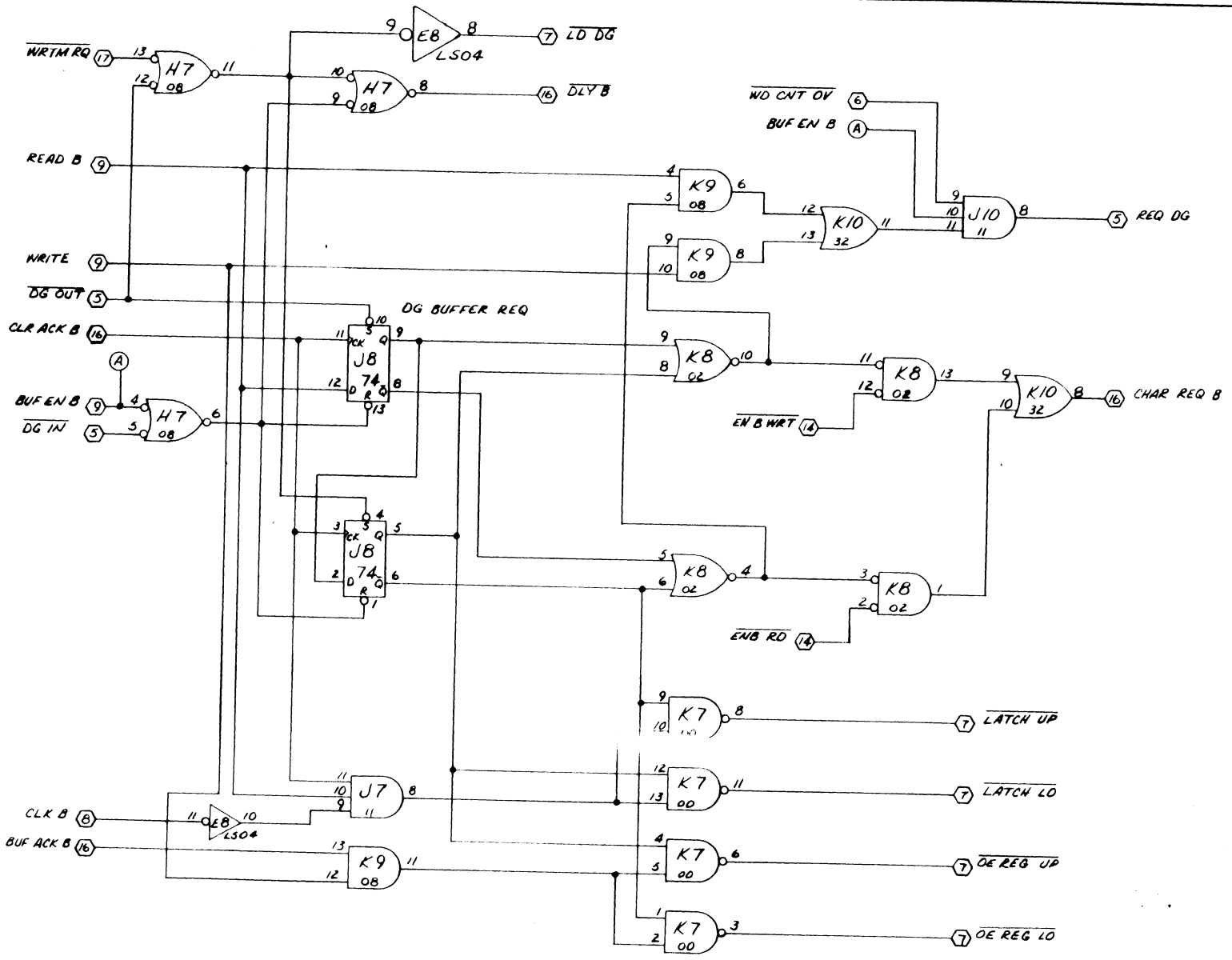

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SCALE:			

TITLE EFC
BUFFER CONTROL

DRAWING NUMBER 700242-000 B

(SHEET 15)

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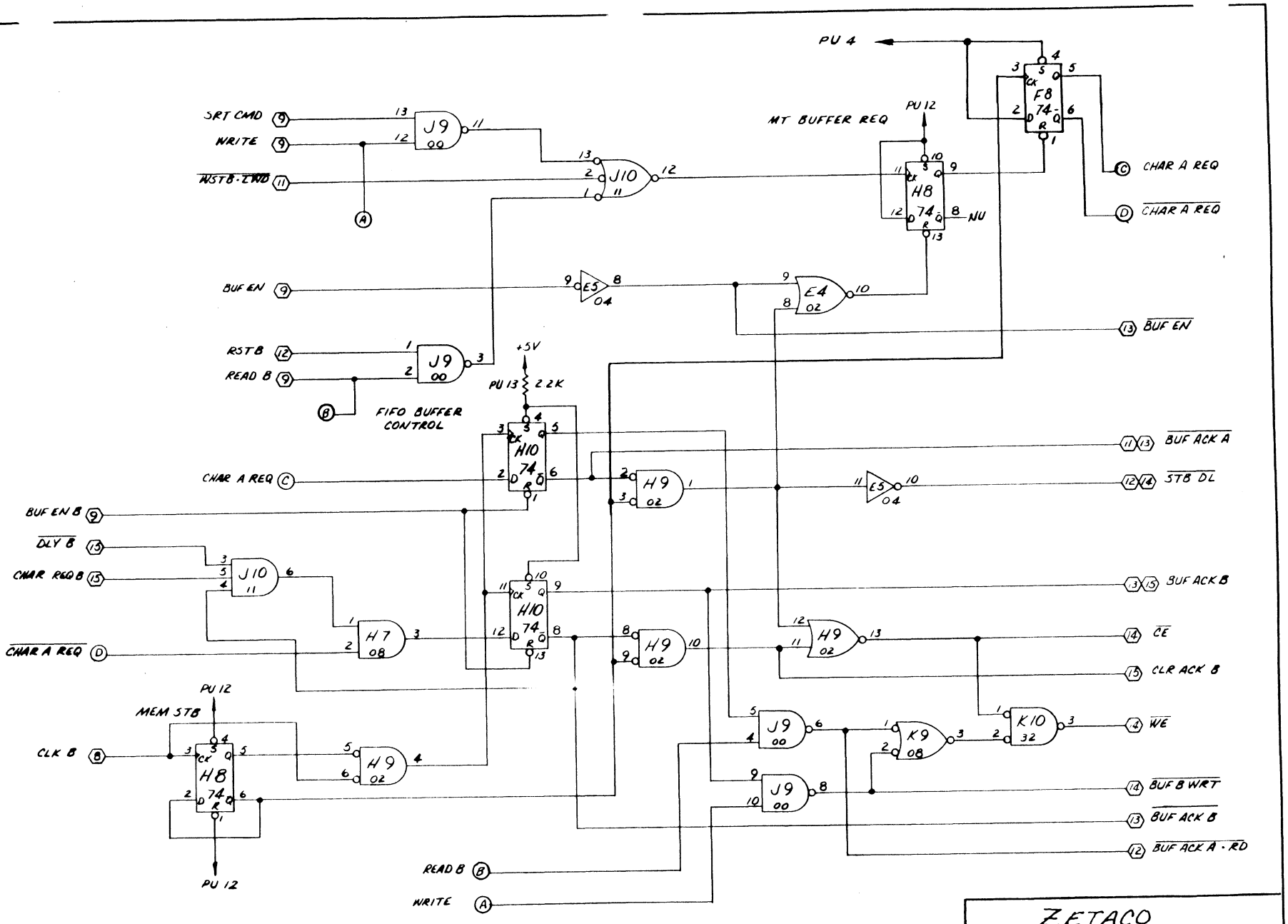

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SCALE:			

TITLE EFC BUFFER CONTROL (CONT.)

DRAWING NUMBER 700242-000 B

(SHEET 16)

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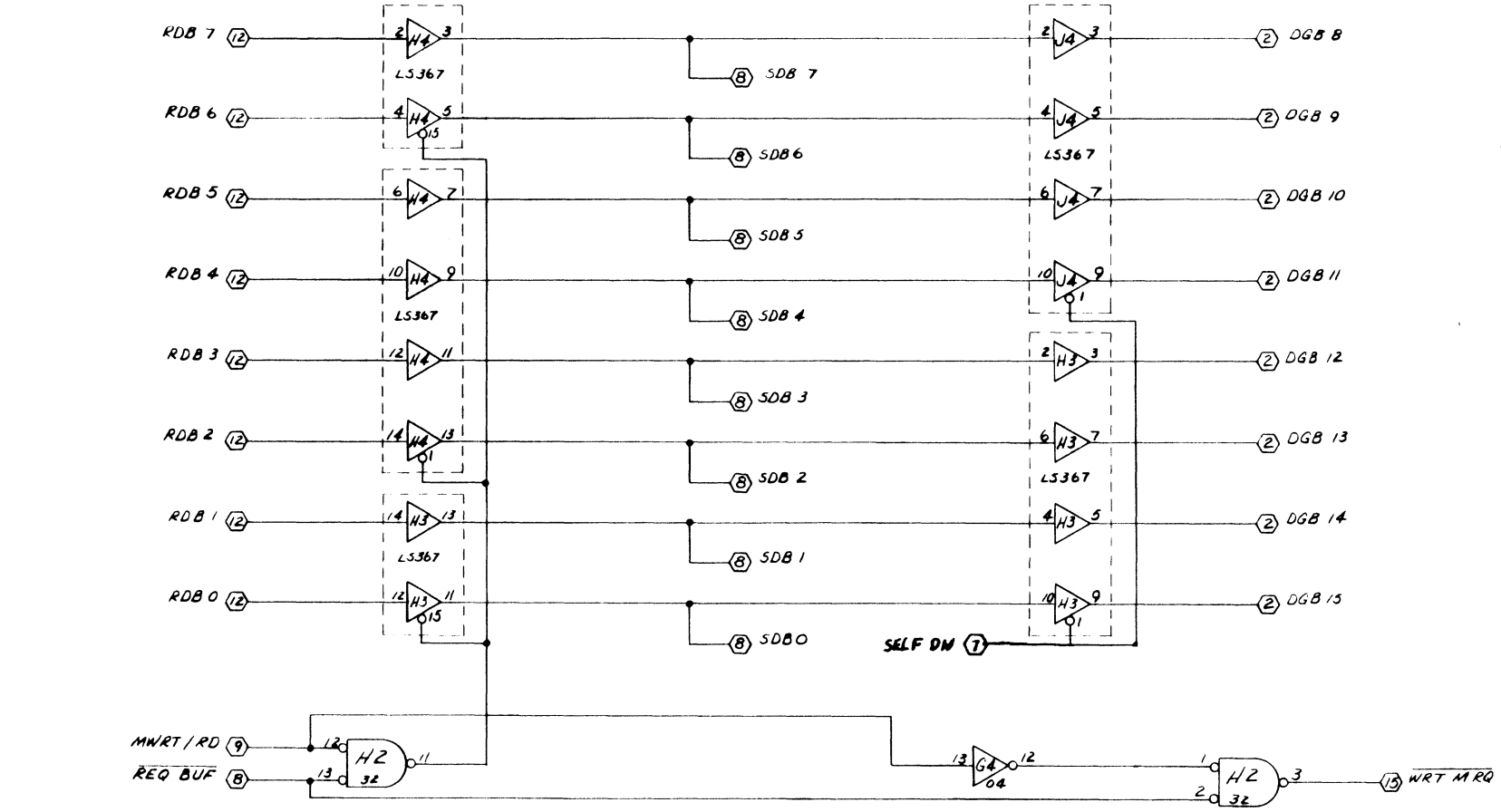

ZETACO

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B.L.S				3-30-81		

TITLE EFC BUFFER MAINT

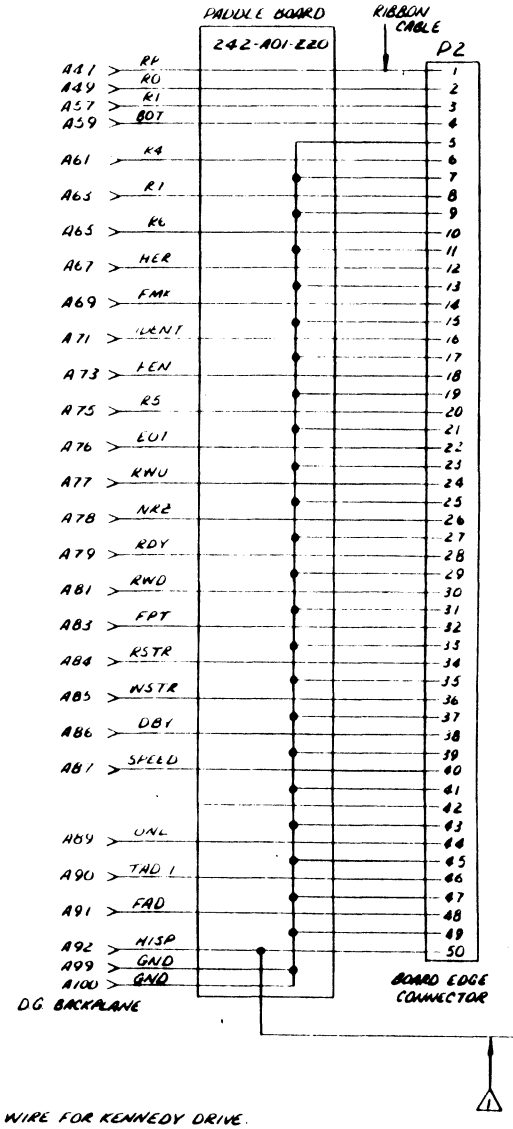
DRAWING NUMBER 700242-000 B

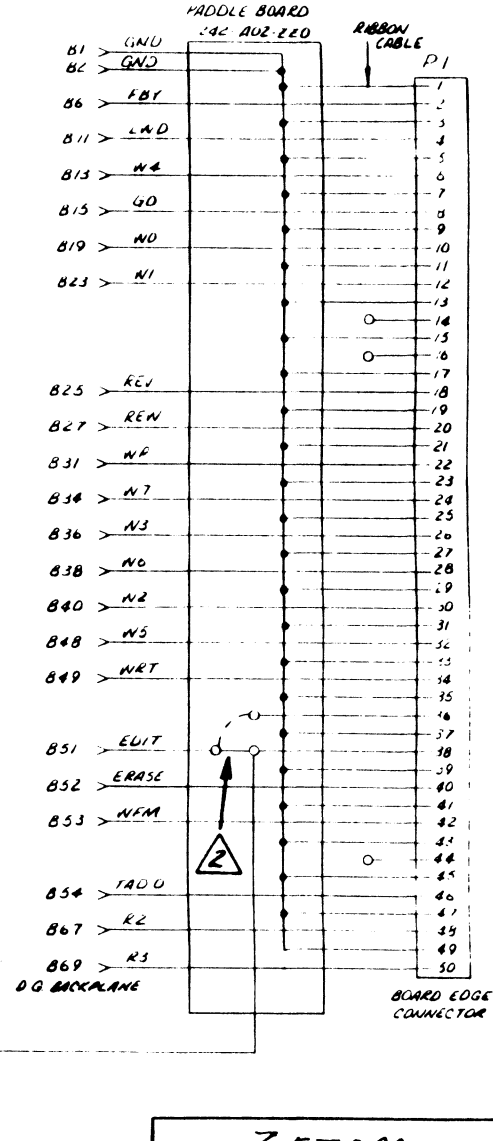
B CONNECTOR

EVEN		ODD	
2	GND	GND	1
4	+5V	+5V	3
6	FBY		5
8			7
10			9
12		LWD	11
14		W4	13
16		GO	15
18		DCH M0	17
20		W0	19
22		DCH M1	21
24		W1	23
26		REV	25
28		REW	27
30		INTR	29
32		WP	31
34	W7	DCH0	33
36	W3	DCHE	35
38	W6	DCH1	37
40	W2	OVFLO	39
42		RDENB	41
44			43
46	+V INH		45
48	W5		47
50	GND	WRT	49
52	ERASE	EDIT	51
54	TAD 0	WFM	53
56	DATA 14	DATA 7	55
58	DATA 11	DATA 3	57
60	DATA 8	DATA 12	59
62	DATA 0	DATA 4	61
64	DATA 13	DATA 9	63
66	DATA 15	DATA 1	65
68		R2	67
70		R3	69
72			71
74		DATA 3	73
76		DATA 10	75
78			77
80			79
82	DATA 2	5V	81
84	-V INH		83
86			85
88			87
90		GND	89
92	GND		91
94			93
96		DATA 6	95
98	+5V	+5V	97
100	GND	GND	99

A CONNECTOR

EVEN		ODD	
2	GND	GND	1
4	+5V	+5V	3
6	-5V		5
8	+V INH		7
10			9
12			11
14			13
16			15
18			17
20			19
22			21
24			23
26			25
28			27
30			29
32			31
34	GND	GND	33
36			35
38	MSRO		37
40	INTA		39
42	DATIB		41
44	DATIA		43
46	DSB		45
48	DATOC	RP	47
50	CLR	R0	49
52	START		51
54	DATIC		53
56	DATOB		55
58	DATOA	R1	57
60	DCHA	BOT	59
62	DS 4	R4	61
64	DS 3	R7	63
66	DS 2	R6	65
68	DS 1	HER	67
70	IORST	FMK	69
72	DSO	IDENT	71
74	IOPLS	FEN	73
76	EOT	R5	75
78	NRZ	RWU	77
80	SELD	RDY	79
82	SELB	RWD	81
84	RSTR	FPT	83
86	DBY	WSTR	85
88	CER	SHELD	87
90	TAD 1	ONL	89
92	MISP	FAD	91
94	DCHP IN	DCHP OUT	93
96	INTP IN	INTP OUT	95
98	+5V	+5V	97
100	GND	GND	99





NOTES:

1. OPTIONAL WIRE FOR KENNEDY DRIVE.
2. CUT JUMPER FOR CDC GCR DRIVE

ZETACO			
DRAWN BY: R. L. S	DATE: 3 30 81	REVISIONS	DATE
CHECKED BY:			
APPROVED BY:			
SCALE:			
TITLE: EFC CABLE DIAGRAM		DRAWING NUMBER: 700242-000 B	

(SHEET 1 OF 8)

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