CUSTOM SYSTEMS, INC.

MAGNETIC TAPE
COUPLER 130

REVISION HISTORY		
ECO	DATE	DESCRIPTION
0060	9/17/83	Add P/N & Rev. History
0196	10/5/83	Release New Manual

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1.1 FEATURES

1.0 INTRODUCTION

The Custom Systems' 130 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.

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

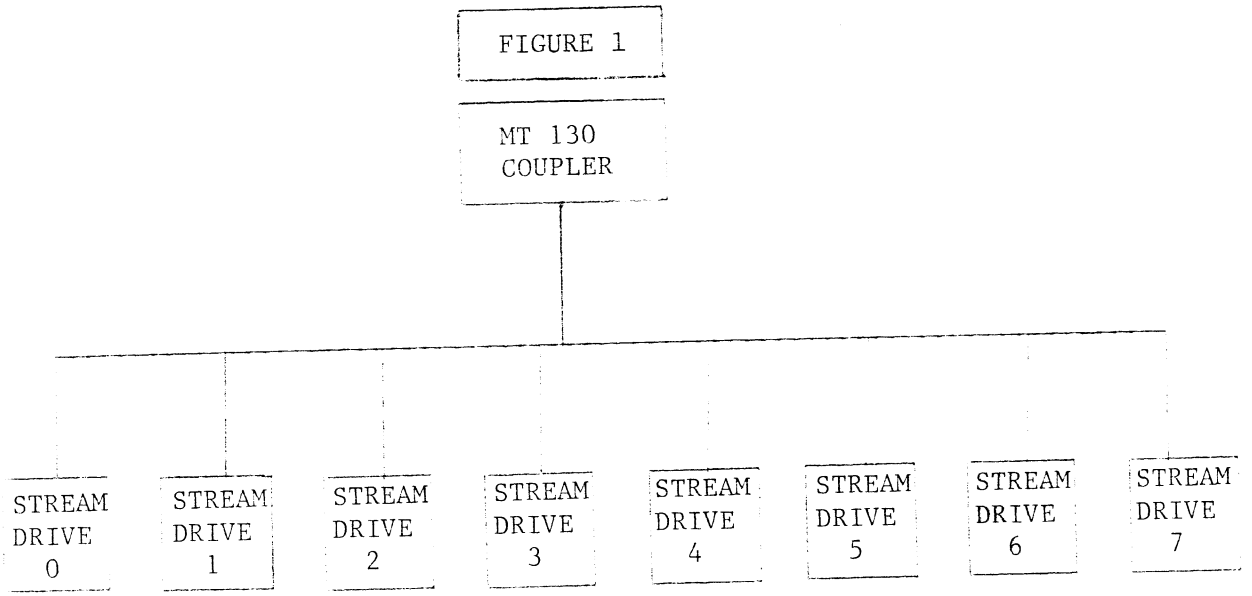
Operating Temp: 0 to 55 degrees C

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

DIAGRAM 2.1

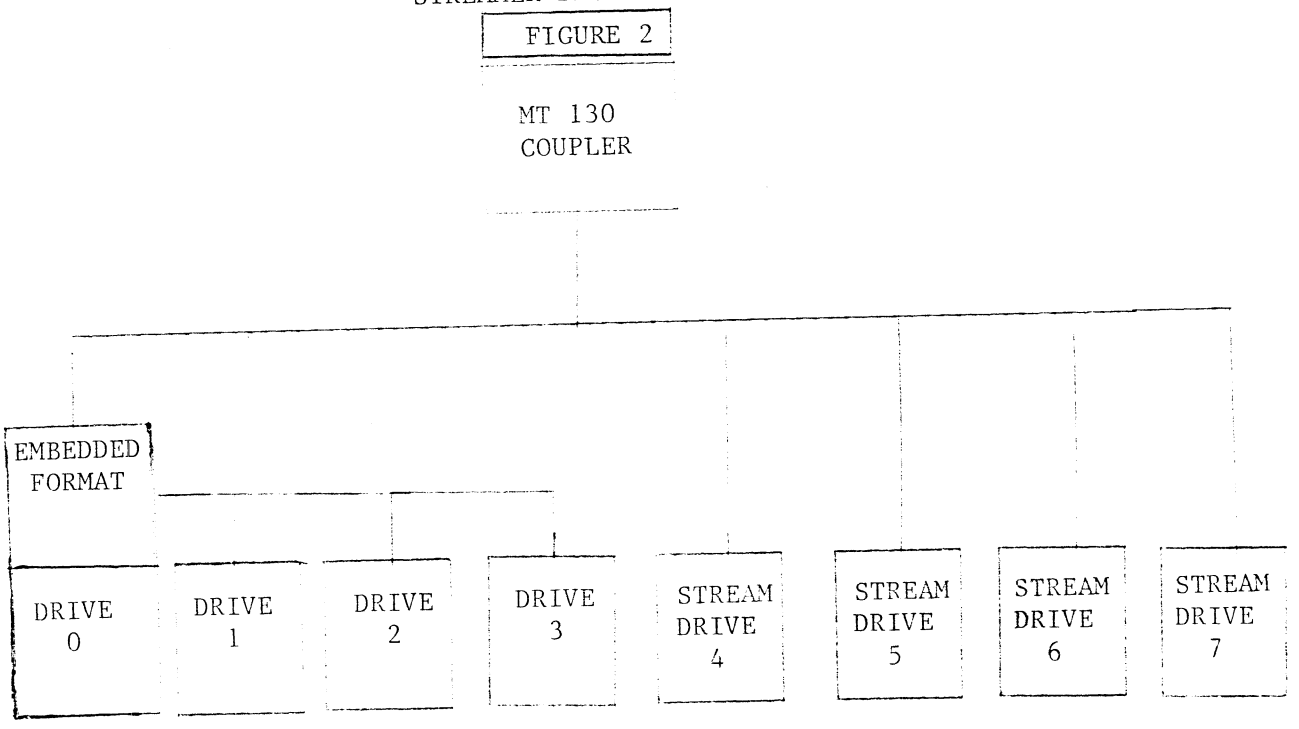
DAISY CHAINING

FIGURE 1



STREAMER DRIVES ONLY

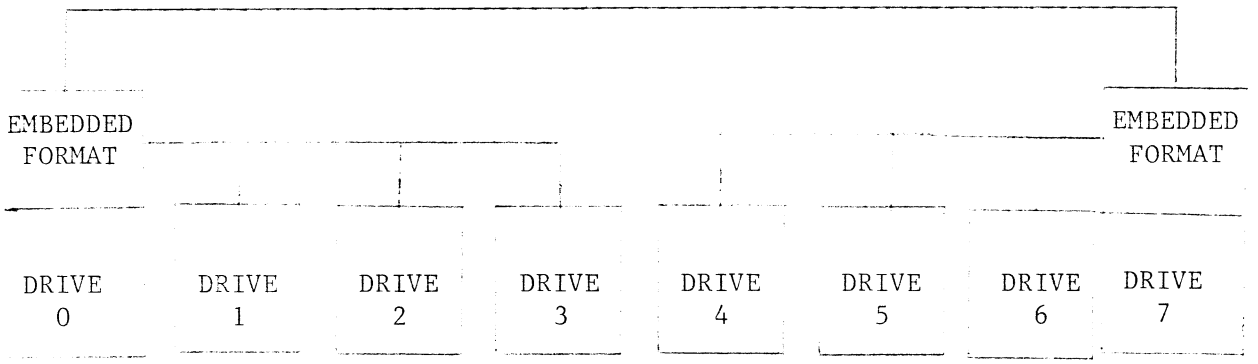
FIGURE 2



EMBEDDED FORMATTER AND STREAMER DRIVES

DIAGRAM 2.1 (continued) DAISY CHAINING

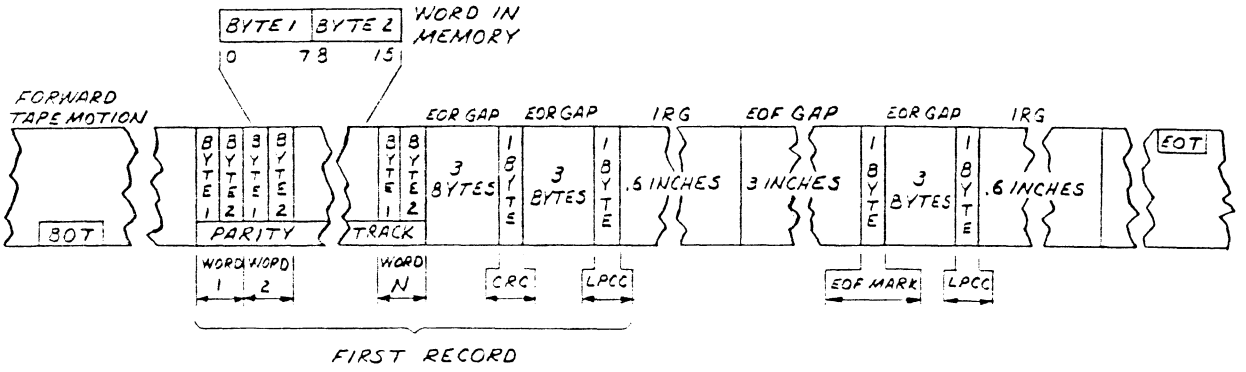
FIGURE 3



TWO EMBEDDED FORMATTERS

Example Tape Formats

Phase Encoded (PE)



Non-Return To Zero (NRZ)

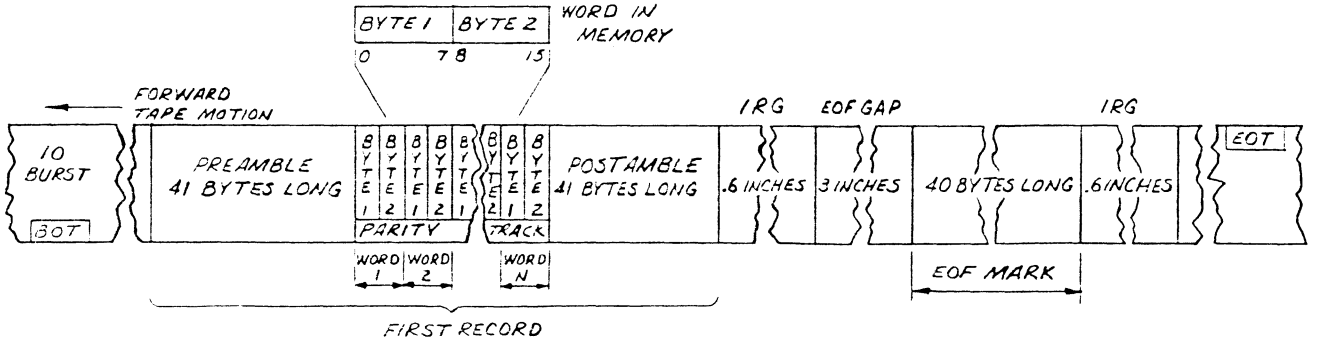


Figure 4

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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3.5 CABLING (MINICOMPUTER BACKPLANE TO TAPE DRIVES FORMATTER BOARD)

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.

3.1 UNPACKING AND INSPECTION

All parts comprising the Model 130 are shipped in one container consisting of:

a) Controller

b) Controller to Tape Drive Cabling

c) Diagnostic Software

d) Technical Manual

On receipt of the Model 130 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 130

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 130 (6021 Emulation) and a 130A (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 as 130.

3.2.2 6125 EMULATION (MV SERIES COMPUTERS REQUIRES 6125 EMULATION)

The 6125 Emulation is used by AOS/VS and can be used by AOS (both are referenced to as MTC). RDOS does not support the 6125 Emulation. Section 8.1 refers to 6125 Emulation as a 130A. 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).

3.2.3 JUMPER TABLE

Refer to Diagram 3.0.

The following jumpers are used to configure the 130 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
	J4	Factory use Only
Read Look Ahead	J5 (IN)	= Read Look Ahead Enabled (STD)
	J5 (OUT)	= Read Look Ahead Disabled

Streamer Drives should have Read Look Ahead enabled for optimum performance. For vacuum drives disable.

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)
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.

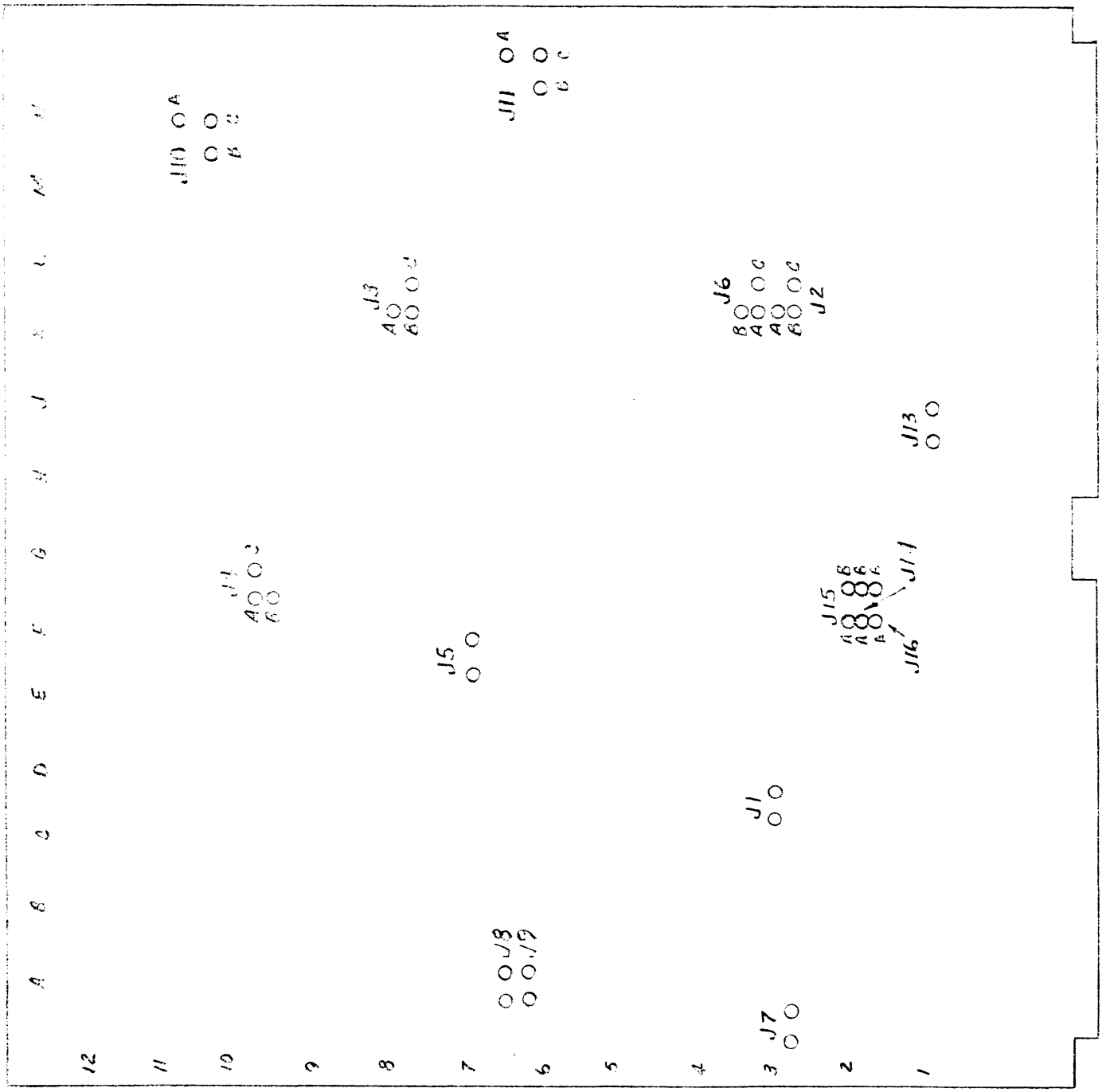


DIAGRAM 3.3

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).

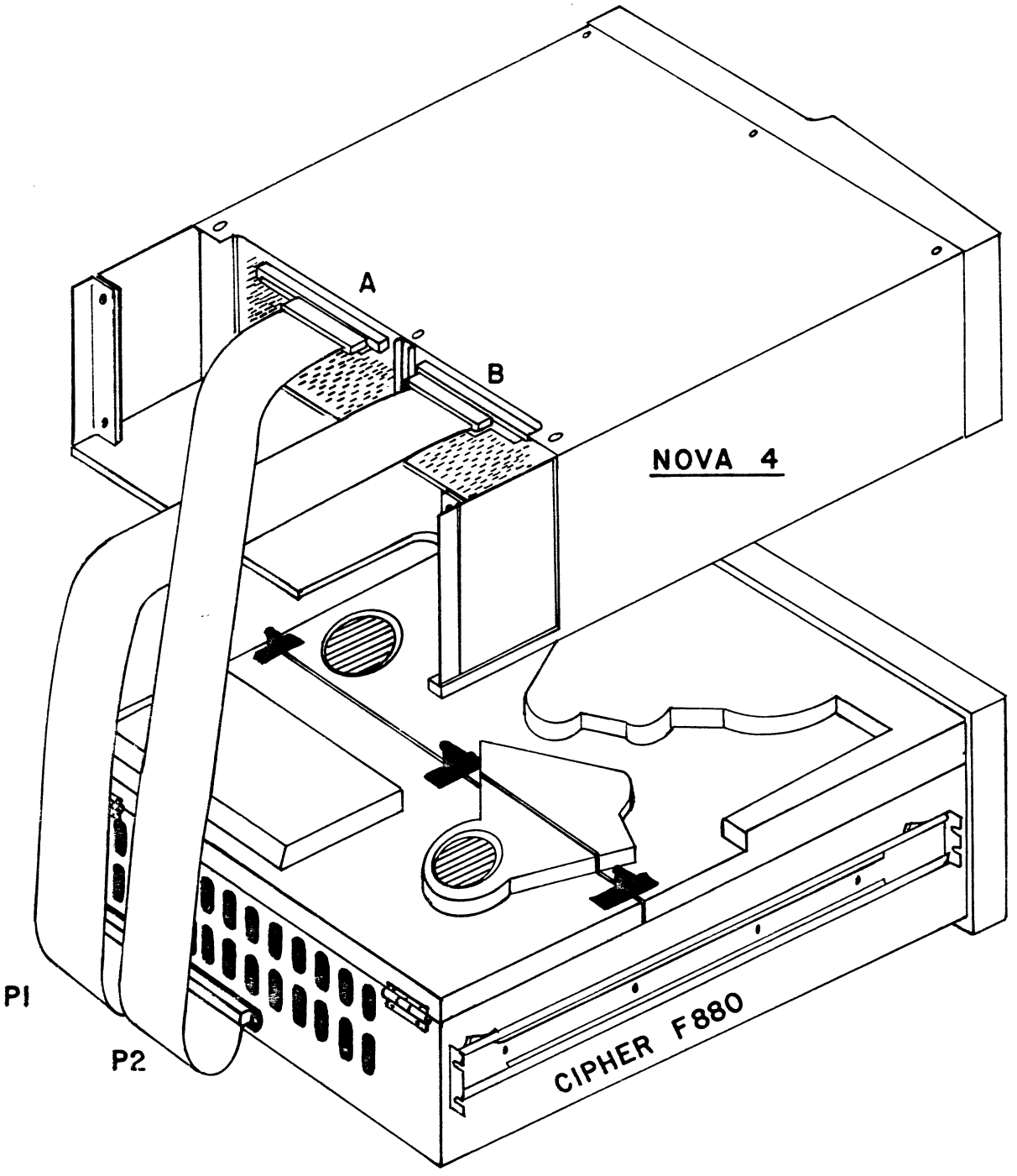
3.5 CABLING (MINICOMPUTER BACKPLANE TO TAPE DRIVES FORMATTER BOARD)

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 (B)	J5 (A)
CDC Streamer	J5	J4
Pertec	P5	P4



CABLE CONNECTION EXAMPLE

DIAGRAM 3.1

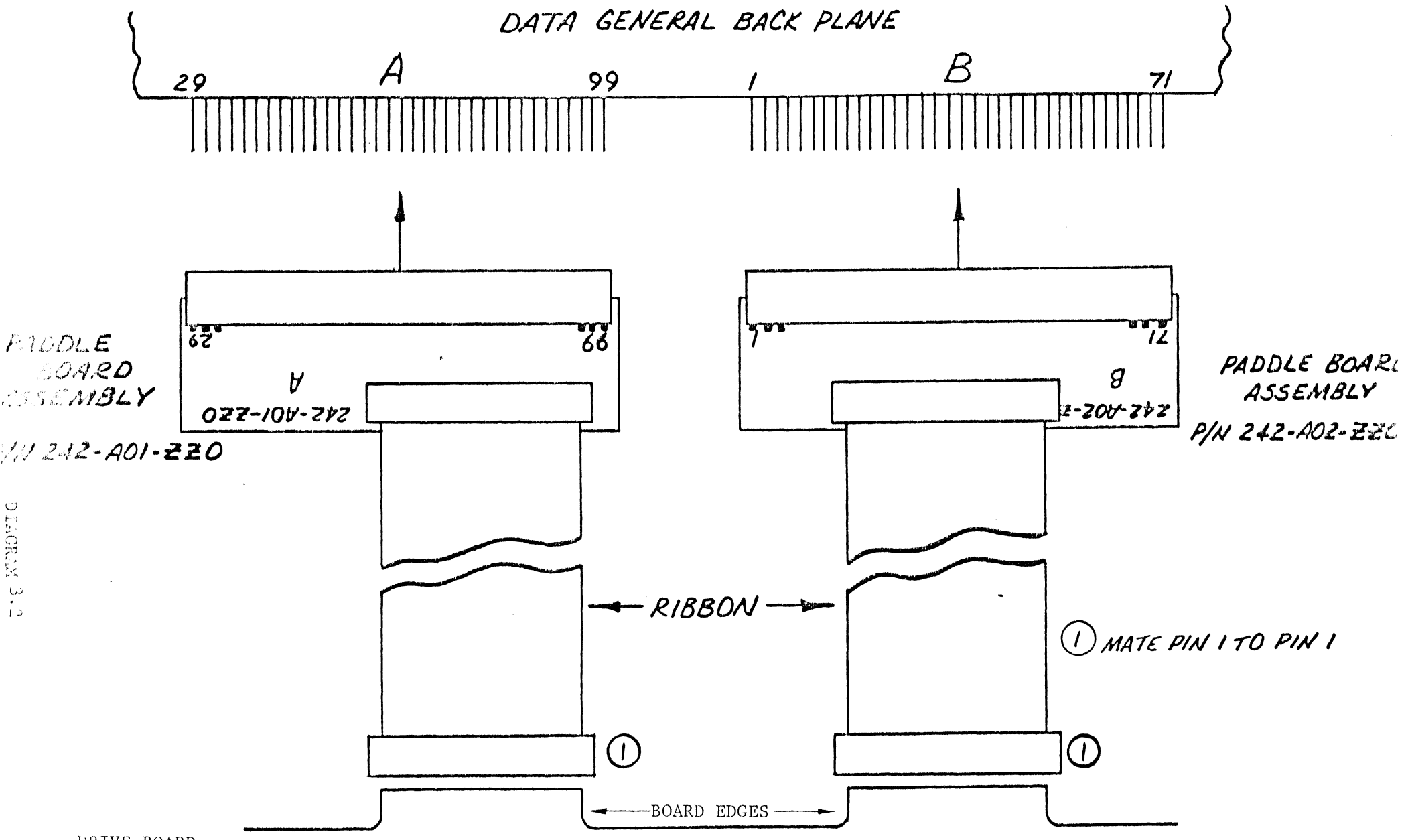


DIAGRAM 3.2

DRIVE BOARD EDGE END		FORMATTER BOARD
Cipher Streamer	P2	P1
* Cipher Formatter	P5	P4
Kennedy Streamer	P2	P1
Kennedy Formatter	J1 (B)	J5 (A)
CDC Streamer	J5	J4
Pertec	P5	P4

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

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4.2 DIAGNOSTICS

4.3 RELIABILITY

4.4 UTILITY PROGRAMS

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         MT130 Coupler Diag
  3         Universal Mag Tape Reliability
  4         Tapemode (Stand-Alone)
  5         **Dump** of Files for Streaming Modes,
              Normal Modes and Files 2 thru 4

File #(CR):
```

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 :
DELETE/V MT130D.- UMTR.- TAPEMODE.- LNG.-
  LDG75.- HNG.- HDG75.- HMG90.-
X RDOS LOAD/V @MTA0:5 +.SV +.PR +.CLI/C +.TX/C
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 (MT130D) from tape M242 or disk. You should see the following:

```
-            MT130D  -  REVISION N
-   130/130A Tape Coupler Diagnostics
-   Custom Systems, Incorporated

-   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.
- (130 = 0 or 130A = 1):

If you have a Model 130 (6021 emulation), enter 0.

If you have a Model 130A (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 or 62):

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 Reliablity 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
- Custom Systems, Incorporated

- 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, 130=3, 130A=4):

C. You should enter 3 if the Coupler is a 130 (6021 emulation), or 4 if it is a 130A (6125 emulation). All the drives being tested must be at the same device code.

- Enter device code (22 or 62):

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

RMA INFORMATION

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
2	Done/Busy Test	Done did not set or busy done were not cleared on power up	4
3	Word Count Overflow Test	Word count overflow flip-flop did not set when expected (should set after 65536 counts)	6
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
6	Illegal Flag Test	Illegal status bit did not set or it was not detected as being set (ISTAT)	9
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 completes.

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 130D 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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6.9 DATA CHANNEL OPERATION (RESULTING FROM A READ OR WRITE COMMAND)

6.0 PROGRAMMING NOTES

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

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	1	AC			OP CODE		FUNC		DEVICE CODE (MTA)					

INTERRUPT MASK BIT = 10

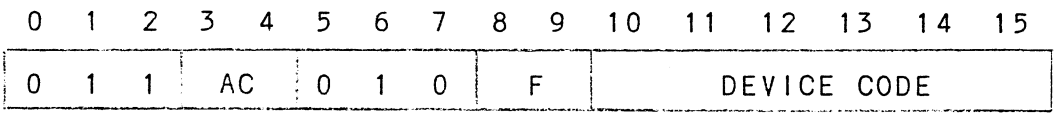
6.1.1 SKIP INSTRUCTIONS

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.

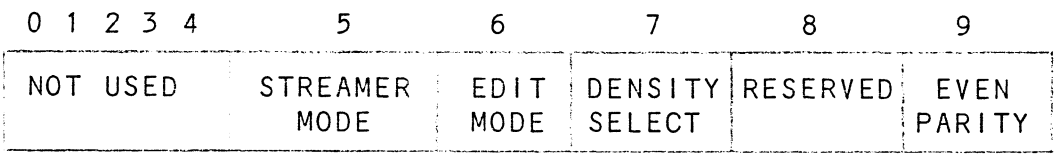
SKPBZ MTA - SKIP IF BUSY FLIP-FLOP IS CLEAR.
SKPBN MTA - SKIP IF BUSY FLIP-FLOP IS SET.
SKPDZ MTA - SKIP IF DONE FLIP-FLOP IS CLEAR.
SKPDN MTA - SKIP IF DONE FLIP-FLOP IS SET.

6.2 DOA - SEND COMMAND

DOAF AC,MTA



AC



UNIT SELECT: USED TO SELECT ONE OF A POSSIBLE EIGHT TAPE DRIVES

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) - 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

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

AC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	CONTENTS OF SELECTED ACCUMULATOR														

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

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

AC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EXT. REC. LENGTH OPT.					CONTENTS OF SELECTED ACCUMULATOR										

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

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

AC

0	1	2	3	4	5	6	7
ERROR FLAG	DATA LATE	RE-WINDING	IL-LEGAL	DENSI-TY	PARITY ERROR	END OF TAPE	FILE MARK

8	9	10	11	12	13	14	15
LOAD POINT	9 TRK	BAD TAPE	ID STATUS	CORRECT-ED ERROR	WRITE LOCK	ODD REC READ	UNIT READY

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														

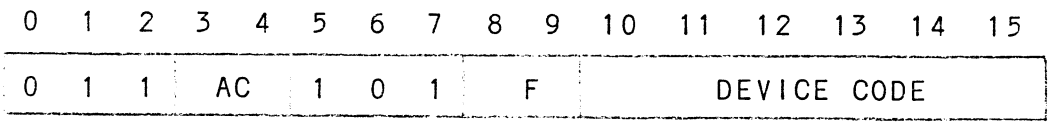
The seleted accumulator will contain the current contents of the address counter after the execution of this instruction.

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.

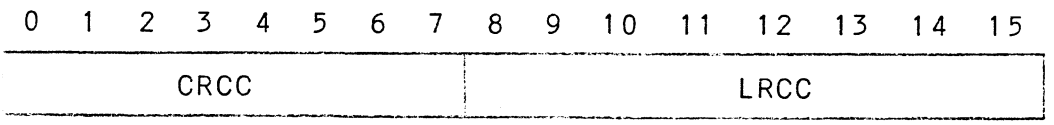
SPACING FORWARD/REVERSE - The address counter becomes a record counter on a space forward or reverse command. The difference between the contents of the counter before and after the space command will indicate the number of records spaced over.

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 130, 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

7.1 RE-INSTRUCT TABLE

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 SYSTEM GUIDELINES

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8.2.1 RDOS EXECUTABLE UTILITIES

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8.2.3 STAND-ALONE UTILITIES

8.2.4 OTHER OPERATION SYSTEMS

8.3 USER-WRITTEN PROGRAMS

8.4 PERFORMANCE CHART

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 130 or as a 130A. The situation is as follows:

RDOS Sysgen - CSI Tape Coupler 130 is MTX.
CSI Tape Coupler 130A is not supported.

AOS Sysgen - CSI Tape Coupler 130 is MTA.
CSI Tape Coupler 130A is MTC.

AOS/VS Sysgen - CSI Tape Coupler 130 is not supported.
CSI Tape Coupler 130A is MTC.

Other - CSI Tape Coupler 130 should be the same as the emulation 6021.

- CSI Tape Coupler 130A 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 or Start/Stop drives, 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 MT130 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

```
;
;
;*****************************************************************
;
;
 DESCRIPTION: MT130 TAPE COUPLER  DIAGNOSTIC
;
;
; CUSTOM SYSTEMS INC, 1983
;*****************************************************************
        .TITL   MT130D
        .DUSR   X=1
        .NOMAC  X
        .TXTM   1
;1.      PROGRAM NAME: MT130D.SR
;2.      REVISION HISTORY:
;
;                REV.      DATE
                          05/24/81
;                01        05/27/81        DISK BOOTABLE
;                02        12/10/81        ALLOW FOR STATUS OF OTHER
;                                          DRIVES
;                03        03/25/82        KSS
;                04        06/20/83        GET RID OF AUTO INC STUFF
;        (CSTL.) 05.00     06/83           -UPGRADE TO USE DTOS REV 6.
;                                          SOME TESTS RUN DIFFERENTLY.
;                                          (BUILT FROM MT110D PROGRAM)
;                                          -ID BURST NO LONGER REQUIRED
;                                          ON PE NOR EXCLUDED ON NON-PE.
;                                          -MODS FOR 6125 EMULATION(130A):
                                           BIT 11 (ID BURST) MUST = 0
;                                          DOB/DIB (TEST A4) USES ALL 16
;                                                  BITS.
;                06         9/83           ----------------------------
;                                          INCLUDE TEST NUMBER AND SUBTEST
;                                           CHARACTER FOR ALL TESTS.  USED
;                                           TO DISPLAY CURRENT TEST NUMBER
;                                           AND TO SUGGEST INSTALLATIONAL
;                                           OR OPERATIONAL CAUSES FOR SOME
;                                           ERRORS. (SEE RTN SUGJEST.)
;                                          FIXED BUGS:
;                                          - WAIT EXPECTS THE IN-LINE PARM
;                                            TO BE DIRECT NOT INDIRECT.
;                                          - MODIFY ALL .NTA INSTRUCTIONS
;                                            WAS NOT DOING SO TO THE LAST
;                                            FEW INSTRUCTIONS.
;                                          - SOFT SW 1 ON SHOULD NOT FORCE
;                                            ERROR DISPLAY ON EACH ROUND.
;
;                                          - REVIZED CAL?B (IN DLIB) TO
;                                            ALLOW FOR ANY OF 3 CLOCKS:
;                                            CLOCK 1,2 OR 3.  THIS PROGRAM
;                                            USING CLOCK 1 (10 HERTZ).
;                                          - MOVED MOST DATA TO END OF
;                                            LISTING SO THAT THE MODIFY
                                             DEVICE CODE ROUTINE NOT DOING
                                             STUFF TO DATA FIELDS.
;3.      MACHINE REQUIREMENTS
;        3.1      NOVA OR ECLIPSE FAMILY CPUS.


;        3.[illegible]      TELETYPE OR CRT AND CONTROLLER.
```

4. TEST REQUIREMENTS
N/A

5. SUMMARY
THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE CSI MODEL 130 OR 130A TAPE CONTROLLER. THE DEVICE CODE CAN BE SELECTED AS 22 OR 62. ONLY ONE READY, WRITE ENABLED DRIVE CAN BE ON LINE AT A TIME.

6. RESTRICTIONS

ONLY ONE(1) DRIVE CAN BE ONLINE AT ANY TIME. THE DEVICE CODE MUST BE SELECTED AS 22 OR 62. ALL RESPONSES TO PROGRAM REQUESTS MUST BE ANSWERED PROPERLY TO CONTINUE THE SEQUENTIAL TESTING OF THE TAPE DRIVE.

7. PROGRAM DESCRIPTION/THEORY OF OPERATION

7.1 INITIALIZATION
- 7.1.1 I/O MODULE INITIALIZED
- 7.1.2 TEST SELD LINE SET, IF LINE SET IRRECOVERABLE ERROR. PROGRAM HALTS AT SHALT.
  1. SELECT UNIT NUMBER
  2. DEVICE CODE CHANGE
  3. SET SOFT SWITCH REGISTER

7.2 PRELIMINARY TESTS
- 7.2.1 TEST A1 - TEST SYSTEM SELD LINE.
- 7.2.2 TESTS A2 AND A3 - TEST CONTROLLER BUSY AND DONE STATUS.
- 7.2.3 TESTS A4 THRU A8 - TEST FOR UNIT SELECT BY LOADING AND TESTING THE MEMORY ADDRESS REGISTER.
- 7.2.4 TESTS A9 THRU A14 - TEST FOR SETTING AND RESETTING OF BUSY AND DONE BY START COMMAND.

7.3 FIRST TAPE MOTION
- 7.3.1 TESTS A15 AND A16 - TEST REWIND AND ERASE OPERATION AND STATUS.

7.4 FIRST DATA TRANSFER
- 7.4.4 TESTS A20 AND A21 - TEST FOR TOTAL DATA DATA WRITE WITH INTERRUPT.
- 7.4.5 TEST A22 - TEST WRITE ODD PARITY.

7.5 STATUS BIT TESTS
- 7.5.1 TEST A24 AND A25 - TEST FOR ILLEGAL COMMAND STATUS BIT SETTING.
- 7.5.2 TEST A26 - TEST FOR EOF STATUS BIT SETTING.
- 7.5.4 TESTS A28, A30, A31, A32- TEST STATUS BITS AND MEMORY ADDRESS REGISTER DURING BACK AND FORWARD SPACING.

7.6 DATA TRANSFER TESTS
- 7.6.1 TEST A33 - TEST WRITE AND READ ODD PARITY.
- 7.6.2 TESTS A35 AND A36 - TEST WRITE AND READ WITH DIFFERENT WORD COUNTS.
- 7.6.4 TESTS A39 THRU A41 - TEST EOF WRITE AND READ.
- 7.6.3 TESTS A50 THRU A53 - TEST FOR SPACING ERRORS BY GENERATING NOISE WITH I/O COMMANDS.

7.7 WRITE LOCK TEST
THIS TEST DETERMINES IF WRITE RING OUT

PERFORMED DURING THE FIRST PASS AND CAN BE DELETED BY SETTING SOFT SWITCH REGISTER BIT 15.

8.2 WRITE TO EOT TEST

THIS TEST WRITES 1K BLOCKS FROM BOT TO EOT. DURING THE TAPE WRITE ALL ERROR STATUS CONDITIONS ARE MONITORED. WHEN THE EOT SENSOR IS DETECTED THE WRITE OPERATION IS TERMINATED AND THE TAPE IS COMMANDED TO REWIND. IF THE EOT SENSOR IS NOT DETECTED THE WRITE WILL CONTINUE UNTIL THE TAPE COMES OFF THE SUPPLY REEL. THIS TEST CAN BE DELETED BY SETTING SOFT SWITCH REGISTER BIT 14.

9. SOFT SWITCH REGISTER SETTINGS

SWREG 0

9.1 SWITCH OPTIONS

DIFFERENT SWITCH BITS AND THEIR INTERPRETATION AT LOCATION "SWREG" ARE AS FOLLOWS:

BIT	OCTAL VALUE	BINARY VALUE	INTERPRETATION
14(E)	00000	0	ENABLE WRITE TO EOT TEST
		1	INHIBIT WRITE TO EOT TEST
15(F)	00001	0	ENABLE WRITE LOCK TEST
		1	INHIBIT WRITE LOCK TEST

NOTE: SWITCH BITS 14 AND 15 CAN ONLY BE ENABLED DURING THE FIRST PASS OF THE DIAGNOSTIC. IF THE TESTS ARE TO BE PERFORMED AFTER THE FIRST PASS, THEY CAN BE DIRECTLY ENTERED.

10. OPERATING PROCEDURES

10.1 PROGRAM LOAD

LOAD THE PROGRAM BY USING THE BINARY LOADER.

10.2 STARTING ADDRESSES

200	DIRECT ENTRY TO OCTAL DEBUGGER(ODT)
500	START DIAGNOSTIC
501	DIRECT ENTRY TO WRITE LOCK TEST
502	DIRECT ENTRY TO WRITE TO EOT TEST

10.3 PROGRAM OPERATION

The diagnostic program is provided to find failures that are related to the basic operations of tape control. The diagnostic assumes that the tape media is perfect and not the cause of any error.

You should load the program from release tape #242. Refer to Appendix A for information on program loading. Once the program has loaded the following message will display:

```
-          MT130D Release 5.0
-       Tape Coupler Diagnostic
-       Custom Systems, Incorporated
-
- Please mount a write-enabled error free scratch tape.
- Only the drive you are testing can be on-line.
        Press any key to continue.
```

The tape unit number is requested as follows:

```
- Drive unit #:
```

```
;
;       The next request is:
;
;       - If drive set for NRZ (800 BPI), enter 0; otherwise, enter 1.
;
;       You should enter 0 or 1 in accordance with the recording mode
;                          -----
;       set for the tape drive.
;
;       You must next respond to:
;
;       - If coupler is a standard MT130, enter 0; For MT130A (6125
;       emulation), enter 1.
;
;       The Custom Systems MT130A coupler emulates Data General's 6125
;       tape unit.  It will write record lengths up to 77777(octal) and
;       always returns bits 11 and 12 = 0 on DIA.  Depending on which
;       emulation you are testing, enter 0 or 1.
;                                        -------
;       Next you will need to enter the device code of the tape drive.
;
;       - Enter deivce code (22 or 62)
;                           --------
;       - Set switch register to desired value, then press return to
;                                                          ------
;       continue.
;
;       Refer to the switch options in the MT130D program listing if
;       you wish to set them.
;
;       If you are running the write lock test, the following message
;       will be displayed:
;
;       - Remove write enable ring.  Don't stop the program.
;
;       Respond by dismounting the tape, removing the write ring, and
;       remounting the tape.  The program will automatically continue.
;       Very shortly, the program will display:
;
;       - Put write ring back on tape.
;
;       When the last test has been completed the program displays:
;
;       - CYCLE
;       - PASS 1
;
;       The program will continue indefinitely, although the write lock
;       and the EOT test will only be performed on the first pass.
;
;10.    PROGRAM ERROR DESCRIPTION
;       10.1    PRELIMINARY TEST ERRORS
;               THE FOLLOWING IS A LIST OF PRELIMINARY CON-
;               TROLLER AND DRIVE ERROR MESSAGES.
;               10.1.1  BUSY AND DONE ERRORS
;       "SELD LINE NOT RESET BY IORST, PC = XXXXX"
;       "BUSY FLIP-FLOP NOT RESET ERROR, PC = XXXXX"
;       "BUSY FLIP-FLOP NOT RESET BY IORST, PC = XXXXX"
;       "BUSY FLIP-FLOP NOT SET ERROR, PC = XXXXX"
;       "DONE FLIP-FLOP NOT RESET ERROR, PC = XXXXX"
;       "DONE FLIP-FLOP NOT SET ERROR, PC = XXXXX"
;               10.1.2  CONTROLLER DATA TRANSFER ERRORS
;       "SEND CLOCK BIT ON TOO LONG ERROR, PC = XXXXX"
;       "FIRST CHARACTER TIME OUT ERROR, PC = XXXXX"
;       "DATA TRANSFER TIME OUT ERROR, PC = XXXXX"
```

```
        "ILLEGAL INTERRUPT WITH MASK BIT SET, MASK = XX,/
        PC = XXXXX"
        "STU SELECT ERROR, BAD COMMAND = XXXXXX, PC = XXXXX"
        "MA REGISTER NOT RESET BY NORST"
        "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, PC = XXXXX"
        "MA REGISTER SETTING ERROR"
        "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, PC = XXXXX"
        "UNIT DEVICE CODE ERROR"
        "DEVICE CODE = XX, UNIT DEVICE CODE = XX, PC = XXXXX"
        10.2    SYSTEM ERRORS
                THE FOLLOWING ERRORS OCCURE DURING COMBINED CON-
                TROLLER AND DRIVE OPERATIONS.
                10.2.1  DATA TRANSFER AND MA REGISTER ERRORS
        "MA REGISTER COUNTING ERROR"
        "GOOD VALUE = XXXXXX, BAD VALUE = XXXXXX, PC = XXXXX"
        "DATA COMPARE ERROR"
        "GOOD WORD = XXXXXX, BAD WORD = XXXXXX, /
        MEMORY ADDRESS = XXXXXX, PC = XXXXX"
                10.2.2  STATUS ERRORS
        "EXPECTED STATUS = XXXXXX, ACTUAL STATUS = XXXXXX, /
        PC = XXXXX"
        10.3    STATUS WORD
                BIT     DESCRIPTION
                0       ANY ERROR, SET BY BITS 1,3,5,6,7,8,10,14
                1       DATA LATE
                2       REMINDING
                3       ILLEGAL COMMAND
                4       HIGH DENSITY
                5       PARITY ERROR
                6       EOT MARK SENSED
                7       EOF MARK SENSED
                8       BOT MARK SENSED
                9       9 TRACK TAPE
                10      BAD TAPE
                11      ID BURST (PE ONLY)
                        Always 0 for MT130A (6125 emualtion)
                12      CORRECTED PARITY ERROR (PE ONLY)
                        Always 0 for MT130A (6125 emulation)
                13      WRITE LOCKOUT
                14      CRC ERROR
                15      UNIT READY
        OCTAL   11
12.     SPECIAL NOTES
        12.1    MEDIA SELECTION
                IT IS IMPORTANT TO SELECT A KNOWN GOOD TAPE WHEN
                PERFORMING THE DIAGNOSTIC. ANY ERRORS CAUSED BY
                THE MEDIA WILL BE CONSIDERED A CONTROLLER AND/OR
                DRIVE FAULT.
        12.2    SCOPE LOOPS
                WHEN A SCOPE LOOP IS BEING IMPLEMENTED TO LOCATE
                A FAILING MODULE AND FORWARD TAPE MOTION IS
                USED, THE TAPE WILL COME OFF THE SUPPLY REEL IF
                THE LOOP IS ALLOWED TO CONTINUE. WHEN THE TAPE
                APPROACHES THE EOT SENSOR, ENTER THE ODT PROGRAM
                BY TYPING A CONTROL "C" CHARACTER, MANUALLY RE-
                WIND THE DRIVE AND TYPE A "P" CHARACTER TO CON-
                TINUE.
        RUN TIME
        THE PROGRAM RUN TIME DEPENDS ON THE LENGTH OF THE TAPE.
        IT IS RECOMMENDED THAT A 600 FOOT REEL BE USED TO SPEED
          UP THE WRITE TO EOT SENSOR TEST.
**      .EJECT
```

```
;*****************************************************************************

 DESCRIPTION: UNIVERSAL MAGNETIC TAPE RELIABILITY


 CUSTOM SYSTEMS INC, 1982
;*****************************************************************************
        .TITL   UMTR
        X=1
        .ENTAC  X
1.      PROGRAM NAME:   UMTR.SR

2.      REVISION HISTORY:

                REV.      DATE
        .REV     00.0   ;06/07/82
        .REV     01.0   ;06/83 BY P.A.H. FOR CSI
                        TO HANDLE CSI MODEL 130A (9135 EMULATION)
                        ASK FOR MODEL NUMBER.
                        IF 130A BIT 0 OF DOB/DIB MUST BE MASKED.
                        9/83 - FOR 130A ALLOW FOR BIGGER RECORD.
;                               (8K WORDS)
;
;3.      MACHINE REQUIREMENTS
;
;       3.1     NOVA OR ECLIPSE FAMILY CPU'S
;       3.2     MINIMUM OF 16K MEMORY
;       3.3     MAG TAPE COUPLER (CONTROLLER) BOARD
        3.4     TELETYPE OR CRT AND CONTROLLER
,       3.5     TAPE DRIVE (S)
;4.      TEST REQUIREMENTS
;
;       N/A
;
;5.      SUMMARY
;
;       THE TAPE RELIABILITY PROGRAM IS A MAINTENANCE
;       PROGRAM INTENDED TO VERIFY THE MAGNETIC TAPE
;       SUB-SYTEM OPERATION.
;
;6.      RESTRICTIONS
;
;       ONLY THOSE TAPE DRIVES TO BE TESTED ARE TO
;       BE ONLINE. ALL ONLINE DRIVES MUST BE WRITE ENABLED.
```

7.1 RANDOM RELIABILITY (SA 500)

THE RANDOM RELIABILITY TEST WRITES RANDOM LENGTH FILES. EACH FILE CONSISTS OF FROM 1 TO 7 RANDOM LENGTH, RANDOM PATTERN RECORDS. THE RANDOM FILES ARE WRITTEN AND READ THE FULL LENGTH OF THE MEDIA. IF MORE THAN ONE(1) TAPE DRIVE IS AVAILABLE, A UNIQUE RANDOM FILE WILL BE WRITTEN ON EACH UNIT SEQUENTIALLY. WHEN EACH UNIT'S EOT SENSOR IS DETECTED, ITS ACCUMULATED HISTORY IS PRINTED AND THE UNIT IS COMMANDED TO REWIND. ALL WRITE ENABLED, READY TAPE UNITS WILL BE TESTED. A UNIT CAN BE MADE READY AND WILL BE TESTED AFTER THE TEST HAS BEEN INITIATED. IF A UNIT BECOMES NOT READY DURING THE TEST, ITS HISTORY WILL BE PRINTED AND THE UNIT WILL BE REMOVED FROM THE AVAILABLE UNITS LIST. THE TEST WILL CONTINUE UNTIL STOPPED BY THE OPERATOR.

7.2 INTERCHANGE TEST, WRITE/READ (SA 501)

THE INTERCHANGE TEST IS USED TO VERIFY THE INTERCHANGABLITY OF THE TAPE UNITS. THIS TEST GENERATES 200, 2000 WORD RECORDS OF SKEW PATTERNS FOLLOWED BY 200, 2000 WORD RECORDS OF RANDOM DATA. AFTER ALL THE ONLINE, WRITE ENABLED UNITS HAVE BEEN WRITTEN, THEY ARE ALL READ TO INSURE PROPER WRITTING. THE OPERATOR THEN INTERCHANGES THE TAPES AND PERFORMS ANOTHER READ VERIFICATION. THIS PROCEDURE IS CONTINUED UNTIL EACH TAPE HAS BEEN READ BY ALL THE UNITS. AFTER EACH READ, A SUMMARY OF THE ACCUMULATED STATISTICS FOR EACH UNIT IS PRINTED. AFTER ALL THE UNITS HAVE BEEN READ, A TEST COMPLETE MESSAGE IS PRINTED. IF THE OPERATOR WISHES TO CONTINUE THE TEST, TYPING A 'P' CHARACTER WILL REPEAT THE ENTIRE TEST.

7.3 INTERCHANGE, READ ONLY (SA 502)

THE READ ONLY INTERCHANGE TEST PROVIDES A MEANS OF TESTING TAPE UNITS WITH PRERECORDED TAPES. THE TAPES MUST BE RECORDED IN THE FORMAT DESCRIBED BY SECTION 7.2. THE READ OPERATION IS IDENTICAL TO SECTION 7.2.

7.4 COMMAND STRING INTERPRETER (SA 504)

THE COMMAND STRING INTERPRETER PROVIDES A TROUBLE SHOOTING AID TO ISOLATE A FAULT. THE OPERATOR CAN SELECT ALL POSSIBLE OPERATING MODES BY RESPONDING TO CONSOLE REQUESTS. ALL NUMBERS MUST BE ENTERED IN OCTAL.

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 NULL. 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 BE IN OCTAL. IF THE COMMAND STRING EXCEEDS THE LINE LENGTH, TYPE A LINEFEED TO CONTINUE ON THE NEXT LINE. THE FOLLOWING IS A LIST OF [illegible] SUBSYSTEM COMMANDS.

```
                    SF n      SPACE FORWARD n RECORDS
                    WT n      WRITE n RECORDS
                    WE        WRITE END OF FILE MARK
                    ER        ERASE 3" OF TAPE
                    RE        READ END OF FILE MARK
                    LOOP      LOOP BACK TO FIRST COMMAND
                    *         LOOP TO HERE
                    LOOP *    LOOP TO *

                    SAMPLE COMMAND STRINGS

                    RW,WT 10 SB 10 RD 10 LOOP

                    THE ABOVE COMMAND STRING WILL REWIND,
                    WRITE 6 RECORDS, SPACE BACK 6 RECORDS,
                    AND READ 6 RECORDS. THIS TEST WILL
                    CONTINUE UNTIL STOPPED BY THE OPERATOR.

                    RW,WT 10,WE * RW,SF,10,SB,10,RD,10,RE,
                    LOOP *

                    THE ABOVE COMMAND STRING WILL REWIND,
                    WRITE 5 RECORDS, WRITE AN EOF MARK,
                    AND THEN LOOP ON REWIND, SPACE FORWARD
                    6 RECORDS, SPACE BACK 6 RECORDS, READ
                    6 RECORDS AND READ EOF MARK.
               NOTE:  EITHER A SPACE OR COMMA CAN BE
                    USED AS AN ARGUEMENT DELIMITER.
                    IF AN INCORRECT CHARACTER OR
                    CHARACTERS ARE TYPED, TYPE A RUB-
                    OUT CHARACTER TO DELETE THE PRE-
                    VIOUSLY TYPED CHARACTER. THE DELE-
                    TED CHARACTER WILL BE PRINTED.

          WHILE THE COMMAND STRING IS BEING EXECUTED,
          TYPE A 'R' CHARACTER TO CAUSE THE PROGRAM
          TO RETURN TO THE UNIT PROMPT. THE ESCAPE
          KEY WILL CAUSE THE PROGRAM TO RETURN TO THE
          COMMAND STRING ENTRY POINT.

    7.5   HISTORY RECOVERY (SA 504)

          IF THE PROGRAM HAS STOPPED DURING AN OPERATION,
          THE ACCUMULATED ERROR AND PASS HISTORY CAN BE
          RECOVERED BY THIS PROGRAM. THIS PROGRAM MUST
          BE RUN BEFORE ANY OTHER PROGRAM IS RESTARTED.

          TO RETRIEVE THE ACCUMULATED ERROR AND PASS
          HISTORY WHILE THE RELIABILITY TEST IS RUNNING,
          TYPE A SPACE. THIS WILL CAUSE THE ACCUM-
          ULATED HISTORIES OF ALL TESTED UNITS TO BE
          PRINTED.
8. OPERATING MODES/SWITCH SETTINGS:
          SWITCH OPTIONS
          BIT     OCTAL   BINARY  INTERPRETATION
                  VALUE   VALUE

          2       20000   0       ENABLE PRINT ON CONSOLE
                          1       INHIBIT PRINT ON CONSOLE

          5       02000   0       INHIBIT LINEPRINTER
                          1       ENABLE LINEPRINTER
```

```
        [illegible]            ENABLE PRINT PARITY ERRORS
             1                 INHIBIT PRINT PARITY ERRORS
..ONAC  0
S?MPD   0
..ONAC  X
        "ESC"    THIS COMMAND GIVEN WHILE RUNNING THE
                 ENTERED COMMAND STRING WILL CAUSE THE
                 PROGRAM TO RESTART AT THE COMMAND STRING
                 ENTER PROMPT.
```

9. OPERATING PROCEDURES/OPERATOR INPUT

9.1 PROGRAM LOAD

LOAD THE PROGRAM BY USING THE BINARY LOADER.

9.2 STARTING ADDRESSES

SA	PROGRAM FUNCTION
500	START RELIABILITY TEST
501	START INTERCHANGE TEST, WRITE/READ
502	START INTERCHANGE TEST, READ ONLY
503	START COMMAND STRING INTERPRETER
504	DIRECT ENTRY FOR ERROR LOG RECOVERY

9.3 PROGRAM OPERATION

9.3.1 INITIALIZATION

THE FOLLOWING MESSAGE IS PRINTED REQUESTING THE SETTING OF THE SOFT SWITCH REGISTER.

```
"SET SWITCH REGISTER TO DESIRED VALUE, THEN PRESS RETURN TO CONTINUE"
.1
0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15
1  1  0  0  0  0  0  0  0  0  0   0   0   0   0   0

0
```

MODIFY THE SWITCH REGISTER SETTING AS DESCRIBED IN SECTION 8.3, FOLLOWED BY A CARRIAGE RETURN. THE FOLLOWING MESSAGES WILL BE PRINTED.

IF A REAL TIME CLOCK IS NOT PRESENT IN THE SYSTEM, THE FOLLOWING MESSAGE WILL BE PRINTED.

"TTO BAUD RATE = ?..."

RESPOND TO THE REQUEST BY TYPING THE CORRECT CONSOLE DEVICE BAUD RATE FOR I/O TIMING CALIBRATION. IF THE RESPONSE IS 110, THE FOLLOWING REQUEST MESSAGE WILL BE PRINTED.

"10 OR 11 BITS/CHAR = ?"

RESPOND TO THE REQUEST BY TYPING 10 OR 11.

"SPECIFY THE MODEL NUMBER OF THE CSI COUPLER(S) BEING TESTED."
"(110=1, 120=2, 130=3, 130A=4):"

YOU SHOULD RESPOND TO THIS QUESTION BY ENTERING THE NUMBER ASSOCIATED WITH THE CSI MODEL NUMBER FOR THE COUPLER IN THE TAPE UNIT(S) BEING TESTED. FOR EXAMPLE, IF YOU ARE RUNNING WITH CSI COUPLER 130, ENTER "3".

"ENTER DEVICE CODE (22 OR 62):"

ANSWER THE REQUEST BY TYPING OCTAL 22 OR 62. IF ANY OTHER DEVICE CODE IS SELECTED, THE DEVICE CODE ENTRY PROMPT WILL BE PRINTED AGAIN.

"ENTER 0 TO TEST CRC (NRZI ONLY). OTHERWISE, ENTER 1."

ANSWER 0 IF TAPE DRIVE IS 800 BPI NRZI OTHERWISE ENTER 1. NEXT A REQUEST IS MADE TO DETERMINE THE ERROR RECOVERY SEQUENCE THAT IS TO BE USED. THIS IS DETERMINED BY THE TYPE OF OPERATING SYSTEM THE CONTROLLER WILL BE USED IN. THE REQUEST IS MADE AS FOLLOWS:

"ENTER 1 IF CONTROLLER WILL BE RUN IN AN RDOS SYSTEM. OTHERWISE, ENTER 0."

9.3.2 PROGRAM ENTRY

WHEN ENTERING THE RELIABILITY PROGRAM, THE FOLLOWING MESSAGE WILL BE PRINTED

"MOUNT SCRATCH TAPE(S). PRESS RETURN TO CONTINUE."

THE OPERATOR SHOULD MAKE READY ALL TAPE UNITS TO BE TESTED. ANY TAPE UNIT THAT IS ONLINE WILL BE TESTED. AFTER ALL UNITS ARE READY, ENTER CR. ON THE CONSOLE TO CONTINUE.

9.3.3 INTERCHANGE TEST, WRITE/READ

ENTRY TO THE INTERCHANGE TEST IS IDENTICAL TO THE RELIABILITY TEST WITH THE FOLLOWING EXCEPTION.

"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 INITIALIZATION 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

9.4.1 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 UNKNOWN STATE OF THE COMMAND BITS.

RESPOND TO THE REQUEST BY SETTING THE "SWREG" LOCATION AS DESCRIBED BY SECTION 6.3, 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 FOLLOWING 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 INDICATING THE ENTRY TO THE COMMAND STRING INTERPRETER.

"COMMAND STRING INTERPRETER"
"MAXIMUM WORD COUNT = XXXX"

NOTE: THE MAXIMUM WORD COUNT VALUE INDICATES THE LARGEST DATA BUFFER AVAILABLE.

THE SUB-SYSTEM DEFAULT VALUES ARE SET AS FOLLOWS:

UNIT 0
WC SET TO MAXIMUM WORD COUNT
DATA RANDOM PATTERN
PARITY ODD

;10. PROGRAM OUTPUT/ERROR DESCRIPTION

```
;       ALL ERRORS ARE IDENTIFIED, COUNTED AND PRINTED ON
;       THE BASIS OF THE SETTING OF LOCATION "SYREG".
;
;       IF A UNIT GOES NOT READY, AN APPROPRIATE ERROR
;       MESSAGE AND ITS ACCUMULATED STATISTICAL HISTORY
;       IS PRINTED. IF ONLY ONE(1) UNIT IS BEING TESTED,
;       AN APPROPRIATE MESSAGE WILL BE PRINTED AND THE
;       PROGRAM WILL WAIT FOR OPERATOR INTERVENTION. IF
;       MORE THAN ONE UNIT IS AVAILABLE, THE TEST PROCESS
;       WILL CONTINUE.
;
;       ALL ERRORS ARE SOFT UNLESS SPECIFIED AS HARD OR
;       FATAL.
;
;       10.1    STATISTICAL HISTORY PRINTOUT
;
;               THE STATISTICAL HISTORY IS PRINTED FOR
;               EACH UNIT WHEN IT REACHES ITS EOT SENSOR.
;               THE STATISTICAL HISTORY FOR ALL TESTED
;               UNITS CAN BE REQUESTED BY TYPING A
;               "SPACE" CHARACTER. A SAMPLE OF THE
;               PRINTOUT IS AS FOLLOWS:
;
;       "UNIT    0          1"
;       "PAR WR  1          0"
;       "PAR RD  1          1"
;       "PERR WR 1          0"
;       "PERR RD 0          0"
;       "WDS RD  30348      1075827"
;       "WDS WR  31345      1075827"
;       10.2    STATUS WORD
;
;               BIT     DESCRIPTION
;
;               0       ANY ERROR, SET BY BITS 1,3,5,6,7,8,10,14
;
;               1(E)    DATA LATE
;               2       REWINDING
;               3(E)    ILLEGAL COMMAND
;
;               4       HIGH DENSITY
;               5(E)    PARITY ERROR
;               6(E)    EOT MARK SENSED
;
;               7(E)    EOF MARK SENSED
;               8(E)    BOT MARK SENSED
;               9       9 TRACK TAPE
;
;               10(E)   BAD TAPE
;               11      SEND CLOCK OR ID STATUS
;               12      FIRST CHARACTER OR CORRECTED ERROR
;
;               13      WRITE LOCKOUT
;               14(E)   CRC ERROR OR ODD REC READ
;               15      UNIT READY
;       0?DTD 11
;12.    SPECIAL NOTES
;
;       12.1    MEDIA SELECTION
;
;               IT IS IMPORTANT TO SELECT KNOWN GOOD TAPES
;
;               ERRORS TO OCCURE. TO VERIFIY THE SUB-SYSTEM
```

[illegible] SHOULD NOT INFLUENCE
THE PASS OR FAIL CRITERIA.

12.2 DATA ENTRY

ALL NUMBER ENTRIES MUST BE ON OCTAL. ANY OTHER
ENTRY WILL BE CONSIDERED AS AN ALPHA CHARACTER.

13. RUN TIME

THE PROGRAM RUN TIME IS DEPENDENT ON THE LENGTH OF THE
TAPE MEDIA.
.EOT

```
 0001 LDG75    MACRO REV 06.70          14:05:13 02-DEC-82
01              ;
02              ;
03              ;
04              ;*****************************************************************************
                ;
                ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07              ;
08              ;
09              ; CUSTOM SYSTEMS INC, 1981
10              ;*****************************************************************************
                        .TITLE  LDG75
12                      .RB     LDG75.RB
13              ;1.     PROGRAM NAME: LDG75.SR
14              ;
15              ;2.     REVISION HISTORY:
16              ;
17              ;       REV.       DATE
18              ;        00     12/10/81
19              ;3      REQUIREMENTS:
20              ;       RDOS EXECUTATABLE
21              ;4.     SUMMARY:
22              ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
23              ;       HIGH SPEED AND DYNAMIC GAP.
24              ;
25              ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
26              ;                10    MINIMUM GAP*
27              ;                9     DYNAMIC GAP
28              ;                8     HIGH SPEED
29              ;               6-7    LIMITS
30              ;                5     STREAMER MODE SELECT
                ;                -
                ;       LIMITS:
33              ;       6   7   10      MAX             MIN
34              ;       0   0   0        75MS           NOMINAL
35              ;       0   1   0       150MS           NOMINAL
36              ;       1   0   0       300MS           NOMINAL
37              ;       1   1   0         4SEC          NOMINAL
38              ;       0   0   0        75MS           30MS
39              ;       0   1   1       150MS           60MS
40              ;       1   0   1       300MS           90MS
41              ;       1   1   1         4SEC         120MS
42              ;
43              ;       *NOTE: MIMIMUN GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
44              ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
45                      .NREL
46 00000'020426 LOAD:   LDA     0,C22                  ;PRIMARY TAPE
47 00001'006017          .SYSTM
48 00002'021031          .DEBL                          ;ENABLE
49 00003'000401          JMP     .+1                    ;NO ERROR
50 00004'020424          LDA     0,CWORD                ;CONFIGURATION WORD
51 00005'061022          DOA     0,22                   ;CONFIGURE PRIMARY MT
52 00006'020420          LDA     0,C22
53 00007'006017          .SYSTM
54 00010'021032          .DDIS
55 00011'000401          JMP     .+1
56 00012'020415          LDA     0,C62
   00013'006017          .SYSTM
58 00014'021031          .DEBL
59 00015'000401          JMP     .+1
```

```
01 00017'061062          DOA    0,62                ;CONFIGURE SECONDARY
02 00020'020407          LDA    0,C62
03 00021'006017          .SYSTM
04 00022'021002          .ODIS
05 00023'000401          JMP    .+1
06 00024'006017          .SYSTM
07 00025'004400          .RTN
08 00026'000022 C22:     22
09 00027'000062 C62:     62
10 00030'002100 CWORD:   2100               ;75MS MAX GAP, MIN NOMINAL GAP, LOW SPEED,
11                                          ;AND STREAMER SELECT MODE.
12                       .END   LOAD
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```



```
C22   000026'        1/46   1/52   2/08
C62   000027'        1/55   2/02   2/09
CWORD 000030'        1/58   1/60   2/10
LOAD  000000'        1/46   2/12
```

```
                ;
                ;
                ;
                ;*****************************************************************************
                ;
                ; DESCRIPTION.  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
                ;
                ;
                ; CUSTOM SYSTEMS INC, 1981
                ;****************************************************************************
                      .TITLE  LNG
                      .RB     LNG.RB
                ;1.     PROGRAM NAME: RLNG.SR
                ;
                ;2.     REVISION HISTORY.
                ;
                ;       REV.       DATE
                ;        00     12/10/81
                ;3      REQUIREMENTS:
                ;       RDOS EXECUTATABLE
                ;4.     SUMMARY:
                ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
                ;       HIGH SPEED AND DYNAMIC GAP.
                ;
                ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
                ;                 10    MINIMUM GAP*
                ;                  9    DYNAMIC GAP
                ;                  8    HIGH SPEED
                ;                6-7    LIMITS
                ;                  5    STREAMER MODE SELECT
                ;                  -
                ;       LIMITS:
                ;       6   7   10      MAX            MIN
                ;       0   0   0        75MS          NOMINAL
                ;       0   1   0       150MS          NOMINAL
                ;       1   0   0       300MS          NOMINAL
                ;       1   1   0         4SEC         NOMINAL
                ;       0   0   0        75MS          30MS
                ;       0   1   1       150MS          60MS
                ;       1   0   1       300MS          90MS
                ;       1   1   1         4SEC        120MS
                ;
                ;       *NOTE: MIMIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
                ;               REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                      .NREL
00000'020426 LOAD:    LDA     0,C22                  ;PRIMARY TAPE
00001'006017          .SYSTM
00002'021031          .DEBL                          ;ENABLE
00003'000401          JMP     .+1                    ;NO ERROR
00004'020424          LDA     0,CWORD                ;CONFIGURATION WORD
00005'061022          DOA     0,22                   ;CONFIGURE PRIMARY MT
00006'020420          LDA     0,C22
00007'006017          .SYSTM
00010'021032          .DDIS
00011'000401          JMP     .+1
00012'020415          LDA     0,C62
00013'006017          .SYSTM
00014'021031          .DEBL
00015'000401          JMP     .+1
[illegible]           LDA     [illegible]
```

```
 0002 LAG
01 00017'061062          DOA     0,62                    ;CONFIGURE SECONDARY
02 00020'020407          LDA     0,C62
03 00021'006017           .SYSTM
04 00022'021022           DOIS
05 00023'000401          JMP     .+1
06 00024'006017           .SYSTM
07 00025'004400          .RTN
08 00026'000022 C22:     22
09 00027'000062 C62:     62
10 00030'002000 CWORD:   2000                    ;NOMINAL GAP, LOW SPEED, AND STREAMER SELECT MODE.
11                       .END    LOAD
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
 0003 LAG

C22    000026'       1/46    1/52    2/08
C62    000027'       1/56    2/02    2/09
CWORD  000030'       1/50    1/60    2/10
LOAD   000000'       1/46    2/11
```

```
 0001 HDG75    ;MACRO REV 05.70          14-JUL-82 08:16:52
01             ;
02             ;
03             ;
04             ;*******************************************************************************
               ;
               ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
07             ;
08             ;
09             ; CUSTOM SYSTEMS INC, 1981
10             ;*******************************************************************************
                       .TITLE  HDG75
12                     .RB     HDG75.RB
13             ;1.     PROGRAM NAME: RnDG75.SR
14             ;
15             ;2.     REVISION HISTORY:
16             ;
17             ;       REV.       DATE
18             ;        00     12/10/81
19             ;3.     REQUIREMENTS:
20             ;       RDOS EXECUTATABLE
21             ;4.     SUMMARY:
22             ;       THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
23             ;       HIGH SPEED AND DYNAMIC GAP.
24             ;
25             ;       CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
26             ;                10    MINIMUM GAP*
27             ;                9     DYNAMIC GAP
28             ;                8     HIGH SPEED
29             ;               6-7    LIMITS
30             ;                5     STREAMER MODE SELECT
               ;                -
               ;       LIMITS:
33             ;       6   7   10      MAX             MIN
34             ;       0   0   0        75MS           NOMINAL
35             ;       0   1   0       150MS           NOMINAL
36             ;       1   0   0       200MS           NOMINAL
37             ;       1   1   0         45IC          NOMINAL
38             ;       0   0   0        75MS           30MS
39             ;       0   1   1       150MS           60MS
40             ;       1   0   1       200MS           90MS
41             ;       1   1   1         45IC         120MS
42             ;
43             ;       *NOTE: MIMIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
44             ;              REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
45                     .NREL
46 00000/020426 LOAD:  LDA     0,C22                   ;PRIMARY TAPE
47 00001/006017        .SYSTM
48 00002/021031        .DEEL                           ;ENABLE
49 00003/000401        JMP     .+1                     ;NO ERROR
50 00004/020424        LDA     0,CWORD                 ;CONFIGURATION WORD
51 00005/061022        DOA     0,22                    ;CONFIGURE PRIMARY MT
52 00006/020420        LDA     0,C22
53 00007/006017        .SYSTM
54 00010/021032        .DDIS
55 00011/000401        JMP     .+1
56 00012/020415        LDA     0,C62
   00013/006017        .SYSTM
58 00014/021031        .DEEL
59 00015/000401        JMP     .+1
```

```
 0002 H0675
01 00017'061062          DOA     0,62                    ;CONFIGURE SECONDARY
02 00020'020407          LDA     0,C62
03 00021'006017          .SYSTM
04 00022'021032          .DDIS
05 00023'000401          JMP     -1
06 00024'006017          .SYSTM
07 00025'004450          .RTN
08 00026'000022 C22:     22
09 00027'000062 C62:     62
10 00030'002300 CWORD:   2300                    ;75MS MAX GAP, MIN NOMINAL GAP, HIGH SPEED,
11                                               ;AND STREAMER SELECT MODE.
12                       .END    LOAD
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
  0002 H0675

C22    000026'       1/46    1/52    2/08
C62    000027'       1/56    2/02    2/09
CWORD  000030'       1/50    1/58    2/10
LOAD   000000'       1/46    2/12
```

```
0001 HNG      MACRO REV 06.70         14:17:41 06/06/81
              ;
              ;
              ;
              ;************************************************************************
              ;
              ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
              ;
              ;
              ; CUSTOM SYSTEMS INC, 1981
              ;************************************************************************
                      .TITLE  HNG
                      .RB     HNG.RB
              ;1.      PROGRAM NAME: XHNG.SR
              ;
              ;2.      REVISION HISTORY:
              ;
              ;        REV.       DATE
              ;         00     12/10/81
              ;3.      REQUIREMENTS:
              ;        RDOS EXECUTATABLE
              ;4.      SUMMARY:
              ;        THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
              ;        HIGH SPEED AND DYNAMIC GAP.
              ;
              ;        CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
              ;                 10    MINIMUM GAP*
              ;                  9    DYNAMIC GAP
              ;                  8    HIGH SPEED
              ;                6-7    LIMITS
              ;                  5    STREAMER MODE SELECT
              ;                  -
              ;        LIMITS:
              ;        6  7  10      MAX            MIN
              ;        0  0  0        75MS          NOMINAL
              ;        0  1  0       150MS          NOMINAL
              ;        1  0  0       300MS          NOMINAL
              ;        1  1  0         4SEC         NOMINAL
              ;        0  0  0        75MS          30MS
              ;        0  1  1       150MS          60MS
              ;        1  0  1       300MS          90MS
              ;        1  1  1         4SEC        120MS
              ;
              ;        *NOTE: MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
              ;               REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                      .NREL
00000'020426 LOAD:    LDA     0,C22                   ;PRIMARY TAPE
00001'006017          .SYSTM
00002'021031          .DEBL                           ;ENABLE
00003'000401          JMP     .+1                     ;NO ERROR
00004'020424          LDA     0,CWORD                 ;CONFIGURATION WORD
00005'061022          DOA     0,22                    ;CONFIGURE PRIMARY MT
00006'020420          LDA     0,C22
00007'006017          .SYSTM
00010'021032          .DDIS
00011'000401          JMP     .+1
00012'020415          LDA     0,C62
00013'006017          .SYSTM
00014'021031          .DEBL
00015'000401          JMP     .+1
00016'020412          LDA     0,CWORD
```

```
 0002 HNG
01 00017'051052          DOA     0,62                    ;CONFIGURE SECONDARY
02 00020'020407          LDA     0,C62
03 00021'006017          .SYSTM
04 00022'021032          .DOIS
05 00023'000401          JMP     .+1
06 00024'006017          .SYSTM
07 00025'004400          .RTN
08 00026'000022 C22:     22
09 00027'000062 C62:     62
10 00030'002200 CWORD:   2200                    ;NOMINAL GAP, HIGH SPEED, AND STREAMER SELECT MODE.
11                       .END    LOAD
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
  0003 HNG

C22    000026'       1/46    1/52    2/00
C62    000027'       1/56    2/02    2/09
CWORD  000030'       1/50    1/60    2/10
LOAD   000000'       1/46    2/11
```

```
          ;
          ;
          ;**************************************************************************
          ;
          ; DESCRIPTION:  STREAMER MAG TAPE CONFIGURATOR (PRE-DEFINED)
          ;
          ;
          ; CUSTOM SYSTEMS INC, 1981
          ;**************************************************************************
                  .TITLE  AMG90
                  .RB     AMG90.RB
          ;1.      PROGRAM NAME: AMG90.SR
          ;
          ;2.      REVISION HISTORY:
          ;
          ;        REV.       DATE
          ;         00     12/10/81
          ;3.      REQUIREMENTS:
          ;        RDOS EXECUTATABLE
          ;4.      SUMMARY:
          ;        THIS PROGRAM IS PROVIDED TO CONFIGURE A STREAMER MAG TAPE, FOR
          ;        HIGH SPEED AND DYNAMIC GAP.
          ;
          ;        CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
          ;                  10    MINIMUM GAP*
          ;                   9    DYNAMIC GAP
          ;                   8    HIGH SPEED
          ;                 6-7    LIMITS
          ;                   5    STREAMER MODE SELECT
          ;                   -
          ;        LIMITS:
          ;        6  7  10      MAX             MIN
          ;        0  0  0        75MS           NOMINAL
          ;        0  1  0       150MS           NOMINAL
          ;        1  0  0       300MS           NOMINAL
          ;        1  1  0         4SEC          NOMINAL
          ;        0  0  0        75MS           30MS
          ;        0  1  1       150MS           60MS
          ;        1  0  1       300MS           90MS
          ;        1  1  1         4SEC         120MS
          ;
          ;        *NOTE: MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
          ;               REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
                  .NREL
00000'020426 LOPO:   LDA     0,C22                 ;PRIMARY TAPE
00001'006017         .SYSTM
00002'021031         .DEBL                         ;ENABLE
00003'000401         JMP     .+1                   ;NO ERROR
00004'020424         LDA     0,CWORD               ;CONFIGURATION WORD
00005'061022         DOA     0,22                  ;CONFIGURE PRIMARY MT
00006'020420         LDA     0,C22
00007'006017         .SYSTM
00010'021032         .DDIS
00011'000401         JMP     .+1
00012'020415         LDA     0,C62
00013'006017         .SYSTM
00014'021031         .DEBL
00015'000401         JMP     .+1
00016'020412         LDA     0,CWORD
```

```
01 00017'061062          DOA     0,62                  ;CONFIGURE SECONDARY
02 00020'020407          LDA     0,C62
03 00021'006017          .SYSTM
04 00022'021032          .DDIS
05 00023'000401          JMP     .+1
06 00024'006017          .SYSTM
07 00025'004400          .RTN
08 00026'000022 C22:     22
09 00027'000062 C62:     62
10 00030'003340 CWORD:   3340               ;300MS MAX GAP, MIN 90MS GAP, HIGH SPEED,
11                                           ;AND STREAMER SELECT MODE.
12                       .END    LOAD
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```



```
C22   000026'       1/46    1/52    2/08
C62   000027'       1/56    2/02    2/09
CWORD 000030'       1/50    1/60    2/10
LOAD  000000'       1/44    2/12
```

```
                 ;
                 ;
                 ;
                 ;
                 ;
                 ;*****************************************************************************
                 ;
                 ;
                 ; DESCRIPTION:  STAND-ALONE STREAMER MAG TAPE CONFIGURATOR(CONSOLE PARAMETERS)
                 ;
                 ;
                 ; CUSTOM SYSTEMS INC. 1981
                 ;*****************************************************************************
                        .TITL   TAPEM
        000001          .DUSR   X=1
                 ;1.      PROGRAM NAME TAPEMODE.SR
                 ;
                 ;2  REVISION HISTORY
                 ;
                 ;        REV.                DATE
                 ;         00              12/10/81
                 ;
                 ;3       MACHINE REQUIREMENTS.
                 ;3.1      NOVA/ECLIPSE FAMILY PROCESSOR
                 ;3.2      8K READ/WRITE MEMORY
                 ;3.3      CONSOLE DEVICE
                 ;
                 ;4.      SUMMARY
                 ;        THIS PROGRAM IS INTENDED FOR USE WITH THE MT130 COUPLER TO SET
                 ;        CONFIGURATION AS DESIRED WHEN PROGRAM ASKS.
                 ;        CONFIGURATION BITS OF DOA WITH BIT 5 = 1:
                 ;                  10    MINIMUM GAP*
                 ;                   9    DYNAMIC GAP
                 ;                   8    HIGH SPEED
                 ;                 6-7    LIMITS
                 ;                   5    STREAMER MODE SELECT
                 ;                   -
                 ;        LIMITS:
                 ;        6   7   10      MAX           MIN
                 ;        0   0   0        75MS         NOMINAL
                 ;        0   1   0       150MS         NOMINAL
                 ;        1   0   0       300MS         NOMINAL
                 ;        1   1   0         4SEC        NOMINAL
                 ;        0   0   0        75MS         30MS
                 ;        0   1   1       150MS         60MS
                 ;        1   0   1       300MS         90MS
                 ;        1   1   1         4SEC       120MS
                 ;
                 ;        *NOTE: MINIMUM GAP IS ONLY TRUE IF DRIVE IS STREAMING, IF
                 ;               REPOSITIONING OCCURS GAP IS OF NOMINAL LENGTH(NOMINAL IS .6 IN)
```

```
            000001            .NOMAC  X
            000000            .LOC    0
      00000 000002            2
      00001 000010            10
      00002 000200            DTO75
      00003 002302            JMP     @.-1
            000010            .LOC    10
      00010 002000            JMP     @0              ;INTERRUPT RTN

            000045            .LOC    45
      00045 002411            EGGS

            000022 .DUSR   MTA=22
      00046 000022 DEVCD:          MTA
      00047 000000 CHNG:   0
      00050 002000 CWORD:  2000               ;STREAMER SELECT MODE BIT
      00051 000000 TEM:    0
                   ;ADDRESSES

      00052 000565 IDCHNG: DCHNG
                   F700U   BEG1,K,J,1,200,70000,1
      00233 001617 IOOT?:  OOT?J
      00234 000200 RES?T:  JMP     200


      00235 000000 ICM?O:  0
      00236 000557 ITTO:   TTIO
      00237 000535 ITTI:   TTII
            006231 LOOPX=  JSR@    ICY?C           ;DELAYED LOOP
            006230 EHALT=JSR@      IERR?
      00240 000001 C1:     1
      00241 000003 C3:     3
      00242 000004 C4:     4
      00243 000005 C5:     5
      00244 000011 C9. :   9.
      00245 000040 C40:    40
      00246 000076 C76:    76
      00247 000100 C100:   100
      00250 000200 C200:   200
      00251 002000 C2K:    2000
      00252 100000 C100K:  100000
      00253 177774 CM4:    -4
      00254 177767 CM9. :  -9.
      00255 177400 CM256. : -256.
      00256 177000 CM512. : -512.

            000376            .LOC    376
      00376 060100 AUTO:   NIOS    0               ;PUT DEVICE CODE HERE FOR BOOTING
      00377 000377         JMP     .               ;THEN, WAIT HERE.

            000400            .LOC    400

      00400 062677 BEG1:   IORST                   ;IN THE BEGINNING, RESET I/O
      00401 020251         LDA     0,C2K           ;RESET CWORD TO STREAMER MODE SELECT BIT ONLY
      00402 040050         STA     0,CWORD
      00403 102400         SUB     0,0
      00404 006215         JSR@    IMES?
      00405 003033         DIRT                    ;NAME
      00406 006215  BEG2:  JSR@    [illegible]     ;*TYPE 2 DIGIT DEVICE [illegible]
      00407 002417         MCODE                   ; OF MT130 COUPLER,
```

```
 0001 TAPE#
01                                          ; THEN CARRIAGE RETURN"
02 00410 006227          JSR@    ITTI
03 00411 000775          JMP     BEGI       ;ERROR!
04 00412 020046          LDA     2,C76
05 00413 121005          MOV     1,0,SNR
   00414 000772          JMP     BEG2
07 00415 125213          MOVR#   1,1,SNC
08 00416 146402          SUBZ#   2,1,SZC    ;0<CODE<76 ALLOWED
09 00417 000767          JMP     BEG2
10 00420 040051          STA     0,TEM      ;MUST BE EVEN #
11 00421 006052          JSR     @IDCHNG    ;CHANGE DEVICE CODE
12 00422 000045          DEVCD
13 00423 000478          CONF               ;FIRST LOCATION TO BE CHANGED
14 00424 000512          MAX                ;LAST LOCATION TO BE CHANGED
15 00425 020051          LDA     0,TEM
16 00426 040045          STA     0,DEVCD    ;C(DEVCD) HOLDS PRIME CODE
17
18 00427 006215 BEGI.    JSR     @IMES?     ;"HIGH OR LOW SPEED
19 00430 000462          HLOW               ;TYPE 1 IF HIGH SPEED"
20 00431 006236          JSR     @ITTD
21 00432 000775          JMP     BEGI       ;INPUT ERROR
22 00433 020040          LDA     0,C1
23 00434 106415          SUB#    0,1,SNR
24 00435 004471          JSR     HIGH       ;SET HIGH SPEED, WAS A 1
25 00436 006215 BEG4:    JSR     @IMES?     ;"DYNAMIC (VARIABLE) OR NOMINAL INTER-RECORD
26 00437 002511          DYNA               ;GAP, ENTER 1 IF DYNAMIC"
27 00440 006236          JSR     @ITTD
28 00441 000775          JMP     BEG4
29 00442 020040          LDA     0,C1
30 00443 106414          SUB#    0,1,SZR
   00444 000424          JMP     CONF       ;DON'T ASK FOR LIMITS
   00445 006215 BEG4A:   JSR     @IMES?     ;"MINIMUM GAP GREATER THAN NOMINAL GAP
33 00446 002526          MING               ;ENTER 1
34 00447 006236          JSR     @ITTD
35 00450 000775          JMP     BEG4A
36 00451 020040          LDA     0,C1
37 00452 106414          SUB#    0,1,SZR
38 00453 000434          JMP     BEG40      ;NOMINAL MINIMUM GAP
39 00454 020050          LDA     0,CWORD
40 00455 024245          LDA     1,C40      ;ADD MINIMUM GAP LENGTH BIT
41 00456 107000          ADD     0,1
42 00457 040050          STA     1,CWORD
43 00460 006215 BEG4B:   JSR     @IMES?     ;"MINIMUM GAP LENGTH: 0=30MS, 1=60MS, 2=90MS,
44 00461 002607          MINL               ;AND 3=120MS
45 00462 006236          JSR     @ITTD
46 00463 000775          JMP     BEG4B
47 00464 121220          MOVZR   1,0
48 00465 101024          MOVZR   0,0,SZR
49 00466 000772          JMP     BEG4B      ;GREATER THAN 3
50 00467 004430 BEG4C:   JSR     LIMIT      ;TAKE VALUE ENTERED AND USE IN CWORD
51 00470 020050 CONF.    LDA     0,CWORD    ;GET CONFIGURATION WORD
52 00471 061022          DOA     0,MTA      ;CONFIGURE TAPE PER REQUEST
53 00472 006215 BEG5:    JSR     @IMES?     ;CONFIGURED DON'T RESET, BOOT FROM WHOM?
54 00473 002722          DFBOO
55 00474 006227          JSR@    ITTI       ;GET DEVICE CODE
56 00475 000775          JMP     BEG5       ;ERROR!
   00476 020046          LDA     2,C76
58 00477 121005          MOV     1,0,SNR    ;GREATER THAN ZERO?
59 00500 000772          JMP     BEG5       ;)
                                            ;0<CODE<76 ALLOWED
```

```
00502 000770         JMP     BEG5          ;
00503 030377         LDA     2,AUTO        ;GET NIOS
00504 147000         ADD     2,1           ;ADD DEVICE CODE
00505 044376         STA     1,AUTO        ;
00506 000375         JMP     AUTO          ;GO BOOT
00507 006215 BEG4D:  JSR     @IMES?        ;"DYNAMIC GAP LENGTH MAX: 0=75MS, 1=150MS,
00510 002651         DYNL                  ;2=300MS, AND 3=45EC
00511 006235         JSR     @ITTD
00512 000775         JMP     BEG4D
00513 121220         MOVZR   1,0
00514 101224         MOVZR   0,0,SZR
00515 000772         JMP     BEG4D         ;GREATER THAN 3
00516 000751         JMP     BEG4C

00517 125300 LIMIT:  MOVS    1,1           ;PLACE LIMIT VALUE IN BITS 6 & 7
00520 020050         LDA     0,CWORD
00521 123000         ADD     1,0
00522 024247         LDA     1,C100        ;ADD DYNAMIC GAP BIT
00523 123000         ADD     1,0
00524 040050         STA     0,CWORD
00525 001400         JMP     0,3
00526 020050 HIGH:   LDA     0,CWORD       ;CONFIGURATION WORD
00527 024250         LDA     1,C200        ;HIGH SPEED BIT
00530 107000         ADD     0,1
00531 044050         STA     1,CWORD
00532 001400         JMP     0,3
00533 000000 XXX:    0
             ;THE FOLLOWING ROUTINES REPLACE THE OCTAL AND DECIMAL
             ;INPUT ROUTINES TO SEARCH FOR ^O,^R,OR ^D AND JUMP TO
             ;THE APPROPRIATE PLACE IF ONE OF THESE CONTROL CHARS
             ;IS STRUCK.


             ;OCTAL INPUT ROUTINE
00534 000000         0
00535 054777 TTII:   STA     3,.-1
00536 050420         STA     2,TTS2        ;SAVE AC2
00537 006224         JSR@    ITI?O         ;GET CHARACTER
00540 004404         JSR     TTII1
00541 010773         ISZ     TTII-1
00542 030414 TTII2:  LDA     2,TTS2
00543 002771         JMP@    TTII-1        ;RETURN+2

             ;ROUTINE LOOKS FOR, ^O, ^R
00544 024241 TTII1:  LDA     1,C3          ;NON-ZERO
00545 030407         LDA     2,TTCO
00546 142415         SUB#    2,0,SNR       ;IS IT CONTROL O?
00547 006233         JSR@    IODT?         ;YES
00550 030405         LDA     2,TTCR        ;OR CONTROL R?
00551 142415         SUB#    2,0,SNR
00552 000234         JMP     RES?T         ;YES
00553 001401         JMP     1,3           ;RETURN,WITHOUT MAIN RET BUMP

00554 000017 TTCO:   17
00555 000022 TTCR:   22
00556 000000 TTS2:   0


             [illegible]
00557 054755 TTID:   STA     3,TTII-1      ;DECIMAL INPUT ROUTINE
```

```
0005 TAPEM
00560 050776        STA     2,TT32          ;KEEP AC2
00561 006225        JSR@    ITITD           ;GET DECIMAL
00562 004761        JSR     TTII1
00563 010751        ISZ     TTII-1          ;
00564 000756        JMP     TTII2
              ;CHANGE ALL DEVICE CODES FROM THE LOCATION IN CALL+2
              ;UP TO BUT NOT THE LOCATION IN CALL+3, FROM THE OLD CODE
              ;WHOSE ADDRESS IS IN CALL+1 TO WHAT IS IN AC0.
              ;IGNORES CODE 77
              ;EXIT TO CALL+4
00565 171400 DCHNG: INC     3,2
00566 151400        INC     2,2
00567 050441        STA     2,DCH.5
00570 024441        LDA     1,DCH.1
00571 037376        LDA     3,@-2,2
00572 137400        AND     1,3
00573 057376        STA     3,@-2,2
00574 123400        AND     1,0
00575 040435        STA     0,DCH.6
00576 031377        LDA     2,-1,2
00577 136414        SUB#    1,3,SZR
00600 122415        SUB#    1,0,SNR
00601 000424        JMP     DCH.2
00602 021000 DCH.4: LDA     0,0,2
00603 103112        ADDL#   0,0,SZC         ;IS IT AN I.O. INSTR?
00604 101103        MOVL    0,0,SNC
00605 103113        ADDL#   0,0,SNC
00606 000412        JMP     DCH.3           ;NO
00607 101200        MOVR    0,0
00610 152400        SUB     3,2
00611 123414        AND#    1,0,SZR
00612 000406        JMP     DCH.3           ;NOT OLD DEVICE CODE
00613 034417        LDA     3,DCH.6
00614 163000        ADD     3,0
00615 041000        STA     0,0,2
00616 034412        LDA     3,DCH.5
00617 037776        LDA     3,@-2,3
00620 151400 DCH.3: INC     2,2
00621 022407        LDA     0,@DCH.5
00622 142414        SUB#    2,0,SZR
00623 000757        JMP     DCH.4
00624 034406        LDA     3,DCH.6
00625 030403 DCH.2: LDA     2,DCH.5
00626 057376        STA     3,@-2,2
00627 001001        JMP     1,2
00630 000000 DCH.5: 0
00631 000077 DCH.1: 77
00632 000000 DCH.6: 0

                    .DOTD   2
      002401 ADDDD= JMP     .@+1
02025 000400        BEG1
02411 000000 EGGS:  0                       ;AUTO RUN SWITCH
02412 000000        0                       ;DEVICE CODE
02413 000000        0                       ;CAT SWITCH
02414 000000        0                       ;# OF PASSES
02415 000000        0                       ;RETURN ADDRESS
02416 000000 SWREG: 0                       ;SWITCH REGISTER
02417 [illegible]
```

```
 0006 T**F*M
01 02462 005215 HLOW:   .TXTE   !<15><12>HIGH OR LOW SPEED? TYPE 1 IF HIGH SPEED.  !
02 02511 005215 DYNA.   .TXTE   !<15><12>DYNAMIC (VARIABLE) OR NOMINAL INTER-RECORD GAP,
03 02541 106674 <15><12>ENTER 1 IF DYNAMIC.  !
04 02556 005215 MING:   .TXTE   !<15><12>MINIMUM GAP GREATER THAN NOMINAL GAP,ENTER 1  !
05 02607 005215 MINL:   .TXTE   !<15><12>MINIMUM GAP LENGTH: 0=30MS, 1=60MS,
06 02631 106654 <15><12>AND 2=90MS. ENTER CHOICE.  !
07 02651 005215 DYNL:   .TXTE   !<15><12>DYNAMIC GAP LENGTH MAX: 0=75MS, 1=150MS, 2=300MS,
08 02702 106654 <15><12>AND 3=4 SEC. ENTER CHOICE.  !
09 02722 005215 CFSOO:  .TXTE   !<15><12>MAG TAPE COUPLER CONFIGURED PER REQUEST.
10 02747 106640 <15><12>TO RETAIN CONFIGURATION, DO NOT PRESS THE RESET SWITCH.
11 03004 005215 <15><12>ENTER DEVICE CODE FOR PROGRAM LOAD (APL).  !
12 03023 005215 DIRT:   .TXTE   !<15><12>....C.S.I. STREAMER MAG TAPE CONFIGURATOR  REV. 00  !
13       000000         .NOLOC  0
14              .END
**00000 TOTAL ERRORS  00000 PASS 1 ERRORS
```

AC0?	002206	5/53						
AC1?	002207	5/53						
AC2?	002210	5/53						
[illegible]	000207	2/22	5/53					
[illegible]	000376	2/48	4/02	4/04	4/05			
BCDDD	002401	5/51	5/53					
BEG1	000400	2/22	2/53	5/52				
BEG2	000405	2/59	3/03	3/06	3/09			
BEG3	000427	3/18	3/21					
BEG4	000435	3/25	3/28					
BEG4A	000445	3/32	3/35					
BEG4B	000450	3/43	3/46	3/49				
BEG4C	000467	3/50	4/13					
BEG4D	000507	3/38	4/06	4/09	4/12			
BEG5	000472	3/53	3/56	3/59	4/01			
BGN?A	000202	2/22						
C1	000240	2/31	3/22	3/29	3/36			
C100	000247	2/39	4/18					
C100K	000252	2/41						
C1070	001272	5/49						
C1B76	002343	5/53						
C200	000250	2/39	4/23					
C2K	000251	2/40	2/74					
C3	000241	2/32	4/45					
C4	000242	2/33						
C40	000245	2/36	3/40					
C5	000243	2/34						
C76	000246	2/37	3/04	3/57				
C9.	000244	2/35						
[illegible]70	000657	5/49						
[illegible]K?	002201	5/53						
CFBOO	002722	3/54	6/09					
CHA?3	000672	5/49						
CHC?T	000660	5/49						
CHE?X	000575	5/49						
CHNG	000047	2/15						
CHR?E	000656	5/49						
CHR?Z	001005	5/49						
CM256	000255	2/44						
CM4	000253	2/42						
CM512	000256	2/45						
CM9.	000254	2/43						
CONF	000479	3/13	3/31	3/51				
CRL?F	000702	2/22	5/49					
CWORD	000055	2/16	2/55	3/19	3/42	3/51	4/16	4/20
		4/22	4/25					
CYC?2	002132	5/53						
CYC?I	002073	5/53						
CYC?J	002055	2/22	5/53					
CYC?X	002046	2/22	5/53					
DCHNG	000565	2/20	5/11					
DCH.1	000631	5/14	5/47					
DCH.2	000625	5/23	5/43					
DCH.3	000620	5/28	5/32	5/38				
[illegible].4	000602	5/24	5/41					
[illegible].5	000630	5/13	5/36	5/39	5/43	5/46		
DCH.6	000632	5/19	5/33	5/42	5/48			
DCO?T	000747	5/49						
[illegible]	[illegible]	[illegible]						

DST?S	001010	5/49						
DEVCD	000045	2/14	3/12	3/16				
DIRT	001003	2/58	6/12					
DIV?	002142	5/52						
DIV?0	002143	5/53						
DIV?D	002146	5/53						
DTO?S	000200	2/05	2/22					
DYNA	003511	3/26	6/02					
DYNL	002551	4/07	6/07					
D2IAG	025075	MC 5/52						
EGOS	002411	2/11	2/22	5/53				
EHALT	006220	2/30						
ENT?R	002026	2/22	5/52					
ERR?1	002207	5/51						
ERR?2	002200	5/53						
ERR?3	002327	5/52						
ERR?4	000211	1/22	5/53					
ERR?5	002216	5/51						
ERR?6	002242	5/53						
ERR?A	002241	5/53						
ERR?I	002227	5/53						
ERR?J	002211	2/22	5/53					
ERR?N	002205	5/52						
ERT?N	002203	5/52						
FST?O	001165	5/49						
HEA?D	002344	5/52						
HEL?P	000201	2/22	5/53					
HIGH	000526	2/24	4/22					
HLON	002452	3/13	6/01					
I127?	001502	5/49	5/51					
ICRL?	000216	2/22	5/49	5/51	5/53			
ICYC?	000227	2/22	5/53					
ICY?C	000231	2/22	2/29					
IDCHN	000052	2/20	3/11					
IEGG?	000212	2/22	5/53					
IENT?	000226	2/22						
IERR?	000230	2/22	2/30					
IINP?	000214	2/22	5/53					
IINR?	001613	5/51						
IMES?	000215	2/22	2/57	2/59	3/18	3/25	3/32	3/43
		3/53	4/06	5/51	5/53			
IN0?	001362	5/49						
IN1?	001447	5/49						
IN1?0	001343	5/49						
IN1?2	001564	5/49	3/51					
IN1?3	001342	5/49						
IN1?5	001565	5/49	5/51					
IN2?	001454	5/49						
IN3?	001331	5/49						
IN3??	001341	5/49						
IN4?	001515	5/49						
IN5?	001401	5/49						
IN6?	001415	5/49						
IN6?0	001563	5/49	5/51					
INB?A	001557	5/49	5/51					
INB?I	001560	5/49	5/51					
INL?K	001345	5/49						
INM?	001471	5/49						

INP?I 001247 5/49
INP?I 001253 5/49
INP?I 001255 5/49
[illegible]?X 002005 2/22 5/51
[illegible]J 001547 5/49 5/51
INP?P 001555 5/49 5/51
INR? 001417 5/49 5/51
INR?1 002016 5/51
INR?K 002015 5/51
INR?O 002017 5/51
INS? 001561 5/49
INS?0 001551 5/49
INS?1 001552 5/49
INS?2 001553 5/49
INS?3 001554 5/49 5/51
INS?R 001559 5/49 5/51
INS?W 001571 5/49 5/51
INS?X 001612 5/51
INT? 001233 5/49
INTIE 001244 5/49
INTPR 001246 5/49
IOOT? 000233 2/22 4/48 5/51
IOM?O 000235 2/29 5/45 5/53
IPOO? 000221 2/22 5/49 5/51 5/53
IPOE? 000220 2/22
IPOO? 000222 2/22 5/51 5/53
ISWR? 000213 2/22 5/49 5/53
ITI?D 000225 2/22 3/02
ITI?O 000224 2/22 4/38
? 000232 2/22 5/49 5/51
lin? 002175 5/53
ITR?O 002177 5/53
ITR?R 000206 2/22 5/33
ITR?T 002176 5/53
ITTD 000236 2/27 3/20 3/27 3/34 3/45 4/00
ITTI 000237 2/28 3/02 3/33
ITYP? 000217 2/22 5/49
I2OO? 000223 2/22 5/51 5/53
K10?0 002204 5/53
K12? 000711 5/49
K15? 000712 5/49
LIMIT 000517 3/50 4/15
LOOPX 006231 2/29
LOO?P 002174 5/53
LOO?T 002364 5/53
LOP?E 002200 5/53
MCODE 002417 2/60 5/59
MDV?1 002205 5/53
MDV?2 002151 5/53
MDV?3 002160 5/53
MDV?4 002165 5/53
MDV?5 002202 5/53
MES?M 000641 5/49
MES?S 000633 2/22 3/49
M[illegible]G 002555 3/33 6/04
. 002607 3/44 6/05
MUL? 002162 5/53
MUL?A 002163 5/53

01071 001567		5/51	
0D172 001564		5/51	
0D175 001565		5/51	
0D670 001563		5/51	
0D77 001771		5/51	
0DA7 001570		5/51	
0DA7C 001566		5/51	
0DA7L 001713		5/51	
0DB7E 001754		5/51	
0DB7P 001633		5/51	
0DD7B 001630		5/51	
0DD7R 001735		5/51	
0DD7T 001775		5/51	
0DE71 001760		5/51	
0DE72 001762		5/51	
0DE74 001757		5/51	
0DE70 001773		5/51	
0DI7N 002006		5/51	
0DI7T 001772		5/51	
0DL7C 001701		5/51	
0DL7T 001777		5/51	
0DO7C 001721		5/51	
0DO7F 001776		5/51	
0DO7K 000210		2/22	5/51
0DP7C 001577		5/51	
0DR7T 001600		5/51	
0DT71 001624		5/51	
0DT72 001647		5/51	
0DT73 002003		5/51	
0DT7I 001614		5/51	
0DT7J 001617		2/22	5/51
0DT7K 002020		5/51	
0DT7P 002002		5/51	
0DU7A 001774		5/51	
0DW7T 001652		5/51	
07DTD 000527	MC	5/50	
07DTP 022740	MC	5/50	
P1777 001166		5/49	
P3777 000654		5/49	
PAC70 001003		5/49	
PAC71 001130		5/49	
PAC72 001004		5/49	
PAS75 000203		2/22	5/53
PA7C1 001274		5/49	
PA7C3 001273		5/49	
PA7SI 000204		2/22	
PA7SV 000205		2/22	
PC170 001007		5/49	
PC171 000655		5/49	
PC172 001266		5/49	
PC175 001257		5/49	
PC470 001137		5/49	
PC670 001006		5/49	
PC77 001140		5/49	
PCR7Y 001002		5/49	
PDC71 000743		5/49	
PDC72 000740		5/49	
PDC75 000725		2/22	5/49

```
PDE?C 000735        2/22    5/49
PLP?T 001065        5/49
POC?T 000717        2/22    5/49
      000652        5/49
P..0U 024652  MC    2/21
RB6?0 001330        5/49
RES?T 000234        2/23    4/51    5/49
RST?R 001020        5/49
RTN?A 001001        5/49
RUB?  001314        5/49
SAV?E 001012        5/49
SPT?G 000651        5/49
STA?T 001556        5/49
STO?P 002277        5/51
SWREG 002416        2/22    5/58
S?WPD 000050  MC    5/49
S?WPK 021330  MC    5/49
TAC?0 001132        5/49
TAC?C 001136        5/49
TEM   000051        1/17    3/10    3/15
TIN?1 001270        5/49
TIN?2 001271        5/49
TIN?A 001275        5/49
TIN?C 001141        5/49
TIN?D 001201        2/22    5/49
TIN?M 001226        5/49
TIN?N 001247        5/49
TIN?O 001175        2/22    5/49
TIN?Q 001204        5/49
    R 001144        5/49
TIN?S 001211        5/49
TIN?W 001215        5/49
TIN?X 001143        5/49
TIN?Z 001205        5/49
TMP?  001011        5/49
TOD?T 001167        5/49    5/51
TO?DT 002004        5/51
TPR?T 001105        5/49
TPS?P 001026        2/22    5/49
TP??  002001        5/51
TSI?  001146        5/49
TTCO  000554        4/46    4/54
TTCR  000555        4/49    4/55
TTID  000557        2/27    4/60
TTII  000535        2/28    4/36    4/40    4/42    4/60    5/04
TTII1 000544        4/39    4/45    5/03
TTII2 000542        4/41    5/05
TTS2  000556        4/37    4/41    4/56    5/01
TTY?  001050        5/49
TYP?E 001031        2/22    5/49
TYP?R 001135        5/49
T?TY0 016366  MC    5/49
XXX   000533        1/14    4/27
ZDC?T 000713        2/22    5/49
   ?T 000722        5/49
...?P 001131        5/49
?F    000000        2/22
?G    000001        2/22
```

REVISION HISTORY		
ECO #	DATE	AFFECTED SHEETS
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

MT130 COUPLER

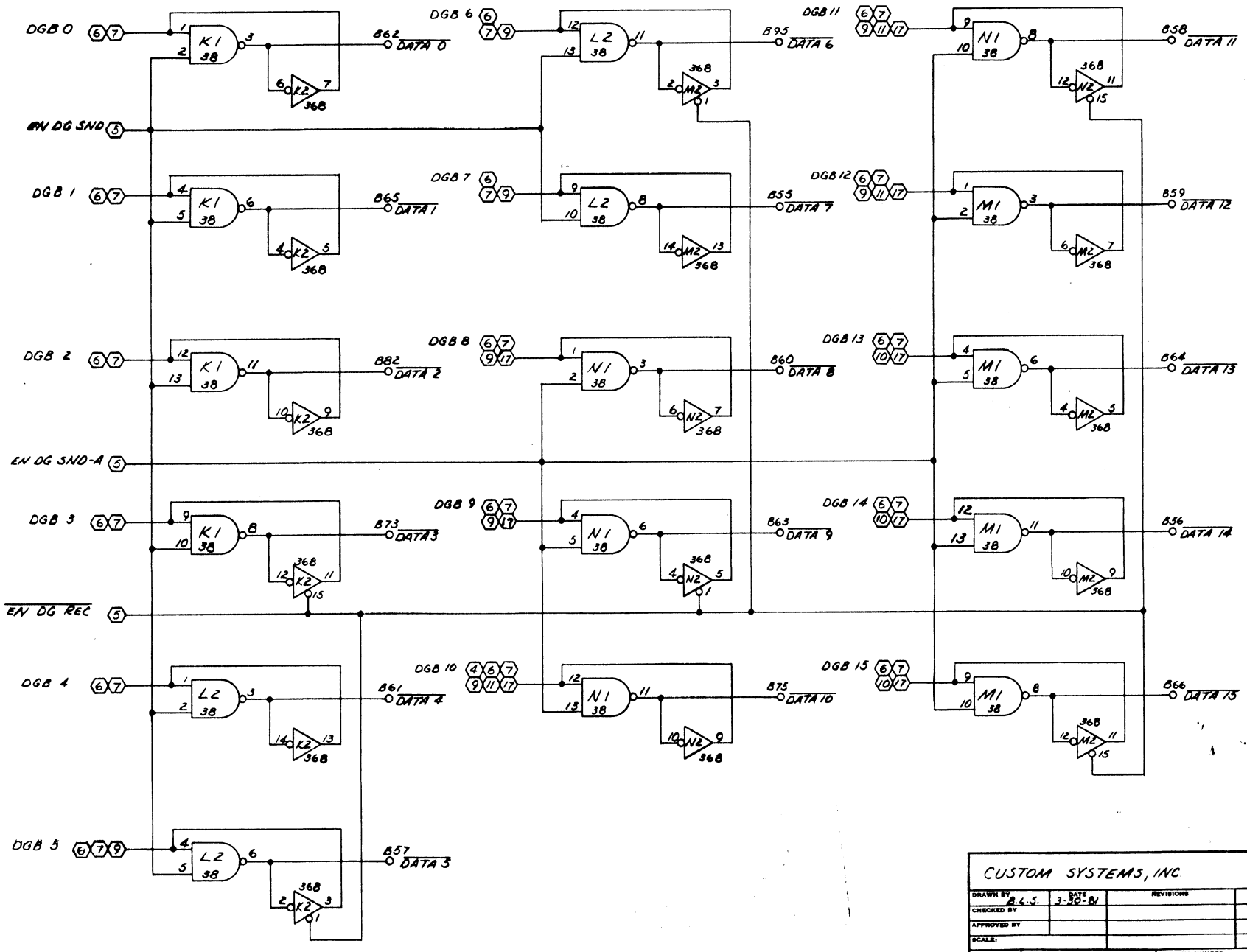
NOTE:

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

EXAMPLE: ⑫ = SHEET 2.

(SHEET 1)

CUSTOM SYSTEMS, INC.			
DRAWN BY B.L.S.	DATE 3-30-81	REVISIONS	DATE
CHECKED BY			
APPROVED BY			
SCALE:			
TITLE MT130 COUPLER		DRAWING NUMBER 242-L18-225-01	



CUSTOM SYSTEMS, INC.			
DRAWN BY B.L.S.	DATE 3-30-81	REVISIONS	DATE
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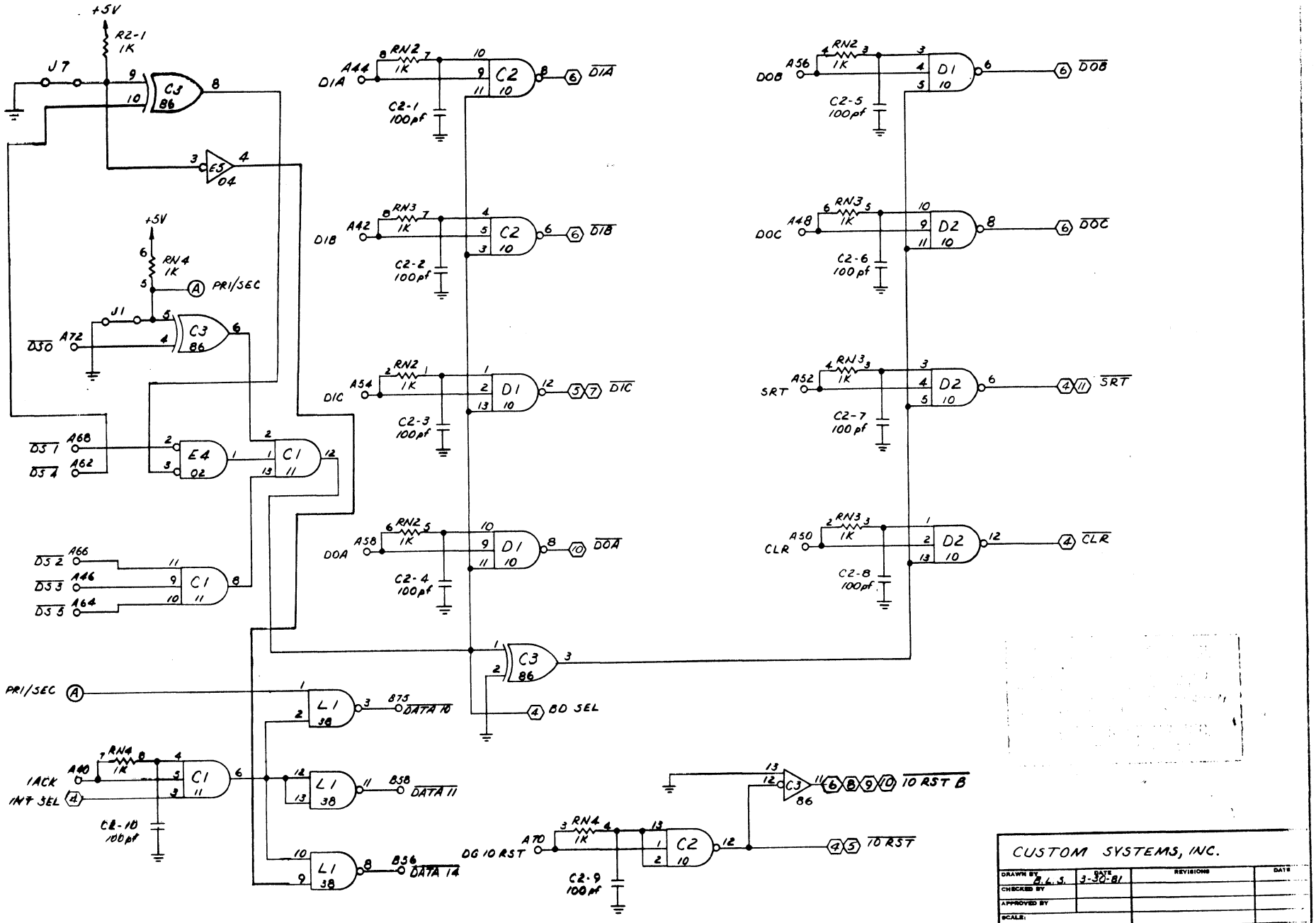
TITLE EFC DG INTERFACE		DRAWING NUMBER 242-L19-ZZ5-00	

(SHEET 2)



CUSTOM SYSTEMS, INC.			
DRAWN BY A.L.S.	DATE 3-30-81	REVISIONS	DATE
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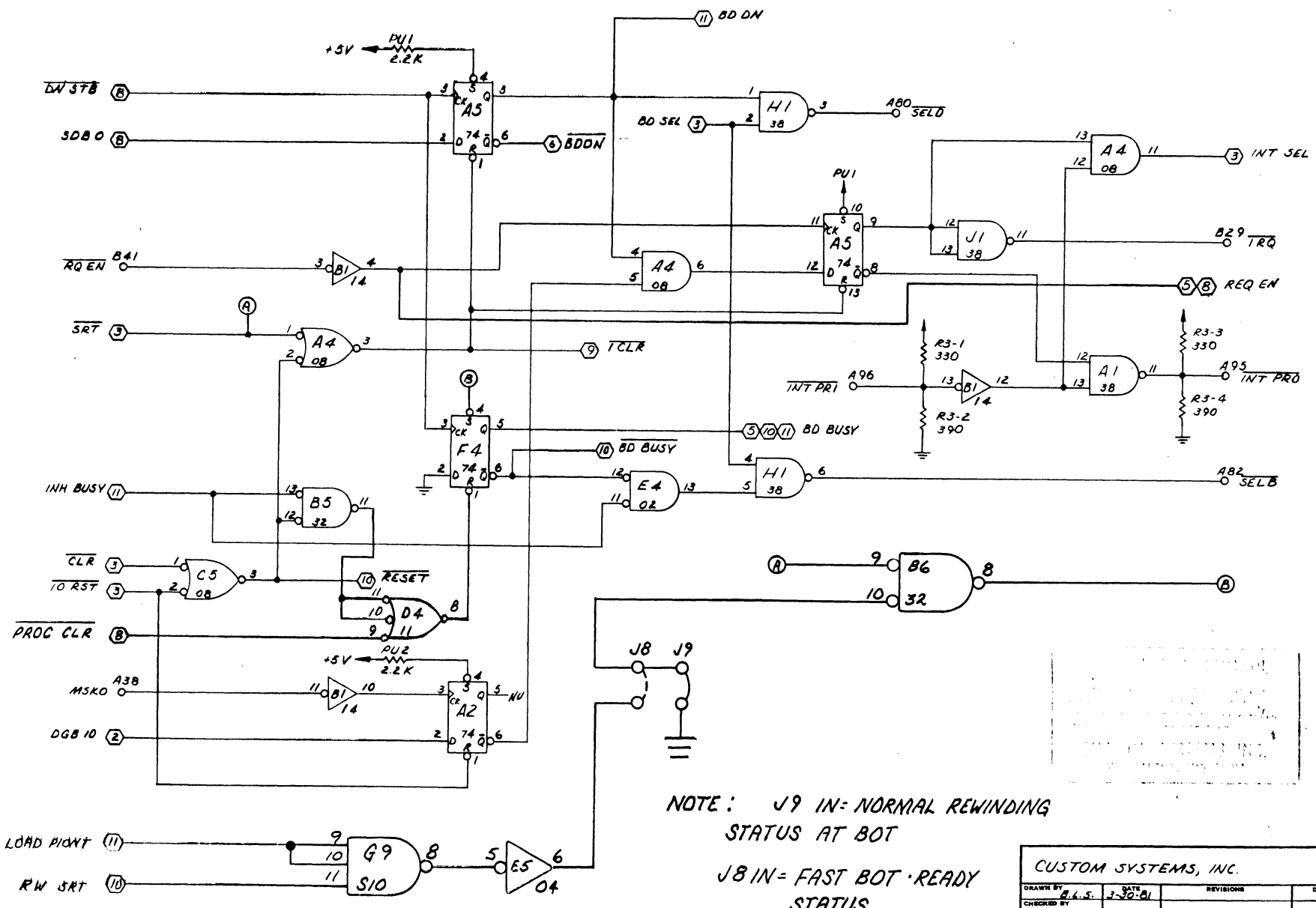
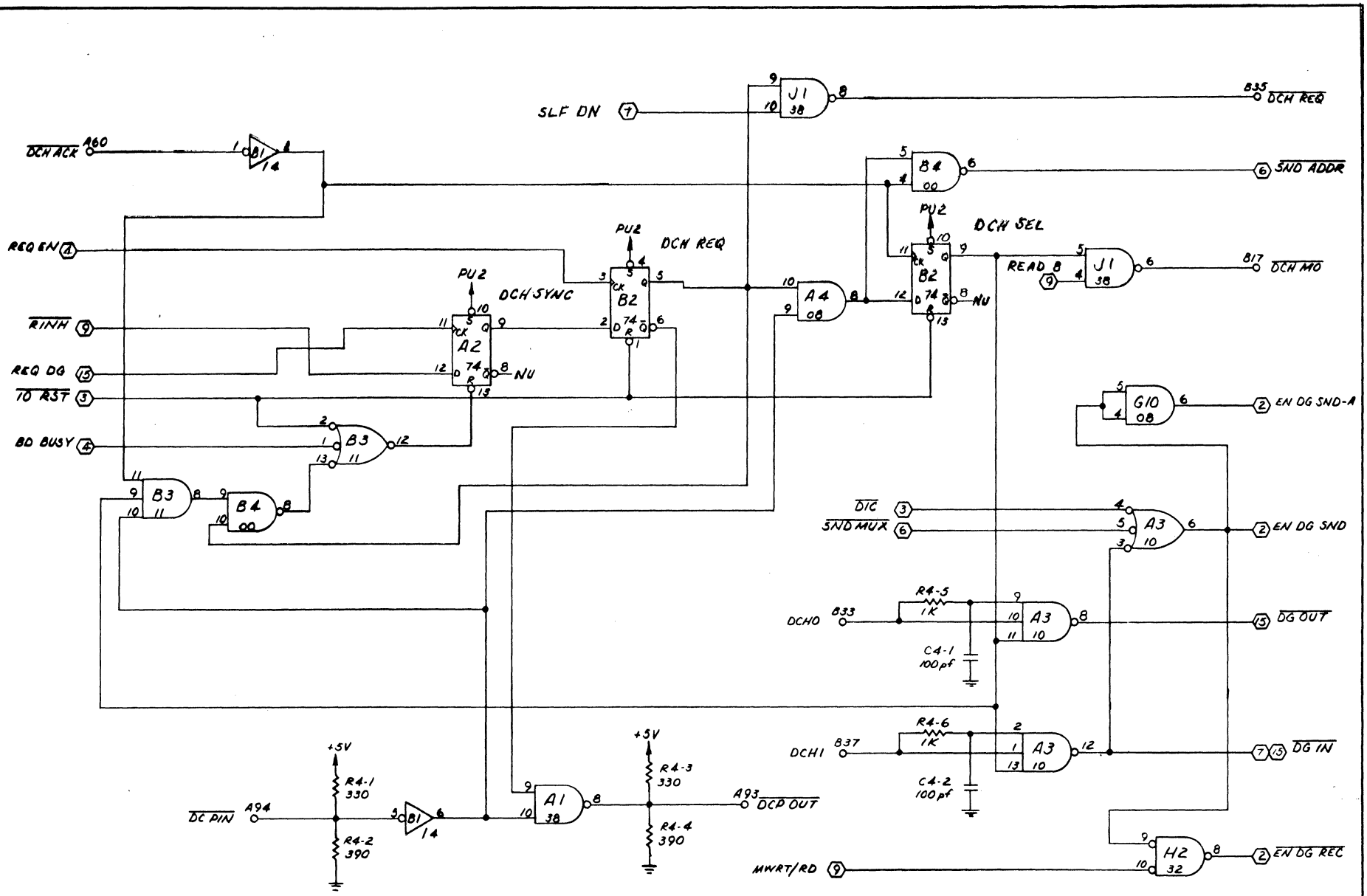
APPROVED BY			
SCALE:			
TITLE EFC DG INTERFACE (CONT.)		DRAWING NUMBER 242-L20-225-C	

(SHEET 3)





CUSTOM SYSTEMS, INC.

DRAWN BY	DATE	REVISIONS	DATE
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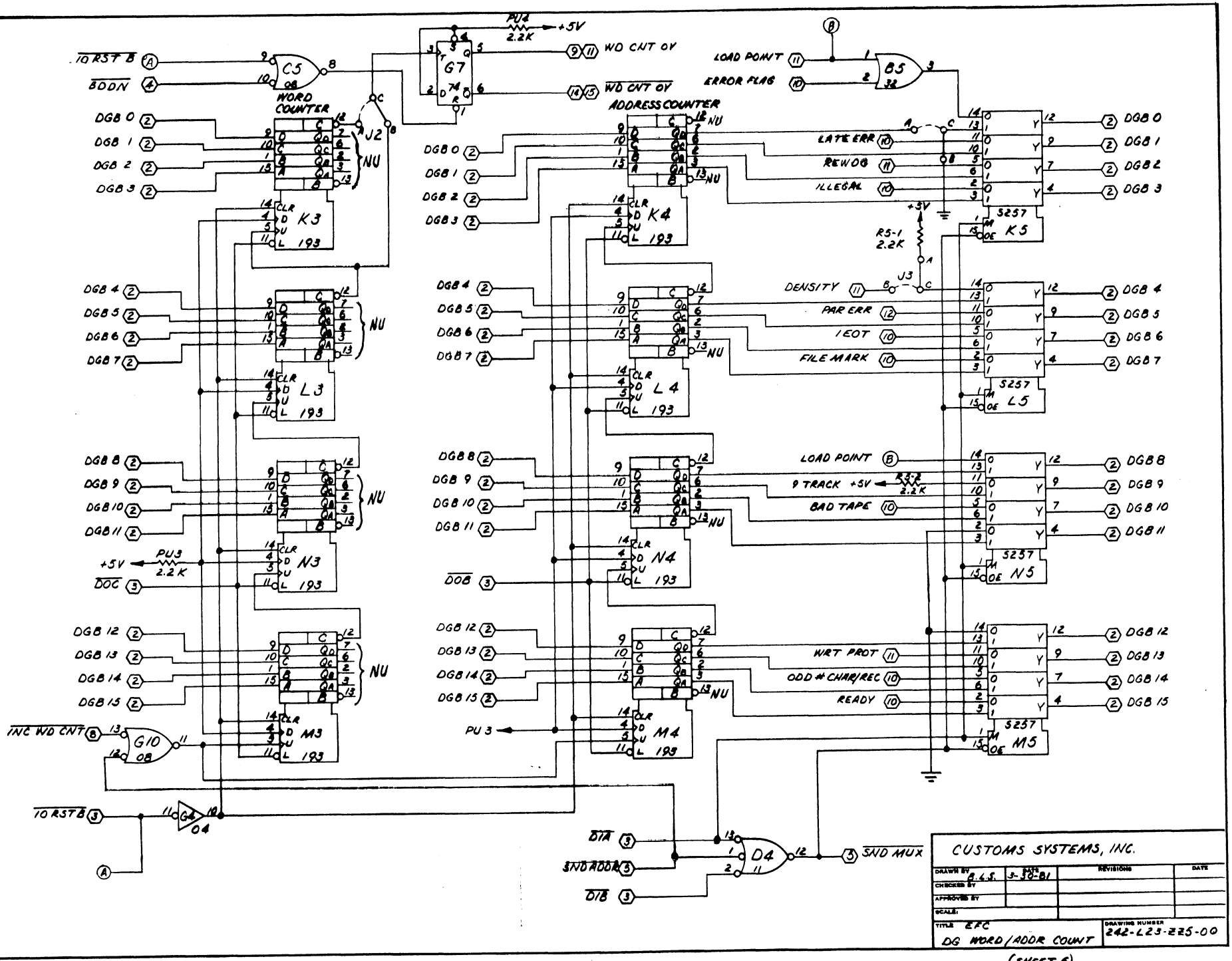
APPROVED BY			
SCALE:			

TITLE EFC
DG CONTROL (CONT.)

DRAWING NUMBER
242-122-225-00

(SHEET 5)



CUSTOMS SYSTEMS, INC.

DRAWN BY	DATE	REVISIONS	DATE
A.L.S.	3-30-81		
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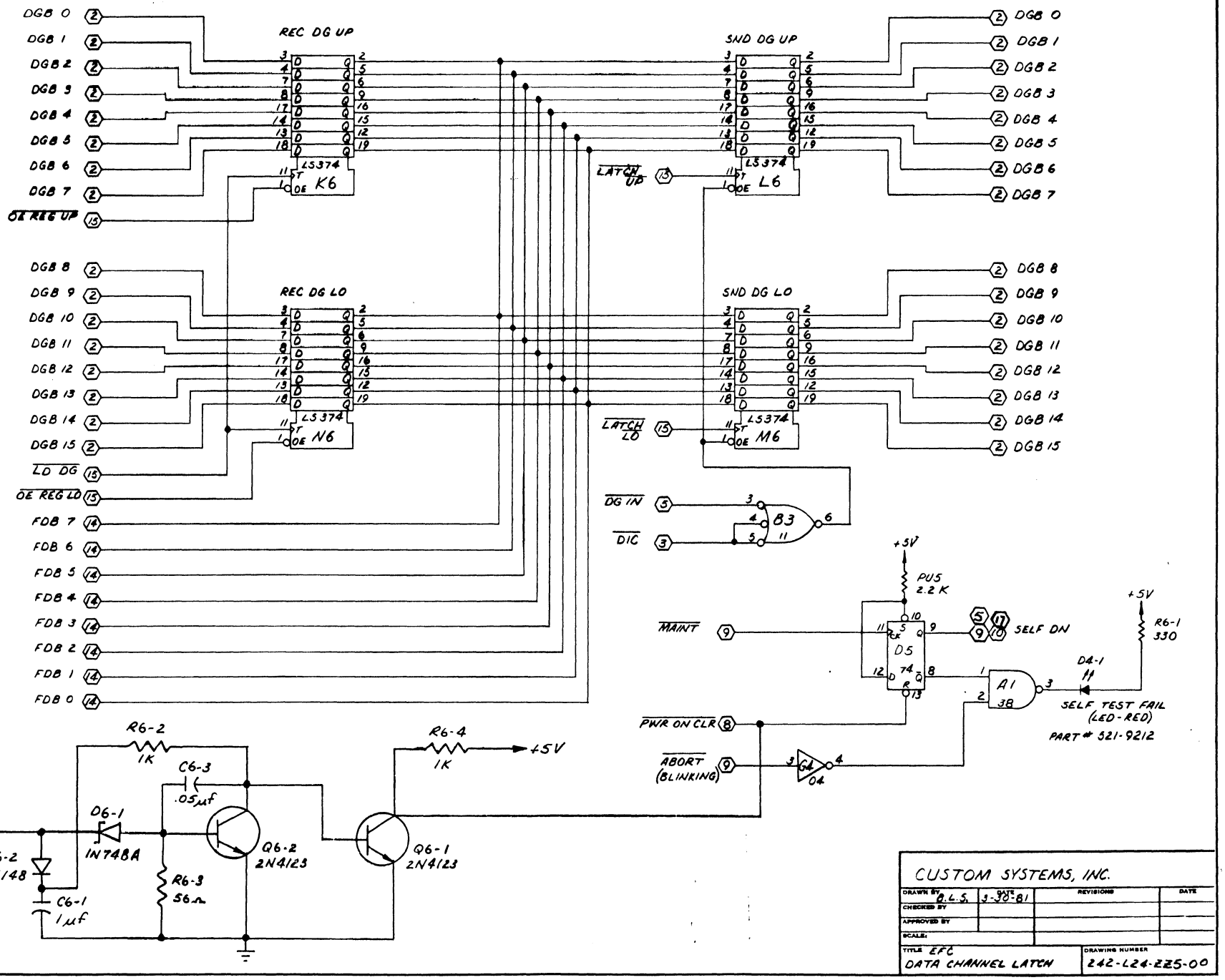
APPROVED BY			
SCALE:			

TITLE EPC
DG WORD/ADDR COUNT

DRAWING NUMBER 242-L23-225-00

(SHEET 6)



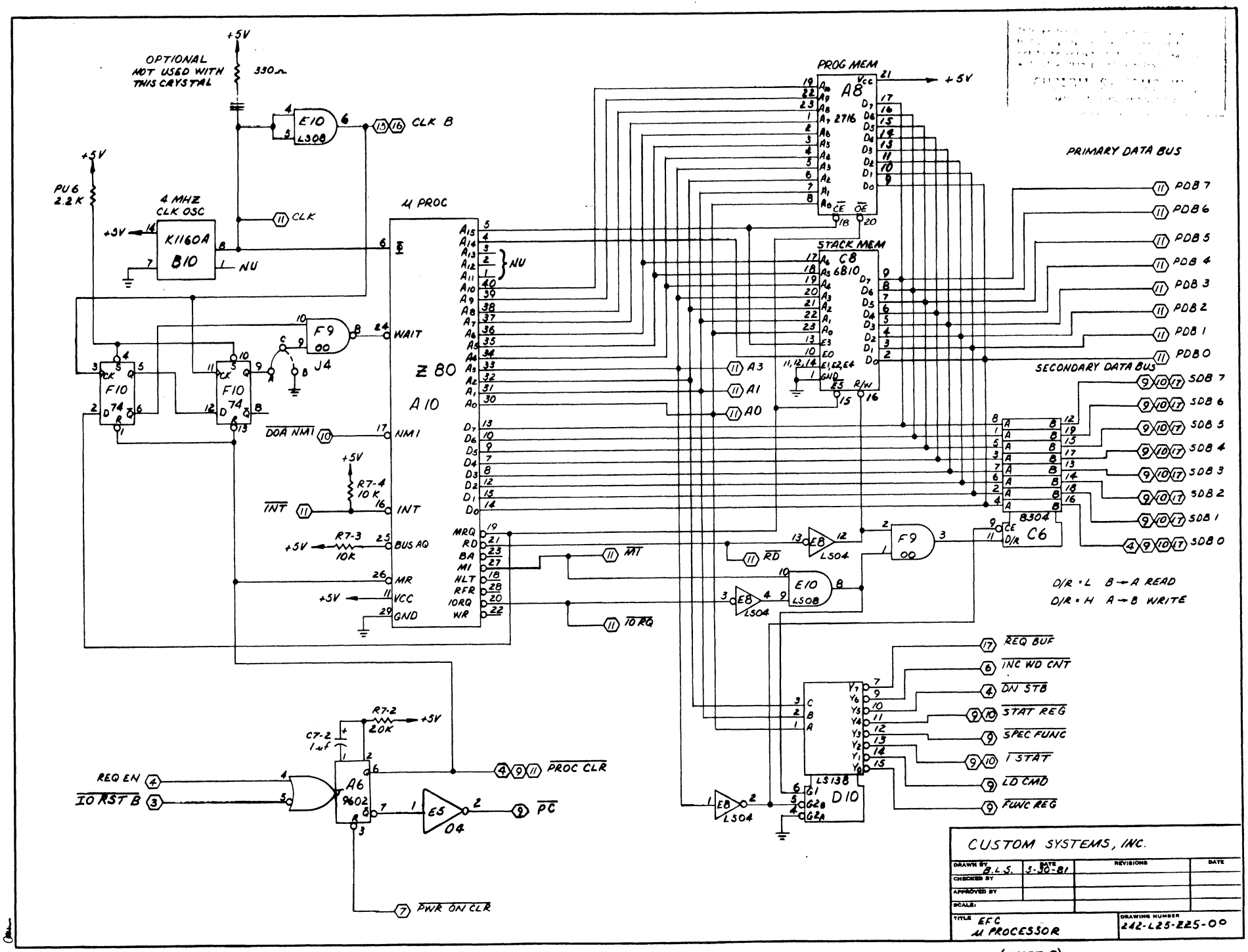
CUSTOM SYSTEMS, INC.

DRAWN BY P.L.S.	DATE 3-30-81	REVISIONS	DATE
CHECKED BY			
APPROVED BY			
SCALE:			

TITLE EFC
DATA CHANNEL LATCH

DRAWING NUMBER
242-L24-225-00

(SHEET 7)



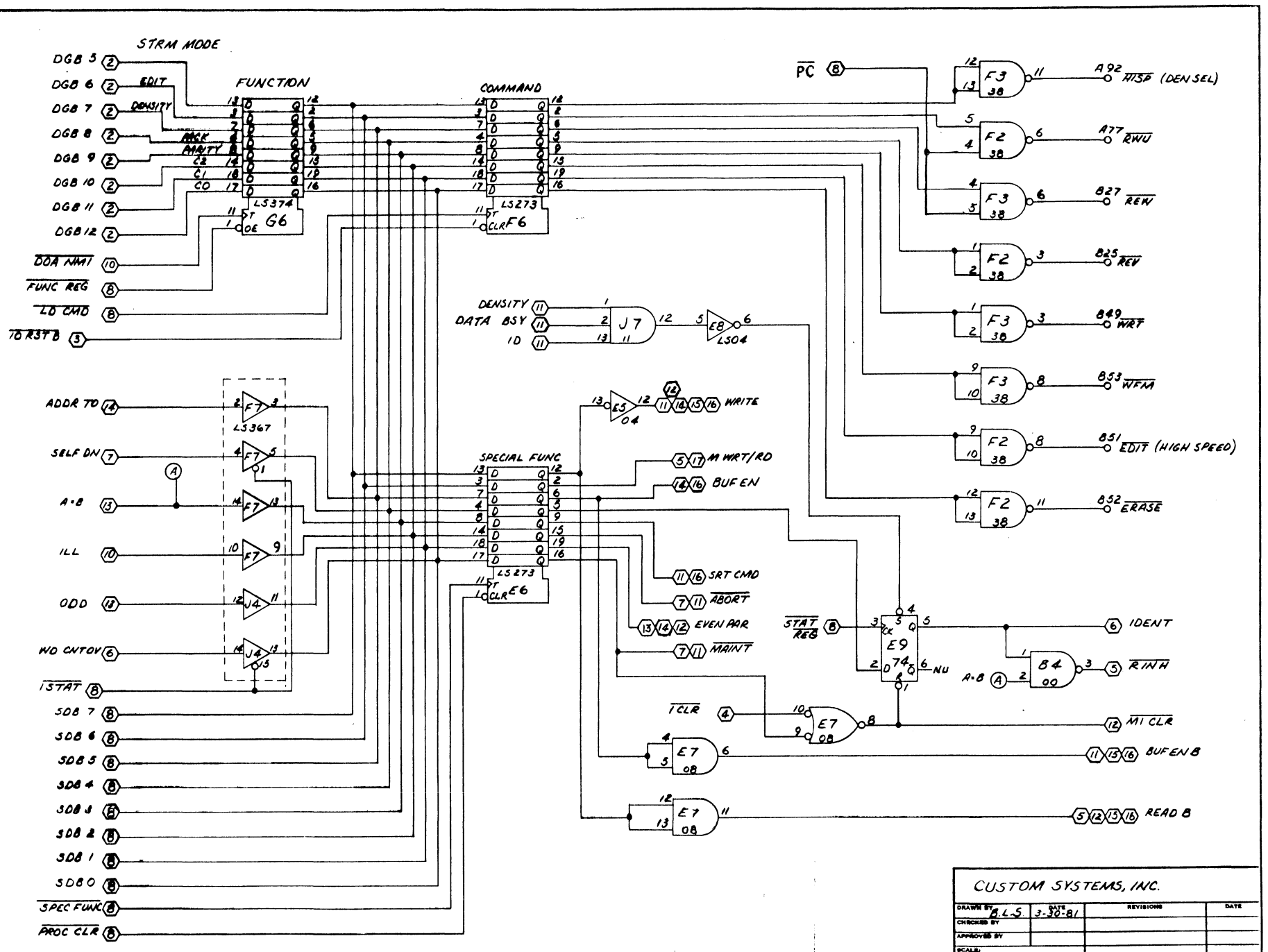
CUSTOM SYSTEMS, INC.

DRAWN BY	DATE	REVISIONS	DATE
B.L.S.	3-30-81		
CHECKED BY			
APPROVED BY			
SCALE:			

TITLE: EFC μ PROCESSOR

DRAWING NUMBER: 242-L25-225-00

(SHEET 8)



CUSTOM SYSTEMS, INC.

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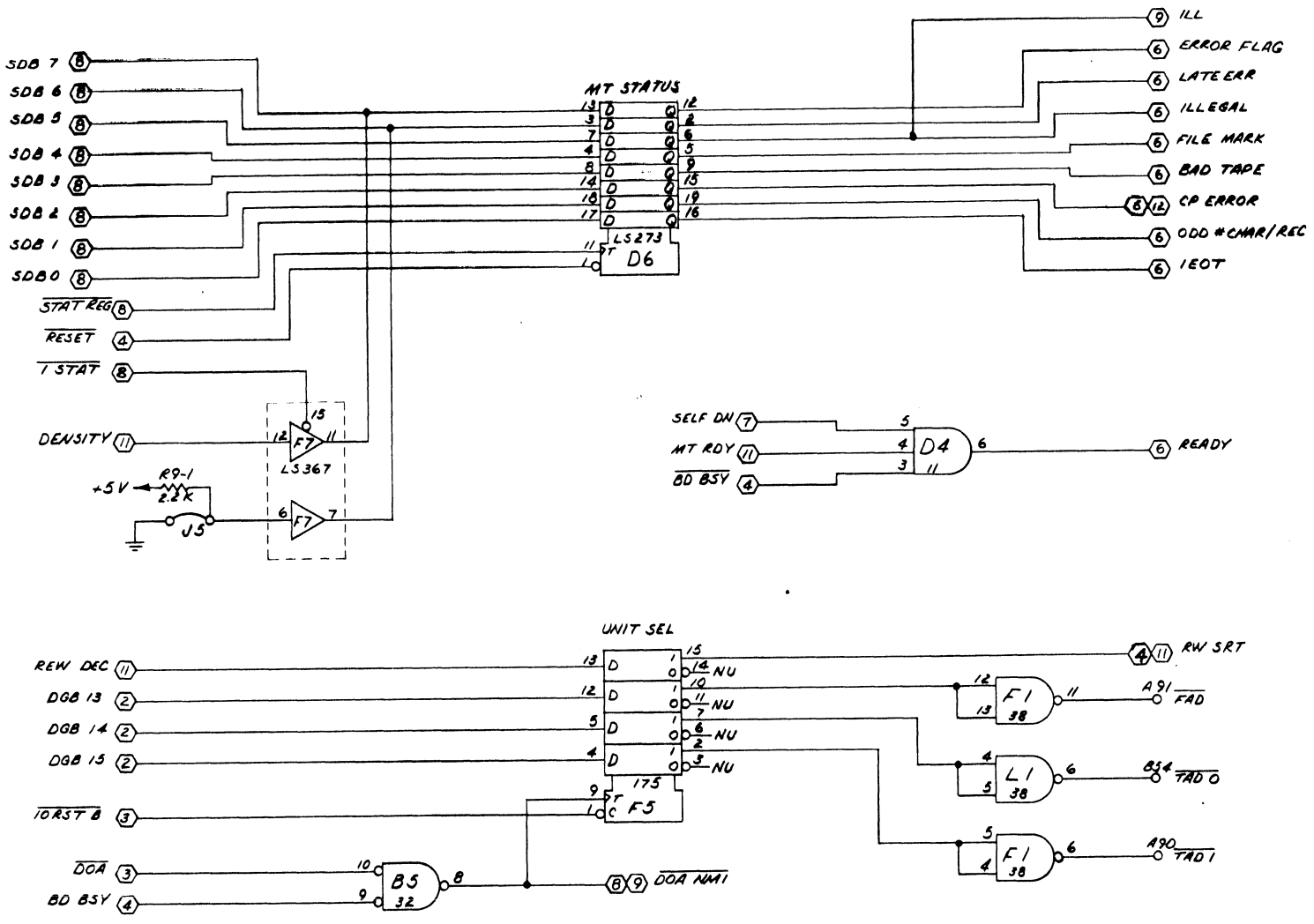
B.L.S	3-30-81		
CHECKED BY			
APPROVED BY			
SCALE:			

TITLE: EFC FUNC/STATUS REG

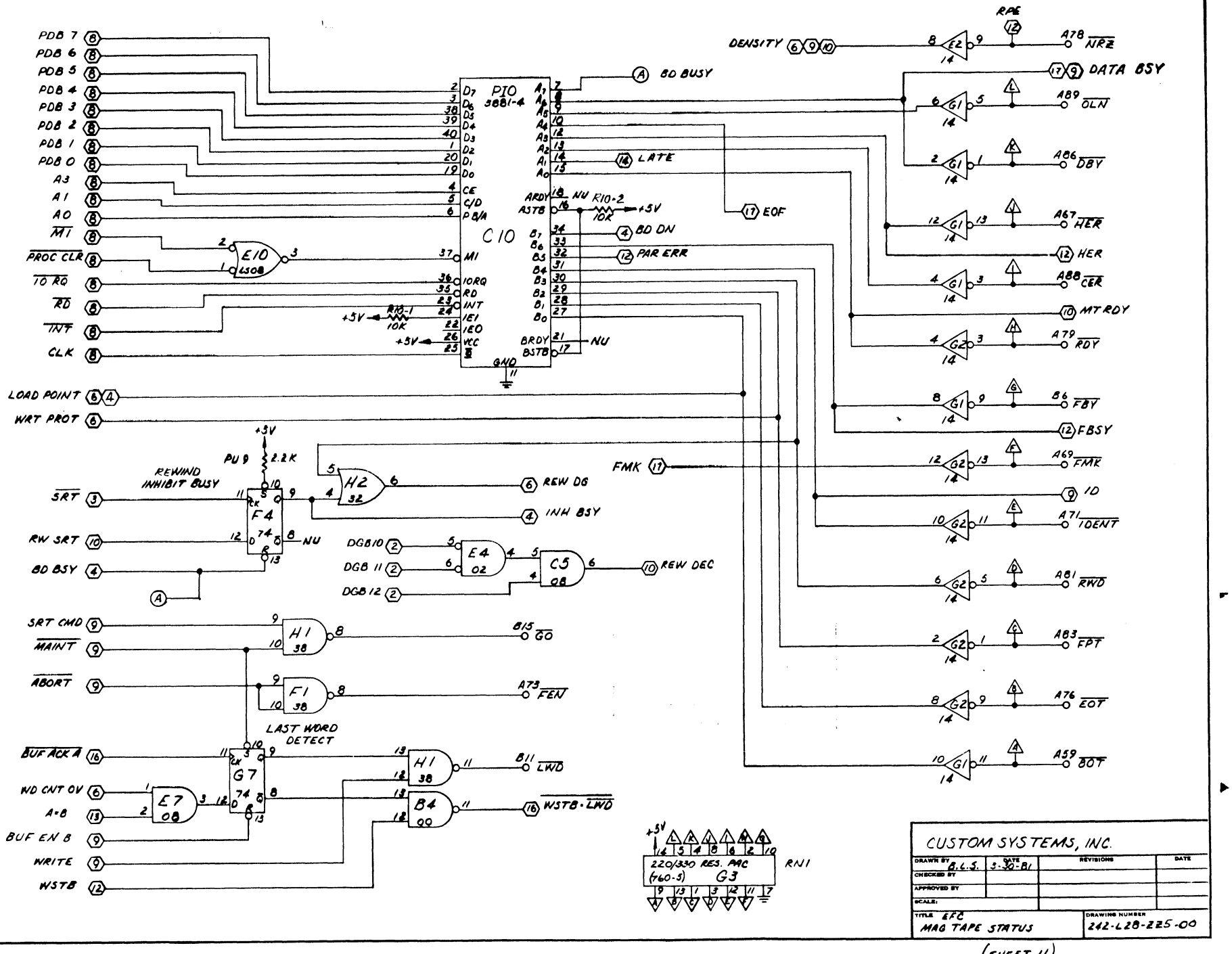
DRAWING NUMBER: 242-L26-225-00

(SHEET 9)



CUSTOM SYSTEMS, INC.			
DRAWN BY A.L.S.	DATE 3-30-81	REVISIONS	DATE
CHECKED BY			
APPROVED BY			
SCALE:			
TITLE EFC FUNC/STATUS REG (CONT.)		DRAWING NUMBER 242-127-225-00	

(SHEET 10)



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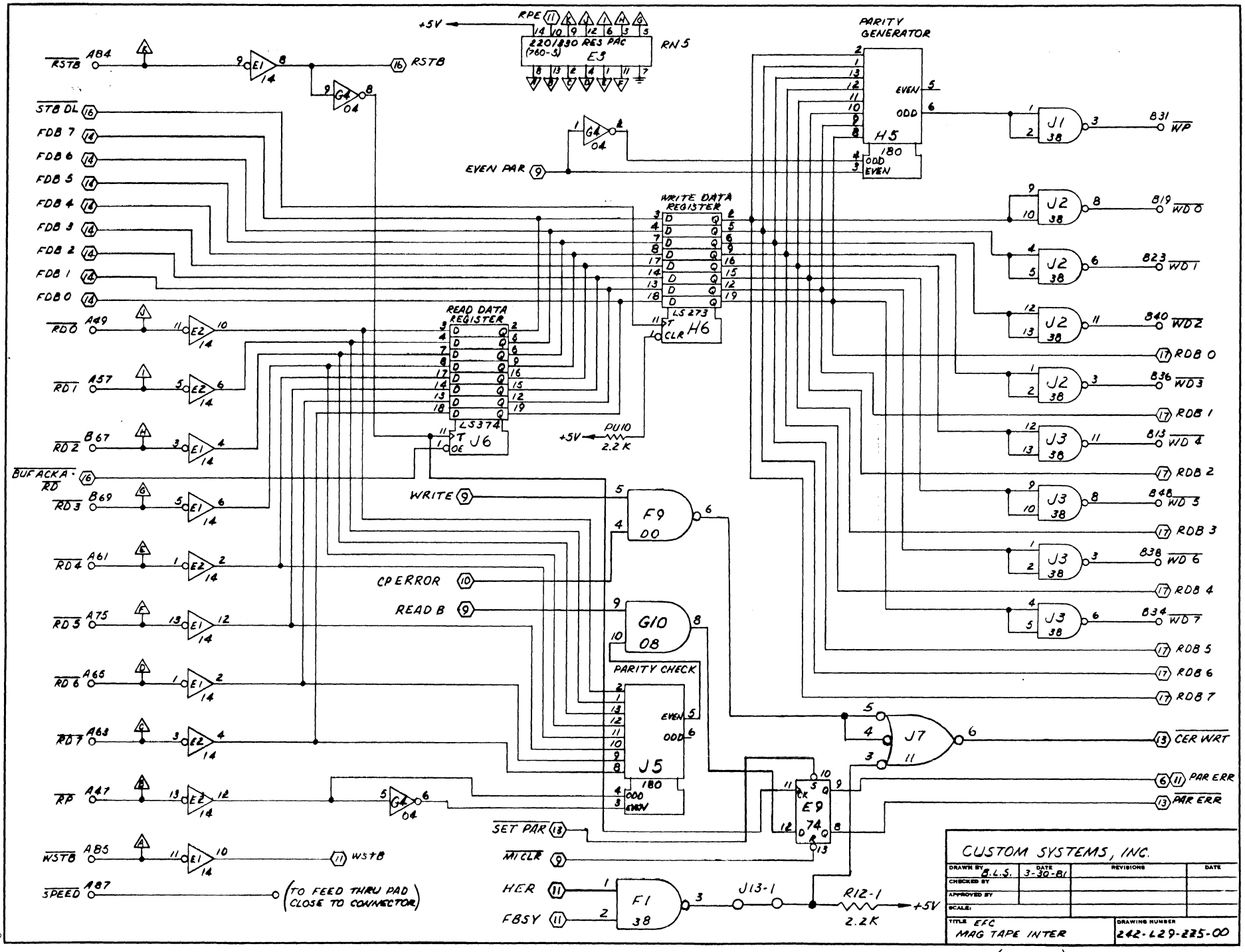
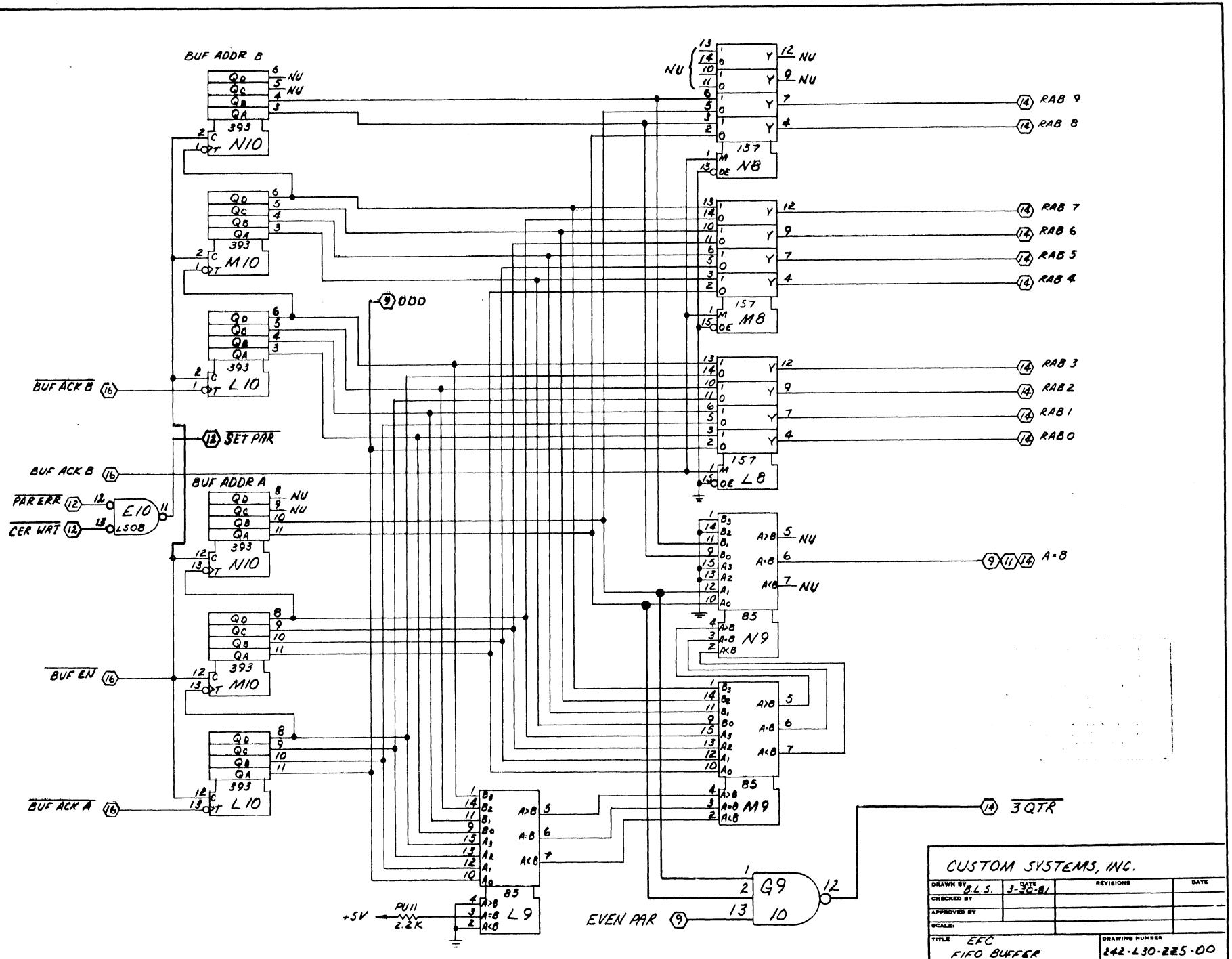
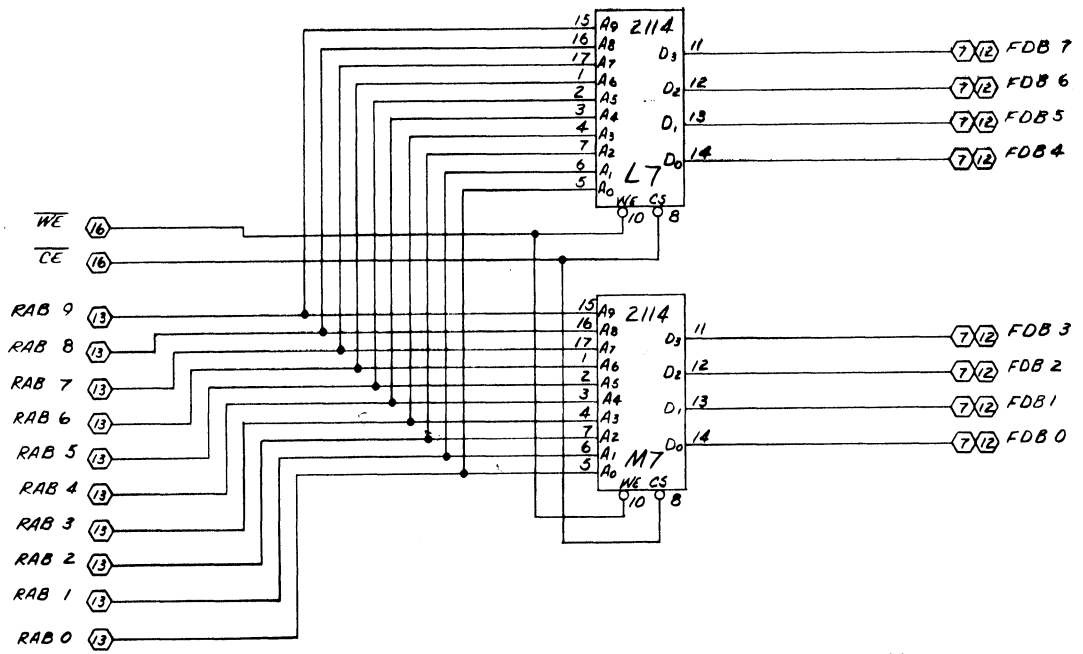
APPROVED BY			
SCALE:			
TITLE: EFC MAG TAPE STATUS		DRAWING NUMBER: 242-L28-225-00	

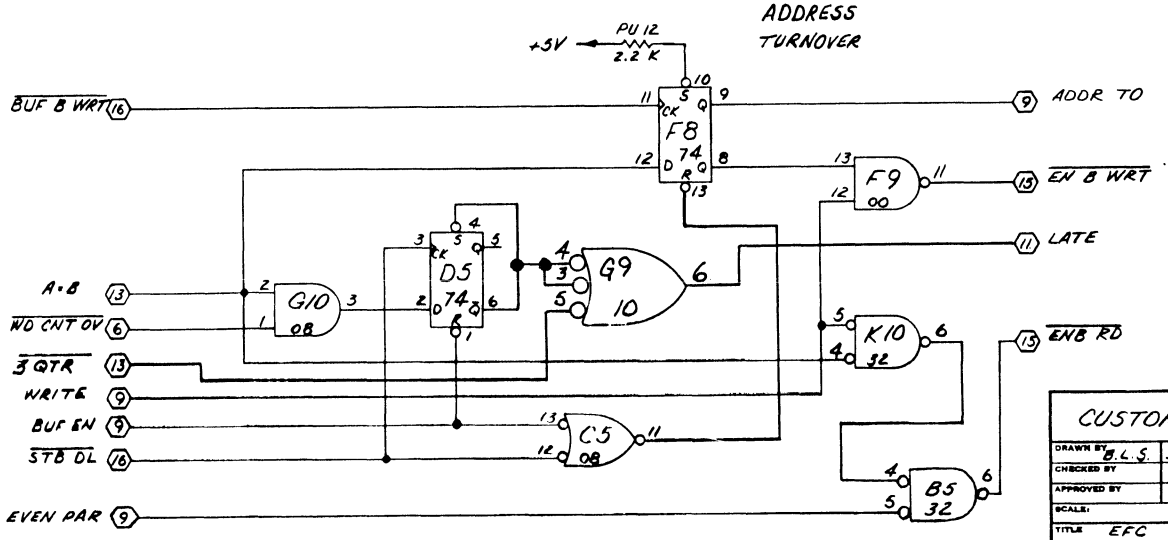
(SHEET 11)



(SHEET 12)







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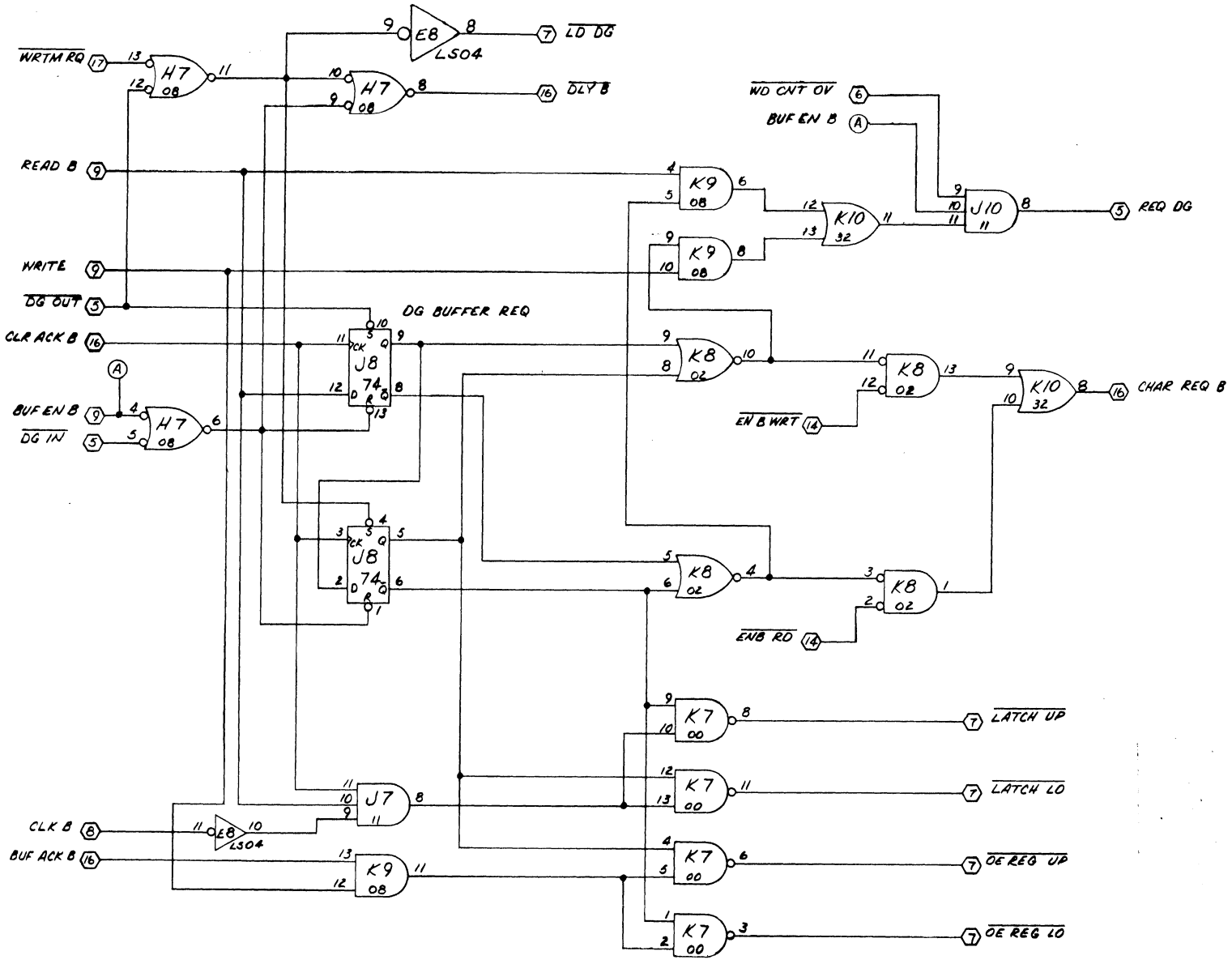
APPROVED BY			
SCALE:			
TITLE EFC FIFO BUFFER (CONT.)		DRAWING NUMBER 242-L31-225-00	

(SHEET 14)



CUSTOM SYSTEMS, INC.

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B.L.S.	3-30-81		
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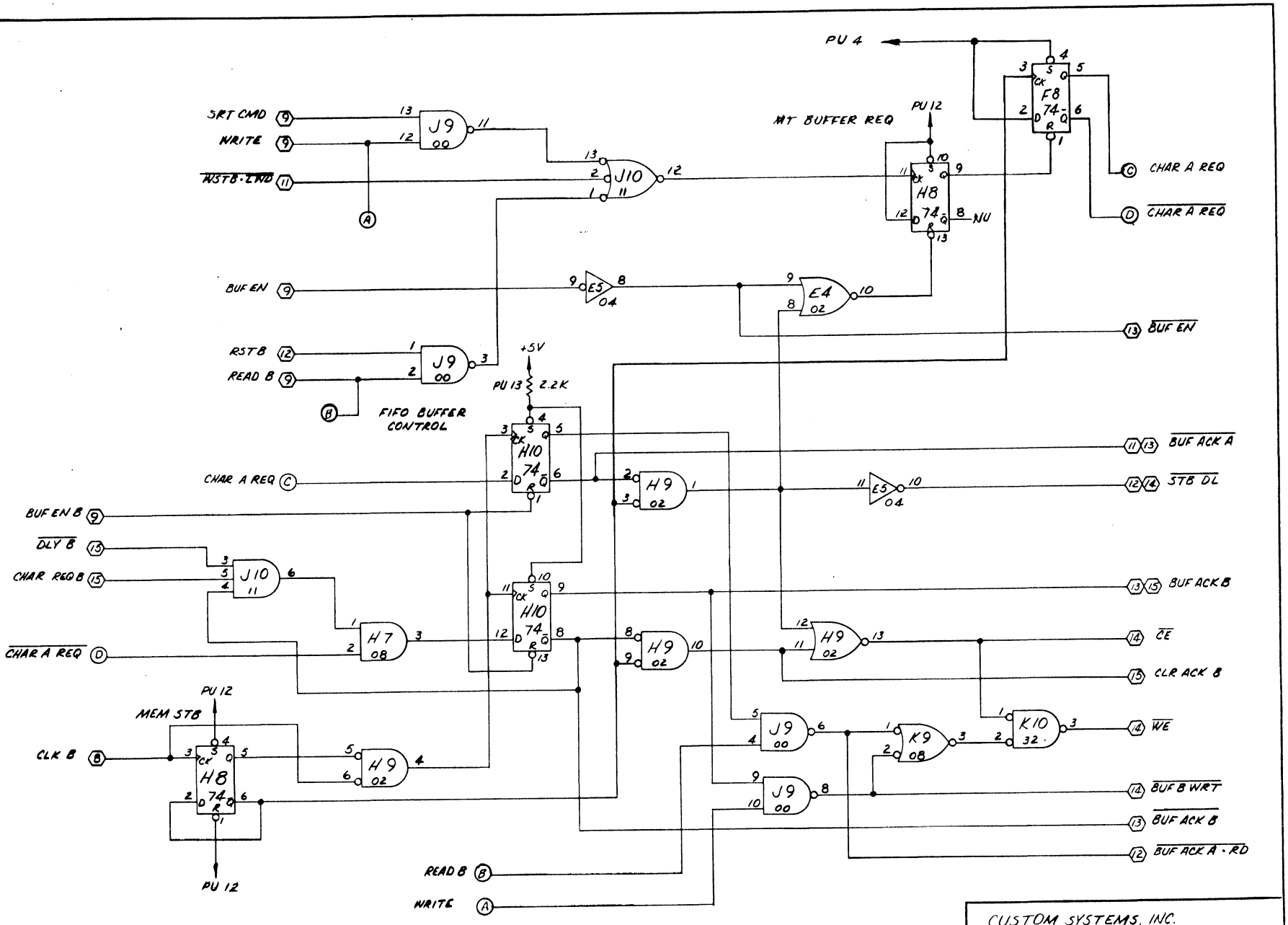
TITLE EFC
BUFFER CONTROL

DRAWING NUMBER
242-L32-225-00

(SHEET 15)



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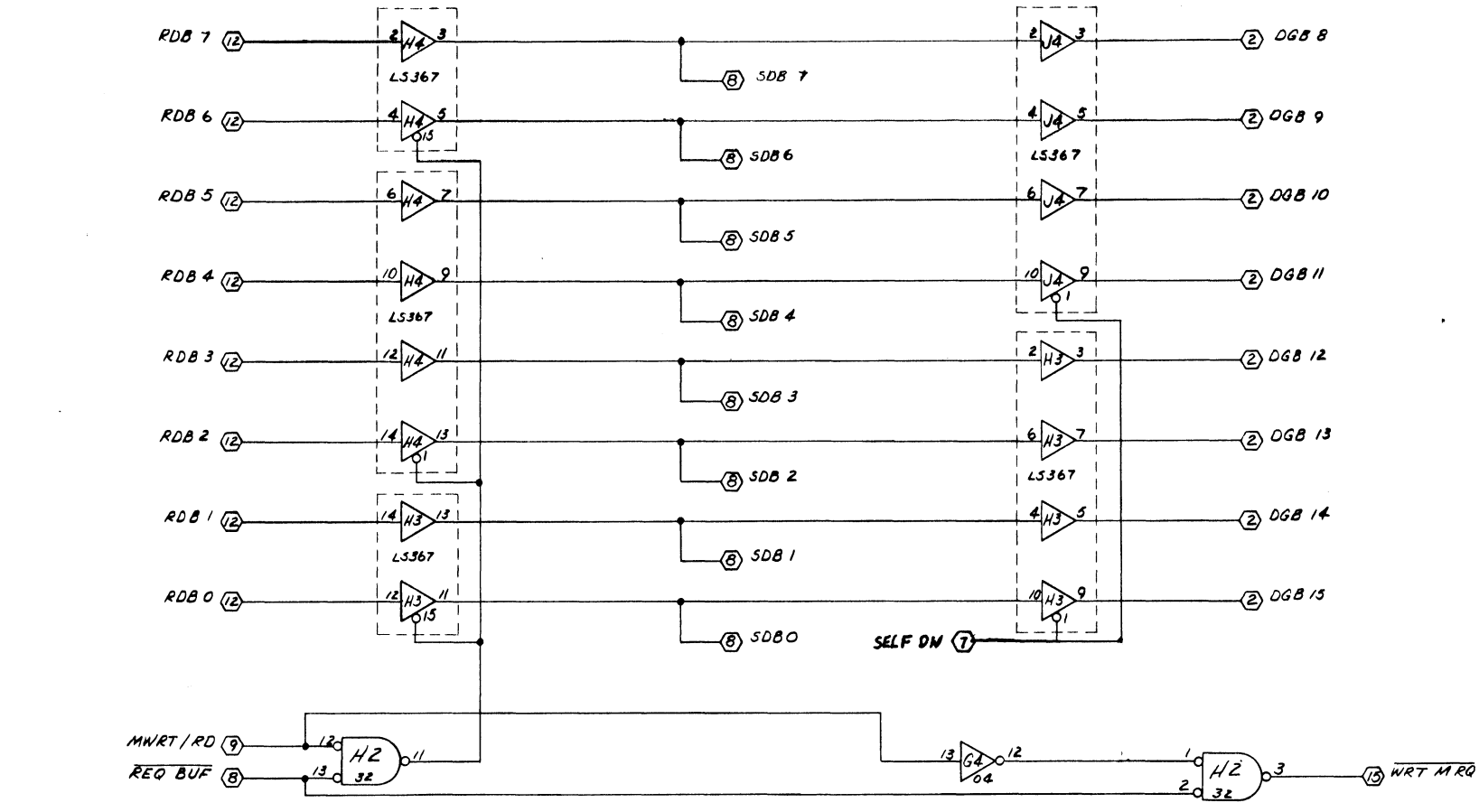
APPROVED BY			
SCALE:			
TITLE EFC BUFFER CONTROL (CONT.)		DRAWING NUMBER 242-133-225-00	

(SHEET 16)



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APPROVED BY			
SCALE:			
TITLE EFC BUFFER MAINT		DRAWING NUMBER 242-L34-225-00	

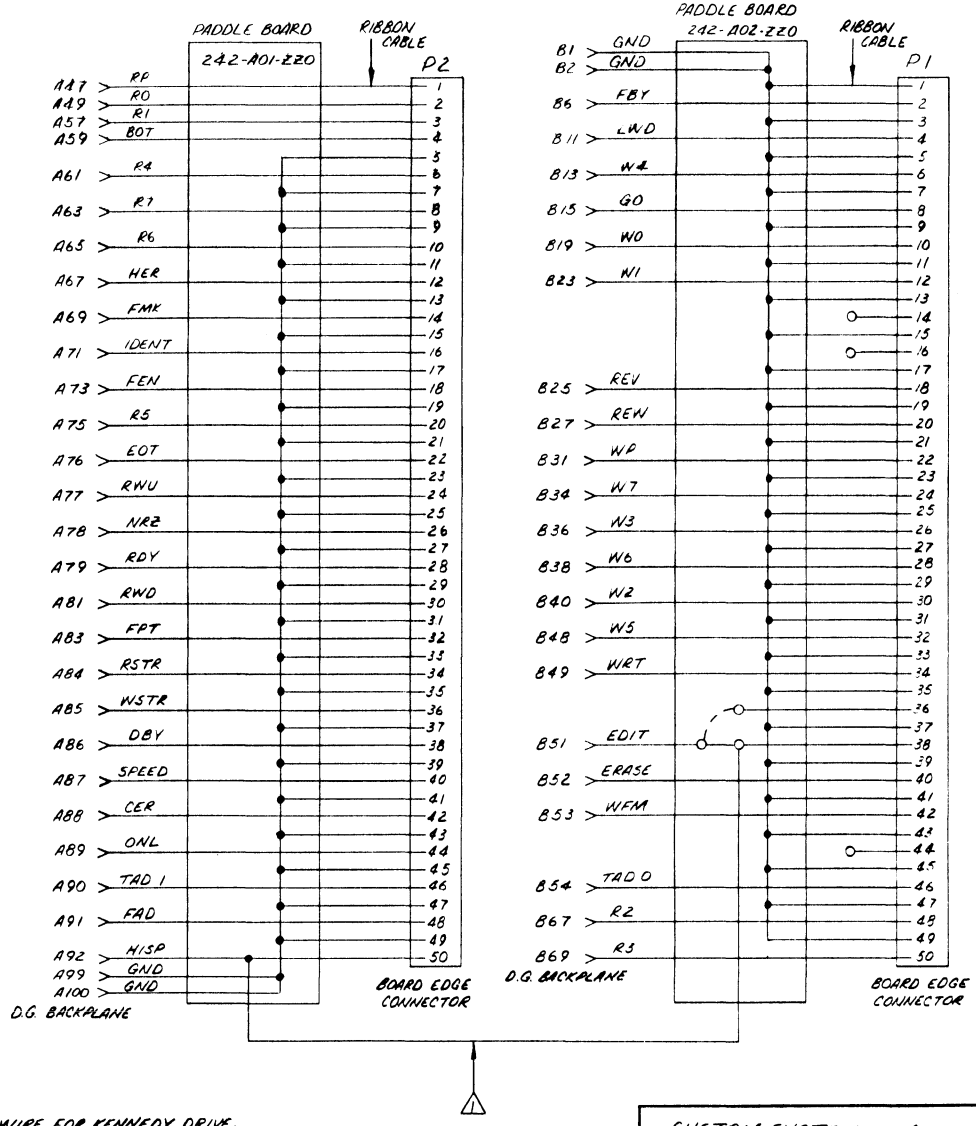
(SHEET 17)

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	DCHO	33
36	W3	DCHR	35
38	W6	DCHI	37
40	W2	OVFLO	39
42		RQENB	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 5	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	DS3		45
48	DATOC	RP	47
50	CLR	RO	49
52	STRT		51
54	DATIC		53
56	DATOB		55
58	DATOA	RI	57
60	DCHA	BOT	59
62	DS4	R4	61
64	DS3	RT	63
66	DS2	R6	65
68	DST	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	SPEED	87
90	TADI	ONL	89
92	HISP	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.

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SCALE:			
TITLE EFC CABLE DIAGRAM		DRAWING NUMBER 242-L35-225-00	

(SHEET 18)

PARTS LIST
CUSTOM SYSTEMS, INC.

FOR	A FORMATTER ASSEMBLY	REF. DWG.		242-B04-ZZ1-01	ASSY. LOGIC

ITEM	QTY	PART TYPE	DESCRIPTION	MFG.	REF.
1	1	242-A01-ZZ0	A Formatter PC Board		
2	1	242-C10-ZZ0-00	Formatter Cable		
3	3	ES24-1/16	24 Pin Connector	Circuit Assembly	

REV

PARTS LIST
CUSTOM SYSTEMS, INC.

FOR	B FORMATTER ASSEMBLY	REF. DWG.		242-B11-ZZ1-00	ASSY. LOGIC

ITEM	QTY	PART TYPE	DESCRIPTION	MFG.	REF.
1	1	242-A02-ZZ0	B Formatter PC Board		
2	1	242-C10-ZZ0-00	Formatter Cable		
3	3	ES24-1/16	24 Pin Connector	Circuit Assembly	

REV