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# 140-FT MODCOMP INTERFACE BUILT BY NRAO

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# 140-FOOT MODCOMP INTERFACE BUILT BY NRAO

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# 140-FT MODCOMP INTERFACE BUILT BY NRAO

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## I. Introduction

This report describes all interface built by NRAO for the MODCOMP system installed at the 140-ft. Each interface is listed below:

Clock and Calendar
ULO Control
Data Taking Control Panel
A/D Converter
MODCOMP to H316 Link
MODCOMP from H316 Link
Telescope Control Panel
Autocorrelator
On-Line to Off-Line Computer Link

## II. Programming

All interfaces have been designed for the following program flow for non-DMP devices:

1. Program issues a terminate command.*

2. Interface responds with a service interrupt.

3. Program issues an output command.

4. Interface responds with a data interrupt when it is ready for a data transfer.

5. Program will input or output the data. This data interrupt, data transfer continues until the block of data is transferred.

6. Interface issues a service interrupt when the block of data is transferred.

* Note: The service interrupt should be connected before issuing the terminate.

### 1. Clock and Calendar

Device Address 39 - Data Interrupt Entry Location B9
Priority 12 - Service Interrupt Entry Location F9
Service Interrupt Return Location 3A*
Data Interrupt Return Location 38*

*These addresses are the same for all devices.

<u>ISD Input Status</u>. This command inputs the status of the device. The following table lists the bits that are used:

| Bit | |
|---|---|
| 0 | 1 = No Error Condition Exists,<br>0 = Error Condition Bits 13-15 Point to the Device |
| 3 | 1 = Inoperable; this will always be the opposite state of Bit 0. |
| 13 | 1 = -15 V Power Supply Failed. |
| 14 | 1 = Clock Problems. |
| 15 | 1 = Calendar Problems. |

<u>OCD Output Command</u>. This command initiates a data transfer, or sends a terminate to the interface. The bit structure for these two commands are listed below:

| Bits .... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transfer | 1 | 0 | D | S | 1 | — | — | I | G | N | O | R | E | D | — | — |
| Terminate | 0 | 1 | D | S | 0 | 1 | — | — | I | G | N | O | R | E | D | — |

D = 1 Connect Data Interrupt
S = 1 Connect Service Interrupt

<u>IDD Input Data Command</u>. This command will input data from the interface and should be executed in response to a data interrupt. Four words are required to input the clock and calendar data; their format is listed below:

| Bit | Word 1 | Word 2 | Word 3 | Word 4 |
|---|---|---|---|---|
| 0 | 0 | 0 | 80 year | 0 |
| 1 | 0 | 40 sec. | 40 year | 0 |
| 2 | 20 hour | 20 sec. | 20 year | 20 day |
| 3 | 10 hour | 10 sec. | 10 year | 10 day |
| 4 | 8 hour | 8 sec. | 8 year | 8 day |
| 5 | 4 hour | 4 sec. | 4 year | 4 day |
| 6 | 2 hour | 2 sec. | 2 year | 2 day |
| 7 | 1 hour | 1 sec. | 1 year | 1 day |
| 8 | 0 | .8 sec. | 0 | 0 |
| 9 | 40 min. | .4 sec. | 0 | 0 |
| 10 | 20 min. | .2 sec. | 0 | 0 |
| 11 | 10 min. | .1 sec. | 10 month | 0 |
| 12 | 8 min. | 0 | 8 month | 0 |
| 13 | 4 min. | 0 | 4 month | 0 |
| 14 | 2 min. | 0 | 2 month | 0 |
| 15 | 1 min. | 20 hr. solar | 1 month | 0 |

## 2. ULO Control

Device Address 30 - Data Interrupt Entry Location B0
Priority 9 - Service Interrupt Entry Location F0

ISD Input Status. This command inputs the status of the device. The status bits and their meaning are listed below.

| Bit | |
|---|---|
| 0 | Always equal to a one. |
| 6 | 0 = ULO #2 connected. |
| 7 | 0 = ULO #2 comp./manual switch set to comp. |
| 8 } 9 } 10 } | ULO #2 front panel switch; see below. |
| 11 | 0 = ULO #1 connected. |
| 12 | 0 = ULO #1 comp./manual switch set to comp. |
| 13 } 14 } 15 } | ULO #1 front panel switch; see below. |

| Bit | 8 | 9 | 10 | ULO #2 |
|---|---|---|---|---|
| | 13 | 14 | 15 | ULO #1 |
| | 0 | 0 | 1 | Modulate |
| | 0 | 1 | 0 | $F_{REF}$ 1 |
| | 0 | 1 | 1 | $F_{LO}$ |
| | 1 | 0 | 0 | $F_{REF}$ 2 |
| | 1 | 1 | 1 | Synthesizer in Local |

OCD Output Command. This command initiates a data transfer or sends a terminate to the interface. The command format is listed below:

| Bits .... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transfer Initiate | 1 | 0 | D | S | —IGNORED— | | | | | | 1 | OUT | IN 2 | IN 1 | ULO 2 | ULO 1 |
| Terminate | 0 | 1 | D | S | 0 | 1 | — | — | I | G | N | O | R | E | D | — |

| | |
|---|---|
| ULO1 | 1 = Select ULO #1 |
| ULO2 | 1 = Select ULO #2 |
| IN1 | 1 = Input the ULO Counter |
| IN2 | 1 = Input the IF Processor Counter |
| OUT | 1 = Output to the ULO |
| S | 1 = Connect Service Interrupt |
| D | 1 = Connect Data Interrupt |

<u>IDD Input Data</u>. Data can be input from two devices depending on the transfer initiate command. The format for each device is listed below.

ULO Counter

| Bits ... | 0 1 2 3 | 4 5 6 7 | 8 9 10 11 | 12 13 14 15 | |
|---|---|---|---|---|---|
| Word 1 | MSD | - | - | - | |
| 2 | - | | LSD | Bands* | $F_{LO}$ |
| 3 | 1 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | |
| 4 | | | | | |
| 5 | | SAME AS | ABOVE | | $F_{REF\ 1}$ |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | SAME AS | ABOVE | | $F_{REF\ 2}$ |
| 9 | | | | | |

* Bands - Bits 12 = 1 Add 1700 MHz to Counter Reading
13 = 1 Add 1300 MHz to Counter Reading
14 = 1 Add 900 MHz
15 = 1 Take Counter Reading as it is.

IF Processor Counter

| Bits ... | 0 1 2 3 | 4 5 6 7 | 8 9 10 11 | 12 13 14 15 |
|---|---|---|---|---|
| Word 1 | 10's kHz | 1's kHz | 100's Hz | BA* |
| 2 | 100's MHz | 10's MHz | 1's MHz | 100's kHz |

* BA - Bits

| 12 | 13 | 14 | 15 | |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | LO A |
| 0 | 0 | 0 | 1 | LO B |
| 0 | 0 | 1 | 0 | LO C |
| 0 | 0 | 1 | 1 | LO D |

<u>ODD Output Data</u>. Output data as in the table below to set the LO frequency. Data is in BCD; the maximum number for 100's MHz is four.

| Bits ... | 0 1 2 3 | 4 5 6 7 | 8 9 10 11 | 12 13 14 15 | |
|---|---|---|---|---|---|
| Word 1 | 100's MHz | 10's MHz | 1's MHz | 100's kHz | |
| 2 | 10's kHz | 1's kHz | 100's Hz | 10's Hz | $F_{LO}$ |
| 3 | 1's Hz | .1's Hz | | | |
| 4 | | | | | |
| 5 | | SAME AS | ABOVE | | $F_{REF1}$ |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | SAME AS | ABOVE | | $F_{REF2}$ |
| 9 | | | | | |

## 3. Data Taking Control Panel

Address 38 Data Interrupt Entry Location B8.
Priority 12 Service Interrupt Entry Location F8.

ISD Input Status. The status format is listed below.

| Bit | |
|---|---|
| 0 | 1 = Device is in operation. |
| 3 | 0 = Device is in operation. |

OCD Output Command. The bit structure is listed below.

| Bits .... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transfer Initiate | 1 | 0 | D | S | DIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | |
|---|---|
| D | 1 = Connect Data Interrupt |
| S | 1 = Connect Service Interrupt |
| DIR | 1 = Input to Computer |
| | 0 = Output to Panel |

IDD Input Data. The panel has thirteen words of data to input; the bit sturcture is listed below.

Word 1 15 Push buttons; 1 = button was pressed
2 Bit 6 = Cal On was pressed
Bit 7 = Cal Off was pressed
Bit 14 = Programable push button 1
Bit 15 = Programable push button 2

Word 3

| Bit 6 | 7 | | 14 | 15 | |
|---|---|---|---|---|---|
| 0 | 0 | Manual | 0 | 0 | GST |
| 0 | 1 | Pulsed | 0 | 1 | GMT |
| 1 | 0 | Timed | 1 | 0 | LST |
| 1 | 1 | No-Cal | 1 | 1 | Sequential |

Word 4 First 4 BCD digits of cal period.
Word 5 Last digit of cal period (bits 12-15)
Word 6 Integer part of integration period (bits 4-15)
Word 7 Fraction part of integration period (bits 4-15)
Word 8 Repeat count (4 BCD digits)
Word 9 HH MM from Start Register
Word 10 SS (bits 0-7) from Start Register and HH from Stop Register
Word 11 MM SS from Stop Register
Word 12 H MM (bits 4-15) from Duration Register
Word 13 SS (bits 8-15) from Duration Register

ODD Output Data. The control panel has nine words of output data.

Word 1 15 Push button lights; 1 = turn the light on. Each bit corresponds with word 1 of the input words.
Word 2 Bit 5 = Data Recorded light.
6 = Cal On light.
7 = Cal Off light.
13 = Chart marker.
14 = Programable push button 1.
15 = Programable push button 2.
Word 3 Most significant BCD digit of scan number (bits 12-15).
Word 4 Last four BCD digits of scan number.
Word 5 First two alphanumeric characters for programable push button 1 (bits 2-7 and bits 10-15), starting at the left.
Word 6 Next two alphanumeric characters for programable push button 1
Word 7 Last alphanumeric character for programable push button 1 and first character for programable push button 2 (bits 10-15).
Word 8 Next two alphanumeric characters for PPB 2.
Word 9 Last two alphanumeric characters for PPB 2.

The alphanumeric displays are programed using Table I.

4. A/D Converter

Device Address 20 Data Interrupt Entry Location AØ.
Priority 2 Service Interrupt Entry Location EØ.

ISC Input Status. The status format is listed below:

Bit 0 Always will be a one.
Bit 7 1 = A/D is doing a conversion.

OCC Output Command.

A/D Converter

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Starting Channel Number | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 1 | CH | CH | CH | CH | CH | CH |
| Number of Channels to Read | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 1 | 1 | N | N | N | N | N | N |
| Transfer Initiate | 1 | 0 | D | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 = Connect Data Interrupt
S = 1 = Connect Service Interrupt
CH = Channel Number in Binary 0-63
N = Number of channels to read minus one. (Zero for number of channels causes one channel to be read.)

OCC Output Command.

50-Channel Receiver

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transfer Initiate | 0 | 1 | D | S | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | R | H | Z |

D & S = Same as above.
R = 1 for reference, 0 = signal
H = 1 for Hold Initiate.
Z = 1 for Zero Test.

IDC Input Data. This command inputs the 15 bit data word from the A/D. Bit 15 will always be a zero. Bit 0 is the sign bit.

5. MODCOMP to H316 Link

Device Address 1Ø
Priority 3
DMP CH Ø

Data Interrupt Entry Location 9Ø
Service Interrupt Entry Location DØ
Transfer Count Location 60,
Transfer Address Location 70

ISB Input Status. The status is listed below:

Bit Ø = 1 = The H316 is running.
3 = 0 = The H316 is running.

OCB Output Command.

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start DMP Transfer | 1 | 1 | D | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interrupt H316 | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 Enable Data Interrupt.
S = 1 Enable Service Interrupt.

6. MODCOMP from H316

Device Address 11
Priority 6
DMP CH 6

Data Interrupt Entry Location 91
Service Interrupt Entry Location D1
Transfer Count Location 66,
Transfer Address Location 76

ISB Input Status. The status word is listed below:

Bit 0 = 1 = The H316 is running.
3 = 0 = The H316 is running.
15 = 1 = The H316 has generated a Service Interrupt.

OCB Output Command.

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start DMP Transfer | 1 | 1 | D | S | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reset Status Bit 15 | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 = Enable Data Interrupt.
S = 1 = Enable Service Interrupt.

7. Telescope Control Panel

Device Address 3A — Data Interrupt Entry Location BA
Priority 12 — Service Interrupt Entry Location FA

ISD Input Status. This command inputs the status of the device. The following table lists the bits that are used.

Bit 0 — 1 = Device is operational.
3 — 0 = Device is operational.

OCD Output Command. This command initiates a data transfer, or issues a terminate to the interface.

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input | 1 | 0 | D | S | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Output | 1 | 0 | D | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Terminate | 0 | 1 | D | S | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 = Connect Data Interrupt.
S = 1 = Connect Service Interrupt.

IDD Input Data. This command will input the data from the control panel. Twenty-two words of data will be transferred.

Word 1 — Two MSD of Epoch Date Bits 8-15
2 — Four LSD of Epoch Date
3 — Bit 3 = RA Pointing Correction sign 1 = +, 0 = -, Bits 4-15 = SS.S digits of RA Pointing Correction.
4 — Bit 3 = Dec Pointing Correction sign 1 = +, 0 = -, Bits 4-15 = M:SS digits of Dec Pointing Correction.
5 — Bits 2 3
0 0 Blank
0 1 West
1 0 East
Bits 4-15 3MSD of Position (RA, HA, etc.).
6 — Four LSD of Position (RA, HA, etc.).
7 — Bit 7 = Position sign 0 = +, 1 = -, bits 8-15 two MSD of Position (Dec, etc.).
8 — Four LSD of Position (Dec, etc.)
9 — Bit 7 = Sign of Rate (HA, RA, etc.), 0 = -, 1 = +, bits 8-15 2MSD of Rate (HA, RA, etc.).

Word 10 Four LSD of Rate (HA, RA, etc.).

11 Bits

| 6 | 7 | |
|---|---|---|
| 0 | 0 | + |
| 0 | 1 | - |
| 1 | 0 | North |
| 1 | 1 | South |

Bits 8-15 two MSD of Rate (Dec).

12 Four LSD of Rate (Dec).

13 Bits

| 6 | 7 | |
|---|---|---|
| 0 | 0 | + |
| 0 | 1 | - |
| 1 | 0 | East |
| 1 | 1 | West |

Bits 8-15 two MSD of Offset 1 (RA, HA, etc.).

14 Four LSD of Offset 1 (RA, HA, etc.).

15 Bits

| 6 | 7 | |
|---|---|---|
| 0 | 0 | + |
| 0 | 1 | - |
| 1 | 0 | North |
| 1 | 1 | South |

Bits 8-15 two MSD of Offset 1 (Dec, etc.).

16 Four LSD of offset 1 (Dec, etc.).

17 Same as word 13, Offset 2

18 Same as word 14, Offset 2

19 Same as word 15, Offset 2

20 Same as word 16, Offset 2

21 Three octal words for Rotary Switch.
Positions bits 0-2 = position, bits 3-5 = rate and bits 6-8 = offset. The octal number and its lable is listed below.

| | | | | | |
|---|---|---|---|---|---|
| 0 | 0 | 0 | HA | DEC | |
| 0 | 0 | 1 | RA | DEC | Epoch |
| 0 | 1 | 0 | RA | DEC | Apparent |
| 0 | 1 | 1 | L | B | |
| 1 | 0 | 0 | AZ | EL | |
| 1 | 0 | 1 | HV | | |

22 Bits 0-11 Momentary Push Button Switches at top of panel. Bit 0 = switch to the left of the panel. Bit 12 is for pointing correction, 1 = Pointing Correction On. Bit 13 is a one when the auto position is selected on the H316 control panel.

ODD Output Data. This command outputs data to the control panel. Two words of data will be transferred to the panel.

Word 1 Bits 0-11 will light lights in direct relation to the input bits 0-11 of word 22. Bit 12 = Pointing Correction Off light. Bit 13 = Pointing Correction On light. Bit 14 = auto light on H316 control panel.

Word 2 Bits 0-7 will light Indicator Lights beside the digi-switches. Bit 0 will light the indicator at the top of the panel and to the left. Bit 1 will light the indicator at the top and to the right. This continues to the bottom of the panel.

8. Autocorrelator/Signal Averager (SA)

Device Address 12 Data Interrupt Entry Location 92
Priority 5 Service Interrupt Entry Location D2
DMP CH 5 Transfer Count Location 65,
Transfer Address Location 75

ISB Input Status. The status word is listed below:

| | | |
|---|---|---|
| Bit | 0 | 1 = Device operational. |
| | 3 | 0 = Device operational. |
| | 11 | 1 = 1 word transfer from SA. |
| | 12 | 1 = 1K word transfer from SA. |
| | 13 | 1 = 2K word transfer from SA. |
| | 14 | 1 = 4K word transfer from SA. |
| | 15 | 1 = Service interrupt was from external device. |

OCB Control Command.

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reset Status | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sync A/C III | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| DMP Initiate | 1 | 1 | D | S | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 = Connect Data Interrupt.
S = 1 = Connect Service Interrupt.

It should be pointed out that if several instructions exist between the Output Control Command for NOP connect data and service interrupt and the Terminate Command an external interrupt could occur.

When using the signal averager, if a terminate is issued after a service interrupt from the SA, the status bits will be reset.

9. On Line to Off Line Link. This is a one way link in that the on line computer transmits data to the off line computer.

Device Address 3 Data Interrupt Entry Location 83
Priority 10 Service Interrupt Entry Location C3
DMP CH 3 Transfer Count Location 63,
Transfer Address Location 73

ISA Input Status. Input status for both computers is listed below:

On Line

| | | |
|---|---|---|
| Bit | 1 | 1 = Device operational. |
| | 3 | 0 = Device operational. |

Off Line

| | | |
|---|---|---|
| Bit | 1 | 1 = Device operational. |
| | 3 | 0 = Device operational. |
| | 15 | 1 = On line computer generated a Service Interrupt. |

OCA Output Command. The output commands for both computers are listed below:

On Line

| Bits ... | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start DMP | 1 | 1 | D | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interrupt Off Line | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off Line | | | | | | | | | | | | | | | | |
| Start DMP | 1 | 1 | D | S | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reset Status | 0 | 1 | D | S | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Terminate | 0 | 1 | D | S | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

D = 1 = Connect Data Interrupt.
S = 1 = Connect Service Interrupt.

## III. Electronics

All interface was built on a MODCOMP general purpose controller (GPC). Each GPC uses a half plane in a peripheral controller interface (PCI). Each GPC requires wiring to satisfy variable I/O functions. These functions and their GPC page number is listed below:

| Function | Page |
|---|---|
| Priority Selection ............. | 1 |
| Address Selection .............. | 1 |
| Service Interrupt Request ...... | 1 |
| Source ID ...................... | 2 |
| Data to Device ................. | 4 |
| Status Information ............. | 5 |
| Data to Computer ............... | 5 |
| DMP Logic ...................... | 6 |

The signals most often used by the custom logic is listed below:

| Memonic | Meaning | Page |
|---|---|---|
| CLKFB | 5 MHz Clock | 3 |
| DATARS | Data Request or Data Interrupt | 2 |
| DFBXX | Data from Computer | 4 |
| DTLMXX | Data from Custom Logic | 5 |
| EOBLK | End of Block (DMP Devices) | 3 |
| ICBFB | Master Clear | 2 |
| INDCMN | Input Data Command | 3 |
| ISLMXX | Status Word from Custom Logic | 5 |
| LDCMRN | Load Command Register | 3 |
| OUDCMN | Output Data Command | 3 |
| RIOTIS | Register I/O Transfer | 3 |
| SIRSTN | Resets Service Interrupt Request | 1 |
| STSIRQ | Service Interrupt Request | 1 |
| TERM | Terminate | 3 |
| DMPSRS | Store DMP Source ID Command | 6 |

1. Clock and Calendar

This interface provides the computer with four data interrupts, one interrupt for each data word. The data is input as shown in the programming section. A service interrupt is generated when the computer issues a terminate or when four data transfers have taken place.

The data from the clock is level converted with 8820's. Data from the calendar was changed to TTL levels by changing the "Computer Buffer Card #3" (see EDIR #120) to a card that provides TTL levels instead of 0/-6. This data is passed to the computer via 4-line to 1-line switches. These switches are controlled by a counter that counts input data commands.

A status word is provided to tell the computer that the clock and calendar is connected and -15 V is present for the level converters. Illegal BCD numbers were used to determine if the clock or calendar has been disconnected. An optical isolated gate was used to monitor the -15 V power supply.

2. ULO Control

This interface connects the MODCOMP to the universal local oscillator (EDIR #144). The interface was designed to simulate a DDP116. This interface outputs to the ULO, reads a counter in the ULO and also reads a counter in the IF Processor. The capability exists to control two ULO's. As in other devices the service interrupt is generated by a terminate from the computer or when the desired number of data words have been transferred.

To input from the ULO the computer will do an OCD command which will select which device to input from and generate the

2. Continued:

appropriate address to the ULO. This command will also determine the number of data interrupts to generate. There will be nine data interrupts to input the ULO counter and eight for the IF Processor counter. The input data is buffered for the MODCOMP.

For an output transfer the computer will do an OCD command which will generate the appropriate address to the ULO. Nine data interrupts will be generated for output to the ULO. The first data interrupt is caused by the OCD. The output data is buffered.

A status word is provided which informs the computer of the position of front panel switches on the ULO and if one or both ULO's are connected.

3. Data Taking Control Panel

This interface consists of two separate sections of logic. The first section is on a general purpose controller located in the MODCOMP. The second section of logic is behind the control panel.

A. MODCOMP GPC

This logic will generate data interrupts for each data transfer and a service interrupt for a terminate and at the end of each data block.

On input the computer will issue an OCD command which will cause the computer to receive 13 data interrupts. A counter is used to count these data interrupt sequences.

This BCD count is sent to the control panel to enable multiplexing of the data from the control panel. The data interrupt sequence also generates an input strobe which is used in the control panel by the "Push Button Switch Input Card".

To output, the computer will issue the appropriate OCD command. This will cause a sequence of nine data interrupts. A counter is used to count these data interrupt sequences; this count is also sent to the control panel to enable multiplexing the data. An output strobe is also generated to latch data in buffers in the control panel.

B. Control Panel Logic

The control panel logic consists of four logic cards -- two for input data and two for output data.

1. Address Decode Input Data. This card decodes the BCD count from the MODCOMP and also contains the logic to multiplex the data from the digi-switches and the "Push Button Switch Input Card". This data is then passed to the input section of the general purpose controller. Through the use of optical-isolated gates the power supplies in the control panel are monitored on this card and this generates a status word for the MODCOMP.

2. Push Button Switch Input. This card stores the fact that a button has been pushed until the MODCOMP reads the data. The circuitry necessary to generate the cal signal is also contained on this card. The normal 0/-6 plus a TTL level cal signal is provided.

3. Address Decode Output Data Buffer. This card decodes the BCD count received from the MODCOMP. This card also provides buffers for all output words except the alphanumeric display.

4. Alphanumeric Display Buffer. All the buffers necessary for the alphanumeric display are contained on the card.

5. Scan Monitor. This is on a separate chassis above the control panel. It gives an audible indication of the beginning and ending of a scan. This monitor receives the data recorded signal for its control.

4. A/D Converter

The interface for the A/D converter contains the logic to read a given number of channels starting on a specified channel.

To select the starting channel the computer issues the proper OCC command to set an up counter to the desired channel number. This counter then provides the A/D converter with a random address. This address gets incremented each time the A/D completes a conversion.

The number of channels to read are loaded into a down counter by an OCC command. This counter decrements each time the computer inputs a data word. When this counter gets to zero, data interrupts are inhibited and a service interrupt is generated. Each time the data is taken another conversion is started.

Logic to control the 50-channel receiver is also contained in this general purpose controller.

5. MODCOMP to 316 Link

This is the first DMP device discussed, so some attention should be given the DMP logic on the GPC drawing on page 6. Two signals

5. Continued:

from the custom logic are needed for DMP operation. These are listed below:

DATARS This is a data request signal that requests a data transfer. The direction of transfer is determined by the logic level on gate U2B, pin 5 (U4B, pin 5 on the old GPC, such as the one the autocorrelator interface is on). The logic level would be a logic one for output from the computer.

DMPSRS This signal enables the DMP logic to cause the computer to store the transfer address from a register back into core. Since these registers are a helpful troubleshooting aid they may be found by the formula below.

Transfer Count = Register 20 + DMP. CH. #
Transfer Address = Register 28 + DMP. CH. #

(Use base 16 arithmetic.)

Another point which is a useful sync point is on gate U5A, pin 12 (on both model GPC). This point causes the DMP to be initialized and is generated when the computer issues an output control command for a DMP transfer.

The source ID is also a useful group of signals to look at. These are labeled DRIDØN - DRID5N on page 6 of the GPC logic. It should be noted that these signals are common with signals on page 2 (used for data and service interrupts). The generation of this source ID is complicated by the fact that it is possible to generate two correct source ID's for the same DMP channel. The table below is an attempt to show the expected source ID for any type DMP transfer.

| | DRID | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Input Channel X .... | 0 | 0 | 0 | x | x | x |
| Input Channel X .... | 1 | 0 | 0 | 0 | x | x |
| Output Channel X ... | 0 | 1 | 0 | x | x | x |
| Output Channel X ... | 1 | 0 | 0 | 1 | x | x |
| Store Current TA ... | 0 | 1 | 1 | x | x | x |
| Store Current TA ... | 1 | 0 | 1 | 1 | x | x |
| Initialize CH X .... | 0 | 0 | 1 | x | x | x |
| Initialize CH X .... | 1 | 0 | 1 | 0 | x | x |

For a more detailed explanation of the DMP logic, refer to MODCOMP's general purpose controller technical manual.

The custom logic provides the necessary DMP signals and those required by the H316 computer. When the program issues an output control command for a DMP transfer, the transmit flip flop is set and a "DATARS" signal is generated. When the computer outputs a data word, this data is stored and a "MCRDY" signal tells the 316 that data is on line. If the 316 is in the receive mode, this ready sginal causes the 316 to input the data. At the time the 316 takes the data "SET 116 DIL" is sent to the MODCOMP generating another "DATARS". This cycle keeps up until the MODCOMP transfers its block of data. When the 316 takes the last data word, a service interrupt is generated.

An output control command is also used to interrupt the 316 computer; this signal is called "MC OCP 401". This command could be used to inform the 316 about a condition in the MODCOMP.

Two circuits have been added to the logic as a diagnostic aid. The first uses a discrete component holder which, if its position is changed in an IC location, the logic will run without a reply signal from the 316. This enabled testing when the 316 was not available. The second aid was a counter that counts data transfers. This gives a light emitting diode indication of the number of transfers in binary.

6. MODCOMP from 316 Link

This logic is very similar to the logic for the MODCOMP to 316 link. When the computer issues an output control command for a DMP transfer initiate, the receive flip flop is set. When the 316 has data available (316 ready), DATARS will be generated after a delay of 75 μs. At the time the MODCOMP takes the data it responds with "RESET 316 RDY". This causes the 316 to put another word of data on line. This process keeps up until the block of data has been transferred at which time a service interrupt will be generated.

The 316 also has the ability to interrupt the MODCOMP via a service interrupt. When this occurs (316 restart or error condition), bit 15 of the status word will be set. This enables the program to distinguish one service interrupt from the other. The program must issue an output control command to reset this status bit.

The diagnostic aids are also in this logic. These aids enable the logic to run without a 316 and counts data transfers.

7. Telescope Control Panel

This logic was designed to make the MODCOMP look like a DDP-116 as far as the control panel was concerned. Most of the custom logic is used to count data transfers and generate a service interrupt when the correct number of input or output words have been transferred. Since this device is not a DMP device, data interrupts must be generated for each data transfer. The following signals have been generated to simulate the DDP116.

| | |
|---|---|
| ADBXX | Nine address lines to select the telescope control panel. |
| OCP | Control signal to the control panel. This signal initializes the control panel for input or output. |
| RRL | Signal to the control panel that the computer has taken the data. |
| OTP | Signal to the control panel that data is on line. |

8. Autocorrelator

The autocorrelator has been interfaced to a DMP channel; the signal averager will also connect to this interface.

Since the autocorrelator was designed to interface with negative logic (o/-6), all signals from the A/C had to be level converted. To be able to program the signal averager it was necessary to store the four most significant data bits of the first word. It was also necessary to store the fact that the A/C has generated the service interrupt. This information is presented to the computer as a status word which must be reset by an output control command.

The autocorrelator makes life difficult for the program because the computer must take data when the A/C is ready to transmit it. This is accomplished by waiting for a serivce interrupt, then checking the status word for bit 15 being set. When this happens the program issues an output control command for a DMP transfer initiate. This causes a flip flop to be set (V4L, pin 5) and if the DRL flip flop has been set by the A/C the signal "DATARS" will be generated. "DATARS" will cause the computer to input a word of data.

When the computer takes the data, the DRL flip flop is reset and a signal called "RRLAC" is sent to the autocorrelator. When the A/C receives "RRLAC", it puts another data word on line and sets the DRL flip flop. This keeps up until the whole block

8. Continued:

of data has been transferred. At this time the interface will generate a data and service interrupt and bit 15 of the status word will not be set.

The signal averager works in much the same way as the autocorrelator except the program will transfer one word blocks and the S/A informs the program (4 bits in the status word) of how many words it must transfer for the long data blocks.

9. On Line to Off Line Computer Link

The interface that links the two MODCOMP computers is an exact duplicate of the logic designed to transmit and receive data from the H316. The only difference is in address, priority, and DMP channel.

The on line computer (control) has the logic that was designed to transmit data to the H316.

The off line computer (analysis) has the logic that was designed to receive data from the H316.

## IV. Credits

Credit should be given to George Patton for his design of the A/D interface and to Ron Weimer for his design of the telescope control panel and the autocorrelator interface. Credit should also be given to W. Vrable, L. Miller, and J. Turner for their help in all the construction work involved in this project.

CLK / CAL

ADDRESS 39

PRIORITY 12

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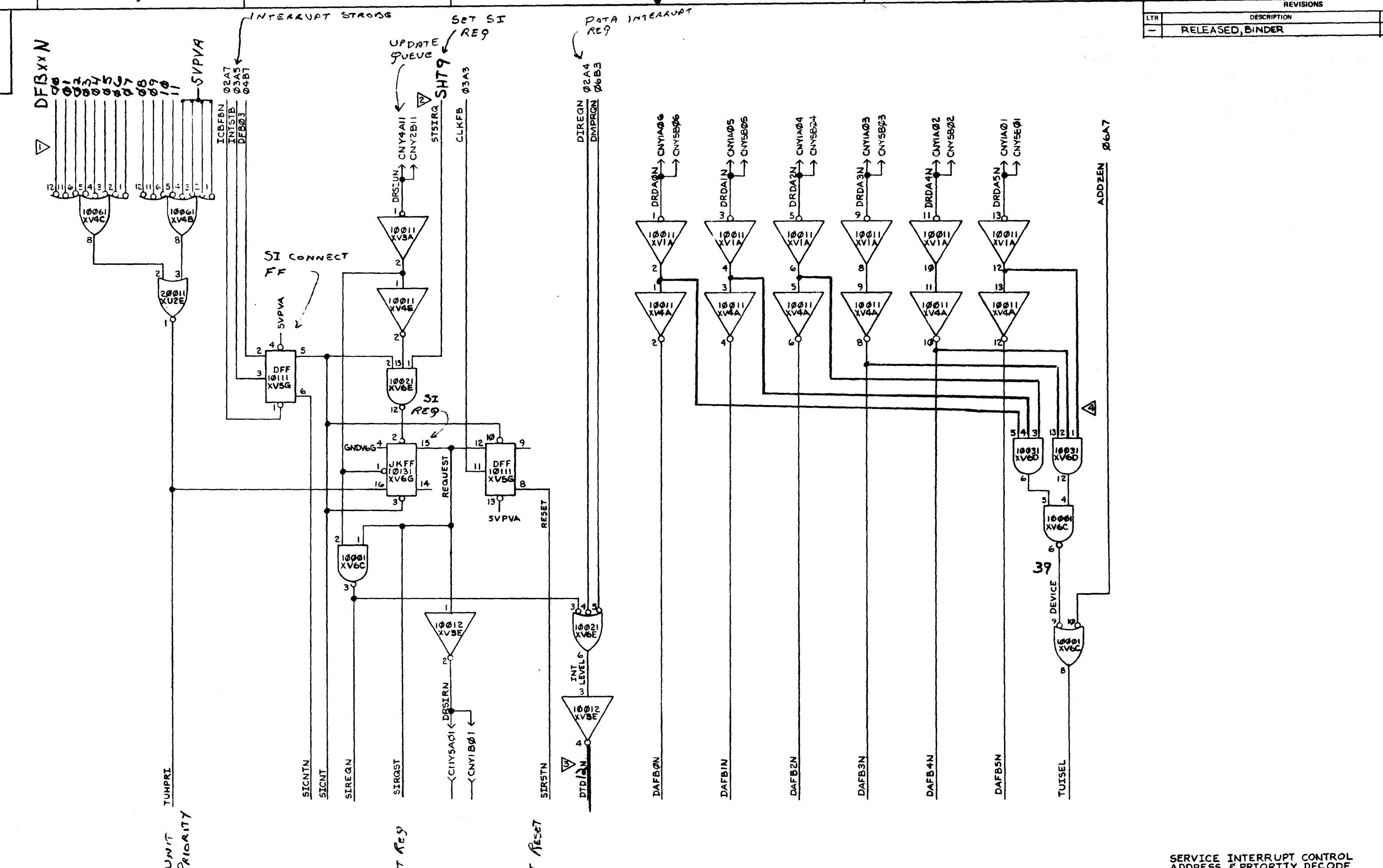


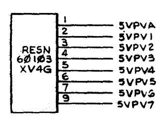


NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

| | |
|---|---|
| TOLERANCE EXCEPT AS NOTED | |
| FRACTIONAL | ± 1/64 |
| DECIMAL | ± .005 (3 PLACE) |
| | ± .020 (2 PLACE) |

modular computer systems

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| DRAWN | | 8-3-73 |
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| ENGINEER | R. F. Baker | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE CONTROLLER NO 2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 520-100260 | — |
| | SHEET 1 OF 6 | LTR |
| | CODE IDENT NO. | |

520-100260

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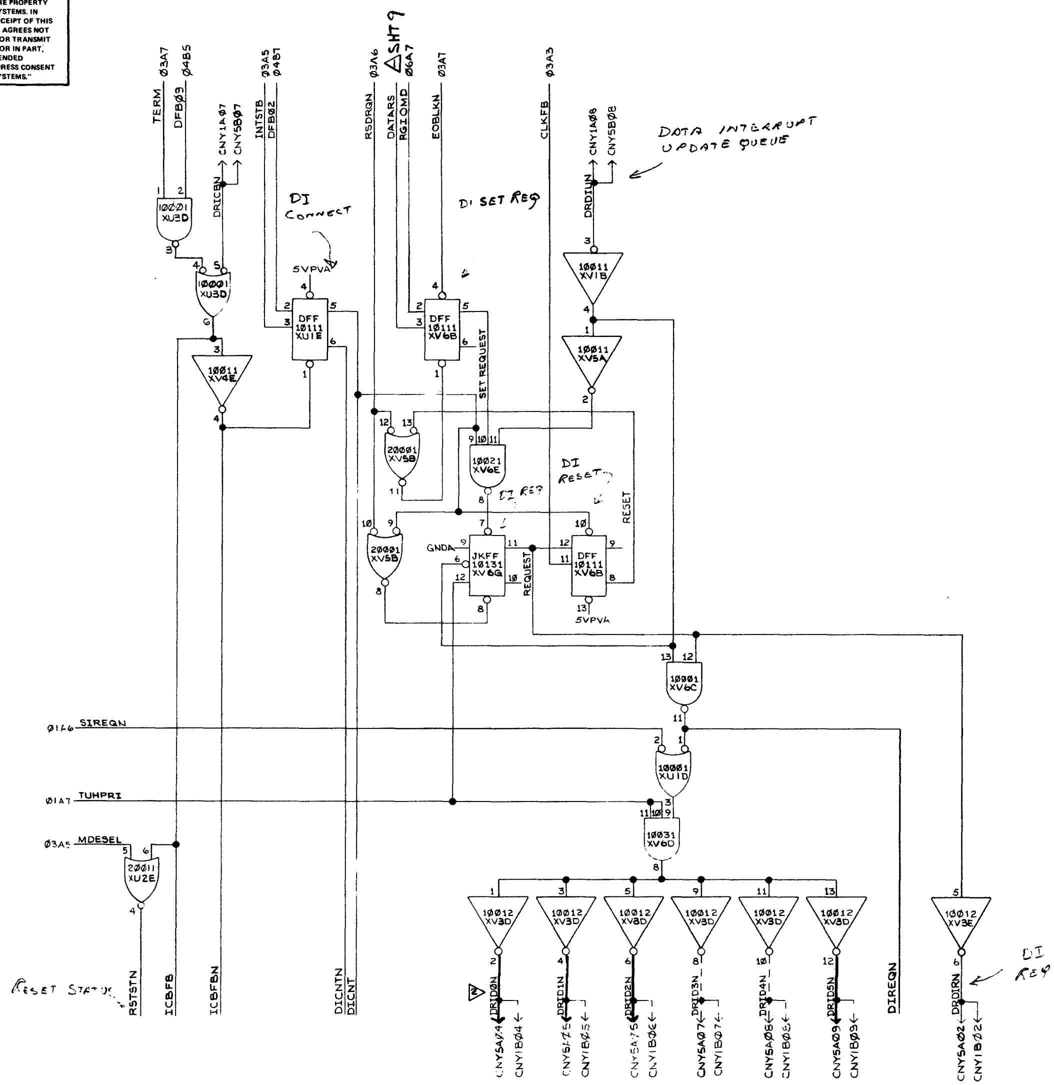


NOTES:
2. CONNECT FOR APPROPRIATE SID'S.
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.

DATA INTERRUPT & SOURCE ID CONTROL

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

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GENERAL PURPOSE CONTROLLER NO. 2

SIZE D
DRAWING NO 520-100260
REV —
SHEET 2 OF 6
CODE IDENT NO

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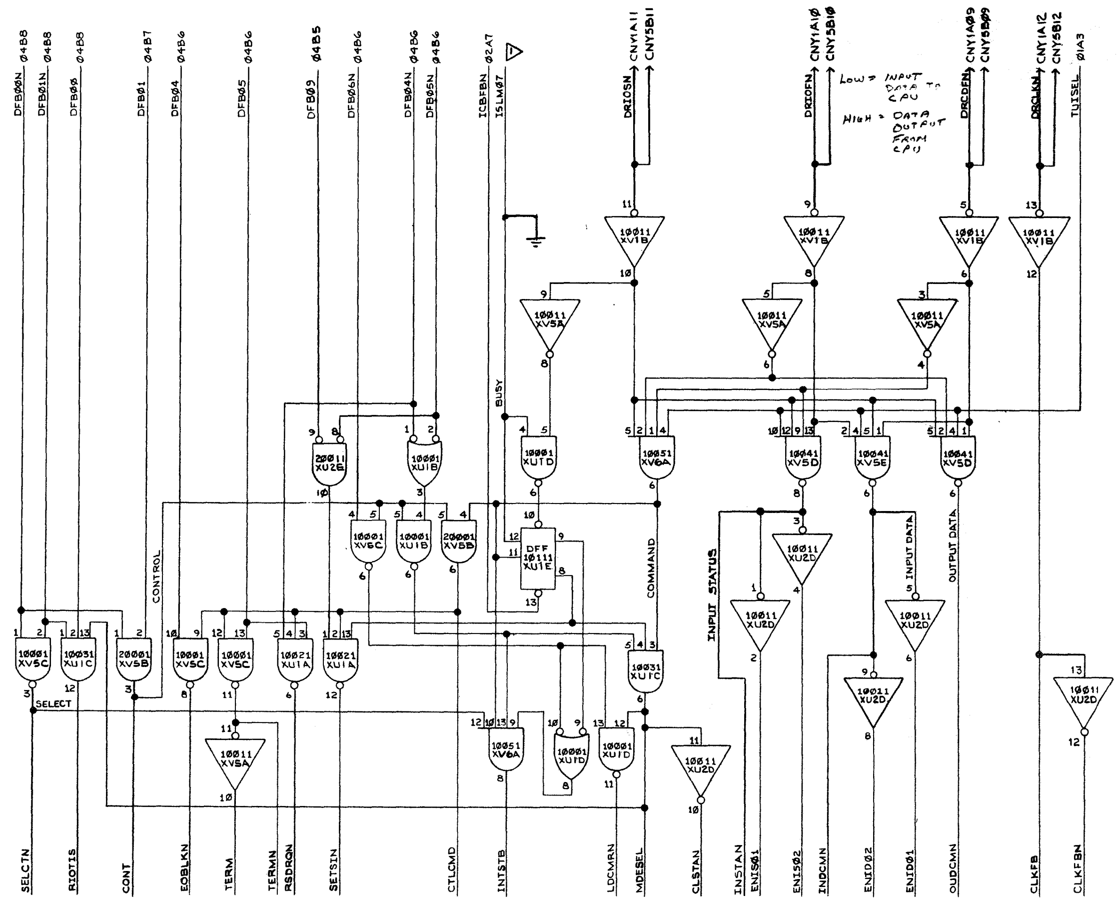
520-100260




REG. I/O XFER INITIATE COMMAND

MODE SELECT

INPUT DATA COMMAND

ENABLE INPUT STATUS

OUTPUT DATA COMMAND

DRCDFN
Low = DATA
HIGH = COMMAND

NOTES: 1 ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC



| REVISIONS | | | |
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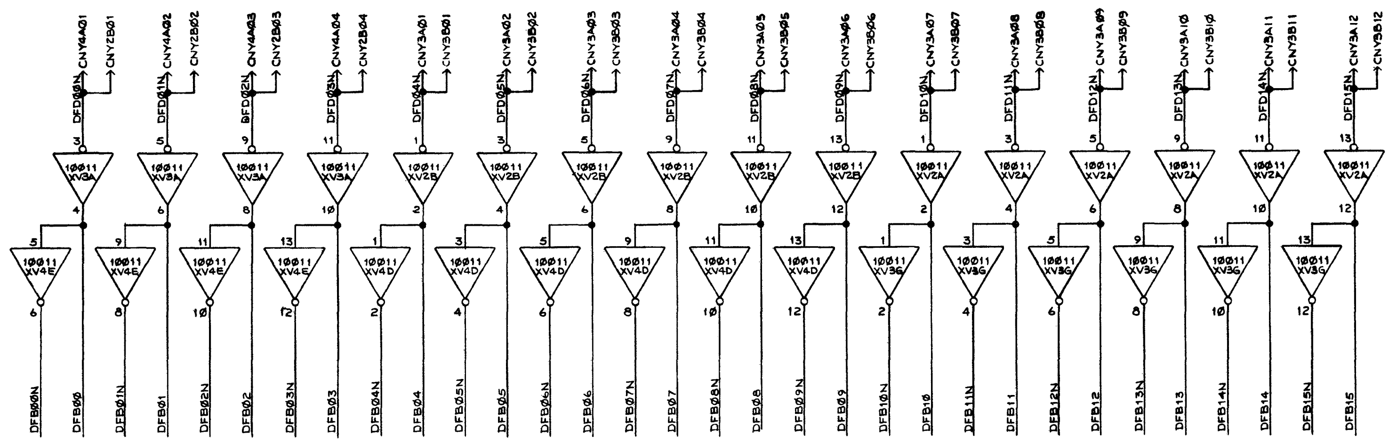
COMMAND DECODE LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 3 OF 6 | CODE IDENT NO

520-100260

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| APVD | | 10/23 |

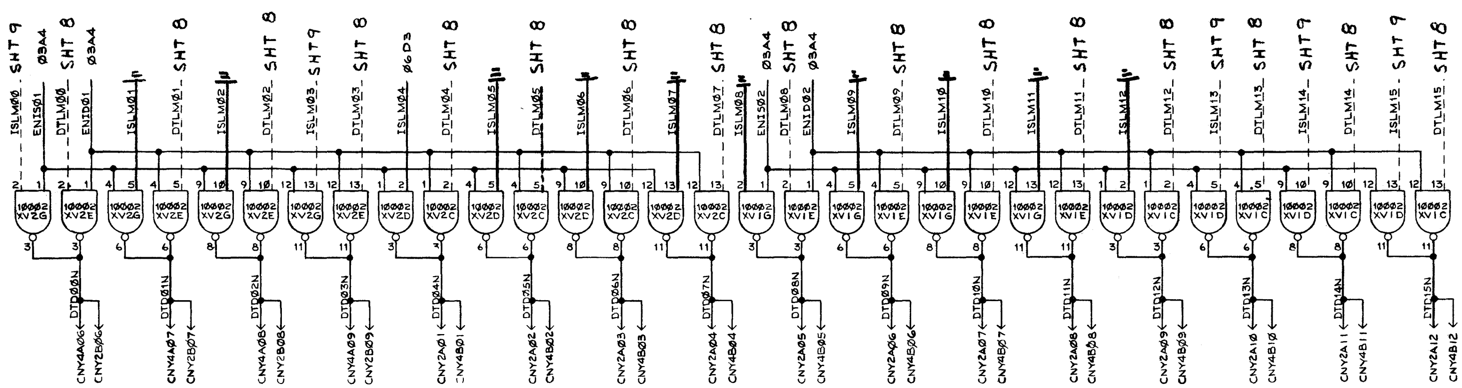
OUTPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 4 OF 6 | LTR
CODE IDENT NO.

MCS Form 15A

520-100260



NOTE: 1. TIE UNUSED INPUTS TO GROUND.

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| PROJ | | 10-21-73 |
| APVD | | 10/23 |

INPUT DATA BUFFERS

# GENERAL PURPOSE CONTROLLER NO.2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 520-100260 | — |
| | SHEET 5 OF 6 | LTR |
| | CODE IDENT NO. | |

MCS Form 15A

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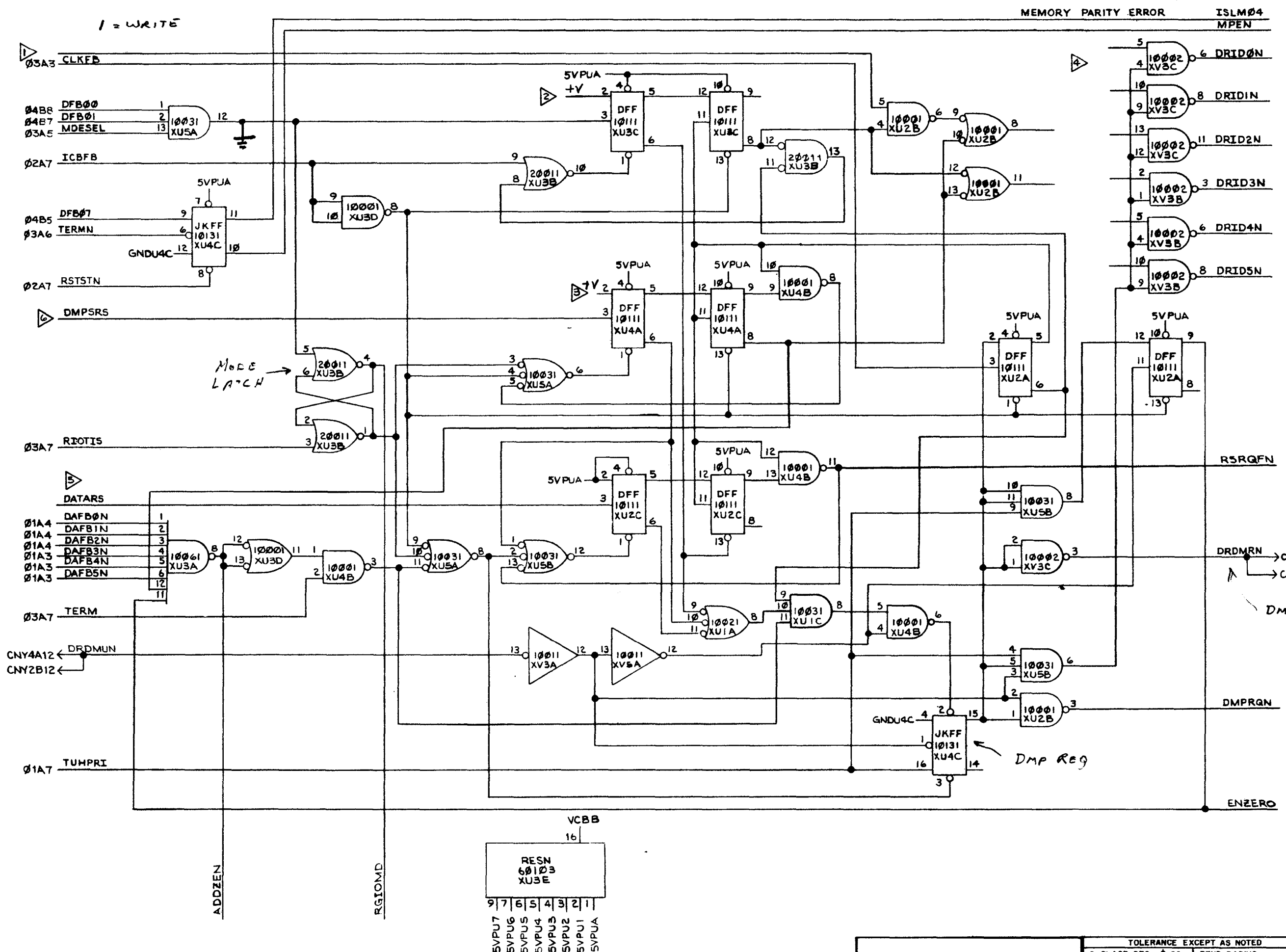
MODCOMP II HAS NO MEMORY FILE




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SIGNT FOR DEVICES WHICH WILL USE DMP FILL (REG. FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT



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DMP CONTROL LOGIC

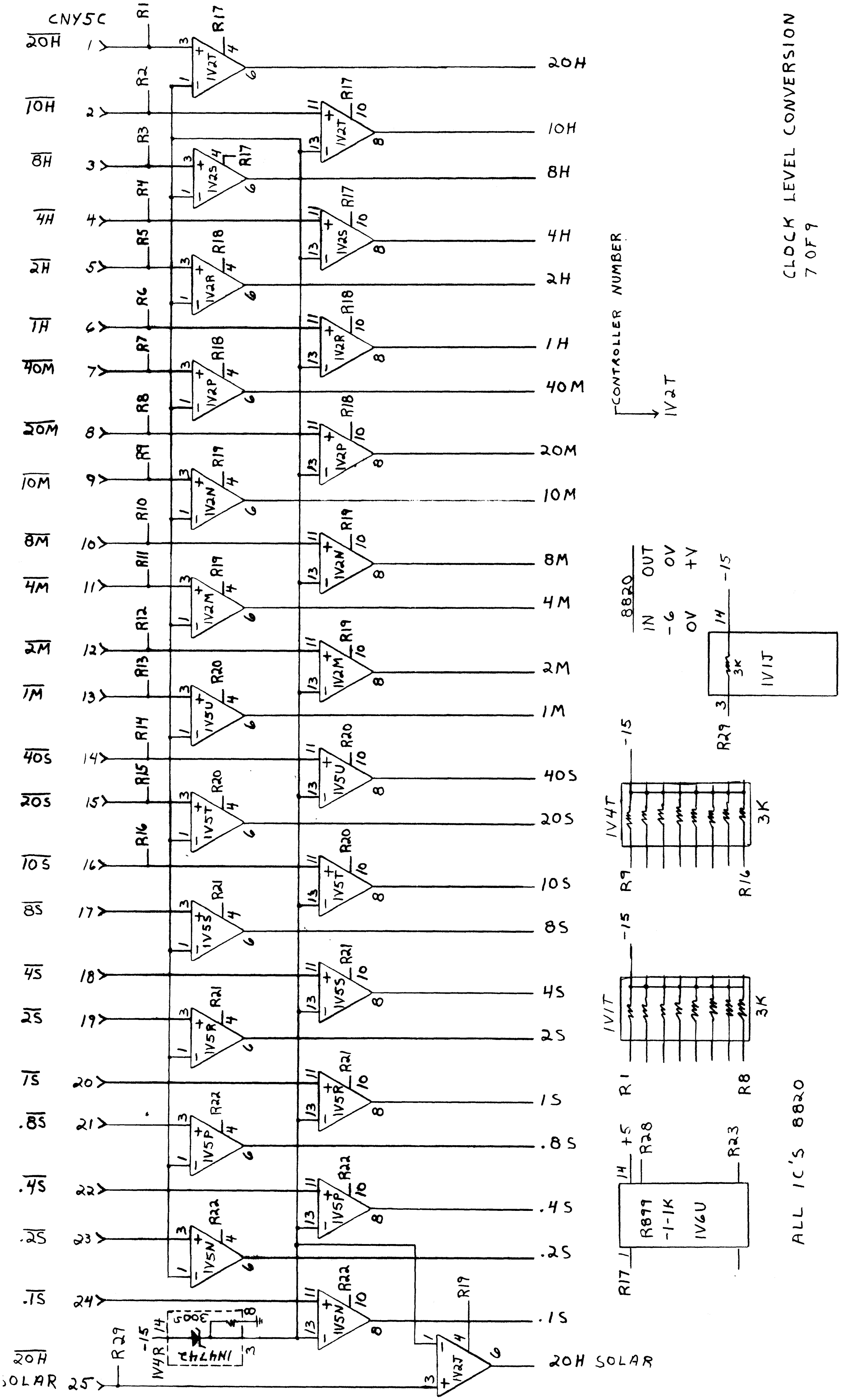
# GENERAL PURPOSE CONTROLLER NO.2

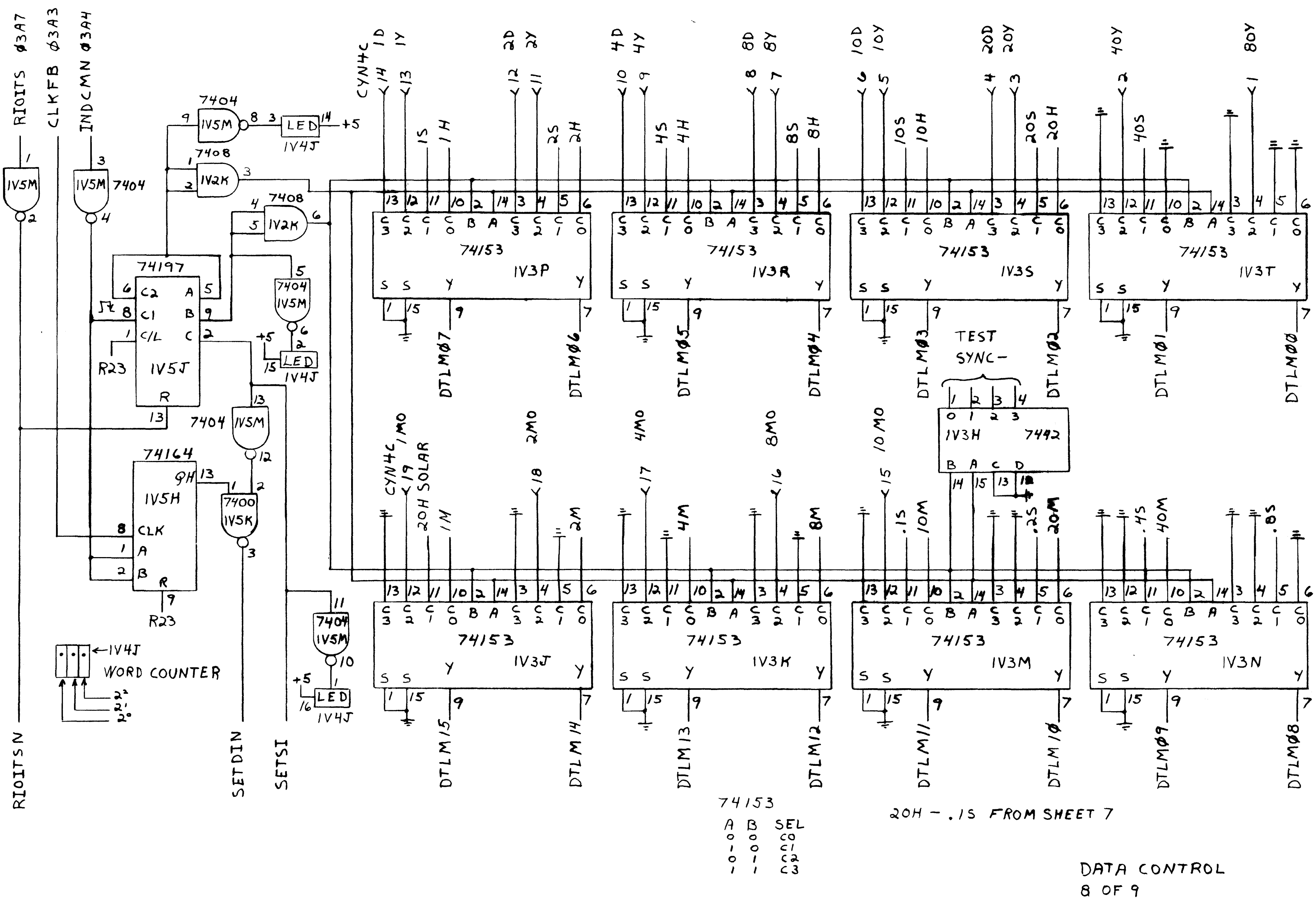
SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 6 OF 6 | LTR
CODE IDENT NO.

520-100260

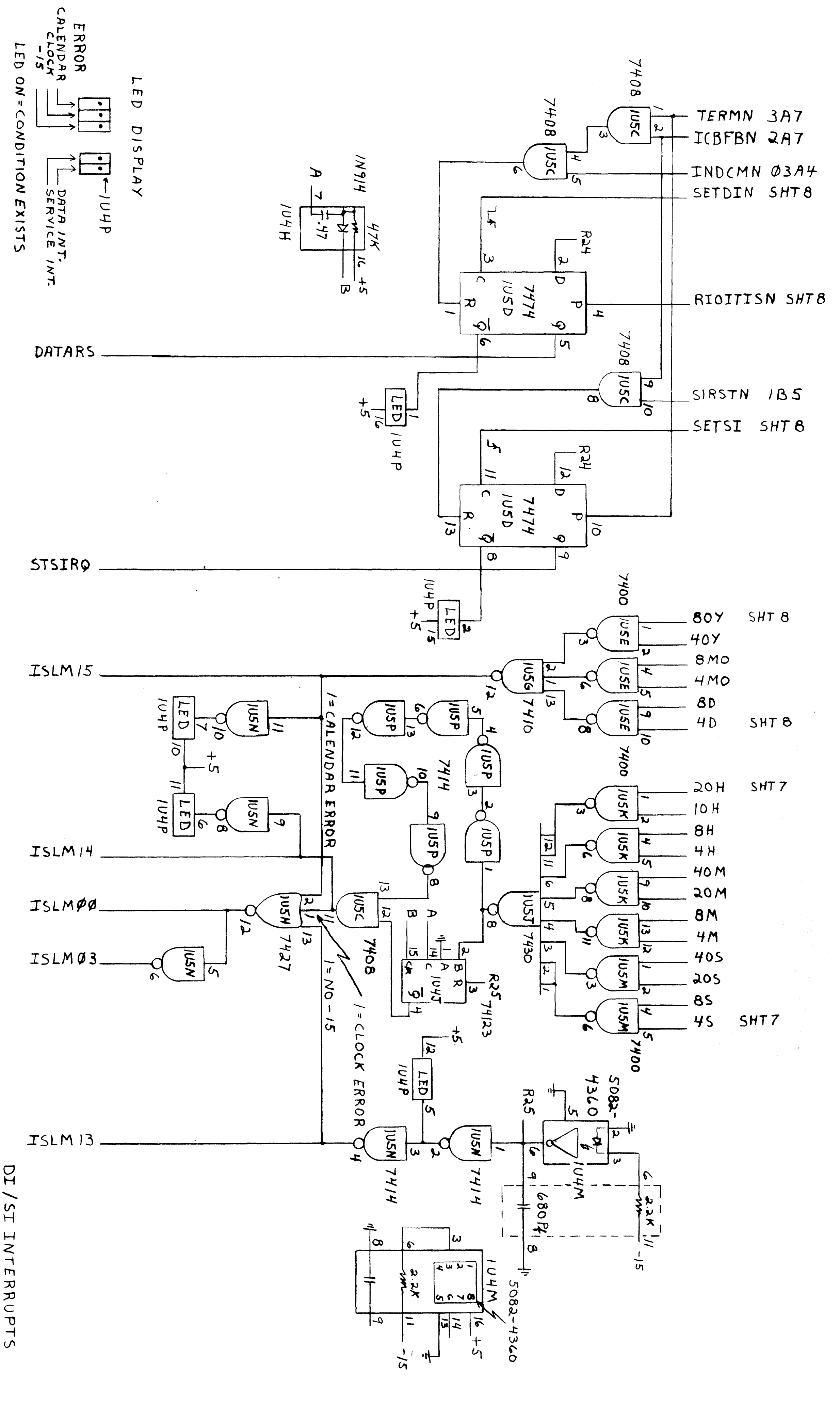
MCS Form 16A

CLOCK LEVEL CONVERSION
7 OF 9






DATA CONTROL
8 OF 9




DI/SI INTERRUPTS
ERROR DETECT
9 OF 9

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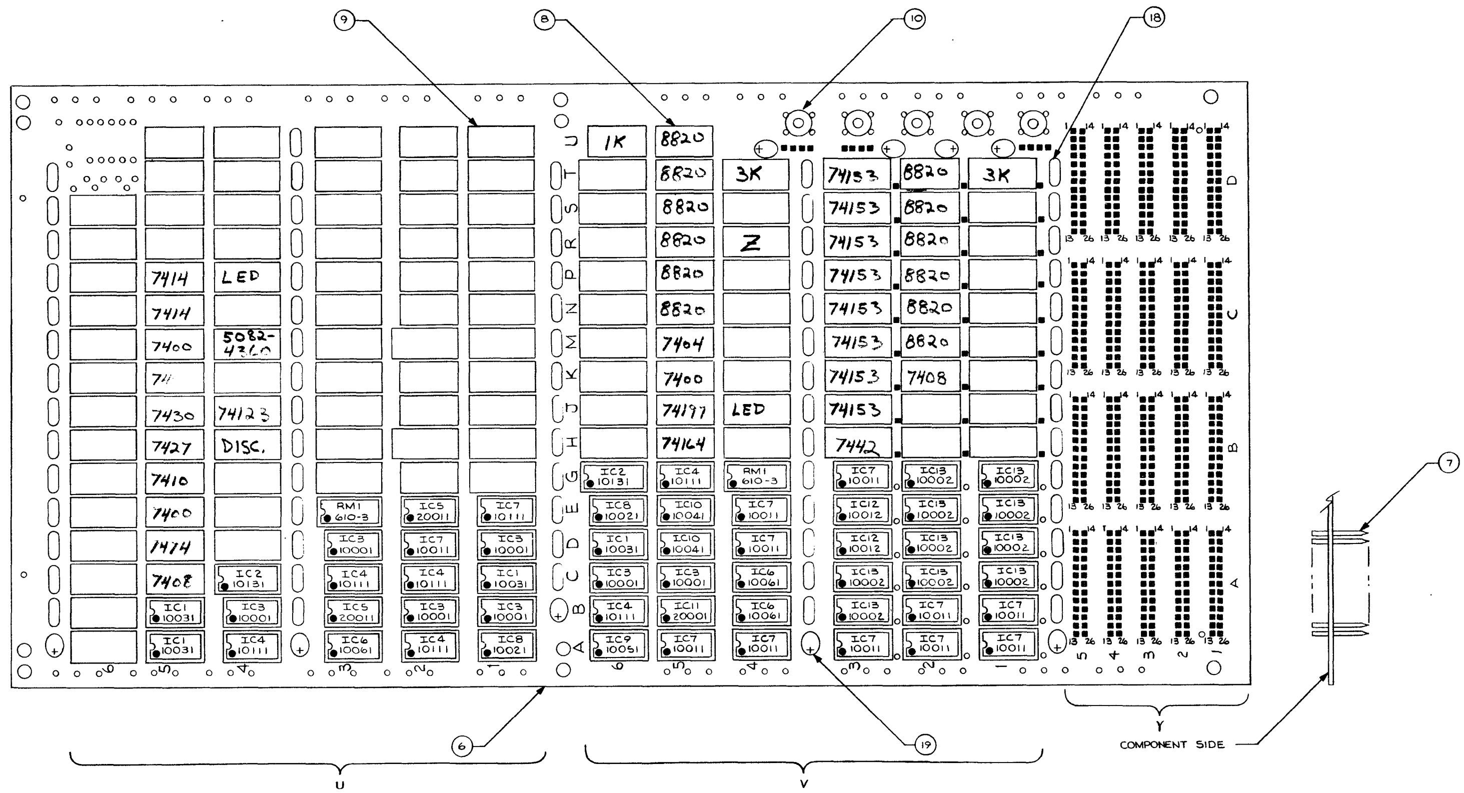


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LM 517-100176

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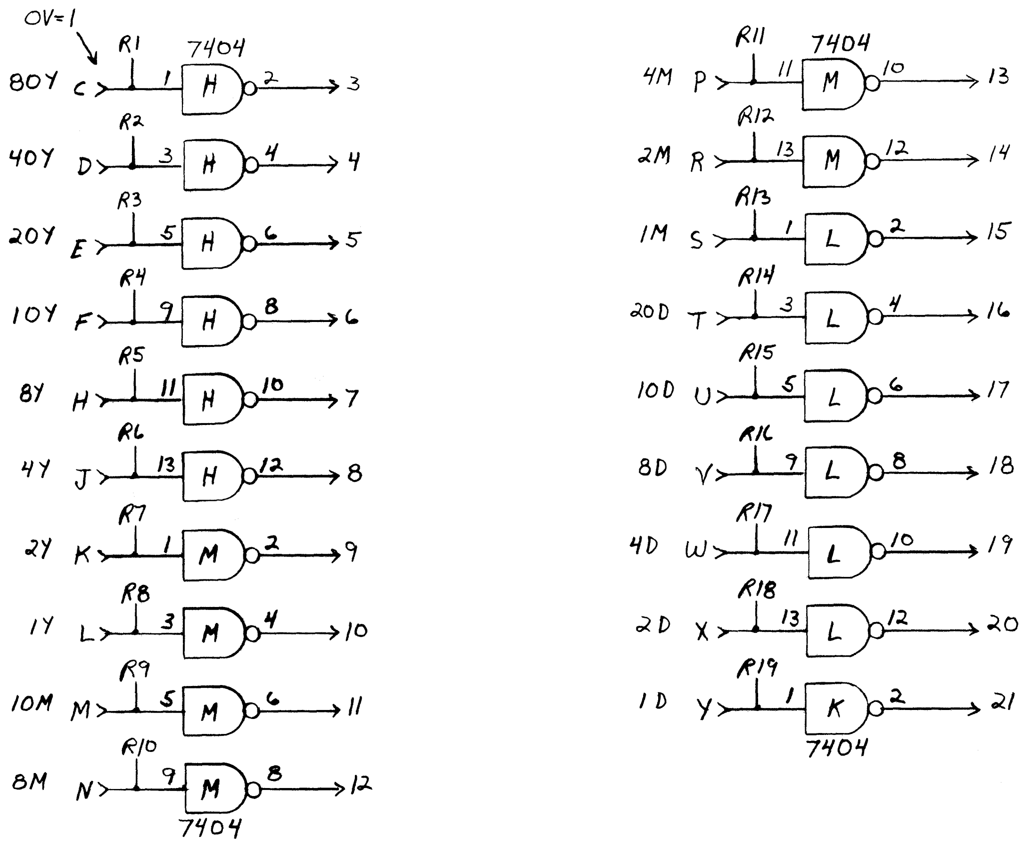
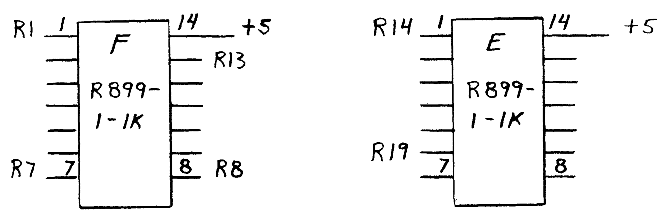
| ENGR | R. BINDER | 10-23-73 |
| PROJ | [illegible] | 10-23-73 |
| APVD | [illegible] | 10/23 |

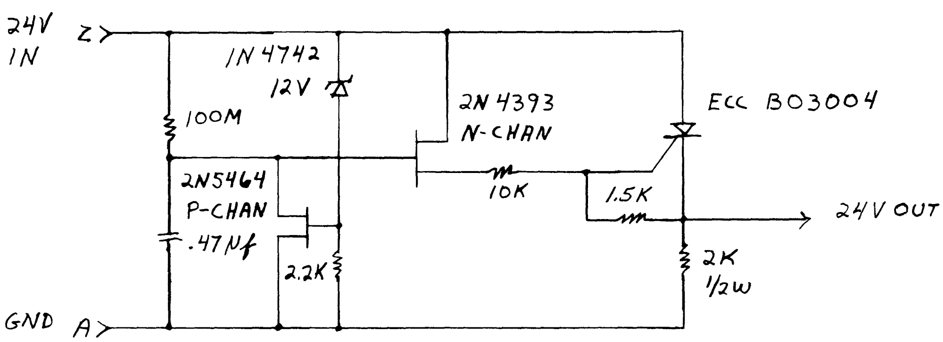
GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 516-100176 | REV —
SHEET 1 OF 1 | LTR
CODE IDENT NO.

MCS Form 15A

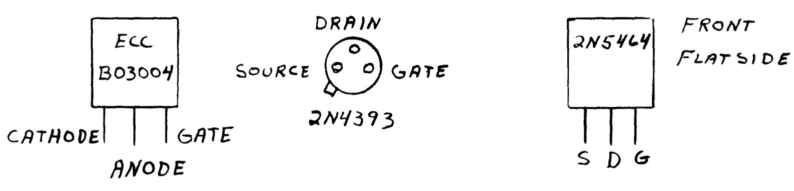



POWER SUPPLY
DELAY CIRCUIT
5 SEC. DELAY
TO OPERATE

REF. EDIR 120
FIG. 5




NRAO CALENDAR
COMPUTER BUFFER
CARD #3, SLOT J
TTL LEVELS OUT

ULO

Address 30

Priority 9

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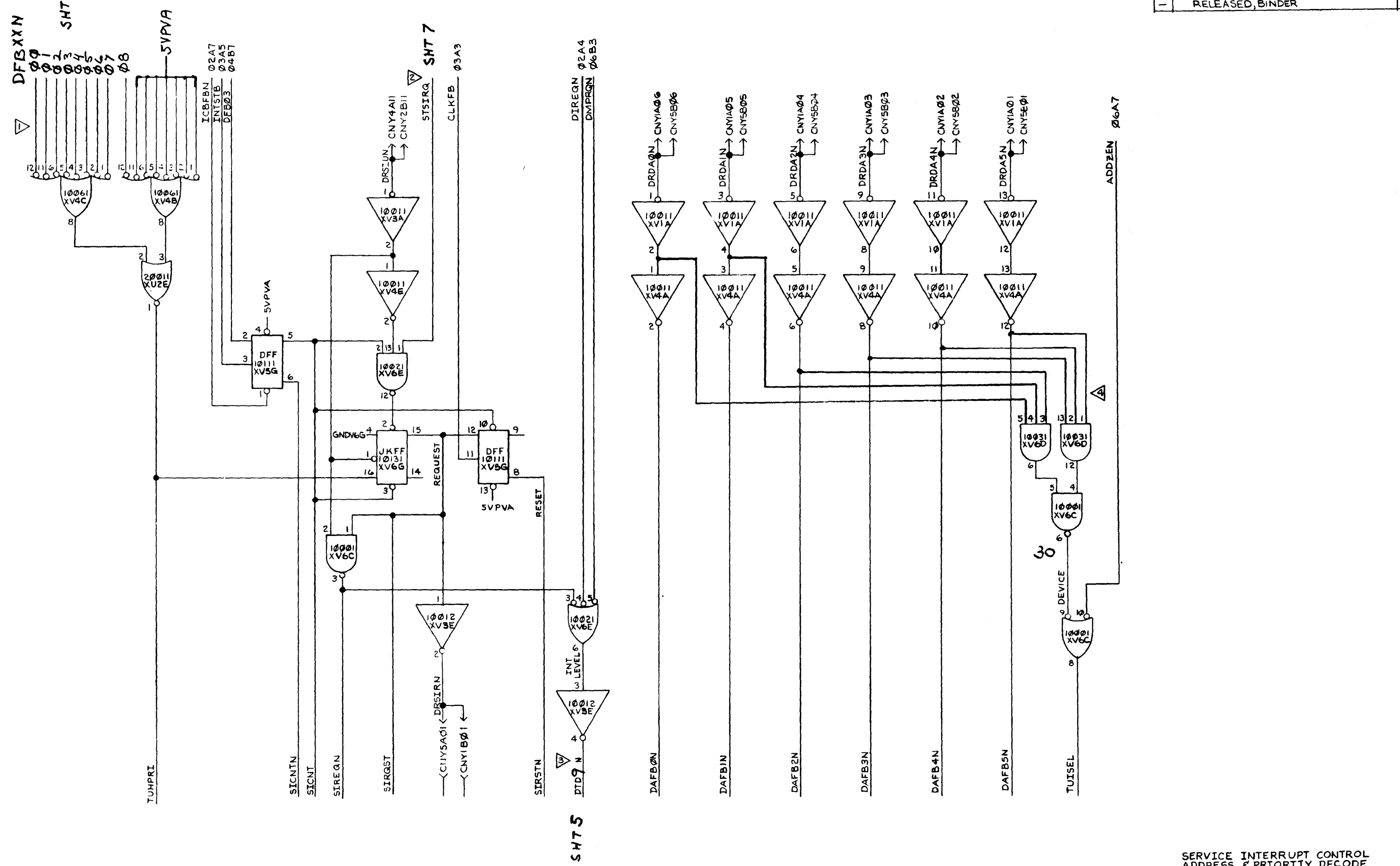


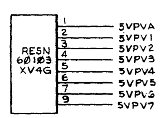


NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

| | | |
|---|---|---|
| TOLERANCE EXCEPT AS NOTED FRACTIONAL ± 1/64 DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE) | DRAWN | 8-3-73 |
| | CHECKED | 10-13-73 |
| | ENGINEER R F | 10-23-73 |
| | PROJECT APP'D | 10-23-73 |
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GENERAL PURPOSE CONTROLLER NO 2

SIZE D — DRAWING NO. 520-100260 — REV —

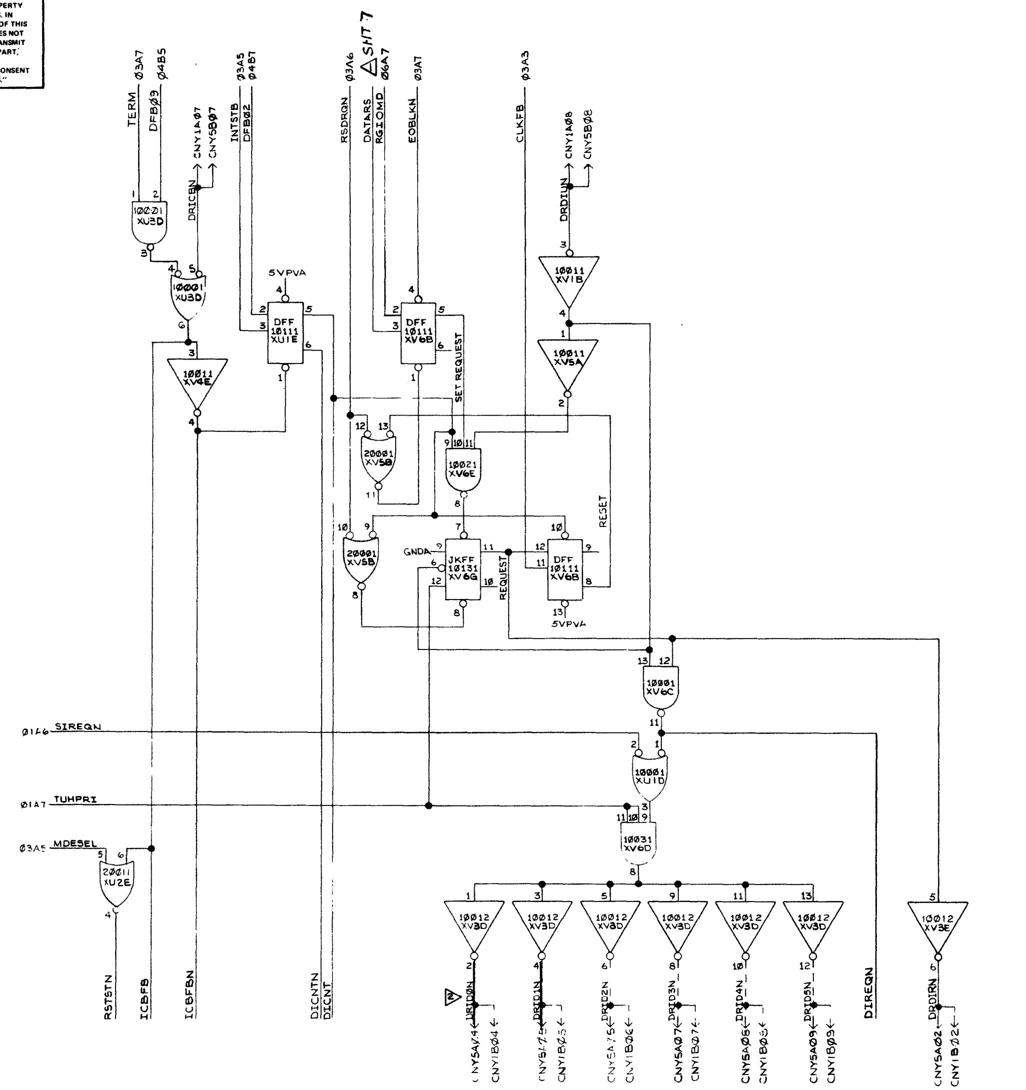
SHEET 1 OF 6

CODE IDENT NO.

LTR



MCS Form 15




NOTES:
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.
2. CONNECT FOR APPROPRIATE SID'S.

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1 64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

| | | DATE |
|---|---|---|
| DRAWN | | 8-2-73 |
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| ENGINEER | | 10-23-73 |
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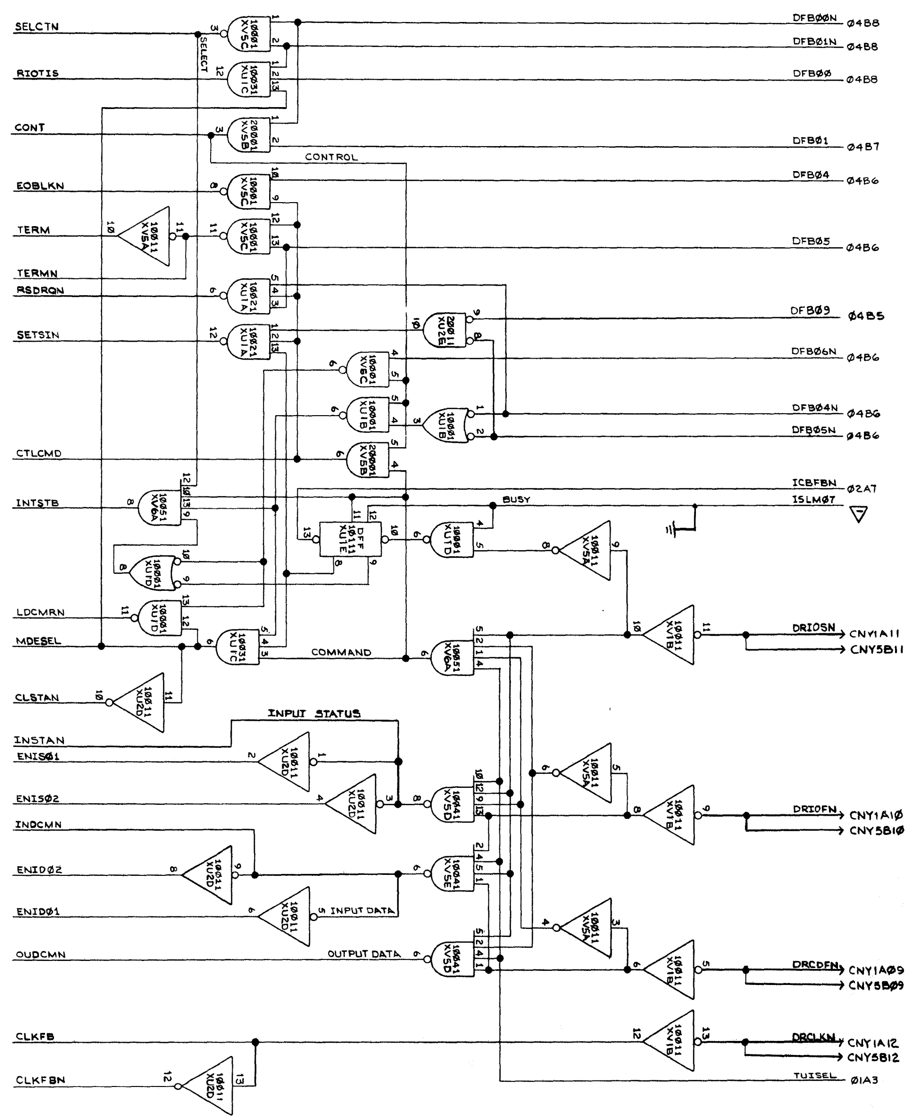
DATA INTERRUPT & SOURCE ID CONTROL

# GENERAL PURPOSE CONTROLLER NO. 2

SIZE D | DRAWING NO 520-100260 | REV — | SHEET 2 OF 6 | CODE IDENT NO



MCS Form 15

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NOTES: 1 ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC

TOLERANCE EXCEPT AS NOTED
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| | |
|---|---|
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COMMAND DECODE LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D DRAWING NO 520-100260 REV 1

SHEET 3 OF 6

CODE IDENT NO

REVISIONS: LTR DESCRIPTION DATE APPROVED

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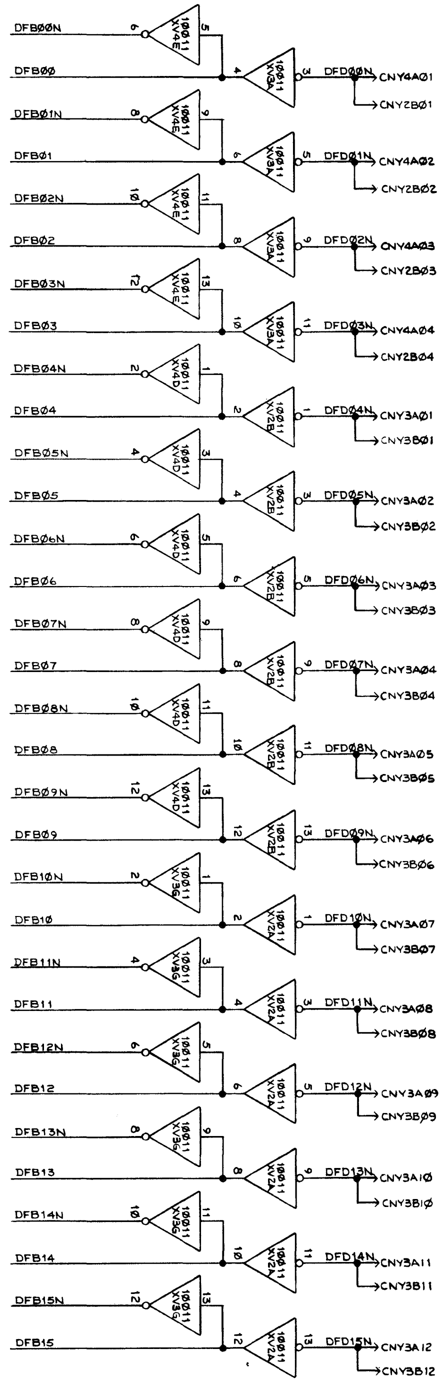


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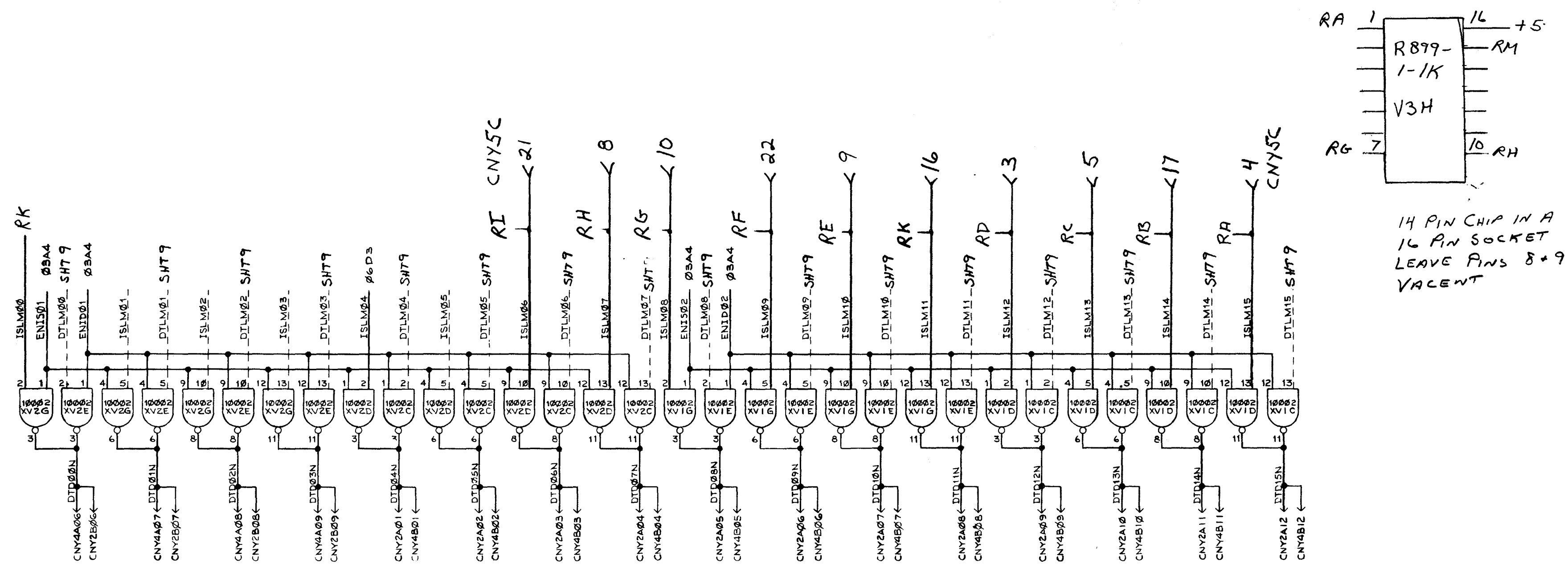
OUTPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO2

SIZE D
DRAWING NO 520-100260
SHEET 4 OF 6
CODE IDENT NO.
REV —
LTR

520-100260




NOTE: 1. TIE UNUSED INPUTS TO GROUND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [illegible] | 8-3-73 |
| CHK | [illegible] | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | [illegible] | 10-21-73 |
| APVD | [illegible] | 10/23 |

INPUT DATA BUFFERS

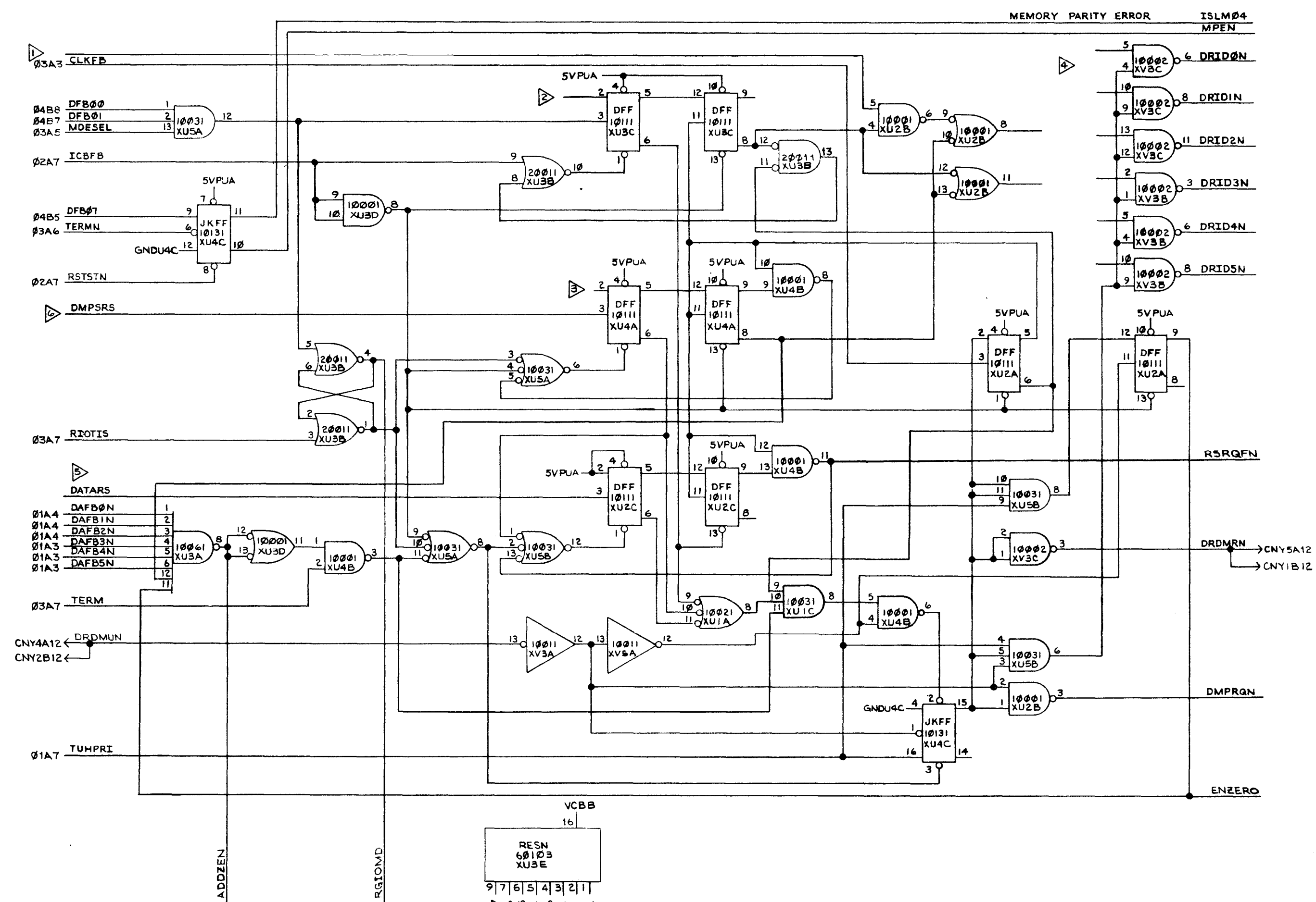
# GENERAL PURPOSE CONTROLLER NO. 2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 5 OF 6 | LTR
CODE IDENT NO

REVISIONS
| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

MCS Form 15A

[520-100260]




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARS TO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL (REG. FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 BEND RADIUS
3 PLACE DEC. ±.005 ANGLES ±1/2°
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modular computer systems

| | | DATE |
|---|---|---|
| DWN | [signature] | 8-3-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | R.G. [signature] | 10-23-73 |
| APVD | [signature] | 10/23 |

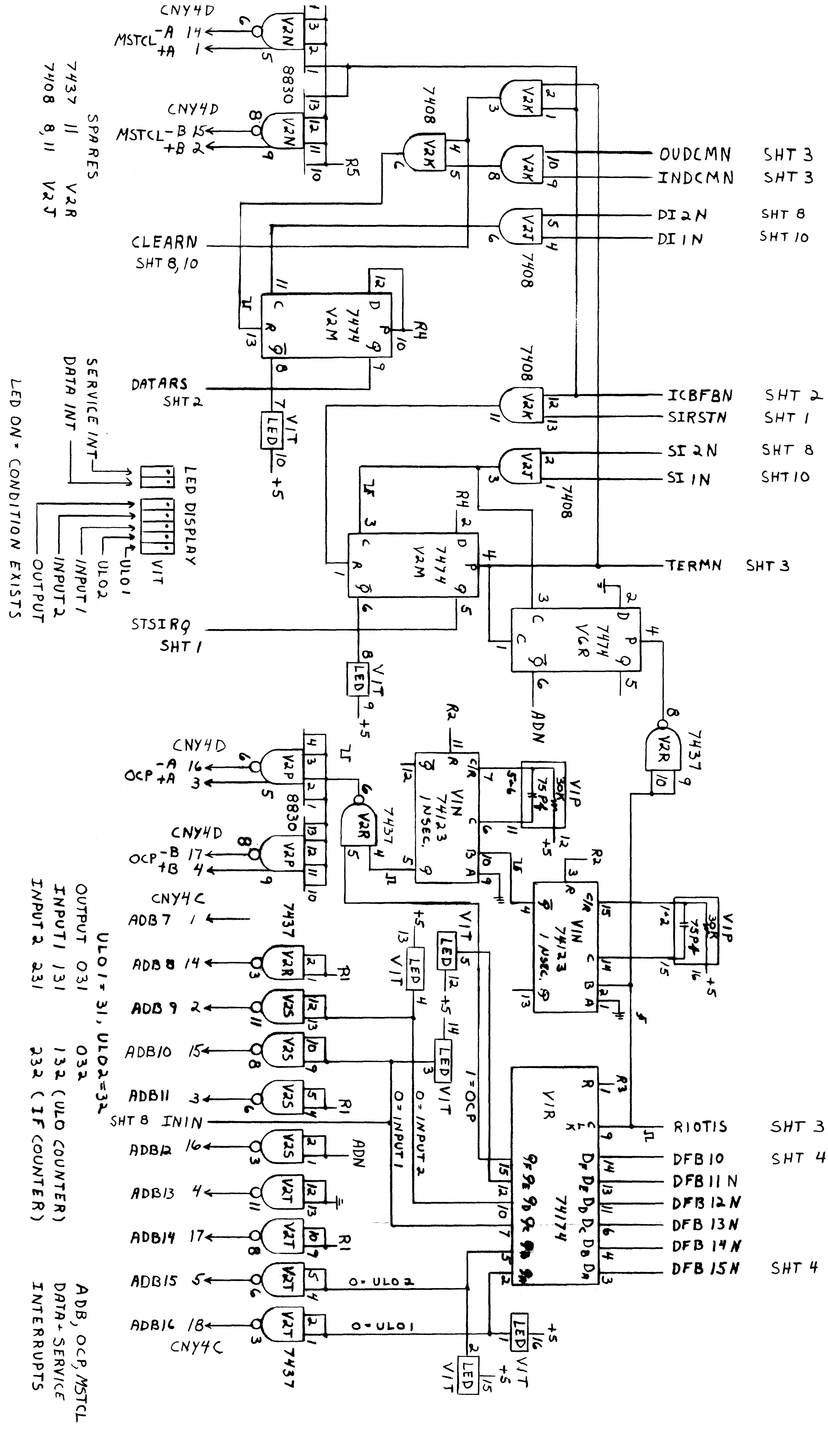
DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

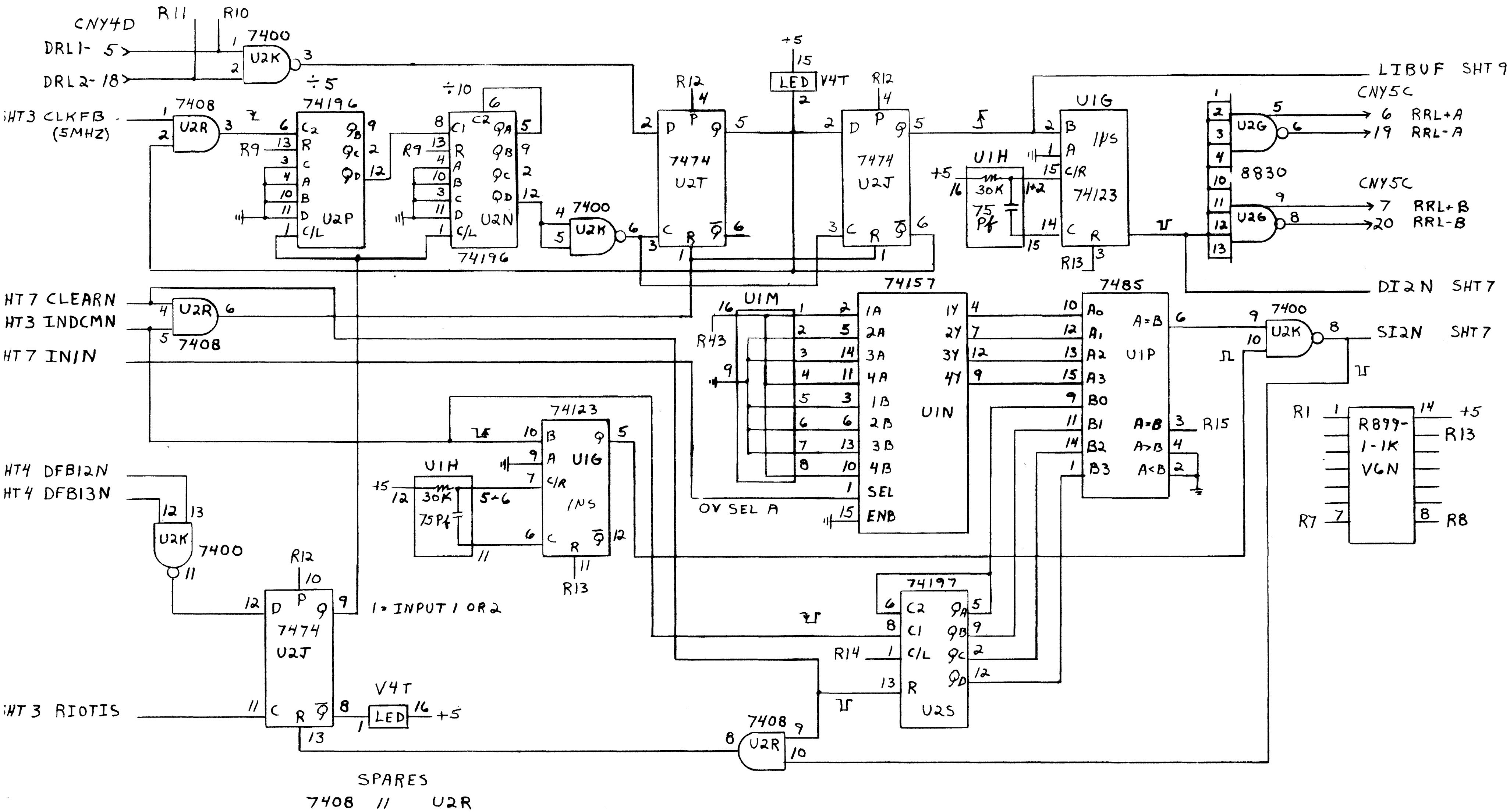
SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 6 OF 6 | LTR
CODE IDENT NO.

520-100260

MCS Form 16A

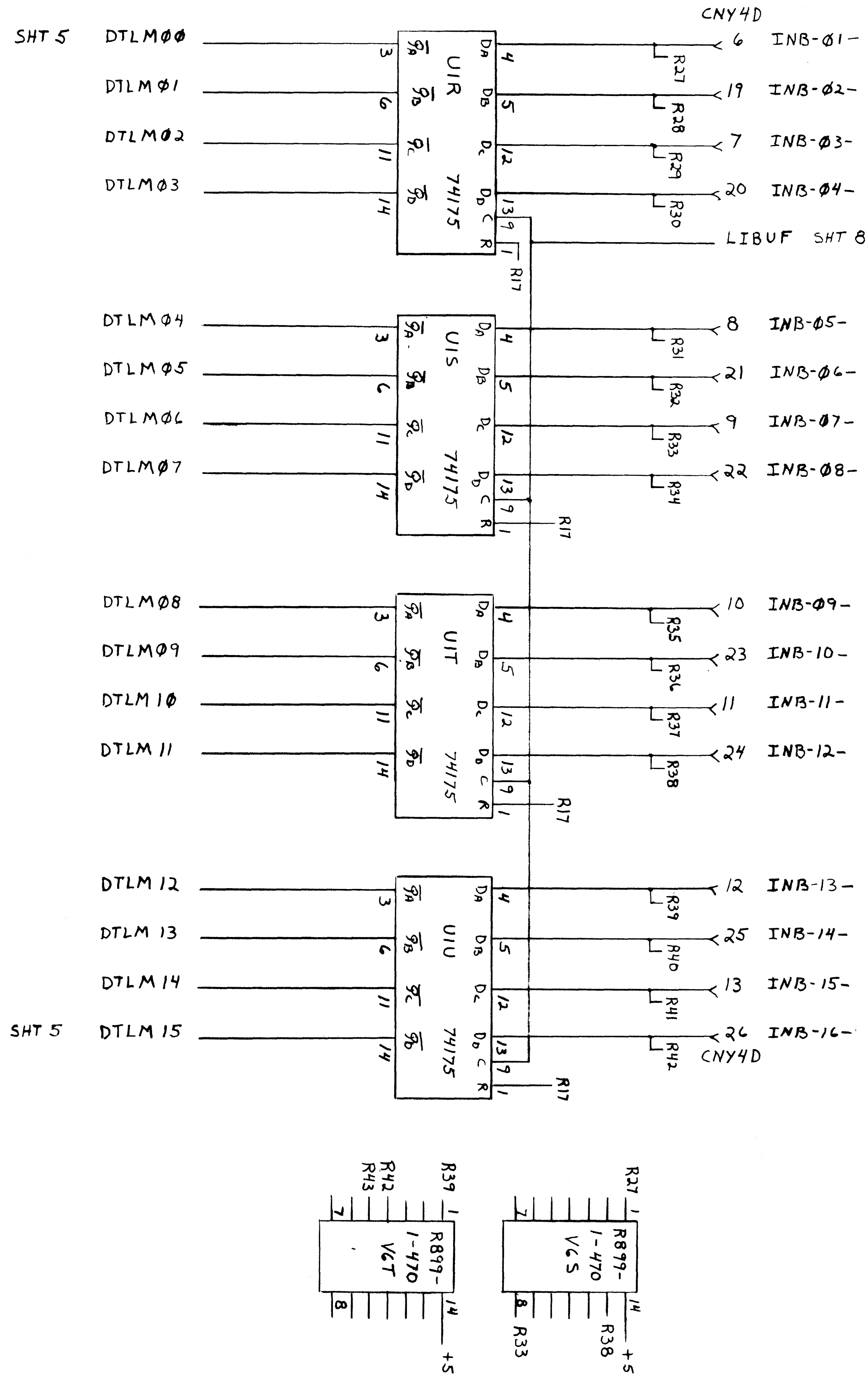


MSTCL -A 14 +A 1
MSTCL -B 15 +B 2
CNY4D
8830
V2N
7408
V2K
OUDCMN SHT 3
INDCMN SHT 3
DI2N SHT 8
DI1N SHT 10
CLEARN SHT 8,10
7474 V2M
DATARS SHT 2
ICBFBN SHT 2
SIRSTN SHT 1
SI2N SHT 8
SI1N SHT 10
TERMN SHT 3
STSIRQ SHT 1
7474 V6R
ADN
7437
V2R
V1T LED
+5
OCP -A 16 +A 3
OCP -B 17 +B 4
V2P
V1N 74123 1 NSEC.
V1P 30K 75P4
CNY4C
ADB7 1
ADB8 14
ADB9 2
ADB10 15
ADB11 3
SHT 8 ININ
ADB12 16
ADB13 4
ADB14 17
ADB15 5
ADB16 18
V2S
V2T
1 = OCP
0 = INPUT 2
0 = INPUT 1
0 - ULO2
0 - ULO1
V1R 74174
RIOTIS SHT 3
DFB10 SHT 4
DFB11N
DFB12N
DFB13N
DFB14N
DFB15N SHT 4
SPARES
7437 11 V2R
7408 8,11 V2J
LED DISPLAY
SERVICE INT
DATA INT
V1T
ULO1
ULO2
INPUT 1
INPUT 2
OUTPUT
LED ON - CONDITION EXISTS
ULO1 = 31, ULO2 = 32
OUTPUT 031 032
INPUT1 131 132 (ULO COUNTER)
INPUT2 231 232 (IF COUNTER)
ADB, OCP, MSTCL DATA + SERVICE INTERRUPTS
SHEET 7 OF 11



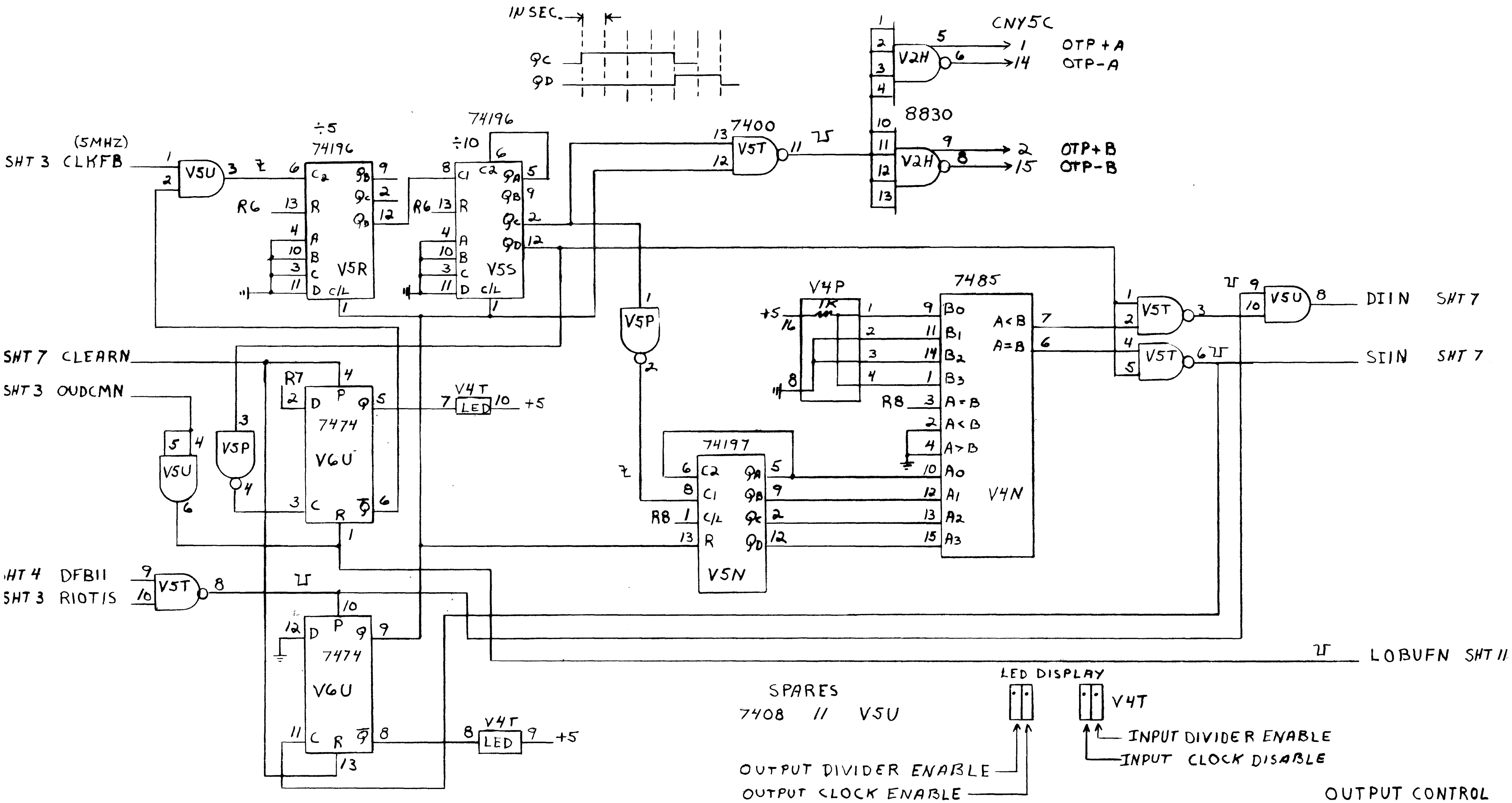

INPUT CONTROL

SHEET 8 OF 11



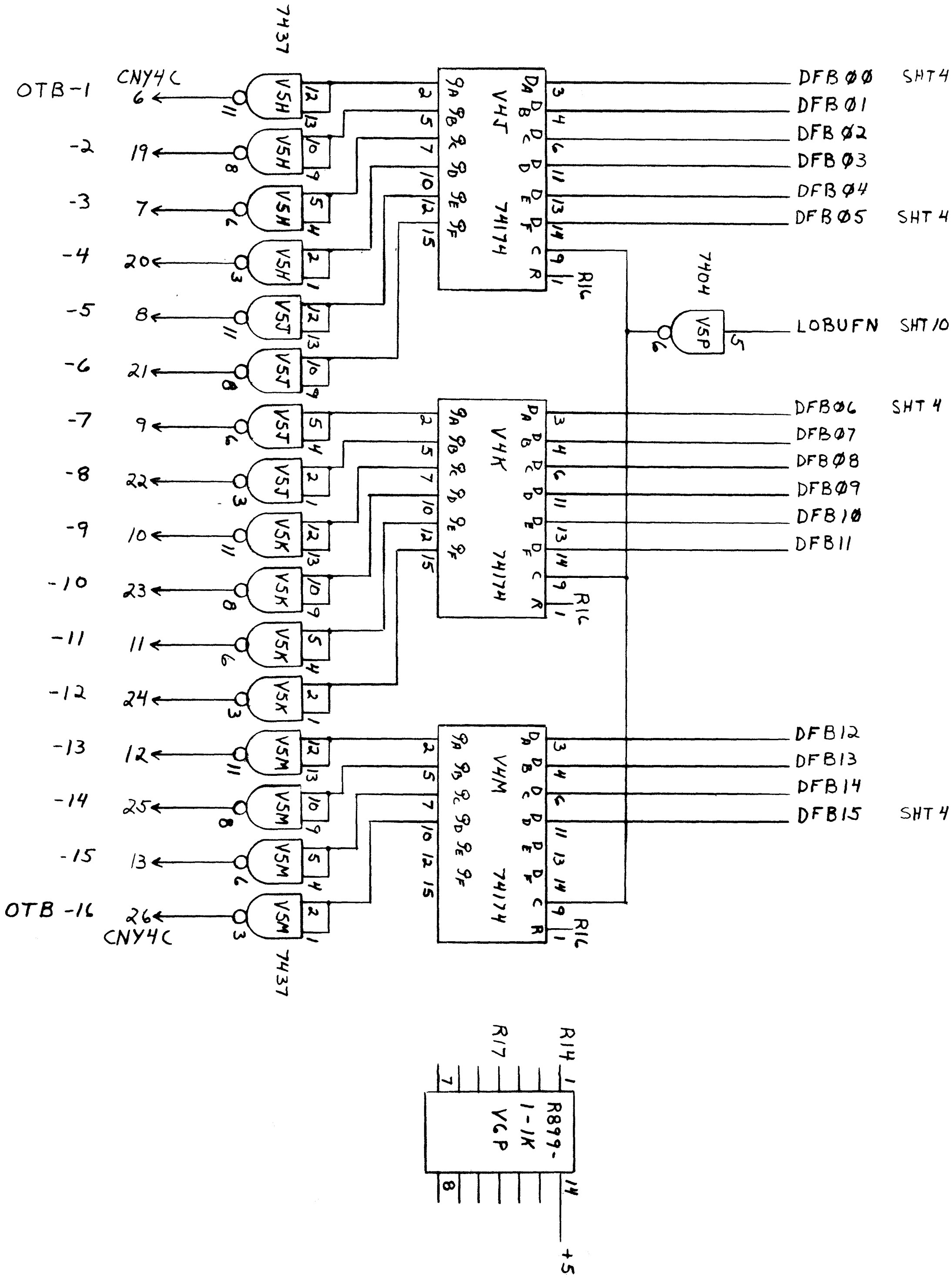

INPUT BUFFER

SHEET 9 OF 11




OUTPUT CONTROL

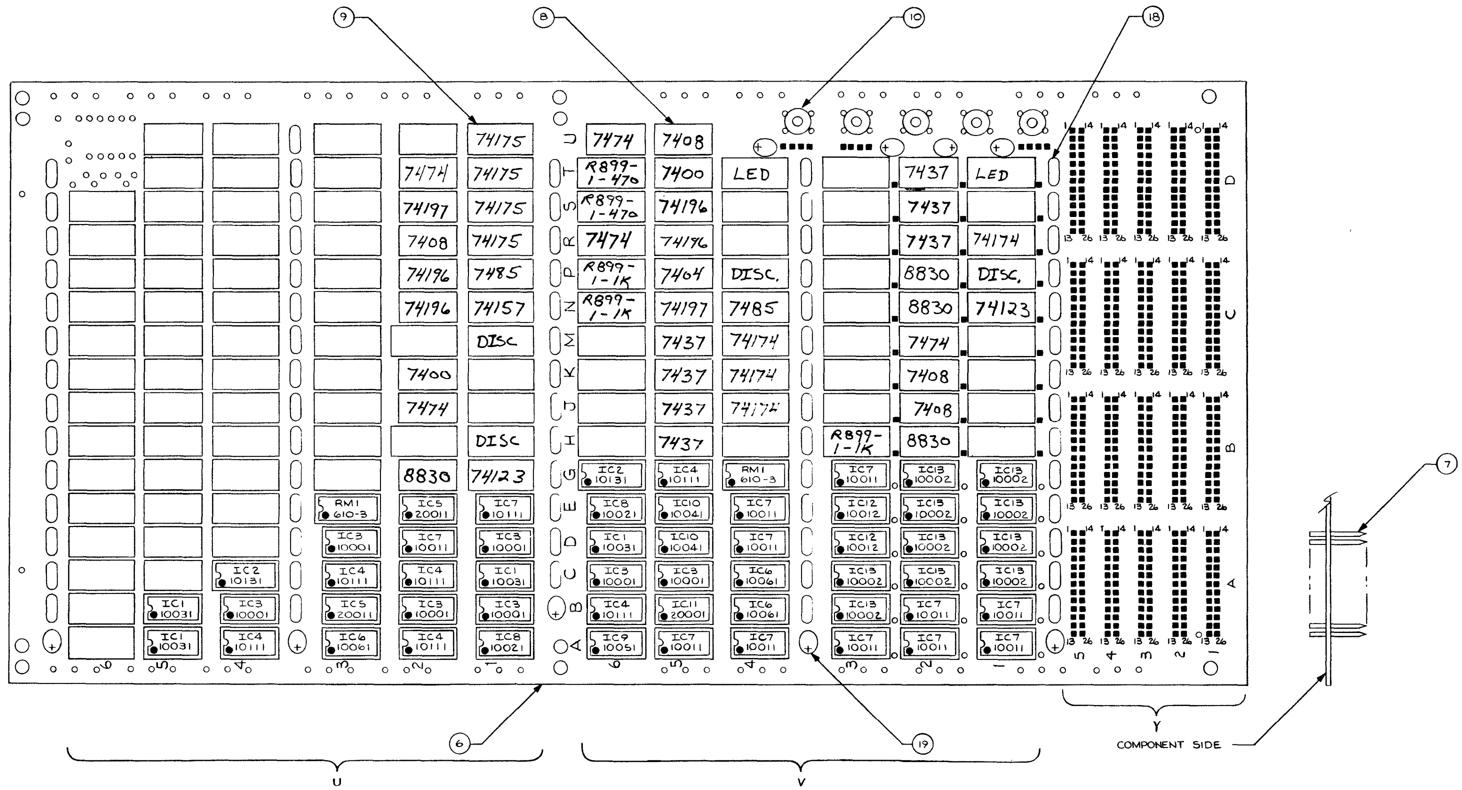
SHEET 10 OF 11




OUTPUT BUFFER

SHEET 11 OF 11

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| – | RELEASED, BINDER | | |




NOTE
WIRE +5 TO THE FOLLOWING
PINS V1T, V4T, U1M, U1H

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3 PLACE DEC. ±.005 ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

LM 517-100176

| | | DATE |
|---|---|---|
| DWN | | 8-9-73 |
| CHK | | 10-13-73 |
| ENGR | R.E. BINDER | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

-001 SHOWN

GENERAL PURPOSE
CONTROLLER NO.2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 516-100176 | — |
| | SHEET 1 OF 1 | LTR |
| | CODE IDENT NO. | |

516-100176

MCS Form 15A BRUNING 46-328

# DATA CONTROL PANEL

ADDRESS 38
PRIORITY 12

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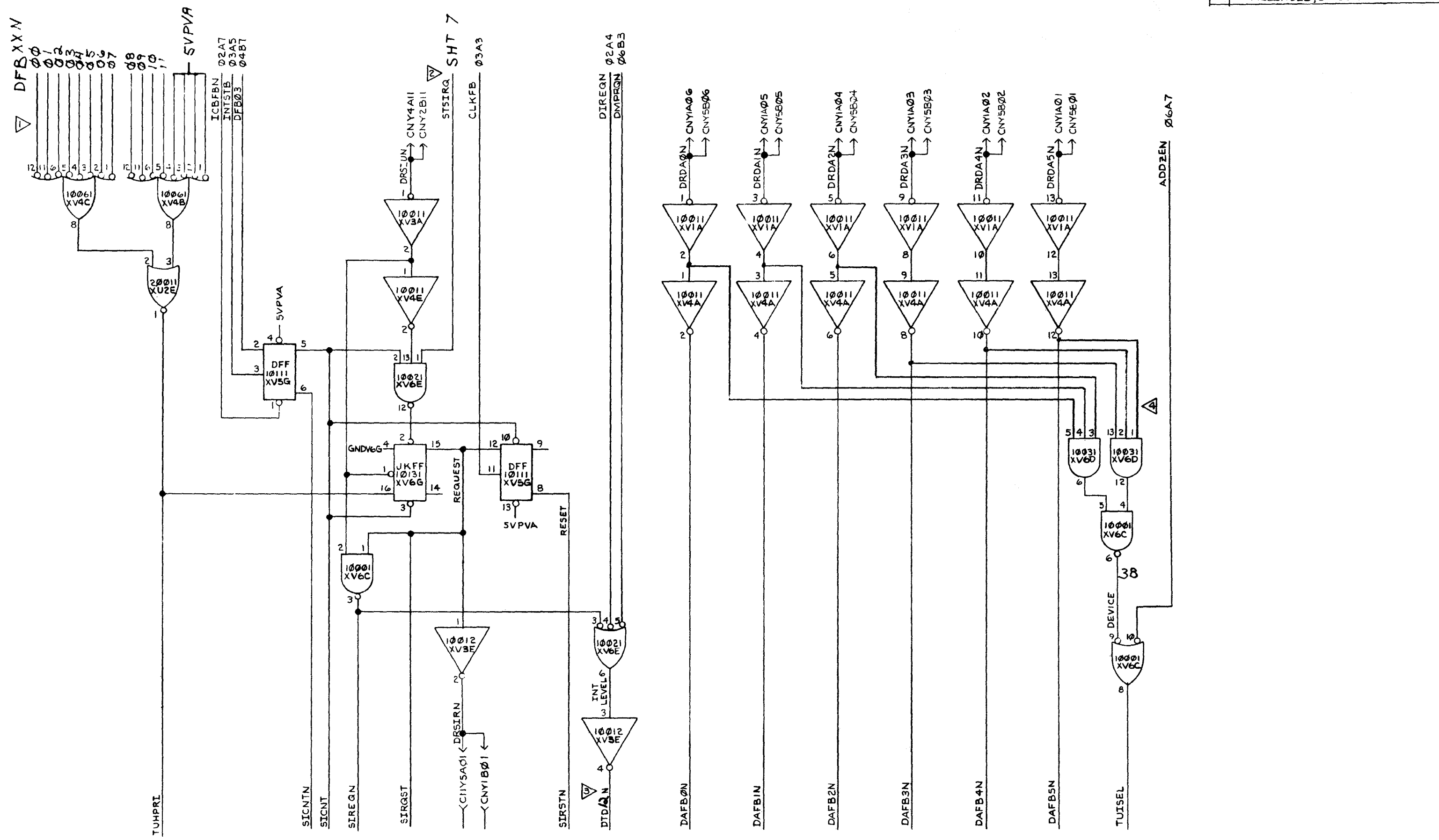
| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| — | RELEASED, BINDER | | |




NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

| | | DATE |
|---|---|---|
| DRAWN | [signature] | 8-3-73 |
| CHECKED | [signature] | 10-13-73 |
| ENGINEER | R F E[signature] | 10-23-73 |
| PROJECT APP'D | F Pagan | 10-23-73 |
| APPROVED | [signature] | 10/23 |

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

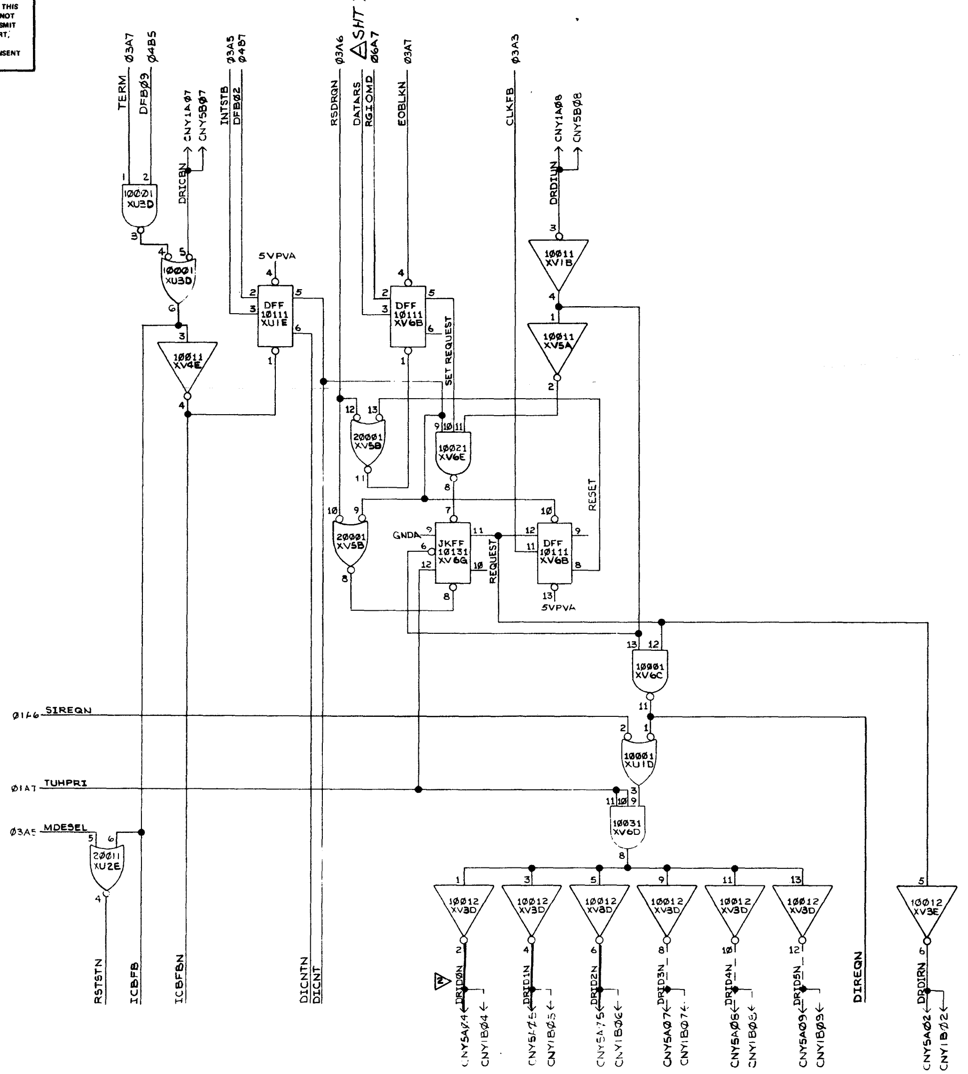
GENERAL PURPOSE
CONTROLLER NO 2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 1 OF 6 | CODE IDENT NO. | LTR

[520-100260]

MCS Form 15

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |




NOTES:

1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.
2. CONNECT FOR APPROPRIATE SID'S.

DATA INTERRUPT & SOURCE ID CONTROL

| | | | |
|---|---|---|---|
| TOLERANCE EXCEPT AS NOTED<br>FRACTIONAL ± 1/64<br>DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE) | DRAWN | 8-2-73 | GENERAL PURPOSE CONTROLLER NO. 2 |
| | CHECK | 10-13-73 | |
| | ENGINEER | 10-23-73 | SIZE D — DRAWING NO 520-100260 — REV — |
| | PROJECT APP'D | 10-23-73 | SHEET 2 OF 6 |
| MCS modular computer systems | APPROVED | 10/23 | CODE IDENT NO. |

MCS Form 15

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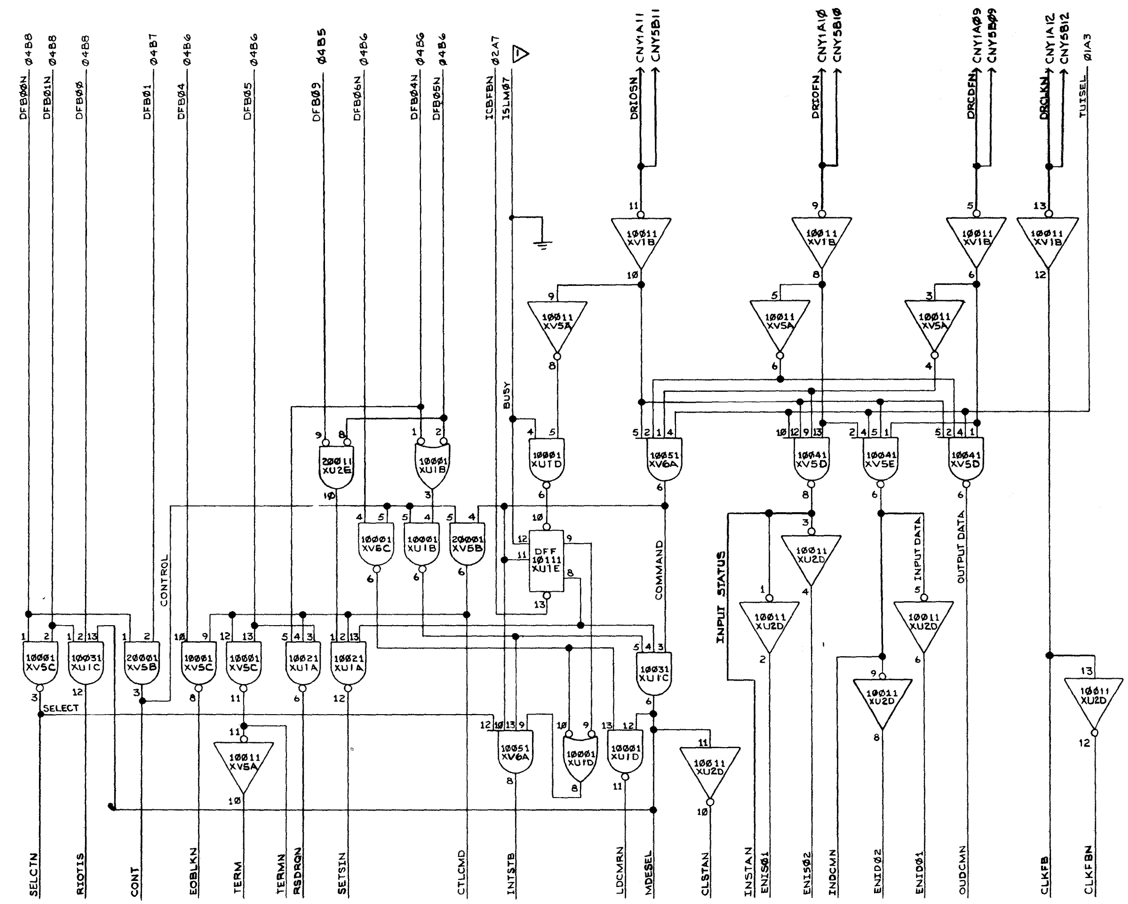
| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |




NOTES: 1 ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC

COMMAND DECODE LOGIC

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

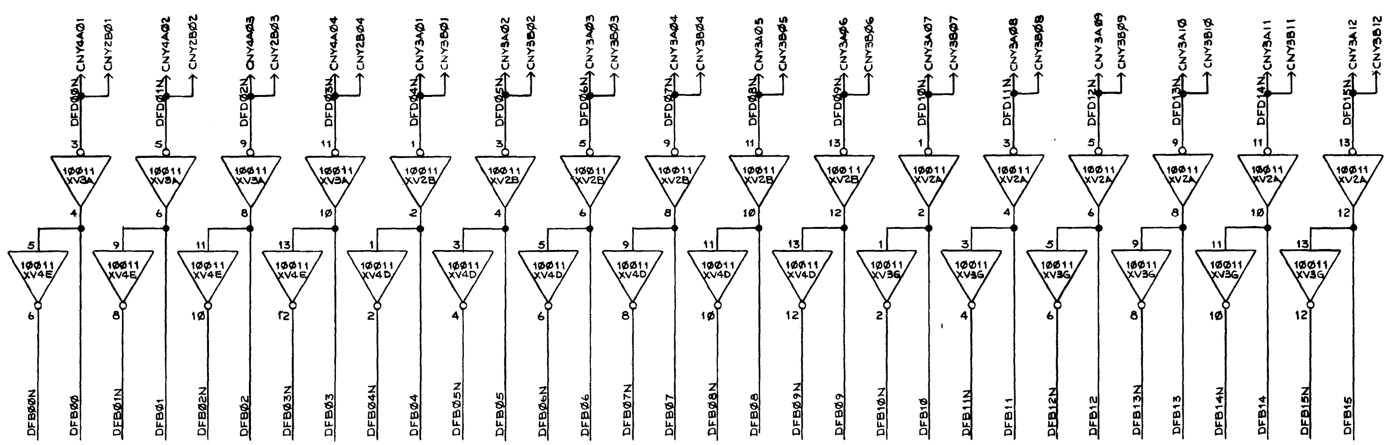
| | | |
|---|---|---|
| DRAWN | [signature] | 8-2-73 |
| CHECKED | [signature] | 10-13-73 |
| ENGINEER | R F BINDER | 10-23-73 |
| PROJECT APP'D | [signature] | 10-23-73 |
| APPROVED | [signature] | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 3 OF 6 | LTR
CODE IDENT NO

520-100260

MCS Form 15




| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

OUTPUT DATA BUFFERS



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

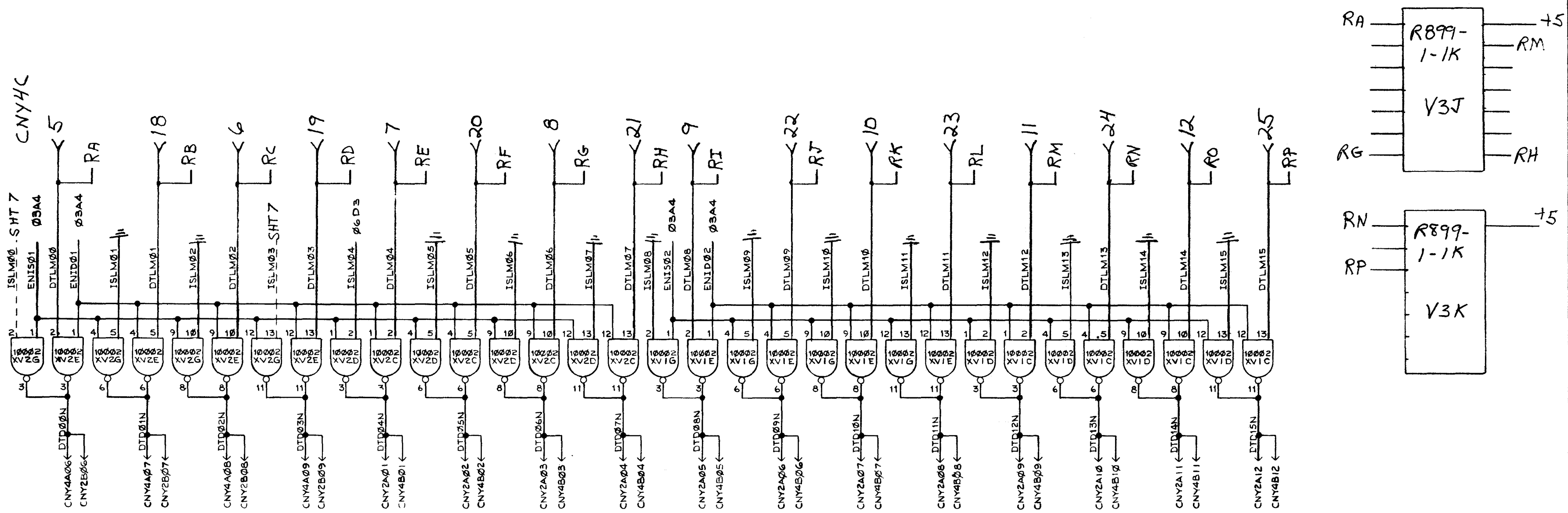
| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | W. J. Bozzaro | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | P. Men | 10-23-73 |
| APVD | | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO. 520-100260
REV —
SHEET 4 OF 6
CODE IDENT NO.
LTR

MCS Form 15A

520-100260




NOTE: 1. TIE UNUSED INPUTS TO GROUND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [illegible] | 8-3-73 |
| CHK | [illegible] | 10-13-73 |
| ENGR | R.F. Binder | 10-23-73 |
| PROJ | P.G. [illegible] | 10-21-73 |
| APVD | [illegible] | 10/23 |

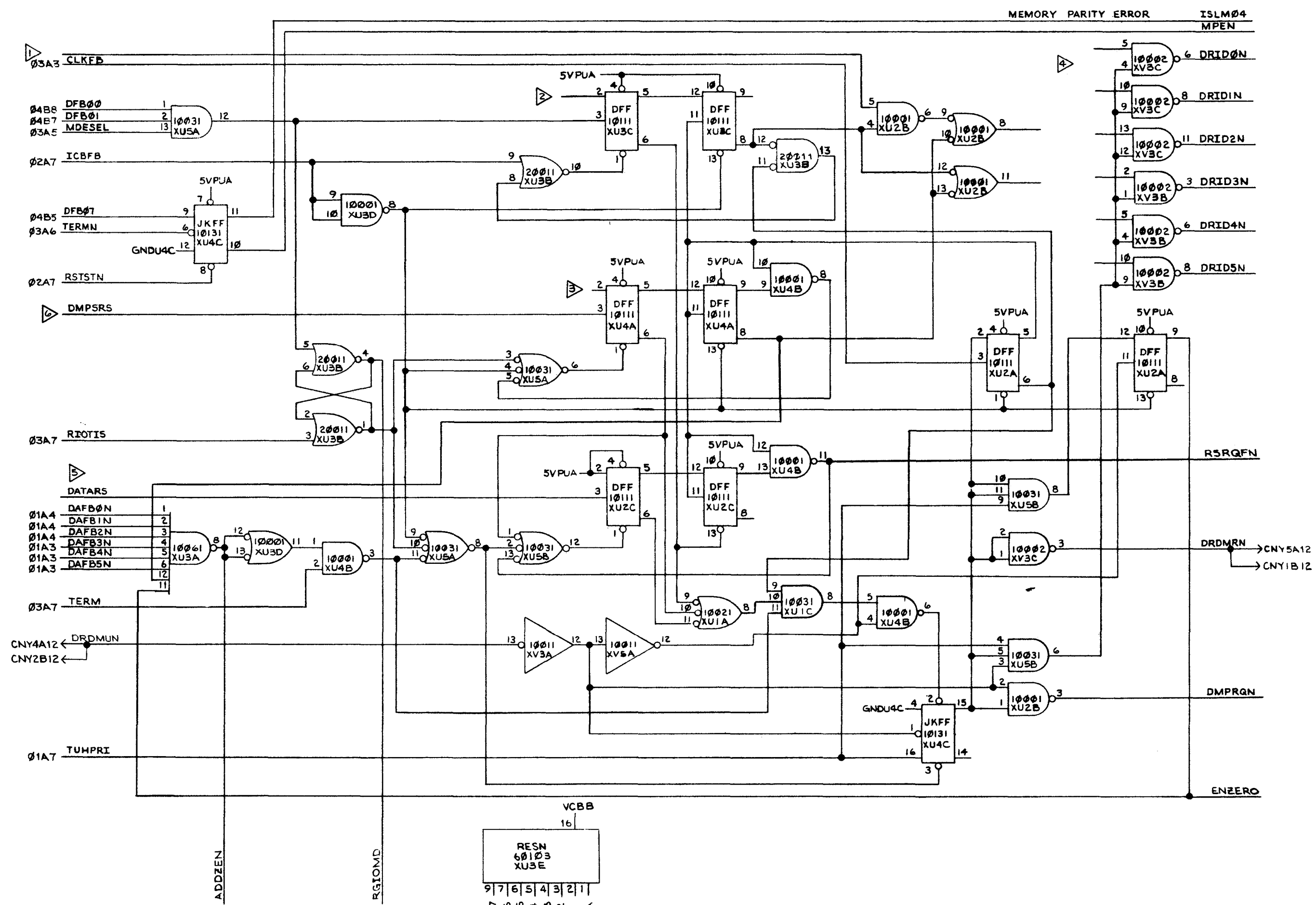
INPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO. 520-100260
REV —
SHEET 5 OF 6
CODE IDENT NO.
LTR

REVISIONS
| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

520-100260
MCS Form 15A




6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL(REG. FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT

NOTES:

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |



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modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. BINDER | 10-13-73 |
| PROJ | R.G. | 10-23-73 |
| APVD | | 10/23 |

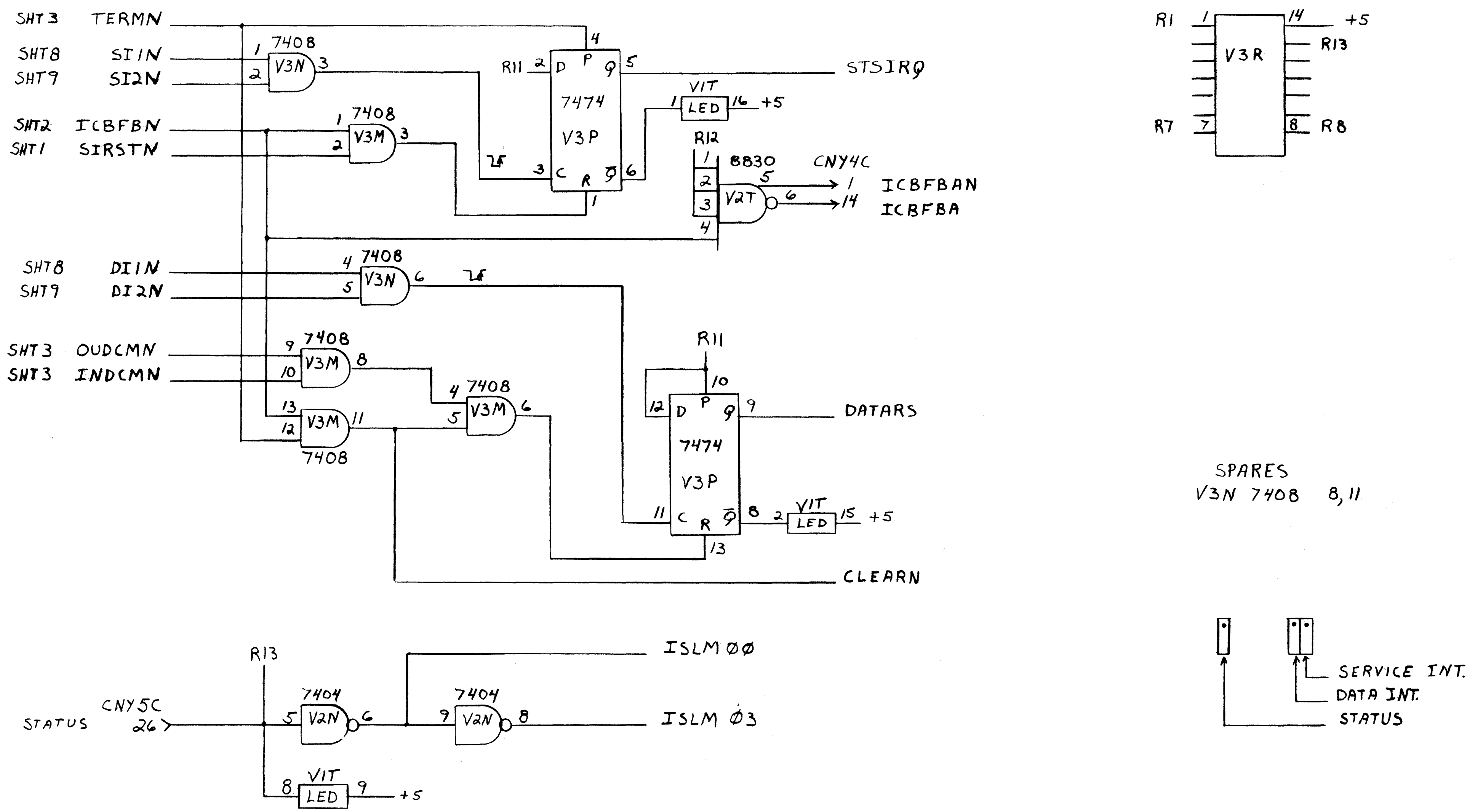
DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

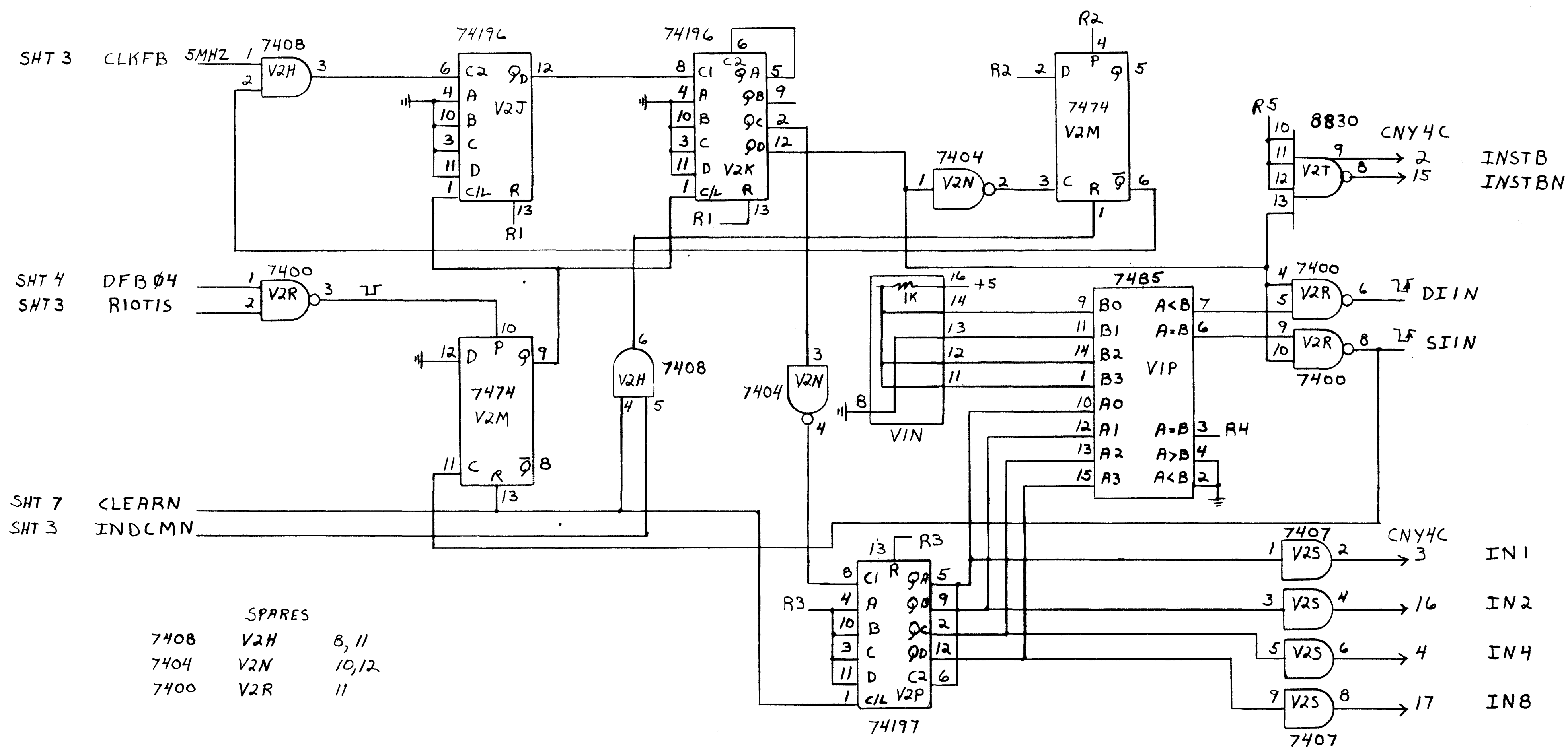
SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 6 OF 6 | LTR
CODE IDENT NO.

520-100260

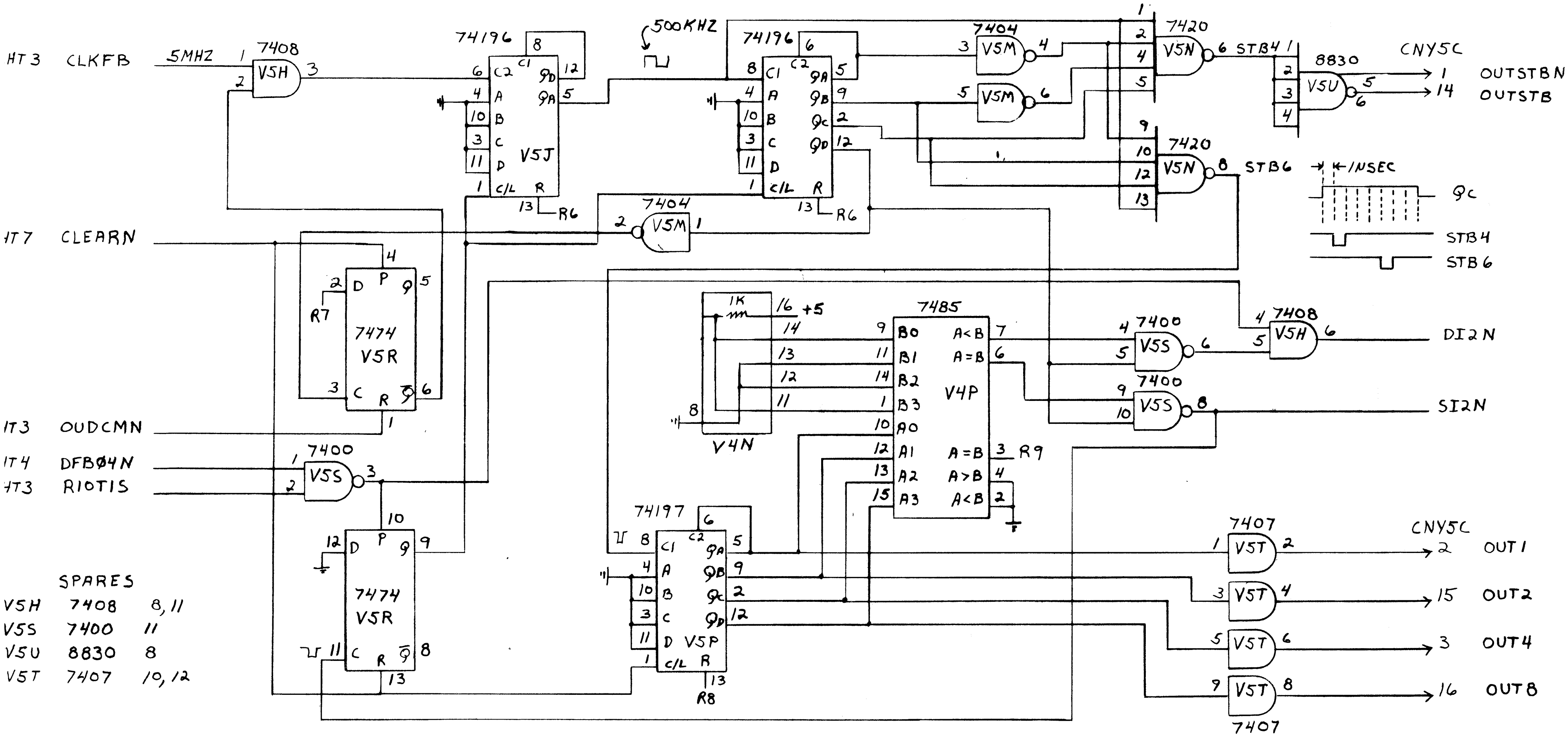
MCS Form 96A



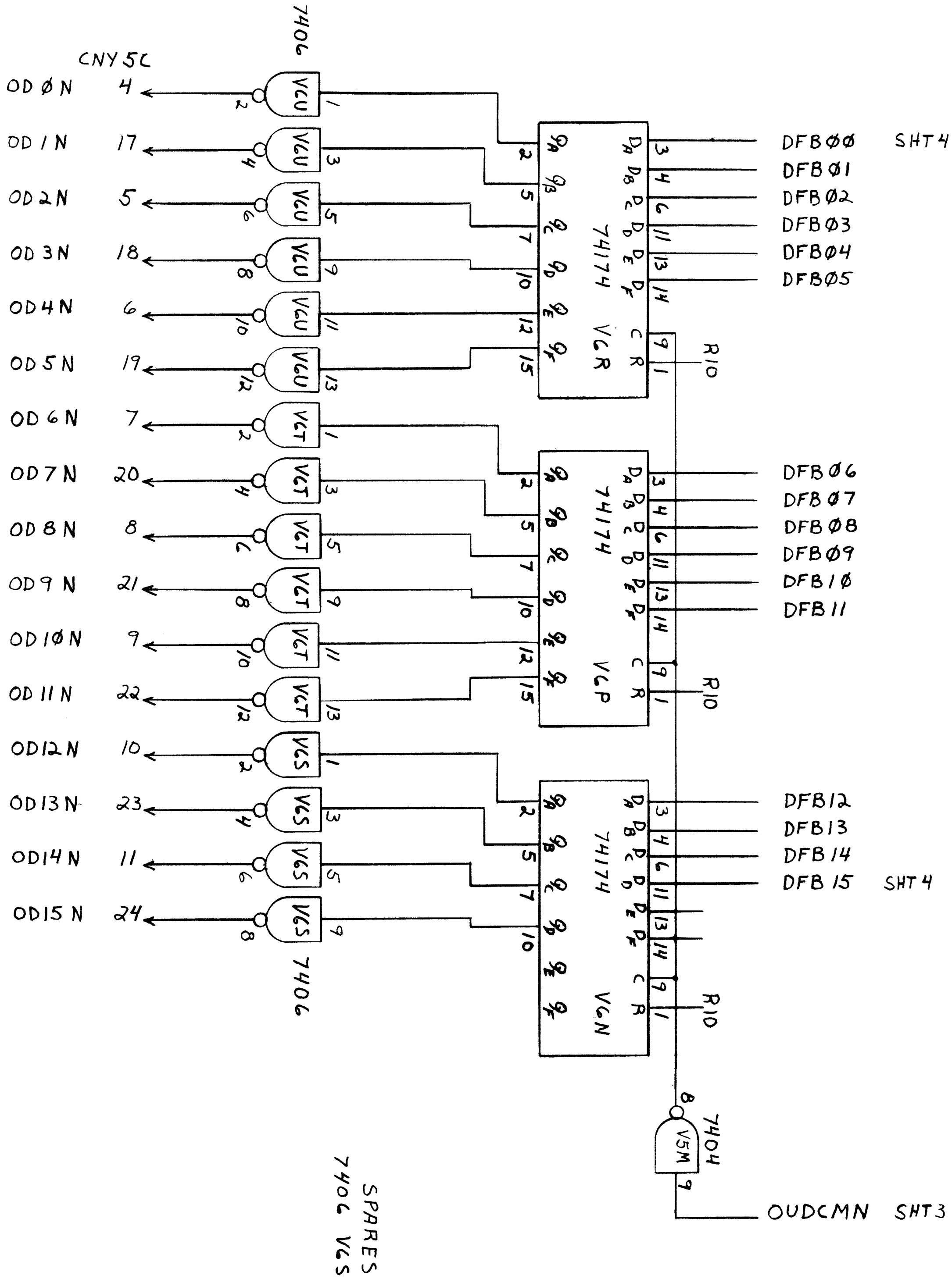

DI + SI INTERRUPTS
7 OF 1Ø




INPUT CONTROL
8 OF 10



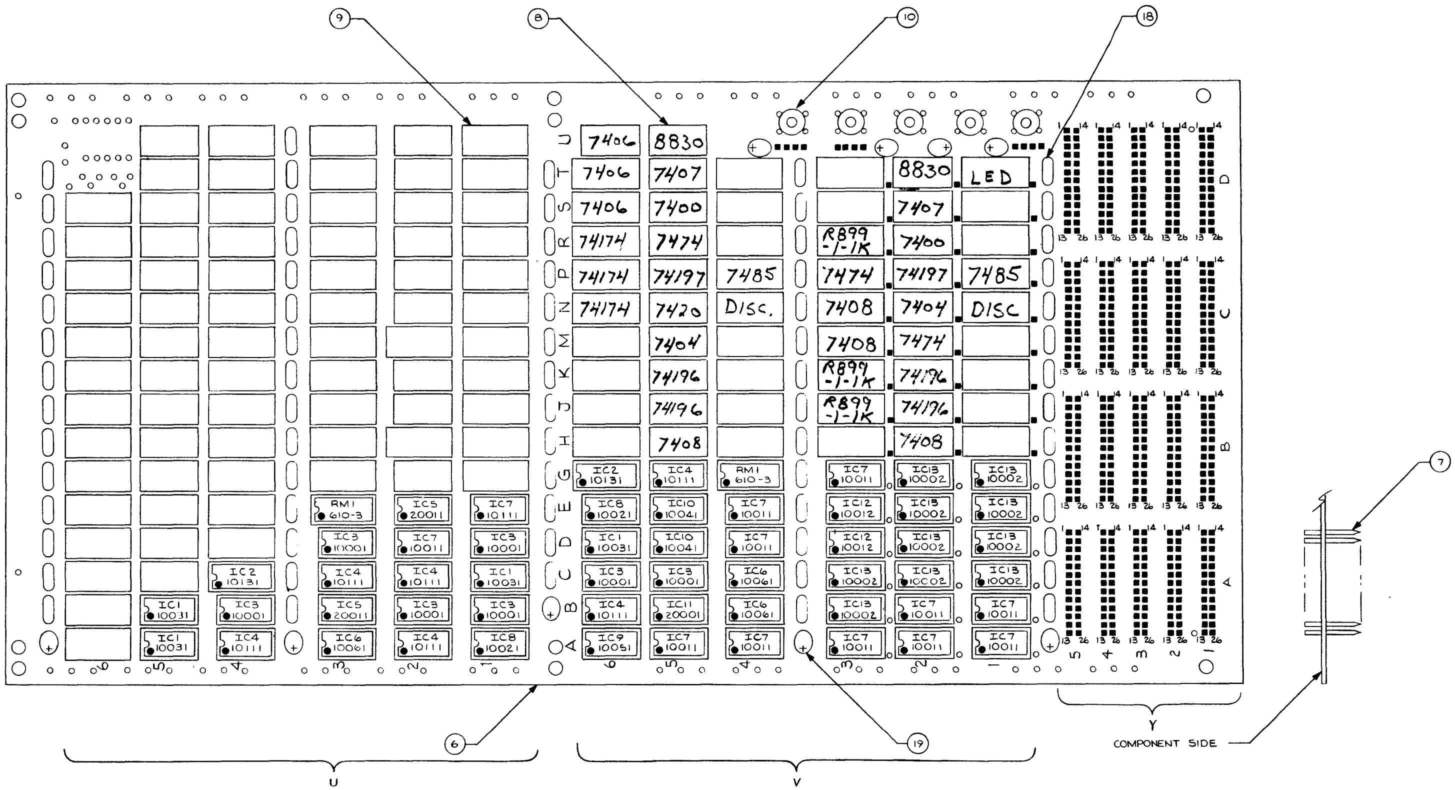

OUTPUT CONTROL
9 OF 10




SPARES
7406 VCS 10, 12

OUTPUT BUFFER
10 OF 10

| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| - | RELEASED, BINDER | | |

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3 PLACE DEC. ±.005 ANGLES ±1/2°
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modular computer systems

LM 517-100176

| | | DATE |
|---|---|---|
| DWN | [signature] | 8-9-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R.F. BINDER | 10-23-73 |
| PROJ | [signature] | 10-23-73 |
| APVD | [signature] | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

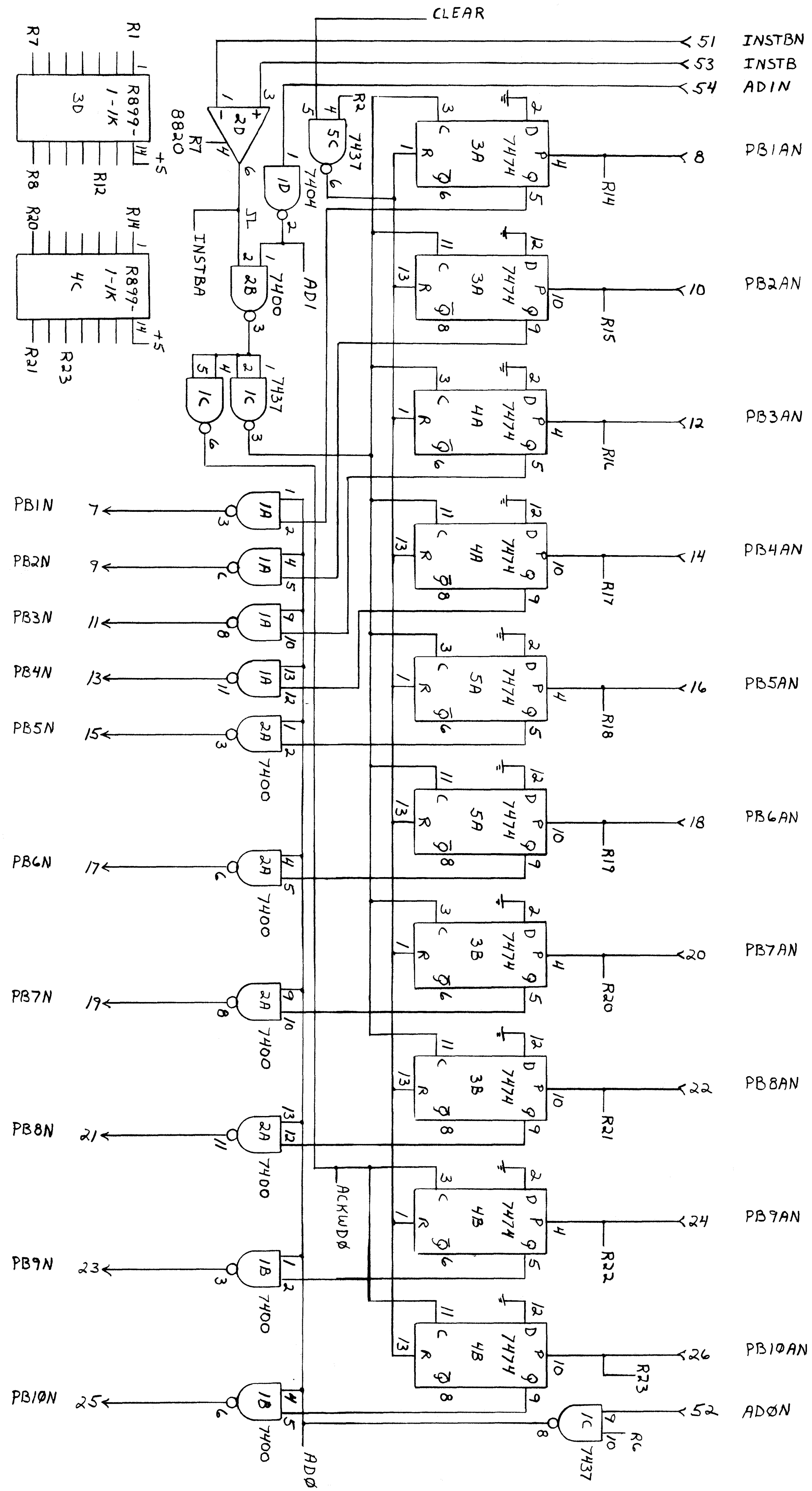
SIZE D | DRAWING NO. 516-100176 | REV —

SHEET 1 OF 1 | LTR

CODE IDENT NO.

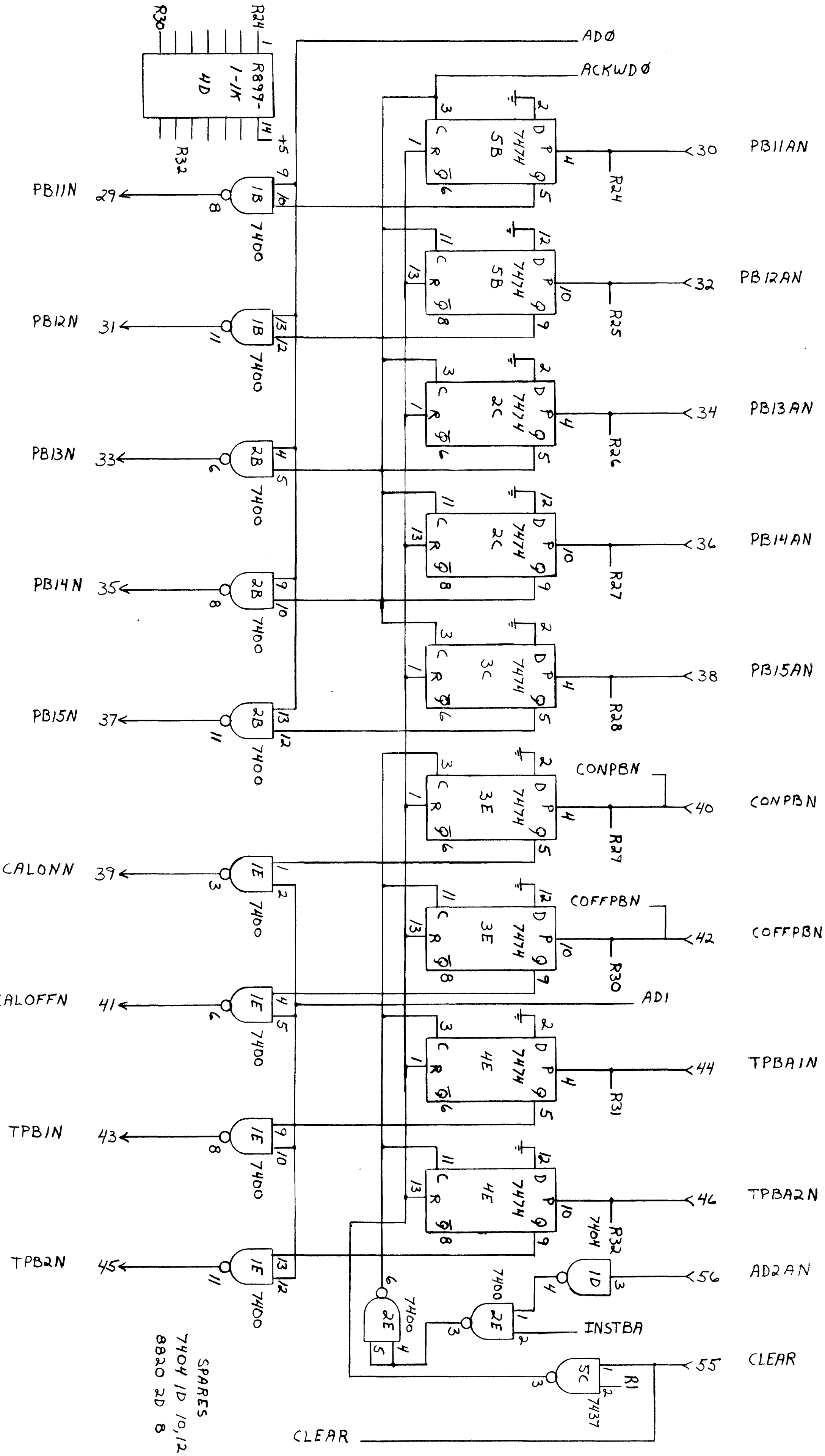
516-100176

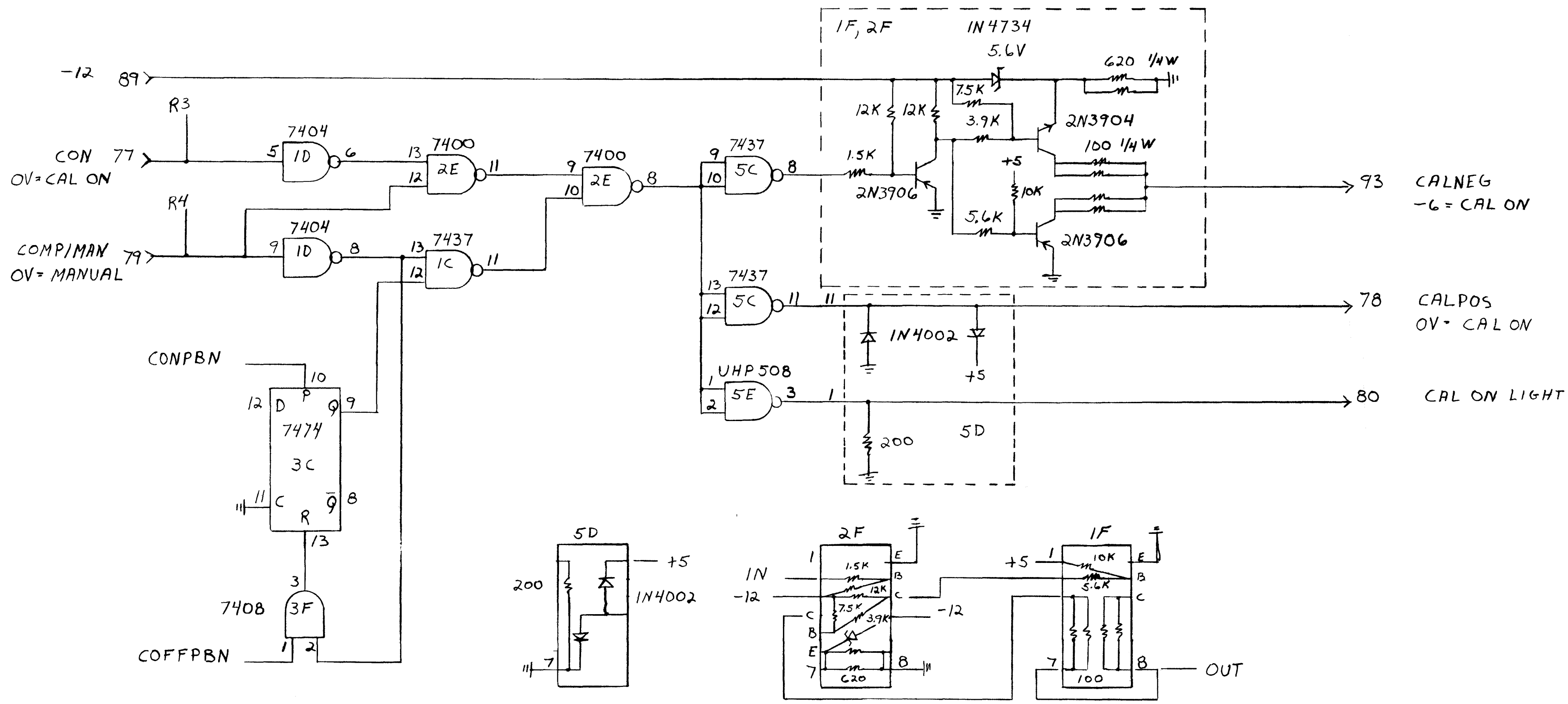
MCS Form 15A BRUNING 46-329



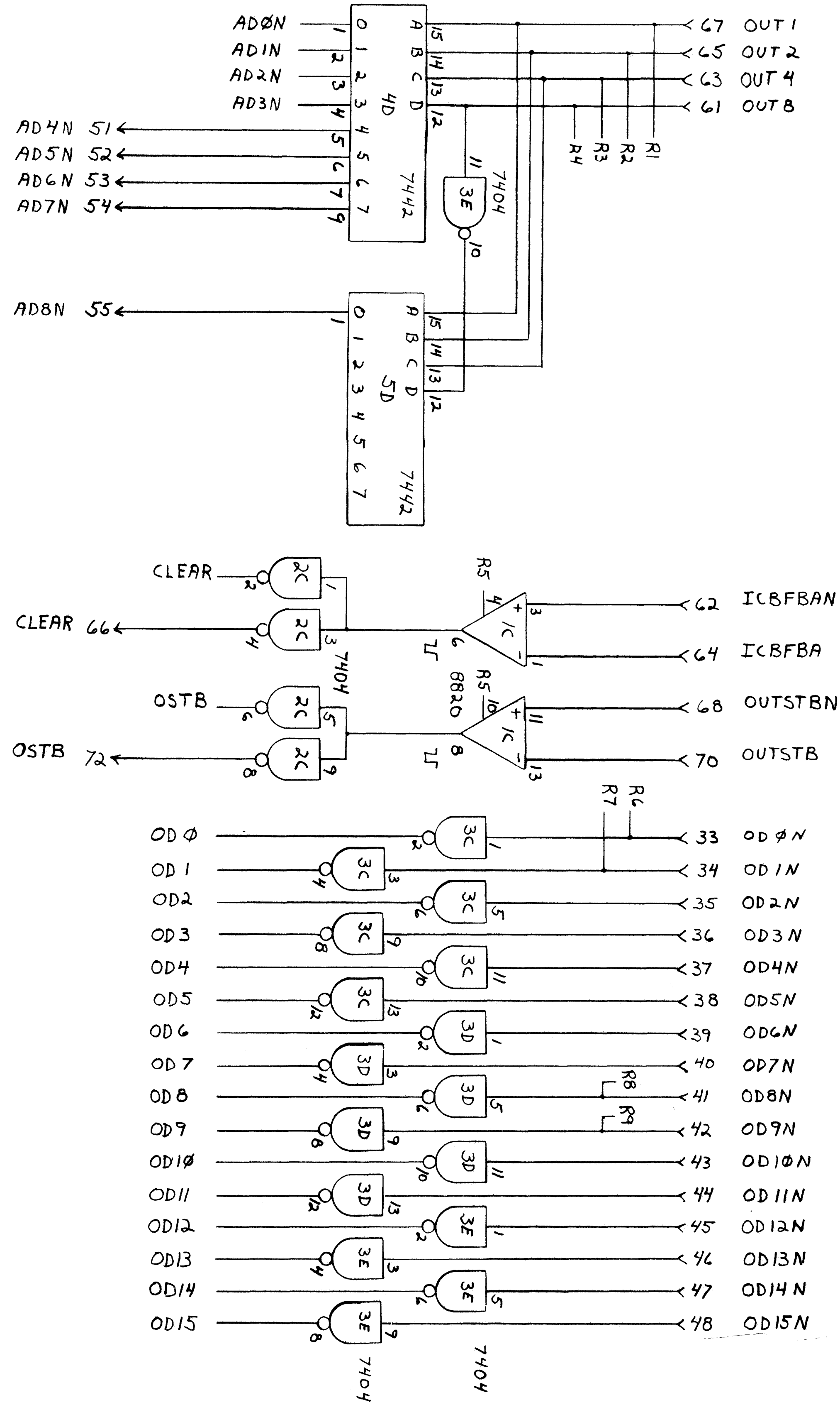

PUSH BUTTON SWITCH INPUT
PAGE 1 OF 3

# PUSH BUTTON SWITCH INPUT
PAGE 2 OF 3



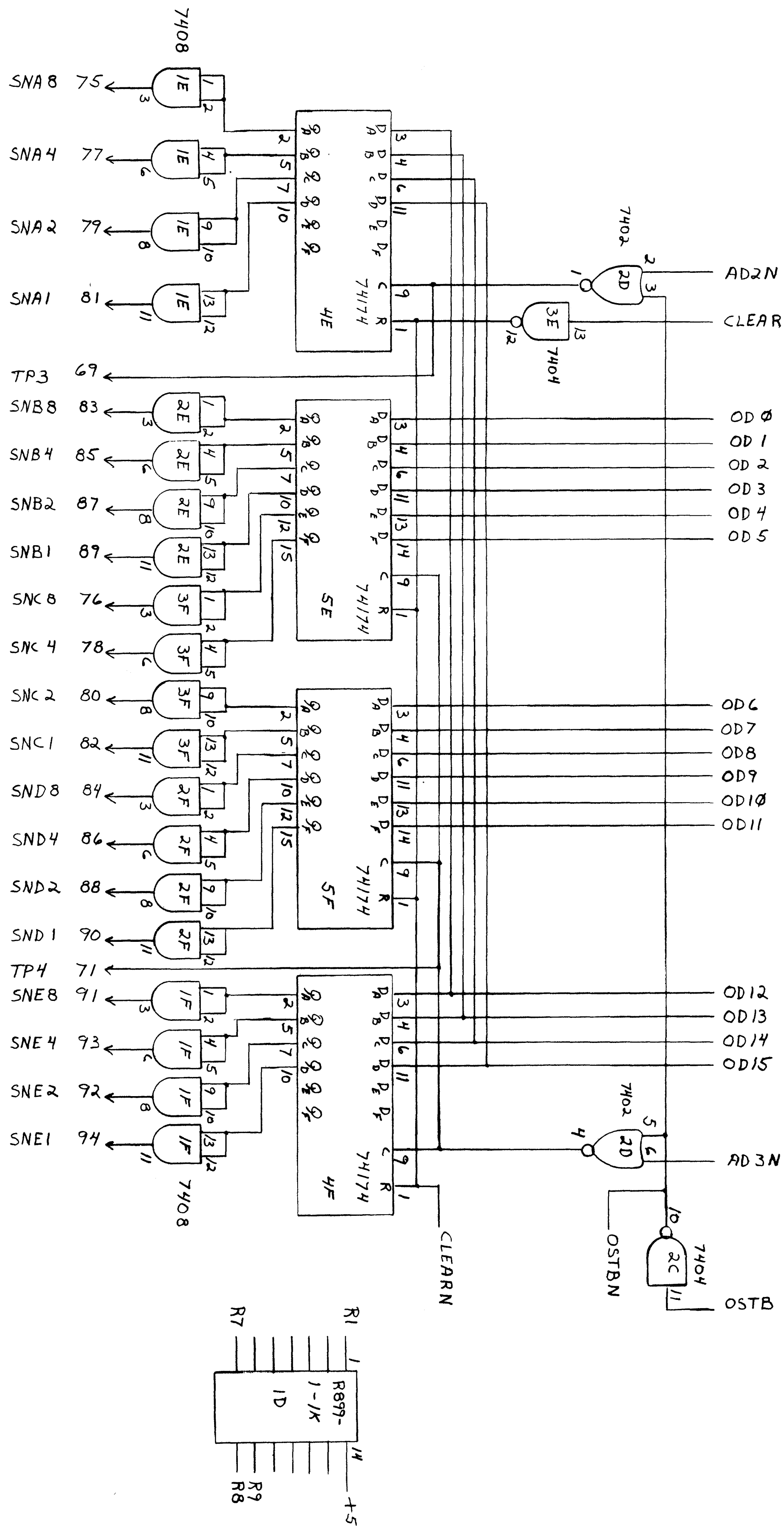



PUSH BUTTON SWITCH INPUT
CAL
PAGE 3 OF 3



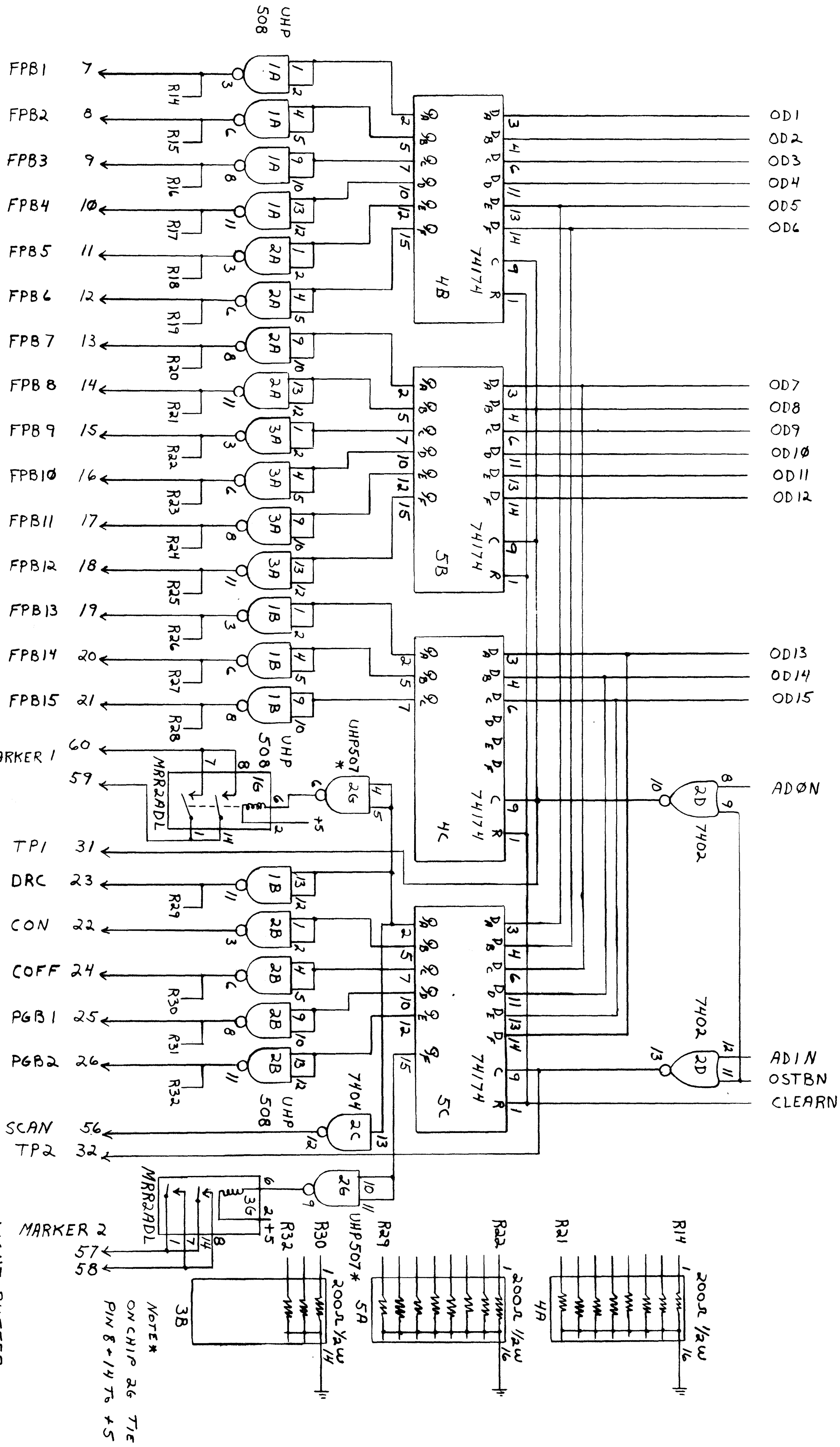

SPARES
UHP507 3,8,12

ADDRESS DECODE OUTPUT
DATA BUFFER
PAGE 1 OF 3

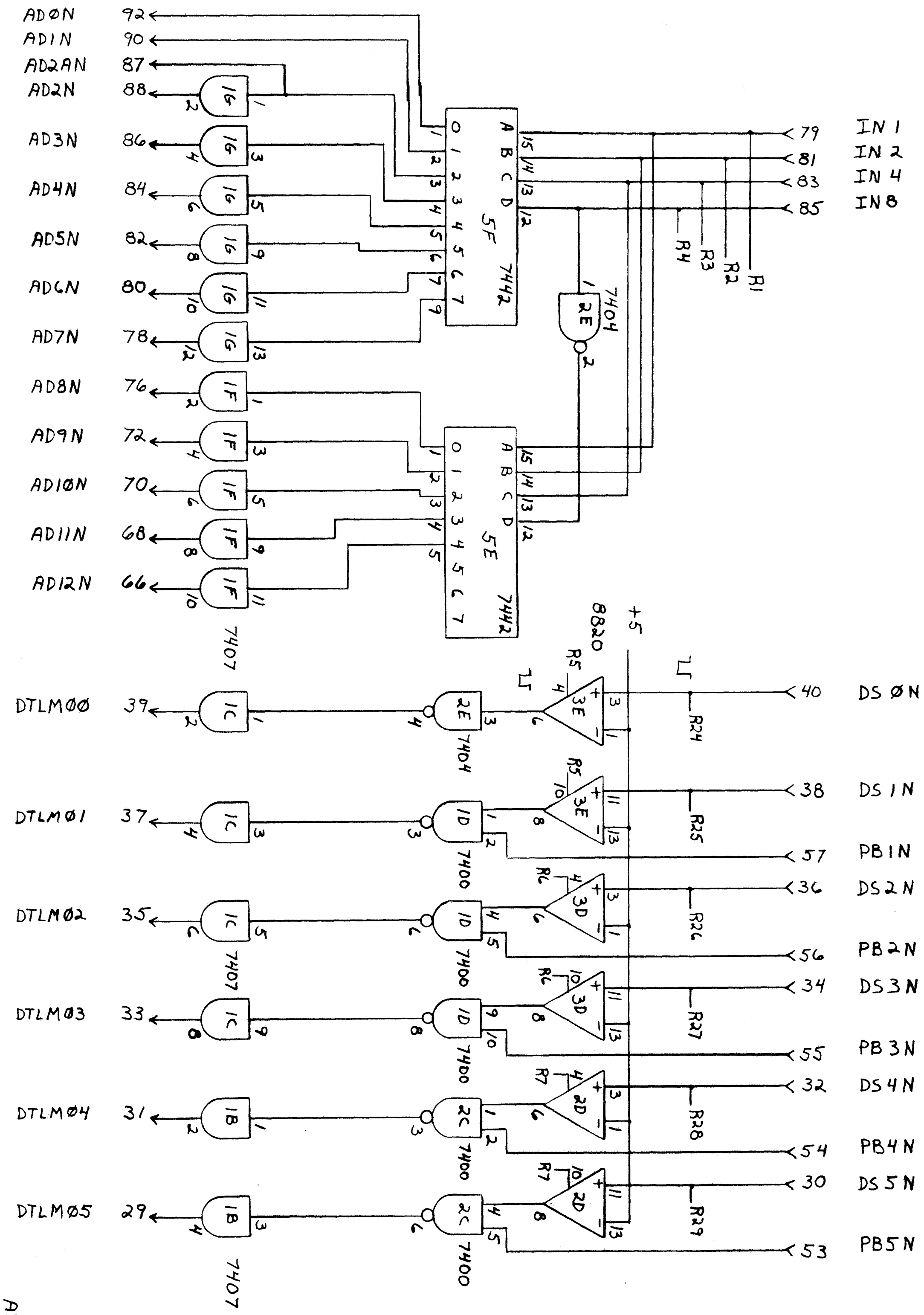


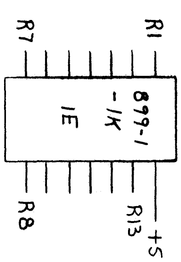

SCAN NUMBER BUFFER

PAGE 2 OF 3




LIGHT BUFFER
PAGE 3 OF 3

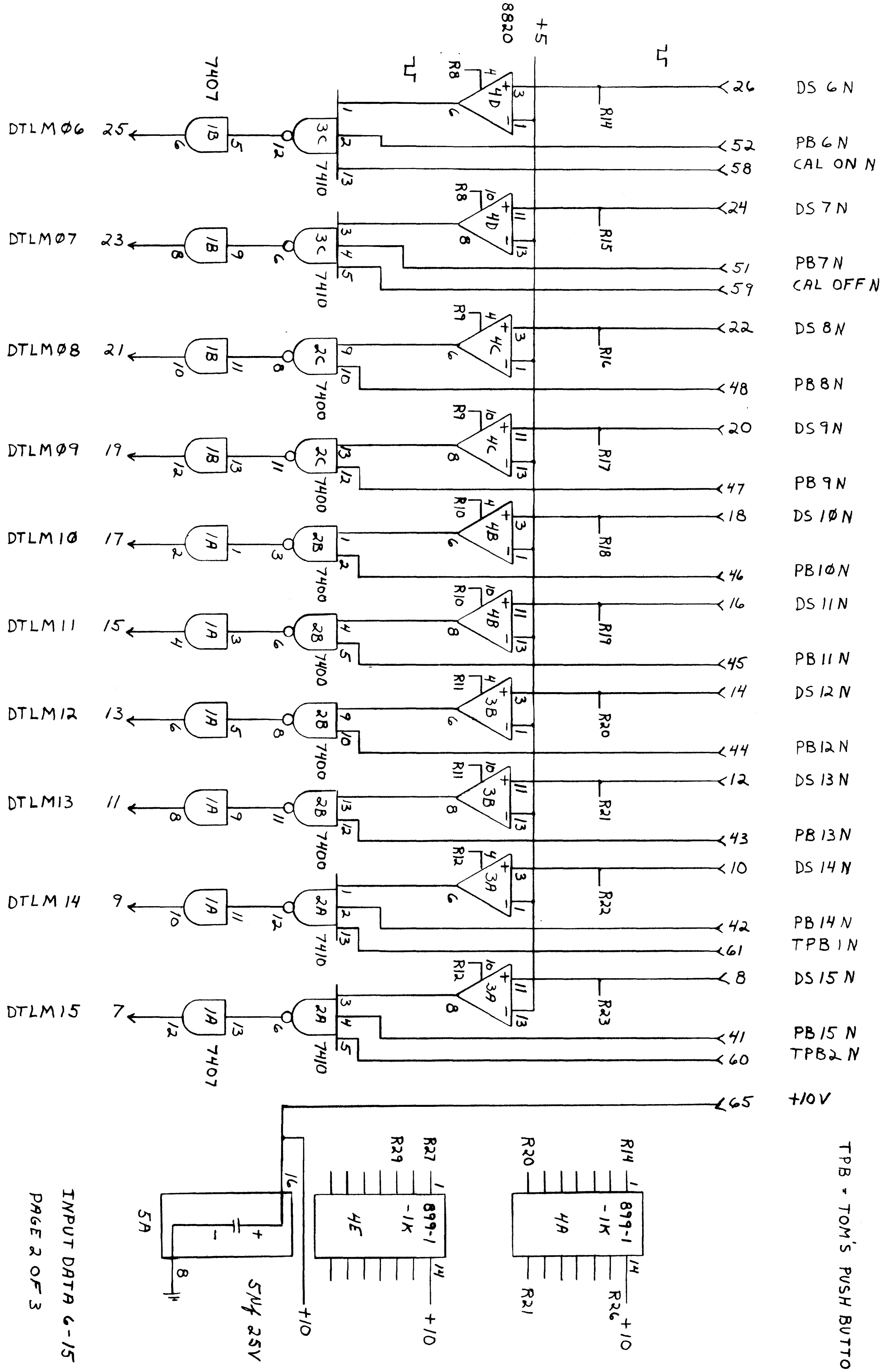



SPARES

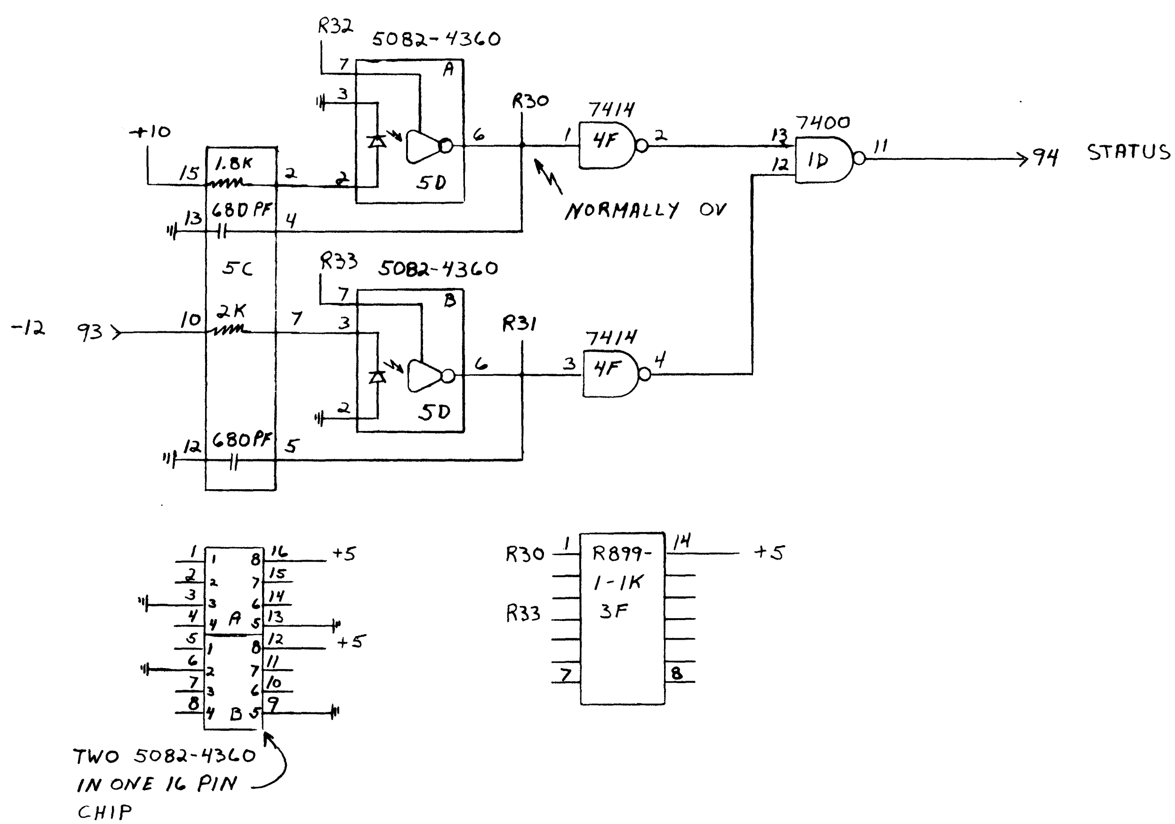
| CHIP | | PINS |
|---|---|---|
| 1C | 7407 | 10,12 |
| 1F | 7407 | 13 |
| 2A | 7410 | 8 |
| 2E | 7404 | 6,8,10,12 |
| 3C | 7410 | 8 |
| 4F | 7414 | 6,8,10,12 |

ADDRESS DECODE
INPUT DATA Ø-5
PAGE 1 OF 3

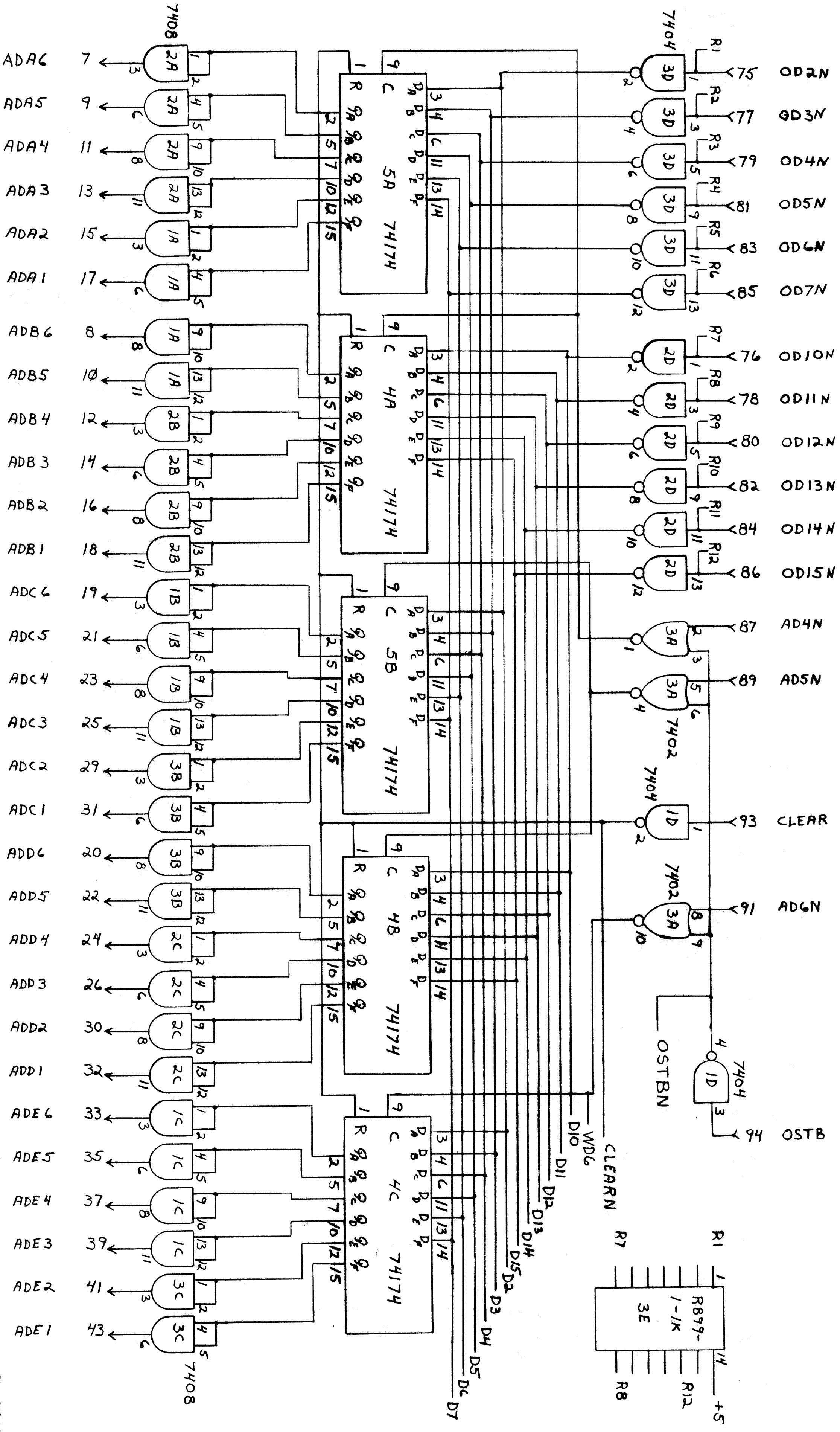



TPB = TOM'S PUSH BUTTON

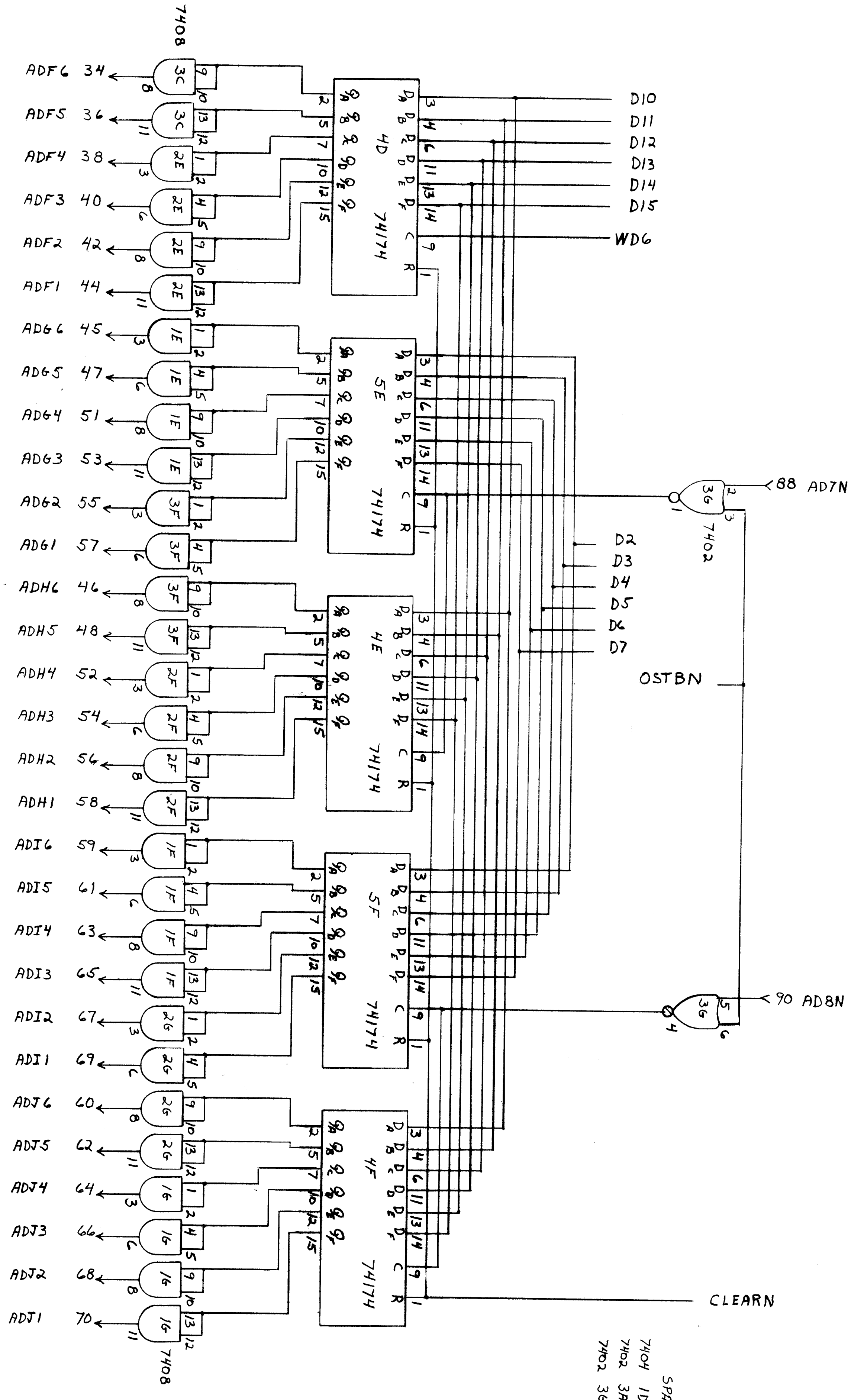
INPUT DATA 6-15
PAGE 2 OF 3




CONTROL PANEL STATUS
PAGE 3 OF 3

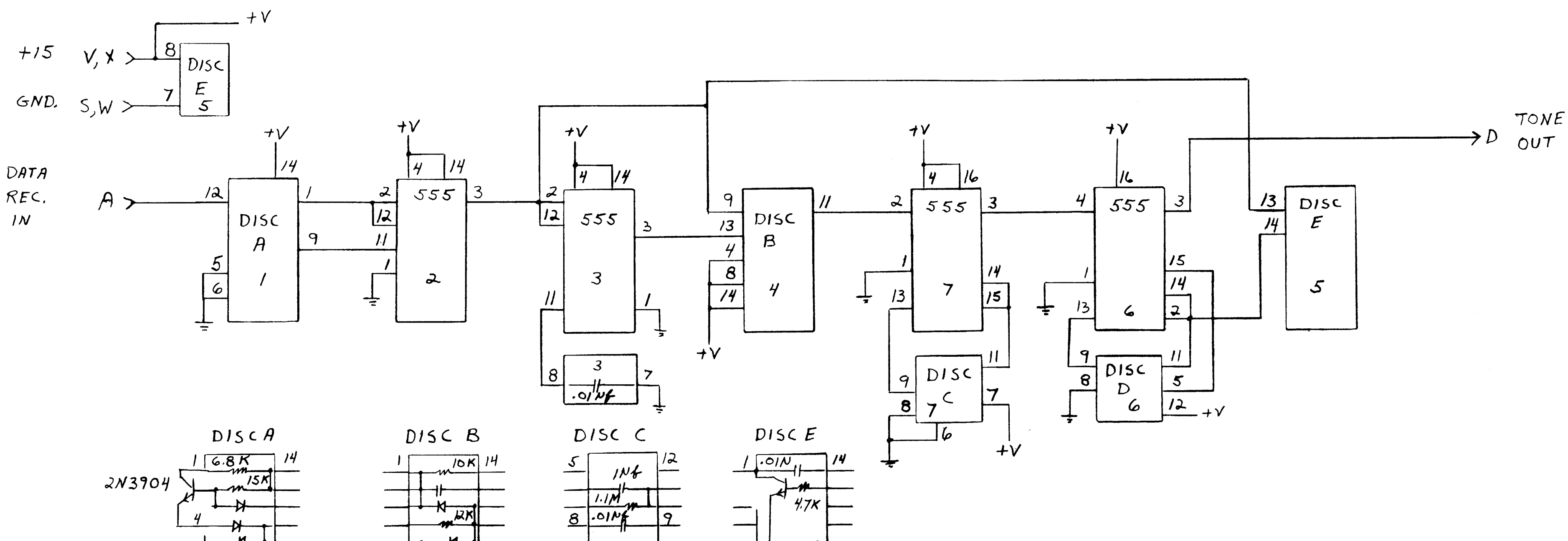


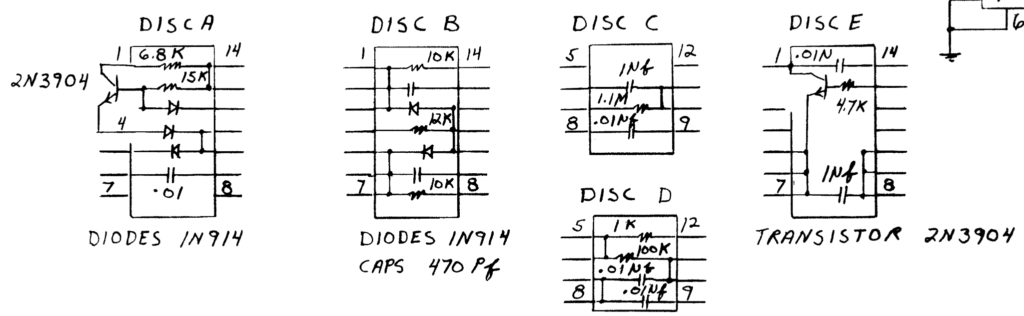

ALPHANUMERIC DISPLAY BUFFER
PAGE 1 OF 2

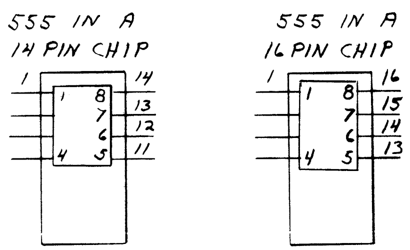



ALPHANUMERIC DISPLAY BUFFER
PAGE 2 OF 2

SPARES
7404 1D 6,8,10,12
7402 3A 13
7402 3G 10,13

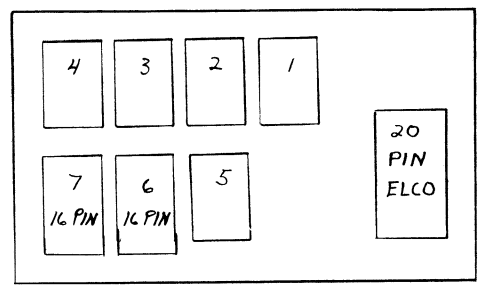



POWER WIREING NOTES

WIRE FROM ELCO CONNECTOR TO CHIPS WITH 26 GAUGE WIRE. RUN GND. FROM CHIP 5 PINS 5,6,+7 TO EACH CHIPS GND. RUN +V FROM CHIP 5 PINS 8, 9, +10 TO EACH CHIPS +V. USE 30 GAUGE WIRE FOR THESE RUNS.




CHIP LAYOUT W/W PIN SIDE
14 PIN CHIPS EXCEPT THOSE NOTED

SCAN MONITOR
PAGE 1 OF 1

# A/D CONVERTER

ADDRESS 20

PRIORITY 2

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| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
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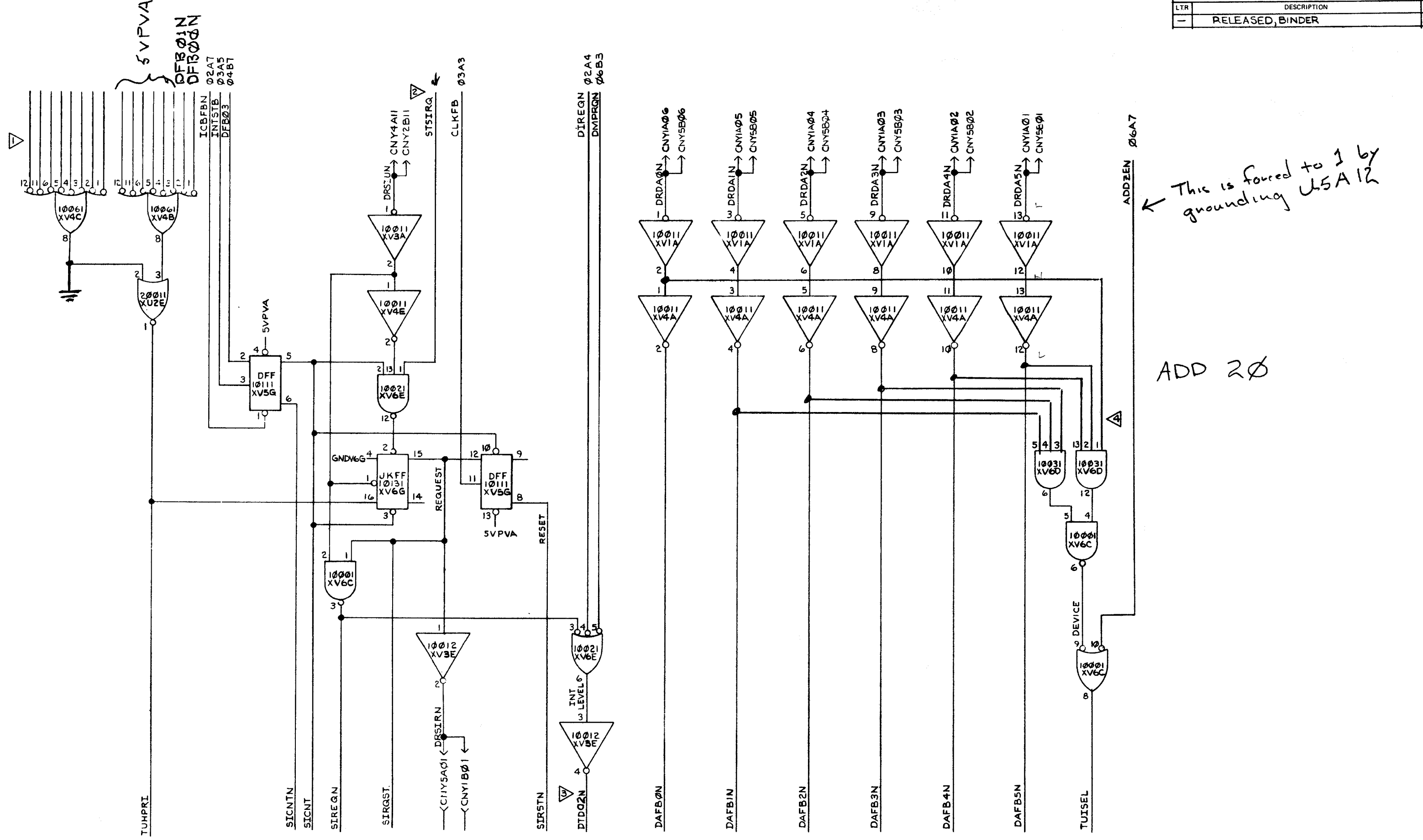



RESN 60103 XV4G: 1 5VPVA, 2 5VPV1, 3 5VPV2, 4 5VPV3, 5 5VPV4, 6 5VPV5, 7 5VPV6, 8 5VPV7

NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL ADDRESS & PRIORITY DECODE

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

MCS modular computer systems

| | | DATE |
|---|---|---|
| DRAWN | | 8-3-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE CONTROLLER NO 2

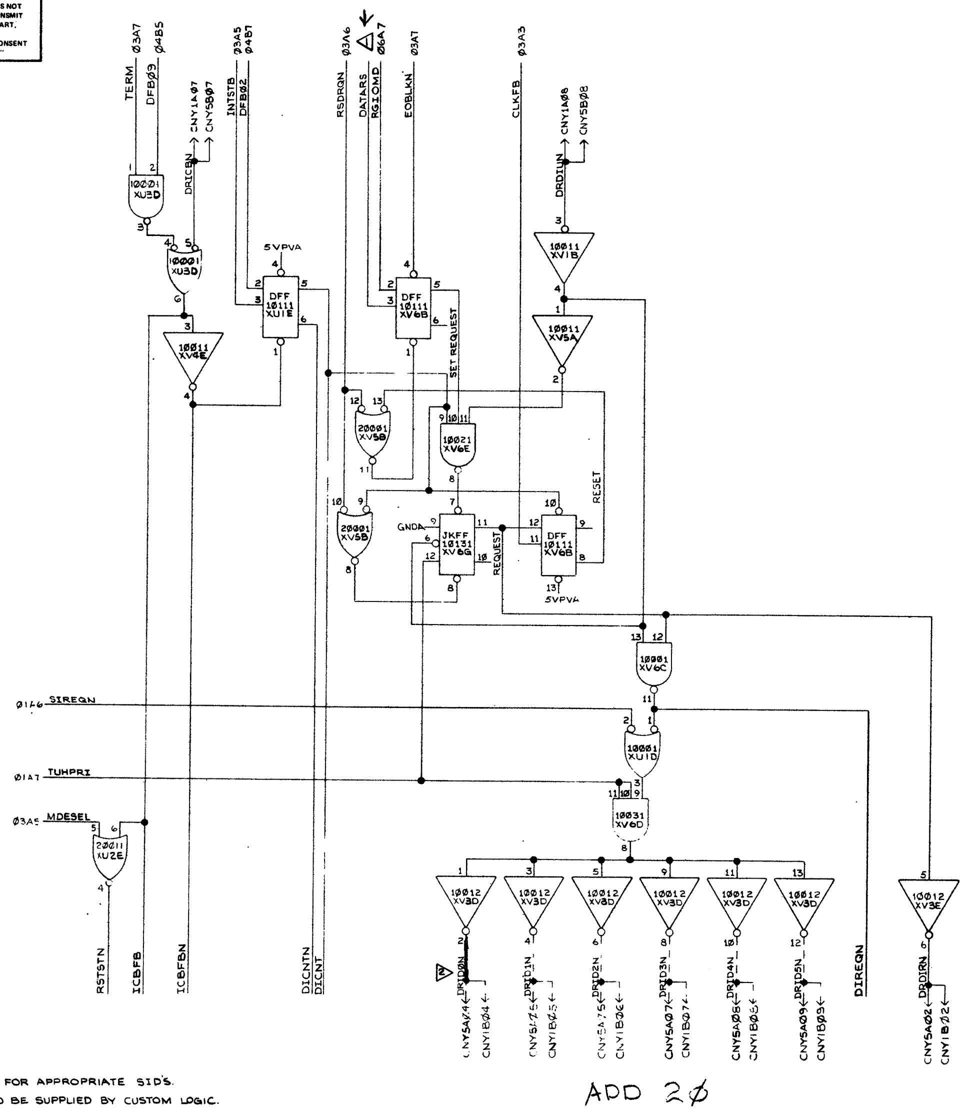
SIZE D | DRAWING NO 520-100260 | REV —

SHEET 1 OF 6

CODE IDENT NO.

MCS Form 15

[520-100260]



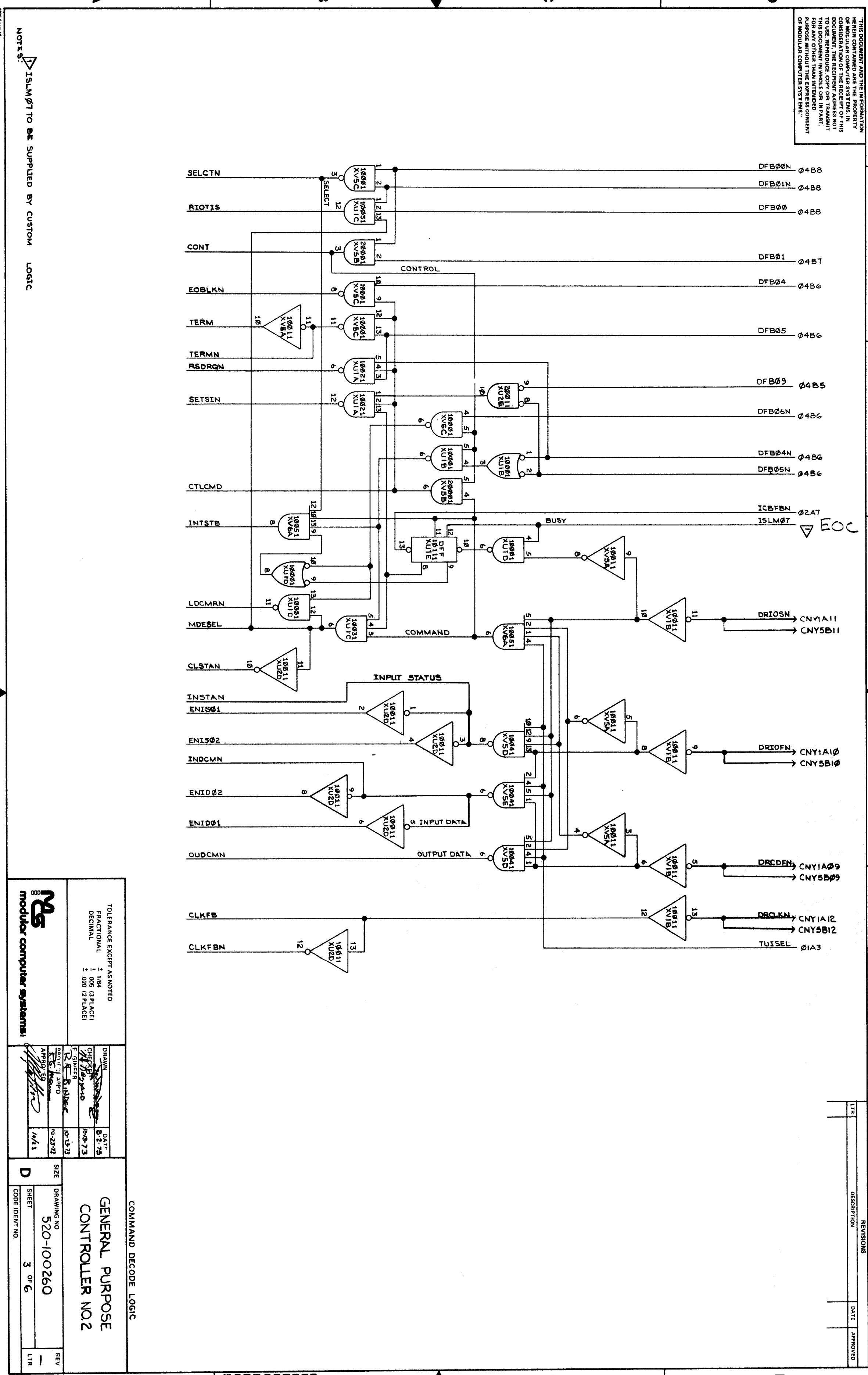

NOTES:
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.
2. CONNECT FOR APPROPRIATE SID'S.

| | | | | |
|---|---|---|---|---|
| TOLERANCE EXCEPT AS NOTED<br>FRACTIONAL ± 1/64<br>DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE) | DRAWN | 8-2-73 | DATA INTERRUPT & SOURCE ID CONTROL<br>GENERAL PURPOSE CONTROLLER NO. 2 | |
| | CHECKED | 10-13-73 | | |
| | ENGINEER | 10-13-73 | | |
| | PROJECT APP'D | 10-13-73 | SIZE D — DRAWING NO 520-100260 | REV — |
| modular computer systems | APPROVED | 10/23 | SHEET 2 OF 6 | LTR |
| | | | CODE IDENT NO | |

REVISIONS

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|


520-100260



NOTES: 1 ISLM07 TO BE SUPPLIED BY CUSTOM LOGIC
SELCTN
RIOTIS
CONT
EOBLKN
TERM
TERMN
RSDRQN
SETSIN
CTLCMD
INTSTB
LDCMRN
MDESEL
CLSTAN
INSTAN
ENIS01
ENIS02
INDCMN
ENID02
ENID01
OUDCMN
CLKFB
CLKFBN
SELECT
CONTROL
BUSY
COMMAND
INPUT STATUS
INPUT DATA
OUTPUT DATA
DFB00N 04B8
DFB01N 04B8
DFB00 04B8
DFB01 04B7
DFB04 04B6
DFB05 04B6
DFB09 04B5
DFB06N 04B6
DFB04N 04B6
DFB05N 04B6
ICBFBN 02A7
ISLM07 EOC
DRIOSN CNY1A11 CNY5B11
DRIOFN CNY1A10 CNY5B10
DRCDFN CNY1A09 CNY5B09
DRCLKN CNY1A12 CNY5B12
TUISEL 01A3
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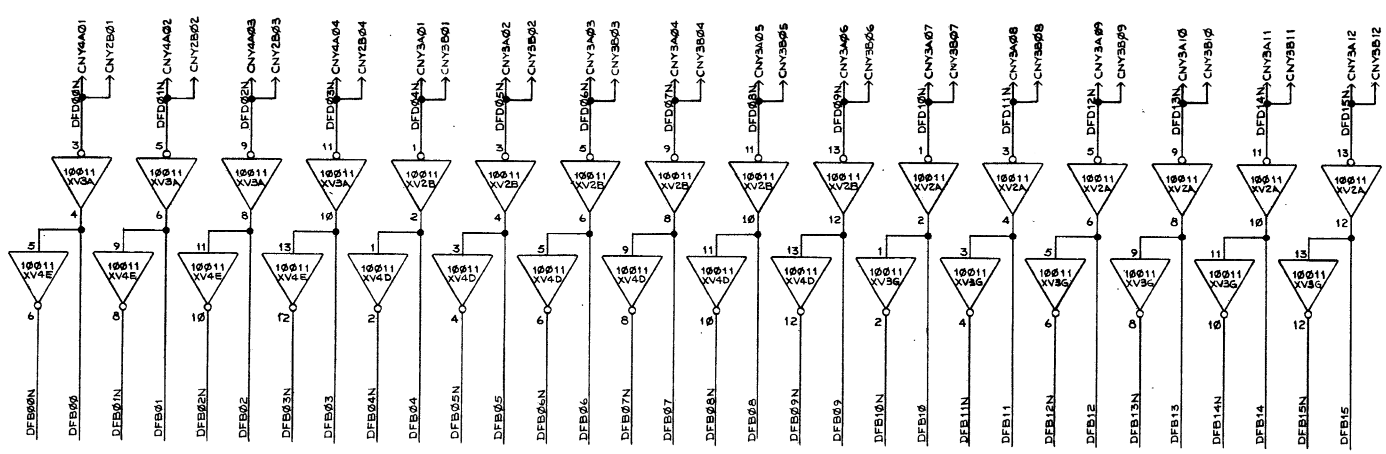
REVISIONS
LTR DESCRIPTION DATE APPROVED
TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)
modular computer systems
DRAWN 8-2-73
CHECKED 10-8-73
ENGINEER 10-23-73
APPROVED 10-29-73
COMMAND DECODE LOGIC
GENERAL PURPOSE CONTROLLER NO.2
SIZE D
DRAWING NO 520-100260
SHEET 3 OF 6
REV —
CODE IDENT NO.
520-100260




| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 | BEND RADIUS
3 PLACE DEC. ± .005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

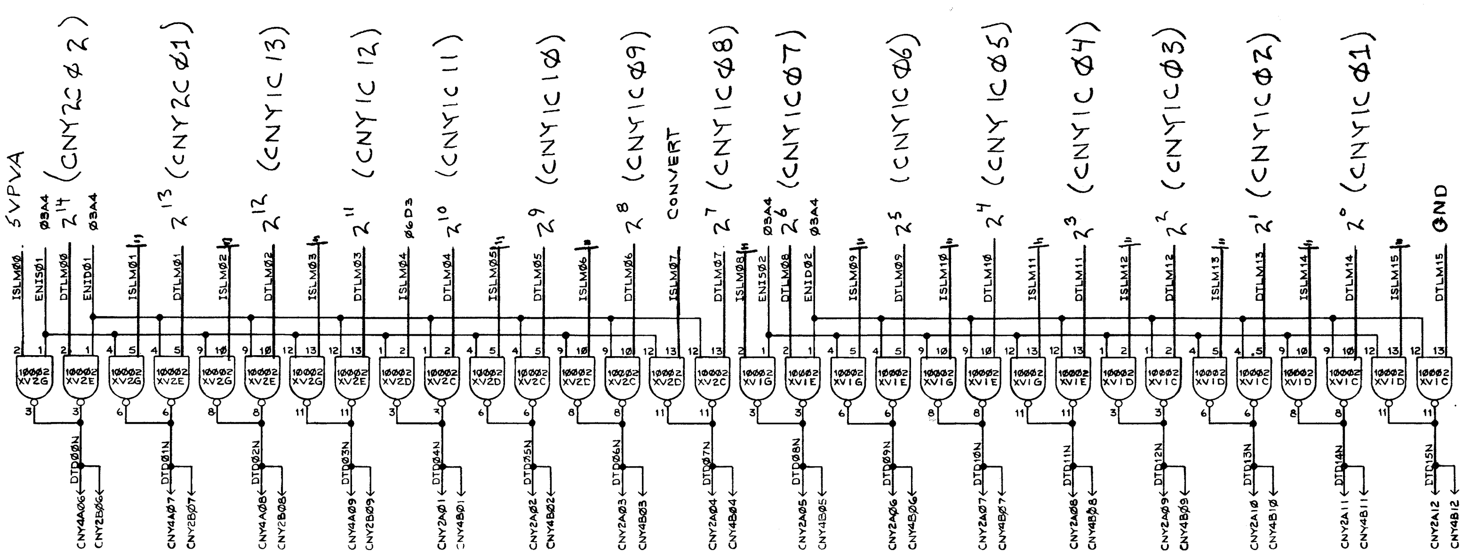
| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | | 10-13-73 |
| ENGR | R F Bindsc | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

OUTPUT DATA BUFFERS

GENERAL PURPOSE
CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 4 OF 6 | LTR
CODE IDENT NO.

[520-100260]




| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

NOTE: 1. TIE UNUSED INPUTS TO GROUND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [signature] | 8-3-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R. Binder | 10-13-73 |
| PROJ | [signature] | 10-21-73 |
| APVD | [signature] | 10/23 |

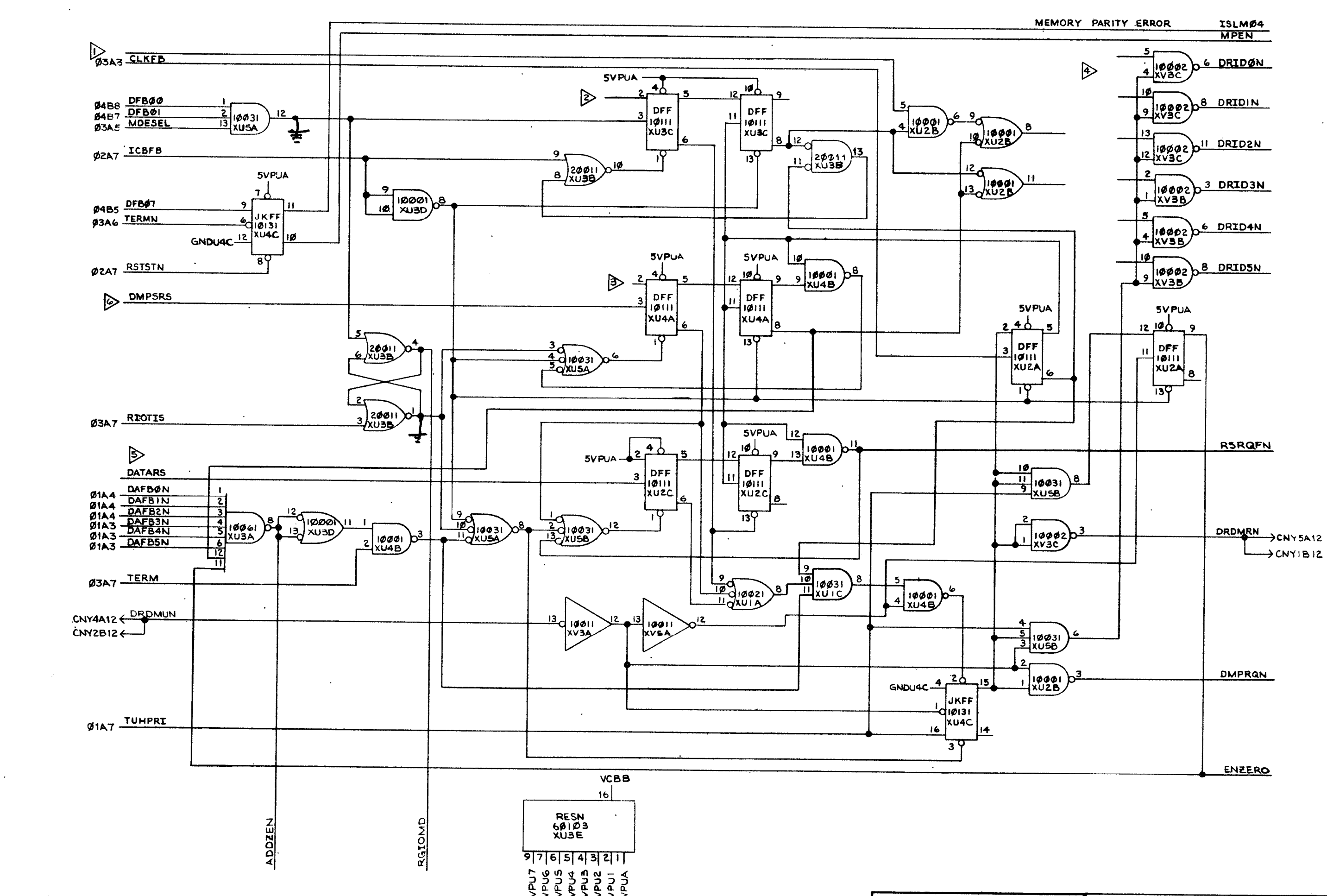
INPUT DATA BUFFERS

# GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 5 OF 6 | LTR
CODE IDENT NO.

MCS Form 15A

520-100260




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL (REG. FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 BEND RADIUS
3 PLACE DEC. ±.005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D — DRAWING NO. 520-100260 — REV —

SHEET 6 OF 6

CODE IDENT NO.

MCS Form 16A

520-100260

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
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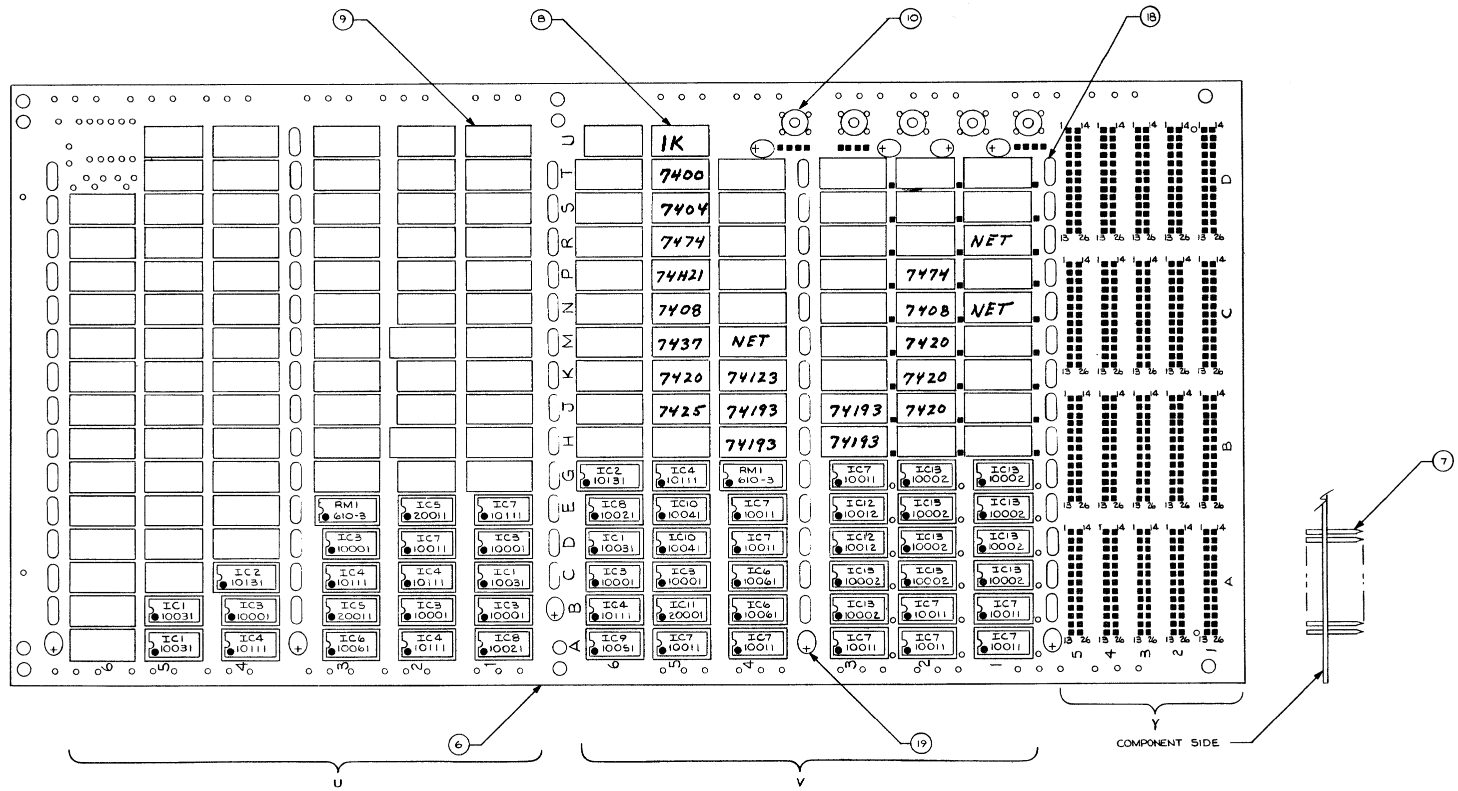



-001 SHOWN



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 BEND RADIUS
3 PLACE DEC. ±.005 ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

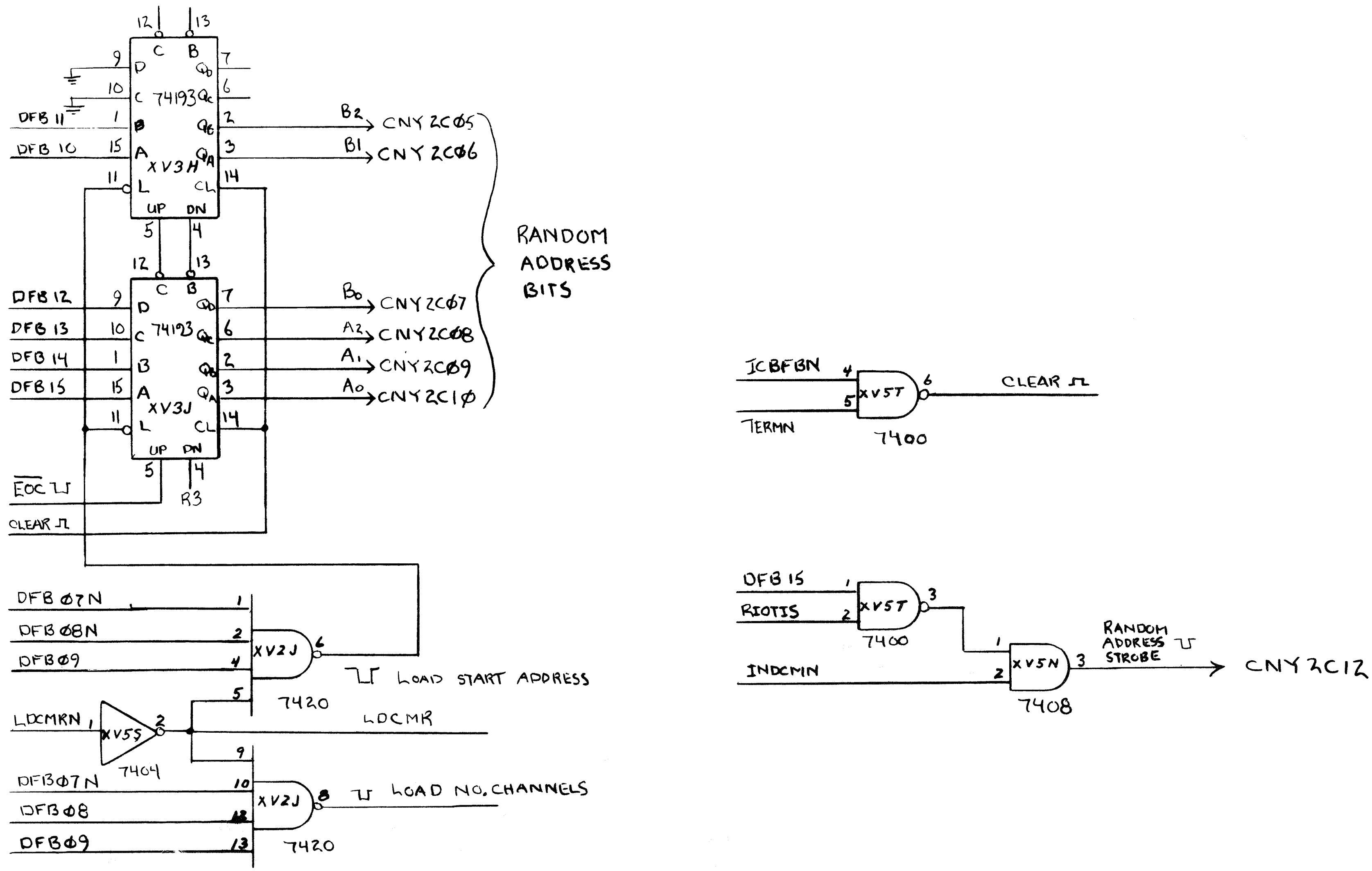
LM 517-100176

| | | DATE |
|---|---|---|
| DWN | [illegible] | 8-9-73 |
| CHK | [illegible] | 10-13-73 |
| ENGR | R. BINDER | 10-23-73 |
| PROJ | [illegible] | 10-23-73 |
| APVD | [illegible] | 10/23 |

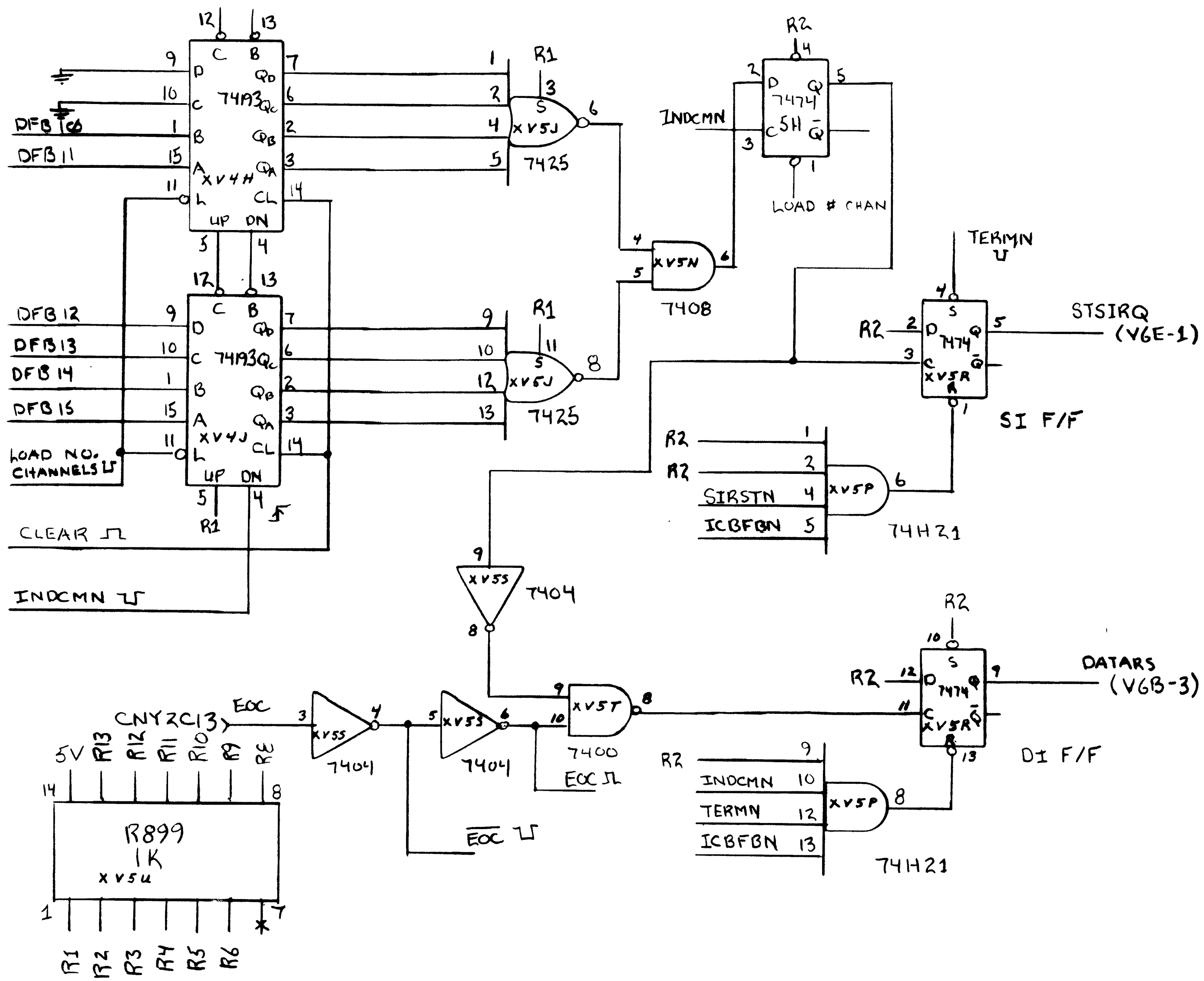
GENERAL PURPOSE
CONTROLLER NO.2

SIZE D
DRAWING NO. 516-100176
REV —
SHEET 1 OF 1
LTR
CODE IDENT NO.

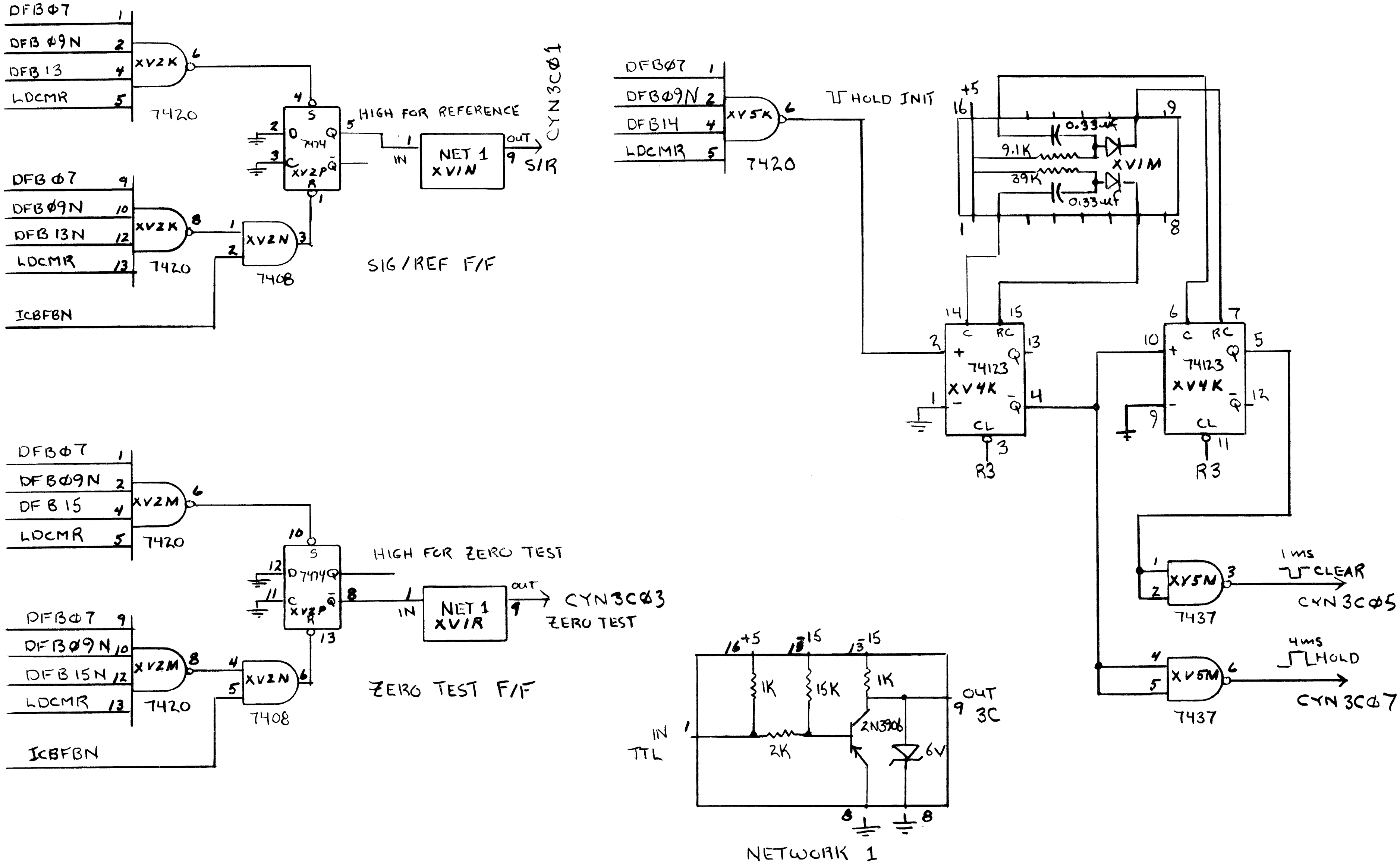
516-100176




A/D CHANNEL CONTROL
PAGE 1 OF 3




A/D INTERRUPT CONTROL
PAGE 2 OF 3




50 CHANNEL RECEIVER CONTROL
PAGE 3 OF 3

MODCOMP TO H316

Address 10

Priority 3

DMP Ch. 0

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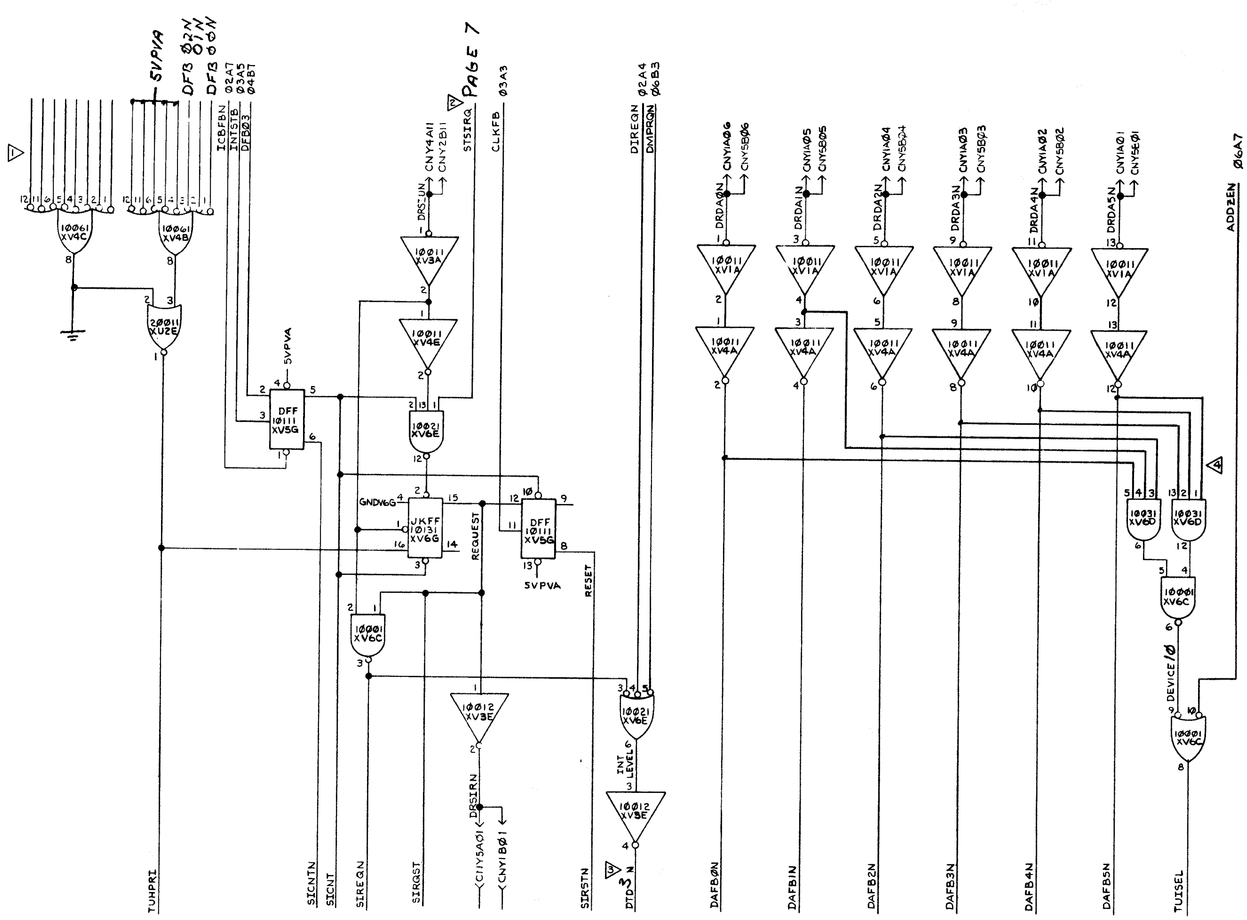
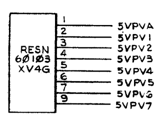



NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1:64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

MCS modular computer systems

| | | |
|---|---|---|
| DRAWN | | 8-3-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | R.F. | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE CONTROLLER NO. 2

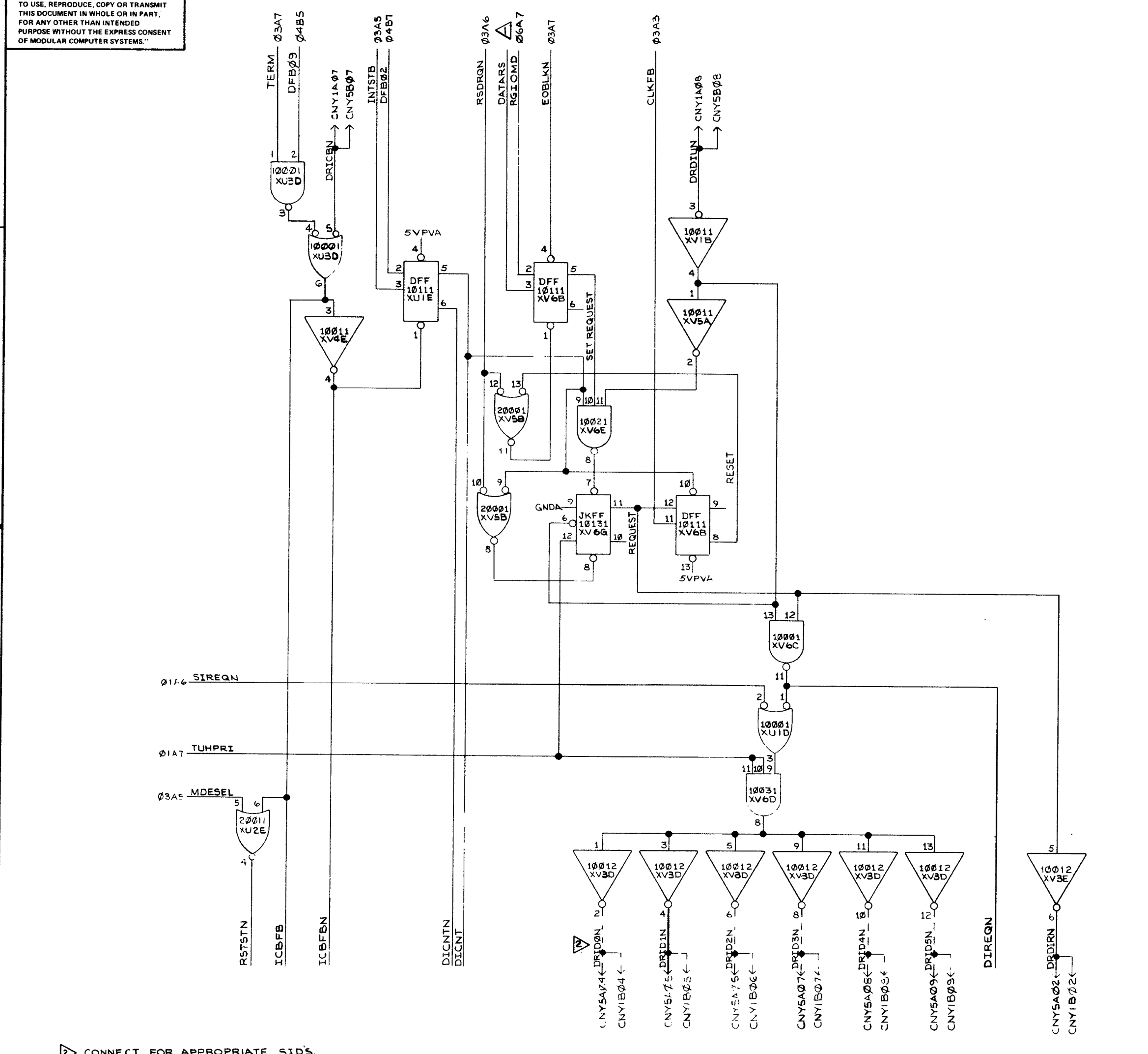
SIZE D | DRAWING NO 520-100260 | REV —

SHEET 1 OF 6

CODE IDENT NO.

520-100260

MCS Form 15



NOTES:
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.
2. CONNECT FOR APPROPRIATE SID'S.

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

| | |
|---|---|
| DRAWN | DATE 8-2-73 |
| CHECKED | 10-13-73 |
| ENGINEER | 10-23-73 |
| PROJECT APP'D | 10-23-73 |
| APPROVED | 10/23 |

modular computer systems

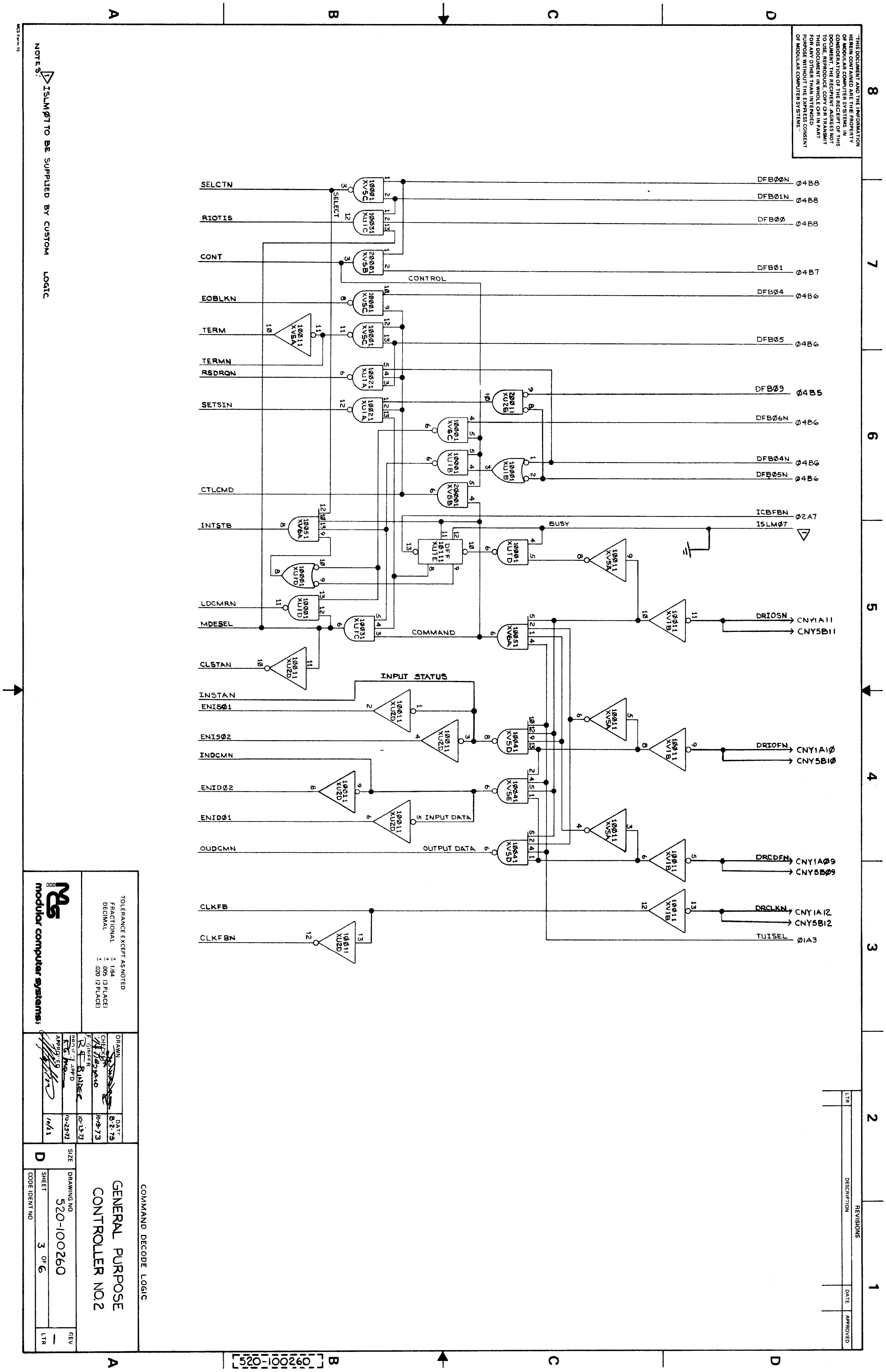
DATA INTERRUPT & SOURCE ID CONTROL

# GENERAL PURPOSE CONTROLLER NO. 2

SIZE D  DRAWING NO 520-100260  REV —
SHEET 2 OF 6
CODE IDENT NO

MCS Form 15

520-100260



NOTES: ISLM07 TO BE SUPPLIED BY CUSTOM LOGIC
SELCTN
RIOTIS
CONT
EOBLKN
TERM
TERMN
RSDRQN
SETSIN
CTLCMD
INTSTB
LDCMRN
MDESEL
CLSTAN
INSTAN
ENIS01
ENIS02
INDCMN
ENID02
ENID01
OUDCMN
CLKFB
CLKFBN
SELECT
CONTROL
BUSY
COMMAND
INPUT STATUS
INPUT DATA
OUTPUT DATA
DFB00N 04B8
DFB01N 04B8
DFB00 04B8
DFB01 04B7
DFB04 04B6
DFB05 04B6
DFB09 04B5
DFB06N 04B6
DFB04N 04B6
DFB05N 04B6
ICBFBN 02A7
ISLM07
DRIOSN CNY1A11 CNY5B11
DRIOFN CNY1A10 CNY5B10
DRCDFN CNY1A09 CNY5B09
DRCLKN CNY1A12 CNY5B12
TUISEL 01A3
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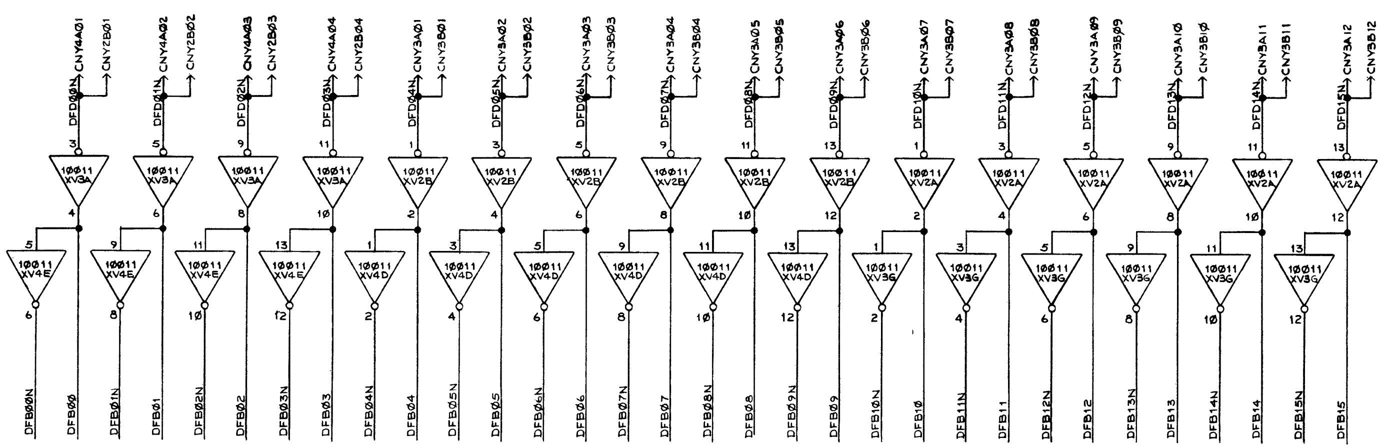
REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE)
± .020 (2 PLACE)
modular computer systems
DRAWN
CHECKED
ENGINEER
APPROVED
DATE
8-2-73
10-9-73
10-13-73
10-23-73
COMMAND DECODE LOGIC
GENERAL PURPOSE CONTROLLER NO.2
SIZE D
DRAWING NO 520-100260
SHEET 3 OF 6
REV
CODE IDENT NO
520-100260




| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 BEND RADIUS
3 PLACE DEC. ±.005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

OUTPUT DATA BUFFERS

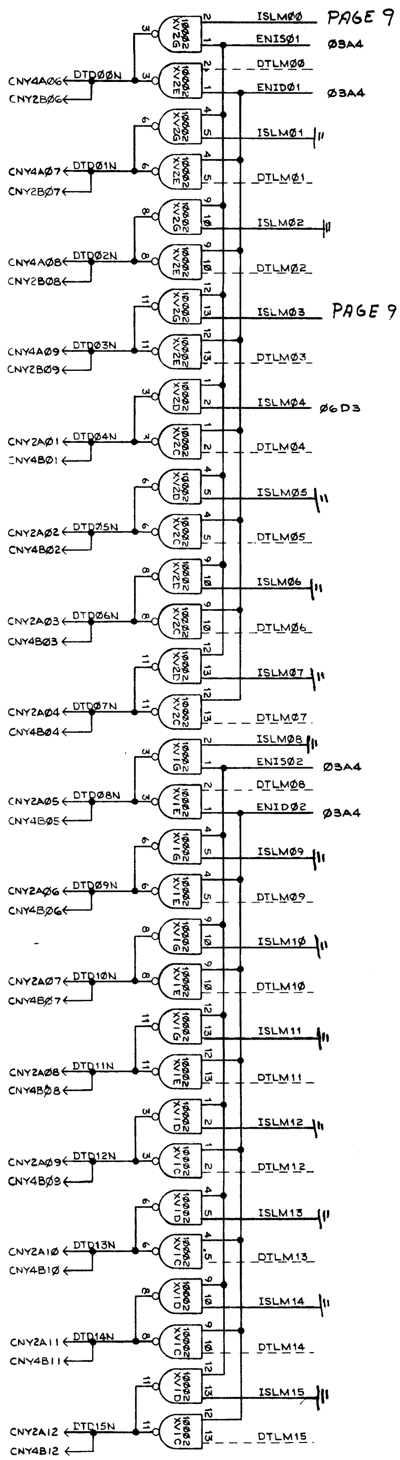
# GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO. 520-100260
REV —
SHEET 4 OF 6
CODE IDENT NO.
LTR

MCS Form 15A

520-100260

NOTE: 1. TIE THE UNUSED INPUTS TO GROUND.






TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ± .02 BEND RADIUS ± 1/2°
3 PLACE DEC. ± .005 ANGLES
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-5-73 |
| CHK | | 10/13/73 |
| ENGR | | 10-23-73 |
| PROJ | | 10-21-73 |
| APVD | | 10/23 |

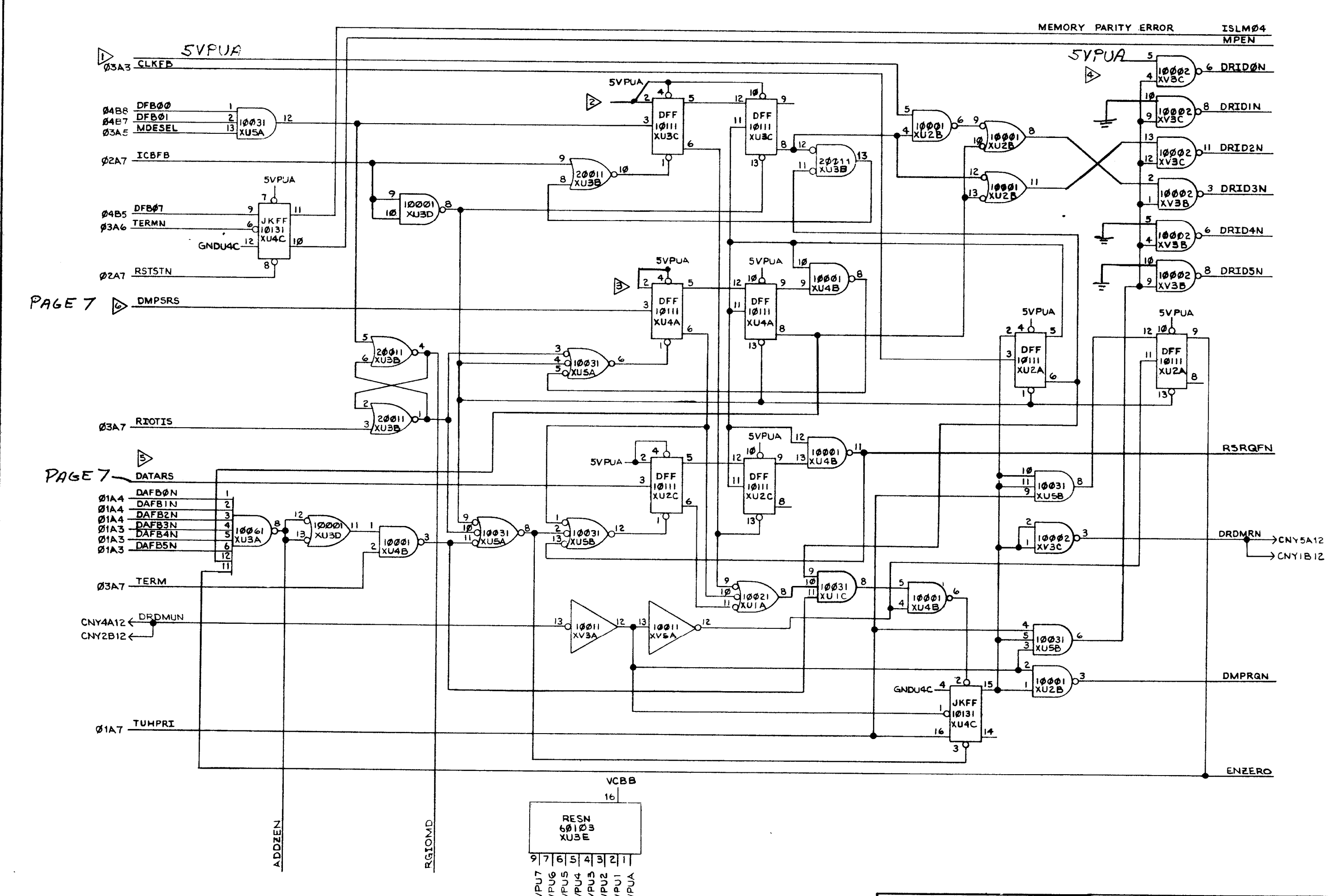
INPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 5 OF 6
CODE IDENT NO. | LTR

REVISIONS
| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

520-100260




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL(REG FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT



| TOLERANCE EXCEPT AS NOTED | |
|---|---|
| 2 PLACE DEC ±.02 | BEND RADIUS |
| 3 PLACE DEC. ±.005 | ANGLES ± 1/2° |

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. Binder | 10-13-73 |
| PROJ | R.G. | 10-23-73 |
| APVD | | 10/23 |

DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —

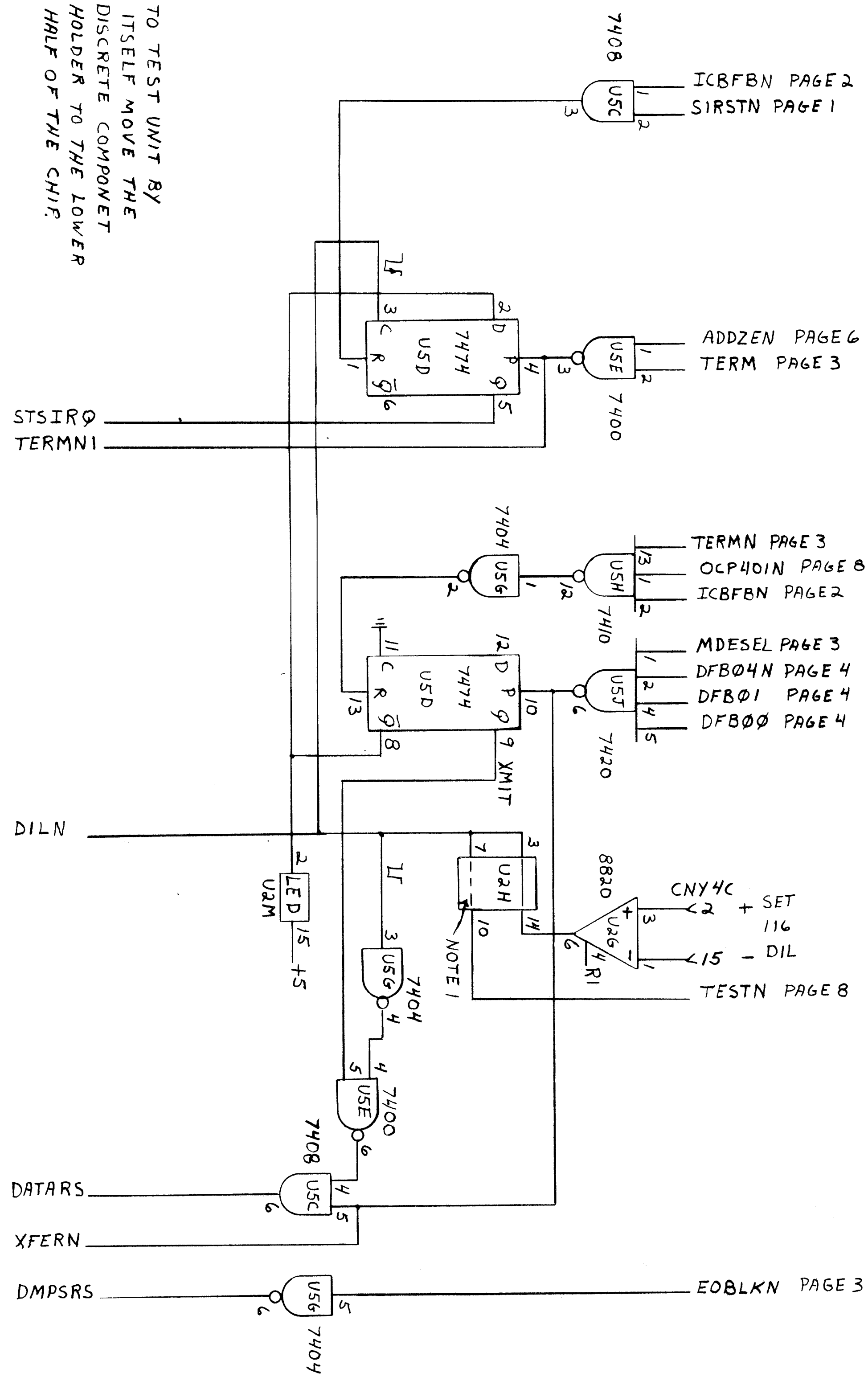
SHEET 6 OF 6

CODE IDENT NO.

REVISIONS

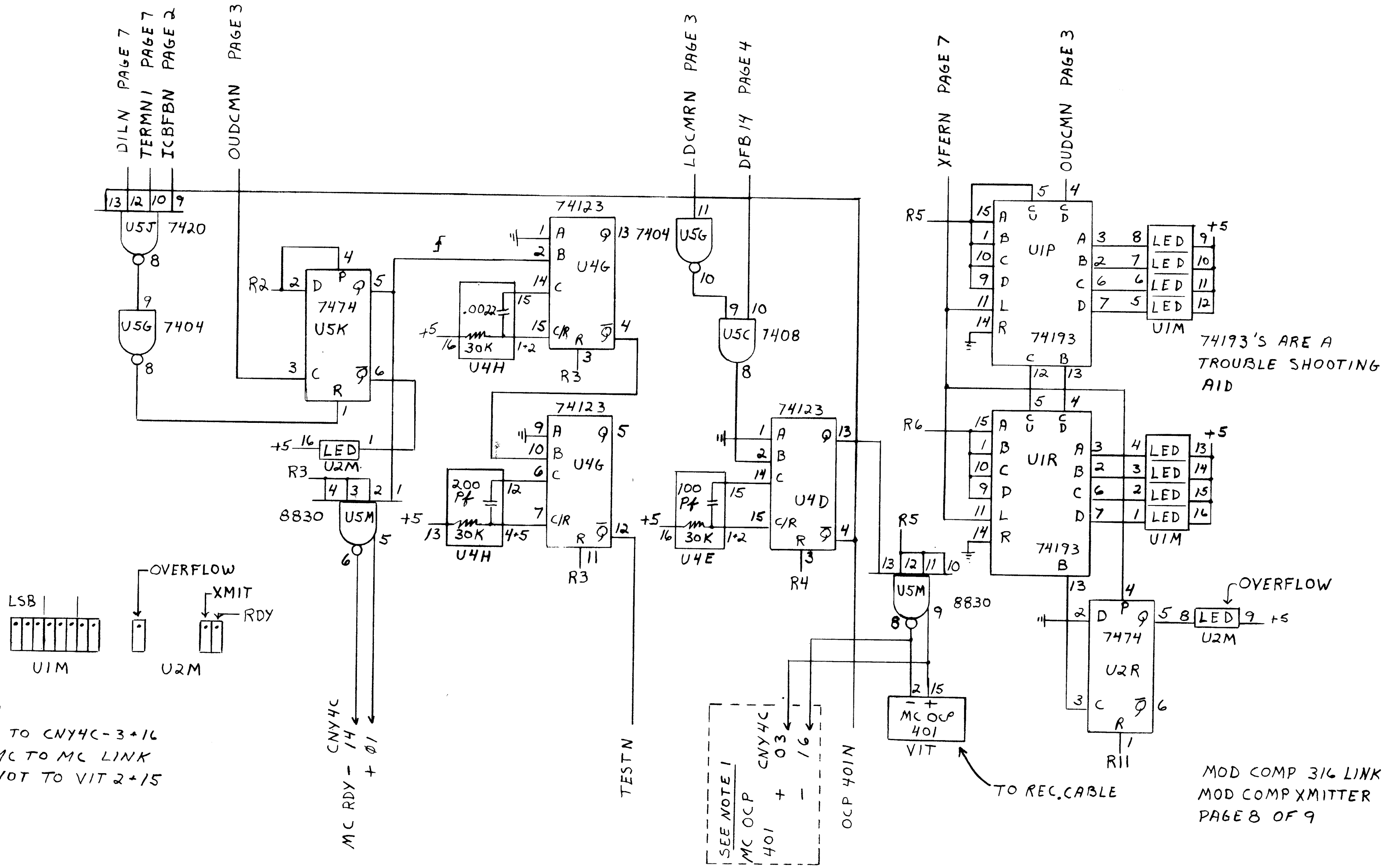
| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

520-100260



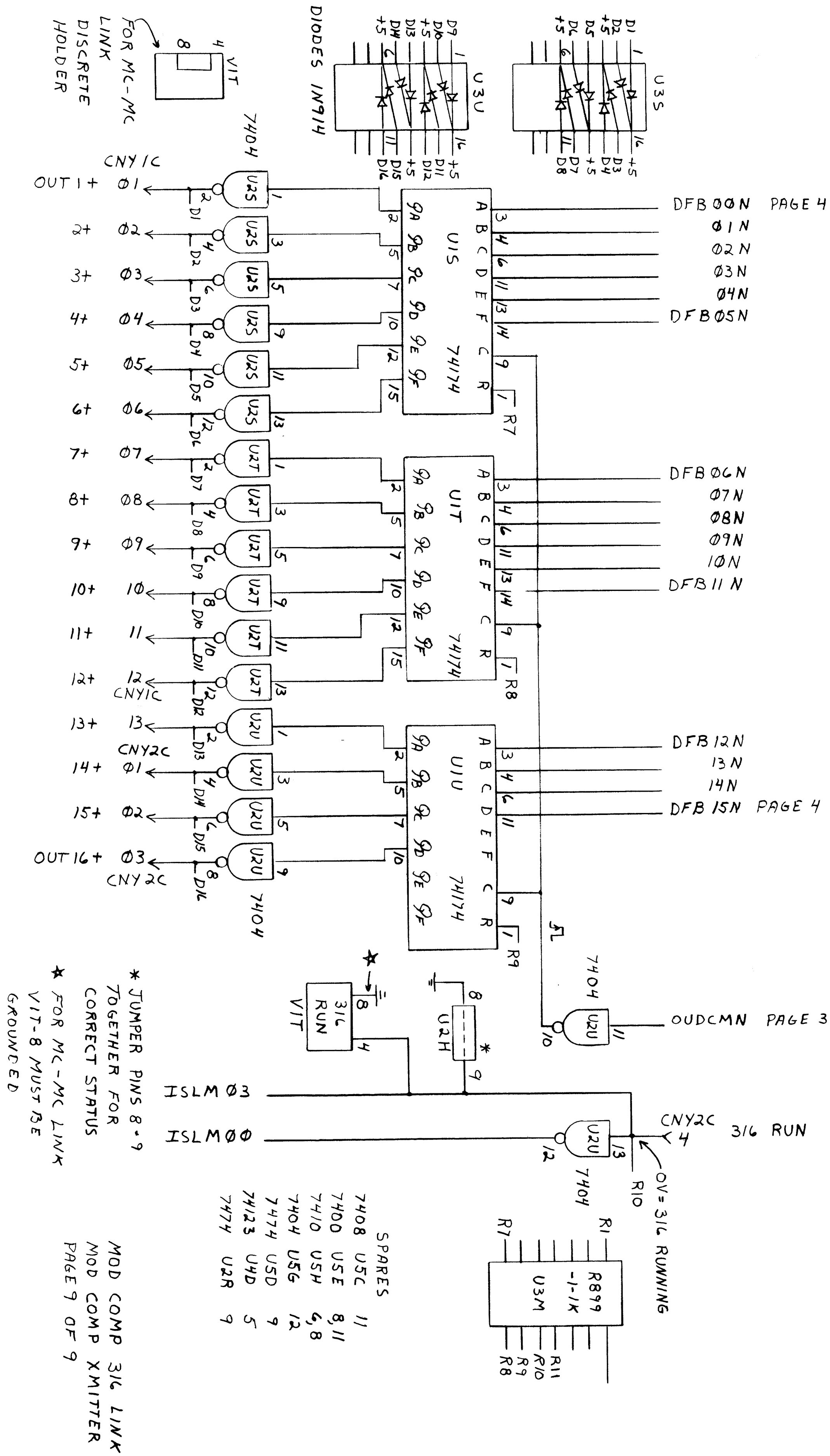

NOTE 1 TO TEST UNIT BY ITSELF MOVE THE DISCRETE COMPONET HOLDER TO THE LOWER HALF OF THE CHIP.

MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 7 OF 9



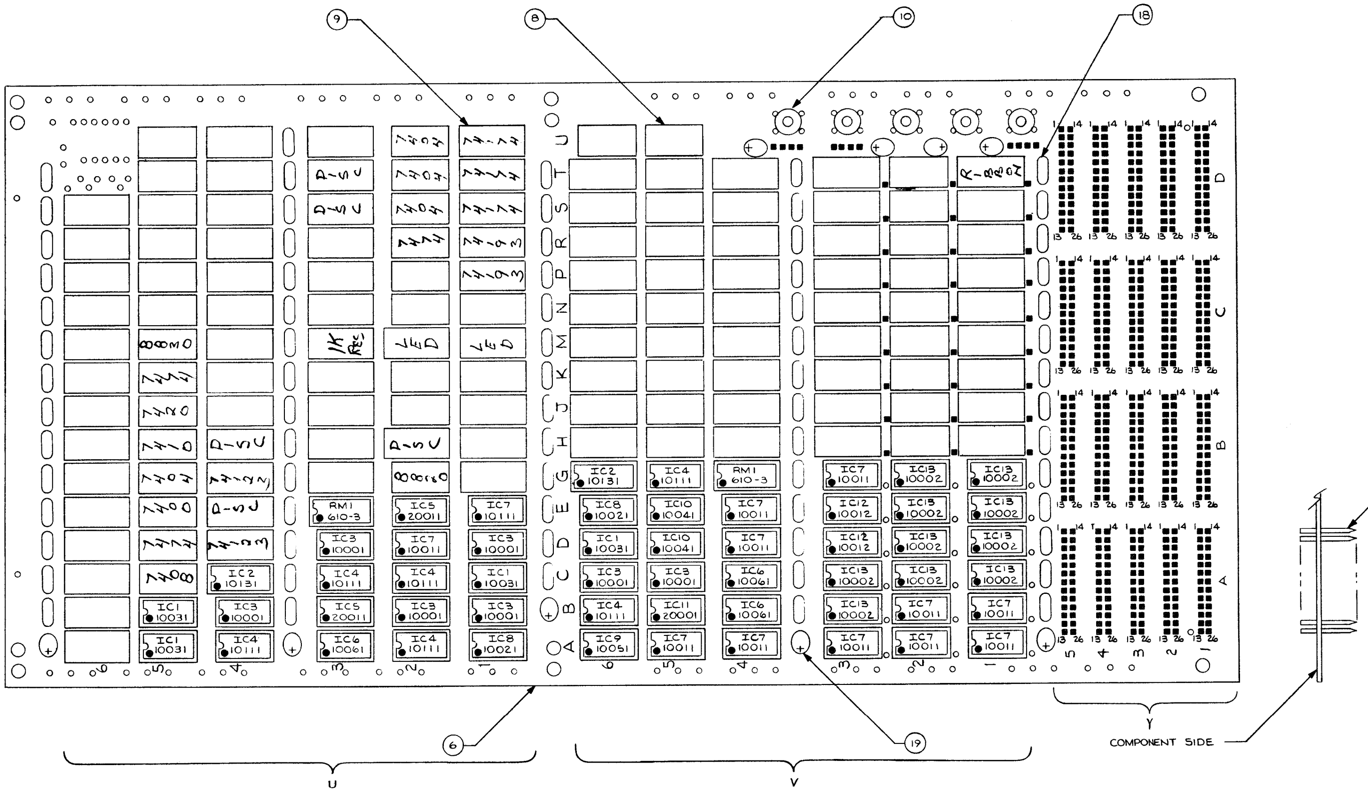

NOTE 1
WIRE TO CNY4C-3+16
FOR MC TO MC LINK
AND NOT TO VIT 2+15

MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 8 OF 9



DIODES 1N914
U3U
U3S
V1T
FOR MC-MC LINK DISCRETE HOLDER
7404
CNY1C
OUT 1+
DFBØØN PAGE 4
DFBØ5N
DFBØ6N
DFB11N
DFB12N
DFB15N PAGE 4
U1S
U1T
U1U
74174
OUT 16+
CNY2C
OUDCMN PAGE 3
316 RUN
U2H
ISLMØ3
ISLMØØ
316 RUN
R10
OV=316 RUNNING
R899 -1-1K
U3M
* JUMPER PINS 8+9 TOGETHER FOR CORRECT STATUS
★ FOR MC-MC LINK V1T-8 MUST BE GROUNDED
SPARES
7408 U5C 11
7400 U5E 8,11
7410 U5H 6,8
7404 U5G 12
7474 U5D 9
74123 U4D 5
7474 U2R 9
MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 9 OF 9

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| – | RELEASED, BINDER | | |




—001 SHOWN

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| TOLERANCE EXCEPT AS NOTED | |
|---|---|
| 2 PLACE DEC. ±.02 | BEND RADIUS |
| 3 PLACE DEC. ±.005 | ANGLES ± 1/2° |

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

LM 517-100176

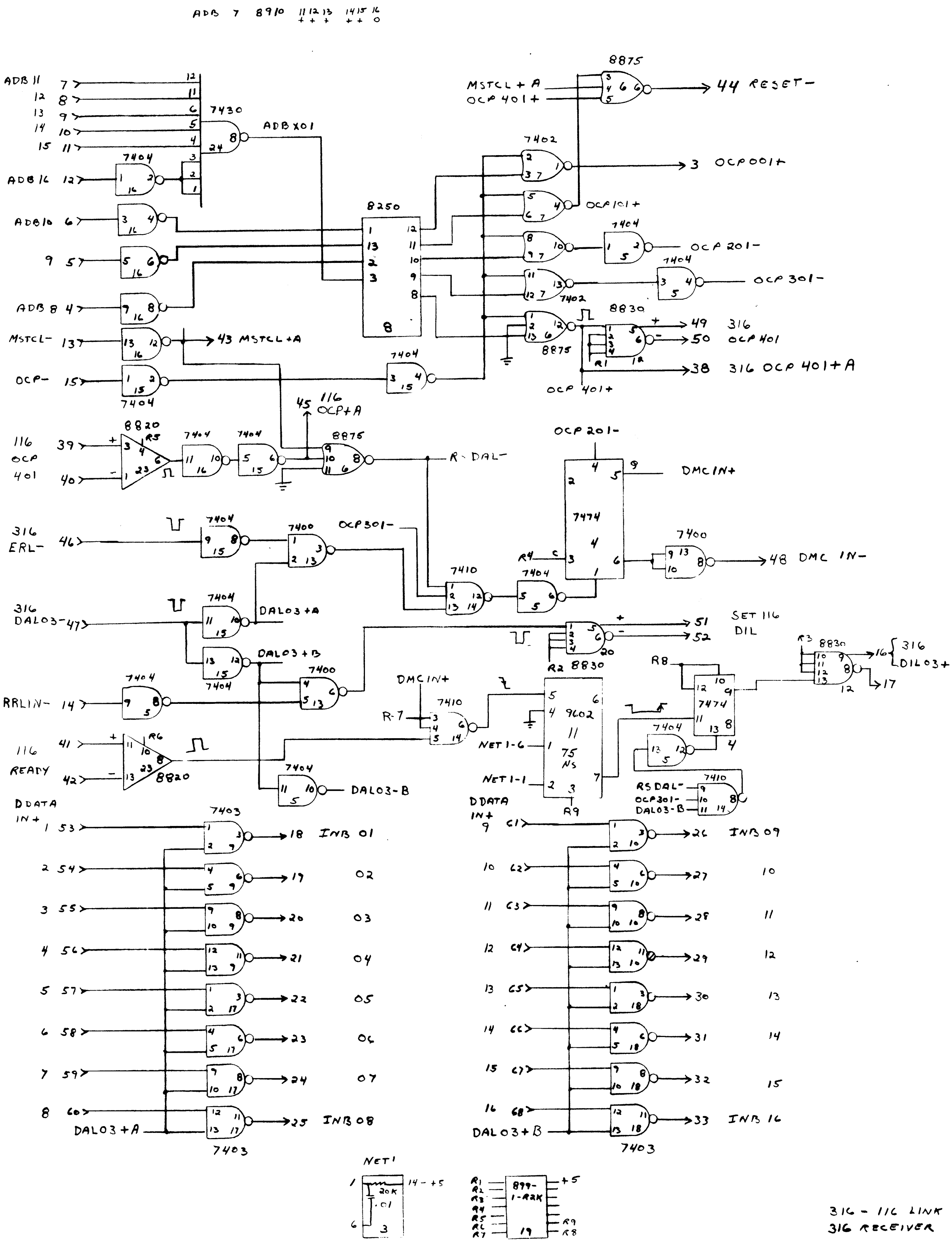
| | | DATE |
|---|---|---|
| DWN | [signature] | 8-9-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R. BINDER | 10-23-73 |
| PROJ | [signature] | 10-23-73 |
| APVD | [signature] | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 516-100176 | — |
| | SHEET 1 OF 1 | LTR |
| | CODE IDENT NO. | |

516-100176

MCS Form 15A




316 - 116 LINK
316 RECEIVER

DECOUPLE WITH .22 NF
THE FOLLOWING CHIPS
CHIP 4, 9, 10, 12, 17, 18, 20, 23

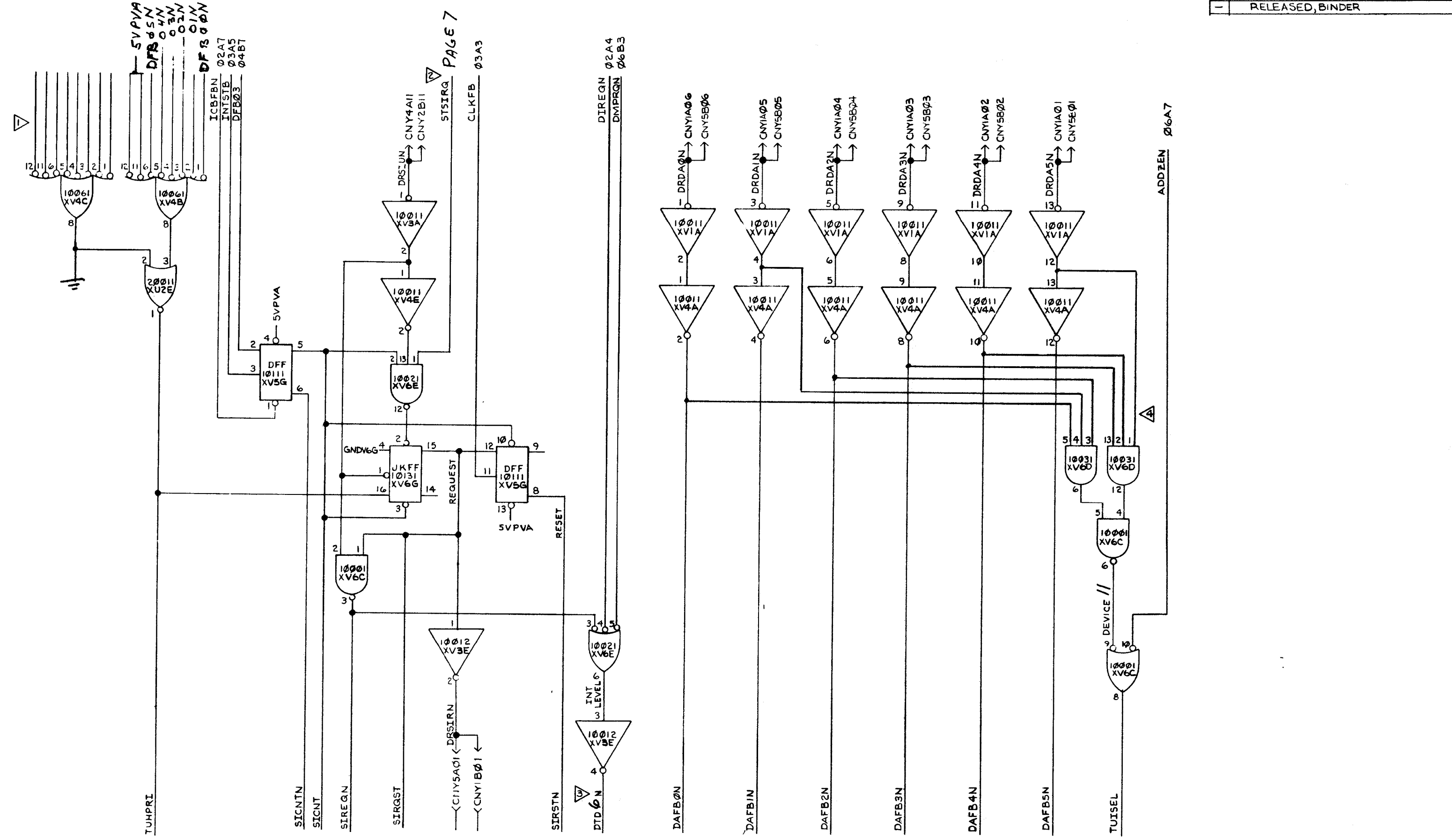
MODCOMP RECEIVE

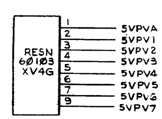
Address 11

Priority 6

DMP Ch. 6

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| – | RELEASED, BINDER | | |




NOTES:
4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

| | |
|---|---|
| TOLERANCE EXCEPT AS NOTED | |
| FRACTIONAL | ± 1/64 |
| DECIMAL | ± .005 (3 PLACE) ± .020 (2 PLACE) |

| | | |
|---|---|---|
| DRAWN | [signature] | 8-3-73 |
| CHECKED | [signature] | 10-13-73 |
| ENGINEER | [signature] | 10-23-73 |
| PROJECT APP'D | [signature] | 10-29-73 |
| APPROVED | [signature] | 10/23 |

modular computer systems

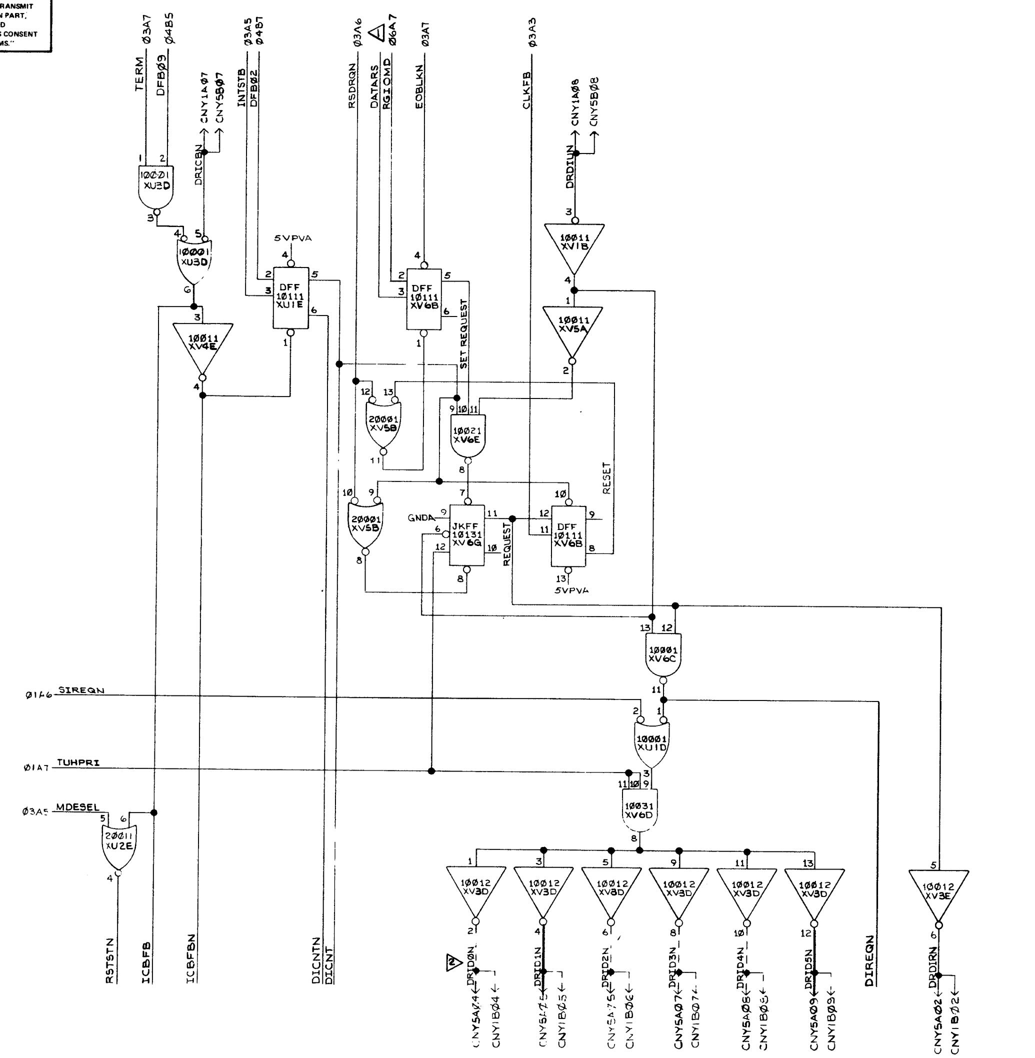
GENERAL PURPOSE CONTROLLER NO 2

| SIZE | DRAWING NO | REV |
|---|---|---|
| D | 520-100260 | – |
| | SHEET 1 OF 6 | LTR |
| | CODE IDENT NO. | |

[520-100260]

MCS Form 15

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |




NOTES:
2. CONNECT FOR APPROPRIATE SID'S
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC.

DATA INTERRUPT & SOURCE ID CONTROL

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems:

| | | DATE |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECK | | 10-13-73 |
| ENGINEER | | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE CONTROLLER NO. 2

SIZE D | DRAWING NO 520-100260 | REV — 
SHEET 2 OF 6 | LTR
CODE IDENT NO

520-100260

MCS Form 15

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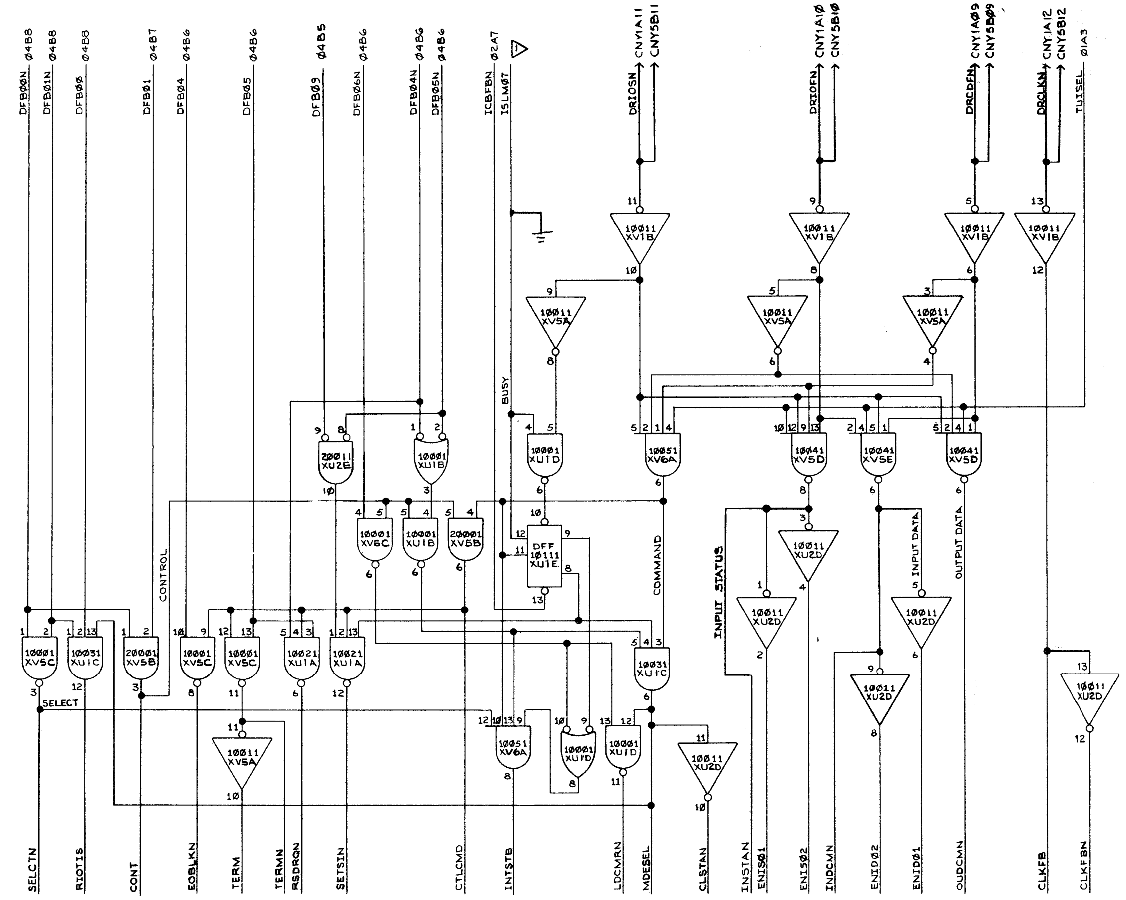



NOTES: 1 ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

COMMAND DECODE LOGIC

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

| | | |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECKED | M Kazaro | 10-13-73 |
| ENGINEER | R F Binder | 10-23-73 |
| PROJECT APP'D | R G | 10-23-73 |
| APPROVED | | 10/23 |

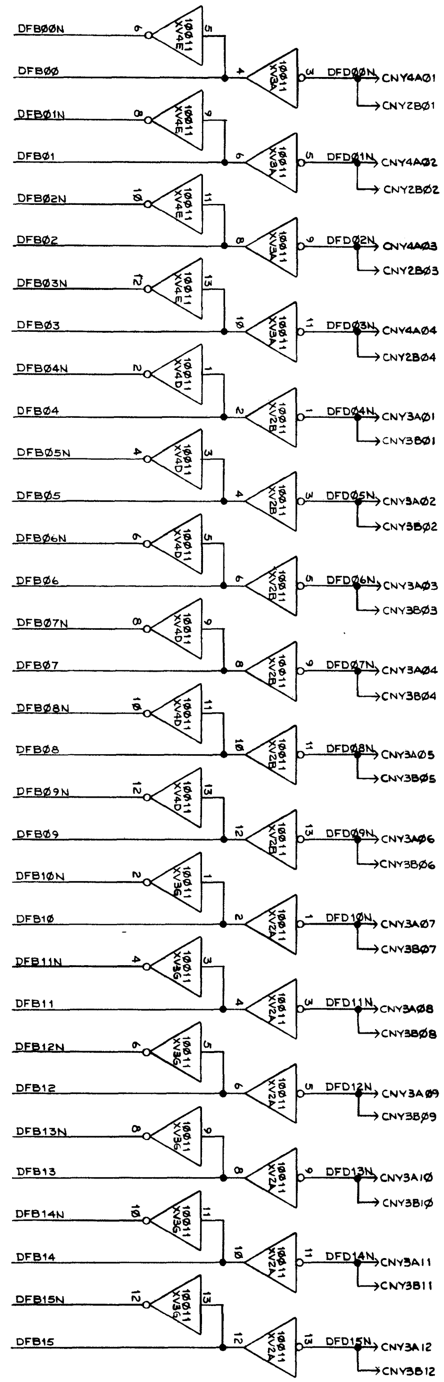
modular computer systems

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 3 OF 6
CODE IDENT NO.

520-100260

MCS Form 15

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TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 | BEND RADIUS
3 PLACE DEC. ± .005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | | 10-18-73 |
| ENGR | R F Bieder | 10-23-73 |
| PROJ | | 10-25-73 |
| APVD | | 11/23 |

OUTPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO.2

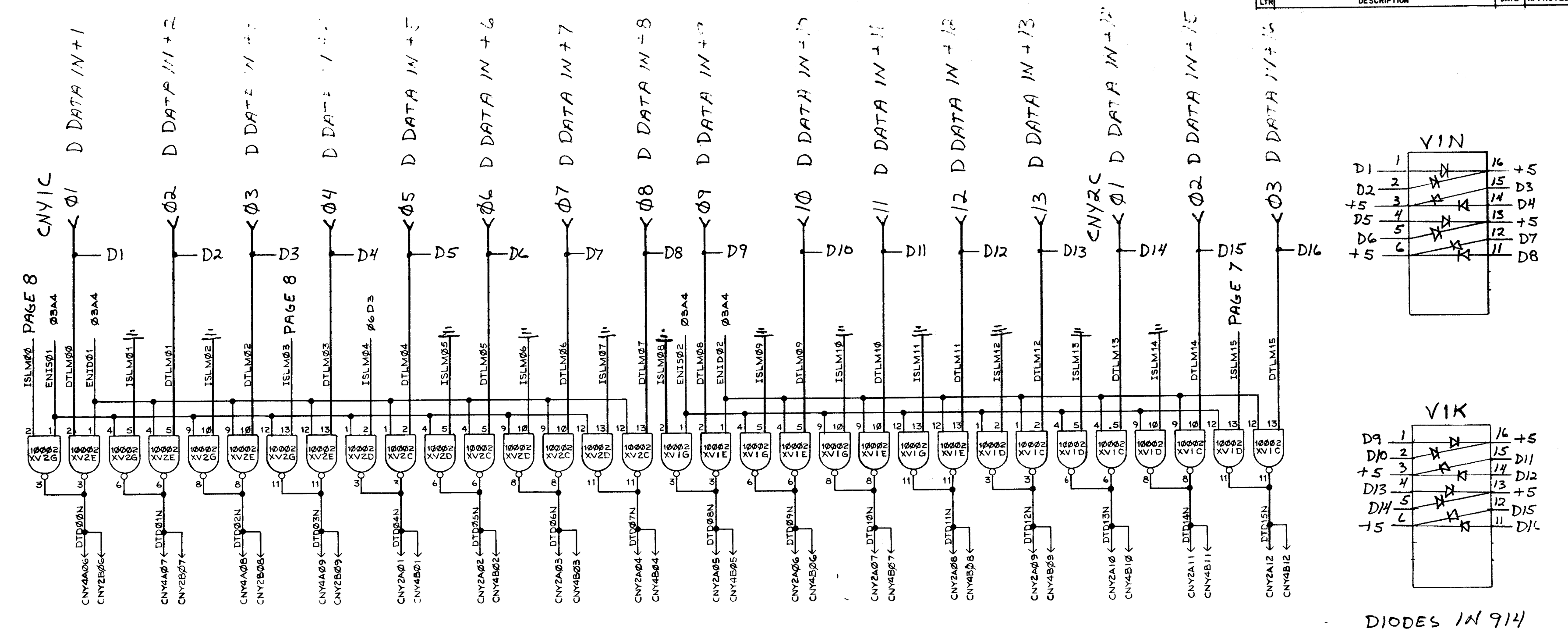
SIZE D | DRAWING NO. 520-100260 | REV —

SHEET 4 OF 6 | LTR

CODE IDENT NO.

REVISIONS: LTR | DESCRIPTION | DATE | APPROVED

520-100260




NOTE: 1. TIE UNUSED INPUTS TO GROUND.



| TOLERANCE EXCEPT AS NOTED | |
|---|---|
| 2 PLACE DEC. ±.02 | BEND RADIUS |
| 3 PLACE DEC. ±.005 | ANGLES ± 1/2° |

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R.F. Binder | 10-23-73 |
| PROJ | | 10-21-73 |
| APVD | | 10/23 |

INPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO. 2

SIZE D | DRAWING NO. 520-100260 | REV —

SHEET 5 OF 6

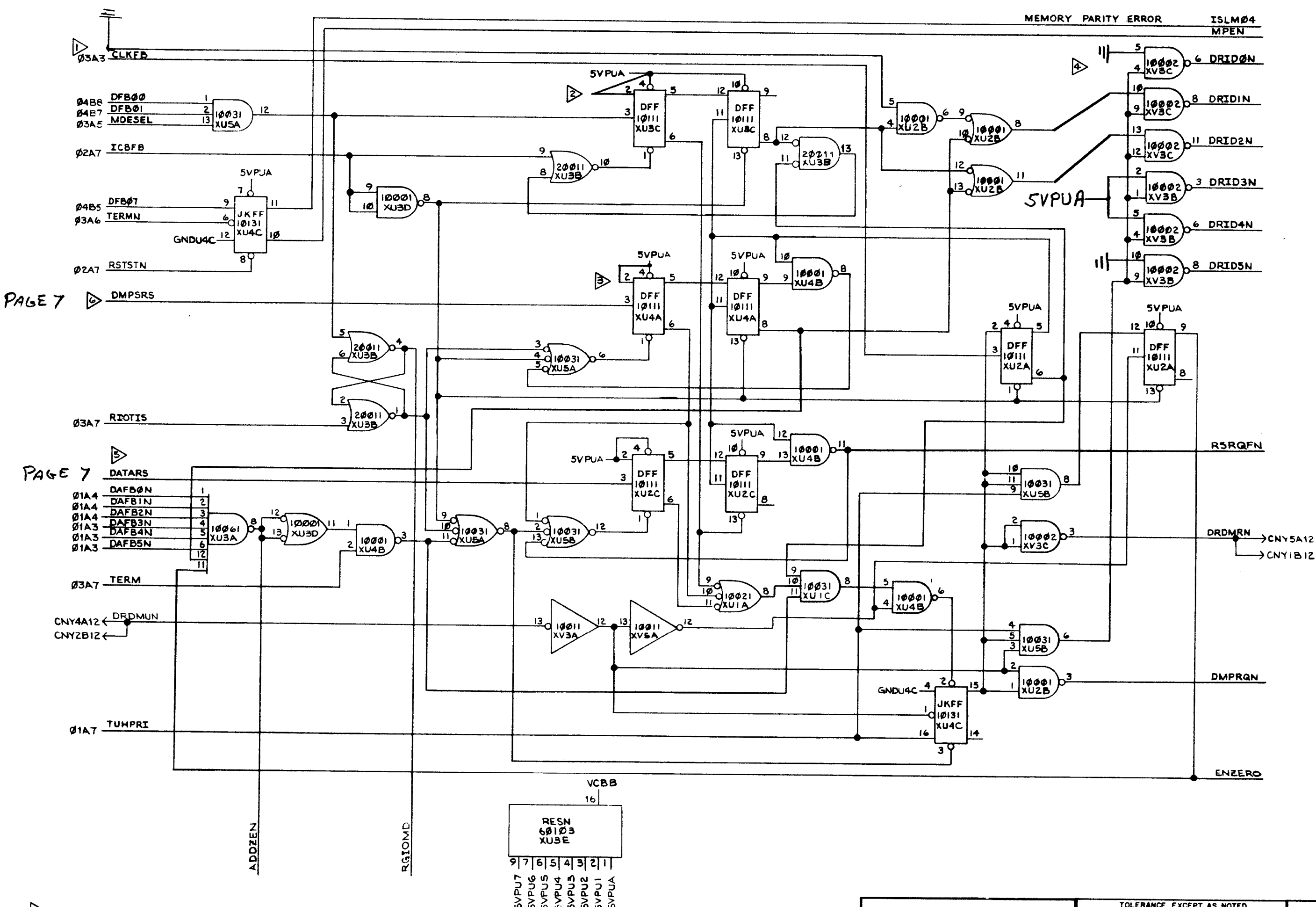
CODE IDENT NO.

LTR

REVISIONS: LTR | DESCRIPTION | DATE | APPROVED

520-100260

MCS Form 15A




NOTES:

1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL (REG. FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM FILE
4. CONNECT TO PRODUCE APPROPRIATE SID'S
5. DATARS TO BE SUPPLIED BY CUSTOM LOGIC
6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 — BEND RADIUS
3 PLACE DEC. ±.005 — ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | R.G. | 10-23-73 |
| APVD | | 10/23 |

DMP CONTROL LOGIC

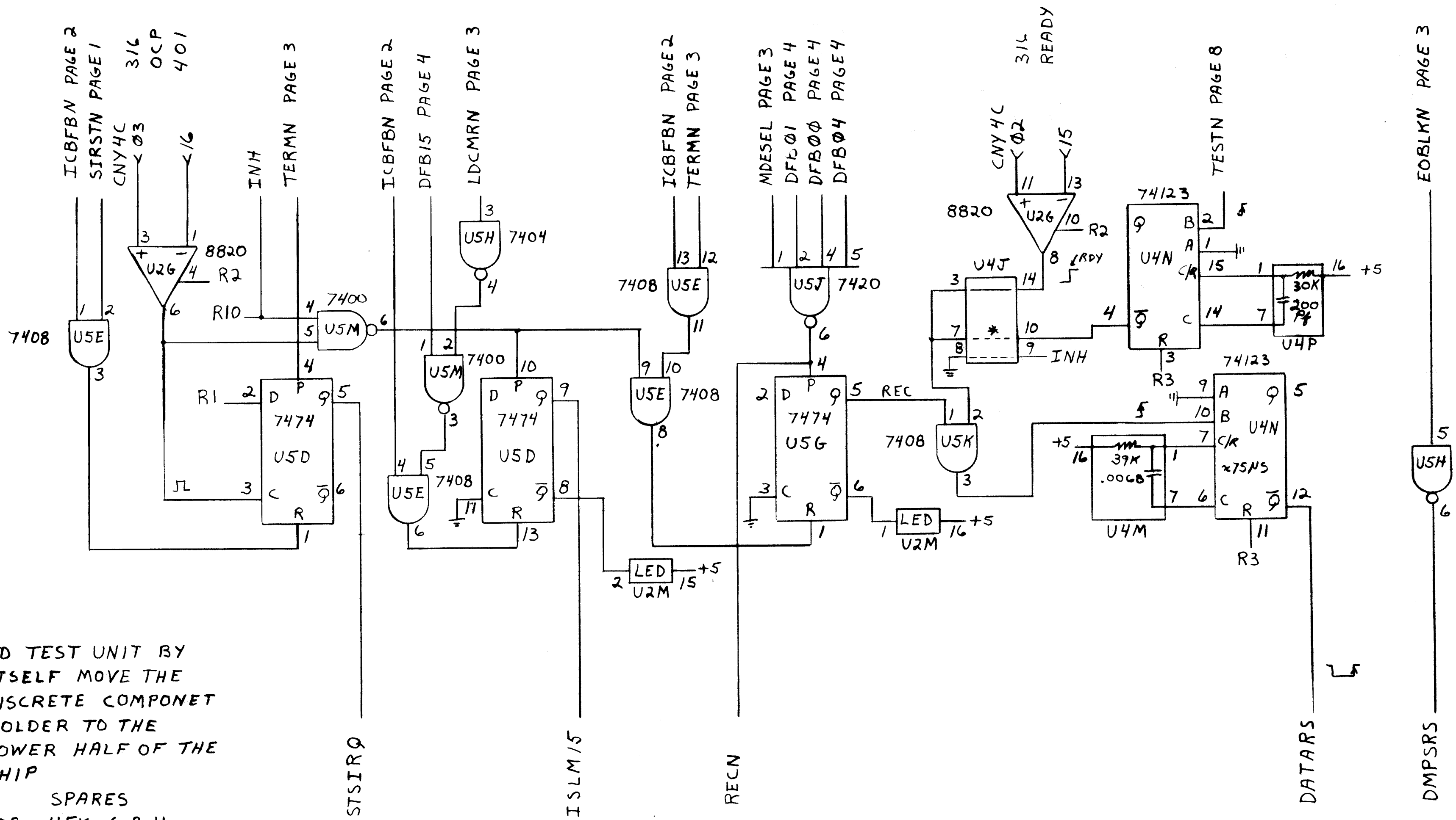
GENERAL PURPOSE CONTROLLER NO.2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 520-100260 | — |
| | SHEET 6 OF 6 | LTR |
| | CODE IDENT NO. | |

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

520-100260

MCS Form 16A

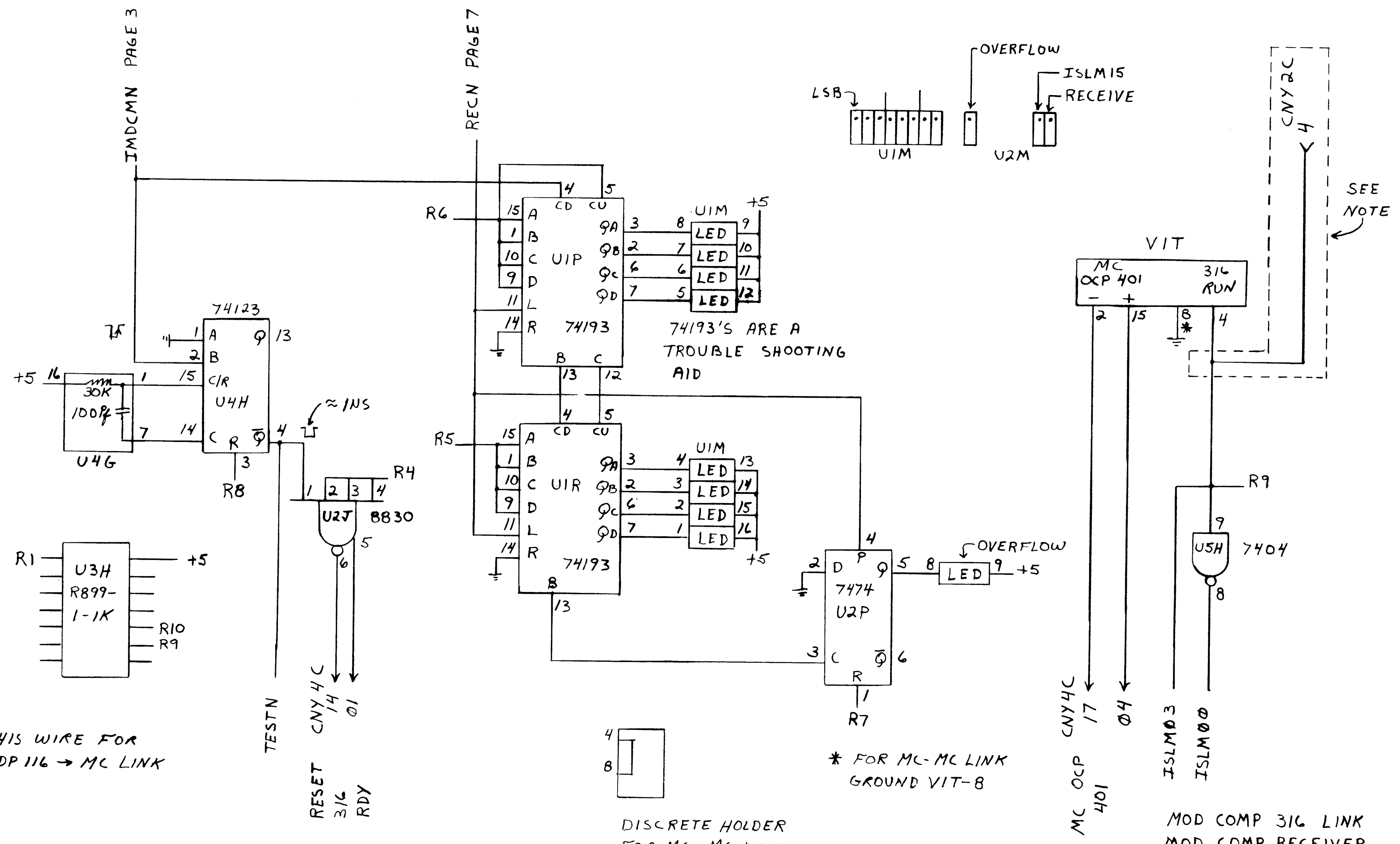



* TO TEST UNIT BY ITSELF MOVE THE DISCRETE COMPONET HOLDER TO THE LOWER HALF OF THE CHIP

SPARES

| | | |
|---|---|---|
| 7408 | U5K | 6, 8, 11 |
| 7404 | U5H | 10, 12, 2 |
| 7400 | U5M | 8, 11 |
| 7474 | U5G | 9 |
| 7420 | U5J | 8 |
| 74123 | U4H | 5 |
| 8830 | U2J | 9 |
| 7474 | U2P | 9 |

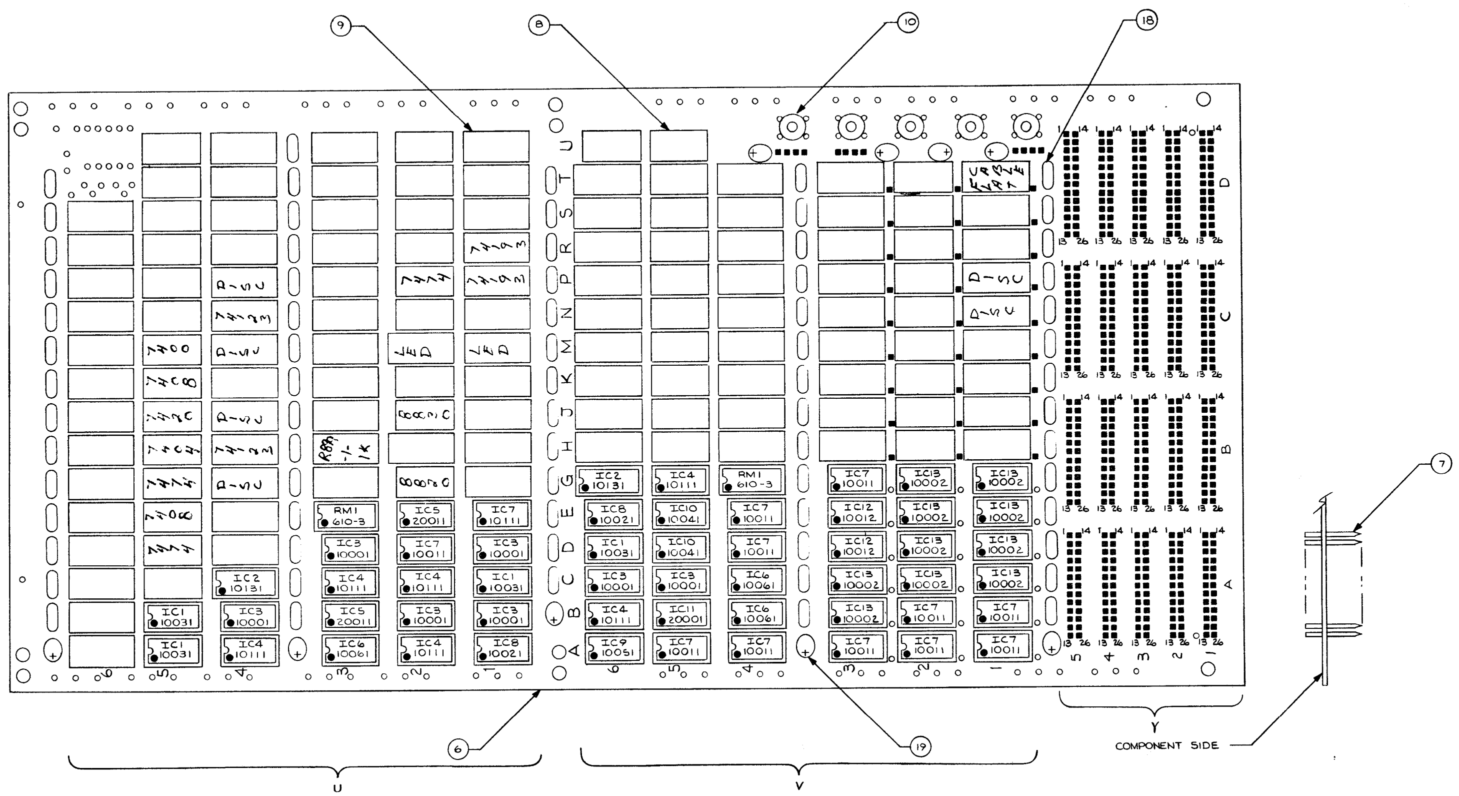
MOD COMP 316 LINK
MOD COMP RECEIVER
PAGE 7 OF 8




NOTE 1
ADD THIS WIRE FOR
300' DDP 116 → MC LINK
ONLY

MOD COMP 316 LINK
MOD COMP RECEIVER
PAGE 8 OF 8

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| — | RELEASED, BINDER | | |

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3 PLACE DEC. ±.005 ANGLES ± 1/2°
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modular computer systems

LM 517-100176

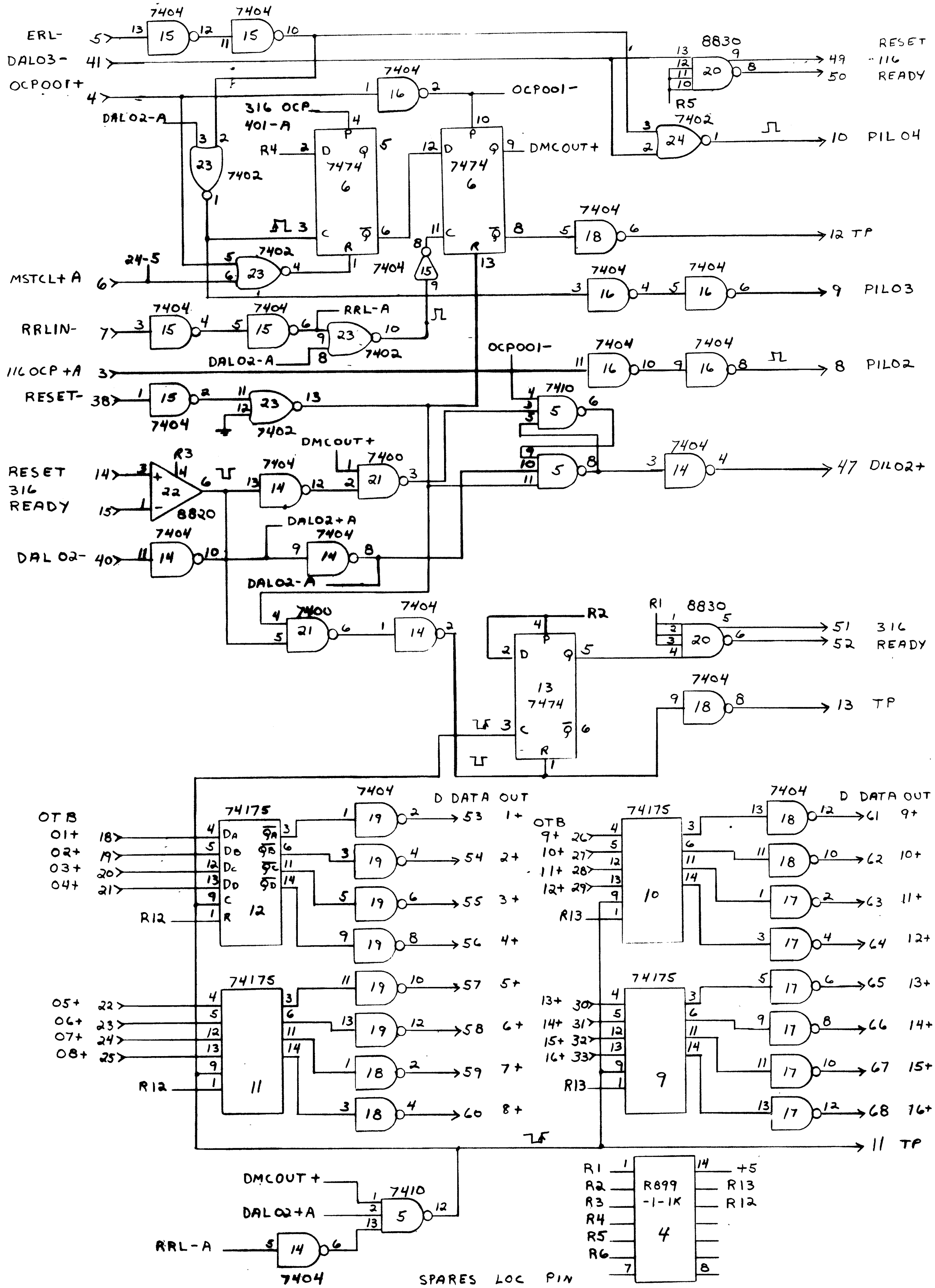
| | | DATE |
|---|---|---|
| DWN | | 8-9-73 |
| CHK | | 10-13-73 |
| ENGR | R.T. BINDER | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO. 516-100176
REV —
SHEET 1 OF 1
CODE IDENT NO.
LTR

MCS Form 15A

516-100176




| SPARES | LOC | PIN |
|---|---|---|
| 7474 | 13 | 9 |
| 7404 | 16 | 12 |
| 7400 | 21 | 11 |
| 8820 | 22 | 8 |
| 7402 | 24 | 10,13 |
| 7406 | 7 | 4,6,8,10,12 |

316 DMC OUT 140'
SHEET 1 OF 1

# TELESCOPE CONTROL PANEL

ADDRESS 3A

PRIORITY 12

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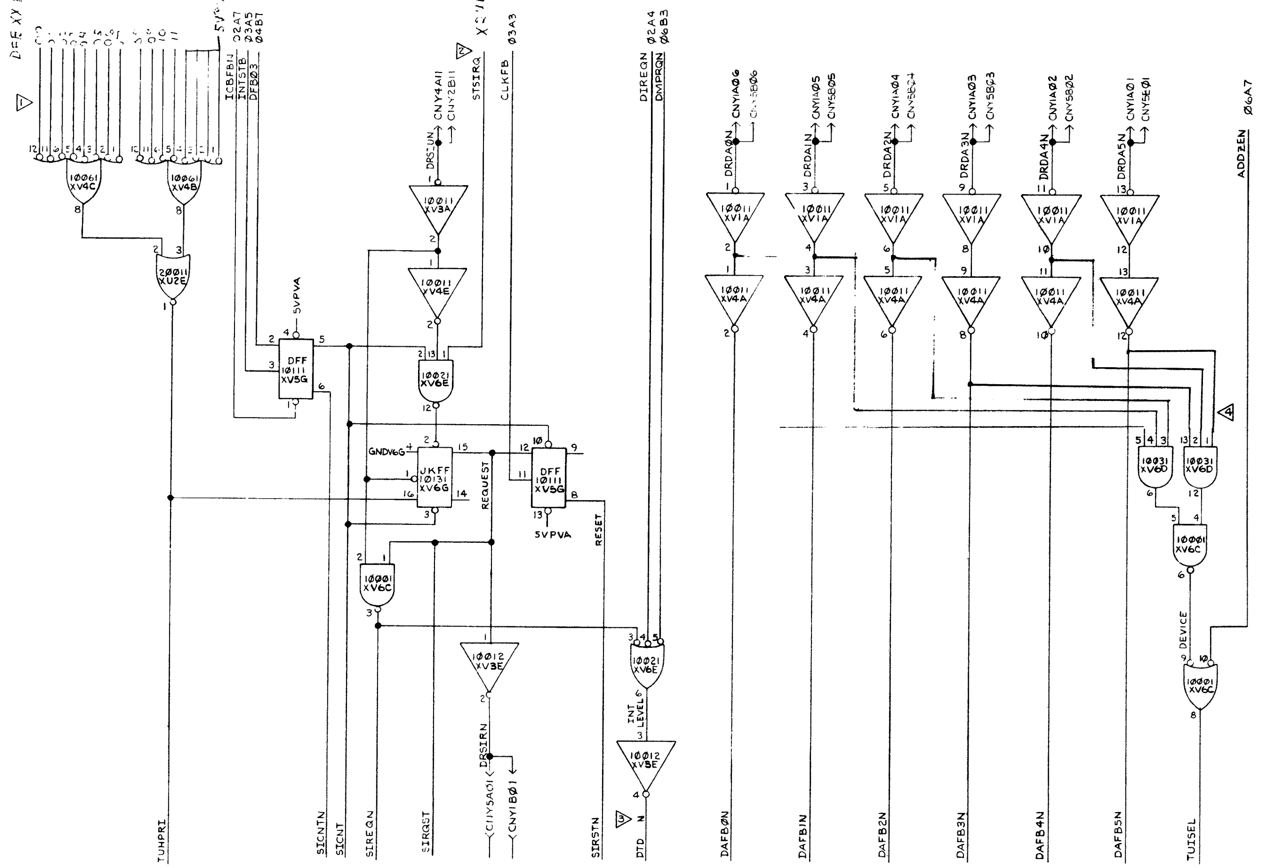
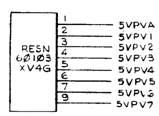
| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| — | RELEASED BINDER | | |




NOTES:

1. CONNECT UNUSED INPUTS TO 5VPVA
   CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
3. CONNECT TO DATA BUS PRIORITY LEVEL
4. CONNECT FOR PROPER DEVICE ADDRESS

XU2N12

DTD1: N

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

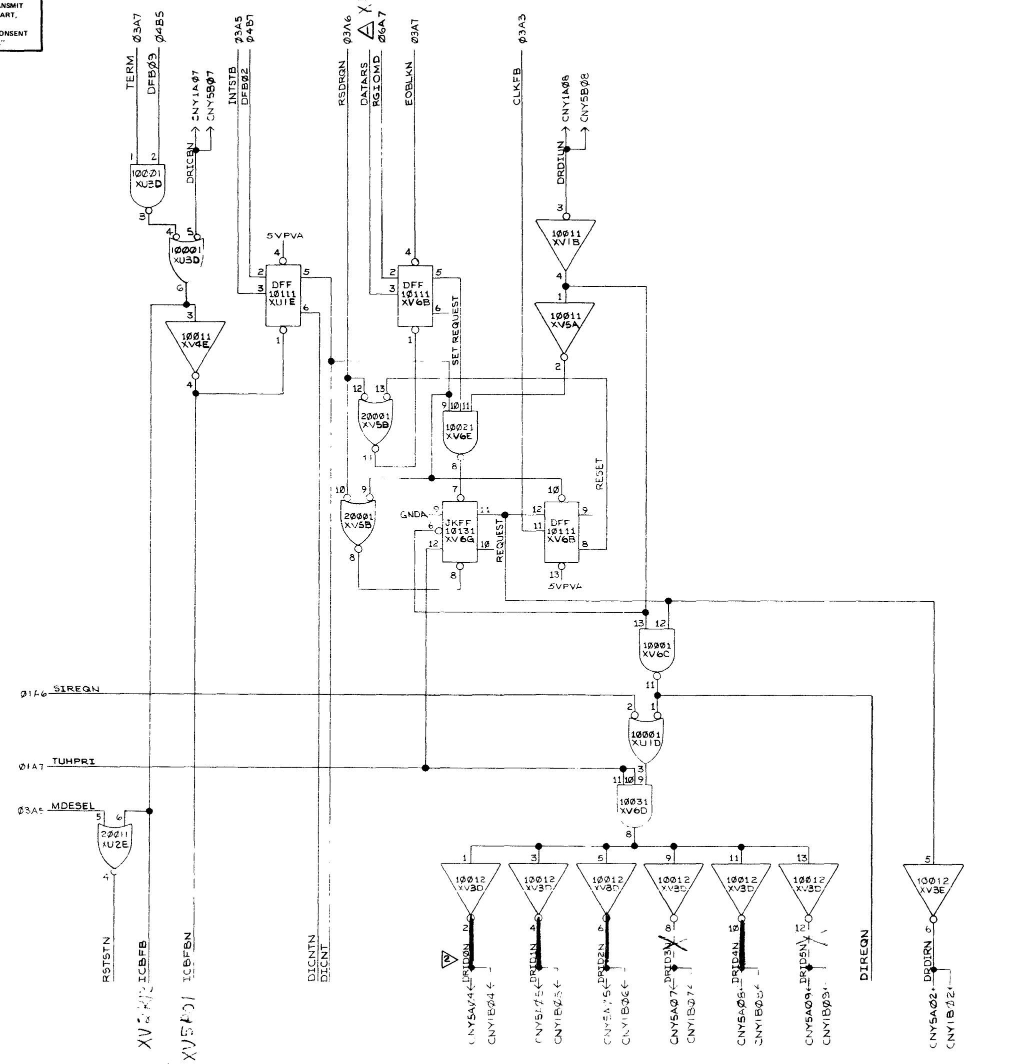
| | | DATE |
|---|---|---|
| DRAWN | | 8-3-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | | 10-3-73 |
| PROJECT APP'D | | 10-25-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE
CONTROLLER NO 2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 1 OF 6
CODE IDENT NO

520-100260

MCS Form 15




NOTES:
2. CONNECT FOR APPROPRIATE SID'S
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

| | | DATE |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

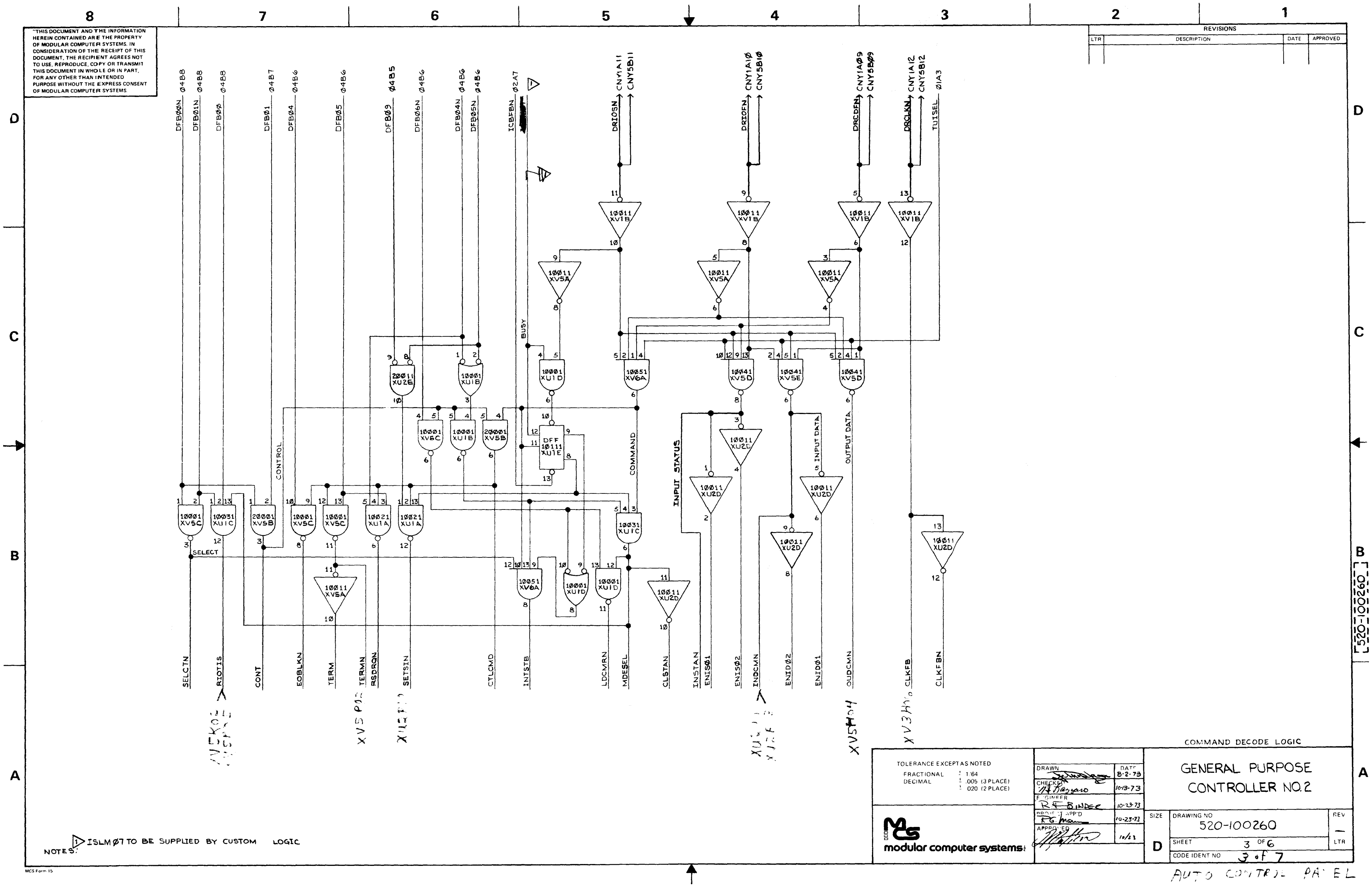
DATA INTERRUPT & SOURCE ID CONTROL

GENERAL PURPOSE CONTROLLER NO. 2

SIZE D
DRAWING NO 520-100260
REV —
SHEET 2 OF 6
CODE IDENT NO

MCS Form 15

520-100260



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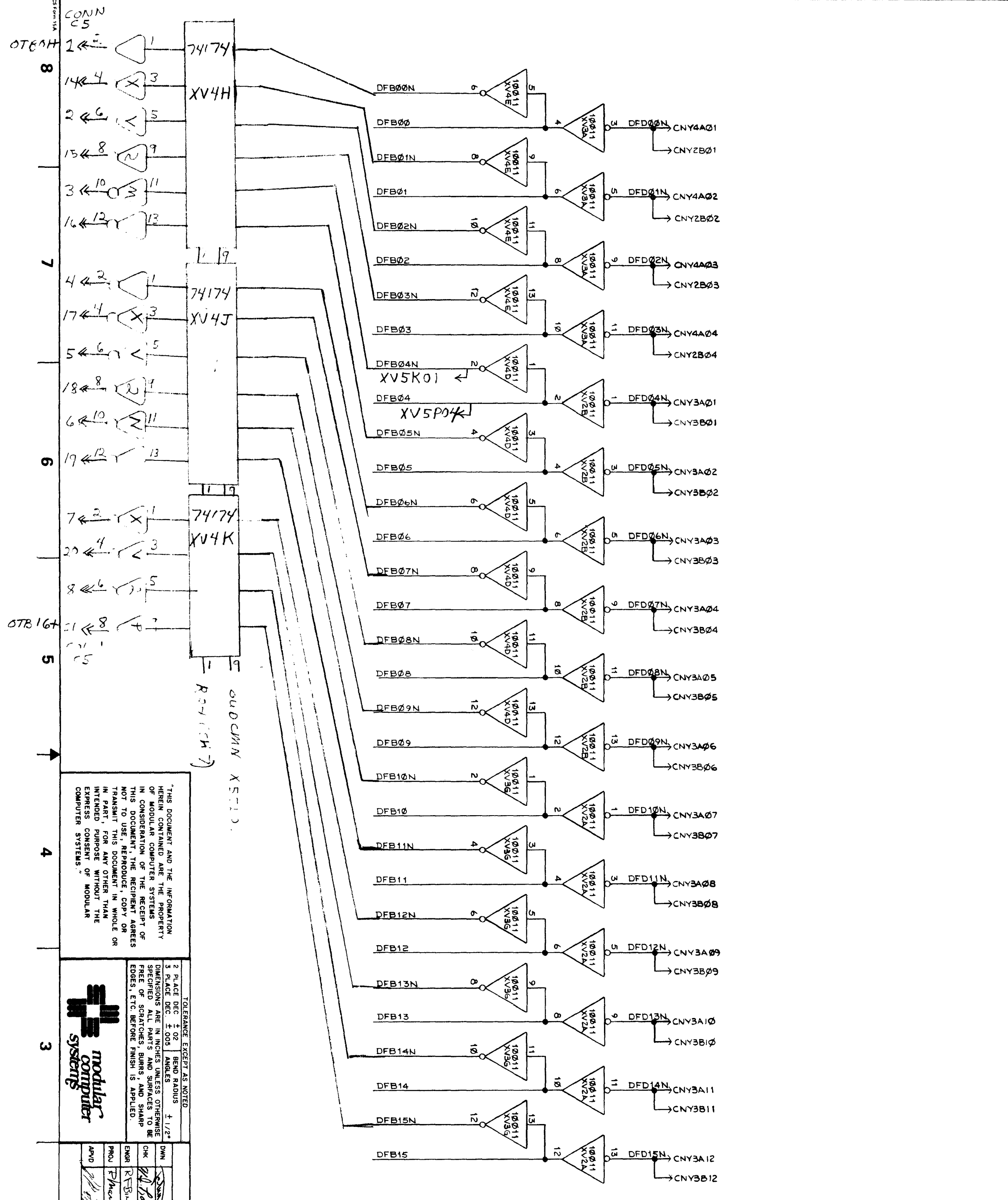
DFBØØN Ø4B8
DFBØ1N Ø4B8
DFBØØ Ø4B8
DFBØ1 Ø4B7
DFBØ4 Ø4B6
DFBØ5 Ø4B6
DFBØ9 Ø4B5
DFBØ6N Ø4B6
DFBØ4N Ø4B6
DFBØ5N Ø4B6
ICBFBN Ø2A7
DRIOSN CNY1A11 CNY5B11
DRIOFN CNY1A1Ø CNY5B1Ø
DRCDFN CNY1AØ9 CNY5BØ9
DRCLKN CNY1A12 CNY5B12
TUISEL Ø1A3
SELECT
CONTROL
BUSY
COMMAND
INPUT STATUS
INPUT DATA
OUTPUT DATA
SELCTN
RIOTIS
CONT
EOBLKN
TERM
TERMN
RSDRQN
SETSIN
CTLCMD
INTSTB
LDCMRN
MDESEL
CLSTAN
INSTAN
ENISØ1
ENISØ2
INDCMN
ENIDØ2
ENIDØ1
OUDCMN
CLKFB
CLKFBN
XV5P12
XV5H04
REVISIONS LTR DESCRIPTION DATE APPROVED
COMMAND DECODE LOGIC
TOLERANCE EXCEPT AS NOTED FRACTIONAL ± 1/64 DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)
modular computer systems
DRAWN DATE 8-2-73
CHECKED 10-19-73
ENGINEER R F BINDER 10-23-73
PROJECT APP'D R G Mau 10-23-73
APPROVED 11/1
GENERAL PURPOSE CONTROLLER NO.2
SIZE D
DRAWING NO 520-100260
REV —
SHEET 3 OF 6
LTR
CODE IDENT NO 3 of 7
AUTO CONTROL PANEL
NOTES: 1 ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC
MCS Form 15
520-100260






TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS ± 1/2°
3 PLACE DEC ± .005 ANGLES
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | | 10-13-73 |
| ENGR | R.F. Bindar | 10-23-73 |
| PROJ | | 10-25-73 |
| APVD | | 11/23 |

OUTPUT DATA BUFFERS

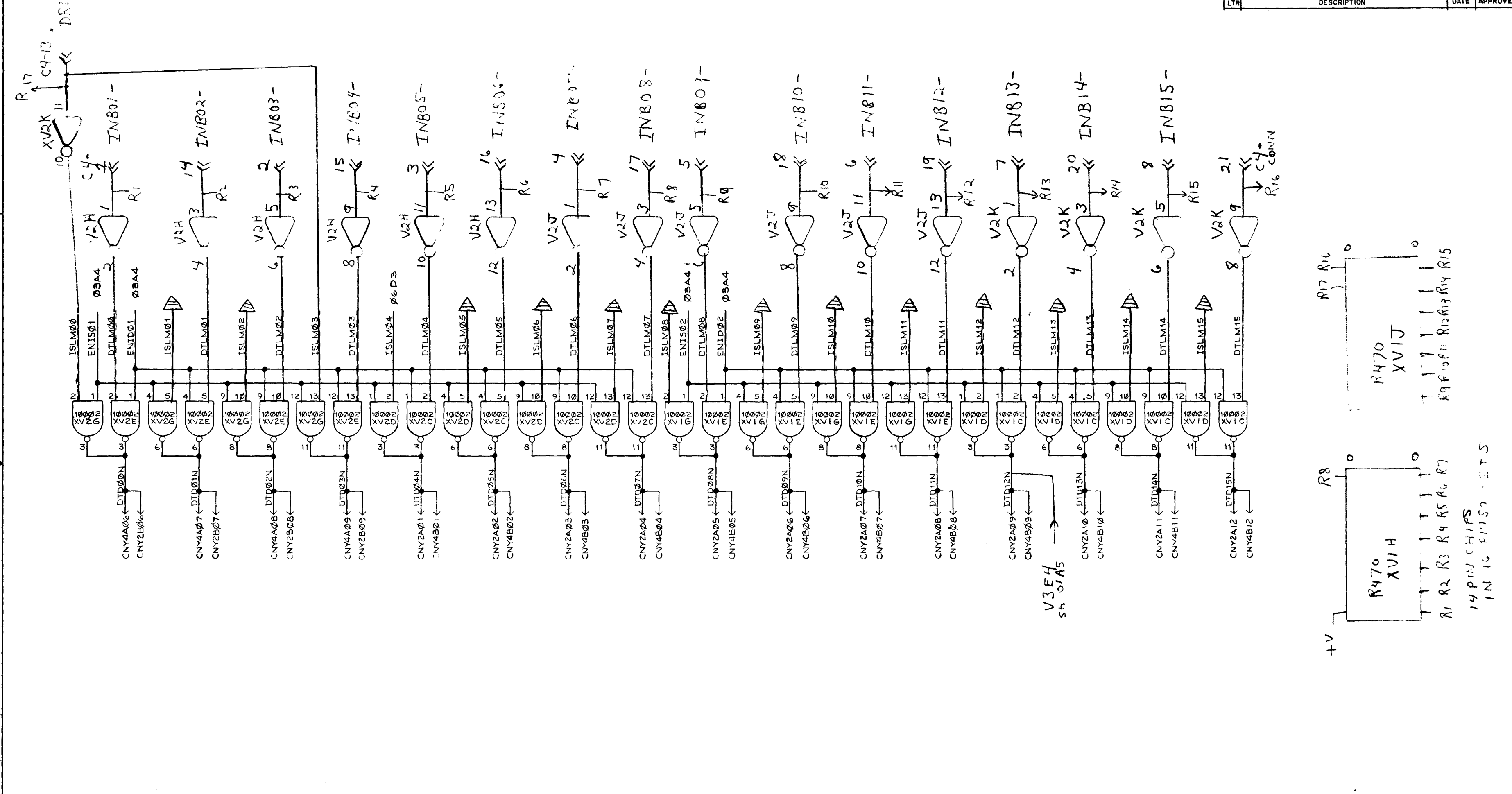
GENERAL PURPOSE CONTROLLER NO.2

| SIZE | DRAWING NO | REV |
|---|---|---|
| D | 520-100260 | — |
| | SHEET 4 OF 6 | LTR |
| | CODE IDENT NO. 4 of 7 | |

AUTO CONTROL PANEL

| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

520-100260



NOTE: 1. TIE UNUSED INPUTS TO GROUND.

INPUT DATA BUFFERS

# GENERAL PURPOSE CONTROLLER NO.2

| | |
|---|---|
| SIZE | D |
| DRAWING NO. | 520-100260 |
| REV | — |
| SHEET | 5 OF 6 |
| CODE IDENT NO | 5 OF 7 |

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | RF BINDER | 10-23-73 |
| PROJ | | 10-21-73 |
| APVD | | 10/23 |

TOLERANCE EXCEPT AS NOTED
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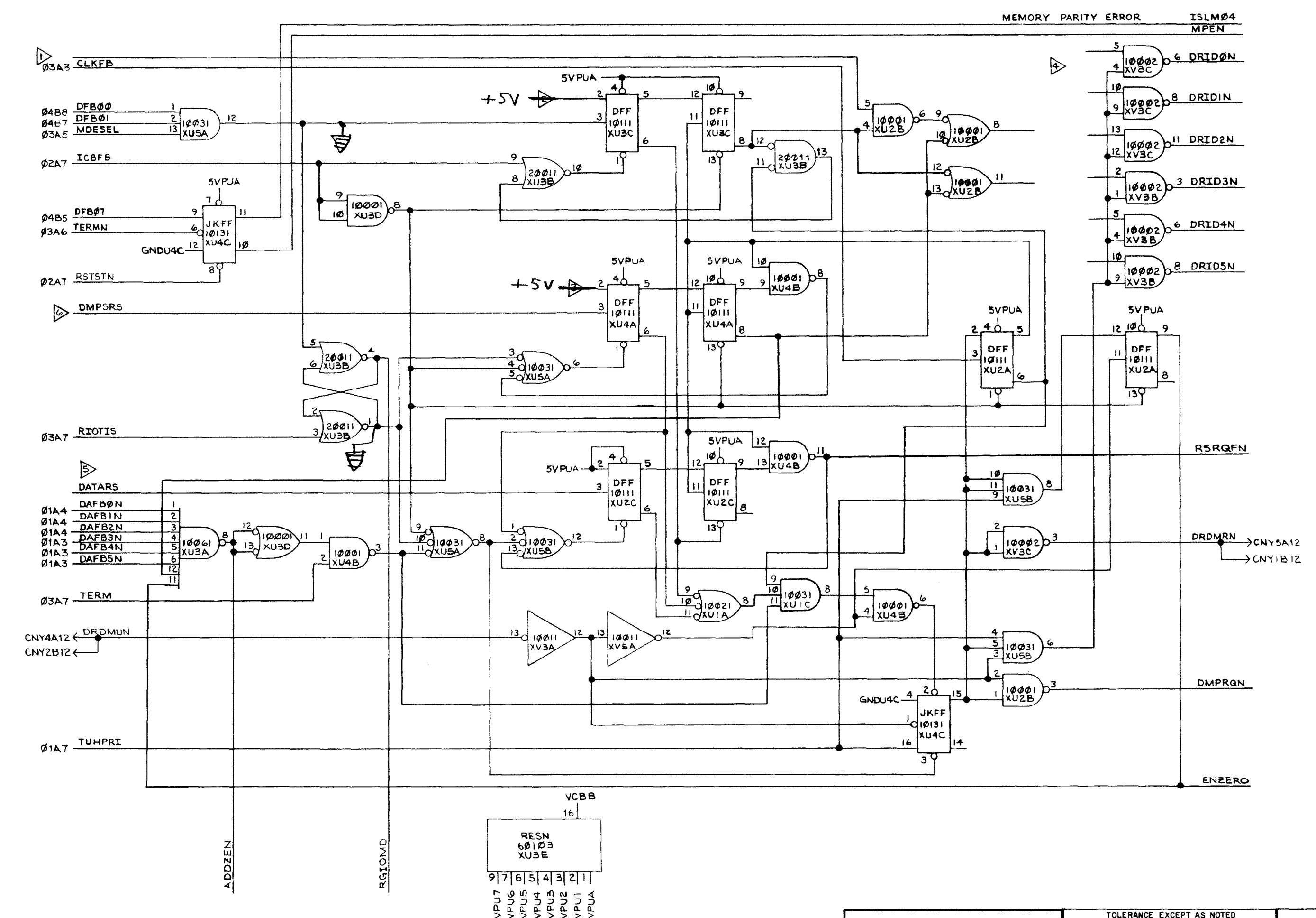
modular computer systems



MCS Form 15A

[520-100260]

AUTO CONTR'S PANEL




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL(REG FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ±1/2°
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modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | R.G. | 10-23-73 |
| APVD | | 10/23 |

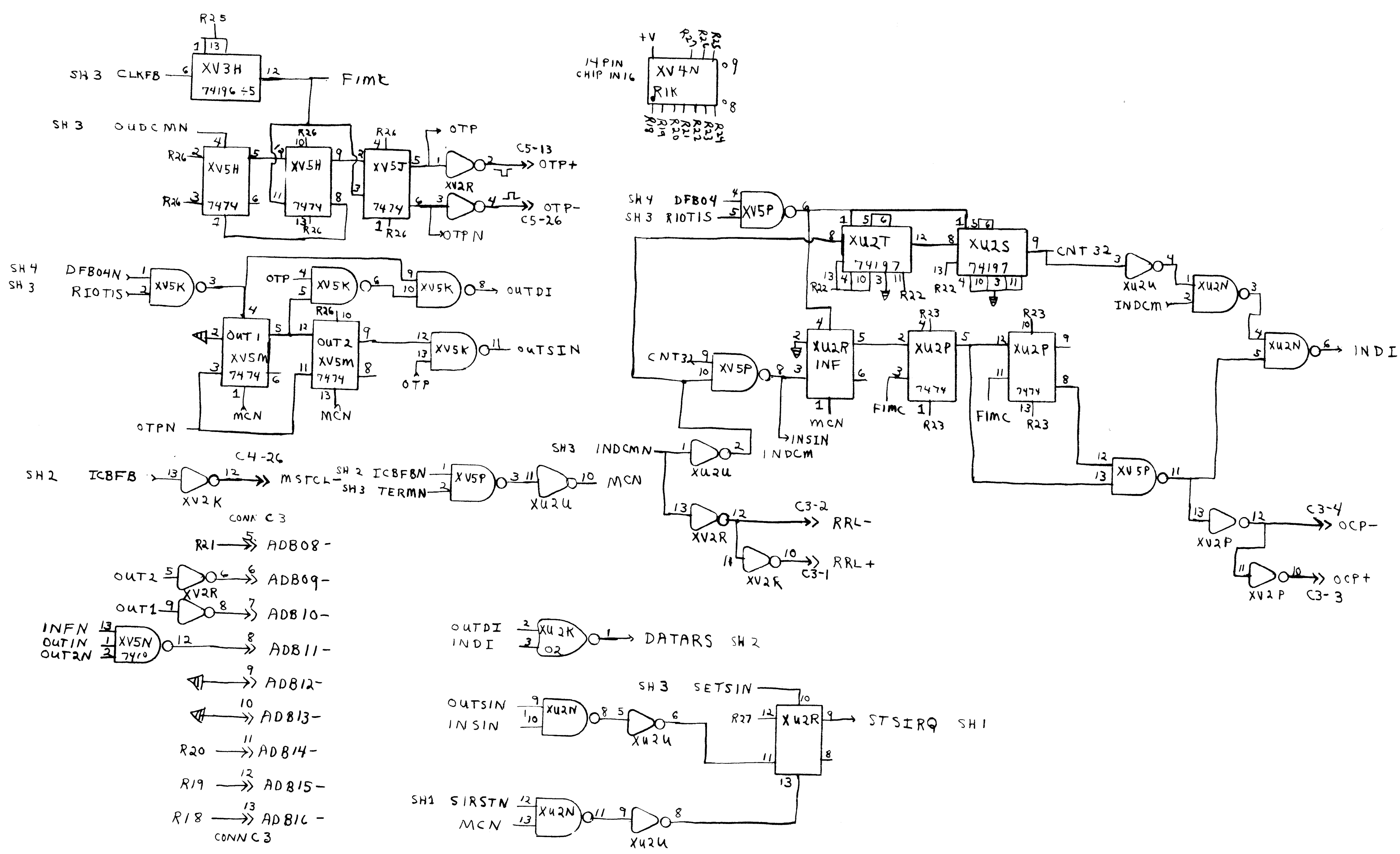
DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 520-100260 | REV —
SHEET 6 OF 6
CODE IDENT NO. 6 OF 7

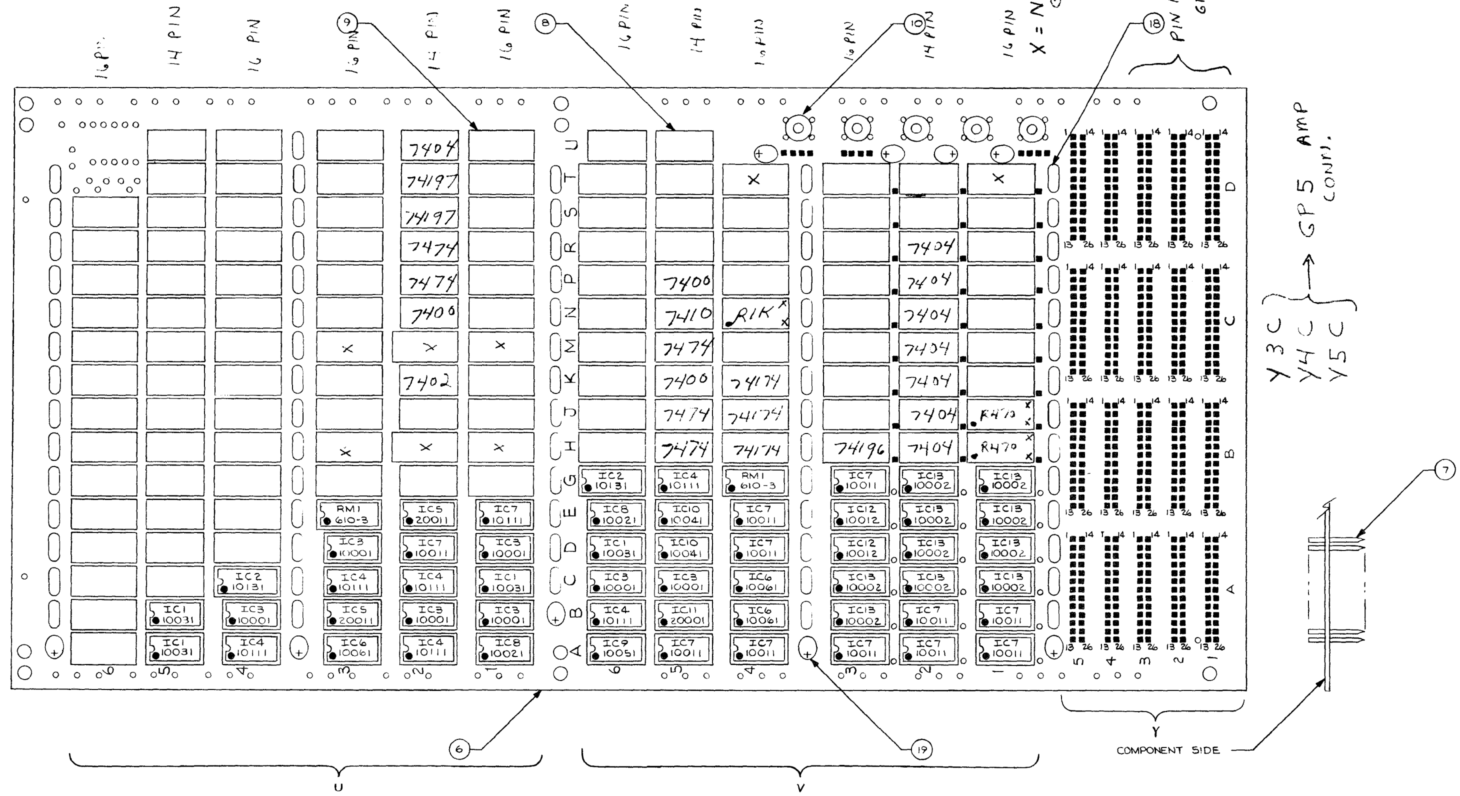
AUTO CONTROL PANEL

520-100260




AUTO CONTROL PANEL
SHEET 7 of 7

| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| - | RELEASED, BINDER | | |




SPARES
V5J09 - 7474
U2U12 7404
U2K04, 10, 13 - 7400

-001 SHOWN

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TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ±.02 | BEND RADIUS
3 PLACE DEC. ±.005 | ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

LM 517-100176

| | | DATE |
|---|---|---|
| DWN | | 8-9-73 |
| CHK | | 10-13-73 |
| ENGR | R.F. BINDER | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 516-100176 | REV –
SHEET 1 OF 1 | LTR
CODE IDENT NO.

516-100176

AUTO CONTROL PANEL

MODCOMP TO MODCOMP LINK

MODCOMP RECEIVE (LOCATED IN OFF-LINE COMP.)

ADDRESS 3

PRIORITY 10

DMP CH. 3

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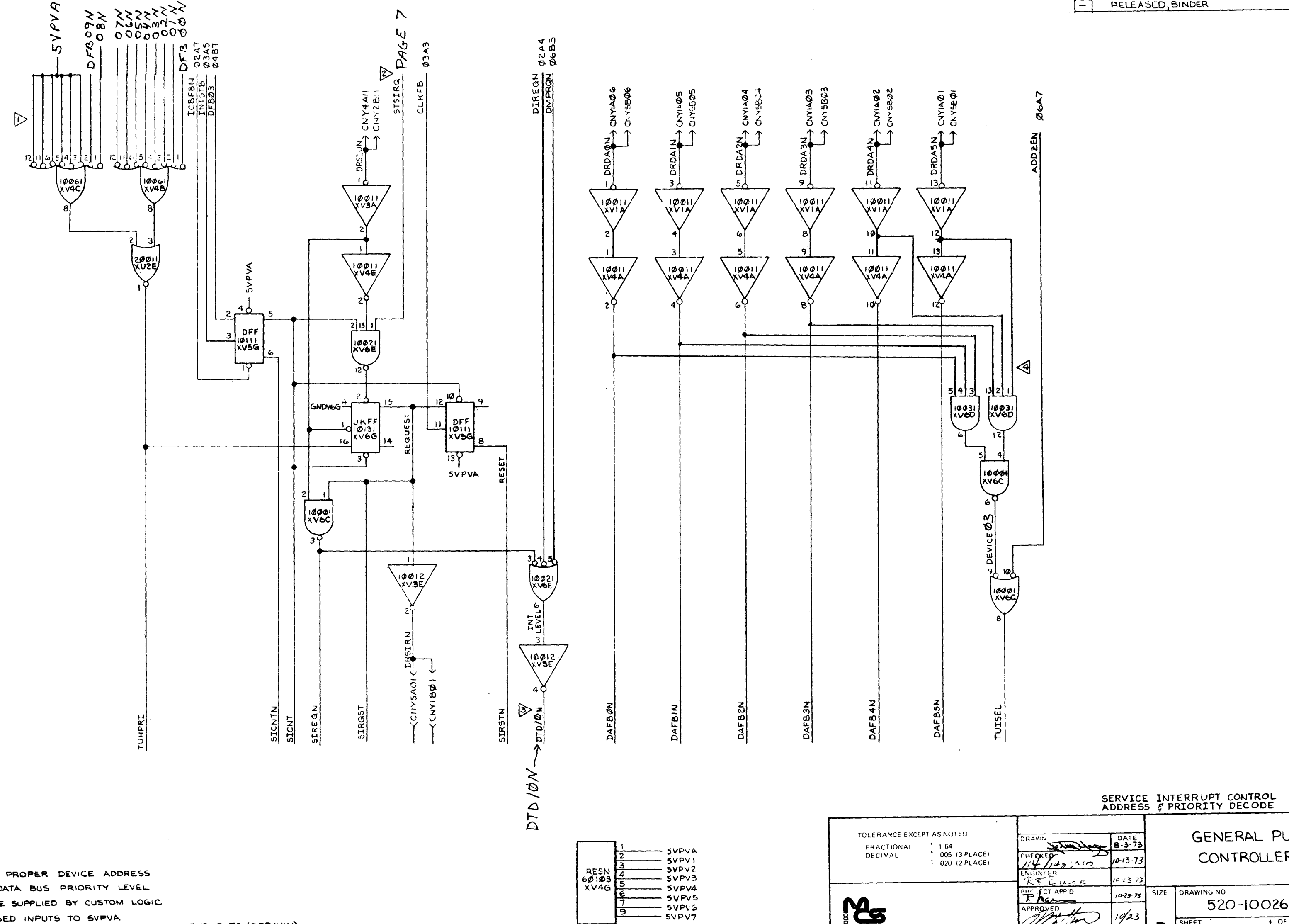
| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| — | RELEASED, BINDER | | |




NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO 5VPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

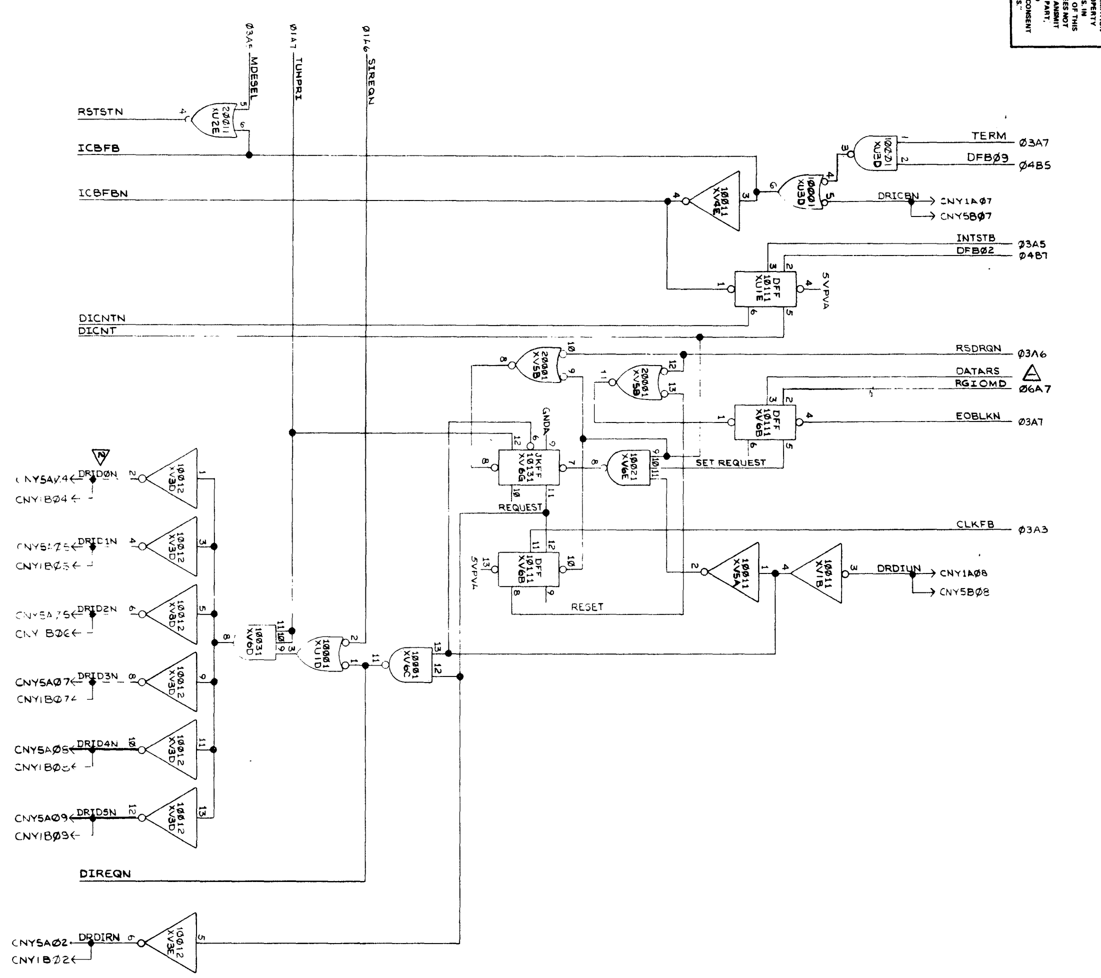
| | | DATE |
|---|---|---|
| DRAWN | | 8-3-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | | 10-23-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

GENERAL PURPOSE CONTROLLER NO 2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 1 OF 6 | LTR
CODE IDENT NO

520-100260

MCS Form 1b




NOTES:
1. DATARS TO BE SUPPLIED BY CUSTOM LOGIC
2. CONNECT. FOR APPROPRIATE SID'S



TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

| | | |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECKED | | 10-1-73 |
| ENGINEER | | 10-17-73 |
| PROJECT APPD | | 10-23-73 |
| APPROVED | | 10/23 |

DATA INTERRUPT & SOURCE ID CONTROL

GENERAL PURPOSE CONTROLLER NO. 2

SIZE D — DRAWING NO 520-100260 — REV —
SHEET 2 OF 6

REVISIONS: LTR | DESCRIPTION | DATE | APPROVED

520-100260

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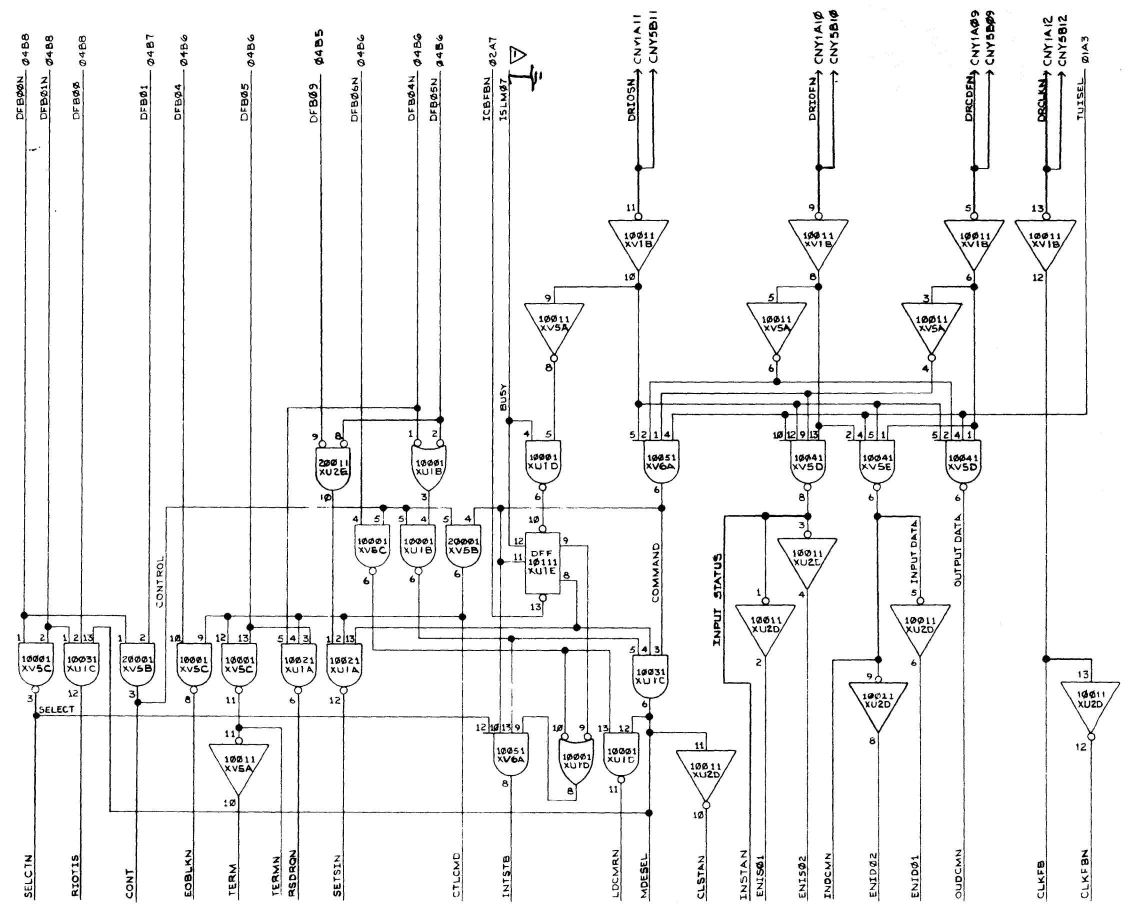
| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |




NOTES: 1. ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

MCS modular computer systems

| | | DATE |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECKED | N Bozzaro | 10-13-73 |
| ENGINEER | R F Binder | 10-23-73 |
| PROJ. APP'D | RG | 10-23-73 |
| APPROVED | | 10/23 |

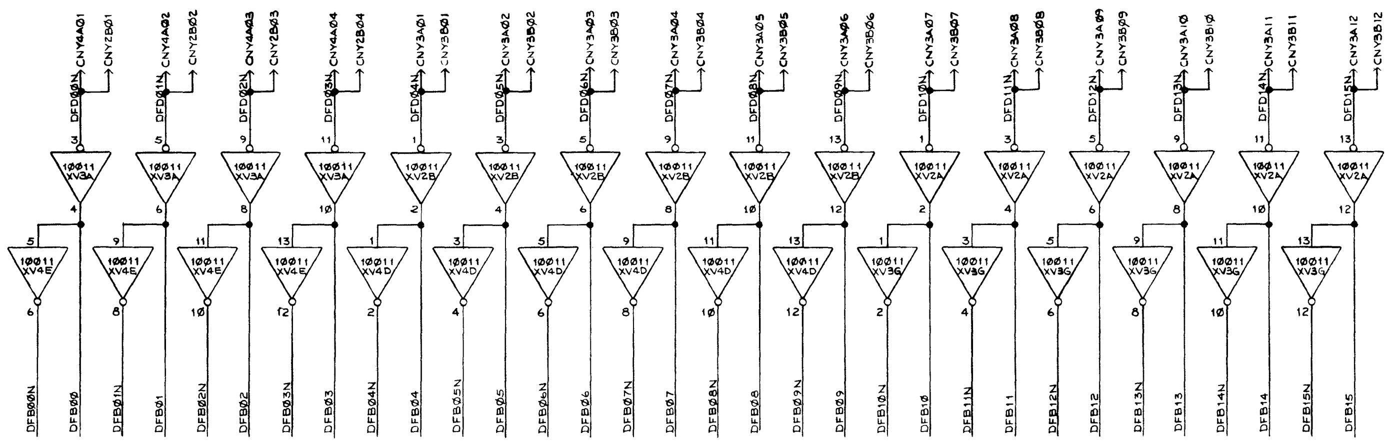
COMMAND DECODE LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO 520-100260 | REV —
SHEET 3 OF 6 | CODE IDENT NO | LTR

520-100260

MCS Form 15



| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

OUTPUT DATA BUFFERS

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TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 | BEND RADIUS
3 PLACE DEC. ± .005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [illegible] | 8-2-73 |
| CHK | [illegible] | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | P [illegible] | 10-23-73 |
| APVD | [illegible] | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

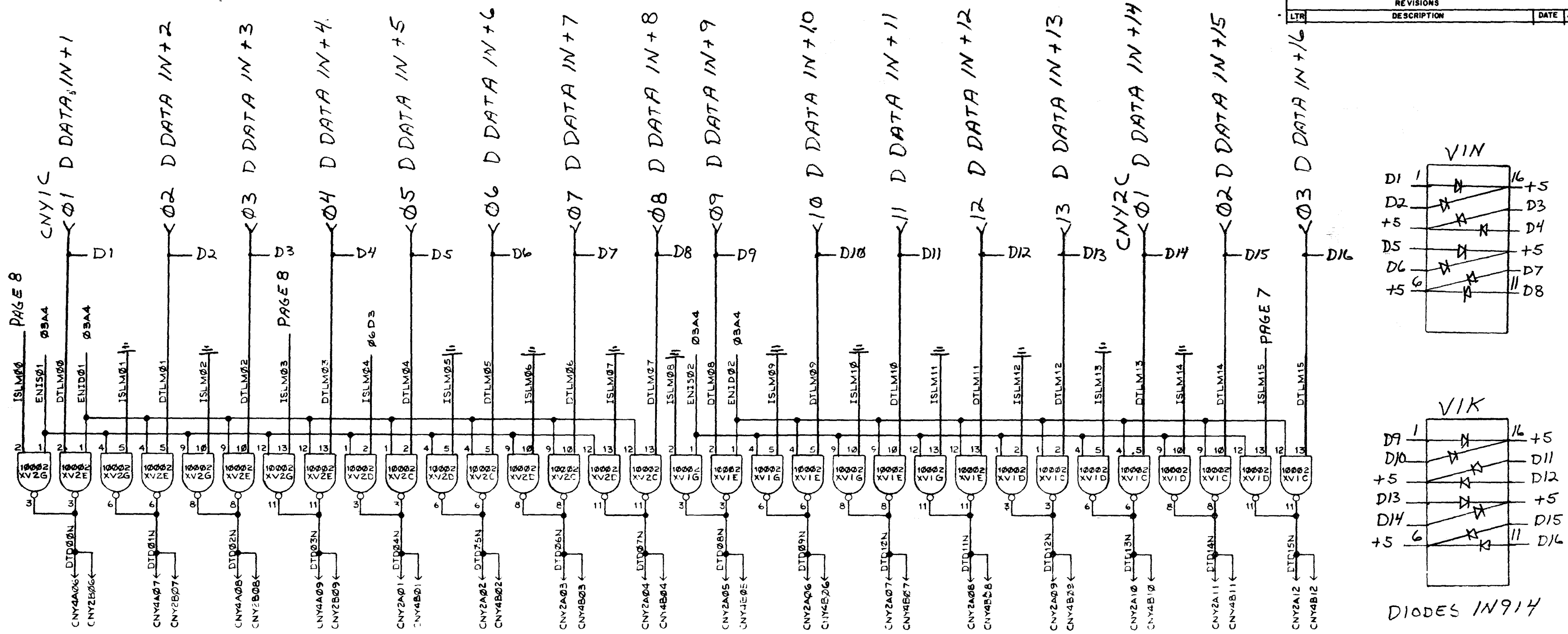
SIZE D | DRAWING NO. 520-100260 | REV —

SHEET 4 OF 6 | LTR

CODE IDENT NO.

520-100260

MCS Form 15A




NOTE: 1. TIE UNUSED INPUTS TO GROUND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 | BEND RADIUS
3 PLACE DEC ± .005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | | 10-21-73 |
| APVD | | 10/2? |

INPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO.2

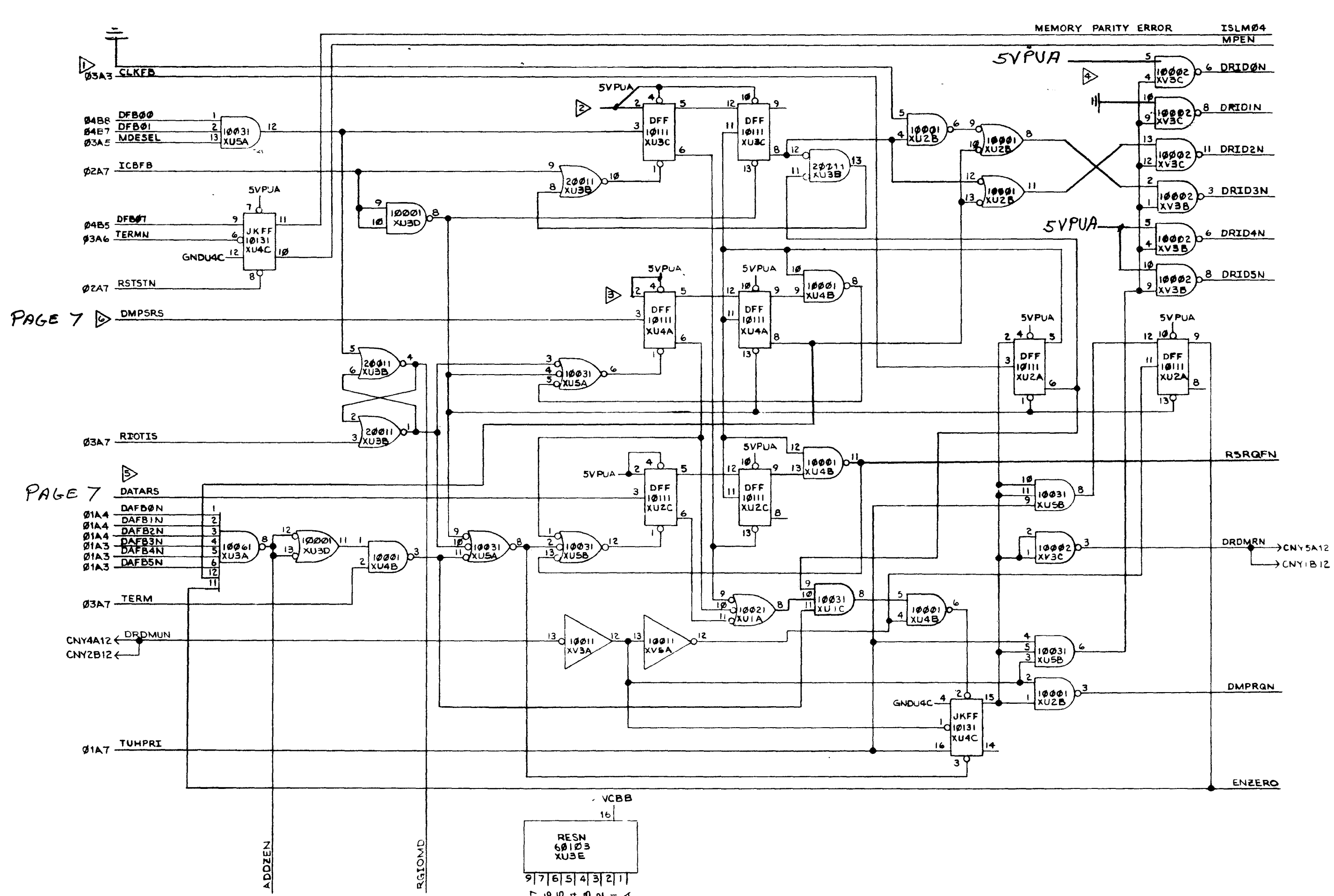
| SIZE | DRAWING NO | REV |
|---|---|---|
| D | 520-100260 | — |
| | SHEET 5 OF 6 | LTR |
| | CODE IDENT NO | |

REVISIONS

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

MCS Form 15A

520-100260




NOTES:

1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL(REG FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM FILE
4. CONNECT TO PRODUCE APPROPRIATE SID'S
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |



| TOLERANCE EXCEPT AS NOTED | |
|---|---|
| 2 PLACE DEC ± .02 | BEND RADIUS |
| 3 PLACE DEC ± .005 | ANGLES ± 1/2° |

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC BEFORE FINISH IS APPLIED

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [illegible] | 8-3-73 |
| CHK | [illegible] | 10-13-73 |
| ENGR | R F Binder | 10-23-73 |
| PROJ | R G [illegible] | 10-23-73 |
| APVD | [illegible] | 10/23 |

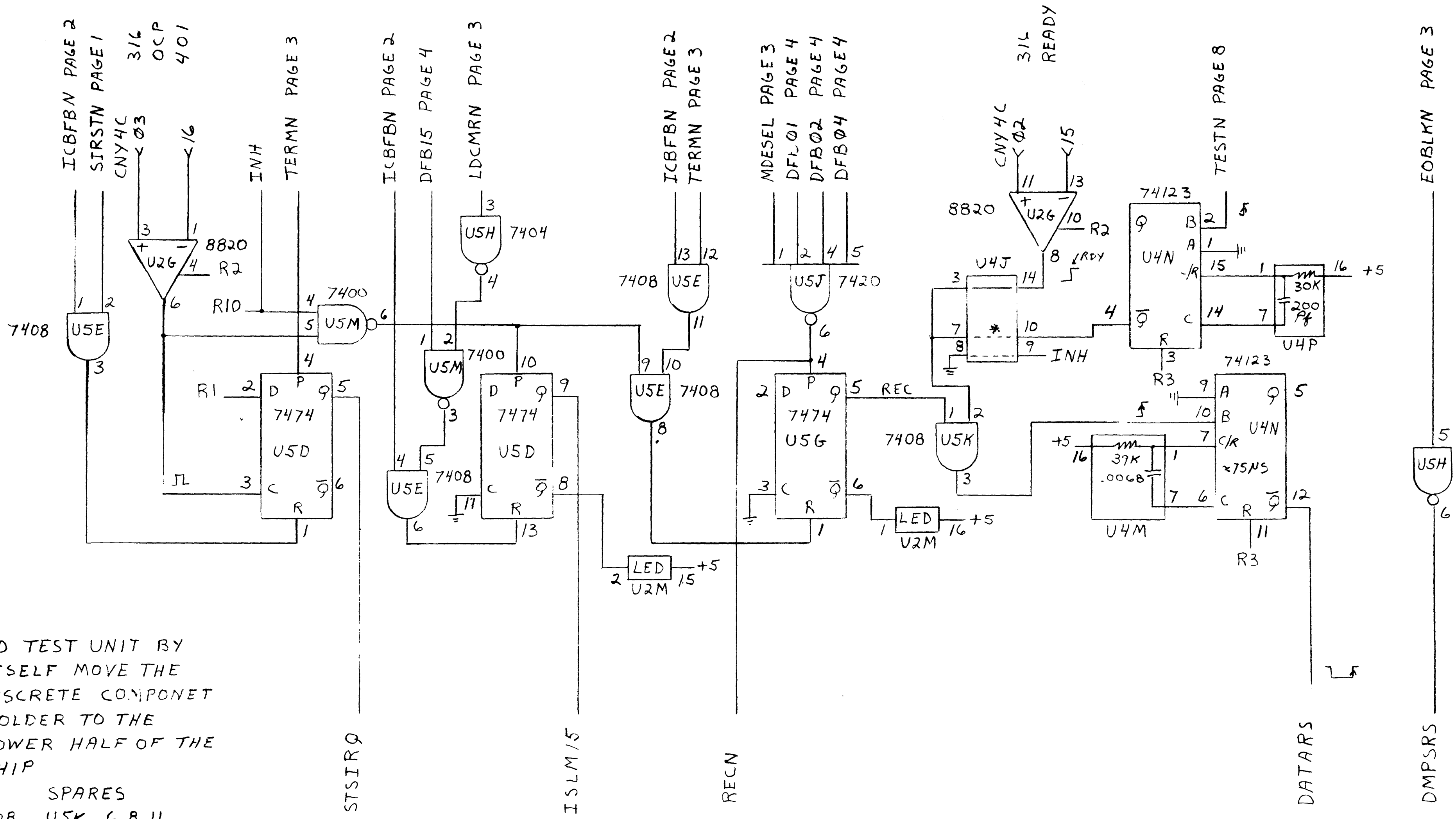
DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO 520-100260 | REV —

SHEET 6 OF 6 | LTR

CODE IDENT NO

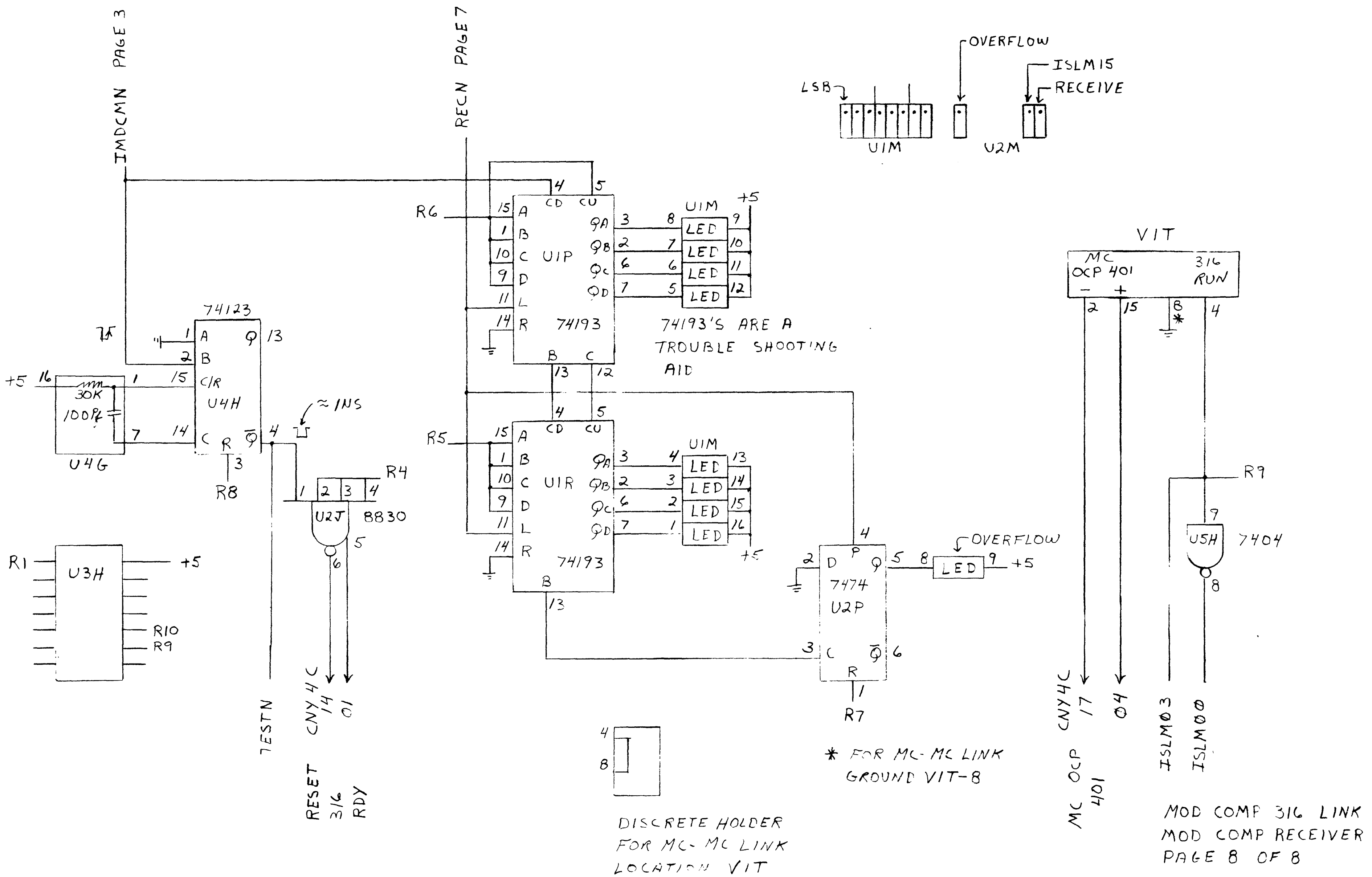



* TO TEST UNIT BY ITSELF MOVE THE DISCRETE COMPONET HOLDER TO THE LOWER HALF OF THE CHIP

SPARES

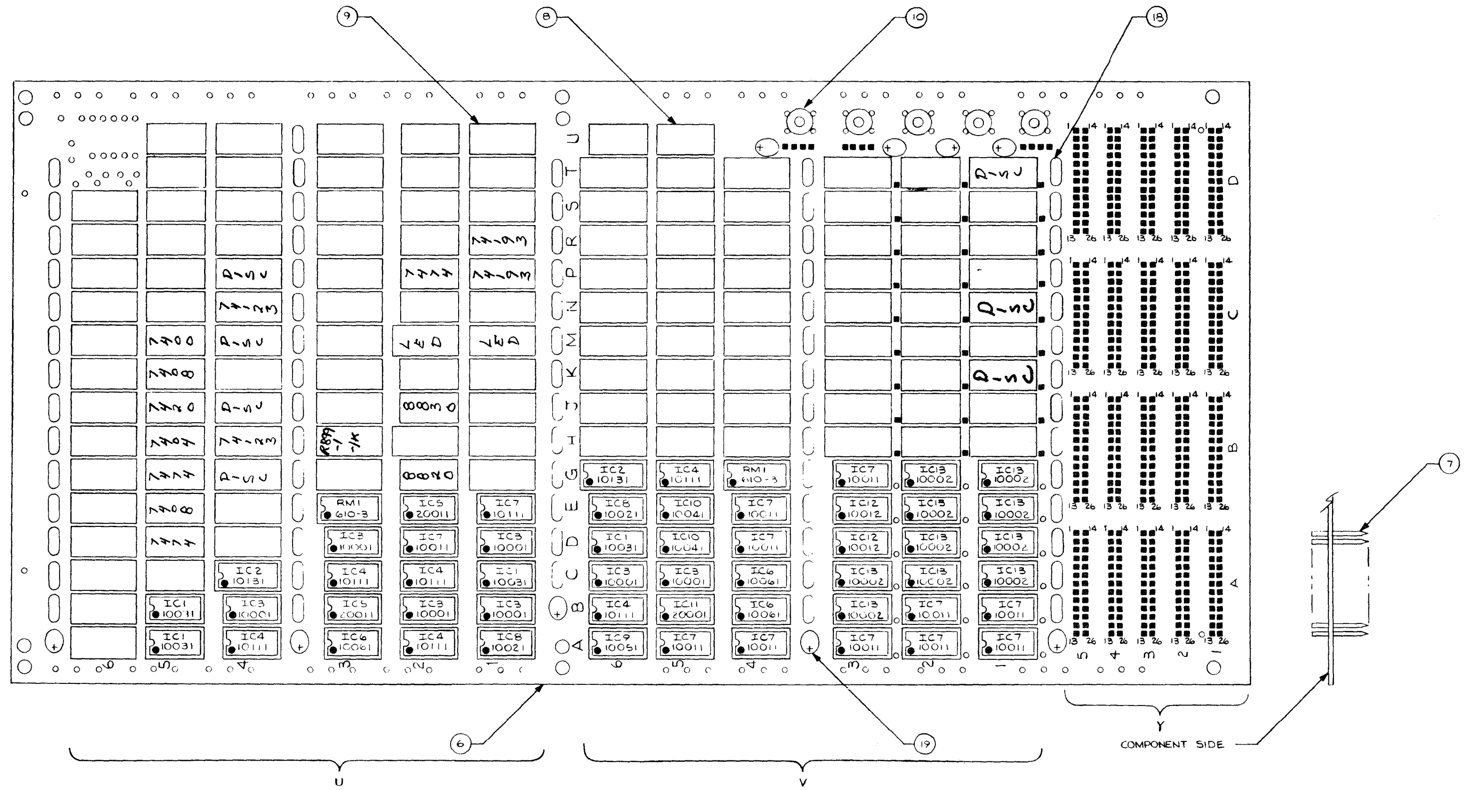
| | | |
|---|---|---|
| 7408 | U5K | 6, 8, 11 |
| 7404 | U5H | 10, 12, 2 |
| 7400 | U5M | 8, 11 |
| 7474 | U5G | 9 |
| 7420 | U5J | 8 |
| 74123 | U4H | 5 |
| 8830 | U2J | 9 |
| 7474 | U2P | 9 |

MOD COMP 316 LINK
MOD COMP RECEIVER
PAGE 7 OF 8




MOD COMP 316 LINK
MOD COMP RECEIVER
PAGE 8 OF 8

| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| – | RELEASED, BINDER | | |




–001 SHOWN

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TOLERANCE EXCEPT AS NOTED
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3 PLACE DEC. ± .005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED

modular computer systems

LM 517-100176

| | | DATE |
|---|---|---|
| DWN | [signature] | 8-9-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | [signature] | 10-23-73 |
| APVD | [signature] | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO. 516-100176 | REV –
SHEET 1 OF 1 | LTR
CODE IDENT NO.

516-100176

MCS Form 15A

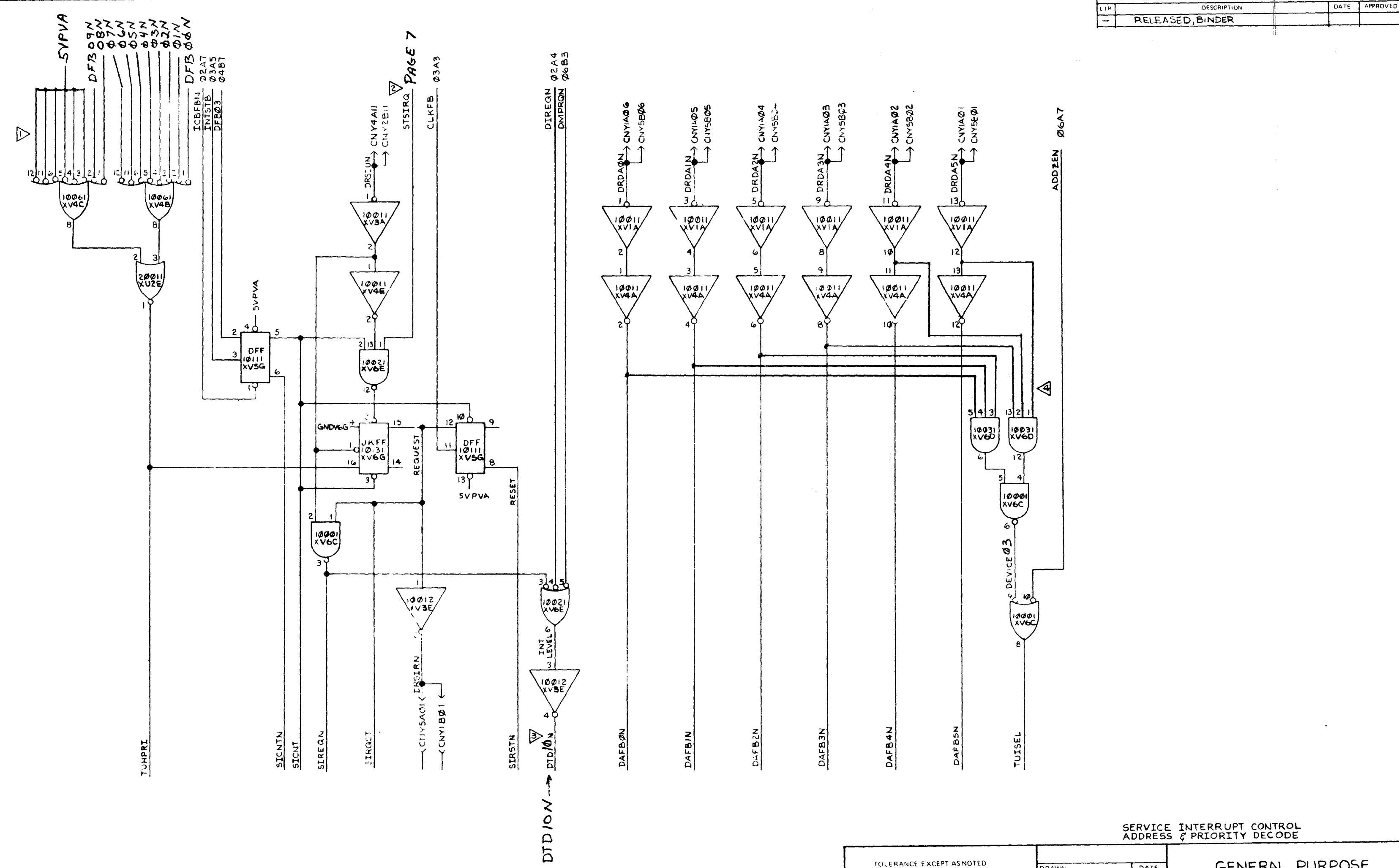
MODCOMP TO MODCOMP LINK

MODCOMP Transmit (Located in on-line comp.)

Address 3

Priority 10

DMP Ch. 3




NOTES:

4. CONNECT FOR PROPER DEVICE ADDRESS
3. CONNECT TO DATA BUS PRIORITY LEVEL
2. STSIRQ TO BE SUPPLIED BY CUSTOM LOGIC
1. CONNECT UNUSED INPUTS TO SVPVA
CONNECT INPUTS TO ALL HIGHER PRIORITY DATA BUS BITS (DFBXXN)



REVISIONS

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| – | RELEASED, BINDER | | |

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE

GENERAL PURPOSE CONTROLLER NO 2

TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

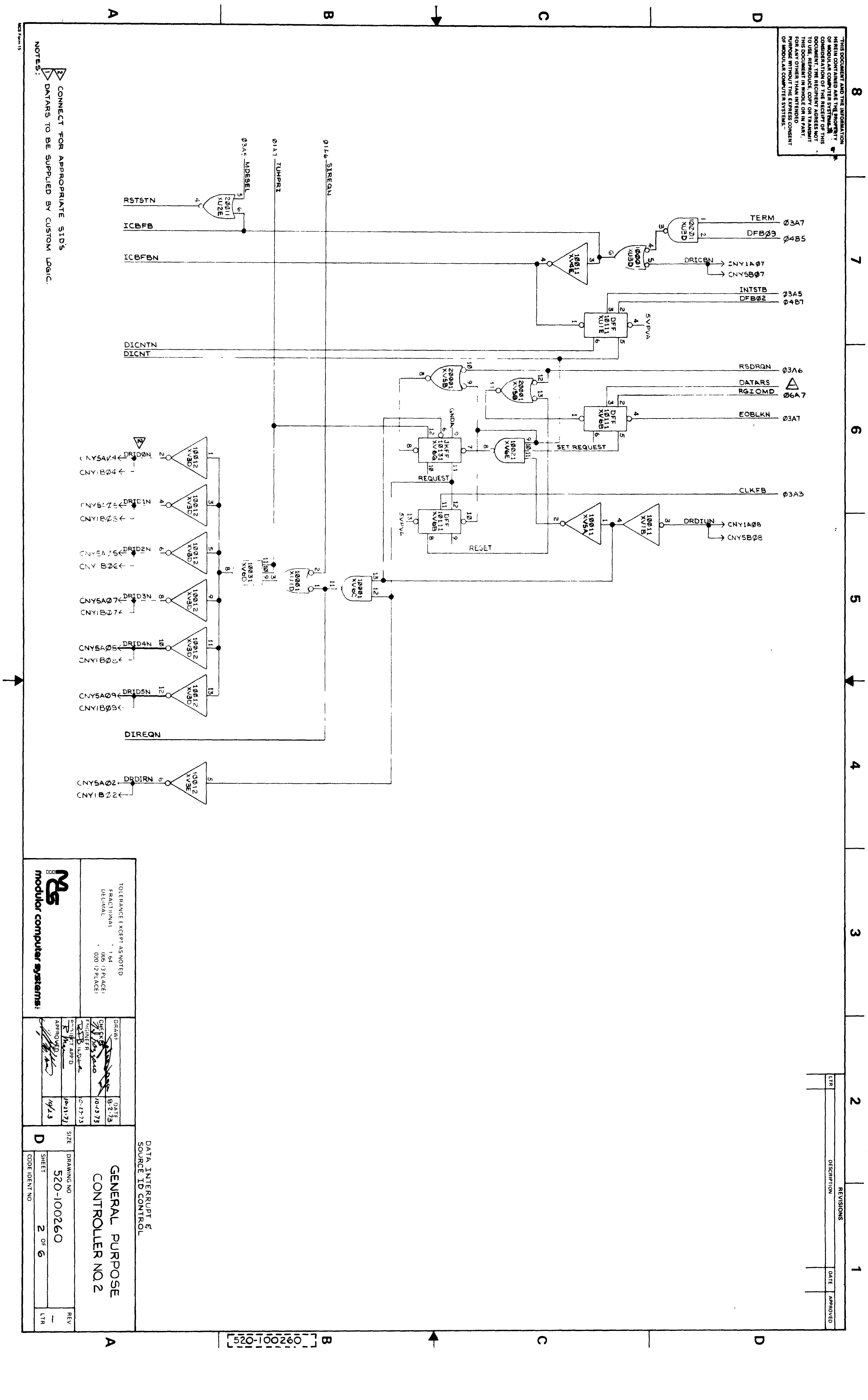
modular computer systems

| | | DATE |
|---|---|---|
| DRAWN | | 8-3-73 |
| CHECKED | | 10-13-73 |
| ENGINEER | R F Clark | 10-3-73 |
| PROJECT APP'D | | 10-23-73 |
| APPROVED | | 10/23 |

SIZE D | DRAWING NO 520-100260 | REV –
SHEET 1 OF 6 | LTR
CODE IDENT NO

520-100260

MCS Form 15



GENERAL PURPOSE CONTROLLER NO. 2
DATA INTERRUPT & SOURCE ID CONTROL
DRAWING NO 520-100260
SIZE D
SHEET 2 OF 6
REV —
modular computer systems
TOLERANCE EXCEPT AS NOTED
NOTES:
1 CONNECT FOR APPROPRIATE SID'S
2 DATARS TO BE SUPPLIED BY CUSTOM LOGIC.
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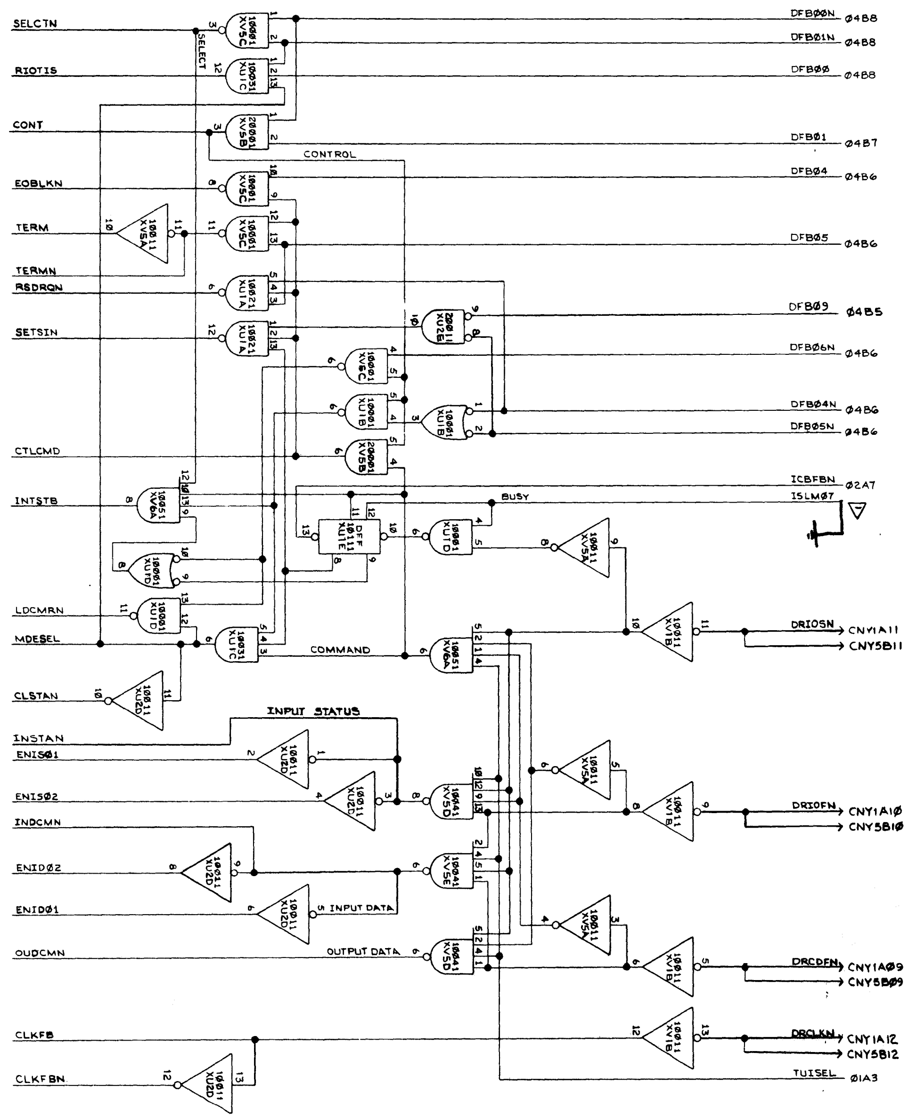
REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
RSTSTN
ICBFB
ICBFBN
DICNTN
DICNT
DIREQN
SIREQN
TUHPRI
MDESEL
TERM Ø3A7
DFBØ9 Ø4B5
DRICBN
CNY1AØ7
CNY5BØ7
INTSTB Ø3A5
DFBØ2 Ø4B7
SVPVA
RSDRQN Ø3A6
DATARS
RGIOMD Ø6A7
EOBLKN Ø3A7
SET REQUEST
REQUEST
RESET
CLKFB Ø3A3
DRDIUN
CNY1AØ8
CNY5BØ8
DRIDØN
DRID1N
DRID2N
DRID3N
DRID4N
DRID5N
DRDIRN
CNY5AØ2
CNY1BØ2
520-100260

NOTES:
1. ISLMØ7 TO BE SUPPLIED BY CUSTOM LOGIC






TOLERANCE EXCEPT AS NOTED
FRACTIONAL ± 1/64
DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE)

modular computer systems

| | | |
|---|---|---|
| DRAWN | | 8-2-73 |
| CHECKED | | 10-9-73 |
| ENGINEER | | 10-23-73 |
| PROJECT APPD | | 10-25-73 |
| APPROVED | | 11/1 |

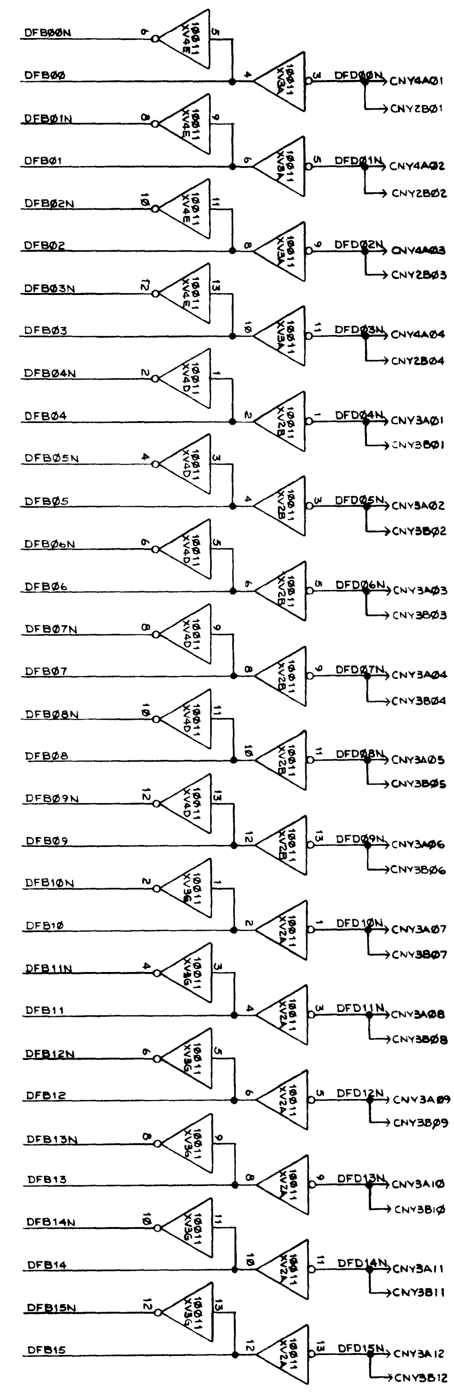
COMMAND DECODE LOGIC

# GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO 520-10026
REV —
SHEET 3 OF 6
CODE IDENT NO.

REVISIONS
LTR | DESCRIPTION | DATE | APPROVED

520-10026

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3 PLACE DEC. ± .005 | ANGLES ± 1/2°
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modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-2-73 |
| CHK | | 10-18-73 |
| ENGR | R.F.B. | 10-23-73 |
| PROJ | | 10-25-73 |
| APVD | | 10/31 |

OUTPUT DATA BUFFERS

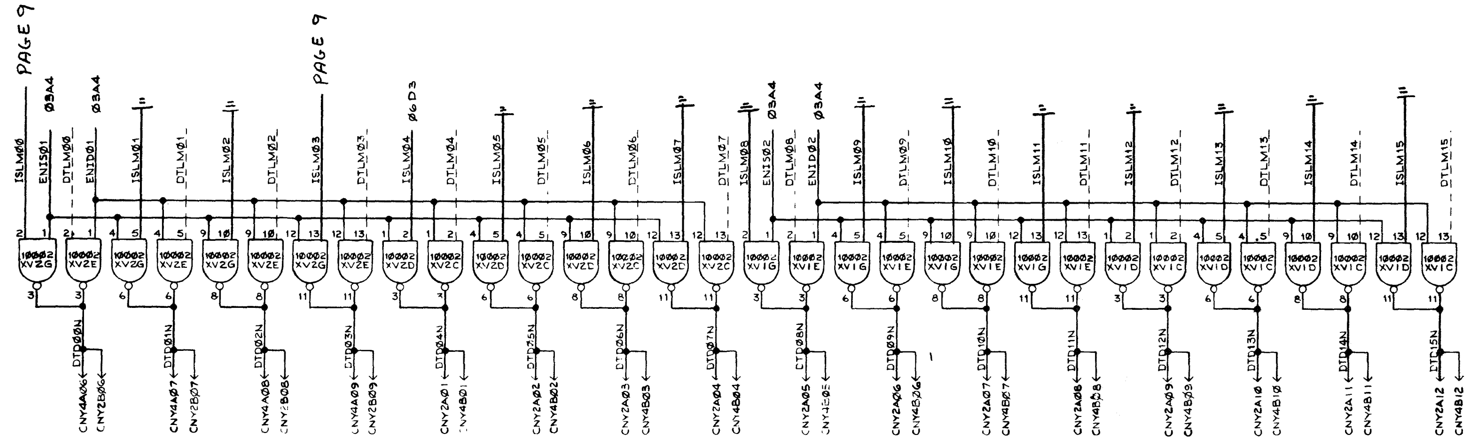
# GENERAL PURPOSE CONTROLLER NO.2

SIZE D | DRAWING NO 520-100260 | REV —

SHEET 4 OF 6 | CODE IDENT NO. | LTR

REVISIONS: LTR | DESCRIPTION | DATE | APPROVED

520-100260




| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

NOTE: 1. TIE UNUSED INPUTS TO GROUND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC. ± .02 | BEND RADIUS
3 PLACE DEC. ± .005 | ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | [signature] | 8-3-73 |
| CHK | [signature] | 10-13-73 |
| ENGR | R. Binder | 10-23-73 |
| PROJ | [signature] | 10-21-73 |
| APVD | [signature] | 10/23 |

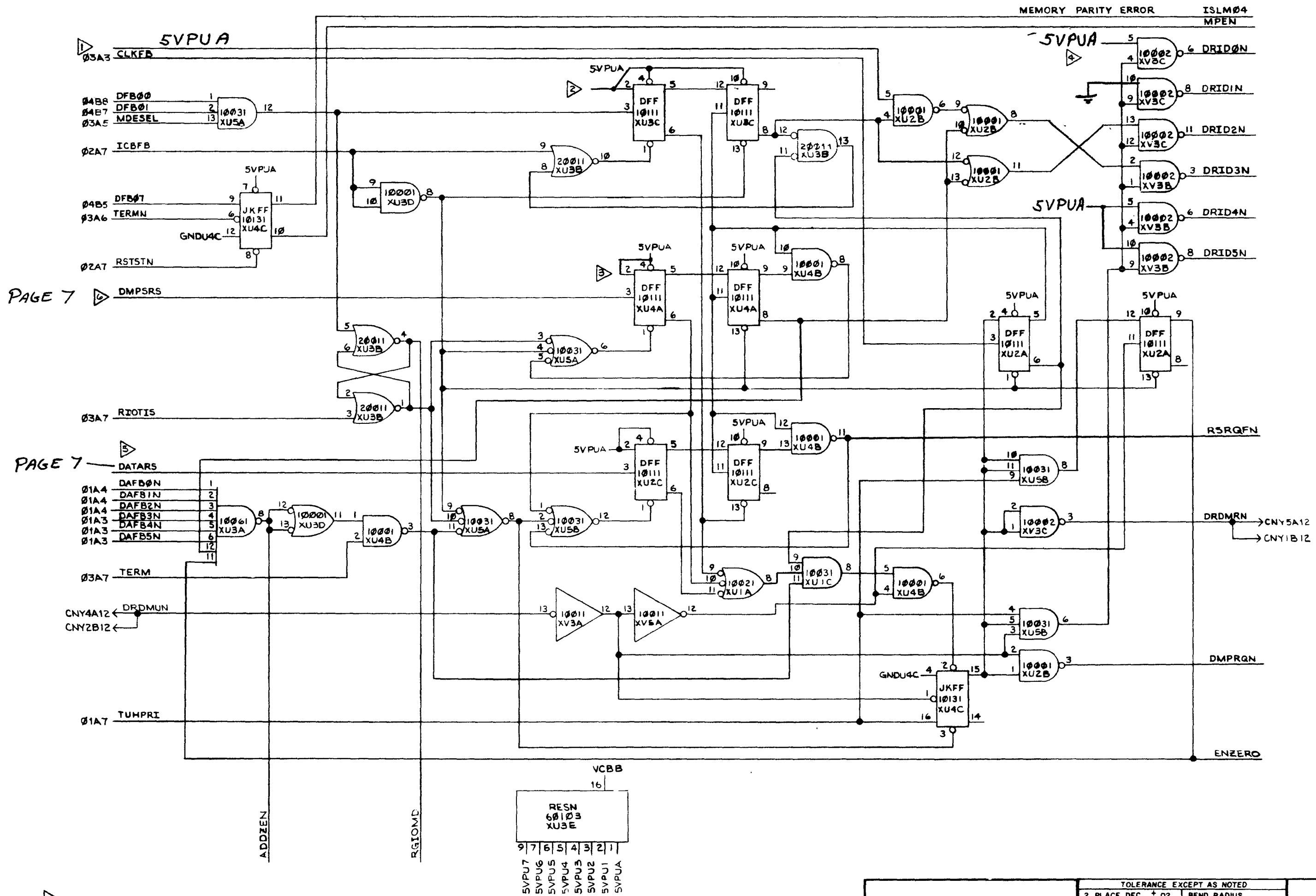
INPUT DATA BUFFERS

GENERAL PURPOSE CONTROLLER NO. 2

SIZE D | DRAWING NO. 520-100260 | REV –
SHEET 5 OF 6 | LTR
CODE IDENT NO.

MCS Form 15A

520-100260




NOTES:

6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
4. CONNECT TO PRODUCE APPROPRIATE SID'S
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL(REG FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM. FILE
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS
3 PLACE DEC. ± .005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC BEFORE FINISH IS APPLIED

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R F Binder | 10-13-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

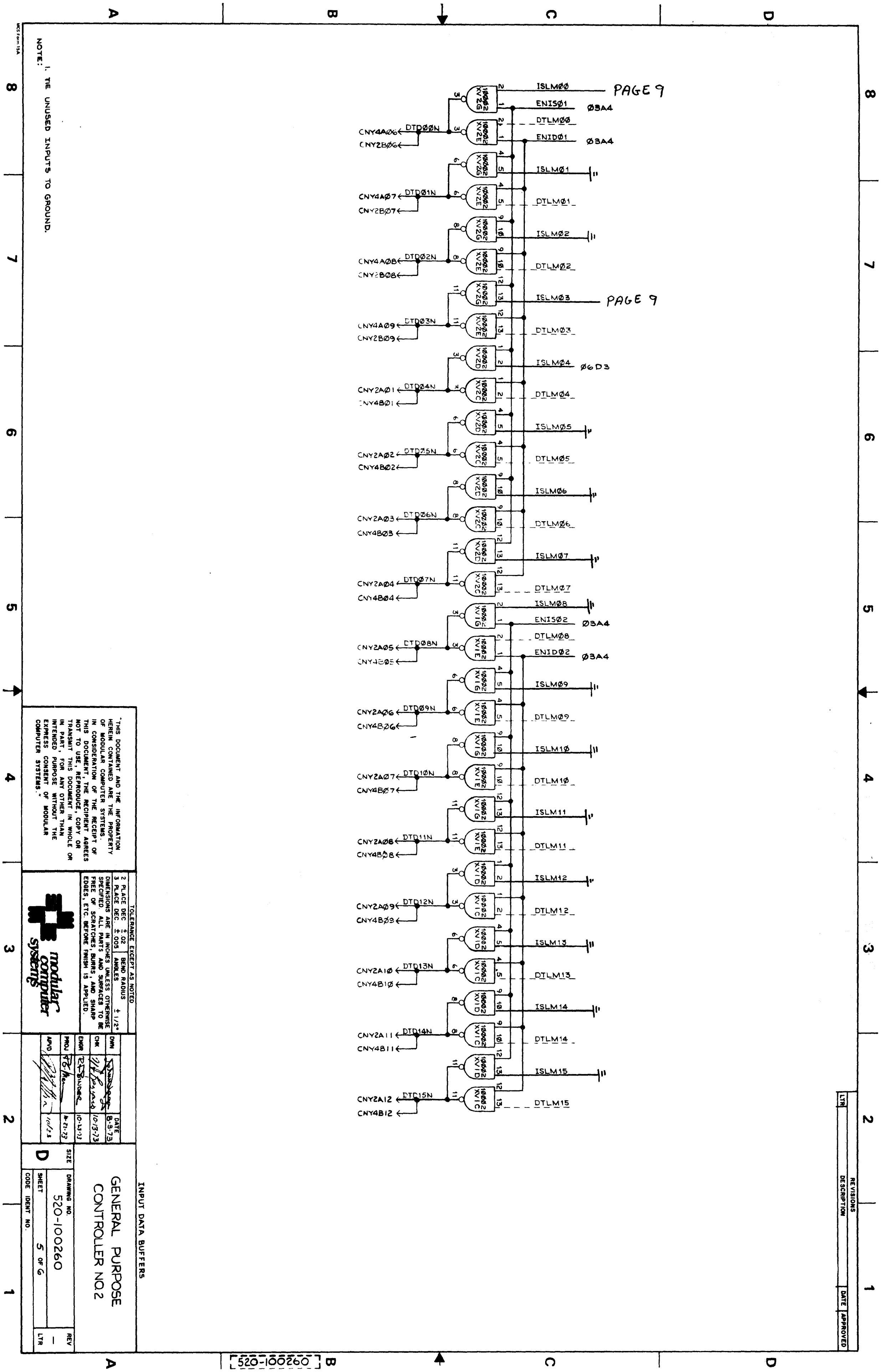
DMP CONTROL LOGIC

GENERAL PURPOSE CONTROLLER NO.2

SIZE D — DRAWING NO. 520-100260 — REV —
SHEET 6 OF 6
CODE IDENT NO.

520-100260

| LTR | REVISIONS DESCRIPTION | DATE | APPROVED |
|---|---|---|---|



NOTE: 1. TIE UNUSED INPUTS TO GROUND.
ISLM00 PAGE 9
ENIS01 03A4
DTLM00
ENID01 03A4
ISLM01
DTLM01
ISLM02
DTLM02
ISLM03 PAGE 9
DTLM03
ISLM04 06D3
DTLM04
ISLM05
DTLM05
ISLM06
DTLM06
ISLM07
DTLM07
ISLM08
ENIS02 03A4
DTLM08
ENID02 03A4
ISLM09
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ISLM12
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ISLM14
DTLM14
ISLM15
DTLM15
CNY4A06 CNY2B06 DTD00N
CNY4A07 CNY2B07 DTD01N
CNY4A08 CNY2B08 DTD02N
CNY4A09 CNY2B09 DTD03N
CNY2A01 CNY4B01 DTD04N
CNY2A02 CNY4B02 DTD05N
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CNY2A09 CNY4B09 DTD12N
CNY2A10 CNY4B10 DTD13N
CNY2A11 CNY4B11 DTD14N
CNY2A12 CNY4B12 DTD15N
10002 XV2G
10002 XV2E
10002 XV2D
10002 XV2C
10002 XV1G
10002 XV1E
10002 XV1D
10002 XV1C
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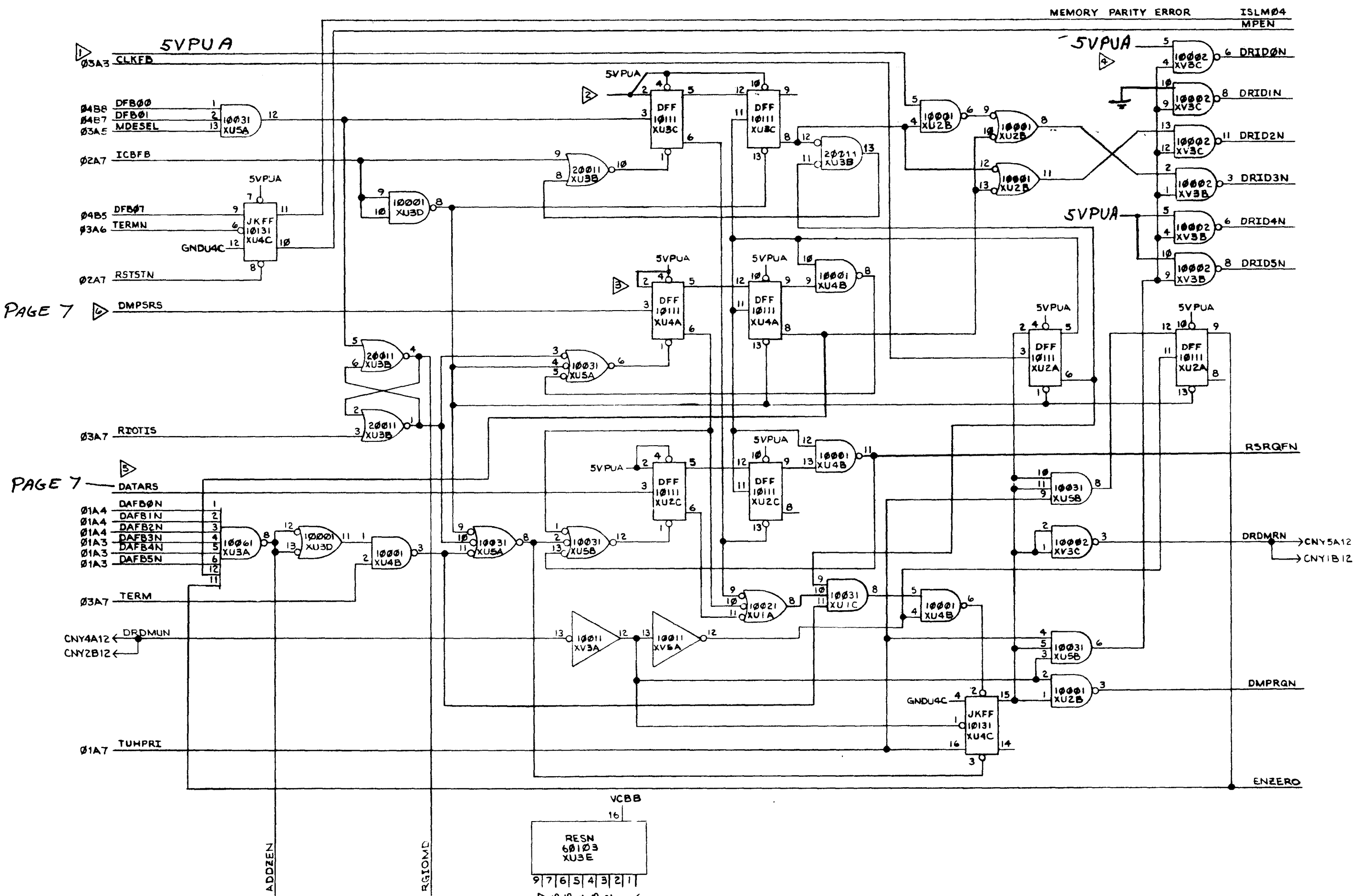
TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS ± 1/2°
3 PLACE DEC ± .005 ANGLES
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.
modular computer systems
DWN 8-8-73
CHK 10/3-73
ENGR 10-23-73
PROJ 8-21-73
APVD 10/23
INPUT DATA BUFFERS
GENERAL PURPOSE CONTROLLER NO. 2
SIZE D
DRAWING NO. 520-100260
REV —
SHEET 5 OF 6
CODE IDENT NO.
REVISIONS
LTR DESCRIPTION DATE APPROVED
520-100260




NOTES:

1. CONNECT TO A SIGNAL WHICH IS HIGH FOR OUTPUT AND LOW FOR INPUT
2. CONNECT TO 5VPUA FOR REG. FILE, GND FOR MEM. FILE
3. CONNECT TO SICNT FOR DEVICES WHICH WILL USE DMP FILL (REG FILE), CONNECT TO 5VPUA FOR OTHER REG FILE DEVICES, GND FOR MEM FILE
4. CONNECT TO PRODUCE APPROPRIATE SID'S
5. DATARSTO BE SUPPLIED BY CUSTOM LOGIC
6. DMPSRS TO BE SUPPLIED BY CUSTOM LOGIC



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS
3 PLACE DEC. ± .005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

| | | DATE |
|---|---|---|
| DWN | | 8-3-73 |
| CHK | | 10-13-73 |
| ENGR | R. Binder | 10-13-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

DMP CONTROL LOGIC

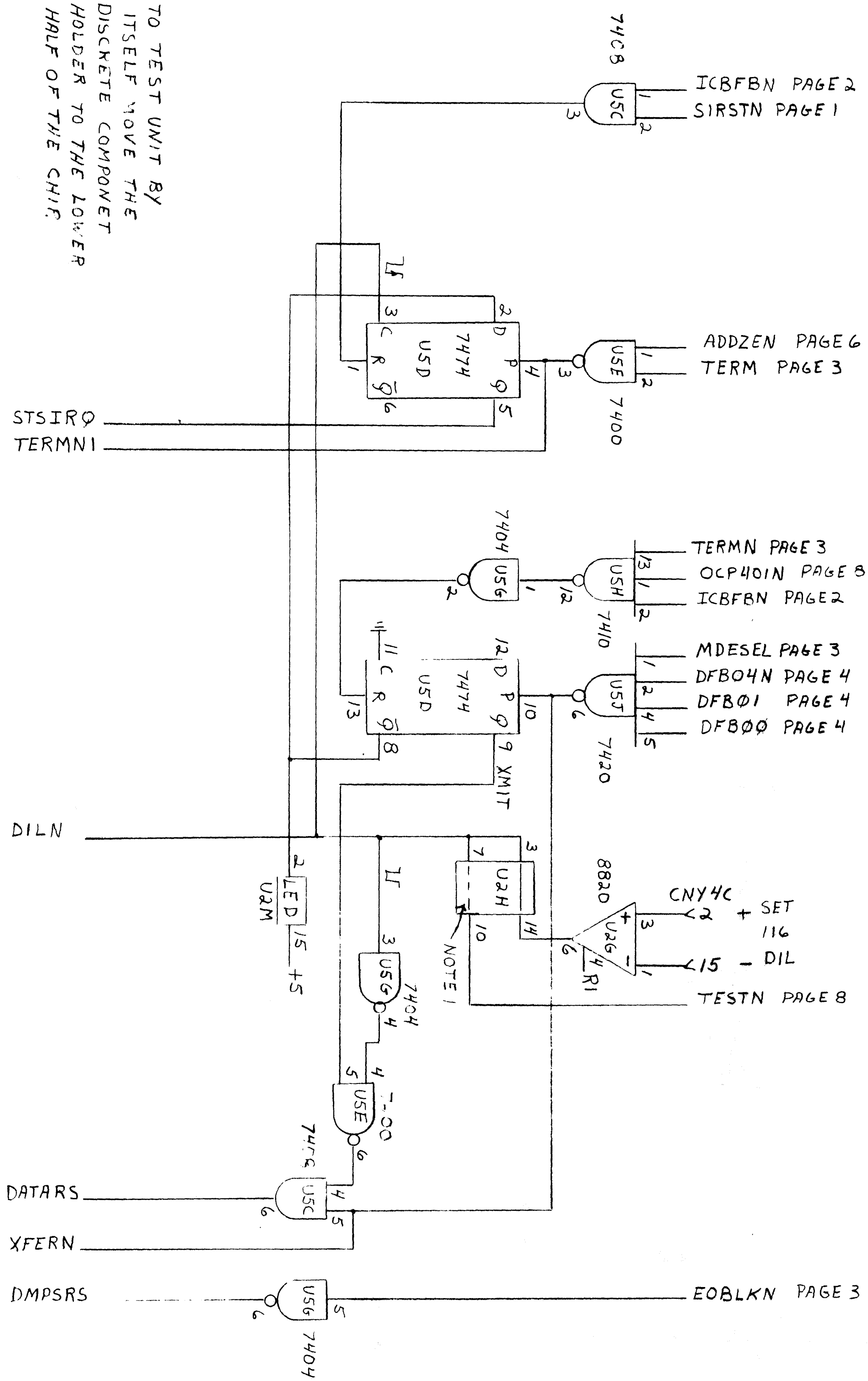
GENERAL PURPOSE CONTROLLER NO.2

SIZE D
DRAWING NO. 520-100260
REV —
SHEET 6 OF 6
CODE IDENT NO.

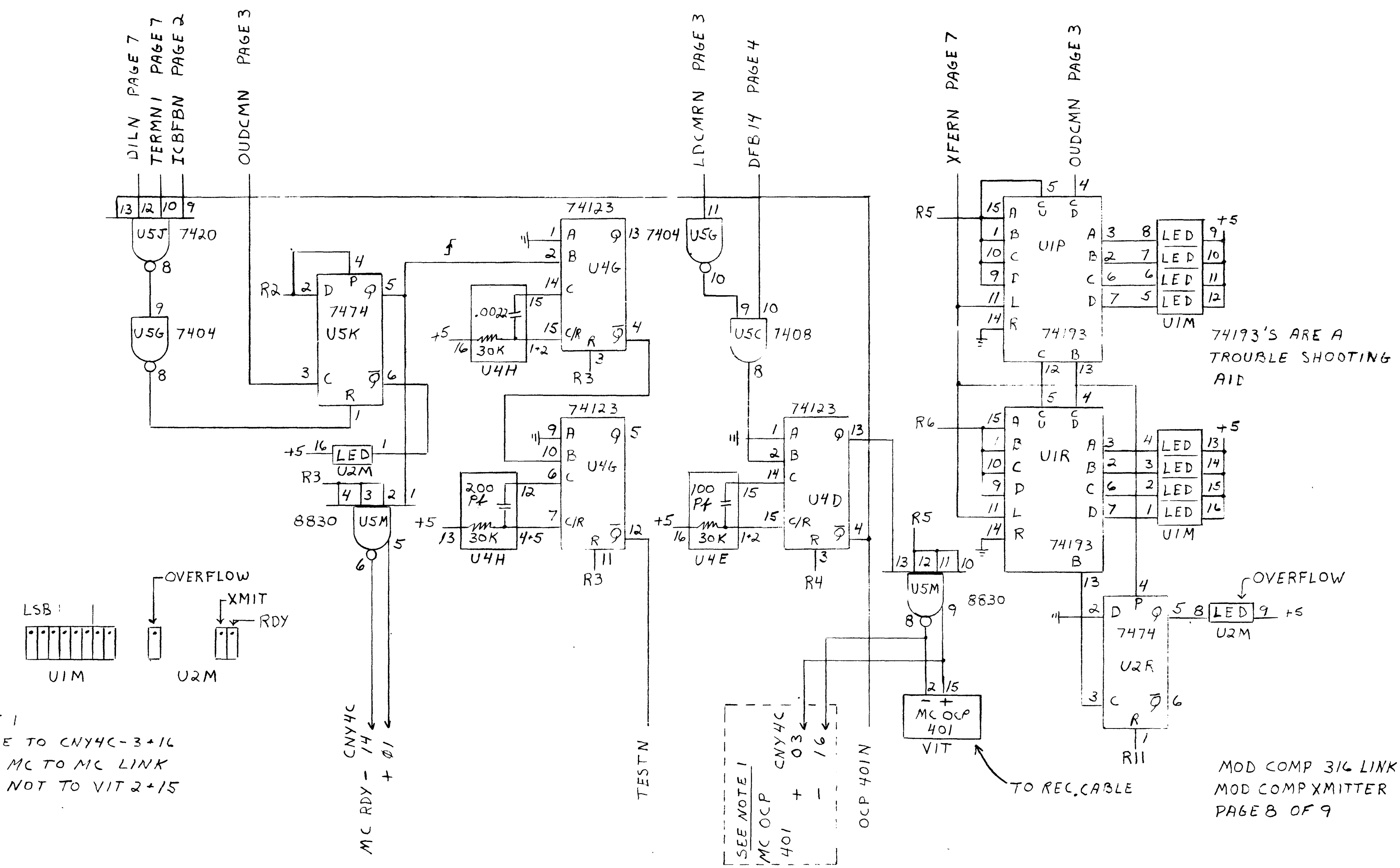
REVISIONS
| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|

520-100260
MCS Form 16A

NOTE 1 TO TEST UNIT BY ITSELF MOVE THE DISCKETE COMPONET HOLDER TO THE LOWER HALF OF THE CHIP.



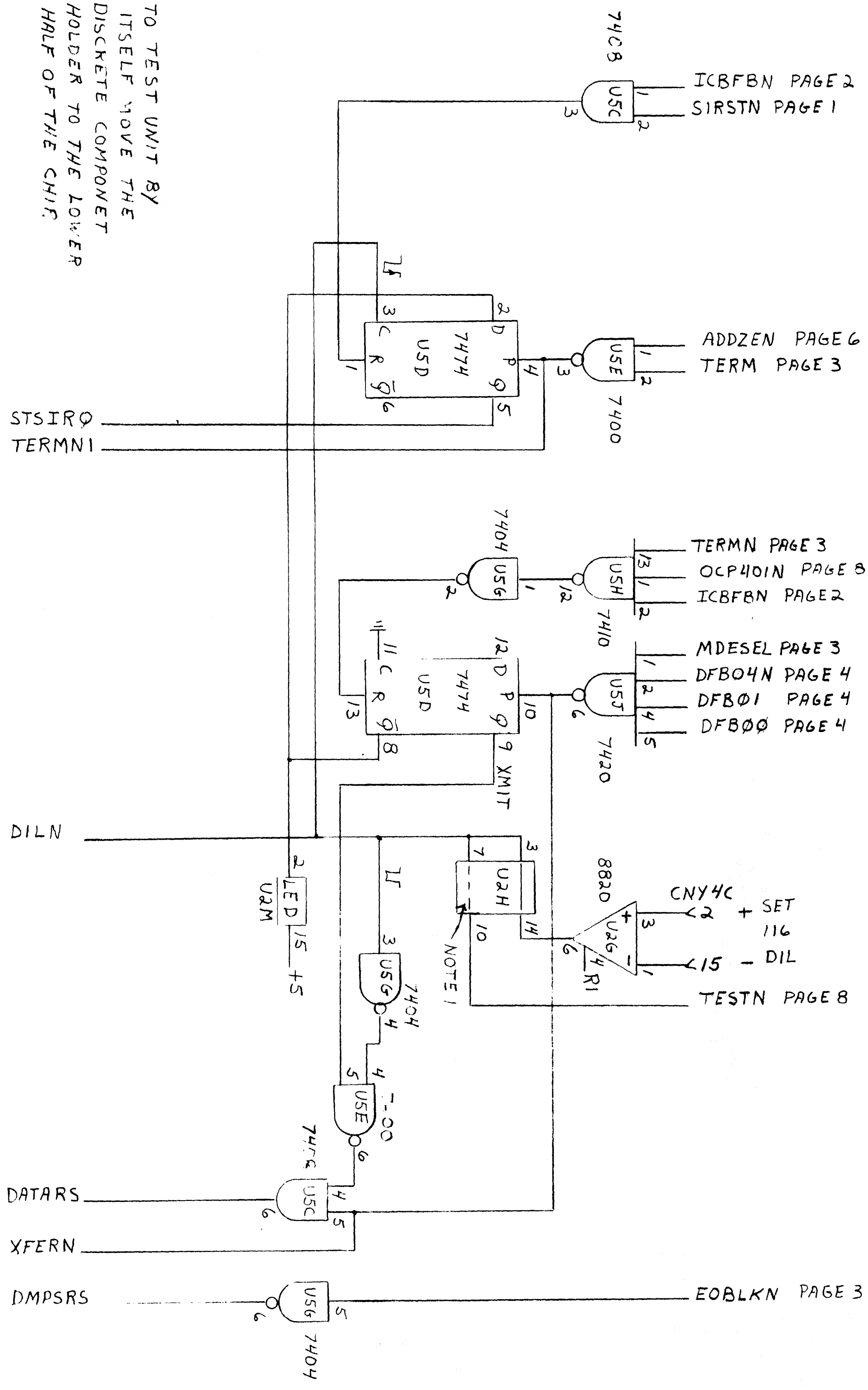

MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 7 OF 9



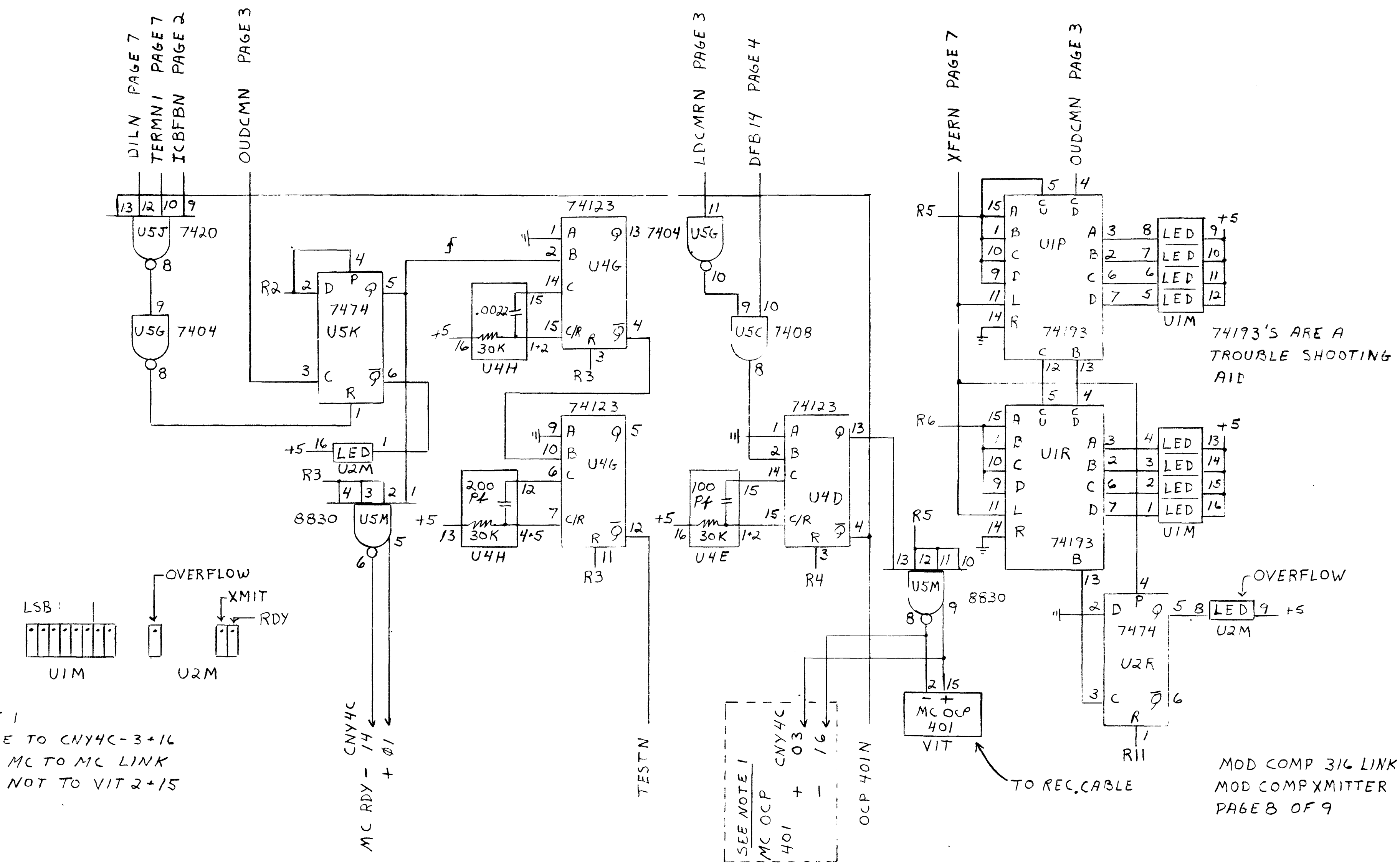

NOTE 1
WIRE TO CNY4C-3+16
FOR MC TO MC LINK
AND NOT TO VIT 2+15

MOD COMP 316 LINK
MOD COMP XMITTER

NOTE 1 TO TEST UNIT BY ITSELF MOVE THE DISCKETE COMPONET HOLDER TO THE LOWER HALF OF THE CHIP.

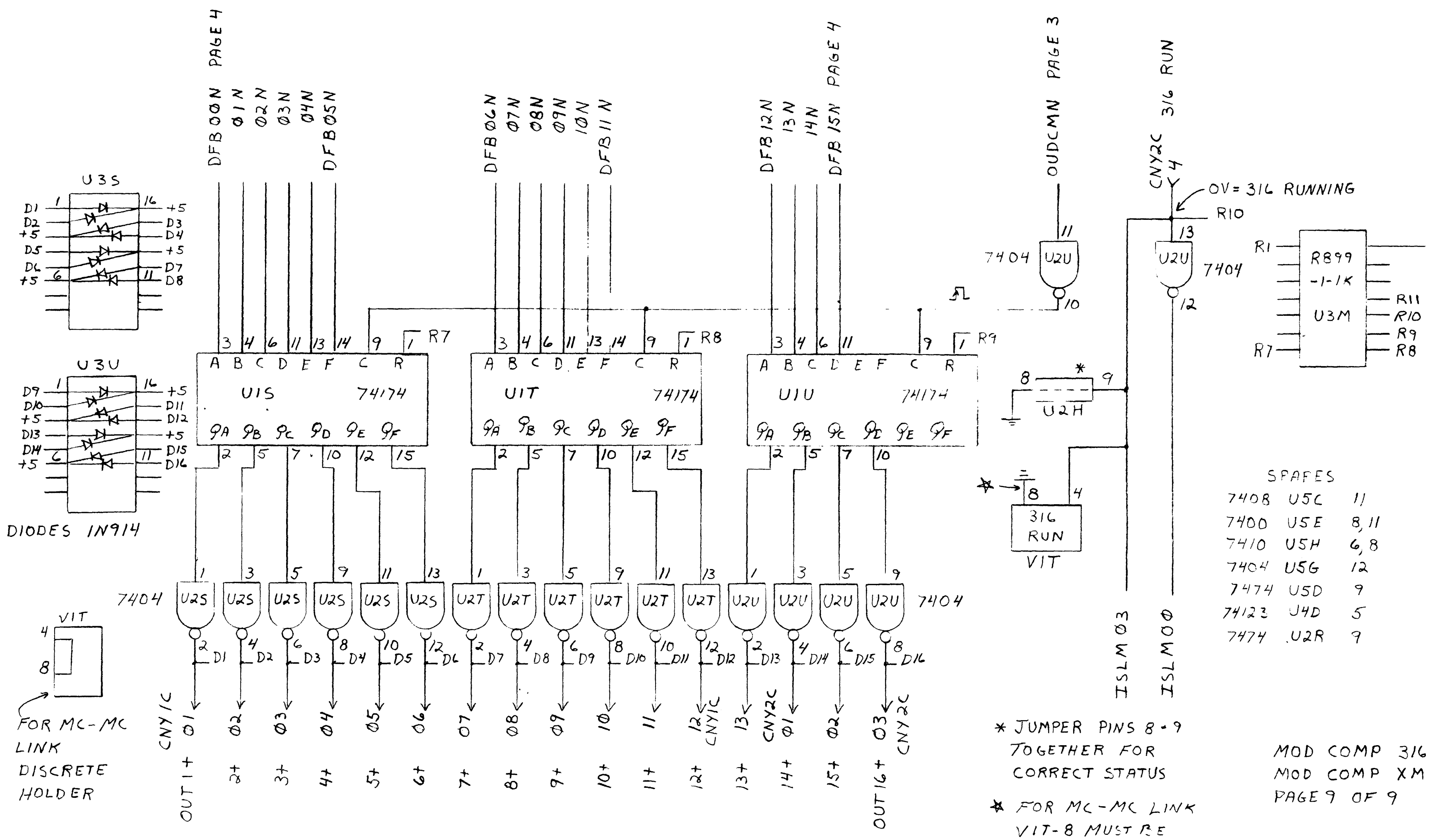



MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 7 OF 9




NOTE 1
WIRE TO CNY4C-3+16
FOR MC TO MC LINK
AND NOT TO VIT 2+15

MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 8 OF 9




* JUMPER PINS 8 • 9
TOGETHER FOR
CORRECT STATUS

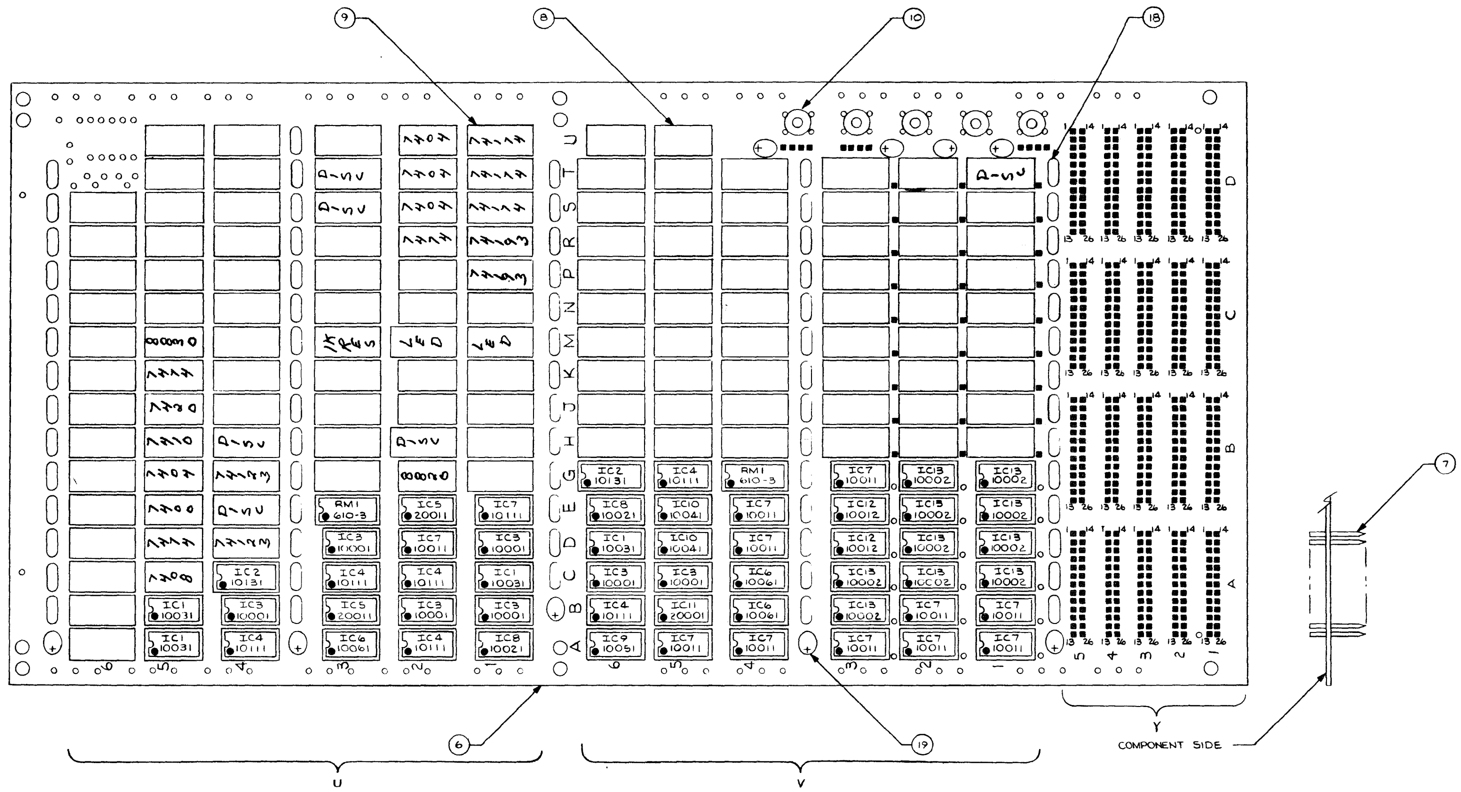
☆ FOR MC-MC LINK
VIT-8 MUST BE
GROUNDED

SPARES

| | | |
|---|---|---|
| 7408 | U5C | 11 |
| 7400 | U5E | 8,11 |
| 7410 | U5H | 6,8 |
| 7404 | U5G | 12 |
| 7474 | U5D | 9 |
| 74123 | U4D | 5 |
| 7474 | U2R | 9 |

MOD COMP 316 LINK
MOD COMP XMITTER
PAGE 9 OF 9

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| – | RELEASED, BINDER | | |




-001 SHOWN



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ±.02 BEND RADIUS
3 PLACE DEC. ±.005 ANGLES ±1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC. BEFORE FINISH IS APPLIED.

modular computer systems

LM 517-100176

| | | DATE |
|---|---|---|
| DWN | | 8-9-73 |
| CHK | | 10-13-73 |
| ENGR | R. BINDER | 10-23-73 |
| PROJ | | 10-23-73 |
| APVD | | 10/23 |

GENERAL PURPOSE CONTROLLER NO.2

| SIZE | DRAWING NO. | REV |
|---|---|---|
| D | 516-100176 | – |
| | SHEET 1 OF 1 | LTR |
| | CODE IDENT NO. | |

[516-100176]

MCS Form 15A

# AUTOCORRELATOR

ADDRESS 12
PRIORITY 5
DMP CH. 5

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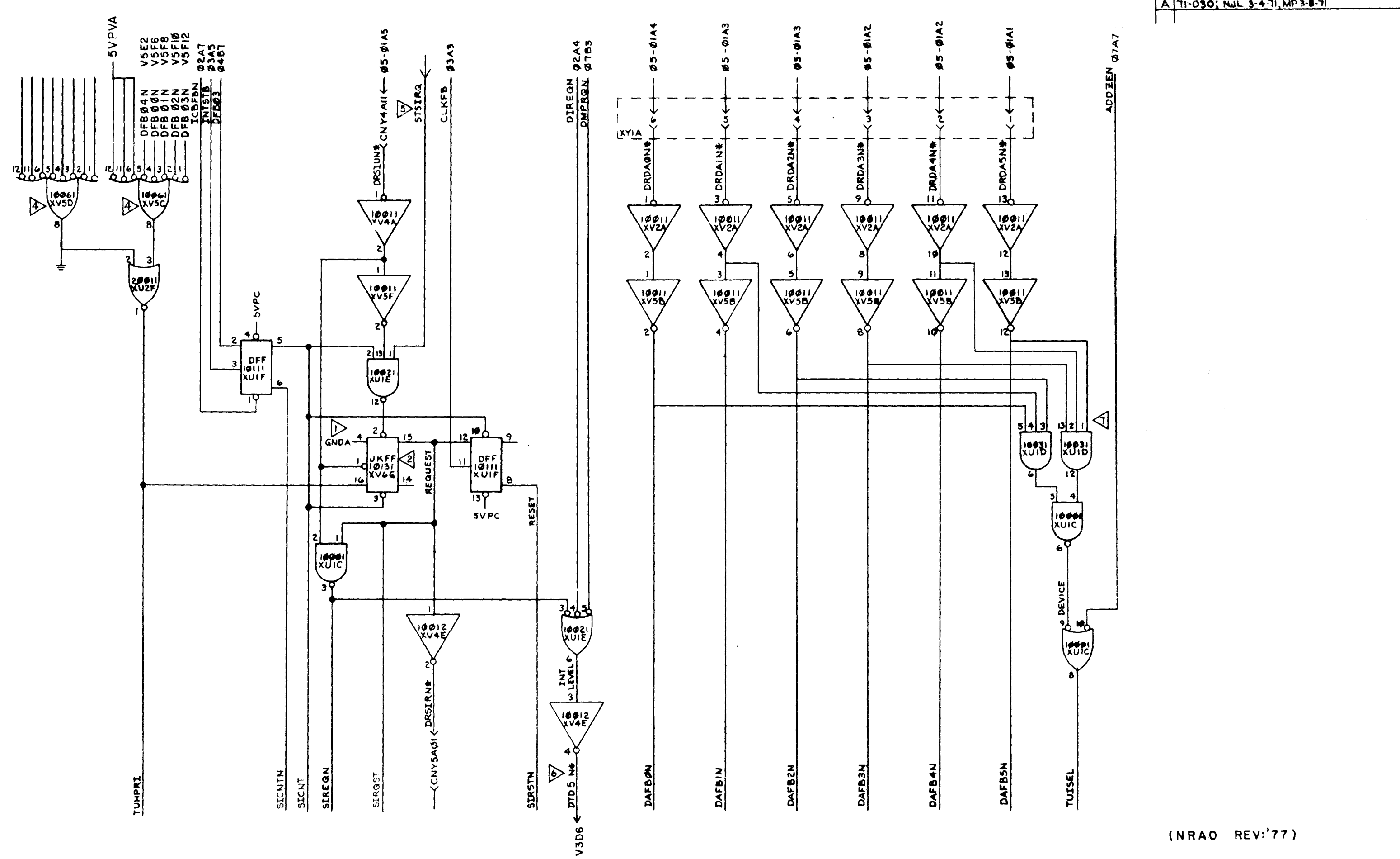
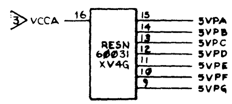
| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |
| A | 71-030; NJL 3-4-71, MP 3-8-71 | 3/11/71 | |




(NRAO REV:'77)

SERVICE INTERRUPT CONTROL
ADDRESS & PRIORITY DECODE




5 STSIRQ SIGNAL TO BE SUPPLIED BY USER

4 CONNECT INPUTS TO ANY DATA BUSS BITS DRIVEN BY HIGHER PRIORITY CONTROLLERS, ALL UNUSED INPUTS CONNECT TO 5VPA, B OR C.

3 VCCA IS CONNECTED FROM XV4F14 TO XV4G16

2 VCCB IS CONNECTED FROM XV6G... TO XV6F14

1 GNDA IS CONNECTED FROM XV6F...

NOTES:

7 CONNECT FOR PROPER DEVICE ADDRESS

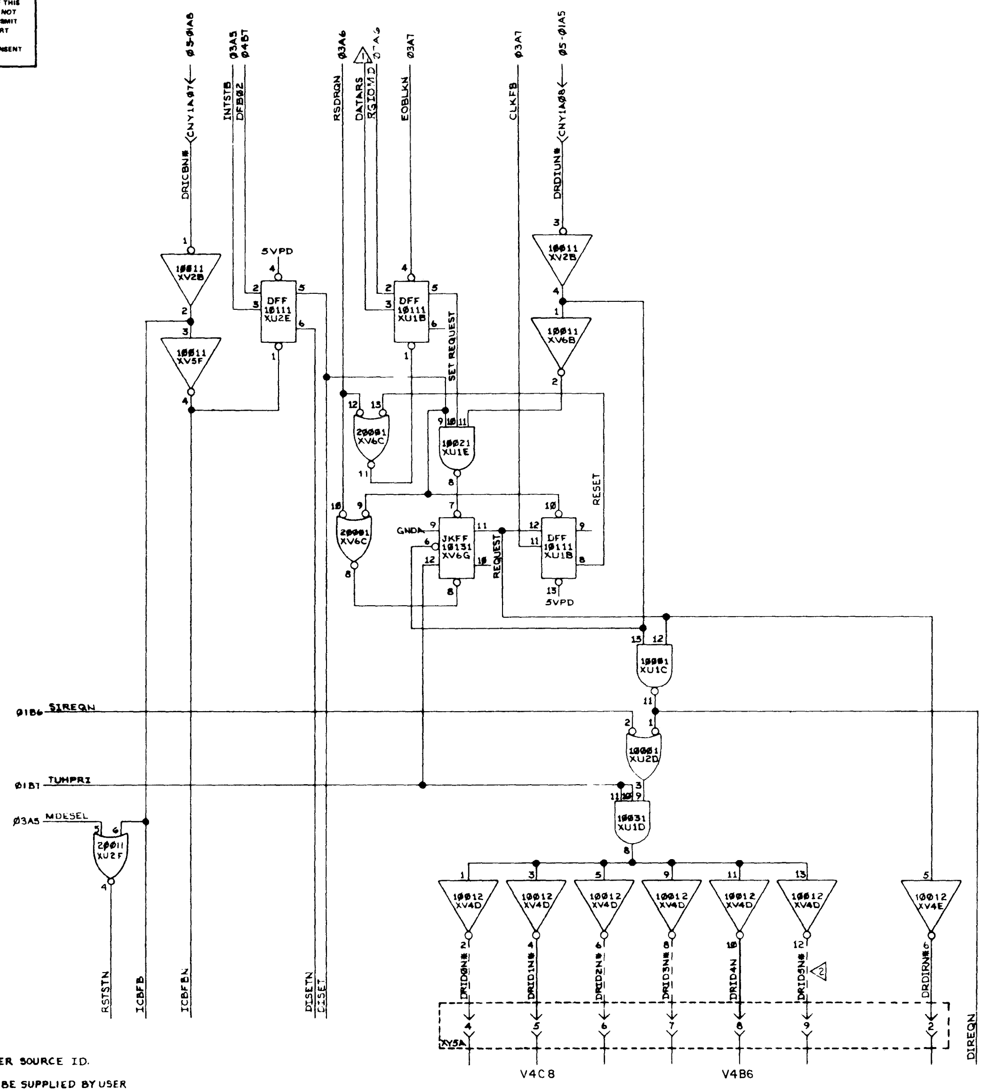
6 CONNECT FOR PROPER INTERRUPT LEVEL

| TOLERANCE EXCEPT AS NOTED | | DATE | GENERAL PURPOSE CONTROL |
|---|---|---|---|
| FRACTIONAL ± 1/64 | DRAWN | 9-30-70 | |
| DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE) | CHECKED A. Jablonski | 12-21-70 | |
| | ENGINEER D.K. Peterson | 12-18-70 | SIZE D, DRAWING NO 520-100106, REV A |
| | PROJECT APP'D | 12-18-70 | SHEET 1 OF 6 |
| modular computer systems | APPROVED | 1/2/71 | CODE IDENT NO |

520-100106

MCS Form 15

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| | | | |




(NRAO REV:'77)

NOTES:

1. DATARS SIGNAL TO BE SUPPLIED BY USER

2. CONNECT FOR PROPER SOURCE ID.

DATA INTERRUPT & SOURCE ID CONTROL

| | | |
|---|---|---|
| TOLERANCE EXCEPT AS NOTED | FRACTIONAL | ± 1/64 |
| | DECIMAL | ± .005 (3 PLACE) |
| | | ± .020 (2 PLACE) |

| | NAME | DATE |
|---|---|---|
| DRAWN | JWSHIPWAY | 9-30-70 |
| CHECKED | B. Walkowski | 12-21-70 |
| ENGINEER | S.R. Harrison | 12-18-70 |
| PROJECT APP'D | K.C. [illegible] | 12-14-70 |
| APPROVED | [signature] | 12/21 |

modular computer systems

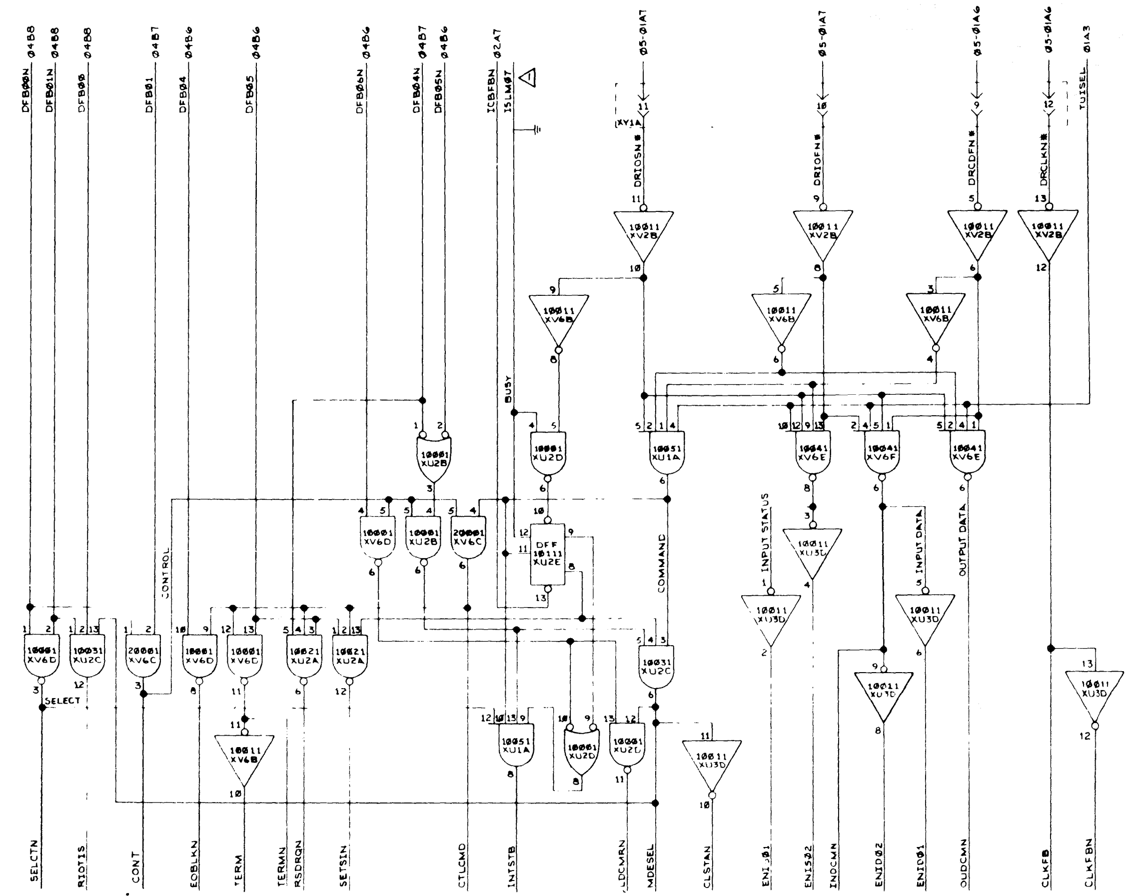
# GENERAL PURPOSE CONTROL

| SIZE | DRAWING NO | REV |
|---|---|---|
| D | 520-100106 | A |
| | SHEET 2 OF 6 | |
| | CODE IDENT NO | |

MCS Form 15

520-100106

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |




(NRAO REV:'77)

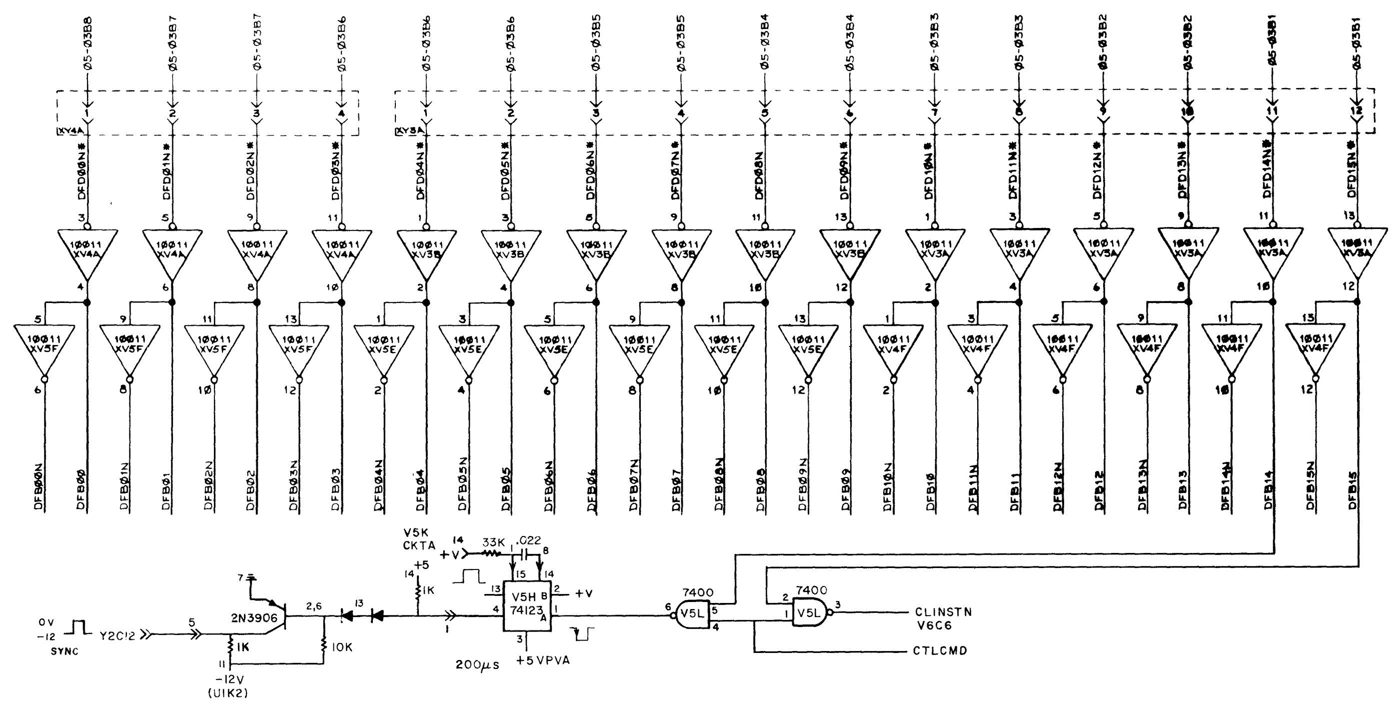
NOTES;

1. ISLM0T TO BE SUPPLIED BY USER

COMMAND DECODE LOGIC

| | | |
|---|---|---|
| TOLERANCE EXCEPT AS NOTED FRACTIONAL ± 1/64 DECIMAL ± .005 (3 PLACE) ± .020 (2 PLACE) | DRAWN JWSHIPWAY 10-1-70 | GENERAL PURPOSE CONTROL |
| | CHECKED R. Jankowski 12-21-70 | |
| | ENGINEER D. F. Harrison 12-18-70 | |
| modular computer systems | PROJECT APPD R.C. ... 12-18-70 | SIZE D · DRAWING NO 520-100106 · REV A |
| | APPROVED ... 12/21 | SHEET 3 OF 6 · CODE IDENT NO |

520-100106




(NRAO REV: 1977)

OUTPUT DATA BUFFERS

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TOLERANCE EXCEPT AS NOTED
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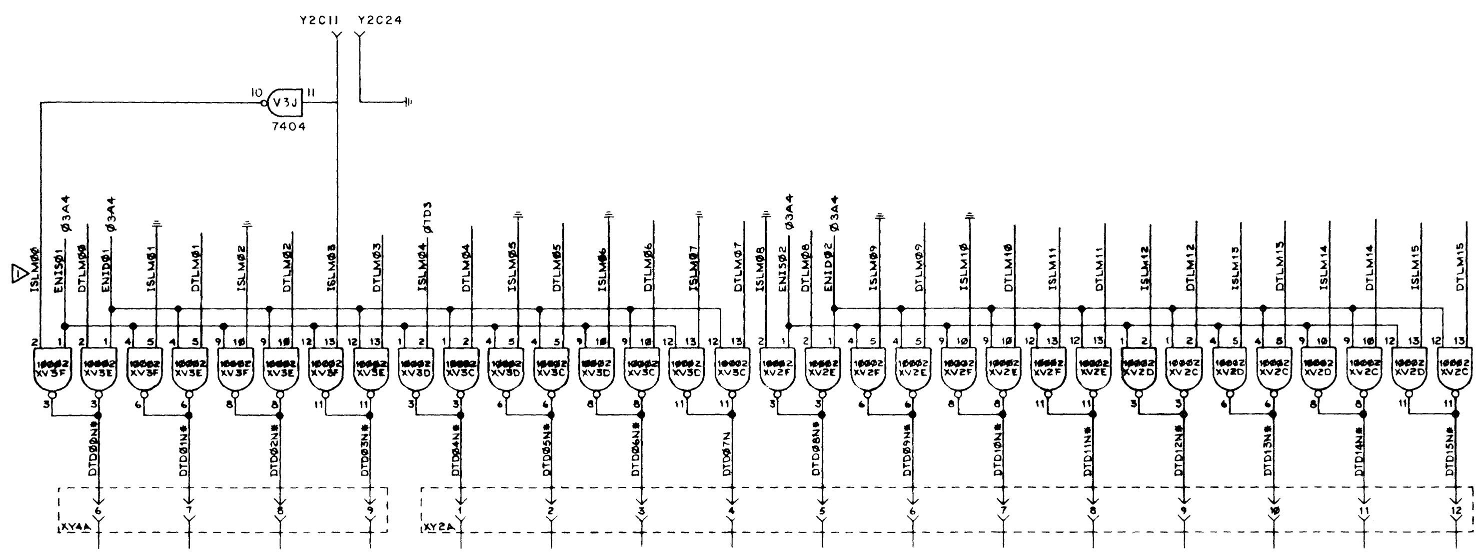
modular computer systems

| | | DATE |
|---|---|---|
| DWN | JWSHIPWAY | 10-3-70 |
| CHK | R. Jablonski | 12-21-70 |
| ENGR | S.R. Hansen | 12-18-70 |
| PROJ | E.G. Hansen | 12-18-70 |
| APVD | [signature] | 12/21 |

GENERAL PURPOSE CONTROL

SIZE D | DRAWING NO 520-100106 | REV A
SHEET 4 OF 6
CODE IDENT NO

520-100106




(NRAC REV: 1977)

NOTES;
1. ALL INPUTS TO BE SUPPLIED BY USER, ALL UNUSED INPUTS TO BE CONNECTED TO GND.



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS
3 PLACE DEC ± .005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC BEFORE FINISH IS APPLIED

modular computer systems

| | | DATE |
|---|---|---|
| DWN | JWSHIPWAY | 10-5-70 |
| CHK | B. Jaskowski | 12-21-70 |
| ENGR | S.R. Harrison | 12-18-70 |
| PROJ | R.C. | 12-14-70 |
| APVD | | 12/21 |

INPUT DATA BUFFERS

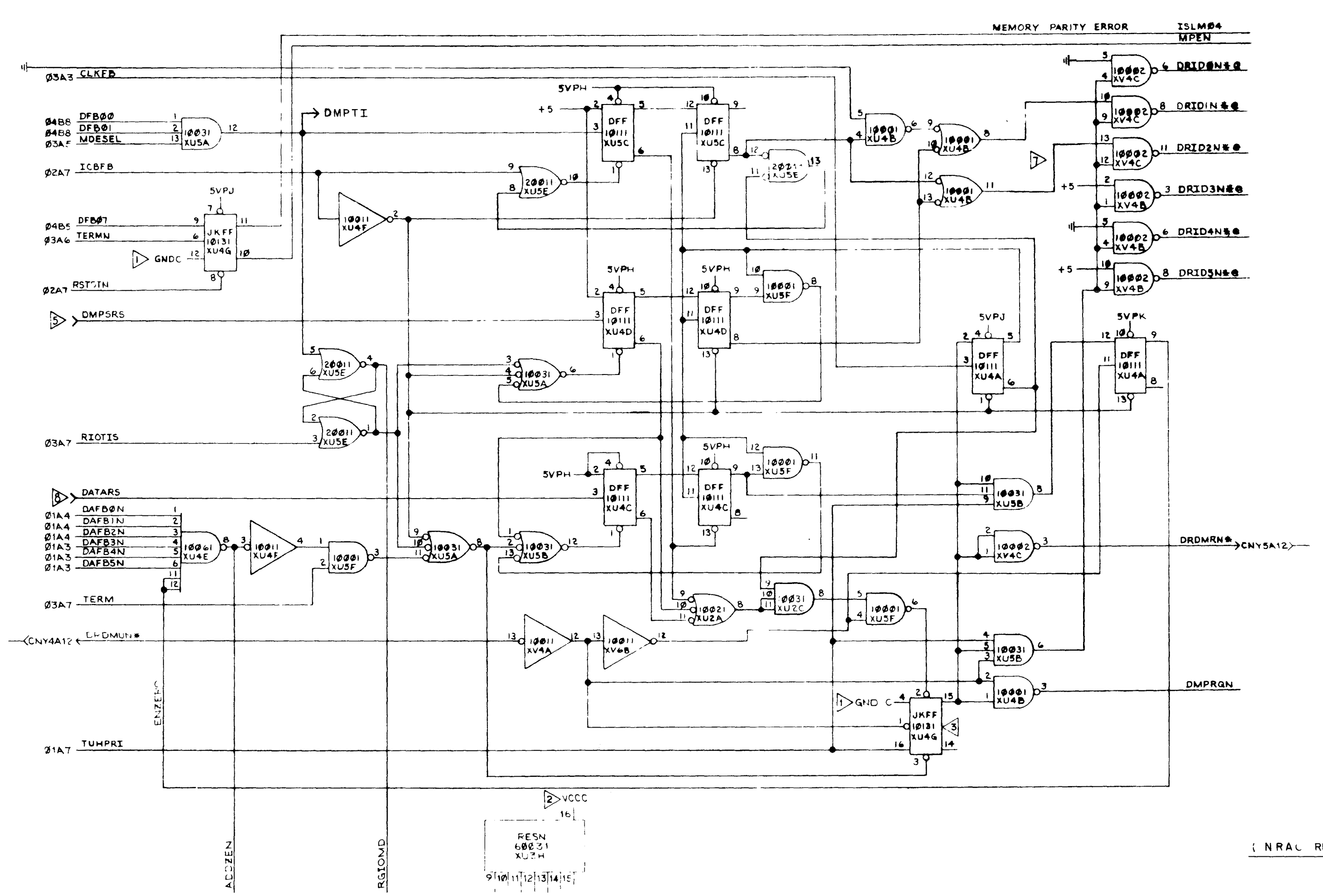
GENERAL PURPOSE CONTROL

SIZE D | DRAWING NO 520-100106 | REV A
SHEET 5 OF 6
CODE IDENT NO

REVISIONS: LTR | DESCRIPTION | DATE | APPROVED

520-100106

MCS Form 15A




( NRAC REV: 1977 )

NOTES:

1. GNDC IS CONNECTED FROM XU4F07 TO XU4G13, XU4G04 & XU4G12.
2. VCCC IS CONNECTED FROM XU3H16 TO XU3H16
3. VCCD IS CONNECTED FROM XU4G05 TO XU4F14
4. SIGNAL SHOULD CORRESPOND WITH OUTPUT MODE SUPPLIED BY USER
5. DMPSRS TO BE SUPPLIED BY USER.
6. CONNECT TO GND FOR MEMORY FILE DMP CONNECT TO 5VPK FOR REGISTER FILE DMP
7. CONNECT INPUTS TO CORRESPOND WITH PROPER SOURCE [illegible]
8. DATARS TO BE SUPPLIED BY USER



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS
3 PLACE DEC ± .005 ANGLES ± 1/2°
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED ALL PARTS AND SURFACES TO BE FREE OF SCRATCHES, BURRS, AND SHARP EDGES, ETC BEFORE FINISH IS APPLIED

modular computer systems

| | | DATE |
|---|---|---|
| DWN | M A Fazzano | 10-21-70 |
| CHK | B. Jastkowski | 12-21-70 |
| ENGR | S R Harrison | 12-18-70 |
| PROJ | R G | 12-18-70 |
| APVD | | 12/21 |

DMP CONTROL LOGIC

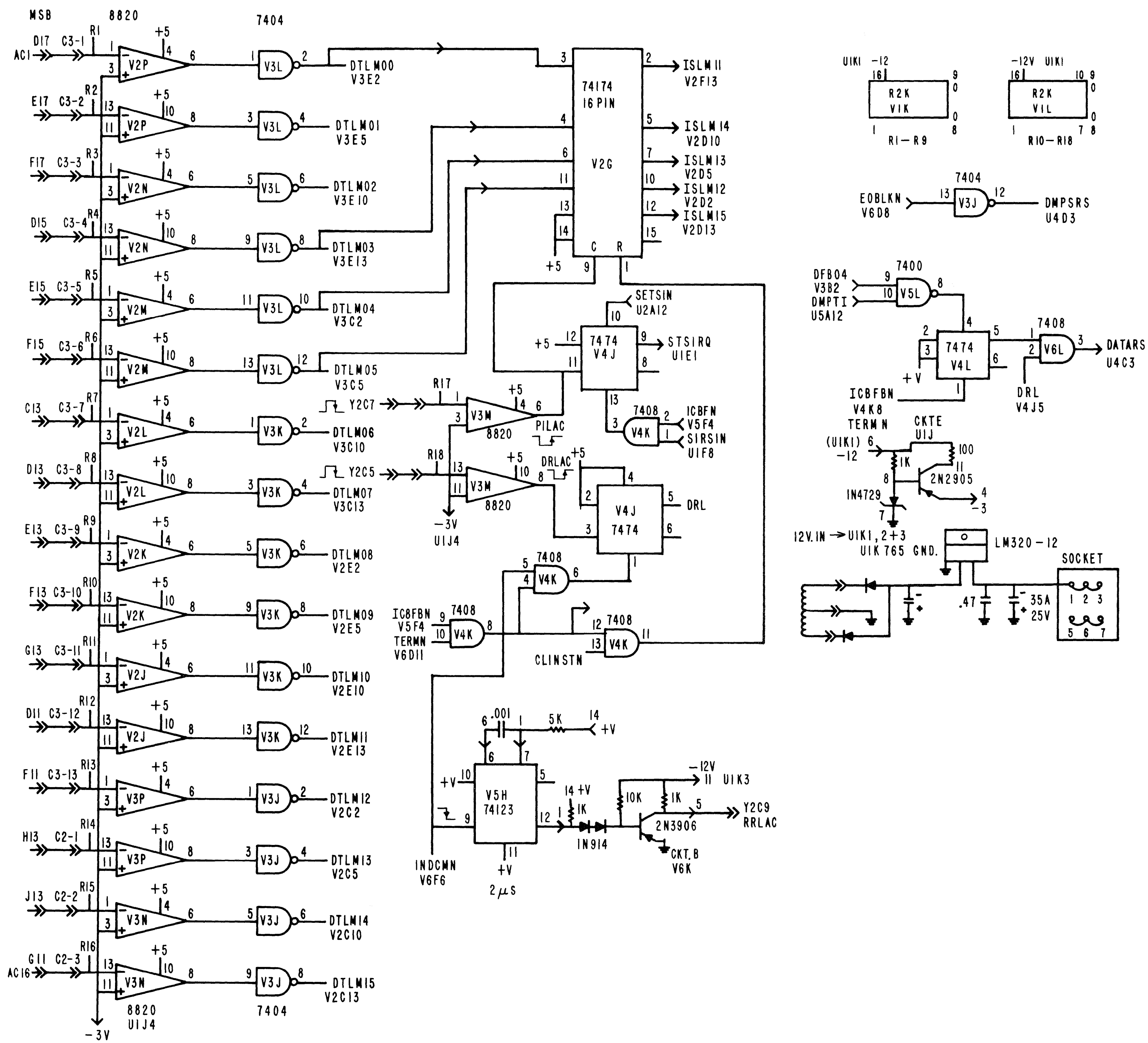
GENERAL PURPOSE CONTROL

SIZE D
DRAWING NO 520-100106
REV A
SHEET 6 OF 6
CODE IDENT NO

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE | APPROVED |

520-100106

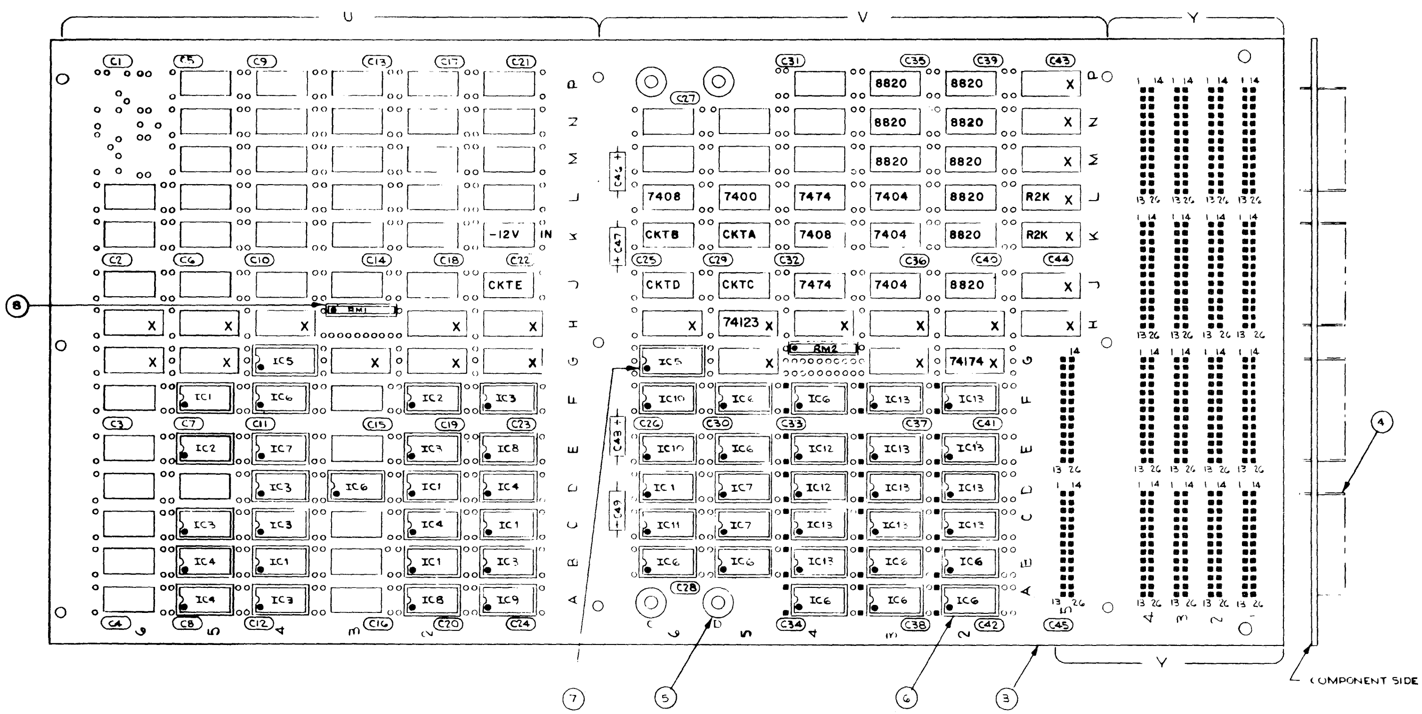
MCS Form 15A



MSB
8820
7404
74174
16 PIN
V2G
ISLM11 V2F13
ISLM14 V2D10
ISLM13 V2D5
ISLM12 V2D2
ISLM15 V2D13
DTLM00 V3E2
DTLM01 V3E5
DTLM02 V3E10
DTLM03 V3E13
DTLM04 V3C2
DTLM05 V3C5
DTLM06 V3C10
DTLM07 V3C13
DTLM08 V2E2
DTLM09 V2E5
DTLM10 V2E10
DTLM11 V2E13
DTLM12 V2C2
DTLM13 V2C5
DTLM14 V2C10
DTLM15 V2C13
8820 U1J4
-3V
R2K V1K
R1 - R9
R2K V1L
R10 - R18
EOBLKN V6D8
DMPSRS U4D3
7400
DFB04 V3B2
DMPTI U5A12
7474 V4L
7408
DATARS U4C3
DRL V4J5
ICBFBN V4K8 TERMN
SETSIN U2A12
STSIRQ U1E1
ICBFN V5F4
SIRSIN U1F8
PILAC
DRLAC
Y2C7
Y2C5
CKTE U1J
2N2905
1N4729
12V.IN → U1K1, 2+3
U1K765 GND.
LM320 - 12
SOCKET
.47
35A 25V
IC8FBN V5F4 TERMN V6D11
CLINSTN
INDCMN V6F6
V5H 74123
2 μS
1N914
2N3906
CKT.B V6K
Y2C9 RRLAC
-12V U1K3

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| A | ECO-2471 | | |

X = 16 PIN SOCKET, NO POWER OR GROUND.
NO GROUNDS ON, Y1C TO Y4C OR Y1D TO Y4D.




(NRAO REV:'77)

-001 SHOWN



TOLERANCE EXCEPT AS NOTED
2 PLACE DEC ± .02 BEND RADIUS
3 PLACE DEC ± .005 ANGLES ± 1/2°
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modular computer systems

LM517-200014

| | | DATE |
|---|---|---|
| DWN | Mario Pestalin | 6-23-71 |
| CHK | Bc | 6-24-71 |
| ENGR | [illegible] | 1-7-72 |
| PROJ | [illegible] | 1-7-72 |
| APVD | [illegible] | 1/7 |

GENERAL PURPOSE CONTROLLER

SIZE D | DRAWING NO. 516-200014 | REV A
SHEET 1 OF 1
CODE IDENT NO.

MCS Form 15A

516-200014