

PRELIMINARY
INSTRUCTION MANUAL

MODEL 480
DATA COMMUNICATIONS TERMINAL

CONRAC CORPORATION

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This will be a
3/4 right front view (photograph)
of the unit.

CHAPTER 1

GENERAL DESCRIPTION

1-1. INTRODUCTION

This instruction manual contains a general description, installation instructions, post installation adjustments, a checkout after installation procedure, and operating instructions for the Model 480 Data Communications Terminal.

1-2. GENERAL DESCRIPTION

The Model 480 Data Communications Terminal (see figure 1-1) is basically a fully buffered terminal that stores and displays up to eight 80 character lines. The unit operates at switchable line rates from 110 to 9600 bits per second in a local, teletype, or block transmit mode. Additional features include a printer output by means of a standard RS232C interface connector, a bell to attract operator attention and addressable cursor positioning.

The edit functions provided which make for more flexible operation and improve operator convenience include character insert/delete and forms protect.

1-2. GENERAL DESCRIPTION (Continued)

The 480 uses a keyboard essentially identical to the standard teletype keyboard so that no retraining of operators is necessary. For performance and reliability, the 480 uses the latest technologies including an MOS memory. To reduce operator fatigue, the screen is refreshed at a flicker free rate of 50 Hz or 60 Hz.

The 480 has three operational modes: 1) on-line (TTY), 2) off-line (local), and 3) block transmit. Each of these modes has available two types of format operation: 1) general (unprotected) format and 2) split (partially-protected) format. Each mode or type of format is defined by a function code which can be issued by the communication interface or the keyboard control keys.

1-3. PHYSICAL DESCRIPTION

The size and form factor of the 480 is the same as some popular electric typewriters, so that it easily fits on all standard secretarial desks and alcove "L's".

The 480 basically consists of three major units: a 9-inch CRT display; an operator keyboard; and a controller unit. These units are integrated into a single free-standing chassis assembly with overall dimensions as shown in figure 1-2.

1-4. LEADING PARTICULARS

The physical, mechanical and electrical characteristics of the Terminal are listed in table 1-1.

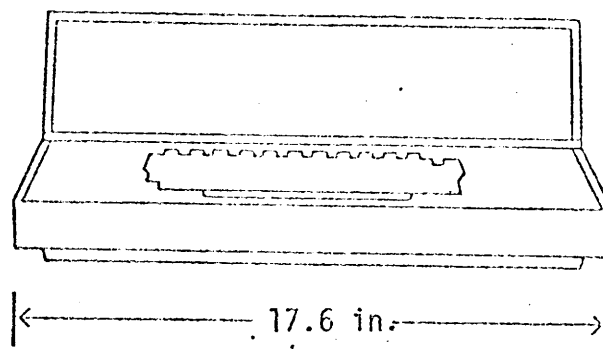
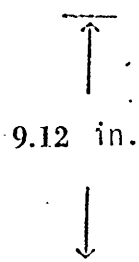
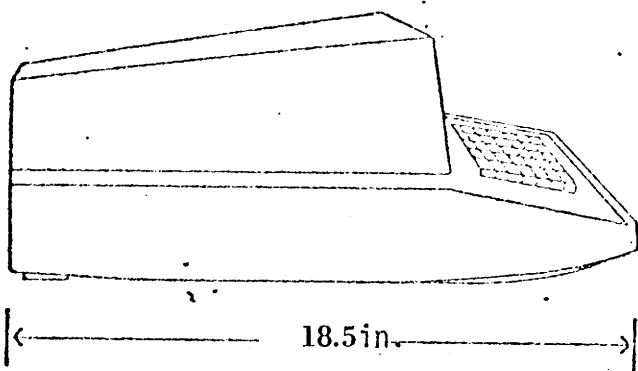


Figure 1-2. Model 480 Video Communications Terminal Overall Dimensions

Table 1-1. Model 480 Data Communications Terminal
Quick-Reference Data

Item	Characteristic
Interfaces (rates and signal quality)	Conform to EIA standards RS232C
Display Characteristics	
Refresh Rate	50 or 60 Hertz (power line frequency dependent)
Phosphor	EIA-P-4 Aluminized EIA-P-39 Aluminized (Optional)
Deflection Method	Electromagnetic
Focus Method	Electrostatic
Memory	640 Characters MOS/Shift Register
Code Set	64 ASCII
Character Set	64 Displayable Characters
Character Generator	5 x 7 dot matrix
Display Format	The viewable screen area is 9 inches wide by 3.0 inches high with the long axis of the CRT in the horizontal plane.
Character and Display Dimensions	
Lines/Display	8 (max.)
Characters/Lines	80 (max.)
Page Width, inches	6.0 inches Nominal
Page Height	2.5 inches Nominal
Character Width	.05 inch Nominal

Table 1-1. Model 480 Data Communications Terminal
Quick-Reference Data (Continued)

Item	Characteristic
Character Origin to Character Origin Spacing	0.075 inch Nominal
Character Height	0.12 inch Nominal
Line Origin to Line Origin Spacing	0.34 inch Nominal
Operating Temperature Range	+50°F to +110°F at 90% Relative Humidity
Operating Barometric Pressure Range	30 to 20.58 inches of Hg.
Storage Temperature Range	-20°C to 75°C
Warmup	CRT display stabilizes within 15 minutes after turn-on.
Input Power	110/120/220/240 Vac $\pm$ 10%, single phase, 50 or 60 Hz, 300 watts maximum
Physical Dimensions	See figure 1-2.

CHAPTER II

INSTALLATION

2-1. INTRODUCTION

This chapter contains unpacking and inspection instructions, an installation procedure including cable connections, post installation adjustments, and a checkout after installation test.

2-2. UNPACKING AND INSPECTION

The 480 is packaged and shipped in a heavy duty corrugated paper carton. Plastic foam is used for packing to insure against possible damage during shipment. Remove the 480 from the container carefully to avoid breaking or otherwise damaging it. Avoid penetrating the container with sharp tools or hammers.

After the 480 has been unpacked, inspect carefully for obvious physical damage that might impair proper operation. Inventory the contents of the shipping container to assure that all necessary hardware and interconnecting cabling has been supplied. If the 480 is damaged, or parts are missing, report this fact through normal channels.

2.3 INSTALLATION

The 480 is supplied as a complete unit and requires no additional material for installation other than interconnecting cabling.

2-3. INSTALLATION (Continued)

The 480 is a cabinet-bench mount unit which is the free-standing configuration. The cabinet mount merely requires removal of the 480 from the packing carton and positioning it in the desired location on a bench or shelf.

2-3-1. Interconnecting Cabling

Only two cable assembly connections are required to place the 480 into operation. The power cable is hard wired at the 480 end and merely requires plugging into a standard wall outlet.

The Data cable assembly is not supplied and must be fabricated by the OEM user. The connector type is a Cannon DB25P or equivalent with pin assignments as itemized in Table 2-1, and Interface Signal assignments as tabulated in Table 2-2.

2-3-2. Post Installation Adjustments

After mechanical installation of the 480 is complete, and all cabling connections have been made, the adjustments outlined in the following subparagraphs should be performed.

There are only two adjustments required after mechanical installation of the 480. Place the Power ON/OFF switch to ON, and visually determine if one of the following adjustments is necessary:

2-3-2. Post Installation Adjustments (Continued)

A. CONTRAST Potentiometer (). This is a slide-type potentiometer which is located at the right front side under the keyboard housing. Manually adjust for desired amount of contrast.

B. HORIZONTAL POSITIONING Potentiometer (R11). This potentiometer is a slotted-head type, and is located at the left rear side of the unit. To gain access, remove the bottom plate. When making this adjustment, use a plastic adjustment tool (non-magnetized) and adjust for desired horizontal positioning.

2-3-3. Post Installation Checkout

After installation, and after all necessary adjustments have been made, perform the following procedural steps in sequence to assure that the 480 is functioning properly.

Before performing the Post Installation Checkout, it is recommended that the reader familiarize himself with the operation of the 480 which is described in Chapter III.

A. KEYBOARD ENTRY AND DISPLAY TEST

In this test, data is entered from the keyboard and displayed on the CRT to verify that the keyboard interface, CRT display, and associated circuits are functioning properly.

1. Place the power ON/OFF switch to ON. The terminal will power up in the LOCAL mode of operation.

2-3-3. Post Installation Checkout (Continued)

A. KEYBOARD ENTRY AND DISPLAY TEST (Continued)

2. Press the CTRL key and hold, then press the "G" Key. The tone of the bell will be heard, and no information will be displayed on the screen.

3. From the keyboard, enter and display two lines of characters. Backspace a few characters, then press and hold the CTRL key. Press "Q" key and visually observe all characters from the cursor and to the right have been erased. With CTRL key pressed, press CLR (L) key to clear the screen.

4. From the keyboard, enter and display three lines of characters. Press and hold the CTRL key and press the HOME (T) key and observe cursor goes to home. From the keyboard, enter and display approximately ten (10) more characters. Press and hold CTRL key, then press "P" key. All characters to the right of the cursor, and all lines below the cursor, will erase. With CTRL key pressed, press CLR key to clear screen.

5. Press and hold the CTRL key, then press "J" key several times in succession. Observe cursor steps down one (1) line each time "J" key is pressed. Repeat, using LINE FEED key.

2-3-3. Post Installation Checkout (Continued)

A. KEYBOARD ENTRY AND DISPLAY TEST (Continued)

6. At the keyboard, enter a message on the screen with a colon at the end. Set forms by pressing and holding the CTRL key, then press "O" key. Repeatedly press "BS" key and observe cursor will not backspace past the colon. Enter additional characters on the screen (approximately 10). Press and hold the CTRL key, then press the "S" key. All characters to the right of the colon will be erased. With CTRL key depressed, press the CLR (L) key and observe all remaining characters on the screen are erased. This will also reset the forms mode.

7. At the keyboard, verify cursor is in the home position. If not, press CTRL and HOME keys. Press and hold CTRL key, then press "R" key. Enter address to which cursor is to jump. Press keys 1, 7, and 9. Verify cursor moves to line 1, character location 79. Repeat for the following addresses:

200, 250, 279
310, 360, 379
405, 440, 479
502, 535, 579

At the conclusion of the test, press CTRL and HOME keys, and observe cursor returns to the home position.

8. At the keyboard, enter and display a minimum of three (3) lines of characters. Select a character and line location within the display (i.e., 150), at which you would like to insert a character.

2-3-3. Post Installation Checkout (Continued)

A. KEYBOARD ENTRY AND DISPLAY TEST (Continued)

Jump cursor to this location as described in step 7. Press the CTRL and SHIFT keys and hold, then press the "N" key. Verify all characters to the right of the cursor will move one (1) character to the right. Do not clear the display.

9. Select a character and line location at which you would like to delete a character (i.e., 279). Jump cursor to this location as described in step 7. Press the CTRL and SHIFT keys and hold, then press the "O" key. Verify that the character at the cursor position is erased. Again press the CTRL and SHIFT keys and then the "O" key. Verify the character at the cursor position is erased, and all characters to the right of the cursor will move one location to the left.

B. BACK-TO-BACK CHECKOUT

In this test, the output of the 480 is tied back to the input to provide a complete loop check of the unit. In order to perform this test, a Cinch DB25S or equivalent test connector is required with pins jumpered as follows:

2 to 3
4 to 5 and
6 to 20

After the pins have been jumpered, remove Data connector J4 from the left rear side of the unit and install the special test connector in its place.

2-3-3. Post Installation Checkout (Continued)

1. Place Power ON/OFF switch to ON. On the keyboard, press the CTRL key and hold, then press the TTY (C) key (Model 480 is now in TTY mode of operation).
2. From the keyboard, enter all characters available and verify that each and all are displayed.
3. On the keyboard, press CTRL key and hold, then press and release CLR (L) key. Verify screen is cleared and cursor goes to home position.
4. On the keyboard, press CTRL key and hold, then press and release LOCAL (B) key.
5. At the keyboard, enter one (1) complete line of characters, then press "NEW LINE" key.
6. Press and release SOM (shifted M) key (start of message), then enter additional characters for line 2. Press and release "NEW LINE" key. Enter a complete group of characters on line three (3), followed by a carriage return.
7. Press CTRL key and hold, then press and release "R" key. Enter address 778 for cursor location.
8. Press CTRL key and hold, then press and release XMIT (D) key. Verify cursor jumps to location where SOM (start of message) was entered, and travels down the screen at a rate

2-3-3. Post Installation Checkout (Continued)

B. BACK-TO-BACK CHECKOUT (Continued)

8. (Continued) determined by the operating band rate.

Verify no entered characters changed as a result of this operation.

9. On the keyboard, press the CTRL key and hold, then press the "U" key. Verify cursor goes to home, searches for an SOM (start of message), and travels down the screen at a rate determined by the operating Band rate. Verify the cursor halts at address location 779 and is not blinking.

10. Press CTRL key and hold, then press LOCAL key and release. Verify cursor is now blinking.

11. Place Power ON/OFF switch to OFF, remove special test connector, and reinstall Data connector J4.

This will be a rear view (photograph)
of the 480 with Data Connector keyed
and nomenclature assigned.

Figure 2-1. Data Communications Terminal, Rear Panel View

Table 2-1. Data Connector J4, Pin Assignments

Pin	EJA Designation	Description	Direction
1	AA	Protective Ground	--
2	BA	Transmitted Data	From 480
3	BB	Received Data	To 480
4	CA	Request to Send	From 480
5	CB	Clear to Send	To 480
6	CC	Data Set Ready	To 480
7	AB	Signal Ground	--
.			
.			
20	CD	Data Terminal Ready	From 480

Table 2-2. Data Connector J4, Interface Signals Assignments

EIA Pin Designation	Signal Nomenclature	Description
AA	Protective Ground	Chassis ground
AB	Signal Ground	Ground reference for interface signals
BA	Transmitted Data	This line shall carry data transmission from the 480. It shall be held in the OFF state when any one or more of the signals CA, CB, CC, and CD are in the OFF state.
BB	Received Data	This line shall carry all data transmission to the 480.
CA	Request to Send	The 480 shall place this line in the ON state when it wishes to transmit data on BA. The 480 shall wait for signal CB to be ON before transmitting.
CB	Clear to Send	The Data Set (the first device connected to the 480 by this interface) will place this line in the ON state in the event CA is in the ON state.
CC	Data Set Ready	The Data Set will hold this line in the ON state at all times that it is operational.
CD	Data Terminal Ready	The 480 shall hold this line ON at all times it is prepared to input data on BB.

CHAPTER III

OPERATION

3-1. INTRODUCTION

Operation of the Data Communications Terminal is related directly to the use of the system developed by the OEM, and the operator should refer to the operation manual provided by the OEM for special operating instructions.

This chapter contains a general description of the Keyboard Assembly, a description of the operating formats and modes, data transmission restraints, and a definition of the communication function codes.

3-2. KEYBOARD DESCRIPTION

The keyboard Figure 3-1, provides the interface between the operator and the 480. As shown, the keyboard is a modified teletype keyboard with special coding as tabulated in Table 3-1. Note that the mode keys TTY, LOCAL, and XMIT are interlocked with the control key (CTRL).

The keyboard combines solid state keys with solid state encoding, thus eliminating all moving parts with the exception of the key plunger.

480 USASCII CODE SET

	B ₇	0	0	0	0	1	1	1	1
	B ₆	0	0	1	1	0	0	1	1
	B ₅	0	1	0	1	0	1	0	1
B ₄ B ₃ B ₂	B ₁								
0 0 0	0	EOF	SP	Ø	@	P			
0 0 0	1	EOL	☐	1	A	Q	Note 1		
0 0 1	0	LOC	LCA	"	2	B			
0 0 1	1	TTY	EP	#	3	C	S		
0 1 0	0	BXT	HOM	\$	4	D	T		
0 1 0	1		NAK	%	5	E	U		
0 1 1	0			&	6	F	V		
0 1 1	1	BEL		'	7	G	W		
1 0 0	0			(	8	H	X		
1 0 0	1			)	8	I	Y		
1 0 1	0	LF		*	:'	J	Z		
1 0 1	1			+	;	K	I	Note 2	
1 1 0	0	CLR		,	<	L	\		
1 1 0	1	NL		:	=	M		Note 3	
1 1 1	0	RF	INS	.	>	N	⌒		
1 1 1	1	SF	DEL	/	?	0	—	BSP	

Notes: 1. Displayed on 480 as EOM (☐) symbol

2. Upon receipt of the NL code the 480 shall initiate the NL function and cause the back slash (\) code to be placed in the memory. Upon transmission to interface, the back slash code shall be converted to the NL code.

3. Displayed on 480 as a SOM (⌒) symbol.

Abbreviations:

BEL	=	Bell	LCA	=	Load Cursor Address
BXT	=	Block Transmit Mode	LF	=	Line Feed
DEL	=	Character Delete	LOC	=	Local Mode
EOF	=	Clear to End of Display	SP	=	Space
EOL	=	Line Cancel	TTY	=	Teletype Mode
CLR	=	Clear Display	HOM	=	Home
INS	=	Character Insert	EP	=	Clear Entry
BSP	=	Back Space	SF	=	Set Format
NL	=	New Line	RF	=	Reset Format
NAK	=	Negative Acknowledge			

The keyboard uses only one circuit board for both switch termination and encoding, thus eliminating circuit board interconnections and assuring improved reliability.

3-3. OPERATING FORMATS AND MODES

The 480 has three operational modes: 1) on-line (TTY), 2) off-line (local), and 3) block transmit. Each of these modes has available two types of format operation: 1) general (unprotected) format and 2) split (partially-protected) format. Each mode or type of format is defined by a function code (see paragraph 3-6) which can be issued by the communication interface or the keyboard control keys.

The 480 always responds to any mode change codes; in the event of communication activity, after the completion of the current character. Keystroke mode changes are not transmitted on the communication interface.

3-3-1. General Format

In this format the display is considered unprotected. The operator, at his discretion, or the communication link may access any area of the screen.

3-3-2. Split Format

This format provides an efficient means for entering and displaying formatted data. When this format is used, the screen can be divided into

3-3-2. Split Format (Continued)

fixed (protected) fields for header information and variable (unprotected) fields for data entry. The COLON (:) is used as the delineator which separates the two fields. In a line containing a colon, data to the left of the colon becomes protected by the Set Format (SF) command. The last colon entered on a line is the delineator. A line containing no colons will not be protected.

NOTE

Because the colon locations are stored in holding registers, erasure or overstrike of the colon will neither clear the register nor keep that line unprotected. Only Clear Display (CLR) command will clear the register; another colon will change the register. Colons entered in the variable field after the SF command are not delineators.

The data from the start of the line to the colon is defined as the fixed field. The variable field is from the right of the colon to the end of the line. There may be only one variable field per line and any line which does not have a delineator present is considered a variable field. Keyboard and communication entry is restricted to the variable field unless the protected area is accessed by use of the LF and LCA operations.

The protected data becomes unprotected by the issuance of a Rest Format Command. The normal operational sequence when using

3-3-2. Split Format (Continued)

this format is: the communication interface will erase the screen, then write the format with colons on the screen, and finally will issue the Set Format Command.

3-3-3. TTY Mode

This mode is a conversational echo mode with valid keystrokes being transmitted to the communication line interface and displayed on the CRT upon receipt of the echo.

This mode is the only mode in which information can be received from the communication interface except mode change codes. Thus, any message sent from the CPU must be preceded by the TTY function code.

3-3-4. Local Mode

This is an off-line mode and enables the operator to compose and edit text for subsequent block transmit. Valid keystrokes are not transmitted in this mode. The communication interface must append each transmission to the 480 with the local function code (LOC) if operation requires the unit to remain off-line.

3-3-5. Block Transmit Mode

This mode is entered from either the local of the Teletype mode by communication link Block Transmit (BXT) code entry or by activation of the Block Transmit Key; in this mode, data is transmitted to the communication interface as described in paragraph 3-4 and with data transmission

3-3-5. Block Transmit Mode (Continued)

restraints, presented in paragraph 3-5. Upon completion of transmission, the 480 remains in the Block transmit mode until the mode is changed by code entry or keyboard control. At this time, the entry of a NAK code will force a retransmit of data beginning with the homing of the cursor (see paragraph 3-4). The Block Transmit Key and code are inhibited (locked out) from reinitiating a block transmission until the mode is changed.

3-4. OPERATIONAL SEQUENCE

The activation of the Block Transmit Key or a BXT code entry when the 480 is not in the Block Transmit Mode, results in an EOM symbol being entered at the cursor location, and sends the cursor to the home position where it begins a sequential search for the start of the message (SOM symbol).

When the 480 finds the first SOM symbol, it will turn on the Request To Send signal and wait for the Clear To Send signal to go on. Then the 480 will transmit an SOM symbol code to the communication interface. Upon receipt of the echo SOM code from the communication interface, the 480 will commence to transmit.

Transmission will be line by line from the first character following the SOM symbol and ending with the first end of message (EOM) symbol code.

3-5. DATA TRANSMISSION RESTRAINTS

Transmission of each line is ended by the N. L. symbol or by the end of the line; in either case an N. L. code is transmitted.

3-5. DATA TRANSMISSION RESTRAINTS

Transmission of the displayed data will always end at the first EOM symbol encountered. In the event that no SOM symbol is present on the screen, only the EOM symbol code will be transmitted.

NOTE

If a new line character is inserted on the line before the only EOM symbol, the EOM symbol will never be found and the message on the screen, including the SOM symbol code, will be transmitted incessantly until operator or data link intervention.

When the 480 is using the Split Format, the transmitted message will be the text from the variable area only. The SOM symbol must therefore lie within the variable data area.

The 480 will wait indefinitely for the SOM symbol code to be returned from the communication interface. If the operator or the communication interface wishes to abort the transmission at any time, the function code of one of the other modes must be sent. Any character in transit will be transmitted before the unit changes modes.

When the 480 is in block transmit mode, the cursor will follow the character being transmitted from the screen and will not blink. Upon completion of transmission, the cursor will remain on (non-blinking), until the mode is changed.

3-6. FUNCTION CODES

The function codes are commands of which there are two types, those issued by the communication interface and those generated by keyboard control keys. All function code performance must be completed without requiring pauses in incoming data with the exception of LINE CANCEL, CLEAR DISPLAY, CLEAR TO END OF DISPLAY, and CLEAR ENTRY. The modified USASCII Code Set is shown in Table 3-1.

3-6-1. Communication Interface Commands

These are commands that the 480 must respond to when they are presented by the communication interface. These commands can be generated by the keyboard but the keycaps do not have legends for operator use.

A. Load Cursor Address (LCA)

LCA will condition the unit to move the cursor to a position specified by the succeeding three characters. The 480 will interpret the three characters succeeding the LCA, as follows:

First character, vertical position; Second character, more significant digit of the horizontal position; and Third character, less significant digit of the horizontal position.

The first position in the address will be zero (0) and addressing is sequential 0-5 vertically and 0-79 horizontally. The 480 is not constrained to detect illegal addresses.

B. Set Format (SF)

Causes the 480 to assume the Split Format operation described

3-6-1. Communication Interface Commands (Continued)

B. Set Format (SF) (Continued)

in paragraph 3-3-2, and position the cursor to home or the first delineator character beyond the home position.

C. Reset Format (RF)

Causes the 480 to assume the General Format operation described in paragraph 3-3-1.

D. Bell

Causes an audible tone to attract the operator's attention.

3-6-2. Communication Interface and Keyboard Commands

These are commands that the 480 must respond to when presented by the communication interface or the keyboard after a character in transit is completed.

A. Local (LOC) ;

Places the unit in the local mode. This keystroke is never transmitted.

B. TTY

Places the unit in the TTY mode. This keystroke is never transmitted.

C. Block Transmit (BXT)

Places the unit in the block transmit mode. This keystroke

3-6-2. Communication Interface and Keyboard Commands (Continued)

C. Block Transmit (BXT) (Continued)

is never transmitted.

D. Clear Display (CLR)

Erases the entire display and moves the cursor to the left-most position of the first line (Home). This command also causes the unit to assume the General Format operation and resets the delineator location registers.

E. Clear to End of Display (EOF)

General Format: Erases all data from the cursor position to the end of page. The cursor does not move.

Split Format: Erases all variable data from the cursor position to the end of page. Cursor does not move.

F. Clear Entry (CLEN)

General Format: Erases entire display and returns the cursor to Home but does not reset delineator location registers.

Split Format: Erases the variable fields and returns cursor to the right of the first delineator; does not reset delineator location registers.

G. Erase Line (EOL)

General Format: Erases entire line on which cursor is

3-6-2. Communication Interface and Keyboard Commands (Continued)

G. Erase Line (EOL) (Continued)

positioned and returns cursor to beginning of that line.

Split Format: Erases variable area of line on which cursor is positioned and returns cursor to right of the delineator on that line.

H. New Line (NL)

General Format: Places the symbol (\) on the screen and moves the cursor to the beginning of the next line.

Split Format: Places the symbol (\) on the screen and moves the cursor to the right of the next delineator found in succeeding lines or the first position of a line with no delineator.

With either format, when the cursor is in the bottom line, the next succeeding line is the first line of the display.

I. Line Feed (LF)

Causes the cursor to move columnly down one line or from the last line to the first without altering any data.

J. Backspace (BS)

Causes the cursor to move left one character position and does not alter any character. The cursor will stop movement at the beginning of the line or the right of the delineator is present.

3-6-2. Communication Interface and Keyboard Commands (Continued)

K. Start of Message (SOM)

Places the symbol (]) on the screen and is used in the block transmit mode.

L. End of Message (EOM)

Places the symbol ([]) on the screen and is used in the block transmit mode.

M. Home (HOM)

General Format: Causes the cursor to move to the left-most position of the first line.

Split Format: Causes the cursor to move to the right of the first delineator or to the first position of the first line with no delineator.

N. Character Insert (INS)

Starts at cursor location by shifting that character and all subsequent variable characters on the same line to the right, one location. Characters at the end of the line are dropped (no wrap around). The cursor does not move.

O. Character Delete (DEL)

Starts at the cursor location, deletes that character, and moves all subsequent variable characters on the same line to

3-6-2. Communication Interface and Keyboard Commands (Continued)

O. Character Delete (DEL) (Continued)

the right of the cursor, one location to the left. A blank character will be inserted at the end of the line. The cursor does not move.

P. Forward Space (FWS)

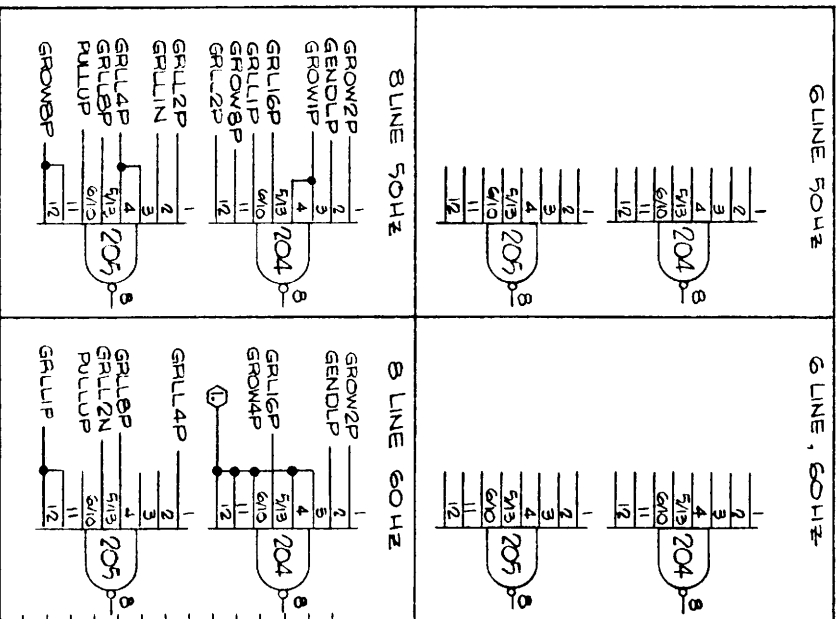
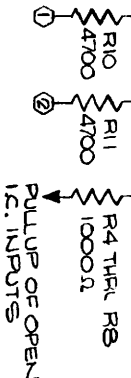
This command is formed by activity of the shift and space keys, and causes the cursor to move right one character position up to the 80th character without altering any character.

No legend is presented on the space key to show the shifted FWS. The code transmitted in the TTY mode is the standard space code (unshifted). This function is a keyboard-only activity and the communications interface cannot cause this function.

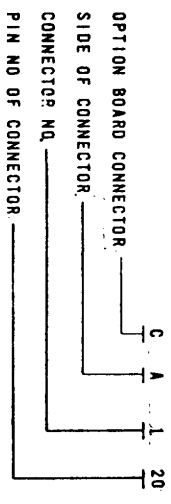
162609-002
SHEET 1 OF 6

162609-002

PULL UP OF OPEN
12. INPUTS

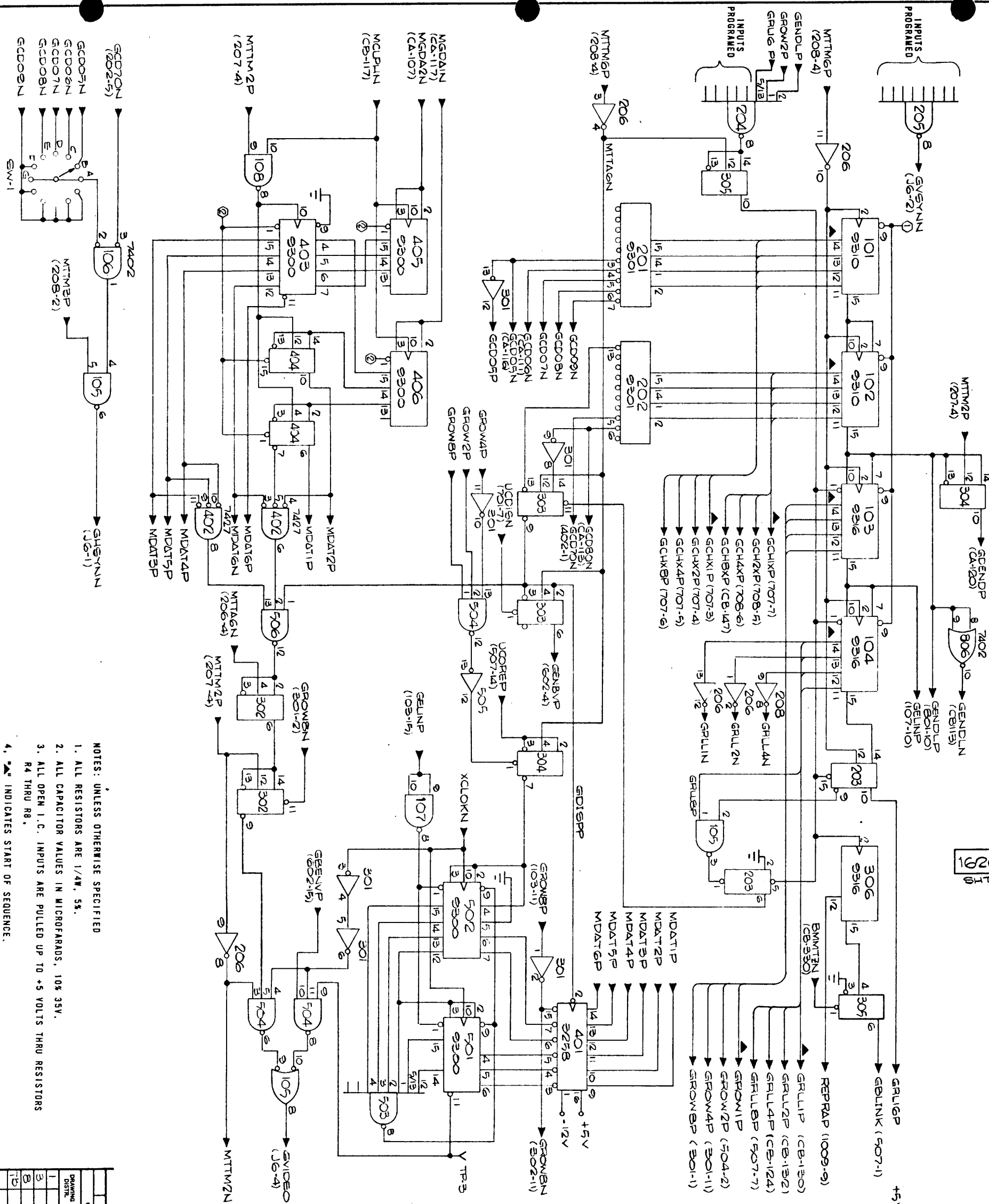


INTERFACE DESIGNATIONS:



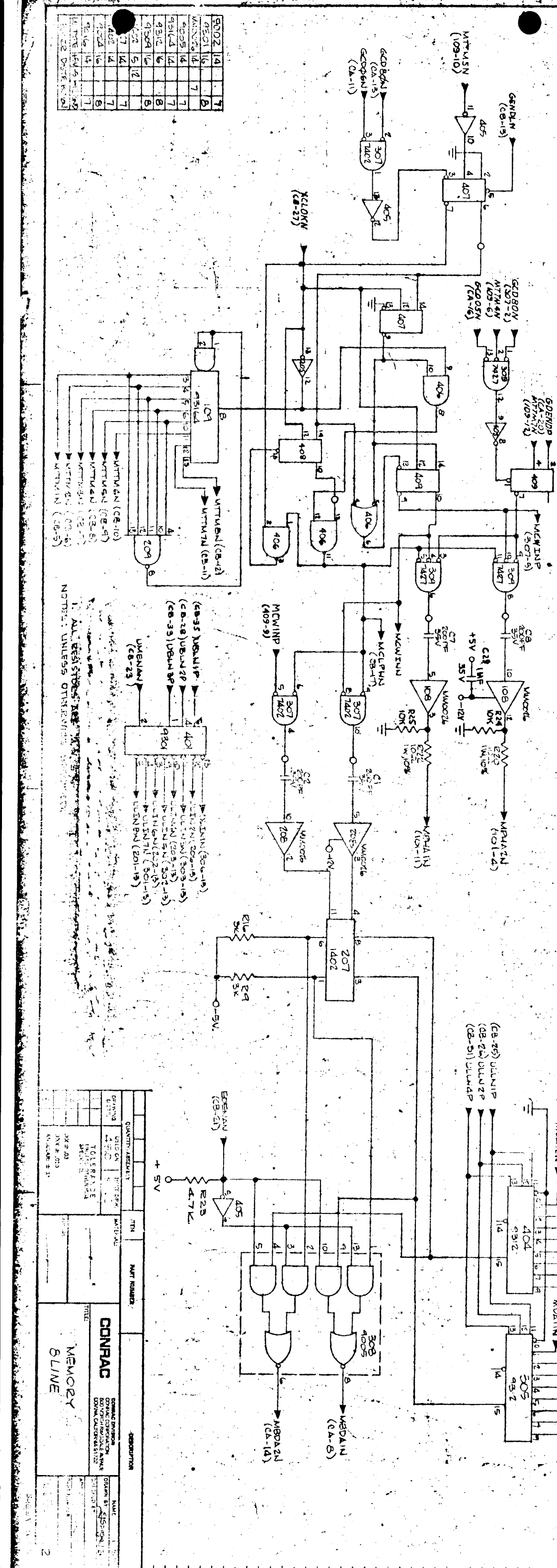
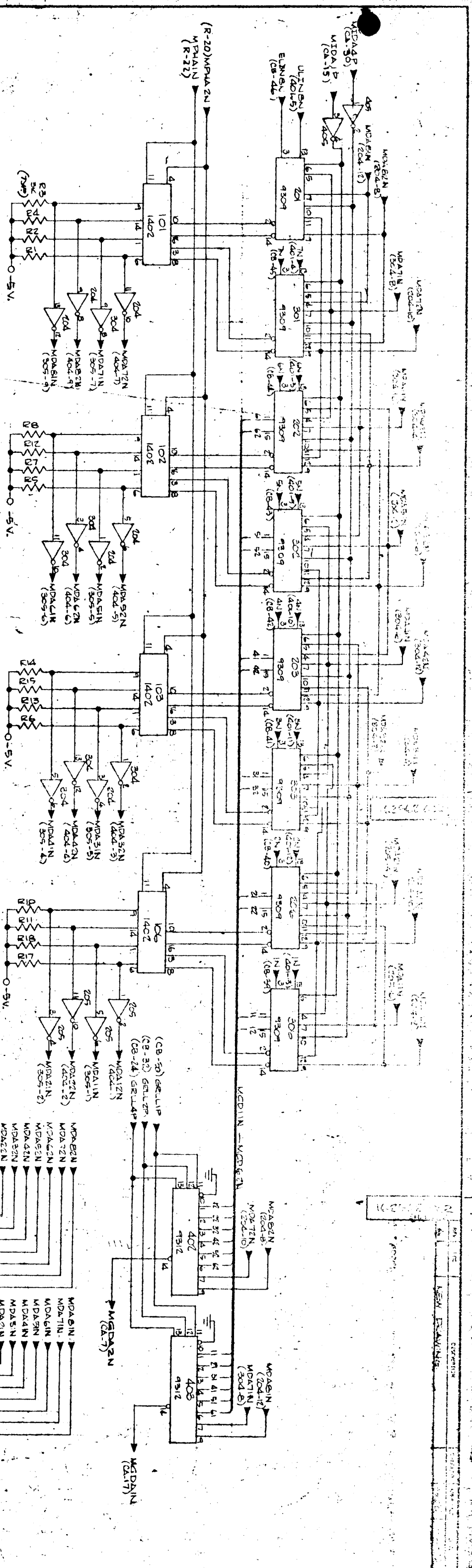
CONNECTOR NO. _____

PIN NO OF CONNECTOR _____



- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/4W, 5%.
 2. ALL CAPACITOR VALUES IN MICROFARADS, 10% 35V.
 3. ALL OPEN I.C. INPUTS ARE PULLED UP TO +5 VOLTS THRU RESISTORS R4 THRU R8.
 4. "A" INDICATES START OF SEQUENCE.

QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION
1	DRIVING	CONPAC	CONPAC
1	USED ON	CONPAC	CONPAC
1	NEXT DWN	CONPAC	CONPAC
1	TOLERANCE	CONPAC	CONPAC
1	SPECIFIED	CONPAC	CONPAC
1	XX ± .03	CONPAC	CONPAC
1	XX ± .010	CONPAC	CONPAC
1	ANGULAR ± 1°	CONPAC	CONPAC



Q102	Q103	Q104	Q105	Q106	Q107	Q108	Q109	Q110	Q111	Q112	Q113	Q114	Q115	Q116	Q117	Q118	Q119	Q120	Q121	Q122	Q123	Q124	Q125	Q126	Q127	Q128	Q129	Q130	Q131	Q132	Q133	Q134	Q135	Q136	Q137	Q138	Q139	Q140	Q141	Q142	Q143	Q144	Q145	Q146	Q147	Q148	Q149	Q150	Q151	Q152	Q153	Q154	Q155	Q156	Q157	Q158	Q159	Q160	Q161	Q162	Q163	Q164	Q165	Q166	Q167	Q168	Q169	Q170	Q171	Q172	Q173	Q174	Q175	Q176	Q177	Q178	Q179	Q180	Q181	Q182	Q183	Q184	Q185	Q186	Q187	Q188	Q189	Q190	Q191	Q192	Q193	Q194	Q195	Q196	Q197	Q198	Q199	Q200	Q201	Q202	Q203	Q204	Q205	Q206	Q207	Q208	Q209	Q210	Q211	Q212	Q213	Q214	Q215	Q216	Q217	Q218	Q219	Q220	Q221	Q222	Q223	Q224	Q225	Q226	Q227	Q228	Q229	Q230	Q231	Q232	Q233	Q234	Q235	Q236	Q237	Q238	Q239	Q240	Q241	Q242	Q243	Q244	Q245	Q246	Q247	Q248	Q249	Q250	Q251	Q252	Q253	Q254	Q255	Q256	Q257	Q258	Q259	Q260	Q261	Q262	Q263	Q264	Q265	Q266	Q267	Q268	Q269	Q270	Q271	Q272	Q273	Q274	Q275	Q276	Q277	Q278	Q279	Q280	Q281	Q282	Q283	Q284	Q285	Q286	Q287	Q288	Q289	Q290	Q291	Q292	Q293	Q294	Q295	Q296	Q297	Q298	Q299	Q300	Q301	Q302	Q303	Q304	Q305	Q306	Q307	Q308	Q309	Q310	Q311	Q312	Q313	Q314	Q315	Q316	Q317	Q318	Q319	Q320	Q321	Q322	Q323	Q324	Q325	Q326	Q327	Q328	Q329	Q330	Q331	Q332	Q333	Q334	Q335	Q336	Q337	Q338	Q339	Q340	Q341	Q342	Q343	Q344	Q345	Q346	Q347	Q348	Q349	Q350	Q351	Q352	Q353	Q354	Q355	Q356	Q357	Q358	Q359	Q360	Q361	Q362	Q363	Q364	Q365	Q366	Q367	Q368	Q369	Q370	Q371	Q372	Q373	Q374	Q375	Q376	Q377	Q378	Q379	Q380	Q381	Q382	Q383	Q384	Q385	Q386	Q387	Q388	Q389	Q390	Q391	Q392	Q393	Q394	Q395	Q396	Q397	Q398	Q399	Q400	Q401	Q402	Q403	Q404	Q405	Q406	Q407	Q408	Q409	Q410	Q411	Q412	Q413	Q414	Q415	Q416	Q417	Q418	Q419	Q420	Q421	Q422	Q423	Q424	Q425	Q426	Q427	Q428	Q429	Q430	Q431	Q432	Q433	Q434	Q435	Q436	Q437	Q438	Q439	Q440	Q441	Q442	Q443	Q444	Q445	Q446	Q447	Q448	Q449	Q450	Q451	Q452	Q453	Q454	Q455	Q456	Q457	Q458	Q459	Q460	Q461	Q462	Q463	Q464	Q465	Q466	Q467	Q468	Q469	Q470	Q471	Q472	Q473	Q474	Q475	Q476	Q477	Q478	Q479	Q480	Q481	Q482	Q483	Q484	Q485	Q486	Q487	Q488	Q489	Q490	Q491	Q492	Q493	Q494	Q495	Q496	Q497	Q498	Q499	Q500	Q501	Q502	Q503	Q504	Q505	Q506	Q507	Q508	Q509	Q510	Q511	Q512	Q513	Q514	Q515	Q516	Q517	Q518	Q519	Q520	Q521	Q522	Q523	Q524	Q525	Q526	Q527	Q528	Q529	Q530	Q531	Q532	Q533	Q534	Q535	Q536	Q537	Q538	Q539	Q540	Q541	Q542	Q543	Q544	Q545	Q546	Q547	Q548	Q549	Q550	Q551	Q552	Q553	Q554	Q555	Q556	Q557	Q558	Q559	Q560	Q561	Q562	Q563	Q564	Q565	Q566	Q567	Q568	Q569	Q570	Q571	Q572	Q573	Q574	Q575	Q576	Q577	Q578	Q579	Q580	Q581	Q582	Q583	Q584	Q585	Q586	Q587	Q588	Q589	Q590	Q591	Q592	Q593	Q594	Q595	Q596	Q597	Q598	Q599	Q600	Q601	Q602	Q603	Q604	Q605	Q606	Q607	Q608	Q609	Q610	Q611	Q612	Q613	Q614	Q615	Q616	Q617	Q618	Q619	Q620	Q621	Q622	Q623	Q624	Q625	Q626	Q627	Q628	Q629	Q630	Q631	Q632	Q633	Q634	Q635	Q636	Q637	Q638	Q639	Q640	Q641	Q642	Q643	Q644	Q645	Q646	Q647	Q648	Q649	Q650	Q651	Q652	Q653	Q654	Q655	Q656	Q657	Q658	Q659	Q660	Q661	Q662	Q663	Q664	Q665	Q666	Q667	Q668	Q669	Q670	Q671	Q672	Q673	Q674	Q675	Q676	Q677	Q678	Q679	Q680	Q681	Q682	Q683	Q684	Q685	Q686	Q687	Q688	Q689	Q690	Q691	Q692	Q693	Q694	Q695	Q696	Q697	Q698	Q699	Q700	Q701	Q702	Q703	Q704	Q705	Q706	Q707	Q708	Q709	Q710	Q711	Q712	Q713	Q714	Q715	Q716	Q717	Q718	Q719	Q720	Q721	Q722	Q723	Q724	Q725	Q726	Q727	Q728	Q729	Q730	Q731	Q732	Q733	Q734	Q735	Q736	Q737	Q738	Q739	Q740	Q741	Q742	Q743	Q744	Q745	Q746	Q747	Q748	Q749	Q750	Q751	Q752	Q753	Q754	Q755	Q756	Q757	Q758	Q759	Q760	Q761	Q762	Q763	Q764	Q765	Q766	Q767	Q768	Q769	Q770	Q771	Q772	Q773	Q774	Q775	Q776	Q777	Q778	Q779	Q780	Q781	Q782	Q783	Q784	Q785	Q786	Q787	Q788	Q789	Q790	Q791	Q792	Q793	Q794	Q795	Q796	Q797	Q798	Q799	Q800	Q801	Q802	Q803	Q804	Q805	Q806	Q807	Q808	Q809	Q810	Q811	Q812	Q813	Q814	Q815	Q816	Q817	Q818	Q819	Q820	Q821	Q822	Q823	Q824	Q825	Q826	Q827	Q828	Q829	Q830	Q831	Q832	Q833	Q834	Q835	Q836	Q837	Q838	Q839	Q840	Q841	Q842	Q843	Q844	Q845	Q846	Q847	Q848	Q849	Q850	Q851	Q852	Q853	Q854	Q855	Q856	Q857	Q858	Q859	Q860	Q861	Q862	Q863	Q864	Q865	Q866	Q867	Q868	Q869	Q870	Q871	Q872	Q873	Q874	Q875	Q876	Q877	Q878	Q879	Q880	Q881	Q882	Q883	Q884	Q885	Q886	Q887	Q888	Q889	Q890	Q891	Q892	Q893	Q894	Q895	Q896	Q897	Q898	Q899	Q900	Q901	Q902	Q903	Q904	Q905	Q906	Q907	Q908	Q909	Q910	Q911	Q912	Q913	Q914	Q915	Q916	Q917	Q918	Q919	Q920	Q921	Q922	Q923	Q924	Q925	Q926	Q927	Q928	Q929	Q930	Q931	Q932	Q933	Q934	Q935	Q936	Q937	Q938	Q939	Q940	Q941	Q942	Q943	Q944	Q945	Q946	Q947	Q948	Q949	Q950	Q951	Q952	Q953	Q954	Q955	Q956	Q957	Q958	Q959	Q960	Q961	Q962	Q963	Q964	Q965	Q966	Q967	Q968	Q969	Q970	Q971	Q972	Q973	Q974	Q975	Q976	Q977	Q978	Q979	Q980	Q981	Q982	Q983	Q984	Q985	Q986	Q987	Q988	Q989	Q990	Q991	Q992	Q993	Q994	Q995	Q996	Q997	Q998	Q999	Q1000	Q1001	Q1002	Q1003	Q1004	Q1005	Q1006	Q1007	Q1008	Q1009	Q1010	Q1011	Q1012	Q1013	Q1014	Q1015	Q1016	Q1017	Q1018	Q1019	Q1020	Q1021	Q1022	Q1023	Q1024	Q1025	Q1026	Q1027	Q1028	Q1029	Q1030	Q1031	Q1032	Q1033	Q1034	Q1035	Q1036	Q1037	Q1038	Q1039	Q1040	Q1041	Q1042	Q1043	Q1044	Q1045	Q1046	Q1047	Q1048	Q1049	Q1050	Q1051	Q1052	Q1053	Q1054	Q1055	Q1056	Q1057	Q1058	Q1059	Q1060	Q1061	Q1062	Q1063	Q1064	Q1065	Q1066	Q1067	Q1068	Q1069	Q1070	Q1071	Q1072	Q1073	Q1074	Q1075	Q1076	Q1077	Q1078	Q1079	Q1080	Q1081	Q1082	Q1083	Q1084	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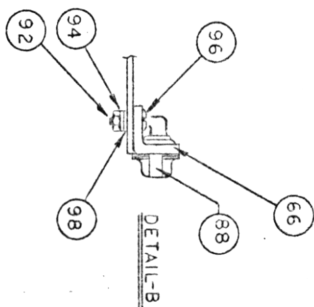
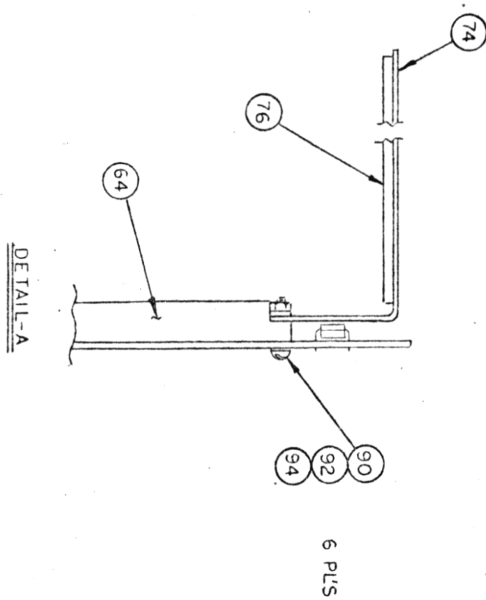
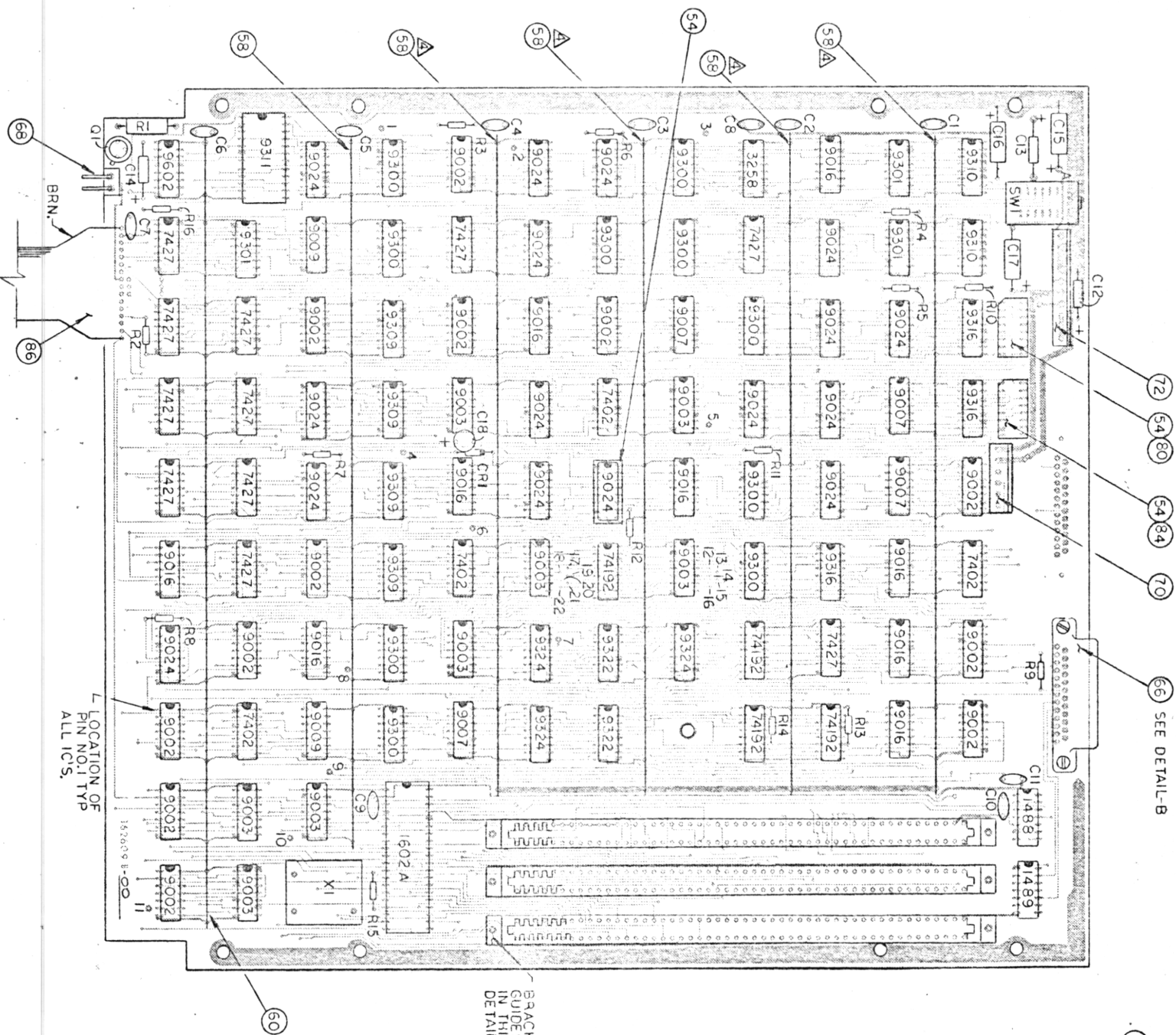
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FROM	TO
512	514
514	516
516	518
518	520
520	521

162609-002
SHT. 6 OF 6

162609-002

REV	ECO	REVISION	DATE
1	4797	REVISED & REDRAWN.	6-3-74



NOTES:
 1- SCALE: 1 TO 1.
 2- STAMP DASH IN POSITION SHOWN.
 3- 700 TO BE CUT OFF OF END OF ITEM 58.
 4- INSTALL ITEM 56 FROM FAR SIDE OF BOARD.
 5- AT ALL NUMBERED LOCATIONS (1 THRU 22).
 6- ALL ITEM NOS ARE FROM PARTS LIST 162609.
 7- COMPONENT SIDE OF BOARD SHOWN.

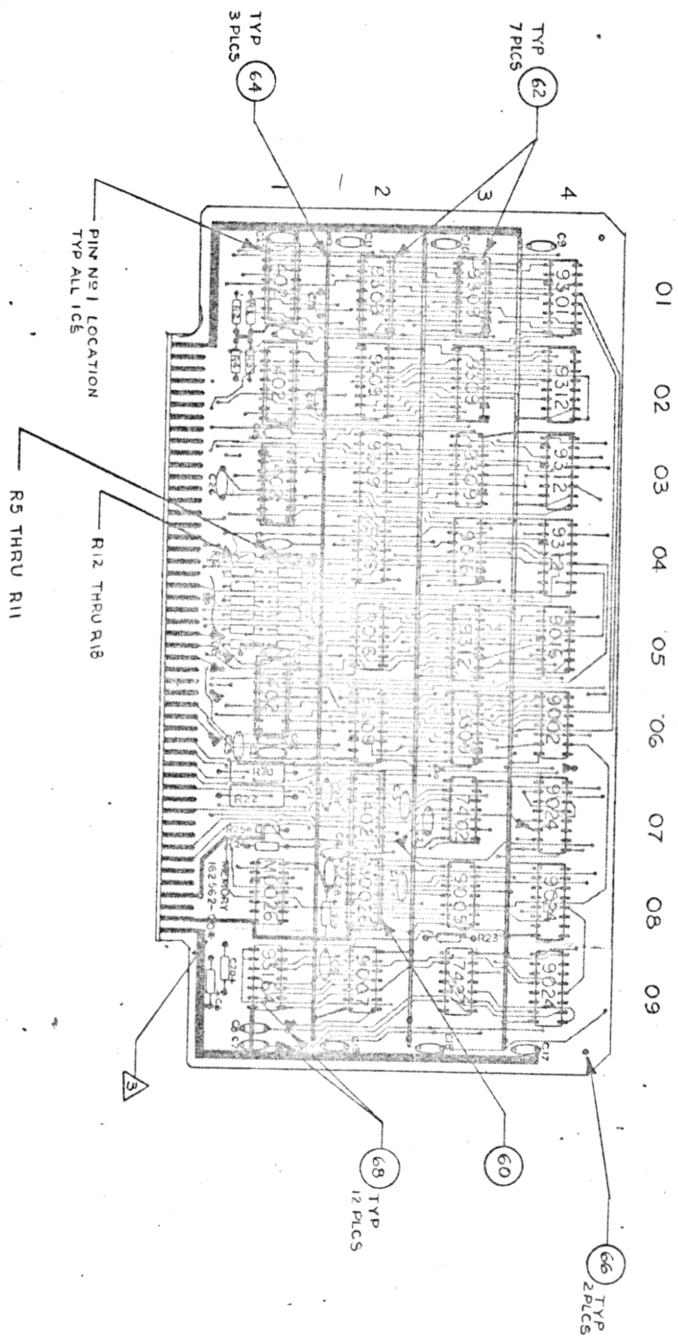
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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162609-002
SHT. 6 OF 6

162562-002

162562-002

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
1	4359	NEW DWG		WAB	11-21-75



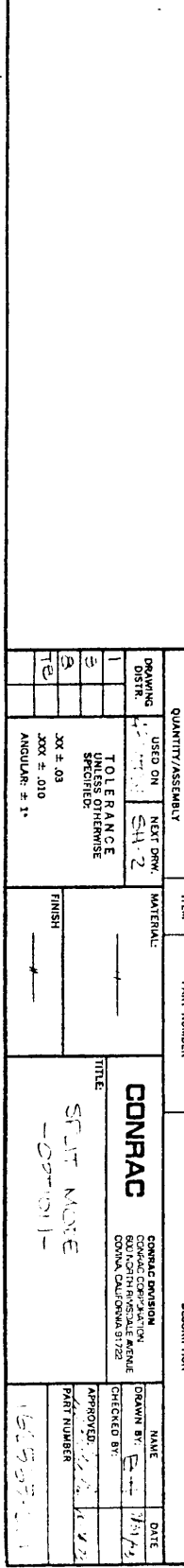
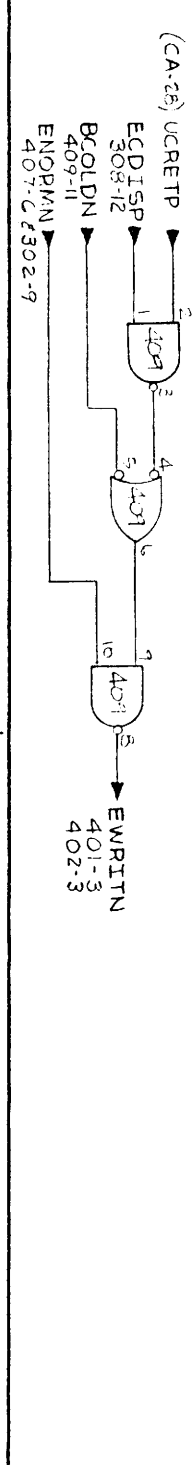
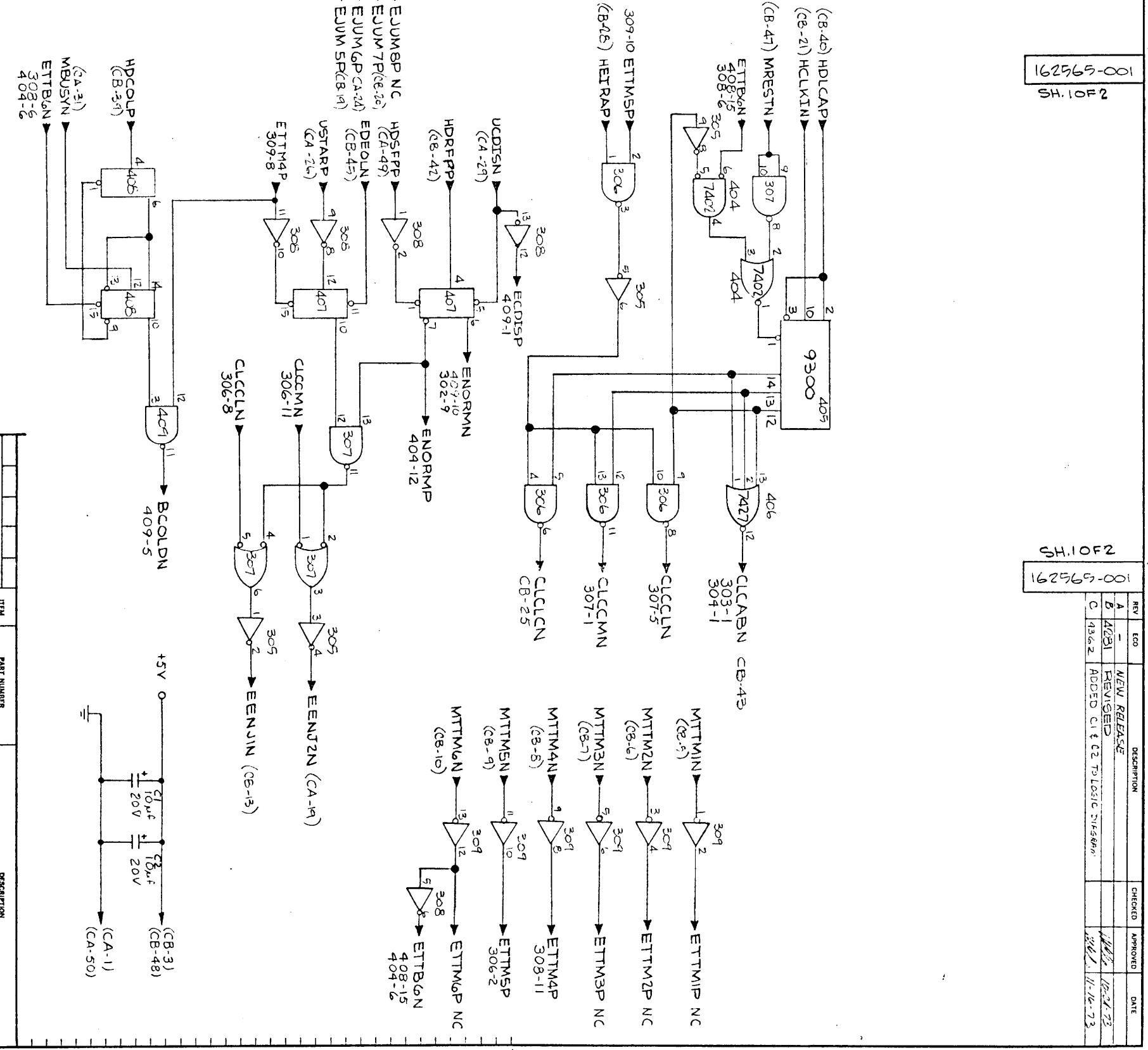
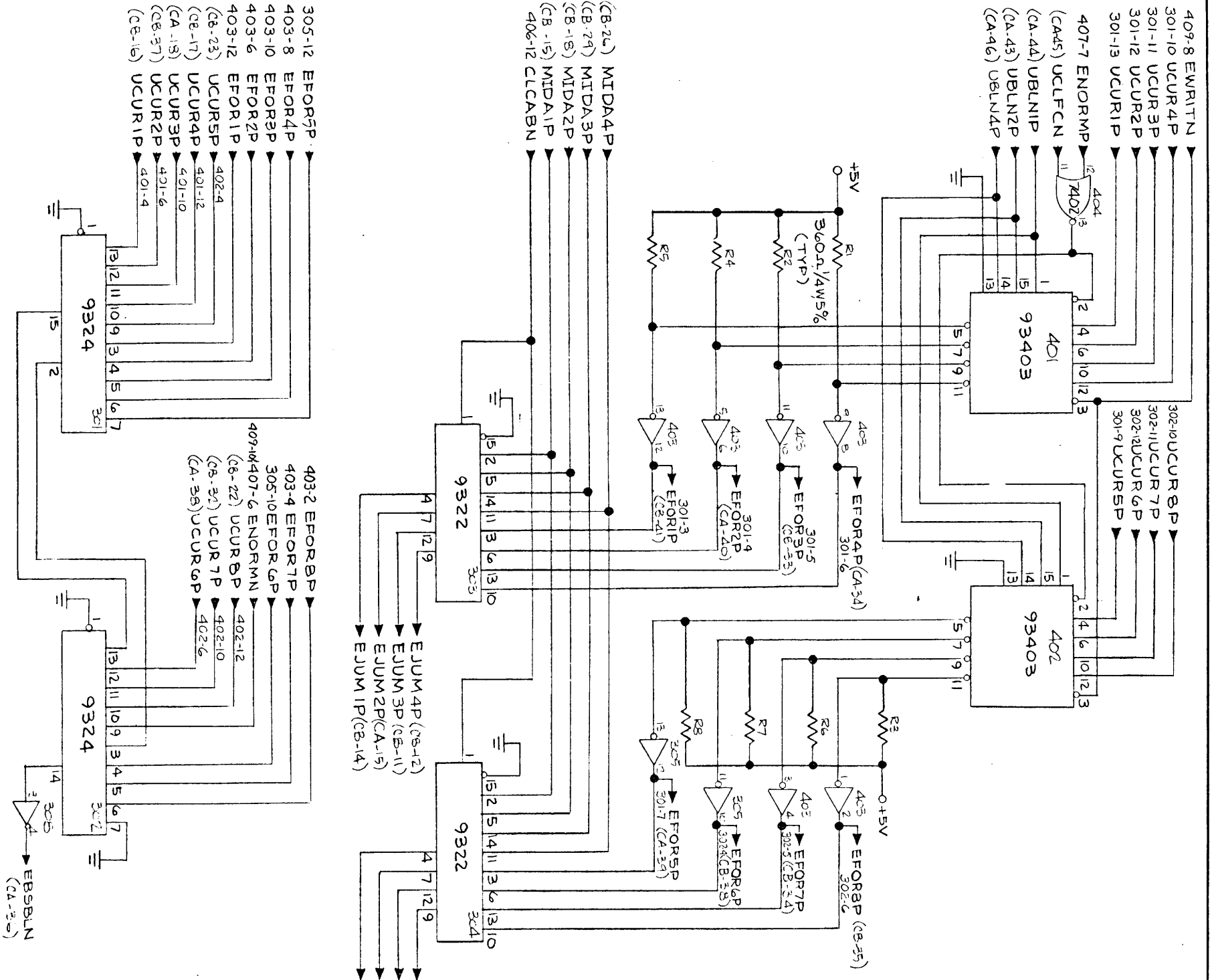
4. ALL ITEMS CALLED OUT (X) REFER TO PARTS LIST
3. STAMP APPROPRIATE DASH NR WHERE INDICATED (X)
2. COMPONENT SIDE SHOWN
1. SCALE 1 TO 1
- NOTES:

QUANTITY/ASSEMBLY		ITEM	PART NUMBER	DESCRIPTION
DRAWING	USED ON	NEXT REV.		
1	480			
3				
4A				
8				
TOLERANCE UNLESS OTHERWISE SPECIFIED:		TITLE		
XX .01		CONRAD		
XX .010		PARTS LAYOUT		
ANGULAR: .1°		MEMORY - 8 LINE		
		162562-002		

162565-001
SH.10F2

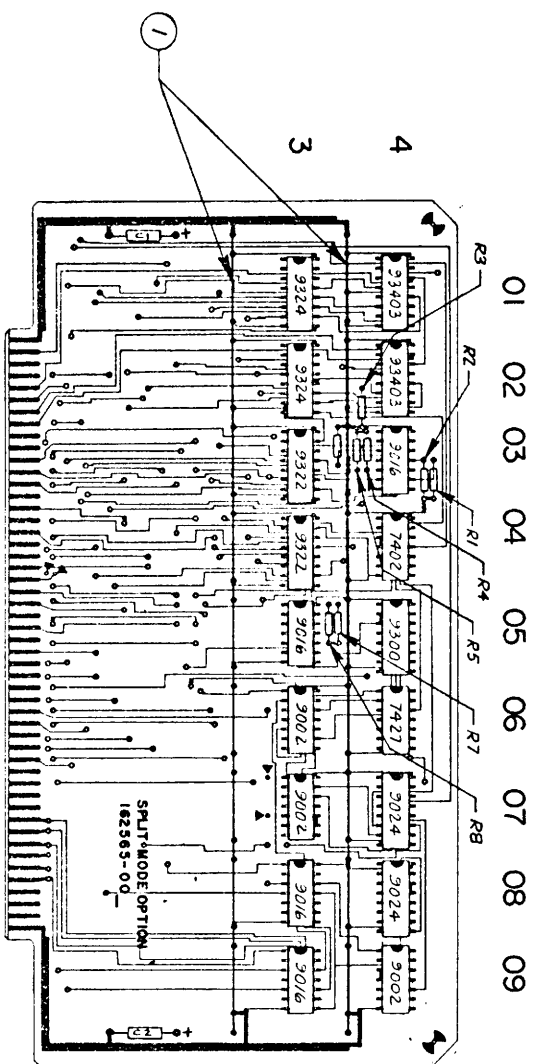
162565-001
SH.10F2

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW RELEASE			
B	4281	REVISED			10-21-73
C	4362	ADDED C1 & C2 TO LOGIC DIAGRAM			11-16-73



QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION
1			
2			
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50			

CONRAC
SCOTT MOORE
-001011-
SH.10F2



WIRE JUMPER	
FROM	TO
303-1	CB-43

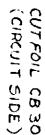
4. SOLDER JUMPER WIRE TO SOLDER SIDE OF BOARD
3. INSTALL PROGRAM PIN(S) FROM CIRCUIT SIDE, IN PLACES INDICATED BY ▲
2. COMPONENT SIDE OF BOARD SHOWN.
1. SCALE = FULL

NOTES: (UNLESS OTHERWISE SPECIFIED)

[illegible]

SH 2 OF 2
162564-001

01 02 03 04 05 06 07 08 09



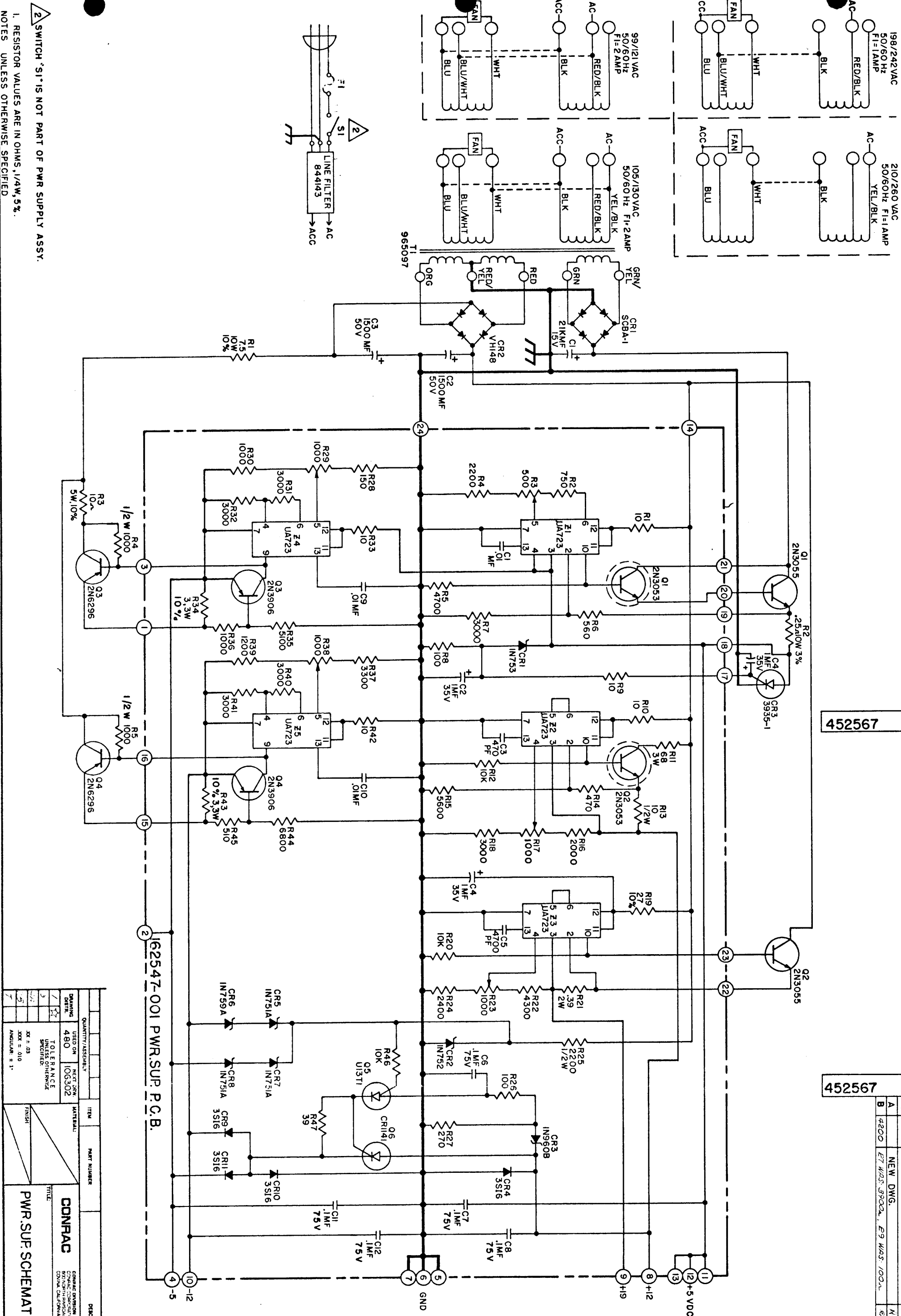
DRAWING CLOCK		QUANTITY/ASSEMBLY	ITEM	PART NUMBER	DESCRIPTION	NAME	DATE
1	480.1RM	QUANTITY/ASSEMBLY	1	844150	BUSS STRIP	DRYAN BY J. C. H.	10/6/22
3	TOLERANCE UNLESS OTHERWISE SPECIFIED	QUANTITY/ASSEMBLY	3			CHECKED BY:	10/6/22
4A	XX - Q3	QUANTITY/ASSEMBLY				DATE:	10/6/22
6A	XXX - Q10	QUANTITY/ASSEMBLY				DATE:	10/6/22
	ANGULAR ± 1°	QUANTITY/ASSEMBLY				DATE:	10/6/22
MATERIAL:		QUANTITY/ASSEMBLY				DATE:	10/6/22
FINISH:		QUANTITY/ASSEMBLY				DATE:	10/6/22
TITLE		QUANTITY/ASSEMBLY				DATE:	10/6/22
CONRAC		QUANTITY/ASSEMBLY				DATE:	10/6/22
PARTS LAYOUT		QUANTITY/ASSEMBLY				DATE:	10/6/22
BLOCK TRANSMIT		QUANTITY/ASSEMBLY				DATE:	10/6/22
BAUD RATE		QUANTITY/ASSEMBLY				DATE:	10/6/22
1625664-001		QUANTITY/ASSEMBLY				DATE:	10/6/22

SH 2072

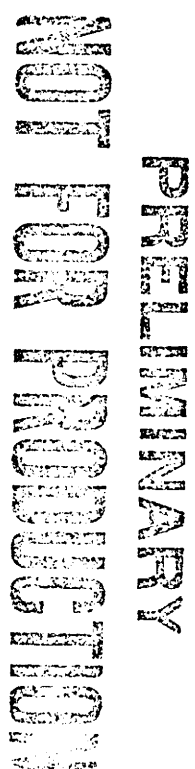
452567

452567

REV	ECO	DESCRIPTION	CHECKED	APPROVED	DATE
A		NEW DWG.	MS	CAP	6/6/72
B	4200	ET WAS 3900, E9 WAS 100, 2	ED	CAP	7-6-72



NOT FOR PRODUCTION



~~NOT FOR PRODUCTION~~

[illegible]