TEKTRONIX®

P7001
FRONT PANEL/Z AXIS

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SERVICE

INSTRUCTION MANUAL

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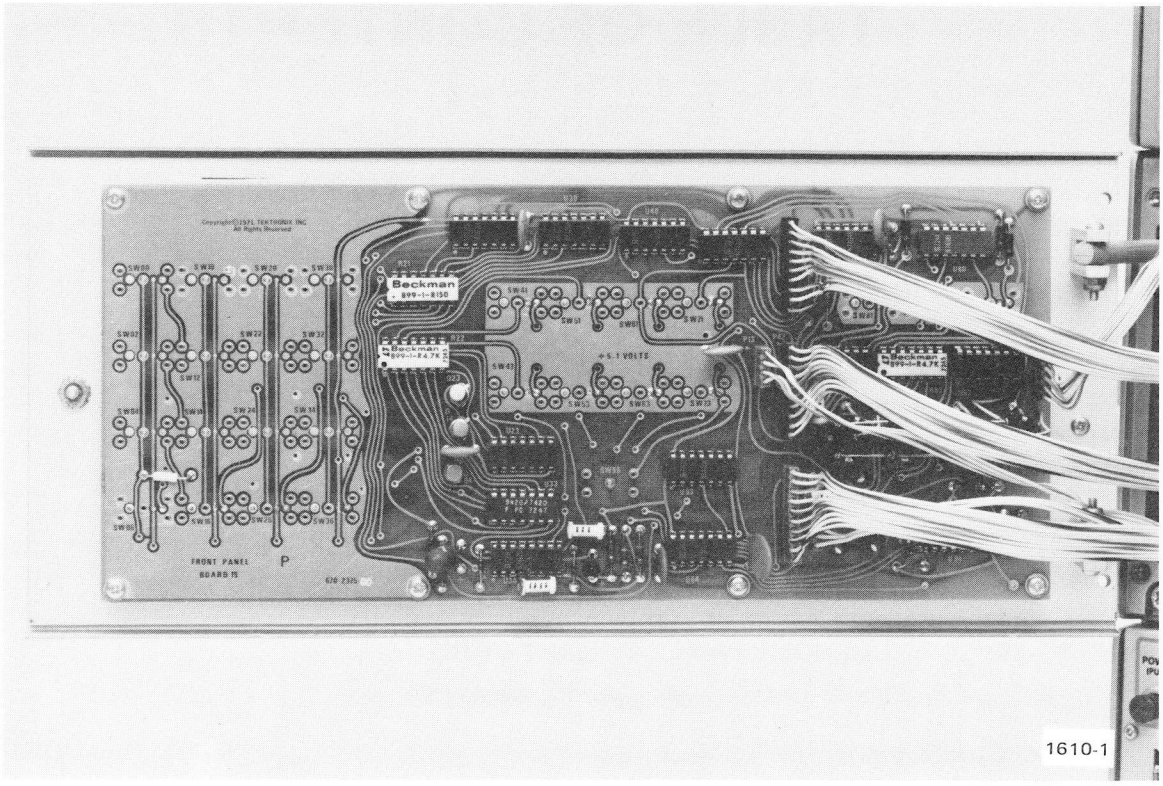
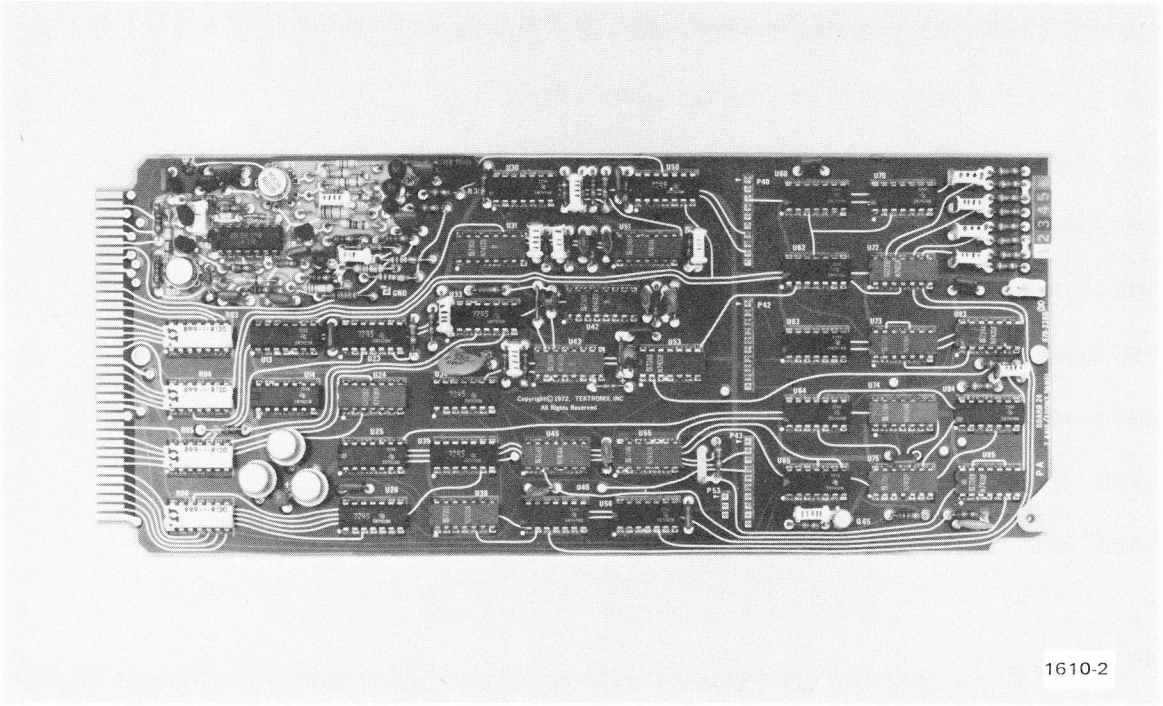


Front Panel Board



Z Axis/Front Panel Circuit Card

P7001
FRONT PANEL & Z AXIS/FRONT PANEL

CIRCUIT DESCRIPTION

FRONT PANEL CIRCUIT BOARD [4A, 4B] and Z AXIS/FRONT PANEL [5A, 5B, and 5C] CIRCUIT CARD

There are many interconnections between the five circuit diagrams in this description, and references will be made to stages located on each diagram. To facilitate locating the mentioned stage, the diagram number, [4A] for example, will be noted after the stage name each time there is a change to another diagram. To simplify composition, diagram numbers are enclosed in brackets in text, rather than a diamond. Stage names are indicated by initial letter capitals, while signal line names are fully capitalized.

Several simplified block diagrams are included that should prove helpful in understanding the description.

GENERAL DESCRIPTION

The Front Panel board and Z Axis/Front Panel card contain circuits for system control and status indication, display switching, Z Axis Valid sensing, and Bus termination.

The FRONT PANEL board includes 28 pushbuttons with their coding and debounce logic and 15 status indicator lamps with decoding and lamp driver logic. The Z AXIS/FRONT PANEL card contains the status latches, data bus interface and control logic, Z Axis Valid sensing, Z axis switching circuits, and P7001 Bus terminations.

Data and power are transmitted between the two boards via three 10-conductor ribbon cables and one 3-conductor ribbon cable. The P7001 Processor may be operated through an I/O device (for example, by a computer) with the Front Panel not installed; however, the Z Axis/Front Panel card is required, as it contains functions essential for processor operation.

DETAILED DESCRIPTION

DATA CHANNEL GRANT SCHEMATIC 5

For the following description, please refer to the simplified block diagram, Fig. 1.

Priority of Data Bus usage within the P7001 is determined by a DATA CHANNEL GRANT (DCG) pulse which originates on the Z Axis/Front Panel card and is transmitted through each card in a "daisy chain" sequence. A $\overline{\text{DCG}}$ pulse is generated by the Data CH Grant Flip-Flop (U13) [5C] whenever $\overline{\text{DATA CH REQ}}$ is low and $\overline{\text{POWER FAIL}}$ and $\overline{\text{SELECT ACK}}$ are high. The output of U13 is applied to the base of Q65 [5A] and to U74A. The delay provided by R65 and C65 allows time for the Bus Controller (U46, etc.) to inhibit DCG Out by pulling high on the input to U65B if it is a requesting controller. Otherwise, DCG is passed on to the next card in the daisy chain by U65B. When the requesting device receives DCG, it pulls down on $\overline{\text{SELECT ACK}}$ [5C], causing DCG to be removed until the requesting device advances to the MASTER state. When $\overline{\text{SELECT ACK}}$ is removed, DCG will again be generated.

The Select Ack Multi (U42A) along with U55A and U23D ensure that a $\overline{\text{SELECT ACK}}$ signal is generated within 3.5 μs after DCG is issued. $\overline{\text{DCG}}$ triggers U42A and is inverted and delayed by U55A and C55. If U42A times out and $\overline{\text{DCG}}$ is still low, U23D is enabled and pulls down on $\overline{\text{SELECT ACK}}$. U42A is retriggered each time $\overline{\text{DCG}}$ is initiated, restarting the timing interval.

U23C triggers the Error Multi (U43A) if a DCG error occurs, turning on DS34 through U33D to provide a visual error indication. C21 couples an $\overline{\text{ERROR INTERRUPT}}$ to U25C [5B] as U43A is triggered, in order to alert the I/O device that a data transfer error has occurred.

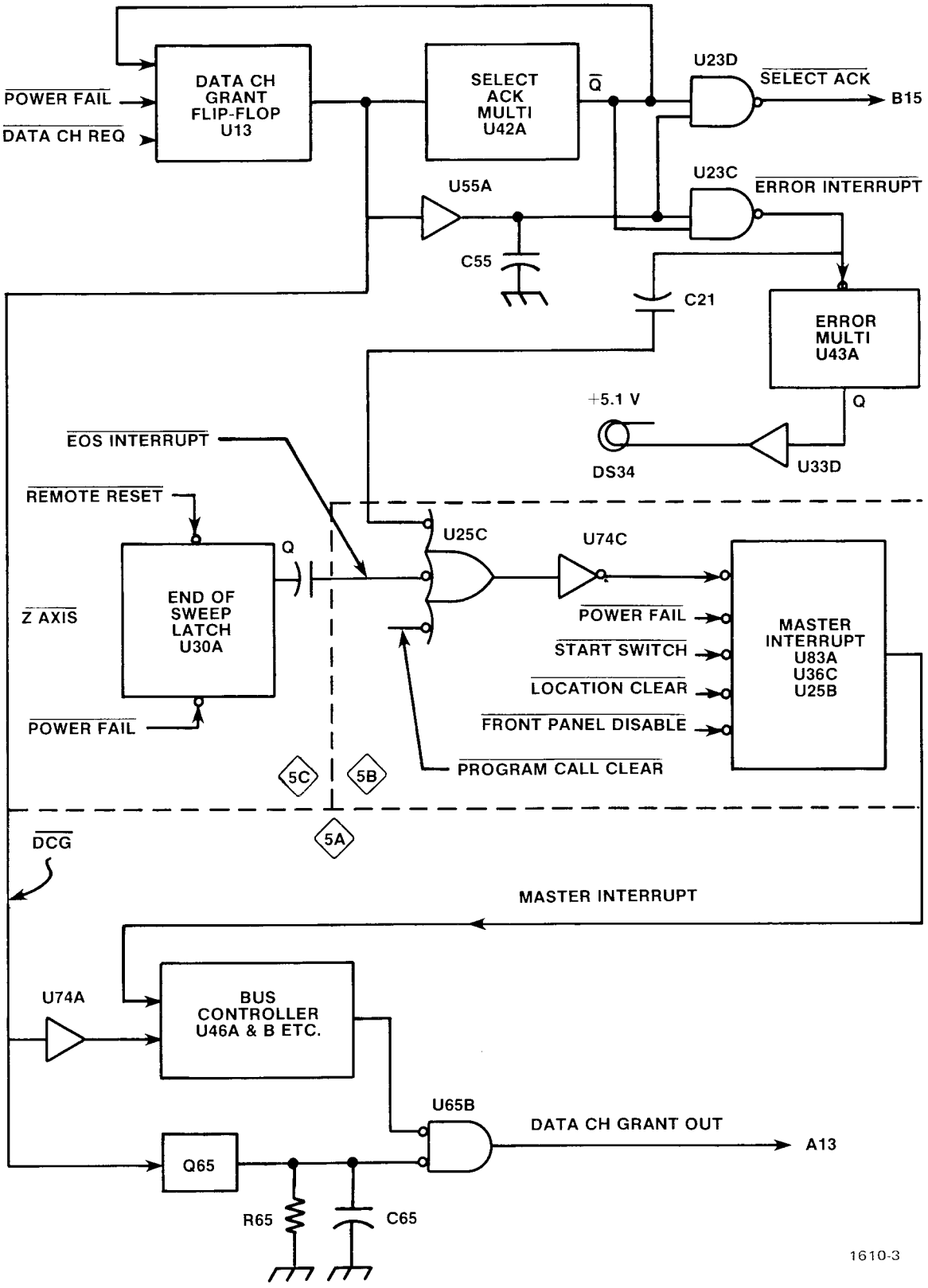


Fig. 1. DATA CH GRANT & SELECT ACKNOWLEDGE GENERATION.

SYNC ACKNOWLEDGE ERROR DETECTION SCHEMATIC 5C

If an address not assigned within the P7001 is called by any device, a SYNC ACK signal is not normally generated, and the Bus Controller logic will hang, preventing further bus usage. To prevent this, U42B, U51B, and U23A operate in a similar manner to the Select Ack Multi (U42A) (previously described) to generate a SYNC ACK signal whenever CONT SYNC remains low for more than 3.5 μs, clearing the Bus for continued operation. U23B triggers the Error Multi and generates an ERROR INTERRUPT as described above for DCG.

STATUS LOGIC SCHEMATIC 5B

The status word latches (U60, U62, U63, U64, U70, and U84A) may be set by any of three methods. Status words may be set by the Front Panel pushbuttons, by a normal data transfer to the Front Panel address (15600 to 15777), or via an I/O STROBE. The contents of the latches are decoded and then displayed by the indicator lamps regardless of the data entry method.

For this description, please refer to the simplified block diagram, Fig. 2.

The status latches are initialized to Hold A, Program Call O, by the application of POWER FAIL through U73A, U73C, and U73D. The Bus Controller (U46, etc.) [5A] is set to the request state by POWER FAIL through U25B [5B] and U74B [5A]. This causes the first Bus operation after POWER FAIL goes high to transmit the status word "HOLD A" to the remainder of the system.

The status latches may be either loaded or examined via the Data Bus, depending on the state of DATA MODE O. In either case, the latches are addressed by applying address 15600 through 15777 to the Address Bus or by asserting I/O STROBE. The board address is decoded by the Address Decoder (U14 and U25A), and a SYNC ACK is generated by U51A and U34D to answer the sending device. I/O STROBE disables U14 via U85A & B, simulating the receipt of the board address, and the remainder of the process is identical to addressing the board via the Address Bus. U45A, C42, R72, C72, U45E, and U75A disable I/O STROBE ADDRESSING for about 2 μs after the Front Panel asserts I/O STROBE, to prevent the board from answering itself (unless no I/O device is installed).

When the address is decoded, U25A output goes low and this signal is combined (with the state of DATA MODE O) by either U53B or U53D and U55D to indicate SEND DATA or LOAD STATUS. If the command is SEND DATA, U53A and U74D generate a LOAD BUS signal which is applied to U24, U75B, and U75C [5B]. The contents of Status Latches U60 and U70 are then applied to the Data Bus via the Data Gates (U24A, B, C, & D). The contents of U62 are applied to the Data Bus via Data Gates (U35B & C) if the Start Latch (U84B) is set, and the contents of U63 and U64 are applied via Data Gates (U26A, B, C, & D) if the Program Call Latch (U84A) is set. The SEND DATA signal is applied directly to U33B & C [5C] to load the contents of the End Of Sweep Latch (U30A) and the Error Multi (U43A) onto the Data Bus.

If DATA MODE O is asserted (low) when the address is received, the Disable Multi (U43B) [5A] will be triggered via U53D and a Load Status command will be applied to the status latches via U55D and U55C. The Data Bus information at the D inputs will then be loaded into U60, U62, U63, U64, and U70 [5B]. U53C decodes HOLD to set or reset the Start Latch (U84B), according to the status word. Additional Data Bus bits are used to set the Display Source Latch (U30B) [5C] and to generate REMOTE RESET and set the End Of Sweep Latch (U30A).

The Disable Multi (U43B) generates a FRONT PANEL DISABLE pulse for approximately 0.5 second after Load Status is generated to prevent status latch override by the Data Handling, Memory Location, or Start pushbuttons. The Program Call pushbuttons are not affected by FRONT PANEL DISABLE. FRONT PANEL DISABLE is applied to the Master Interrupt Detector [5B] to prevent interrupts from being generated by status word changes entered via the Data Bus.

FRONT PANEL BOARD SCHEMATIC 4

The Front Panel pushbuttons are divided logically into three groups plus the Start and Display Source buttons. Each switch closure to ground generates a CLEAR associated with its group and SETS as required by the individual switch function. The component values are chosen so that the SET is removed from the latches last, leaving the appropriate latches set. Additional logic generates a Master Interrupt whenever a switch operation indicates a change in system status.

When one of the Data Handling switches is pushed, U50A, U70A, and C73 [4A] generate a MODE CLEAR at U73C [5B] to clear the Mode Latches (U62A & B) and at U73B to set the Start Latch (U84B) and clear the Program Call Latch (U84A). When the Start Latch is set, the transition at pin 8 pulls U83A pin 4 low (in Master Interrupt Detector) via C37, generating an interrupt. Since the Start Latch is set, the status word will be HOLD regardless of which Data Handling button was pushed. The START output of U84B, which is at the logic high state of time, is applied to U20A [4A] to light the HOLD lamp. U40A & B generate a two bit code ($\overline{M0}$ & $\overline{M1}$) to set the Mode Latches (U62A & B) [5B] to the desired state. U703 & F, U20B & C, and U30D [4A] light the lamp under the button pushed.

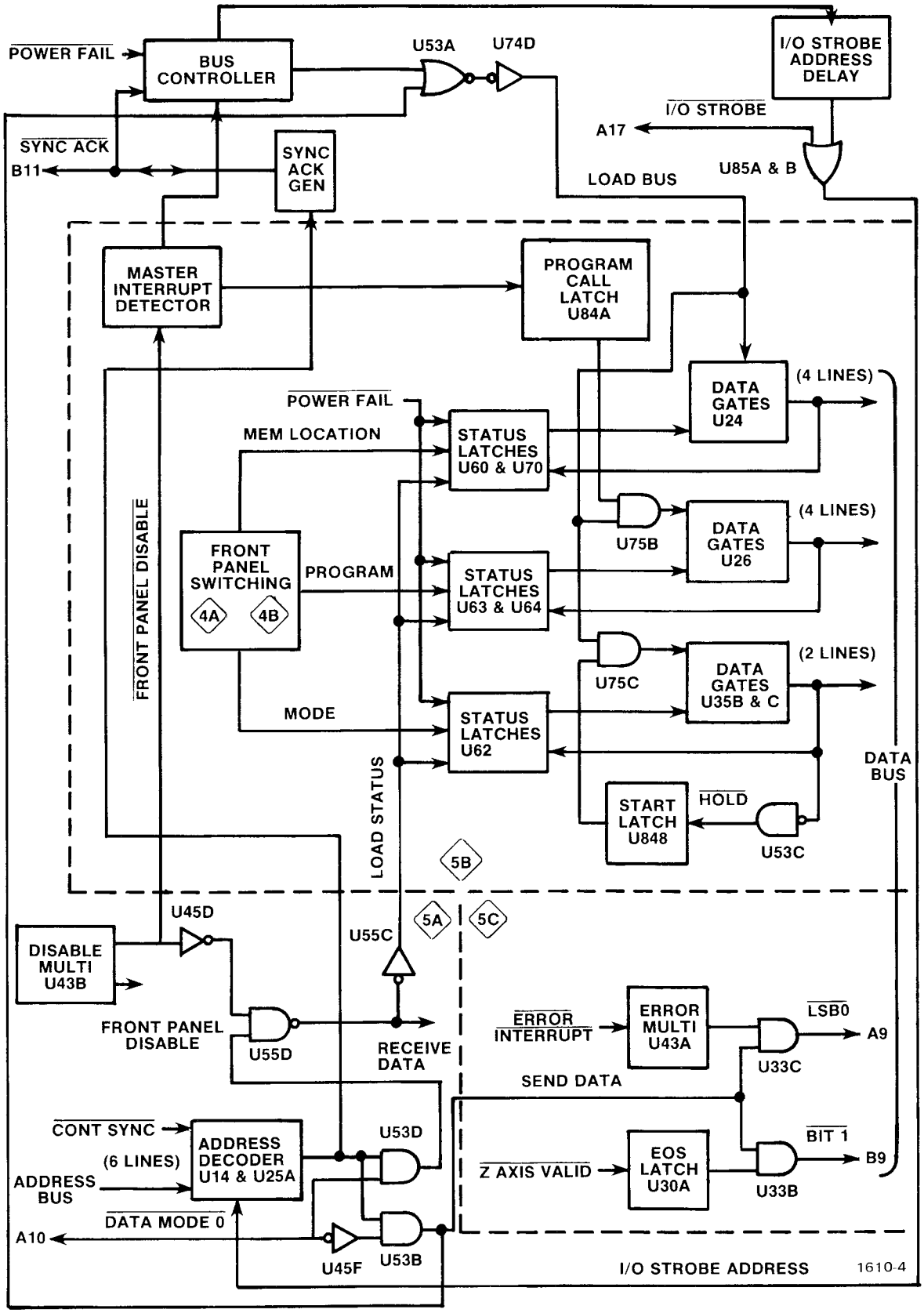


Fig. 2. Simplified block diagram of Front Panel Data Handling.

U94A and U54A form an oscillator to drive the debounce multis U94B, U34A, and U34B [4B] with a retrigger pulse every 3 ms. The timeout of the multi then starts every 3 ms as long as the appropriate switch is depressed, and runs out after the switch is released. This action allows only one transition for each switch operation.

The Start switch (SW55) triggers the Start Multi (U94B) [4A] each time it is depressed, providing that U54B has not decoded a Hold to disable U94B. The output of the Start Multi is coupled to the Start Latch (U84B) [5B] to clear the latch and to the Master Interrupt Detector to generate an interrupt each time the Start switch is pushed.

Pressing any of the Memory Location buttons generates a set at $\overline{A}$, $\overline{B}$, $\overline{C}$, or $\overline{D}$, and via U33B triggers the Location Clear Multi (U34A) [4A] to generate a clear for latches U60 [5B] and U70 via U73D, and an interrupt via U83A (in Master Interrupt Detector). The Location Clear Multi has a period of approximately 500 ms, so new clear pulses are not generated if another button is pushed within this time. New set pulses (during the timeout) are coupled to the appropriate latch, and the latch output coupled to U72B through a capacitor. These capacitors serve to generate an interrupt if any of the latches are set while the Location Clear Multi [4A] is timing out. Fig. 3 is a simplified block diagram showing the major logic in selection of Memory Location A.

Program Call button operation triggers U34B [4B] via U33A, generating an interrupt which is coupled to the Master Interrupt Detector [5B]. This same signal also sets the Program Latches (U63 & U64) via U75D and sets the Program Call Latch (U84A) via U25C and U74C. Each Program Call switch completes a circuit to ground when pushed, either directly or via the bases of Q04 [4B], Q14, or Q23. The low generated at the pull-up resistors is encoded by U23A & B to encode the two LSBs of the Program Call status world; the low at the transistor collectors (base drive supplied by pull-up resistors R22) is encoded by U23C & D to form the two MSBs. The outputs of U23 are passed by U53 until the output of U34B, delayed by U40C, C54, and U54C, disables U53. The outputs of U53 are low long enough to set the Program Latches (U63 and U64) [5B], then are inhibited (to allow Data Bus entry of data) until the Program Call button is released. If any of the program call bits are set, U83B is enabled, and the CPU BUSY lamp is lighted by U72A [4B].

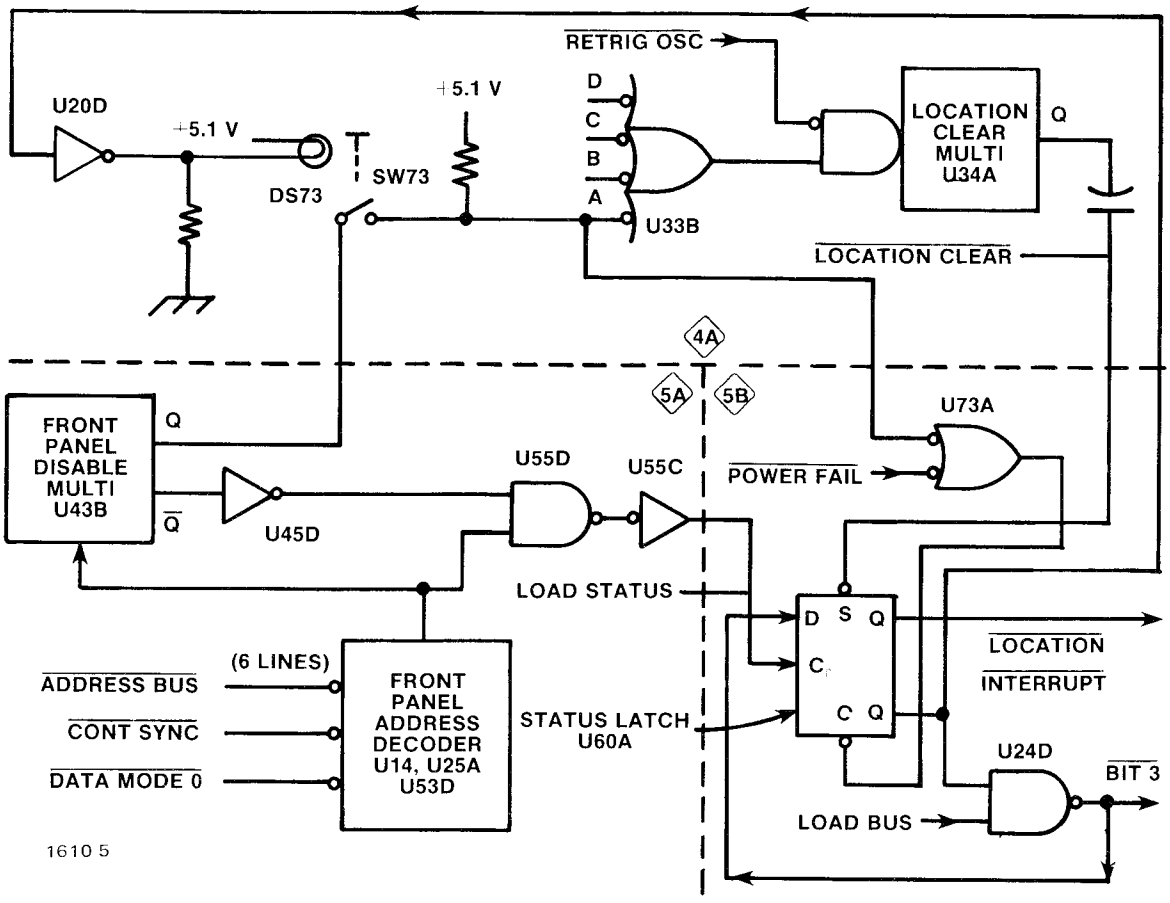


Fig. 3. Simplified Partial Front Panel Logic, showing selection of Memory Location "A" and Indicator Lamp Logic.

DISPLAY SOURCE SWITCHING

The Display Source may be programmed via the Data Bus in a manner similar to the other status latches, or the source may be selected by front-panel pushbuttons. The Data Bus programming is assertive only. If both bits are zero, the Display Source will remain unchanged. No interrupts are generated by the Display Source pushbuttons, and their state may not be read via the Data Bus. If the Display Source is PLUG-INS and one of the Data Handling buttons is pushed, U80D [4B] is enabled by the MODE CLEAR signal and sets the Display Source to BOTH. Otherwise, the Display Source is independent of the operation of the remainder of the front panel controls.

Operation of the Display Source pushbuttons directly sets the tri-flop (U92A & B and U50B) to one of three states. The appropriate lamp is turned on by U70D and U72B, C, & D. In the case of Data Bus programming, the status word is applied to U70B & C and U80A, B, & C via the Display Source Gates (U65C & D) [5A] to set the tri-flop.

The outputs of U92A and U50B [4B] are applied to the clear and set inputs of the Display Source Latch (U30B) [5C] to control the display source drive, and through U50A to U31A. U31B, U51F, C31, and U51E (Processor Chop Oscillator) trigger U31A at a 600 kHz rate whenever U50A is enabled (Display Source is BOTH). HUSH disables the oscillator whenever it is low. Each time U31A is triggered, the Z axis is turned off through U50C & D, Q03, and Q11. After a delay generated by U51D, R52, C52, and U51C, the Display Source Latch (U30B) is clocked to switch the display source. U31A times out somewhat later and enables the Z axis, and U30B determines which Z axis input is routed to the Z AXIS OUT line. The Q output of U30 is used by the channel switches to control the source of crt display.

Z AXIS VALID DETECTION SCHEMATIC 5C

The Z axis current from the Acquisition Unit is routed through Q02 (Z Axis Valid Logic) to cause a similar current through Q01 and R70. This current reduces the current supplied to R70 by Q11, and thereby the voltages at the input to the comparator, U10. Circuit constants at the comparator input are chosen so both inputs follow the Acquisition Unit Z axis output, but at differing gains. If the Z axis current is greater than approximately 1 mA, pin 1 voltage will be higher than pin 2, and the output at pin 5 will be low, indicating Z Axis Valid. Conversely, if the Z axis current is less than 1 mA, pin 1 voltage will be lower than pin 2 and pin 5 will be high, indicating $\overline{\text{Z AXIS VALID}}$ (labeled as $\overline{\text{Z AXIS}}$ at terminal B33).

SWEEP RESET SCHEMATIC 5C

If Data Bus $\overline{\text{BIT 1}}$ is low when $\overline{\text{RECEIVE DATA}}$ is present, U85D is enabled and triggers a monostable composed of U85C, U55B, C57, and R57. The output of U55B is applied to U33A to generate a $\overline{\text{REMOTE RESET}}$ to actuate the single-sweep reset in a horizontal (time-base) plug-in unit, and set the End Of Sweep Latch (U30A). The next time $\overline{\text{Z AXIS}}$ goes high, a zero is clocked into U30A, resetting it and generating an END OF SWEEP INTERRUPT, which is coupled to the Master Interrupt Detector [5B] via U25C.

BUS CONTROLLER SCHEMATIC 5A

The Bus Controller for the Front Panel circuit card is similar to those on other cards in the P7001, except that $\overline{\text{CONTROL SYNC}}$ is never asserted. Also, this controller is always set to the Bus Request state when power is first applied to the instrument so that Memory Location A and Hold are established as initial operating conditions.

The Bus Controller circuitry consists of the D-type flip-flops (U46A and U46B) plus associated inverters and gates. The function of the controller is to allow use of the Bus by other requesting devices (circuit cards) or use of the Bus by the Front Panel card to communicate front-panel switching status (Memory Location, Mode, and Program). The Bus Controller sequences through four states, as indicated by the truth table for U46A and U46B. The four states, IDLE, BUS REQ, SEL ACK, and MASTER will be described as they occur in a normal operation.

IDLE

In this mode, the Q outputs of U46A and U46B are both at the high state. It is assumed that the instrument has been in operation previous to this cycle of operation. The last mode for the controller before IDLE is MASTER. The $\overline{\text{Q}}$ output of U46B is high, as is the Q output of U46A. These highs enable gate U36B, generating $\overline{\text{MASTER}}$ at its output (pin 6). $\overline{\text{SYNC ACK}}$ (terminal B11) would have been asserted due to previous use of the Bus by one of the circuit boards. $\overline{\text{MASTER}}$ and $\overline{\text{SYNC ACK}}$ enable gate U56B, and the resulting output (via U56A) sets U46B so that Q is high. The Q output of U46A is still high from the MASTER mode, so we are now in the IDLE mode.

BUS REQ

Note that in the IDLE mode, the $\overline{\text{Q}}$ outputs of both U46A and U46B are low, enabling gate U56D. The high from pin 13 of U56D is coupled to one input (pin 12) of U36D. When MASTER INTERRUPT occurs due to use of Front Panel pushbuttons, END OF SWEEP INTERRUPT, or by ERROR INTERRUPT, U36D is enabled and U46A is thus cleared. The $\overline{\text{Q}}$ output of U46A goes to high, and the Q of U46B is high. Gate U35A is enabled, generating the $\overline{\text{DATA CH REQ}}$ signal. The controller is now in the BUS REQ mode.

SEL ACK

The $\overline{\text{DATA CH REQ}}$ signal, as previously described under Data Channel Grant [5A or B], cause the $\overline{\text{DATA CH}}$

GRANT (DCG) to be generated. During BUS REQ mode, the $\overline{Q}$ output had gone to high, disabling gate U56D and thus setting the D input of U46B to low. DCG, via U74A, clocks U46B so that its Q output goes to low. The highs at $\overline{Q}$ of both U46A and U46B enable gate U35D and disabling U35A, generating the SELECT ACK signal and removing DATA CH REQ. The controller is now in the SEL ACK mode.

MASTER

SELECT ACK resets the DATA CH GRANT flip-flop (previously described), and DCG goes to high. If the Bus is not busy, BUS BUSY and SYNC ACK are high. The $\overline{Q}$ output of U46A is high, so gate U72A is enabled, generating a clock pulse for U46A. In the meantime the $\overline{Q}$ output of U46B had set the D input of U46A to high. U46A is clocked and its Q output goes high, setting the controller to the MASTER mode. In this mode, U36B is enabled and MASTER is asserted at pin 6 ofU36B.

MASTER is inverted by U36A and U50B to generate BUS BUSY, indicating to other units that the bus is in use. The output of U36A is also coupled through U53A and U74D to form the LOAD BUS signal, which enables the Data Gates for the Front Panel Latches [5B].

MASTER, coupled through inverters U45A, U45B, U45C, and U45E enables gate U34A (after a delay due to charging C42), asserting I/O STROBE at terminal B17.

If the Program Call Latch (U84A) [5B] is not set, PROGRAM CALL at pin 8 of U56C [5A] will be at the low state, and along with I/O STROBE, will enable U56C. The resulting high at pin 5 of U34B and the high at pin 4 from the inverted MASTER signal (via U36A) cause STATUS STROBE to be asserted at terminal A17.

When SYNC ACK is received, U56B is satisfied (since MASTER is low), U46B is reset (via U56A), and the controller returns to its IDLE state. MASTER is coupled through U45E, U45A, R72, and U75A, and delayed approximately 2 μs by C42 and C72 to disable U14A & B. When U14A & B are disabled, U25A is satisfied and SYNC ACK is generated via U51A and U34D. This action occurs only if no other device generates SYNC ACK within 2 μs.

In order to establish initial operating conditions when the instrument is first turned on, the Front Panel Bus Controller is always set to the BUS REQ mode at that time. This is accomplished as follows:

When instrument power is first applied, POWER FAIL is low (see Power Fail Signal in Mainframe Manual Circuit Description). Via U74B and U56A, this signal sets U46B so that Q is high. Simultaneously, POWER FAIL via U25B [5B] generates a MASTER INTERRUPT signal, which is coupled into U36D [5A]. If U46A is in the wrong state (this is, with Q high), gate U56D is enabled by the Q outputs of U46A and B. The output of U56D, along with the MASTER INTERRUPT signal, enables U36D which clears U46A so that its Q output is low. This establishes the BUS REQUEST mode of the controller. Operation of the controller is now the same as described for a normal cycle.

POWER FAIL, via U73D [5B] clears Memory Location Latches U60B, U70A, and U70B. Via U73A, this signal sets latch U60A, asserting Memory Location A. The Mode Latches, U62A and U62B, are cleared by the POWER FAIL signal via U73C, establishing HOLD as the mode.

ACCESS TO FRONT PANEL CIRCUIT BOARD AND THE Z AXIS/FRONT PANEL CIRCUIT CARD

Easy access to these and most other circuit cards in the P7001 is provided by means of a hinged front panel. To release the front-panel hinge, refer to Fig. 4 and follow these steps:

1. Remove the 4 Phillips-head screws located in the corners of the front panel.

2. Hold the Front-Panel Pull located at the left side of the panel and carefully pull straight out until the stop is reached. The front panel should now be approximately 2½ inches out from the instrument.

3. Pull the right-hand edge of the front panel out and to the left (rotating) to open.

NOTE

When re-closing the front panel, make certain that the ribbon-cable leads are tucked back into the instrument and do not get squeezed between the front panel and the frame.

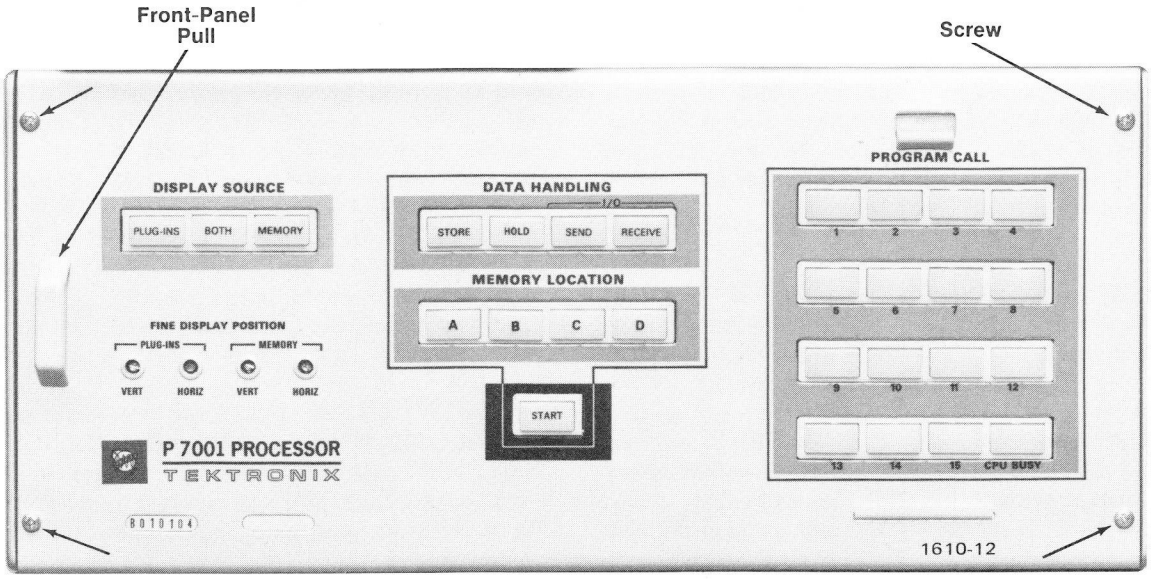


Fig. 4. Access to circuit cards.

SERVICING THE Z AXIS/FRONT PANEL CARD

To service the Z Axis/Front Panel card, a Card Extender (Part No. 067-0683-00) is required. The ribbon-cable leads are long enough to permit operation of the card while it is mounted outboard of the instrument on the card extender.

To install the card extender, first turn the instrument power off. Then, release the Z Axis/Front Panel card by pressing down on the nylon release, (located on the front lower edge of the board). Carefully pull the card out and free of its slide track. Install the card extender in place of the card and plug the card into the extender. Fig. 5 shows the card mounted on the extender.

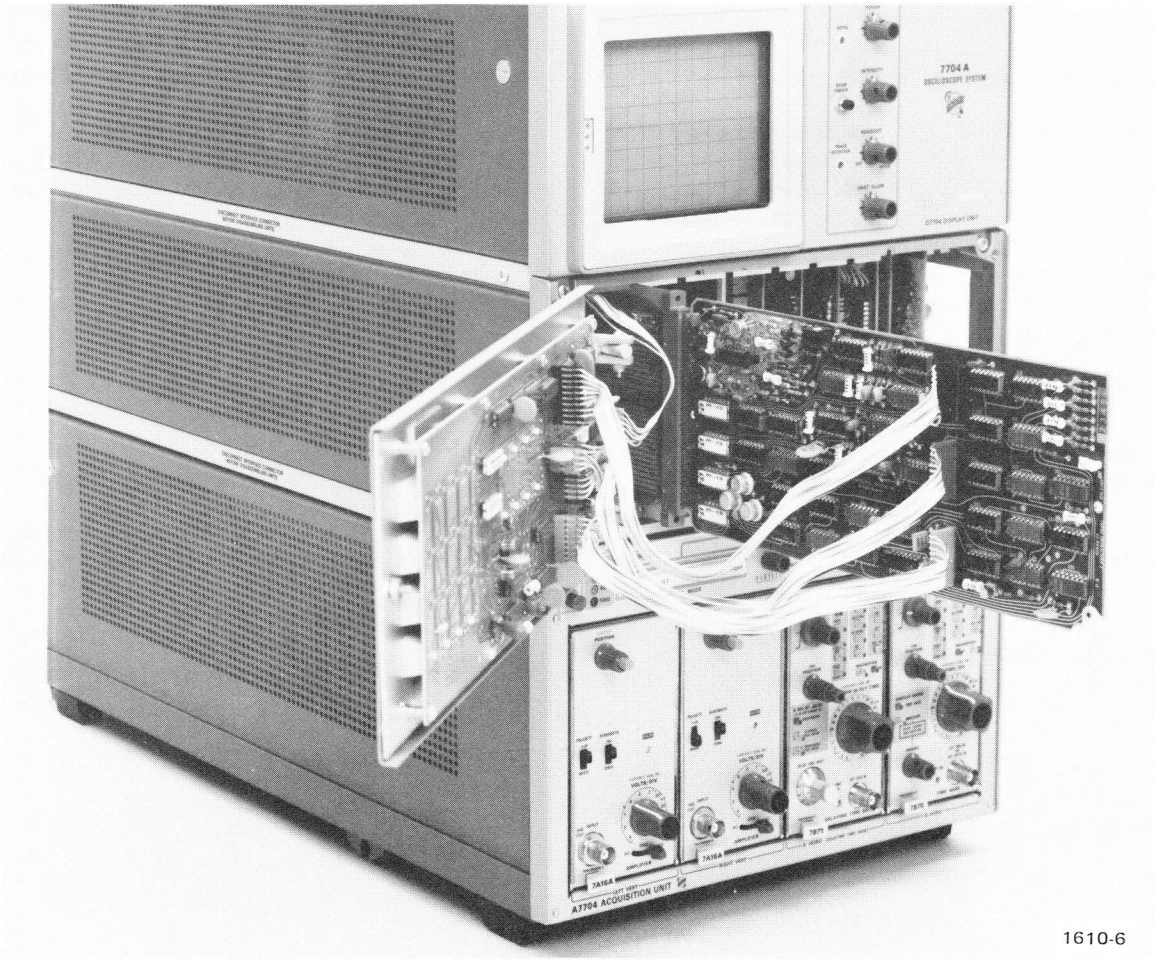


Fig. 5. Z Axis/Front Panel card mounted on a card extender for servicing.

CALIBRATION PROCEDURE

FRONT PANEL BOARD

Calibration of the Front Panel Board consists of adjusting the four front-panel FINE DISPLAY POSITION potentiometers.

Since these controls are operational adjustments, a procedure for setting them is covered in the DPO Operators Manual (070-1599-00). If the controls are too far out of range to use that procedure, please refer to the Sample & Hold and Display Generator calibration procedures in the individual manuals.

Z AXIS/FRONT PANEL CARD

The Z Axis/Front Panel card has only one Calibration adjustment, labeled OFFSET (R30) on schematic [5C]. This control adjusts the $\overline{\text{Z AXIS}}$ signal for proper operation with all settings for the Acquisition Unit A or B INTEN controls. Misadjustment of the $\overline{\text{Z AXIS}}$ signal typically causes loss of the ability to store waveforms in the P7001, so its adjustment should be checked whenever difficulty of this nature is encountered.

Equipment Required:

1. Test Oscilloscope – Tektronix 7704A with 7B70 or 7B71 Time Base and 7A16A Amplifier recommended.

2. 10X Probe – P6053A.

3. Screwdriver – 3" to 5" shaft, narrow, with small blade tip.

Proceeds as follows:

1. With Front Panel swung open, mount the Z Axis/Front Panel card on a card extender.

2. Connect the test oscilloscope probe tip to TP_2. This test point is located at the upper edge of the card near the edge-connector. Fig. 6 shows the test probe attached.

3. Turn the power on and allow the DPO to warm up, at least 20 minutes, meanwhile presetting the controls:

P7001

DISPLAY SOURCE – PLUG-INS
DATA HANDLING – HOLD
MEMORY LOCATION – A

Acquisition Unit

TIME BASE	1 μs/DIV – Free running
AMPLIFIER	Center trace without waveform

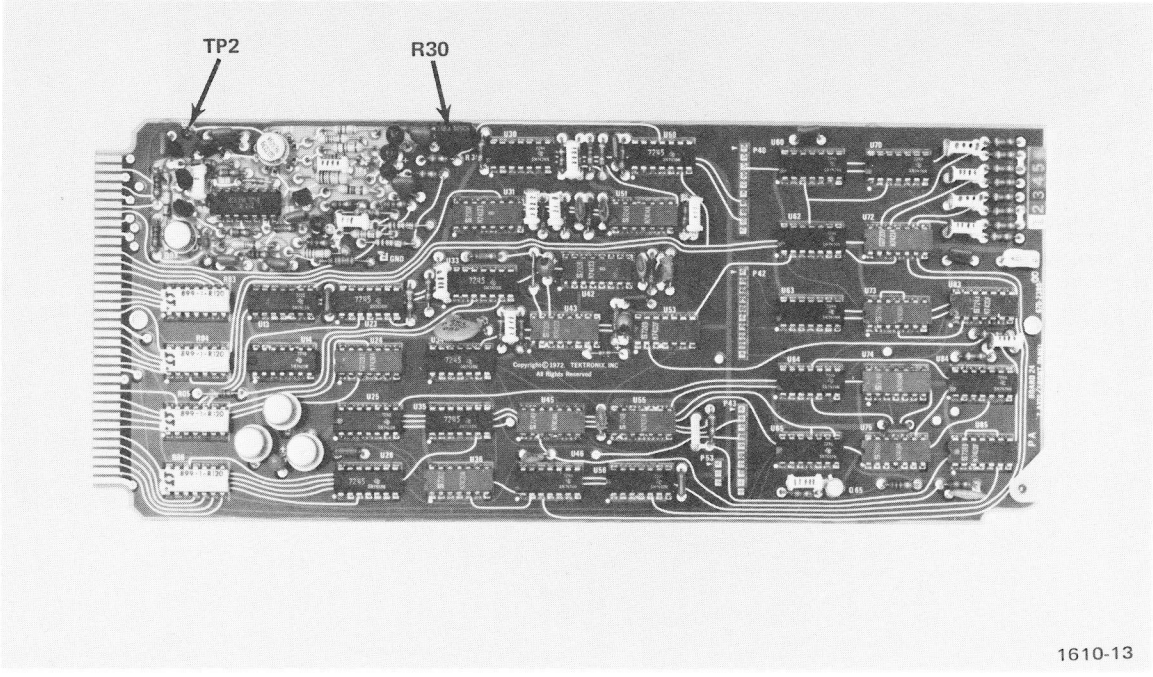


Fig. 6. R30 and TP2, Z Axis/Front Panel card.

Test Oscilloscope

TIME BASE	5 μs/DIV – AUTO Trigger
AMPLIFIER	2 V/DIV (.2 V/DIV + 10X Probe)

4. Obtain a sweep (trace) on the screen of the DPO Display Unit.

5. Turn the A & B INTEN controls on the Acquisition Unit fully ccw (off).

6. Locate R30, at the top edge of the Z Axis/Front Panel card (Fig. 6).

Observing the test oscilloscope screen, adjust R30 slowly cw and then ccw between the points where the Z Axis blanking pulses disappear and the trace becomes a steady high or a steady low. This indicates range of the adjustment. Set R30 midway between these two points, where the waveform is steady and free of jitter. Fig. 7 shows the proper waveform.

7. Change the P7001 DISPLAY SOURCE to BOTH.

8. Adjust R30 carefully until the test oscilloscope display is the same as that seen when the DISPLAY SOURCE is set to PLUG-INS. The waveform should be stable and free of jitter.

9. Rotate the INTEN control (A or B), which is selected by the Acquisition Unit HORIZONTAL MODE, through its range and check for the same waveform obtained in Step 8. If jitter is encountered at any setting of the INTEN control, R30 must be re-adjusted.

10. Change the Time Base plug-in unit to the other horizontal compartment (A or B HORIZ), change the HORIZONTAL MODE to match, and repeat Step 9, rotating the now-selected INTEN control through its range.

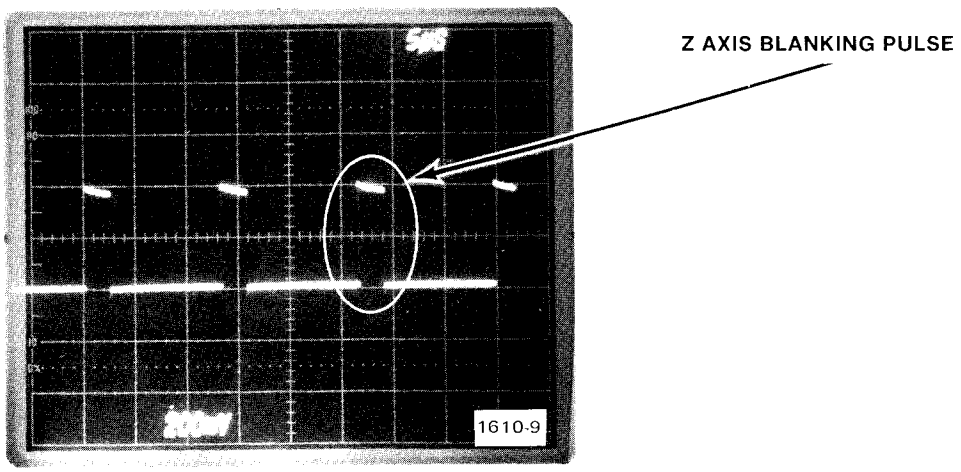


Fig. 7. Z AXIS signal at TP2, Z Axis/Front Panel card.

REPLACEABLE PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 *Name & Description*

Assembly and/or Component
Attaching parts for Assembly and/or Component
- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07707	USM CORP., USM FASTENER DIV.	510 RIVER RD.	SHELTON, CT 06484
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
08806	GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT	NELA PARK	CLEVELAND, OH 44112
11237	CTS KEENE, INC.	3230 RIVERSIDE AVE.	PASO ROBLES, CA 93446
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
18677	SCANBE MFG. CORP.	3445 FLETCHER AVE.	EL MONTE, CA 91731
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E WASHINGTON STREET P O BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
93907	CAMCAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
	670-2375-00	B010100	B070394	CKT BOARD ASSY:FRONT PANEL	80009	670-2375-00
	670-2375-01	B070395		CKT BOARD ASSY:FRONT PANEL	80009	670-2375-01
C11	290-0532-00			CAP.,FXD,ELCTLT:150UF,20%,6V	90201	TDC157M006WLC
C13	290-0532-00			CAP.,FXD,ELCTLT:150UF,20%,6V	90201	TDC157M006WLC
C17	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C19	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C21	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C23	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C25	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C27	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C33	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C35	281-0523-00	B010100	B070394	CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C35	281-0540-00	B070395		CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C36	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C38	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T368C476M020AZ
C43	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C54	283-0104-00			CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C73	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C92	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C94	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C95	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
CR33	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR38	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR71	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR95	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
DS06	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS16	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS26	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS36	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS41	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS43	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS51	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS53	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS61	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS63	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS71	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS73	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS81	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS91	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS101	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
Q04	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q14	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q23	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
R21	307-0348-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R150
R22	307-0383-00			RES.,FXD,FILM:4.7K OHM,2%,1.5W	73138	899-1-R4.7K
R33	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R34	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R36	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R37	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R38	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R43	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R52	311-0448-00			RES.,VAR,NONWIR:20K OHM,+/-20%	11237	41331

FRONT PANEL (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R54	311-0448-00			RES.,VAR,NONWIR:20K OHM,+/-20%	11237	41331
R60	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R61	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R62	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R64	311-0448-00			RES.,VAR,NONWIR:20K OHM,+/-20%	11237	41331
R66	311-0448-00			RES.,VAR,NONWIR:20K OHM,+/-20%	11237	41331
R71	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R73	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R82	307-0383-00			RES.,FXD,FILM:4.7K OHM,2%,1.5W	73138	899-1-R4.7K
R92	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R94	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R95	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
S00	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S02	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S04	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S06	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S10	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S12	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S14	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S16	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S20	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S22	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S24	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S26	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S30	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S32	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S34	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S36	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S41	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S43	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S51	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S53	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S55	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S61	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S63	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S71	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S73	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S81	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S91	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
S101	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
U20	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U23	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U30	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U33	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U34	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00
U40	156-0129-00			MICROCIRCUIT,DI:QUAD 2-INPUT GATE	80009	156-0129-00
U50	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U53	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U54	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U70	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U72	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U80	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00

FRONT PANEL (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U92	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U94	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
	670-2375-02			CKT BOARD ASSY:FRONT PANEL,OPTION 21	80009	670-2375-02
C1911	290-0532-00			CAP.,FXD,ELCTLT:150UF,20%,6V	90201	TDC157M006WLC
C1913	290-0532-00			CAP.,FXD,ELCTLT:150UF,20%,6V	90201	TDC157M006WLC
C1917	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1919	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1921	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1923	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1925	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1927	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1933	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C1935	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C1936	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C1938	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T368C476M020AZ
C1943	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C1954	283-0104-00			CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C1973	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C1992	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C1994	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C1995	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
CR1933	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1938	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1971	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR1995	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
DS1906	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1916	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1926	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1936	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1941	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1943	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1951	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1953	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1961	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1963	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1971	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1973	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1981	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS1991	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS19101	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
Q1904	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1914	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q1923	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
R1921	307-0348-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R150
R1922	307-0383-00			RES.,FXD,FILM:4.7K OHM,2%,1.5W	73138	899-1-R4.7K
R1933	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R1934	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1936	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1937	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1938	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R1943	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1952	311-0448-00			RES.,VAR,NONWIR:PNL,20K OHM,0.5W	01121	W-7703
R1954	311-0448-00			RES.,VAR,NONWIR:PNL,20K OHM,0.5W	01121	W-7703

FRONT PANEL OPTION 21 (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1960	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1961	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1962	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R1964	311-0448-00			RES.,VAR,NONWIR:PNL,20K OHM,0.5W	01121	W-7703
R1966	311-0448-00			RES.,VAR,NONWIR:PNL,20K OHM,0.5W	01121	W-7703
R1971	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R1973	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1982	307-0383-00			RES.,FXD,FILM:4.7K OHM,2%,1.5W	73138	899-1-R4.7K
R1992	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1994	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R1995	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
SW1900	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1902	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1904	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1906	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1910	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1912	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1914	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1916	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1920	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1922	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1924	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1926	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1930	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1932	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1934	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1936	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1941	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1943	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1951	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1953	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1955	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1961	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1963	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1971	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1973	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1981	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW1991	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
SW19101	214-0628-00			SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
U1920	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U1923	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U1930	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U1933	156-0034-00			MICORCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U1934	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE SHOT W/CLEAR	80009	156-0172-00
U1940	156-0129-00			MICROCIRCUIT,DI:QUAD 2-INPUT GATE	80009	156-0129-00
U1950	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U1953	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U1954	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U1970	156-0058-00			MICROCIRCUIT,DI:HEX INVERTER	80009	156-0058-00
U1972	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U1980	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U1992	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U1994	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLEAR	80009	156-0172-00

Z AXIS LOGIC (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
	670-2380-00	B010100	B059999	CKT BOARD ASSY:Z AXIS LOGIC	80009	670-2380-00
	670-2380-01	B060000		CKT BOARD ASSY:Z AXIS LOGIC	80009	670-2380-01
C01	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C02	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C03	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C04	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C05	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C05	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C06	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C06	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C07	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C07	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C08	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C09	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C10	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C11	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C13	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C14	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C14	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C15	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C15	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C16	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C16	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C17	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C17	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C18	283-0010-00	B010100	B039999	CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C18	283-0111-00	B040000		CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C19	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C20	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C21	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C23	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C25	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C30	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C31	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C33	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C36	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C37	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C42	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C43	290-0530-00			CAP.,FXD,ELCTLT:68UF,20%,6V	90201	TDC686M006NLF
C45	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C47	283-0067-00	B010100	B090549	CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C47	283-0065-01	B090550		CAP.,FXD,CER DI:0.001UF,5%,100V	72982	0835582Z5E00102J
C49	290-0530-00			CAP.,FXD,ELCTLT:68UF,20%,6V	90201	TDC686M006NLF
C51	283-0104-00			CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C52	281-0546-00			CAP.,FXD,CER DI:330PF,10%,500V	04222	7001-1380
C53	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C54	281-0605-00			CAP.,FXD,CER DI:200PF,10%,500V	04222	7001-1375
C55	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C57	283-0058-01			CAP.,FXD,CER DI:0.027UF,10%,100V	72982	841-000C0Z0105F
C60	283-0067-00	B0101000	B059999X	CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C65	281-0623-00			CAP.,FXD,CER DI:650PF,5%,500V	04222	7001-1362
C67	281-0501-00			CAP.,FXD,CER DI:4.7PF,+/-1PF,500V	72982	301-000S2H0479F

Z AXIS LOGIC (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C68	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C71	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C72	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C75	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C79	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C83	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C86	281-0549-00			CAP.,FXD,CER DI:68PF,10%,500V	72982	301-000U2J0680K
CR05	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR06	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR07	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR43	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR49	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR77	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
CR79	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	80009	152-0141-02
DS34	150-0048-00			LAMP,INCAND:5V,60MA	08806	683
Q01	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q02	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q03A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q11	151-0367-00			TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q65	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
R03	307-0362-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R120
R04	307-0362-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R120
R05	307-0362-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R120
R06	307-0362-00			RES.,FXD,FILM:13 RES NETWORK	73138	899-1-R120
R07	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R09	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R11	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R13	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R19	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R20	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R21	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R22	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R23	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R25	321-0147-00			RES.,FXD,FILM:332 OHM,1%,0.125W	91637	MFF1816G332R0F
R26	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R27	321-0267-00			RES.,FXD,FILM:5.9K OHM,1%,0.125W	91637	MFF1816G59000F
R29	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R30	311-1236-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	73138	72X-22-0-251K
R31	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R32	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R33	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R34	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R35	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R36	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R37	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R39	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R43	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R45	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R46	321-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.125W	91637	MFF1816G54901F
R47	315-0103-00	B010100	B080489	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R47	315-0123-00	B080490	B090549	RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235

Z AXIS LOGIC (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R47	321-0302-00	B090550		RES.,FXD,FILM:13.7K OHM,1%,0.125W	91637	MFF1816G13701F
R49	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R50	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R51	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R52	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R53	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R54	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R56	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R57	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R61	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	91637	MFF1816G23700F
R62	321-0203-00			RES.,FXD,FILM:1.27K OHM,1%,0.125W	91637	MFF1816G12700F
R63	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R64	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R65	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R66	321-0218-00			RES.,FXD,FILM:1.82K OHM,1%,0.125W	91637	MFF1816G18200F
R67	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R68	321-0196-00			RES.,FXD,FILM:1.07K OHM,1%,0.125W	91637	MFF1816G10700F
R70	322-0223-00			RES.,FXD,FILM:2.1K OHM,1%,0.25W	75042	CEBT0-2051F
R71	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R72	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R73	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R74	321-0351-00			RES.,FXD,FILM:44.2K OHM,1%,0.125W	91637	MFF1816G44201F
R75	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R77	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R79	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R80	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	91637	MFF1816G60400F
R81	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R83	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R84	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R85	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R86	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	91637	MFF1816G23700F
R87	321-0203-00			RES.,FXD,FILM:1.27K OHM,1%,0.125W	91637	MFF1816G12700F
R88	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R89	321-0359-00			RES.,FXD,FILM:53.6K OHM,1%,0.125W	91637	MFF1816G53601F
R90	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R91	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R95	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R96	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
U10	156-0251-00			MICROCIRCUIT,DI:VOLTAGE COMPENSATOR	18324	E5059K/NE529K
U11	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	80009	156-0048-00
U13	156-0149-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND SCHMITT	80009	156-0149-00
U14	156-0165-00			MICROCIRCUIT,DI:DUAL 4-INPUT POS NOR GATE	01295	SN7425N
U23	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U24	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U25	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U26	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U30	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U31	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00
U33	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U34	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U35	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U36	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U42	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00

Z AXIS LOGIC (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U43	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00
U45	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U46	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U50	156-0145-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	80009	156-0145-00
U51	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U53	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U55	156-0150-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR	01295	SN7437N
U56	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U60	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U62	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U63	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U64	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U65	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U70	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U72	156-0297-00			MICROCIRCUIT,DI:DUAL 4-INPUT AND GATE	18324	N7421A
U73	156-0129-00			MICROCIRCUIT,DI:QUAD 2-INPUT GATE	80009	156-0129-00
U74	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U75	156-0129-00			MICROCIRCUIT,DI:QUAD 2-INPUT GATE	80009	156-0129-00
U83	156-0034-00			MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE	80009	156-0034-00
U84	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U85	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
VR59	152-0279-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	80009	152-0279-00

Replaceable Mechanical Parts

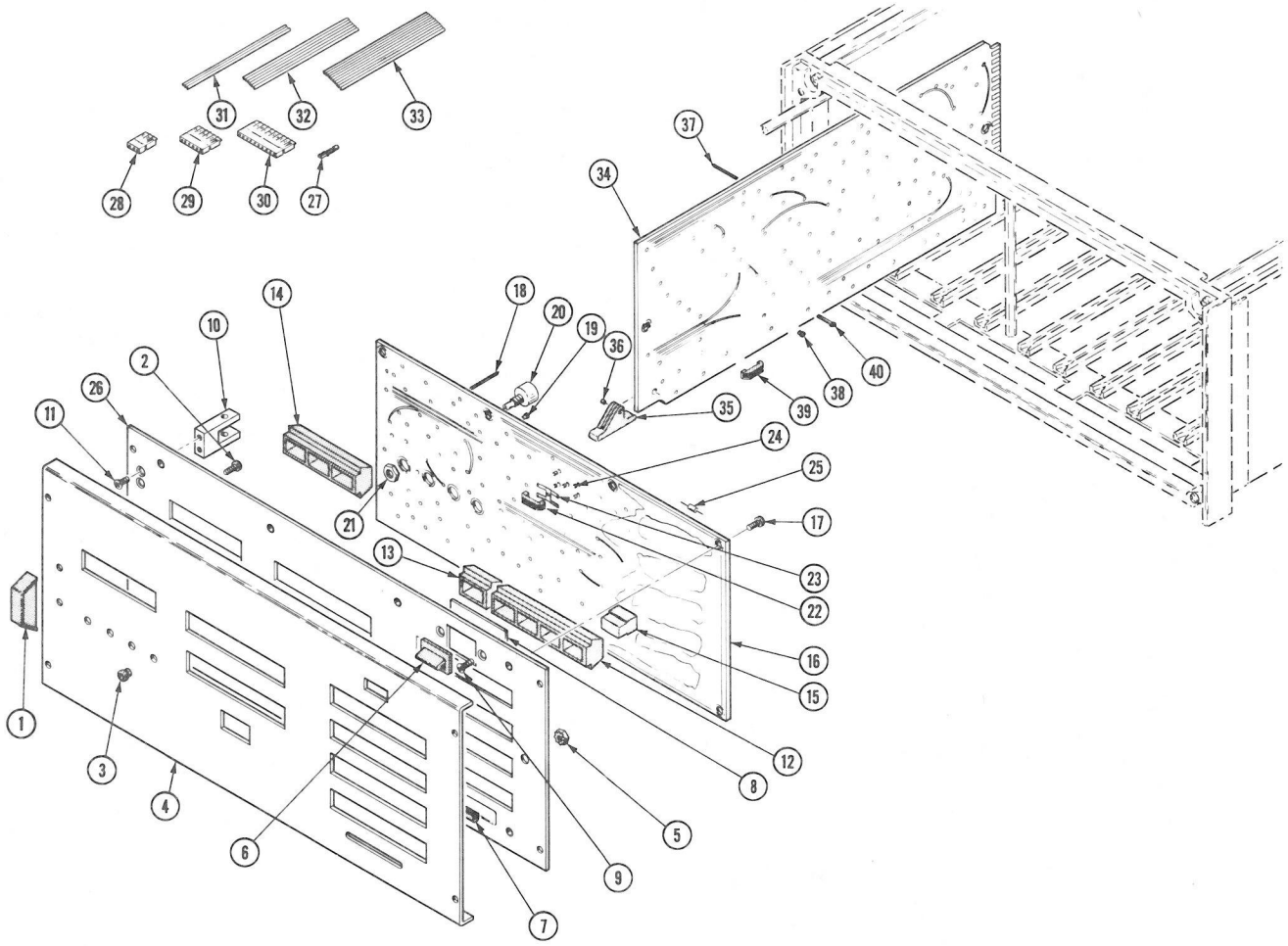
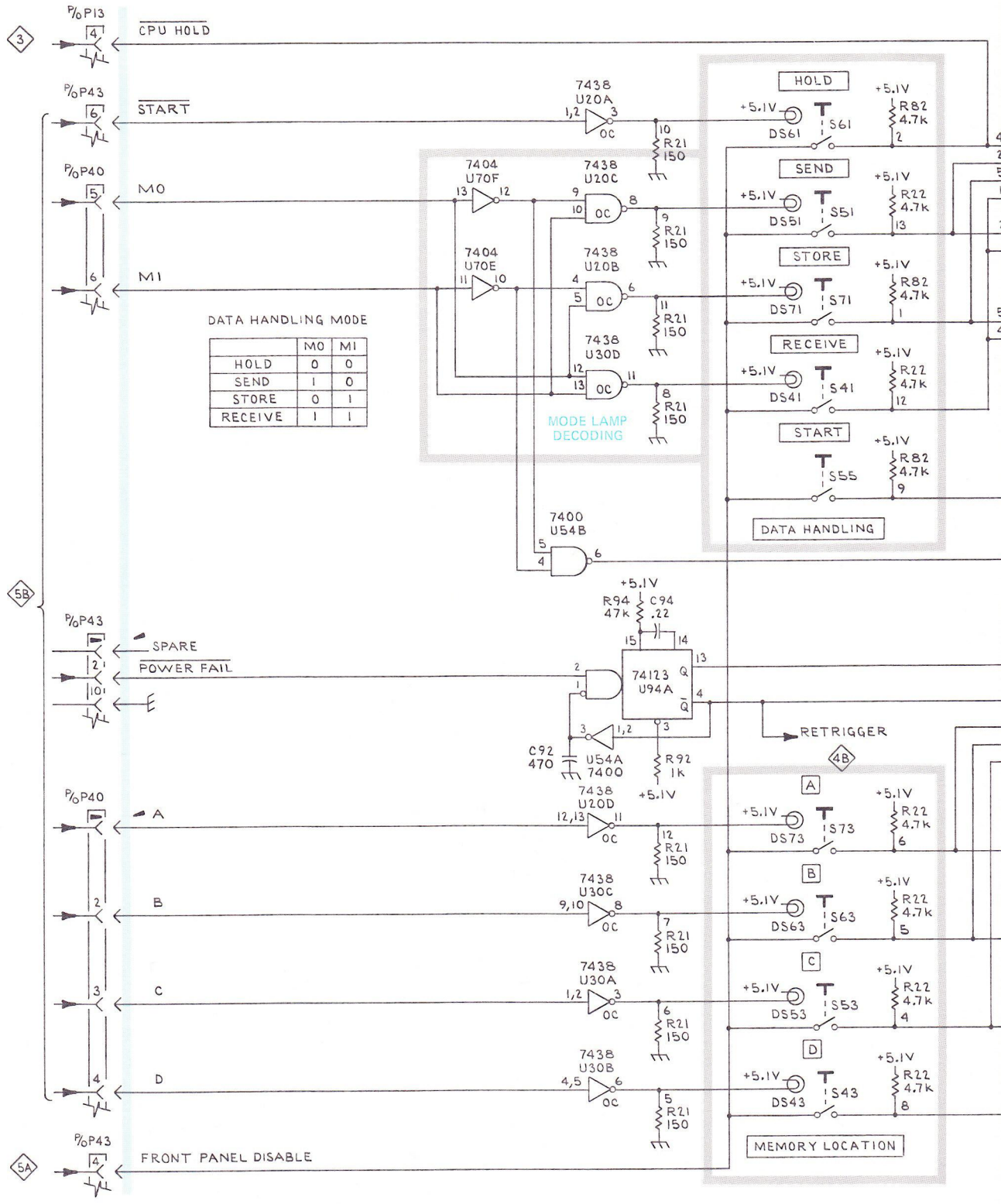
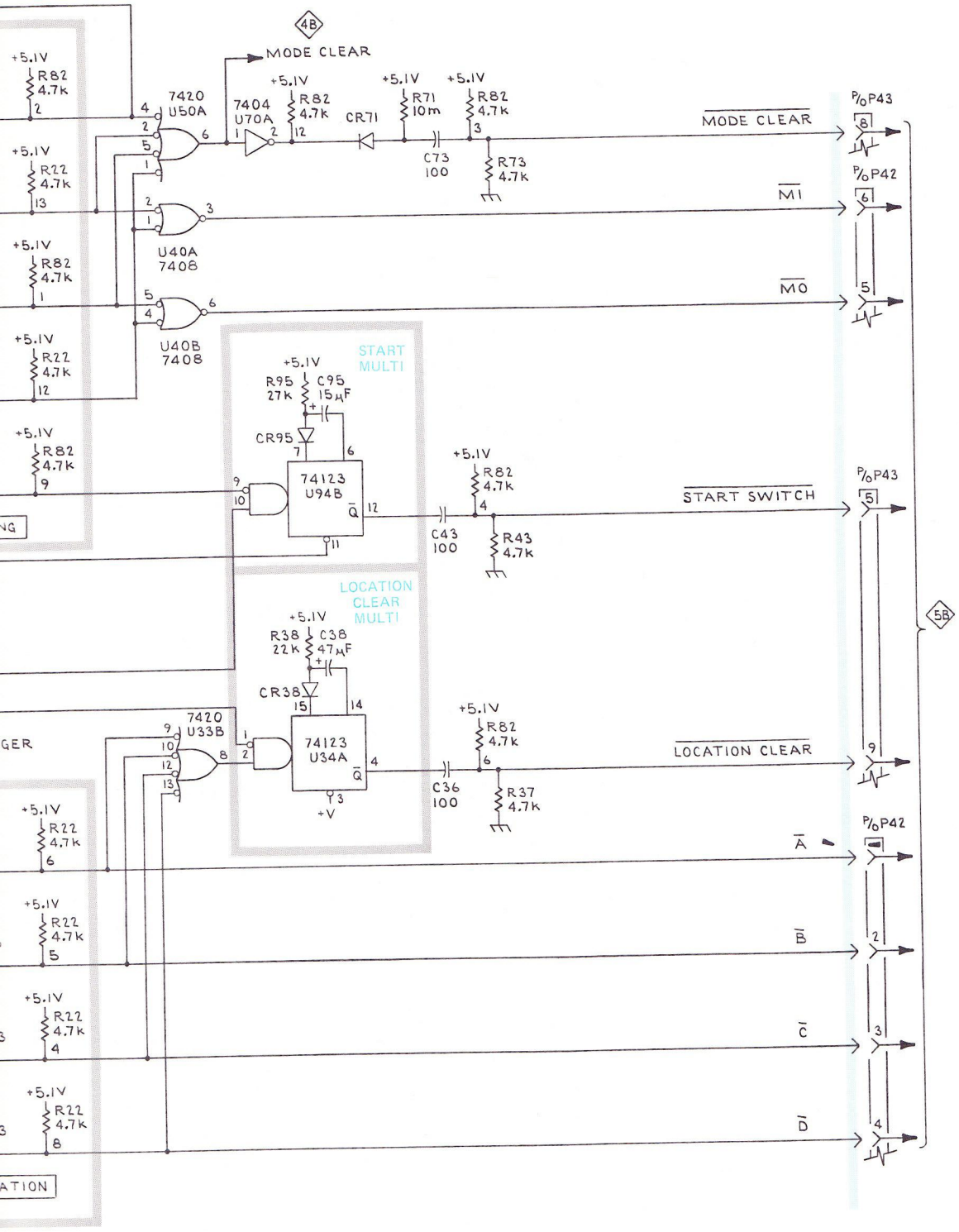


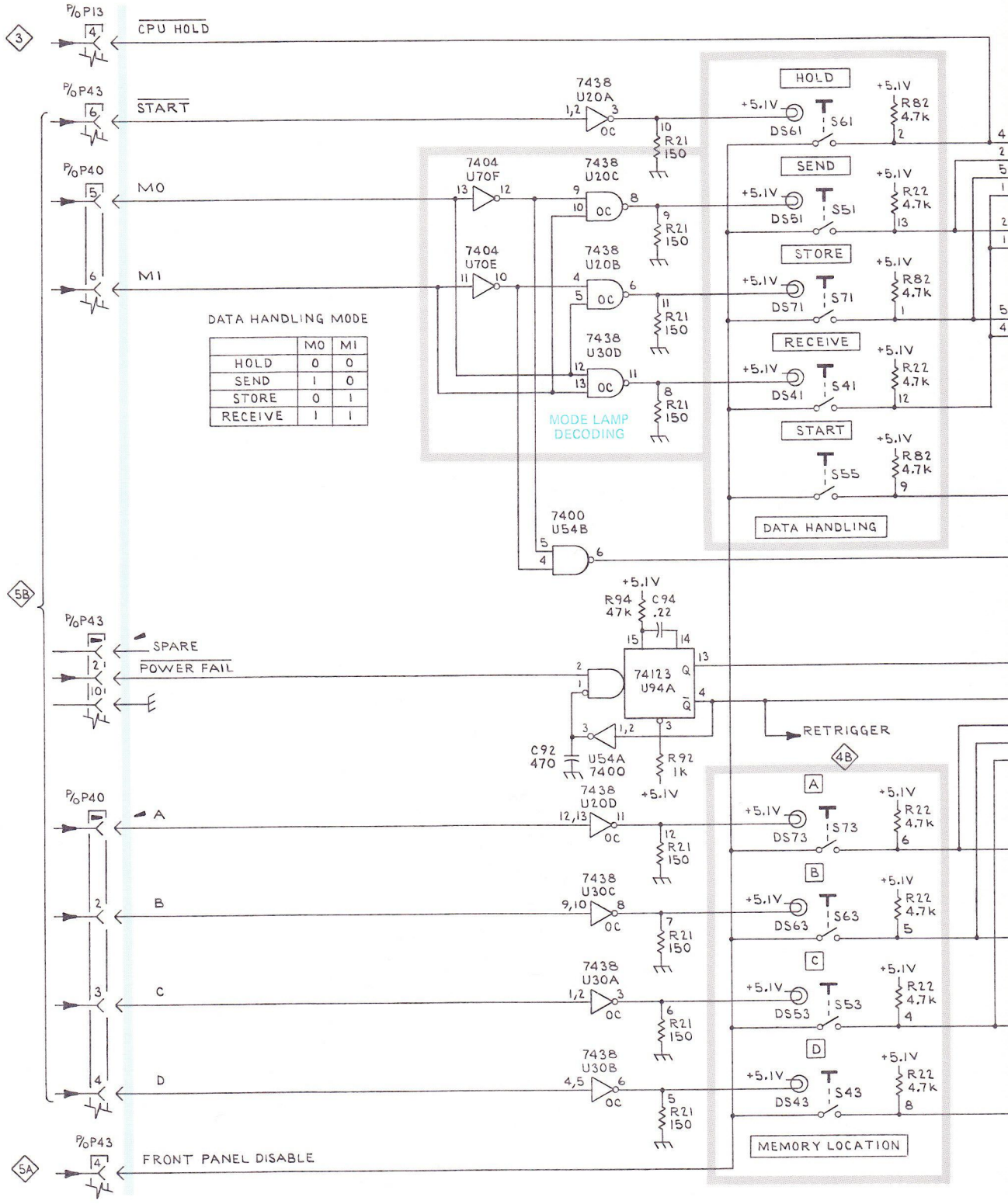
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	614-0113-00	B010100	B070394	1		SUBPANEL,ASSY:	80009	614-0113-00
	614-0113-01	B070395		1		SUBPANEL,ASSY:	80009	614-0113-01
	614-0113-03			1		SUBPANEL,ASSY:OPTION 21	80009	614-0113-03
	----- -----			-		* OPTION 21 ONLY		
-1	367-0180-00			1		. HANDLE,BOW:	80009	367-0180-00
						(ATTACHING PARTS)		
-2	213-0267-00			2		. SCREW,MACHINE:4-24 X 0.375 INCH,PNH STL	83385	OBD
						- - - * - - -		
-3	358-0301-02			4		. BUSHING,SLEEVE:GRAY PLASTIC	80009	358-0301-02
-4	333-1540-00			1		. PANEL,FRONT:	80009	333-1540-00
						(ATTACHING PARTS)		
-5	210-0457-00			1		. NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-6	343-0431-00			1		. RETAINER,CABLE:	80009	343-0431-00
-7	352-0321-00			1		. HOLDER,CARD:	80009	352-0321-00

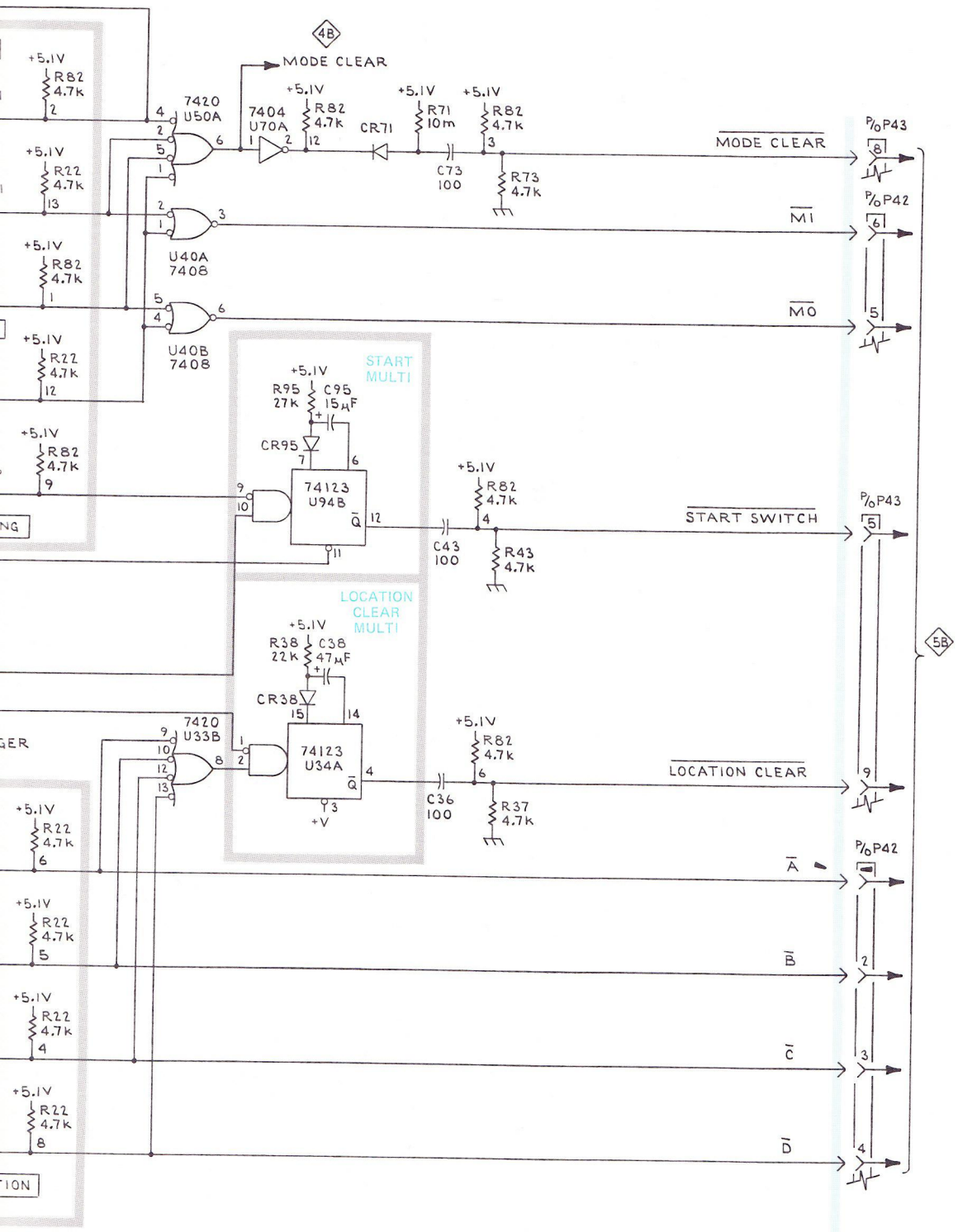
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-8	386-2623-00			1		. PLATE,SPACER:	80009	386-2623-00
						(ATTACHING PARTS)		
-9	213-0107-00			2		. SCR,TPG,THD FOR:4-40 X 0.25 INCH,FLH STL	93907	OBD
						- - - * - - -		
-10	214-1738-00			2		. HINGE HALF:	80009	214-1738-00
						(ATTACHING PARTS FOR EACH)		
-11	211-0101-00			2		. SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-12	352-0308-00			6		. HOUSING,PB:	80009	352-0308-00
-13	352-0308-01			1		. HOUSING,PB:	80009	352-0308-01
-14	352-0308-02			1		. HOUSING,PB:	80009	352-0308-02
-15	366-1200-00			16		. PUSH BUTTON:0.61 X 0.50 X0.355 OA	80009	366-1200-00
	366-1200-44			1		. PUSH BUTTON:MARK A	80009	366-1200-44
	366-1200-45			1		. PUSH BUTTON:MARK B	80009	366-1200-45
	366-1200-46			1		. PUSH BUTTON:MARK C	80009	366-1200-46
	366-1200-47			1		. PUSH BUTTON:MARK D	80009	366-1200-47
	366-1200-58			1		. PUSH BUTTON:MARK PLUG-INS	80009	366-1200-58
	366-1200-59			1		. PUSH BUTTON:MARK BOTH	80009	366-1200-59
	366-1200-60			1		. PUSH BUTTON:MARK MEMORY	80009	366-1200-60
	366-1200-61			1		. PUSH BUTTON:MARK STORE	80009	366-1200-61
	366-1200-62			1		. PUSH BUTTON:MARK SEND	80009	366-1200-62
	366-1200-63			1		. PUSH BUTTON:MARK RECEIVE	80009	366-1200-63
	366-1200-64			1		. PUSH BUTTON:HOLD	80009	366-1200-64
	366-1200-65			1		. PUSH BUTTON:START	80009	366-1200-65
-16	----- -----			1		. CKT BOARD ASSY:FRONT PANEL(SEE EPL)		
						(ATTACHING PARTS)		
-17	211-0008-00			8		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	----- -----			-		. . CKT BOARD ASSY INCLUDES:		
-18	131-0608-00			43		. . TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
	131-0608-00			52		. . TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
	----- -----			-		* OPTION 21 ONLY		
-19	136-0252-04			251		. . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-20	----- -----			4		. . RES.,VAR,WW:(SEE R52,R54,R64,R44 EPL)		
						(ATTACHING PARTS FOR EACH)		
-21	210-0583-00			1		. . NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
						- - - * - - -		
-22	136-0370-00			15		. . LAMPHOLDER:PLASTIC	80009	136-0370-00
-23	214-0628-00			28		. . SPRING,FLAT:PUSH BUTTON	80009	214-0628-00
-24	210-0702-00			140		. . EYELET,METALLIC:0.047 OD X 0.125 INCH LONG	07707	S6127
-25	131-0566-00			1		. . LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-26	386-2174-00			1		. SUBPANEL,FRONT:	80009	386-2174-00
-27	131-0707-00			78		. CONNECTOR,TERM.:0.48" L,22-26AWG WIRE	22526	75691-005
-28	352-0161-03			2		. CONN BODY,PL,EL:3 WIRE ORANGE	80009	352-0161-03
-29	352-0164-00			1		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0164-00
	352-0164-03			1		. CONN BODY,PL,EL:6 WIRE ORANGE	80009	352-0164-03
-30	352-0168-00			2		. CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	352-0168-02			2		. CONN BODY,PL,EL:10 WIRE RED	80009	352-0168-02
	352-0168-03			2		. CONN BODY,PL,EL:10 WIRE ORANGE	80009	352-0168-03
-31	175-0826-00			FT		. WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-32	175-0829-00			FT		. WIRE,ELECTRICAL:6 WIRE RIBBON	08261	SS-0626-710610C
-33	175-0833-00			FT		. WIRE,ELECTRICAL:10 WIRE RIBBON	08261	OBD
-34	----- -----			1		CKT BOARD ASSY:Z AXIS LOGIC(SEE EPL)		
-35	105-0144-00			1		. EJECTOR,CKT CD:MOLD PLASTIC,W/ROLL PIN	18677	S203
-36	214-1337-00			1		. . PIN,SPRING:0.10 OD X 0.25 INCH L,STL	80009	214-1337-00
-37	131-0608-00			34		. TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
-38	136-0252-04			30		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-39	136-0370-00			1		. LAMPHOLDER:PLASTIC	80009	136-0370-00
-40	214-0579-00			3		. TERM.,TEST PT:BRS CD PL	80009	214-0579-00
						STANDARD ACCESSORIES		
	070-1610-00			1		MANUAL,TECH:SERVICE	80009	070-1610-00


P/O P13
CPU HOLD
P/O P43
START
P/O P40
M0
M1
DATA HANDLING MODE
HOLD 0 0
SEND 1 0
STORE 0 1
RECEIVE 1 1
7404 U70F
7404 U70E
7438 U20A
7438 U20C
7438 U20B
7438 U30D
MODE LAMP DECODING
HOLD
SEND
STORE
RECEIVE
START
DS61
DS51
DS71
DS41
S61
S51
S71
S41
S55
DATA HANDLING
7400 U54B
5B
P/O P43
SPARE
POWER FAIL
74123 U94A
C92 470
U54A 7400
R92 1k
R94 47k
C94 .22
RETRIGGER
4B
P/O P40
A
B
C
D
7438 U20D
7438 U30C
7438 U30A
7438 U30B
DS73
DS63
DS53
DS43
S73
S63
S53
S43
MEMORY LOCATION
P/O P43
FRONT PANEL DISABLE
5A
R21 150
R22 4.7k
R82 4.7k
+5.1V

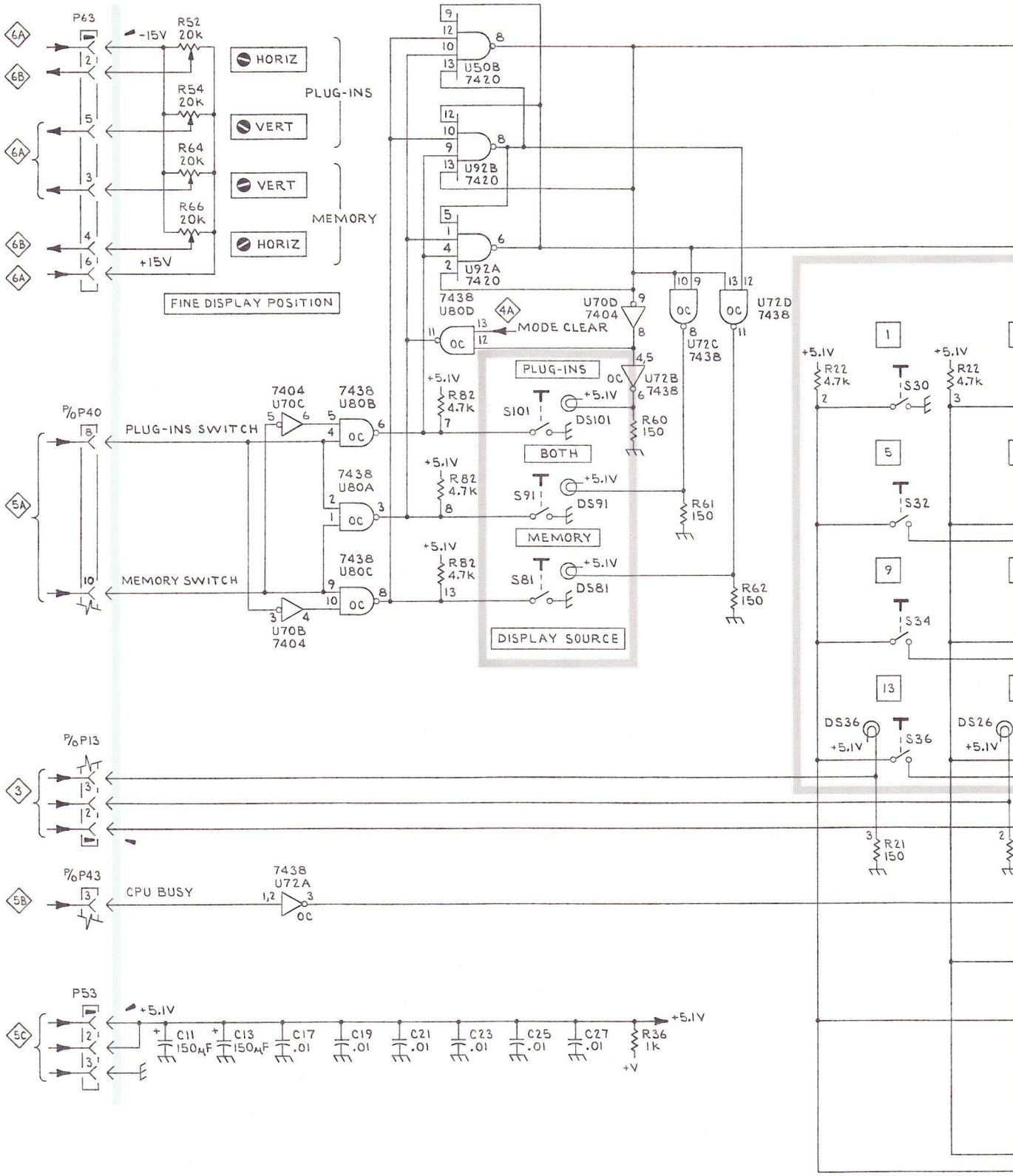

4B
MODE CLEAR
+5.1V
R82 4.7k
7420 U50A
7404 U70A
R82 4.7k
CR71
R71 10m
C73 100
R73 4.7k
MODE CLEAR
P/O P43
M1
P/O P42
U40A 7408
M0
U40B 7408
START MULTI
R95 27k
C95 15μF
CR95
74123 U94B
C43 100
R43 4.7k
START SWITCH
LOCATION CLEAR MULTI
R38 22k
C38 47μF
CR38
7420 U33B
74123 U34A
+V
C36 100
R37 4.7k
LOCATION CLEAR
R22 4.7k
Ā
B̄
C̄
D̄
5B

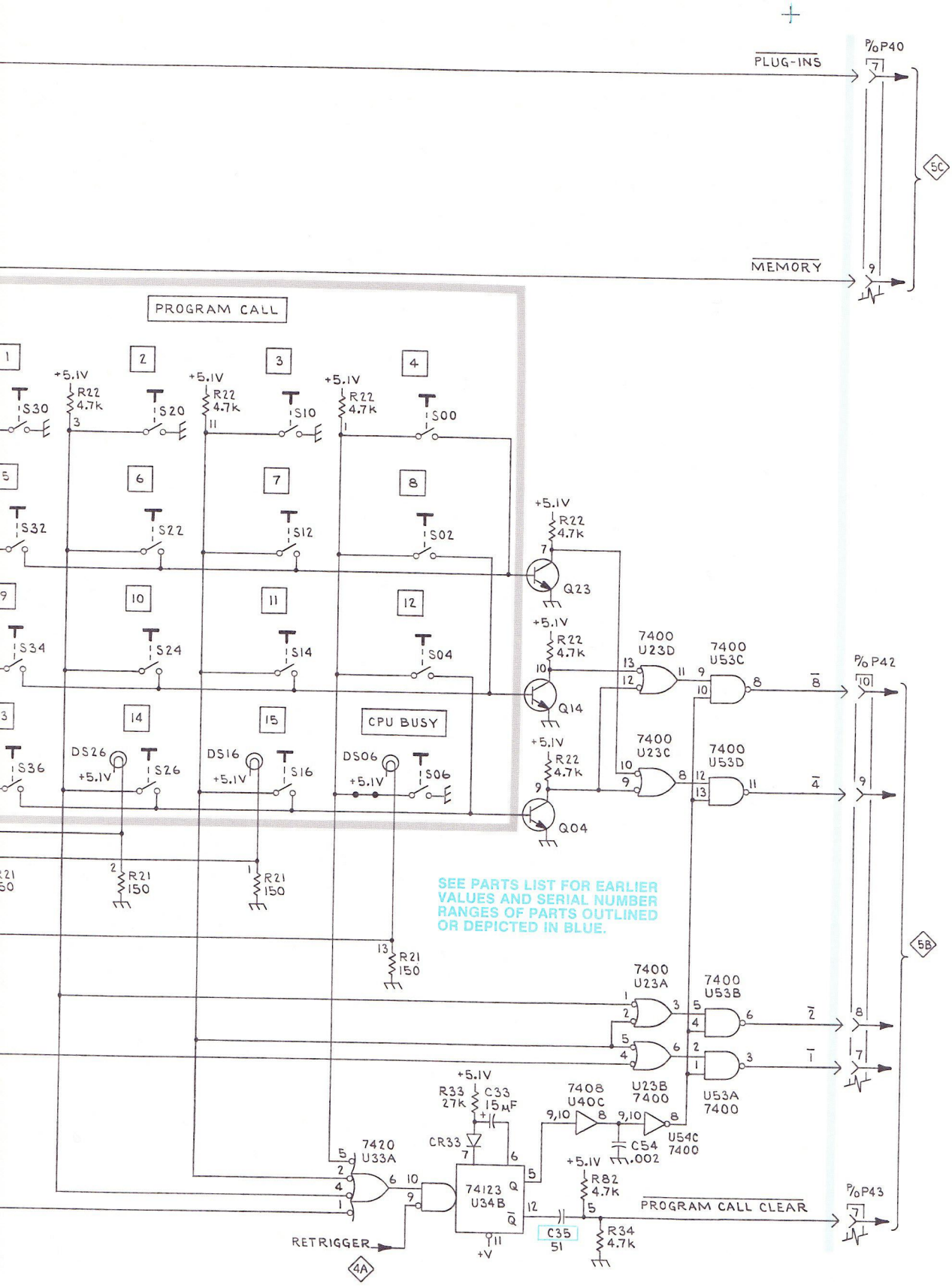
FRONT PANEL COMPONENT LOCATION


P/O P13
CPU HOLD
P/O P43
START
P/O P40
M0
M1
DATA HANDLING MODE
HOLD 0 0
SEND 1 0
STORE 0 1
RECEIVE 1 1
7438 U20A
7404 U70F
7438 U20C
7404 U70E
7438 U20B
7438 U30D
MODE LAMP DECODING
HOLD
SEND
STORE
RECEIVE
START
DATA HANDLING
7400 U54B
P/O P43
SPARE
POWER FAIL
74123 U94A
C92 470
U54A 7400
R92 1K
RETRIGGER
P/O P40
A
B
C
D
7438 U20D
7438 U30C
7438 U30A
7438 U30B
MEMORY LOCATION
P/O P43
FRONT PANEL DISABLE



FRONT PANEL 4A NLL


P63
-15V
R52 20k
R54 20k
R64 20k
R66 20k
+15V
HORIZ
VERT
VERT
HORIZ
PLUG-INS
MEMORY
FINE DISPLAY POSITION
U50B 7420
U92B 7420
U92A 7420
7438 U80D
MODE CLEAR
U70D 7404
U72C 7438
U72D 7438
U72B 7438
PLUG-INS
BOTH
MEMORY
DISPLAY SOURCE
S101
S91
S81
DS101
DS91
DS81
R82 4.7k
R60 150
R61 150
R62 150
7404 U70C
7438 U80B
7438 U80A
7438 U80C
7404 U70B
P/O P40
PLUG-INS SWITCH
MEMORY SWITCH
R22 4.7k
S30
S32
S34
S36
DS36
DS26
R21 150
P/O P13
P/O P43
CPU BUSY
7438 U72A
P53
C11 150μF
C13 150μF
C17 .01
C19 .01
C21 .01
C23 .01
C25 .01
C27 .01
R36 1k
+V



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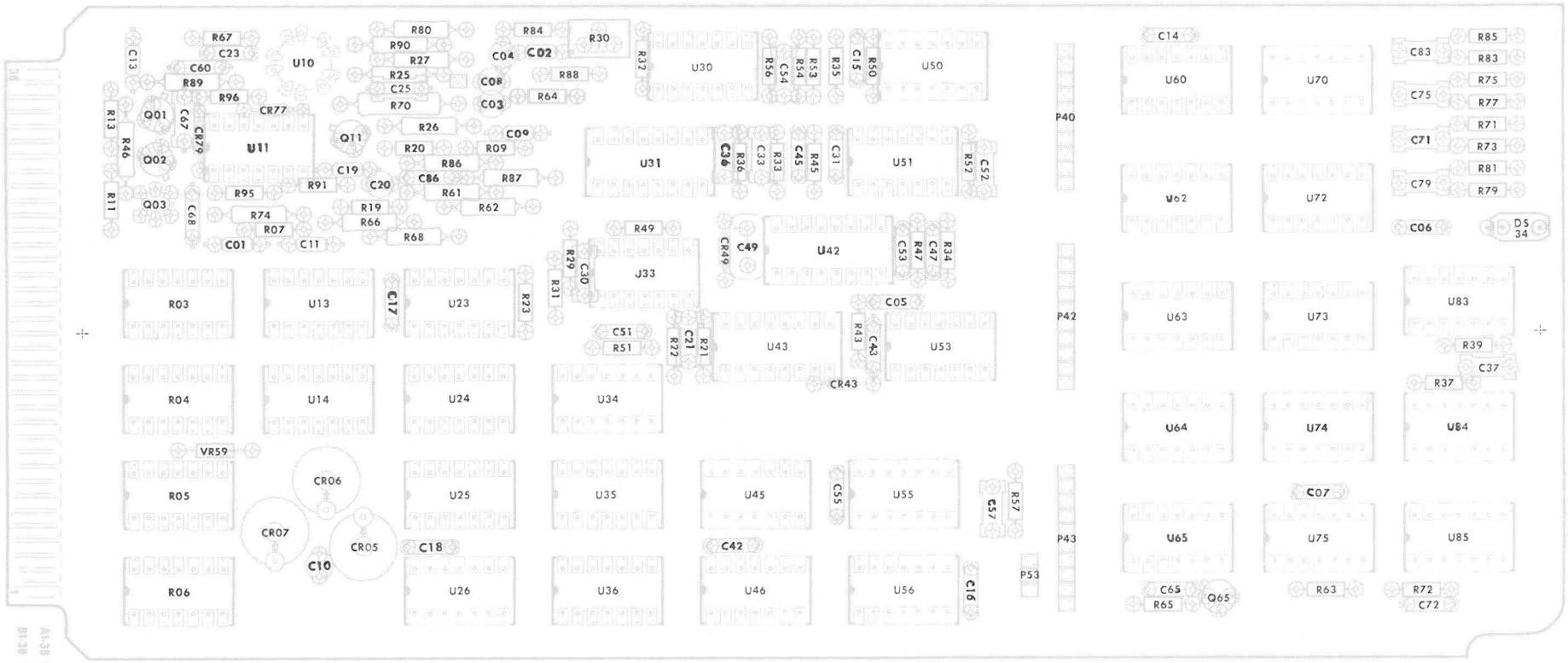
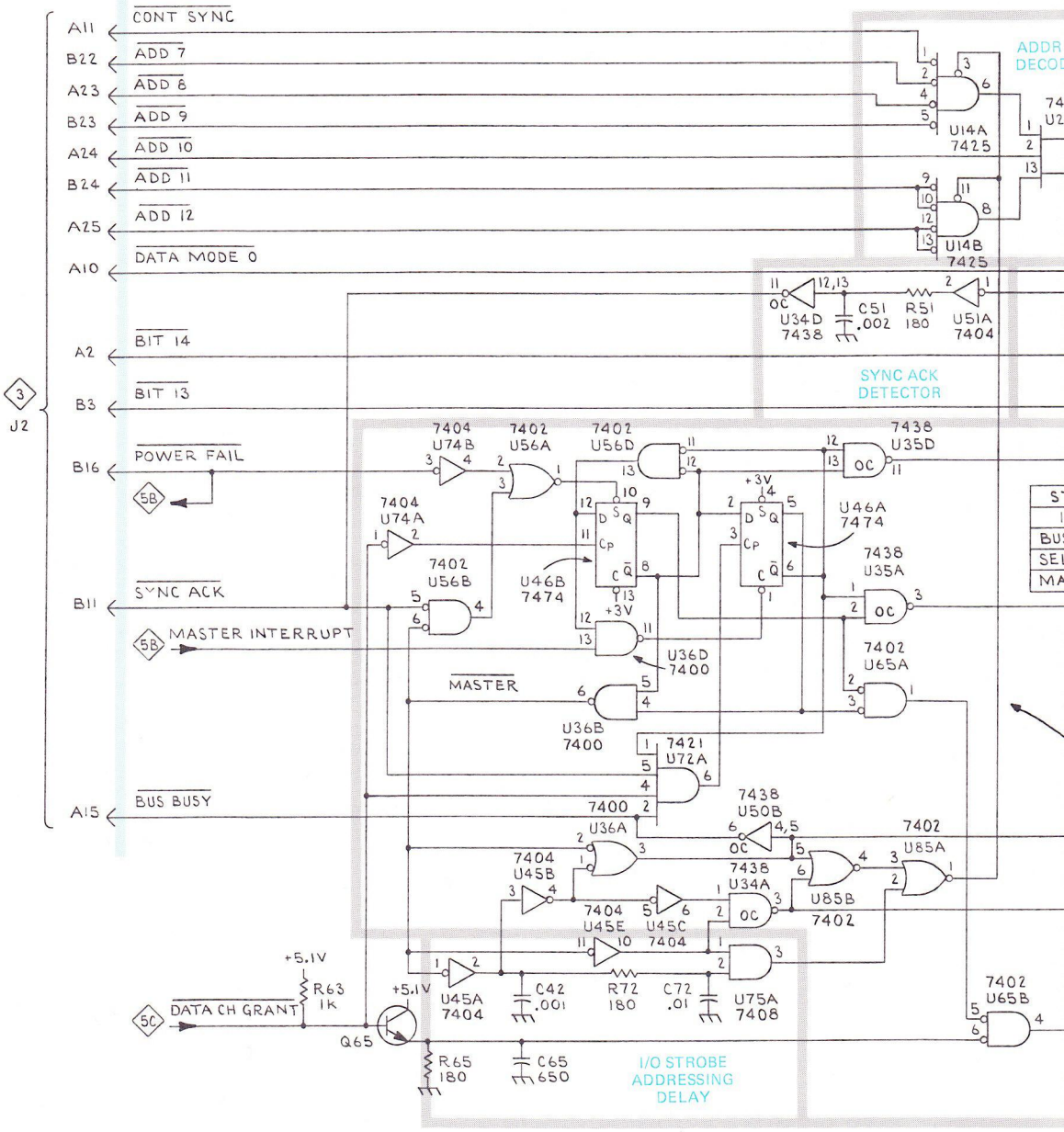
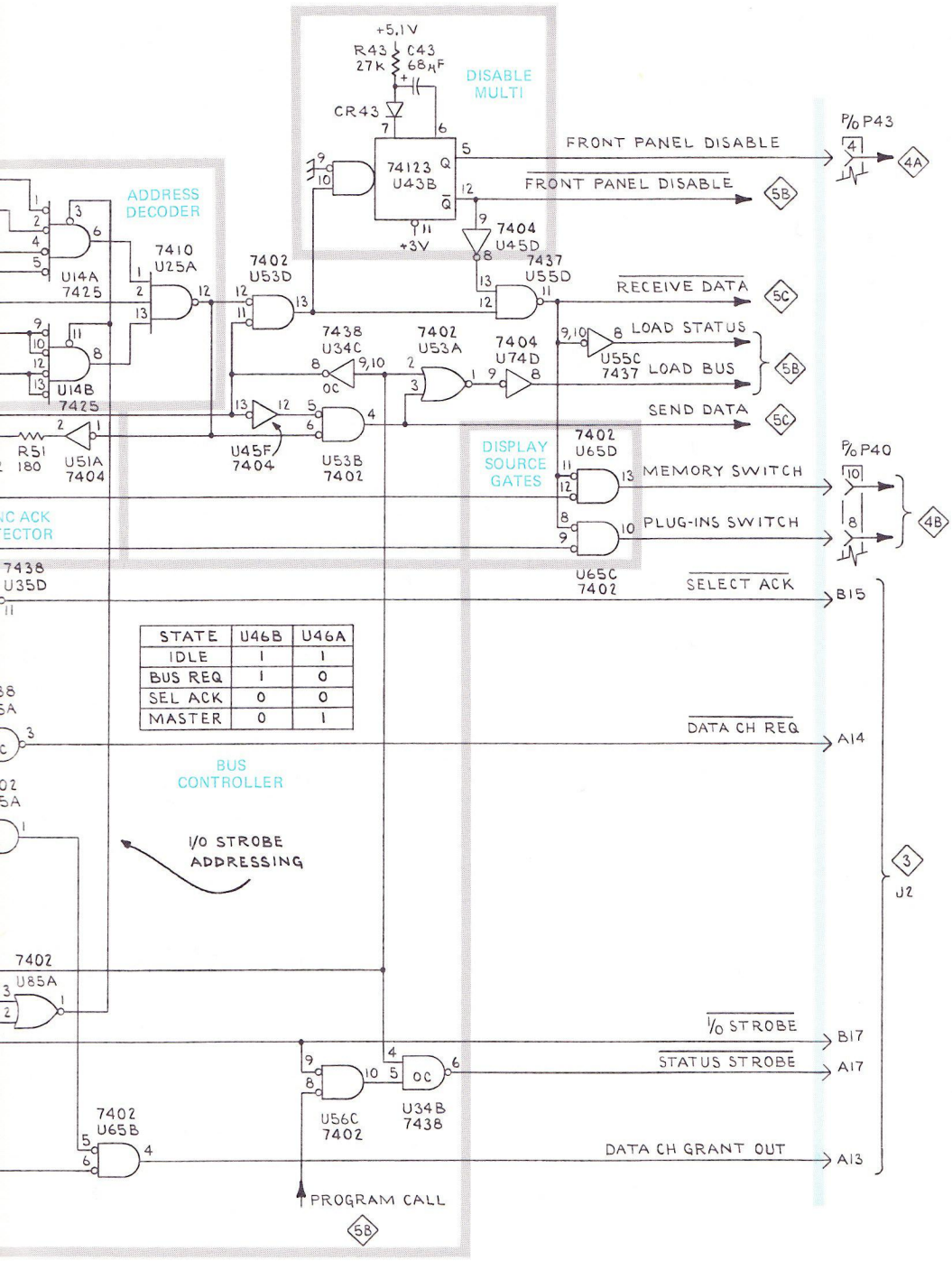
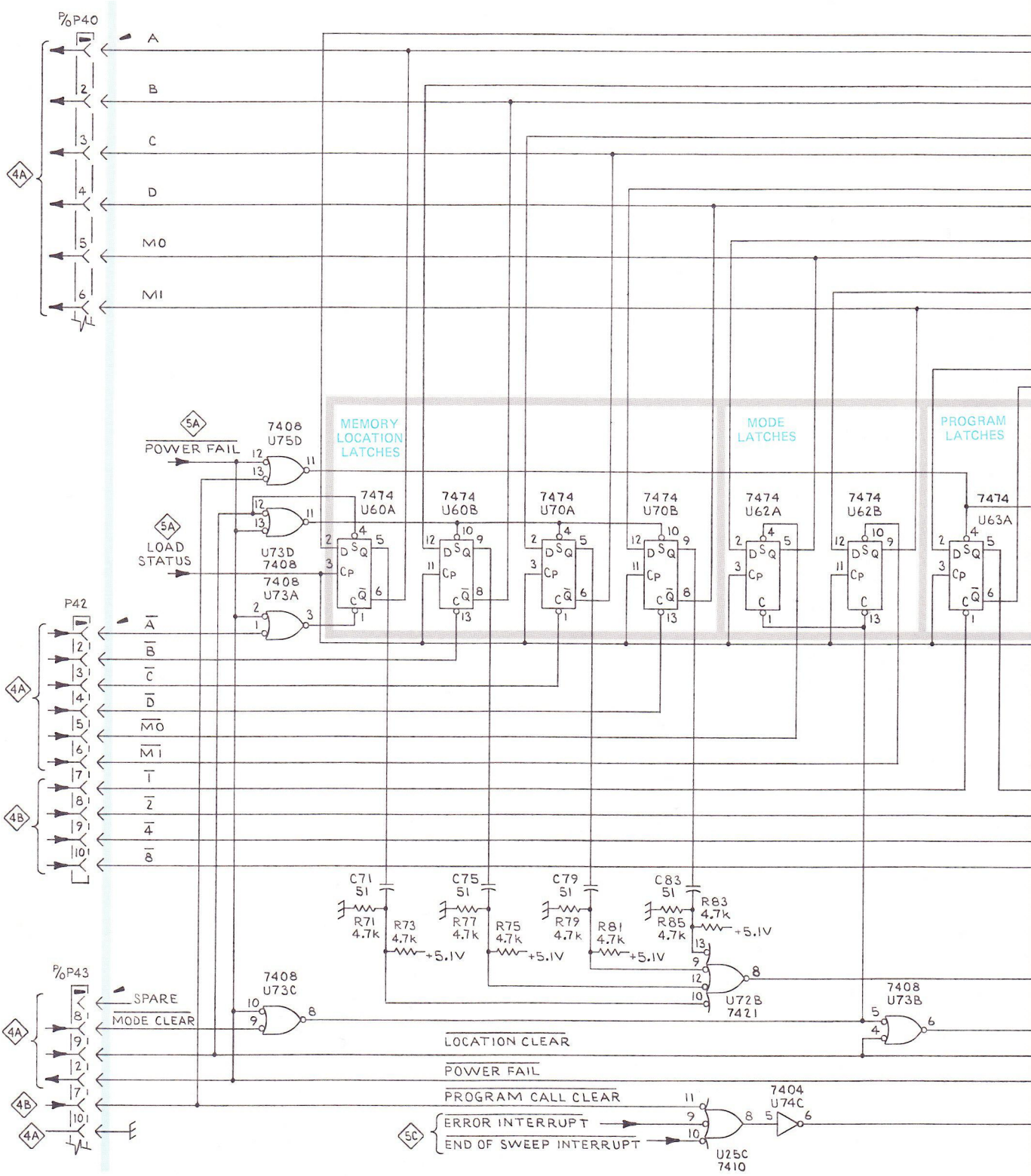
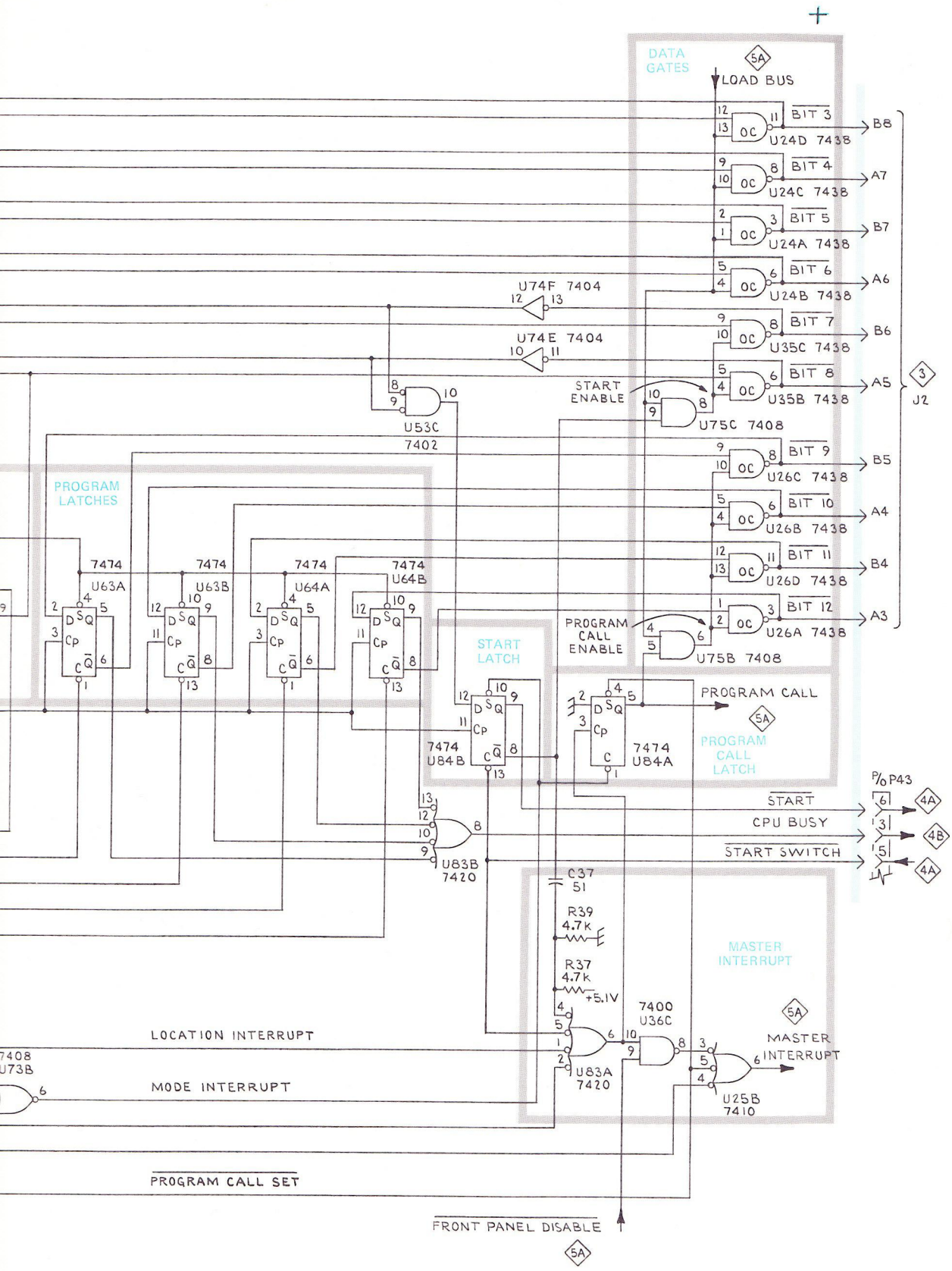
Z AXIS\FR PAN COMPONENT LOCATION




A11 CONT SYNC
B22 ADD 7
A23 ADD 8
B23 ADD 9
A24 ADD 10
B24 ADD 11
A25 ADD 12
A10 DATA MODE 0
A2 BIT 14
B3 BIT 13
B16 POWER FAIL
B11 SYNC ACK
MASTER INTERRUPT
A15 BUS BUSY
3 J2
5B
5C
DATA CH GRANT
U14A 7425
U14B 7425
U34D 7438
C51 .002
R51 180
U51A 7404
SYNC ACK DETECTOR
7404 U74B
7402 U56A
7402 U56D
7438 U35D
7404 U74A
7402 U56B
U46B 7474
U46A 7474
7438 U35A
U36D 7400
U36B 7400
7421 U72A
7400 U36A
7438 U50B
7402 U85A
7404 U45B
7438 U34A
U85B 7402
7404 U45E
U45C 7404
+5.1V
R63 1K
Q65
U45A 7404
C42 .001
R72 180
C72 .01
U75A 7408
R65 180
C65 650
I/O STROBE ADDRESSING DELAY
7402 U65A
7402 U65B

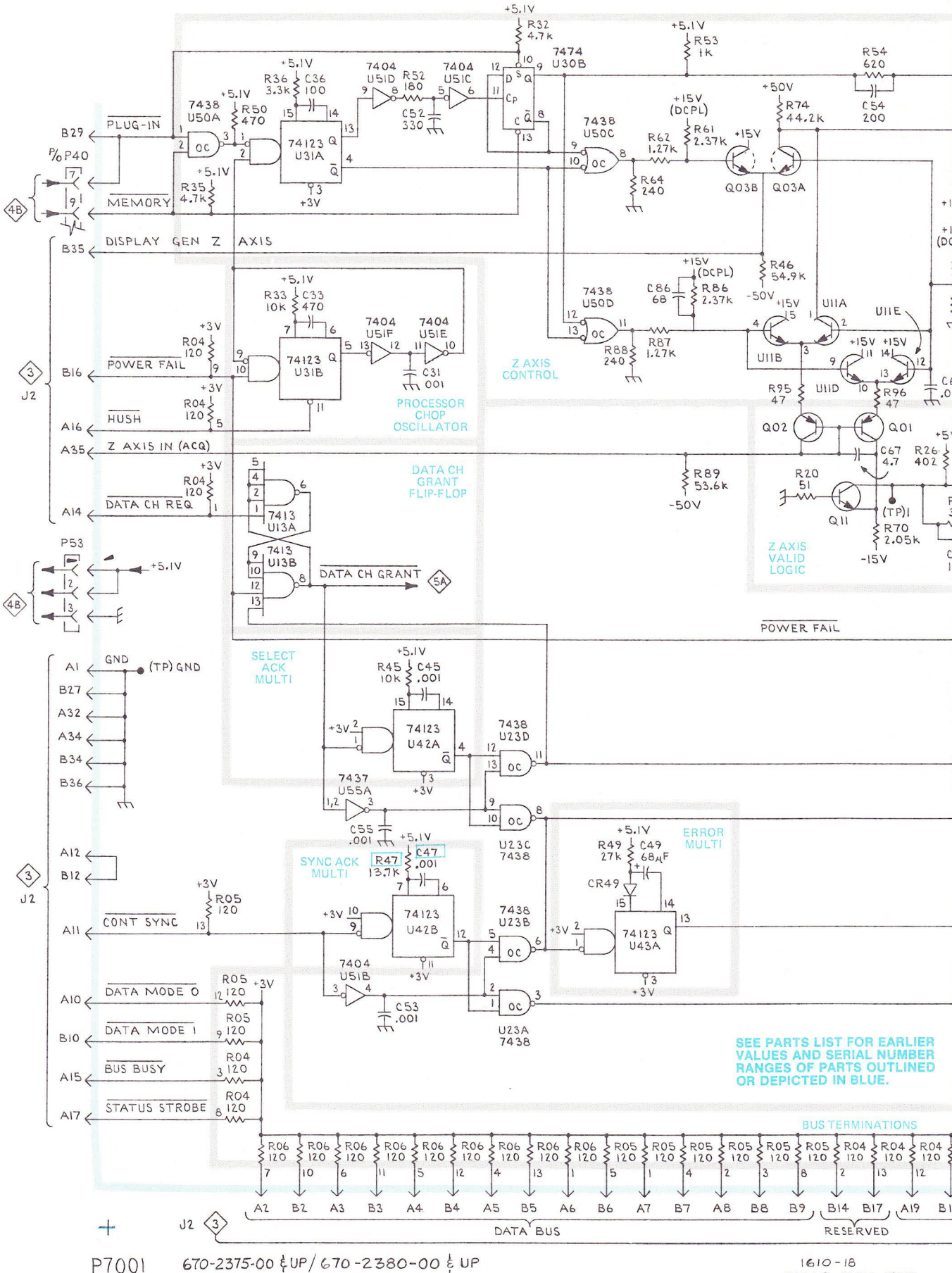

+5.1V
R43 27K
C43 68μF
DISABLE MULTI
CR43
74123 U43B
+3V
7404 U45D
FRONT PANEL DISABLE
FRONT PANEL DISABLE
P/O P43
4A
5B
ADDRESS DECODER
7410 U25A
U14A 7425
U14B 7425
7402 U53D
7437 U55D
RECEIVE DATA
5C
7438 U34C
7402 U53A
7404 U74D
U55C 7437
LOAD STATUS
LOAD BUS
SEND DATA
R51 180
U51A 7404
U45F 7404
U53B 7402
DISPLAY SOURCE GATES
7402 U65D
MEMORY SWITCH
PLUG-INS SWITCH
P/O P40
4B
U65C 7402
SELECT ACK
B15
7438 U35D
STATE | U46B | U46A
IDLE | 1 | 1
BUS REQ | 1 | 0
SEL ACK | 0 | 0
MASTER | 0 | 1
DATA CH REQ
A14
BUS CONTROLLER
I/O STROBE ADDRESSING
3
J2
7402 U85A
I/O STROBE
B17
STATUS STROBE
A17
U56C 7402
U34B 7438
7402 U65B
DATA CH GRANT OUT
A13
PROGRAM CALL
5B


P/O P40
A
B
C
D
M0
M1
4A
5A
POWER FAIL
7408
U75D
MEMORY LOCATION LATCHES
MODE LATCHES
PROGRAM LATCHES
7474
U60A
7474
U60B
7474
U70A
7474
U70B
7474
U62A
7474
U62B
7474
U63A
LOAD STATUS
U73D
7408
7408
U73A
P42
$\overline{A}$
$\overline{B}$
$\overline{C}$
$\overline{D}$
$\overline{M0}$
$\overline{M1}$
$\overline{1}$
$\overline{2}$
$\overline{4}$
$\overline{8}$
4B
C71
51
C75
51
C79
51
C83
51
R71
4.7k
R73
4.7k
R77
4.7k
R75
4.7k
R79
4.7k
R81
4.7k
R85
4.7k
R83
4.7k
+5.1V
U72B
7421
P/O P43
SPARE
MODE CLEAR
7408
U73C
7408
U73B
LOCATION CLEAR
POWER FAIL
PROGRAM CALL CLEAR
5C
ERROR INTERRUPT
END OF SWEEP INTERRUPT
U25C
7410
7404
U74C



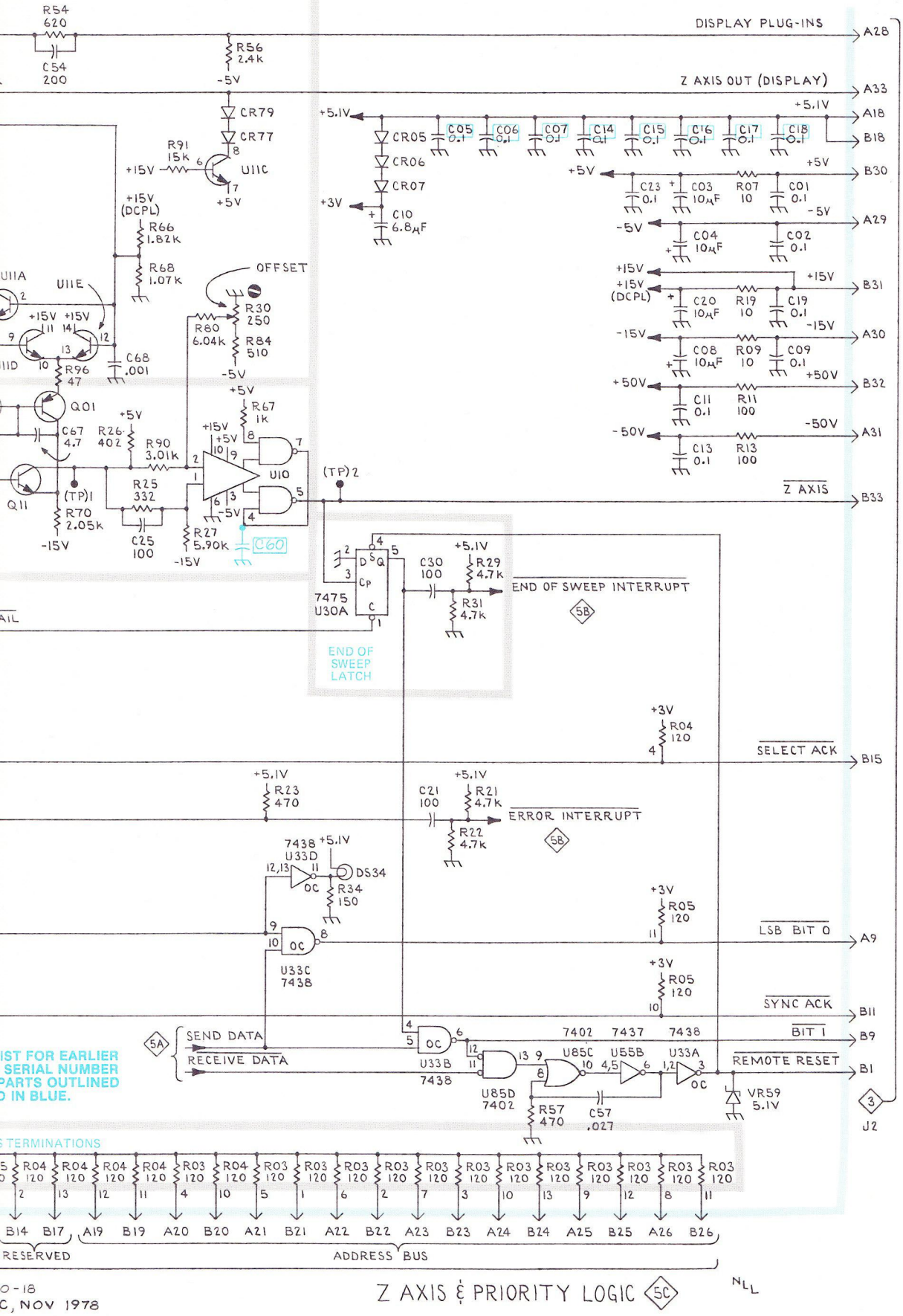
FRONT PANEL LATCHES 5B

NLL



P7001 670-2375-00 & UP / 670-2380-00 & UP

1610-18
REV C, NOV 1978



Z AXIS & PRIORITY LOGIC 5C

Tektronix
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Change Reference: M34035 Date: 6-6-79

Product: P7001 FRONT PANEL Z/AXIS 070-1610-00 EFF SN B100681

CHANGE	DESCRIPTION

ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

	670-2375-01	CKT BOARD ASSY:FRONT PANEL
U20	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U23	156-0030-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE
U30	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U53	156-0030-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE
U54	156-0030-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE
U72	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U80	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
	670-2380-01	CKT BOARD ASSY:Z AXIS LOGIC
U11	156-0065-00	MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY,SEL
U23	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U24	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U26	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U30	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP
U33	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U34	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U35	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U36	156-0030-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE
U46	156-0041-05	MICROCIRCUIT,DIDUAL D-TYPE FLIP-FLOP
U50	156-0145-02	MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BFR
U60	156-0041-05	MICROCIRCUIT,DI DUAL D-TYPE FLIP-FLOP
U62	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP
U63	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP
U64	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP
U70	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP
U84	156-0041-05	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP