



*Please Check for
CHANGE INFORMATION
at the Rear of this Manual*

**4052/4054
&
4052A/4054A
TECHNICAL DATA
SERVICE MANUAL**

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**

MANUAL PART NO. 070-2840-03
PRODUCT GROUP 14

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PRODUCT: 4054/4054A Options 30 and 31 Dynamic Graphics

This manual supports the following versions of this product: 4052: B010100 and up

4054: B010100 and up

4052A: B010100 and up

4054A: B010100 and up

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OPERATORS SAFETY SUMMARY

This general safety information is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

IN THIS MANUAL

CAUTION statements identify conditions or practices that can result in damage to the equipment or other property.

WARNING statements identify conditions or practices that can result in personal injury or loss of life.

AS MARKED ON EQUIPMENT

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

IN THIS MANUAL



This symbol indicates where applicable cautionary or other information is to be found.

As Marked on Equipment



DANGER high voltage.



Protective ground (earth) terminal.



ATTENTION — refer to manual.



Refer to manual.

POWER SOURCE

This product is designed to operate from a power source that does not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

GROUNDING THE PRODUCT

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the power input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

USE THE PROPER FUSE

To avoid fire hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an atmosphere of explosive gases unless it has been specifically certified for such operation.

DO NOT REMOVE COVERS OR PANELS

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

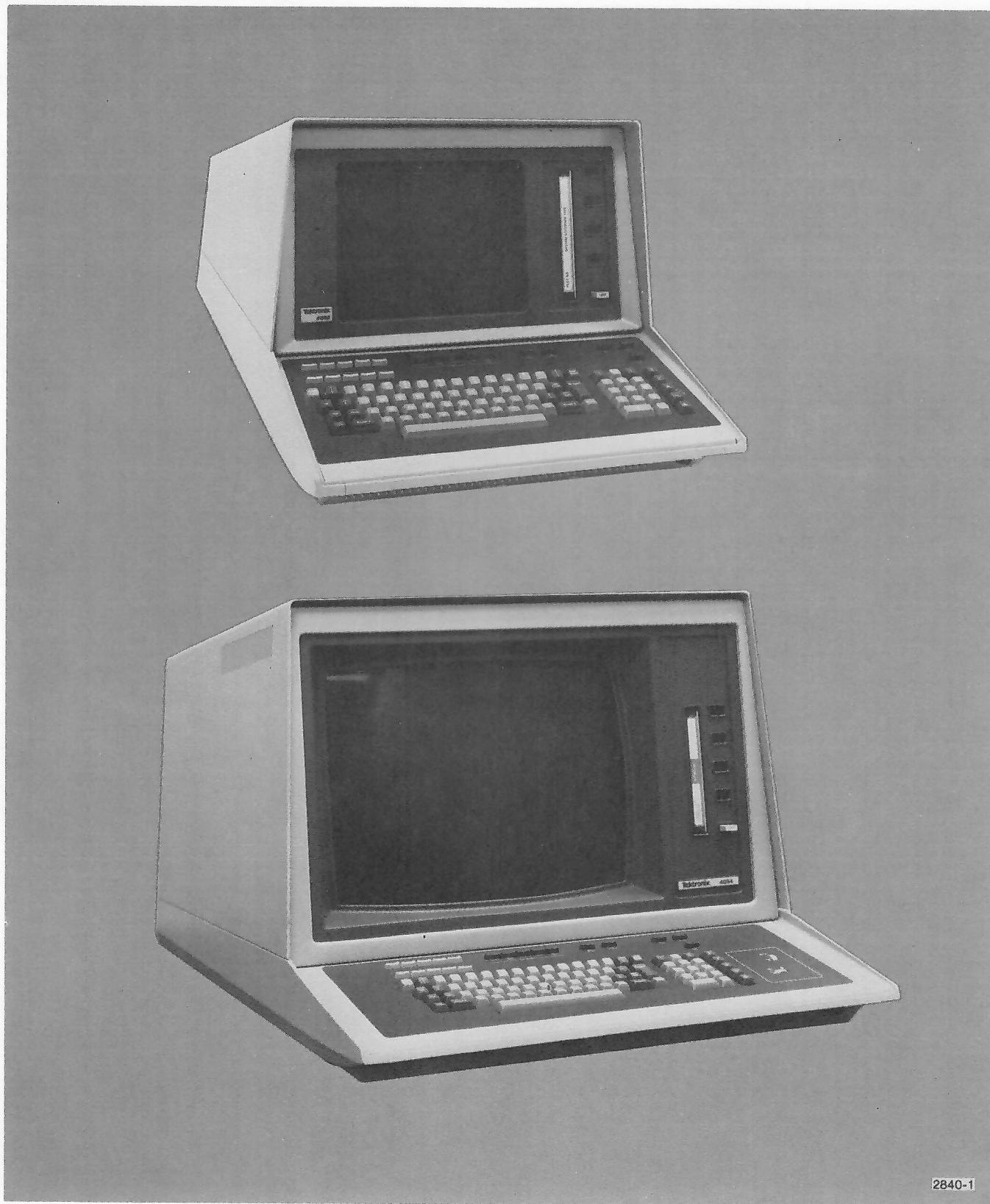


Figure 1-1. 4052 and 4054 Graphic Computing Systems.

4. Pull the board set out carefully by its supporting rails. There are two layers of boards and they can be damaged by static charges.
5. Remove the 14 screws that hold the two layers of boards together.
6. To service the boards, place an insulating pad over the front lip of the 4052 chassis to keep the boards from shorting to the chassis. See Figure 3-20. Use a pink polyethylene shipping bag or similar material material that doesn't develop electrostatic charges. Paper can develop dangerous charges and should not be used. Unfold the boards, keeping the interconnecting cables connected and place them alongside on insulating material. Reconnect the cables from the 4052. A power supply extension cable (175-2431-00) will be needed.

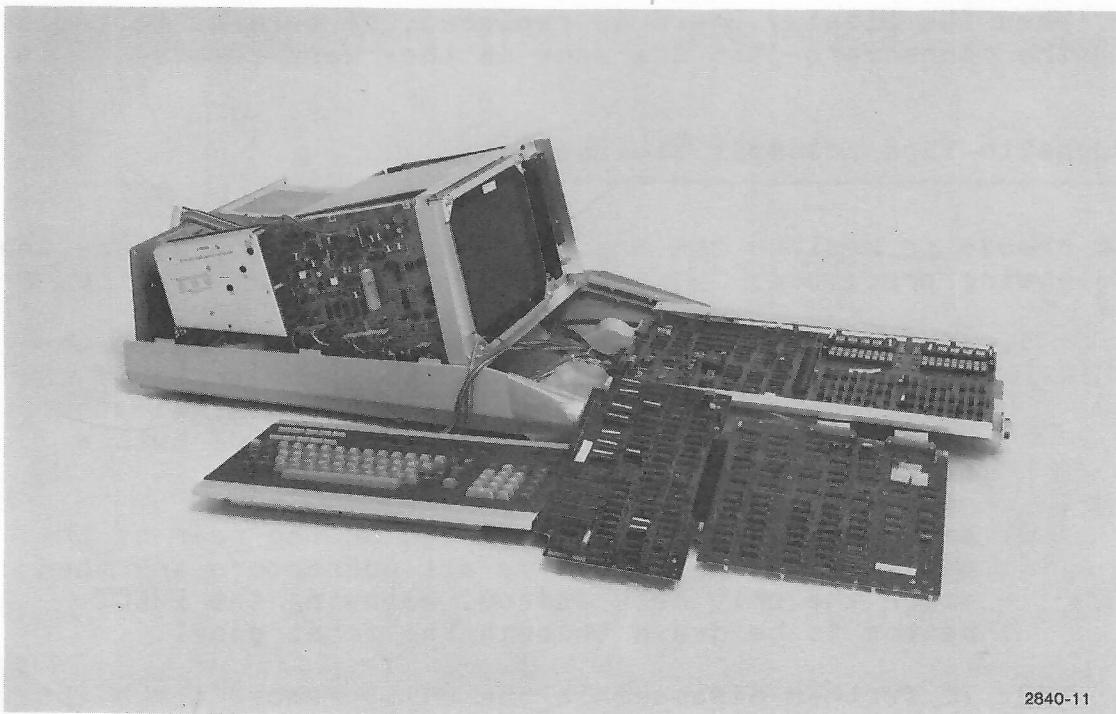


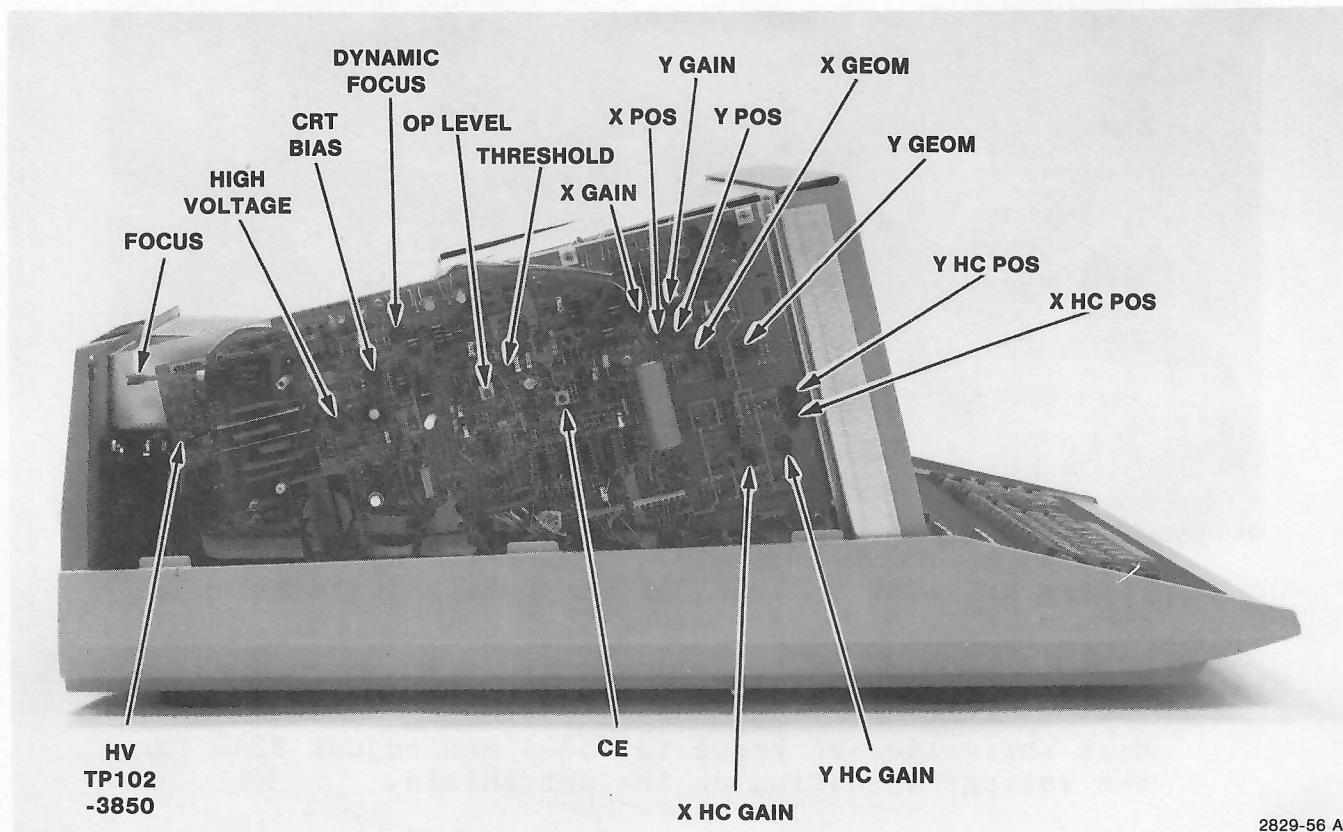
Figure 3-20. Service Layout for CPU Board and Memory Board.

DISPLAY CALIBRATION

Refer to Figure 4-4 for locations of the following adjustments.

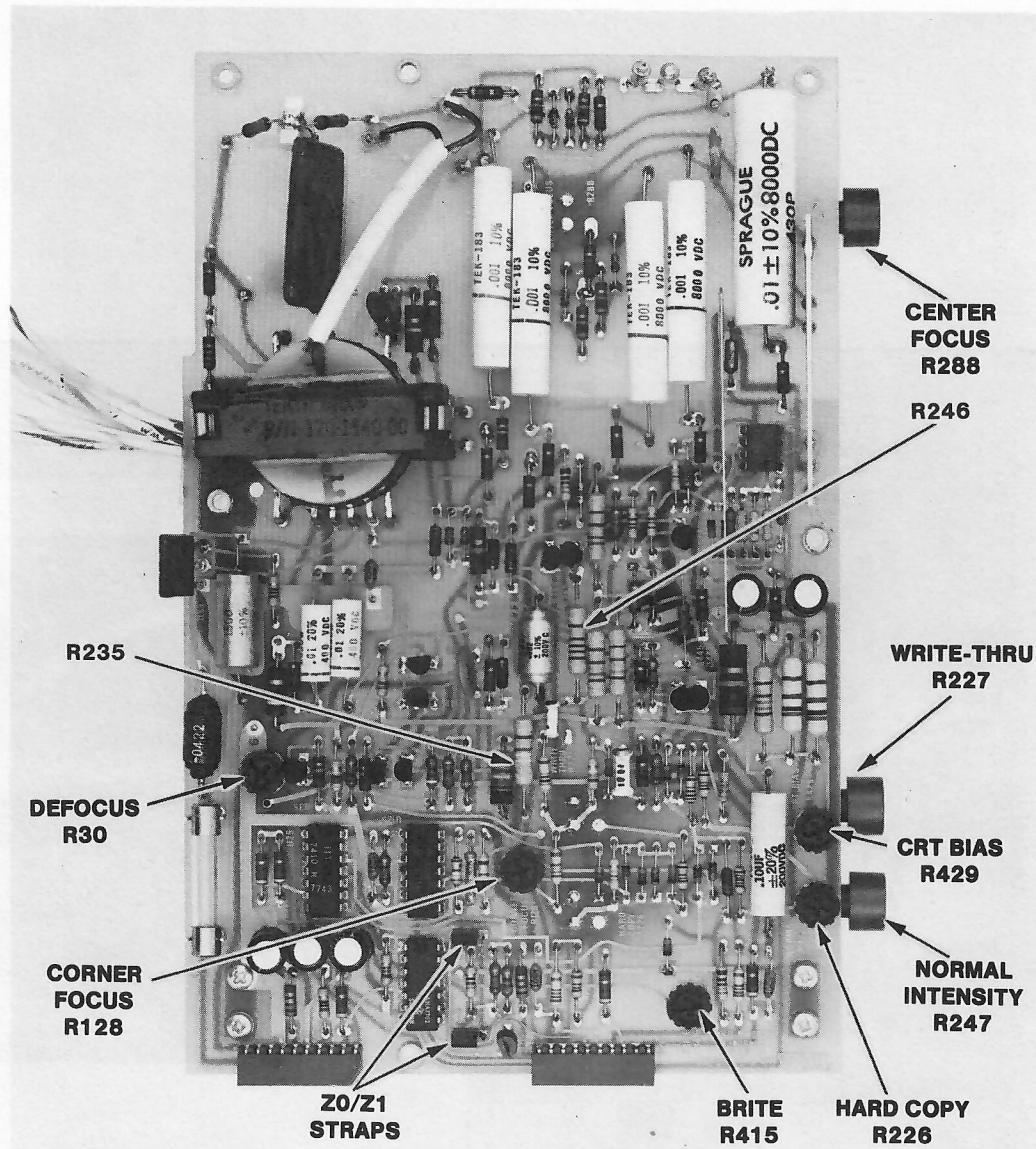
1. High Voltage Adjustments.

Turn off the power. Remove the high voltage shield. Connect a high voltage probe to TP102, and turn on the power. Adjust R224 for approximately -3850 V.



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Figure 4-4. Display Board Checkpoints and Adjustments.



2839-106

Figure 5-3. High Voltage/Z-Axis Board Strap Settings and Adjustments (Standard 4054).

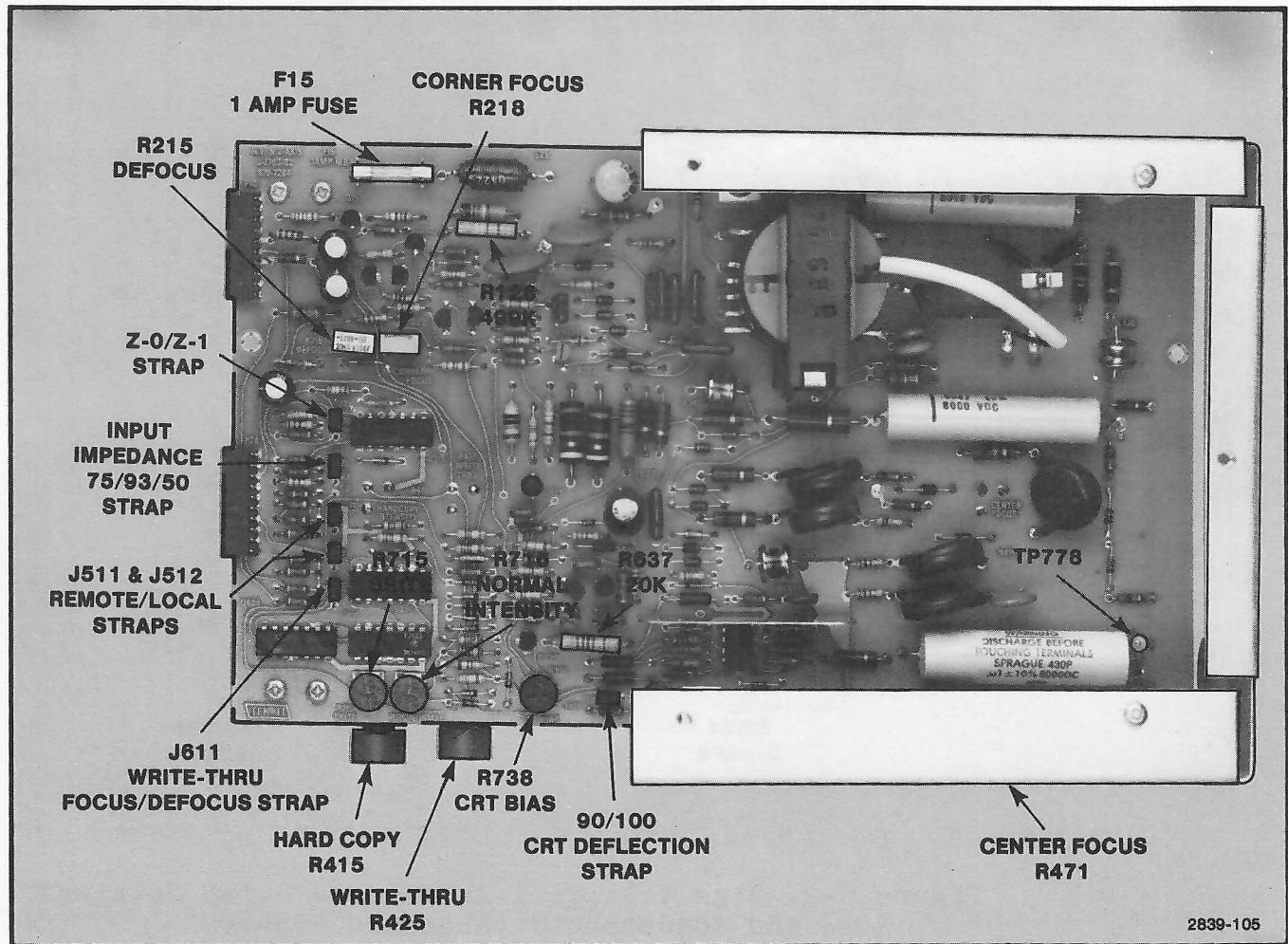


Figure 5-4. High Voltage/Z-Axis Board (4054 Option 31).

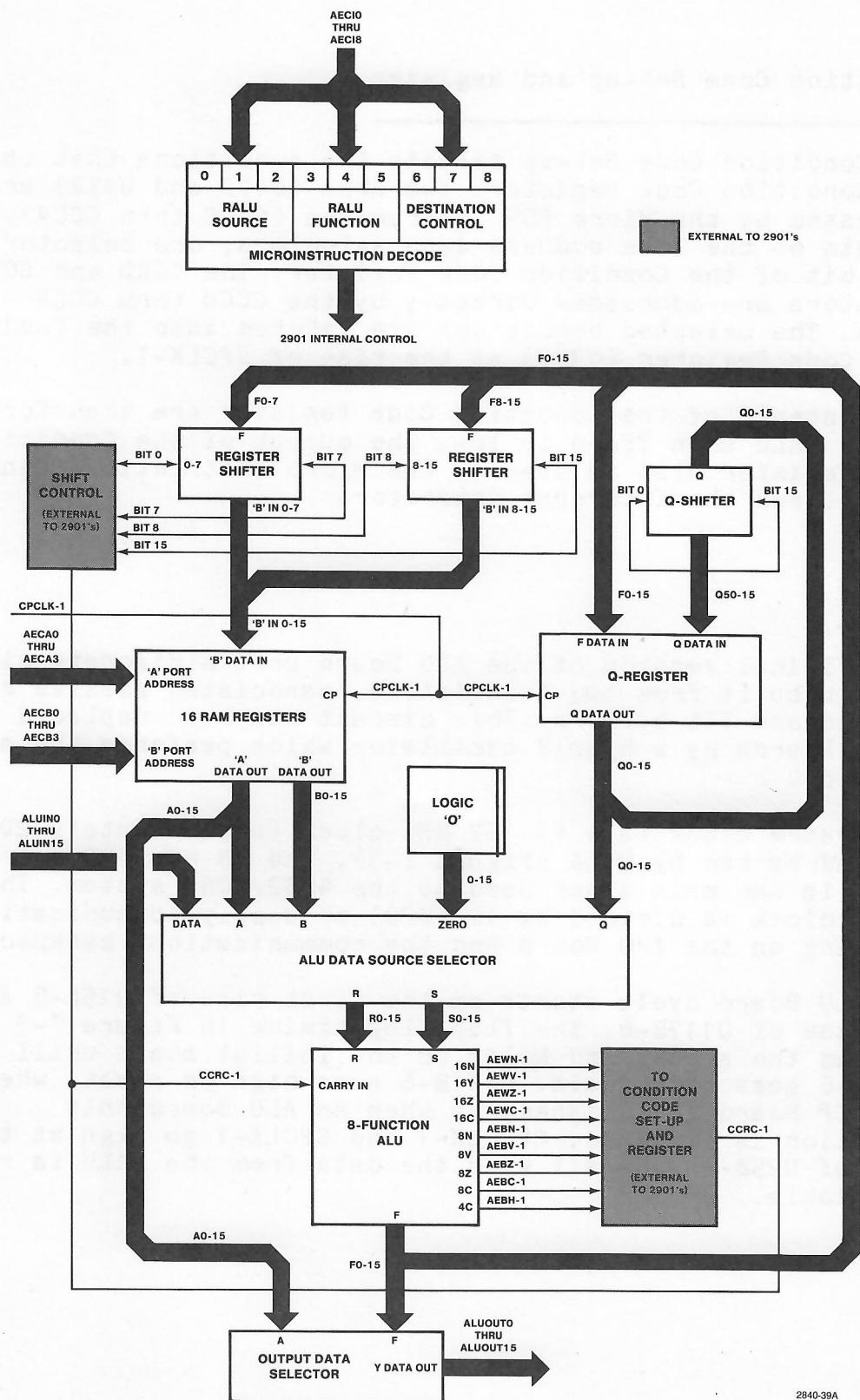


Figure 7-2. RALU Block Diagram.

COMMUNICATION INTERFACE TEST "CMTEST"

The "CMTEST" utility tests the interface control lines, data lines, and baud rate. The test requires the 012-0689-01 Interconnect Cable and the 013-0173-01 Self-Test-Adapter. The wiring of the Adapter is shown in Figure 15-4. Details on performing this test are given in the 4050 Series Data Communications Interface Operators Manual, 070-2066-02.

By using the Self-Test Adapter, cross connections transfer signals driven by the 4050 Series instrument to pins used to receive signals. Thus, by stimulating a driver and listening to a receiver, the driver, receiver, and associated interconnections are tested. In the description which follows, signal names and pin numbers refer to the lines at the end of the 012-0689-01 cable where the Self-Test Adapter is attached.

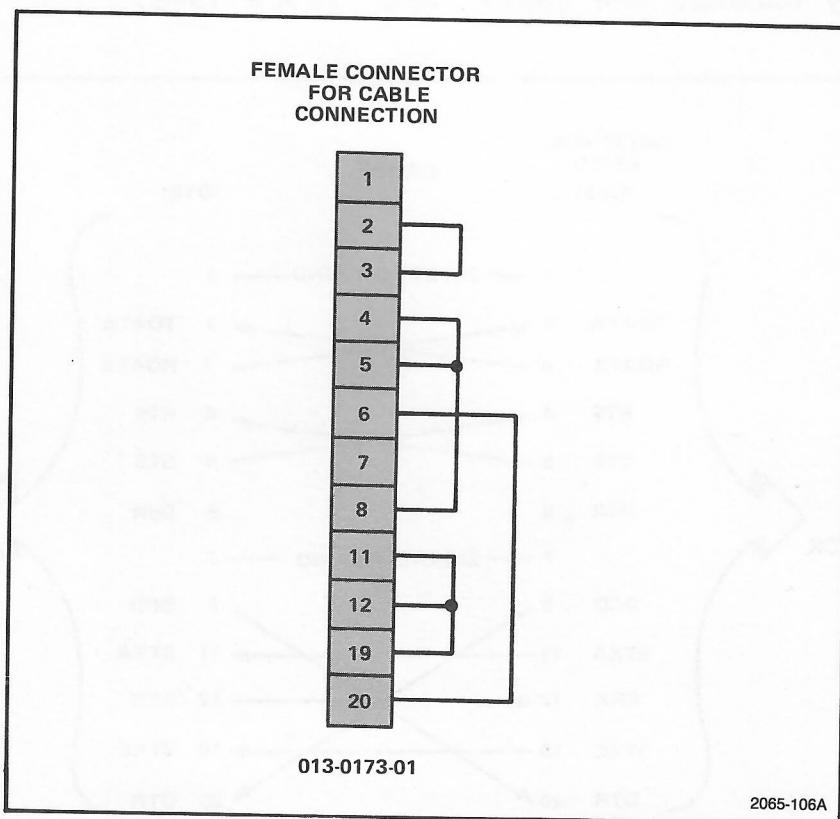


Figure 15-4. Self-Test Adapter for use with the Communication Backpack.

The lines used as drivers in this test are Request To Send (RTS-Pin 4) and Secondary Request To Send (STXC-Pin 19 or STXA-Pin 11). The selection of Pin 19 or Pin 11 depends upon whether the RS-232C or RS232A data communication standard is used. Which standard is used depends upon a strap setting in the Data Communications Backpack. A pattern of signals is applied to RTS and STX during CMTEST, and the control lines SRX (Pin 12), DCD (Pin 8), and CTS (Pin 5) are tested for specific transitions and levels. Figure 15-5 shows the signals applied by RTS and STX, and the results expected, at each phase of the test, on SRX, DCD, and CTS. RS232 standards specify an ON condition for control lines to be a voltage more positive than +3 volts with respect to signal ground. The OFF state is defined to be a voltage more negative than -3 volts. Thus, a high-level signal would be a voltage level greater than +3 volts but not greater than +Vcc (+12 volts). Voltages within the region of +3 volts to -3 volts do not represent acceptable RS232 levels.

As an example using Figure 15-5, the firmware causes RTS (Pin 4) and STX (Pin 19) to be high. These are the output signals for test six. The expected inputs are high signal levels on CTS, DCD, and SRX. Negative transitions are not applicable to test six. Moving on to test seven, the firmware drops RTS and STX low. Negative transitions are then looked for on CTS, DCD and SRX. A negative transition requires that the control line switch from the ON state to the OFF state (greater than +3 volts to less than -3 volts). The final level on these lines at the end of test seven must be low. If any of the preceding conditions are not met, an error message is displayed on the screen.

		CABLE PIN NUMBERS							
		OUTPUT				EXPECTED INPUT			
		4 RTS 11 or 19 STX		12 SRX 8 DCD 5 CTS 5 CTS 8 DCD		12 SRT			
PIA LINE NAME		PB3 PB4	CA1 CB1	CB2 PB2	PB1 PB0	Transitions	Levels		
0	0 0	- - - -							
1	0 0	* * * 0 0 0							
2	1 0	* * * 1 1 0							
3	0 0	* l l 0 0 0							
4	0 1	* * * 0 0 1							
5	0 0	l * * 0 0 0							
6	1 1	* * * 1 1 1							
7	0 0	l l l 0 0 0							
8	0 0	* * * 0 0 0							

* are don't cares
l = negative transition sensitive

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Figure 15-5. Active data lines, expected transitions and expected data during the first test in the "CMTEST" program.

Figures 15-6 through 15-14 show the results of various error conditions as displayed on the screen. The numbers in the first column indicate the applicable test. The following six columns indicate whether there is a mismatch between the expected transition state or data level. A "1" indicates an error and a "0" indicates no error. Thus, in Figure 15-6, the results of test seven indicate that transitions were correct for SRX, DCD, and CTS. However, CTS and DCD failed to reach their required low levels. Other control line error displays can be similarly evaluated.

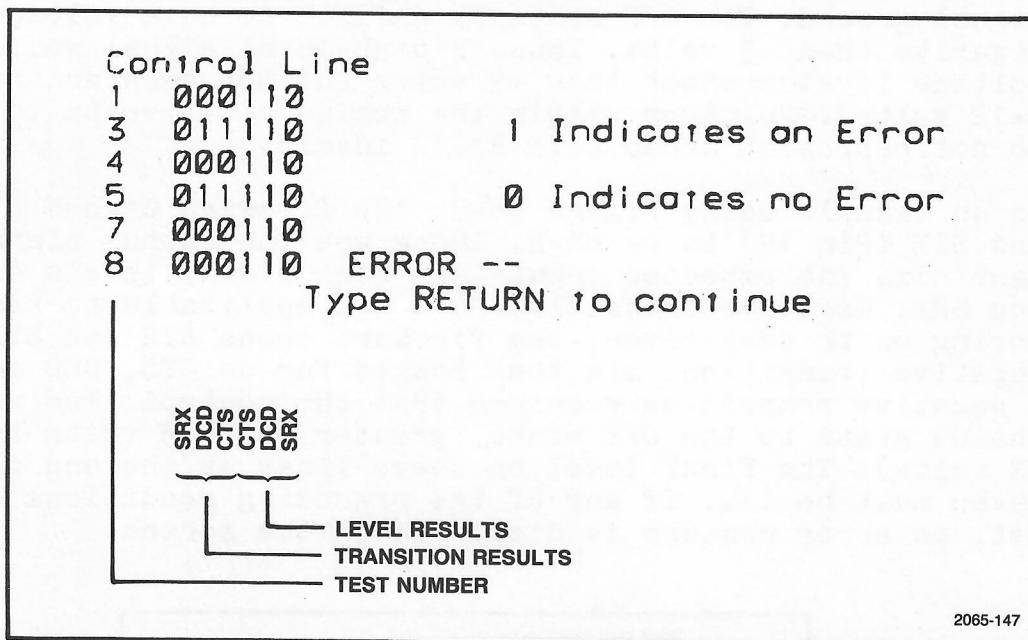


Figure 15-6. Control Line Error Display,
Lead 4 Open.

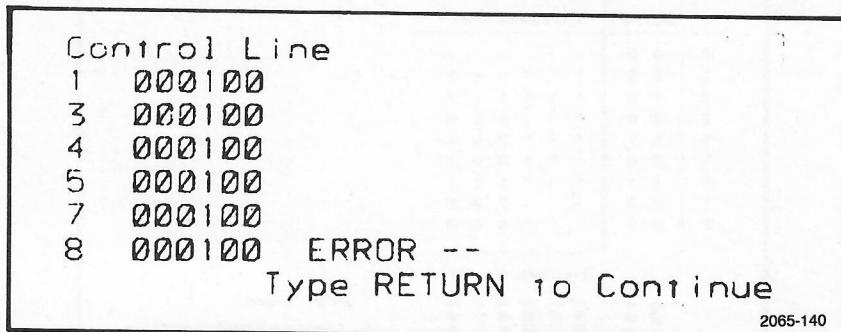


Figure 15-7. Control Line Error Display,
Lead 5 Open.

```
Control Line
1 000010
3 000010
4 000010
5 000010
7 000010
8 000010  ERROR --
Type RETURN to continue
```

2065-141

Figure 15-8. Control Line Error Display,
Lead 8 Open.

```
Control Line
1 000110
3 010110
4 000110
5 010110
7 000110
8 000110  ERROR --
Type RETURN to continue
```

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Figure 15-9. Control Line Error Display,
Leads 5 and 8 Open.

```
Control Line
1 000110
3 010110
4 000110
5 010110
7 000110
8 000110  ERROR --
Type RETURN to continue
```

2065-143

Figure 15-10. Control Line Error Display,
Leads 4, 5, and 8 Open.

```
Control Line
1 000001
2 000001
3 000001
5 100001
7 100001
8 000001  ERROR --
Type RETURN to continue
```

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Figure 15-11. Control Line Error Display,
Lead 19 Open.

```
Control Line
1 000001
2 000001
3 000001
5 000001
7 000001
8 000001  ERROR --
Type RETURN to continue
```

2065-145

Figure 15-12. Control Line Error Display,
Lead 12 Open.

```
Control Line
1 000001
2 000001
3 000001
5 100001
7 100001
8 000001  ERROR --
Type RETURN to continue
```

2065-146

Figure 15-13. Control Line Error Display,
Leads 12 and 19 Open.

Control Line
1 000111
2 000001
3 011111
4 000110
5 100111
7 111111
8 000111 ERROR --
 Type RETURN to continue

Data Line
ERROR --
pin#3 for (BAUD RATE)/2
Type RETURN to continue

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Figure 15-14. Control Line Error Display,
Self-Test Adapter Removed.