Tektronix®

COMMITTED TO EXCELLENCE

**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

CURRENT LOOP
INTERFACE ADAPTER
015-0361-00

INSTRUCTION MANUAL

Serial Number _____

TABLE OF CONTENTS

WARNING

*THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY
QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO
NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN
OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO
SO.*

LIST OF ILLUSTRATIONS

The following illustrations are located at the rear of the manual.

@

LIST OF TABLES

OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary 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 could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could 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.

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 product 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 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 explosive atmosphere 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.

@

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

OPERATING INSTRUCTIONS
GENERAL INFORMATION

INTRODUCTION

The Current Loop Interface Adapter (015-0361-00) is a compact unit that allows Tektronix Data Communication Testers to monitor and send data through current loop interfaces rather than through the standard RS-232-C interfaces. The adapter can monitor both two-wire (simplex or half-duplex) and four-wire (full-duplex) lines.

The current source for each of the two loops is selectable by the operator and can be either externally supplied by the unit under test or internally provided by the adapter. This current loop testing capability is enabled whenever the 26-pin connector plug (P5100) on the end of the adapter cable is inserted into connector receptacle J5100 on the rear panel of the data comm tester.

2963-2
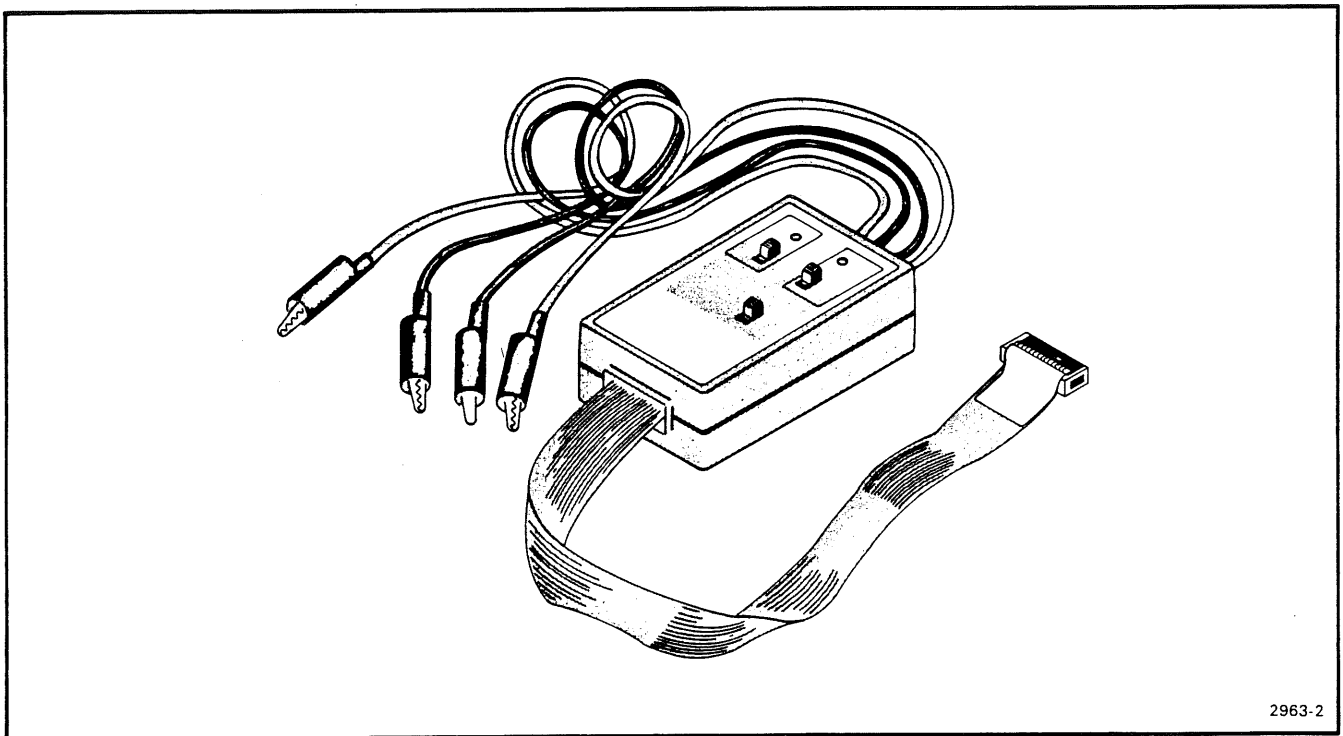
Fig. 1-1. Current Loop Interface Adapter.

SPECIFICATION

Table 1-1

ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Current Sources		
Internal		
20 mA	18 mA $\leqslant$ MARK $\leqslant$ 22 mA. 0 mA $\leqslant$ SPACE $\leqslant$ 1.5 mA.	

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
60 mA	54 mA ≤MARK ≤66 mA. 0 mA ≤SPACE ≤1.5 mA. ≥8 V can be supplied across current loop leads.	
External	15 mA ≤ MARK ≤ 80 mA. 0 mA≤ SPACE ≤ 1.5 mA. ≤ 2 V required across T data leads. ≤ 3 V required across R data leads.	
Current Loop Leads Maximum Input Voltage	 125 V peak between leads. 125 V peak between either lead and ground.	 External current source.
Maximum Output	−30 V ≤V_{out} ≤0 V.	Internal current source.
Maximum Data Transfer Rate Seven and Eight Bits per Character	 ≥9600 bits per second.	
Five and Six Bits	≥4800 bits per second.	

Table 1-2

P5100 CONNECTIONS

Pin Number	Type of Data
OUTPUTS: **Pin 1** Pin 5	 **23 V enable (held at ground)** 5 V (notifies Tester that Adapter is connected)
Pin 8	R data
Pin 12	Request to Send (held at ground)
Pin 19	T data
Pin 22	Data Terminal Ready (held high)
INPUTS:	
Pin 10	Data input disable
Pin 16	Data input
POWER INPUTS FROM TESTER:	
Pins 7, 9, 11, 14, 17, 18, 20	STATIC GROUND
Pins 13, 15	CHASSIS GROUND
Pins 4, 23	+5 V supply
Pin 26	**-23 V supply, unregulated (normal range -14 to -24 V)**

Table 1-3

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Description
Vibration	Vibration frequency cycled from 10 to 55 to 10 Hz (linear or logarithmic sweep) for a duration of 15 minutes in each major axis at a displacement of 0.050 inches (1.27 mm) peak-to-peak. Vibrated for 10 minutes in each major axis at any resonant frequencies.
Shock	150 g's, 1/2-sine, 9 ms duration, three shocks in each major axis for a total of 18 shocks.

Table 1-4

PHYSICAL CHARACTERISTICS

Characteristics	Description
Overall Dimension –	
Length	5.4 inches (13.7 cm).
Width	3.25 inches (8.25 cm).
Height	1.6 inches (4.1 cm).
Weight	Not more than 1 pound (0.45 kg).

CONTROLS, CONNECTORS, AND INDICATORS

The locations of the Current Loop Interface Adapter controls, connectors, and indicators are depicted in Fig. 1-2 and are keyed to the following descriptions.

R-DATA LOOP

① **Test Leads**—Two color coded test leads are connected in series with the Receive-Data Current Loop. Current flows into the black lead and out of the red lead, as marked by the arrows on the front panel. Data on this loop will be treated as Data Communications Equipment (DCE) data by the data comm tester. In simulate mode, data is transmitted by the tester on this loop. In the two-wire mode, use this loop only and set data comm tester for half-duplex (HDX) operation.

② **REV Indicator**—A reverse LED that illuminates whenever current is flowing backwards in the R-Data Loop, indicating that test leads should be reversed.

Fig. 1-2. Location of Controls, Connectors, and Indicators.

(3) **EXT/INT Switch**—A two-position slide switch used to select the current source for the R-Data Loop.

   EXT—Current is supplied by unit under test.

   INT—Current is supplied by the Adapter.

T-DATA LOOP

(4) **Test Leads**—Two color-coded test leads are connected in series with the Transmit-Data Current Loop. Current flows into the black lead and out of the red lead, as marked by the arrows on the front panel. Data on this loop will be treated as DTE data by the data comm tester. The T-data loop is not able to transmit data.

(5) **REV Indicator**—A reverse LED that illuminates whenever current is flowing backwards in the T-Data

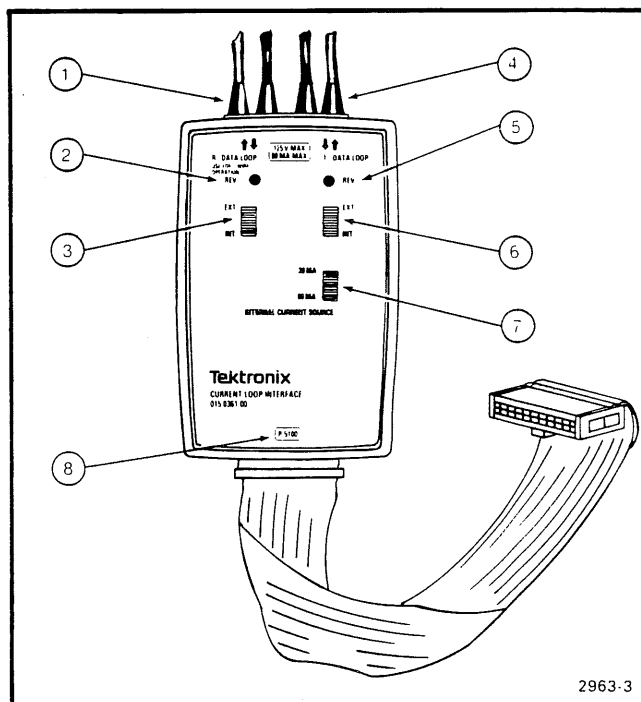Loop, indicating that test leads should be reversed.

(6) **EXT/INT Switch**—A two-position slide switch used to select the current source for the T-Data Loop.

   EXT—Current is supplied by unit under test.

   INT—Current is supplied by the Adapter.

(7) **INTERNAL CURRENT SOURCE Switch**—A two-position slide switch used to select either 20 mA or 60 mA source current for both the T-Data Loop and the R-Data Loop whenever either or both EXT/INT switches are set to INT.

(8) **P5100**—A 26-pin connector plug at the end of the flat cable used to connect the Current Loop Interface Adapter to the data comm tester.

OPERATING INFORMATION

INSTALLATION

Connect the Current Loop Adapter to the data comm tester as follows:

1. Find the jack on the rear panel of the tester which matches the plug on the end of the adapter's flat cable. Note that both are keyed.

CAUTION

Excessive force can damage connectors.

2. Carefully insert plug into the jack.

OPERATION

A summary of the following instructions is printed on the bottom of the adapter case, to provide the operator with a convenient reference guide.

Preliminary

Perform the following steps which are common to both two-wire and four-wire operation.

1. Disconnect the RS-232-C connector from the data comm tester because any data through this connector will interfere with current loop interface operation.

2. Remove all jumpers from the data comm tester Interface Access connectors.

Two-Wire Operation

1. If the unit under test provides the current, set the R-DATA LOOP EXT/INT switch to EXT. If the unit under test does not provide current, set the R-DATA LOOP EXT/INT switch to INT.

2. If INT was selected in the preceding step, set the INTERNAL CURRENT SOURCE switch to either 20 mA or 60 mA, as required by the data communications interface.

3. Connect only the R-DATA LOOP test leads to the unit under test as shown in Figs. 1-3 and 1-4.
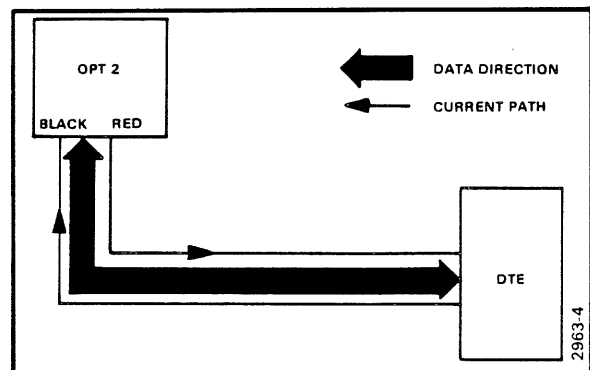
Fig. 1-3. Half-Duplex (two-wire) Modem Simulator Mode.

Fig. 1-4. Half-Duplex (two-wire) Monitor Mode.

Four-Wire Operation

1. If the unit under test provides the current, set both EXT/INT switches to EXT. If the unit under test does not provide current, set both EXT/INT switches to INT.

2. If INT was selected in the preceding step, set the INTERNAL CURRENT SOURCE switch to either 20 mA or 60 mA, as required by the data communications interface.

3. Connect both the R-DATA LOOP and T-DATA LOOP test leads to the unit under test as shown in Figs. 1-5 and 1-6.

4. Set data comm instrument to HDX (half duplex).

5. Information is now stored as DCE data.

4. Switch the data comm tester to FDX. This allows both the R-Data Loop and T-Data Loop to accept data from the unit under test.

R-Data is stored as DCE data. T-Data is stored as DTE data.
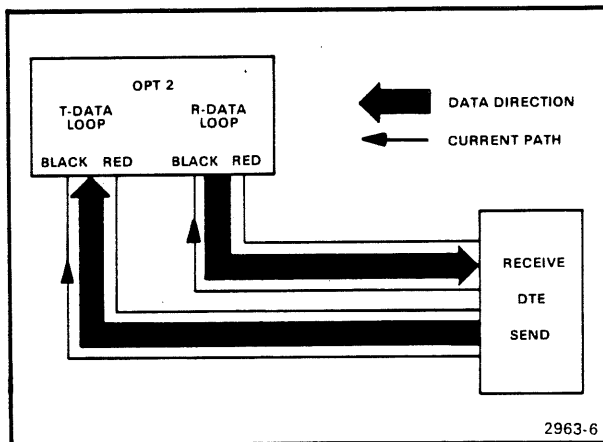
Fig. 1-5. Full-Duplex (four-wire) Modem Simulator Mode.
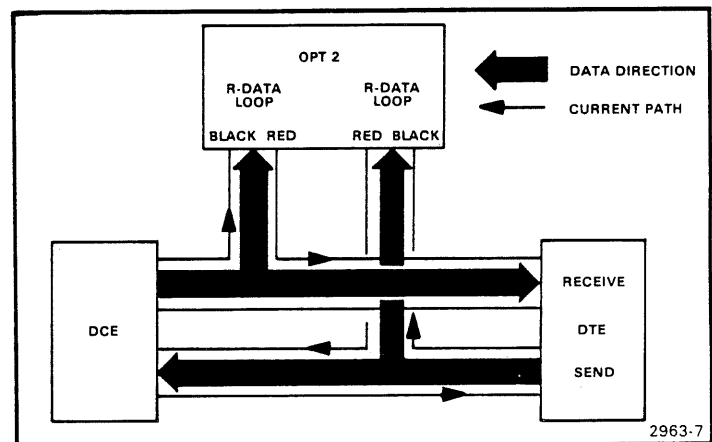
Fig. 1-6. Full-Duplex (four-wire) Monitor Mode.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.
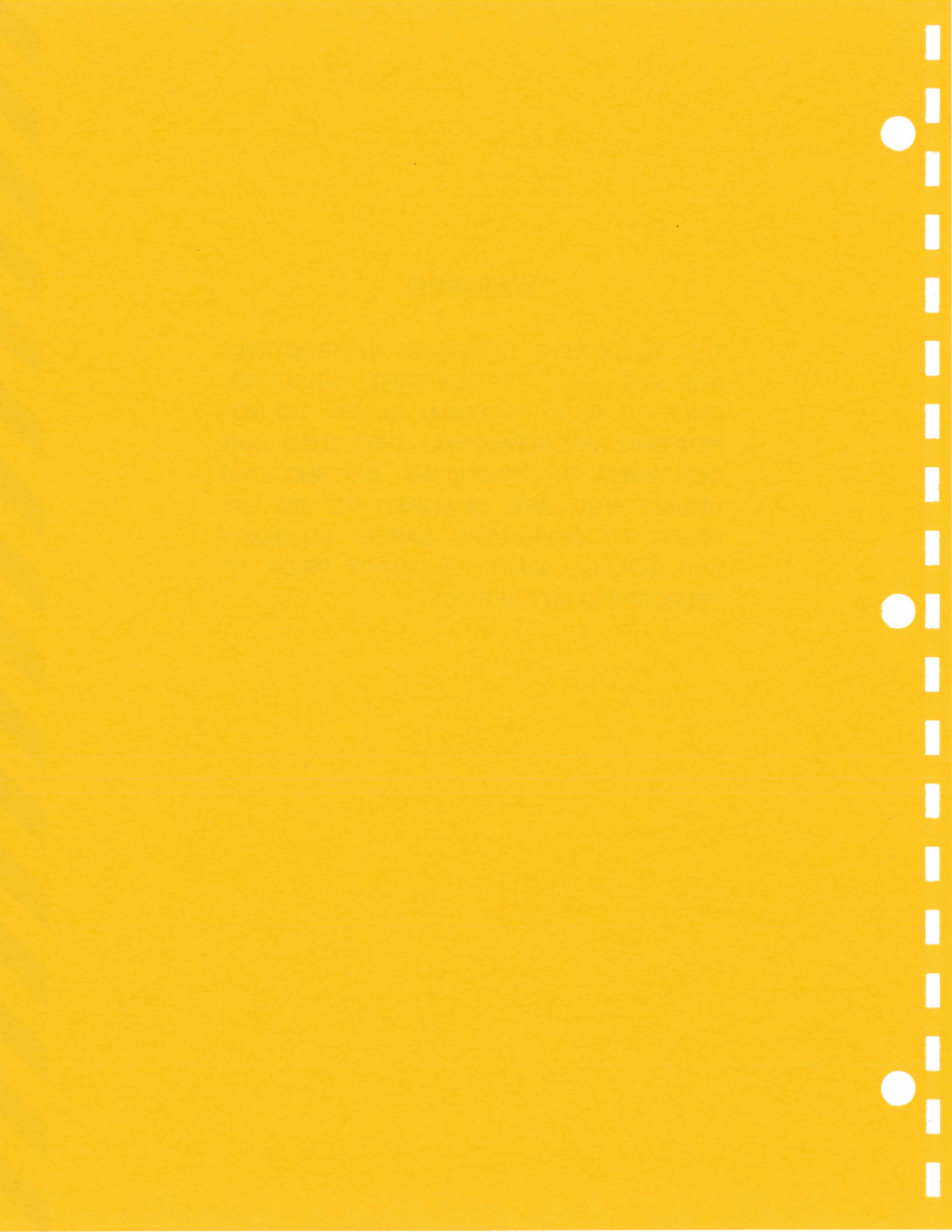
THEORY OF OPERATION

The Current Loop Interface Adapter allows the data comm tester to perform monitoring and modem simulating on 20 mA and 60 mA current loop interfaces. For the purpose of the following descriptions, loop activity means that data is being imposed on the loop through unipolar loop current interruptions.

BLOCK DIAGRAM DESCRIPTION

For the following description, refer to Diagram 1 at the rear of this manual. Notice that the T-DATA (upper section) and R-DATA (lower section) circuit blocks are identical, except for the optocoupler loop driver and Schmitt trigger blocks in the R-DATA section. Since the optocoupler loop sensor sections and their associated blocks are identical, only the R-DATA loop will be fully explained in both the block diagram and circuit descriptions.

When the adapter is connected to the data comm tester, the -23 V enable block completes circuitry that applies an unregulated -23 V to the Adapter.

The Adapter is connected in series into the current loop through T-DATA alligator clips EP6134 and EP6032 and through R-DATA Probe Tips EP6136 and EP6235. If the Adapter is connected for full-duplex operation, both loops are connected. For half-duplex operation, only the R-DATA clips are connected. In the latter case, the R-DATA loop would be handling both R-DATA and T-DATA.

The position of R-DATA Loop switch S6226 selects the loop current source (either the loop under test or the Adapter). In most cases when the data comm tester is used in the MONITOR mode, the EXT position would be selected, and loop current would be supplied by the loop under test. In modem simulator modes the INT position would usually be selected, and the Adapter would provide the loop current from its internal Constant Current Supply. When this supply is used, INTERNAL CURRENT SOURCE switch S6014 selects a loop current output of either 20 mA or 60 mA.

Since most current loops are polarized and the unit will operate properly only in one direction of a unipolar current loop, a Reverse Current Indicator (DS6232) turns on whenever current is flowing through the Adapter in the wrong direction.

Once the unit is properly connected and set up for operation, any loop activity is sensed by Optocoupler Loop Sensor U6127. This activity is passed to Schmitt Trigger U6119D, which converts it to TTL levels for the data comm tester.

This concludes the R-DATA loop sensing section. The T-Data section of the Adapter operates identically. The remainder of the block diagram description covers the data comm tester's ability to transmit data to the loop in the simulator modes of operation. Only the R-DATA section can transmit information.

Data transmitted by the data comm tester originates as a serial data stream at TTL levels and is sent through Schmitt Triggers U6119B and U6119C. These Schmitt Triggers provide sufficient drive current to pass the transmitted data through Optocoupler Loop Driver U6226 and onto the loop. The optocoupler loop driver passes data to the loop by turning Loop Interrupter Q6228 on and off to cause loop current interruptions.

CIRCUIT DESCRIPTION

Diagrams 1 and 2 are the block diagrams and schematic for the Current Loop Adapter.

Power Supply

The Adapter receives its power from the data comm tester through plug P5100. Pin 26 supplies -23 V, pins 4 and 23 supply +5 V, and pins 13 and 15 provide ground. The unregulated -23 V can be monitored at test point TP1.

Constant-Current Supply

A constant-current generator is made up of Q6221 and associated circuitry. It supplies either 20 mA or 60 mA to the loop as selected by S6014. Zener diode VR6218 and resistor R6218 set a fixed bias at the base of Q6221, which generates an amount of constant current that is determined by the combination of current-limiting resistors (R6006 and R6008) selected by S6014. When R6006 is selected by S6014, Q6221 generates 20 mA of current. When both R6006 and R6008 are selected, 60 mA of current are generated.

Rapid saturation and current-spike damage to Q6221, as a result of normal loop activity, is prevented by CR6219 and CR6225. These diodes also protect Q6221 whenever the unit is being connected to or disconnected from the loop. The current supply is protected by CR6226 and CR6228 if external current is inadvertently supplied at the same time.

Reverse-Current Indicator

Reverse-current indicator DS6232 is a conventional LED circuit that turns on when the loop is reverse connected. With the loop properly connected, the LED is reverse biased and remains off. An increase in the reverse voltage breakdown of the circuit is provided by CR6234, which protects the LED during normal operation. Resistor R6234 shunts any leakage current from CR6234 that also may cause a reverse voltage breakdown failure of the LED.

Optocoupler Loop Sensor

For the following description of the optocoupler loop sensor, Q6234 will be considered to be on continuously. It is normally controlled by optocoupler loop driver U6226; therefore, its operation will be covered in the description of U6226.

When data is imposed on the loop, causing loop activity, current interruptions pass through pins 1 and 2 of R-DATA optocoupler U6127, R6133, and Q6234. These interruptions cause the optocoupler's LED to turn off and on. The LED status is sensed by the optocoupler phototransistor. When the phototransistor is off, its emitter voltage is held at +2.5 V by voltage divider R6125 and R6220. As soon as the phototransistor turns on, the emitter voltage goes to +5 V. This voltage can be measured at TP6. The emitter voltage swing represents data from the loop and is passed to Schmitt Trigger U6119 for conversion to standard data comm TTL levels. The stored charge on the base-emitter junction of the phototransistor is discharged by R6127, causing it to turn off faster. Current through the LED is held to approximately 15 mA by Q6128, CR6133, and R6133. Whenever the current exceeds 15 mA, the voltage drop across R6133 biases Q6128 on, which causes the excess current to pass through Q6128 and CR6133.

Biasing by R6112, R6115, and R6116 causes U6119D to operate with about a 0.5 V hysteresis curve within the +2.5 V to +5 V range. The output of U6119D is prevented from going more negative than one diode drop below ground by CR6112. The output of U6119D goes to the data comm tester through P5100-8.

Optocoupler Loop Driver

In modem simulator modes the data comm tester must be capable of putting data into the current loop. This is done on the R-DATA loop through optocoupler loop driver U6226 and its associated circuitry.

Semiconductors U6226 and Q6234 act together as a gate in the current loop. The data is transferred through U6226 in the same manner that U6127 extracted it from the loop (i.e., through its LED and phototransistor). The data enters the Adapter via W510-16 (pin 16) and the Schmitt Triggers U6119B-7 and U6119C-9.

When the data comm tester is in Monitor mode, a logic high on W5100-10 holds the inputs to the Schmitt Triggers at logic high (some testers put a logic high on W5100-16, not W5100-10). This holds the Schmitt Trigger outputs high, which keeps the optocoupler LED turned off. With the LED off, the phototransistor is off, allowing Q6228 to remain on. This keeps Q6234 on, permitting current to flow in the loop and through R-DATA loop sensor U6127.

When W5100-10 goes low (Simulate mode) data received by U6119B-7 and U6119C-9 is transferred to the LED in U6226, turning it on and off. Activity of the LED is sensed by the phototransistor which turns Q6228 on and off, thus passing data to the loop as loop current interruptions. The biasing network of R6118 and R6119 establish the operating threshold of U6119B and U6119C. Current through the optocoupler LED is limited by R6219. Output of the Schmitt Triggers can be monitored at TP2.

CR6128 and CR6131 are 1 mA constant-current diodes. When both the optocoupler LED and phototransistor are off, 1 mA flows through CR6128 and CR6131 into the base of Q6228. This biases Q6228 on, turning on Q6234 and allowing loop current to flow through U6127 and Q6128. When the loop driver LED turn on, the phototransistor in U6226 shunts the 1 mA current away from Q6228 so Q6228 is biased off. This turns off Q6234 and the loop current is interrupted. In this manner, the marks and spaces of data received at U6119B and U6119C (and passed on to U6226) cause loop current to be interrupted in response to data being transmitted.

Capacitor C6228, located between the base and collector of Q6228, prevents the loop interruptions of an external device from momentarily turning Q6228 off, then back on, during the modem simulate receive mode. Since CR6128 and CR6131 are rated only for 100 V, they are placed in series to handle the loop voltage. Current-balancing resistors R6126 and R6131 ensure that CR6128 and CR6131 will not be damaged should one of them attempt to regulate at a lower current than the other.

PERFORMANCE CHECK

The Performance Check procedure is used to verify that the Current Loop Interface Adapter meets its electrical performance requirements presented in the Specification section.

TEST EQUIPMENT REQUIRED

The following test instruments, or equivalent equipment, are required to perform these checks:

1. TEKTRONIX 851 Digital Tester

2. TEKTRONIX DM 501 Digital Multimeter (DMM)

3. TEKTRONIX Data Comm Tester ·

PERFORMANCE CHECK PROCEDURE

1. Check Current Source

a. Attach Adapter to data comm tester and turn on tester. **Set MODE switch to DCE SIM.**

b. Set the DMM to dc mA range to check 60 mA of current.

c. On the Adapter set both the R-DATA LOOP and T-DATA LOOP EXT/INT switches to EXT and set the INTERNAL CURRENT SOURCE switch to 60 mA.

d. Connect the T-DATA LOOP red test lead to the DMM High input and connect T-DATA LOOP black test lead to the DMM Low input. Set the T-DATA LOOP EXT/INT switch to INT.

e. Check that the DMM reads 60 mA **± 6 mA.**

f. Set the INTERNAL CURRENT SOURCE switch to 20 mA.

g. Check that the DMM reads 20 mA ±2 mA.

h. Disconnect both T-DATA LOOP test leads from the DMM.

i. Connect the R-DATA LOOP red test lead to the DMM High input and connect the R-DATA LOOP black test lead to the DMM Low input. Set the R-DATA LOOP EXT/INT switch to INT.

j. Check that the DMM reads 20 mA ±2 mA.

k. Set the INTERNAL CURRENT SOURCE switch to 60 mA.

l. Check that the DMM reads 60 mA **± 6 mA.**

2. Check R-Data Loop for Space Current

a. Use the same test setup established at Step 1-i.

b. Program the 834 to repeatedly send a string of 20 zeros at a baud rate of 50 by pressing the following keys in sequence: 1, TRANSFER, 0 and ENTER (repeat 20 times), SETUP, ↓, 8, ←, START.

c. Set the Adapter's INTERNAL CURRENT SOURCE switch to 60 mA.

d. Set the DMM to dc mA to measure the Space current.

e. Check that the DMM reads between 0 and 1.5 mA. The reading will briefly change to the Mark value approximately every 4 seconds.

f. Set the Adapter's INTERNAL CURRENT SOURCE switch to 20 mA. ·

g. Repeat Step e.

h. Press STOP on the 834.

i. Disconnect both R-DATA LOOP leads from the DMM.

3. Check Loop Output Voltages

a. Set the 851 Digital Tester Function switch to DCV.

b. Connect the 851 DMM plus (+) lead to the T-DATA LOOP black test lead and connect the 851 DMM minus (−) lead to the T-DATA LOOP red test lead.

c. At the Interface Adapter set the INTERNAL CURRENT SOURCE switch to 60 mA.

d. Set T-DATA EXT/INT switch to INT.

e. Check that the 851 reads between 0 and −30 V.

f. Set the INTERNAL CURRENT SOURCE switch to 20 mA.

g. Check that the 851 reads between 0 and −30 V.

h. Disconnect the 851 DMM leads from the T-DATA LOOP test leads and connect them to the R-DATA LOOP test leads in the same manner specified in step 3-b.

i. Repeat steps c through g.

j. Disconnect the 851 DMM leads from the R-DATA LOOP test leads.

MAINTENANCE

The following information is provided to help locate faults in the Current Loop Adapter circuitry. The Theory of Operation material in this manual may also be helpful while troubleshooting. The TEKTRONIX 851 Digital Tester, or equivalent equipment, and a data comm tester are required to do these routines.

Refer to the data comm tester manual if it appears there is a fault within that instrument.

FUSE TEST

The following procedure tests those fuses which are in series with the T-DATA LOOP and R-DATA LOOP test leads. (Adapter is attached to data comm tester and tester is turned on.)

1. Set both the T-DATA LOOP and R-DATA LOOP EXT/INT switches to EXT.

2. Connect the T-DATA LOOP black test lead to the R-DATA LOOP black test lead.

3. Connect the T-DATA LOOP red test lead to the R-DATA LOOP red test lead.

4. Set INTERNAL CURRENT SOURCE switch to 60 mA.

5. Set the T-DATA LOOP EXT/INT switch to INT and observe whether the R-DATA LOOP REV indicator illuminates.

6. Set the T-DATA LOOP EXT/INT switch to EXT and the R-DATA LOOP EXT/INT switch to INT. Observe whether the T-DATA LOOP REV indicator illuminates.

7. If either the T-DATA LOOP or the R-DATA LOOP REV indicator (or both indicators) did not illuminate, proceed to Fig. 2-1, Troubleshooting Chart 1.

8. If both REV indicators illuminate, continue troubleshooting with the next text.

9. Disconnect loop leads from each other.

ADAPTER SELF TEST

1. Set the MODE switch to DCE SIM. Power-up the 834 without a ROM pack. Press the following keys in sequence.

KEY	OPERATION PERFORMED
SETUP	
2	
→	Select CODE= ASCII
↓	
6	
→	Select BAUD= 9600
3	
↓	
2	
→	Select SETUP= ASYNC
1	
TRANSFER	Sets up untriggered repeat program
5 (repeat 17 times)	
ENTER	Loads message buffer with 17 ASCII "U" characters.

2. Connect the Adapter's red R-DATA test lead to the black T-DATA test lead. Connect the black R-DATA test lead to the red T-DATA test lead.

3. Connect the Adapter to the tester.

4. Press the START key.

5. Wait a few seconds then press STOP.

6. The capture buffer should be filled with groups of 34 ASCII "U" characters separated by the EOF character. Scan through the data by pressing DATA and using the arrow keys. The DTE and DCE indicators will alternate on and off to verify that no erroneous characters were stored.

7. If the buffer has any erroneous characters, restart the 834 and proceed to Fig. 2-2. The tester will send 55 HEX at 9.6k-baud providing an approximate 4.3 kHz signal to the Adapter.

Fig. 2-1. Troubleshooting Chart 1.

2963-8

START*

CHECK 4.3 kHz TP2 — NO → CHECK 4.3 kHz W5100-16 — NO → CHECK W5100 OR DATA COMM TESTER

CHECK 4.3 kHz W5100-16 — YES → REPLACE U6119

CHECK 4.3 kHz TP2 — YES ↓

CHECK 4.3 kHz Q6022 COLLECTOR — NO → SET BOTH R-DATA LOOP AND T-DATA LOOP EXT/INT SWITCH TO INT 4.3 kHz AT COLLECTOR OF Q6022 — NO → CHECK U6226, Q6228 CR6131 AND CR6128 FOR FAILURES

SET BOTH R-DATA LOOP AND T-DATA LOOP EXT/INT SWITCH TO INT 4.3 kHz AT COLLECTOR OF Q6022 — YES → CHECK FOR U6124 AND Q6032 FOR FAILURES

CHECK 4.3 kHz Q6022 COLLECTOR — YES ↓

CHECK +5 V TP4 0 V TP3 — NO → CHECK DATA COMM TESTER

CHECK +5 V TP4 0 V TP3 — YES ↓

CHECK 4.3 kHz TP5 — NO → REPLACE U6124

*The 834 must be sending data. For setup, see the Adapter Self Test procedure in this section.

CHECK 4.3 kHz TP5 — YES ↓

CHECK 4.3 kHz TP6 — NO → CHECK U6127, Q6128 AND Q6234 FOR FAILURES

CHECK 4.3 kHz TP6 — YES ↓

CHECK 4.3 kHz U6119A-2 — NO → REPLACE U6119

CHECK 4.3 kHz U6119A-2 — YES ↓

CHECK 4.3 kHz U6119D-13 — NO → REPLACE U6119

CHECK 4.3 kHz U6119D-13 — YES ↓

CHECK W5100 OR DATA COMM TESTER → END

2389-214

Fig. 2-2. Troubleshooting Chart 2.

CORRECTIVE MAINTENANCE

The following procedures describe how to remove and reinstall the Current Loop circuit board for component replacement or repair.

NOTE

Be sure Adapter is disconnected from data comm tester.

Removing the Current Loop Circuit Board (Fig. 2-3)

1. Set the Adapter on a flat surface with its four rubber feet facing upward.

2. Remove the four screws and rubber feet from the lower half of the Adapter case and lift off the lower case-half.

3. Turn the upper case-half over so that the switches are on top. This will prevent the slide-switch covers from falling off when the circuit board is removed.

4. Grasp the heat sink with one hand and, holding the upper case-half with the other hand, separate the upper case-half from the circuit board.

5. Remove the slide-switch covers and set them aside.

Reassembling the Interface Adapter

1. Hold the circuit board assembly with slide switches facing upward.

2. Replace covers on the slide switches.

3. Position the upper case-half over the circuit board.

4. Place the four grooved rubber test lead lead boots into appropriate detents on the back edge of the upper case-half.

5. Position the lower case-half into place, install the four rubber feet, and secure with the four screws.

Fig. 2-3. Disassembling and assembling the Adapter.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from your Tektronix Field Office or representative. When ordering parts, include the part number plus instrument type, serial number and modification number (if applicable).
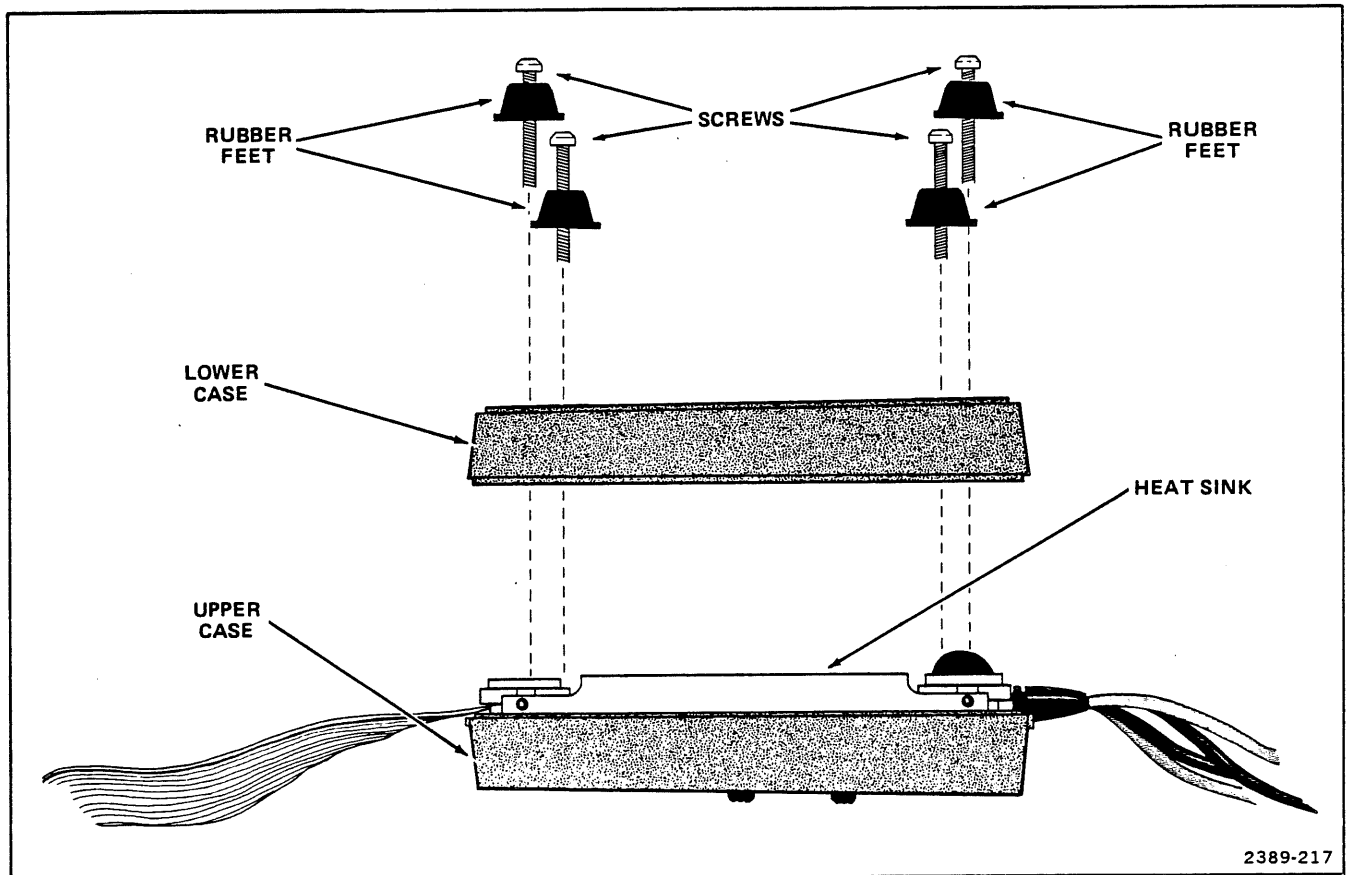
If a part has been replaced with a new or improved part, your Tektronix representative will contact you regarding any change in part number.

LIST OF ASSEMBLIES

A list of assemblies is found at the beginning of the Replaceable Electrical Parts list. Assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

MFR. CODE NUMBER-TO-MANUFACTURER CROSS INDEX

The Mfr. Code Number-to-Manufacturer cross index provides codes, names and addresses of manufacturers of components listed in the Replaceable Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (Column 1 of Electrical Parts List)

A numbering method is used to identify assemblies, subassemblies and parts. An example of this numbering method and typical expansions is as follows:

$$A23A2R1234 = \begin{array}{ccc} A23 & A2 & R1234 \\ \uparrow & \uparrow & \uparrow \\ \text{Assembly} & \text{Subassembly} & \text{Circuit} \\ \text{number} & \text{number} & \text{number} \end{array}$$

Read: resistor 1234 of subassembly 2 of assy 23

Only circuit numbers appear on the schematics and circuit board illustrations, and Each schematic and illustration is marked with its assembly number. Assembly numbers are also marked on the mechanical exploded view located in the Replaceable Mechanical Parts list. A component number is obtained by adding the assembly number prefix to the circuit number.

This parts list is arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts precedes A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are listed at the end of the Replaceable Electrical Parts list.

TEKTRONIX PART NO. (Column 2)

This column lists the part number used when ordering a replacement part from Tektronix.

SERIAL/MODEL NO. (Columns 3 and 4)

Column 3 lists the serial number of the first instrument in which the part was used. Column 4 lists the serial number of the last instrument in which the part was used. No entry indicates that the part is used in all instruments.

NAME AND DESCRIPTION (Column 5)

In this parts list, the item name is separated from its description by a colon (:). Because of space limitations, the item name may appear to be incomplete. For further item name identification, refer to the U.S. Federal Cataloging Handbook, H6-1.

MFR. CODE (Column 6)

This column lists the code number of the manufacturer of the part.

MFR. PART NUMBER (Column 7)

This column lists the manufacturer's part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN BRADLEY COMPANY	1201 2ND STREET SO	MILWAUKEE, WI 53204
02735	RCA CORP/SOLID STATE DIVISION	ROUTE 202 SOMERVILLE, NJ 08876	
04222	AVX CERAMICS/DIV OF AVX CORP	19TH AVE SOUTH P.O.BOX 867	MYRTLE BEACH, SC 29577
04713	MOTOROLA INC SEMICONDUCTOR DIVISION	5005 E MC DOWELL ROAD P.O.BOX 20923	PHOENIX, AZ 85036
09019	GENERAL ELECTRIC CO POWER ELECTRONICS SYSTEMS DEPT	ELECTRONICS PARK BLDG 7	SYRACUSE, NY 13321
07263	FAIRCHILD SEMICONDUCTOR CAMERA AND INSTRUMENT CORP	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
19701	MEPC/CENTRALAB	P.O.BOX 760	MINERAL WELLS, TX 76067-0760
56289	SPRAGUE ELECTRIC CO	87 MARSHALL STREET	NORTH ADAMS, MA 01247
57668	R-OHM CORP	16931 MILLIKEN AVE	IRVINE CA, 92713
75915	LITTLEFUSE INC	800 E.NORTHWEST HWY	DES PLAINES, IL 60016
80009	TEKTRONIX INC	P.O.BOX 500	BEAVERTON, OR 97077
82389	SWITCHCRAFT INC	5555 N. ELSTON AVE	CHICAGO, IL 60630

A66- CURRENT LOOP ADAPTER

Ckt.No.	Tektronix Part No.	Serial/Model No. Eff.	Dscont.	Name & Description	Mfr. Code	Mfr.Part Number
A66	670-6113-01			CKT BOARD ASSY:CURRENT LOOP	80009	670-6113-01
C6008	290-0145-00			CAP.,FXD,ELCTLT:10μF,+75-10%,50V	56289	30D106G050CB2R58
C6008	290-0145-00			CAP.,FXD,ELCTLT:10μF,+75-10%,50V	56289	30D106G050CB2R58
C6212	283-0198-00			CAP.,FXD,CER DI:0.22μF,20%,50V	04222	SR305C224MAA
C6228	283-0108-00			CAP.,FXD,CER DI:220pF,10%,200V	04222	SR206A221KAA
CR6011	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6021	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6022	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6024	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6032	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6112	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6128	152-0460-00			SEMICOND DVC:SI,25V,1mA	04713	SCLO72
CR6131	152-0460-00			SEMICOND DVC:SI,25V,1mA	04713	SCLO72
CR6133	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6213	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6217	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6219	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6225	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6226	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6228	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
CR6234	152-0061-00			SEMICOND DVC:SI,175V,100mA	07263	FDH2161
DS6032	150-1014-00			LED,RED:100mA,695nM	07263	MV5054-1/CLIP
DS6232	150-1014-00			LED,RED:100mA,695nM	07263	MV5054-1/CLIP
F6032	159-0056-00			FUSE CARTRIDGE:0.1A,125V,SFTY CNTRLD	75915	279-100
F6134	159-0056-00			FUSE CARTRIDGE:0.1A,125V,SFTY CNTRLD	75915	279-100
F6136	159-0056-00			FUSE CARTRIDGE:0.1A,125V,SFTY CNTRLD	75915	279-100
F6235	159-0056-00			FUSE CARTRIDGE:0.1A,125V,SFTY CNTRLD	75915	279-100
Q6022	151-0464-00			XSTR:SI,NPN	04713	SJE412
Q6032	151-0224-00	B010100	B063019	XSTR:SI,NPN (834)	07263	SA24850
		B010100	B011111	(835)		
		B010100	B010824	(836)		
	151-0190-00	B063020		XSTR:SI,NPN (834)	01295	SKA3703
		B011112		(835)		
		B010825		(836)		
Q6128	151-0224-00	B010100	B063019	XSTR:SI,NPN (834)	07263	SA24850
		B010100	B011111	(835)		
		B010100	B010824	(836)		
	151-0190-00	B063020		XSTR:SI,NPN (834)	01295	SKA3703
		B011112		(835)		
		B010825		(836)		
Q6221	151-0464-00			XSTR:SI,NPN	04713	SJE412
Q6228	151-0253-00			XSTR:SI,NPN	02735	40327-17
Q6234	151-0253-00			XSTR:SI,NPN	02735	40327-17
R6006	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	19701	5043ED221R0F
R6008	321-0102-00			RES.,FXD,FILM:113 OHM,1%,0.125W	19701	5043ED113R0F
R6009	315-0102-00			RES.,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25J-E01K0
R6012	321-0130-00			RES.,FXD,FILM:221 OHM,1%,0.125W	19701	5043ED221R0F
R6014	321-0102-00			RES.,FXD,FILM:113 OHM,1%,0.125W	19701	5043ED113R0F
R6015	301-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	01121	EB2425

A66- CURRENT LOOP ADAPTER(cont)

Ckt.No.	Tektronix Part No.	Serial/Model No. Eff.	Dscont.	Name & Description	Mfr. Code	Mfr.Part Number
R6112	315-0303-00			RES.,FXD,FILM:30K OHM,5%,0.25W	57668	NTR25J-E30K
R6114	315-0272-00			RES.,FXD,FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K
R6115	315-0113-00			RES.,FXD,FILM:11K OHM,5%,0.25W	57668	NTR25J-E11K
R6116	315-0622-00			RES.,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CXK200J
R6117	315-0103-00			RES.,FXD,FILM:10K OHM,5%,0.25W	57668	NTR25J-E10K0
R6118	315-0303-00			RES.,FXD,FILM:30K OHM,5%,0.25W	57668	NTR25J-E30K
R6119	315-0103-00			RES.,FXD,FILM:10K OHM,5%,0.25W	57668	NTR25J-E10K0
R6120	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W		NTR25J-E100K
R6122	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W		NTR25J-E100K
R6123	315-0390-00			RES.,FXD,FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R6124	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W		NTR25J-E100K
R6125	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W		NTR25J-E100K
R6126	315-0105-00			RES.,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R6127	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W		NTR25J-E100K
R6128	315-0204-00			RES.,FXD,FILM:200K OHM,5%O.25W	19701	5043CX200K0J
R6129	315-0204-00			RES.,FXD,FILM:200K OHM,5%O.25W	19701	5043CX200K0J
R6131	315-0105-00			RES.,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R6133	315-0390-00			RES.,FXD,FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R6208	315-0272-00			RES.,FXD,FILM:2.7K OHM,5%,0.25W		NTR25J-E02K
R6212	315-0272-00			RES.,FXD,FILM:2.7K OHM,5%,0.25W		NTR25J-E02K
R6213	315-0303-00			RES.,FXD,FILM:30K OHM,5%,0.25W	57668	NTR25J-E30K
R6215	315-0113-00			RES.,FXD,FILM:11K OHM,5%,0.25W	57668	NTR25J-E11K
R6216	315-0622-00			RES.,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R6217	315-0272-00			RES.,FXD,FILM:2.7K OHM,5%,0.25W		NTR25J-E02K
R6218	301-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.50W	57668	NTR25J-EE02K4
R6219	315-0241-00			RES.,FXD,FILM:240 OHM,5%,0.25W	19701	5043CX240R0J
R6220	315-0104-00			RES.,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R6226	315-0301-00			RES.,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R6234	315-0102-00			RES.,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25J-E01K0
S6014	260-1811-00			SW,SLIDE:DPDT,0.5A,125V DC	82389	11P-1137
S6024	260-1811-00			SW,SLIDE:DPDT,0.5A,125V DC	82389	11P-1137
S6226	260-1811-00			SW,SLIDE:DPDT,0.5A,125V DC	82389	11P-1137
U6119	156-0411-02			MICROCKT,LI:QUAD-COMP,SGL,SPLY,SCRN	04713	LM339J0S
U6124	156-0885-01			CPLR,OPTOELEC ISOLATOR	09019	H11AX940
U6127	156-0885-01			CPLR,OPTOELEC ISOLATOR	09019	H11AX940
U6226	156-0885-01			CPLR,OPTOELEC ISOLATOR	09019	H11AX940
VR6011	152-0662-00			SEMICOND DVC:ZENER,0.4W,5V,1%	04713	SZG195
VR6218	152-0662-00			SEMICOND DVC:ZENER,0.4W,5V,1%	04713	SZG195

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATION

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966   Drafting Practices.
Y14.2, 1973   Line Conventions and Lettering.
Y10.5, 1968   Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.
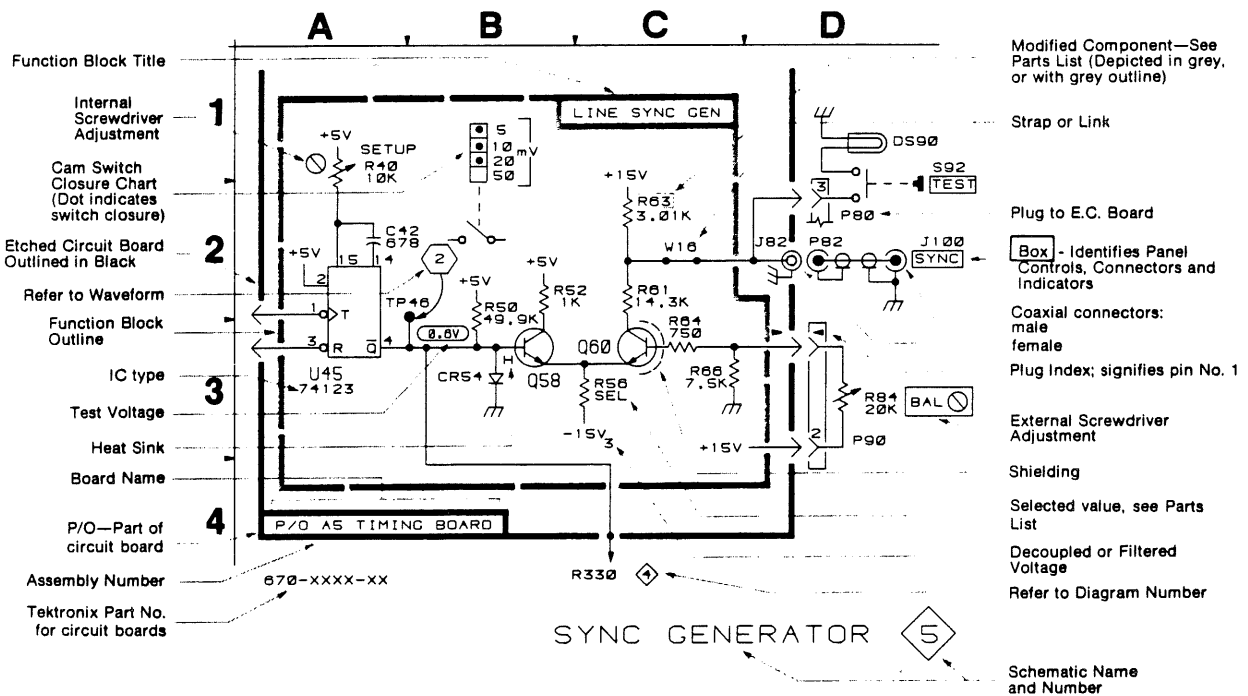
American National Standard Institute
1430 Broadway
New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

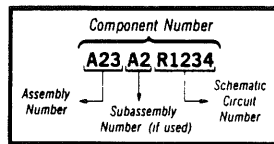## Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number (see following illustration for constructing a component number).

COMPONENT NUMBER EXAMPLE

Component Number

A23 A2 R1234

Assembly Number — Subassembly Number (if used) — Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.
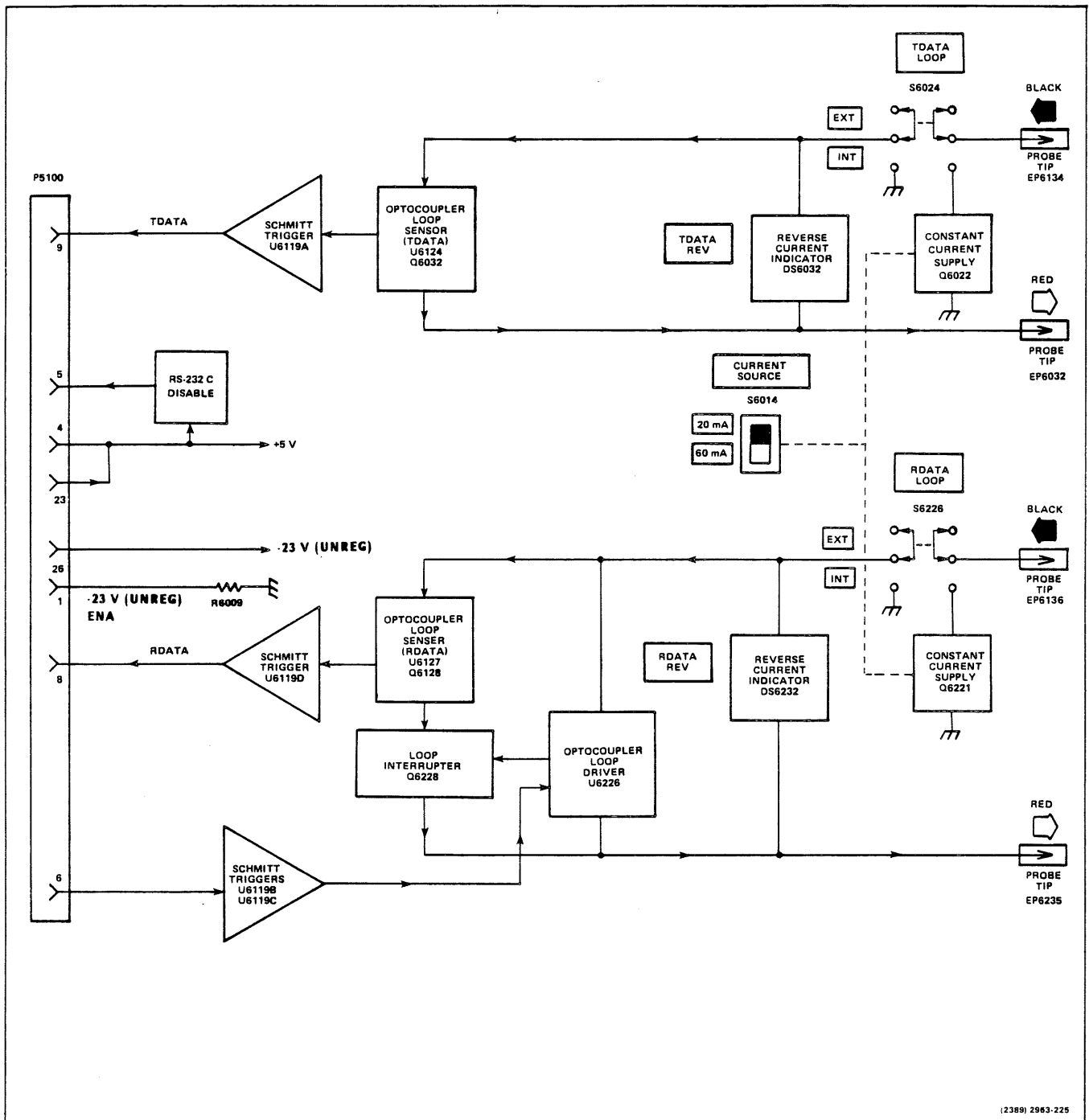
The following special symbols may appear on the diagrams:

A66 Current Loop Interface Adapter Board component locations.

2389-224

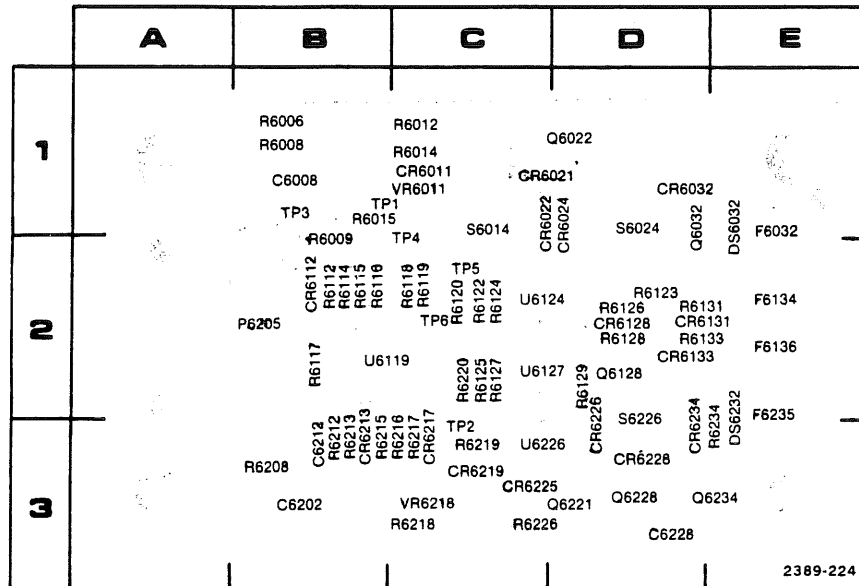| CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C6008	1B	CR6133	2D	F6032	1E	R6006	1B	R6120	2C	R6215	3B	TP1	1B
C6202	3B	CR6213	3B	F6134	2E	R6008	1B	R6122	2C	R6216	3C	TP2	3C
C6212	3B	CR6217	3C	F6136	2E	R6009	2B	R6123	2D	R6217	3C	TP3	1B
C6228	3D	CR6219	3C	F6235	2E	R6012	1C	R6124	2C	R6218	3C	TP4	2C
		CR6225	3C			R6014	1C	R6125	2C	R6219	3C	TP5	2C
CR6011	1C	CR6226	3D	P6205	2B	R6015	1B	R6126	2D	R6220	2C	TP6	2C
CR6021	1C	CR6228	3D			R6112	2B	R6127	2C	R6226	3C		
CR6022	1C	CR6234	3D	Q6022	1D	R6114	2B	R6128	2D	R6234	3E	U6119	2B
CR6024	1D			Q6032	1D	R6115	2B	R6129	2D			U6124	2C
CR6032	1D	DS6032	1E	Q6128	2D	R6116	2B	R6131	2D	S6014	1C	U6127	2C
CR6112	2B	DS6232	2E	Q6221	3D	R6117	2B	R6133	2D	S6024	1D	U6226	3C
CR6128	2D			Q6228	3D	R6118	2C	R6208	3B	S6226	3D		
CR6131	2D			Q6234	3E	R6119	2C	R6212	3B			VR6011	1C
								R6213	3B			VR6218	3C
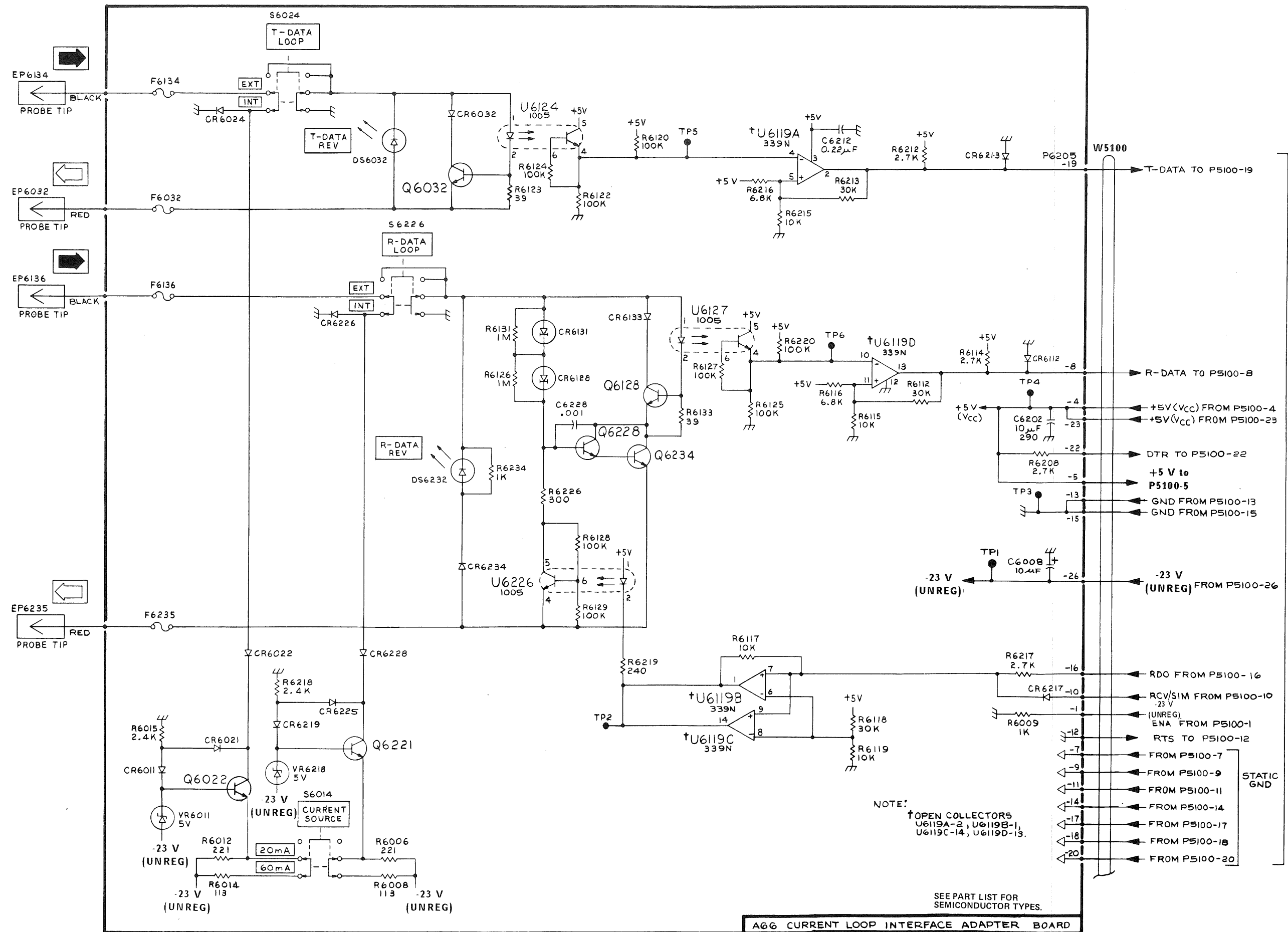
A66 CURRENT LOOP INTERFACE ADAPTER BOARD

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from your Tektronix Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to provide benefit of the latest circuit improvements developed by our engineering department. It is important when ordering parts to include the following information: part number, instrument type, serial number and modification number (if applicable).

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

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 showing that part.

INDENTATION SYSTEM

This parts list is indented to indicate item relationships. The following is an example of the indentation system:

   Name & Description

Assembly and/or component
Attaching parts for this assembly or component
   - - - * - - -
. Detail part of assembly or component
. Attaching parts for detail part
   - - - * - - -
. . Parts of detail part
. . Attaching parts for parts of detail part
   - - - * - - -

Attaching parts are indented the same as the host part; detail parts are indented to the right. Indented parts 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 this parts list, an item name is separated from its description by a colon (:). Because of space limitations an item name may sometimes appear to be incomplete. For additional item name identification, refer to the U.S. Federal Cataloging Handbook H6-1.

ABBREVIATIONS

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

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State,Zip
00779	AMP INC	P.O.BOX 3608	HARRISBURG, PA 17105
04713	MOTOROLA INC	5005 E.MCDOWELL ROAD	PHOENIX, AZ 85008-4229
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LANE P.O.BOX 34829	DALLAS, TX 75234
22526	BERG ELECTRONICS INC	YOUK EXPRSWY	NEW CUMBERLAND, PA 17070
49671	RCA CORP	30 ROCKERFELLER PLAZA	NEW YORK, NY 10020
70485	ATLANTA INDIA RUBBER WORKS INC	571 POLK STREET	CHICAGO, IL 60607
73803	TEXAS INSTRUMENTS INC METALLURGICAL MATERIALS DIV	34 FOREST STREET	ATTLEBORO, MA 02703
76545	MUELLER ELECTRIC CO	1583 EAST 31ST STREET	CLEVELAND, OH 44114
80009	TEKTRONIX INC	P.O.BOX 500 BEAVERTON, OR97077	
83385	CENTRAL SCREW CO	2530 CRESCENT DR	BROADVIEW, IL 60153

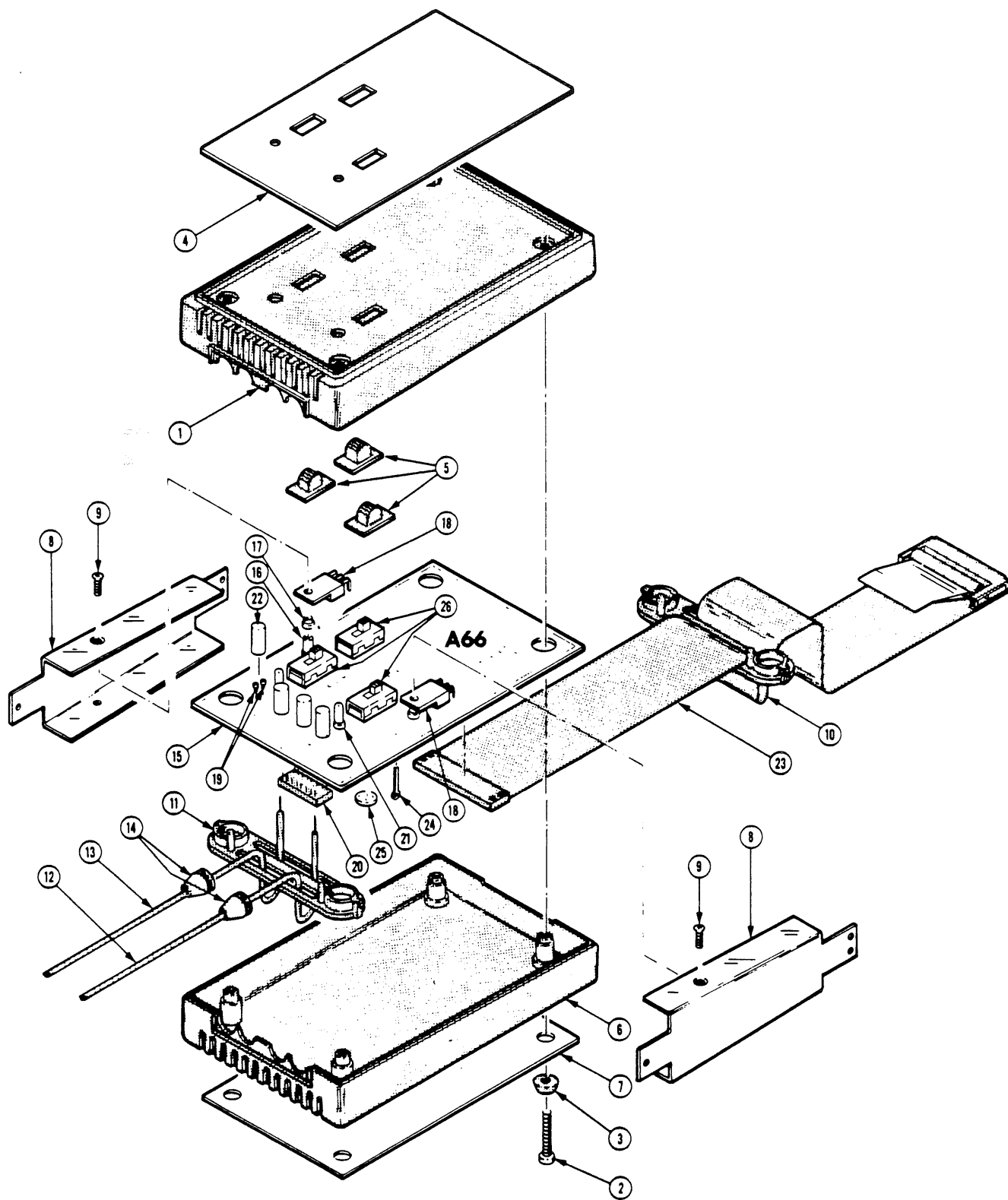| Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff.	Dscont.	Qty.	Name & Description	Mfr. Code	Part Number
1-	015-0361-00			1	ADAPTER ASSY:CURRENT LOOP INTERFACE	80009	015-0361-00
-1	202-0253-01			1	CASE HALF,ADAPTER (ATTACHING PARTS)	80009	202-0253-01
-2	211-0020-00			4	. SCREW,MACH:4-40 X 1.125 PNH STL	83385	ORD BY DESCR
	210-1122-00			4	. WSHR,LOCK:0.12 ID,DISHED,0.25 THK	04713	B52200F006
					- - - * - - -		
-3	348-0037-00			4	FOOT:RUBBER	70485	1059
-4	333-2559-00			1	PANEL FRONT	80009	333-2559-00
-5	200-2367-00			3	COVER,SLIDE SW	80009	200-2367-00
-6	202-0253-00			1	CASE HALF,ADAPTER	80009	202-0253-00
-7	333-2560-00			1	PANEL,REAR	80009	333-2560-00
-8	214-2913-00			2	HEAT SINK,ELEC (ATTACHING PARTS)	80009	214-2913-00
-9	211-0101-00			2	. SCR,MACH:4-40 X 0.25,FLH STL		
					- - - * - - -		
-10	343-0814-00			1	CLAMP,CABLE:1.4 INCH L	80009	343-0814-00
-11	343-0818-00			1	CLAMP,CABLE:1.4 INCH L	80009	343-0818-00
-12	195-0375-00			2	LEAD,ELEC:18 AWG,48.0 L (RED)	80009	195-0375-00
	334-2794-08			1	BAND MARKER:0.371 DIA,BLUE PLSTC EACH LEAD ASSY INCLUDES:	80009	334-2794-08
	200-2410-00			1	. COVER,ELEC CLIP:ALLIGATOR,BLACK	80009	200-2410-00
	344-0001-00			1	. CLIP,ELECTRICAL	76545	60
-13	195-0376-00			2	LEAD,ELEC:18 AWG,48.0 L (BLACK)	80009	196-0376-00
	334-2794-08			1	BAND MARKER:0.371 DIA,BLUE PLSTC EACH LEAD ASSY INCLUDES:	80009	334-2794-08
	200-2410-00			1	. COVER,ELEC CLIP:ALLIGATOR,BLACK	80009	200-2410-00
	344-0001-00			1	. CLIP,ELECTRICAL	76545	60
-14	200-0491-00			4	COVER,CAL FIXT:0.148 X 0.625 L,BLK	80009	200-0491-00
-15	----- -----			1	CKT BD ASSY:CURRENT LOOP(SEE A66 REPL) CKT BD ASSY INCLUDES:		
-16	129-0110-00			2	. SPCR POST:0.272 L X 0.219	80009	129-0110-00
-17	210-1178-00			2	. WSHR,SHLDR:MTG FOR TO-220 XSTR	49671	DF 137A
-18	----- -----			2	. XSTR:(SEE Q6022, Q6221 REPL)		
-19	136-0613-00			8	. SKT PIN TERM:0.018-0.026 PIN	00779	1-332080-5
	136-0252-07			18	. SKT,PIN CONN:W/O DIMPLE	22526	75060-012
-20	136-0728-00			1	. SKT -PL-IN ELEC:MICROCKT,14 DIP	09922	DILB14P-108
-21	----- -----			2	. LT EMITTING DIODE(SEE DS6032,DS6232 REPL)		
-22	----- -----			4	. FUSE CRTG(SEE F6032,6134,6136,6235 REPL)		
-23	175-2322-00			1	. CA ASSY,SP ELEC:26,28 AWG,18.0 L	80009	175-2322-00
-24	214-0579-02			6	. TERM TEST POINT:CD PL BRS	80009	214-0579-00
-25	342-0324-00			2	. INSULATOR DISC:XSTR	13103	7717-5N-BLUE
-26	----- -----			3	. SW,SLIDE(SEE S6014,6024,6226 REPL)		

Fig 5-1 Current Loop Interface Adapter