

Service Manual



371B Programmable High Power Curve tracer 070-A843-50

Warning

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Use Proper Voltage Setting. Before applying power, ensure that the line selector is in the proper position for the power source being used.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The common terminal is at ground potential. Do not connect the common terminal to elevated voltages.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



WARNING
High Voltage



Protective Ground
(Earth) Terminal



CAUTION
Refer to Manual



Double
Insulated

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

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

Disconnect Power. To avoid electric shock, disconnect the mains power by means of the power cord or, if provided, the power switch.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface

This is the service manual for the 371B Programmable High Power Curve Tracer. The manual contains information needed to service the 371B to the module level.

Manual Structure

This manual is divided into sections, such as *Specifications* and *Theory of Operation*. Further, some sections are divided into subsections, such as *Product Description* and *Removal and Installation Procedures*.

Sections containing procedures also contain introductions to those procedures. Be sure to read these introductions because they provide information needed to do the service correctly and efficiently. The following contains a brief description of each manual section.

- *Specifications* contains a description of the 371B Programmable High Power Curve Tracer and the characteristics that apply to it.
- *Operating Information* includes general information and operating instructions.
- *Theory of Operation* contains circuit descriptions that support service to the module level.
- *Performance Verification* contains procedures for confirming that the 371B Programmable High Power Curve Tracer functions properly and meets warranted limits.
- *Adjustment Procedures* contains a collection of procedures for adjusting the 371B Programmable High Power Curve Tracer to meet warranted limits.
- *Maintenance* contains information and procedures for performing preventive and corrective maintenance of the 371B Programmable High Power Curve Tracer. These instructions include cleaning, module removal and installation, and fault isolation to the module.
- *Options* contains information on servicing factory-installed options.
- *Electrical Parts List* contains a statement referring you to *Mechanical Parts List*, where both electrical and mechanical modules are listed.
- *Diagrams* contains an block diagram and an interconnection diagram.
- *Mechanical Parts List* includes a table of all replaceable modules, their descriptions, and their Tektronix part numbers.

Manual Conventions

This manual uses certain conventions that you should become familiar with.

Some sections of the manual contain procedures for you to perform. To keep those instructions clear and consistent, this manual uses the following conventions:

- Names of front panel controls appear in the same case (initial capitals, all uppercase, etc.) in the manual as is used on the 371B Programmable High Power Curve Tracer front panel. Front panel names are all upper-case letters; for example, REF, SAVE, VIEW etc.
- Instruction steps are numbered unless there is only one step.

Modules

Throughout this manual, any replaceable component, assembly, or part of the 371B Programmable High Power Curve Tracer is referred to generically as a module. In general, a module is an assembly (like a circuit board), rather than a component (like a resistor or an integrated circuit). Sometimes a single component is a module; for example, the chassis of the 371B Programmable High Power Curve Tracer is a module.

Safety

Symbols and terms related to safety appear in the *Safety Summary* near the beginning of this manual.

Finding Other Information

Other documentation for the 371B includes:

- The 371B Programmable High Power Curve Tracer *User Manual* contains a tutorial to quickly describe how to operate the 371B Programmable High Power Curve Tracer. It also includes an in-depth discussion on how to more completely use the 371B Programmable High Power Curve Tracer features.

Contacting Tektronix

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Technical support	Email: techsupport@tektronix.com 1-800-833-9200, select option 3* 1-503-627-2400 6:00 a.m. – 5:00 p.m. Pacific time

* **This phone number is toll free in North America. After office hours, please leave a voice mail message. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**

Introduction

This manual contains information needed to properly service the 371B Programmable High Power Curve Tracer as well as general information critical to safe and effective servicing.

To prevent personal injury or damage to the analyzer, consider the following before attempting service:

- The procedures in this manual should be performed only by a qualified service person.
- Read the *General Safety Summary* and the *Service Safety Summary*, beginning on page vii.
- Read *Preparation for Use* in Chapter of *Operating Information*

When using this manual for servicing, be sure to follow all warnings, cautions, and notes.

Performance Check Interval

Generally, the performance check described in Chapter of, *Performance Verification*, should be done every 12 months. In addition, performance check is recommended after module replacement.

If the analyzer does not meet performance criteria, repair is necessary.

Strategy for Servicing

Throughout this manual, the term, module, refers to any field-replaceable component, assembly, or part of the analyzer.

This manual contains all the information needed for periodic maintenance of the 371B Programmable High Power Curve Tracer (Examples of such information are procedures for checking performance.)

Further, it contains all information for corrective maintenance down to the module level. To isolate a failure to a module, use the fault isolation procedures found in *Troubleshooting*, part of Chapter of *Diagram*. To remove and replace any failed module, follow the instructions in *Removal and Installation Procedures*. After isolating a faulty module, replace it with a fully-tested module obtained from the factory. Chapter of *Mechanical Parts List*, contains part number and ordering information for all replaceable modules.

Tektronix Service Offerings

Tektronix provides service to cover repair under warranty as well as other services that may provide a cost-effective answer to your service needs.

Whether providing warranty repair service or any of the other services listed below, Tektronix service technicians are well trained to service the waveform generator. They have access to the latest information on improvements to the 371B as well as new options.

Warranty Repair Service

Tektronix warrants this product for one year from date of purchase. The warranty appears on the back of the title page in this manual. Tektronix technicians provide warranty service at most Tektronix service locations. The Tektronix product catalog lists all worldwide service locations.

Self Service

Tektronix supports repair to the module level by providing Module Exchange.

Module Exchange. This service reduces down-time for repair by allowing you to exchange most modules for re-manufactured ones. Each module comes with a 90-day service warranty.

For More Information. Contact your local Tektronix service center or sales engineer for more information on any of the repair or adjustment services just described.

Specifications

Product Overview

The 371B Programmable High Power Curve Tracer provides both high current and high voltage for testing high-power semiconductor devices at user-selected power settings. It can test devices at up to 400 amps at power levels up to 3000 watts. By measuring and displaying the characteristics on a CRT screen, the 371B enables a user to analyze and evaluate the static characteristics of semiconductor devices.

Non-volatile memory (RAM) and floppy disk storage enable you to store frequently used test setups and curve characteristics for quick and easy measurement comparisons. Using memory in this way helps you avoid errors associated with manual testing, and allows you to run more repetitive-type tests in any given period. You can store up to 64 characteristic curves and 64 setups on a floppy disk, and up to 16 characteristic curves and 16 setups in non-volatile memory. Stored characteristic curves and setups can be recalled for additional analysis and comparison.

The 371B provides direct readout on the CRT of offset base/gate voltage or current. The 371B calculates these values for you, unlike earlier curve tracers where these functions had to be calculated manually.

The 371B also has the ability to average readings to reduce the effects of random noise, which can obscure actual curve data.

The rear panel contains a GPIB connector. The GPIB connector is for use by a GPIB-compatible controller or other GPIB instrumentation. Using this connector and appropriate GPIB instruments, you can create and control tests to suit your application. A typical GPIB system will include a controller and one or more instruments, such as the 371B, a signal generator, a digital multimeter, and a digital oscilloscope. Some GPIB instruments are talk only or listen only devices while others can both talk and listen. The 371B does both. Linking a controller to the 371B, and possibly other instruments, provides operation in four major task areas:

- Program development
- System control
- Data processing
- Display and storage

Specifications

This section contains the 371B Programmable High Power Curve Tracer specifications. All specifications are guaranteed unless labeled “typical”. Typical specifications are provided for your convenience but are not guaranteed.

Performance Conditions

The following electrical and environmental characteristics are valid for instruments operated at ambient temperatures from +10°C to +40°C after an initial warm-up period of 20 minutes, when previously calibrated at a temperature from +20 to +30°C.

The performance of all stimulus outputs (collector high current, collector high voltage, step generator current, step generator voltage) should be verified on the test fixture unit.

To prevent temperature rising of internal ambient temperature and external GND pin at the maximum power condition, continuous setting should be limited.

Intermittent use at above condition is:
 4 min. Operating
 11 min. Non-operating

Table 1-1: Collector Supply Electrical Specification

Characteristic	Performance Requirement	Supplemental Information
Collector Supply Polarity		Selected by the collector supply POLARITY button.
NPN +	Positive pulse for 300 W/ 3 kW peak power watts. Positive rectified sine-square wave for 30 W/ 3 W/ 300 mW/ 30 mW peak power watts.	Applies positive pulse to the collector terminal. Measures collector/Drain current. Applies positive full-wave rectified square sine wave to the collector terminal. Measure collector/Drain current.
PNP -	Negative pulse for 300 W/3 kW peak power watts. Negative rectified sine-square wave for 30 W/ 3 W/ 300 mW/ 30 mW peak power watts.	Applies negative pulse to the collector terminal. Measures collector/Drain current. Applies negative full-wave rectified square sine wave to the collector terminal. Measure collector/Drain current.

Table 1-1: Collector Supply Electrical Specification (Cont.)

Characteristic	Performance Requirement	Supplemental Information
Peak Power Watts Range	3 kW 300 W 30 W 3 W 300 mW 30 mW	Selected by the PEAK POWER WATTS buttons, but 300 mW or 30 mW setting is selected by the 30 W or 3 W button with the SHIFT button. Derived from nominal peak open circuit collector voltage and nominal series resistance value.
Collector Peak Current		With a shorted load in the test fixture unit.
3 kW range	400 A	Pulsed collector supply
300 W range	40 A	Pulsed collector supply
30 W range	40 mA, -20 %, +20 %	Sine wave collector supply
3 W/ 300 mW range	4 mA, -20 %, +20 %	Sine wave collector supply
30 mW range	0.4 mA, -20 %, +20 %	Sine wave collector supply
Maximum Peak Voltage	Peak open circuit voltage	At 100 % VARIABLE COLLECTOR SUPPLY.
3 kW range	30 V, +10 %, -5 %	Pulsed collector supply
300 W range	30 V, +10 %, -5 %	Pulsed collector supply
30 W range	3 kV, +10 %, -0 %	Rectified sine-wave collector supply
3 W range	3 kV, +10 %, -0 %	Rectified sine-wave collector supply
300 mW range	300 V, +15 %, -0 %	Rectified sine-wave collector supply
30 mW range	300 V, +15 %, -0 %	Rectified sine-wave collector supply
Variable Collector Supply	0 % to 100.0 %	% of maximum peak voltage value is displayed on the CRT readout area. Provides uncalibrated variable control of collector supply amplitude from 0 to 100 % in 0.1 % increments.
Looping Compensation	Valid for High Voltage mode	Cancels stray capacitance from collector terminal and ground at Collector Peak Power Watts 30 W/ 3 W and 300 mW/ 30 mW.
Range (Typical)	Maximum 100 pF	
Vertical Projection (Typical)	Within +10 μ A, -20 μ A	At open circuit connecting with Test Fixture box at Collector Peak Power Watt 30 W.
Tan Delta (Typical)	Within \pm 2.5 μ A at 3 kV	
Sweep Start Voltage	Less than +10 %, -10 % of peak volt.	Valid for High Voltage mode.
OUTPUTS Indicator		Indicates all outputs (COLLECTOR SUPPLY, STEP GENERATOR output terminal) enabled/disabled mode.

Table 1-1: Collector Supply Electrical Specification (Cont.)

Characteristic	Performance Requirement	Supplemental Information
CIRCUIT BREAKER	High Current Circuit Breaker is disabled by rush current.	Interrupts COLLECTOR SUPPLY HIGH CURRENT/ HIGH VOLTAGE outputs separately.
Pulsed Collector Supply	Pulse amplitude is controlled by VARIABLE COLLECTOR SUPPLY.	At High Current mode (Peak Power Watts 3 kW/ 300 W)
Repetition Rate	One-fourth (.25 X) line frequency	At 3 kW peak power watts.
	One-half (.5 X) line frequency	At 300 W peak power watts.
Pulse Width (Half amplitude)	250 μ s +10 %, -10 %	More than 30 % of the collector supply VARIABLE at open circuit.
	150 μ s to 250 μ s	5 % to 30 % of the collector supply VARIABLE at open circuit.
Rise time/ Fall Time	40 μ s to 120 μ s	With collector supply VARIABLE at 50 %. COLLECTOR SUPPLY at Open circuit. <i>Note: To prevent False Triggering on Thyristor, di/dt is limited less than 10 A/μs.</i>
Overshoot/ Undershoot (Typical)	Less than 5 % of total output	More than 5 % of VARIABLE COLLECTOR SUPPLY at Open circuit.

Table 1-2: Step Generator

Characteristics	Performance Requirements	Supplemental Information
Incremental Accuracy (Current or Voltage Steps including Offset)		Check DMM Reading.
	Within 2 % between any two steps.	Without STEP MULTI .1X
	Within 5 % between any two steps.	With STEP MULTI .1X
Absolute Accuracy (Current or Voltage Steps including Offset)	Within 2 % of total output + 3 % of Step range + 10 nA or 2 mV.	Without STEP MULTI .1X
	Within 4 % of total output + 5 % of Step range + 10 nA or 2 mV.	With STEP MULTI .1X
Offset Control Range	Variable 0 to 10 times STEP/OFFSET AMPLITUDE setting. However, 0 to 5 times when STEP/OFFSET AMPLITUDE is 5 V or 2 A.	Same polarity as step signal. Control resolution is 1 %.
Number of Steps	0 to 10. However, 0 to 5 when STEP/OFFSET AMPLITUDE setting is 5 V or 2 A.	
Step Polarity	Positive, Negative	Corresponds to the collector supply POLARITY when step generator INVERT is disabled.

Table 1-2: Step Generator (Cont.)

Characteristics	Performance Requirements	Supplemental Information
Step Rate		
3 kW peak power watts	One-fourth (.25 X) the line frequency	
300 W peak power watts	One-half (.5 X) the line frequency	
30 W, 3 W, 300 mW, 30 mW peak power watts	Twice (2 X) the line frequency	
Current Mode		Provides current staircase or pulsed current step.
Amplitude Range		Selected by STEP/OFFSET AMPLITUDE SWITCH.
Normal Step	1 μ A to 2 mA in a 1-2-5 sequence.	COLLECTOR SUPPLY HIGH VOLTAGE MODE (30 W/ 3 W and 300 mW/ 30 mW)
Pulsed Step	1 mA to 2 A in a 1-2-5 sequence.	COLLECTOR SUPPLY HIGH CURRENT MODE (3 kW/ 300 W)
Maximum Current	20 times step amplitude, except 10 times STEP/OFFSET AMPLITUDE when control is set to 2 A per step.	
Maximum Voltage	12 V, +30 %, -30 %	Accuracy: At least 5 V.
Ripple plus Noise	Within 1 % of STEP AMPLITUDE + 10 nA	Check by Oscilloscope with 20 MHz bandwidth.
Maximum Inductive Load	1 μ H	
Maximum Resistive Load	500 Ω	At 1 mA/step without STEP MULTI .1X Accuracy: At least 5 V.
Maximum Capacitive Load	1000 pF	
Pulsed Current Step	Valid for STEP GENERATOR Current mode.	When Pulsed Collector Supply (PEAK POWER WATTS 3 kW/ 300 W) is selected, STEP CURRENT becomes pulsed step automatically.
Pulse Width	500 μ s +10 %, -10 %	With 1 k Ω load, 1 mA/step with STEP MULTI .1X off.
Rise Time ¹	Less than 40 μ s	With 1 k Ω load, 1 mA/step with STEP MULTI .1X off.
Fall Time ¹	Less than 40 μ s	With 1 k Ω load, 1 mA/step with STEP MULTI .1X off.
Overshoot/ Undershoot	Less than 10 %	With 1 k Ω load, 1 mA/step and zero Variable Collector Supply.

Table 1-2: Step Generator (Cont.)

Characteristics	Performance Requirements	Supplemental Information
Voltage Mode		Provides normal voltage staircase step every time.
Step Amplitude Range	200 mV to 5 V in a 1-2-5 sequence.	Selected by STEP/OFFSET AMPLITUDE SWITCH.
Short Circuit Current Limiting	100 mA + 50 %, -20 %	
Maximum Voltage	10 times STEP AMPLITUDE	With 5 V STEP AMPLITUDE setting.
	20 times STEP AMPLITUDE	Except 5 V STEP AMPLITUDE setting.
Ripple plus Noise	Within 1 % of STEP AMPLITUDE + 10 mV	Check by Oscilloscope with 20 MHz bandwidth.

- ¹ Pulsed Current Response for high DUT resistance. The specific degradation occurs when the DUT resistance (Rdut) is greater than Current sense resistor (Rsense) of the amplifier by 10 times.

The time constants for the rise time and fall time above is given as $T_{dut} = T_0 * (1 + R_{dut}/R_{sense})$ where T_{dut} is the time constants for DUT with R_{dut} resistance and T_0 is the time constants for the DUT with zero resistance.

The Current sense resistors are listed as following table.

Rsense	STEP AMPLITUDE (with STEP MULTI .1X on) setting
0.1 Ω	2 A and 1 A STEP (200 mA and 100 mA STEP)
1.0 Ω	500, 200 and 100 mA STEP (50, 20 and 10 mA STEP)
10 Ω	50, 20 and 10 mA STEP (5, 2 and 1 mA STEP)
100 Ω	5, 2 and 1 mA STEP (500, 200 and 100 μ A STEP)
1.0 k Ω	500, 200 and 100 μ A STEP (50, 20 and 10 μ A STEP)
10 k Ω	50, 20 and 10 μ A STEP (5, 2 and 1 μ A STEP)
100 k Ω	5, 2 and 1 μ A STEP (500, 200 and 100 nA STEP)

Table 1-3: Vertical Deflection System

Characteristic	Performance Requirement	Supplemental Information
Collector Current (Ic) Range		Varies in Collector Supply Peak Power Watts
3 kW peak power watts	1 A/div to 50 A/div	
300 W peak power watts	500 mA/div to 5 A/div	
30 W peak power watts	100 μ A/div to 5 mA/div	
3 W peak power watts	10 μ A/div to 500 μ A/div	
0.3 W peak power watts	10 μ A/div to 500 μ A/div	

Table 1-3: Vertical Deflection System (Cont.)

Characteristic	Performance Requirement	Supplemental Information
0.03 W peak power watts	1 μ A/div to 50 μ A/div	
Collector Current (Ic) Accuracy	Within 0.1 div of the Vertical graticule lines.	
Collector Current (Ic) Cursor Accuracy	Within 1.5 % of readout + 0.1 div of the CURRENT/div setting.	In Store mode (use the DOT CURSOR)

Table 1-4: Horizontal Deflection System

Characteristic	Performance Requirement	Supplemental Information
Collector Supply Volts (Vce) Range		At Collector Peak Power Watts 3 kW/ 300 W
3 kW, 300 W peak power watts	100 mV/div to 5 V/div in a 1-2-5 sequence	
30 W, 3 W peak power watts	50 V/div to 500 V/div in a 1-2-5 sequence	
300 mW, 30 mW peak power watts	5 V/div to 50 V/div in a 1-2-5 sequence	
Step Generator Volts (Vbe) Range	100 mV/div to 5 V/div in a 1-2-5 sequence	
Step Generator Volts (Vbe) Accuracy	Within 0.1 div of Horizontal graticules.	
Step Generator Volts (Vbe) Cursor Accuracy	Within 1.5 % of the readout + 0.1 division of HORIZONTAL VOLTS/div setting.	
	At 100 mV/div COLLECTOR: Within 5 % of the readout + 0.2 division of the HORIZONTAL VOLTS/div setting.	

Table 1-5: Digital Storage Acquisition

Characteristic	Performance Requirement	Supplemental Information
A/D Converter		
Resolution	10 bits for 1024 division, 100 points per one division.	
Tolerance	Within ± 2 count	
Max Data Point	1024	
Max Sample Rate	1024 times Line frequency	
Min Sample Rate	1/8 times Line frequency	

Table 1-6: CRT and Readout

Characteristic	Performance Requirement	Supplemental Information
CRT		
Type	Electrostatic deflection	
Phosphor	P31	
Accelerating Potential	Typical 12 kV	
Screen Size	178 mm (7 in) diagonal, internal graticule and scale factor.	
Total addressable Pixels	1000 X 1000 for Curve Display	
Geometry	1/2 minor division or less of tilt or bowing 3/4 minor division or less of keystone.	
Resolution	At least 10 line/div	
Spot Size	Less than 0.95 mm (center)	
Orthogonality	90 °, Within 0.6 °	
Trace Rotation	At least $\pm 3^\circ$	
Readout		
On-screen display		
VERT/div	Collector Supply Current deflection factor (Ic/div)	
Peak Power Watts		
3 kW	1 A/div to 50 A/div	
300 W	500 mA/div to 5 A/div	
30 W	100 μ A/div to 5 mA/div	
3 W	10 μ A/div to 500 μ A/div	
0.3 W	10 μ A/div to 500 μ A/div	
0.03 W	1 μ A/div to 50 μ A/div	
HORIZ/div	Collector Supply Voltage (Vce) or Step Generator Voltage (Vbe) deflection factor.	
Peak Power Watts	Vce	
3 kW, 300 W	100 mV/div to 5 V/div	
30 W, 3 W	50 V/div to 500 V/div	
0.3 W, 0.03 W	5 V/div to 50 V/div	
Vbe	100 mV/div to 5 V/div	
Per Step	Step Generator Current / Voltage Output	At Step .1X Multi, readout is 1/10 times Per Step.
	200 mV to 5 V	Voltage source
	1 mA to 2 A	Pulsed Current

Table 1-6: CRT and Readout (Cont.)

Characteristic	Performance Requirement	Supplemental Information
	1 μ A to 2 mA	Staircase Current
β or gm / div	5m to 500K for β . 2 μ Simence to 2.5K Simence for gm.	
Vertical Cursor	4-digit Collector Current	
(f : / grad)	readout by Dot or Window cursor; 4-digit Vce / Ic or Ic / Vbe readout by f-Line cursor;	
HORIZ Cursor (f : intercept)	4-digit Collector Volts or Step Generator Volts readout by Dot or Window cursor; 4-digit horizontal interception readout by f-Line cursor;	
OFFSET	4-digit Step Generator / Voltage offset readout	
%Of Collector Peak Volts	4-digit Variable Collector Supply readout	0% to 100%

Table 1-7: Power Requirements

Characteristic	Description
Power Connection	This instrument is designed for operation from power source with its natural at or near ground (earth) potential. It is not intended for two phase of multi-phase system, or across legs of single-phase, three wire system. It is provided with a three-wire power code with three terminal polarized plug for connection to the power source. Third wire directly connected to instrument frame, and is intended to ground the instrument to protect operating personnel, as recommended by national and international safety codes.

Table 1-8: Power Source

Characteristic	Description		
Line Voltage Range	CAT II		
Nominal	Range	Line Fuse	Collector Fuse
240 V	High 216 V to 250 V	250 V, 1 A, Slow	250 V, 2 A, Slow
200 V	Low 180 V to 220 V	250 V, 1 A, Slow	250 V, 2 A, Slow
120 V	High 108 V to 132 V	250 V, 2 A, Slow	250 V, 4 A, Slow
100 V	Low 90 V to 110 V	250 V, 2 A, Slow	250 V, 4 A, Slow
Line Frequency	48.0 Hz to 63.0 Hz		
Maximum Power Dissipation (Fully Loaded)	400 W max. Maximum line current is 4.5 Arms at 50 Hz, 90 V line, with 5 % clipping.		

Table 1-9: Physical Specification

Characteristic	Description
Weight	Approx. 36 kg (79.3 lb)
Height	326 mm (12.8 in) with feet 310 mm (12.2 in) without feet
Width	429 mm (16.9 in)
Depth	638 mm (25.1 in)

Table 1-10: Surge Current

Characteristic	Description
Surge Current	80 A peak (25 °C) for ≤ 5 line cycles, after product has been turned off for at least 30 s.

Table 1-11: Cooling Clearance

Characteristic	Description
Clearance	
Top and Bottom	0 cm
Side	5 cm (2 in)
Rear	5 cm (2 in)

Table 1-12: Environmental Specification

Characteristic	Description
Temperature	
Operating	+10° C to +40° C
Non-Operating	-20° C to +60° C
Temperature gradient	
Operating	$\leq 15^{\circ}$ C per hour (no condensation)
Non-operating	$\leq 15^{\circ}$ C per hour (no condensation)
Altitude	
Operating	Up to 3.0 km (10000 ft)
Non-Operating	Up to 15 km (50000 ft) Maximum operating temperature decreases 1° C each 300 m (1000 ft) above 1.5 km (5000 ft)
Relative Humidity	

Table 1-12: Environmental Specification (Cont.)

Characteristic	Description
Operating	20 % to 80 % (no condensation) Maximum wet bulb temperature shall be 29.4°C.
Storage	5 % to 90 % (no condensation) Maximum wet bulb temperature shall be 40.0°C.
Vibration	
Operating	2.352 m/s ² (0.24 G _{rms}), 5 Hz to 500 Hz
Shock (non-operating)	196 m/s ² (20 G), half-sine, 11 ms duration. Three shocks per axis in each direction (18 shocks total)
Bench handling	
Operating	Drop from 10 cm (4 in) tilt, or 45 ° which ever less (Tilt not to balance to point.)
Packaged transportation drop	Meets the limits of the National Safe Transit Association test procedure 1A-B-2; 10 drops of 610 mm (24 in).
Packaged transportation vibration	Meets the limits of the National Safe Transit Association test procedure 1A-B-1 ;excursion of 25mm (1 in) p-p at 4.63 Hz 10.8m/s ² for 60 minutes.

Table 1-13: Certifications and Compliances

Category	Standards or description
EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC, amended by 93/68/EEC; EN 61326-1: 1997 Product Family Standard for Electrical Equipment for Measurement, Control, and Laboratory Use-EMC Requirement.
Emissions	EN 55011 Class A Radiated and Conducted Emissions EN 61000-3-2 Power Line Harmonic EN 61000-3-3 Line Voltage Alteration and Flicker
Immunity	EN 61000-4-2 Electrostatic Discharge Immunity EN 61000-4-3 Radiated RF Electromagnetic Field Immunity Note: The output level of Step Generator may vary in this test. EN 61000-4-4 Electrical Fast Transient/Burst Immunity Note: This test may cause the oscillation of EUT. EN 61000-4-5 Surge Immunity EN 61000-4-6 Conducted Disturbance induced by RF Field Immunity EN 61000-4-8 Power Frequency Electromagnetic Field Immunity EN 61000-4-11 Voltage Dips, Short Interruptions and Voltage Variations Immunity Note: The output of Collector Supply is disabled after this test.
Australia/New Zealand Declaration of Conformity – EMC	Complies with EMC provision of Radio Communications Act per the following standard: Industrial, Scientific, and Medical Equipment: 1992
Safety	UL3111-1 CAN/CSA C22.2 NO. 1010.1
Self-Declaration	EN 61010-1 with second amendment
Installation Category	Power input – Installation Category II (as defined in IEC 61010-1, Annex J)
Pollution Degree	Pollution degree 2 (as defined in IEC 61010-1)

Table 1–14: Installation category and Pollution degree Descriptions

Characteristics	Description		
Installation category	Terminals on this product may have different installation category designations. The installation categories are:		
	<table border="1"> <thead> <tr> <th data-bbox="553 464 829 506"><i>Category</i></th> <th data-bbox="829 464 1461 506"><i>Descriptions</i></th> </tr> </thead> </table>	<i>Category</i>	<i>Descriptions</i>
	<i>Category</i>	<i>Descriptions</i>	
	CAT III	Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location	
CAT II	Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected		
CAT I	Secondary (signal level) or battery operated circuits of electronic equipment		
Pollution degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.		
	<table border="1"> <thead> <tr> <th data-bbox="553 915 829 957"><i>Category</i></th> <th data-bbox="829 915 1461 957"><i>Descriptions</i></th> </tr> </thead> </table>	<i>Category</i>	<i>Descriptions</i>
	<i>Category</i>	<i>Descriptions</i>	
	Pollution Degree 1	No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.	
	Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.	
Pollution Degree 3	Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.		
Pollution Degree 4	Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.		

Functional Specification

Table 1-15: Text Display

Characteristic	Performance Requirement	Supplemental Information
Alphanumeric character set (1)	SP, I, ..., A, B, ..., 0, 1, ..., 9, /, ..., a, b, ..., y, z, ... "u" is recognized as micro.	GPIB accessible with the TEXT command.
Alphanumeric character set (2)	(space), A, B, ..., Y, Z, (space), m, u, n, p, ., 0, 1, ..., 9, -, /, *, (,), = "u" is recognized as micro.	Accessible with the Position Control buttons.
Maximum text strings	24 characters	
Character size	Approximately 3 mm height, 2 mm width.	

Interface Characteristics

GPIB Interface. The IEEE-488-1978 (GPIB) standard defines the GPIB interface functions and the allowed subsets of those functions.

Function	Implemented As
Source handshake	SH1
Acceptor Handshake	AH1
Talker	T6
Listener	L4
Service request	SR1
Remote/Local	RL2
Parallel poll	PP0
Device Clear	DC1
Device trigger	DT0
Controller	C0

General Information

General Information

This section provides the following information:

- Description and features of the 371B Programmable High Power Curve Tracer.
- Measurement concept
- Initial inspection procedure
- Installation procedures
- Repackaging procedure for shipment

Product Description

The 371B is a high-power, GPIB-programmable digital-storage curve tracer that provides static and dynamic semiconductor device testing. This versatile instrument stimulates, measures, and displays the semiconductor characteristics of a variety of two-, three-, and four-terminal devices; including bipolar transistors, field effect transistors, silicon-controlled rectifiers, diodes, and thyristors. A variety of measurements can be performed using either grounded-emitter or grounded-base configurations.

The collector supply produces either high-current pulses (up to 400 A) or a sine-square high-voltage waveform (up to 3 kV). The high-current pulses enable dynamic testing of high-power devices while keeping the internal heating of these devices to a minimum. The high-voltage/low-current output enables measurement of static characteristics, such as breakdown voltage. A step generator produces voltage steps or current pulses, or steps, of either polarity for application to the base or emitter terminal.

In addition to conventional curve tracer performance features, the 371B includes the following features.

- Digital storage capability that allows bright and stable display of characteristic data.
- A mass storage system that consists of non-volatile memory and a 3.5 inch floppy disk drive. Up to 64 families of characteristic curves and 64 front-panel setups can be stored in a floppy disk. Up to 16 families of characteristic curves and 16 front-panel setups can also be stored in non-volatile IC memory. The stored characteristic curves can be recalled for additional analysis and comparison.

- Program control of almost all of the 371B front-panel settings using GPIB commands. (Exceptions are those controls intended only for manual operation, such as INTENSITY, FOCUS and LOOPING COMPENSATION.) Also, curve data can be sent to or received from an external controller through the GPIB.
- Printer interface that permits sending displayed curve data and digital on-screen readouts to a printer without having to use an external controller.
- Other features such as cursor measurement readout and diagnostic routines.

Related Manuals

In addition to this service manual, the following manual supports the 371B.

371B User Manual. This manual provides information that enables you to effectively and efficiently use the measurement features of the 371B. Information is presented in an order in which a first-time user can quickly learn measurement concepts and begin applying the 371B to a particular measurement application.

371B Components

The 371B consists of two large components: a main unit and a test fixture unit.

Main Unit

The main unit contains front and rear panel controls, indicators and connectors, a display CRT, and the control electronics.

Front and Rear Panels. To use the 371B effectively, you need a clear understanding of the functions and meanings of the operator controls, indicators and connectors mounted on the front and rear panels. Detailed descriptions are provided in Chapter 4: Controls, Indicators, and Connectors.

The CRT functions as the display device. It has 10 x 10 graticule markings etched into its inner surface, the brightness of which can be controlled by the front-panel GRAT ILLUM (graticule illumination) control. A filter mounted on the front of the CRT improves display contrast.

The readout area of the display (which also displays setup information) is divided into two parts:

- The readout labels which identify the readout information printed in the readout area
- The readout information which identifies either a specific control setting (such as 1 A or 1 V), or a measured characteristic of the device under test (DUT)

Readout intensity is controlled by the READOUT/CURSORS knob; label intensity is controlled by the GRAT ILLUM knob.

NOTE. *The READOUT/CURSORS control also controls the intensity of other information displayed on the screen, which may include text, messages, and setup and curve identification.*

Test Fixture Unit. All tests are made with the semiconductor device mounted inside the test fixture unit. The test fixture unit connects to the front panel of the main unit.

The test fixture unit contains a patch panel and an adapter panel that are enclosed by a clear plastic cover during the actual testing process. The DUT connects to the patch panel in one of two ways.

- Using test adapters. Test adapters are used to connect common semiconductor devices to the adapter panel, which in turn is connected to the patch panel using patch cords.
- Using patch cords. Devices that cannot be connected using test adapters can be connected to the patch panel using patch cords with clips. In such cases, the adapter panel may have to be removed.

The test fixture connects to the main unit using the interconnect cable and connector. The top row of connectors on the patch panel are linked internally to the connector cable.

Test Fixture Interlock

The test fixture unit is provided with a safety interlock system. Whenever the test fixture cover is in the raised position, the collector supply voltage is disabled and you can safely connect and disconnect devices at the patch panel and the adapter panel. When the cover is closed the collector supply voltage is enabled. The enabled state is indicated by a red WARNING indicator on the 371B. When lit, the WARNING indicator indicates that the collector supply is enabled and that a dangerous voltage may appear at the patch panel terminals on the test fixture unit.



WARNING. *Do not disable the safety interlock system and then attempt to operate the 371B. You may accidentally contact high voltage and serious personal injury or death may result.*

The collector supply is also disabled whenever the test fixture unit cable is disconnected from its connector at the front panel of the main unit.

Measurement Concepts

The 371B consists of a specially-designed CRT screen and associated electronics that allow a user to display the characteristics of a semiconductor device. The display screen is designed to display the operating characteristics of the DUT in an easy-to-read, standard graph form.

The 371B can be applied to a broad range of semiconductor test application, such as:

- Semiconductor design analysis
- Semiconductor failure analysis
- Incoming inspection of semiconductors
- Comparison of semiconductor device characteristics
- Semiconductor manufacturing output

Figure 2-1 helps to illustrate 371B measurement concepts. A collector supply and step generator circuits apply voltage or current to the DUT. A detector amplifier measures the resulting effect. Measurement results are displayed on a CRT as one or more characteristic curves.

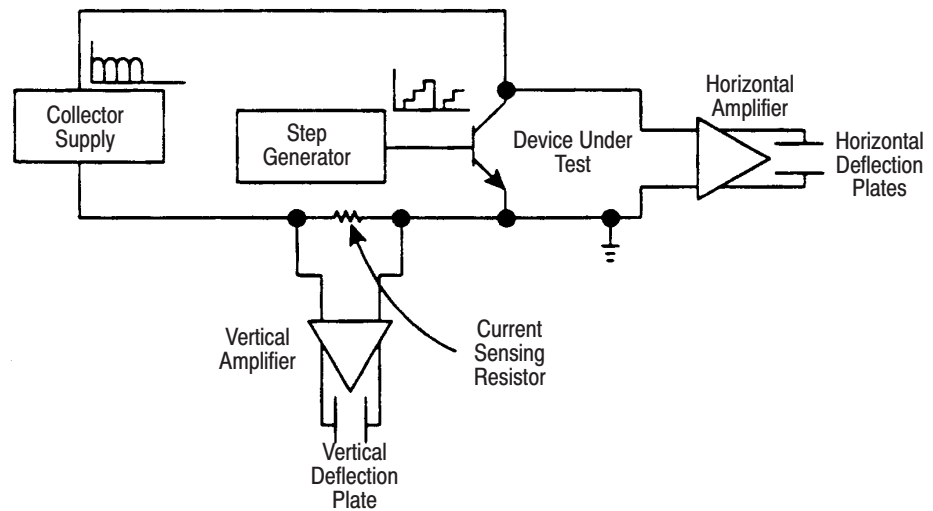


Figure 2-1: Basic 371B block diagram

Collector Supply

The collector supply provides a swept or pulsed voltage to the DUT. Amplitude is controlled by the collector supply VARIABLE knob. This signal is applied to the collector (drain, anode, or equivalent terminal) of the DUT.

Step Generator

The step generator supplies one voltage or current step, or pulse, for each collector supply sweep or pulse. The amplitude of the voltage or current is set by the STEP/OFFSET AMPLITUDE knob and the number of steps by the NUMBER OF STEPS selection buttons. The signal from the step generator can be applied to the base or emitter (or an equivalent terminal) of the DUT.

Detector Amplifier

The detector amplifiers are connected to the DUT to measure the effect of the stimulus signals from the collector supply and the step generator. The measurement result is amplified and the voltage obtained is applied to the CRT deflection plates. Sensitivity of the amplifier is set by the VERTICAL CURRENT/DIV (vertical current per division) and HORIZONTAL VOLTS/DIV (horizontal volts per division) knobs.

Installation



WARNING. *The 371B Programmable High Power Curve Tracer weighs approximately 36 kg (80 lb). It requires two people to lift the instrument out of its shipping carton. Work carefully to avoid injury due to improper lifting.*

The CRT can implode if it or the 371B is handled severely. When handling the 371B always be aware of and practice safe work habits. If damaged, the CRT could implode resulting in serious personal injury

Initial Inspection

All shipping containers and internal packing material should be saved for reuse. Perform the following to unpack the 371B from its shipping container and to perform initial inspection.

1. Remove the securing bands holding the outer lid on the shipping container.
2. Lift the lid off the shipping container.
3. Remove the accessory box from the carton. Set this box aside to be unpacked later.
4. Carefully lift the 371B and the test fixture unit out of the shipping container and place them on a flat, sturdy surface.



CAUTION. *DO NOT apply power at this time otherwise severe instrument damage may occur.*

5. Thoroughly inspect the 371B for mechanical and electrical defects that may have occurred during shipment. If the instrument has been damaged in shipment, first contact the shipping company and then contact your nearest Tektronix field representative.

Checking Standard Accessories

Standard accessories are shipped with your 371B. Open the accessories package you removed when unpacking the instrument, and verify its contents against the list of standard accessories on page 6–2. If there are any discrepancies, contact your nearest Tektronix field representative.

Line Voltage Requirements

This instrument operates from a single-phase power source having a neutral at or near ground (earth) potential. It is not intended for operation from two phases of a multi-phase system, nor across legs of a single-phase, three-wire system. This instrument can be operated from either a 100 V, 120 V, 200 V, or 240 V nominal supply source of 48 Hz to 63 Hz. Table 2–1 provides a listing of line voltage ranges, line frequency range, and power consumption. The line voltage setting of the instrument is indicated by a screw on the rear panel (shown in Figure 2–2).

Table 2–1: Line voltage ranges

Line Voltage		Fuses	
Nominal	Range	Main	Collector
240 V	216 V to 250 V	250 V, 1 A Slow blow	250 V, 2 A Slow blow
200 V	180 V to 220 V		
120 V	108 V to 132 V	250 V, 2 A Slow blow	250 V, 4 A, Slow blow
100 V	90 V to 110 V		
Line Frequency	48 Hz to 63 Hz		
Maximum Power	400 W, 4.5 A		

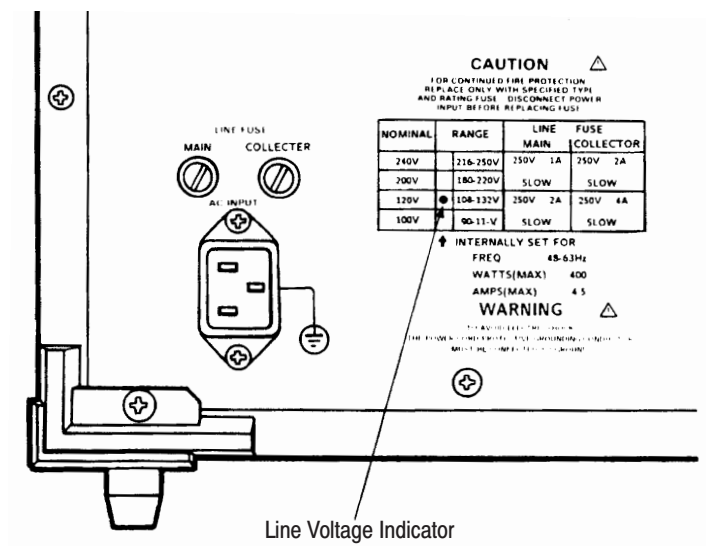


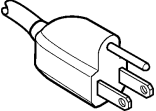
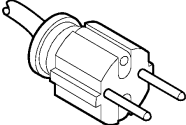
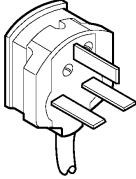
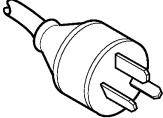
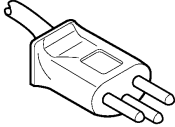
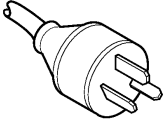
Figure 2-2: Location of the LINE VOLTAGE INDICATOR



CAUTION. To prevent damage to the instrument, check the position of the **LINE VOLTAGE INDICATOR** located on the rear panel of the 371B before connecting the instrument to a line voltage source. Also, check to ensure that the proper line fuses are installed for the main and collector power supplies.

If the **LINE VOLTAGE INDICATOR** indicates that the 371B is configured to operate at a voltage other than that available at the user's site, contact your local Tektronix field representative, or refer a qualified service technician.

Table 2-2: Power cord identification

Plug configuration	Normal usage	Option number
	North America 125 V	Standard
	Europe 220 V	A1
	United Kingdom 240 V	A2
	Australia 240 V	A3
	Switzerland 220 V	A5
	China 240 V	AC
	No power cord supplied.	A9



WARNING. *This instrument operates from a single-phase power source, and has a detachable three-wire power cord with a two-pole, three-terminal grounding plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage (250 Vrms).*

Before making connection to the power source, make sure that the instrument is set for the power source voltage, and is equipped with a suitable plug (two-pole, three-terminal, with ground).

This instrument is IEC Safety Class 1 equipment. All accessible conductive parts are directly connected through the grounding conductor of the power cord to the grounding contact of the power plug. Therefore, the power plug must only be inserted in a mating receptacle with a grounding contact. Do not defeat the grounding connection. Any interruption of the grounding connection can create an electric shock hazard.

Refer to Table 2–2 if a power cord other than the one supplied is required.

Operating Temperature and Cooling

The 371B can be operated where the ambient temperature is between +10°C and +40°C. After storage at temperatures outside the operating limits, allow the chassis temperature to reach the safe operating limits before applying power.

The instrument is cooled by air drawn in through the air filter on the rear panel and blown out through holes in the side panels. For proper instrument cooling, provide adequate clearance of at least two inches on the rear and sides to ensure free air flow and dissipation of heat away from the unit.



CAUTION. *Prolonged use of the 371B can cause high temperatures which may damage the instrument or DUT. When applying current in the 3 kW range of the peak power watts selector, test time should be limited to four minutes, followed by at least 11 minutes of cooling.*



WARNING. *Prolonged use of the 371B at high power settings can make the device under test, test fixture unit, or protective cover hot enough to cause injury. Avoid touching any of these areas until cooled.*

Top and Side Panels

The side, top, and bottom cabinet panels provide protection for personnel from high-voltage potentials present within the instrument. In addition, they reduce radiation of electromagnetic interference from the instrument. Operate the instrument with the panels in place to protect the interior from dust and to maintain cooling airflow.

Operating Temperature

The 371B can be operated where the ambient temperature is between +10 °C and +40 °C and stored in ambient temperatures from -20 °C to +60 °C. After storage at temperatures outside the operating limits, allow the instrument temperature to reach the safe operating limits before applying power.

The 371B is cooled by air drawn through the fan from the rear and blown out through holes on the side panels. To ensure proper cooling of the instrument, maintain clearance at top, sides, and rear of the instrument.

Rackmounting Information

Latching The 371B incorporates a spring-latch design built into the rackmounting ear. To release, pull the rackmount latch release (see Figure 2-3). To relatch, push the rackmount latch release until the spring latches engage.

For those applications that require additional rackmounting security, the rackmounting ears of the 371B are drilled for screw fasteners (see Figure 2-3).

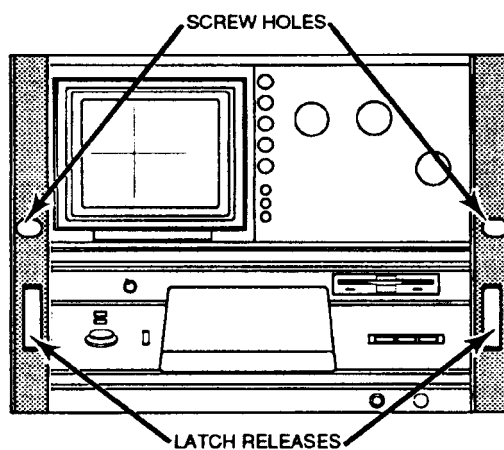


Figure 2-3: Location of the Rackmount Latch Release

Rackmounting The 371B fits most commercial consoles and 19-inch racks with rail holes that conform to universal spacing. See Figure 2-4 for hole spacing details.



WARNING. The 371B weighs more than 36kg(80 lb). To avoid personal injury, use care when lifting the instrument, and where required, seek help in lifting and positioning the 371B into the rack. Once the 371B is installed in a rack, use care that when extended, the 371B does not tip the rack forward, causing personal injury or instrument damage.

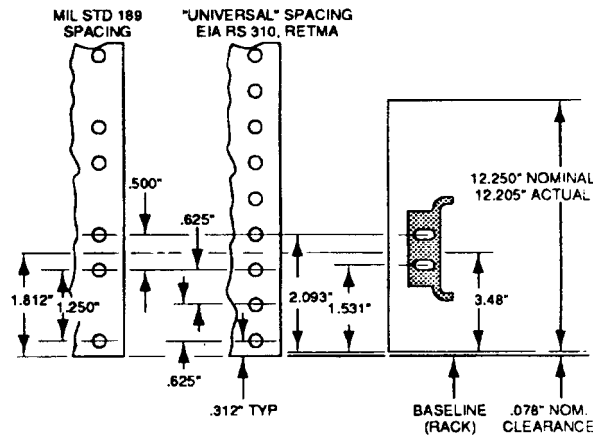


Figure 2-4: Rackmount hole spacing

When rackmounting the 371B, take note of the following: Allow one inch clearance above and below, and on the left and right sides of the 371B for air circulation. Allow at least three inches of clearance between the 371B rear panel and the rack enclosure for adequate cooling air and to provide cable clearance. The depth of the 371B from behind the rack ears to the rear panel is 480mm(18.9 in). The rack depth must be at least 559mm(22 in) (see Figure 2-5) to meet the rear clearance requirement.

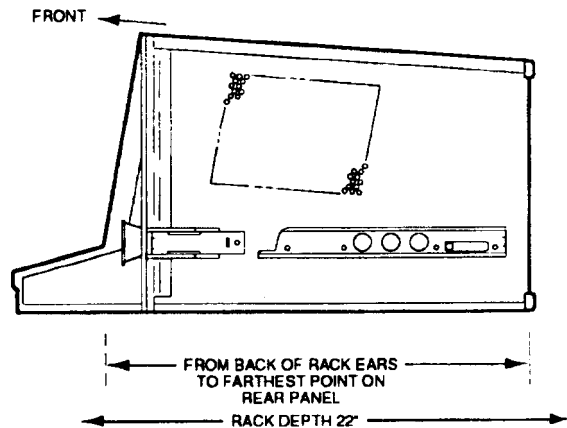


Figure 2-5: Rackmounting Length and Clearance

The 371B is 312mm(12.25 in) high, a multiple of 45mm(1.75 in) (the standard rack spacing). If the 371B is installed in a rack with standard hole spacing, and positioned some multiple of 45mm(1.75 in) from the bottom or top, all holes should line up and no drilling should be required.

The slide-out tracks mount easily to the rack front and rear vertical mounting rails if the inside distance between the rails is within 503mm(19.8in) to 674mm(26.5 in). If the tracks are to be installed in a rack having other dimensions, provide extra support (for example, extensions to the rear mounting brackets) for the rear ends of the slide-out tracks.

The front rack rails must be at least 17 inches apart. The front lip of the stationary-track section mounts in front of the rail. (Use bar nuts behind untapped front rails.) The front lip of the stationary track section must mount in front of the front rail to allow the 371B spring latch to function properly.

The slide-out tracks consist of two assemblies, one for each side of the instrument. Each assembly consists of three sections (see Figure 2-6). The stationary section of each track attaches to rack rails as shown in Figure 2-7. The chassis section mounts on the instrument and is installed at the factory. The intermediate section fits between the other two sections, allowing the instrument to be fully extended out of the rack.

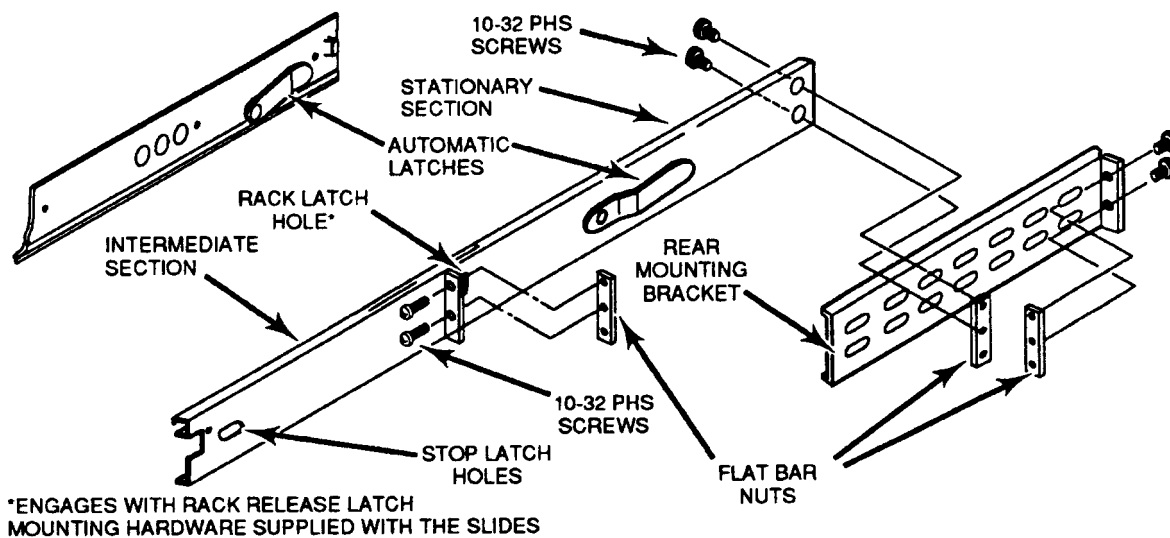


Figure 2-6: Rackmounting Hardware

The stationary and intermediate sections for both sides are shipped as a matched set and should not be separated. The package includes matched sets for both sides and mounting hardware. To identify the assemblies, note that the automatic latch and intermediate section latch stop holes are located near the top when the matched sets are properly mated to the chassis sections.

To mount the instrument in a rack, perform the following:

1. Select the appropriate holes in the rack rail, using Figure 2-4 as a guide.
2. Mount the stationary-track sections to the front rack rails with truss head screws (and bar nuts, if necessary).
3. Mount the stationary-track sections to the rear rails, using one of the methods depicted in Figure 2-7. Note that the rear mounting bracket can be installed to fit either deep or shallow cabinet racks.
4. After mounting the instrument in the slide-out tracks, adjust for proper width by loosening the front and rear screws and allowing the slides to seek the proper width. Center the instrument, then tighten the screws.

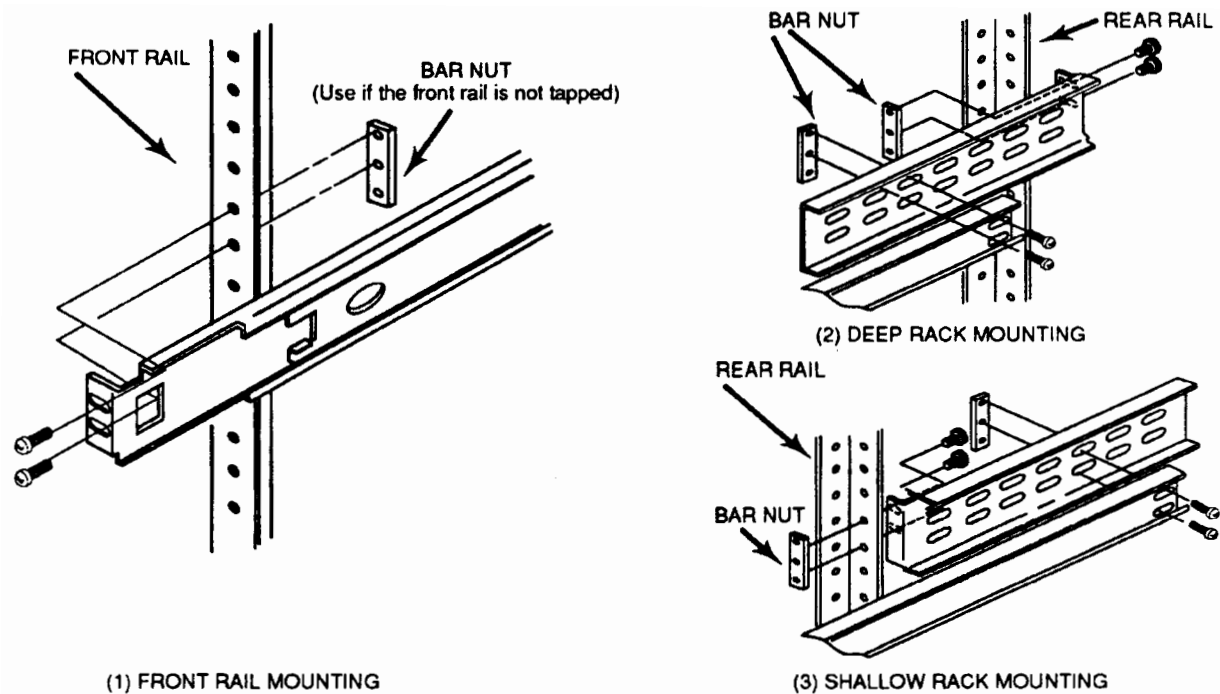


Figure 2-7: Mounting Stationary Rackmount Sections

5. Push the instrument into the rack, and check that the automatic spring latch engages the spring latch catch to hold the instrument in place.
6. Extend the instrument out of the rack by pulling the rackmount latch releases on the front panel (see Figure 2–3) out to disengage the spring latches. Then, pull the instrument out.
7. Once the instrument is out of the rack, press the latch release and push the instrument back into the rack.

Rackmount to Cabinet Conversion

To convert the 371B rackmount version to a cabinet model, use the following procedure (see Figure 2–8):

1. Remove the bracket from each corner of the instrument rear panel.
2. Replace the left and right side panels with cabinet model side panels.
3. Mount a carrying handle assembly on the left and right sides of the top.
4. Fasten a foot at each corner on the bottom of the instrument.

Cabinet to Rackmount Conversion

To convert the 371B cabinet model to a rackmount version, use the following procedure (see Figure 2-8):

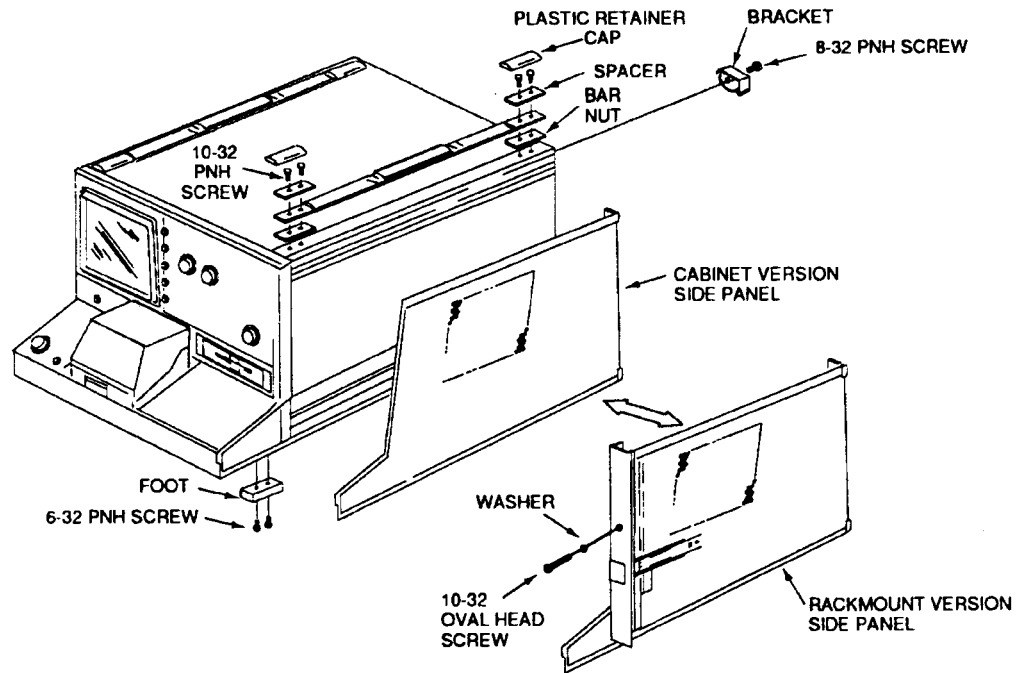


Figure 2-8: Cabinet-to-Rackmount Conversion

1. Remove the bracket from each corner on the rear panel.
2. Replace the side panels with rackmount version side panels.
3. Attach brackets at each corner on the rear panel.
4. Remove both carrying handle assemblies:
 - a. Remove the plastic retainer caps that conceal the screws located at each end of the handle.
 - b. Remove the screw, spacer and bar nut, then lift off the carrying handle assembly.

Repacking for Shipment

If you must ship the 371B long distances, we recommend that you repackage the instrument the same as when it initially arrived at your site. The cartons and packaging material in which the instrument was shipped should be saved and used for this purpose.

If the instrument is shipped to a Tektronix service center for service or repair, attach a tag to the instrument showing the following information:

- Owner of the instrument (with address)
- Name of a person at your firm to contact
- Instrument type and instrument serial number
- Description of the service requested

If the original packaging is unfit for use or not available, package the instrument as follows:

1. Obtain a corrugated cardboard shipping carton with a 170kg(375 lb) test strength and inside dimensions at least six inches greater than the instrument dimensions.
2. Surround the instrument with polyethylene sheeting to protect the finish.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, placing at least three inches of dunnage on all sides.
4. Seal the carton with shipping tape or with an industrial stapler.
5. Write the address of the Tektronix service center and your return address on the carton in one or more prominent locations.

Theory of Operation

Theory of Operation

This section describes the operation of the 371B Programmable High Power Curve Tracer circuits.

Block Diagram Description

The following description is an overview of the 371B operation. Figure 3–1 is an overall block diagram of the 371B. The numbers enclosed in diamonds within each block in Figure 3–1 indicate the schematic diagrams associated with the block.

The 371B is a static high-power semiconductor tester that displays and enables measurement of semiconductor characteristics obtained under simulated operating conditions.

The 371B consists of five major functional sections:

- Collector supply and step generator
- Data acquisition and display
- Control and processing
- Interface
- Power supply

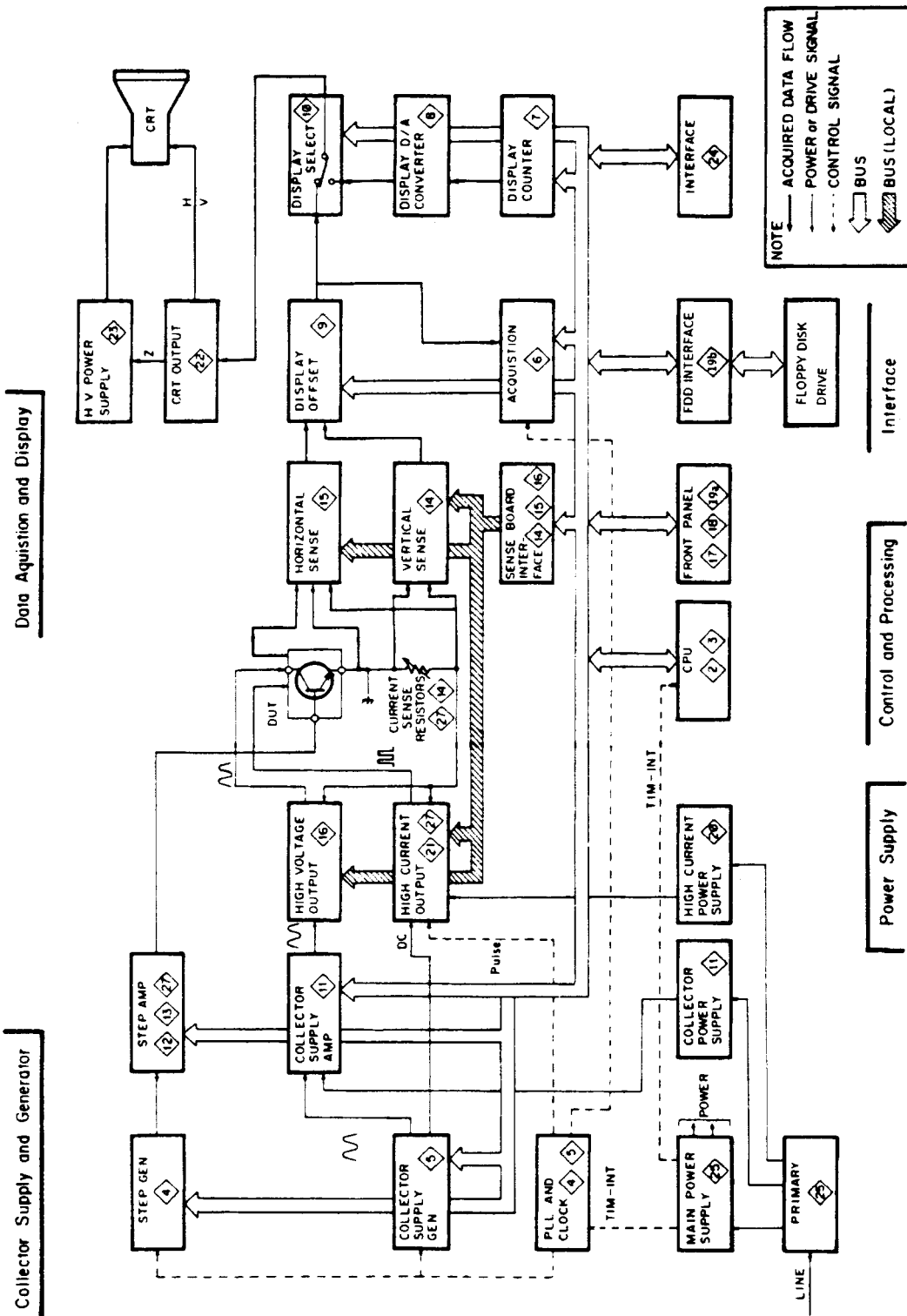


Figure 3-1: 371B Block Diagram

Collector Supply and Step Generator

This circuitry supplies stimulus to the device under test. It consists of the following circuits:

- Phase lock loop (PLL) and clock circuit
- Step generator circuit
- Step amplifier circuit
- Collector supply generator
- Collector supply amplifier
- High-voltage output
- High-current output

The PLL and clock circuit supplies clock signals to the collector supply generator, step generator, high current output, and acquisition circuits. These clock signals are synchronized to the line frequency.

The step generator circuit generates a fixed-amplitude step voltage and an offset voltage from the clock signal received from the PLL and clock circuit. The signal is amplified as a current step signal or voltage signal by the step amplifier, then output to the STEP GENERATOR VOLTAGE or STEP GENERATOR CURRENT connector.

The collector supply generator generates two types of signals: a sine-square waveform generated from the clock signal received from the PLL and clock circuit, and a DC signal. These signals are output at an amplitude selected by the collector supply VARIABLE control on the front panel.

The collector supply amplifier amplifies the sine-square waveform and sends it to the high voltage output circuit. There the signal is stepped up by a transformer, then output to the COLLECTOR SUPPLY HIGH VOLTAGE connector.

The high-current output circuit reshapes the DC signal into a voltage pulse signal by means of control signals from the PLL and clock circuit. Then it is amplified and sent to the COLLECTOR SUPPLY HIGH CURRENT connector.

Data Acquisition and Display

This group of circuitry consists of circuits that sense, acquire, and display the effect that the collector supply and step generator circuits have on the device under test (DUT). These circuits include:

- Horizontal sense circuit
- Vertical sense circuit
- Sense board interface circuit
- Display offset circuit

- Acquisition circuit
- Display counter circuit
- Display digital to analog (D/A) converter circuit
- Display select circuit
- Cathode-Ray Tube (CRT) output circuit
- High voltage power supply circuit

The horizontal sense circuit senses and amplifies the voltage between the collector and emitter (or base and emitter) of the DUT. The vertical sense circuit senses and amplifies the collector current of the device under test. The display offset circuit determines the polarity of the output signals from these circuits according to whether PNP or NPN is selected for collector supply, then sends them to the display select and acquisition circuits.

The analog signal sent to the acquisition circuit is converted to a digital signal and stored in memory in the acquisition circuit. The stored data are processed by the CPU, then set to the display memory in the display counter circuit. Next, they are reconverted to an analog signal in the display D/A converter circuit.

In non store mode, the display select circuit selects the signal from the display offset circuit and sends it to the CRT output circuit. In store mode, the signal from the display D/A converter circuit is selected and output to the CRT output circuit.

Control and Processing

This group of circuitry consists of circuits that control the 371B and circuits that process acquired data. These circuits are:

- CPU circuit
- Front panel circuit
- Floppy disk drive (FDD) interface circuit

The CPU circuit controls all operations of the 371B: such as, collector supply and step generator control, sense circuit control, CRT display control, front panel control, and floppy disk control. The CPU circuit also processes the data acquired from the DUT. These operations are controlled by the microprocessor and its operation programs through its address, data, and control bus lines.

The front panel circuit reads keys, switches, and rotary encoder information to set the 371B to the desired measurement conditions. This circuit also displays these settings to the operator by LED and numerical displays.

The floppy disk circuit stores data acquired from the DUT and 371B setting information. The data and information are stored on a 3.5-inch floppy disk.

Interface This group of circuitry includes a printer interface and a GPIB interface for transfer of data between the CPU and external devices.

Power Supply The power supply consists of the following circuits:

- Primary circuit
- Main power circuit
- Collector power supply circuit
- High current power supply circuit

The primary circuit receives line voltage at a transformer and converts it to the voltages required by the main power supply circuit, collector power supply circuit and high-current power supply circuit.

The main power supply circuit supplies low-voltage operating power to the circuits of the 371B. It also outputs a TIM-INT signal synchronized to the frequency of the power line to the PLL and clock circuit and the CPU circuit. The function operates synchronously with the line frequency.

The collector power supply circuit provides collector supply power in the high voltage mode.

The high current power supply circuit provides collector supply power in the high current mode.

Detailed Circuit Description

This section provides a detailed description of the electrical operation of the 371B. These descriptions, together with the troubleshooting/diagnostics information provided in Chapter of Maintenance, and appropriate test equipment, enable you to isolate a problem to the faulty component.

Schematic diagrams are provided in Chapter of: Diagrams and Circuit Board Illustrations.

Conventions

Digital Logic. Digital logic techniques are used to perform logic functions within electrical circuits. The functions and operations of the logic circuits are represented by standard logic symbols and terms. Logic functions are described using the positive logic convention. (Where voltages above the logic threshold voltage are the true, or 1 state, and voltages below the threshold are the false, or 0 state.)

In logic descriptions the logic true state voltages are referred to as high and logic false states are referred to as low.

NOTE. *The specific voltages that constitute a high or low state vary between different families of electronic devices (e.g., ECL, CMOS, and TTL logic).*

Active-low signals are indicated by an (L) following the signal name. Signal names without indicators are considered to be either active-high or to have both active high and active low states.

Assembly Numbers. The following circuit descriptions are presented according to their schematic number. For example, the A1 Mother Board, is discussed first and the A2 MPU Board is discussed second. Its electrical circuits are shown on the MPU schematic, and so on.

Schematic Standards. Refer to Chapter of Diagrams and Component Location Illustrations, for an explanation of schematic standards used in this manual.

Mother Board

The A1 Mother Board connects inter-board signals of the 371B. These include control, drive, data, reference, and sense signals, as well as power supply and ground lines.

Microprocessor Unit

The A2 CPU board contains the MPU circuits which consist of a 68000 Microprocessor, power-up reset circuit, clock generator, buffers, wait timing generator, and an interrupt logic circuit.

Microprocessor. The 68000 is a 16-data bit, 23-address bit microprocessor. The input and output signals can be grouped in eight categories. The following paragraphs describe each group and the signals in that group.

Memory The A2 CPU board also contains the memory circuits which consist of the ROM, RAM, battery backup, address selector, and buffers.

A/D Control and Setup Generator Circuit The A/D control and step generator circuit, located on the A3 A/D (analog to digital) board, consists of an acquisition and step generator control circuit, pulse generator circuit, step generator circuit, and control latch and decoder circuit.

These circuits generate a variety of signals for the step generator, and generate pulse timing signals for the high-current mode.

Collector Supply Generator The collector supply generator circuit, located on the A3 A/D board, consists of a sine-square wave timing generator, sine-square wave generator, collector level control circuit and high voltage sine-square wave attenuator circuit. These circuits generate a sine-square wave synchronized to the line frequency, which is the source of the collector signal in the high voltage mode, and DC signal which is the source of the collector signal in high current mode.

Acquisition The acquisition circuitry, located on the A3 A/D board, consists of an S/H (sample and hold) and select circuit, A/D timing circuit, acquisition memory control circuit, acquisition memory circuit and bus driver circuit.

These circuits perform A/D conversion of the HD and VD signals from the A5 Display Control board, write them into acquisition memory, and transfer data to the CPU.

Display Counter Circuit The display counter circuitry is located on the A4 Digital Display board. The display counter circuit consists of the bus buffer, the 4.5 MHz oscillator, display counter, address switch & CPU control, display RAM, bus transceiver, dot cursor generator and character & latch controller.

These circuits determine if the CPU accesses the display RAM, or the display counter reads out the display RAM contents to display them on the CRT. This circuit also generates the necessary control signals for the display.

Display D/A Converter Circuit The display D/A converter circuitry is located on A4 Digital Display board. The display D/A converter circuitry consists of the following circuits:

1. X data & attribute prefetch latch
2. X-Y data & attribute load latch

3. X 10-bit DAC & Y 10-bit latch
4. X & Y low-pass filter
5. Font latch
6. Character ROM & shift resistor
7. X & Y readout position latch
8. Readout attribute latch
9. 8-bit adder
10. X readout step generator
11. X readout DAC and Y readout DAC

These circuits convert the digitized waveform data, readout data and cursor data from the display RAM into an analog signal and generate the Z-axis signal.

Display Offset Circuit

The display offset circuitry is located on the A5 Display Control board. The display offset circuitry consists of the control logic circuit, offset D/A converter circuit, polarity select circuit, source select circuit, zero & invert select circuit, and X and Y gain select circuits. These circuits select the horizontal and vertical source inputs for the CRT display and provide invert, collector supply polarity, and peak power watts.

Display Select

The display select circuitry is located on the A5 Display Control board. This circuitry consists of the signal select logic circuit, unblank & Z select circuit, and the horizontal & vertical preamp circuit. This block of circuitry selects and amplifies the source inputs that are displayed on the CRT. Selection of the source inputs are performed by the signal select logic circuit. The Z signal for the source inputs is controlled by the unblank & Z select circuit.

Collector Supply Amplifier

The collector supply amplifier consists of a collector power supply circuit and collector supply amplifier circuit.

The collector supply amplifier amplifies signals from the sine-square wave generator (located on the A3 A/D board) to provide driving voltage for the collector supply transformer.

Step Generator Voltage Amplifier

The step generator voltage amplifier consists of the 1-2-5 ranging circuit, the +55 and -55 V power supply circuit and the voltage amplifier circuit. This circuit transforms the output of the step generator on the A3 A/D board into voltage steps of various amplitudes to be applied to the device under test. The STEP/

OFFSET AMPLITUDE control on the front panel determines the amplitude of the steps.

Step Generator Current Amplifier

The step generator current amplifier consists of a control signal latch circuit, a relay driver circuit, and a current amplifier circuit. It transforms the output of the 1-2-5 ranging circuit (diagram 12) into current steps of various amplitudes to be applied to the DUT. The STEP/OFFSET AMPLITUDE control on the front panel determines the amplitude of the steps.

Vertical Sense

The vertical sense circuitry consists of a current sense circuit, 1-2-5 ranging circuit, looping compensator circuit and control latch circuit. The vertical sense circuitry measures the collector current of the DUT, excluding stray capacitance effects.

Horizontal Sense

This circuitry consists of the voltage sense circuit, 1-2-5 ranging circuit, and control latch circuit. It measures the collector voltage or base voltage of the DUT.

Collector Supply Interface and High-Voltage Output

This circuit consists of an interlock and overheat circuit, high-voltage control circuit, high-current control circuit and high-voltage output circuit. The collector supply interface and high voltage output controls the collector supply output, step generator output and collector supply output relays by means of an interlock.

Main Key

The main key circuitry is located on the A11 Main Key board, and consists of the bus buffer circuit, the address decoder circuit, the variable control circuit, and the witch matrix circuit. These circuits interface signals between the A2 CPU board and the A12 Sub Key board, and control set ups such as; VERTICAL CURRENT/DIV, HORIZONTAL VOLTS/DIV and STEP/OFFSET AMPLITUDE settings, and control focus.

Sub Key

The sub key circuit is located on the A12 Sub Key board, and consists of the front panel display circuit and the front panel key matrix circuit. The circuit is controlled by the A11 Main Key board; it displays the main key setting information and transfers key input data from the key matrix.

Lower Key

This circuitry is located on the A14 Lower Key & FDD board, and consists of the bus buffer circuit, the address decoder interface signals with the A2 CPU board, set up collector supply VARIABLE settings, and transfer the status data to the A2 CPU board.

FDD Interface This circuitry is located on the A14 Lower Key & FDD board. The circuit consists of the bus buffer circuit, the address decoder circuit, the FDD controller circuit and the FDD bus driver circuit. The function of this circuit is to communicate with the FDD unit.

High-Current Power Supply This circuitry operates as the power supply for the collector supply circuit in high-current mode.

High-Current Amplifier This circuitry consists of a high-current pulse generator circuit, high-current pulse filter circuit, high-current pulse driver circuit, power MOS FETs circuit and high-current output circuit.

CRT Output Amplifier The CRT output amplifier is located on the A18 Output board, and consists of the horizontal output amplifier, the vertical output amplifier, and the Z-axis amplifier. The horizontal and vertical output amplifiers convert current signals from the preamplifier of the A5 Display Control board into deflection plate driving voltages for the CRT. The Z-axis amplifier converts the current signal from the unblanking logic of the A5 Display Control board into the driving voltage for the grid bias and DC restorer circuit of the A20 H.V. Regulator board.

CRT HV Power Supply The CRT HV power supply is located on the A20 H.V. Regulator board. This circuit consists of the high-voltage generator circuit, the high voltage regulator circuit, the grid bias and DC restorer circuit, the focus amplifier and DC restorer circuit, the anode multiplier circuit, the rectifier filter circuit, and the CRT circuit. The CRT HV power supply circuitry provides the various high voltage operating potentials required by the CRT, and displays the 371B data.

GPIB & Printer Interface The GPIB and printer interface circuitry is located on the A22 Interface board. The circuit consists of the bus buffer circuit, the interrupt driver circuit, the address decoder circuit, the GPIB address switch circuit, the GPIB controller circuit, the GPIB bus driver circuit, the printer controller circuit and the printer bus driver circuit. The function of this circuitry is to transfer data to the printer and to communicate with other instruments via the bidirectional general purpose interface bus (GPIB). These functions are under control of the microprocessor and the communication handling software, which are located on the A2 CPU board.

Power Supply This circuitry is located on the A25 Main Power Supply board and the A27 Primary board. This circuitry consists of the primary circuit, the main power supply circuit and the interrupt generator circuit. These circuits supply low voltage power for the 371B and generate interrupt signals.

Maintenance

Maintenance

This chapter of the manual contains information for performing preventive maintenance, troubleshooting, and corrective maintenance for the 371B.

Preventive Maintenance

Preventive maintenance performed on a regular basis can prevent instrument breakdown and may improve the reliability of the instrument. The severity of the environment to which the instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding electrical adjustment of the instrument.

Cabinet Panels



WARNING. *Dangerous high-voltage potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on the case. Disconnect power before cleaning the instrument or replacing parts.*

The side, top, and bottom cabinet panels provide protection to personnel from high-voltage potentials present within the instrument. In addition, they reduce radiation of electromagnetic interference from the instrument. Operate the instrument with the panels in place to protect the interior from dust, and to maintain cooling airflow.

Cleaning

The 371B should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket and prevents efficient heat dissipation. It also provides an electrical conduction path that may result in instrument failure.



CAUTION. Avoid the use of chemical cleaning agents that might damage the plastics in this instrument. Use a non-residue type of cleaner, preferably isopropyl alcohol or totally denatured ethyl alcohol. Before using any other type of cleaner, consult your Tektronix service center or field representative.

Exterior

Loose dust accumulated on the outside of the instrument can be removed with a soft cloth or small brush. The brush is particularly useful for dislodging dirt on and around the front-panel controls. Dirt that remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

Air Filter

Inspect and clean the air filter periodically to maintain cooling air flow. Remove the filter retainer (remove four attaching screws) from the rear of the 371B. Wash the filter in soapy water, rinse, dry, and replace on the 371B.

CRT

Clean the plastic light filter, implosion shield, and the CRT faceplate with a soft, lint-free cloth dampened with denatured alcohol.

Interior

Cleaning the interior of the instrument should only be necessary occasionally. The best way to clean the interior is to blow off the accumulated dust with dry, low-velocity air (approximately 5 lbs/sq in). Remove any dirt that remains with a soft brush or a cloth dampened with a mild detergent and water solution. A cotton swab is useful for cleaning in narrow spaces or for cleaning more delicate circuit components.



CAUTION. Circuit boards and components must be dry before applying power to prevent damage from electrical arcing.

The high-voltage circuit should receive special attention. Excessive dirt in this area may cause high-voltage arcing and result in improper instrument operation.

Visual Inspection

The 371B should be inspected occasionally for such defects as broken connections, improperly seated semiconductors, damaged or improperly installed circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged parts are found. Overheating usually indicates other trouble in the instrument; therefore, correcting the cause of overheating is important to prevent recurrence of the damage.

Semiconductor Checks

Periodic checks of the semiconductors are not recommended. The best check of semiconductor performance is actual operation in the instrument. More details on semiconductors are given under “Troubleshooting” later in this chapter.

Periodic Electrical Adjustment

To ensure accurate measurements, check the electrical adjustment of this instrument after each 2000 hours of operation or every 12 months if used infrequently. In addition, replacement of components may necessitate adjustment of the affected circuits. Complete adjustment instructions are given in Chapter Four: Performance Check and Adjustment. Performing all or selected performance checks and adjustments procedures can be helpful in localizing certain troubles in the instrument and in some cases may correct them.

Troubleshooting

The following information is provided to facilitate troubleshooting the 371B:

- Troubleshooting aids
- Troubleshooting equipment
- Troubleshooting techniques
- Diagnostics

Information contained in other chapters of this manual should be used in conjunction with the following data to aid in locating a defective component. An understanding of the circuit operation is helpful in locating troubles. See Chapter 3: Theory of Operation, for this information.

Troubleshooting Aids

Diagrams. Schematic diagrams are given on the pullout pages in Chapter 8: Diagrams and Circuit Board Illustrations. Important voltages and numbered waveform test points are also shown on the diagrams. Waveforms and the numbered test points where each waveform was obtained are located adjacent to each diagram. The portions of circuitry mounted on circuit boards are enclosed with heavy solid-black lines.

Circuit Board Illustrations. To aid in locating circuit boards, a circuit board location illustration appears on the back of the pullout page that faces the

appropriate schematic diagram. In addition, the circuit board illustrations are included that show the physical location of the waveform test points that appear on the schematic diagram.

Troubleshooting Charts. Troubleshooting charts are given in Chapter 8: Diagrams and Circuit Board Illustrations, to aid in locating a defective circuit. The shaded blocks on the troubleshooting charts indicate circuits that may cause the indicated malfunction. The circuits listed are discussed in detail in Chapter 3: Theory of Operation.

Adjustment and Test Point Location. To aid in locating test points and adjustable components called out in the various portions of the adjustment procedure, the “Adjustment and Test Point Locations” pullout pages appear in Chapter 8: Diagrams and Circuit Board Illustrations.

Troubleshooting Equipment

The following equipment is useful for troubleshooting the 371B.

1. Transistor Tester

Description:	Dynamic tester
Purpose:	Tests semiconductors.
Recommended type:	SONY/Tek 370B Programmable Curve Tracer

2. Digital Multimeter

Description:	10 M Ω input impedance and 0 to 1 kV range, AC and DC; ohmmeter, accuracy, within 0.1%. Test probes must be insulated to prevent accidental shorting.
Purpose:	Checks voltages and resistances.
Recommended type:	Tektronix DM501A Digital Multimeter

3. Test Oscilloscope

Description:	Frequency response, DC to 150 MHz minimum; deflection factor, 2 mV to 5 V/division. A 10X, 10 M Ω voltage probe should be used to reduce circuit loading for voltage measurements.
Purpose:	Checks operating waveforms.
Recommended type:	Tektronix 2445B Oscilloscope

4. Variable Auto transformer

Description:	Output variable from 0 V to 140 V, 10 amperes minimum rating. Must have three-wire power cord, plug, and receptacle.
Purpose:	Varies line voltage when troubleshooting the power-supply.
Recommended type:	General Radio W10MT3W Variac Autotransformer

5. Calibration Fixtures

a. Extender Board

Purpose:	Troubleshooting the circuit boards.
Recommended type:	Tektronix Extender board (part number 670-9303-00)

b. Extension Cables

Purpose:	Troubleshooting with the drawer unit extended.
Recommended type:	Tektronix cables (part numbers 174-1999-00 and 174-0352-00)

Troubleshooting Techniques

The information presented here guides you through a troubleshooting sequence that is arranged to help you check the basic trouble possibilities before you proceed with extensive troubleshooting. The first few checks ensure proper connection and operation of associated equipment. If the trouble is not located by these checks, the remaining steps aid in locating the defective component.

Power-Up Diagnostics. When the 371B is powered on, it automatically runs diagnostic routines that execute RAM, LED, display quality, and push button checks. If one of these routines notes a failure, an appropriate message is displayed on the CRT. If any RAM diagnostic routine notes a failure, an appropriate error message is displayed and the power on process is terminated. Refer to “Diagnostics” described later in this chapter for additional information.

Check Control Settings. Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control on the instrument, refer to the 371B User manual. Also, a user-initiated diagnostic routine allows you to check the functionality of each front panel push button or rotary switch. Refer to “Diagnostic” described later in this chapter for additional information.

Check Associated Equipment. Before proceeding with troubleshooting, check that the equipment used with this instrument is operating correctly. Make sure that the input signals are properly connected and that the interconnecting cables are not defective. Also check the line-voltage source.

Visual Check. Visually check the portion of the instrument where the trouble is located. Many troubles can be found by visible indications such as unsoldered connections, loose cable connections, broken wires, damaged circuit boards, and damaged components.

Check Instrument Adjustment. Check the overall electrical adjustment of this instrument or of the affected circuit if the trouble appears in one circuit. The apparent trouble may only be a result of misadjustment. Complete adjustment instructions are given in Chapter 5: Performance Check and Adjustment.

Isolate Trouble to a Circuit. Note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by taking voltage and waveform measurements.

Incorrect operation of all circuits often indicates trouble in the power supply. Check first the correct voltage of the individual supplies. However, a defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits

The 371B Troubleshooting charts in the Chapter 8: Diagram and Circuit Board Illustrations, provides a guide for locating defective circuits. Start at the top of the chart and perform the checks until one of the checks fails.

Check Voltages. Often the defective component can be located by checking for the correct voltages in the circuit. Typical voltages are given in Chapter 8: Diagrams and Circuit Board Illustrations.

NOTE. *Voltages provided in Chapter 8: Diagrams and Circuit Board Illustrations, are not absolute and may vary slightly between 371B instruments. To obtain operating conditions used to take these readings, see the “Voltage Conditions” adjacent to the schematic diagram.*

Diagnostics

The 371B has three sets of diagnostic routines.

- Power-up diagnostics are run every time the 371B is powered up. There is a default set and an extended set that can be run during power up.
- User-initiated diagnostics can be used to verify the operation of the front-panel controls.
- GPIB controlled diagnostics can be used by a GPIB controller to obtain 371B system ROM and RAM information.

The following provides additional information on each set of diagnostic tests.

Power-up Diagnostics

There are seven power-up tests. Five tests are run automatically each time the 371B is powered up. Two additional (extended) tests can be run by pressing the cursor SHIFT button and then powering up the instrument. These tests are listed in Table 4–1 in the sequence they occur during power-up.

Table 4–1: Default and Extended Power-up Routines

Diagnostic Test	Routine Default	Sequence Extended
Boot ROM check	yes	yes
System RAM check	yes	yes
Flash ROM check	yes	yes
Display RAM check	yes	yes
Acquisition RAM check	yes	yes
LED check	no	yes
Display quality check	no	yes
Push button test	no	yes

After completing the power-up tests listed in Table 4–1, it displays the message SELFTEST PASS and sets the front-panel settings to their default (initial state).

You can exit the power-up diagnostics by pressing the cursor SHIFT button during power-up.

The following is a description of each power-up test.

Table 4–2 lists the ROM and RAM power-up error messages.

Boot ROM Check. During power-up diagnostics, the ROM is checked by checksum methodology. If a checksum error is found, the error message is displayed in the error message area of the CRT graticule and the 371B does not advance to the next routine. ROM must function properly in order to continue with power-up diagnostics.

The message format is as follows:

ROM 000X

If a fatal error is found in the boot ROM (such as a mis-insertion), the memory location LED blinks 0 and 1 alternately, and the 371B does not advance to the next routine

System RAM Check. The 371B checks the system RAM with read/write operations. If read/write errors are found, the error message is displayed in the error message area of the CRT graticule and the 371B does not advance to the next routine.

The message format is as follows:

RAM XXXXX YYYY

If a fatal system RAM error is found (such as a shorted bus), the memory location LED blinks 0 and 2 alternately, and the 371B does not advance to the next routine.

Flash ROM Check. The 371B checks the Flash ROM by checksum. When a Flash ROM fatal error is found (such as bus shorted), the memory index display alternately blinks 0 and 5, and the 371B does not advance to the next routine.

Display RAM Check. The 371B checks the display RAM with a read/write operation. If a read/write error is found (such as a shorted bus), the memory location LED blinks 0 and 3 alternately, and the 371B does not advance to the next routine.

Acquisition RAM Check. The 371B checks the acquisition RAM with a read/write operation. If a read/write error is found (such as a shorted bus), the memory location LED blinks 0 and 4 alternately, and the 371B does not advance to the next routine

Table 4–2 lists the power-up system error messages displayed in the memory location LED.

Lithium battery Check(warning). In the case of the lithium battery low, the memory index LED blinks with 0 and 99, the 371B displays it and advance the diagnostic routine.

Table 4-2: Power-up System Error Messages

Display	Description
0/1 (blink)	System ROM error (e.g., misinsertion)
0/2 (blink)	System RAM error (e.g., bus shorted)
0/3 (blink)	Display RAM Read/Write error (e.g., bus shorted)
0/4 (blink)	Acquisition RAM Read/Write error (e.g., bus shorted)
0/5 (blink)	Flash ROM error
0/99 (blink)	Lithium battery low (warning)

LED Check. This is the first of two extended power-up diagnostic routines. This test runs when the operator presses the cursor SHIFT button and holds it pressed when pressing the POWER switch. When the power-up sequence reaches this test, it displays a logo while it sequentially lights all front-panel LEDs.

NOTE. *You may have to adjust the NON STORE/STORE/VIEW intensity control to display the logo.*

The operator can follow the lighting sequence to obtain a visual indication that the LEDs are operating.

When all LEDs have been lit in sequence, the 371B diagnostic software advances to the display quality check.



CAUTION. *Be sure to turn the NON STORE/STORE/VIEW intensity control to a level that prevents burning the CRT when the display quality test pattern is displayed.*

Display Quality Check. This is second of two extended power-up diagnostic routines. When the extended power-up sequence reaches this test, the 371B displays a test pattern as shown in Figure 4-1. The operator can use this text pattern as a template to align the display vertically and horizontally using the display ROTATION screwdriver adjustments. Use these adjustments to position the display as shown in Figure 4-1.

The NON STORE/STORE/VIEW intensity control adjusts the intensity of the bright alignment dots. These dots are displayed at the center, outer corners, and mid-outer lines of the display graticule. The READOUT CURSOR intensity control adjusts the intensity of the double-line, dotted box.

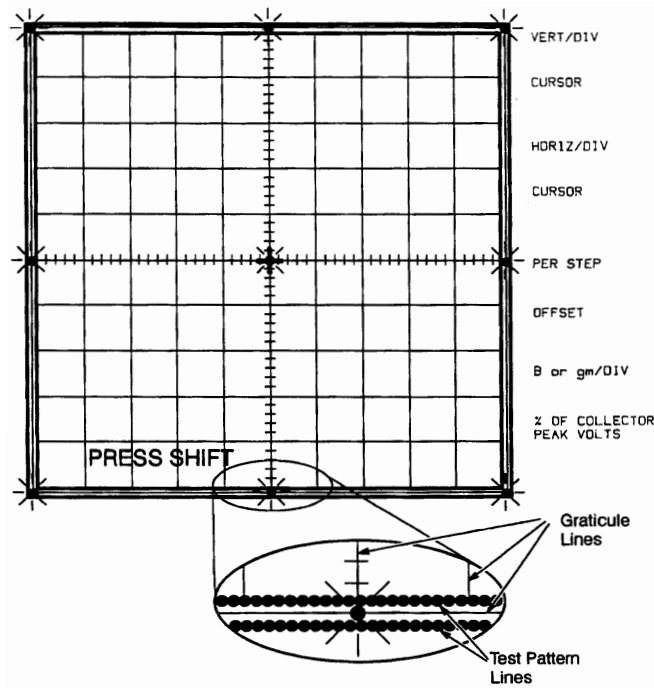


Figure 4-1: Display quality test pattern

After you have positioned the display pattern, press the cursor SHIFT button to continue power-up diagnostics sequence.

Push Button Test. This is the final power-up test for both the default test string and the extended test string. This test includes a push button stack test. It does not check the functionality of the push buttons. If an error is found, the error message is displayed at the bottom of the CRT. The error message is in the following format:

<STRING> KEY ERROR

where:

<STRING> identifies the front-panel control as listed in Table 4-3.

The following message also appears in the text area of the display graticule.

PUSH SHIFT KEY TO GO ON

The displayed error can be ignored and the test continued by pressing the cursor SHIFT button. However, keep in mind that the front-panel control may not operate correctly.

User-Initiated Push Button Diagnostic Routine

This routine displays a number or message that corresponds to the last front panel control used. This routine can be used to determine whether a front-panel control is operating normally.

To start this routine, simultaneously press the cursor SHIFT button, and the NON STORE button. To exit this routine, press the cursor SHIFT button, then press the NON STORE button once again.

Table 4-3 lists the 371B controls and the corresponding numbers or messages.

Table 4-3: Front Panel Control Identification

Control	Message
Display SAVE	SAVE
Display RECALL	RECALL
MEMORY up	MEMORY up
MEMORY down	MEMORY down
Display NON STORE	NON STORE
Display STORE	STORE
Display REF	REF
Display VIEW	VIEW
Display ENTER	ENTER
Display INVERT	INVERT
Measurement REPEAT	REPEAT
Measurement SINGLE	SINGLE
Measurement SWEEP	SWEEP
GPIB RESET TO LOCAL	RESET TO LOCAL
GPIB USER REQUEST	USER REQUEST
HARD COPY	HARD COPY
CURSOR Mode up	CURSOR MODE up
CURSOR Mode down	CURSOR MODE down
CURSOR LEFT ARROW	CURSOR left
CURSOR RIGHT ARROW	CURSOR right
CURSOR UP ARROW	CURSOR up
CURSOR DOWN ARROW	CURSOR down
CURSOR SHIFT	SHIFT
Collector Supply POLARITY	POLARITY
MAX PEAK POWER WATTS 3 KW	3 kW
MAX PEAK POWER WATTS 300 W	300 W

Table 4-3: Front Panel Control Identification (Cont.)

Control	Message
MAX PEAK POWER WATTS 30 W	30 W
MAX PEAK POWER WATTS 3 W	3 W
Step Generator POLARITY INVERT	STEP INVERT
Step Generator CURRENT SOURCE	CURRENT
Step Generator VOLTAGE SOURCE	VOLTAGE
NUMBER OF STEPS up	# OF STEPS up
NUMBER OF STEPS down	# OF STEPS down
Step Generator OFFSET INCR	OFFSET up
Step Generator OFFSET DECR	OFFSET down
Step Generator MULTI .1X	STEP MULT
VERTICAL CURRENT/DIV	VERTICAL XX (0 - 16)
HORIZONTAL VOLTS/DIV	HORIZONTAL XX (0 - 16)
STEP/OFFSET AMPLITUDE	STEP AMP XX (0 - 16)
VARIABLE COLLECTOR SUPPLY	VARIABLE XX (0 - 25)
HIGH CURRENT OUTPUT: ON	H.C. ENABLED
HIGH CURRENT OUTPUT: OFF	H.C. DISABLED
HIGH VOLTAGE OUTPUT: ON	H.V. ENABLED
HIGH VOLTAGE OUTPUT: OFF	H.V. DISABLED
INTERLOCK: ON	INTERLOCK ON
INTERLOCK: OFF	INTERLOCK OFF
GPIB ADDRESS/TERM	GPIB: n.term (n: 0 - 31, term = [EOI or LF/EOI])

GPIB Diagnostic Routine

This routine allows a GPIB controller to obtain boot ROM and system RAM information over the GPIB.

To initiate this routine, the GPIB controller sends the TEST? query over the GPIB. The 371B responds by running its boot ROM and system RAM diagnostic routines and returning boot ROM and system RAM information to the controller as follows:

TEST ROM 000X, RAM:YYYY

Refer to TEST? command description in the 371B User manual for additional information.

Disassembly/Assembly



WARNING. To avoid electric shock hazard, always disconnect the instrument from the power source before removing or replacing sub-assemblies.

Overview

In the following procedures, directional terms (top, bottom, left, right) are based on the assumption that your 371B is in a normal, upright position and that you are facing the front of the instrument.

Installation or reassembly procedures are the reverse of the disassembly procedures unless otherwise noted. In some cases, installation hints are provided to aid in reassembly.

The mechanical drawings associated with Chapter 9: Replaceable Mechanical Parts, are helpful in the removal or disassembly of sub-assemblies. Refer to these drawings as required.

The 371B has many types of connectors; some of them are very similar in appearance. Tag each connector for identification before removing it from its respective board. This will greatly aid reassembly.

Some connectors have latches to prevent accidental removal during operation. These latches must be “released” before they connectors can be removed.

Some connectors are “keyed” to ensure proper orientation (alignment) when reconnected. Other board connectors have either an alignment dot or small arrow-like designator to indicate pin 1. Be sure to orient each connector properly when reconnecting it.

The disassembly/assembly procedures are organized as follows:

1. Panel removal
2. Drawer unit removal and related components
3. Main unit and related components

Tools Required

The following tools are required to perform disassembly and assembly of 371B assemblies and subassemblies.

- Magnetic screwdriver, 1/4 inch drive
- POZIDRIV bit #1
- POZIDRIV bit #1
- Phillips bit #1

- Phillips bit #2
- 3/16 Spin Tight
- 5/15 Spin Tight

Panel Removal

These procedures describe how to remove the top, side and rear panels.

Top and Side Panels. Before any assembly can be removed, the top and side panels must be removed.

1. Remove the four cabinet panel retainers from each corner of the 371B rear panel.
2. Remove the securing screw at the middle rear of the top panel. Slide the panel back to remove it from the 371B.
3. Remove the right and left cabinet panels by first removing a securing screw at the rear-middle of each panel.
4. Press the palm of your hand on the panel and push back slightly to release the panel from the front casting. Move the top of the panel outward and lift it from the bottom groove to remove the panel from the 371B.
5. Install panels in the reverse order of removal, beginning with Step 4.

Rear Panel. For most disassembly/assembly purposes, the rear panel does not have to be completely removed from the main unit. Simply “open” the rear panel as described in Steps 1 through 4 of the following procedure. Step 5 describes how to completely disconnect the rear panel from the main unit.

1. Remove any connectors attached to the outside of the rear panel.
2. Remove the top and side panels as previously described.
3. Remove the six screws that secure the rear panel to the main unit.
4. Tilt the rear panel out from the top and carefully lower it away from the main unit. Do not stretch any connector wires inside the panel.
5. To completely disconnect the rear panel from the main unit, perform the following:
 - a. Remove the drawer unit from the main unit as described in its removal/assembly procedure (immediately following).
 - b. Remove the two screws that secure the power switch to the rear chassis. The power switch is located to the right of the main unit/drawer unit connectors.

- c. Remove J274 and J276 from the A27 Primary board.
- d. Remove the A2 CPU and A3 A/D boards. Refer to the A2, A3, A4, and A5 Plug-In boards procedures later in this chapter for removal instructions.
- e. Remove J220 from the A1 Mother board.
- f. Remove both ground wires that attach the rear panel to the main unit.
- g. Replace the rear panel in the reverse order of removal.

NOTE. Procedures are provided later in this chapter for removing the A22 Interface board, the A27 Primary board, and the B100 Cooling Fan from the rear panel. Refer to the applicable procedure as needed.

Drawer Unit and Associated Assemblies and Components

The following describes how to remove the drawer unit from the main unit. The drawer unit should be completely removed from the main unit before attempting to remove any associated assembly or chassis-mounted component.

Chapter 8: Diagrams and Component Locations, shows the location of related electrical assemblies. Refer to the “Drawer Unit” and “Front Porch” drawings in Chapter 9: Mechanical Parts for location of related chassis-mounted sub-assemblies and components.

Drawer Unit. Perform the following to remove the drawer unit from the 371B.

1. Remove the right and left cabinet panels from the main unit.

The drawer unit is secured to the main unit using a long metal bracket on each side.

2. Remove the eight screws (four flat-head and four round-head) that secure the bracket to the main unit/drawer unit.
3. Pull the drawer unit forward away from the 371B.

You may have to place the fore and index fingers of each hand at the left- and right-rear corners of the drawer unit. Then pry toward you with a slight rocking motion to slide the drawer unit from the 371B.

NOTE. Before installing the mounting bracket (upon reassembly), make certain that the bracket that contains potentiometer identification is installed on the right side (the brackets are interchangeable).

4. Install the drawer unit in the reverse order of removal.

A24 Floppy Disk Driver. The Floppy Disk Drive (FDD) unit with mounting bracket is secured to the drawer unit with four screws. Note that the bracket mounting holes are slotted to allow the FDD to be aligned flush with its front panel bezel.

1. Remove the connector from the rear of the FDD.
2. Remove the four screws that secure the mounting bracket to the drawer unit.
3. Push the FDD to the rear, away from its front bezel, and remove the FDD from the drawer unit.
4. If replacing the FDD with a new unit, remove the mounting bracket from the FDD (four screws) and install the bracket on the new FDD.
5. Install the A24 FDD in the reverse order of removal.

A23 FDD Interface Circuit Board. Remove and replace the A23 FDD Interface circuit board as follows:

1. Pull out the drawer unit from the main body of the 371B.
2. Remove the connector for J100 from the A13 Key Interface circuit board.
3. Remove the connector (through the W200 on the A23 FDD Interface circuit board) from the FDD assembly.
4. Remove the A23 FDD Interface circuit board by removing the four securing screws from the board.
5. Replace the A23 FDD Interface circuit board in the reverse order of removal.

A10 Sense Circuit Board. Remove and install the A10 Sense board as follows:

1. Pull out the drawer unit from the 371B.
2. Remove J140, J146, J142, and J148 from the A14 Lower Key and FDD board.
3. Remove the six screws that secure the support bracket for the A24 FDD assembly and the A14 Lower Key and FDD board to the drawer unit chassis.
4. Remove the bracket with the A24 FDD and A14 Lower Key and FDD board assemblies attached.
5. Remove the following connectors from the A10 Sense board: J670, J146, J612, J614, J690, J610, J617, J616, J620, J695, J630, J632, J626, J622, J618, J634, and J636.

6. Remove the six screws that secure the A10 Sense board to the drawer unit chassis.
7. Lift the A10 Sense board from the drawer unit.
8. Install the A10 Sense board in the reverse order of removal.

Front Porch Assembly. The Front Porch assembly must be unfastened from the drawer unit in order to access the A30 Connector board and various chassis-mounted components.

1. Remove the shield (four screws) that covers the A16 High-Current Control and A31 Relay boards.
2. Remove the 5/16 inch nut that attaches the Front Porch assembly to the center brace of the drawer unit.
3. Remove the three screws from each side of the drawer unit.

Tilt the Front Porch assembly up and back to access the A30 Connector board and chassis-mounted components. Be careful not to stretch the cabling between the Front Porch and other drawer unit assemblies.

4. Install the Front Porch assembly in the reverse order of removal.

A30 Connector Board. The A30 Connector board is fastened to the underside of the Front Porch panel.

1. Unfasten the Front Porch assembly from the drawer unit as previously described.
2. Tilt the Front Porch assembly up and back to access the A30 Connector board. Be careful not to stretch the cabling between the Front Porch and other drawer unit assemblies.
3. Remove the nuts at J700, J702, J704, J706, J708, J710, J712, J714, J716, and J720 on the A30 board.

NOTE. Several of the above nuts are used to attach wiring to the connectors. Be sure to tag such wires to identify their location to ensure proper placement upon re-assembly.

4. Two cable assemblies, W622 and W632 are hardwired to the A30 Connector board. Remove these cables at J622 and J632, respectively, on the A10 Sense board. Remove the cables from the chassis clamps.
5. Remove the A30 board from the Front Porch assembly.

6. Install the A30 Connector board in the reverse order of removal.

Front Porch Chassis-Mounted Components. The Front Porch assembly contains several chassis-mounted subassemblies and components. Refer to the Front Porch Assembly drawing in Chapter 9: Mechanical Parts for location of these subassemblies and components. The Front Porch assembly must be removed in order to access these chassis-mounted subassemblies and components.

A31 Relay Board. Perform the following to remove the A31 Relay board.

1. Remove the drawer unit from the 371B.
2. Remove the shield (four screws) that covers the A31 Relay board and the A15 High-Current Control board.
3. Remove the Front Porch assembly as described earlier in this chapter. Pull the Front Porch away from the drawer unit slightly to access the A31 Relay board.
4. Remove J914 and J695 from the A31 Relay board.
5. Remove the eight screws that secure wires to J920, J921, J924, J926, J928, J932, and J934.
6. Remove the 10 screws that secure the A31 Relay board to the drawer unit chassis.
7. Lift the A31 Relay board from the drawer unit.
8. Install the A31 Relay board in the reverse order of removal.

A15 High-Current Power Supply Circuit Board. Perform the following to remove the A15 High Current Power Supply board.

1. Remove the drawer unit from the main unit.
2. Remove the shield (four screws) that covers the A31 Relay board and the A15 High Current Control board.
3. Remove J800, J802, J804, J900, J902, J904, and J906 from the A15 board.
4. Remove the eleven screws that secure the A15 board to the drawer unit chassis.
5. Lift the A15 High Current Power Supply board from the drawer unit.
6. Install the A15 High Current Power Supply board in the reverse order of removal.

A16 High-Current Control Board. Perform the following to remove the A16 High-Current Control board from the drawer unit.

1. Remove the drawer unit from the 371B.
2. Remove the shield (four screws) that covers the A31 Relay board and the A16 High-Current Control board.
3. Remove J690, J906, J908, J912, and J914 from the A16 High-Current Control board.
4. Remove the four screws that secure the A16 High-Current Control board to the drawer unit chassis.
5. Lift the A16 High Current board from the drawer unit chassis.
6. Install the A16 High Current Control board in the reverse order of removal.

FETs Q910, Q920, Q930, and Q940. These field effect transistors are chassis-mounted under the A16 High Current Control board. Perform the following to access and remove these transistors.

1. Remove the drawer unit from the 371B.
2. Remove the shield (four screws) that covers the A31 Relay board and the A15 High Current Control board.
3. Remove the A16 High Current Control board as previously explained.
4. Remove the four spacer posts, using a 7/32 inch Spintite, that attach the rectangular shield to the chassis standoffs.
5. Lift the electrical shield from the drawer unit.
6. Remove the eight 5/16 inch nuts that attach the FET assembly to the drawer unit chassis.
7. Remove the yellow and black wires from the FET assembly.
8. Lift the FET assembly from the drawer unit.
9. Install the A16 High-Current Control board in the reverse order of removal.

Other Drawer Unit Chassis-mounted Sub-assemblies and Components. The drawer unit contains several chassis-mounted subassemblies and components. Refer to the “Drawer Chassis” drawing in Chapter 9: Mechanical Parts for location of these subassemblies and components.

Main Unit Assemblies and Components

The following describes how to remove assemblies from the main unit.

Chapter 8: Diagrams and Component Locations shows the location of related electrical assemblies and chassis-mounted components. Refer to related drawings in Chapter 9: Mechanical Parts for location of related chassis-mounted subassemblies and components.

CRT Removal.

NOTE. Before removing the CRT, check associated circuits to be certain that removal is necessary.



WARNING. Use extreme care when handling a CRT. Breakage of the CRT causes a high-velocity scattering of glass fragments (implosion). Wear protective clothing and safety glasses. Avoid striking the CRT on any object, that might cause it to crack or implode. When storing a CRT, place it in a protective carton or face down in a protected location on a smooth surface with a soft mat under the faceplate.

The CRT may retain a dangerous electrical charge. Before removing the CRT, the anode must be fully discharged by shorting the CRT anode to the chassis. Wait at least 10 minutes and again firmly short the anode to the chassis, then proceed with the CRT removal procedures.

Perform the following to remove the CRT from the main unit chassis.

1. Remove the rear, top, and left side panels.
2. Loosen the two CRT base clamp screws (at the rear of the CRT) until the tension of the springs is released (springs are loose on the screws).
3. Remove the CRT base-pin socket from the rear of the CRT.
4. Disconnect the CRT anode cap from the jack located on the left side of the CRT. Ground the CRT anode to the chassis to discharge any stored charge remaining in the CRT.
5. Remove the CRT bezel cover from the under side of the CRT bezel by pulling it off with your fingernail.
6. Remove the two screws exposed on the lower side of the CRT bezel, and remove the CRT bezel from the front panel.
7. Remove the CRT filter, spacer, and implosion shield from the CRT frame.
8. Remove the four screws located on the inner side of the frame.

9. Remove the CRT frame by removing the four remaining screws located on the outer corners of the CRT frame.
10. Pull the graticule illumination lamp assemblies from the sides of the CRT faceplate.
11. Hold one hand on the CRT faceplate and gently pull out the CRT while pushing on the base of the CRT.

CRT Installation. Perform the following to install the CRT.

1. Check to ensure that each guide slot contains a CRT retainer at each corner of the front panel CRT opening.
2. Check the CRT base pins for proper alignment. Align as necessary to ensure that the base socket can be easily installed once the CRT is placed in the CRT shield.
3. Inset the CRT into the front panel opening and set its base into the CRT clamp ring located at the rear of the CRT shield.
4. Clean the CRT faceplate and place the A28 and A29 lamp board assemblies on the right and left side of the CRT, respectively. Place the lamp retainer springs between the lamp boards and the chassis.
5. Fasten the CRT frame to the chassis by installing the four screws located on the outer corners of the CRT frame.
6. Install and tighten to 5 kg/cm (4.3 in/lb) the four screws located on the inner corners of the CRT.
7. Tighten the two CRT base clamp screws until the springs on the screws are fully compressed.
8. Install the CRT base-pin socked on the CRT base pins.
9. Install the CRT implosion shield, spacer, and filter.
10. Install the CRT bezel and bezel cover.
11. Reconnect the CRT anode cap.
12. If you installed a replacement CRT, perform the adjustment procedures provided in Chapter 5: Performance Check and Adjustment.
13. Install the right side, rear, and top panels.

A2, A3, A4, and A5 Plug-In Boards. These circuit boards plug into the A1 Mother board. Chapter 8: Diagrams and Component Locations shows their location in the 371B.

1. Remove the top panel from the 371B.
2. Remove the two board retainer strips holding the boards in the card cage.
3. Pull-up on the ejector tabs at each end of the board to remove the board from the card cage.
4. To install a plug-in board, perform the following:
 - a. Align the board with the alignment guide in its assigned slot (component side away from the CRT). Insert it holding the tabs parallel to the top of the board.
 - b. Slide the board down through the slots until the edge connectors rest on the bus slot connectors on the A1 Mother board.
 - c. Push the plug in card down into the bus slot connectors of the A1 Mother board. Press firmly on the board, but do not press on components.
5. Replace the two circuit board retainers.
6. Install the top panel.

A1 Mother Circuit Board. Perform the following to remove and replace the A1 Mother board.

1. Remove the top, left, and right side panels.
2. Remove the A2, A3, A4, and A5 boards from the main body as instructed in the “A2, A3, A4, and A5 Plug-in Boards procedure.
3. Remove J10, J12, J110, J180, J190, J220, J400, J410, J412, and J420 from the A1 Mother board.
4. Remove J60 from the A6 Collector Supply Output Circuit board (located at left rear of 371B).

Remove J70 from the A7 Step Generator board.

Remove J192 from the A25 Main Power Supply board.

5. Remove the eight screws from the A1 Mother board.
6. Lift the A1 Mother board from the 371B.
7. Replace the A1 Mother board in the reverse order of removal.

A6 Collector Supply Output Board. Perform the following to remove the install the A6 Collector Supply Output board.

1. Remove the top, rear, and left side panels.
2. Remove the electrical shield over the A6 board.
3. Remove J60, J62, and J66 from the board.
4. Remove J64 from the A26 Collector Power Supply board.
5. Remove the four screws that secure the heat sink of the A6 board to the chassis.
6. Remove the two screws that secure the A6 Collector Supply Output board to the chassis and remove the board from the main unit.
7. Install the A6 Collector Supply Output board in the reverse order of removal.



CAUTION. *If you have removed Q438, Q440, Q538, and Q540 from the heat sink, upon reassembly, make sure that all four insulation washers are placed in position. Without these insulator, destructive electric short circuits will occur.*

NOTE. *Do not apply silicon grease to the insulation washers. No grease is required because of the high heat conductivity of the insulation washers.*

A7 Step Generator Circuit Board. Perform the following to remove and install the A7 Step Generator board.

1. Remove the top, rear, and right side panels from the 371B.
2. Remove J70, J72, J74, J76, and J78 from the A7 board.
3. Remove the three screws located on the lower side of the A7 Step Generator board.
4. Remove the three screws that fasten the heat sink of the A7 Step Generator board to the chassis. Support the board as these screws are removed so it does not fall and become damaged.
5. Remove the A7 Step Generator board from the 371B.
6. Replace the A7 Step Generator board in the reverse order of removal.

A11 Main Key Board. Perform the following to remove and install the A11 Main Key board.

1. Remove the top, rear, and side panels from the 371B.
2. Remove the CRT bezel from the front panel (refer to the CRT removal procedure).
3. Remove two screws that secure the right side of the A11 Main Key board to the front panel frame. Tilt the A11 Front Panel assembly down and away from the 371B.
4. Remove J110 from the A1 Mother board, then remove the front panel away from the 371B.
5. Pull off the eight knobs (three large and five small) from the front panel.
For reassembly, note that the five small knobs have dot position indicators.
6. Remove the six screws that secure the A11 Main Key board to the A12 Sub Key board.

NOTE. *The A11 Main Key board and A12 Sub Key board are connected by circuit board connectors J100/P100 and J120/P120. Be careful not to damage the connectors when removing and reassembling the boards.*

7. Replace the A11 Main Key board in the reverse order of removal.

A12 Sub Key Board. Perform the following to remove and install the A12 Sub key board.

1. Remove the A11 Main Key board as previously described.
2. Remove the six spacers from the A12 Sub Key board.
3. Lift the A12 Sub Key Board from the front panel casting.
4. Replace the A12 Sub Key board in the reverse order of removal.

A18 CRT Output Board. Perform the following to remove and install the A18 CRT Output board.

1. Remove the top panel from the 371B.
2. Remove the four screws that secure the clear insulator panel to the A18 CRT Output board. Set the insulator panel aside.
3. Remove J180, J182, J184, and J186 from the board.

4. Remove the four spacers that secure the A18 board to the chassis and lift the A18 board from the main unit.
5. Replace the A18 CRT Output board in the reverse order of removal.

A20 High Voltage (H.V.) Regulator Circuit Board. Perform the following to remove and install the A20 H. V. Regulator board.

1. Remove the left side panel from the 371B.



WARNING. *The CRT anode circuit retains a charge of up to 12000 V. Be sure that the circuit is completely grounded to the chassis before handling the circuit board, otherwise, serious injury or death may result.*

2. Remove four screws that secure the shield over the A20 H.V. Regulator board. Set the shield aside.
3. Remove the screw that holds the retainer clip for Q100 to the chassis.
4. Remove the CRT anode cap from the jack located on the left side of the CRT. Ground the CRT anode cap to the chassis to discharge any stored charge.
5. Remove J182, J194, and J200 from the A20 H.V. Regulator board.
6. Remove the four screws that secure the A20 H.V. Regulator board to the chassis, and remove the board from the main unit.
7. Replace the A20 H.V. Regulator board in the reverse order of removal.

A22 Interface Board. Perform the following to remove and install the A22 Interface board.

1. Remove the top and rear panels from the 371B.
2. Remove J220 from the A1 Mother board. Refer to the “A2, A3, A4, and A5 Plug-In Circuit board” removal procedure.
3. Remove the four screws that secure the IEEE STD 488 port connector and PRINTER INTERFACE port connectors to the rear panel.
4. Remove four screws that secure the A22 Interface board and lift the board with its insulation cover away from the rear panel.
5. Replace the A22 Interface board in the reverse order of removal.

A25 Main Power Supply Board. Perform the following to remove and install the A25 Main Power Supply board.

1. Remove the top and rear panels from the 371B.
2. Remove J72, J190, J192, J194, J250, J252, J280, and J290 from the A25 board.
3. Remove the three screws that secure the A25 heat sink to the chassis.
4. Remove the remaining two screws that secure the A25 Main Power Supply board to the chassis.
5. Lift the board from the main unit.
6. Replace the A25 Main Power Supply board in the reverse order of removal.

A26 Collector Power Supply Assembly. The A26 Collector Power Supply assembly consists of a transformer and a small circuit board. Perform the following to remove and install the A26 Collector Supply assembly.

1. Remove the top, right and rear side panels.
2. Remove J64, J260, and J262 from the A26 Collector Power Supply assembly.
3. Remove J276 from the A27 Primary board.
4. Remove the four screws that secure the A26 Collector Power Supply assembly to the chassis (two on the bottom side rail and two on the floor of the chassis).
5. Lift the A26 Collector Power Supply assembly from the main unit.
6. Replace the A26 Collector Power Supply assembly in the reverse order of removal.

A27 Primary Board. Perform the following to remove and install the A27 Primary board.

1. Remove the rear panel from the 371B.
2. Remove the protective cover over the A27 Primary Circuit board by crimping the tip of the plastic standoff and pulling the cover from board.
3. Remove J274 and J276 from the board.
4. Remove the three screws and two spacer posts from the board; lift the A27 Primary board from the rear panel.
5. Replace the A27 Primary board in the reverse order of removal.

A28 and A29 Graticule Illumination Lamp Boards. Perform the following to remove and install the A28 and A29 Graticule Illumination Lamp boards.

1. Remove the top panel from the 371B.
2. Remove the CRT bezel cover from the lower side of the CRT bezel by pulling it off with your fingernail.
3. Remove the two exposed screws to remove the CRT bezel from front panel.
4. Remove the CRT filter, spacer, and implosion shield from the CRT frame.
5. Remove J280 and/or J290 from the A25 Main Power Supply board.
6. Remove the (internal scale illumination) light reflector, the light reflector retainer, and the retainer spring by pulling them out from alongside the CRT faceplate.
7. Remove the A28 and A29 Graticule Illumination boards by removing the two screws that secure each board to the light assembly.
8. Replace the A28 and A29 Graticule Illumination Lamp boards in the reverse order of removal.

Low-Voltage Power Supply Transformer. The Low-Voltage Power Supply transformer is located under the A25 Main Power Supply board. Perform the following to remove and install the Low Voltage Power Supply Transformer.

1. Remove the top and rear panels.
2. Remove the A25 main Power Supply board as previously described.
3. Disconnect J274 from the A27 Primary board.
4. Remove the four screws that secure the transformer to the floor of the main unit.
5. Lift the transformer from the main unit.
6. Replace the Low Voltage Transformer in the reverse order of removal.

Cooling Fan. Perform the following to remove and install the Cooling Fan.

1. Remove the rear panel from the 371B.
2. Remove the protective cover over the A27 Primary board by crimping the tip of the plastic standoff and pulling the cover from board.
3. To aid re-assembly, note how the fan is placed on the rear panel. The fan AC connector is located close to the center of the rear panel.

Also check that the air flow arrow marked on the fan is pointing toward the inside of the 371B.

4. Remove the four screws and nuts that secure the Cooling Fan to the rear panel. Lift the Cooling Fan, fan cover, filter, and fan guard from the rear panel.
5. Replace the Cooling Fan assembly in the reverse order of removal.

Performance Verification

Performance Verification

Information in this section instructs a qualified technician on how to

- Check key electrical specifications
- Determine whether adjustment is necessary
- Perform all internal adjustments
- Perform optional functional check procedures

Adjustment is generally required after a repair has been made, or after a long time interval in which normal aging of components may affect instrument accuracy. The 371B should be checked and, if necessary adjusted after each 2000 hours of operation or at least once every year, to ensure that it is operating properly. At the same time, Tektronix recommends that you thoroughly inspect and clean the 371B as instructed in Chapter 4: Maintenance of this manual.

Check the performance of this instrument at an ambient temperature between +10°C and +40°C unless otherwise stated. Make adjustments at an ambient temperature between +20°C and +30°C in order to ensure that the specified tolerances can be met.

NOTE. *Adjustment of the 371B should only be performed by a qualified service technician.*

If problems occur while performing the procedures in this section, you should correct them before continuing. Troubleshooting, repair, and servicing information is provided in Chapter 4: Maintenance.

Tektronix Field Service

Tektronix field service centers and the Factory Service Center provide instrument repair and adjustment services. Contact your Tektronix field representative or service center for further information.

Test Equipment

The test equipment listed in Table 5–1 is required for a complete performance check and adjustment of the instrument. However, complete checking or adjustment may not always be necessary or desirable. You may be satisfied with checking only selected characteristics, thereby reducing the amount of test equipment actually required.

The specifications for test equipment listed in Table 5–1 are the minimum required to check performance requirements of the 371B. Detailed operating instructions for test equipment are not given in these procedures; refer to the test equipment instruction manual if more information is needed.

Table 5-1: Test Equipment

Item	Minimum Specification	Purpose	Example of Applicable Test Equipment
Test Oscilloscope	Bandwidth, DC to 150 MHz; deflection factor, 2 mV to 5 V/div (with 1X probe)	Used to check ripple, noise, and pulse shape.	a. Refer to Tektronix Products catalog for compatible equipment. (e.g. TDS3032B)
DC Voltage Source	Voltage range: 0 mV to 1000 V; Accuracy: 0.1 mV; Resolution: 0.1 mV	Supplies a reference voltage to the 371B.	Fluke 5101B
DC Current Source	Current range: 0 μ A to 1.999 A; Accuracy: 0.1 %; Resolution: 0.1 μ V	Supplies a reference current to the 371B.	Fluke 5101B
Digital Multimeter	4.5 digit DCV: 1000 V, Accuracy: 0.05 %; Resolution: 0.1 mV; Input imp: >10 M Ω) DCA: 2 A; Accuracy: 0.1 % Resolution: 0.1 nA OHM: 2 k Ω ; Accuracy: 0.05 %; Resolution; 0.1 Ω	Used throughout the checks and adjustments to measure voltage, current and resistance.	a. Fluke 8505A and Tektronix DM501A (for 2 A measurement only) b. Keithley 195A W/OP 1950
Tool, Alignment	Screwdriver tips for electronics use.	Used to perform internal adjustments.	Tektronix Part No. 003-0489-00
Calibration Fixture		Used in many procedures.	Tektronix Part No. 067-1345-00
Screw Driver	POZIDRIV; length: 8.5 inch Point size #1, #2	Used in many procedures.	Tektronix Part No. 003-0293-00
Patch Cord	Banana Plug-Jack to Banana Plug-Jack	Used in many procedures.	Tektronix Part No. 012-1371-00
High Voltage Probe	Voltage range: 0 – 3 kV (DC, AC); Accuracy: \pm 1 %	Used to examine –2400 V	Fluke 80K–6

Table 5-1: Test Equipment (Cont.)

Item	Minimum Specification	Purpose	Example of Applicable Test Equipment
Test Lead		Used in many procedures.	Tektronix Part No. 198-5625-00 (included with Calibration Fixture)
Transistor	2SC2527G (To220) or 2N3055H (TO3)	Used as DUT for acquisition of curve data.	Tektronix Part No. 015-0701-00 or 151-0336-00
Printer		Used to check the printer interface	CBM, model iDP3240
Controller	GPIB Support	Used to check the GPIB	Hewlett-Packard 9836A
Floppy Disk	3.5 inch, 2HD	Used to store displayed curve data and instrument settings.	
Test Adapter		Used to hold the DUT.	Tektronix A1002 or A1003

Test Equipment Alternatives

The checks and adjustment procedures are based on the first item of equipment given as an example. When other equipment is substituted, control settings or setups may have to be altered. If the exact item of equipment given as an example in Table 5-3 is not available, first check the Minimum Specifications column carefully to see if any other equipment might suffice. Then check the Purpose column to see where this item is used. If used for a performance check or adjustment that is of little or no importance for your measurement requirements, the item and corresponding procedure(s) can be deleted.

Special Fixtures

Special fixtures are used to facilitate instrument adjustment. These fixtures are available from Tektronix, Inc. Order by part number from Tektronix field representatives.

Performance Check and Adjustment Alternative

When you perform the complete set of performance check and adjustment procedures provided in this chapter, the 371B is thoroughly checked and adjusted to meet performance characteristics. Tektronix recommends that the complete set of checks and adjustments be performed after 2,000 hours of operation or at least once a year.

It is not necessary to perform all the checks and adjustments whenever you make a minor repair or whenever a specific area of 371B performance is questioned. The performance check and adjustment procedures are designed to check a specific electrical specification or to perform a specific adjustment. Thus, in most cases, you need to perform only those performance check and adjustment tasks required based on the level of repair made or the scope of electrical specification(s) in question. Carefully read Table 5–2 to select the appropriate procedure alternative.

Table 5–2: Performance Check and Adjustment Alternatives

Task	Procedure Options
Performance Check (Checking key electrical specifications)	<p>Perform the “371B Setup and Initialization” procedure provided later in this chapter.</p> <p>Perform those procedures identified by the word “Checking” in the procedure title.</p> <p>NOTE: If a “Checking” procedure also contains the word “Adjusting” in the title description, ignore those parts of the procedure with adjustment instructions.</p>
Adjustment	<p>Perform the “Initialization” procedure provided later in this chapter.</p> <p>Perform only those procedures identified by the word “Adjusting” in the procedure title (see the Procedure Index at the beginning of the performance check and adjustment procedures).</p> <p>NOTE: Perform all steps of these adjustment procedures. Most adjustments are preceded by instructions for determining whether the adjustment is necessary and are followed by instructions for verifying that the adjustment was correctly performed.</p>
Performance Check and Adjustment	<p>Perform the “Initialization” procedure provided later in this chapter</p> <p>Perform all procedures identified by the words “Checking” or “Adjusting” in the procedure title.</p> <p>NOTE: Steps for “Examining” characteristics only (i.e., those with no “Checking” or “adjusting” instructions included) are not necessary for checking specifications or making adjustments.</p>
Partial Performance Check or Adjustment	<p>Perform the “Initialization” procedure provided later in this chapter.</p> <p>Perform the desired procedures (e.g., A1, B3, etc.) using the EQUIPMENT SETUP information at the beginning of each procedure.</p> <p>NOTE: Although a partial adjustment can be performed, we recommend that the entire subsection (e.g., A Power Supply, D. Step Generator, etc.) be performed if any adjustments are made.</p>

Table 5-2: Performance Check and Adjustment Alternatives (Cont.)

Task	Procedure Options
Functional Check of Front Panel Controls and Connectors	Perform the “First-Time Operating Exercises” in Section 3 of the 371B User manual. Perform the “User-Initiated Push Button Diagnostic Routine” in Chapter 3: Maintenance. Complete Functional Check.
Complete Functional Check	Perform the “Initialization” procedure provided later in this chapter Perform only those procedures identified by the words “Checking” or “Adjusting” in the procedure title. <i>NOTE: If a “Checking” or an “Examining” procedure also contains the word “Adjusting” in the procedure title, ignore those parts of the procedure with adjustment instructions.</i>

Performance Check Summary

Table 5-3 lists key characteristics checked in this chapter and the order in which they are checked. Also listed are procedures containing adjustment instructions which may affect the performance of a specified characteristic. The specifications for characteristics listed in Table 5-3 are given at the beginning of the procedure in which they are checked.

Table 5-3: Performance Check Summary

Characteristic	Examined	Checked	Adjusted
POWER SUPPLY			
Reference Voltage		A2, A3	A2, A3
Deviation	A1		
Ripple	A4		
PLL	A4		
Cathode Supply	A5		
Display			
Offset	B1		
Bias	B2		B2
Astigmatism	B3		B3
Intensity	B4, B5, B6		
Accuracy			B7
Orthogonality and Geometry		B8	B8
Position and Size		B8	B8
Looping			B9

Table 5-3: Performance Check Summary (Cont.)

Characteristic	Examined	Checked	Adjusted
Measurement Accuracy			
Horizontal Balance			C1
Vertical Balance			C2
Step Generator Voltage Measurement		C3	
Collector Low Voltage Measurement		C4	
Collector High Voltage Measurement		C5	
Collector Current Voltage Measurement in High Voltage Mode		C6	
Collector Current Voltage Measurement in High Current Mode		C7	
Step Generator			
Multi .1X Balance and Offset			D1
Voltage Balance			D2
Gain (Voltage)			D3
Current Zero and Balance			D4
Gain (Current)			D5
Rate and Pulse Form		D6	
Ripple and Noise (Voltage)		D7	
Incremental Accuracy		D8	
Amplitude Accuracy (Voltage)		D9	
Maximum Voltage		D10	
Offset Accuracy		D11	
Short Circuit Limit		D12	
Amplitude Accuracy (Current)		D13, D15	
Maximum Current		D14, D16	
Maximum Voltage in Current Mode		D17	
Ripple and Noise		D18	
Collector Supply			
Calibrator Voltage			E1
Gain			E2
Pulse Form		E3	
Minimum Current		E4	
Maximum Voltage		E5	

Table 5-3: Performance Check Summary (Cont.)

Characteristic	Examined	Checked	Adjusted
Test Fixture			
Sense lead Resistance		F1	
Continuity		F2	

371B Setup and Initialization

Perform the following to setup and initialize the 371B before making any performance checks or adjustments.

Setup

1. Check that the 371B is set for the proper power source and that a suitable power cord has been attached.
2. Remove the 371B cabinet panels to gain access to internal adjustments and test points.

For instructions on cabinet panel removal, refer to the description under the heading “Component Removal and Replacement” in Chapter 4: Maintenance of this manual.



WARNING. Use extreme care when operating the 371B with the covers removed, due to the line voltage, high-voltage, and high-current levels present.

3. Connect the 371B to a suitable power source.
4. Press the **POWER** button and allow at least 20 minutes warm-up before proceeding.

Initializing

During the power-up process, the 371B sets front panel controls to initial (default) settings. At the beginning of most procedures, you will be instructed to “initialize the 371B.” This means that you are to have first saved the power up settings in memory before you can “recall” them in order to initialize the 371B. Perform the following procedure to save the power-up default settings.

1. Press the setup **SAVE** button to store the default settings in memory location 1.
2. Check that the SAVE COMPLETE message is displayed.

These default settings together with the manual initialization settings are used as the initial control settings throughout the procedure, except as noted otherwise.

With the power up settings in memory, you can initialize the 371B, as instructed, by performing the following:

1. Press the setup **RECALL** button (with the memory location set to location 1).
2. Check that the SET 1 message is displayed.

DISPLAY	
Mode	STORE
VERTICAL	1 A/DIV
HORIZONTAL	1 V/DIV
INVERT	Off
STEP GENERATOR	
SOURCE	CURRENT
NUMBER OF STEPS	2
OFFSET	0.00 mA
STEP MULTI .1X	Off
STEP AMPLITUDE	50 nA
INVERT	Off
COLLECTOR SUPPLY	
VARIABLE	0.0%
PEAK POWER WATTS	300 W
POLARITY	NPN+
MEASUREMENT	REPEAT
CURSOR	OFF
MEMORY	
INDEX NUMBER	1

Performance Check and Adjustment Procedures

Information in the remainder of this chapter is organized as follows:

- Organization of the performance check and adjustment procedures
- Procedure index
- Procedures

Organization of the Performance Check and Adjustment Procedures

The following describes how the performance check and adjustment procedures are organized.

Procedure Index. The “Procedure Index” lists all procedures included in each subsection. The beginning page number is given for each procedure for easy location if you intend to perform only a selected procedure or part of a procedure.

Subsection Headings. The procedures are organized according to major circuit function. For example: A. Power Supply, B. Display, etc.

Procedure Titles. The title of each procedure begins with Checking, Adjusting, Examining, or a combination of these words.

- “Checking” indicates that an electrical characteristic is checked.
- “Adjusting” indicates that instructions are given to make one or more internal adjustments.
- “Examining” indicates that a functional check of the circuit is performed and that no electrical specifications are checked.

371B.Setup and Initialization Each procedure has an “Equipment Setup” illustration that shows pertinent 371B and test equipment connections and that provides initialization instructions and control settings.

NOTE. *You will be instructed to initialize the 371B at the beginning of most procedures to prevent the carry-over of inappropriate setup conditions from previous procedures. Initialization also allows you to perform each procedure independently when only selected parts of the procedure are performed.*

When a procedure instructs you to “initialize the 371B,” perform the initializing instructions under “371B Setup and Initializing” provided earlier in this chapter.

Parts of Procedure. Each procedure is composed of sequentially-numbered steps. Functional headings, such as “Examining CRT Bias” and “Adjusting CRT Bias” are provided to help identify steps associated with a specific task.

Power Supply

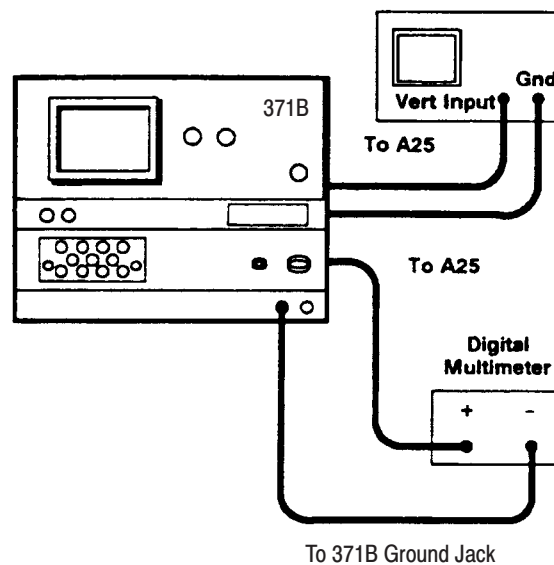
Equipment Required (see Table 5–3):

- Digital Multimeter
- Test Oscilloscope
- High Voltage Probe

A1. Examining Voltage Deviation and Ripple

NOTE. The characteristics examined in this step are examples of typical instrument operation; they are not specifications.

Equipment Setup:



371B Settings:

Initialize the 371B

Test Equipment Settings:

DIGITAL MULTIMETER

Mode

DC Voltage

TEST OSCILLOSCOPE

VERTICAL

20 mV/Div

TIME

5 ms/Div

TRIGGER

AUTO

NOTE. See “Test Point and Adjustment Locations Pullout 3” in Chapter 8 for the location of test points for this step.

Examining Voltage Deviation.

1. Connect the digital multimeter to the +5 V test point on the A25 Main Power Supply board.
2. EXAMINE the digital multiplier reading at the +5 V test point and each of the other power supply test points listed in Table 5–4 for voltage levels within the given deviation.

Examining Ripple.

3. Disconnect the digital multimeter and connect the test oscilloscope to the +5 V test point.
4. EXAMINE the test oscilloscope display at each of the test points listed in Table 5–4 for the ripple displays within the given deviation.

Removing the Setup.

5. Disconnect the test oscilloscope.

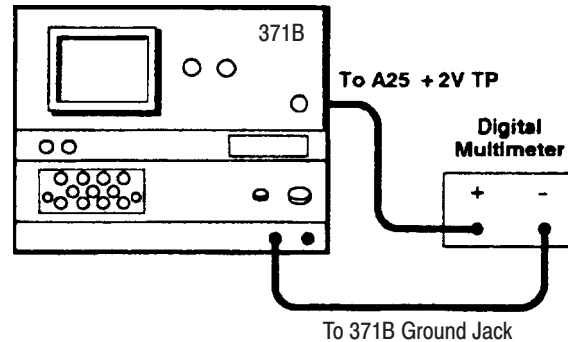
Table 5-4: Voltage Regulation and Ripple

Voltage	Test Point	Deviation Limits (V)	Ripple (mV)
+5.2 V	+5	+4.992 to +5.408	≤ 200
-12 V	-12	-11.4 to -12.6	≤ 100
+12 V	+12	+11.4 to +12.6	≤ 100
-6.5 V	-6.5	-6.37 to -6.67	≤ 50
+6.5 V	+6.5	+6.37 to +6.67	≤ 50

A2. Checking the +2 V Reference Adjusting the +2 V Reference (A25R500)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

Test Equipment Settings:

DIGITAL MULTIMETER

Mode

DC Voltage

NOTE. See “Test Point and Adjustment Locations Pullout 3” in Chapter 8 for the location of test points for this step.

Checking the +2 V Reference.

1. CHECK for digital multimeter reading of +1.999 V to +2.001 V. If not within these limits, the following adjustment is necessary.

Adjusting the +2 V Reference.

2. ADJUST R500 (+2ADJ) on the A25 Main Power Supply board, for a digital multimeter reading of +2.000 V.

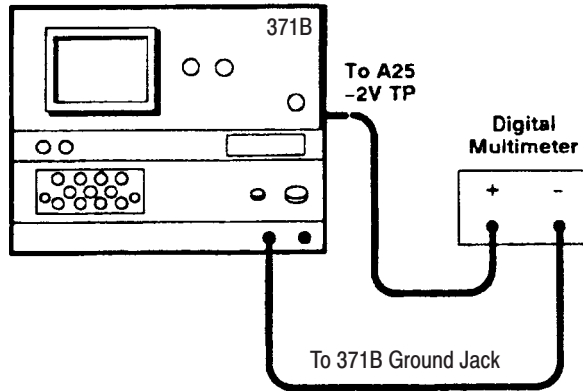
Removing the Setup.

3. Disconnect the positive lead of the digital multimeter from the test point.

**A3. Checking the -2 V Reference
Adjusting the -2 V Reference (A25R516)**

NOTE. *The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.*

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

Test Equipment Settings:

DIGITAL MULTIMETER

Mode

DC Voltage

NOTE. See “Test Point and Adjustment Locations Pullout 3” in Chapter 8 for the location of test points for this step.

Checking the -2 V Reference.

1. CHECK for digital multimeter reading of -1.999 V to -2.001 V. If not within these limits, perform Step 2.

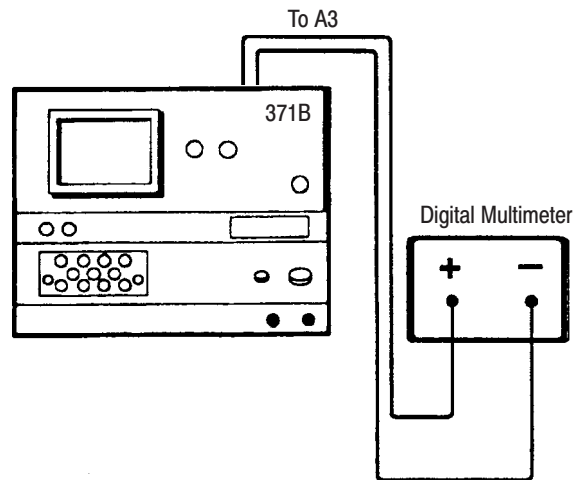
Adjusting the -2 V Reference.

2. ADJUST R51 6 (-2 V ADJ) on the A25 Main Power Supply board, for a digital multimeter reading of -2.000 V.

Removing the Setup.

3. Disconnect the digital multimeter leads from the 371B.

A4. Adjusting PLL



371B Settings:

Initialize the 371B

Test Equipment Settings:

DIGITAL MULTIMETER

Mode

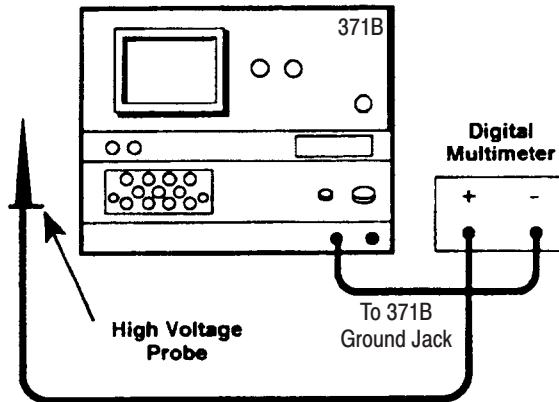
DC Voltage

1. Connect the Digital Multimeter test leads to A-GND test point and 9 pin of U110.
2. In case that the frequency of line power supply is 50 Hz, adjust R118 PLL FREQ-1 adjustment on the A3 A/D board for a digital multimeter readout of 2.0 ± 0.1 V.
3. In case that the frequency of line power supply is 60 Hz, adjust R104 PLL FREQ-1 adjustment on the A3 A/D board for a digital multimeter readout of 3.0 ± 0.1 V.
4. Connect the Digital Multimeter test leads to A-GND test point and 9 pin of U310.
5. In case that the frequency of line power supply is 50 Hz, adjust R318 PLL FREQ-2 adjustment on the A3 A/D board for a digital multimeter readout of 2.0 ± 0.1 V.
6. In case that the frequency of line power supply is 60 Hz, adjust R104 PLL FREQ-2 adjustment on the A3 A/D board for a digital multimeter readout of 3.0 ± 0.1 V.

A5. Examining the -2400 V Cathode Supply

The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

POWER	OFF
INTENSITY	
NONSTORE/STORE/VIEW	Fully counterclockwise

NOTE. See “Test Point and Adjustment Locations Pullout 3” in Chapter 8 for the location of test points for this step.

Removing the High Voltage Shield.



WARNING. To avoid electric shock hazard, be certain the 371B POWER switch is set to OFF before removing or replacing the high-voltage shield and connecting the digital multimeter to the 371B. Be certain that the digital multimeter ground lead is connected to the 371B ground terminal.

1. Use a #1 POZIDRIV screwdriver to remove the high-voltage shield from the left side of the 371B. There are three shields on the left side; remove the center shield.

Display

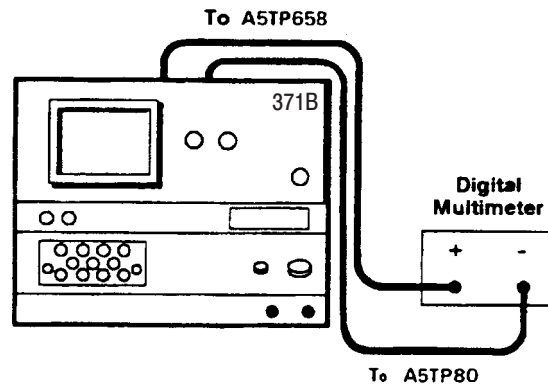
Equipment Required (see Table 5–3):

- Digital Multimeter

B1. Examining Calibrator Voltage

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

Test Equipment Settings:

DIGITAL MULTIMETER

Mode

DC Voltage

NOTE. See “Test Point and Adjustment Locations Pullout 1” in Chapter 8 for the location of test points for this step.

Examining Horizontal CAL ZERO.

1. Change the following 371B setting:

DISPLAY Mode

CAL ZERO

Cal zero mode is initiated by pressing the **VIEW** button while holding down the **SHIFT** button.

2. EXAMINE the digital multimeter for reading between -0.995 and -1.005 V.

Examining Horizontal CAL FULL.

3. Change the following 371B setting:

DISPLAY	
Mode	CAL FULL

Cal full mode is initiated by pressing the **STORE** button while holding down the **SHIFT** button.

4. EXAMINE the digital multimeter for reading between $+0.995$ V and $+1.005$ V.
5. Disconnect the digital multimeter positive lead from TP658.

Examining Vertical CAL FULL.

6. Connect the digital multimeter positive lead to TP648 of the A5 Display Control board.
7. EXAMINE the digital multimeter for reading between $+0.995$ V and $+1.005$ V.

Examining Vertical CAL ZERO.

8. Change the following 371B setting:

DISPLAY	
Mode	CAL ZERO

9. EXAMINE the digital multimeter for reading between -0.995 V and -1.005 V.

Removing the Setup.

10. Change the following 371B setting:

DISPLAY	
Mode	CAL OFF

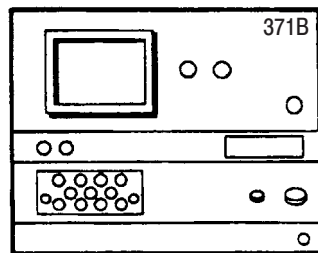
Cal off mode is initiated by pressing the REF button while holding down the SHIFT button.

11. Disconnect the digital multimeter from TP648 and TP80.

B2. Examining CRT Bias Adjusting CRT Bias (A20R210)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation to aid in the adjustment of R210; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

POWER	OFF
INTENSITY	
NONSTORE/STORE/VIEW	Fully counterclockwise
REF	Fully counterclockwise
READOUT Cursor	Fully counterclockwise
GRAT ILLUM	Fully counterclockwise

1. While pressing the cursor **SHIFT** button, set the 371B **POWER** switch to ON. This displays the frame test pattern on the CRT.

Examining CRT Bias.

2. EXAMINE the CRT for the center spot to be barely visible. If the spot is bright or not visible at all, the following adjustment may be necessary.

Adjusting CRT Bias.

NOTE. *R210 can be adjusted through the access hole in the high voltage shield.*

3. ADJUST GRID BIAS adjustment R210 on the A20 H.V. Regulator board until the CRT spot is barely visible.

Removing the Setup.

4. Change the following 371B settings:

INTENSITY

NON STORE/STORE/VIEW	Optimum intensity
READOUT/CURSOR	Optimum intensity

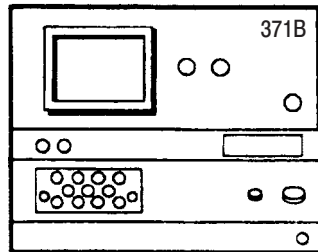
NOTE. *The frame test pattern is also used in procedure B3 (“Examining and Adjusting Astigmatism”). Proceed to Step 5 only if procedure B3 will not be performed.*

5. Press the Cursor **SHIFT** button to remove the test pattern.

B3. Examining Astigmatism Adjusting Astig (A18R420)

NOTE. The characteristics examined in this procedure are provided as examples of typical instrument operation to aid in the adjustment of R420; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

POWER	OFF
FOCUS	Fully counterclockwise

1. While pressing the cursor **SHIFT** button, set the 371B **POWER** switch to ON. This displays the Frame Test Pattern on the CRT.

Examining Astigmatism.

2. Change the following 371B settings:

INTENSITY

NON STORE/STORE/VIEW	Largest possible displayed center spot
----------------------	--

READOUT/CURSOR	Fully counterclockwise
----------------	------------------------

3. EXAMINE the center spot for a circular shape.

If the center spot is not circular, the following adjustment may be necessary.

Adjusting Astigmatism.

NOTE. See “Test Point Adjustment Location Pullout 2” in Chapter 8 for the location of the adjustment associated with this step.

4. ADJUST ASTIG adjustment R420 on the A18 CRT Output board for a circular spot shape.
5. Change the following 371B settings:

FOCUS	Clockwise for smallest possible spot
INTENSITY	
NON STORE/STORE/VIEW	Normal Viewing
READOUT/CURSOR	Normal Viewing

6. EXAMINE the CRT for the frame test pattern to be similarly in focused.
If the frame test pattern is not similarly focusing, the following adjustment may be necessary.
7. READJUST ASTIG adjustment R420 on the A18 CRT Output board for a slight compromise between the center dot and the outer frame.

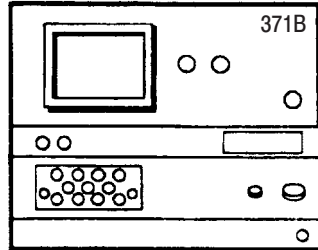
Removing the Setup.

8. Press the cursor **SHIFT** key to remove the frame test pattern.

B4. Examining NON STORE/STORE/VIEW Intensity Operation

NOTE. *The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.*

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

Examining STORE.

1. CHECK that the STORE LED is lit.
2. EXAMINE the CRT for a continuous increase in spot brightness when the **NON STORE/STORE/VIEW INTENSITY** control is turned from full counterclockwise to full clockwise.

Examining VIEW.

3. Press the **ENTER** button to store the displayed trace (spot) in memory location 1.
4. EXAMINE the display for ENTER COMPLETE message.
5. Change the following 371B setting:

DISPLAY	
Mode	VIEW

6. CHECK that the VIEW LED is lit.
7. EXAMINE the CRT for continuous increase in brightness of the viewed trace (spot) as the **NON STORE/STORE/VIEW INTENSITY** control is turned from full counterclockwise to full clockwise.

Examining NON STORE.

8. Change the following 371B setting:

DISPLAY	
Mode	NON STORE

9. CHECK that the NON STORE LED is lit

10. EXAMINE the CRT for a continuous increase in spot brightness as the **NON STORE/STORE/VIEW INTENSITY** control is turned from fully counterclockwise to fully clockwise.

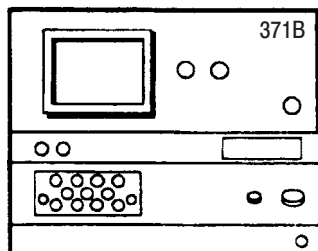
11. Change the following 371B settings:

INTENSITY	
NON STORE/STORE/VIEW	Normal Viewing Level
DISPLAY	
Mode	STORE

B5. Examining REF Intensity Operation

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

1. Press the **REF** button.
2. CHECK that the REF LED is lit.
3. Change the following 371B setting:

DISPLAY	
INVERT	ON

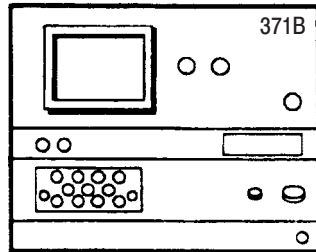
4. EXAMINE the CRT for a continuous increase in brightness of the trace (spot) as the **REF INTENSITY** control is turned from full counterclockwise to full clockwise:
5. Change the following 371B settings:

INTENSITY	
REF	Normal Viewing Level
DISPLAY	
REF	OFF

B6. Examining READOUT/CURSOR INTENSITY Operation

NOTE. The characteristics examined in this procedure are examples of typical operation, they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

CURSOR

Mode

WINDOW

1. Examine the display for a continuous increase in readout and brightness as the **READOUT/CURSOR INTENSITY** control is turned from full counterclockwise to full clockwise.
2. Change the following 371B settings:

INTENSITY

READOUT/CURSOR

Normal Viewing Level

CURSOR

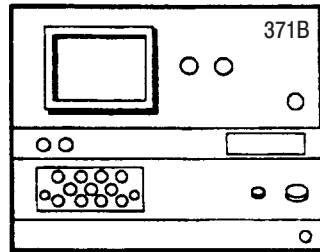
Mode

OFF

B7. Adjusting V ZERO and H ZERO (A3R614 and A3R604) Adjusting Store Gain (A3R622)

NOTE. The characteristics examined in this procedure are provided as examples of typical instrument operation to aid in the adjustment of R604 and R614; they are not specification.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

CURSOR

Mode DOT

DISPLAY

Mode CAL ZERO

NOTE. CAL ZERO is initiated by pressing the VIEW button while holding down the cursor SHIFT button.

Determining if Adjustment is Necessary.

1. EXAMINE the vertical CURSOR readout for a reading that does not exceed ± 0.02 A and the horizontal CURSOR readout for a reading that does not exceed ± 0.02 V.

If the CURSOR readouts are not within these limits, the following adjustment is necessary.

Adjusting H Zero and V Zero.

NOTE. See “Test Point Adjustment Locations Pullout 1” in Chapter 8 for the location of adjustments in the following steps.

2. ADJUST H ZERO adjustment R604 and V Zero adjustment R614 on the A3 A/D board for a CURSOR readout of 0.00 for Vertical and 0.00 for horizontal.
3. Change the following 371B setting:

DISPLAY	
INVERT	ON

4. CHECK that the INVERT LED is lit, and that the displayed spot moved from the lower left to the upper right corner of the CRT.
5. Repeat Steps 1 and 2.
6. Change the following 371B settings:

DISPLAY	
INVERT	OFF
Mode	CAL FULL

Cal full mode is initiated by pressing the **STORE** button while holding the cursor **SHIFT** button.

Examining Cal Full.

7. EXAMINE the 371B for the following:
 - The vertical CURSOR readout is between 9.98 A and 10.02 A.
 - The horizontal CURSOR readout is between 9.98 V and 10.02 V.
8. Change the following 371B setting:

INVERT	ON
--------	----

The indicator above the INVERT button will be lit.

9. Repeat Step 7.
10. Change the following 371B setting:

DISPLAY	
INVERT	OFF

Returning to Cal Off Mode.

11. If the cal zero mode and cal full mode readouts are within the given limits, proceed to Step 13. If they are not within the limits, the following adjustments are necessary.

Adjusting Store Gain.

NOTE. See “Test Point Adjustment Locations 1 in Chapter 8” for the location of adjustments performed in this procedure.

12. ADJUST STORE GAIN adjustment R622 on the A3 A/D board so that the difference in vertical CURSOR readouts is 10.00 A between the cal zero and cal full modes.

Example: Cal Zero -0.05 A, Cal Full 9.95 A, difference equals 10.00 A.

13. Press the **REF** button while pressing the cursor **SHIFT** button.

This initiates cal off mode.

B8. Checking Orthogonality and Geometry Examining Store Position, Non Store Gain, and D/A Gain

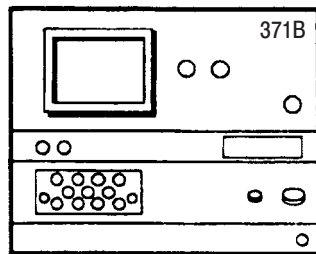
Adjusting SX Position (A5R508, SY Position (A5R528), D/A Gain (A4R842), X-Gain (A5R554), Y-Gain (A5R574), Orthogonality (A5R80), Geom (A18R410)

Specifications:

- Orthogonality is $90^\circ \pm 0.5$ minor division.
- Geometry includes two categories: (1) tilt or bowing is no more than 0.5 minor division; (2) keystone effect is no more than 0.75 minor division.

NOTE. Characteristics in EXAMINE steps are provided as examples of typical instrument operation to aid in adjustment; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

POWER

OFF

NOTE. See “Test Point and Adjustment Location Pullouts 1 and 2” in Chapter 8 for the location of adjustments associated with this procedure.

Initiating the Test Pattern.

1. While pressing the cursor **SHIFT** button, set the 371B POWER switch to ON.

This initiates the diagnostic routine. The logo first appears, followed by the display test pattern shown in Figure 5–1.

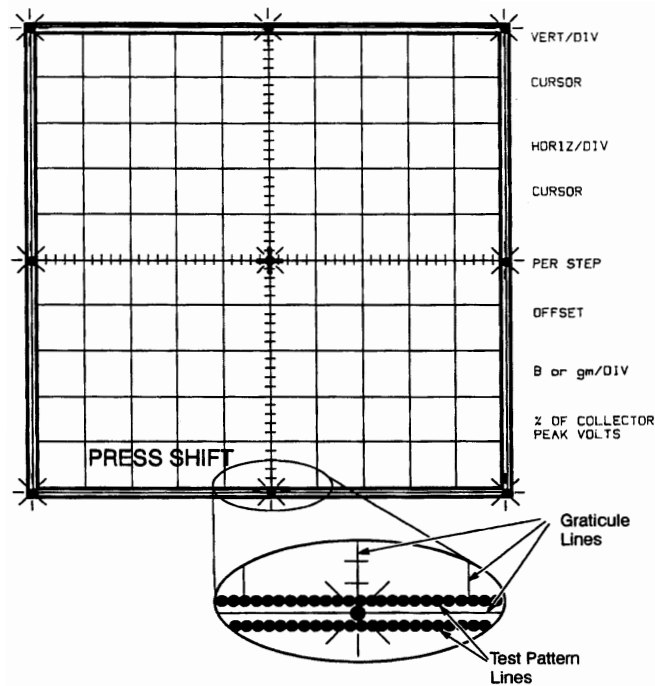


Figure 5-1: Diagnostic test pattern display

The test pattern consists of a frame test pattern overlaid over a dot test pattern.

2. Turn the **GRAT ILLUM** control fully clockwise for the maximum brightness.
3. Set the frame test pattern to the same intensity as the graticule using the **READOUT/CURSOR INTENSITY** control and set the dot test pattern slightly brighter using the intensity **NON STORE/STORE/VIEW INTENSITY** control.

Examining Store Position.

4. **EXAMINE** the display to determine whether the center cross mark of the frame test pattern aligns with the center dot of the dot test pattern.

If the pattern centers do not align, the following adjustments are necessary.

Adjusting SY POSITION and SX POSITION. The SX and SY POSITION controls change the frame test pattern position without changing the dot test pattern position.

5. ADJUST SY POSITION adjustment R528 and SX POSITION adjustment R508 on the A5 Display Control board so that the center cross mark of the frame test pattern conforms to the center dot of the dot pattern (not the center of the graticule).

Examining and Adjusting DIA Gain.

6. EXAMINE the display to determine whether the outer eight dots of the dot pattern are located between the inner frame and outer frame of the frame test pattern.

If the location is not correct, the following adjustment is necessary.

7. ADJUST D/A GAIN adjustment R842 on the A4 Digital Display board to position the outer eight dots between the inner frame and outer frame of the frame test pattern.

D/A Gain adjusts the size of the frame test pattern without changing the dot test pattern size.

Checking and Adjusting the Display. The dot frame test patterns are visual aids for display alignment. Positioning, straightening and sizing of the display involves several adjustments. Three of these adjustments, GEOMETRY, TRACE ROTATION, and ORTHOGONALITY, are interactive.

- GEOMETRY adjusts the curvature of the sides, top and bottom of the test pattern.
- TRACE ROTATION tilts the test pattern about a pivot point approximately 2.5 divisions from the right side of the graticule on the horizontal line.
- ORTHOGONALITY changes the test pattern shape from the rhombus to rectangular.
- X-GAIN and Y-GAIN change the test pattern from rectangular to square.
- Front-panel POSITION controls change the position of the whole display.

Checking Orthogonality.

8. Change the following 371B settings:

POSITION

Vertical and Horizontal

Position the center dot to graticule center.

TRACE ROTATION

Position the three intermediate horizontal dots on the center horizontal graticule line.

9. CHECK that the three intermediate vertical dots conform to the center vertical graticule line within 0.5 minor division.

If the dots do not conform, the following adjustment is necessary.

Adjusting Orthogonality.

10. ADJUST ORTHOGONALITY adjustment R80 on the A5 Display Control board so that the three intermediate vertical dots conform to the center vertical graticule line.

Examining Non-Store Gain.

11. EXAMINE the display to determine if the outer eight dots of the test pattern are positioned within the inner and outer frame patterns.

If the positioning is not correct, the following adjustment is necessary.

Adjusting X-Gain and Y-Gain.

12. ADJUST X-GAIN adjustment R554 and Y-GAIN adjustment R574 on the A5 Display Control board to position the outer eight dots of the dot pattern within the inner and outer frame patterns.

Checking and Adjusting Geometry.

13. Change the following 371B settings:

POSITION

Vertical and Horizontal

Position the center dot pattern at graticule center.

14. CHECK the frame test pattern for ≤ 0.5 minor division of bowing and ≤ 0.75 minor division of keystone effect.

If the bowing and keystone effect are not within these limits, the following adjustment may be necessary.

15. ADJUST GEOMETRY adjustment R410 on the A18 CRT Output board (if necessary) for minimum display bowing.

Examining the Display for Adjustment Interaction.

16. EXAMINE the display for the graticule periphery to be between the outer frame and inner frame of the frame test pattern, within 0.5 minor division.

If not, repeat Steps 9 through 13.

17. EXAMINE the display for the center dot to be at graticule center, within 0.5 minor division.

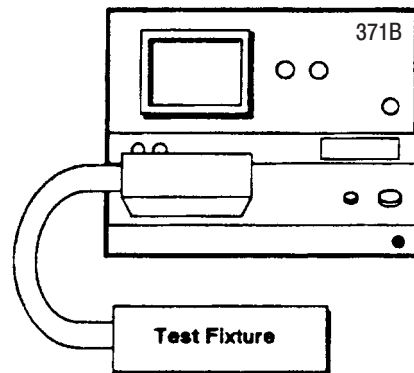
Removing the Test Pattern.

18. Press the cursor **SHIFT** button to exit the diagnostic routine.

**B9. Adjusting Tangent
Zero (A10R462), Looping
Balance (A10R422),
Looping Zero (A10R413)**

NOTE. The characteristics in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.

**371B Settings:**

Initialize the 371B, then set the following settings:

COLLECTOR SUPPLY

PEAK POWER WATTS	3 mW
HIGH VOLTAGE	ENABLED
VARIABLE	100%

DISPLAY

Mode	NON STORE
VERTICAL	1 μ A/DIV

371B Settings:

HORIZONTAL	500 V/DIV COLLECTOR
Protective Cover	CLOSED

1. Turn the **LOOPING COMPENSATION** control throughout its range.
2. CHECK that the looping passes through minimum curve separation.

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustments R462, R422, and R413.

3. ADJUST TAN ZERO adjustment R462 on the A10 Sense board to align the trace with the horizontal graticule line.
4. Change the following 371B setting:

COLLECTOR SUPPLY VARIABLE	0.0 %
LOOPING COMPENSATION	Fully clockwise

5. ADJUST LOOP BAL R422 on A10 Sense board so that spot conforms to the intersection on the left side and lower side of the graticule.
6. ADJUST LOOP ZERO R413 on A10 Sense board for minimum spot shift while turning front-panel **LOOPING COMPENSATION** control from one extreme to the other.
7. Change the following 371B setting:

COLLECTOR SUPPLY	
HIGH VOLTAGE	DISABLED

Measurement Accuracy

Equipment Required (see Table 5–3):

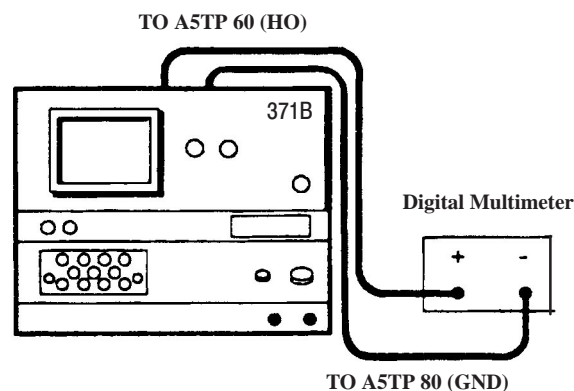
- Digital Multimeter
- DC Current Source
- DC Voltage Source
- Calibration Fixture (P/N: 067-1345-00)

C1. Adjusting Horizontal Balance (A5R655, R945, A10R276)

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting. (100 mV/DIV setting accuracy is 5.0 % of READOUT plus 20 mV.)

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

DISPLAY		
Horizontal		100 mV/DIV COLLECTOR
CURSOR		
Mode		DOT

Test Equipment Settings:

Mode		DC VOLTAGE
------	--	------------

Determining Whether Adjustment is Necessary.

1. EXAMINE the horizontal CURSOR readout for a reading within the limits given in Table 5-5 while setting the HORIZONTAL VOLTS/DIV switch and peak power watts selectors as indicated.

If within the given limits, no adjustment is necessary. Go on to the next procedure.

NOTE. When you want to set the PEAK POWER WATTS to 300 mW or 30 mW, simultaneously press the cursor **SHIFT** button and the **300 mW** or **30 mW** button. The indicator to the left of HIGH or LOW will change color from red to green.

Adjusting Horizontal Balance.

2. Change the following 371B settings:

DISPLAY
 Mode NON STORE
 COLLECTOR SUPPLY
 PEAK POWER WATTS 30 mW

Table 5-5: Horizontal Balance Limits

PEAK POWER WATTS Setting	HORIZONTAL (COLLECTOR) setting	HORIZONTAL CURSOR READOUT
3 kW or 300 W	100 mV/DIV	± 20 mV
	500 mV/DIV	± 50 mV
	1 V/DIV	± 0.10 V
	5 V/DIV	± 0.50 V
30 W or 3 W	50 V/DIV	± 5 V
	200 V/DIV	± 20 V
300 mW or 30 mW	10 V/DIV	± 1 V

NOTE. See “Test Point and Adjustment Location Pullouts 1 and 2” in Chapter 8 for the location of adjustment R655 and R276.

3. ADJUST +W.LVL R945 on the A5 Display Control board to minimize deviation from 100.0 mV for NPN mode and from -100.0 mV for PNP mode while switching COLLECTOR SUPPLY POLARITY.
4. Change the positive lead of digital multimeter from TP 60 (HO) to TP 658 (HD).
5. ADJUST X-MAG R655 on the A5 Display Control board to minimize the deviation from -1.000 V for NPN mode and from +1.000 V for PNP mode while switching COLLECTOR SUPPLY POLARITY.
6. ADJUST H BAL adjustment R276 on the A10 Sense board for minimum spot shift while setting HORIZONTAL VOLTS/DIV from 50 V/DIV COLLECTOR to 500 V/DIV COLLECTOR.

Rechecking After Adjustment.

7. Change the following 371B setting:

DISPLAY	
Mode	STORE

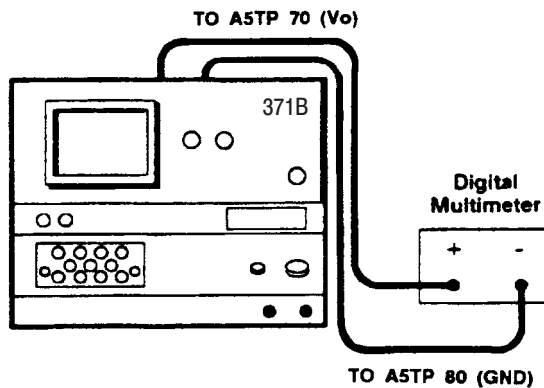
8. Repeat Step 1.

C2. Adjusting Vertical Balance (A5R645, R955, A10R146)

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of VERTICAL CURRENT/DIV setting.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY		
PEAK POWER WATTS		30 mW
DISPLAY		
VERTICAL		1 μ A/DIV
CURSOR		
Mode		DOT

Test Equipment Settings:

Mode		DC VOLTAGE
------	--	------------

NOTE. When you want to set the PEAK POWER WATTS to 300 mW or 30 mW, simultaneously press the cursor **SHIFT** button and the **300 mW** or **30 mW** button. The indicator to the left of **HIGH** or **LOW** will change color from red to green.

Determining Whether Adjustment is Necessary.

1. EXAMINE the vertical CURSOR readout for a reading within the limits in Table 5–6, while setting the VERTICAL CURRENT/DIV control and peak power watts selector as indicated.

If the CURSOR readout is within the given limits, go on to the next procedure.

Adjusting Vertical Balance.

NOTE. See “Test Point and Adjustment Location Pullouts 1 and 2” in Chapter 8 for the location of adjustment R645 and R146.

2. Change the following 371B settings:

DISPLAY	
Mode	NON STORE
COLLECTOR SUPPLY	
PEAK POWER WATTS	30 mW

3. ADJUST –W.LVL R955 on A5 Display Control board to minimize deviation from 100.0 mV for NPN mode and from –100 mV for PNP mode while switching COLLECTOR SUPPLY POLARITY.

Table 5-6: Vertical Zero Limits

PEAK POWER WATTS Setting	VERTICAL setting	VERTICAL CURSOR Readout (\pm)
30 mW	1 μ A/DIV	0.1 μ A
300 mW, 3 W	10 μ A/DIV	1.0 μ A
3 W	200 μ A/DIV	20 μ A
30 W	5 mA/DIV	0.50 mA
300 W	2 A/DIV	0.20 A

4. Change the positive lead of the digital multimeter from TP 70 (VO) to TP 648 (VD).
5. ADJUST Y-MAG R645 on the A5 Digital Control board to minimize the deviation from –1.00 V for NPN mode and from +1.000 V for PNP mode while switching COLLECTOR SUPPLY POLARITY.
6. Remove the voltmeter leads.
7. ADJUST V BAL adjustment R146 on the A10 Sense board for minimum spot shift while VERTICAL CURRENT/DIV is alternately set to 5 μ A/DIV and 10 μ A/DIV.

Rechecking After Adjustment.

8. Change the following 371B settings:

DISPLAY	
Mode	STORE
COLLECTOR SUPPLY	
PEAK POWER WATTS	30 mW

9. Repeat Step 1.

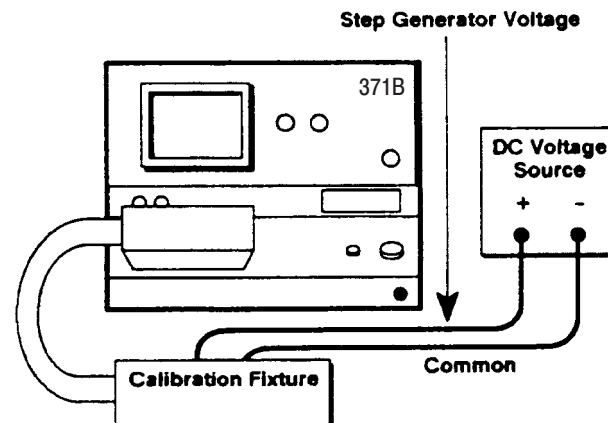
C3. Checking Step Generator (V_{BE}) Voltage Measurement Accuracy

Specifications:

- Cursor accuracy is less than 1.5% of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting. (100 mV/DIV setting accuracy is 5.0 % of READOUT plus 20 mV.)

Equipment Setup.

1. Turn off the 371B.
2. Remove the connector at J76 on the A7 Step Generator board.
3. Turn on the 371B and configure as shown in the setup illustration below.



371B Settings:

DISPLAY	
HORIZONTAL	200 mV/DIV STEP GEN
STEP GENERATOR	
SOURCE	VOLTAGE
CURSOR	
Mode	DOT
Protective Cover	OPEN

Test Equipment Settings:

VOLTAGE SOURCE	
Mode	DC VOLTAGE

NOTE. Leave the Protective Cover open until the end of this procedure.

4. Connect the voltage source between the COMMON and STEP GENERATOR VOLTAGE terminals using two long patch cords as shown in Figure 5-2.

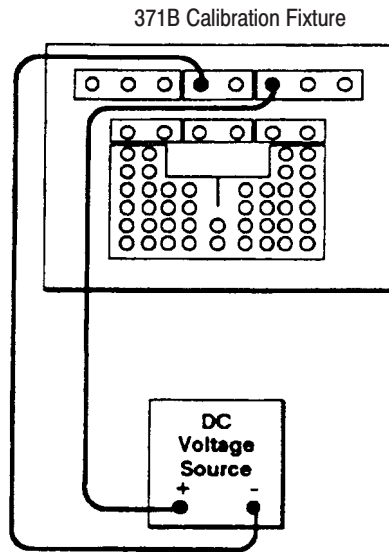


Figure 5-2: Setup for determining voltage measurement accuracy

5. Set the voltage source to 0 V.
6. CHECK that the horizontal CURSOR readout is within the limits shown in Table 5-7 for a voltage source of 0.000 V at each setting of HORIZONTAL VOLTS/DIV STEP GEN.
7. Set HORIZONTAL to 200 mV/DIV STEP GEN.
8. Repeat Step 6, this time setting the voltage source to the non zero – value shown in table 5-7 for each setting of HORIZONTAL VOLTS /DIV STEPGEN.
9. CHECK that the horizontal CURSOR readout is within the limits shown in table 5-7.

Table 5-7: Step Generator Voltage Measurement Accuracy

HORIZONTAL V/DIV STEP GEN Setting	VOLTAGE SOURCE Setting	HORIZONTAL CURSOR Readout
200 mV	0.000 V	± 20 mV
	1800 mV	1753 to 1847 mV
2 V	0.000 V	± 0.20 V
	18.00 V	17.53 to 18.47 V

10. Set the voltage source to 0 V output.
11. Disconnect the patch cords from the Calibration Fixture.

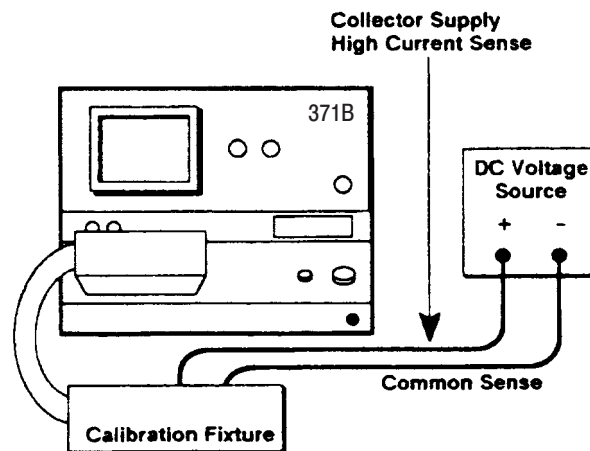
12. Set the 371B power switch to OFF.
13. Connect the connector at J76 on the A7 Step generator board.

C4. Checking Collector (V_{CE}) Low Voltage Measurement Accuracy

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting. (100 mV/DIV setting accuracy is 5.0 % of READOUT plus 20 mV.)

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

DISPLAY		
	HORIZONTAL	100 mV/DIV COLLECTOR
CURSOR		
	Mode	DOT
HIGH CURRENT		DISABLED
Protective Cover		OPEN

Test Equipment Settings:

VOLTAGE SOURCE		
	Mode	DC VOLTAGE

NOTE. Leave the protective cover open until the end of this procedure.

1. Connect the voltage source between the HIGH CURRENT SENSE terminal and the COMMON SENSE terminal by using two long patch cords as shown in Figure 5-3.
2. CHECK that the horizontal CURSOR readout is within the limits shown in Table 5-8 at each setting of HORIZONTAL VOLTS/DIV COLLECTOR with changing each Voltage setting.

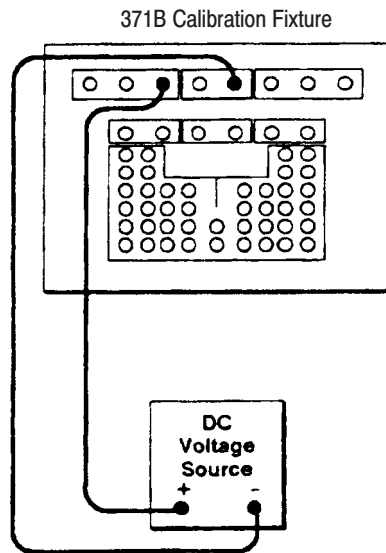


Figure 5-3: Setup for determining low voltage measurement accuracy

Table 5-8: Collector Low Voltage Measurement Accuracy

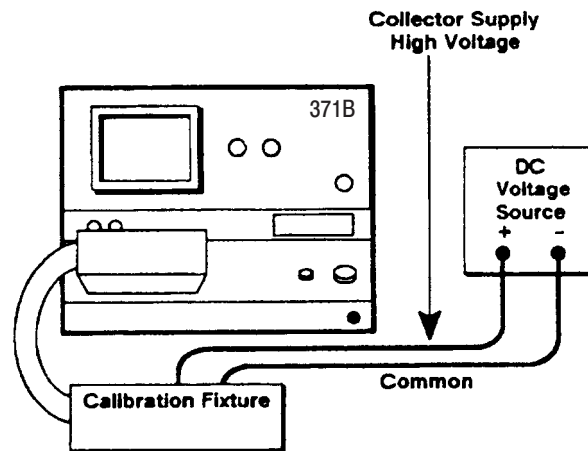
HORIZONTAL V/DIV STEP COLLECTOR Setting	VOLTAGE SOURCE Setting	HORIZONTAL CURSOR Readout
100 mV	0.9 V	835 mV to 965 mV
500 mV	4.5 V	4383 mV to 4617 mV
1 V	9 V	8.77 V to 9.23 V
5 V	45 V	43.83 V to 46.17 V

C5. Checking Collector (V_{CE}) High Voltage Measurement Accuracy

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 30 mW

DISPLAY

HORIZONTAL 10 mV/DIV COLLECTOR

CURSOR

Mode DOT

Test Equipment Settings:

VOLTAGE SOURCE

Mode DC VOLTAGE

NOTE. When you want to set the PEAK POWER WATTS to 30 mW, simultaneously press the cursor **SHIFT** button and the **30 mW** button. The indicator to the left of **LOW** will change color from red to green.

1. Connect the voltage source between the COLLECTOR SUPPLY HIGH VOLTAGE terminal and the COMMON terminal by using two long patch cords as shown in Figure 5-4.

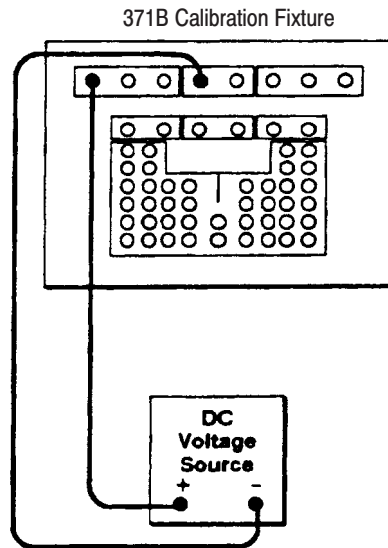


Figure 5-4: Setup for determining high voltage measurement accuracy

2. Set the voltage source to 0 V.
3. Set the **COLLECTOR SUPPLY HIGH VOLTAGE** breaker to **ENABLED**.
4. Close the protective cover.
5. CHECK that the horizontal CURSOR readout is within the limits shown in Table 5-9 for each setting of the peak power watts controls, HORIZONTAL VOLTS/DIV COLLECTOR and VOLTAGE SOURCE Setting.

6. Set the voltage source to 0 V.

Before disconnecting the voltage source, make sure that the voltage source has been set to 0 V or disabled.

7. Disconnect the voltage source from the Calibration Fixture.
8. Initialize the 371B.



CAUTION. Before disconnecting the voltage source, make sure that the voltage source has been set to 0 V or disabled.

Table 5-9: Collector High Voltage Measurement Accuracy

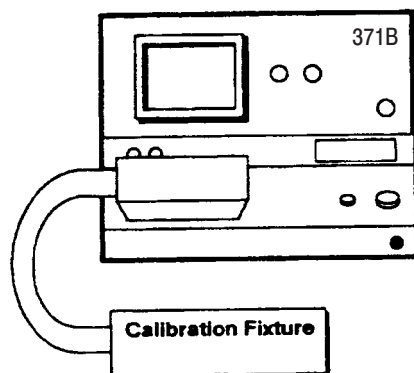
PEAK POWER WATTS Setting	HORIZONTAL VOLTS/DIV Setting	VOLTAGE SOURCE Setting	HORIZONTAL CURSOR Readout
30 mW	10 V/DIV	90 V	87.7 V to 92.3 V
3 W	50 V/DIV	450 V	438.3 V to 461.7 V

C6. Checking Collector Current Measurement Accuracy in High Voltage Mode

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 30 mW

DISPLAY

VERTICAL 1 μ A/DIV

CURSOR

Mode DOT

Test Equipment Settings:

VOLTAGE SOURCE

Mode DC VOLTAGE

NOTE. When you want to set the **PEAK POWER WATTS** to 30 mW, simultaneously press the cursor **SHIFT** button and the **30 mW** button. The indicator to the left of **LOW** will change color from red to green.

1. Press the **POLARITY** button while pressing the **SHIFT** button to enter vertical amplifier check mode.
2. Set the peak power watts controls to 20 mW and the **VERTICAL VOLTS/DIV** control to 1 μ A/DIV.
3. Connect the current source between the **COLLECTOR SUPPLY HIGH VOLTAGE** and the **COMMON** terminals on the Calibration Fixture by using two long patch cords as shown in Figure 5-5.

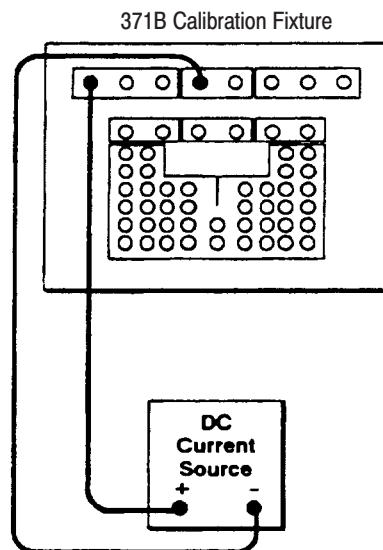


Figure 5-5: Calibration Fixture setup for checking collector current measurement accuracy in high voltage mode

4. Verify that vertical **CURSOR** readout is within the limit shown in Table 5-10 at each setting of the current source, peak power watts, and **VERTICAL CURRENT/DIV**.
5. Disable the current source, then disconnect the patch cords.
6. Initialize the 371B.

Table 5-10: Cursor Readout with Current

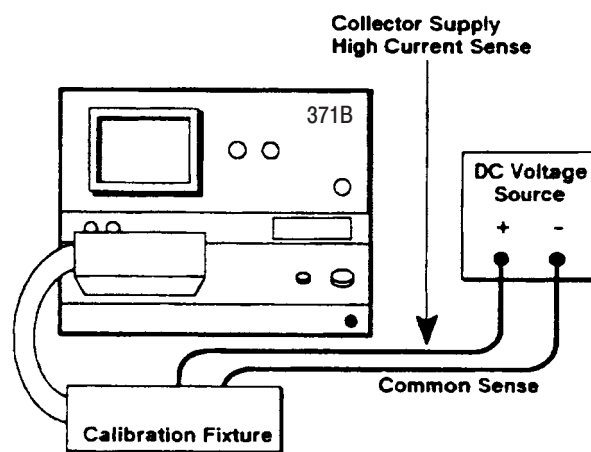
CURRENT SOURCE Setting	PEAK POWER WATTS Setting	VERTICAL CURRENT/DIV Setting	VERTICAL CURSOR Readout
-9.0 μA	30 mW	1 μA	8.77 μA to 9.23 μA
-90 μA	3 W	10 μA	87.7 μA to 92.3 μA
-1800 μA	3 W	200 μA	1753 μA to 1847 μA
-45.0 mA	30 W	5 mA	43.83 mA to 46.17 mA

C7. Checking Accuracy of Collector Current Measurement in High Current Mode

Specifications:

- Cursor accuracy is less than 1.5 % of READOUT plus 10 % of HORIZONTAL VOLTS/DIV setting.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

DISPLAY

VERTICAL 2 $\mu\text{A}/\text{DIV}$
HORIZONTAL 500 mV/DIV COLLECTOR

CURSOR

Mode DOT
Protective Cover OPEN

Test Equipment Settings:

VOLTAGE SOURCE

Mode DC VOLTAGE

NOTE. *The accuracy of the vertical CURSOR readout is verified by forcing a known voltage across load resistors in the Calibration Fixture using the collector supply and reading the resulting calibrated current with the vertical CURSOR.*

1. Connect long patch cords between the Calibration Fixture and the voltage source as shown in Figure 5–6.
2. Set the voltage source to 4.500 V and note the reading of the horizontal CURSOR readout.
3. Set the voltage source output to 0 V and disconnect the long patch cords.
4. Connect the short patch cords and plug the two shorting bars over the 250 m Ω load resistor label as shown in Figure 5–7.
5. Close the protective cover.
6. Set the **HIGH CURRENT** breaker to **ENABLED**.

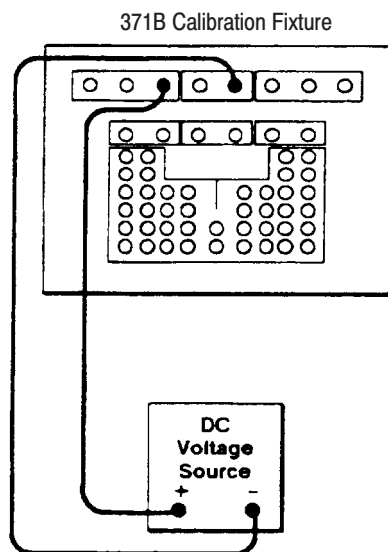


Figure 5–6: Calibrating CURSOR readout for checking accuracy of collector current measurement

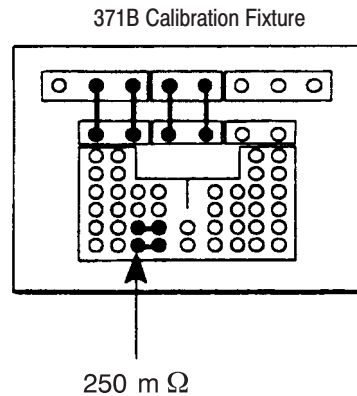


Figure 5-7: Calibration Fixture setup for measuring high collector current measurement accuracy

7. Turn the COLLECTOR SUPPLY VARIABLE control clockwise until the horizontal CURSOR readout reaches 4.5 Volt.
8. CHECK that the vertical CURSOR readout is within a reading specified in Table 5-11.
9. Set the **HIGH CURRENT** breaker to **DISABLED**.
10. Remove the patch cords from the Calibration Fixture.
11. Initialize the 371B.

Table 5-11: High Collector Current Measurement Accuracy

PEAK POWER WATTS Setting	VERTICAL Setting	HORIZONTAL (COLLECTOR) Setting	VOLTAGE SOURCE Setting	Calibration Fixture Load Resistor Setting	VERTICAL CURSOR Readout
300 W	2 A/DIV	500 mV/DIV	4.5 V	250 m Ω	17.53 A to 18.47 A

Step Generator

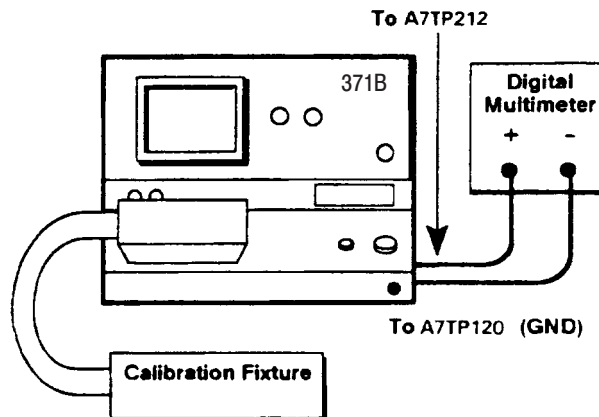
Equipment Required (see Table 5–3):

- Digital Multimeter
- DC Voltage Source
- Calibration Fixture (067-1345-00)
- Patch Cords

D1. Adjusting Step Generator Balance (A7R210), Step Generator Offset (A3R560), Step Multi .1X Balance (A3R510)

NOTE. *The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.*

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

STEP GENERATOR	
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	5 V
NUMBER OF STEPS	0
Protective Cover	CLOSED

Test Equipment Settings:

DIGITAL MULTIMETER	
Mode	DC VOLTAGE

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of test points.

Determining Whether Adjustment is Necessary.

1. EXAMINE the digital multimeter for a reading of $0\text{ mV} \pm 1\text{ mV}$ when the STEP/OFFSET AMPLITUDE is set to 5 V, 2 V, and 1 V.
2. Change the following 371B setting:

STEP GENERATOR	
STEP MULTI .1X	On

The indicator above the STEP MULTI .1X button will be lit.

3. EXAMINE the digital multimeter for a reading of $0\text{ mV} \pm 1\text{ mV}$ when STEP/OFFSET AMPLITUDE is set to 100 mV, 200 mV, and 500 mV.

If the digital multimeter reading is within the given limits in Steps 1 and 3, no adjustment is necessary and the remainder of this procedure may be skipped.

Adjusting Step Generator (SG) Balance.

NOTE. See “Test and Point Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustments R210.

4. Change the following 371B settings:

STEP GENERATOR	
STEP MULTI .1X	Off
STEP/OFFSET AMPLITUDE	5 V
Protective Cover	Open

5. ADJUST SG BALANCE adjustment R210 on the A7 Step Generator board for a digital multimeter reading of $0\text{ V} \pm 1\text{ mV}$.

Adjusting .1X Balance.

NOTE. See “Test Point and Adjustment Locations Pullout 1” in Chapter 8 for the location of adjustments R510.

6. Close the Protective Cover.
7. ADJUST .1X BALANCE adjustment R510 on the A3 A/D board so the difference of digital multimeter reading is 1 mV when the step generator STEP MULTI .1X is set between ON and OFF.

Adjusting Step Generator (SG) Offset.

NOTE. See “Test Point and Adjustment Locations Pullout 7” in Chapter 8 for the location of adjustments R560.

8. Protective Cover remains closed.
9. ADJUST SG OFFSET adjusting R560 on the A3 A/D board for a digital multimeter reading of $0\text{ V} \pm 1\text{ mV}$ when STEP GENERATOR INVERT is set to ON and OFF.

Rechecking the Adjustments.

10. EXAMINE the digital multimeter for a reading of $0\text{ V} \pm 1\text{ mV}$ when the STEP/OFFSET AMPLITUDE is set to 5 V, 2 V, and 1 V.
11. If further adjustments are required, repeat Steps 4 through 9.

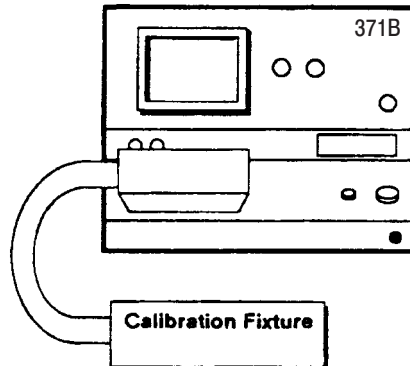
Removing the Setup.

12. Disconnect the digital multimeter leads and patch cords.

**D2. Adjusting Step
Generator Voltage Source
Balance (A7R405), and
Voltage Source CMR
(A7R417)**

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 30 W

DISPLAY

Mode NON STORE

Horizontal 100 mV/DIV STEP GEN

STEP GENERATOR

NUMBER OF STEPS 0

SOURCE VOLTAGE

STEP/OFFSET AMPLITUDE 500 mV

Protective Cover

CLOSED

Test Equipment Settings:

DC VOLTAGE SOURCE

Mode DC VOLTAGE

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustments R405 and R417.

Adjusting SGV Balance.

1. ADJUST SGV BALANCE adjustment R405 on the A7 Step Generator board for no horizontal display shift when STEP/OFFSET AMPLITUDE is set back and forth between 500 mV and 1 V.

Changing the Setup.

2. Change the following 371B settings:

DISPLAY	
Mode	STORE
STEP GENERATOR	
STEP/OFFSET AMPLITUDE	200 mV
CURSOR	
Mode	DOT

3. Connect the DC voltage source to the COMMON and the COMMON SENSE terminals as shown in Figure 5–8, and close the protective cover.

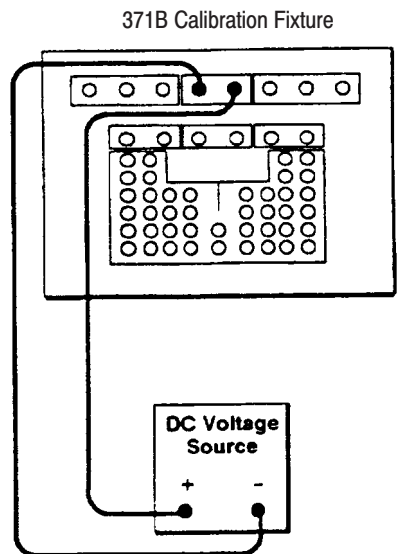


Figure 5–8: Calibration Fixture connections for procedure D2

Adjusting V CMR.

4. Change the following test equipment setting:

DC VOLTAGE SOURCE
VOLTAGE 0 V

5. Note the horizontal CURSOR readout for use in Step 7.

6. Change the following test equipment setting:

DC VOLTAGE SOURCE
VOLTAGE 2 V

7. ADJUST V CMR adjustment R417 on the A7 Step Generator board for the horizontal CURSOR value noted in Step 5, ± 8 mV.

Adjusting for Interaction.

8. Change the following test equipment:

DC VOLTAGE SOURCE
VOLTAGE 0 V

9. Repeat Steps 5 through 8 to determine if further adjustment is necessary.

Removing the Setup.

10. Disconnect the DC voltage source from the 371B.

**D3. Adjusting Step
Generator Gain (A3R518)**

NOTE. *The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.*

Moving the Cal Jumper.

1. Change the following 371B setting:

POWER OFF

Connecting the Patch Cords.

4. Connect the digital multimeter between the STEP GEN VOLTAGE terminal and the COMMON terminal with long patch cords as shown in Figure 5–9.

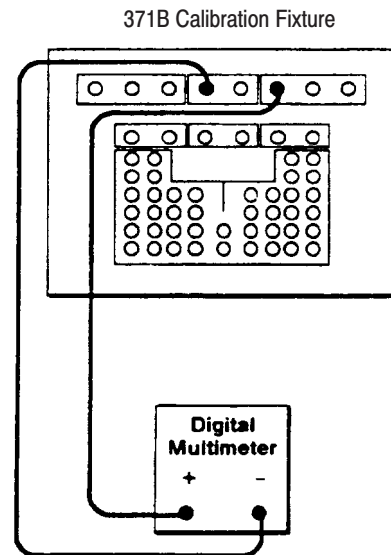


Figure 5–9: Calibration Fixture connection for adjusting Step Generator Gain

5. Close the protective cover.

Adjusting Step Generator Gain.

6. Press the **REPEAT** button several times to move the spot 10 divisions to the right.

NOTE. See “Test Point and Adjustment Locations Pullout 1” in Chapter 8 for the location of adjustment R518.

7. ADJUST SG GAIN adjustment R518 on the A3 A/D board for a digital multimeter reading of $10.00\text{ V} \pm 0.01\text{ V}$.

Returning Jumper J340 to the Zero Position.

8. Change the following 371B setting:

POWER

OFF

9. Change the position of jumper J340 on the A3 A/D board to the Zero position.

10. Change the following 371B setting:

POWER	ON
-------	----

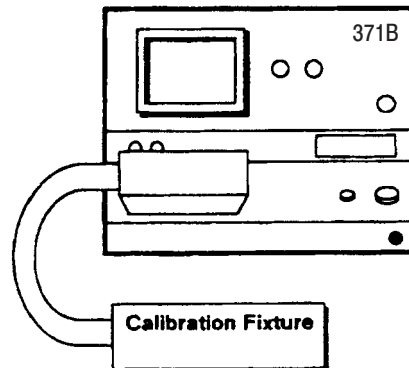
Removing the Setup.

11. Disconnect the digital multimeter.

D4 Adjusting Step Generator Current Zero (A7R322) and Negative Current Balance (A7R380)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

DISPLAY

Mode	NON STORE
Horizontal	100 mV/DIV STEP GEN

STEP GENERATOR

NUMBER OF STEPS	0
STEP/OFFSET AMPLITUDE	1 A

Connecting the Patch Cords.

1. Connect the patch cords and shorting bars as shown in Figure 5–10.

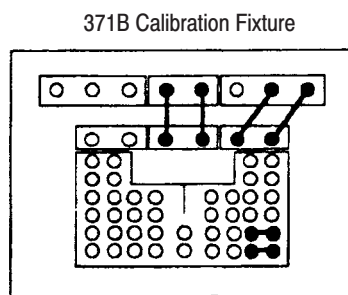


Figure 5–10: Calibration Fixture connections for adjusting Step Generator Current Zero and Negative Current Balance

2. Close the protective cover.

Adjusting Step Generator Current Zero.

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustment R322.

3. ADJUST SGI ZERO adjustment R322 on the A7 Step Generator board for minimum spot shift when STEP/OFFSET AMPLITUDE is set back and forth between 1 A/STEP and 500 mA/STEP.

Correcting for Unsatisfactory Adjustment.

NOTE. Repeat procedures D1 through D2 if R322 cannot be satisfactorily adjusted.

Adjusting Negative Current Balance.

4. Change the following 371B setting:

STEP GENERATOR
INVERT ON

The indicator beside the INVERT button will be lit.

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustment R380.

5. ADJUST NEG CURRENT BALANCE adjustment R380 on the A7 Step Generator board for minimum spot shift through the same settings used for Step 3.

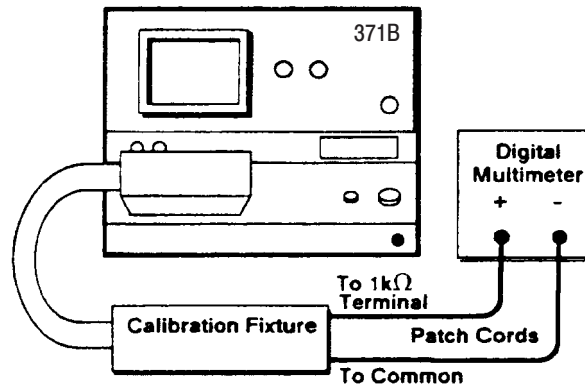
Remove the Setup.

6. Remove the patch cords and shorting bars.

D5. Adjusting Loop Gain in Current Source Mode (A7R305)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 30 W

DISPLAY

Horizontal 1 V/DIV STEP GEN

STEP GENERATOR

NUMBER OF STEPS 0

STEP/OFFSET AMPLITUDE 1 mA

OFFSET 5 mA

Test Equipment Settings:

DIGITAL MULTIMETER

Mode DC CURRENT

Connecting the Patch Cords.

1. Connect a patch cord between the STEP GENERATOR CURRENT and 1 k Ω terminal.
2. Connect a long patch cord between the other 1 k Ω terminal and the digital multimeter positive input.
3. Connect a long patch cord between the COMMON terminal and the digital multimeter negative input.
4. Connect a shorting bar over the 1 k Ω terminals as shown in Figure 5–11.

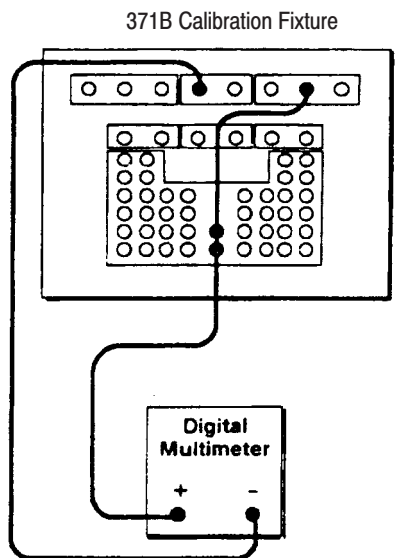


Figure 5-11: Calibration Fixture connections for adjusting Loop Gain in current source mode

5. Close the protective cover.

Noting the Reference Value.

6. Note the digital multimeter reading.

This reading will be used in Step 9.

7. Disconnect the shorting bar.
8. Close the protective cover.

Adjusting Loop Gain.

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustment R305.

9. ADJUST SGI LOOP GAIN adjustment R305 on the A7 Step Generator board for the digital multimeter reading noted in Step 6, ± 0.13 mA.

Readjusting for Interaction.

10. Repeat Steps 4 to 9 to determine if further adjustment is necessary.

Removing the Setup.

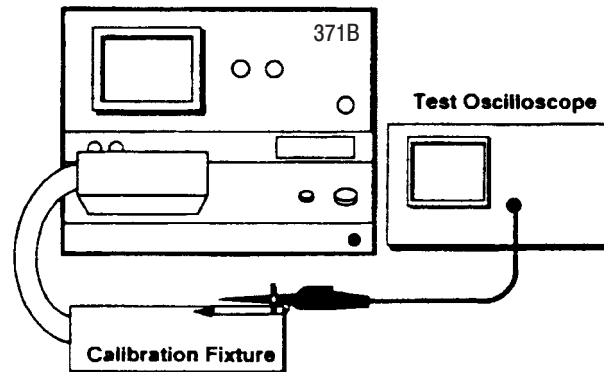
11. Disconnect the patch cords.

**D6. Checking Step Rates,
Pulse Form**

Specifications:

- Pulse width is $500 \mu\text{s} \pm 10\%$ with $1 \text{ k}\Omega$ load at 1 mA/step .
- Rise and fall time are less than $40 \mu\text{s}$ with $1 \text{ k}\Omega$ load at 1 mA/step .

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.

**371B Settings:**

Initialize the 371B, then set the following control as indicated.

STEP GENERATOR

NUMBER OF STEPS	1
-----------------	---

Test Equipment Settings:**TEST OSCILLOSCOPE**

COUPLING	DC
VERTICAL	200 mV/DIV
HORIZONTAL	10 ms/DIV

1. Connect a patch cord between the COMMON and one of the $1 \text{ k}\Omega$ terminals.
2. Connect a patch cord between the STEP GEN CURRENT and the remaining $1 \text{ k}\Omega$ terminals.
3. Connect the probe from the test oscilloscope by using terminal plugs as shown in Figure 5-12.

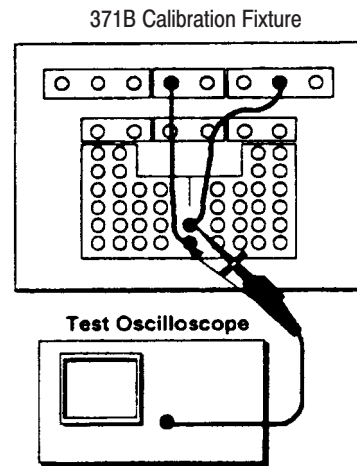


Figure 5-12: Calibration Fixture connections for checking step rates, pulse form

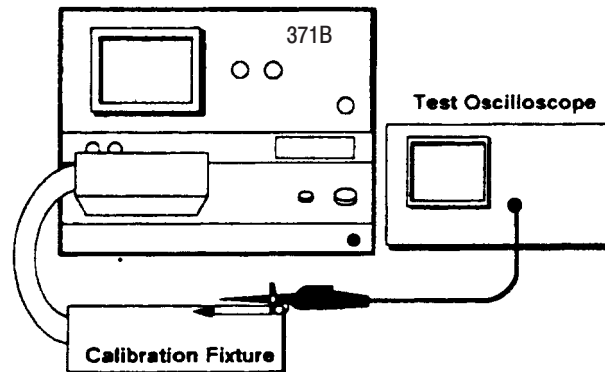
4. Close the protective cover.
5. Set the test oscilloscope to DC coupling.
6. Set the test oscilloscope time/division to 50 μ s/division.
7. CHECK that the pulse width is 450 μ s to 550 μ s at half amplitude and overshoot or undershoot is within 10 % of full amplitude.
8. Set the test oscilloscope time/division to 10 μ s/division.
9. CHECK that the rise and fall time are less than 40 μ s between 10 % and 90 % of full amplitude.
10. Remove the probe and the patch cords.

D7. Checking Ripple Pulse Noise of Voltage Source Mode

Specifications:

- Less than 1 % of AMPLITUDE setting + 10 mV.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

STEP GENERATOR

NUMBER OF STEPS	0
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	2 V
OFFSET	0 mV

Test Equipment Settings:

TEST OSCILLOSCOPE

COUPLING	AC
VERTICAL	10 mV/DIV
HORIZONTAL	10 ms/DIV
TRIGGERING	LINE
BANDWIDTH	20 MHz

1. Connecting the X1 probe tip from the test oscilloscope to the STEP GENERATOR VOLTAGE terminal and the ground lead to the COMMON terminal plugs as shown in Figure 5-13.

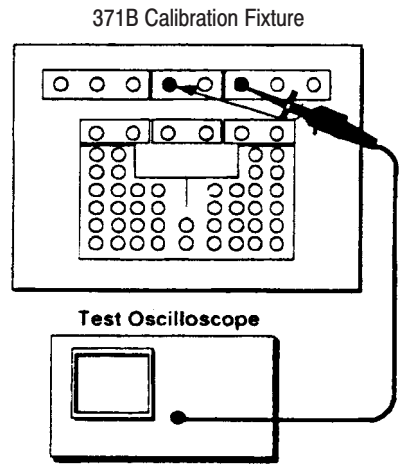


Figure 5-13: Calibration Fixture connections for checking ripple pulse noise of voltage source mode

2. Close the protective cover.
3. CHECK for the ripple pulse noise within 30 mV_{P-P}
4. Remove the X1 probe.

D8. Checking Incremental Accuracy

Specifications:

- Each step is within 2 % of total output + 3 % of Step Amplitude + 2 mV.
- Less than 2 % variation between step amplitudes.
- With STEP MULTI .1X on, each step is within 4 % of total output + 5% of step AMPLITUDE + 2 mV.
- With STEP MULTI .1X on, variation between step amplitudes is less than 5 %.

1. Change the following 371B setting:

POWER	OFF
-------	-----
2. Change the position of jumper J340 on A3 A/D board from ZERO to CAL.

NOTE. When the jumper J340 position is changed from ZERO to CAL, store mode is disabled.

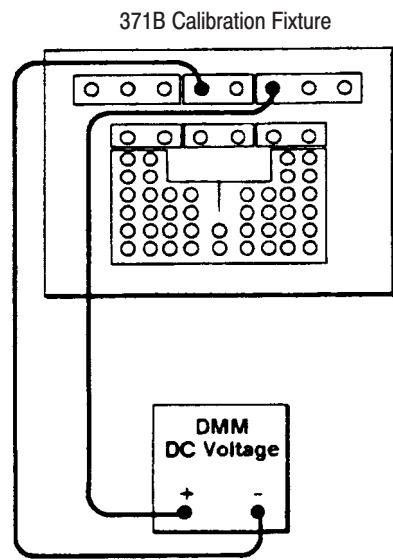


Figure 5-14: Calibration Fixture connections for checking Incremental Accuracy

5. Close the protective cover.
6. Press the **SINGLE** button so that the spot moves to the left-most vertical graticule line.
7. CHECK the digital multimeter reading for the value specified for STEP 0 of Table 5-12. Note the reading for use in Step 10.
8. Press the **REPEAT** button once so that the spot moves right 1 division.
9. CHECK the digital multimeter reading for the value specified in the next STEP of Table 5-12. Note the reading for use in Step 10.
10. CHECK that the voltage difference between adjacent steps is within $2000 \text{ mV} \pm 40 \text{ mV}$.
11. Repeat Steps 8 to 10 for each STEP in Table 5-12.
12. Press the step generator **.1X button** to turn invert on.
13. Press the **SINGLE** button so that the spot moves to the right-most vertical graticule line.
14. CHECK the digital multimeter reading for the value specified for STEP 0 for Table 5-12. Note the reading for use in Step 17.
15. Press the **REPEAT** button once so that the spot moves left 1 division.
16. CHECK the digital multimeter reading for the value specified in the next STEP of Table 5-12. Note the reading for use in Step 17.

17. CHECK that the voltage difference between adjacent steps is within $1000 \text{ mV} \pm 20 \text{ mV}$.
18. Repeat Steps 15 to 17 for each STEP in Table 5–12.

Table 5–12: Incremental Accuracy

STEP	DMM Reading (\pm)
0	-62 to +62 mV
1	1.898 to 2.102 V
2	3.858 to 4.142 V
3	5.818 to 6.182 V
4	7.778 to 8.222 V
5	9.738 to 10.262 V
6	11.698 to 12.302 V
7	13.658 to 14.342 V
8	15.618 to 16.382 V
9	17.578 to 18.422 V
10	19.538 to 20.462 V

Voltage difference between adjacent STEPS is $2000\text{mV} \pm 40\text{mV}$

19. Set the STEP MULTI .1X control to on, and the horizontal sensitivity to $200 \text{ mV/DIV STEP GEN}$.
20. Repeat Steps 6 through 18 using Table 5–13 instead of Table 5–12.
21. Proceed to the “Setup Conditions” for procedure D9 to check step generator amplitude accuracy in voltage mode. Otherwise, perform the following steps.
22. Set **POWER** switch to off.
23. Change the position of the jumper J340 from CAL to ZERO on the A3 A/D board.

Table 5–13: Incremental Accuracy Using STEP MULTI .1X

STEP	DMM Reading (\pm)
0	-12 to +12 mV
1	180 to 220 mV
2	372 to 428 mV
3	564 to 636 mV
4	756 to 844 mV

Table 5-13: Incremental Accuracy Using STEP MULTI .1X (Cont.)

STEP	DMM Reading (\pm)
5	948 to 1052 mV
6	1140 to 1260 mV
7	1332 to 1468 mV
8	1524 to 1676 mV
9	1716 to 1884 mV
10	1908 to 2092 mV

Voltage difference between adjacent STEPs is 200 mV \pm 10 mV.

D9. Checking Amplitude Accuracy of Voltage Source Mode

Specifications:

- Each step is within 2 % of total output + 3 % of Step Amplitude + 2 mV.

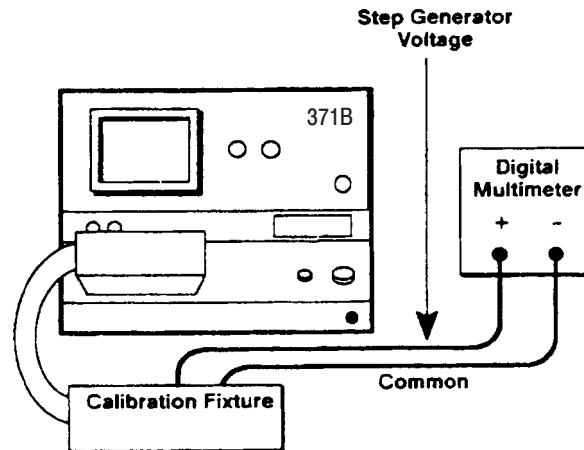
1. Change the following 371B setting:

POWER OFF

2. Change the position of jumper J340 from ZERO to CAL on the A3 A/D board and turn the **POWER** switch to ON.

NOTE. When the jumper position is changed from ZERO to CAL, store mode is disabled.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Change the following control as indicated.

POWER	ON
COLLECTOR SUPPLY	
PEAK POWER WATTS	30 W
DISPLAY	
Mode	NON STORE
Horizontal	200 mV/DIV STEP GEN
STEP GENERATOR	
NUMBER OF STEPS	10
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	200 mV

Test Equipment Settings:

DIGITAL MULTIMETER	
Mode	DC VOLTAGE

3. Connect the digital multimeter between the STEP GENERATOR VOLTAGE terminal and the COMMON terminal as shown in Figure 5-15.

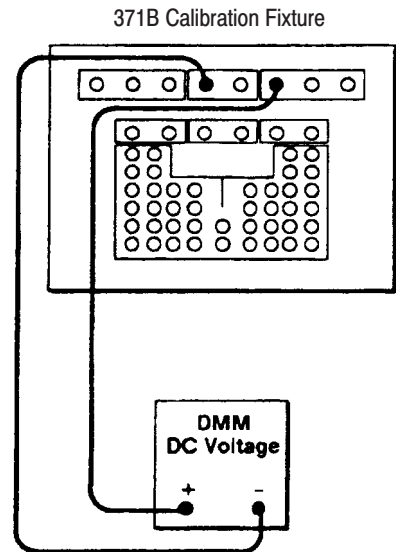


Figure 5-15: Setup for checking amplitude accuracy of voltage source mode

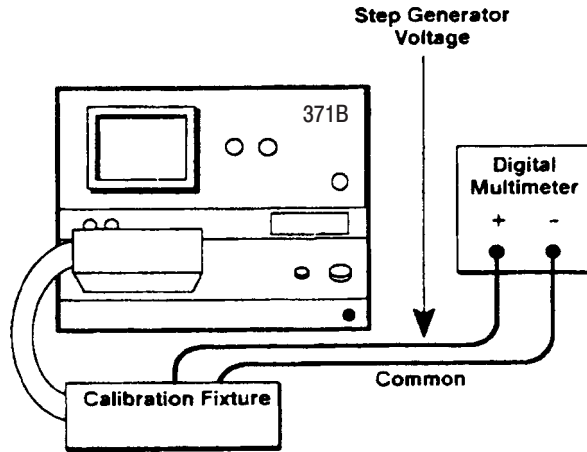
4. Close the protective cover.
5. Press the **REPEAT** button several times until the spot moves to the right-most vertical graticule line.
6. CHECK that the digital multiplier reading is within the range specified in Table 5-14 for each STEP/OFFSET AMPLITUDE setting from 200 mV to 1 V.
7. Press the step generator **INVERT** button to turn invert on.
8. CHECK that the digital multiplier reading is within the range specified in Table 5-14 for each STEP/OFFSET AMPLITUDE setting from 200 mV to 1 V.

Table 5-14: Voltage Amplitude Accuracy

AMPLITUDE Setting	DMM Reading (\pm)
200 mV	1.952 to 2.048 V
1 V	9.768 to 10.232 V

9. Disconnect the digital multimeter.
10. Press the **RECALL** button to initialize the 371B.
11. Proceed to the "Setup Conditions" for procedure D10 to check maximum voltage accuracy. Otherwise perform the following steps.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

POWER	ON
COLLECTOR SUPPLY	
PEAK POWER WATTS	30 W
DISPLAY	
Mode	NON STORE
Horizontal	1 V/DIV STEP GEN
STEP GENERATOR	
NUMBER OF STEPS	10
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	500 mV
OFFSET	5000 mV

Test Equipment Settings:

DIGITAL MULTIMETER	
Mode	DC VOLTAGE

3. Connect the digital multimeter between the STEP GENERATOR VOLTAGE terminal and the COMMON terminal as shown in Figure 5-16.

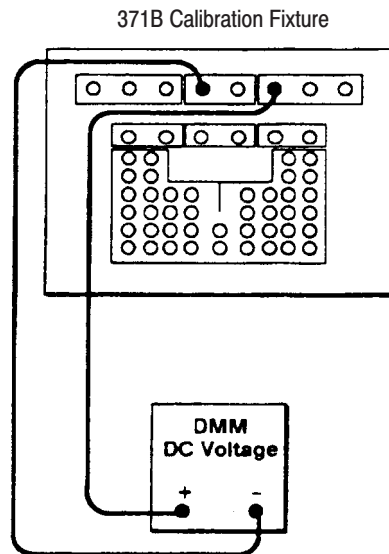


Figure 5-16: Setup for checking maximum voltage accuracy of voltage source mode

4. Close the protective cover and press the **SHINGLE** button.
5. Press the **REPEAT** button ten times until the spot moves to the right-most vertical graticule line, and set the STEP/OFFSET AMPLITUDE to 200 mV.
6. CHECK that the digital multimeter reading is within the range specified in Table 5-15 for each STEP/OFFSET AMPLITUDE setting from 200 mV to 1 V.
7. Change the following 371B settings:

STEP GENERATOR

INVERT	On
STEP/OFFSET AMPLITUDE	200 mV
NUMBER OF STEPS	10
OFFSET	2000 mV

8. CHECK that the digital multimeter reading is within the range specified in Table 5-15 for each STEP/OFFSET AMPLITUDE setting from 200 mV to 1 V.

9. Press the **SHINGLE** button and change the following 371B settings:

DISPLAY	
HORIZONTAL	5 V STEP GEN
STEP GENERATOR	
STEP/OFFSET AMPLITUDE	5 V
NUMBER OF STEPS	5
OFFSET	25.00 V

10. Press the **REPEAT** button five times until the spot moves to the right-most vertical graticule line.
11. CHECK that the digital multimeter reading is within the specified in Table 5–16 for 5 V STEP/OFFSET AMPLITUDE.
12. Press the **STEP GENERATOR INVERT** button, and repeat step 11.
13. Disconnect the digital multiplier.
14. Set the 371B **POWER** switch to OFF.
15. Change the position of the jumper J340 from CAL to ZERO on A3 A/D board.

Table 5-15: Maximum Voltage Accuracy

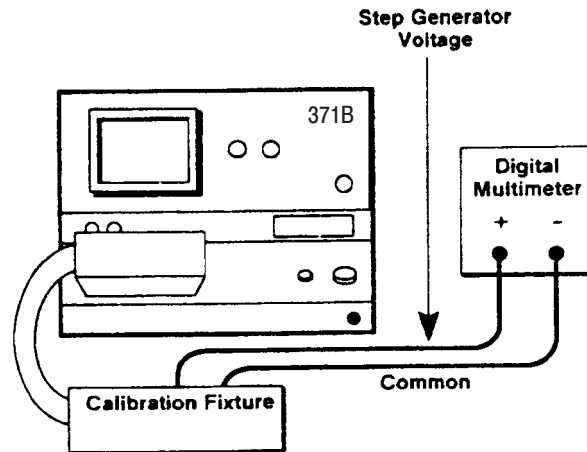
AMPLITUDE Setting	DMM Reading
200 mV	$\pm(3.912 \text{ to } 4.088) \text{ V}$
1 V	$\pm(19.568 \text{ to } 20.432) \text{ V}$
5 V	$\pm(48.85 \text{ to } 51.15) \text{ V}$

D11. Checking Offset Accuracy

Specifications:

- Each step is within 2 % of total output + 3% of step AMPLITUDE +2 mV.
- Maximum Offset Voltage is 10 times of Step AMPLITUDE except 5 V of Step AMPLITUDE.
- Maximum Offset Voltage is 5 times of Step AMPLITUDE with the setting 5 V of Step AMPLITUDE.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS	3 W
HIGH VOLTAGE	DISABLED

DISPLAY

HORIZONTAL	5 V/DIV STEP GEN
------------	------------------

STEP GENERATOR

NUMBER OF STEPS	0
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	200 mV

Protective Cover CLOSED

Test Equipment Settings:

DIGITAL MULTIMETER

Mode	DC VOLTAGE
------	------------

1. Connect the digital multimeter between the STEP GENERATOR VOLTAGE terminal and the COMMON terminal as shown in Figure 5-17.

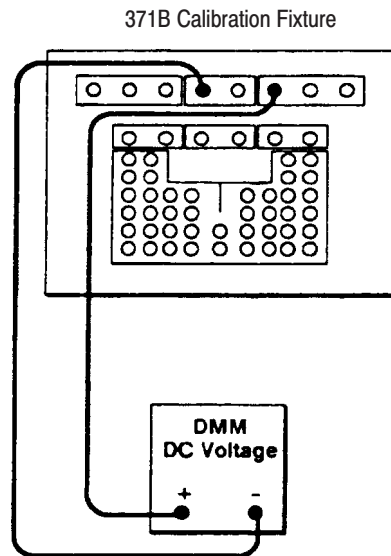


Figure 5-17: Setup for checking offset accuracy

2. Close the protective cover.
3. CHECK the digital multimeter reading is within the limit shown in the 0 % of OFFSET column in Table 5-16 for each setting of STEP/OFFSET AMPLITUDE from 200 mV to 5 V.
4. Press the step generator **INVERT** button to turn invert on.
5. Repeat Step 3.
6. Change the following 371B settings:

STEP GENERATOR	
INVERT	OFF
STEP/OFFSET AMPLITUDE	200 mV
OFFSET	2000 mV

7. CHECK that the digital multimeter reading is within the limit shown in the 100 % of OFFSET column in Table 5-16 for each setting of STEP/OFFSET AMPLITUDE from 200 mV to 5 V.

8. Change the following 371B settings:

STEP GENERATOR	
INVERT	ON
STEP OFFSET AMPLITUDE	200 mV
OFFSET	-2000 mV

9. Repeat Step 7.
10. Remove the patch cords from the STEP GENERATOR VOLTAGE OUTPUT and the COMMON terminals.
11. Initialize the 371B.

Table 5-16: Offset Accuracy

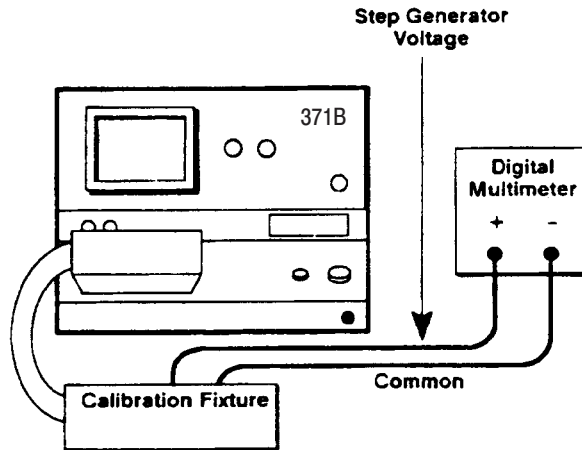
STEP/OFFSET AMPLITUDE Setting	DMM (0 % of OFFSET) Reading	DMM (100 % of OFFSET) Reading
200 mV	± 8 mV	$\pm (1952 - 2048)$ mV
1 V	± 32 mV	$\pm (9.768 - 10.232)$ V
5 V	± 152 mV	$\pm (24.35 - 25.65)$ V

D12. Checking Short Circuit Current Limit of Voltage Source Mode

Specifications:

- Short circuit current limit is 80 to 150 mA.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

STEP GENERATOR

NUMBER OF STEPS	0
SOURCE	VOLTAGE
STEP/OFFSET AMPLITUDE	200 mV
OFFSET	2000 mV

Test Equipment Settings:

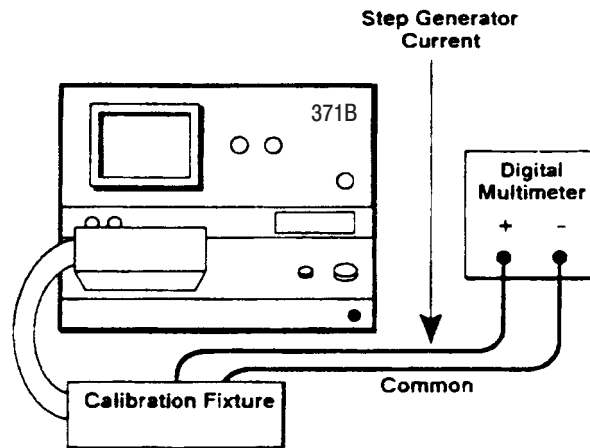
DIGITAL MULTIMETER

Mode	DC CURRENT
------	------------

1. Connect the digital multimeter between the STEP GENERATOR VOLTAGE and the COMMON terminals as shown in Figure 5–18.

NOTE. When the jumper position is changed from ZERO to CAL, store mode is disabled.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



Change the following 371B setting:

POWER ON

371B Settings:

Change the following control as indicated.

COLLECTOR SUPPLY		
PEAK POWER WATTS		3 W
DISPLAY		
Mode		NON STORE
VERTICAL		10 μ A/DIV
STEP GENERATOR		
INVERT		ON
NUMBER OF STEPS		10
SOURCE		CURRENT
STEP/OFFSET AMPLITUDE		10 μ A

Test Equipment Settings:

DIGITAL MULTIMETER		
Mode		DC CURRENT

3. Connect the digital multimeter between the STEP GENERATOR CURRENT terminal and the COLLECTOR SUPPLY HIGH VOLTAGE terminal as shown in Figure 5–19, and close the protective cover.

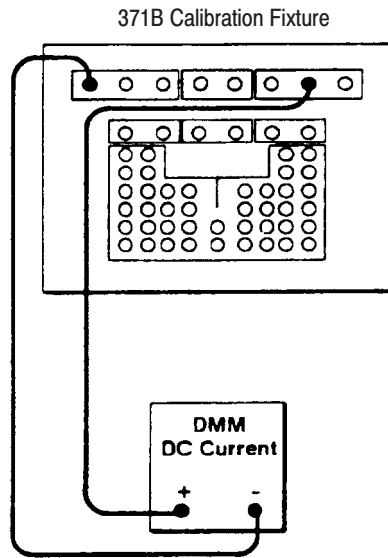


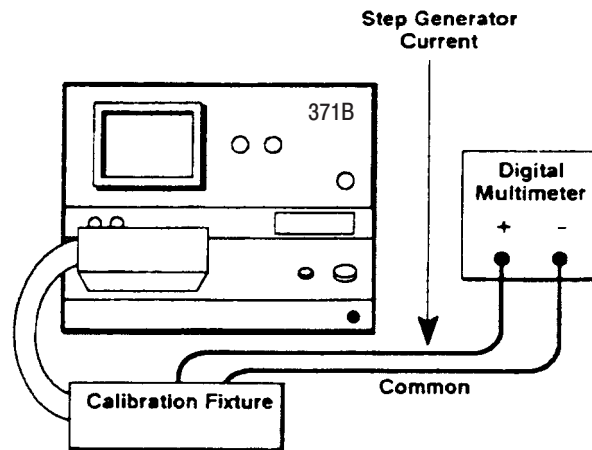
Figure 5-19: Setup for checking amplitude accuracy of normal step current source mode

4. Simultaneously press the **SHIFT** and **COLLECTOR SUPPLY POLARITY** buttons to set **VERTICAL AMP CHECK MODE**.
5. Press the **SHINGLE** button, and press the **REPEAT** button ten times until the spot moves to the upper-most horizontal graticule line. Then change the following 371B settings:

COLLECTOR SUPPLY	
MAX PEAK POWER WATTS	30 W
DISPLAY	
VERTICAL	5 mV/DIV
STEP GENERATOR	
INVERT	OFF

6. CHECK that the digital multimeter reading is within the limit specified in Table 5-17 for each STEP/OFFSET AMPLITUDE setting from 10 μ A to 1 mA.
7. Press the step generator **INVERT** button to turn invert on.
8. CHECK that the digital multimeter reading is within the limit specified in Table 5-17 for each STEP/OFFSET AMPLITUDE setting from 10 μ A to 1 mA.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



Change the following 371B setting:

POWER ON

371B Settings:

Change the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 3 W

DISPLAY

Mode NON STORE

VERTICAL 20 μ A/DIV

STEP GENERATOR

INVERT ON

NUMBER OF STEPS 10

SOURCE CURRENT

STEP/OFFSET AMPLITUDE 10 μ A

OFFSET 100 μ A

Test Equipment Settings:

DIGITAL MULTIMETER

Mode DC CURRENT

3. Connect the digital multimeter between the STEP GENERATOR CURRENT terminal and the COLLECTOR SUPPLY HIGH VOLTAGE terminal as shown in Figure 5–20, and close the protective cover.

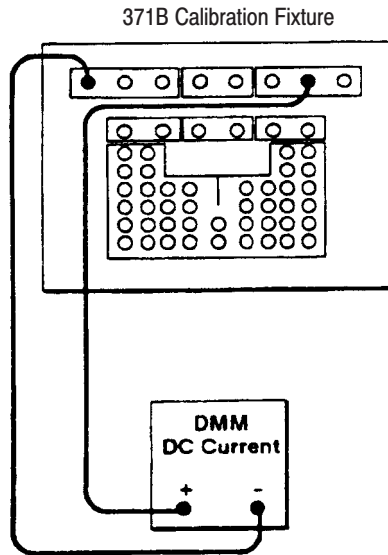


Figure 5–20: Setup for checking maximum current accuracy of normal step current source mode

4. Simultaneously press the **SHIFT** and **COLLECTOR SUPPLY POLARITY** buttons to set VERTICAL AMP CHECK MODE.
5. Press the **SHINGLE** button, and press the **REPEAT** button ten times until the spot moves to the upper-most horizontal graticule line. Then change the following 371B settings:

COLLECTOR SUPPLY	
MAX PEAK POWER WATTS	30 W
DISPLAY	
VERTICAL	5 mV/DIV
STEP GENERATOR	
INVERT	OFF
STEP OFFSET AMPLITUDE	100 μ A

6. CHECK that the digital multimeter reading is within the range (1957.0 μ A to 2043.0 μ A).

7. Press the step generator **INVERT** button to turn invert on.
8. CHECK that the digital multimeter reading is within the range ($-1957.0 \mu\text{A}$ to $-2043.0 \mu\text{A}$).
9. Press the step generator **INVERT** button to turn invert off and disconnect the digital multimeter.
10. Set the 371B **POWER** switch to OFF.
11. Change the position of the jumper J340 from CAL to ZERO.

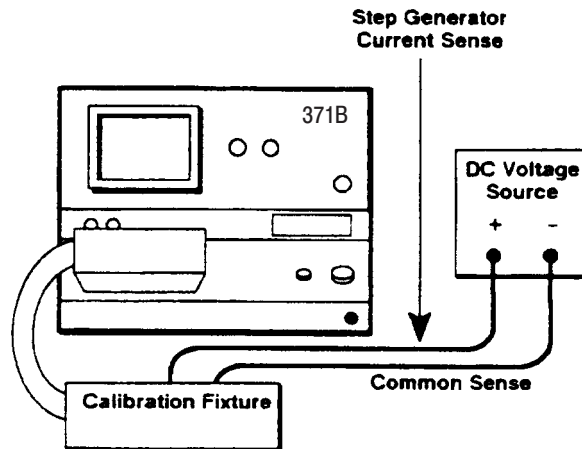
D15. Checking Amplitude Accuracy of Pulsed Step Current Source Mode

Specifications:

- Each step is within 2 % of total output + 3 % of step AMPLITUDE + 10 nA.

NOTE. The following procedure checks the amplitude of step generator current pulses by forcing these pulses through load resistors and measuring the pulse voltage across the resistors using the dot cursor. The measurement variation noted in the CURSOR readout, determined by measuring a calibrated voltage source, is added to each pulse voltage measurement and compared to a table of limit values.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

STEP GENERATOR

- NUMBER OF STEPS 10
- STEP/OFFSET AMPLITUDE 100 A

DISPLAY

- HORIZONTAL 100 mV / DIV STEP GEN

CURSOR

- Mode DOT
- Protective Cover OPEN

Test Equipment Settings:

VOLTAGE SOURCE

- Mode DC VOLTAGE

1. Connect long patch cords between the Calibration Fixture and the voltage source as shown in Figure 5–21.

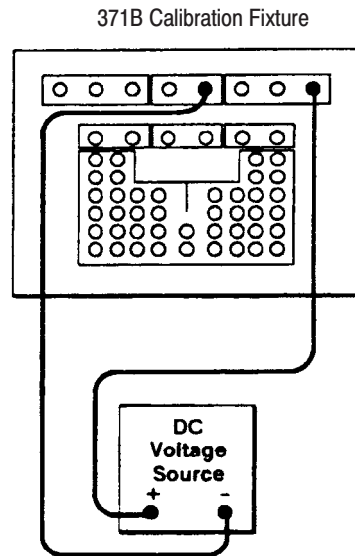


Figure 5–21: Setup for determining cursor measurement variation

2. Apply 0.750 V from the voltage source.
3. Note the reading of the horizontal CURSOR readout.
4. Calculate:

$$\text{Horizontal Cursor} - \text{Applied Voltage} = \text{Variation}$$

Example:

Applied Voltage	750 mV
Cursor Readout	-760 mV
Variation	-10 mV

5. Record the variation.
6. Set the voltage source output to 0 V and disconnect the voltage source.
7. Connect the patch cords as shown in Figure 5–22.

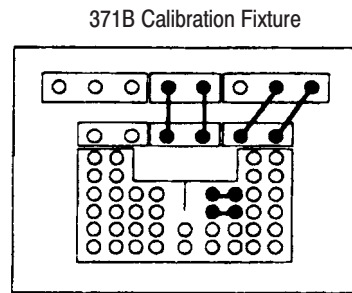


Figure 5-22: Setup for measuring pulse amplitude accuracy

8. Set the load resistor to 750 m Ω
9. Close the protective cover.
10. Move the dot cursor, using the cursor position buttons, to the right-most dot, representing the tenth step generator pulse.
11. Record the horizontal cursor readout.
12. Calculate:

$$\text{Cursor Reading} - \text{Variation} = \text{Pulse Amplitude}$$

Example:

Cursor Reading	760 mV
Variation	-10 mV
Pulse Amplitude	750 mV

$$750 \text{ mV} \div 750 \text{ m}\Omega = 100 \text{ mA}$$

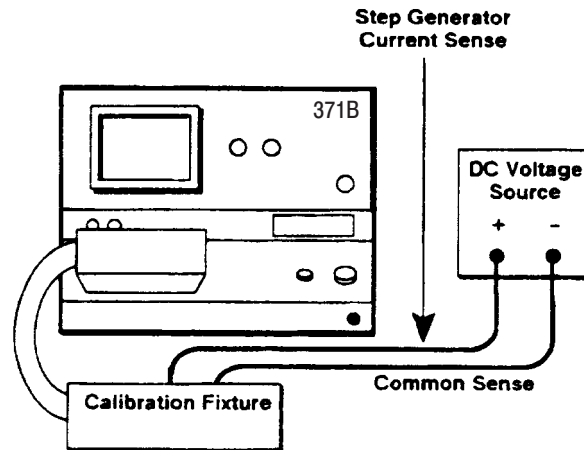
13. Check whether the calculated value of PULSE AMPLITUDE is within the range of 977 mA from 1023 mA.
14. Press the step generator **INVERT** button to reverse step polarity.
15. Repeat Steps 8 through 13
16. Check whether the calculated value of PULSE AMPLITUDE is within the range of -977 mA from -1023 mA.
17. Disconnect the patch cords.

D16. Checking Maximum Current Accuracy of Pulsed Step Current Source Mode

Specifications:

- Each step is within 2 % of total output + 3 % of step AMPLITUDE + 10 nA.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

STEP GENERATOR

NUMBER OF STEPS	10
STEP/OFFSET AMPLITUDE	100 mA
OFFSET	1000 mA

DISPLAY

HORIZONTAL	200 mV/DIV STEP GEN
------------	---------------------

CURSOR

Mode	DOT
------	-----

Protective Cover

OPEN

Test Equipment Settings:

VOLTAGE SOURCE

Mode	DC VOLTAGE
------	------------

1. Connect long patch cords between the Calibration Fixture and the voltage source as shown in Figure 5–23.

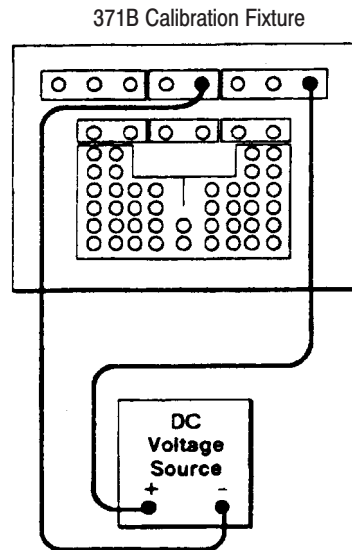


Figure 5–23: Setup for determining cursor measurement variation

2. Apply 0.750 V from the voltage source.
3. Note the reading of the horizontal CURSOR readout.
4. Calculate:

$$\text{Horizontal Cursor} - \text{Applied Voltage} = \text{Variation}$$

Example:

Applied Voltage	750 mV
Cursor Readout	–760 mV
Variation	–10 mV

5. Record the variation.
6. Set the voltage source output to 0 V and disconnect the voltage source.

7. Connect the patch cords as shown in Figure 5–24.

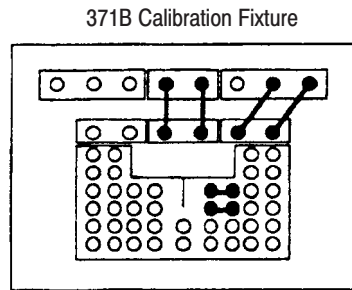


Figure 5–24: Setup for measuring maximum pulse amplitude accuracy

8. Set the load resistor to 750 m Ω
9. Close the protective cover.
10. Move the dot cursor, using the cursor position buttons, to the right-most dot.
11. Record the horizontal CURSOR readout.
12. Calculate:

$$\text{Cursor Reading} - \text{Variation} = \text{Pulse Amplitude}$$

Example:

Cursor Reading	1510 mV
Variation	-10 mV
Pulse Amplitude	1500 mV

$$1500 \text{ mV} \div 750 \text{ m}\Omega = 2000 \text{ mA}$$

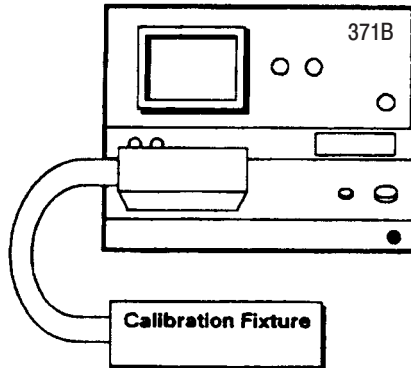
13. Check whether the calculated value of PULSE AMPLITUDE is within the range of 1957.0 mA from 2043.0 mA.
14. Press the step generator **INVERT** button to reverse step polarity.
15. Repeat Steps 8 through 12.
16. Compare the calculated value of PULSE AMPLITUDE with the LIMIT VALUE (-1957 to -2043 mA).
17. Disconnect the patch cords.
18. Initialize the 371B.

D17. Checking Maximum Voltage of Current Source Mode

Specifications:

- Maximum output voltage in current mode is $12\text{ V} \pm 30\%$.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY		
PEAK POWER WATTS		30 W
DISPLAY		
HORIZONTAL		2 V/DIV STEP GEN
STEP GENERATOR		
OFFSET		10 μ A
CURSOR		
Mode		DOT
Protective Cover		CLOSED

1. CHECK that the horizontal CURSOR readout is between 8.4 V and 15.6 V when the STEP/OFFSET AMPLITUDE is turned throughout its range.
2. Press the step generator **INVERT** button to reverse step polarity.
3. CHECK that the horizontal CURSOR readout is between -8.4 V and -15.6 V when the STEP/OFFSET AMPLITUDE is turned throughout its range.
4. Press the step generator **INVERT** button to resume normal operation.
5. Set the peak power watts to 300 W.
6. Repeat Steps 1 through 4.
7. Initialize the 371B.

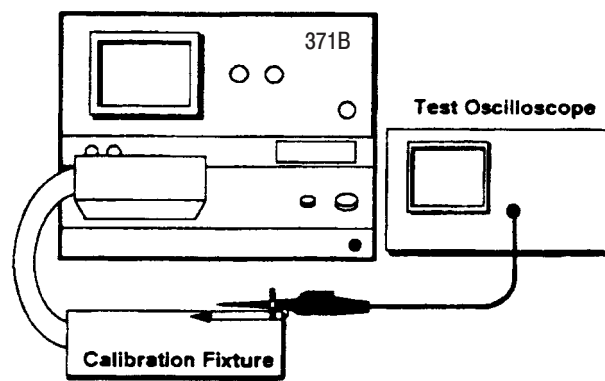
D18. Checking Ripple Pulse Noise of Current Source Mode

Specifications:

- Ripple plus noise is within 1 % of step amplitude + 10 nA.

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY		
PEAK POWER WATTS		30 W
STEP GENERATOR		
NUMBER OF STEPS		0
STEP/OFFSET AMPLITUDE		1 mA

Test Equipment Settings:

TEST OSCILLOSCOPE		
COUPLING		AC
VERTICAL		5 mV/DIV
HORIZONTAL		10 ms/DIV
TRIGGERING		LINE

1. Connect a patch cord between the COMMON and one of the 1 k Ω terminals.
2. Connect a patch cord between the STEP GENERATOR CURRENT and the other 1 k Ω terminal.
3. Connect the X1 probe tip from the test oscilloscope by using terminal plugs as shown in Figure 5–25.

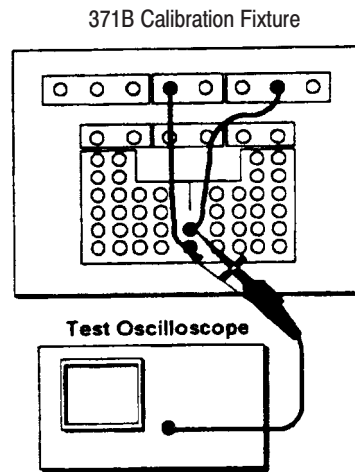


Figure 5-25: Setup for checking ripple and pulse noise

4. Close the protective cover.
5. CHECK that the ripple pulse noise is less than 20 mVp-p.
6. Disconnect the X1 probe and the patch cords.
7. Initialize the 371B.

Collector Supply

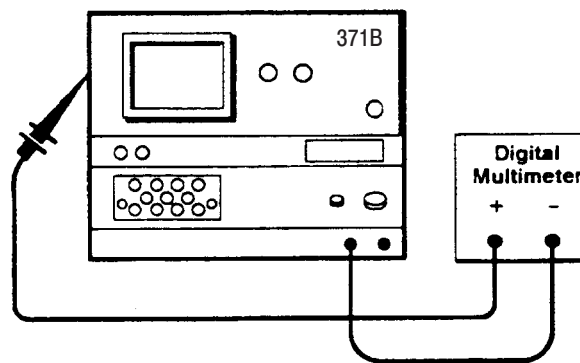
Equipment Required (see Table 5–3):

- Test Oscilloscope
- Digital Multimeter

E1. Adjusting Collector Supply Offset (A6R412)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



Test Equipment Settings:

DIGITAL MULTIMETER

Mode

DC Voltage

Removing the Shield Panel and Connecting the Meter.

1. Change the following 371B setting:

POWER

OFF

2. Remove the shield panel on the A6 Collector Supply board.
3. Connect the positive lead of the digital multimeter to J62 pin 1 on the A6 Collector Supply Output board and the negative lead to ground.

Adjusting Collector Supply Offset.

4. Change the following 371B settings:

POWER	ON
COLLECTOR SUPPLY	
PEAK POWER WATTS	30 W

5. Close the protective cover.

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustment R412.

6. ADJUST HV CS OFFSET adjustment R412 on the A6 Collector Supply Output board for a digital multimeter reading of $0\text{ V} \pm 1.00\text{ mV}$.

Disconnecting the Meter and Replacing the Shield Panel.

7. Change the following 371B setting:

POWER	OFF
-------	-----

8. Disconnect the digital multimeter from the 371B.

9. Replace the shield panel.

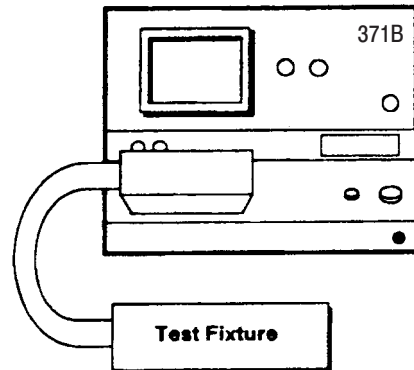
10. Change the following 371B setting:

POWER	ON
-------	----

E2. Adjusting Collector Supply Gain for High Voltage (A6R401)

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated

COLLECTOR SUPPLY

PEAK POWER WATTS	30 W
HIGH VOLTAGE	ENABLED
VARIABLE	100%

DISPLAY

HORIZONTAL	500 V/DIV
------------	-----------

CURSOR

Mode	DOT
------	-----

Determining Whether Adjustment is Necessary.

1. Close the protective cover.
2. Press the cursor position buttons to move the dot cursor to the end of the trace.
3. EXAMINE the display for a horizontal CURSOR readout between 3000 V and 3300 V.
4. Change the following 371B setting:

COLLECTOR SUPPLY

PEAK POWER WATTS	3 W
------------------	-----

5. EXAMINE the display for a horizontal CURSOR readout between 3000 V and 3300 V.

6. Change the following 371B setting:

COLLECTOR SUPPLY
PEAK POWER WATTS 300 mW

7. EXAMINE the display for a horizontal CURSOR readout between 300 V and 345 V.

8. Change the following 371B setting:

COLLECTOR SUPPLY
PEAK POWER WATTS 30 mW

9. EXAMINE the display for a horizontal CURSOR readout between 300 V and 345 V.

If the readouts are both within these limits, proceed to Step 13. If either readout is not within these limits, the following adjustment is necessary.

Adjusting Collector Supply Gain.

10. Change the following 371B setting:

COLLECTOR SUPPLY
PEAK POWER WATTS 30 W

NOTE. See “Test Point and Adjustment Locations Pullout 2” in Chapter 8 for the location of adjustment R410.

11. ADJUST HV CS GAIN adjustment R401 on the A6 Collector Supply Output board for a horizontal CURSOR readout of approximately 3150 volts (midway between 3000 V and 3300 V).

NOTE. R401 can be adjusted through the access hole in the electrical shield.

Determining Whether Further Adjustment is Necessary.

12. Repeat Steps 3 to 8 to determine whether further adjustment is necessary.

Removing the Setup.

13. Change the following 371B setting:

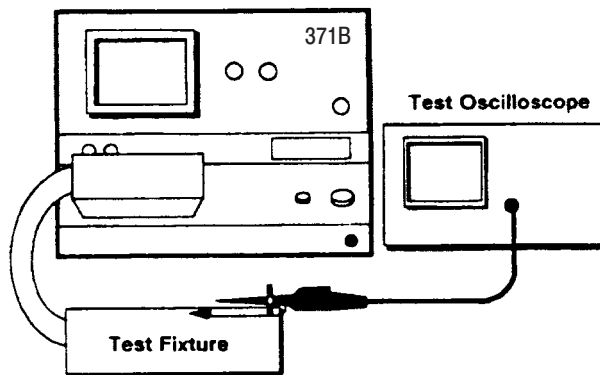
COLLECTOR SUPPLY	
HIGH VOLTAGE	DISABLED

E3. Checking Pulse Form

Specifications:

- Pulse width is $250 \mu\text{s} \pm 10\%$ above 30 % of collector supply VARIABLE and from 150 to 250 μs from 5 % to 30 %.
- Rise and Fall time are between 40 and 120 μs with collector supply VARIABLE set at 50 %.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B

Test Equipment Settings:

TEST OSCILLOSCOPE	
COUPLING	DC
VERTICAL	5 V/Div
HORIZONTAL	10 ms/Div

1. Connect the X1 probe tip from the test oscilloscope to the HIGH CURRENT and the ground lead to the COMMON terminals with plugs as shown in Figure 5-26.

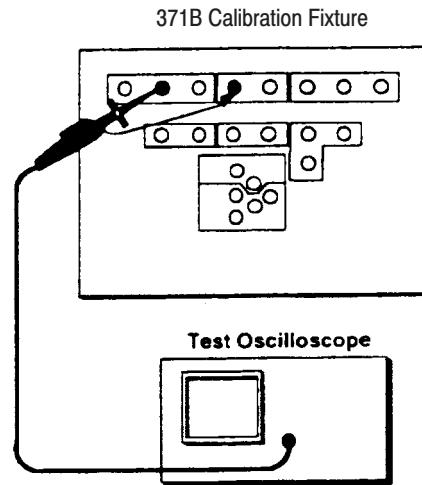


Figure 5-26: Setup for checking pulse form

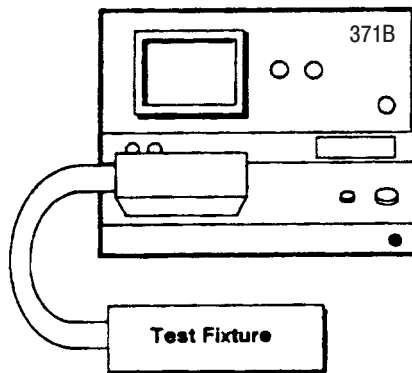
2. Close the protective cover and set the **HIGH CURRENT** breaker to the **ENABLED** position.
3. Set the collector supply **VARIABLE** control to 50 %.
4. Set the test oscilloscope time/DIV to 50 μ s/DIV.
5. CHECK that the half-amplitude pulse width is between 225 μ s and 275 μ s.
6. CHECK that the rise and fall time is between 40 μ s and 120 μ s from 10 % to 90 % of full amplitude.
7. Set the collector supply **VARIABLE** control to 5 % and test oscilloscope to 500 mV/DIV.
8. CHECK that the half-amplitude pulse width is between 150 μ s and 250 μ s.
9. Set the **HIGH CURRENT** breaker to **DISABLED**.
10. Disconnect the X1 probe.

E4. Checking Maximum Peak Current

Specifications:

- Collector supply output exceeds 400 A at 3 kW, 40 A at 300 W. Output is 40 mA \pm 20 % at 30 W, 4 mA \pm 20 % at 3 W and 300 mW and 400 μ A \pm 20% at 30 mW.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS 3 kW

DISPLAY

VERTICAL 50 A/Div

1. Connect a patch cord between the HIGH CURRENT terminal and the COMMON terminal as shown in Figure 5-27.

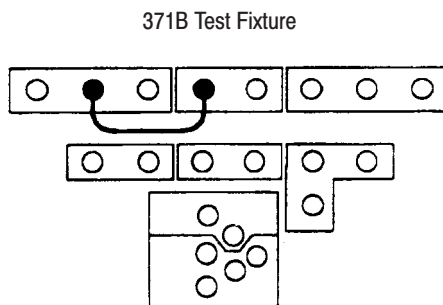


Figure 5-27: Setup for checking maximum peak current in HIGH CURRENT mode

2. Close the protective cover.
3. Set the **HIGH CURRENT** breaker to **ENABLED** position.
4. CHECK that the spot can reach the value specified in Table 5–18 when the collector supply VARIABLE control is turned clockwise.
5. Set the collector supply VARIABLE control to 0 %.
6. Set the peak power watts to 300 W.
7. Repeat Step 4.
8. Set the **HIGH CURRENT** breaker to the **DISABLED** position.
9. Move the patch cord from the **HIGH CURRENT** terminal to the **HIGH VOLTAGE** terminal as shown in Figure 5–28 and close the protective cover.

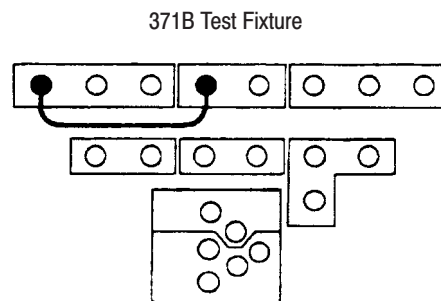


Figure 5–28: Setup for checking maximum peak current in HIGH VOLTAGE mode

10. Set the **HIGH VOLTAGE** breaker to the **ENABLED** position and the peak power watts to 30 W.
11. CHECK that the trace reaches the value specified in Table 5–18 when the VARIABLE control is turned to 100 %.
12. Set the peak power watts to 3 W.
13. Repeat Step 11.
14. Set the peak power watts to 300 mW.
15. Repeat Step 11.
16. Set the peak power watts to 30 mW.
17. Repeat Step 11.
18. Initialize the 371B.

19. Disconnect the patch cord.

Table 5-18: Minimum Output Current

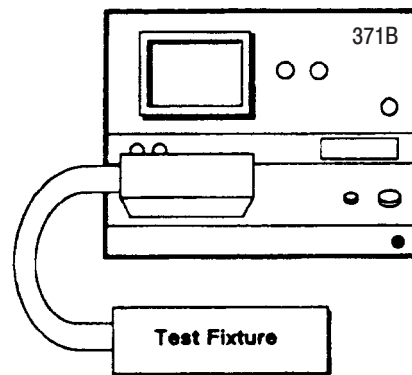
Peak Power Watts Setting	Current Output Reading
3 kW	400 A
300 W	40 A
30 W	32 mA to 48 mA
3 W	3.2 mA to 4.8 mA
300 mW	3.2 mA to 4.8 mA
30 mW	320 μ A to 480 μ A

E5. Checking Maximum Peak Voltage

Specifications:

- Maximum peak voltage is 30 V + 10 %, -5 % at 3 kW and 300 W; it is 3 kV + 10 %, -0 % at 30 W and 3 W; it is 300 V + 15 %, -0 % at 300 mW and 30 mW.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



371B Settings:

Initialize the 371B, then set the following control as indicated.

COLLECTOR SUPPLY

PEAK POWER WATTS	30 mW
HIGH VOLTAGE	ENABLED
VARIABLE	100.0

DISPLAY

HORIZONTAL	50 V/DIV COLLECTOR
------------	--------------------

CURSOR

Mode	DOT
------	-----

Protective Cover	CLOSED
------------------	--------

1. Turn the **LOOPING COMPENSATION** control to minimum looping and press the cursor position buttons to move the cursor dot to the end of the trace.
2. CHECK that the horizontal CURSOR reading is the value specified in Table 5-19.
3. Set the peak power watts to 3 W, and VARIABLE control to 100.0.
4. Repeat Step 2.

Table 5-19: Maximum Peak Voltage

Peak Power Watts Setting	Current Output Reading (Horizontal CURSOR readout)
30 mW	300 V to 345 V
3 W	3000 V to 3300 V
30 W	3000 V to 3300 V

5. Set the **HIGH VOLTAGE** breaker to the **DISABLED** position.
6. Set the peak power watts to 300 W.
7. Set the **HIGH CURRENT** breaker to the **ENABLED** position.
8. Set the VARIABLE control to 100 %.
9. CHECK that the value of the horizontal CURSOR readout is set between 28.5 V to 33.0 V.
10. Change the following 371B settings:

COLLECTOR SUPPLY

POLARITY	PNP
PEAK POWER WATTS	30 mW
HIGH VOLTAGE	ENABLED
HIGH CURRENT	DISABLED
VARIABLE	100.0

DISPLAY

HORIZONTAL	50 V/DIV COLLECTOR
------------	--------------------

11. Repeat Steps 1 to **⏏⏏⏏⏏**. The horizontal CURSOR readout in Step 9 will be a negative value.
12. Set the **HIGH CURRENT** breaker to the **DISABLED** position.
13. Initialize the 371B.

Test Fixture

Equipment Required (see Table 5–3):

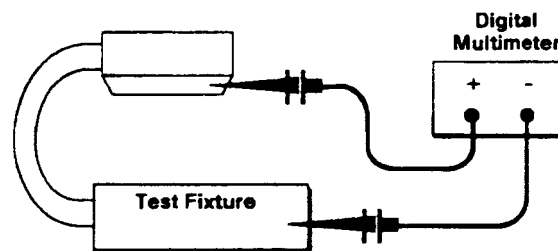
- Digital Multimeter

F1. Checking Sense Load Resistance



WARNING. *The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.*

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



Test Equipment Settings:

DIGITAL MULTIMETER

Mode

OHMS

1. Connect the patch cords as shown in Figure 5–29 on the Test Fixture.

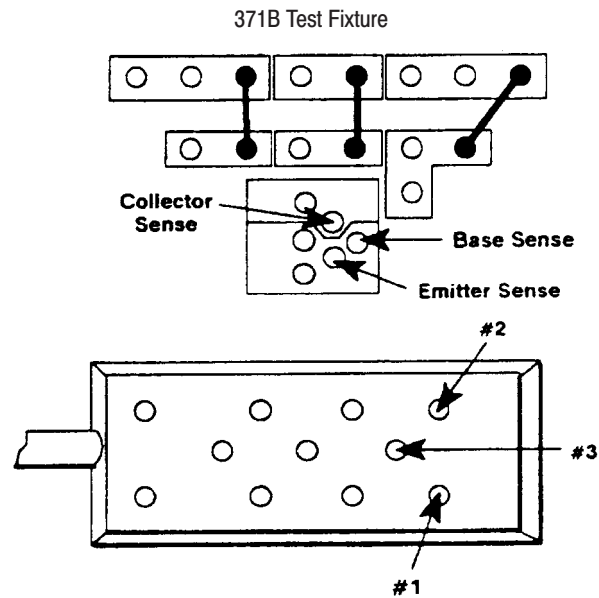


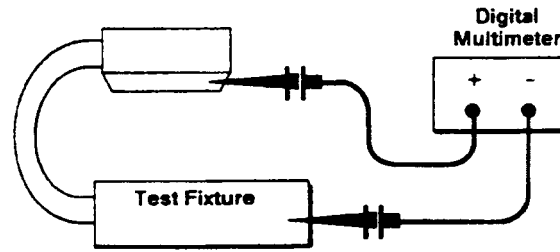
Figure 5-29: Setup for checking sense load resistance

2. CHECK that the resistance between the COLLECTOR SENSE and #1 is less than 1 Ω .
3. CHECK that the resistance between the BASE SENSE and #2 is less than 1 Ω .
4. CHECK that the resistance between the EMITTER SENSE and #3 is less than 1 Ω .

F2. Checking Test Fixture Continuity

NOTE. The characteristics examined in this procedure are examples of typical instrument operation; they are not specifications.

Equipment Setup. Set up the equipment as shown in the following illustration and set controls as described.



Test Equipment Settings:

DIGITAL MULTIMETER

Mode

OHMS

1. Connect the patch cords on the Test Fixture as shown in Figure 5–30.

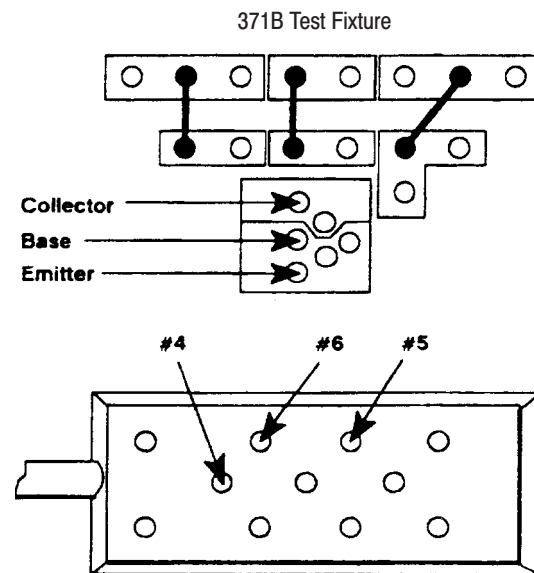


Figure 5–30: Setup A for Checking Test Fixture continuity

2. CHECK that the resistance between the COLLECTOR and #4 is less than 1Ω .
3. CHECK that the resistance between the BASE and #5 is less than 1Ω .
4. CHECK that the resistance between the EMITTER and #6 is less than 1Ω .
5. Connect the patch cords on the Test Fixture as shown in Figure 5-31.

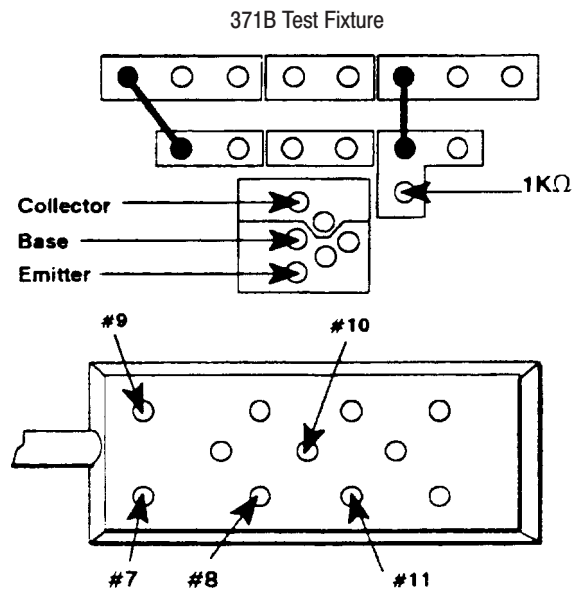


Figure 5-31: Setup B for Checking Test Fixture continuity

6. CHECK that the resistance between the COLLECTOR and #7 is less than 1Ω .
7. CHECK that the resistance between the BASE and #8 is less than 1Ω .
8. CHECK that the resistance between the $1 \text{ k}\Omega$ terminal and #8 is about $1 \text{ k}\Omega$.
9. CHECK that the resistance between #9 and #10 is less than 1Ω .
10. CHECK that the resistance between #10 and #11 is less than 1Ω with the protective cover closed and open circuit when the protective cover is open.

Reconfigure the 371B

This completes the performance check and adjustment procedures. To reconfigure the 371B perform the following:

1. Turn off 371B power.
2. Disconnect all test equipment from the 371B
3. Install any protective covers/panels removed during the performance check and adjustment procedures.
4. Install the top and side panels to the 371B.

The 371B is ready for use.

Options

Options and Accessories

Options

This subsection describes the following options available with the 371B Programmable High Power Curve Tracer.

- Option 1R (Rack mounting)
- Option D1 (Test result report)
- Option A9 (No power cord supplied)

Option 1R 371B Programmable High Power Curve Tracer comes configured for installation in a 19-inch wide instrument rack.

Option D1 A calibration data test result report will be provided with the 371B Programmable High Power Curve Tracer when this option is specified.

Option A9 371B Programmable High Power Curve Tracer comes without the power cord.

Accessories

Standard Accessories

The 371B Programmable High Power Curve Tracer includes the standard accessories listed in Table 6–1:

Table 6–1: Standard accessories

Accessory	Part number
User Manual	070-A840-XX
Test Fixture	016-A328-00
Test Adapters	
In-line Adapter	A1002
TO-3/TO-66 Adapter	A1003
Wire Set (Wire set with Alligator clips)	012-1371-00
Fuse	
250 V, 1 A, slow-blow	159-0019-00
250 V, 2 A, slow-blow	159-0238-00
250 V, 4 A, slow-blow	159-0291-00
Power Cord	161-0066-00
Utility Software (FDD)	063-3341-XX

Optional Accessories

The following optional accessories, listed in Table 6–2, are recommended for use with the instrument:

Table 6–2: Optional accessories

Accessory	Part number
Service Manual	070-A843-XX
Test Adapter	
Blank Adapter	A1001
Axial Adapter	A1005
GPIB Cable, 2m	012-0991-00
Rack Mount Kit	016-0930-00
Cart	K475

**Recommended
Accessories**

The following optional accessories, listed in Table 6–3, are recommended for use with the instrument:

Table 6–3: Recommended accessories

Accessory	Model number
Thermal Printer CBM, Thermal Printer (http://www.jcbm.co.jp)	iDP3240

Electrical Parts List

Replaceable Electrical Parts

The modules that make up this instrument are often a combination of mechanical and electrical subparts. Therefore, all replaceable modules are listed in section 9, *Mechanical Parts List*. Refer to that section for part numbers when using this manual.

The repair of the 371B Programmable High Power Curve Tracer is the exchange of the board fundamentally.

This section contains a list of the electrical components for the 371B Programmable High Power Curve Tracer. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number (see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix 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.

Part Number Revision Level

Tektronix part numbers contain two digits that show the revision level of the part. For most parts in this manual, you will find the letters XX in place of the revision level number.



When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.

Using the Replaceable Electrical Parts List

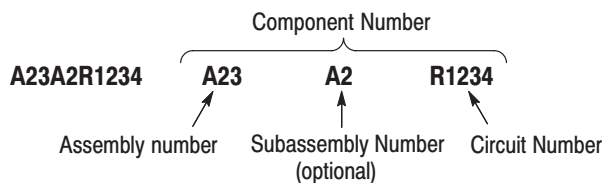
The tabular information in the Replaceable Electrical Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replacement parts. The following table describes each column of the electrical parts list.

Parts List Column Descriptions

Column	Column Name	Description
1	Component Number	The component number appears on diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are clearly marked on each diagram and circuit board illustration in the <i>Diagrams</i> section, and on the mechanical exploded views in the <i>Replaceable Mechanical Parts</i> list section. The component number is obtained by adding the assembly number prefix to the circuit number (see Component Number illustration following this table). The electrical parts list is arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes A2, with its subassemblies and parts). Chassis-mounted parts have no assembly number prefix, and they are located at the end of the electrical parts list.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entry indicates the part is good for all serial numbers.
5	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
6	Mfr. Code	This indicates the code number of the actual manufacturer of the part.
7	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations Abbreviations conform to American National Standard ANSI Y1.1–1972.

Component Number



Read: Resistor 1234 (of Subassembly 2) of Assembly 23

List of Assemblies A list of assemblies is located at the beginning of the electrical parts list. The assemblies are listed in numerical order. When a part's complete component number is known, this list will identify the assembly in which the part is located.

Chassis Parts Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts List.

Mfr. Code to Manufacturer Cross Index The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
TK0191	SONY/TEKTRONIX	5-9-31 KITASHINAGAWA, SHINAGAWA-KU, TOKYO	TOKYO JAPAN 141-0001
80009	TEKTRONIX INC.	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
TKOBD	TAISHO ELECTRIC IND CO LTD	5-28- 16 OKUSAWA SETAGAYA- KU	TOKYO JAPAN

Replaceable electrical parts list

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
A1	671-0236-21			CIRCUIT BD ASSY:MOTHER	80009	671023621
A2	671-B126-01			CIRCUIT BD ASSY:CPU	80009	671106401
A3	671-0235-08			CKT BD ASSY:A/D	80009	671023508
A4	670-9306-04			CIRCUIT BD ASSY:DIGITAL DISPLAY	80009	670930604
A5	670-9307-04			CIRCUIT BD ASSY:DISPLAY CONTROL	80009	670930704
A6	670-9308-21			CIRCUIT BD ASSY:COLLECTOR SUPPLY	80009	670930821
A7	671-0234-01			CIRCUIT BD ASSY:STEP GENERATOR	80009	671023401
A10	671-0233-03			CIRCUIT BD ASSY:SENSE	80009	671023303
A11	671-B236-00			CIRCUIT BD ASSY:MAIN KEY	80009	671B23600
A12	671-1768-01			CIRCUIT BD ASSY:SUB KEY	80009	671176801
A15	671-0226-01			CIRCUIT BD ASSY:HIGH CURRENT POWER SUPPLY	80009	671022601
A16	671-0225-01			CIRCUIT BD ASSY:HIGH CURRENT CONTROL	80009	671022501
A18	670-9319-02			CIRCUIT BD ASSY:CRT OUTPUT	80009	670931902
A20	671-B211-00			CIRCUIT BD ASSY:H.V. REGULATOR	TK0191	ORDER BY DESC
A22	671-B127-01			CIRCUIT BD ASSY:INTERFACE	80009	671B12701
A23	671-B128-01			CIRCUIT BD ASSY:FDD INTERFACE	80009	671B12801
A24	119-3456-00			FLOPPY DISK UNI:3.5 INCH W/INTERFACE	80009	119345600
A25	671-0229-02			CIRCUIT BD ASSY:MAIN POWER SUPPLY	80009	671022902
A26	671-B234-00			CIRCUIT BD ASSY:COLLECTOR PWR SPLY	TK0191	ORDER BY DESC
A27	671-0227-01			CIRCUIT BD ASSY:PRIMARY	TK0191	ORDER BY DESC
A28	670-9324-01			CIRCUIT BD ASSY:LAMP(R)	80009	670932401
A29	670-9324-02			CIRCUIT BD ASSY:LAMP(L)	80009	670932402
A30	671-0305-01			CIRCUIT BD ASSY:CONNECTOR	80009	671030501
A31	671-0306-00			CIRCUIT BD ASSY:RELAY	80009	671030600

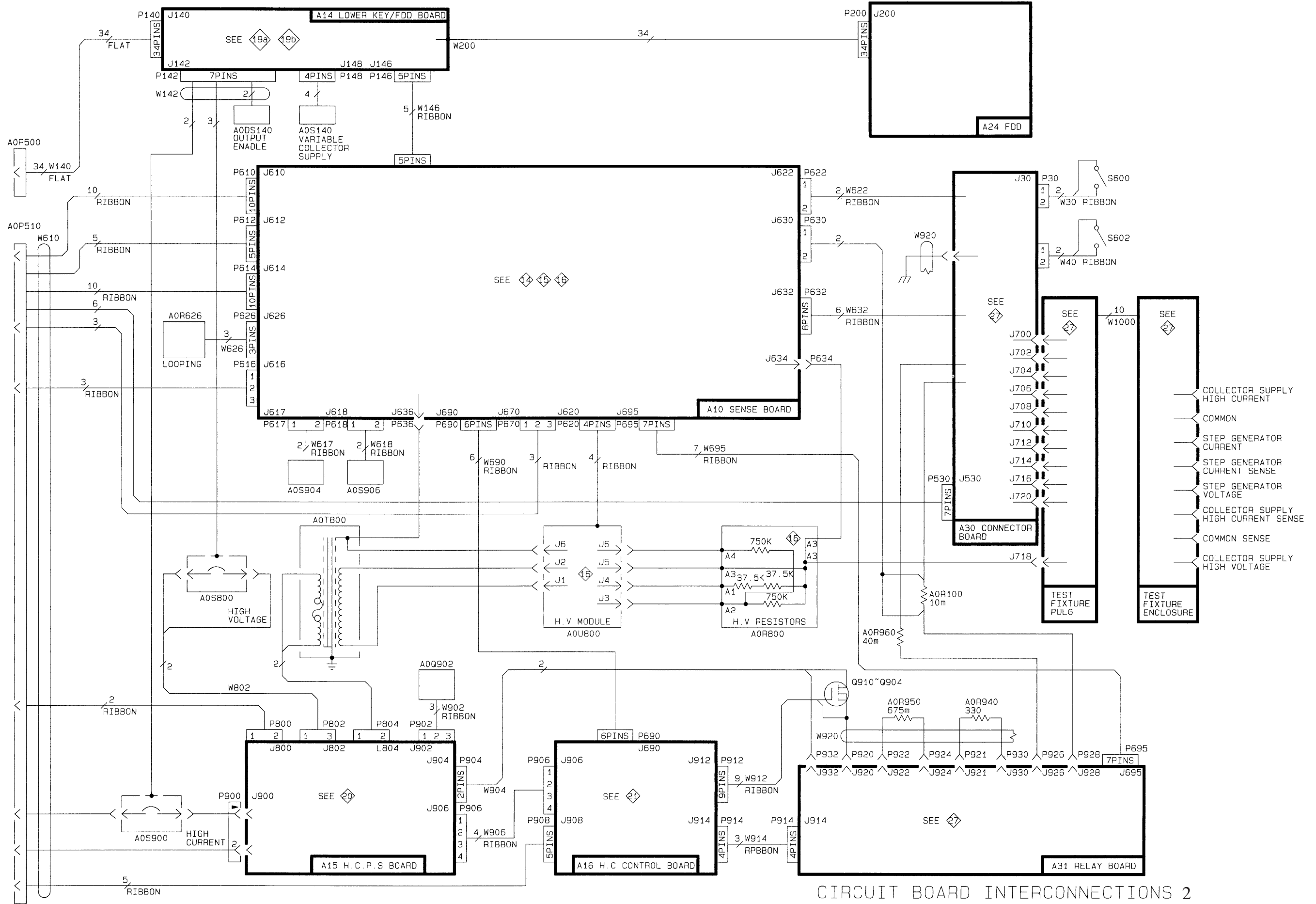
Replaceable electrical parts list (Cont.)

Component number	Tektronix part number	Serial no. effective	Serial no. discontinued	Name & description	Mfr. code	Mfr. part number
A1W60	174-0291-00			CA ASSY,SP,ELEC:16,28 AWG,18.5 L,RIBBON	80009	174029100
A1W70	174-0292-00			CA ASSY,SP,ELEC:16,28 AWG,4.3 L,RIBBON	80009	174029200
A1W192	174-0294-00			CA ASSY,SP,ELEC:16,28 AWG,12.6 L,RIBBON	80009	174029400
A6W64	174-0301-00			CA ASSY,SP,ELEC:4,22 AWG,16.0 L	80009	174030100
A11W110	174-0293-00			CA ASSY,SP,ELEC:40,28 AWG,4.3 L,RIBBON	80009	174029300
A22W220	174-0295-00			CA ASSY,SP,ELEC:26,28 AWG,11.0 L,RIBBON	80009	174029500
A23W200	174-1611-00			CA ASSY,SP,ELEC:34,28 AWG,9.0 L,RIBBON	80009	174161100
A27P100	174-1009-00			CA ASSY,SP,ELEC:1,22 AWG,3.0 L	80009	174100900
A28W280	174-0313-00			CA ASSY,SP,ELEC:2,26 AWG,30.0 L,RIBBON	80009	174031300
A29W290	174-0312-00			CA ASSY,SP,ELEC:2,26 AWG,22.0 L,RIBBON	80009	174031200
A30W622	174-0991-00			CA ASSY,SP,ELEC:6,26 AWG,23.6 L,RIBBON	TK0191	174099100
A30W632	174-0993-00			CA ASSY,SP,ELEC:6,26 AWG,23.6 L,RIBBON	TK0191	174099300

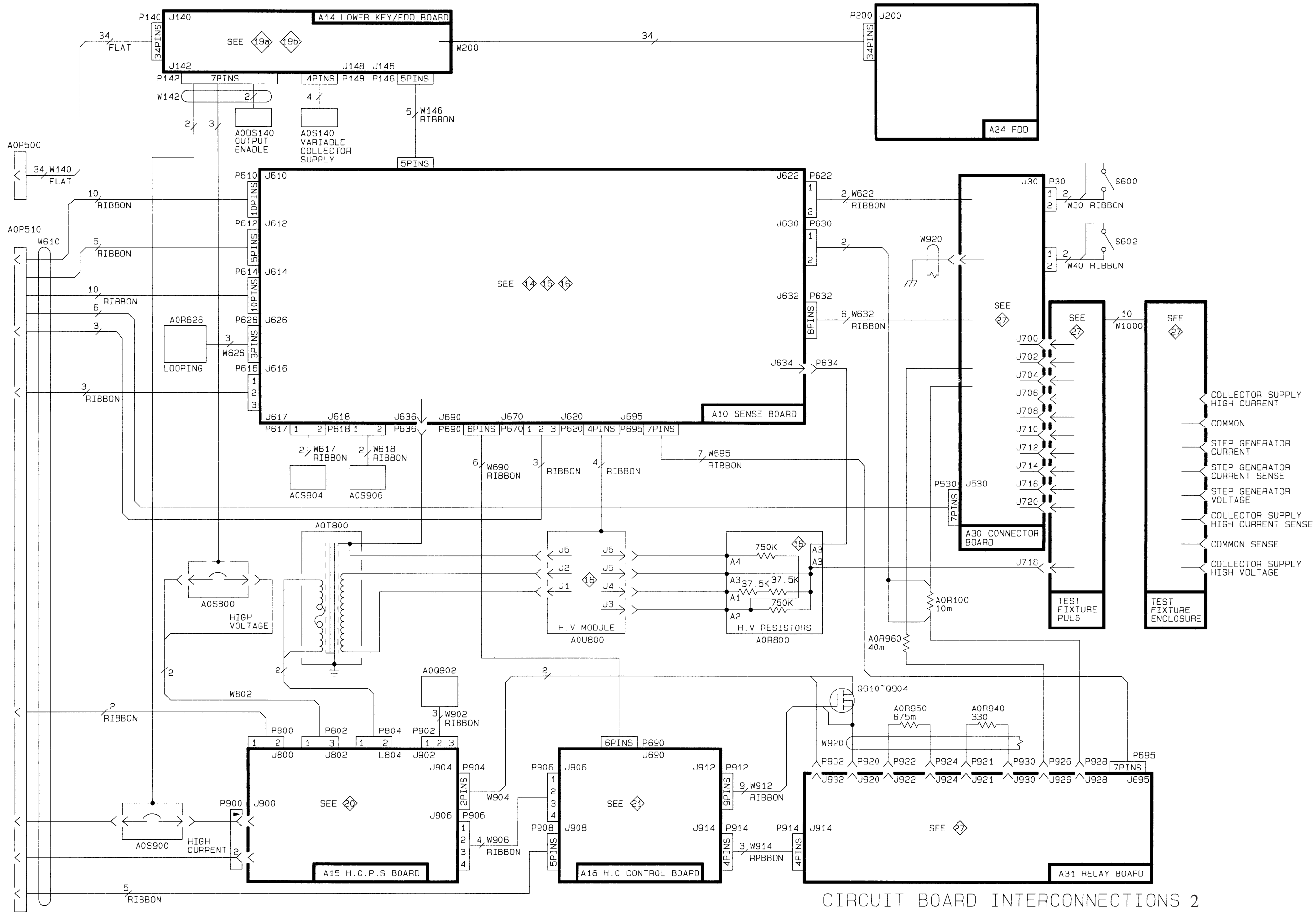
Replaceable electrical parts list (Cont.)

Component number	Tektronix part number	Serial no. effective	Serial no. discont'd	Name & description	Mfr. code	Mfr. part number
B100	119-3674-00	J300000	J300484	FAN,TUBEAXIAL:115VAC,240MA,19W,2650 RPM	80009	119367400
B100	119-2310-01	J300485		FAN ,TUBEXIAL:115VAC,230MA,16W,2650 RPM	80009	119231001
W14	196-3099-00			LEAD,ELECTRICAL:24 AWG,10.0 L	80009	196309900
W16	198-5667-01			WIRE SET,ELEC:LINE FILTER,371B	80009	198566701
W17	196-3112-01			LEAD,ELECTRICAL:18 AWG,6.0 L,5-4	80009	196311201
W18	198-5667-01			WIRE SET,ELEC:LINE FILTER,371B	80009	198566701
W20	196-3189-00			LEAD,ELECTRICAL:18 AWG,5.0 L,8-02	TK0191	196318900
W30	174-0981-00			CA ASSY,SP,ELEC:2,26 AWG,2.0 L,RIBBON	TK0191	ORDER BY DESC
W40	174-0981-00			CA ASSY,SP,ELEC:2,26 AWG,2.0 L,RIBBON	TK0191	174098100
W66	174-0304-00			CA ASSY,SP,ELEC:2,26 AWG,6.0 L,RIBBON	80009	174030400
W72	174-0982-00			CA ASSY,SP,ELEC:10,22 AWG,21.7 L	TK0191	174098200
W140	174-1693-00			CA ASSY,SP,ELEC:34,28 AWG,130.0 L,RIBBON	80009	174169300
W142	174-2302-00			CA ASSY,SP,ELEC:7,26 AWG,30CM L,RIBBON	80009	174230200
W146	174-0985-00			CA ASSY,SP,ELEC:5,26 AWG,7.8 L,RIBBON	TK0191	174098500
W180	174-0314-00			CA ASSY,SP,ELEC:9,26 AWG,7.5 L,RIBBON	80009	174031400
W182	174-0309-00			CA ASSY,SP,ELEC:10,22 AWG,5.0 L,RIBBON	80009	174030900
W190	174-0328-00			CA ASSY,SP,ELEC:4,18 AWG,15.5 L	80009	174032800
W194	174-0308-00			CA ASSY,SP,ELEC:6,22 AWG,20.0 L,RIBBON	80009	174030800
W270	174-0986-00			CA ASSY,SP,ELEC:3,18 AWG,10.0 L	TK0191	174098600
W272	161-0257-01	300000	300484	CABLE ASSY,PWR,:125V,1A.200MM L	80009	161025701
W400	174-0296-00			CA ASSY,SP,ELEC:34,28 AWG,5.5 L,RIBBON	80009	174029600
W410	198-5749-00			WIRE SET,ELEC:371B W/D-SUB 50 CONT,FEMALE	80009	198574900
W610	198-5750-00			WIRE SET,ELEC:371B W/D-SUB 50 CONT,MALE	80009	198575000
W617	174-0989-00			CA ASSY,SP,ELEC:2,26 AWG,15.7 L,RIBBON	TK0191	174098900
W618	174-0989-00			CA ASSY,SP,ELEC:2,26 AWG,15.7 L,RIBBON	TK0191	ORDER BY DESC
W626	174-0992-00			CA ASSY,SP,ELEC:3,26 AWG,8.6 L,RIBBON	TK0191	174099200
W690	174-0994-00			CA ASSY,SP,ELEC:6,26 AWG,15.7 L,RIBBON	TK0191	174099400
W695	174-0995-00			CA ASSY,SP,ELEC:7,26 AWG,20.0 L,RIBBON	TK0191	174099500
W706	198-5616-00			WIRE SET,ELEC:371B	TK0191	198561600
W802	174-1146-00			CA ASSY,SP,ELEC:2,18 AWG,20 L,8-01 & 8-02	80009	174114600
W902	174-0996-00			CA ASSY,SP,ELEC:3,22 AWG,7.0 L	TK0191	174099600
W904	174-0997-00			CA ASSY,SP,ELEC:2,12 AWG,4.7 L	TK0191	174099700
W906	174-0998-00			CA ASSY,SP,ELEC:4,26 AWG,13.3 L,RIBBON	TK0191	174099800
W912	174-0999-00			CA ASSY,SP,ELEC:9,26 AWG,6.7 L,RIBBON	TK0191	ORDER BY DESC
W914	174-1000-00			CA ASSY,SP,ELEC:3,26 AWG,7.0 L,RIBBON	TK0191	174100000
W920	198-5616-00			WIRE SET,ELEC:371B	TK0191	ORDER BY DESC
W1000	198-5627-00			WIRE SET,ELEC:371B	TK0BD	198562700

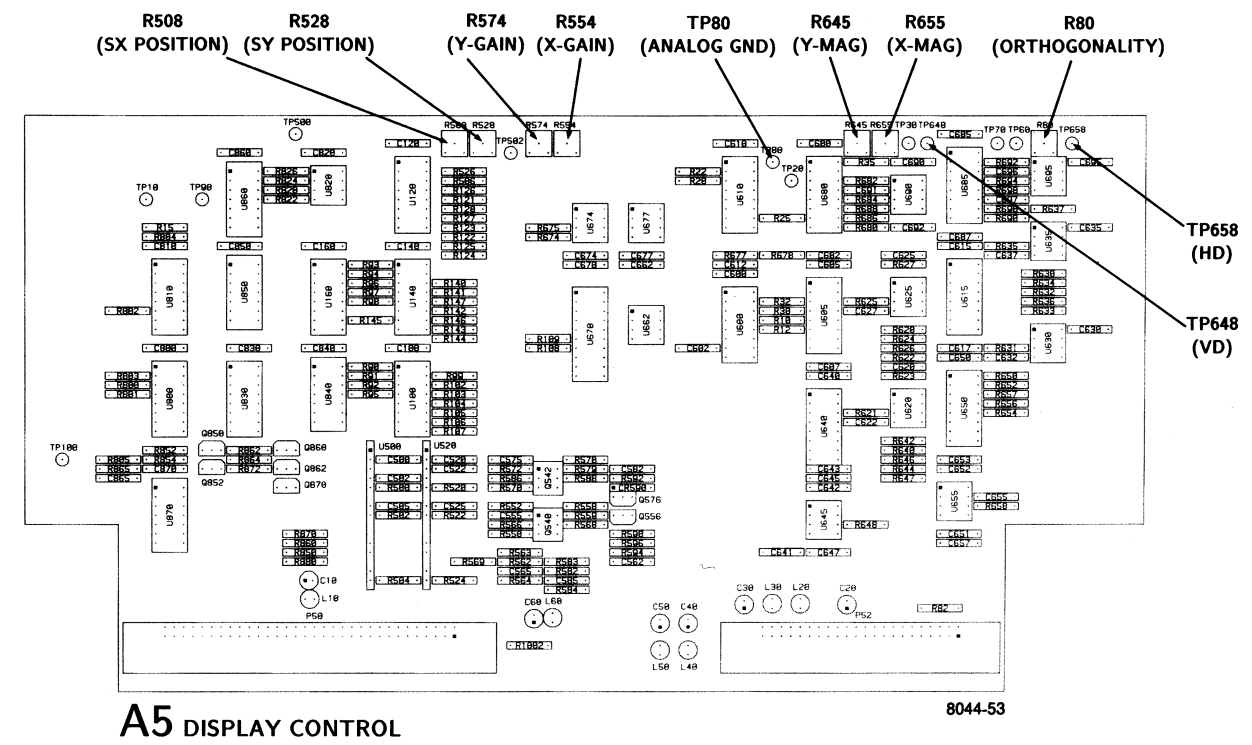
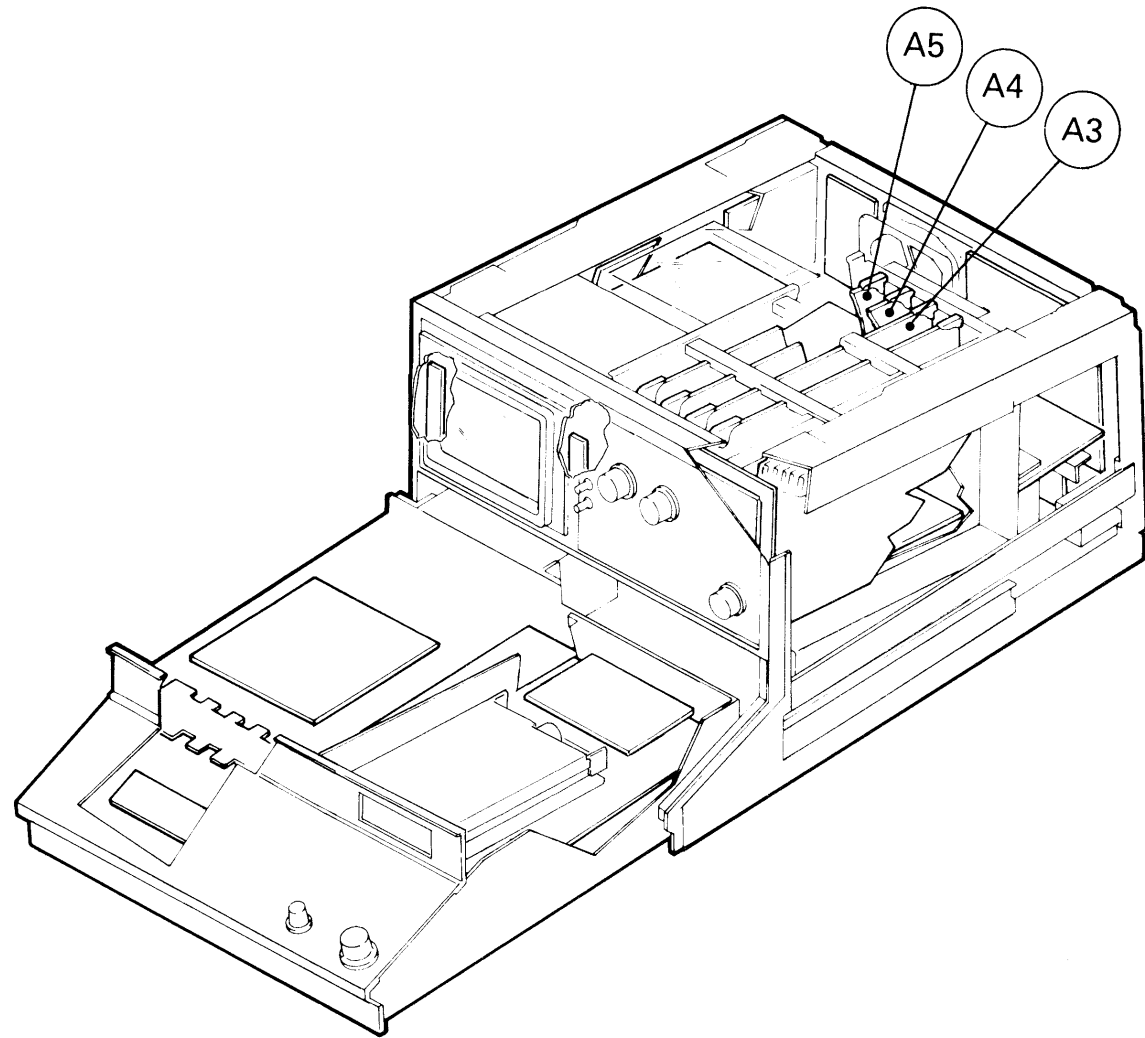
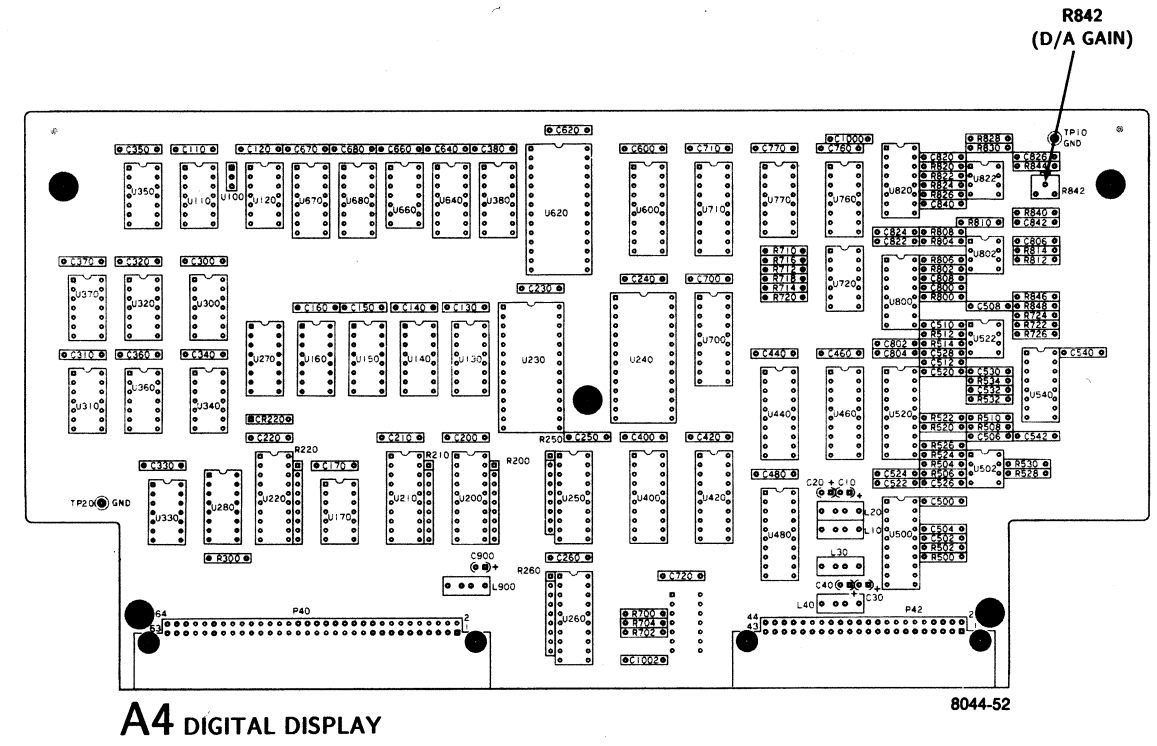
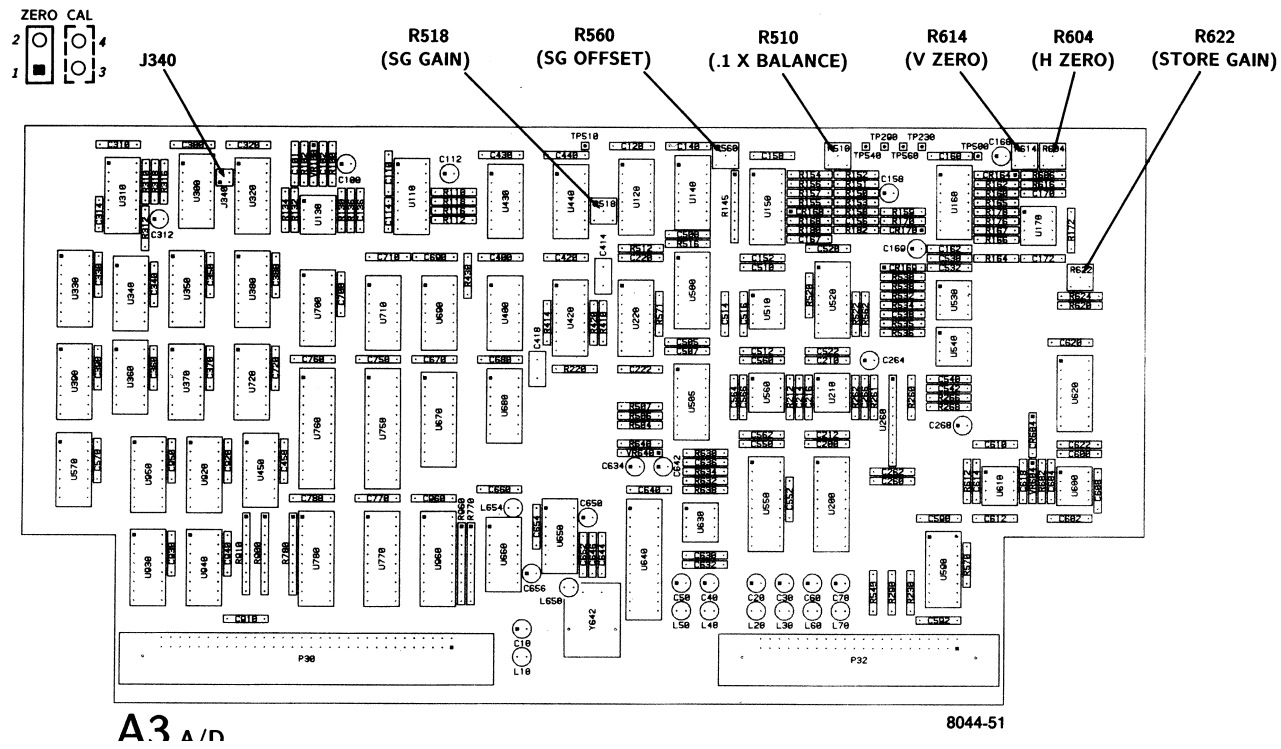
Diagrams

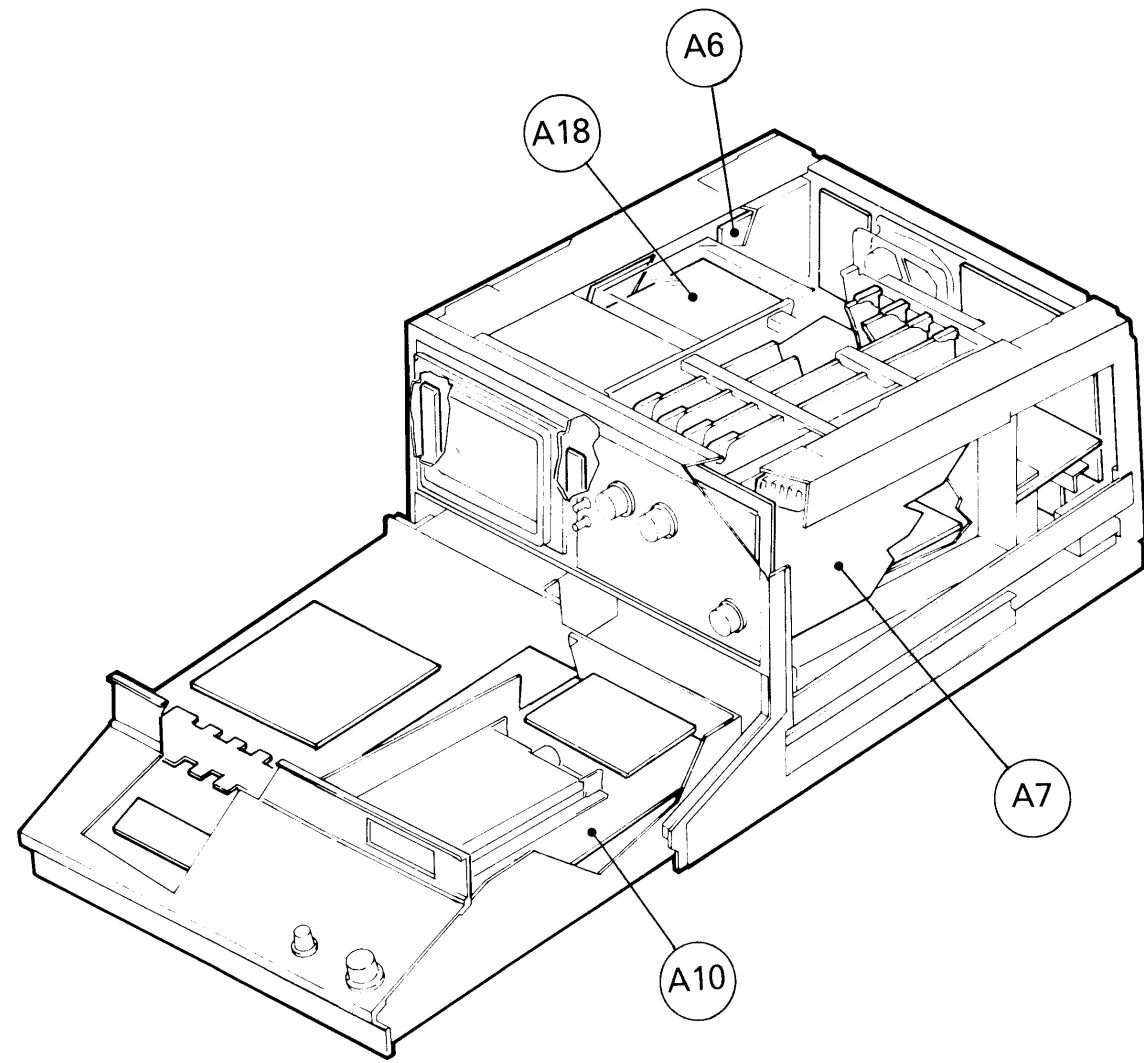


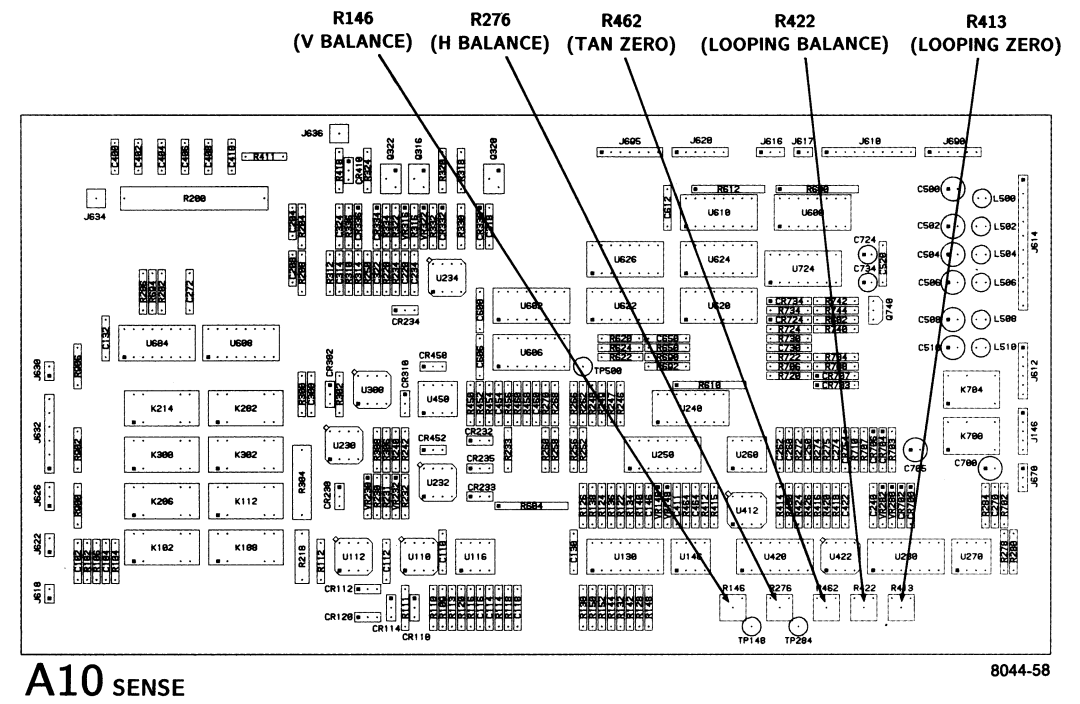
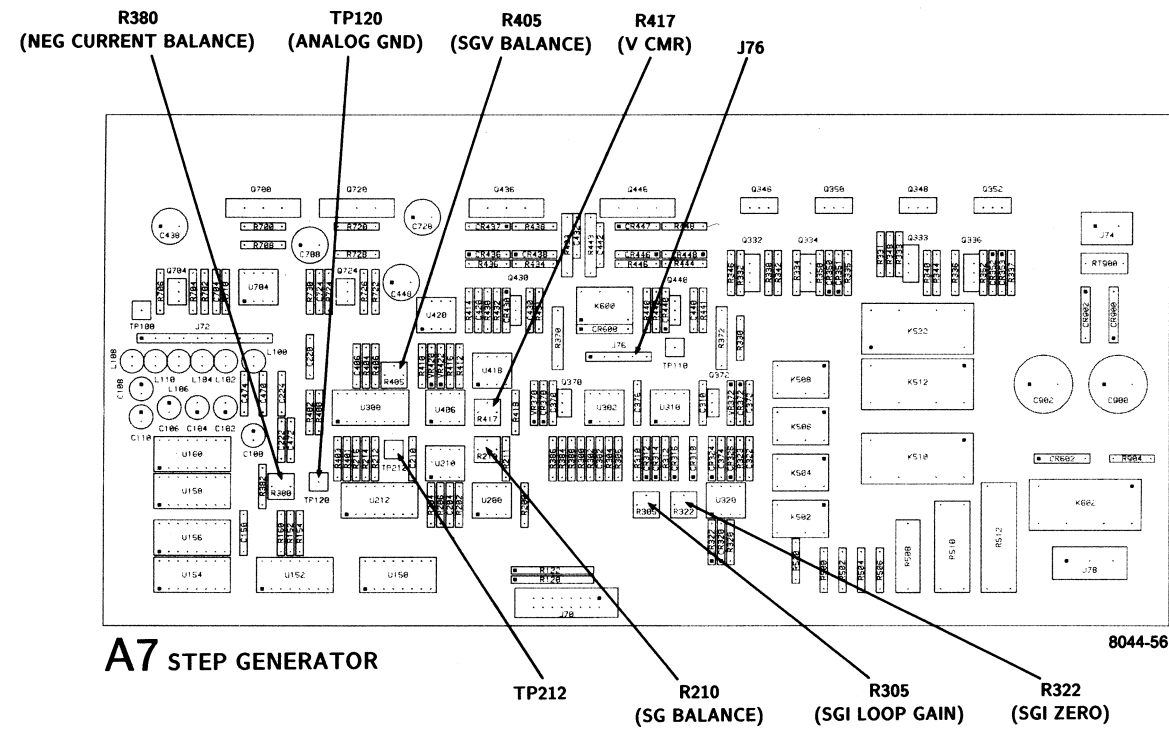
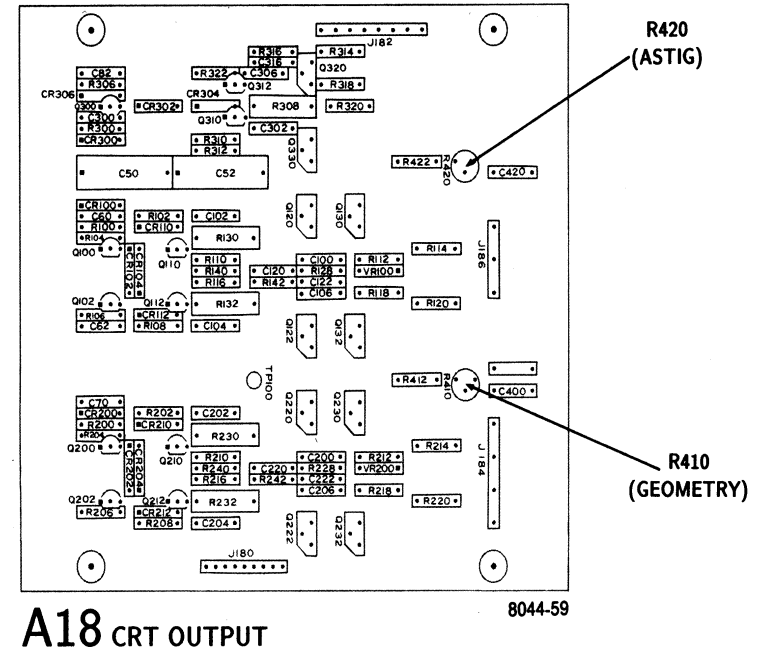
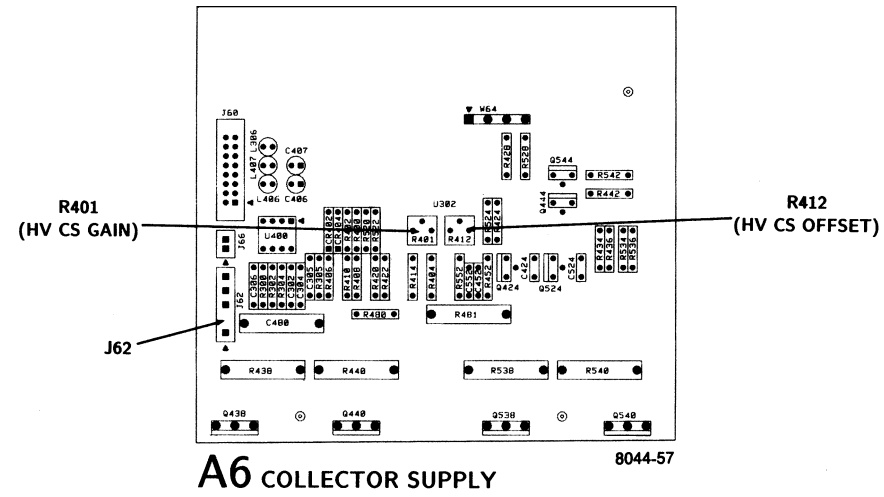
CIRCUIT BOARD INTERCONNECTIONS 2

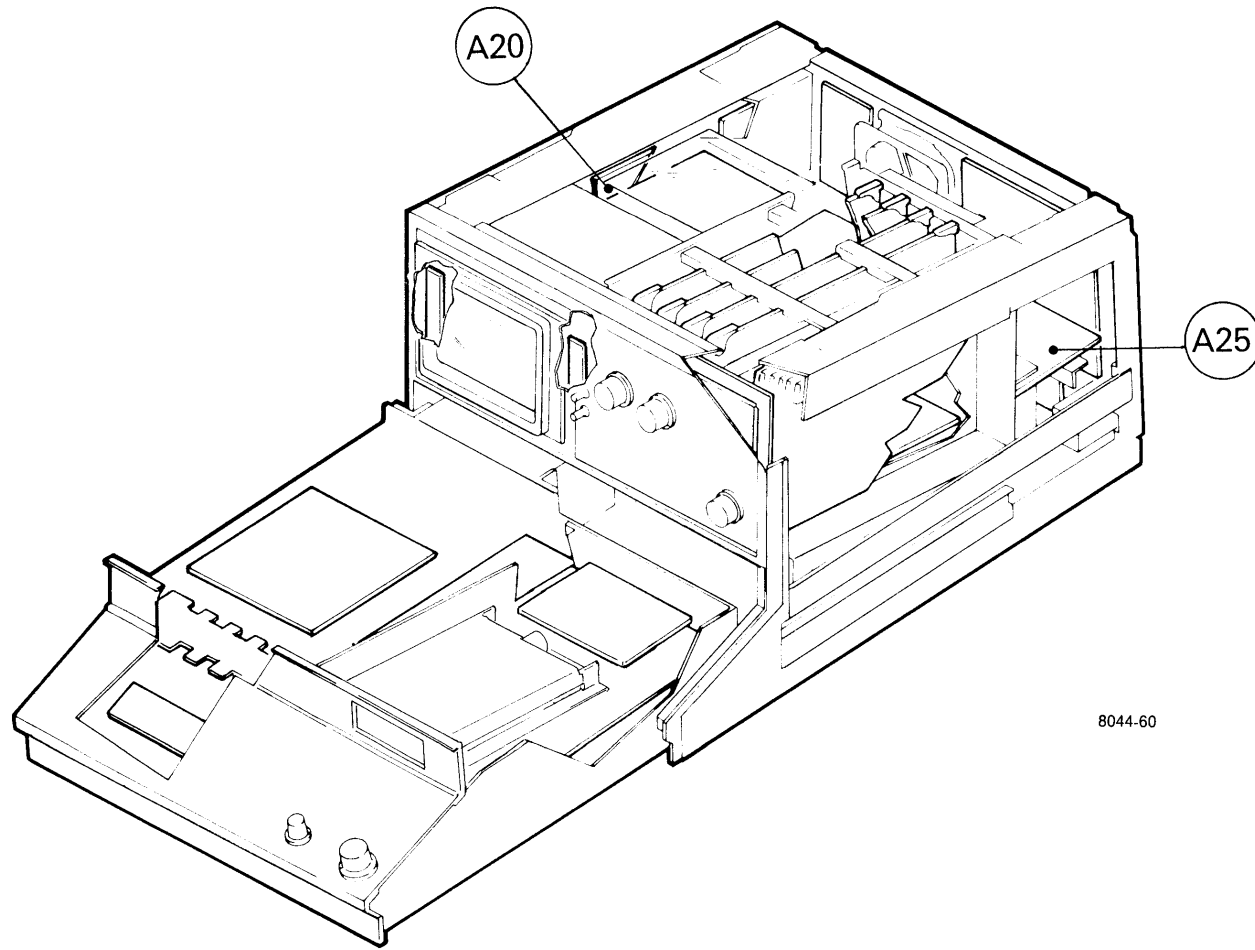


CIRCUIT BOARD INTERCONNECTIONS 2

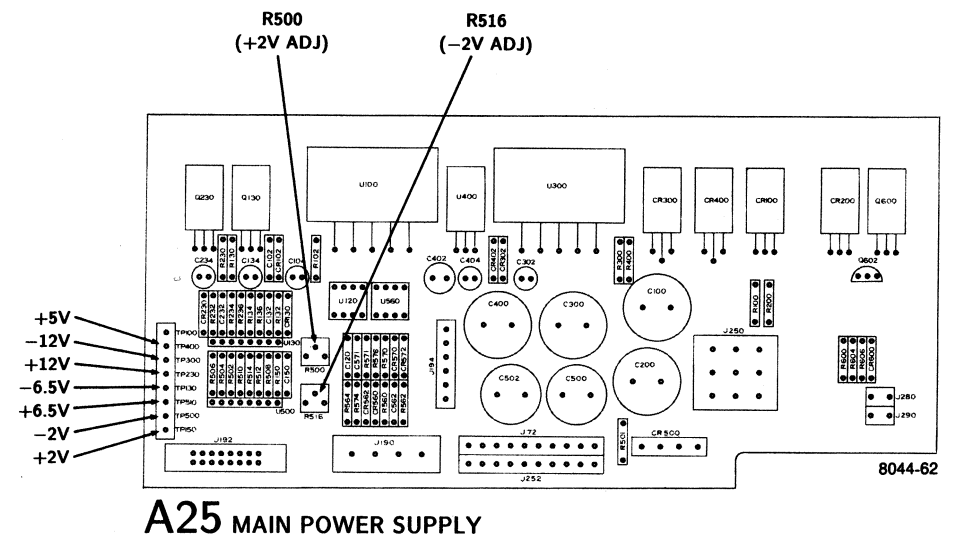
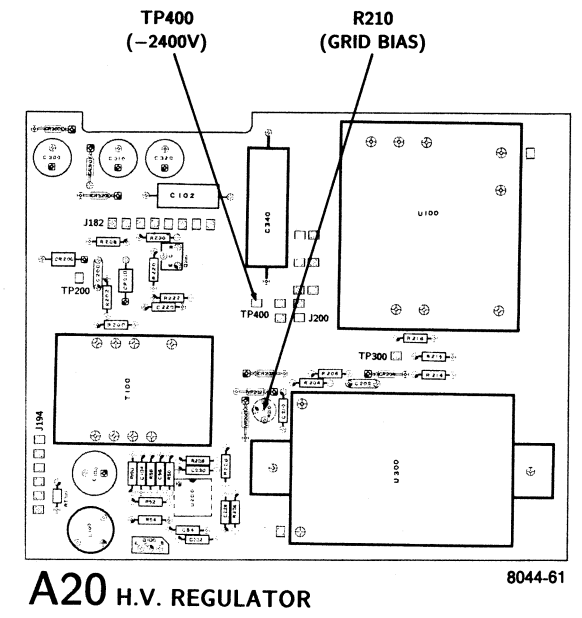


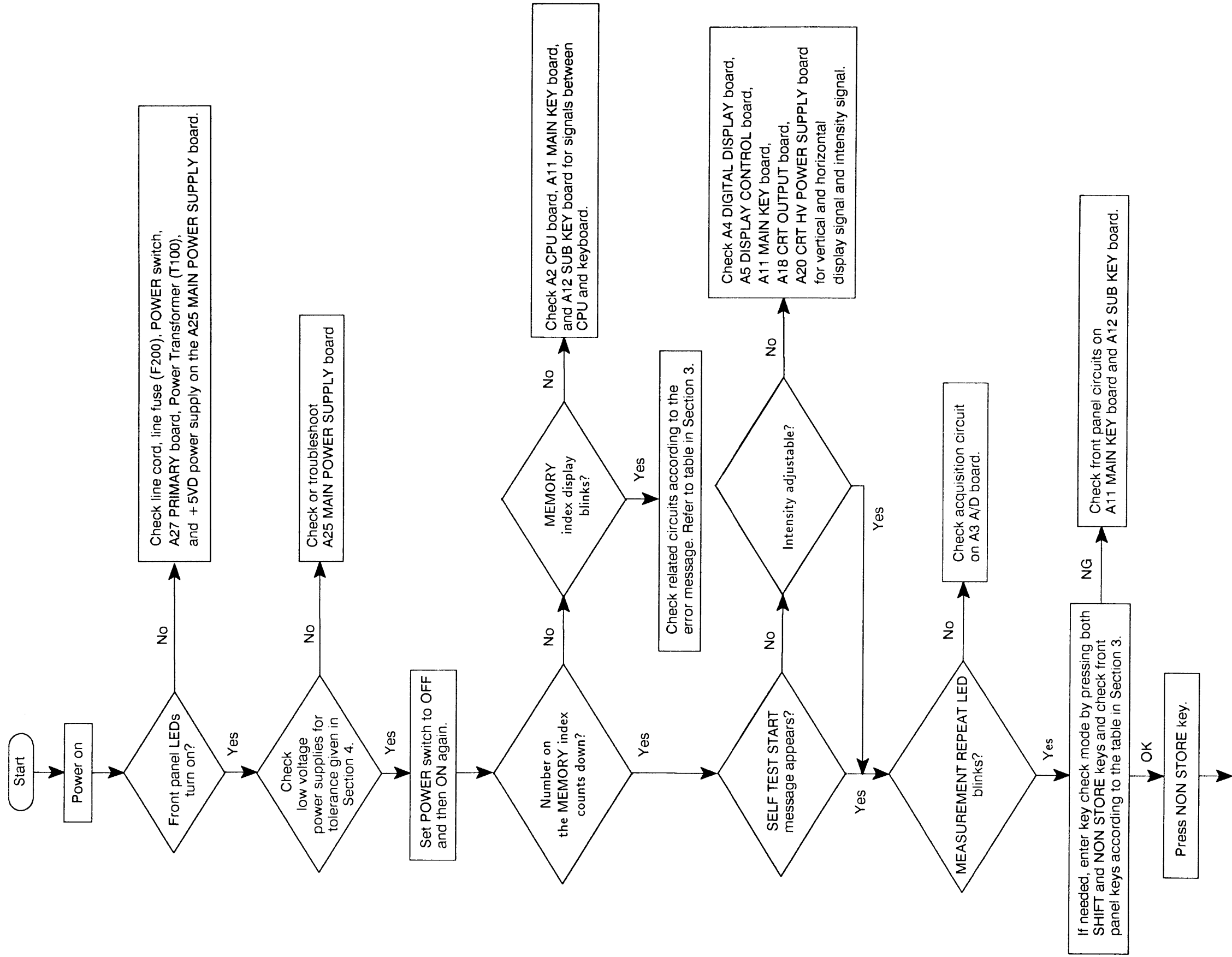




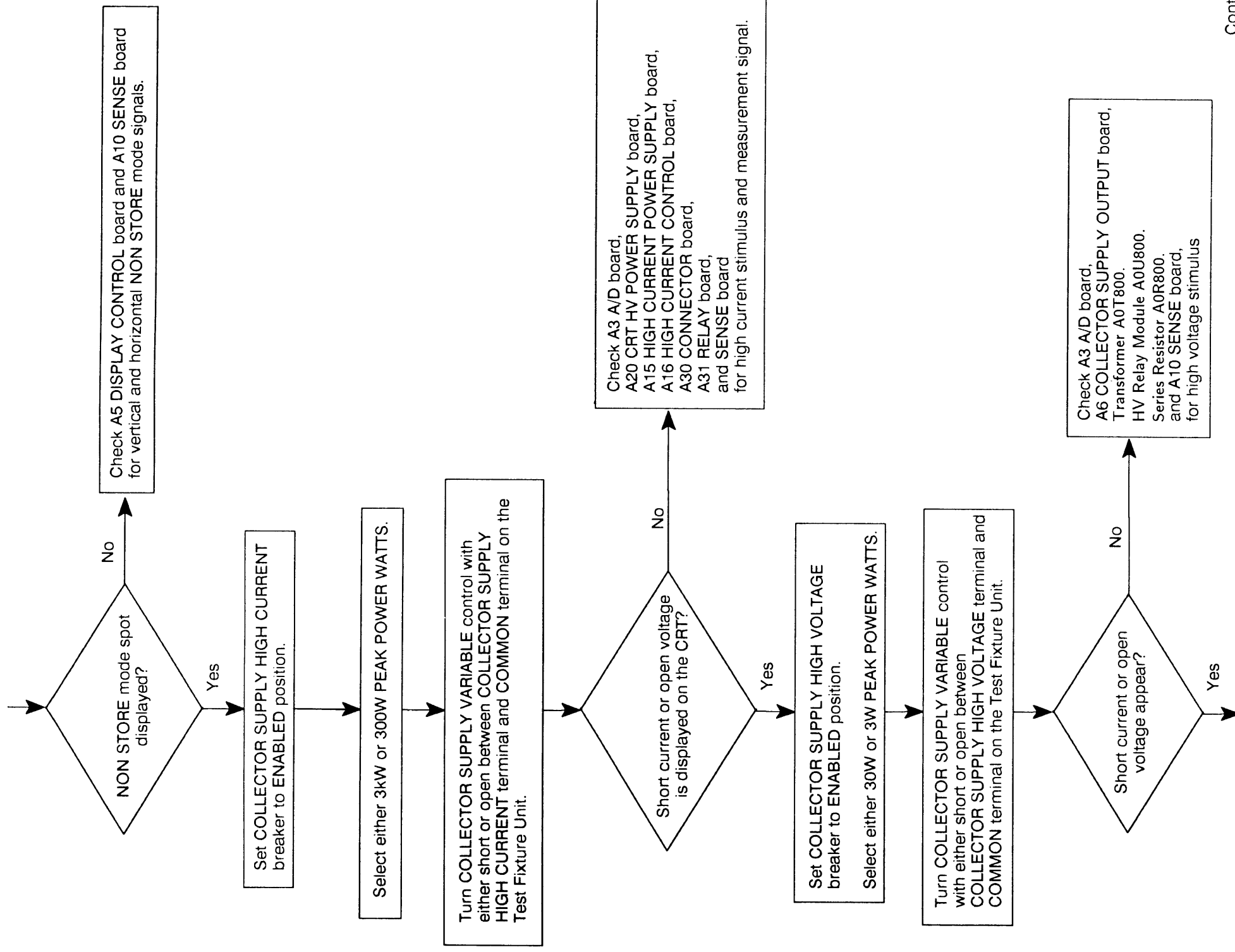


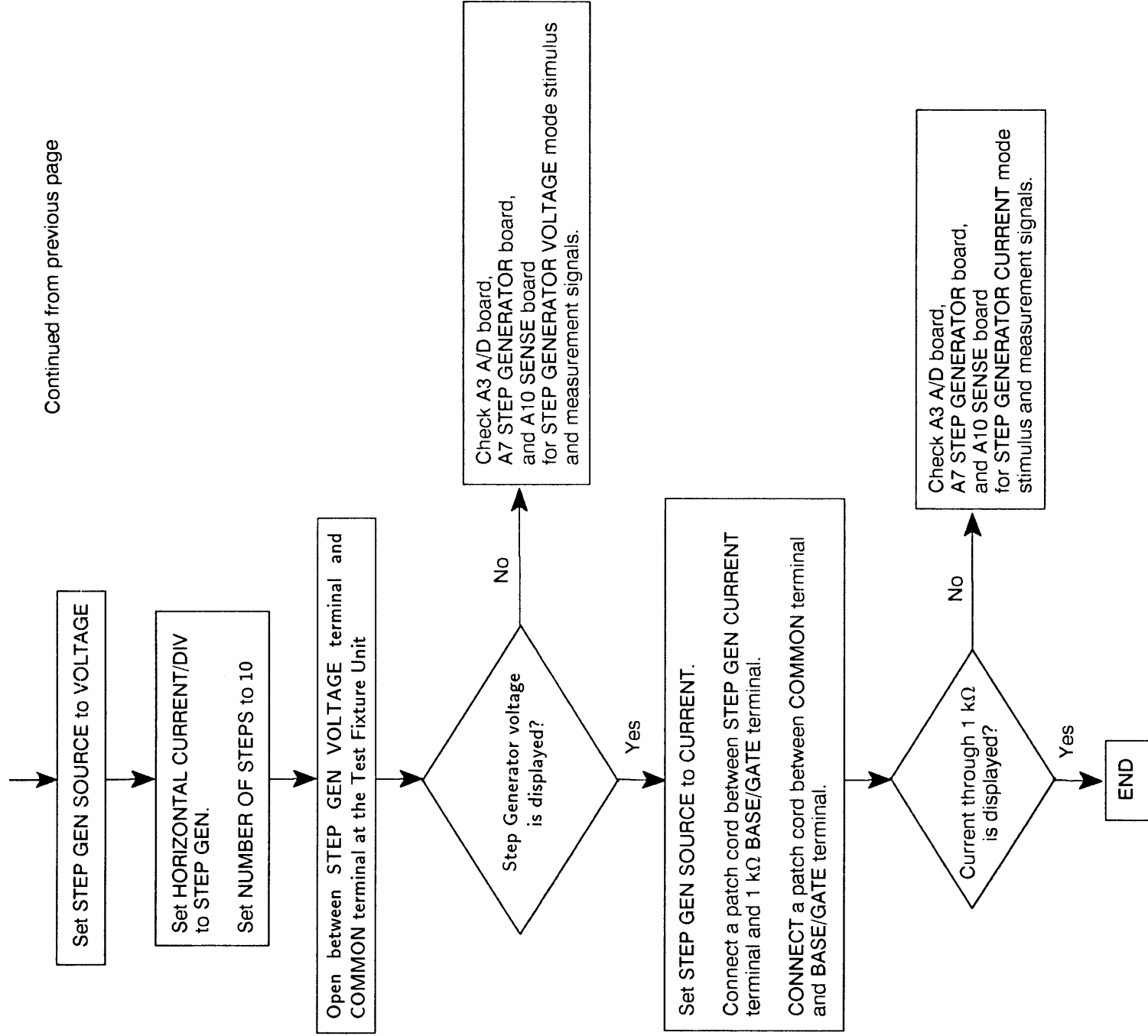
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Mechanical Parts List

Mechanical Parts List

This section contains a list of the replaceable modules for the 371B. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix 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. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number(see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix 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.

Part Number Revision Level

Tektronix part numbers contain two digits that show the revision level of the part. For most parts in this manual, you will find the letters XX in place of the revision level number.



When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.

Module Servicing Modules can be serviced by selecting one of the following three options. Contact your local Tektronix service center or representative for repair assistance.

Module Exchange. In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-TEK-WIDE, extension 6630.

Module Repair and Return. You may ship your module to us for repair, after which we will return it to you.

New Modules. You may purchase replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

This section contains a list of the mechanical and/or electrical components that are replaceable for the analyzer. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

Parts List Column Descriptions

Column	Column Name	Description
1	Figure & Index Number	Items in this section are referenced by component number.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty.	This indicates the quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
7	Mfr. Code	This indicates the code of the actual manufacturer of the part. (Code to name and address cross reference is located after this page.)
8	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations Abbreviations conform to American National Standard ANSI Y1.1-1972.

Mfr. Code to Manufacturer Cross Index The following table cross indexes codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S4238	STANLEY ELECTRIC CO LTD	2-9-13 NAKA-MEGURO MEGURO-KU	TOKYO 153 JAPAN
TK0AL	ONODERA MFG. CO LTD	3-1-2 KAMIYOHGA SETAGAYA-KU	TOKYO JAPAN
TK0AP	SUGANUMA MFG CO LTD	5-8-22 KITA-SHINAGAWA SHINAGAWA-KU	TOKYO JAPAN
TK0AR	KITAGAWA IND CO LTD	2-4-26 MUROMACHI NIHONBASHI CHUO-KU	TOKYO JAPAN
TK0AU	CHIYODA DENSHI CO LTD	2-5-12 MITA MEGURO-KU	TOKYO JAPAN
TK0BD	TAISHO ELECTRIC IND CO LTD	5-28-16 OKUSAWA SETAGAYA-KU	TOKYO JAPAN
TK0BI	ACOUS IND CO LTD	2-6 TA-CO KANDA CHIYODA-KU	TOKYO JAPAN
TK0BJ	SONE SHOTEN CO LTD	2-1-10 TSUKIZE CHUO-KU	TOKYO JAPAN
TK0BK	SHOWA KOSAN CO LTD	2-947 IKEBUKURO TOSHIMA-KU	TOKYO JAPAN
TK0BV	KYODO LIGHT METAL CO LTD	2-5-3 NIHONBASHI CHUO-KU	TOKYO JAPAN
TK0BW	MULTI CONTACT	2-7-2 SHINYOKOHAMA KITA-KU YOKOHAMA-CITY	KANAGAWA JAPAN
TK0CA	SUZUKI ELEC MFG CO LTD	105 OHKUMA-CHO MIDORI-KU YOKOHAMA-CITY	KANAGAWA JAPAN
TK0CB	T K Y MFG CO LTD	2-18-8 MASUGATA TAMA-KU KAWASAKI-CITY	KANAGAWA JAPAN
TK0CF	YASUDA MFG CO LTD	81-1 OKESHITA NISHIMAKADO NUMAZU-CITY	SHIZUOKA JAPAN
TK0CM	SUMISHO NON-FERROUS METALS TRADING CO	2-6-1 NISHI-SHINJUKU SHINJUKU-KU	TOKYO JAPAN
TK0CP	NISSHO DENZAI CO LTD	15-26 ICHIBAN-CHO MISHIMA-CITY	SHIZUOKA JAPAN
TK0CX	SANRIN PRINTING CO LTD	5-7-3 KITA-SHINAGAWA SHINAGAWA-KU	TOKYO JAPAN
TK0DJ	KOKKO ELEC CO LTD	5-8-20 KITA-SHINAGAWA SHINAGAWA-KU	TOKYO JAPAN
TK0DK	KYORITSU PLASTIC IND CO LTD	2739 FURUIKE OHHIRA NUMAZU-CITY	SHIZUOKA JAPAN
TK0DW	MIZUNO MFG CO LTD	592-1 TSUMADA ATSUGI-CITY	KANAGAWA JAPAN
TK0EV	MORI HATSUJO CO LTD	1-1-17 BUNDA SUMIDA-KU	TOKYO JAPAN
TK0FE	NAKANO PERMALLOY CO LTD	5-22-14 HIGASHINAKANO NAKANO-KU	TOKYO JAPAN

Manufacturers cross index (Cont.)

Mfr. code	Manufacturer	Address	City, state, zip code
TK00Z	H Y ASSOCIATES CO LTD	1-2-2 MOMOI SIGINAMI-KU	TOKYO JAPAN
TK0191	SONY/TEKTRONIX	5-9-31 KITASHINAGAWA, SHINAGAWA-KU, TOKYO	TOKYO JAPAN 141-0001
TK0392	NORTHWEST FASTENER SALES INC	8058 SW NIMBUS AVENUE	BEAVERTON OR 97008
TK0413	ADAMS SUPPLY COMPANY	1850 W 205TH ST P O BOX 2938	TORRANCE CA 90509
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK0914	WESTERN SINTERING CO INC	2620 STEVENS DRIVE	RICHLAND WA 99352
TK1499	AMLAN INC	97 THORNWOOD RD	STAMFORD CT 06903-2617
TK1943	NEILSEN MANUFACTURING INC	3501 PORTLAND ROAD NE	SALEM OR 97303
TK2541	AMERICOR ELECTRONICS LTD	2682 W COYLE AVENUE	ELK GROVE VILLAGE IL 60007
TK2548	XEROX BUSINESS SERVICES DIV OF XEROX CORPORATION	14181 SW MILLIKAN WAY	BEAVERTON OR 97077
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661-2999
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
07416	NELSON NAME PLATE CO	3191 CASITAS	LOS ANGELES CA 90039-2410
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250-3318
12136	P H C INDUSTRIES INC	1643 HADDON AVE PO BOX 1448	CAMDEN NJ 08103-3109
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LN PO BOX 810839	DALLAS TX 75381
2X013	MCGUIRE BEARING CO	947 SE MARKET ST	PORTLAND OR 97214-3556
28389	MICROMANIPULATOR	2801 ARROWHEAD DR	CARSON CITY, NV 89706
6D224	HARBOR TRI-TEC A BERG ELECTRONICS COMPANY	14500 SOUTH BROADWAY	GARDENA, CA 90248
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952-1152
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076-9749
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
8X345	NORTHWEST SPRING & MFG CO	5858 SW WILLOW LANE	LAKE OSWEGO OR 97035
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
86928	SEASTROM MFG CO INC	701 SONORA AVE	GL ENDALE CA 91201-2431
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
99742	PERMACEL TAPE DIV AN AVERY CO	U S HIGHWAY 1 P O BOX 671	NEW BRUNSWICK NJ 08903

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
1-1	390-0984-XX			1	CABINET SIDE:LEFT (ATTACHING PARTS)	80009	39009840XX
-2	211-0507-XX			1	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-3	367-0116-XX			2	HANDLE,CARRYING:16.54 L,BLUE VINYL (ATTACHING PARTS)	12136	ORDER BY DESC
-4	212-0628-XX			8	SCREW,SHOULDER:10-32 X 0.4 L,RDH,STL	93907	ORDER BY DESC
-5	386-1624-XX			4	PLATE,HDL RTNG:STAINLESS STEEL (END ATTACHING PARTS)	TK1943	ORDER BY DESC
-6	386-1283-XX			4	PLATE,HDL MTG:FRONT	0JR05	ORDER BY DESC
-7	200-0728-XX			4	COVER,HDL END:1.91 X 0.91 X 0.36 BLUEACETAL	0JR05	200-0728-XX
-8	426-2371-XX			1	FRAME,SECTION:TOP LEFT,TEK TAN,AL (ATTACHING PARTS)	80009	4262371XX
-9	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-10	211-0510-XX			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-11	211-0538-XX			4	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-12	124-0446-XX			1	STRIP,TRIM:TOP RIGHT	80009	1240446XX
-13	426-2372-XX			1	FRAME,SECTION:TOP RIGHT,TEK TAN,AL (ATTACHING PARTS)	80009	4262372XX
-14	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-15	211-0510-XX			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-16	211-0504-XX			5	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-17	124-0447-XX			1	STRIP,TRIM:TOP RIGHT	80009	1240447XX
-18	426-2141-XX			1	FRAME SECT,CAB.:LEFT (ATTACHING PARTS)	80009	4262141XX
-19	211-0559-XX			1	SCREW,MACHINE:6-32 X 0.375,FLH,STL	TK0435	1593-300
-20	211-0504-XX			4	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-21	426-2142-XX			1	FRAME SECT,CAB.:RIGHT (ATTACHING PARTS)	80009	4262142XX
-22	211-0559-XX			1	SCREW,MACHINE:6-32 X 0.375,FLH,STL	TK0435	1593-300
-23	211-0504-XX			3	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-24	407-3890-XX			1	BRACKET,SUPPORT:ALUMINUM (ATTACHING PARTS)	80009	4073890XX
-25	212-0002-XX			4	SCREW,MACHINE:8-32 X 0.25,FLH,STL	0KB01	ORDER BY DESC
-26	212-0004-XX			4	SCREW,MACHINE:8-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-27	407-3890-XX			1	BRACKET,SUPPORT:ALUMINUM (ATTACHING PARTS)	80009	4073890XX
-28	212-0002-XX			4	SCREW,MACHINE:8-32 X 0.25,FLH,STL	0KB01	ORDER BY DESC

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discount'd	Qty	Name & description	Mfr. code	Mfr. part number
-29	212-0004-XX			4	SCREW,MACHINE:8-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-30	334-7068-XX			1	MARKER,IDENT:MKD R146	TK0CX	30-0102
-31	426-2211-XX			1	FRAME SECTION:BOTTOM,LEFT (ATTACHING PARTS)	TK019 1	4262211XX
-32	211-0559-XX			2	SCREW,MACHINE:6-32 X 0.375,FLH,STL (END ATTACHING PARTS)	TK0435	1593-300
-33	124-0448-XX			2	STRIP,TRIM:BOTTOM	80009	1240448XX
-34	348-0128-XX			4	FOOT,CABINET:BLACK POLYURETHANE (ATTACHING PARTS)	80009	3480128XX
-35	211-0513-XX			8	SCREW,MACHINE:6-32 X 0.625,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-36	426-2134-XX			1	FRAME SECTION:FRONT,LEFT (ATTACHING PARTS)	TK0191	4262134XX
-37	211-0538-XX			2	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-38	426-2138-XX			1	FRAME SECTION:BOTTOM,RIGHT (ATTACHING PARTS)	TK0191	4262138XX
-39	211-0559-XX			2	SCREW,MACHINE:6-32 X 0.375,FLH,STL (END ATTACHING PARTS)	TK0435	1593-300
-40	334-3379-XX			1	MARKER,IDENT:MARKED GROUND SYMBOL	07416	ORDER BY DESC
-41	426-2135-XX			1	FRAME SECTION:FRONT,RIGHT (ATTACHING PARTS)	TK0191	4262135XX
-42	211-0538-XX			2	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-43	351-0770-XX			2	GUIDE,TEST FXTR:BOTTOM (ATTACHING PARTS)	80009	3510770XX
-44	211-0038-XX			6	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-45	441-1739-XX			1	CHAS,CRV TRACER:BOTTOM (ATTACHING PARTS)	80009	4411739XX
-46	211-0541-XX			2	SCREW,MACHINE:6-32 X 0.25,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-47	390-0987-XX			1	CABINET BOTTOM: (ATTACHING PARTS)	80009	3900987XX
-48	211-0007-XX			6	SCREW,MACHINE:4-40 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-49	390-1088-XX			1	CABINET,TOP:ALUMINUM (ATTACHING PARTS)	80009	3901088XX
-50	211-0507-XX			1	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-51	426-2136-XX			1	FRAME SECT,CAB.:REAR,AL	80009	4262136XX
-52	390-0985-XX			1	CABINET SIDE:RIGHT (ATTACHING PARTS)	80009	3900985XX

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
-53	211-0507-XX			1	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
	334-6495-XX			1	MARKER,IDENT:MKD ,	80009	3346495XX
-54	333-A432-00			1	PANEL,REAR:371B,ALUMINUM (ATTACHING PARTS)	80009	3333886XX
-55	211-0507-XX			6	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-56	343-1272-XX			2	RTNR,CAB.COVER:BLUE,PLASTIC (ATTACHING PARTS)	80009	3431272XX
-57	213-0782-XX			2	SCREW,TPG,TF:8-32 X 0.625,FILH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-58	200-3300-XX			1	GUARD,FAN: (ATTACHING PARTS)	80009	2003300XX
-59	129-1126-XX			4	SPACER,POST:21.5MM L,4-40,6-32 THD,BRS (END ATTACHING PARTS)	80009	1291126XX
-60	378-0278-XX			1	FILTER,AIR:125MM X 5MM THK	TK0191	3780278XX
-61	200-3277-XX			1	COVER,FAN:ALUMINUM (ATTACHING PARTS)	80009	2003277XX
-62	211-0088-XX			4	SCREW,MACHINE:2-56 X 0.281,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-63	343-1271-XX			2	RTNR,CAB.COVER:BLUE,PLASTIC (ATTACHING PARTS)	80009	3431271XX
-64	213-0782-XX			2	SCREW,TPG,TF:8-32 X 0.625,FILH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-65	119-2310-01			1	FAN,TUBEXIAL:115VAC,230MA,16W,2650RPM:(B100) (ATTACHING PARTS)	80009	119231001
-66	210-0457-XX			4	NUT,PLASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-67	161-0257-01			1	CABLE ASSY,PWR,:125V,1A.200MM L:(W272)	80009	161025701
-68	671-B127-01			4	CONN,RCPT,ELEC: (ATTACHING PARTS of A22)	80009	671B12701
-69	342-A149-00			1	INSULATOR,PLATE:CIRCUIT BOARD,PC	80009	3420894XX
-70	671-B127-01			1	CKT BOARD ASSY:INTERFACE(A22) (ATTACHING PARTS)	80009	671B12701
-71	211-0871-00			4	SCR,ASSEM M3 X 6,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0191	211087100
-74	671-0227-01				CKT BOARD ASSY:PRIMARY(A27)	TK0191	671022701
-75	342-0827-XX			1	INSULATOR,PLATE:CKT BD,POLYCARBONATE (ATTACHING PARTS)	80009	3420827XX
-76	211-0661-XX			3	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-77	342-0828-XX			1	INSULATOR,PLATE:CKT BD,POLYCARBONATE	80009	3420828XX
-78	129-1187-XX			1	SPACER,POST:43MM L,W/4-40 EXT THD,BRS	80009	1291187XX

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-79	343-1346-XX			1	RETAINER,INSUL:15.9MM L,NYLON	80009	3431346XX
-80	129-1188-XX			1	SPACER,POST:23.7MM L,4-40 EXT THD,BRS	80009	1291188XX
-81	129-0992-XX			5	SPACER,POST:0.41 L,4-40 INT,BRS,0.19 HEX	80009	1290992XX
-82	200-2264-XX			2	CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
-83	159-0291-00			1	FUSE,CARTRIDGE:4A,250V,SLOW BLOWE:(F100)	80009	159029100
	159-0019-00			1	FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW:(F200)	80009	159001900
-84	204-0833-XX			2	BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	61935	031 1653
-85	210-1039-XX			2	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	OKB01	1224-02-00-0541
-86	200-1388-XX			2	COVER,FUSE LEAD:POLYURETHANE	OJR05	ORDER BY DESC
-87	119-2683-00			1	FILTER,RFI:50/60HZ,250VAC,6A:(FL100) (ATTACHING PARTS)	TK2058	ZUB2206H-F
-88	211-0537-XX			2	SCREW,MACHINE:6-32 X 0.375,TRH,STL	TK0435	ORDER BY DESC
-89	210-0407-XX			2	NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
-90	210-0006-XX			2	WASHER,LOCK:#6 INTL,0.018 THK,STL (END ATTACHING PARTS)	78189	1206-00-00-0541
-91	196-3112-01			1	LEAD,ELECTRICAL:18 AWG,6.0 L,5-4:(W17) (ATTACHING PARTS)	80009	196311201
-92	211-0565-XX			1	SCREW,MACHINE:6-32 X 0.250,TRH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-93	196-3098-XX			1	LEAD,ELECTRICAL:18 AWG,7.0 L,5-4 (ATTACHING PARTS)	80009	1963098XX
-94	211-0565-XX			1	SCREW,MACHINE:6-32 X 0.250,TRH,STL	TK0435	ORDER BY DESC
-95	210-0407-XX			1	NUT,PLAIN,HEX:6-32 X 0.25,BRS (END ATTACHING PARTS)	73743	3038-402
-96	129-A590-00			2	SPACER,POST	80009	129A59000
-97	220-A178-00			1	NUT,PLATE	80009	220A17800

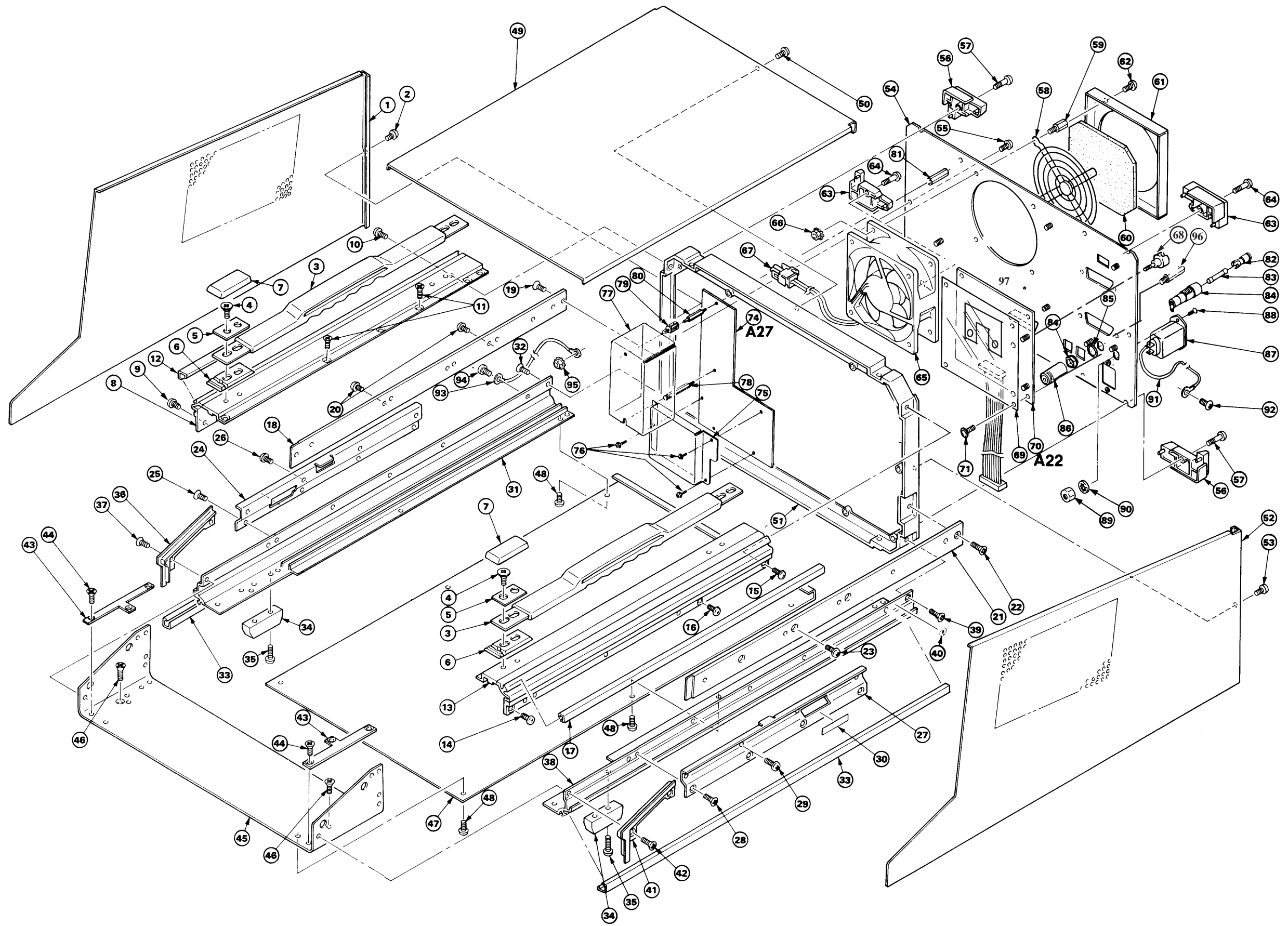


Figure 9-1: Cabinet, Rear

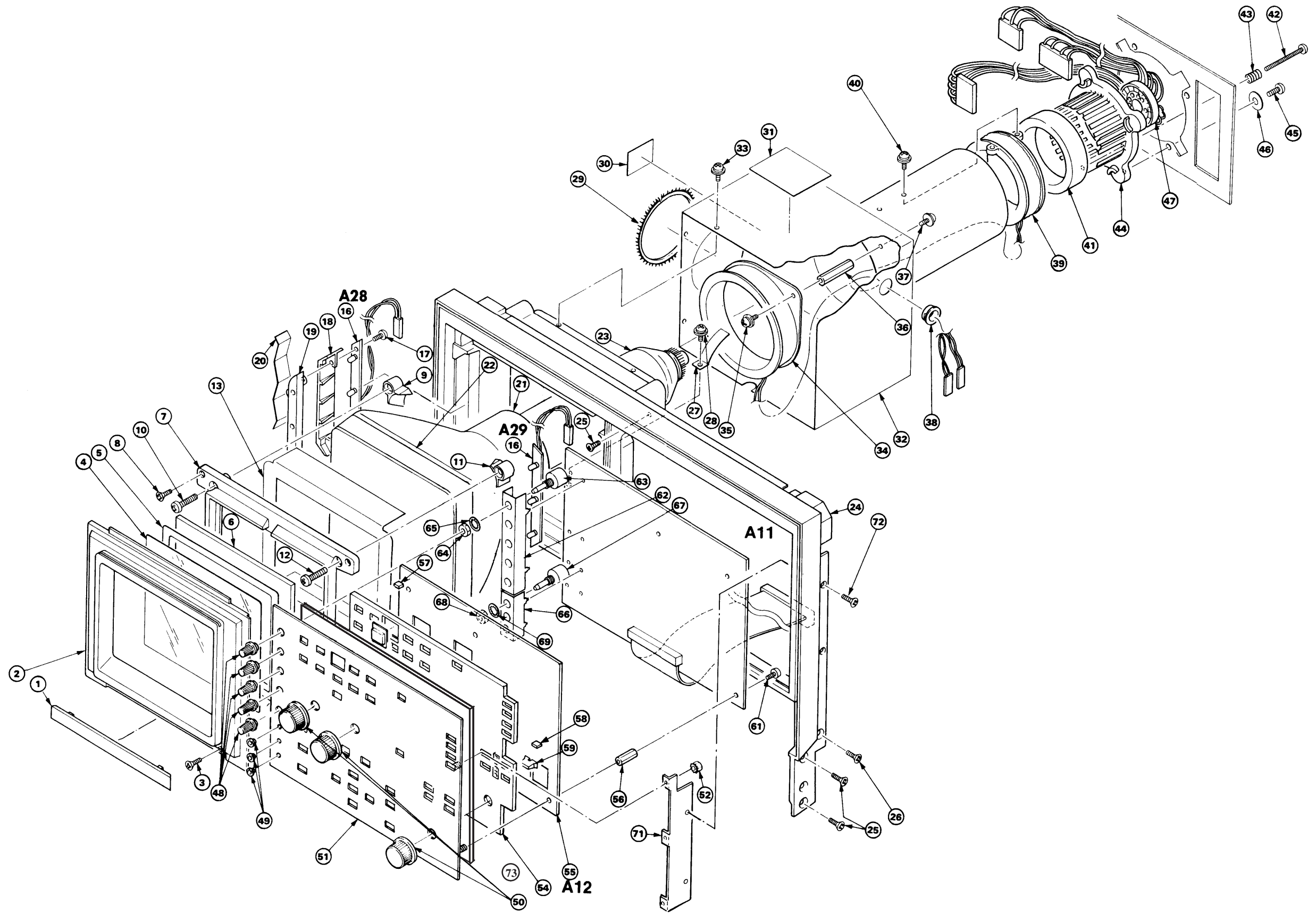


Figure 9-2: Display, Front

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
2-1	200-3281-XX			1	COVER,BEZEL:POLYCARBONATE,TEK TAN	80009	2003281XX
-2	200-3276-XX			1	BEZEL,CRT:PC,TEK TAN (ATTACHING PARTS)	80009	2003276XX
-3	211-0538-XX			2	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-4	378-0276-XX			1	FILTER,LT,CRT:BLUE,108.4MM X 134.4MM X 1MM	80009	3780276XX
-5	361-1381-XX			1	SPACER,RING:CRT,0.4MM	80009	3611381XX
-6	337-3328-XX			1	SHIELD,CRT:CLEAR	80009	3373328XX
-7	426-2133-XX			1	FRAME,CRT:371B (ATTACHING PARTS)	80009	4262133XX
-8	211-0512-XX			4	SCREW,MACHINE:6-32 X 0.5,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-9	343-1269-XX			2	RETAINER,CRT:FRONT,(A) (ATTACHING PARTS)	80009	3431269XX
-10	212-0022-XX			2	SCREW,MACHINE:8-32 X 1.5,PNH,STL (END ATTACHING PARTS)	TK0435	2011-300
-11	343-1270-XX			2	RETAINER,CRT:FRONT,(B) (ATTACHING PARTS)	80009	3431270XX
-12	212-0022-XX			2	SCREW,MACHINE:8-32 X 1.5,PNH,STL (END ATTACHING PARTS)	TK0435	2011-300
-13	331-0491-XX			1	MASK,CRT:371B	80009	3310491XX
-16	670-9324-01			2	CIRCUIT BD ASSY:LAMP(R):(A28)	80009	670932401
	670-9324-02				CIRCUIT BD ASSY:LAMP(L):(A29) (ATTACHING PARTS)	80009	670932402
-17	211-0062-XX			4	SCREW,MACHINE:2-56 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-18	343-1268-XX			2	RETAINER,LIGHT:REFLECTOR	80009	3431268XX
-19	378-0614-XX			2	REFLECTOR,LIGHT:INT SCALE ILLUMINATION	0JR05	ORDER BY DESC
-20	214-3886-XX			2	SPRING,RTNR:SCALE LAMP	80009	2143886XX
-21	154-0928-00			1	ELECTRON TUBE:CRT,P31,INT SCALE:(V100)	80009	154092800
-22	253-0267-XX			1	TAPE,PRESS SENS:0.08 X 20 X 20000MM,AL FOIL	80009	2530267XX
-23	253-0137-XX			1	TAPE,SILICONE:RED RBR,1.25 X 0.02	99742	2650
-24	426-A192-00			1	FRAME,FRONT:371B,ALUMINUM (ATTACHING PARTS)	80009	4262421XX
-25	211-0538-XX			8	SCREW,MACHINE:6-32 X 0.312,FLH,STL	TK0435	ORDER BY DESC
-26	211-0541-XX			2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-27	214-3880-XX			1	CONTACT,SPRING:GROUNDING CRT (ATTACHING PARTS)	80009	2143880XX
-28	211-0661-XX			1	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-29	255-1106-XX			1	PLASTIC CHANNEL:250 X 3.3 X 4.0MM,NYLON	80009	2551106XX
-30	334-6691-XX			1	MARKER,IDENT:MKD DANGER	80009	3346691XX

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-31	334-6805-XX			1	MARKER,IDENT:MKD WARNING	80009	3346805XX
-32	337-3325-XX			1	SHIELD,CRT: (ATTACHING PARTS)	80009	3373325XX
-33	211-0661-XX			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-34	108-1345-01			1	COIL,TUBE DEFL:TRACE ROTATION:(L100) (ATTACHING PARTS)	80009	108134501
-35	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-36	129-1123-XX			2	SPACER,POST:33MM L,4-40 THD,BRASS,0.188 (ATTACHING PARTS)	80009	1291123XX
-37	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-38	348-0948-XX			1	GROMMET,PLASTIC:BLACK,RING,9.5MM ID	80009	3480948XX
-39	108-1347-01			1	COIL,TUBE DEFL:Y-AXIS ALIGNMENT:(L120) (ATTACHING PARTS)	80009	108134701
-40	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-41	354-0347-XX			1	RING,CRT CLAMP:2.127 ID X 2.595 OD X 0.563 (ATTACHING PARTS)	OJR05	ORDER BY DESC
-42	211-0170-XX			2	SCREW,MACHINE:4-40 X 2.25,PNH,SST	TK0435	ORDER BY DESC
-43	214-1333-XX			2	SPRING,HLCPS:0.213 OD X 0.375,CLE,CU-BE (END ATTACHING PARTS)	8X345	ORDER BY DESC
-44	343-0205-XX			1	RTNR,ELCTR TU:3.0 DIA X 1.5 L,DELTRIN, (ATTACHING PARTS)	80009	3430205XX
-45	211-0578-XX			4	SCREW,MACHINE:6-32 X 0.438,PNH,STL	TK0435	ORDER BY DESC
-46	210-0949-XX			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS (END ATTACHING PARTS)	12327	ORDER BY DESC
-47	196-3099-00			1	LEAD,ELECTRICAL:24 AWG,10.0 L:(W14)	80009	196309900
-48	366-0625-XX			5	KNOB:SILVER GRAY,9.5MM OD	80009	3660625XX
-49	358-0378-XX			3	BUSHING,SLEEVE:0.131 ID X 0.18 OD X 0.125L	80009	3580378XX
-50	366-0620-XX			3	KNOB:SILVER GRAY,25MM OD	80009	3660620XX
-51	333-A434-00			1	PANEL,FRONT:371B,ALUMINUM	80009	3333882XX
-52	210-0586-XX			3	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-53	378-0349-XX			1	FILTER,LED DSPL:GRAY,10.8 & 18.3M,PC	80009	3780349XX
-54	351-0887-XX			1	GUIDE,PUSH BTN:MAIN KEY BD,POLYCARBONATE	80009	3510887XX
-55	671-1768-01			1	CKT BOARD ASSY:SUB KEY(A12) (ATTACHING PARTS)	80009	671176801
-56	129-1131-XX			6	SPACER,POST:12.7MM L,4-40 THD,BRASS (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	80009	1291131XX
-57	129-1128-XX			32	.SPACER,POST:5.1MM,L,POLYCARBONATE	80009	1291128XX

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
-58	129-1372-XX			8	.SPACER,POST:4.6MM L,POLYCARBONATE	80009	1291372XX
-59	366-0617-XX			36	PUSH BUTTON:SILVER GRAY,9.6 X 4.2 X 8.5MM	80009	3660617XX
-61	211-0661-XX			6	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-62	407-3474-XX			1	.BRACKET,ANGLE:VAR RES MTG	80009	4073474XX
-63	311-2457-00			5	RES,VAR,NONWW:PNL,10K OHM,1/2W,20%: (A11R302,R312,R322,R330,R340 Electrical Part) (ATTACHING PARTS)	80009	311245600
-64	210-0583-XX			5	.NUT,PLAIN,HEX:0.25-32 X 0.312,BRS	73743	2X-20319-402
-65	210-0046-XX			5	.WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL (END ATTACHING PARTS)	78189	1214-05-00-0541
-66	407-3475-XX			1	.BRACKET,ANGLE:VAR RES MTG	80009	4073475XX
-67	311-2456-00			3	RES,VAR,NONWW:PNL,10KOHM,1/2W,20%:(A11R350,R360,R370) (ATTACHING PARTS)	80009	311245600
-68	210-0583-XX			3	.NUT,PLAIN,HEX:0.25-32 X 0.312,BRS	73743	2X-20319-402
-69	210-0046-XX			3	.WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL (END ATTACHING PARTS)	78189	1214-05-00-0541
-71	407-3665-XX			1	BRACKET,ANGLE:FRONT PNL MTG,ALUMINUM (ATTACHING PARTS)	TK0CA	30-0071
-72	211-0106-XX			2	SCREW,MACHINE:4-40 X 0.625,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-73	386-A846-00			1	SUB PANEL	80009	386A84600

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
3-1	441-1740-XX			1	CHASSIS,CKT BD:371B,ALUMINUM	TK019 1	4411740XX
-2	255-0334-XX			1	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-3	343-0778-XX			2	CLAMP,CABLE:5MM ID,NYLON	80009	3430778XX
-4	348-0948-XX			1	GROMMET,PLASTIC:BLACK,RING,9.5MM ID	80009	3480948XX
-5	351-0769-XX			2	GUIDE,CKT BD:371B	80009	3510769XX
-6	343-1289-XX			1	CLAMP,CABLE:STEEL	80009	3431289XX
-7	343-1084-XX			5	CLAMP,CABLE:NYLON	80009	3431084XX
-8	255-1107-XX			1	PLASTIC CHANNEL:500 X 3.7 X 4.0MM,NYLON	80009	2551107XX
-9	255-0334-XX			1	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-10	255-0334-XX			1	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-11	671-0234-01			1	CKT BOARD ASSY:STEP GEN(A7) (ATTACHING PARTS)	80009	671023401
-12	211-0661-XX			3	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-20	671-0236-21			1	CKT BOARD ASSY:MOTHER(A1) (ATTACHING PARTS)	80009	671023621
-21	211-0661-XX			8	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
	343-1084-XX			1	CLAMP,CABLE:NYLON	80009	3431084XX
-22	407-3633-XX			1	BRACKET,CKT BD:ALUMINUM (ATTACHING PARTS)	TK0CA	30-0006
-23	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-24	671-0229-02			1	CKT BD ASSY:MAIN PWR SUPPLY(A25) (ATTACHING PARTS)	80009	671022902
-25	211-0246-XX			2	SCR,ASSEM WSHR:4-40 X 0.625,PNH,STL	TK0435	ORDER BY DESC
-26	211-0507-XX			3	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-40	343-1273-XX			2	RETAINER,CKT BD:BRASS (ATTACHING PARTS)	80009	3431273XX
-41	211-0504-XX			2	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-42	348-1048-XX			2	PAD,CUSHIONING:150MM X 12MM X 13MM	TK019 1	3481048XX
-43	671-B126-01			1	CKT BOARD ASSY:CPU(A2) (ATTACHING PARTS)	80009	671106401
-47	671-0235-08			1	CKT BOARD ASSY:A/D(A3) (ATTACHING PARTS)	80009	671023508
-51	670-9306-04			11	CKT BOARD ASSY:DIGITAL DSPLY(A4)(ATTACHING PARTS)	80009	670930604
-55	670-9307-04			1	CKT BOARD ASSY:DISPLAY CONT(A5) (ATTACHING PARTS)	80009	670930704

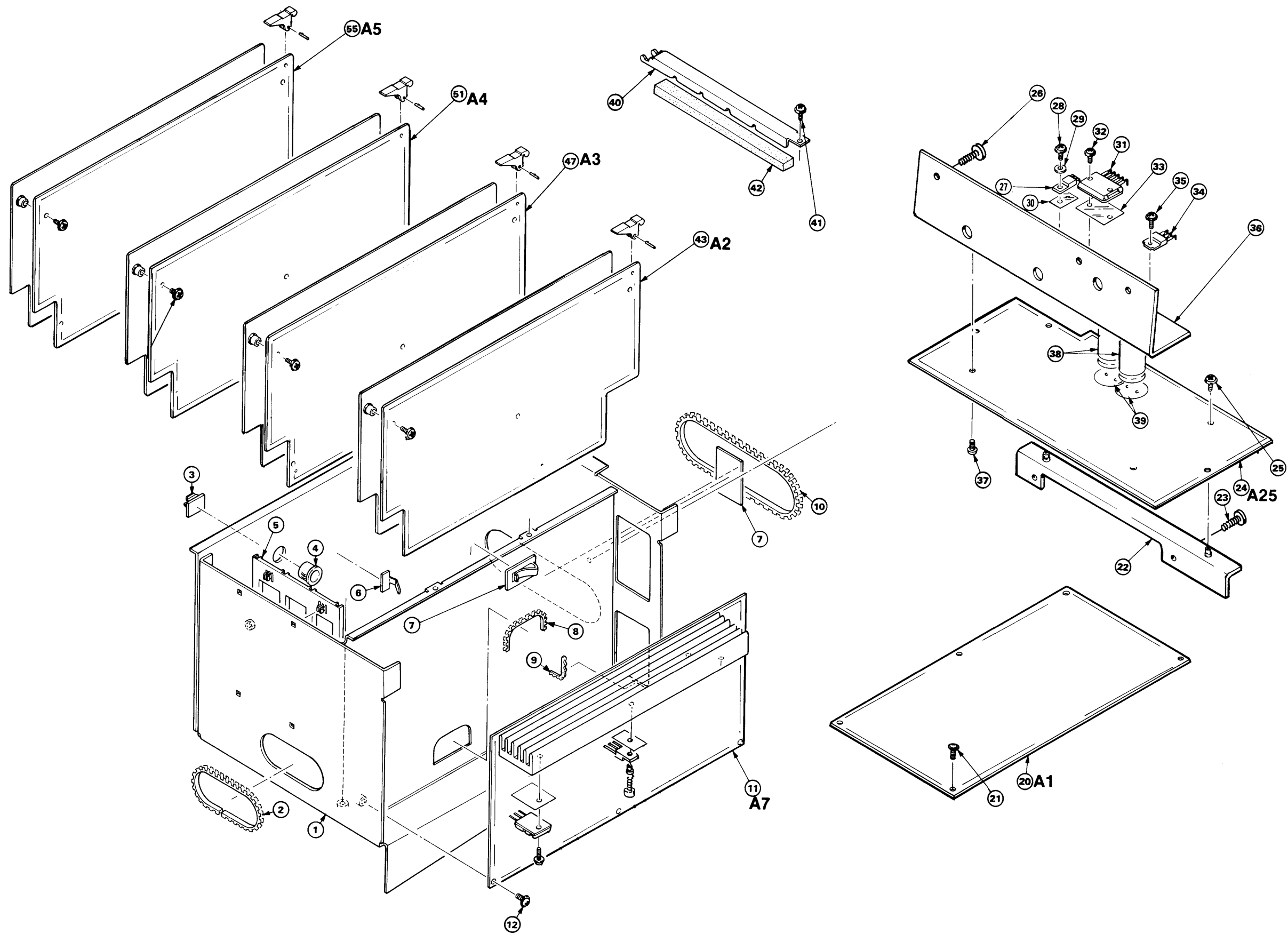


Figure 9-3: Chassis, Circuit Board

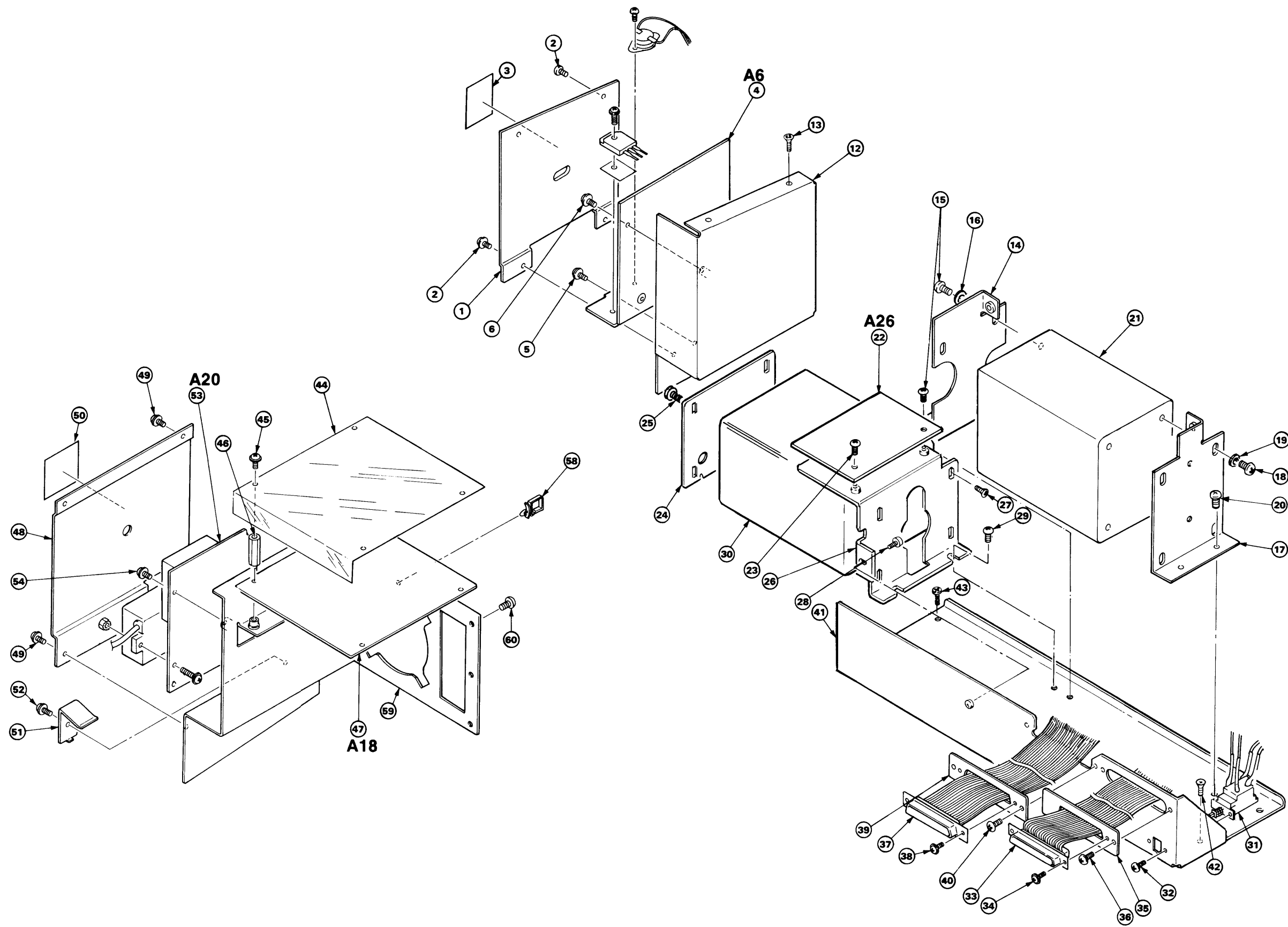


Figure 9-4: Power Supply

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
4-1	337-3330-XX	300000	300585	1	SHIELD,ELEC:COLLECTOR SUPPLY (ATTACHING PARTS)	80009	3373330XX
-2	211-0008-XX	300000	300585	4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-3	334-6695-XX	300000	300585	1	MARKER,IDENT:MKD DANGER & POT	80009	3346695XX
-4	670-9308-21			1	CKT BOARD ASSY:COLLECTOR SUPPLY OUTPUT (A6),(ATTACHING PARTS)	80009	670930821
-5	211-0507-XX			4	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-6	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-12	407-3470-XX			1	BRACKET,CKT BD:COLLECTOR SUPPLY OUTPUT (ATTACHING PARTS)	80009	4073470XX
-13	211-0538-XX			2	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-14	407-3478-XX			1	BRACKET,XFMR:LEFT,ALUMINUM (ATTACHING PARTS)	80009	4073478XX
-15	212-0507-XX			6	SCREW,MACHINE:10-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-16	210-1003-XX			4	WASHER,FLAT:0.2 ID X 0.438 OD X 0.036 BRS (END ATTACHING PARTS)	12327	ORDER BY DESC
-17	407-3907-XX			1	BRACKET,XFMR:RIGHT,ALUMINUM (ATTACHING PARTS)	80009	4073907XX
-18	212-0507-XX			4	SCREW,MACHINE:10-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-19	210-1003-XX			4	WASHER,FLAT:0.2 ID X 0.438 OD X 0.036 BRS	12327	ORDER BY DESC
-20	212-0507-XX			2	SCREW,MACHINE:10-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-21	120-1756-00			1	XFMR,PWR,STPDN:MAIN POWER:(T100)	TK0BZ	STT-047-00
-22	671-B234-00			1	CKT BOARD ASSY:COLLECTOR POWER SUPPLY (A26),(ATTACHING PARTS)	TK0191	671B23400
-23	211-0661-XX			3	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-24	407-3632-XX			1	BRACKET,XFMR:ALUMINUM (ATTACHING PARTS)	TK0CF	30-0003
-25	212-0507-XX			4	SCREW,MACHINE:10-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-26	407-3631-XX			1	BRACKET,XFMR:ALUMINUM (ATTACHING PARTS)	TK0CF	30-0002
-27	212-0507-XX			4	SCREW,MACHINE:10-32 X 0.375,PNH,STL	TK0435	ORDER BY DESC
-28	211-0507-XX			1	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-29	212-0507-XX			2	SCREW,MACHINE:10-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-30	120-1755-01			1	XFMR,PWR,STU:CMOS,CLK GEN & READY INTFC:(T200)	TK0191	120175501

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-31	260-2323-00			1	SWITCH,PUSH:DPST,15A,250V,ON/OFF:(S100) (ATTACHING PARTS)	80009	260232300
-32	211-0751-XX			2	SCR,ASSEM WSHR:M3 X 8 (END ATTACHING PARTS)	80009	2110751XX
-33	174-0296-00			1	CA ASSY,SP,ELEC:34,28 AWG,5.5 L,RIBBON:(W400) (ATTACHING PARTS)	80009	174029600
-34	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-35	386-5485-XX			1	PLATE,CONN MTG:FEMALE,STEEL (ATTACHING PARTS)	80009	3865485XX
-36	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-37	198-5749-00			1	WIRE SET,ELEC:371B W/D-SUB 50 CONT,FEMALE:(W410),(ATTACHING PARTS)	80009	198574900
-38	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-39	386-5909-XX			1	PLATE,CONN MTG:FEMALE,STEEL (ATTACHING PARTS)	80009	3865909XX
-40	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-41	441-1977-XX			1	CHASSIS,XFMR:REAR ASSY,ALUMINUM (ATTACHING PARTS)	80009	4411977XX
-42	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-43	211-0538-XX			2	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-44	342-0785-XX			1	INSULATOR,PLATE:CRT OUTPUT (ATTACHING PARTS)	80009	3420785XX
-45	211-0661-XX			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-46	129-1139-XX			4	SPACER,POST:25MM L,W4-40 THD,BRASS	80009	1291139XX
-47	670-9319-02			1	CKT BOARD ASSY:CRT OUTPUT(A18)	80009	670931902
-51	343-1275-XX			1	RETAINER,XSTR:HV,SST (ATTACHING PARTS)	80009	3431275XX
-52	211-0661-XX			1	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-53	671-B211-00			1	CKT BOARD ASSY:HV REG(A20) (ATTACHING PARTS)	TK0191	671B21100
-54	211-0661-XX			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-58	343-1288-XX			1	CLAMP,CABLE:PLASTIC	80009	3431288XX
-59	441-1743-XX			1	CHASSIS,CRT:LEFT (ATTACHING PARTS)	80009	4411743XX
-60	211-0504-XX			3	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC

Replaceable mechanical parts list (Cont.)

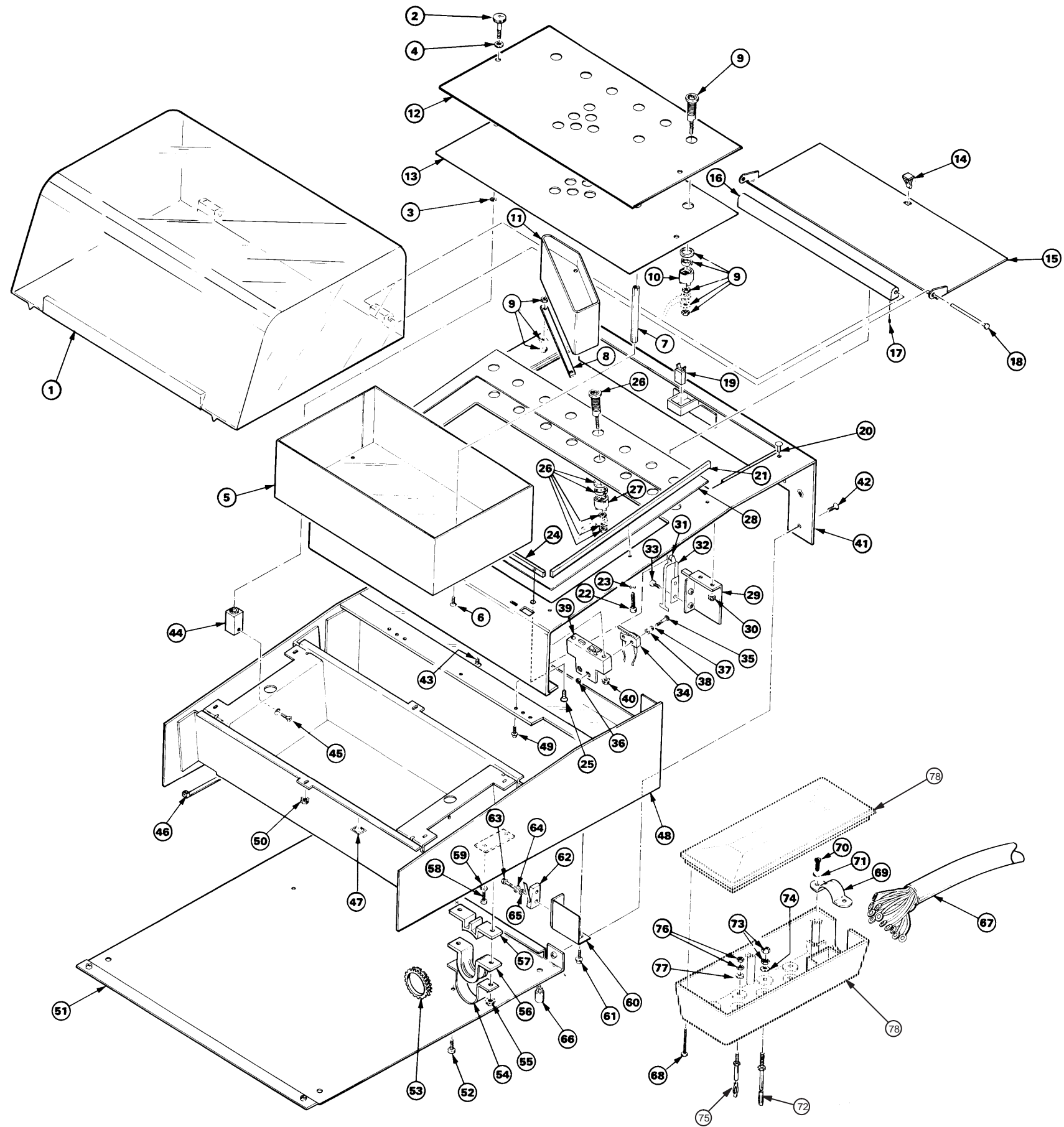
Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
5-1	337-3473-XX			1	SHIELD,ELEC:TEST LID,POLYCARBONATE	TK0BV	30-0220
-2	213-1013-XX			2	THUMBSCREW:6-32 X 15.6MM,12MM OD (ATTACHING PARTS)	TK0CM	30-0223
-3	354-0165-XX			2	RING,RETAINING:TYPE E EXT,U/O 0.156 OD SFT	2X013	ORDER BY DESC
-4	210-1318-XX			2	WASHER,FLAT:0.169 ID X 0.315 OD X 0.02,STL (END ATTACHING PARTS)	80009	2101318XX
-5	200-3560-XX			1	COVER,ELEC CONN:ALUMINUM,TEST FIXTURE (ATTACHING PARTS)	TK0CM	30-0212
-6	211-0101-XX			4	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-7	129-1242-XX			4	SPACER,POST:56.8MM L,4-40 INT THD	TK0AL	30-0243
-8	131-4322-XX			1	BUS,CONDUCTOR:83 L X 8 W X 0.8MMH,BRS	TK0CM	30-0240
-9	136-0933-XX			9	SOCKET,PIN TERM:0.16 DIA,GRAY	TK0BW	SLB4-F6.3-8
	136-0934-XX			4	SOCKET,PIN TERM:0.16 DIA,RED	TK0BW	SLB4-F6.3-1
-10	342-0852-XX			13	INSULATOR,BSHG:15MM OD X 11.3MM L,PC	TK0DK	ORDER BY DESC
-11	342-0851-XX			1	INSULATOR,CONN:TEST FIXTURE,PC	TK019 1	3420851XX
-12	334-A583-00			1	MARKER,IDENT:MARKED TEST ADAPTER INFO	TK0AU	30-0219
-13	386-5698-XX			1	PLATE,CONN MTG:TEST FIXTURE,ALUMINUM	80009	3865698XX
-14	214-4097-XX			1	LATCH,DOOR:POLYACETAL	TK0BK	2Y24
-15	200-3561-XX			1	DOOR,ACCESS:STRAGE,TEST FIXTURE,AL	TK0CM	30-0214
-16	214-4096-XX			1	HINGE HALF:ALUMINUM (ATTACHING PARTS)	TK0CM	30-0229
-17	213-0153-XX			4	SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESC
-18	214-4095-XX			2	PIN,HINGE:4MM DIA,45MM L,6MM DIA HD,STL (END ATTACHING PARTS)	TK0CM	30-0230
-19	105-1005-XX			1	CATCH,LATCH:PLASTIC	TK0BK	2A16
-20	348-1039-XX			2	BUMPER,PLASTIC:7.5MM OD X 1.5MM L,NYLON	TK0BK	74-01
-21	426-2270-XX			2	FRAME,SHIELD:181.6MM,BRASS (ATTACHING PARTS)	TK019 1	426227000
-22	211-0008-XX			10	SCREW,MACHINE:4-40 X 0.25,PNH,STL	TK0435	ORDER BY DESC
-23	210-0004-XX			10	WASHER,LOCK:#4 INTL,0.015 THK,STL (END ATTACHING PARTS)	78189	1204-00-00-0541
-24	426-2269-XX			2	FRAME,SHIELD:267.0MM,BRASS (ATTACHING PARTS)	TK019 1	4262269XX
-25	211-0105-XX			2	SCREW,MACHINE:4-40 X 0.188,FLH,STL (END ATTACHING PARTS)	TK019 1	2110105XX
-26	136-0933-XX			7	SOCKET,PIN TERM:0.16 DIA,GRAY	TK0BW	SLB4-F6.3-8
	136-0934-XX			1	SOCKET,PIN TERM:0.16 DIA,RED	TK0BW	SLB4-F6.3-1
-27	342-0852-XX			8	INSULATOR,BSHG:15MM OD X 11.3MM L,PC	TK019 1	3420852XX
-28	334-A582-00			1	MARKER,IDENT:MARKED I/O SIGNALS	TK0AU	30-0218

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-29	407-3693-XX			1	BRACKET,ANGLE:I.L SW ACTR SPRING,AL (ATTACHING PARTS)	TK0CM	30-0217
-30	210-0586-XX			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-31	214-4098-XX			1	ROLLER,ACTR:5MM DIA X 3.5MM L,BRASS	TK0CM	30-0216
-32	214-4099-XX			1	SPRING,FLAT:0.3MM THK (ATTACHING PARTS)	TK0EV	30-0215
-33	211-0008-XX			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-34	260-2324-00			1	SW,SENSITIVE:SPDT,3A,250VAC,INTERLOCK:(S1000,S1002), (ATTACHING PARTS)	80009	260232400
-35	213-0986-XX			4	SCREW,MACHINE:2-26 X 12MM,HEX,BRS	80009	2130986XX
-36	210-0405-XX			4	NUT,PLAIN,HEX:2-56 X 0.188,BRS	73743	12157-50
-37	210-0054-XX			4	WASHER,LOCK:#4 SPLIT,0.025 THK STL	86928	ORDER BY DESC
-38	210-0938-XX			4	WASHER,FLAT:0.109 ID X 0.25 OD X 0.032,STL (END ATTACHING PARTS)	TK0413	ORDER BY DESC
-39	351-0823-XX			2	GUIDE,SW ACT AD:INTERLOCK (ATTACHING PARTS)	TK019 1	3510823XX
-40	210-0586-XX			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-41	333-A441-00			1	PANEL,FRONT:371B TEST FXTR,ALUMINUM (ATTACHING PARTS)	80009	3333576XX
-42	211-0101-XX			6	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-43	211-0101-XX			2	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-44	220-0096-XX			2	NUT BLOCK:12MM SQ X 22.5MM L,6-32 THRU (ATTACHING PARTS)	TK0CM	30-0224
-45	211-0559-XX			2	SCREW,MACHINE:6-32 X 0.375,FLH,STL (END ATTACHING PARTS)	TK0435	1593-300
-46	343-0549-XX			5	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
-47	334-3379-XX			1	MARKER,IDENT:MARKED GROUND SYMBOL	07416	ORDER BY DESC
-48	441-1833-XX			1	CHASSIS ASSY:TEST FIXTURE,ALUMINUM (ATTACHING PARTS)	TK0CM	30-0209
-49	211-0244-XX			3	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL	TK0435	7772-312
-50	210-0586-XX			6	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-51	390-1034-XX			1	CABINET,TEST FI:BOTTOM,ALUMINUM (ATTACHING PARTS)	TK0CM	30-0213
-52	211-0008-XX			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-53	348-1041-XX			1	GROMMET:CHANNEL,3.2MM X 70MM L,NYLON	TK0AR	CSG-032
-54	343-1381-XX			1	CLAMP,LOOP:25MM ID,ALUMINUM (ATTACHING PARTS)	TK0CB	30-0227

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
-55	210-0458-XX			2	NUT, PLASSEM WA:8-32 X 0.344, STL (END ATTACHING PARTS)	0KB01	210-0458-XX
-56	343-1380-XX			1	CLAMP, CABLE: TOP	TK0DK	30-0226
-57	343-1379-XX			1	CLAMP, CABLE: BOTTOM	TK0DK	30-0225
-58	211-0507-XX			2	SCREW, MACHINE: 6-32 X 0.312, PNH, STL	TK0435	ORDER BY DESC
-59	210-0006-XX			2	WASHER, LOCK: #6 INTL, 0.018 THK, STL (ATTACHING PARTS)	78189	1206-00-00-0541
-60	407-3694-XX			1	BRACKET, ANGLE: INTERLOCK SW MTG, AL	TK0CM	30-0222
-61	211-0244-XX			2	SCR, ASSEM WSHR: 4-40 X 0.312, PNH, STL (END ATTACHING PARTS)	TK0435	7772-312
-62	260-2324-00			1	SW, SENSITIVE: SPDT, 3A, 250VAC, INTERLOCK: (S1004) (ATTACHING PARTS)	80009	260232400
-63	213-0986-XX			2	SCREW, MACHINE: 2-26 X 12MM, HEX, BRS	80009	2130986XX
-64	210-0054-XX			2	WASHER, LOCK: #4 SPLIT, 0.025 THK STL	86928	ORDER BY DESC
-65	210-0938-XX			2	WASHER, FLAT: 0.109 ID X 0.25 OD X 0.032, STL (END ATTACHING PARTS)	TK0413	ORDER BY DESC
-66	348-1040-XX			4	FOOT, CABINET: BLACK, PLASTIC	TK0BK	5475
-67	198-5627-XX			1	WIRE SET, ELEC: WITH CONNECTING BOX	TK0BD	ORDER BY DESC
-68	211-0459-XX			4	.SCREW, MACHINE: M3 X 25MM, PNH, STL	TK0191	2110459XX
-69	343-1401-XX			1	.CLAMP, LOOP: 18MM ID, STEEL (ATTACHING PARTS)	TK019 1	3431401XX
-70	211-0458-XX			2	.SCREW, MACHINE: M4 X 10MM PNH, STL	TK0191	2110458XX
-71	210-0092-XX			2	.WASHER, LOCK: M4 SPLIT, 1MM THK, STL (END ATTACHING PARTS)	TK0191	210009200
-72	134-0198-XX			1	.PLUG, TIP: MULTI CONTACT, 4MM DIA, 38.5MM L (ATTACHING PARTS)	TK0BW	SA479
-73	220-0083-XX			2	.NUT, PLAIN, HEX: M5 X 8MM, STL	TK0BJ	30-0616
-74	210-1460-XX			1	.WASHER, PLAIN: 5.3MM ID X 1MM THK, STL (END ATTACHING PARTS)	TK0191	210146000
-75	134-0199-XX			10	.PLUG, TIP: MULTI CONTACT, 4MM DIA, 30.5MM L (ATTACHING PARTS)	TK0BW	SA405
-76	220-0085-XX			20	.NUT, PLAIN, HEX: M3 X 5.5MM, STL	TK0BJ	30-0614
-77	210-1459-XX			10	.WASHER, PLAIN: 3.2MM ID X 0.5MM THK, STL (END ATTACHING PARTS)	TK0191	210145900
-78	202-0343-XX			1	COVER AND BASE FOR CONNECTING BOX	80009	2020343XX
	614-0919-XX			1	ADAPTER PANEL ASSEMBLY (CONTAINS FIGURE 5-2 THROUGH FIGURE 5-13)	80009	6140919XX



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Figure 9-5: Test Fixture

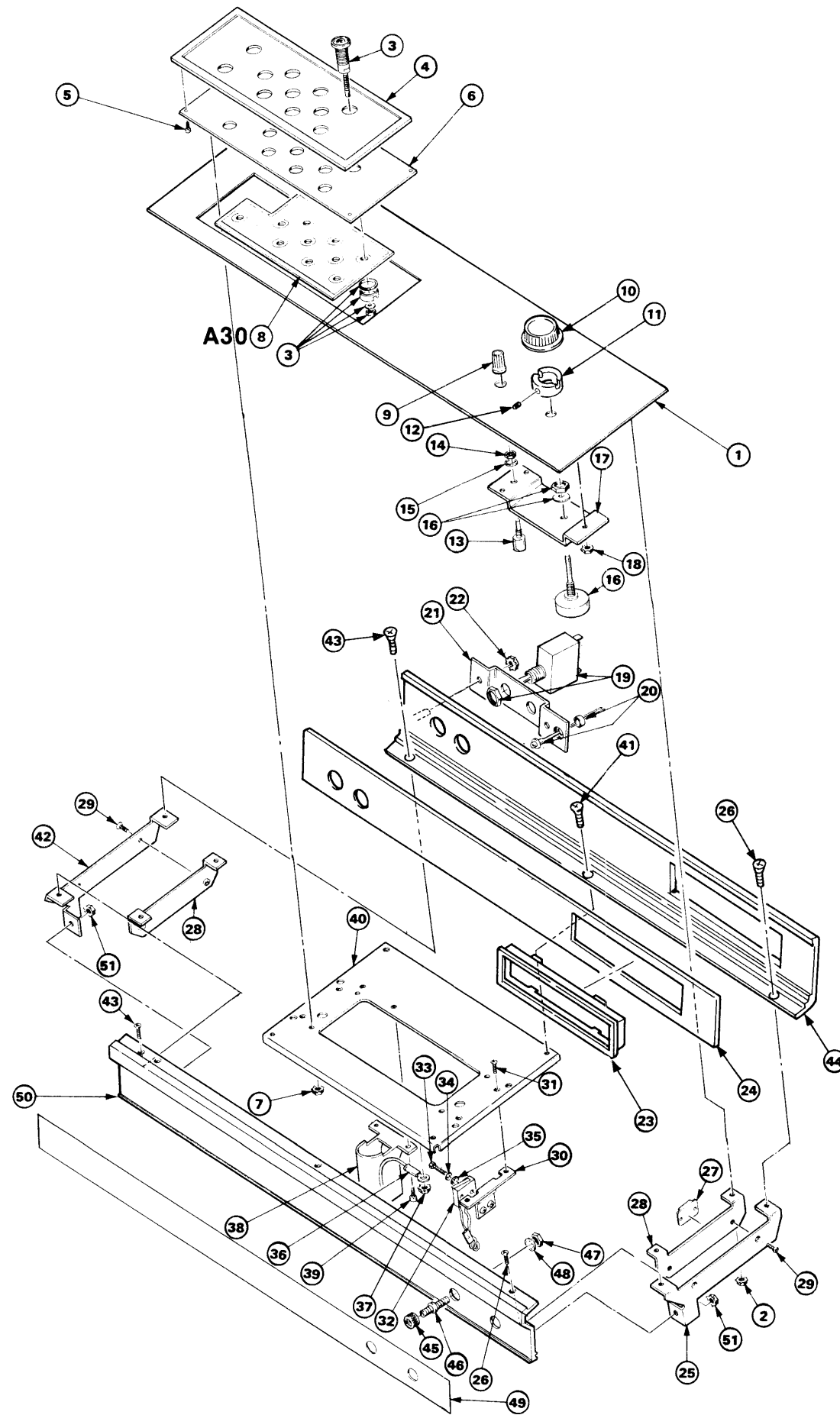


Figure 9-6: Front Porch

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discount'd	Qty	Name & description	Mfr. code	Mfr. part number
6-1	333-3512-XX			1	PANEL,FRONT:371B,LOWER (ATTACHING PARTS)	80009	3333512XX
-2	210-0586-XX			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-3	136-0933-00 136-0934-00			11	SOCKET,PIN TERM:0.16 DIA,GRAY: (J700,J702,J704,J706,J708,J710,J712,J714,J716,J720) SOCKET,PIN TERM:0.16 DIA,RED:(J718)	TK0BW TK0BW	SLB4-F6.3-8 SLB4-F6.3-1
-4	386-5607-XX			1	PLATE,CONN MTG:W/SPRING,PC (ATTACHING PARTS)	80009	3865607XX
-5	213-0816-XX			4	SCREW,TPG,TC:2-56 X 0.188L,TYPE T,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-6	386-5609-XX			1	PLATE,CONN SHLD:ALUMINUM (ATTACHING PARTS)	80009	3865609XX
-7	210-0586-XX			6	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-8	671-0305-01			1	CKT BOARD ASSY:CONNECTOR(A30)	80009	671030501
-9	366-0626-XX			1	KNOB:SILVER GRAY,12MM OD	80009	3660626XX
-10	366-0621-XX			1	SHELL,KNOB:TEKTAN,30MM OD X 15MM H,ABS	80009	3660621XX
-11	377-0609-XX			1	INSERT,KNOB:8.6MM ID X 16MM OD X 8MM H,AL (ATTACHING PARTS)	80009	3770609XX
-12	213-0022-XX			1	SETSCREW:4-40 X 0.188,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-13	311-1624-00			1	RES,VAR,NONWW:10K OHM,10%,0.25W:(R626) (ATTACHING PARTS)	80009	311162400
-14	210-0583-XX			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS	73743	2X-20319-402
-15	210-0046-XX			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL (END ATTACHING PARTS)	78189	1214-05-00-0541
-16	260-2497-02			1	SWITCH,ROTARY:ENCODER:(S140)	80009	260249702
-17	407-4014-XX			1	BRACKET,SW MTG:ALUMINUM (ATTACHING PARTS)	80009	4074014XX
-18	210-0586-XX			3	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-19	260-2379-00			1	CIRCUIT BREAKER:1A,250V:(S800)	TK0BY	T11-1RE-4-4-1.0
-20	352-0858-XX			1	HOLDER,LED:PLASTIC	S4238	30-0603
-21	407-3637-XX			1	BRACKET,ELEC SW:ALUMINUM (ATTACHING PARTS)	TK0AP	30-0022
-22	210-0457-XX			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-23	426-2331-XX			1	FRAME:POLYCARBONATE	80009	4262331XX
-24	333-3887-XX			1	PANEL,FRONT:FDD,POLYCARBONATE	80009	3333887XX
-25	122-0184-XX			1	ANGLE,RAIL:SUBPANEL MTG,RIGHT (ATTACHING PARTS)	80009	1220184XX
-26	211-0038-XX			2	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discount'd	Qty	Name & description	Mfr. code	Mfr. part number
-27	344-0396-XX			3	CLIP,CABLE:PVC	80009	3440396XX
-28	407-3472-XX			2	BRACKET,ANGLE:LOWER,PANEL (ATTACHING PARTS)	80009	4073472XX
-29	211-0038-XX			4	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-30	407-3484-XX			2	BRACKET,SW MTG:ALUMINUM (ATTACHING PARTS)	80009	4073484XX
-31	211-0038-XX			4	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-32	260-2324-00			2	SW,SENSITIVE:SPDT,3A,250VAC,INTERLOCK:(S600,S602) (ATTACHING PARTS)	80009	260232400
-33	213-0986-XX			4	SCREW,MACHINE:2-26 X 12MM,HEX,BRS	80009	2130986XX
-34	210-0054-XX			4	WASHER,LOCK:#4 SPLIT,0.025 THK STL	86928	ORDER BY DESC
-35	210-0938-XX			4	WASHER,FLAT:0.109 ID X 0.25 OD X 0.032,STL (END ATTACHING PARTS)	TK0413	ORDER BY DESC
-36	198-5616-00			1	WIRE SET,ELEC:371B:(W920) (ATTACHING PARTS)	TK0191	ORDER BY DESC
-37	210-0457-XX			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-38	342-0841-XX			1	INSULATOR,CONN:H.V.,NYLON (ATTACHING PARTS)	TK0DK	30-0073
-39	211-0007-XX			2	SCREW,MACHINE:4-40 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-40	407-3635-XX			1	BRACKET,CMPNT:ALUMINUM (ATTACHING PARTS)	TK0CA	30-0018
-41	211-0038-XX			2	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-42	122-0183-XX			1	ANGLE,RAIL:SUBPANEL MTG,LEFT (ATTACHING PARTS)	80009	1220183XX
-43	211-0038-XX			2	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-44	426-2422-XX			1	SUBPANEL,TEST F:FDD,ALUMINUM	80009	4262422XX
-45	200-0103-XX			1	NUT,PLAIN,KNURL:0.25-28 X 0.375 OD,BRASS	TK0588	ORDER BY DESC
-46	355-0507-XX			1	STUD,SHOULDERED:BINDING POST,BRS (ATTACHING PARTS)	TK0588	ORDER BY DESC
-47	210-0455-XX			1	NUT,PLAIN,HEX:0.25-28 X 0.375,BRS	73743	3089-402
-48	210-0046-XX			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL (END ATTACHING PARTS)	78189	1214-05-00-0541
-49	333-3514-XX			1	PANEL,FRONT:371B,PWR SW	80009	3333514XX
-50	426-2213-XX			1	SUBPANEL,FRONT:PWR SW (ATTACHING PARTS)	TK019 1	4262213XX
-51	210-0586-XX			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontin'd	Qty	Name & description	Mfr. code	Mfr. part number
7-1	671-0225-01			1	CKT BOARD ASSY:HIGH CURRENT CONTROL (A16) (ATTACHING PARTS)	80009	671022601
-2	211-0661-XX			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-3	337-3427-XX			1	SHIELD,ELEC:H.C.C. BD	80009	3373427XX
-4	129-1216-XX			4	SPACER,POST:8MM L,6-32 EXT/4-40 INT THD	TK0AL	30-0074
-5	151-0995-00			4	PWR,MOS FET,N-CH;75A,500W;P2HM755HA:	S0319	FM50DZ-9
-6	210-0457-XX			8	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-7	131-4116-XX			2	BUS,COND:140MM L X 50MM W X 0.8MM H	TK0AP	30-0033
-8	671-0306-00			1	CKT BOARD ASSY:RELAY(A31) (ATTACHING PARTS)	80009	671030600
-9	211-0507-XX			10	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-10	211-0751-XX			7	SCR,ASSEM WSHR:M3 X 8	80009	2110751XX
-11	260-2332-01			1	SWITCH,THRMSTC:(S904) (ATTACHING PARTS)	S3385	ORDER BY DESC
-12	211-0007-XX			2	SCREW,MACHINE:4-40 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-13	307-1372-00			1	RES,FXD,FILM:75K OHM,60W:(R800) (ATTACHING PARTS)	TK0CH	STC-010-00
-14	211-0541-XX			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-15	120-1755-01			1	XFMR,COLLECTOR SUPPLY:(T200) (ATTACHING PARTS)	TK0FY	ORDER BY DESC
-16	212-0001-XX			4	SCREW,MACHINE:8-32 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-17	407-3638-XX			2	BRACKET,XFMR:ALUMINUM (ATTACHING PARTS)	TK0AP	30-0024
-18	212-0023-XX			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-19	342-0843-XX			1	INSULATOR,PLATE:H.V.MODULE,POLYCARB (ATTACHING PARTS)	TK0DJ	30-0034
-20	211-0007-XX			2	SCREW,MACHINE:4-40 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-21	119-2682-01			1	MODULE:HIGH VOL,W/3 RELAY:(U800) (ATTACHING PARTS)	TK019 1	119268201
-22	211-0507-XX			4	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-23	151-0896-00			1	TRANSISTOR:(Q902) (ATTACHING PARTS)	TK00L	MG100H1BS1
-24	211-0507-XX			2	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-25	210-0803-XX	300000	300401	2	WASHER,FLAT:0.15 ID X 0.375 OD X 0.032,STL	12327	ORDER BY DESC

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discount'd	Qty	Name & description	Mfr. code	Mfr. part number
-26	211-0446-XX			3	SCR,ASSEM WSHR:M4 X 6MM,PNH,STL (END ATTACHING PARTS)	TK0BJ	30-0617
-27	343-1286-XX			3	CLAMP,CABLE:6.8 ID,NYLON (ATTACHING PARTS)	80009	3431286XX
-28	210-0407-XX			3	NUT,PLAIN,HEX:6-32 X 0.25,BRS (END ATTACHING PARTS)	73743	3038-402
-29	671-0226-01			1	CIRCUIT BD ASSY:HIGH CURRENT POWER SUPPLY (A15) (ATTACHING PARTS)	80009	671022601
-30	211-0661-XX			11	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-31	214-4031-XX			5	.HEAT SINK,DIODE:ALUMINUM (ATTACHING PARTS)	80009	2144031XX
-32	211-0246-XX			1	.SCR,ASSEM WSHR:4-40 X 0.625,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-33	344-0395-XX			11	CLIP,CABLE:NYLON	80009	3440395XX
-34	344-0409-XX			7	CLIP,RETAINING:WIRE MOUNTING,NYLON	80009	3440409XX
-35	129-1185-XX			4	SPACER,POST:45MM L,W/4-40 INT THD,BRS	80009	1291185XX
-36	122-0181-XX			1	ANGLE,RAIL:LEFT (ATTACHING PARTS)	80009	1220181XX
-37	211-0502-XX			4	SCREW,MACHINE:6-32 X 0.188,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-38	344-0396-XX			4	CLIP,CABLE:PVC	80009	3440396XX
-39	129-1234-XX			11	SPACER,POST:4-40 INT THD BOTH END,21MML	TK0AL	30-0078
-40	255-1108-XX			1	PLASTIC CHANNEL:1000 X 4.4 X 5.0MM,NYLON	80009	2551108XX
-41	260-2332-00			1	SWITCH,THRMSTC:NC,60 OPEN,3A,250V:(S906) (ATTACHING PARTS)	80009	260233200
-42	211-0007-XX			2	SCREW,MACHINE:4-40 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-43	308-0933-00			1	RES,FXD,WW:4.7 OHM,2%,8W:(R940)	80009	308093300
	308-0926-00			1	RES,FXD,WW:0.675 OHM,2%,8W:(R950) (ATTACHING PARTS)	TK0AE	RHF-25ML0.675G
-44	211-0008-XX			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-45	210-0457-XX			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL (ATTACHING PART FOR FRONT SUBPANEL)	TK0435	ORDER BY DESC
-46	220-0547-XX			2	NUT BLOCK:4-40 X 0.282,NI SIL (ATTACHING PARTS)	TK0914	ORDER BY DESC
-47	211-0105-XX			2	SCREW,MACHINE:4-40 X 0.188,FLH,STL (END ATTACHING PARTS)	TK0435	MACHINE SCREW
-48	343-1287-XX			1	CLAMP,CABLE:8.4MM ID,NYLON (ATTACHING PARTS)	80009	3431287XX
-49	210-0407-XX			1	NUT,PLAIN,HEX:6-32 X 0.25,BRS (END ATTACHING PARTS)	73743	3038-402

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description	Mfr. code	Mfr. part number
-50	198-5750-00			1	WIRE SET,ELEC:371B W/D-SUB 50 CONT,MALE:(W610) (ATTACHING PARTS)	80009	198575000
-51	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-52	386-5917-XX			1	PLATE,CONN MTG:STEEL (ATTACHING PARTS)	80009	3865917XX
-53	211-0510-XX			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-54	174-1693-00			1	CA ASSY,SP,ELEC:34,28 AWG,130.0 L,RIBBON:(W140) (ATTACHING PARTS)	80009	174169300
-55	211-0661-XX			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-56	386-5484-XX			1	PLATE,CONN MTG:MALE,STEEL (ATTACHING PARTS)	80009	3865484XX
-57	211-0510-XX			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-58	671-B128-01			1	CIRCUIT BD ASSY:FDD INTERFACE (A23) (ATTACHING PARTS)	80009	671B12801
-59	211-0871-00			4	SCR,ASSEM WSHR:M3 X 6,,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-60	348-1046-XX			1	GROMMET:CHANNEL,2.4MM X 98MM L,NYLON	TK0AR	30-0602
-61	334-7069-XX			1	MARKER,IDENT:MARKED DANGER	TK0CX	30-0101
-62	344-0409-XX			2	CLIP,RETAINING:WIRE MOUNTING,NYLON	80009	3440409XX
-63	407-A676-00			1	BRACKET,MTG:FDD,ALUMINUM (ATTACHING PARTS)	80009	4074013XX
-64	211-0507-XX			3	SCREW,MACHINE:6-32 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-65	211-0538-XX			3	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-66	671-0233-03			1	CKT BOARD ASSY:SENSE(A10) (ATTACHING PARTS)	80009	671023303
-67	211-0661-XX			6	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESC
-68	342-0826-XX			1	.INSULATOR,PLATE:CKT BD,POLYCARBONATE	80009	3420826XX
-69	343-1345-XX			2	.RETAINER,CKT BD:19.1MM L,NYLON	80009	3431345XX
-70	342-0847-XX			1	INSULATOR,PLATE:SENSE BD LOWER,PC	TK0CP	30-0080
-71	129-1234-XX			6	SPACER,POST:4-40 INT THD BOTH END,21MML	TK0AL	30-0078
-72	384-1703-XX			1	EXTENSION SHAFT:PWR SW	80009	3841703XX
-73	211-0038-XX			6	SCREW,MACHINE:4-40 X 0.312,FLH,STL (ATTACHING PARTS FOR FRONT PORCH ASSY)	TK0435	ORDER BY DESC
-74	308-0922-00			2	RES,FXD,WW:0.01 OHM,0.1%,8W:(R100) RES,FXD,WW:0.04 OHM,2%,12W:(R960) (ATTACHING PARTS)	TK0AE 80009	RHF-75ML0.01B 308092501

Replaceable mechanical parts list (Cont.)

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
-75	211-0507-XX			8	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-76	214-3420-XX			1	SPRING,HLCPS:10.0MM OD X 9.5MM L,CLE,SST	80009	2143420XX
-77	351-0774-XX			3	GUIDE,SLIDE:PWR SW,POLYCARBONATE (ATTACHING PARTS)	80009	3510774XX
-78	211-0038-XX			3	SCREW,MACHINE:4-40 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-79	366-1767-XX			1	PUSH BUTTON:BLACK,GREEN INDICATOR	80009	3661767XX
-80	122-0182-XX			1	ANGLE,RAIL:RIGHT (ATTACHING PARTS)	80009	1220182XX
-81	211-0502-XX			4	SCREW,MACHINE:6-32 X 0.188,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-82	441-1976-XX			1	CHASSIS,DRAWER:MAIN ASSY,AL	80009	4411976XX
-83	119-3456-00			1	FLOPPY DISC DRIVE:(A24) (ATTACHING PARTS)	80009	119345600
-84	211-0751-XX			4	SCR,ASSEM WSHR:M3 X 8 (END ATTACHING PARTS)	80009	2110751XX
-85	337-3588-XX			1	SHIELD,ELEC:ALUMINUM (ATTACHING PARTS)	80009	3373588XX
-86	211-0658-XX			4	SCR,ASSEM WSHR:6-32 X 0.312,PNH,STL,POZ (END ATTACHING PARTS)	TK0435	17691-300
-87	407-3854-XX			1	BRACKET,ANGLE:ALUMINUM,SUPPORT (ATTACHING PARTS)	80009	4073854XX
-88	211-0538-XX			4	SCREW,MACHINE:6-32 X 0.312,FLH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-89	337-3479-XX			1	SHIELD,CRT:LOWER (ATTACHING PARTS)	TK0FE	30-0004
-90	211-0661-XX			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-91	342-0846-XX			1	INSULATOR,PLATE:CIRCUIT BREAKER,PC	TK0CP	30-0079

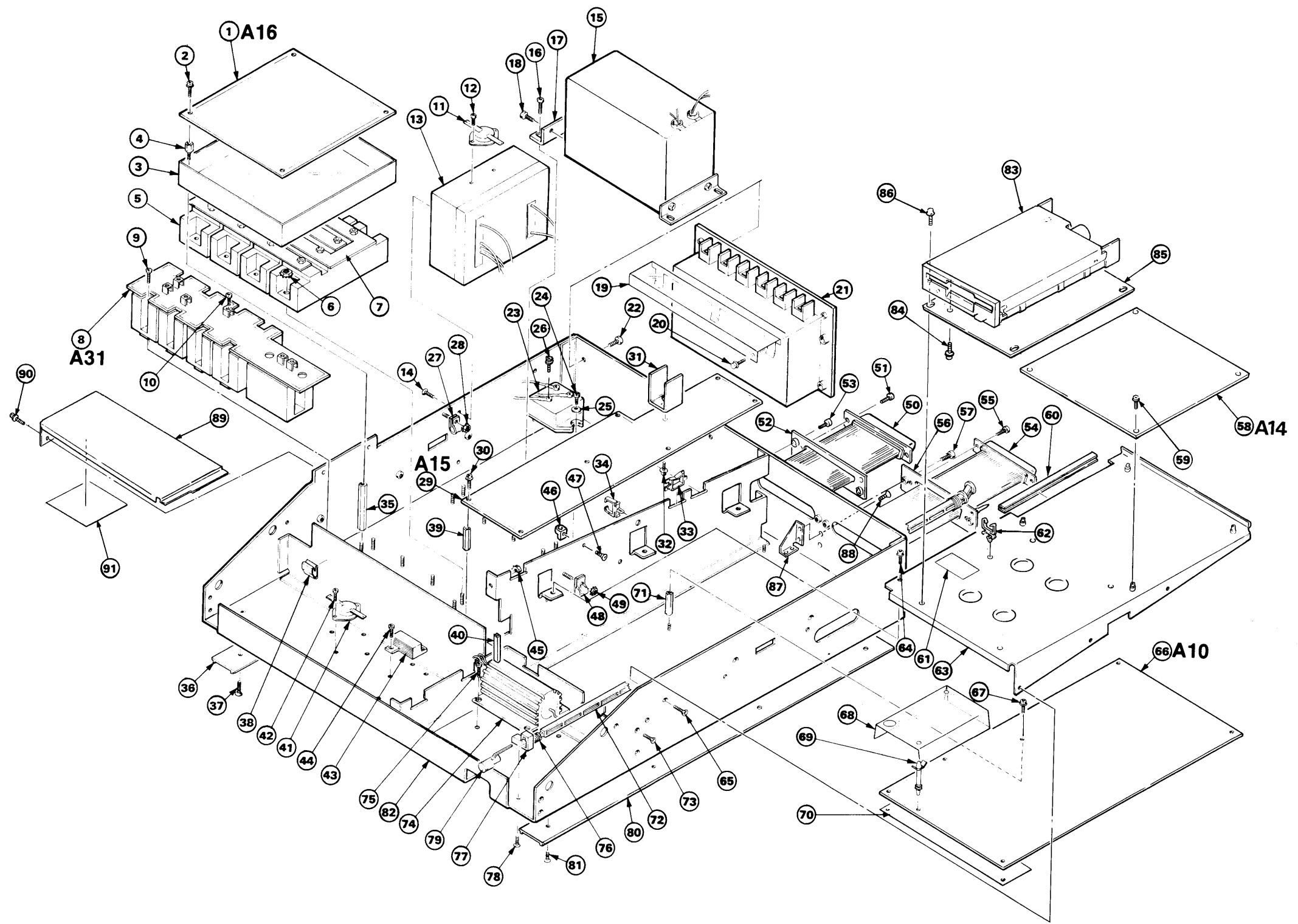


Figure 9-7: Drawer Chassis

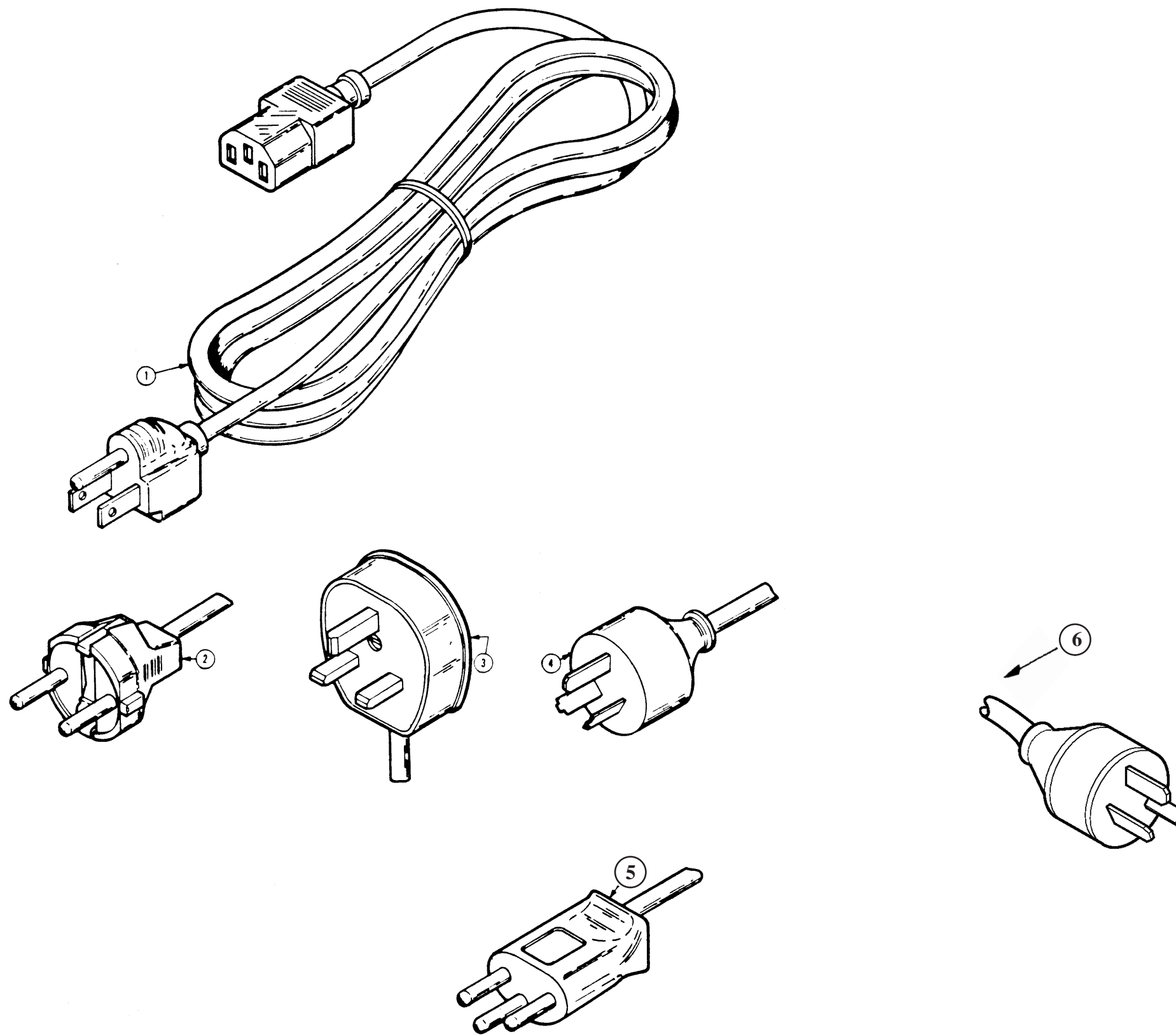


Figure 9-8: Accessories

Replaceable mechanical parts list

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
STANDARD ACCESSORIES							
	070-A840-50			1	USER MANUAL,371B	TK2548	PER TEK P/N
	159-0019-XX			1	FUSE,CARTRIDGE:1A,250V,SLOW-BLOW	80009	1590019XX
	159-0228-00			1	FUSE,CARTRIDGE:2A,125V,SLOW-BLOW	80009	1590228-00
	159-0291-00			1	FUSE,CARTRIDGE:4A,125V,SLOW-BLOW	80009	159029100
	063-3341-XX			1	UTILITY SOFTWARE (FD)	80009	0633341XX
	016-A328-XX			1	TEST FIXTURE	80009	016A32800
	-----			1	A1002,TEST ADAPTER:(IN-LINE ADAPTER)		
	-----			1	A1003,TEST ADAPTER:(T3/TO-66 ADAPTER)		
	012-1371-00			1	WIRE SET:(WIRE SET WITH ALLIGATOR CLIPS)		
8-1	161-0066-00			1	CA ASSY,PWR:3,18 AWG,250V/10A,98 INCH,STR (STANDARD ONLY)	S3109	161006600
-2	161-0066-09			1	CA ASSY,PWR:3,0.75MM SQ,250V/10A,99 INCH (OPTION A1 ONLY)	S3109	86511000
-3	161-0066-10			1	CA ASSY,PWR:3,0.1MM SQ,250V/10A,2.5 METER (OPTION A2 ONLY)	S3109	BS/13-H05VVF3G0
-4	161-0066-11			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER (OPTION A3 ONLY)	S3109	198-000
-5	161-0157-00			1	CABLE ASSY,PWR,:3 X 0.75MM SQ,250V,7.0 L (OPTION A5 ONLY)	TK1267	ORDER BY DESC
-6	161-0304-00			1	CABLE ASSY,PWR,:3 X 1.0MM SQ,250V/10A, 2.5 METER (OPTION AC ONLY)		
				1			
				1			
				1			
	070-A843-50			1	SERVICE MANUAL,371B	80009	070A843XX
	-----			1	A1001,TEST ADAPTER:(BLANK ADAPTER)		
	-----			1	A1005,TEST ADAPTER:(AXIAL ADAPTER)		
	012-0991-00			1	GPIB CABLE :2m		
	016-0930-00			1	RACK MOUNT KIT		
	K475			1	CART		
				1			
				1			

