

TEKTRONIX®

**7A21N
DIRECT ACCESS UNIT
(SN B040000-up)**

INSTRUCTION MANUAL

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

Serial Number _____

070-1962-00

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WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

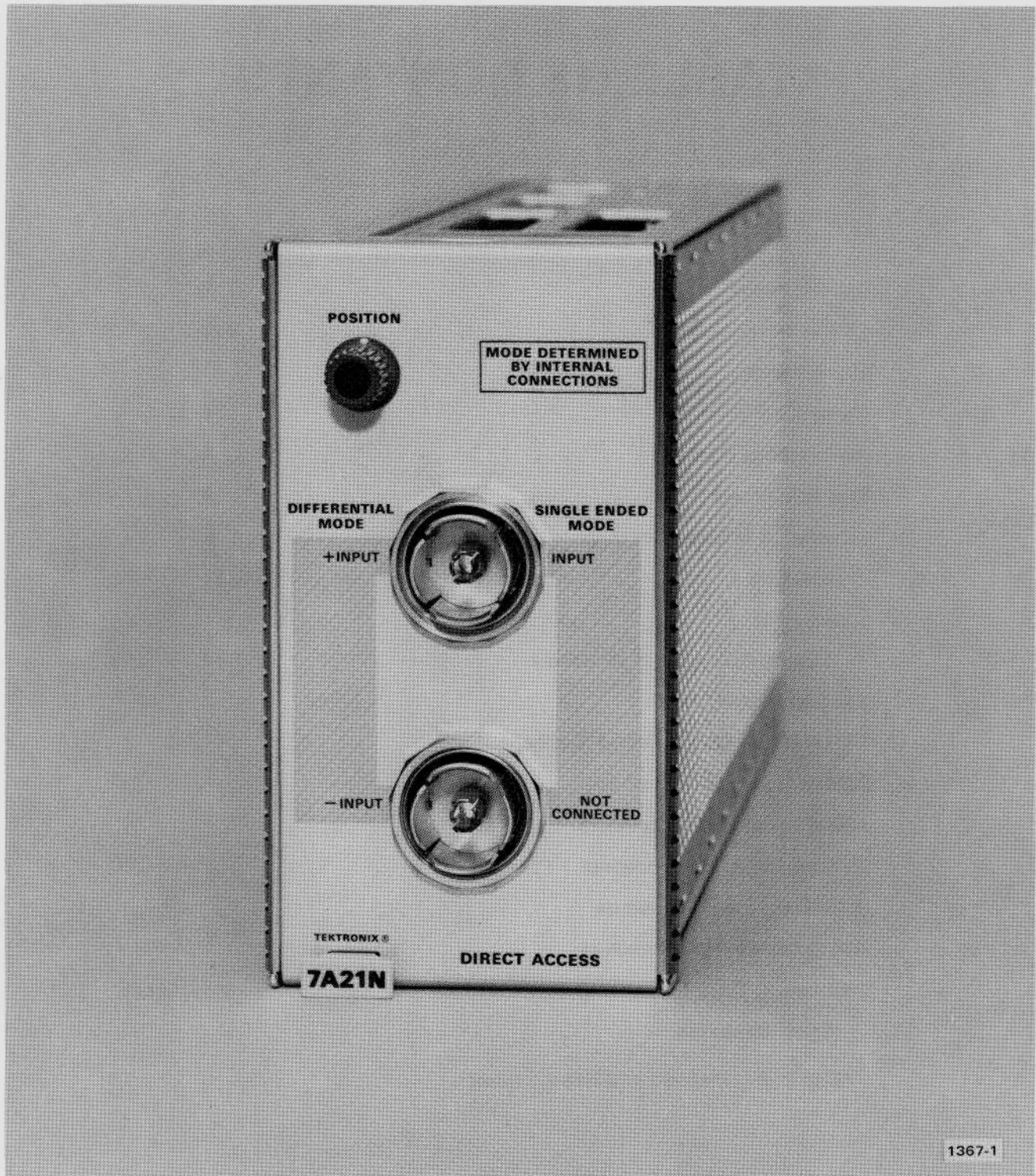
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7A21N Features

The 7A21N Direct Access plug-in is designed for use with Tektronix 7800 and 7900-Series oscilloscopes. This unit provides AC coupling of high-frequency or fast-risetime signals directly to the crt vertical deflection plates. Two front-panel input connectors permit either single ended or differential operation (internally selected). Trace positioning is accomplished with a front-panel control.

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SPECIFICATION

The following electrical characteristics are valid for instruments calibrated at an ambient temperature between +20°C and +30°C after a 20 minute warm up period.

TABLE 1-1

ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
Deflection Factor		
Single Ended Mode	Less than four volts/division	
Differential Mode	Less than ten volts/division	
Bandwidth	20 kilohertz to one gigahertz	
Maximum Input Power (Each Input)	Six watts average; 200 volts dc	
Input Impedance (Each Input)	50 ohms, ac coupled	
Reflection Coefficient	0.1 peak-to-peak	Measured using a reflectometer with a system risetime of 75 ps.

CIRCUIT DESCRIPTION

The 7A21N circuitry is explained first as internally connected for the differential mode of operation, then as internally connected for the single-ended mode of operation. It should be noted that the entire signal line is designed to maintain a constant impedance of 50 Ω .

The signal connected to the -INPUT is ac coupled through C18 and inverted in L21. The signal is inverted to provide proper phasing with the -INPUT signal. After inversion, the signal is algebraically added to the +INPUT signal in the 50 Ω Bridge, U12. The characteristics of this bridge are such that each input is terminated into 50 Ω and the output of the bridge has a source impedance of 50 Ω .

The signal connected to the +INPUT is ac coupled through C5, then connected to U12 through the delay line, L6. The delay time of L6 is calculated so that the transit time from the +INPUT connector to U12 is the same as the transit time from the -INPUT connector to U12.

The output of the 50 Ω Bridge assembly, U12, is connected to the compensating network composed of R24, C24, R25, C25, R26, and L26. This network compen-

sates for the skin effect losses and line losses in U12 and the cables.

Power divider U30 splits the signal into two directions. The characteristics of the Power Divider are such that, when properly terminated, the impedance looking into any leg is 50 Ω .

The output of U30 at J31 is inverted at L56. Components R61, C61, R62, C62, R63, and L63 compensate for skin effect losses and line losses of the cables, the Inverter, and the Power Divider. The signal is then capacitively coupled to the crt deflection plate. The output of U30 at J30 is connected to the delay line L36. Delay time for L36 is calculated so that the transit times of the inverted and non-inverted signals are equal. R41, C41, R42, C42, R43, and L43 compensate for the skin effect losses and line losses of the cables, delay line and Power Divider. The non-inverted signal is connected to the crt Input Network where it is capacitively coupled to the crt vertical deflection plate. The 69 Ω resistors on the crt Input Network parallel the 182.5 Ω impedance of the deflection plates to form 50 Ω termination for the inverted and non-inverted signals.

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Single ended circuitry is similar to differential circuitry except that the $-INPUT$ is not used and the signal at the $+INPUT$ bypasses $50\ \Omega$ Bridge U12 and the compensation network R24, C24, R25, C25, R26, and L26.

The vertical deflection plates are terminated into their characteristic impedance by the CRT Termination Assembly, U120. Positioning voltage is supplied from R96.

R98 sets the nominal position voltage. This control also has an effect on the crt trace focus.

The Load Board (located on U110) provides a storage space for the power line that was removed from the Oscilloscope Vertical Amplifier board. The $+50\ V$ and $-15\ V$ supplies in the power line are loaded so that the supplies stay in regulation during direct access operation. Proper bias is supplied from the Load Board to protect the oscilloscope Channel Switch.

MAINTENANCE

General

This portion of the manual contains information concerning preventive maintenance, corrective maintenance and troubleshooting the 7A21N.

Cleaning

To improve reliability and to avoid possible electrical problems, it is recommended that the 7A21N be cleaned at periodic intervals.

Loose dust may be removed with a soft cloth or a dry brush. Hardened dirt can be removed with a cotton-tipped swab or cloth, dampened with a mild detergent and water solution, then carefully rinsed and dried.

NOTE

Calibration of the 7A21N can be effected if the physical position of the components are moved.

Troubleshooting

If trouble is suspected, before moving or replacing any components, check that all cables and interconnections are properly made. Refer to the Operating Instructions portion of this manual for complete information. If trouble is still evident and if calibration does not correct the problem, then a component malfunction is the likely cause.

Since the 7A21N contains no active components, all that is usually required to locate the defective part is an ohmmeter. A reflectometer (such as the Tektronix 7L12 or 1501) can be used to pinpoint the problem area by checking for discontinuities in the $50\ \Omega$ signal path.

Before replacing any component first note the physical position of the component. Install the replacement part in the same position.

Corrective Maintenance

Standard Replacement Parts. All electrical and mechanical replacement parts for the 7A21N can be obtained through your local field office or representative. However, many of the electronic parts can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts list for value, rating, tolerance, and description.

Ordering Parts. When ordering replacement parts from Tektronix, Inc., include the instrument types, instrument serial number, a description of the part (if electrical, include circuit number), and the Tektronix part number.

Soldering Techniques. Care should be taken when soldering to prevent damage due to excess heat. A small wattage soldering iron (15 to 50 watts) should be used. Apply heat directly to the junction to be soldered. Use only enough heat to form a good bond. Heat sink components when necessary.

CALIBRATION

Adjustment Procedure

Two methods of setting the 7A21N Vertical Voltage adjustment follow. If a focused trace was obtained prior to the installation procedure, use Method A. An alternative adjustment procedure is given as Method B.

Method A:

1. Position the trace to the center of the crt graticule area with the 7A21N POSITION control.
2. Adjust Vertical Voltage adjustment, R98 (located on left side of 7A21N) for a well-defined trace.

Method B:

1. Position the trace to the center of the crt graticule area with the 7A21N POSITION control.
2. Measure and record the DC voltage between pin 10 of the cathode ray tube and ground. Use a VOM set to the 50 V range, or higher, for this purpose.

NOTE

Pin 10 of the crt connects to the shield surrounding the Vertical Deflection plates. The easiest place to measure the voltage of this shield is on the multi-pin connector connecting pin 10 of the crt to the Z-Axis Amplifier board. Refer to the oscilloscope main-frame manual for the exact location.

3. Measure the DC voltage between each of the two Vertical deflection plates and ground. Average these two answers by the formula:

$$V_{\text{average}} = \frac{V_1 + V_2}{2}$$

4. Adjust the Vertical Voltage adjustment, R98 so that the voltage measured at pin 10 of the crt (step 2) and the V_{average} (calculated from step 3) are within 0.5 volt.

This completes the adjustment for the 7A21N.

PERFORMANCE CHECK

General

The performance of this instrument can be checked without making any internal adjustments by using the following procedure. This procedure checks the instrument against tolerances listed in the Specification section of this manual. If the instrument does not meet any or all of these specifications it is due to a malfunction. Refer to the Troubleshooting portion of this manual for possible causes and corrective techniques.

Test Equipment Required

General. The following test equipment and accessories, or its equivalent, is required for a complete check of the 7A21N. Specifications given for the test equipment are the minimum necessary for an accurate check. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications. All test equipment is assumed to be correctly calibrated and operating within the listed specifications. Detailed operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

Special Calibration Fixtures. Special Tektronix test fixtures are used in this procedure only where they facilitate the Performance Check. These special test fixtures are available from Tektronix, Inc. Order by part number through your local Tektronix Field Office or representative.

Test Equipment Alternatives. All of the listed test equipment is required to completely check this instrument. The Performance Check procedure is based on the first item of equipment given as an example of applicable equipment. When other equipment is substituted, control settings or test setup may need to be altered slightly to meet the requirements of the substitute equipment. If the exact item of test equipment given as an example in the Test Equipment list is not available, first check the Specifications column carefully to see if any other equipment is available which might suffice. Then check the Usage column to see what this item of test equipment is used for. If used for a check which is of little or no importance to your measurement requirements, the item and corresponding step(s) can be deleted.

TEST EQUIPMENT

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
1. Calibration Oscilloscope	Tektronix 7900-Series 7A21N system bandwidth to 1 GHz.	Used throughout procedure to provide display.	a. Tektronix 7904 oscilloscope with 7A21N installed.
2. Time Base Plug-in Unit	Tektronix 7B-Series time base unit. 0.5 ns sweep rate required.	Used throughout procedure to provide sweep.	a. Tektronix 7B92 Time Base Unit.
3. Test Oscilloscope	Complete with time base unit and vertical unit. Must have vertical deflection factor of 5 V/div.	Used for deflection factor check.	a. Tektronix 7603 Oscilloscope with Tektronix 7A16A Vertical Unit and 7B50 Time Base Unit or equivalent.
4. Time Domain Reflectometer	System risetime, 75 ps; pulse amplitude, 200 mV; input, single ended; sensitivity, to 100 m ρ .	Used to check input reflections and transit time.	a. Tektronix 7S12 TDR/Sampler plug-in unit with S-52 Pulse Generator head and S-2 Sampling head. (This system to be used with the Test oscilloscope.)
5. Square-wave Generator	Frequency, to 75 kHz; output amplitude, 10 volts P-P into 50 Ω .	Used to check Deflection Factor.	a. Tektronix 106 Square Wave Generator.
6. Pulse Generator	Pulse risetime, 250 ps or less; pulse amplitude to 50 volts or greater.	Used to check risetime and aberrations.	a. Tektronix 109 Pulse Generator.
7. Delay Line and Trigger Pickoff	Delay time, approximately 75 ns; risetime, 175 ps or less.	Used to check risetime and aberrations.	a. Tektronix 7M11 Delay Line plug-in unit.
Cables and Accessories			
8. TEKTRONIX to GR adapter	Tektronix female to GR adapter.	Used for transit time check.	a. Tektronix Part Number 017-0093-00.
9. 20 ns Cable	Connectors, GR; impedance, 50 Ω ; time delay, 20 ns.	Used for risetime and aberration checks and other signal connections.	a. Tektronix Part Number 017-0504-00.
10. GR Cable (2 each)	Connectors, GR; impedance, 50 Ω ; length, 20-inch.	Used throughout procedures for signal connections.	a. Tektronix Part Number 017-0515-00.
11. BNC Cable	Connectors, BNC; impedance, 50 Ω ; length, 42-inch.	Used for external trigger in the risetime and aberration check.	a. Tektronix Part Number 012-0057-00.
12. SMA Male to GR Adapter	SMA (3 mm) to GR adapter.	Used for connections to Time-Domain Reflectometer pulse generator.	a. Tektronix Part Number 015-1007-00.

Preliminary Set Up

1. Connect the 7A21N internal connections for single-ended operation.

2. Install the 7A21N into the Calibration Oscilloscope and turn power on.

Check Reflection Coefficient

1. Connect the Time-Domain Reflectometer to the 7A21N +INPUT. Check that the reflections are 0.1 peak-to-peak or less (100 m μ peak-to-peak or less).

2. Change the 7A21N internal connections for differential operation.

3. Connect the Time-Domain Reflectometer to the 7A21N +INPUT: Check that the reflections are 0.1 peak-to-peak or less (100 m μ peak-to-peak or less).

4. Connect the Time-Domain Reflectometer to the 7A21N -INPUT. Check that the reflections are 0.1 peak-to-peak or less (100 m μ peak-to-peak).

Check +INPUT/-INPUT Transit Time

1. Remove the right side cover of the 7A21N. It is not necessary to plug the 7A21N into the Calibration Oscilloscope for this check.

2. Remove the cable connected to J29 (on U30). Connect the end of this cable to the Time-Domain Reflectometer sampling head by using the Tektronix to GR adapter and GR Cable.

3. Connect the Time-Domain Reflectometer pulse generator to the 7A21N +INPUT. Set the Reflectometer Time/Div to 50 ps.

4. Use the Time-Domain Reflectometer controls to obtain a full graticule display of the rising portion of the pulse. Adjust the controls so that the pulse starts at the lower left side of the graticule and intersects the graticule center lines, see Fig. 1.

5. Without moving any controls, move the pulse generator to the -INPUT.

6. Vertically position the trace so that the pulse (now negative going) starts at the graticule upper left side. Check that the trace intersects the horizontal graticule centerline within ± 25 ps of the vertical line, see Fig. 2.

7. Disconnect Time-Domain Reflectometer. Reconnect the cable to J29.

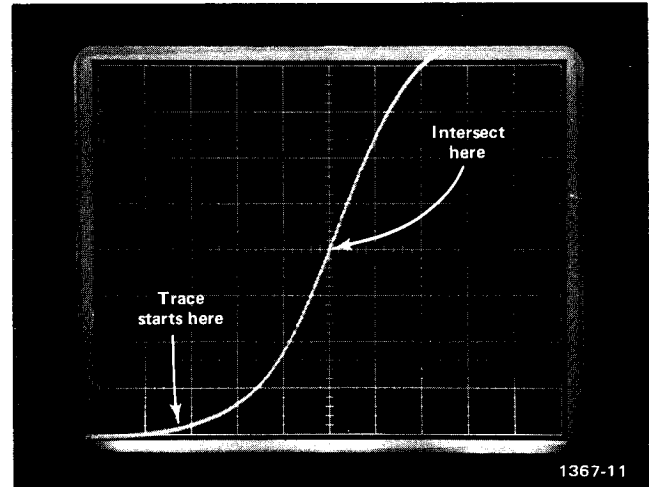


Fig. 1. +INPUT signal.

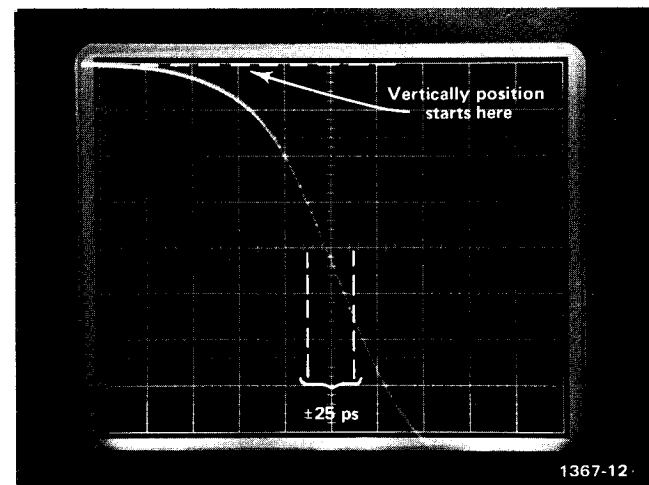


Fig. 2. -INPUT signal.

Alternate Procedure

Some reflectometers do not have a separate pulse generator output and sampling input. If this is the case, disconnect the cable connected to J29 and measure that the reflected pulses at the +INPUT and -INPUT is within 50 ps of one another.

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Check Deflection Factor

1. Install the 7A21N into the Calibration Oscilloscope.
2. Set the Square Wave Generator frequency control to approximately 75 kHz. Use the test Oscilloscope to adjust the Square Wave Generator for an output of 10 volts peak-to-peak into 50 Ω .
3. Connect the Square Wave Generator to the 7A21N +INPUT. Terminate the -INPUT into 50 Ω . Check for a crt display of at least 1 division.
4. Connect the Square Wave Generator to the 7A21N -INPUT. Terminate the +INPUT into 50 Ω . Check for a crt display of at least 1 division.
5. Change the 7A21N internal connections for single-ended operation.
6. Connect the Square Wave Generator to the 7A21N +INPUT. Terminate the -INPUT into 50 Ω . Check for a crt display of at least 2.5 cm.

Check Risetime and Aberration

1. Connect the Pulse Generator to obtain a pulse duration of approximately 40 ns by connecting the 20 ns GR cable between the two charge line outputs.
2. Connect the Pulse Generator output to the Delay Line and Trigger Pickoff. Connect the Delay Line output to the 7A21N +INPUT. Connect the Trigger Pickoff to the external trigger input of the Time Base unit.
3. Adjust the Pulse Generator to obtain a six-division display. Set the triggering controls for a stable display.

4. Check that the risetime of the display is less than 465 ps².

5. Check that the aberrations are +4%, -6%, 8% peak-to-peak or less.

6. Change the 7A21N internal connections to obtain differential operation. Terminate the -INPUT into 50 Ω .

7. Connect the Pulse Generator to the 7A21N +INPUT and adjust for a 6 division display.

8. Check that the risetime of the display is less than 465 ps².

9. Check that the aberrations are 10% peak-to-peak or less.

10. Connect the Pulse Generator to the 7A21N -INPUT. Terminate the +INPUT into 50 Ω .

11. Check that the risetime of the display is less than 465 ps².

12. Check that the aberrations are 10% peak-to-peak or less.

²This value was calculated from the formula where: T_{rPG} is the risetime of the pulse generator; T_{rDL} is the risetime of the delay line; and $T_{r_{system}}$ is the risetime of the 7A21N/7904 system.

$$Tr = \sqrt{(Tr_{PG})^2 + (Tr_{DL})^2 + (Tr_{system})^2}$$

OR

$$Tr = \sqrt{250^2 + 175^2 + 350^2}$$

INSTALLATION INFORMATION

General

To effectively use the 7A21N, the operation and capabilities of the instrument must be known. This section gives installation procedures, and gives general information on operation and signal connections.

INSTALLATION

The 7A21N is designed to operate in the Left Vertical plug-in compartment of TEKTRONIX 7900-Series os-

cilloscope mainframes and the Left or Right, or both Vertical plug-in compartments of TEKTRONIX 7800-Series oscilloscopes mainframes. When shipped from the factory, this instrument has been calibrated to meet the tolerances listed in the Performance Requirement column in the Specification section.

To operate the 7A21N, the mainframe Vertical Amplifier board and the CRT Termination Assembly must first be replaced with the 7A21N Vertical Termination Board and the 7A21N CRT Termination Assembly. These assemblies

are provided as standard accessories and are stored on the left side of the 7A21N; see Fig. 3. Extension Cables and a Positioning Wire Assembly is also provided to connect the signal and the position control voltages to the crt deflection plates. Locations of board assemblies and cable connections are shown for each instrument in the Before and After illustrations, which are located in the foldout pages behind diagram 1.

Removal

To use other plug-in units in the Vertical compartments of the mainframe, it is necessary to remove the parts added for direct-access operation with the exception of the Positioning Wire assembly. The connector ends of this assembly are permanently installed and should not be removed. The multi-pin connector end of this assembly, however, should be disconnected and placed where it will not interfere with operation of the mainframe.

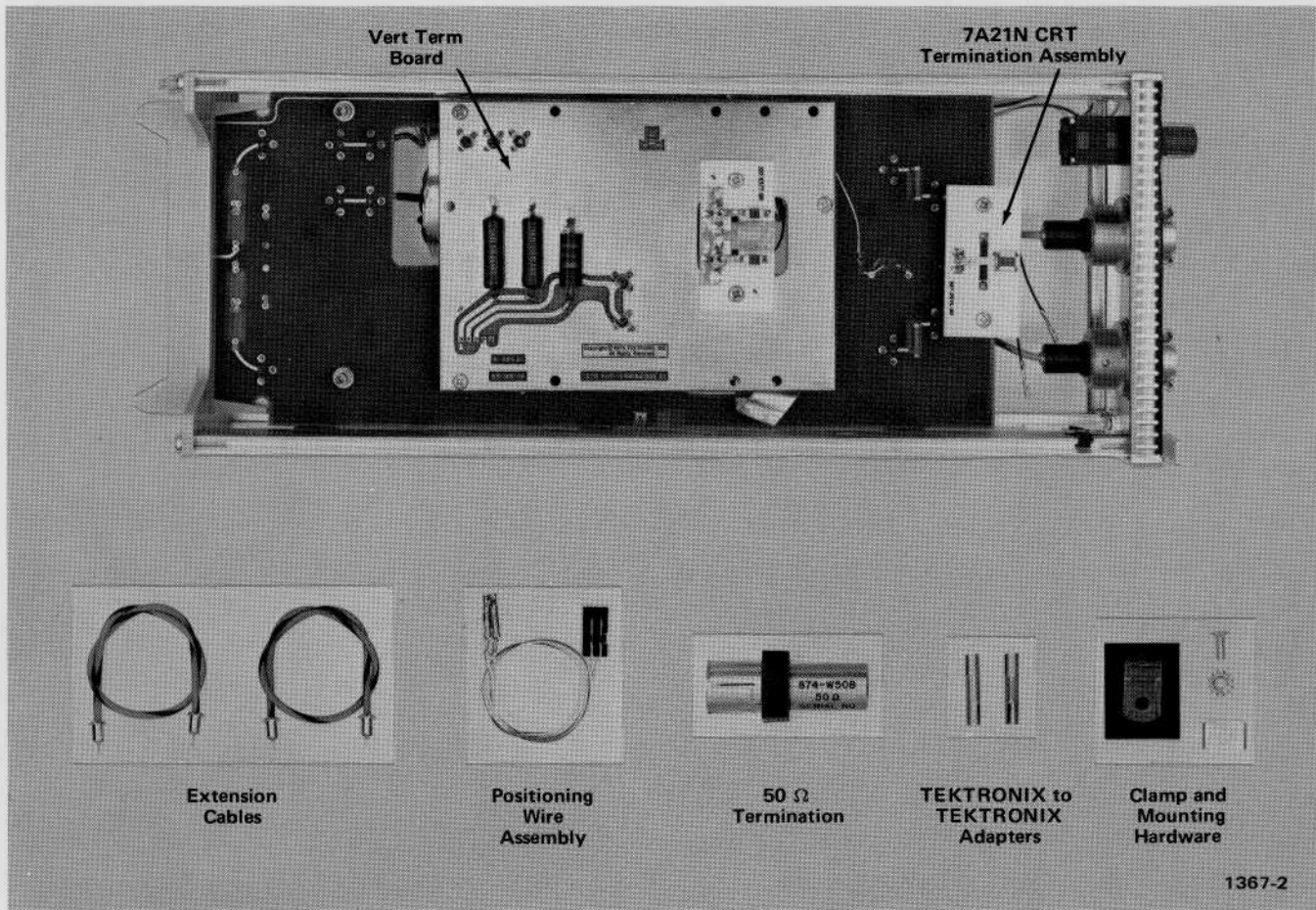


Fig. 3. Standard accessories supplied with 7A21N.

GENERAL OPERATING INSTRUCTIONS

The 7A21N can be connected (internally) for single-ended operation or differential operation. The illustrations shown in Fig. 4 show the internal cable connections used for the single ended and differential modes of operation.

When used in the differential mode and if only one input is used, the other input should be terminated into 50 Ω . It is always good practice to terminate the unused input. Use the 50 Ω Terminator supplied with the 7A21N.

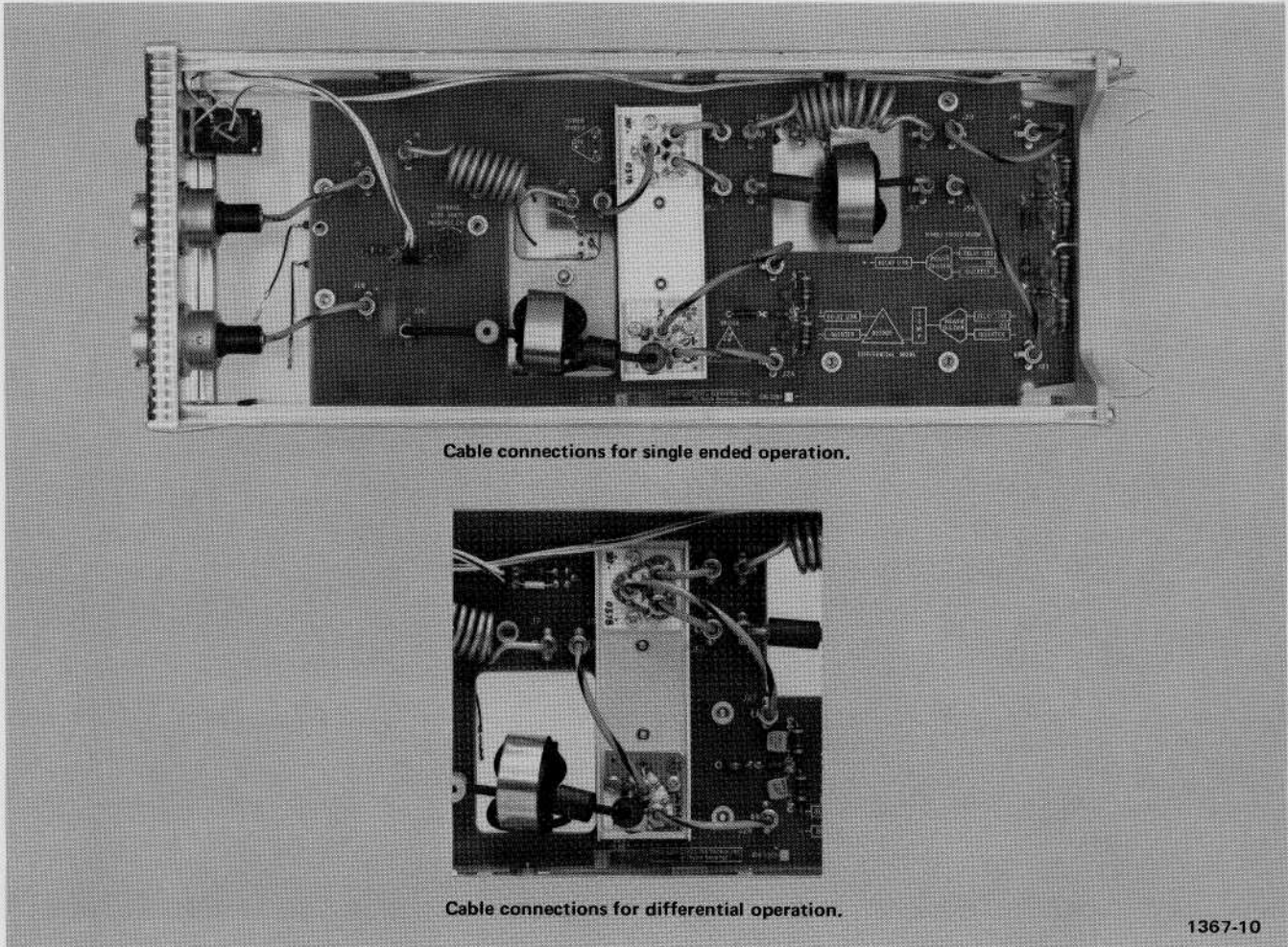


Fig. 4. Cable connections for single-ended and differential operation.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number

00X Part removed after this serial number

ITEM NAME

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

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
01121	ALLEN-BRADLEY CO.	1201 2ND ST. SOUTH	MILWAUKEE, WI 53204
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON ST.	DOVER, NH 03820
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NB 68601

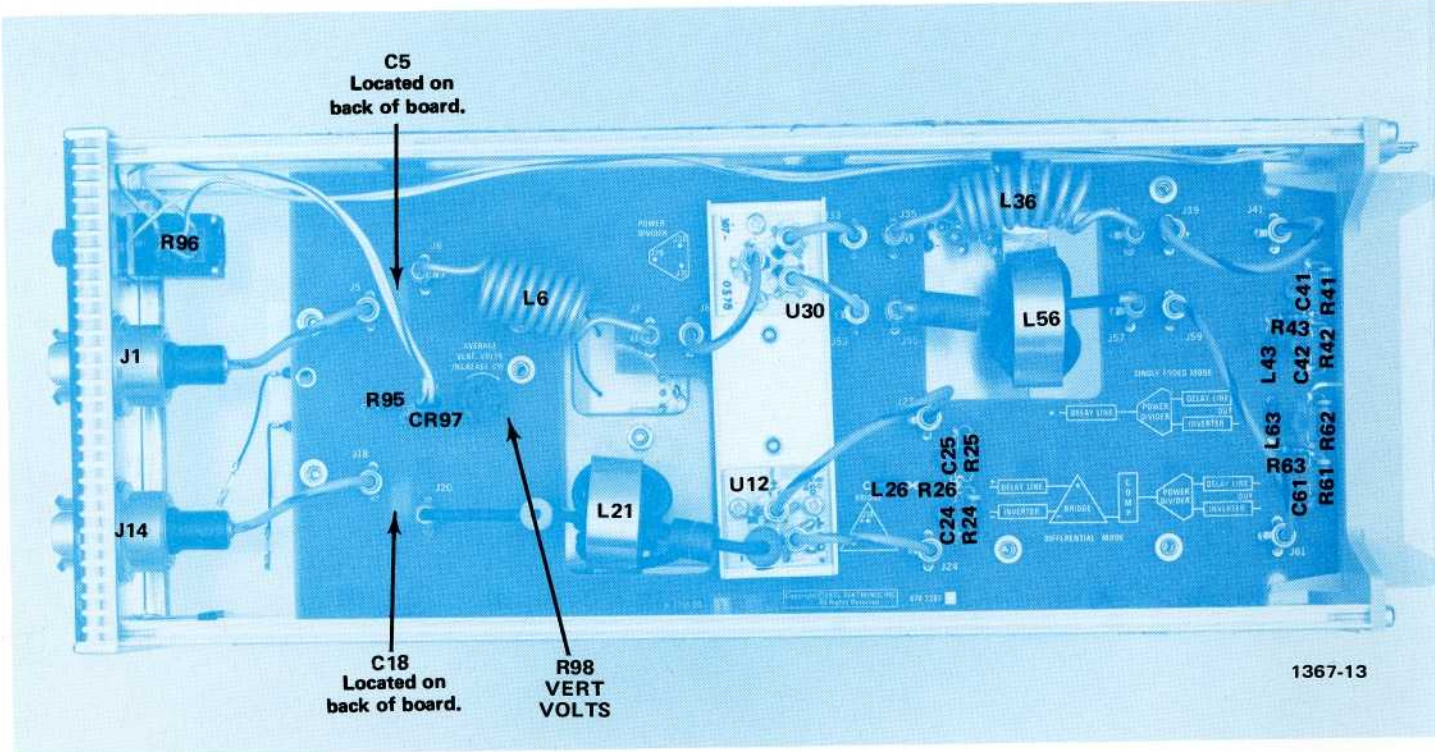
Electrical Parts List—7A21N (S/N B040000 & up)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2207-01		CKT BOARD ASSY:DIRECT ACCESS	80009	670-2207-01
A2	670-3087-00		CKT BOARD ASSY:VERT TERM	80009	670-3087-00
C5	283-0278-00		CAP.,FXD,CER DI:2.2UF,20%,100V	72982	8131-100651104Z
C18	283-0278-00		CAP.,FXD,CER DI:2.2UF,20%,100V	72982	8131-100651104Z
C24	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
C25	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
C41	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
C42	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
C61	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
C62	283-0047-00		CAP.,FXD,CER DI:270PF,5%,500V	72982	861-518B271J
J1	017-0093-01		CONN,RCPT,ELEC:ADAPTER	80009	017-0093-01
J3	017-0093-01		CONN,RCPT,ELEC:ADAPTER	80009	017-0093-01
J5	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J6	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J7	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J8	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J14	017-0093-01		CONN,RCPT,ELEC:ADAPTER	80009	017-0093-01
J16	017-0093-01		CONN,RCPT,ELEC:ADAPTER	80009	017-0093-01
J18	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J20	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J24	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J27	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J33	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J35	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J37	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J39	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J41	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J53	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J55	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J57	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J59	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
J61	131-1003-00		CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
L6	119-0370-00		COUPLER,XMSN,LI:50 OHM,NORMALIZER	80009	119-0370-00
L21	119-0397-00		COUPLER,XMSN,LI:50 OHM,INVERTER	80009	119-0397-00
L26	108-0182-00		COIL,RF:0.3UH	80009	108-0182-00
L36	119-0370-00		COUPLER,XMSN,LI:50 OHM,NORMALIZER	80009	119-0370-00
L43	108-0182-00		COIL,RF:0.3UH	80009	108-0182-00
L56	119-0369-00		COUPLER,XMSN,LI:50 OHM,INVERTER	80009	119-0369-00
L63	108-0182-00		COIL,RF:0.3UH	80009	108-0182-00
R24	307-0023-00		RES.,FXD,CMPSN:4.7 OHM,10%,0.50W	01121	EB47G1
R25	307-0023-00		RES.,FXD,CMPSN:4.7 OHM,10%,0.50W	01121	EB47G1
R26	315-0271-00		RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R41	307-0056-00		RES.,FXD,CMPSN:4.3 OHM,5%,0.50W	01121	EB43G5
R42	307-0056-00		RES.,FXD,CMPSN:4.3 OHM,5%,0.50W	01121	EB43G5
R43	315-0301-00		RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R55	308-0106-00		RES.,FXD,WW:1K OHM,5%,5W	91637	HL60528-10000J
R56	308-0106-00		RES.,FXD,WW:1K OHM,5%,5W	91637	HL60528-10000J
R58	305-0271-00		RES.,FXD,CMPSN:270 OHM,5%,2W	01121	HB2715
R61	307-0056-00		RES.,FXD,CMPSN:4.3 OHM,5%,0.50W	01121	EB43G5
R62	307-0056-00		RES.,FXD,CMPSN:4.3 OHM,5%,0.50W	01121	EB43G5
R63	315-0301-00		RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015

Electrical Parts List—7A21N (S/N B040000 & up)

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R95	315-0242-00			RES. ,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R96	311-1595-00			RES. ,VAR,NONWW:PNL,2 X 10K OHM,1W	12697	381-CM 40366
R98	311-1564-00			RES. ,VAR,NONWIR:500 OHM,20%,0.50W	73138	91A-500ROM
R99	311-0978-00			RES. ,VAR,NONWIR:250 OHM,10%,0.50W	80740	62-67-3
U12	307-0397-00			RES. ,FXD,FILM:50 OHM BRIDGE	80009	307-0397-00
U30	307-0378-00			RES. ,FXD,FILM:50 OHM BRIDGE	80009	307-0378-00
VR97	152-0147-00			SEMICOND DEVICE:ZENER,0.4W,27V,5%	81483	1N971B

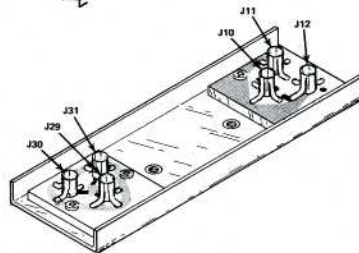
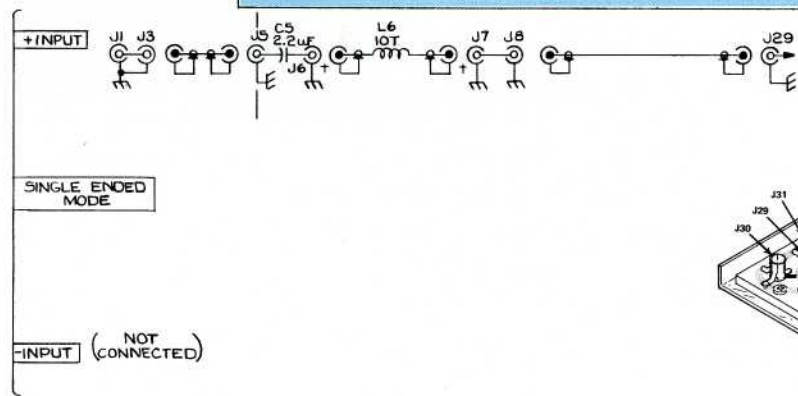
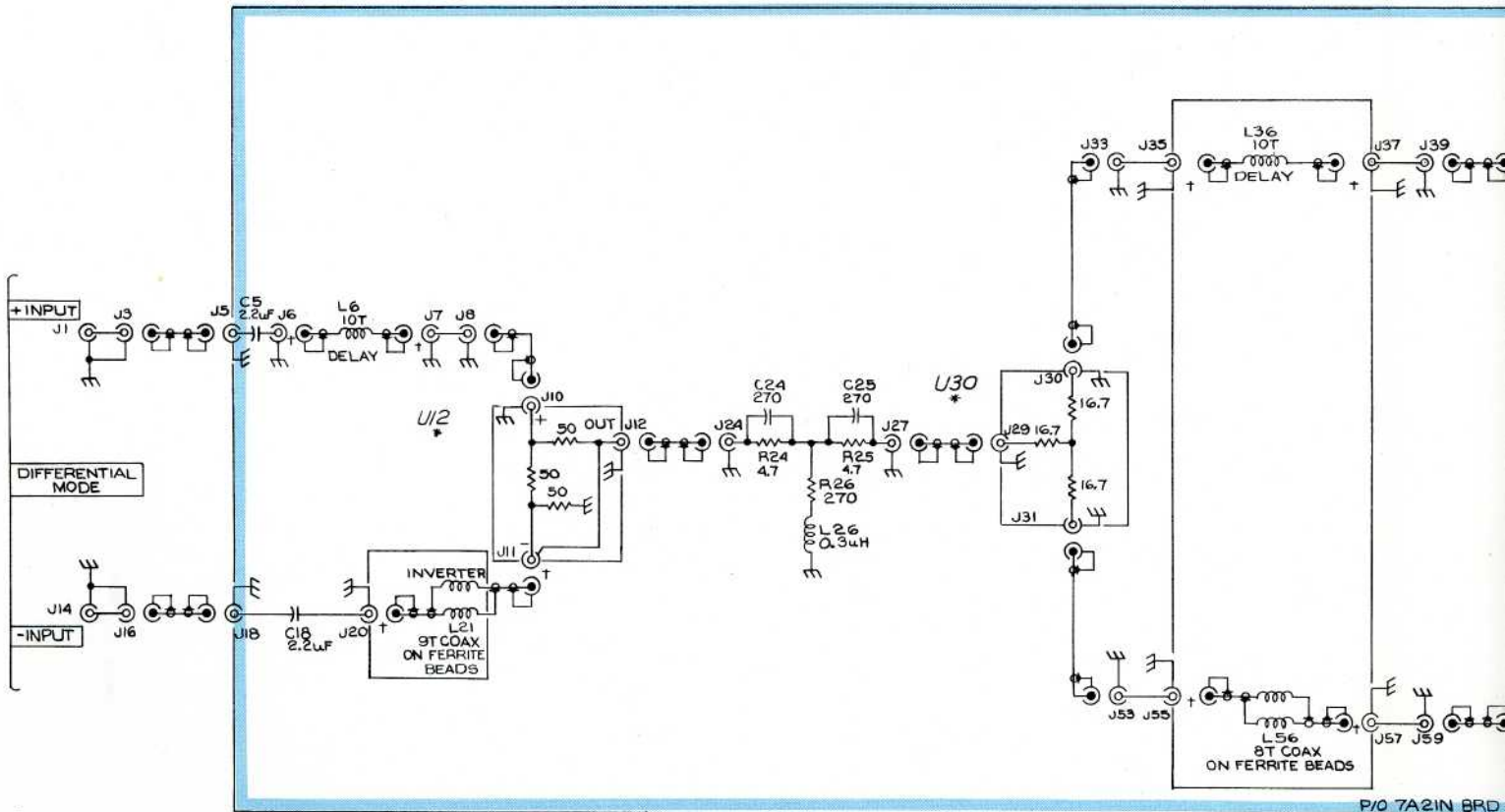
7A21N (B040000-up)



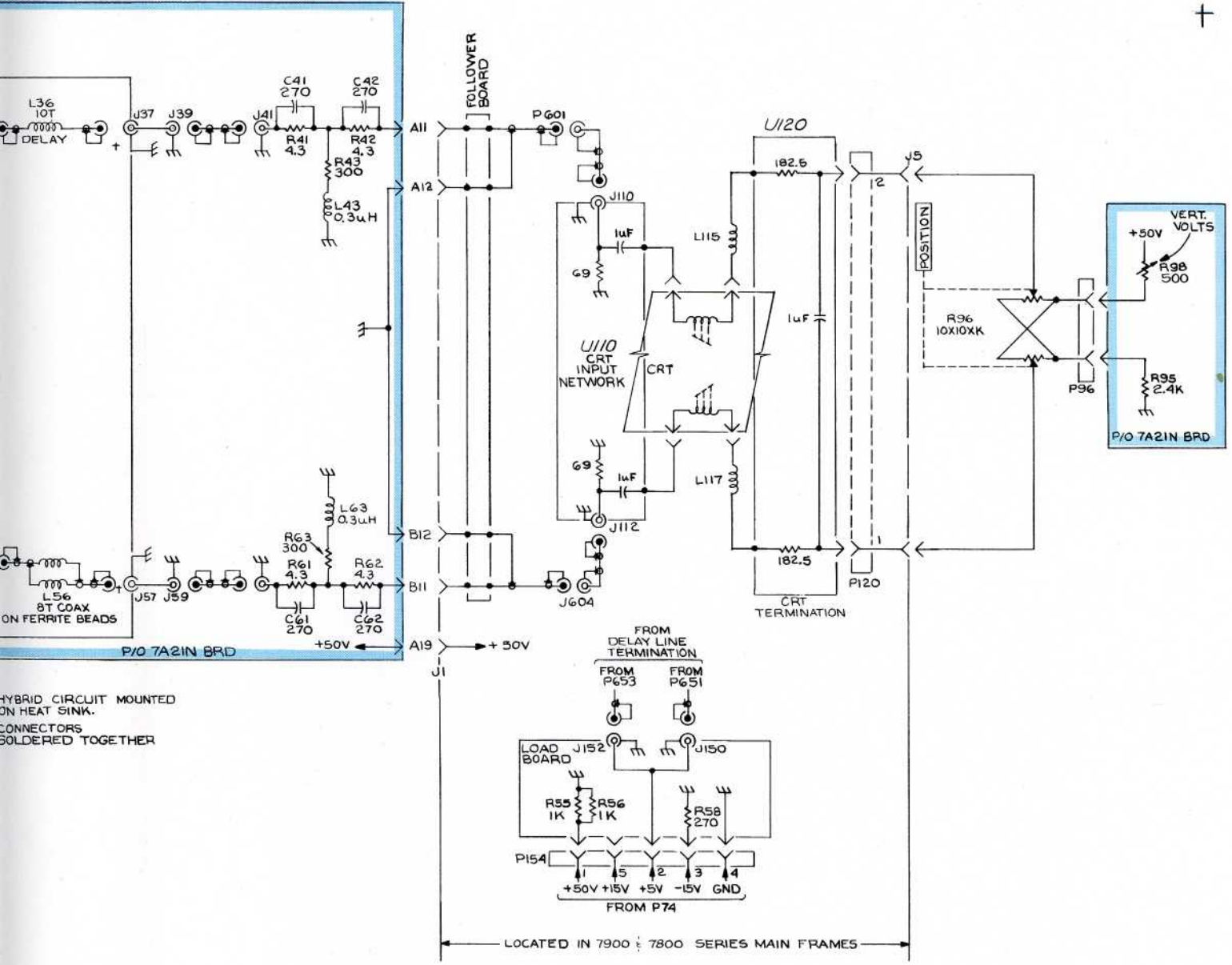
1367-13

Fig. 12. 7A21N component locations.

®



* HYBRID CIRCUIT MOUNTED ON HEAT SINK.
† CONNECTORS SOLDERED TOGETHER



DIRECT ACCESS UNIT 
(SN B040000 & UP) N5

Installation Procedure for 7844

NOTE

The 7A21N may be used in one or both vertical plug-in compartments, however, crt readout becomes inoperative when used in Beam 2. The following procedure describes Beam 1 installation. Use this procedure for Beam 2 installation, but use Fig. 6 as a reference for corresponding plug numbers, cable, and board locations.

1. Disconnect the mainframe from the power source.
2. Remove all plug-ins from the vertical compartments.
3. Remove both side panels.
4. Note the positions of the cables and connectors for later reference. Remove the seven screws securing the vertical amplifier board to the mainframe.
5. Disconnect all cables and connectors from the board and gently pull the board straight out. Remove the cable (P1782, P1783) and set aside.
6. Disconnect the two leads from the crt pin connectors. Remove the two screws securing the pin connector board, and remove the board.
7. Secure the new Vertical Termination Board to the chassis, aligning the board to the seven holes on the mainframe chassis.
8. Connect the leads located on the underside of the CRT Input Network to the vertical deflection plate pins. After these leads are connected, gently pull on each lead to be sure it will remain connected. These leads should be kept close to each other to obtain optimum high frequency characteristics.

CAUTION

Use care when handling the crt connectors. The crt pins may break if bent.

9. Remove the cable connected to J3601 (brown on blue) on the Vertical Interface Board, and connect it to J110 of the CRT Input Network.

10. Remove the cable connected to J3602 (red on blue) on the Vertical Interface Board, and connect it to J112 of the CRT Input Network.

11. Connect the multi-pin connector, P1794 to J154 on the Vertical Termination Board. Match the arrow on the multi-pin connector to the arrow on the board.

12. Connect the cable from J1660 (blue) to J152 on the Vertical Termination Board.

13. Connect the cable from J1661 (black on blue) to J150 on the Vertical Termination Board.

14. Connect the AUX Y cable to the center connector, located at the top left of the Vertical Termination Board (For Beam 2, connect the three auxiliary cables to the lower right corner of the board).

Replace CRT Termination Assembly

15. Remove the two screws securing the CRT Termination assembly to the oscilloscope chassis. Disconnect the pin connectors from the crt, and remove the assembly.

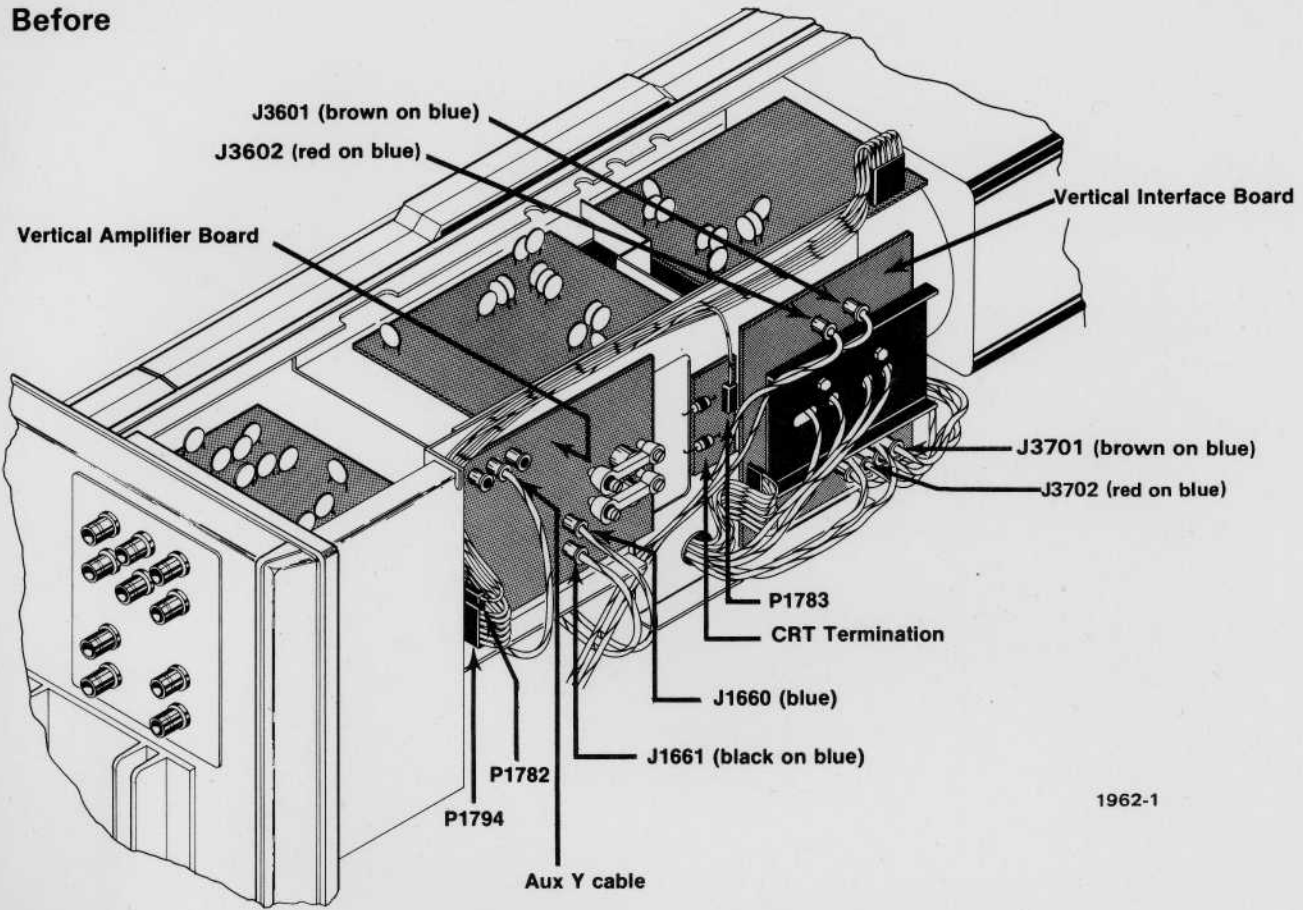
16. Remove the 7A21N CRT Termination assembly from the storage space in the 7A21N. Mount this assembly to the oscilloscope chassis, using the hardware previously removed.

17. Connect the leads located on the underside of the 7A21N CRT Termination assembly to the crt deflection plates. Pull gently on each lead to be sure it will remain connected.

18. Insert the connectors of the Positioning Wire assembly into sockets J5-3 and J5-4, located on the oscilloscope interface connector. Place the socket end of the red lead in J5-4 and the socket end of the brown end in J5-3. Refer to the close-up in Fig. 5A. Push the connectors into the sockets until they snap into place. It may be necessary to use a pair of long-nose pliers or tweezers to push the sockets until they extend beyond the plastic housing. These connectors are now permanently installed and cannot be removed.

19. Connect the 2-pin connector end of the Positioning Wire assembly to J120 of the CRT Termination assembly. The red lead connects to the top pin of J120 (the red lead connects to the bottom pin of J120 for Beam 2). This completes the installation procedure for the 7A21N.

Before



After

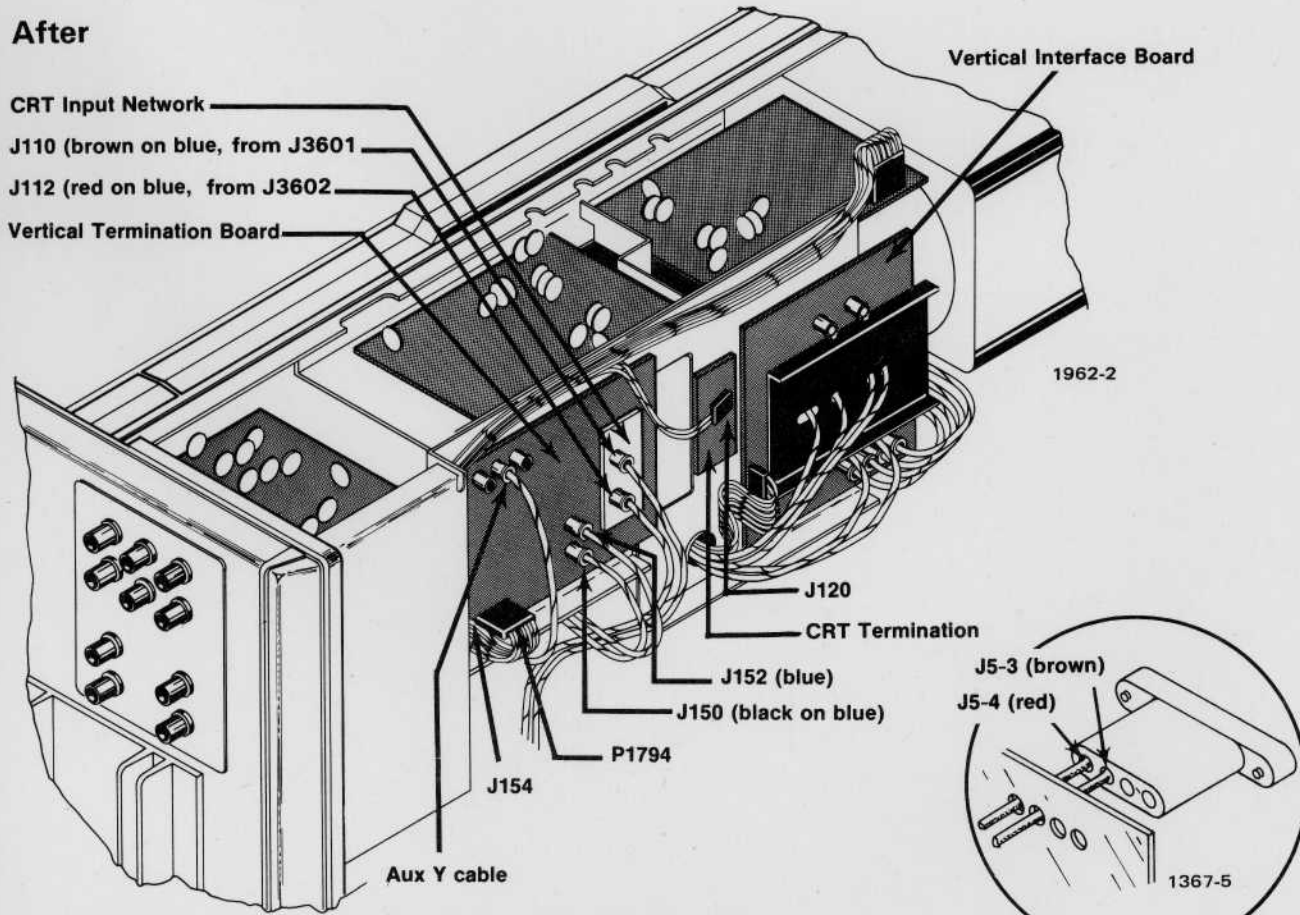
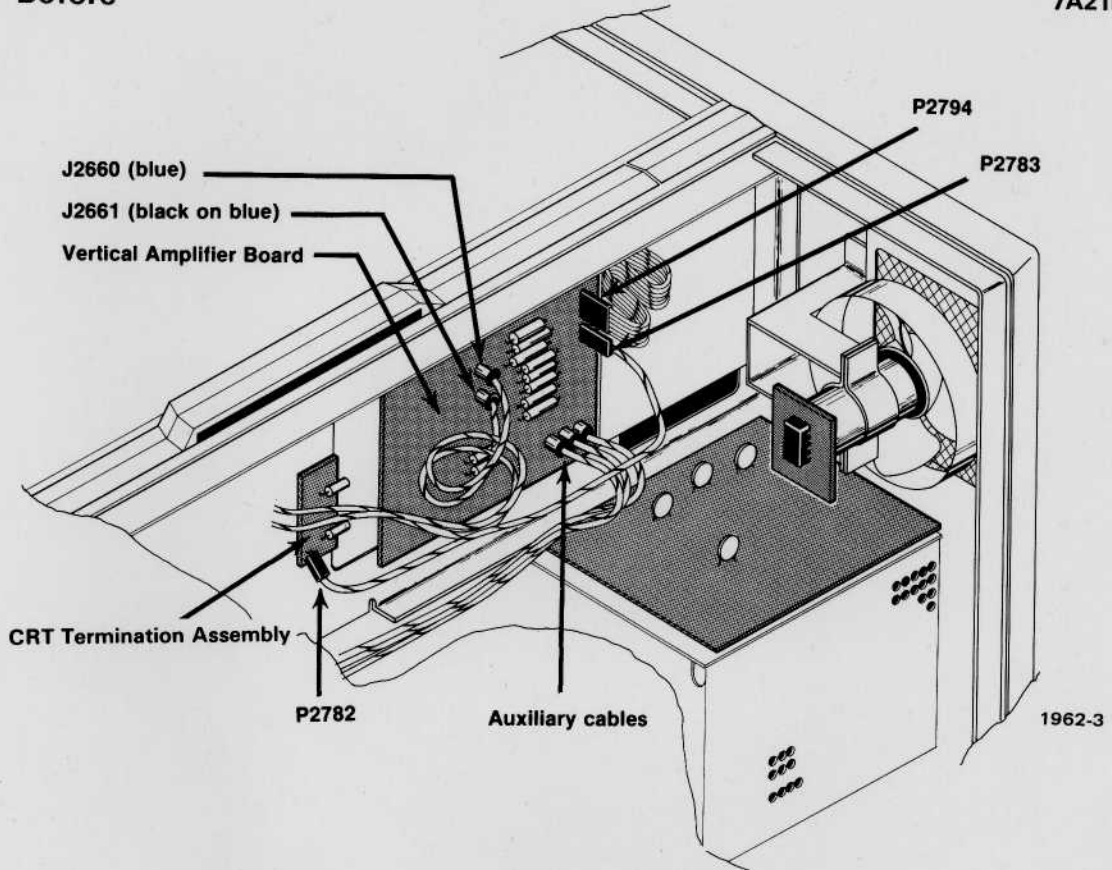


Fig. 5. Shows board position and cable connections before and after installation of 7A21N in the 7844; left side, Beam 1.

Fig. 5A. Installation of positioning wire assembly.

Before

7A21N (B040000-up)



After

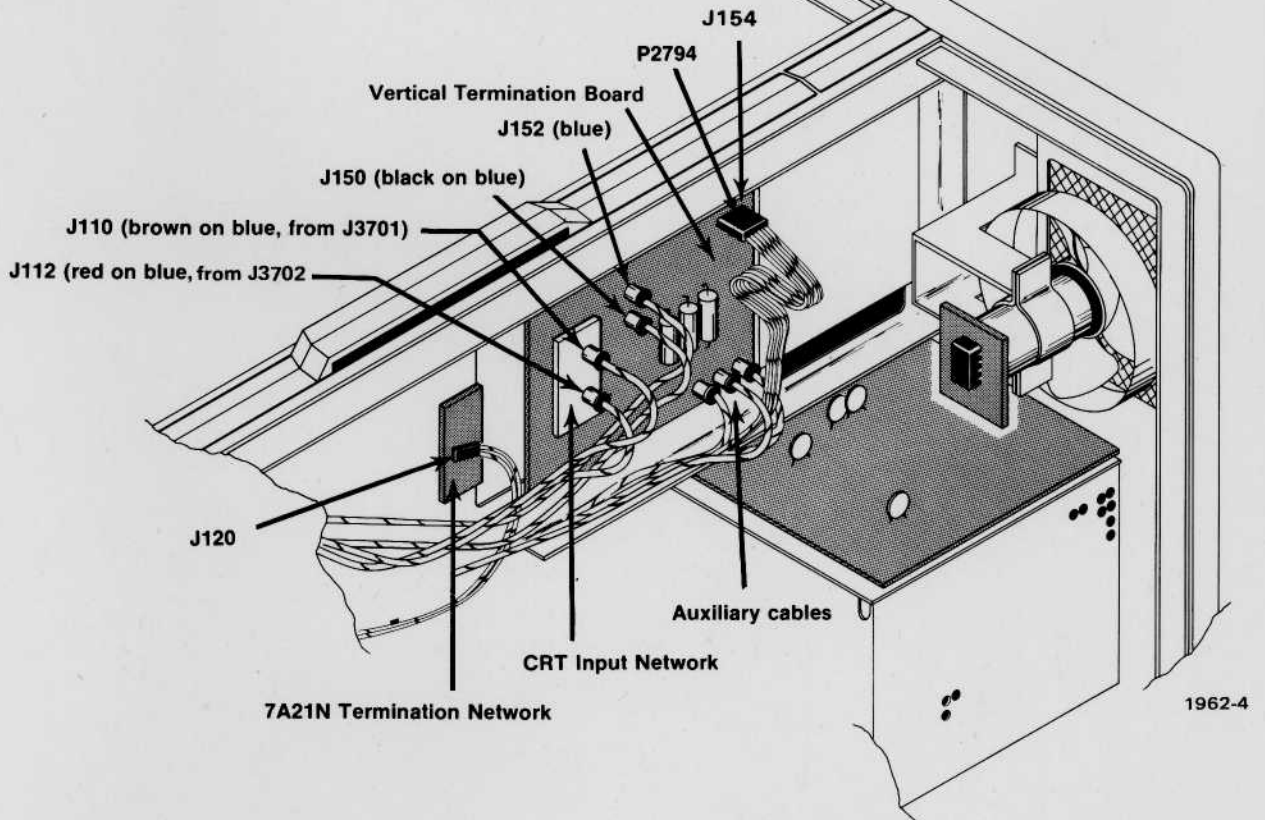


Fig. 6. Shows board positions and cable connections before and after installation of 7A21N in the 7844; right side, Beam 2. ©

Installation Procedure for R7844

NOTE

The 7A21N may be used in one or both vertical plug-in compartments, however, crt readout becomes inoperative when used in Beam 2. The following procedure describes Beam 1 installation. Use this procedure for Beam 2 installation, but use Fig. 8 as a reference for corresponding plug numbers, cable, and board locations.

1. Disconnect the mainframe from the power source.
2. Remove all plug-ins from the vertical compartments.
3. Remove the top panel and the access covers to the vertical amplifier boards.
4. Note the positions of the cables and connectors for later reference. Remove the seven screws securing the vertical amplifier board to the mainframe.
5. Disconnect all cables and connectors from the board and gently pull the board straight out. Remove the cable (P1782, P1783) and set aside.
6. Disconnect the two leads from the crt pin connectors. Remove the two screws securing the pin connector board, and remove the board.
7. Secure the new Vertical Termination Board to the chassis, aligning the board to the seven holes on the mainframe chassis.
8. Connect the leads located on the underside of the CRT Input Network to the vertical deflection plate pins. After these leads are connected, gently pull on each lead to be sure it will remain connected. These leads should be kept close to each other to obtain optimum high frequency characteristics.



Use care when handling the crt connectors. The crt pins may break if bent.

9. Remove the cable connected to J3601 (brown on blue) on the Vertical Interface Board, and connect it to J110 of the CRT Input Network.
10. Remove the cable connected to J3602 (red on blue) on the Vertical Interface Board, and connect it to J112 of the CRT Input Network.

11. Connect the multi-pin connector, P1794 to J154 on the Vertical Termination Board. Match the arrow on the multi-pin connector to the arrow on the board.

12. Connect the cable from J1660 (blue) to J152 on the Vertical Termination Board.

13. Connect the cable from J1661 (black on blue) to J150 on the Vertical Termination Board.

14. Connect the AUX Y cable to the center connector, located at the top left of the Vertical Termination Board (For Beam 2, connect the three auxiliary cables to the lower right corner of the board).

Replace CRT Termination Assembly

15. Remove the two screws securing the CRT Termination assembly to the oscilloscope chassis. Disconnect the pin connectors from the crt, and remove the assembly.

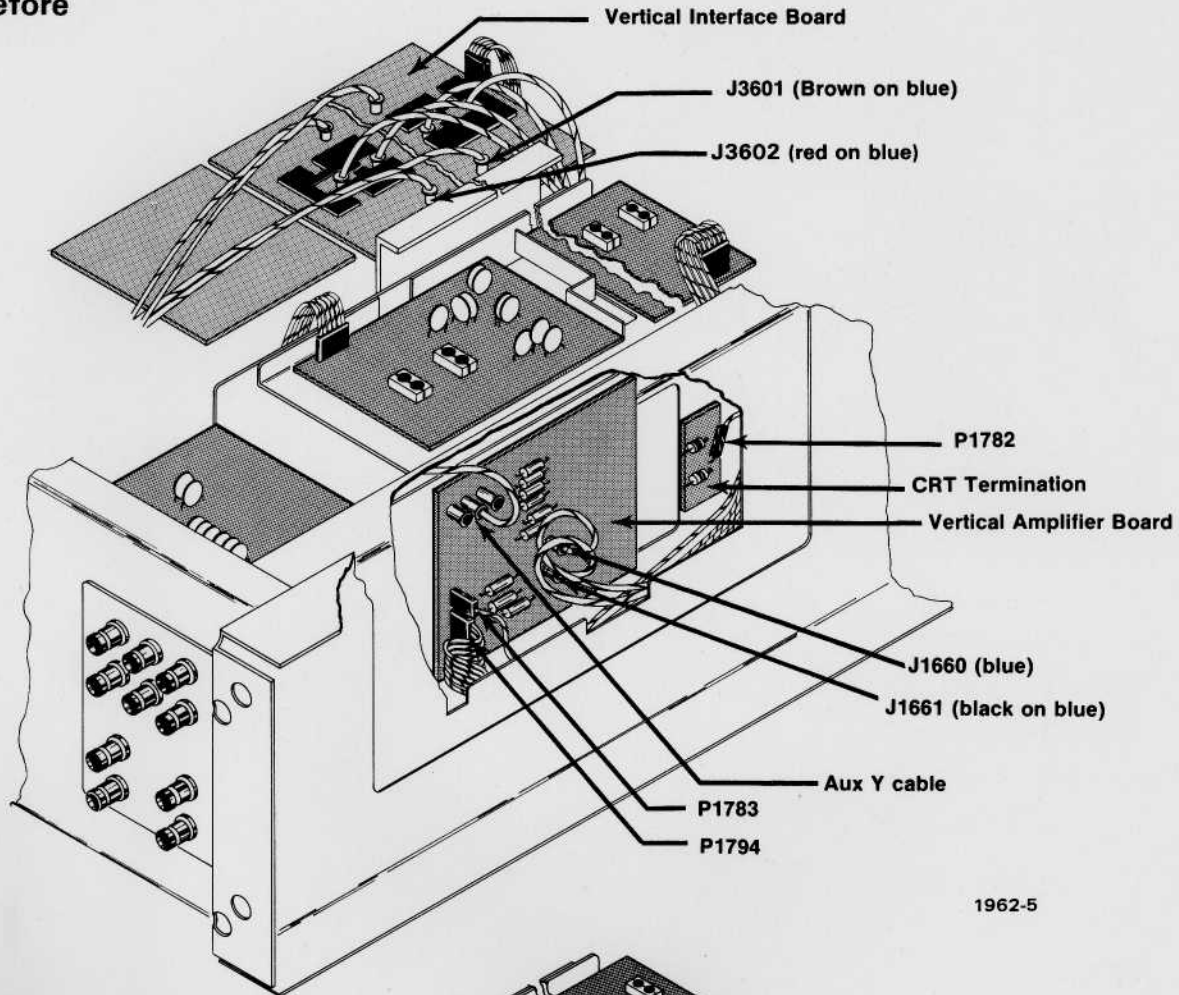
16. Remove the 7A21N CRT Termination assembly from the storage space in the 7A21N. Mount this assembly to the oscilloscope chassis, using the hardware previously removed.

17. Connect the leads located on the underside of the 7A21N CRT Termination assembly to the crt deflection plates. Pull gently on each lead to be sure it will remain connected.

18. Insert the connectors of the Positioning Wire assembly into sockets J5-3 and J5-4, located on the oscilloscope interface connector. Place the socket end of the red lead in J5-4 and the socket end of the brown end in J5-3. Refer to the close-up in Fig. 7A. Push the connectors into the sockets until they snap into place. It may be necessary to use a pair of long-nose pliers or tweezers to push the sockets until they extend beyond the plastic housing. These connectors are now permanently installed and cannot be removed.

19. Connect the 2-pin connector end of the Positioning Wire assembly to J120 of the CRT Termination assembly. The red lead connects to the top pin of J120 (the red lead connects to the bottom pin of J120 for Beam 2). This completes the installation procedure for the 7A21N.

Before



After

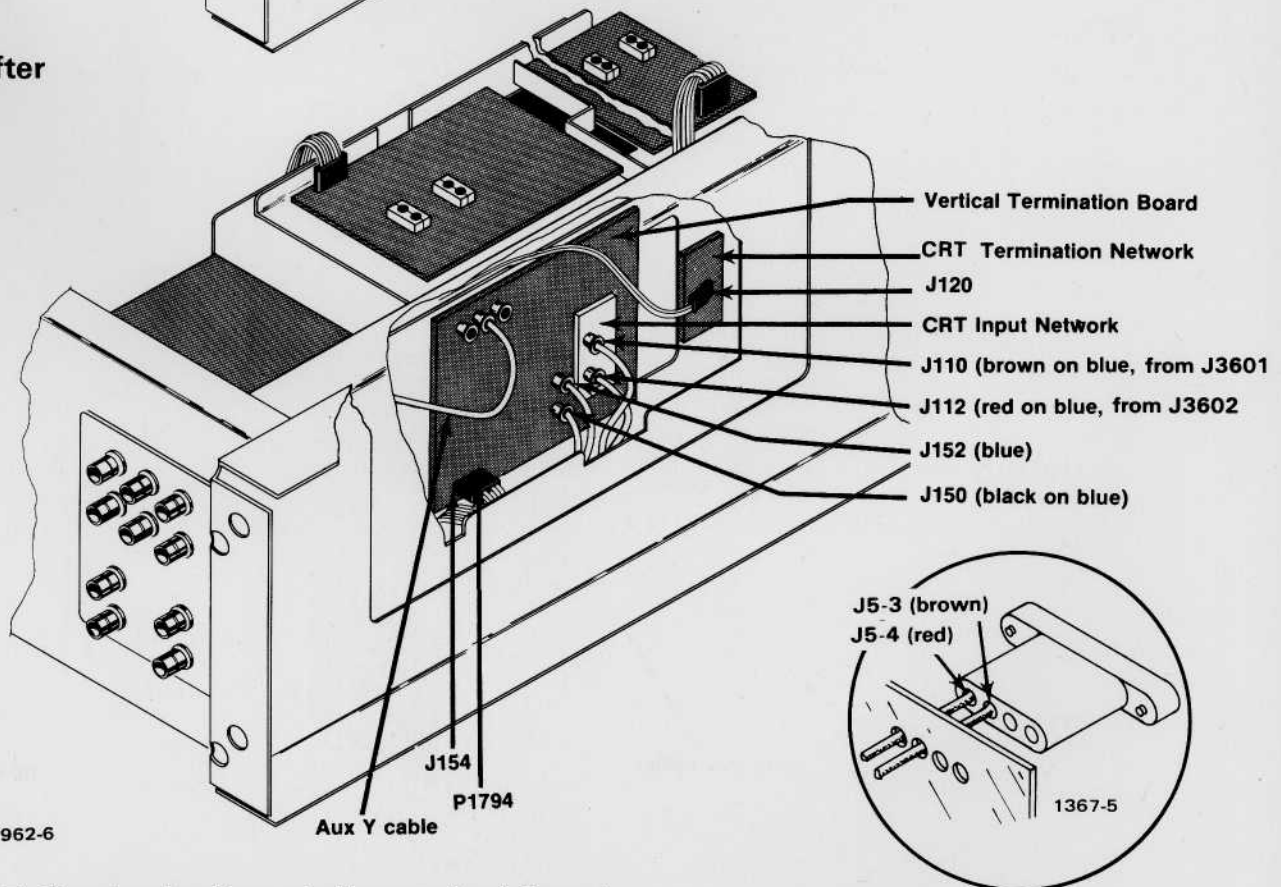
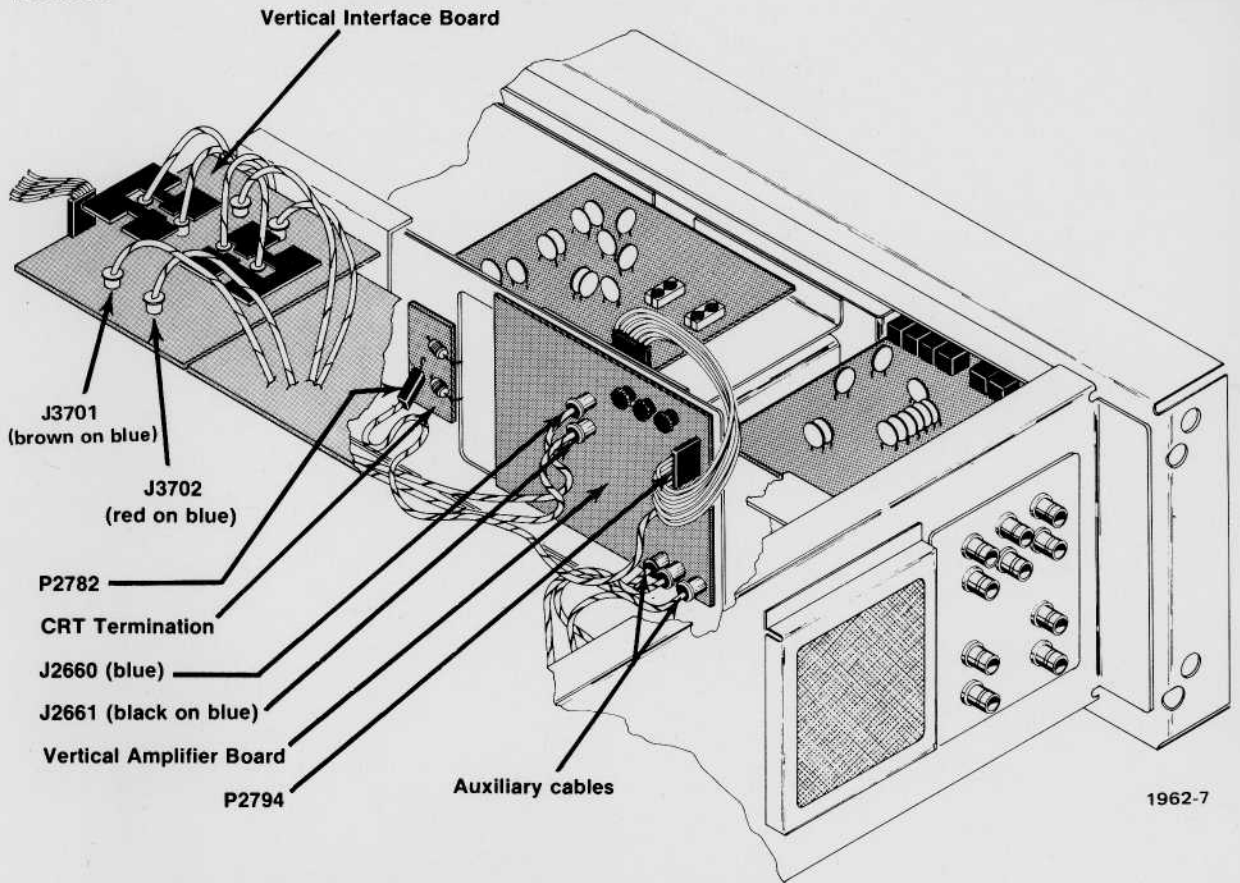


Fig. 7. Shows board positions and cable connections before and after installation of 7A21N in the R7844; left side, Beam 1.

Fig. 7A. Installation of positioning wire assembly.

Before



After

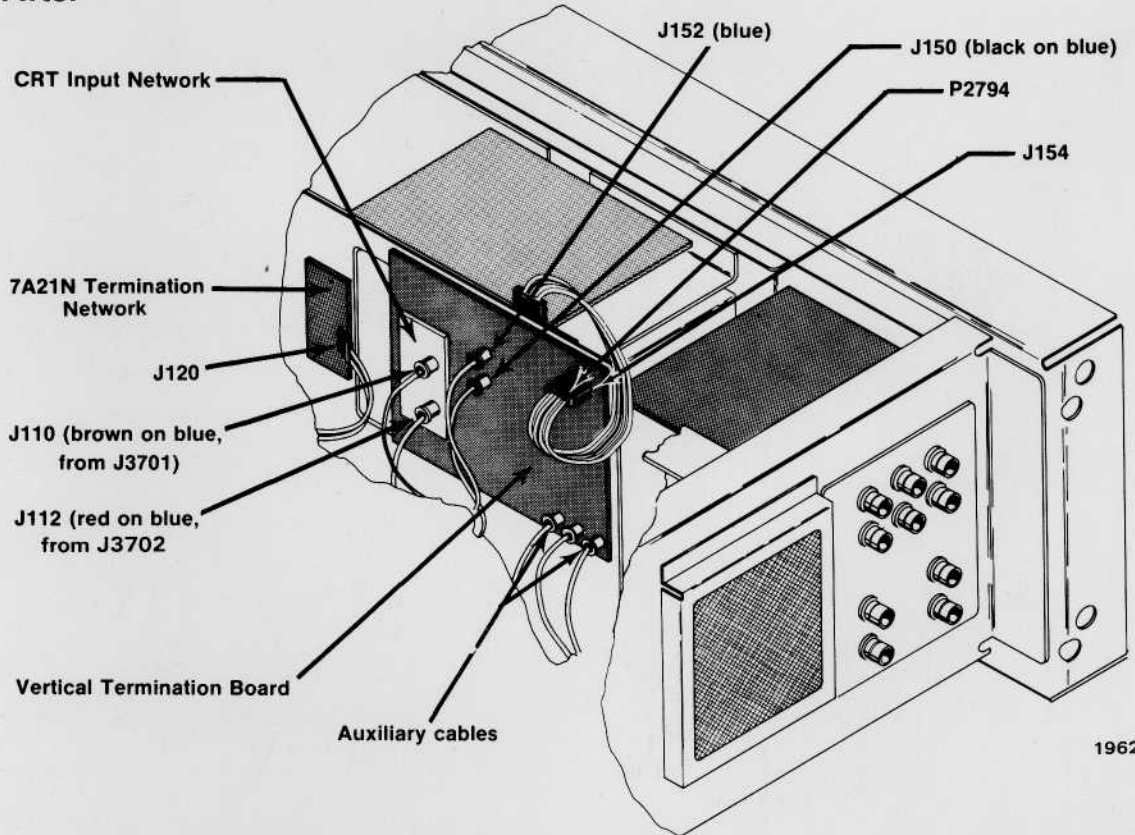


Fig. 8. Shows board positions and cable connections before and after installation of 7A21N in the R7844; right side, Beam 2.

Installation Procedure for R7903

1. Disconnect the mainframe from the power source.
2. Remove all plug-ins from the Vertical compartments.
3. Remove the top and bottom panels.
4. Note the positions of the cables and connectors. Remove the nine screws securing the Vertical Amplifier Board to the mainframe. Disconnect all cables and connectors from the board and gently pull the board straight out.
5. Secure the new Vertical Termination Board to the chassis, aligning the board to the forward-most holes. Use four of the nine screws removed in Step 4.
6. Connect the leads located on the underside of the CRT Input Network to the vertical deflection plate pins. After these leads are connected, gently pull on each lead to be sure it will remain connected. These leads should be dressed close to each other to obtain optimum high frequency characteristics.

CAUTION

Use care when handling the crt pin connectors. The crt pins may break if bent.

7. Remove the cable connected to J604, (brown on blue) and connect it to J110 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the red on blue extension cable. See Fig. 9.
8. Remove the cable connected to J601 (red on blue) and connect it to J112 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the red on blue extension cable. See Fig. 9.
9. Connect the cable (blue, J660) to J152 on the Vertical Termination Board.
10. Connect the cable (black on blue, J661) to J150 on the Vertical Termination Board.
11. Connect the multi-pin connector, P794 to J154 on the Vertical Termination Board. Match the arrow on the multi-pin connector to the arrow on the board.
12. Connect the three cables (previously connected to the top left of the Vertical Amplifier Board) to the top left of the Vertical Termination Board.
13. Connect the 2-pin connector to the 2-pin jack, located at the top of the Vertical Termination Board. Match the arrow on the 2-pin connector to the arrow on the board.
14. To replace the CRT Termination Assembly perform the following:
 - a. Remove the two screws securing the CRT Termination assembly to the oscilloscope chassis, refer to Fig. 9 for location. Disconnect the pin connectors from the crt. Remove the CRT Termination assembly.
 - b. Remove the 7A21N CRT Termination assembly from the storage space in the 7A21N, see Fig. 3. Mount this assembly to the oscilloscope chassis, using the hardware removed in part a.
 - c. Connect the leads located on the underside of the 7A21N CRT Termination assembly to the crt deflection plates. Pull gently on each lead to be sure it will remain connected.
 - d. Insert the connectors of the Positioning Wire assembly into sockets J5-3 and J5-4, located on the oscilloscope interface connector. Refer to Fig. 9 and close-up in Fig. 9A. Push the connectors into the sockets until they snap into place. It may be necessary to use a pair of long-nose pliers or tweezers to push the sockets until they extend beyond the plastic housing. These connectors are now permanently installed and cannot be removed.
 - e. Connect the 2-pin connector end of the Positioning Wire assembly to J120 of the CRT Termination assembly. The arrow on the connector should be toward the bottom of the oscilloscope.
 - f. Fully insert the 7A21N into the oscilloscope Left Vertical compartment. This completes the installation procedures for the 7A21N.

¹In some earlier oscilloscope models, SEAELECTRO connectors are used. In these cases, the 7A21N can be equipped with special SEAELECTRO cable assemblies. Consult your Tektronix Field Engineer or Representative for details.

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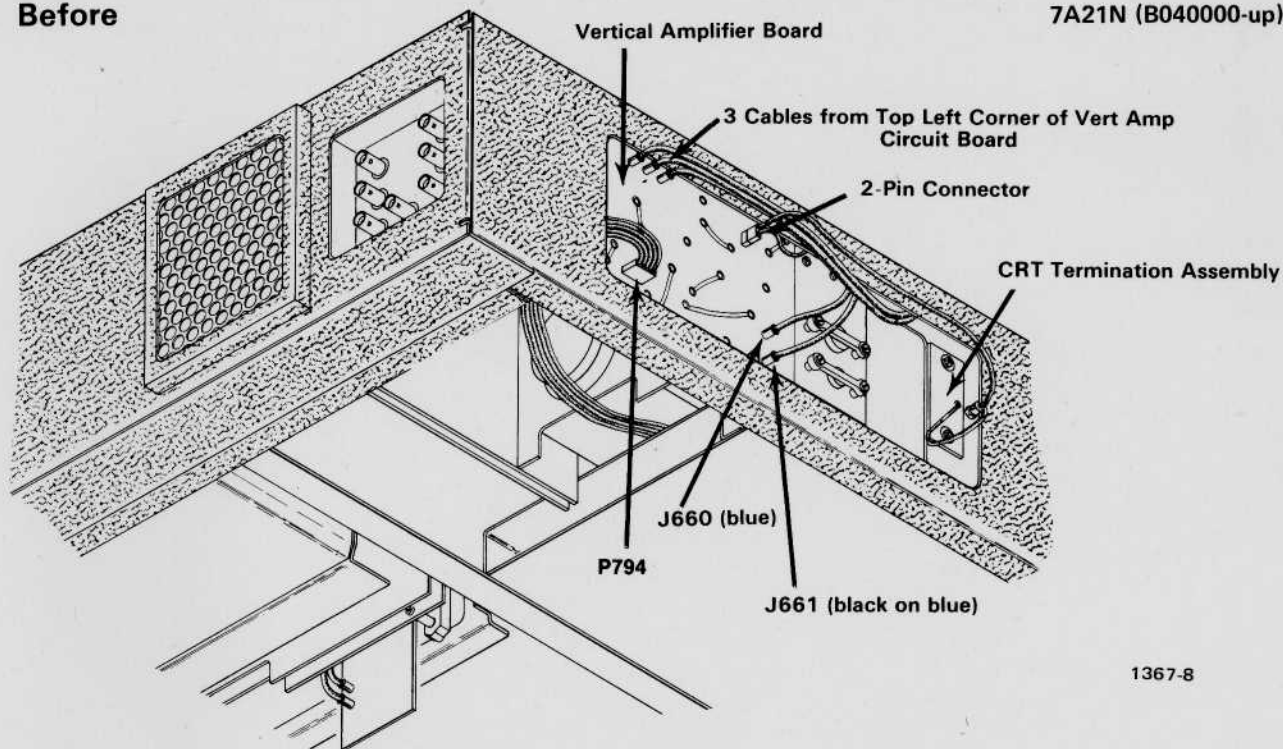
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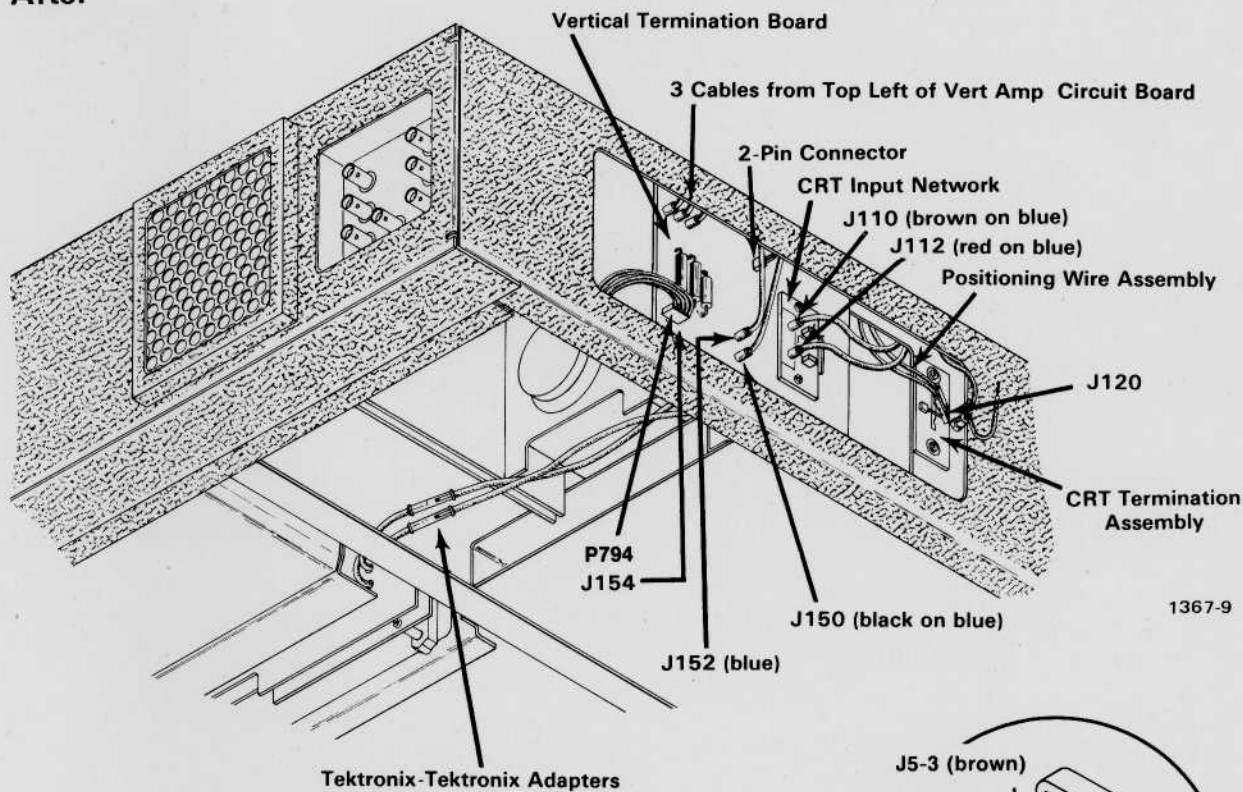
7A21N (B040000-up)

Before

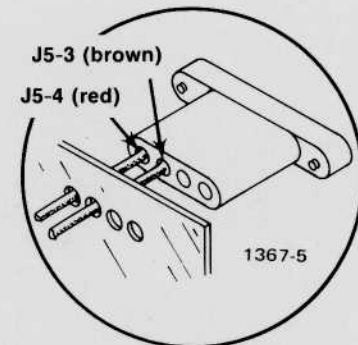


1367-8

After



1367-9



1367-5

Fig. 9. Shows board positions and cable connections

before and after installation of 7A21N in the 7903.

Fig. 9A. Installation of positioning wire assembly.

@

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Installation Procedure for 7904

1. Disconnect the mainframe from the power source.
2. Remove all plug-ins from the vertical compartments.
3. Remove the left side cover.
4. Note the positions of the cables and connectors. Remove the nine screws securing the Vertical Amplifier Board to the mainframe. Disconnect all cables and connectors from the board and gently pull the board straight out.
5. Secure the new Vertical Termination Board to the chassis, aligning the board to the forward-most holes. Use four of the nine screws removed in Step 4.
6. Connect the leads located on the underside of the CRT Input Network to the vertical deflection plate pins. After these leads are connected, gently pull on each lead to be sure it will remain connected. These leads should be dressed close to each other to obtain optimum high frequency characteristics.



Use care when handling the crt pin connectors. The crt pins may break if bent.

7. Remove the cable connected to J604, (brown on blue) and connect it to J110 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the red on blue extension cable. See Fig. 10A.
8. Remove the cable connected to J601 (red on blue) and connect it to J112 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the red on blue extension cable. See Fig. 10A.
9. Clamp the two cables installed in Steps 7 and 8 to the chassis, using the clamp and hardware supplied with the 7A21N. See Fig. 3.
10. Connect the cable (blue, J660) to J152 on the Vertical Termination Board.
11. Connect the cable (black on blue, J661) to J150 on the Vertical Termination Board.

12. Connect the multi-pin connector, P794 to J154 on the Vertical Termination Board. Match the arrow on the multi-pin connector to the arrow on the board¹

13. Connect the three cables (previously connected to the top left of the Vertical Amplifier Board) to the top left of the Vertical Termination Board.

14. Connect the 2-pin connector to the 2-pin jack, located at the top of the Vertical Termination Board. Match the arrow on the 2-pin connector to the arrow on the board.

15. To replace CRT Termination Assembly, perform the following:

a. Remove the two screws securing the CRT Termination assembly to the oscilloscope chassis, refer to Fig. 10, for location. Disconnect the pin connectors from the crt. Remove the CRT Termination assembly.

b. Remove the 7A21N CRT Termination assembly from the storage space in the 7A21N, see Fig. 3. Mount this assembly to the oscilloscope chassis, using the hardware removed in part a.

c. Connect the leads located on the underside of the 7A12N CRT Termination assembly to the crt deflection plates. Pull gently on each lead to be sure it will remain connected.

d. Insert the connectors of the Positioning Wire assembly into sockets J5-3 and J5-4, located on the oscilloscope interface connector. Refer to Fig. 10 and close-up in Fig. 10A. Push the connectors into the sockets until they snap into place. It may be necessary to use a pair of long-nose pliers or tweezers to push the sockets until they extend beyond the plastic housing. These connectors are now permanently installed and cannot be removed.

e. Connect the 2-pin connector end of the Positioning Wire assembly to J120 of the CRT Termination assembly. The arrow on the connector should be toward the bottom of the oscilloscope.

f. Fully insert the 7A21N into the oscilloscope Left Vertical compartment. This completes the installation procedures for the 7A21N.

¹In some earlier oscilloscope models, SEAELECTRO connectors are used. In these cases, the 7A21N can be equipped with special SEAELECTRO cable assemblies. Consult your Tektronix Field Engineer or Representative for details.

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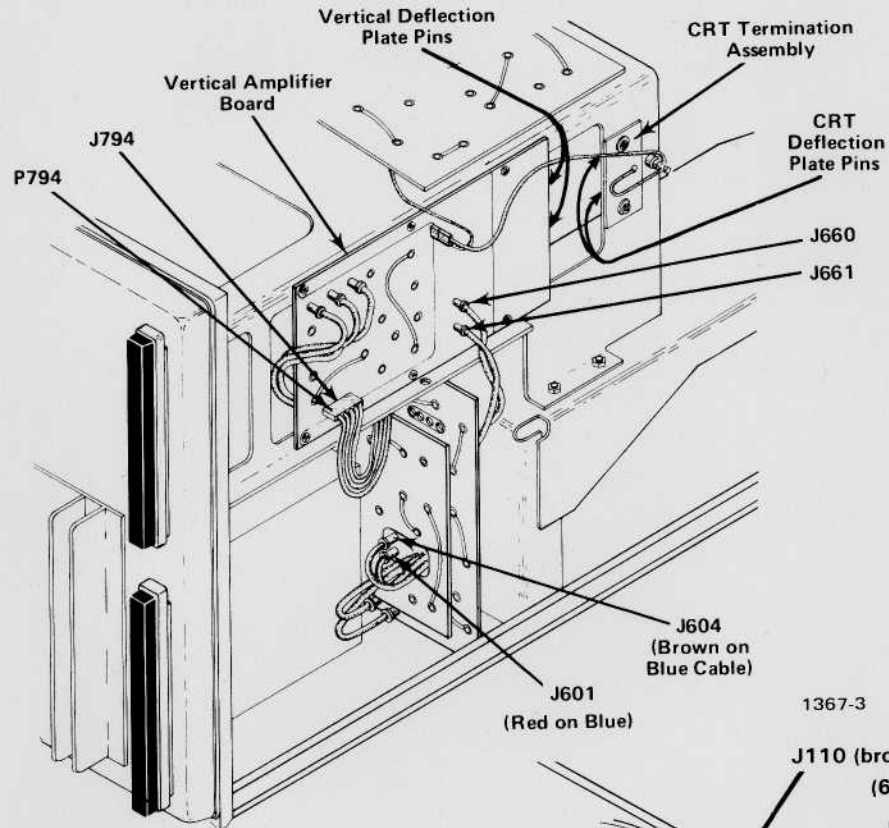
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7A21N

7A21N (B040000-up)

Before



After

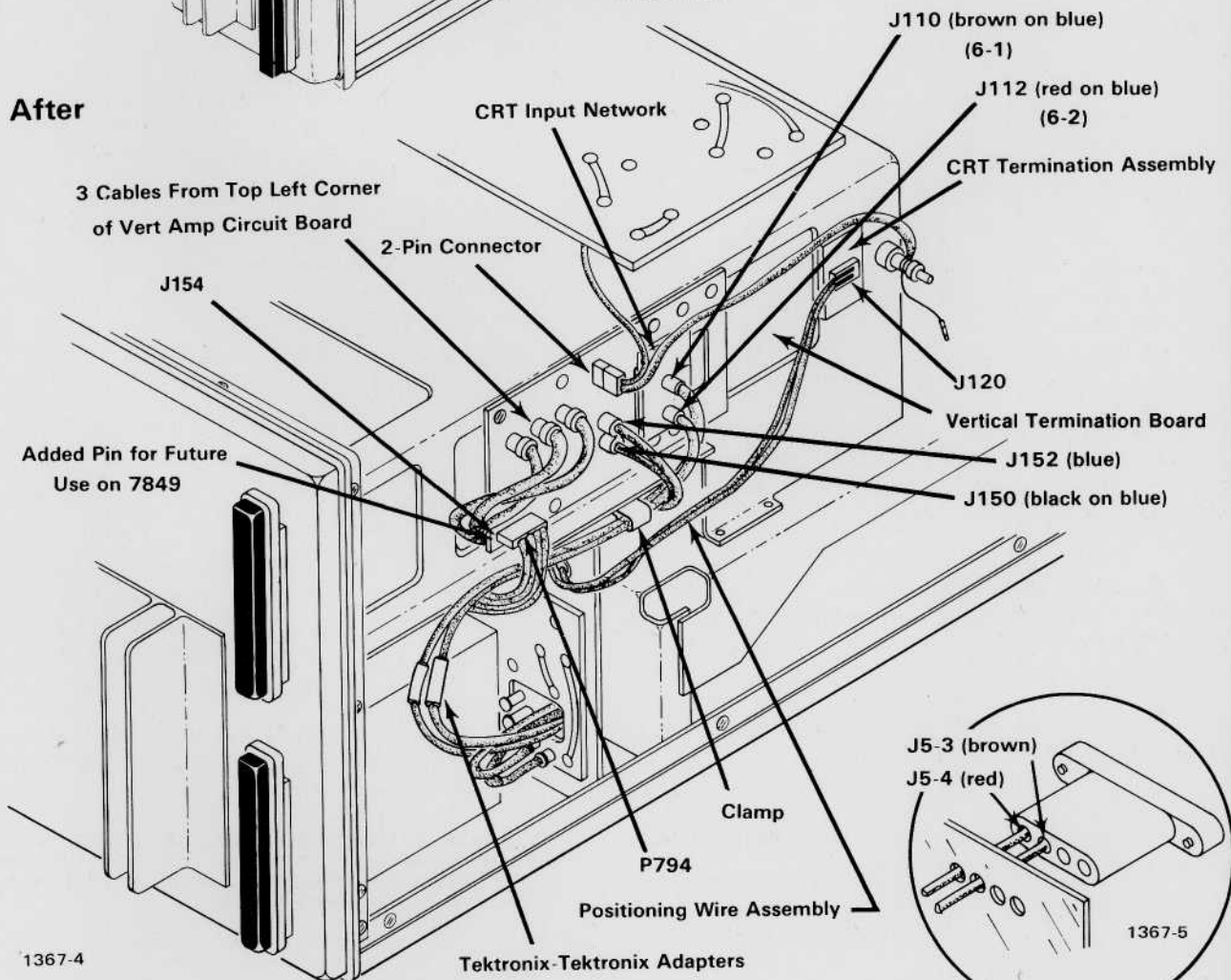


Fig. 10. Shows board positions and cable connections

before and after installation of 7A21N in the 7904.

Fig. 10A. Installation of positioning wire assembly.

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Installation Procedure for R7912

1. Disconnect the mainframe from the power source.
2. Remove all plug-ins from the Vertical compartments.
3. Remove both top and bottom panels.
4. Note the positions of the cables and connectors. Remove the nine screws securing the Vertical Amplifier Board to the mainframe. Disconnect all cables and connectors from the board and gently pull the board straight out.
5. Secure the new Vertical Termination Board to the chassis, aligning the board to the forward-most holes. Use four of the nine screws removed in Step 4.
6. Connect the leads located on the underside of the CRT Input Network to the vertical deflection plate pins. After these leads are connected, gently pull on each lead to be sure it will remain connected. These leads should be dressed close to each other to obtain optimum high frequency characteristics.



Use care when handling the crt pin connectors. The crt pins may break if bent.

7. Remove the cable connected to J604, (brown on blue) and connect it to J110 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the brown on blue extension cable. See Fig. 2A.
8. Remove the cable connected to J601 (red on blue) and connect it to J112 on the CRT Input Network by using the Tektronix to Tektronix adapter¹ and the red on blue extension cable. See Fig. 2A.
9. Connect the cable (blue, J660) to J152 on the Vertical Termination Board.
10. Connect the cable (black on blue, J661) to J150 on the Vertical Termination Board.
11. Connect the multi-pin connector P3554 to J154 on the Vertical Termination Board. Match the arrow on the multi-pin connector to the arrow on the board.

12. Connect the three cables (previously connected to the top left of the Vertical Amplifier Board) to the top left of the Vertical Termination Board.

13. Connect the 2-pin connector to the 2-pin jack, located at the top of the Vertical Termination Board. Match the arrow on the 2-pin connector to the arrow on the board.

14. To replace the CRT Termination Assembly, perform the following:

a. Remove the two screws securing the CRT Termination assembly to the oscilloscope chassis, refer to Fig. 11, for location. Disconnect the pin connectors from the crt. Remove the CRT Termination assembly.

b. Remove the 7A21N CRT Termination Assembly from the storage space in the 7A21N, See Fig. 3. Mount this assembly to the oscilloscope chassis; using the hardware removed in part a.

c. Connect the leads located on the underside of the 7A21N CRT Termination assembly to the crt deflection plates. Pull gently on each lead to be sure it will remain connected.

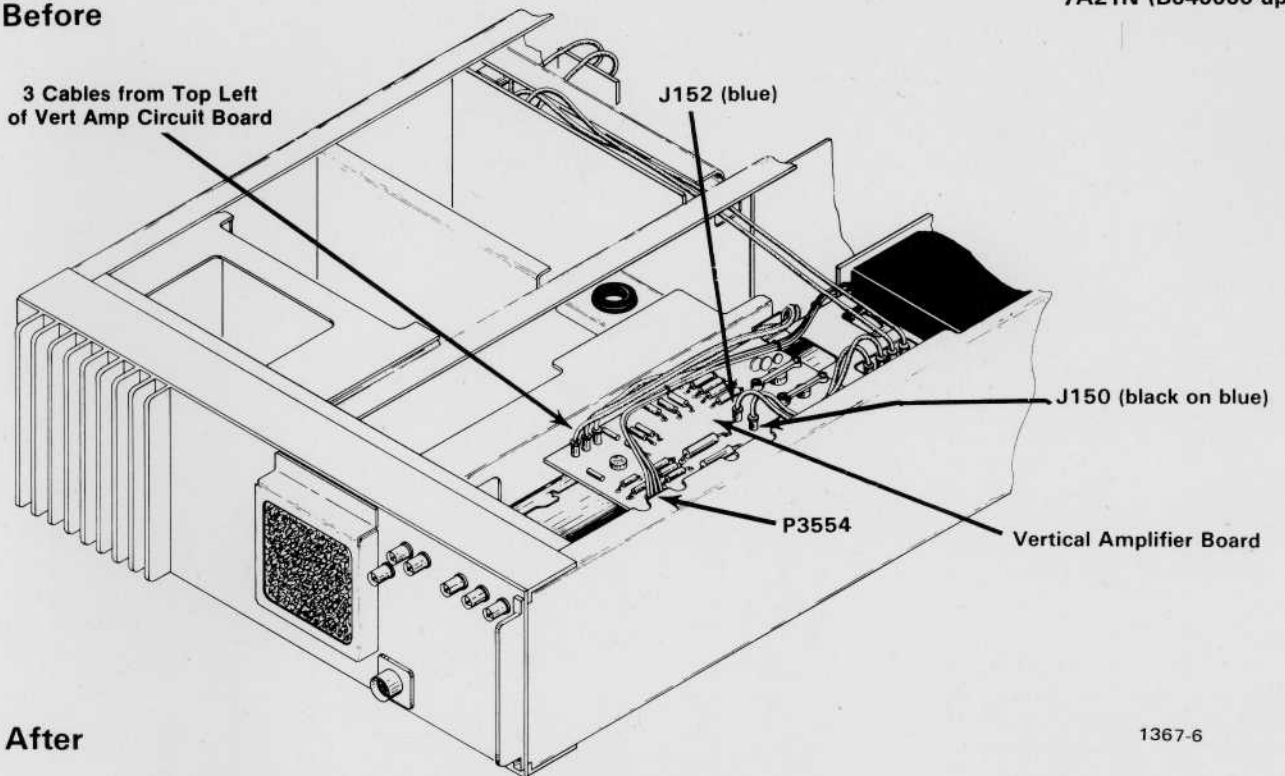
d. Insert the connectors of the Positioning Wire assembly into sockets J5-3 and J5-4, located on the oscilloscope interface connector. Refer to Fig. 11 and close-up in Fig. 11A. Push the connectors into the sockets until they snap into place. It may be necessary to use a pair of long-nose pliers or tweezers to push the sockets until they extend beyond the plastic housing. These connectors are now permanently installed and cannot be removed.

e. Connect the 2-pin connector end of the Positioning Wire assembly to J120 of the CRT Termination assembly. The arrow on the connector should be toward the bottom of the oscilloscope.

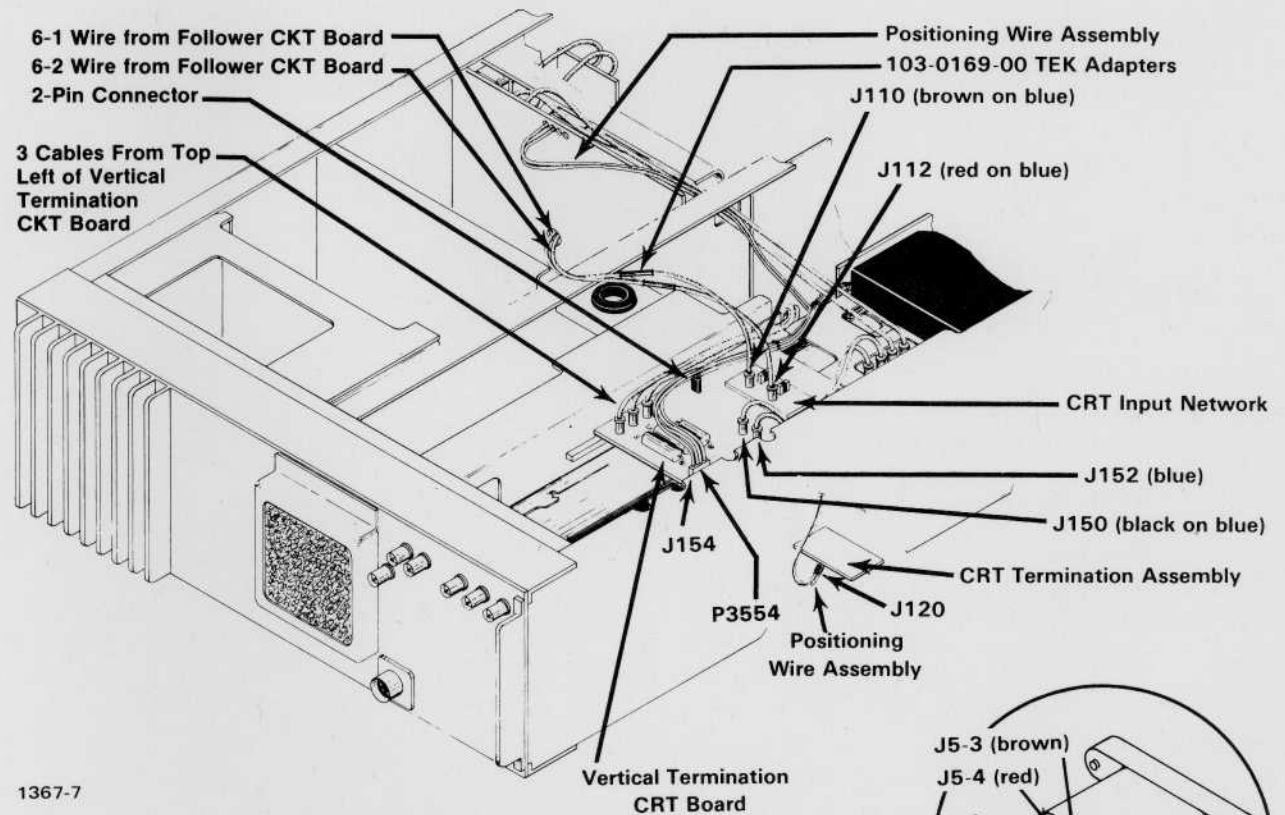
f. Fully insert the 7A21N into the oscilloscope Left Vertical compartment. This completes the installation procedures for the 7A21N.

¹In some earlier oscilloscope models, SEAELECTRO connectors are used. In these cases, the 7A21N can be equipped with special SEAELECTRO cable assemblies. Consult your Tektronix Field Engineer or Representative for details.

Before



After



1367-7

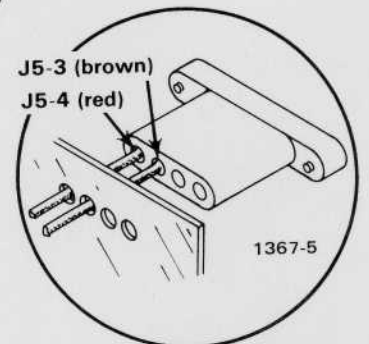


Fig. 11. Shows board positions and cable connections before and after installation in the R-7912.

Fig. 11A. Installation of positioning wire assembly.

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
    ---*---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
    ---*---
Parts of Detail Part
Attaching parts for Parts of Detail Part
    ---*---

```

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

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

Mechanical Parts List—7A21N (S/N B040000 & up)

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

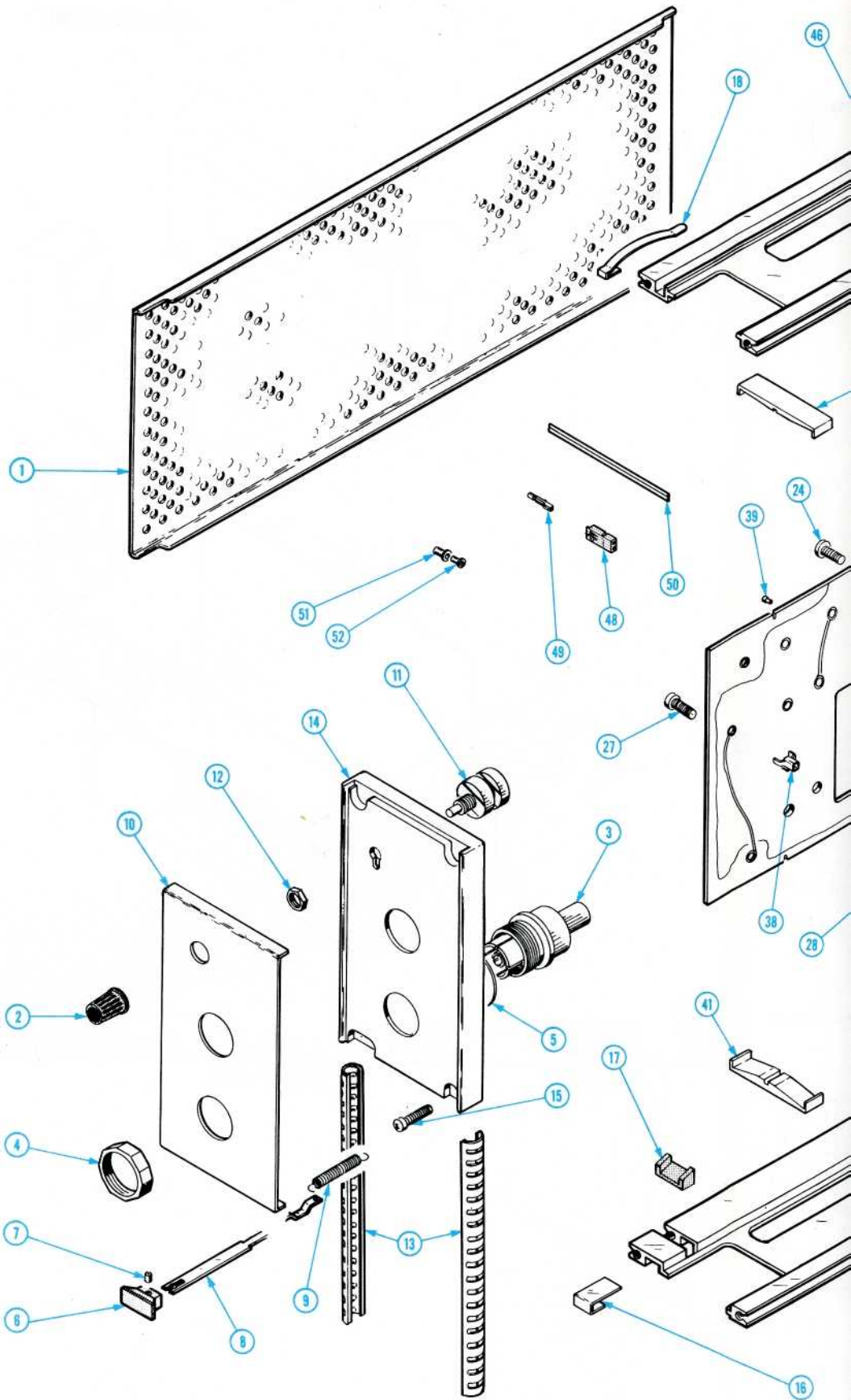
MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00779	AMP, INC.	P. O. BOX 3608	HARRISBURG, PA 17105
13257	ESNA LTD.	10 ESNA PARK DR.	MARKHAM, ONTARIO, CANADA
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
24655	GENERAL RADIO	300 BAKER AVE.	CONCORD, MA 01742
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
80009	TEKTRONIX, INC.	P. O. BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
87308	N. L. INDUSTRIES, INC., SOUTHERN SCREW DIV.	P. O. BOX 1360	STATESVILLE, NC 28677
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641

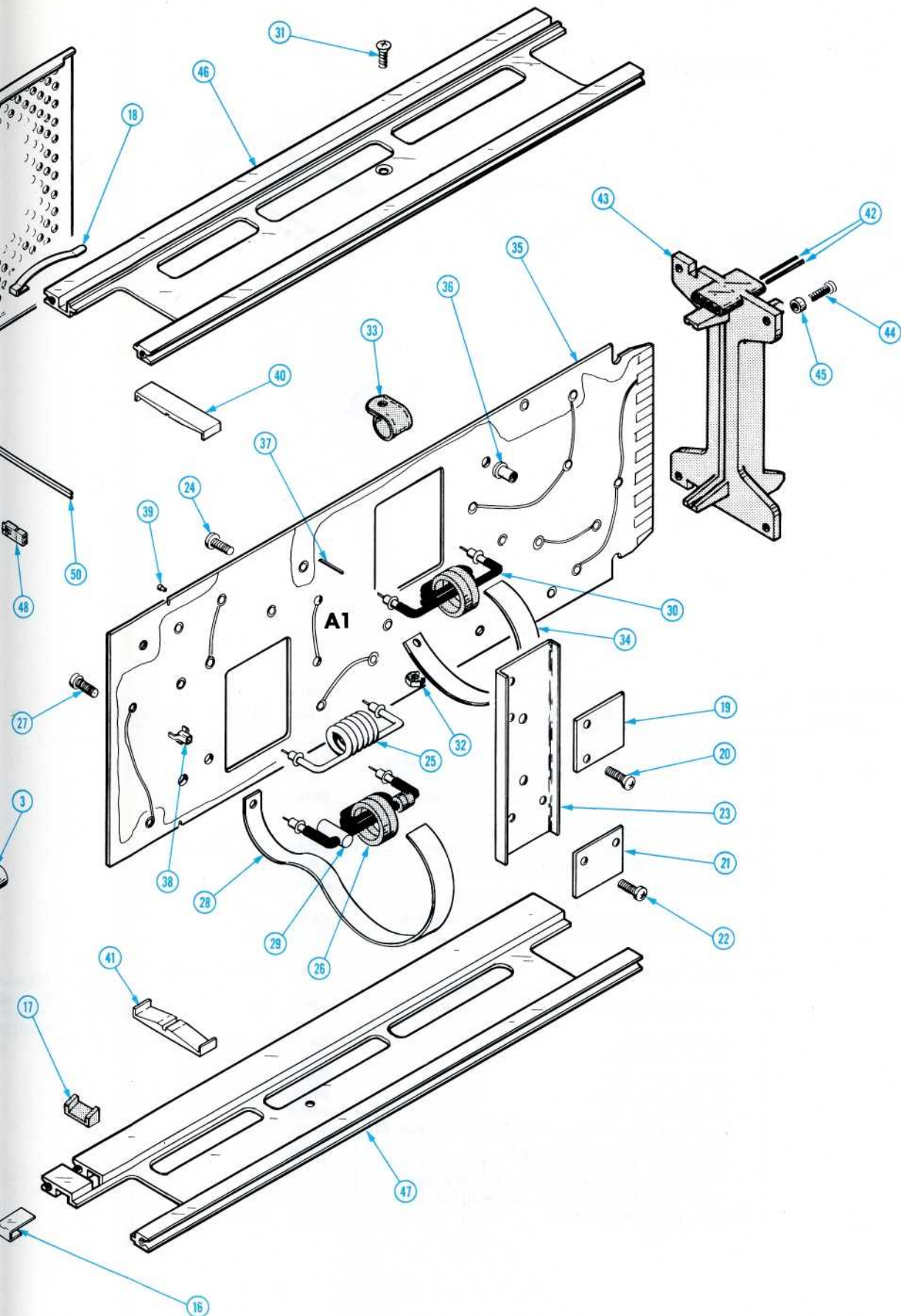
Mechanical Parts List—7A21N (S/N B040000 & up)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty	1 2 3 4 5					Name & Description	Mfr Code	Mfr Part Number
1-1	337-1064-04			2						SHIELD,ELEC:SIDE	80009	337-1064-00
-2	366-0494-00			1						KNOB:GRAY	80009	366-0494-00
	213-0153-00			1						. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-3	017-0093-01			2						CONN,RCPT,ELEC:	80009	017-0093-01
										(ATTACHING PARTS FOR EACH)		
-4	220-0459-00			1						NUT,PLAIN,DODEC:	73743	2XX-64066-101
-5	210-0047-00			1						WASHER,LOCK:	80009	210-0047-00
										- - - * - - -		
-6	366-1058-37			1						KNOB,LATCH:	80009	366-1058-37
										(ATTACHING PARTS)		
-7	214-1095-00			1						PIN,SPG,SPLIT:0.094 OD X 0.187 INCH LONG	13257	52-022-094-0187
										- - - * - - -		
-8	105-0076-00			1						REL BAR,LATCH:PLUG-IN UNIT	80009	105-0076-00
-9	214-1280-00			1						SPRING,HLCPS:0.14 OD X 1.126"L,0.16"DIA W	80009	214-1280-00
-10	333-1213-04			1						PANEL,FRONT:	80009	333-1213-04
-11	-----			1						RES.,VAR:(SEE R96 EPL)		
										(ATTACHING PARTS)		
-12	210-0583-00			1						NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20319-402
										- - - * - - -		
-13	348-0235-00			2						SHLD GSKT,ELEC:4.734 INCH LONG	80009	348-0235-00
-14	386-1447-60			1						SUBPANEL,FRONT:	80009	386-1447-60
										(ATTACHING PARTS)		
-15	213-0192-00			4						SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
										- - - * - - -		
-16	214-1054-00			1						SPRING,DETENT:LATCH	80009	214-1054-00
-17	105-0075-00			1						PAWL:0.475 X 0.21 X 0.184 INCH,PLSTC	80009	105-0075-00
-18	214-1061-00			1						SPRING,GROUND:FLAT	80009	214-1061-00
-19	-----			1						RES.,FXD,FILM:(SEE U12 EPL)		
										(ATTACHING PARTS)		
-20	211-0008-00			2						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
										- - - * - - -		
-21	-----			1						RES.,FXD,FILM:(SEE U30 EPL)		
										(ATTACHING PARTS)		
-22	211-0008-00			2						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
										- - - * - - -		
-23	407-1131-00			1						BRACKET,ANGLE:	80009	407-1131-00
										(ATTACHING PARTS)		
-24	211-0116-00			2						SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
										- - - * - - -		
-25	-----			2						COUPLER,XMSN LI:(SEE L6 EPL)		
	210-0774-00			2						. EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	210-0775-00			2						. EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-26	-----			1						COUPLER,XMSN LI:(SEE L21 EPL)		
										(ATTACHING PARTS)		
-27	211-0097-00			1						SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
-28	337-1720-00			1						SHIELD,ELEC:	80009	337-1720-00
										- - - * - - -		
-29	385-0013-01			1						. INSULATOR,STDF:	80009	385-0013-01
	210-0774-00			2						. EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	210-0775-00			2						. EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-30	-----			1						COUPLER,XMSN LI:(SEE L56 EPL)		
										(ATTACHING PARTS)		
-31	211-0101-00			1						SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
-32	210-0586-00			1						NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
-33	343-0144-00			1						CLAMP,LOOP:	95987	1-8-2
-34	337-1720-00			1						SHIELD,ELEC:	80009	337-1720-00
										- - - * - - -		
	210-0774-00			2						. EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	210-0775-00			2						. EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-35	-----			1						CKT BD ASSY:DIRECT ACCESS(SEE A1 EPL)		
-36	351-0213-00			8						. GUIDE-POST,LOCK:0.285 INCH LONG	80009	351-0213-00
-37	131-0608-00			2						. CONTACT,ELEC:0.365 INCH LONG	22526	47357

Mechanical Parts List—7A21N (S/N B040000 & up)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty						Name & Description	Mfr Code	Mfr Part Number
				1	2	3	4	5			
1-38	131-1003-00		18	.					CONNECTOR BODY, :CKT BD MT, 3 PRONG	80009	131-1003-00
-39	136-0252-00		18	.					CONTACT, ELEC: 0.145 INCH LONG	00779	2-330808-7
-40	344-0210-00		3						CLIP, SPR TNSN:	80009	344-0210-00
-41	344-0211-00		3						CLIP, SPR TNSN:	80009	344-0211-00
-42	131-0958-00		2						CONTACT, ELEC:	00779	66102-1
-43	386-1402-00		1						PANEL, REAR:	80009	386-1402-00
									(ATTACHING PARTS)		
-44	213-0192-00		4	SCR,	TPG,	THD	FOR:	6-32 X 0.50 INCH, PNH STL		87308	OBD
-45	361-0326-00		1	SPACER,	SLEEVE:	0.18 ID X 0.25 OD X 0.10" L				80009	361-0326-00
				- - -	*	- - -					
-46	426-0499-05		1	FR SECT,	PLUG-IN:					80009	426-0499-05
-47	426-0505-05		1	FR SECT,	PLUG-IN:					80009	426-0505-05
-48	352-0169-00		1	CONN BODY,	PL, EL:	2 WIRE BLACK				80009	352-0169-00
-49	131-0707-00		2	CONTACT,	ELEC:	0.48" L, 22-26 AWG WIRE				22526	47439
-50	175-0863-00		FT	CABLE,	SP, ELEC:	2 WIRE RIBBON				80009	175-0863-00
-51	210-0774-00		16	EYELET,	METALLIC:	0.152 OD X 0.245 INCH L, BRS				80009	210-0774-00
-52	210-0775-00		16	EYELET,	METALLIC:	0.126 OD X 0.23 INCH L, BRS				80009	210-0775-00





7A21N DIRECT ACCESS (B04000 & up)

ACCESSORIES

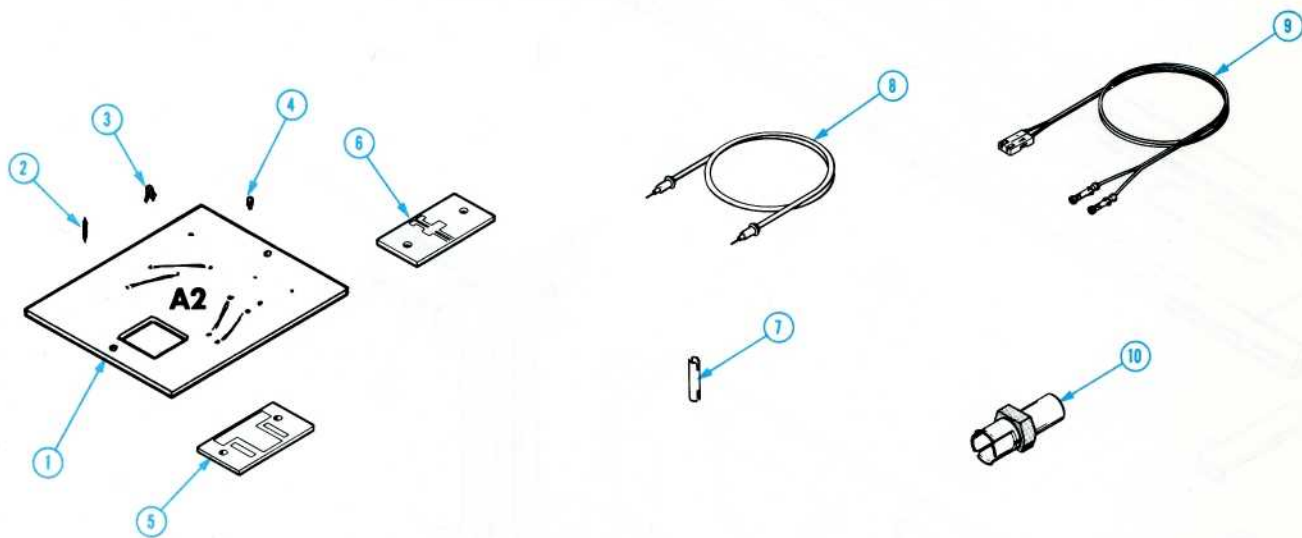


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
2-	020-0062-01			1						ACCESSORY KIT:	80009	020-0062-01
-1	-----			1						. CKT BOARD ASSY:VERTICAL TERM(SEE A2 EPL) (ATTACHING PARTS)		
	211-0097-00			3						. SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL -----*-----	83385	OBD
-2	131-0608-00			8						. CONTACT,ELEC:0.365 INCH LONG	22526	47357
-3	131-1003-00			5						. CONNECTOR BODY,:CKT BD MT,3 PRONG	80009	131-1003-00
-4	136-0252-04			2						. CONTACT,ELEC:0.188 INCH LONG	22526	75060
-5	307-0377-00			1						. RES.,FXD,FILM: (ATTACHING PARTS)	80009	307-0377-00
	211-0008-00			2						. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0586-00			2						. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL -----*-----	78189	OBD
-6	307-0376-00			1						. RES.,FXD,FILM: (ATTACHING PARTS)	80009	3070-0376-00
	211-0012-00			2						. SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL -----*-----	83385	OBD
-7	103-0169-00			1						. ADAPTER,CONN:	80009	103-0169-00
-8	175-1401-00			1						. CABLE ASSY,RF:	80009	175-1401-00
	175-1402-00			1						. CABLE ASSY,RF:	80009	175-1402-00
-9	175-1403-00			1						. CA ASSY,SP,ELEC:	80009	175-1403-00
-10	017-0081-00			1						. TERMINATION END:	24655	0874-9954
	211-0559-00			1						. SCREW,MACHINE:6-32 X 0.375"100 DEG,FLH STL	83385	OBD
	343-0002-00			1						. CLAMP,LOOP:0.188 INCH DIA	95987	3-16-6B
	210-0863-00			1						. WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
	210-0457-00			1						. NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
	211-0008-00			3						. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	070-1962-00			1						MANUAL,TECH:INSTRUCTION	80009	070-1962-00

Fig. & Index No. Tek Part

065-

REPACKAGING

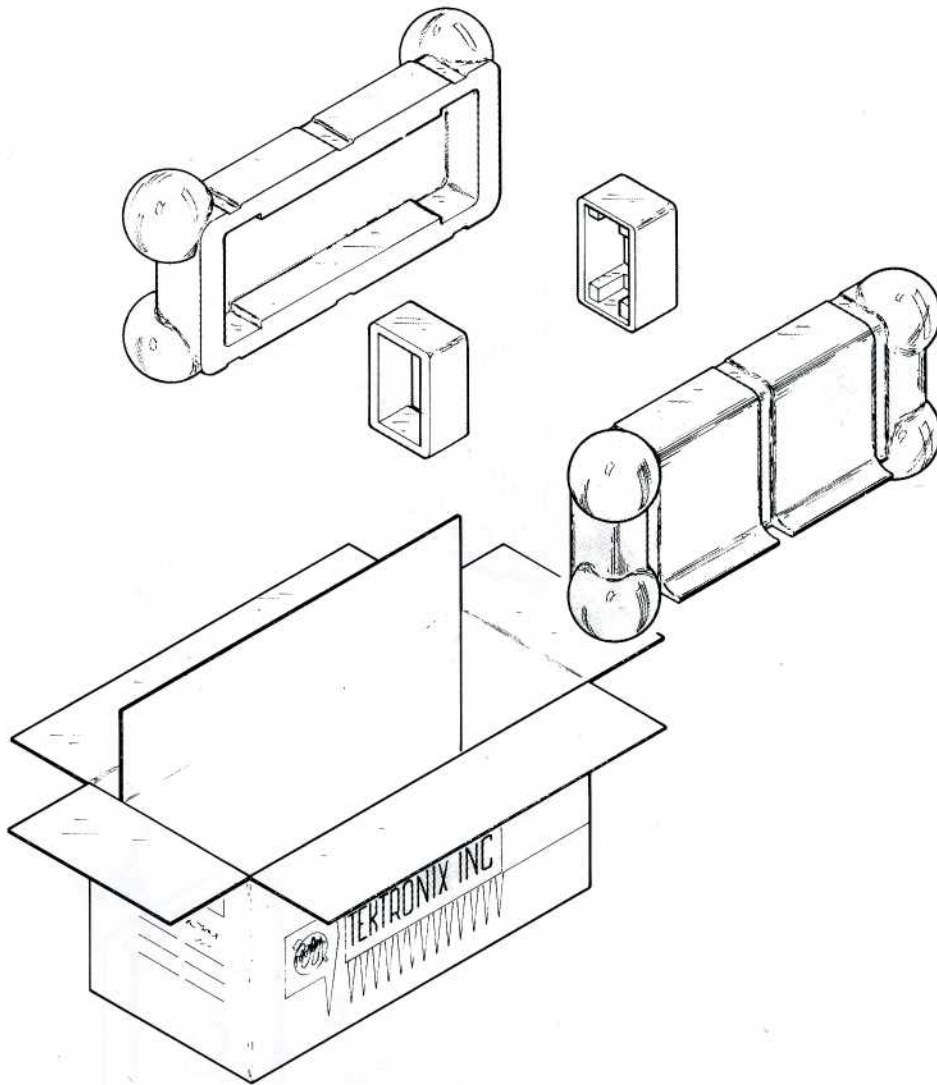


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty	Name & Description					Mfr Code	Mfr Part Number
					1	2	3	4	5		
065-0125-00				1	CARTON ASSY:					80009	065-0125-00