TEKTRONIX®

WP2051/WP2052

CAMAC COMPATIBLE WAVEFORM DIGITIZING INSTRUMENT

INSTRUCTION MANUAL

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

Serial Number _____

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SYSTEM WARRANTY

Unless otherwise provided, Tektronix warrants that this System shall be free from defects in materials and workmanship under normal use and service for a period of 90 days from the date of installation. During the first 90 days after installation, if this System fails to meet the system specifications as a result of a defect in material or workmanship, Tektronix will provide on-site warranty service with no charge to the Buyer for parts or labor. A service contract covering on-site repair service after the expiration of the free 90-day warranty service can be purchased through the Tektronix Regional Service Center. Neither the System warranty nor the service contract apply to problems or failures associated with components not supplied by Tektronix.

COMPONENT WARRANTY

In addition to the System warranty, those individual Tektronix components of the System that have separate operating or service manuals are warranted against defects in materials and workmanship for the periods set forth in the manuals accompanying the components. If any Tektronix component not covered by the System warranty or service contract fails during the warranty period under normal use and service because of a covered defect, Tektronix will repair or replace such component, provided that is shipped freight prepaid to a designated service center. Tektronix will ship the repaired component or its replacement freight collect to the Buyer. The risk of loss or damage and the duty to insure components in transit to or from Tektronix under this warranty shall be with the Buyer.

LIMITATION OF WARRANTY

Any attempt by any person other than an authorized representative of Tektronix to repair or service the System or any component thereof or to make any modifications to the hardware or software of the System or any component thereof, without the express prior written consent of Tektronix, will void all warranties. **Tektronix makes no other warranties, express or implied, and specifically disclaims all warranties of merchantability or fitness for a particular purpose. Tektronix further disclaims any warranty that use of its components in conjunction with components supplied by buyer does not infringe any patent. Tektronix specifically excludes all special incidental and consequential damages for breach of any warranty. Tektronix' sole obligation for breach of any warranty shall be to repair or replace as set forth above.**

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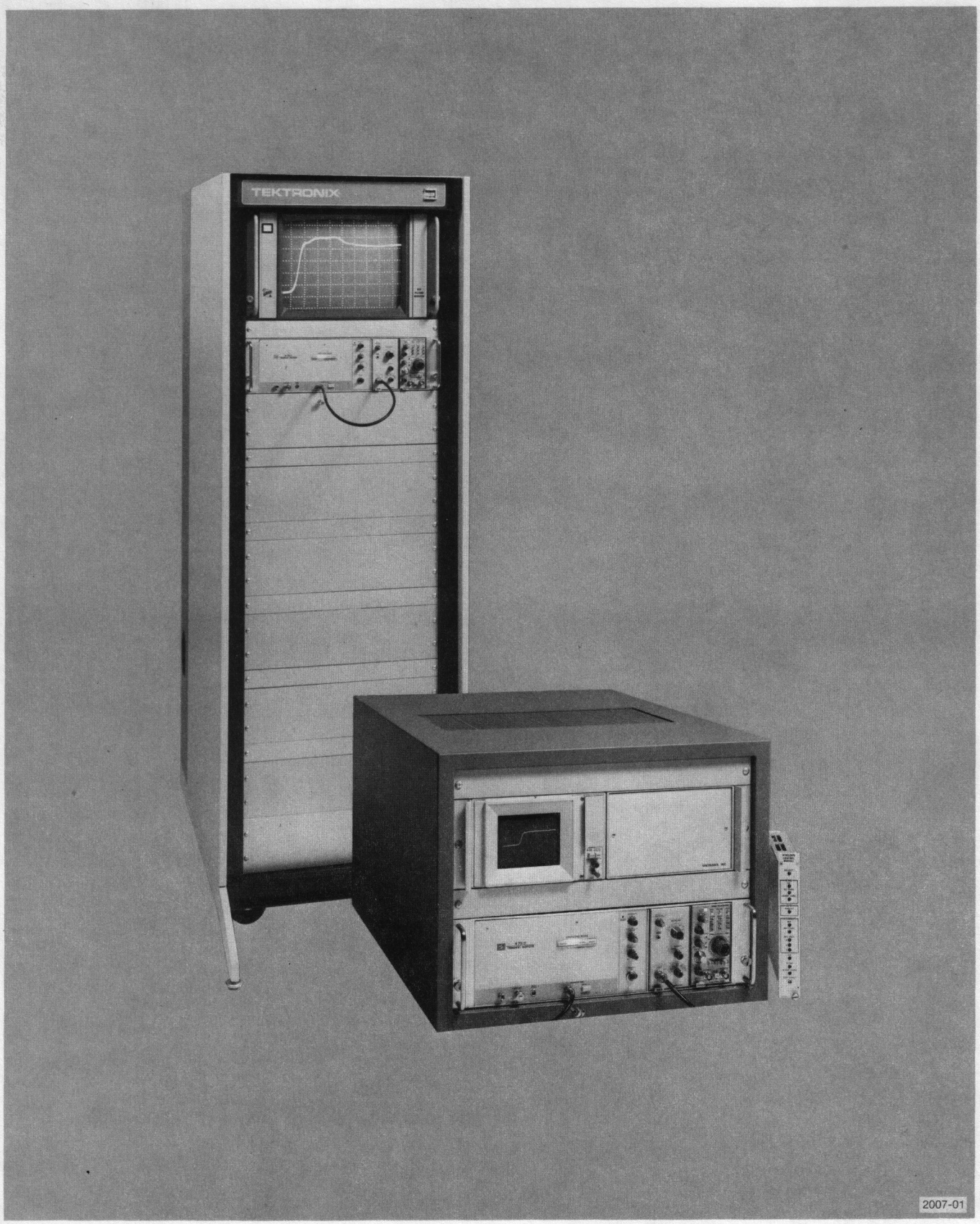
PREFACE

The WP2051 and WP2052 systems make the high-speed repetitive or single transient data acquisition capabilities of the R7912 available to CAMAC users.

This manual is an introduction to the WP2051 and WP2052 CAMAC Compatible Waveform Digitizing Instruments (WDI). Section 1 describes the components of your WP2051/WP2052 package. Section 2 guides you in unpacking, assembling and connecting the system. Then Section 3 helps you perform some basic tests and check communication between the WP2051/WP2052 and your computer. In case of difficulty, these tests can be used to diagnose problems. Section 4 lists the other manuals included with your package. General specifications for the system are given in Section 5.

The manual set provided with your WP2051/WP2052 package includes Operator's and Service manuals for each instrument. In addition, special Interface Concepts manuals are provided to assist you in designing an efficient, versatile software package for the system. The Operator's, Service and Concepts manuals contain information essential to the safe operation of the instruments. Read them carefully before applying power to any system component.



WP2051/WP2052 Camac Compatible Waveform Digitizing Instrument

SECTION 1

THE WP2051 AND WP2052 CAMAC

COMPATIBLE WAVEFORM DIGITIZING INSTRUMENTS

The WP2051/WP2052 Waveform Digitizing Instruments include an R7912 Transient Digitizer, a TV or Storage Monitor and an R7912/DPO Control Module. Each package provides a powerful computer controlled waveform acquisition and display system.

Standard WP2051/WP2052 Components:

R7912 Transient Digitizer

Electronic Graticule, Option 6

Memory, Option 14

ASCII Readout, Option 20 (WP2052 only)

7A19 Amplifier

7B92A Dual Time Base

605 Storage Monitor (WP2051 only)

R632 TV Monitor (WP2052 only)

R7912/DPO Control Module for CAMAC

R7912/CP Bus Interface Card

120V, 15A Power Controller (WP2052 only)

Cabinet

Interconnecting Cables

WP2051/WP2052 Manuals

Description

R7912 Transient Digitizer 7A19 and 7B92A. The R7912 Transient Digitizer acquires, digitizes and stores input waveforms in repetitive or single sweep modes. The 7A19 Amplifier and the 7B92A Dual Time Base included in this package facilitate acquisition of most high-speed waveforms.

The R7912 can be operated in either TV (Non-Store) or Digital mode. In TV mode the monitor provides a real-time display of the input signal. In Digital mode the waveform is digitized and stored in the R7912 internal memory. These operating modes can be selected manually from the front panel of the R7912 or by the computer under program control.

Electronic Graticule. The electronic graticule feature of the R7912 provides a highly stable dot array for use as a measurement reference by the computer or as a visual reference on the TV monitor screen.

Memory. The internal memory of the R7912 stores digitized waveforms and scale-factors for later viewing or processing.

ASCII Readout (WP2052 only). The ASCII readout enables the computer to process scale factor information acquired from the R7912 control settings.

TV Monitor (WP2052 only). The WP2052 package includes a TV monitor such as the Tektronix R632 Monitor. The TV monitor provides a real-time display of waveforms acquired by the R7912. The monitor provides large, bright displays of extremely fast transients and step waveforms.

Storage Monitor (WP2051 only). A Tektronix 605 Storage Monitor is included in the WP2051 package. The 605 monitor stores waveforms displayed on its screen without using the R7912 internal memory. This feature is useful for observing transient pulses stored on the monitor

screen while the R7912 is operating in TV mode.

R7912/DPO Control Module. The R7912/DPO Control Module is the interface between the WP2051/WP2052 and your CAMAC system. It is a double-width module designed to plug into a standard CAMAC crate, and is fully compatible with 1972-standard CAMAC system. Front-panel indicators are provided to display the status of several registers internal to the Control Module. Careful design of the module has minimized the amount of special software necessary to control the WP2051/WP2052 package.

R7912/CP Bus Interface. This card interfaces the R7912 to the Control Module via the CP Bus. The card is located in the R7912.

120V 15A Power Controller (WP2052 only). The Power Controller distributes and filters the AC line power. It also provides overcurrent protection for the instruments in the cabinet.

Cabinet. The Cabinet provided with your package (cabinet size and type varies with the package type and options) provides rackmounting for the power controller (WP2052 only), R7912(s), and the TV or storage monitor.

Interconnecting Cables. The interconnecting cables included with your WP2051 or WP2052 package are listed below. The Tektronix part numbers are marked on a plastic sleeve near one end of each cable, or on the connector case. Be sure to check the additional cables included if you have additional R7912's (options 41-45) in the WP2052 package.

WP2051 - 2 Cables Total

1 ea. 012-0487-00 2.3 meter (7.5 ft) R7912/605

Interconnecting cable

1 ea. 012-0534-01 6.1 meter (20 ft) R7912/CAMAC

Interconnecting cable

WP2052 Standard Package - 3 Cables Total

2 ea. 012-0074-00 1.1 meter (42 inch) R7912/R632

Interconnecting cable (75 ohm BNC)

1 ea. 012-0534-01 6.1 meter (20 ft) R7912/CAMAC

Interconnecting cable

2 ea. 011-0113-00 (75 ohm BNC)

Termination Resistors

WP2052 Options 41-45 - 3 Cables per R7912 Total

2 ea. 012-0074-00 1.1 meter (42 inch) R7912/R632

Interconnecting cable (2 per R7912)

1 ea. 012-0534-01 6.1 meter (20 ft.) R7912/CAMAC

Interconnecting cable

1 ea. 012-0509-01 1.2 meter (4 ft.) R7912

Interconnecting Cable (1 per additional R7912)

Package Options

WP2051 Options

Option 2 - Deletes the standard 7A19 Amplifier

Deletes the standard 7B92A Dual Time Base

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Option 9 - Changes input line voltage and frequency of all instruments to 230V, 50 Hz

Option 13 - Changes TV scan rate to 625 Horizontal lines, 50 Hz frame rate

WP2052 Options

Options 2 and 13 - These options are the same as for WP2051 packages.

Option 9 - Changes input line voltage and frequency of all instruments to 230V, 50 Hz; deletes 115V Power Controller: adds Tektronix 230V Power Controller

Option 41 - Adds one additional R7912 (without plug-ins). All optional additional R7912's include one R7912/CP Bus Interface Card per instrument, and all necessary interconnecting cables.

Option 42 - Adds two additional R7912's (without

plug-ins) as above

Option 43 - Adds three additional R7912's (without plug-ins) as above

Option 44 - Adds four additional R7912's (without plug-ins) as above

Option 45 - Adds five additional R7912's (without plug-ins) as above

SECTION 2

SETTING UP THE WP2051 AND WP2052 SYSTEMS

This section will help you unpack and assemble your WP2051/WP2052 system. The space required by the system is shown in Figs. 5-1 and 5-2 in the system specifications section.

While unpacking, be alert for any damage that may have occurred in transit. If you find damage, immediately notify the carrier who made delivery and request inspection. Then notify your Tektronix Sales Engineer of the damage.

Check all packing cartons carefully for spare parts, accessories and accessory instructions. Save the cartons and packing material. This will be helpful if you need to repack and reship the equipment.

Unpacking and Assembling

Cabinet and Monitor. The shipping container used for the cabinet and monitor varies with the type of package and the options ordered. If you have a WP2051 package, the cabinet (with the 605 Monitor mounted in it) is shipped in a cardboard carton. If you have a WP2052 package, the cabinet (with the TV Monitor mounted in it) is shipped in a wooden crate. In either case, be very careful as you unpack the cabinet to not strike or scratch the monitor screen.

CAUTION

The cabinet provided with some WP2052 packages may be top-heavy. This is especially true of taller cabinets designed to mount several R7912's (options 41-45). Be careful that the cabinet does not tip as you remove it from the wooden crate.

Unpack the cabinet and monitor and remove all packing material. Set the cabinet in a convenient place so the R7912(s) can be mounted as they are unpacked.

R7912 Transient Digitizer.

1. Remove the R7912 from its carton.

2. Pull the sliding track sections in the cabinet out to the fully extended position.

3. Insert the R7912 chassis rails into the track. See Fig. 2-1.

4. Press the stop latches on the track and push the R7912 toward the cabinet until the latches snap into their holes.

5. If you have more than one R7912, each instrument is shipped in a separate carton. Repeat steps 1 through 5 until all the R7912's are unpacked and mounted as shown in Fig. 2-2.

CAUTION

The instruments in the cabinet are arranged and spaced for proper cooling. Do not change this arrangement or spacing as the flow of cooling air will be reduced and the instruments may be damaged.

6. Push all the instruments into the cabinet but do not secure them with the thumbscrews at this time.

R7912/DPO Control Module, Cables and Manuals.

1. Remove the Control Module from its carton.

2. Remove all packing material and check to see that no packing material is left on the rear edge-connectors.

3. Set the module aside temporarily.

4. Unpack the cables and manuals and check them against the lists given in Sections 1 and 5.

Cabling

The number of cables and their connection varies with different packages. The cabling instructions are divided into three groups: WP2051 packages, standard WP2052 packages, and WP2052 packages with additional R7912's (Options 41 - 45). Refer to the section that applies to your package.

WP2051 Packages. Table 2-1 lists and describes the cables included with your WP2051.

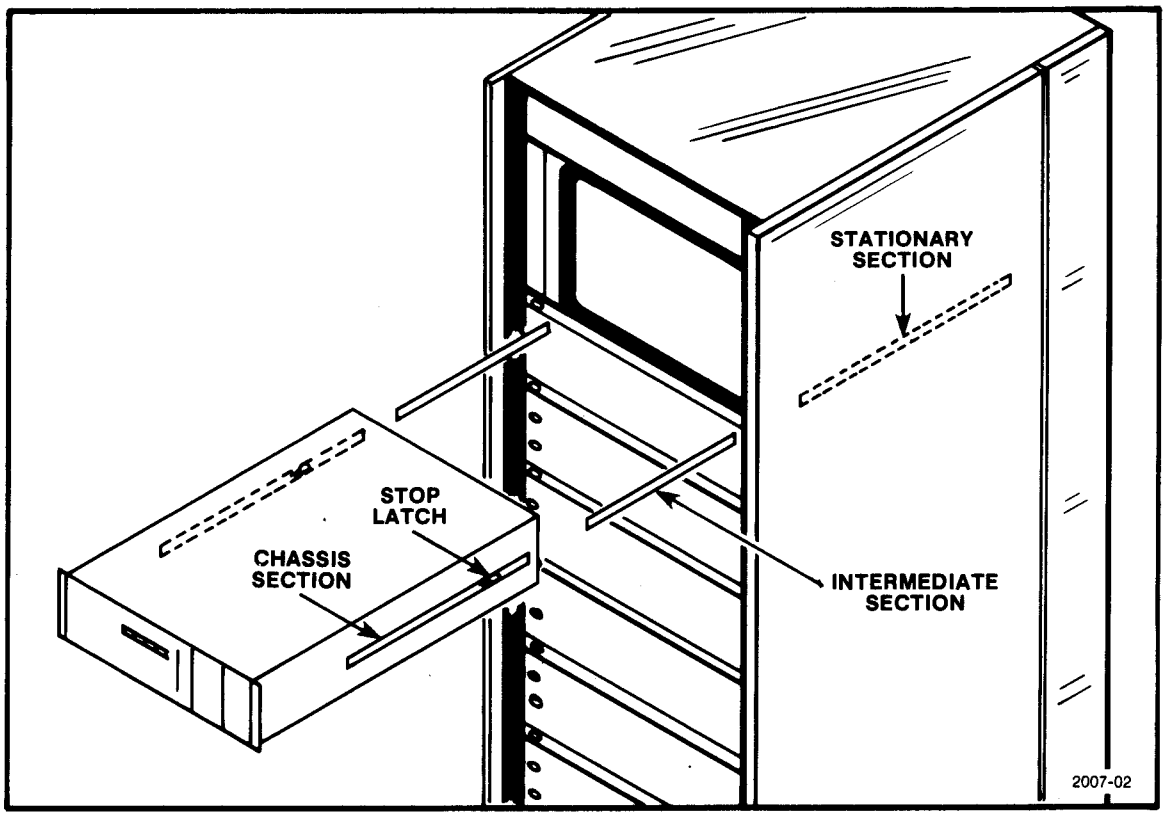

Fig. 2-1. Rackmounting the R7912.

1. Check that the R7912 and 605 Monitor are off.

2. Run the 7.5-foot cable (012-0487-00) from the D or P INTERCONNECT jack on the R7912 to the REMOTE PROGRAM connector on the 605 Monitor. Secure them with the two anchor screws on each connector. Tighten the screws gently. Do not overtighten.

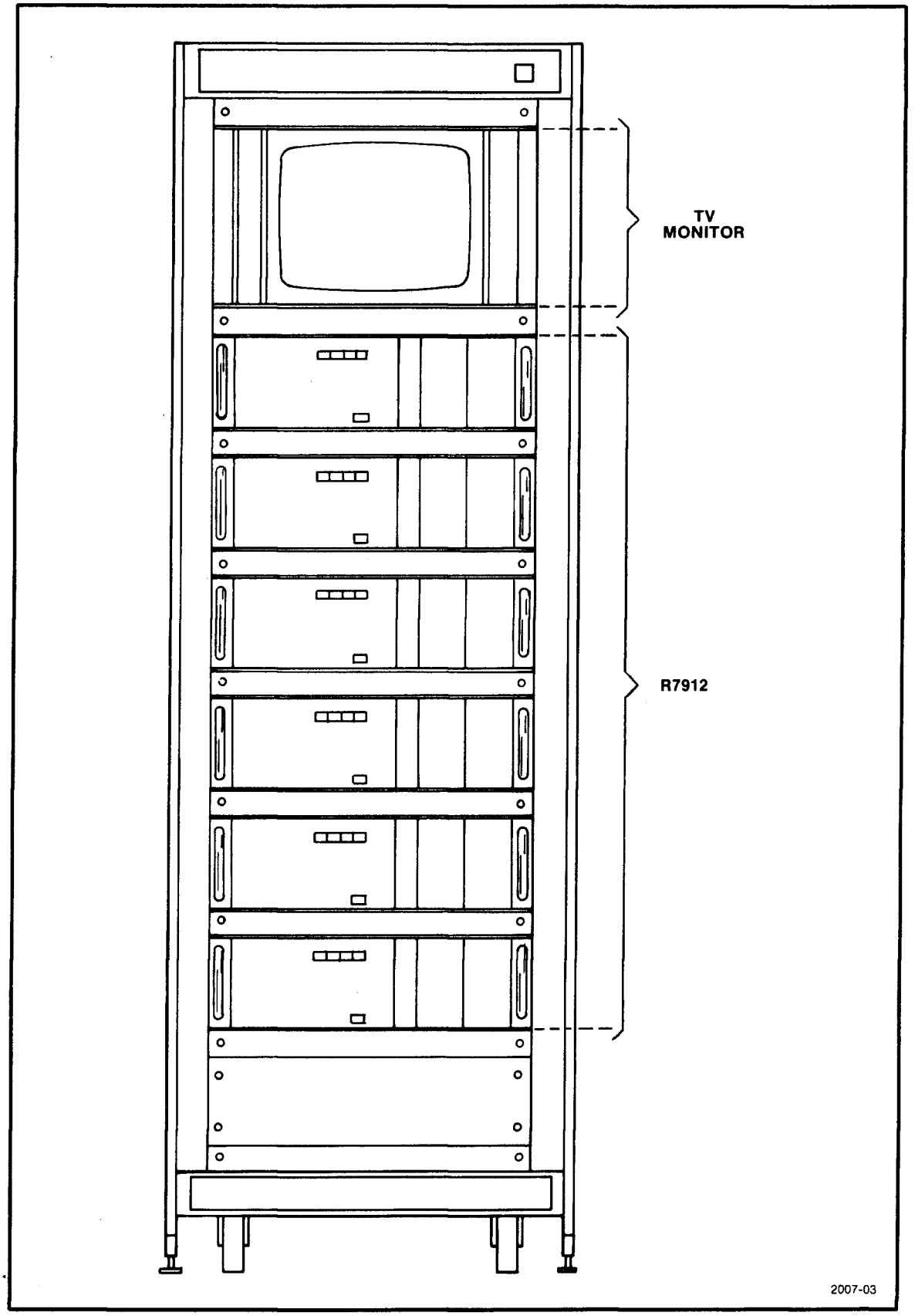

Fig. 2-2. WP2052 instruments mounted in the cabinet.

TABLE 2-1

WP2051 CABLES

FROM	TO	CABLE
R7912 rear	AC Power Outlet	161-0066-00 power cord
605 Monitor rear	AC Power Outlet	power cord, wired to Monitor
DIGITAL OUT Connector; R7912 rear	Control Module rear	012-0534-01 6.1 meter (20 ft) CP Bus cable
D or P INTERCONNECT: R7912 rear	REMOTE PROGRAM Connector; 605 Monitor rear	012-0487-00 2.3 meter (7.5 ft.) Interconnecting cable
VIDEO OUT (Binary); R7912 rear	+ Z-AXIS Input 605 Monitor rear	012-0074-01 1.1 meter (42 in.) 75 ohm BNC cable

3. Connect a 75 ohm feed-through BNC termination resistor (011-0113-00) to the + Z-AXIS input on the 605 monitor. Connect the 42-inch, 75 ohm BNC cable (012-0074-00) from the VIDEO OUT (Binary) on the R7912 to the connector on the termination resistor. Remove all other shorting caps from the monitor.

4. Connect the power cords from the R7912 and 605 monitor to AC outlets that supply the correct voltage and line frequency. The outlets must be the grounding type with one side neutral and should supply 115 VAC, 60 Hz; or if you ordered Option 9, 220 VAC, 50-60 Hz.

5. The 20-foot CP Bus Cable (012-0534-01) has a large T-connector at one end. The T-connector houses a 104 pin male plug and a 37 pin jack. Insert the 104 pin male plug into the DIGITAL OUT connector on the rear of the R7912. Secure the plug with the two anchor

screws. Do not connect the other end of the cable at this time.

6. Go on to the Strap Options section.

WP2052 Standard Package (One R7912). Table 2-2 lists and describes the cables included in the Standard WP2052 Package.

1. Check that the R7912 and the TV Monitor are off. Make sure that the Master Power Switch, located in the upper right corner of the cabinet front panel is off.

2. Connect the power cords from the R7912 and the TV Monitor into switched outlets on the power controller.

3. Connect one 42-inch, 75 ohm BNC Cable (012-0074-00) from the VIDEO OUT (Binary) connector on the R7912 to the A VIDEO input on the monitor.

4. Connect the other 42-inch BNC cable from the EXT SYNC connector on the TV monitor to the TV SYNC OUT connector on the R7912. Connect a 75 ohm BNC termnation resistor to the other EXT SYNC connector.

5. Run the power cord from the power controller under the rear door of the cabinet to an AC power outlet. The outlet must be grounded (3-prong plug) with one side neutral and capable of providing at least 15 amperes at 115 volts. If you ordered Option 9, the outlet must supply 15 amperes at 220 volts.

6. The 20-foot CP Bus cable (012-0534-01) has a large T-connector at one end. The T-connector houses a 104-pin male plug and a 37-pin jack. Insert the 104-pin male plug into the DIGITAL OUT connector on the rear of the R7912. Secure the plug with the two anchor screws. Do not connect the other end of the cable at this time.

7. Go on to the Strap Options section.

TABLE 2-2

STANDARD WP2052 CABLES

FROM	TO	CABLE
R7912 rear	Power Controller switched outlet	161-0066-00 power cord
TV Monitor	Power Controller switched outlet	161-0036-00 power cord (for R632 TV monitor)
Power Controller	AC Power Outlet	power cord, wired to Power Controller
DIGITAL OUT connector; R7912 rear	Control Module rear	012-0534-01 6.1 meter (20 ft) CP Bus cable
VIDEO OUT (Binary); R7912 rear	A VIDEO input; TV Monitor rear	012-0074-00 1.1 meter (42 in.) 75 ohm BNC cable
EXT SYNC input; TV Monitor rear	TV SYNC OUT connector; R7912 rear	012-0074-00 1.1 meter (42 in.) 75 ohm BNC cable

WP2052 Packages with Options 41-45. Table 2-3 lists and describes the cables included in the WP2052 with Options 41-45.

TABLE 2-3

CABLES FOR WP2052 WITH ADDITIONAL R7912's

(OPTIONS 41-45)

FROM	TO	CABLES	NOTES
R7912 rear	Switched outlet on Power Controller	161-0066-00 power cord	One per R7912
TV Monitor rear	Switched outlet on Power Controller	161-0036-00 power cord	
Power Controller	AC Power outlet	Power cord, wired to Power Controller	
DIGITAL OUT connector; R7912 rear	Control Module; rear	012-0534-01 6.1 meter (20 ft.) CP Bus cable	
T-Connector jack on above cable	DIGITAL OUT connector; R7912 rear	012-0509-01 1.2 meter (4 ft.) CP Bus cable	One per additional R7912
VIDEO OUT (Binary); R7912 rear	A and B VIDEO INPUTS: monitor rear	012-0074-01 1.1 meter (42-in.) 75 ohm BNC cable	One per R7912
EXT SYNC input; TV Monitor rear	TV SYNC IN: R7912 rear	012-0074-01 1.1 meter (42-in.) 75 ohm BNC cable	
TV SYNC OUT: R7912 rear	TV SYNC IN: (next R7912 in the chain)	012-0074-01 1.1 meter (42-inch) 75 ohm BNC cable	One per additional R7912

1. Check that the R7912s and the TV Monitor are off. Make sure the Master Power switch is off. This switch is located in the upper right corner of the cabinet front panel.

2. Plug the power cords from the R7912s and the TV Monitor into the switched outlets on the power controller.

3. The 20-foot CP Bus cable (012-0534-01) has a large T-connector at one end. The connector body houses a 104-pin male plug and a 37-pin jack. Insert the 104-pin plug into the DIGITAL OUT connector on the rear panel of the lowest R7912 in the cabinet. Secure the connector with the two anchor screws. Do not connect the other end of the cable at this time.

4. The 4-foot CP Bus cable (012-0509-01) has a large T-connector at one end, as above, and a 37-pin male plug at the other. Connect the 37-pin plug to the jack in the T-connector body on the cable you connected in step 3. See Fig. 2-3.

5. Connect the other end of this 4 foot cable to the DIGITAL OUT connector on the next R7912. Continue cabling with 4 foot CP Bus cables as outlined in steps 3 through 5 until all R7912's are connected in a chain. See Fig. 2-4.

6. Video cable connection varies with different options. Figures 2-5 through 2-10 show the cabling configurations for Standard WP2052 Packages and WP2052 Packages with Options 41-45. Refer to the figure applicable to your system. Make all the connections shown in the figures, including termination resistors (included in accessories). All cables used in these figures are 012-0074-00 1.1 meter (42-inch) 75 ohm BNC cables.

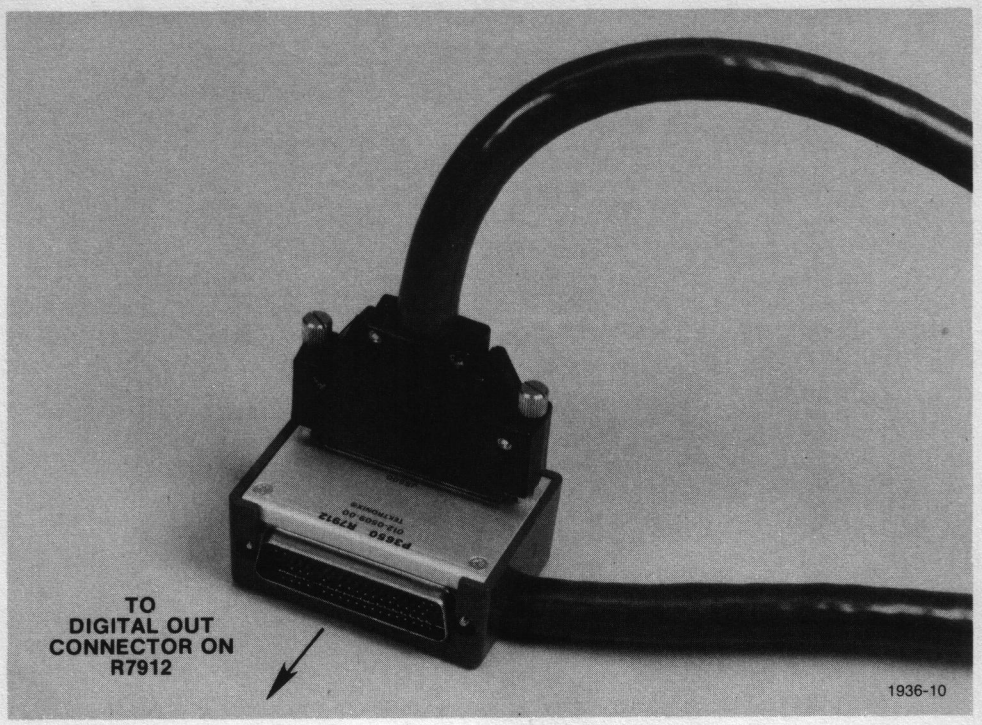

Fig. 2-3. R7912 "T" connector.

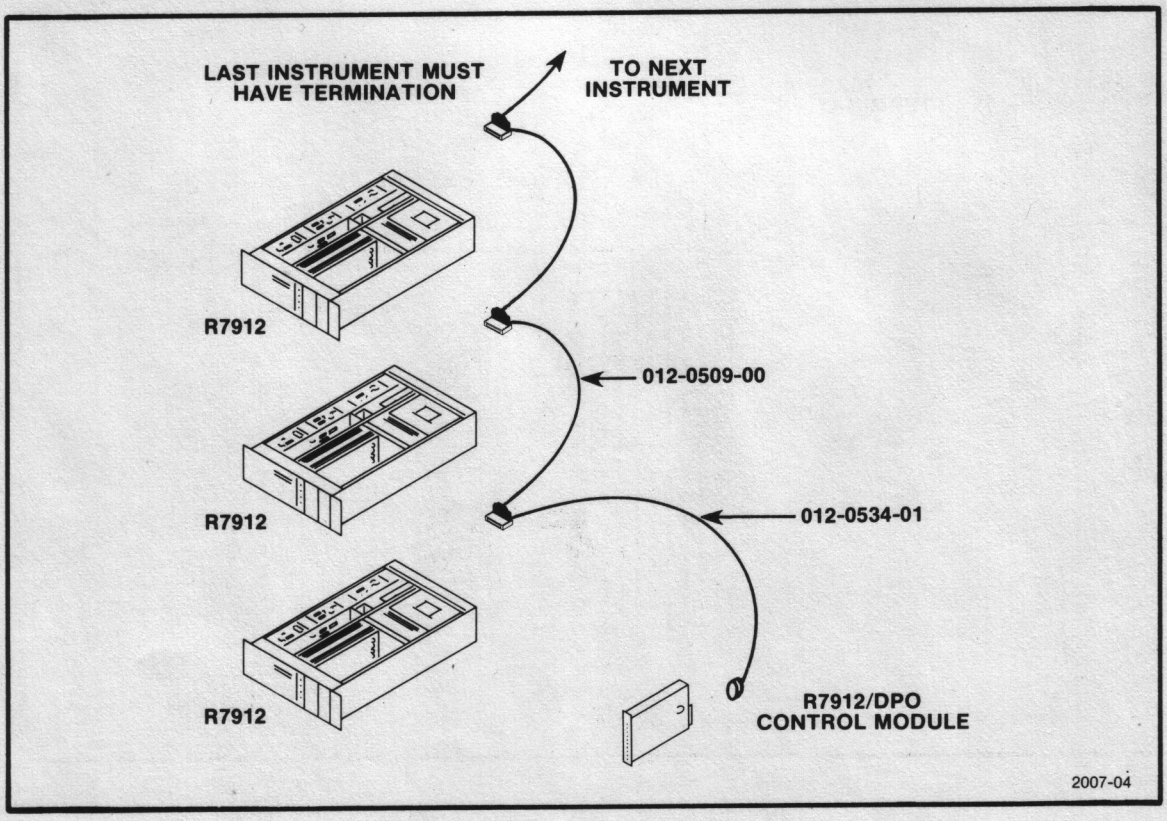

Fig. 2-4. WP2052 CP Bus cabling.

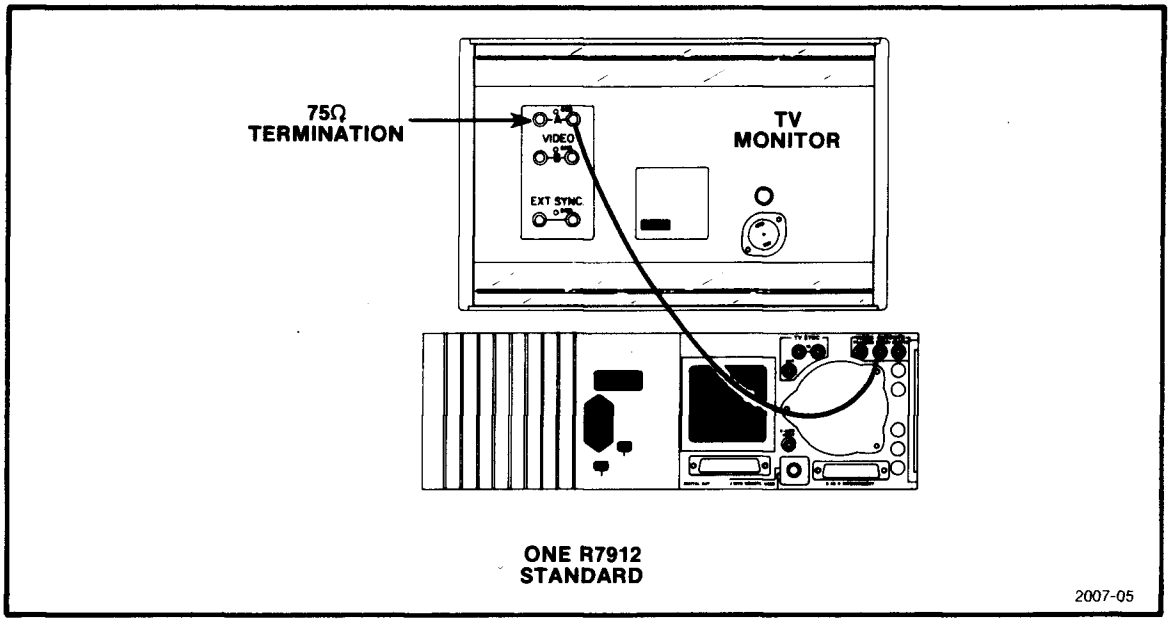

Fig. 2-5. Standard WP2052 video cabling.

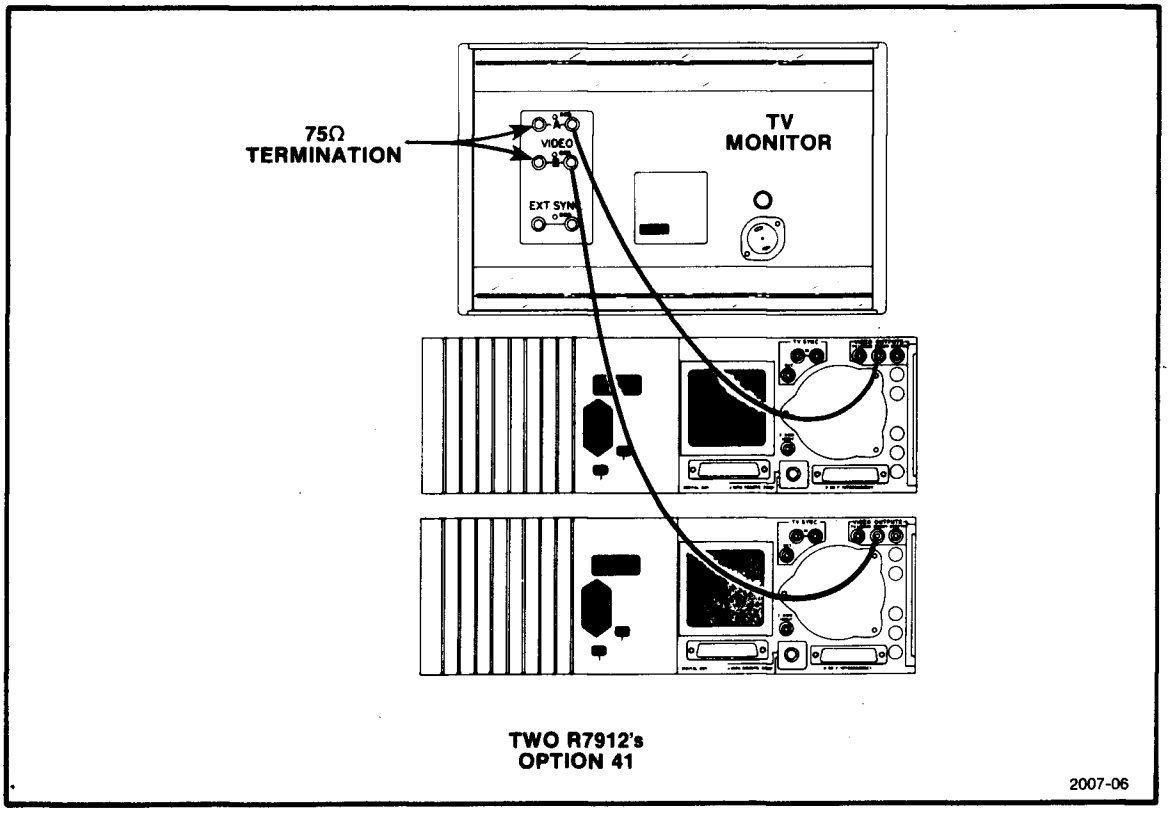

Fig. 2-6. Video cabling for WP2052 with Option 41.

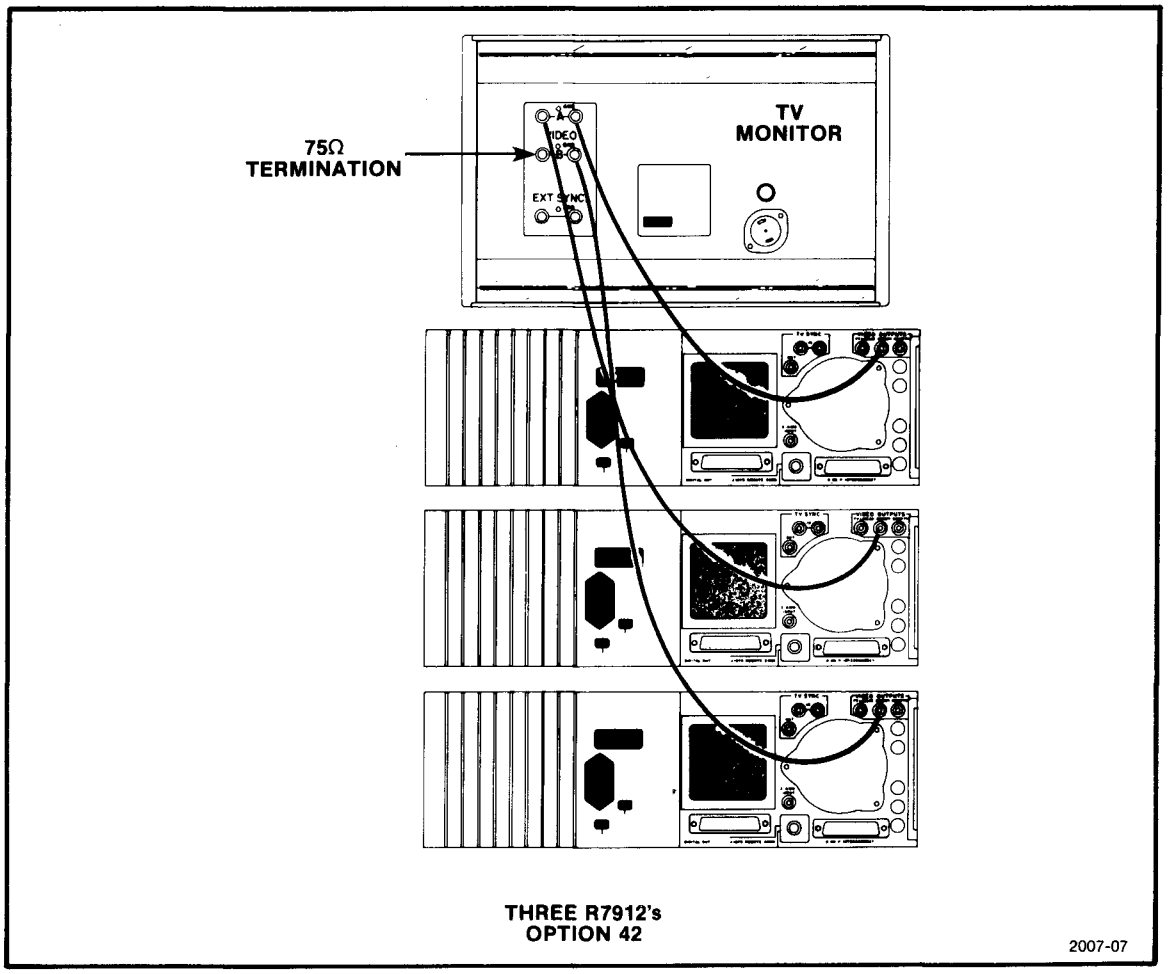

Fig. 2-7. Video cabling for WP2052 with Option 42.

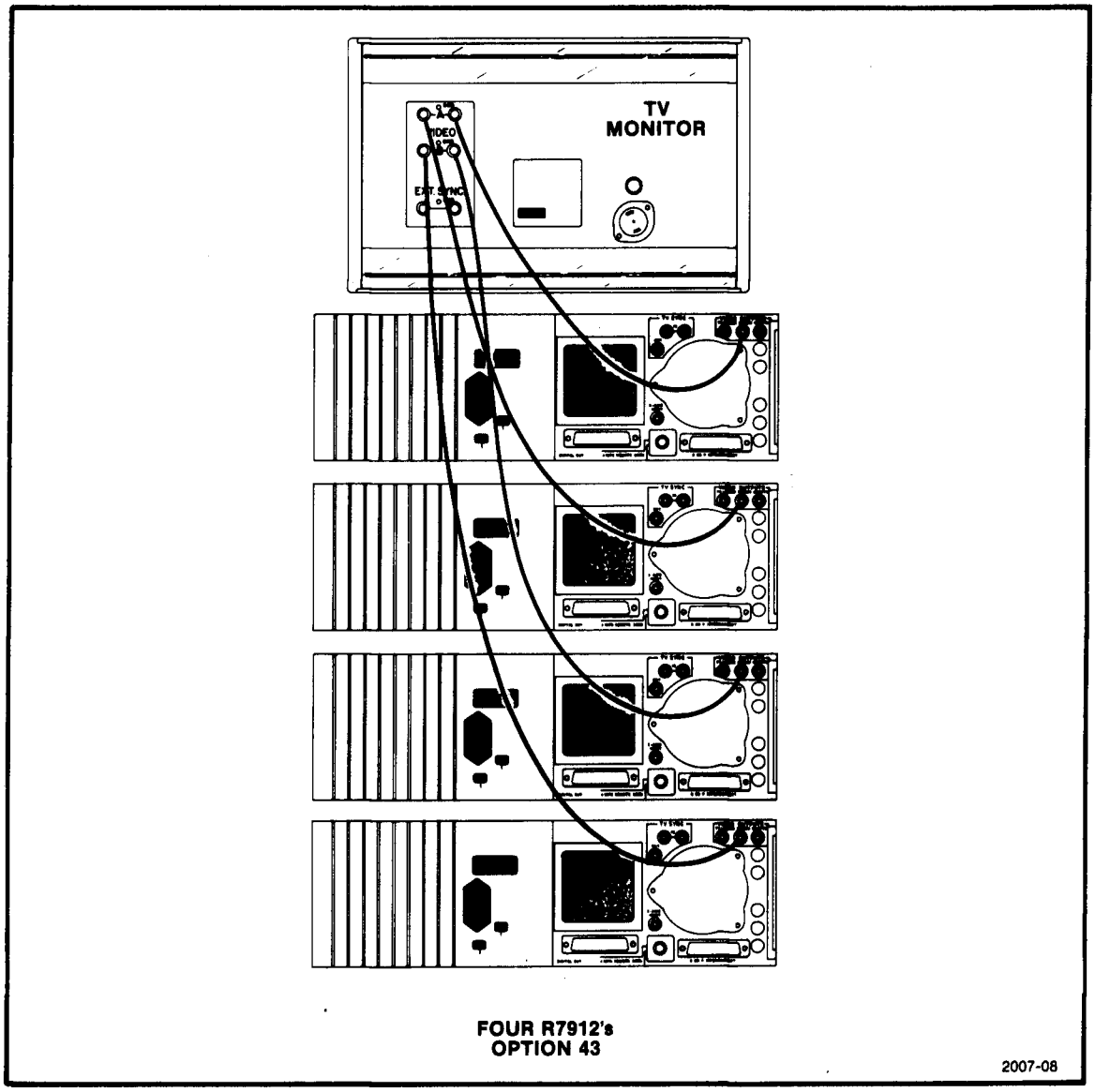

Fig. 2-8. Video cabling for WP2052 with Option 43.

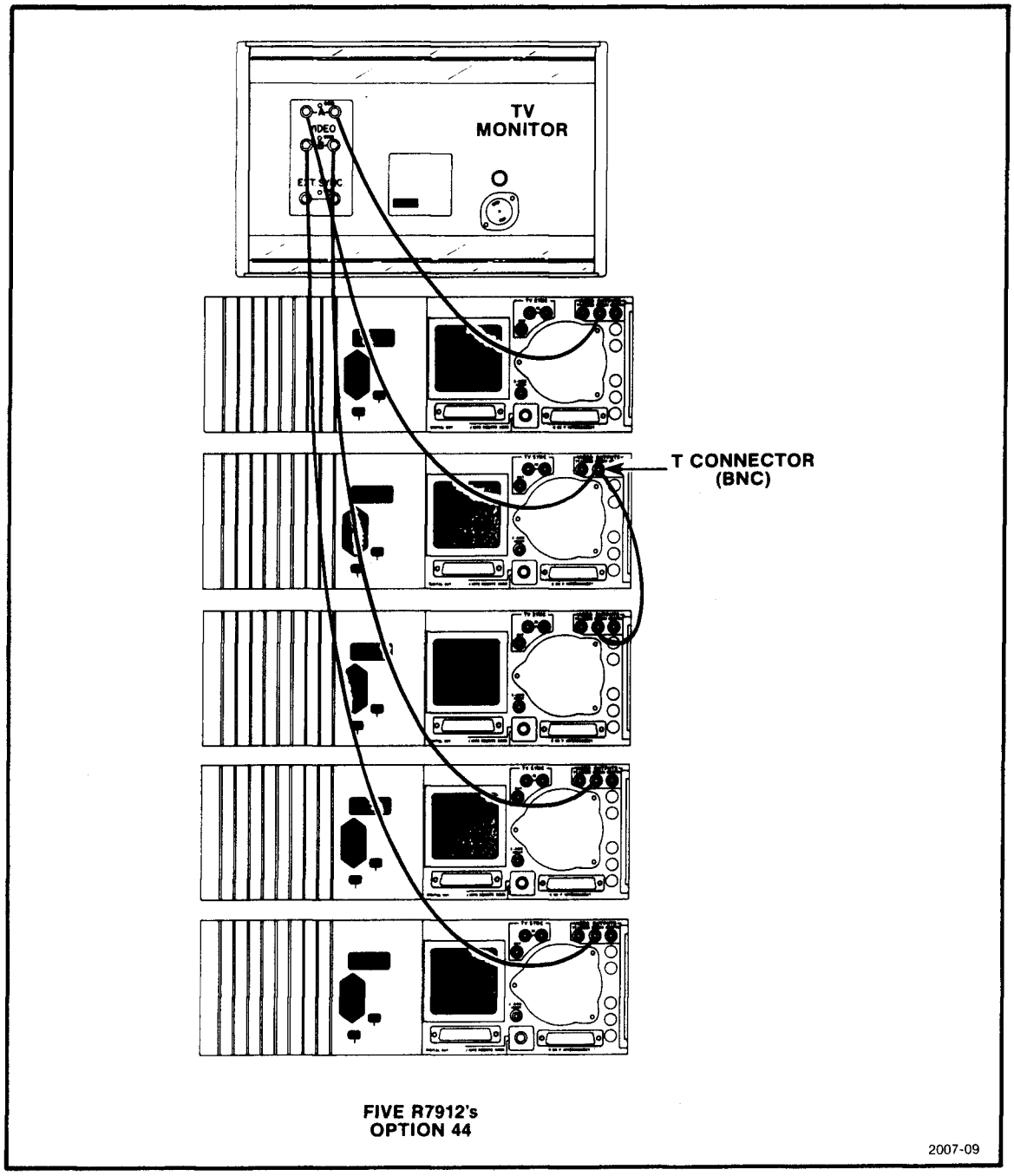

Fig. 2-9. Video cabling for WP2052 with Option 44.

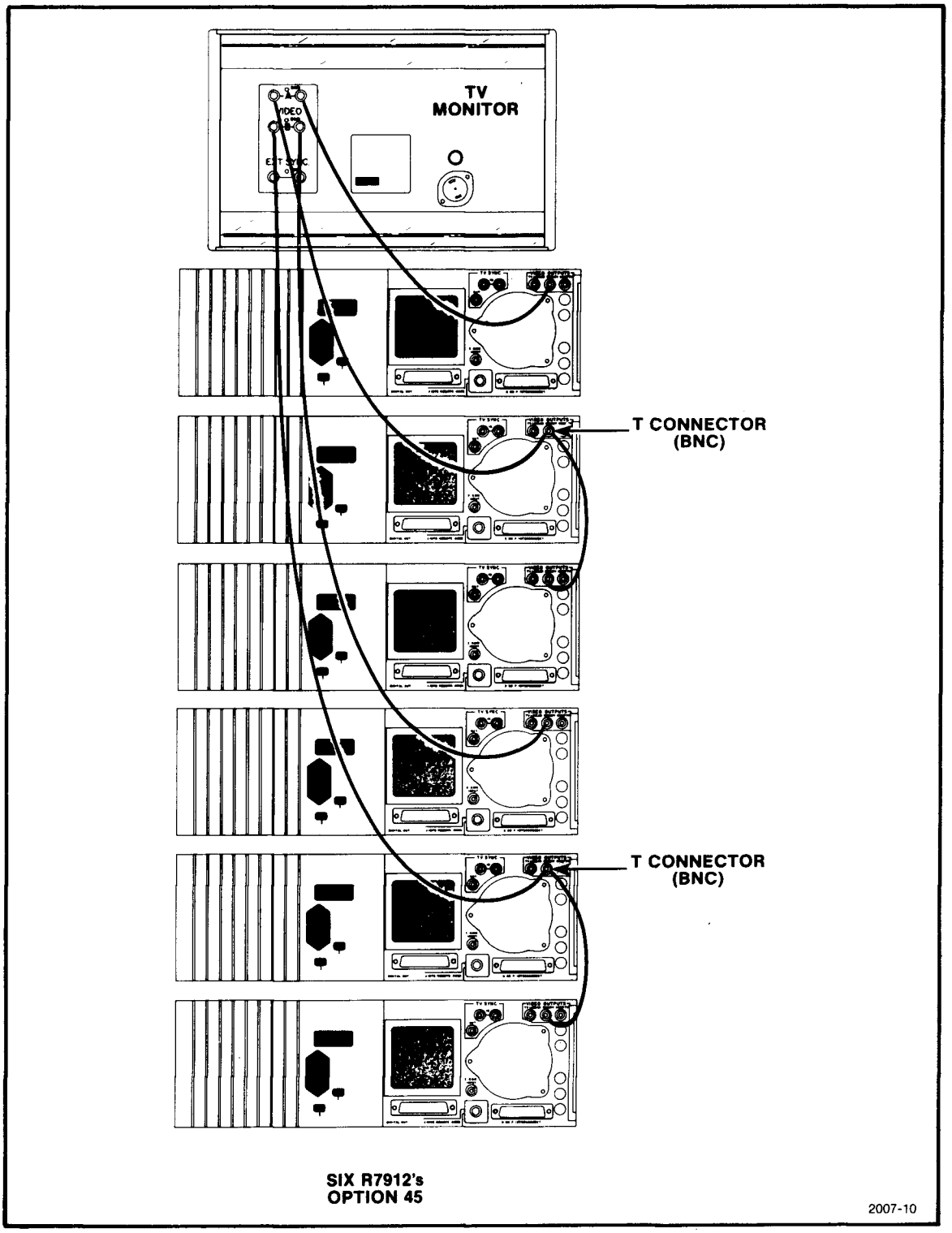

Fig. 2-10. Video cabling for WP2052 with Option 45.

7. Refer to Fig. 2-11 to hook up the SYNC cables. One R7912 must be used as a master sync generator as shown. Connect all other R7912's and the TV Monitor in a chain to the TV SYNC OUT connector on the master sync generator. Be sure to include the 75 ohm termination resistors where shown. Dress the cables as shown in Fig. 2-12.

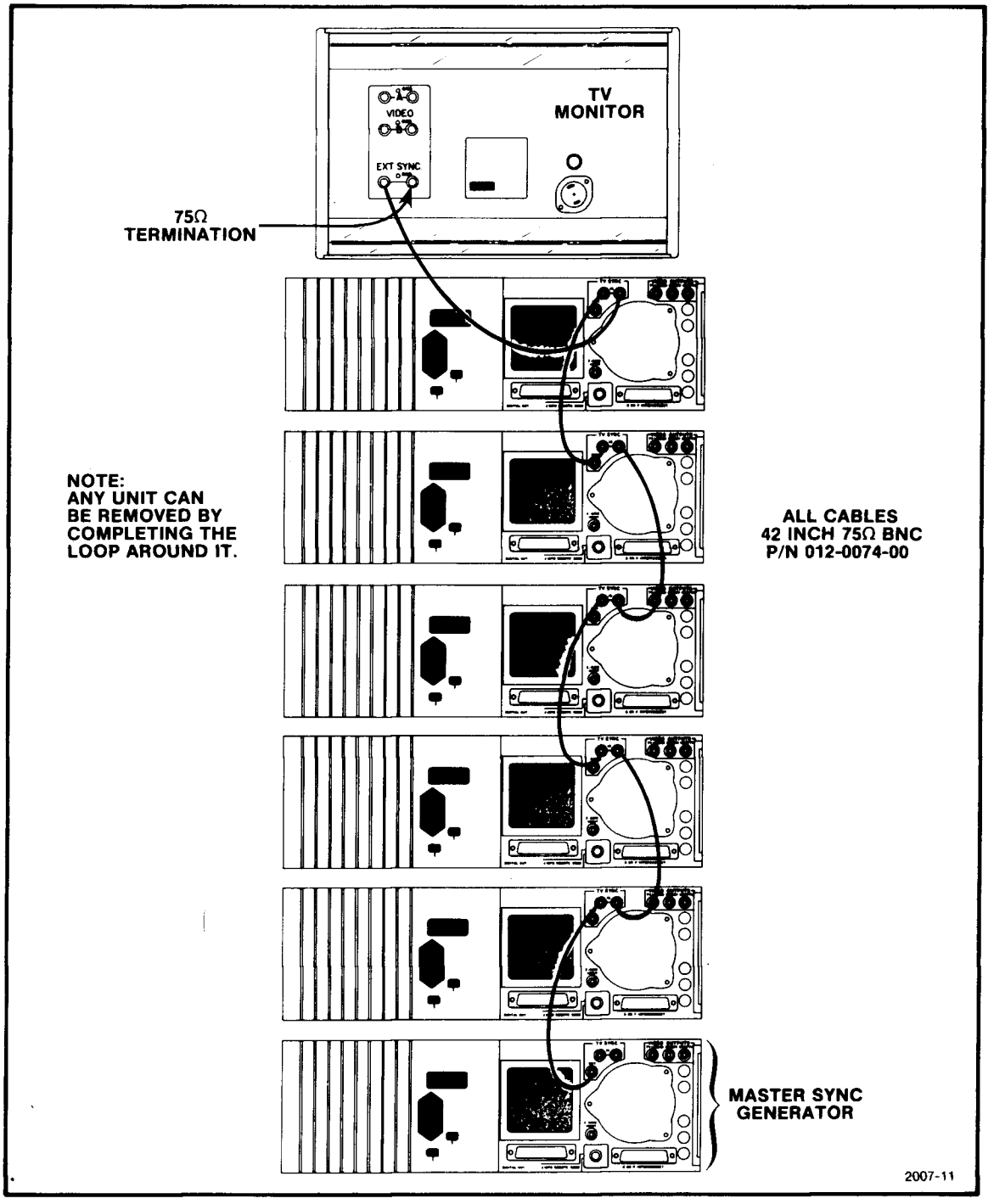

Fig. 2-11. WP2052 sync cabling.

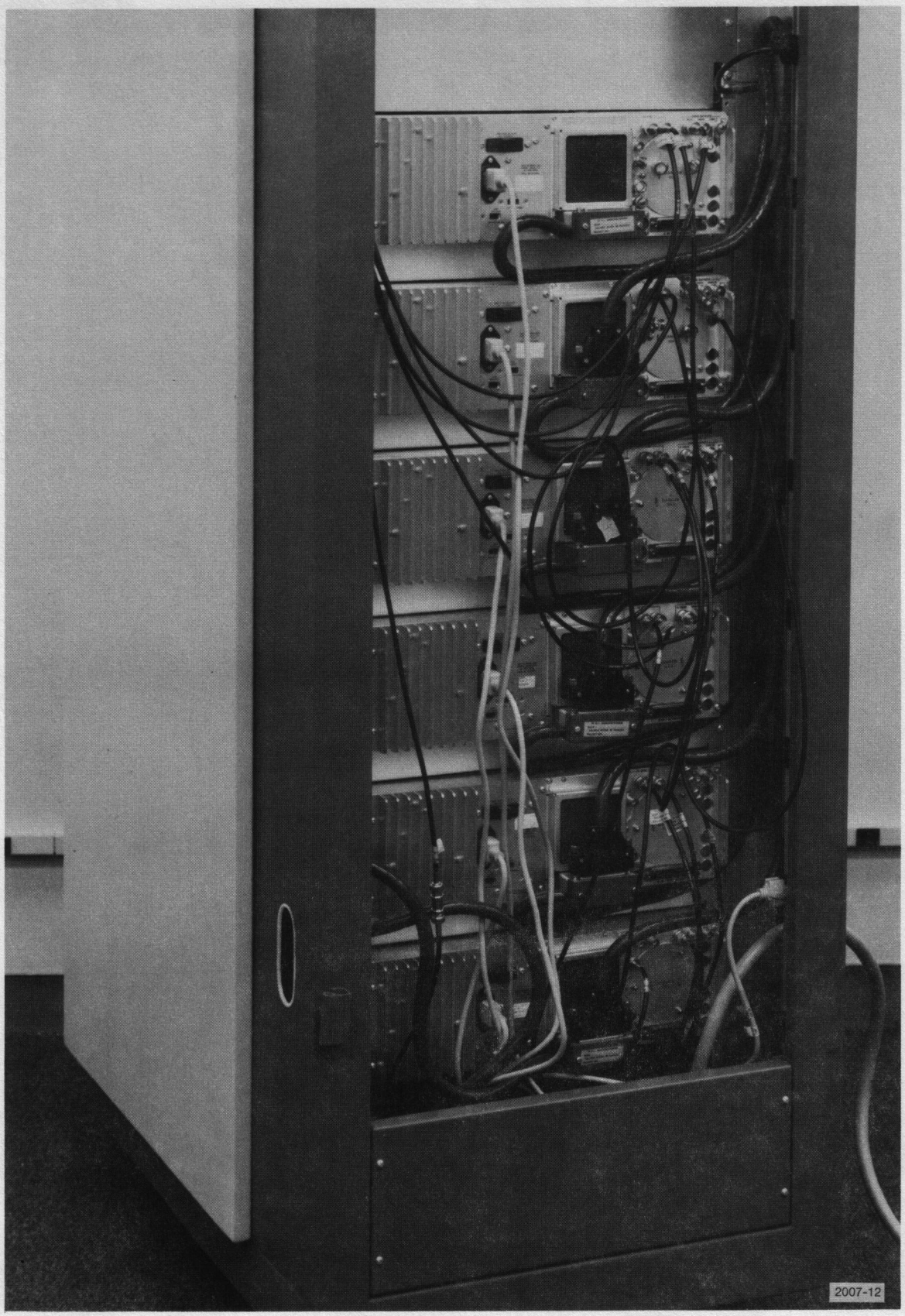

Fig. 2-12. Cable dress for WP2052.

8. Run the power cord from the Power Controller under the rear door or through the hole in the side of the cabinet to an AC power outlet. The outlet must be grounded (3-prong plug) with one side neutral and capable of providing at least 15 amperes at 115 volts. If you ordered Option 9, the outlet must supply 15 amperes at 220 volts.

Strap Options and Bus Termination

WARNING

Dangerous voltages are exposed when the covers of the instruments are removed. Under no circumstances should anyone except qualified service personnel open the covers to set the strap options.

Several strap options must be set within the R7912 and the Control Module. Refer to pages 1-1 through 1-6 in the R7912/DPO Control Module Service Manual. Follow the instructions under the Bus Termination, Interface Strap Options and Module Strap Options sections before proceeding.

CAUTION

Do not apply power to any instruments until you have checked all cable connections, strap options, and bus termination. Also, check line voltage and fan range settings on each R7912. (See "POWER AND SAFETY INFORMATION", pages 1-6 through 1-9 in the R7912 Operator's Manual.)

Final Hook Up

After all strap options have been set and the CP Bus properly terminated, slide the R7912(s) back into the cabinet. Secure them with the thumbscrews. Check to see that all cable connections are tight. Route the free end of the 20 foot CP bus cable (012-0534-01) through the rear of the crate and out the front. Connect the free end of this cable to its mating connector on the rear of the Control Module. Secure the connection by gently tightening the two anchor screws. Now insert the Control Module into the CAMAC crate. Push it in and tighten the thumbscrew until the module front panel is flush with the front of the crate. Do not overtighten the thumbscrew.

Power Up

1. Make sure that all instruments are turned off.

2. Set the SYNC EXT pushbutton on the right front panel of the TV Monitor to the out (EXTernal sync) position (WP2052 only). Press the NON-STORE button on the R7912.

3. Turn the computer on, and apply power to the crate.

4. On WP2052 systems, set the circuit breaker on the power controller (white switch) on. A green light should come on, showing that the unswitched outlets have power.

5. Turn the INTENSITY control on each R7912 fully counterclockwise (off).

CAUTION

Mis-adjustment of the INTENSITY control can cause serious damage to the R7912. Refer to page 3-2 of the R7912 Operator's Manual for more information on the proper adjustment of this control.

6. Turn the R7912(s) and the TV or storage monitor on. Turn on the master power switch (WP2052 only). The NON-STORE button on the R7912(s) should light and the cooling fans should start.

The WP2051/WP2052 is now ready for some basic communication tests. Refer to the next section: "TESTING COMMUNICATION" for instructions on performing these tests.

SECTION 3

TESTING COMMUNICATION

This section helps you test the communication between the WP2051/WP2052 and your computer. Before proceeding, read the Operator's Manuals for the R7912 and the 605 Storage Monitor (WP2051) or TV Monitor (WP2052). Refer also to the R7912/DPO Control Module Service Manual for information on the Module. These manuals will familiarize you with the controls and indicator lights on the instruments.

CAUTION

Read the Manuals for the TV or Storage Monitor carefully before proceeding. If the monitor is not correctly adjusted, the R7912 can be damaged in an attempt to obtain a waveform display.

Follow the instructions given in Section 2 to connect and power up your system.

The Initial Adjustment instructions are divided into two parts: WP2051 Initial Adjustments and WP2052 Initial Adjustments. Refer to the section that applies to your package.

WP2051 Initial Adjustments

1. Set the TIME/DIV control on the 7B92A time base plug-in to one microsecond per division. Press the AUTO MODE, AC COUPLING and INTernal SOURCE buttons on the time base. Set the POSITION control on the 7A19 vertical amplifier to mid-range. Make sure the R7912 NON-STORE button is pressed.

2. Connect a BNC coaxial cable from the CALIBRATOR connector to the input of the vertical amplifier. Latch in the calibrator switch (4.0 volts).

3. Set the Storage Monitor PERSISTENCE control fully clockwise and push in the PULL TO SAVE button. Turn the OPERATE LEVEL fully counterclockwise, and then clockwise approximately three-quarters of a turn.

4. Adjust the monitor INTENSITY control for a visible raster. Do not move the R7912 INTENSITY control at this time.

CAUTION

The writing beam intensity of the R7912 is critical. Excessively high settings of the front panel INTENSITY control can permanently damage the diode target. Special circuitry within the R7912 protects the target from gross misadjustment of the INTENSITY control, but the target may be damaged if the intensity is set at or near the automatic protect level. The possibility of damage is greater at slow sweep speeds.

5. Slowly increase the R7912 waveform INTENSITY until the trace is visible on the monitor. If the trace does not appear when the R7912 INTENSITY control is turned up one half turn or less, turn the control back to the off position. Recheck the adjustment of the monitor. If necessary increase the OPERATE LEVEL and INTENSITY controls on the monitor slightly and repeat this step.

CAUTION

Excessive blooming of the trace on the monitor indicates a potenially damaging R7912 intensity level.

6. Slowly increase the R7912 GRATICULE intensity until the dot array is visible on the monitor.

7. Slowly increase the R7912 READOUT intensity until the readout appears on the monitor. Some readjustment of the INTENSITY control may be necessary.

CAUTION

The intensity controls for the waveform display, the readout and the electronic graticule interact. Turning the READOUT or GRATICULE controls off will cause the remaining display intensity to increase. To prevent target damage, reduce the waveform INTENSITY before turning the READOUT or GRATICULE displays off.

8. Focus the monitor and R7912 for a clear display of the waveform and graticule.

9. Go on to the Test Procedures section.

WP2052 Initial Adjustments

1. Set the TIME/DIV control on the 7B92A time base plug-in to one microsecond per division. Press the AUTO MODE, AC COUPLING, and INTernal SOURCE buttons on the time base. Set the POSITION control on the 7A19 vertical amplifier to mid-range. Make sure the R7912 NON-

STORE button is pressed.

2. Connect a BNC coaxial cable from the CALIBRATOR connector to the input of the vertical amplifier. Latch the calibrator switch in (4.0 volts).

3. Latch in the CONTRAST and BRIGHTNESS CAL switches located behind the door on the right front panel of the monitor.

4. Press the A VIDEO button on the monitor. If you have multiple R7912's select the VIDEO channel which is connected to the R7912 under test.

NOTE

For WP2052 packages with more than one R7912, you must select the A or B VIDEO channel that is connected to the R7912 under test.

5. Slowly increase the R7912 INTENSITY until a trace appears on the monitor. If the trace does not appear when the R7912 INTENSITY control is turned up 1/2 turn or less, turn the control back to the off position. Recheck the adjustment of the monitor. If necessary, unlatch the monitor BRIGHTNESS CAL pushbutton and turn up the BRIGHTNESS control slightly. Then repeat this step.

CAUTION

Excessive blooming of the trace on the monitor indicates a potentially damaging R7912 intensity level.

6. Slowly increase the R7912 GRATICULE intensity until the dot array is visible on the monitor.

7. Slowly increase the R7912 READOUT intensity until the readout appears on the monitor. Some readjustment of the INTENSITY control may be necessary.

CAUTION

The intensity controls for the waveform display, the readout, and the electronic graticule interact. Turning the READOUT or GRATICULE controls off will cause the remaining display intensity to increase. To prevent target damage, reduce the waveform INTENSITY before turning the READOUT or GRATICULE displays off.

8. Focus the R7912 for a clear display of the waveform and graticule.

9. Go on to the Test Procedures section.

Test Procedures

The instructions and addresses used in the following test procedure are given in standard FNA code format, and are expressed as octal numbers. Note that N(A) refers to the station number of the left slot occupied by the module. N(B) refers to the right slot occupied by the module.

1. Place the binary unit number of the R7912 to be addressed on the CAMAC dataway write lines. For example, to address the R7912 strapped to unit number 7, place a binary 7 on the write lines.

2. Place the octal number 17 on the CAMAC dataway function lines.

3. Place the octal number 0 on the CAMAC dataway sub-address lines.

4. Assert the N(B) line. Now remove all instructions and codes from the dataway lines.

5. Place the octal number 2015 on the CAMAC dataway write lines (the Switch-to-Digital command).

6. Place the octal number 17 on the CAMAC dataway function lines.

7. Place the octal number 1 on the CAMAC dataway sub-address lines.

8. Assert the N(B) line. Again remove all instructions and codes from the dataway lines.

9. The R7912 addressed in step 2 should have switched to Digital Mode. When the instrument switches, the DIGITAL button lights and the display on the TV or Storage Monitor disappears.

NOTE

The NON-STORE button must be pressed (latched in) during the entire test procedure.

10. Place the octal number 12000 on the CAMAC dataway write lines (the Load Memory command).

11. Place the octal number 17 on the CAMAC dataway function lines.

12. Place the octal number 1 on the CAMAC dataway sub-address lines.

13. Assert the N(B) line. Now remove these instructions and codes from the lines.

14. After a very short delay, the INT UNIT lights on the Control Module will display the binary unit number of the R7912 addressed in Step 2. The Load Memory command caused the addressed R7912 to interrupt following execution of the command.

15. Place the octal number 2005 on the CAMAC dataway write lines.

16. Place the octal number 17 on the CAMAC dataway function lines.

17. Place the octal number 1 on the CAMAC dataway sub-address lines (the Switch to Non-Store mode command).

18. Assert the N(B) line. Remove all instructions and codes from the dataway lines.

19. The addressed R7912 should now switch back to TV (NON-STORE) mode. When the instrument switches, the NON-STORE button lights, and the display on the Monitor reappears.

20. If you have a WP2052 package with more than one R7912, repeat the entire test procedure for each instrument. In Step 2, substitute the correct unit number of each R7912 under test.

This procedure tests two R7912 functions as controlled through the CAMAC control module. You can test other functions in a similar manner by referring to the command word format list on page 2-7 of the R7912/CAMAC Interface Concepts Manual, and to the table of Instruction Codes on page 4-4 of the same manual.

In Case of Difficulty

If you experienced problems while performing the tests, begin diagnosing the problem by assuring that all the instruments are properly connected and turned on. Refer to Section 2 for a step-by-step procedure. Look carefully for loose or incorrect connections.

Carefully recheck the strap options in the Control Module and in the R7912. Instructions for selecting strap options are found in the "Installation and Operation" section of the R7912/DPO Control Module Service Manual, pages 1-1 through 1-7. Be certain that no two instruments on the CP Bus are strapped to the same unit number.

Check that all R7912(s) operate correctly in the TV mode. Be sure the instruments can be manually switched between modes.

Try to isolate the problem to a specific instrument. If one R7912 in a multiple instrument system fails to respond, try switching its cables with one that does respond. If the known good instrument fails to respond, the cables are probably bad. Once the problem has been isolated to a particular instrument, refer to the applicable service manual for more troubleshooting procedures.

Because the WP2051/WP2052 is a complex system, repair should be performed only by trained personnel. Tektronix, Inc., maintains a world-wide service organization. Call the nearest Tektronix Field Office or Service Center if you have a question concerning repair, replacement parts, or warranty for this system.

SECTION 4

WP2051/WP2052 INSTRUCTION MANUALS

Two binders hold your WP2051/WP2052 manuals. This list shows the manuals as they appear in the binders and gives the reorder numbers for replacement or additional manuals.

VOL I

System Introduction, Operator's and Interface Concepts manuals make up Vol. I as follows:

WP2051/WP2052 Introduction	070-2007-00
R7912 Transient Digitizer Operator's	070-1589-00
7A19 Amplifier Operator's	070-1400-00
7B92A Dual Time Base Operator's	070-1401-00
605 Storage Monitor (WP2051 only)	070-1679-00
TV Monitor (WP2052 only) (Part number shown is for Tektronix R632 Monitor manual)	070-1440-00
R7912/CAMAC Interface Concepts	070-1871-00

VOL II

Volume II contains Service manuals and other documentation as follows:

015-0255-02 Power Controller (WP2052 only)	070-3210-00
R7912/DPO Control Module Service	070-1873-00
R7912 Transient Digitizer Service	070-1590-00
7A19 Amplifier Service	070-1243-00
7B92A Dual Time Base Service	070-1192-00
R7912/CP Bus Interface	070-2034-00
012-0074-00 Cable Data Sheet	062-0104-00
012-0487-00 Cable Data Sheet	062-1841-00
012-0509-01 Cable Data Sheet	062-1836-00
012-0534-01 Cable Data Sheet	062-1831-00

OPTIONS

Manual changes resulting from Option selections:

Option 2:

Delete 7A19 Amplifier Operator's	070-1400-00
Delete 7A19 Amplifier Service	070-1243-00
Delete 7B92A Dual Time Base Operator's	070-1401-00
Delete 7B92A Dual Time Base Service	070-1192-00

@

Option 9 (WP2052 only):

Delete 120 V Power Controller Manual	070-3210-00
Add 230 V Power Controller Manual	070-3212-00

SECTION 5

SYSTEM SPECIFICATIONS

The specifications given here are divided into two sections. Refer to the section that applies to your system. The specifications for the individual instruments are given in their respective manuals.

WP2051 SYSTEMS

Electrical

CAMAC Control Module	Meets standards set forth in CAMAC specifications documents TID-25875 and TID-25877
Module Power Consumption	12 watts typical from CAMAC crate
Power Requirements (R7912 and 605)	115 volts ± 10% 48-62 Hertz
If Option 9	230 volts ± 10% (one side neutral) 48-62 Hertz
Connected Load	3.5 amps maximum

Physical

Dimensions	See Fig. 5-1
Weight (net)	52 Kilograms (114.6 lbs)

Environmental

Operating Temperature Range	$0^{o}C$ to $+35^{o}C$

Thermal Output (R7912 and 603)	1458 BTU/hour
Control Module Ventilation	Fan forced crate ventilation

WP2052 SYSTEMS

These specifications are for a system including a TEKTRONIX R632 TV Monitor.

Electrical

CAMAC Control Module	Meets standards set forth in CAMAC specifications documents TID-25875 and TID-25877
Module Power Consumption	12 watts typical from CAMAC crate
Power Requirements (R7912 and TV Monitor)	115 volts ± 10% 48-62 Hertz
If Option 9	230 volts ± 10% (one side neutral) 48-62 Hertz

Connected Load

Standard	3.3 amps continuous
Option 41	5.1 amps continuous
Option 42	6.9 amps continuous
Option 43	8.7 amps continuous
Option 44	10.5 amps continuous
Option 45	13 amps continuous

Physical

Dimensions	See Fig. 5-2
Weight (Standared)	191.4 Kilograms (422 lbs)

Environmental

Operating Temperature Range	$0^{o}C$ to $+30^{o}C$
Thermal Output (R7912 and TV Monitor)	1374 BTU/hour
Option 41	2133 BTU/hour
Option 42	2891 BTU/hour
Option 43	3650 BTU/hour
Option 44	4409 BTU/hour
Option 45	5167 BTU/hour
Control Module Ventilation	Fan forced crate ventilation

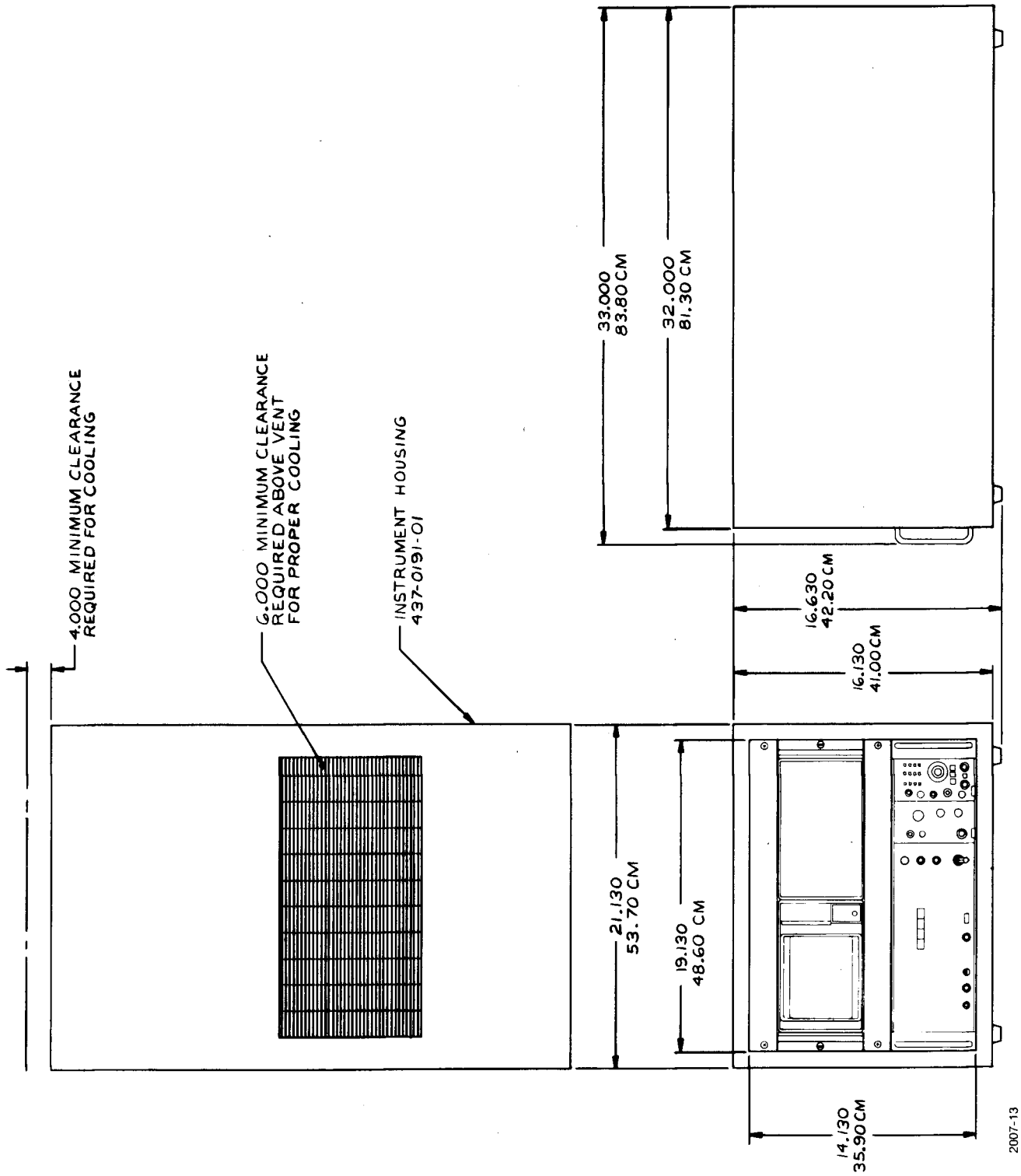

Fig. 5-1. WP2051 dimensional drawing.

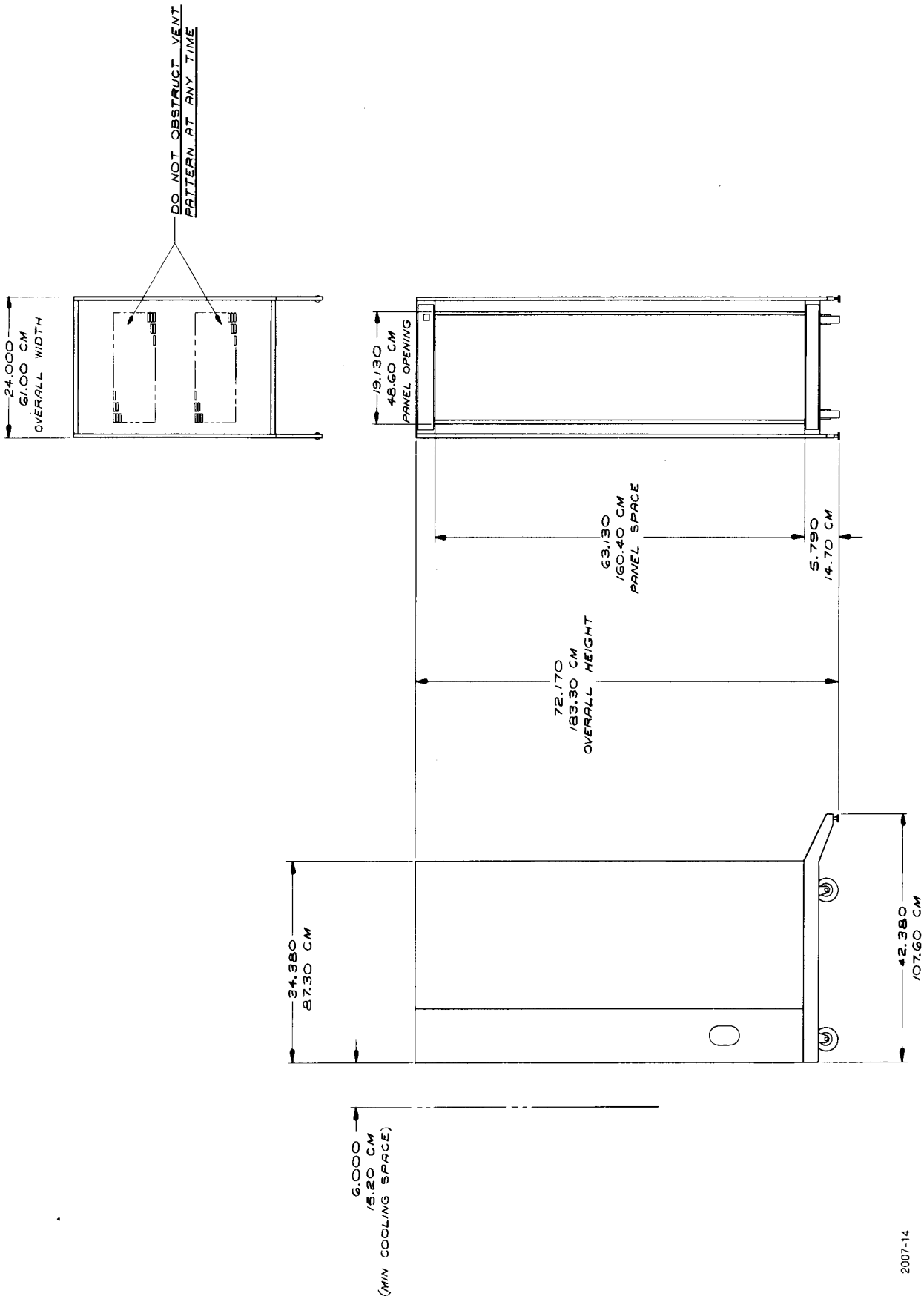

Fig. 5-2. WP2052 dimensional drawing.