TEKTRONIX®

WP1000 SERIES

DIGITAL PROCESSING OSCILLOSCOPE

INTRODUCTION

INSTRUCTION MANUAL

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

Serial Number _____

FIRST PRINTING OCT 74

070-1885-00

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.

U.S.A. and foreign TEKTRONIX products covered by U.S. and foreign patents and/or patents pending.

WP1000 SERIES

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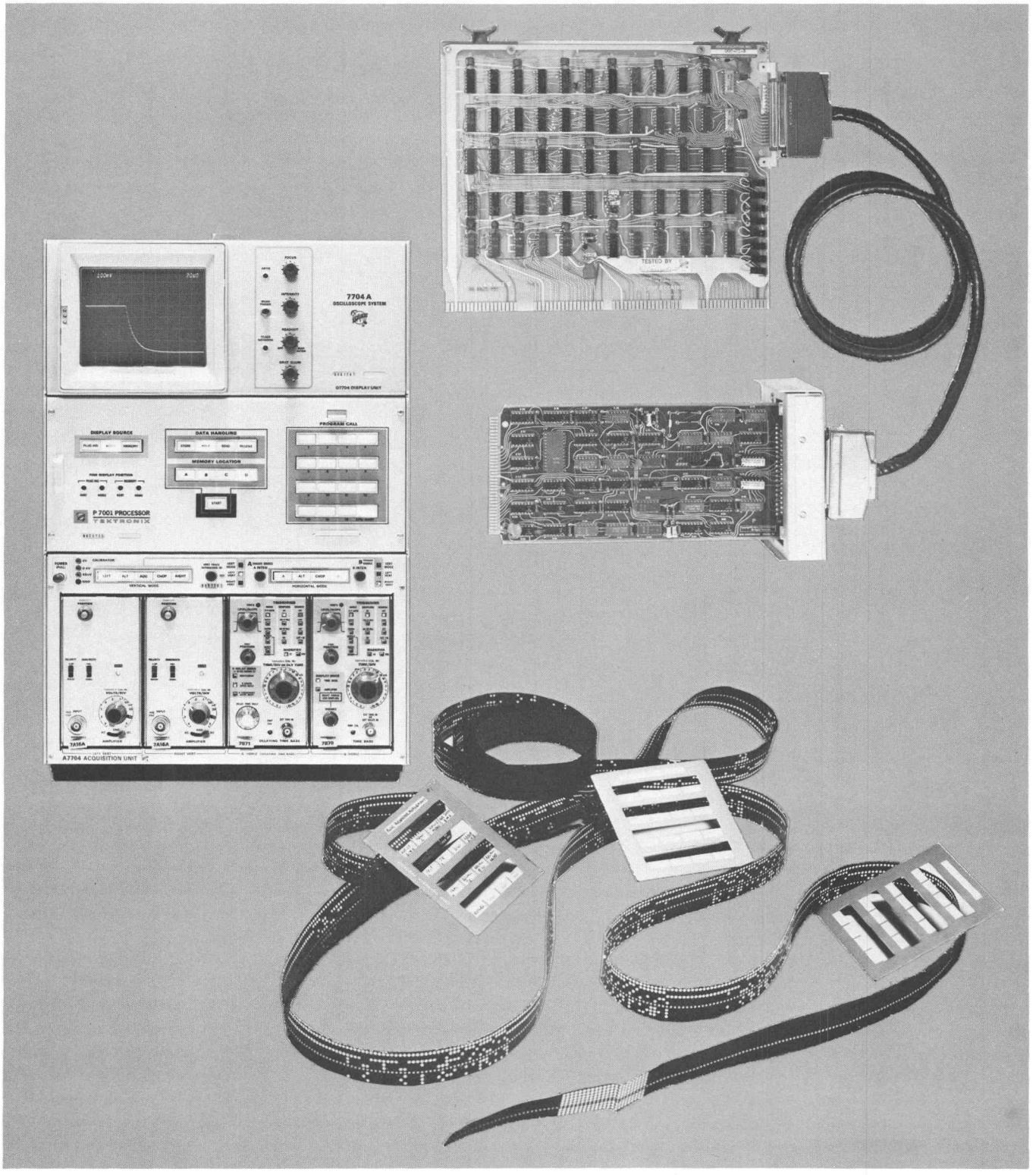

Fig. 1.1 WP1000 Basic Components

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SECTION 1

General WP1000 Description

Figure 1-1 shows the WP1000 Digital Processing Oscilloscope. This basic unit consists of a wide bandwidth scope (7704A) with CRT readout and plug-ins: two each 7A16A Vertical Amplifiers, and one each 7B70 and 7B71 Horizontal Timebase. To this, add a processor (P7001) with four channel A/D - D/A Convertor and local memory. Also add complete interfacing, including the DPO/CP Bus Interface, the CP1100/CP Bus Interface, and an interconnecting cable. Finally, there is the software package which includes the DPO TEK BASIC Software and the P7001 Checkout Software.

Additional Equipment

To make this package totally functional, you need a controller (Tektronix CP1100 or Digital Equipment Corporation PDP-11), a terminal; and a paper tape reader, which are not provided with this configuration. It is important to remind you that there are several variations. If you need any help to complete your package in order to meet your measurement needs, please call your nearest Digital Applications Engineer.

Manual Summary

Table 1-1 shows the available manuals for this configuration.

This Introduction Manual gives you a general description of the WP1000 and a brief review of the manuals. The second section gives you some suggestions for cabling and assembling the WP1000. The third section of this manual is a WP1000 Diagnostic Procedure.

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It is suggested that you read the DPO Operators and both software manuals (DPO TEK BASIC and P7001 CHECKOUT) before attempting to operate this configuration.

If maintenance is required on the DPO package, the Service Manual along with the associated circuit card manuals (see * sections of Table 1-1) become important tools. Plug-ins or additional components have their own manuals. For additional details contact your Digital Application Engineer. The DPO Systems Specification and Calibration Manual is also an important maintenance aid in repair and checkout.

The card manuals explain the circuits associated with their circuit boards. The manuals also include parts list, schematics and Strap Options.

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TABLE 1-1

MANUAL SUMMARY CHART

WP1000 SERIES INTRODUCTION	070-1885-00
DPO OPERATORS	070-1599-00
DPO TEK BASIC SOFTWARE	070-1602-00
P7001 CHECKOUT SOFTWARE	070-1612-00
P7001 SERVICE MANUAL	070-1882-00
* P7001 MAIN INTERFACE	070-1604-00
* MEMORY	
SEMICONDUCTOR	070-1606-00
CORE	070-1605-00
* P7001 FRONT PANEL/Z AXIS	070-1610-00
* P7001 DISPLAY GENERATOR	070-1608-00
* P7001 A-D CONVERTER	070-1809-00
* P7001 SAMPLE & HOLD	070-1810-00
* P7001 POWER SUPPLY	070-1890-00
* READOUT INTERFACE	070-1609-00
DPO/CP BUS INTERFACE	070-1654-00
formerly (DPO CONTROLLER SERVICE)	
CP1100/CP BUS INTERFACE	070-1603-00
formerly (INTERFACE CONTROLLER PDP-11)	
DPO SYSTEM SPECIFICATION & CALIBRATION	070-1600-00
7A16A AMPLIFIER (vertical)	070-1378-00
7B70 TIMEBASE	070-1579-00
7B71 DELAYING TIMEBASE	070-1580-00
7704A OSCILLOSCOPE SYSTEM OPERATORS	070-1402-00
7704A OSCILLOSCOPE SYSTEM SERVICE	070-1260-00

* Part of Service Manual - can be ordered separately.

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Each of the manuals can be ordered separately. To receive a complete copy of the P7001 Service Composite Manual, order manual number 070-1925-00.

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SECTION 2

UNPACKING AND ASSEMBLING THE WP1000-SERIES DPO CONFIGURATION

IMPORTANT

Inspect for apparent damage during transit.

If damage is found:

1. *Immediately notify the carrier who made the delivery and request inspection.*
2. *Contact the nearest Tektronix Digital Applications Engineer.*

Introduction

This section is intended as a guide to instrument installation. It includes some key points, safety notes, warnings, and helpful hints for installing your new DPO Configuration. More detailed information can be obtained by reading all appropriate manuals. Please read the Operator's and Software Manuals before operating this package.

Before adjusting any portion of this package, allow a minimum of 20 minutes warm-up time. It has been adjusted at the factory and should be within specification. Consult the service manual before making any adjustments.

Not all components mentioned in this document may be included in your new DPO Configuration.

It is recommended that all boxes be saved for possible further shipment.

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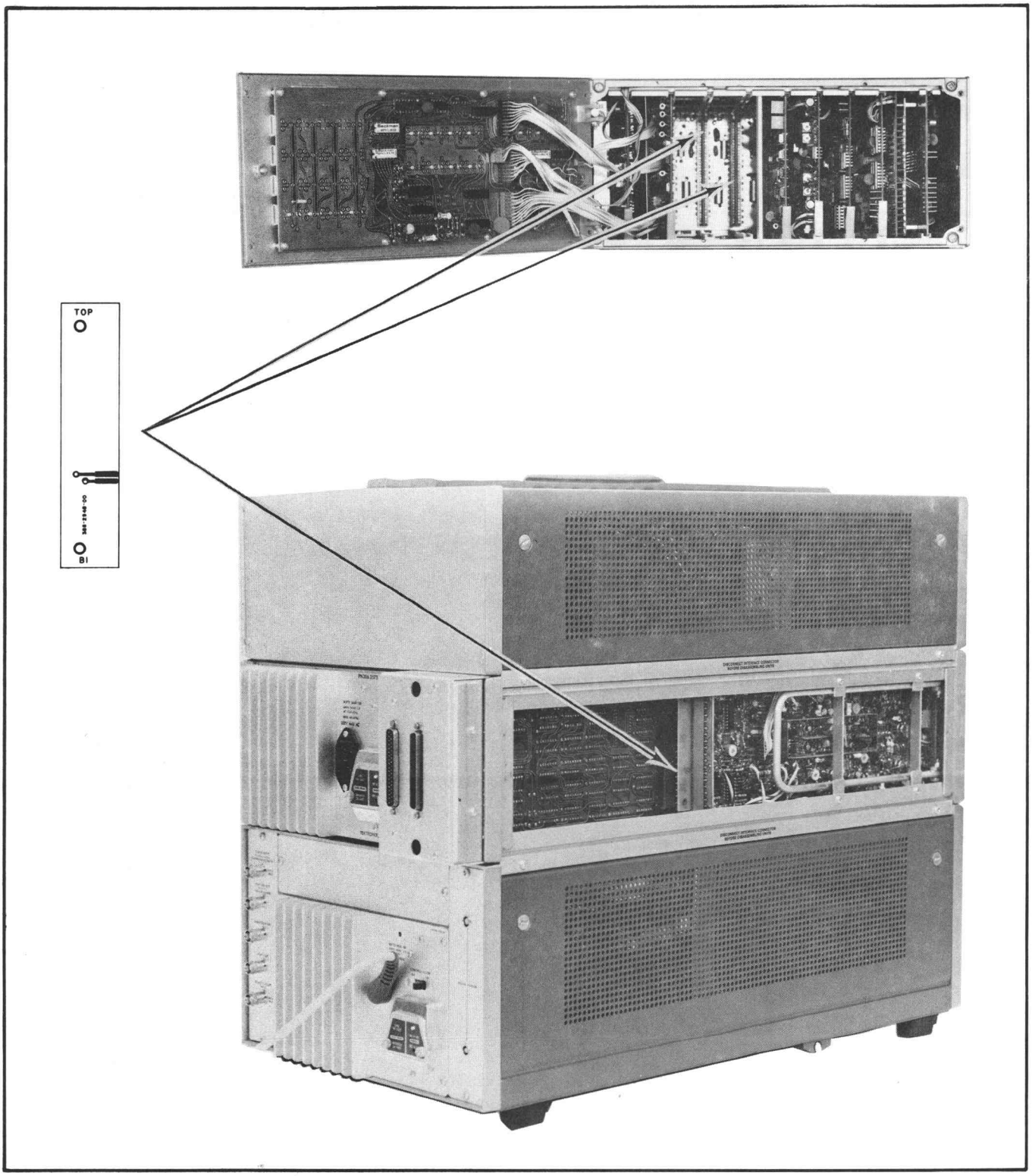

Fig. 2-1. Data Channel Grant Continuity Card.

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Before plugging any instrument into line power, make sure that:

1. The instrument power switch is in the OFF position.

2. The rated voltage for the instrument corresponds to the line voltage used.

DPO (Digital Processing Oscilloscope)

1. Remove the DPO from the carton and place on a convenient work surface.

2. Remove the four front-panel screws on the P7001 Processor (middle unit of the DPO) and carefully pull out the front panel by the thumb and finger grip on the left side and gently swing the panel to the left.

3. Remove packing (foam pads) from behind the P7001 front panel.

4. Insure that all cards inside the front panel are properly seated. (Pull forward slightly on each card and push the cards back gently to make sure they reseat properly.)

5. There are two empty card slots on the bus located inside the front panel. Each empty slot should have a "Data Channel Grant Continuity" card plugged into the front of the Main Interface bus at the rear of the P7001. Make sure the Channel Grant Continuity card is right side up, with "top" upward. These cards must also be firmly seated for correct operation (see Fig. 2-1).

6. Remove the left outside panel cover of the P7001. There should be a "Data Channel Grant Continuity" card plugged

into the rear of the Main Interface Bus at J11 (see Fig. 2-1). Reseat this card also, making sure that the card is right side up, with "top" upward. Replace the panel cover.

7. Carefully close the front panel and replace the four screws.

8. Plug both power cords from the DPO into power source.

Operating Voltage

The WP1000 can be operated from either a 115-volt or a 230-volt nominal line voltage source. The Line Selector assemblies on the rear panel converts this instrument from one operating voltage to the other. This assembly also includes line fuses (see Fig. 2-2).

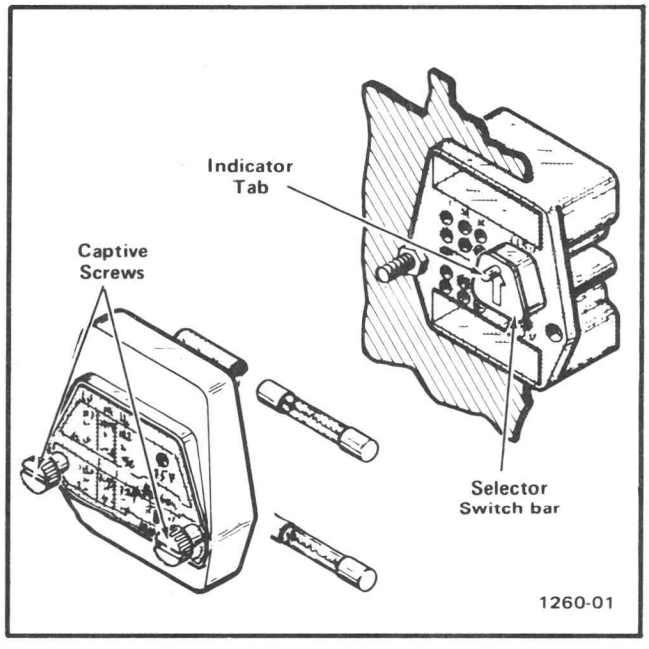

Fig. 2-2. Line Selector Assemblies

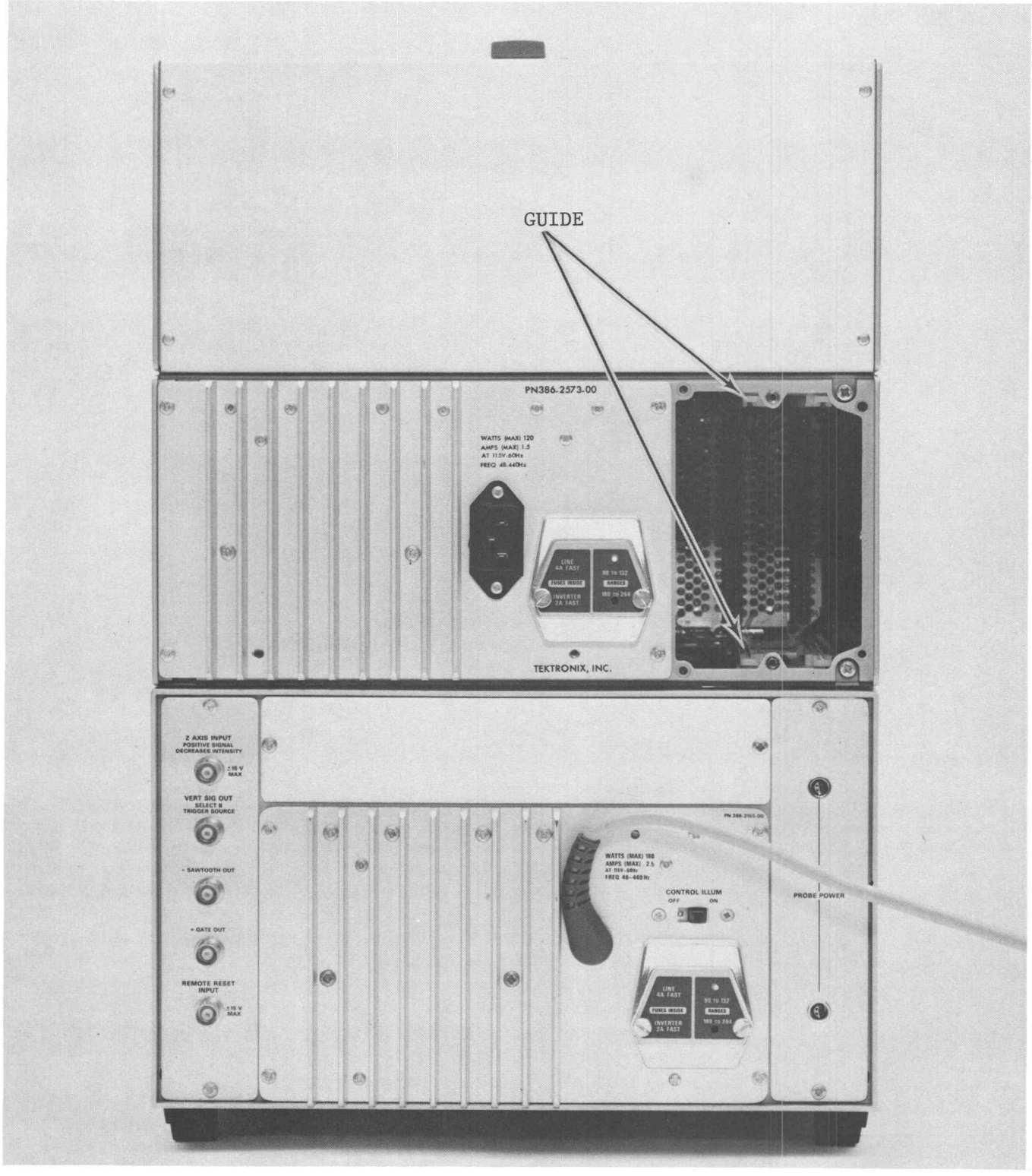

Fig. 2-3. DPO - Rear View

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Strap Options

There are strap options on both interface boards to provide flexible operation. Information on the strap options will be found in their interface manuals. These straps were set and verified at the factory, but you should check their settings before operating this system.

DPO/CP Bus Interface

There are two interfaces in the WP1000 DPO Configuration. The DPO/CP Bus Interface is located at the rear of the P7001. Two guides will help you locate the proper position for the DPO/CP Bus Interface (see Fig. 2-3).

CP1100/CP Bus Interface

The CP1100/CP Bus Interface goes inside a CP1100 Controller (or PDP-11 minicomputer).

Card Installation

1. Turn the power off.
2. Check that a spare (Small Peripheral Controller) slot is available in the CP1100 (or PDP-11) controller bus (see Fig. 2-5).
3. Slide the male end of the interconnecting cable (012-0432-01) into the rear of the controller.
4. Connect the cable to the interface card before the card is installed in the controller.
5. Install the interface card very carefully. The card has a very tight fit.

The CP1100 CONTROLLER is NOT provided with this basic configuration.

Cabling

The standard interconnecting cable is a six foot, 120 ohm, 37-pin connector cable. The cable connects to both interfaces. The male end of the cable is connected to the CP1100/CP Bus Interface (see Fig. 2-4). The female end of the cable is connected to the DPO/CP Bus Interface (see Fig. 2-4). Other cable lengths can be ordered.

Final Procedure

After the package is assembled:

1. Turn on MAIN power.
2. Turn on the instrument(s).
3. Allow a minimum of 20 minutes for warm-up time.
4. Using the P7001 Checkout Software manual (070-1612-00), run the tests.
5. If your configuration includes a Controller exclusive of the CP1100 (or PDP-11), you can write your own checkout routine using the DPO Interface Concepts manual.

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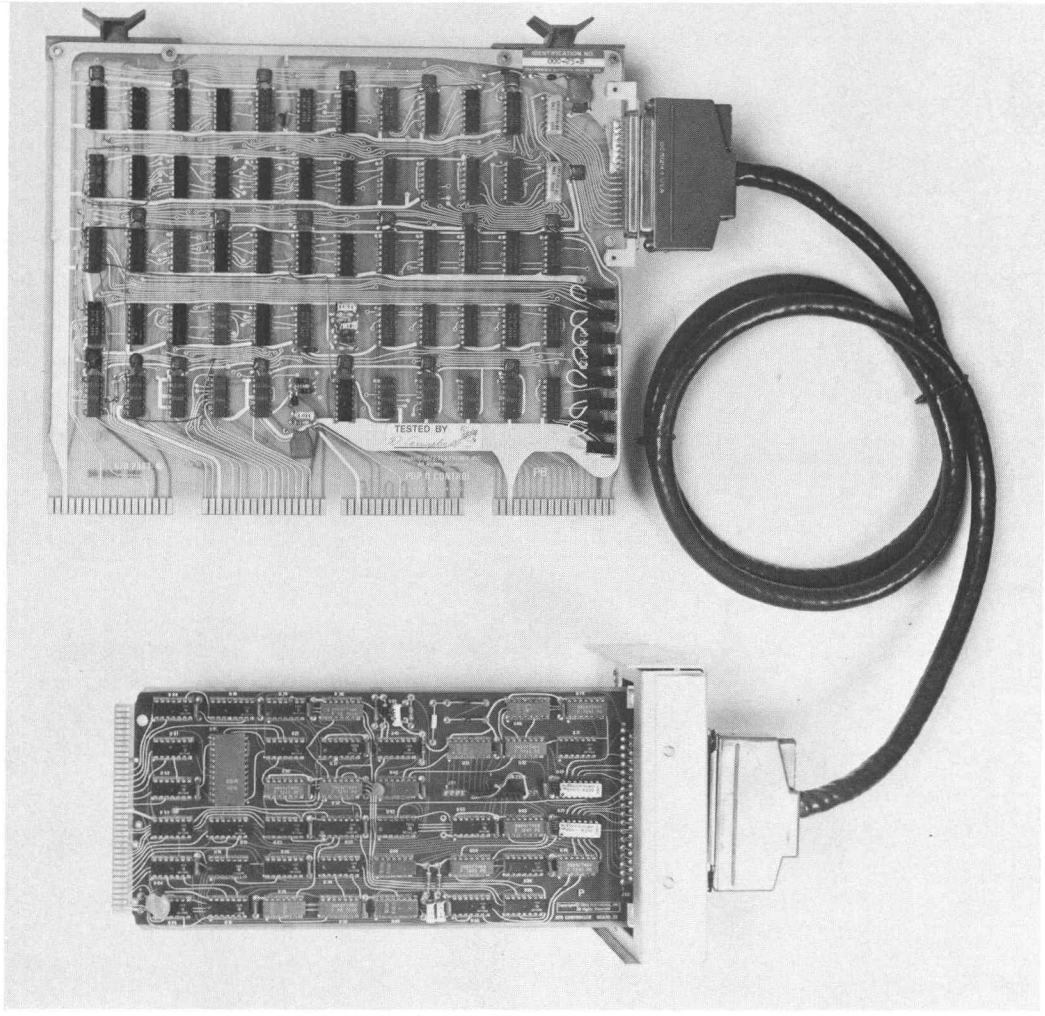

Fig. 2-4. Cable Connection (DPO to Controller)

TABLE 2-1

WP1000 SYSTEM CABLING

	FROM	TO	CABLE USED
1.	P7001 Processor Power receptacle	Main power bus	161-0066-00 power cord
2.	A7704 Acquisition Unit power receptacle	Main power bus	161-0033-06 power cord
3.	DPO/CP Bus Interface Connector	CP1100/CP Bus Interface connector in the CP1100	012-0432-01 Interconnecting cable

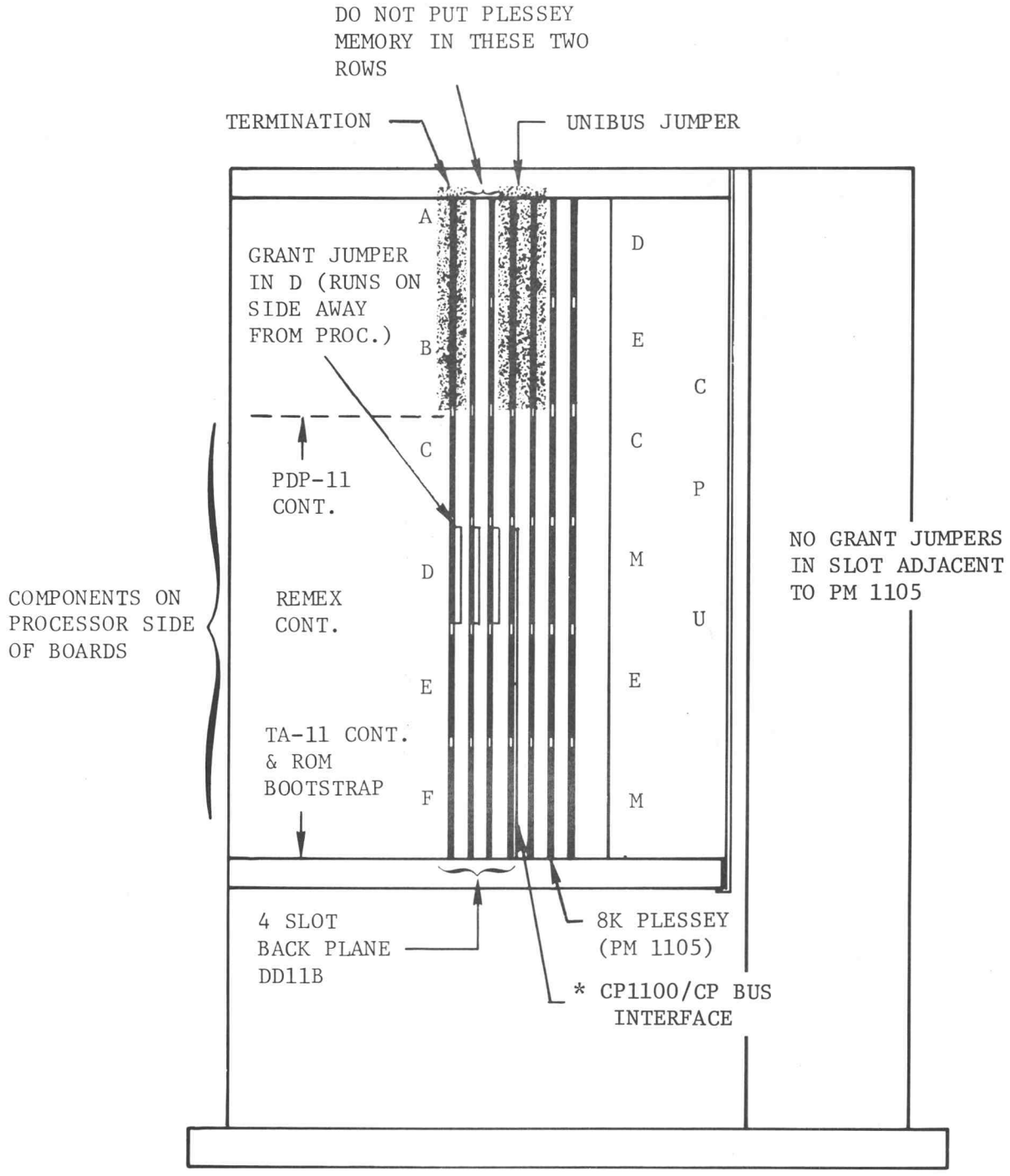

Fig. 2-5. Controller with CP1100/CP Bus Interface Location.

* Formerly PDP-11 Controller

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SECTION 3

WP1000 SERIES DIAGNOSTIC PROCEDURES

WP1000 Diagnostic

Basically, this diagnostic consists of a procedure to check the WP1000, followed by a checkout procedure for each component. The detailed checkout procedures for each component may be used anytime that a component is suspect to determine how well it is functioning. If any of the component checkout procedures indicate failure, the fact that the problem is in that component can be verified by substitution.

The following procedures refer specifically to a WP1000 composed of a DPO with interfaces. While references are made to a controller and associated peripherals, diagnostic procedures for these components are not included.

I. Visually check all equipment and cabling. Refer to the unpacking and assembling instructions in Section 2, if any of the cabling is in doubt.

II. Load the P7001 Checkout Software (see the manual for loading instructions). Loading software will give you many clues as to the functioning of the system, and it ensures that the software within the computer is correct. Many times, software is partially destroyed and presents symptoms similar to a hardware problem.

    A. P7001 Checkout Software loads correctly.

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1) If the P7001 Checkout Software loads correctly, the tape will stop at the end of the punched tape and will not read the blank trailer. The terminal will ask several questions and these questions must be answered. If the P7001 Checkout Software loads correctly, you can be reasonably sure that the terminal, the reader, and the computer are functioning correctly. The problem is probably in the DPO or its interface. Proceed on to Step A.3.

2) If any of the P7001 Checkout Software loads but does not ask questions, it may be controller problem and most likely a problem with memory. When it functions incorrectly, the symptoms typically are that software will not function correctly, even though it may load. These symptoms are usually intermittent. The P7001 Checkout Software resides in the first 8K of memory. If Checkout Software loads, but "TEK BASIC" does not, then the upper portion of memory is the problem. (Proceed to Step B.1.)

3) If the P7001 Checkout Software loaded, then run ALL tests. A problem may show up on the tests. If you have a failing test, go on; stay in the ALL mode and then return to the failed test after all the tests have been completed. If it passes all tests, then go on and test the full range of the addresses with the address test with a /R. Each time the test is complete, a line

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will be printed on the terminal. Let the test run until a full page printout has been accumulated on the terminal. Then run the worst case memory test with a /R. Again, let the test run until a full page of printout has been accumulated on the terminal. These two tests will detect most intermittent failures for the DPO, or failures that are temperature-dependent and require the instrument to warm up first.

B. Verify Controller Memory

The controller memory can be checked in 4K sections. If the test can be completed without any failure, then the section of memory under test is working correctly. If the test fails then repeat the complete procedure and verify the test failure.

Controller Memory Test:

1) Select the section of memory for testing.

28K	157
24K	137
20K	117
16K	077
12K	057
8K	037
4K	017

2) Press HALT.

3) Load the address XXX77Ø into the Address Register.

4) Press LOAD ADRS.

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5) Load the data Ø14747 into the Data Register.

6) Press DEPosit.

7) Press EXAMine:

A) Down - Contents of the Address Register.

B) Up - Contents of the Data Register (Ø14747).

(If the contents are invalid then the memory test has failed.)

8) Again load XXX77Ø into the Address Register.

9) Press LOAD ADRS.

10) Press ENABLE.

11) Press START (all zeros should appear).

12) Load zeros into the Address Register.

13) Press LOAD ADRS.

14) Press EXAMine: (5 or 6 times)

A) Down - increments the address from zero.

B) Up - the contents (Ø14747) appears in the Data Lights.

If the Address Register does not increment from zero then the memory test has failed. Also, if the Data Register lights do not indicate Ø14747 each time the EXAMine switch is released then the memory test has failed.

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C. P7001 Checkout Software DOES NOT load correctly.

1) If the P7001 Checkout Software did not load, check to see that the Bootstrap and Absolute loader are in the machine. This is best done by examining the Bootstrap using the front panel EXAMine switch (on the controller); then load the Absolute Loader tape using the paper tape reader.

2) If the Bootstrap was blown, and all attempts to restore it fail, the problem is probably in the controller. Refer to the service manual for more detail.

3) If the Bootstrap was correct or if it was correctly restored, try to load the Absolute Loader. Be sure to follow the procedure in the Software manual. The Absolute Loader correctly loads if it reads the punched tape and stops at the end of the punched tape without reading any of the blank trailer tape.

4) If the Absolute Loader loaded correctly, go back to Step A.2 and try to reload the P7001 Checkout Software.

5) If the Absolute Loader did not load correctly, the problem is probably in the reader or terminal. Refer to the service manual for more detail. This concludes this procedure.

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