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User Manual

Tektronix

VX1405
VXI 5-Slot Horizontal Mainframe

070-7778-01

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Please check for change information at the rear of this manual.

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Preface

Purpose of this Document

This manual provides the information necessary to install, configure, and operate the VX1405 Mainframe.

Organization of this Manual

This manual consists of the following sections:

Section 1 — General Information. Provides a brief overview of the Mainframe and lists its specifications.

Section 2 — Preparation For Use. Provides information the installer must consider when including the Mainframe as a part of a system. Includes information regarding safety, installation, and configuration.

Section 3 — Operation. Provides information regarding the Front Panel and Rear Panel controls, connectors, and fuses.

Section 4 — Backplane. Describes the Backplane component of the Mainframe.

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Notational Conventions

This manual uses the following notational conventions:

To indicate the active state of TTL signals, an asterisk (*) following a signal mnemonic denotes that the signal is active when in the low state (typically, 0 V). A signal mnemonic without a following asterisk (*) denotes the signal is active when in the high state (typically, 2.8 — 5 V).

Unless otherwise noted, all numbers are assumed to be decimal (base 10).

Related Publications

The following documents on related subjects may be useful in efficient use of the Mainframe.

- *VXIbus System Specification. Version 1.3, July 14, 1989*
- *ANSI/IEEE Std 1014-1987, IEEE Standard for a Versatile Backplane Bus: VME bus.*

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GENERAL SAFETY SUMMARY

The general safety information in this summary is for both operating and servicing personnel. Specific warnings and cautions are found throughout the manual where they apply, and may not appear in this summary.

TERMS

Terms in This Manual

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

CAUTION statements identify conditions or practices that could result in damage to the instrument or other property.

Terms as Marked on Instrument

CAUTION indicates a hazard to property, including the equipment itself, and could cause minor personal injury.

WARNING indicates solely a personal injury hazard not immediately accessible as you read the marking.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

Symbols in This Manual



This symbol indicates where applicable cautionary or other information is to be found.



This symbol indicates where special explanatory information is included in the manual. There is no caution or danger associated with the information.

Symbols as Marked on Instrument



DANGER - High Voltage.



Protective ground (earth) terminal.



ATTENTION - Refer to manual.



Refer to manual before using.

Power Source

This instrument is intended to operate in a power module connected to a power source that does not apply more than 250 V rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord(s) is essential for safe operation

Grounding the Product

WARNING: This product is grounded through the grounding connector of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation. (I.E.C. Safety Class I)

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts can render an electric shock.

Use the Proper Fuse

To avoid fire hazard, use only fuses specified in the instrument parts list. A replacement fuse must meet the type, voltage rating, and current rating specifications required for the fuse that it replaces.

Do Not Operate in Explosive Atmosphere

To avoid explosion, do not operate the instrument in an explosive atmosphere.

Do Not Remove Covers or Panels

To avoid personal injury, the instrument covers should be removed only by qualified service personnel. Do not operate the instrument without covers and panels properly installed.

Remove from Operation

If you have reason to believe that the instrument has suffered a component failure, do not operate the instrument until the cause of the failure has been determined and corrected.

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Section 1
General Information

Description

Introduction

The VX1405 VXI Mainframe is a benchtop horizontal 5-slot, C-size, VXIbus mainframe that supports the full implementation of the *VXIbus Specification, Revision 1.3*. An optional 19" rackmount adapter kit is also available. The backplane in this mainframe provides two 96-pin VXIbus connectors (P1 and P2) per slot which enables full access to the VXI resources available. These resources are assigned to specific connectors by the *VXIbus Specification* according to functionality and performance.

Backplane

The backplane is a monolithic, multiple-layer, printed circuit board that provides the interface between its installed modules. It contains the VXIbus P1 and P2 connectors, power supply connectors, and other signal interfacing connectors. It accommodates the installation of up to 5 C-size VXI modules designed on 1.2" spacing between modules. This backplane is described in more detail in Section 4 of this manual.

VXIbus Connectors

The P1 connectors provide the VXIbus handshaking, arbitration, interrupt support, A16/A24 addressing, and D8/D16 data paths.

The P2 connector expands the VXIbus data paths up to its A32 capability, and extends the addressing capability up to 4 Gbytes. It also supports medium performance instrumentation resources by adding access to common instrument voltages (+5V, ±12V, ±24V, -5.2V, and -2V), eight parallel TTL trigger lines, two parallel ECL trigger lines, a 10 MHz system clock, and the MODID lines that allow a logical device to be identified with a particular physical slot.

VXI Module Sizes

The VX1405 standard size for the mainframe is C-size (13.4 x 9.2").

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Power Supplies

The mainframe power supplies are designed to provide voltages at power levels consistent with high-performance ATE applications. Additionally, the VX1405 supports the ACFAIL* and SYSRESET* signals on Power Up and Power Down as part of the power utility monitoring function required of a VXIbus mainframe. For additional information, refer to the Electrical Specifications, in this section.

Auto Line Voltage Selection

The Line Voltage is automatically selected for the power supplies, allowing use of either 115 or 230 volts (nominal). The chassis requires 115 VAC or 230 VAC at 47 Hz to 63 Hz frequency. The user can connect the AC line cord to either a 115 VAC or 230 VAC outlet. The chassis power supplies will sense and automatically accommodate either AC voltage range, eliminating the need for a line voltage selection switch.

Standard Accessories

- *VX1405 5-Slot Horizontal Mainframe Users Manual*
- *VX1405 5-Slot Horizontal Mainframe Service Manual*
- Power cord

Options

- 020-1828-00 VX1405 Rackmount Adapter Kit

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Specifications

Performance Conditions

The performance characteristics listed in the specification tables of this manual are valid only if the Mainframe is operating in an environment that is within the limits described in Table 1-1, Environmental Specifications.

Any conditions that are unique to a particular characteristic, are stated as parts of that characteristic.

The electrical and environmental performance limits, together with the related validation procedure, comprise a complete statement of the electrical and environmental performance of a calibrated Mainframe.

Table 1-1. Environmental Specifications

Characteristic	Performance Requirement
Temperature:[1]	
Operating	0 — 50° C
Non-operating	-55 — +75° C
Humidity:[1]	
0 — 30° C	95 ±5%, non-condensing
30 — 40° C	75 ±5%, non-condensing
40 — 50° C	45 ±5%, non-condensing
Altitude:[1]	
Operating	10,000' (derate maximum operating temperature by -1° C for each 1000' above 5000')
Non-operating	40,000'
Vibration:[1]	
Non-operating	Withstands 0.013" p-p, 10 — 55 Hz sinewave, 15 minutes each axis; and 10 minutes each axis at resonance or 55 Hz
Shock:[1]	
Non-operating	Withstands 30 g, halfsine, 11 ms duration, 3 shocks in each direction along 3 major axes, 18 total shocks
Bench Handling:[1]	
Non-operating	12 drops from 45°, 4", or equilibrium, whichever occurs first
Transportation	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2
Electromagnetic Compatibility	Within limits of FCC Regulations, Part 15, Subpart, Class A
Electrostatic Immunity	
Operating	
Non-interruptive	15 kV, 100 Ω in series with 500 pF
Non-destructive	20 kV, 100 Ω in series with 500 pF

[1] Meets or exceeds MIL-T-28800D, Class 5.

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Table 1-2. Electrical Specifications

Characteristic	Performance Requirement
Communications:	
Internal	VXIbus
External	Dependent upon instrument modules installed
Power Input Requirement:	
Voltage Range	
115 V nominal	90 — 130 Vac
230 V nominal	180 — 250 Vac
Frequency	47 to 63 Hz
Power Consumption	575 W (maximum)
Heat Dissipation	1536 BTU/hour, maximum (450 W)

Power Supplies

Voltage	Accuracy	dc Current[1]	ac Current	Power	PARD[2]
+24	+5/-3%	2 A	2 A	48 W	<150 mV
-24	+5/-3%	2 A	2 A	48 W	<150 mV
-2	±5%	4 A	300 mA	8 W	<50 mV
-5.2	+5/-3%	10 A	500 mA	52 W	<50 mV
+12	+5/-3%	4.5 A	4 A	54 W	<50 mV
-12	+5/-3%	2 A	1.3 A	24 W	<50 mV

[1]The dc Current value is the Peak dc Current defined as I_{MP} in the VXIbus Specification.The ac Current value is the Dynamic ac Current defined as I_{MD} in the VXIbus Specification.

[2]PARD = Periodic And Random Deviations (V peak-to-peak, 2 Hz — 10 MHz)

Table 1-3. Mechanical Specifications

Characteristic	Description
Instrument Modules:	
Number/Type	Accommodates 5 (maximum) C-size, including 1Slot 0 Module and 4 other modules
Size	VXIbus C (13.4 x 9.2") Double-height, long Eurocard
Dimensions:	
Height	177.8 mm (7")
Width	414.02 mm (16.3")
Depth	558.8 mm (22")
Net Weight	10 kg (22 lbs), w/o instrument modules
Shipping Weigh	12.73 kg (28 lbs)
Cooling	Forced air cooling is provided by three fans to the high-performance C-sized chassis slots and the power supplies. Air is drawn in from the sides and exits at the rear of the mainframe in an adequate quantity to dissipate up to 45 W for each module slot (at a temperature rise of 15° C). CAUTION *When operating the VX1405 in the vertical position, be sure the two black metal "gullwing" mounting feet are installed, to permit adequate cooling.*

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Section 2
Preparation For Use

Module/Backplane Current Protection

CAUTION

All installed modules that use mainframe power supply voltages should be current protected on the module to protect both the module and the mainframe. If an unprotected short occurs on a module, the backplane is protected. The + 5 V supply is protected by fuses.

It is the users responsibility to ensure that modules installed in this mainframe conform to Section B.8.5, Power Management, of the VXIbus Specification Revision 1.3. Mainframe damage caused by shorted modules that are not current protected may void all or part of the mainframe warranty.

Checking Line Voltage

The mainframe operates from 115 V (nominal) or 230 V (nominal) single-phase power sources having a line frequency ranging from 47 — 63 Hz. Make certain that the voltages at both sources are within the appropriate voltage range as follows before connecting the power cord to the power sources:

- 115 V nominal: 90 — 130 Vac
- 230 V nominal: 180 — 250 Vac

Checking Line Fuses

The mainframe uses two line fuses. These fuses are located on the bottom center of the mainframe rear panel. Verify the proper values of both fuses as follows (or information located on the mainframe rear panel) before connecting the power cord to the power sources:

- 115/230 Vac nominal: 4 A (PSI135), 5 A (PSI225) 250 V (medium blow)

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Power Cords

WARNING

The mainframe operates from a single-phase power source, using a detachable three-wire power cord, with a two-pole, three-terminal grounding type plug. The voltage to ground (earth) from either pole of the power source must not exceed 250 V.

All accessible conductive parts of the mainframe are directly connected through the grounding conductor of the power cord to the grounding contact of the power plug. Therefore, the power plug must be inserted into a mating receptacle with a grounding contact. Do not defeat the grounding connection. Any interruption in the grounding connection can create an electric shock hazard.

High leakage current exists in the mainframe. Make certain that it is properly grounded.

Configuration

Board Jumpers

Note

Jumper identity is printed on the circuit board and is shown in Figure 2-1. To prevent loss or misplacement of removed jumpers, it is recommended that removed jumpers be reinstalled on one of the pins where it was removed.

BG* and IACK* Jumpers

The only configuration required before placing the mainframe in operation is to make certain that the four 2-pin Bus Grant jumpers (BG0* through BG3*) located adjacent to Slots 1-4, and the five 2-pin Interrupt Acknowledge jumpers (IACK*), located adjacent to Slots 0-4 on the backplane are installed or removed as required for the application (refer to Fig. 2-1). The mainframe is shipped with a full complement of jumpers installed. Before any module is installed, jumpers for the slot(s) where the module is to be installed must be checked, and removed or installed as necessary.

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Note

The names of the jumpers BG0 — BG3* and IACK* are printed on the printed circuit board side facing the front of the mainframe. Figure 2-1 identifies the location of these jumpers and also identifies their "P" numbers. Beginning with Slot 1, the BG0* — BG3* jumpers are located to the left of the P1 connector. Beginning with Slot 0, the IACK* jumpers are located to the left of the P1 connector for each slot. These jumpers are accessed through the front of the mainframe.*

When a module occupies more than one slot, it must be determined whether all occupied slots need to have their BG and IACK* jumpers removed. In most cases, only one of the occupied slots has active BG* and IACK* connections. The module's documentation should indicate which slot must have its VXI P1 connector daisy-chain jumpers installed or removed.*

Table 2-1 provides a correlation between the BG0* — BG3* and IACK* jumper names printed on the Backplane and the "P" numbers shown in Figure 2.1.

Table 2-1. BG0* — BG3* and IACK* Jumper Information

Slot	BG0*	BG1*	BG2*	BG3*	IACK*
0					P0004
1	P0105	P0106	P0107	P0108	P0103
2	P0205	P0206	P0207	P0208	P0203
3	P0305	P0306	P0307	P0308	P0303
4	P0405	P0406	P0407	P0408	P0403

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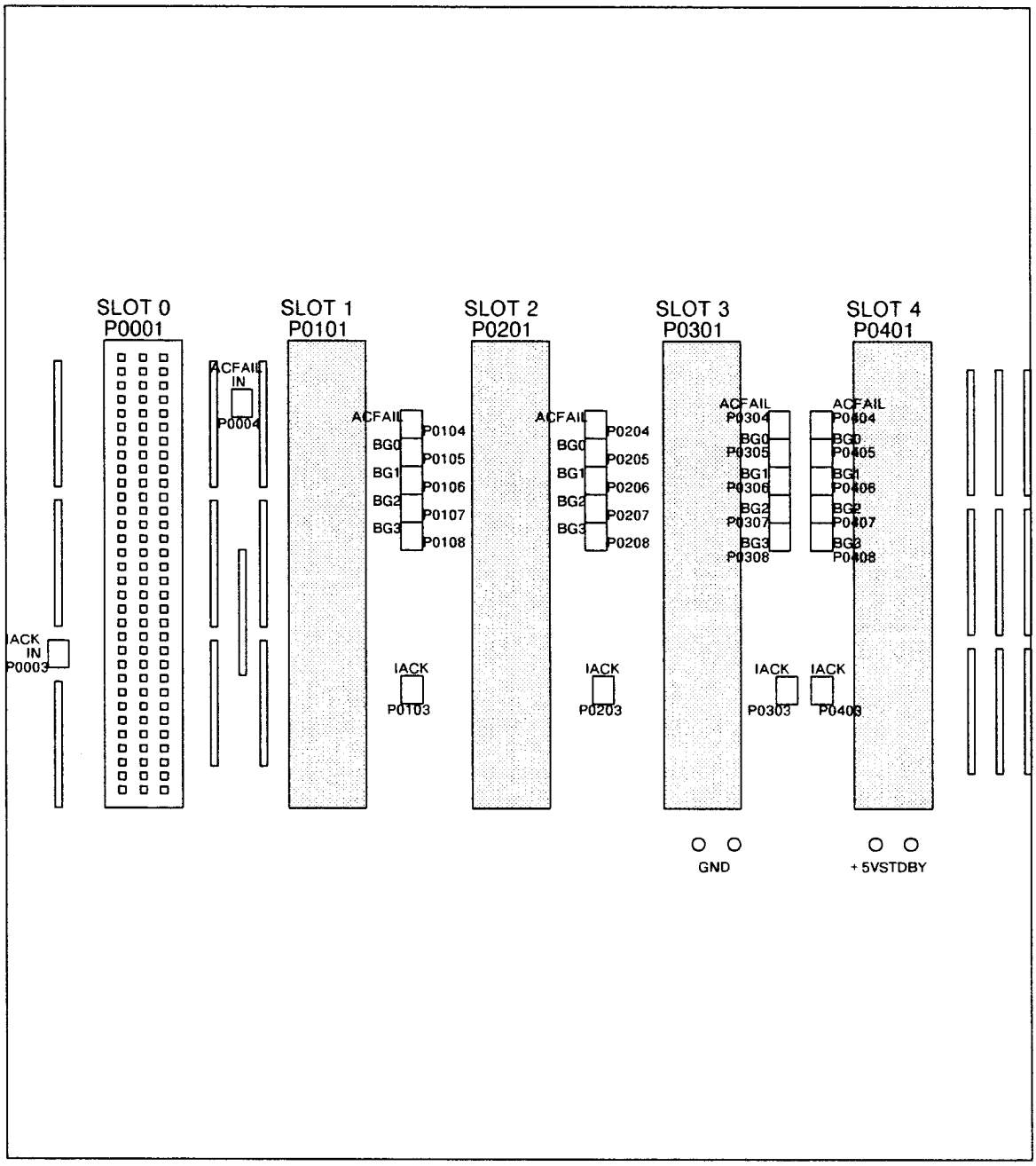


Figure 2-1. Jumper Locations

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Fan Jumpers

Full-Speed Jumper (J13). This 2-pin jumper (J13,) located on the on the front side of the Backplane, allows the user to select between full speed and variable speed (factory set for full speed), for the two fans connected to backplane connectors J10 and J11. This jumper, when installed, causes both fans to run at full speed (approximately 2800 rpm). This jumper can be accessed by removing the Mainframe top cover.

Speed-Range Connector (J14). This 3-pin connector (J14), located on the front side of the Backplane, enables a 2-pin jumper to select the temperature-controlled speed range of all three fans. A thermistor monitors the air temperature exiting the modules and adjust the fan speed (the higher the air temperature, the faster the fan speed). Installing the jumper in one position selects the "high" speed range (approximately 1900 to 2800 rpm). With the jumper installed in the opposite position, the "low" speed range (approximately 1000 to 2800 rpm) is selected. This jumper can be accessed by removing the Mainframe top cover.

Power Monitor Jumpers

ACFAIL*. When installed, these 2-pin jumpers (1 jumper each for Slots 0 — 4, on the Backplane), allow the module in the given slot to drive the ACFAIL* signal, as part of a power monitor function. Normally, this jumper will be installed for each slot; however, some modules violate the VME Specification and drive ACFAIL* for reasons other than a power monitor function. Remove the ACFAIL* jumpers to accommodate such modules.

Battery Backup

Pin connections are provided on the rear of the Backplane for connecting a backup battery +5 V (5 A) standby.

Note

Tektronix Inc., assumes no responsibility to the user for incorrect supplied voltages or damage to the backplane board, if user installs the battery backup.

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Section 3
Operation

Front-Panel Controls

The only front panel control on the VX1405 is the ON/STANDBY switch. This switch remotely controls application of dc power to the instrument modules in the Mainframe chassis.

Rear-panel Connector and Fuses

The Mainframe rear panel contains the Power Cord Connector and Line Fuses (Front and Rear).

Power Cord Connector

The Power Cord connector provides input power to the power supplies. It is located near the bottom left of the Mainframe rear panel. The line cord must be inserted into this connector and into an appropriate line receptacle before power can be applied to the Mainframe (there is no power switch).

Line Fuses

The Line Fuses (one for each Power Supply) protect the Mainframe circuits from damage caused by a malfunction that results in a significant overcurrent condition.

These fuses are located near the bottom center of the Mainframe rear panel. The fuse to the left is Rear; the fuse to the right is Front. Any replacement fuse must be of the same value specified under the Checking Line Fuses topic in Section 2, *Preparation For Use*.

WARNING

The neutral side of the ac line power is not fused.

Periodic Fan Operational Check

All fans should be checked every six months or less to ensure proper operation. The best way to check for proper fan operation is to turn off power and remove all modules. Then, with all fans stopped, observe the fans and turn on the power. An operative fan should start turning clockwise. In the case of a cold instrument, install jumper J13, to allow full power to the fans. Refer to Section 2, *Preparation for Use* for jumper location.

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Section 4
Backplane

Description

The Backplane is a monolithic, multiple-layer, VXI double-height circuit board that distributes all system voltages, busses and terminates all relevant signals, and controls chassis power and fans.

VXIbus Module Connectors

The module connectors consist of the two VXIbus connectors, P1 and P2 for each of the five module slots. The pin and signal information for these connectors is shown in Table 4-1. Figure 4-1 shows the connector pin identification.

Daisy-Chain Connectors

The Bus Grant (BG0* — BG3*) and Interrupt Acknowledge (IACK*) daisy-chain lines provide for inter-slot coupling of bus arbitration and interrupt control signals. These signal lines determine which device has control of the bus, and which device can acknowledge an interrupt, respectively. For further information, refer to Section 2, *Preparation for Use*.

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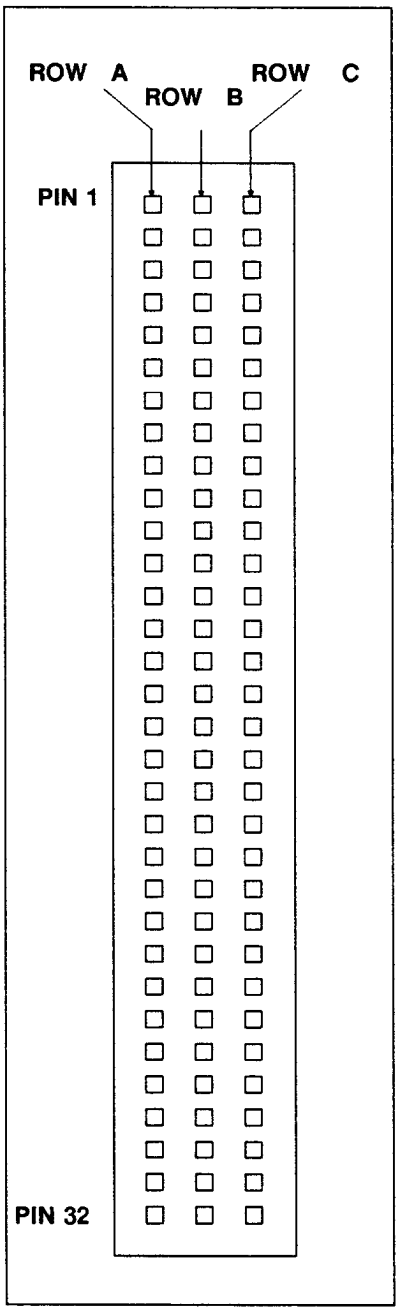


Figure 4-1. Connector Pin Indentification

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Table 4-1. J1 Pin Assignments

PIN #	ROW A	ROW B	ROW C
1	D00	BBSY*	D08
2	D01	BCLR*	D09
3	D02	ACFAIL*	D10
4	D03	BG0IN*	D11
5	D04	BG0OUT*	D12
6	D05	BG1IN*	D13
7	D06	BG1OUT*	D14
8	D07	BG2IN*	D15
9	GND	BG2OUT*	GND
10	SYSCLK	BG3IN*	SYSFAIL*
11	GND	BG3OUT*	BERR*
12	DS1*	BR0*	SYSRESET*
13	DS0*	BR1*	LWORD*
14	WRITE*	BR2*	AM5
15	GND	BR3*	A23
16	DTACK*	AM0	A22
17	GND	AM1	A21
18	AS*	AM2	A20
19	GND	AM3	A19
20	IACK*	GND	A18
21	IACKIN*	SERCLK	A17
22	IACKOUT*	SERDAT*	A16
23	AM4	GND	A15
24	A07	IRQ7*	A14
25	A06	IRQ6*	A13
26	A05	IRQ5*	A12
27	A04	IRQ4*	A11
28	A03	IRQ3*	A10
29	A02	IRQ2*	A09
30	A01	IRQ1*	A08
31	-12 V	+5VSTDBY	+12 V
32	+5 V	+5 V	+5 V

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Table 4-2. J2 Pin Assignments (Slot 0)

PIN #	ROW A	ROW B	ROW C
1	ECLTRG0	+5 V	CLK10+
2	12 V	GND	CLK10-
3	ECLTRG1	RSV1	GND
4	GND	A24	-5.2 V
5	MODID12	A25	LBUSC00
6	MODID11	A26	LBUSC01
7	-5.2 V	A27	GND
8	MODID10	A28	LBUSC02
9	MODID09	A29	LBUSC03
10	GND	A30	GND
11	MODID08	A31	LBUSC04
12	MODID07	GND	LBUSC05
13	-5.2 V	+5 V	-2 V
14	MODID06	D16	LBUSC06
15	MODID05	D17	LBUSC07
16	GND	D18	GND
17	MODID04	D19	LBUSC08
18	MODID03	D20	LBUSC09
19	-5.2 V	D21	-5.2 V
20	MODID02	D22	LBUSC10
21	MODID01	D23	LBUSC11
22	GND	GND	GND
23	TTLTRG0*	D24	TTLTRG1*
24	TTLTRG2*	D25	TTLTRG3*
25	+5 V	D26	GND
26	TTLTRG4*	D27	TTLTRG5*
27	TTLTRG6*	D28	TTLTRG7*
28	GND	D29	GND
29	RSV2	D30	RSV3
30	MODID00	D31	GND
31	GND	GND	+24 V
32	SUMBUS	+5 V	-24 V

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Table 4-3. J2 Pin Assignments (Slots 1 — 4)

PIN #	ROW A	ROW B	ROW C
1	ECLTRG0	+5 V	CLK10 +
2	-2 V	GND	CLK10-
3	ECLTRG1	RSV1	GND
4	GND	A24	-5.2 V
5	LBUSA00	A25	LBUSC00
6	LBUSA01	A26	LBUSC01
7	-5.2 V	A27	GND
8	LBUSA02	A28	LBUSC02
9	LBUSA03	A29	LBUSC03
10	GND	A30	GND
11	LBUSA04	A31	LBUSC04
12	LBUSA05	GND	LBUSC05
13	-5.2 V	+5 V	-2 V
14	LBUSA06	D16	LBUSC06
15	LBUSA07	D17	LBUSC07
16	GND	D18	GND
17	LBUSA08	D19	LBUSC8
18	LBUSA09	D20	LBUSC09
19	-5.2 V	D21	-5.2 V
20	LBUSA10	D22	LBUSC10
21	LBUSA11	D23	LBUSC11
22	GND	GND	GND
23	TTLTRG0*	D24	TTLTRG1*
24	TTLTRG2*	D25	TTLTRG3*
25	+5 V	D26	GND
26	TTLTRG4*	D27	TTLTRG5*
27	TTLTRG6*	D28	TTLTRG7*
28	GND	D29	GND
29	RSV2	D30	RSV3
30	MODID	D31	GND
31	GND	GND	+24 V
32	SUMBUS	+5 V	-24 V

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Appendix A
VXIbus Glossary

This glossary contains terms defined according to their use in the VXIbus System. Although some terms may be used in other systems with different meanings, it is important to apply them only to VXIbus applications. In any instance in which a term is applicable only to a particular instrument module, that fact is so noted.

ACCESSED Indicator

An amber LED indicator that illuminates when the module identity is selected by the Resource Manager module, and flashes during any I/O operation for the module.

ACFAIL*

A VXIbus backplane line asserted under these conditions: 1) by the Mainframe Power Supply when a power failure has occurred (either ac line source or power supply malfunction) or 2) by the Mainframe front panel ON/STANDBY switch when it is switched to STANDBY.

A-Size Card

A VXIbus instrument module 100 x 160 x 20.32 mm (3.9 x 6.3 x 0.8"); it is the same size as a VMEbus single-high, short module.

Asynchronous Communication

Communications occurring outside the normal "command-response" cycle. Such communications may have a higher priority than synchronous communication.

Backplane

The printed circuit board mounted in a VXIbus Mainframe to provide the interface between VXIbus modules, and between the Mainframe power supplies and the modules.

B-Size Card

A VXIbus instrument module 233.4 x 160 x 20.32 mm (9.2 x 6.3 x 0.8"); it is the same size as a VMEbus double-high, short module.

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Bus Arbitration

In the VMEbus interface, a system for resolving contention for service among VMEbus Master devices on the VMEbus.

Bus Timer

A functional module measuring the duration of each data transfer on the Data Transfer Bus (DTB) and terminating the DTB cycle if the duration is excessive. Without the termination capability of this module, a Bus Master attempt to transfer data to or from a non-existent Slave location could result in an infinitely long wait for the Slave response.

Client

In Shared Memory Protocol (SMP), the half of an SMP channel that does not control the shared memory buffers.

CLK10

A 10 MHz, individually buffered, differential ECL system clock sourced from Slot 0 and distributed to each slot (1 — 12) through P2. It is distributed to each module as as a single source, single destination signal with a matched delay of under eight (8) nanoseconds total.

CLK100

A 100 MHz, individually buffered, differential ECL system clock sourced from Slot 0 and distributed to each slot (1 — 12) through P3. It is synchronized to CLK10 and distributed to each module as a single source, single destination signal with a maximum timing skew of two (2) nanoseconds, and a matched delay of under eight (8) nanoseconds total.

Commander

A device controlling another device (a servant). A commander may be a servant of another commander.

Command

Any communication from a commander to a message based servant, consisting of a write to the servant's Data Low register, possibly preceded by a write to the data register.

Communication Registers

A set of device registers accessible to the commander of the device. Such registers are used for inter-device communications, and are required on all VXIbus message-based devices.

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Configuration Registers

A set of registers allowing the system to identify a (module) device type, model, manufacturer, address space, and memory requirements. In order to support automatic system and memory configuration, the VXIbus Specification requires all VXIbus devices have a set of such registers, all accessible from P1 on the VXIbus.

C-Size Card

A VXIbus instrument module 340 x 233.4 x 30.48 mm (13.4 x 9.2 x 1.2").

Data Transfer Bus

One of four buses on the VMEbus backplane. The Data Transfer Bus allows Bus Masters to direct the transfer of binary data between Masters and Slaves.

DC FAIL Indicator

A red LED indicator that illuminates when a power fault is detected on the backplane.

Device Specific Protocol

A protocol for communication with a device not defined in the VXIbus specification.

D-Size Card

A VXIbus instrument module 340 x 366.7 x 30.48 mm (13.4 x 14.4 x 1.2").

DTB

See Data Transfer Bus.

DTB Arbiter

A functional module accepting bus requests from Requester modules and granting control of the DTB to one Requester at a time.

DUT

Device Under Test.

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ECLTRG

Six single-ended ECL trigger lines (two on P2 and four on P3) functioning as inter-module timing resources, and bussed across the VXIbus subsystem backplane. Any module, including the Slot 0 module, may drive and receive information from these lines. These lines have an impedance of 50 Ω and the asserted state is logical High.

Embedded Address

An address in a communications protocol in which the destination of the message is included in the message.

ESTST

Extended STart/STop protocol; used to synchronize VXIbus modules.

Extended Device

A device having both VXIbus configuration registers and a subclass register. This category of device is intended to allow for definition of additional device types.

Extended Self Test

Any self test or diagnostic power-up routine executing after the initial kernel self-test program.

External System Controller

The host computer or other external controller exerting overall control of VXIbus operations.

FAILED Indicator

A red LED indicator that illuminates when a device on the VXIbus has detected an internal fault. This might result in the assertion of the SYSFAIL* line.

HI TEMP Indicator

A VX5520 Slot 0 Controller (only) LED indicator that illuminates to signify an excessive temperature condition on the module.

IACK Daisy Chain Driver

The circuit driving the VXIbus Interrupt Acknowledge daisy chain line that runs continuously through all installed modules or through jumpers across the backplane.

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ID-ROM

An NVRAM storage area providing for non-volatile storage of various module attributes, such as device name, serial number, error codes, and calibration data, etc.

Instrument Module

A plug-in printed circuit board, with associated components and shields, that can be installed in a VXIbus mainframe. An instrument module can contain more than one device, and/or can occupy more than one mainframe slot.

Interface Device

A VXIbus device providing an interface to external equipment.

Interrupt Handler

A functional module detecting interrupt requests generated by Interrupters and responding to those requests by requesting status and identification information.

Interrupter

A device capable of asserting VMEbus interrupts and performing the interrupt acknowledge sequence.

IRQ

(Interrupt ReQuest) A VXIbus interrupt line asserted by an Interrupter to signify to the controller that a device on the bus requires service by the controller.

Local Bus

A daisy-chained bus connecting adjacent VXIbus slots.

Local Controller

The instrument module performing system control and external interfacing functions for the instrument modules in a VXIbus Mainframe or several Mainframes. See Resource Manager.

Local Processor

The processor on an instrument module.

Logical Address

An 8-bit number uniquely identifying each VXIbus Device in a system. It defines a device's A16 register address, and indicates Commander/Servant relationships.

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Mainframe

A rigid framework providing mechanical support for modules inserted into a VXIbus backplane. It ensures connectors mate properly, adjacent modules do not contact each other, and modules do not disengage from the backplane due to vibration or shock. It also may provide mechanical support and housing for power supplies and their distribution wiring to the backplane.

Memory Device

A storage element (such as bubble memory, RAM, and ROM) having configuration registers and memory attributes (such as type and access time).

Message

A series of data bytes treated as a single communication element, with a well defined message body and terminator.

Message Based Device

A VXIbus device supporting VXI configuration and communication registers. Such devices support the Word Serial Protocol, and possibly other message-based protocols.

MODID Lines

Module/system identity lines.

Physical Address

The address assigned to a backplane slot during an access.

Power Monitor

A device monitoring backplane power and reporting fault conditions.

P1

The top-most backplane connector for a given module slot in a vertical Mainframe, such as the Tektronix VX1500. The left-most backplane connector for a given slot in a horizontal Mainframe.

P2

The middle backplane connector for a given slot in a Mainframe.

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P3

The bottom backplane connector for a given module slot in a vertical Mainframe, such as the Tektronix VX1500. The right-most backplane connector for a given slot in a horizontal Mainframe.

Query

A form of command allowing for inquiry to obtain status or data.

READY Indicator

A green LED indicator that illuminates when the power-up diagnostic routines have been successfully completed. An internal failure or failure of +5 V power will extinguish this indicator.

Register Based Device

A VXIbus device supporting VXI register maps, but not high level VXIbus communication protocols.

Requester

A functional module residing on the same module as a Master or Interrupt Handler and requesting use of the DTB whenever its Master or Interrupt Handler requires it.

Resource Manager

A VXIbus device providing configuration management services such as address map configuration, determining system hierarchy, allocating shared system resources, performing system self-test diagnostics, and initializing system commanders.

Self Calibration

A routine verifying the basic calibration of the instrument module circuits, and capable of adjusting this calibration to compensate for variables such as temperature, power supply variations, and line losses..

Self Test

A set of routines testing the operational functionality of the the instrument module. These routines are performed on power-up, and on command.

Servant

A device controlled by a Commander. There are message-based and register-based servants.

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Server

A shared memory device controlling the shared memory buffers used in a given Shared Memory Protocol (SMP) channel.

Shared Memory Protocol

A communications protocol using a block of memory accessible to both client and server. The memory block operates as a message buffer for communications.

Slot 0 Controller

See Slot 0 Module. Also see Resource Manager.

Slot 0 Module

A VXIbus device providing the minimum VXIbus Slot 0 services to Slots 1 — 12 (CLK10 and the MODID module identity lines), but that can also provide other VXIbus services such as CLK100, SYNC100, STARBUS, and trigger control.

SMP

See Shared Memory Protocol.

STARX

Two bidirectional, 50 Ω, differential ECL lines providing inter-module asynchronous communication. These pairs of time-delay matched lines connect Slot 0 to each of Slots 1 — 12 in a Mainframe. These lines have a well matched timing skew and less than five (5) nanoseconds of total timing delay.

STARY

Two bidirectional, 50 Ω, differential ECL lines providing inter-module asynchronous communication. These pairs of time-delay matched lines connect Slot 0 to each of Slots 1 — 12 in a Mainframe. These lines have a well matched timing skew and less than five (5) nanoseconds of total timing delay.

STST

STart/STop protocol; used to synchronize modules.

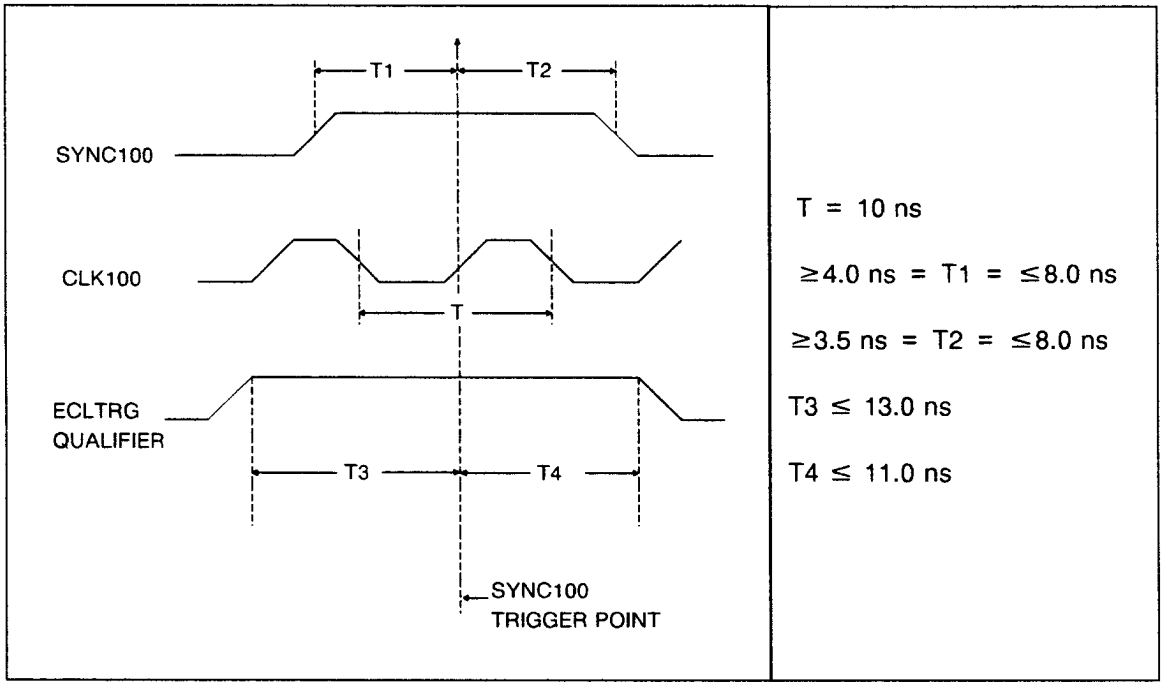
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SYNC100

SYNC100 is a Slot 0 signal used to synchronize multiple VXI devices with respect to a given rising edge of CLK100. The signal distributed to the devices is individually buffered to each slot, and is matched to less than 2 ns of skew between slots.

SYNC100 Trigger Protocol

SYNC100 trigger is a Tektronix designed protocol allowing multiple devices to receive a trigger on the same edge of the 100 MHz System Clock (CLK100). It utilizes the VXI SYNC100 signal to select the particular clock edge and an ECLTRG line as a qualifier to distinguish SYNC100 trigger protocol from ESTST protocol (see timing diagram below). This protocol allows device groups (such as multiple VX5260 Digitizers) to be triggered synchronously.



Synchronous Communications

A communications system following the "command-response" cycle model. In this model, a device issues a command to another device; the second device executes the command; then returns a response. Synchronous commands are executed in the order received.

SYSFAIL*

A signal line on the VMEbus used to indicate a failure by a device. The device failing asserts this line.

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System Clock Driver

A functional module providing a 16 MHz timing signal on the Utility Bus.

System Hierarchy

The tree structure of the commander/servant relationships of all devices in the system at a given time. In the VXIbus structure, each servant has a commander. A commander may also have a commander.

Test Monitor

An executive routine responsible for executing the self tests, storing any errors in the ID-ROM, and reporting such errors to the Resource Manager.

Test Program

A program, executed on the system controller, controlling the execution of tests within the test system.

Test System

A collection of hardware and software modules operating in concert to test a target DUT.

TTLTRG

Open collector TTL lines used for inter-module timing and communication.

VXIbus Subsystem

One Mainframe with modules installed. The installed modules include one module in Slot 0 to perform the Slot 0 functions and a given complement of instrument modules in Slots 1 — 12. The subsystem also may include a Resource Manager.

Word Serial Protocol

A word oriented, bidirectional, serial protocol for VXIbus communications between message-based devices (devices that include communication registers in addition to configuration registers).

Word Serial Communications

Inter-device communications using the Word Serial Protocol.

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WSP

See Word Serial Protocol.

10 MHz Clock

A 10 MHz timing reference. Also see CLK10.

100 MHz Clock

A 100 MHz clock synchronized to CLK10. Also see CLK100.

488-To-VXIbus Interface

A message based device providing for communication between the IEEE 488 bus and VXIbus instrument modules.

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Appendix B
Rackmount Installation

Introduction

A rackmount adapter kit is available for the VX1405 which accommodates a standard 19" wide rack (depth between the front and rear vertical rails of not less than 22" and not more than 30"). The VX1405 Rackmount Adapter Kit allows variable depth recess mounting of up to 3".

WARNING

The equipment rack for the mainframe installation, must either be bolted to the floor or include extension feet. An unsecured rack may be unsafe to the user, if the mainframe rackmounting assembly is extended.

Basic rack requirements are:

- Clear mounting space 7" high and 21.5" deep (plus approximately 2" for power cord) in a standard 19" equipment rack or equivalent mounting space
- At least 2" of clearance must be maintained between the sides of mainframe and the sides of the rack for air circulation

Note

It may be necessary to remove the top and bottom covers to prevent interference with instruments mounted directly above or below the VX1405 in rackmount applications.

Rackmount Components

Each rackmount assembly (one for each side of the mainframe and rack) consists of three major sections:

- Adjustable Mounting Bracket assembly
- Chassis Sections (There is one Chassis Section mounted on each side of the mainframe chassis.)
- Stationary/Intermediate Sections
- A front cover panel (w/hardware)

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Brackets and Chassis Sections Installation

Refer to Figures B-1 and B-2 while performing the following steps:

1. Remove the instrument carrying handle.

   Pull up on the instrument carrying handle to expose the small slots (one on each side of the handle). Carefully insert a small screwdriver into one of the slots (Figure B-1) while sliding handle away (towards the center). This releases the holding spring in the handle. Repeat this for the other side, then remove and store the handle.

2. VX1405 mounting.

   If user desires to rackmount the VX1405 directly above or below another instrument, within a 4U (7" high) space, the top and bottom covers must be removed (and temporarily stored). For applications where a 4U rack space is not required, remove the four rubber feet located on the right side of the VX1405 (Figure B-1), and reinstall the top and bottom covers, making sure the ventilation holes are oriented over the cooling fans.

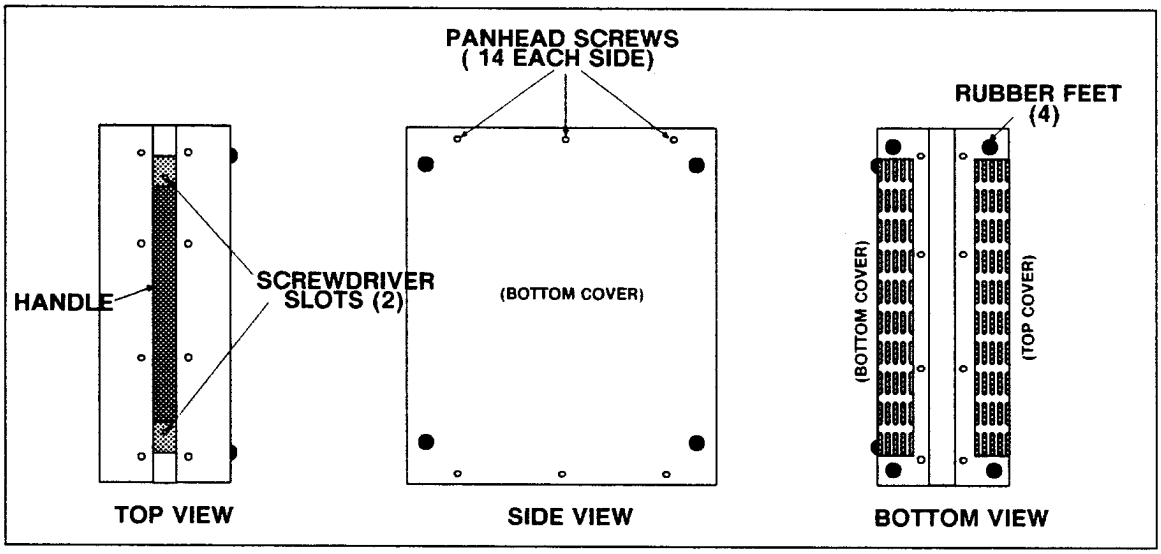


Figure B-1. Removing the Handle and Covers

3. Locate the Adjustable Mounting Bracket assemblies.

   Carefully position the Adjustable Mounting Bracket assembly for alignment to the instrument right side. Align the assembly to the existing threaded holes as shown in Figure B-2. Use the furnished 8-32 pan head screws (4) to secure bracket. Repeat this procedure for mounting the other Adjustable Mounting Bracket to the left side.

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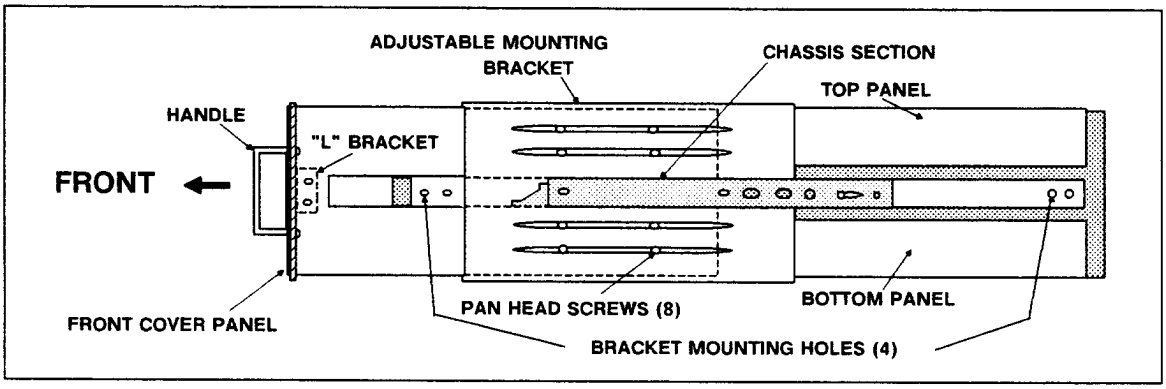


Figure B-2. Adjustable Bracket and Chassis Section

4. Locate the Chassis Section.

   Remove the Stationary Track sections from the shipping carton. Note the Right and Left sections.

   Properly orient and mount the Right Chassis Section to the Adjustable Mounting Bracket (see Figure B-2) using the threaded holes and hardware provided.

   Repeat this step for the instrument Left Chassis Section side installation.

Adjusting the Mounting Bracket

The Adjustable Mounting Bracket is shipped from the factory in the closed position. If recess mounting is desired, loosen the pan head screws (8, each side, refer to Figure B-2), extend the bracket as required, and tighten the screws.

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Front Cover Panel

The cover panel can be installed to provide a finished appearance and protect instrument modules and cabling. To install the cover panel, the mainframe must be recessed back from the front mounting cover, allowing adequate space to clear all cables and front panel connectors. The front cover is fastened with 1/4 turn fasteners to "L" Brackets (furnished). Since the "L" Brackets are not used in the flushmount applications, the user must install the "L" Brackets, with hardware provided, to the Adjustable Mounting Brackets (refer to Figures B-2 and B-3).

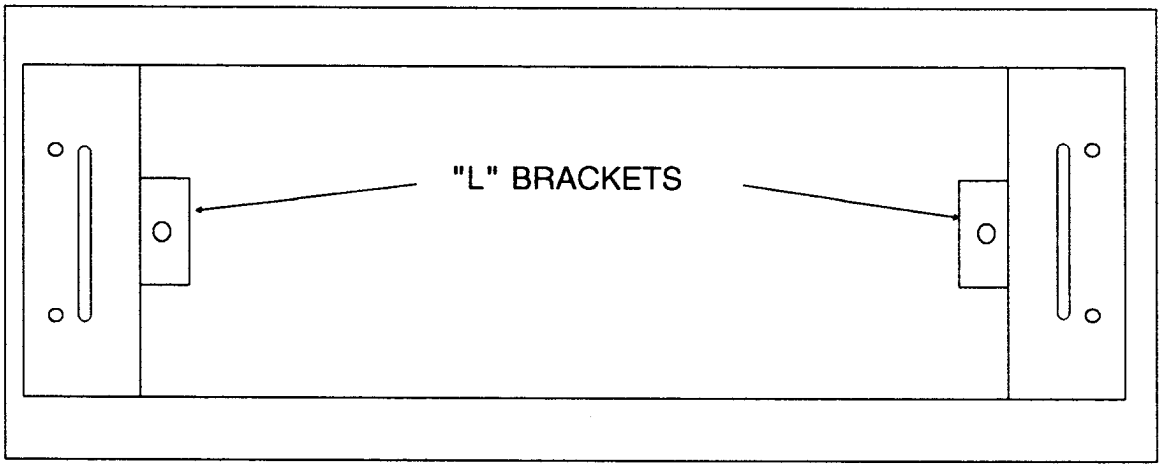


Figure B-3. "L" Bracket Installation

Track Installation

Refer to Fig. B-4 while performing the following steps:

Measure the distance between the front and rear rails (depth between the front and rear vertical rails is not less than 22" and not more than 30").

1. Attach the rear mounting bracket to the stationary section with bolts and bar nuts to match the rail spacing. Do not fully tighten the bolts.

2. Install the assembled stationary sections and rear mounting brackets into the rack. The right and left tracks are different and must be compared to the chassis sections that were mounted on the sides of the mainframe, to install correctly. Use nuts and bar nuts at the rear if the rack rail holes are not threaded.

3. Tighten the rack rail bolts enough to secure the stationary section and rear mounting bracket, but still allow movement. Fully tighten the bolts that attach the rear mounting brackets to the stationary sections.

4. Slide the intermediate sections into the stationary tracks so they lock in their extended positions.

5. Carefully lift the mainframe into place so the chassis sections align with the intermediate sections. Slide the mainframe tracks into the intermediate sections and push the instrument halfway into the rack (stops on first detent).

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6. The sliding track sections should align themselves as the mainframe is pushed into the rack. Tighten all bolts with the sections aligned.

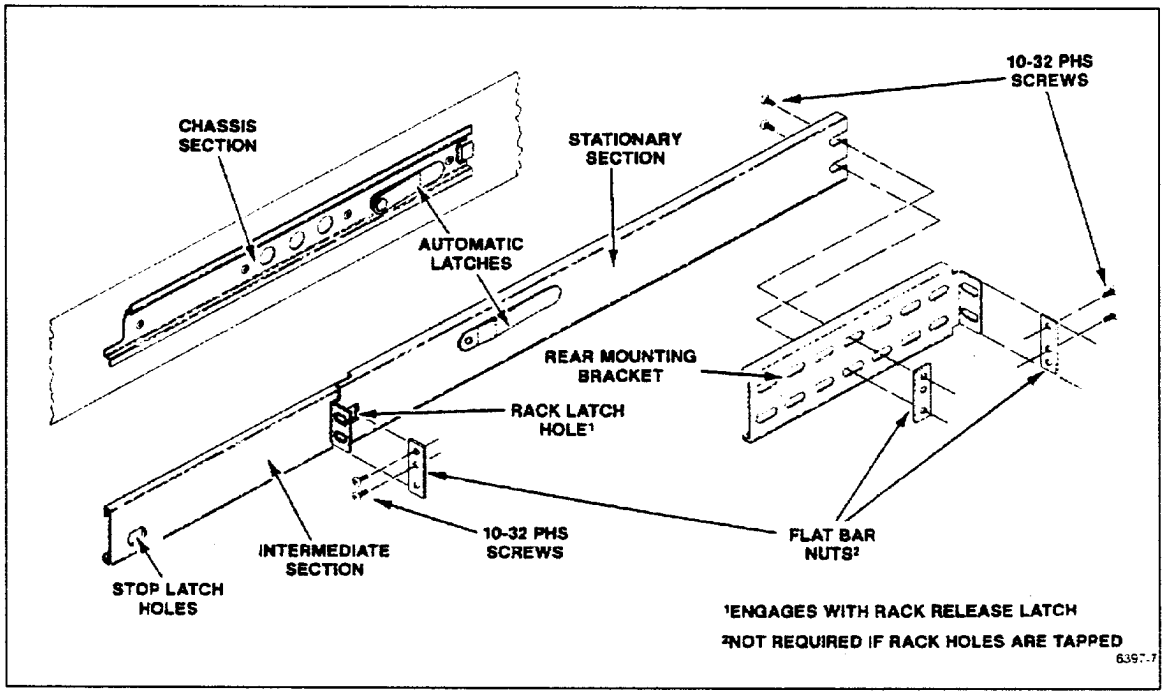


Figure B-4. Track Installation

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Rack Mounting Methods

Figure B-5 illustrates the different types of rack mountings.

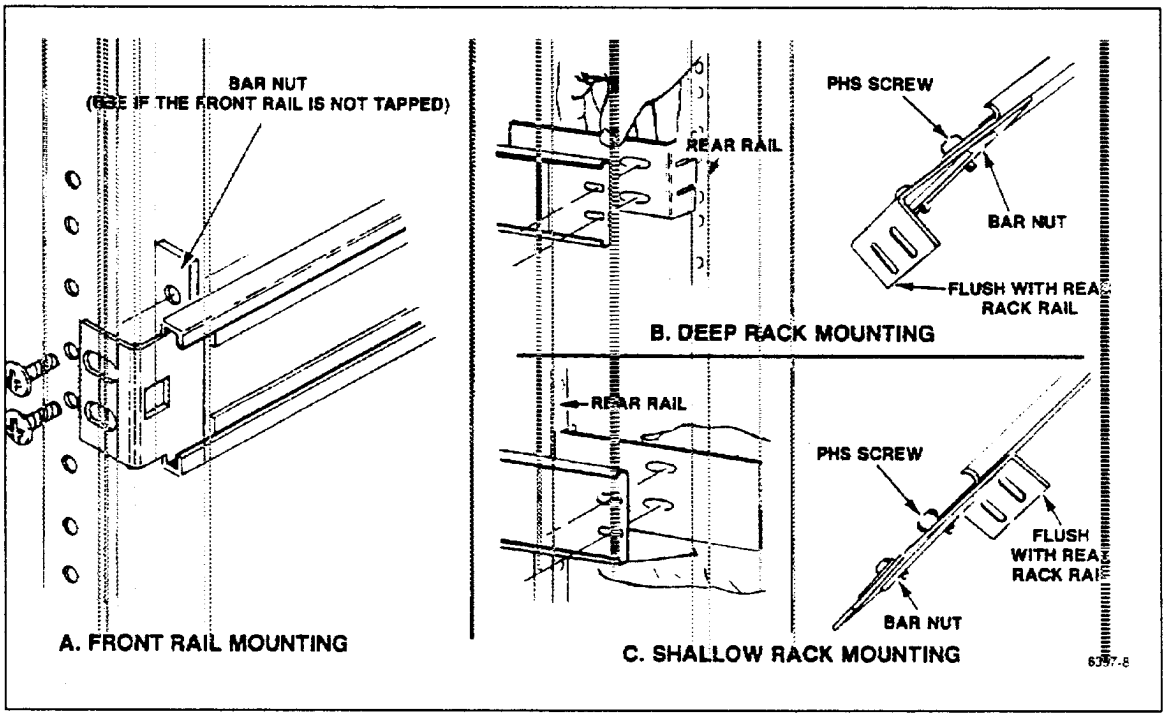


Figure B-5. Rack Mounting Methods

Track Adjustment

To adjust the tracks for smooth operation, loosen the screws that hold the front flanges of the stationary sections to the rack sides. Center the assembly, allowing the tracks to seek their proper position, then tighten the screws.

Track Lubrication

The tracks require no lubrication because of their special finish.

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