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# Instruction Manual

Tektronix

## VX1410 IntelliFrame™
## VXIbus Mainframe

## 070-9019-04

**Warning**
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the Safety Summary prior to performing service.

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# General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

*Only qualified personnel should perform service procedures.*

## Injury Precautions

**Use Proper Power Cord**

To avoid fire hazard, use only the power cord specified for this product.

**Avoid Electric Overload**

To avoid electric shock or fire hazard, do not apply a voltage to a terminal that is outside the range specified for that terminal.

**Ground the Product**

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

**Do Not Operate Without Covers**

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

**Use Proper Fuse**

To avoid fire hazard, use only the fuse type and rating specified for this product.

**Do Not Operate in Wet/Damp Conditions**

To avoid electric shock, do not operate this product in wet or damp conditions.

**Do Not Operate in Explosive Atmosphere**

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

## Product Damage Precautions

**Use Proper Power Source**

Do not operate this product from a power source that applies more than the voltage specified.

**Provide Proper Ventilation**

To prevent product overheating, provide proper ventilation.



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**Do Not Operate With Suspected Failures**

If you suspect there is damage to this product, have it inspected by qualified service personnel.

## Safety Terms and Symbols

**Terms in This Manual**

These terms may appear in this manual:



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



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

**Terms on the Product**

These terms may appear on the product:

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

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

CAUTION indicates a hazard to property including the product.

**Symbols on the Product**

The following symbols may appear on the product:



DANGER
High Voltage



Protective Ground
(Earth) Terminal



ATTENTION
Refer to
Manual



Double
Insulated

## Certifications and Compliances

**Compliances**

Consult the product specifications for IEC Installation Category, Pollution Degree, and Safety Class.



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# Service Safety Summary

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

### Do Not Service Alone

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

### Disconnect Power

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

### Use Care When Servicing With Power On

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

To avoid electric shock, do not touch exposed connections.



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# Preface

The VX1410 IntelliFrame Instruction Manual provides information on using the mainframe. The manual includes the following chapters:

- Getting Started provides a brief description of the VX1410 IntelliFrame, a list of accessories that accompany the mainframe, installation and configuration procedures, and a functional check procedure.
- Operating Basics provides a functional overview of the mainframe and includes illustrations of the main components.
- Reference provides reference information on the various connectors on the mainframe. It also provides details on the command set and programming information for the Enhanced Monitor option.
- Specifications lists all of the warranted characteristics, nominal traits, and typical characteristics of the mainframe.
- Adjustment Procedures provide service related command information for use with the Enhanced Monitor option.
- Performance Verification includes the performance verification procedures used to verify the advertised specifications of the mainframe.
- Maintenance is intended for qualified service personnel who need to service the mainframe. Module-level removal and replacement procedures and troubleshooting procedures are included in this chapter.
- Replaceable Parts includes a list of replaceable mechanical and electrical parts for the mainframe to be used with the maintenance chapter. It also includes the exploded view diagrams of the mainframe and options.
- Appendices include a power budget worksheet, a description of special configuration options, and SCPI Command conformance information.
- Glossary.
- Index.



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# Getting Started

This chapter provides an overview of the VX1410 IntelliFrame. It includes installation and configuration information on user-installable options.

## Product Description

The VX1410 IntelliFrame is an intelligent, 13-slot, C-size, VXIbus Mainframe. It fully complies with the VXIbus Specification 1.4 requirements and is VXI Plug & Play compatible for WIN frameworks. The mainframe has the following features:

- High output power supply
- Intelligent cooling for installed modules
- High quality auto-configurable backplane
- Optional adjustable rackmounts and cable trays
- Optional enhanced monitor

These features are explained in more detail in the following paragraphs.

### Power Supply

The VX1410 IntelliFrame provides all VXIbus voltages at levels necessary for the most demanding ATE applications. The power supply has a volt-ampere capacity of 1660 VA, but only 872 watts is usable by VXI instrument modules at any one time (see *Appendix A: Power Budget Worksheet*). The mainframe accommodates exclusively digital applications, exclusively analog applications, or combinations of both.

The power supply plugs directly into the rear of the mainframe and has no cables to disconnect. Because of this, the power supply can easily be replaced in less than three minutes, keeping downtime to a minimum. The power supply automatically sets the ranges for the appropriate input voltage and frequency; no mechanical switch is required to select the correct line voltage.

You can order the VX1410 IntelliFrame without a power supply (Option 1D). This option allows you to power the mainframe from an external power supply.

---

***NOTE.*** *If you order your mainframe with Option 1D, all safety, electrical, and environmental specifications no longer apply for the mainframe.*

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### Intelligent Cooling

The VX1410 IntelliFrame provides optimal cooling for all installed modules. The mainframe uses an intelligent, adaptive cooling scheme to efficiently remove heat while maintaining quiet operation. The mainframe monitors the temperature rise above each slot and automatically adjusts the fan speed to keep the temperature rise to approximately 10° C, or less, for the warmest module. You can also manually set the fan to full speed to provide maximum cooling.

Air is exhausted at the sides of the mainframe allowing you to stack the mainframe with other rackmount equipment. You don't have to to worry about restricting any airflow out of the top of the mainframe or creating a chimney effect.

Cooling is not wasted on empty slots. IntelliGuides automatically direct air to only those slots containing modules; empty slots are shut off. The mainframe directs airflow across each installed module from the bottom to the top of each slot. Baffles balance the airflow from the front to back and across occupied slots in the mainframe.

You can easily remove the air filter from the rear of the mainframe within a matter of seconds. The fans can be easily replaced without disassembling the entire mainframe.

### Backplane

The VX1410 IntelliFrame has an autoconfigurable, solid-state backplane that uses electronic jumpering of the IACK and BUS GRANT signal lines. There are no jumpers to move or install on the backplane. This results in a high quality backplane that is ideal for ATE systems that must be reconfigured frequently.

Full differential distribution of the CLK10 signals provide a clean timing source for your VXIbus instruments.

### Optional Rackmounts and Cable Trays

You can order the VX1410 IntelliFrame with user-installable rackmounts and cable trays. Two different cable trays are available, 1.75-inch deep (Option 1U), and the 3.5-inch deep (Option 2U). The cable trays provide a means to conveniently route cables from the front of the modules to the rear of the mainframe. Options 1U and 2U include a 1.75-inch and a 3.5-inch butch plate respectively. You can install Option 1U to provide a 1.75-inch, 2.5-inch, or 4.25-inch deep cable tray. Similarly, you can install Option 2U to provide a 3.5-inch, 4.25-inch, or 6.0-inch deep cable tray.

The rackmount adapters let you recess the mainframe from the front panel mounting surface at specified depths from 0.735 inches to 5.735 inches in 0.5-inch increments. Similarly, you can configure the mainframe to extend out of the front of the rack at specified depths (0.57 inches to 5.57 inches in 0.5-inch increments).



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You can install the rackmount kits along with the cable trays to provide vertical cable access to easily route cables to instruments above or below the mainframe while keeping lead lengths as short as possible.

You can also install an optional Lexan door with the rackmount kit.

***NOTE.*** *If you choose to extend the mainframe out of the front of the rack, the mainframe cannot accept a door.*

Instructions for installing the cable trays begin on page 1–7 and instructions for the rackmounts begin on page 1–12.

## Optional Enhanced Monitor

The optional enhanced monitor (Options 1M and 2M) lets you monitor the power supply voltages, slot temperature rises, fan speeds, and other VXIbus system activity via the VXIbus or a rear RS-232 interface. The Option 1M also includes a 20-character alphanumeric display on the front panel with scroll keys for manual viewing for mainframe status.

## Options and Upgrade Kits

Table 1–1 lists the VX1410 IntelliFrame options and upgrade kits that you can purchase and install separately. Contact your local Tektronix representative for information on the upgrade kits.

**Table 1–1: VX1410 IntelliFrame Options and Upgrade Kits**

| Description | Option | Part Number |
|---|---|---|
| Rackmount Kit with Rack Slides | 1R | 020-2117-XX |
| Rackmount Kit with Rack Slides and Lexan Door | 2R | 020-2118-XX |
| Rackmount Kit (without Rack Slides and Lexan Door) | – | 020-2136-XX |
| Cable Tray Kit | 1U | 020-2119-XX |
| Cable Tray Kit | 2U | 020-2120-XX |
| Enhanced Monitor Kit | 1M | 040-1480-XX |
| Enhanced Monitor Kit (without front panel display) | 2M | 040-1581-XX |
| Delete Power Supply | 1D | – |



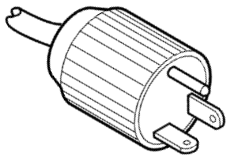
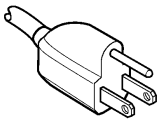
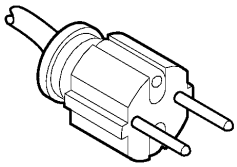
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## Standard Accessories

The VX1410 IntelliFrame comes with the following standard accessories:

- *VX1410 IntelliFrame Instruction Manual*
- One single-slot panel filler (Tektronix part number 333-4170-00)
- Six double-slot panel fillers (Tektronix part number 333-4169-00)
- Two Power cords (voltage range and plug type varies according to country, see Table 1–2)
- Line fuse, 15 A, 250 V
- Line fuse, 20 A, 250 V
- Line fuse, 6.3 A, 250 V
- VXI Plug & Play Floppy disk (See the Readme file on disk for installation information)
- Enhanced monitor upgrade kit (Tektronix part number 040-1480-XX)

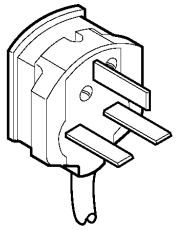
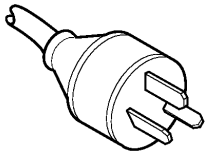
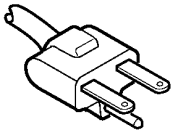
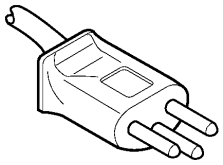
**Table 1–2: Power Cord Identification**

| Plug Configuration | Normal Usage | Option Number |
|---|---|---|
|  | North American<br>115V/15A Plug<br>NEMA 5-20P | Standard |
|  | North America<br>250V/13A Plug<br>NEMA 5-15P | Standard |
|  | Europe<br>230 V | A1 |



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**Table 1–2: Power Cord Identification (Cont.)**

| Plug Configuration | Normal Usage | Option Number |
|---|---|---|
|  | United Kingdom<br>230 V | A2 |
|  | Australia<br>230 V | A3 |
|  | North America<br>230 V | A4 |
|  | Switzerland<br>230 V | A5 |

## Optional Accessories

The VX1410 IntelliFrame has the following optional accessories:

- RS-232C Cable, DB9 female X DB9 female, serial null modem (Tektronix part number 012-1379-XX)
- AC to DC low voltage converter supply to externally supply power to the Enhanced Monitor (Options 1M and 2M) (Tektronix part number 119-5061-XX)
- US Power cord for the external supply (Tektronix part number 161-0066-00)
- Option A1 Power cord for the external supply (Tektronix part number 161-0066-09)
- Option A2 Power cord for the external supply (Tektronix part number 161-0066-10)



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- Option A3 Power cord for the external supply (Tektronix part number 161-0066-11)
- Option A4 Power cord for the external supply (Tektronix part number 161-0066-12)
- Option A5 Power cord for the external supply (Tektronix part number 161-0154-00)
- Single-wide EMI panel fillers (Tektronix part number 333-4092-00)
- Double-wide EMI panel fillers (Tektronix part number 333-4092-01)
- EMI intermodule shields (Tektronix part number 337-4041-XX)
- Backplane EMI DIN shields (Tektronix part number 337-4057-XX)

## Selecting the Correct Power Cord and Fuse

The VX1410 IntelliFrame comes standard with two power cords and three fuses. Before installing the mainframe, you must determine the correct fuse and power cord for your application. Use the following information to determine the appropriate power cord and line fuse for the VX1410 IntelliFrame. This information is important to avoid overloading the power distribution system and to comply with the National Electrical Code.

For card cage loads in the nonshaded region of Figure 1–1, use the power cord with the 15 A plug (Tektronix part number 161-0213-XX) or the power cord with the 20 A plug (Tektronix part number 161-0218-XX). For high card cage loads combined with low input line voltages (shaded region), use only the power cord with the 20 A plug.



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Select the proper fuse based on the ranges shown in Figure 1–1.

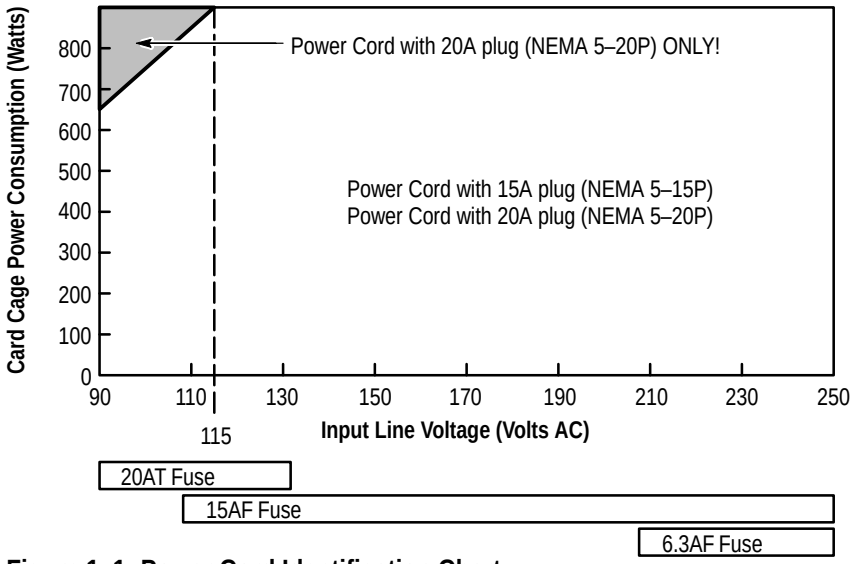



**Figure 1–1: Power Cord Identification Chart**

## Installation

This section describes the procedures to install your mainframe. It includes procedures for installing the mainframe with the rackmount or cable tray options.

This section does not include specific procedures for installing modules in the mainframe. Refer to your module documentation for information regarding the module installation instructions.

### Site Considerations

The VX1410 IntelliFrame is designed to operate on a bench or in a rackmount environment. For proper cooling, allow at least two inches (5.1 cm) of clearance on the rear and sides of the mainframe. Determine how you will use your VX1410 IntelliFrame and follow the appropriate installation instructions. If you ordered your mainframe with one of the cable tray options and one of the rackmount options, install the cable trays before installing the rackmount.



***WARNING.*** *Use care when lifting or moving the mainframe to avoid personal injury while performing the installation procedures.*

### Cable Tray Installation

The VX1410 IntelliFrame comes a with 0.75-inch cable access area on the bottom of the mainframe (1-inch with the feet installed for bench-top operation). You can order the mainframe with the optional cable trays and install the cable



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trays following the procedures in this section. Both options come with butch plates to mount cable connectors at the rear of the cable trays.

Both cable tray options can be installed three different ways as shown in the following illustrations. In each example, place the mainframe upside-down or on one of the sides on a clean working surface and follow the instructions in the illustrations. To install the cable trays you need a T-15 and a T-20 Torx Driver.

Figure 1–2 on page 1–9 shows how to install Option 1U to provide a cable tray depth of 1.75 inches. Similarly, you can install Option 2U to provide a cable tray depth of 3.5 inches.

Figure 1–3 on page 1–10 shows how to install Option 2U to provide a cable tray depth of 4.25. Similarly, you can install Option 1U to provide a cable tray depth of 2.5 inches.

Figure 1–4 on page 1–11 shows how to install Option 2U to provide a cable tray depth of 6.0 inches. Similarly, you can install Option 1U to provide a cable tray depth of 4.25 inches.

You can modify the butch plate to accept cable connectors at the rear of the mainframe. Specific instructions for modifying the butch plate are not given since the locations, types, and size of connectors vary with each application.



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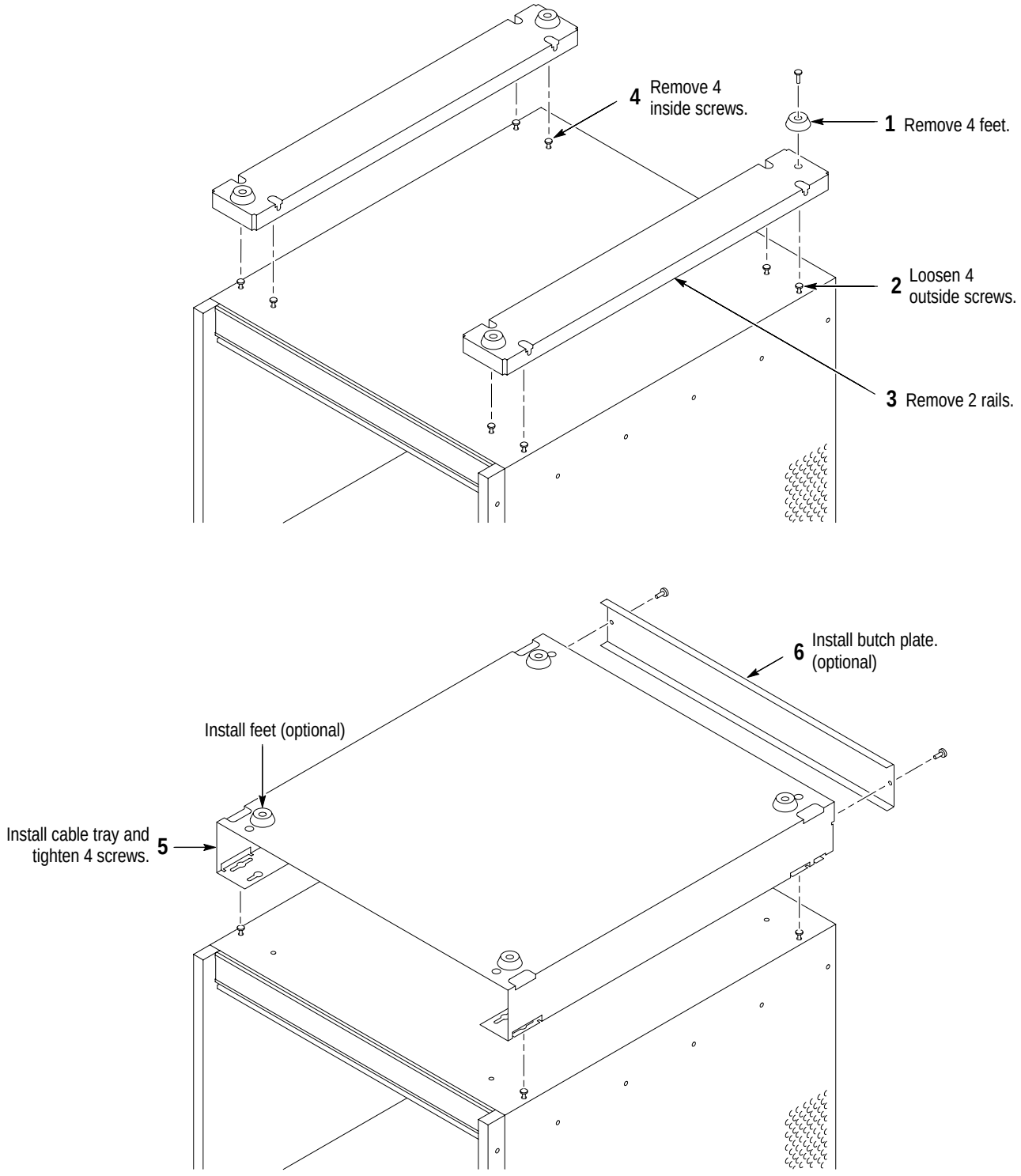



**Figure 1–2: Installing the Option 1U 1.75-inch Deep Cable Tray (Option 2U 3.5-Inch Deep Installation is Similar)**



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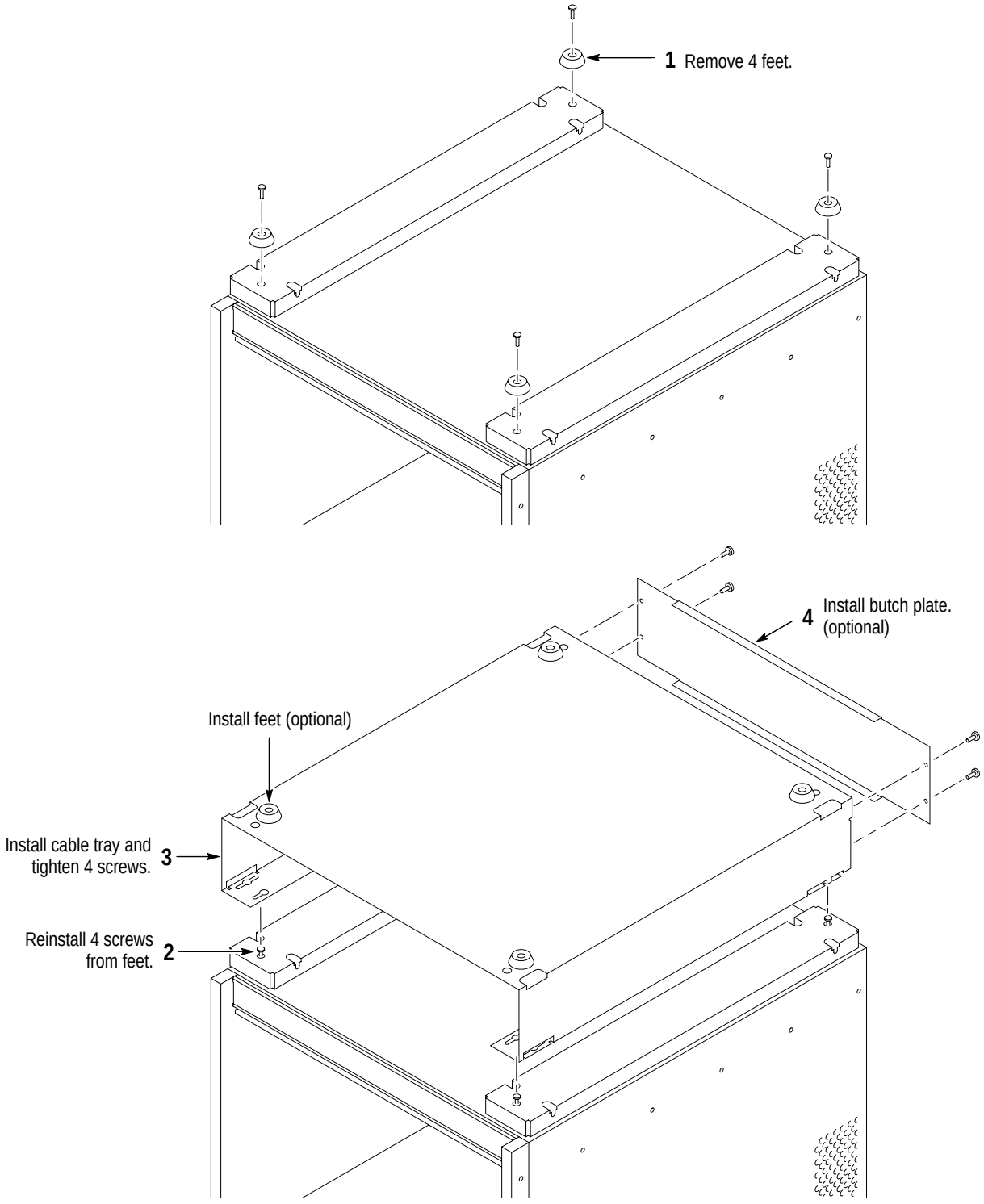



**Figure 1–3: Installing the Option 2U 4.25-inch Deep Cable Tray (Option 1U 2.5-Inch Installation is Similar)**



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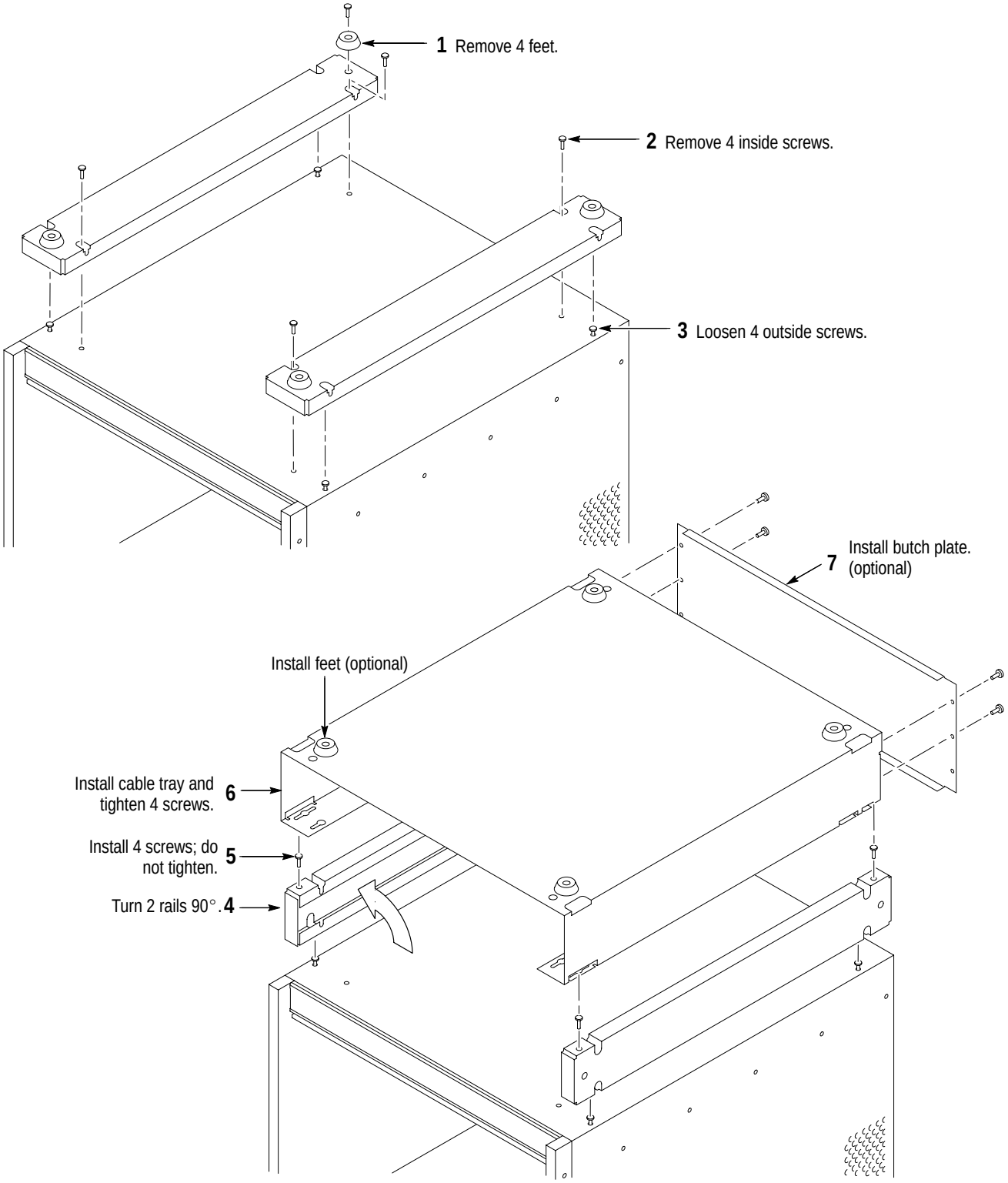



**Figure 1–4: Installing the Option 2U 6.0-Inch Deep Cable Tray (Option 1U 4.25-Inch Deep Installation is Similar)**



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## Remote Power Configuration

The VX1410 IntelliFrame allows you to power on and power off the mainframe from the rear panel as well as the front panel On/Standby switch. Alternately, you can disable the front panel On/Standby switch. If you decide to bypass the front panel On/Standby switch, you should configure the mainframe before installing the rackmount hardware. Refer to *Appendix B: Special Configuration Options* and then return to this section to continue the installation procedures.

If your mainframe has the Enhanced Monitor, you can power on the mainframe through VXI and RS-232 commands. If you apply external power to the Enhanced Monitor, you can you can also power off the mainframe using RS-232 commands.

## Rackmount Installation

The procedures for installing the rackmount kits are nearly identical for the Option 1R and 2R kits. You can install the Option 1R kit to either recess the mainframe from the front of the mainframe rack or to extend it out of the mainframe rack. However, you can only install the Option 2R kit so that the mainframe recesses into the rack.

The steps for installing the rackmount kits consist of installing the rackmount hardware to the mainframe and then installing the mainframe in the rack.

You will need the following tools to install the rackmount options:

- T-15 Torx Driver
- T-20 Torx Driver
- #2 Phillips Screw Driver

## Install the Rackmount Kit Hardware

Refer to Figure 1–5 and perform the following steps to install the rackmount kit hardware:

1. Remove the rubber feet from the mainframe.
2. Determine whether you want to install the VX1410 IntelliFrame so that it extends out of the rack or is recessed within the rack.

   If you want to extend the VX1410 IntelliFrame from the front of the rack, position the rackmount bracket as shown on the right side of Figure 1–5. If you want to recess the VX1410 IntelliFrame in the rack, position the rackmount bracket as shown on the left side of Figure 1–5.
3. Determine how far you want to recess or extend the VX1410 IntelliFrame and install the rackmount adapter as shown using two 8-32 screws (included with the kit). Similarly, install the other bracket on the other side of the mainframe.



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***NOTE.*** *To comply with VXI Plug & Play mounting specifications, position the rackmount adapter at the mounting holes with the adjacent identifier keys (See Figure 1–5). This results in 3.960 inches (10.06 cm) from the module panel mounting surface to the rack frame mounting surface.*

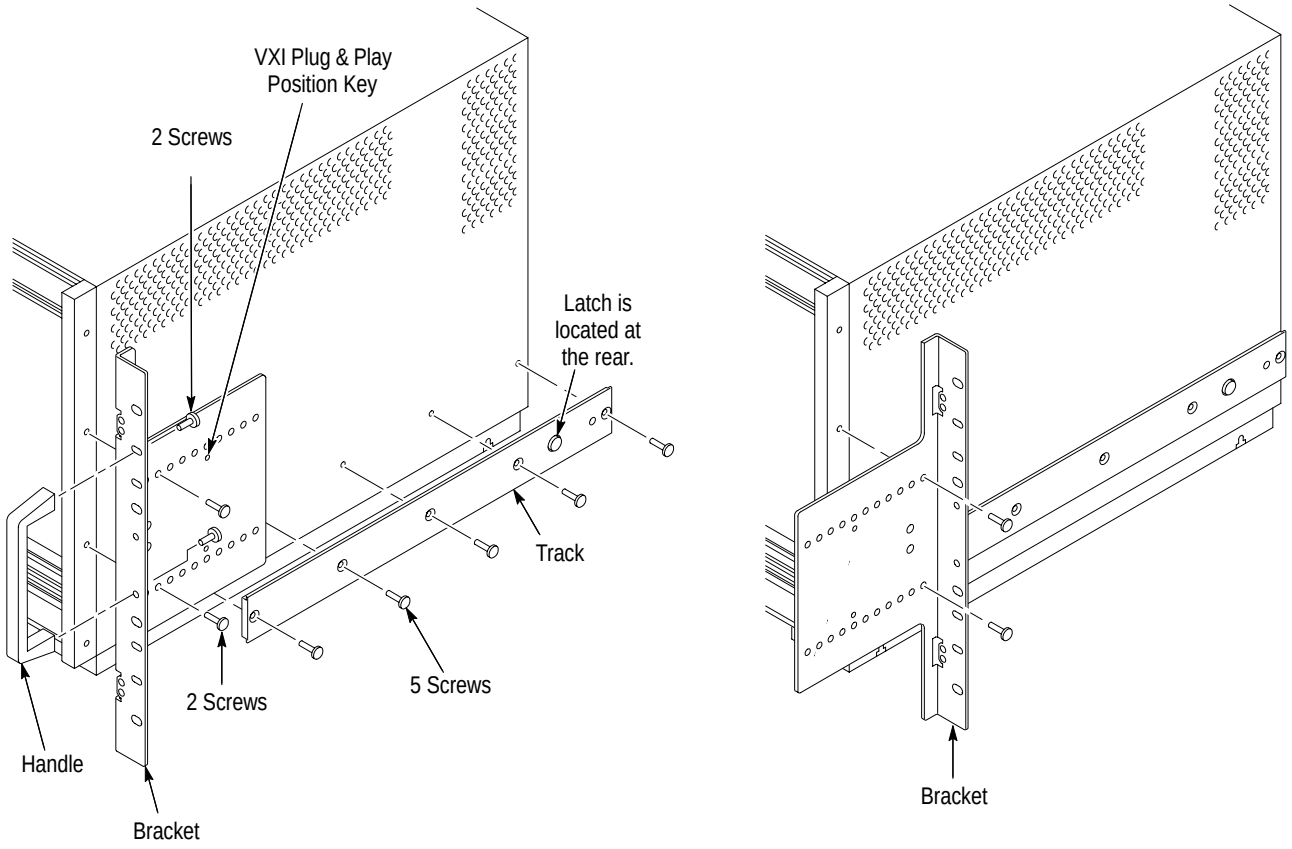



**Figure 1–5: Installing the Rackmount Kit Hardware**

4. Remove the five 8-32 screws from both sides of the mainframe.
5. Attach the left and right inside tracks to the sides of the VX1410 Intelli-Frame using five 8-32 flathead screws. Orient the button latch so that it faces away from the mainframe and toward the rear.



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## Install the Mainframe in the Rack

Use the following procedure to install the VX1410 IntelliFrame in the rack:

1. Identify the right and left slide-out track assemblies: find the date code label on each assembly. The assembly to be mounted in the left side of the rack (the side nearest the left side of the mainframe when it is mounted in the rack) has a date code that ends with LH (for left hand). The right assembly has a date code ending with RH.
2. Measure the distance between the front and rear rail of the rack.
3. Align the rear bracket to the right slide-out track as shown in Figure 1–6. Note that the rear bracket has two pairs of mount-through holes. When aligning the bracket and the track, select a pair of holes that mount the rear bracket so the flange-to-flange distance (see Figure 1–6) matches the front rail to rear rail spacing that you just measured in step 2.

***NOTE**. If necessary, refer to the rackmount kit instructions for detailed installation information.*

4. Attach the rear bracket to the right slide-out track using two 10-32 screws and a bar nut as shown in Figure 1–6. Leave the screws loose so that you can adjust the overall length of the slide-out track assembly when installing the mainframe in the rack.
5. Repeat steps 3 and 4 to assemble the left slide-out track assembly.

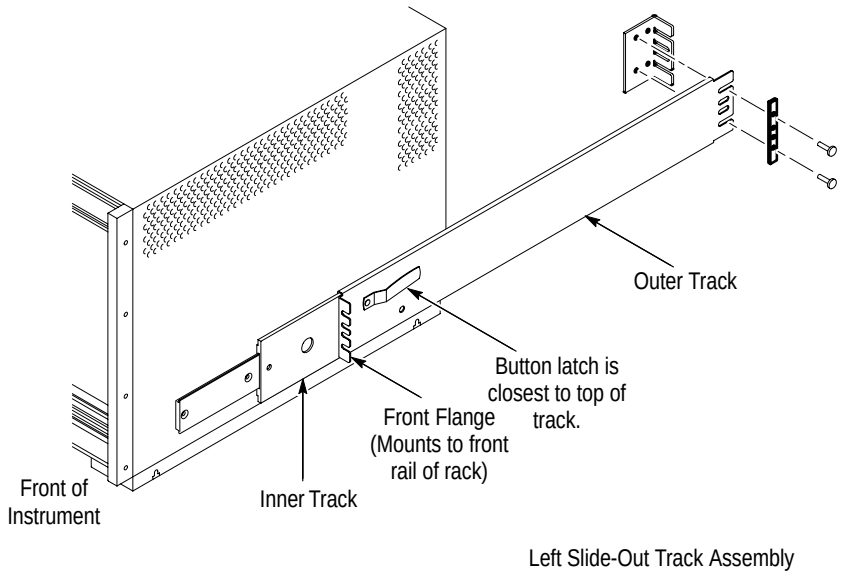



**Figure 1–6: Assembling the Slide-Out Track Assemblies**



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6. Select the mounting position in the rack: select two 0.5-inch spaced holes in the front rail and verify that the 1.5-inch and 14.00-inch clearances exist relative to the mounting holes as shown in Figure 1–7.

***NOTE.*** *The 14-inch vertical clearance is only valid for the mainframe without the rubber feet and cable trays. Refer to Figures 4–2, 4–3, and 4–4 on pages 4–10, 4–11, and 4–12 for information on vertical clearances of the mainframe with cable tray options.*

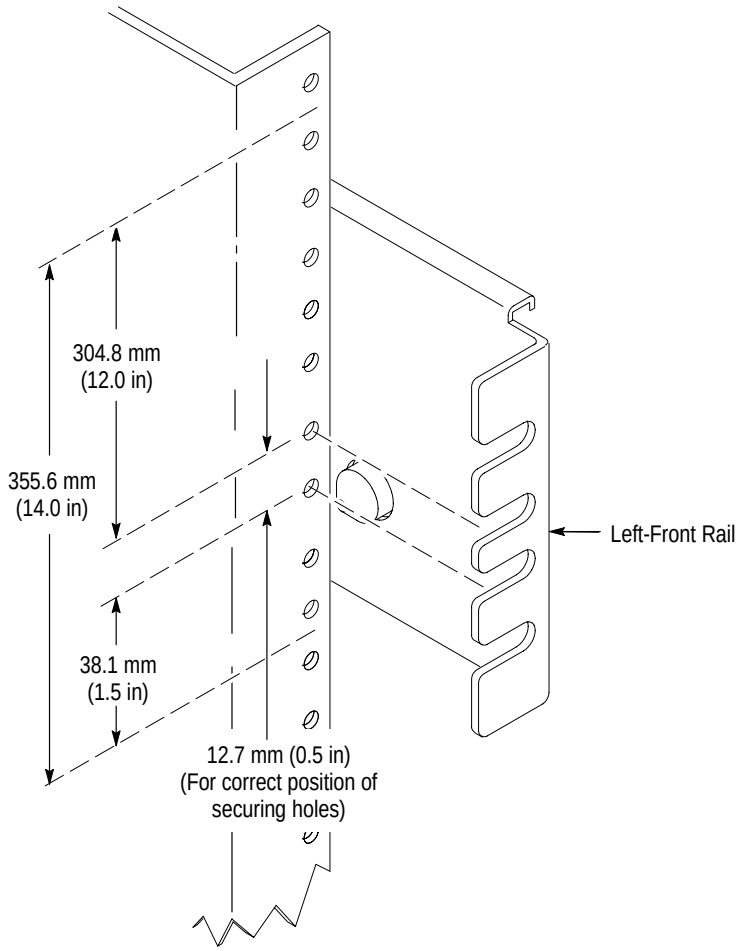



**Figure 1–7: Vertical Clearance for Rack Installation (Standard Mainframe)**



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7. Select the mounting method according to the rack type.

   To mount the slide-out tracks with the front and rear flanges outside of the front and rear rails, use method A shown in Figure 1–8 when doing step 8. Add a bar nut to the installation only if the rails have untapped holes.

   To mount with front and rear flanges inside of the rails, use mounting method B shown in Figure 1–8 when doing step 8. This mounting method assumes untapped holes.

8. Using the mounting method determined from the previous step, secure the right slide-out track assembly to the front and rear rails. Seat the screws fully, but lightly, to adjust the mounting later.

9. Tighten the screws left loose in step 4 to fix the front to rear flange spacing of the slide-out track assembly.

10. Repeat steps 6 through 9 to mount the left slide-out track assembly.

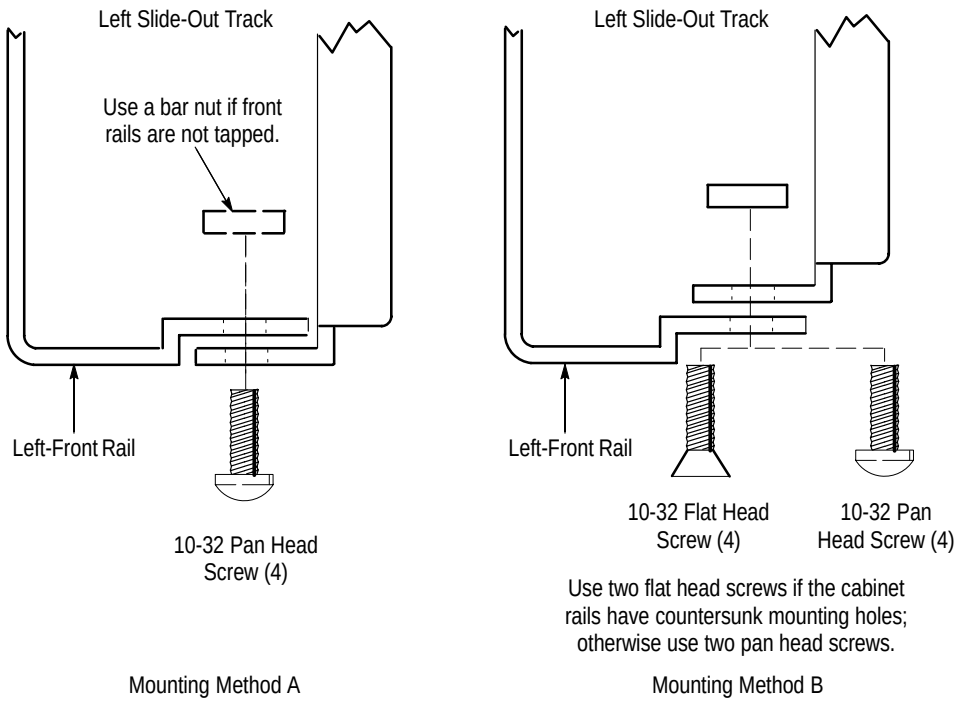



**Figure 1–8: Installing the Slide-Out Track Assemblies in the Rack (Top View)**



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***WARNING.*** *Installing the VX1410 IntelliFrame in the rack requires at least two people. Because of the size and weight of the mainframe, installing the mainframe alone can result in personal injury or equipment damage. One person should be on the left side of the mainframe with one hand holding the left front handle and with the other hand underneath the mainframe. The other person should do likewise on the right side of the mainframe.*

11. Fully extend the inner tracks of each slide-out section out of the front of the rack until they lock.
12. Lift the mainframe and insert the left and right tracks that extend from the rear of the mainframe into the ends of the tracks that you just extended. Make sure that the tracks mounted on the mainframe slip just inside the inner tracks that you extended earlier.
13. Slide the mainframe back until it stops.
14. Push to release the button latches, located on the outside of each track, and continue to slide the mainframe all the way back into the rack cabinet.
15. Tighten the four screws that you left loose at the rear of the rack when you performed step 8 and pull the mainframe part way out of the rack. (Tighten the 10-32 screws using 28 inch-lbs of torque.)
16. Be sure that the screws that you left loose at the front of the rack are loose enough to allow the slide-out track assemblies to seek the normal positions.
17. Tighten the screws and push the mainframe all the way into the rack. If the tracks do not slide smoothly, readjust the level using the method described in steps 15 and 16. (Tighten the 10-32 screws using 28 inch-lbs of torque.)
18. Install the proper power cord at the rear of the mainframe.

## Install the Option 2R Rackmount Door

Refer to Figure 1–9 and perform the following steps to install the rackmount door for Option 2R:

1. Install the bottom halves of the two hinges to the left rackmount bracket as shown in Figure 1–9.
2. Install the top halves of the hinges on the door.
3. Install the catch on the right rackmount bracket.

   You can adjust the catch position forward or back to assure a flush fit between the door and the rackmount bracket.
4. Lift the rackmount door and mate the door with the hinges.



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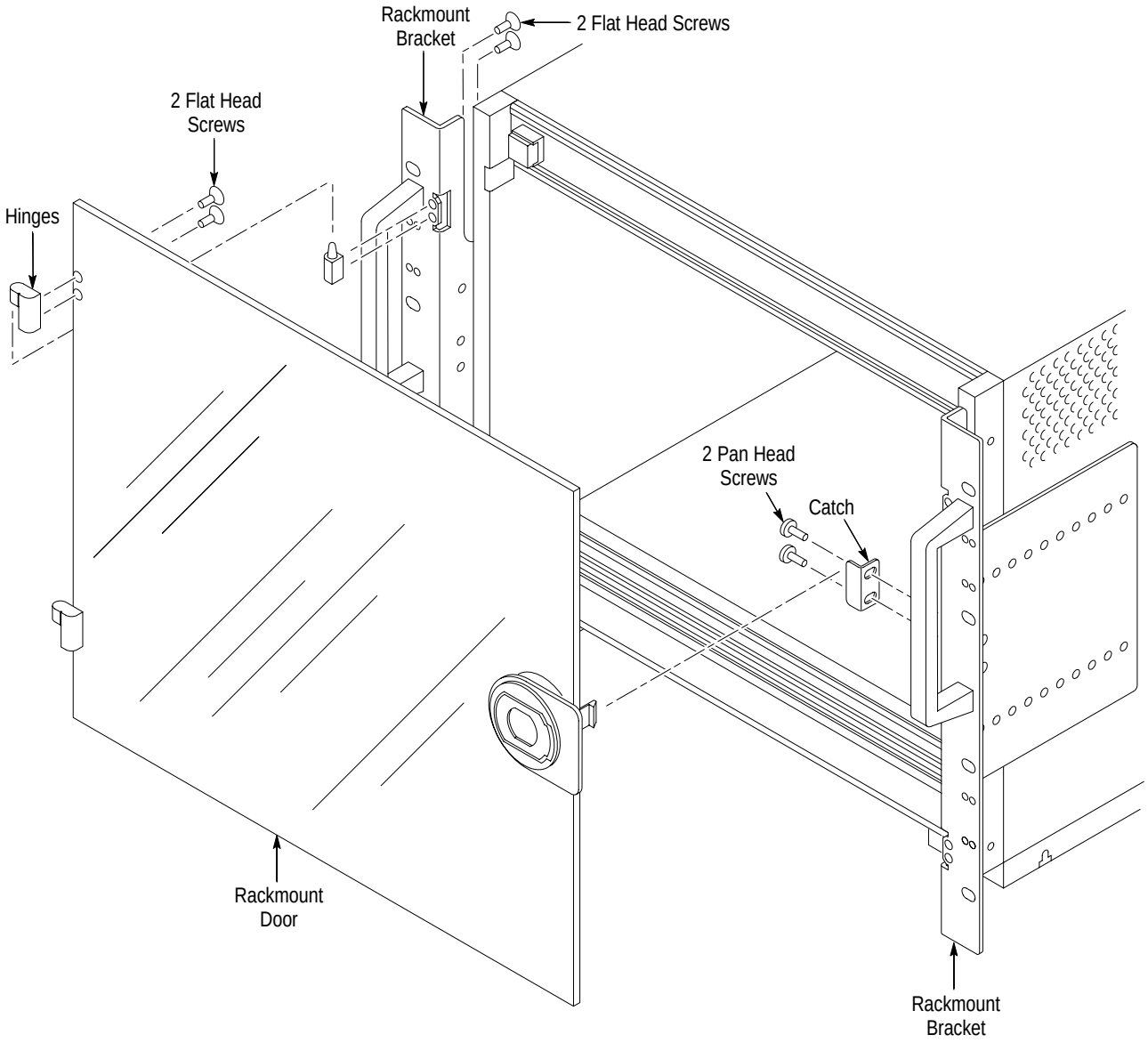



**Figure 1–9: Installing the Rackmount Door (Option 2R)**



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# Configuration

After installing the mainframe you are ready to configure it for your applications. If you have not already done so, install your VXIbus modules in the mainframe following the installation guidelines for your VXIbus module.

***NOTE.*** *If some VXI modules do not install fully into the mainframe, it may be necessary to remove the shutter and spring from the card guide. For some double-wide modules it may be convenient to remove only one of the shutters instead of disassembling the shutter. To remove the card guides refer a qualified service person to* Procedure 4: Removing the Card Guides *beginning on page 7–9 in the Maintenance chapter.*

## Module Selection and Design Guidelines

The VX1410 IntelliFrame is UL listed to UL 3111-1 and CAN/CSA C22.2 No. 1010.1 and is IEC 1010-1 compliant. You should use VXIbus modules with the mainframe that are listed or designed to limit electric shock and fire.

- Investigate the possibility of fire hazards due to the availability of power from the mainframe exceeding 150 W per slot. Use similar considerations for VXIbus Modules that externally receive power greater than 150 W per slot.
- Printed wiring boards should be flame rated UL 94V–1 or better.
- To prevent possible electrical shock, limit the voltage to the mainframe interface or chassis to less than 60 VDC, 30 $V_{RMS}$, or 42.4 $V_{pk}$.
- Ensure that temperature measuring inputs provide a means of limiting unintended voltages that may reach the mainframe interface or chassis to less than 60 VDC, 30 $V_{RMS}$, or 42.4 $V_{pk}$.



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## Install Empty Slot Panel Fillers

If you have any unused (empty) slots in your mainframe, you may install the empty slot Panel Fillers. Install either the single-wide or double-wide fillers that came with your mainframe. Use only Tektronix front panels; otherwise the shutters may activate, effectively robbing airflow from installed modules. Installing the fillers provides improved cooling for installed modules, improved EMI shielding, and more accurate air temperature sensing to control the fan speeds.

Refer to Figure 1–10 for information on installing the slot fillers.

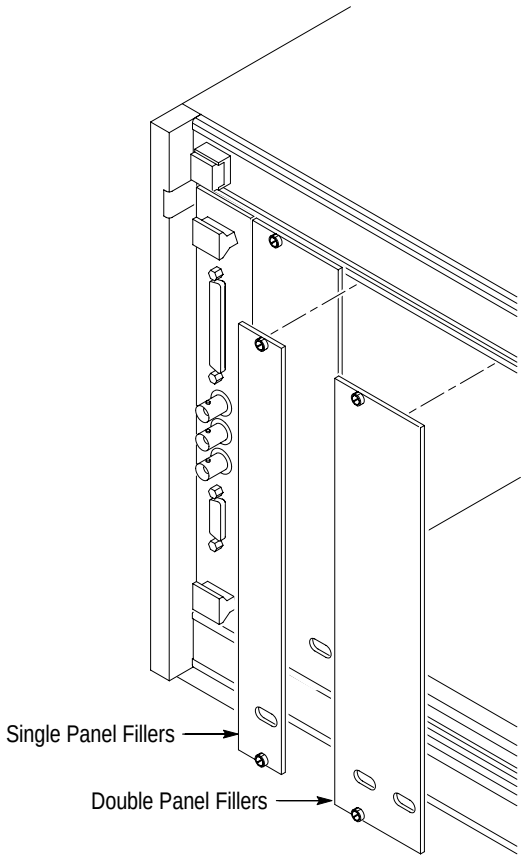



**Figure 1–10: Installing the Empty Slot Panel Fillers**



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## Safety and Chassis Grounds

The left rear of the VX1410 IntelliFrame has a connection point for the chassis ground (see Figure 1–11). The safety ground screw must always be in place to ensure the proper bonding of the power supply to the mainframe. You can use the chassis ground connection to connect the grounds of one or more instruments to the mainframe. This ensures a common ground connection between instruments.

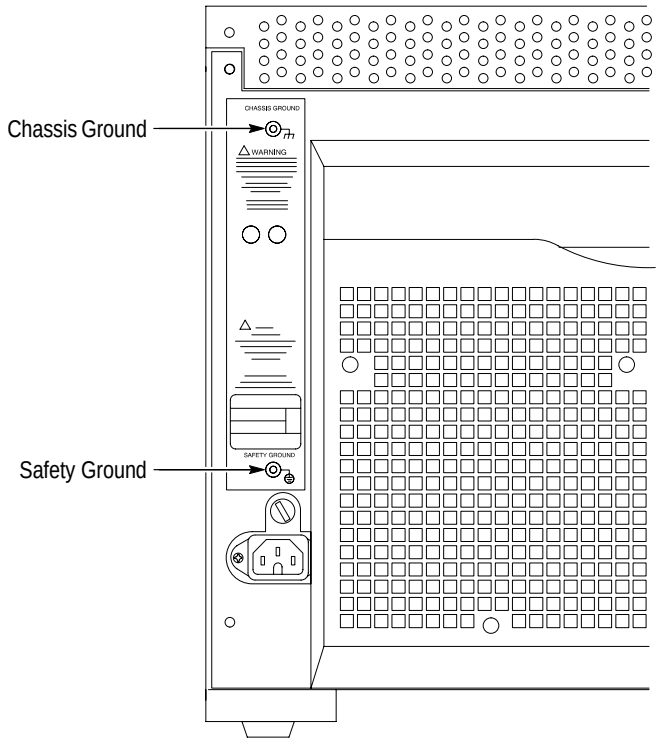



**Figure 1–11: Locations of Safety and Chassis Ground Connections on Left Rear of the Mainframe**



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## EMI Configurations

Perform the following steps if you intend to install the optional EMI shields (part numbers are listed under *Optional Accessories* on page 1–5):

1. To install the Backplane EMI DIN shields, determine the slot connectors where you want to install the shields.
2. Remove any modules surrounding the slots where you intend to install the Backplane EMI DIN shields.
3. Refer to Figure 1–12 and install the shields over the backplane connector.
4. Mount the connector in place using two 4-20 thread forming screws.
5. Reinstall any modules that you removed in step 2.

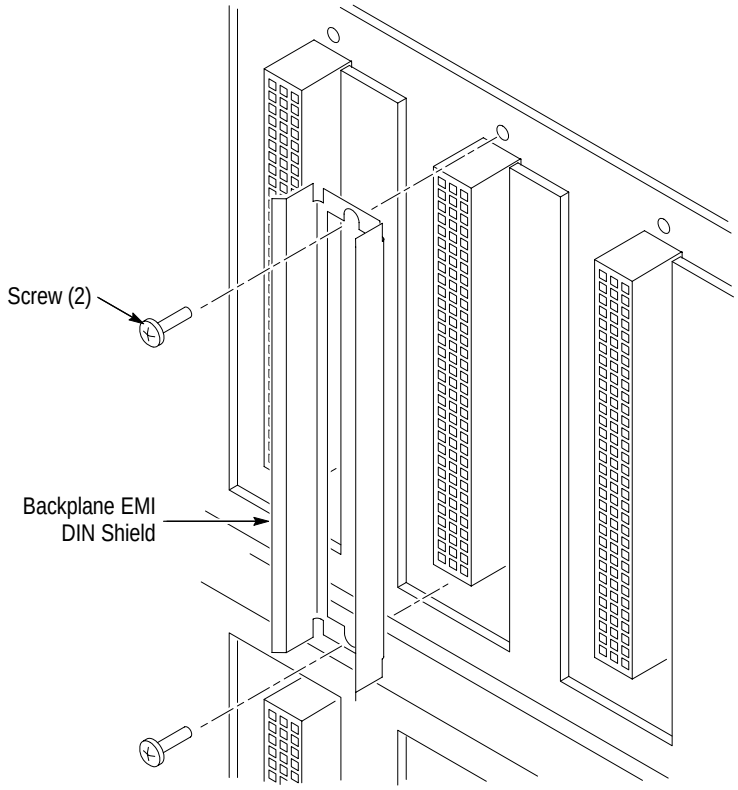



**Figure 1–12: Installing the Backplane EMI DIN Shields**

***NOTE.*** *It is only necessary to install the EMI intermodule shields if your VXIbus module does not have EMI shielding.*



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6. Refer to Figure 1–13 and slide the EMI intermodule shields between the grooves of the card guide on one side of each installed VXIbus module. This is recommended to use with unshielded modules; the shielding may not be compatible with some modules. The shield conforms with the VXI specification for intermodule shielding.

7. Install a blank EMI front panel for each empty slot making sure that the EMI shielding is in contact with the adjacent front panel.

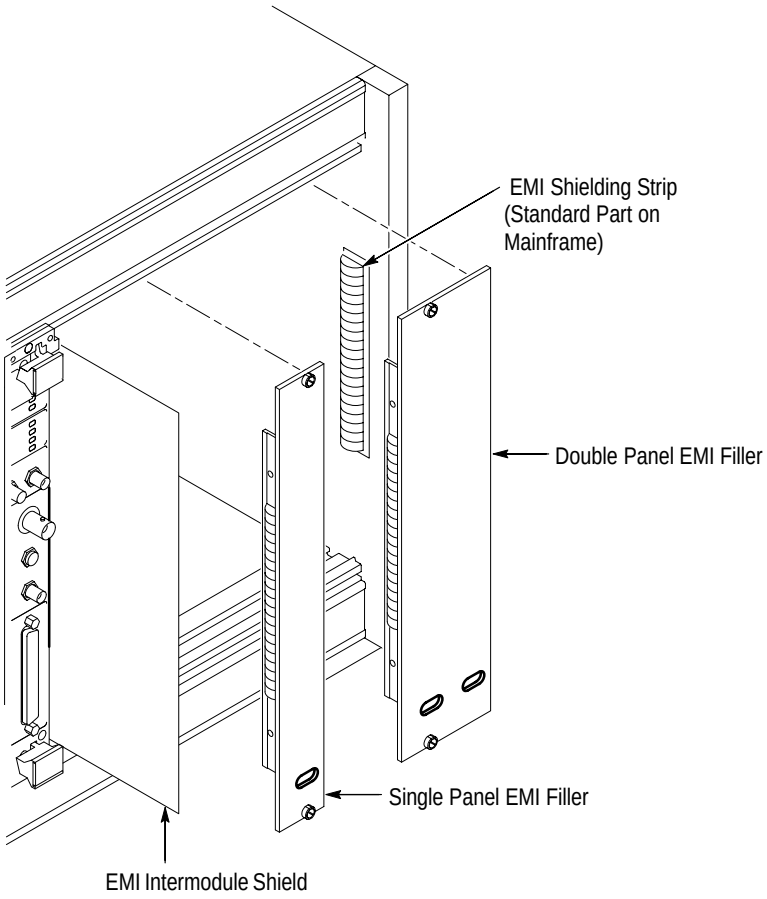



**Figure 1–13: Installing the EMI Intermodule Shield and Front Panel EMI Fillers**



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## Logical Address Switch Settings

If your mainframe includes the enhanced monitor, you can set the logical address of the mainframe with the switches on the rear panel. Figure 1–14 shows the locations of the logical address switches on the rear of the Enhanced Monitor Board.

In most cases you can leave the switches in the factory default position of FF. This allows the mainframe to dynamically configure the address. However, make sure that no other module uses the same slot address as the enhanced monitor board (determined by the position of the MODID jumper) and that the logical address of the module is not set to FF. See *Enhanced Monitor Board Jumpers* on page B–4 for information on configuring the jumpers on the Enhanced Monitor board.

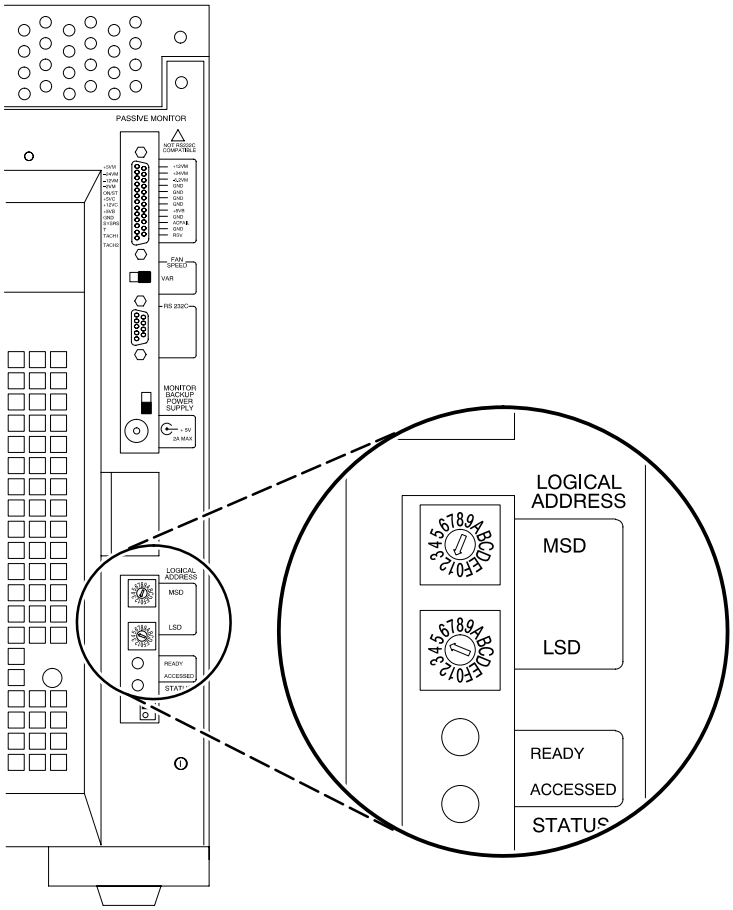



**Figure 1–14: Logical Address Switches**



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## Functional Check

Use the information in this section to determine that the VX1410 IntelliFrame operates properly. The functional check consists of checking the power supply voltages at the 25-pin connector at the rear of the mainframe with a digital voltmeter.

If your mainframe comes with the Optional Monitor (Option 1M), verify that the display shows no errors at power on. You can then verify the power supply voltages with the front-panel digital display and compare the displayed values against those in Table 1–3.

If your mainframe does not include the Optional Monitor you can measure the power supply voltages with a digital voltmeter.

Connect one lead of the voltmeter to the supply pins of the 25-pin connector on the rear panel of the mainframe. Connect the reference lead of the voltmeter to one of the ground pins. Compare each voltage reading to the values listed in Table 1–3.

**Table 1–3: Power Supply Voltages at the 25-Pin Connector**

| Pin | Supply | Acceptable Voltage Range |
|---|---|---|
| 1 | +5 V | 4.875 V to 5.25 V |
| 2 | –12 V | –12.6 V to –11.64 V |
| 3 | –24 V | –25.2 V to –23.28 V |
| 4 | –2 V | –2.1 V to –1.9 V |
| 14 | +12 V | 11.64 V to 12.6 V |
| 15 | +24 V | 23.28 V to 25.2 V |
| 16 | –5.2 V | –5.46 V to –5.044 V |
| 9, 17, 19, 20, 22, 24 | Logic Ground | |

If the voltages are within the specified ranges, your mainframe is functional.



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# Operating Basics

This chapter provides a brief overview of the VX1410 IntelliFrame including illustrations and descriptions of switches, indicators, and connectors.

Figure 2–1 shows the front view of the VX1410 IntelliFrame. All of the mainframe slots are labeled on the top and bottom of the mainframe. Slot 0 is reserved for the mainframe controller; all other slots are available for any VXIbus modules.

IntelliGuides on the bottom of each slot automatically open when you install a module with a front panel in the mainframe to provide cooling for the installed modules. The guides remain closed for empty slots to direct airflow only where it is needed.

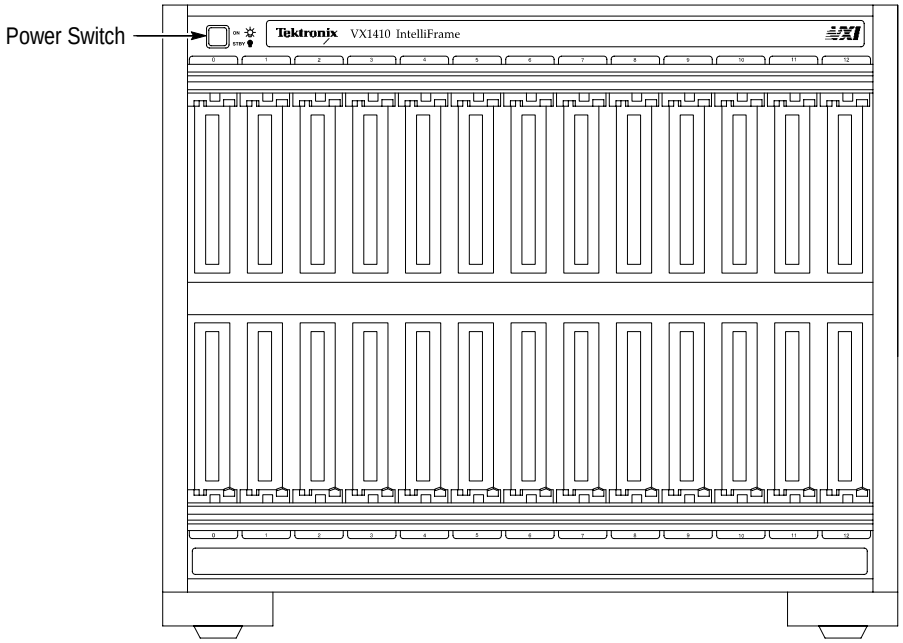



**Figure 2–1: Front View of the Standard VX1410 IntelliFrame**



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The On/Standby switch on the top-left corner of the front panel applies DC voltages to the mainframe. The switch is a momentary contact switch. The switch is lighted when DC voltages are applied to the mainframe. You can also remotely power on or power down the mainframe.

You can configure your mainframe to bypass the On/Standby switch (refer to *Remote Power Switch Configuration* in Appendix B of this manual for information on configuring the power switch). The On/Standby switch remains lighted while power is applied; however, the switch itself no longer controls the mainframe.

If you ordered your VX1410 IntelliFrame with the Enhanced Monitor (Option 1M), the mainframe includes a 20-character alphanumeric display indicating the status of the system (see Figure 2–2). The NEXT and PREV push buttons on the side of the display allow you to scroll through the display selections.

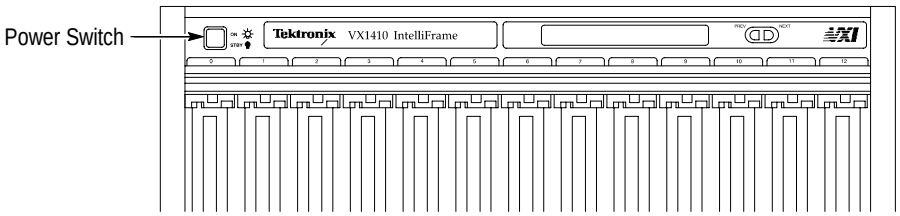



**Figure 2–2: Partial Front View of the VX1410 IntelliFrame with Option 1M**

Figure 2–3 shows the rear view of the standard VX1410 IntelliFrame.

The AC power connector is located on the bottom left side on the rear of the mainframe. The AC fuse holder is located just above the power connector.

The chassis ground screw (if installed) can be used to connect multiple mainframes to a common ground point.

The fan filter is located on the back of the mainframe. The filter slides easily into the mainframe; there is no need to remove any covers to replace or clean the fan filter.

## Standard Monitor

The Fan Speed switch controls the speed of the system cooling fan. When the switch is set to the VAR (variable) position, the mainframe automatically controls the speed of the fan depending on the air temperature and amount of cooling required by the modules. When the switch is in the FULL position, the fans operate at full speed.



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A DB-25-pin connector provides the ability to monitor the power supply voltages, fan speeds, and the maximum slot temperature rise of the mainframe. Refer to page 3–1 for information on the pinouts of the connector.

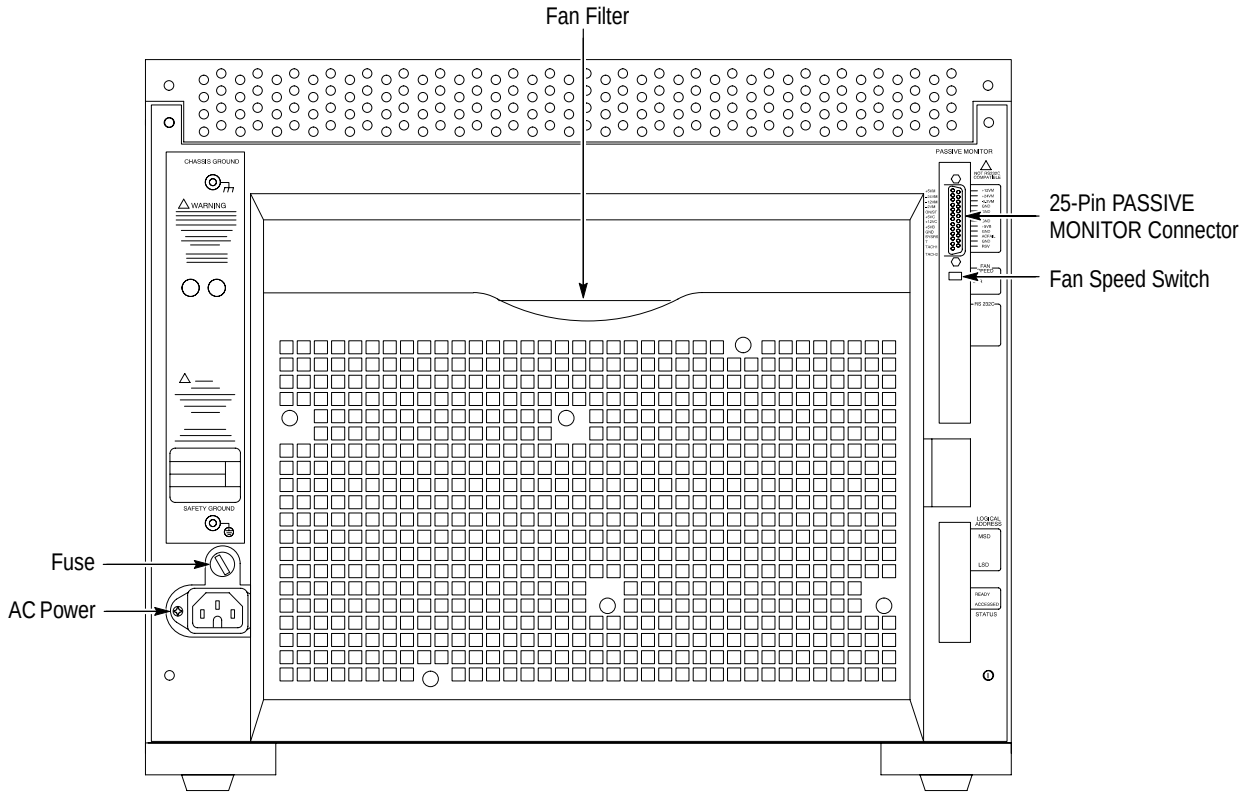



**Figure 2–3: Rear View of the Standard VX1410 IntelliFrame**

***WARNING.*** *Do not connect an RS-232 cable to the 25-pin connector. The connector is not an RS-232 connector. Connecting an RS-232 cable to the connector can result in damage to the equipment.*

## Enhanced Monitor

The Enhanced Monitor, in addition to the DB25-pin connector and the fan switch, includes a 9-pin RS-232 D-connector to provide RS-232 communication, Logical Address switches, an auxiliary power connection and status lights (see Figure 2–4). For information on the pinouts of the RS-232 connector, refer to page 3–5.



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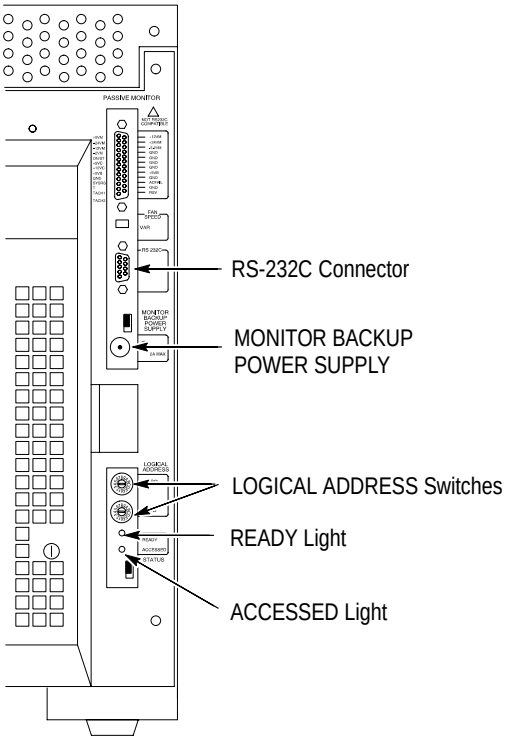



**Figure 2–4: Rear View of the VX1410 IntelliFrame with Options 1M or 2M**

The Logical Address switches are available with the Enhanced Monitor; these switches select the logical addresses for the Enhanced Monitor option. The top switch sets the most-significant digit, and the bottom switch sets the least-significant digit.

The green READY indicator lights after the power on diagnostics are complete and there are no failures. During normal operation, the light flashes if there is a pending error message. Once all error messages have been retrieved, the READY indicator stops flashing and remains on.

The amber ACCESSED indicator lights when the MODID line is accessed by the slot 0 device. Refer to *Enhanced Monitor Board Jumpers* in Appendix B for information on the jumper MODID jumper positions.

An auxiliary power connector (MONITOR BACKUP POWER SUPPLY) allows you to apply +5 volts to the Enhanced Monitor board to provide RS-232 communication with a host computer while the mainframe is not powered on. The jumper located just above the power connector determines whether you source the standby voltage from the power connector or from the 25-pin connector (refer to *Enhanced Monitor Board Jumpers* in Appendix B for information on the jumper positions).



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# Reference

This chapter provides reference information on the mainframe and its connectors. A description of the command set and information related to the Enhanced Monitor makes up the remainder of this chapter.

## Passive Monitor Connector

The 25-pin Sub-D connector lets you monitor the power supply voltages, fan speed, and the maximum slot temperature rise within the mainframe. The connector also provides remote on and off capability and access to the SYSRESET* and ACFAIL* signals. Figure 3–1 shows the pinouts of the Passive Monitor Connector. Table 3–1 describes each of the pins and its function.

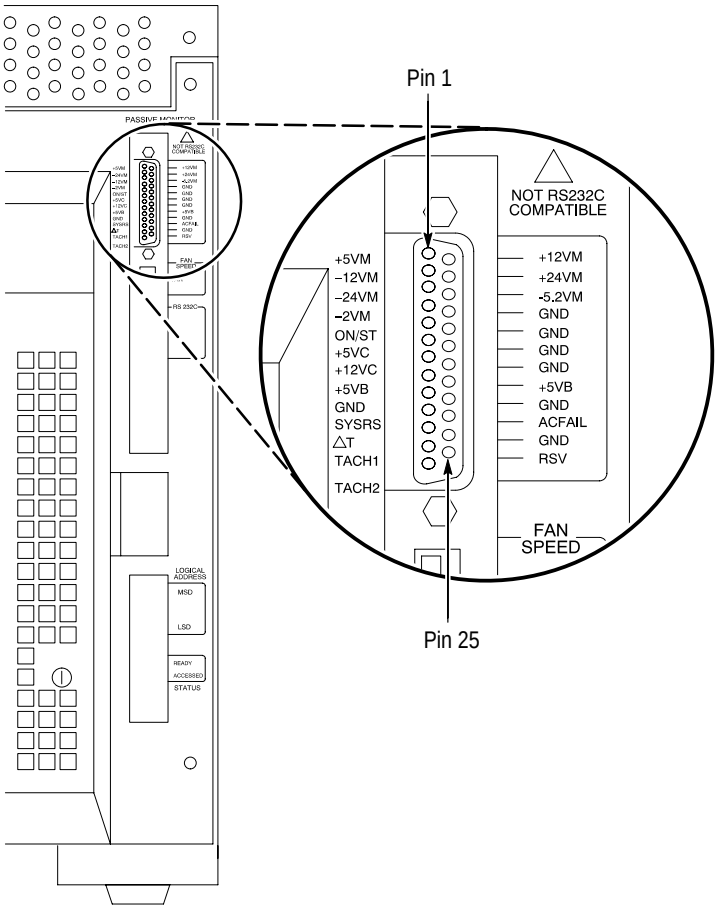



**Figure 3–1: Passive Monitor Connector**



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**Table 3–1: Passive Monitor Connector Pinouts**

| Pin | Function | Description |
|---|---|---|
| 1 | +5 VM | +5 V for voltage monitoring[1] |
| 2 | –12 VM | –12 V for voltage monitoring[1] |
| 3 | –24 VM | –24 V for voltage monitoring[1] |
| 4 | –2 VM | –2 V for voltage monitoring[1] |
| 5 | Rem Stdby | Remote On/Standby Power Switch.[2] |
| 6 | +5 VC | +5 V output for charging batteries, running external TTL circuitry, 1 A maximum |
| 7 | +12 VC | +12 V output for charging batteries, running external TTL circuitry, 1 A maximum |
| 8 | +5 VB | Input for +5 V standby voltage (for example, from an external battery). Maximum of 1 A total (pins 8 and 21 combined)[3] |
| 9 | Gnd | Logic Ground |
| 10 | SYSRESET* | Backplane SYSRESET* signal (input or output). If you use this pin, do not violate VXIbus electrical specifications (keep the extender cable as short as possible).[4] |
| 11 | ΔT | An analog output signal proportional to the maximum temperature rise of the 13 modules (100 mV/°C) |
| 12 | Tach1 | A square wave output signal proportional to the speed of Fan 1. RPM = 15 / (+Pulse Width), where (+Pulse Width) is the positive pulse width of the Tach1 fan output signal. |
| 13 | Tach2 | A square wave output signal proportional to the speed of Fan 2. RPM = 15 / (+Pulse Width), where (+Pulse Width) is the positive pulse width of the Tach2 fan output signal. |
| 14 | +12 VM | +12 V for voltage monitoring[1] |
| 15 | +24 VM | +24 V for voltage monitoring[1] |
| 16 | –5.2 VM | –5.2 V for voltage monitoring[1] |
| 17 | Gnd | Logic Ground |
| 18 | Gnd | Logic Ground |
| 19 | Gnd | Logic Ground |
| 20 | Gnd | Logic Ground |
| 21 | +5 VB | Input for +5 V standby voltage (for example, from an external battery). Maximum of 1 A total (pins 8 and 21 combined)[3] |
| 22 | Gnd | Logic Ground |
| 23 | ACFAIL* | Backplane ACFAIL* signal output. If you use this pin, do not violate the VXIbus electrical specifications (keep the extender cable as short as possible).[4] |



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**Table 3–1: Passive Monitor Connector Pinouts (Cont.)**

| Pin | Function | Description |
|---|---|---|
| 24 | Gnd | Logic Ground |
| 25 | RSV | Reserved (for Standard Monitor)<br>Request Service signal (Enhanced Monitor, Options 1M and 2M)[5] |

1 To monitor, only use a probe with greater than 1 MΩ impedance.

2 By momentarily grounding this line, the mainframe will toggle from on to off (or vice versa). The state changes on the falling edge of the signal. Hold the signal low for at least 500 ms before releasing. Attach only a momentary switch or an open collector device to drive this line. The line is pulled up to 1 V internally.

3 For Option 1M and 2M. If you use pins 8 and 21 (+5 VB) to supply +5 V Standby to the backplane, make sure that the rear panel jumper is in the correct position (refer to *Enhanced Monitor Board Jumpers* in Appendix B).

4 Refer to *VMEbus Specification Manual* for details on using the ACFAIL* and SYSRESET* signals.

5 For Options 1M and 2M, the RSV signal is equivalent to the IEEE 488.1 SRQ signal. The signal is asserted (0) when an enable event is generated; the signal is unasserted(1) when the event is cleared by reading the event register. This line is an open collector output. The signal can be stand-alone or multiple mainframes can be tied together. If you tie multiple mainframes together, each mainframe must be polled to determine the source of the service request.



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## Enhanced Monitor RS-232 Connector

The Enhanced Monitor includes a 9-pin RS-232 connector that allows connection to a RS-232 host. Figure 3–2 shows the pinouts of the 9-pin RS-232 connector; Table 3–2 describes the pin assignments.

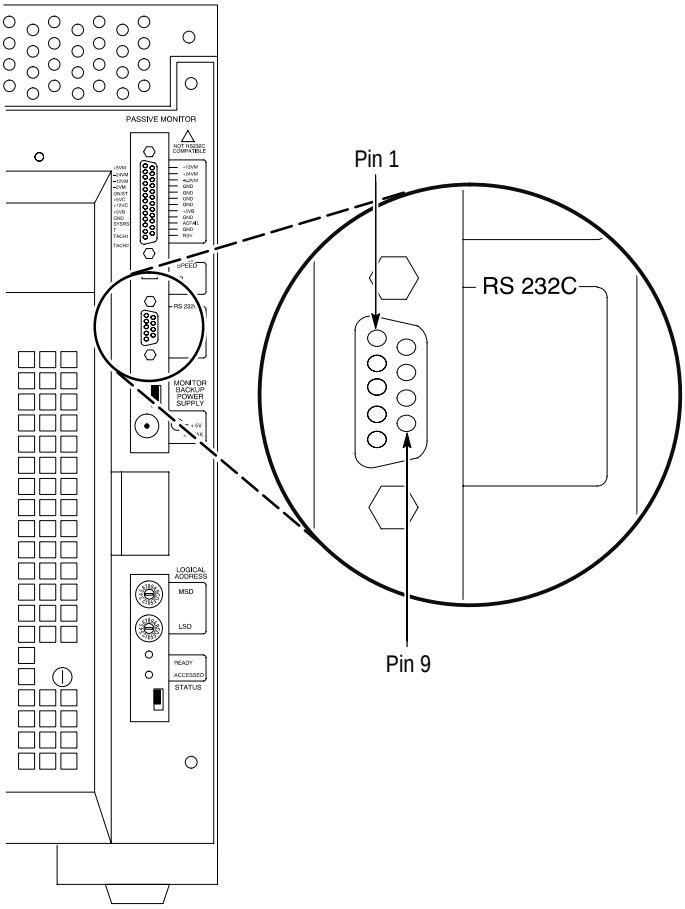



**Figure 3–2: RS-232 Connector Pinout**



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**Table 3–2: RS-232 Pin Connector**

| Pin | Description |
|---|---|
| Shield | Protective Ground |
| 1 | No Connection |
| 2 | Receive Data (RxD) |
| 3 | Transmit Data (TxD) |
| 4 | Data Terminal Ready (DTR) |
| 5 | Signal Ground (GND) |
| 6 | No Connection |
| 7 | Request to Send (RTS) |
| 8 | Clear to Send (CTS) |
| 9 | No Connection |

## Backplane Connectors

Table 3–3 shows the P1 connector pinouts for all slots in the VX1410 IntelliFrame. Table 3–4 shows the P2 connector pinouts for slots 1 to 12 and Table 3–5 shows the pinouts for the Slot 0 P2 connector.



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**Table 3–3: P1 Connector Pinouts**

| 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 | +5 V STDBY | +12 V |
| 32 | +5 V | +5 V | +5 V |



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**Table 3–4: P2 Connector Pinouts for Slots 1 – 12**

| 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 | LBUSC08 |
| 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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**Table 3–5: P2 Connector Pinouts for Slot 0**

| 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 | 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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## Enhanced Monitor

The optional Enhanced Monitor (Options 1M and 2M) provides the VX1410 IntelliFrame with the following additional capabilities via the VXIbus and the rear panel RS-232 interface:

- Power supply voltage readouts
- Input and exhaust temperature for each slot
- Fan speed readout
- User-selectable alarms
- User-selectable maximum temperature rise
- VXIbus system monitoring activities

Option 1M also includes a front panel display to indicate the system status as determined by the monitoring system. Use the NEXT and PREV buttons on the side of the display to scroll through the individual messages. Table 3–6 lists some of the messages that you may see on the display. You can also display user defined messages with the DISPlay command (see *Display Subsystem* beginning on page 3–27).

**Table 3–6: Front Panel Display Messages**

| Category | Message |
|---|---|
| Failure Messages | FAIL:+24V@XX.XX |
| | FAIL:+12V@XX.XX |
| | FAIL:+5V@X.XX |
| | FAIL:+5V STBY@XX.XX |
| | FAIL:+5V EXT@XX.XX |
| | FAIL:–2V@X.XX |
| | FAIL:–5.2V@X.XX |
| | FAIL:–12V@XX.XX |
| | FAIL:–24V@XX.XX |
| | FAIL:S0 ΔT@XX°C |
| | FAIL:S1 ΔT@XX°C |
| | FAIL:S2 ΔT@XX°C |
| | FAIL:S3 ΔT@XX°C |
| | FAIL:S4 ΔT@XX°C |
| | FAIL:S5 ΔT@XX°C |



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**Table 3–6: Front Panel Display Messages (Cont.)**

| Category | Message |
|---|---|
| | FAIL:S6 ΔT@XX°C |
| | FAIL:S7 ΔT@XX°C |
| | FAIL:S8 ΔT@XX°C |
| | FAIL:S9 ΔT@XX°C |
| | FAIL:S10 ΔT@XX°C |
| | FAIL:S11 ΔT@XX°C |
| | FAIL:S12 ΔT@XX°C |
| | FAIL:Ambient T@XX°C |
| | FAIL:Fan1 XXXXRPM |
| | FAIL:Fan2 XXXXRPM |
| Warning Messages | WARN:Clean Filter |
| Power Supply Status Messages | +24 Volts:XX.XXV |
| | +12 Volts:XX.XXV |
| | +5 Volts:X.XXV |
| | +5V Stby:X.XXV |
| | +5V External:X.XXV |
| | –2 Volts:X.XXV |
| | –5.2 Volts:X.XXV |
| | –12 Volts:XX.XXV |
| | –24 Volts:XX.XXV |
| Temperature Status Messages | Ambient T:XX°C |
| | ΔT S0,S1:XX,XX°C |
| | ΔT S2,S3:XX,XX°C |
| | ΔT S4,S5:XX,XX°C |
| | ΔT S6,S7:XX,XX°C |
| | ΔT S8,S9:XX,XX°C |
| | ΔT S10,S11:XX,XX°C |
| | ΔT S12:XX°C |
| Fan Status Messages | Fan 1 RPM: XXXX |
| | Fan 2 RPM: XXXX |
| Filter Status Messages | Filter Hr Left:HHHH[1] |
| Miscellaneous Messages | Time On:HHHHHH:MM |
| | Hr of Oper:HHHHHH |



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**Table 3–6: Front Panel Display Messages (Cont.)**

| Category | Message |
|---|---|
| | SYSTEM OFF |
| | SYSTEM OK |

1 **To reset the filter cleaning interval, display the filter status message by pressing the Next or Prev scroll buttons. While the messages displays, press both buttons at the same time. The Filter Cleaning Interval will reset to the current interval.**

You can also query the individual messages and status information using the commands and queries described in the remainder of this chapter.

The remainder of this chapter provides the following information:

- A summary of the SCPI commands and queries
- An overview of the syntax used with the commands and queries
- A detailed description of each command and query
- A list of error messages
- Brief examples of using commands and queries



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# Command Groups

This section lists VX1410 IntelliFrame commands by functional groups. A question symbol surrounded by brackets [?] identifies commands that also have a query form.

## Display Commands

Commands in the DISPlay subsystem display user defined messages on the front panel of mainframes with Option 1M only. Note that Option 2M does not include a front panel display. Detailed information on the DISPlay command and query begins on Page 3–27.

**Table 3–7: Display Commands**

| Header | Description |
|---|---|
| DISPlay | |
| [:WINDow] | |
| :TEXT | |
| [:DATA][?] | Sets or queries user defined messages to display on the front panel readout. |

## Status Commands

Commands in the STATus subsystem, along with several IEEE 488.2 Common Commands, control the status and event reporting system. Detailed information on the STATus subsystem begins on page 3–29.

**Table 3–8: Status Commands**

| Header | Description |
|---|---|
| STATus | |
| :OPERation? | Returns the contents of the Operation Event register as a decimal number. |
| :CONDition? | Returns the contents of the Operation Condition register. |
| :ENABle[?] | Sets or queries the contents of the Operation Event Enable register. |
| :VXIMonitor? | Returns the contents of the VXI Monitor Event register. |



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**Table 3–8: Status Commands (Cont.)**

| Header | Description |
|---|---|
| :ACFail? | Returns the time when the ACFAIL signal was asserted. |
| :BERR? | Queries the VXI Bus Error address space. |
| :ENABle[?] | Sets or queries the contents of the VXI Monitor Enable register. |
| :SYSFail? | Returns the time when the VXI SYSFAIL signal was asserted. |
| :PRESet | Presets the SCPI enable registers, transition filters,and the Error/Event queue enable. |
| :QUEStionable? | Returns the contents of the Questionable Register as a decimal number. |
| :BLOWer? | Returns the contents of the Blower Event register. |
| :CONDition? | Returns the contents of the Blower Condition register. |
| :ENABle[?] | Sets or queries the contents of the Blower Enable register. |
| :SPEed? | Returns the fan speed in revolutions per minute. |
| :CONDition? | Returns the contents of the Questionable Condition register. |
| :ENABle[?] | Sets or queries the contents of the Questionable Status Enable register. |
| :FILTer | |
| :TINTerval[?] | Sets or queries the filter cleaning interval time. |
| :TREMaining? | Returns the remaining time for the next filter cleaning cycle. |
| :TRESet | Resets the remaining filter cleaning time to the filter cleaning interval. |
| :TEMPerature? | Returns the contents of the Temperature Event register as a decimal number. |
| :CMAXimum? | Returns the maximum measurable temperatures in the mainframe since power on. |
| :CONDition? | Returns the contents of the Temperature Condition register. |
| :ENABle[?] | Sets or queries the contents of the Temperature Enable register. |
| :LEVel? | Returns the current temperatures in the mainframe. |
| :LIMit[?] | Sets or queries the maximum ambient and delta temperatures in each slot of the mainframe. |
| :MAXimum? | Returns the maximum measurable temperatures in the mainframe since the last factory maintenance. |



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**Table 3–8: Status Commands (Cont.)**

| Header | Description |
|---|---|
| :VOLTage? | Returns the contents of the Voltage Event register as a decimal number. |
| :CONDition? | Returns the contents of the Voltage Condition register. |
| :ENABle[?] | Sets or queries the contents of the Voltage Enable register. |
| :LEVel? | Returns the current power supply output voltages. |
| :PTR[?] | Sets or queries the power supply positive transition filter. |
| :QUEue? | |
| [:NEXT]? | Returns the next event code and message from the Error/Event queue. |
| :ALL? | Returns a comma-separated list of all unread events from the Error/Event queue. |
| :CODE? | Returns the next event code from the Error/Event queue. |
| :ALL? | Returns a comma-separated list of all unread event codes from the Error/Event queue. |
| :COUNt? | Returns the number of unread events from the Error/Event queue. |
| :ENABle[?] | Sets or queries enable events to be placed in the Error/Event queue. |
| :ALL | Presets the Error/Event queue enable to –1999:1000. |
| :SCONdition? | Returns a summary condition of all monitors. |
| :SEVent? | Returns summary information of all events in the mainframe. |

## System Commands

Commands in the SYSTem subsystem program utility functions and return version information about the VX1410 IntelliFrame. Detailed information on the SYSTem subsystem begins on page 3–77.

**Table 3–9: System Commands**

| Header | Description |
|---|---|
| SYSTem | |
| :COMMunicate | |
| :SERial | |



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**Table 3–9: System Commands (Cont.)**

| Header | Description |
|---|---|
| :BAUD[?] | Sets or queries the baud rate of the RS-232 port. |
| :BITS[?] | Sets or queries the number of bits per character in the RS-232 port. |
| :CONTrol | |
| :RTS[?] | Sets or queries the operation of the RTS and CTS lines. |
| :ECHO[?] | Sets or queries whether incoming characters are echoed back to the RS-232 port. |
| :ERESponse[?] | Sets or queries whether error messages are automatically returned to the RS-232 port. |
| :LBUFfer[?] | Sets or queries the state of the character buffer. |
| :PACE[?] | Sets or queries whether software flow control (XON/XOFF) is enabled. |
| :PARity[?] | Sets or queries the type of parity for the RS-232 port. |
| :PRESet | |
| [:ALL] | Configures RS-232 port parameters to default values. |
| :RAW | Configures the RS-232 port parameters for use with a computer. |
| :TERMinal | Configures the RS-232 port parameters for use with a terminal. |
| :SBITs[?] | Sets or queries the number of stop bits sent with each character. |
| :DATE | |
| :LMAintenance? | Returns the last factory maintenance date. |
| :ERRor? | Returns the next entry from the Error/Event queue. |
| :ALL? | Returns a comma separated list of all events stored in the Error/Event queue. |
| :CODE? | Returns the next event code stored in the Error/Event queue. |
| :ALL? | Returns a comma separated list of all event codes stored in Error/Event queue. |
| :COUNt? | Returns the number of unread events in the Error/Event queue. |
| :ENABle[?] | Sets or queries enable events to be placed in the Error/Event queue. |
| :ALL? | Presets the Error/Event queue enable to –1999:1000. |
| :FACTory | Sets the VX1410 IntelliFrame settings to the factory default values. |



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**Table 3–9: System Commands (Cont.)**

| Header | Description |
|---|---|
| :HELP | |
| :SYNTax? | Returns the syntax of the specified command. |
| :IEMessage | Sends interface event messages between the VXI interface and the RS-232 port. |
| :NVRecall | Recalls device settings from nonvolatile RAM. |
| :NVSave | Saves device settings to nonvolatile RAM. |
| :PASSword | |
| :CDISable[1] | Disables the CALibrate command. |
| :CENable[1] | Enables the CALibrate command. |
| :STATe?[1] | Queries if password-protected commands are enabled. |
| :POWer[?] | Powers the mainframe on or off. The query returns whether the power is on or off. |
| :CYCLe? | Queries the number of times the mainframe power has been cycled. |
| :SOURce? | Queries the power source of the enhanced monitor. |
| :SYSReset[?] | Sets or queries whether the VXI SYSRESET signal can reset the enhanced monitor. |
| :TIME | |
| :LMAintenance? | Returns the number of hours the mainframe has been operating since the last factory maintenance. |
| :ON? | Returns the number of hours the mainframe has been operating since power on. |
| :VERSion? | Returns the SCPI version supported by the VX1410 IntelliFrame. |

1 **These commands are intend to be used only by qualified service personnel while servicing the instrument.**



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## Test Commands

Commands in the TEST subsystem execute the internal self-tests of the VX1410 IntelliFrame. Detailed information on the TEST subsystem begins on page 3–109.

**Table 3–10: Test Commands**

| Header | Description |
|---|---|
| TEST | |
| [:ALL][?] | Executes all internal self-tests once. The query returns the test results. |
| :NUMBer[?] | Executes a test, the query returns the test result. |
| :RESults? | Returns the failure code for the last self-test command that was executed. |
| :VERBose? | Returns a failure code as a string describing the last executed self-test command and the test results. |

## VXI Monitor Commands

Commands in the VXIMonitor subsystem control parameters that relate to the VXIbus. Detailed information on the VXIMonitor subsystem begins on page 3–115.

**Table 3–11: VXI Monitor Commands**

| Header | Description |
|---|---|
| VXIMonitor | |
| :REPeat[?] | Sets repeat mode of the VXI monitor. |
| :STATe[?] | Starts or stops the VXI monitor. |
| :TINTerval[?] | Sets the time interval that the VXI monitor the VXIbus. |



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## IEEE 488.2 Commands

The VX1410 IntelliFrame supports the following IEEE 488.2 common commands. Detailed information on the command begins on page 3–119.

**Table 3–12: IEEE 488.2 Common Commands**

| Header | Description |
|---|---|
| *CLS | Clears the SCPI and IEEE 488.2 event registers and the Error/Event Queue. |
| *ESE[?] | Sets or queries standard Event Status Enable register. |
| *ESR? | Returns the contents of the Standard Event Status Register. |
| *IDN? | Returns the identification message of the mainframe. |
| *OPC[?] | Synchronizes command execution with the controller. |
| *PSC[?] | Sets or queries the power-on status clear flag. |
| *RST | Resets instrument settings to a default state. |
| *SRE[?] | Sets or queries the Service Request Enable register. |
| *STB? | Returns the contents of the Status Byte Register. |
| *TST? | Initiates an internal self-test and returns a failure code. |
| *WAI? | Synchronizes command execution with the system controller. |



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# Syntax

This section provides an overview of the commands for the VX1410 IntelliFrame and includes the following topics:

- A brief introduction to SCPI
- A description of the command syntax
- Instructions on how to enter commands

The commands for the mainframe are compatible with IEEE-488.1, IEEE-488.2, and SCPI-1995.0 standards.

## SCPI

SCPI (Standard Commands for Programmable Instruments) is a standard created by an international consortium of the major manufacturers of test and measurement equipment. SCPI uses IEEE-488.2 syntax to provide common commands for the same functions of various programmable instruments.

The standard simplifies the task of programming a group of instruments that use SCPI. Instead of having to learn different commands for every instrument, the programmer may use the same commands for the same functions of each instrument.

The controller sends instructions to the instrument in the form of commands or queries. Commands modify control settings or tell the instrument to perform a specific action. Queries cause the instrument to send data or status information back to the controller. A question mark at the end of a command header identifies it as a query.

## Command Syntax

Any instruction that you send to an instrument that complies with SCPI must have at least three basic elements:

- Command header
- Parameter (if required)
- Message terminator or separator



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## Command Headers

The command header has a hierarchical structure that may be represented by a command tree (Figure 3–3). An easy-to-remember word called a mnemonic designates each level of the hierarchy. A colon separates the levels.

The top level of the tree is the root level. A root node is a mnemonic at the root level. A root node and one or more lower-level nodes form a header path to the last node called the leaf node.

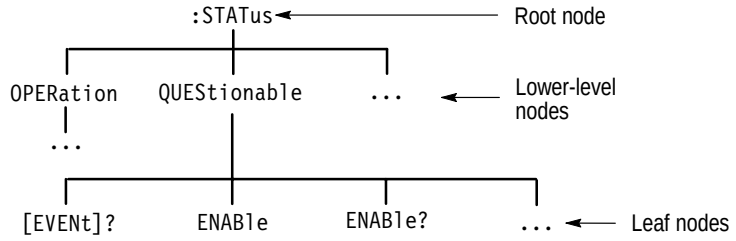



**Figure 3–3: Tree Hierarchy**

The header path and leaf node together form the command header. Figure 3–4 shows the command header for the leaf node indicated in Figure 3–3.

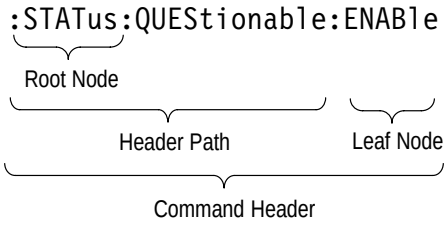



**Figure 3–4: Command Header**

## Parameter

You must include values for commands that have parameters. In this manual, the < > symbols enclose the parameter type when stating the syntax of the command. For example, the syntax of the command in Figure 3–5 includes the <NRf> parameter type.

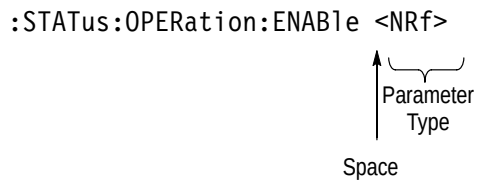



**Figure 3–5: Command Header with Parameter**



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***NOTE.*** *Do not include the* <, >, {,}, or | *symbols when entering the actual value for a parameter.*

Separate multiple parameters after a command header with a comma. For example:

```
STATus:QUEStionable:TEMPerature:LIMit DELTa1,30
```

Table 3–13 defines the command and response parameter types for the VX1410 IntelliFrame.

**Table 3–13: Parameter Types for Syntax Descriptions**

| Parameter Type | Description | Example |
|---|---|---|
| Boolean | Boolean number or value (command parameter, response returns a 1 or 0) | ON or 1<br>OFF or 0 |
| Block | A specified length of block formatted data (command parameter) | #212xxxxxxxxxxx where 2 indicates that the following 2 digits (12) specify the length of the following block data (xxx...). |
| Nondecimal numeric | Integers in hex (#H), octal (#Q), or binary (#B) format (command parameter). | #H00FF, #B010101, #Q0753 |
| NR1 | Integers (response parameter) | 0, 1, 15 |
| NR2 | Decimal numbers (response parameter) | 1.2, 3.141516, 6.5 |
| NRf | Integer, decimal, or floating point number as well as MAX and MIN for setting the largest or smallest value the instrument allows. (command parameter) | 1, 3E+1, MAX, 2.6 |
| discrete | A list of specific values (command or response parameter) | P24, P5EXT, N2, ... |
| String | Alphanumeric characters within quotation marks (command or response parameter) | “No error” |

Parameter values that appear in this manual are often enclosed in curly braces ({}) separated by a vertical line. This vertical line means the same thing as the word “or.” For example, values for the parameter <Boolean> are

```
{0|1|OFF|ON}
```

This is the same thing as saying “0 or 1 or OFF or ON.” Any single value is a valid parameter.



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### Message Terminator and Message Separator

In accordance with IEEE 488.2 and the VXIbus specification, the VX1410 IntelliFrame accepts any of the following message terminators:

- LF^END — Linefeed code (hexadecimal 0A) with the END bit in the *Byte Available* command asserted.
- LF — Linefeed code
- <dab>^END — Last data byte with the END bit in the *Byte Available* command asserted.

A semicolon separates one command from another when the commands appear on the same line. See *Entering Commands*.

## Entering Commands

The standards that govern the command set for the VX1410 IntelliFrame allows for a certain amount of flexibility when you enter command. For example, you can abbreviate many commands or combine commands into one message that you send to the mainframe. This flexibility, called “friendly listening,” saves programming time and makes the command set easier to remember and use.

### Command Characters

The mainframe is not sensitive to the case of command characters. You can enter commands in either upper or lower case.

You can precede any command with white space characters. White space characters include a space or any combination of the ASCII control characters hexadecimal 00 through 1F except for the character 0A (new line). You must, however, use at least one space between the parameter and the command header.

### Abbreviating Commands

Most commands have a long form and a short form. The listing for each command in this section shows the abbreviations in upper case. For example, you can enter the query `SYSTem:ERRor?` simply as `SYST:ERR?` (or `syst:err?`).

The brackets around a mnemonic indicate that the mainframe assumes this level of the command header by default. It is not necessary, therefore, for this mnemonic to appear as part of the header when you send the command. For example, you can abbreviate the command

```
STATus:OPERational[:EVENt]?
```

to

```
STAT:OPER?
```

Because the mainframe assumes that a command at the beginning of a program message starts from the root, you have the option of beginning the initial command header with a colon (:).



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## Combining Commands

You can combine (concatenate) commands and queries using a semicolon (;). The mainframe executes concatenated commands in the order it receives them. When you concatenate queries, the mainframe combines the responses into a single response message. For example, querying both the standard event status register and the error/event queue in the same program message

```
STATus:OPERation?;:SYSTem:ERRor?
```

returns the response message

```
0;0,"No errors"
```

If the command that follows the semicolon has a different header path from the root level, you must use a colon to force a return to the root level:

```
SYSTem:VERSion?;:TEST:RESult?
```

If the command that follows the semicolon has the same header path, you may omit the colon and the path and state only the new leaf node. This makes it possible, for example, to shorten the concatenated query

```
SYSTem:TIME:LMAintenance?;:SYSTem:TIME:ON?
```

into

```
SYSTem:TIME:LMAintenance?;ON?
```

The 488.2 common commands that begin with an asterisk (*) may be used anywhere in a command sequence with no effect on the command header path.

```
SYSTem:VERSion?;*ESR?
```

returns

```
1995.0;16
```

You can combine commands and queries into the same message. Note, for example, the following combination which sets the temperature limit and queries to verify the setting

```
status:questionable:temperature:limit AMBient,25;limit? AMBient
```



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# DISPlay Subsystem

This section describes the commands in the DISPlay Subsystem, which only applies to mainframes with Option 1M. Please note that Option 2M does not include a display. Use the DISPlay subsystem to display user defined messages on the front panel. Figure 3–6 lists the DISPlay subsystem parameters.




**Figure 3–6: DISPlay Subsystem Hierarchy**



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# DISPlay:WINDow:TEXT:DATA
# DISPlay:WINDow:TEXT:DATA?

Sets or queries the user defined message to be displayed on the front panel readout of the mainframe. You can display up to 20 characters in the message. The string "SYSTEM OK" is the default factory message. This message only displays when there are no monitor failures.

**Syntax**

```
DISPlay[:WINDow]:TEXT[:DATA] <String>|<Block>
DISPlay[:WINDow]:TEXT[:DATA]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| <String><br><Block> | <String> |

**Reset Value**

Not Applicable

**Errors and Events**

–223, "Too Much Data"
You attempted to send too much data to the display.

–220, "Parameter Error"
You attempted to send nonprinting data in the block parameter.

**Dependencies**

None

**Examples**

Command: `DISP:TEXT "SYSTEM INIT"`

Query: `DISP:TEXT?`

Response: `"SYSTEM INIT"`

**Related Commands**

None

***NOTE***. (DISPlay:WINDow:TEXT:DATA): *This command only applies to mainframes with Option 1M. Please note that Option 2M does not include a front panel display.*



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# STATus Subsystem

This section describes each command and query in the STATus subsystem. The STATus subsystem controls the parameters shown in Figure 3–7.

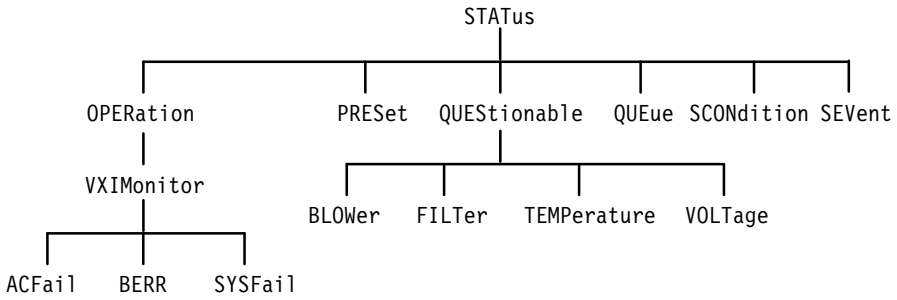



**Figure 3–7: STATus Subsystem Hierarchy**

Use the STATus subsystem to monitor the status of the voltages, temperatures, fans, and the VXI Monitor.



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## STATus:OPERation?

Returns the contents of the Operation Event register. A value of one in a bit indicates the corresponding condition bit changed from false to true. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query.

**Syntax**

```
STATus:OPERation[:EVENt]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Operation Status Word Bits | Definition |
|---|---|
| D0 | CALibrating |
| D1 | Not Used |
| D2 | Not Used |
| D3 | Not Used |
| D4 | Not Used |
| D5 | Not Used |
| D6 | Not Used |
| D7 | Not Used |
| D8 | VXI Monitor |
| D9 | Mainframe Power Down |
| D10 | Not Used |
| D11 | Not Used |
| D12 | Not Used |
| D13 | Not Used |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

Reading the register clears it.



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**Examples**

Query: `STAT:OPER?`

Response: 0

**Related Commands**

STATus:OPERation:CONDition?
STATus:OPERation:ENABle



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## STATus:OPERation:CONDition?

Returns the contents of the Operation Condition register. A value of one in a bit indicates the corresponding current condition is asserted. Definition of the bits in this register can be found under the STATus:OPERation? command on page 3–30. Unused bits always return a value of 0.

Reading the Operation Condition register does not clear it.

There is no command associated with this query.

**Syntax**

```
STATus:OPERation:CONDition?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:OPER:COND?`

Response: `0`

**Related Commands**

STATus:OPERation?
STATus:OPERation:ENABle



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# STATus:OPERation:ENABle
# STATus:OPERation:ENABle?

Sets or queries the contents of the Operation Event Enable register. Setting unused enable bits does not generate an error; the unused bits are ignored.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H0000. Executing the STATus:PRESet command sets the register value to #H0000.

**Syntax**

```
STATus:OPERation:ENABle <Mask>
STATus:OPERation:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, "Data Out of Range"
You attempted to set the mask to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:OPER:ENAB #H0100`

Query: `STAT:OPER:ENAB?`

Response: `256`

**Related Commands**

STATus:OPERation?
STATus:OPERation:CONDItion
STATus:PRESet



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## STATus:OPERation:VXIMonitor?

Queries the contents of the VXI Monitor Event Register. A value of one in a bit indicates the corresponding condition bit changed from false to true. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query.

**Syntax**

```
STATus:OPERation:VXIMonitor[:EVENt]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| VXI Monitor Event Word Bits | Definition |
|---|---|
| D0 | BERR Occurred |
| D1 | SYSFAIL Occurred |
| D2 | ACFAIL Occurred |
| D3 | AS Missing |
| D4 | Not Used |
| D5 | Not Used |
| D6 | Not Used |
| D7 | Not Used |
| D8 | Not Used |
| D9 | Not Used |
| D10 | Not Used |
| D11 | Not Used |
| D12 | Not Used |
| D13 | Not Used |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

Reading the register clears it.



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**Examples**

Query: `STAT:OPER:VXIM?`

Response: 0

**Related Commands**

STATus:OPERation:VXIMonitor:ENABle



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## STATus:OPERation:VXIMonitor:ACFail?

Queries the time when the VXI ACFAIL signal was asserted. The time is relative to the mainframe power-on time.

If there are multiple occurrences of the ACFAIL signal, only the time of the first assertion is saved.

When no ACFAIL is detected, the query returns a value of 0 in all fields. At power-on the values of all fields are set to 0.

There is no command associated with this query.

**Syntax**

```
STATus:OPERation:VXIMonitor:ACFail?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <Hour>,<Minute>,<Second> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:OPER:VXIM:ACF?`

Response: `0,0,0`

**Related Commands**

STATus:OPERation:VXIMonitor:ENABle
STATus:OPERation:VXIMonitor?



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## STATus:OPERation:VXIMonitor:BERR?

Queries the VXI Bus Error address space.

If multiple bus errors occurred, only the first BERR address space will be saved. If there are no errors, the query returns NONE.

At power-on the value is set to NONE.

There is no command associated with this query.

**Syntax** `STATus:OPERation:VXIMonitor:BERR?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | {A16 \| A24 \| A32 \| NONE} |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:OPER:VXIM:BERR?`

Response: `NONE`

**Related Commands** STATus:OPERation:VXIMonitor:ENABle
STATus:OPERation:VXIMonitor?



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# STATus:OPERation:VXIMonitor:ENABle
# STATus:OPERation:VXIMonitor:ENABle?

Sets or queries the contents of the VXI Monitor Enable register. Setting unused enable bits does not generate an error; the bits are ignored.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H7FFF. Executing the STATus:PRESet command sets the register value to #H7FFF.

**Syntax**

```
STATus:OPERation:VXIMonitor:ENABle <Mask>
STATus:OPERation:VXIMonitor:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable register to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:OPER:VIXM:ENAB #H0001`

Query: `STAT:OPER:VXIM:ENAB?`

Response: 1

**Related Commands**

STATus:OPERation:VXIMonitor?
STATus:PRESet



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## STATus:OPERation:VXIMonitor:SYSFail?

Queries the time when the VXI SYSFAIL signal was asserted. The time is relative to the mainframe power-on time.

If there are multiple occurrences of the VXI SYSFAIL signal, only the time of the first assertion is saved.

When no SYSFAIL is detected, the query returns a value of 0 in all fields. At power-on the values of all fields are set to 0.

There is no command associated with this query.

**Syntax** `STATus:OPERation:VXIMonitor:SYSFail?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <Hour>,<Minute>,<Second> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:OPER:VXIM:SYSF?`

Response: `0,0,0`

**Related Commands** STATus:OPERation:VXIMonitor:ENABle
STATus:OPERation:VXIMonitor?



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## STATus:PRESet

Presets the SCPI enable registers. The Operation and Questionable Enable registers are preset to zero, disabling all events. All other enable registers are preset to one, enabling all events. The Error/Event Queue is preset to the default value of –499:0. The SCPI Positive Transition Filters are preset to 1.

This command does not clear the SCPI event registers or the IEEE 488.2 enable and event registers.

**Syntax** `STATus:PRESet`

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None.

**Examples** Command: `STAT:PRES`

**Related Commands** STATus:OPERation:ENABle
STATus:QUEue:ENABle
STATus:QUEStionable:ENABle
*CLS



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## STATus:QUEStionable?

Returns the contents of the Questionable Event register. A value of one in a bit indicates the corresponding condition bit changed from false to true. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query..

**Syntax**

```
STATus:QUEStionable[:EVENt]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Questionable Status Word Bits | Definition |
|---|---|
| D0 | VOLTage |
| D1 | Not Used |
| D2 | Not Used |
| D3 | Not Used |
| D4 | TEMPerature |
| D5 | Not Used |
| D6 | Not Used |
| D7 | Not Used |
| D8 | CALibration |
| D9 | BLOWer |
| D10 | FILTer |
| D11 | Not Used |
| D12 | Not Used |
| D13 | Not Used |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

Reading the register clears it.



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**Examples**

Query: `STAT:QUES?`

Response: `0`

**Related Commands**

STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle



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## STATus:QUEStionable:BLOWer?

Queries the contents of the Blower Event register. A value of one in a bit indicates the corresponding condition bit changed from false to true and that there may be a problem with one of the fans. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query.

**Syntax** `STATus:QUEStionable:BLOWer[:EVENt]?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Blower Status Word Bits | Definition |
|---|---|
| D0 | Blower 1 |
| D1 | Blower 2 |
| D2 | Not Used |
| D3 | Not Used |
| D4 | Not Used |
| D5 | Not Used |
| D6 | Not Used |
| D7 | Not Used |
| D8 | Not Used |
| D9 | Not Used |
| D10 | Not Used |
| D11 | Not Used |
| D12 | Not Used |
| D13 | Not Used |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value** Not Applicable

**Errors and Events** None



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**Dependencies** Reading the register clears it.

**Examples** Query: `STAT:QUES:BLOW?`

Response: `0`

**Related Commands** STATus:QUEStionable:BLOWer:CONDition?
STATus:QUEStionable:BLOWer:ENABle



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## STATus:QUEStionable:BLOWer:CONDition?

Returns the contents of the Blower Condition register. A value of one in a bit indicates possible problems with one of the fans. Unused always return a value of zero. Definition of the bits in this register can be found under the STATus:QUEStionable:BLOWer command on page 3–43.

Reading this register does not clear it.

There is no command associated with this query.

**Syntax** `STATus:QUEStionable:BLOWer:CONDition?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:QUES:BLOW:COND?`

Response: 0

**Related Commands** STATus:QUEStionable:BLOWer?
STATus:QUEStionable:BLOWer:ENABle



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# STATus:QUEStionable:BLOWer:ENABle
# STATus:QUEStionable:BLOWer:ENABle?

Sets or queries the contents of the Blower Enable register. Setting unused enable bits does not generate an error; the bits are ignored. Enabling bits in the register allows information from the Blower Event register to be passed on to the Questionable Event register.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H7FFF. Executing the STATus:PRESet command sets the register value to #H7FFF.

**Syntax**

```
STATus:QUEStionable:BLOWer:ENABle <Mask>
STATus:QUEStionable:BLOWer:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable register to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:BLOW:ENAB #H0000`

Query: `STAT:QUES:BLOW:ENAB?`

Response: `0`

**Related Commands**

STATus:QUEStionable:BLOWer?
STATus:QUEStionable:BLOWer:CONDition?
STATus:PRESet



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## STATus:QUEStionable:BLOWer:SPEed?

Queries the current fan (blower) rotational speed in revolutions per minute (RPM). Normal values are between 1200 and 3350 RPM.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:BLOWer:SPEed? <Blower>
```

**Parameters**

| <Blower> | Query Response |
|---|---|
| {BLOWer1 \| BLOWer2} | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an invalid parameter value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:BLOW:SPE? BLOW1`

Response: `1200`

**Related Commands**

STATus:QUEStionable:BLOWer?
STATus:QUEStionable:BLOWer:CONDition?
STATus:QUEStionable:BLOWer:ENABle



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## STATus:QUEStionable:CONDition?

Queries the contents of the Questionable Condition register. Unused bits always return a value of zero. Definition of the bits in this register can be found under the STATus:QUEStionable? command on page 3–41.

Reading the register does not clear it.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:CONDition?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:QUES:COND?`

Response: 0

**Related Commands**

STATus:QUEStionable?
STATus:QUEStionable:ENABle



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# STATus:QUEStionable:ENABle
# STATus:QUEStionable:ENABle?

Sets or queries the contents of the Questionable Enable register. Setting unused enable bits does not generate an error; the bits are ignored.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H0000. Executing the STATus:PRESet command sets the register value to #H0000.

**Syntax**

```
STATus:QUEStionable:ENABle <Mask>
STATus:QUEStionable:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
The value of the data was outside of the legal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:ENAB #H0001`

Query: `STAT:QUES:ENAB?`

Response: 1

**Related Commands**

STATus:QUEStionable?
STATus:QUEStionable:CONDition?
STATus:PRESet



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# STATus:QUEStionable:FILTer:TINTerval
# STATus:QUEStionable:FILTer:TINTerval?

Sets or queries the filter cleaning interval in hours. The factory default setting is 4000 hours.

**Syntax**

```
STATus:QUEStionable:FILTer:TINTerval <Time>
STATus:QUEStionable:FILTer:TINTerval?
```

**Parameters**

| <Time> | Query Response |
|---|---|
| <NRf><br>1 ≤ N ≤ 65535<br>MIN<br>MAX | <NR1><br><br>1<br>65535 |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the filter cleaning time interval to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:FILT:TINT 300`

Query: `STAT:QUES:FILT:TINT?`

Response: `300`

**Related Commands**

STATus:QUEStionable:FILTer:TREMaining?
STATus:QUEStionable:FILTer:TRESet



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## STATus:QUEStionable:FILTer:TREMaining?

Returns the time for the next the filter cleaning cycle.

**Syntax** `STATus:QUEStionable:FILTer:TREMaining?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value** Not Applicable

**Errors and Events** Not Applicable

**Dependencies** None

**Examples** Query: `STAT:QUES:FILT:TREM?`

Response: 300

**Related Commands** STATus:QUEStionable:FILTer:TINTerval
STATus:QUEStionable:FILTer:TRESet



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## STATus:QUEStionable:FILTer:TRESet

Resets the filter cleaning remaining time to the cleaning interval time.

You can also reset the filter cleaning time by pressing both the PREV and NEXT keys on the front panel display when the front panel displays the filter cleaning warning message or the filter cleaning remaining time (Option 1M only).

**Syntax**

```
STATus:QUEStionable:FILTer:TRESet
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

Not Applicable

**Dependencies**

None

**Examples**

Command: `STAT:QUES:FILT:TRES`

**Related Commands**

STATus:QUEStionable:FILTer:TINTerval
STATus:QUEStionable:FILTer:TREMaining?



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## STATus:QUEStionable:TEMPerature?

Returns the contents of the Temperature Event register. A value of one in a bit indicates the corresponding condition bit changed from false to true. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query.

**Syntax** `STATus:QUEStionable:TEMPerature[:EVENt]?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Blower Status Word Bits | Definition |
|---|---|
| D0 | Slot 0 Delta Temperature |
| D1 | Slot 1 Delta Temperature |
| D2 | Slot 2 Delta Temperature |
| D3 | Slot 3 Delta Temperature |
| D4 | Slot 4 Delta Temperature |
| D5 | Slot 5 Delta Temperature |
| D6 | Slot 6 Delta Temperature |
| D7 | Slot 7 Delta Temperature |
| D8 | Slot 8 Delta Temperature |
| D9 | Slot 9 Delta Temperature |
| D10 | Slot 10 Delta Temperature |
| D11 | Slot 11 Delta Temperature |
| D12 | Slot 12 Delta Temperature |
| D13 | Ambient Temperature |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** Reading the register clears it.



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**Examples**

Query: `STAT:QUES:TEMP?`

Response: `0`

**Related Commands**

STATus:QUEStionable:TEMPerature:CONDition?
STATus:QUEStionable:TEMPerature:ENABle



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## STATus:QUEStionable:TEMPerature:CMAXimum?

Queries the current maximum temperatures in the mainframe since power on. The returned value is in °C.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:TEMPerature:CMAXimum? <Location>
```

**Parameters**

| <Location> | Query Response |
|---|---|
| {AMBient \| OUT0 . . . OUT12 \| DELTa0 . . . DELTa12}<br><br>AMBient – ambient input temperature<br>OUT0 . . . OUT12 – output temperature of each slot<br>DELTa0 . . . DELTa12 – output temperature minus input temperature of each slot | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an illegal parameter value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:TEMP:CMAX? DELTA12`

Response: `10`

**Related Commands**

STATus:QUEStionable:TEMPerature:LEVel?
STATus:QUEStionable:TEMPerature:MAXimum?



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## STATus:QUEStionable:TEMPerature:CONDition?

Queries the contents of the Temperature Condition register. A value of one in a bit indicates the corresponding temperature condition is outside of the limits. Unused bits always return a value of zero. Definition of the bits in this register can be found under the STATus:QUEStionable:TEMPerature? command on page 3–53.

If the fan speed is already set to the maximum speed and the delta temperature is above the limit for 30 seconds, a failure will be reported.

Reading the register does not clear it.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:TEMPerature:CONDition?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:QUES:TEMP:COND?`

Response: `0`

**Related Commands**

STATus:QUEStionable:TEMPerature?
STATus:QUEStionable:TEMPerature:ENABle



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## STATus:QUEStionable:TEMPerature:ENABle
## STATus:QUEStionable:TEMPerature:ENABle?

Sets or queries the contents of the Temperature Enable register. Setting unused enable bits does not generate an error; the bits are ignored.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H7FFF. Executing the STATus:PRESet command sets the register value to #H7FFF.

**Syntax**

```
STATus:QUEStionable:TEMPerature:ENABle <Mask>
STATus:QUEStionable:TEMPerature:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable register to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:TEMP:ENAB #H7FFF`

Query: `STAT:QUES:TEMP:ENAB?`

Response: `32767`

**Related Commands**

STATus:QUEStionable:TEMPerature?
STATus:QUEStionable:TEMPerature:CONDition?
STATus:PRESet



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## STATus:QUEStionable:TEMPerature:LEVel?

Returns the current temperatures in the mainframe; the returned value is in °C.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:TEMPerature:LEVel? <Location>
```

**Parameters**

| <Location> | Query Response |
|---|---|
| {AMBient \| OUT0 . . . OUT12 \| DELTa0 . . . DELTa12}<br><br>AMBient – ambient input temperature<br>OUT0 . . . OUT12 – output temperature of each slot<br>DELTa0 . . . DELTa12 – output temperature minus input temperature of each slot | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an illegal parameter value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:TEMP:LEV? OUT0`

Response: `24`

**Related Commands**

STATus:QUEStionable:TEMPerature?
STATus:QUEStionable:TEMPerature:CONDition?
STATus:QUEStionable:TEMPerature:ENABle



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# STATus:QUEStionable:TEMPerature:LIMit
# STATus:QUEStionable:TEMPerature:LIMit?

Sets or queries the maximum allowable ambient and delta temperatures in each slot. The factory default settings are 55 °C for ambient and 10 °C for each delta temperature.

**Syntax**

```
STATus:QUEStionable:TEMPerature:LIMit <Location>,<Limit>
STATus:QUEStionable:TEMPerature:LIMit? <Location>
```

| **<Location>** | **Query Response** |
|---|---|
| {AMBient \| DELTa0 . . . DELTa12}<br><br>AMBient – ambient input temperature<br>DELTa0 . . . DELTa12 – output temperature minus input temperature of each slot | <NR1> |
| **<Limit>** | |
| <NRf><br>If Location is AMBient<br>1 ≤ Limit ≤ 55<br>MIN<br>MAX<br><br>If Location is DELTan<br>5 ≤ Limit ≤ 30<br>MIN<br>MAX | <br><br><br>1<br>55<br><br><br><br>5<br>30 |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set the location to an illegal value.

–222, “Data Out of Range”
You attempted to set the temperature limit to an illegal value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:TEMP:LIM? AMB`
Response: `55`

**Related Commands**

STATus:QUEStionable:TEMPerature?
STATus:QUEStionable:TEMPerature:CONDition?
STATus:QUEStionable:TEMPerature:ENABle
STATus:QUEStionable:TEMPerature:LEVel?



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## STATus:QUEStionable:TEMPerature:MAXimum?

Queries the maximum measurable temperatures in the mainframe since the last factory maintenance was performed; the returned value is in °C.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:TEMPerature:MAXimum? <Location>
```

**Parameters**

| <Location> | Query Response |
|---|---|
| {AMBient \| OUT0 . . . OUT12 \| DELTa0 . . . DELTa12}<br><br>AMBient – ambient input temperature<br>OUT0 . . . OUT12 – output temperature of each slot<br>DELTa0 . . . DELTa12 – output temperature minus input temperature of each slot | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an illegal parameter value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:TEMP:MAX? AMB`

Response: `32`

**Related Commands**

STATus:QUEStionable:TEMPerature:LEVel?
STATus:QUEStionable:TEMPerature:CMAXimum?



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## STATus:QUEStionable:VOLTage?

Returns the contents of the Voltage Event register. A value of one in a bit indicates the corresponding power supply failure event has been asserted. Unused bits always return a value of zero. The register is cleared by the *CLS command.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:VOLTage[:EVENt]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Voltage Status Word Bits | Definition |
|---|---|
| D0 | +24 V |
| D1 | +12 V |
| D2 | +5 V |
| D3 | +5 V Standby |
| D4 | +5 V External |
| D5 | –2 V |
| D6 | –5.2 V |
| D7 | –12 V |
| D8 | –24 V |
| D9 | Not Used |
| D10 | Not Used |
| D11 | Not Used |
| D12 | Not Used |
| D13 | Not Used |
| D14 | Not Used |
| D15 | Not Used |

**Reset Value** Not Applicable

**Errors and Events** None



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**Dependencies** Reading the register clears it.

**Examples** Query: `STAT:QUES:VOLT?`

Response: `0`

**Related Commands** STATus:QUEStionable:VOLTage:CONDition?
STATus:QUEStionable:VOLTage:ENABle



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## STATus:QUEStionable:VOLTage:CONDition?

Queries the contents of the Voltage Condition register. A value of one in a bit indicates the corresponding power supply has a failure. Unused bits always return a value of zero. Definition of the bits in this register can be found in STATus:QUEStionable:VOLTage? command on page 3–61.

Reading the register does not clear it.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:VOLTage:CONDition?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:QUES:VOLT:COND?`

Response: 0

**Related Commands**

STATus:QUEStionable:VOLTage?
STATus:QUEStionable:VOLTage:ENABle



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# STATus:QUEStionable:VOLTage:ENABle
# STATus:QUEStionable:VOLTage:ENABle?

Sets or queries the contents of the Voltage Enable register. Setting unused enable bits does not generate an error; the bits are ignored.

If the power-on status clear flag is FALSE (see **PSC* command on page 3–124) at power-on, the register value will be restored from nonvolatile RAM; otherwise the register value at power-on is set to #H7FFF. Executing the STATus:PRESet command sets the register value to #H7FFF.

**Syntax**

```
STATus:QUEStionable:VOLTage:ENABle <Mask>
STATus:QUEStionable:VOLTage:ENABle?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable register to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:VOLT:ENAB #H3FFF`

Query: `STAT:QUES:VOLT:ENAB?`

Response: `16383`

**Related Commands**

STATus:QUEStionable:VOLTage?
STATus:QUEStionable:VOLTage:CONDition?
STATus:PRESet



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## STATus:QUEStionable:VOLTage:LEVel?

Queries the current power supply output voltage.

There is no command associated with this query.

**Syntax**

```
STATus:QUEStionable:VOLTage:LEVel? <Power Supply>
```

**Parameters**

| <Power Supply> | Query Response |
|---|---|
| {P24 \| P12 \| P5 \| P5STBY\|P5EXT \| N2 \| N5PT2 \| N12 \| N24} | <NR2> |

| Code | Power Supply |
|---|---|
| P24 | +24 V |
| P12 | +12 V |
| P5 | +5 V |
| P5STBY | +5 V Standby |
| P5EXT | +5 V External |
| N2 | –2 V |
| N5PT2 | –5.2 V |
| N12 | –12 V |
| N24 | –24 V |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an illegal parameter value.

**Dependencies**

None

**Examples**

Query: `STAT:QUES:VOLT:LEV? P24`

Response: `24.01`

**Related Commands**

STATus:QUEStionable:VOLTage?
STATus:QUEStionable:VOLTage:CONDition?
STATus:QUEStionable:VOLTage:ENABle



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# STATus:QUEStionable:VOLTage:PTR
# STATus:QUEStionable:VOLTage:PTR?

Sets or queries the power supply positive transition filter.

You can only set or clear bits 3 and 4 of the transition filter. Setting a bit enables the corresponding power supply condition to propagate to the event system. Any failures will display on the front panel readout. If you disable the bits, any failure in the corresponding power supply will not be reported to the front panel readout or to the event system.

Bits 0 – 2 and bits 5 – 8 of the transition filter are always enabled. Bit 15 always returns a 0. The factory default setting is 32743. The +5 V Standby and +5 V External are not monitored.

**Syntax**

```
STATus:QUEStionable:VOLTage:PTR <Mask>
STATus:QUEStionable:VOLTage:PTR?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Nondecimal Numeric>}<br>0 ≤ N ≤ #HFFFF | <NR1> |

| Voltage Positive Transition Filter Bits | Definition |
|---|---|
| D3 | +5 V Standby |
| D4 | +5 V External |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the transition filter to an illegal value.

**Dependencies**

None

**Examples**

Command: `STAT:QUES:VOLT:PTR #H7FF7`

Query: `STAT:QUES:VOLT:PTR?`

Response: `32759`

**Related Commands**

STATus:QUEStionable:VOLTage:CONDition?



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## STATus:QUEue?

Returns the next event code and message in the Error/Event queue.

The Error/Event queue is cleared at power on or when you send the *CLS command. This is derived from the standard SCPI command. The SYSTem:ERRor? query is an alias.

There is no command associated with this query.

**Syntax**

```
STATus:QUEue[:NEXT]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1>, <string> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:QUE?`

Response: –221, “Settings Conflict.”

**Related Commands**

STATus:QUEue:ENABle
SYSTem:ERRor?



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## STATus:QUEue:ALL?

Returns a comma-separated list of all unread events from the Error/Event queue.

The Error/Event queue is cleared at power on or when you send the *CLS command. The SYSTem:ERRor:ALL? query is an alias.

There is no command associated with this query.

**Syntax**

```
STATus:QUEue:ALL?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1>, <string> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query:

```
STAT:QUE:ALL?
```

Response:

```
–221, “Settings Conflict.”,–224, "Illegal Parameter Value", . . .
```

**Related Commands**

STATus:QUEue?
STATus:QUEue:ENABle



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## STATus:QUEue:CODE?

Returns the next event code from the Error/Event queue. The SYSTem:ERRor:CODE? query is an alias.

The Error/Event queue is cleared at power on or when you send the *CLS command.

There is no command associated with this query.

**Syntax** `STATus:QUEue:CODE[:NEXT]?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:QUE:CODE?`

Response: `-221`

**Related Commands** STATus:QUEue?
STATus:QUEue:ENABle



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## STATus:QUEue:CODE:ALL?

Returns a comma-separated list of all unread events from the Error/Event queue. The SYSTem:ERRor:CODE:ALL? query is an alias.

The Error/Event queue is cleared at power on or when you send the *CLS command.

There is no command associated with this query.

**Syntax**

```
STATus:QUEue:CODE:ALL?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query:

```
STAT:QUE:CODE:ALL?
```

Response:

```
-221,-224
```

**Related Commands**

STATus:QUEue?
STATus:QUEue:CODE?



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## STATus:QUEue:COUNt?

Returns the number of unread events in the Error/Event queue. The SYSTem:ERRor:COUNt? query is an alias.

The Error/Event queue is cleared at power on or when you send the *CLS command.

There is no command associated with this query.

**Syntax** `STATus:QUEue:COUNt?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:QUE:COUN?`

Response: 3

**Related Commands** STATus:QUEue:ALL?



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# STATus:QUEue:ENABle
# STATus:QUEue:ENABle?

Sets or queries the enable events to be placed in the Error/Event queue. The SYSTem:ERRor:ENABle and SYSTem:ERRor:ENABle? commands are aliases.

Attempting to enable events that are not reported by the mainframe does not generate an error.

At power on or when you send the STATus:PRESet command the contents of the register is set to –499:0.

**Syntax**

```
STATus:QUEue:ENABle <Event List>
STATus:QUEue:ENABle?
```

**Parameters**

| <Event List> | Query Response |
|---|---|
| {<NRf> \| numeric range[,<NRf> \| numeric range]}* | {<NRf> \| numeric range[,<NRf> \| numeric range]} |

* **numeric range is <NRf>:<NRf>**

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable list to an illegal value.

**Dependencies**

STATus:PRESet

**Examples**

Command: `STAT:QUE:ENAB (-499:200)`

Query: `STAT:QUE:ENAB?`

Response: `(-499:200)`

**Related Commands**

STATus:QUEue?
STATus:PRESet
SYSTem:ERRor



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## STATus:QUEue:ENABle:ALL

Presets the Error/Event queue enable to the value of –1999:1000. The SYSTem:ERRor:ENABle:ALL command is an alias.

**Syntax** `STATus:QUEue:ENABle:ALL`

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `STAT:QUE:ENAB:ALL`

**Related Commands** STATus:PRESet
STATus:QUEue:ENABle
*CLS



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## STATus:SCONdition?

Returns the pass/fail condition of all the monitors. A value of one in a bit indicates the corresponding current condition has failed. Unused bits always return a value of zero. Definition of the bits can be found in STATus:SEVent? command on page 3–75.

Reading the register does not clear it.

There is no command associated with this query.

**Syntax**

```
STATus:SCONdition?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `STAT:SCON?`

Response: `0`

**Related Commands**

STATus:SEVent?



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## STATus:SEVent?

Returns the summary information on the power supply voltage events, temperature events, blower events, filter events, and VXI monitor events.

A one in a bit indicates the corresponding event has been asserted. Unused bits always return a value of zero. The query returns a value of zero at power on or when you send the *CLS command. Reading events by this command does not clear the events.

There is no command associated with this query.

**Syntax** `STATus:SEVent?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not applicable | <NR1> |

| Event Status Word Bits | Definition |
|---|---|
| D0 | Blower 1 |
| D1 | Blower 2 |
| D2 | Filter |
| D3 | Slot 0 Delta Temperature |
| D4 | Slot 1 Delta Temperature |
| D5 | Slot 2 Delta Temperature |
| D6 | Slot 3 Delta Temperature |
| D7 | Slot 4 Delta Temperature |
| D8 | Slot 5 Delta Temperature |
| D9 | Slot 6 Delta Temperature |
| D10 | Slot 7 Delta Temperature |
| D11 | Slot 8 Delta Temperature |
| D12 | Slot 9 Delta Temperature |
| D13 | Slot 10 Delta Temperature |
| D14 | Slot 11 Delta Temperature |
| D15 | Slot 12 Delta Temperature |
| D16 | Ambient Temperature |
| D17 | +24 V |
| D18 | +12 V |



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| Event Status Word Bits | Definition |
|---|---|
| D19 | +5 V |
| D20 | +5 Standby |
| D21 | +5 V External |
| D22 | –2 V |
| D23 | –5.2 V |
| D24 | –12 V |
| D25 | –24 V |
| D26 | BERR |
| D27 | SYSFAIL |
| D28 | ACFAIL |
| D29 | AS |
| D30 | Not Used |
| D31 | Not Used |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `STAT:SEV?`

Response: 0

**Related Commands** STATus:SCONdition?



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# SYSTem Subsystem

This section describes each command and query in the SYSTem subsystem. The SYSTem subsystem controls the parameters shown in Figure 3–8. The SYSTem subsystem collects the functions that are not related to the performance of the VX1410 IntelliFrame.

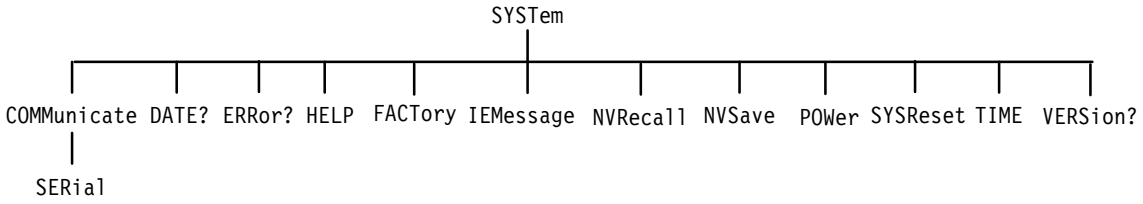



**Figure 3–8: SYSTem Subsystem Hierarchy**

Table 3–14 lists the factory default settings for the SYSTem:COMMunicate:Serial parameters in the VX1410 IntelliFrame. These default settings do not change when you issue the SYSTem:FACTory command.

**Table 3–14: Default Factory RS-232 Communication Settings**

| Command | Factory Default Setting |
|---|---|
| SYSTem:COMMunicate:SERial[:RECeive]:BAUD | 9600 |
| SYSTem:COMMunicate:SERial[:RECeive]:BITS | 8 |
| SYSTem:COMMunicate:SERial:CONTrol:RTS | ON |
| SYSTem:COMMunicate:SERial:ECHO | 1 |
| SYSTem:COMMunicate:SERial:ERESponse | 1 |
| SYSTem:COMMunicate:SERial:LBUFfer | 1 |
| SYSTem:COMMunicate:SERial[:RECeive]:PACE | XON |
| SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE] | NONE |
| SYSTem:COMMunicate:SERial[:RECeive]:SBITs | 1 |



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# SYSTem:COMMunicate:SERial:BAUD
# SYSTem:COMMunicate:SERial:BAUD?

Sets or queries the baud rate of the RS-232 port. This command sets the transmit and receive baud rates.

**Syntax**

```
SYSTem:COMMunicate:SERial[:RECeive]:BAUD <Baud Rate>
SYSTem:COMMunicate:SERial[:RECeive]:BAUD?
```

**Parameters**

| <Baud Rate> | Query Response |
|---|---|
| <NRf> | <NR1> |
| 300 | 300 |
| 600 | 600 |
| 1200 | 1200 |
| 2400 | 2400 |
| 4800 | 4800 |
| 9600 | 9600 |
| 19200 | 19200 |
| MINimum | 300 |
| MAXimum | 19200 |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the baud rate to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:BAUD 4800`

Query: `SYST:COMM:SER:BAUD?`

Response: `4800`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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# SYSTem:COMMunicate:SERial:BITS
# SYSTem:COMMunicate:SERial:BITS?

Sets or queries the number of bits per character in the RS-232 port.

**Syntax**

```
SYSTem:COMMunicate:SERial[:RECeive]:BITS <Bits>
SYSTem:COMMunicate:SERial[:RECeive]:BITS?
```

**Parameters**

| <Bits> | Query Response |
|---|---|
| <NRf> | <NR1> |
| 7 | 7 |
| 8 | 8 |
| MINimum | 7 |
| MAXimum | 8 |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the bits per character value to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:BITS 8`

Query: `SYST:COMM:SER:BITS?`

Response: `8`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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# SYSTem:COMMunicate:SERial:CONTrol:RTS
# SYSTem:COMMunicate:SERial:CONTrol:RTS?

Sets or queries the operation of the RTS/CTS lines. A value of OFF sets the outgoing RTS line low and ignores the incoming CTS line. A value of ON sets the outgoing RTS line high and ignores the incoming CTS line. A value of IBFull or RFR specifies that the two lines are used for hardware flow control.

**Syntax**

```
SYSTem:COMMunicate:SERial:CONTrol:RTS <Flow Control>
SYSTem:COMMunicate:SERial:CONTrol:RTS?
```

**Parameters**

| <Flow Control> | Query Response |
|---|---|
| OFF | OFF |
| ON | ON |
| IBFull \| RFR | IBF |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to use an illegal parameter value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:CONT:RTS IBF`

Query: `SYST:COMM:SER:CONT:RTS?`

Response: `IBF`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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## SYSTem:COMMunicate:SERial:ECHO
## SYSTem:COMMunicate:SERial:ECHO?

Sets or queries whether the incoming characters are echoed back to the RS-232 port.

**Syntax**

```
SYSTem:COMMunicate:SERial:ECHO <Boolean>
SYSTem:COMMunicate:SERial:ECHO?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NRf> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `SYST:COMM:SER:ECHO OFF`

Query: `SYST:COMM:SER:ECHO?`

Response: `0`

**Related Commands** All SYSTem:COMMunicate:SERial commands



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# SYSTem:COMMunicate:SERial:ERESponse
# SYSTem:COMMunicate:SERial:ERESponse?

Sets or queries if error response messages automatically return to the RS-232 port. When the mode is ON, all error and event response messages will output directly to the RS-232 port; the error and event response messages will not be placed in the Error/Event queue. When the mode is OFF, all error and event messages will be reported to the Error/Event queue and will not be output to the RS-232 port directly.

If the mode is ON, all asynchronous error messages are placed in the Error/Event queue. The event registers will not be updated by any event message.

Asynchronous event messages include “Self Test Failed” and “Configuration Memory Lost.”

**Syntax**

```
SYSTem:COMMunicate:SERial:ERESponse <Boolean>
SYSTem:COMMunicate:SERial:ERESponse?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NRf> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set use an illegal parameter value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:ERES OFF`

Query: `SYST:COMM:SER:ERES?`

Response: `0`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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## SYSTem:COMMunicate:SERial:LBUFfer
## SYSTem:COMMunicate:SERial:LBUFfer?

Sets or queries whether the RS-232 line buffer is enabled. If the buffer is enabled, all input characters are buffered until a newline character (^J or 0x0A) is received. Then all characters are available for processing. You can use special characters to modify the input before the newline character is received. For example, for a backspace character, use ^H; for a line-delete character, use ^U.

If you enable the line buffer mode, the output character "\n" 0x0A will be converted to "\n\r" 0x0A 0x0D and the input character will be converted to "\n" 0x0A.

**Syntax**

```
SYSTem:COMMunicate:SERial:LBUFfer <Boolean>
SYSTem:COMMunicate:SERial:LBUFfer?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NRf> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `SYST:COMM:SER:LBUF OFF`

Query: `SYST:COMM:SER:LBUF?`

Response: `0`

**Related Commands** All SYSTem:COMMunicate:SERial commands



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# SYSTem:COMMunicate:SERial:PACE
# SYSTem:COMMunicate:SERial:PACE?

Sets or queries whether software flow control (pacing) is enabled for the RS-232 port. This command sets both the transmit and receive values.

Avoid using XON pacing when transferring binary data.

**Syntax**

```
SYSTem:COMMunicate:SERial[:RECeive]:PACE <Flow Control>
SYSTem:COMMunicate:SERial[:RECeive]:PACE?
```

**Parameters**

| <Flow Control> | Query Response |
|---|---|
| NONE<br>XON | NONE<br>XON |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set the flow control to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:PACE XON`

Query: `SYST:COMM:SER:PACE?`

Response: `XON`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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## SYSTem:COMMunicate:SERial:PARity
## SYSTem:COMMunicate:SERial:PARity?

Sets or queries the type of parity used by the RS-232 port. This command sets both the transmit and receive values.

**Syntax**

```
SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE] <Type>
SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE]?
```

**Parameters**

| <Type> | Query Response |
|---|---|
| EVEN | EVEN |
| NONE | NONE |
| ODD | ODD |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set the parity to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:PAR EVEN`

Query: `SYST:COMM:SER:PAR?`

Response: `EVEN`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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## SYSTem:COMMunicate:SERial:PRESet

Preset logical groups of RS-232 port control parameters. The default mode sets all RS-232 settings to a known state. The RAW and TERMinal modes change only a subset of the parameters. Use RAW when connected to a computer and use TERMinal when connected to a computer display terminal.

The command "T" followed by a new line character (^J) configures the RS-232 port for terminal operation when it is currently in the RAW mode.

There are no associated queries with these commands.

Table 3–15 lists the preset values for each PRESet command.

**Table 3–15: Effects of :PRESet on Serial Port Parameters**

| SERial Port Parameter | [:ALL] | :RAW | :TERMinal |
|---|---|---|---|
| BAUD | 9600 | NC[1] | NC[1] |
| BITS | 8 | NC[1] | NC[1] |
| CONTrol:RTS | ON | NC[1] | NC[1] |
| ECHO | OFF | OFF | ON |
| ERESponse | OFF | OFF | ON |
| LBUFfer | OFF | OFF | ON |
| PACE | NONE | NONE | XON |
| PARity | NONE | NC[1] | NC[1] |
| SBITs | 1 | NC[1] | NC[1] |

[1] **The entry NC in a field means the value is not changed.**

**Syntax**

```
SYSTem:COMMunicate:SERial:PRESet[:ALL]
SYSTem:COMMunicate:SERial:PRESet:RAW
SYSTem:COMMunicate:SERial:PRESet:TERMINAL
```

**Parameters** None

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** See Table 3–15.

**Examples** Command: `SYST:COMM:SER:PRES:TERM`

**Related Commands** All SYSTem:COMMunicate:SERial commands



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# SYSTem:COMMunicate:SERial:SBITs
# SYSTem:COMMunicate:SERial:SBITs?

Sets or queries the number of stop bits sent with each character over the RS-232 port. This command sets both the transmit and receive values.

**Syntax**

```
SYSTem:COMMunicate:SERial[:RECeive]:SBITs <Stop Bits>
SYSTem:COMMunicate:SERial[:RECeive]:SBITs?
```

**Parameters**

| <Stop Bits> | Query Response |
|---|---|
| <NRf> | <NR1> |
| 1 | 1 |
| 2 | 2 |
| MINimum | 1 |
| MAXimum | 2 |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set terminator to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:COMM:SER:SBIT 2`

Query: `SYST:COMM:SER:SBIT?`

Response: `2`

**Related Commands**

All SYSTem:COMMunicate:SERial commands



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## SYSTem:DATE:LMAintenance?

Queries for the last factory maintenance date.

There is no command associated with this query.

**Syntax** `SYSTem:DATE:LMAintenance?`

**Parameters**

| Parameter | Query Response |
|---|---|
| None | <year>, <month>, <day> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `SYST:DATE:LMA?`

Response: `1995,3,10`

**Related Commands** SYSTem:TIME:LMAintenance?



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## SYSTem:ERRor?

This query returns the next entry from the Error/Event queue. This is an alias command with the STATus:QUEue[:NEXT]? command. There is no associated command for this query.

The Error/Event queue is cleared at power up, upon receipt of *CLS, and upon reading the last item from the queue.

**Syntax**

```
SYSTem:ERRor?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1>, <string> |

**Reset Value**

Not Applicable

**Errors and Events**

–350, “Queue Overflow”
The Error/Event queue overflowed due to the execution errors of other commands. The SYST:ERR? query, itself, cannot generate an error.

**Dependencies**

Reading the event clears the entry from the queue.

**Examples**

Query:

```
SYST:ERR?
```

Response:

```
0, "No error"
```

**Related Commands**

STATus:PRESet
STATus:QUEue?
STATus:QUEue:ENABle
*CLS



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## SYSTem:ERRor:ALL?

Returns a comma-separated list of all unread events from the Error/Event queue. This is an alias command with the STATus:QUEue:ALL? command.

The Error/Event queue is cleared at power up, upon receipt of the *CLS command.

There is no associated command for this query.

**Syntax**

```
SYSTem:ERRor:ALL?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1>, <string> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query:

```
SYST:ERR:ALL?
```

Response:

```
-221, "Settings Conflict.",-224, "Illegal Parameter Value"
```

**Related Commands**

STATus:QUEue?
STATus:QUEue:ENABle
STATus:QUEue?:ALL
*CLS



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## SYSTem:ERRor:CODE?

Returns the next event code from the Error/Event queue. This is an alias command with the STATus:QUEue:CODE? command.

The Error/Event queue is cleared at power up, upon receipt of the *CLS command.

There is no associated command for this query.

**Syntax**

```
SYSTem:ERRor:CODE:[NEXT]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:ERR:CODE?`

Response: `-221`

**Related Commands**

STATus:QUEue?
STATus:QUEue:ENABle
STATus:QUEue?:CODE?



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## SYSTem:ERRor:CODE:ALL?

Returns a comma-separated list of all unread event codes from the Error/Event queue. This is an alias command with the STATus:QUEue:CODE:ALL? command.

The Error/Event queue is cleared at power up, upon receipt of the *CLS command.

There is no associated command for this query.

**Syntax**

```
SYSTem:ERRor:CODE:ALL?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query:

```
SYST:ERR:CODE:ALL?
```

Response:

```
-221,-224
```

**Related Commands**

STATus:QUEue:ALL?
STATus:QUEue?:CODE:ALL?



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## SYSTem:ERRor:COUNt?

Returns the number of unread events in the Error/Event queue. This is an alias command with the STATus:QUEue:COUNt? command.

The Error/Event queue is cleared at power up, upon receipt of the *CLS command.

There is no associated command for this query.

**Syntax**

```
SYSTem:ERRor:COUNt?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:ERR:COUNt?`

Response: 3

**Related Commands**

STATus:QUEue:ALL?
STATus:QUEue?:COUNt?



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# SYSTem:ERRor:ENABle
# SYSTem:ERRor:ENABle?

Sets or queries the enable events to be placed in the Error/Event queue. The STATus:QUEue:ENABle and STATus:QUEue:ENABle? commands are aliases.

Attempting to enable events that are not reported by the mainframe does not generate an error.

At power on, when the power-on status clear flag is true, or when you send the STATus:PRESet command the contents of the register is set to –499:0.

**Syntax**

```
SYSTem:ERRor:ENABle <Event List>
SYSTem:ERRor:ENABle?
```

**Parameters**

| <Event List> | Query Response |
|---|---|
| {<NRf> \| numeric range[,<NRf> \| numeric range]}* | {<NRf> \| numeric range[,<NRf> \| numeric range]} |

* **numeric range is <NRf>:<NRf>**

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable list to an illegal value.

**Dependencies**

STATus:PRESet

**Examples**

Command: `SYST:ERR:ENAB (-499:0)`

Query: `SYST:ERR:ENAB?`

Response: `(-499:0)`

**Related Commands**

STATus:QUEue?
STATus:PRESet
SYSTem:ERRor
STATus:QUEue:ENABle
STATus:QUEue:ENABle?



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## SYSTem:ERRor:ENABle:ALL

Presets the Error/Event queue enable to the value of –1999:1000. The STATus:QUEue:ENABle:ALL command is an alias.

**Syntax** `SYSTem:ERRor:ENABle:ALL`

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `SYST:ERR:ENAB:ALL`

**Related Commands** STATus:PRESet
STATus:QUEue:ENABle
STATus:QUEue:ENABle:ALL



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## SYSTem:FACTory

This command sets the VX1410 IntelliFrame settings (except the communication settings) to the factory default values. Table 3–16 lists the impacted commands and their factory default settings.

**Table 3–16: VX1410 IntelliFrame Factory Default Settings**

| Command | Settings |
|---|---|
| DISPlay[:WINDow]:TEXT:[DATA] | "SYSTEM OK" |
| STATus:OPERation:ENABle | 0 |
| STATus:OPERation:VXIMonitor:ENABle | 32767 |
| STATus:QUEStionable:BLOWer:ENABle | 32767 |
| STATus:QUEStionable:ENABle | 0 |
| STATus:QUEStionable:FILTer:TINTerval | 4000 |
| STATus:QUEStionable:TEMPerature:ENABle | 32767 |
| STATus:QUEStionable:TEMPerature:LIMit | AMBient: 55<br>DELTaN: 10 |
| STATus:QUEStionable:VOLTage:ENABle | 32767 |
| STATus:QUEStionable:VOLTage:PTR | 32743 |
| STATus:QUEue:ENABle | (–1999:1000) |
| SYSTem:ERRor:ENABle | (–1999:1000) |
| SYSTem:SYSReset | 0 |
| VXIMonitor:REPeat | 0 |
| VXIMonitor:TINTerval | 10 |
| *ESE | 0 |
| *PSC | 0 |
| *SRE | 0 |

**Syntax**

```
SYSTem:FACTory
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

None



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**Dependencies** None

**Examples** Command: `SYST:FACT`

**Related Commands** None



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## SYSTem:HELP:SYNTax?

Returns a string containing the syntax specification of the specified command. There is no command associated with this query.

**Syntax**

```
SYSTem:HELP:SYNTax?
```

**Parameters**

| <Command Header> | Query Response |
|---|---|
| <string> | <string> |

**Reset Value**

Not Applicable

**Errors and Events**

The query returns a null string ("") if the <Command Header> is not a valid command header being recognized by the VX1410 IntelliFrame.

**Dependencies**

None

**Examples**

Query: `SYST:HELP:SYNTax? "DISP:TEXT"`

Response: `"DISPlay[:WINDow]:TEXT[:DATA] <string>|<block>"`

**Related Commands**

None



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## SYSTem:IEMessage

Sends an interface event message from the VXI interface to the RS-232 interface or vice versa. You can use a maximum of 32 data bytes in the message. There is no query associated with this command.

When you send the command from the RS-232 interface, the interface event message is placed in the VXI Error/Event queue as part of an event message. When you send the command from the VXI interface, the interface event message is placed in the RS-232 Error/Event queue as part of an event message.

The message in the Error/Event queue looks similar to the following message:

```
100,"System Message; Your Message Here"
```

Event number 100 has to be enabled by the SYSTem:ERRor:QUEue:ENABle command to place an event into the event queue.

**Syntax**

```
SYSTem:IEMessage <Message>
```

**Parameters**

| <Parameter> | Query Response |
|---|---|
| <string> | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

–223, “Too Much Data”
You attempted to send too much data in the string.

**Dependencies**

None

**Examples**

Command: `SYST:IEM "System Init"`

**Related Commands**

None



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## SYSTem:NVRecall

Recalls device settings from nonvolatile RAM.

Table 3–17 lists the device settings that will be restored from nonvolatile RAM:

**Table 3–17: NVRecall Device Settings**

| Device Settings | |
|---|---|
| DISPlay[:WINDow]:TEXT[:DATA] | STATus:QUEStionable:VOLTage:ENABle |
| STATus:OPERation:ENABle | STATus:QUEStionable:VOLTage:PTR |
| STATus:OPERation:VXIMonitor:ENABle | SYSTem:SYSReset |
| STATus:QUEStionable:BLOWer:ENABle | VXIMonitor:TINTerval |
| STATus:QUEStionable:ENABle | VXIMonitor:REPeat |
| STATus:QUEStionable:FILTer:TINTerval | *ESE |
| STATus:QUEStionable:TEMPerature:ENABle | *PSC |
| STATus:QUEStionable:TEMPerature:LIMit | *SRE |

**Syntax**

```
SYSTem:NVRecall
```

**Parameters**

| <Parameter> | Query Response |
|---|---|
| Not Applicable | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Command: `SYST:NVR`

**Related Commands**

SYSTem:NVSave



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## SYSTem:NVSave

Saves device settings to nonvolatile RAM. The settings will be restored at power on.

Table 3–17 lists the device settings that will be saved to nonvolatile RAM:

**Table 3–18: NVSave Device Settings**

| Device Settings | |
|---|---|
| DISPlay[:WINDow]:TEXT[:DATA] | SYSTem:COMMunicate:SERial:ECHO |
| STATus:OPERation:ENABle | SYSTem:COMMunicate:SERial:ERESponse |
| STATus:OPERation:VXIMonitor:ENABle | SYSTem:COMMunicate:SERial:LBUFfer |
| STATus:QUEStionable:BLOWer:ENABle | SYSTem:COMMunicate:SERial:PACE |
| STATus:QUEStionable:ENABle | SYSTem:COMMunicate:SERial:PARity |
| STATus:QUEStionable:FILTer:TINTerval | SYSTem:COMMunicate:SERial:SBITs |
| STATus:QUEStionable:TEMPerature:ENABle | SYSTem:SYSReset |
| STATus:QUEStionable:TEMPerature:LIMit | VXIMonitor:TINTerval |
| STATus:QUEStionable:VOLTage:ENABle | VXIMonitor:REPeat |
| STATus:QUEStionable:VOLTage:PTR | *ESE |
| SYSTem:COMMunicate:SERial:BAUD | *PSC |
| SYSTem:COMMunicate:SERial:BITS | *SRE |
| SYSTem:COMMunicate:SERial:CONTrol:RTS | |

**Syntax**

```
SYSTem:NVSave
```

**Parameters**

| <Parameter> | Query Response |
|---|---|
| Not Applicable | Not Applicable |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `SYST:NVS`

**Related Commands** SYSTem:NVRecall



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# SYSTem:POWer
# SYSTem:POWer?

Powers the mainframe on or off. Use the query to determine if the mainframe is powered on or off.

**Syntax**

```
SYSTem:POWer[:STATe] <Boolean>
SYSTem:POWer[:STATe]?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NRf> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set the parameter to an illegal value.

**Dependencies**

None

**Examples**

Command: `SYST:POW ON`

Query: `SYST:POW?`

Response: 1

**Related Commands**

None



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## SYSTem:POWer:CYCLe?

Returns the number of times the mainframe power has been cycled since the mainframe was manufactured.

**Syntax** `SYSTem:POWer:CYCLe?`

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `SYST:POW:CYCL?`

Response: `50`

**Related Commands** None



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## SYSTem:POWer:SOURce?

Queries whether the power source of the Enhanced Monitor is from the mainframe power supply or from an external power supply.

**Syntax**

```
SYSTem:POWer:SOURce?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | MAIN<br>EXTERNAL |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:POW:SOUR?`

Response: `MAIN`

**Related Commands**

None



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# SYSTem:SYSReset
# SYSTem:SYSReset?

Sets or queries whether the VXI SYSRESET signal can reset the mainframe.

When SYSRESET is enabled, asserting the VXI SYSRESET signal will reset the Enhanced Monitor. When disabled, asserting the VXI SYSRESET signal only initializes the Enhanced Monitor VXI Interface; all other Enhanced Monitor functions are not affected.

The factory default setting is disabled (0).

***NOTE**. If SYSRESET is enabled and the mainframe is powered down, communication through the RS-232 port is not possible even if an external +5 V is supplied to the enhanced monitor card. The display will not show the current status and the scroll buttons will be inoperative. Consequently the enhanced monitor is inoperative.*

**Syntax**

```
SYSTem:SYSReset <Boolean>
SYSTem:SYSReset?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NRf> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value** Not Applicable

**Errors and Events** –224, “Illegal Parameter Value”
You attempted to set the parameter to an illegal value.

**Dependencies** None

**Examples** Command: `SYST:SYSR ON`

Query: `SYST:SYSR?`

Response: 1

**Related Commands** None



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## SYSTem:TIME:LMAintenance?

Returns the number of hours the VX1410 IntelliFrame. has been operating since the last factory maintenance. There is no command associated with this query.

**Syntax**

```
SYSTem:TIME:LMAintenance?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| None | <hour>,<minute>,<second> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:TIME:LMA?`

Response: `101,3,3`

**Related Commands**

SYSTem:TIME:ON?



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## SYSTem:TIME:ON?

Returns the number of hours the VX1410 IntelliFrame has been operating since power on. There is no command associated with this query.

**Syntax**

```
SYSTem:TIME:ON?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <hour>,<minute>,<second> |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:TIME:ON?`

Response: `1,2,55`

**Related Commands**

SYSTem:TIME:LMAintenance?



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## SYSTem:VERSion?

Returns the SCPI version number to which the VX1410 IntelliFrame complies. There is no command associated with this query.

**Syntax**

```
SYSTem:VERSion?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR2><br>1995.0 |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `SYST:VERS?`

Response: `1995.0`

**Related Commands**

*IDN?



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# TEST Subsystem

This section describes each command and query in the TEST subsystem. These commands are used to execute internal self-tests. The TEST subsystem controls the parameters shown in Figure 3–9.

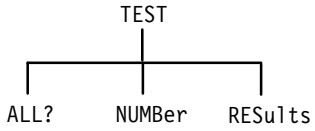



**Figure 3–9: TEST Subsystem Hierarchy**

Table 3–19 lists all of the internal self tests of the VX1410 IntelliFrame.

**Table 3–19: VX1410 IntelliFrame Self Test**

| Test Number | Test Name | Execution Time (Seconds) | Power On Test | Included in TEST? | Invoked by TEST:NUMBer? |
|---|---|---|---|---|---|
| 1000 | Fan Speed Control | 116 | No | Yes | Yes |
| 1010 | ADC and DAC Control | < 1 | Yes | Yes | Yes |
| 1100 | Front Panel Display Control Test 1 | 25 | No | No | Yes |
| 1110 | Front Panel Display Control Test 2 | 36 | No | No | Yes |
| 1120 | Front Panel Display Control Test 3 | 6 | No | No | Yes |

A description of each self test is listed below:

- Fan Speed Control test. This test varies the fan speed control and verifies that the fan speed changes accordingly.
- ADC and DAC Control test. This test verifies the internal ADC and DAC circuitry.
- Front Panel Display Control Test 1. This test performs the following sequences:

  **a.** Turns on all display pixels.

  **b.** Turns off all display pixels.

  **c.** Writes the character 8 to each display position.

  **d.** Turns on all display pixels.



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**e.** Turns off all display pixels.

**f.** Writes the character 8 to each display position.

**g.** Turns off all display pixels.

- Front Panel Display Control Test 2. This test writes the following ASCII characters to the display: " " 0x20 to "~" 0x7E. These characters are followed by "Δ" and "°c."
- Front Panel Display Control Test 3. This test writes the following blinking message to the display: "Text is BLINKING."



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# TEST
# TEST?

This command executes all internal self-tests. If a failure occurs and the halt control is enabled, the test will immediately end. The query form returns the unique numeric identifier of the first test that failed. A value of zero is returned if there are no failures. The command form executes the same tests but returns no results code.

Each internal self-test has a unique numeric identifier in the range of 1000 to 1999 (see Table 3–19 on page 3–109).

*TST? and TEST? are aliases.

**Syntax**

```
TEST[:ALL]
TEST[:ALL]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1><br>0<br>1000 ≤ N ≤ 1999 |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `TEST`

Query: `TEST?`

Response: 0

**Related Commands** TEST:RESults?
TEST:RESults:VERBose?



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# TEST:NUMBer
# TEST:NUMBer?

The command executes the specified self-test but does not return the test results. The query returns the results of the specified test. A value of zero is returned if there are no failures.

Each internal self-test has a unique numeric identifier in the range of 1000 to 1999 (see Table 3–19 on page 3–109).

**Syntax**

```
TEST:NUMBer <test>
TEST:NUMBer? <test>
```

**Parameters**

| Parameter | Query Response |
|---|---|
| {<NRf>\|<Non-decimal number>}<br>1000 ≤ N ≤ 1999 | <NR1><br>0<br>1000 ≤ N ≤ 1999 |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Command: `TEST:NUMB 1000`

Query: `TEST:NUMB? 1000`

Response: `0`

**Related Commands**

TEST:RESults?
TEST:RESults:VERBose?



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## TEST:RESults?

This query returns the results code for the last executed self-test command. The unique numeric identifier of the first individual test that failed is reported. A value of zero is returned if there were no failures.

There is no associated command for this query.

Each internal self-test has a unique numeric identifier in the range of 1000 to 1999 (see Table 3–19 on page 3–109).

**Syntax**

```
TEST:RESults[:CODE]?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1><br>0<br>1000 ≤ N ≤ 1999 |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `TEST:RES?`

Response: 0

**Related Commands**

TEST
TEST:RESults:VERBose?



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## TEST:RESults:VERBose?

This query returns a string describing the results of the last executed self-test command. The unique numeric identifier of the first individual test that failed is reported. A value of zero is returned if there were no failures.

There is no associated command for this query.

**Syntax**

```
TEST:RESults:VERBose?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <string><br>error number: <NR1><br>0<br>1000 ≤ N ≤ 1999<br>verbose message:<br>(error specific) |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `TEST:RES:VERB?`

Response: `1001,"Test ADC and DAC failed"`

**Related Commands**

TEST
TEST:RESults?



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# VXIMonitor Subsystem

This section describes the commands and queries in the VXIMonitor subsystem. Use the TINTerval command and query to specify or read the time interval that the VXI Monitor monitors the VXI bus. Use the REPeat command to enable or disable the repeat mode and use the query to return the status of the repeat mode. The VXIMonitor subsystem controls the parameters shown in Figure 3–10.

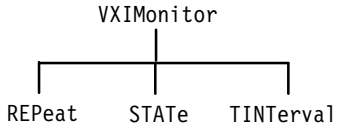



**Figure 3–10: VXIMonitor Subsystem Hierarchy**

The VXIMonitor monitors the following VXI bus signals: BERR, SYSFAIL, ACFAIL, and AS. Use the VXIMonitor commands to set or query the time interval that the VXI Monitor monitors the bus and how often to monitor the bus.



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# VXIMonitor:REPeat
# VXIMonitor:REPeat?

Sets or queries the repeat mode of the VXI Monitor. When the repeat mode is on, the VXI Monitor continuously monitors the VXI bus.

When the repeat mode is off, the VXI Monitor monitors the VXI bus for the specified time interval.

The factory default setting is OFF(0).

**Syntax**

```
VXIMonitor:REPeat <Boolean>
VXIMonitor:REPeat?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NR1><br>N ≠ 0<br>0<br>ON<br>OFF | <NR1><br>1<br>0<br>1<br>0 |

**Reset Value**

Not Applicable

**Errors and Events**

–221, “Settings Conflict.”
You attempted to set the interval while the VXI Monitor was executing.

**Dependencies**

None

**Examples**

Command: `VXIM:REP ON`

Query: `VXIM:REP?`

Response: 1

**Related Commands**

VXIMonitor:TINTerval



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# VXIMonitor:STATe
# VXIMonitor:STATe?

Starts or stops the VXI Monitor. The query returns whether the VXI Monitor is running.

**Syntax**

```
VXIMonitor:STATe <Boolean>
VXIMonitor:STATe?
```

**Parameters**

| <Boolean> | Query Response |
|---|---|
| <NR1> | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| ON | 1 |
| OFF | 0 |

**Reset Value** 0

**Errors and Events** –213, “Init Ignored”
You sent INITiate while the VXI Monitor was already monitoring the VXI bus.

**Dependencies** None

**Examples** Command: `VXIM:STAT 1`

Query: `VXIM:STAT?`

Response: 1

**Related Commands** VXIMonitor:TINTerval
VXIMonitor:REPeat



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# VXIMonitor:TINTerval
# VXIMonitor:TINTerval?

Sets or queries the time interval the VXI Monitor monitors the VXI bus. The VXI monitor monitors the bus for the specified number of seconds and reports any detected VXI Monitor event.

The factory default setting is 10 seconds.

**Syntax**

```
VXIMonitor:TINTerval <time>
VXIMonitor:TINTerval?
```

**Parameters**

| <time> | Query Response |
|---|---|
| <NRf><br>1 ≤ N ≤ 2147483647<br>MIN<br>MAX | <NR1><br><br>1<br>2147483647 |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the interval to an illegal value.

–221, “Settings Conflict.”
You attempted to set the interval while the VXI Monitor was executing.

**Dependencies**

None

**Examples**

Command: `VXIM:TINT 100`

Query: `VXIM:TINT?`

Response: `100`

**Related Commands**

VXIMonitor:REPeat
VXIMonitor:STATe



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# IEEE 488.2 Common Commands

This section describes each of the IEEE 488.2 common commands implemented in the VX1410 IntelliFrame.

## *CLS

This command clears the SCPI and IEEE 488.2 event registers and the Error/ Event queue. There is no query associated with this command. SCPI and IEEE 488.2 enable registers are not cleared by this command.

**Syntax** `*CLS`

**Parameters** None

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `*CLS`

**Related Commands** STATus:PRESet



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# *ESE
# *ESE?

Sets or queries the enable mask for the Standard Event Status Register. The STATus:PRESet command does not change this enable mask.

The factory default setting is 0.

**Syntax**

```
*ESE <mask>
*ESE?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| {<NRf> \| <Non-Decimal Numeric>}<br>0 ≤ N ≤ #HFF | <NR1> |

| Standard Status Byte Definition | Query Response |
|---|---|
| D0 | Operation Complete |
| D1 | Not Used |
| D2 | Query Error |
| D3 | Device Dependent Error |
| D4 | Execution Error |
| D5 | Command Error |
| D6 | Not Used |
| D7 | Power On |

**Reset Value**

Not Applicable

**Errors and Events**

–222, “Data Out of Range”
You attempted to set the enable mask to an illegal value.

**Dependencies**

None

**Examples**

Command: `*ESE #H40`

Query: `*ESE?`

Response: `64`

**Related Commands**

*ESR?



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# *ESR?

This query returns the event(s) from the Standard Event Status Register. There is no command associated with this query. The Error/Event queue contains a chronological record of the events.

**Syntax** *ESR?

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

| Standard Status Byte Definition | Query Response |
|---|---|
| D0 | Operation Complete |
| D1 | Not Used |
| D2 | Query Error |
| D3 | Device Dependent Error |
| D4 | Execution Error |
| D5 | Command Error |
| D6 | Not Used |
| D7 | Power On |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** Reading this register clears it.

**Examples** Query: *ESR?

Response: 0

**Related Commands** *ESE



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## *IDN?

This query returns the VX1410 IntelliFrame identification message. There is no command associated with this query. The fourth field of the id message includes both the SCPI and firmware version numbers.

**Syntax**

```
*IDN?
```

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <Syntax Defined by IEEE 488.2><br>Manufacturer, Model Number, Serial Number, Firmware Version (or Equivalent) |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `*IDN?`

Response: `TEKTRONIX,VX1410,B123456,SCPI:95.0 RM1:1.0 RM2:1.0`

**Related Commands**

None



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# *OPC
# *OPC?

The command synchronizes command execution with the controller. The command causes the device to set the OPC bit in the Standard Event Status register after the previous command has completed execution.

The query causes an ASCII one to be placed in the output queue after the previous command has completed execution.

**Syntax**

```
*OPC
*OPC?
```

**Parameters**

None

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Command: `*OPC`

Query: `*OPC?`

Response: 1

**Related Commands**

*WAI



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# *PSC
# *PSC?

Sets or queries the setting of the power-on state clear flag. If the <Value> parameter is zero, the power-on state clear flag is set to FALSE; otherwise the flag is set to TRUE.

If the power-on state clear flag is FALSE, at power on, the Service Request Enable Register, the Standard Event Status Enable Register, and the SCPI Enable Register settings will be restores to their previous settings. Otherwise the settings will be cleared.

The factory default setting is 0.

**Syntax**

```
*PSC <Value>
*PSC?
```

**Parameters**

| <Value> | Query Response |
|---|---|
| {<NRf> \| <Non-Decimal Numeric>} | <NR1> |
| N ≠ 0 | 1 |
| 0 | 0 |
| –32767 ≤ N ≤ 32767 | |

**Reset Value**

Not Applicable

**Errors and Events**

–224, “Illegal Parameter Value”
You attempted to set the parameter to an illegal value.

**Dependencies**

None

**Examples**

Command: `*PSC 0`

Query: `*PSC?`

Response: `0`

**Related Commands**

STATus



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## *RST

This command resets instrument settings to a default state. There is no query associated with this command. This command has no effect other than stopping the VXI Monitor.

The VXI Monitor stops execution while other monitors remain active.

**Syntax** `*RST`

**Parameters** None

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `*RST`

**Related Commands** STATus:PRESet
*CLS



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# *SRE
# *SRE?

Sets or queries the enable mask for the Service Request (Status Byte) Register. Setting unused enable bits does not generate an error; they are ignored. The STATus:PRESet command does not change this enable mask.

The VX1410 IntelliFrame accepts Non-Decimal Numeric masks even though this is not required by IEEE 488.2.

The factory default setting is 0.

**Syntax**

```
*SRE <mask>
*SRE?
```

**Parameters**

| <Mask> | Query Response |
|---|---|
| {<NRf> \| <Non-Decimal Numeric>}<br>0 ≤ N ≤ #HFF | <NR1> |

| Standard Status Byte Definition | Query Response |
|---|---|
| D0 | Not Used |
| D1 | Not Used |
| D2 | Error/Event Queue |
| D3 | Questionable Event Register |
| D4 | MAV |
| D5 | ESB Standard Event Status Reg |
| D6 | Not Defined |
| D7 | Operation Event Register |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Command: `*SRE #H60`

Query: `*SRE?`

Response: `96`

**Related Commands**

*STB?



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## *STB?

This query returns the contents of the Status Byte Register. There is no command associated with this query.

**Syntax** *STB?

**Parameters**

| Parameter | Query Response |
|---|---|
| Not Applicable | <NR1> |

| Standard Status Byte Definition | Definition |
|---|---|
| D0 | Not Used |
| D1 | Not Used |
| D2 | Error/Event Queue |
| D3 | Questionable Event Register |
| D4 | MAV |
| D5 | ESB Standard Event Status Reg |
| D6 | RQS/MSS |
| D7 | Operation Event Register |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: *STB?

Response: 96

**Related Commands** *SRE



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## *TST?

This query initiates an internal self-test and returns a failure code. If more than one failure occurred, only the the unique numeric identifier of the first self-test that failed is reported. A value of zero is returned if there were no failures.

Each internal self-test has a unique identifier in the range of 1000 to 1999.

*TST? and TEST? are identical queries. There is no command associated with this query. You can obtain additional test results with the TEST:RESult:VERBose? command.

**Syntax**

```
*TST?
```

**Parameters**

| <failure code> | Query Response |
|---|---|
| Not Applicable | <NR1><br>0 \| 1000 ≤ N ≤ 1999 |

**Reset Value**

Not Applicable

**Errors and Events**

None

**Dependencies**

None

**Examples**

Query: `*TST?`

Response: `0`

**Related Commands**

TEST
TEST:RESults:VERBose?



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## *WAI

This command is used to synchronize command execution with the controller. There is no query associated with this command.

*WAI prevents the instrument from executing further commands until the previous command has completed execution.

**Syntax** `*WAI`

**Parameters** None

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Command: `*WAI`

**Related Commands** *OPC



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# Status and Events

The VX1410 IntelliFrame complies with SCPI version 1995.0. You can use the SYSTem:VERSion? command to read the latest version or the *IDN? command to read a more detailed identification message.

The VX1410 IntelliFrame supports the Status Byte model shown in Figure 3–11. The figure shows core of the SCPI-required status reporting capability.

The status registers fit into a 16-bit integer with the most-significant bit always zero (positive logic). Unused or “don’t care” bits in masks and registers always return zeros when queried.

The Operation Status register and the Questionable Status register outputs are logically ORed together as shown in Figure 3–11.

The Operation Status register contains information on the normal operation of the VX1410 IntelliFrame. In particular, bit 8 contains summary information on the VXI Monitor status register (see Figure 3–12). The VXI Monitor Status register monitors activity on bits 0 through 3.

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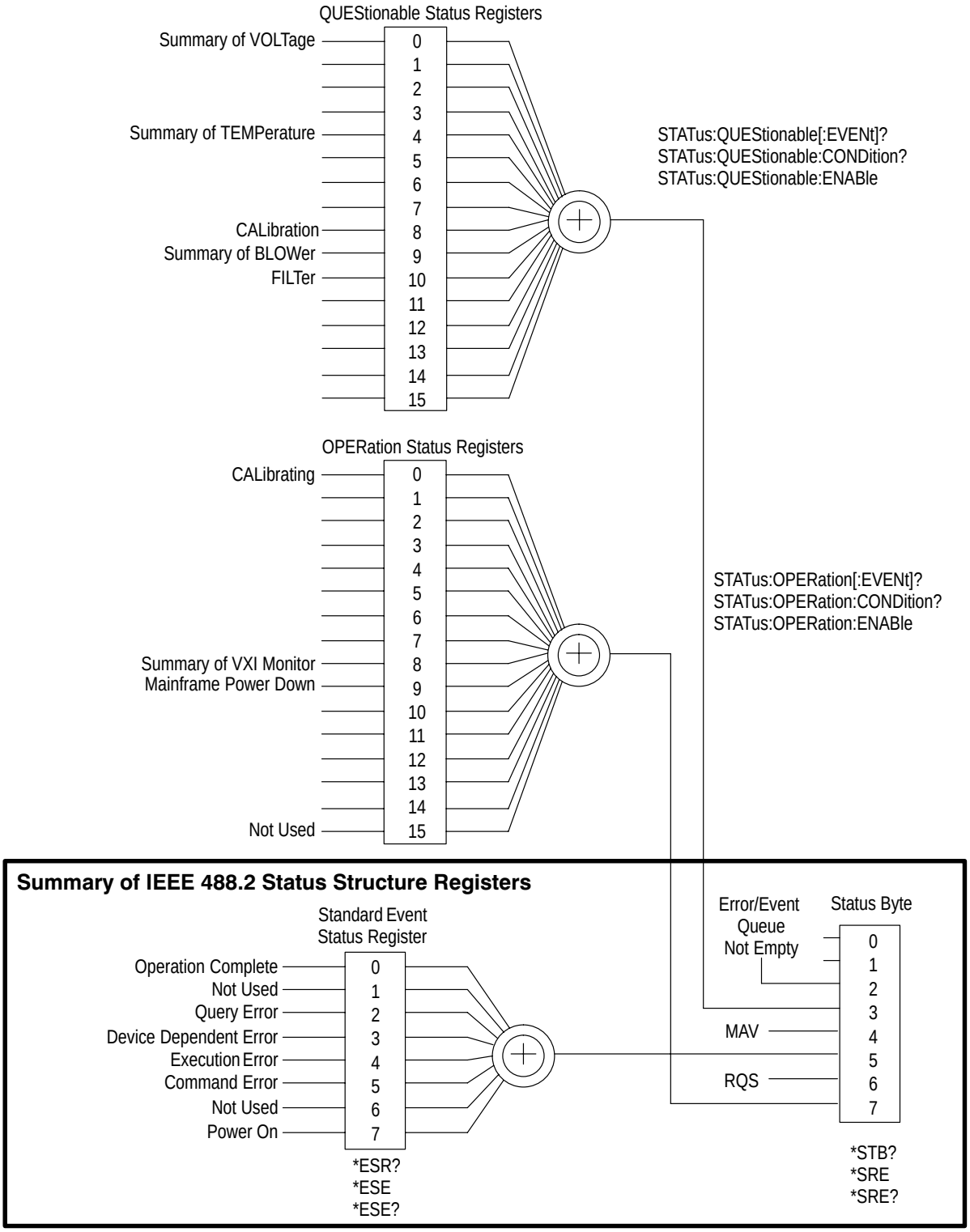



**Figure 3–11: SCPI and IEEE Status and Event Registers**



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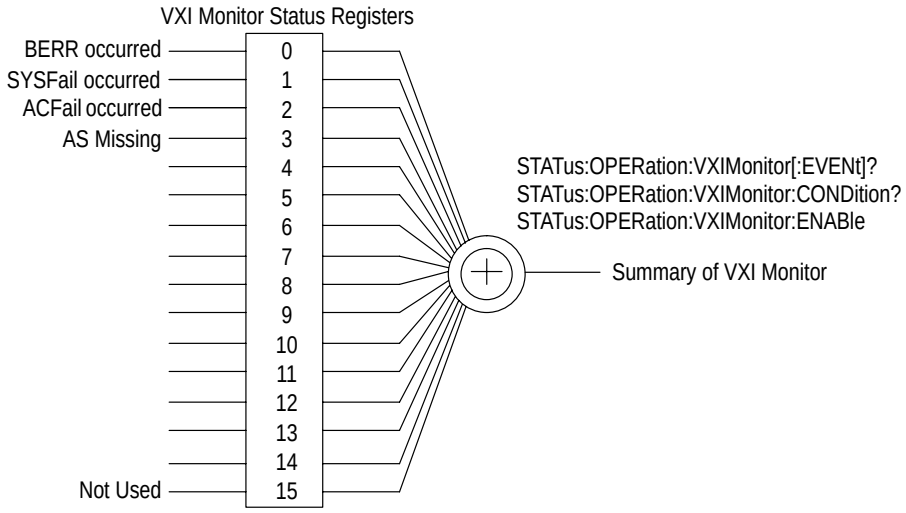



**Figure 3–12: VXI Monitor Status Register**

The Questionable Status register contains information on the quality of the signals within the mainframe. In the event problems occur within the mainframe (for example, one of the power supplies is not working properly), you could program the mainframe to warn you of possible problems.

There are three status registers that provide summary information to the Questionable Status register: the Voltage Status register, the Temperature Status register, and the Blower Status register.

The Voltage Status register provides status information on the individual power supply voltages (see Figure 3–13). You can detect problems with any one of the power supply voltages by monitoring the corresponding bit in the Voltage Status register. If a problem occurs, the corresponding bit will be set in the register.



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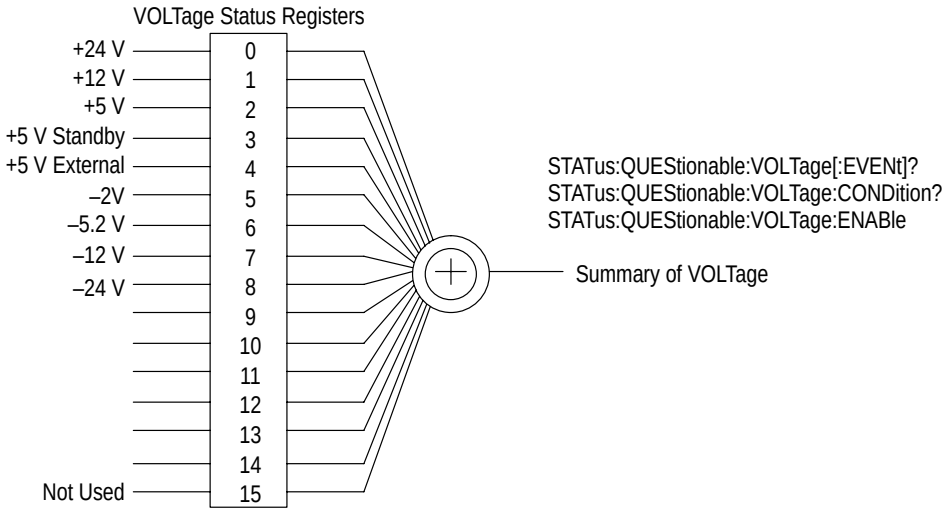



**Figure 3–13: Voltage Status Register**

The Temperature Status register provides status information on the delta temperature for each slot in the mainframe (see Figure 3–14). You can detect temperature problems with any one of the mainframe slots by monitoring the corresponding bit in the Temperature Status register. If a problem occurs, the corresponding bit will be set in the register.

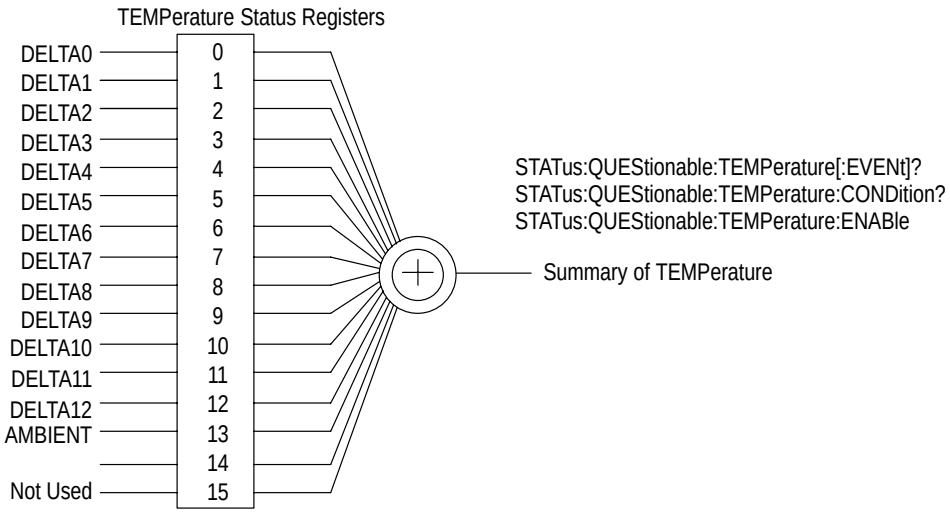



**Figure 3–14: Temperature Status Register**

The Blower Status register provides status information on the two fans in the mainframe (see Figure 3–15). You can detect problems with either fan by monitoring the corresponding bit in the Blower Status register.



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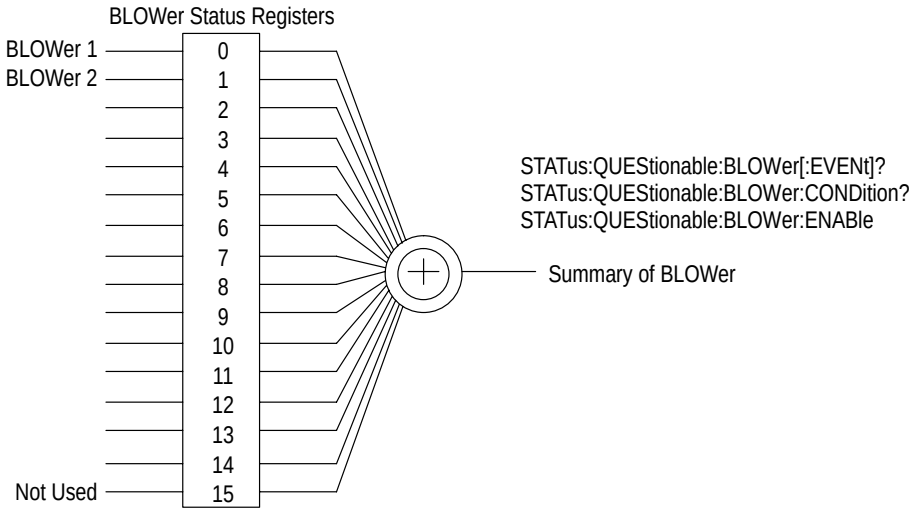



**Figure 3–15: Blower Status Register**

## RS-232 and VXI Interface Status and Events

The RS-232 and VXI interfaces have separate status and event systems. There are two sets of status and event registers and two separate Error/Event queues for the two interfaces. You can send the commands listed below from the interface to set up only those status and event registers of that interface. This allows the RS-232 interface to have different settings than the VXI interface.

- STATus:OPERation:ENABle
- STATus:OPERation:VXIMonitor:ENABle
- STATus:QUEStionable:BLOWer:ENABle
- STATus:QUEStionable:ENABle
- STATus:QUEStionable:TEMPerature:ENABle
- STATus:QUEStionable:VOLTage:ENABle
- STATus:QUEStionable:VOLTage:PTR
- STATus:QUEue:ENABle
- *ESE
- *SRE



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## Error and Event Messages

Table 3–20 on page 3–137 lists some of the error messages that you may encounter while sending commands and queries to the VX1410 IntelliFrame. The VX1410 IntelliFrame reports the following categories of errors:

- Command Errors
- Execution Errors
- Device Specific Errors
- Query Errors

### Command Errors

Command errors have error codes within the range of –100 and –199. These errors indicate syntax errors. The syntax errors can be due to the command parser detecting an IEEE 488.2 syntax error or an unrecognized header was received. Command errors may also occur when you attempt to send an unimplemented IEEE 488.2 common command.

### Execution Errors

Execution errors have error codes within the range of –200 and –299. These errors are detected by the VX1410 IntelliFrame execution control block. Execution errors can occur when a program data element following a header was evaluated as outside of the legal input range or when the program data element is inconsistent with the capabilities of the mainframe.

### Device Specific Errors

Device specific errors have error codes within the range of –300 and –399. These errors may indicate that some operations failed to complete due to abnormal hardware or firmware conditions.

### Query Errors

Query errors have error codes within the range of –400 and –499. These errors indicate that the VX1410 IntelliFrame detected a problem with the message exchange protocol. Query errors set the query error bit in the Event Status register. These errors may result when you attempt to read data from the output queue when no input is present or pending. The errors may also occur when the data in the output queue is lost.



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**Table 3–20: VX1410 IntelliFrame Error and Event Codes**

| Code | Message |
|---|---|
| 0 | No error. The error queue is empty. Every error or event has been read or was purposely cleared. |
| –100 | Command error. |
| –101 | Invalid character. |
| –102 | Syntax error. |
| –103 | Invalid separator. The parser detected an illegal separator character. |
| –104 | Data type error. The parser recognized a data element different than the one allowed. |
| –108 | Parameter not allowed. More parameters than expected were received for the header. |
| –109 | Missing parameter. Not enough parameters were received. |
| –110 | Command header error. An error was detected in the header. |
| –112 | Program mnemonic too long. The header has more than 12 characters. |
| –113 | Unidentified header The header is undefined for the VX1410 IntelliFrame. |
| –120 | Numeric data error. |
| –141 | Invalid character data. The character data element contains an invalid character or the data was invalid for the header. |
| –144 | Character data too long. The character element was more than 12 characters long. |
| –160 | Block data error. |
| –161 | Invalid block data. An invalid block data element was received. |
| –200 | Execution Error. |
| –203 | Command protected. A password-protection program command or query could not be executed because the command was disabled. |
| –213 | Init Ignored. The measurement initiation was ignored because another measurement was already in progress. |
| –220 | Parameter error. A program data element related error occurred. |
| –221 | Settings conflict. A legal program data element was parsed but could not be executed due to the current state of the mainframe. |
| –222 | Data out of range. The value of the data was outside of the legal range. |
| –223 | Too much data. More data was received by the instrument than what it was capable of handling. |
| –224 | Illegal parameter value. The parameter value must be one of the exact values from the command list. |
| –315 | Queue Overflow. An error occurred but there was no room in the queue to record the error. |



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**Table 3–20: VX1410 IntelliFrame Error and Event Codes (Cont.)**

| Code | Message |
|---|---|
| –350 | Too many errors. An error occurred but there was no room in the queue to record the error. |
| –380 | Calibration failed |
| –381 | Execution queue overflow. Internal error. |
| –410 | Query INTERRUPTED. The query was interrupted before a response was completely sent. |
| –420 | Query UNTERMINATED. An incomplete program message was received. |
| –430 | Query DEADLOCKED. The input and output buffers are full and the device can not continue. |
| –440 | Query UNTERMINATED after indefinite response. A query was received in the same program message after executing a query waiting for an indefinite response. |
| 100 | System Message |



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# Examples

This section describes a few brief examples on using some of the commands described in this manual. These examples are intended to show how the commands from the Command section work together to complete a task.

## Example 1: Monitor Power Supply Voltages

This example shows how to monitor the mainframe power supply voltages

1. Send the STATus:QUEStionable:VOLTage:ENABle command to enable the bits in the Voltage Enable register. This command lets you monitor all voltage limits.

   ```
   STAT:QUES:VOLT:ENAB 32767
   ```

2. Send the STATus:QUEStionable:ENABle command to enable the bit 0 in the Questionable Enable register. If any problems occur with any of the power supplies, bit 0 of the register will be set.

   ```
   STAT:QUES:ENAB 1
   ```

## Example 2: Monitor the Delta Temperature

This example shows how to monitor the delta temperature in slots 0, 1, 2, and 3. The maximum allowable delta temperature for slots 0 and 1 is 10 °C; the maximum allowable delta temperature for slots 2 and 3 is 5 °C.

1. Send the STATus:QUEStionable:TEMPerature:LIMit command to set the temperature limits for the four slots (one command per slot):

   ```
   STAT:QUES:TEMP:LIM DELTA0, 10
   STAT:QUES:TEMP:LIM DELTA1, 10
   STAT:QUES:TEMP:LIM DELTA2, 5
   STAT:QUES:TEMP:LIM DELTA3, 5
   ```

2. Send the STATus:QUEStionable:TEMPerature:ENABle command to enable the bits in the Temperature Enable register. This command allows you to measure temperatures for the individual slots.

   ```
   STAT:QUES:TEMP:ENAB #HOF
   ```



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3. Send the STATus:QUEStionable:ENABle command to enables bit 4 in the Questionable Enable register. If any problems occur with any of the slots, the corresponding bit will be set.

   ```
   STAT:QUES:ENAB 16
   ```

## Example 3: Summarize Status Information

The following example shows how to return a summary of the status information using the STAT:SEVent command.

Send the STAT:SEVent? query and note the returned information. For example, assume that the query returns a decimal value of 123. Decoding the information indicates that both fans failed and that the temperatures for slots 0 through 3 exceeded the specified limits.



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# Specifications

This chapter contains the complete specifications for the VX1410 IntelliFrame. Within each section, the specifications are arranged in functional groups such as: *AC Power Source*, *Secondary Power*, *Cooling*, *Safety*, *Environmental*, *Backplane*, and *Mechanical*.

All specifications are warranted unless they are designated *typical*. Warranted characteristics are directly checked by procedures contained in the *Performance Verification* chapter beginning on page 5–1; these characteristics are listed in **boldface** under the Characteristics column.

If the characteristic is noted as *typical*, the characteristic is not warranted. Typical characteristics describe typical or average performance and provide useful reference information.

**Table 4–1: AC Power Source[1]**

| Characteristic | Description |
|---|---|
| Source Voltage | 90 $V_{RMS}$ to 250 $V_{RMS}$, continuous range |
| Source Frequency | 45 Hz to 440 Hz, continuous range, 115 V operation<br>45 Hz to 66 Hz, 230 V operation |
| Power Consumption | 1350 W line power maximum |
| Fuse Rating | |
| 90 V – 132 V Operation | 0.25 in × 1.25 in, Slow Blow, 20 A, 250 V |
| 103 V – 250 V Operation | 0.25 in × 1.25 in, Fast Blow, 15 A, 250 V |
| 207 V – 250 V Operation | 5 mm × 20 mm, Fast Blow, 6.3 A, 250 V |
| Inrush Surge Current | 70 A maximum |
| Input Current | 15 A maximum at 90 $V_{RMS}$<br>6.3 A maximum at 207 $V_{RMS}$ |
| Power Factor Correction | Yes |
| Power Disconnect | Front Panel On/Standby. Rear panel connection allows for remote operation. Power cord provides main power disconnect. The On/Standby switch can be disabled for remote operation. With Option 1M, the mainframe can be powered on or off under program control. |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**



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**Table 4–2: Secondary Power[1, 2]**

| Characteristic | Description | |
|---|---|---|
| Maximum Power Available | | |
| Mainframe | 925 W, 0° C to 55° C | |
| Available Slots 0 – 12 | 872 W minimum | |
| DC Current Capacity ($I_{MP}$) | Voltage | $I_{MP}$ (steady-state current) |
| | +24 V | 12 A |
| | +12 V | 13 A |
| | +5 V | 80 A |
| | –2 V | –30 A |
| | –5.2 V | –60 A |
| | –12 V | –13 A |
| | –24 V | –12 A |
| | +5 V STDBY | 0 A (1 A maximum if user supplied) |
| Maximum Current Capacity ($I_{MD}$) | Voltage | $I_{MD}$ (dynamic current) |
| (Specification only valid for Mainframe serial numbers B020100 and higher) | +24 V | 6.5 A |
| | +12 V | 3 A |
| | +5 V | 12 A |
| | –2 V | –5 A |
| | –5.2 V | –9 A |
| | –12 V | –3 A |
| | –24 V | –6.5 A |
| | +5 V STDBY | 0 A (user supplied) |
| **DC Voltage Regulation** | Voltage | Tolerance, $\triangle$V |
| | +24 V | +1.2 V, –720 mV |
| | +12 V | +600 mV, –360 mV |
| | +5 V | +250 mV, –125 mV |
| | –2 V | –100 mV, +100 mV |
| | –5.2 V | –260 mV, +156 mV |
| | –12 V | –600 mV, +360 mV |
| | –24 V | –1.2 V, +720 mV |



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**Table 4–2: Secondary Power[1, 2] (Cont.)**

| Characteristic | Description | |
|---|---|---|
| **Maximum DC Load Ripple/Noise** | Voltage | Ripple/Noise |
| | +24 V | 150 $mV_{pp}$ |
| | +12 V | 50 $mV_{pp}$ |
| | +5V | 50 $mV_{pp}$ |
| | –2 V | 50 $mV_{pp}$ |
| | –5.2 V | 50 $mV_{pp}$ |
| | –12 V | 50 $mV_{pp}$ |
| | –24 V | 150 $mV_{pp}$ |
| Maximum DC Induced Ripple/Noise | Voltage | Ripple/Noise |
| | +24 V | 150 $mV_{pp}$ |
| | +12 V | 50 $mV_{pp}$ |
| | +5V | 50 $mV_{pp}$ |
| | –2 V | 50 $mV_{pp}$ |
| | –5.2 V | 50 $mV_{pp}$ |
| | –12 V | 50 $mV_{pp}$ |
| | –24 V | 150 $mV_{pp}$ |
| Protection | Over voltage protection<br>Under voltage protection<br>Over temperature protection<br>Short circuit protection | |
| Voltage Readout | Readout of ±24 V, ±12 V, +5 V, –2 V, –5.2 V, +5 V, External, and +5 V Standby if present through VXIbus or RS-232 (with Option 1M) | |
| Voltage Readout Accuracy, typical | ±3% | |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**

2 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, to maintain safe operation, the power supply that provides power to the chassis should not exceed the $I_{MP}$ current ratings found under *DC Current Capacity ($I_{MP}$)* on page 4–2. The short circuit capacity of each voltage should not exceed 120% of the $I_{MP}$ rating. The total power dissipation of the chassis, with modules installed, should not exceed 925 Watts.**



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**Table 4–3: Cooling[1]**

| Characteristic | Description |
|---|---|
| Slot Thermal Capacity | ≥ 130 W per slot, with a 10° C rise. Figure 4–1 on page 4–5 shows the cooling curve of the mainframe. |
| Cooling System | Forced air circulation (positive pressurization) with one removable filter. Two internal DC fans provide cooling for the power supply and the 13 VXIbus module slots. |
| Fan Speed Control | A rear panel switch chooses between full speed and variable speed. The slot exhaust air temperature and ambient air temperature are monitored to maintain a constant temperature rise across the installed modules. |
| Slot Activation | Installing a VXIbus module activates the cooling for the corresponding occupied slots by opening the IntelliGuide mechanism. Only provides cooling to installed modules. |
| Slot Airflow Direction | P2 to P1, bottom of module to the top of module |
| Mainframe Intake | Bottom rear of mainframe |
| Mainframe Exhaust | Top sides of mainframe, also on top rear of mainframe |
| Cooling Clearance | Two inches on both sides and rear of mainframe |
| Pressurization | Positive (modules pressurized) |
| Filter Access | Filter accessible from rear of the mainframe |
| Temperature Readout | Readout of intake air temperature and individual slot exhaust temperature through VXIbus or RS-232 (with Option 1M) |
| Fan Speed Readout | RPM = 15 / (+Pulse Width), where (+Pulse Width) is the positive pulse width of either of the Tach1 or Tach2 fan output signals. Readout of system fan speed through VXIbus or RS-232 (with Option 1M). |
| Delta Temperature Rise Sensitivity, typical | 100 mV per ° C, 0° C corresponds to 0 V output |
| Temperature Sense Range, typical | –10° C to +90° C, Delta temperature rise ≤ 50° C |
| Fan Speed Range, typical | 1200 to 3350 RPM |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**



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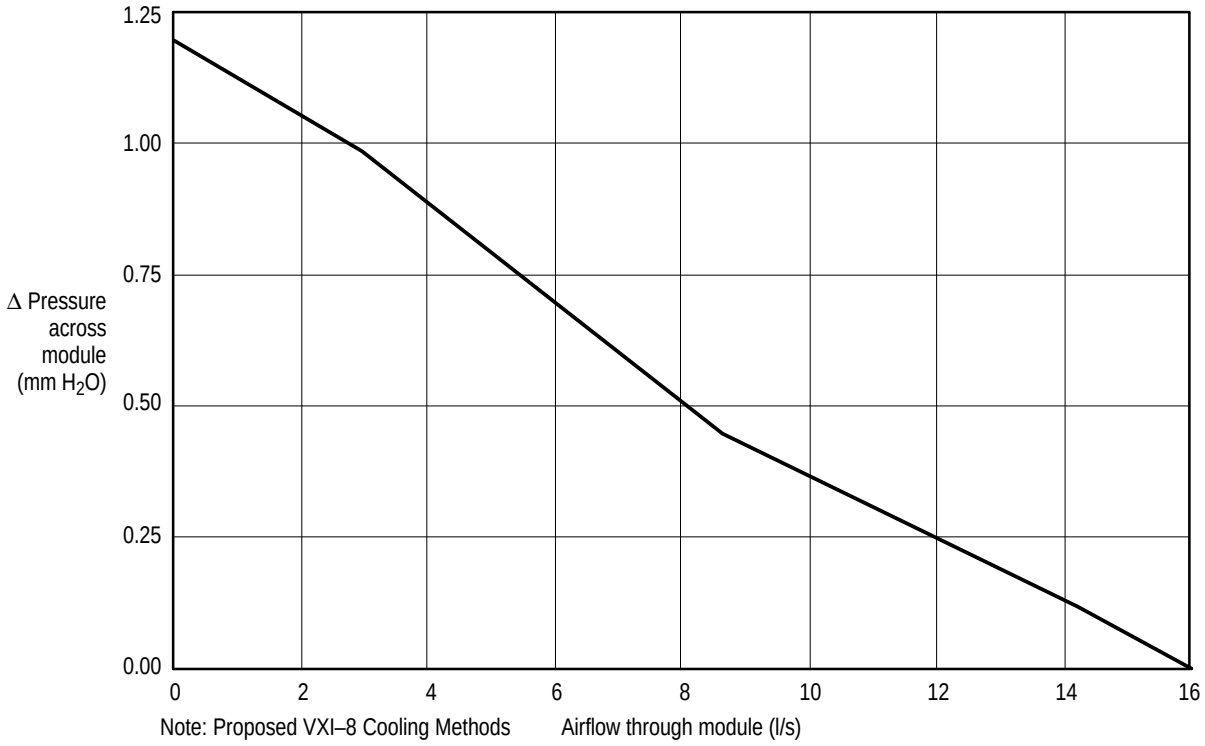



**Figure 4–1: Mainframe Cooling Curve**



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**Table 4–4: Safety[1, 2]**

| Characteristic | Description |
|---|---|
| Safety Certification | The VX1410 IntelliFrame complies with the requirements of UL3111-1, IEC 1010-1, and CAN/CSA–22.2 No 1010.1.<br><br>EN 61010–1 Safety requirements for electrical equipment for measurement, control and laboratory use.<br><br>Does not include mainframes shipped as Option 1D, Delete Power Supply. |
| IEC Characteristics | Installation Category II<br>Pollution Degree 2<br>Safety Class I |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**

2 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, to maintain safe operation, the power supply that provides power to the chassis should not exceed the $I_{MP}$ current ratings found under *DC Current Capacity ($I_{MP}$)* in Table 4–2 on page 4–2. The short circuit capacity of each voltage should not exceed 120% of the $I_{MP}$ rating. The total power dissipation of the chassis, with modules installed, should not exceed 925 Watts.**



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**Table 4–5: Environmental[1]**

| Characteristic | Description |
|---|---|
| Classification | The VX1410 IntelliFrame is suitable for operation in the Tektronix and MIL-T-28800E (Type III, Class 5, Style E or F) environments as specified in this table. |
| Atmospherics | |
| Temperature | Meets the limits stated in MIL-T-28800E for Type III, Class 5 |
| Operating | 0° C to 55° C, derated 1° C/1000 ft. (305 m) above 5000 ft. (1524 m) |
| Nonoperating | –40° C to 75° C |
| Relative Humidity | |
| Operating | Up to 95% at up to 30° C and up to 45% at up to 55° C |
| Nonoperating | Up to 95% at up to 55° C |
| Altitude | |
| Operating | 15,000 ft. (4570 m) Operating temperature derated 1° C/1000 ft. (305 m) above 5000 ft. (1524 m) |
| Nonoperating | 40,000 ft. (12,190 m) |
| Dynamics | |
| Random Vibration | Three axis, 30 minutes total, 10 minutes per axis |
| Operating | 0.27 $g_{RMS}$ total from 5 Hz to 500 Hz |
| Nonoperating | 2.28 $g_{RMS}$ total from 5 Hz to 500 Hz |
| Mechanical Shock Operating | Half sine, 30 g, 11 ms duration, three drops each side, 18 shocks total. Meets functional shock requirements of MIL-T-28800E, Type-III, Class 5 |
| User Bench Handling Operating | Each edge lifted four inches and allowed to free fall onto a solid wooden bench surface. Rear face exempted. |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**



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**Table 4–6: Electromagnetic Compatibility (EMC)[1]**

| Characteristic | Description |
|---|---|
| Emissions | Emissions shall be within the limits specified by the following requirements: |
| Enclosure: | EN 55011 Class A limits for radiated emissions |
| AC Mains: | EN 60555-2 AC power harmonic emissions<br>EN 55011 Class A limits for conducted emissions |
| Immunity, Enclosure, Radio Frequency Electromagnetic Field | No mainframe failures when the mainframe is subjected to a 3 V/m electromagnetic field over the frequency range of 27 MHz to 500 MHz. |
| Immunity, Enclosure, Electrostatic Discharge (ESD) | Up to 8 kV with no change to control settings or impairment of normal operation, and up to 15 kV with no loss of stored data or damage that prevents recovery of normal operation by the user. |
| Immunity, Fast Transients, Common Mode | No loss of stored data, change to control settings, degradation of performance, or temporary loss of function will occur when the mainframe is subjected to the following transients:<br>Port — Peak Voltage — Tr/Th — Rep Frequency<br>Signal & Control — 0.5 kV — 5/50 ns — 5 kHz<br>DC Power — 0.5 kV — 5/50 ns — 5 kHz<br>AC Power — 1.0 kV — 5/50 ns — 5 kHz |
| FCC | The mainframe complies with the radiated and conducted emissions requirements of FCC 47 CFR, Part 15, Subpart B, Class A equipment. |

1 **If the VX1410 IntelliFrame is configured with Option 1D, Delete Power Supply, all product specifications in this table do not apply. To be VXI compliant, the power supply must adhere to the specifications of the VXI standard.**



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**Table 4–7: Backplane**

| Characteristic | Description |
|---|---|
| Bus Grant/ Interrupt Acknowledge | Solid state, auto-configuring (jumperless) |
| VXIbus CLK10 Distribution | Full differential |

**Table 4–8: Display System (Option 1M)**

| Characteristic | Description |
|---|---|
| Display Type | 3.74 in x 0.20 in (95 mm x 5 mm), Fluorescent Indicator Module |
| Display Resolution | One line by 20 alphanumeric characters, implemented in a 5 x 7 dot matrix with cursor underline |

**Table 4–9: Mechanical**

| Characteristic | Description |
|---|---|
| Overall Dimensions | |
| Standard Mainframe | |
| Height (with feet) | 14.4 in (36.58 cm) |
| Width | 16.7 in (42.55 cm) |
| Depth | 24 in (60.96 cm) |
| Mainframe with Rackmount | |
| Height | 14.0 in (35.56 cm) |
| Width | 18.9 in (48.01 cm) |
| Depth | 26.4 in (67.06 cm) to 31.4 in (79.76 cm) in 0.5 in (1.27 cm) increments, user selectable |
| Cable Tray, Option 1U | (See Figure 4–3 for overall mainframe dimensions) |
| Height | 1.75 in (4.45 cm) |
| Width | 16.6 in (42.16 cm) |
| Depth | 18.4 in (46.74 cm) |
| Cable Tray, Option 2U | (See Figure 4–4 for overall mainframe dimensions) |
| Height | 3.50 in (8.89 cm) |
| Width | 16.6 in (42.16 cm) |
| Depth | 18.4 in (46.74 cm) |
| Weight | |



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**Table 4–9: Mechanical (Cont.)**

| Characteristic | Description |
|---|---|
| Standard Mainframe | 48 lbs (21.8 kg) with no modules installed |
| Rackmount Option 1R | 18 lbs (8.2 kg) |
| Rackmount Option 2R | 20 lbs (9.1 kg) |
| Cable Tray Option 1U | 4 lbs (1.8 kg) |
| Cable Tray Option 2U | 6 lbs (2.7 kg) |
| Shipping Weight | |
| Standard Mainframe | 100 lbs (45.4 kg) maximum with no modules installed |
| Cable Tray Option 1U | 8 lbs (3.6 kg) |
| Cable Tray Option 2U | 8 lbs (3.6 kg) |
| Module Size | 13 C-size VXI slots. The mainframe also accepts A-size or B-size modules using the 73A-851 module. |
| Finish | Tektronix smoke tan and graphite grey paint on an aluminum chassis |

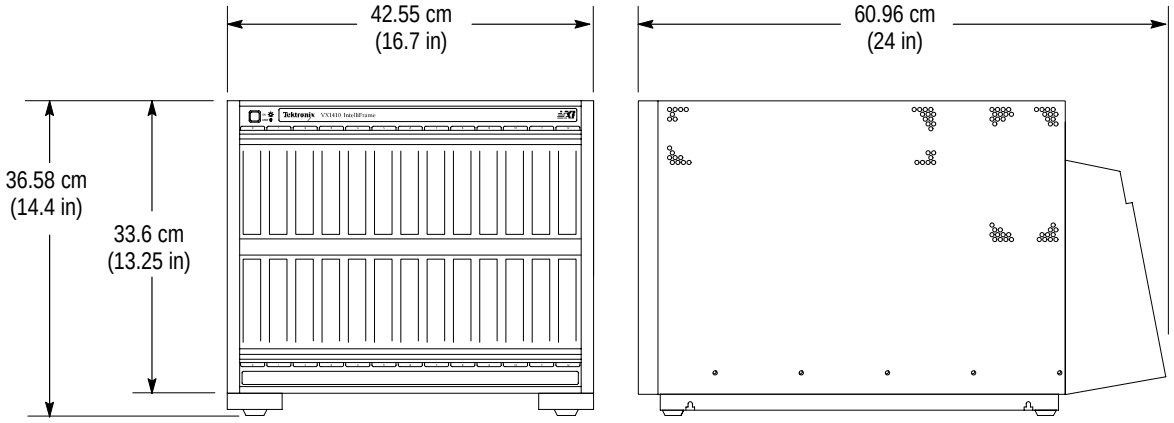



**Figure 4–2: Front View and Side View of Standard VX1410 IntelliFrame**



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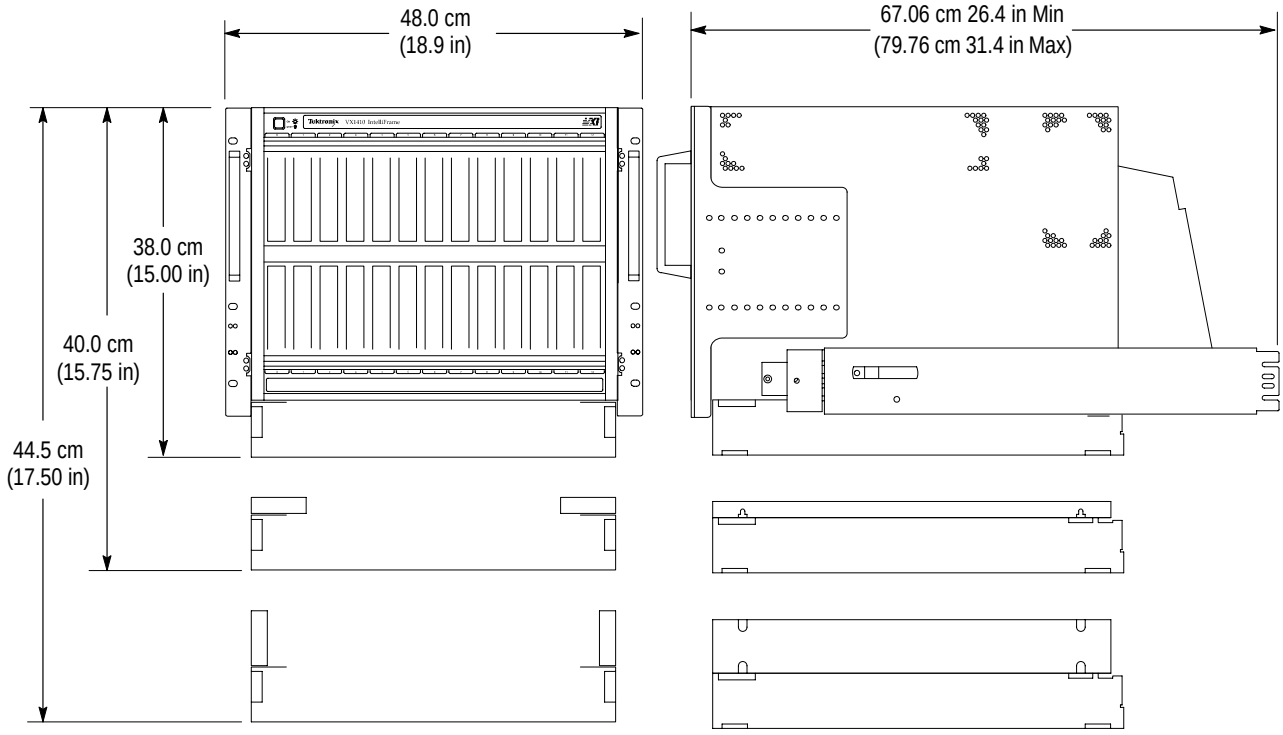



**Figure 4–3: Front View and Side View of VX1410 IntelliFrame with Option 1U and Rackmount Option**



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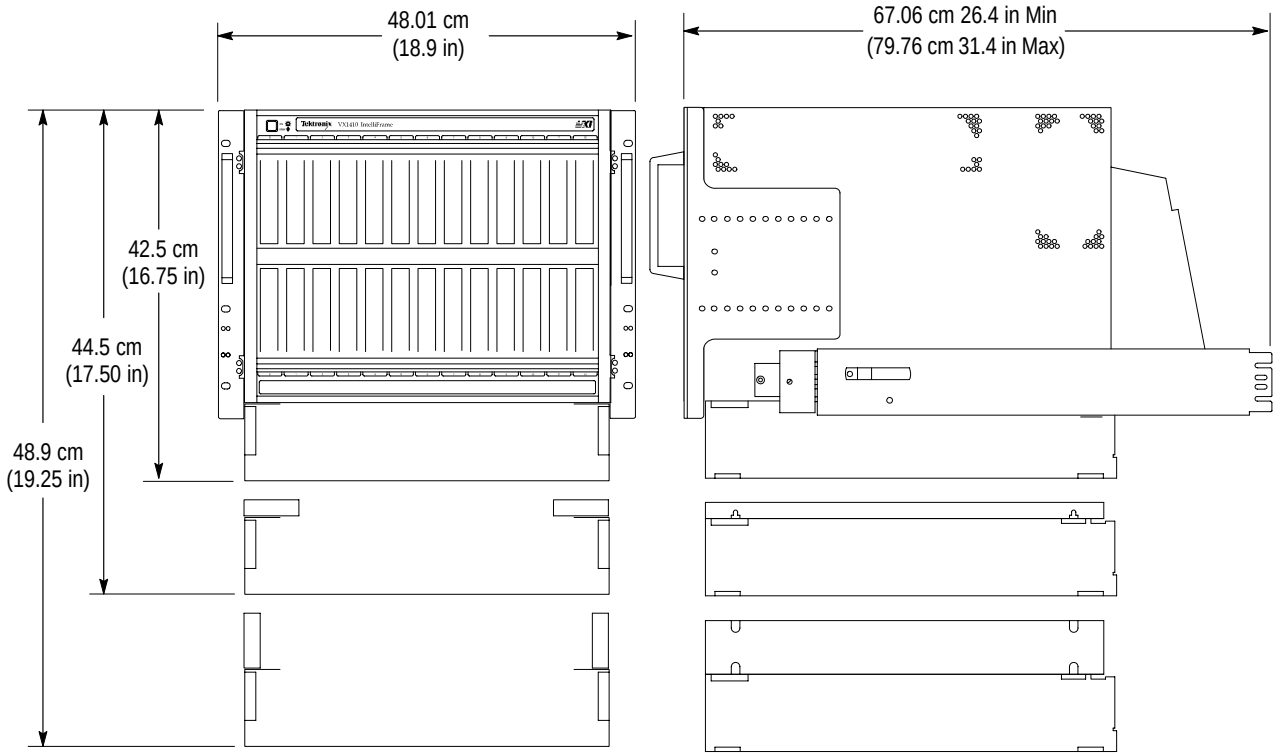



**Figure 4–4: Front View and Side View of VX1410 IntelliFrame with Option 2U and Rackmount Option**

**Table 4–10: VXI and Plug & Play**

| Characteristic | Description |
|---|---|
| VXI | Fully compatible with VXIbus System Specifications, Rev 1.4 |
| Plug & Play | |
| Mainframe | VXI Plug & Play compliant with the following:<br>DOS Framework 3.0<br>WIN Framework 3.0<br>GWIN Framework 3.0 |
| Option 1M, Enhanced Monitor | VXI Plug & Play compliant with WIN Framework 3.0 |



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# Performance Verification

Use the steps in this chapter to verify that the VX1410 IntelliFrame operates properly. The checks consist of checking the power supply voltages at the 25-pin Rear Panel Passive Monitor connector at the rear of the mainframe.

## Equipment Required

You will need the following equipment to complete the performance verification checks in this chapter:

- Digital Voltmeter (Tektronix DM250 series digital voltmeter)
- Oscilloscope, 20 MHz BW, with 1X Probe with < one-inch ground lead, (Tektronix TDS400A or TDS500A series oscilloscope with a P6101B probe)

## DC Voltage Regulation

The DC voltage regulation can be verified by following the steps listed under *Functional Check* beginning on page 1–25.

If your mainframe has the enhanced monitor, Option 1M, perform the additional following steps:

1. Scroll through the various status messages on the front panel display and check that the display does not flash and that no failures appear.
2. Compare the seven voltages that you measured under *Functional Check* on page 1–25 against the readouts of the voltages on the display.
3. Verify that the voltage readings on the display are within ±3% of the voltage measured at the 25-pin connector.



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## DC Load Ripple and Noise

Use an oscilloscope to check the DC Load Ripple and Noise on the pins of the 25-pin connector and compare the results against the limits listed in Table 5–1.

1. Set up the oscilloscope as follows:

| | |
|---|---|
| Bandwidth Limit | 20 MHz |
| Input Coupling | AC |
| Volts/Division | 10 mV/div |
| Time Base | 1 s/div |
| Trigger Mode | Auto |
| Acquisition Mode | Peak Detect |

2. Connect a ground lead (less than one inch) to the 1X oscilloscope probe (P6101B).
3. Connect the probe to Pin 1 of the 25-pin connector and connect the ground lead to one of the ground pins listed in Table 5–1.
4. Check that peak-to-peak voltage displayed on the oscilloscope is less than the limits listed in Table 5–1.
5. Check the remaining voltages in Table 5–1.

**Table 5–1: DC Load Ripple and Noise Check**

| Pin | Supply | Limits ($V_{p-p}$) |
|---|---|---|
| 1 | +5 V | 50 mV |
| 2 | –12 V | 50 mV |
| 3 | –24 V | 150 mV |
| 4 | –2 V | 50 mV |
| 14 | +12 V | 50 mV |
| 15 | + 24 V | 150 mV |
| 16 | –5.2 V | 50 mV |
| 9, 17, 18 ,19,20,22,24 | Ground | |



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***WARNING***

***The following servicing instructions are for use only by qualified personnel. To avoid injury, do not perform any servicing other than that stated in the operating instructions unless you are qualified to do so. Refer to all Safety Summaries before performing any service.***

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# Adjustment Procedures

This chapter describes adjustment procedures for the VX1410 IntelliFrame. There are no hardware adjustments required for the VX1410 IntelliFrame. The information in this chapter describes the command set for service related tasks.

The information in this section is designed for use by qualified service personnel. Read the *Safety Summary* at the front of this manual and *Service Strategy* before attempting any procedures in this chapter. Refer to the *Operating Basics* chapter for information on the location of controls, indicators, and connectors used with the mainframe.

---

***NOTE**. This procedure assumes that you have a PC running MS Windows with the Microsoft Terminal program.*

---

The following steps describe the calibration procedure using the CALibration command:

1. Make sure that the Temperature Sense board is located toward the front of the mainframe. You can see the position of the board by looking through the exhaust holes on the side of the mainframe.

   If the Temperature Sense board is located toward the rear of the mainframe, you must remove the mainframe cover and move the Temperature Sense board to the front of the mainframe. Refer to *Procedure 6: Remove the Temperature Sense Board* on page 7–12 for instructions on moving the Temperature Sense board. Replace the mainframe cover before continuing with this calibration procedure.

2. Place the VX1410 IntelliFrame in a constant-temperature environment.

3. Remove all modules from the VX1410 IntelliFrame.

4. Install the empty slot panel fillers to close off the 13 slots of the mainframe. (if necessary refer to *Install Empty Slot Panel Fillers* on page 1–20 for instructions on installing the slot fillers).

5. Power on the VX1410 IntelliFrame and let it run for five minutes.

6. While you are waiting for the mainframe to warm up, execute the Microsoft Terminal program.

   The Microsoft Terminal program is located in the Accessories folder (for the default setup of Microsoft Windows).



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7. Connect an RS-232 cable between the COM port on the PC and the RS-232 connector at the rear of the VX1410 IntelliFrame. Refer to Table 3–14 on page 3–77 for a list of the factory default RS-232 settings.

8. Select the **Communications...** command from the Settings menu of the Terminal program and select the appropriate COM port (for example, COM1 or COM2) from the dialog box.

9. Refer to Table 6–1 and set up the PC RS-232 port configurations. The RS-232 settings must match those of the mainframe.

**Table 6–1: PC RS-232 Settings for the Calibration Procedure**

| RS-232 Parameter | Setting |
|---|---|
| Baud Rate | 9600 |
| Data Bits | 8 |
| Stop Bits | 1 |
| Parity | None |
| Flow Control | Xon/Xoff |

10. Make sure that the mainframe has had at least five minutes to warm up before continuing this procedure.

11. Send the following commands to enable the password and to calibrate the VX1410 IntelliFrame:

    ```
    SYST:PASS "VX1410"

    CAL?
    ```

12. Check that the CAL? query returns a value of zero to indicate no error has been detected during the calibration.

13. Note the serial number on the rear panel of the mainframe.

14. Send the following command to set up the serial number in the enhanced monitor:

    ```
    SYST:SER "Bxxxxxx"
    ```

    The value of Bxxxxxx is the serial number as noted from the rear of the mainframe.

15. Use the front panel Next and Prev buttons to scroll through the delta temperature of the slots. All delta temperatures should read 0 °C ±1 °C.

16. Power down the mainframe.



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**17.** This completes the calibration procedure.

The rest of this section describes the CALibration and SYSTem:PASSword commands in detail.



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# CALibration
# CALibration?

This a service-related command. The command calibrates the exhaust temperature of each slot. While the mainframe executes the command, the command sets the CALibrating bit in the Operation Status Condition register.

The query performs the same function as the command but it also returns a pass or fail response. A return value of 0 means that the calibration has passed and a return value between 10 and 22 indicates a calibration failure in slots 0 through 12.

**Syntax**

```
CALibration[:ALL]
CALibration[:ALL]?
```

**Parameters**

| <Parameter> | Query Response |
|---|---|
| Not Applicable | <NR1><br>0<br>10 – 22 |

**Reset Value**

Not Applicable

**Errors and Events**

–203, “Command Protected”
You attempted to execute a command that is protected by a password. See the SYSTem:PASSword command beginning on page 6–5 for more information.

**Dependencies**

None

**Examples**

Command: `CAL`

Query: CAL?

Response: 0

**Related Commands**

None



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## SYSTem:PASSword:CDISable

This command disables the protected command CALibration. If the user sends the CALibration command after this command, the VX1410 IntelliFrame will generate an error.

**Syntax**

```
SYSTem:PASSword:CDISable <Password>
```

**Parameters**

| <Password> | Query Response |
|---|---|
| <string><br>"VX1410" | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

–221, "Settings Conflict."
You attempted to send an invalid password.

**Dependencies**

None

**Examples**

Command: `SYST:PASS:CDIS "VX1410"`

**Related Commands**

SYSTem:PASSword:CENable



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## SYSTem:PASSword:CENable

This command enables the protected command CALibration. The user has to send this command before the CALibration command; otherwise the VX1410 IntelliFrame will generate an error.

**Syntax**

```
SYSTem:PASSword[:CENable] <Password>
```

**Parameters**

| <Password> | Query Response |
|---|---|
| <string><br>"VX1410" | Not Applicable |

**Reset Value**

Not Applicable

**Errors and Events**

–221, "Settings Conflict."
You attempted to send an invalid password.

**Dependencies**

None

**Examples**

Command: `SYST:PASS:CEN "VX1410"`

**Related Commands**

SYSTem:PASSword:CDISable



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## SYSTem:PASSword:CENable:STATe?

This query returns whether the password protected commands are enabled/disabled. Enabled commands return a value of 1; disabled return a value of 0.

**Syntax** `SYSTem:PASSword[:CENable]:STATe?`

**Parameters**

| <Parameter> | Query Response |
|---|---|
| Not Applicable | <NR1><br>1<br>0 |

**Reset Value** Not Applicable

**Errors and Events** None

**Dependencies** None

**Examples** Query: `SYST:PASS:STAT?`

Response: 1

**Related Commands** SYSTem:PASSword:CDISable



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# SYSTem:SERial
# SYSTem:SERial?

This command stores the serial number of the instrument in nonvolatile RAM. The query returns the serial number previously stored.

The command converts all lower case characters in the serial number to upper case.

**Syntax**

```
SYSTem:SERial <Serial Number>
SYSTem:SERial?
```

**Parameters**

| <Parameter> | Query Response |
|---|---|
| <string><br>The serial number must start with an alphabetical character followed by an optional alphabetical character and by a maximum of six digits. | <string> |

**Reset Value**

Not Applicable

**Errors and Events**

–221, “Settings Conflict.”
You attempted to execute a command that is protected by a password. See the SYSTem:PASSword command beginning on page 6–5 for more information.
–220, “Parameter Error”
Invalid serial number.

**Dependencies**

None

**Examples**

Command: `SYST:SER "B123456"`

Query: `SYST:SER?`

Response: `"B123456"`

**Related Commands**

None



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# Maintenance

This chapter provides procedures for inspecting and cleaning the VX1410 IntelliFrame, removing and replacing internal mainframe components, and isolating problems to module levels.

## Service Strategy

The service procedures in this manual provide removal and replacement procedures to repair the VX1410 IntelliFrame to a module level. Instrument level repairs are accomplished by exchanging faulty modules with known-good modules or parts. No component-level repair is provided in this manual.

## Preparation

The information in this section is designed for use by qualified service personnel. Read the *Safety Summary* at the front of this manual and *Service Strategy* before attempting any procedures in this chapter. Refer to the *Operating Basics* chapter for information on the location of controls, indicators, and connectors used with the mainframe.



***CAUTION.*** *Many components within the mainframe are susceptible to static-discharge damage. Service the mainframe only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the mainframe. Always wear a grounded wrist strap, or equivalent, while servicing the mainframe.*

Observe the following precautions to avoid damaging the mainframe:

- Do not handle static-sensitive components on boards.
- Transport and store static-sensitive boards in their original containers or on conductive foam. Label any package that contains static-sensitive assemblies.
- Wear a wrist strap attached to the mainframe while handling the boards to discharge the static voltage from your body.
- Do not allow anything capable of holding or generating a static charge on the work surface.
- Do not slide a board over any surface.



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- Avoid handling boards in areas that have a floor or work surface cover that is capable of generating a static charge.

***NOTE.*** *Always power off the mainframe and disconnect the power cord before cleaning or servicing the mainframe.*

## Inspection and Cleaning

The mainframe is inspected mechanically and electrically before shipment. It should be free of marks or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the mainframe for physical damage incurred during transit. Retain the mainframe packaging in case shipment for repair is necessary. If there is damage or deficiency, contact your local Tektronix representative.

Cleaning procedures consist of exterior and interior cleaning of the mainframe and cleaning the fan filter. Periodic cleaning reduces instrument breakdown and increases reliability. Clean the mainframe as needed, based on the operating environment. Refer to your module user documentation for information on cleaning the individual VXIbus modules.

### Interior Cleaning

Use a dry, low-velocity stream of air to clean the interior of the mainframe. Use a soft-bristle brush for cleaning around components. If you must use a liquid for minor interior cleaning, use a 75% isopropyl alcohol solution and rinse with deionized water.

### Exterior Cleaning

Clean the exterior surfaces of the mainframe with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, use a cloth or swab dipped in a 75% isopropyl alcohol solution. Use a swab to clean narrow spaces around controls and connectors. Do not use abrasive compounds on any part of the mainframe.



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***CAUTION.*** *Avoid getting moisture inside the mainframe during exterior cleaning; use just enough moisture to dampen the cloth or swab.*

*Do not wash the front-panel On/Standby switch. Cover the switch while washing the mainframe.*

*Use only deionized water when cleaning. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.*

*Do not use chemical cleaning agents; they may damage the mainframe. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.*

## Cleaning the Fan Filter

The fan filter easily removes from the rear of the mainframe. The filter slides out of the rear of the mainframe as shown in Figure 7–1.

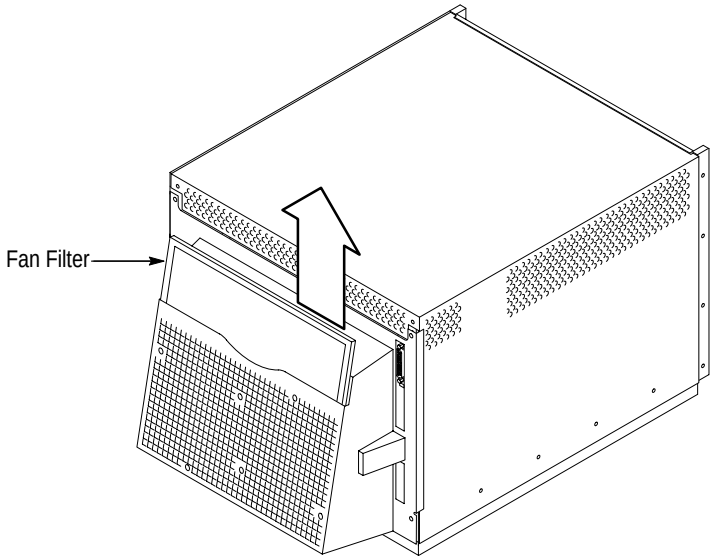



**Figure 7–1: Removing the Fan Filter**

Clean the fan filter by vacuuming or blowing air through the filter. Rinse the filter in cool water and dry it before replacing it in the mainframe.

If your mainframe has the enhanced monitor (Option 1M or 2M), you can reset the filter cleaning interval with the VXI*plug&plug* soft front panel, or by sending the STATus: QUEStionable: FILTer:TRESet command. If you mainframe has the front panel display (Option 1M only), you can also reset the filter cleaning interval by scrolling to the air filter cleaning time and simultaneously pressing both the NEXT and PREV buttons.



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# Removal and Replacement

The following procedures describe how to remove and replace module-level components of the VX1410 IntelliFrame. Refer to the exploded view illustrations in *Replaceable Parts* for an overview of the assembly and disassembly of the mainframe.



***WARNING.*** *To avoid electric shock, always power off the mainframe and disconnect the power cord before cleaning or servicing the mainframe.*

## Tools Required

The following tools are required to disassemble the VX1410 IntelliFrame to the module level:

- Small flat blade screwdriver
- Diagonal cutters (for removing cable ties)
- Torx screw driver with a T-15 and T-20 tip.
- A 3/32-inch Allen wrench (hex wrench)

## Procedure 1: Remove Fan Assembly

To remove the fan assembly, refer to Figure 7–3 and Figure 7–4 while performing the following steps:

1. From the back of the mainframe, remove the four 8-32 screws using a 3/32-inch Allen wrench (refer to Figure 7–2 for the screw locations).
2. Remove the Safety Ground screw and the Chassis Ground screw using a T-20 tip (if installed).
3. Gently pivot the fan assembly outward from the mainframe far enough to access the fan cables on the right side of the mainframe.
4. Unplug the fan cables and set the fan assembly aside on a clean working surface.
5. Remove the fan filter from the fan assembly if you need to replace one of the fans.
6. To remove the two fans, remove the three 6-32 screws (with a T-15 driver) holding each fan to the inside of the fan assembly as shown in Figure 7–4.
7. Remove the cable tie holding the fan cables to the fan.



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***NOTE.*** *When reconnecting the fan cables to the mainframe, verify that you connect the fan cables to their respective connectors. Match the labels on the fan cables to their respective connector on the rear of the mainframe.*

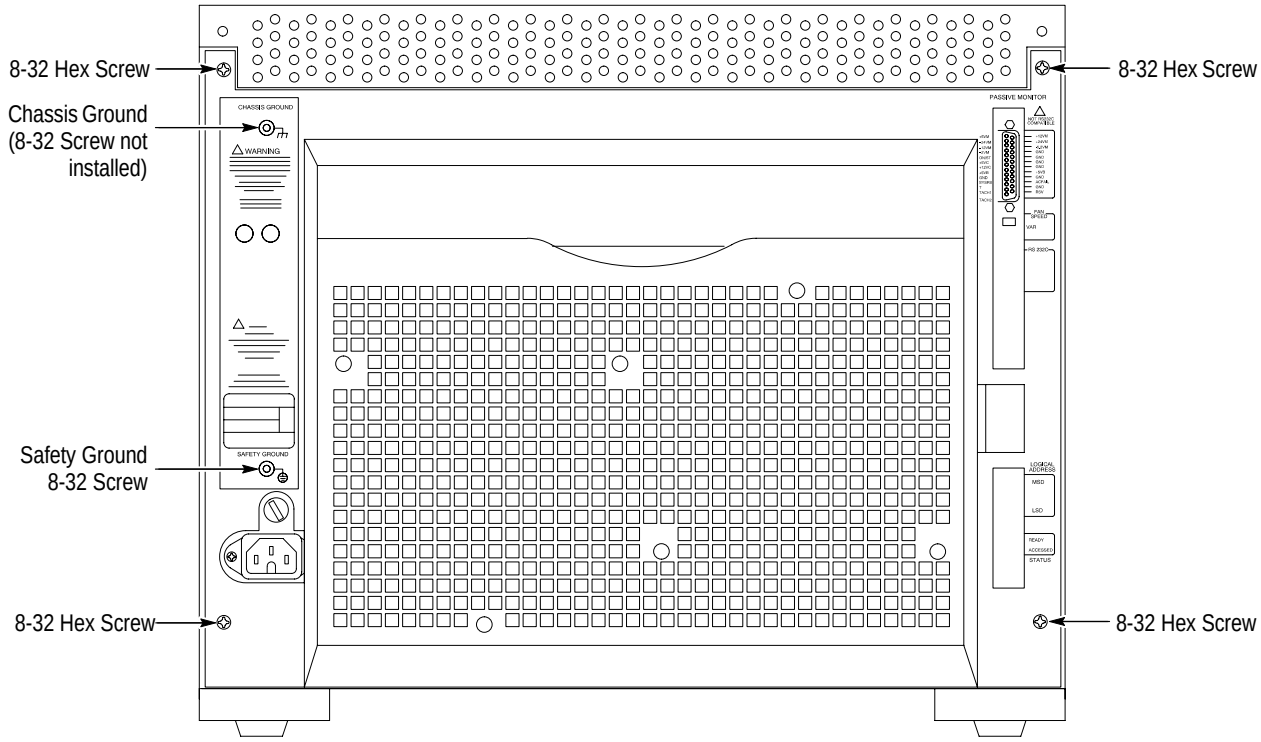



**Figure 7–2: Location of Fan Assembly Screws on the Rear of the Mainframe**



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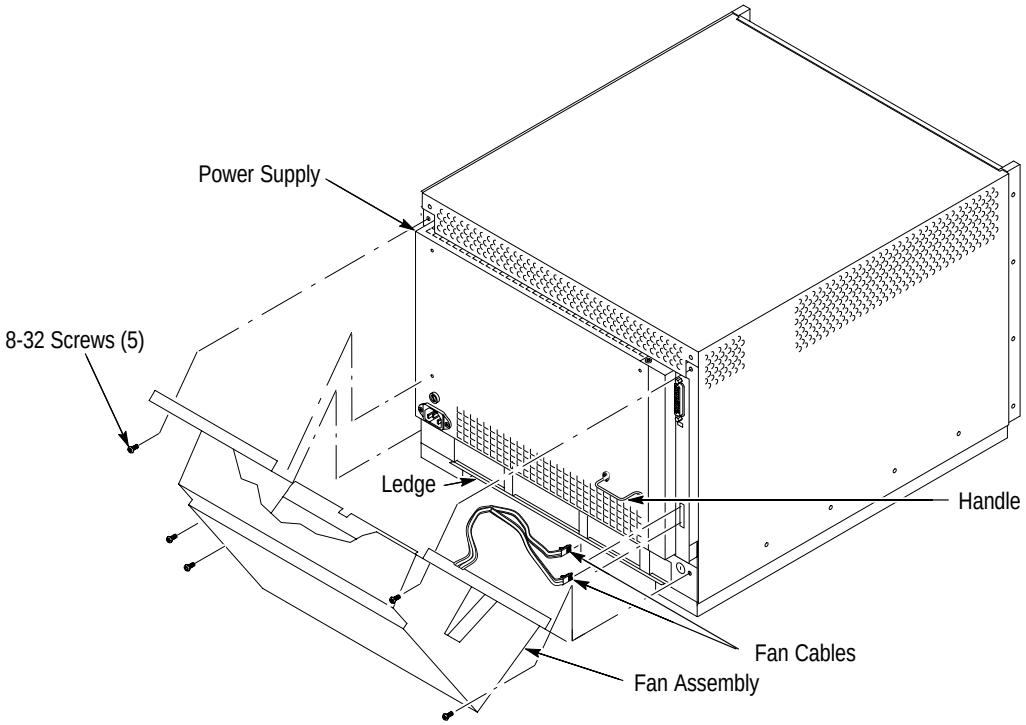



**Figure 7–3: Removing the Fan Assembly**

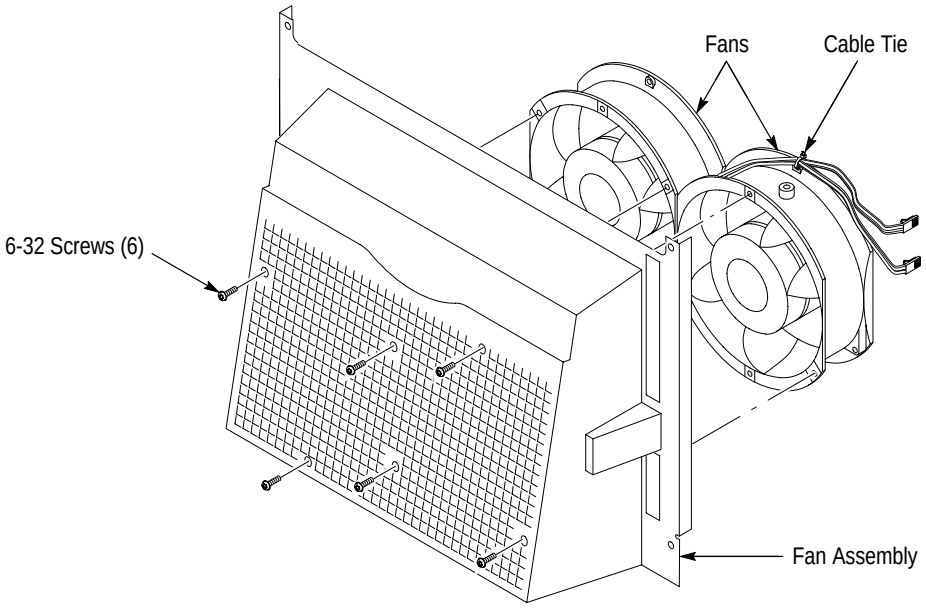



**Figure 7–4: Removing the Fans**



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### Procedure 2: Remove Monitor Board

To remove the monitor board (standard or enhanced), perform *Procedure 1: Remove Fan Assembly* and then refer to Figure 7–5 to remove the fan assembly.

Grasp the cable tie loop and pull the monitor board until it comes loose from the backplane. Then slide the board out of the right side of the mainframe.

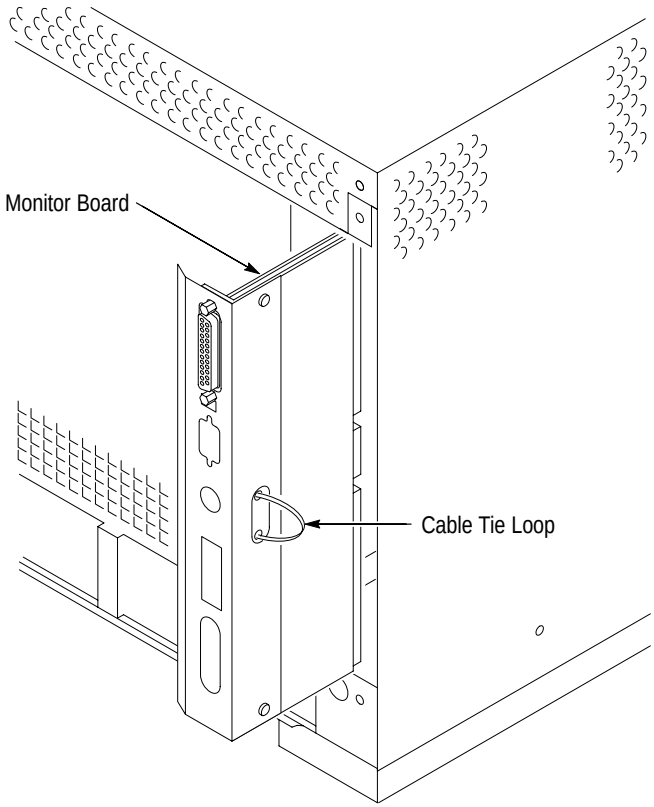



**Figure 7–5: Removing the Monitor Board**

***NOTE**. If you replace the enhanced monitor board (Option 1M or 2M), remember to calibrate the mainframe. Refer to* Chapter 5 Adjustment Procedures *beginning on page 6–1 for information on calibrating the mainframe.*

### Procedure 3: Remove Power Supply

To remove the power supply from the mainframe, refer to Figure 7–3 and perform steps 1 through 4 of Procedure 1 to remove the fan assembly and Procedure 2 to remove the monitor board; then continue with the following steps:

1. Using the handle on the power supply, firmly pull out the power supply from the rear of the mainframe.



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2. Set the power supply assembly on a clean working surface.

***NOTE**. Step 3 is necessary only if you intend to replace the Power Supply Interface board. This step is normally not necessary because the Power Supply and the Power Supply Interface board can be replaced as a single unit.*

3. Refer to Figure 7–6 and remove the Power Supply Interface board from the power supply module as shown.

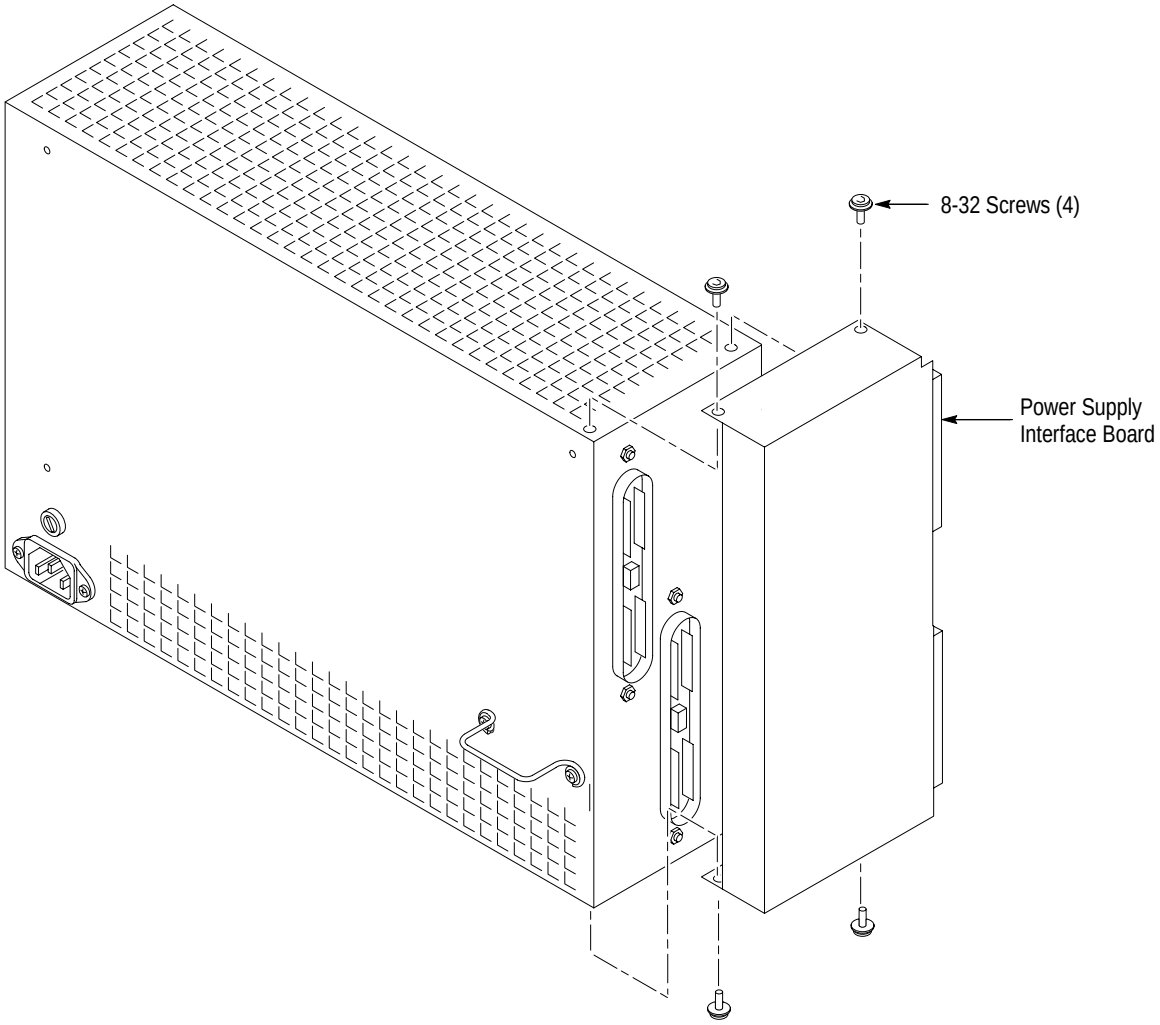



**Figure 7–6: Removing the Power Supply Interface Board**



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### Procedure 4: Removing the Card Guides

The card guides at the top and bottom of the mainframe are very similar. The main difference is that the bottom guides (IntelliGuides) include the spring-loaded shutters to redirect air into the mainframe. The procedure for removing both guides is identical. Refer to Figure 7–7 while performing the following steps:

1. Use a small flat blade screw driver to pry up the tab of the card guide at the front of the mainframe being careful not to damage the card guide or the mainframe.
2. Gently pull the card guide forward until it pops out of place.
3. Remove the card guide.

***NOTE**. The bottom card guides (IntelliGuides) are replaced as a unit. The IntelliGuides are not intended to be disassembled.*

To replace a card guide, slide the card guide towards the rear of the mainframe and allow the front of the card guide to snap into place.



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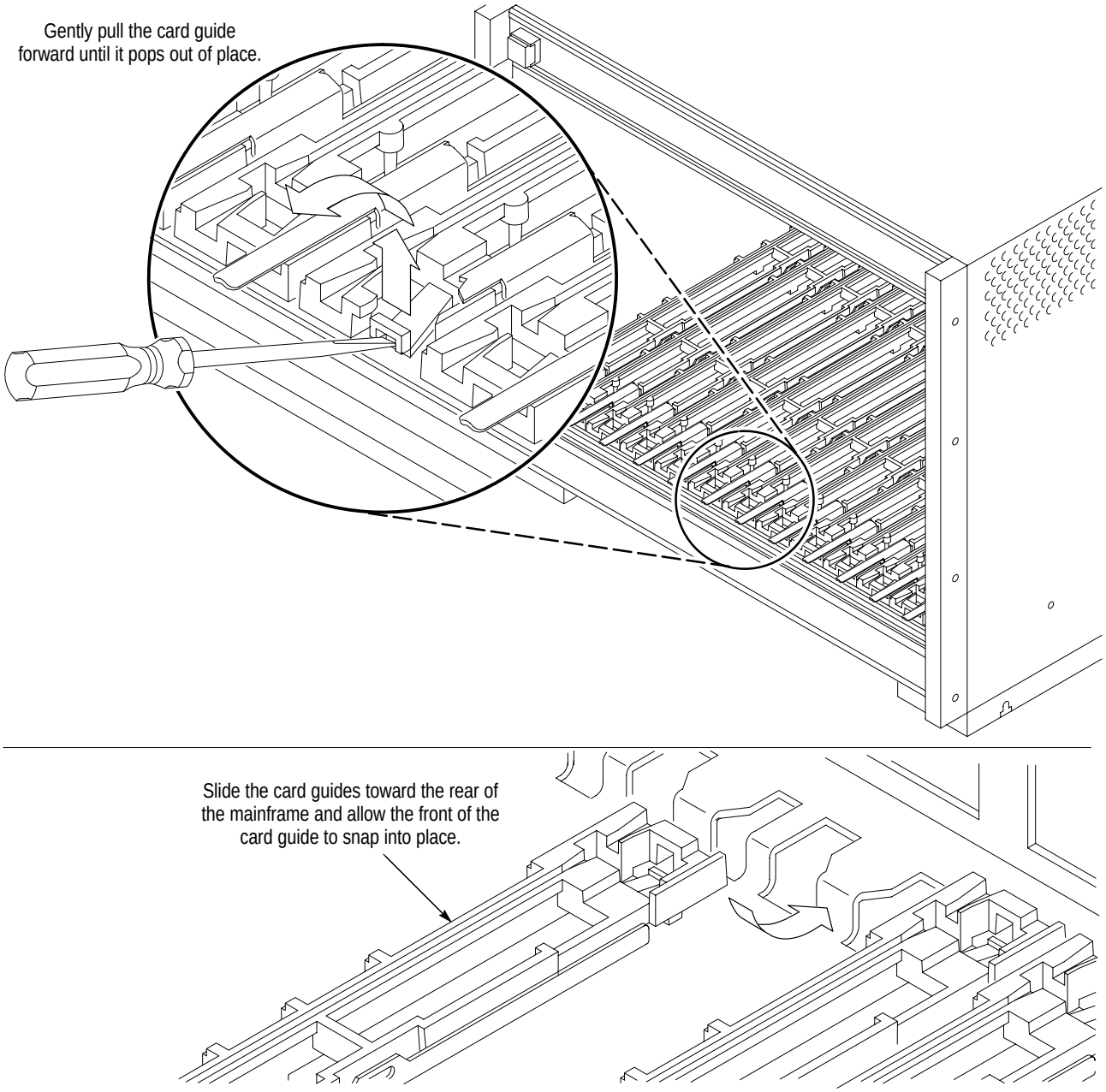



**Figure 7–7: Removing the Top and Bottom Card Guides**



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### Procedure 5: Replacing the Top and Bottom Nut Rails

The nut rails at the top and the bottom of the front of the VX1410 IntelliFrame allow the user to securely install the modules in the mainframe by screwing the top and bottom of the modules to the front of the mainframe. Refer to Figure 7–8 to remove these nut rails.

1. Loosen all module retaining screws (it may be necessary to slide the modules partially out of the mainframe).
2. Remove the 12 screws holding the top cover to the mainframe using a 3/32-inch Allen wrench.
3. Slide the top cover of the mainframe back far enough to expose the hole just inside the top and bottom extrusions.
4. Slide the nut rail out of hole on the side of mainframe.

Replace the nut rail by sliding it back in the side of the mainframe and pushing it into place.

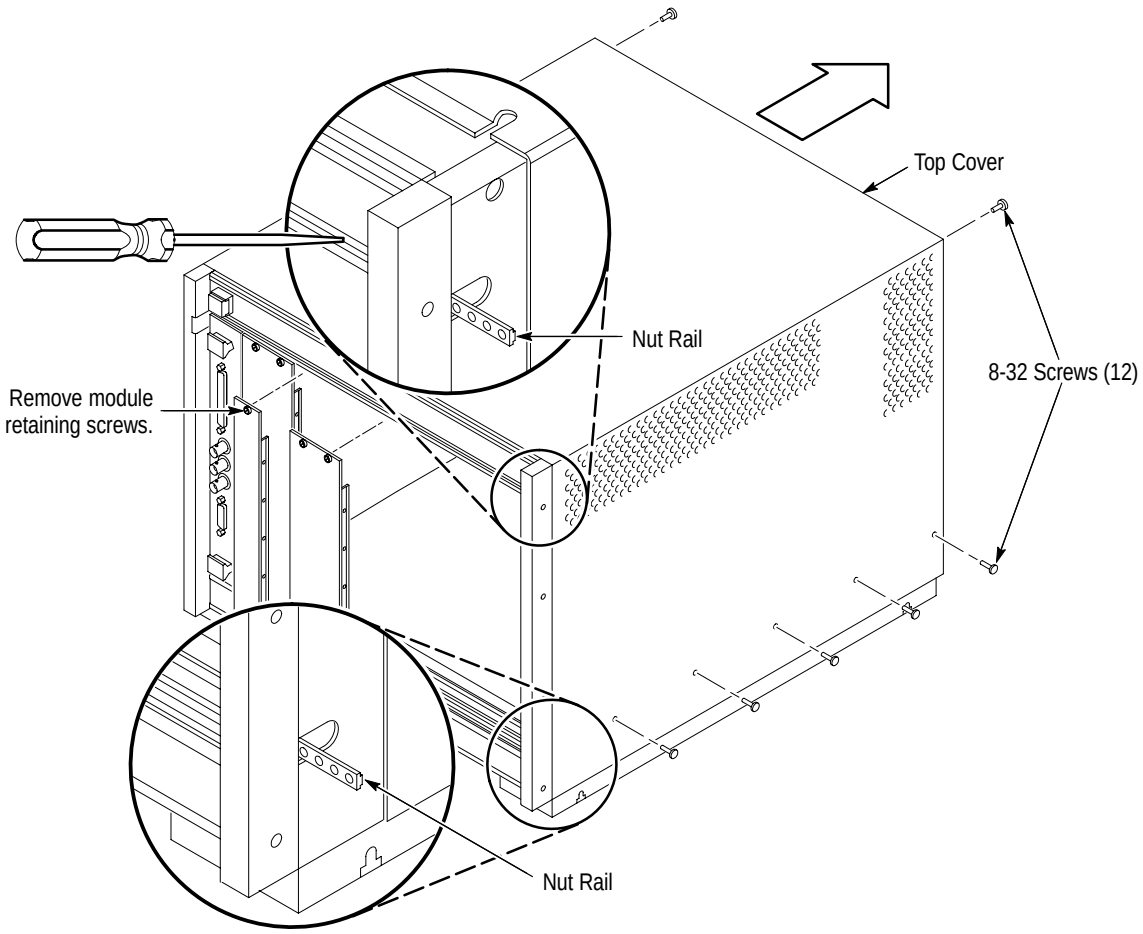



**Figure 7–8: Replacing the Top and Bottom Nut Rails**



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### Procedure 6: Remove the Temperature Sense Board

To remove the Temperature Sense board, remove the mainframe cover and then complete the following steps:

1. Disconnect the ribbon cable from the Temperature Sense board.
2. Refer to Figure 7–9 and gently pry back on each retainer holding the Temperature Sense board in place.
3. Lift the board out of the holes at the top of the mainframe being careful not to damage any components on the circuit board.

---

***NOTE.*** *If you replace the Temperature Sense board and you have Option 1M or 2M, remember to calibrate the mainframe. Refer to* Chapter 5 Adjustment Procedures *beginning on page 6–1 for information on calibrating the mainframe.*

---

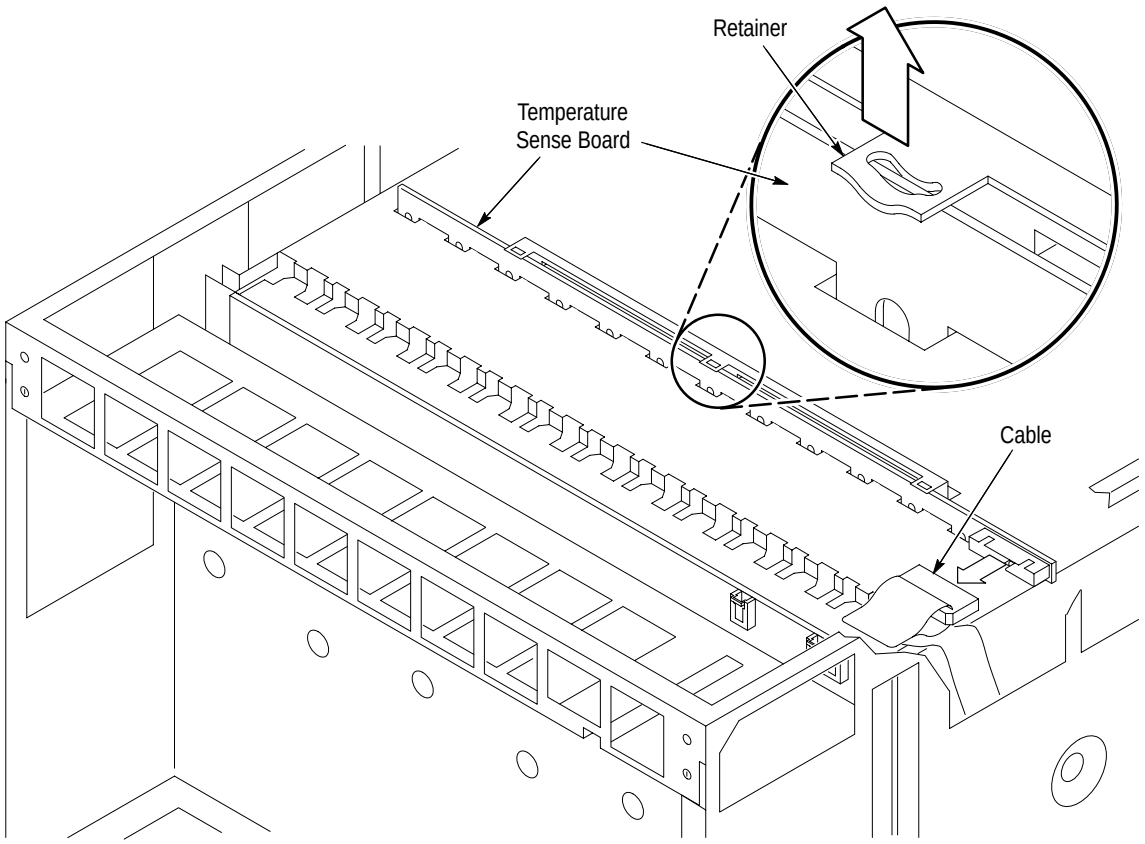



**Figure 7–9: Removing the Temperature Sense Board**



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### Procedure 7: Remove Instrument Monitor Display Assembly

To remove the enhanced monitor display assembly (for mainframes with Option 1M), complete the following steps:

1. Remove the top cover of the mainframe (see Figure 7–8 on page 7–11, if necessary).
2. Refer to Figure 7–10 and disconnect the ribbon cable from the rear of the Display assembly.
3. Remove the 6-32 screws holding the Display assembly in place.
4. Gently remove the Display assembly from the mainframe.

   When you reconnect the ribbon cable to the Display assembly, observe the orientation of Pin 1 as shown in Figure 7–10.

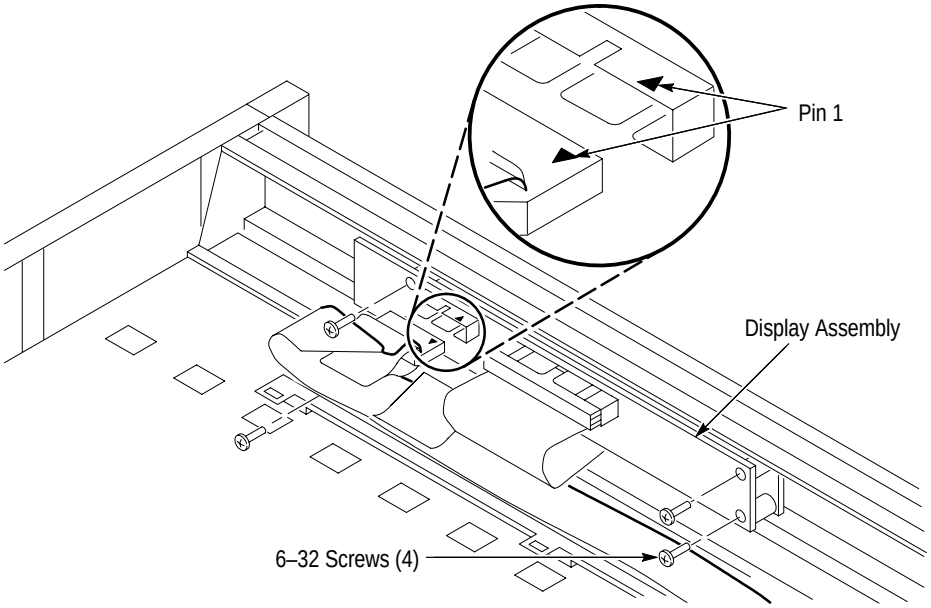



**Figure 7–10: Removing the Monitor Display**



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### Procedure 8: Remove the Backplane

To remove the backplane, perform Procedures 1, 2, and 3. Refer to Figure 7–11 and then complete the following steps:

1. Remove the top cover of the mainframe (see Figure 7–8 on page 7–11, if necessary).
2. Disconnect the ribbon cable on the right side of the backplane.

***NOTE**. Before disconnecting the power switch cable, note which connector the cable is connected to (J22, normally, or J23). Remember to reconnect the cable to the correct connector.*

3. Disconnect the power switch cable at J22 (or from J23) at the top of the backplane.
4. From the rear of the mainframe, remove the five 6-32 screws on the top of the backplane, seven 6-32 screws from the center, and five 6-32 screws from the bottom.
5. After removing all screws from the backplane, remove the backplane from the mainframe by sliding it out of the right side.

Install the backplane by reversing the disassembly procedure.



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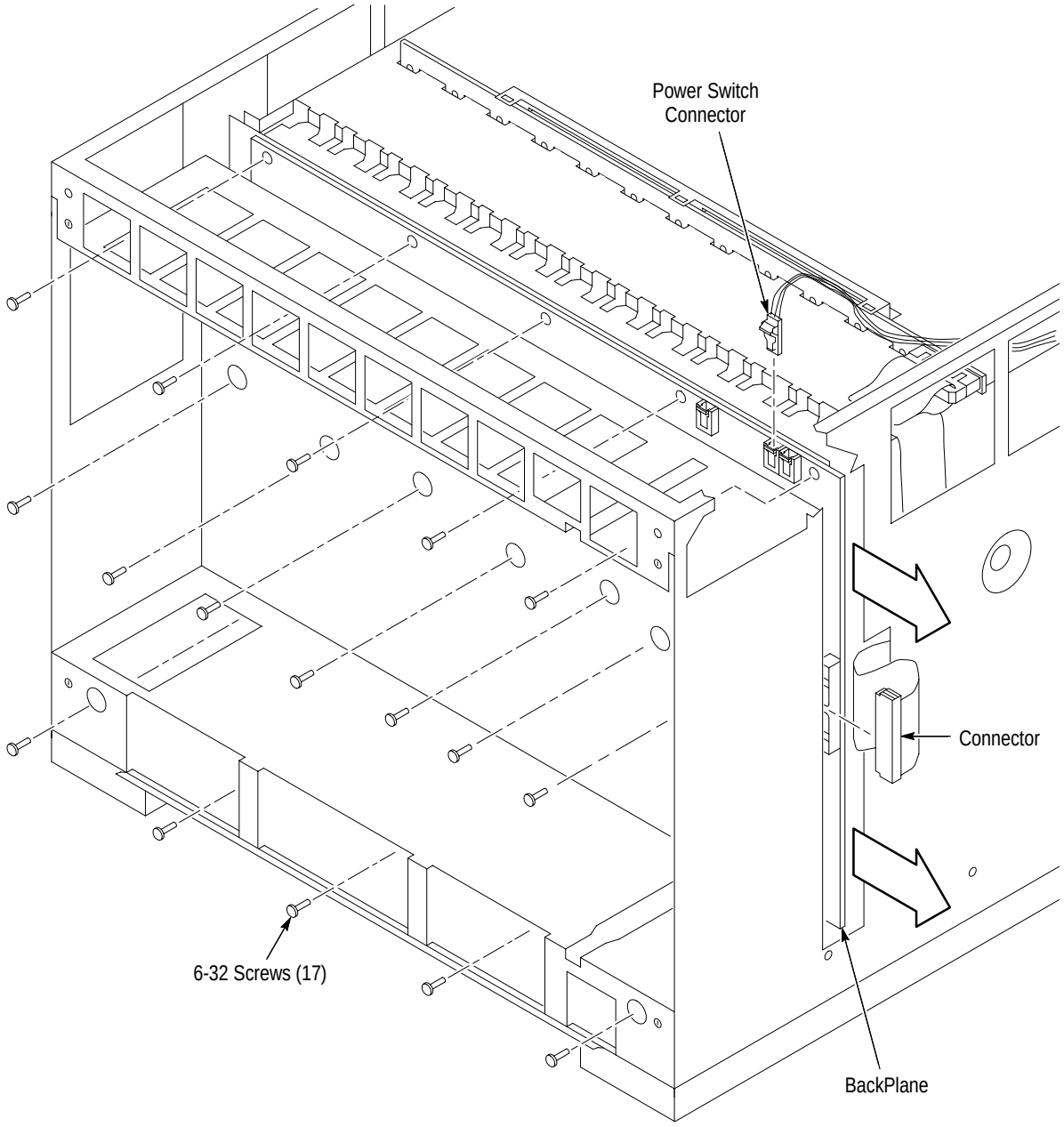



**Figure 7–11: Removing the Backplane**



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# Troubleshooting Procedures

The troubleshooting procedures are designed to isolate problems to a module level. No component-level procedures are provided.

## Equipment List

The following test equipment is recommended for troubleshooting procedures.

- Digital Voltmeter (Tektronix DM250 series digital voltmeter)
- Oscilloscope, 20 MHz BW, with 10x Probe with < 1-inch ground lead, (Tektronix TDS400A or TDS500A series oscilloscope)

## Diagnostic Information

The standard VX1410 IntelliFrame does not include diagnostics. The functionality of the mainframe can be verified by following the performance verification procedures as described in *Performance Verification* beginning on page 5–1.

## Fuses

The mainframe has two fuses for normal operation, the line fuse and a 5 V fuse on the backplane. The line fuse can be one of three different kinds depending on the operating voltage of the mainframe. Table 7–1 summarizes the different fuses in the mainframe.

**Table 7–1: Fuses**

| Voltage | Rating | Tektronix Replacement Part Number |
|---|---|---|
| 90 V to 132 V operation | 20 A, Slow Blow, 250 V | 159-0379-XX |
| 103 V to 250 V operation | 15 A, Fast Blow, 250 V | 159-0256-XX |
| 207 V to 250 V operation | 6.3 A, Fast Blow, 250 V | 159-0381-XX |
| 5 V Backplane | 4 A, Fast Blow, 250 V | 159-0320-XX |

## Fault Isolation

The main focus of the troubleshooting procedures is to isolate problems to one of the major modules within the mainframe. You may find it helpful to refer to the functional block diagram in Figure 7–12 on page 7–19 to isolate problems to one of the modules within the mainframe.



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**Power Supply Problems.** Use the following information to isolate power supply problems to the power supply or to other modules.

- Isolate the problem to either the mainframe or to one of the installed VXIbus Modules. Remove the modules from the mainframe and check that the problem still exists.
- Try isolating the problem to a module by either replacing the module with an known-good module or moving the module to a different slot.
- Check the fuses in the mainframe and on the backplane.
- Perform the procedures as described in *Performance Verification* beginning on page 5–1 to verify the power supply voltages are present and within the specified limits. If the voltages are not present on the 25-pin connector at the rear of the mainframe, try replacing either the power supply or the instrument monitor board. If any of the voltages are not within the specified limits, replace the power supply.

**Inadequate Cooling.** Cooling problems can be due to one or more of the following problems:

- Verify that the air filter is clean. If not, remove the air filter and clean it.
- One or both fans may not be operating properly. Check that both fans rotate.
- Verify that each fan is properly connected to the monitor board (see Figure 7–3 on page 7–6).
- Check that both fans are working at their proper speeds.
- Verify that all of the IntelliGuides of empty slots within the mainframe are closed when no modules are installed. If necessary replace the faulty assembly.
- Verify that the ribbon cable from the Temperature Sense board to the backplane is properly connected.
- Verify that all VXIbus modules have front panel that activate the IntelliGuides (shutters).

## Repackaging Instructions

If you need to send the VX1410 IntelliFrame to a Tektronix field center for repair, attach a tag to the mainframe with the owner name and address, the serial number, and a brief description of the problem(s) encountered or the service required. Always return all accessories so that the entire system can be tested.



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When repacking the mainframe for shipment, use the original packaging. If the packaging is unavailable or unfit for use, contact your local Tektronix representative to obtain new packaging.

## Theory of Operation

This section provides a brief overview of the theory of operation for the VX1410 IntelliFrame. Figure 7–12 shows the functional block diagram of the mainframe and the major components.

### Standard Mainframe

The standard mainframe contains the following major components:

- Power supply
- Backplane
- Standard Monitor board
- Temperature Sense board

**Power Supply.** The power supply provides all voltages and currents to the mainframe. The power supply connects to the backplane at J1 and J2 through the Power Supply Interface board. The power supply and the Power Supply Interface board can be replaced as a single unit.

**Backplane.** The backplane (A4) provides all the connections to module slots 0 through 12 in the mainframe. It also has connections to all other circuit boards and modules in the mainframe.

The front panel On/Standby DC switch connects to one of two connectors at the top of the backplane. When the switch is connected to J22, the switch controls the power in the mainframe. When the switch is connected to J23, the power-on functions are controlled by an external source through the 25-pin connector on the Monitor board. Although the switch still illuminates when power is applied to the mainframe, the on/off function of the switch is disabled. (Refer to *Remote Power Switch Configuration* on page B–1 for information on powering the mainframe with a remote momentary switch.)

The backplane connects to the Power Supply Interface board at J20 and J21. A 34-wide ribbon cable at 0J4 on the backplane connects to J16 on the Temperature Sense board. Connectors 0J1, 0J2, and 0P3 carry instrument monitoring information from the backplane to the Monitor board.



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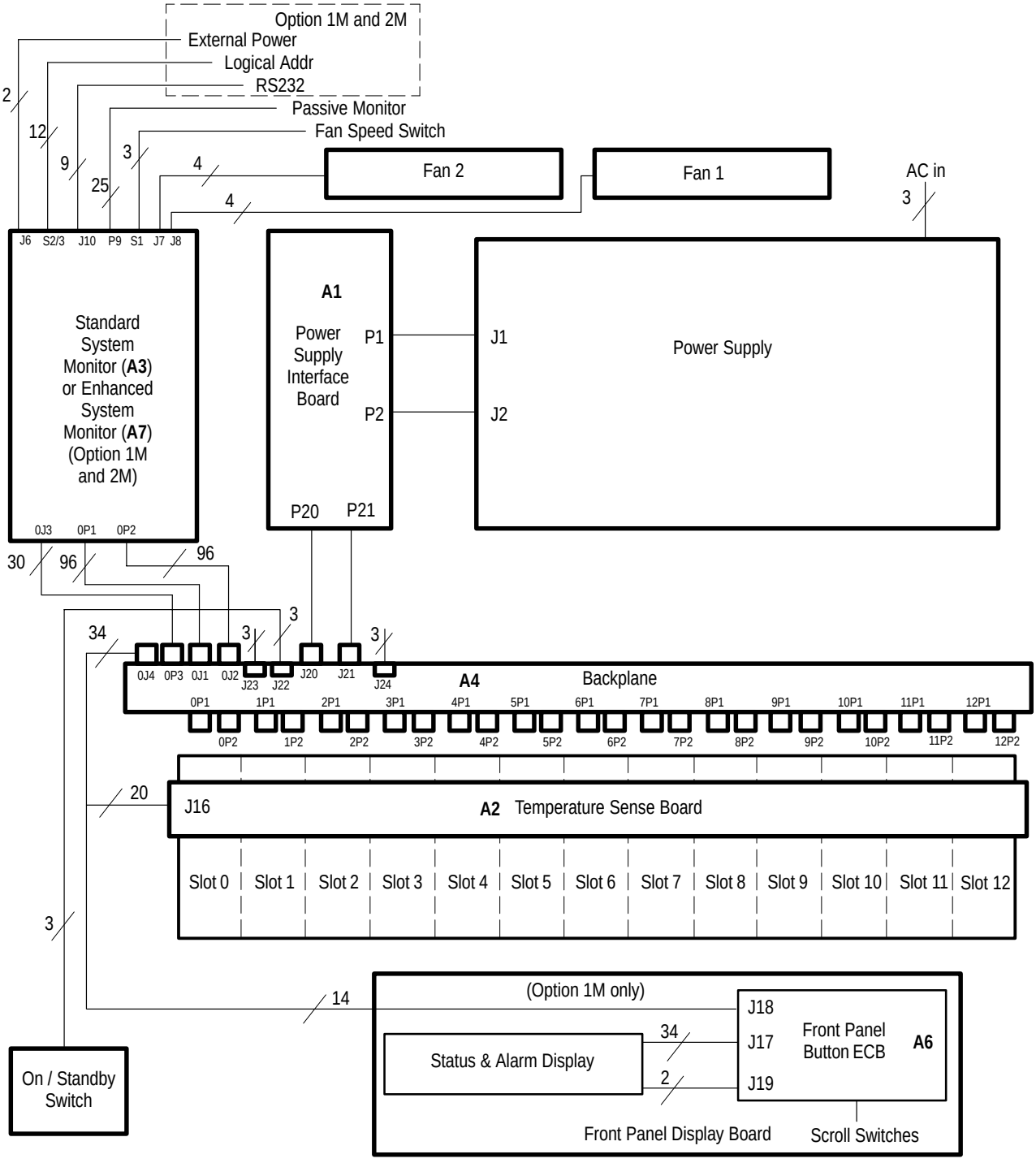



**Figure 7–12: Mainframe Block Diagram**



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**Standard Monitor Board.** The Standard Monitor board (A3) collects the monitoring information from the power supply, fans, and Temperature Sense board and passes the information to the 25-pin D connector. The monitor board connects directly to the backplane at 0J3, 0P1 and 0P2.

The two fans connect to the Monitor board at J7 (Fan2) and J8 (Fan1). The Fan Speed switch (S1) selects either variable fan speed (VAR) or full speed (FULL).

Table 3–1 on page 3–2 shows the pinouts of the 25-pin D connector.

**Temperature Sense Board.** The Temperature Sense board (A2) monitors the temperatures for each slot within the mainframe. The Temperature Sense Board connects to the backplane through the ribbon cable at J16.

## Mainframe with Option 1M or 2M

If your mainframe includes Option 1M, the Enhanced Monitor board replaces the Standard Monitor board. Option 1M also includes a front panel display board.

**Enhanced Monitor Board.** The Enhanced Monitor board (A5) has similar circuitry and connectors as the Standard Monitor board. The Enhanced Monitor board includes a nine-pin RS-232 port to connect to an external host. Address switches near the bottom rear of the board allow you to select the VXIbus address. A green READY indicator and amber ACCESSED indicator located at the bottom of the board indicate the operating status of the mainframe.

The Enhanced Monitor board also has circuitry to allow you to communicate with the mainframe with SCPI commands. These commands are detailed in the *Reference* section of this manual.

An Auxiliary Power input connector is available to connect 5 volts from an outside source to power the communication circuitry in the event of power failure of the mainframe.

**Monitor Display Board.** The Monitor Display board (A6) has a 20-character alphanumeric display that displays the system messages on the front panel. Scroll keys allow you to scroll through the messages one at a time. The display board connects to the backplane through the ribbon cable at J18.

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***NOTE**. Mainframes with Option 2M: If your mainframe includes Option 2M, there will be no front panel display. Otherwise, it is functionally identical to Option 1M described above.*

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# Replaceable Parts

This section contains a list of the replaceable modules for the VX1410 Intelli-Frame Instrument. Use this list to identify and order replacement parts.

## Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order.

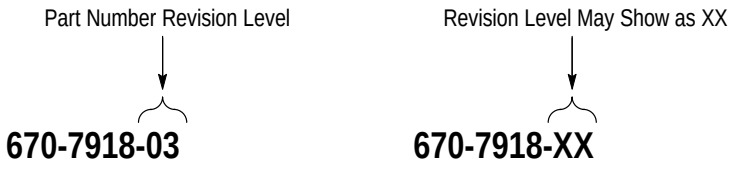
- Part number (see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

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

### Part Number Revision Level

Tektronix part numbers contain two digits that show the revision level of the part. For most parts in this manual, you will find the letters XX in place of the revision level number.




When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.



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### Module Servicing

Modules can be serviced by selecting one of the following three options. Contact your local Tektronix service center or representative for repair assistance.

**Module Repair and Return.** You may ship your module to us for repair, after which we will return it to you.

**New Modules.** You may purchase replacement modules in the same way as other replacement parts.

## VX1410 IntelliFrame Common Replaceable Parts

Table 8–1 provides a quick reference list of parts that you are most likely to replace. The table only provides a summary of information on the parts. For more detailed information refer to the individual parts lists in this chapter.

**Table 8–1: VX1410 IntelliFrame Common Replaceable Parts**

| Name | Description | Tektronix Part Number |
|---|---|---|
| Power Supply Module | Power supply and power supply interface board | 020-2116-XX |
| Air Filter | Air filter:Woven Polypropylene, black, 0.125 thick, 2 layer, vinyl,edging | 378-2075-XX |
| Fuse | Fuse, cartridge:15A,250V,Fast | 159-0256-00 |
| Fuse | Fuse, cartridge:20A,250V,5 Sec Min @ 200%,0.25 X 1.25,US REC:326020 | 159-0379-00 |
| Fuse | Fuse, cartridge:5MM X 20MM,250V,6.3A,High Breaking capacity,ceramic;VDE | 159-0381-00 |
| Fuse (Backplane) | Fuse, cartridge:5 X 20MM,4.0A,250V,30 MIN MAX | 159-0320-00 |
| Bottom Card Guide with Shutters | Baffle,VXI Slot:0.040 AL,Formed Sheet Metal with Perforations | 378-2074-XX |
| Card Guide | Guide:Plastic Guide,ECB,VXI Molded Ckt Bd Guide, VXI Form Factor,VXI410 | 351-0962-XX |
| Fan | Fan,DC:48V;TUBEAXIAL,Programmable with Tach Out, 15W,2500 RPM,170 CFM,48DBA,6.75” X 5.9” X 2.0” | 119-4801-XX |



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# Using the Replaceable Parts List

This section contains a list of the mechanical and/or electrical components that are replaceable for the VX1410 IntelliFrame Instrument. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

**Parts List Column Descriptions**

| Column | Column Name | Description |
|---|---|---|
| 1 | Figure & Index Number | Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow. |
| 2 | Tektronix Part Number | Use this part number when ordering replacement parts from Tektronix. |
| 3 and 4 | Serial Number | Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers. |
| 5 | Qty | This indicates the quantity of parts used. |
| 6 | Name & Description | An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification. |
| 7 | Mfr. Code | This indicates the code of the actual manufacturer of the part. |
| 8 | Mfr. Part Number | This indicates the actual manufacturer's or vendor's part number. |

**Abbreviations**

Abbreviations conform to American National Standard ANSI Y1.1–1972.

**Mfr. Code to Manufacturer Cross Index**

The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.



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## Manufacturers Cross Index

| Mfr. Code | Manufacturer | Address | City, State, Zip Code |
|---|---|---|---|
| TK1163 | POLYCAST INC | 9898 SW TIGARD ST | TIGARD OR 97223 |
| TK1499 | AMLAN INC | 97 THORNWOOD RD | STAMFORD CT 06903–2617 |
| TK1547 | MOORE ELECTRONICS INC. | 19500 SW 90TH CT<br>PO BOX 1030 | TUALATIN OR 97062 |
| TK2208 | NORTHWEST RUBBER EXTRUDERS INC | 16748 SW 77TH AVE | PORTLAND OR 97223 |
| TK2469 | UNITREK CORPORATION | 3000 LEWIS & CLARK HWY<br>SUITE 2 | VANCOUVER WA 98601 |
| TK2548 | XEROX BUSINESS SERVICES<br>DIV OF XEROX CORPORATION | 14181 SW MILLIKAN WAY | BEAVERTON OR 97077 |
| 0B445 | ELECTRI–CORD MFG CO INC | 312 EAST MAIN ST | WESTFIELD PA 16950 |
| 0KB01 | STAUFFER SUPPLY | 810 SE SHERMAN | PORTLAND OR 97214 |
| 06666 | GENERAL DEVICES CO INC | 1410 S POST RD<br>PO BOX 39100 | INDIANAPOLIS IN 46239–9632 |
| 1Y013 | DEANCO, ACACIA DIVISION | 3101 SW 153RD DRIVE | BEAVERTON OR 97006 |
| 22589 | ELECTRO–SPACE FABRICATORS INC | 300 W HIGH ST<br>PO BOX 67 | TOPTON PA 19562–1420 |
| 3M099 | PORTLAND SCREW CO | 6520 N BASIN ST | PORTLAND OR 97217–3920 |
| 4T165 | NEC ELECTRONICS, INC. | 475 ELLIS STREET<br>PO BOX 7241 | MOUNTAIN VIEW CA 94039 |
| 5Y921 | COMAIR ROTRON | 2675 CUSTOMHOUSE CT | SAN YSIDRO, CA 92073 |
| 51506 | ACCURATE SCREW MACHINE COMPANY (ASMCO) | 19 BALTIMORE STREET | NUTLEY NY 07110–1303 |
| 52152 | MINNESOTA MINING AND MFG CO<br>INDUSTRIAL TAPE DIV | 3M CENTER | ST PAUL MN 55144–0001 |
| 61081 | ELECTRONIC SOLUTIONS | 6790 FLANDERS DRIVE | SAN DIEGO, CA 92121 |
| 61935 | SCHURTER INC | 1016 CLEGG COURT | PETALUMA CA 94952–1152 |
| 63426 | NKK SWITCHES OF AMERICA INC | 14415 N SCOTTSDALE RD<br>NO 600 | SCOTTSDALE AZ 85260 |
| 71400 | BUSSMANN<br>DIV OF COOPER INDUSTRIES INC | 114 OLD STATE RD<br>PO BOX 14460 | ST LOUIS MO 63178 |
| 80009 | TEKTRONIX INC | 14150 SW KARL BRAUN DR<br>PO BOX 500 | BEAVERTON OR 97077–0001 |
| 06383 | PANDUIT CORP | 17303 RIDGELAND AVE | TINLEY PARK, IL 60477–3048 |



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **CABINET AND CHASSIS ASSEMBLY** | | |
| 1–1 | 212–0193–00 | | | 12 | SCREW,EXT RLV:8–32 X 0.375 BUTTON HEAD,HEX-DRIVE,STAINLESS STEEL,BLACK OXIDE FINISH | 0KB01 | 212–0193–00 |
| –2 | 200–4206–00 | | | 1 | COVER:0.050 ALUMINUM,PAINTED,VX1410 | 80009 | 200420600 |
| –3 | 441–2064–00 | | | 1 | CHASSIS:VXI MAINFRAME SHEET METAL ASSY,(RIVET SPOTWELD) | 80009 | 441206400 |
| –4 | 426–2524–00 | | | 2 | RAIL,FOOT:ALUM SHEET METAL,GRAPHITE GRAY,VX1410 | 80009 | 426252400 |
| –5 | 348–0001–00 | | | 4 | FOOT,CABINET:BLACK RUBBER | TK2208 | ORDER BY DESC |
| –6 | 212–0193–00 | | | 4 | SCREW,EXT RLV:8–32 X 0.375 BUTTON HEAD,HEX-DRIVE,STAINLESS STEEL,BLACK OXIDE FINISH | 0KB01 | 212–0193–00 |
| –7 | 212–0158–00 | | | 8 | SCREW,MACHINE:8–32 X 0.375,PNH,STL,CDPL,T–20 | 0KB01 | ORDER BY DESC |
| | | | | | **STANDARD ACCESSORIES** | | |
| | 040–1480–XX | | | 1 | FIELD KIT:ENHANCED MONITOR UPGRADE OPTION 1M | 80009 | 040–1480–XX |
| | 040–1581–XX | | | 1 | FIELD KIT:ENHANCED MONITOR UPGRADE OPTION 2M (WITHOUT FRONT PANEL DISPLAY) | 80009 | 040–1581–XX |
| | 070–9019–XX | | | 1 | MANUAL,TECH:INSTRUCTION,VX1410 | TK2548 | 070–9019–XX |
| | 063–2267–XX | | | 1 | SOFTWARE PKG:VXI PLUG –N– PLAY SOFTWARE,(1) 3.5" HIGH DENSITY,1.44MBYTE DISK,V1.0;VX1410;1M,2M | 80009 | 063–2267–XX |
| | 161–0218–00 | | | 1 | CABLE ASSY,PWR,:3,14 AWG,100 L,SJT,BLK,60 DEG C,5–20 P X BME–3S,15A/125V | 0B445 | ECM–161–0218–00 |
| | 161–0213–00 | | | 1 | CABLE ASSY,PWR,3,16 AWG,2.5 METER,SJT,GREY,105 DEG C,MCA–3T X BME–3S,13A/250V | 0B445 | ECM–161–0213–00 |
| | 159–0256–00 | | | 1 | FUSE,CARTRIDGE:15A,250V,FAST, | 71400 | ABC–15 |
| | 159–0379–00 | | | 1 | FUSE CARTRIDGE:20A,250V,5 SEC MIN @ 200%.0.25 X 1.25,US REC:326020 | 80009 | 159037900 |
| | 159–0381–00 | | | 1 | FUSE,CARTRIDGE:5MM X 20MM,250V,6.3A,HIGH BREAKING CAPACITY,CERAMIC;VDE | 80009 | 159038100 |



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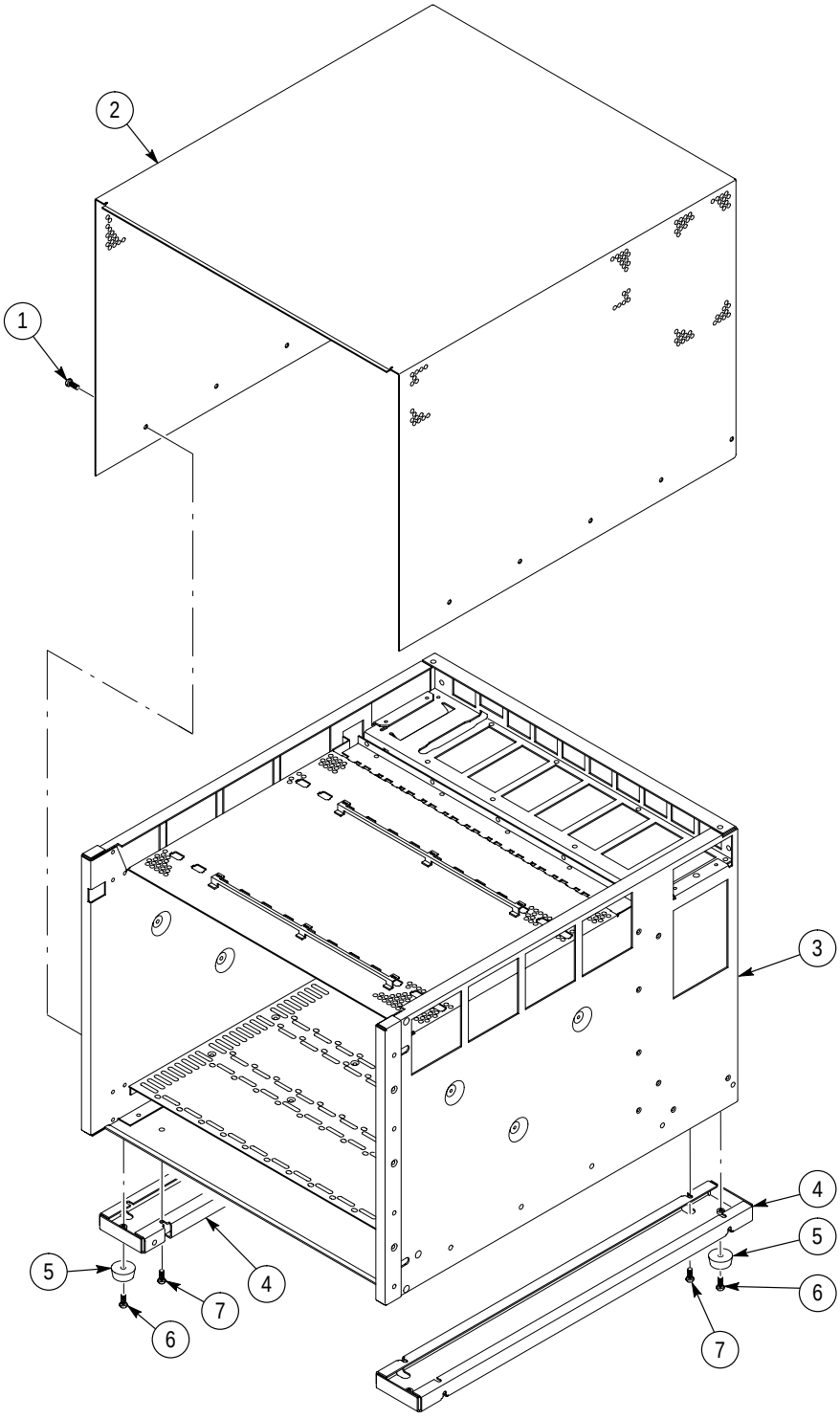



**Figure 8–1: Cabinet and Chassis Assembly**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **CIRCUIT BOARDS AND CHASSIS PARTS** | | |
| 2–1 | 260–2618–00 | | | 1 | SWITCH,PUSH:SPST;MOM,GOLD OVER NICKEL CONTACTS,0.4V | 63426 | YB15KKG01–04F–J |
| –2 | 386–6865–00 | | | 1 | EXTRUSION,ASSY:UPPER EXTRUSION ASSY,ASSY OF EXT,LABEL,POWER SWITCH,& NUT BAR | 80009 | 386686500 |
| –3 | 343–0775–00 | | | 2 | CABLE,CLAMP:RIBBON,;1.0 X 1.0,GRAY,POLYVINYL,W/URETHANE FOAM TAPEBACKING,RETAINS 6 RIBBON CABLES,UL94V–0 | 52152 | 80610029243/348 |
| –4 | 174–3424–00 | | | 1 | CA ASSY,SP:RIBBON,;IDC,34,28 AWG,SPLIT&FOLDED, 6"+8" +1.25,2X10,RCPT,0.1CTR & 12"+19.75"+1" 2X7,RCPT,0.1 CTR,VXI | 1Y013 | 73423 |
| –5 | 671–3219–00 | | | 1 | CIRCUIT BD ASSY:TEMP SENSE; | 80009 | 671321900 |
| –6 | 211–0720–00 | | | 17 | SCR,ASSEM WSHR:6–32 X 0.500,PNH,STL,CDPL,T–15 | 0KB01 | ORDER BY DESC |
| –7 | 118–9142–00 | | | 1 | BACKPLANE,VXI:13 SLOT,C–SRE,W/ELECTRONIC AUTOMATIC BUS GRANTSENSING,, | 61081 | V1213J1J2X–7059 |
| –8 | 213–0882–00 | | | 12 | SCREW,TPG,TR:6–233 X 0.437,PNH,STL,CDPL,TYPE TT,T–15 | 0KB01 | ORDER BY DESC |
| –9 | 220–0199–01 | | | 2 | NUT BAR,VXI:VME/VXI NUT BAR,M2.5 THREADS,CUT TO 15.60 LENGTH | 22589 | 120 15.580 LENG |
| –10 | 386–6867–00 | | | 1 | EXTRUSION,ASSY:LOWER EXTRUSION ASSY,VX1410 ASSY OF EXTRUSION,LABEL,&NUT BAR | 80009 | 386686700 |
| –11 | 378–2074–00 | | | 13 | BAFFLE,VXI SLOT:0.040 AL,FORMED SHEET METAL W/PERFORATIONS | 80009 | 378207400 |
| –12 | 351–0962–00 | | | 13 | GUIDE:PLASTIC GUIDE,ECB,VXI MOLDED CKT BD GUIDE, VXI FORM FACTOR,VXI410 | 80009 | 351096200 |
| | | | | | **STANDARD ACCESSORIES** | | |
| 2–13 | 333–4169–00 | | | 6 | PANEL,FRONT:DOUBLE WIDE(2.4")BLANK FRONT PANEL, SHEET METAL W/LEXAN OVERLAY,VXI C SIZEFRAME | 80009 | 333416900 |
| 2–14 | 333–4170–00 | | | 1 | PANEL,FRONT:SINGLE WIDE (1.2") BLANK FRONTPANEL, SHEET METAL W/LEXAN OVERLAY,VXI C SIZE FRAME | 80009 | 333417000 |



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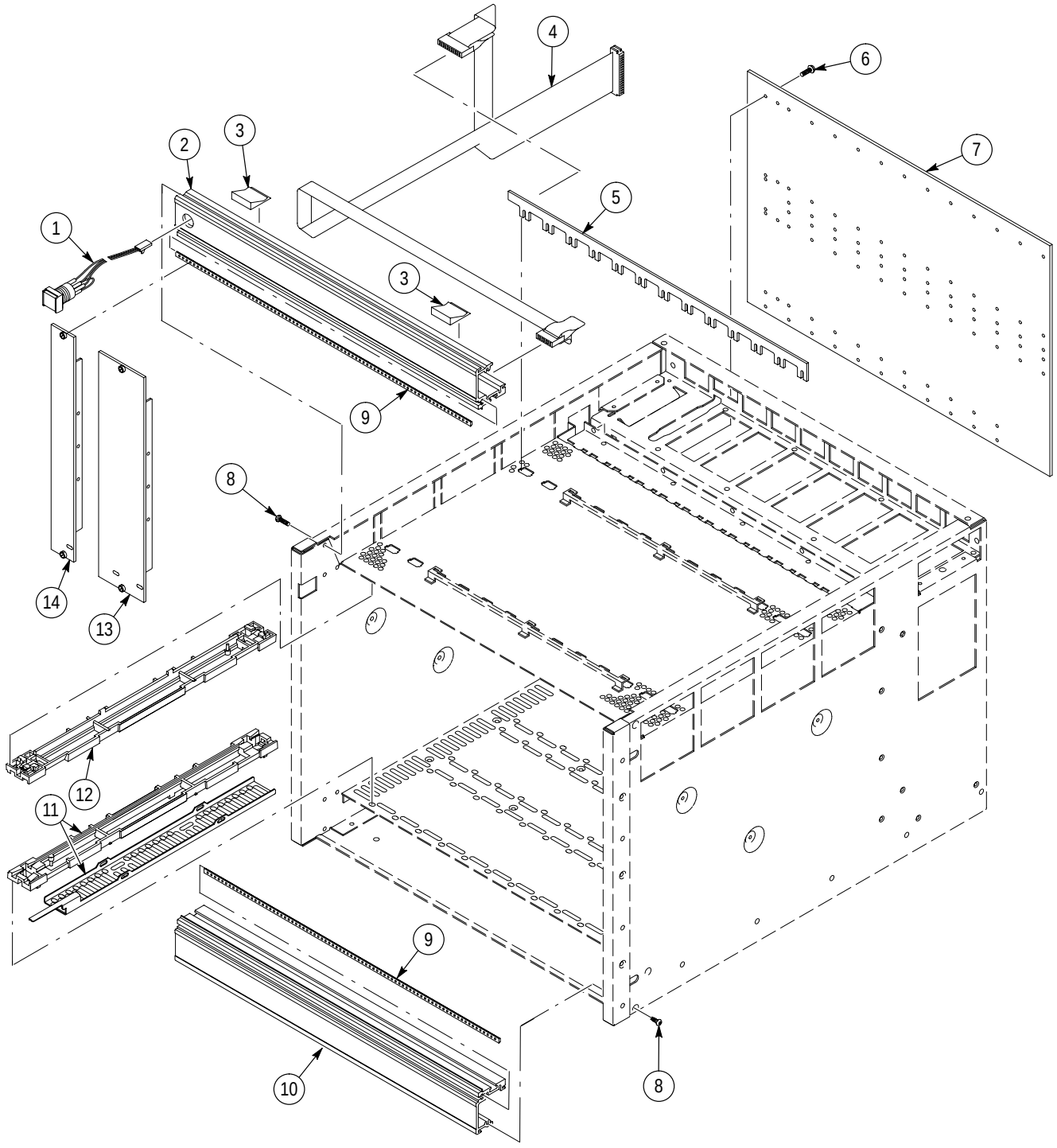



**Figure 8–2: Circuit Boards and Chassis Parts**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **POWER SUPPLY AND FAN ASSEMBLY** | | |
| 3–1 | 211–0501–00 | | | 2 | SCREW,MACHINE:6–32 X 0.125,PNH,STL CD PL,POZ | 73893 | ORDER BY DESC |
| –2 | 337–4053–00 | | | 1 | SHIELD,EMI,MONITOR ECB:SST SHIELD,MONITOR ECB & PANEL | 80009 | 337405300 |
| –3 | 346–0128–00 | | | 1 | STRAP,TIEDOWN,E:0.1 W X 8.0 L,NYLON | 06383 | PLT2M |
| –4 | 407–4331–00 | | | 1 | BRACKET:0.062 ALUM SHEET,MOUNTS MONITOR ECB, VXI410 | 80009 | 407433100 |
| –5 | 214–3903–01 | | | 2 | SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX,STEEL,CADPLATE | 0KB01 | 214–3903–01 |
| –6 | 671–3217–00 | | | 1 | CIRCUIT BD ASSY:STANDARD MONITOR; | 80009 | 671321700 |
| –7 | 211–0747–00 | | | 4 | SCREW,MACH:6–32 X 0.188,PNH,STL,CDPL,T–15 | 0KB01 | ORDER BY DESC |
| –8 | 020–2116–01 | | | 1 | COMPONENT KIT:POWER SUPPLY/POWER SUPPLY INTERFACE BOARD KIT | 80009 | 020211601 |
| –9 | 200–4207–00 | | | 1 | COVER:0.050 AL,COVER,ECB,PWR SPLY I/F,SHEET METAL, MOUNT PWRSPLY I/F ECB TO PWR SPLY,VX1410 | 80009 | 200420700 |
| –10 | 212–0158–00 | | | 7 | SCREW,MACHINE:8–32 X 0.375,PNH,STL,CDPL,T–20 | 0KB01 | ORDER BY DESC |
| –11 | 671–3216–00 | B010100 | B019999 | 1 | CIRCUIT BD ASSY:POWER SUPPLY INTERFACE; | 80009 | 671321600 |
| –11 | 671–3216–01 | B020100 | | 1 | CIRCUIT BD ASSY:POWER SUPPLY INTERFACE; | 80009 | 671321601 |
| –12 | 119–4783–00 | | | 1 | POWER SUPPLY:925W; 5V 95A, –5.2V 60A, –2V 3 0A, OTHER VXI, AMP CONN | 80009 | 119478300 |
| –13 | 367–0466–00 | | | 1 | HANDLE:WIREFORM,0.125 SST,ELECTRO POLISH, 1 X 2 IN. | 80009 | 367321600 |
| –14 | 119–4801–00 | | | 2 | FAN,DC:48V;TUBEAXIAL,PROGRAMMABLE W/TACH OUT, 15W, 2,500 RPM,170 CFM,48DBA,6.75" X 5.9"X 2.0" | 5Y921 | JQ48R7 |
| –15 | 380–1088–00 | | | 1 | HOUSING:0.062 AL,FAN,VXI MAINFRAMESHEET METAL ASSY,RIVET & SPOTWELD,MOUNT FANS & HOLD AIR FILTERS | 80009 | 380108800 |
| –16 | 211–0691–00 | | | 6 | SCR,ASSEM WSHR:6–32 X 0.625,T–15 | 0KB01 | ORDER BY DESC |
| –17 | 378–2075–00 | | | 1 | AIR FILTER:WOVEN POLYPROPYLENE,BLACK,0.125 THICK, 2 LAYER,VINYL EDGING,VX1410,, | 80009 | 378207500 |
| –18 | 212–0158–00 | | | 1 | SCREW,MACHINE:8–32 X 0.375,T–20 | 0KB01 | ORDER BY DESC |
| –19 | 212–0193–00 | | | 4 | SCREW,EXT RLV:8–32 X 0.375 BUTTON HEAD,HEX DRIVE,STAINLESS STEEL,BLACK OXIDE FINISH | 0KB01 | 212–0193–00 |
| –20 | 343–0549–00 | | | 1 | STRAP,TIEDOWN,,E:0.098 W X 4.0 L,ZYTEL | TK1499 | HW–047 |
| –21 | 211–0846–00 | | | 4 | SCREW:SCREW,SHLDR,6–32 X 0.156,HEX SOCKET SHOULDER SCREW,0.156 DIA X 0.125 SHANK | 51506 | 67515–S–12–VT |



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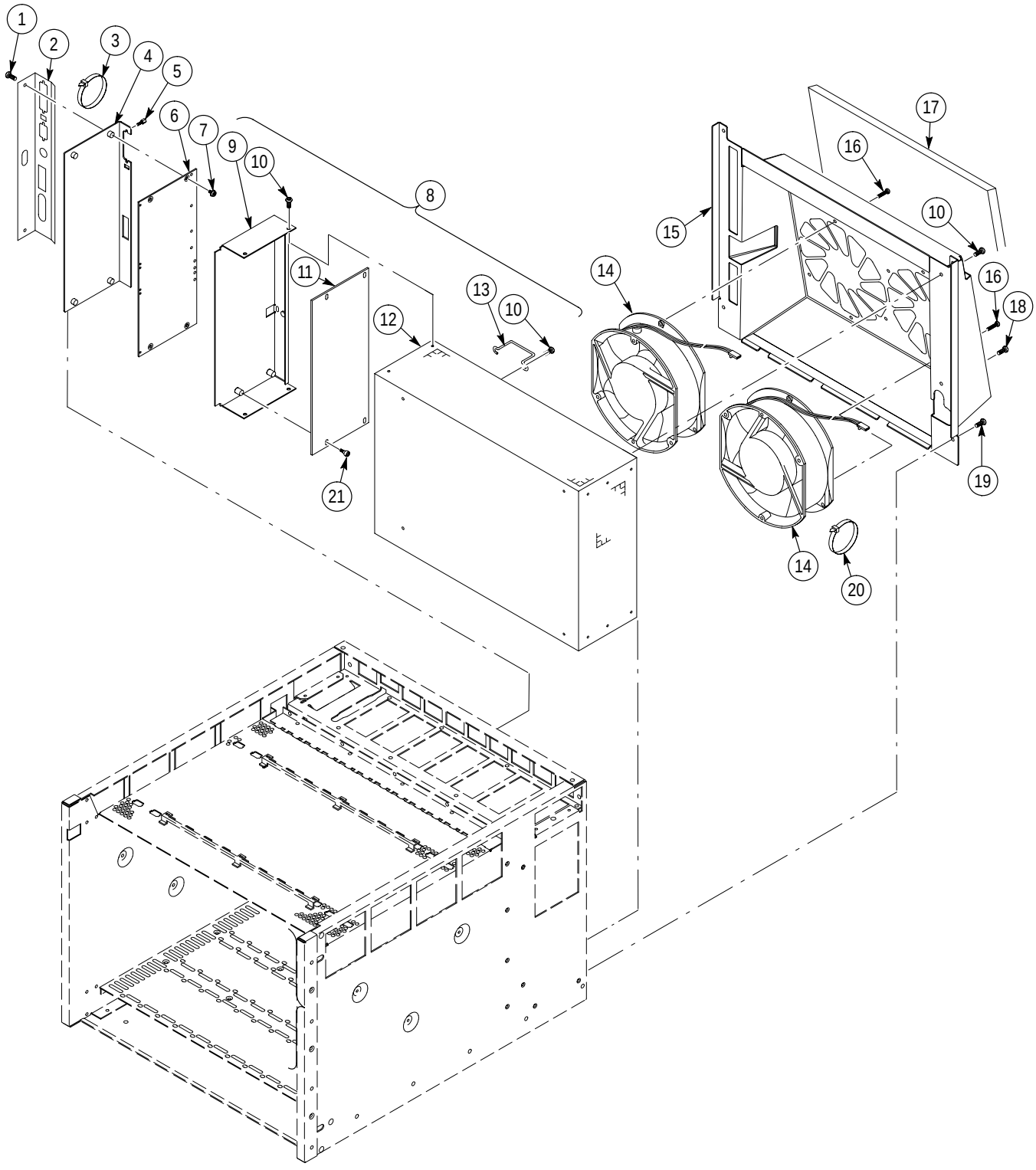



**Figure 8–3: Power Supply and Fan Assembly**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **1R RACKMOUNT ASSEMBLY** | | |
| 4–0 | 020–2117–00 | | | 1 | COMPONENT KIT:RACKMOUNT KIT 1R,VX1410<br>(KIT CONTAINS ITEMS 1 THROUGH 5) | 80009 | 020211700 |
| –1 | 950–0991–00 | | | 2 | HANDLE ALUMINUM BLK | 80009 | 950099100 |
| –2 | 212–0157–00 | | | 14 | SCREW,MACHINE:8–32 X 0.5,FLH,100 DEG,STL CDPL,TORX | 0KB01 | ORDER BY DESC |
| –3 | 407–4363–00 | | | 2 | BRACKET:RACKMOUNT,2R,VX1410 | 80009 | 407436300 |
| –4 | 212–0671–00 | | | 4 | SCREW,MACHINE:10–32 X 0.625,FLH,100 DEG,STL,CD PL, TORX | 0KB01 | ORDER BY DESC |
| –5 | 351–0800–00 | | | 1 | GUIDE,SLIDE:CHASSIS TRACK, (PAIR) | 06666 | CTS–124 |



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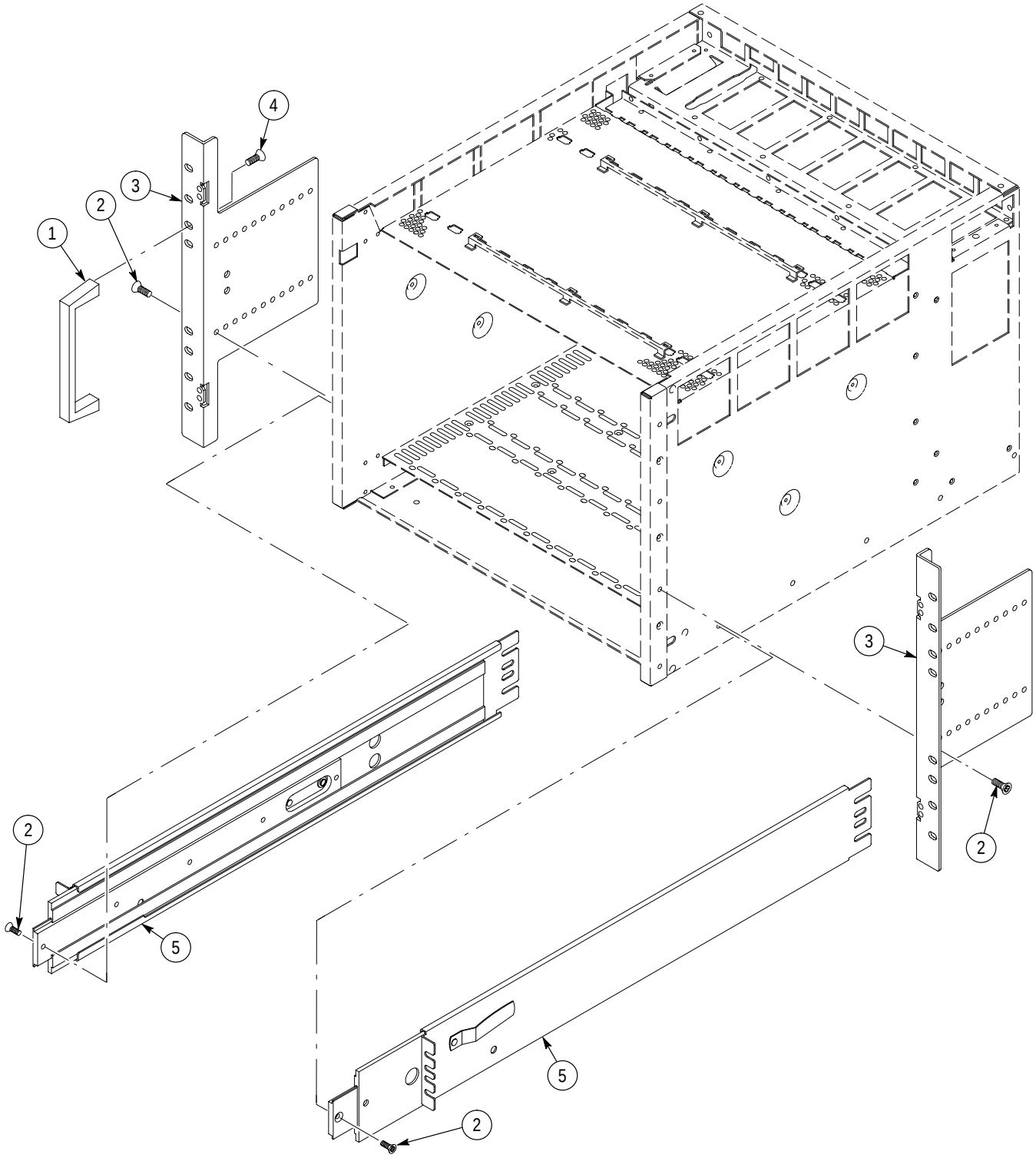



**Figure 8–4: 1R Rackmount Assembly**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **2R RACKMOUNT AND DOOR ASSEMBLY** | | |
| 5–0 | 020–2118–00 | | | 1 | COMPONENT KIT:RACKMOUNT KIT 2R,VX1410 (KIT CONTAINS ALL THE FOLLOWING ITEMS EXCLUDING ITEMS 3, 5 & 8) | 80009 | 020211800 |
| –1 | 950–0991–00 | | | 2 | HANDLE ALUMINUM BLK | 80009 | 950099100 |
| –2 | 212–0157–00 | | | 14 | SCREW,MACHINE:8–32 X 0.5,FLH,100 DEG,STL CDPL, TORX | 0KB01 | ORDER BY DESC |
| –3 | 214–4678–00 | | | 2 | HINGE LIFT OFF, BLACK | 80009 | 214467800 |
| –4 | 407–4363–00 | | | 2 | BRACKET:RACKMOUNT,2R,VX1410 | 80009 | 407436300 |
| –5 | 211–0718–00 | | | 8 | SCREW,MACHINE:6–32 X 0.312,FLH100,STL,CDPL,T–10 | 0KB01 | 211–0718–00 |
| –6 | 212–0671–00 | | | 4 | SCREW,MACHINE:10–32 X 0.625,FLH,100 DEG,STL,CD PL, TORX | 0KB01 | ORDER BY DESC |
| –7 | 212–0158–00 | | | 2 | SCREW,MACHINE:8–32 X 0.375,PNH,STL,CDPL,T–20 | 0KB01 | ORDER BY DESC |
| –8 | 200–4243–00 | | | 1 | DOOR ASSY:LEXAN DOOR,W/LATCH HARDWARE ATTACHED, VX1410 | 80009 | 200424300 |
| –9 | 351–0800–00 | | | 1 | GUIDE,SLIDE:CHASSIS TRACK,, (PAIR) | 06666 | CTS–124 |



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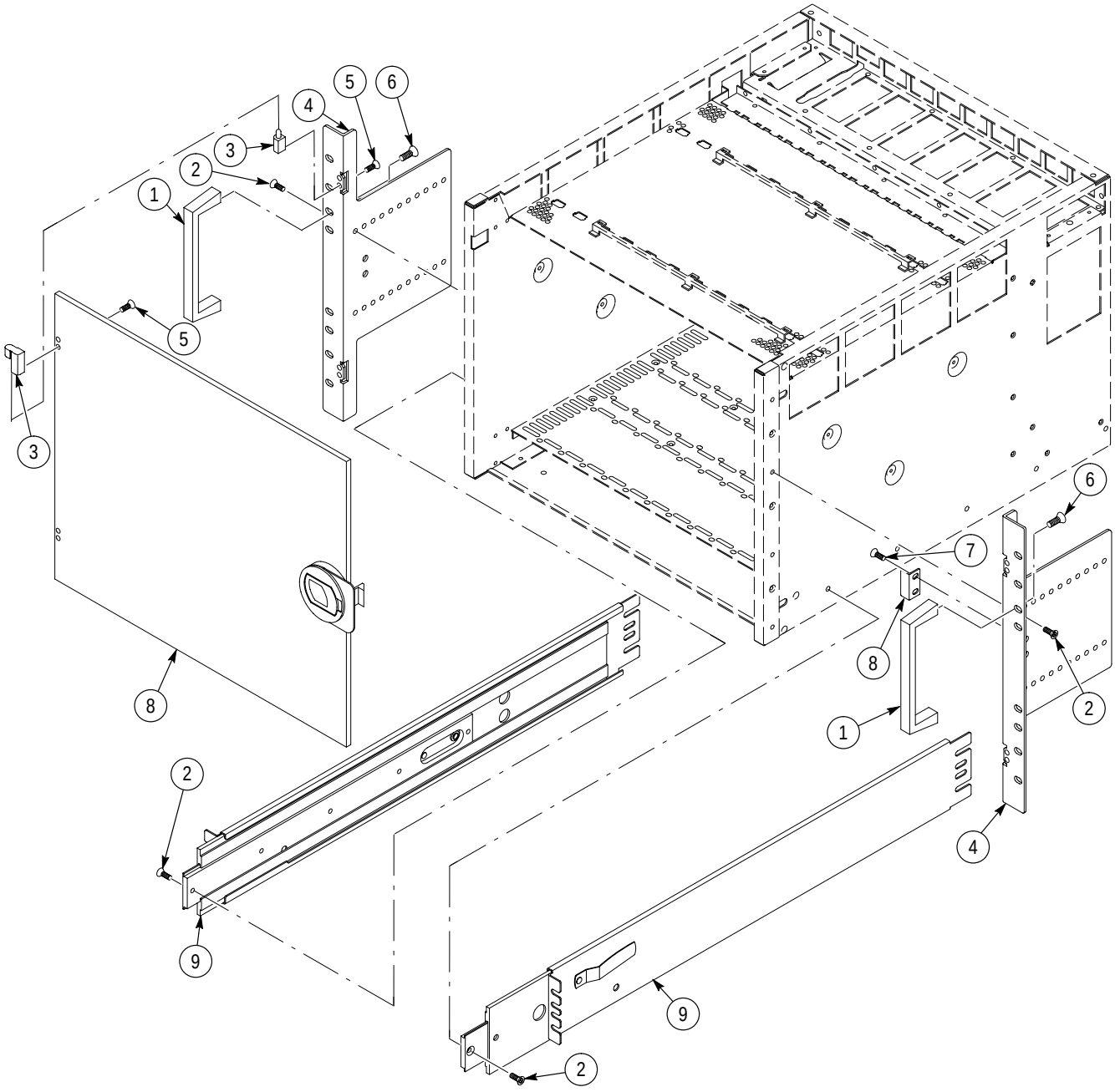



**Figure 8–5: 2R Rackmount and Door Assembly**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **OPTION 1U CABLE TRAY** | | |
| 6–0 | 020–2119–00 | | | 1 | COMPONENT KIT:CABLE TRAY 1U KIT<br>(KIT INCLUDES ITEMS 1 THROUGH 3) | 80009 | 020211900 |
| –1 | 212–0158–00 | | | 2 | SCREW,MACHINE:8–32 X 0.375,PNH,STL,CDPL,T–20 | 0KB01 | ORDER BY DESC |
| –2 | 333–4158–00 | | | 1 | PANEL,CONN:0.09ALUM,VX1410 | 80009 | 333415800 |
| –3 | 407–4361–00 | | | 1 | CABLE TRAY:0.09 ALUMINUM,PAINTED GRAPHITE GRAY, VX1410 | 80009 | 407436100 |



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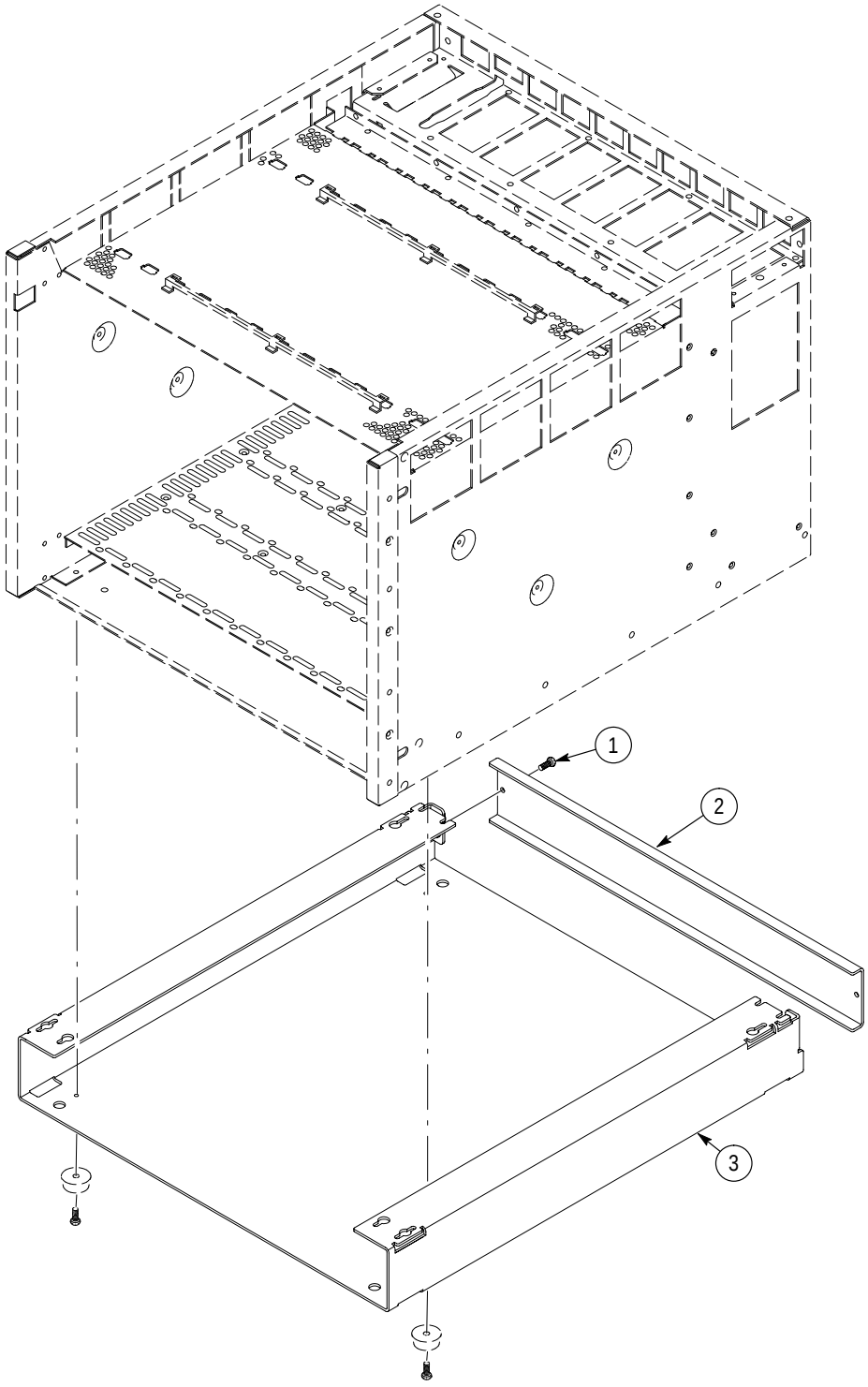



**Figure 8–6: Option 1U Cable Tray**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **OPTION 2U CABLE TRAY** | | |
| 7–0 | 020–2120–00 | | | 1 | COMPONENT KIT: CAB;E TRAY 2U KIT VX1410 (KIT INCLUDES THE ITEMS 1 THROUGH 4) | 80009 | 020212000 |
| –1 | 212–0158–00 | | | 4 | SCREW,MACHINE:8–32 X 0.375,PNH,STL,CDPL,T–20 | 0KB01 | ORDER BY DESC |
| –2 | 333–4162–00 | | | 1 | PANEL,CONN:2U,0.09 AL,VX1410 | 80009 | 333416200 |
| –3 | 333–4159–00 | | | 1 | PANEL,CONN:0.09 AL,VX1410 | 80009 | 333415900 |
| –4 | 407–4362–00 | | | 1 | CABLE TRAY:0.09 ALUM,PAINTED GRAPHITE GRAY, VX1410 | 80009 | 407436200 |



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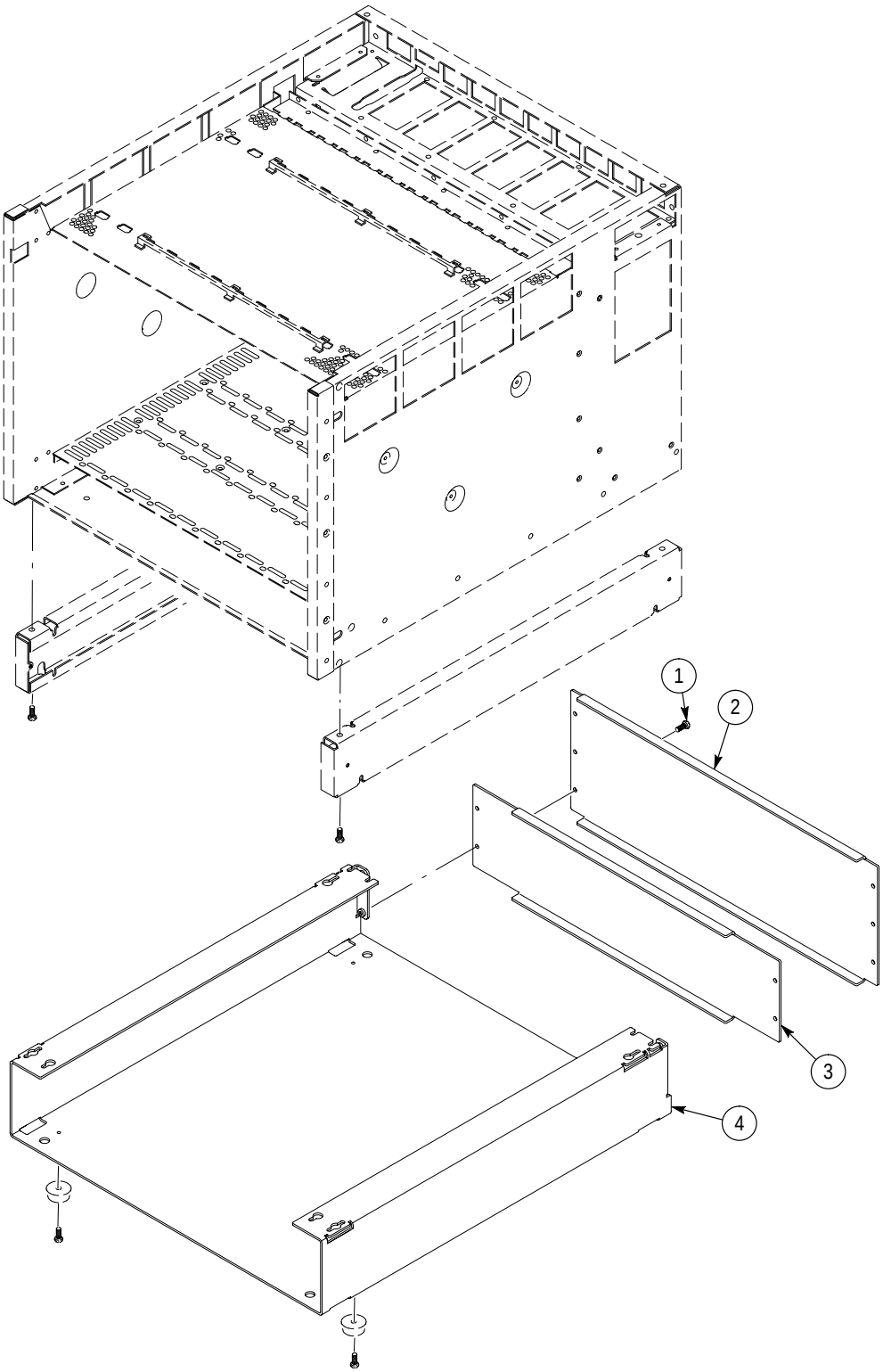



**Figure 8–7: Option 2U Cable Tray**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **OPTION 1M ENHANCED MONITOR** | | |
| 8–0 | 040–1480–XX | | | 1 | MOD KIT:ENHANCED MONITOR OPTION 1M KIT,VX1410 | 80009 | 040148000 |
| –1 | 386–6866–00 | | | 1 | EXTRUSION ASSY:EXTRUSION ASSEMBLY,MONITOR, VX1410 ASSY OF EXTRUSION,LABEL,POWER SWITCH,NUT BAR,CS | 80009 | 386686600 |
| –2 | 119–5086–00 | | | 1 | DISPLAY MODULE:DISPLAY VACUUM,FLOURESCENT 1 X 20 ALPHANUMERIC ,5 X 7 DOT MATRIX W/CURSOR, DC/DCCONVERTER CHAR GEN LOGIC & | 4T165 | FC20X1RA–AA/AB |
| –3 | 671–3290–00 | | | 1 | CIRCUIT BD ASSY:FRONT PANEL DISPLAY | 80009 | 671329000 |
| –4 | 211–0732–00 | | | 6 | SCR,ASSEM WSHR:6–32 X 0.75,PNH,STL,CD PL,T-15 | 0KB01 | ORDER BY DESC |
| –5 | 174–0034–00 | | | 1 | CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBON | TK1547 | ORDER BY DESC |
| –6 | 337–4053–01 | | | 1 | SHIELD,EMI:EMI SHIELD,OUTPUT CONNECTORS ON ENHANCED MONITOR BOARD,0.010 SST;VX1410 | 80009 | 337405301 |
| –7 | 211–0501–00 | | | 2 | SCREW,MACHINE:6–32 X 0.125,PNH,STL CD PL,POZ | 73893 | ORDER BY DESC |
| | 346–0128–00 | | | 1 | STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL | TK1499 | HW–047 |
| –8 | 407–4332–00 | | | 1 | BRACKET:0.062 ALUM SHEET METAL,MOUNTS ENHANCED MONITOR ECB,VXI410 | 80009 | 407433200 |
| –9 | 671–3218–01 | | | 1 | CIRCUIT BD ASSY:OPTIONAL MONITOR | 80009 | 671321800 |
| –10 | 211–0747–00 | | | 4 | SCREW,MACHINE:6–32 X 0.188,PNH,STL,CDPL,T–15 | 0KB01 | ORDER BY DESC |
| –11 | 159–0208–00 | | | 1 | FUSE,WIRE LEAD':2A,125V,5 SEC | 71400 | MCR–2 |
| –12 | 159–0193–00 | | | 1 | FUSE,WIRE LEAD:10A,60V,FAST BLOW | 71400 | MCR–10 |
| –13 | 159–0246–00 | | | 2 | FUSE,WIRE LEAD:3.5A,125V,FAST BLOW | 71400 | MCR–3 1/2 |
| –14 | 441–2064–01 | | | 1 | CHASSIS:CHASSIS MAINFRAME SHEET METAL ASSY. EXTRUSION MOD,OPTIONAL MONITOR VERSION; VX1410 OPT 1M | 80009 | 441206401 |
| –15 | 174–3503–00 | | | 1 | CA,ASSY SP:DISCRETE,CABLE DISPLAY POWER;LDI,2,26 AWG,3 L,1X2,0.1CTR,LATCHING,RCPT X 1X2,0.1CTRRCPT, PLZ,W/FRICTION LOC | TK2469 | 174–3503–00 |
| –16 | 366–1538–00 | | | 2 | PUSH BUTTON:IVORY GRAY,0.3 X 0.665 H,ROUNDED | TK1163 | ORDER BY DESC |
| –17 | 213–0882–00 | | | 6 | SCREW,TPG,TR:6–32 X 0.437,PNH,STL,CDPL,TYPE TT,T–15 | 0KB01 | ORDER BY DESC |



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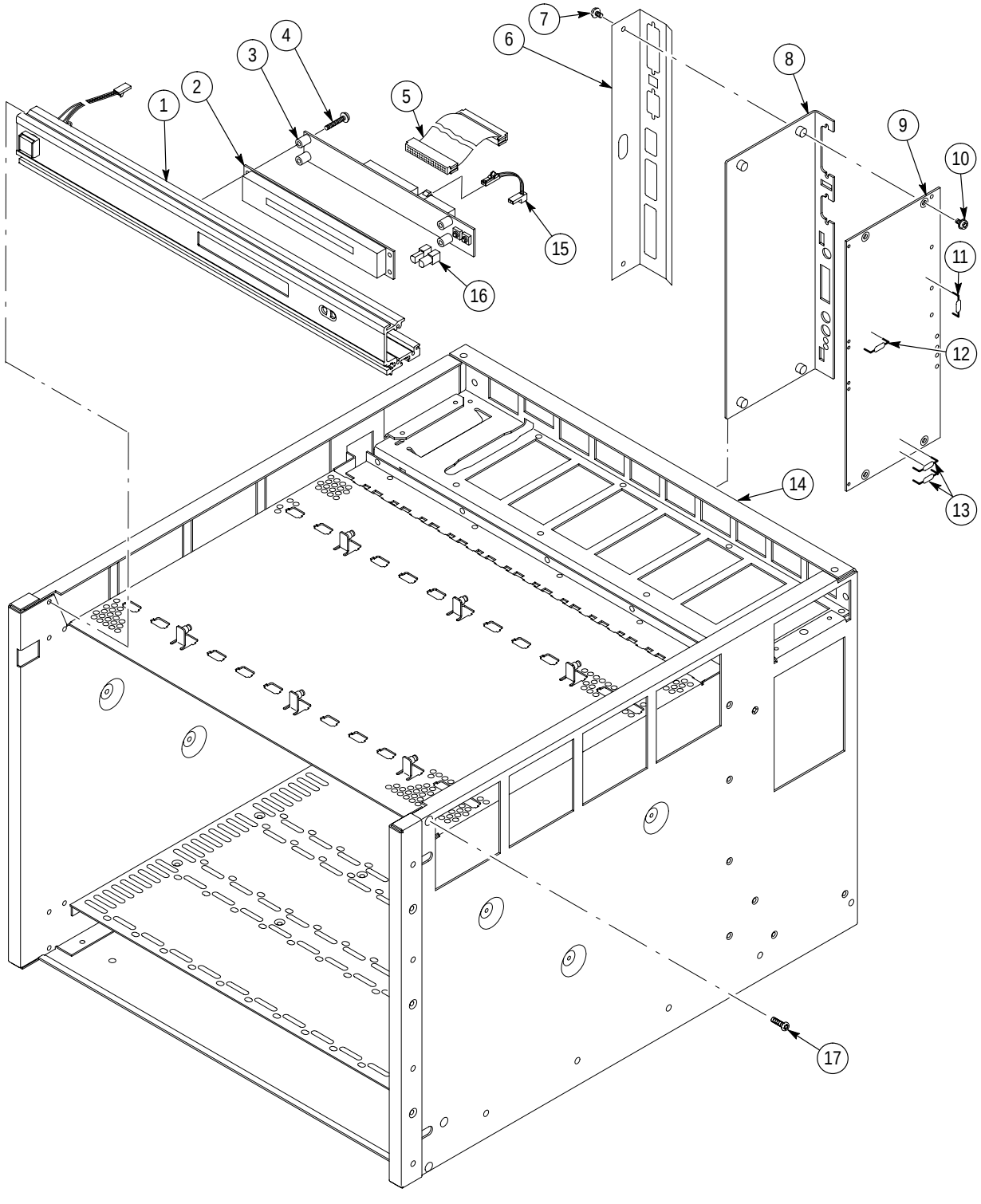



**Figure 8–8: Option 1M Enhanced Monitor**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **OPTION 2M ENHANCED MONITOR** | | |
| 8–0 | 040–1581–XX | | | 1 | MOD KIT:ENHANCED MONITOR OPTION 2M KIT,VX1410 | 80009 | 0401581XX |
| –1 | 337–4053–01 | | | 1 | SHIELD,EMI:EMI SHIELD,OUTPUT CONNECTORS ON ENHANCED MONITOR BOARD,0.010 SST;VX1410 | 80009 | 337405301 |
| –2 | 211–0501–00 | | | 2 | SCREW,MACHINE:6–32 X 0.125,PNH,STL CD PL,POZ | 73893 | ORDER BY DESC |
| | 346–0128–00 | | | 1 | STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL | TK1499 | HW–047 |
| –3 | 407–4332–00 | | | 1 | BRACKET:0.062 ALUM SHEET METAL,MOUNTS ENHANCED MONITOR ECB,VXI410 | 80009 | 407433200 |
| –4 | 671–3218–01 | | | 1 | CIRCUIT BD ASSY:OPTIONAL MONITOR | 80009 | 671321800 |
| –5 | 211–0747–00 | | | 4 | SCREW,MACHINE:6–32 X 0.188,PNH,STL,CDPL,T–15 | 0KB01 | ORDER BY DESC |
| –6 | 159–0208–00 | | | 1 | FUSE,WIRE LEAD':2A,125V,5 SEC | 71400 | MCR–2 |
| –7 | 159–0193–00 | | | 1 | FUSE,WIRE LEAD:10A,60V,FAST BLOW | 71400 | MCR–10 |
| –8 | 159–0246–00 | | | 2 | FUSE,WIRE LEAD:3.5A,125V,FAST BLOW | 71400 | MCR–3 1/2 |



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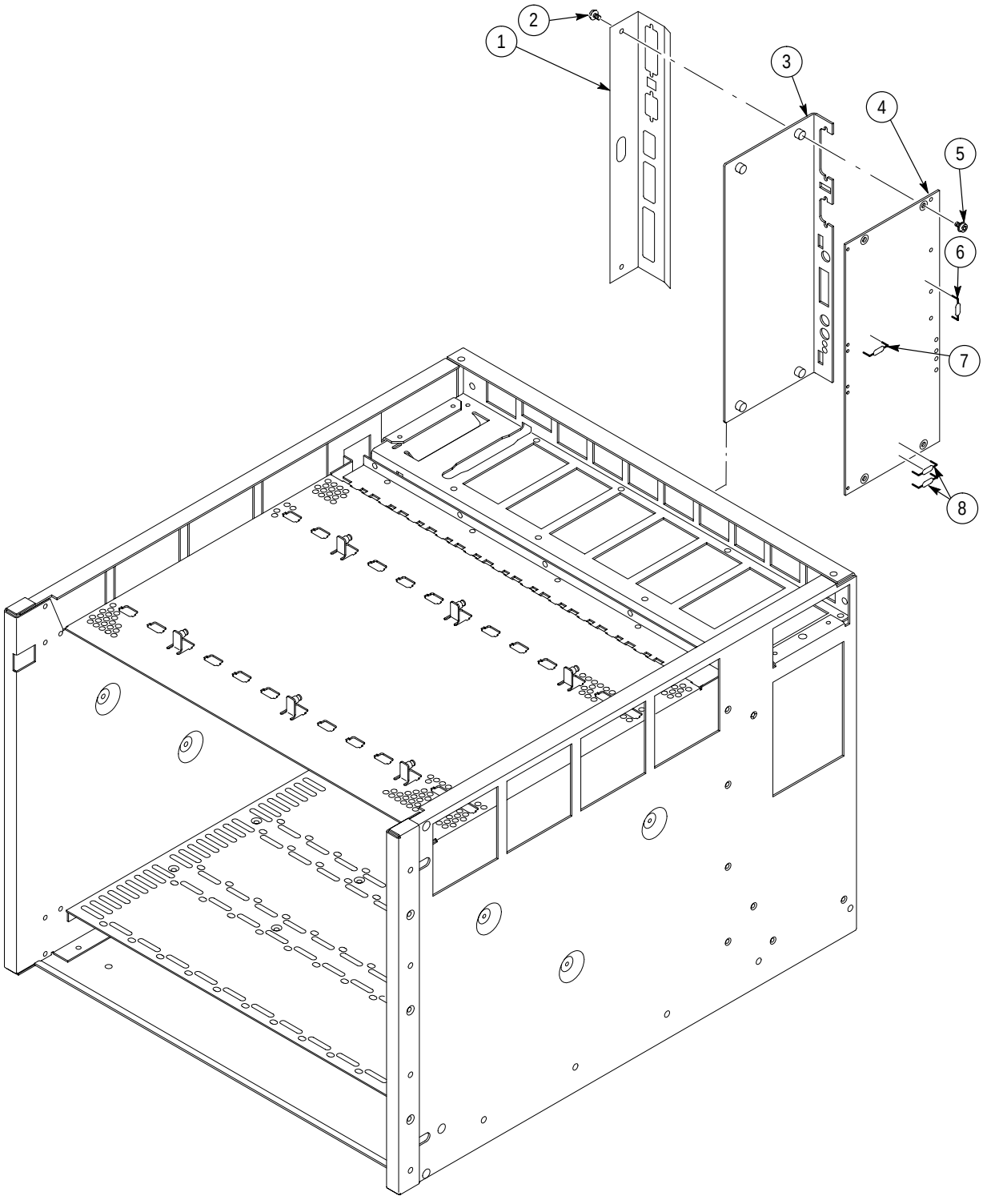



**Figure 8–9: Option 2M Enhanced Monitor**



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## Replaceable Parts List

| Fig. & Index Number | Tektronix Part Number | Serial No. Effective | Serial No. Discont'd | Qty | Name & Description | Mfr. Code | Mfr. Part Number |
|---|---|---|---|---|---|---|---|
| | | | | | **OPTION 1D DELETE POWER SUPPLY** | | |
| | 441–4402–00 | | | 1 | BRACKET:BRACKET,PSIF (DUMMY P/S);VX1410 (NOT ILLUSTRATED) | 80009 | 441440200 |
| | 211–0846–00 | | | 4 | SCREW:SCREW,SHLDR,6–32 X 0.156,HEX SOCKET SHOULDER SCREW,0.156 DIA X 0.125 SHANK (NOT ILLUSTRATED) | 51506 | 67515–S–12–VT |



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# Appendix A: Power Budget Worksheet

Use the Power Budget Worksheet to determine the operating parameters of the VX1410 IntelliFrame and any installed modules. Enter the steady-state current ($I_{MP}$) and the dynamic current ($I_{MD}$) for each module (the dynamic current is only valid for mainframes with serial number B020100 or higher). Add the individual currents to determine the total current needed for each power rail. Calculate the total power for the mainframe.

***NOTE.*** *The Power Budget Worksheet does not apply to mainframes with Option 1D, Delete Power Supply.*



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Power Requirements

| Slot | Module | $I_{MP}$ +5V | $I_{MD}$ | $I_{MP}$ +12V | $I_{MD}$ | $I_{MP}$ −12V | $I_{MD}$ | $I_{MP}$ +24V | $I_{MD}$ | $I_{MP}$ −24V | $I_{MD}$ | $I_{MP}$ −5.2V | $I_{MD}$ | $I_{MP}$ −2V | $I_{MD}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |
| External Usage (1 A max +5 V, +12 V) | | | | | | | | | | | | | | | |
| Total Current of All Modules ($I_{MP}$, $I_{MD}$) | | | | | | | | | | | | | | | |
| VX1410 Current Limit | | 80A | 12A | 13A | 3A | 13A | 3A | 12A | 6.5A | 12A | 6.5A | 60A | 9A | 30A | 5A |
| Individual Current Sums Less Than VX1410 Current Limits? | | | | | | | | | | | | | | | |

Power Calculation ($V \times$ total $I_{MP}$)

Total Power < 872W



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# Appendix B: Special Configuration Options

This appendix contains information for configuring your VX1410 IntelliFrame for specific situations not documented earlier in this manual. These special configuration options require you to disassemble parts of the mainframe to access jumpers or circuit boards. Refer to the Maintenance chapter for detailed information on the assembly and disassembly procedures. You may also need to refer to the exploded views.

The information in this section is intended for use by qualified service personnel. Read the *Safety Summary* at the front of this manual and the static precautions on page 7–1 before attempting any procedures in this appendix. Refer to the *Operating Basics* chapter for information on the location of controls, indicators, and connectors used with the mainframe.



***CAUTION.*** *To avoid damage from high currents on the backplane, always power off the mainframe and disconnect the power cord before performing any of the configuration procedures for the mainframe described in this appendix.*

## Remote Power Switch Configuration

You can control the power-on function of the mainframe by the front panel On/Standby switch and from a remote momentary switch through the connections of the 25-pin rear panel connector. If you connect a remote switch to pins 5 and 18 (return side) of the 25-pin connector, the remote switch and the front panel On/Standby switch control the power-on functions of the mainframe.

You can also disable the front panel switch and control the power-on functions from the remote switch only. The backplane has two connectors that control the power-on functions. If the front panel switch is connected to the backplane at J22, the switch controls the power-on functions. If the switch is connected to J23, the front panel switch is disabled, however, the light still illuminates when the mainframe is powered on. To configure the mainframe to disable the front panel On/Standby switch, perform the following steps:

1. Disconnect the power cord from the mainframe.
2. Remove the cover from the mainframe.
3. Refer to Figure B–1 and locate the two connectors at the top of the backplane.
4. Disconnect the On/Standby switch cable at J22 and connect it to J23.



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5. Replace the mainframe cover.

6. Connect the momentary switch to pins 5 and 18 (return side) of the 25-pin rear panel connector.

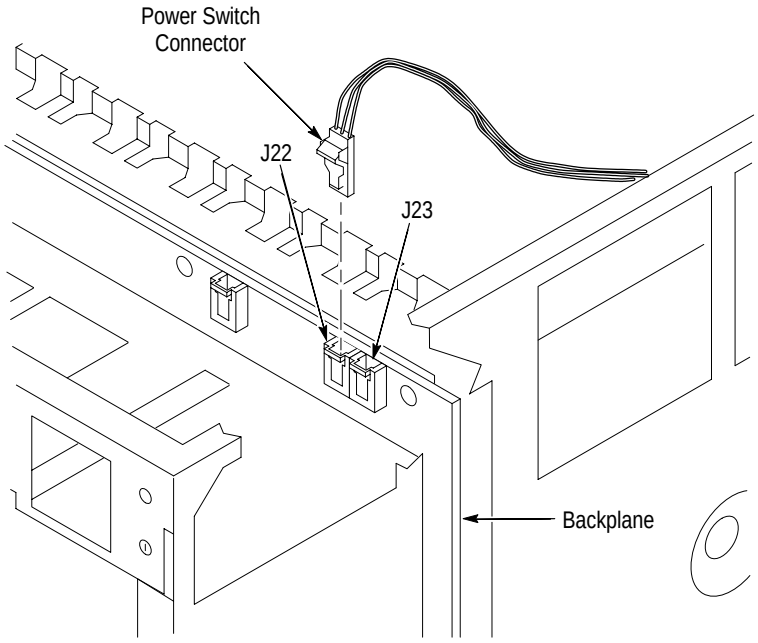



**Figure B–1: Power Switch Connectors**



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## 8°/10° and 13°/15° Jumper on the Standard Monitor Board

Jumper J11 on the Standard Monitor board allows you to further define the temperature sensitivity of the Temperature Sense board. The jumper determines the maximum temperature rise in the mainframe. Figure B–2 shows the jumper location on the Standard Monitor board. The jumper is shipped in the 8°/10° position.

You can move the jumper to the 13°/15° position if there is a high temperature rise expected in the modules or when the ambient room temperature will not exceed the mainframe maximum temperature. Moving the jumper to the 13°/15° position reduces the fan speed and noise.

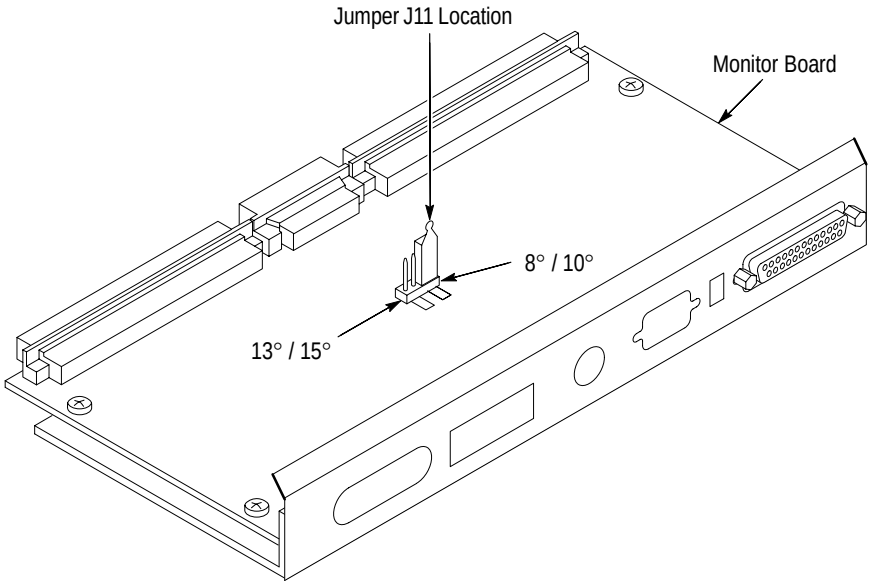



**Figure B–2: 8°/10° and 13°/15° Jumper Location on the Standard Monitor Board**



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## Enhanced Monitor Board Jumpers

The Enhanced Monitor Board has two jumpers accessible from the rear of the mainframe. Figure B–3 shows the factory default settings of these jumpers.

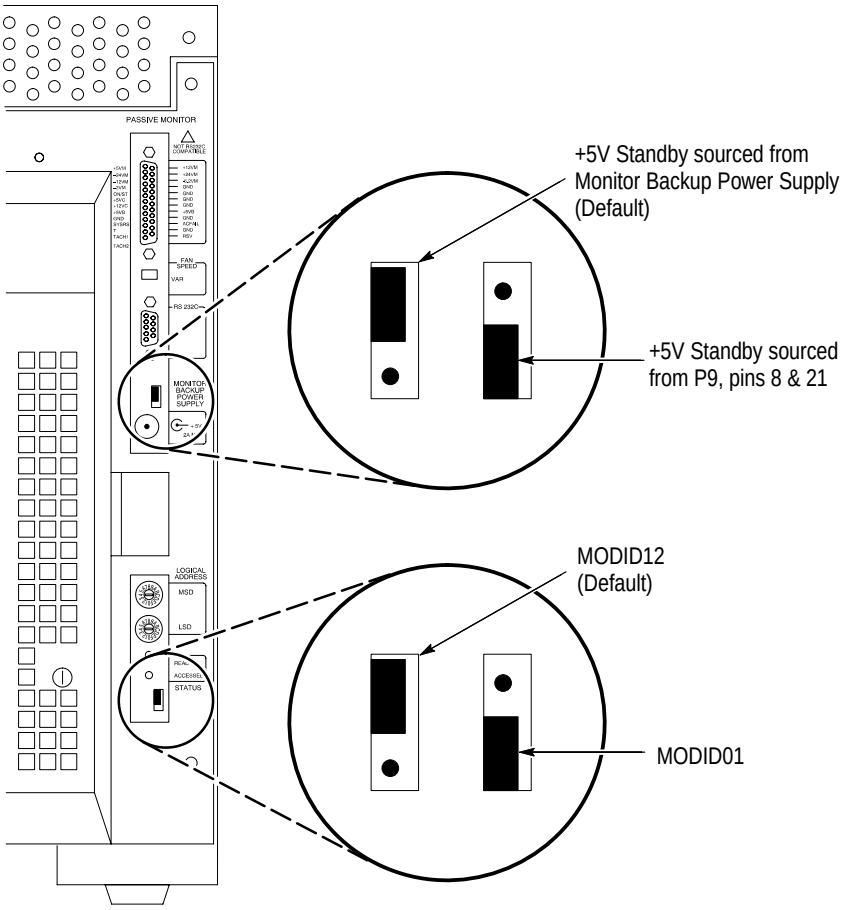



**Figure B–3: Enhanced Monitor Board Jumpers**

You can also select the source of the +5 V Standby voltage. If you source the +5 V Standby voltage from the +5 V external supply (Monitor Backup Power Supply connector), then the external supply will provide the backplane with the +5 V external voltage (1 A maximum). If you source the +5 V Standby voltage from the 25-pin connector, you must provide the +5 V to pins 8 and 21 of the 25-pin connector. The default jumper setting is to provide the voltage from the external source (+5 V external power supply).

The Enhanced Monitor can answer to the slot 1 or slot 12 MODID line for the VXI configuration manager. The default position is slot 12 since it is most likely to be empty. Slot 1 is available if you use an embedded controller.



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## Remote Power Supply Installation

If you ordered your mainframe with Option 1D (Delete Power Supply) you can power the mainframe from a remote power source. You need to assemble a cable or a circuit board to connect through the rear of the mainframe to the backplane.

***NOTE.*** *When the VX1410 IntelliFrame is configured with Option 1D, all product specifications no longer apply. To be VXI compliant, the power supply that provides power to the chassis must adhere to the specifications of the VXI standard and provide appropriate control signals (ACFail*, SysReset*, and On/Stndby) in a manner that is compatible with the VXI standard and the circuitry that interfaces with the signals within the mainframe.*

After building and installing the connector, make sure that you block the air path through the vacant power supply and that you reconnect the fans and the fan housing before applying power to the mainframe. You can use the bracket available with Option 1D to block the air flow. If necessary, design the power supply cables so that they can be routed through the AC power connector on the Fan Assembly.



***CAUTION.*** *To prevent damage to the mainframe, do not operate the mainframe with the fans disconnected. The mainframe will overheat if there is inadequate airflow.*

*To maintain safe operation when the mainframe is configured for Option 1D, the power supply that provides the power to the chassis should not exceed the DC Current Capacity ($I_{MP}$) listed in Table 4–2 on page 4–2. The short circuit capacity of each voltage should not exceed 120% of the $I_{MP}$ rating. The total power dissipation of the chassis, with modules installed, should not exceed 925 W.*

The mating connector for the backplane is a DIN41612 Style M connector with ten high-current female contacts and six signal pins. The contacts can be either solder cups, wire-crimp, or ECB solder tails. Figure B–4 shows the backplane connector.



***WARNING.*** *To avoid shock hazards when the mainframe is configured with Option 1D, connect the chassis to earth ground through one of the grounding screws located on the left rear of the mainframe (see Figure 1–11 on page 1–21 for the location of the grounding screws.)*



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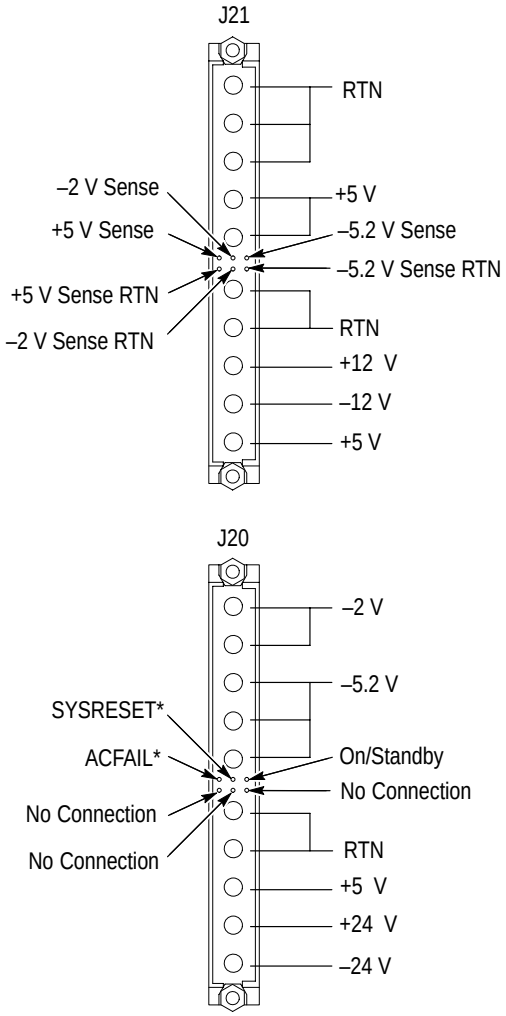



**Figure B–4: J20 and J21 Backplane Interface Connector**

An alternate connection scheme would be to build a connector to connect to the P1 and P2 Power Supply Interface connectors. Figure B–5 shows an example of the connector. You can assemble a mating connector using parts from the AMPOWER Wave Crimp System (AMP catalog number 82271) with four cable receptacles with eight signal lines. You will need to assemble the cable receptacle using a housing (catalog number 765224-1), a strain relief (catalog number 765238-1), ground contacts (catalog part number 765209-1), and power contacts (catalog part number 765209-2).



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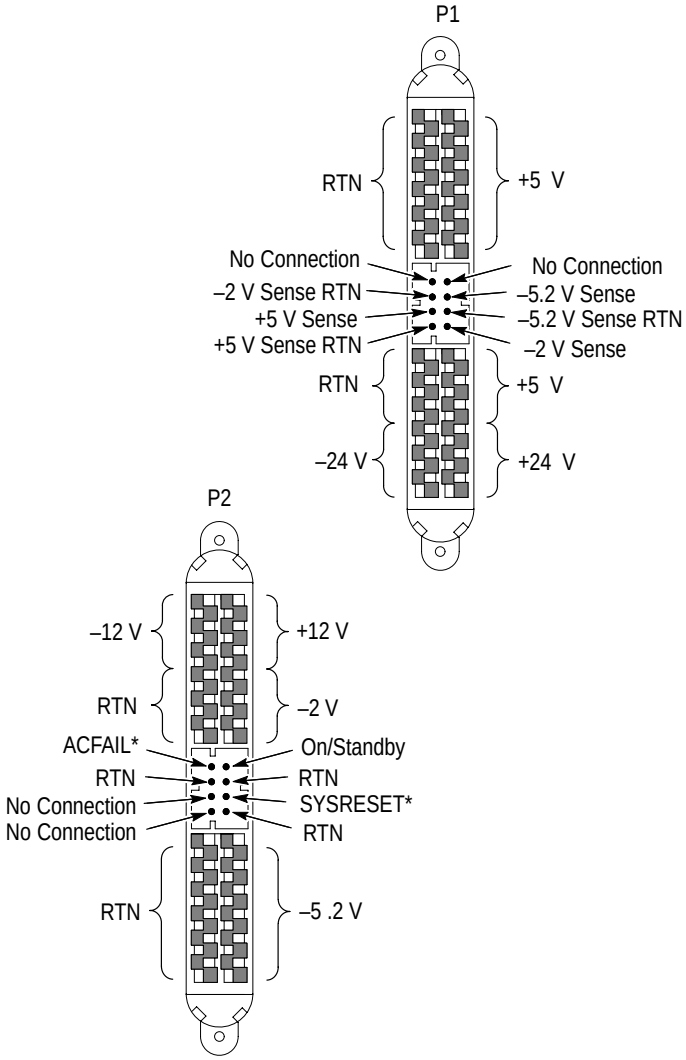



**Figure B–5: Power Supply Interface Connector**



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# Appendix C: SCPI Conformance Information

All commands in the VX1410 IntelliFrame conform to SCPI Version 1995.0. Table C–1 lists all commands supported by the VX1410 IntelliFrame. The columns at right show whether a command is defined in the SCPI 1995.0 Standard or not.

**Table C–1: SCPI Conformance Information**

| Command | | | | Defined in SCPI 1995.0 | Not Defined In SCPI 1995.0 |
|---|---|---|---|---|---|
| CALibration | :ALL[?] | | | ✓ | |
| DISPlay[?] | [:WINDow] | :TEXT | [:DATA][?] | ✓ | |
| STATus | :OPERation | [:EVENt]? | | ✓ | |
| | | :CONDition? | | ✓ | |
| | | :ENABle[?] | | ✓ | |
| | | :VXIMonitor | [:EVENt]? | | ✓ |
| | | | :ACFail? | | ✓ |
| | | | :BERR? | | ✓ |
| | | | :ENABle[?] | | ✓ |
| | | | :SYSFail? | | ✓ |
| | :PRESet | | | ✓ | |
| | :QUEStionable | [:EVENt]? | | ✓ | |
| | | :BLOWer | [:EVENt]? | | ✓ |
| | | | :CONDition? | | ✓ |
| | | | :ENABle[?] | | ✓ |
| | | | :SPEed? | | ✓ |
| | | :CONDition? | | ✓ | |
| | | :ENABle[?] | | ✓ | |
| | | :FILTer | :TINTerval[?] | | ✓ |
| | | | :TREMaining? | | ✓ |
| | | | :TRESet | | ✓ |
| | | :TEMPerature | :[EVENt][?] | ✓ | |
| | | | :CMAXimum? | | ✓ |
| | | | :CONDition? | ✓ | |
| | | | :ENABle[?] | ✓ | |



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**Table C–1: SCPI Conformance Information (Cont.)**

| Command | | | | | | Defined in SCPI 1995.0 | Not Defined In SCPI 1995.0 |
|---|---|---|---|---|---|---|---|
| | | | :LEVel? | | | | ✓ |
| | | | :LIMit[?] | | | | ✓ |
| | | | :MAXimum? | | | | ✓ |
| | | :VOLTage | [:EVENt]? | | | ✓ | |
| | | | :CONDition? | | | ✓ | |
| | | | :ENABle[?] | | | ✓ | |
| | | | :LEVel? | | | | ✓ |
| | | | :PTR[?] | | | ✓ | |
| | :QUEue | [:NEXT]? | | | | ✓ | |
| | | :ALL? | | | | | ✓ |
| | | :CODE | [:NEXT]? | | | | ✓ |
| | | | :ALL? | | | | ✓ |
| | | :COUNt? | | | | | ✓ |
| | | :ENABle[?] | | | | ✓ | |
| | | | :ALL? | | | | ✓ |
| | :SCONdition? | | | | | | ✓ |
| | :SEVent? | | | | | | ✓ |
| SYSTem | :COMMunicate | :SERial | [:RECeive] | :BAUD[?] | | ✓ | |
| | | | [:RECeive] | :BITS[?] | | ✓ | |
| | | | :CONTrol | :RTS[?] | | ✓ | |
| | | | :ECHO[?] | | | | ✓ |
| | | | :ERESponse[?] | | | | ✓ |
| | | | :LBUFfer[?] | | | | ✓ |
| | | | [:RECeive] | :PACE[?] | | ✓ | |
| | | | [:RECeive] | :PARity | [:TYPE][?] | ✓ | |
| | | | :PRESet | [:ALL] | | | ✓ |
| | | | | :RAW | | | ✓ |
| | | | | :TERMinal | | | ✓ |
| | | | [:RECeive] | :SBITs[?] | | ✓ | |
| | :DATE | :LMAintenance? | | | | | ✓ |
| | :ERRor? | | | | | ✓ | |
| | | :ALL? | | | | | ✓ |



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**Table C–1: SCPI Conformance Information (Cont.)**

| Command | | | | Defined in SCPI 1995.0 | Not Defined In SCPI 1995.0 |
|---|---|---|---|---|---|
| | | :CODE | [:NEXT]? | | ✓ |
| | | | :ALL? | | ✓ |
| | | :COUNt? | | | ✓ |
| | | :ENABle[?] | | ✓ | |
| | | | :ALL | | ✓ |
| | :FACTory | | | | ✓ |
| | :HELP | :SYNTax? | | ✓ | |
| | :IEMessage | | | | ✓ |
| | :NVRecall | | | | ✓ |
| | :NVSave | | | | ✓ |
| | :PASSword | :CDISable | | ✓ | |
| | | [:CENable] | | ✓ | |
| | | | :STATe? | ✓ | |
| | :POWer | | | | ✓ |
| | | :CYCLe? | | | ✓ |
| | | :SOURce? | | | ✓ |
| | :SYSReset[?] | | | | ✓ |
| | :TIME | :LMAintenance? | | | ✓ |
| | | :ON? | | | ✓ |
| | :VERSion? | | | ✓ | |
| TEST | [:ALL][?] | | | | ✓ |
| | :NUMber[?] | | | | ✓ |
| | :RESults | [:CODE]? | | | ✓ |
| | | :VERBose? | | | ✓ |
| VXIMonitor | :REPeat[?] | | | | ✓ |
| | :STATe[?] | | | | ✓ |
| | :TINTerval[?] | | | | ✓ |
| IEEE 488.2 Common Commands | | | | | |
| *CLS | | | | ✓ | |
| *ESE[?] | | | | ✓ | |
| *ESR? | | | | ✓ | |
| *IDN? | | | | ✓ | |



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**Table C–1: SCPI Conformance Information (Cont.)**

| Command | Defined in SCPI 1995.0 | Not Defined In SCPI 1995.0 |
|---|---|---|
| *OPC[?] | ✓ | |
| *PSC[?] | ✓ | |
| *RST | ✓ | |
| *SRE[?] | ✓ | |
| *STB? | ✓ | |
| *TST? | ✓ | |
| *WAI? | ✓ | |



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# Glossary

The terms in this glossary are defined as used in the VXIbus System. Although some of these terms may have different meanings in other systems, it is important to use these definitions in VXIbus applications. Terms which apply only to a particular instrument module are noted. Not all terms appear in every manual.

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

**ACFAIL***
A VMEbus backplane line that is 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 front panel ON/STANDBY switch when switched to STANDBY.

**A-Size Card**
A VXIbus instrument module that is 100.0 × 160 mm × 20.32 mm (3.9 × 6.3 in × 0.8 in), the same size as a VMEbus single-height short module.

**Asynchronous Communication**
Communications that occur outside the normal “command-response” cycle. Such communications have higher priority than synchronous communication.

**Backplane**
The printed circuit board that is mounted in a VXIbus mainframe to provide the interface between VXIbus modules and between those modules and the external system.

**B-Size Card**
A VXIbus instrument module that is 233.4 × 160 mm × 20.32 mm (9.2 × 6.3 in × 0.8 in), the same size as a VMEbus double-height short module.

**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 that measures the duration of each data transfer on the Data Transfer Bus (DTB) and terminates 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.



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**Butch Plate**
A connector plate that optionally connects to the rear of the cable tray options. The plate can be modified to accept cable connectors thus reducing the number of cables under the VX1410 IntelliFrame.

**Client**
In shared memory protocol (SMP), that half of an SMP channel that does not control the shared memory buffers.

**CLK10**
A 10 MHz, ±100 ppm, individually buffered (to each module slot), differential ECL system clock that is sourced from Slot 0 and distributed to Slots 1–12 on P2. It is distributed to each module slot as a single source, single destination signal with a matched delay of under 8 ns.

**CLK100**
A 100 MHz, ±100 ppm, individually buffered (to each module slot), differential ECL system clock that is sourced from Slot 0 and distributed to Slots 1–12 on P3. It is distributed to each module slot in synchronous with CLK10 as a single source, single destination signal with a maximum system timing skew of 2 ns, and a maximum total delay of 8 ns.

**Commander**
In the VXIbus interface, a device that controls another device (a servant). A commander may be a servant of another commander.

**Command**
A directive to a device. There are three types of commands:

In Word Serial Protocol, a 16-bit imperative to a servant from its commander.

In Shared Memory Protocol, a 16-bit imperative from a client to a server, or vice versa.

In a Message, an ASCII-coded, multi-byte directive to any receiving device.

**Communication Registers**
In word serial protocol, a set of device registers that are accessible to the commander of the device. Such registers are used for inter-device communications, and are required on all VXIbus message-based devices.

**Configuration Registers**
A set of registers that allow 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 standard specifies that all VXIbus devices have a set of such registers, all accessible from P1 on the VMEbus.



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**C-Size Card**
A VXIbus instrument module that is 340.0 × 233.4 mm × 30.48 mm (13.4 × 9.2 in × 1.2 in).

**Custom Device**
A special-purpose VXIbus device that has configuration registers so as to be identified by the system and to allow for definition of future device types to support further levels of compatibility.

**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.

**Delta Temperature**
The difference between the exhaust temperature of a given slot within the VX1410 IntelliFrame and the input air temperature.

**Device Specific Protocol**
A protocol for communication with a device that is not defined in the VXIbus specification.

**D-Size Card**
A VXIbus instrument module that is 340.0 × 366.7 mm × 30.48 mm (13.4 × 14.4 in × 1.2 in).

**DTB**
See Data Transfer Bus.

**DTB Arbiter**
A functional module that accepts bus requests from Requester modules and grants control of the DTB to one Requester at a time.

**DUT**
Device Under Test.

**ECLTRG**
Six single-ended ECL trigger lines (two on P2 and four on P3) that function as inter-module timing resources, and that are 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; 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.



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**Extended Self Test**
Any self test or diagnostic power-on routine that executes after the initial kernel self test program.

**External System Controller**
The host computer or other external controller that exerts overall control over VXIbus operations.

**IACK Daisy Chain Driver**
The circuit that drives the VMEbus Interrupt Acknowledge daisy chain line that runs continuously through all installed modules or through jumpers across the backplane.

**ID-ROM**
An NVRAM storage area that provides for non-volatile storage of diagnostic data.

**Instrument Module**
A plug-in printed circuit board, with associated components and shields, that may be installed in a VXIbus mainframe. An instrument module may contain more than one device. Also, one device may require more than one instrument module.

**IntelliGuides**
The card guides used in the VX1410 IntelliFrame. The card guides on the bottom of the mainframe shut off airflow when no modules are installed in the respective slots.

**Interface Device**
A VXIbus device that provides one or more interfaces to external equipment.

**Interrupt Handler**
A functional module that detects interrupt requests generated by Interrupters and responds to those requests by requesting status and identity information.

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

**IRQ**
The Interrupt ReQuest signal, which is the VMEbus interrupt line that is 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 that connects adjacent VXIbus slots.



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**Local Controller**
The instrument module that performs system control and external interface 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**
The smallest functional unit recognized by a VXIbus system. It is often used to identify a particular module.

**Mainframe**
Card Cage. For example, the Tektronix VX1410 Mainframe, an operable housing that includes 13 C-size VXIbus instrument module slots.

**Memory Device**
A storage element (such as bubble memory, RAM, and ROM) that has configuration registers and memory attributes (such as type and access time).

**Message**
A series of data bytes that are treated as a single communication, with a well defined terminator and message body.

**Message Based Device**
A VXIbus device that supports 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 that monitors backplane power and reports fault conditions.

**P1**
The top-most backplane connector for a given module slot in a vertical mainframe such as the Tektronix VX1410. The left-most backplane connector for a given slot in a horizontal mainframe.

**P2**
The bottom backplane connector for a given module slot in a vertical C-size mainframe such as the VX1410; or the middle backplane connector for a given module slot in a vertical D-size mainframe.

**P3**
The bottom backplane connector for a given module slot in a vertical D-size mainframe.



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**Query**
A form of command that allows for inquiry to obtain status or data.

**READY Indicator**
A green LED indicator that lights when the power-on diagnostic routines have been completed successfully. An internal failure or failure of +5 V power will extinguish this indicator.

**Register Based Device**
A VXIbus device that supports VXI register maps, but not high level VXIbus communication protocols; includes devices that are register-based servant elements.

**Requester**
A functional module that resides on the same module as a Master or Interrupt Handler and requests use of the DTB whenever its Master or Interrupt Handler requires it.

**Resource Manager**
A VXIbus device that provides 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 that verifies the basic calibration of the instrument module circuits, and adjusts this calibration to compensate for short- and long-term variables.

**Self Test**
A set of routines that determine if the instrument module circuits will perform according to a given set of standards. A self test routine is performed upon power-on.

**Servant**
A VXIbus message-based device that is controlled by a commander.

**Server**
A shared memory device that controls the shared memory buffers used in a given Shared Memory Protocol channel.

**Shared Memory Protocol**
A communications protocol that uses a block of memory that is 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.



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**Slot 0 Module**
A VXIbus device that provides the minimum VXIbus slot 0 services to slots 1 through 12 (CLK10 and the module identity lines), but that may provide other services such as CLK100, SYNC100, STARBUS, and trigger control.

**SMP**
See Shared Memory Protocol.

**STARX**
Two (2) bi-directional, 50 Ω, differential ECL lines that provide for inter-module asynchronous communication. These pairs of timed and matched delay lines connect slot 0 and each of slots 1 through 12 in a mainframe. The delay between slots is less than 5 ns, and the lines are well matched for timing skew.

**STARY**
Two (2) bi-directional, 50 Ω, differential ECL lines that provide for inter-module asynchronous communication. These pairs of timed and matched delay lines connect slot 0 and each of slots 1 through 12 in a mainframe. The delay between slots is less than 5 ns, and the lines are well matched for timing skew.

**STST**
STart/STop protocol; used to synchronize modules.

**SYNC100**
A Slot 0 signal that is used to synchronize multiple devices with respect to a given rising edge of CLK100. These signals are individually buffered and matched to less than 2 ns of skew.

**Synchronous Communications**
A communications system that follows 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 that is used to indicate a failure by a device. The device that fails asserts this line.

**System Clock Driver**
A functional module that provides 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.



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**Test Monitor**
An executive routine that is 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, that controls the execution of tests within the test system.

**Test System**
A collection of hardware and software modules that operate 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 that performs slot 0 functions and a given complement of instrument modules. The subsystem may also include a Resource Manager.

**Word Serial Protocol**
A VXIbus word oriented, bi-directional, serial protocol for communications between message-based devices (that is, devices that include communication registers in addition to configuration registers).

**Word Serial Communications**
Inter-device communications using the Word Serial Protocol.

**WSP**
See Word Serial Protocol.

**10-MHz Clock**
A 10 MHz, ±100 ppm timing reference. Also see CLK10.

**100-MHz Clock**
A 100 MHz, ±100 ppm clock synchronized with CLK10. Also see CLK100.

**488-To-VXIbus Interface**
A message based device that provides for communication between the IEEE-488 bus and VXIbus instrument modules.



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