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User Manual

Tektronix

73A-452
Blank Wire-Wrap Module

070-9156-01

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and above.

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Safety Summary

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

TERMS

In This Manual

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

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

Marked on the Module

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

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property, including the module itself.

SYMBOLS

In This Manual



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



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

Marked on the Module



DANGER — High Voltage.



Protective ground (earth) terminal.



ATTENTION — Refer to the manual.



Refer to manual before using.

Power Source

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

Grounding the Module

This module is grounded through the grounding conductor of the mainframe power cord(s). To avoid electrical shock, plug the mainframe power cord(s) into a properly wired receptacle before connecting to the module connectors. A protective ground connection through the mainframe is essential for safe operation.

Danger Arising from Loss of Ground

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

Use the Proper Fuse

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

Do Not Operate in Explosive Atmosphere

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

Do Not Remove Covers or Panels

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

73A-452 BLANK WIREWRAP MODULE

DESCRIPTION

The 73A-452 Blank Wirewrap Module is a printed circuit board assembly for use in a card cage conforming to the VXIbus Specification, such as the 73A-021, used in the CDS 73A IAC System. The module is designed to allow users to develop functions and/or interfaces unique to their own requirements. It meets the mechanical requirements of the VXIbus System Specification (VXIbus Consortium V1.2) for a "C" size module, and includes the power and EMI filtering required by the VXIbus standard.

The 73A-452 Module also includes the VXI P1 and P2 backplane connectors and connection points for all VXIbus defined signals for user defined VXI P1 and P2 Backplane interfaces. The 73A-453 Module is a four-layer board with approximately 95 square inches of board space available for user-designed circuitry.

Note that certain terms used in this manual have very specific meanings in the context of a VXIbus System. A list of these terms is presented in the VXIbus Glossary (Appendix B).

- **Fuses**

The 73A-452 Module has fuses for +5V, -5.2V, -2V, +12V, -12V, +24V and -24V power busses. * The fuses protect the module in case of an accidental shorting of the power bus or any other situation where excessive current might be drawn.

If any of the fuses blow, remove the fault before replacing the fuse. To replace a fuse, pull it straight up away from its socket. Replace with a new fuse of the same value. Figure 452-1 shows the location of the fuses on the 73A-452 Module.

* Previous versions of this module used circuit breakers instead of fuses.

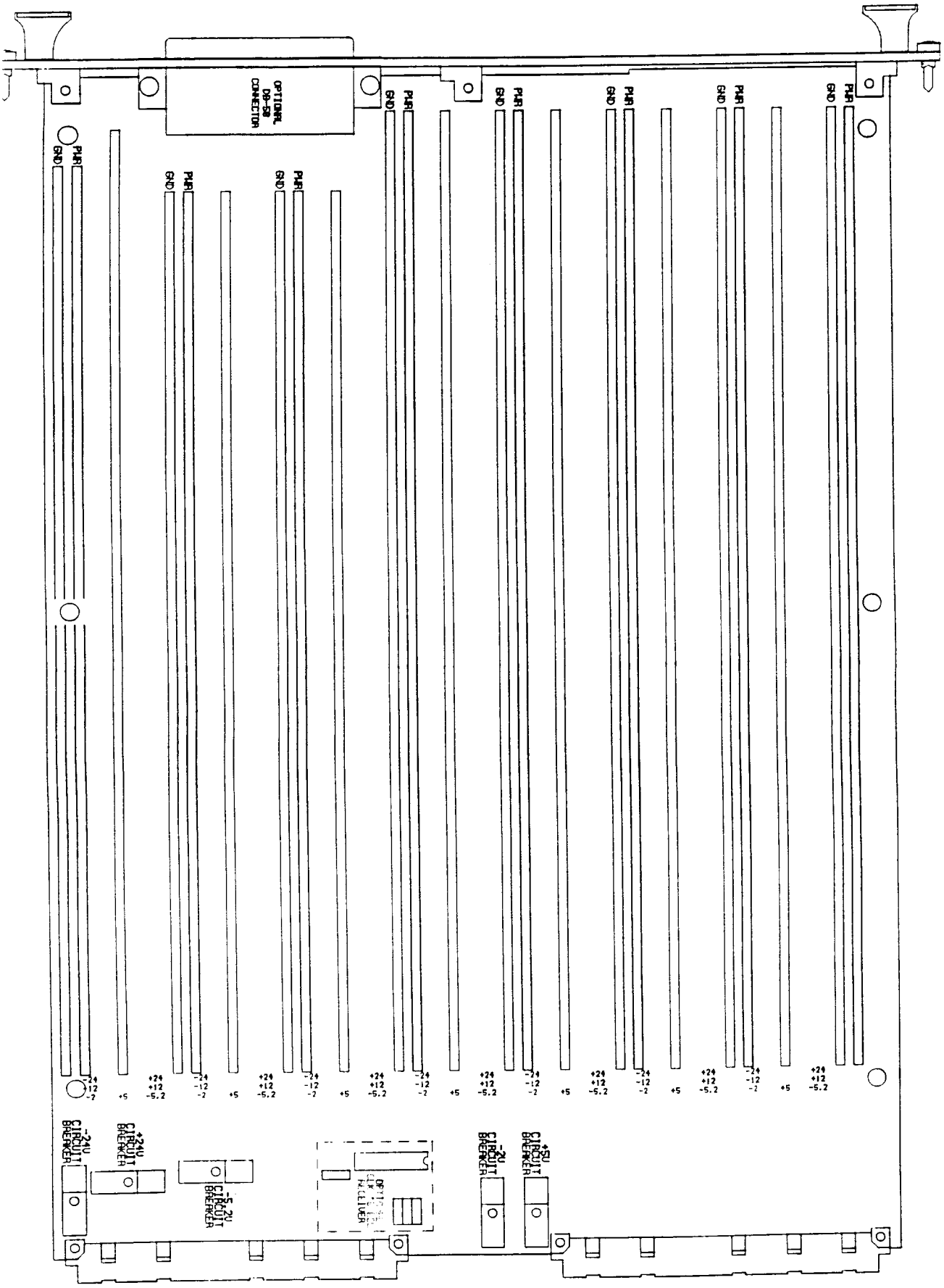


Figure 452-1: 73A-452 Controls and Indicators

SPECIFICATIONS

Function:	Allows creation of special circuit interfaces to a VXIbus System which are not provided by standard IAC modules.
Circuitry Provided:	VXI P1 and P2 backplane connectors and connection points for all VXIbus defined signals.
User Circuit Space:	Four-layer board with a total of 95 square inches of use space, consisting of a hole pattern on 0.1 inch grid spacing to allow installation of wire wrap sockets or other components. Power busses are provided in the wire wrap area.
VXI Card Cage Slots:	If point-to-point wiring method is used, one (1) slot. If wire wrap pins are use, two (2) slots, blank slot to left.
Front Face Plate:	Solid one-wide and two-wide (1.2" and 2.4") face plates with ejector handles furnished. Two-wide panel installed.
VXI Card Size:	VXIbus "C" size card, 9.187 in. x 13.3858 in. (233.35 mm x 280 mm).
Power Requirements:	All required dc power is provided by the Power Supply in the 73A IAC System card cage.
Voltage:	+5 Volt Supply: 4.75 V dc to 5.25 V dc. +24 Volt Supply: +23.5 V dc to +24.5 V dc. -24 Volt Supply: -23.5 V dc to -24.5 V dc.

Power Available:

Voltage	Current*
+5 Volts	4.0 Amperes (4 amps)
-5.2	0.8 (4 amps)
-2	0.33 (2 amps)
+24	0.5 (2 amps)
-24	0.5 (2 amps)
+12	0.8 (2 amps)
-12	0.8 (2 amps)

* *NOTE*: Indicated currents are nominal, based on an even distribution of available CDS 73A-021 Card Cage power across all card slots. Individual currents may be exceeded on an application-specific basis subject to total power availability of the card cage power supply. Value in parentheses is the fuse capacity.

User Power Busses:	Power busses run horizontally from front to rear of the module. Seven (7) power/ground bus pairs, jumper selectable for +5 Volts or -5.2 Volts; six (6) single power busses, jumper selectable for ±12 Volts, ±24 Volts, +5 Volts, -5.2 Volts, or 2 Volts. See Figures 452-3 and 452-4 for jumper instructions.
VXI EMI Shielding:	Mounting holes provided for user supplied circuit and or component side shields as required by application and/or VXIbus Standard.
Cooling:	When properly mounted in a 73A-IAC Chassis, up to 35 Watts of power may dissipated on the card.
Temperature:	-10°C to +65°C, operating (assumes ambient temperature of 55° and airflow to assure less than 10°C temperature rise). -40°C to +85°C, storage.
Humidity:	Less than 95% R.H. non-condensing, -10°C to +30°C. Less than 75% R.H. non-condensing, +31°C to +40°C. Less than 45% R.H. non-condensing, +41°C to +55°C.
Radiated Emissions:	Complies with VXIbus Specifications.
Conducted Emissions:	Complies with VXIbus Specifications.
Module Envelope Dimensions:	VXI C size. 233.35 mm high, 340 mm deep, 25 mm wide. (9.187 in x 13.3858 in x 1.0 in).
Dimensions, Shipping:	When ordered with a CDS card cage, this module will be installed and secured in one of the instrument module slots (slots 1 - 12). When ordered alone, the module's shipping dimensions are: 406 mm x 305 mm x 102 mm. (16 in x 12 in x 4 in).
Weight:	0.45 kg. (1.0 lb).
Weight, Shipping:	When ordered with a CDS card cage, this module will be installed and secured in one of the instrument module slots (slots 1-12). When ordered alone, the module's shipping weight is: 0.9 kg. (2.0 lb).
Mounting Position:	Any orientation.

Mounting Location:	Installs in an instrument module slot (slots 1-12) of a C or D size VXIbus card cage. (Refer to D size card cage manual for information on required adapters.)
Option 001:	Front face plate with one uncommitted 50 pin connector installed. Requires mating 73A-780 Connector Assembly.
Option 002:	Two-wide front face plate with one uncommitted 50 pin connector installed. Requires mating 73A-780 Connector Assembly.
Recommended Cable:	73A-742S Data Cable.
Equipment Supplied:	1 - 73A-452 Blank Wirewrap Module. 1 - Spare fuse, 2 amp 1 - Spare fuse, 4 amp
Optional Equipment:	1 - 73A-742S cable, or 73A-780S Hooded Connector.
EMC Compliance:	This product, as provided, complies with the following standards: EN 55011 Class A EN 50081-1 EN 60555-2 EN 50082-1 IEC 801-2 IEC 801-3 IEC 801-4 IEC 801-5 Since this product is a prototyping module in which the end user may install their own circuitry, Tektronix, Inc. assumes no responsibility for compliance to these standards once modifications have been made. It is the responsibility of the purchaser of this product to assure compliance with any required EMC regulations.

INSTALLATION

The 73A-452 Module is a C size VXIbus instrument module and therefore may be installed in any C or D size VXIbus card cage slot other than slot 0. If the module is being installed in a D size card cage, consult the operating manual for the card cage to determine how to install the module in that particular card cage.

Tools Required

The following tools are required for proper installation:

Slotted screwdriver set

CAUTION:

Note that there are two ejector handles on the card. To avoid installing the card incorrectly, make sure the ejector labeled "73A-452" is at the top.

CAUTION:

In order to maintain proper card cage cooling, unused card cage slots must be covered with blank front panels supplied by the card cage manufacturer. Based on the number of IAC modules ordered with a CDS card cage, blank front panels are supplied to cover all unused slots.

CAUTION:

Verify that the card cage is able to provide adequate cooling and power for the 73A-452 Module. Refer to the card cage Operating Manual for instructions on determining cooling and power compatibility.

CAUTION:

The 73A-452 Module is a piece of electronic equipment and therefore has some susceptibility to electrostatic damage (ESD). ESD precautions must be taken whenever the module is handled.

CAUTION:

If the 73A-452 Module is inserted in a slot with any empty slots to the left of the module, the VME daisy-chain jumpers must be installed on the backplane in order for the 73A-452 Module to operate properly.

Check the manual of the card cage being used for jumpering instructions.

If a CDS 73A-021 Card Cage is being used, the jumper points may be reached through the front of the card cage. There are five jumpers that must be installed for each empty slot. The five jumpers are the pins to the left of the empty slot.

OPERATION

Either point-to-point or traditional wire-wrap techniques may be used for building a user-defined circuit. If the point-to-point method is used, you may wish to remove the two-wide front panel and install the supplied one-wide front panel. The mounting hardware must be removed from the two-wide panel and reinstalled on the one-wide panel. Refer to Figure 452-2.

The P1 and P2 VXIbus backplane signals have access holes immediately behind the connectors. The pins are marked with a grid of numbers and letters. These correspond to the pin's VXIbus standard nomenclature. A chart of the signal names vs. pin numbers is given in Appendix A.

- **Special Features**

The special features described below give the 73A-452 Module added capability, enhancing the design possibilities and making the design process easier.

Power Busses

Choose which voltage, +5 V or -5.2 V, is required on the power plane under the wire-wrap area. Whichever voltage is chosen will be available on the busses labeled PWR. The jumper is located on the lower middle edge of the board. At least 22 ga. wire should be used for this jumper, since up to 4 amperes may be flowing through the jumper. Refer to Figure 452-3.

There are six individually configurable busses into the wire-wrap area that must be jumpered. All seven VXIbus voltages are available and marked at the right end of each bus. Select on a bus by bus basis which voltage is required and install the appropriate jumper. Refer to Figures 452-1 and 452-4.

CLK 10

The VXIbus defined ECL 10 MHz clock is brought into a component location that is defined to hold a 10H116 ECL differential receiver chip. There are also locations for decoupling capacitors and 50 ohm terminating resistors. Refer to Figure 452-1, the 73A-452 schematic, and the assembly drawing for component installation. The differential output of the receiver is available at two wire-wrap pads marked CLK10+ and CLK10-.

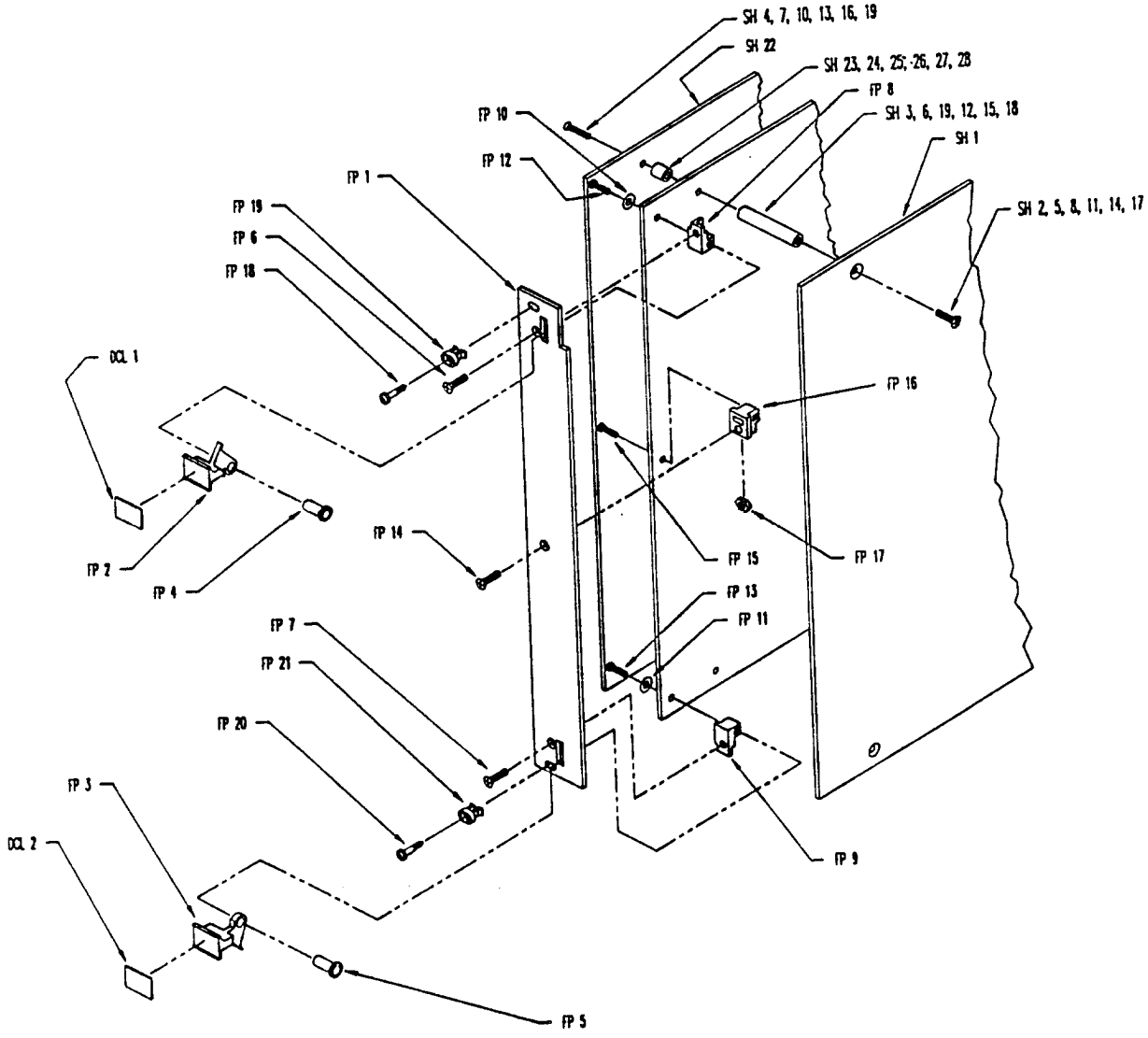


Figure 452-2: Front Panel and Shield Mounting

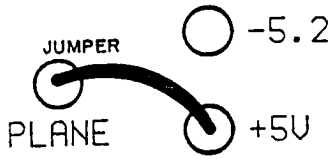


Figure 452-3: Jumper of Power Plane to +5V (Example)

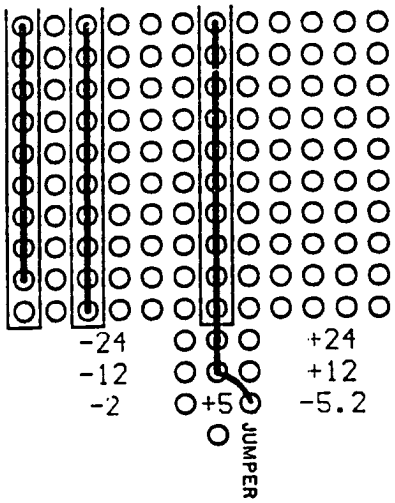


Figure 452-4: Jumper to -5.2V

DB-50 Connector

The 73A-452 Module has a component location for a single DB-50P connector at the lower front panel. The connector and a front panel with a cutout for the connector may be purchased separately from CDS. There are two front panels available. Option 001 is a one-wide (1.2 inches) front panel with connector and Option 002 is a two-wide (2.4 inches) front panel with connector. CDS also has a 73A-742S 48 conductor cable available for use with the DB-50P connector. Refer to Figure 452-1 for connector placement.

APPENDIX A - VXIbus CONNECTIONS

P1 CONNECTOR PINOUTS

Pin No.	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	-12V	+5V STBY	+12V
32	+5V	+5V	+5V

P2 CONNECTOR PINOUTS

Pin No.	Row A	Row B	Row C
1	ELECTRG0	+5V	CLK10+
2	-2V	GND	CLK10-
3	ELCTRG1	RSV1	GND
4	GND	A24	-5.2V
5	LBUSA00	A25	LBUSC00
6	LBUSA01	A26	LBUSC01
7	-5.2V	A27	GND
8	LBUSA02	A28	LBUSC02
9	LBUSA03	A29	LBUSC03
10	GND	A30	GND
11	LBUSA04	A31	LBUSC04
12	LBUSA05	GND	LBUSC05
13	-5.2V	+5V	-2V
14	LBUSA06	D16	LBUSC06
15	LBUSA07	D17	LBUSC07
16	GND	D18	GND
17	LBUSA08	D19	LBUSC08
18	LBUSA09	D20	LBUSC09
19	-5.2V	D21	-5.2V
20	LBUSA10	D22	LBUSC10
21	LBUSA11	D23	LBUSC11
22	GND	GND	GND
23	TTLTRIG0*	D24	TTLTRIG1*
24	TTLTRIG2	D25	TTLTRIG3*
25	+5V	D26	GND
26	TTLTRIG4*	D27	TTLTRIG5*
27	TTLTRIG6*	D28	TTLTRIG7*
28	GND	D29	GND
29	RSV2	D30	RSV3
30	MODID	D31	GND
31	GND	GND	+24V
32	SUMBUS	+5V	-24V

APPENDIX B - VXIbus GLOSSARY

Certain terms used in this manual have very specific meanings in the context of a VXIbus System. A list of these terms is presented below.

Commander

A VXIbus device that has bus master capability and has VXIbus servants under it in the system hierarchy. A commander may be a servant as well.

Fast Handshake

Compared to the Normal Transfer Mode of the VXIbus, the Fast Handshake Transfer Mode reduces the number of VMEbus data transfer cycles by 50%. On receipt of a request for data, a fast handshake module is able to return data in less than 20 µs, so that the VXIbus fast handshake protocol can be used by the module's commander. Using fast handshake protocol, data can be written and read without checking the Ready bits in the module's Response register.

Hard Reset

This is the state of the module when the SYSRESET* line is true. While in this state, the module is inactive and its Status and Control registers are cleared. The SYSFAIL* line is driven low, and the Failed LED is lit. In the case of a CDS 73A-IBX Card Cage, for example, a module hard reset occurs when the card cage is powered-up or the Reset switch on the front panel of the 73A-151 Resource Manager/IEEE-488 Interface Module is depressed.

Interrupt Handler

The module in the VXIbus system that generates the hardware interrupt acknowledge for a particular VME interrupt level. The software interrupt handler may or may not be on the same module as the hardware interrupt handler. In the case of CDS instrument modules, both the hardware and software interrupt handlers reside on the commander module of a given servant module.

Logical Address

A unique eight bit number which identifies each VXIbus device in a system. It defines the device's A16 register addresses, and indicates the device's commander/servant relationship.

Reset Bit

Bit 0 in the Control register of the module. When set to a one (1) by the module's commander or resource manager, the device is forced into a reset state.

Resource Manager

A message based commander located at logical address 0, which provides configuration management services, including self test, address map configuration, commander/servant mapping, and diagnostic management. In CDS systems, the resource manager function is co-located with the VMEbus controller, the slot 0 timing functions, and the system controller interface.

Servant

A VXIbus device that may or may not have bus master capability, that is under control of a commander in the VXIbus system hierarchy. A servant may also be a commander.

Soft Reset

This state is entered when the Reset bit in the module's Control register is set to one (1) by the module's commander. While in this state, a device is inactive, interrupts which are pending are unasserted, all pending bus requests are unasserted, and the onboard processor is halted. The device's VMEbus slave interface is active in this state; however, the device is incapable of responding to any commands other than RESET and SYSFAIL INHIBIT. In the case of a CDS 73A-IBX Card Cage, for example, a module soft reset occurs when the card cage's 73A-151 Resource Manager/IEEE-488 Interface Module receives a STOP command over the IEEE-488 bus that is addressed to the 73A-452.

SYSFAIL INHIBIT

Bit 1 in the Control register of the module. When set to a one (1) by the VXIbus Resource Manager, the device is disabled from driving the SYSFAIL* line. CDS modules are designed so that the Sysfail Inhibit bit will work under all conditions except when the +5V power is lost.

VXI Commands

These are commands passed from a commander to a servant within the VXIbus environment. A command may or may not be prompted by an external event. For example, an IEEE-488 GROUP EXECUTE TRIGGER will generate a trigger command to all addressed devices. However, a BEGIN NORMAL OPERATIONS command is generated by the VXIbus resource manager and has no external source.

VXI Events

Events are passed from a servant to a commander. They may be generated by the servant either in response to a command (for example, Unrecognized Command event) or due to a condition detected in the module (internal error).

VXI Message Based Instrument

An intelligent instrument that implements the defined VXIbus registers and, at a minimum, the Word Serial protocol. All CDS instruments are message based.

VXI Word Serial Protocol

The simplest required communication protocol supported by Message Based devices in a VXIbus system. It utilizes the A16 communications registers to transfer data using a simple polling handshake method. All CDS instruments implement the Word Serial protocol.

488-VXIbus Interface

An IEEE-488 to VXIbus Interface Device is a message based device which provides communication between the IEEE-488 bus and VXIbus instruments.

Appendix C
User Service

This appendix contains service-related information that covers the following topics:

- Preventive maintenance
- User-replaceable Parts

Preventive Maintenance

You should perform inspection and cleaning as preventive maintenance. Preventive maintenance, when done regularly, may prevent malfunction and enhance reliability. inspect and clean the module as often as conditions require by following these steps:

1. Turn off power and remove the module from the VXIbus mainframe.
2. Remove loose dust on the outside of the instrument with a lint-free cloth.
3. Remove any remaining dirt with lint-free cloth dampened in a general purpose detergent-and-water solution. Do not use abrasive cleaners.

User-Replaceable Parts

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable.

User-Replaceable Parts

Part Description	Part Number
User Manual	070-9156-XX
Label, Tek CDS	950-3743-00
Label, VXI	950-5063-00
Fuse, Micro 4 Amp 125 V Fast	159-0374-00
Fuse, Micro 2 Amp 125 V Fast	159-0128-00
Collar Screw, Metric 2.5 × 11 Slotted	950-0952-00

Appendix D
Options

Option 01

This option adds a front panel DD-50P connector to the 73A−452. A single wide front panel with a cut out for the connector replaces the standard front panel.

Option 02

This option adds a front panel DD-50P connector to the 73A−452. A double wide front panel with a cut out for the connector replaces the standard front panel.

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