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53B-000 CARD CAGE

OPERATION MANUAL

BFGoodrich
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53B-000 CARD CAGE

OPERATING MANUAL

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53B-000 CARD CAGE

DESCRIPTION

The TSD 53B-000 Card Cage is an integral part of the CDS Instrument on a Card (IAC) System. Like the other members of the 53/63 Series, it accepts all of the 53A function and instrument cards. However, the 53B-000 Card Cage represents a significant improvement over its predecessors. Not only does it offer a greater power budget with improved cooling characteristics (less than a 3°C rise over the ambient for a fully loaded chassis), but it is much lighter and more durable than previous models.

The 53B Card Cage, together with one of the 53A-1XX interface cards and up to ten function/instrument cards (up to 100 in a complete system), form an integrated test system that can be controlled either by a computer or controller of the user's choice or by an internal, single board computer (the CDS Advanced Computer System ACX). Available interfaces include IEEE-488, RS-232C, differential or single-ended 8-bit parallel, or a special interface for an IBM or compatible PC. Please consult a current CDS Information and Ordering Guide under ACX, IBX, RSX, PIX, MCX, or CCX for more information.

The TSD 53/63 Series are designed so that up to ten card cages may be chained together (both 53 Series and 63 Series card cages intermixed) on a single controller I/O port or single ACX. Using this technique, a system containing of up to 100 function cards may be controlled through a single address. As an example, up to 100 function cards can have only a single IEEE-488 address and would therefore appear to the system controller to be one instrument. The system controller directly addresses any one of the 100 function/system cards using a simple three-ASCII-characteraddress sequence. In a similar fashion, commands and data are sent to the IAC module using ASCII sequences. (Note: In the case of certain cards, data may be sent in binary to help improve the programming efficiency for that card.) Each 53A function card has the necessary embedded logic to decode the characters sent to it over the System backplane data bus, and take the proper action, thus freeing the user from the necessity of writing special software drivers to program each type of card.

The backplane is unique to the CDS concept. It is divided into two separate portions. The first three slots are optimized for the job of interface and control, while the remaining ten slots are optimized for instrumentation. The slots are color coded to clearly indicate their roles and to avoid confusion on the part of the user. The communication slot, color coded green, is where the computer interface or single board computer previously described is inserted.

The control slot, color coded black, handles all of the interfacing between the communications slot and the instrument modules. This helps ensure that the environment within which the function/instrument card resides is always the same no matter what computer, operating system, or language the user chooses. It also means that the manner in which the CDS cards are programmed is computer independent.

The chaining slot, color coded red, is as its name implies, where the chaining card resides. Please note that the chaining function has its own slot to help insure that minimal degradation in performance is seen in any of the chained cages. A side benefit of this format is that the chained cage may be configured remotely up to 300 m from the host cage. The chaining slot may, in addition, be used to house the high speed interface to the CDS external disk drive, and the bubble memory designed for remote, unattended locations.

The remaining slots are color coded blue and are used for any combination of IAC modules the user may choose.

A wide variety of instrument and interface cards are available to satisfy a range of test and measurement requirements. Functions include: switching and scanning, digital data coupling, analog measurement and stimuli, digital measurement and stimuli, RF and microwave, temperature and vibration, and many other automatic test equipment functions. Special requirements unique to aerospace, such as MIL-STD-1553A/B, ARINC-429, ARINC-561, synchro and resolver, and others, are also supported.

SPECIFICATIONS

Plug-in Card Positions:	13 positions. The first three slot positions, labeled Chaining, Communications, and Control, are used for system communications and control. The remaining 10 positions, labeled 0-9, can hold function cards.
Installation:	The 53B-000 Card Cage is designed for both bench-top and rack-mounted use. The card cage will mount in a standard 19 in. NEMA equipment rack (EIA RS-310, ANSI C83.9-1972.) using the supplied chassis slides and associated hardware. The supplied hardware will permit mounting it in a 21 to 29-in. deep rack.
Cooling, Internal:	The card cage supplies forced air cooling to the power supply and to the installed function cards using two 105 CFM dc fans. These fans will keep the inlet to exhaust temperature rise of the air to less than 3°C.
Cooling, External:	When rack mounted, the rack cooling system must be able to handle a total of 350 W dissipated by the card cage (700 Btu/hr).
Cooling, Inlet:	The air inlet is through the two fans mounted on the rear panel. Because of the location of the fans, the card cage should never be placed so that a vertical or blocking surface is within 3 in. of the rear panel.
Cooling, Exhaust:	The card cage hot air exhaust is through the cable tray and out the sides of the cage. The rear of the cable tray may be completely blocked.
Temperature:	-10°C to +55°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., noncondensing.
Dimensions:	419.1 mm X 26.7 mm X 469.9 mm (16.5 in. X 10.5 in. X 18.5 in.) *NOTE:* The width (419.1) does not include the rack ears.
Weight:	14.5 kg (32 lbs.) includes the rack mounting hardware.
Weight, Shipping:	18.2 kg (40 lbs.)
Voltage Requirements:	90-132/180-264 V ac, rear panel switch selectable. Unit is delivered in USA, Canada, and Japan set to 115 V ac, and delivered to Europe set to 230 V ac.
Power Requirements:	410 VA worst case, fully loaded.
Frequency Requirements:	47-63 Hz. (The 53B-000 will operate up to 440 Hz, and has over 3.5 mA of leakage current at 440 Hz.)
In-rush Surge:	35 A peak, cold start, duration 1/2 cycle.

Overload Protection:	Thermal shutdown.
Efficiency:	75% typical.
Power Supply Type:	Multiple output switching power supply.
Output Voltages:	+ 5 V dc, 25 A + 15 V dc, 3.0 A - 15 V dc, 3.0 A
Card Slot Power Budget:	The 53B-000 Card Cage supplies the following power to the cards in the cage: 2.0 A @ 5 V dc 0.300 A @ ±15 V dc
Regulation, Line:	±0.25%, all outputs over the full ac input range.
Regulation, Load:	±0.25% for 5 V dc output, ±1% for 15 V dc outputs. Minimum load for regulation is 7%. (Minimum load requirements are met when the 53A-171 Control Card and a communications card are installed.)
PARD:	1% peak to peak, all outputs to 10 MHz.
Overvoltage Protection:	5 V dc output crowbars at 6.25 V ±5%, ±15 V dc have preregulated inputs.
Fuses:	The 53B-000 Card Cage has three power fuses in it. Two are located on the rear panel and their values are shown on the panel. The third fuse is located in the power supply and is a 20-A 3AG-type fuse.
Mounting Position:	Any orientation.
Equipment Supplied:	1 - 53B-000 Card Cage 1 - Operating Manual (P/N 00000-10000) 1 - Service Manual (P/N 00000-20000) 1 - Rack mounting brackets, handles, and slides 1 - 115 V ac Power Cord or optional 240 V ac Power Cord

Module Selection and Design Guidelines

TSD recommends that modules used with this mainframe be designed to meet the following requirements:

Modules should be investigated for possible fire hazard due to the availability of mainframe power in excess of 150W. The same consideration should be given to modules that externally receive greater than 150W.

Printed wiring boards should be flame rated UL94V-1 or better.

To protect against possible electric shock, voltages that could reach the mainframe interface/chassis need to be limited to less than 60Vdc, 20 Vrms, or 42.4Vpk.

Ensure that temperature measuring inputs provide a means of limiting unintended voltages that could reach the mainframe interface/chassis to less than 60Vdc, 20 Vrms, or 42.4Vpk.

OPERATION

To turn on the 53B-000 Card Cage, first verify that a fuse of the correct rating (250 V ac, 4 A) is installed in the fuse drawer on the rear panel, and that the power supply line voltage select switch is set for the correct voltage setting. Refer to Drawing 00000-00831, Detail B in the Service Manual, for the power supply line voltage select switch positions.

CAUTION:
Never insert or remove circuit cards while the card cage power is on. This action may result in damage to the card.

Verify that the power switch in the front of the 53B Card Cage is off (in the out position). Next plug in the supplied ac power cord into the ac receptacle on the back panel and into an ac source. Mount all of the function and system cards into the card cage in the correct slots. Refer to each individual card's operating manual to set their switches before the cards are installed. Turn on the power switch in the front of the 53B Card Cage. The green power indicator next to the power switch and the red power LEDs on each card will light and the fans will start.

GROUNDING:

Both the power supply ground and the chassis/safety ground are provided on a terminal strip on the rear panel of the 53B-000 Card Cage. The terminals are identified on the panel. The system is shipped with a shorting bar between the two grounds which ties the power supply ground and chassis/safety ground together. The shorting bar may be removed in order to float the power supply. The power supply ground is internally connected to the signal ground.

CARD CAGE FUSES:

Two of the card cage ac fuses are located on the rear panel of the card cage and are labeled. The third is located in the power supply. (Refer to the Service Manual.)

CIRCUIT CARD FUSES:

Individual cards are protected by fuses located on each card. All voltages (5 V dc, ±15 V dc) are fused. Consult each card's operating manual for fuse location and size.

RACK MOUNTING

To install the 53B Card Cage into a cabinet storage unit, refer to the diagrams and the steps below. To remove a card cage, reverse these steps. The tools required are a #2 Phillips-head screwdriver and a 3/8 in. wrench. Any hardware remaining after installation may be used as spares.

1. The 53B Card Cage is shipped with the chassis slide section attached. Remove the cabinet slide sections, the mounting brackets, and the separately-bagged hardware (nuts, bolts, and washers) from the shipping container. Save the shipping container for future use.

2. Attach the front and rear mounting brackets to the cabinet slide section. The rear brackets are longer than the front brackets. Leave the hardware loose. If more than one card cage is to be installed, determine the position of all card cages before installing the first one.

NOTE: The mounting holes on the rails of a standard 19 inch rack are in an asymmetric pattern. Use the correct mounting pattern for the card cage to be installed:

Be sure that ALL slots on the mounting bracket are aligned with a tapped #10-32 hole on the rack rail. If all five slots are not properly aligned with the rack mounting holes, installation of more card cages will be complicated.

3. Adjust the length of the combined mounting brackets and cabinet slide section. Position the rear mounting brackets at the back of the cabinet. Position the front mounting brackets approximately in line with the front of the cabinet slide section. Tighten the hardware once the brackets are adjusted.

4. There should be a distance of 1.985 in. from the bottom of the card cage to the centerline of the bottom slot of the mounting bracket for the 63/64, and 1.485 for the 53B card cages. Mount the cabinet slide section to the cabinet as shown. Be sure that the cabinet slide sections on both sides are mounted at the same height.

To make any necessary vertical adjustments, loosen the #10-32 screws that secure the rack slide mounting brackets to the rack mounting rails. Move the card cage into position and tighten the screws. The vertical adjustment range is approximately 0.06 inches.

5. Check all of the hardware to see that it is tight and secure.

6. Fully extend the sliding section of one of the cabinet slides until it locks into place. Repeat this procedure with the other cabinet slide.

7. Lift the card cage by its handles, and insert both attached chassis slide sections into the sliding sections of the two cabinet slides. Make sure that the chassis slide sections engage the wheel bearings and are riding freely upon them.

8. Completely insert the card cage into the rack by depressing both chassis member latches from their locked position, and pushing the card cage until its rack ears are flush against the cabinet mounting rails.

Additional card cages can now be installed, if desired.

To install another card cage above or below the first one, find the next set of properly aligned mounting holes in the rack rails, and install the mounting brackets of the card cage rack slide assemblies as described above. If necessary, adjust the height of either or both card cages for proper vertical clearance between them.

Repeat as needed to install all remaining card cages.

Instrument and Interface Card Selection

TSD recommends that modules used with this card cage be designed to meet the following requirements:

Cards should be investigated for possible fire hazard due to the availability of card cage power in excess of 150W. The same consideration should be given to cards that externally receive greater than 150W.

Printed wiring boards should be flame rated UL94V-1 or better.

To protect against possible electric shock, voltages that could reach the card cage interface/chassis need to be limited to less than 60Vdc, 20 Vrms, or 42.4Vpk.

Ensure that temperature measuring inputs provide a means of limiting unintended voltages that could reach the card cage interface/chassis to less than 60Vdc, 20 Vrms, or 42.4Vpk.

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