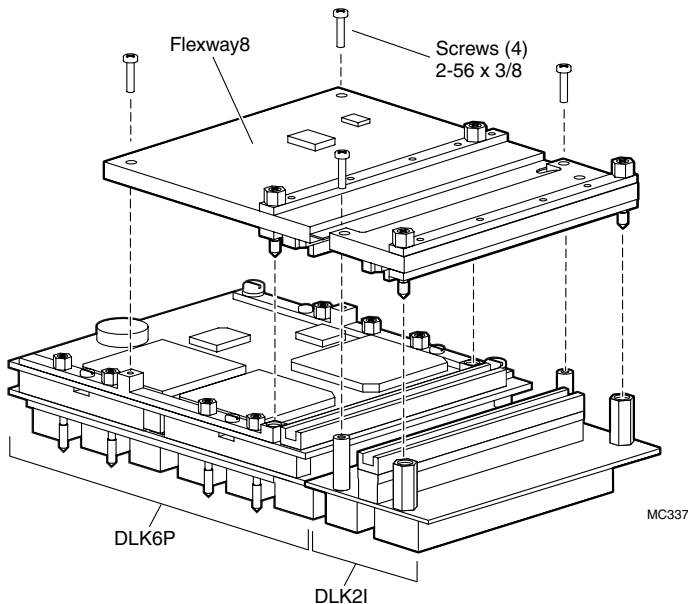# *DLK8P Interlink*

VME RACE++ 8-Slot Dual-Port Motherboard Interlink

DLK8P Interlink Overview

The DLK8P interlink (Figure 1) is composed of a DLK6P module and a DLK2I module, connected by a Flexway8 rigid-flex printed wiring board (PWB). The Flexway8 provides support logic for the interlink. The DLK8P links the backplane pins of 8 VME 5-row P2 connectors.

Note:　　The DLK8P is shipped unassembled, since components are assembled during installation on the VME backplane. To verify that you have the necessary tools for installation, see "Tools Required" on page 7.

Figure 1. DLK8P Interlink

The active component of the DLK8P is the DLK6P, which is a dual 6-port RACE Series++® interlink module providing multi-port links between resources on the RACEway. The DLK6P consists of three 8-port crossbars with six dual-port RACEway slots and an expansion connector to connect to other interlink modules.

Indicators

Indicator LD1 in the DLK6P component lights if any of the three crossbar ASICs registers a system error. Note that this indicator is not visible when the Flexway8 is installed.

Switches

None.

DLK8P Interlink Specifications

The DLK8P interlink meets the following specifications.

Physical Dimensions

Dimensions (mm): 162.3 x 94.9 (6.39" x 3.74")

Maximum height of DLK8P assembly above VME backplane (mm): 47 (1.85")

Weight (gm): 526.7 (18.56 oz.)

Slot-to-Slot spacing (mm): 20.3 (0.8")

Electrical Specifications

Input voltage (Vdc ±5%): 5.0

Input current in amps (maximum): 2.0

Power dissipation (W typical @5.0 Vdc): 8.75

Clock speed: 66 MHz

Caution: DLK2I ports support 3.3 volt signaling only, and must be used only with RACE++ boards.

Commercial Environmental Specifications

Operating temperature range (°C): 0 to 40

Storage temperature range (°C): -40 to 85

Cooling requirements: natural convection

Relative humidity (% non condensing): 10 to 90

Vibration: 0.003 G^2/Hz, 20 - 2000 Hz random, 1 hr/axis

Shock:

6U: X and Y axes: 32 G, 11 msec, 1/2 sine; Z axis: 20 G, 11 msec, 1/2 sine

9U: X and Y axes: 20 G, 11 msec, 1/2 sine; Z axis: 12 G, 11 msec, 1/2 sine

Altitude (ft. above sea level): 0 to 10,000 (operating) and 0 to 30,000 (storage)

Rugged Environmental Specifications

Rugged RACE++ Level 1:

Operating temperature range (°C): -25 to 55

Storage temperature range (°C): -55 to 85

Cooling requirements: natural convection

Relative humidity (% non condensing): 5 to 95

Vibration: 0.04 G^2/Hz, 20 - 2000 Hz random, 1 hr/axis

Shock:

6U: X and Y axes: 80 G, 11 msec, 1/2 sine; Z axis: 50 G, 11 msec, 1/2 sine

9U: X and Y axes: 50 G, 11 msec, 1/2 sine; Z axis: 30 G, 11 msec, 1/2 sine

Altitude (ft. above sea level): 0 to 30,000 (operating) and 0 to 50,000 (storage)

Rugged RACE++ Level 2:

Operating temperature range (°C): -45 to 70

Storage temperature range (°C): -55 to 125

Cooling requirements: natural convection

Relative humidity (% non condensing): 5 to 95

Vibration: 0.04 G^2/Hz, 20 - 2000 Hz random, 1 hr/axis

Shock:

> 6U: X and Y axes: 80 G, 11 msec, 1/2 sine; Z axis: 50 G, 11 msec, 1/2 sine

> 9U: X and Y axes: 50 G, 11 msec, 1/2 sine; Z axis: 30 G, 11 msec, 1/2 sine

Altitude (ft. above sea level): 0 to 30,000 (operating) and 0 to 100,000 (storage)

Rugged RACE++ Level 3:

Operating temperature range (°C): -40 to 71

Storage temperature range (°C): -55 to 125

Cooling requirements: natural convection

Relative humidity (% non condensing): 5 to 95; (% condensing): 100

Vibration: 0.1 G^2/Hz, 5 - 2000 Hz random, 1 hr/axis; 10 G Peak, 5 - 2000 Hz sine, 1 hr/axis

Shock:

> 6U: X and Y axes: 80 G, 11 msec, 1/2 sine; Z axis: 50 G, 11 msec, 1/2 sine

> 9U: NA

Altitude (ft. above sea level): 0 to 70,000 (operating) and 0 to 100,000 (storage)
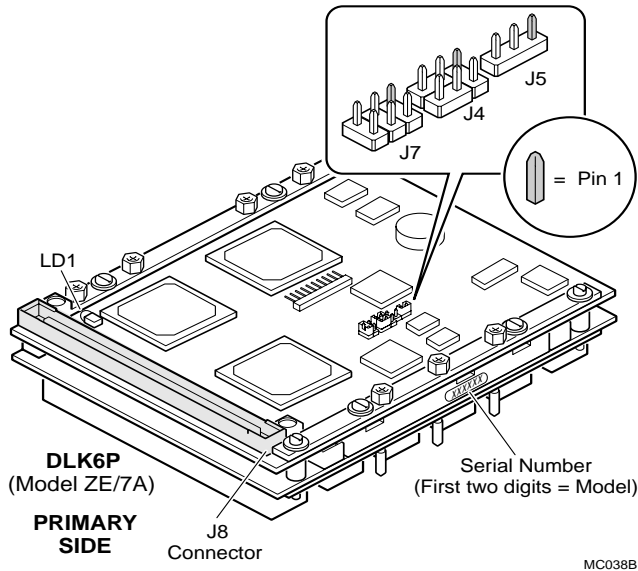
DLK8P Interlink Installation

Complete the following tasks to install the DKL8P:

1. Verify jumper settings and labelling on the DLK6P. See Figure 2 on page 5.

2. Install the DLK2I. See Figure 4 on page 10.

3. Install the DLK6P. See Figure 3 on page 9 and Figure 4 on page 10.

4. Install the Flexway8. See Figure 5 on page 12.

Caution: Assemble the DLK8P interlink exactly as specified in "Assembly" on page 6.

DLK6P Jumper Settings

Figure 2. Location of DLK6P Jumpers


■ **Pre-installation steps**

Caution:	Before handling internal system components, put on the antistatic wrist strap.

1. Verify that the label on the DLK6P component reads "DLK8P," indicating that the module is intended for use in the DLK8P assembly. The DLK6P used in the DLK8P assembly is not compatible with other Mercury DLK6P models. See Figure 2.

2. Verify jumper settings on the DLK6P. Jumpers on the DLK6P are factory-set and must not be changed. If the jumpers become dislodged, return them to the factory setting. See Table 1.

Note:	The DLK8P is always clock master for the VME backplane. The DLK6P component is clock slave.

Table 1 shows the factory-default settings for the jumpers on the DLK6P.

Table 1. Factory Settings for DLK6P Jumper Blocks

Jumper Block J4	Jumper Block J5	Jumper Block J7
Jumper on pins 1-3.	Jumper on pins 1-2.	Jumper off pins 1-2. Jumper on pins 3-4. Jumper off pins 5-6

DLK6P EEPROM Default Setting

The default setting for jumper J7 (on pins 3-4) sets the DLK6P EEPROM to write-protected. (The write-enabled setting is on pins 5-6.)

Caution: Do not change the default setting of the EEPROM on the DLK6P in a DLK8P assembly. Enabling the write-protect jumper could cause the EEPROM to be erased or to be programmed with erroneous values, making the system unusable.

All other jumpers or test connectors on the components of the DLK8P are for factory use only.

Assembly

Before installing the DLK8P, review your host's instructions for adding new devices.

Note: Mercury interlinks installed in equipment that is expected to operate in Level 3 rugged environments must have the connectors treated with a contact lubricant to prevent fretting of the connector surfaces. If the interlink you are installing will operate in a Level 3 environment, refer to the section "Application of Connector Lubricant for Rugged Level 3 Assemblies" on page 12. Apply the lubricant to the backplane before installing the DLK2I and DLK6P components, and to all other DLK8P connectors before installing the Flexway8.

When assembly is complete, the DLK2I is mounted on two VME backplane slots, and the DLK6P occupies six adjacent slots to the left (when viewed from the rear of the chassis). The Flexway8 connects the two modules.

Tools Required

- #1 Phillips screwdriver (a long handle may be required for some installations)

- Torque screwdriver (0-10 in-lb. range) with #1 Phillips bit, small flat-blade bit, 3/16 in. socket, and 1/4 in. socket

- 1/4 in. and 3/16 in. nut driver

- Small flat-blade screwdriver

- Antistatic wrist strap

- A dentist's mirror may be useful for some installations.

- A flashlight may be useful for some installations.

◼ **To install the DLK2I:**

1. Select eight sequential slots in the VME backplane. The DLK2I is installed in the two lowest-numbered slots occupied by the DLK8P.

Caution: DLK2I ports must be used only with RACE++ components that support 3.3 volt signaling. Connecting devices with 5 volt signaling to DLK2I ports may result in physical damage to the DLK8P.

2. Before handling internal system components, put on the antistatic wrist strap.

3. If the assembled DLK8P will operate in a Level 3 environment, apply the required contact lubricant to all backplane connectors occupied by the interlink before proceeding with the installation. See "Application of Connector Lubricant for Rugged Level 3 Assemblies" on page 12.

4. Install the standoffs for the DLK2I on the backplane (see Figure 4 on page 10). Tighten the screws to finger tight. Do not tighten to final torque yet.

5. Install the DLK2I in the lowest-numbered backplane slots selected for the DLK8P. Orient the DLK2I so that its Mictor connector will align with the Mictor connectors on the DLK6P board. Apply gentle, even pressure to install the board.

Caution: The DLK2I can be mounted on the VME backplane in two orientations; only one of these is correct. If the DLK2I is not correctly mounted, the Flexway8 will not align properly with the DLK2I. Mount the DLK2I so that the flush end of the Mictor connector is nearest the row-32 side of the VME 5-row connectors, and the recessed end is toward the row-1 side. (See the inset in Figure 4.)

6. Install the four standoffs in the DLK2I until finger tight. Note that there are two sets of two standoffs. The two shorter standoffs should be mounted on the side of the DLK2I away from the DLK6P. Note that the standoffs have a thread-locking compound pre-applied to the thread.

7. Using a torque driver, tighten the standoffs installed in Step 4 to 3 to 4 in-lb.

8. Using a torque driver, tighten the standoffs installed on the DLK2I in Step 6 to 5 in-lb.
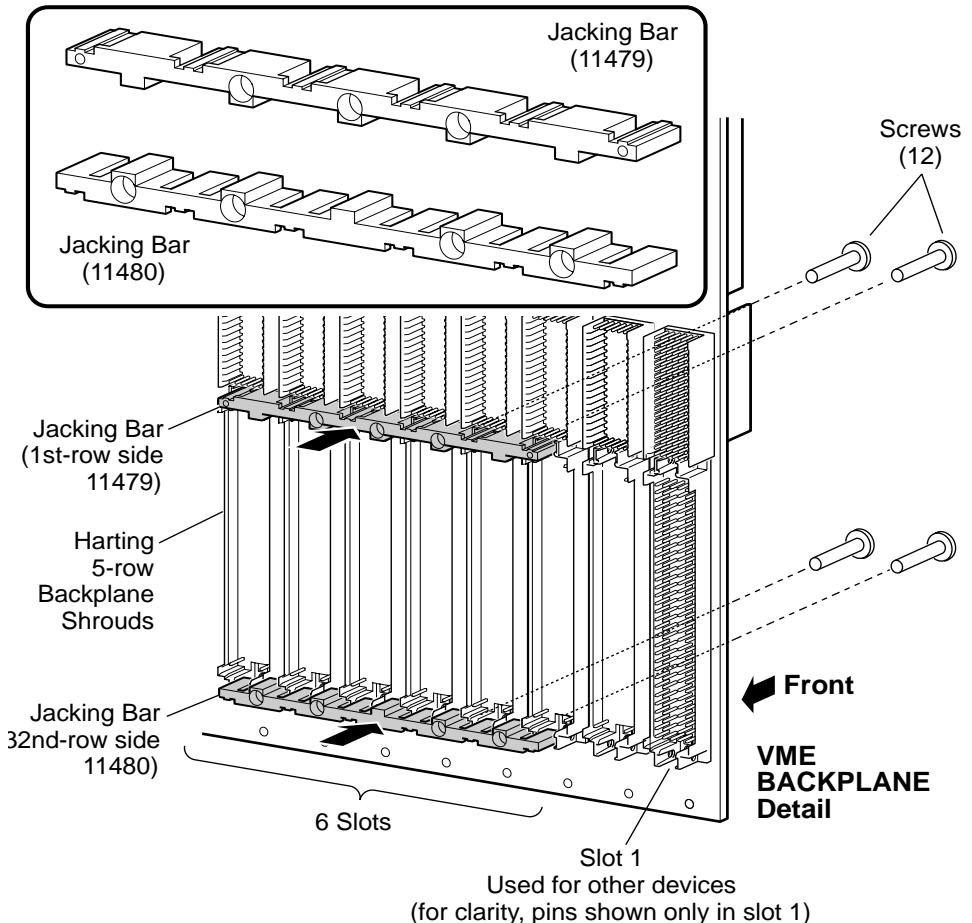
■ **To install the DLK6P:**

1. Select the six backplane slots adjacent to the DLK2I on the left. Make sure all slots covered by the DLK6P are available for interconnection. The pins in rows A, B, D, and Z of the P2 connectors must all be 13 mm or 17 mm long, with no wire wraps. In row C, pins 1, 2, 31, and 32 must also be 13 mm or 17 mm long, with no wire wraps. Ensure that pins in selected slots are not bent or broken.

Caution: Slots chosen for the DLK8P must be free of any busbars, stiffeners, power taps, cables, and such. Straddling an object with a DLK can damage the DLK. All slots used by the DLK must be equipped with Harting 5-row backplane shrouds. Mercury products are intended for use only with Harting shrouds. Other shrouds may damage the backplane or the DLK.

2. If the assembled DLK8P will operate in a Level 3 environment, apply the required contact lubricant to all backplane connectors occupied by the interlink before proceeding with the installation. See "Application of Connector Lubricant for Rugged Level 3 Assemblies" on page 12.

3. Install jacking bars on the VME backplane. Make sure to install the jacking bars at the correct ends of the P2 connectors. Bars with three jackscrew holes (part number 1114879 go next to row 1 (toward P1); bars with four jackscrew holes (part number 111480) go next to row 32 (toward P3). Fit the jacking bars onto the shrouds; the bottom six posts of each bar should be nested into the recesses on the shrouds. Figure 3 on page 9 shows an example of the jacking bars on the VME backplane.

Caution: Before securing the jacking bars, verify that they are positioned correctly. Misaligned jacking bars can cause electrical damage to the DLK6P upon power up.

**Figure 3. Example of Jacking Bars on VME Backplane**

Jacking Bar (11479)

Jacking Bar (11480)

Screws (12)

Jacking Bar (1st-row side 11479)

Harting 5-row Backplane Shrouds

Jacking Bar 32nd-row side 11480)

6 Slots

Front

VME BACKPLANE Detail

Slot 1
Used for other devices
(for clarity, pins shown only in slot 1)

4. Insert screws with captive washers (part no. 050235) into the jacking bars through the P2 connector mounting holes, from the *front* side of the backplane (see Figure 4 on page 10). Insert twelve screws for the DLK6P, six on each side. (The screws have thread-locking compound preapplied.) Turn the

screws until they are mostly engaged, but do not tighten them at this point. You will tighten with the torque driver later.

5. Mount the DLK6P board on the jacking bars. The DLK6P is mechanically keyed to its pair of jacking bars to prevent improper mounting (three jack-screws on one side, four on the other). See Figure 4.

Figure 4. Installing DLK6P and DLK2I Boards
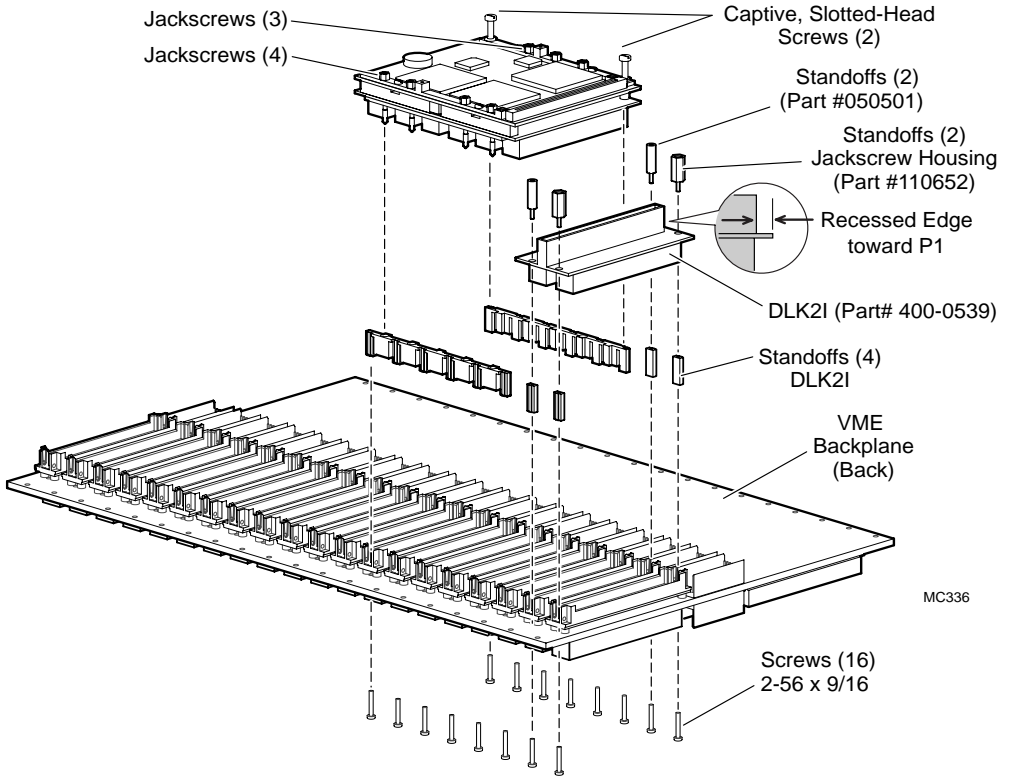
6. *Using a nut driver*, engage the jackscrews on the DLK6P board, starting with one screw and moving around the board clockwise, turning each jackscrew *one half turn only* before moving on to the next. Continue until the DLK6P is fully seated. *Using a torque driver*, tighten these screws to a torque of 4 to 5 in-lb.

|	
Note:	When tightening jackscrews, make sure the DLK6P is seated evenly and parallel to the backplane on both sides.

7. Tighten the two captive slotted-head screws at the ends of the DLK6P on the row-1 side of P2. Torque the screws to 2 to 3 in-lb.

8. Tighten the screws installed in step 4 to a torque of 3 to 4 in-lb.

■ **To install the Flexway8:**

Note:	Verify the jumper settings of the DLK6P before installing the Flexway8. Refer to Table 1, "Factory Settings for DLK6P Jumper Blocks" on page 6.

1. If the DLK8P will operate in a Level 3 environment, apply the required contact lubricant to all pins connecting the DLK6P/DLK2I and the Flexway8 before completing the assembly. See "Application of Connector Lubricant for Rugged Level 3 Assemblies" on page 12.

2. Carefully lay the Flexway8 on top of the DLK6P interlink and the DLK2I module, making sure that the large section of the cable lies over the DLK6P (see Figure 5). Verify that the Flexway8 connectors engage correctly with the connectors on the DLK6P and DLK2I. For each mating connector (2 in total), align the two jackscrews in the Flexway8 with the two receptacles on the DLK6P and the DLK2I. Rotate each jackscrew sufficiently to engage about one turn of the thread.

Figure 5. Installing the Flexway8

Screws (4)
2-56 x 3/8

Flexway8

VME
Backplane

MC335
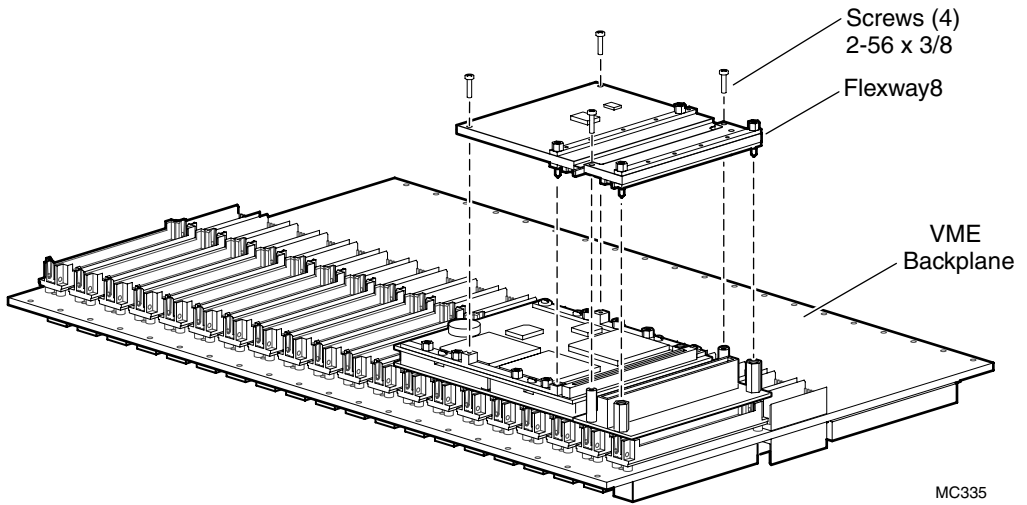
3. When all four jackscrews are started in the thread, start at one screw, then move to the next, and make a complete circuit, tightening each screw in succession by about half a turn. Repeat until the Flexway8 assembly is fully seated.

Caution: When seating the Flexway8, check the space between the Flexway8 and the DLK6P to see that the board is seating evenly. Check to see that each Mictor connector aligns with its mate and that connector pairs are completely engaged.

4. When the Flexway8 is completely seated, use the torque driver to tighten the jackscrews to 5 in-lb.

5. Install four 2-56 x 3/8 Phillips-head screws (part no. 050428) through the remaining holes on the Flexway8. These screws have thread-locking compound preapplied. Using the torque driver, tighten the screws to 2 to 3 in-lb.

The installation is now complete.

Application of Connector Lubricant for Rugged Level 3 Assemblies

This section is only applicable to interlinks that operate in a Mercury Level 3 environment, referred to below as "rugged."

Mercury provides a small quantity of the required lubricant (Miller-Stephenson connector lubricant and cleaner #MS-383H-UV) and an applicator brush with each rugged DLK8P interlink.

For proper protection, lubricant must be applied to:

- Male connectors on the VME backplane that mate with connectors on the DLK8P interlink

- *All* connectors (both halves of each connector) between the DLK6P/DLK2I components and the Flexway8

■ **To Apply Lubricant to VME Backplane Connectors**

1. Immerse the brush in the lubricant solution, approximately 1/8 inches deep.

2. After removing the brush, hold the backplane with the connector pins facing up. Draw the brush across each row of pins, for a maximum of 6.2 inches (two rows), and back to its starting point.

3. Repeat steps 1 and 2 on all rows of connectors until all pins have been coated.

4. Place the backplane in a card basket or equivalent fixture with the connector pins facing down.

5. Wait a minimum of three minutes for the solvent to evaporate from connector pins.

6. Repeat steps 1 through 4 to achieve a total of two coating cycles on all pins. The lubricant contains an ultraviolet trace chemical. This facilitates inspection of the connector pins using a UV light to ensure proper coating of the pins by the lubricant.

7. Wait a minimum of three minutes for the solvent to evaporate from the connector pins.

The backplane is now ready for installation of the interlink.

■ **To Apply Lubricant to DLK8P Components**

➜ Apply lubricant *after* installing the DLK2I and DLK6P modules on the backplane, but *before* installing the Flexway8. Follow Step 1 through Step 7 above to apply lubricant to *all* pins (both halves of all connector pairs) that connect the DLK2I and DLK6P modules to the Flexway8.

Removal

When removing the DLK8P assembly from a backplane, remove the Flexway8 first and work slowly to make sure you keep the Flexway8 parallel to the DLK6P board. Starting at one jackscrew, loosen each screw by half a turn only, then move

to the next. Unseat the Flexway8 starting at one end, and work along the Flexway8 until it is free from the DLK6P board and from the DLK2I. Then, unseat the DLK6P, making sure that the board remains parallel to the backplane. Finally, remove the DLK2I board.

Caution: Avoid pivoting or rocking during the removal process, since this can damage the connectors.

DLK8P Interlink Topology

Figure 6 shows the topology of the DLK8P interlink viewed from the front of the chassis.

Figure 6. DLK8P Topology (Front View)
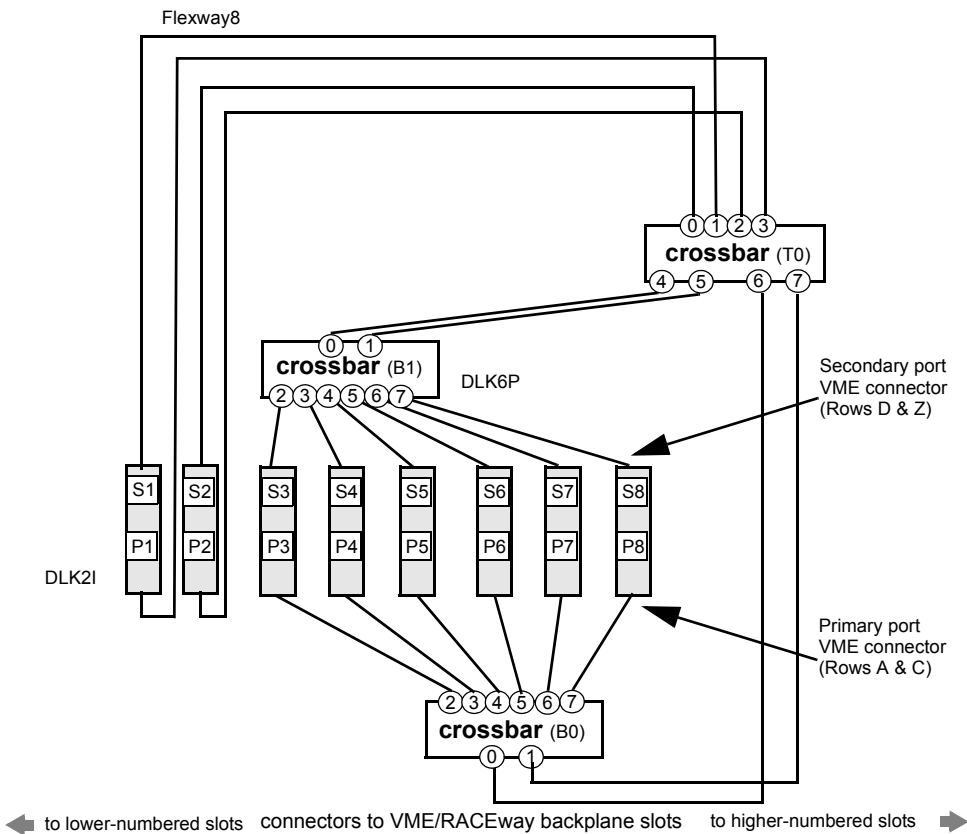
Caution:	DLK2I slots must be used only with Mercury RACE++ configurations that support 3.3 volt signaling.

DLK8P Interlink Configuration

The following sections provide configuration file directives used for this specific device. For general information about creating configuration files and the meaning of the configuration directives, see the *Mercury System Manager's Guide.*

Board Directive

The board directive for the DLK8P is:

```
board DLK8P user-assigned-name
```

where:

user-assigned-name

A name assigned by the user.

The following three attributes indicate the location of the DLK8P in the VME backplane, and are specified as part of the board directive. These attributes support the `configmc inventory` tool, and do not affect the functionality of the DLK8P device. For more information on using `configmc inventory`, see the *Mercury System Manager's Guide.*

`chassis=`*n*

Indicates the chassis number in which the DLK8P is installed. The default value for *n* is 1, so you do not need to use this attribute unless you are configuring a multi-chassis system. For instance, in a two-chassis system, the backplane component boards in the second chassis would include a `chassis` attribute, `chassis=2`.

`leftmost_slot=`*n*

Specifies the leftmost slot of the chassis in which the DLK8P is installed, when observing the system from the front, viewing the boards from left to right. The default value for *n* is 1, so you need only use this attribute if the board is in a slot other than the first.

Mercury uses the `leftmost_slot` value as an offset for other board positions in the chassis, incrementing from the offset when the boards are ordered from left to right, and decrementing from it when boards are ordered from right to left, using the next attribute.

`right_to_left=[yes|no]`

> Indicates the way that the boards are ordered inside the system. By default, `right_to_left=no` for all backplane components, so you do not need to use this attribute in the board directive, unless the boards are being ordered from the opposite direction. If that is so, add the attribute `right_to_left=yes` as part of board directive for the backplane component. Note that this attribute is rarely used in VME configurations.

Connect Directive

`connect` *user-assigned-name1.connector1 user-assigned-name2.connector2*

where:

user-assigned-name1
user-assigned-name2

> Two names assigned by the user in a board directive: one for the DLK8P and the other for the hardware device being connected to.

connector1
connector2

> Two connectors, one being a connector on the DLK8P and the other a connector on the hardware device being connected to. The DLK8P connector can be:
>
> > **RWP2_1P** through **RWP2_8P** - VME P2 connectors (160-pin), labeled P1 to P2 on the DLK2I component and P3 to P8 on the DLK6P component of the DLK8P. Connector RWP2_1P is the first slot (P1) on the DLK2I; connector RWP2_3P is the first slot (P3) on the DLK6P. These connectors are the primary connectors on rows A and C. They are compatible with MCJ6 and MCJ9 boards.
> >
> > **RWP2_1S** through **RWP2_8S** - VME P2 connectors (160-pin), labeled S1 to S2 on the DLK2I component and S3 to S8 on the DLK6P component of the DLK8P. Connector RWP2_1S is the first slot (S1) on the DLK2I; connector RWP2_3S is the first slot (S3) on the DLK6P. These connectors are the secondary connectors on rows D and Z. They are compatible only with MCJ6 and MCJ9 boards.

DLK8P Interlink Diagnostics

Diagnostics tool DMC supports the following test phases and tests on this hardware device. For test descriptions, see the *Mercury Diagnostic Tools Guide*.

Additional test phases and tests depend on the hardware configuration. See the *Hardware Device Note* for each motherboard, daughtercard or interlink in the system.

ILK Phase

```
ILK Probe test

ILK DMA test
```

DLK8P Interlink Reference

Address Space

None.

Files

```
${MC_ROOT_DIR}/etc/desc/DLK8P.desc
```

Hardware description file for this device.

DLK8P Interlink