**digital**™

# DECmau 900TL
# INSTALLATION
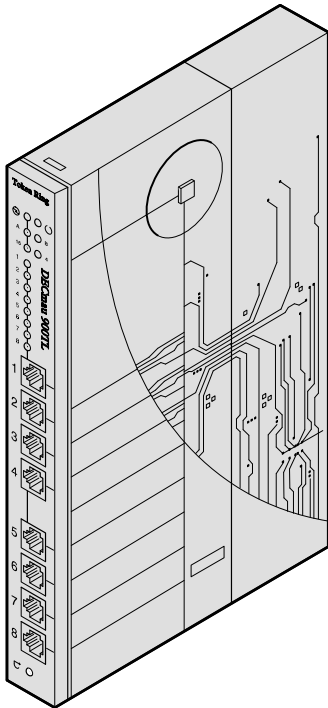


LKG–8137-93I
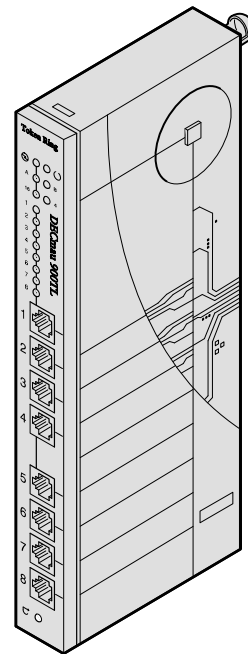
**DEChub ONE MAU 900TL**

**DECmau 900TL**

The DECmau 900TL is a Token Ring Multistation Access Unit (MAU). As a member of Digital's Token Ring product family, it operates in a DEChub 900 MultiSwitch, or a single-slot hub (DEChub ONE MAU 900TL). The MAU connects up to eight stations using 100-ohm shielded or unshielded cable with RJ45 connectors, and 150-ohm IBM Type 1 data cable using an impedence matching transformer cable. It operates at 4 or 16 Mb/s and incorporates speed detection. The MAU can also be managed by optional HUBwatch management software.

**EK–DTMAU–IN. A01**

# Copyright

# Front Panel

Token Ring

DECmau 900TL

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LKG-8145-93I

**1 )** **Power LED.** Lights when the MAU has power.

**2 )** **Module OK LED.** Lights when the MAU passes its self-test. If the MAU fails its self-test, the OK LED is off.

**3 )** **Ring A/B LEDs.** In a hub, either the A LED or the B LED is on to show the ring. In a standalone MAU, both Ring LEDs are always off.

**4 )** **Speed LEDs.** Either the 16 LED or the 4 LED is on to show the ring speed.

**5 )** **Eight Lobe LEDs.** Lights when a station has access to the network.

**6 )** **Eight Lobe Connectors.** Connects a station to the network. The MAU connects up to eight stations with shielded or unshielded 100-ohm cable, and 150-ohm IBM Type 1 data cable using an impedence matching transformer cable (Digital part number BN26T-03).

**7 )** **Reset Switch.** Resets the MAU to factory defaults. To reset: while turning on the power, press the reset switch with a pen or screwdriver.

**Notes:**
The DECmau 900TL has speed detect, which ensures the integrity of the network. At startup, a MAU determines the ring speed based on the speed settings of the majority of the stations on the ring and the Ring Out port. In a hub, the MAU then connects to the appropriate ring in the hub. After startup, speed detect prevents stations with the wrong speed setting from connecting to the network.

Network management can override any of the MAU's factory default settings.

## Rear Panel of DEChub ONE MAU 900TL

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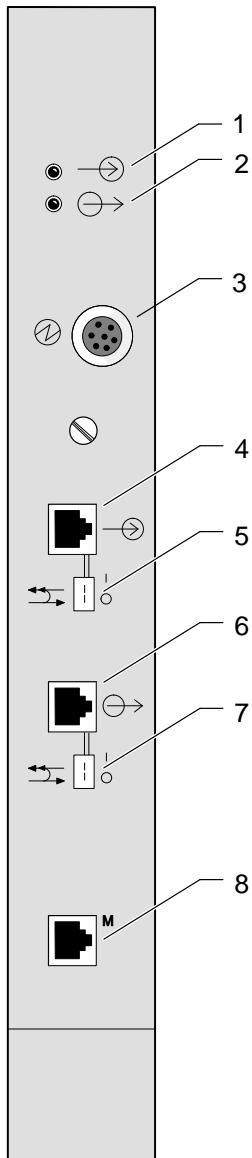
LKG-8146-93I

**Note:**
The rear panel shown here is used only when the MAU is in a single-slot hub configuration.

**1 )** **Ring In LED.** Lights with a Ring In connection.

**2 )** **Ring Out LED.** Lights with a Ring Out connection.

**3)** **Power Connector.** Provides power connection for the MAU.

**4 )** **Ring In Connector.** Connects Ring In to the Ring Out connector of a MAU or repeater.

**5 )** **Ring In Autowrap Switch.** Determines whether the MAU automatically loops back when it detects a disconnected link on Ring In. If the Ring In port connects to a device with Digital's Autowrap, set the switch to 1 to enable Autowrap. If the Ring In port connects to a device without Digital's Autowrap, set the switch to 0 to disable Autowrap.

**6 )** **Ring Out Connector.** Connects Ring Out to the Ring In connector of a MAU or repeater.

**7 )** **Ring Out Autowrap Switch.** Determines whether the MAU automatically loops back when it detects a disconnected link on Ring Out. If the Ring Out port connects to a device with Digital's Autowrap, set the switch to 1 to enable Autowrap. If the Ring Out port connects to a device without Digital's Autowrap, set the switch to 0 to disable Autowrap.

**8 )** **Not used.** Reserved for out-of-band network management.

## Installing a MAU in a DEChub 900 MultiSwitch

When you install a MAU in a DEChub 900 MultiSwitch, you do not have to turn off the hub power.

**1** **Remove the single-slot hub (if necessary).**

If you want to install a DEChub ONE MAU 900TL in a hub,
you need to remove the single-slot hub.
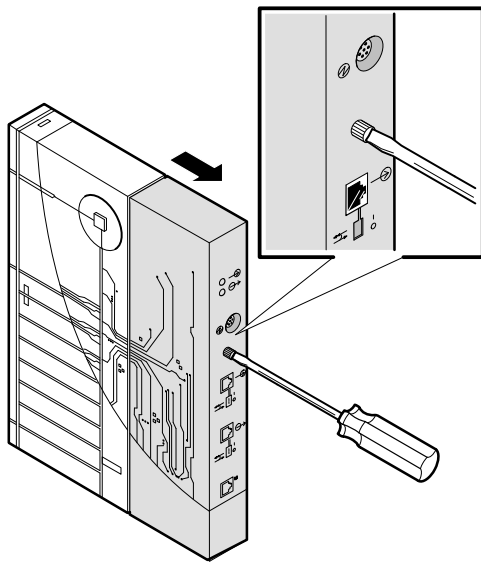
**a.** Loosen the screw on the single-slot hub until it disengages.

**b.** With one hand holding the front of the MAU, and your other hand holding the single-slot hub, carefully pull the two units apart.

**2** **Install the MAU in the hub.**

The release lever is lifted and clicks back into place as the module is seated.

Mounting tab
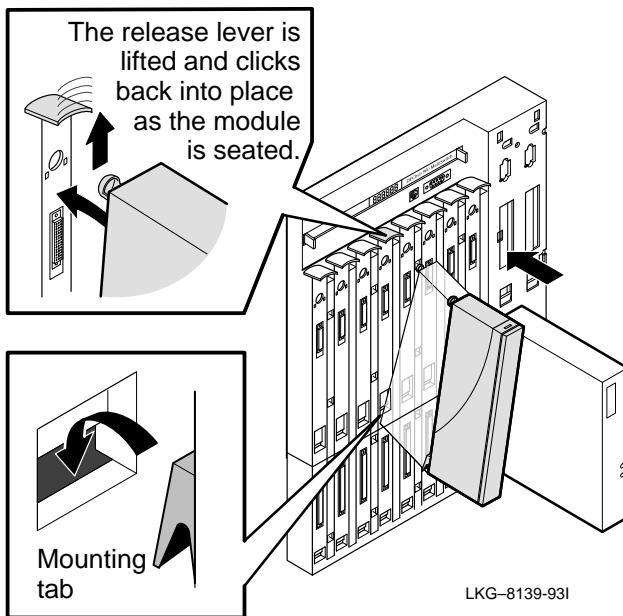
LKG–8139-93I

**a.** Align the MAU's 48-pin connector with any available 48-pin slot on the hub.

**b.** Place the MAU's bottom mounting tab into the mounting slot on the hub.

**c.** Rock the MAU into place. You hear a "click" when the MAU is seated.

## Installing a MAU in a DEChub 900 MultiSwitch (continued)

**3** **Verify power.**
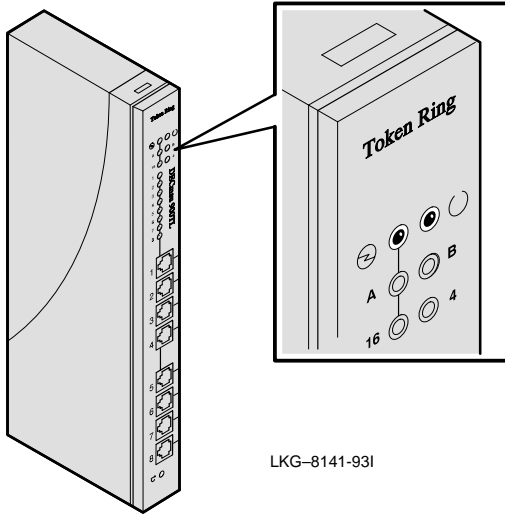
With power on in the hub, verify that the Power and Module OK LEDs are on.
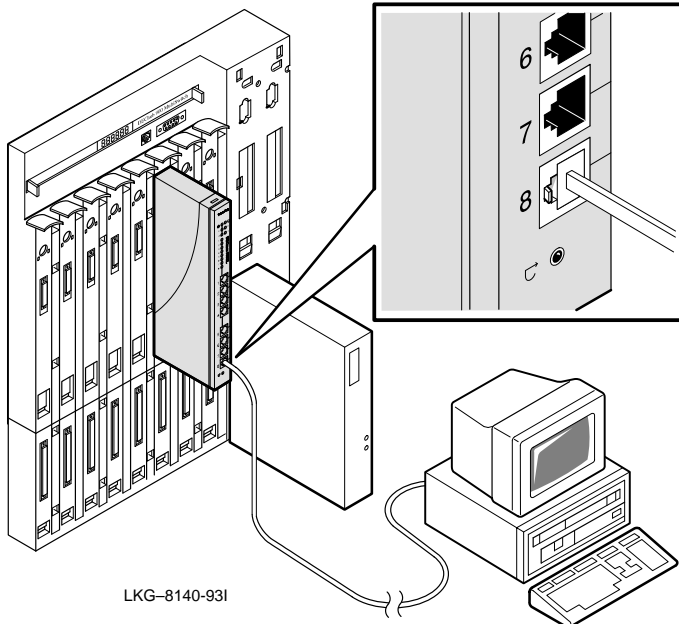
LKG–8141-93I

**4** **Connect station cables.**

Connect station cables to any available lobe connector on the MAU. For 150-ohm applications, you also need an impedence matching transformer cable (Digital part number BN26T-03).

Module installation for a DEChub 900 MultiSwitch is complete.

LKG–8140-93I

# Installing a DEChub ONE MAU 900TL

**1** **Mount MAU (optional).**

You can place the MAU on a table, mount it on a wall, or mount it in a standard 19-inch rack using a shelf assembly, Digital part number H9544-MS.

For a wall mounting, position two screws 19.7 centimeters (7.75 inches) apart on the wall. Turn screws until tight and then back off two turns. Hang the MAU using the keyholes.

**2** **Set Autowrap switches.**
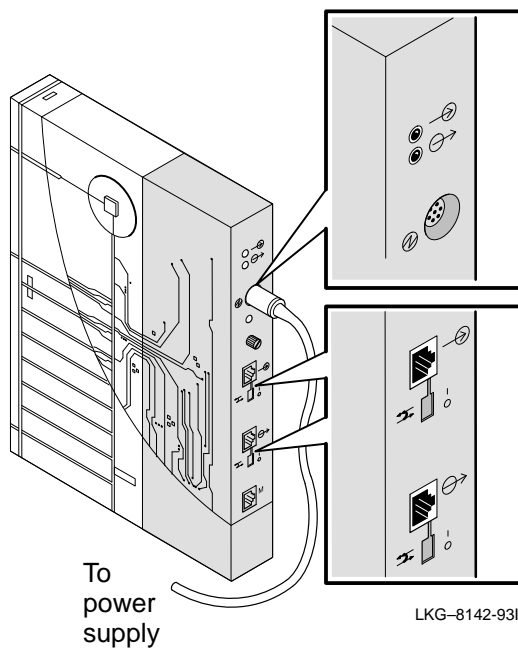
**a.** Set the Ring In and the Ring Out Autowrap switches to 1 or 0.

**b.** Set the switch to 1 to enable Autowrap when the Ring In or Ring Out port connects to a device with Digital's Auto wrap, there is only one MAU in the network, or the port is not connected to the network. Otherwise, set the switch to 0 to disable Autowrap.

To
power
supply

LKG–8142-93I

**3** **Connect power supply.**

**a.** Connect the power supply cable to the power connector.

**b.** Plug the power supply into a wall outlet.

# Installing a DEChub ONE MAU 900TL (continued)

**4** **Connect station cables.**
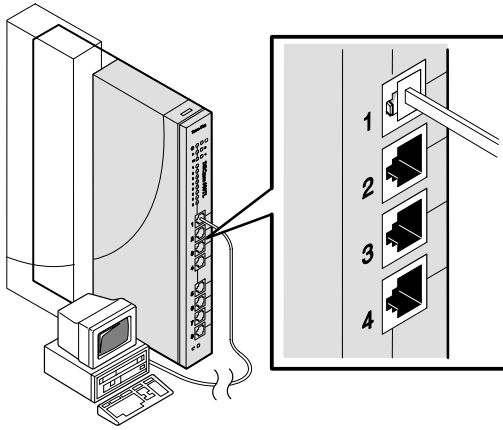
Connect station cables to any available lobe connector on the MAU.  For 150-ohm applications, you also need an impedence matching transformer cable (Digital part number BN26T-03).

**5** **Install a MAU to adjacent MAUs or repeaters.**
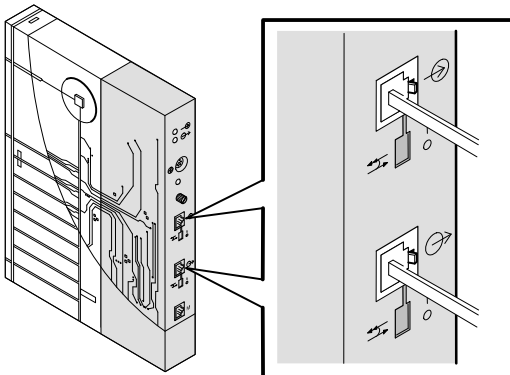
If a MAU is being added to an existing network, connect Ring In → to the Ring Out connector of a MAU or repeater, and connect Ring Out → to the Ring In connector of a MAU or repeater.

**6** **Check LEDs.**
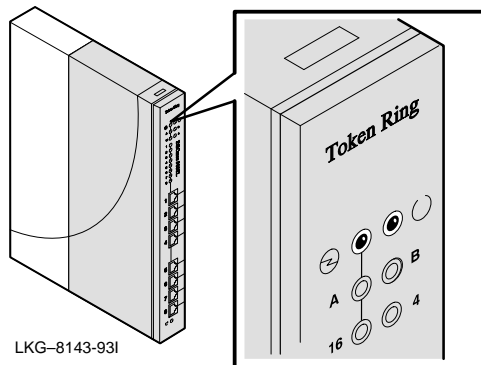
With power on, verify that the Power and Module OK LEDs are on.

Module installation for a DEChub ONE MAU 900TL is complete.

LKG–8143-93I

## Removing a MAU from a DEChub 900 MultiSwitch

**1** **Disconnect the station connector cables from the MAU.**

**2** **Remove the MAU from the hub.**

**Note:**
When you remove a MAU from the hub, do not turn off the hub power.

The release lever is lifted and clicks back into place as the module is removed.

Mounting tab

**a.** Lift up the Release lever on the hub.

**b.** Pivot the MAU back on its bottom mounting tab until it disengages from the hub.
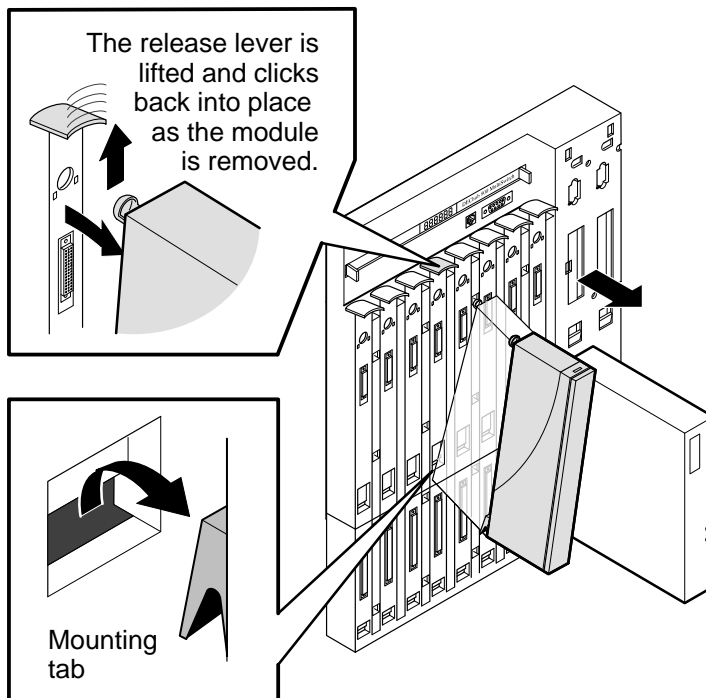
LKG–8144-93I

# LED Summary

The LEDs indicate status by being on, off, and flashing. Flashing LEDs indicate special situations. There are two flashing patterns and a scroll pattern. When an LED indicates a continuous single-flash pattern, network management has disabled the port. A continuous double-flash pattern indicates the wrong speed. In a scroll pattern, the LEDs turn on and off in a set order.

| LED[1] | Off | On | Flashing |
|---|---|---|---|
| Power ① | No Power | Power OK | |
| Module OK ◯ | Self-test failed or not operating | Self-test OK | |
| 4/16 Mb/s | No activity | Valid speed or management set speed | |
| Lobe | Inactive | Connected to network | Continuous single flash: network management disabled port. Continuous double flash: wrong speed. |
| **Hub MAU ONLY:** | | | |
| Ring A/B | Not connected | Connected to Ring A or Ring B | Continuous single flash: network management disabled port. A and B alternately flash: MAU needs an upgrade or an upgrade is in progress. |
| **DEChub ONE ONLY:** | | | |
| Ring In/ Ring Out | Inactive or wire fault | Connected to network | Continuous single flash: network management disabled port. Continuous double flash: wrong speed. |

[1] Scroll: During power-up self-tests, all LEDs, except the Power LED, indicate a scrolling pattern.

# Cabling

Table 1 lists the Token Ring industry guideline for the maximum lobe length of shielded twisted-pair (STP) and unshielded twisted-pair (UTP) cable.

**Table 1  Industry Lobe Length Guideline**

| Speed | UTP | | STP |
| --- | --- | --- | --- |
| | Level 3 | Level 5 | |
| 4 Mb/s | 100 m (327 ft) | 100 m (327 ft) | 100 m (327 ft) |
| 16 Mb/s | 65 m (213 ft) | 100 m (327 ft) | 100 m (327 ft) |

Lobe lengths for Digital's MAUs exceed the industry guideline.  Specifically, lobe lengths can be longer than the industry guideline for STP cable and UTP level 5 cable at 4 Mb/s. See Table 2, Digital Lobe Length Guideline, for the maximum lobe lengths for Digital's MAUs. Also refer to either "DEChub 900 MultiSwitch Configuration or DEChub ONE Configurations" below for more configuration information.

**Table 2  Digital Lobe Length Guideline**[1]

| Speed | UTP | | STP |
| --- | --- | --- | --- |
| | Level 3 | Level 5 | |
| 4 Mb/s | 100 m (327 ft) | 200 m (655 ft) | 376 m (1235 ft) |
| 16 Mb/s | 65 m (213 ft) | 100 m (327 ft) | 173 m (569 ft) |

[1] All distances include patch cables and hub connections.

Digital recommends that you keep lobe lengths within the maximums found in the industry guideline whenever possible. This allows for future network expansion and upgrade.  When current needs dictate the longer lobe lengths, you can increase lobe lengths up to the maximums in Digital's guideline without any negative effect on the network.

## DEChub 900 MultiSwitch Configuration

**Multiple Hubs**
A repeater is needed in each hub to connect hubs in a multiple hub network.  Refer to the appropriate Token Ring repeater manual for specific information.

## DEChub ONE Configurations

**Unshielded Twisted-Pair Cable Configurations**:

**Multiple MAUs in One Wiring Closet at 16 Mb/s**
At 16 Mb/s, a maximum of five MAUs can be in one wiring closet without affecting maximum lobe length.  Subtract 10 meters from the lobe lengths in Table 2 for each additional MAU above five in a wiring closet.

**Multiple Wiring Closets**
Digital recommends that you use repeaters to segment the ring in a network with multiple wiring closets. In some situations, only one, or no repeaters, are required. Refer to the appropriate Token Ring repeater manual for specific information.

# Cabling (continued)

Digital recommends that you use repeaters to segment the ring in a network with multiple wiring closets. In some situations, only one, or no repeaters, are required. Refer to the appropriate Token Ring repeater manual for specific information.

When distances exceed the lobe lengths in Table 2, or if the MAU does not have Digital's Autowrap functionality, two repeaters are required.

When a MAU has Autowrap enabled, only one repeater is required per wiring closet if the distance between the wiring closets does not exceed the distances shown in Table 2.

With UTP level 5 cable at 4 Mb/s, no repeaters are required with multiple wiring closets if the total cable budget is within the distances shown in Table 3.

For UTP level 3 cable at 4 Mb/s, divide all distances in Table 3 by 1.3.

**Table 3  Total Cable Budget for UTP Level 5 Cable at 4 Mb/s[1]**

| MAUs | Wiring Closets | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 1 | 210 m (689 ft) | 206 m (675 ft) | | | | | |
| 2 | 192 m (630 ft) | 189 m (620 ft) | 185 m (607 ft) | | | | |
| 3 | 175 m (574 ft) | 171 m (561 ft) | 168 m (551 ft) | 164 m (538 ft) | | | |
| 4 | 157 m (515 ft) | 154 m (505 ft) | 150 m (492 ft) | 147 m (482 ft) | 143 m (469 ft) | | |
| 5 | 140 m (459 ft) | 136 m (446 ft) | 133 m (436 ft) | 129 m (423 ft) | 126 m (413 ft) | 122 m (400 ft) | |
| 6 | 122 m (400 ft) | 119 m (390 ft) | 115. m (377 ft) | 112 m (367 ft) | 108 m (354 ft) | 105 m (344 ft) | 101 m (331 ft) |

[1] All distances include patch cables.

Total cable budget = maximum lobe length + adjusted ring length
Adjusted ring length = total trunk length – shortest trunk length

### Shielded Twisted-Pair Cable Configuration:
Digital supports industry standards for shielded twisted-pair (STP) cable.  Refer to the *IBM Token Ring Network Introduction and Planning Guide* for specific information on STP cable.

## Cable Connector Specifications
Table 4 lists the signal names of each pin associated with the Ring In, Ring Out, and Lobe connectors. The shaded area in the table indicates signals used only by Token Ring.

**Table 4  MAU Connector Signal Names**

| Connector Name | Pins | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Ring In | RS422 RX+ | RS422 RX– | Transmit– | Receive+ | Receive– | Transmit+ | RS422 TX– | RS422 TX+ |
| Ring Out | not used | not used | Receive– | Transmit+ | Transmit– | Receive+ | not used | not used |
| Lobe | not used | not used | Receive– | Transmit+ | Transmit– | Receive+ | not used | not used |

## Problem Solving

| If ... | Then ... | Do This ... |
|---|---|---|
| **DEChub 900 MultiSwitch and DEChub ONE** | | |
| Power LED is off. | MAU does not have power. | Verify that outlet has power. Check power connection to MAU. Replace power supply. Replace MAU. |
| Module OK LED is off. | MAU failed self-test. | Replace MAU. |
| Ring A and B LEDs alternately flash. | MAU needs an upgrade or an upgrade is in progress. | If you have network management, do a downline load; otherwise, replace MAU. Wait for upgrade to complete. |
| Both Speed LEDs are off. | No activity is on the network. | Start up at least one station. |
| Lobe LED is off after station completes self-test | Station cannot access network. | Check lobe cabling for crossover between transmit and receive wires. All cables, including patch cables, must be straight through. |
| Lobe LED indicates a continuous single flash pattern. | Network management disconnected station from the network. | To change setting, you can use network management commands or the MAU's Reset switch. |
| Lobe LED indicates a continuous double flash pattern. | MAU and station have different speed settings. | Change the speed setting of the station. |

# Problem Solving (continued)

| If ... | Then ... | Do This ... |
|--------|----------|-------------|
| **DEChub 900 MultiSwitch ONLY** | | |
| Lobe, Ring In, Ring Out, Ring A/B LEDs flash together. | Network management has disabled MAU. | To change settings, you can use network management commands or the MAU's Reset switch. |
| MAU does not connect to hub. | Network management will not connect MAU to hub. | Check speed and hub settings for incorrect network management overrides. |
| MAU does not work in DEChub 90. | DEChub 90 only supports Ethernet networks. | A DEChub 900 MultiSwitch supports Token Ring networks. |
| **DEChub ONE ONLY** | | |
| Ring In or Ring Out LED indicates a continuous single flash pattern. | Network management disconnected the MAU's RI or RO port. | To change setting, you can use network management commands or the MAU's Reset switch. |
| Ring In or Ring Out LED indicates a continuous double flash pattern. | MAU and ring have different speed settings. | Change the speed setting of the stations or the ring. |
| Lobe, Ring In and Ring Out LEDs flash together. | Network management has disabled MAU. | To change settings, you can use network management commands or the MAU's Reset switch. |
| Vendor's MAU or repeater causes loopback on ring. | Vendor's unit is incompatible with Digital's Autowrap. | Set Autowrap switches on the DECmau or DECrepeater adjacent to the vendor's unit to 0. |
| Network crashes when a MAU or repeater fails. | Vendor's unit does not have Digital's Autowrap. | Set Autowrap switches on the DECmau or DECrepeater adjacent to the failed unit to 1. |

## Product Specifications

| Product Specification | In a Hub | DEChub ONE |
|---|---|---|
| Size | 27.3 x 11.2  x  3.2 cm<br>(10.8 x 4.4 x 1.2 inches) | 27.3 x 17.0 x 3.2  cm<br>(10.75 x 6.7 x 1.25 inches) |
| Weight | .82kg (1.5 lb) | 1.09kg (2.0 lb) |
| Operating temperature | 5° C to 50° C (41° F to 122° F) | 5° C to 50° C (41° F to 122° F) |
| Relative humidity | 10% to 95% non-condensing | 10% to 95% non-condensing |
| Altitude | Sea level to 4800 m (16,000 ft) | Sea level to 4800 m (16,000 ft) |
| Power Supply | Hub provides | Provided by:<br>H7082–AB |
| Input Power | 1.0 A @  +5.1 Vdc | 1.0 A @  +5.1 Vdc |
| Connectors | RJ-45 | RJ-45 |
| Agency certification | UL, TÜV, CSA, FCC, VDE | UL, TÜV, CSA, FCC, VDE |
| Acoustics: Preliminary declared values per ISO 9296 and ISO 7779 | No acoustic noise | No acoustic noise |
| Schallemissionswerte: Vorläuge Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779 | keine meßbaren Schallemissionen | keine meßbaren Schallemissionen |

## Associated Document

*DEChub 900 MultiSwitch Owner's Manual*    This manual provides overview, installation, and problem-solving information for the DEChub 900 MultiSwitch.