

CANARY COMMUNICATIONS, INC.

USER MANUAL

(M)CC-2002 SERIES

MCC-2021, MCC-2022, MCC-2022-SC, MCC-2022-SM

FIBER OPTIC/UTP CONVERTERS

REVISION B-2 MODELS

Standard Versions and versions with
Link Fault Signaling (LFS)

ETHERNET IEEE 802.3 COMPATIBLE

Your package should contain:

- One MCC-2021, MCC-2022 or MCC-2022-SC, MCC-2022-SM Fiber Optic/UTP converter
- One external Wall-Mount/Table-Top style power supply, AC input voltage, 95V-135V (domestic) or 95V-270V (universal) @50-60Hz Class 2 Type (Auto-sensing)
- One user Manual (this manual)

Inspect your unit for damage, which may have occurred during shipment. If you discover any shipping damage, notify the carrier and follow their instructions for damage and claims. Be sure to save the original shipping carton if reshipment is necessary.

Notice:

CANARY COMMUNICATIONS, INC. reserves the right to make changes in specifications and other information contained in this document without prior notice. The reader should contact CANARY to determine if any such changes have been made.

Warranty Information

Canary Communications warrants the MCC-2021, MCC-2022, MCC-2022-SC and MCC-2022-SM converters to be in good working order for the period of FIVE YEARS from the date of purchase from Canary or an authorized Canary reseller. Should the converter fail anytime during said FIVE YEAR period, Canary will, at its option, repair or replace with like product. This warranty is limited to defects in workmanship and materials and does not cover damage from accident, disaster, misuse, abuse or unauthorized modifications.

Under no circumstances will Canary be liable for any damages incurred by the use of this product. This includes but is not limited to: lost profits, lost savings, and any incidental or consequential damages arising from the use of or inability to use this product. If the product was purchased from an authorized Canary dealer, limited warranty service may be obtained by returning the product to the dealer. Return the product in its original shipping container (or equivalent), pre-insured, and with proof of purchase. Canary specifically disclaims all other warranties express or implied, and the installation or use of the MCC-2021, MCC-2022 or MCC-2022-SC, MCC-2022-SM converter shall imply acceptance of the above terms.

Canary Communications Inc. is always open to any comments or suggestions you may have about its products and/or this manual. Send correspondence to:

Product Manager
Canary Communications, Inc.
5884 Eden Park Place
San Jose, CA 95138

Phone: (408) 365-7100
Fax: (408) 365-1600

Internet: www.canarycom.com
e-mail: info@canarycom.com

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ISO 9001 Certified

MCC-2002 series Media Converters in use

Use single or paired converters to link UTP LANs up to 2 Km (1.24 miles) apart or up to 15 Km for the MCC-2022-SM. The MCC-2021, MCC-2022, MCC-2022-SC and MCC-2022-SM series converters, transparently connect full-duplex segments. Half-duplex operation is automatic, but pairs of converters cannot be used to directly link half-duplex and full-duplex segments. See the note under Single Mode Fiber Optic Interface.

MDI or MDI-X options for B-2 revision MCC-2021, MCC-2022, MCC-2022-SC AND MCC-2022-SM

The UTP port has a MDI/ MDI-X SWITCH, which allows the user to configure the unit for either MDI (uplink) or MDI-X (downlink) connection. Hubs and most switches have MDI-X configured ports. Workstations and servers typically have MDI configured ports. MDI is the COMPLEMENT of MDI-X. When using straight cable, always configure the converter UTP port to be the OPPOSITE or COMPLEMENT of the port type on the other device. If one device is MDI configured, the other must be MDI-X configured. If a Crossover cable is being used, then the port configurations should be of the SAME type.

Connecting Standard B-2 Revision MCC-2022 series converters

Standard (non-LFS) Revision B-2 converters function with each port independently able to establish (transmit) a good link signal. There is no requirement for a good signal to be received on one port before a link signal can be transmitted on the second port. If one port loses its good link, its loss has no effect on the ability of the second port to establish and maintain its own link. Standard B-2 converters function like early 10Mbps equipment with each port, establishing link when properly connected.

LED Indicators for Standard (Rev. B-2 (non-LFS) converters:

1. SYS PWR LED (green): The LED will be steady ON when power is applied to the unit.
2. F/O LFS LED (red): The F/O (LFS) LED circuit is disabled (non-functional) on standard B-2 models.
3. F/O LNK LED (GREEN): F/O Link LED will be lit steady ON indicating good fiber connection.
4. F/O Activity LED (yellow): F/O Activity LED will flash indicating incoming activity on F/O Port.
5. UTP LFS LED (red): The UTP (LFS) LED circuit is disabled (non-functional) on standard B-2 models.
6. UTP Link LED (green): The LED will be steady on when the UTP port is properly (configured)
7. UTP Activity LED (yellow): The LED will blink when there is activity on the attached UTP segment.
8. UTP Collision LED (red): The LED has been disabled.
9. UTP A/P LED (yellow): Lit when UTP receive polarity is reversed and has been corrected (Auto Polarity).

Connecting Link Fault Signaling (LFS) versions of B-2 Revision MCC-2022 converters

An MCC-2002 converter (with LFS) typically begins operation when it receives a 10Base-T link signal from a device attached to its RJ-45 port. The received link, allows it to then turn-on the fiber transmit link signal to the 10Base-FL port on the second converter. Having received a good fiber link signal from the first converter, the second converter then transmits a 10Base-T link signal across the UTP segment to the far-end device connected to its RJ-45 port. The key point is that if any segment is not connected or is disabled, a good link signal will not be allowed to be transmitted (forwarded) to the next converter or end-device connected to that converter.

To enable the MCC-2021, MCC-2022, MCC-2022-SC and MCC-2022-SM simply attach the transmit fiber cable to the TX port and the receive fiber cable to the RX port on the back of the converter. Connect the UTP cable to the RJ-45 port on the back of the converter.

- Both segments (F/O and T/P) must be connected to each MCC-2002 before proper link across both (all) segments can be established. Refer to section: Configuration guidelines for Link Fault Signaling (LFS) operation for additional details.

Configuration guidelines for Link Fault Signaling (LFS) operation

The following applies to the MCC-2021, MCC-2022, MCC-2022-SM and CCM-1202 converters - singly and paired together.

Link Fault Signaling (LFS) circuitry provides visual indication of link condition on both segments as well as alerting each host DTE or other device, when the remote link (segment) is down. If either segment experiences a link failure or is not connected, the remaining converter/host link is instantly disabled. Each end device can quickly establish a back-up connection path if available.

1. The MCC-2002 converter begins operation when it receives a link signal from a device attached to either the 10Base-T or the 10Base-FL port, then turns-on the link signal to the device connected on the other (port) segment.
- Both segments (F/O and T/P) must be connected to the MCC-2002 before proper link across both segments can be established.
 - At least one end device must provide a good link signal to initiate link across all segments.
 - Normal "good" link on both segments will be indicated by the UTP LNK and F/O LNK LED's lit.
 - If one link segment is broken, the link LED will no longer be lit but the LFS LED will be on. The good (unbroken) segment's link LED will remain lit. The good segment link connection to the far-end device will be disabled turning its link LED off. This indicates the fault condition, the bad link segment and the good link segment. When the faulty segment is repaired, the disabled segment will automatically re-establish a good link.
2. An end device using a 10/100 auto-negotiation TX port to connect to the converter may not provide the initial link signal. This is because the link pulse is generated after the negotiation process is completed, and in some cases, there is a failure to default to 10 Mbs operation. If a 10/100 auto-negotiation port is being used, and there is a failure to default, the initial link signal will originate at the 10Base-FL connection that is connected to a hub, switch, router or node. Pairs of MCC-2022s linked with fiber cannot initiate link. Only an end station that is fixed at 10 Mbs or has defaulted to 10 Mbs after auto-negotiation can provide the needed initial link signal.
3. The MCC-2002 does not auto-negotiate data transmission rates. It only functions at 10Mb/s. Both end devices attached on each segment must also match that data rate. If the twisted pair link from the CCM is attached to a device with a 10/100/half duplex/full duplex auto-negotiation port, the link initiation process can [only] begin at the end-device with the fiber optic or (non-negotiation) UTP connection.
4. When two MCC-2002 converters or a combination MCC-2002 converter and CCM-1202 card are placed in series linking two twisted pair segments, the converter pair will establish link and support the full LFS function if at least one end device has:
- A 10Base-T port that is fixed at 10Mb/s half/full duplex operation. (OR)
 - Has a 10/100 TX port that can be configured by software command, to provide a fixed 10Mb/s half/full duplex operation.

LED Indicators (Rev. B-2 with Link Fault Signaling):

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|-------------------------------|--|
| 1. SYS PWR LED (green): | The LED will be steady ON when power is applied to the unit. |
| 2. F/O LFS LED (red): | The LED is lit when there is a F/O link failure (and) LFS has disabled the UTP link. |
| 3. F/O LNK LED (GREEN): | F/O Link LED will be lit steady ON indicating good fiber connection. |
| 4. F/O Activity LED (yellow): | F/O Activity LED will flash indicating incoming activity on F/O Port. |
| 5. UTP LFS LED (red): | The LED is lit when there is a UTP link failure (and) LFS has disabled the F/O link. |
| 6. UTP Link LED (green): | The LED will be steady on when the UTP port is properly (configured) |
| 7. UTP Activity LED (yellow): | The LED will blink when there is activity on the attached UTP segment. |
| 8. UTP Collision LED (red): | The LED has been disabled. |
| 9. UTP A/P LED (yellow): | Lit when UTP receive polarity is reversed and has been corrected (Auto Polarity). |

Physical

Case: Fully enclosed, fire-retardant metal construction
Height: 1.2" (2.9 cm) Length: 4.75" (11.48 cm) Width: 2.75" (6.62 cm)

Technical Specifications

UTP Interface

Connector: One RJ-45, 8-pin connector.
Impedance: 100 Ohms nominal.
Cable Type: 22-24 AWG (0.5mm) unshielded twisted pair cable, Category 3 and 5
Link Length: 100 meters or 328 feet maximum, each port

The Unshielded Twisted Pair interface on the MCC-2022 series converters is IEEE802.3 10Base-T standards compliant.

FIBER Interfaces

Fiber Optic interface: IEEE 802.3 10Base-FL (FOIRL) standard for fiber optic transmission.

Multi-Mode Fiber-Optic Interface

Connector: One pair of SMA or ST type connectors
Cable Type: 50/125, 62.5/125 and 100/140 um multi-mode duplex fiber
Receiver Sensitivity: -32.5 dBm Overdrive Limit: -8.2 dBm

Transmitter:
Transmitter Wavelength: 850 (820) nano-meters
Output Power: -16.5 dBm (50/125 Fiber, 0/18 NA)
-12 dBm (62.5/125 Fiber, 0/27 NA)
-9 dBm (100/140 Fiber, 0/30 NA)

Segment Length: 2 kilometers or 2.485 miles maximum, half and full-duplex

Single-Mode Fiber-Optic Interface

Connector: Two ST (SM) LED emitter type
Cable type: 8.7 - 10.0 um/125 um SM fiber
Receiver Sensitivity: -33 dBm min.
Optical Transmitter:
Transmitter Wavelength: 1310 nm nominal (LED)
Output Power: -29 dBm min. (10/125 fiber)
Segment Length: Link Length (Max) 4 Km max Half Duplex (CSMA/CD) connections
Link Length (Max) 15Km max Full Duplex connections

Note: The optical launch power and sensitivity can support an optical range of 15 Km. However, the Half Duplex 4 Km distance limit is imposed by the collision domain timing constraint defined by CSMA/CD operation. The Half Duplex 4Km distance represents the best case of transceiver to transceiver connection with no intervening converter or repeater hops in between. The MCC-2022-SM adds the equivalent of an additional pair of transceivers to the overall network time delay. The quality of the Fiber Optic cable, all connections and other attached equipment will affect the maximum delay present. Recall that any collision must be detected within one slot time = 512 bit times.

Power Supply

External wall-mount or table-top style power supply input voltage 95V-135V or 190V-270V and 47Hz to 63Hz. Power supplies comply with UL, CSA and VDE EMI standards.

Agency Compliance

The MCC-2021, MCC-2022, MCC-2022-SC and MCC-2022-SM converters generate and use radio frequency energy, and if not installed or used properly, that is, in strict accordance with manufacturer's instructions, may cause interference to radio or television reception.

The MCC-2021, MCC-2022, MCC-2022-SC and MCC-2022-SM converters comply with the Class A limits of computing devices in accordance to Subpart J, Part 15 of FCC rules.

Safety

Designed in compliance with UL, CSA and TUV safety standards, as well as FCC, CE and VDE EMI standards.

Environmental

Operation temperature: 10° to 55° Celsius
Storage temperature: 0° to 70° Celsius
Relative humidity: 5% to 95% non-condensing
