

WC -155



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**Metrodata WAN-in-a-CAN
WC-155 LAN Extender
Installation Guide**

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1 INTRODUCTION

1. 1 About the WC-155

The Metrodata WC-155 “WAN-in-a-CAN” provides a low-cost high performance LAN extension over fibre. The product can be used to extend a LAN segment across a fibre WAN link to a remote site. The LAN port may be connected to a single LAN workstation or to a hub or switch supporting multiple workstations. The exact configuration will depend upon the user’s network design and workload characteristics. WC-155’s are used in pairs, one on either side of a WAN link.

The user port is an RJ45 socket supporting a 10/100baseT interface. Auto-negotiation of LAN speed and automatic MDI/MDI-X crossover switching are available by default, making the WC-155 a “Plug & Play” device. Alternatively, full manual control can be effected by using the bit-switches mounted on the WC-155’s base plate. The User port performs MAC address filtering of local packets and will forward all other packets.

The WAN port is presented as a duplex SC Fibre transceiver. Model variants support Multi-mode, Single-mode short haul and Single-mode long haul applications. The WAN interface operates at 155.52 Mbps and supports either SONET OC-3 or SDH STM-1 framing.

The WC-155 uses GFP (Generic Framing Procedure ITU G.7041.5) encapsulation within a VC-4/STS 3-c payload to transport LAN traffic across the fibre link. Internal and loop timing modes are supported. The WC-155 requires the whole bandwidth of the WAN link to transport the User LAN traffic, and offers full wire-speed, full duplex operation. The maximum performance of the WAN port is 148810 packets per second (pps) with 64 byte packet size.

An external alarm relay is provided to indicate power failure and WAN port alarm conditions. An LED mounted on the rear panel indicates the unit’s status.

1. 2 WC-155 models

Model variants support Multi-mode, Single-mode short haul and Single-mode long haul applications. Models are available for either 100-250 VAC mains supply, or for -48VDC supply.

Two WC-155 1U enclosures can be mounted side by side in a 19” rack using the rackmount kit. An alternative rack kit is available to mount 18 units in a 6U high 19” rack section.

A forthcoming model will enclose 4 WC-155 units in a single 1U enclosure.

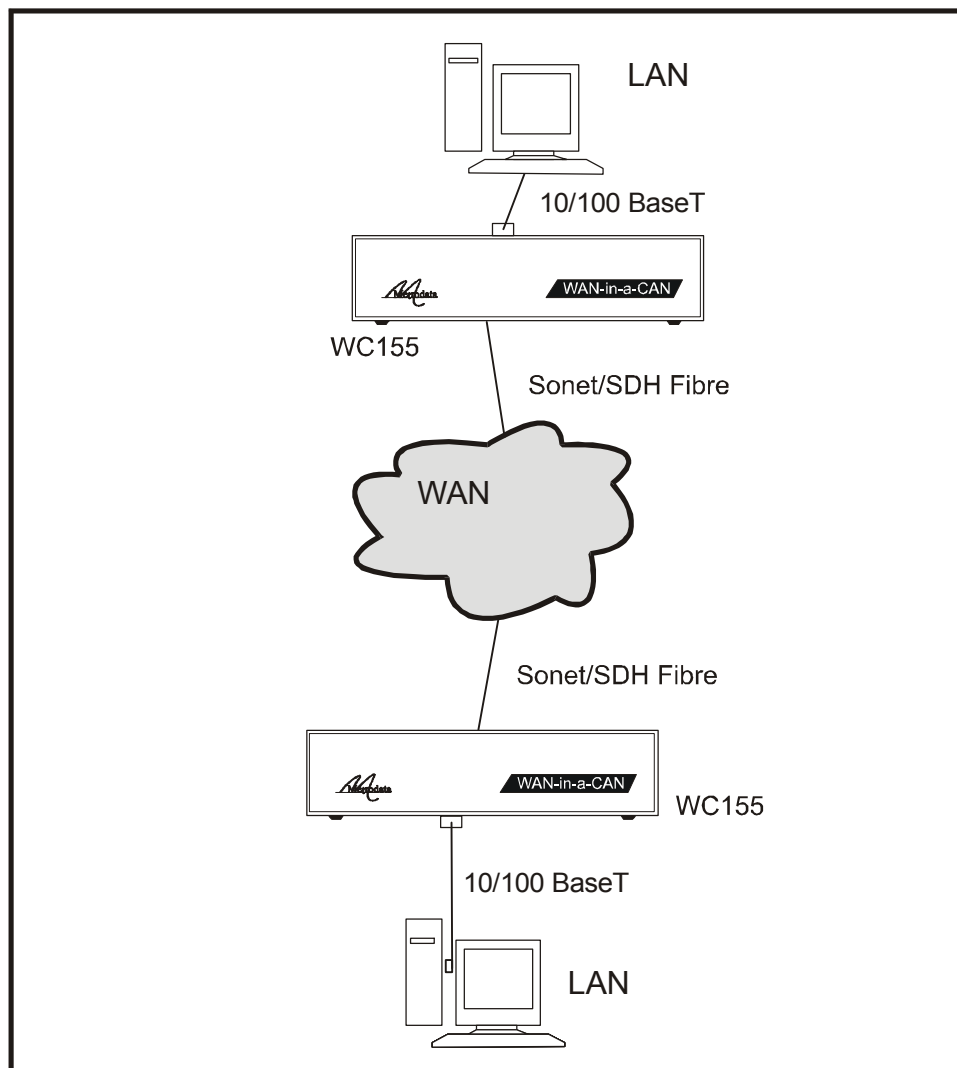


Figure 1. 1 WC-155 typical installation

1. 3 Performance

Forwarding and filtering is performed at a maximum of 148810 64 byte packets per second. The maximum permitted packet size is 1536 bytes, thus allowing the transport of VLAN tagged packets in more complex installations.

1. 4 Safety

The WC-155 should not be connected to cabling which would be required by BS6701 to be equipped with over-voltage protection. The following ports are designated SELV (Safety Extra Low Voltage) within the scope of EN41003:

- 1 x 10/100 BaseT Ethernet port (RJ45)
- 1 x Alarm port (RJ45)

These ports should only be connected to SELV ports on other equipment in accordance with EN60950 clause 2.3.

1. 5 Electromagnetic Compatibility

In order to ensure EMC compliance all signal and data cables and connectors must use a screened connector shell with a screened cable. The cable screen must be terminated to the screened connector shell and not connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance.

1. 6 EN55022 Declaration

The WC-155 is a Class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

1. 7 Laser technology

The user is reminded that the WC-155 employs laser technology. Care must be taken not to expose the eyes to laser beams or radiation since eye tissue damage can result. The rear panel is marked with a label as shown below:

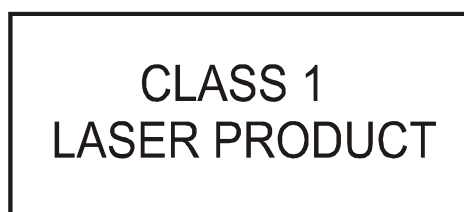


Figure 1.2 Laser warning label

Note that although this warning label appears on Metrodata products, in fact Unconditionally Eye-Safe lasers are used, which comply with IEC825 Class1 and CDRH Class1 Eye Safety Requirements.

1. 8 FCC Declaration

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.

2 WC-155 DESCRIPTION OF PARTS

2.1 Rear panel

All connections into and out of the WC-155 are made through the rear panel which is shown in schematic form below for both AC and DC powered models.

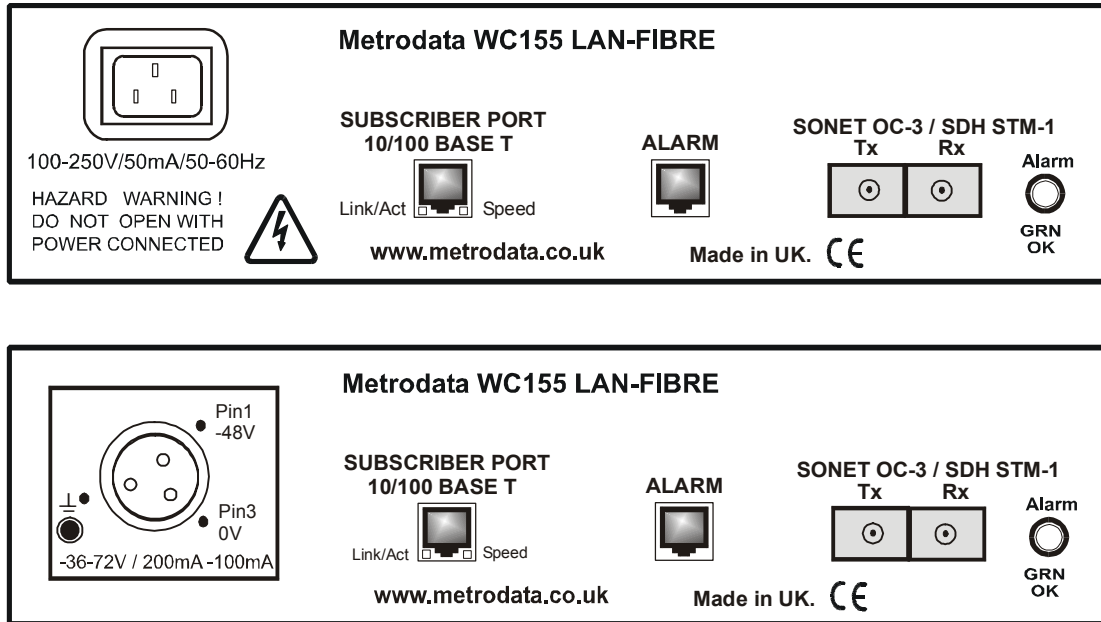


Figure 2.1 WC-155 rear panels for AC & DC models

2.2 Alarm status display - rear panel

There is a status LED on the right hand side of the rear panel which indicates the status of the unit as shown in the figure below.

Status LED	Meaning
Off	No mains power present
Red steady	Loss of Signal
Red/Off Flashing	Loss of Frame
Red/Green Flashing	Line AIS
Red/Green/Off Flashing	Line RDI
Green/Red/Off Flashing	Pointer, Path Errors
Green/Off Flashing	Ethernet Errors
Green Steady	Status OK

Figure 2.2 Rear panel LED status display

The RJ45 connector on the rear panel has two miniature LEDs mounted on it. The left hand (green) LED shows link activity, and the right hand (yellow) LED shows operation at 100Mbps when it is illuminated.

2.3 Power Supply

The WC-155 is powered by a mains supply with an input voltage of 100-250VAC 50-60Hz and with an input current of 60 to 24 mA, depending upon the input voltage. Power consumption is approximately 6 watts. The WC-155 is provided ex-factory with a 250mA internal fuse. AC Mains power is connected via the IEC inlet on the rear of the unit.

An alternative -48VDC powered unit is available. The input voltage and current ranges are -36 to -72 volts DC, 200 - 100mA. A Buccaneer type socket is fitted to the rear panel, and a plug is provided with the unit for the customer's own wiring. The connections are labelled on the rear panel of the WC-155.

On some units, an additional Ground stud may be located on the rear panel to permit a separate Ground connection to be made.

Pin no	Connection
1	-48VDC
2	Ground
3	0VDC

Figure 2.3 -48VDC connections

Note: The WC-155 must be connected to mains safety earth for correct operation. Excessive voltages are present inside the unit. There are no user serviceable parts inside the unit, and the cover should not be removed by unqualified personnel. The unit must not be exposed to damp or condensing conditions.

2.4 LAN port

The LAN port is presented on an RJ45 female connector mounted on the rear panel of the WC-155.

The port automatically sense the LAN interface and switch between MDI and MDI-X configurations. This removes the potential requirement for crossover cables when connecting LANs to the WC-155 regardless of what LAN equipment is being used. The ports also automatically sense the LAN speed and operate at either 10 Mbps or 100 Mbps, and sense whether operation should be in Full or Half duplex mode.

There is a miniature LED on the lower right corner of each RJ45 socket on the rear panel which is illuminated yellow when operation is proceeding at 100 Mbps. The miniature LED on the lower left corner of each RJ45 socket is illuminated green when the link is active.

The RJ45 connector layout for an auto-sensing MDI/MDI-X port is shown below:

Pin No	MDI Signal	MDI-X Signal
1	Tx Data +ve	Rx Data +ve
2	Tx Data -ve	Rx Data -ve
3	Rx Data +ve	Tx Data +ve
4	Not connected	Not connected
5	Not connected	Not connected
6	Rx Data -ve	Tx Data -ve
7	Not connected	Not connected
8	Not connected	Not connected

Figure 2.4 LAN port connector layout

The pin numbering for the connector is shown below:

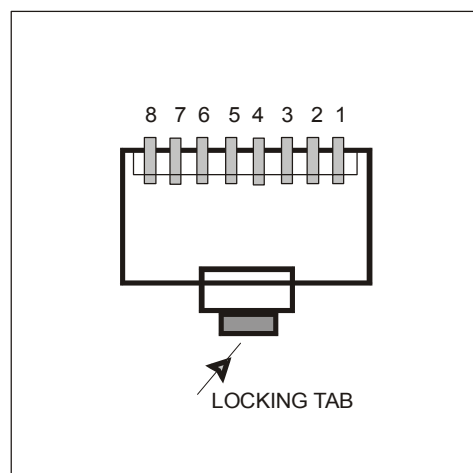


Figure 2.5 RJ45 connector layout

3 INSTALLATION & SET-UP

3.1 Setting-up the bit-switches

The bit-switches on the base of the unit must be set-up before making any connections to the unit. There is an explanatory label on the unit's base which defines the bit-switch set-up.

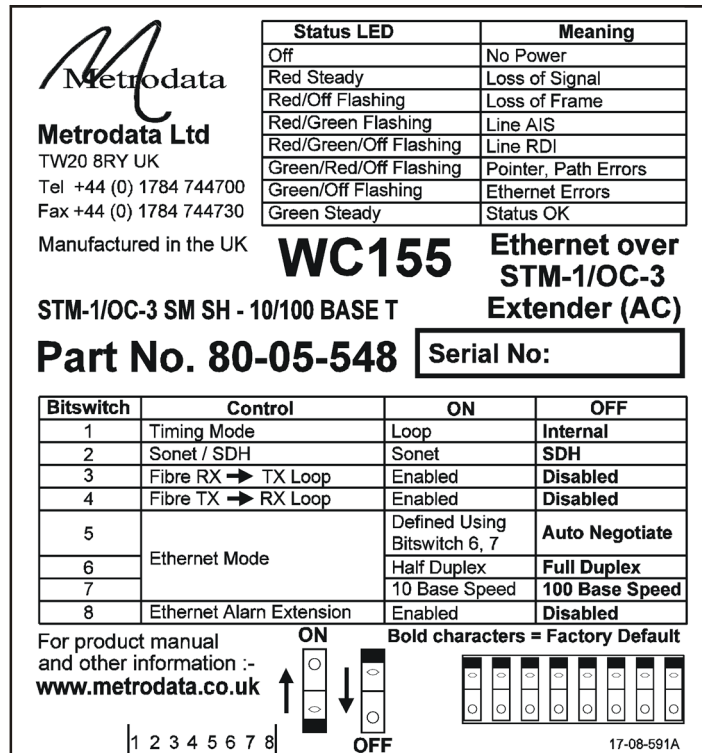


Figure 3.1 WC-155 baseplate label

3.2 Bit-switch definitions

The default settings of the Bit-switches are shown in bold.

Bit-switch	Control	On	Off
1	Timing mode	Loop	Internal
2	Sonet/SDH	Sonet	SDH
3	Fibre RX→TX Loop	Enabled	Disabled
4	Fibre TX→RX Loop	Enabled	Disabled
5	Ethernet Mode	Defined using bit-switch 6,7	Auto-negotiate
6		Half Duplex	Full Duplex
7		10 Base Speed	100 Base Speed
8	Ethernet alarm extension	Enabled	Disabled

Figure 3.2 WC-155 Bit-switch definitions

3 . 2. 1 Timing

TIMING determines the source for the WAN port transmit clock, and is set by bit-switch No1. The options are *ON* or *OFF*. *OFF* is the default setting.

With the switch set to *OFF*, the transmit clock is derived from the WC-155's own internal oscillator.

With the switch set to *ON*, the transmit clock is derived from the LINE receive clock.

3 . 2. 2 Sonet/SDH

With the switch set to *OFF* (default), SDH is selected.

With the switch set to *ON*, Sonet is selected

3 . 2. 3 Fibre Rx to Tx Loop

This is an external loop test mode in which the signal received is looped back at the WAN port to the transmit side of the port. Options are *ENABLED* and *DISABLED* (default).

3 . 2. 4 Fibre Tx to Rx Loop

This is an internal loop test mode in which the transmit signal is looped back at the WAN port to the receive side of the port. Options are *ENABLED* and *DISABLED* (default).

3 . 2. 5 Ethernet mode

This mode is set using bit-switches 5, 6 and 7. When switch 5 is in the default *OFF* state the *AUTO-NEGOTIATE* mode is selected, and the Ethernet User port auto-negotiates Full/Half Duplex and 10 or 100 BaseT speed.

Auto-negotiate does not distinguish between full versus half duplex modes when negotiating with a fixed (i.e. non-negotiating) 100Mbps port.

When switch 5 is in the *ON* state, the Ethernet mode is forcibly defined by the positions of bit-switches 6 to be Full or Half Duplex, and switch no 7 to be 10 or 100 BaseT speed. Defaults are Full duplex and 100 BaseT.

3 . 2. 6 Ethernet Alarm Extension

In the default *OFF* state, no Alarm actions are performed. When bit-switch 8 is in the *ON* state, the Alarm extension relay is activated to provide alarm signals for external devices to indicate power failure and/or WAN port alarm conditions.

3.3 Rackmounting option

A Rackmounting kit may be used to mount two WC-155 units side by side in a 19" rack.

The kit, Part no 80-05-256, has a recessed plate to permit fibre bends to be made within the envelope of a 19" rack. It also has a single cut-out to, accommodate all connections to the rear of the WC-155. The installation method is the same in all cases.

First remove the two rear panel screws securing each unit's cover. Fasten the two WC-155 units to the rack mount adaptor plate using the screws that you have removed, as shown in the illustrations below.

Then secure the rack mounting plate complete with the two WC-155 units to the 19" rack using the locating holes at the ends of the adaptor plate. If you have set the bit-switches on the base plate of the units before fixing them to the adaptor plate, check that the settings are still correct.

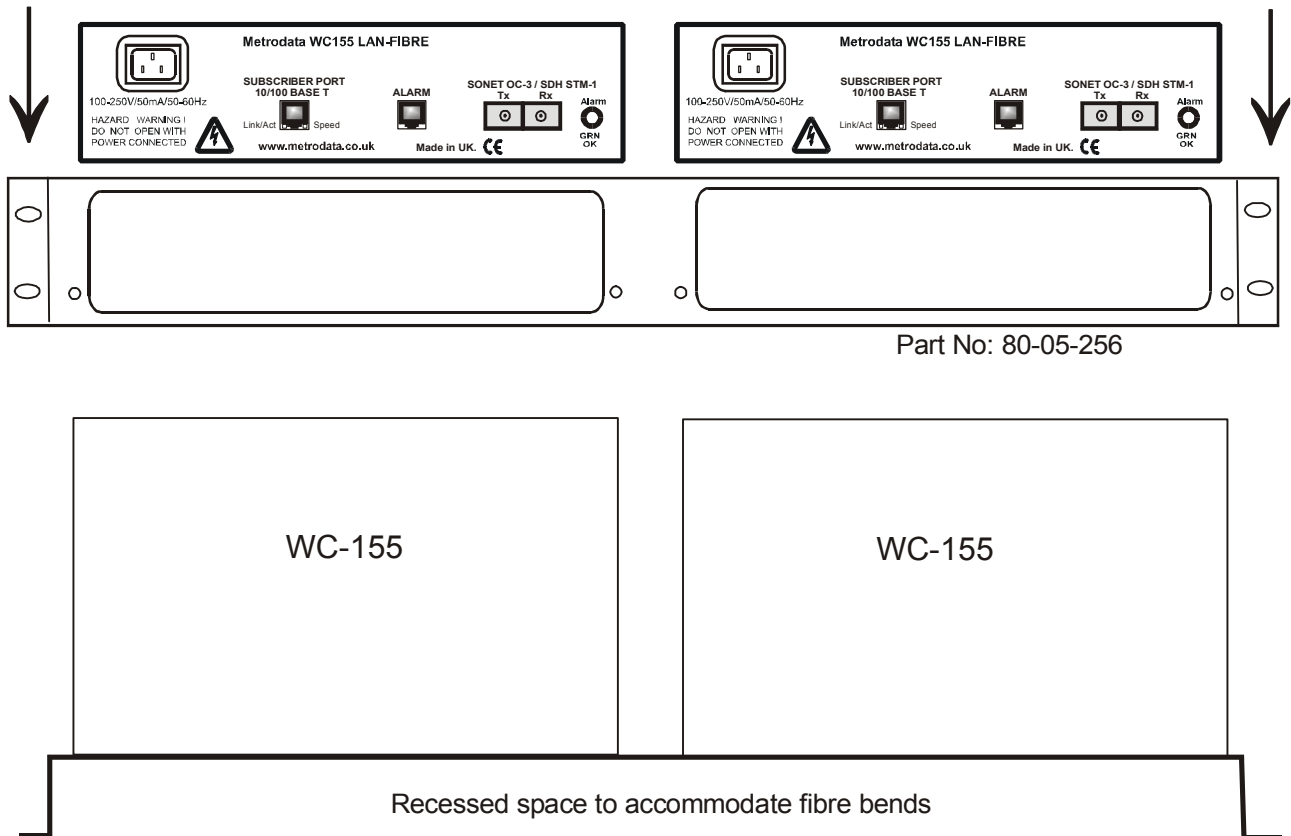


Figure 3.3 2-unit recessed rackmount plan & elevation

3. 4 Connecting up

Safety Notice: Ports that are identified as SELV in this manual should only be connected to SELV ports on other equipment in accordance with EN 60950 clause 2.3.

Step 1: Mounting.

The WC-155 is housed in a convenient 1U table top enclosure. 19 inch rack-mount options are also available, as well as rack nests for two or 18 units. The procedure for mounting 2 WC-155 units side by side is described in the next sub-section.

An option is also available for 4 WC-155's to be mounted in a single 1U enclosure. The unit rear panel will then present 4 WAN port SC-connectors and 4 RJ45 Ethernet port connectors.

Step 2: Check and set up bit-switches

These switches are located on the base of the unit and must be set up as required by the network. If they are all in the OFF position, the WC-155 is in its default state.

Step 2: LAN port

Connect the WC-155 to the LAN port using the RJ45 port labelled *SUBSCRIBER PORT 10/100 BASE T* on the rear panel.

Step 3: WAN port (Fibre)

Connect the WAN by means of the two SC fibre connectors labelled *SONET OC-3 / SDH STM-1 Rx* and *Tx*. Remember to set the *PORT SELECT* bit-switch 2 on the unit's baseplate to the correct interface type (Sonet or SDH) before connecting.

Step 4: Power Supply

Finally, connect the mains power and re-check all connections for security. Then turn on the power supply. Check the rear panel status LED to ensure that it is continuously lit (green).

Warning: Do not connect the WC-155 to excessive voltage. Read the safety information before continuing.

4 ALARMS, TROUBLESHOOTING & TESTING

4.1 Alarms

The Status LED on the WC-155 rear panel shows alarm conditions as shown below:

Status LED	Meaning
Off	No mains power present
Red steady	Loss of Signal
Red/Off Flashing	Loss of Frame
Red/Green Flashing	Line AIS
Red/Green/Off Flashing	Line RDI
Green/Red/Off Flashing	Pointer, Path Errors
Green/Off Flashing	Ethernet Errors
Green Steady	Status OK

Figure 4.1 Rear panel LED alarms

4.2 Troubleshooting

Step 1: Verify the power supply

Check the status LED on the right hand side of the rear panel of the unit at both ends of the link. If either is unlit, power is not present on that unit. Check the mains connection to the unit. If mains supply is satisfactory, we recommend that the unit be taken out of service and returned to a repair centre. Unqualified users should not open the WC-155.

Step 2 Establish and verify the LAN link

Connect the LAN cable to the LAN port. If the LED on the bottom left hand corner of the RJ45 socket goes green, or flashes green, then there is a LAN connection. If the LED remains dark, there is no LAN connection, and investigatory action should be taken on the LAN and/or its cables. If LAN operation is at 100Mbps, the LED at the bottom right hand corner of the RJ45 socket will flash yellow.

Step 3 Establish and verify the WAN links

If the WAN link is suspected of being faulty, the tests described in the next sub-section may help to identify the nature of the problem and/or the likely location of the fault.

4. 3 Test Loop Fibre Rx to Tx

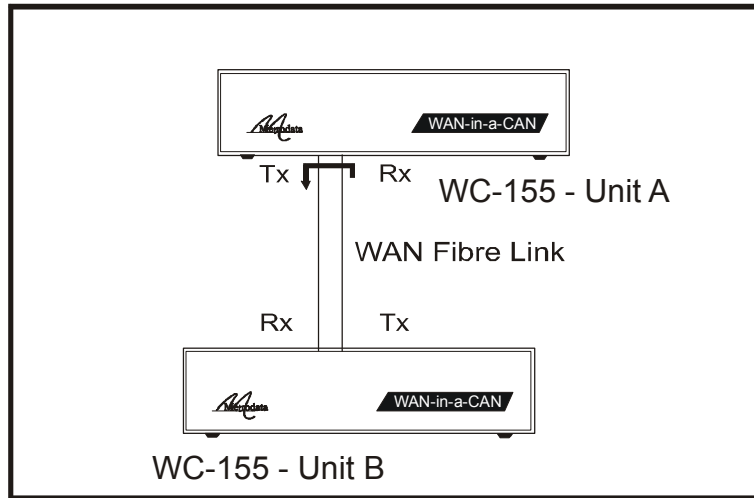


Figure 4.2 Test loop Fibre Rx to Tx

Set the local WC-155 base panel bit-switch number 3 labelled *FIBRE RX to TX LOOP* to the *ON* position. When the test loop is activated, the signal received at the local unit A from the remote WC-155 is transmitted back to the remote unit B. This is also known as an External loop test.

If the remote unit recognises its own transmissions, then the link has been validated.

4. 4 Test Loop Fibre Tx to Rx

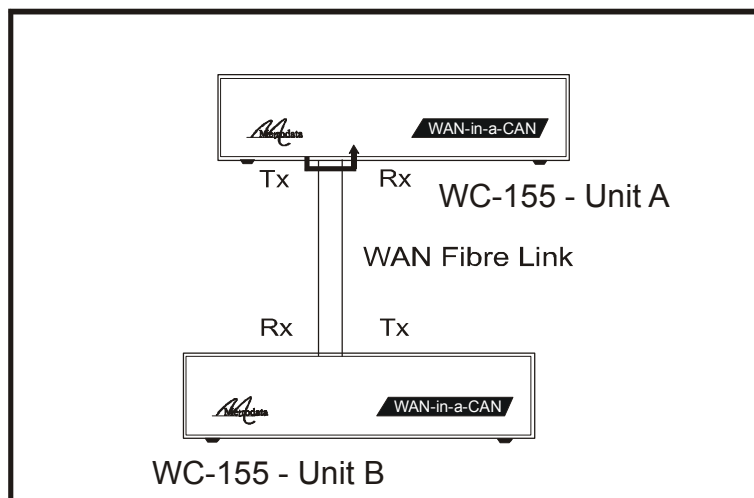


Figure 4.3 Test loop Fibre Tx to Rx

Set the local WC-155 base panel bit-switch number 4 labelled *FIBRE TX to RX LOOP* to the *ON* position. When the test loop is activated, the signal transmitted at the local unit A is looped back at the interface to the receive port of the local unit. This is also known as an Internal loop test

If the local unit recognises its own transmissions, then unit A's operation has been validated.

5 WC-155 SPECIFICATIONS

WAN (Line) Port	Definition
Presentation	Duplex SC Fibre Transceiver
Multi-mode Fibre option	Wavelength: 1310 nm, Loss Budget: 11dB
Single-mode Short Haul option	Wavelength: 1310 nm, Loss Budget: 15dB
Single-mode Short Haul option	Wavelength: 1310 nm, Loss Budget: 29dB
Data Rate	155.52 Mbps
Framing	Sonet OC-3 or SDH STM-1
Encapsulation	GFP over OC-3/SPE or STM-1/VC4
Clocking options	Internal or Loop
Packet rate	148810 x 64 byte packets per second
LED Indicators	On RJ45 LAN Socket: Traffic present: Green, 100 Mbps: Yellow Rear Panel LED: Power, Alarm & Test status indications by LED codes
Alarms	LOS, LOF, AIS, RDI, Pointer/Path errors, Ethernet errors
Diagnostics	Internal and External Loop Tests on WAN ports initiated by bit-switch
LAN (User)Port	Definition
LAN Interface	1 x RJ45, Auto switched MDI or MDI-X, or fixed MDI selected by bit-switch
Operating modes	Auto negotiated 10/100 Mbps, Full / Half Duplex, or manually selected by bit-switch
Port filtering rate	148810 pps (packet per sec)
Port switching rate	148810 pps (packet per sec)
MAC address table	4096 entries
Min/Max Packet size	64 bytes minimum, 1536 bytes maximum
General	Definition
Power supply	100-250 VAC, 50-60 Hz, 50 mA or minus 36 to minus 72 VDC, 200-100mA
Dimensions	202 x 132 x 44 mm (w x d x h) Enclosure only 202 x 132 x 47 mm (w x d x h) Overall including feet
Environmental	Range
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

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