

Inception

LAN Installation Guide

NOTE

This manual is a supplement to the Inception Controller Installation Manual and must be used in conjunction with that document.

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DISCLAIMER

1. The manufacturer &/or it's agents take no responsibility for any damage, financial loss or injury caused to any equipment, property or persons resulting from the correct or incorrect use of the system or it's peripherals. The purchaser assumes all responsibility in the use of the system and it's peripherals.
2. While every effort has been made to ensure the accuracy of this manual, the manufacturer assumes no responsibility or liability for any errors or omissions. Due to ongoing development, this manual is subject to change without notice.

RS485 LAN SYSTEM OVERVIEW

The Inception RS485 LAN (Local Area Network) is a 3 or 4 wire network, and is the primary method used to connect remote modules in a system. Using recommended cable types, modules on the LAN can be installed hundreds of metres from the Controller.

Programmable supervisory polling continuously monitors the network to detect cable tamper, cable fault conditions, module off-line and module substitution. The data format used has been developed to ensure fast, reliable communications regardless of the size of the system.

For larger systems and complex sites, LAN Isolators can provide opto-isolation between sections of the LAN, eliminate potential earth loop problems, improve surge protection, provide signal level restoral for improved performance over longer cabling distances and offer a monitored "loop" LAN wiring option for a higher level of LAN integrity.

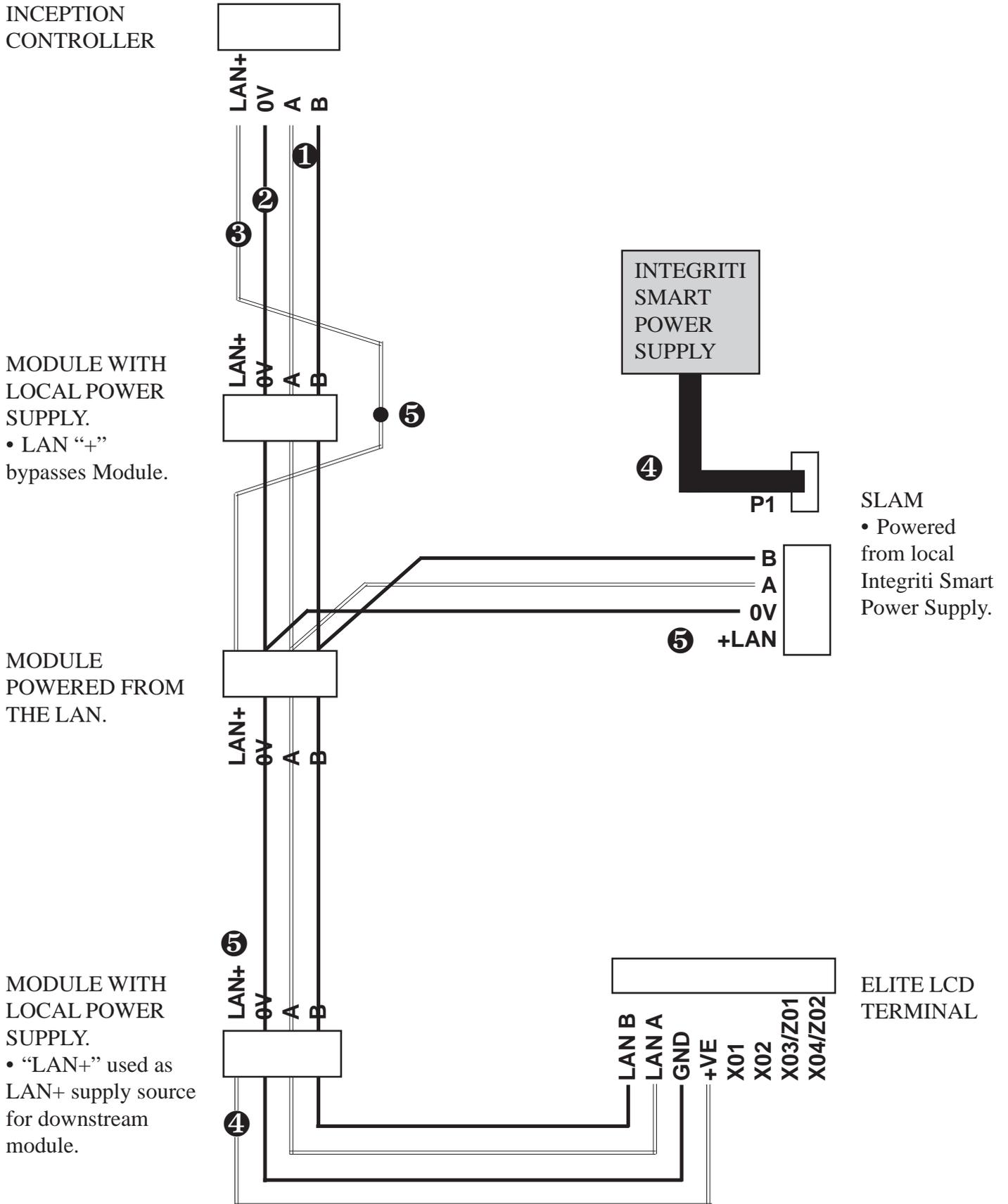
CONNECTING MODULES TO THE LAN. Refer to diagram opposite.

- "A" & "B" signal connections are wired in parallel across the system using TWISTED PAIR cable. ❶
See "Cable Types" details on page 4.
The "NEG" connection (0V reference) must also be wired to every module. ❷
 - An optional + 12 V connection (LAN +) may be used to provide power to modules that do not have their own local power supply. e.g. LCD Terminals. ❸
 - The +12 V connection (LAN +) used to power LCD Terminals, etc. can be derived from any module with it's own local power supply (e.g. Controller and 8 Zone LAN Expander), or from a separate external power supply. ❹
CAUTION ! Never connect the + (POS) of two power supply sources together. i.e. Controller LAN+, Expander Module LAN+, or External Power Supply +ve.
 - When wiring the LAN to Modules that are powered by a local power supply, do not connect any incoming LAN +12V wires to the LAN+ connection on the Module. ❺
- NOTE: LAN +/- should not be used to power detectors, relays, etc. Always use "VOUT" or "DET+"/"DET-" on the module to power these devices.
- A DC Voltmeter may be used to check that the LAN will operate reliably. See "LAN Voltage Testing" on Page 8.

SYSTEM EARTHING

- Ensure that 0V(Common) and DET - , on all remote Modules have NO local connection to Earth. (Defeats Surge Diversion circuitry if connected)
- The System Ground (0V) is connected to Mains Earth via the Power cord at the Controller.
- In some cases a device connected to the Controller may also provide a connection to earth via the peripheral device. If so, ensure that the peripheral device is powered from the same AC Mains circuit or the connection is isolated.
- While the metal chassis of remote modules with a local power supply such (e.g. 8 Zone LAN Expander or SLAM) is connected to Mains Earth, the PCB circuitry is isolated from the chassis. Ensure that wiring, additional hardware or peripherals connected to these modules does NOT provide an Earth connection to the Module PCB.

Connecting Modules to the LAN.



CABLE TYPES. (Ensure that the cable complies with relevant standards and regulations)

- TWISTED PAIR Cable **MUST** be used to connect the RS485 LAN.

Multi-strand wire is preferred for terminating into the screw terminal connectors and may be mandated by standards.

Two pair or Category 5/5e LAN cable is suitable as it provides all 4 conductors required. One pair for “A” & “B”, and the other for “POS” & “NEG”. The twist ratio should be equivalent to Category 5 cable or RS485 cable or better.

Unshielded cable is quite acceptable, however, in situations where electrical storms or higher levels of electrical interference may be present, shielded 2 pair cable should be used. Examples of suitable 2 pair cables:

Unshielded. Figure 1.

- Olex JCAT5E
- Tycab TIC6105 †
- Tycab DPZ81051
- Alpha 1317C
- Belden 9744
- DCS CM-CAT5E
- Garland UTPL5E
- Garland UTPL5EMTP ‡

Shielded (All Multistrand) Figure 2.

- Olex JD2PS485A3
- Tycab DPF4702
- Tycab DCK4702
- Alpha 2466C * / 6413
- Electra EAS7202P / 7302P
- General Cable B2002CS
- Belden 8723 * / 9842
- Tycab DQQ47025 *
- Garland MCP-2S
- Roadworx RW600224
- Electra EAS16202P

Legend:
† 3 Pair.
‡ Multistrand (7/0.2).
* Individually screened pairs.

- If SHIELDED CABLE is used, DO NOT use the shield as a negative connection & do not allow the shield to make contact with Negative, Ground, or any other wiring or metalwork within the system. Shields should only be terminated to a Protective Earth at ONE END of the cable. ❶ See “System Earthing” below. If no suitable earth point is available at a module location, the shield can be looped back to the shield of the previous length of cable. ❷

- LAN POWER CABLING. Separate heavy duty Figure 8 cable (24 / 0.20 recommended) should also be run for “POS” & “NEG” over longer distances if used for powering modules. e.g. LCD Terminals. *Figure 3.*

LAN “POS” current required:

Max. Cabling Length for LAN +ve (POS) & GND (NEG)

	Twisted pair	Fig 8. 14 / 0.20	Fig 8. 24 / 0.20
60mA (e.g. 1 LCD Terminal)	200 metres	400m	640m
120mA (e.g. 2 LCD Terminals)	100 metres	200m	320m
180mA (e.g. 1 SLAM - Reader pwr not incl)	62metres	130m	210m
250mA (e.g. 4 LCD Terminals)	50 metres	100m	160m
500mA (e.g. 8 LCD Terminals)	25 metres	50m	76m

Remember to allow for any extra current required by Detectors, Auxiliaries, Readers, etc:

NOTE: Lock strikes must not be powered from the LAN.

Relay (1A contacts)	approx. 25mA	Small Proximity reader (~10cm read range)	~50 to 120mA
Relay (5A contacts)	approx. 45mA	Standard Prox reader (~15cm read range)	~120 to 180mA
PIR	15 to 25mA typical.	Magnetic Swipe reader.	~15mA

Figure 1. Twisted pair communications cable.

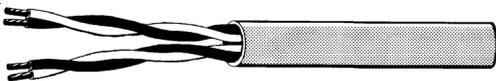


Figure 2. Shielded, twisted pair communications cable

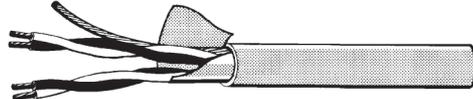
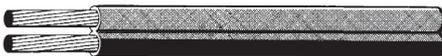


Figure 3.

Heavy duty Figure 8 cable. 24 / 0.20 Used for LAN +ve & GND on long cable runs.



SURGE PROTECTION.

- In multi-building installations and on longer cable runs, shielded cable should be used to provide added protection.
- Each individual shield should be terminated to a Protective Earth point such as an earth stake, building earth (metal building framework) or Earth point in the equipment enclosure. ❶ It is very important to ensure that the shield makes no contact with Negative, 0V, Ground or any other wiring within the system.
- Inner Range Advanced Surge Protection Devices provide surge protection for the Inception and Integriti family of products. They consist of the Power Surge Diverter, LAN Surge Diverter and the PSTN (Telecom) Line Surge Diverter and can be used where LAN cabling enters/exits each building, or on cable runs that are more exposed to spikes or surges. LAN Isolator/s can also be included in a Surge protection scheme to electrically isolate different sections of the LAN.

SYSTEM CABLING CONFIGURATION *Figure 4 & Figure 5.*

- Avoid installing the LAN cable with mains power cables & any other cables likely to cause interference wherever possible
- No module is to be more than 1.5km (1500 metres) cable length from the Control Module OR from a LAN Isolator “LAN 2” or “LAN 3” Port OR from a CLOE Slave. ③
(LAN Isolator/s can be used to extend the cabling distance. CLOE devices can be used to link LAN sections via Ethernet)
- **TOTAL LAN CABLING** in a system without LAN Isolators should not exceed 2000 metres, and/or 64 Modules. ④
If the total amount of LAN cable will exceed 2000 metres, and/or there are more than 64 modules to be connected, LAN Isolator/s must be used to separate the LAN system into sections and maintain optimum LAN performance. i.e. Include one LAN Isolator for every 2000 metres of LAN cabling and/or for every 64 Modules connected. ⑤

LAN TERMINATION

- The Inception RS485 LAN is self-terminating and LAN Modules do not have a “Termination” setting.
- Elite LCD Terminals used in an Inception LAN **MUST NOT BE TERMINATED.**
i.e. The “Term” Link must be removed.

Figure 4. Simple LAN configuration.

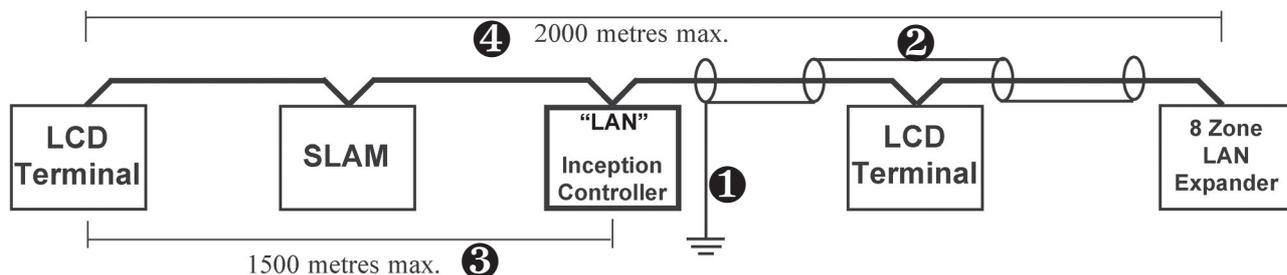
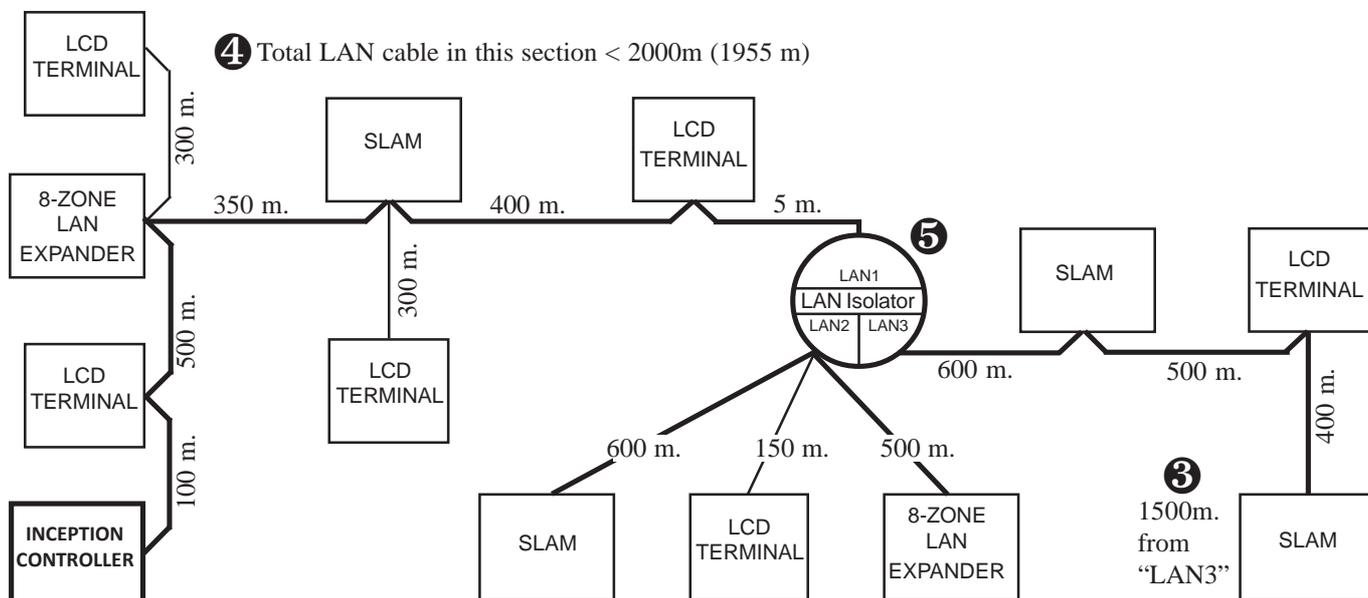


Figure 5. Complex LAN configuration.



LAN TROUBLESHOOTING FLOWCHART

BEFORE SYSTEM POWER UP

(No Power connected to modules
AND No batteries connected)

A1. WHERE POSSIBLE, PHYSICALLY CHECK:

- LAN A & B connections not reversed on any module.
- No module's 0V is connected to earth. (via mounting bolts, ext. power supplies, input/output cabling, etc.)
Note that the Controller 0V may be connected to earth via the supplied power supply. If so, this must be the only 0V to earth connection in the system unless Isolators are used.
- Elite LCD Terminals are NOT terminated.



A2. CHECK FOR SHORT CIRCUITS ON THE LAN

(No Power connected AND No batteries connected)
METER ON OHMS RANGE

Check at the Control Module for short circuits between:

- LAN A & B.
- LAN A to +ve and -ve.
- LAN B to +ve and -ve.

Note:DC Resistance in the LAN cable (~0.18Ohms/metre) can mask short circuits that exist on longer cable runs.



A3. CHECK LAN TERMINATION

(No Power connected AND No batteries connected)
METER ON OHMS RANGE

Measure between LAN A & B on the Control Module:

If 470 Ohm or less*

Short circuit across LAN A & LAN B,
OR, one or more Elite LCD Terminals are terminated.

Locate the Modules and remove the Termination.

* See Note 1.



POWER UP SYSTEM & CONNECT BATTERIES

A4. CHECK CONTROLLER OPERATION

DC POWER CHECK. With Meter on DC Volts range, measure between LAN +VE & LAN -VE (GND) on the Control Module:

11V to 14V. OK.

<11V. Too many devices being powered from the Control Module or Battery Flat.

Check FAULT LEDs on Controller:

Refer to "LED Status Indicators" in the Inception Controller Installation Manual for details.



A5. DETERMINE THE TYPE OF LAN PROBLEM

A. SOME MODULES HAVE INTERMITTENT COMMUNICATIONS PROBLEM.

Proceed to Step B1, "Intermittent LAN problems". ⇒

B. SOME/ALL MODULES NOT COMMUNICATING AT ALL. Proceed to Step A6.



A6. IS THE LAN COMPLETELY DEAD ?

YES. Proceed to Step C1, "LAN Dead". ⇒ ⇒

NO. (Some Modules not communicating, others OK)
Proceed to Step A7.



A7. CHECK STATUS OF PROBLEM MODULE/S

DC POWER CHECK. Meter on DC Volts range. Check for 11 to 14 Volts between LAN +VE & LAN -VE (GND) on the problem module. See Note 2.

Check LAN & FAULT LEDs OR LCD Display on problem Module:

Both LEDs Off OR Display has no "Module ..." messages.
Proceed to step A8.

Any other state. Refer to relevant module installation manual for LED details.



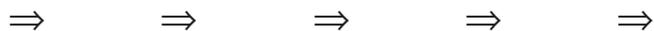
A8. TEST LAN VOLTAGES AT PROBLEM MODULE/S

Perform LAN Voltage Checks at the problem Module/s. Refer to the table "LAN Voltage Testing" on Page 18.



A9. SUBSTITUTE MODULE/S

If the troubleshooting procedure fails to locate any power, wiring or termination problems, you may have an equipment fault. Replace the module/s suspected of causing the problem.



LAN DEAD

⇒ **C1. TEST VOLTAGES AT CONTROLLER**

Perform LAN Voltage Checks at the Inception Controller. Refer to the table “*LAN Voltage Testing*” on Page 8.

If this fails to locate the problem, *proceed to Step C2.*

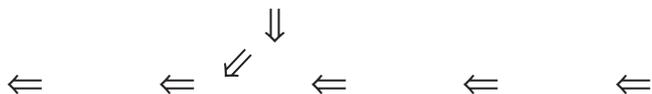


C2. ISOLATE PROBLEM CABLING OR MODULE/S

Disconnect all LAN wiring from Inception Controller. Reconnect one LCD Terminal and ensure that it communicates. (If it doesn't, follow Steps A7 & A8)

Reconnect the LAN one module at a time until a problem module, or section of cabling kills LAN communications when reconnected.

With the problem area identified, *proceed to Step A8.*



INTERMITTENT LAN PROBLEMS

B1. WHICH MODULES ARE INTERMITTENT ?

Using an LCD Terminal or Review Logging via the browser, check Review data for “Module Disconnected” and “Module Connected” messages.

Each message will also identify the Module type and number. Note the problem module/s. *Proceed to Step B2.*



B2. IS ANOTHER EVENT CAUSING THE MODULE TO BE LOST ?

Look at the Review Messages immediately preceding the “Module Disconnected” messages for any event that repeatedly coincides with the loss of module/s, or if the loss of module/s occurs at, or around, the same time of day. Look for messages such as Door Un-lock/Lock, Siren On, Auxiliary On, etc., and note the times when the “Module Disconnected” messages occurred.

YES. Ancillary devices & external equipment (e.g. electrical machinery) can produce voltage spikes, electrical noise and excessive current drain. If the LAN, Power & Auxiliary circuits are not wired correctly or Earth loops exist, these devices can interfere with LAN communications.

If such an event does coincide with loss of comms, reproduce the sequence of events to confirm the effect, then check any associated wiring circuits accordingly.

NO. *Proceed to Step A8*

NOTES:

1. LCD TERMINAL TERMINATION RESISTOR CHECK

To determine if an LCD Terminal is fitted with a Termination Resistor, disconnect the module from the LAN, remove power, and measure across LAN A and B on the module with the meter on the OHMS range.

LAN VOLTAGE TESTING

NOTES:

1. These Voltage checks should be done with no (or minimal) communications traffic on the LAN. To ensure this:
 - a) Check that poll times for all addressed modules in the system are set to 1 minute (60 seconds) or greater.
 - b) Disconnect LAN A and LAN B from any unaddressed modules on the LAN, as these modules may be constantly attempting to send messages to the Control Module.
 - c) Ensure that Terminals, Readers, etc. are not being used while performing tests.
Before proceeding with Voltage tests, check the "LAN TX & RX" LEDs on one or more modules to confirm that there is minimal LAN activity.

2. To determine if a problem exists on the module under test, or elsewhere on the LAN, these voltage tests can be performed:
 - a) With the module connected to the LAN.
 - b) On the cable connections with the module disconnected from the LAN.

Test Point + PROBE	Test Point - PROBE	EXPECTED RESULT	PROBLEM/ REMEDY
LAN +ve	LAN -ve or GND	11V to 14V DC	0V. Open circuit LAN +ve connection, or short cct between LAN +ve and LAN -ve. < 11V. Too many modules powered from the LAN power supply source. Length (or guage) of LAN cabling causing excessive Voltage drop on the cable.
LAN B	LAN A	500mV to 4.5V DC	Negative reading (< 0V). LAN A & LAN B connections reversed. 0V. Short circuit between LAN A & B. < 200mV. Possible short circuit between LAN A & B. < 500mV. One or more legacy Concept 3000/4000 Modules may be terminated in this section of the LAN. Remove Termination. > 4.5V. LAN A &/or LAN B Open circuit.
LAN A	LAN -ve or GND	500mV to 4.5V DC	< 500mV / > 4.5V DC. System may have more than one module connected to an earth point, causing earth loop/s. Ensure that no more than one module in the system is connected to earth. Remember that a module may be connected to earth via a peripheral device or it's cabling. e.g. PC, Printer, External power supply, Detector, Output device, etc. If installation methods &/or system configuration makes multiple earth points unavoidable, install LAN Isolator/s or Fibre Modem pairs at suitable points in the LAN system to isolate the earthed section/s.
LAN B	LAN -ve or GND	500mV to 4.5V DC	As above.