TECHNICAL SUPPORT DATA

Fault Finding on the JTL Network

The following document is intended for on site guidance. For comprehensive instructions please refer to the User Guides and Item Number manuals.

Overview of the JTL Network or Communications System

All JTL network products communicate with a JTL network controller on a 2 wire RS485 multidrop network cable. Up to 32 JTL network products can communicate on a single 2 core cable (zone). The units on a zone are all in parallel electrically, but the installation normally means that the units are 'daisy chained'. For display cabinet controllers JTL provides pre-made 'jumper' cables which connect adjacent units together. Ideally each zone is installed as a single spur however site conditions often dictate that several spurs may occur on a single zone. Up to 5 zones may be connected to a network controller.

The communications speed is defined by the network controller at either 600 or 4800 baud. To enable the communications to be managed, all JTL network products have 1 or more identification numbers (unit number) which act as a unit address. During commissioning the connected unit numbers are entered into the network controller.

A communications failure alarm indicates that the unit is failing to communicate with the JTL network or network controller. The alarm is critical because there is, as a result of the communications failure, no knowledge of the state of the controller. This alarm does not imply that the controller is not functioning properly only that it is no longer communicating. This fault must be rectified as soon as possible as no other alarms can be given while it is not communicating.

Communications failure can occur as a result of the following conditions.

- Cabling problems
- Defective controller
- Defective network controller
- Signal or voltage being applied to zone cable from a source external to JTL equipment

To isolate which of the above is causing the failure, a fault finding strategy is required.

Experience has shown that controllers do not fail to communicate but continue to function normally without external influences. Less than 0.1 % of all such faults are due to a simple component failure. Controllers fail in this way due to rodent activity, water damage and electrical over voltage or surges applied externally.

Fault Finding Strategy

To implement this strategy the use of a digital voltmeter is necessary, the voltmeter should be set to measure 5 V dc

Before starting to find the fault determine the exact routing of the cables and any spurs, so that a logical plan can be developed.

Identify which zones contain units with communications faults.

Are all the units on a zone faulty?

Are all the units beyond a certain point on the cable faulty?

Are all the units on a particular spur faulty?

Are the faults permanent or intermittent?

Is there a pattern to intermittent faults such as the time of the occurrence?

Each zone on the network controller has an LED indicator associated with it. The LED is on during transmission and off during receive. If there are no units in the zone list of the communications controller then the LED is normally on or off continuously. Study the flashing of the LEDs and see if there is a pattern. Fast flashing indicates good communications, slow flashing or a constant on condition indicate no communications.

If part of the zone is permanently faulty then this can only be associated with cable damage or possibly (statistically unlikely) a faulty controller at the point of the cable break. The controller fault would be a mechanical problem such as a faulty or damaged connector. There is no possibility that an electrical problem with the controller can cause such a fault.

Measure the voltages on the zones affected on both wires to earth and measure the voltage between the wires. The voltages to earth should be positive and the average of the 2 voltages should be about +2.5 V dc. The voltage between the wires varies depending on the number of units connected, about 4 V dc for no units down to about 0.5 V dc for 31 units. The voltage between the wires falls quite rapidly for a the first few units connected then more slowly towards a full zone of 31 units.

The measured voltage between the zone pair should be the same at all points on the zone. If the voltage varies between the network controller and the controllers then the only explanation is a cable break.
The network controller zone cables are connected to the communications unit via screw terminals. After measuring the zone voltages with the zone connected disconnect the wiring and measure the voltage from the network controller. This should be about +0.5 and +4.5 V dc on the pair. With the zone disconnected the LED should flash slowly when trying to communicate. If prior to disconnecting the zone the LED was on more or less permanently then a faulty controller or short circuit cable is the likely cause. This would normally be associated with a whole zone of permanent communications failure alarms.

If when the zone is disconnected the LED stays on or the voltage is not as specified above then damage to the network controller is suspected. This would often be associated with a 'hot' communications chip which would be adjacent to the connector and marked '75176'. Such damage is ALWAYS as a result of external application of high voltage or power surges caused for example by a lightning strike or badly routed cables. If this cause is suspected there is often similar damage to some or all of the controllers connected on the zone.

When the fault is permanent and a short circuit cable or damaged controller is suspected the zone must be split into manageable parts. Often only one part of the zone will be affected so the other part will then recover. Once the faulty part has been isolated then the zone can be further subdivided to find the faulty controller. If the fault is due to the external application of high voltage or power surge then controllers on the whole of the zone may be damaged. If this is the cause of the zone failure then all the units will need to be repaired or replaced. We would recommend, under these circumstances, that a JTL service engineer be called in as the controllers can often be repaired on site at a lower cost than the cost of replacing the units.

If the average voltage to earth on the zone pair is not about +2.5 V dc but significantly different, for example +7 V, then this is usually due to an earth fault on one of the controllers or its associated parts. Display cable or temperature sensor cable damage has been found to be a cause of such problems in the past. These problems can be isolated by splitting the zone into parts and finding the offending controller by use of the voltmeter.

Intermittent faults are difficult to isolate but can usually be traced with a voltmeter. If a controller is electrically damaged by voltage, rodents or water then odd voltages, i.e. voltages that do not average about +2.5 V dc, can be put onto the zone causing intermittent communications on other units. The approach here is to split the zone and use the voltmeter to find the unit that gives out the odd voltages. Part of the difficulty of finding rodent or water damaged units is that as the moisture evaporates over time, communications are restored as the voltages return to normal.

Intermittent faults can also be caused by cable breaks where one lead of the 2 is disconnected. Units beyond the break are affected in this way. This failure mechanism is unusual on 4800 baud communications, in this case a single core break normally gives a permanent fault. The break can be traced using a voltmeter as the voltages will vary on either side of the break. If a break is suspected in the main cable run to the shop floor, disconnect the zone cable from the network controller and at the first junction. Use the meter as a continuity tester to check for continuity by joining the cores together at one end. The main cable run has often been found to be damaged months or years after the installation as a result of normal warehouse activity, i.e. crushed by pallets etc.

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