CHURCHILL CONTROLS
www.churchill-controls.co.uk

Data_Link 2000

APPLICATION NOTE AN012

Enhancements in Version 2.xx software

Summary

Since its inception *Data_Link 2000* has been subject to continual improvement, mostly through software enhancements. Churchill Controls have a company policy to make all enhancements backwards-compatible wherever possible. However, the introduction of Version 2.xx of *Micro_Link*, *Nano_Link* and DCD software adds numerous new features and slightly alters the operation of some existing features. To benefit from all the enhancements, all units in a given system must be upgraded to Version 2.xx, along with the DCD software used to configure it. Every effort has been made to ensure that any mix of new and old software will still work, albeit with some restrictions.

This document describes the changes between Version 1.xx and Version 2.xx, and any compatibility issues. Note that all units shipped from 15 June 2001 onwards will be fitted with V2.xx software.

---

1 Exception Reporting

Exception reporting was introduced in V2.xx, and allows outstations to send unsolicited messages when defined events occur. It also allows the base-station to interrupt its normal poll sequence and send data to outstations when defined events occur (provided the outstations are mains powered). The events are configured within the data routing table downloaded into the base-station.

On systems with large amounts of I/O exception reporting can significantly decrease the delay between an input change and the corresponding output being updated. On systems with battery-powered outstations exception reporting can also significantly extend battery life, since the poll rate can be reduced without affecting the data update time. (Note, however, that the user must define the sample rate if using analogues. Some power is consumed reading analogues, so the sample rate must be chosen to be adequate, without compromising battery life).

Exception reporting is described in detail in Application Note AN011.

If no exception events are programmed into the base-station the system operates identically to previous versions.

Compatibility Issues:

- **V1.xx base-station, V2.xx outstation:** No adverse effect, but exception reporting will not be available.
- **V2.xx base-station, V1.xx outstation:** No adverse effect, but exception reporting from the outstation will not occur.
- **V1.xx base-station, V2.xx DCD:** If the user attempts to configure exception reporting

commands, they will be ignored.

- **V2.xx base-station, V1.xx DCD:** If exception reporting is configured in the base-station, uploading the configuration into DCD will give entries in the data routing table referring to 'parameters', which are not readily understandable. The user will be unable to modify exception reporting commands.

2 Dual Scan Rates

In V1.xx the user can programme a Scanning Interval and a Scanning Window. At the start of each scan the base-station polls the lowest-numbered outstation. It waits until the end of the Scanning Window before polling the next outstation. This is repeated until it has polled all outstations. It then waits until the end of the Scanning Interval before repeating the sequence.

In V2.xx there are two Scanning Windows, one for Normal outstations and the other for Low Power outstations. The user can also configure the number of retries and the error back-off for Normal outstations, and the Scan Rate for Low Power outstations. After any reset the base-station will scan all outstations and deduce which are Low Power (i.e. battery-powered ***Nano_Link***). It will then intersperse two different poll rates. This allows a faster update rate to be set for normal outstations without compromising the battery life of low-power outstations.

If all I/O on a system is configured for exception reporting, the background poll can be regarded as a confidence poll, to confirm the outstations are still functioning. For battery-powered outstations the user may consider that a confidence poll once per day is adequate, and thus greatly extend battery life. For this reason the Low Power Scan Rate is now programmed in minutes rather than seconds.

Compatibility Issues:

- This feature works with both V1.xx and V2.xx outstations.
- **V1.xx base-station, V2.xx DCD:** The base-station will ignore the Normal outstation Scanning Window, and apply the Low Power Scanning Window to all outstations.

  If uploading a configuration that was created in V1.xx DCD, the Low Power Scan Rate value displayed will be rounded down to the nearest minute. If the configuration is subsequently downloaded, the scan rate will be the value as displayed.
- **V2.xx base-station, V1.xx DCD:** The base-station will apply the Scanning Window to both Normal and Low Power outstations. However, it will repeat its scan of Normal outstations continually, whilst using the Scan Rate to delay polling Low Power outstations.

3 Solar Powered Repeaters

V1.xx assumed that any ***Nano_Link*** outstation used as a repeater would be mains powered. V2.xx makes provision for battery-powered repeaters. However, since the power consumption is about three times that of an outstation (if repeating to one outstation – higher if used with more outstations), it is only practical if the battery is charged from a solar panel.

A battery-powered outstation normally stays awake for 4 seconds after replying to a command, in case the base-station sends another command. After any reset a ***Micro_Link*** V2.xx base-station polls all its outstations, and deduced from the response which are battery-powered. It knows from is configuration which outstations are used as repeaters. Any subsequent data requests addressed to battery-powered repeaters are modified to append to the command the time for which the repeater is to remain awake after replying. This will normally be (Scanning Window + 5) seconds.

The repeater will remain awake for this period after receiving the command, on the assumption that the next command sent by the base-station will be routed through it to a more distant outstation. It will also stay awake for this period after each command that it repeats. If the time lapses without a command being received, it will assume that no more messages will be addressed to it until the next scan, and put itself to sleep. It will wake up again (Scan Rate – 2) seconds after the first command received.

It is a necessary requirement, therefore, that the addresses of all outstations accessed via the repeater follow consecutively after the address of the repeater. The base-station must also be configured to request some data from the repeater, since this command is used to synchronised the repeater.

Compatibility Issues:

- This feature works with both V1.xx and V2.xx outstations.
- **V1.xx base-station, V2.xx repeater:** No adverse effect, but the repeater must be mains-powered.
- **V2.xx base-station, V1.xx repeater:** No adverse effect, but the repeater must be mains-powered.

4 Communication Fail Alarm

4.1 Base-station

In V1.xx, in the event of a comms failure the base-station cleared the local RSSI level within its database, and the remote RSSI level for battery-powered outstations, but not for mains-powered outstations. This is corrected in V2.xx.

4.2 Outstation

In V1.xx the outstation raised a comms fail alarm if a period of 25 seconds (***Micro_Link***) or 60 seconds (***Nano_Link***) lapsed without it detecting a command from the base-station. This caused problems if the user wanted to use the comms fail alarm on an outstation that is polled slowly.

In V2.xx the base-station appends the required time-out period (normally Scan Rate + 60 secs, but this could be user-programmable in the future) to the end of each message.

Compatibility Issues:

- **V1.xx base-station, V2.xx outstation:** If the outstation does not find the time-out appended to the message, it defaults to (actual scan rate + 60 secs). It cannot derive the actual scan rate until it has been polled twice.
- **V2.xx base-station, V1.xx outstation:** The outstation will ignore the time-out appended to the message, and apply the 25/60 sec time-out described above.

5 DCD Diagnostics

A ***Micro_Link*** base-station copies physical inputs from an outstation to output registers within its database. The user can configure internal transfers to copy data from output registers to physical outputs at the base-station. The same process occurs in reverse when sending inputs at the base-station to outputs at an outstation. This can cause confusion, since physical inputs at an outstation are stored in output registers within the base-station, while physical inputs at the base-station are stored in input registers.

DCD shields the user from this anomaly, as do the routines used to process ***Bus_Link*** messages. However, in ***Micro_Link*** V1.xx the diagnostic commands ID, OD, IR, OR, FC, FD, FH & FR required translation by the user. In ***Micro_Link*** V2.xx this has been corrected, so references to inputs or outputs will always match the physical I/O.

6 RSSI Calibration

In ***Micro_Link*** V1.xx the base-station sent the uncalibrated RSSI level to the outstation, and also displayed the uncalibrated level on DCD Diagnostics. This has been corrected in V2.01.

7 Large Configuration Files

Micro_Link V1.xx could hang if the user attempted to download a large configuration file. Also, when uploading a large configuration file entries in the data routing table would be repeated every 30 lines. Both of these problems are fixed in V2.xx.

Churchill Controls Ltd, Unit 2, Station Industrial Estate, Wokingham, Berkshire, RG41 2YQ

Tel: 0118-9892200, Fax: 0118-9892007, e-mail: sales@churchill-controls.co.uk

website: http//www.churchill-controls.co.uk