**Overview**

This application note provides details on how to connect Workbench v5.5 to a Mint Controller remotely using analogue modems.

To achieve this it is recommended that two external analogue modems with serial connectivity are used together with a separately supplied application – the Baldor Workbench Dialer.

Although not recommended, it should also be possible to utilize a PC/Laptop internal modem (this is also described in the application note).

**Equipment List**

For the purposes of this application note the following modems were used:

Local (dialing) modems – US Robotics Sportster 56k Faxmodem and Conexant D480 Internal modem (integrated with Dell Latitude laptop)

Remote (answering) modem – Hayes Accura 56k

**Connection Details**

Connect a 9 way straight through (pin to pin) lead between the Mint controller’s serial port and the modem’s serial port (if the modem is fitted with a 25 way serial connector then a standard 25 way to 9 way adaptor should be used).

If using an external modem at the local PC, connect a straight through (pin to pin) lead between the PC’s serial port and the modem’s serial port (if the modem is fitted with a 25 way serial connector then a standard 25 way to 9 way adaptor should be used). If using an internal modem then there is no requirement to wire a serial connection.

**Programming the Remote Modem**

Although it is possible for programmable Mint controllers (e.g. Nextmove ESB) to issue modem programming strings via the serial port using Mint language commands it is more convenient to program the remote modem directly (using a PC running Hyperterminal for example) and store this setup in the modem’s memory (i.e. it is recommended that a modem with retentive memory is utilized at the remote end of the connection).

Connect a PC to the remote modem using the same straight through lead that will eventually be used for remote communication and start Hyperterminal. Switch the modem on and start Hyperterminal.

**Supported Controllers**

- NextMovePCI
- NextMoveBX
- NextMoveST
- NextMoveES
- NextMoveESB
- NextMoveE100
- MintDrive
- Flex+Drive
- MicroFlex
Enter a name for the Hyperterminal connection (e.g. Modem Setup) and click on OK.

Hyperterminal will then ask how you’d like to connect to the modem and dial a telephone number. Select ‘Connect to Com1’ (or whichever serial port your external modem is connected to) and click on OK.

Hyperterminal will now ask how you’d like to configure the selected serial port (i.e. Baud rate, handshaking method etc.). The modem should auto-detect the incoming baud rate so this setting isn’t critical – select a reasonable rate for speed of response (e.g. 19200), select 8 data bits, no parity and 1 stop bit and set ‘Flow control’ to ‘None’. The screenshot below illustrates this.
Hyperterminal should now connect to the modem, type `at` (or `AT`) and the modem should respond with OK to indicate successful communication.

AT commands are issued to the modem to control the modem’s operation and software configuration. AT commands can only be entered whilst the modem is in command mode (i.e. not connected to another modem). The formats for entering commands are:

- `ATXn` (where X is the AT command and n is the specific value for that command)
- `AT&Xn` (where &X is the AT command and n is the specific value for that command)
• AT\Xn (where \X is the AT command and n is the specific value for that command)
• ATSX=n (where SX is a specific S register and n is the specific value for that register)

The following list details the final configuration for our remote modem as queried from the modem using the command AT&V0:

B0 E1 L1 M1 N1 O0 T V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K0 &Q0 &R1 &S0 &T5 &X0 &Y0  
S00:001 S01:000 S02:043 S03:013 S04:010 S05:008 S06:004 S07:050 S08:002 S09:006  
S10:014 S11:075 S12:100 S18:000 S25:005 S26:001 S36:007 S37:000 S38:001 S44:001  
S46:138 S48:007 S95:000

Most of these settings are factory defaults, however we’ll explain a few of the important settings below (including those that aren’t displayed by the AT&V0 command):

ATS0 = 1  Program the modem to auto answer incoming calls after 1 ring
AT&D0  Ignore the true status of DTR and treat it as always on (this is because the Mint controller cannot provide a DTR signal)
AT&K0  Disable flow control
AT\G1 The modem passes XON/XOFF flow control characters (as these are liable to naturally occur as part of Workbench communication we don’t want the modem to intercept these)
AT\J1 Force the maximum DCE rate to the DTE rate (i.e. force the connection rate to that used by the Mint controller)
AT&W0 Stores the programmed settings in modem configuration profile 0
AT&Y0 Select stored profile 0 on power up

Note: These commands are specific to the Hayes Accura modem we used as our remote modem. It is advisable to check your modem documentation in case there are slight differences in commands between manufacturers.

Example settings for US Robotics modem as the remote modem:

AT&B0 Allow serial port rate to vary
AT&C0 Carrier Detect override - forces CD on at all times
AT&D0 DTR override
AT&K0 Data compression disabled
AT&M0  Error control disabled
AT&N10  19200 baud (set the connect speed – adjust to suit motion controller’s SERIALBAUD setting)
ATSO=1  Puts the modem in receiving mode.
ATST19=1 Allows for one minute of inactivity before hanging up.
AT&W0  Store to modem profile 0

**Programming the Local Modem**

Use the same procedure with Hyperterminal described previously to connect to the local modem and issue AT commands as necessary.

In the case of the dialing modem, most of the factory defaults should prove adequate. The Baldor Workbench dialer can be used to set an initialization string if necessary (e.g. ATZ will reset factory defaults), alternatively use of another modem with retentive memory will allow a custom profile to be configured and restored on power up if necessary.

It is recommended that an external modem of the same type as the remote modem is used.

Example settings:

**US Robotics modem:**

&M4  &M0  &M0  &M2  &M5  &M0  &M1  &M1
S00=000 S01=000 S02=043 S03=013 S04=010 S05=008 S06=004
S07=060 S08=002 S09=006 S10=014 S11=072 S12=050 S13=000
S15=000 S16=000 S18=000 S19=000 S21=010 S22=017 S23=019
S25=005 S27=001 S28=008 S29=020 S30=000 S31=128 S32=002
S33=000 S34=000 S35=000 S36=014 S38=000 S39=012 S40=000
S41=004 S42=000

**Conexant D480 Internal modem:**

E0 L1 M1 Q0 T V1 X4 &C1 &D2 &G0 &P1
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:003 S07:050 S08:002
S10:014 S12:050 S29:010
These were default settings for our internal modem, however it was also necessary to enter AT+MS=,,19200,19200 as the modem initialization string (to force a connection rate of 19200 baud).

**Using the Baldor Workbench Dialer**

The Baldor Workbench Dialer is designed to be used in conjunction with Workbench v5.5. Both of these applications can be downloaded from www.baldormotion.com (the Dialer is also included with this application note). If necessary install Workbench v5.5 first (this is a pre-requisite for operation of the Dialer) and then install the Baldor Workbench Dialer. Ensure Workbench v5.5. is closed and start the Dialer application:

The Dialer allows you to program the following settings:

- Telephone number to be dialed (i.e. the number for the remote modem). If dialing from an internal exchange and an outside line is required then precede the main telephone number with the appropriate number for obtaining an outside line followed by a comma (e.g. 9,). The comma introduces a small delay between digits. If a longer delay is required simply insert further commas.

- Initialize string – commands to be sent to local modem prior to dialing

- Dial string – AT command prefix to be pre-pended to the telephone number

- Command mode – string used by the local modem to enter command mode (prior to hangup)

- Hang Up string – AT command to hang up local modem
• Com port – serial port to which local modem is connected
• Wait for answer – time in seconds to wait for remote modem to answer call
• Node – node address of remote Mint controller
• Baud rate – baud rate setting of remote Mint controller’s serial port

These settings are all retained and restored if the Dialer application is closed and restarted.

**Important:** The remote Mint controller’s serial port must be programmed to operate at a rate lower than the maximum connection rate between modems. For a typical analogue connection the modem’s should communicate at 28800 baud successfully so a setting of 19200 is common for the Mint controller. Use the Mint keyword SERIALBAUD.x to set an appropriate baud rate (where x is the channel number for the RS232 port – usually 1). This should either be programmed in the Mint application (e.g. Nextmove controllers) or set at the command line and stored in the parameter table (e.g. drive products).

Once the dialer has connected to the remote modem (as indicated by the status text at the bottom of the application dialog) the user should now start Workbench v5.5 and scan for a controller in the normal fashion.

Having selected the remote controller it should now be possible to use Workbench v5.5 as if connected locally.

**Note:** Firmware update via modem is not possible unless a connection between modems at a 56kbaud (or higher) rate can be achieved.

When closing the Dialer ensure that Workbench v5.5 is closed first (otherwise communications between Workbench and the controller will prevent the local modem from detecting the Command sequence required to enable the modem to hang up). Despite this, if the Dialer is accidentally closed first then the local modem should still hang up when Workbench is eventually closed.

**Mint Controller Settings**

In addition to the setting of the baud rate (via SERIALBAUD) as detailed previously it will also be necessary to disable miscellaneous errors resulting from faults such as serial overrun (otherwise the Mint ONERROR event may be called spuriously).

Examples:

`'Bits 4,5,6,17,18 and 19 need setting on a NextmoveESB controller…`

\[
\text{MISCELLARORDISABLE} = 0 \text{xE0070}
\]

`'Disable miscellaneous serial port errors on Nextmove e100…`

\[
\text{ERRORCODEENABLE.\_ecSERIAL1\_RECEIVE\_OVERRUN} = 0 \\
\text{ERRORCODEENABLE.\_ecSERIAL1\_TRANSMIT\_OVERRUN} = 0
\]