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Use of modems with Mitsubishi PLC and HMI equipment

1. Introduction

In an attempt to rationalise the potential problems with the use of modems, this data sheet is intended to explain how to set up and use modems with PLC's and MEDOC / MMPlus. This data sheet will also detail which types of modem have been tested and that Mitsubishi will recommend.

Systems tested used the A series and FX PLC's and included using MEDOC and MMPlus.

2. Test Procedure

All systems were tested for up loading and down loading and monitoring of test programs using MMPlus and DOS MEDOC.

The test procedures were as follows

2.1 All modems were setup using the US Robotics "Quick Link Modem" terminal emulator. AT settings as described in section 3 below.

2.2 The Hardware was then assembled and "Quick Link Modem" terminal emulator used to dial up a PLC modem.

2.3 When the connection was established the "Quick Link Modem" terminal emulator was shutdown but the line or connection was left open. This was the reason for using this terminal emulator. Other standard terminal emulators and windows terminal emulators seemed to drop the connection when closed down. Windows 95 Hyper terminal was not fully tested for this ability.

2.4 When the terminal emulator was closed MMPlus or DOS MEDOC was started and the communications port and port parameters were set to match the selected system eg internal modem was COM2.

2.5 PLC Program up load, down load and monitoring was then tested. (Note : It is not possible to make on line changes with an A series C24-R2 card)

2.6 Once MM+ or MEDOC was finished and closed, "quick link modem" terminal emulator was started, and the phone line was hung up.

2.7 With some modems it was necessary to start Medoc with the I3 parameter to disable interrupt driven communications i.e. the start up line is MEDOC I3.

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3. Modem Setup

3.1 PLC modem

Settings were AT&F &D0 &K0 Q1 E0 S0=1 &W

3.2 PC / Laptop modem

Settings were AT&F &D0 &K0 &W

3.3 These settings mean

AT	-	Instructs modem that commands follow
&F	-	Reset to factory defaults
&D0	-	Ignore DTR (data terminal ready see 3.4)
&K0	-	Disable data compression (US Robotics modems only) Disable flow control from DTE (all other standard modem types)
Q1	-	suppress results code
E0	-	Echo OFF
S0=1	-	Set auto answer on 1 ring
&W	-	Save settings to NVR (non volatile RAM)

3.4 &D0 ignores DTR if &Q is set to 0, 5 or 6. This is necessary because the MEDOC to programming port communications toggles DTR.

3.5 The use of &F and &W vary between modem types, and some have numbers eg &F2, but if &F and &W are used the default profile will be read from and written to. This profile will also be the one used on power up.

3.6 For some modems including some US Robotics modems, it may be necessary to add the parameter &M0 to the command line at either end. This will disable error control.

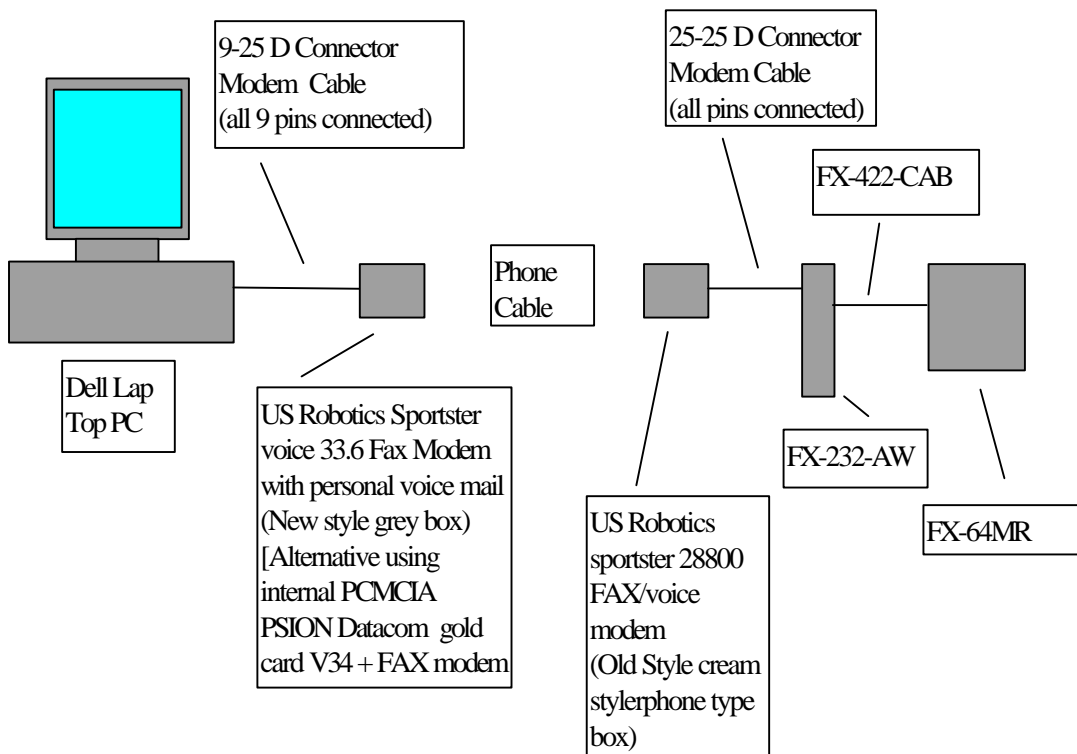
3.7 For some modems including some Psion gold card modems it may be necessary to add the parameter +MS=9,0,9600,9600. This fixes the connection baud rate to 9600 with no automatic detection.

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4. Systems tested

4.1 System 1 - FX PLC

4.1.1 System Setup



4.1.2 Communication Port Parameters

Both modems were set to 9600 baud, 7 data bits, even parity, 1 stop bit no flow control.

4.1.3 Potential Problems

A. The latest Black/Grey box US Robotics Sportster voice 33.6 Fax modem with personal voice mail, has a known bug which will cause the modem that answers the call to pick up the call and drop it immediately. This is why the older cream box US Robotics Sportster 28,800 Fax modem was used for the PLC end.

B. The latest Black/ Grey box US Robotics Sportster voice 33.6 Fax modem with the personal voice mail displayed a problem when using a phone lead from a different modem so always use the lead supplied.

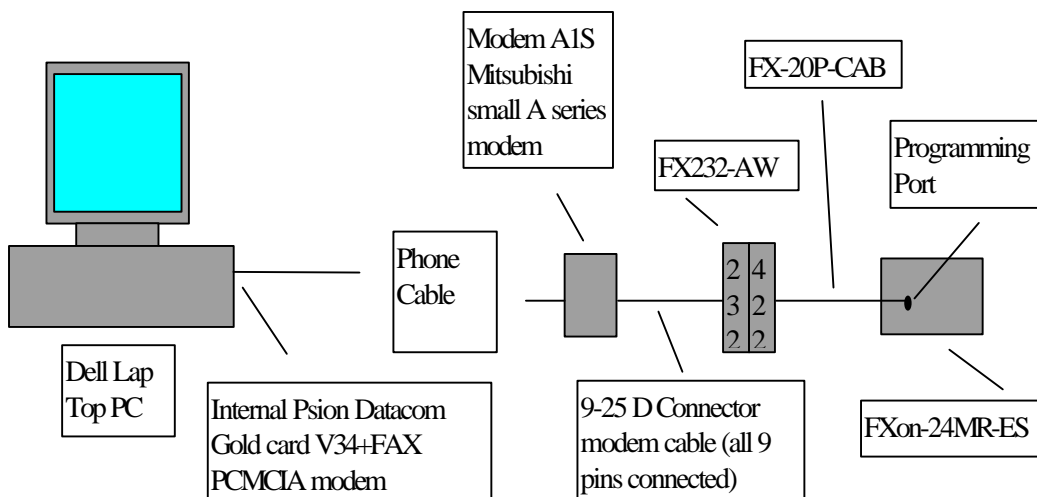
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C. The PLC end modem may display a problem with communication settings after it has been configured and powered down. This is because the PLC requires settings of 9600 baud, 7 data bits, even parity, 1 stop bit, no flow control, however most systems default to 9600 baud, no parity, 8 data bits, 1 stop bit, no flow control. This means that if the AT commands are set using the wrong communication settings or if the modem is reset (or possibly powered down) , the modem will not know what settings to use for the serial port to PLC connection and will thus use the defaults which are wrong for an FX PLC.

The root cause of this problem is that the modern modems change communications port settings automatically to suit the device talking to it. In our system the PLC will not normally communicate to the modem, it will only respond when the modem is dialled, and thus it does not know the settings. This problem is not normally an issue but if it does manifest itself then the solution is to use an additional AT command. AT&B0 will force the communications port to follow the connection baud rate.

4.2 system 2 - Fxon PLC

4.2.1 Setup



4.2.2 Communication port parameters

Both modems were set to 9600 baud, 7 data bits, even parity, 1 stop bit, no flow control.

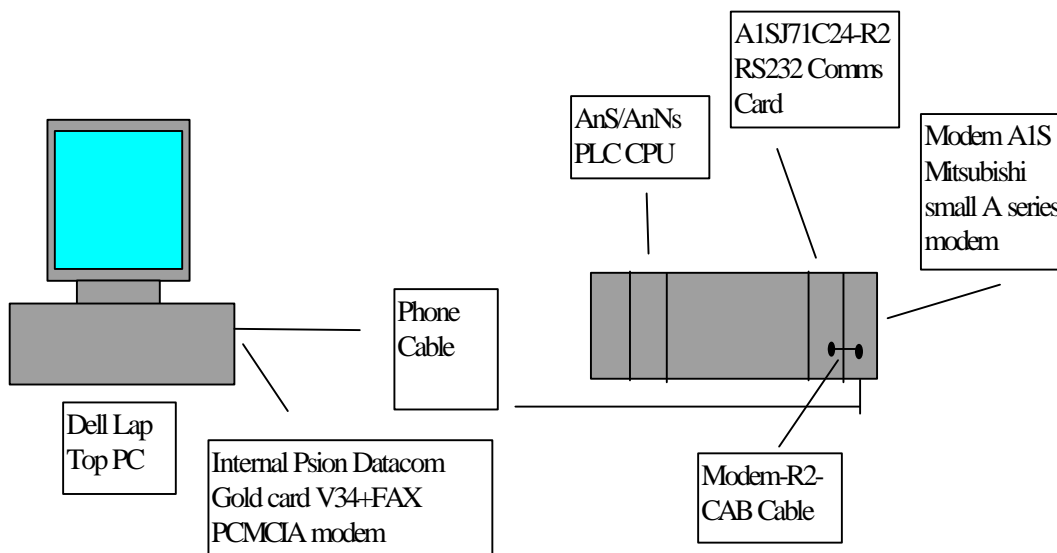
4.2.3 Potential problems

No problems encountered however see 4.1.3(c) which may be a difficulty.

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4.3 System 3 - AnS/AnNs PLC and C24-R2 system

4.3.1 Setup



4.3.2 Communications port parameters

Both modems were set to 9600 baud, 8 data bits, no parity, 1 stop bit, no flow control.

These settings could be changed as all items in the chain of communications have selectable parameters including the A1SJ71C24-R2 card.

The A1SJ71C24-R2 card was set for protocol 1 write during run, 9600 baud, 8 data bits, no parity, sum check on. rotary switch set to 1, other switches to :-

SW3	OFF	SW8	ON
SW4	ON	SW9	OFF
SW5	ON	SW10	OFF
SW6	OFF	SW11	OFF
SW7	ON	SW12	ON

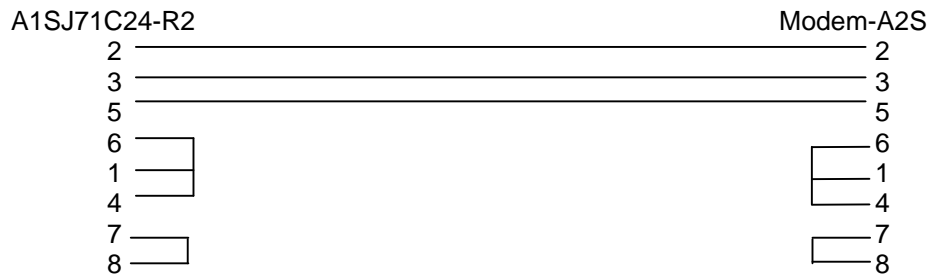
4.3.3 Potential Problems

No problems encountered however see 4.1.3(c) which may be a difficulty.

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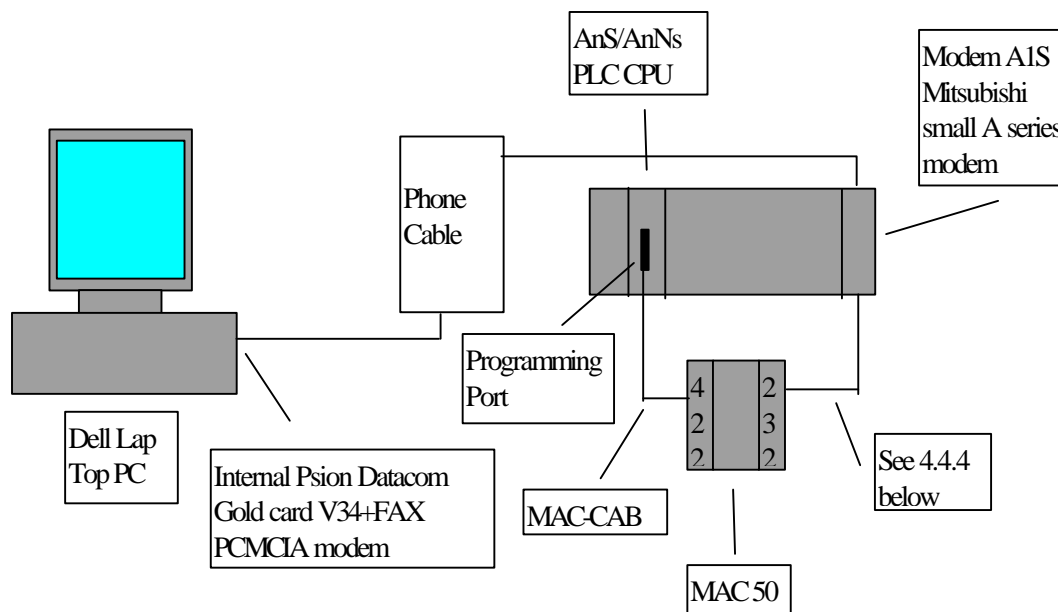
4.3.4 Notes

The Modem-R2-CAB connections are:-



4.4 System 4 - AnS/AnNs PLC and MAC 50 system

4.4.1 Setup



4.4.2 Communications Port Settings

Both modems were set to 9600 baud, 8 data bits, no parity, 1 stop bit, no flow control.

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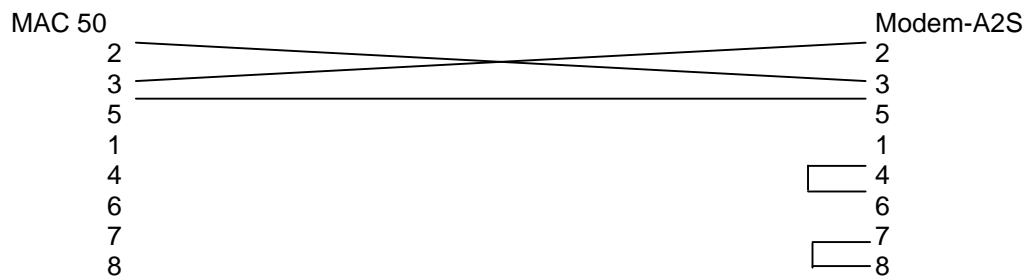
4.4.3 Potential Problems

A. See 4.1.3(c) which may be a difficulty.

B. Problems of getting modems to work with odd parity which is required by the PLC programming port was resolved by converting to no parity within the MAC 50 between the RS422 and RS232 port.

4.4.4 Notes

The cable between the MAC RS232 port and the MODEM-A2S are:-



The MAC 50 RS232 port was set for 9600 baud, 8 data bits, no parity, 1 stop bit which meant that the MAC 50 effectively converted the PLC programming port settings of 9600 baud, 8 data bits, even parity, 1 stop bit to those on the RS232 port.

5. Modem Recommendations

Avoid using the US Robotics modems, especially the grey box Sportster voice 33.6 Fax/Voice modem with the personal voice mail.

Most standard modems will work but Mitsubishi recommend using our MODEM-A2S and MODEM-FX modems.

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6. Common problems

No response to AT from modem	Echo OFF. Turn on with ATE1
Connect message garbled	Baud rate set differently at either end
Connection broken when trying to use it	DTR not ignored. Ignore with AT&D0
PLC modem will not answer call	Auto answer not set. Set with ATSO=1
Setting PLC modem communication parameters	Set with a terminal emulator then connect to PLC or use AT&B0 to force modem to use connect settings
A Series program port odd parity	Caused a problem in terminal emulator. Avoided by using a MAC in transparent mode to convert to no parity