

PPM FIBRE OPTIC LINKS

USER HANDBOOK FOR *point2point & Intelligent FOL* SYSTEMS AND ACCESSORIES

Sxx-HB-7



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Safety Information

Please read the whole of this section before using your new Fibre Optic System.

Electrical Safety



The PPM Fibre Optic System Subracks / Cases are Safety Class 1 instruments (having a metal case that is directly connected to earth via the power supply cable).

- Hazardous voltages exist within the equipment.
- Do not remove equipment covers when operating.
- Make sure that only fuses of the required rated current, and of the specified type (anti-surge, quick blow, etc.) are used for replacement.

Adjustment, maintenance and repair of the equipment should only be carried out by suitably qualified personnel.

Optical Safety



The **point2point** modules contain laser diode sources operating at 1300nm. These devices are rated at under IEC825-1 "Safety Of Laser Products", Part 1, First Edition, 1993 as CLASS 1 radiation emitting devices.

When operating the equipment note the following:

- Never look into the end of an optical fibre or connector directly or by reflection either with the naked eye or through an optical instrument.
- Never leave equipment with radiating bare fibres accessible – always cap the connectors.
- Do not remove equipment covers when operating.

Heavy Items

Some parts of this product can weigh in excess of 5kg. For heavy or awkward items, ensure that the correct precautions and safety equipment are implemented to avoid injury and/or damage to equipment. If in doubt, consult your Health & Safety representative.

Important Handling Instructions

Connecting Fibre Optic Connectors

The fibre optic cable used with **point2point** modules is terminated with either angle-polished **FC/APC**, super polished **FC/PC** or bayonet **ST** type optical connectors. These are not interchangeable. **Particular care should be taken to avoid confusion between FC/APC and FC/PC connectors, which look similar.**

The FC/APC connector is identified by a green connector boot.

The FC/PC connector is identified by a black or blue connector boot.

The protective dust caps on the equipment and cable connectors should only be removed immediately before the connectors are mated.

The optical connectors should be cleaned in accordance with the instructions in Appendix I **before each and every** connection, even if they have been protected with dust caps.

It is important to align the alignment lug on the cable plug with the matching slot in the module socket.

The screw fitting FC/APC and FC/APC optical connectors should only be finger tightened.

Care should be taken not to drop the optical connector or to subject it to any other excessive physical shock.

Disconnecting Fibre Optic Connectors

The connectors should be removed by unscrewing and withdrawing the connector.

UNDER NO CIRCUMSTANCES SHOULD THE FIBRE BE PULLED TO REMOVE THE CONNECTOR.

Immediately after removing the connectors, all protective dust caps should be fitted.

Care Of Fibre Optic Connectors

When the fibre optic cables are not connected, it is essential that the cable and equipment connectors are protected by the dust caps provided with the system. Failure to do so may result in damage to the fibre ends, which are critical to the system performance.

System performance may be compromised by dirt on the connector end or its alignment surfaces. Refer to Appendix I for instructions on cleaning the optical connectors.

Connector performance will be compromised if its end face is scratched or chipped.

Bend Radius

All fibre optic cable is subject to a minimum bend radius beyond which physical damage may occur to the cable. The cable supplied with this system consists of a simplex glass optical fibre with 3mm tight jacket ruggedisation. The minimum bend radius (MBR) for this type of fibre can be found in the specifications in Appendix II

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1 Introduction to PPM Fibre Optic Links

The PPM Fibre Optic Link System for Test & Instrumentation brings together a wide range of products designed particularly to meet the needs of researchers and engineers with requirements for monitoring, measurement, antenna remoting and data transmission in the EMP, EMC and High Voltage industries.

The system offers a modular solution with a high level of compatibility across the product ranges. The wide variety of supported products, that encompasses simple point to point links to fully controllable measurement systems and spans signal formats from true DC to 3GHz and common digital formats, means that your system can grow as system requirements dictate.

This handbook covers the specification, installation and use of the generic Fibre Optic Link System components. It also introduces the wide range of supported products. For detailed instructions on the use of compatible signal modules, please refer to the relevant handbooks.

Compatible Product Ranges

The following signal module ranges can be used with the PPM Fibre Optic Link System.

- ***Intelligent FOL*** - *Sentinel* and *Sentry sc* range of intelligent Fibre Optic Links
- ***point2point*** - DC, AC & Digital point to point modular Fibre Optic Links

2 Installation

Safety Precautions

Refer to Safety Information at the beginning of this handbook for safety precautions prior to operating mains powered equipment.

Initial Inspection

Unpack and inspect the equipment as soon as possible. If there is any sign of damage or any parts missing, do not install the equipment before seeking advice from PPM or your local agent.

The equipment received should correlate with the delivery documentation that is shipped with the equipment. If there are any discrepancies, contact PPM or your local agent.

Plug-In Module Installation

The Plug-In modules must be installed in the Desktop Case before use.

Switch off the System Case Power Supply before proceeding. Never remove or install modules with the power connected.

System Controller

The System Controller must be mounted at the far right-hand side of the desktop case or subrack and occupies 28hp (four standard card positions). If card guides have been installed in the case at locations 15 and 22 (visible on the backplane PCB), these must be removed. This is done by pinching the clips together beneath the mounting rail at each end of the card guide and lifting the card guide out, one end at a time.

Switch Panel

The Switch Panel is mounted at the far right-hand side of the desktop case or subrack and occupies 14hp (two standard card positions). If card guides have not been installed in the case at locations 15 and 22 (visible on the backplane PCB), these must be installed. Subracks are supplied with these card guides not fitted. Replacements are available from PPM.

Fibre Optic Modules

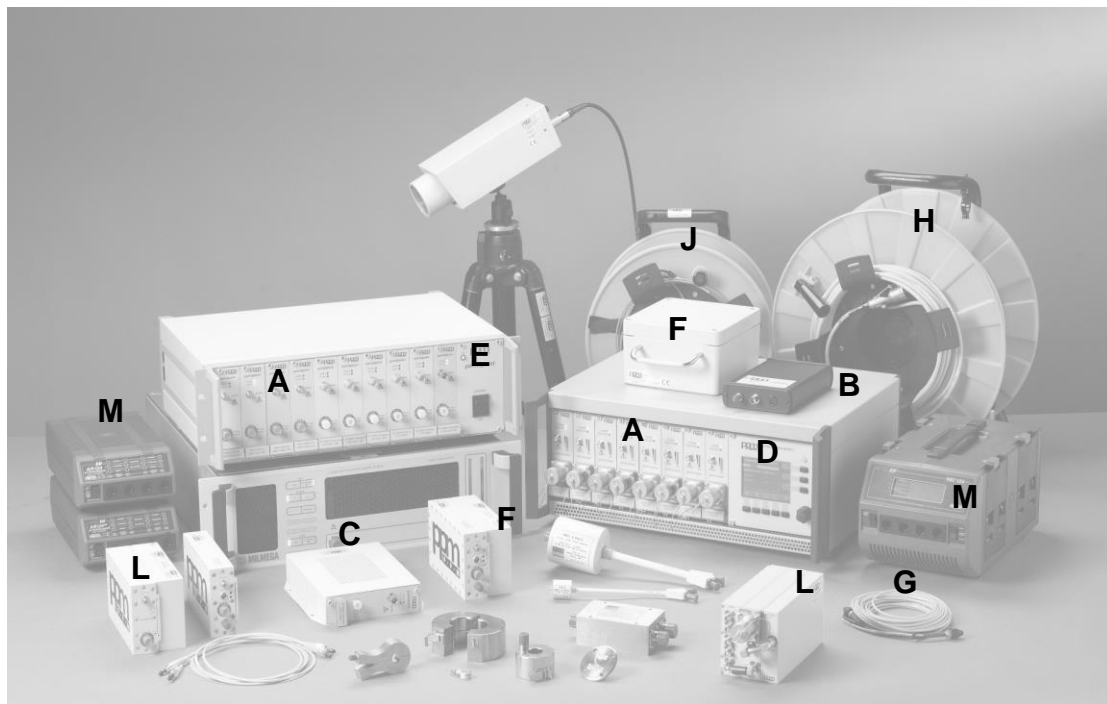
Fibre-optic modules can be installed in any position in the subrack and should be installed after the Switch panel or System Controller has been installed.

To install any plug-in module, first unscrew the blanking plate(s) from the case. Check that the module guides are in place and gently slide in the module, ensuring that it does not foul the adjacent module. The module should mate with the backplane connector firmly to leave the front panel level with the other front panels.

Tighten up the front panel screws firmly. Switch on power to the Case, turn on the System Controller or front panel power switch (if the switch plate is used). The module power light should illuminate. If a System Controller is installed, it should be able to recognise all installed modules.

3 System Components

A system, in its basic form, comprises an Optical Transmitter and an Optical Receiver, connected by a fibre optic cable. Around this simple idea a customised system can be constructed.



Case & Subrack Options

The plug-in modules [A] are used in conjunction with the case / subrack. For desktop usage a desktop case [B] is available.

Where the modules will be used in a 19" rack or cabinet, a subrack is available.

point2point plug-in modules can also be used in conjunction with the Converter Sleeve [C]. This sleeve enables plug-in modules to be used in a standalone format.

These products are explored in full in section 4.

Controller Options

Intelligent FOL products, like the Sentinel and Sentry IIsc can be fully controlled by the System Controller Module [D]. This intelligent module enables link parameters, for instance input channel, gain, input impedance etc. to be changed by local or remote control. The operation of the System Controller is covered in section 5.

For applications not requiring control over modules, as is the case with **point2point** modules, the System Controller can be substituted with a Switch Panel [E]. This lower cost option simply provides power to all the modules while increasing the capacity of the case from 8 modules to 10.

Power Supply Options

Shielded Modules can be powered from one of three sources :

- Battery Pack [F] – These are specifically for use with shielded modules [L] where a high level of electromagnetic shielding is required. Batteries are charged using the PPM Fast Chargers [M].
- External Power Lead – allows the shielded module to be powered from a suitable local low voltage supply.

Fibre Optic Cables

Transmitter and receiver modules are connected together with fibre optic cable. The specification of fibre optic cable depends on the module types, and this will be detailed in the handbook for your signal modules.

The **point2point** system supports three industry standard fibre optic connectors, ST multi-mode connectors and with multi-mode fibre and FC/PC or FC/APC for single-mode fibre.

These connector types are not interchangeable and connectors of one type CAN NOT be mated to connectors of another type. Ensure that you are familiar with the type of connectors used on the modules and fibre optic cables in your system.

point2point Cross-Site Fibre Optic Cables [G]

A 3mm kevlar re-inforced Fibre Optic Cable that has FC/PC or FC/APC type optical connectors mounted on both ends.

Intelligent FOL Cross-Site Fibre Optic Cables [H]

A ruggedised Fibre Optic Cable that has a LEMO 3K optical connector mounted on both ends of a multi-core, ruggedised cable. The connector is securely bonded to the cable.

Intelligent FOL Extension Leads

These may be used to extend the cross-site cable. For example, it may be required to have a bulkhead connector at the wall of a test chamber or control room. These extension leads may only be used as extension leads, and cannot be used in place of the cross-site cable.

The Fibre Optic Cables and Extension are available in a range of lengths to suit individual requirements.

4 Enclosures

The hub of the Fibre Optic Link System is the 19" Enclosure. There are currently five products available :

- Cooled Desktop Case, SRK-3
- Uncooled Desktop Case, SRK-1
- Cooled Subrack, SRK-3R
- Ventilated Subrack, SRK-2
- Converter Sleeve, 75002
- Battery Power Sleeve 75013-16

Desktop Cases

The desktop cases, SRK-1 and SRK-3 are enclosed 19" cases. The cooled version, SRK-3 is 4U high and the SRK-1 is 3U. They are compatible with plug-in modules from the following ranges :

PRODUCT	FAMILY	SRK-1	SRK-3
System Controller	Intelligent FOL		✓
Sentry IIsc FOL	Intelligent FOL		✓
Sentinel IIsc FOL	Intelligent FOL		✓
p2p AC FOL	point2point	✓	✓
p2p DC FOL	point2point		✓

The Desktop Cases come fitted with front handles, subracks are fitted with mounting ears for 19" cabinets.

Subracks

The ventilated subrack, SRK-2, is a 3U high full width subrack for use in 19" cabinet or rack installations. The cooled subrack, SRK-3R, is an enclosed 4U subrack, and is identical to the SRK-3 desktop case, but for the rack-mounting ears at either side of the front panel.

PRODUCT	FAMILY	SRK-2	SRK-3R	75011
System Controller	Intelligent FOL		✓	
Sentry IIsc FOL	Intelligent FOL		✓	
Sentinel IIsc FOL	Intelligent FOL		✓	
p2p AC FOL	point2point	✓	✓	✓
p2p DC FOL	point2point	☑	✓	✓

☑ can only be used in conjunction with a fan shelf and 1U air circulation above and below.

Standalone Converter Sleeve

For applications where space is at a premium and Electro-Magnetic shielding is not a concern, the Converter Sleeve can be used to house a single **point2point** plug-in module. The Converter Sleeve is provided with an auto-switching mains PSU which attaches at the rear of the sleeve. Note : this product is not suitable for **Intelligent FOL** products such as Sentry or Sentinel.

Optically controlled battery switch and controller



The battery switch is designed for use with all type of **point2point** shielded FOLs and batteries.

It provides the ability to remotely control a FOL. The unit is highly shielded and can be used with a multimode control fibre in excess of 1km of length.

The system can be either manually or electrically controlled. The system consists of a 73680 single channel battery switch (fitted in

place of the U link) and 73681 four channel battery switch control module (fitted into any **point2point** rack or sleeve).

The system can also be used standalone to switch DC voltages of 5V to 30V and currents of up to 5A (dependent on SOA curve), its optical control and shielded design it will operate in demanding EMC environments.

73680	Single channel battery optical switch
73681	Four channel battery switch control module
F1R1/xxx	xxx meters Multimode Fibre Optic Cable 50/125, ST Connectors
F8R1/xxx	xxx meters Multimode Fibre Optic Cable 62.5/125, ST Connectors

Power Sleeves



The Plug-In module power sleeve enables a Plug-In module to be used for battery powered standalone use. The integrated battery will provide power for up to 50 hours continuous operation.

Power for the module is provided by an integrated 3.6Ah or 9.0Ah NiMH battery. It is recommended for use in a less demanding RFI environments.

There is also the option to remotely control power ON/OFF via a multimode fibre link using the technology taken from PPMs

optically controlled battery switch. For optical control it must be used in conjunction with PPM 73681 four channel battery switch control module.

The backplane has a built in low voltage disconnect switch which prevents the battery from over discharge. A front panel switch is provided to set the power sleeve to ON or OFF/charge state.

The unit is fitted with a 2.1mm plug to charge the battery and is supplied with a charging cable compatible with a PPM 56292 4 channel charger.

75013	Power sleeve with 9.0Ah capacity
75014	Power sleeve with 3.6Ah capacity
75015	Power sleeve with 9.0Ah capacity, with optical switch
75016	Power sleeve with 3.6Ah capacity, with optical switch

5 The System Controller

The PPM System Controller allows the user to control and monitor all intelligent fibre optic link modules installed in the Case or Sub-rack. Through the front panel controls and colour LCD display, it is possible to change the parameters of both the local and remote modules. The Controller also interfaces to RS-232 and GPIB ports through the case backplane to provide remote control of the equipment from a computer.



Using the Controller for the First Time

Once the Controller and a compatible signal module are installed in the case, switch power to the case/rack using the red mains power switch on the rear panel. The System Controller's power button glows when in the standby state.

To power the controller, press the power button located to the top right of the LCD screen. The power button glows when the unit is in standby mode.

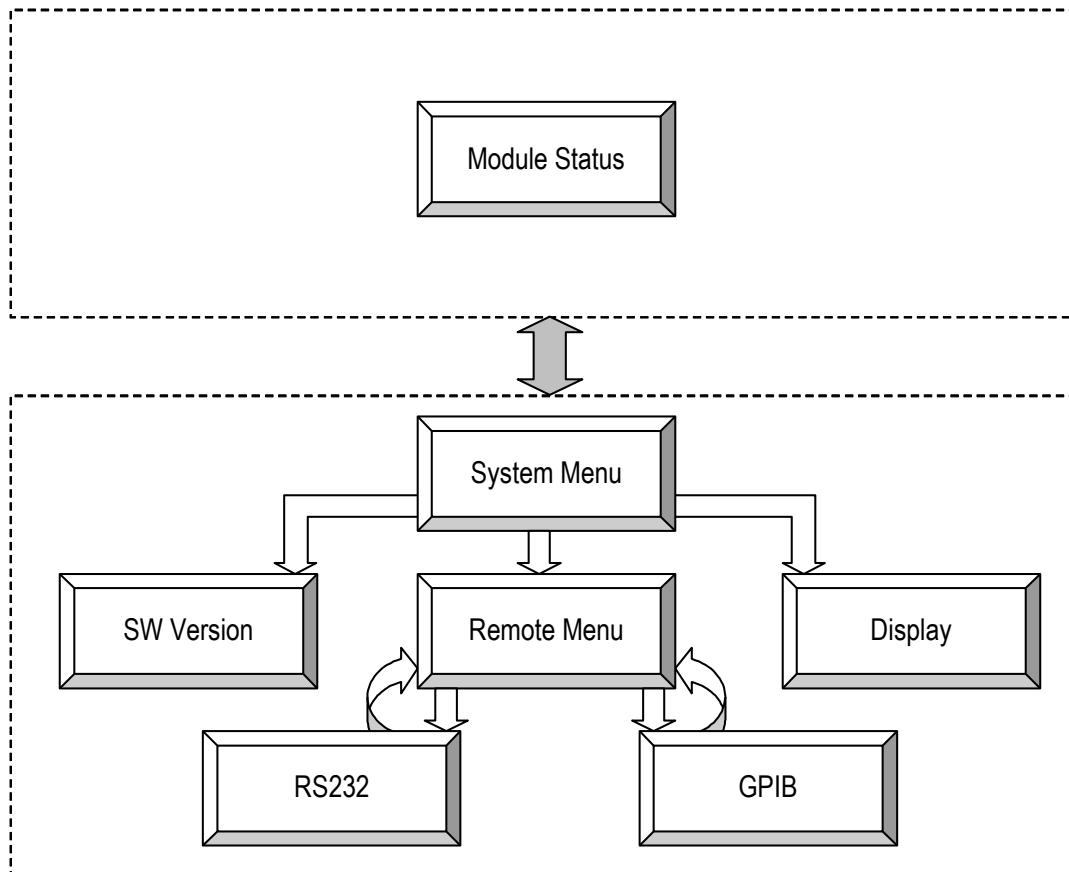
The start-up screen will appear and the Controller will interrogate all modules and select the first controllable module it reaches.

To power down the controller, simply hold the power button in for 3 seconds.

Navigating the Menus

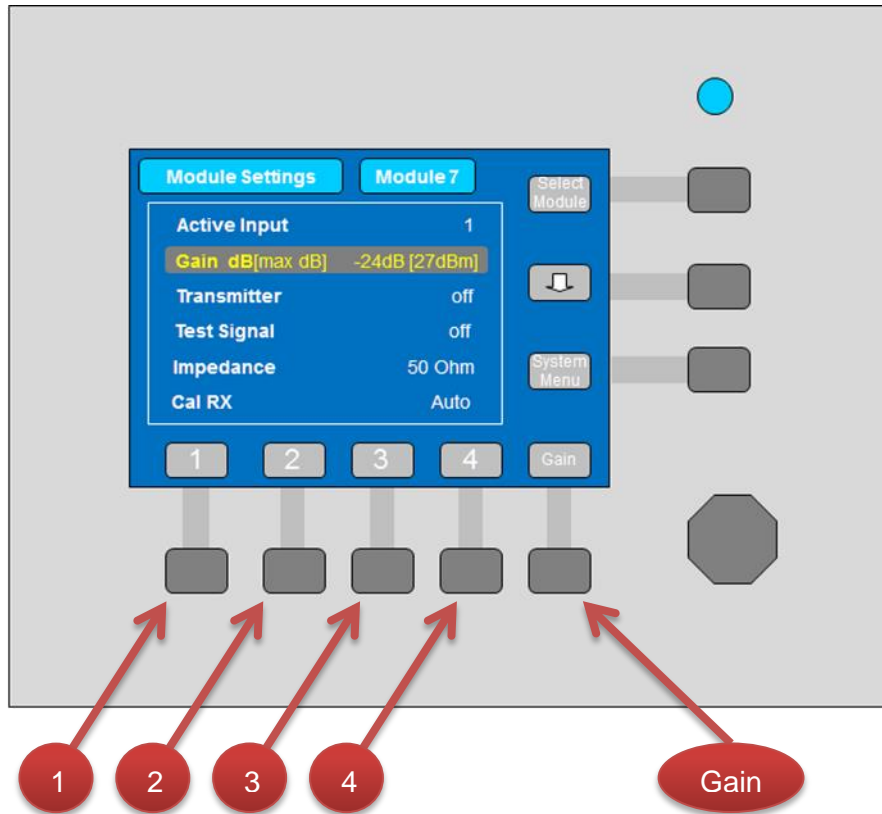
The Controller's user interface is based around softkeys, whose functions change depending on the current screen contents. There are two distinct areas of the Controller menu structure:

- System Functions
- Module Functions



System Related Functions

A graphical representation of the system controller is shown below:



The graphical representation above shows the Module Setting menu. In this menu the vertical keys to the right of the LCD screen perform the following functions.

- **Select Module.** This enables the user to switch between modules being controlled. When the key has this function, pressing the button will advance the module selected by one. The SELECTED LED on the module being scanned will illuminate as the module is selected. Blank locations (slots in the rack that contain no module) are automatically skipped.
- **Cursor down.** This moves the cursor through the 5 selectable options, Gain, Transmitter, Test Signal, Impedance and Cal RX .
- **System Menu.** This toggles to the System Menu, where system parameters such as display settings and remote control functions can be edited.

The horizontal keys below the LCD screen perform the following functions.

- **1.** This sets the active input of the Selected Module to 1.
- **2.** This sets the active input of the Selected Module to 2.
- **3.** This sets the active input of the Selected Module to 3.
- **4.** This sets the active input of the Selected Module to 4.
- **Gain.** This moves the cursor to the gain selection.

Changing Parameters

To change a parameter in the Module Setting menu, use the down arrow softkey to move the cursor to the parameter you wish to change. Then, to change the value the selected parameter, turn the rotary knob to the left or right.

Note: It may take 2-3 seconds from the rotary knob to stop moving, to the changes to be made on the transmitter.

Display Settings

To cater for various viewing angles and ambient light conditions, the contrast of the display can be edited from the Display Menu.

To enter Display Settings menu from the Module Setting menu, select the System Menu, and then select Display Setup. To adjust the contrast, press the contrast adjust button, and then use the function wheel to increase or decrease the contrast. Press Confirm to save your change.

Firmware Upgrade

When a new type of module is installed in your system, the software to control that module must be installed into the System Controller. This software contains the Module Menu structure for the controller as well as the hardware drivers for the equipment. This process can be performed from a Desktop PC, Notebook PC or PDA and only needs to be performed once for each new module type. A range of module drivers comes pre-loaded with your new Controller.

Instructions for upgrading Controller Firmware - Microsoft™ Windows™ PC

To upgrade the Controller firmware, a PC with serial port is required, with Microsoft™ Hyperterminal™ terminal emulation software installed. The System Controller must be installed in a PPM Desktop case or Subrack.

Step 1

Connect the PC's COM1 port to the System Controller RS232 input using a 9-way RS232 null modem cable.

Step 2

Switch on PC and System Controller.

Step 3

Insert the PPM Upgrade CD / Diskette and run the "SCT1" HyperTerminal setup file. This will launch HyperTerminal and set up the communications protocol between the two units.

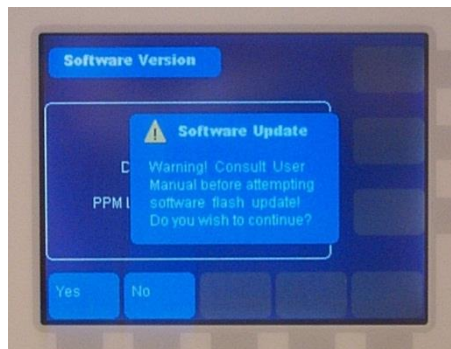
Once HyperTerminal has launched, it is highly advisable to check that the right COM port has been selected, as follows: Ensure that HyperTerminal is disconnected using *Call -> Disconnect*. Now select *File -> Properties* and ensure that "Connect To" is set to "COM 1" (or an alternative port to which you have connected your RS232 cable). Select *Call -> Call* to resume the connection.

Step 4

On the System Controller, navigate to Software Version and select Upgrade. The Controller will ask you if you are sure, then display a message on both the PC screen and the System Controller screen.

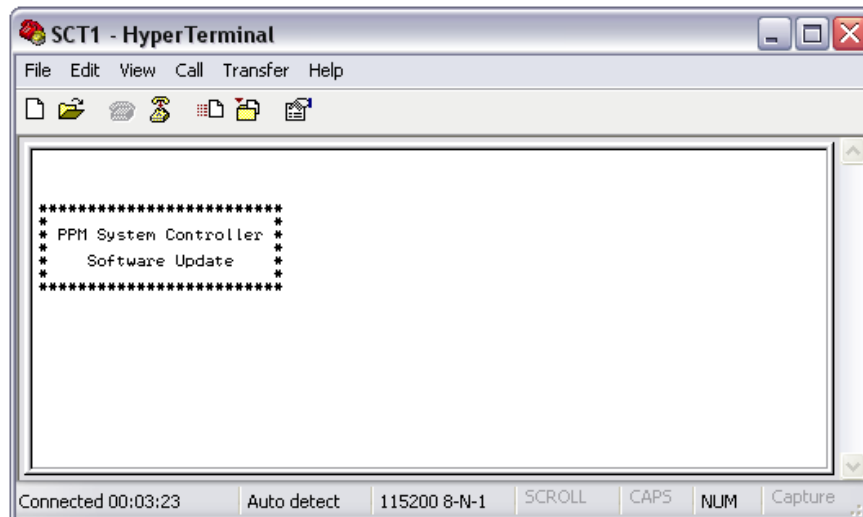


First, navigate to the Software Version screen, and select “Software Update”



A confirmation window is displayed. Hit ‘Yes’ to start updating the software.





The Controller now awaits the software update. This is indicated by a message that will appear within HyperTerminal as above.

Step 5

Again within HyperTerminal, Select *Transfer -> Send Text File* and open the SCT directory. The software update file is in this directory. The name of this file will reflect the issue status e.g. v1_1.txt, and press OK. A progress bar is displayed on the PC screen. When the Controller has been fully updated it will restart.

Step 6

It is recommended that after a firmware update is completed, the default settings are reloaded into the Controller. This is done by selecting *Defaults* from the System Settings screen.

NB: if power to the PC or Controller is interrupted for any reason, power down the controller, close Hyperterminal and start the sequence again. At step 4 switch on the controller and the update will resume.

Remote Control of the System Controller

All System Controller functions can be controlled remotely with a computer via an RS232 link or a GPIB link. Connectors are on the rear panel of the subrack and case.



Before remote control can be established between a PC and the System Controller, the communications protocol must be set up. This is done on the *Remote Setup* Menu. Select the *System Menu* and press the Remote softkey. Select the interface required (RS232 or GPIB).

▪ Connecting the Controller

The Controller module should be connected to the GPIB or RS232 controller via the correct cabling. For GPIB control, a cable should be selected that conforms to IEEE488.1. For RS232, a female-female 9-way D-Sub Null Modem Cable should be used.

▪ Selecting Control Channel

Communications settings for both RS232 and GPIB are found in the System Menu under *Remote Setup*. The System Controller can only accept control from either RS232 or GPIB, not both at the same time. The source of commands is selected on the *Remote Setup* screen.

▪ GPIB Settings

The individual settings for GPIB are found in *Remote Setup -> GPIB Setup*. The default GPIB address for this equipment has been set to 16. The System Controller must be allocated a unique address on the bus which no other connected peripheral shares. Transmit and receive addresses are the same. The End-Of-Line delimiter can be set up for Transmit and Receive data. When "EOI" is selected, the end of transmission and reception are delimited by signalling using the EOI line only. When "EOI/LF" is selected, the EOI signal is accompanied by transmission of an "LF" character.

- **RS232 Settings**

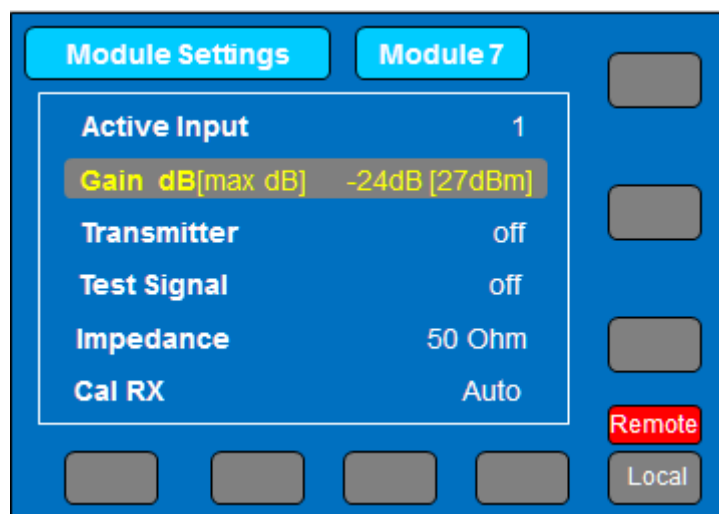
The settings for RS232 control are found in *Remote Setup* -> *RS232 Setup*. Control of the System Controller via RS232 must be done using 8-N-1 transmission. Baud Rate and Flow Control settings are adjustable, as is the End-Of-Line delimiter.

- **Selecting Remote**

The System Controller can be switched between Local and Remote Control mode remotely, or by direct entry on the front panel. Remote control mode is selected using the *Go Remote* key on the System Settings screen.

- **Monitoring Remote mode**

When in Remote mode, the SCT-1 displays the current status of the unit as shown below:



The unit can be forced into local mode by pressing the local button.

The red remote button on the screen indicates that remote mode is active

Remote Control Command Set for Sentry & Sentinel IIsc FOLs

Please note: As standard, All GPIB commands written to the system controller generate a response, it is important to read these responses back from the controller even if the data is not required. Failure to do so will cause the system controller not accept another command for 2 – 3 seconds.

To disable the “Ok” responses please see the “REMOTE OFF” command.

All commands refer to the currently selected module unless otherwise specified. " " represents a SPACE character. All responses are followed by [CR] and [LF].

Command	Description	Responses	Meaning
*IDN?	System Data, Identification query	PPM,SCT-1,FOL,V1.3	Folnet successfully found at queried GPIB address.
TXON	Turn Transmitter ON	CARRIER DETECTED Ok	Ok
		NO CARRIER DETECTED Ok	No Optical Carrier at Receiver
TXOFF	Turn Transmitter OFF	Ok	Ok
IN1	Select Input 1	Ok	Ok
IN2	Select Input 2	Ok	Ok
IN3	Select Input 3	Ok	Ok
IN4	Select Input 4	Ok	Ok

Command	Description	Responses	Meaning
GAINΞ-x	Set Gain of Current Input Channel to -xdB	Ok	Ok
		NOT AVAILABLE Ok	Gain setting out of range
GAINΞ0	Set Gain of Current Input Channel to 0dB	Ok	Ok
GAINΞ+x	Set Gain of Current Input Channel to +xdB	Ok	Ok
		NOT AVAILABLE Ok	Gain setting out of range
IMPΞ50	Select 50Ω Input Impedance for Current Input Channel	Ok	Ok
IMPΞHIZ	Select High Input Impedance for Current Input Channel	Ok	Ok
CALΞON	Turn Tx Test Signal ON for Current Input Channel	Ok	Ok
CALΞOFF	Turn Tx Test Signal OFF for Current Input Channel	Ok	Ok
DBM	Puts Maximum Input Display in dBm	Ok	Ok
DBUV	Puts Maximum Input Display in dBμV	Ok	Ok
VPP	Puts Maximum Input Display in Volts Peak-to-Peak	Ok	Ok
SYS	Report Status of Current Module	See Below	Ok
REPORTΞALL	Operates the same as SYS command	See SYS Below	Ok
REPORTΞMOD	Returns only SYS Header Section	See SYS Below	Ok
REPORTΞINP1	Returns only Input 1 information	See SYS Below	Ok
REPORTΞINP2	Returns only Input 2 information	See SYS Below	Ok
REPORTΞINP3	Returns only Input 3 information	See SYS Below	Ok
REPORTΞINP4	Returns only Input 4 information	See SYS Below	Ok

Command	Description	Responses	Meaning
ALLTXON	Turn Tx Test Signal On, All Channels	Ok	Ok
ALLTXOFF	Turn Tx Test Signal Off, All Channels	Ok	Ok
ALLTXON	Turn all Transmitters On	Ok	Ok
ALLTXOFF	Turns all Transmitters Off	Ok	Ok
MODE1	Select Module 1	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE2	Select Module 2	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE3	Select Module 3	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE4	Select Module 4	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE5	Select Module 5	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE6	Select Module 6	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE7	Select Module 7	Ok	Ok
		MODULE DISABLED Ok	No Module Present
MODE8	Select Module 8	Ok	Ok
		MODULE DISABLED Ok	No Module Present
LOCAL	Puts SCT in Local mode	Ok	Ok

Command	Description	Responses	Meaning
REMOTE	Puts SCT in Remote mode	Ok	Ok
		NOT AVAILABLE Ok	Module is already in remote mode
REMOTE Ξ OFF	Puts SCT in Remote mode, but also removes the "OK" response after completion of every command sent.	NONE	
STAT	Queries the status of each module position.	0,0,0,0,0,0,7,6 Ok	Returns 8 numbers where each number represents the type of module installed in each of the 8 possible positions: 0=none 6=Sentinel 7=Sentry
REMOTE Ξ ON	Puts SCT in Remote mode, but also adds the "OK" response on completion of every command. This command is only required if responses have been previous removed by a REMOTE OFF command.	Ok	Ok

Command	Description	Responses	Meaning
SET?Ex	Queries module x	1,1,Y,-24,50,2,N,-24,50,3,N,-24,50,4,N,-24,50 Ok	<p>The output is formatted as “A,B,C,D,E,B,C,D,E,B,C,D,E,B,C,D,E”</p> <p>Where the character represented by “A” is the module queried. The character represented by “B” is the module input. The character represented by “C” is Y if the input is selected or N if the input is not selected. The character represented by “D” is the gain. The character represented by “E” is the input impedance, 50 for 50 ohm and HIZ for high impedance.</p>
		MODULE DISABLED Ok	No Module Present

Command	Description	Responses	Meaning
SET Ξ a,b,c,d	Set a modules input, gain and impedance in one command a=module b=input c=gain d=impedance Examples: SET 1,1,-3,HIZ <i>Set module 1, input 1 to -3dB of gain and High impedance.</i> SET 1,3,33,50 <i>Set module 1, input 3 to 33dB of gain and 50ohm impedance.</i>	Ok	Ok
		MODULE DISABLED Ok	No Module Present

Command	Description	Responses	Meaning
GPIB x	<p>This sets the GPIB response timeout. x is between 0 and 15.</p> <p>0= OFF 1= 16us 2= 32us 3= 128us 4= 256us 5= 1ms 6= 4ms 7= 16ms 8= 33ms 9= 131ms 10= 262ms 11= 1s 12= 4s 13= 17s 14= 34s 15= 134s</p>	Ok	<p>Ok</p> <p>Note: this command may cause unexpected results if the GPIB timeout is either set too low or too high and therefore should be used with care.</p>

Other responses

SCT1 IS IN LOCAL MODE Ok	SCT is in Local Mode - send REMOTE command or press "Go Remote".
UNSUPPORTED FUNCTION Ok	Function is not supported by the type of module selected.

SYS (or REPORT ALL) Command Response

```
MODULE SELECTED: 1 SENTRY 2SC      )
TRANSMITTER STATUS : *****      |
BATTERY STATUS   : NOT TESTED      |
CARRIER        : Off               } REPORT MOD
TRANSMITTER      : Off
CALIBRATE       : Off
INPUT : 4        )

INPUT : 1 *****      )
GAIN           : -24.0 dB      |
MAX INPUT      : 14.1V mV p-p  } REPORT INP1
INTEGRATOR     : OFF
IMPEDANCE      : 50 Ohm
FILTER         : OFF
INPUT : 2 *****      )
GAIN           : -24.0 dB      |
MAX INPUT      : 14.1V mV p-p  |
INTEGRATOR     : OFF
IMPEDANCE      : 50 Ohm
FILTER         : OFF
INPUT : 3 *****      )
GAIN           : -24.0 dB      |
MAX INPUT      : 14.1V mV p-p  |
INTEGRATOR     : OFF
IMPEDANCE      : 50 Ohm
FILTER         : OFF
INPUT : 4 *****      )
GAIN           : 0.0 dB        |
MAX INPUT      : 894.0 mV p-p  |
INTEGRATOR     : OFF
IMPEDANCE      : 50 Ohm
FILTER         : OFF
OK
```

It should be noted that the INTEGRATOR and FILTER functions are redundant and only appear in the SYS response data to maintain compatibility with the FOLNET controller.

Please note: The following commands return multiple lines, and therefore a suitable program in LabVIEW or equivalent will have to be written to receive the data from these commands when using GPIB.

"␣" represents a SPACE character

<i>Command</i>	<i>Meaning</i>	<i>Number of lines returned</i> (in REMOTE ON mode)
SYS	Report Status of Current Module	33
REPORT␣ALL	Report Status of Current Module	33
REPORT␣MOD	Returns only SYS Header Section	9
REPORT␣INP1	Returns only Input 1 information	7
REPORT␣INP2	Returns only Input 2 information	7
REPORT␣INP3	Returns only Input 3 information	7
REPORT␣INP4	Returns only Input 4 information	7

6 Battery Packs & Power Supplies

All plug-in modules are powered through their backplane connector at the rear of the module. However, shielded modules must be powered from a clean local source which is free of EMI (Electro-Magnetic Interference). The following products are available for powering shielded modules.

- Nickel Metal Hydride Battery Packs
- Nickel Cadmium Battery Packs (end of life in 2007)
- External Power Leads
- Shielded mains PSU

Refer to the battery and charger handbook for details.

Battery Packs

Shielded modules from the Intelligent FOL and **point2point** ranges of fibre optic links can be powered from shielded battery packs. There are two sizes of battery pack available, the standard pack and the high capacity.

The battery packs are attached to the shielded module by locating a "lug" in one end of the pack into a slot on the module, then using a rigid screened battery "u-link" adapter to secure the two parts. This connector should be finger tightened for best screening performance.

The signal modules have been designed for minimal current consumption, providing maximum continuous operation, depending on module type.

In order to maintain the EM screening capability of shielded modules, there is no power switch. In the case of **point2point** modules, when the battery linking plug is attached, the module is powered and a green power LED illuminates. When the battery voltage falls below a predetermined cut-off voltage, a battery monitor circuit puts the module in a "hibernation" state, resulting in less than 30µA current consumption and preventing over discharge of the battery pack.

Test & Instrumentation products have additional functionality, whereby when a shielded module is switched off through the System Controller the overall current consumption is very low, providing at least 100 hours of standby life from a fully charged battery pack. This allows users to conserve battery strength when, for example, testing is suspended for a short time.

For maximum shelf life, the battery pack should be fully disconnected from the Transmitter Module by removing the "U" link.

Battery Pack Maintenance

Refer to the battery handbook for details

Battery Pack Charging

To charge a battery pack it should be removed from the shielded module and connected to the battery charger as shown below.

Please refer to battery handbook and charger hand book to ensure that a charger compatible with the battery type is being used

Fast charging can simply be achieved by

1. Turn the Battery Charger on.
2. Connecting the batteries to the charger
3. The charger automatically controls and charges each battery connected.

Full details of operation are given in the battery and charger handbooks

External Power Lead

There are applications where access is required to a suitable regulated DC power source where the shielded module is located. In this instance, a shielded cable PPM part number 73613 is provided for connection to a user power supply.

The power supply must conform to the requirements of the shielded module.

<i>Parameter</i>	<i>Minimum</i>	<i>Rated</i>	<i>Maximum</i>
<i>Voltage</i>	13.0V _{DC}	14.5V _{DC}	16V _{DC}
<i>Current</i>	2A *	-	-
<i>Ripple</i>	-	-	75mV

- a 2.5A anti-surge fuse must be provided in-line.

Shielded mains PSU

Where an AC power source is available it is also possible to run the system from a shielded power supply module (part number 73503).

7 Part Numbering Guide

Below are the part numbers of common components of the PPM Test & Instrumentation System.

Enclosures	
SRK-1	3U high Desktop Case
SRK-2	3U high Subrack
SRK-3	4U high Desktop Case
SRK-1 / SPL-1	3U high Desktop Case with Switch Plate (for point2point only)
SRK-2 / SPL-1	3U high Subrack with Switch Plate (for point2point only)
SRK-3 / SPL-1	4U high Desktop Case with Switch Plate (for point2point only)
SRK-3P	Cooled 4U 19" for Test & Instrumentation +SPL1
SRK-3R	Cooled 4U 19" Cabinet mounting, rack mounted
SRK-3RP	Cooled 4U 19" Cabinet mounting, rack mounted + SPL1
73680	Single channel battery optical switch
73681	Four channel battery switch control module
75002	7hp Standalone Converter Sleeve
75011	1U high Subrack
75013	Power sleeve with 9.0Ah capacity
75014	Power sleeve with 3.6Ah capacity
75015	Power sleeve with 9.0Ah capacity, with optical switch
75016	Power sleeve with 3.6Ah capacity, with optical switch

Controllers	
SCT-1	System Controller
SPL-1	Switch Plate

Power Supplies & Battery Packs	
73512	High Capacity NiMH Battery Pack with U-Link
73511	Standard Capacity NiMH Battery Pack with U-Link
55733	NiCd Battery U-Link
73469	Battery Charging Lead
73502	Converter Sleeve PSU
73613	External Power Lead 1m
56292	Four Channel Fast NiMH Battery Charger with Charging Leads

Fibre Optic Cable	
F1R1/x	ST Fibre optic cable, x metres in length (multi mode 50/125um)
F4R1/x	FC/PC Fibre optic cable, x metres in length (single mode 8/125um)
F5R1/x	LEMO Fibre optic cable, x metres in length (single mode 8/125um)
F6R1/x	FC/APC Fibre optic cable, x metres in length (single mode 8/125um)
F8R1/x	ST Fibre optic cable, x metres in length (multi mode 62.5/125um)

8 Product Warranty

The Company guarantees its products, and will maintain them for a period of three years from the date of shipment and at no cost to the customer. Extended warranty options are available at the time of purchase.

Please note that the customer is responsible for shipping costs to return the unit to PPM.

The Company or its agents will maintain its products in full working order and make all necessary adjustments and parts replacements during the Company's normal working hours provided that the Customer will pay at the rates currently charged by the Company for any replacements made necessary by accident, misuse, neglect, wilful act or default or any cause other than normal use.

Claims must be made promptly, and during the guarantee period.

IMPORTANT:

Please contact both your selling agent and PPM prior to returning any goods for Warranty or NonWarranty repairs. Goods will not be accepted without a valid Goods Return Number (GRN).

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