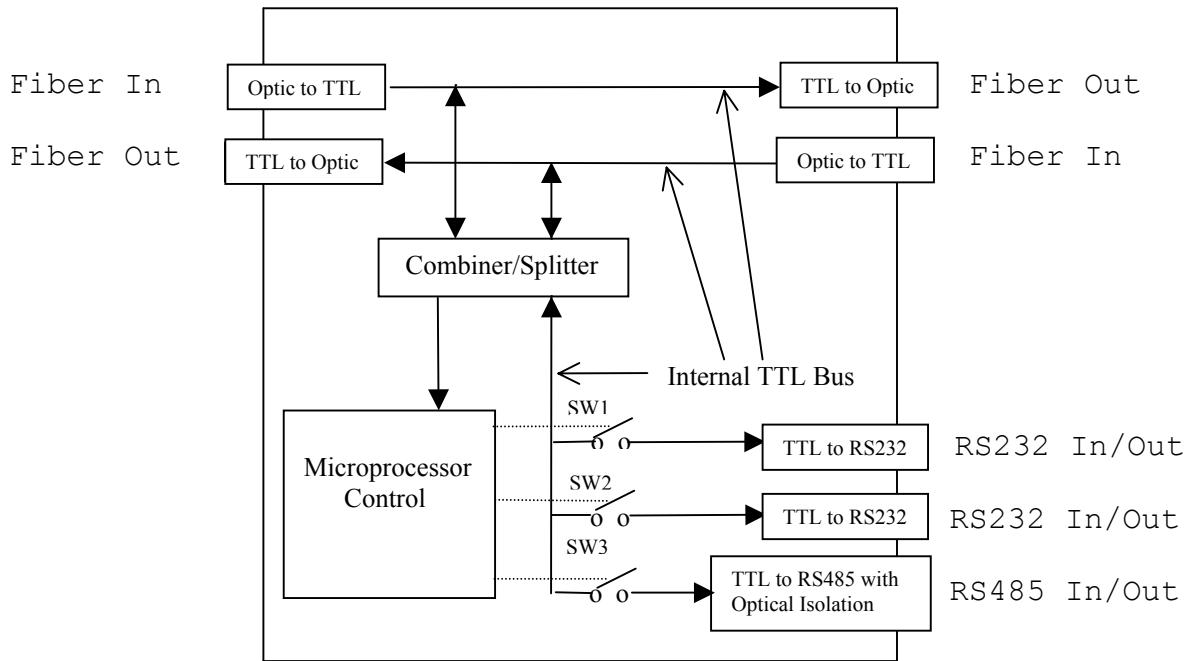


PRELIMINARY INFORMATION, October 12, 2001

FCASX3 Fiber Optic Code Activated Switch

The FCASX3 is a Fiber Optics Repeater with two RS232 and one RS485 ports. These ports can tap into the Fiber Optic channel under software control from a host computer, or other serial device.

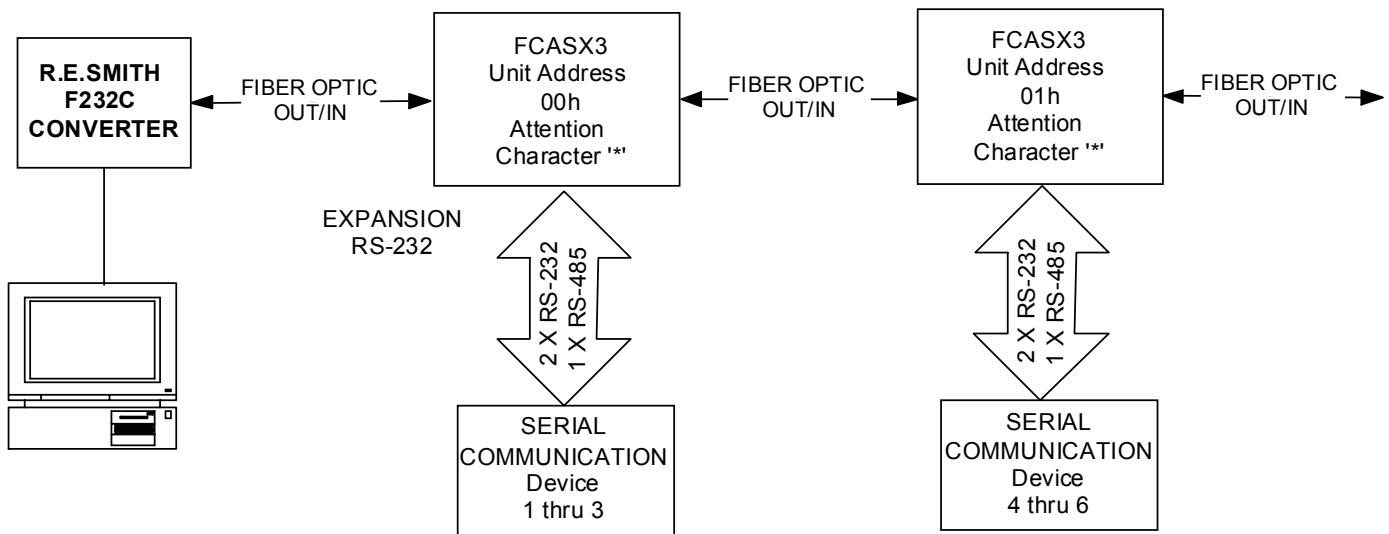
Block Diagram



To select a port to be connected to the optic port, a command is sent to the **FCASX3** on either side of the optic channel. This closes one of the three switches shown above.

When a port is selected, data coming into the selected port are copied to both sides of the optic channel, and data on both sides of the optic channel are copied to the output of the selected port. Note that communications between the tap ports is not supported. More than one tap port can be enabled, using hardware jumpers, in order to broadcast to though ports.

Typical Hook Up



Factory Communications Configuration

- Communications rate = 9600 baud, no parity, one stop bit
- Software selected Unit Address = 00h
- Attention Character = * (asterisks)
- Command Structure = 3 characters

The configuration can be changed using onboard hardware jumpers or software commands through one of the three ports. The configuration is stored in non-volatile memory, and not lost on power down.

User Interface

- 2 Fiber Optic Ports: Four ST connectors
- 2 RS232 Ports: DB9M connectors with pin 4 tied to 6, and 7 to 8.
- 1 RS485 Port: Three pin removable terminal strip.
- Power Supply: Approx 2.5 Watts max at 9-35VDC.

LED Indicators

- Fiber Optic Ports: Red and green activity indicators on each port.
- RS232 Ports: A green "Port Selected" indicator on each port.
- RS485 Port: Red and green activity indicators.
- Power: A pair of yellow indicators for primary and isolated power.

On Board Microprocessor

The on board microprocessor monitors the data on the fiber optic ports, and the selected tap port, looking for commands to change the selected tap port or the software set configuration.

Software Commands

The command string, sent on the fiber optic ports, to select the tap port consists of 3 or 4 characters depending upon the baud rate. At baud rates above 19,200 a fill character is appended to the 3 character command. Otherwise the 3 and 4 character command strings are identical. The 4 character mode is selected by removing J11. The fill character can be any character, but should be chosen so that it will not be recognized as command or data by any device capable of receiving it.

After the command string is received by the **FCASX3**, the designated port is enabled and additional characters will be transmitted out of that port.

The command string consists of:

- Byte 1: Attention Character ("*", default)
- Bytes 2 and 3: Unit and port address in Ascii Hex (detailed below)
- Byte 4: Fill character (required above 19,200 baud)

Attention Character

The Attention Character is set at the factory as the asterisk ("*"). The user, as will be shown in the programming explanation, can change this.

Unit and Port Address Details

There are two ways to establish the Unit Address.

- Install jumper J15. Then jumpers J17-J22 determine the address in the range of 0 thru 63.
- Remove J15. The Unit Address is now taken from the onboard non-volatile memory, which can be set by the user in that same range.

The three port addresses are inherent in the hardware design.

- Port 1 is the RS232 port labeled "CH1", which has port address 0.
- Port 2 is the RS232 port labeled "CH2", which has port address 1.
- Port 3 is the RS485 port labeled "CH3", which has port address 2.

The 6 bit unit address and the 2 bit port address are combined into an 8 bit value, which has an Ascii Hex representation from 00 to FF. Please note that the alpha characters A thru F must be in upper case.

Here's how to combine the 6 bit Unit Address and the 2 bit port address into the 8 bit value needed.

1. Put the 6 bit representation of the unit address into the combined 8 bit byte. For example, if the unit address is 2 the 8 bit value starts out as: **00000010**.
2. Shift this 8 bit value left twice, or multiply it by 4. This shifts the 6 bit Unit Address into the leftmost 6 bits of the combined 8 bit binary value. For our example the 8 bits would now be: **00001000**
3. Now insert the 2 bit binary representation of the port address into the rightmost 2 bit positions of the combined 8 bit value. For our example, use "CH2" which has port address 01. This yields a final Unit/Port binary value: **00001001**
4. Convert this 8 bit value into its two character Ascii Hexadecimal representation. Our example would convert to 09. The zero represents the 4 leftmost bits in the 8 bit value, and the nine is for the 4 rightmost bits.

This Ascii Hex representation is sent as bytes 2 and 3 in the command string. Below is an partial table of unit and port addresses which illustrates how this combined address is derived, and what the 3 byte command string looks like.

For this table, assume that jumpers determine the Unit Address, and further assume that the attention character is the asterisk(*). The 3 byte command is shown in **BOLD** under the Target Ports headings. Recall that the 4 byte command string is the same as the 3 byte command string except for an appended fill character, which is not shown in the following table.

Unit and Port Address Examples

JUMPERS						Unit Address	TARGET PORT 1	TARGET PORT 2	TARGET PORT 3
J17	J18	J19	J20	J21	J22				
R	R	R	R	R	R	0	*00	*01	*02
R	R	R	R	R	I	1	*04	*05	*06
R	R	R	R	I	R	2	*08	*09	*0A
R	R	R	R	I	I	3	*0C	*0D	*0E
R	R	R	I	R	R	4	*10	*11	*12
<hr/>									
I	I	I	I	I	R	3E	*F8	*F9	*FA
I	I	I	I	I	I	3F	*FC	*FD	*FE

Selecting and Deselecting a Port

The previous examples show how to select a tap port. There are several ways to deselect a port that has been enabled by software command. This, of course, does not apply to ports which have been selected by a jumper.

- Send the attention character, "*" in the previous examples, and a non-existent unit or port address. Since the **FCASX3** does not have a port with address 3, sending a command to select port 3 will deselect all ports, on all units, which use that attention character. As a matter of convenience, any unit and port address character which is not in the range of 0-9 or A-F will cause deselection.
- Select another port on the same unit, or select a port on any other unit which responds to the same attention character.
- Enable the automatic timeout feature. After the specified time has expired, the selected port will be disabled. A new command addressed to that unit and port is required to once again enable the port.

There are two timeout modes: Fixed and keep-alive. In fixed timeout mode the period starts when the port is selected. In keep-alive mode the period also starts when the port is selected but is restarted each time a character is sent out the selected port.

The user can set the timeout period from 1 to 65535mSecs. This is detailed in the section on **Monitor Mode**.

Command and Data Timing

If a port is selected by a hardware jumper(J25-J27), all data which comes into the **FCASX3** on either optic channel will be transmitted in its entirety out that port. Likewise any data that comes into the selected port will be sent out both optic channels.

If a port is selected by software command it is essential to understand what will happen to the data in this case.

- If a port has been previously selected by software command, and has not timed out, the data flow is exactly as described above when a port has been hardware jumper selected.
- If no ports are selected and a software command to select a port is received on one of the optic channels, here is what happens. After all bytes(3 or 4) of the command are

received, if the attention command and unit address match those designated for the unit, and the port address is 0 to 2, the selected port is enabled. No part of the command is sent out any of the 3 ports on the **FCASX3**, including the newly selected port. Data to the selected port can immediately follow the last byte of the command.

- If a port has been previously selected by software command, and has not timed out, and a software command to select a port is received on one of the optic channels, here is what happens.
 - 1) When the attention character is being received it is sent out the selected port in real time. There is no character buffering in the **FCASX3**.
 - 2) At the end of the attention character, if it matches the designated attention character for the unit, the selected port will be deselected. In this case only the attention character will have been sent out the selected port. The balance of the command, the two byte unit/port address and fill character, if any, and data following will not be sent out.
 - 3) After all bytes(3 or 4) of the command are received, if the unit address matches and the port address is 0 to 2 the selected port is enabled. No part of the command will have been sent out the newly selected port. Data to the selected port can immediately follow the last byte of the command.
 - 4) If the attention character is not correct for this unit, the entire command will be sent out the previously selected port, and the port will remain enabled.

Monitor Mode

To enable **FCASX3** Monitor mode, remove jumper J7. Communications is enabled at a fixed baud rate of 9600,8,N,1. The monitor mode can be accessed using a terminal emulator program or using the R.E. Smith SuperCas utility. After evoking the communications program you have chosen, press the ENTER key. The first screen you will see is the Main Menu. Note: all data entered in Monitor Mode must be in upper case.

MAIN MENU

```
FCASX3 MONITOR
1 SHOW SETUP
2 CHANGE SETUP
3 FACTORY DEFAULTS
4 CHANGE HEADING
5 VERSION INFORMATION
6 JUMPER SETTINGS
>
```

Select one of the above items from the Main Menu.

SHOW SETUP(1)

```
BAUD = 9600
PARITY = N
INTERNAL EEPROM ADDRESS = 00
CURRENT EXTERNAL ADDRESS(J15-22) = 00 (ACTIVE)
ATTENTION CHARACTER = "*" (2A)
TIMEOUT = 0064 (100 mSecs)
```

After the above data are displayed the MAIN MENU will be again be shown.

CHANGE SETUP (2)

This menu selection will sequentially prompt you with setup items and the acceptable values. When you enter a proper value the next setup item will be displayed. If the value you enter is not proper, you will be prompted again for the same item. After all setup items have been entered you will be asked if the changes are to be accepted.

BAUD (0=2400, 1=4800, 2=9600, 3=14400, 4=19200,
5=28800, 6=38400, 7=57600, 8=115200) :

PARITY (Y/N) :

TIMEOUT (4 Hex Characters) :

ATTENTION CHARACTER (Any Printable or Nonprintable Character) :

INTERNAL EEPROM ADDRESS (2 Hex Characters) :

ACCEPT CHANGES (Y/N) :

FACTORY DEFAULTS (3)

RESET TO FACTORY DEFAULTS (Y/N) :

CHANGE HEADING (4)

After entering the Heading you will be asked if the changes are to be accepted.

ENTER HEADING (xx Characters max) :

ACCEPT CHANGES (Y/N) :

VERSION INFO (5)

VERSION MM-DD-YY

HARDWARE REV. XN

JUMPER SETTINGS (6)

Jumpers are installed(**I**) or removed(**R**) to control the feature.

J7	R	:	MONITOR MODE ENABLED
J8, J9	I, I	:	TIMEOUT MODE DISABLED
J10	R	:	BAUD RATE FIXED AT 9600
J11	I	:	3 CHARACTER COMMAND MODE
J12	I	:	ATTENTION CHARACTER ENABLED
J13	R	:	BROADCAST COMMAND ENABLED
J14		:	RESERVED
J15	I	:	EXTERNAL ADDRESS ENABLED
J16		:	RESERVED
J17-J22		:	EXTERNAL UNIT ADDRESS (J17=LSb)
J23-J24		:	RESERVED
J25	R	:	PORT 1 SOFTWARE CONTROL
J26	R	:	PORT 2 SOFTWARE CONTROL
J27	R	:	PORT 3 SOFTWARE CONTROL

Jumper Configuration

There are several features that can be controlled using the jumpers on the **FCASX3** board. If a factory default applies, that configuration is designated in the tabular data below with an asterisk.

J1-J4: RS232 Channels 1 and 2 Device Type

There is a set of 4 jumpers(labeled J1-J4) associated with each of the two RS-232 ports(Channel 1 and Channel 2). These jumpers determine the Transmit(Tx) and Receive(Rx) pins on the DB9M connectors.

The default setting(J1 and J2 installed) connects the Tx(Output) to pin 2 and the Rx(Input) to pin 3. This is the same gender and pinout as you will find on a 9 pin serial port on a standard desktop PC. This is the default configuration and is usually designated as "Computer or DTE". This allows you to connect the **FCASX3** directly to the serial port on the PC using a DB9F to DB9F "Null Modem" cable.

If you move the two jumpers from J1 and J2 to J3 and J4, the Tx and Rx pins on the DB9M are reversed. This configuration conforms to the pinout for "Modem" or "DCE". However, the gender of the DB9 connector is still male, and this is not standard for "Modem or DCE". In this case you can connect the **FCASX3** to the 9 pin serial port on a standard desktop PC using a DB9F to DB9F "one to one" cable.

RS232 Mode	J1 & J2	J3 & J4
* Computer (DTE)	Installed	Removed
Modem (DCE)	Removed	Installed

J7: Operation Mode

Operation Mode	J7
* Normal (Monitor Function Disabled)	Installed
Monitor Mode Enabled @ 9600 Baud 8,N,1	Removed

J8 & J9: Timeout Mode Control

Mode	J8	J9
* No Timeout	Installed	Installed
Fixed Timeout @ 100mSecs	Removed	Installed
Timeout with keep alive feature 100 mSec default. User settable from 1 to 65535 mSec	Removed	Removed

J10: Baud Rate Control

Mode	J10
* Baud Rate set in EEPROM (User settable)	Installed
Baud Rate fixed @ 9600 Baud 8,N,1	Removed

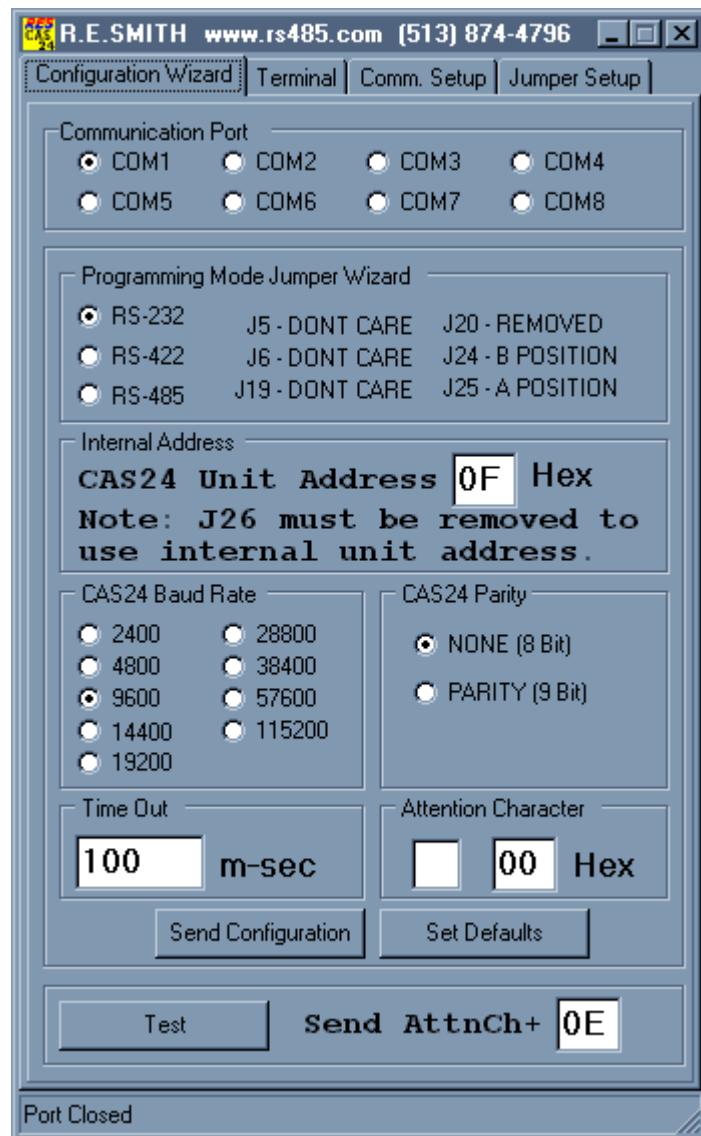
J11: Command String Length

Mode	J11
* 3 Characters. For Baud Rates above 19,200	Installed
4 Characters. Refer to "Software Commands"	Removed

J15: Address Mode

Mode	J15
* Address (0-3F) set externally by J17 to J22	Installed
Address set in EEPROM (User settable)	Removed

R. E. Smith Configuration Wizard (For Windows 95/98/ME/NT)



EXAMPLE 2
(4 Character Port Control Command)

A FCASX3 unit is connected to devices running at high baud rates, 19200 baud and above. The goal for this example is to switch reliably between 8 different devices with no delay in communications. The user must select the 4-character port control command when using high baud rates. The format of this command is as follows. Attention Character + XX + D, where XX is the ASCII-hex encoded board address and port number and D is a synchronization character which triggers the port enabling operation. Note! D can be any character except the attention character. To enable the 4 character port control command remove jumper J11.

Steps

1. Power up. All ports on all boards powered up are disabled.
2. Transmit "*01 Hello" where "*" is the attention character, "01" is the data and " " is the synchronization character. Note "01" is in ASCII-hex format and represents the coded board address and port to be selected. The FCASX3 unit receives "*01 " and parses in the following manner, the binary representation is equal to **00000001b** or **AAAAAAADD** (AAAAAA - board address) (DD - port selected). The FCASX3 unit with address 0 would then allow its target RS-232 port 2 to transmit and receive characters following the addressing sequence and synchronization character. Board 0, Port 2 would then pass the message "Hello" to the device connected to Port 2. Depending on the other configuration jumpers, this port would either stay connected or time-out and be disabled.
3. Repeat for any configured FCASX3 board/port configured.

Configuration

Several user selectable configuration parameters can be selected using external jumper settings and a terminal program to access the on board monitor function enabled by removing jumper J7. The monitor operates at a fixed baud rate of 9600, communications parameters N-8-1. The following text is from the monitor function showing the user selectable choices. Pressing the enter key will display the following menu.