TrueTime

Model 560-5143-2
Fiber Optic Transceiver Manual

April 8, 1998

Serial Number _____

SECTION ONE

1. GENERAL INFORMATION

1.1. PURPOSE OF EQUIPMENT

The Model 560-5143-2 Fiber Optic Transceiver card provides a fiber optic input and output interface for the backplane reference signals REF IN7, IN8, or C. The card can be configured to drive IN7, IN8, or REF C with the fiber optic input signal and/or to transmit IN7, IN8, or REF C via the fiber optic output. The card is intended to be configured as a repeater, where the output is an echo of the input.

The three backplane signals are distributed via 50 ohm controlled-impedance traces, terminated at Slot 17. For best signal quality, the Transceiver card must be located in Slot 1 through 4.

1.1.1. PHYSICAL SPECIFICATIONS

Dimensions:	0.8"w X 4.4"h X 5.0"d (2 cm X 11 cm X 13 cm)
Weight:	Approximately ½ pound (¼ kg)

1.1.2. ENVIRONMENTAL SPECIFICATIONS

Operating Temp:	0° to +50°C
Storage Temp:	-17° to +100°C
Humidity:	Up to 95% relative, non-condensing
Cooling Mode:	Convection

1.1.3. POWER REQUIREMENTS

Voltage:	48 VDC ±20%
Power:	3 W

1.1.4. FUNCTIONAL SPECIFICATIONS

1.1.4.1. RECEIVER FIBER OPTIC INPUT

Signal:	890 nM, -16 dBm to -26 dBm
Connector:	ST
Fiber type:	Multi-mode 50, 62.5 or 100 micron

1.1.4.2. TRANSMITTER FIBER OPTIC OUTPUT

Signal:	890 nM, -18.8 dBm typical, into 50 micron fiber
Signal:	890 nM, -16 dBm typical, into 62.5 micron fiber
Signal:	890 nM, -12 dBm typical, into 100 micron fiber
Connector:	ST

1.1.4.3. RECEIVER BACKPLANE OUTPUT TO IN7, IN8 and/or REF C

Signal Type:	Squarewave, AC-coupled

Amplitude: 4 Vpp into 50 ohms

1.1.4.4. TRANSMITTER BACKPLANE INPUT FROM IN7, IN8 and/or REF C

Signal Type: Squarewave
Amplitude: 2.2 Vpp - 5 Vpp

1.1.4.5. DRC CARD COMPATIBILITY

Location: Slot 1-4.
Compatibility: See DRC Card Compatibility Matrix.

SECTION TWO

2. INSTALLATION AND OPERATION

2.1. HOT-SWAPPING

All cards, input cables and output cables are hot swappable. It is not necessary to remove chassis power during insertion or removal. Hot swapping and reference-source changes are abrupt, the effects difficult to characterize; however, the system is designed to protect against permanent effects and minimize temporary effects of these events.

Typically, adjacent-card hot swapping has a negligible effect on the Fiber Optic Transceiver. The hot swapping event typically lasts less than one clock-period and has an average of 0 Volts. The effect of redundant power supply switch-over is also negligible.

Hot swapping of a Fiber Optic Transceiver affects the system in varying ways depending upon whether it is configured to drive IN7, IN8 and/or REF C and depending upon which reference input is the currently-highest priority. These effects are discussed in individual card manuals.

2.2. REMOVAL AND INSTALLATION

CAUTION: Individual components on this card are sensitive to static discharge. Use proper static discharge procedures during removal and installation.

Refer to CARD COMPATIBILITY section prior to installing new card.

To remove card, loosen the captive retaining hardware at the top and bottom of the assembly, then firmly pull on the handle (or on any connector on rear panel adapter cards) at the bottom of the card. Slide the card free of the frame. Refer to the SETUP section for any required switch settings; or, set them identically to the card being replaced. Reinstall the card in the frame by fitting it into the card guides at the top and bottom of the frame and sliding it in slowly, avoiding contact between bottom side of card and adjacent card front panel, until it mates with the connector. Seat card firmly to avoid contact bounce. Secure the retaining screws at the top and bottom of the card assembly.

2.3. SETUP

The setup of the Fiber Optic Transceiver involves selection of the reference: IN7, IN8 and/or REF C. While it is possible to connect the input and output to different references, the card is intended to be used in a repeater configuration. For non-repeater applications, verify that the reference signal (IN7, IN8 and/or REF C) meets the Fiber Optic card input signal specifications. If the card is to be used as a fiber optic

receiver only, the transmitter should be disabled. If the card is to be used as a fiber optic transmitter only, with another card driving IN7, IN8, and/or REF C, the receiver must be disabled.

Use the tables below to set the Fiber Optic Transceiver into the repeater mode. Jumper 1 selects the reference to be driven by the Fiber Optic Receiver. Jumper 2 selects the reference source for the Fiber Optic Transmitter.

To use REF A:

	IN7	**IN8**	**REF C**
XCVR-JP1	JUMPER	OPEN	OPEN
XMTR-JP2	JUMPER	OPEN	OPEN

To use REF B:

	IN7	**IN8**	**REF C**
XCVR-JP1	OPEN	JUMPER	OPEN
XMTR-JP2	OPEN	JUMPER	OPEN

To use REF C:

	IN7	**IN8**	**REF C**
XCVR-JP1	OPEN	OPEN	JUMPER
XMTR-JP2	OPEN	OPEN	JUMPER

To DISABLE FIBER OPTIC RECEIVER:

	IN7	**IN8**	**REF C**
XCVR-JP1	OPEN	OPEN	OPEN

To DISABLE FIBER OPTIC TRANSMITTER:

	IN7	**IN8**	**REF C**
XMTR-JP2	OPEN	OPEN	OPEN

2.4. FAULT INDICATION

This card has no fault indication.

2.5. MAINTENANCE

This card has no maintenance requirements.

SECTION THREE

3. THEORY OF OPERATION

3.1. GENERAL INFORMATION

This section contains a detailed description of the circuits in the Fiber Optic Transceiver card. These descriptions should be used in conjunction with the drawings in SECTION FOUR.

3.2. CIRCUIT BOARD DESCRIPTION

The 560-5143-2 Assembly provides a single Fiber Optic input channel which may be connected to any one of three signal buses by means of a jumper. It also provides a single Fiber Optic output channel which may likewise be connected to any one of three signal buses. The input channel and the output channel are normally connected to the same signal bus, and the card acts as a repeater, echoing whatever is fed to the input channel out onto the output channel.

3.3. DETAILED DESCRIPTION

Reference drawing 560-5143-2, sheet 3 of 3.

3.3.1. INPUT CHANNEL

The signal source for the input channel is an optical signal between 1 and 10 MHz. It is applied via a fiber optic cable to U2 which detects and amplifies the signal. The signal is then applied to U4:A which amplifies the signal further before passing it on to successive stages of U4 to achieve as close to an amplitude limited signal as possible. The output of U4:C is applied to a Schmitt Trigger, U1:A, for squaring up of the edges before applying it to a digital squelch circuit composed of One Shot U5:A, Flip Flop U3:A, and Nand gate U10:A. If a properly limited signal of sufficiently high frequency is applied to this squelch circuit, it opens up the gate and passes on the signal to a paraphrase generator consisting of U11:A and U11:B. This circuit generates two signals that are 180 degrees out of phase with each other which are used to drive a transformer in push pull mode via buffers composed of U1:C, U1:D, U1:B, and U1:E. The output windings of the transformer are paralleled and connected to one of three signal buses via terminating resistor R2 and Jumper JP1. The output level seen on the bus, which itself is terminated by a 50 Ω resistor, is 4 Vpp. If the optical input signal is too low in amplitude, or not present, then the squelch circuits prevents any output from being impressed on the bus. This guards against two possible failures, a broken fiber or a failed driver.

3.3.2. OUTPUT CHANNEL

The signal source for the output channel is a 1 to 10 MHz, 2.2 Vpp (min.) squarewave available from one of three signal buses coming onto the card through P1 and selected by JP2. It is applied through a 1KΩ resistor, R4, and a 270 pF capacitor, C10, to the base of Q1 which performs a level shifting function to drive the input of Schmitt Trigger U1:F. The output of the Schmitt Trigger is capacitively coupled by C6 to the input of an LM6321 buffer, U9, which is biased to +5 VDC by R6 and R7. This biasing sets the quiescent current of the Fiber Optic Driver U8. Current for this LED device is limited by R15 and R16 in parallel. Note that the component designated C23 is now actually a Zero Ω resistor. The actual range of acceptable input signals goes from 2.2 Vpp to 10 Vpp as well as 1 Vpk to 5 Vpk, although monopolar signals are not normally used on this design.

3.3.3. POWER SUPPLY

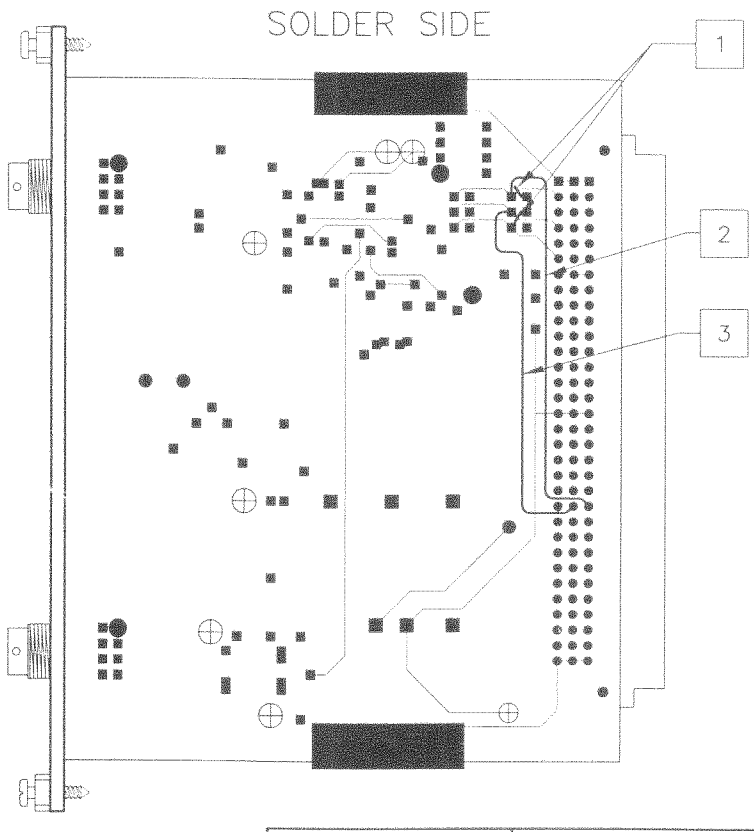
Power is applied to the board at a nominal 48 VDC level. It is filtered by L1, C9, and C19, and applied to a DC to DC converter, U7, which is used to supply +10 VDC to the on card circuitry. A linear post regulator, U6, supplies +5 VDC to the logic and receiver circuits. Both the +10 VDC and the +5 VDC levels are heavily filtered by tantalum and ceramic capacitors. In addition RF chokes L2 and L3 are employed to isolate the transmitting section and the power supply section of this card from the receiving section of the card.

SECTION FOUR

4. DETAILED DRAWINGS

4.1. 560-5143-2 DETAILED DRAWINGS / BILL OF MATERIALS

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



4. OTHER TRACES SHOWN FOR REFERENCE ONLY.

3 SOLDER PRELEG JUMPER WIRE FROM JP1-B TO P1-B22.

2 SOLDER PRELEG JUMPER WIRE FROM JP1-A TO P1-A22.

1 CUT TRACE WHERE INDICATED.

NOTES: UNLESS OTHERWISE SPECIFIED.

CONTRACT NO,		TrueTime 2835 DUKE CT. SANTA ROSA CA 95407			
APPROVALS	DATE	FIBER OPTIC RCVR IN7/IN8			
DRAWN BY KOLLANDER	1/98				
CHECKED BY					
APPROVED BY	1/98				
NEXT ASSY		SIZE B	CODE IDENT NO.	DRAWING NO. 560-5143-2	REV N/C
		SCALE NONE			SHEET 1 OF 1

FILENAME: \560\5143-2
DATE: 01-29-98

MAX * BILL OF MATERIALS * SINGLE-LEVEL EXPLOSION BY PART IDENTIFIER W/REFERENCE

PART IDENTIFIER	DESCRIPTION 1	DESCRIPTION 2	EFF DATE	ECN #	QTY/ASSY	UOM	REV LVL	REFERENCE DESCRIPTION
560-5143-2	FIBER OPT RCVR BUS MODULE IN7/IN8					EA		
0000-APPROVAL	PARTS LIST APPROVAL				1.0000	EA		
0000-PL	PARTS LIST REV LEVEL				1.0000	EA		REV N/C (01-21-98)
0000-PRINT	REFERENCE PRINT				1.0000	EA		560-5143-2 REV N/C
560-5143-1	FIBER OPT RCVR BUS MODULE MADE FROM 560-2143				1.0000	EA		
LA	LABOR ASSEMBLY COST HRS				0	EA		
LT	LABOR TEST COST HOURS				0	EA		