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HF Controls

HF CONTROLS CONTROL SYSTEM

HFC-6000 Product Line Components

HFC-ILR06R
Hardware Design Specification
DS901-000-91, Rev B

Effective Date 2/16/2011

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Revision History

Date	Revision	Author	Changes
1/10/11	A	N. Reid	Initial Release
2/11/11	B	N. Reid	Update for 50 kHz relay signal and solid state relay changes.

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1.0 INTRODUCTION

The HFC-ILR06R operates in a standard HFC-6000 rack. The card will operate in any standard I/O card slot. The assembly receives contact closure fiber optic input and/or ICL data. The HFC-ILR06R's purpose is to either transmit contact closure information to the built in relay on board or propagate ICL data across the fiber optic link in both directions.

Major features of the HFC-ILR06R card are as follows:

- Redundant 24-vdc power sources provide operating power; the onboard voltage regulator controls the +5-vdc power rail.
- 1300 nm fiber optic interfaces
- 820 nm backwards compatible design
- ICL fiber optic data link
- Contact closure reception and DO relay output

1.1 REFERENCES

400404-01	HFC-ILR06 Design Specification, Rev B
RS901-001-02	HFC-ILR06R Requirements Specification, Rev A
WI-ENG-106	Development of Hardware Design Specifications

1.2 SPECIAL TERMS AND ABBREVIATIONS

BJT	Bipolar Junction Transistor
C-Link	Communication Link
I/O	Input/Output
FO	Fiber Optic
LED	Light Emitting Diode

2.0 SPECIFICATIONS

Mounting Requirements

- HFC-6000 standard form factor.

Fiber Optic Cable Requirements

- Fiber type shall be Multimode 62.5/125 micron. Connector type shall be ST type. The maximum FO cable length is 2 km.

3.0 CONTROLS AND INDICATORS

3.1 LED INDICATORS

One LED, D2, indicates the closure status of the solid state relay. When D2 emits a red color the relay is closed.

3.2 BOARD SETTINGS

The HFC-ILR06R can be set to different functionality based on the installation status of R6, R11, R25, R26, R27, and R28. The devices installed in FO2 and FO1 can be changed along with the resistors listed previously to allow 820 nm fiber optic communications.

3.2.1 820 nm ICL Applications

Installation of resistors R26 and R11 will allow an 820 ohm HFBR-2412 receiver to be installed in FO2. FO1 should be installed with an HFBR 1412 receiver for 820 nm ICL transmission. R6, R25, R27, and R28 should be removed. The 820 nm ICL link works without the installation of the 1320 nm amplifier circuit also.

3.2.2 820 nm Relay Contact Closure Operation

Installation of resistors R26, R11, and R27 will allow the HFBR-2412 receiver in FO2 to be used for relay contact operation. R6, R16, R18 should be removed for this configuration. The transmitter circuit does not need to be installed for solid state relay contact closure operation.

3.2.3 1300 nm ICL Applications

Installation of resistors R6, R25, and R27 will allow the HFBR-2316 receiver in FO2 to be used for 1300nm ICL communications. A HFBR-1312 transmitter should be installed in FO1 for 1300 nm transmission. R11, R26, and R28 should be removed for this configuration.

3.2.4 1300 nm Relay Contact Closure Operation

Installation of resistors R6, R25, and R28 will allow the HFBR-2316 receiver in FO2 to be used for relay contact operation. R11, R26, and R27 should be removed for this configuration. The transmitter circuit does not need to be installed for solid state relay contact closure operation.

4.0 HFC-ILR06R HARDWARE FUNCTIONAL DESCRIPTION

4.1 OVERVIEW

The HFC- ILR06R card is designed to receive and transmit information over a 1300 nm fiber optic link. It is backwards compatible with a few resistor changes to the 820 nm fiber optic ICL communications of the original HFC-ILR06.

4.1.1 ICL Communications

The HFC-ILR06R converts incoming fiber optic signals into TTL signals and sends them to the RS485 transceiver. If XMTEN is high (receive mode), the transceiver drives the RS485 bus on the backplane. When the XMTEN line is pulled low, the transceiver drives the fiber optic transmitter based on the voltage present on the differential data lines. XMTEN should be pulled low when the electrically connected boards are sending data and high when they are open to receiving data. Two wavelengths of fiber optic operation are supported on the HFC-ILR06R, 820 nm and 1300 nm. Choosing between the two modes requires changing of the fiber optic receiver/transmitter and installing/removing a few resistors.

The 820 nm ICL communications are handled through the same interfaces as the previous HFC-ILR06 board. The fiber optic receiver chosen for the 820 nm communications drives TTL output. This interfaces directly with the original HFC-ILR06 transceiver circuit. See section 3.2.1 for information on which parts to install for 820 nm functionality.

The 1300 nm ICL receiver is first passed through an amplifier circuit to obtain the proper TTL signals and then fed into the old HFC-ILR06 ICL logic. The electrical ICL output lines have been moved directly onto the backplane through the P1 connector. See section 3.2.2 for information on which parts to install for 1300 nm functionality.

4.1.2 Monostable Circuit and Solid State DO

The fiber optic input signal is a 50 kHz signal. The signal is amplified out of the receiver and the DC component is removed. The AC component is coupled into a NPN BJT, whose output is fed into a 7555 chip. The BJT ensures enough output current is driven to the 7555 chip. The 7555 chip is operated in monostable mode, and the output is held high across a small low pass filter in order to hold the relay output high until the next input signal pulse is received. If the HFC-ILR06R stops receiving the 50 kHz signal, the 7555 chip will no longer be triggered and the output will fall to 0V.

The output signal from the monostable circuit is fed into two hex inverter drivers to provide enough driving current for the solid state relay and D2 LED. When the 7555 output falls to 0V, the solid state DO output is turned off. See section 3.2.3 for information on which parts to install for this mode of operation.

Two solid state relays are used in parallel to provide the 1A current and 200 ms response time for the solid state DO. The DO signal from these relays is accessible from 9 points on the backplane connector, allowing up to 9 inputs to use the DO signal at one time, provided they draw no more than 1A.

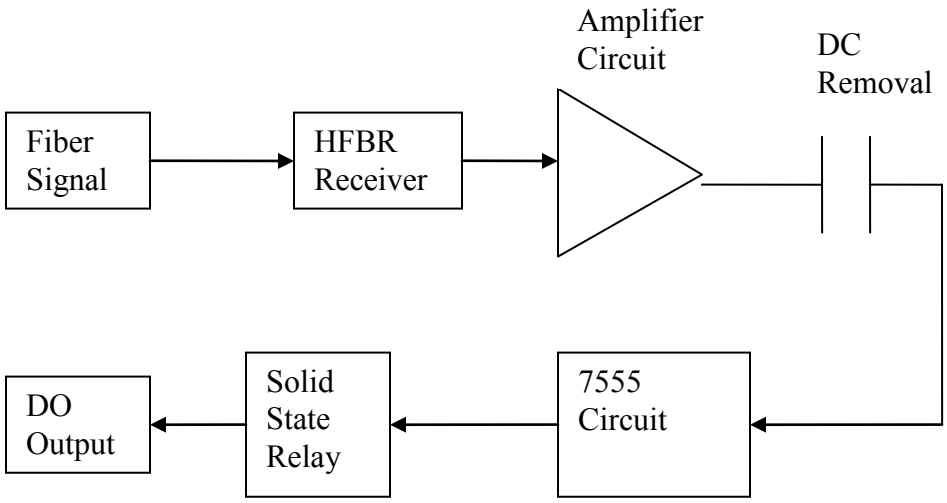

Figure 1: HFC-ILR06 Solid State DO Flow Diagram

4.2 POWER DISTRIBUTION

The card receives redundant 24-vdc power feeds from the connector P1. The two power feeds are diode auctioneered enabling redundant power distribution to the hardware on this card. If one of the 24-vdc power sources fails, the other power source provides all required operating power to the HFC-ILR06R card.

- The combined 24-vdc-power line is sent into a 5V regulator (U4).
- The 5V regulator powers the assorted board components making up the HFC-ILR06R.

5.0 HARDWARE CONNECTIONS

Two fiber optic ST connectors control fiber optic input to the HFC-ILR06R. The card contains P1 and P2 connectors that connect to the standard HFC-6000 rack. Table 1 and table 2 provide a pin-out summary for the connectors.

Table 1: Connector P1 Pin-out Summary

P1 PIN	Mnemonic	Function
P1- A1, B1, C1, A2, B2	+24V A	Power feed A
P1- C2, A3, B3, C3, A4	+24V B	Power feed B
P1-B4, C4, A5, B5, C5	GND	Return

P1- A9	Data +	Data +
P1- C9	Data -	Data -
P1-B8	Shield/XMTEN	Transmit enable
P1- A10	Data +	Data +
P1- C10	Data -	Data -
P1- C8	Shield/XMTEN	Transmit enable
P1-A12, B12, C12	AUX 1	DO auxiliary 1
P1-A14, B14, C14	AUX 2	DO auxiliary 2

Table 2: Connector P2 Pin-out Summary

P2 PIN	Mnemonic	Function
P2- C1, C2, C3, C4, C5, C6, C7, C8, C9	DO	DO output.