Transmitting IRIG Signals via Fiber Optics

Background

The need for precision timing signals for the correlation of data became apparent in the early 1950s. At that point in time the nation's growing missile and space programs required large amounts of data to be recorded and stored and a means to provide a "base line" for such data was sorely needed. After many arbitrary formats were developed by various manufacturers, with a good deal of confusion, the government stepped in. The result was the formation of the Inter-Range Instrumentation Group (hence the name IRIG) with the primary task being the standardize the various time code formats required so that all related equipment, regardless of manufacturer, could "talk" to each other. The result of that effort is employed to this day in a wide range of applications from air traffic controls, medical instrumentation and law enforcement systems to the vary latest GPS equipment.

Types of Timing Signals

There are several basic time codes commonly in use today under the general IRIG umbrella. These are:

Amplitude modulated carriers

IRIG A	A 10 KHz carrier amplitude modulated with timing signals
IRIG B	A 1KHz carrier amplitude modulated with timing signals
NASA 36	A 1KHz carrier amplitude modulated with timing signals

DC Time Codes

IRIG A	A stream of precision pulses at a rate of 1000 pps
IRIB B	A stream of precision pulses at a rate of 100 pps
IRIG H	A stream of precision pulses at a rate of 2 pps
NASA 36	A stream of precision pulses at a rate of 100 pps.

Sine Waves

1, 5 or 10 MHz pure ultra-stable sine waves derived from atomic frequency standards.

It is important that all of these be transmitted from point to point with the least amount of distortion and interference in order to maintain the integrity of the various signals. Fiber optic transmission techniques with their inherent immunity to interfering signals and wide bandwidth is an ideal method to transmit such signals.

Fiber Optic Transmission Systems

In response to this need ***Liteway, Inc.*** has developed, and currently manufacturers ***Luxlink®*** brand fiber optic transmission systems for use with all of the above. These products are:

IRGT/IRGR-1001 Analog IRIG Transmitter and Receiver

This system transmits all of the amplitude modulated carriers mentioned above in a point-to-point system at distances of up to several miles when required. Figure 1 shows the typical connection of this system.

IRGP-1001 Analog IRIG Repeater

This unit, when used in conjunction with the IRGT/IRGR-1001 units can be used to provide a drop and repeat configuration for an IRIG distribution system. Figure 2 shows the use of this unit in a typical application.

IRGM-1004 Four Channel IRIG Distribution Transmitter

This unit accepts a single amplitude modulated IRIG carrier and provides four separate optical outputs to drive four separate IRGR-1001 receivers in a “star-type” distribution system. Figure 3 shows the details of this configuration.

IRGT/IRGR-7001 DC Time Code IRIG Transmitter and Receiver

This system transmits all of the digital IRIG pulse train signals described above in a point-to-point system at distances of up to several miles when required. Figure 1 shows the typical connection of this system.

IRGP-7001 Digital IRIG Repeater

This unit, when used in conjunction with the IRGT/IRGR-7001 units can be used to provide a drop and repeat configuration for a digital IRIG distribution system. Figure 2 shows the use of this unit in a typical application.

IRGM-7004 Four Channel Digital IRIG Distribution Transmitter

This unit accepts a single digital IRIG pulse train and provides four separate optical outputs to drive four separate IRGR-7001 receivers in a “star-type” distribution system. Figure 3 shows the details of this configuration.

INST/INSR-1001 Sine Wave Transmitter and Receiver

This system transmits precision sine waves from 20 Hz to 30 MHz in a point-to-point system at distances of up to several miles when required. Figure 1 shows the typical connection of this system.

INSP-1001 Sine Wave Repeater

This unit, when used in conjunction with the INST/INSR-1001 units can be used to provide a drop and repeat configuration for a sine wave distribution system. Figure 2 shows the use of this unit in a typical application.

INSM-1004 Four Channel Sine Wave Distribution Transmitter

This unit accepts a single precision sine wave and provides four separate optical outputs to drive four separate INSR-1001 receivers in a “star-type” distribution system. Figure 3 shows the details of this configuration.

All of the above units are available in multimode fiber optic versions for transmitting signals up to 6 miles (10Km). All may also be used as “stand-alone units or rack mounted by means of RMP- series rack mounting panels.

By using fiber optic transmitters, receivers and repeaters such as the ones described above an interference free transmission system can be implemented that will enable high quality signals to be routed as desired.

For specific details on any of the above systems please consult the individual data sheets found on the ***Luxlink*** web site at www.luxlink.com.

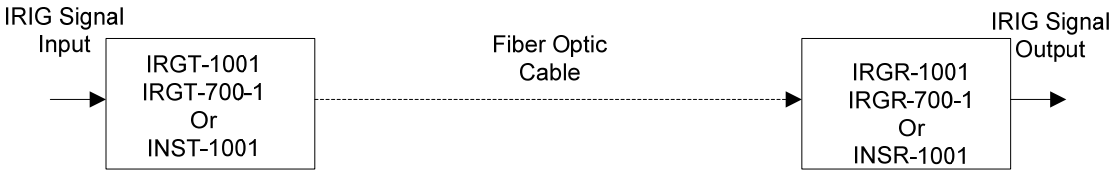

Figure 1, Point to Point

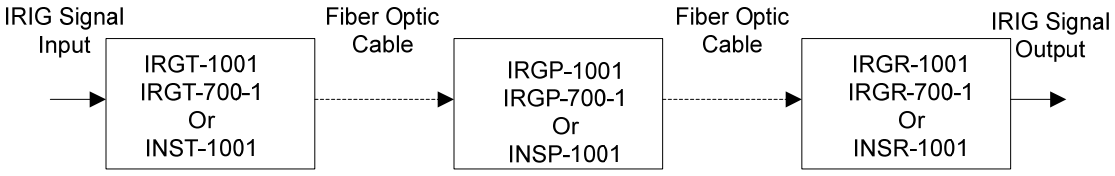

Figure 2, Point to Point with Repeater

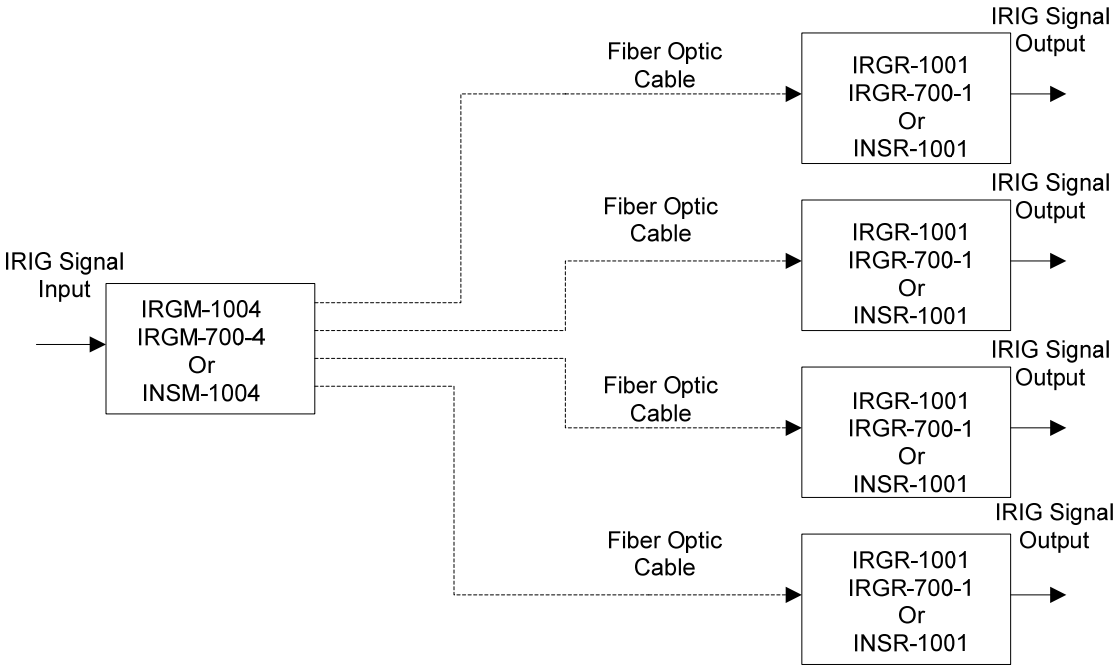

Figure 3, Point to 4 Separate Points