



# Fiber Optic System

## 6530A Fiber Optic Transmitter and 6531A Fiber Optic Receiver

### KEY FEATURES

#### 6530A Fiber Optic Transmitter

- Choice of Input Frequencies: 100kHz, 1MHz, 5MHz or 10MHz
- Ten Low Noise 850nm Optical Outputs
- Distributes Signals 2km or Less Without Degradation
- Channel Fault Alarm
- Daisy Chain for Up to 100 Outputs

#### 6531A Fiber Optic Receiver

- Accepts One 850nm AM Optical Input Signal
- Ten Buffered, Low Noise RF Signal Outputs
- >100db Channel Isolation
- Channel Fault Alarm

### INTRODUCTION

The Symmetricom Fiber Optic System consists of a 6530A Fiber Optic Transmitter and up to ten 6531A Fiber Optic Receivers. Each unit is packaged in a 1U rack mount chassis.

The inherent benefits of fiber optic technology allow users to eliminate AC ground loop noise and to greatly reduce signal loss over long cable runs. The Symmetricom 6530A Fiber Optic Transmitter coupled with the

Symmetricom 6531A Fiber Optic Receiver provides a simple, cost effective method of transmission and distribution of the selected 100kHz, 1MHz, 5MHz or 10 MHz RF signal to multiple locations.



FIG.1 Fiber Optic System

## THE SYMMETRICOM HIGH PERFORMANCE FIBER OPTIC TRANSMITTER

Designated the Symmetricom 6530A, the Symmetricom Fiber Optic Transmitter is factory set for one of the four RF sine wave input frequencies (100kHz, 1MHz, 5MHz or 10MHz). The electronics housed in a 1U rack mount chassis converts the RF input signal into ten low noise optical output signals of the same frequency for transmission to the frequency matched Symmetricom fiber optic receiver(s).

Maintained signal integrity is possible even when the receiver is located up to two kilometers away. When the need is for more than ten signals multiple Symmetricom 6530As daisy chained together provide an infinite number of distribution channels with virtually no signal degradation. Each output and input has an alarm indicator that warns of either a loss of signal or a signal of insufficient amplitude.

## THE SYMMETRICOM HIGH PERFORMANCE FIBER OPTIC RECEIVER

Designated the Symmetricom 6531A, the Symmetricom Fiber Optic Receiver needs an 850nm amplitude modulated optical input signal to operate. The electronics housed in a 1U rack mount chassis converts the optical input signal into ten RF output signals. A key feature is the phase lock loop (PLL) that cleans up the input signal to ensure the ten output signals deliver the low phase performance expected. Output signal channel isolation is >100 db.

Each output and input has an alarm indicator that warns of either a loss of signal or signal of Insufficient amplitude.

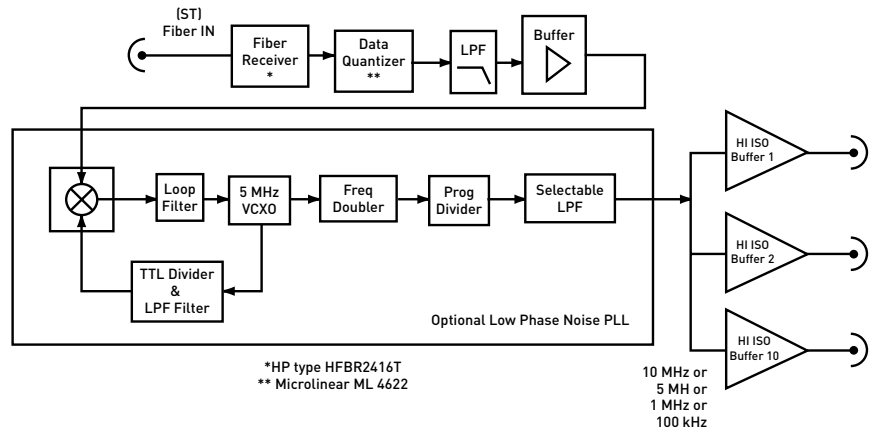


FIG.2 Fiber Optic Transmitter

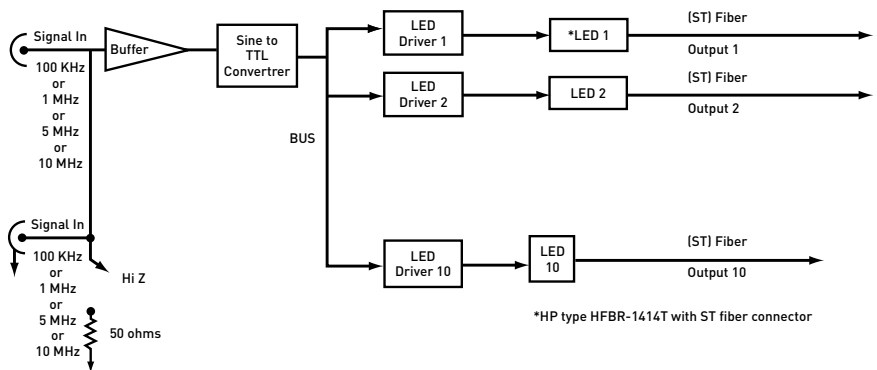


FIG.3 Fiber Optic Receiver

**LOW PHASE NOISE CLEAN-UP PLL**

Symmetricom is known for the generation, transmission and distribution of radio frequency signals that exhibit low phase noise characteristics. The Fiber Optic System's Receiver, the Symmetricom 6531A, features an internal Low Phase Noise Clean-up Phase Lock Loop to ensure that noise added during transmission is removed and the system outputs ten, high quality, low phase radio frequency signals.

**WHY USE FIBER OPTICS FOR RF SIGNAL TRANSMISSIONS?**

Long runs of critical radio frequency signals through traditional copper cable require attention to details. There is a need to test, check, calculate and address electrical interference challenges, like AC ground loop noise, signal strength loss due to the cabling and signal degradation due to the distance traveled. Weather conditions like exposure to lightning and electrical storms can affect long transmissions and in some cases even transmits overloads that damage other expensive equipment on the transmission line. Most of these issues are easy to foresee but some may only happen after or during the installation. Fiber optic systems, like the Symmetricom high performance transmitter and receiver combination provide ease of transmission of high quality RF outputs signals at distances of up to 2 kilometers.

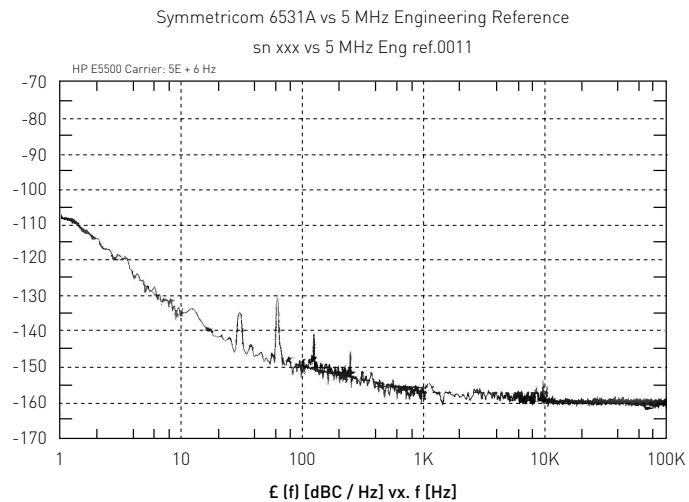
**SYSTEM SOLUTION**

The inherent benefits of fiber optic technology allow users to eliminate AC ground loop noise and to greatly reduce signal loss over long cable runs. The Symmetricom 6530A Fiber Optic Transmitter coupled with the Symmetricom 6531A Fiber Optic Receiver provides a simple, cost effective method of transmission and distribution of the selected 100kHz, 1MHz, 5MHz or 10MHz RF signal to multiple locations.

**DISTANCE WITH DISTRIBUTION**

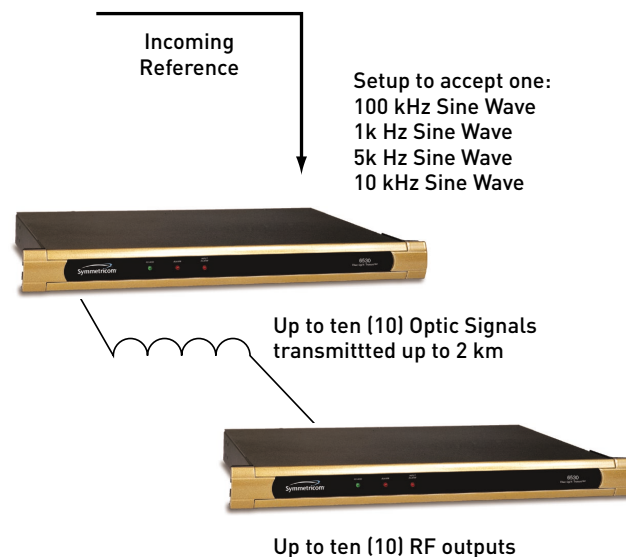
One Symmetricom transmitter sends the RF signal to ten separate locations up to 2 kilometers away via fiber optic cable. Each location's Symmetricom receiver sends the RF signal to ten locations.

**Typical Phase Noise (Over 2 km of Fiber)**



**FIG.4** Typical phase noise over 2km of fiber

- ✓ Excellent for Long Distances
- ✓ Eliminates AC Ground Loop Noise Pickups
- ✓ Eliminates Lightning Interferences & Damage Exposure
- ✓ Eliminates Electrical Interferences
- ✓ Cleans Up Signal



**FIG.5** Distance with distribution

## Fiber Optic System Specifications

### ELECTRICAL SPECIFICATIONS

#### 6530A Fiber Optic Transmitter

- Optical outputs (10)
  - Frequency: 850 nm with AM square MOD  
10 MHz / 5 MHz / 1 MHz / 100 kHz
  - Level (optical) (nominal): -13dBm
  - Connectors: ST
- Temp coefficient of phase
  - Input to output: 50 ps/° C
- Input
  - Frequency: 10 MHz / 5MHz / 1MHz / 100 kHz
  - Level: 1 Vrms
  - Connectors\*: (2) BNC
  - \*[1 Input, 2nd to daisy chain off]
  - Switch: Two position slide for HI Z and 50Ω input impedance terminus

#### 6531A Fiber Optic Receiver

- RF outputs (10)
  - Frequency: 10 MHz / 5MHz / 1MHz / 100 kHz
  - Level (nominal): -13dBm
  - Gain: 1 (nominal)
  - Harmonic distortion: <-40dB
  - Non-harmonic signals: <-80dB
  - Load impedance: 50Ω
  - Isolation: >100dB
  - Connectors: BNC
- Temp coefficient of phase
  - Input to output: 100 ps/° C
- SSB phase noise at 5MHz  
(1 Hz bandwidth) offset from carrier
 

1 Hz	-110dbc
10 Hz	-130dbc
100 Hz	-145dbc
1000 Hz	-155dbc
10000 Hz	-155dbc
- Input
  - Frequency: 850 nm with AM square MOD  
10 MHz / 5 MHz / 1 MHz / 100 kHz
  - Level (optical): -10dBm to -30dBm
  - Connector: ST

### ENVIRONMENTAL & PHYSICAL SPECIFICATIONS (6530A & 6531A)

- Recommended cable: 62.5 / 125 um (multimode)  
(For details, consult factory)
- Temperature (operating): 0° to 50° C
- Relative humidity: 0 to 95% (non-condensing)
- Reliability: MTBF: 125,000 hours
- Alarm output
  - Summary alarm indicates failure of any output signal.
  - Each output & main: Red LED
  - Non-alarm condition: Relay energized (fail safe)
  - C Form contacts
  - Connector: 9-Pin D-male
  - >2.5V (CMOS high)
- Power requirements
  - AC input: 86-264 V AC, <15W
  - DC input (optional): 22 to 56 V DC, 15W
- Dimensions
  - Height: 1U (1.75") (4.44 cm)
  - Width: 19" (48.26 cm)
  - Depth: 12" (30.48 cm)
- Weight: <10 lbs. (4.5 Kg)



FIG.6 6530A Rear View



FIG.7 6531A Rear View



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