REF TEK CENTRAL RECORDING MULTI-CHANNEL ACCELEROGRAPH SPECIFICATIONS

Model	130-MC12A (P/N 97113-00) 130-MC18A (P/N 97114-00)
Channel Specifications	
No. of Channels	12 in 130-MC12A, 18 in 130-MC18A
Input	±10 VDC full scale
Noise Level	<40 µV P-P (<1 count of an 18 bit system) @ 200 sps
ADC Resolution	24-bit
Noise Power Ratio	21-bit @ 125 sps
Sample Rate	20, 40, 50, 100, 125, 200, 250, 500 sps (User Selectable)
Channel Skew	None, Simultaneous Independent Sampling
Anti-alias Filtering	>120 dB
Temperature Effects	<1% of Full Scale from -20° to 70°C
Time Base	
Type	GPS Receiver/Clock plus a Disciplined Oscillator
Accuracy with GPS	±10 µsec, with 3-D Satellite Fix & Locked
Free-Running Accuracy	2.5 ppm from -20° to 60°C
Triggered Recording	
Trigger Type	Continuous, Vote, External/Event
Vote Trigger	
Votes	User settable number of: • Votes per Channel • Votes required to determine Trigger/Detrigger User settable threshold for issuing votes Threshold range 0.00001 – 4g
External Trigger	
An external signal can be issued by one station to trigger all other stations in the case of an event.	
Pre-event Time	User settable from 0 to 30 sec.
Post-event Time	User settable from 0 to 60 sec.
Trigger Filter	0.1 to 12 Hz Band Pass Filter
Recorder Interconnection	
Interconnected Network Signals	Common GPS Time Trigger Notification IRIG-E
Time Synchronization	Within 10 µsec
Mechanical	
Size	24” high x 20” wide x 16” deep (61 cm x 50.8 cm x 40.6 cm)

Mechanical continued	
Volume	4.4 cubic feet
Weight w/o Battery	93 lbs (42.2 Kg)
Cable Feed-thru	Liquid Tight Cable Grips 3/8” (0.95 cm) nominal diameter
Wiring Connection	
Wire Strip	Sensor, Communication with Wire Cage
Power Requirements	
Recorder Power Input Voltage	10 to 15 VDC
System Power Input Voltage	110/220 VAC, 47-63 Hz
Digitizer Consumption	<21 Watt-Hour/Day Per Channel

Ordering Information

Part No.	Description
97113-00	130-MC12A: Recorder 12-Channel
97114-00	130-MC18A: Recorder 18-Channel
97150-00	130-GPS: GPS Receiver/Clock
97180-00	130-FLASH/8G: Disk, Flash Memory, 8GB Compact Flash II
97181-00	130-FLASH/16G: Disk, Flash Memory, 16GB Compact Flash II
97165-00	130-8015-75: Cable, Recorder to GPS
W-88105	Cable, Triaxial Sensor, Plenum
W-88103	Cable, Uniaxial Sensor, Plenum
97257-00	MBLC-X1220P: Battery, 20 amp/hour, Back-Up Power
97192-00	130-READER_USB: Reader, CF I/II/III, External, USB-00)

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Related Sub-systems:

3rd Generation Seismic Recorders, 130S-01
Strong Motion Accelerographs, 130-SMA
Accelerometers, 131A & 131B
Miniature Seismic Recorders, 125A “Texan”

KEY FEATURES:

- 6-18 Integrated Recording Channels
- 24-Bit Output A/D Resolution
- IP Based Communications over Ethernet and Asynchronous Serial
- Embedded/Removable Mass Storage
- Remote Alerting for both Event and Alarm Triggers

APPLICATIONS:

- Structural Monitoring (Buildings, Bridges, Dams)
- Dense Accelerometer Arrays

Model 130-MC

REF TEK MULTI-CHANNEL ACCELEROGRAPH

Multiple Applications, One Solution

The REF TEK 130-MC Multi-Channel Recorder offers a singular solution for multiple applications, for example, the monitoring of bridges, buildings, and dams.

The MC’s rugged design allows for installation in the harsh outdoor environment, and the standard wall-mount design of the enclosure allows the system to be installed out of the way, as opposed to occupying valuable floor space in a building’s electrical room.

When using this centralized system, the user has the flexibility to deploy dense sensor arrays around a structure at their discretion. For sites requiring large numbers of recording channels, multiple 130-MCs can be networked together to achieve common triggering of all channels in the system and common time synchronization, establishing a robust solution for large scale projects.

Introduction

Complete with REF TEK's Third Generation Technology, the 130-MC is a robust Multi-Channel Recorder designed around today's modern needs for structural monitoring. Built-in communication facilities allow for Real-Time and On-Demand data collection. The Multi-Channel Recorder is available in a twelve channel or eighteen channel recording scheme with advanced Telemetry built-in for Real-Time Data collection for every channel (figure 1).

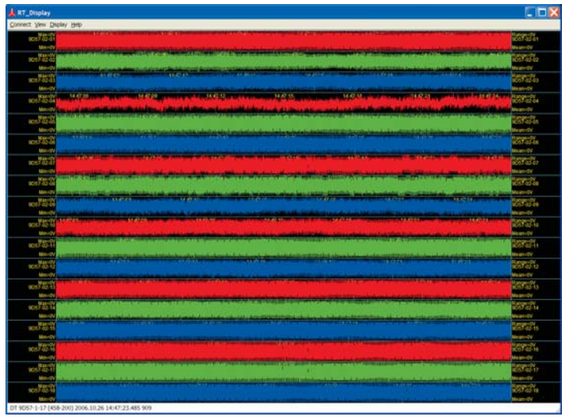

Figure 1. 18 Ch. Real-Time Data Display

Accommodating the large scale needs of today's market, the 130-MCs, with fully featured network capabilities, can be installed in and around the structure, whether it be a campus, a single building, a bridge or a dam.

The seismic based recording system has a powerful CPU to handle the recording of multiple data streams simultaneously, recording locally to removable compact flash memory cards and transmitting data remotely to a user's PC (in Real-Time or On-Demand). All locally recorded data, along with the written system State-Of-Health files, is accessible to the user for copy and/or deletion from a local or remote PC protected from outside tampering with verified user login and password.

The recorder has three A/D boards, each containing six independent channels for recording. Each A/D board has its own built-in pre-event memory to avoid diminished size as more channels are added to the system. For convenience, the input levels on the A/D are matched to the REF TEK family of accelerometers, models 131A and 131B.

In the case of a power failure, the Multi-Channel Recorder will continue autonomously with data acquisition, running on up to four internal 12V DC batteries; expected autonomous life-time, with four 20 Amp Hour 12V DC batteries, is 72 hours. The batteries are constantly kept charged by the internal battery charger. If the power fails for more than 72 hours and the system shuts down, upon return of AC power the Multi-Channel Recorder will resume its previous data acquisition mode and begin charging the batteries without any user interaction.

This system provides a user-friendly interface for all command-and-control, data off-loading, and parameter checking. Using our REF TEK GUI based interface software (fig. 2 and fig. 3) with a local PC or remote PC, the user can select all recording parameters from data stream allocation, independent channel selection, sampling rate, and trigger settings, to recording destination, external alarm settings, and automatic notification settings for State-Of-Health messages and recorded events.

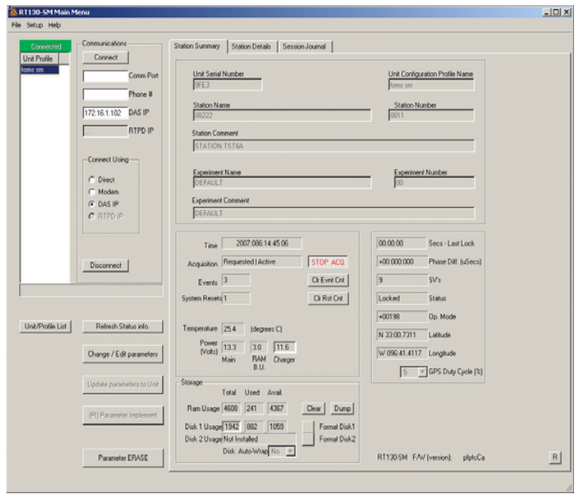

Figure 2. Strong Motion User Interface

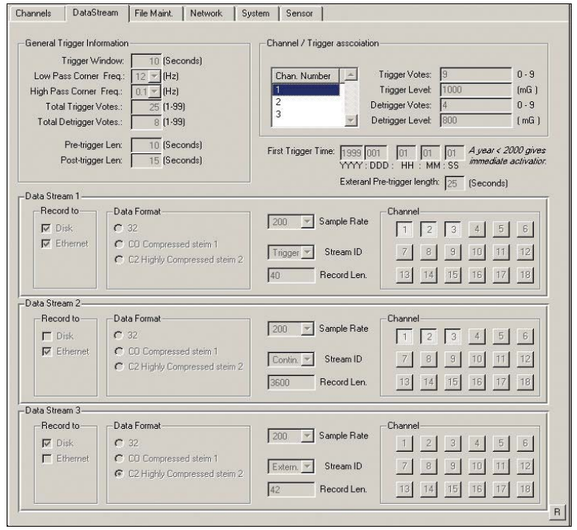

Figure 3. Parameter Settings

For an intuitive analysis of the data, our Strong Motion Data Processing software offers the user options for calculating and displaying such functions as CAV, Raw and Corrected Acceleration, Arias Intensity, Velocity, Displacement, Response Spectra, PSDs, and FFTs. This software (fig. 4) offers the user the option to view all of these calculations in the same screen or individually, and the option to analyze a single channel or all channels from a station simultaneously.

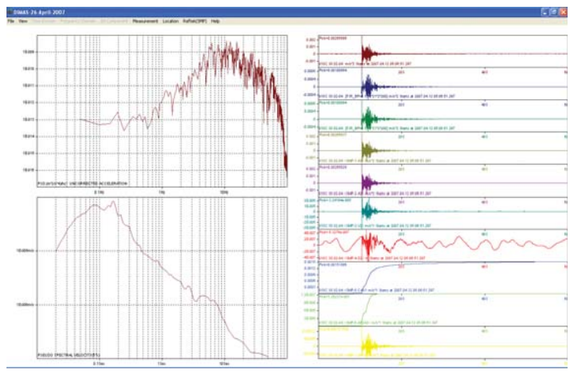

Figure 4. Strong Motion Data Processing Software

Communications

Modem Port:

Standard: .....ITU-V.90, V-34, V.32 bis
Speed: .....Modem up to 56 kbps
Serial Interface: .....Up to 115 Kbps
Power Consumption: .....100 mW (Active)
Triggered Communication: .....Auto-dial within 4 sec. of trigger
Alarm Communications: .....Auto-dial within 4 sec. of alarm conditions: Low Battery, Loss of AC Power, Threshold Exceedence, Defined Time
Auto-Answer: .....Automatic (always active)
Auxiliary power: .....For use with external comunications device, 5 programmable time windows

Data Retrieval:

Protocol: .....XMODEM, YMODEM on terminal command FTP

Transfer:

Rate: .....> 64 Kbps. Limited by both modem and serial interface speed

Ethernet Port:

Standard: 10BaseT
Speed: .....10 mbps
Protocols: .....TCP/IP, UDP/IP, FTP, RTP

Data Storage

Format: .....32-bit integer, Steim1, Steim2 Compression
Type: .....Removable Compact Flash Card 8GB or 16GB capacity
Storage Life: .....10 years (without power)
Direct Access: .....Readable on a PC using a PCMCIA Adapter, USB Flash Reader
Remote Disk Access: .....Read Contents, Copy, Upload, or Delete files
File Transfer Protocol: .....XMODEM, YMODEM, FTP
Recovery after Power Loss: .....The recorder returns to the same recording state after a power cycle, all parameters are saved.

System Status

State-Of-Health Display: .....2 line, 16 character LCD Display:
Model number, Firmware Version Number
Data & Time, GPS Status, Supply Voltage
Internal Temperature, Trigger status, RAM Usage,
Disk Usage, Modem Initialization String,
Current Modem State
Disk Status Display: .....LED Indicator (Red/Green)