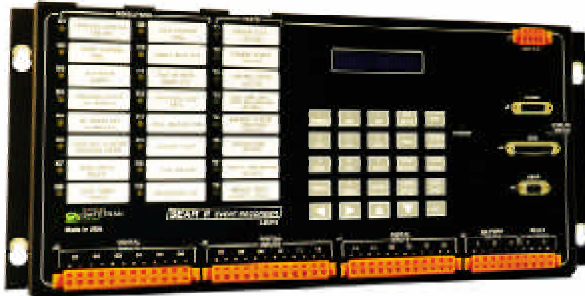


## SAFETRAN EVENT ANALYZER AND RECORDER II

### SEAR II



SEARII

- Storage for 180,000 — 390,000 events
- Automated testing capability
- Remote reporting via multiple communications options
- Setup and reports via keypad & display
- Field replaceable battery
- Communications with all Safetran equipment
- Records EZ levels from GCP equipment

### SYSTEM OPERATION

The Safetran Event Analyzer and Recorder II, SEAR II, is a highly flexible, cost-effective system for monitoring and reporting equipment operation at railroad grade crossing, interlocking and wayside signal installations. The standard SEAR II system monitors 18 digital inputs and 3 battery inputs, has 2 internal relays for output control and stores over 180,000 events, thus, providing sufficient capacity to monitor most signal installations. Both I/O capacity and event storage capacity can be expanded to monitor the most complex interlocking, grade crossing and rail transit signal installations. Battery backup is provided for all memory storage and the memory battery is field-replaceable with a 90-day advance, low battery warning feature.

Initial setup of SEAR II is performed from the front panel keypad and LED display. Easy-to-read, standard field reports can be accessed based on events or train movements. The keypad and display can also be used for manual testing of the unit. Software version control is provided.

## AUTOMATED CROSSING INSPECTION AND REPORTING

Many of the normal crossing inspections and tests can be automated using the SEAR II's advanced application programming capabilities. Custom or site specific reports can be programmed via the keypad or a laptop computer. Reporting/alarm parameters can be established by the user and reported to a central location for monitoring or action. Remote reporting can be accomplished through a wide variety of modes including: DTMF, VHF, SSR, CDPD and ATCS protocols. Manual and automatic test results may be stored in Flash-ROM memory for one year. For customized reports and alarms, or specialized communications interfaces, contact Safetran California Division Customer Service at 800-793-7233.

The SEAR II interconnects to Safetran's Grade Crossing Predictors, Solid State Crossing Controllers and the GEO® Geographic Signal System® and is fully-compatible with all previous generation SEAR Expansion Modules. The combination of this interconnectivity, and built-in programming support allows the SEAR II to serve as a powerful tool for managing railroad crossing maintenance.

## SYSTEM FEATURES

**Microprocessor:** Controls all functions of the system. Executive software, configuration and user programs are downloaded into flash memory. SEAR II can be programmed using a PC running standard Windows® applications or it can be completely configured from the local user keypad and LED display.

**Real Time Clock:** SEAR II contains a real time clock. Time and date can be set from the front panel or from a PC. The time and date are used to time-stamp the event log. In the event of a power failure the internal back up battery maintains the time and date.

**Event Memory:** The standard event memory capacity is over 180,000 events, which is expandable to over 390,000 events. Events are stored in battery-backed RAM to insure the event log is maintained during loss of primary unit power.

**Internal Battery:** The internal lithium battery maintains power to the event RAM and real time clock when power to the unit is off. Under normal circumstances, memory will be maintained for a period of 5 years without power applied to the unit. SEAR II is equipped with 2 battery holders, one for the in-use battery and one for installation of the replacement battery. This prevents loss of power during battery replacement. SEAR II also has a low-battery warning alarm. This alarm will detect a low-battery condition and prompt the user to replace the battery. It typically provides 3 months of low-battery warning. The battery features a "freshness seal" for maximum battery life. SEAR II units are shipped from the factory with the internal, lithium battery disconnected from the circuit. The battery automatically connects when the unit is powered up.

**Digital Inputs:** Unit has 18 independently isolated digital inputs with the following states: on, off, toggling and unknown. These inputs monitor signals in the range of 0-120 VAC or DC. The number of inputs can be expanded by adding standard Safetran I/O Modules.

**Battery Monitor Inputs:** Unit has 3 independently isolated, analog battery monitoring inputs with an input signal range of 0-30 VDC. The number of battery inputs can be expanded by adding standard Safetran I/O Modules.

**Relay Outputs:** Unit has 2 independent output relays with isolated front/heel contacts. Contacts are rated for 5 amps at 30 VDC or 120 VAC. The number of outputs can be expanded by adding standard Safetran I/O modules.

**Expansion Modules:** SEAR II can be expanded through the addition of standard Safetran intelligent I/O modules on the Echelon LAN or through communications devices, peripherals, etc.

**Analog & Digital I/O Unit, P/N 80258-01:**

Can monitor up to 30 separate functions: 24 external digital inputs, internal battery, internal temperature and 4 external analog inputs including high and low voltage.

**Digital I/O Unit, P/N 80258-02:**

Can monitor up to 24 separate, digital inputs.

**Analog I/O Unit, P/N 80261:**

Can monitor four analog inputs including high and low voltage.

## SEAR II COMMUNICATION SYSTEMS

Through the RS 232, RS 422 and Echelon® port connections, SEAR II has been designed to communicate with all forms of data transmission systems including leased telephone circuits, MCP and BCP radios with an ATCS protocol, VHF (data, voice and DTMF) and Spread Spectrum Radio (SSR).

**DIAL-UP MODEM LINKS:** Allow inputs, outputs, diagnostics and event logs to be accessed remotely through a telephone modem connected to the RS 232 port on the front of the unit.

**RADIO LINK:** Allows inputs, outputs, diagnostics and event logs to be accessed remotely through an MCP radio connected to the RS 422 or Echelon ports; through a Spread Spectrum Radio connected to the RS 232 or Echelon ports or through a VHF radio connected to the Echelon port. The RS 232, RS 422 and Echelon ports are front panel mounted.

## SEAR II SYSTEM CONNECTIONS

Through the Echelon port, SEAR II can be easily interconnected with SSCCIII, SSCCIII PLUS, SSCCIV, GEO, GCP 3000 and MS 2000 to provide a complete event monitoring, recording and analysis system suitable for monitoring all crossing and wayside signal installations. The Echelon connection allows the rapid transfer of data in a node type of network and can, therefore, handle the data transfer requirements found in any size crossing or signal installation.

SEAR II functions are integrated into the GCP4000 system as a plug-in recorder module (SEAR Ili).

## SEAR II AUTOMATED TESTING FEATURE

With additional connections and components, SEAR II can automatically perform many of the required monthly, quarterly and annual highway crossing tests. Test results can be stored within the unit for one year and/or they can be downloaded locally or to a central office location for monitoring or appropriate action. SEAR II can be configured to monitor any combination of crossing devices. When connected to the operating battery busses, iLOD Sensor, Mini-Trackside Sensor, Gate Tip Transmitter and Bell Sensor Transmitter, SEAR II can test/monitor/report on battery capacity, gate down time, gate horizontal/vertical position, grounded battery conditions, flash rate, lamp-out conditions, bell operation and warning time.

**The following components can be added as required to monitor a specific crossing:**

**iLOD Sensor, P/N 80271:** Monitors the crossing lights, both flashing and gate tip. It records flashing light current, tip light current, flash rate and current type (AC, DC or Pulse-Width Modulated current from the SSCC IIIA/ PLUS/IV or GCP4000). Each sensor can read up to 30 amps RMS. Two sensors are available on each iLOD.

**Mini-Trackside Sensor (MTSS), P/N 80285:** Monitors five (5) functions: gate up contact, gate down contact, gate level (using gate tip sensor), bell audio and power (Safetran electronic bell). It draws power from the existing gate battery circuit and reports back to the SEAR II unit over a single wire.

The MINI-TRACKSIDE SENSOR supports the operation of the GATE TIP SENSOR and BELL SENSOR and is required in order to monitor those two functions.

**Gate Tip Sensor (GTS), P/N 80281:** Monitors the gate tip position within +/- five degrees from horizontal and transmits that data to the MINI-TRACKSIDE SENSOR via existing tip lamp wires. The GATE TIP SENSOR mounts onto the tip light and draws power from the tip lamp wiring.

**Electronic Bell with Integrated Bell Sensor, P/N 80301:** The sensor is an independent unit built into the Safetran electronic bell assembly which continuously monitors bell sound and transmits data to the MINI-TRACKSIDE SENSOR over the existing bell power wires. See catalog section A-8 for electronic bell details.

**Ground Fault Sensor, PN 80297:** Monitors grounds on two independent battery banks and reports the status to the SEAR II. Performs continuous internal diagnostics of the ground test function and performs ground fault test as directed by an external input.

**Note:** An external ground fault detector is required to complete the connections for the automated reporting system.

## SPECIFICATIONS

**Input Voltage:** 8 – 30 VDC power supply input (customer supplied), reverse polarity protection, 2000 VRMS isolation.

**Input Current:** 800 mA maximum; 1200 mA maximum at start-up

### Monitored Inputs:

**Digital:** 18 digital inputs with 2000 VRMS isolation; 0 - 120 VAC/DC range; 6V to 120V = energized, 0.0V to 0.8V = de-energized. Front Panel mounted.

**Analog:** 3 battery monitor analog inputs with 2000 VRMS isolation, 0-30 VDC range. Front Panel mounted.

### Controlled Outputs:

**Relay Outputs:** 2 non-vital relays with 2000 VRMS isolation. Front/Heel dry contacts.

**Contact Rating:** 5A @ 30 VDC/120 VAC

### Visual Indicators:

**Display:** 2-line by 20-character, high-contrast, vacuum fluorescent display

**LEDs:**

**Indicators:** 16 user-definable and identifiable red LEDs.

**Tests:** 8 test status tri-color LEDs, user-definable and identifiable.

**Echelon® Service:** yellow LED (indicates non-configured device when flashing).

**Power:** green, lit when power applied.

### User Controls:

**Keypad:** 25-key, alphanumeric embossed overlay matrix with tactile/audible feedback

**Single Key Access:** For site setup, main menu and reports

### External Interface Connectors:

**J1 ECH N B,** keyed 4-pin male connector for Echelon® LonTalk® interface and DC power input.

**J2 COMM,** female DB-15 connector for RS232/RS422 serial interface to radio or telephone modem.

**J3 AUX,** female DB-25 connector for RS232/RS422 serial interface to radio or telephone modem.

**J4 USER,** female DB-9 connector for RS232 serial interface to printer or PC.

**J5, J6, J7 DIGITAL INPUTS,** 3 keyed 12-pin male connectors for 6 digital input pairs each.

**J8 BATTERY INPUTS / RELAY OUTPUTS,** keyed 10-pin male connector for 3 battery monitor input pairs and 2 non-vital output relays with Front/Heel contacts.

**Message Protocols Supported:** ATCS Specification 200, ASCII

### Dimensions:

**Width:** 19.0 inches (48.26 cm) overall including mounting flanges, 17.56 inches (44.60 cm) front panel

**Height:** 8.72 inches (22.15 cm)

**Depth:** 1.68 inches (4.27 cm)

**Weight:** 5.75 pounds (2.61 kg) (approximate)

**Environmental:****Temperature:** -40° F to +160° F (-40° C to +70° C)**Humidity:** 95%, non-condensing**Reliability:****Battery Backup:** 3 years (minimum) under typical operating conditions for stored event data and real-time clock**ORDERING INFORMATION**

<u>Description</u>	<u>Part Number</u>
SEAR II Unit (2 megabyte memory)	80273-01
SEAR II Unit (4 megabyte memory)	80273-02

**Expansion I/O Units**

24-Digital 4-Analog Input Unit	80258-01
24-Digital Input Unit	80258-02
4-Analog Input Unit	80261-01

**For additional expansion options contact Customer Service at California Division****System Components**

VHF Communicator	80276
Gate Tip Sensor	80281
Mini-Trackside Sensor	80285
Bell Sensor	80301
(integrated into Safetran electronic bell)	
Communications Isolator	80291
iLOD Sensor	80271

**COMPLETE SYSTEMS**

SEAR II can be customized as a system to fit the individual needs of your application. This system can be purchased as an assembly. For more information contact California Division Customer Service at 1-800-793-7233.