



PSO 4000

Phase Shift Overlay (PSO) Track Circuit

Rail Automation

System Description

The Phase Shift Overlay (PSO) track circuit is used to provide track occupancy information for a train detection system. The PSO is a reliable and secure, microprocessor based, vital system for use in a variety of complex installations.

The PSO 4000 is available in four configurations:

- The Standard configuration consists of separate transmitter and receiver assemblies.
- The Transceiver consists of an integrated transmitter and receiver within a single package.
- The IPI (Island) consists of an integrated island with crossing logic. (not shown)
- The Crossing Package includes two receive modules and a combination transmitter/receiver island circuit module in a single case

Theory of Operation

- The transmitter assembly transmits a coded, 8- or 16-bit address through the rails using an audio frequency signal carrier channel.
- The modulated signal is then detected by a receiver (tuned to the same carrier frequency) where it is decoded and processed.
- The receiver responds only to signals of the proper frequency, modulation rate, address and amplitude.
- The ability of PSO to differentiate between its operation signal and all other signals present on the track is due to the non-symmetrical coded modulation and receiver decoding techniques which ensure that the systems is immune to random or foreign AM, FM and beat signals.

Address Formats

The PSO 4000 is capable of providing modulation using two 8-bit address formats ("A" or "C") and three 16-bit address formats ("D," "E" or "F").

- The "A" and "C" address formats are the standard format based on, and compatible with, earlier PSO II and PSO III technology.
- The "D," "E" and "F" address is based on a 16-bit format and is intended for use in applications involving a high-density mix of frequencies and multiple tracks.

Features

- Transmitter, Receiver, Crossing and Transceiver Configurations
- 2 Vital Inputs and 1 VRO on Transmitter Configuration
- 2 Vital Inputs and 3 VRO on Receiver, Crossing and Transceiver Configuration
- Programmable for all common PSO II and III, AFTAC & METRA Carrier Channels
- Internally Programmable Pick-up and Drop Delay Times are available
- Internally Programmable Vital Stick Release Timer Functionality embedded within Crossing Package
- PSO Channels Compatible with existing PSO-II and PSO-III equipment
- Program Selectable Modulation Codes "A," "C," and new 16 bit codes "D" "E" and "F"
- Ability to Dynamically Select Codes via Vital Inputs or ATCS Interface

Specifications

All Standard Safetran PSO Frequencies Are Programmable with the PSO 4000
156Hz, 211 Hz, 285 Hz, 348 Hz, 430 Hz, 525 Hz, **645 Hz, 790 Hz, 970 Hz, 1180 Hz, 1450 Hz, 1770 Hz, 2140 Hz, 2630 Hz, 3240 Hz, 4000 Hz.**

(Frequencies in **Bold** text are recommended for use in electrified territories)

All Standard Island Circuit Frequencies are Programmable with PSO 4000

2.14 kHz, 2.64 kHz, 3.24 kHz, 4.00 kHz, 4.90 kHz, 5.90 kHz, 7.10 kHz, 8.30 kHz, 10.0 kHz, 11.5 kHz, 13.2 kHz, 15.2 kHz, 17.2 kHz, 20.2 kHz

Miscellaneous Frequency Data

- Frequency Stability: 6 0.01% (Hz) of the selected frequency.
- Transmitter Output: 2.0 ohms (nominal) Impedance.
- Receiver Sensitivity: 62 dB over entire operating range of equipment.
- Receiver Selectivity: 60 dB down on adjacent channels.
- Track Circuit Shunt: Between 0.06 Ohm and 0.5 ohm Sensitivity.
- Signal Strength: 4 Volts Root Mean Square (VRMS) in the 2.0 kHz to 20.2 kHz bandwidth.
- Island Track Transmitter: 100 Ohm beyond the 3 dB point of the Island Load operating freq. with a Q of 10 to the track.
- Island Track Receiver Load: 100 Ohm beyond the 3 dB point of the Island Load operating freq. with a Q of 10 to the track.
- Island Sensitivity: 30 dB down on adjacent channels.
- Relay Coil Resistance: 400 to 1,000 Ohms.
- Input Power Supply: 9.0 VDC to 16.5 VDC.

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.



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