TC-CK1-SBE
INTER**SECTOR**™
Motion and Presence Sensor

MS SEDCO
ENGINEERED FOR MOTION

DESCRIPTION

The TC-CK1-SBE INTER**SECTOR**™ is a microwave-based radar motion and presence sensor used for intersection control. The unit interfaces with a traffic-control cabinet, and outputs signals when vehicles are present in user-defined zones. Zones are created using an X-Y coordinate system, and operation is verified and optimized using a laptop with a modern web browser (Google Chrome, FireFox, Microsoft Internet Explorer and Edge) as part of the installation process.

The TC-CK1-SBE allows users to create up to 8 detection zones and assign vehicle presence in these zones to up to 8 outputs to the control cabinet (e.g. left turn, straight through, right turn). Detection zones can be created to a maximum distance of 600 feet from the sensor itself. Unlike previous microwave radar sensors, the INTER**SECTOR**™ will track the presence of a vehicle in a detection zone for a predetermined time.

Interface boards are available for the INTER**SECTOR**™ which are compatible with both NEMA, 170, 179, and 2070 cabinets. For each sensor, one interface board is required in order to communicate with the control cabinet. Three interface boards are available. The TCIB-2.1 provides 2 outputs and uses a single slot in the cabinet. The TCIB-4.1 provides 4 outputs and uses a single slot, and TCIB-4.2 provides 4 outputs and utilizes two slots in the cabinet.

BENEFITS

The INTER**SECTOR**™ brings the advantages of microwave radar detection together with presence-tracking capabilities in an easy-to-understand visual image. The INTER**SECTOR**™ offers these advantages when compared to cameras or loops:

- Detection not affected by weather*
- Immune to sunrise/sunset or post-rain glare
- Not susceptible to in-road breakage
- Multiple lanes covered by a single unit
- Advanced and stop bar detection in a single unit
- Easily installs to corner pole
- Surge protection provided in detector
- Successfully detects bicycles/motorcycles
- Significant cost savings when compared to camera mounting requirements or multiple loops
- No privacy concerns
- Classifies bicycles as they approach a red light, allowing users to establish bicycle-only detection zones.

The INTER**SECTOR**™ allows users to:

- Graphically track vehicles as they approach the intersection
- Easily set up detection zones to provide programmable inputs to a control cabinet
- Verify that the system is functioning correctly and troubleshoot

*up to 2 in/hour of rain

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SENSOR SPECIFICATIONS

PHYSICAL:
- Size: 10.5x8.5x7 (LxWxH)
- Weight: 5 pounds
- Color: Blue body with gray endcaps
- Universal Mounting Bracket included

OPERATING:
- Temperature range: -40°C to +85°C
- Power requirements: Powered from TCIB over Ethernet cable

RADAR:
- Seven selectable frequency channels at 24 GHz
- Beam angle: Azimuth ±15 degrees out to 600'
- Elevation: 12 degrees
- Operates with FSK-4 mode

PERFORMANCE:
- Track multiple moving and stationary vehicles
- Tracking of X and Y location of each vehicle
- Updates 20 times per second
- Speed of each vehicle is shown for reference
- Motion detection—60 feet minimum to 600 feet maximum
- Stop bar presence detection—60 feet to 160 feet (20M~50M)
- Mounting height 14 to 20 feet*—Mounting outside this range may reduce performance (See Installation Table)
- Mounting location—corner signal pole, or on mast arm no further than 10 feet from signal pole—Maximum ±15 degrees offset from traffic direction—Mounting outside this range may reduce performance
- Ethernet interface with power supplied over the Ethernet (POE)—Maximum distance 300'—For longer distances, consult factory
- Eight programmable independent zones
- Eight Opto-isolated outputs
- Grid tracking with live interactive zones
- Simulation mode for demonstration

* If the INTER**SECTOR**™ is mounted over active roadway, make sure bottom of sensor has adequate clearance for state and local requirements.

- Adjustable Delay Before Max time on stationary objects from 0 to 960 seconds
- Adjustable OZP/Max time on stationary objects from 0 to 960 seconds
- Provides histograms to verify setup of zones
- Selectable standard (English) or metric units
- User-defined delay and extension time for each zone
- Operational from cold start in 20 seconds—Full performance in 1 minute
- Automatically recovers from power failure
- FCC and IC approved
- IP addressable for remote set-up and monitoring
- Optional bicycle-only setting for detection zones
- Surge protection provided in detector

WARRANTY

A 3 year warranty is available from the manufacturer covering defects in materials and workmanship. Contact MS SEDCO for details.

INSTALLATION TABLE

RECOMMENDED SETTINGS

Distance to Stop Bar	Max.# Lanes	Mounting Height	Angle[1] (°)
60'-80'	2	16'	-6°
80'-100'	3	17'	-6°
100'-120'	4	18'	-4°
120'-160'	4	19'	-2°

[1] Tilt angle relative to road grade/slope. Values listed are meant to be starting points. Installed INTER**SECTOR**™ tilt angle may require adjustment depending on observed performance. See Figure 3 for a Tilt and Elevation Angle visual representation diagram.

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The INTER**SECTOR**™ is a forward-looking stop bar presence and advanced zone radar detection system. It has high reliability of an above ground, non-intrusive radar detection. INTER**SECTOR**™ interfaces to MS Sedco TCIB, a standard rack detector interface card. INTER**SECTOR**™ can track individual vehicles by lane across a wide range of temperature and climate conditions.

TABLE 1: INTER**SECTOR**™ Performance: Detection Performance

Parameter	Value	Unit
Max Range for Pedestrian	160	Feet
Max Range for Passenger Car	600	Feet
Min Range	50	Feet
Number of Detection Lanes: >100 ft	4	Lanes
Number of Detection Lanes: 80-100 ft	3	Lanes
Number of Detection Lanes: 60-80 ft	2	Lanes
Radar Field of View: Azimuth	±15	Degrees
Max Offset Angle	±15	Degrees
Range Accuracy	Typical < ±2.5% or < ±2 ft	Greater of
Radar Channels	7	Unique Channels
Presence Detection Range	60 to 160	Feet
Motion Detection Range	60 to 600	Feet
Typical Mounting Height	Typical 14 to 20	Feet
Mounting Location	Rigid Location	Metal Pole or Mast Arm
Tilt Angle: Stop Bar = 60-100 ft	-6	Degrees
Tilt Angle: Stop Bar = 100-120 ft	-4	Degrees
Tilt Angle: Stop Bar = 120-160 ft	-2	Degrees
Radar Field of View: Elevation	12	Degrees
Radar Speed Range	± (0.2 to 150)	Miles-Per-Hour
Radar Speed Accuracy	Typical < ±2 MPH or ±2%	Greater of
Radar Update Rate	<50	Milli-Seconds
Tracking Initialization Time	<0.5	Seconds
New Object Validation Distance	60	Feet, Minimum

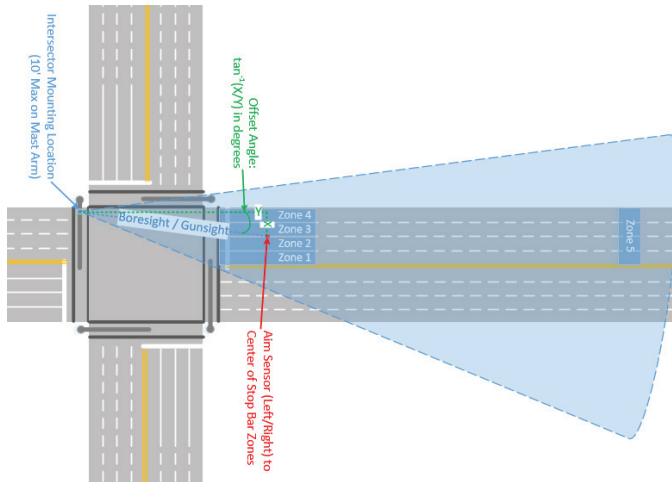### FIGURE 1: INTER**SECTOR**™ Installation Example

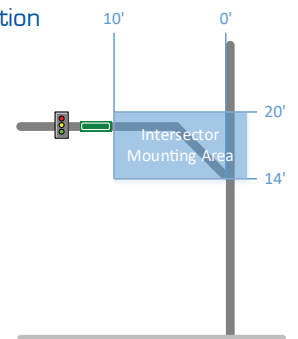### FIGURE 2: Recommended INTER**SECTOR**™ Mounting Location Depiction
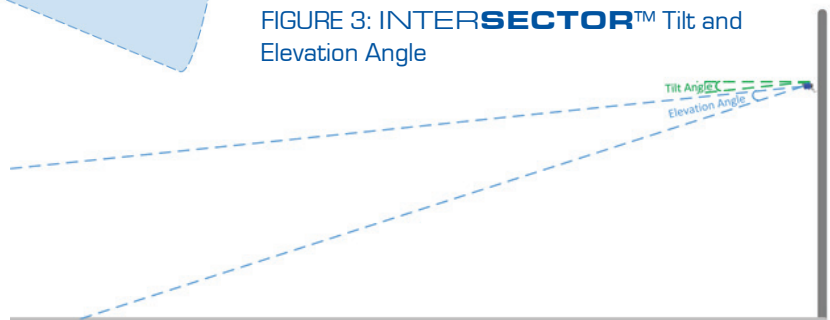

FIGURE 3: INTER**SECTOR**™ Tilt and Elevation Angle

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TABLE 2: INTER**SECTOR**™ Performance: Available Software Features

Parameter	Value	Unit
Simultaneous Displayed Objects	Up to 32	Objects
Simultaneous Tracked Objects	Up to 64	Objects
Adjustable Zones	8	Per Intersector
Outputs	Up to 8	With Secondary Card
Counts	Loop from 0 to 65,535	By Zone
Adjustable Min and Max Speed Bins	Adjustable 0 to ±150 MPH	By Zone
Direction of Detection	Approach or Depart	Movement Relative to Sensor
Stationary Vehicle Hold Time	Adjustable from 0 to 960	Seconds, Delay Before Max Setting
Occlusion Zone Protection (OZP)	Adjustable from 0 to 960	Seconds, OZP Setting
Number System	Metric and English	Units
Web Interface	Chrome, IE, Edge, Firefox	Browsers (latest version)
Simulate Car Length	Point / Extend	By Zone
Adjustable Rain Threshold	Yes	From mist to extremely heavy
Adjustable Bike Classification Sensitivity	Yes	Adjustable Car/Bike decision threshold
Product Software Upgradable	Yes	Via Bootloader program

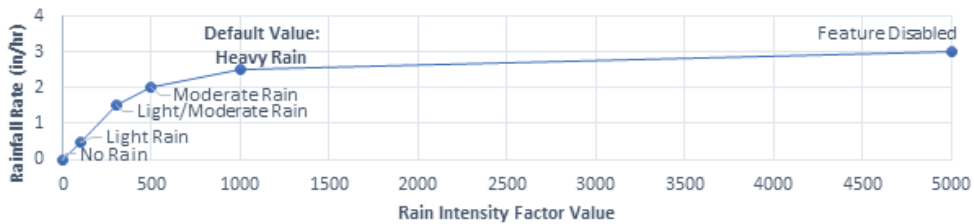## FIGURE 4: Rain Intensity Factor Correlated to Rainfall Rate

TABLE 3: INTER**SECTOR**™ Performance: Environmental Performance

Parameter	Value	Unit
NEMA TS2 2003	Pass	Appropriate sections
Temperature	-40 to +85	Degrees C
Shock	10	G's
Vibration	±0.5	G's
IP Rating	54[1]	
Conformal Coating	Yes	

TABLE 4: INTER**SECTOR**™ Performance: Environmental Performance

Parameter	Value	Unit
Weight	5	Pounds
Dimensions	10.5 x 8.5 x 7	L x W x H Inches
Material: Front and Back Covers	UV-Protected Polycarbonate	
Material: Body	Powder Coated Aluminum	
Weep Hole	1/8	Inch Diameter
Ethernet Connector	IP67	

TABLE 5: INTER**SECTOR**™ Performance: General Parameters

Parameter	Value	Unit
Interface	100Base-T	Ethernet with power
Frequency	24.000 to 24.250	GHz
Max Transmit Power (EIRP)	20	dBm
Power Requirements: TC-CK1 Only	6.4	Watts
Power Requirements: System	8.8	Watts
Input Voltage Requirements	12 to 24	Volts – DC, Power over Ethernet
IP Address	Yes	Configurable
MAC Address	Yes	Set at factory
Preventative Maintenance	None required	When installed
Startup time	1	Minute
Regulatory	FCC and IC	FCC part 15.245 Canadian Standards: - RSS-210

TABLE 6: RF Channel to Radio Frequency Map

RF Channel	Frequency (GHz)
1	24.0810
2	24.0935
3	24.1060
4	24.1185
5	24.1310
6	24.1435
7	24.1560

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