

DB-9 RS-232 Communication Interface Connector:

Pin	Function
1	No Connection
2	Receive (RX)
3	Transmit (TX)
4	No Connection
5	Logic Ground
6	No Connection
7	No Connection
8	No Connection
9	No Connection
Case	Chassis Ground



Engineering Excellence!

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OPERATING INSTRUCTIONS FOR

Model AVI-E

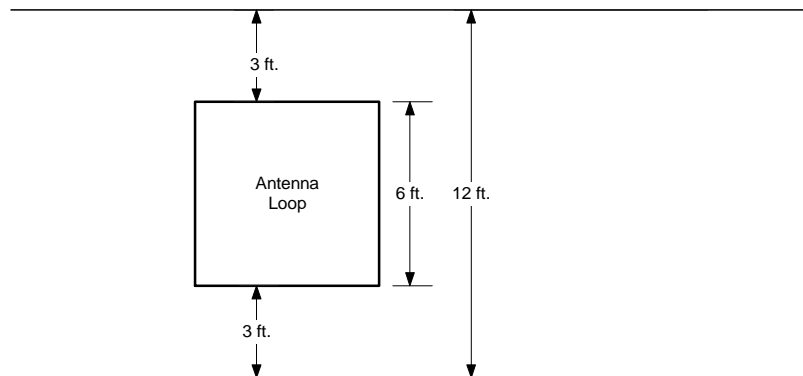
**TWO CHANNEL, RACK MOUNT
 AUTOMATIC VEHICLE IDENTIFICATION RECEIVER**

VII. Antenna Loop Installation:

The installation procedures for the antenna loop (or loops) are similar to those of an inductive loop. However, the AVI-E receiver does not have the inductance range requirements of an inductive loop detector. Therefore, the antenna loop does not require as many turns of wire as an inductive loop. The AVI-E receiver requires only a single turn of wire in the saw cut. The antenna loop can be placed in very close proximity to inductive loops without any interference. In fact, if an inductive loop is also required, the single turn antenna loop can be placed in the same saw cut as the inductive loop. Each inductive loop detector may react differently.

It is important to select the antenna loop size so the transmitter will cross directly over the loop area. The antenna loop(s) area must not exceed 600 square feet (182 square meters) and the feeder cable length from the antenna loop to the AVI-E receiver must not exceed 500 feet (152 meters).

Example: If the road is 12 feet wide and the transmitter is mounted in the center of the vehicle under the front bumper, a 6 foot wide antenna loop would ensure that the transmitter would cross directly over the loop.



Special Note: If multiple antenna loops are connected to a single receiver channel, they must be connected in series, not parallel. Connecting multiple loops in parallel may result in the receiver not sensing a loop failure condition (open or shorted loop) in the event one or more of the loops connected to the channel fails and at least one loop remains functional.

I. General Description:

The Model AVI-E Automatic Vehicle Identification Receiver is a two channel, card rack mount unit that detects and identifies a vehicle (or vehicles) equipped with a coded transmitter and provides an output signal once the vehicle(s) has (have) been detected. The AVI-E uses two antenna loop coils (one per channel) installed in the road surface to receive the transmitter's code. The transmitter must pass directly over the area defined by the receiver's antenna loop coil(s) at a height not exceeding four (4) feet. Each receiver channel is programmed to identify all of 19,683 specific transmitter codes.

The AVI-E also incorporates loop monitoring capability that continually checks the integrity of the antenna loop(s).

A front panel mounted DB-9, RS-232 communication port is provided to allow the unit to receive data from and transmit data to an external source.

The model designation indicates the output configuration as follows.

Model AVI-E-xx ← R = Relay Outputs, SS = Solid State Outputs

II. Operating Controls:

i. Front Panel Mounted Valid Code LEDs:

Each channel has a front panel mounted, high intensity, red LED that indicates the presence of a valid-coded transmitter within that channel's antenna loop zone. When the LED is illuminated, the transmitter on a vehicle equipped with a valid-coded transmitter is within the area defined by the channel's antenna loop. When the LED is **OFF**, the transmitter on a vehicle equipped with a valid-coded transmitter is not within the area defined by the channel's antenna loop(s).

ii. Front Panel Mounted Loop Fault LEDs:

Each channel has a front panel mounted, high intensity, red LED that indicates a current or prior loop failure condition. When the LED is **OFF**, the channel's antenna loop is in tolerance. When the LED is illuminated, a loop failure condition (open or shorted loop) exists. A prior loop failure condition that has been corrected is indicated when the LED flashes at a three Hz rate.

iii. Front Panel Mounted Transmit / Receive LEDs:

Two front panel mounted, high intensity, red LEDs (one per channel) provide an indication of an active transmit state. When the transmit (**TX**) LED corresponding to either channel is illuminated, that channel is currently transmitting data via the RS-232 communication port. When the LED is **OFF**, no data is being transmitted.

An active receive state to the AVI-E via the RS-232 communication port is indicated via a front panel mounted, high intensity, green LED. When the receive (**RX**) LED is illuminated, the AVI-E is currently receiving data via the RS-232 communication port. When the LED is **OFF**, no data is being received.

iv. Front Panel Mounted Enable / Disable Toggle Switches:

Each channel has a front panel mounted, two position toggle switch that controls the function of the associated channel. When the switch is in the **ENABLE** position, the channel operates in a normal manner (i.e. AVI function active, loop monitoring function active). When the switch is in the **DISABLE** position, the channel will not recognize the presence of a valid-coded transmitter within its antenna loop zone and its loop monitoring function is also rendered inoperative.

v. **Front Panel Mounted Pushbutton - Audible Detect Buzzer:**

The front panel mounted pushbutton labeled **BUZZER** is used to enable an audible detect signal that is emitted any time a valid-coded transmitter is present within a given channel's antenna loop zone. To activate this feature, press the pushbutton. Only one channel can have this feature active at any given time. The first time the pushbutton is pressed, a short (50 millisecond) audible signal confirms the activation of the feature for Channel 1. The second time the pushbutton is pressed, two short (50 millisecond) audible signals confirm the activation of the feature for Channel 2. The third time the pushbutton is pressed, the feature is deactivated for both channels. A long (250 millisecond) audible signal confirms the deactivation of the feature. This feature will automatically turn off 15 minutes after activation.

vi. **Front Panel Mounted Communication Port:**

The AVI-E receiver has a front panel mounted, female, DB-9, RS-232 connector that allows data to be transmitted to and received from a local controller or computer (laptop or PC). When connected via an appropriate interface cable, the AVI-E can be interrogated as required to provide data for vehicle identification, preemption control, loop status, and/or data logging.

The RS-232 connector can also be used to program either or both channels of the AVI-E receiver to recognize and accept, or ignore, coded input signals from any combination of 19,683 programmable transmit / receive codes.

vii. **PC Board Mounted Address DIP Switches:**

The four-position DIP switch module located near the lower right corner of the PC board is used to set one of sixteen (16) possible address bit combinations for the AVI-E receiver (and its two channels). When one of the four DIP switches is in the **ON** position, the address bit corresponding to that switch is set. When a switch is in the **OFF** position, the address bit corresponding to that switch is cleared. The following table is a reference for the switch settings and associated address bit selections.

Switch 1 (Address Bit 1)	Switch 2 (Address Bit 2)	Switch 3 (Address Bit 4)	Switch 4 (Address Bit 8)	Effective Value
OFF *	OFF *	OFF *	OFF *	0 + 0 + 0 + 0 = 0 *
ON	OFF	OFF	OFF	1 + 0 + 0 + 0 = 1
OFF	ON	OFF	OFF	0 + 2 + 0 + 0 = 2
ON	ON	OFF	OFF	1 + 2 + 0 + 0 = 3
OFF	OFF	ON	OFF	0 + 0 + 4 + 0 = 4
ON	OFF	ON	OFF	1 + 0 + 4 + 0 = 5
OFF	ON	ON	OFF	0 + 2 + 4 + 0 = 6
ON	ON	ON	OFF	1 + 2 + 4 + 0 = 7
OFF	OFF	OFF	ON	0 + 0 + 0 + 8 = 8
ON	OFF	OFF	ON	1 + 0 + 0 + 8 = 9
OFF	ON	OFF	ON	0 + 2 + 0 + 8 = 10
ON	ON	OFF	ON	1 + 2 + 0 + 8 = 11
OFF	OFF	ON	ON	0 + 0 + 4 + 8 = 12
ON	OFF	ON	ON	1 + 0 + 4 + 8 = 13
OFF	ON	ON	ON	0 + 2 + 4 + 8 = 14
ON	ON	ON	ON	1 + 2 + 4 + 8 = 15

* The factory default setting of all four switches is **OFF** (all bits cleared).

The channel address numbering scheme is:

Channel 1 Address = (2 x Receiver Address Bit Setting) + 1

Channel 2 Address = (2 x Receiver Address Bit Setting) + 2.

Receiver Address Bit Setting	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Channel 1 Address	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31
Channel 2 Address	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32

III. **Reset:**

The AVI-E receiver can be reset by connecting a logic ground signal to Pin C (Reset Pin) or by reapplication of power after a power loss. Changing the position of an individual channel's Enable / Disable switch will reset the channel.

IV. **Antenna Loop Specifications:**

Antenna Loop Area: The maximum area that can be covered by the antenna loop(s) is 600 square feet (182 square meters).

Antenna Loop Feeder Length: 500 feet (152 meters) maximum with proper feeder cable and appropriate loops.

Antenna Loop Inductance Range: The receiver will operate on any loop / lead-in network in the inductance range of 50 to 700 μH. Any inductance outside of this range may cause a loop fault indication to be displayed.

Antenna Range: The transmitter must be directly over the antenna loop(s) at a height not exceeding four feet.

Lightning Protection: The receiver can tolerate, without damage, a 10 microfarad capacitor charged to 2000 volts being discharged directly into the antenna loop input terminals, or a 10 microfarad capacitor charged to 2000 volts being discharged between either antenna loop terminal and earth ground.

V. **Receiver Specifications:**

Power: 8 to 30 VDC, 160 mA maximum.

Relay Output Ratings: The relay contacts are rated for 6 Amps maximum, 150 VDC maximum, and 180 Watts maximum switched power

Solid State Output Ratings: Optically isolated. 40 VDC maximum collector (drain) to emitter (source). 100 mA maximum saturation current. 2 VDC maximum transistor saturation voltage. The output is protected with a 47 volt Zener diode connected between the collector (drain) and emitter (source).

Operating Temperature: -40° F to +180° F (-40° C to +82° C).

Response Time: The receiver will reliably recognize a valid transmitter code within the antenna's range in 61 milliseconds.

Presence Time: The receiver will hold the output signal for a valid-coded transmitter for as long as it is in the antenna's range and for 0.5 seconds after the transmitter leaves the range of the antenna.

Connector: 2 x 22 pin edge card connector with 0.156 inch (0.396 cm.) contact centers. Key slots located between pins B / 2 & C / 3, E / 5 & F / 6, and M / 11 & N / 12.

Communication Interface Connector: Front panel mounted, 9 pin, metal shell, D subminiature receptacle with gold plated female contacts and nuts for retaining screws.

VI. **Pin Assignments:**

2 x 22 Card Edge Connector:

Pin	Function	Pin	Function
A	DC Common	1	No Connection
B	DC +	2	No Connection
C	External Reset Input	3	No Connection
D	Channel 1 Loop Input	4	Channel 1 Loop Input
E	Channel 1 Loop Input	5	Channel 1 Loop Input
F	Channel 1 Output, Collector (Drain) / Relay Normally Open	6	No Connection
H	Channel 1 Output, Emitter (Source) / Relay Common	7	No Connection
J	Channel 2 Loop Input	8	Channel 2 Loop Input
K	Channel 2 Loop Input	9	Channel 2 Loop Input
L	Chassis Ground	10	No Connection
M	Reserved (AC Neutral)	11	Reserved (AC Neutral)
N	Reserved (AC Line)	12	Reserved (AC Line)
P	No Connection	13	No Connection
R	No Connection	14	No Connection
S	No Connection	15	No Connection
T	No Connection	16	No Connection
U	No Connection	17	No Connection
V	No Connection	18	No Connection
W	Channel 2 Output, Collector (Drain) / Relay Normally Open	19	No Connection
X	Channel 2 Output, Emitter (Source) / Relay Common	20	No Connection
Y	No Connection	21	No Connection
Z	No Connection	22	No Connection

Note: All pin connections listed above are with power applied, loop(s) connected, and no transmitter present.