

## **TRAKIT-15**

### **Printings**

**Version 1.00: 03/16/00**

**Version 2.00: 02/5/03**

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## SPECIFICATIONS

Input voltage	11VDC - 18VDC
Standby current @ 13.8VDC with GPS receiver and antenna	125mA 310mA
Temperature range	0 to +70 deg C
Relative humidity	90% at 50 deg C
Weight	1.1 lb.
Dimensions	5.5" x 5.5" x 1.5"

## **1.0 GENERAL DESCRIPTION**

### **1.1 Description**

The TrakIt-15 provides a full featured Automatic Vehicle Location (AVL) system for fleet management using the Global Positioning System (GPS). The TrakIt-15 contains a GPS receiver, a data buffer, and two data ports. Numerous events can be programmed to generate position records that can be stored in the data buffer or sent to either of the data ports.

Interface cables are available for quick and easy installation of the TrakIt-15 into a vehicle. The TrakIt-15 can collect position information without operator intervention or the data ports can be used for real time monitoring from within the vehicle.

### **1.2 Capabilities and Features**

- ◆ Interface cables are available for easy installation.
- ◆ Operating and timing parameters are stored in non-volatile EEPROM and can be programmed to meet system requirements.
- ◆ Two data ports with numerous programmable operating modes.
- ◆ Three event input signals allow position records to be generated on external events.
- ◆ On board battery backed position buffer holds 1000+ records.
- ◆ Internally located GPS receiver board.

## **2.0 INSTALLATION AND SETUP**

### **2.1 Inspection**

Please refer to the checklist packed with the TrakIt-15 in order to become familiar with the unit and to insure that everything ordered has been received. In the event a part is missing from the checklist, please call the Customer Services Department at 1-701-280-1122.

This unit was thoroughly inspected before leaving the factory. If the outer package appears damaged, please inspect the unit for possible damage immediately. Any dents, scratches, or marks suggest rough handling in shipping. Please notify the shipper if you find any indications of mishandling. If there are any concerns about the condition of the TrakIt-15 when it is received, please don't hesitate to call the Customer Services Department.

## **2.2 Disassembly and Reassembly**

To remove the TrakIt-15 printed circuit board from its case, remove the two black screws from the front of the TrakIt-15 and then remove the front panel. Remove the top cover by sliding it off the TrakIt-15. Since the printed circuit board contains sensitive circuitry, be sure to take the necessary precautions against static discharge.

To reassemble the TrakIt-15, replace the top cover and the front panel making sure the front and back panels are seated properly with the case. Replace the two black screws but do not over-tighten them.

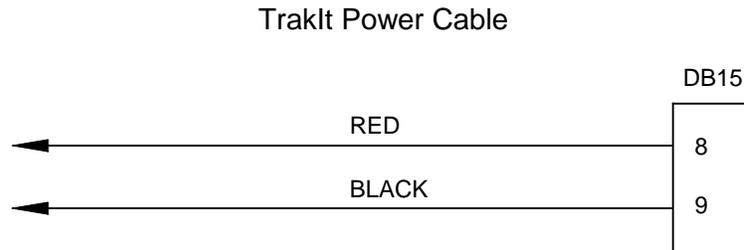
## **2.3 Installation Procedure**

This section describes the general procedure for installing the TrakIt-15 in a vehicle. For additional and more detailed information, refer to sections 2.4 – 2.8.

1. Using the AVL Installer (Logger) program, initialize the unit ID and program the installer and operator tables in the TrakIt-15 as required. Power will need to be applied to the TrakIt-15 and either Data Port 1 or Data Port 2 of the TrakIt-15 will need to be connected to the serial port of the computer that the AVL Installer (Logger) program is on. This can also be done after the TrakIt-15 is installed in the vehicle.
2. Obtain power for the TrakIt-15 from the vehicle's battery. The TrakIt Power Cable, available from IDA, can be used for this. In addition, make any connections required for the event input signals and external outputs of the TrakIt-15.
3. If required, connect Data Port 1 and Data Port 2 of the TrakIt-15 to the appropriate devices.
4. Install the TrakIt-15 in the vehicle. An optional mounting bracket kit is available to assist in mounting the TrakIt-15 in the vehicle.
5. Install the GPS antenna and connect it to the TrakIt-15.

## 2.4 Radio Connection

Connector J1 (labeled "RADIO") requires no connections to a radio since the TrakIt-15 does not support radio control. However, connector J1 is used to interface power from the vehicle's battery to the TrakIt-15 and to interface the event input signals and the external outputs of the TrakIt-15 to external devices when required. The TrakIt Power Cable, available from IDA, can be used for connecting power to the TrakIt-15. Following is the wiring diagram of the TrakIt Power Cable.



By adding wires to this cable, the event input signals and the external outputs can be connected. Following is a description of the function of each pin of connector J1.

- 1,2. These pins are not used.
3. This is the event input 2 signal pin. The TrakIt-15 uses this pin to determine the state of an external device. Position records can be generated by the TrakIt-15 when the state of the external device changes. The event input 2 signal pin is de-bounced and any new input level on this pin should be held for at least 1 second. The event input 2 signal pin can be programmed as either an active high or active low input.
4. This is the event input 3 signal pin. The TrakIt-15 uses this pin to determine the state of an external device. Position records can be generated by the TrakIt-15 when the state of the external device changes. The event input 3 signal pin is de-bounced and any new input level on this pin should be held for at least 1 second. The event input 3 signal pin can be programmed as either an active high or active low input.
5. This is the event input 1 signal pin. The TrakIt-15 uses this pin to determine the state of an external device. Position records can be generated by the TrakIt-15 when the state of the external device changes. The event input 1 signal pin is de-bounced and any new input level on this pin should be held for at least 1 second. The event input 1 signal pin can be programmed as either an active high or active low input.
- 6,7. These pins are not used.

## 2.4 Radio Connection (cont.)

8. This pin is used to supply power to the TrakIt-15. It should be connected to the vehicle's battery. If the TrakIt-15 is to be powered on and off with the ignition to prevent battery drain, an ignition relay must be installed or the power connection must be made to a switched accessory connector.
9. This is the ground pin. It should be connected to the vehicle's ground.
10. This is the external output 3 pin. The TrakIt-15 can change the state of this pin to allow a device in the vehicle to be enabled and disabled. The external output 3 pin can be programmed as either an active high or active low output.
11. This is the TXD pin of Data Port 2 when switch SW4 is set to position A. This pin is not currently used and should be left unconnected.
12. This is the RXD pin of Data Port 2 when switch SW4 is set to position A. This pin is not currently used and should be left unconnected.
13. This is the external output 1 pin. The TrakIt-15 can change the state of this pin to allow a device in the vehicle to be enabled and disabled. The external output 1 pin can be programmed as either an active high or active low output.
14. This is the external output 2 pin. The TrakIt-15 can change the state of this pin to allow a device in the vehicle to be enabled and disabled. The external output 2 pin can be programmed as either an active high or active low output.
15. This pin is the 5 VDC output from the TrakIt-15 and does not generally need to be connected.

## 2.5 Data Port Connection

Connector J2 (labeled "DATA PORT") provides the connections for two serial ports, Data Port 1 and Data Port 2. These data ports are used to make a serial connection from the TrakIt-15 to a computer, a Smart Card reader, or some other device depending upon the operating mode of Data Port 1 and Data Port 2. The pin-out for connector J2 is as follows:

<u>Pin #</u>	<u>Function</u>
1	TXD2
2	TXD1
3	RXD1
4	RXD2
5	GND
6	CTS2
7	CTS1
8	RTS1
9	RTS2

Since Data Port 1 and Data Port 2 have many different programmable modes of operation, what they are connected to is determined by their selected operating mode. The AVL Installer (Logger) program can be used to change the operating mode of Data Port 1 and Data Port 2. The available operating modes are as follows:

None - In this mode, the data ports do not perform any function except to receive programming information from the AVL Installer (Logger) program (which can be done in any mode).

NMEA Out - In this mode, NMEA messages that are received from the internal GPS receiver are sent to the data port (at 4800 baud, 8-N-1). Only the GGA, GSA, VTG, and ZDA messages will be sent to the data port. The data port should be connected to a computer or some other appropriate device.

Display Software - This mode allows the TrakIt-15 to communicate with the AVL Personal Navigator software. The data port should be connected to the computer that will be running the AVL Personal Navigator software.

Smart Card Reader - This mode allows the TrakIt-15 to communicate with a Smart Card reader. The data port should be connected to a Smart Card reader.

Cables are available from IDA that can be used to connect various devices to the data ports. Please contact IDA for more information.

## 2.6 GPS Antenna Connection

The TrakIt-15 comes with a GPS receiver and a GPS antenna. The GPS antenna should be connected to the connector on the back of the TrakIt-15 that is labeled "GPS ANT". The GPS antenna is either magnetic mount or permanent mount and should be mounted to a flat horizontal surface that will have an unobstructed view of the sky. When installing the GPS antenna, be sure that the antenna cable is not pinched or run past sharp edges.

## 2.7 Jumper and Potentiometer Settings

Any jumpers or potentiometers on the TrakIt-15 printed circuit board are either not installed or have been factory set as required and should not be changed.

## 2.8 Dip Switch Settings

The following describes the function of each of the dip switches on the TrakIt-15.

SW1-1,2: These switches are not used and should be left unchanged.

SW1-3: This switch routes the received data from Data Port 1 to the internal GPS receiver board when in the ON position. This allows differential GPS information to be passed to the internal GPS receiver. If DGPS is not being used, this switch should be in the OFF position. Data Port 1 can only be used in the None and NMEA Out operating modes when DGPS is being used.

SW1-4: This switch routes the received data from Data Port 1 to the TrakIt-15's micro-processor. This switch should normally be in the ON position. If DGPS is being used (SW1-3 ON), this switch should be in the OFF position. Programming information from the AVL Installer (Logger) program can only be received through Data Port 1 when this switch is in the ON position.

SW2: This switch determines if Data Port 1 is at TTL levels or at RS232 levels. Position A selects TTL levels and position B selects RS232 levels. This switch should normally be set to position B.

SW3: This switch determines if Data Port 2 is at TTL levels or at RS232 levels. Position A selects TTL levels and position B selects RS232 levels. This switch should normally be set to position B.

SW4: This switch determines if Data Port 2 is routed to the radio port or to the data port. Position A selects the radio port and position B selects the data port. This switch should normally be set to position B.

## PARTS LIST

### TRAKIT-15 PCB BOARD

101-0277

Item	Reference	Description	Part No.	Qty.
1	B1	3V BATTERY	399-0008	1
2	B1	3V BATTERY HOLDER	399-0009	1
3	C4,6	10uF ELEC. CAP	360-0004	2
4	C7,8,9,10,12,13,14,15, 16,19,20,21,22,23,29, 41,63	.1uF 10% X7R CAP	372-5104	15
5	C11	220uF ELEC. CAP	360-0007	1
6	C17,18,27,28	18pF 5% NPO CAP	372-5180	4
7	C49,50,51,52,53,54, 55,56,57,58,59,60,61, 62	.01uF 10% X7R CAP	372-5103	14
8	D1,2,4	1N4148 DIODE	110-0018	3
9	D3	1N4003 DIODE	110-0002	1
10	D5,6,7,8	1N5232 5.6V ZENER DIODE	111-0018	4
11	F1	1 AMP PC MOUNT FUSE	290-0008	1
12	J1	DB15 FEMALE CONN R/A	231-0031	1
13	J2	DB9 FEMALE CONN R/A	231-0026	1
14	J1,2	HEX NUT 4-40	199-0010	4
15	J1,2	WASHER, STAR #4	199-2001	4
16	J1,2	SCREW, 4-40 x 3/8 PHLP	199-3056	4
17	J3	8 POS HEADER	231-1518	1
18	J4	7 POS HEADER	231-1517	1
19	JP5	STAPLE JUMPER	265-0016	1
20	JP6	1 POS JUMPER POST	231-1001	1
21	JP6	3 POS JUMPER POST	231-1003	1
22	JP6	SHORTING JUMPER	234-0046	1
23	P1	8 POS DIP CONN	234-0022	1
24	Q1,2,3,4,5,6,8,9,10,11, 12,13,14,15	MMUN2211 TRANSISTOR	180-0040	6
25	R4	1M 5% 1/8 W RES	321-1105	1
26	R5,8,9,11,12,13,14,16, 18,34,35,38,39,52,53, 54,55,56,57,58,59,60, 61,62,63,64,65	10K 5% 1/8 W RES	321-1103	11
27	R6,19	100K 5% 1/8 W RES	321-1104	2
28	R7,10,15,17	100ohm 5% 1/8 W RES	321-1101	4
29	R34	4.7K 5% 1/4 W RES	312-0040	1
30	R66	4.7K 5% 1/8 W RES	321-1472	1
31	SW1	4 POS DIP SWITCH	613-0002	1
32	SW2,3,4	DPDT SWITCH	611-0048	3
33	U2	80C32 IC	131-3005	1
34	U3	UA7805 TO-220 IC	130-0022	1

35	U4	27C512 IC	130-0319	1
36	U5	74HCT00 IC	131-1026	1
37	U6	74HCT245 IC	131-1023	1
38	U7	74HC373 IC	131-1022	1
39	U8	208 IC	131-1032	1
40	U9	24LC04 IC	131-1029	1
41	U10	60L256 IC	131-1024	1
42	U11	74HC244 IC	131-1021	1
43	U12	74HC138 IC	131-1020	1
44	U14	88C681 IC	131-3004	1
45	U21	695 IC	131-1018	1
46	U22	MM74HC573WM IC	131-1055	1
47	U23	74HC08M IC	131-1034	1
48	U24	74HC32 IC	131-1031	1
49	U2	44 PIN PLCC SOCKET	220-0011	1
50	U3	T0220 INSULATOR	210-0103	1
51	U4	28 PIN DIP SOCKET	220-0008	1
52	X2	3.579545MHZ CRYSTAL	305-0001	1
53	X3	11.0592MHZ CRYSTAL	305-0012	1
54	X2,3	CRYSTAL INSULATOR	210-0106	2
55		SPACER, 4-40 x 3/8	200-0305	4
56		PC BOARD TRAKIT-25	900-0277	1

**TRAKIT-15 CABINET  
103-0277**

Item	Description	Part No.	Qty.
1	NUT, HEX, 4-40	199-0010	1
2	WASHER, STAR #4	199-2001	1
3	SCW, 4-40 X 1/4 SLOT	199-3055	1
4	S/N LBL IDA PRODUCT	199-6009	1
5	NUT, PEM 6-32 FLUSH	200-0056	4
6	BACKPLATE, TRAKIT	900-6062A	1
7	CABINET, TRAKIT	900-6071	1
8	FACEPLATE, TRAKIT	900-6072S	1

**TRAKIT-15 GPS RECEIVER KIT  
105-0277**

Item	Description	Part No.	Qty.
1	NUT, HEX 10 X 32	199-0046	1
2	SCW, #4-40 X 1/4 SLOT	199-3055	4
3	GPS RECEIVER BD.	902-0006	1

**GPS MAGNETIC ANTENNA**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
1	GPS MAGNETIC ANTENNA	902-0007	1

**GPS PERMANENT ANTENNA**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
1	GPS PERMANENT ANT.	902-0011	1

**TRAKIT CABINET BRACKET KIT  
103-5025**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
1	SCW, #10 X 3/4 SHEET MET.	199-1009	4
2	SCW, #6-32 X 3/16 PHILLIPS	199-3068	4
3	WASHER, STAR #6	199-2002	4
4	BRACKET, TRAKIT ANOD.	900-5025A	1

**TRAKIT POWER CABLE  
106-TRPWRCBL**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
1	SCREW CLIP KIT	231-0014	1
2	MALE DB15 CONNECTOR	231-0035	1
3	DB15 CONN HOUSING	231-0036	1
4	2 COND CABLE	800-1106	10'

## SCHEMATICS