ST-900

CELLULAR SERVICE TRACKER
USER MANUAL

Installation Guide and
User's Manual

OEM Data Delivery,
A Division of OEM Controls, Inc.
10 Controls Drive
Shelton, CT 06484
203-929-8431
www.service-tracker.com

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DOCUMENT NUMBER: 20977
DATE OF REVISION: 6/14/10 – Rev. C

ABOUT THIS GUIDE:

THIS GUIDE PROVIDES BASIC INSTRUCTION ON THE USE OF THE ST-900 CELLULAR SERVICE TRACKER.

Contents

General Information

OEM Data Delivery, a leading developer of rugged electronic tools for managing worksites and high-end equipment, has introduced a versatile system for tracking equipment at remote locations.

The ST-900 generates the real-time information needed to maximize revenue and cut waste. The ST-900 is one of the most powerful, and versatile tools available for precise job costing. It was engineered for severe service performance at construction, landfill, rental and other complex operations. Implementation is quick and training typically requires just a few hours.

The ST-900 works with the GoPod from OEM Data Delivery. This concealed computer installs in lube/fuel trucks, low boy trucks, and supervisor's vehicles for additional process data capture, including fuel, driver logs, and mechanic work logs. It has a GPS antenna and a radio antenna. GPS coordinates are stamped into the record as hour data is collected. Information is collected passively, within range of a 300 foot line of sight, and transmitted via secure radio link.

The ST-900 works remotely using cellular GPRS. This allows the user to capture data from the tracker, the profile, work/idle/run logs, latitude, longitude, travel logs, and count/duration logs. It also allows the user to disable or enable the ignition on the vehicle, profile the tracker, and modify the real time clock to adjust for daylight savings time and time zone differences.

Radio Communication

The radio will allow you to retrieve all ST-900 data, such as the profile, service alerts, work/idle/run/count duration logs, and GPS information (latitude and longitude). You can retrieve this data using a GoPod. The Aceeca/Gopod will allow the user to update (modify) the real time clock. The Aceeca will not be used to capture the work/idle/run, count/duration logs.

GPS Communication

The GPS will give the user the positional information of the ST-900 (Latitude and Longitude). The speed over ground is used to derive the cumulative machine mileage.

GPRS Communication

The GPRS will allow the user to have remote connectivity using cellular technology. The user can obtain information on a PC with OEM Server Software that will communicate with the ST-900 using the GPRS network. The Cellular GPRS will allow you to retrieve all data, such as the count/duration logs. It also allows the user to disable/enable the ignition on the vehicle, profile the tracker and modify the real time clock to adjust for daylight saving time and time zone differences.

ST-900 Models Available

Product	Cable	Features
ST-900-100	EPW/1174	Standard
ST-900-101	EPW/1174	Standard and Computer Connection
ST-900-102	EPWH/1191	Standard and Remote Starter Disable (RSD)
ST-900-103	EPWH/1200	Standard and Data Logs

The next few pages will display schematics of each of these models.

F-11701 Rev. A 11-30-00 [A-TBlock-H]

DWG. NO. A20900 SHT. 1 REV. A

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	ORIGINAL	MP*05-05-09	

J1

REF-DES	QTY.	U/M	DESCRIPTION	OEM PART#	A TERMINATION	B TERMINATION
1	1	EA.	CONNECTOR 14-POS AMPSEAL PLUG	EPCN/1507		
2	5	EA.	PIN - AMP SOCKET	EPWT/858		
3	1	EA.	RING TONGUE NON-INSULATED	EPWT/915		
4	5.00	IN.	TUBE - HEAT SHRINK 1/8 x 1/16"	EPSU/706		
5	18.00	IN.	WIRE - RED 20/19 AWG	EPWB/234	J1 - 1	PENDENT
6	18.00	IN.	WIRE - YEL 20/19 AWG	EPWB/236	J1 - 3	PENDENT
7	6.00	IN.	WIRE - GRN 20/19 AWG	EPWB/241	J1 - 4	EPWT/915
8	18.00	IN.	WIRE - BLU 20/19 AWG	EPWB/237	J1 - 6	PENDENT
9	18.00	IN.	WIRE - BLK 20/19 AWG	EPWB/235	J1 - 10	PENDENT

MATERIAL:
*

FINISH:
*

UNLESS OTHERWISE SPECIFIED:

	TOLERANCE	ANGLES
.X	±.1	X ±1°
.XX	±.01	.X ±.5°
.XXX	±.005	
.XXXX	±.0010	

DIMENSIONAL UNITS: UNITS
UNDIMENSIONED RADII: RADII
BREAK ALL SHARP CORNERS, EDGES & BURRS.

DRAWN BY: MP DATE: 05-05-09
CHECKED BY: TOL 05-05-09
APVD ENG.
APVD DESN
APVD SALES
PROJECTION:

OEM Controls, Inc.
10 Controls Drive - Shelton, CT 06484
Phone: (203) 929-8431 Fax: (203) 929-7586

WIRE HARNESS FOR
ST-900-100

PART NO. EPWH/1200 DWG NO. A20900 REV A
SCALE N/A SHEET 1 of 1 SIZE A

F-11701 Rev. A 11-30-00 [A-TBlock-H]

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DWG. NO. A20647 SHT. 1 REV. A

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	ORIGINAL	MP*02-23-09	

J1

REF-DES	QTY.	U/M	DESCRIPTION	OEM PART#	A TERMINATION	B TERMINATION
1	1	EA.	CONNECTOR 14-POS AMPSEAL PLUG	EPCN/1507		
2	6	EA.	PIN - AMP SOCKET	EPWT/858		
3	1	EA.	RING TONGUE NON-INSULATED	EPWT/915		
4	5.00	IN.	TUBE - HEAT SHRINK 1/8 x 1/16"	EPSU/706		
5	18.00	IN.	WIRE - RED 20/19 AWG	EPWB/234	JT - 1	PENDENT
6	18.00	IN.	WIRE - YEL 20/19 AWG	EPWB/236	JT - 3	PENDENT
7	6.00	IN.	WIRE - GRN 20/19 AWG	EPWB/241	JT - 4	EPWT/915
8	18.00	IN.	WIRE - RED/WHT 20/19 AWG	EPRD/88	JT - 5	PENDENT
9	18.00	IN.	WIRE - WHT 20/19 AWG	EPWB/238	JT - 9	PENDENT
10	18.00	IN.	WIRE - BLK 20/19 AWG	EPWB/235	JT - 10	PENDENT

MATERIAL:
*

UNLESS OTHERWISE SPECIFIED:

TOLERANCE		ANGLES	
.X	±.1	.X	±1°
.XX	±.01	.X	±.5°
.XXX	±.005		
.XXXX	±.0010		

DIMENSIONAL UNITS: UNITS

UNDIMENSIONED RADII: RADII

BREAK ALL SHARP CORNERS, EDGES & BURRS.

FINISH:
*

DRAWN BY: MP DATE: 02-23-09
CHECKED BY: TOL DATE: 02-23-09
APVD ENG.
APVD DESN
APVD SALES

PROJECTION: 1st angle

OEM Controls, Inc.
10 Controls Drive – Shelton, CT 06484
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WIRE HARNESS FOR
ST-900-102

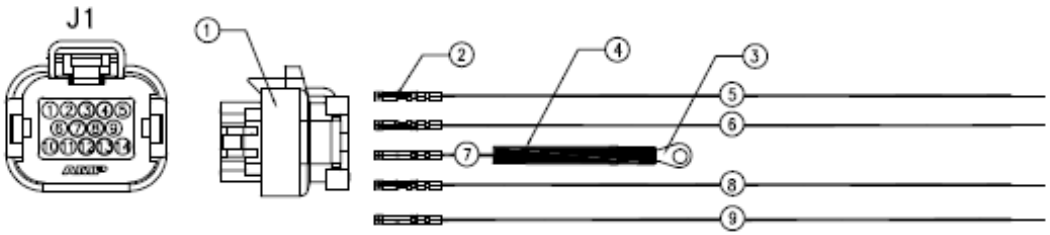
PART NO. EPWH/1191 DWG. NO. A20647 REV. A
SCALE N/A SHEET 1 of 1 SIZE A

F-11701 Rev. A 11-30-00 [A-TBlock-H]

DWG. NO.	SHT.	REV.
A20900	1	B

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	ORIGINAL	MP*05-05-09	DOC*05-06-09
B	CHANGED TITLE FROM ST-900-100 TO ST-900-103 PER ECR#12863	MP*08-31-09	



REF-DES	QTY.	U/M	DESCRIPTION	OEM PART#	A TERMINATION	B TERMINATION
1	1	EA.	CONNECTOR 14-POS AMPSEAL PLUG	EPCN/1507		
2	5	EA.	PIN - AMP SOCKET	EPWT/858		
3	1	EA.	RING TONGUE NON-INSULATED	EPWT/915		
4	5.00	IN.	TUBE - HEAT SHRINK 1/8 x 1/16"	EPSU/706		
5	18.00	IN.	WIRE - RED 20/19 AWG	EPWB/234	J1 - 1	PENDENT
6	18.00	IN.	WIRE - YEL 20/19 AWG	EPWB/236	J1 - 3	PENDENT
7	6.00	IN.	WIRE - GRN 20/19 AWG	EPWB/241	J1 - 4	EPWT/915
8	18.00	IN.	WIRE - BLU 20/19 AWG	EPWB/237	J1 - 6	PENDENT
9	18.00	IN.	WIRE - BLK 20/19 AWG	EPWB/235	J1 - 10	PENDENT

MATERIAL:
*

FINISH:
*

UNLESS OTHERWISE SPECIFIED

TOLERANCE		ANGLES	
.X	±.1	X	±1°
.XX	±.01	.X	±.5°
.XXX	±.005		
.XXXX	±.0010		

DIMENSIONAL UNITS: UNITS
UNDIMENSIONED RADII: RADII
BREAK ALL SHARP CORNERS, EDGES & BURRS.

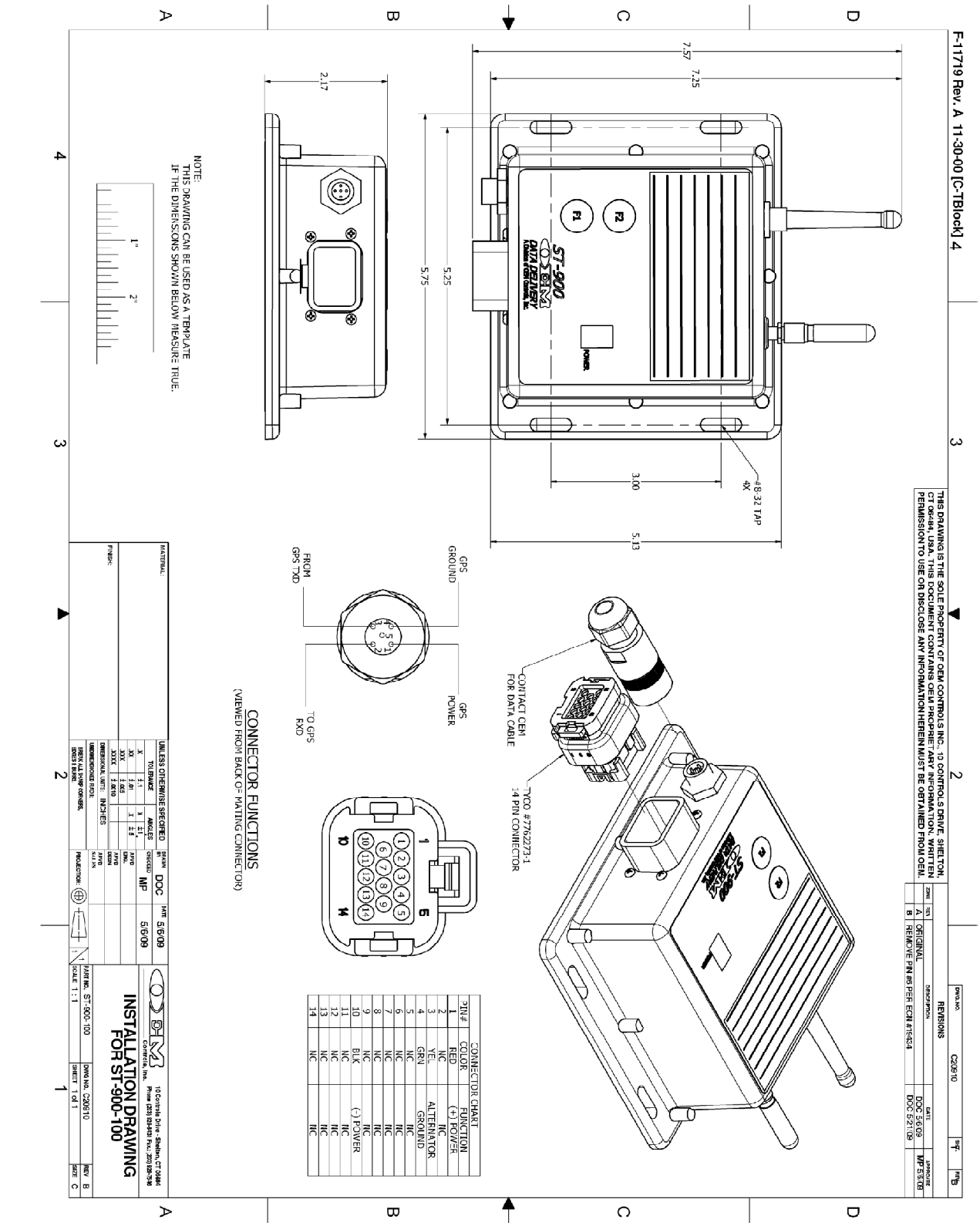
DRAWN BY	MP	DATE 05-05-09
CHECKED BY	TOL	05-05-09
APVD ENG.		
APVD DESN		
APVD SALES		
PROJECTION:		1 / 1

OEM Controls, Inc.
10 Controls Drive - Shelton, CT 06484
Phone: (203) 929-8431 Fax: (203) 929-7586

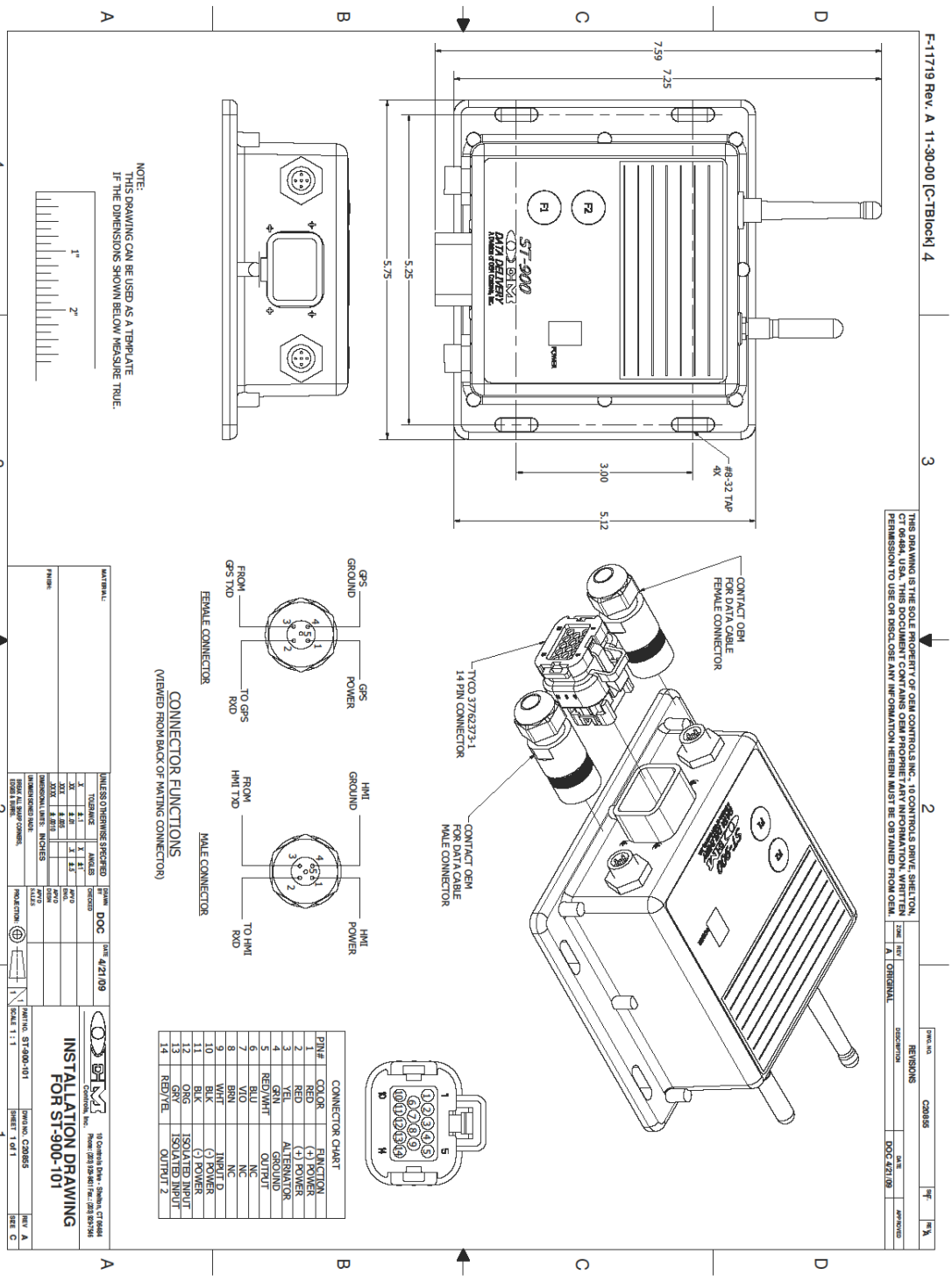
WIRE HARNESS FOR
ST-900-103

PART NO. EPWH/1200	DWG NO. A20900	REV B
SCALE N/A	SHEET 1 of 1	SIZE A

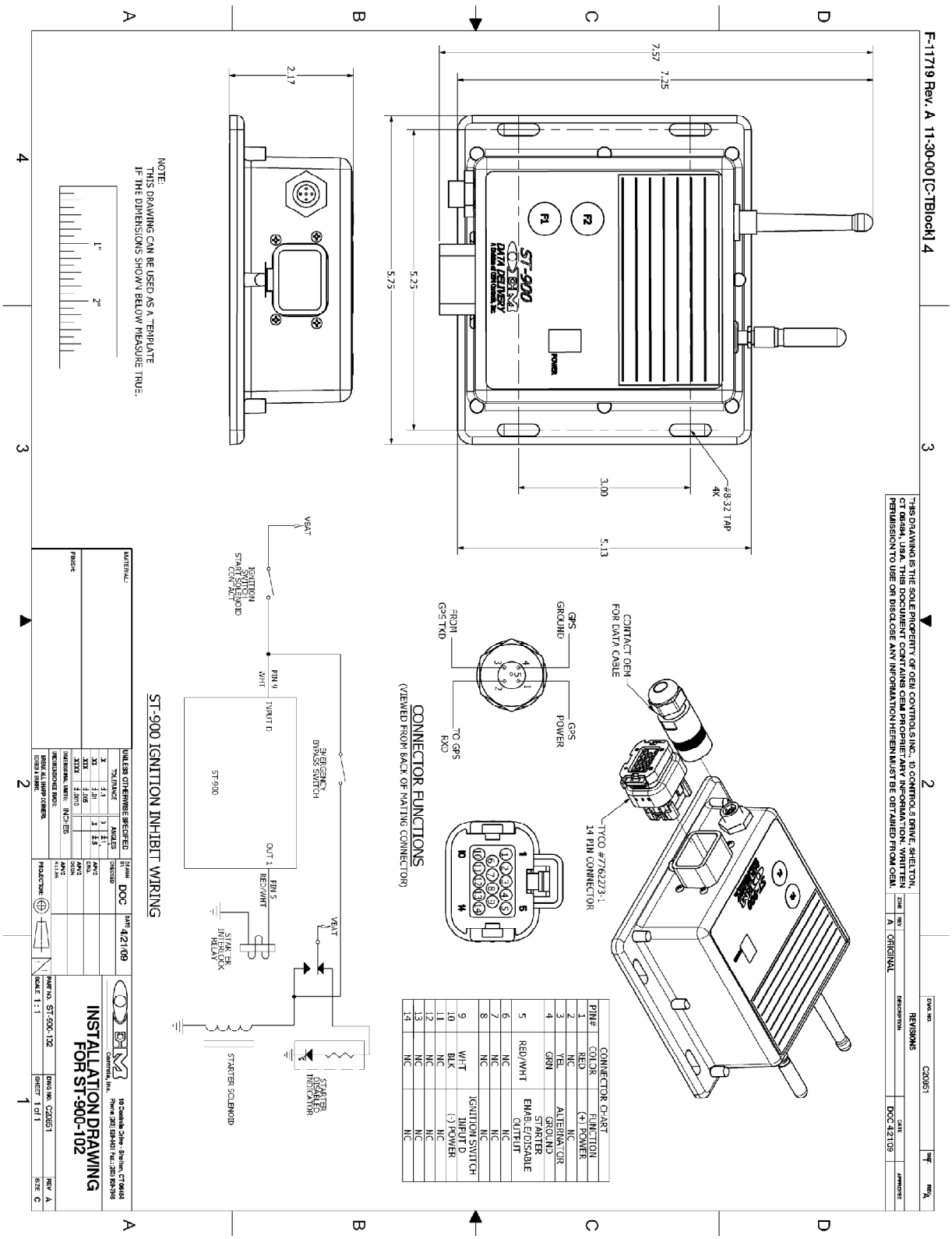
Electrical Installation



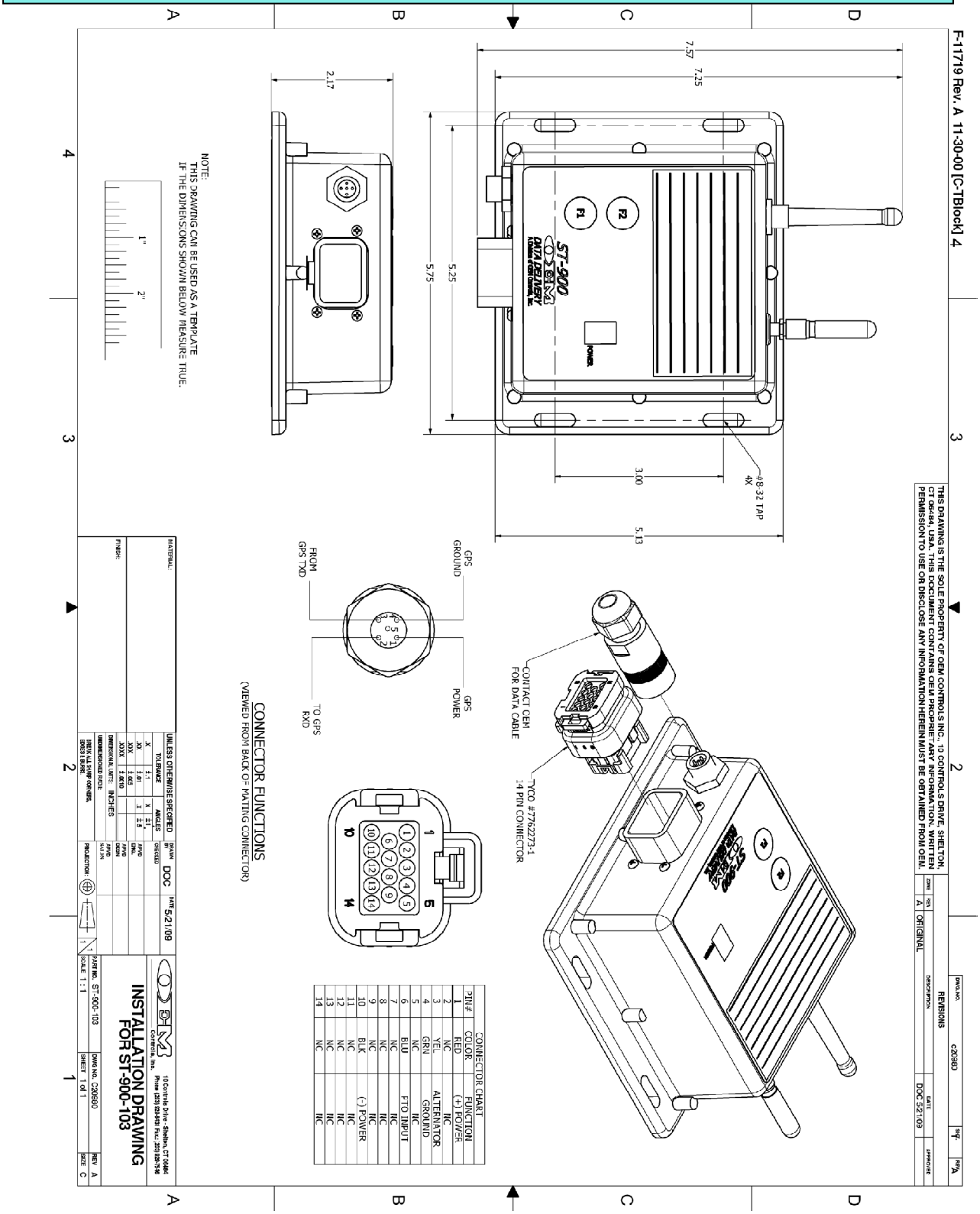
Electrical Installation



Electrical Installation



Electrical Installation



Installing an ST-900 Cellular Service Tracker

1. Turn off motor. Also turn off master switch, if so equipped.
2. **Mount** ST-900 near fuel refill area.
3. **Wire Color:**

   RED – Connect **RED** wire to a positive 12V or 24V DC source. Provide a 3 or 5 amp fuse at the battery

   BLACK – Connect **BLACK** wire to ground on battery
   GREEN – Connect **GREEN** wire to a chassis ground (e.g., frame, body, engine or frame side of the master switch).
   YELLOW – Connect **YELLOW** wire to a positive 12V or 24V power source that ONLY has voltage while the machine is running (must be on alternator "R" DC terminal in order to get both work and idle reading or yellow wire to output of Vibe Sensor) (ST-103).

   Note: 7.0 volts is the minimum "motor run" voltage (starts the Service Tracker counting hours).

4. **Calibrating your ST-900 for Engine Work and Idle Logging:**

   Step 1: Start the equipment and keep it idling.
   Step 2: **PRESS & HOLD** the "F1" button on your Service Tracker.
   Step 3: Release the "F1" button after the display cycles from **F** to **C** to **F** for, about 10 to 15 seconds. If you don't get a **C** during calibration, check the connection of your yellow & green wires.
   Note: If the equipment does not have a pulse (RPM) output, the ST-900 display will cycle **F** to **C** to **n (no pulses)** to **F**. In this case, there will be a Run Log.
   Note: The ST-900 will generate run logs, if the yellow wire connected to 12 V or 24 DC.
   Note: If the yellow wire is connected to the "R" terminal of alternator and the alternator is giving pulsed outputs, the tracker will generate idle and work logs.
   Note: If the yellow wire is connected to an ST-103 (Engine Vibration Sensor) you will be able to obtain work logs.

5. **Diagnosis:**

   1. If the motor is OFF, and the master switch is ON and there is a fast-pulse** - re- check the yellow wire connection location.
   2. If the motor is ON, and the master switch is ON, and there is a slow-pulse* - re-check the there is a yellow or green wire connection.

   ***** Fast Pulse - LED flashes once every two seconds***

   ****Slow Pulse - LED flashes once every four seconds***

   3. If the Service Tracker will not turn on or wake, check the red wire and the fuse. Use a voltmeter to check the red and black wires at the Service Tracker. Re-check the power wiring if there is not 12 (or 24) volts present.

4. If the motor is OFF, and the master switch is OFF, and there is fast-pulse** - separate the green and black wires and connect the green to a chassis ground.
5. **Make sure you don't split the batteries when they are jumped (e.g., two 12V batteries to get 24V).**

***** Fast Pulse - LED flashes once every two seconds***

****Slow Pulse - LED flashes once every four seconds***

6. Completion:

1. Observe the Service Tracker:
    1. If the alert light flashes at one second intervals, then it is counting hours.
    2. If the alert light flashes at three second intervals, then it is NOT counting hours.

7. Installation Tips:

1. Identify the frame voltage (i.e., positive ground or negative ground).
2. Avoid routing wires near moving parts. Give adequate slack in wires. Zip-tie all wires.
3. Avoid routing wires near hot exhaust system and turbo chargers.
4. **When mounting Service Trackers, watch out for compartments that open, especially bob cats or other skid steers where the radiator assembly lifts up, so leave slack in wires to the Service Tracker**.
5. Do not drill mounting holes unless you are confident that you will not damage the underlying component.

Installing the GPS

1. Plug the GPS module into the connector located beside the **main harness connector.** Make sure the key on the connector is aligned before you fasten it securely.

2. Turn the vehicle ignition on. (The power to the GPS is turned off when the ignition is off to conserve battery power). The GPS module will need about 5 minutes to get a valid fix for the first time.

3. Depress "F2" for diagnostics. There should be no "G" displayed when your GPS is fully functional.

Equipment Needed to Operate your ST-900

ST-900 Cellular Service Tracker*

GPS Antenna

Cables (Part #'s for Reorder)

EPWH/1174 – Main Cable (Service Tracker)
P-19779 – GPS Antenna replacement

*Actual ST-900 may differ slightly from that pictured

ST-900 Features

- Radio Terminal Downloader
- Travel logs are logged 10 times per hour while the vehicle is in motion
- Work/idle/run logs, count/duration logs
- Cumulative Machine Hours (CMH)
- 7 User Programmable Service Alerts (Maintenance) (Turned off by default)
- GPRS communication for remote connectivity
- Power conservation (GPS turns off when ignition is off). GPRS modem turns off when vehicle battery is low and 2 low messages have been transmitted to the server.
- SSI starter solenoid inhibit option - GPRS only
- Update Cumulative Machine Mileage using Aceeca (PDA)
- Radio connectivity for GoPod/Aceeca

Programming the ST-900 with the Aceeca PDA

The Aceeca can be used to program your ST-900 profile. You will be able to assign a unique equipment number and description to each of your ST-900's. You can program service alarms to remind you of your machine maintenance. With the ST-900 you will be able to program up to seven service alerts. Some of the features of the PDA you should be familiar with include the power button, the touch sensitive screen, the directional arrows, and the graffiti pad, as well as the infrared port.

The part number for ordering an Aceeca is STP/MEZ1000/RMA.

Setting an Equipment Profile

1. On your PDA:
   - Plug the Primary Radio Antenna into the PDA
   - Press **" POWER"**
   - TAP **"Home"**

2. TAP **"Equipment Setup"** on your list of programs

3. TAP **"Radio"** to be sure your PDA is in Channel 2

4. TAP **"Setup"**

5. TAP **"New Profile"**

6. TAP inside the Equip# box to enter your Equip#. Choose your number from the list or to enter a new Equip #, TAP **"Edit"**, then TAP **"New"**. TAP **"keyboard"** and enter your Equip #, then TAP **"Done"**.

7. TAP on the second line and enter your new Description by tapping **"keyboard"** and entering your description. TAP **"Done"**, then TAP **"OK"**.

8. TAP inside the first Service Box to enter your Service Tags. (This will display the Tag Edit Screen).

9. On the Tag Edit screen enter your service description using your ABC-123 Graffiti Pad and TAP **"Done"**, then TAP **"OK"**. (You may program as many as seven different services.)

10. TAP on the "0" under "Actual" to program your actual hours. (This will display the Actual Hours Edit screen).

11. Program your actual hours using the ABC-123 Graffiti Pad and TAP **"Done"**, then TAP **"OK"**. (Use the same process to set all other actual hours).

12. To program your Scheduled Hours, TAP to the left of the number. Use your ABC-123 Graffiti Pad to program your scheduled hours and TAP **"Done"**.

13. Enter the total number of hours the machine has been operating into the "Cumulative Machine Hours" field by tapping to the right of Cumulative Machine Hours and using your ABC-123 Graffiti pad. TAP **"Done"**.

14. Enter timeout value by tapping to the right of the "Timeout" field. Using your ABC-123 Graffiti pad enter your "Timeout" value. TAP **"Done"**, then TAP **"OK"** at the bottom left of the "New" Screen when you are done setting up your profile.

15. The Write Warning screen will appear.

16. TAP **"OK"**.

17. The “Set Up” screen will appear, which means your profile is ready for uploading onto the ST-900 Service Tracker. (There will be two arrows above the Com-Link button).

Loading your Profile onto the Service Tracker

1. Hold the **“F1”** button on your Service Tracker until it switches to Channel 2 (fuel mode). There will be an **“F”** in your power window. The “Alert” button on your Service Tracker will flash quickly.

2. On your PDA, TAP “**Radio”**, then TAP **“Com-Link”**. Your PDA will now be in the Setup screen and the two arrows above the Com-link button will be facing downward. You are done programming your Service Tracker.

Diagnosing the ST-900

You will be able to diagnose your ST-900 using your PDA. You can retrieve information about your ST-900 such as your software part number, serial number, ICCID number (Cellular Modem I.D.), and modem firmware version number. It will also display the state of your battery, GPS and GPRS communication status. You will also be able to retrieve information such as the serial number, latitude, longitude, cumulative machine mileage and cumulative machine hours. The following is the procedure:

1. On your PDA:

   - Plug the Primary Radio Antenna into the PDA
   - Press **"POWER"**
   - TAP **"Home"**

2. TAP "**Equipment Setup"** on your list of programs

3. TAP **"Load"** in the upper left hand corner of the screen

4. TAP **"Info"** on the upper right hand corner of the screen

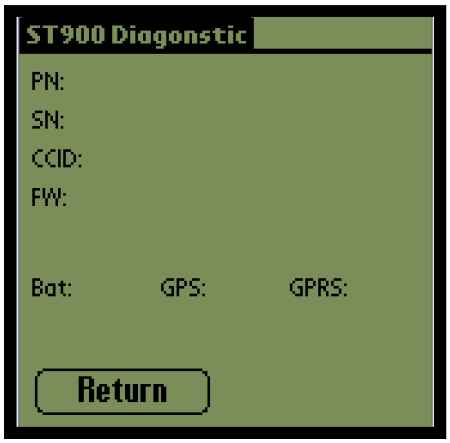
5. TAP **"Diag"** on the drop down menu

6. On your ST-900 press and hold **"F1"** for about 3 seconds to switch to channel 2 (an **"F"** is displayed)

7. On your Aceeca TAP **"ST-900"**

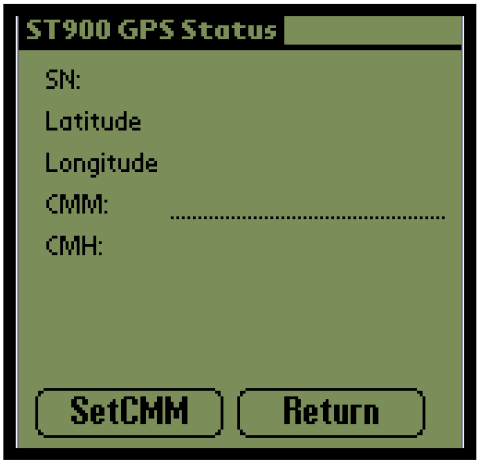
8. TAP "**Diagnostic"** or **"GPS"** depending on what you would like to see information about

ST-900 Diagnostic Screen



This screen will display your part number, serial number, cellular modem identification number, firmware version number, the state of your battery, GPS and GPRS communication.

ST-900 GPS Status Screen



This screen will display your serial number, latitude, longitude, cumulative machine mileage and cumulative machine hours.

Technical Specifications

- Zinc Casting – Water resistant to IP67
- Voltage: 12 to 24 V (Range: 8-32 V)
- Memory - 256K bytes of program memory, 15K bytes of RAM; 128K bytes of external EEPROM
- Storage – 34 days history each for idle/work/run/count/duration logs in external non-volatile EEPROM when configured as daily logs, when configured as hourly logs, the history is user specific
- 7 Segment Display for alarms display, GPS/GPRS communication diagnostics, fuel mode, radio GPRS and connection status
- Real Time Clock (RTC) for time stamped data
- 2 push buttons **(F1, F2)**:

  F1 - used for calibrating ST-900 and radio channel switch during fuel mode

  F2 - used for diagnostic purposes
- Operational temperature range -40℃ +70℃
- Warranty: Standard 2 year warranty
- GPS : Serial connection to ST-900
- Cellular – dual band, GPRS, AT&T, normal operating frequency (824.2 – 848.8 MHz)
- Radio – 802.15.4 physical layer, normal operating frequency (240.5 MHz)
- Harness – Power (8 – 32 v DC), ground, ignition, 6 digital inputs, 2 digital outputs (1A, Max)
- Data Logs – 2 optically isolated digital inputs, 4 standard digital inputs, Idle/work/run logs, duration/count logs
- Travel Log – GPS latitude, longitude, incremental time log and Delta CMM (Cumulative Machine Mileage)
- Data Format – Comma-Separated Value (CSV), Extensible Markup Language (XML), Open Database Connectivity (OBDC), and others

Seven Segment Display (Service Alerts, Diagnostics, Channel)

Your “power” window will display the following messages:

DISPLAY	MEANING
	**Calibration (when F1 is depressed for about 10 seconds)**
	**Service Alarms (turned off by default)**
	**GPRS Cellular Error (anytime when not on network)**
	**GPS Error (displayed when GPS has no fix or power to GPS has been turned off or GPS malfunction)**
	**Entering Diagnostic Mode (Active ONLY after unit is calibrated)**
	**GPS and GPRS communication ok**
	**No pulses detected during Calibration**
	**- New, Un-Calibrated and ignition on** **- For 1 second ignition on-off backup to Non Volatile Memory**
	**Fuel Mode – Channel 2 (operating frequency – 2410 MHz when “F1” is depressed for about 3 seconds**
	**Radio/Serial Terminal Downloader mode – Radio operating channel is 6**
	**Engine Idle - Displayed only after calibration is complete and engine is idling**
	**Engine Work - Displayed only after calibration is complete and engine is working**

User Notes:

If you have any questions regarding this product, we will be happy to assist you.

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A Division of OEM Controls Inc.,
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Shelton, CT 06484

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Ask for OEM Data Delivery Support
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