

Hardware
Guide

Shadow Tracker TM
2000



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Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment operates in a commercial environment.

- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
- Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Only peripherals certified to comply with the Class A limits may be attached to this device. Operation with non-certified peripherals or peripherals not recommended by Advanced Tracking Technologies, Inc. Are likely to result in interference to radio and television reception.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits.

ADVANCED TRACKING TECHNOLOGIES, INC. is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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INTRODUCTION

Please read this manual completely before use.



Thank you for purchasing Shadow Tracker™, the cornerstone of the MobilEyes™ vehicle tracking system from Advanced Tracking Technologies, Incorporated. MobilEyes™ is a unique hardware and software combination, used for the tracking needs of today's mobile workforce.

Shadow Tracker™ 2000

The Shadow Tracker™ 2000 uses a stationary system of satellites placed around the globe in orbit by the Department of Defense (DOD). Signals received from one satellite are compared to signals of three others in view. The small differences in reception can be used to calculate the position anywhere on the Earth through triangulation.

The Shadow Tracker™ 2000 easily installs into a vehicle and use the vehicles electrical system. The unit gathers and stores vital GPS data which is downloaded into the application software providing detailed distance, location and time information necessary for accurately monitoring your mobile staff. Although rare, time may appear distorted while a Shadow Tracker™ 2000 is stationary for long periods of time. Data may appear as if the unit has wandered for short distances and/or brief periods of time. This is due to the DOD's procedure of Selective Activation (SA). In addition, there may be other atmospheric circumstances which could cause the Shadow Tracker™ data to be unreliable and are beyond our control. For a listing of the dates and times where problems are a possibility refer to this website: www.laafb.af.mil/SMC/CZ/homepage/

CONNECTING THE UNIT

Connecting Power

The battery on the vehicle serves as the power source for the Shadow Tracker™ units however, if a unit is left on for an extended period in which the vehicle is not running the unit may drain the vehicle battery to the point that the vehicle cannot be started.

Carefully, connect the receiver adapter to the back of the Shadow Tracker™ unit paying special attention not to bend any of the connector prongs.



The adapter should be connected to the vehicles power source.
Refer to: Wiring Instructions of this manual for further explanation.



Wiring Instructions

The Red wire must be connected to a **CONSTANT** 12 volt positive power source, it **MUST** have power even when the vehicle is turned off. The Blue wire should be connected to a switched 12 volt positive power source, it should have power **ONLY** when the vehicle is running and **NOT** when the vehicle is turned off. This tells the Shadow Tracker™ 2000 unit that the vehicle is turned off verifying that the vehicle must be stopped. If you can not locate a switched power source then the Blue wire **MUST** be connected to the same constant power source as the Red wire. (Note: If the Blue wire is connected to a continuous power source then the stop reporting may not be as accurate. The Blue wire **MUST** be connected to a power source, either constant or switched or the Tracker unit will **NOT** collect GPS data.) The Black wire must be connected to a 12 volt ground source.

Status Indicator Lights

Once power is properly connected the **Power** LED and **GPS** LED light located on the front panel of the Shadow Tracker™ 2000 will glow.

The **Power** LED indicator will be red when the unit is receiving power. When the unit is downloading the **Transmit** LED indicator will blink.



CONNECTING THE UNIT

Status Indicator Lights

The **GPS** LED indicator is green when satellite information is being acquired. The **GPS** light is orange when no satellites are visible and the unit is unable to successfully track its position. If this occurs on a regular basis you may need to reposition the antenna.

Upon the initial power up or after extended periods of non use it may take up to 10 minutes to acquire (**GPS** LED will turn green) satellites. Once the unit has acquired, if power is turned off and on the acquisition time will normally be less than one minute.

If the unit does not successfully power up, refer to the trouble shooting section located at the back of the manual. The unit power should be disconnected when left for extended periods of time.

The GPS Antenna

You can add an active GPS antenna that can convert to either an internal suction mount or external magnetic mount. Always place the antenna where the **GPS** light remains green for continuous tracking, otherwise mapping and reporting accuracy may decrease. For best tracking results, placement of the antenna in an obstructed view of the sky is recommended.

Warning: Attaching a passive GPS antenna will result in damage to this device. Crimping or cutting the GPS antenna cable may cause damage to the antenna and the Shadow Tracker™ 2000 unit.

Downloading the GPS data to your PC

This unit does not require removal from the vehicle. The unit will automatically notify the system server when in range and download its GPS information for you.

Equipment / Vehicle Monitoring (EVM)

After properly installing the EVM Sensor Kit, the ST2000 unit has the ability to monitor and record 2 digital signals from a vehicles system components.

The Sensor Kit is composed of a cable with 4 Sensor connection wires, and a DB9 female connector that plugs into the "Serial2" DB9 male connector located on the ST2000's rear panel.(see page 3)
It is the responsibility of the user to properly install the 4 Sensor connection wires into the vehicles sensor switches or circuits.

For purpose of example, this illustration will consider connecting two single pole, single throw switches (**S1** and **S2**) to the **Sensor1** and **Sensor2** ports.

CONNECTOR PIN	SIGNAL	SWITCH CONNECTION
1	Battery Voltage	S1-1
6	Sensor1	S1-2
9	Battery Voltage	S2-1
4	Sensor2	S2-2

In this example,
the **Sensor1** signal will become active (logic 1), when switch **S1** is **closed**, connecting the Battery Voltage to **Sensor1**.
In turn, the **Sensor1** signal will become inactive (logic 0) , when switch **S1** is **open**.

Likewise,
the **Sensor2** signal will become active (logic 1), when switch **S2** is closed, connecting the Battery Voltage to **Sensor2** and
the **Sensor2** signal will become inactive (logic 0) , when switch **S2** is open.

CONNECTING THE UNIT

After the Sensor Kit has been properly installed, the Shadow Tracker Professional software can be used to name the Sensor Ports and define the active and inactive states for the Sensors.
(See Shadow Tracker Professional - Modules Manual)

The ST2000 unit can easily be expanded to monitor and record additional digital and/or analog signals. An example of an analog signal would be monitoring temperature or pressure readings.

The following facts should be noted regarding the recording of Sensor data in the ST2000 unit:

- 1) No Sensor recording will occur until GPS satellites have been visible at least once. This requirement is imposed in order that GPS time may be recorded accurately.
- 2) Sensor readings will only be recorded at the GPS recording or collection rate. The default setting is a 10 second collection rate. However, if necessary, this can be easily changed to a collection rate of as low as 3 seconds.

Note: Since the standard memory of the ST2000 is 512KB, it is advised that when adjusting to a 3 second collection rate, you upgrade to the 2MB memory option.

Other Information

The Shadow Tracker™ 2000 unit must remain connected to a continuous power supply during vehicle movement for accurate location readings.

Safety

- Do not place where spills can occur on the unit.
- Do not place the unit near a heating device.
- Do not place the unit in direct sunlight.
- Do not subject the unit to electrical shock.
- Do not pour liquid onto the unit.
- Do not apply any physical pressure to the unit.
- Do not place anything heavy on the unit.
- Do not leave any objects on top.
- Do not disassemble the unit or any of its components.
- Do not scratch, twist, hit, or push the surface of the LED.
- Do not use the unit when temperatures are below -40C or above 70C.
- Always use the designated AC or DC adapter provided with the unit to avoid the risk of fire or damage to this unit.
- Do not disassemble the unit or any component of the product.
- Use only power cables or antennas provided by Advanced Tracking Technologies, Inc.

Caring for the Shadow Tracker™ 2000

Occasionally the Shadow Tracker™ 2000 needs to be cleaned. Use the following precautions.

Cleaning of the Shadow Tracker™ 2000 unit

- Use a soft cloth to wipe the exterior.
- Do not use an alkaline detergent.
- Do not use alcohol on the unit case.
- Avoid excessive moisture when cleaning the unit.

Care of the antenna:

- Do not crimp or cut the GPS antenna cable.
- Do not place heavy objects on the antenna
- Do not pull on the antenna connections or connectors

SPECIFICATIONS AND FEATURES

Shadow Tracker™ 2000 at a glance

Height:	1.23 in.
Width:	3.50 in.
Length:	6.18 in.
Weight:	
Shadow Tracker™:	10.00 oz
Magnetic mount antenna for transceiver	12.40 oz
GPS Antenna	2.6 oz.
Current draw transmitting:	850ma @ 12v
Current draw receiving:	200ma @ 12v
Allowable voltage range:	9v to 18v DC
Normal operating voltage:	12v DC
Data download rate:	115K Baud
On board memory:	512K
Operating temperature range:	-20 to 70 C
Approximate data storage time:	1440 Hrs.
Line of Sight:*	Up to 20 mls
Frequency Range:	902-928 Mhz
System Requirements: Windows® 2000, ME, NT, 98 or 95, Pentium® 233 Mhz processor min., 32 MB Ram min. (64 MB recommended), 20 MB of free HD space, CD Rom, SVGA Monitor (17 in. Recommended), Win® compatible printer, 1 open 9 pin com port. Shadow Tracker™ V3.0 software.	

*With unity gain omnidirectional antenna. Ranges may be increased with varied antenna configurations, terrain and antenna heights.

Time-To-First-Fix

Satellite Acquisition State	Typical (minutes)	90% Probable (minutes)
Warm	0.03	0.4
Initialized	0.8	1.0
Cold	2.0	2.5
Frozen	(*)	(*)

Note that times are valid at 25 degrees Celsius with no satellite signal blockage. (*)= Frozen start is considered to be a recovery mode. An "out-of-the-box" board that has not operated for a significant amount of time (months) may approximate this state because the data in EEPROM may be valid but expired or partially complete.

Problem	Action
Unit LED does not turn Red or Green.	●Make sure the connection is made to the back of the unit.
Unit LED will not turn green. Unit is not receiving GPS signal.	●Check antenna connection ●Make sure the antenna cable is not crimped or cut . ●Reposition the antenna.



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