

STATE OF CALIFORNIA
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STANDARD OPERATING PROCEDURES
FOR
AIR QUALITY MONITORING

APPENDIX O

GLOBAL POSITIONING SYSTEM

MONITORING AND LABORATORY DIVISION

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TABLE OF CONTENTS

APPENDIX O

GLOBAL POSITIONING SYSTEM

	<u>Pages</u>	<u>Revision</u>	<u>Date</u>
O. GLOBAL POSITIONING SYSTEM	3	3	08-1-07
O.1 Introduction			
O.2 General Information			
O.3 Initial Fix & Use			

APPENDIX O
GLOBAL POSITIONING SYSTEM
FIGURES

Page

Figure O.1.1 GPS Display Screen and Control Panel 3

O.1 INTRODUCTION

As part of the Air Resources Board (ARB) ongoing program to pinpoint and validate the location of all air monitoring stations in California, the ARB has employed the use of Global Positioning Systems (GPS). The GPS is a portable, battery operated instrument capable of providing accurate latitude, longitude, and altitude data 24 hours a day. The Quality Assurance Section (QAS) verifies the site locations during field performance audits.

O.2 GENERAL INFORMATION

The GPS unit used by QAS is a Garmin GPS 12 Global Positioning System. This section will describe basic information and instructions that are important for the proper use. For more detailed information or instructions, refer to the operations and maintenance guide.

1. The GPS is an all weather, portable navigation device which receives satellite based radio signals to determine the time of day, position, distance from locations, speed of haul, direction and time of arrival at a destination.
2. The GPS is a twelve channel receiver that can track up to twelve satellites. In addition, the GPS can be set up in one of three transportation modes; land, sea, or air to optimize receiver dynamics for land, sea, or air navigation. The system will ensure worldwide operation with 24 hour coverage.
3. The GPS may take from one second to five minutes to gain the initial fix (connection with two or more satellites that project radio signals that are converted by the GPS to the latitude and longitude format) depending on the distance that the GPS has been moved since it was turned off. The GPS will update the position every second.
4. For best results, use the GPS in open areas away from objects that could disrupt or block the radio signals being emitted by the satellites.
5. Battery life: The GPS 12 operates on the use of 4 AA batteries and will provide up to 24 hours of continuous use. A battery level indicator can be found by navigating to the satellite page of the GPS, located to the left of the 'sky view'. Ensure batteries have a sufficient charge before use (at least 25% charge). If batteries have a low charge, they **MUST** be changed as accuracy is severely affected. Be sure to follow the polarity guide on the battery pack when inserting new batteries. Before removing the battery pack, ensure the unit has shut down.

WARNINGS: Improperly inserting the AA batteries in the battery pack will damage the internal memory of the GPS.

Prolonged exposure to direct sunlight may create very high internal temperatures which can reduce the life of the internal memory backup battery.

Always be sure the unit's power is off when connecting external power or changing the battery pack.

6. Altitude information is only accurate to within ± 500 feet.

O.3 INITIAL FIX & USE

The GPS provides fixes in either two-dimensional (2D) or three-dimensional (3D) position solutions. If the GPS is receiving signals from four or more satellites, it has a 3D fix and is accurate in latitude, longitude, and altitude. If the GPS is only receiving signals from three satellites, it will only be accurate in latitude and longitude. A 3D fix is the most desirable fix.

1. Stand adjacent to the air monitoring station's probe line and power GPS unit on by pressing the  key (see Figure O.1.1).
2. Navigate to the Satellite Page using the 'PAGE' or 'QUIT' keys (see Figure O.1.1).
3. Allow time for a fix to occur. The top of the screen will read 'ACQUIRING EPICENTER' while going through this fix (see Figure O.1.1).
4. Once the GPS has gone through this initial fix, it will display the latitude, longitude, and altitude values of the current position. These values can then be recorded onto the audit worksheets.



Figure O.1.1
GPS Display Screen and Control Panel