

PATHFINDER

VOL 10 ISSUE 1

JANUARY 2003

An informal newsletter produced for the GPS user community by Army PM GPS, Fort Monmouth, NJ. Information presented is based on published and submitted news items of interest to the general user. Widest dissemination and reproduction is encouraged. Newsworthy items are solicited for inclusion. Editor Mr. Don Mulligan at PM GPS, Ft Monmouth NJ DSN 992-6137 or (732) 532-6137 or email: Donald.Mulligan@iew.s.mnmouth.army.mil

The PATHFINDER can be found online at the PM GPS web page: <http://army-gps.robins.af.mil>

PM's Corner:

Hello GPS Users!

Have you heard either of these comments: "COMSEC, who needs COMSEC?" or "The President turned off COMSEC in the satellites so we don't need to key our PLGR anymore". Those are a couple of the urban myths floating around the Army and they are wrong, dead wrong.

Selective Availability was turned off back in 2000. That action had no impact on the need to use COMSEC for combat missions. The major article in this newsletter explains why you still need COMSEC keys. Okay, loading keys is not fun or easy but it's not that difficult and doing so could make a big difference on a mission – like helping you come home alive! Do not accept the bad advice of "we don't need COMSEC anymore". Truth is, you need it more than ever.

If you need more information you can reach my staff at the contacts listed in this issue.

LTC Skip Harborth

On the top, Rockwell-Collins employees, Joni McCloskey and Debbie Imhoff, package PLGRs at the Coralville Iowa production facility for shipment to US Military forces world-wide. On the bottom, US Army forces deployed overseas use PLGR for position location. Here Special Forces teammates Mark, Sean and Jessie take a breather between missions. Their team relies on a keyed PLGR for accuracy and anti-spoof protection.

WHERE PLGRS COME FROM...



WHERE PLGRS EARN THEIR KEEP...

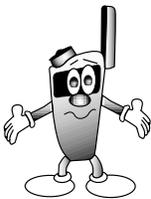


The GPS PLGR Team Acts To Support Deployment

Over the past 90 days, Army PM GPS has obtained Headquarters Dept. Army approval to purchase additional new PLGR for Army users. In a series of actions, PM GPS has purchased and shipped over 7,000 new PLGR from the manufacturer in Iowa to high priority units at a variety of locations. Another 2,400 are in-process right now.

This action alleviates the shortage of handheld GPS in high priority units but the Army-wide shortage of PLGR will persist until we begin fielding DAGR, the PLGR replacement, in FY04. At that time, PLGR will be collected and re-issued to backfill remaining equipment shortages. Ultimately we hope to see enough DAGR and PLGR in the field to meet the entire Army requirement for handheld/mounted GPS systems.

*POC Dennis Rotenberry at
DSN 992-6133.*



PLGR KEYS: FAILURE and DECEPTION:

If you had a choice, which would you prefer: PLGR Failure or Deception? Failure is better because if your

PLGR fails, you know it isn't working and you can immediately fall back on your alternate means of navigation, such as personal navigation skills using map & compass. Deception is worse because if your PLGR is deceiving you based on false signals, you may not realize it before you experience mission failure.

Failure and Deception translate to Jamming and Spoofing. This article talks about how they affect the GPS signal and what you can do about it.

Jamming can mess with the signal and cause your PLGR to "fail". Spoofing can be more devious by transmission of a false GPS signal. If your receiver accepts it, your position calculation will be off the mark. Over

time the error may get a lot worse before you realize something is wrong. There are obvious spoofers like the guy who interferes with the signal to create obvious problems (like ground speed when you are standing still). More dangerous is the sophisticated spoofer who plays with your head by transmitting a fake signal that slowly deviates your position data over time, delaying the point at which you realize something is wrong.

You may experience "accidental" jamming when you operate PLGR near a source of high power electronic emissions where a sudden change in receiver performance is obvious. On the battlefield you can expect intentional jamming, a fine EW tradition for over 50 years. Jamming will typically render a receiver inoperable for the lack of signals.

By contrast, you have probably not experienced spoofing. If we turned on a spoofer for a peacetime exercise we would risk interference with friendly users such as commercial aviation. On the battlefield, hostile spoofing might play out something like this: You are walking using the FIX mode. Every 15 minutes, when you turn the PLGR on, the POS display will be "off a little." Initially, you don't notice the difference when comparing the position display to your map and visual terrain association. If you are operating at night or under other low visibility conditions, this spoofing error could get a lot worse before you realize something is wrong. Suddenly you are in the wrong place at the wrong time!

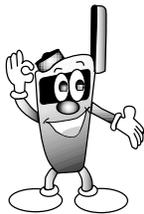
What can you do? Your single most effective defense against spoofing and jamming is to operate your Precise Positioning Service (PPS) receiver with current crypto-keys at all times! That' right, **KEY YOUR PLGR!**

But you ask "If President Clinton turned off intentional signal scrambling known as Selective Availability (SA) back in 2000, why do we need a crypto-key?" It is true that civil and military receivers provide similar accuracy in peacetime. But tests demonstrate a keyed PLGR is 50- 100% more accurate than an un-keyed PLGR

without Selective Availability. The more important point is this: The satellites still send out a "military code" signal that can only be read by a keyed PLGR. It is this special military code (known officially as "Y-code") that provides ANTI-SPOOFING protection! Without the crypto-key, your PLGR cannot read this code and turning off SA had no effect on this critical issue!

So you are expecting to go somewhere soon. Who might spoof on the battlefield? It is possible that the opposing force might obtain GPS spoofers from the "Axis of Evil toy store". We know the bad guys bought a lot of commercial GPS receivers so the good guys are going to employ measures to prevent those commercial sets from working properly. If your PLGR is not keyed, it isn't going to work properly either. Now do you understand the DoD Policy mandate: You shall use keyed PPS receivers for all combat and combat-related missions!

NOTE: Okay, we know there is a technology geek in every unit! Yes, you are correct, even a keyed PLGR initializes using the civilian GPS signal. This happens when the PLGR has been off for a while. The PLGR knows its satellite data is old and the satellites will not be where the old data says they are. Also, the internal PLGR clock is cheap to keep costs down and it will drift off if it is not kept current by actively tracking satellite signals. So, to help find the GPS satellites faster, the PLGR starts out using the civilian signal if it's been off for close to an hour. Once it gets good satellite data, the civilian signal hands off to the military Y-code signal in a KEYED PLGR. Then you are good to go.



So, what can you do to keep the PLGR "tight?" Here are our suggestions, in order of preference:

1. Leave one PLGR On in Continuous Mode the entire time you are in the field. This becomes the "Golden PLGR." Then, before each mission, connect the other PLGRs that were turned off to the Golden PLGR for a "Hot Start" to

transfer current position, satellite data, clock updates and the daily key to these PLGRs. If you don't have access to external power remember that 8 fresh L-91 AA batteries will last about 12-13 hours in Continuous Mode.

2. If no external power is available and you don't have enough batteries, then turn the "Golden PLGR" from Standby to On every hour just long enough to collect data updates (best to just wait for FOM=1) and then turn it back to Standby, never to Off. Remember to turn it on NLT 2345Z in order to get the next day's daily key.
3. No volunteer to stay up all night for the hourly PLGR update in solution 2? Then put the "Golden PLGR" in Automark Mode for a maximum interval of 30 minutes. It will come on, collect updated data and automatically go back to Standby. This 30-minute interval will insure the next day's key is collected.

THE BOTTOM LINE: Spoofing is a real danger. It can create confusion, disrupt Situational Awareness and cause GPS guided munitions to miss their target, maybe landing on you or some other location causing collateral damage. Worst case, a devious spoofer can drive you off course causing injury or death. Only a keyed receiver will provide anti-jam and anti-spoof protection!

FOOTNOTE: If you bought commercial GPS receivers to augment PLGR, beware of the severe risks associated with their use on the battlefield. Never use them for calling in critical position information. PLGR is your only authorized handheld PPS-rated receiver for combat. PLGR is a little bigger due to the built-in Battlefield Protection features but as this article has pointed out, a PLGR with crypto-key is your best protection against spoofing and jamming and the mission failure injury or death that could result from their effect on a commercial or un-keyed receiver!

NOTE: A detailed description of these issues can be found in the GPS Tutorial CD

ROM produced by the Defense Mapping School: It is available in the DLA supply system under limited distribution. NSN 7644-01-445-4559.

- Chapter 1; Basics - Screens 14 – 16 & 21 (4 screens; 10 minutes)
- Chapter 6; Survivability - Screens 5 to 16 (12 screens; 20 minutes)
- Chapter 8; Battlefield Ops - Screens 75 - 86 (7 screens; 15 minutes)
- Chapter 9; Battle Planning - Screens 3-5 (3 screens; 5 minutes)
- Chapter 2; Policies - Screens 2 & 6 (2 screens; 2 minutes)

You'll also find Electronic Counter-measures information in the PLGR Soldiers Guide, TB 11-5825-291-10-2, Section 23-24, and Section 6.1.2 of the PLGR O&M manual TM 11-5825-291-13. For information about loading keys, refer to PLGR O&M manual, page 3-66, para 3.6.3.1.

POC Tony Callanan at DSN 833-2914,
Willie Jackson at DSN 468-3518

Progress on Ground Based (GB) GRAM

We recently issued a draft Request for Proposal (RFP) through the CECOM Acquisition Center for the Ground Based GPS Receiver Applications Module (GB GRAM). This means we are now soliciting bids to produce "GPS on a card". GB GRAM is a full function next-generation GPS receiver that can be embedded within and operated by the input/output controls of a radio or any other electronic device. Over the next decade, GB GRAM will be used in communications and weapons platforms across DoD. The initial format is a Standard Serial Interface (SSI) card but we expect to see the commercial PCMCIA format come on line as well.

In some cases, the use of GB GRAM in a soldier-carried system (e.g. certain radios or Land Warrior equipment) will result in the elimination of a separate hand-held GPS

receiver such as today's PLGR. The current schedule calls for the delivery of "First Article Test" GB GRAM for testing this summer, followed by a production contract award and initial deliveries in FY04. GB GRAM is managed from our Los Angeles office.

*Mike Dash DSN 833-6505 or
Don Manlove at DSN 833-5536.*

PLGR Memory Battery

Recent reports from the field indicate that some users are not replacing the memory battery after 1 year, an important preventive maintenance action prescribed by the PLGR technical manual. A memory battery failure could result in the loss of critical data including the crypto variable key, satellite data and PLGR almanac. If the battery leaks, it will likely damage the PLGR. Since damage of this type is not covered by the warranty, the PLGR may be subject to the Deferred Maintenance Program described elsewhere in this newsletter. Replace your memory battery annually.

Here's a tip: When you replace the battery, carefully check the spring attached to the memory battery cover. Springs that were twisted out of alignment punctured the LS-14500 memory battery when it was reinstalled and this caused leakage and PLGR damage. You can bend the tip of the spring into proper form so that it holds the battery snugly in place.

*Willie Jackson at
Georgia Field Office DSN 468-3518*

Availability of Digital Maps

Authorized users can now obtain Digitized Raster Graphic maps on CD-ROM through the supply system. DRG are digital representations of paper graphic products that have been scanned into an electronic format and stored on CD-ROM. You can order a series of maps to cover a specific geographic region using the Regional Ordering Kit. The Richmond Map Facility at

the DLA Defense Supply Center Richmond (DSCR) has set up the following process for access to the CD ROMs containing these digital maps as follows:

Establish an account with the Richmond Map Facility (RMF): Do so by submitting an electronic DLA Form 1832 (form and instructions available at www.dscr.dla.mil/pc9). Your access will be limited to the custodian and alternate listed on the Form 1832.

Identify the desired maps or regional ordering kit by obtaining the CD catalog of NIMA maps. Get the e-catalog by contacting DSCR directly at 1-800 826-0342 or the Richmond Map Facility at DSN 695-6500 or visit the website listed above. Digital map catalogs cover all four NIMA products (topographic, aeronautical, hydrographic and digital): Classified Product map catalog: 7644-01-478-4791. Limited Distribution unclassified map catalog: 7644-01-478-4783.

Use that information to electronically submit your order through MILSTRIP/ FEDSTRIP procedures. To fully utilize the enhanced catalog ordering process, you should have a Web Requisitioning (WEBREQ) account that provides files to support the use of the E-catalog. You can get information about the WEBREQ at www.daas.dla.mil/daashome/daasc_webreq.htm

For DLA customer support call DSN 932-4725 or CML (616) 961-4725.

*POC Dennis Rotenberry at
Fort Monmouth, DSN 992-6133.*

PLGR Warranty Maintenance

First, disregard the warranty expiration label: If you are an Army user, your PLGR is still subject to free repair under extended warranty coverage! (The other branches of services have also extended repair support so USN and USAF users can also disregard original warranty dates).

Second, when a PLGR goes bad (fair wear and tear, an "accident", etc) immediately submit it for direct exchange at your DSU. If you don't have PLGR direct exchange support, return the PLGR to the vendor depot in Cedar Rapids IA. (NOTE: Other services have different return procedures so follow service-specific guidance). Broken PLGR do not repair themselves and only the manufacturer is authorized to open and repair a PLGR. Rockwell-Collins is doing a great job with an average Turn-Around Time (TAT) for warranty work of 3 to 5 days once a PLGR arrives at Cedar Rapids. Allow for your inbound and outbound package shipment transit times to determine the total maintenance cycle TAT from your location. If your replacement has not arrived by the end of that period (and you have not received a letter indicating your PLGR was subject to exclusion repair or deferred maintenance procedures), contact Army PM GPS at Fort Monmouth with your PLGR Serial Number; we can get a status on your repairs.

So if you have a PLGR that is not operating properly, use the TM checklist for any on-the-spot faults (batteries, battery terminal contacts, valid crypto key, remote cable connections, etc). If it is confirmed not working, follow the return procedures: See the July 2002 issue of PATHFINDER, Section 8.2 of the PLGR TM, or visit the GPS website.

*POC Dennis Rotenberry or
Suzanne Reinhardt Smith at
Ft Monmouth DSN 992-6133/5758.*

Update on the PLGR Deferred Maintenance Program

The Deferred Maintenance Program was created in 2001 in response to a shortage of Army depot funding. Here's an overview of the process as it affects Army field users. (NOTE this does not apply to other services).

Army PLGRs entering the repair cycle are identified as WARRANTY or WARRANTY

EXCLUSION repairs. Warranty repairs are quickly processed and the replacement PLGR is usually shipped within 5 working days (See PLGR Warranty Maintenance article elsewhere in this issue). Warranty exclusion repairs are subject to a second criteria: Is the owning unit above the cut-off point on the Army Order of Precedence (AOP) priority list? If "yes" your PLGR will be replaced, although not as fast as a warranty repair. If "no" your PLGR will not be repaired and it will not be returned to you. Instead it goes into the Deferred Maintenance Program. To date, over 1,300 PLGR have been taken out of service for lack of funding for lower priority units.

Here is what happens when a PLGR enters the Deferred Maintenance Program:

- a. PM GPS sends a notification letter to owning units.
- b. If you receive one of these letters, it is important that you follow the instructions to submit a requisition using the unique code provided in the letter! Requisitions submitted as part of the Deferred Maintenance Program must have this unique code and the correct quantity.
- c. PM GPS will coordinate with the CECOM Item Manager to verify your requisition and place you on the list used to fill these special requisitions as repair funds become available.

So, please take a few minutes to read the letter and follow the instructions carefully. When we receive incremental funding for the Deferred Maintenance Program we replace PLGRs using the specially-coded requisition list, starting with the oldest requisition.

POC Randy Robinson or
*Suzanne Reinhart-Smith at
Fort Monmouth, NJ DSN 992-6140/5758.*

PLGR Battery Alternatives

In case the BA-5800 main power battery (6135-01-440-7774) is hard-to-find, remember there are alternatives for powering your PLGR:

- 1) The AA cell battery holder (6160-01-385-4358) fits into the main power chamber in lieu of the BA-5800. The battery holder accommodates 8 AA cells which are easier to find in military and civilian stock but they won't have the same mission duration as a BA-5800. Check a current PLGR TM for the types of AA cells that can be used and their NSNs.
- 2) External power: If your mission allows for connecting PLGR to external power, e.g. a wheeled vehicle, you can use the remote power cable and other accessories to install PLGR. TACOM has official guidance on how to install PLGR to HMMWVs. (Details were provided in October 2001 PATHFINDER available at the GPS website). When you install PLGR to a vehicle you can still remove it for handheld use as long as you have AA cells or a rechargeable battery in the PLGR.
- 3) The Rockwell rechargeable battery is another option. Although CECOM plans to introduce a new rechargeable battery and charging stand system for PLGR, it is intended for the training environment. However, Rockwell Collins offers a unique Ni-Cad rechargeable battery built specifically for PLGR with the advantage of automatically maintaining charge while the PLGR is connected to external power. Look for NSN 6140-01-400-2902 or contact Rockwell directly at 1-800-321-2223 (Outside the USA call 319-295-5100). If you want recharging stands for the Rockwell battery, they are only available from Rockwell and range in price from \$206 to \$581 for stands that accommodate 1 to 6 batteries (same sources as for the battery).

An important reminder about battery safety: Due to the risk of explosion, DO NOT leave a BA-5800 battery in the PLGR when you connect it to external power.

*Jim Buggy at
Fort Monmouth, DSN 992-4733 and
Don Brockel at CECOM, DSN 992-4948.*

Land Navigation Skills Are Still Personal!

The primary article in this issue mentioned the fallback means of navigation when GPS fails. For the foot soldier we are talking basic Tactics, Techniques & Procedures (TTPs). Despite the advances of technology, every soldier needs to remain proficient in basic land navigation techniques. GPS is a great aid to navigation but it will never replace the Critical Tasks that you need for survival. Do not slack off on TTP training for terrain orienteering and map reading!

*Willie Jackson at Georgia,
DSN 468-3518, CML (478) 926-3518.*

PLGR Soldiers Guide

The PLGR Soldiers Guide was originally published in 1997 as an illustrated easy-reading supplement to the 492-page PLGR TM. It is oriented on PLGR features of interest to the typical hand-held user. Some of the data such as the references to Software Versions and NSN for batteries is now obsolete: Refer to a current TM for correct battery NSN and see the note on the back of this issue for current SW Versions. (You might want to pencil in this information to your copy of the Soldiers Guide).

Otherwise the PLGR Soldiers Guide is a useful tool for refresher training on the many features of the PLGR. You can requisition copies through unit pubs or USAF publication channels using TO-31R4-2PSN11-21. Alternatively, we have a limited number of copies available from the PM GPS office in Georgia or New Jersey.

*Willie Jackson at
Georgia, DSN 468-3518
or Darlene Phillips at FT Monmouth,
DSN 992-8406.*

GPS Signal Reception!

Here's a tip: If you suspect you are being jammed or spoofed, hold your PLGR close to the ground where it is more likely to be shielded from ground-based signals on the horizon yet still have clear access to the "true" satellite signals from space.

HOW TO CONTACT US

Los Angeles Office for PM GPS and Technical Management (TMD):
DSN 833-1459 CML (310) 363-1459.
Email: Donald.Rice@LOSANGELES.AF.MIL

New Jersey Office for Army Readiness Management (RMD):
DSN 992-4733 CML (732) 532-4733.
Email: James.Buggy@iew.s.monmouth.army.mil

Georgia Field Office (GFO) for Joint Service Sustainment::
DSN 468-3288 CML (478) 926-3288.
Email: Johnny.Walker@ROBINS.AF.MIL

The following note is included with all PLGRs returned from the warranty repair depot.

This PLGR was updated with a new Software Version 613-9544-009 or 613-9854-004 and is compatible with other PLGR SW versions that you may have. Do not return functional PLGR for SW upgrade. A schedule for Field Reprogramming of all PLGR is being developed.

Notice anything else different about your PLGR? It doesn't have a warranty expiration date anymore! Find out why and check out the "Pathfinder" GPS Newsletter at <http://army-gps.robins.af.mil>

Who To Call?

- For information about the Space and Control segments, GPS integration assistance and new product information, call TMD.
- For sustainment issues including software, supply, technical publications, accessory procurement and refresher training call GFO.
- For equipment authorizations, deferred maintenance, fielding, host vehicle installations and New Equipment Training call RMD.
- Not sure? Contact the Pathfinder editor via email address in this newsletter and we will route your question to the appropriate office for response.

ARMY Users: Have Current PLGR Software?

There are multiple versions of software for each version of PLGR in the field. All versions work the same with no impact on the user or integrations. If your PLGR displays one of these version numbers on start-up, you are "okay"

For Baseline II PLGR (most tan PLGR):

613-9854-003 or **613-9854-004**

For Baseline III or above PLGR (most green PLGR):

613-9544-008 or **613-9544-009**

NOTE 1: Units operating PLGR+96 software for the Laser Rangefinder System should be using software version **613-9868-006**

So check your PLGR! If it displays any other version number, contact your service system manager to determine which SW fits your hardware:

Army: Ed McAuley at (732) 532-6136 DSN 992-6136

Navy: Kristin Stith at (619) 524-7763 DSN 524-7763

USAF: Diana Wright at (478) 926-5096 DSN 468-5096

USMC: Matt Brandt at (703) 784-0906 DSN 278-0906

PM GPS
ATTN SFAE-IEWS-NS-GPS
Bldg 563
Fort Monmouth, NJ 07703

ACCT #89

FIRST CLASS