



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

OCT -4 2006

In Reply  
Refer To: 130S-06-578

**Transport Airplane Directorate  
Aircraft Certification Service**

1601 Lind Avenue S.W.  
Renton, Washington 98055-4056

Ms. Colleen M. Portch  
Certification Services Administrator  
Honeywell International, Inc.  
15001 N.E. 36<sup>th</sup> Street  
Redmond, WA 98052

Receive  
**OCT 5 - 2006**  
Certification Department

Dear Ms. Portch:

**Subject: Technical Standard Order (TSO) Authorization for TSO C92c, TSO C151b, and TSO C117a for the Honeywell MK V and MK VII Enhanced Ground Proximity Warning Computer (EGPWC) and Authorization for TSO C129a for the Honeywell MK V and MK VII EGPWC Global Navigation Satellite Sensor Unit (GNSSU)**

We received your letters 06FAA095, dated September 25, 2006, and 06FAA109, dated October 3, 2006, in which you certified that a major change to the EGPWC constitutes a change in EGPWC function resulting in new part numbers. You also certified that the new MK V and MK VII EGPWC part numbers listed below meet the applicable requirements of TSO-C92c, TSO-C117a, and TSO-C151b Class A and the new MK V and MK VII EGPWC/GNSSU part numbers listed below meet the applicable requirements of TSO-C129a Class C3 and are in conformance with Title 14 Code of Federal Regulations (CFR) part 21, subpart O.

EGPWC Type	Unique Characteristics	Certification Baseline	New Part Number
MK V	115 VAC, -40°C, no GPS	965-0976-003-224-224 (ref: 960-0329-025)	965-0976-003-226-226 (ref: 960-0329-026)
MK V	115 VAC, -40°C, Internal GPS Receiver	965-0976-020-224-224 (ref: 960-0336-012)	965-0976-020-226-226 (ref: 960-0336-013)
MK V	28 VDC, -55°C, no GPS	965-0976-040-224-224 (ref: 960-0335-020)	965-0976-040-226-226 (ref: 960-0335-021)
MK V	115 VAC, -40°C, w/Mercury GNSSU	965-0976-060-224-224 (ref: 960-0337-008)	965-0976-060-226-226 (ref: 960-0337-009)
MK V	115 VAC, -40°C, no GPS	965-1676-002	965-1676-003
MK VII	115 VAC, -40°C, no GPS	965-1076-001-224-224 (ref: 960-2226-015)	965-1076-001-226-226 (ref: 960-2226-016)
MK VII	115 VAC, -40°C, w/Express GPS	965-1076-020-224-224 (ref: 960-2225-013)	965-1076-020-226-226 (ref: 960-2225-014)
MK VII	28 VDC, -40°C, w/Express GPS	965-1076-030-224-224 (ref: 960-2230-009)	965-1076-030-226-226 (ref: 960-2230-010)

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EGPWC Type	Unique Characteristics	Certification Baseline	New Part Number
MK VII	28 VDC, -55°C, no GPS	965-1076-040-224-224 (ref: 960-2224-015)	965-1076-040-226-226 (ref: 960-2224-016)
MK VII	115 VAC, -40°C, w/Mercury GNSSL	965-1076-060-224-224 (ref: 960-2233-008)	965-1076-060-226-226 (ref: 960-2233-009)

The Federal Aviation Administration (FAA) confirms your certification is in conformance with 14 CFR part 21, subpart O, as described in your letter. Your quality control manual has been previously approved by the FAA and is on file in the Seattle Manufacturing District Office (ANM-108S).

Honeywell requested two deviations as described below:

- Mode 1 Deviation from the TSO-C151b standard for height above terrain:**  
The major change listed in the Plan for Software Aspects of Certification will place the lower height above terrain cut-off of the Mode 1 curve higher than that specified for the Mode 1, Envelope 3 curve in RTCA/DO-161A Minimum Performance Standards – Airborne Ground Proximity Warning Equipment, dated May 27, 1976. The revised Mode 1 envelope meets or exceeds the requirements of DO-161A with the exception that the lower cut-off height is raised from 10 feet to 130 feet (the lower cut-off of DO 161A, Mode 1, Envelope 3 is 50±10 feet. The Steep Approach Mode 1 envelope will only be active when the flight crew activates a dedicated steep approach switch in the flight deck, and the aircraft is in a configuration to allow a steep approach (slats/flaps, gear and speed brakes in appropriate positions.) When the steep approach switch is activated, the Mode 1 alert curve is modified so that no new alerts will be provided below 130 feet of height above terrain.
- Mode 2A Deviation:**  
TSO-C151b identifies RTCA DO-161A as the minimum operational performance standard for the equipment. DO-161A specifies in paragraph 2.1.2 and Appendix A page 4, a dynamic envelope of 1250 feet to 1050 feet above ground level (AGL) in Mode 2A conditions. Honeywell requested a deviation to reduce the Mode 2A maximum altitude from 1250 to 950 feet. The deviation only affects Excessive Closure Rate to Terrain and is activated only under a defined set of conditions that ensure that Terrain Awareness and Warning System (TAWS) functions provide terrain avoidance protection.

The Seattle Aircraft Certification Office (SACO) reviewed the deviation request and forwarded it to FAA Headquarters for concurrence via SACO memorandum 130S-06-460, dated August 21, 2006. Concurrence was provided via the enclosed AIR-130 memorandum, dated September 15, 2006.

The manufacturer must put specific details of deviations granted that result in operational or installation limitations into their installation manual (IM) and/or component maintenance

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manual (CMM) for continued airworthiness concerns for articles that may be used in other applications. The details of these deviations should be sufficiently described such that any functional differences resulting from the deviation are fully described.

The MK V and MK VII EGPWC meet the performance standards for TSO-C92c, TSO-C117a, and TSO-151b, Class A equipment. In addition, the MK V and MK VII EGPWC/GNSSU's meet the performance standards for TSO-C129a, Class 3. The data received with your letters to support this application has been reviewed and added to our files.

We acknowledge receipt of the FAA Form 8110-3, signed by Designated Engineering Representative (DER) E. Mannisto, which was submitted approving the Software Accomplishment Summary and other related data for this application.

Effective this date, you are authorized to use TSO procedures as prescribed by of 14 CFR part 21, subpart O and to identify the MK V and MK VII Enhanced Ground Proximity Warning Computer for the referenced part numbers above, with the applicable TSO markings as required by TSO-C92c, TSO-C117a, and TSO-C151b. You are also authorized to identify the MK V and MK VII with Mercury GNSSU's, part numbers 965-0976-060-226-226 and 965-1076-060-226-226 respectively, with the applicable markings as required by TSO C129a, Class C3.

Additional non-TSO functions contained in this article are:

Non-TSO Function(s)	Performance Requirements
<p><b>Runway Awareness Advisories</b> - This feature uses global positioning system (GPS) position data and the EGPWS Database to provide aural advisories that supplement flight crew awareness of position during ground operations and on approach to landing.</p>	<p>System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B</p>
<p><b>Military Basic Modes</b> - Options have been implemented to support military tactical operations. These modes are aircraft specific, and although similar in function to the Air Transport Minimum Operational Performance Standard (MOPS) requirements, they deviate from the MOPS for military applications when a unique tactical input discrete is configured as part of the aircraft type and selected by the pilot.</p>	<p>System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B</p>
<p><b>Tactical Military Mode 3</b> - The Tactical Mode 3 Altitude Loss Detection warning is based upon a significant barometric altitude loss, relative to a signal indicative of an accumulated time-altitude product after takeoff or go-around.</p>	<p>System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B</p>

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Non-TSO Function(s)	Performance Requirements
<b>Speed Brake Alert (KC-135)</b> – A “Speed Brake” voice alert is issued if enabled via configuration and speed brakes are deployed while flying below 1000 AGL.	System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B
<b>Improper Flap Position</b> – A “Flap Flap” voice alert is issued if enabled via configuration and the flaps are in the incorrect position during take-off roll.	System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B
<b>Carrier Qualified Control Logic</b> – Carrier operations require unique mode control to enable the modes to function properly for this type of operation. Specific mode and control logic is implemented and active when enabled via configuration.	System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B
<b>Pitch Limit Indicator (PLI)</b> – When enabled via configuration, the PLI continuously displays the aircraft's current angle of attack relative to the onset of stick shaker. This information helps the pilot correctly manage aircraft energy (potential vs. kinetic) during critical portions of flight such as windshear and ground proximity recovery maneuvers.	System Requirement Document for the Enhanced Ground Proximity Warning Computer, Document Number 993-0976-318, Rev B

The statement of conformance for functional performance at the equipment level, as well as the hardware and software design assurance, and environmental qualification for the non-TSO function(s) is also accepted on a non-interference basis. The applicable Installation Manual contains the information on the non-TSO function(s) necessary to support installation approval.

Your Quality Control System, as defined in your Quality Control Manual, Quality Assurance Manual Policy/Procedure, Revision A, May 1, 2006, Index ID #17315, is considered satisfactory for production of this article.

The MK V and MK VII EGPWC engineering development and design is located at:

Honeywell International Inc.  
1500 N.E. 36<sup>th</sup> Street  
Redmond, WA 98052

The MK V and MK VII EGPWC Production Approval Holder will be:

Honeywell International Inc.  
21111 N. 19<sup>th</sup> Avenue  
Phoenix, AZ 85027

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As required by the TSO, the following statement must be furnished with each manufactured unit:

"The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in all aircraft. The article may be installed only if performed under 14 CFR Part 43 or the applicable airworthiness requirements."

This authorization is not transferable to another person or location and is effective until surrendered, withdrawn, or otherwise terminated by the Administrator.

Please note that technical data retained by the FAA may be subject to the Freedom of Information Act (FOIA) request. As such, this office will notify you of all such requests pertaining to your data and afford you the opportunity to contest the release of the data.

This authorization pertains only to the manufacturing operations at the above address and this office must be notified in advance of any proposed relocation.

Since I am very much interested in the service we provide to the aviation community and the general public, it would be helpful if you would provide your thoughts and comments regarding how the approval process went. To gather this information, we have enclosed a short survey (with a self-addressed, stamped envelope) that I hope you will fill out and return. You will note that the return envelope is addressed to me. You may rest assured that your comments will receive my full attention and that I will hold your comments in strict confidence, should you request I do so. Please note that this customer service survey is common to all Aircraft Certification Offices within the FAA's Aircraft Certification Service and is aimed at enabling the Aircraft Certification Service to deliver the best services to each of our customers.

If you have any questions, please contact Mr. Patrice Adjiby of the Systems and Equipment Branch at telephone (425) 917-6459.

Sincerely,



Jeffrey E. Duven  
Manager, Seattle Aircraft  
Certification Office

2 Enclosures

