FAA-E-2745
November 2, 1983

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
SPECIFICATION

Peak Detector, Glide Slope, AN/GRN-27 Replacement

1. SCOPE

1.1 Scope.- The equipment specified herein is a solid state linear peak detector, designed to operate over the frequency range of 329.0 to 335.0 MHz as a "drop-in" replacement for the existing glide slope peak detector, including the DC-DC converter in the FAA AN/GRN-27(V). It will provide a detected audio signal to the monitor input proportional to the detector input and shall be required to operate and interface physically and electronically with existing associated equipment without any change required to this equipment.

2. APPLICABLE DOCUMENTS

2.1 FAA Documents.- The following FAA specifications and directive of the issues specified in the invitations for bids or requests for proposals, form a part of this specification:

FAA-G-2100, Electronic Equipment, General Requirements
FAA-STD-013, Quality Program Requirements
Order 1320.33, Equipment Modification and Facility Instruction Directives

2.2 Military Specification.- The following military specification of the issues in effect on the date of the invitation for bids or requests for proposals, form a part of this specification and is applicable to the extent specified herein: MIL-E-17555, Electronic And Electrical Equipment And Associated Repair Parts, Preparation For Delivery Of; MIL-HDBK-217, Reliability Stress and Failure Rate Data for Electronic Equipment.

(Copies of this specification and other applicable FAA specifications, standards and directives may be obtained from the Contracting Officer in the FAA office issuing the invitation for bids or requests for proposals. Requests should fully identify materials desired, i.e., specification, standard, amendment, and dates. Requests should cite the invitation for bids, requests for proposals or the contract involved or other use to be made of the requested material.)

(Single copies of military standards and specifications may be requested by mail or telephone from the U.S. Naval Supply Depot, 5810 Tabor Avenue, Philadelphia, Pennsylvania 19120, telephone number (215) 697-3321. Applicable invitation for bids or contract number should be cited.)

3. REQUIREMENTS

3.1 Equipment to be furnished by the contractor.- Each linear peak detector furnished by the contractor shall be complete in accordance with all specifications documents. In addition, the contractor shall furnish equipment GRN-27 modification instructions for FAA use and revise existing (TI 6750.69A and 6750.70A) instruction book manuscript pages for FAA use in accordance with Order 1320.33.

3.2 General system requirements.- Equipment furnished herein shall meet the requirements of this specification and the requirements of specification FAA-G-2100. In the event of conflict, the requirements of this specification shall take precedence over the requirements of the general specification.

3.3 Ambient conditions.- The ambient conditions for the system detector shall be those of Environment III (FAA-G-2100), except for wind and ice loading.

3.4 Input impedance.- The design center input impedance of the detector assembly shall be 50 ohms. The input VSWR shall not exceed 1.2 over the specified frequency range.

3.5 Frequency range.- The equipment specified herein shall operate over the frequency band 329.0 MHz to 335.0 MHz without adjustments for frequency.

3.6 Power source.- The equipment shall operate from a nominal 28 VDC power source with a load current not to exceed 100 milliamperes.

3.7 Detector load.- The detector shall be designed to operate with existing monitors.

3.8 Sensitivity.- This equipment shall be designed to operate throughout the input range of .002 milliwatt to 20 milliwatts, amplitude modulated simultaneously by the following modulating signals or any ratio thereof, provided the arithmetic sum of the modulation percentages does not exceed 95 percent:

1) 90 Hz AM
   - 0 to 95%
2) 150 Hz AM
   - 0 to 95%

3.9 Voltage transformation.- With the detector output terminated per 3.7 and an RF input signal in the range from .002 milliwatt to 20 milliwatt, it shall be possible to adjust the detector input for a detector output level of 600 millivolt dc. With an RF input signal anywhere within the specified range level, from .002 milliwatt to 20 milliwatt modulated to a depth of 90 percent at 150 Hz, the detected audio output shall be at least 0.81 volt p-p.

3.10 Harmonic distortion.- The harmonic distortion at 90 Hz shall not exceed 10 percent with the RF signal modulated to a modulation depth of 95 percent.

3.11 Audio frequency response.- With the detector output terminated per 3.7 and with input RF carrier signals over the range of paragraph 3.8, and total modulation percentage in the range of 0 to 80 percentage (with equal modulation percentages for the 90 Hz and 150 Hz components), the response of the 90 Hz and 150 Hz components in the output circuit of the detector shall be within 0.1 dB of each other.

3.12 RF frequency response.- For any given input level of RF signals over the specified range, the RF response of the detector over the frequency range of paragraph 3.5 shall be within 2.0 dB.

3.13 Composite audio output level stability.- With a constant input within the range of paragraph 3.8, the level of the combined 90/150 Hz output signal from the detector shall not vary more than 0.2 dB over the service conditions of paragraph 3.3. For test purposes, measurement shall be permitted to be made with an RF carrier signal (3.8) modulated with either 90 or 150 Hz to a modulation depth of 80 percentage.

3.14 D.C. output level stability.- With a constant RF carrier input within the range of paragraph 3.8 and with DC input voltage variation from 22 to 35 VDC, the rectified carrier output level shall not vary more than 0.3 dB over the service conditions of paragraph 3.3.

3.15 Protection against stray radiation.- The specification requirements of paragraph 3.11 and 3.12 shall be met with the detector assembly as installed with associated equipment and operating in an RF field strength of 1.0 volts per meter produced by a standard glide slope signal with the same RF frequency as the signal being monitored.

3.16 Detector heater system.- In order to comply with all specification requirements, at his option, the contractor may provide a heater system, to apply uniform heat to the detector for a nominal temperature in the order of up to 120°F when the outside environment permits. If provided, the heater system shall consist of a thermostatically controlled heater mounted inside the detector assembly. Provisions shall be made so that the heater element can be readily replaced in the field. Provisions shall also be made to shut off the voltage supply to the heater element in the event of a failure in the heater controller.

3.17 Construction.- The overall dimensions, mounting provisions and input and output terminals shall be such that the detector assembly can directly replace the GRN-27 glide slope peak detector assembly including, if applicable, the heating system. The detector assembly shall have a removable cover plate to permit access to the circuitry for maintenance. The electronic components shall be mounted on a PCB removable from the detector assembly. It shall be possible to remove and replace this PCB within 15 minutes in the field.

3.18 Reliability.- The computed failure rate for the peak detector specified herein shall not exceed 0.6 failures per million hours. A reliability analysis shall be performed according to the techniques and data of MIL-HDBK-217 to show compliance.

3.19 Fail-safe design.- The peak detector shall be fail-safe, i.e., the failure of any component shall result directly in the loss of the output signal or shall not permit a change of the output signal which would, in effect, allow an expanded tolerance for any system parameter.

3.20 Nameplate.- A nameplate, in accordance with 3.10 of FAA-G-2100 shall be furnished on each detector. The nameplate title shall be GLIDE SLOPE MONITOR DETECTOR.

4. QUALITY ASSURANCE PROVISIONS

4.1 General.- The contractor shall establish and maintain a quality control program in accordance with FAA-STD-013. Quality assurance provisions specified in paragraph 4 through 4.11 of FAA-G-2100 shall apply.

4.2 Design qualification tests.- In addition to the tests specified in FAA-G-2100, the following design qualification tests shall be conducted.

4.2.1 Design qualification tests under normal test condition.- The following tests shall be conducted under normal test conditions (FAA-G-2100).

Paragraph	Test
3.15 (332 MHz)	Protection against stray radiation
3.17	Interface suitability
3.19	Fail-safe design

4.3 Type tests under the service conditions.- The tests listed in the following tabulation shall be conducted while subjecting the equipment to the test procedures described in FAA-G-2100.

Paragraph	Test
3.13 (332 MHz and 1 mw)	Composite Audio Output Level Stability
3.14 (332 MHz and 1 mw)	D.C. Output Level Stability

4.4 Type tests under normal test conditions.- The tests listed in the following tabulation shall be conducted under normal test conditions.

Paragraph	Test
3.10 (332 MHz)	Harmonic Distortion
3.11 (332 MHz)	Audio Frequency Response
3.12 (329, 332 and 335 MHz)	RF Frequency Response

4.5 Production tests.- The tests listed in the following tabulation shall be conducted on each equipment under normal test conditions:

Paragraph	Test
3.4 (329, 332 and 335 MHz)	Input Impedance
3.8 (329, 332 and 335 MHz)	Sensitivity
3.9 (.002 mw, 20 mw, 332 MHz)	Voltage Transformation
3.16	Detector Heater System (if required)

5. PREPARATION FOR DELIVERY

5.1 General.- Unless otherwise specified in the contract, the equipment shall be prepared for domestic shipment in accordance with the following paragraphs.

5.2 Packaging.- Packaging shall be in accordance with Specification MIL-E-17555, Level A, Method II.

5.3 Packing.- Packing shall be in accordance with Specification MIL-E-17555, Level B.

5.4 Marking.- Each package and shipping container shall be durably and legibly marked with the following information:

Name of Item and FA Type Designation
Serial Number(s)
Quantity
Contract Number
Federal Stock Number
Gross Weight of Container
Manufacturer's Name

6. NOTES