ALA-52B
RADIO ALTIMETER

Air Transport and Regional Technical Summary

Honeywell

ALA-52B RADIO ALTIMETER

The ALA-52B Radio Altimeter (RALT), designed and manufactured by Honeywell Aerospace, is part of the Quantum™ line of communications and navigation equipment. The ALA-52B RALT, a lightweight, solid-state, airborne altimeter, provides accurate digital height measurements above terrain during aircraft approach, landing, and climb-out phases. The operating range is –20 feet to +8000 feet.

The ALA-52B has recently been upgraded with new hardware and software to provide enhanced reliability and improved robustness to external signal leakage or direct coupling of TX and RX signals. Leveraging the all new Radio Altimeter developed for the Boeing 787, Honeywell has ported the new fully-digital RF module design over to the ALA-52B.

ALA-52B RALT TECHNOLOGY ADVANTAGE

The ALA-52B RALT contains fault memory and provides built-in test equipment (BITE) interfaces for use in a Central Maintenance Computer (CMC) or in a Centralized Fault Display System (CFDS) in compliance with ARINC 604 and Airbus Industrie ABD-0048.

The ALA-52B RALT requires two antennas; one for transmitting and one for receiving the RF signals, and a multifunction or dedicated indicator for display of altitude information.

The key features of the ALA-52B RALT are listed below:

- 4.2 GHz to 4.4 GHz operation
- Range: -20 to +8,000 feet (-6,1 to 2438 metres)
- Accuracy: ± 1.5 feet (0,46 metres) or 2%
- Transmit Power: 1 Watts (nominal)
- 3 MCU form factor (ARINC 600)
- ARINC 429 Tuning Interface
- CMC/CFDS Maintenance System Interface
- 200 millisecond Power Interrupt transparency
- DO-160C Environmental Test compliant
- High Intensity Radiated Fields (HIRF) protection
- Lightning protection
- 18 0 minute ETOPS cooling
- Front Panel LCD Display
- PCMCIA “Flash Memory” Interface
- RS-232 PC maintenance port

TROUBLESHOOTING AND MAINTENANCE

What uniquely distinguishes the ALA-52B RALT from similar products is the LCD (Liquid Crystal Display) located on the front panel. This provides part number, software version and detailed troubleshooting and maintenance information in plain English. Self-test is initiated and detailed troubleshooting can be performed by simply pushing one of two buttons located on the front panel.

Maintenance personnel can review the status of discrete inputs to the unit, verify tuning words, and review fault history (up to 64 flight legs are stored in non-volatile memory) – again, all at the push of a button.

Software loading is also simplified by the use of the built-in PCMCIA card interface, also located on the front panel. The software loads in a fraction of the time compared to legacy systems, and only a single flash memory card is needed instead of the traditional handful of floppy disks.

RELIABILITY

The ALA-52B was designed as part of the Honeywell radio range to overcome reliability issues encountered with older ARINC 707 type radio equipment:

- Reduce parts count by 25%
- Reduce interconnections by 33%
- Increase MTBF (Mean Time Between Failures) by 50%

An integrated product design team, consisting of representatives from all departments including engineering, materials, manufacturing, test, product support and marketing, worked together to ensure that goals were not only met but also exceeded. The ALA-52B has 30% fewer parts than previous designs. A higher level of component integration resulted in only five modules being used in the ALA-52B, versus eleven modules in older designs. Fewer modules mean fewer interconnections, eliminating motherboards and extra ribbon cables.

The ALA-52B was subjected to HALT (Highly Accelerated Life Testing), during which the radio was tested at temperatures well beyond normal operating extremes and also exposed to vibration levels beyond those specified in RTCA DO-160C. This comprehensive testing was done in order to evaluate the robustness of the design and determine areas for improvement. In production, each ALA-52B also undergoes HASS (Highly Accelerated Stress Screening) testing. The levels are slightly lower than those established during HALT testing to avoid damaging the radio, but still high enough to ensure solder defects, component defects, and process problems are found and subsequently eliminated.

So what does this mean for the end user?

- Fewer parts and reduced interconnections mean there is less likelihood of component failures in the unit.
- HALT testing proves that the ALA-52B can withstand extremes beyond those seen in normal operation.
- HASS testing in accordance with ISO 9001 procedures ensures a high-quality, high-reliability product, which in turn means that the ALA-52B will stay on the aircraft for a longer period of time – in fact, the warranted MTBF for the radio is 30,000 hours. Data collected from airlines indicates the ALA-52B will far exceed this goal.

WARRANTY

To back up the warranted MTBF of 30,000 hours, the ALA-52B also comes with a three (3) year warranty as standard, which means the radio is “fit and forget”. Should repairs be necessary, the simple modular approach ensures rapid turn-around repair times.

ALA-52B RALT PRODUCT SPECIFICATION	
GENERAL	
Form Factor	3 MCU (ARINC 600)
Weight	8.6 lbs. (3.9 kg)
Power Requirements	115 Vac, 380 to 420 Hz
Cooling	Forced Air per ARINC Specification 600
Temperature (Operating)	55°C to +70°C (-67°F to +158°F)
Temperature (Storage)	-65°C to +85°C (-85°F to +185°F)
Warm-up period	Stable operation within six seconds after application of power
Frequency Range	4.2 GHz to 4.4 GHz
Frequency Control	ARINC 429 MARK 33 (Serial Digital)
Output Power	1 watts (Nominal)
Operating Range	-20 to +8000 feet (-6,1 to 2438 metres)
Accuracy	± 1.5 feet (± 0,46 metres) or 2%, whichever is greater
Data Outputs	ARINC 429 Range, ARINC 604 and ABD-0048 BITE, ARINC 615 Data Loader with growth capability for analogue outputs
Aircraft Installation Delays	40, 57, 80 feet
Pitch Limits	± 20°
Roll Limits	± 40°
Doppler Error	Compensated using dual-slope FM ramp
Self-Test	Automatic in-flight; manual from discrete input, ARINC 429, or front panel
Integrity Monitoring	Continuous self-monitoring establishes operations status at all altitudes
Certification	TSO C87; DO-160C Categories /A2D2/ZBA/MNB/ XXXXXXAEAEZYZ/XXE2/XX DO-155, DO-178B, EUROCAE ED-14C & ED-30

ALA-52B Radio Altimeter

SUMMARY

Honeywell's ALA-52B RALT was designed to the following standards and specifications:

- ARINC 707-6 "Airborne Radio Altimeter (RALT)"
- RTCA DO-155 "Minimum Operational Performance Standards (MOPS) for Airborne Low-Range Radio Altimeters"
- EUROCAE ED-30 "Minimum Performance Specification for Airborne Low-Range Radio (Radar) Altimeter Equipment"

The ALA-52B RALT is also a very highly-reliable product having easy access to troubleshooting and maintenance with a 3 year warranty.

ABBREVIATIONS	
BITE	Built In Test Equipment
CMC	Central Maintenance Computer
CFDS	Central Fault Display System
ETOPS	Extended Operations
HALT	Highly Accelerated Life Testing
HASS	Highly Accelerated Stress Screening
HIRF	High Intensity Radiated Fields
LCD	Liquid Crystal Display
PCMCIA	Personal Computer Memory Card International Association
RALT	Radio Altimeter

For more information

For more information on Honeywell's ALA-52B RALT, please contact your Honeywell sales representative or call:
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N61-3092-000-000 I 03/22

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