Volume 8 Issue 3 July 2003

Approach

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SERVICE INFORMATION LETTER

MEGGITT AVIONICS
S-TEC

Inside This Issue

Bill Shields x243
Director, Flight Engineering

As a method of improving communication between Meggitt Avionics / S-TEC and our dealers, we wish to introduce to you the first "Service Information Letter". A copy was mailed to you several weeks ago. It is intended to be used "For Reference Only" - Not FAA Approved Data".

We will continue to provide these Service Information Letters to you, so that we can inform you of specific issues regarding S-TEC Autopilots.

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SERVICE INFORMATION LETTER

NO. SIL 03-001
DATE: 05-05-03

TO: All MEGGITT S-TEC Dealers

FROM: Director of Flight Engineering

SUBJECT: Avionics Equipment with High Density Interface Connectors

A. Reported Condition

Intermittent operation of avionics equipment during normal flight conditions.

B. Potential Cause

Unit is not is not fully seated in its mounting tray or rack. This may be due to improper installation of the tray/rack, its interface connector, or the unit.

C. Background

As avionics equipment technology becomes more advanced, several trends have occurred.

Since there have been no recent changes to basic cockpit design, only limited changes can be made to equipment package design. Traditional high end equipment tends to be remote-mounted, offering interfaces and features not typically available in panel-mounted equipment. However, such capabilities are becoming available in newer panel-mounted equipment at an affordable cost, but can quickly overwhelm aircraft panel space. In retrofit applications, when installing new equipment that incorporates the latest safety and flight enhancing technology, there are options that allow for selected legacy equipment to remain in the panel. In new aircraft installation applications, the original equipment manufacturer (OEM) generally strives to offer the most complete suite of equipment possible, in order to ensure a competitive advantage in the marketplace. Such equipment is factory installed.

Consequently there must be installation flexibility, which places the associated design burden onto new equipment being developed. To allow for interfacing with various other aircraft systems, the input and output requirements of new equipment is increasing. To minimize the required panel space, design effort is expended to maximize human factors (knobs, buttons, displays, etc.). To maximize functional capability, design effort is expended to include all required input and output parameters. As a result, there tends to be the design conflict of space versus capability .

To support the numerous input and output parameters required, high density interface connectors are used which have a large pin distribution. They may be located on either the front or rear of remote-mounted equipment, and employ the turn-click-positive locking system. However, panel-mounted equipment cannot support an optional connector located on the front, and so must rely on a rear connector. In addition, the use of a turn-click-positive connector is restricted due to the necessity of rear access, small package dimensions, and a locking mechanism. These limitations require that a panel-mounted unit slide into a panel-mounted tray, such that connector seating is achieved when the unit is completely installed into the tray. Connections between aircraft and unit rely on proper seating.

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MEGGITT
MEGGITT AVIONICS / S-TEC

COUPLERS VS. TRACKERS
REVISITED

There are two types of radio signal tracking systems used in General Aviation Autopilots - trackers and couplers. Confusion about the difference in how they fly the airplane often leads to pilots being unhappy with their performance.

The basic difference is that a coupler can intercept a course and then track it. A tracker must be put on the course by the pilot, either with manual or autopilot commands, before it can track the signal. Intercepting a course is a function of the Directional Gyro (DG), part of a system which has a coupler. Systems without Heading Bug equipped DG's have trackers.

RADIO COUPLERS

In order to intercept a navigation course (VOR/LOC/GPS) line of position you must know two things: (1) the direction of the desired course and, (2) direction of the aircraft relative to that course. Private pilot VOR orientation instruction covers it best. To intercept and navigate a specific course, such as an airway to the station, move the OBS to select the course direction with a To indication, then turn the aircraft to that heading and observe whether the CDI needle is displaced Left or Right. Turn toward the displaced needle 45°, the intercept angle. As the needle centers reduce the intercept angle so that the heading of the aircraft and the course are the same with a centered needle.

With the bearing (course) and aircraft heading information you can intercept and then track the course. An autopilot with a radio coupler uses a Directional Gyro in the same way.

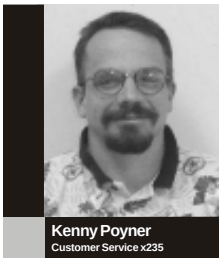
The HDG information is provided by the position of the HDG Bug, relative to the Lubber Line on the DG. The autopilot determines the position of the Bug by virtue of the voltage amplitude, or sometimes the phase relationship of the Bug position to the zero point, or Lubber Line position. The signal is mixed with the L-R signal in a way that causes the intercept angle to diminish to zero as the aircraft intercepts the desired course.

After course intercept is complete, cross wind correction logic is employed to change the aircraft heading, in small increments, to correct any tendency to drift caused by a cross wind. Once a coupler equipped system has intercepted the course line and the gain has automatically reduced to Cap-Soft and Soft conditions, they are trackers with the HDG information washed out. If the cross wind is very strong and the correction angle increases to approximately 31°, the DG signal is reinstated and a reintercept made.

With a DG equipped system, the HDG Bug thus becomes the course datum input to the autopilot while the L-R radio information indicates our position relative to the desired course line. With an HSI (Horizontal Situation Indicator) the course datum information for the autopilot is typically provided by a synchro or potentiometer output connected to the OBS needle instead of the HDG Bug. Because of the separate OBS output, the Bug is only used for HDG in an HSI, which allows for selected angle intercepts.

Continued on page 4

INSTALLATION SECRETS
DG & HSI Compatibility Guide



Number one on the S-TEC technical support priority list is our availability to assist S-TEC dealers with the answers to installation and maintenance questions on S-TEC autopilots. Due to high volumes of e-mail regarding which HSI's and DG's are compatible with S-TEC autopilots, we are providing you with a listing of DG's and HSI's that have been approved by S-TEC. There are other DG's and HSI's that work, but these are the ones that have interconnect documentation provided by S-TEC.

COMPATIBLE DG's

Manufacturer	System Model/Type	Output	Notes
AIM	#200-11AL,#210-13AL	AC	1
Cessna/ARC	G502A, G502B, G503A	AC	2
EDO	52D54, 52D154	AC	
EDO	52D254 (Model 4000C-5 Or -6)	DC	
RC Allen	Model RCA110-3	AC	
S-TEC	6406- ( ) Standard DG	AC	
Sigma Tek	IU262-006-45	AC	1
Sigma Tek	IU262-014-11, -13 Sigma Tek DG	DC	
Sigma Tek	IU262-015-12, -13 Sigma Tek DG	DC	
Sigma Tek	IU262-033-5, IU262-034-6	AC	3
Sigma Tek	IU262-003-14, IU262-004-15	AC	4
Sigma Tek	IU262-014-4, IU262-015-5	DC	5
Sigma Tek	IU262-005-19, -20	AC	2

Notes:

1) Same as S-TEC Standard DG
2) Use only for Systems Twenty, Thirty, 40 & 50
3) Standard DG with bootstrap
4) Same as 52D54
5) Same as 52D254

COMPATIBLE HSI's

Manufacturer	System Model/Type	Output	Notes
Aeronetics	Model 8000	AC	
Bendix	IN831A	AC	6
Bendix	HSD 880	DC	
Century	NSD 1000	DC	7
Cessna/ARC	IG-832A, IG-832C, IG-895A	DC	7
Collins	PN-101 P/N 331A-3G	AC	
Collins	HSI P/N 331A-6P/6R	AC	
EDO	NSD 360/360A, DG 360	DC	
King	KCS 55/55A	DC	
King	KPI 550/550A	AC	
NARCO	HSI 100/100S	AC	
Sandel	SN 3308	DC	8
Sigma Tek	HSI IU445-004-9	DC	
S-TEC	ST 180	AC	

Notes:

6) P/N 4000172-8504 &-8505 only. Other dash numbers require ST-500 AC to DC converter.
7) Interface same as NSD 360
8) Configure for KCS 55

COUPLERS VS. TRACKERS

Continued from Page 2

RADIO TRACKERS

A radio tracker is part of an autopilot system that does not use a Directional Gyro HDG Bug input to solve the navigation problem. Usually this is a system that does not require a DG for operation, such as an S-TEC System 40/50. Without the HDG Bug input, it is not possible to set up an intercept since no angular information exists. The system can only track the course once established on it. With a tracker, it is necessary to position the aircraft on the desired course centerline with the aircraft going in the same direction. With the intercept complete all that remains is the tracking function - hence the name Tracker.

If a Tracker is engaged with too large an offset between the aircraft location and the course, such as when displaced by a cross wind, the autopilot will command a turn toward the needle with too large an intercept angle to remove as it joins the course. This will happen if the CDI needle is more than 1 to 2 needle widths from center or if there is over 5° difference between the aircraft HDG and the course. The result is an "S" turn across the course or, if the intercept angle is large enough, a divergent "S" turn where every pass across the course is at an increasingly larger angle. When this occurs the pilot should disengage the tracking mode, reestablish the aircraft on the course, and then engage the tracker again.

Trackers typically will track a radial or course as accurately as a radio coupler, they simply cannot perform the intercept. In S-TEC systems, for instance, the radio tracker in the System 40/50 has two gain levels, NAV for long range tracking and APR (approach) for tighter close-in VOR, Localizer or GPS tracking. These gain levels and modes are identical to NAV mode capture-soft gain and soft gain in the Systems 60-1, 60-2, 55, and 65.

ROLL CENTERING

The roll centering adjustment, which adjusts the system for the zero position of the turn coordinator gyro, is very important to being able to track in the SOFT condition in coupler equipped systems, or in NAV mode with System 40/50 trackers. We hope this coupler/tracker discussion is helpful information which you can pass along to your customers.

SERVICE INFORMATION LETTER

Continued from Page 3

D. Resolution Details and Recommendations

Observation One - Installation of Tray/Rack and Connectors

The initial installation of a panel-mounted tray or remote-mounted rack must be done in accordance with the manufacturer's instructions. A tray or rack that is already installed should be inspected, to ensure that the unit will fully seat with its connector. The front of a panel-mounted tray should not be significantly inset from the panel, since otherwise the unit will not fully seat.

Observation Two - Installation of Equipment with High Density Connectors

High insertion forces are required to seat a unit with "high density" connectors into the tray/rack, which tends to limit the effectiveness of the first seating attempt. Thus several attempts may be required, each comprised of applying a force to the front of the unit and then tightening the locking mechanism. The sequential process below should ensure that a unit is properly installed, such that its connectors are sufficiently seated into the tray:

1) Carefully slide unit into tray/rack, and apply a moderate insertion force.
2) Tighten locking mechanism on front of unit to remove any slack, but do not try to "pull" unit into place.
3) Apply additional insertion force to front of unit.
4) Tighten locking mechanism again.
5) Apply additional insertion force to front of unit.
6) Finish tightening locking mechanism.
7) For panel-mounted equipment, ensure that unit bezel is "tight" against panel.
8) For remote-mounted equipment, ensure that aft end of unit is "tight" against front of mounting rack.

E. Summary

Using these basic principles should ensure the proper installation of either remote-mounted or panel-mounted equipment, such that the interface connectors are sufficiently seated.

Put A Face With A Name

THESE ARE SOME OF OUR KEY PEOPLE AT MEGGITT AVIONICS / S-TEC

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President

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- **New Product Development**
- **Manufacturing Excellence**

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- **Direct Mail and Brochures**
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- **Public Relations and Brochures**
- **Advertising and Promotional Materials**
- **Corporate and Dealer Communications**

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- **Program Management**
- **Contract Administration**
- **Enterprise Resource Planning**
- **Maximize HR and IT Investment**
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Areas of Involvement

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- **ISO 9000 Implementation**
- **Supplier Management**

POH'S Available on the Web

As a service to our dealers, customers and potential customers, all new and existing POH's will be hosted on our website at www.S-TEC.com in PDF format. The primary purpose of these Pilot Operating Handbooks (POHs) is to provide current users and potential S-TEC Autopilot buyers with step-by-step functional preflight and in-flight operating procedures for a specific system.

The following manuals are currently available

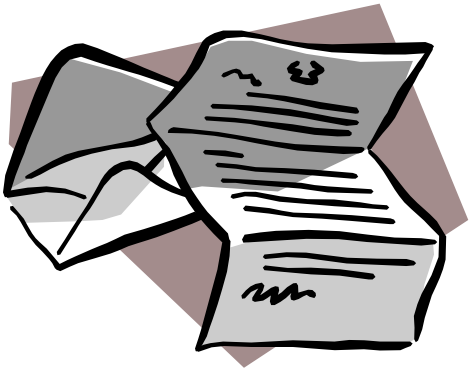
GPSS Converter
SA-200 Altitude Selector/Alerter
ST-360 Altitude Selector/Alerter
System Twenty/System Thirty/System Thirty ALT
System 40/50
System 55
System Fifty Five X
System 60-2
System 60 PSS
System 65

We Get Mail!

Steve Dean
Phoenix Associates
Gilmer, Texas

Wednesday, March 5, 2003

Re: Twin Beech, S/N A-283, Registration No. N412K



"I'm the owner of a Twin Beech and I observed the installation of my new S-TEC 50 autopilot. I flew behind a 60-2 autopilot in my Bonanza for several years. Best autopilot by far that I have ever flown. Test flew the S-TEC 50 autopilot in my Beech last week and I was equally impressed. Keep it up!!!"

Best Regards,
Steve Dean

Dealer Contributions

With the Approach newsletter, we hope to cover the kind of helpful information that you won't find in a Service Manual. We want to pass along the kind of knowledge that only comes from skinned knuckles and hours of chasing intermittent gremlins.

This is the kind of knowledge that you have more of than we do at the factory and we want and need your input.

Dealer management, sales, technical or installation personnel are encouraged to submit material for any column in this publication. The contributor will be given appropriate credit in the form of a byline with their name, company affiliation and home town plus a photograph, (provided an acceptable photograph is submitted). In addition, the contributor will receive a Meggitt baseball cap.

The preferred method of submission is via e-mail. The contribution can be written in the body of the e-mail or attached as a Microsoft Word Document. Of course, contributions will be accepted via "snail mail", as long as they are legible.

Submit contributions to the Editor, at info@mavstec.aero or:

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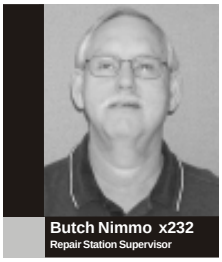
Meggitt Avionics / S-TEC
One S-TEC Way
Mineral Wells, TX 76067

Pre-Installation Inventory



Prior issues of the Approach featured articles in the "Installation Secrets" column which were devoted to Post-Installation check out procedures (Volume 1, Issue 1, December 1995) and Pre-Installation Planning (Volume 1, Issue 2, March, 1996). Both of these articles have been very helpful to installers since they were published. It would be a good idea to find the back issues and review the articles, or read them on our our website at www.s-tec.com.

As an addendum to the topic of Pre-Installation Planning, we would like to discuss the value of the installer taking a Pre-Installation Inventory. In many facilities the receipt and unpacking of our autopilot kit is done in the Receiving Department or the Parts Department. It is not unusual for the system to be handled by numerous persons prior to getting to the installer. Each of these "stops along the way" can be a place for hardware or paperwork to get misplaced. While we go to extraordinary efforts to assure that we ship all the correct drawings and piece parts with the system, we also have been known to err. If you don't catch the shortage until the aircraft is in the hangar and disassembled, an unpleasant installation delay can occur while we get a new part or drawing to you.

Performing an inventory of the contents of the autopilot kit prior to the start of the installation can save time and help you to keep your delivery commitments to the customer.

Each kit comes with a documentation package containing an "aircraft specific" Installation Bulletin, General Installation Bulletin, and Drawings which are necessary to complete the installation.

First, locate the aircraft specific Installation Bulletin. Check to determine that it is the correct bulletin for the autopilot system and model of aircraft targeted for installation. The inside front cover will contain this information at the top of the page. This is a good time to review the "Notice to the Installer" statement at the bottom of the page. Now is the time to identify any potential inconsistencies, which need to be resolved prior to proceeding.

Once it has been determined that you have the correct Installation Bulletin, proceed to reviewing the parts list. The parts list is divided into groups I, II, III, etc. Each group defines a particular portion of the autopilot system identifying the components and hardware required to complete the installation of that portion.

Check and verify that the component and hardware part numbers and quantities match what is required for the installation. If a discrepancy or shortage is discovered we can ship the parts to make the kit complete in time to have a minimal impact on schedules and delivery.

The next step after the major component and hardware inventory is complete, is to insure that the proper drawings are included which define the installation. Section I of the aircraft specific Installation Bulletin gives a step by step description and refers to either specific drawing numbers or the General Installation Bulletin. It is common to have instructions contained in the General Installation Bulletin as well as on one of the drawings referenced by it, which apply to the same installation procedure.

As an installation note, when there are two sets of instructions supplied, most times you do not have a choice. The specific instructions, such as found on a drawing or outlined in the aircraft specific Installation Bulletin, ***ALWAYS*** *take precedence over the General Installation Bulletin instructions. One very common installation mistake, which is the result of using the General Installation Bulletin instead of the specific instructions, is locating the altitude pressure transducer behind the instrument panel tee'd into the existing aircraft static system. In many aircraft it should be located in the tail section of the aircraft utilizing its own dedicated set of static ports. This is a common error on all high wing Cessna aircraft. A clean static source is critical for proper operation of the pitch axis of the autopilot.*

Each step in Section I of the aircraft specific Installation Bulletin will refer to a specific drawing or to the General Installation Bulletin number. A master drawing list is provided in the aircraft specific Installation Bulletin to assist the installer. At this point verify that all of the listed drawings, as well as the General Installation Bulletin, are part of the document package you received. If there are any shortages call S-TEC's Sales or Technical Support Department immediately so the missing or incorrect drawings can be replaced.

The time spent doing this inventory of autopilot kits can be a very valuable investment.

STC UPDATE

APPROVALS SINCE LAST NEWSLETTER

SYSTEM	AIRCRAFT
20/30	(14V) Cessna 182P and 182Q when modified per STC SA1382WE (Robertson STOL) and Reims Aviation S.A. Cessna models F182P and F182Q when modified per STC SA1382WE (Robertson STOL)
40/50	(14V) Reims Aviation S.A. Cessna models F182P and F182Q Cessna models 182P and 182Q; Reims Aviation S.A. Cessna models F182P and F182Q when modified by: 1.STC SA485SW (Wren conversion) and STC SA3825SW or 2.STC SA950CE (Horton STOL) and/or STC SA2285CE (Horton flap gap seals) and STC SA3825SW (260 H.P.engine conversion) or 3. STC SA1382WE (Robertson STOL) and STC SA3825SW (260 H.P. engine conversion)
55/55X	(14V) Piper models PA-28-140, PA-28-150, PA-28-160, PA-28-180; and PA-28-235, S/N 28-10003 through S/N 28-11393 and S/N 28-7110001 through S/N 28-7210023
60-2	(28V) Cessna models 320, 320-1, 320A
60-2 w/o trim	(28V) Rockwell International North American models AT-6A (SNJ-3), AT-6B, AT-6C(SNJ-4), AT-6D(SNJ-5), AT-6F(SNJ-6), SNJ-7, and T-6G

IN-PROCESS STC's

SYSTEM	AIRCRAFT
55/55X	28V Cessna models R182 and TR182 and the above models when modified per STC SA950CE (Horton STOL) and/or STC SA2285CE (Horton flap gap seals); Reims-Cessna model FR182 and the above model when modified per STC SA2422CE (Horton STOL)
60-2	14V Cessna models 210G, T210G, 210H, T210H, 210J, and T210J and models T210G, T210H and T210J when modified per STC SA2689SW (RAM modification)
20/30	14V Cessna models 206, P206, U206, P206A, TP206A, U206A, TU206A, P206B,TP206B, U206B, TU206B, P206C, TP206C, U206C, TU206C, P206D,TP206D, U206D, TU206D, P206E, TP206E, U206E, TU206E, U206F, TU206F;and U206G AND TU206G (landplane, floatplane or amphibian configuration)and models U206G AND TU206G(landplane, floatplane or amphibian configuration)when modified by any of the following STCS: STC SA1513WE (Robertson STOL) or STC SA2353NM (Soloy engine conversion) and/or STC SA3634SW (extended range fuel tanks) and/or STC SA914NE (wing tip extensions)
40/50	14V Cessna models 210G, T210G, 210H, T210H, 210J, and T210J and models T210G, T210H and T210J when modified per STC SA2689SW (RAM modification)

STC Correction

In the last Approach Newsletter, (April 2003) we accidentally listed a few "In-Process" STC's as being complete. The corrected list is shown on the left. We apologize for any confusion this may have caused.

Approach

Published and copyrighted by Meggitt Avionics / S-TEC, the *Approach* is intended to provide S-TEC dealers with information valuable in the everyday selling and servicing of S-TEC electronic instruments and autopilots.

Comments and suggestions are encouraged and welcomed. For additional copies of the *Approach* for others in your organization or for distribution to your own mailing list, contact:

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