

Oakton International Corp.  
2714 Clarkes Landing Drive  
Oakton, Va. 22124

Flight Manual Supplement for  
Cessna 150H N50037

**FAA Approved**  
**Airplane Flight Manual Supplement**  
**For**  
**Cessna 150H**  
**With**  
**KLN 89B GPS Navigation System**

Reg. No. N50037  
Ser. No. 15069028

This supplement must be attached to the FAA Approved Airplane Flight Manual when the Bendix/King KLN 89B GPS is installed in accordance with Honeywell Installation Manual P/N 006-10522-0003 or later revision and FAA Form 337 dated JUL 09 2004. The information contained herein supplements or supercedes the basic manual only in those areas listed herein. For Limitations, Procedures, and performance information not contained in this supplement; consult the basic Airplane Flight Manual.



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**Log of Revisions**

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## Section I – General

The KLN 89B GPS panel mounted unit contains the GPS sensor, the navigation computer, a dot matrix display, and all controls required to operate the unit. It also houses the data base card which plugs directly into the front of the unit.

The data base card is an electronic memory containing information on airports, nav aids, intersections, SIDS, STARS, instrument approaches, special use airspace, and other items of value to the pilot.

Every 28 days, Bendix/King receives new data base information from Jeppesen Sanderson for the North America data base region. This information is processed and downloaded onto the data base cards. Bendix/King makes these data base card updates available to KLN 89B GPS users.

Provided the KLN 89B GPS navigation system is receiving adequate useable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of:

VFR/IFR en route oceanic and remote, en route domestic, terminal, and instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System, North Atlantic Minimum Navigation Performance Specifications (MNPS) Airspace and latitudes bounded by 74 degrees North and 60 degrees South using the WGS-84 (or NAD 83) coordinates reference datum in accordance with the criteria of AC 20-138A, AC 91-49, and AC 120-33. Navigation data is based upon use of only the global positioning system (GPS) operated by the United States.

**Note:** Aircraft using GPS for oceanic IFR operations may use the KLN 89B to replace one of the other approved means of long-range navigation. A single KLN 89B GPS installation may also be used on short oceanic routes which require only one means of long-range navigation.

**Note:** FAA Approval of the KLN 89B does not necessarily constitute approval for use in foreign airspace.

**Note:** When the KLN 89B contains receiver software RCVR 01621-0001 (or higher dash number), as verified on the OTH 6 page, the unit is qualified for BRNAV operation in the European region in accordance with the criteria of AC 90-96, (Reference ICAO Doc 7030 Regional Supplementary Procedures, JAA Technical Guidance Leaflet AMJ20X2 and Eurocontrol RNAV Standard Doc 003-93 Area Navigation Equipment Operational Requirements and Functional Requirements (RNAV)).

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## Section II – Limitations

- A. The KLN 89B GPS Pilot's Guide Bendix/King P/N 006-08786-0000, dated May, 1995 (or later applicable revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the system. The Operational Revision Status (ORS) of the Pilot's Guide must match the ORS level annunciated on the self test page.

**B. IFR Navigation is restricted as follows:**

1. The system must utilize ORS level 01 or later FAA approved revision.
2. The data on the self test page must be verified prior to use
3. IFR en route and terminal navigation is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.
4. Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the KLN 89B data base. The KLN 89B data base must incorporate the current update cycle.
  - (a) The KLN 89B Quick Reference, Bendix/King P/N 006-08787-0000, dated 5/95 (or later applicable revision) must be immediately available to the flight crew during instrument approach operations.
  - (b) Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.
  - (c) APR ACTV mode must annunciated at the Final Approach Fix.
  - (d) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, and MLS approaches are not authorized.
  - (e) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation.
  - (f) The KLN 89B can only be used for approach guidance if the reference coordinate datum system for the instrument approach is WGS-84 or NAD-83. (All approaches in the KLN 89B data base use the WGS-84 or the NAD-83 geodetic datums.)
5. The aircraft must have other approved navigational equipment appropriate to the route of flight installed and operational.

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**6. For BRNAV operations in the European region:**

- a. With 23 (24 if the altitude input to the KLN 89B is not available) or more satellites projected to be operational for the flight, the aircraft can depart without further action.
- b. With 22 (23 if the altitude input to the KLN 89B is not available) or fewer satellites projected to be operational for the flight, the availability of the GPS integrity (RAIM) should be confirmed for the intended flight (route and time). This should be obtained from a predication program run outside of the aircraft. The prediction must comply with the criteria of Appendix 1 of AC90-96. In the event of a predicted continuous loss of RAIM of more than 5 minutes for any part of the intended flight, the flight should be delayed, cancelled, or rerouted on a track where RAIM requirements can be met.

**Note:** Allied Signals Preflight, Version 2.0 or later computer based prediction Program may be used for the RAIM prediction. Alternate methods should be Submitted for approval in accordance with Advisory Circular AC90-96.

**Section III – Emergency Procedures  
Abnormal Procedures**

- A. If the KLN 89B GPS information is not available or invalid, utilize remaining operational navigation equipment as required.
- B. If a “RAIM NOT AVAILABLE” message is displayed while Conducting an instrument approach, terminate the approach. Execute a missed approach if required.
- C. If a “RAIM NOT AVAILABLE” message is displayed in the en route or terminal phase of flight, continue to navigate using the KLN 89B or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using another IFR approved navigation system.

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- D. Refer to the KLN 89B Pilot's Guide, Appendices B and C, for appropriate pilot actions to be accomplished in response to annunciated messages.

#### Section IV – Normal Procedures

**Warning**      **Familiarity with the en route operation of the KLN 89B does not constitute proficiency in approach operations. Do not attempt approach operations in IMC prior to attaining proficiency in the use of the KLN 89B.**

##### A. Operation

Normal operating procedures are outlined in the KLN 89B GPS Pilot's Guide. Bendix/King P/N 006-08786-0000 , dated May 1995, (or later applicable revision). A KLN 89B Quick Reference, Bendix/King P/N 006-08787-0000 dated 5/95 (or later applicable revision) containing an approach sequence, operating tips and approach related messages is intended for cockpit use by the KLN 89B familiar pilot when conducting instrument approaches.

**Warning**      **To prevent the possibility of turn anticipation causing potentially misleading navigation when the aircraft is not on course:**

- **Verify the HSI course and D-BAR presentation is proper prior to takeoff.**
- **Do not switch from OBS to LEG with greater than 1 nm cross track error (XTK)**

**If misleading data is suspected, a Direct-To operation to your desired waypoint will clear any previous OBS course, and cancel turn anticipation.**

##### Notes:

- **After the above Direct-To operation, further reorientation to the nearest leg of the active flight plan may be accomplished by pressing Direct-To, Clear, Enter.**
- **Refer to the Pilot's Guide section 4.2.2 for an explanation of turn anticipation, and Appendix A- Navigation Terms for the definition of cross track error (XTK).**

## **B. System Annunciators/Switches/Controls**

1. KI 209A Nav presentation (NAV/GPS) switch annunciator – May be used to select data for presentation on the KI 209A ; either Nav data from the number KX 155 vhf navigation receiver or GPS data from the KLN 89B GPS.
2. Message (MSG) annunciator – Will flash to alert the pilot of a situation that requires attention. Press the MSG button on the KLN 89B GPS to view the message. ( Appendix B of the KLN 89B Pilot’s Guide contains a list of all of the message page messages and their meanings).
3. Waypoint (WPT) annunciator – Prior to reaching a waypoint in the active flight plan, the KLN 89B GPS will provide navigation along a curved path segment to ensure a smooth transition between two adjacent legs in the flight plan. This feature is called turn anticipation. Approximately 20 seconds prior to the beginning of turn anticipation the WPT annunciator will flash, going solid upon initialization of the turn, and extinguishing upon turn completion.

### **Warning:**

**Turn anticipation is automatically disabled for FAF waypoints and those used exclusively in SID/STARS where overflight is required. For waypoints shared between SID/STARS and published en route segments (requiring overflight in the SID/STARS), proper selection on the presented waypoint page is necessary to provide adequate route protection on the SID/STARS.**

4. KI 209A course control knob- Provides analog course input to the KLN 89B in OBS when the NAV/GPS switch/annunciator is in the GPS. When the NAV/GPS switch annunciation is in NAV, GPS course selection in OBS mode is digital through the use of the controls and display at the KLN 89B.

### **Note:**

**Manual KI 209A course centering in OBS using the control knob can be difficult, especially at long distances. Centering the dbar can best be accomplished by pressing the Direct-To and manually setting the KI 209A OBS Card to the course value prescribed in the KLN 89B displayed message.**



5. GPS approach (**GPS APR ARM/ACTV**) switch/annunciator – used to a) manually select or deselect approach ARM (or disable approach ACTV) and b) annunciate the stage of approach operation either armed (ARM) or activated (ACTV). Sequential button pushes if in ACTV would first result in approach ARM and then approach arm canceled. subsequent button pushes will cycle between the armed state (if an approach is in the flight plan) and approach arm canceled. Approach ACTV cannot be selected manually.

**C. Pilot's Display**

Left/right steering information is presented on the KI 209A as a function of the NAV/GPS switch position. A function is incorporated in the Mid Continent MD41-1524 if an ILS frequency is selected on the KX 155 the information displayed on the KI 209A is from the KX 155. The NAV annunciator will alert the pilot that displayed data is from the KX 155 and derived from the KLN 89B.

**D. Autopilot Coupled Operation**

There is no autopilot coupling in this aircraft.

**E. Altitude Alert Tones**

There is no Altitude Alert feature wired in this aircraft.

**F. Approach Mode Sequencing and RAIM Prediction**

**Note:**        **The special use airspace alert will automatically be disabled prior to flying an instrument approach to reduce the potential for message congestion.**

1. Prior to arrival, select a STAR if appropriate from the APT 7 page.  
Select an approach and an initial approach fix (IAF) from the APT 8 page.

**Notes:**

- Using the outer knob, select the **ACT** (Active Flight Plan Waypoints) pages. Pull the inner knob out and scroll to the destination airport, then push the inner knob in and select **ACT 7** or **ACT 8** page.
- To delete or replace a **SID**, **STAR** or approach, select **FPL 0** page. Place the cursor over the name of the procedure, press **ENT** to change it, or **CLR** then **ENT** to delete it.

2. En route, check for RAIM availability at the destination airport ETA on the **OTH 3** page.

**Note:**        RAIM must be available at the FAF in order to fly an instrument approach.  
Be prepared to terminate the approach upon loss of RAIM.

3. At 30 nm from the airport:
  - a. Verify automatic annunciation of **APR ARM**.
  - b. Note automatic dbar scaling change from 5 nm to 1 nm over the next 30 seconds.
  - c. Update the KLN 89B altimeter baro setting as required.
  - d. Internally the KLN 89B will transition from en route to terminal integrity monitoring.
4. Select **NAV 4** page to fly the approach procedure.
  - a. If receiving radar vectors, or need to fly a procedure turn or holding pattern, fly in **OBS** until inbound to the **FAF**.

**Note:** OBS navigation is TO-FROM (like a VOR) without waypoint sequencing.

**Warning:** To prevent the possibility of turn anticipation causing potentially misleading navigation when the aircraft is not on course, do not switch from **OBS** to **LEG** with greater than 1 nm cross track (**XTK**).

- b. **NoPT** routes including DME arc's are flown in **LEG**. **LEG is Mandatory from the FAF to the MAP.**

**Note:** Nav or **APR** coupled DME arc intercepts can result in excessive overshoots ( aggravated by high ground speeds and/or intercepts from inside the arc).

**Warning:** Flying final outbound from an off-airport vortac on an overlay approach; beware of the DME distance increasing on the final approach, and the GPS distance-to-waypoint decreasing, and not matching the numbers on the approach plate.

5. At or before 2 nm from the FAF inbound:
  - a. Select the FAF as the active waypoint, if not accomplished already.
  - b. Select LEG operation.
6. Approaching the FAF inbound (within 2 nm.):
  - a. Verify **APR ACTV**.
  - b. Note automatic dbar scaling change from 1nm to .3 nm over the 2 nm inbound to the FAF.
  - c. Internally the KLN 89B will transition from terminal to approach integrity monitoring.

7. Crossing the FAF and APR ACTV is not annunciated:
  - a. Do not descend.
  - b. Execute the missed approach.
  
8. Missed Approach:
  - a. Climb.
  - b. Navigate to the MAP (in APR ARM if APR ACTV is not available).

**Note:** There is no automatic LEG sequencing at the MAP.

- c. After climbing in accordance with the published missed approach procedure, press Direct-To, verify or change the desired holding fix and press ENT.

**General Notes:**

- The database must be up to date for instrument approach operatio.
- Only one approach can be in the flight plan at a time.
- Checking RAIM prediction for your approach while enroute using the **OTH 3** page is recommended. A self check occurs, automatically within 2 nm of the FAF. APR ACTV is inhibited without RAIM.
- Data cannot be altered, added to or deleted from the approach procedures contained in the database. (DME arc intercepts may be relocated along the arc through the NAV 4 or the FPL O pages).
- **Some approach waypoints do not appear on the approach plates (including in some instances the FAF)!**
- Waypoint suffixes in the flight plan:
  - i – IAF
  - f – FAF
  - m – MAP
  - h – missed approach holding fix.
  
- The DME arc IAF ( arc intercept waypoint) will be a) on your present position radial off the arc VOR when you load the IAF into the flight plan, or b) the beginning of the arc if currently on a radial beyond the arc limit. To adjust the arc intercept to be compatible with the arc IAF waypoint in the NAV 4 page scanning field or under the cursor on the FPL O page, press CLR, then ENT. Fly the in LEG. Adjust the OBS course with reference to the desired track value on the NAV 4 page (it will flash to remind you). Left/Right dbar information is relative to the arc. Displayed distance is not along the arc but direct to the active waypoint. ( The ARC radial is also displayed in the lower right corner of the NAV 4 page.)

- The DME arc IAF identifier maybe unfamiliar. Example: DO98G where O98 stands for the 098 degree radial off the referenced VOR, and G is the seventh letter in the alphabet indicating a 7 DME arc.
- APR ARM to APR ACTV is automatic provided:
  - a. You are in APR ARM (normally automatic)
  - b. You are in LEG mode!
  - c. The FAF is the active waypoint!
  - d. Within 2 nm of the FAF.
  - e. Outside of the FAF.
  - f. Inbound to the FAF.
  - g. RAIM is available.
  
- Direct – To operation between the FAF and MAP cancels APR ACTV. Fly the missed approach in APR ARM.
- Flagged navigation inside the FAF may usually be restored (not guaranteed) by pressing the GPS APR button changing form ACTV to ARM. Fly the missed approach.
- The instrument approach using the KLN 89B may be essentially automatic starting at 30 nm out ( with a manual baro setting update) or it may require judicious selection of the OBS and LEG modes.
- APR ARM may be canceled at any time by pressing the GPS APR button. ( A subsequent press will reselect it.)

## Section V – Performance

No change.