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E-BK-13-0009 Rev A

FAA Approved

Airplane Flight Manual Supplement

To The

Aircraft Make PIPER Model PA 28-181

Select approved Aircraft Make and Model from Supplemental Type Certificate SA00765DE Approved Model List (AML)

Airplane Flight Manual

for the installation of

ADS-B Transmitter: BendixKing KT 74

Position Source:
FreeFlight Systems 1201 GPS,
Accord Technologies NexNav Mini 21000 GPS,
Garmin GNS 400W/500W Series or Garmin GTN 6XX/7XX Series

Aircraft Serial Number 28-8090287 Aircraft Registration Number N8189Q

This supplement must be attached to the FAA approved Airplane Flight Manual when the aircraft is modified for ADS-B Out by the installation of the BendixKing KT 74 Mode S Transponder using an ADS-B Out GPS Position Source in accordance with Supplemental Type Certificate No. SA00765DE.

The information contained herein supplements or supersedes 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.

FAA Approved _____
Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office
Transport Airplane Directorate

DATE: August 19, 2014

Original Approval Date: March 14, 2014

LOG OF REVISIONS

Rev No	Page Date	Page No.	Description	FAA Approved
IR	03/14/2014	1-12	Complete Supplement	Hien Tong for Manager, Flight Test Branch, ANM-160L Federal Aviation Administration Los Angeles Aircraft Certification Office Transport Airplane Directorate Date: 3/14/2014
A	08/14/2014	3, 4, 6	Added position sources: - Garmin GNS 400W/500W, - Garmin GTN 6XX/7XX.	 Manager, Flight Test Branch, ANM-160L Federal Aviation Administration Los Angeles Aircraft Certification Office Transport Airplane Directorate Date: August 14, 2014
		6	- Added Antenna	
		7	-Updated KT74 Software Level, Section 7	

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1. GENERAL

1.1. Introduction

The purpose of this document is to describe the operating procedures for the BendixKing KT 74 Mode S transponder and an Automatic Dependent Surveillance-Broadcast (ADS-B) Out Global Positioning System (GPS) position source. This supplement will address normal operations of the installed equipment including any considerations of the ADS-B Out functionality of the system.

The information to be included in this supplement contains limitations, procedures, and performance information specific to the ADS-B Out compliant installation that is not otherwise included in the basic Airplane Flight Manual.

The KT 74 front Panel showing Pilot control input is shown in Figure 1.

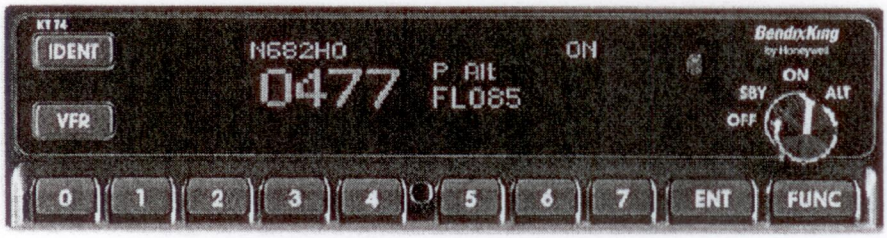

Figure 1: BendixKing KT 74 Transponder Front Panel

1.2. ADS-B Out System

The installed ADS-B Out system has been shown to meet the equipment requirements of 14 Code of Federal Regulations (CFR) 91.227, *Automatic Dependent Surveillance-Broadcast (ADS-B) Out Equipment Performance Requirements*.

2. LIMITATIONS

Data provided by the ADS-B Out System GPS/Wide Area Augmentation System (WAAS) receiver (FreeFlight Systems 1201 GPS or Accord Technology NexNav Mini 21000 GPS) is **prohibited** for navigational use without additional Federal Aviation Administration (FAA) approval.

This STC does not provide approval for the installation of the Garmin GNS 400W/500W series or GTN 6XX/7XX GPS receivers. Use of the Garmin series GPS receivers for navigational purposes **must** be approved independently of this STC.

This STC provides for the utilization of the following Garmin 400W/500W product family models for use as an approved ADS-B Out system GPS/WAAS receiver, Table 1.

Table 1: Garmin 400W/500W Product Family

Model Number	Part Number	Description
GPS 400W	011-01057-(__)	GPS/WAAS functionality only
GNC 420W	011-01058-(__)	GPS/WAAS & VHF COM (10W)
GNC 420AW	011-01059-(__)	GPS/WAAS & VHF COM (16W)
GNS 430W	011-01060-(__)	GPS/WAAS, VHF COM (10W) & VOR, & VHF NAV
GNS 430AW	011-01061-(__)	GPS/WAAS, VHF COM (16W) & VOR, & VHF NAV
GPS 500W	011-01062-(__)	GPS/WAAS functionality only
GPS 500W TAWS	011-01063-(__)	GPS/WAAS with Terrain Awareness & Warning System
GNS 530W	011-01064-(__)	GPS/WAAS, VHF COM (10W) & VOR, & VHF NAV
GNS 530W TAWS	011-01065-(__)	GPS/WAAS, VHF COM (10W) & VOR, & VHF NAV with Terrain Awareness & Warning System
GNS 530AW	011-01066-(__)	GPS/WAAS, VHF COM (16W) & VOR, & VHF NAV
GNS 530AW TAWS	011-01067-(__)	GPS/WAAS, VHF COM (16W) & VOR, & VHF NAV with Terrain Awareness & Warning System

This STC also provides for the utilization of the following Garmin GTN 6XX/7XX product family models for use as an approved ADS-B Out system GPS/WAAS receiver, Table 2.

Table 2: Garmin GTN 6XX/7XX Product Family

Model Number	Part Number	Description
GTN 625	011-02254-00	GPS/WAAS
GTN 635	011-02255-00	GPS/WAAS, VHF COM
GTN 650	011-02256-00, 011-02256-50 [1]	GPS/WAAS, VHF COM, VHF NAV
GTN 725	011-02281-00	GPS/WAAS, GMA 35 Control
GTN 750	011-02282-00 011-02282-50 [1]	GPS/WAAS, VHF COM, VHF NAV, GMA 35 Control

[1] Indicates gray bezel part number.

3. EMERGENCY PROCEDURES

No change

4. NORMAL PROCEDURES

No change

5. PERFORMANCE

No change

6. WEIGHT AND BALANCE

Weight and balance additions to the aircraft as a result of this Supplemental Type Certificate (STC) are documented in the following table:

W & B Arm and moment values are specific to installation		Weight (lbs)	Arm (in)	Moment (in lbs)
Installed Equipment:				
Item	Description			
KT 74	Transponder, BendixKing	2.80		
1201	GPS Sensor, FreeFlight	1.40		
	-- or --			
21000	GPS Sensor, Accord Technologies NexNav Mini	1.50		
AT 575-43	GPS Antenna, Aero Antenna	0.50		
	-- or --			
S67-1575	GPS Antenna, Sensor Systems	0.63		

Notes:

1. Aircraft Weight and Balance records shall be adjusted to account for any removed equipment upon installation of the above items. Changes shall account for the specific configuration of the installed equipment listed above.
2. Aircraft Weight and Balance records shall account for the exact placement of equipment on the aircraft.
3. Aircraft Equipment list and electrical loads shall be adjusted to account for addition of the above components, and any removed equipment.
4. The Garmin GNS 400W/500W and GTN 6XX/7XX are previously installed equipment on eligible models and, therefore, do not affect the weight and balance; the components do not need to be placed, only connected.

7. SYSTEM DESCRIPTION

The KT 74 transponder is a DO-181D Class 1 compliant Mode S level 2 datalink transponder, which is compatible with the European elementary surveillance requirements. The KT 74 includes interfaces which can be connected to an appropriate GPS position source and can be used to generate ADS-B position and state extended squitter transmissions. KT 74 software version 3.12 (or later approved revision) provides support for ADS-B in accordance with DO-260B. The KT 74 software version is shown on the face of the transponder display upon system power up.

The GPS/WAAS Sensor is designed to provide position, velocity, time and integrity (PVT&I) data. The GPS position sensors approved under this STC meet all ADS-B Out performance requirements identified in FAA advisory circular AC 20-165A.

By connecting the GPS position source to the BendixKing KT 74 transponder over a single RS232 interface, the system will generate ADS-B position and state extended squitter transmissions.

The airspeed switch input to the system allows the transponder to automatically switch between airborne and ground modes and affects both the Mode S reply behavior and the ADS-B reporting behavior. This input ensures that the system is transmitting the appropriate information for the given aircraft operating mode.

The pilot's guide for the transponder is BendixKing document D201308000036, *KT 74 ADS-B Out Enabled Mode S Transponder Pilot's Guide.*

7.1. Front Panel

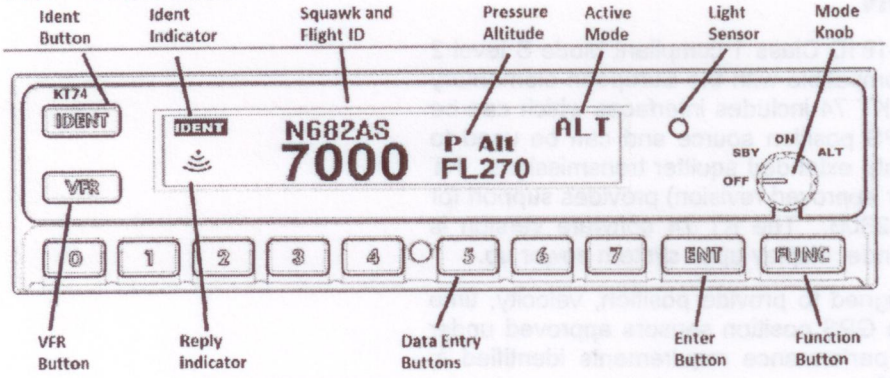

Figure 2: BendixKing KT 74 Transponder Front Panel

7.2. ADS-B Monitor

The transponder provides an ADS-B Monitor function that can be accessed with the FUNC push button. By selecting the ADS-B Monitor function, the display will provide the position information that is being transmitted in ADS-B position reports (see Figure 3: ADS-B Monitor). This can provide confirmation that the correct information is being transmitted, particularly where the GPS source is remote from the transponder.

Figure 3: ADS-B Monitor

Following initial position fix, loss of ADS-B position information from the GPS source will also result in a WARNING message being displayed (see Figure 4: Loss of ADS-B Position Information). This message will also be displayed within 5 minutes after system power-up if no position information is being received. This message may be cleared by pressing the ENT button.

Figure 4: Loss of ADS-B Position Information

The transponder will resume transmitting ADS-B parameters upon reacquisition of the position information from the GPS source. Transmission will resume regardless of whether or not the fault message has been cleared.

In the event that valid position information is NOT available from the GPS, and the message has been cleared, the latitude and longitude display will be replaced by dashes on the ADS-B Monitor; if no valid latitude and longitude is shown when the ADS-B Monitor is selected, then ADS-B position information is NOT being transmitted.

7.3. Warning Messages

If the transponder detects a problem, the screen will indicate WARNING and a brief statement of the problem. Depending on the nature of the problem, your transponder may not be replying to interrogations. Note the message on the screen and pass that information to your avionics maintenance personnel. Press ENT to clear the message; if the fault is still present the message will reappear. The error message will remain visible as long as the condition persists until the pilot clears the message by pressing ENT.

7.4. Fault Annunciation

If the transponder detects an internal failure, the screen will indicate FAULT and a brief statement of the problem. No replies will be made to interrogations when a fault is detected.

Some FAULT indications can be recovered by switching the transponder off and back on again, although in all cases a FAULT code implies that there is a fault with the transponder or the installation. Note the FAULT message at the bottom of the screen and pass that information to your avionics maintenance personnel.

In the event of a FAULT message, the pilot should consider the transponder inoperative and should take appropriate actions to remain in compliance with the requirements of 14 CFR 91.215, *ATC transponder and altitude reporting equipment and use* and 91.225 *Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment and use*.

7.5. Display

The display shows the operating mode of the transponder, the reported pressure altitude, and the current squawk code and Flight ID. The reply indicator is active when the transponder replies to interrogations.

The pressure altitude is displayed as a Flight Level, which is the pressure altitude in hundreds of feet. When non-standard atmospheric conditions apply, this may not match the altimeter's indicated altitude, but will be correctly displayed by the ATC radar.

7.6. Mode Selector Knob

The right hand knob controls the power to the transponder and the operating mode. Listed below are descriptions of the selectable functions of the Mode Selector Knob on the transponder.

Table 3: Mode Selector Control

OFF	Power is removed from the transponder.
SBY	The transponder is on, but will not reply to any interrogations.
ON	The transponder will respond to all interrogations, but altitude reporting is suppressed.
ALT	The transponder will respond to all interrogations with altitude encoded.

When operating the aircraft for flight purposes (e.g. pre-flight, taxi, takeoff, enroute, landing) the transponder should always be set to ALT unless directed otherwise by air traffic control. The transponder will ensure that the air/ground status is automatically selected.

7.7. Push Buttons

Reference Figure 1: BendixKing KT 74 Transponder Front Panel. The following describe the functions of the push buttons on the transponder.

Table 4: Push Button Controls

IDENT	Press the IDENT button only when ATC instructs you to "Ident" or "Squawk Ident". This activates the special position identification (SPI) pulse in the transponder replies for 18 seconds. IDENT will appear in the display.
FUNC	Pressing the FUNC button provides access to the flight timer, stopwatch, ADS-B monitor (depending on installation), and altitude monitor function.
VFR	Pressing the VFR button sets the transponder to the pre-programmed conspicuity code. Pressing the button again restores the previous squawk code.
ENT	The ENT button enters a digit in the code selector.
Data Entry Buttons (0-7)	Used to enter the Squawk Code and Flight ID.

7.8. Code Selector Knob

The Data Entry Buttons are used to set squawk codes and the Flight ID. When ENT is pressed on the last digit, the new squawk code or Flight ID will replace the previous value. If the code entry is not completed within 7 seconds, the changes are ignored and the previous code restored. Table 5: Standard SQUAWK Codes describes the common codes of the Code Selector knob on the transponder.

Table 5: Standard SQUAWK Codes

1200	VFR code in the USA
7500	Hijack code
7600	Loss of communications
7700	Emergency code

The Flight ID should correspond to the aircraft call sign entered on your flight plan. If no flight plan is active, the aircraft registration should be used as your Flight ID. Use only letters and digits. If the Flight ID is less than 8 characters long, entering a blank character will end it.

Contact your maintenance personnel to update the preset call sign/Flight ID if the aircraft registration number changes.

7.9. Disabling the ADS-B System

Turning off the transponder/GPS or pulling the transponder/GPS circuit breaker will disable/terminate the ADS-B Out functionality. When the transponder is ON and in the ALT position the automatic air/ground switch will determine the aircraft status (GND or ALT) and control the transmission of surface/airborne ADS-B messages as appropriate. The transponder and GPS MUST be enabled during all phases of flight including airport surface operations.

7.10. Additional KT 74 Features

The KT 74 provides the pilot with additional features. These features are accessible by pressing the "FUNC" push button and cycling through the features until the desired function is active.

Stopwatch

The stopwatch can be used as a convenient timer. Press the FUNC button to display the stopwatch. Pressing ENT will reset and start the timer. Pressing ENT again will stop the timer.

Flight Timer

The Flight Timer records the time for which the transponder has been powered on and operating in flight mode – either ON or ALT. The flight timer runs while the transponder is reporting airborne status, and stops when the transponder is reporting on ground status. The flight timer is reset when power is removed from the transponder. Press the FUNC button to display the Flight Timer.

Altitude Monitor

The Altitude Monitor activates an aural alert or annunciator light (depending on installation) when the aircraft pressure altitude differs from the selected altitude by more than 200 feet. When Altitude Monitoring is in use, a small deviation pointer appears adjacent to the display on the transponder screen.

This installation is not integrated with an aural alert or annunciator light. When Altitude Monitoring is in use, the only indication will be the deviation pointer adjacent to the display on the transponder.

Press the FUNC button to display the altitude monitor enable screen. Pressing ENT toggles the altitude monitor at the present altitude.

7.11. Low Temperature Operation

The KT 74 is certified to operate correctly down to -20°C, but at low temperatures the display may be impaired. On a cold day you may need to wait for the cockpit to warm up (or preheat) to ensure normal operation.

8. HANDLING, SERVICE, AND MAINTENANCE

8.1. Handling

The KT 74 transponder shall be handled as any other standard piece of avionics equipment. No special considerations are required while the unit is installed in the aircraft, and normal electro-static discharge (ESD) protection shall be followed if the unit is removed from the aircraft.

8.2. Service

No user serviceable components are included in the KT 74 transponder. Any required servicing shall be completed by an appropriately rated FAA approved service center or person.

8.3. Maintenance

Other than for periodic functional checks as required by the FAA regulations, the KT 74 unit has been designed and manufactured "on condition maintenance". There are no periodic service requirements necessary to maintain continued airworthiness.