



NSCM: D2356

Blind Encoder

BE6400-01-(XX)

(for Becker Mode S transponders)

INSTALLATION AND OPERATION

Manual DV 69804.03 / AN 0594.547-071

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INTRODUCTION

1. General

The Blind Encoder BE6400-01-(XX) for Becker Mode S transponders Class 2, Level 2es in accordance with ETSO-C88a and Class 2B in accordance with TSO-C88a is described in this manual "Installation and Operation".

2. Manufacturer

The Blind Encoder was developed and is manufactured by :

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CERTIFIED QUALITY SYSTEM

The Becker quality management system is certified according to :

DIN EN ISO 9001:2000 CERT Reg. - Nr. 12 100 20985

LICENSES AND APPROVALS

DE.21G.0075	Approval as manufacturer to EASA PART 21
DE.145.0166	Approval as maintenance organization to EASA PART 145

3. Safety information

- The installation of the Blind Encoder into an aircraft may be carried out only by an authorized installation company.

4. Layout of manual

The manual is divided into three chapters:

- GENERAL DESCRIPTION
- INSTALLATION
- OPERATION

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5. Revisions of the manual

All changes to the manual are recorded consecutively on the pre-page "Record of Revisions".

6. List of abbreviations

ADLP	Avionics Data Link Processor
ALT	Altitude or transponder ALT mode
ALTS-/+	Data interface for serial encoding altimeter
AN	Article Number
ATC	Air Traffic Control
BFW	Becker Flugfunkwerk GmbH
DV	Manual identification number
EASA	European Aviation Safety Agency
EIA	Electronic Industry Association
ETSO	European Technical Standard Order
EUROCAE	European Organization for Civil Aviation Equipment
FAA	Federal Aviation Administration
FL	Flight Level
ft	feet
GND	Ground
ID	Identifier
NSCM	Nato Supply Code of Manufacturers
RF	Radio Frequency
RTCA	Radio Technical Commission for Aeronautics
SI	Surveillance Identifier
SUPP	Equipment supply voltage DC
TSO	Technical Standards Order
XPDR	Transponder

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GENERAL DESCRIPTION

1. Application

Together with the Becker Mode S transponder BXP6401/BXP6402 the Blind Encoder BE6400-01-(XX) forms the aircraft part of the air traffic control system.

2. General description

- A. The blind encoder is designed for use with BXP6401 single block mode S transponder and with the BXP6402 remote unit mode S transponder.
- B. The equipment is intended to be connected to the J8 unit connector of the transponders BXP6401/BXP6402 and can be used only in installations that do not require connection of other equipment utilizing ADLP interface of the transponder.
- C. The equipment provides a static port for connection to the aircraft static port.
- D. The blind encoder is supplied via the transponder, no separate power connection is required.
- E. The equipment is intended only for direct connection to the transponder, without any interwiring.



Fig. 1-1 Blind Encoder BE6400-01-(XX)

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3. Technical data

A. General data

Power supply	supplied through pin 4 of XPDR (BXP640X unit connector J8)
Equipment input voltage	3.2 to 6.0 V DC
Current consumption	max. 12 mA
Start-time of reporting altitude	≤ 1.5 seconds
Measurement range	-1000...20000 ft
Altitude increments	100 ft
Pressure data interface	RS-422 serial, compatible to BXP640X and ALT mode UPS/AT
Data transfer:	
- Baud rate	1200
- No of data bits	8
- No of stop bits	1
- Parity	None
Operating altitude	up to 20000 ft
Operating temperature range	- 15° C to + 55° C
Storage temperature range	- 40° C to + 85° C
Environmental conditions	in accordance with EUROCAE/RTCA ED-14D/DO-160D (see section C.)
Insulation resistance between case and electrical circuits	> 5 MΩ
Mechanical dimensions	62.9 x 63 x 14.8 mm (L x W x H) (2.476 x 2.480 x 0.583 inch)
Weight	approx. 100 g (0.225 lb)

B. Altitude data output

The equipment is provide an output for transmission of altitude and status reports. The output is differential and provide voltage levels compatible with EIA-422 standard:

Logic state	Non-inverting output	Inverting output
0	max. 0.5 V	min. 2.2 V
1	min. 2.2 V	max. 0.5 V

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C. Environmental qualification

EUROCAE/RTCA ED-14D/DO-160D

Condition	Section	Cat.	Description
Temperature and Altitude	4.0	A4	
Low Ground Survival Temperature	4.5.1	A4	-40 deg C
Low Operating Temperature	4.5.1	A4	-15 deg C
High Ground Survival Temp.	4.5.2	A4	+85 deg C
High Operating Temp.	4.5.2	A4	+55 deg C
In-flight Loss of Cooling	4.5.4	Z	No forced cooling required – No test required
Altitude	4.6.1	A4	20,000 ft
Decompression	4.6.2	A4	20,000 ft
Overpressure	4.6.3	A4	-15,000 ft
Temperature Variation	5.0	B	5 deg C/min
Humidity	6.0	A	Standard humidity environment
Shock and Crash Safety	7.0	B	Fixed-wing aircrafts and helicopters
Vibration	8.0	S U	Cat. S, vibrations test curve M Cat. U, vibrations test curve G
Explosion Proofness	9.0	X	No test required
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	1 deg deflection at 0.3 m
Power Input	16.0	B	
Voltage Spike	17.0	A	
Audio Freq. Conducted Susceptibility	18.0	X	
Induced Signal Susceptibility	19.0	A	Interference-free operation desirable
Radio Frequency Susceptibility	20.0	WW	Interim High Intensity Ratiated Fields
Spurious RF Emission	21.0	B	Equipment where interference should be controlled to a tolerable level
Lightning Induced Transients Susceptibility	22.0	A3 E3	Pin test waveform A, level 3 Cable bundle test waveform E, level 3
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge	25.0	A	Equipment operated in an aerospace environment

Note: With exception of the overpressure test (Section 4.6.3 of EUROCAE/RTCA ED-14D/DO-160D) all qualification tests were applied to the combination BECKER BXP6401 and BECKER BE6400.

4. Software

The Blind Encoder BE6400-01-(XX) is controlled by a microcontroller. The software criticality is determined to be **Level C** in accordance with EUROCAE/RTCA document ED12B/DO-178B.

5. Approvals

EASA

ETSO-C88a

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6. Equipment

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Article-No. 0592.137-915

7. Accessories

Air pressure tube, e.g. Polyurethane tube, blue from LEGRIS
(outer diameter 6 mm, inner diameter 4 mm)

Manual "Installation and Operation"

Article-No. 0594.547-071

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INSTALLATION

1. General

Installation of the Blind Encoder BE6400-01-(XX) is depending on the aircraft type and its classification as well as requirements. Therefore, only general information can be provided in this section.

2. Inspection before installation

Before the blind encoder is installed on an aircraft, a visual inspection for possible transport damages shall be done.

Please look out for the following defects:

- (1) Dirt, dents, scratches, corrosion, broken fastening elements on connector housing and housing parts.
- (2) Dirt and scratches on nameplate and inscriptions.
- (3) Dirt, bent or broken pins, cracked insert of equipment connector.
- (4) Missing screws.

3. Mechanical installation

The blind encoder is designed for installation in an aircraft together with the Becker Mode S transponder BXP6401 or BXP6402. The equipment is capable of being mounted to the J8 unit connector of the transponder. To the mechanical stabilization the blind encoder must be fastened with a device at the housing of the transponder (see Fig. 2-1). The outline dimensions of the blind encoder are given in Fig. 2-2.

The sensor of the blind encoder must be connected with the outer air over a flexible air pressure tube (see accessories in section General Description). The inner diameter of the air pressure tube must be 4 mm. The sensor therefore gets the outer air pressure of the respective aircraft for the altitude measuring.

Note: The protection cover must be removed before connect the air pressure tube.



Fig. 2-1 Assembled Blind Encoder with Mode S transponder

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4. Aircraft wiring

A. Pin connections of the unit connector P8 (for BXP6401 and BXP6402)

The unit connector type is a D-SUB 25-pole male connector.

Pin ID	Name	Direction	Function
1	-	-	-
2	-	-	-
3	GND	-	Signal and supply return
4	SUPP	In	Equipment supply
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-
10	-	-	-
11	-	-	-
12	ALTS-	Out	Altimeter receiver input inverting
13	ALTS+	Out	Altimeter receiver input-non-inverting
14	-	-	-
15	-	-	-
16	-	-	-
17	-	-	-
18	-	-	-
19	-	-	-
20	-	-	-
21	GND	-	Signal and supply return
22	-	-	-
23	-	-	-
24	-	-	-
25	-	-	-

5. Configuration setting of the transponder

After the installation of the equipment, the configuration setting of the transponder must be adapted in the following way (supposing that programmed Address Module and antenna are connected):

- (1) Switch the transponder to "SBY" and press the "SEL" button.
- (2) Turn the rotary knob until "INS" appears in the lower left corner of the display.
- (3) Press the rotary button. "PASSWORD" appears in the display.
- (4) Enter "6435" by turning the rotary knob and press it to go to the next digit.
- (5) Press the "STO" button. The display shows ALTM SELECT".
- (6) Check if "UPS AT" is marked. If yes, go to (9).
- (7) Turn the rotary knob until "UPS AT" is highlighted.
- (8) Press the "STO" button to select "UPS AT".

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- (9) Press the rotary button until "SPECIALS" appears in the display.
- (10) Check if "ALTM HIGH RESOL" is marked. If yes, go to (13).
- (11) Turn the rotary button to select "ALTM HIGH RESOL".
- (12) Press the "STO" button to set high resolution.
- (13) Press the rotary button until "ERROR LATCHES" appears in the display.
- (14) Turn the rotary button to select "CLEAR LATCHES".
- (15) Press the "STO" button to clear the error latches.
- (16) Press the SEL" button to leave the menu.

Configuration is complete now.

6. Checking after installation

A. General

After the installation, check the blind encoder in conjunction with the corresponding transponder to ensure satisfactory operation of the equipment.

B. Pre-flight check

Switch the Mode S transponder to "ALT" and check the correct flight level is displayed.

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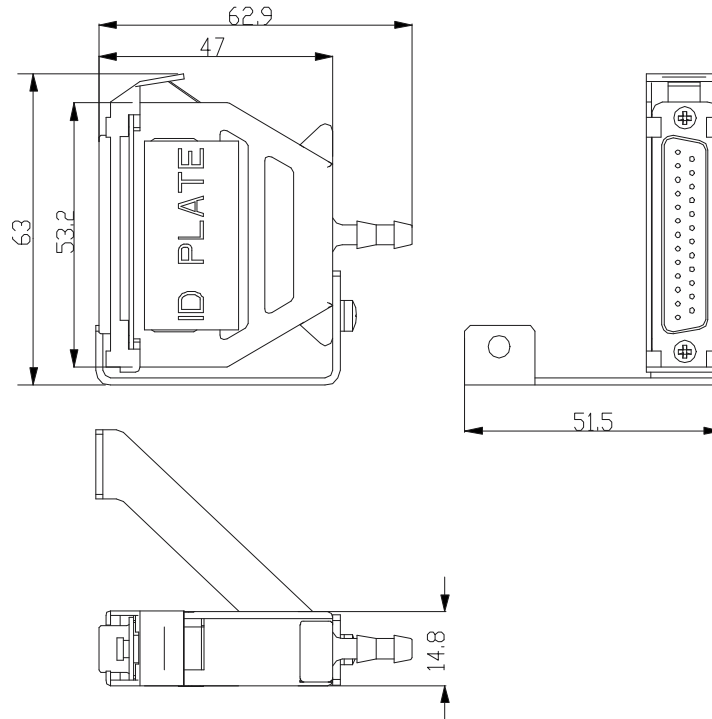


Fig. 2-2 Outline dimensions BE6400-01-(XX), measures in mm

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OPERATION

1. Operating instructions

- A. The operation of the Blind Encoder is controlled by the Becker Mode S transponder BXP6401 or BXP6402.
- B. Place the Mode S transponder in the altitude reporting mode to transmit the altitude data. Blind encoder which transmit RS-422 data provide continuous data to RS-422 devices.
- C. The start time of altitude reporting is ≤ 1.5 seconds.

2. Flight level indication

The altitude flight level is indicated in the bottom row of the Mode S transponder display (altitude = FL x 100 in ft).

Faulty measurements of the blind encoder are displayed in the bottom row by "---" indication instead of altitude reports.

3. Behavior in the fault case

In case of a failure the altitude indication has to be turned off, i.e. switch the Mode S transponder to ON using the mode switch.

The pilot must make up, whether he can fly on without altitude information, or whether he must leave the corresponding airspace.

4. Check the blind encoder

The blind encoder has to be checked for function and data retention in the context of the annual check of the aircraft. If at this deviations are stated, then the blind encoder must be calibrated or overhauled in the manufacturer factory.

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