

Service Info No. 86/14
Installation of PowerFLARM in DG single seaters

General notes for PowerFLARM installation: Each sailplane or motorglider may be equipped with different instrumentation, therefore it is not possible to give precise installation instructions which will meet each existing instrumentation.

This Service Info provides an overview of useful Power FLARM installations already performed. FLARM and POWERFLARM equipment is not part of the required minimum equipment. Therefore it's not necessary to approve each installation separately. Use TN DG-G-07 as means of approval for PowerFLARM installations.

Warning:

1. Frequencies: In the USA and in Australia different frequencies are used for FLARM than in the rest of the world. USA 915 MHz, Australia 921 MHz, others 868 MHz. This means that both FLARM and PowerFLARM units and antennas for USA and Australia are different to those for the rest of the world. As there is only some MHz difference for the frequencies used in USA and Australia the PowerFLARM unit and the FLARM antennas will be delivered such that they will suit both frequencies.

2. Differences of the core units: The version of PowerFLARM core units may be determined from the data plate:

FLAPFCxxAxxxxxx for USA and Australia and FLAPFCxxExxxxxx for the rest of the world, x are serial No.s.. The polarity of the antenna sockets is reversed.

3. Differences of the antennas: For USA and Australia: the connector of the FLARM antenna is equipped with a centre socket, the connector of the ADS-B antenna is equipped with a centre pin. As the ADS-B-Antenna is the same all over the world also an antenna with a centre socket may be used together with an adapter with 2 centre pins.

For the rest of the world: the connector of the FLARM antenna is equipped with a centre pin and the connector of the ADS-B antenna is equipped with a centre socket.

General hints for antenna installations:

- a) FLARM Antennas are marked with a red heat shrink tubing at the connector,
ADS-B Antennas are marked with a blue (or black) heat shrink tubing at the connector.
- b) Mount antennas vertically.
- c) Don't kink or bend antennas.
- d) Antennas shouldn't touch other components, of course except for the antenna mounting.
- e) Antennas should have large distance to electrically conductive material (e.g. steel, carbon fibres), FLARM-antennas minimum 100mm).
- f) Antennas should have the max. possible distance from each other.
- g) Don't extend the antenna wire, buy antennas with long enough wires.
- h) If you mount antenna wires with cable-ties make sure not to squeeze the wire by over-tightening the cable ties.

1. Necessary parts:

1 x PowerFLARM-Set consisting of core unit and antennas

FLARM-displays as desired

Depending on the kind of installation additional antennas, cable-ties and other parts and material as given in the following instructions

2. Installation of the core unit

The instrument tower provides enough space for the PowerFLARM-Core unit. Fix the unit with cable-ties or tape to the instrument lines.

Connect the power supply to + and – wires already existing in the instrument tower. The positive supply wire must be equipped with an on/off switch and a 0.5 A fuse. Install switch and fuse holder on the instrument panel, mark fuse and holder.

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3. Antenna installations

An overview of the installation versions is shown on the attached drawing Z210.

3.1 FLARM and/or ADS-B antenna Version 1

Installation of a single FLARM-antenna or of a single ADS-B-antenna or of both antennas on the instrument panel cover.

3.1.1 Additionally needed parts:

1 x BD-9 FLARM-Antenna (supplied by DG), you must indicate if the antenna should be used in USA, Australia, or in the rest of the world.

1 x BD-9 ADS-B-Antenna (supplied by DG)

1 x or 2x SMA-Reverse-sockets 50 Ω brass, gold plated (Conrad Elektronik order no.:734387 – 62)

1 x or 2x 0,4m LowLoss antenna wire 50 Ohm

1 x SMA-plug with centre socket for FLARM-Antenna

1 x SMA- plug with centre pin for ADS-B-Antenna

Aluminium foil or tape

3.1.2 Installation:

The installation should be performed according to drawing Z212 page 1.

- a) Drill a dia. 6,5mm hole according to drawing Z212 page 1 through the upper side of the instrument panel cover.
- b) Cut out a sheet of aluminium foil according to drawing Z212 page 2 and glue into the cover for 1 or 2 antennas.
- c) Determine the length of the antenna wire and install an SMA-plug with centre pin to one end of the wire for the FLARM antenna resp. a plug with a centre bush for the ADS-B-Antenna (reverse USA and Australia).
- d) Install a SMA-Reverse-socket to the other end of the wire and push the socket with the nut from the inside through the hole according to drawing Z212 page 1. The nut must contact the aluminium foil.
- e) Fasten the socket from the top with a toothed washer and nut (supplied with the socket).
- f) Screw on the BD-9 antenna.
- g) Connect the antenna wire with the core unit.



Inside of the instrument panel cover with aluminium foil and wiring for 2 Antennas

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3.2 FLARM-Antenna Version 2:

In case an ELT-Antenna BD3 according to drawing Z191 is installed on top of the instrumentpanel cover the BD3's ground plane may be used as ground plane for a single BD-9 FLARM -Antenna.

3.2.1 Additionally needed parts:

- 1 x BD-9 FLARM-Antenna (supplied by DG or by the manufacturer Dolba & Dolba), you must indicate if the antenna should be used in USA, Australia, or in the rest of the world.
- 1 x SMA-Reverse-sockets 50 Ω brass, gold plated (Conrad Elektronik order no.:734387 – 62)
- 1 x 0,4m LowLoss antenna wire 50 Ohm
- 1 x SMA-plug with centre socket for FLARM-Antenna

3.2.2 Installation:

The installation should be performed according to drawing Z213.

- a) Drill dia. 14 mm and dia. 18 mm holes according to drawing Z213 page 1 up to the ELT-Antenna BD3.
Z213 page 2 shows the hole in the ELT-Antenna.
- b) Determine the length of the antenna wire and install an SMA-plug with centre pin to one end of the wire for the FLARM antenna (resp. a plug with a centre bush for USA and Australia).
- c) Install a SMA-Reverse-socket to the other end of the wire and push the socket with the nut and toothed washer from the lower side through the holes according to drawing Z213 page 1.
- d) Fasten the socket from the upper side with the nut (nuts and washers supplied with the socket).
- e) Screw on BD-9 antenna.
- f) Connect antenna wire to the core unit.

3.3 ADS-B-Antenna Version 2:

When installing the FLARM-Antenna according to section 3.2 you should choose the small Dipole antenna as ADS-B-antenna and mount it to the front side of the instrument panel cover.

3.3.1 Additionally needed parts:

- 1 x small ADS-B-Dipole antenna (supplied with PowerFLARM)
- 1 x SMA- plug with centre pin for ADS-B-Antenna
- 1 x PVC-tube (Dia. 10 mm outside, dia. 7.2 mm inside; 100mm long)
- 1 x bush Z214/1
- 1 x GFRP plate Z214/2

3.3.2 Installation:

The installation should be performed according to drawing Z214.

- a) Prepare PVC-tube according to drawing Z214.
- b) Glue GFRP plate Z214/2 to inside of the instrument panel cover.
- c) Drill a dia. 7.5 mm hole through GFRP plate and instrument panel cover for bush Z214/1.
- d) Push bush Z214/1 into the hole and fix with suitable glue (e.g. Uhu Plus).
- e) Remove the SMA-plug from the antenna wire and route through the PVC-tube and bush.
Reinstall SMA-plug.
- f) Glue Dipole antenna into the PVC-tube.
- g) Push PVC-tube onto the bush and fix with suitable glue (e.g. Uhu Plus).
- h) Connect antenna wire to the core unit.

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3.4 FLARM and /or ADS-B Antenna Version 3

The small Dipol-antennas (supplied with PowerFLARM) may be glued to both sides of the instrument panel cover. This is the simplest installation method, however there is the risk to damage or tear off an antenna when climbing into the cockpit.

3.4.1 Additionally needed parts:

None

3.4.2 Installation:

The installation should be performed according to drawing drawing Z215.

- a) Drill dia. 10 mm holes for the wires according to drawing Z215 and route antenna wires through the holes.
- b) Fix small Dipole-antennas for FLARM and ADS-B to the instrument panel cover according to drawing Z215 using the self adhesive tape installed to the antennas.
- c) Connect antenna wires to the core unit.

3.5 + 3.6 Additional FLARM-Antenna at the fuselage bottom

To improve the range of FLARM below the glider a second FLARM-Antenna may be connected to the PowerFLARM unit. The unit must be cleared by the supplier (Butterfly) for the use of the second antenna. The second antenna is only for receiving, not for transmitting.

3.5 FLARM-Antenna variant with non flexible antenna:

3.5.1 Additionally needed parts:

- 1 x Original "Zahnstocher"- FLARM Antenna (Part no.: 110160 from Ülis Segelflugbedarf)
- 1 x SMA-Reverse-socket 50 Ω brass, gold plated (Conrad Elektronik Part no.: 734387 – 62)
- 1 x 3m LowLoss antenna wire 50 Ohm
- 1 x SMA-plug with centre pin

3.5.2 Installation:

The installation should be performed according to drawing Z216, the installation may be performed on the left or right hand side depending on the available space.

- a) Mark the hole from the inside according to drawing Z216 and so, that a ground plane (see b)) with dia. 160 mm can be installed. Drill with dia. 3 mm from the inside. Then enlarge the hole from the outside to dia. 6.5 mm, otherwise the paint may be damaged.
- b) Cut out a dia. 160 mm sheet of aluminium foil and glue into the fuselage centered to the hole (see above).
- c) Determine the length of the antenna wire and connect an SMA-plug with centre pin to one end of the wire.
- d) Install a SMA-Reverse-socket to the other end of the wire and push the socket with the nut from the inside through the hole according to drawing Z216. The nut must contact the aluminium foil.
- e) Fasten the socket from the outside with a toothed washer and nut (supplied with the socket).
- f) Screw antenna to the socket.
- g) Route the antenna wire through one of the empty tubes under neath the tube for the oxygen bottle to the front. Connect antenna to the core unit.

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3.6 FLARM-Antenna variant with flexible Antenna:

3.6.1 Additionally needed parts:

1 x Flexible FLARM Antenna (e.g.: Part No. 1.0.0.0017 from Butterfly/Garreht)
1 x rubber grommet dia.8 mm inside, 16 mm outside

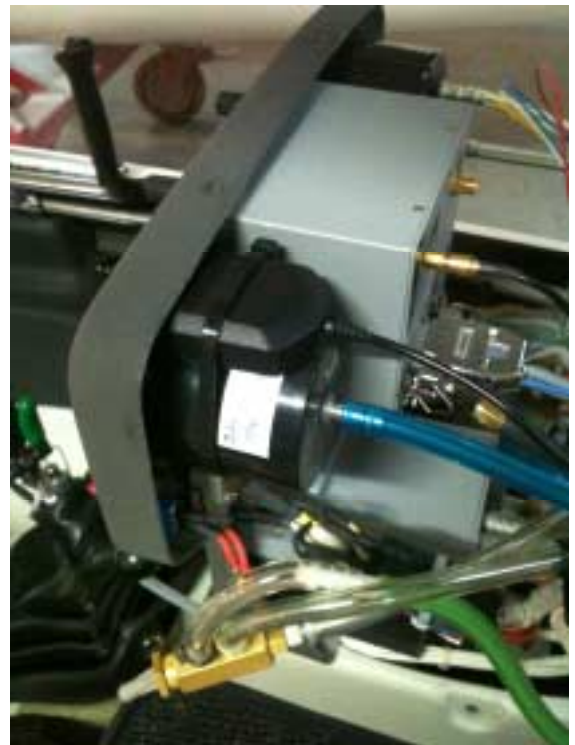
3.6.2 Installation:

The installation should be performed according to drawing Z217, the installation may be performed on the left ore right hand side depending on the available space.

- a) Mark the hole from the inside according to drawing Z217. Drill with dia. 3 mm from the inside. Then enlarge the hole from the outside to dia. 10 mm, otherwise the paint may be damaged.
- b) Install the grommet into the hole.
- c) Slide the antenna half-length from the inside into the grommet.
- d) Fix the antenna wire with cable-ties at suitable places.
- e) Route the antenna wire through one of the empty tubes under neath the tube for the oxygen bottle to the front. Connect to the core unit.

3.7 GPS-Antenna

The GPS antenna is best to install underneath the instrument panel cover. Make sure that there are no metallic or electric components above the antenna. Install the GPS-Antennas with the largest distance possible from each other. E.g. install the FLARM-GPS-Antenna at the right hand side and the GPS-Antenna of the gliding computer at the left and side. Don' install antenna below the compass.



Example: GPS-Antenna fixed with cable ties to the altimeter.

4. Display

Install the display at a suitable position on the instrument panel. Connect the display to the core unit.

5. Attachments:

Mounting instruction for SMA-plugs and SMA reverse sockets
Drawings: Overview Z210, Installation drawings Z212 up to Z217

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Mounting instruction for SMA-plugs

Abisoliermaße *stripping instruction*

① 3.5 4.5 10

② 3.5 4.5 13.5

Folie bündig mit Geflecht *
 foil even with braid *

Kontaktstift *contact pin*

Crimprohr *crimp ferrule*

weichlöten
 solder

Gehäuse *housing*

Crimpbereich
 crimp area

Abschirmung *braid*

Folie in den Crimpanschluß schieben*
 foil goes inside housing*

* nur für Kabel mit Folie / *only for cables with foil*

XX	Crimpeinsatz <i>crimp insert</i>	6kt.1 x Länge <i>hex1 x length</i>	6kt.2 x Länge <i>hex2 x length</i>	Abisoliermaße <i>stripping instruction</i>
03	N01003A0009		3.25x8	①
05	N01003A0005		5.41x8	②
13	N01003A0010		2.67x8	①
14	N01003A0014		3.65x8	①

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Mounting instruction for SMA reverse sockets

Abisoliermaße *stripping instruction*

Kontaktbuchse *contact socket* weichlöten *solder* Crimprohr *crimp ferrule*

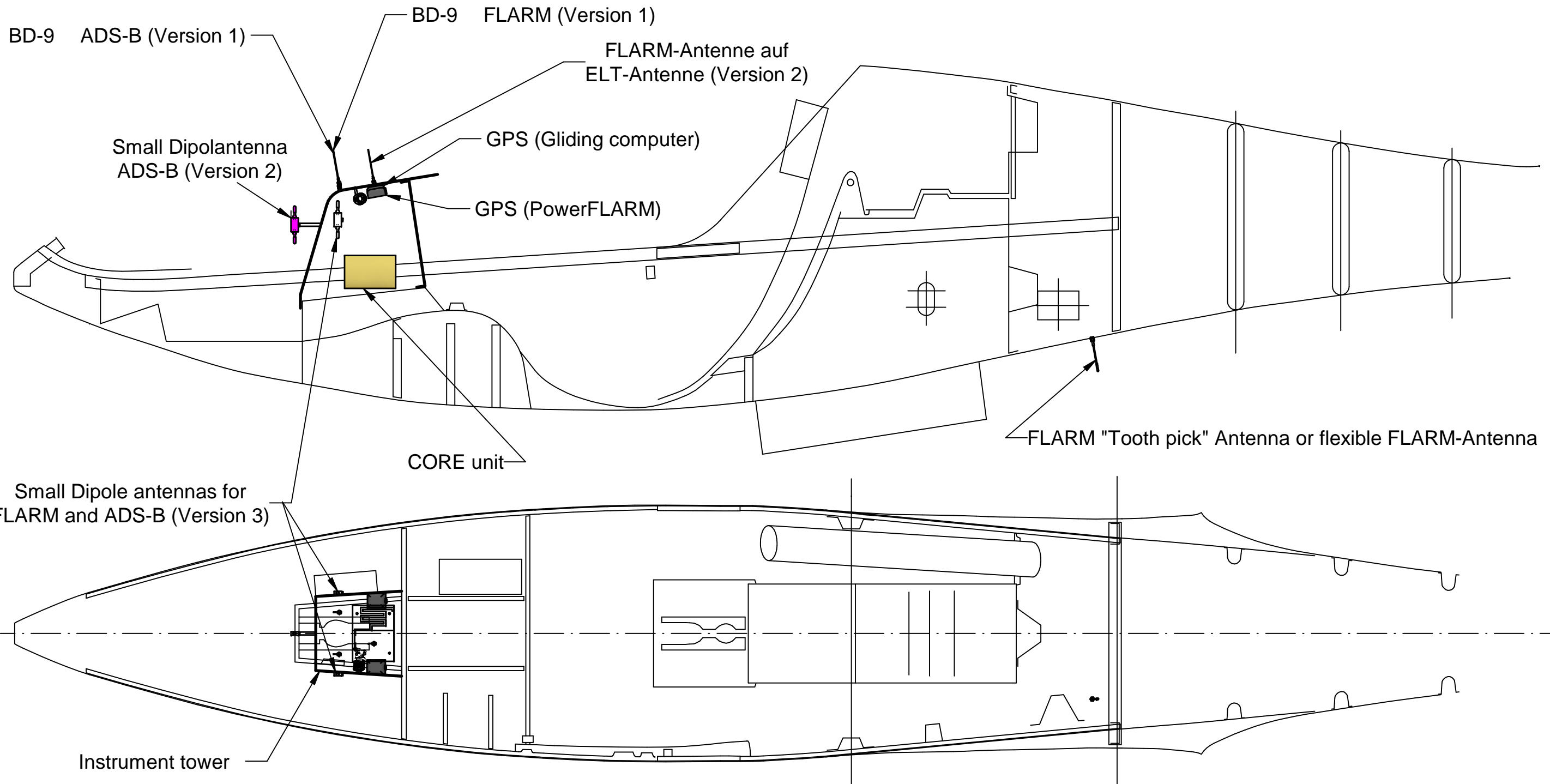
Gehäuse *housing* Crimpbereich *crimp area* Abschirmung *braid*

hex2

Folie in den Crimpanschluß schieben*
*foil goes inside housing**

* nur für Kabel mit Folie / *only for cables with foil*

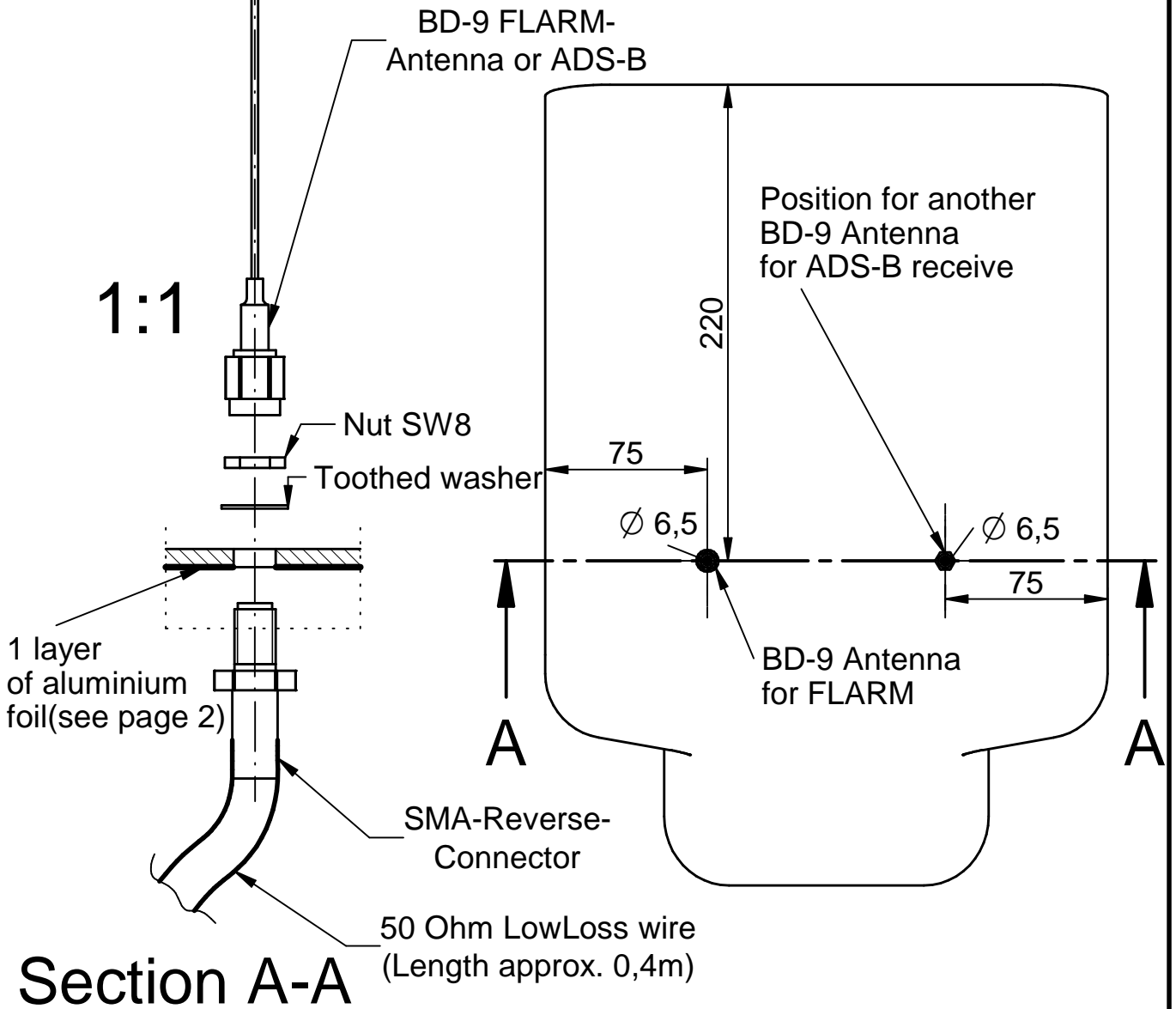
XX	Crimpeinsatz <i>crimp insert</i>	6kt.1 x Länge <i>hex1 x length</i>	6kt.2 x Länge <i>hex2 x length</i>	Abisoliermaße <i>stripping instruction</i>	
03	N01003A0009		3.25x8	①	
05	N01003A0005		5.41x8	②	
14	N01003A0014		3.65x8	①	



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Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1					Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2	
Gez.					15.01.14	Donkels			 Z210
Gepr.									
Norm.							von 1		
					Maßstab:	Installation position PowerFLARM DG-single seaters			
					1:10				
					Maße ohne Toleranzang. nach: ISO2768-m				
Ausg.	Änderung	ab Wnr	Datum	Name					

Note: All screwed joints are 1/4".
So use the supplied nuts with
the connectors only



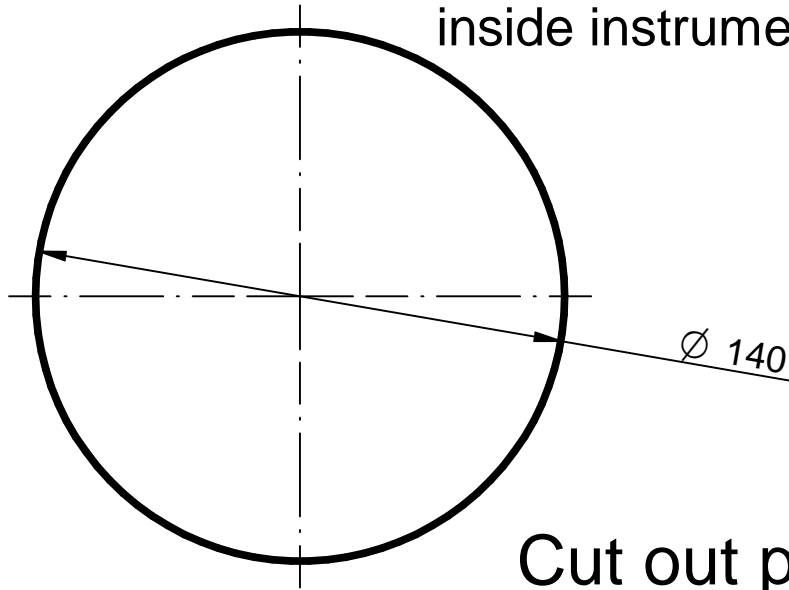
Section A-A

SMA- Reverse-Connector 50 Ohm, with 2 nuts and
toothed washer. Conrad Best.-Nr.: 734387 - 62
Install without centre pin

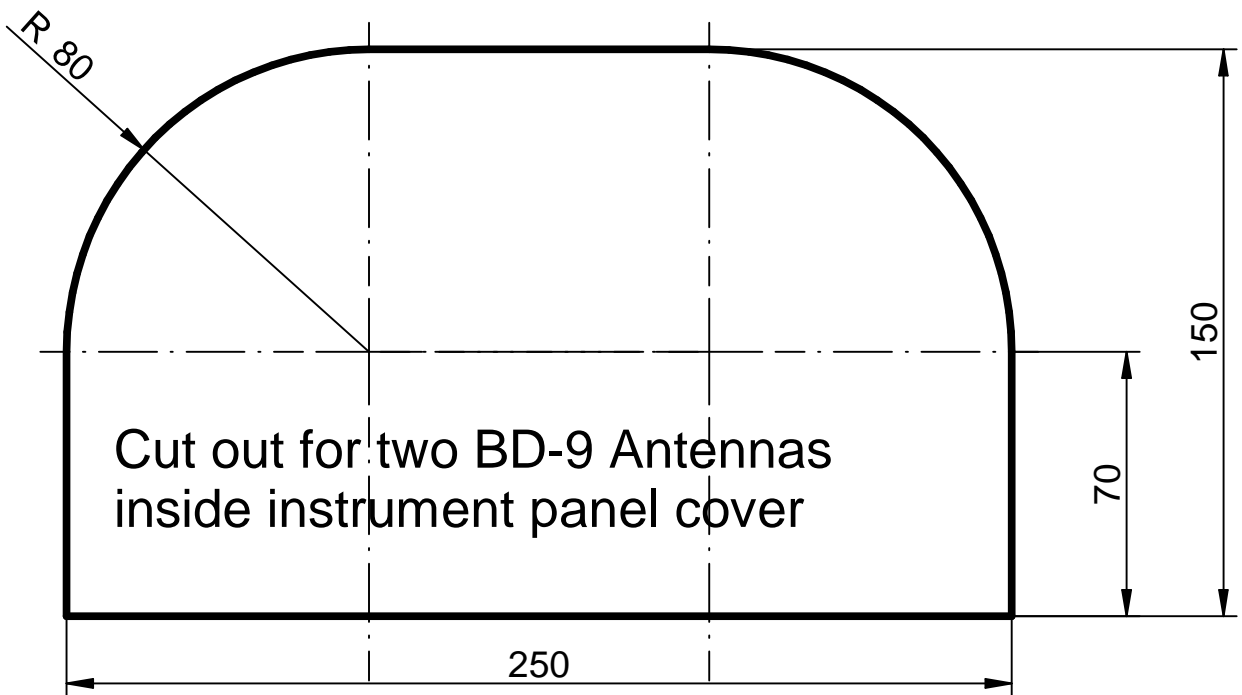
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Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant	
1							
Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1			Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2	
			Gez.	16.01.14			Donkels
			Gep.				
				Norm.			
			Maßstab: 1:2	Installation BD-9 Antenna on instrument panel cover. Single seaters		 DG Flugzeugbau GmbH Z212	
			Maße ohne Toleranz- ang. nach: ISO2768-m				
Ausg.	Änderung	ab Wnr	Datum	Name	Seite 1 von 2		

Cut out for one BD-9 Antenna
inside instrument panel cover



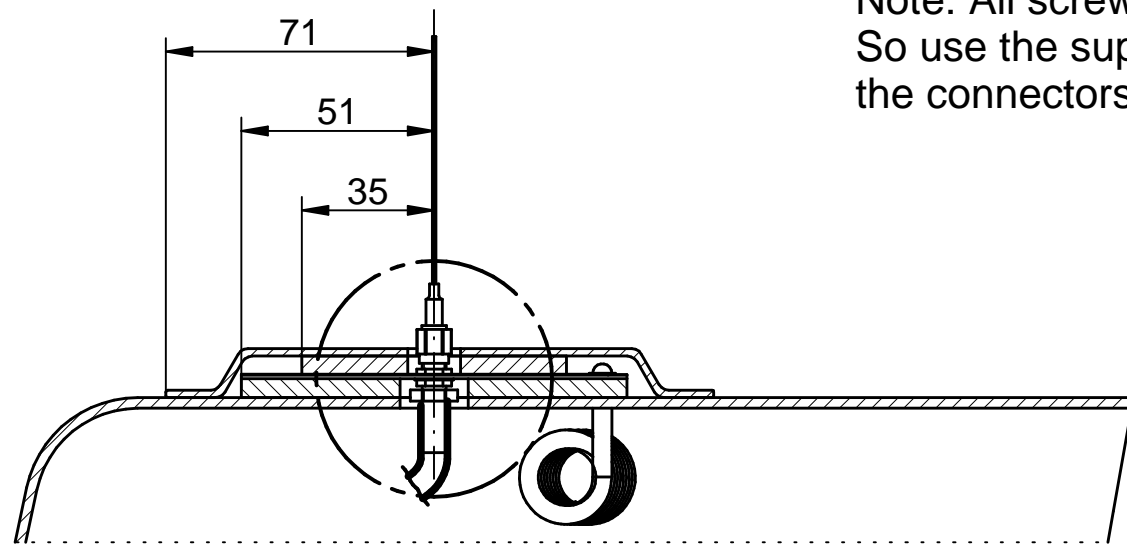
Cut out patterns for
aluminium foil



Cut out for two BD-9 Antennas
inside instrument panel cover

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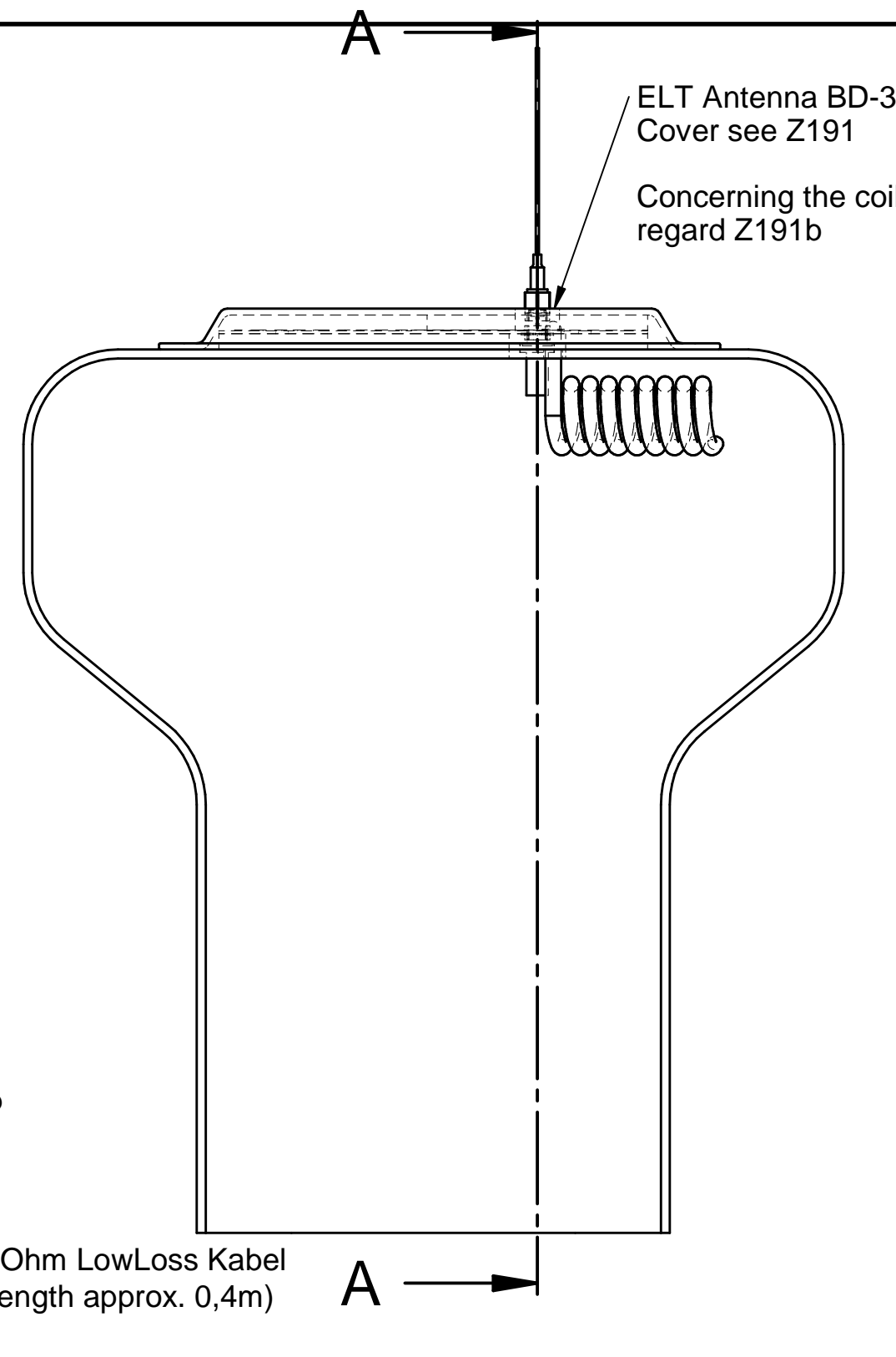
1										
Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant				
Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1				Gez.	Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2		
				Gepr.	16.01.14	Donkels				
				Norm.						
				Maßstab: 1:2	Installation BD-9 Antenna on instru- ment panel cover. Single seaters			DG Flugzeugbau GmbH Z212		
				Maße ohne Toleranz- ang. nach: ISO2768-m						
Ausg.	Änderung	ab Wnr	Datum	Name	von 2					



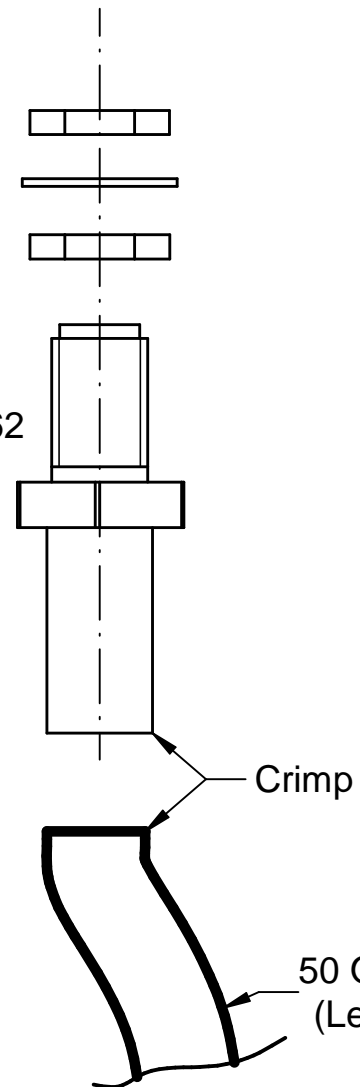
B
Schnitt A-A

Note: All screwed joints are 1/4".
So use the supplied nuts with
the connectors only

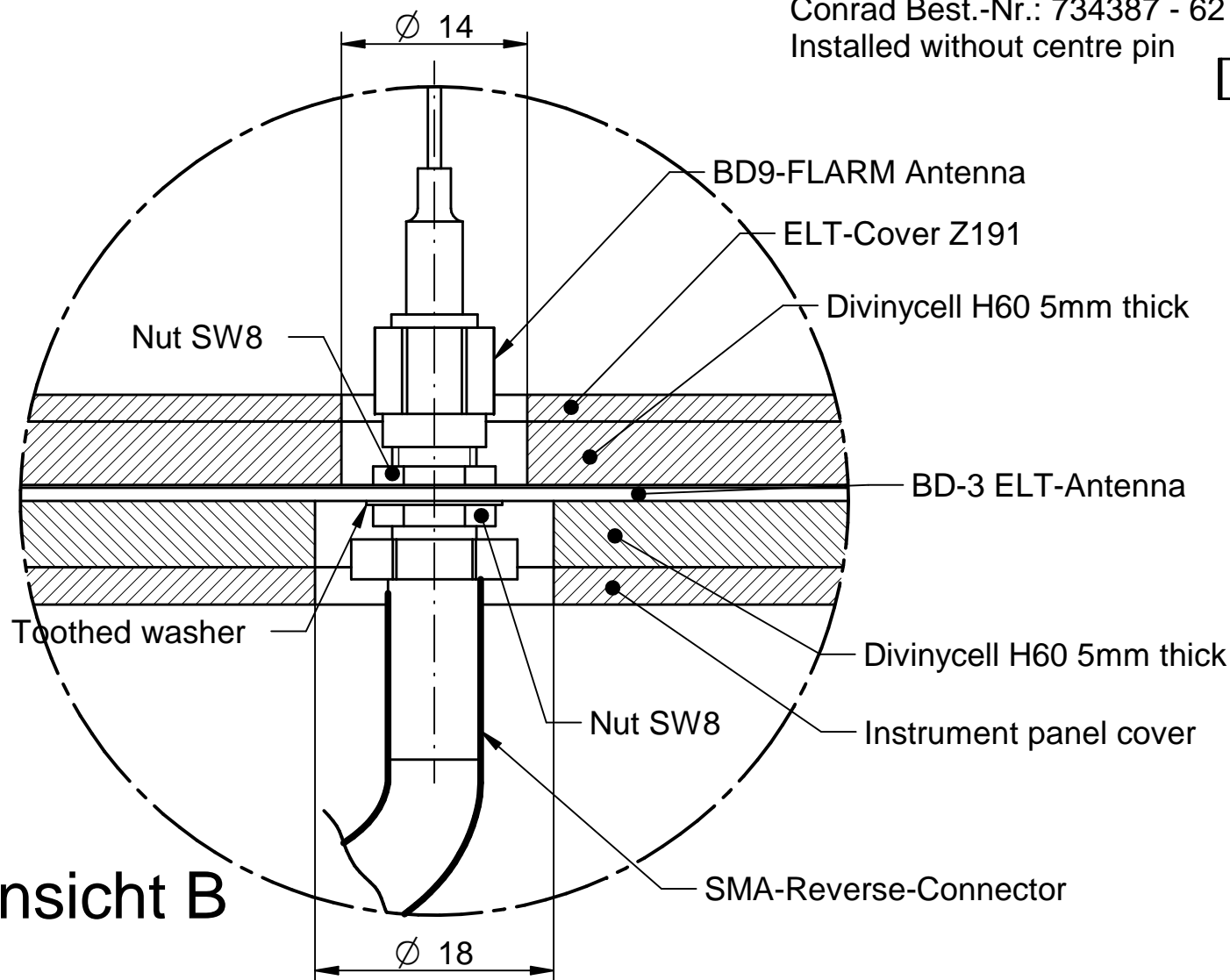
SMA- Reverse-Connector
50 Ohm, with 2 nuts and
toothed washer
Conrad Best.-Nr.: 734387 - 62
Installed without centre pin




ELT Antenna BD-3
Cover see Z191
Concerning the coil
regard Z191b



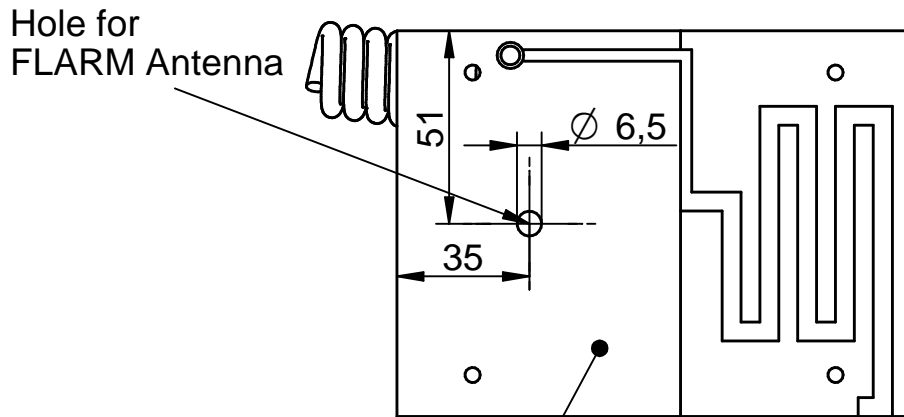
50 Ohm LowLoss Kabel
(Length approx. 0,4m)



Ansicht B

1	Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant
				Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1	Datum 14.11.13	Name Donkels	DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2
					Gez.		
					Gepr.		
					Norm.		
					Maßstab: 1:2 (2:1)	Installation BD-9 FLARM-Antenna together with BD-3 ELT-Antenna on instrument panel cover DG-Single seaters	
					Maße ohne Toleranz- ang. nach: ISO2768-m	 DG Flugzeugbau GmbH Z213	
					Ausg.	Änderung	ab Wnr
							Datum
							Name

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ELT Ground plane

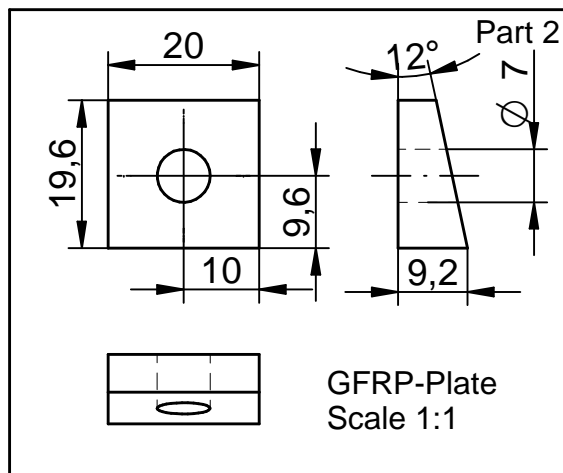
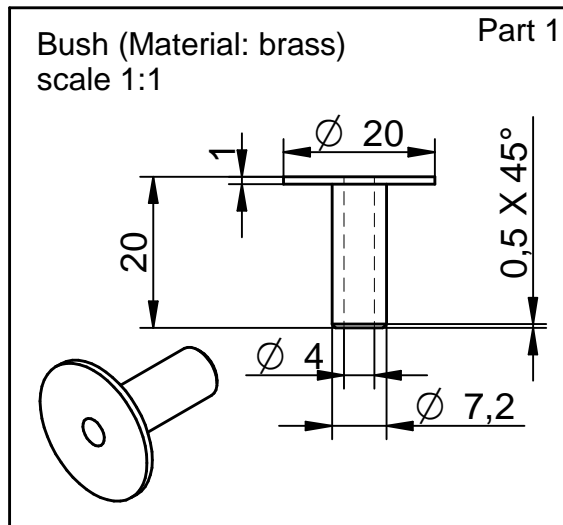
The hole must be drilled on the ground plane area

The hole is for a 1/4" thread, so a 1/4" drill may be used

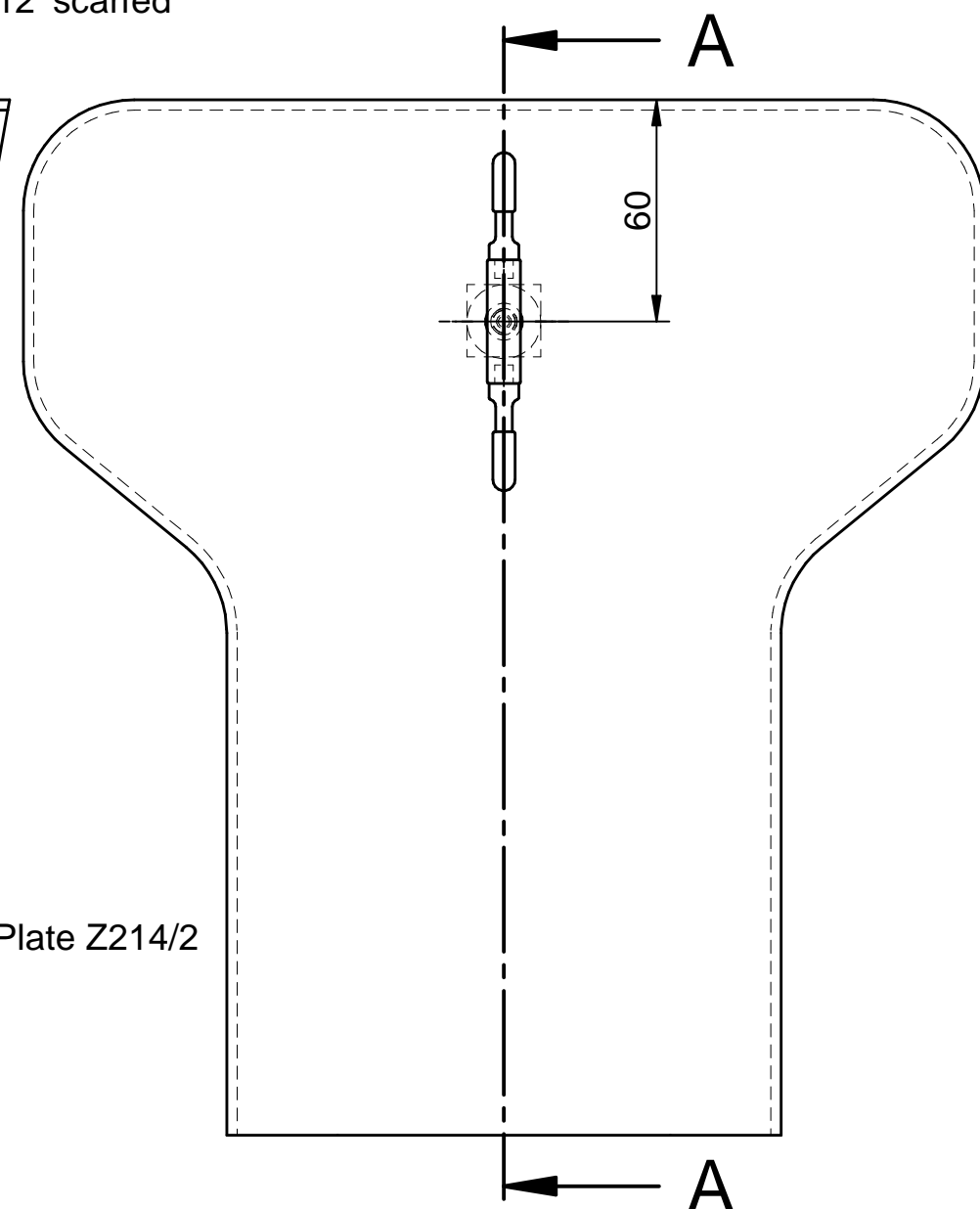
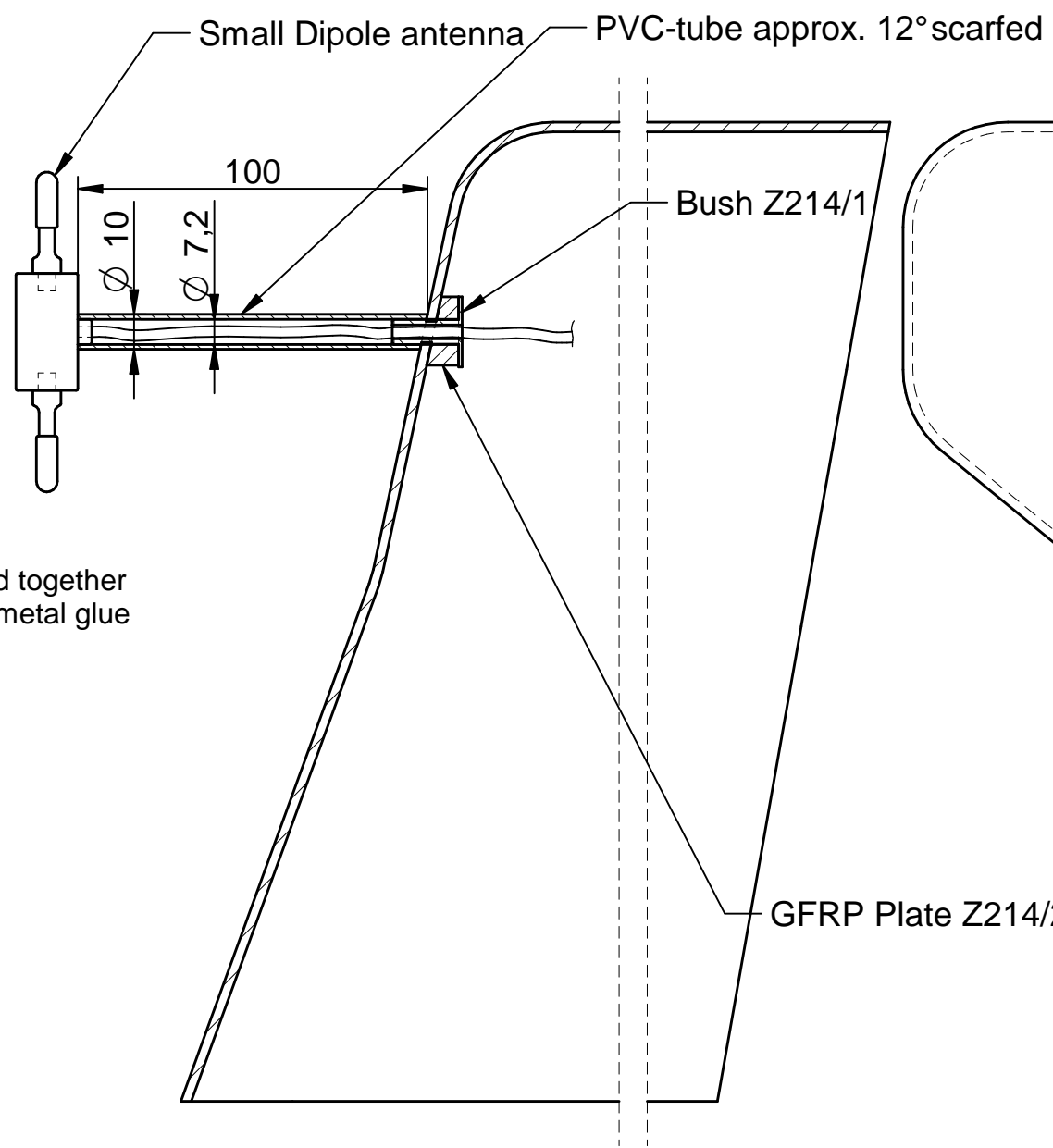
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Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1					Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2	
					Gez.	14.11.13			Donkels
					Gepr.				
					Norm.				
					Maßstab:	Hole in ELT- antenna BD-3 for FLARM-antenna		 DG Flugzeugbau GmbH Z213	
					1:1				
					Maße ohne Toleranz- ang. nach: ISO2768-m			Seite 2	
Ausg.	Änderung	ab Wnr	Datum	Name			von 2		

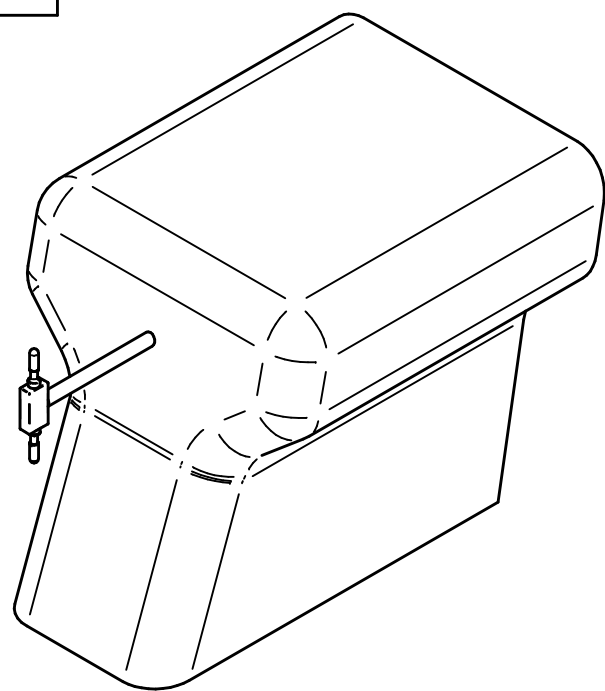
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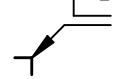



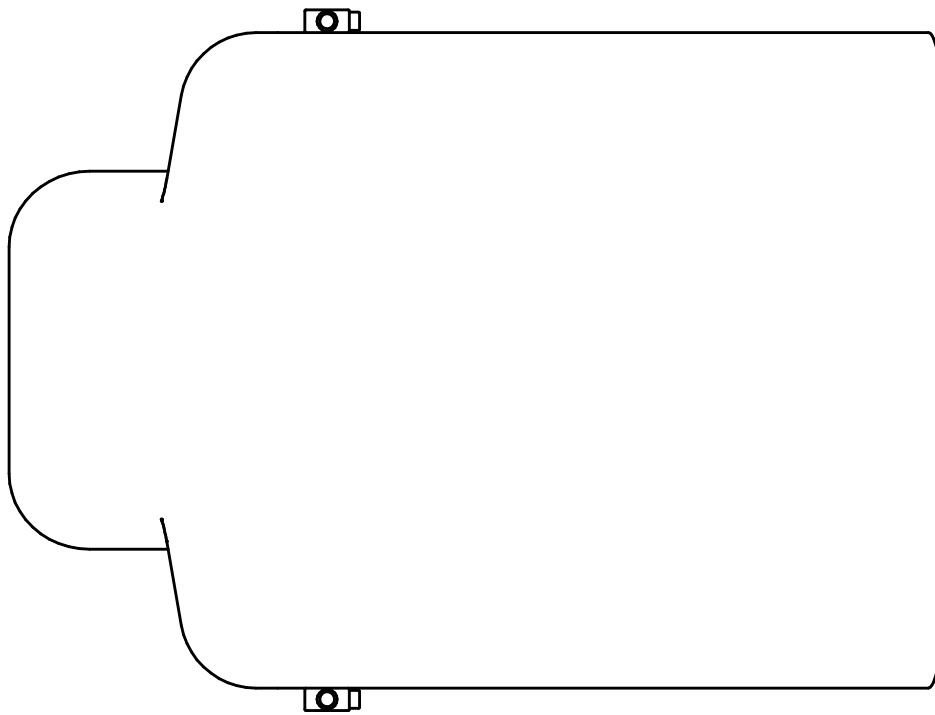
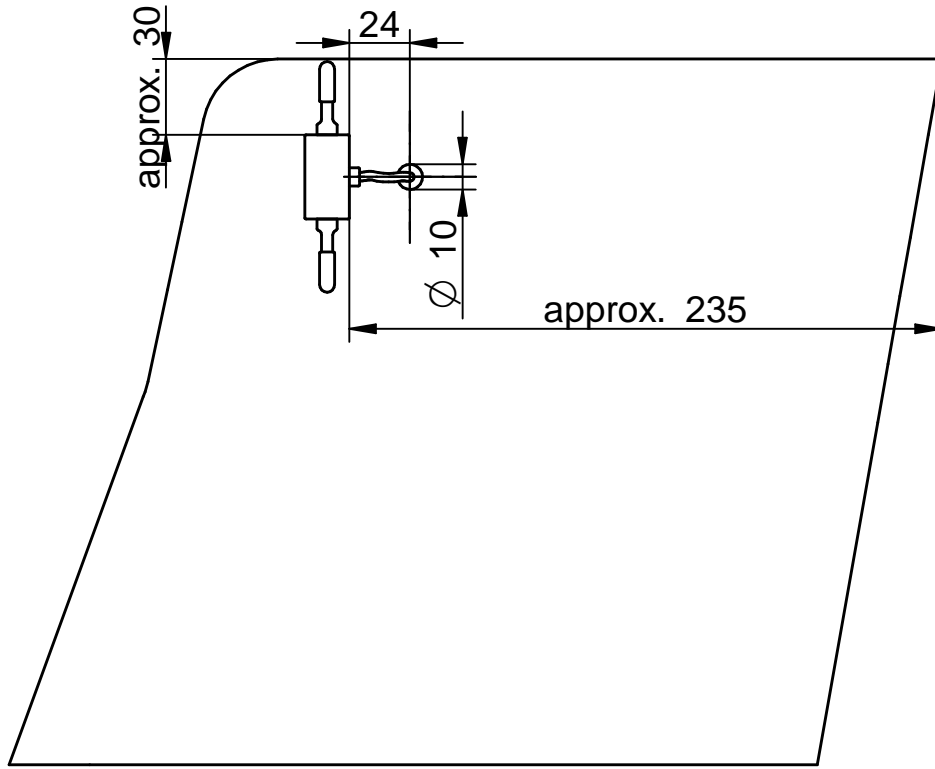
All parts glued together
 with suitable metal glue



Section A-A



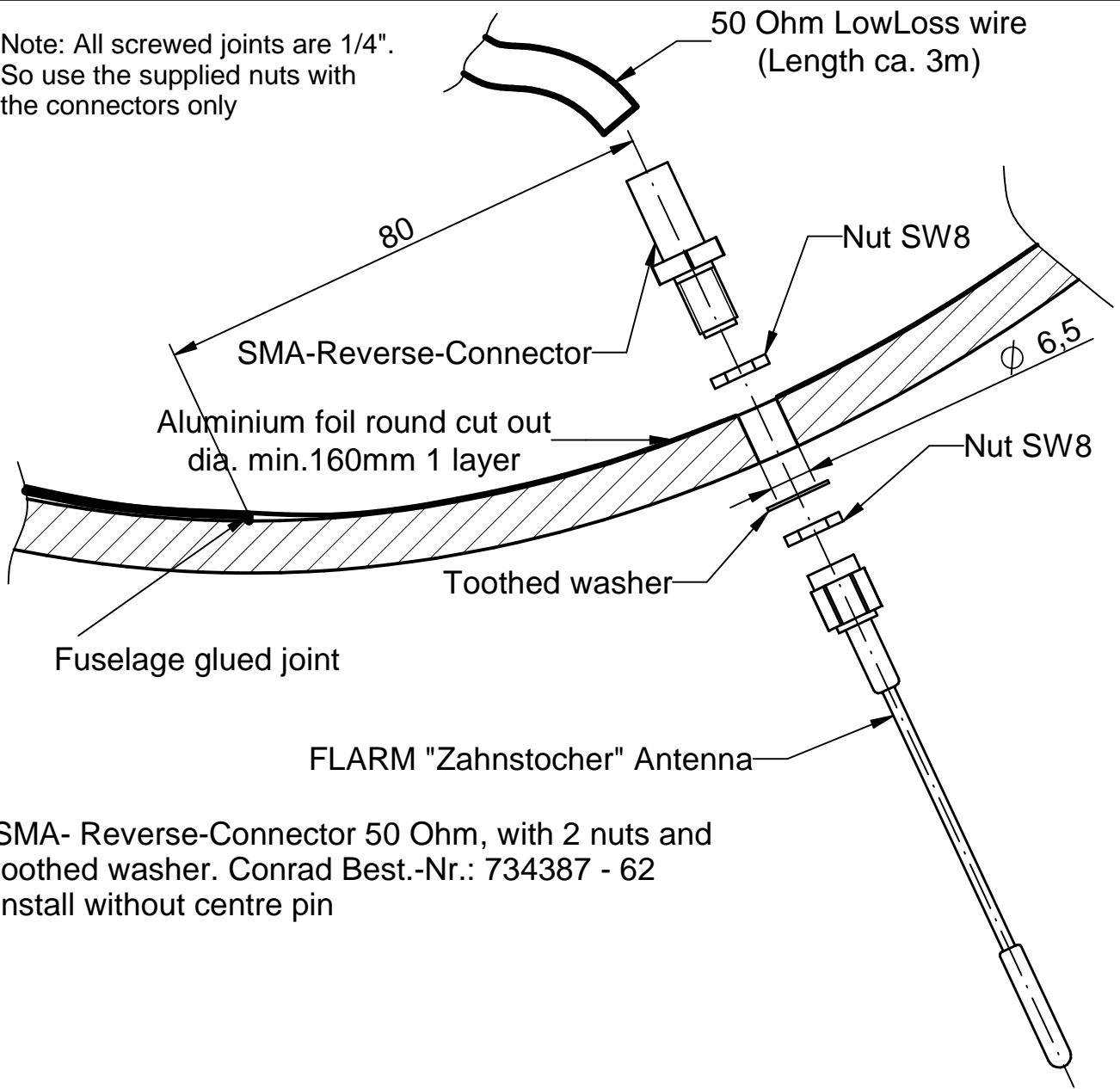
Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant
1						
Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1				Datum	Name	 DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2
				Gez.	15.11.13	
				Gepr.	Donkels	
				Norm.		 DG Flugzeugbau GmbH Z214
				Maßstab:	1:1 (1:5)	
				Maße ohne Toleranzang. nach: ISO2768-m		Installation small Dipole antenna with PVC-mounting in DG-Single seaters
Ausg.	Änderung	ab Wnr	Datum	Name	Seite 1 von 1	



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1									
Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant			
			Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1	Gez.	Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2	
				Gepr.	16.01.14	Donkels			
				Norm.					
				Maßstab:	Installation of small Dipole Antennas for FLARM and ADS-B on the sides of the instrument panel cover. DG-Single seaters			 DG Flugzeugbau GmbH Z215	
				Maße ohne Toleranz- ang. nach: ISO2768-m					
Ausg.	Änderung	ab Wnr	Datum	Name				Seite 1	
								von 1	

Note: All screwed joints are 1/4".
So use the supplied nuts with
the connectors only



SMA- Reverse-Connector 50 Ohm, with 2 nuts and
toothed washer. Conrad Best.-Nr.: 734387 - 62
Install without centre pin

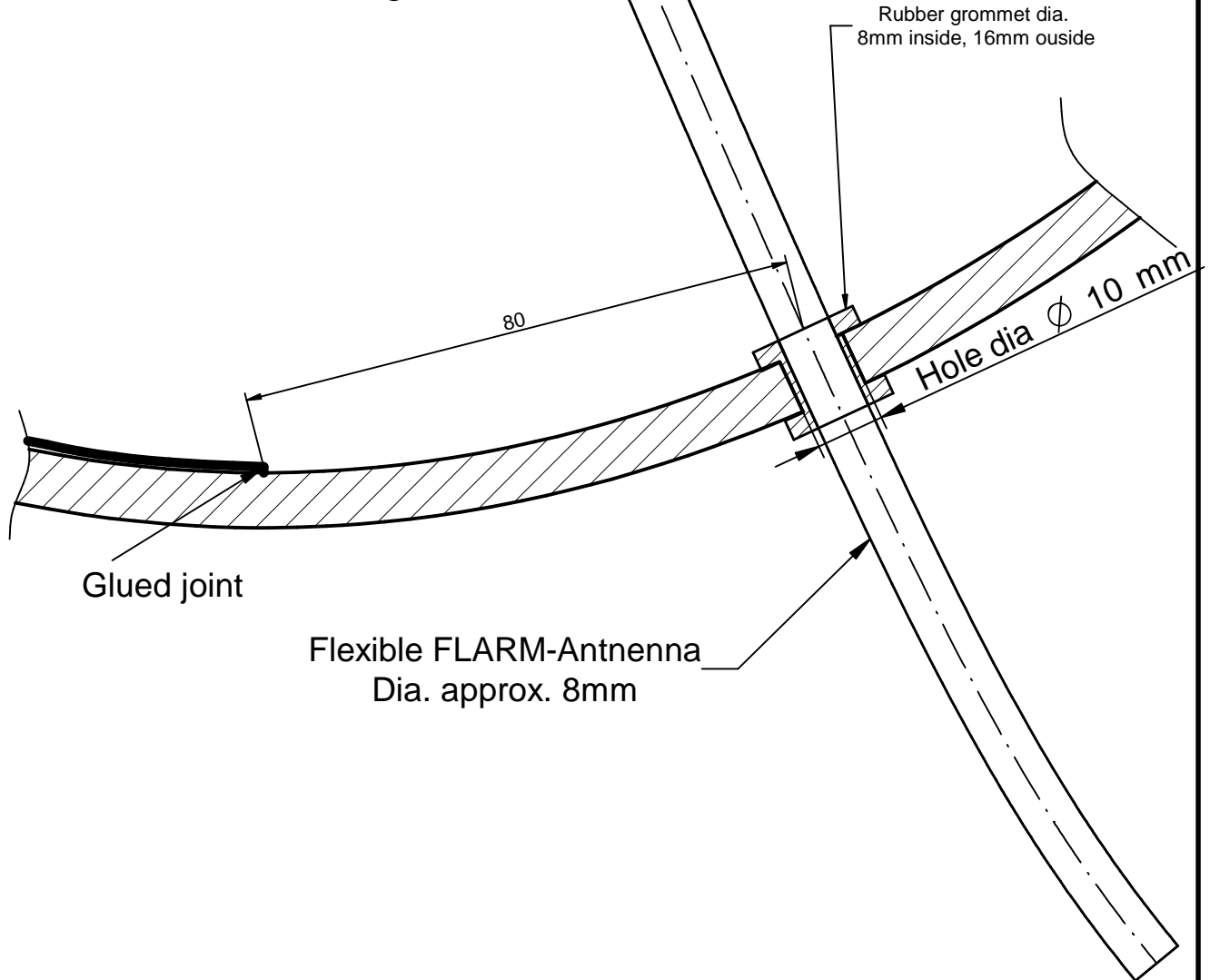
Installation on right hand side shown.
Installation may be performed on left
hand side too.

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1										
Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant				
Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1				Gez.	Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2		
				Gepr.	17.01.14	Donkels				
				Norm.						
				Maßstab:	Installation FLARM "Zahnstocher" Antenna on lower fuselage side. DG-Single seaters			DG Flugzeugbau GmbH Z216		
				Maße ohne Toleranz- ang. nach: ISO2768-m						
Ausg.	Änderung	ab Wnr	Datum	Name	Seite 1			von 1		

In case of an antenna with smaller diameter, use a smaller grommet and drill a smaller hole

Slide the antenna half length from the inside into the grommet.



Installation on right hand side shown.
Installation may be performed on the left hand side too.

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Pos.	Stück	Bauteilnummer	Beschreibung	Halbzeug	Werkstoff	Lieferant			
Toleranzen nach Arbeitsanweisung BA 1 Schweißen nach Arbeitsanweisung SA 1				Gez.	Datum	Name		DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2	
				Gepr.	17.01.14	Donkels			
				Norm.					
				Maßstab:	Installation FLARM flexible Antenna on lower fuselage side. DG-Single seaters			DG Flugzeugbau GmbH Z217	
				Maße ohne Toleranz- ang. nach: ISO2768-m					
Ausg.	Änderung	ab Wnr	Datum	Name				Seite 1	
								von 1	