
Bulletin No.	07-001	Issue Date:	30/01/2007
Issue/Revision:	02	No. of Pages:	6
Prepared By:	D.C. Lawes	Signature/Date:	 30/01/07.
Approved By:	S.C. Partridge	Signature/Date:	 30/01/07.

Subject: ROVNAV Connectors

Summary

- Sonardyne ROVNAVS (RN4 & RN5) have used Burton 5500 Series connectors for seven years. Burton connectors were chosen as standard, commonly used connectors on ROVs, recommended by ROV operators.
- The connectors have on the whole proved as reliable as many other connectors. However, more recently the failure rate of these connectors in service appears to have increased. The main failure seen in the field is corrosion of contact pins within the connector, largely caused by the connector seal either being deformed or the seal not mating due to the connector not being tightened up properly.
- To highlight the need to mate the connectors properly, detailed technical information on the operation and maintenance has been re-issued by Sonardyne within manuals and through Technical Bulletins.
- As most failures have been seen on the remote transducer, a new endcap has been designed to improve the use of the existing connector. This is now available (see below).
- In addition an alternative high quality connector has been selected, designed into the RN5 and successfully long term tested in the field. This is also now available.

Background

Reason connectors were chosen.

The Burton connector was chosen for the RovNav 4 after a survey of ROV operators conducted in Houston and Aberdeen. The majority favoured the Burton 5500 series for its reliability, robustness and because spares were readily available worldwide (we were asked to use the 6 and 8-pin versions as these are widely stocked by agents).

All RovNav 4s and RovNav 5s (except for a couple of specials) have been fitted with Burton connectors since RovNav 4 was launched to the survey market in 1999. When RovNav 5 was launched in 2003, the same connector series were used as no problems had been reported with the Burton connectors on RovNav 4.

Sonardyne purchase connectors only from Burton or their agents. The UK agents supply Burton cable connectors moulded to our cable.

Reports of corrosion

A small but significant number of reports have been received from the field informing of corrosion on the pins of the Burton connector. Some of these reports appear to be attributable to poor handling. Sonardyne have re-issued the manufacturer's recommendations on lubrication and tightening techniques in a Technical Bulletin (TB-06-011) as well as in the RovNav manual.

The majority of corrosion reports have involved the remote transducer connector, rather than those on the main electronics bottle. The extension of the housing, which provides physical protection for the connector, does limit access when tightening the connector and restricts vision to ensure that the mating faces are fully in contact. It was therefore considered likely that connectors were not being fully tightened, which was resulting in water ingress and resulting corrosion of the power pins.

In conjunction with customers in Aberdeen and the UK Burton agents, the cable moulding was modified to allow the locking ring to be retracted after tightening to allow visual checking that the mating surfaces were in contact. This change was implemented in early 2006 and all cables delivered since have been to the new design. This did reduce the incidence of corrosion reports for a time.

More recently, the transducer connector guard has been re-designed to allow more room for access while tightening the connector and easier viewing of the mated surfaces when the locking ring is retracted.

Another potential problem is over-tightening of the connector. Use of a wrench to tighten the connectors can cause severe distortion of the rubber mating surface. It may seal the first time this is done but next time it is likely to allow water ingress.

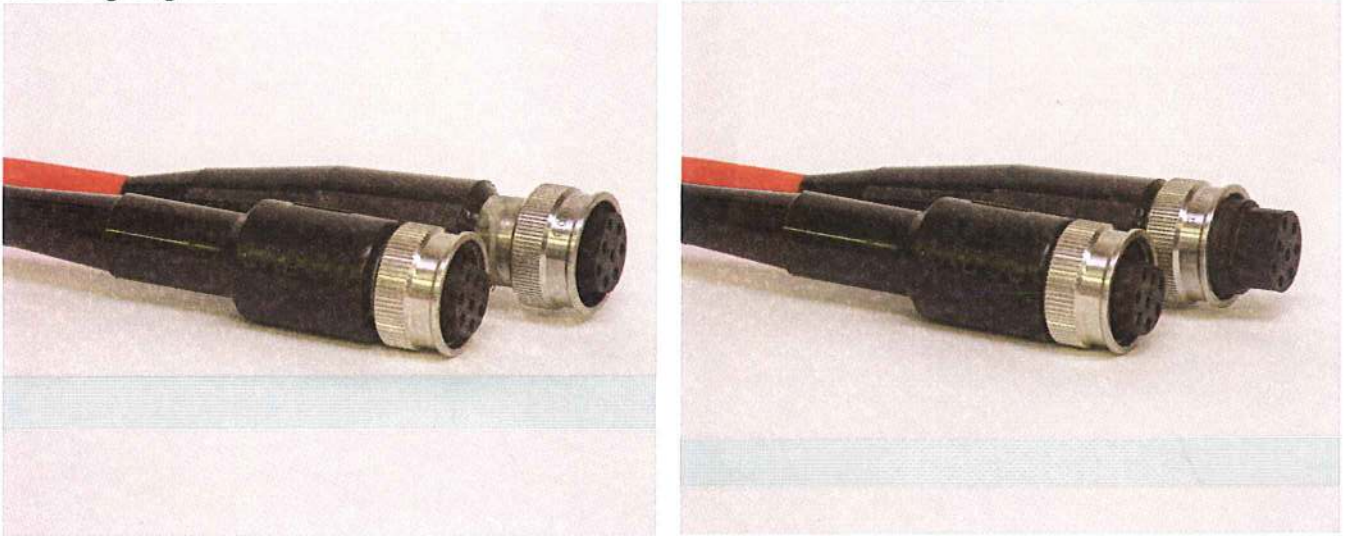
For full details of the correct handling procedures for Burton connects, refer to Sonardyne Technical Bulletin TB-06-011 or to the RovNav 5 manual.

By far the most serious reports of corrosion came from one customer working in Canada. They reported corrosion after a single dive, despite detailed correspondence with Sonardyne and Burton on the subject. They tried 'compatible' connectors from a different manufacturer with the same problem. It can only be assumed that the cold water was badly affecting the rubber, possibly reducing its flexibility to the point where the seal failed. Sonardyne worked with this customer to provide an alternative RovNav design as described below.

New cable-connector moulding

The new cable connector moulding allows the connector to be fully tightened and then for the locking sleeve to be retracted, allowing a visual inspection of the mating surfaces. The main seal is formed by the outer ring of the rubber moulding of the cable connector being in close contact with the outer metallic ring of the bulkhead connector. It is therefore vitally important that these parts are clean and undamaged. The photographs below show the old cable connector and the new design.

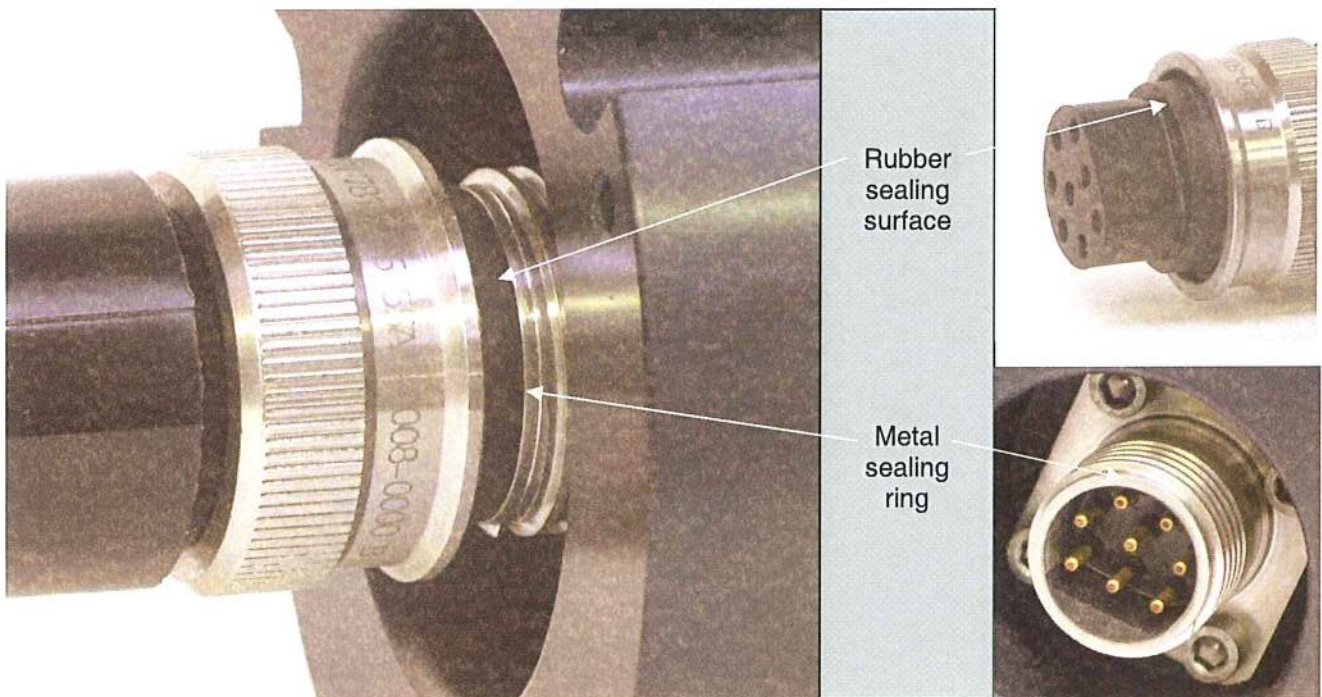
In the photographs below, the old and new cable moulding designs are compared. In the left-hand photo, the new design (at the rear) can be recognised by the longer neck of the connector before PU moulding begins



The right-hand photo shows the improved visibility of the rubber sealing parts when the locking sleeve is retracted.

Once the connector has been fully tightened, the locking sleeve can be retracted to ensure that the sealing surfaces shown below are in contact.

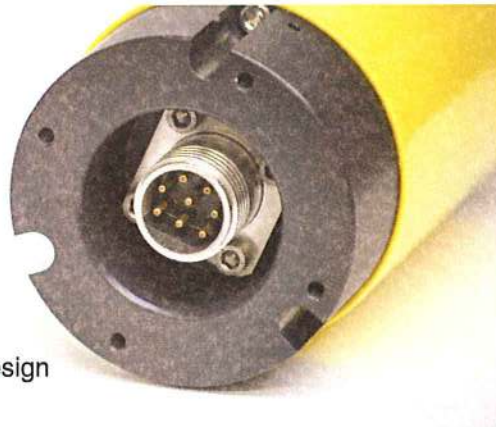
Photographs showing sealing surfaces (locking sleeve retracted)



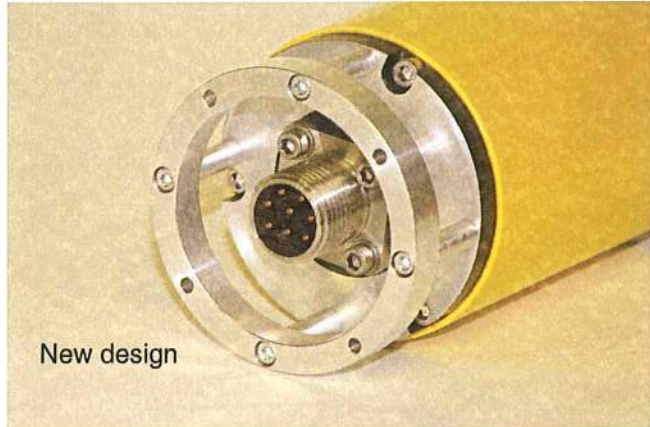
Finally the locking ring is re-tightened as recommended by the manufacturer.

New Transducer endcap

The new transducer endcap design provides improved access for tightening the connector with improved visibility of the mated connector in conjunction with the retractable locking sleeve. The new guard design still provides protection for the connector when it is disconnected and removed from its normal mounting position on the ROV.



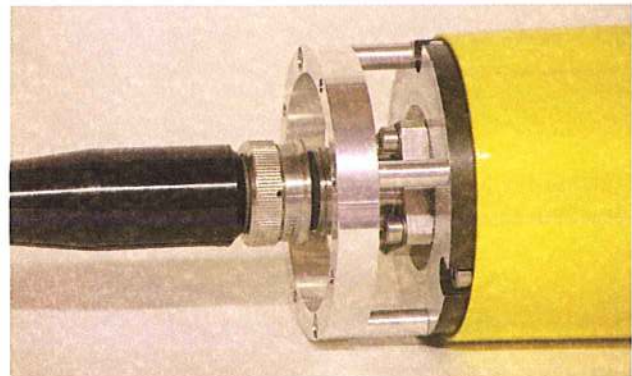
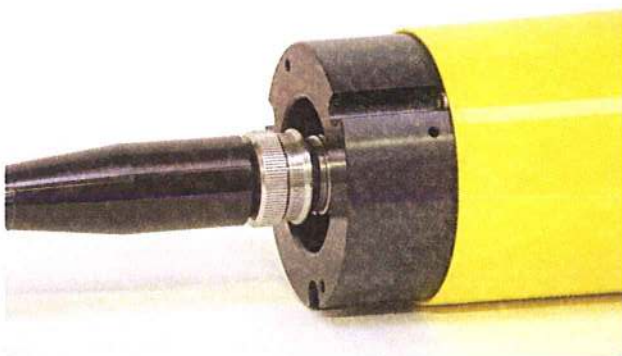
Old design



New design

The new design on the right shows the increased access space for fingers, facilitating the locking sleeve to be fully tightened.

The photos below show the improved visibility of the mating surfaces with the locking ring retracted.



Change out proposal

Replacement of the endcap on an existing Transducer can be undertaken.

The upgrade process for each Transducer includes:

- Inspection and Functional test
- Dismantle old endcap
- Fit new endcap
- Bench test
- Tank test

Contact your local Sonardyne office for price and availability information for this upgrade.

New Connector Type available

In conjunction with some of our customers, Sonardyne reviewed the connector market for an alternative to the Burton series. The most reliable, reasonably-priced connector that Sonardyne had used to date was the type used in the geophysical market, originally manufactured by Reed and now by A-G Geophysical Inc and HL Technologies Inc. The main disadvantage of this type of connector has always been that it is very difficult to de-mate.

Sonardyne worked with A-G Geophysical to develop a connector which was just as reliable but had greatly reduced de-mate forces. Prototypes of these connectors were tested at Sonardyne by pressure cycling down to 7000 m equivalent water pressure and down to -5 degrees Celsius to ensure that the low temperatures did not affect the sealing. After successful tests the connectors were fitted to a customer deployed RovNav and the system tested offshore. The results were excellent so much so they have now converted their two other RovNavs to use the new connectors. Operations have been on-going for over twelve months now with no connector problems.

The photographs below show the RovNav 5 version with AGP connectors. The cable connectors are water-blocked and the cables are gel-filled. These features prevent any damage to the cable which causes water ingress, from penetrating through the connector to cause corrosion of the pins.





The Burton connectors have metallic locking sleeves and bodies to both the bulkhead and cable connectors, allowing the cable screen to be carried through the body of the connector. The A-G Geophysical connector cannot be used in this way as the locking sleeve only bears on the PU mouldings. The wiring of the RovNav, particularly the Remote Transducer cable therefore had to be re-organised to take the screen through a pin of the connector. It was also necessary to ensure that the screened twisted pairs within the cable were still utilised in the most efficient manner to transfer the small received signals from the transducer to the electronics bottle with the minimum of loss.

As well as the testing carried out at Sonardyne's offices and by customers, Sonardyne have had experience of the A-G Geophysical type of connector on other products. All Sonardyne's USBL Transceivers and the Mini-RovNav family of products have used them without any known problems. The Mini-RovNavs in particular are operating in a similar environment to the RovNav 5 – mounted on ROVs and operating at depths down to 4000 m.

Advantages of the A-G Geophysical connector

- High quality connector
- More rugged sealing arrangement
- High de-mate forces overcome
- Long and positive experience on other products

Disadvantages of the A-G Geophysical connector

- Not as readily available as Burton nor as commonly used as Burton on ROVs
- Slightly longer bulkhead connector and mated pair
- Expensive change out costs as RN5 + TDR endcaps and cables need changing out

Proposal to change out connectors

Burton connectors can be changed out for AGP connectors on the RovNav electronics bottle and Remote Transducer endcaps, including the wiring changes. The upgrade process will include

- An initial inspection and functional test
- Removal of endcaps and replacement of connectors
- Re-wiring of connectors to PCBs
- Re-assembly and functional test
- Tank test of acoustic parameters

Contact your local Sonardyne office for price and availability information for this upgrade.