# Instruction Manual

KONGSBERG

# MPT 341 ”Shorty” series

## Multifunction Positioning Transponder (MPT)

*857-164871*

# *MPT 341 “Shorty” series*

## *Multifunction Positioning Transponder (MPT)*

This is the Instruction manual for the Kongsberg Maritime Multifunction Positioning Transponder (MPT) 341 “Shorty”series.

## Note

Kongsberg Maritime AS makes every effort to ensure that the information contained within this document is correct. However, our equipment is continuously being improved and updated, so we cannot assume liability for any errors which may occur.

## Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to install, operate or maintain the equipment.

Kongsberg Maritime AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

## Copyright



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# Contents

# Document logistics

| Rev | Date | Written by | Checked by | Approved by |
|---|---|---|---|---|
| A | 10.06.04 | GM | SER | JEF |
| B | | | | |
| C | | | | |

(The original signatures are recorded in the company’s logistic database)

| Rev | Comments |
|---|---|
| A | Original issue. |
| B | |
| C | |

# INTRODUCTION

## Manual contents

This manual describes all the MPT 341 “Shorty” transponders, for deep water use - 4000 m rated.

It provides technical specifications, safety procedures, operating instructions, how to re-build a transponder and maintenance procedures. It also includes spare parts lists.

## How to handle a transponder


*Figure 1 Special precautions to avoid personnel injury*

## List of abbreviations

| | |
|---|---|
| BOP | Blow Out Preventer |
| HiPAP | High Precision Acoustic Positioning |
| HPR | Hydroacoustic Position Reference |
| LBL | Long Base Line |
| MF | Medium Frequency |
| MPT | Multifunction Positioning Transponder |
| ROV | Remotely Operated Vehicle |
| SSBL | Super-Short Base Line |

# General description

The medium frequency MPT 341 “Shorty” series transponders design, are based on the standard Kongsberg Maritime MPT transponder. This is a transponder for shorter duration subsea jobs, like subsea construction applications - small size, light weight, but full MPT capability. This means:

- All models have an acoustic telemetry link for command and data transfer.
- All units are designed for ROV manipulator handling.
- The transponder unit is designed with a modular construction such that the transducer, transponder electronics, battery pack and options (where applicable) can be replaced individually.
- A transponder is normally a self-contained unit, its power being provided from an internal battery pack.
- The transponder may be secured to a subsea structure using mounting brackets, or fitted with an anchor weight and buoyancy collar for location on the open seabed.
- The basic MPT 341 ”Shorty” series transponders can be field-rebuild.


*Figure 2 MPT 341 transponders*

## Available transponders

The MPT 341 “Shorty” series transponders are designed for use with the HiPAP and HPR systems. The following are available:

| **Model** | | **Housing material** |
|---|---|---|
| MPT 341/DTSxDuB | Basic unit with Depth / Temperature sensor, Short tube and dual beam. | Aluminium |

## Options

| **Module** | **Housing material** |
|---|---|
| Serial interface | Aluminium |
| Release | Aluminium |
| Split transducer-head | Aluminium |

→ *Examples of the transponders are shown in figure on page 2.*

## Transponder identification

An identification clamp ring is tightened around the transponder body. This ring is engraved with:

- Transponder name
- Transponder registration number
- Unique serial number
- Frequency channel
- Type of battery

The figure below shows an identification clamp ring for a transponder using channel 57 and includes a lithium battery. Name and serial number is engraved on the other side - see illustrations in the *Spare parts* section.

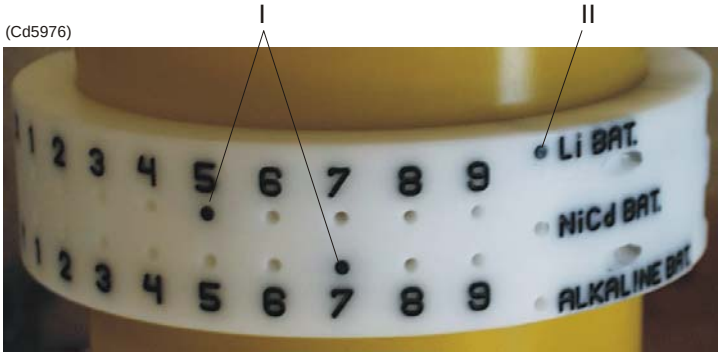



*Figure 3 Example of identification clamp ring*

If the TP configuration and battery is changed, the channel number (I) and the type of battery (II) can be altered by setting pegs into different holes in the clamp.

## Applications

All the models can be used in the following applications:

- SSBL positioning
- LBL positioning
- Metrology
- Range measuring
- Self positioning
- Acoustic release
- Depth and temperature measurement
- Reading external subsea sensors by telemetry

## Compatibility

All the transponders are compatible with the Kongsberg Maritime HiPAP and HPR systems.

# Transponder model identification principles

The transponder name consists of:

- Model name (three letters)
- Model number (three digits)
- Any options included (letters after the digits)

→ *See example below.*

### Model name

MPT = Multifunction Positioning Transponder.

### Model number

The three digits:

Digit 1: frequency band

Digit 2: depth rating

Digit 3: beamwidth

The following are available:

| 1st digit | 2nd digit | 3rd digit |
|---|---|---|
| **Frequency band** | **Depth rating** | **Transducer beamwidth** |
| 3 = 30 kHz | 1 = 4000 m | 1 = + - 15° |

### Options

The combination of letters after the number describes the options contained in the unit. The following options are available:

| | |
|---|---|
| DT | Depth and Temperature sensors |
| DuB | Dual Beam |
| R | Release mechanism |
| S | Split transducer |
| Si | Serial interface |
| Sx | Short tube |

## Housing material

Aluminium is the standard housing material.

# Transponder models description

## MPT 341/DTSxDuB

The basic transponder is the MPT 341/DTSxDuB transponder. This is a Multifunction Positioning Transponder, with depth / temperature sensors. It is a short unit, with aluminium housing, and is 4000-m depth rated.

The transponder has SSBL, LBL and telemetry functions. The transponder works as a dual beam transponder, and is equipped with one vertical and one horizontal transducer. The array calibration and Metrology are performed using a “doughnut-shaped” beam. When the calibration is completed, this beam is switched off, and the transponder is then operating in the position mode, with a ±15° beamwidth upwards.

The basic MPT 341/DTSxDuB transponder can be field-rebuilt to contain:

- Serial interface
- Release
- Split transducer-head

### Serial interface

This kit consists of a unit with a Subconn underwater connector for interfacing external subsea sensors.

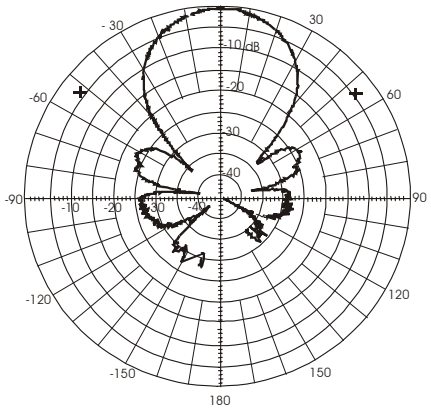
### Release

This kit consists of a unit with release mechanism.

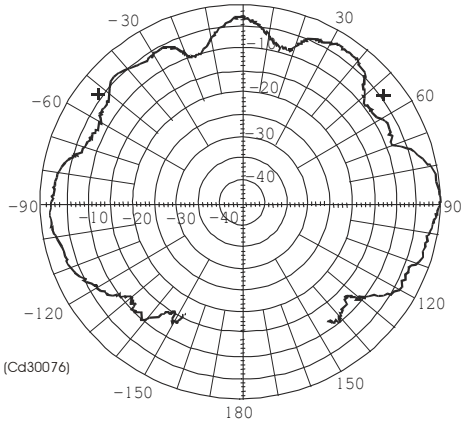
### Split transducer-head

This kit makes it possible to separated the transducer from the transponder body. An underwater cable of 5 m length is included.

# Beam patterns




MPT 341/DuB vertical
Source level = 206 dB




MPT 341/DuB horizontal
Source level = 190 dB

*Figure 4 Examples of beam pattern*

# TECHNICAL SPECIFICATIONS

## Source level and receiver sensitivity

The technical details given in this paragraph are common for all the transponder types described in this manual.

| Transponder | Source level - max (4 steps of 3 dB) | Receiver sensitivity HIGH / LOW (2 steps) |
|---|---|---|
| MPT 341 DuB | Vertical: 206 | 100 / 106 |
| | Horizontal: 190 | 115 / 121 |

## Common transponder specifications

The technical details given in this paragraph are common for all the transponder types described in this manual.

| | |
|---|---|
| Maximum depth rating | 4000 meters |
| Housing material | Aluminium |
| Flange and transducer head | Aluminium/anodized |
| Weight in air | 24 kg - 32 kg |
| Weight in water | 10 kg - 15 kg |
| Operation temperature | 0° to +30°C |

→ *Outline dimensions - see drawing on page 71.*

### Overall length - relevant combinations

| | |
|---|---|
| MPT 341/DTSxDuB | 910 mm |
| MPT 341/DTRSxDuB | 1185 mm |
| MPT 341/DTSSxDuB | 810 mm |
| MPT 341/DTSiSxDuB | 1130 mm |

### Connectors

| | |
|---|---|
| Connectors | Subconn |

### Transducer

| | |
|---|---|
| Transducer beamwidth | ±15 deg (vertical / horizontal) |

# Sensors

## Pressure and temperature sensor

| | |
|---|---|
| Max depth on /DT - sensors | 4000 m |
| - Resolution | 0.1 m |
| - Accuracy (FS) | < 0.1% |
| Temperature range on /DT - sensors | - 5° to + 30° C |
| Resolution | 0.1° C |
| Accuracy | 0.2° C |

# Release unit

As in common specifications, except:

| | |
|---|---|
| Weight in air | 7.6 kg |
| Release; lift / buoyancy | 250 kg |

→ *Outline dimensions - see drawing on page 71.*

# Serial interface unit

As in common specifications, except:

| | |
|---|---|
| Weight in air | 5.9 kg |

→ *Outline dimensions - see drawing on page 71.*

| | |
|---|---|
| Number of sensors | 4 external |
| Sensor types | - Library<br>- Generic |
| Electrical | Serial line (RS-232) |

**Acoustic telemetry link**

Can handle 3 sensors from a pre-defined library, or 3 generic sensors (floating-point numbers) in one telemetry message.

| | |
|---|---|
| Data transfer speed | up to 48 bit/sec |
| Update time (depending on depth) | min. 6 sec |

# Split transducer-head

As in common specifications, except:

| | |
|---|---|
| Weight in air | 6 kg |

→ *Outline dimensions - see drawing on page 71.*

## Floating collars

| | |
|---|---|
| Depth rating | 4000 m |
| Weight in air | 62 kg |
| Total buoyancy in water | 30 kg |
| Overall height | 520 mm |
| Colour | orange |

→ *Outline dimensions - see drawing on page 71.*

# External connectors

The following units are fitted with external connectors

## Serial interface unit

A 12 pins Subconn (MCBH12F) for external subsea sensors.

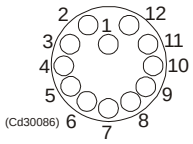



*Figure 5 12 pin connector - face view*

| Pin no. | Function | Comments |
|---|---|---|
| 1 | TP Tx 1 | RS-232 |
| 2 | TP Rx 1 | RS-232 |
| 3 | TP Tx 2 | RS-232 |
| 4 | TP Rx 2 | RS-232 |
| 5 | TP Tx 3 | RS-232 |
| 6 | TP Rx 3 | RS-232 |
| 7 | TP Tx 4 | RS-232 |
| 8 | TP Rx 4 | RS-232 |
| 9 | | |
| 10 | | |
| 11 | GND | |
| 12 | GND | |

A 8 pins Subconn (MCBH8F) for configuration of the Serial interface unit, “Configuration connector”.

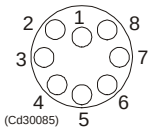



*Figure 6 8 pin connector - face view*

| Pin no. | Function | Comments |
|---|---|---|
| 1 | Rx_a | RS-232 |
| 2 | Rx_b | RS-232 |
| 3 | Tx_a | RS-232 |
| 4 | Tx_b | RS-232 |
| 5 | GND | |
| 6 | 10 V_a | |
| 7 | 10 V | |
| 8 | 10 V_b | |

- Read the Serial interface unit via a transponder by telemetry:
  - Configuration plug with the following links:
    pin1 - pin2, pin3 - pin4 and pin7 - pin8.
- Configuration and test of the serial interface unit, using a portable PC (serial line).
  - Configuration cable:
    - Connect PC to pin2, pin4 and pin5.
    - Link between pin 6 and pin7.

## Split transducer-head

A 10 pins Subconn (MCBH10F).

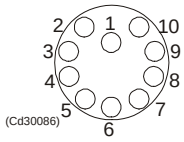



*Figure 7 10 pin connector - face view*

| Pin no. | Function | Comments |
|---|---|---|
| 1 | TD1_a | |
| 2 | TD1_b | |
| 3 | TD2_a | |
| 4 | TD2_b | |
| 5 | TD sensor Rx | TTL |
| 6 | TD sensor Tx | TTL |
| 7 | TD sensor power | |
| 8 | TD sensor GND | |
| 9 | Screen 1 | |
| 10 | Screen 2 | |

# OPERATION

## General

The transponders are designed for operation in water only.

*Caution* *At delivery, the transponder battery is disconnected, and must therefore be connected before deployment.*

## Connecting the battery

### Transponder

→ *Refer to page 24 for details.*

## System set-up

All transponders are preset by the manufacturer. The channel setting may be changed if required. This can be done as follows:

- Use of internal switches, or
- Use of acoustic telemetry from a HiPAP / HPR 400 system. (A HPR 300 system can not send telemetry for this purpose.)

For information about set-up of a transponder, refer to*:*

→ *APOS Instruction manual / APOS on-line help.*

## Operation

### General

The operation of the transponder is performed at the HiPAP / HPR operator station. For information regarding operation, refer to:

- *APOS Instruction manual / APOS on-line help*.

## Pre-deployment checks

Before you deploy the transponder, you must:

**1** Check that the battery contains sufficient power for the proposed operation.

**2** Before deployment, perform a visual inspection of the transponder.

**3** Perform a functional check to ensure it will operate correctly once it has been positioned on the seabed.

- Ensure the transponder replies to the correct interrogation frequency.

**The functional check can be performed as follows:**

**Transponder in water** - use the APOS function check. When checking, lower the transponder on a rope over the vessel’s side.

→ *Refer to the APOS Instruction manual/APOS on-line help.*

**Transponder on deck** - use the Transponder Test and Configuration Unit (TTC 400).

→ *Refer to the TTC 400 Instruction manual / TTC 400 Quick Reference Guide.*

## Serial interface unit

The system configuration and test can be carried out via the configuration connector (serial line), using a portable PC.

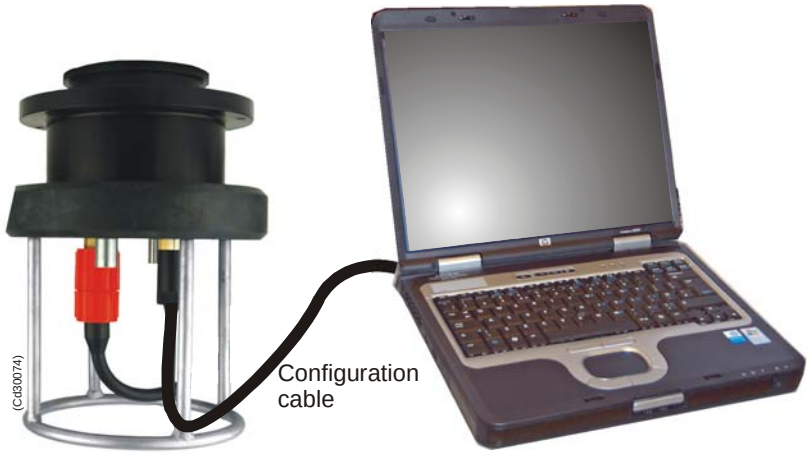



*Figure 8 Serial Interface unit with portable PC*

→ *Refer to on-line help for the portable PC programs:*
- *Sensor interface configuration*
- *Subsea Sensor Module (SSM)*

## Mounting

### General

A transponder may be secured to a subsea structure using mounting brackets, or fitted with an anchor weight and floating collar for location on the open seabed.

## Deployment

*Caution* *During deployment prevent the transponder from slamming against other solid objects.*

*Caution* *Lift the transponder with floating collar via the anchor-weight.*

**When you deploy the transponder:**

- The unit must be positioned with the transducer upright.
- Ensure a clear line of sight between the transponder's head and the ship's transducer.
- The transponder requires an anchor-weight / brackets to hold the transponder securely in position on the seabed/ROV.

### Release mechanism

- The transponder release mechanism must be attached to a shackle. The shackle will ensure a smooth release of the transponder when requested by the operator station.

## Ready for operation

Once deployed, the transponder is ready for operation. The sensors in your application will respond to requests from the HPR / HiPAP system, when they are enabled using telemetry.

## Positioning of a transponder

Positioning of a transponder can be done in two ways:

**1** The normal way is that the topside send a request to the transponder, the transponder answer the request after a given time delay.

**2** The other way is with the transponder in beacon mode, then the transponder acts as an acoustic lighthouse. It transmits pulses regularly (with a given Pulse Repetition Interval) without being interrogated.

→ *For more information, refer to the APOS on-line help.*

## DT sensor

No special preparations for the user.

→ *For more information, refer to the APOS on-line help.*

## Serial interface

- The Configuration plug must be be connected.
- The connedctor for external subsea sensors must be connected to sensors - if not a dummy plug must be used.

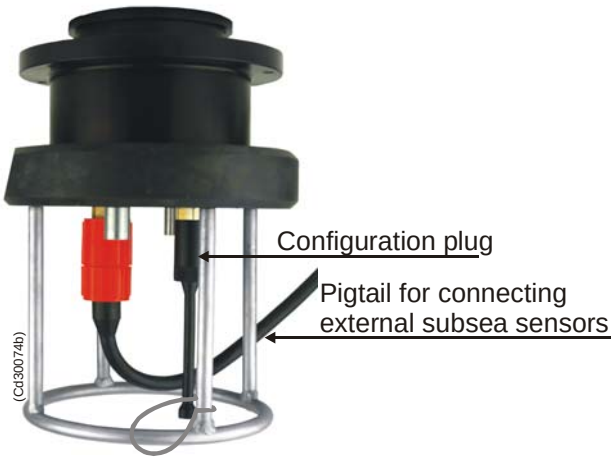



*Figure 9 Serial interface unit with cable and connection plug*

→ *For more information, refer to the figure on page 16 and the APOS on-line help.*

## Release unit

No special preparations for the user.

→ *For more information, refer to the APOS on-line help.*

## Split transducer-head

No special preparations for the user.

→ *For more information, refer to the APOS on-line help.*

## Recovery

After recovery, wash the unit thoroughly in fresh water to dissolve any salt deposits and clean off any sand or silt. If available, an high pressure hose may be used.

*Caution* *It is very important that the release unit (if fitted) is washed properly. Salt deposits, may prevent the mechanical part’s mobility.*

## Storage

*Caution* *A release unit must be stored in open position (released), as illustrated in the figure below.*

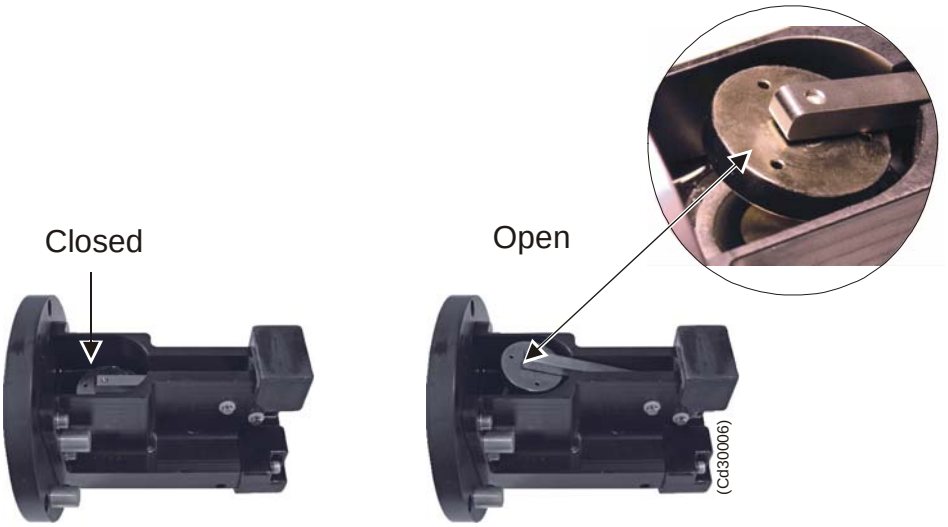



*Figure 10 Release unit*

→ *For information about manual release, refer to page 21.*

# Release mechanism

## General

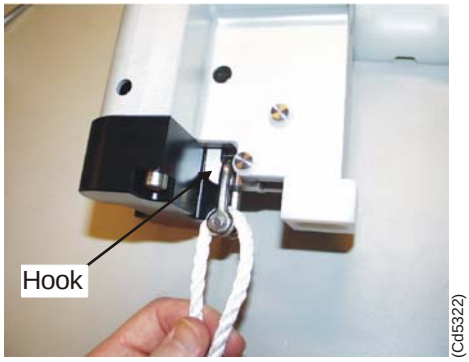
Note

*Once the transponder reaches the surface, it can be lifted from the water by attaching a hook / rope to the transducer cage.*

The release mechanism has two moveable parts. These are:

- Hook
  - The hook sits at the bottom of the release unit, and holds the shackle to be released.

*Figure 11 Release unit indicating the Hook*

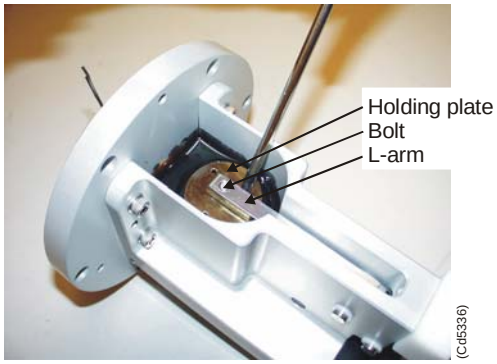



- L-arm
  - The L- arm is attached to the holding plate. (The holding plate has the shape of a very large coin, but much thicker).

Note

*This holding plate has been adjusted during assembly and it MUST be loose. Do NOT attempt to tighten the bolt between the L-arm and the holding plate (see figure below).*

*Figure 12 Release unit indicating the L-arm and holding plate*



The release mechanism can be operate in one of the two following ways:

- Automatic
- Manual

### Automatic release

Automatic release is normally used when the transponder is submerged.

- The release is performed within 10-15 seconds after the command is performed.

Note *Once the transponder reaches the surface, it can be lifted from the water by attaching a hook / rope to the transducer cage.*

### Manual release

Manual release is normally used for testing purposes.

Note *Do NOT try to pull the L-arm or holding the plate away from magnet.*

**Manual release procedure**

**1** Look into the small hole near the lower end of the springs.
- The L-arm is just visible a few mm above the plastic ”foot”.

**2** Insert a medium sized screwdriver between the L-arm and the plastic foot, and pry apart.

→ *Refer to figure 13.*
- The mechanism will snap open.

Note *The L-arm is balanced between a strong magnet and two springs. When the mechanism is released, it kicks open with a sudden movement. Keep your fingers clear of the back of the L-arm and holding plate.*

*Figure 13 Release unit - indicating manual release*

## Setting the release mechanism

**1** Ensure the anchor shackle (chain link etc.) is located in the jaws.

**2** Snap the hook back onto position.

**3** Fasten the required load onto the shackle.

**4** Put the shackle onto the hook.

- Ensure right side up. The curved end **onto the hook** and the shackle bolt **away from** the hook.

→ *Refer to figure on page 20.*

**5** Swing the hook into place.

- Ensure that the magnet face and the holding plate are free of grit and debris.
- For proper function, ensure good parallel physical contact between the magnet and holding plate.

**6** Push the back of the L-arm and holding plate towards the magnet until the magnet catches the holding plate.

**7** Ensure the holding plate covers the circular face of the magnet.

# BATTERIES

## General

The transponders are normally self-contained with power. The standard battery is a Alkaline (A) battery.

A battery consists of two sections, one for the receiver (Rx) and one for the transmitter (Tx).

## Specification

The battery specification includes:

- battery type
- Rx/Tx voltage
- number of battery cells used for Rx/Tx

**Example: A 10/36 (8/26)**

The battery specification indicates that this is a Alkaline battery, with Rx voltage = 10 V / Tx voltage = 36V. The Rx section comprises 8 battery cells, and the Tx section comprises 26 battery cells.

| Battery data | Alkaline |
|---|---|
| Battery Type no. | A10/36 (8/26) |
| Maximum continuous on-time | 12 days |
| Quiescent time | 50 days |
| No. of replies, max source level | 300.000 pings |

# Connecting the transponder battery

## Procedure

To connect the battery, the unit must be opened.

→ *Refer to page 39 for details.*

**1** Connect the battery.

- Connect C and F.
- Connect D and E

→ *Refer to the figure on page 33.*

- When connecting the battery, listen for the transponder initialization:
- **Three bursts** should be transmitted **at a rate of one per second**.
- If no **bursts** are heard, disconnect the battery immediately, and wait minimum 20 sec. before connecting / reconnecting it again.

**2** When the battery is correctly connected, assemble the transponder.

→ *Refer to page 45 for details.*

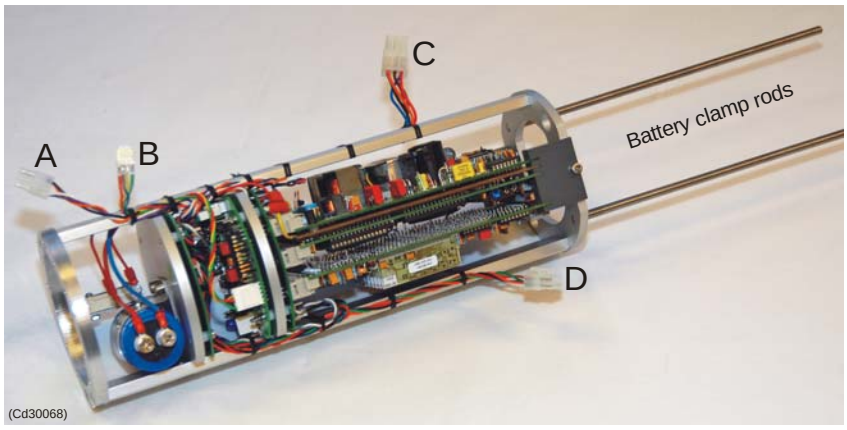



*Figure 14 Transponder electronics chassis with battery clamp rods*

**3** Check that the unit is correctly assembled and sealed.

**4** Perform a functional check before deployment, to ensure it will operate correctly once it has been positioned on the seabed.

→ *How to perform a functional check, refer to page 15.*

## Replacement of the transponder battery

To replace a battery, follow the procedure below:

To replace the battery, the unit must be opened.

→ *Refer to page 39 for details.*

**1** Disconnect the battery from the electronics chassis.

- Disconnect C and F.
- Disconnect D and E.

→ *Refer to the figure on page 33.*

**2** Remove the two nuts and locking washers at the battery base, holding the battery to the chassis.

**3** The battery can now be removed from the chassis.

**4** Replace the battery pack in the reverse order, as follows:

- Mount the two nuts and locking washers holding the battery to the chassis.

→ *Refer to figure on page 24.*

**5** Connect the battery.

→ *Refer to figure on page 33.*

**6** Assemble the transponder.

Note *Replace the used silica-gel bag with the new bag delivered with the battery.*

Note *When the battery is connected / disconnected the electronics is Reset.*

Note *After Hard reset / Reset, Tx power is set to:*

HPR 400 = HIGH

HPR 300 = MAXIMUM

→ *Refer to procedure on page 25.*

# TRANSPONDER CONFIGURATION

## General

All transponders are configured by the manufacturer. The configuration may be altered if required. The procedure to perform alterations will depend on the HiPAP / HPR system in use.

A transponder can operate with the following topside systems:

- HiPAP
- HPR 400 series
- HPR 300 series

- Each transponder series is dedicated to a specific frequency band.
- Altering the configuration, switching between the operating systems or changing the channel settings is done by:
  - Acoustic telemetry. (A HiPAP / HPR 400 system is required).
  - Use of internal switches. (Located on the microcontroller board).
- A large number of transponder channels are available (depending on the selected system) to prevent interference between transponders if several are located in the same area (a channel being an interrogation and reply frequency combination).

## Frequency bands

For the transponders described in this manual, the 30 kHz frequency band is used.

## Acoustic telemetry - basics

For information on how to use acoustic telemetry in a HiPAP / HPR 400 system.

→ *Refer to the Standard command reference chapter in the System operator manual / APOS on-line help.*

## Switch settings - basics

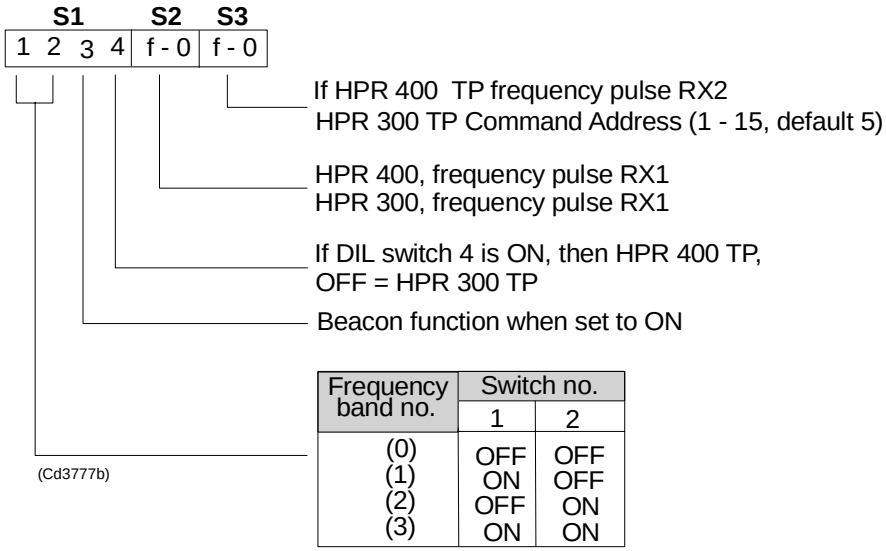
The switches for frequency and channel set-up are located on the microcontroller board:

→ *Ref paragraph on page 58.*

The set-up must therefore be done before unit installation, while the unit is open. The following switches are available; a 4-bit DIL switch and two 16-position rotary switches.

The set-up is described in figure 15 and the switches are used as follows:

- The DIL switches (S1 - four switches) select the system of operation.
- The rotary switches S2 and S3:
  - For the HPR 400 and the HiPAP systems - select the transponder operating frequency and channel.
  - For the HPR 300 series - set the interrogation frequency and command address.




| Frequency band no. | Switch no. 1 | Switch no. 2 |
|---|---|---|
| (0) | OFF | OFF |
| (1) | ON | OFF |
| (2) | OFF | ON |
| (3) | ON | ON |

*Figure 15 Microcontroller board - switch settings*

## HPR 400 / HiPAP channels

An HiPAP system uses the same channel working principle as an HPR 400 system. The following paragraphs, therefore describe only the principles for an HPR 400 system.

The HPR 400 channel operation is the default. When set to HPR 400, the transponder executes all the commands for LBL and SSBL operation and subsea ranging. It also has an incorporated telemetry system.

## Acoustic coding principle

The telemetry link uses a burst of seven pulses, all with different frequencies, transmitted in a sequence to make up a message. The coding principle is called “Factorial coding”, and has a total of 5040 combinations, used as follows:

- 4096 of these are used for defining a 12-bit message,
- while the remainder, 4097 to 5040, are spare.
  The spare combinations may be used for other messages such as ASCII transmissions and special single messages.

A complete telegram is constructed by sending several messages in sequence.

## HPR 400 channels and positioning frequencies

The number of channels available with an HPR 400 system depend on the transponder type used.

→ *An overview of available channels and operating frequencies, is given in the APOS on-line help.*

### Frequency band

- Rx frequencies used are: 21.000 - 24.500 kHz.
- Telemetry frequencies used are: 25.000 - 26.500 kHz, at 250 Hz intervals.
- Tx frequencies used are: 27.000 - 31.500 kHz.

The HPR 400 system interrogates the transponders by transmitting two pulses with frequencies according to the protocol. The transponder reply is determined by the second interrogation pulse (refer to figure 16). When the first interrogation pulse is an odd number (o) the reply is 250 Hz higher than it is when the pulse is an even number.

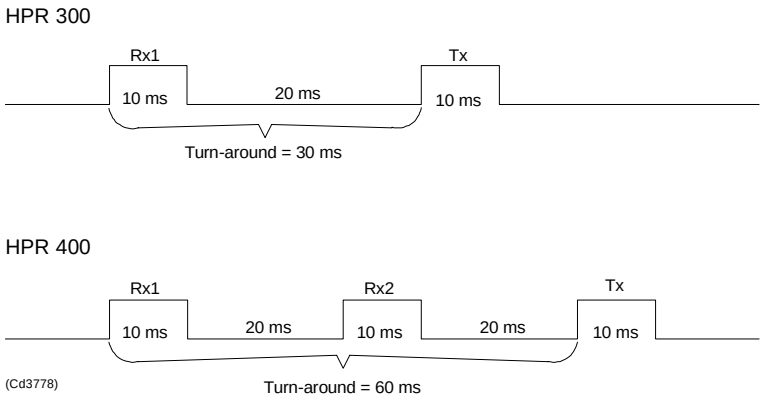



*Figure 16 Transponder reception and transmission signal timing diagram*

The switch settings are:

**Referring to figure on page 27, the switch settings are:**

| DIP switches | | | | |
|---|---|---|---|---|
| **HPR** | **S1-1** | **S1-2** | **S1-3** | **S1-4** |
| HPR 400 | On | Off | Off | On |
| **Rotary switches** | | | | |
| HPR 400 | **S2** | | **S3** | |
| | Set to the first digit of the desired channel number – Rx 1. | | Set to the second digit of the desired channel number – Rx 2. | |

*Table 1 HPR 400 switch settings*

# HPR 300 channels

An HPR 300 system interrogates the transponders by transmitting one pulse with frequency according to the protocol.

→ *Refer to figure 16*

The channels available are listed in table 2.

## HPR 300 command function

The HPR 300 command function principles are the same for all the transponders described in this manual. In a HPR 300 system, the command system uses a combination of “Frequency shift keying” and “Pulse position coding”.

The commands are transmitted as a series of tone bursts, two frequencies being required to transmit the range of commands to each transponder. These are:

- An Individual Interrogation Frequency (IFF) - specific to the particular transponder.
- A Common Command Frequency (CCF) - common to all transponders.

The command information is contained in the delay between the IFF and the CCF signals, and in the CCF signal’s repetition period.

## HPR 300 frequencies and switch settings

The HPR 300 system uses the Common Command Frequency (CCF) of 20 kHz, and has a total of 14 channel numbers (frequency combinations) available.

→ *An overview of channels and operating frequencies, see also the APOS on-line help.*

| Switch S2 setting | Transponder channel number | Operating frequencies (kHz) | |
|---|---|---|---|
| | | Interrogation (TP Rx) | Reply (TP Tx) |
| 1 | 1 | 20.492 | 29.762 |
| 2 | 2 | 21.552 | 30.488 |
| 3 | 3 | 22.124 | 31.250 |
| 4 | 4 | 22.727 | 31.847 |
| 5 | 5 | 23.364 | 32.468 |
| 6 | 6 | 24.038 | 27.173 |
| 7 | 7 | 24.510 | 27.777 |
| 8 | 8 | 25.000 | 28.409 |
| 9 | 9 | 26.042 | 29.070 |
| A | 11 | 21.552 | 27.173 |
| B | 22 | 22.727 | 28.409 |
| C | 33 | 23.923 | 29.762 |
| D | 44 | 25.126 | 31.250 |
| E | 55 | 26.455 | 32.468 |

*Table 2 HPR 300 frequencies and switch settings*

In the HPR 300 the switch settings are:

The HPR 300 the switch settings are:

→ *Refer to figure on page 27.*

| **DIP switches** | | | | |
|---|---|---|---|---|
| **HPR function** | **S1-1** | **S1-2** | **S1-3** | **S1-4** |
| HPR 300 | On | Off | Off | Off |
| HPR 300– Beacon function | On | Off | On | Off |
| **Rotary switches** | | | | |
| HPR 300 | **S2** | | **S3** | |
| | Set to the interrogation frequency. | | Set to the command address default setting – position 5. | |

*Table 3 HPR 300 switch settings*

The system interrogates the transponders by transmitting one pulse with frequencies according to the protocol.

# RE-BUILD A TRANSPONDER

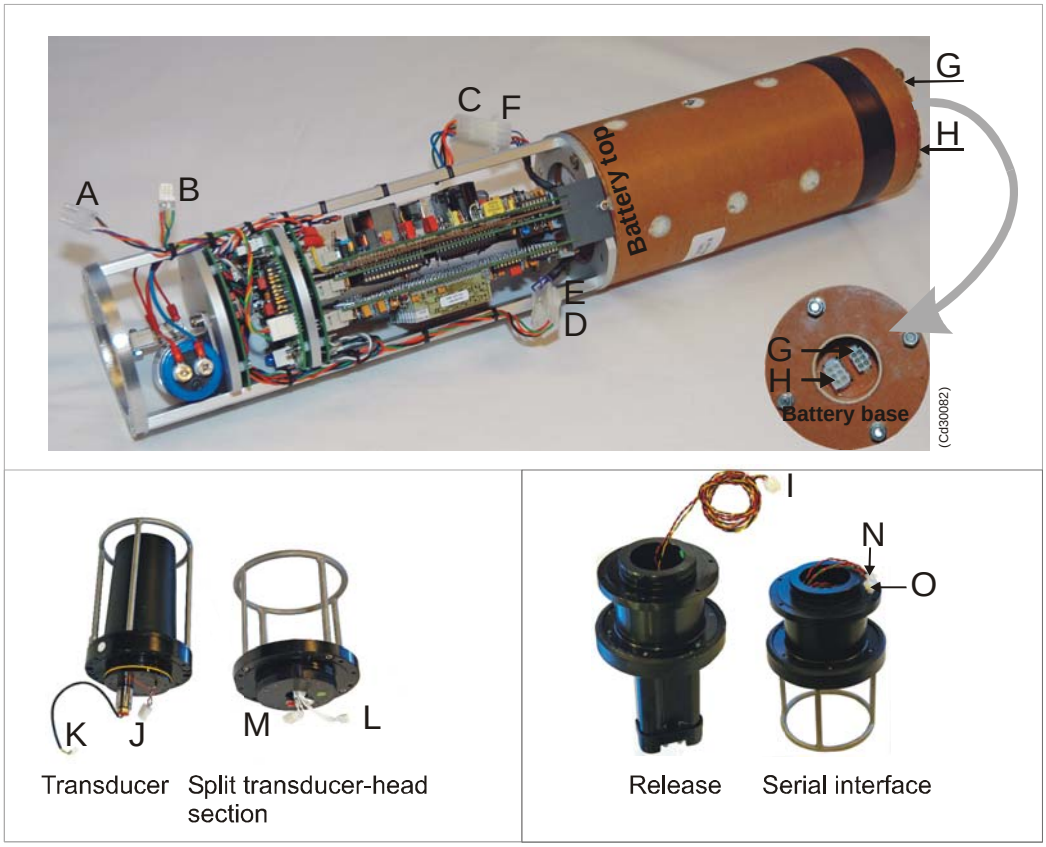
## General

The basic transponder can be field-rebuild to contain:

- Serial interface
- Release
- Split transducer-head

## Overview

The figure gives an overview of internal connectors for the transponder and options.




**The transponder holds connectors for:**

| | | | | | |
|---|---|---|---|---|---|
| **A** | Transducer | **D** | Serial interface | **G** | Serial interface |
| **B** | Depth sensor | **E** | Serial interface | **H** | Battery and Release |
| **C** | Battery and Release | **F** | Battery and Release | | |

**The transducer unit holds connectors for:**

| | | | |
|---|---|---|---|
| **J** | Electronics | **K** | Depth sensor |

**The split transducer-head unit connectors for:**

| | | | |
|---|---|---|---|
| **L** | Depth sensor | **M** | Electronics |

**The release unit connectors for:**

| | |
|---|---|
| **I** | Battery and Release |

**The serial interface unit connectors for:**

| | | | |
|---|---|---|---|
| **N** | Battery | **O** | Serial interface |

## Mounting the Release unit

To re-build a basic transponder to a transponder with the release unit, only the end cap must be removed.

How to remove the end cap:

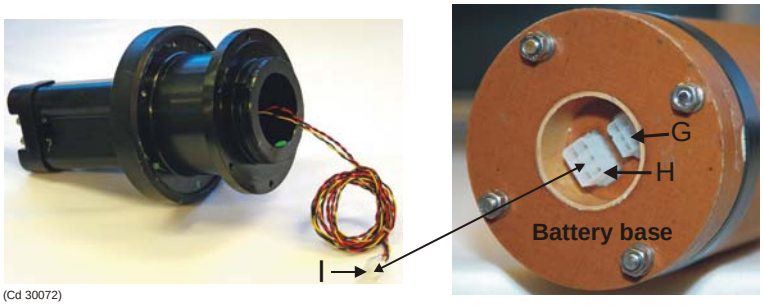
→ *Refer to page 44.*

When fitted, the release unit forms the bottom end cap of the transponder. The release unit includes electronics and must be handled accordingly.

*Caution* *Do not open the release unit.*

**Proceed as follows:**

**1** Connect the release unit cable to the battery pack
- Connect I and H.



(Cd 30072)

**2** Hold the transponder body securely, and press the release unit into the housing. The unit should seal tightly into the housing, so some force will be required.
- Ensure the cable is not damaged.

**3** When the O-ring on the release unit meet the lead-in chamfer at the entrance to the housing, support the base of the transponder unit and push firmly on the transducer cage.
- Ensure the O-ring compress easily as the end cap enters the housing, and are not crimped or damaged.

**4** When the release unit is fully home, align the screw holes and screw the six socket-head screws into the holes.
- Tighten the screws using a screwdriver-handled hexagonal key.

**5** Wipe off any excess grease and clean the unit.

**6** Perform a final check to ensure all the screws are correctly tightened and nothing has been left out.

**7** Removing the release unit is basically the reverse of mounting.

## Mounting the Serial interface unit

To re-build a basic transponder to a Serial interface transponder, only the end cap must be removed.

How to remove the end cap:

→ *Refer to page 44 for details.*

When fitted, the Serial interface unit forms the bottom end cap of the transponder. The serial interface unit includes electronics and must be handled accordingly.

*Caution* *Do not open the serial interface unit.*

**Proceed as follows:**

**1** Connect the serial interface unit cable to the battery pack.
- Connect O and G..
- Connect N and H.

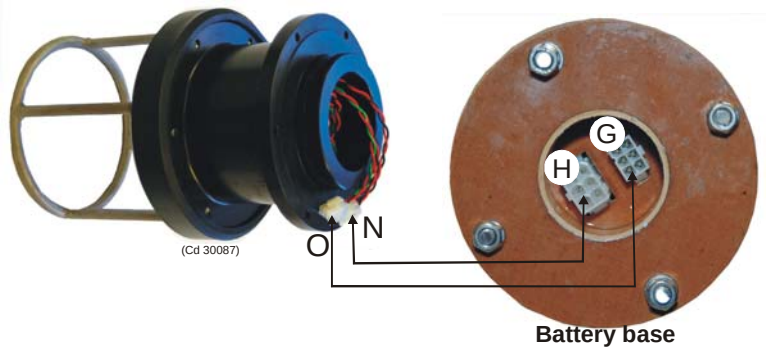



*Figure 17 Serial interface unit and battery connectors*

**2** Hold the transponder body securely, and press the unit into the housing. The unit should seal tightly into the housing, so some force will be required.
- Ensure the cable is not damaged.

**3** When the O-ring on the unit meet the lead-in chamfer at the entrance to the housing, support the base of the transponder unit and push firmly on the transducer cage.
- Ensure the O-ring compress easily as the end cap enters the housing, and are not crimped or damaged.

**4** When the unit is fully home, align the screw holes and screw the six socket-head screws into the holes.
- Tighten the screws using a screwdriver-handled hexagonal key.

**5** Wipe off any excess grease and clean the unit.

**6** Perform a final check to ensure all the screws are correctly tightened and nothing has been left out.

**7** Removing the unit is basically the reverse of mounting.

## Mounting the Split transducer-head

To re-build a basic transponder to a Split transducer-head transponder, the transponder must be open, and the transducer must be removed.

How to open the transponder:

→ *Refer to page 39 for details.*

Note

*The battery must be disconnected.*

→ *Refer to page 25 for details.*

How to remove the transducer:

→ *Refer to page 43 for details.*

**Proceed as follows:**

**1** Connect the transducer cables to the transducer housing cables as follows:
- Connect K and X.
- Connect J and Y.

**2** Hold the transducer housing, and press the transducer into the housing. The unit should seal tightly into the housing.
- Ensure the cable is not damaged.

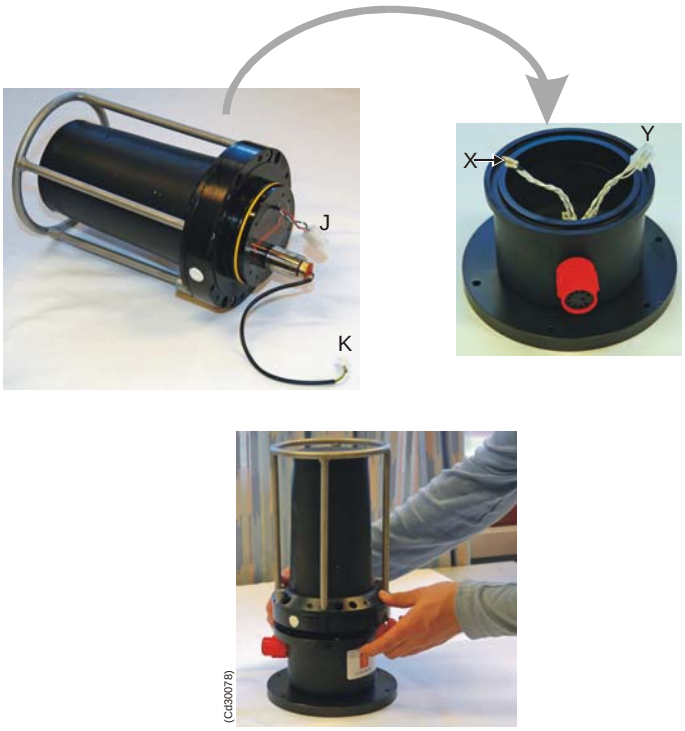



*Figure 18 Mounting the split transducer-head 1*

**3** When the O-ring on the transducer meet the lead-in chamfer at the entrance to the housing, support the base of the transducer housing and push firmly.

- Ensure the O-ring compress easily as the transducer enters the housing, and are not crimped or damaged.

**4** When the unit is fully home, align the screw holes (transducer and clamp ring) and screw the six socket-head screws into the holes.

- Tighten the screws using a screwdriver-handled hexagonal key.

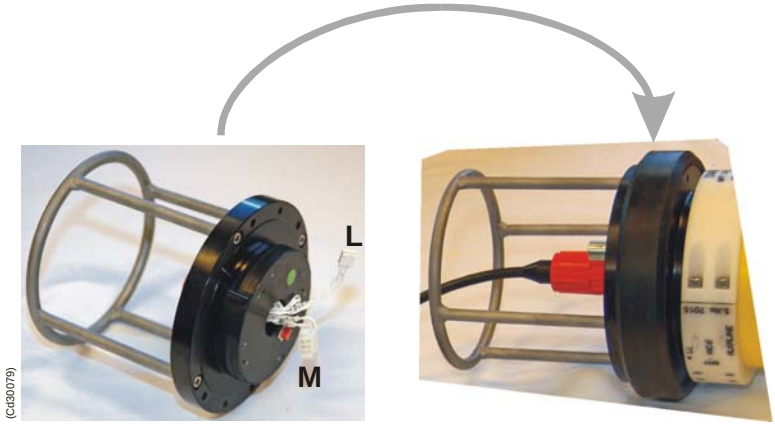



*Figure 19 Mounting the split transducer-head 2*

**5** Connect the flange connector cables to the transponder electronics as follows:

- Connect M and A.
- Connect L and B.

→ *Electronics connectors, see the figure on page 33.*

**6** Hold the flange, and press the into the transponder. The unit should seal tightly into the housing, so some force will be required.

- Ensure the cable is not damaged.

**7** When the unit is fully home, align the screw holes and screw the six socket-head screws into the holes.

**8** Perform a final check to ensure all the screws are correctly tightened and nothing has been left out.

**9** Connect the cable between the transducer housing and the transponder.


*Figure 20 Split transducer-head transponder*

**10** Wipe off any excess grease and clean the unit.

**11** Removing the unit is basically the reverse of installing.

# MAINTENANCE

## General

No maintenance is normally required, apart from washing the unit. To change the battery pack, the unit must be dismantled.

## Preventive maintenance

Preventive maintenance is limited to keeping the unit clean.

*Caution* *Do not use high pressure water as this will damage the transducer face.*

- Remove all traces of salt and debris.
- Before any connectors are disconnected, ensure the surrounding areas are dry.
- Inspect the unit for damage at regular intervals. Pay particular attention to the transducer surface. This is manufactured of a synthetic rubber material, and can be damaged easily.

## Testing the transponder

A transponder may be tested for *short* periods on deck.

**The functional check can be performed as follows:**

**Transponder in water** - use the APOS function check. When checking, lower the transponder on a rope over the vessel's side.

→ *Refer to the APOS Instruction manual/APOS on-line help.*

**Transponder on deck** - use the Transponder Test and Configuration Unit (TTC 400).

→ *Refer to the TTC 400 Instruction manual / TTC 400 Quick Reference Guide.*

*Caution* *Continuous operation in air may cause the unit to overheat.*

## Dismantling a transponder

The procedure for opening the pressure housing is identical for the all types of transponders described in this manual.

**Pressure housing assembly:**

The pressure housing comprises the cylinder body (housing), the transducer head and bottom end cap. The bottom end cap can be replaced by a release unit or a serial interface unit. The transducer head comprises of the transducer and the transducer cage. The transducer head has a screwed flange. The transducer head and the bottom end cap are both sealed into the housing, using two O-rings and a backup ring, and secured by six socked-head screws.

→ *An example of pressure housing assembly is shown in figure on page 41.*

To remove the electronics chassis and battery pack from the housing, follow the procedure below:

**Before you open the unit:**

**1** Wash the unit thoroughly in fresh water, and dry off any moisture on the outside.

**2** Place the transponder horizontally on a flat, clean work-bench, and support it so it can not roll off.

**Opening the unit:**

**1** Remove the six socket-head screws that secure the transducer head into the housing.

**2** Screw the same screws into the threaded holes in the transducer head till they meet the housing flange.

**3** Tighten the screws a little at a time to extract the transponder head out of the housing.

Note *If the transponder is fitted with a release unit or a serial interface unit, care must be taken to ensure that the wires connected to the units and battery pack are not damaged when withdrawing the chassis.*

Note *DO NOT attempt to ”unscrew” the transducer from the housing as the internal wiring and circuitry can be damaged.*

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the transducer out. This will damage the sealing surfaces resulting in water penetration.*

**4** Support the end cap as it is withdrawn. Once the O-ring is clear of the housing, the transducer and electronics chassis may be removed.

**5** There is a wire from the release mechanism or the serial interface unit (whichever is fitted) to the base of the battery pack. Disconnect this wire from the battery pack before attempting to remove the chassis too far from the transponder housing.

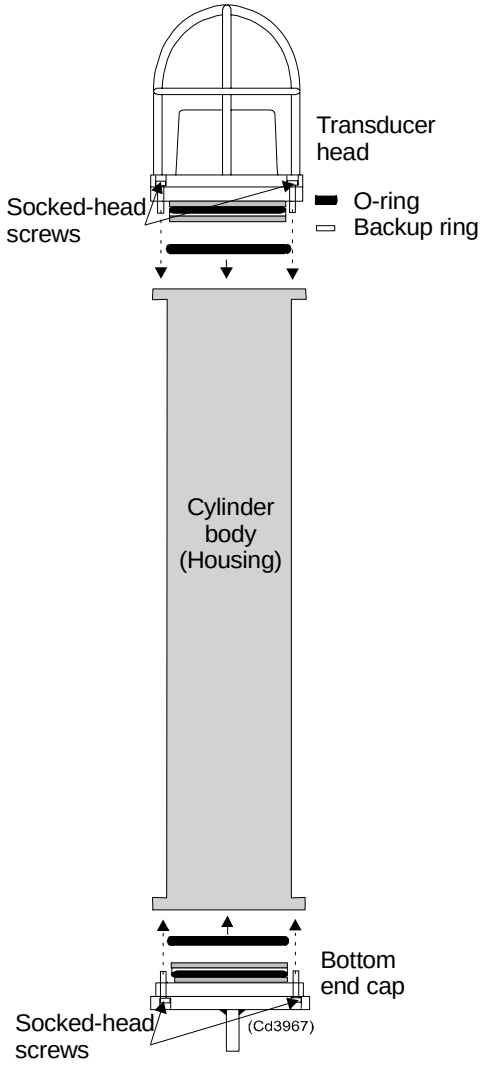



*Figure 21 Transponder pressure housing assembly*

# Replacement of transponder circuit boards

## Rx board, Tx board and microcontroller board

To replace one of these circuit boards, follow the procedure below:

**1** Open the transponder.

→ *Refer to page 39.*

**2** Short-circuit the capacitor in the electronics chassis, to discharge the transmitter capacitors (use a 10 to 20 Ω resistance). The location of the capacitor may vary, depending on model.

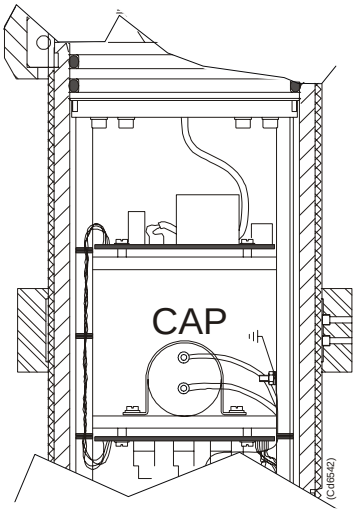



*Figure 22 Part of a transponder, indicating location of the electronics chassis capacitor*

**3** Unscrew the plastic locking devices. The appropriate board can now be removed from the chassis.

Note *The Microcontroller board and Rx board are interconnected via a flat cable.*

**4** Mount the new circuit board and tighten the locking devices. Take care not to over-tighten the locks.

**5** Assemble the transponder.

→ *Refer to page 41 for details.*

### Rx-amplifier board, serial interface board and motherboard

To replace one of these circuit board, follow the procedure below:

**1** Open the transponder.

→ *Refer to page 39 for details.*

**2** Remove the soldering at the connections. Remember to mark the wires.

**3** Unscrew the four screws holding the board. The appropriate board can now be removed from the chassis.

**4** Assemble the transponder.

→ *Refer to page 41 for details.*

## Changing batteries

### Transponder battery pack

→ *Refer to page 25 for details.*

## Replacement of transducers

The transducer is a sealed unit and can not be opened. If the unit is not working, the whole unit must be replaced

**1** Open the transponder.

→ *Refer to page 39 for details.*

**2** Disconnect the transducer from the electronics chassis.

- Disconnect A and J.
- Disconnect B and K.

→ *Refer to the figure on page 33.*

**3** Remove the electronic chassis (8 fixing screws).

**4** Assembly is basically the reverse of dismantling.

***Warning*** ***Do not try to unscrew the two sealing screws on each side of the transducer flange (see figure on page 44).***

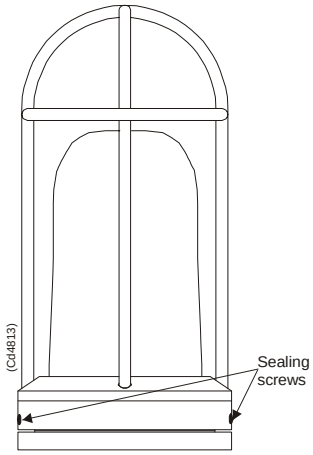



*Figure 23 Transducer head, indicating the two sealing screws*

## Remove the bottom end cap

When fitted, the release unit or serial interface unit forms the transponder bottom end cap. Removing a standard end cap, a release unit or a serial interface unit are basically the same. The end cap is sealed into the transponder housing.

The procedure describes how to remove the release unit:

**1** Remove the six socket-head screws that secure the end cap unit into the housing.

**2** Hold the transponder securely, and agitate the end cap back and forth in the tube to break the seal.

**3** Pull the end cap out.

- The unit should seal tightly into the housing, so some force will be required to withdraw it. There are no threaded holes for assistance at the base end, so care must be taken when using force.

Note *DO NOT attempt to ”unscrew” the unit from the housing as the internal wiring and circuitry can be damaged.*

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the unit out. This will damage the sealing surfaces resulting in water ingress.*

**4** The end cap may now be removed. Once the O-ring is clear of the housing, it will be loos.

**5** Disconnect the end cap from base of the battery.

**6** Assembly is basically the reverse of dismantling.

## Transponder assembly

To replace the electronics chassis and battery pack into the housing, follow the procedure below:

**Before you start:**

**1** Inspect the O-rings and backup rings for damage. If in doubt, or if they have been used for more than one year, they should be replaced.

**2** Place the new bag of silica-gel desiccant into the housing to absorb any humidity that may have entered the unit while it was open.

**3** Ensure the mating surfaces and O-rings and backup rings are *completely* clean, then wipe a thin film of silica-gel over the rings and mating surfaces.

**Assembling:**

**1** Carefully insert the chassis into the housing. Do not allow the circuit boards to knock against the housing, and ensure no wires are trapped between the chassis and the housing or left protruding from the housing.

**2** Ensure the bag of silica-gel is positioned such that it will not prevent the chassis from fully entering the housing.

**3** When the O-ring on the end cap meet the lead-in chamfer at the entrance to the housing, support the base of the transponder unit and push firmly on the transducer cage. Ensure the O-ring compress easily as the end cap enters the housing, and are not crimped or damaged.

**4** When the end cap is fully home, align the screw holes and screw the six socket-head screws into the holes. Tighten the screws using a screwdriver-handled hexagonal key.

**5** Wipe off any excess grease and clean the unit.

**6** Perform a final check to ensure all the screws are correctly tightened and nothing has been left out.

# MAIN PARTS

A basic transponder consists of the following main parts:

- Transducer
- Housing
- Bottom end cap
- Circuit boards
- Battery pack (described in a separate section)

## Options

- Serial interface unit
- Release unit
- Split transducer-head

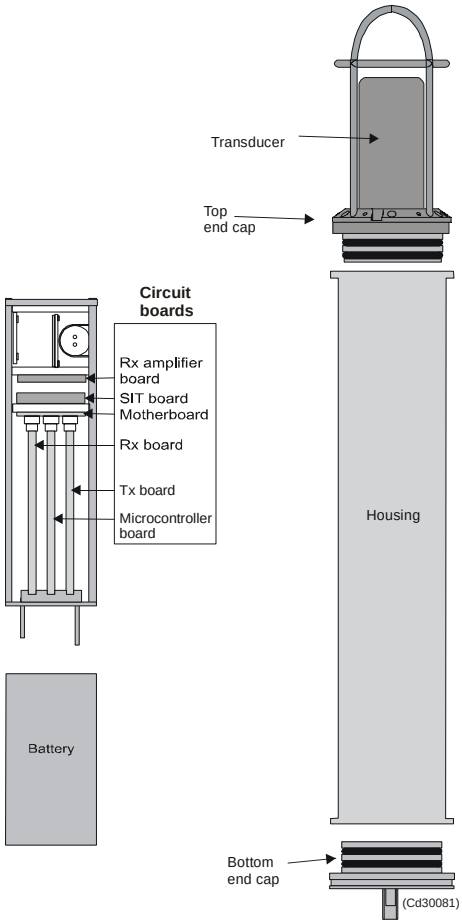



*Figure 24 Transponder main parts*

## Transducer

The transducer is mounted in one end of the cylindrical transponder. The following transducer is used:

- The DuB transducer with a ± 15 vertical beam and a “doughnut-shaped” horizontal beam.

## Depth and temperature sensors

For transponders with Depth and temperature sensors the transponder head is equipped with a hole to enable direct contact between the sensors and the sea water.

Note *Ensure that this hole is kept clean and open at all times.*

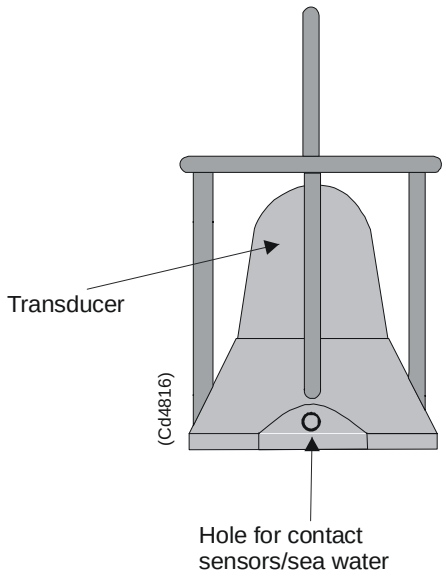



*Figure 25 Transponder head*

## Housing

For information on the housing, refer to *Technical specification.*

## Bottom end cap

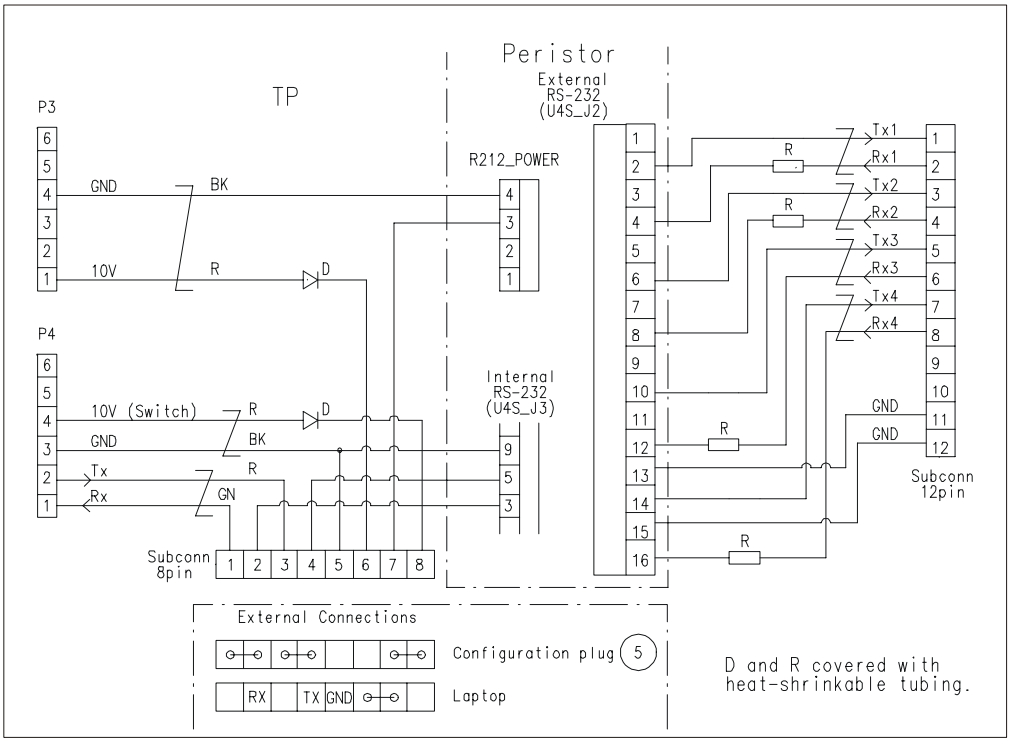
This is a standard bottom end cap.

### Serial interface

This kit consists of a unit to be fitted at the transponder bottom, replacing the end cap. This unit has a Subconn underwater connector for interfacing external equipment.

It includes a computer handling up to 4 external  sensors at the same time, like Digiquartz Depth sensor, Inclinomenters, subsea Gyro etc., using serial lines (RS-232). Some sensor types are pre-defined in a library, other types can be defined by the user (generic).


*Figure 26  Serial interface unit*




(Cd30083)

The system configuration and test can be carried out prior to transponder deployment via one serial line, using a portable PC.

→ *Refer to page 16 for details.*

### Release

The kit consists of a unit with release mechanism to be fitted at the transponder bottom, replacing the end cap.

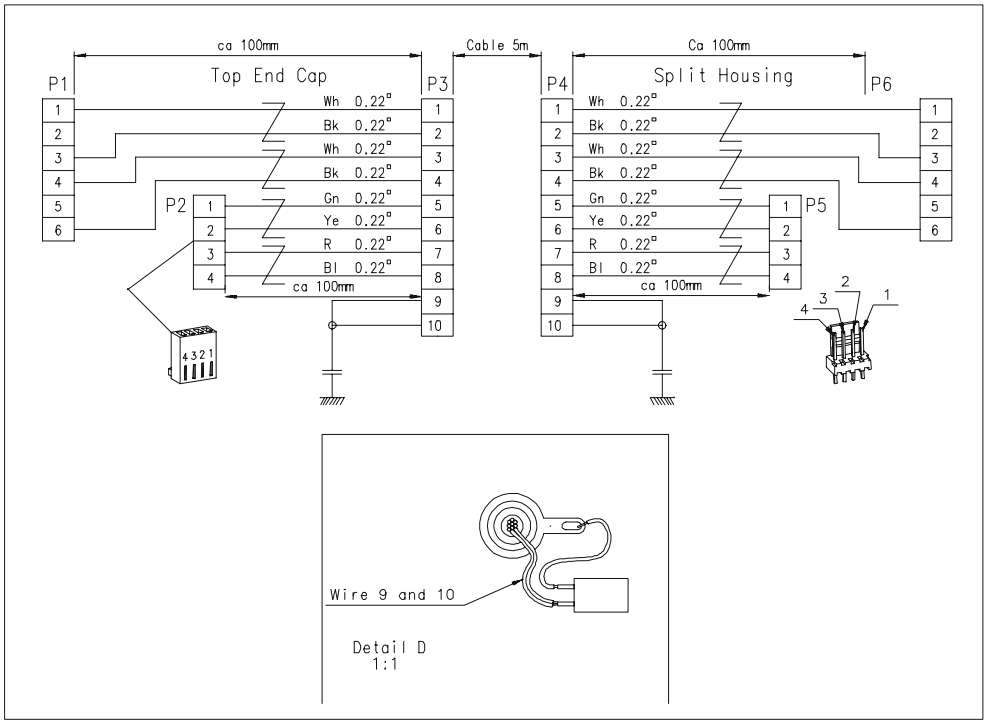
*Figure 28 Release unit*

### Split transducer-head

This kit makes it possible to separated the transducer from the transponder body. An underwater cable of 5 m length is included. The kit includes:

- A small transducer housing. On the figure below, the transducer is fitted onto this housing. This small housing has a mounting plate with holes for easy fixing to a flat plane.
- A blind flange with bulkhead connector for mounting on the the top end of the transponder housing. On the figure below, the blind flange is fitted onto the transponder (the transducer is removed and fitted onto a small housing).


*Figure 29 Split transducer-head transponder*




(Cd30084)

*Figure 30 Split transducer kit - wiring diagram*

## Circuit boards

The transponder electronics comprises of the following printed circuit boards. These boards are standard for all applications.

→ *Refer to figure on page 46.*

- Transmitter board (Tx)
- Receiver board (Rx)
- Rx amplifier board
- Microcontroller board
- Motherboard
- SIT board

## Transmitter board (Tx)

The Transmitter board is a general purpose transmitter, containing its own frequency generator, power control and power supply circuits, (the board feeds both the receiver and microcontroller circuit boards.

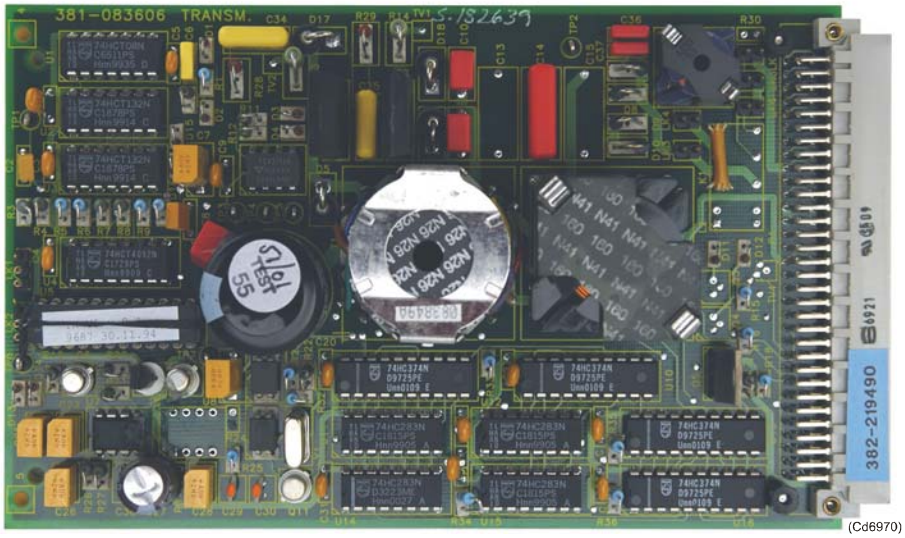



*Figure 31 Transmitter circuit board*

→ *Refer to figure on page 54 for the block diagram.*

The board holds two voltage regulators which output the voltages required by the other boards. It also has a crystal oscillator which is used as the Tx frequency source, and a direct numerical synthesizer for generating the correct Tx frequency. Driver stages with power control, an output stage with over-current protection, and transducer matching circuits, complete the board.

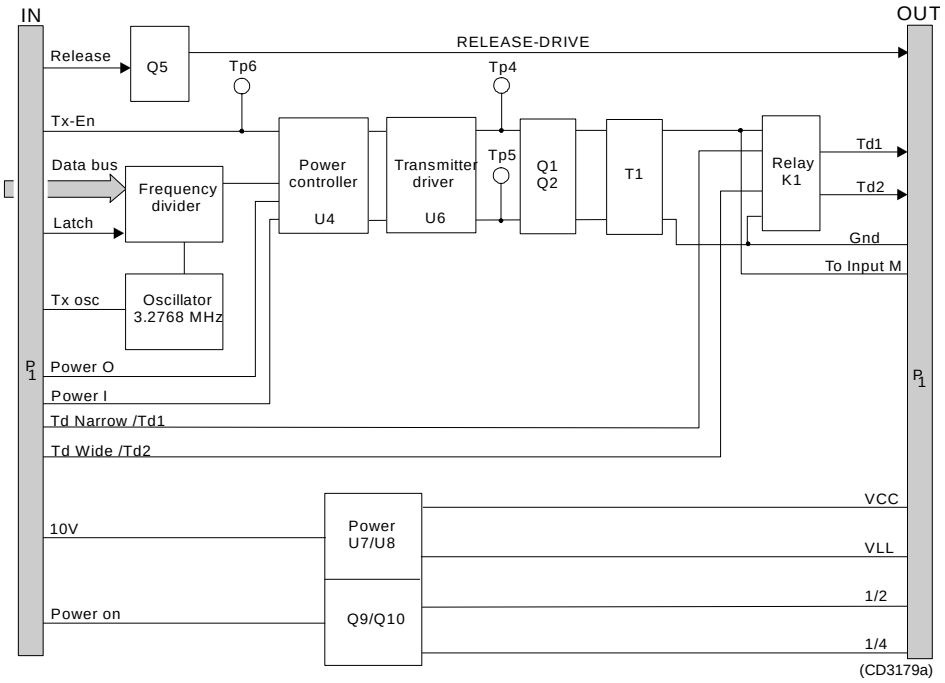



*Figure 32 Transmitter circuit board - block diagram*

## Receiver board (Rx)

The receiver board is designed to receive transponder interrogation signals and telemetry signals. It contains nine narrow-band channel receivers, and a WIDE-detector and phase-locked loops for generating the right modulation frequencies to the channel receivers.

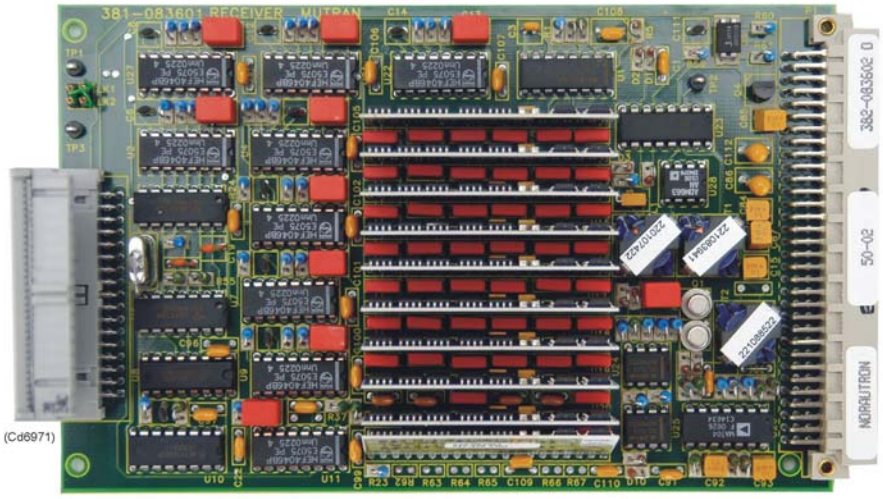



*Figure 33 Receiver circuit board*

→ *Refer to figure on page 56 for the block diagram.*

The board consists of a two stage amplifier with signal limitation and an anti-aliasing filter, two channel receiver stages for wake-up, and seven channel receiver stages for telemetry, all constructed as ceramic hybrid circuits. The channel receivers perform mixing, low-pass filtering, summing and envelope detection. The outputs from the channel receivers are fed to the microcontroller.

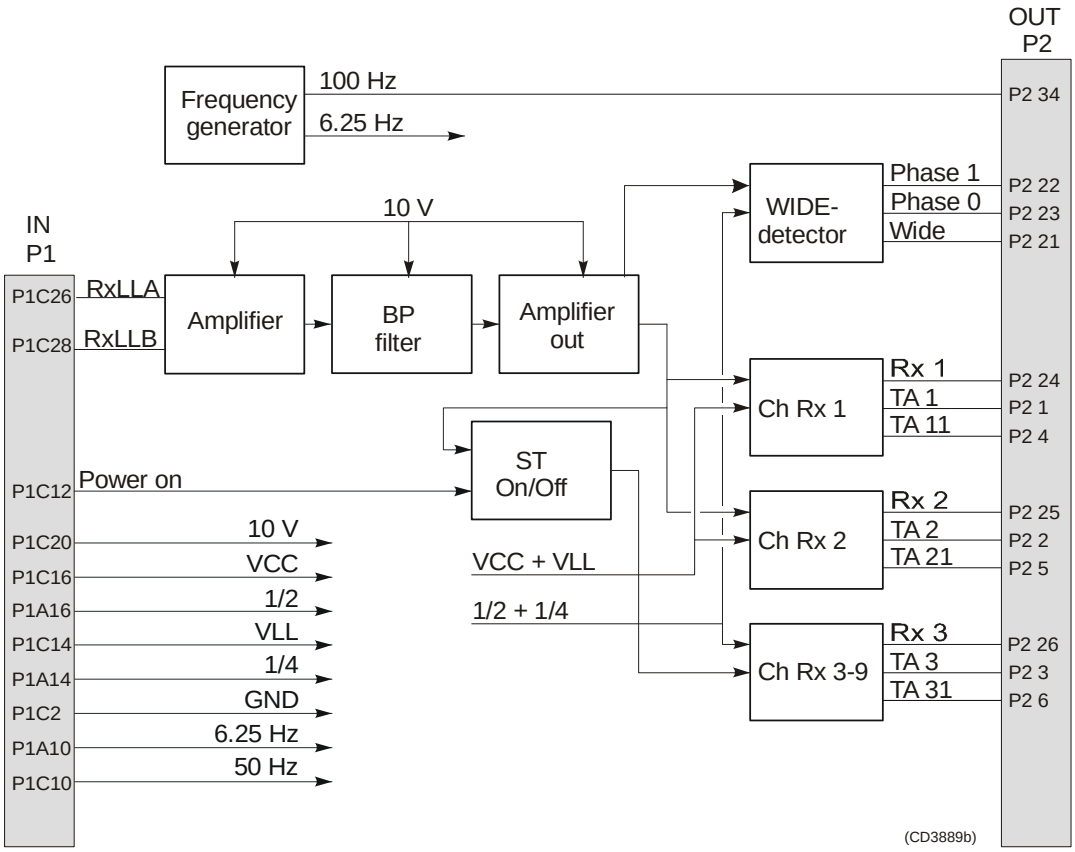



*Figure 34 Receiver circuit board - block diagram*

## Rx amplifier matching board

The TP-PREAMP 24K Hz acts as a matching preamplifier between the transducer and the Channel Receiver circuit board.

→ *Refer to figure 35 for the block diagram.*

The transducer is connected to TP1 and TP2.

The incoming signal passes through the matching component, T1. From T1, the input signal is connected to a two-step amplifier.

The first step of this amplifier is a low noise FET with a voltage gain of approximately 10 dB.

The signal then enters the micropower operational amplifier, where the gain can be altered in two steps; either 0 dB or 6 dB (approximate values). A logic “0” at TP7 causes 0dB to be achieved. A logic “1” at TP7 causes 6 dB to be achieved.

The amplifier contains a bandpass filter to reduce the input noise before the signal is connected to the output transformer T2. The output to the Rx board is on TP8 and TP9.

TP5 and TP6 are connected to the Transmitter board. When the system is transmitting, a TR-switch in the T1 block protects the input of the amplifier. Transmitted signals are transformed via T1 and leave the board from terminals TP1 and TP2.

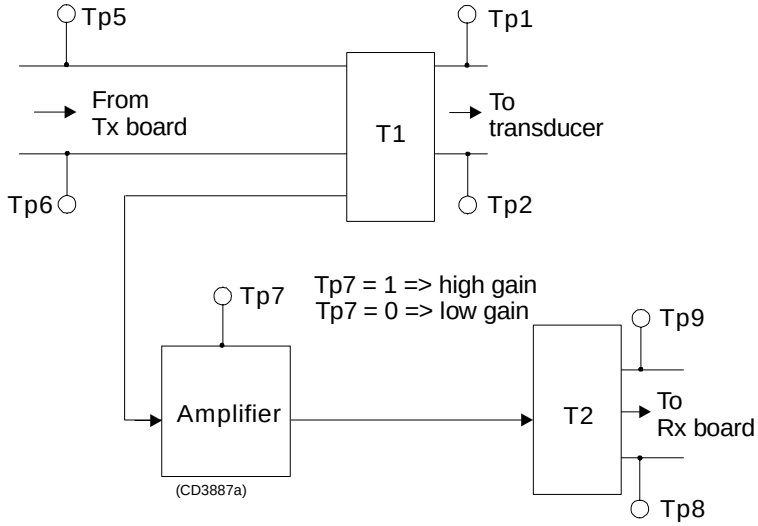



*Figure 35 Rx amplifier matching board - block diagram*

## Microcontroller board

The Microcontroller board is a general purpose single microcontroller board, with the main task of performing calculations and digital signal control. It uses the *87C196KC/KD Microcontroller* manufactured by Intel, and is also equipped with a number of timers, inputs and outputs.

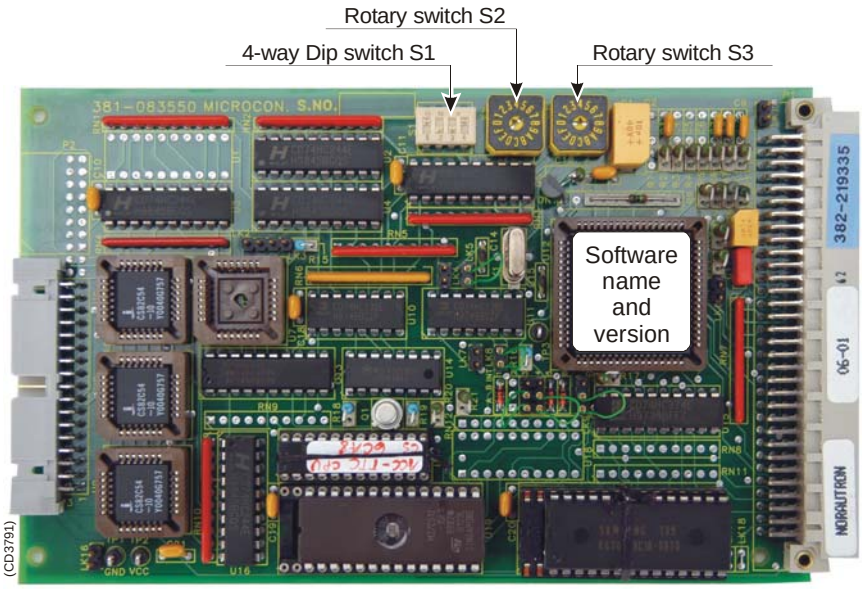



*Figure 36 Microcontroller circuit board - switch locations*

→ *Refer to figure 37 for the block diagram.*

The 87C196 microcontroller is the main component on the board. It can be run in different modes such as active, idle and power down, the inactive modes being used to save power. The microcontroller performs all the calculations and controls all the board’s inputs and outputs. The timers on the board are used for dividing down the off-board Phase-Locked-Loop frequencies, controlling the receiver frequency channels.

## Switches

The board carries one 4-way Dip-switch block and two 10-position rotary switches:

- The Dip-switch block is used to set the system’s operating frequency band.

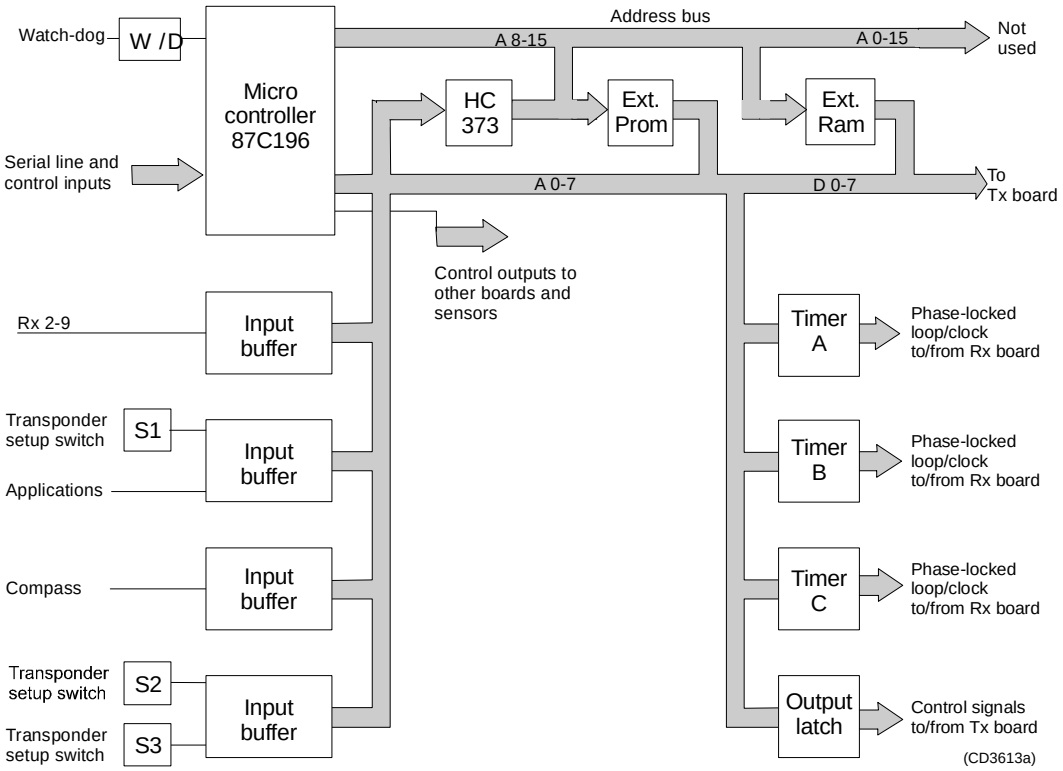



*Figure 37 Microcontroller circuit board - block diagram*

## Motherboard

The motherboard contains all the input/output interfacing for the transponder. It has an interface connection (P4) for the two inclinometers and a + 10 V supply which is turned on only during processing to conserve battery life. It also carries an interface plug (P5) for the Depth/Temp serial line. The TTL interface is buffered through U1 on the motherboard.

### Interconnections

The interconnections will differ from tp model to tp model.

Note

*For details of the interconnections between the circuit boards, the transducer and the electronics, and the battery and the electronics, contact Kongsberg Maritime.*

## Serial Interface Transponder (SIT) board

### Purpose

The purpose of the SIT board is to provide TTL to RS-232/RS-422 interfacing for the Microcontroller board in the transponder.

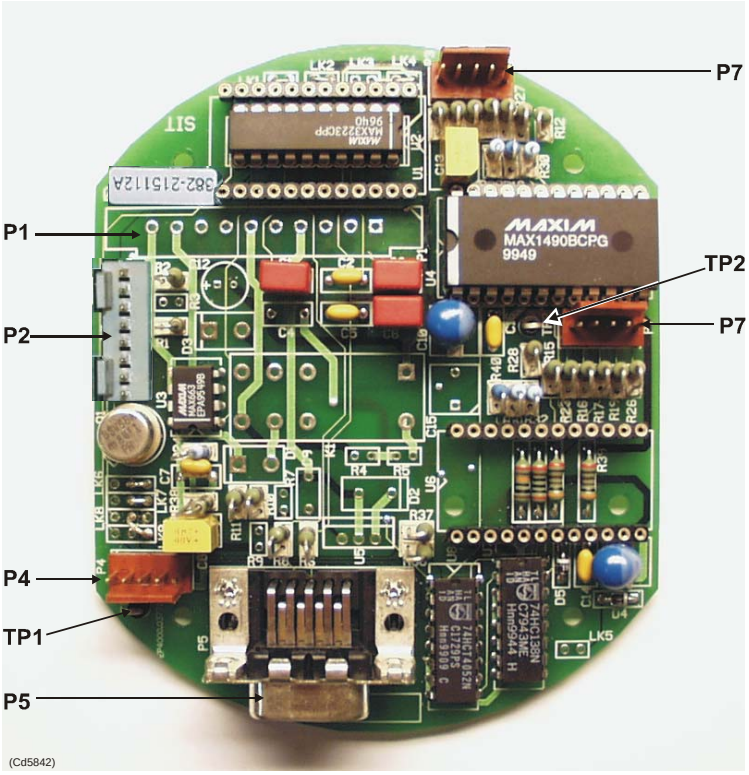



*Figure 38 Serial Interface Transponder - circuit layout*

### Functional description

The board contains a two channel TTL to RS-232 converter isolated (NM232DD)/or non isolated (MAX3223). Only one can be mounted at one time. In addition, two isolated TTL/RS-422 converters (MAX 1490B) are included.

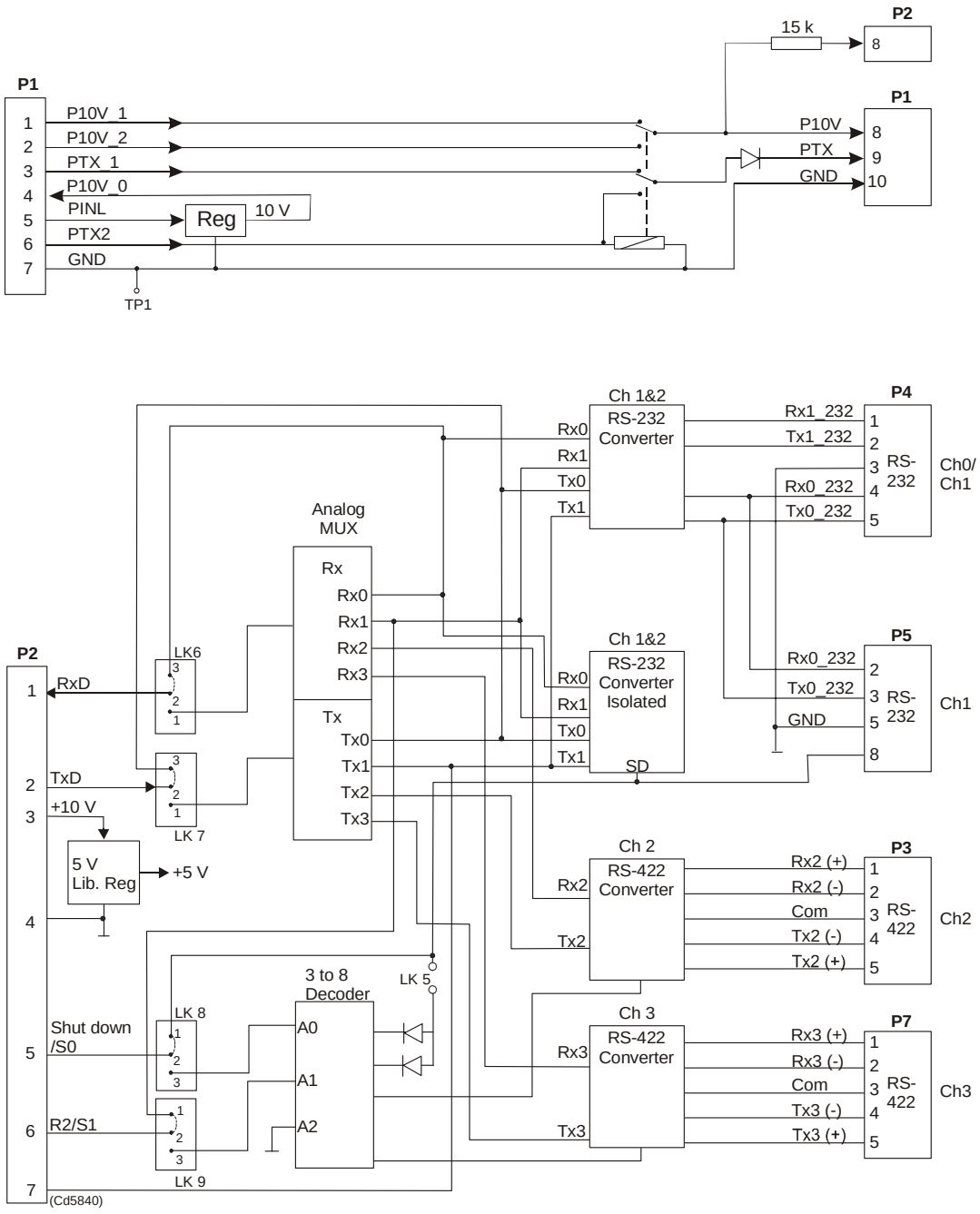



*Figure 39 Serial Interface Transponder board - block diagram*

# AUXILIARY EQUIPMENT

## General

This section describes various types of auxiliary equipment that may be used to secure a transponder.

## Anchor-weight

A transponder requires an anchor-weight of approximately 60 to 70 kg to hold the transponder securely in position on the seabed. Use a length of rope 3 to 15 metres long to attached the anchor, and then attach a suitable shackle to the ”top” of the rope. (The length of the rope depends on the transponder use.)

- If you use LBL with very long base line in deep water, use up to 15 m.
- If you use SSBL on a flat seabed, a 3 m rope is sufficient.

## Floating rope

A floating rope may be used when collecting the transponder by an ROV.

## Auxiliary equipment supplied by Kongsberg Maritime

Kongsberg Maritime may supply the following:

- Floating collar

## Floating collar

The collar is divided lengthwise into two halves. These halves are placed around the transponder housing and bolted together, enabling the collar to be assembled onto a transponder without removing the end cap clamping ring. The ID-clamp ring may be used to hold the collar up against the top clamping ring on the transponder.

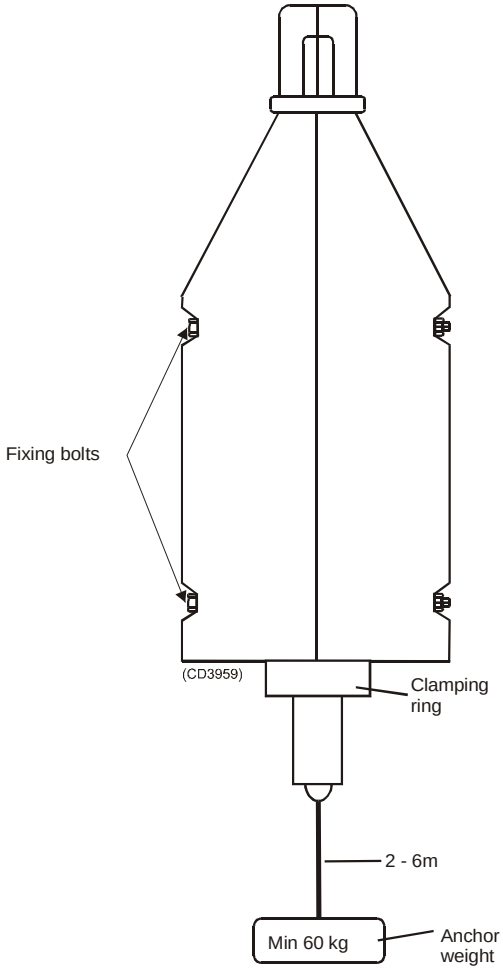



*Figure 40 Transponder floating collar*

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# SPARE PARTS

## Introduction

This section lists the parts and modules defined by Kongsberg Maritime as *Line Replaceable Units (LRUs)*. The required mounting components (such as nuts, bolts, washers etc.) are identified on the diagrams, but have not been allocated order numbers as we regard these items as standard commercial parts available from retail outlets around the world.

## Codes used

The following codes are used in the parts lists:

**Part no. -** Kongsberg Maritime’s part number.

**Item name -**The name of the item.

**Technical data -** Technical specifications and any other relevant information.

**Drw. ref. -** Reference number of the production or illustration drawing where the item is included. If a number is given here, the drawing will be included in the manual’s/document’s drawing file.

**Drw. pos. -** The item’s position number on the drawing referenced above.

**No. in sys. -** The quantity of the item used in the system. *Note that this information is not provided for standard components such as nuts, bolts and washers.*

**Rec. spares -** The quantity of the item recommended to be carried as spares onboard the vessel. *Note that this information is not provided for standard components such as nuts, bolts and washers.*

## Accessories

This list includes the common accessories used for all transponder types.

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | Technical data | Drw. pos. | Rec.spares |
| 540-084173 | O-ring | Figure page 69 | 2 |
| - | 124,3 x 5,7 | 11 | 2 |
| 540-021249 | O-ring | Figure page 69 | 2 |
| - | 101,0 x 5,34 | 12 | 2 |
| 549-086691 | Backup ring | Figure page 69 | 2 |
| - | 101,0 x 5,34 | 13 | 2 |
| 560-085925 | Socket-heads screws | Figure | 6 |
| - | - | - | 6 |
| 599-089487 | Plug for ID-clamp | Figure | 3 |
| - | - | - | - |
| 899-220090 | Information clamp ring | Figure page 69 | 1 |
| | w/freq. | 24 | - |
| 599-220199 | Information clamp ring | Figure page 69 | 1 |
| | w/reg. no. | 25 | - |
| 599-089318 | PCB guide | Figure page 69 | 1/1 |
| 599-089320 | - | 7/9 | - |
| 654-085883 | Aquva lube | N/A | - |
| - | - | - | - |
| 654-077261 | Silicone grease | - | 1 |
| - | - | N/A | 1 |
| 659-063787 | Bag of desiccant 10 g | Figure page 69 | 1 |
| - | - | 21 | 1 |
| 119-099102 | Floating collar | N/A | - |
| - | 4000 m | - | - |
| 857-164871 | MPT 341 series Instruction manual | N/A | 1 |
| - | (This manual) | - | - |

## Sensor

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | Technical data | Drw. pos. | Rec.spares |
| 298-099063 | DT sensor | N/A | - |
| - | (400 bar) | - | - |

# MPT 341/DTSxDuB transponder

## Complete transponder

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | Technical data | Drw. pos. | Rec.spares |
| 102-220200 | MPT 341/DTSxDuB transponder complete | Figure page 69 | 1 |
| - | All main modules are included | N/A | - |

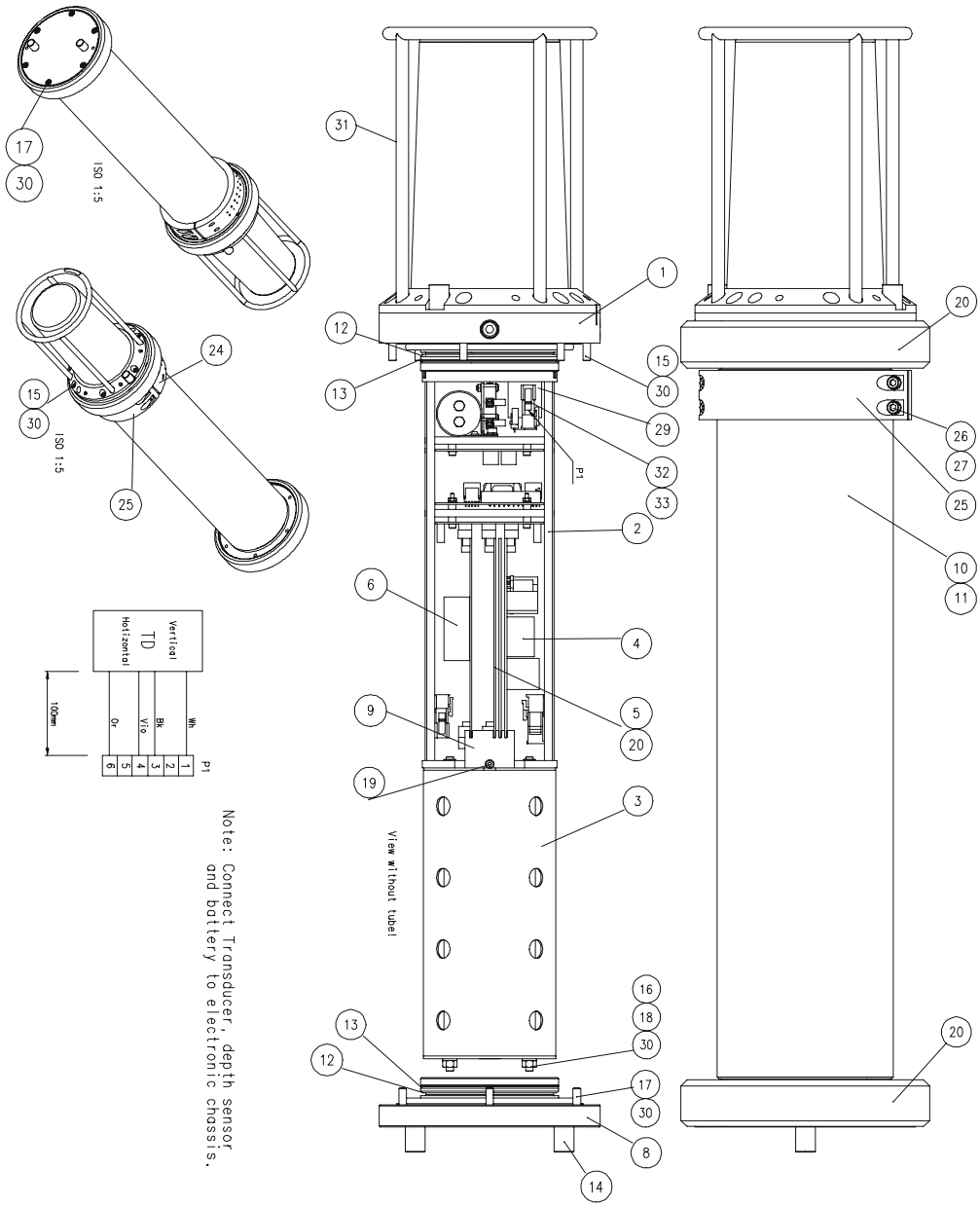
## Main modules

This list includes the main modules for the MPT 341/DTSxDuB transponder.

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | Technical data | Drw. pos. | Rec.spares |
| 312 -214880 | Transducer unit | Figure page 69 | 1 |
| - | - | 1 | - |
| 299 -220201 | Electronic chassis | Figure page 69 | 1 |
| - | Motherboard, Rxamp board and sensors are included | 2 | - |
| 382-210413 | Tx board | Figure page 69 | 1 |
| - | - | 4 | - |
| 382-083551 | Microcontroller board | Figure page 69 | 1 |
| - | - | 5 | - |
| 382-211016 | Rx board | Figure page 69 | 1 |
| - | - | 6 | - |
| 290-219964 | Alkaline battery | Figure page 69 | 1 |
| - | A10/36 (8/26) | 3 | - |
| 599 -219913 | Housing | Figure page 69 | 1 |
| - | - | 10 | - |
| 599 -219976 | Bottom end cap | Figure page 69 | 1 |
| - | - | 8 | - |

## Accessaries

→ *Refer to the table on page 67.*




Note:
The drawing is not in scale.

| Page 1 of 1 (CD30005) | MPT 341/DTSxDuB transponder | **102-220200** Rev.A |
|---|---|---|

## Serial interface

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | **Technical data** | **Drw. pos.** | **Rec.spares** |
| 499-220117 | Serial interface unit complete | Figure page 71 | - |
| - | - | - | - |
| 599-222033 | Configuration plug | Figure page 71 | - |
| - | - | - | - |
| 380-222049 | Configuration cable | N/A | - |
| - | - | - | - |
| 370-099035 | Pigtail | N/A | - |
| - | Subconn MCIL12M | - | - |
| 379-076710 | Locking sleeve * | N/A | - |
| - | Subconn DLSAM | - | - |

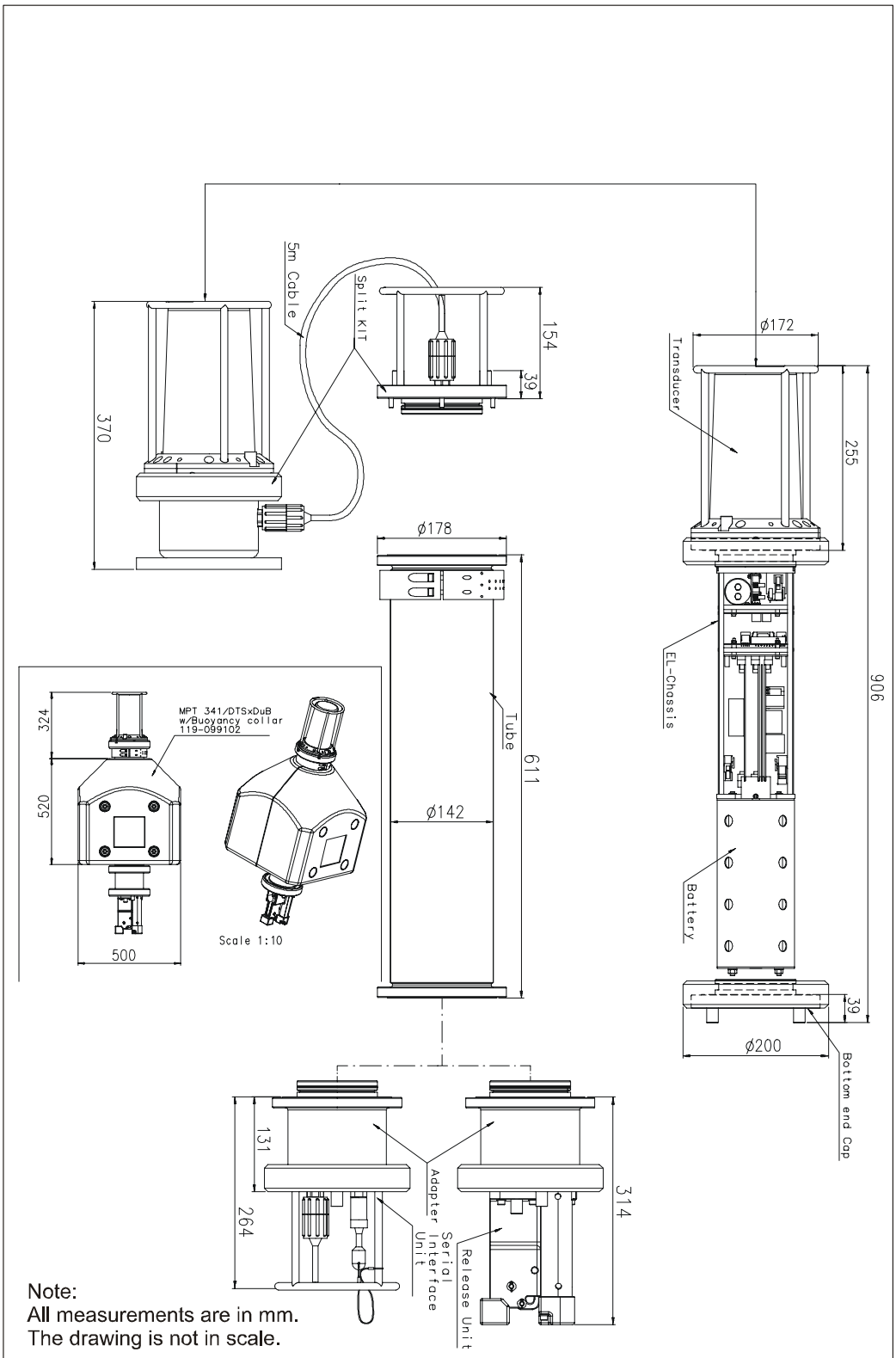
* Locking sleeve for the pigtail.

## Split transducer-head

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | **Technical data** | **Drw. pos.** | **Rec.spares** |
| 499 -220115 | Split transducer-head kit | Figure page 71 | - |
| - | - | - | - |
| 380-099095 | Cable | Figure page 71 | - |
| - | 5 m | - | - |

## Magnetic release mechanism

| Part no. | Item name | Drw. ref. | No. in sys. |
|---|---|---|---|
| - | **Technical data** | **Drw. pos.** | **Rec.spares** |
| 499 -220119 | Release unit complete | Figure page 71 | - |
| - | - | - | - |




| | | |
|---|---|---|
| Page 1 of 1 (CD30077) | MPT 341/DTSxDuB transponder and kits - outline dimensions | **830-220206** Rev.A |

# MAIN INDEX

The next pages presents the main index of this manual.

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KONGSBERG