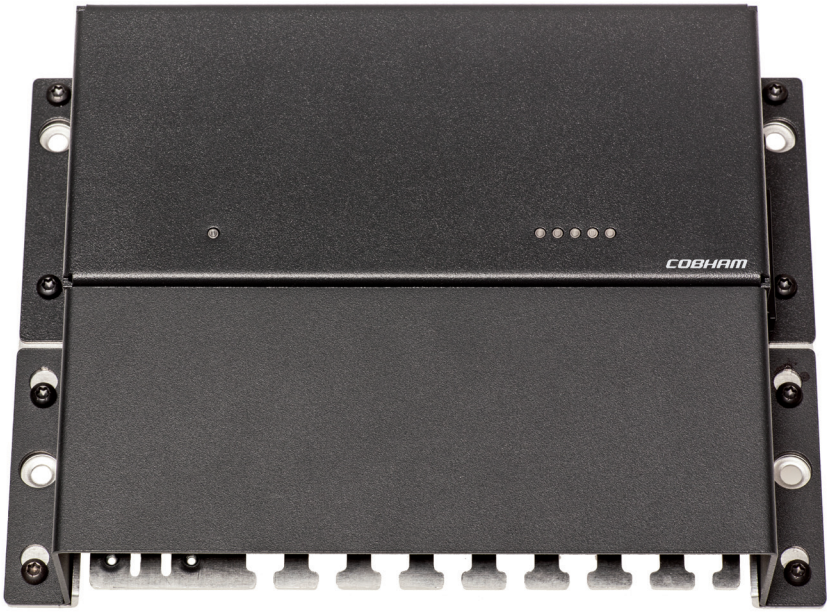
COBHAM

SAILOR 6194
Terminal Control Unit

Installation and user manual



SAILOR 6194 Terminal Control Unit

Installation and user manual

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Safety summary

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

GROUND THE EQUIPMENT
To minimise shock hazard, the equipment chassis and cabinet must be connected to an electrical ground and the cable instructions must be followed.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE
Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS
Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel. Do not service the unit with the power cable connected. Always disconnect and discharge circuits before touching them.

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT
Because of the danger of introducing additional hazards, do not substitute parts or perform any unauthorised modification to the equipment.

COMPASS SAFE DISTANCE
20 cm

About the manual

Intended readers

This manual is primarily an installation manual for the Terminal Control Unit Terminal Control Unit. The manual is intended for installers of the system and service personnel. Personnel installing or servicing the system must be properly trained and authorised by Cobham SATCOM. It is important that you observe all safety requirements listed in the beginning of this manual, and install the system according to the guidelines in this manual.

The manual also describes some basic configuration of the system, the use of SSA buttons and scripting.

See also the user manual for the system in which the Terminal Control Unit is installed, e.g. SAILOR 6120 SSA System. Related manuals are listed on the next page under *Related documents*.

Related documents

The below list shows the documents related to this manual and to this product.

The manuals can be found in the Self Service Center at cobham.com/satcom under Service and Support.

Ref.	Title and description	Document number
[1]	SAILOR 6006 and SAILOR 6007, Message Terminal, Installation manual	98-130088
[2]	SAILOR 6110 GMDSS System, Installation manual	98-130752
[3]	SAILOR 6110 GMDSS System, User manual	98-130753
[4]	SAILOR 6120/6130/6140/6150 System, Installation manual	98-131589
[5]	SAILOR 6120/6130/6140/6150 System, User manual	98-131590
[6]	SAILOR 6081 Power Supply and Charger, Installation and user manual	98-130980
[7]	System 6000 GMDSS Console, Installation manual	98-131571

Table 1: Related documents

Table of Contents

Introduction

The Terminal Control Unit

The Terminal Control Unit is used for the following purposes:

- For connecting covert alert buttons for use in Ship Security Alert (SSA) systems, or SAILOR 6108 Non-SOLAS Alarm Panels or SAILOR 3042E Alarm Panels in Non-SOLAS Distress systems.
- For connecting a SAILOR 3027 terminal, which has a CAN interface, with other equipment that has Ethernet or RS-232 interface.
- For executing custom scripts that can react on events registered by the Terminal Control Unit, e.g. in SCADA applications and for vessel monitoring.

You can also connect a switch for power control of the Terminal Control Unit, and with the optional Glonass module you can connect to a Glonass antenna.

The power for the Terminal Control Unit is supplied through the CAN connector (extended input range 10.5-32 V DC).

The Terminal Control Unit is supported by the ThraneLINK Management Application, a Windows program that provides easy monitoring and software update of connected Cobham SATCOM devices with ThraneLINK support.

Installation

This chapter describes how to unpack, store and install the SAILOR 6194 Terminal Control Unit. It contains the following sections:

- *Unpacking*
- *What's in the delivery*
- *Installing the Terminal Control Unit*
- *Outline drawing*
- *Installing Ship Security Alert (SSA) buttons*
- *Installing Non-SOLAS Alarm Panels*
- *Installing the Glonass option*

For information on cable connections, see *Connecting cables* on page 15.

Unpacking

Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that the carrier's agent be present when opening the carton. Save the carton packing material for future use.

Warning! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

What's in the delivery

The following items are included in the delivery of the Terminal Control Unit:

- Terminal Control Unit Terminal Control Unit
- NMEA2000 Micro Device Cable, 6 m
- Mounting tool for spring-loaded terminals
- Installation and user manual (this manual)

Installing the Terminal Control Unit

General installation requirements

The Terminal Control Unit must be installed in a location which is

- indoors
- not exposed to water
- close to a ship ground connection point.

Make sure the Compass Safe Distance is maintained. See *General specifications for the TCU* on page 67.

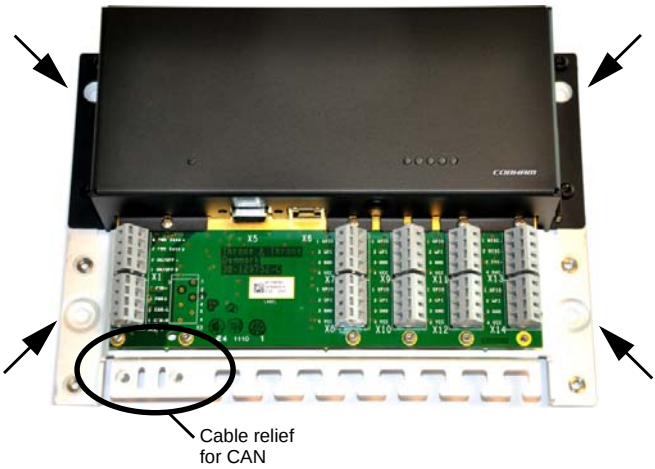
Mounting the Terminal Control Unit

The Terminal Control Unit is designed to be mounted on a flat surface, e.g. on a bulkhead.

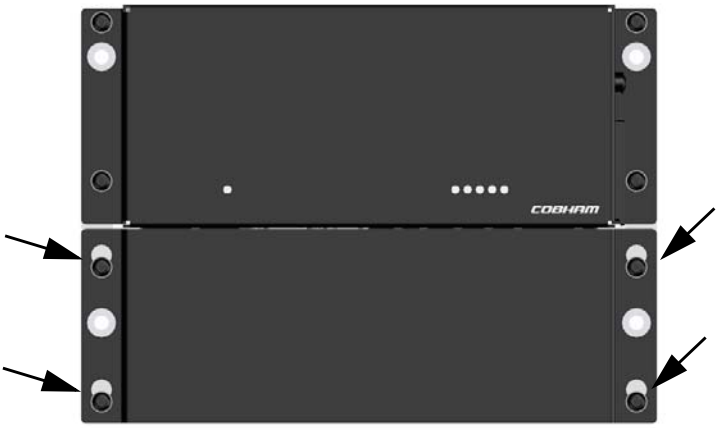
Important If the Terminal Control Unit is not mounted on a surface with a good connection to ship ground, you must connect a separate cable for this purpose. See *Grounding the Terminal Control Unit* on page 28.

To mount the Terminal Control Unit, do as follows:

1. Using four screws, mount the Terminal Control Unit on the mounting surface. The mounting holes are Ø6. If you mount the Terminal Control Unit on a vertical surface, make sure the cable relief is facing down as shown in the picture below.



2. Tighten the screws.
3. Connect all cables as described in *Connecting cables* on page 15 and fasten the cables to the cable relief with cable strips.
4. When all cables are installed, mount the cover for the spring-loaded terminals. Tighten the screws to 1.5 Nm.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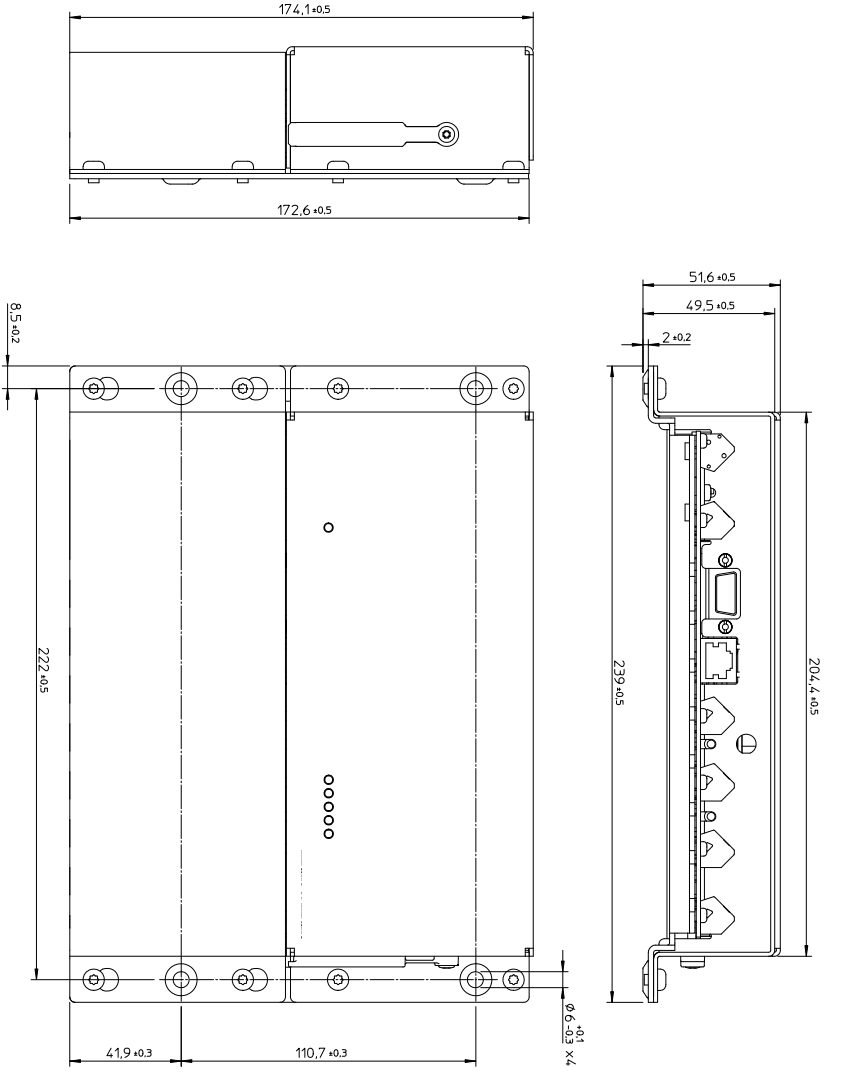
Outline drawing



Dimensions are in mm

Installing Ship Security Alert (SSA) buttons

Placing the SSA buttons

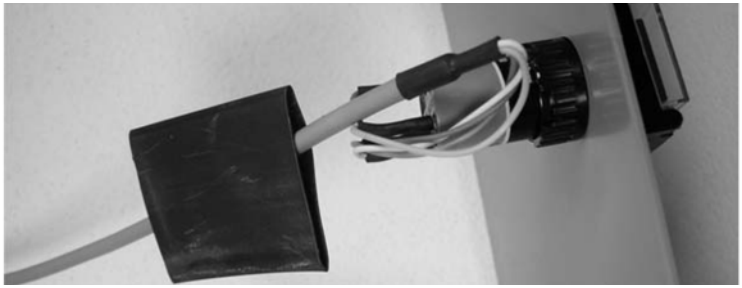
To fulfil the IMO requirement on covert activation, the alert button installation must be concealed using appropriate covert installation techniques. One of the alert buttons must be placed on the ship's navigation bridge. To make testing easier we recommend installing the test button close to one of the covert alert buttons, but in such a way that the constant light does not disturb navigation (night sight). The test button must be installed where it is easy to test the SSA installation at regular intervals.

Installing the SSA buttons

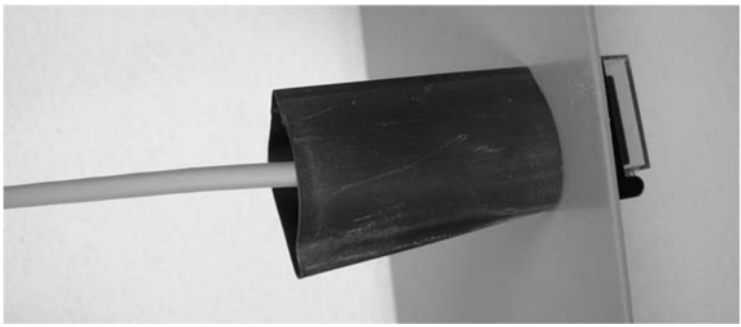
When the place for installation is determined, do as follows:

1. Drill a hole with a diameter of 16 mm.
2. Place the mounting-nut and the large piece of heat-shrink 19x30 mm on the back of the hole.
3. Slip the wires from the covert alert button through the hole, the mounting nut, the heat-shrink, and all the way to the Terminal Control Unit.

   The 19x30 mm heat-shrink is for cable strain relief on the back of the button.
4. Tighten the mounting nut.
5. Bend the cable in an S shape on the side of the switch.



6. Pull the heat-shrink to the back of the board where the button is installed.



7. Shrink the heat-shrink with heat.

For information on wiring, see *GMDSS or SSA systems (SAILOR 6110 or SAILOR 6120)* on page 23.

For information on how to configure the SSA buttons, see *Configuring SSA buttons* on page 41.

For information on how to use the SSA buttons, see *Use of SSA buttons* on page 46.

Installing Non-SOLAS Alarm Panels

The Non-SOLAS Alarm Panel is used in Non-SOLAS Distress systems to send Distress alerts. You may use the SAILOR 6108 Non-SOLAS Alarm Panel or the SAILOR 3042E Alarm Panel.

The Non-SOLAS Alarm Panel can be mounted on a wall or desktop.

For information on wiring, see *Non-SOLAS Distress systems (SAILOR 6150)* on page 25.

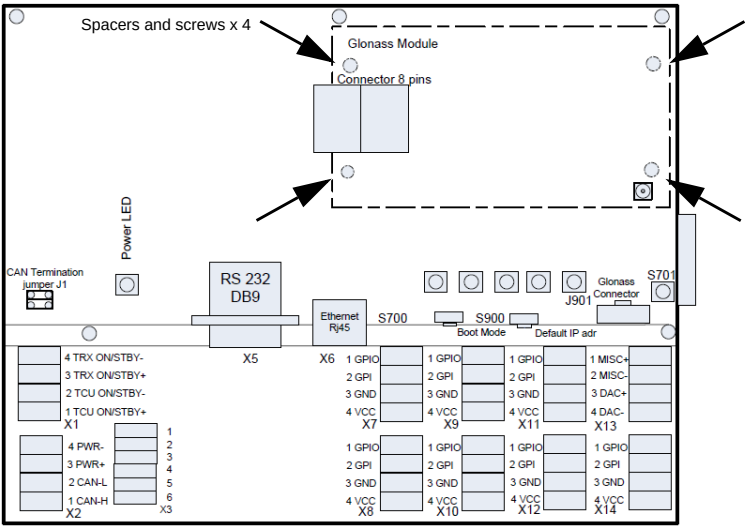
Installing the Glonass option

An optional Glonass module is available for the Terminal Control Unit. The Glonass module enables the THRANE 6194 to receive a Glonass signal and make it available to other parts of the system.

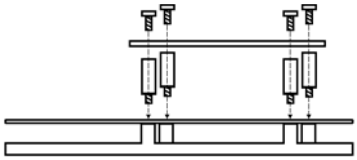
Caution! Before removing the cover enclosing the electronic circuits, first make sure you are wearing a wrist strap connected to the work place.

To install the Glonass module, do as follows:

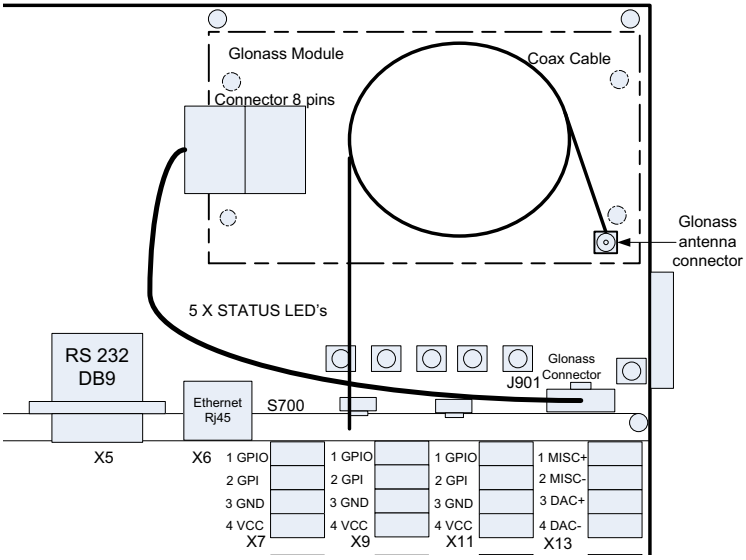
1. Unscrew the screws holding the cover for the electronic circuits and remove the cover.
2. Mount the four threaded spacers in the positions shown below, through the main PCB and into the threaded bushings in the bottom of the Terminal Control Unit. Tighten them to 1 Nm.



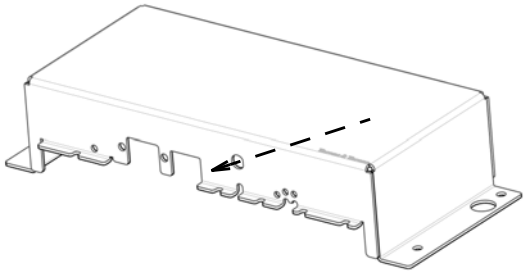
3. Place the Glonass module over the four spacers and mount the four screws through the holes in the Glonass module and into the spacers.
   Tighten the screws to 1 Nm.



4. Connect the cable harness from the Glonass module to the connector J901 in the Terminal Control Unit.



5. Lead the external connector on the antenna cable through the hole indicated in the drawing below and fasten it to the cover with the nut on the connector.



6. Connect the internal connector on the antenna cable to the antenna connector on the Glonass module as shown in the drawing in step 4.
7. Mount the cover and fasten the screws to 1.5 Nm.

For information on how to configure the Glonass module see *Configuring the Glonass option* on page 44.

Connecting cables

This chapter provides a description of the connectors on the Terminal Control Unit and gives guidelines to cabling. It has the following sections:

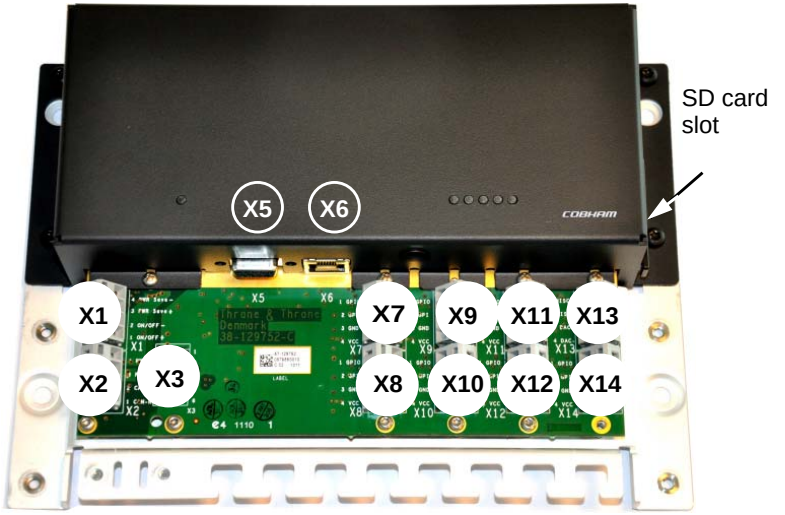
- *Connector overview*
- *Power control (X1)*
- *CAN interface (X2)*
- *RS-232 interface (X5)*
- *LAN interface (X6)*
- *SSA and Alarm Panel (X7 to X14)*
- *Grounding the Terminal Control Unit*
- *Cable requirements*

Connector overview

The drawing below shows the connectors on the Terminal Control Unit and the SD card slot for inserting an SD memory card.

X5 and X6 are standard connectors for RS-232 (9-pin D-sub) and Ethernet (RJ-45), all other connectors are spring-loaded terminals.

Note X3 and X13 are for future use.



Note Some of the spring terminals can change function depending on the connected equipment or by means of software commands. See the available functions in *SSA and Alarm Panel (X7 to X14)* on page 23.

Power control (X1)

By default, when the system is powered on, the Terminal Control Unit and the connected mini-C Terminal are always on. If you want to change this behaviour, you must configure the X1 connector using a software command (`Constant_On 0`). For details see *Setting up software controlled power management* on page 42.

Important If you have configured X1 with the command `Constant_On 0`, you cannot switch on the system until you connect pin 1 and 2 in X1 with a switch.

Remote on/standby

When X1 is configured for power management, Pin 1 and 2 in the connector X1 can be used for switching between **on** and **standby** on the Terminal Control Unit and the mini-C Terminal. Connect a switch between the two pins if you want to be able to set the Terminal Control Unit and the mini-C Terminal in standby mode independently of the rest of the system.

- Open contact: The Terminal Control Unit and the mini-C Terminal are in standby mode.
- Closed contact: The Terminal Control Unit and the mini-C Terminal are always on.

Pin 3 and 4 are for future use.

Power management (only SAILOR 6140 and SAILOR 6150)

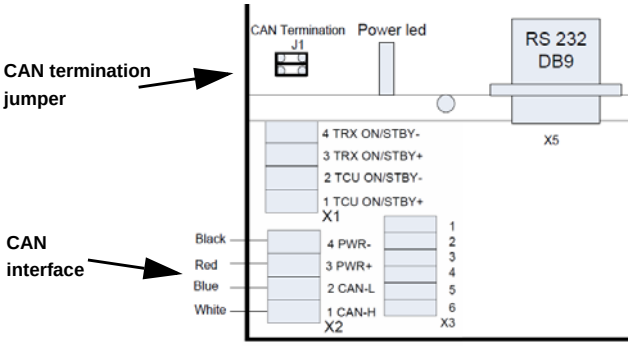
Note Note that software controlled power saving functions are not available in GMDSS, SSA nor LRIT systems.

When X1 is enabled and the switch is open (standby), you can control the power management with software. See *Setting up software controlled power management* on page 42.

CAN interface (X2)

The Terminal Control Unit has one CAN interface (spring-loaded terminals) used for communicating with connected equipment, such as a Message Terminal and/or a mini-C GMDSS terminal. The CAN interface is located in the bottom left corner of the Terminal Control Unit as shown below.

Important Do not connect the shield of the CAN cable to the chassis of the Terminal Control Unit, or to any other ship ground connection on the Terminal Control Unit. For safety reasons the CAN shield must only be connected to ship ground at the power supply.



To connect the CAN interface, insert the wires as shown in the drawing above. Use the tool supplied with the Terminal Control Unit to open the spring-loaded terminals.

Power input

There are 2 different options for the power input:

- The Terminal Control Unit can be powered through the CAN bus (extended range: 10.5-32 V DC).

  Note If your power source is supplying more than 15 V, the system is not protected against incorrect wiring.

- In systems where CAN power is not available, you can connect your power supply or battery to pin3 **PWR+** and pin 4 **PWR-** shown in the drawing on page 18, if the power supply is within the limits stated in *General specifications for the TCU* on page 67.

Caution! If your power source is a battery, you must configure an under-voltage protection for the battery. The battery may be damaged if the correct under-voltage protection is not applied! For details, see the next section, *Under-voltage protection*.

Under-voltage protection

If the power source is a battery, you must configure the Terminal Control Unit to the correct under-voltage protection as follows:

1. Connect a computer to the Terminal Control Unit and start a terminal program as described in *Using commands* on page 37.
2. At the `tt6194:/$` prompt, type in the relevant command, depending on the source voltage:
   - Disable UVP: Type **`avr_uvp 0`**
   - 24 V: Type **`avr_uvp 1`**
   - 12 V: Type **`avr_uvp 2`**
   - CAN voltage: type **`avr_uvp 3`**

120 Ohm termination for CAN interface

Caution! Before removing the cover enclosing the electronic circuits, first make sure you are wearing a wrist strap connected to the work place in to avoid ESD (ElectroStatic Discharge).

A double jumper, J1 in the drawing on page 18, connects a 120 Ohm termination for the CAN interface. If you have terminated the CAN connection elsewhere and want to remove the termination in the Terminal Control Unit, you must remove the jumper. To access the jumper you must first remove the cover by unscrewing the screws holding the cover.

RS-232 interface (X5)

Overview

There is one RS-232 connector, 9-pin D-Sub, on the Terminal Control Unit. The RS-232 (DTE) interface can be used for entering commands or running scripts on the Terminal Control Unit.

Note The default setup for the RS-232 interface is 115200 bps 8N1. You must use this setting the first time you connect.

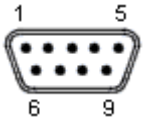
Pin-out

The figure and table below show the connector outline and pin assignments.

Pin number	Pin function
1	Not Connected
2	RxD (Receive Data) Input
3	TxD (Transmit Data) output
4	Not Connected
5	GND
6	Not Connected
7	Not Connected
8	Not Connected
9	Not Connected

Table 1:

D-Sub, 9 pin male



LAN interface (X6)

Overview

There is one Ethernet (10/100 MB) connector on the Terminal Control Unit. We recommend connecting to the slave unit, in order to reserve the free LAN connectors for user interfaces on the master unit.

The Ethernet interface can be used to connect a computer and use the easyMail program supplied on CD with the Terminal Control Unit, the ThraneLink Management Application or a terminal program to access the Terminal Control Unit or the connected SAILOR 3027.

Note

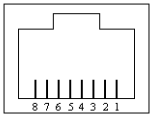
To access the Terminal Control Unit through the LAN interface you must know the IP address of the Terminal Control Unit. The ThraneLink Management Application lists all connected units with their IP addresses. For details, see *Updating software* on page 61. You may also define a temporary IP address for the Terminal Control Unit.

Pin-out

The figure and table below show the connector outline and pin assignments.

Pin number	Pin function
1	Rx+
2	Rx-
3	Tx+
4	Not connected
5	Not connected
6	Tx-
7	Not connected
8	Not connected

RJ-45 female



SSA and Alarm Panel (X7 to X14)

Some of the spring-loaded terminals can have different functions, depending on the system configuration.

The function of the I/O pins are automatically configured to match the connected type of satellite terminal. Depending on the connected terminal, some of the I/O pins are preconfigured, and some of the I/O pins are configurable.

The general purpose inputs and outputs can be used for various applications, e.g. temperature sensors, trawl indicators, flow meters/level sensors or ignition ON indication.

Note For specifications of the general purpose inputs/outputs, see *Specifications for I/O pins* on page 68.

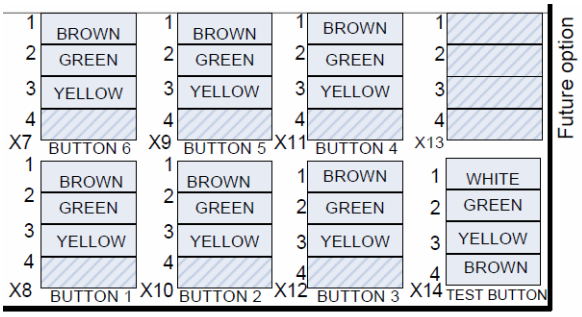
The following sections describe some of the possible configurations.

GMDSS or SSA systems (SAILOR 6110 or SAILOR 6120)

You can use the Terminal Control Unit for connecting alarm and test buttons for use in SSA systems. When a SAILOR 3027C or SAILOR 3027SSA terminal is connected, X7 to X14 are automatically configured as shown below. X13 is not used.

Important If you are not using all terminal blocks assigned for SSA alarm buttons (X7 to X12), make sure pin 1 and 2 are shorted in the terminal blocks that are not used. This only applies to the alarm buttons X7 to X12, **not** to the test button X14.

The Terminal Control Unit can connect up to 6 alarm buttons and 1 test button. The pin-out is shown below.

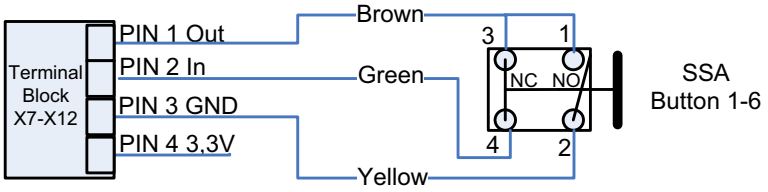


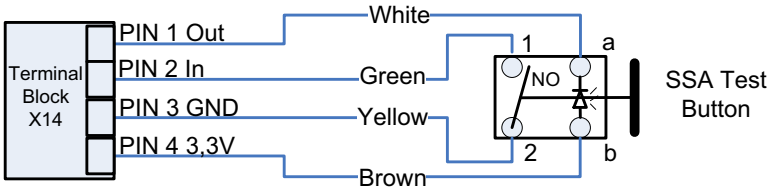
The following spring-loaded terminals are used for the buttons:

- SSA Alarm buttons: X7, X8, X9, X10, X11 and X12.
- SSA Test button: X14.

Note Before inserting the wires into the terminals, make sure there is no jumper between pin 1 and 2 (Output and Input).

Connect the buttons as shown below:



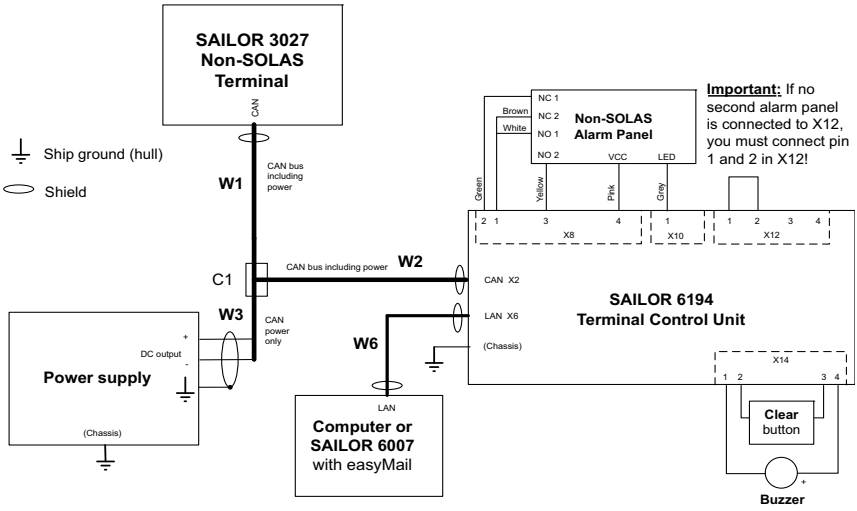


Note that there may also be a white wire in the cables for the SSA Alarm buttons. Do not connect the white wire from the red SSA alarm buttons - only from the Test button.

Non-SOLAS Distress systems (SAILOR 6150)

The multi-purpose interface on the Terminal Control Unit can also connect to Non-SOLAS Alarm Panels e.g. in Non-SOLAS Distress installations. When a SAILOR 3027D is connected, X8, X10, X12 and X14 are automatically[1] configured as shown in the two following drawings. X13 is not used.

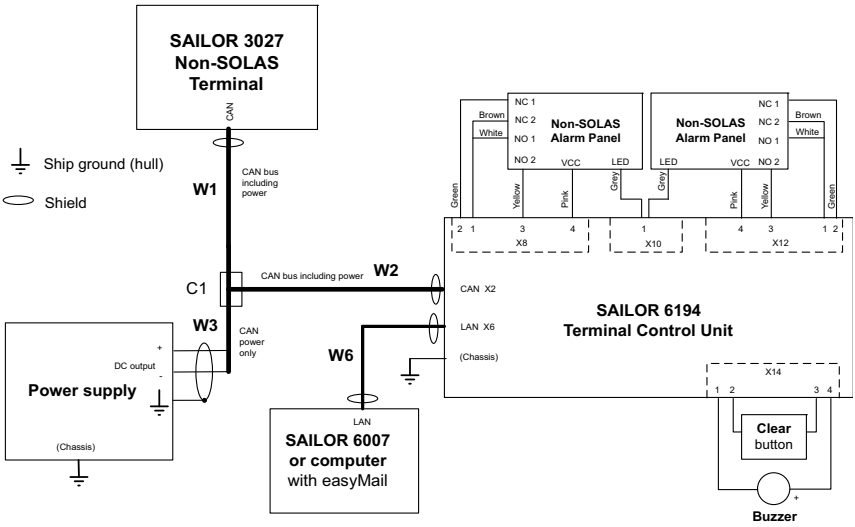
With 1 TT-3042E Non-SOLAS Alarm Panel (Inmarsat C Distress Alarm Box):



Note Make sure to connect 1 and 2 in X12 if you only have 1 TT-3042E Non-SOLAS Alarm Panel.

1. See extra information for use with 1 TT-3042E Non-SOLAS Alarm Panel in the block diagram and the note below it.

With 2 TT-3042E Non-SOLAS Alarm Panels (Inmarsat C Distress Alarm Box):



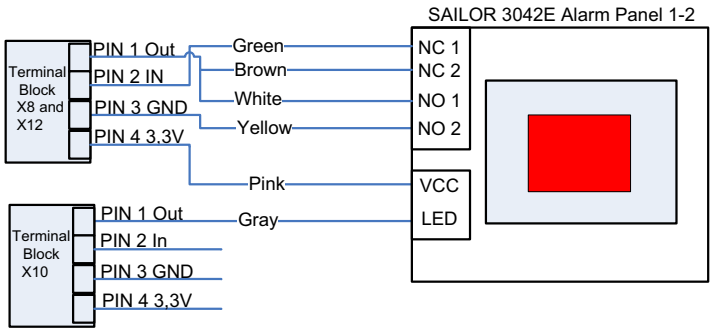
Each Non-SOLAS Alarm Panel uses two connector blocks as shown in the drawings above. Note that X10 pin 1 is shared by the two Non-SOLAS Alarm Panels.

The following spring-loaded terminals are used:

- Non-SOLAS Alarm Panels: X8, X10 and X12.
- Buzzer/Mute button: X14

Non-SOLAS Alarm Panel

Connect the Non-SOLAS Alarm Panel(s) as shown below:



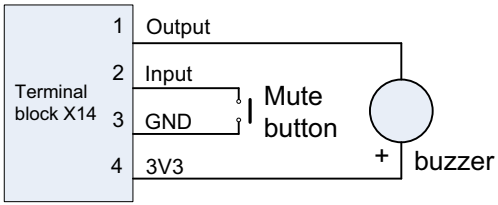
Buzzer and Mute button

You can also connect a buzzer and a Mute button to X14.

The buzzer indicates incoming or outgoing Distress alerts. The buzzer must be self-driven (make a sound when connected to power) and it must be working at 3.3 V DC with a max. current of 100 mA.

The Mute button mutes the buzzer connected to X14 when the button is pressed. The button must be a non-latched normally-open button of the type single-pole single-toggle (SPST).

Connect the buzzer and Mute button as shown below:



Grounding the Terminal Control Unit

The base plate of the Terminal Control Unit must be connected to ship ground in one of two ways:

- Mount the Terminal Control Unit on a conducting surface connected to ship ground, or
- connect a ground wire between ship ground and the cable relief for the CAN cable shown in the picture below.

Cable requirements

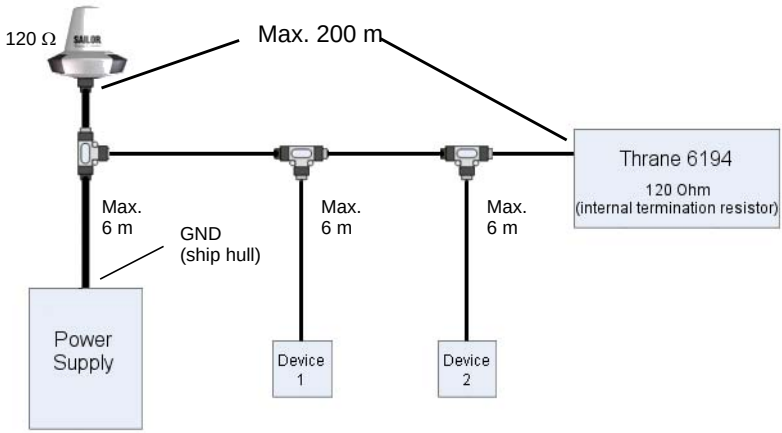
The following requirements apply to the cables used with the Terminal Control Unit. Before using the Terminal Control Unit for the first time, check that all cables are correctly wired and fastened.

CAN cables

The CAN cables must meet the requirements in the NMEA 2000 standard.

When connecting the CAN backbone, be aware of the following requirements:

- The CAN bus must have a termination resistance at both ends of the CAN backbone. If you are using a SAILOR 3027 mini-C Terminal, it is already terminated with 120 Ω internally. **You must provide the CAN bus with a termination resistance of 120 W** at the other end of the CAN backbone, either with a separate termination resistance or inside the last device on the CAN backbone. The Terminal Control Unit has an internal 120 Ω resistor which can be disconnected by removing a jumper (see *120 Ohm termination for CAN interface* on page 19).



- The cable length from each device to the CAN T-connector must be maximum 6 m.
- The total length of the backbone must be maximum 200 m.
- For the distance between the mini-C Terminal and the Power Supply Unit, refer to the installation manual for your mini-C System.
- Make the ground connection to ship ground (hull) at the power supply - and only there.
- Connect the shield of the CAN cable throughout the system.

Ethernet cables

Ethernet cables must be Category 5e or higher. The cables must be shielded. Max. length is 100 m.

RS-232 cables

Max. length of RS-232 cables is 15 m.

Using the Terminal Control Unit

This chapter provides a description of how to set up and use the Terminal Control Unit Terminal Control Unit. It has the following sections:

- *Status indicators*
- *Configuration*
- *Use of SSA buttons*
- *Use of Non-SOLAS Alarm Panels*

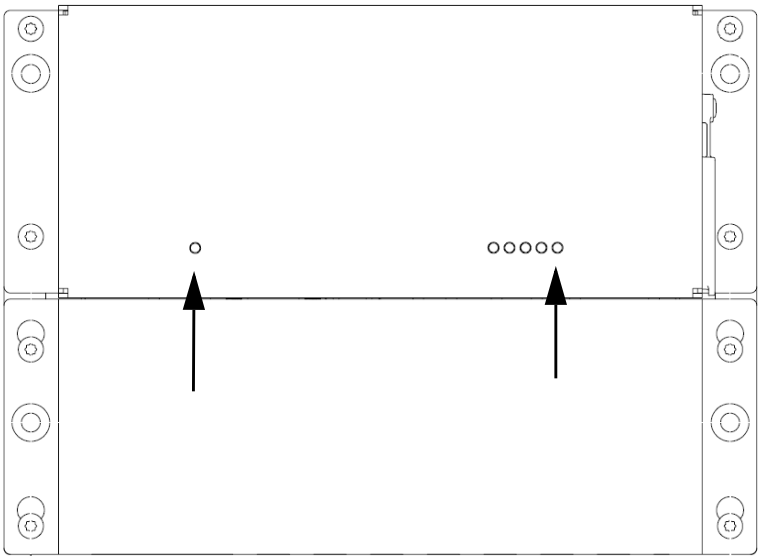
Status indicators

Light indicator positions

The Terminal Control Unit has a number of light indicators for signalling status and errors/warnings.

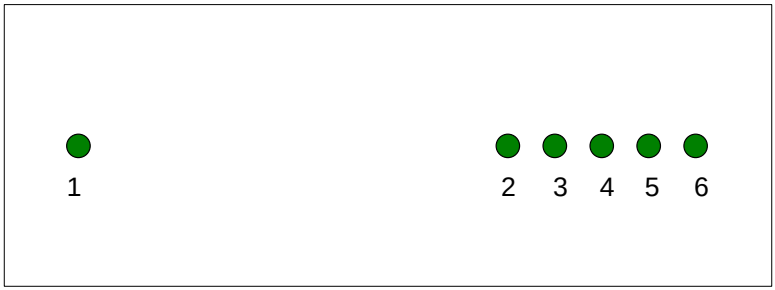
The indicators show status of power, position and logon as well as status of the Terminal Control Unit and the satellite terminal and program status.

The drawing below shows the location of the light indicators.



The function of the status indicators is described in the next pages.

The drawing below shows the position of each light indicator.



1. **Terminal Control Unit Power/sleep mode**, a green indicator
2. **Satellite status**, a green/red/yellow indicator
3. **Position signal**, a green/red/yellow indicator
4. **Program status** in SAILOR 3027, a green/yellow indicator
5. **Satellite terminal status**, a green/red/yellow indicator
6. **Terminal Control Unit status**, a green/red/yellow indicator

The following sections show the function of each light indicator.

Light indicator functions

Terminal Control Unit Power/sleep mode indicator

Behaviour	Meaning
Steady green	Terminal Control Unit is on.
Flashing green	Terminal Control Unit is in power save mode, see *Setting up software controlled power management* on page 42).
Off	Terminal Control Unit is in standby mode.

Satellite status indicator

Behaviour	Meaning
Steady green	Successfully logged in.
Steady yellow	Synchronized.
Steady red	No satellite found.
Flashing green	Login ongoing.
Off	Terminal Control Unit is in standby mode.

Position signal indicator

Behaviour	Meaning
Steady green	3D position fix obtained.
Steady yellow	No position fix - satellite visible.
Steady red	No satellite found.
Flashing green	2D position fix obtained.
Off	Terminal Control Unit is in standby mode.

Program status in SAILOR 3027 indicator

Behaviour	Meaning
Green	Interval program[a] for current Ocean Region is running.
Flashing green	Interval program for current Ocean Region is defined but not running.
Yellow	DNID is downloaded to the satellite terminal.
Off	No DNID (or the Terminal Control Unit is in standby mode).

a. An interval program is a program running at certain intervals, e.g. sending data or position reports.

Satellite terminal status indicator

Behaviour	Meaning
Green	Satellite terminal is on (including sleep mode).
Yellow	Warning. If a Message Terminal is connected you can access the list of active warnings and errors by selecting the icon in the top right corner of the display.
Red	Critical error.
Off	Terminal Control Unit is in standby mode.

Terminal Control Unit Status indicator

Note If more than one event cause the same indicator to light up or flash, the indication for the **most critical event is shown**. This means there may be more than one event, even if only one indication is shown. Check your user interface, e.g. the Message Terminal, to see the events.

Behaviour	Meaning
Steady green	Terminal Control Unit is OK.
Steady yellow	No mini-C (SAILOR 3027) is detected.
Flashing yellow	Upload to micro controller failed
Steady red	Critical error.
Flashing red	Button failure. SSA alarm buttons or Non-SOLAS Alarm Panels are not working properly.
Off	Terminal Control Unit is in standby mode

Configuration

Using commands

Using the com or serial port you can send commands to the Terminal Control Unit or SAILOR 3027.

To access the Terminal Control Unit or SAILOR 3027 settings using commands, do as follows:

1. Connect a computer to the RS-232 or LAN interface.
   For details refer to *RS-232 interface (X5)* on page 21 and *LAN interface (X6)* on page 22.
2. Start up a terminal program and connect to the Terminal Control Unit. The prompt shows:
   tt6194:/$
3. **To configure the SAILOR 3027** type **`minic`** in your terminal program.
   To return to Terminal Control Unit configuration after configuring SAILOR 3027, press **Ctrl** + **D** or type **`exit`**.
4. There are two access levels to the THRANE 6194:
   - normal (User level, default)
   - sysadm (administrator level), used for running scripts and for some commands

   To see which type of user is currently active type:
   ```
   t6194:/$ su
   Current user: normal
   ```
   To log-on as a system administrator (for running scripts), type:
   ```
   tt6194:/$ su sysadm
   Enter password:
   ```

Per default the password is empty.

To change the password type:

`password sysadm`, then enter and confirm the new password.

5. Type the commands for Terminal Control Unit or SAILOR 3027.

To list all commands

For a list of all commands for the Terminal Control Unit, type:

tt6194:/$ **`help`**

The commands for the currently selected user mode (normal or sysadm) are listed.

To auto-connect to the SAILOR 3027

To connect directly to a SAILOR 3027 after start-up of the Terminal Control Unit, do as follows:

1. Connect a computer to the RS-232 interface or the LAN interface of the TCU and start a terminal program as described in the section *Using commands*.
2. Log in as a system administrator:
   ```
   tt6194:/$ su sysadm
   Enter password:
   ```
3. To enable auto connect to the SAILOR 3027, type**:**
   ```
   tt6194:/$ auto_minic 1
   Automatic Mini-C prompt is enabled
   (reboot required)
   ```
4. To reboot the Terminal Control Unit, type:
   ```
   tt6194:/$ reboot
   ```
   <Your 'TELNET' connection has terminated>

   can0:/$

   You are now connected to the SAILOR 3027.

Note Once auto connect to mini-C is enabled, you can only access the mini-C, but not the TCU **if you use the serial connection**.

To disable auto connect, connect **via the LAN interface**. Then type:

```
tt6194:/$ auto_minic 0
Automatic Mini-C prompt is disabled
```

Configuring the IP address of the Terminal Control Unit

1. Connect a computer to the RS-232 interface or the LAN interface and start a terminal program as described in the previous section *Using commands*.
2. Log in as a system administrator:
   ```
   tt6194:/$ su sysadm
   Enter password:
   ```

To see current system configuration

To see the current configuration type:

```
tt6194:/$ sysconf
```

The Terminal Control Unit returns (example):

```
tt6194:/$ sysconf
Model type        : 0
Serial number     : 0340530091
PCB ID            : 0340530091
BOM               : D.00
Unit BOM          :
PCB revision      :
PCB variant       : 0
Location          :
MAC               : 00:11:cf:03:b5:c0
```

```
Use DHCP          : 1
IP address        : 0.0.0.0
IP mask           : 0.0.0.0
IP gateway        : 0.0.0.0
IP DNS            : 0.0.0.0
ISO address       : 0
Unique number     : 0x00211628
Dev. inst.        : 0
Dev. class inst.  : 0
Host              : 0
```

To use a DHCP server

It is recommended to set Use DHCP to on (1). Type the following for automatically assigning an IP address to the Terminal Control Unit:

tt6194**:/$ sysconf h 1**

To set a static IP address

If needed in your network you can set a static IP address for the Terminal Control Unit.

Example: Set Terminal Control Unit to IP address: 169.254.2.2, IP netmask: 255.255.0.0:

```
tt6194:/$ sysconf h 0
tt6194:/$ sysconf i <169.254.2.2>
tt6194:/$ sysconf a <255.255.0.0>
```

To set a gateway type:

```
tt6194:/$ sysconf g <gateway ip address>
```

To set a DNS server type:

```
tt6194:/$ sysconf d <dns ip address>
```

Reset button for IP address

The TCU has a button for setting a temporary fixed IP address. When you push the button, the IP address of the TCU is temporarily set to the default value (169.254.100.100). For further details see *Setting a temporary fixed IP address* on page 65.

Configuring SSA buttons

Configuration of the SSA buttons lies in the SAILOR 3027. To access these settings enter the terminal program as described in *Using commands* on page 37 and type:

```
minic
```

The prompt changes to (example): `can0:/$`

Configuring SSA recipients

If your system uses SSA buttons, the SAILOR 3027 must be configured with the recipient(s) of the Ship Security Alert. The recipients must be selected according to the Flag Administration under which the vessel is sailing. The recipients can be:

- e-mail addresses
- phone numbers (SMS)
- fax numbers
- telex numbers.

Specifications of the SSA routing requirements are found in IMO SOLAS Regulation XI-2/6 and in IMO Circulars MSC/Circ.1072 and MSC/Circ.1073.

To configure the SSA recipients in the connected SAILOR 3027, do as follows:

1. Connect a computer and access the SAILOR 3027 settings as described in the previous section *Using commands*.
2. Enter the command for configuration of SSA recipients.

Configuring SSA button type

There are two types of SSA buttons. You can distinguish between the two types by the color of the test button:

- Standard activation:
  Covert alert buttons are latched red buttons.
  Test button is green.
- Instant activation:
  Covert alert buttons are non-latched red buttons.
  Test button is yellow.

To configure the SSA button type in the connected SAILOR 3027, connect a computer and access the SAILOR 3027 settings as described in *Using commands* on page 37. Then enter the command for configuration of SSA buttons.

Configuring SSA message repeat rate

When an SSA button is pushed, an SSA message is sent with regular intervals to the SSA message recipients. The default interval is 30 minutes, but you can change the interval to anything between 20 and 60 minutes.

To change the interval (repeat rate), do as follows:

1. Connect a computer and access the SAILOR 3027 settings as described in *Using commands* on page 37.
2. Enter the command for configuration of the repeat rate:

Setting up software controlled power management

Note Software controlled power management is only available for SAILOR 6140 and SAILOR 6150 (see the next section).

For SAILOR 6110, 6120 and 6130 you can only use a switch connected to X1 to switch between on and standby. For location of X1 see *Connector overview* on page 16.

By default, when the system is powered on, the Terminal Control Unit and the connected mini-C Terminal are always on. You can change this

behaviour with a command, so that you can use a switch connected to X1 for switching between on and standby. For details on the connector X1, see *Power control (X1)* on page 17.

- To enable switching between on and standby, send the command `Constant_On 0`.
- To return to always on (default setting), send the command `Constant_On 1`.

For information on how to send commands to the Terminal Control Unit, see *Using commands* on page 37.

SAILOR 6140 and SAILOR 6150 only

In the SAILOR 6140 and SAILOR 6150 systems you can define programs that control when to power on and off.

Before you can use power management, the connector X1 must be enabled with the command "**`constant_on 0`**" as described in the previous section.

X1, **closed switch**: the system is **always on** and you **cannot** control power management with software.

X1, **open switch**: the system is in **standby** and you can control the power management with software. If a power management program is present, the Terminal Control Unit shifts between standby and wake-up periods depending on the timing set up in the program.

- Standby period.
  Only the power supply micro controller is powered. The main power supply is shut down to minimize the power consumption (Power consumption in standby mode ˜10 mW). The system can exit standby by use of Interval or fixed time wake-up.
- Wake-up period.
  The function is equal to always on, except that the Terminal Control Unit will return to standby when ordered to do so by software.

Configuring the Glonass option

The Glonass module can be set up in several ways:

- Position data are based solely on the Glonass module
- Position data come preferably from the Glonass module
- Position data will always be those with best 3D fix

Configuration of the Glonass option lies in the SAILOR 3027. To access these settings enter the terminal program as described in *Using commands* on page 37, login as system administrator (`sysadm`) and type:

```
minic
```

The prompt changes to

`can0:/$` (example)

To allow external navigational input

External navigational input	Command
Allow	`can0:/$ cfg -pa 1`
Not allow	`can0:/$ cfg -pa 0`

To display the current external navigational input, type:

```
can0:/$ cfg -pa
External nav input: 1 (Allowed)
```

To set preferred navigational input

Preferred navigational input	Command
GPS	`can0:/$ cfg -pi 1`
Glonass	`can0:/$ cfg -pi 2`

To display the currently preferred navigational input, type:

```
can0:/$ cfg -pi
Preferred nav input: 2 (External Glonass)
```

To set navigational input mode

Navigational input mode	Command
To use preferred input only	`can0:/$ cfg -pm 1`
To use 3D fix over preferred input	`can0:/$ cfg -pm 2`
To use preferred input in 2D fix, even if 3D fix is available	`can0:/$ cfg -pm 3`
To use input with best Pdop value	`can0:/$ cfg -pm 4`
To use input with best Hdop value	`can0:/$ cfg -pm 5`

To display the currently selected navigational input mode, type:

```
can0:/$ cfg -pm
External nav input mode: 1 (Preferred input
only)
```

Use of SSA buttons

You can connect up to 6 SSA covert alert buttons and one SSA test button to the Terminal Control Unit.

Important Do not push the red covert alert buttons, unless you are under attack or threat. Only test the system using the built-in test functionality.

For information on how to connect the buttons, see *GMDSS or SSA systems (SAILOR 6110 or SAILOR 6120)* on page 23. See the previous section for SSA configuration in the connected satellite terminal.

Sending a Ship Security Alert

To send an alert using **standard activation** SSA, do as follows:

1. Lift the cover for the red covert alert button.
2. Push the button.
   An alert is sent after 30-33 seconds to the recipients configured in the mini-C terminal. Within 30 seconds, if you want to cancel the alert push the button again to release the button.
   If the alert is not cancelled, SSA messages are retransmitted every 30 minutes (by default), until you press the button again to release it.

To send an alert using **instant activation** SSA, do as follows:

1. Lift the cover for the red covert alert button.
2. Push the button.
   An alert is sent immediately to the recipients configured in the mini-C terminal. SSA messages are retransmitted every 30 minutes, until you send an SSA test message (see the next section).

Note You can change the SSA message repeat rate using a command. See *Configuring SSA message repeat rate* on page 42.

Sending an SSA test message

The SSA test button is green or yellow and should be placed close to the red covert alert button. The test button is normally lit, but switches off when pushed.

To send an SSA test message, do as follows:

1. Lift the cover for the green or yellow test button.
2. Push and hold the test button. The light in the test button is turned off.
3. While holding in the test button, push one of the red covert alert buttons.
   - push for less than 30 seconds: The test button flashes to indicate that it is operational.
   - push for more than 30 seconds: An SSA test message is sent to the message recipients configured during installation.

The message clearly shows that it is an SSA Test Message. The SSA Test Message also includes a list of all recipients for SSA Messages.

Use of Non-SOLAS Alarm Panels

You can use the SAILOR 6108 or 3042E to send a Distress alert to the rescue centre closest to your location. The SAILOR 6108 Non-SOLAS Alarm Panel works similar to the SAILOR 6101/6103 Alarm Panels.

Important Only send a Distress Alert if you are in immediate danger! The Distress Alert can be compared to a MAYDAY call.

To send a Distress Alert, do as follows:

1. Open the cover for the Distress button.
2. Press and hold the button until the light is steady and the buzzer stops (more than 5 seconds).

During this time the button light flashes and the buzzer sounds. After 5 seconds the red light goes steady on and the buzzer is silent. This means the Distress alert is being sent.

Important The MRCC normally sends a message to the alerting unit to gather more information about the situation.

If at all possible, respond to such messages with a Distress message sent to the same LES that was used for the Distress Alert. The LES is set up in easyMail.

Scripting

This chapter provides an introduction to scripting with the Terminal Control Unit and an example for a script. It has the following sections:

- *Introduction to scripting*
- *What can scripts do*
- *Complete example of a Lua script*

Introduction to scripting

The Terminal Control Unit supports simple scripting, using Lua language. Scripting can be used e.g. for automatically reacting on events registered in the multi-purpose input/output pins. With the Script option you can run custom-designed scripts dedicated to specific applications with the mini-C.

Typically a script monitors and controls the mini-C by using commands via the command shell interface.

The scripts are run from an SD memory card installed in the SD card slot of the Terminal Control Unit.

What can scripts do

In this section you find two scenarios to illustrate the use of a script.

Scenario 1: Monitoring the engine speed

In a mini-C installation the Terminal Control Unit tacho input is connected to an engine tachometer so the Terminal Control Unit can monitor the engine speed. In this example we want to:

- Set up a set of speed limits (upper and lower limit) via a message sent to the mini-C.
- Continually calculate the average engine speed.
- Have a message with speed information sent to a DNID if the speed limits are exceeded.

This behaviour is not supported by a standard mini-C but it can be programmed into the Terminal Control Unit via a script that can provide the following:

1. Read the current engine speed.
2. Calculate a new average engine speed.
3. Check whether the mini-C has received a message containing new speed limits.
4. Check the current engine speed against the latest speed limits.
5. Issue a message transmission if the speed limits are exceeded.
6. Repeat the sequence from step 1.

This example could be adapted or expanded in countless ways. Generally the script may perform all actions that are available via the command shell interface. It has access to a number of inputs and outputs on the Terminal Control Unit as well as the files on the SD memory card.

Scenario 2: Logging the temperature on the SD memory card

The script does not necessarily have to involve the mini-C at all. The following example is a Terminal Control Unit installation with a temperature probe connected to an A/D converter input. In this example we want to:

- Log the temperature on the SD memory card every 5 minutes. This data is then read from the SD card when the equipment is in for service.

This behaviour can be programmed into the Terminal Control Unit via a script that can provide the following:

1. Read the A/D converter value and calculate a corresponding temperature.
2. Append the temperature to a log file on the SD memory card.
3. Wait for 5 minutes.
4. Repeat the sequence from step 1.

How to write a script

The scripts that can be used with the Terminal Control Unit are written in the Lua language, a compact, powerful, and well documented language. Documentation and tutorials are available from the Lua project home page at www.lua.org. The Terminal Control Unit includes Lua version 5.1.

First step: writing and running a test script

To illustrate the scripting process we use the following small Lua example test script. This script makes the Terminal Control Unit write back the text string **Hello world**.

```
-- This is our first test script
print("Hello world")
```

1. Name the script test1.lua.
2. Copy the script to a SD memory card and insert the card in the Terminal Control Unit.

3. Connect to the Terminal Control Unit as described in *Using commands* on page 37.
4. Type the command **`lua s`**, the location of the script on the SD card (**`/sdcard/`**) and the script name (**`test1.lua)`** to run the script.

Example: The following lines show the above procedure executed on a PC connected to a Terminal Control Unit:

```
tt6194:/$ su sysadm
Enter password:
tt6194:/$ lua s /sdcard/test1.lua
tt6194:/$ Hello world
22:42:31.721 INFO:lua_task: LUA: Script
terminated.
```

The **`lua`** command is generally used to control script execution:

lua command	Action
`lua s <file name>`	Executes the script <file name>
`lua e`	Terminates the script
`lua r <lua sentence>`	Executes the sentence <lua sentence>
`lua c <file name> <code>`	Calculates a lock code for the file <file name>. See also *To lock the Terminal Control Unit running a script* on page 59.

As indicated in the example above a Lua script is stored on an SD memory card. All references to scripts files (and all other SD card files) are through the path /sdcard/.

Configuring the Terminal Control Unit: auto execute

A script is executed via the command line and the `lua s` command. In most situations automatic script execution is more relevant. This makes it possible to execute a script automatically after power up of the Terminal

Control Unit or in response to a change of state of an IO pin. This is controlled with the `luaconf` command.

```
luaconf a <auto>    :
  <auto>=0: No auto execute
  <auto>=1: Auto execute
  <auto>=2: Auto execute and auto restart
luaconf c <old> <new>: Change script lock code
luaconf i <gpi>     :
  <gpi>=0: No GPI control
  <gpi>=1..16: Use GPI for script start/stop
```

You find a mapping table for general purpose input/output pins at *GPIO mapping table* on page 72.

If `auto execute` is enabled, the Terminal Control Unit searches the SD memory card for a script called `autoexec.lua` every time unit is powered up. The feature is available in two modes:

- `Auto execute` — The script is executed once
- `Auto execute and auto restart` — The script is executed and restarted if it terminates for any reason.

Script execution can also be controlled via an IO-pin (called GPI-control). If enabled, a script will not auto execute or auto restart until the IO-pin is pulled high. If a script is forced to stop then the IO-pin is pulled low.

TCU platform input and output

The most simple form of output is basic Lua print, that sends the output to the serial port. This is convenient for simple program trace and information output.

More general port access is established through opening of streams:

- A mini-C connected via CAN bus is accessed through the /dev/minic device.
- The serial COM port is accessed through the /dev/serial device.

The code lines below show how a script opens the mini-C stream, writes "ver\r" to the stream, reads back some characters, and closes the stream again:

```
f = assert(io.open("/dev/minic","r+"))
f:write("ver\r")
f:flush()
s = f:read(256)
f:close()
```

Complete example of a Lua script

Communicating with a mini-C

Communicating with a mini-C requires a number of steps and considerations apart from accessing the /dev/minic device.

First and foremost the mini-C connection is a shell interface that accepts commands and sends back a response. In case of the "ver" command the following is sent to and received from the mini-C (example):

Sent to the mini-C	Received from the mini-C
ver	ver Build : tt3027-445 Mar 7 2012 22:10:10 CPU : 1.03 DSP : 1.01 AVR : 0.42 OMAP bootld: 0.00 AVR bootld : 0.10 GPS SW : 6.02 (36023) GPS HW : 00040005 GPS ROM : 5.00 (28483) Hardware : can0:/$

The mini-C response includes an echo of the command itself as well as a trailing prompt for the next command. When reading from the mini-C device there is no built-in mechanism to separate the command and the prompt from the actual response.

Furthermore there is no guarantee that the full response is received in a single read. The script must therefore be able to combine the response from a number of reads until the succeeding prompt has been received.

Template for basic mini-C communication

The script below includes these functions and may serve as a template for basic mini-C communication.

```
function read_timeout(stream, timeout_ms)
    local res = ""
    repeat
        local rd
        rd = stream:read(16)
        if rd == nil then
            timeout_ms = timeout_ms - 100
        else
            res = res .. rd
        end
    until timeout_ms <= 0
    return res
end

function make_pattern(pattern)
    -- Escape all "magic" characters to make it usable as search pattern
    return string.gsub(pattern, "([%^%$%(%)%%%.%[%]%*%+%-%?])", "%%%1")
end

function detect_prompt(stream) [1]
    local last_prompt = "unknown prompt"
    local eq_count = 0
    local resp = ""
    local retries = 6
    repeat
        stream:write("\r")
        stream:flush()
        resp = read_timeout(stream, 500)
        if string.len(resp) > 1 then
            local new_prompt
            local i
```

1. Detecting the mini-C prompt

```
            local ctrl_pos = 1
            new_prompt = tostring(resp)

            -- Only use the part of the string after the last control
char
            for i = 1, string.len(new_prompt) do
               if string.sub(new_prompt,i) <  " " then ctrl_pos = i end
            end
            new_prompt = string.sub(new_prompt, ctrl_pos)

            if new_prompt == last_prompt then
                eq_count = eq_count + 1
            else
                last_prompt = new_prompt
                eq_count = 0
            end
        end
        retries = retries - 1
    until eq_count > 2 or retries == 0

    if retries == 0 then
        return nil
    else
        return last_prompt
    end
end

function read_until_prompt(stream, prompt, timeout_ms)
    local retbuf = ""
    local pr_found
    repeat
        local newdata = stream:read(16)
        if newdata == nil then
            timeout_ms = timeout_ms - 100
        else
            retbuf = retbuf .. newdata
        end
        pr_found = string.find(retbuf, make_pattern(prompt) .. "$")
    until pr_found or timeout_ms <= 0
    return retbuf, pr_found
end

PROMPT = ""

function send_cmd(stream, cmd, extra_char) [1]
    local resp = ""
    local pr
    stream:write(cmd .. "\r")
    stream:flush()
    repeat
        local resp_part = ""
        resp_part, pr = read_until_prompt(stream, PROMPT, 2000)
```

1. Send a command and return the response in a single call

```
        resp = resp .. resp_part
        if extra_char and not pr then
            stream:write(extra_char)
            extra_char = nil
        end
    until extra_char == nil
    if resp then
        local patt
        -- remove trailing prompt
        patt = make_pattern(PROMPT) .. "$"
        resp = string.gsub(resp, patt, "\r\n", 1)
        -- remove the command itself
        patt = "^%s*" .. make_pattern(cmd) .. "[\r\n]*"
        resp = string.gsub(resp, patt, "", 1)
    end
    return resp, pr
end

function print_cmd_result(stream, cmd, extra)
    local result = send_cmd(stream,cmd,extra)
    if result then
        print(cmd .. " ---->")
        print(result)
    end
end

-- main chunk
if os.getenv("TCU") then [1]
    -- TCU
    devname = "/dev/minic"
    print("TCU environment")
elseif os.getenv("HOME") then
    -- Linux
    devname = "/dev/ttyS0"
    os.execute("stty -F /dev/ttyS0 raw time 1 min 0 ispeed 38400 ospeed
38400 -echo")
    print("Linux environment")
else
    -- unsupported system
    error("Environment not supported")
end

f = assert(io.open(devname,"r+"))

PROMPT = detect_prompt(f)
assert(PROMPT)

print_cmd_result(f, "st -w") [2]

f:close()
```

1. Platform check
2. Printing mini-C communication

The script uses a number of techniques worth noting:

- The platform is checked by inspecting the `"TCU"` environment variable (see footnote *1.* on page 57). That way the script can take different hardware surroundings into account or prevent the script from running on unsupported platforms.
- It is necessary to know the mini-C prompt to be able to split it from the command response. The script detects the prompt by sending a number of carriage returns to the mini-C - corresponding to empty commands - and comparing the responses (see footnote *1.* on page 55).
- For convenience the scripts contains a function that sends a command and returns the response in a single call. This function is called `send_cmd` (see footnote *1.* on page 56) and is practical for many basic scripts purposes.
- This script demonstrates mini-C communication by simply printing the response to an `"st -w"` command (Hardware Status Screen) (see footnote *2.* on page 57).

Lua environment

The Lua language provides a large number of features that are derived from the operating environment (file access, time, memory management, etc.). The TCU implementation of Lua imposes a few constraints on the scripts, mainly in these areas:

1. The amount of memory is limited. This means the scripts with large variables or deep recursion may not be usable on a TCU.
2. The file system is limited. It supports FAT16 and FAT32 system but there is no support for long file names (i.e., file names must follow the classic "8.3" convention - up to 8 characters base name and up to 3 characters extension). Files can only be stored and accessed on the SD memory card and they are accessed on the /sdcard/ path (e.g., the file \subdir\file.ext on and SD card is accessed as /sdcard/subdir/file.ext).

To make it easier to write portable code, the TCU defines a few environment variables. These are available from Lua via the os.getenv function:

Variable name	Content
HOME	/sdcard
TMPDIR	/sdcard
TCU	The current software version of the TCU (e.g., 1.03)

Script security

In some applications it is important to ensure that only approved scripts are used and that scripts cannot be altered. The TCU script module has a script lock function that makes the TCU reject scripts without a specific security tag.

To lock the Terminal Control Unit running a script

The "Hello World"-script (see *First step: writing and running a test script* on page 51) is used here to illustrate how the lock function is set up and how it works:

Objective: To ensure that the TCU can only execute the original "Hello World" script. To prepare for locking, an empty comment line is added as the first line (i.e., line 1):

```
--
-- This is our first test script
print("Hello world")
```

1. Copy the script to the SD memory card and insert the card in the TCU.
2. Choose a code word and calculate a corresponding checksum shell with the following command:

   `lua c <file name> <code word>`

   With the file name test1.lua and the code word being 1234, the command will be like this:

```
tt6194:/$ lua c /sdcard/test1.lua 1234
1:3560946965
tt6194:/$
```

where 1:3560946965 is the checksum. Note that any changes in the script file - including subtle changes like extra spaces and different line endings - will change the checksum. Also a different code word will give a different checksum.

If the script file does not begin with an empty comment line, the TCU will refuse to calculate a checksum.

3. This checksum is inserted on the empty comment line in the script:

```
--1:3560946965
-- This is our first test script
print("Hello world")
```

4. The final step is to instruct the TCU only to execute scripts with a matching checksum. This is done by configuring the code word into the TCU:

   `luaconf c <current code word> <new code word>`

   The default code word is empty so in this example (where we chose the code word 1234) this command will set up the script lock:

   ```
   tt6194:/$ luaconf c "" 1234
   tt6194:/$
   ```

   Note that the "" in the command indicates an empty string corresponding to an empty code word.

Now the Terminal Control Unit will only accept scripts that have a checksum that matches the stored code word. If the checksum does not match, the execution will abort with a warning: Cannot validate script.

To unlock the Terminal Control Unit running a script

If the TCU has to be unlocked at some point, use the `luaconf` command to set the code word back to an empty string. Without a code word configured, the TCU will execute any script with or without a checksum. Note that this re-configuration can only be done if the current code word is known:

```
tt6194:/$ luaconf c 1234 ""
tt6194:/$
```

Service

This chapter has the following sections:

- *Updating software*
- *Status signalling*
- *Setting a temporary fixed IP address*
- *Returning units for repair*
- *Repacking for shipment*

Updating software

Required tools and files

Before you can update the software for the Terminal Control Unit you must get a download tool and the new software for the Terminal Control Unit.

Do as follows:

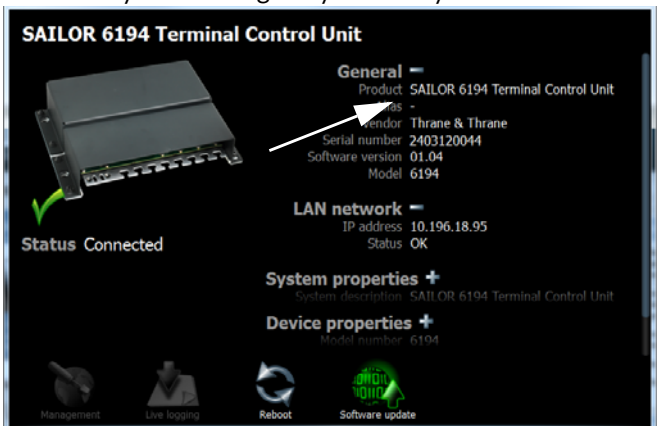
1. Download the TMA from the Cobham eSupport web site (Self-Service Center, SSC. You find the SSC in the Service and Support section, 24-7 Service).
2. Install the ThraneLINK Management Application (TMA) on your PC.
3. Locate the new software image for the Terminal Control Unit (.tiif file).
4. Download the .tiif file to a USB memory stick or to a folder on your PC.

Updating the Terminal Control Unit software

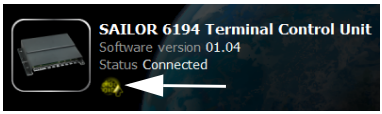
To update the Terminal Control Unit software, do as follows:

1. Start the TMA.
2. The TMA searches for units connected to the local network. All units found are shown on the screen.

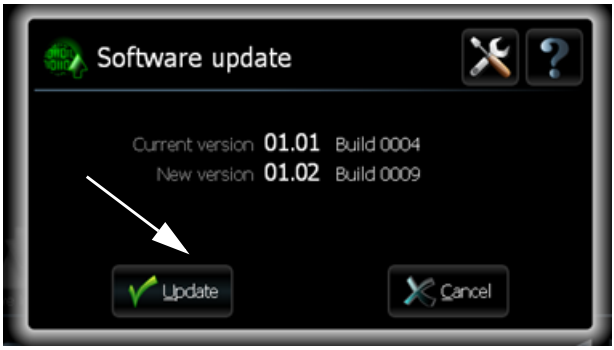
3. Click on the image of the Terminal Control Unit to select it and to check the current software version. If there are more than one Terminal Control Unit you can recognize your unit by the serial number.



4. Have the new software ready on the PC, for example on an USB memory stick. The TMA will automatically find the new software. If new software is available you can see a yellow circular image on the start screen and on the Terminal Control Unit page at the bottom, where the icon for software update flashes.



5. Click the icon **Software update**. The following window is displayed (example):



6. Click the button **Update** and wait for the update procedure to finish.

The software is now updated and the Terminal Control Unit automatically restarts with the new software. You can use the ThraneLINK Management Application at any time to check the software version.

Status signalling

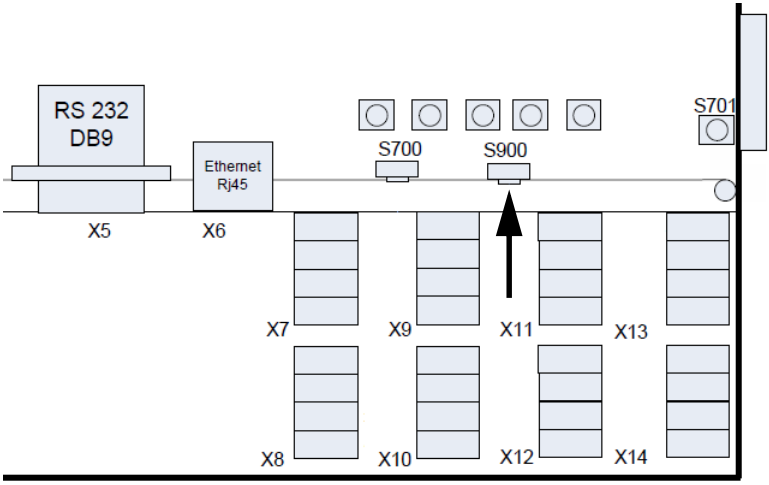
Light indicators

The Terminal Control Unit has a number of light indicators for signalling status and errors/warnings. See *Status indicators* on page 32 for a full description of the indicators and their function.

Should the system fail, you can use the indicators to see which units are affected. To see a description of the error you must use the easyMail application on a connected computer or connect a Message Terminal to the system. For further information, see the user manual for your mini-C System.

Setting a temporary fixed IP address

The TCU has a button for setting a temporary fixed IP address.



The function of the button is: When you push the button, the IP address of the Terminal Control Unit is temporarily set to the default value (169.254.100.100).

With this function, even if the IP address has been changed and you do not remember the new IP address, you can still access the Terminal Control Unit. The default value is not saved in the configuration, but is only valid for the first IP session.

Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem.

Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair.

Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

Repacking for shipment

The shipping carton has been carefully designed to protect the Terminal Control Unit and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, model number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note | Correct shipment is the customer's own responsibility.

Specifications

General specifications for the TCU

Item	Specifications
Power	10.5 to 32 VDC (nom. 12-24 VDC)
Power consumption	Typical 1 W, Maximum 3 W Standby power < 10 mW
Interfaces	Ethernet (10/100 Mbit), RJ45 connector (X6) RS-232 (DTE), 9-pin D-sub connector (X5) CAN (including power for the Terminal Control Unit), spring-loaded terminals (X2) I/O spring-loaded terminals, primarily for SSA buttons (up to 6 SSA alarm buttons and 1 test button) (X7 - X14) Remote standby spring-loaded terminal (X1),
Conformity	Inmarsat C GMDSS approved/ Wheelmark approved.
IP protection class	IP2X
Ambient temperature	-25˚C to 55˚C operating -40˚C to 80˚C storage.
Compass safe distance	20 cm
Dimensions TCU	 239 mm x 174 mm x 52 mm (9.4” x 6.9” x 2”)
Weight	0.8 kg

Specifications for I/O pins

Item	Specifications
ADC, Pin 1, spring-loaded terminals X7-X12	Analogue to digital converter
Input range	0-15 V
2.7 V pull up	10 kOhm
Input resistance	min. 130 kOhm
Accuracy	±15 mV
GPI, Pin 1, spring-loaded terminals X7-X12 and X14	General purpose input
Input resistance	min. 130 kOhm
Voltage	max. 32 V
Voltage high	min. 2.2 V
Voltage low	max. 1.2 V
GPO, Pin 1, spring-loaded terminals X7-X12 and X14	General purpose output. Open Collector (10 kOhm pull up), Short circuit protected at 1.5 A and reverse polarization protected.
Open switch hold-off voltage	max.32 V
Open circuit resistance	min. 130 kOhm
Closed switch voltage	max. 0.5 V DC at 50 mA max. 1.6 V DC at 0.7 A
Closed switch current	max. 0.7 A

Item	Specifications
GPI, Pin 2, spring-loaded terminals X7-X12 and X14	General purpose input
Voltage	max. 5 V
Voltage high	min. 2.0 V
Voltage low	max. 0.8 V
Tacho, Pin 1, spring-loaded terminal X13	Tacho input
Input resistance	min. 130 kOhm
Allowed input voltage	0-12 V
Voltage high	min. 6 V
Voltage low	max. 2.0 V
DAC, Pin 3, spring-loaded terminal X13	Digital to analog converter
Voltage range	0.1-3.0 V
Accuracy	±25 mV

Lua extensions

Lua in the Terminal Control Unit has been expanded with a number of functions to access and control the specific environment. The functions are grouped as follows:

- *GPIO functions*
- *Miscellaneous functions*

GPIO functions

API functions for general purpose input/output. The following functions are available:

- *tcu_get_adc_value*
- *tcu_get_gpi_pin*
- *tcu_get_tacho_value*
- *tcu_set_dac_value*
- *tcu_set_gpo_pin*
- *tcu_start_gpo_square_wave*
- *tcu_stop_gpo_square_wave*

GPIO mapping table

The following table shows the mapping of GPIO pins of the TCU:

Block	Pin type	I/O pin
X8 PIN 1	Input/output/adc	1
X10 PIN 1	Input/output/adc	2
X12 PIN 1	Input/output/adc	3
X11 PIN 1	Input/output/adc	4
X9 PIN 1	Input/output/adc	5
X7 PIN 1	Input/output/adc	6
X14 PIN 1	Input/output	7
X8 PIN 2	Input	8
X10 PIN 2	Input	9
X12 PIN 2	Input	10
X11 PIN 2	Input	11
X9 PIN 2	Input	12
X7 PIN 2	Input	13
X14 PIN 2	Input	14

Table 1:

tcu_get_adc_value

Purpose: Get the current value of an ADC channel.

Format: tcu_get_adc_value (channel)

channel: ADC channel. Value: 1-6

Return value:
ADC value in [mV]: 0-15000 or
Error code: <0=error

Example: a = tcu_get_adc_value(2);

tcu_get_gpi_pin

Purpose: Get the current state of an input pin.

Format: tcu_get_gpi_pin (pin)

pin: Input pin: 1-14.

Return value:
Returns current pin state: 0=low, 1=high. or
Error code: <0=error

Example: a = tcu_get_gpi_pin(9);

tcu_get_tacho_value

Purpose: Gets the current tachograph frequency.

Format: tcu_get_tacho_value (channel)

channel: TACHO channel. Value: 1

Return values:
1) Delta time since last function call
2) Delta count since last function call or
1) Error code: <0=error

Internal time and count values will be reset after each function call.

Example: a = tcu_get_tacho_value(1);

tcu_set_dac_value

Purpose: Set DAC output voltage.

Format: tcu_set_dac_value (value, channel)

value: Value: 0-3000 [mV].

channel: DAC channel. Value: 1

Return value:

Error code: 0=OK, <0=error

Example: --Set DAC value to 2V

```
tcu_set_dac_value(2000, 1);
```

tcu_set_gpo_pin

Purpose: Set state of output pin.

Format: tcu_set_gpo_pin (pin, state)

pin: Pin number: 1-7

state: Pin state: 0=low, 1=high

Pin changes from low to high at 350mV.

Return value:

Error code: 0=OK, <0=error

Example: --Set output pin 7 to high statetcu_set_gpo_pin(7,1);

tcu_start_gpo_square_wave

Purpose:	Start gpo square wave with specified interval.
Format:	tcu_start_gpo_square_wave (pin, high_time, low_time, duration)
pin:	Pin number. Value: 1-7.
high_time:	Time of high state in milliseconds.
low_time:	Time of low state in milliseconds.
duration:	Duration of square wave in milliseconds. Value: 0=No timeout 2 - 2.147.483.647 milliseconds After timeout, the pin will be left in high state.
Return value:	Error code: 0=OK, <0=error
Example:	--Set pin 2 high for 50 ms every second. Stop after --1 minute.tcu_start_gpo_square_wave(2, 50, 950, 60000);

tcu_stop_gpo_square_wave

Purpose:	Stop gpo square wave on specified pin.
Format:	tcu_stop_gpo_square_wave (pin)
pin:	Pin number: 1-7. The pin will be left in high state.
Return value:	Error code: 0=OK, <0=error
Example:	tcu_stop_gpo_square_wave(2);

Miscellaneous functions

The following miscellaneous functions are available:

- *tcu_set_time*
- *tcu_power_off_for*
- *tcu_get_sw_start_cause*
- *tcu_get_power_signals*
- *tcu_sleep*
- *tcu_get_product_info*
- *tcu_slog*
- *tcu_serial_baud*
- *tcu_get_powersave_edge_detect*
- *tcu_reset_powersave_edge_detect*

tcu_set_time

Purpose:	Set time in TCU.
Format:	tcu_set_time (year, month, day, hours, minutes, seconds)
year:	Year: 1970-2037
month:	Month: 1-12
day:	Day: 1-31
hours:	Hours: 0-23
minutes:	Minutes: 0-59
seconds:	Seconds: 0-59
Return value:	
	Error code: 0=OK, <0=error

Example:

```
--Set time to 8th of november 2011 13:16:00
tcu_set_time (2011,11,8,13,16,0);
```

tcu_power_off_for

Purpose: Power off TCU for specified time. After the time-out, the Terminal Control Unit will power on again.

If the Terminal Control Unit is used with a SAILOR 3027 mini-C, the TCU will attempt to power down the mini-C before powering down itself. This can potentially delay the power off by up to 3 minutes if the mini-C is busy or unable to respond.

A timeout value may be given to wake up the TCU later. The timeout is counted from the time of the actual power off. Other events may trigger the TCU to power up before the timeout occurs (external power cycle, CAN activity, etc.).

Format: tcu_power_off_for (time)

time: Timeout value in seconds counted from time of actual power off.

Value: 0 = No time out (powered off until woken for other reason)
1 - 2.147.483.647 seconds

Return value:

Error code: 0=OK, <0=error

Example:

```
--Power TCU off for 2 hours
tcu_power_off_for(7200);
```

tcu_get_sw_start_cause

Purpose: Get reason for latest start-up.

Format: tcu_get_sw_start_cause ()

Return values:

1) Start-up reason flags.
1 = Power on
2 = CAN activity
4 = Timeout
8 = Remote on
16 = Power save

2) AVR start-up reason flags.
1 = Power on
2 = External reset
4 = Brown out
8 = Watchdog

Example: `tcu_get_sw_start_cause ()`

tcu_get_power_signals

Purpose: Get current status of the power control signals (REMOTE_ON and POWER_SAVE).

Normally these signals are handled automatically by the Terminal Control Unit: If REMOTE_ON is high, the Terminal Control Unit powers down.

Calling this function can be used to replace the automatic remote power control in the Terminal Control Unit by Lua functionality. The function returns the state of the two power control signals and the Lua script may respond to power down requests by calling tcu_power_off_for.

The automatic handling of the power signals is re-enabled when the LUA script terminates; it may also be re-enabled by calling this function with automatic=1 (see below).

Format: tcu_get_sw_start_cause (automatic)

automatic: Optional parameter: Set to 1 to re-enable the automatic handling of the power signals. If the parameter is left out (or set to 0), the automatic handling is disabled.

Return values:

1) REMOTE_ON signal.
0 = Low / pulled down.
1 = High / disconnected

2) POWER_SAVE signal.
0 = Low / pulled down.
1 = High / disconnected

Example:
```
r_on, pw_save = tcu_get_power_signals();
if r_on == 1 then
   tcu_power_off_for(0);
end
```

tcu_sleep

Purpose: Suspend the LUA script. The script will continue after the given time has elapsed. Other functions in the Terminal Control Unit - such as LED control - will continue unaffected while the script is suspended.

Format: tcu_sleep (time)

time: Time in milliseconds. Value: 2 - 2.147.483.647

Return value:

Error code: 0=OK, <0=error

Example:
```
--wait for 5 seconds
tcu_sleep(5000);
```

tcu_get_product_info

Purpose: Get TCU product info

Format: tcu_get_product_info ()

Return values:

1) TCU main sw version.

2) TCU AVR sw version.

3) TCU AVR bootloader version.

4) Transceiver type:
0 = Unknown
1 = Land mobile
2 = Maritime
4 = SSAS
5 = Distress
6 = LRIT
7 = SOLAS

5) TCU user defined platform:
0 = Not set by user
7 = SCADA
8 = No discover Trx 7
9 = French Fishery 2011

Example: `tcu_get_product_info()`;

tcu_slog

Purpose: Log to syslog

Format: tcu_slog (priority, message)

priority: Values:
3 = Error
4 = Warning
6 = Info
7 = Debug

message: String to log.

Return value:

Error code: 0=OK, <0=error

Example:
```
local str = string.format('Pin %d is low',
5);
tcu_slog(4, str);
```

Result:

```
00:46:36.479 WARNING:lua_task: Pin 5 is low
```

tcu_serial_baud

Purpose: Set bit rate on the serial RS-232 connection

Format: tcu_serial_baud (bit_rate)

bit_rate: Values:
4800, 9600, 14400, 19200, 38400, 57600, 115200

Return value:

Error code: 0=OK, <0=error

Example:
```
-- Set bit rate to 38.4 kbit/s
tcu_serial_baud(38400)
```

tcu_get_powersave_edge_detect

Purpose: Get powersave input state

Format: tcu_get_powersave_edge_detect ()

Return value:

State: 0 (low) or 1 (high) or
Error code: <0=error

Example: `tcu_get_powersave_edge_detect()`

tcu_reset_powersave_edge_detect

Purpose: Reset powersave input state to 0

Format: tcu_reset_powersave_edge_detect ()

Return value:

Error code: 0=OK, <0=error

Example: `tcu_reset_powersave_edge_detect()`

A

ADC	Analogue to Digital Converter
API	Application Programming Interface

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.

D

DAC	Digital to Analog Converter
DNID	Data Network Identifier. An address code to an electronic mailbox at the Land Earth Station.
DTE	Data Terminal Equipment. Includes Computers, Serial Printers, PLC's, Video Cameras, Video Recorders, Video Editors, and most devices which are not used to extend communications.

E

ESD	ElectroStatic Discharge

G

Glonass	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema. Global Navigation Satellite System in English.

GMDSS	Global Maritime Distress Safety System. The system is intended to perform the following functions: alerting (including position determination of the unit in distress), search and rescue coordination, locating (homing), maritime safety information broadcasts, general communications, and bridge-to-bridge communications.
GND	Ground
GPI	General Purpose Input
GPO	General Purpose Output

H

Hdop	Horizontal dilution of precision. Precision of 2D position on Earth's surface, without height indication. This is typically better than Pdop.

I

IMO	International Maritime Organization. A UN organization developing and maintaining regulatory framework for shipping. This framework includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.
IMSO	International Mobile Satellite Organisation. An intergovernmental organisation that oversees certain public satellite safety and security communication services provided via the Inmarsat satellites.

IP	Ingress Protection. An international classification system for the sealing effectiveness of enclosures of electrical equipment against the intrusion into the equipment of foreign bodies (i.e. tools, dust, fingers) and moisture. This classification system uses the letters "IP" followed by two or three digits. An "x" is used for one of the digits if there is only one class of protection; e.g. IPX4 which addresses moisture resistance only.

L

LAN	Local Area Network. A computer network covering a limited area, like a home, office, school or airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.
LES	Land Earth Station
LRIT	Long Range Identification and Tracking. A system established by the IMO applying to all passenger ships, cargo ships > 300 gross tonnage and mobile offshore drilling units. These ships/units must automatically report their position to their Flag Administration at least 4 times a day. Other contracting governments may request information about vessels in which they have a legitimate interest under the regulation.
Lua	A lightweight multi-paradigm programming language designed as a scripting language with extensible semantics as a primary goal.

M

MRCC	Maritime Rescue Co-ordination Centre

N

NMEA	National Marine Electronics Association (standard). A combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonars, anemometer (wind speed and direction), gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the U.S.-based National Marine Electronics Association.

P

Pdop	Positional dilution of precision. Precision of 3D position, including height indication.

S

SCADA	Supervisory Control And Data Acquisition. It generally refers to an industrial control system: a computer system monitoring and controlling a process.
SMS	Short Message Service
SOLAS	(International Convention for the) Safety Of Life At Sea. Generally regarded as the most important of all international treaties concerning the safety of merchant ships.
SPST	Single-Pole Single-Toggle
SSA	Ship Security Alert. A system provided to a vessel for the purpose of transmitting a security alert to the shore (not to other vessel!) to indicate to a competent authority that the security of the ship is under threat or has been compromised.

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