cC-1

Maintenance Manual

Kongsberg Maritime Part no.
cC-1 Joystick and DP (115/230 VAC): 300078
cC-1 Joystick and DP (24 VDC): 301207
cC-1 Taut Wire Controller (115/230 VAC): 319821

This document contains hardware description and maintenance information for the Joystick, Dynamic Positioning and Taut Wire Controller (cC-1).

The cC-1 is used as the controller unit in Compact Joystick and DP Control Systems (cJoy and cPos), and as an interface for the Taut Wire position-reference system.

303999/C
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Document history

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Rev. A	August 2006	First version.
Rev. B	November 2006	Updated descriptive text, figures, section 5.1 and Appendix A.
Rev. C	March 2008	cC-1 Taut Wire Controller added.

Note

Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.
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Table of contents

1 HARDWARE DESCRIPTION

This section describes the cC-1 hardware configuration.

1.1 Cabinet layout

Note

The layout of a delivery specific cabinet may deviate from the standard example in Figure 1. See the specific layout drawing in the vessel's Drawing File for the exact layout and wiring information.

The cC-1 cabinet is made for wall mounting, and it comprises a computer system without redundancy. For an example of a cC-1 cabinet overview, refer to figure below:

Figure 1 Layout of a cC-1 cabinet (maximum configuration)

Note

For 24VDC option: Q2 and service socket outlet not applicable, see also Figure 2.

The configuration shown is maximum configuration. The number of network switches, RSERs and RMPs is project specific.

Field cabling to the cC-1 is routed through the cabinet bottom.

1.2 Power Distribution

The Power Supply (PSU1), Filter (FL1), and Terminals blocks are located in the left side of cabinet (WU1). Spare core terminations are located in the right side of the cabinet (WU6).

There are two types of cC-1 cabinets:

- One 115/230VAC type, with Service socket outlet and Magnetic circuit-breaker (MCB) Q2
- One 24VDC type

The cC-1 (type 115/230VAC) handles both 115VAC and 230VAC as mains supply. It is usually fed from an Uninterruptible Power Supply (UPS). The cC-1 (type 24VDC) handles 24VDC as mains supply.

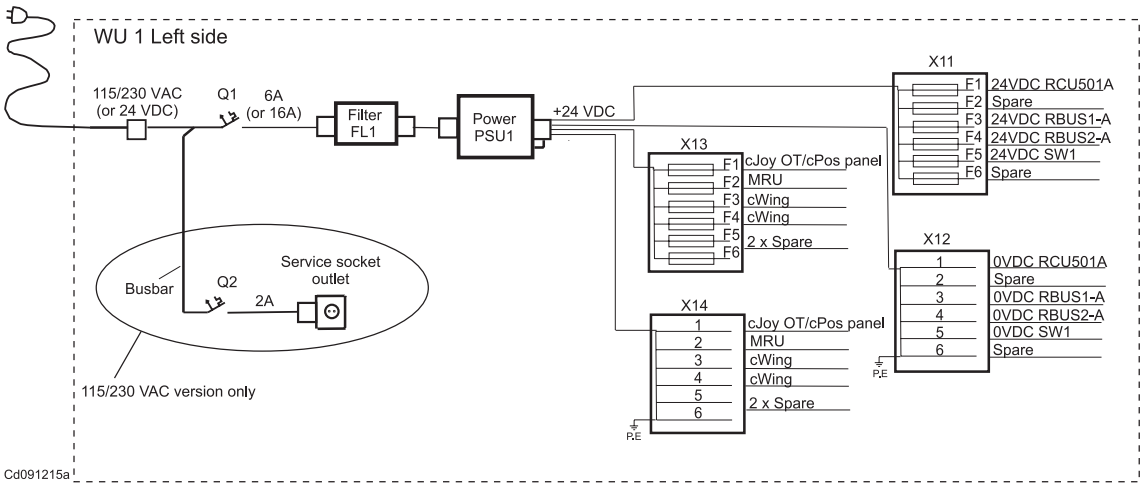
The mains voltage passes the MCB (Q1) before it is filtered for noise (FL1). The MCB trips and breaks the circuits if the mains current exceeds the rated MCB current.

For 115/230VAC version, the mains voltage also passes the MCB (Q2) before it is passed to 115/230VAC Service socket outlet. The Service socket outlet is used for service purpose only.

The filtered mains voltage from FL1 is fed to the Power Supply (PSU1) and further via fuses (on X11- and X13- terminal blocks) to supply the RCU501, the RBUS and external equipment with 24VDC. The fuses can also be used to isolate the different circuits. Ground is supplied via X12- and X14- terminal blocks.

The block diagram in Figure 2 shows the power supply principles of cC-1, type 115/230VAC and 24VDC.

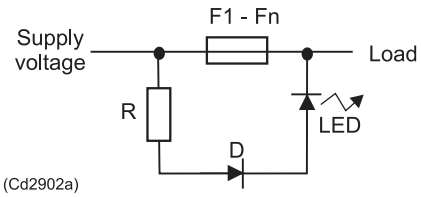
Figure 2 cC-1 cabinet power distribution (maximum conPguration)



1.2.1 Fuse-status indication

The distribution fuses named Fn (F1-Fn) have a built-in status LED. If a fuse is broken, its LED is lit red. Refer to figure below:

Figure 3 Fuse status indicator circuitry



See the *Power and Wiring diagram, cC-1* in the vessel's *Drawing File* for fuse and power details.

1.2.2 Power supply (24VDC) monitoring and alarming

To monitor the supply voltage (24VDC) the RCU501 reads the voltage with high precision at the power terminals X2 on RCU501 and gives system alarm if voltage is outside predefined values.

1.2.3 Grounding RCU modules

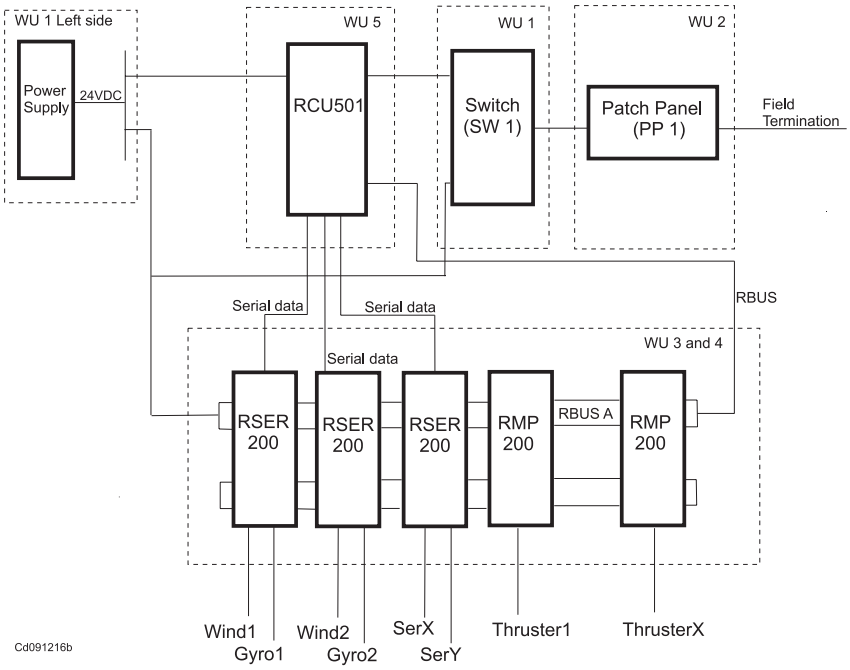
The RCU module shall be grounded. FL1 fast-on terminal is connected to PE. For special configurations FL2 (floating module with HF ground) may be used.

See also the *RCU501 Hardware Module Description* about details on the grounding principles.

1.3 cC-1 overview

The following figure is an overview of a typical cC-1 configuration.

Figure 4 cC-1 cabinet equipment and interconnections (maximum conÞguration)



Note

RBUS A is divided into RBUS 1-A (WU3) and RBUS 2-A (WU4). WU4 contains only RMP200 modules.

The modules RSER200-4 and RMP200-8 described below, are modules in the Kongsberg RIO200 module family. The modules provide functions such as I/O interface and serial line interface. They have the same shape and are mechanically mounted on a horizontal, dual-rail system.

1.3.1 RCU501

The RCU501 is located in WU5. See Figure 1 and Figure 4.

The RCU501 is a Remote Controller Unit (RCU) based on a real-time single board computer. It runs the application program of the Kongsberg process control system and interfaces to different bus systems. See *RCU501 Hardware Module Description* for details.

1.3.2 RSER200-4

The RSER200-4 is a four channel, galvanic isolated, serial line, interface module that can be linked to one, two or three controllers (RCUs). The four field channels are individually configurable as either RS232, RS422, RS485 or NMEA 0183 for

connection to field equipment. There are three Link Channel interfaces for connection to the controllers. See Figure 4, and *RSER200-4 Hardware Module Description* for details.

1.3.3 RMP200-8

The RMP200-8 is a multipurpose, eight channel/port I/O module. It has six common ground channels/ports individually configurable to handle DI, DO, AI, AO or Potentiometer signals, and two individually galvanic isolated channels/ports individually configurable to handle AI or AO signals. See Figure 4, and *RMP200–8 Hardware Module Description* for details.

1.3.4 RBUS interface

The RBUS comprises a standard, multidrop RS485 serial line and power supply cable. The RBUS interface contains the RBUS H and RBUS L data terminals, and the 24VDC and Ground terminals. There are two RBUS interfaces on the RCU501; RBUS A is available on connector P19 and RBUS B on connector P20. The interfaces are electrically isolated from the rest of the RCU501. The cC-1 uses the RBUS A interface. See Figure 4.

1.4 Network interface

The network interface is via a Switch (SW1) located in the left side of cabinet on WU1, and a Patch Panel (PP1) located in the centre cabinet on WU2. See Figure 1 and Figure 4.

1.5 Field cabling

See *cC-1 Installation Manual* and the vessel's *Drawing File* for the exact layout and wiring information.

1.5.1 Field cable termination

The field cables' outer shields are cut and terminated inside the through-holes in the bottom plate of the cabinet. The signal wires are then routed in cable ducts to the terminal blocks on the RSER200-4 and RMP200-8 modules.

1.5.2 Spare core termination

Normally the spare cores should be terminated to PE bar in WU6 located in right side of cabinet. See Figure 1.

2 FAULT FINDING

This section presents the fault-finding principles for the cC-1.

2.1 General fault Þnding and repair

If an error situation has occurred, you will need a combination of the following information items to correct the system:

- Status information or alarm message shown in the application window on the Operator Station (OS) screen, cJoy Operator Terminal (OT) or cPos OS screen. See 2.3.1 and 2.3.2 for more details on this topic.
- Status LEDs and lamps on hardware modules such as PSU1, RCU501, RSER200-4 and RMP200-8 modules. See the appropriate *Hardware Module Description* for details.
- Power supply output voltages and fuse status in the system. See the appropriate *Hardware Module Description* for details.
- System-specific diagrams, lists and drawings. See the vessel's *Drawing File* for details.
- Replacement procedures for replaceable modules. See the *Corrective Maintenance* section in this manual or the appropriate *Hardware Module Description* for details.

If you are not able to correct the error situation yourself, you should contact your nearest Kongsberg Maritime service office for advice or to request service.

2.2 Reading power LED status and measuring supply voltages

The PSU1 is, depending on input voltage, a 115/230VAC to 24VDC AC/DC converter or a 24V DC/DC converter. The status of the PSU is shown by a LED inside the power module. OK state corresponds to green LED colour.

The power supply module PSU1 is located in WU1 on the left side wall inside the cabinet. Its output voltage can be measured on its voltage-output terminals.

2.3 Message system

The system contains built-in tests that continually check for faults while the system is running. System messages are generated to inform you of any incorrect system operation or to bring any other relevant information to your attention.

2.3.1 cJoy

The cJoy system messages are presented in two ways on the operator terminal display; via the Message Line and in the Message View. For further details, refer to the *cJoy OT Operator Manual* or *cJoy DP-OT Operator Manual*, as applicable.

2.3.2 cPos

The cPos system messages are presented in two ways on the colour monitor; via the Message Line and in the Event List Window.

If the system has an alarm printer then the messages are printed out automatically when they are first reported by the system. For further details, refer to the *cPos (OS) Operator Manual*.

2.3.3 Taut Wire

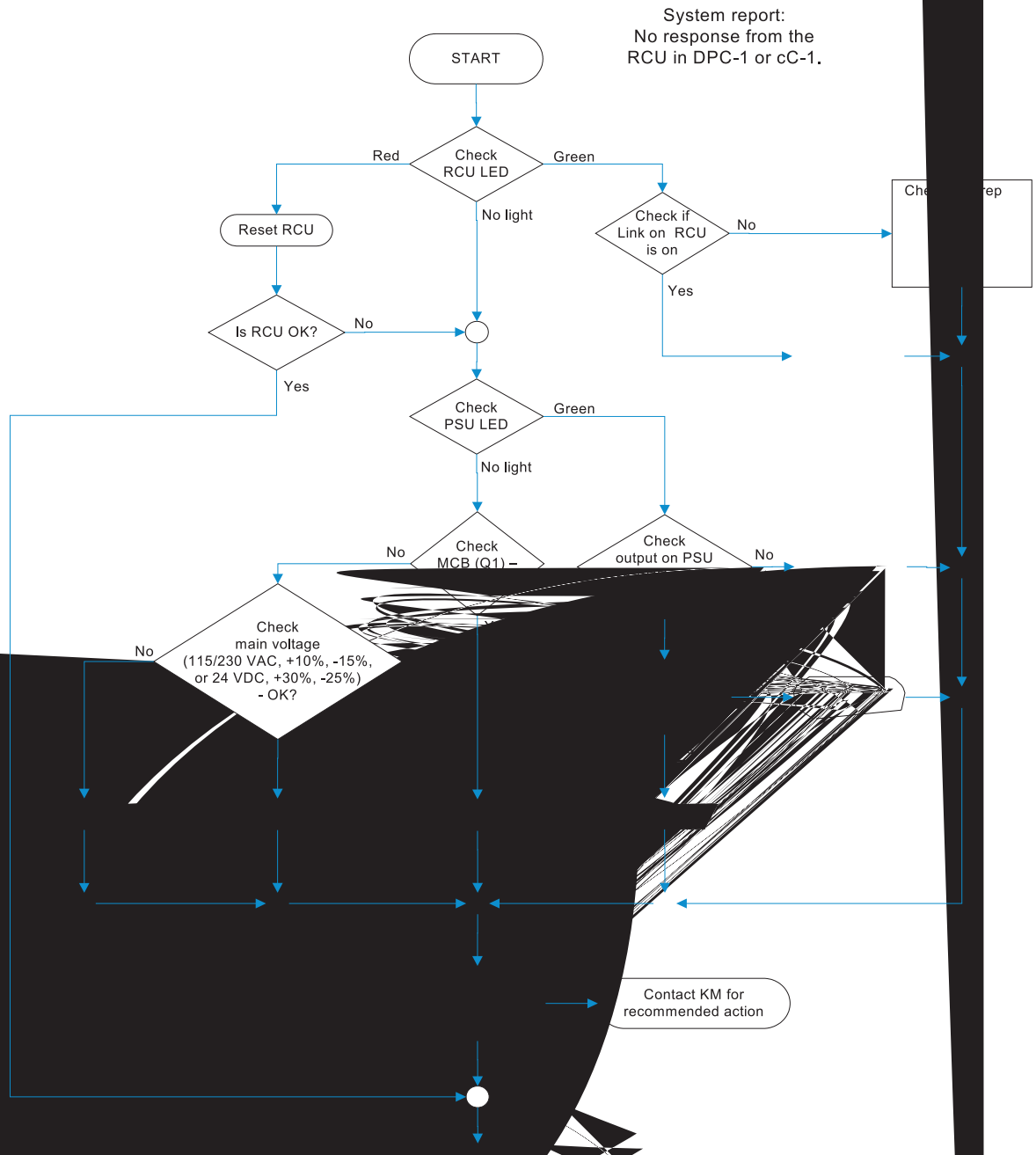
Taut Wire position-reference system messages are presented in two ways on the colour monitor of the K-Pos operator station; via the Message Line and in the Event List Window.

If the K-Pos system has an alarm printer then the messages are printed out automatically when they are first reported by the system. For further details, refer to the *K-Pos DP (OS) Operator Manual*, *K-Pos DPM (OS) Operator Manual* or *K-Pos PM (OS) Operator Manual*, as applicable.

2.4 Fault-finding flow chart

The Fault-finding flow chart at cC-1 error in Figure 5 shows a general fault-finding flowchart telling how to re-establish the connection after no response from RCU501.

Figure 5 Fault-finding flowchart at cC-1 error



3 PREVENTIVE MAINTENANCE

This section presents the preventive maintenance procedures for the cC-1.

3.1 How to tighten screws in the termination blocks

Use a screwdriver with an isolated-handle and a Posidrive no. 2 socket wide bit, to tighten any loose screws on Q1 and Q2.

Use a screwdriver with an isolated-handle and a 3 mm socket wide bit, to tighten any loose screws on X11 to X14, and RCU501, RSER200-4 and RMP200-8 modules.

3.2 How to clean cabinets/equipment housing

Use a lint-free, non-abrasive cloth and a neutral or mild soap solution for best result. Use only moistened cloth.

3.3 Preventive maintenance intervals for cC-1

Note

Local evaluations should be made to determine site-specific maintenance intervals.

Table 1 Recommended maintenance intervals for cC-1

Action	**Interval recommended**
Check fuse status LEDs	Once a week, refer to 1.2.1.
Clean cabinets and equipment housing	Once a month
Tighten screws in the termination blocks	Every six months

4 CORRECTIVE MAINTENANCE

This section presents the corrective maintenance procedures for the cC-1.

Corrective maintenance procedures not described in this section can be found in the appropriate *Hardware Module Descriptions* for the part numbers referred to in section *Replaceable parts and consumables* on page 16. Corrective maintenance of parts not provided by any of the above should be performed by Kongsberg Maritime service personnel only.

4.1 Replacing PSU1

This procedure lists steps that should be taken to replace a defective Power Supply - PSU1 in cC-1.

Note

You must be allowed to turn OFF the power to the specific cC-1 and have a spare Power Supply Module available.

1 Open the front door of cC-1.

2 Turn off circuit breaker (MCB) Q1 for PSU1.

3 Remove the faulty PSU by removing the screws holding the clamp brackets.

4 Remove wires attached to the PSU by using a flat-bit screwdriver.

5 Re-attach the wires to the new PSU by using the flat-bit screwdriver.

6 Attach the new PSU by holding it in position and fix the clamp bracket by fastening the screws.

7 Turn on MCB Q1 for PSU1.

8 Verify that the RUN LED of the RCU module is turned from red to green after a while.

9 Verify that the RCU module is working OK by watching operator station status.

10 Close the front door of cC-1.

4.2 Replacing Q1 circuit-breaker (MCB)

This procedure lists steps that should be taken to replace a defective circuit breaker (MCB) – Q1.

Note

You must be allowed to turn off the power to the specific cC-1 and have a spare MCB.

1. Turn off power (mains) to cC-1.
2. Open the front door of cC-1.
3. For 115/230VAC version; remove the busbar between the MCBs Q1 and Q2. For both versions; remove the wires attached to the MCB - Q1 by using a screwdriver.
4. Remove faulty MCB - Q1.
5. Attach the new MCB - Q1.
6. Re-attach the busbar and the wires to the MCBs by using the screwdriver.
7. Turn on the power (mains) to cC-1.
8. Turn on the MCB - Q1.
9. Verify that the RUN LED of the RCU module is turned from red to green after a while.
10. Verify that the RCU module is working OK by watching operator station status.
11. Close the front door of cC-1.

4.3 Replacing the RCU501

1. Open fuse X11:F1.
2. See the *RCU501 Hardware Module Description* for the replacement procedure.
3. Close fuse X11:F1.

4.3.1 Replacing fan for RCU501 module

1. Open fuse X11:F1.
2. See the *RCU501 Hardware Module Description* for the replacement procedure.
3. Close fuse X11:F1.

4.4 Replacing RSER200-4 or RMP200-8 modules

See the appropriate *RSER200-4* or *RMP200-8 Hardware Module Description* for the replacement procedure.

5 REPLACEABLE PARTS AND CONSUMABLES

5.1 Replaceable parts and consumables

This section contains lists of replaceable parts, recommended spare parts and consumables used in cC-1. Replacement procedures for the listed parts are, for most of them, described in their *Hardware Module Description.*

Table 2 cC-1 Spare parts list

Part.no	Description	Basic (1)	Recomm. (2)	Complete (3)
603439	RCU501 Controller	0	1	1
600686	Fan for RCU501 Controller	1	1	1
603443	RMP200-8	0	1	1
603444	RSER200-4 (not for cC-1 Taut Wire Controller)	0	1	1
702847	Moxa Ethernet Switch EDS-205 (not for cC-1 Taut Wire Controller)	0	1	1
702802	Fuse MCB 2-pole 6A (for 115/230VAC version)	0	0	1
702804	Fuse MCB 2-pole 16A (for 24VDC version)	0	0	1
47749445	Power 100-240VAC/5A,24VDC/10A (for 115/230VAC version)	1	1	1
703424	DC/DC Converter, SD350B, 24V/24V 245W (for 24VDC version)	1	1	1
44489565	Fuse 5x20 0.5A 250VT	10	10	10
43505833	Fuse 5x20 2.0A 250VT	10	10	10
43505858	Fuse 5x20 4.0A 250VT	10	10	10

(1) Basic

These are the parts recommended if the vessel is going to operate near any of Kongsberg Maritime's world wide service locations and where down time is of less importance.

(2) Recomm. (Recommended)

These are the parts recommended if the vessel is going to operate not too far away from any of Kongsberg Maritime's world wide service locations and where down time must be kept at a minimum.

(3) Complete

These are the parts recommended if the vessel is going to operate far away from any of Kongsberg Maritime's world wide service locations. This kit is also recommended when down time must be kept at an absolute minimum or when operating in class 2 or class 3 conditions.

APPENDIX A — HW CONFIGURATION STATUS

This manual is based on the following parts lists and drawings. The revisions listed are those that were valid when the manual was produced.

Parts Lists

Parts Lists cC-1, DP Controller (115/230VAC)	300078 Rev. B
Parts Lists cC-1, DP Controller, (24VDC)	301207 Rev. C
Parts Lists cC-1, Taut Wire Interface Controller (115/230VAC)	319821 Rev. A

Drawings

General Arrangement, cC-1, Cabinet 600x800x250	302899, Rev. B
Layout Drawing, cC-1, 115/230VAC	300108, Rev. B
Layout Drawing, cC-1, 24VDC	300512, Rev. B
Layout Drawing, cC-1, Taut Wire Controller, 115/230VAC	319820, Rev. A
Power and Wiring Diagram, cC-1, 115/230VAC	300109, Rev. B
Power and Wiring Diagram, cC-1, 24VDC	300110, Rev. B
Power and Wiring Diagram, RBUS, cC-1	300060, Rev. B
Term. Diagram 72ch I/O 12ch. Serial, cC-1	300111, Rev. B
EC Declaration, cC-1, 115/230VAC	300076, Rev. A
EC Declaration, cC-1, 24VDC	301744, Rev. A

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