CATTRON™

CattronControl™ CCM12

CANbus Machine Control Unit (MCU)

User Manual

9M02-7717-A001-EN

CONNECT. CONTROL. PROTECT.

CATTRON

Revision History

VERSION	DATE	NOTES
EP1	11/05/2008	Preliminary Version
EP1a	11/19/2008	Added physical dimensions drawing
EP2	06/03/2009	Specifications update: max voltage set to 32V Added specifications to fuses
A1	11/23/12	Overall revision: Added sections on CANbus redundant operation, CCM12 rotary switches, CANopen and J1939-specific information
2.0	04/2016	Updated styles and branding
3.0	03/2019	Changed part number to 9M02-7717-A001 from 9M04- and rebranded
4.0	07/2020	Changed product photos and updated trademark usage

Contents

1. Functional Overview

The Cattron CANbus compact MCU (CCM12) is a radio remote control receiver with CANbus interfaces. It is designed to be used with the Cattron OCU (Operator Control Unit) product line.

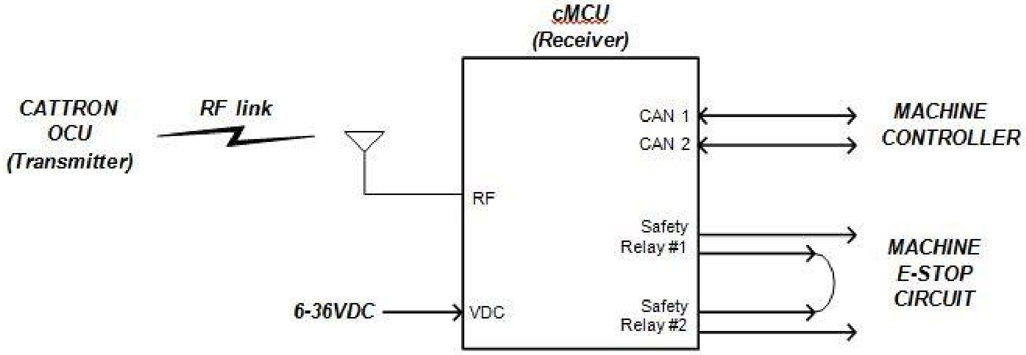

Figure 1: CattronControl CANbus CCM12 typical application

In most applications, the two redundant safety relays are connected in series as shown.

1.1 Features

Several important features of the CCM12 are described here.

- **CANbus interface –** The CCM12 CANbus interfaces meet the ISO11898-2 standard. Both interfaces are electrically isolated. Higher level protocols such as CANopen and J1939 are supported.
- **Dual safety relays outputs –** The CCM12 provides two monitored safety relays (forcibly guided contact relays, according to EN50205). The normally-opened contacts close when a valid RF link is present between the OCU and the CCM12, and both units operate without error. The safety relays are used as STOP devices independent of the CANbus link.
- **RF Communication –** The CCM12 supports two-way RF communication with the OCU, providing feedback capability for sending information to the OCU display. RF transmission is protected against noise and corruption with mechanisms as CRC, sequencing control, etc.
  The CCM12 is compatible with several Cattron RF modules, each one supporting a particular frequency band. It can be configured to operate on a specific RF channel, or to scan among the available channels (auto-scan mode).
- **TransKey Configuration Device –** System configuration is done using a removable, contact-less RFID memory device, the TransKey. TransKeys are produced in pairs (one for the OCU and one for the MCU). Each pair has a unique 24-bit ID. RF links can only be established between an OCU and MCU sharing the same TransKey ID.
  The TransKeys are also used to store configuration parameters, such as RF channel, link time-out delay, etc. To be programmed, the TransKey has to be removed from the unit and programmed using a PC with the proper programming hardware and software.
  The TransKey cannot be removed during operation; if removed, the unit enters Error mode within a few seconds.
- **Dual Processor Redundant Architecture for Safety (EN13849) –** In order to meet the EN13849 requirements for safety-relevant applications, the system design is based on a dual channel redundant architecture. Two processors running in parallel perform similar operations on the process data, and compare their results at specific check points for consistency. In addition, active fault detection is performed at run-time by each processor. In the case of inconsistency or fault detection, the device enters Error mode.

1.2 Block Diagram

The following block diagram illustrates the CCM12. The main interfaces are described in more detail in the next sections.

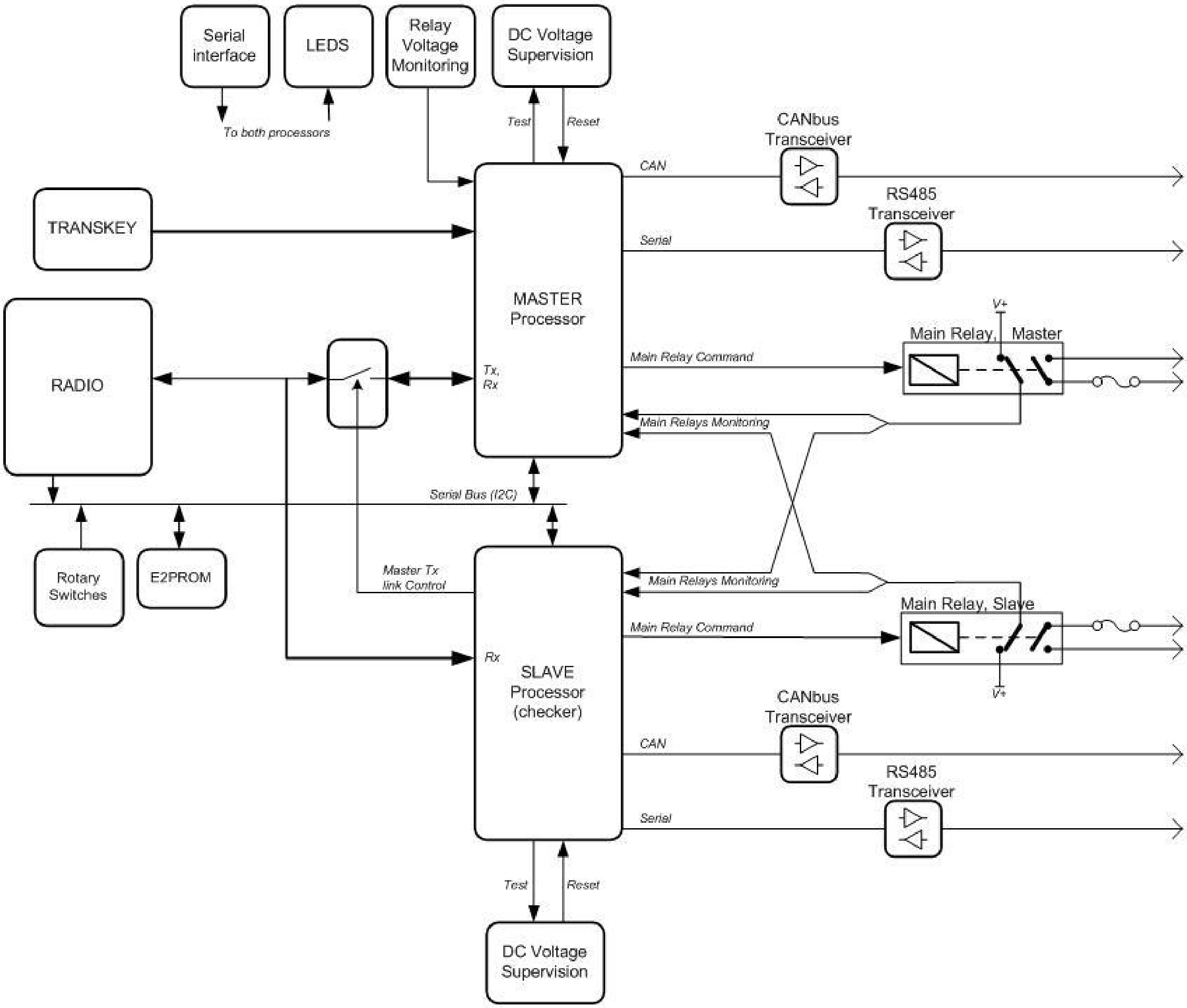

Figure 2: Block Diagram

2. Physical Description and Interfaces

2.1 Physical Description

The CCM12 is enclosed in a compact, watertight, impact-resistant black nylon housing. The main connector is integrated to the front plate, ensuring sealed packaging.

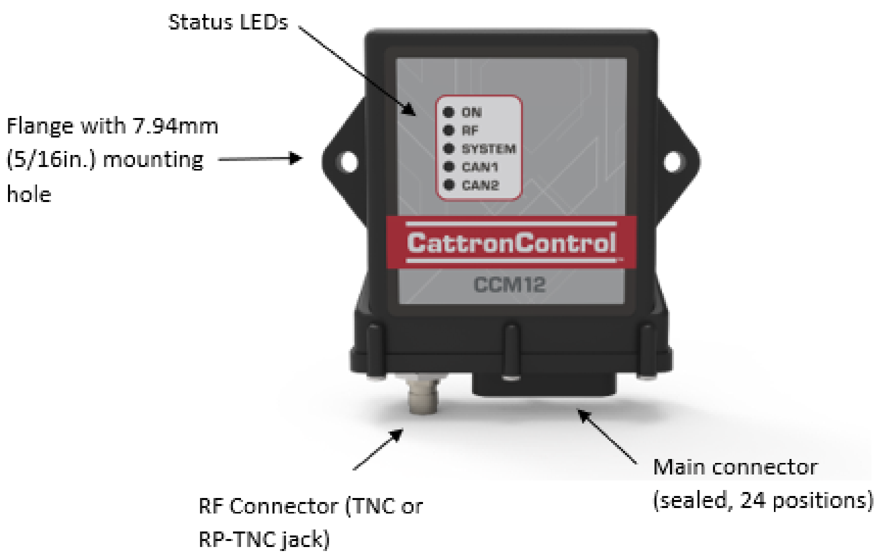

Figure 3: CCM12 housing

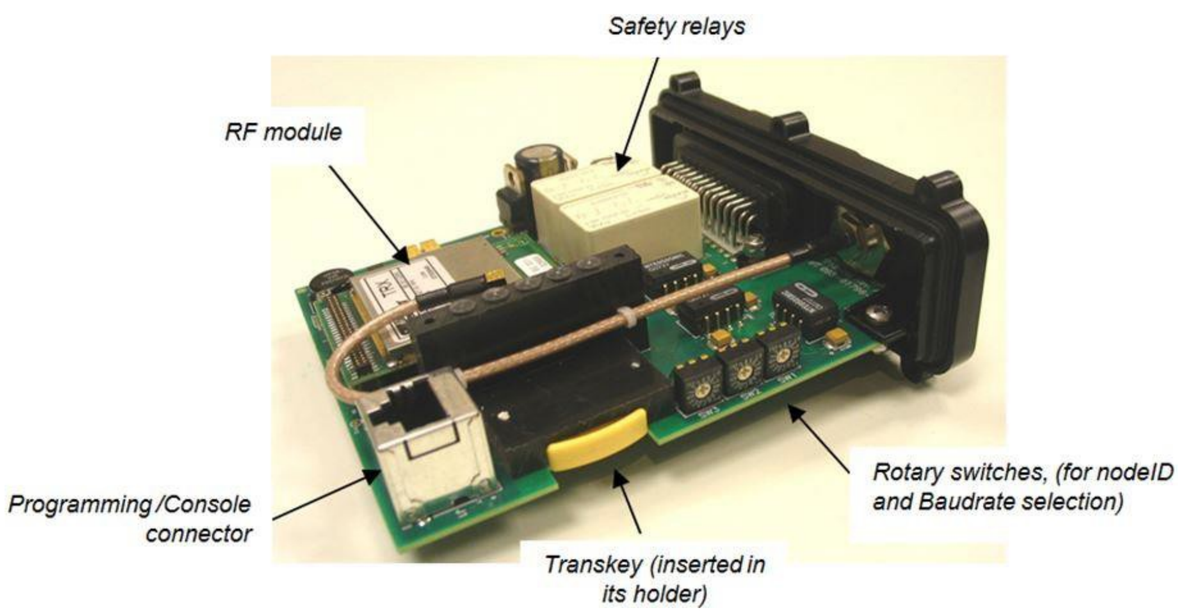

Figure 4: CCM12 internal – the main PCB is assembled to the front panel PCB-mount connector

Figure 5 shows the CCM12 physical dimensions. The unit can be mounted using two ¼-20 screws.

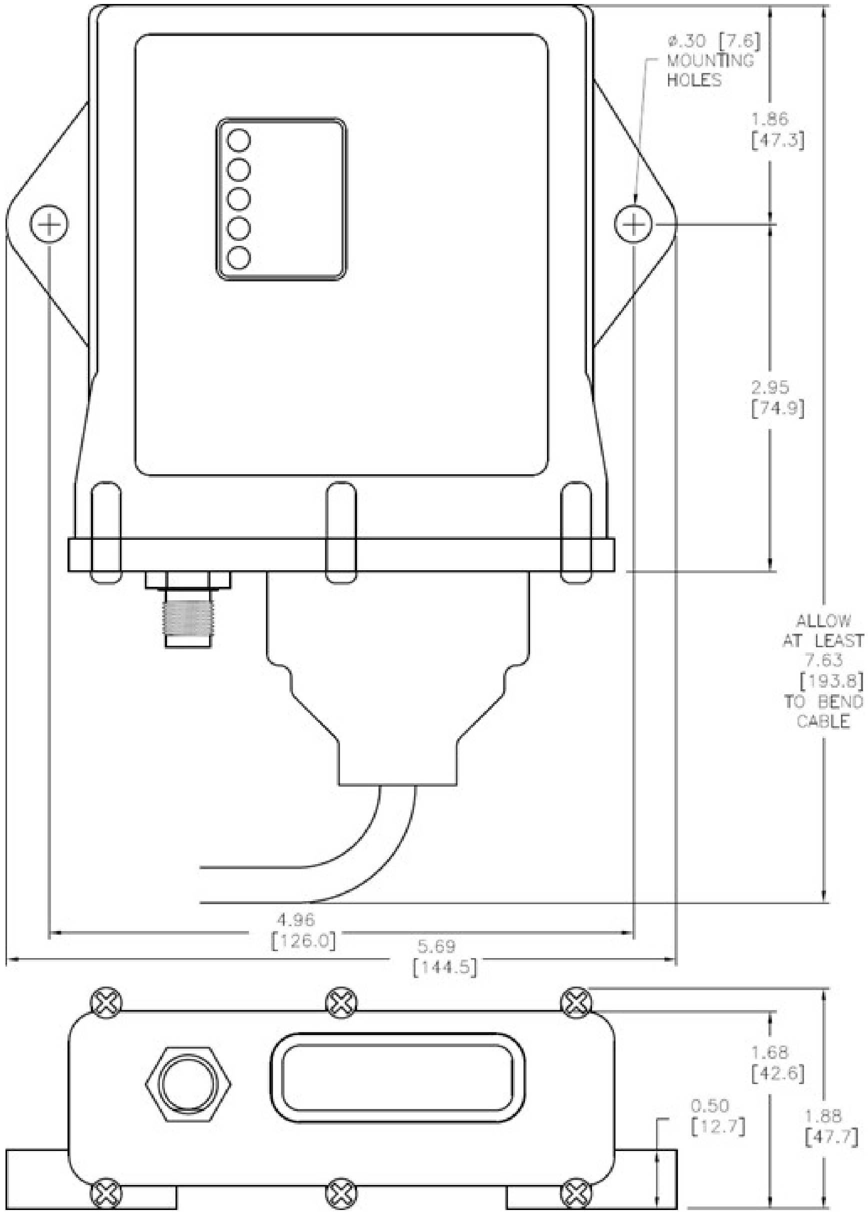

Figure 5: CCM12 physical dimensions

2.2 Interface Description

2.2.1 Power Supply

The system is designed to support off-road mobile applications on 12 VDC and 24 VDC systems.

Table 1: Power Supply Characteristics

INPUT VOLTAGE	6-32 VDC
INPUT CURRENT	Less than 300 mA at 12 VDC Less than 175 mA at 24 VDC
PROTECTION	- Reverse polarity - Load dumps and electrical transients

2.2.2 Safety Relays

The CCM12 has two independent safety relays; each relay is controlled by one processor, and monitored by both of them, as shown:

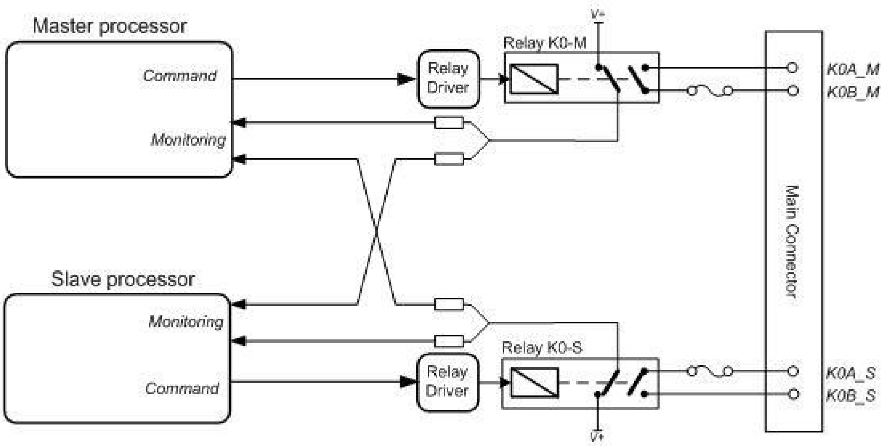

Figure 6: Safety Relays interface block diagram

Contacts for the relays normally-open are connected to the CCM12 main connector, while the normally-closed are used for relay monitoring.

The safety relays main contacts (normally-opened) are closed when a valid RF connection is established from the OCU, and the MCU is operating without error. Since the master and slave processors run parallel operation, both relays operate quasi-simultaneously.

It is recommended that the contacts for both relays be connected in series to the machine E-STOP circuitry.

Table 2: Safety Relays Characteristics

RELAYS TYPES	EN 50205, type A (forcibly guided contacts)
RELAYS SWITCHING VOLTAGE	5 to 250 VDC/VAC
RELAYS SWITCHING CURRENT	5 mA to 6 A
SHOCK RESISTANCE 16MSEC	17 g
VIBRATION RESISTANCE 10-200 HZ	7 g
RELAYS CONTACT FUSE RATING	4 A, 125 VDC/VAC

2.2.3 CAN Interface

The system supports two CAN controllers, each driving its own isolated CAN interface.

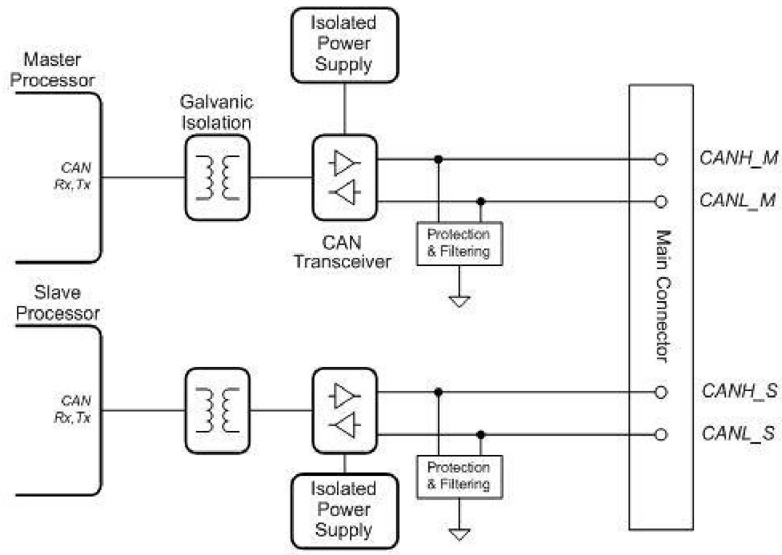

Figure 7: CAN interface block diagram

Each CAN interface is connected to one processor, providing redundancy and self-verification capabilities.

Both interfaces are electrically isolated from each other and from the rest of the electronics. They meet the specifications of the ISO 11898 standard.

Table 3: CAN Interface Characteristics

CAN FORMAT	CAN 2.0A and CAN 2.0B
BUS SPEED	10, 20, 50, 125, 250, 500, 800 and 1000 kbps
STANDARD	ISO 11898-2
PROTECTION	According to ISO 11898-2: - Bus fault protection from -27 to +40 V - Transient voltage from -200 to +200 V
ISOLATION	Each port is individually isolated for signals and power supply
CONFIGURATION	Node ID and bitrate can be configured using rotary switches

2.2.3.1 Protocols

The CAN interfaces support CANopen and SAE J1939 protocol, as well as lower-level CANbus protocol variants. Section 0 provides details on CANbus operation.

2.2.3.2 Redundant Controllers

The two CAN controllers operate in a redundant fashion to meet the needs of safety-relevant applications. Two modes are supported:

- **Parallel Operation:** Both controllers perform identical processing; the same messages are sent simultaneously on both channels. The recipient nodes are responsible for comparing and validating the messages.
- **Cross-Monitored Operation:** The slave CAN controller monitors the CAN frames sent by the master and compares the frames with its own copy of the process data. In case of any discrepancy, the MCU enters Error mode.

In the case where no redundancy is desired, only the master controller interface is used. Refer to Section 0 for more details.

2.2.4 RS485

The MCU provides two RS485 ports. These ports are electrically isolated from the system, but they share the same isolated power supply. In the default configuration, both ports are connected together with jumpers.

Note: This interface is currently not implemented as a standard feature. Please contact Cattron with your requirements.

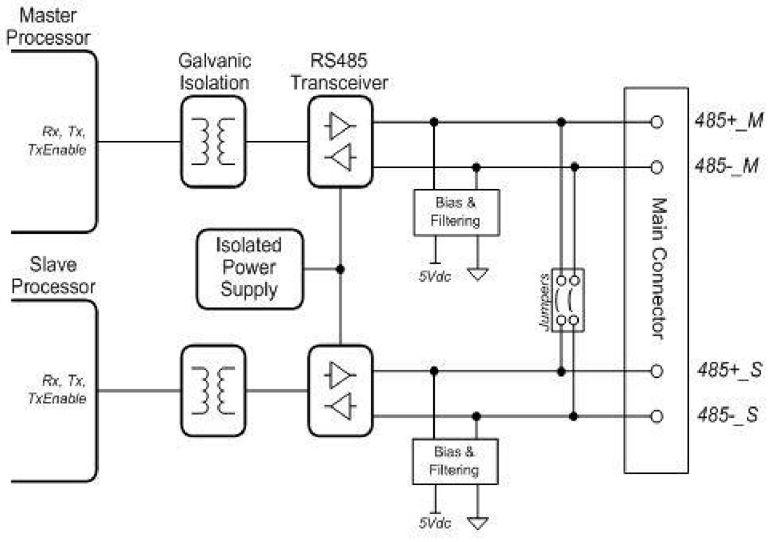

Figure 8: RS485 interface block diagram

Table 4: RS485 Interface Characteristics

BUS SPEED	TBD
STANDARD	TBD
PROTECTION	TBD
ISOLATION	Each port is individually isolated for signals, and globally isolated for power supply
CONFIGURATION	TBD

2.2.5 LED Indicators

The MCU has five bicolor LEDs.

Figure 9: MCU LEDs

Table 5: MCU LEDs Description

LED NAME	COLOR	MEANING
ON	Orange	The MCU is powered and properly initialized.
RF	Green	Valid RF Telegrams are received from peer OCU, and RF connection is established. Both main relays are activated - MCU is in Active State.
	Orange	Valid RF Telegrams are received from peer OCU, but RF connection is not established. Main relays are not activated - MCU is in Passive State.
	Red	Indicates that valid RF Telegrams are received from another OCU (an OCU with a different TransKey ID).
	Red/Orange Flashing	MCU is scanning RF channels to find its peer OCU. Main relays are not activated - MCU is in Passive State.
	Off	No RF Telegrams received. Main relays are not activated - MCU is in Passive State.
SYSTEM	Green	Commands are being received (OCU actuators are being moved).
	Red Blinking	Error indication; the number of blinks provides an error code. Refer to Appendix A for description of error codes.
CAN1	Green, Red	Master Processor CAN status. Behavior depends on CAN operation (CANopen or J1939). Refer to the sections specific to CANopen and J1939.
CAN2	Green, Red	Slave Processor CAN status. As for CAN1, refer to the sections specific to CANopen or J1939 for more details.

*"Peer OCU" refers to an OCU using the peer TransKey (with the same 24-bit ID)

3. CANbus Operation

3.1 CANbus Redundant Controllers for Safety-Relevant Applications

The two CANbus interfaces are designed to operate in redundant fashion, so as to meet the requirements for safety-relevant applications. Two different configurations are supported, as illustrated in Figure 10.

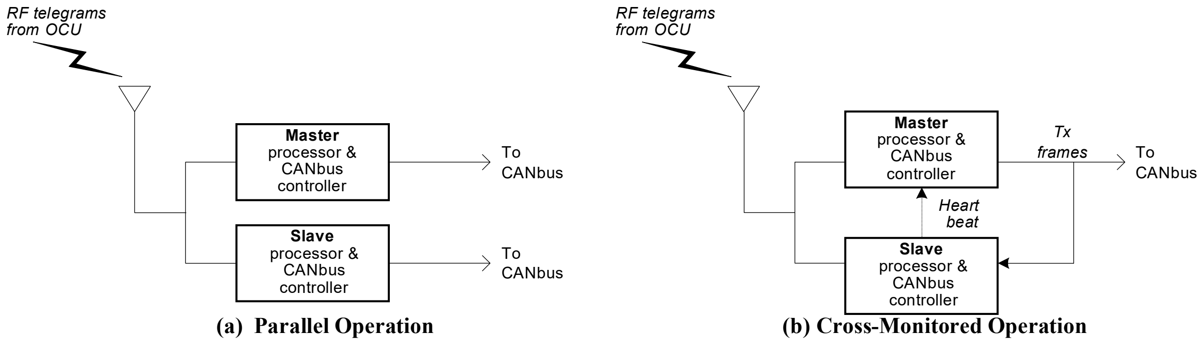

Figure 10: Two CANbus redundant operation

3.1.1 Parallel Operation

In parallel operation, the two processor/CANbus controllers operate independently from each other. They perform similar processing on received RF telegrams, so the same CANbus data frames are sent from both of them. In this configuration, it is up to the receiving nodes to validate the CANbus frames by comparing the master and slave sides.

- **Node IDs –** The two CANbus controllers are assigned different node IDs so they can be connected to the same bus; the CCM12 actually appears as two different nodes running in parallel. The slave node ID equals the master node ID + 1.
- **Received Data Frames –** This redundant scheme works for transmit data frames only. The received data frames (RPDO for CANopen, Rx PGN for J1939) are ignored by the slave controller.
- **Network Parameters –** The master and slave controllers can be configured with different network parameters by the network master. For example, in CANopen, one can be programmed for asynchronous transmission and one for synchronous transmission. By default, the parameters are the same.

For applications where no redundancy is required, the master controller shall be used; the slave controller can be left floating.

3.1.2 Cross-Monitored Operation

In cross-monitored operation mode, both processors perform the same processing on the received RF telegrams, but CAN frames are sent by the master controller only. The slave reads back the frames transmitted by the master controller for comparison. In addition, the slave processor reports to the master at regular intervals with Monitoring Status Heartbeat messages so the master can double-check that the slave performs its verification activity properly.

- **Node ID –** Unlike parallel operation, the CCM12 appears as a single CAN node, so a single node ID is used.
- **Error Detection –** In case of error detection from the slave or from the master, the MCU enters Error mode. In this mode, the transmission of CAN frames is aborted until the next power off/on cycle.
- **Received Data Frames –** As for parallel operation, this scheme operates for transmitted CAN frames only; there is no cross-verification of received data frames.
- **Master-Slave Interconnection –** The two CANbus controllers are not connected internally. They need to be connected together outside the MCU:

Connect **CANH_M** (pin1)	to **CANH_S** (pin 14)	(Master and Slave CAN High signals)
Connect **CANL_M** (pin2)	to **CANL_S** (pin 15)	(Master and Slave CAN Low signals)

The CCM12 main connector is shown in Section **Error! Reference source not found.**.

Note: The standard configuration for the CCM12 is the *cross-monitored* configuration. Parallel operation is available upon request.

3.2 CANbus Protocols

The CCM12 supports two standard configurations:

- CANopen protocol standard configuration
- J1939 protocol standard configuration

In many applications, low-level CANbus protocols can be supported using a subset of CANopen.

In addition, custom configurations can be implemented according to the customer's requirements. The selection of the protocol configuration is done at the Cattron factory.

Sections 0 and 0 provide basic information about CANopen and J1939 usage.

3.3 CANopen

3.3.1 Standard Configuration

The CANopen CCM12 is a slave device that supports three transmit PDOs (TPDO1-3) and two receive PDOs (RPDO1-2). The transmit PDO contains control data from the OCU, and the receive PDO contains feedback data to be sent to the OCU for display.

Table 6: PDO summary

PDO	COB-ID	DLC	CONTENT
TPDO1	Node ID + 180h	8	Digital inputs (OCU pushbuttons, switches)
TPDO2	Node ID + 280h	8	Proportional inputs 1 to 6 (OCU paddles/joysticks)
TPDO3	Node ID + 380h	8	Proportional inputs 7 to 8 + alternate digital inputs
RPDO1	Node ID + 200h	8	Feedback bits 1-64
RPDO2	Node ID + 300h	8	Feedback bits 65-128

The standard CANopen implementation is described in the following documents:

[1] Cattron #9S02-7887-A002, "Standard CANopen Protocol Specification"

[2] Cattron #9S02-7887-A100, "Standard CANopen Protocol Specification for Pushbutton OCUs"

The TPDO mapping depends on the RF Telegram Format. Reference [1] is the general specification, applicable to Telegram Formats 0F, 1F, 2F, 3F and 4F. Reference [2] is the application of [1] to Cattron pushbutton OCUs (Excalibur and MKU), which employ Telegram Format 0F.

3.3.2 Custom Configurations

Custom definitions can also be implemented by Cattron based on customer requirements.

3.3.3 Rotary Switches – Baud rate and Node ID

The CANbus baud rate and node ID are configured using the three CCM12 16-position rotary switches labeled SW1, SW2 and SW3, as shown in Figure 11. SW1 is used for baud rate selection, and SW2 and SW3 are used for node ID. Note that the rotary switches are read at initialization only. Any position change at run-time has no effect.

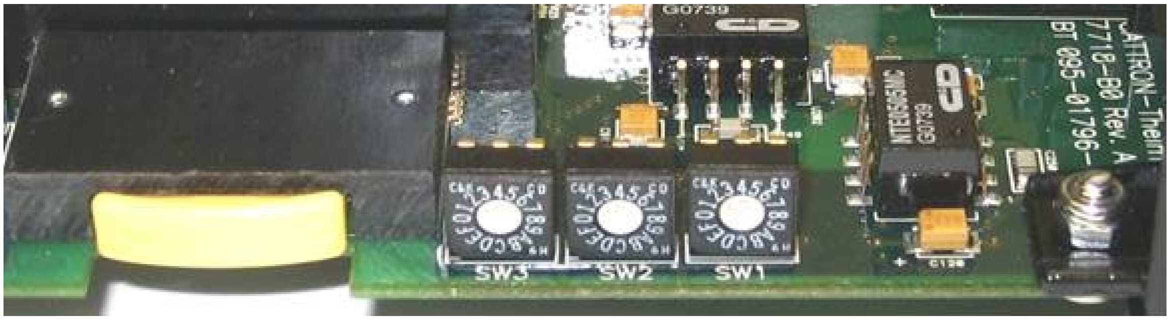

Figure 11: CCM12 rotary switches (SW1, SW2, SW3)

3.3.3.1 CAN Baud rate

SW1 selects amongst standard CANbus baud rates, according to the table below:

Table 7: CANbus baud rate selection table

SW1 POSITION	BAUD RATE
0	*Do not use*
1	20 kbps
2	50 kbps
3	100 kbps
4	125 kbps
5	250 kbps
6	500 kbps
7	800 kbps
8 – F	1 Mbps

3.3.3.2 CANbus Node ID

SW2 and SW3 select the CANopen node ID. SW3 is the most significant and SW2 the least significant nibble.

In parallel operation, the CCM12 appears as two nodes; the slave controller adds one to the rotary switch value. In cross-monitored operation, the CCM12 appears as a single node.

Table 8: CANopen Node ID selection table

SW3 POSITION	SW2 POSITION	NODE ID, CROSS-MONITORED OPERATION	NODE ID, PARALLEL OPERATION	
			MASTER CONTROLLER	SLAVE CONTROLLER
0	0	*Invalid – Do not use*	*Invalid – Do not use*	
0	1	01h	01h	02h
0	2	02h	02h	03h
…	…	…	…	..
7	D	7Dh	7Dh	7Eh
7	E	7Eh	7Eh	7Fh
7	F	7Fh	*Invalid – Do not use*	
8-F	X	*Invalid – Do not use*	*Invalid – Do not use*	

If SW1, SW2 or SW3 are set to an invalid position, the CCM12 goes to Error mode at start-up (with the 14 flashes code).

3.3.4 LEDs

The MCU CAN1 and CAN2 LEDs are bicolor (Green and Red), operating according *to CiA DR303-3*, “CANopen Indicator Specification”. CAN1 is associated with the master controller and CAN2 with the slave controller.

The behavior of the Green and Red components is independent. Green behavior indicates the RUN state, and Red behavior the ERROR state. In the case of conflict between turning the LED Green or Red, Red has priority.

Table 9: CAN LED Green component behavior (CANopen operation)

GREEN (RUN) BEHAVIOR	MEANING
Blinking (200 ms ON, 200 ms OFF)	The MCU is in PRE-OPERATION state
Single flash (200 ms ON, 1 s OFF)	The MCU is in STOPPED state
On	The MCU is in OPERATIONAL state

Table 10: CAN LED Red component behavior (CANopen operation)

RED (ERROR) BEHAVIOR	MEANING
OFF	No error
Single flash (200 ms ON, 1 s OFF)	A warning limit has been reached (too many error frames)
ON	Bus off condition

3.4 J1939

3.4.1 Standard Configuration

The standard J1939 CCM12 is an arbitrary address capable device, supporting three proprietary transmit PGNs and two proprietary receive PGNs. The transmit PGN contains control data from the OCU, and the receive PGN contains feedback information to be sent to the OCU for display.

Table 11: PGN summary

PGN	FORMAT	TX/RX	CONTENT
65280	PDU2	Tx	Digital inputs (OCU pushbuttons, switches)
65281	PDU2	Tx	Proportional inputs 1 to 6 (OCU paddles/joysticks)
65282	PDU2	Tx	Proportional inputs 7 to 8 + alternate digital inputs
65288	PDU2	Rx	Feedback bits 1-64
65289	PDU2	Rx	Feedback bits 65-128

The PGN standard definition is described in the following documents:

[3] Cattron #9S02-8019-A002, “Standard J1939 Protocol Specification”

[4] Cattron #9S02-8019-A100, “Standard J1939 Protocol Specification for Pushbutton OCUs”

[5] Cattron #9S02-8019-A200, “Standard J1939 Protocol Specification for LRC-M1 OCU; N-A Standard Configuration”

The transmit PGN mapping depends on the RF Telegram Format. Reference [3] is the general specification, applicable to Telegram Formats 0F, 1F, 2F, 3F and 4F. Reference [4] is the application of [3] to Cattron pushbutton OCUs (Excalibur and MKU), which employ Telegram Format 0F. Similarly, reference [5] is the application of [3] to the N-A standard LRC-M1 configuration.

3.4.2 Custom Configurations

Custom definitions can also be implemented by Cattron based on customer requirements.

3.4.3 Rotary Switches

The rotary switches are not used in J1939 mode.

3.4.4 LEDs

The MCU CAN1 and CAN2 LEDs are bicolor (Green and Red). CAN1 is associated with the master controller and CAN2 with the slave controller.

The Red component indicates the status of the CAN physical layer (as defined in the *CiA DR303-3* recommendation for the ERROR LED). The Green component indicates the state of the J1939 address claiming process.

In the case of conflict between turning the LED Green or Red, Red has priority.

Table 12: CAN LED Green component behavior (J1939 operation)

GREEN (RUN) BEHAVIOR	MEANING
Blinking (200 ms ON, 200 ms OFF)	The MCU is currently negotiating for a node address
Single flash (200 ms ON, 1 s OFF)	The MCU was not able to get an address – it cannot send/receive normal messages
ON	The MCU negotiated successfully for a node address – it can now send and receive normal messages

Table 13: CAN LED Red component behavior (J1939 operation)

RED (ERROR) BEHAVIOR	MEANING
OFF	No error
Single flash (200 ms ON, 1 s OFF)	A warning limit has been reached (too many error frames)
ON	Bus off condition

3.5 CANbus Termination Resistor

The CCM12 does not have an internal termination resistor.

3.6 CCM12 Power-On Sequence

1. The MCU turns on as soon as it is powered up. It performs internal tests, and it gets ready for a RF connection to an OCU and operation on the CANbus.

   While the RF connection is off, the MCU is in Passive Mode:

   – The Safety Relays are released

   – The "ON" LED is on (orange)

   The CANbus status depends on the system configuration. For example, if it is configured as a CANopen Boot Master, the unit enters the CANopen OPERATIONAL state, and the "CAN" LED is solid green. If not, the unit enters the CANopen PRE-OPERATIONAL state, and the "CAN" LED blinks green.

2. When the MCU receives a valid connection request from its peer OCU, it enters Active Mode. The safety relays close and the "RF" LED turns on green.

RF and CANbus connections are independent of each other; any connection can happen first.

RF Connection Variants

There are basically two RF connection variants, which are configurable through the OCU TransKey device.

1. The OCU sends connection requests for a short period after switching on. In this case, a MCU powered up after the OCU would remain in Passive Mode ("RF" LED would turn on orange, with the main relays released). The OCU has to be switched off and then on again.

2. The OCU sends connection requests continuously if all control elements are released.

3.7 Active STOP and Passive STOP

- **Active STOP –** When the MCU receives a STOP command from the OCU (resulting from pressing the STOP switch), it opens the main relays and transits into Passive Mode, getting ready for a new OCU connection request.
- **Passive STOP –** While in a connected state, if no valid RF telegrams are received within the passive STOP delay (programmable in the TransKey), the MCU opens the main relays and enters into Passive Mode, as for Active STOP.

3.8 Error Behavior

In the case of any internal error detection from one processor, an indication is given to the other processor and the MCU enters Error Mode:

- The main relays are released
- RF reception is disabled
- The error code is displayed on the “SYSTEM” LED (red blinking).

The MCU has to be switched off and then on again in order to be restarted.

6.9 RF AutoScan Mode

The MCU can either be programmed to a fixed RF channel, or programmed to operate in scan mode, where the MCU continuously scans a predefined RF channel group until it receives valid RF telegrams from its peer OCU. This programming is done in the MCU TransKey.

4. Connectors

4.1 Main Connector

Connector Type: Delphi 12092320 (24 position Micro-Pack 100W male connector)

Mating Connector: The sealed Micro-Pack 100W female connector is built from the Delphi parts listed in the table below.

Table 14: Delphi Parts Used in Mating Connector

DELPHI P/N	DESCRIPTION
12129225	Female connector, 24 position
12129183	Retainer
12110403	Cable seal
12160848 (black 90 degree) 12129858 (gray straight) 12129811 (gray 90 degree)	Strain relief
15359001 (0.35-0.5 mm²) 15359002 (0.8 mm²)	Female terminals, gold plated, 7.5 A

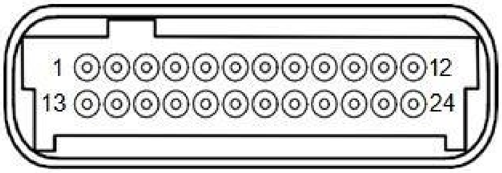

Figure 12: Delphi 12092320 Connector

Table 15: Delphi 12092320 Connector

DESCRIPTION	SIGNAL	PIN NUMBER		SIGNAL	DESCRIPTION
CAN ground, Master	CANGND_M	**13**	**1**	CANH_M	CAN dominant High, Master
CAN dominant High, Slave	CANH_S	**14**	**2**	CANL_M	CAN dominant Low, Master
CAN dominant Low, Slave	CANL_S	**15**	**3**	CANGND_S	CAN ground, Slave
RS485 ground, Master&Slave	485GND	**16**	**4**	485GND	RS485 ground, Master&Slave
RS485 Data+, Slave	485+_S	**17**	**5**	485+_M	RS485 Data+, Master
RS485 Data-, Slave	485-_S	**18**	**6**	485-_M	RS422 Data-, Master
	n/c	**19**	**7**	n/c	
	n/c	**20**	**8**	n/c	
	n/c	**21**	**9**	K0A_M	Main relay contacts, Master (normally-open)
	n/c	**22**	**10**	K0B_M	
Battery voltage input (6-32VDC)	VBAT+	**23**	**11**	K0A_S	Main relay contacts, Slave (normally-open)
	VBAT-	**24**	**12**	K0B_S	

4.2 Programming Connector

Connector Type: RJ45 Jack

This connector is located inside the enclosure.

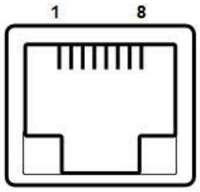

Figure 13: RJ45 Jack Connector

Table 16: RJ45 Jack Connector

PIN	SIGNAL	DESCRIPTION
1	TXD_S	TX data – Slave
2	RXD_S	RX data – Slave
3	PRG_S	Programming mode – Slave (active high)
4	PRG_M	Programming mode – Master (active high)
5	RXD_M	RX data – Master
6	TXD_M	TX data – Master
7	VCC	3.3VDC, provided from board power supply
8	GND	

4.3 RF Connector

Connector Type: TNC variant

Table 17: RF Connector

CATTRON MCU P/N	CONNECTOR TYPE	REMARK
1MCU-7717-A001	RP-TNC jack	Reverse polarity connector is used to comply to FCC part15 requirements for intentional radiators
1MCU-7717-A101	TNC jack	

5. Compliance Information

5.1 FCC Part 15 Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

⚠	**CAUTION**
	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

5.2 Industry Canada

This Class A digital apparatus complies with Industry Canada ICES-003 standards.

5.3 Approved Antennas

Table 18: Cattron P/N 1MCU-7717-A001, 902-928 MHz, FCC Part 15

CATTRON P/N	MANUFACTURER P/N	MANUFACTURER	TYPE	GAIN
PRT-0000620	S467TR-915S	Nearson	Portable, omni, ½ wave dipole	2 dBi
PRT-0000196	3DB-806	Childs Antennas	Mobile, omni, ground plane collinear	3 dBi

Table 19: Cattron P/N 1MCU-7717-A101, 450-470 MHz, FCC Part 90

CATTRON P/N	MANUFACTURER P/N	MANUFACTURER	TYPE	GAIN
	ANY			
	ANY			

9. CE Declaration of Conformity

Hereby Cattron declares that the radio equipment is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: www.cattron.com

Appendix A: Error Codes

ERROR CODE	ERROR	ACTION
2 flashes	TransKey cannot be read	Make sure the TransKey is in place
3 flashes	TransKey configuration fault	Verify TransKey configuration is coherent with the actual hardware. Ex: RF module selected is not the same as the one installed.
4 flashes	Fault during voltage monitor test	Send to Cattron for repair
5 flashes	Fault with the safety relays	Send to Cattron for repair
6 flashes	(not used)	
7 flashes	Fault with RF module	Replace the RF module
8 flashes	General system error	Send to Cattron for repair
9 flashes	Relay control voltage is too low	Send to Cattron for repair
10 flashes	Hardware fault	Send to Cattron for repair
11 flashes	(not used)	
12 flashes	(not used)	
13 flashes	Slave CAN controller cross-monitor error	Make sure both master and slave CAN interfaces are properly connected to the CAN bus
14 flashes	Master CAN controller cross-monitor error	Make sure both master and slave CAN interfaces are properly connected to the CAN bus
	Rotary switches invalid setting	Make sure switches SW1 to SW3 are set to valid positions

Appendix B: Spare Parts List

Please contact the Cattron sales department at cattron.com/contact for the spare parts list applicable to your system configuration.

Cattron Support
For remote and communication control systems support, parts and repair, or technical support, visit us online at:
www.cattron.com/contact

Cattron North America Inc., 655 N River Rd NW, Suite A, Warren, OH 44483

9M02-7717-A001-EN
Version 4.0