



CattronControl™

MKU

Operator Control Unit (OCU)

User Manual

9M02-7641-A003-EN



CONNECT. CONTROL. PROTECT.

Revision History

VERSION	DATE	NOTES
1.0	6/20/2019	Initial Release

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1. Important Notes

Information to the User regarding FCC Compliance:

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

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


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.


Note: 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 their own expense.


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2. Warnings and Cautions

	WARNING
	More than one remote control system may be used at, around, or nearby your operating facility. Therefore, before inserting a TransKey into an OCU, you must insure the correct coded TransKey is selected for the desired equipment to be operated.
	If the wrong TransKey is inserted into an OCU, other remote controlled equipment located at, around, or nearby your facility may become operational. Failure to comply with the above warnings may result in unintended operation of remote controlled equipment which in turn could result in serious injury or death to personnel and damage to equipment.


	WARNING
	Before attempting to use the remote control system, verify the target crane or machine you wish to operate is under the direct command of your OCU. This is accomplished by operating a non-motion OCU function such as a horn or lamp and observing that the respective function on the targeted crane or machine responds.
	Failure to implement the above may result in serious injury or death to personnel and damage to equipment.

	WARNING
	The use of unapproved components or accessories in the systems sold by Cattron and its subsidiaries is strictly prohibited. Unapproved components are defined as any component not inspected and sold by Cattron. This also includes any component modified from its intended use and/or any component exhibiting observable damage or defect.
	Use of non-conforming parts, assemblies and accessories may lead to injury or death.

	WARNING
	The remote control system you have purchased is designed to stop in a safe mode under a variety of conditions. Some examples of these conditions are excessive radio signal interference, loss of battery and/or electrical power, failure of certain components, operation beyond signal range and others. Although Cattron and its subsidiaries do not specify the position of the operator when controlling the equipment, we are aware that some users are instructed and trained by their employer to ride the equipment in a safe manner. It is imperative that you are prepared for an unplanned stop of the equipment at any time and do not place yourself or others in a position where this situation may cause you to fall from the equipment. Failure to use caution may lead to injury or death.





	CAUTION
	Cattron MKU battery conditioners and external charging units are designed for use with Cattron Ni-Cad battery packs only.
	Battery packs must be removed or disconnected from battery conditioners/external charging units within 48 hours of achieving the fully charged state.

Failure to comply with these CAUTIONs may result in equipment and/or battery damage and will void our warranty.



3. System Description

A Cattron Portable Remote Control (PRC) system offers the safety and dependability required for industrial control applications such as overhead cranes, conveyors, machines, etc.

A remote control system enables an operator to be in the safest and most efficient position for each and every operation, thereby reducing accidents with associated injury or material damage and simultaneously boosting efficiency and productivity.

Each system typically includes one Operator Control Unit (OCU) and one Machine Control Unit (MCU), but other combinations of OCUs and MCUs are possible.

Additionally, different types of MCUs are available and can be paired with the OCU. The MCU types can be any of the CattronControl range, including the CT24-09, CT24-17 Relay MCUs, the CCM12 CANopen, the J1939 MCU and the MMCU4 which can be configured with other BUS-based interfaces such as Ethernet/IP, PROFINET, etc., plus relays and Analog and Digital inputs and outputs. Talkback (optional) to LEDs on the OCU can be made from either the CCM12 or MMCU4 MCUs.

Basically, the OCU transmits secure data to the MCU where it is decoded and drives the machine interface (relays, etc.); hence the machine is under the direct control of the OCU.

The OCU is supplied with both Standard System Packages and also with Custom Engineered Systems. This provides a great deal of flexibility to make the solution fit exactly the client's needs.

A wide range of optional features are also available for CattronControl systems, including Infra-Red and RF Start-up and range control options, Multi User control options, etc. More details are available on request.



4. General

With an OCU and a matching MCU, a machine such as a crane or vehicle can be remotely radio controlled, avoiding the need for a wired connection between the human interface and the controlled device. A number of different control elements are integrated into the OCU housing so that commands to the device are securely encoded into a radio transmission. The MCU is then able to receive this transmission, securely decode these commands and provide suitable interfaces to drive the machine.

4.1 Radio Transmission

The transmission between the OCU and MCU is performed by means of radio communication. With regard to the actual radio frequency that is used, there are several radio frequency bands available.

A specific RF frequency band and channel will often have been selected prior to delivery of the system. Depending on the frequency band, a certain number of RF channels are available.

The OCU and MCU must operate on the same RF channel in order to be able to communicate.

4.1.1 Continuous Transmission

Typically, transmission is continuous and the MCU uses this as part of the information required to maintain the safety relays in an active state. If the MCU does not receive a valid telegram in this mode for a certain period of time (defined as PNH-Time), then it automatically turns off; i.e., safety relays and command relays open. Depending on the application, the PNH-Time varies from 0.5 s to 2.0 s.

In order to ensure optimum communication between the OCU and the MCU, the OCU should ideally be operated with line-of-sight transmission to the MCU antenna at all times. Avoid total shielding of the signal path by metallic and other solid obstructions.

In some cases, the MCU may be configured to operate safely in the absence of an RF signal, much as a safety PLC will do. Such applications are strictly defined.

4.1.2 Radio Interference

Signals from other RF-emitting sources might interfere with the radio communication between the OCU and MCU. If the radio link is affected by these sources, changing the RF channel or even the RF band might be necessary.

4.2 Telegram Security

The transmitted telegram contains several security features, as follows:

4.2.1 Frame Type

Each message has an 8 bit message type identifier that is unique to the equipment in use.

4.2.2 System Address

Your remote control system uses a 24 bit addressing scheme, where each OCU/MCU pair shares a common, unique system address. This system address is contained in every telegram sent by the OCU and is checked by the MCU every time an RF signal is received. The MCU processes a command only when the address in the telegram and the address stored in the MCU match. This is a safety measure to ensure that the MCU will act only upon its assigned OCU.

4.2.3 CRC

The telegram is checked for integrity by the use of a 16 bit CRC. Frames containing a mismatched CRC will be rejected.



4.2.4 Frame Counter

Each message has an 8 bit embedded frame counter that changes on every data frame. This prevents frozen data and data frame hacking.

4.3 System Parameters

The system parameters, including the system address and the selected RF channel, are set by programming the TransKey. The TransKey is a removable radio frequency identification device (RFID) located inside the OCU and MCU. It is programmed by the manufacturer.

Note: Please refer to the separate 'Configuration Data' documents for the specific system parameter settings for your system.



5. Operator Control Unit (OCU)

The OCU is a lightweight, palm-sized, extremely rugged customizable controller for use with any CattronControl series MCU.

Each OCU is designed to meet a specific control application. Two standard OCU options are available: one with a toggle select switch on the end cap and one without this switch.

Each pushbutton may have its specific control function identified from a sheet of self-adhesive labels that is provided for this purpose.

Referring to Figure 1, advanced operational security and configurability are made possible by the use of a removable RFID 'TransKey' which, when installed in the OCU, defines and enables the appropriate operating parameters such as frequency and address. A label with the ID address is affixed to each TransKey.

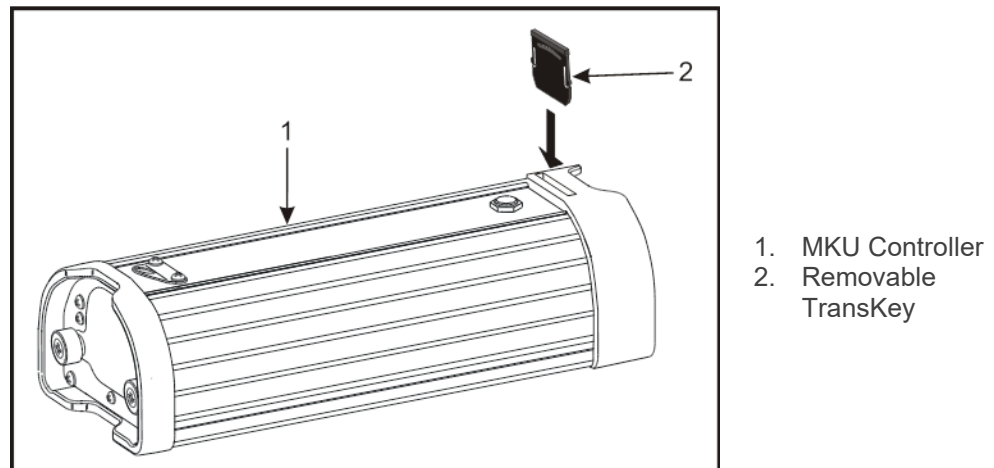


Figure 1: OCU removable TransKey

Note: The OCU and MCU TransKeys must not be swapped. The OCU TransKey is black. The MCU TransKey is yellow. Swapping TransKeys will result in OCU/MCU fault indications and the system will not go into operation.

Referring to Figure 2, the keypad unit and electronics are contained in an IP65-rated aluminum housing which has tough, protective rubber end-caps for switch protection and high impact resistance.

The TransKey is placed into a slot within the confines of the rubber 'bumper' that surrounds the top end-cap. Separate ON/OFF and STOP switches are located next to the TransKey.

A sealed elastomer keypad on the OCU front face contains large pushbuttons (function keys), which are coated with clear epoxy for additional durability. Each pushbutton is labeled for a specific function. Pushbuttons are two-step (i.e., dual pressure) operation.

Both steps of each individual pushbutton can operate different functions. Typically the first step controls a direction or function and the second step controls a speed increment. However, it is possible with a step-less drive to use the second step as accelerate, the first step as hold speed and the released state as decelerate.

Any function is active only as long as the respective pushbutton is pressed. When the pushbutton is released, the function stops automatically.

The 'STATUS' LED (located in the center of the row of LED lights) indicates the operational mode and any error messages.



The LEDs located on either side of the 'STATUS' LED indicate either selection information or optional Talkback information.

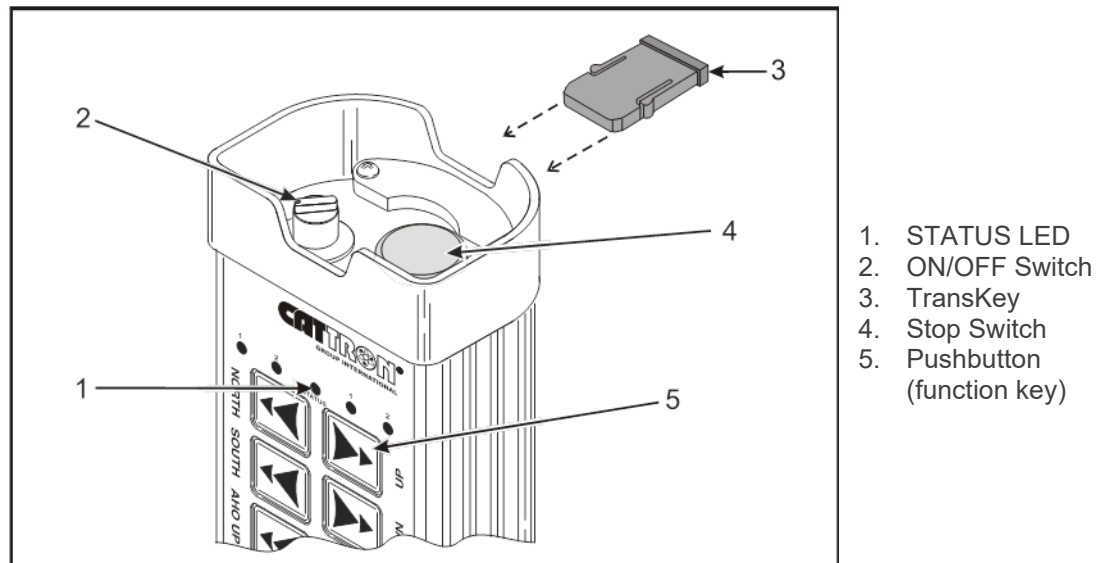


Figure 2: MKU OCU

MKU dual pressure keypad OCUs normally send ON/OFF commands that activate programmed functions at the target Cattron MCU.

All MKU OCUs are powered by a rechargeable Ni-Cad or disposable 3-volt alkaline battery packs.

In normal operation, the 'STATUS' LED flashes green with each function command message and a beep is sounded when a key is pressed.

When the battery voltage becomes low, the 'STATUS' LED flashes red and a beep sounds every ten seconds to alert the operator that the battery pack needs to be replaced or re-charged.

The 'STATUS' LED can illuminate in a series of red blinking sequences to indicate a specific OCU fault, as discussed in Appendix IV.

A belt loop strap is provided with all Cattron MKU OCUs. This is quickly and simply installed to a 'D'-ring located on the curved underside of the controller. Referring to Figure 3, an optional shoulder-carrying strap is available on request.



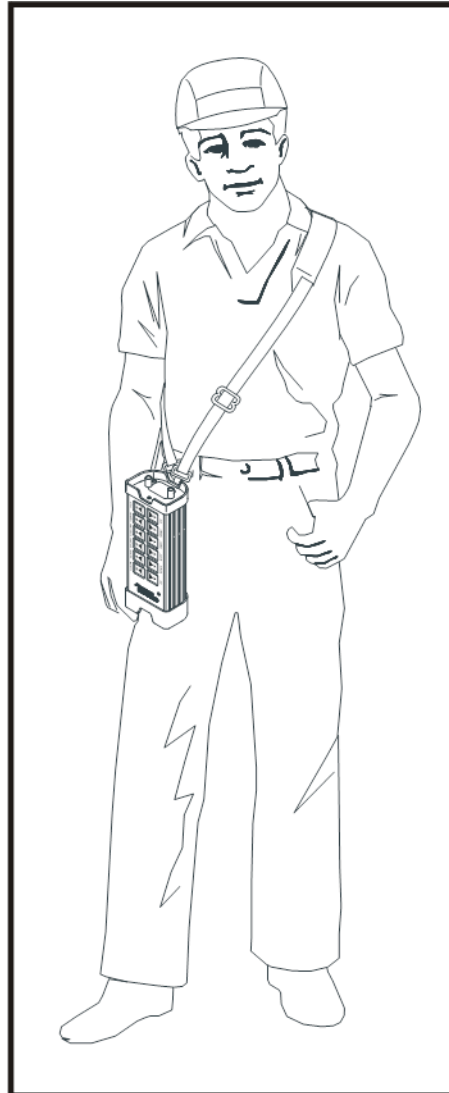


Figure 3: Optional shoulder-carrying strap

5.1 General Information

The MKU OCU is globally compliant when supplied with an appropriate radio module – additional certifications may be required for some regions; details are available on request. It has been designed with the latest generation dual-channel electronics and exceeds the Safety Related Systems requirements for ISO13849 Category 3 PLd.

MKU OCUs are equipped with an internal antenna and the typical operating range is in excess of 300 ft (92 m), for uninterrupted line-of-sight operation. It should be understood that operating range varies with environmental conditions. Should the OCU go out of operating range, all motion of the crane or controlled machine will cease.

MKU OCUs have been approved to comply with the RF standards applicable to the region or country of use.

In North America, the MKU is compliant with both FCC Part 15 and Industry Canada RSS-210 standards. No United States of America FCC or Industry Canada license is required for operation of FCC Part 15 or RSS-210 OCUs. These non-licensed OCUs are approved for use in the 902-928 MHz frequency band. See Appendix V for additional details.

Other frequency bands are available and may require an operating license.



In Europe and other regions, the operating frequency will typically be in the 433-434 MHz license exempt band; again, other licensed and unlicensed frequency bands are available.

Battery packs are easily and quickly replaced without the need for tools by turning two knurled thumbscrews and removing the battery cover-plate located within the confines of the bottom end-cap. The battery pack makes positive contact without snaps or plugs and has no wires to break – simply drop it in and replace the battery cover-plate.

A battery charger, battery conditioner, 'AAA' size battery adapter, and an external battery charging unit are available on request. Refer to the accessories/consumable items in Appendix I of this manual for details and part numbers.


In normal operation, a 'STATUS' LED (located centrally) flashes green at 1.25 second intervals. When the battery voltage becomes low, the 'STATUS' LED flashes red at one second intervals to alert the operator that the battery pack needs to be replaced or re-charged. The 'STATUS' LED will also illuminate in a series of red blinking sequences to indicate a specific OCU fault – refer to Appendix IV for a table of OCU Fault/Status Messages.

In some remote control applications, four function LEDs located to the right and left of the 'STATUS' LED may be configured to indicate when an OCU function command has been activated at the target machine, or to provide status indication of the machine state, via Talkback.



6. Preparing the OCU for Operation

6.1 Changing TransKeys

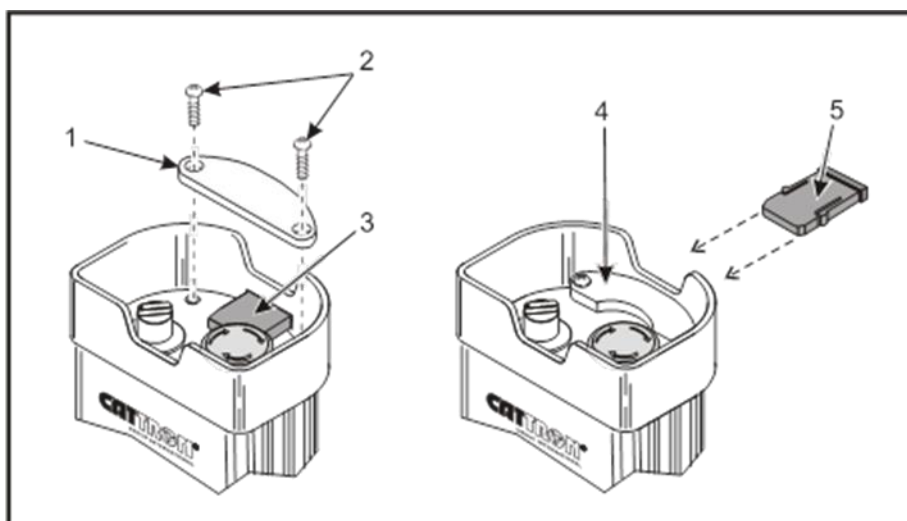
	WARNING
	<p>More than one remote control system may be used at, around, or nearby your operating facility. Therefore, before inserting a TransKey into an OCU, you must insure the correct coded TransKey is selected for the desired equipment to be operated.</p>
	<p>If the wrong TransKey is inserted into an OCU, other remote controlled equipment located at, around, or nearby your facility may become operational.</p> <p>Failure to comply with the above warnings may result in unintended operation of remote controlled equipment which in turn could result in serious injury or death to personnel and damage to equipment.</p>

Due to the flexible TransKey concept, it is not uncommon for one OCU to be used to control multiple cranes or machines. Each crane or machine will be provided with a unique pair of TransKeys having the same address. This pair of TransKeys must be inserted into their respective OCU and MCU locations before carrying out remote control operations.

A permanent TransKey retainer is also supplied with your OCU. Installing this item as shown in Figure 4 will securely retain the TransKey within the OCU top end-cap.

Cattron strongly emphasizes that installing the permanent TransKey retainer is entirely at the operator's discretion. An operator should be aware that securely retaining the TransKey within the OCU top end-cap will not prevent unauthorized operation of the controller or its target machinery.

Therefore, when not in authorized use, Cattron recommends that an OCU having a permanently retained TransKey be held in a suitable cabinet under lock and key.



1. Permanent TransKey retainer (Part # 3BRA-7598-A001)
2. Retaining screws (Part # 03C-0142)
3. TransKey
4. Removable TransKey retainer (Part # 3BRA-7598-A101)
5. TransKey

Figure 4: Permanent and removable TransKey retainers

6.2 Controls and



Indicators

Referring to Figure 5, the OCU is a lightweight hand-held unit with twelve pushbuttons (function keys) on a single keypad, plus a rotary ON/OFF switch and a push/pull STOP switch.

The OCU may be hand carried, held by a belt loop strap or worn with an optional shoulder-carrying strap. The OCU is powered by a disposable (alkaline) or rechargeable (Ni-Cad) battery pack.

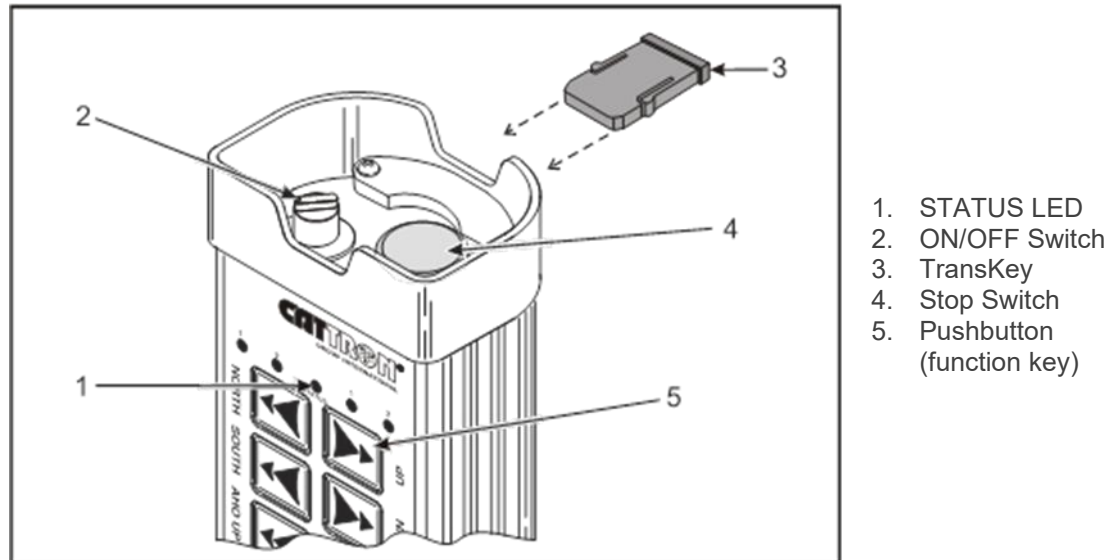


Figure 5: Operator controls and indicators

Note: An optional toggle switch may be fitted between the ON/OFF switch and STOP switch.

With the correct color-coded TransKey inserted into the OCU, setting both the STOP and ON/OFF switches to their respective 'OFF' and 'ON' positions will apply power to the OCU.

Immediately after power has been applied to the OCU, if a good battery is installed, the 'STATUS' LED should momentarily illuminate red, followed by orange, then 'flash' green. Two short beeps will also be heard. In addition, any time a pushbutton (function key) is pressed, a beep will be heard and the 'STATUS' LED will 'flash' green during a radio transmission.

When the battery voltage becomes low, the 'STATUS' LED will 'flash' red and a beep will be heard once every ten seconds to alert the operator to change or re-charge the battery pack.

When the ON/OFF switch is set to the 'OFF' position, power is removed from the OCU causing all control functions to cease. Setting (pushing down) the red STOP switch to 'STOP' before setting the ON/OFF switch to 'OFF' immediately sends a stop command to the MCU.

Referring to Figure 5 above, all active function key (pushbutton) commands are identified using labels placed next to each pushbutton. When a pushbutton is depressed, the OCU transmits the corresponding command (as labeled). All pushbutton operations are momentary and must be maintained by the operator. Releasing the pushbutton will send an 'OFF' command that de-energizes the corresponding output function.



7. OCU Operation

7.1 OCU Battery Pack

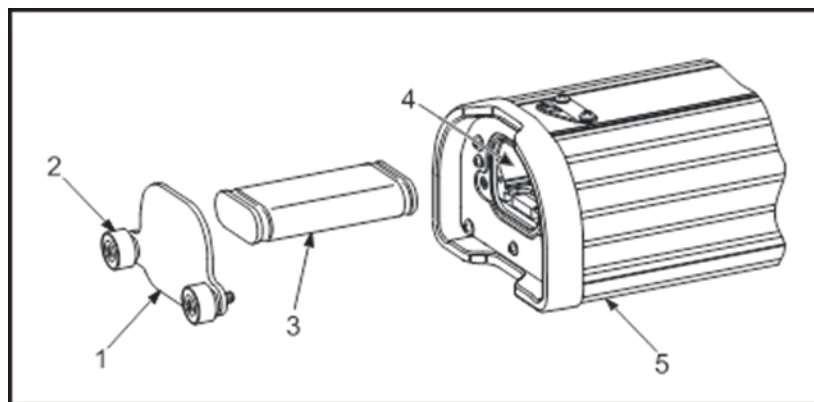
If using rechargeable batteries, they must be fully charged before using the remote control system for the first time. Note that charging the battery pack can take up to three hours for a fast charger (Part # 70C-0002) and over 10 hours for a trickle charger (Part # 70C-0001).

We recommend that the battery packs be discharged completely from time to time to preserve their capacity.

7.2 Changing the Battery Pack

Referring to Figure 6, remove the battery pack as follows:

1. Lay the OCU (5) face down.
2. Release the two knurled thumbscrews (2) and withdraw the cover-plate (1).
3. Withdraw the battery pack (3) from the battery compartment (4).



1. Cover Plate
2. Knurled Thumbscrew (2)
3. Battery Pack
4. Battery Compartment
5. OCU

Figure 6: Battery pack removal and replacement

Replace the battery pack as follows:

1. Position the battery pack (3) with the four contact strips facing down and forwards. Install the battery pack (3) by pushing it fully inside the battery compartment (4).
2. Install the cover-plate (1) and secure it by evenly hand tightening the two knurled thumbscrews (2). Do not over-tighten – a snug fit is all that is necessary.

7.3 Charging the Battery Pack


Note: Do not re-charge the battery pack until the OCU LED indicates 'low battery'.

Note: A Cattron external battery charging adapter (Part # 70C-0003) will be required for battery charging or conditioning.

A Cattron 'Standard' Battery Charger (Part # 70C-0001) enables a Ni-Cad battery pack to be charged within 10 hours.

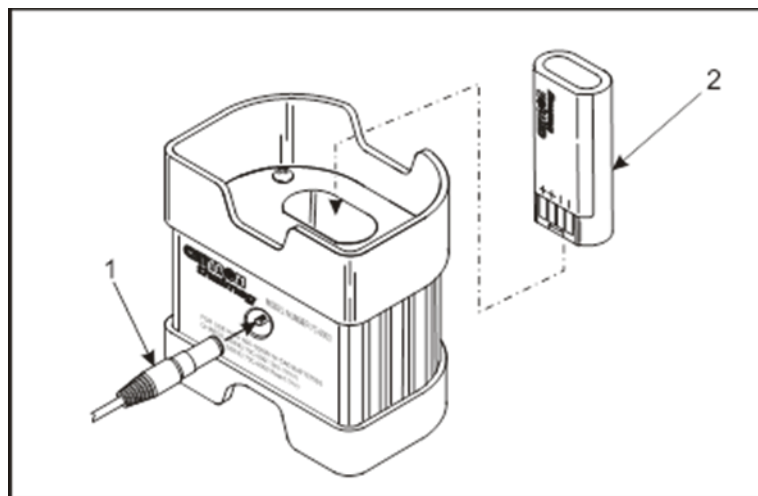
A Cattron Battery Conditioner/Charger (Part # 70C-0002) is also available. For details, refer to Section 7.4 below.



	CAUTION
	Cattron MKU battery conditioners and external charging units are designed for use with Cattron Ni-Cad battery packs only.
	Battery packs must be removed or disconnected from battery conditioners/external charging units within 48 hours of achieving the fully charged state. Failure to comply with these CAUTIONs may result in equipment and/or battery damage and will void our warranty.

Inserting battery into adapter and initiating charging

To charge a Ni-Cad battery pack, refer to Figure 7. Connect the Cattron battery charger to the power source by inserting the charging jack into the external battery charging adapter socket. Drop the battery pack into the battery charging adapter, ensuring the battery pack contacts are positioned as shown. When the Ni-Cad battery pack is properly installed, the appropriate LED(s) on the charging unit will show the current status (refer to the appropriate tables for the charger in use below).



1. Charging jack from battery charger
2. Ni-Cad battery pack only (Part # 60C-0060N)

Figure 7: Ni-Cad battery pack charging adapter

7.4 Conditioning / Charger Use

The Cattron Battery Conditioner/Charger (Part # 70C-0002) is available for use with Ni-Cad battery packs only.

The conditioner/charger automatically conditions the battery pack by first discharging it at 750mA for 1.5 hours before applying a rapid charge for 1.2 hours. The unit incorporates end-of-charge detection circuitry to accurately sense when the battery pack is fully charged. When this condition has been detected, the conditioner/charger switches to a 'trickle' charge mode that keeps the battery pack fully charged and ready to use for up to 48 hours. To prevent damage to the battery pack, it should be removed from the conditioner/charger within 48 hours of achieving a fully charged state.

The Cattron battery conditioner/charger incorporates an LED that indicates status as follows:

- **Amber Color** – indicates the battery pack is being discharged.
- **Red Color** – indicates the battery pack is being charged at a rapid rate.
- **Green Color** – indicates the battery pack is fully charged and that a 'trickle' charge is being applied to maintain the fully charged state. The battery pack is ready for use and should be removed from the conditioner within 48 hours.



The battery conditioner/charger includes a VAC adaptor that enables the unit to operate from power supply voltages between 100 and 240 VAC @ 50/60 kHz. Referring to Figure 8, this adaptor is connected as shown. Similarly, when connecting the battery conditioner to the external battery charging unit, refer to Figure 9 for the appropriate connections.

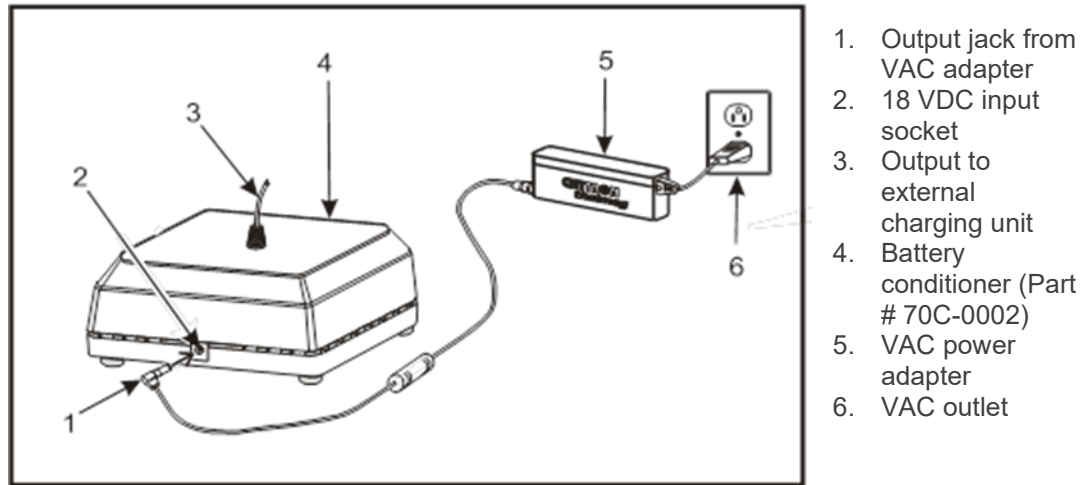


Figure 8: Battery pack conditioning / charging unit – interconnection details

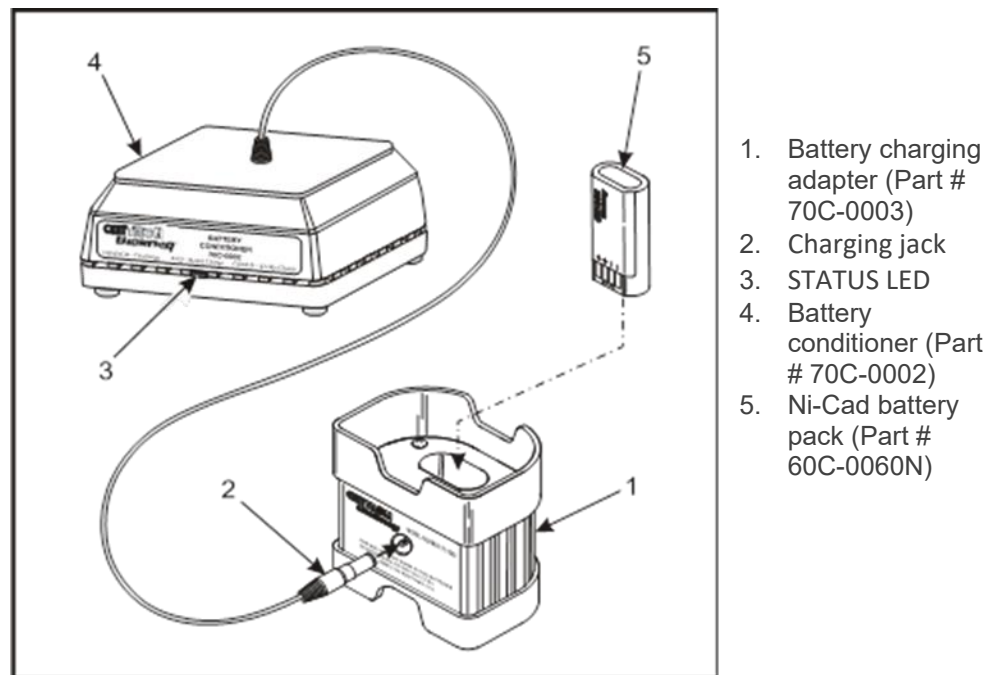


Figure 9: Battery pack conditioning / charging unit to adapter – interconnection details

7.5 Trickle Charger Use

The Cattron Battery Trickle Charger (Part # 70C-0001) is available for use only with Ni-Cad battery packs and a power supply of 120V 60Hz.



This trickle charger will fully charge the batter within 10 hours. The RED LED illuminates when the charger is plugged in and powered on. To prevent damage to the battery pack, it should be removed from the adapter when it is fully charged.

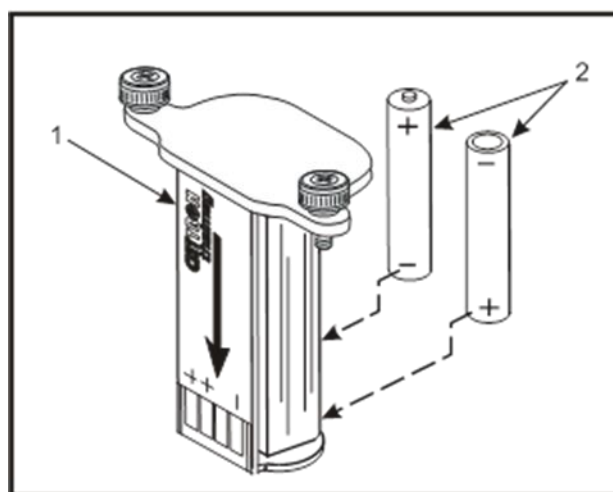
Refer to Section 7.3 for details on how to insert the battery.



Figure 10: Battery trickle charger and adapter

7.6 Alkaline Battery Adapter

Referring to Figure 11, a Cattron Battery Adapter (Part # 60C-0062MK-001) is available that accepts two 'AAA' size alkaline 1.5-volt batteries. It should be noted that when using 'AAA' size alkaline 1.5-volt batteries with this adapter, battery life will only be 40% of that provided by a Cattron Alkaline Battery Pack.



1. Battery Adapter, 3 volt
2. 'AAA' Alkaline Batteries (2)

Figure 11: 'AAA' alkaline battery adapter




8. Operating the OCU

Note that dual pressure (DP) function key pushbuttons are pre-assigned through TransKey programming for two-step operation. In other words, a second output is tied to the second level of button depression.

Typically, dual pressure OCUs send one of two output commands to the MCU from a single button. DP buttons are paired to opposite directions of the same output (i.e., forward and reverse). These two buttons will control direction and speed relays. The first level of depression on each button will command the desired direction and first step of movement (two directions = two relays). The third relay is operated by either button's second level of depression to the second speed output of the controlled machine. This could be a single relay, or two separate relays assigned for the second speed step, or for the variable frequency drive (VFD) accelerate output (for the button in use).

If the DP button is depressed to its first level, first speed is achieved and maintained as long as the button remains at that level of depression. If the button is depressed to its second level, second speed is achieved. If the operator releases pressure and allows the button to return to the first level, first speed is again achieved. Moving directly from 'OFF' to the second level of depression can command second speed if sufficient pressure is applied. For example, one of two DP buttons labeled 'FORWARD' and 'REVERSE' is used at the first pressure level to command the direction and first speed of the equipment. The second pressure level of the button in use will command a second speed.

Note: Depending upon the factory set configuration, the OCU Stop switch verification at Start-up may be enabled or disabled.

	WARNING
	More than one remote control system may be used at, around, or nearby your operating facility. Therefore, before inserting a TransKey into an OCU, you must insure the correct coded TransKey is selected for the desired equipment to be operated.
	If the wrong TransKey is inserted into an OCU, other remote controlled equipment located at, around, or nearby your facility may become operational.

Failure to comply with the above warnings may result in unintended operation of remote controlled equipment which in turn could result in serious injury or death to personnel and damage to equipment.

1. Ensure the correct Transkey is inserted.
2. Release the red STOP switch. If the switch has been pushed down to the 'STOP' position, you will first have to unlatch the switch knob by rotating in a clockwise direction.
3. Set ON/OFF switch to 'ON'. Power will be applied to the OCU and the 'STATUS' LED will illuminate RED.


8.1 If the Stop switch verification at Startup is enabled

1. Press the red STOP switch. The 'STATUS' LED will illuminate ORANGE.
2. Release (unlatch) the red STOP switch by rotating in a clockwise direction. The 'STATUS' LED will now illuminate flashing GREEN at an approximate rate of 2 cycles per second. The OCU is ready for use and a power up message has been sent to the target MCU. The targeted MCU will respond by energizing the mainline contactor of your controlled machine.



8.2 If the Stop switch verification at Startup is disabled

1. The 'STATUS' LED will illuminate flashing GREEN at an approximate rate of 2 cycles per second. The OCU is ready for use and a power up message has been sent to the target MCU. The targeted MCU will respond by energizing the mainline contactor of your controlled machine.

	WARNING
	<p>Before attempting to use the remote control system, verify the target crane or machine you wish to operate is under the direct command of your OCU. This is accomplished by operating a non-motion OCU function such as a horn or lamp and observing that the respective function on the targeted crane or machine responds.</p> <p>Failure to implement the above may result in serious injury or death to personnel and damage to equipment.</p>

2. Press a non-motion function key (pushbutton) such as a horn or lamp and observe that the targeted crane or machine responds. The OCU is now fully operational and transmitting a signal as indicated by the flashing green 'TRANSMIT' LED. Operate the keypad control and auxiliary pushbuttons as required, remembering that each pushbutton must be maintained in order for the function to continue to operate. Any or all functions may be operated simultaneously if the controlled machine permits such operation.

Note: A system STOP may be initiated at any time during the control function by pushing the red STOP switch downwards. When all control functions have been completed, we recommend you initiate a system STOP (push red STOP switch down) before setting the ON/OFF switch to the 'OFF' position.

Note: Pushing the red STOP switch downwards does NOT switch off power to the OCU. To prevent the OCU from consuming power, the ON/OFF switch must be set to the 'OFF' position.



9. Maintenance Instructions

Unless customer technicians have received formal maintenance training from Cattron, our maintenance philosophy is that inoperative OCUs and MCUs be returned as complete units to our workshops for repair. This is primarily for safety reasons as it is unlikely that two control systems will be the same.

Note: When returning an OCU for repair, the original TransKey supplied with the unit should be removed and retained for use with your spare unit.

9.1 Preventative Maintenance

Preventive maintenance is limited to the following:

Daily Visual Inspection:

Before use, visually inspect the OCU and MCU for cleanliness, physical damage and security of external parts (screws, switches, rubber grips, etc.). Cattron emphasizes that regular visual inspections not only mean quickly locating a source of potential problems, but also may prevent serious problems from developing later.

9.2 Cleaning the OCU

The OCU should be cleaned with a moist cloth and then wiped dry with a clean paper towel. DO NOT IMMERSE THE OCU IN WATER.

9.3 Functional Check

A functional check is accomplished by operating the OCU in accordance with the operating procedures outlined in Section 9.1 of this manual. Ensure all system control functions are fully operational.



10. Changing the RF Channel

- With the OCU in 'Programming Mode' (see Section 11.2), pressing the first level of the 'UP' and 'DOWN' pushbuttons selects the next higher or next lower RF channel respectively.
- Alternatively, holding down the second level initiates a fast scan (approx. 0.3 seconds per channel) in order to set the system to the desired RF channel.
- When the desired RF channel has been selected, pressing the 'ENTER' pushbutton at the first level stores the selected RF channel in the OCU, exits the RF channel selection mode and switches off the OCU.
- When the OCU is switched on again it will transmit on the newly selected channel.
- Pressing the red 'STOP' button when in the RF channel selection mode will exit the RF channel selection mode and switch off the OCU without saving the RF channel.

Note: The first time the OCU is switched 'ON' after a channel change, it can take few minutes before the MCU has adjusted itself to the new RF channel and is ready for operation.

Note: Depending on the TransKey configuration, not all channels will be available. Typically 10 or 11 channels spread over the complete band are available.

Note: MCU must be in AUTOSCAN mode in order to be able to detect the RF channel change. AUTOSCAN mode is set in the MCU TransKey.



11. RF Channel Change Option

To ensure interference-free operation of the radio control system, it may be necessary to change the RF channel previously assigned by the manufacturer. Changing the RF channel may be necessary due to interference, or in the event that an RF channel is already in use by another system. RF channels may be changed at the OCU.

Only the legal frequencies for one particular operating band will be available on your device; this will have been pre-assigned by Cattron.

Note: Ensure that country-specific regulations regarding frequency range and channel are observed when changing the RF channel.

11.1 Working Principle

Referring to Figure 12, when the OCU operating mode is changed to Programming Mode, the RF channel is selected using the top row of pushbuttons. Either a higher or lower RF channel can be selected by selecting the 'UP' or 'DOWN' pushbuttons. This can be done in individual steps when using the first step of the pushbutton, or in fast step when using the second step of the pushbutton. Each RF channel has been assigned a specific color code and the respective RF channels are displayed by the four function LEDs located on either side of the 'STATUS' LED.

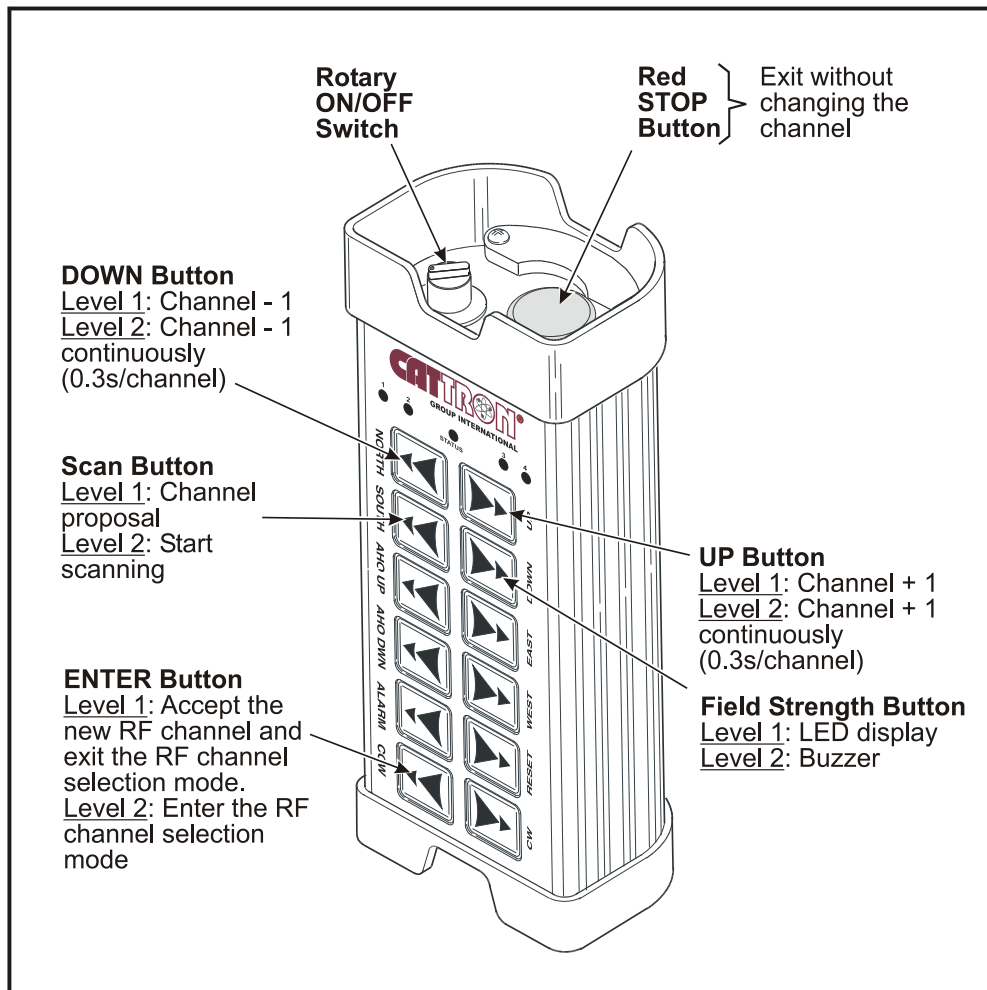


Figure 12: Channel Selection Mode Pushbuttons

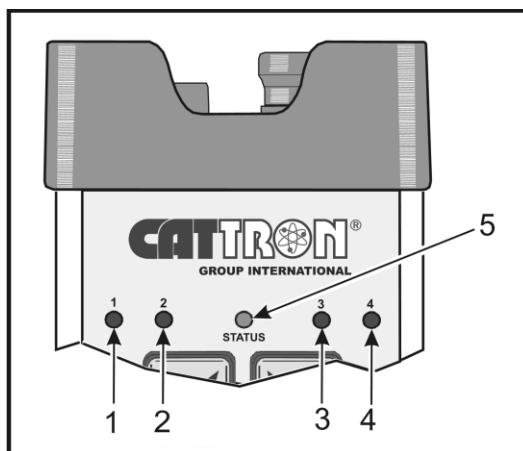


11.2 Activating Programming Mode

Referring again to Figure 12, set the OCU to 'Programming Mode', as follows:

- With the OCU switched off, hold the 'ENTER' pushbutton fully down (second step) and switch on the OCU using the rotary ON/OFF switch. The system will start up with the 'STATUS' LED illuminating red.
- Continue to hold the 'ENTER' pushbutton for approximately 5 seconds until the 'STATUS' LED changes from permanent red to fast-flashing red and then release the 'ENTER' pushbutton.
- Within 3 seconds after the 'STATUS' LED starts flashing red, press the 'UP' and 'DOWN' pushbuttons simultaneously at the first and second level (Level 1 then Level 2).
- The OCU is now in 'Programming Mode'. The 'STATUS' LED blinks orange and the current RF channel will be indicated via a color code using the 4 function LEDs, as illustrated in Figure 13 and shown in the following tables.

Note: The RF Channel Color Code Tables for the various bands are shown below.



1 – 4: Function LEDs
5: 'STATUS' LED

Figure 13: Function and Status LEDs

Table 1: RF Channel Color Code Table for 433 MHz Band

Channel	Frequency	LED Color			
		1	2	3	4
1	433,0775	-	-	-	red
2	433,1025	-	-	-	green
3	433,1275	-	-	-	orange
4	433,1525	-	-	Red	-
5	433,1775	-	-	Red	red
6	433,2025	-	-	Red	green
7	433,2275	-	-	Red	orange
8	433,2525	-	-	Green	-
9	433,2775	-	-	Green	red



Table 1: RF Channel Color Code Table for 433 MHz Band, continued

Channel	Frequency	LED Color			
		1	2	3	4
10	433,3025	-	-	Green	green
11	433,3275	-	-	Green	orange
12	433,3525	-	-	Orange	-
13	433,3775	-	-	Orange	red
14	433,4025	-	-	Orange	green
15	433,4275	-	-	Orange	orange
16	433,4525	-	red	-	-
17	433,4775	-	red	-	red
18	433,5025	-	red	-	green
19	433,5275	-	red	-	orange
20	433,5525	-	red	Red	-
21	433,5775	-	red	Red	red
22	433,6025	-	red	Red	green
23	433,6275	-	red	Red	orange
24	433,6525	-	red	Green	-
25	433,6775	-	red	Green	red
26	433,7025	-	red	Green	green
27	433,7275	-	red	Green	orange
28	433,7525	-	red	Orange	-
29	433,7775	-	red	Orange	red
30	433,8025	-	red	Orange	green
31	433,8275	-	red	Orange	orange
32	433,8525	-	green	-	-
33	433,8775	-	green	-	red
34	433,9025	-	green	-	green
35	433,9275	-	green	-	orange
36	433,9525	-	green	Red	-
37	433,9775	-	green	Red	red
38	434,0025	-	green	Red	green
39	434,0275	-	green	Red	orange
40	434,0525	-	green	Green	-
41	434,0775	-	green	Green	red
42	434,1025	-	green	Green	green
43	434,1275	-	green	Green	orange
44	434,1525	-	green	Orange	-
45	434,1775	-	green	Orange	red
46	434,2025	-	green	Orange	green
47	434,2275	-	green	Orange	orange
48	434,2525	-	orange	-	-
49	434,2775	-	orange	-	red
50	434,3025	-	orange	-	green
51	434,3275	-	orange	-	orange
52	434,3525	-	orange	Red	-
53	434,3775	-	orange	Red	red
54	434,4025	-	orange	Red	green



Table 1: RF Channel Color Code Table for 433 MHz Band, continued

Channel	Frequency	LED Color			
		1	2	3	4
55	434,4275	-	orange	red	orange
56	434,4525	-	orange	green	-
57	434,4775	-	orange	green	Red
58	434,5025	-	orange	green	green
59	434,5275	-	orange	green	orange
60	434,5525	-	orange	orange	-
61	434,5775	-	orange	orange	Red
62	434,6025	-	orange	orange	green
63	434,6275	-	orange	orange	orange
64	434,6525	red	-	-	-
65	434,6775	red	-	-	Red
66	434,7025	red	-	-	green
67	434,7275	red	-	-	orange
68	434,7525	red	-	red	-
69	434,7775	red	-	red	Red

Table 2: RF Channel Color Code Table for 869 MHz Band

869 MHz	869 MHz	LED Color			
Channel	Frequency	1	2	3	4
0 *	869,850	-	-	-	-
1	869,800	-	-	-	red
2	869,900	-	-	-	green
3	869,535	-	-	-	orange
4	686,300	-	-	red	-

* This channel should not be used if existing systems are already operating on channels 1 and/or 2 and are in close proximity.



Table 3: RF Channel Color Code Table for 915 MHz Band

902 - 928 MHz		LED Color			
Channel	Freq.	1	2	3	4
1	903	-	-	-	red
2	904.2	-	-	-	green
3	905.4	-	-	-	orange
4	906.6	-	-	red	-
5	907.8	-	-	red	red
6	909	-	-	red	green
7	918.6	-	-	red	orange
8	919.8	-	-	green	-
9	921	-	-	green	red
10	922.2	-	-	green	green
11	923.4	-	-	green	orange
12	903.2	-	-	orange	-
13	904.4	-	-	orange	red
14	905.6	-	-	orange	green
15	906.8	-	-	orange	orange
16	908	-	red	-	-
17	909.2	-	red	-	red
18	918.8	-	red	-	green
19	920	-	red	-	orange
20	921.2	-	red	red	-
21	922.4	-	red	red	red
22	923.6	-	red	red	green
23	903.4	-	red	red	orange
24	904.6	-	red	green	-
25	905.8	-	red	green	red
26	907	-	red	green	green
27	908.2	-	red	green	orange
28	909.4	-	red	orange	-
29	919	-	red	orange	red
30	920.2	-	red	orange	green
31	921.4	-	red	orange	orange
32	922.6	-	green	-	-
33	923.8	-	green	-	red
34	903.6	-	green	-	green



Table 3: RF Channel Color Code Table for 915 MHz Band, continued

902 - 928 MHz		LED Color			
Channel	Freq.	1	2	3	4
35	904.8	-	green	-	orange
36	906	-	green	red	-
37	907.2	-	green	red	red
38	908.4	-	green	red	green
39	909.6	-	green	red	orange
40	919.2	-	green	green	-
41	920.4	-	green	green	red
42	921.6	-	green	green	green
43	922.8	-	green	green	orange
44	924	-	green	orange	-
45	903.8	-	green	orange	red
46	905	-	green	orange	green
47	906.2	-	green	orange	orange
48	907.4	-	orange	-	-
49	908.6	-	orange	-	red
50	919.4	-	orange	-	green
51	920.6	-	orange	-	orange
52	921.8	-	orange	red	-
53	923	-	orange	red	red
54	924.2	-	orange	red	green
55	904	-	orange	red	orange
56	905.2	-	orange	green	-
57	906.4	-	orange	green	red
58	907.6	-	orange	green	green
59	908.8	-	orange	green	orange
60	918.4	-	orange	orange	-
61	919.6	-	orange	orange	red
62	920.8	-	orange	orange	green
63	922	-	orange	orange	orange
64	923.2	Red	-	-	-
65	924.4	Red	-	-	red



12. 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 I: Spare Parts and Accessories

Contact the Cattron sales department at www.cattron.com/contact for availability and pricing of the spare parts and accessories that are listed in Table 4.

Table 4: Spare Parts and Accessories

Item	Part Number	Order Quantity	Item Description
1	1OCU-7599-A001	1	General Assy., OCU, MKU, 902-928 MHz ^[1] or
	1OCU-7599-A101	1	General Assy., OCU, MKU, 902-928 MHz with Toggle option ^[1]
2	2MOD-7609-A001	1	Module Assy., OCU TranKey, c/w Address ID ^[1]
3	3BRA-7598-A001	1	Bracket, TransKey Holder, Fixed ^[1]
4	03C-0142	2	Retaining screws ^[1]
5	3BRA-7598-A101	1	Bracket, TransKey Holder, Removable
6	9M02-7641-A003	1	User Manual, MKU System ^[1]
7	60C-0060A	2	Battery pack, Alkaline, non-rechargeable, 3-volt, 2, 500 mA ^H ^[1]
8	42C-0066	1	Carrying strap, belt, loop, 2", nylon, black ^[1]
9	54C-0088A	1	Label kit, English text ^[1] ^[3]
10	60C-0060N	1	Battery pack, Ni-Cad, re-chargeable, 2.4-volt, 1,100 mA ^H ^[2]
11	70C-0001	1	Battery charger, 110 VAC power supply ^[2]
12	70C-0002	1	Battery conditioner, 100-240 VAC input ^[2]
13	42C-0057	1	Carrying strap, shoulder
14	70C-0003	1	Battery charging adapter ^[2]
15	60C-0062MK-001	1	AAA Battery Pack w/door
16	70C-0003KIT	1	Battery Charger Kit (70C-0003, 70C-0001, 60C-0060N x2) ^[2]

[1] Standard Items – supplied with system

[2] All items referenced as 2 are needed if this option is selected

[3] Other language options available



Appendix II: Technical Data

OCU Technical Specifications

Table 5: OCU Technical Specifications

OCU Data	Description
Case material	Extreme duty, dust and water resistant, aluminum housing
Approximate weight	1.4 lb / 634 gm (including battery pack)
Dimensions	8.0" x 3.0" x 2.0" (203 x 76 x 51 mm)
Environmental	-4° F to +140° F (-20° C to +60° C), RH 0 to 95% Non-condensing
Commands	12 dual pressure pushbuttons
ON/OFF/STOP	Standard with ON/OFF and STOP switches on end cap
System Configuration	Saved in removable contact-less RFID key (Trans-Key™); defines system address, RF channel, key mapping and operation parameters
Switch types	Sealed silicon elastomer keypad; dust, water, oil, acid resistant with 'tactile feel', clear epoxy coated pushbuttons
Battery types	Alkaline battery pack, 3 V, 2,500 mAh, non-rechargeable (standard) or NiCad battery pack, 2.4 V, 1,100 mAh, re-chargeable (optional), or 2 'AAA' batteries with optional battery adapter
Battery Duration	In excess of 100 hours with Alkaline battery pack, 3 V, 2,500 mAh
Transmit indicator	'STATUS' LED flashes green when transmitting
Low battery indication	'STATUS' LED flashes red for low battery
Fault indication	'STATUS' LED sequentially blinks red to identify a specific fault
Battery charging	A 'Standard' rate (10 hour) battery charger and external battery charging unit is available for Ni-Cad battery packs only. An additional battery conditioner is also available which operates from power supply voltages between 100 to 240 VAC @ 50/60 kHz
Audio speaker	For power-up self-test indication, function pushbutton 'click' and low battery indication
Operating Frequency	Unlicensed 902-928 MHz band for North and South America; other frequency bands (including 433 MHz and 868 MHz) are available for Europe and Asia
RF Power	0 dBm (1 mW)
RF Channels	Up to 65 channels, pre-defined in the TransKey™
RF Operating Range	In excess of 300 ft (92 m) line-of-sight
Antenna	Internal
Safety/Approvals:	Worldwide standards safety acceptance: Category 3 design and performance level D according to ISO 13849-1 RF approvals according to region (license exempt unless otherwise stated)
Carrying Accessory	Shoulder strap



Appendix III: System Configurations

MKU System Identifier

MKU systems may be 'Standard' or pre-configured; they may also be fully engineered.

Figure 14 identifies some of the Standard versions.

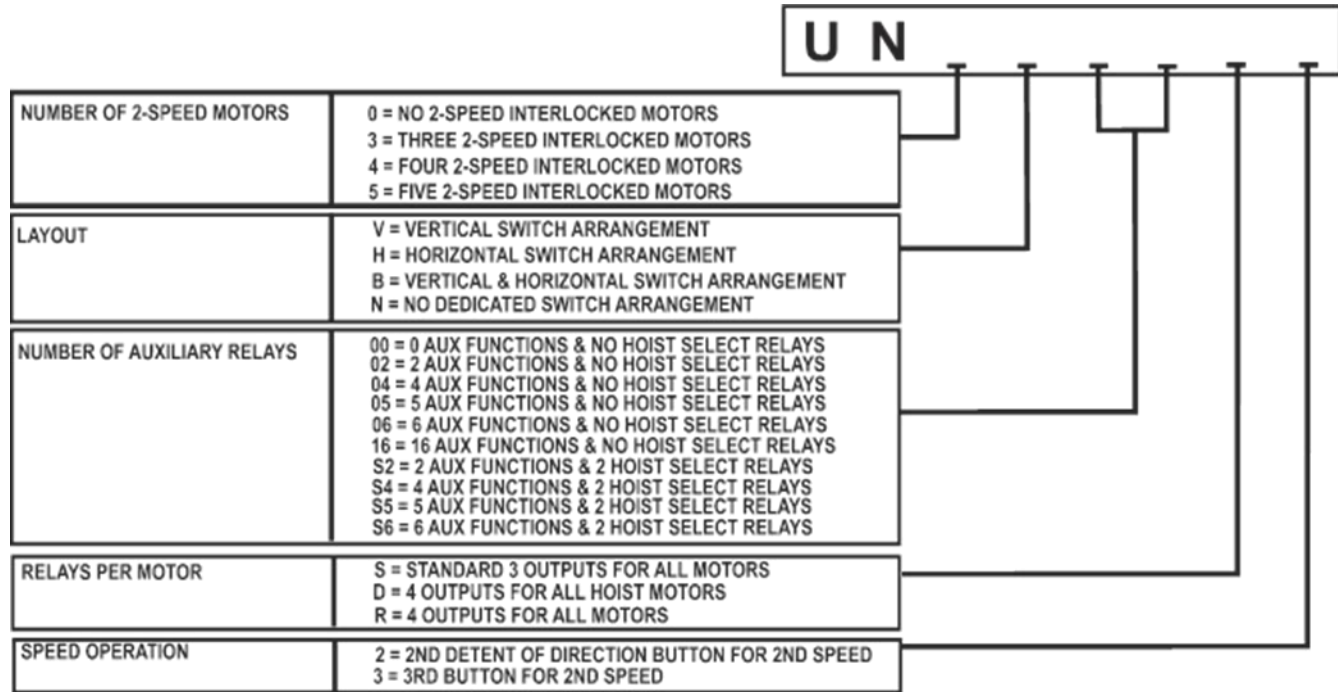


Figure 14: MKU System Identifier for Standard Versions

MKU System Configurations

Table 6: MKU System Configurations

UN3HS5D2A	3 Two-Speed Motions + Hoist Select Relays + 5 Auxiliary Relays	4 Relays for Hoist Motions
UN3H06D2	3 Two-Speed Motions + 6 Auxiliary Relays	4 Relays for Hoist Motions
UN4H03D2	4 Two-Speed Motions + 3 Auxiliary Relays	4 Relays for Hoist Motions
UN5H02S2	5 Two-Speed Motions + 2 Auxiliary Relays	3 Relays for Hoist Motions

Refer to the following Example Configuration Sheets for each of the above systems.



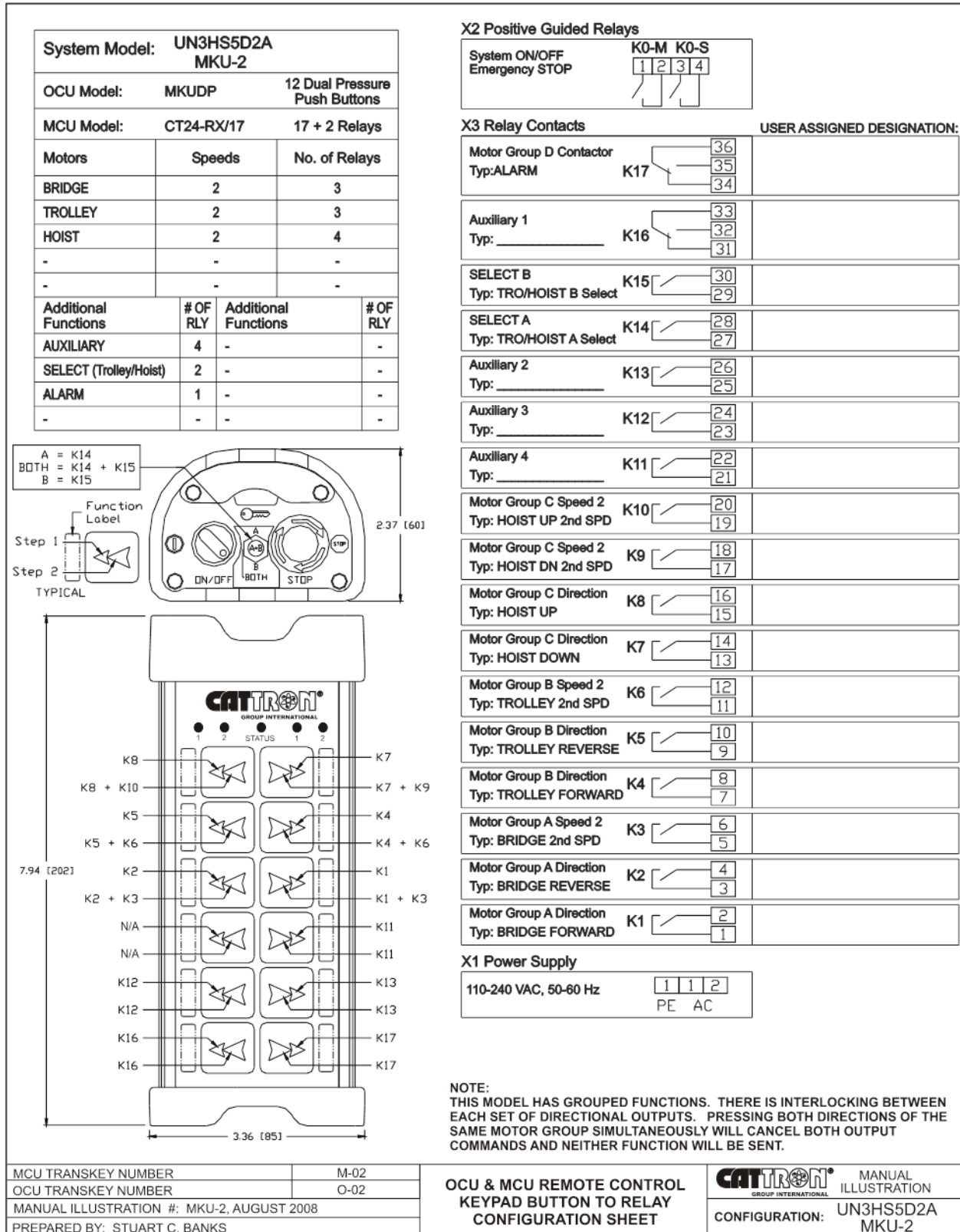


Figure 15: Example Configuration Sheet for System Model UN3HS5D2A



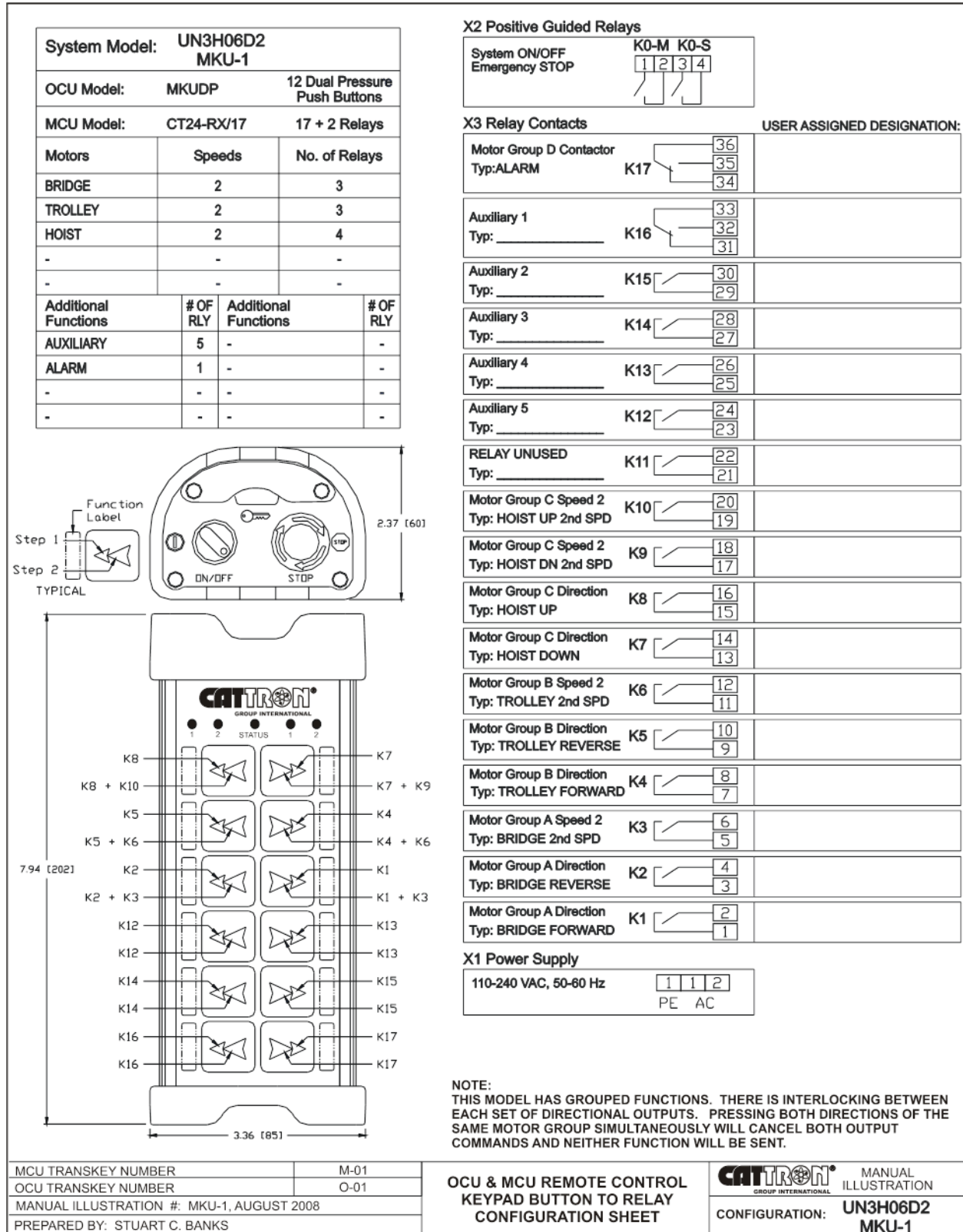


Figure 16: Example Configuration Sheet for System Model UN3H06D2



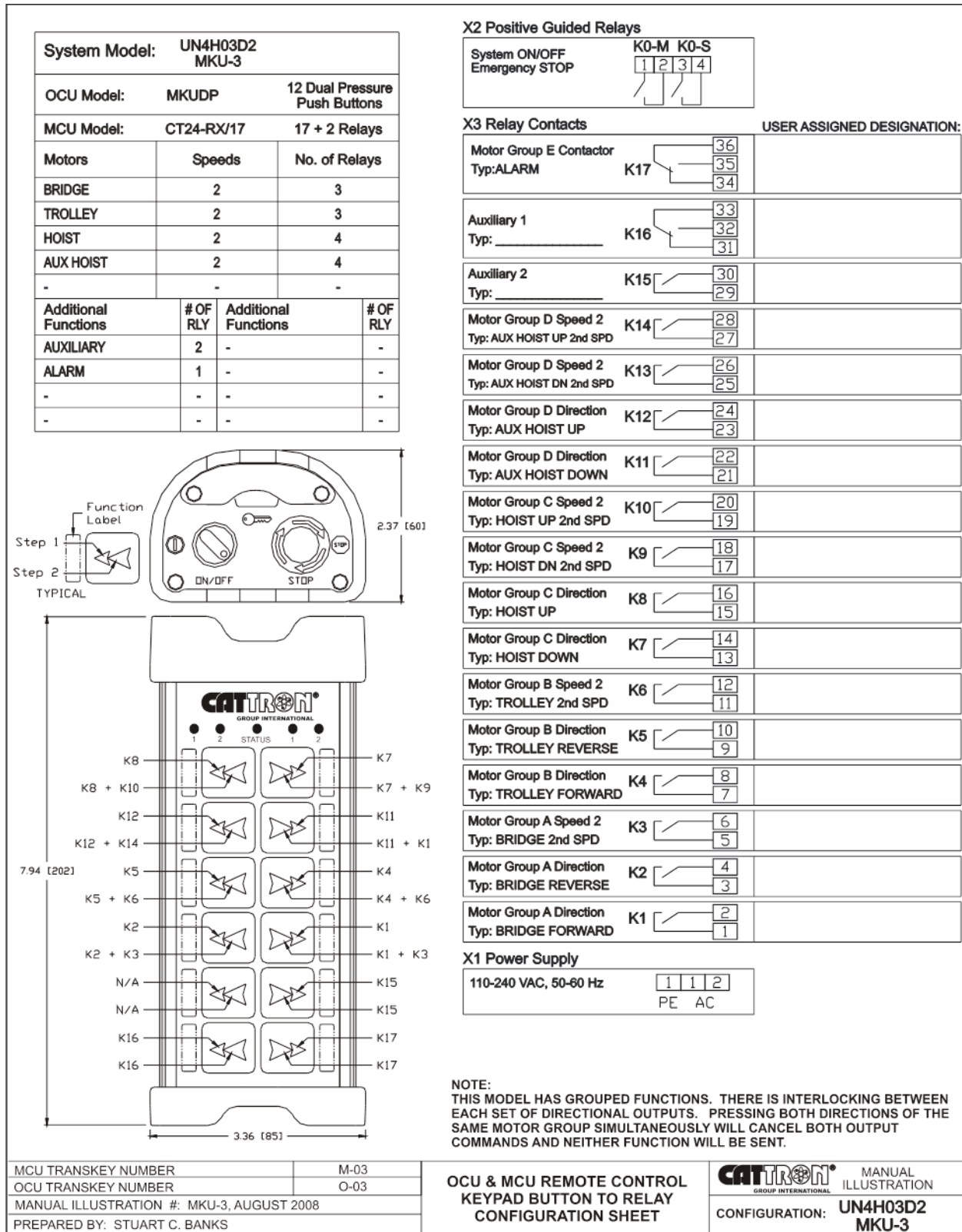


Figure 17: Example Configuration Sheet for System Model UN4H03D2



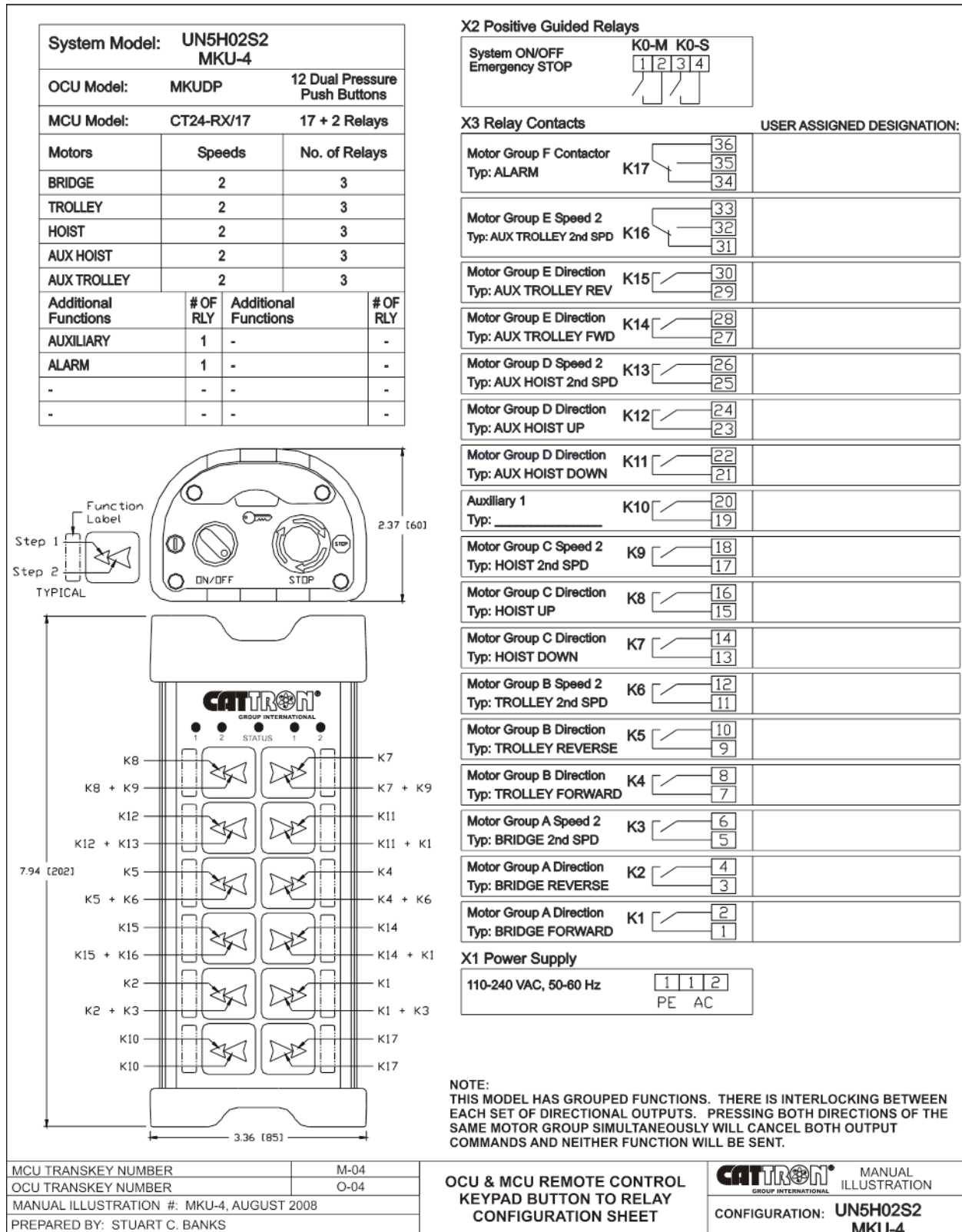


Figure 18: Example Configuration Sheet for System Model UN5H02S2



Appendix IV: System Fault / Status Messages

OCU Fault / Status Messages

The OCU has a 'STATUS' LED indicator that displays the current system status to the operator. When an OCU fault is detected, the 'STATUS' LED will illuminate red and signal the fault with a series of blinks. Refer to Table 7 for the blink sequence and the corresponding fault messages.

Note that any repairs or replacements should only be made by Cattron-trained technicians.

Table 7: OCU Fault / Status Messages

OCU Status LED Indication	Fault	Action
2-flashes	TransKey cannot be read	Plug in the TransKey
3-flashes	TransKey configuration is incorrect	Check the TransKey configuration*
4-flashes	Fault in the low-voltage test during switch-on	Switch the OCU off then on again Replace/charge the battery pack If fault persists, investigate fault* Change OCU board* Return OCU for repair
5-flashes	Switch-on sequence not performed correctly	Insure the STOP pushbutton is released Switch the OCU 'OFF' then 'ON' again
6-flashes	Fault during reading of command initiator	Investigate fault* Change OCU board/keyboard* Return OCU for repair
7-flashes	Incorrect RF module or RF module incorrectly configured	Replace the RF module or correct the configuration* Return OCU for repair
8-flashes	General system fault	Investigate fault* Change OCU board* Return OCU for repair
9-flashes	Low power supply voltage	Replace/charge the battery pack Change OCU board* Return OCU for repair
10-flashes	Hardware fault	Change OCU board* Return OCU for repair

*Cattron customer trained technicians only. If necessary, contact the factory for the replacement part number applicable to your system configuration. Refer to www.cattron.com/contact for the telephone numbers and email addresses.

MCU Fault / Status Messages

The MCU has five externally visible LED indicators. Refer to the MCU manual for details.



Appendix V: RF Compliance and Operating Frequency Selection

MKU OCUs have been approved to comply with both FCC Part 15 and Industry Canada RSS-210 application standards.

No United States of America FCC or Industry Canada license is required for operation of FCC Part 15 or RSS-210 MKU OCUs. These non-licensed OCUs are approved for use in the 902-928 MHz frequency band.

When used in Europe, they may be configured on the 433-434 MHz or 868 MHz band.

Other regions may differ based on National and regional rules.

Due to continuous product improvement, the information provided in this document is subject to change without notice.

Cattron Support

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

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