LENS CONTROL SYSTEM
USER GUIDE

as of April 21st 2006 - technical specifications are subject to change without notice

by Lisa Buschek

User Guide Vers. 06-04

Introduction: Using The User's Manual

Note: *Notes are used to indicate important information for the user that pertains to the respective section of this user's guide.*

Warning: *Warnings are used to indicate important information for the user that pertains to the respective section of this user's guide and where something could go wrong in the process or damage to units could be caused.*

camin, coperate, czoom: All cmotion components are written in cursive throughout this user's manual. These words can all also be found at the back of this user's manual.

Cables

When a cable is referred to in this user's manual it will be referred to as follows (e.g. FI 12p, LE 7p). Cables are referred to in reference to their connectors. Cmotion cables are manufactured by W. W. Fisher, Lemo or Hirose which will be referred to as FI, LE and HI respectively. The cable identification begins with the connector that is connected to the cmotion unit, a comma follows, followed by the connector which is connected to non-cmotion units; each connector takes reference to the number of pins it has e.g. the cable (FI 12p, LE 7p) cable is the cmotion Scorpio motor cable. The FI 7p connector is connected to the camin and the LE 12p connector is connected to the Scorpio motor. Cables may also be referred to by their commonly used names e.g. CBUS (FI 7p, FI 7p) and RS (FI 3p, FI 3p) cables, the cable for the CBUS interface and the cable for the RS interface, respectively.

Necessary Tools

The following tools may be required to complete steps laid out in this user's manual:

4mm Allen key

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1 SAFETY WARNINGS

Warnings

Notice:
Danger of operational error!
Danger of injury!
Damage to equipment possible!

General Safety Specifications

- Do not put your fingers near the motors while motors are moving!
- In order to ensure optimal performance, read this Users' Guide!
- Assembly and initial operation should be carried out only by persons who are familiar with the equipment!
- Make sure all components (*camin*, Lens Motors, etc.) are securely mounted!
- Remove batteries from components before transporting or putting in storage!
- Repairs should be made only by authorized service centers!
- Use only original cmotion replacement parts!
- In the case of wet weather, routine safety precautions for handling electrical equipment in wet weather should be taken!
- Do not remove any screws that are secured with paint!
- Do not remove warranty seal!

Important

If you have questions, or you need to order parts, please note the component's model and serial number.

2 COMPONENT DESCRIPTIONS

2.1 Component Overview

This section will give you a brief description of all *cmotion* components.

Fig. 2. 1: *camin*

camin (Fig. 2. 1)

The *camin* is the "brain" of the system. It communicates with the camera and the lens motors. It can be connected to the other components of the *cmotion* Lens Control System wireless or via cable. Up to 3 lens motors can be plugged into the *camin*. Commonly used digital servo motors from different manufacturers (Arri, Preston, Scorpio, Hedén) can be connected to the *camin*. It comes equipped with a radio/wireless module.

Fig. 2. 2: *coperate*

coperate (Fig. 2. 2)

The *coperate* is the hand-held unit of the *cmotion* Lens Control System. It controls focus and iris. The *coperate* is equipped with a control wheel and a control slider. The *coperate* is the main cmotion hand unit. The system can be expanded in several ways to a multi-functional 3 motor and camera control system. The *coperate* user's structure is clearly and comprehensively laid out, with a user friendly design. The *coperate* is light-weight and its design is based on stringent ergonomic principles.

Fig. 2. 3: *czoom*

czoom (Fig. 2. 3)

The czoom is an extension module of the cmotion Lens Control System. It controls the zoom-motor. There are several ways to integrate the czoom in the cmotion Lens Control System. It can be attached directly to the *coperate.* It can be used in stand-alone mode, when used in combination with the *chandle.* The *czoom* + *chandle* configuration can be hard-wired to either the *camin* or the *coperate.*

Fig. 2. 4: ***chandle***

chandle (Fig. 2. 4)

The *chandle* is the handle unit for the *czoom*. It includes a [CAL] and a [RUN] button. It enables the user to use the *czoom* in stand-alone mode. The *chandle* is available in different wood types, colors and styles.

Fig. 2. 5: ***cdisplay***

cdisplay (Fig. 2. 5)

The *cdisplay* is a multi-functional display and control unit with a 3,8" TFT-screen. The display has an integrated touch-screen. It acts as a control unit for both lenses and cameras. The *cdisplay* can be used stand-alone (in both wired and wireless configurations), or can be connected directly to the *camin*. By means of the cmotion fastening tool, the *clamp*, it can also be connected directly to the *coperate*. Lens data can be stored in the *cdisplay.*

Fig. 2. 6: ***cdisplay.ext***

cdisplay.ext (Fig. 2. 6)

The *cdisplay*-ext is an add-on module for the *cdisplay.* It allows for wireless use of the *cdisplay.* Its package consists of: a reader module for reading and writing the *ctag* (C017-K01) and a radio module for independent communication with the *camin.*

ctag (Fig. 2. 7)

Fig. 2. 7: ***ctag***

The *ctag* is the cmotion lens memory chip. All lens data is "read" onto the *ctag* which then accompanies its respective lens. Anytime the user may then need to upload lens information he/ she can "read" the data onto the *cdisplay* and within seconds the lens data is available on the *cdisplay.*

Note: Includes credit for lens calibration.

2.2 Cmotion Software

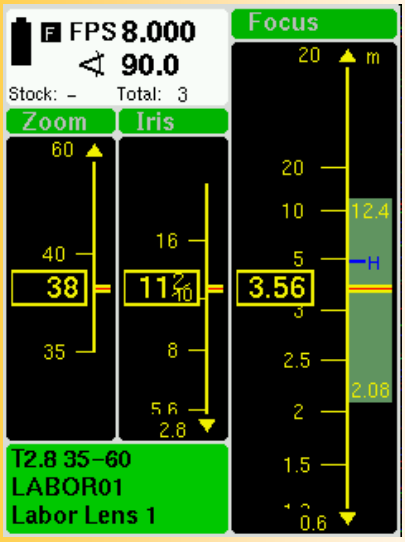

Fig. 2. 8: ***clensinfo***

clensinfo (Fig. 2. 8)

clensinfo is the software module for the *cdisplay* that allows for lens and camera information to be displayed on the *cdisplay* screen. The software reads out an animated depiction of the actual lens barrel and its movements. On the focus scale the hyperfocal distance is indicated with an "H" as well as focus near and focus far of the depth of field. The user can also make focus marker points on the focus scale using the *coperate.* The system is compatible with all lenses and all camera systems which means that all lenses can be depicted.

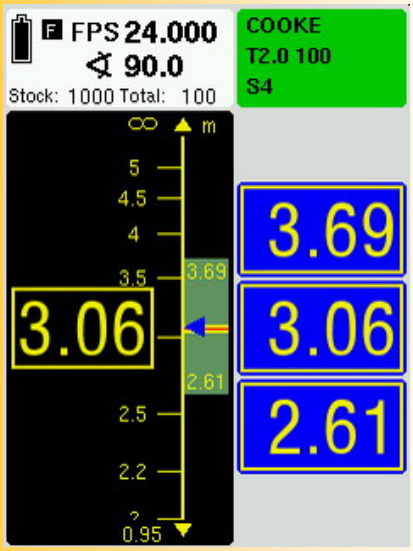

Fig. 2. 9: ***cdepth***

cfocas (Fig. 2. 9)

cfocas depicts a large scale image of the focus scale and all depth of field information. The large fonts of the information make the *cfocas* software practical and easy to use and practical. Information that is read out onto the *cfocas* screen include: focus near, focus far and distance measurement tools information. The focus value fields indicate whether the current focus value is within the depth of field according to color. Focus markers can also be made on the focus scale. The software is compatible with distance measurement tools e.g. the cinetape or. *cfocas* will calculate the focus measurements using the distance information provided by the cinetape or cfinder. The software is compatible with all lenses and all camera systems.

camcon (Fig. 2. 10)

Fig. 2. 10: ***camcon***

The camera control software allows the user to set camera parameters such as fps and shutter.

Note: Currently, Arri 435, Arri 535, Arri 16SR3, Arri 35 III, Aaton 35 III, Aaton XTR Prod and the Panavision Millennium can be controlled. Implementation of other cameras is in development.

Note: Please contact cmotion for the most recent camera control information.

cramp (Fig. 2. 11)

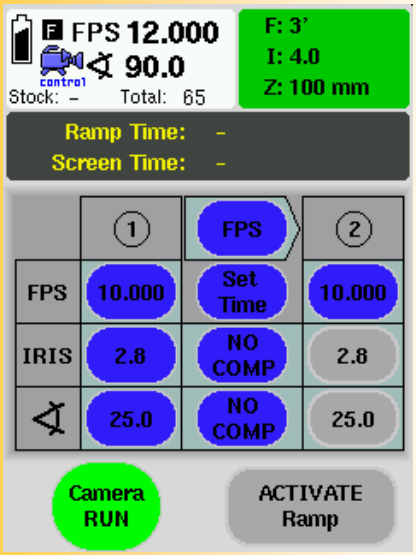

Fig. 2. 11: ***cramp***

The cmotion ramp software allows the user to program and execute ramps. Speed and depth of field ramps can be programmed. Speed ramps can be compensated by the iris or shutter or a mixture of both. The ramp time can be given in either screen-time or ramp-time.

Note: Currently, Arri 435, Arri 535, Arri 16SR3, Arri 35 III, Aaton 35 III, Aaton XTR Prod and the Panavision Millennium can be controlled. Implementation of other cameras is in development.

Note: Please contact cmotion for the most recent camera control information.

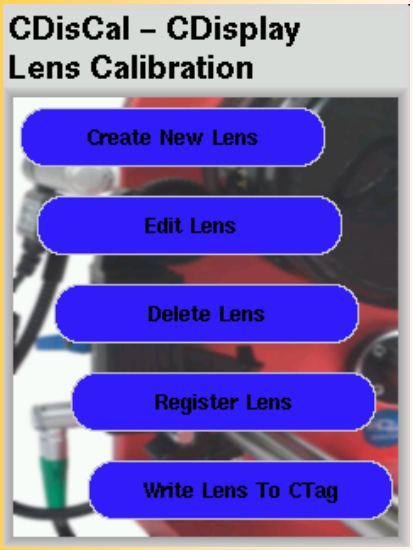

Fig. 2. 12: *cdiscal*- Welcome Screen

cdiscal (Fig. 2. 12 and Fig. 2. 13)

cmotion offers its users two calibration software interfaces; one which is administered from a PC, and another which is administered directly from the *cdisplay.* *cdiscal* is the cmotion *cdisplay* lens calibration software. The software allows the user to:

- calibrate new lenses into the system,
- edit existing lenses
- delete existing lenses
- register lenses to the system and
- write lenses to *ctags*

Lens calibration memorizes motor positions in relation to the user entered lens scales and the end-stops. This must be completed once for each lens and can be done using the *cdiscal* interface.

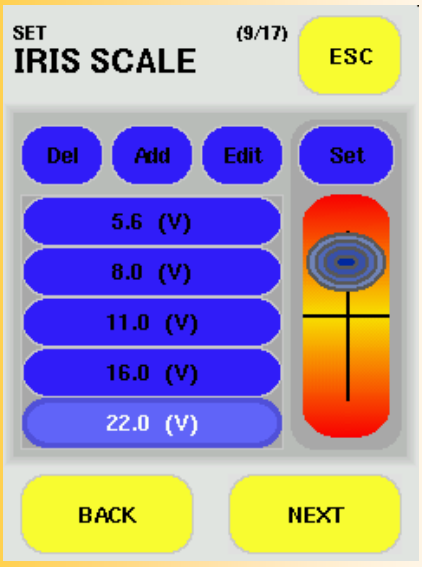

Fig. 2. 13: *cdiscal* - Iris Calibration Screen

2.3 Cmotion Accessories

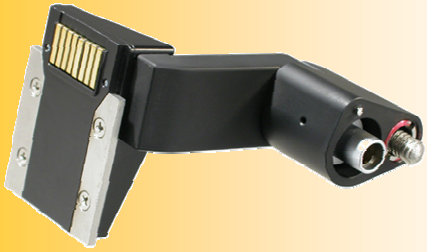

Fig. 2. 14: *clamp*

clamp (Fig. 2. 14)

The *clamp* allows the user a very comfortable use of the *coperate* and the *cdisplay* together. The *clamp* provides mechanical and internal electronic connection between *coperate* and *cdisplay*.

Fig. 2. 15: Battery

Battery (Fig. 2. 15)

Battery, 2.400mAh, 7.2V for all *cmotion* hand-units

Fig. 2. 16: Battery Charger

Battery Charger (Fig. 2. 16)

Battery charger for cmotion batteries, includes 3 batteries

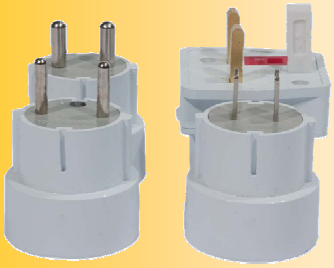

Fig. 2. 17: Worldwide Socket Adapter

Socket Adapter (Fig. 2. 17)

Worldwide socket adapter

Fig. 2. 18: *ctruss*

ctruss (Fig. 2. 18)

The *ctruss* is a *coperate* fastening tool. It is attached to the back of the *coperate* giving the user access to a multi-functional 1/4 inch screw hole. The *ctruss* allows the *cstrap* can be screwed to the back of the *coperate.*

Fig. 2. 19: *cstrap*

cstrap (Fig. 2. 19)

Universal carry-strap accompanied with a 1/4 inch screw. It includes an innovative locking mechanism to prevent it from coming loose.

Fig. 2. 20: *cboost*

cboost (Fig. 2. 20)

Adapter for power supply cables that keeps the voltage at a steady 28 V. The entry voltage can be anywhere between 10V and 35V. The cboost is used with 10V camera systems to boost the voltage available to lens motors.

Fig. 2. 21: *cfastener*

cfastener (Fig. 2. 21)

The *cfastener* is a universal clamp to be secured to rods 15-28mm (e.g. a support rod or the pan-bar). The clamp comes with two 1/4 inch screws to allow attachment of various fixtures.

Fig. 2. 22: *cfast-czoom*

cfast-czoom (Fig. 2. 23)

Attachment set that attaches the *czoom* to the pan-bar or directly to the camera. The rosette is the same size as an Arri rosette, and is two-sided allowing for attachment to both sides.

Fig. 2. 23: *cfast-camin*

cfast-camin (Fig. 2. 23)

Attachment set which secures the *camin* to the camera or any 1/4" or 3/8" screw hole. A 6 sided piece is attached to the *camin* which slips into the *cfast-camin* receiver. An integrated quick lock allows for quick and easy mounting and dismounting of the *camin*.

Fig. 2. 24: *cfast-cdisplay*

cfast-cdisplay (Fig. 2. 24)

Attachment set that connects the *cdisplay* to the camera. The multifunctional arm allows for optimal positioning of the *cdisplay*.

Fig. 2. 25: *cfast-artemis*

cfast-artemis (Fig. 2. 25)

Attachment tool that secures the *camin* to the Sachtler-Artemis Steadycam system.

Fig. 2. 26: Calibration Package, includes calibration software

Calibration Package (Fig. 2. 26)

The calibrating package includes all necessary tools for lens calibration with a PC. The set includes: software, webcam, fastening tool for the webcam, 2 rods, power supply, lens mount.

Note: DOES NOT INCLUDE: Laptop, lens, *camin* or lens-motor

Calibration Software

The cmotion calibration software is a PC program that allows the user to implement new lenses into the system. Cmotion also offers a calibration software which is administered directly through the *cdisplay* called *cdiscal.*

2.4 Spare Parts

Fig. 2. 27: Antenna

Antenna (Fig. 2. 27)

Flexible swivel antenna, straight or right angle, length 10cm, +1dBi, 2.4Ghz, for all units

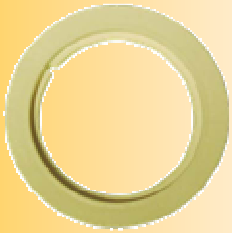

Fig. 2. 28: Marker Ring

Marker Ring (Fig. 2. 28)

Marker ring for rotary knob, for *coperate* and Arri WFU.

Fig. 2. 29: Marker Strip

Marker Strip (Fig. 2. 29)

Marker strip for slider, for *coperate*

2.5 Detailed Component Description

2.5.1 *camin*

Connectors and LEDs on the *camin* CHANNEL side

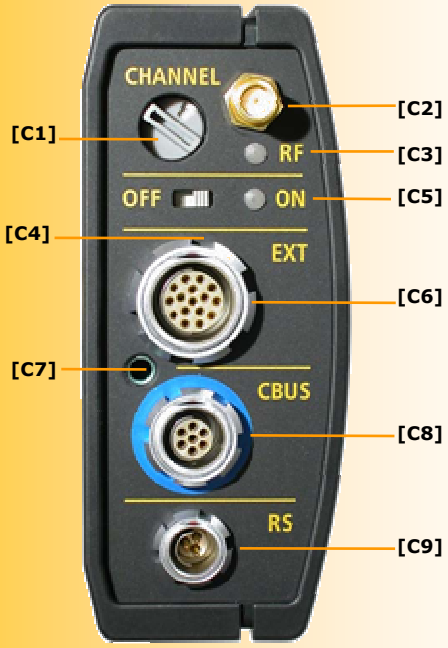

Fig. 2. 30: The *camin* Channel Side

C1	Channel Selector	Selector knob for radio transmission Depending where the device is used, select the channel accordingly Set I1I – I7I in Europe, USA and Canada Set I8I – I9I in Europe, USA, Canada **and** Japan and Australia Set I0I to switch off the transceiver, or to use in hand wired mode.		
C2	Antenna Connector	Flexible swivel antenna, straight or right angle, attached here		
C3/ C5	RF LED/ ON LED (Operation Status)	**RF**	**ON**	
		Off	Off	*camin* off
		Off	Red/ Green/ Blinking	*camin* ready, (hardwired mode – channel selector set at 0), no client logged on
		Red Blinking	Red/ Green/ Blinking	*camin* ready (wireless mode), no client logged on
		Off	Green	• *camin* ready, client logged on in hard-wired mode • **During Start-Up:** motor is moving to position that hand units are currently set at
		Green	Green	*camin* ready, client logged on in wireless mode
		Red	Red	• **During Start-Up:** *camin* is booting up • Selected channel already in use by another *camin* • Channel selector dial was turned during operation
		Green Blinking	Red Blinking	Software incompatible between *camin* and clients
		Red	Red Blinking	Battery low, *camin* will not work
C4	*camin* ON/OFF Switch	*camin* power switch		
C6	16 Pin EXT Connector	Connector for camera communication, synchronizations and power supply.		
C7	M4 Screw Hole	For attachment of various accessories		
C8	CBUS Connector	*Cmotion* intra-system 7 pin connector		
C9	RS Connector	Camera power supply connector		

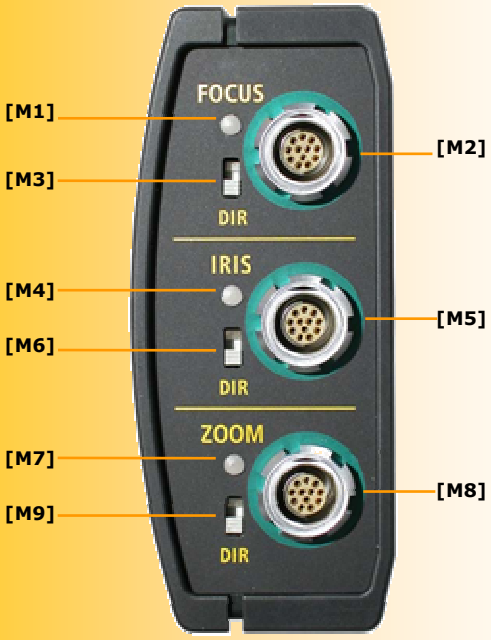

Fig. 2. 31: The *camin* Motor Side

Connectors and LEDs on the *camin* MOTOR side

M1	Focus LED	Green	Focus motor ready
		Green/ Red Blinking	• System is calibrating **or** • the focus motor cannot reach its position
		Off	No motor connected
M2	Focus Motor Connector	Connector for digital servo motors for focus	
M3	Focus Motor Direction Switch	Changes direction of the focus motor between clockwise and counterclockwise	
M4	Iris LED	Green	Iris motor ready
		Green/ Red Blinking	• System is calibrating **or** • the iris motor cannot reach its position
		Off	No motor connected
M5	Iris Motor Connector	Connector for digital servo motors for iris	
M6	Iris Motor Direction Switch	Changes direction of the iris motor between clockwise and counterclockwise	
M7	**Zoom LED**	Green	Zoom motor ready
		Green/ Red Blinking	• System is calibrating **or** • the zoom motor cannot reach its position
		Off	No motor connected
M8	Zoom Motor Connector	Connector for digital servo motors for zoom	
M9	Zoom Motor Direction Switch	Changes direction of the zoom motor between clockwise and counterclockwise	

2.5.2 *coperate*

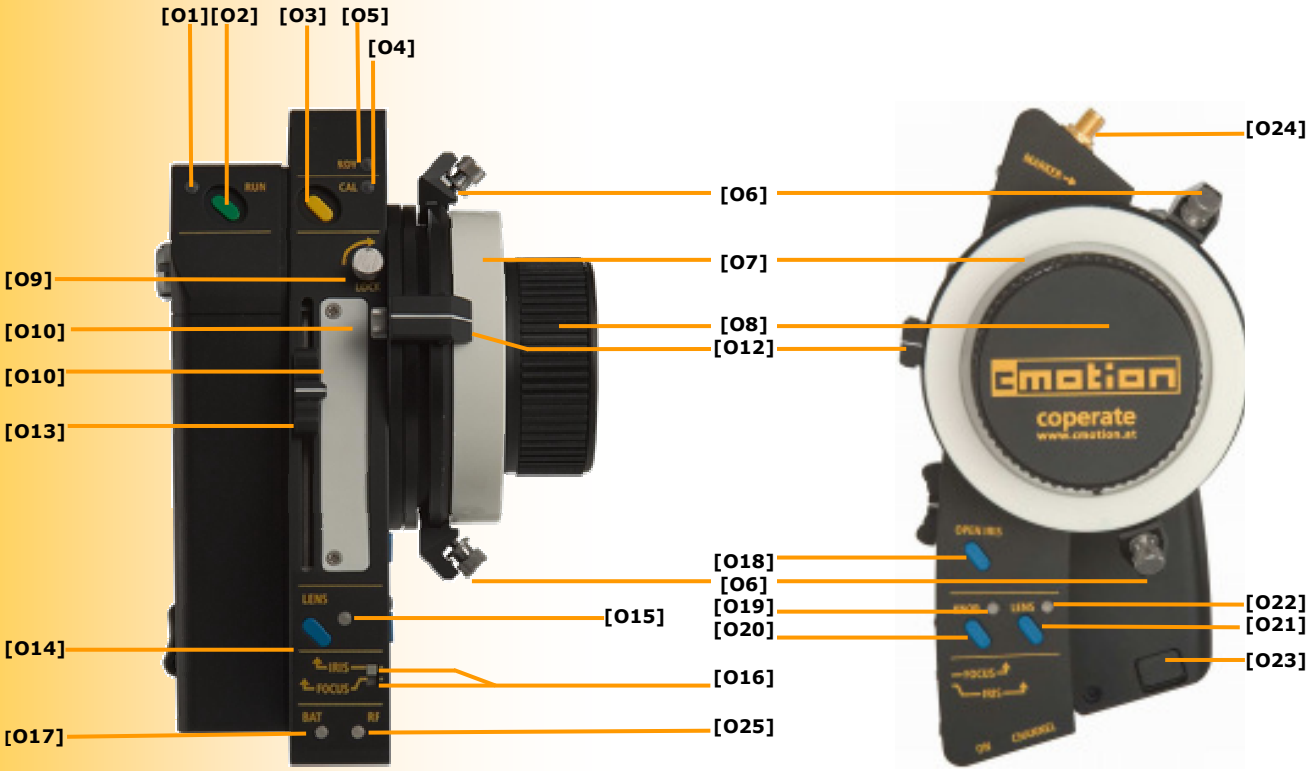

Fig. 2. 32: The *coporate* top view and right side

O1	RUN LED	Off	• No RUN signal received from camera or • Camera in standby mode	
		Green	Camera running	
		Red	Camera error or camera is running up/ down	
O2	RUN Button	Starts/ stops camera		
O3	CAL Button	• Button to start motor calibration (Push for at least one second) or • can be used together with a LENS Button for single motor calibration		
O4	CAL LED	Off	Lens has been calibrated	
		Yellow	Motors are calibrating	
		Yellow Blinking	Motor(s) need to be calibrated	
O5	RDY LED/ RF LED	RDY	RF	
		Off	Off	System off
		Green	Off	System ready, client logged on in hard-wired mode

		Green	Green	System ready, client logged on in wireless mode
		Green	Red	Radio transmission has minor errors
		Red Blinking	--	Battery is going to be empty
		Red	Red	• coperate error, system will only work in hard-wired mode • No radio transmission to camin, system will only work in hard-wired mode • Battery empty
O6	Mechanical End-Stop Lock	Enables you to set mechanical limits on the wheel rotation		
O7	Exchangeable Markable Ring	Can be used to write (e.g. focus marks) on the ring		
O8	Knob	Depending on the position of the Iris/ Focus Selector the hand wheel knob will control either the Focus or the Iris motor		
O9	Slider Lock	Locks the slider as well and adjusts slider resistance		
O10	Exchangeable Marker Strip	Can be used to write (e.g. a Iris scale) on the pad		
O11	Knob Lock	Locks the knob rotation		
O12	Index Marker	Enables a precise reading of the inscriptions written on the ring		
O13	Slider	Depending on the position of the Iris/ Focus Selector the slider will control either the Iris or the Focus motor		
O14	LENS Button (Slider)	• Assigns a segment of the lens scale to the entire length of the slider or • can be used together with the [CAL] button for single motor calibration		
O15	LENS LED (Slider)	Off	Motor ready for control	
		Green	Limits have been set by the LENS button	
		Red	• No motor available or • another unit is in control of the motor	
		Green Blinking	Limits are currently being set, LENS button is currently being pushed	
O16	Iris / Focus Selector	Pos. 1 (Up)	Slider will control the Iris Knob will control the Focus	
		Pos. 2 (Down)	Slider will control the Focus Knob will control the Iris	
O17	BAT LED	Off	coperate battery is OK	
		Red Slowly Blinking	coperate battery is running low	
		Red Fast Blinking	coperate battery is almost empty, CHANGE BATTERY	
		Red	coperate battery is empty, CHANGE BATTERY	
O18	OPEN IRIS	Opens the aperture completely		

	button	Note: If aperture closes, change the motor direction of the IRIS motor with the DIR switch on the camin	
O19	KNOB LED	Off	No limits have been assigned to the wheel
		Green	Limits have been set by the KNOB button
		Green Blinking	Limits are currently being set, KNOB button is currently being pushed
O20	KNOB button	Assigns a rotation of the lens scale, e.g. from close focus to infinity, to just one segment of the wheel rotation	
O21	LENS Button (Knob)	• Assigns a segment of the lens scale to the entire rotation of the slider or • can be used together with the [CAL] button for single motor calibration	
O22	LENS LED (Knob)	Off	Motor is ready for control
		Green	Limits have been set by the LENS button (Knob)
		Red	• No motor available or • another unit is in control of the motor
		Green Blinking	Limits are currently being set, LENS button (Knob) is currently being pushed
O23	Battery Release Button	While holding the coperate vertically, press the release button to enable the battery to glide out of its receptacle.	

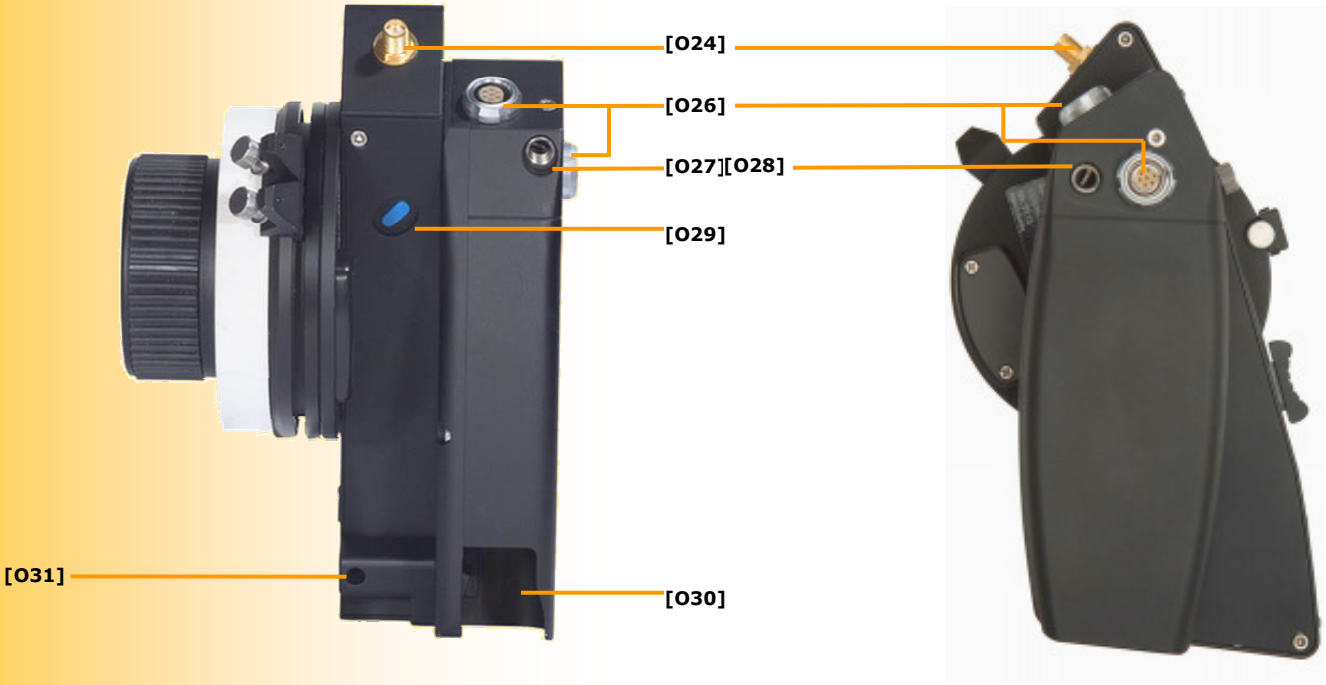

Fig. 2. 33: The *coperate*

O24	Antenna Connector	Flexible swivel antenna, straight or right angle, attached here **Note:** Only necessary for those *coperates* not equipped with an internal antenna. If your *coperate* has an antenna attachment it **IS NOT** equipped with an internal antenna
O25	RF LED	shows if there is radio contact (see [05])
O26	CBUS Connector	*cmotion* intra-system interface
O27	¼" Screw Hole	For attachment of various accessories
O28	¼" Screw Hole	For attachment of various accessories
O29	MARKER button	When the *coperate* is configured to work with the *cdisplay*, a push on the MARKER button will place a numbered mark on the Focus scale
O30	Battery receptacle	
O31	*ctruss*	An accessory to be attached to the *coperate*, allows for the attachment of *cstrap*

Fig. 2. 34: The *coperate*

O24	Antenna Connector	Flexible swivel antenna, straight or right angle, attached here **Note:** Only necessary for those *coperates* not equipped with an internal antenna. If your *coperate* has an antenna attachment it **IS NOT** equipped with an internal antenna
O27	CBUS Connector	*cmotion* intra-system interface
O31	BATTERY receptacle	
O32	ON Button	*coperate* power button **Note: Must** be pushed for at least ½ second **Note:** If the *camin* is turned off the *coperate* will turn off automatically **Note:** If communication can not be formed the *coperate* will turn off automatically
O33	CHANNEL selector	Selector knob for radio transmission **Note:** Select the same radio channel as set on the *camin*

2.5.3 *czoom*

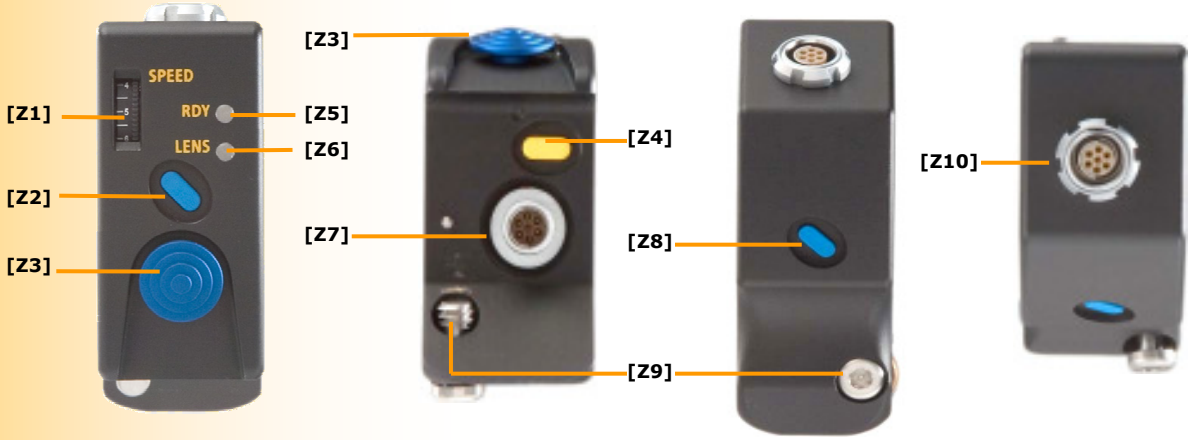

Fig. 2. 35: The *czoom*

Z1	SPEED Dial	Sets/presets the speed of the zoom motor, 1-9, 1=slow 9=zoom as fast as possible	
Z2	LENS Button	• Assigns a segment of the zoom lens scale to the force sensitive joystick **or** • can be used together with the [CAL] button for single zoom motor calibration	
Z3	LENS LED	Off	No limits have been set
		Green	Limit has been set
		Green Slowly Blinking	Motor is at end-stop
		Green Fast Blinking	• Limits are currently being set • LENS button is currently being pushed
		Red	*Czoom* is not in control of the motor
		Red Blinking	Motor error
		Red/ Green Blinking	Motor is currently being calibrated
Z4	Zoom Control	Force sensitive joystick to control the zoom motor	
Z5	CAL Button	• Button to start motor calibration (Push for at least one second) **or** • can be used together with a LENS Button for single motor calibration	
Z6	RDY LED	Off	*czoom* has no power
		Green	System is ready
		Red/ Green Blinking	Searching for *camin*
		Red	Error has occurred (e.g. another unit is in control of the motor. System is not ready)

Z5/ Z6	LENS LED/ RDY LED	**LENS**	**RDY**	
		Green Blinking	Red Blinking	Software incompatible with camin
Z7	*czoom* Connector	Used to connect the *czoom* to the *coperate* or the *chandle*. (CBUS female connector)		
Z8	ZAP Button	While performing zoom control, moves motor as fast as possible (Zoom As Fast as Possible)		
Z9	Mounting Screw	By means of an M4 Allen key, tighten the screw to fix the *czoom* either on the *coperate* or on the *chandle*		
Z10	CBUS Connector	*Cmotion* intra-system interface		

2.5.4 *chandle*

Fig. 2. 36: The *chandle*

H1	RUN LED	Off	• No RUN signal received from camera **or** • Camera in standby mode
		Green	Camera running
		Red	Camera error **or** camera is running up/ down
H2	RUN Button	Starts/ stops camera	
H3	CAL LED	Off	Lens has been calibrated
		Yellow	Motors are calibrating
		Yellow Blinking	Motor(s) need to be calibrated
H4	CAL Button	• Button to start motor calibration (Push for at least one second) **or** • can be used together with a LENS Button for single motor calibration	
H5	3/8" Screw Hole	For attachment of *cfast-cdisplay*	
H6	CBUS Connector (front)	*cmotion* intra-system interface	

2.5.5 *cdisplay*

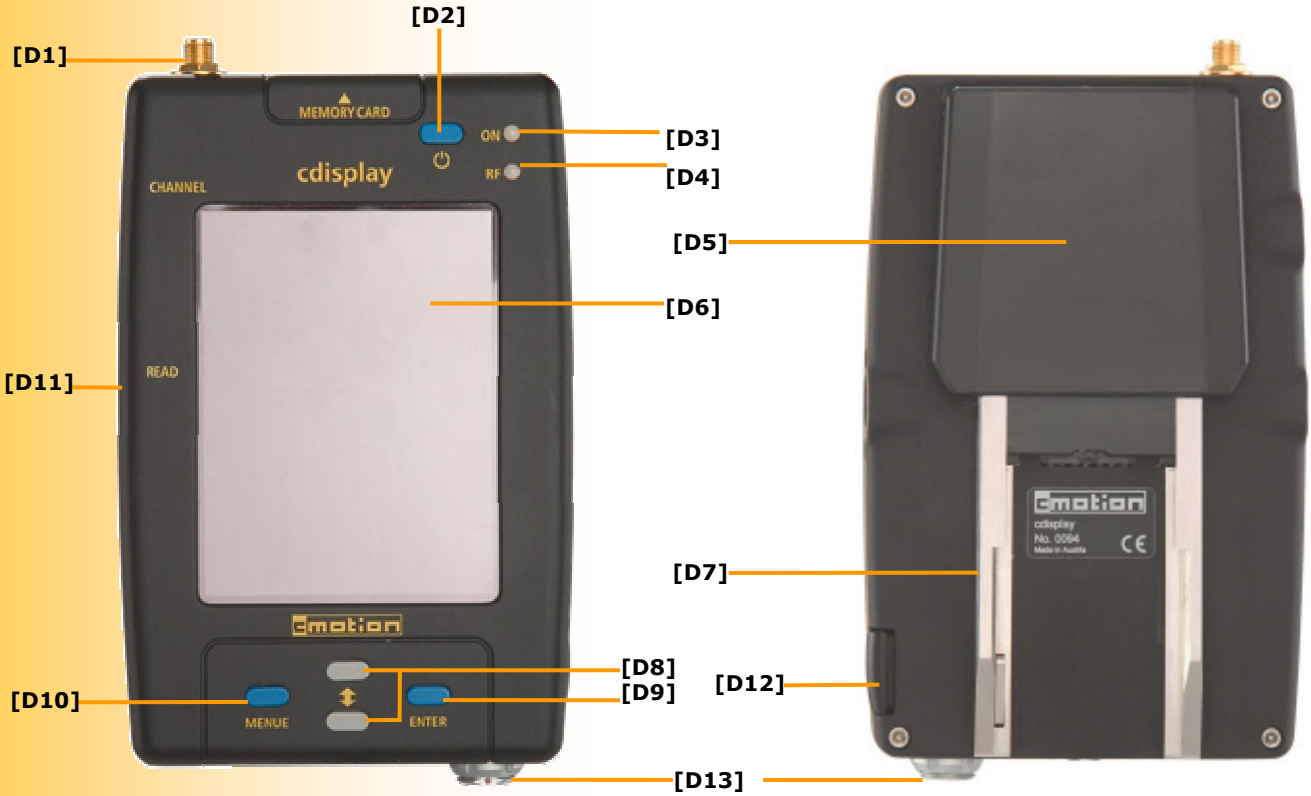

Fig. 2. 37: The *cdisplay*

D1	Antenna Connector	Flexible swivel antenna, straight or right angle, attached here		
D2	STANDBY Button	*cdisplay* power button		
D3/ D4	ON LED/ RF LED	**ON LED**	**RF LED**	
		Off		*cdisplay* off **or** in standby mode
		Red	--	**During Start-Up:** System is not yet ready **or** *cdisplay* cannot find communication with other unit **or** battery empty
		Red Blinking	Red Blinking	System is searching for connection
		Green	Green	Normal wireless operation
		Green Blinking	--	*cdisplay* is reading transponder
		--	Off	Unit is in hard-wired mode
		Red	Red	Channel is currently being changed **or** no RF connection
		Red Blinking	Off	Battery critically low
D5	*cdisplay.ext*	*cmotion* wireless extension module		
D6	Display With	• *cdisplay* screen		

	Touch Screen	• Used for operation of *cdisplay* programs
D7	Battery Receptacle	
D8	Menu Arrow Buttons	Used to navigate through the *cdisplay* menu
D9	Menu ENTER Button	Used to make selections in the *cdisplay* menu
D10	MENU Button	Uploads *cdisplay* main menu
D11	READ Button	Used to transfer data to and from the *ctag*
D12	Battery Release Button	While holding the *cdisplay* vertically, press the release button to enable the battery to glide out of its receptacle
D13	CBUS Connector	*cmotion* intra-system 7 pin connector

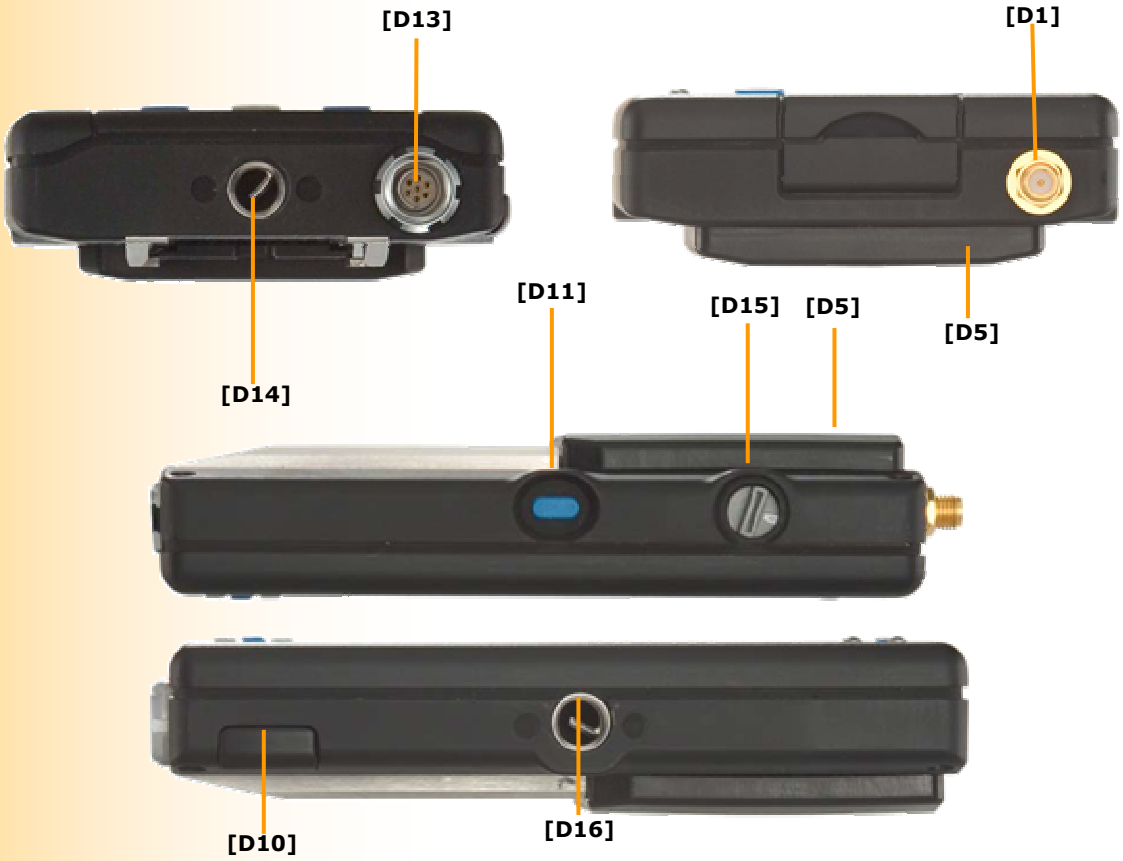

Fig. 2. 38: The *cdisplay*-side view

D1	Antenna Connector	Flexible swivel antenna, straight or right angle, attached here
D5	*cdisplay.ext*	*cmotion* wireless extension module
D12	Battery Release Button	While holding the *cdisplay* vertically, press the release button to enable the battery to glide out of its receptacle
D13	CBUS Connector	*cmotion* intra-system 7 pin connector
D11	READ Button	Used to transfer data to and from the *ctag*
D14	3/8" Screw Hole	For attachment of various accessories or *cfast-cdisplay*
D15	Channel Selector	Selector knob for radio transmission **Note:** Select the same radio channel as set on the *camin*
D16	3/8" Screw Hole	For attachment of various accessories

Fig. 3. 1

Fig. 3. 2

Fig. 3. 3

Fig. 3. 4

Fig. 3. 5

3 SYSTEM SET UP

This section will tell you how to set the cmotion system up. The section will start with *camin* set up, and then it will move on to *coperate*, *czoom* and *cdisplay* set up.

3.1 *camin*

The *camin* is the "brain" of the cmotion Lens Control System. It allows for communication between the lens motors and all cmotion control units. You will have to secure the *camin* somewhere near the camera (see Fig. 3. 1), attach motor cables and facilitate communication between units.

1. Mount Lens Motors and camin securely to camera, the *camin* can be attached to the camera using the attachment tool, *cfast-camin* (see Fig. 3. 2) or the *cfast-camin* & *cfastener* (see Fig. 3. 4).

   Note: The *cfastener* can be attached to rods 15-28mm in diameter e.g. camera carrying handles. The *cfast-camin* consists of a six-sided insert piece (located on the *camin*) and an interlocking mechanism with a steel release clip (located on the camera or the *cfastener*, see Fig. 3. 2).

   To attach the *cfast-camin*:

   i. Using a 4mm Allan key attach the six-sided insert piece to the *camin*

   ii. Using a 4mm Allan key attach the *cfast-camin* to any 3/8″ or 1/4" screw hole (e.g. the camera carrying handle) or to the *cfastener*

   iii. Attach the *cfastener* to any rod 15-28 mm (see Fig. 3. 4). Fasten securely!

   iv. Place the insert piece into the interlocking mechanism at an angle (see Fig. 3. 3)

   v. Gently move the insert piece into the interlocking mechanism until you hear an audible click

   To release the *cfast-camin*:

   i. Pull the steel release clip towards the *camin*

   ii. Tilt the insert piece out of the interlocking mechanism while still pulling the release clip

Fig. 3. 6

2. Use the cable RRS-x (FI 3p, FI 3p) to connect the *camin* to the camera (see Fig. 3. 6).

Note: RRS-x is for various Arri cameras. See attachment for more cameras

3. Screw on the antenna

4. Connect Lens Motors to the *camin*

- **ARRI CLM-1**: with RLM-1 (FI 7 p, FI 5p) cable to CBUS Connector (blue). The original cable can be used as a connection to the Arri CLM-1 motor.
- **ARRI CLM-2**: directly with the integrations cable (FI 12p) to the Focus, Iris and Zoom connectors (green)
- **Denz**: directly with the integrations cable (FI 12p) to the Focus, Iris and Zoom connectors (green)
- **Hedén M26VE**: with RHM-x (FI 12p, LE 7p) cable to the Focus, Iris and Zoom connectors (green)

Fig. 3. 7

Note: When using the Hedén motors (see Fig. 3. 7) included in cmotion sets), the gear rings can be easily exchanged (see Fig. 3. 8) according to teeth size. They can also be placed on either side of the motor. The following moduls are available:

i. Push on the small rod exiting the opposite side of the gear ring mount.

ii. Choose the gear ring with your desired teeth size

iii. Choose the side on which you would like to gear ring to be placed

iv. Place gear ring rod into hole located on the gear ring mount

v. Gently push gear ring while slowly turning it until rod pops into hole

vi. Push rod completely into hole until it clicks

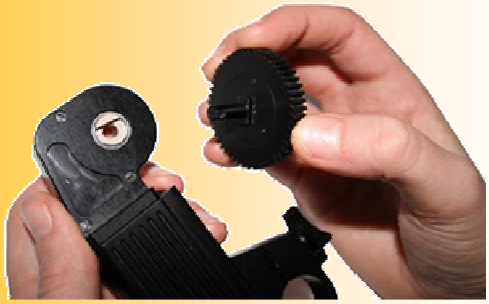

Fig. 3. 8

The rod attachment ring's height can also be adjusted to assure that the motor can reach the lens gear ring.

- **Preston**: with RPM -1 (FI 12p, LE 7p) cable to the Focus, Iris and Zoom connectors (green)
- **Scorpio**: with RSM-1 (FI 12p, LE 7p) cable to the Focus, Iris and Zoom connectors (green)

Warning: Make sure that the cables will not get in the way of equipment, during operation, or during camera handling (movement).

5. Select a radio channel

CHANNEL	Region
0	OFF
1	Europe/USA/Canada
2	Europe/USA/Canada
3	Europe/USA/Canada
4	Europe/USA/Canada
5	Europe/USA/Canada
6	Europe/USA/Canada
7	Europe/USA/Canada
8	Europe/USA/Canada/Japan/Australia
9	Europe/USA/Canada/Japan/Australia

6. Switch *camin* ON.

7. Check LEDs

RF LED/ ON LED (Operation Status)	**RF**	**ON**	
	Off	Off	*camin* off
	Off	Red/ Green/ Blinking	*camin* ready, (hardwired mode – channel selector set at 0), no client logged on
	Red Blinking	Red/ Green/ Blinking	*camin* ready (wireless mode), no client logged on
	Off	Green	• *camin* ready, client logged on in hard-wired mode • **During Start-Up:** motor is moving to position that hand units are currently set at
	Green	Green	*camin* ready, client logged on in wireless mode
RF LED/ ON LED (Warnings)	**RF**	**ON**	
	Red	Red	• **During Start-Up:** *camin* is booting up • Selected channel already in use by another *camin* • Channel selector dial was turned during operation

	Green Blinking	Red Blinking	Software incompatible between *camin* and clients
	Red	Red Blinking	Battery low, *camin* will not work
Focus LED	Green	Focus motor ready	
	Green/ Red Blinking	• System is calibrating **or** • the focus motor cannot reach its position	
	Off	No motor connected	
Iris LED	Green	Iris motor ready	
	Green/ Red Blinking	• System is calibrating **or** • the iris motor cannot reach its position	
	Off	No motor connected	
Zoom LED	Green	Zoom motor ready	
	Green/ Red Blinking	• System is calibrating **or** • the zoom motor cannot reach its position	
	Off	No motor connected	

Warning: Important information for using the LCS system with the Titan Transvideo(TM)

Cmotion channels 8 and 9 should be used while operating wireless video link. Channel A should be used on the Transvideo.

The *camin* and the Transvideo transmitter Tx should be placed as far away as possible from each other.

The antennas should be aligned parallel to each other (they should not cross)

Fig. 3. 9

Fig. 3. 10

Fig. 3. 11

3.2 *coperate*

The *coperate* is the hand control unit of the cmotion system (see Fig. 3. 9). Please follow the following steps to get it ready for operation.

Note: *coperate* set-up is to be done after *camin* set-up.

Note: If the slider and/ or knob do not move; loosen their respective locks

1. Screw on the antenna (If external antenna is necessary).

Note: If you have a *coperate* with an antenna connector then an external antenna is necessary. If no antenna connector is available, your system is accompanied with an internal antenna.

Note: You can also use the *coperate* in **hard-wired** mode. You can connect the *coperate* and the *camin* using the CBUS cable (FI 7p, FI 7p). As soon as the CBUS cable (FI 7p, FI 7p) is connected the system's wireless mode will turn off automatically.

2. Insert a battery. Press until it snaps in with an audible click.

Note: If you use the coperate hardwired no battery is necessary.

Removing an Empty Battery:

i. Hold the *coperate* wheel with your right hand, so that the opening of the battery receptacle looks downwards.

ii. Press the release button (see Fig. 3. 10) with your left index finger. The battery will slide out into your hand. (see Fig. 3. 11)

Fig. 3. 12

3. Preset the same radio channel as selected on the *camin*.

4. Push the [ON] button (see Fig. 3. 12), for at least half a second, to turn the *coperate* "ON".

Warning: If the *coperate* turns off automatically after 6 seconds it cannot establish communication with the *camin*. Is the *camin* turned on? Are all units preset to the same channel?

Note: The *coperate* offers a **Camera Run Toggle Function** for video cameras. Because the *cmotion* system usually only reads out the Camera Run LED if the camera delivers a status feedback and video cameras do not deliver status information; the Camera Run Toggle function allows you to have a camera run LED read-out once the Camera Run Button has been activated without a status feedback. The video camera must be connected with the Video Camera Interface cable (FI 16p, HI 12p). To activate the Camera Run Toggle function:

i. When turning the *coperate* on, hold down the Camera Run Button

Note: Make sure that the knob mechanical locks on the knob are located at their end-stops

Accessory: The *cstrap*

The *cstrap* is a universal carry-strap; when the *coperate* is attached to the *cstrap,* the *coperate* can twist freely. Screw the *cstrap* into the ¼ inch screw hole located at the bottom of the Coperate as tight as you can.

Fig. 3. 13

To Secure the Screw:
Push and turn the screw head to the right to fix the *cstrap* (see Fig. 3. 13)

Note: The key ring is meant to act as a lever to help you turn and secure the screw

Note: The screw will not seem to move much while securing

5. Check LEDs

RUN LED	Off	• No RUN signal received from camera **or** • Camera in standby mode
	Green	Camera running
	Red	Camera error **or** camera is running up/ down (this warning signal depend on the function of the camera)

CAL LED	Off		Lens has been calibrated
	Yellow		Motors are calibrating
	Yellow Blinking		Motor(s) need to be calibrated
RDY LED/ RF LED	**RDY**	**RF**	
	Off	Off	System off
	Green	Off	System ready, client logged on in hard-wired mode
	Green	Green	System ready, client logged on in wireless mode
	Green	Red	Radio transmission has minor errors, system will continue operation
	Green Blinking	Off	**During Start-Up:** motor is moving to position that hand units are currently set at
	Red Blinking	--	Battery empty
	Red	Red	• *coperate* error, system will only work in hard-wired mode • No radio transmission to *camin*, system will only work in hard-wired mode • Battery empty
LENS LED (Slider)	Off		Motor ready for control
	Green		Limits have been set by the LENS button
	Red		• No motor available **or** • another unit is in control of the motor
	Green Blinking		Limits are currently being set, LENS button is currently being pushed
KNOB LED	Off		No limits have been assigned to the wheel
	Green		Limits have been set by the KNOB button
	Green Blinking		Limits are currently being set, KNOB button is currently being pushed
BAT LED	Off		*coperate* battery is OK
	Red Slowly Blinking		*coperate* battery is running low
	Red Fast Blinking		*coperate* battery is almost empty, CHANGE BATTERY
	Red		*coperate* battery is empty, CHANGE BATTERY
LENS LED (Knob)	Off		Motor is ready for control
	Green		Limits have been set by the LENS button (Knob)
	Red		• No motor available **or** • another unit is in control of the motor
	Green Blinking		Limits are currently being set, LENS button (Knob) is currently being pushed

Fig. 3. 14

3.3 *czoom*

The *czoom* (Fig. 3. 14) is the zoom control unit of the cmotion Lens Control System. There are three ways to implement the *czoom* into the cmotion Lens Control System.

- On the *coperate*
- On the *chandle*
- Stand alone

Fig. 3. 15

Please complete the following steps:

3.3.1 *czoom* and *coperate*

Note: With the *czoom* attached to the *coperate* you can control three motors **wireless**

You will find a CBUS connecter and a screw hole on the left top of the *coperate* over the green RUN button.

1. Attach the *czoom* to the CBUS connector on the *coperate* as seen in Fig. 3. 15
2. Using a 4mm Allan key, securely fasten the screw located at the bottom of the *czoom*

Fig. 3. 16

3.3.2 czoom and *chandle*

Note: The *chandle* is the *czoom* hand grip. It has a [RUN] and a [CAL] button. It can be attached via CBUS (FI 7p, FI 7p) to the *coperate* or directly to the *camin*

1. Plug the *czoom* to the CBUS connector on the *chandle* (see Fig. 3. 16)
2. Using a 4mm Allan key, securely fasten the screw located at the bottom of the *czoom*
3. Using the CBUS cable (FI 7 p, FI 7p), connect the *czoom- chandle* to the *camin (*see Fig. 3. 17*).* It can also be connected directly to the *coperate* (see Fig. 3. 17)

Fig. 3. 17

3.3.2.1 *Attaching the czoom/ chandle to the pan-bar*

Fig. 3. 18

Fig. 3. 19

Fig. 3. 20

Using the *cfastener-czoom* (see Fig. 3. 18) the *czoom* can be attached to the pan – bar allowing for practical zoom control. The *cfast-czoom* is composed of an arm, two rosettes and a *cfastener.* It can be attached to any rod 15-28 mm e.g. the pan bar. The angle of the *czoom* to the pan-bar can also be adjusted with the *cfast-czoom* providing optimal comfort for the user.

Note: The arm of the *cfast-czoom* has two rosettes. One rosette is attached to the *cfastener* and the other is attached to the *czoom.* The rosette that attaches to the *cfastener* can be switched from side to side of the arm. This means that the *cfastener* can be attached to the inside or the outside of the *czoom* (see Fig. 3. 18).

1. Attach the *czoom* to the *cfast-czoom* using the rosettes. Secure tightly with the tightening lever.

2. Attach the *cfastener* to the pan-bar (or any other rod 15-28 mm). Secure tightly with the tightening lever. (see Fig. 3. 19)

Note: Adjusting the angle of the czoom to the pan-bar

Now you can adjust the angle of the *czoom* to the pan-bar to ensure maximum comfort.

1. Loosen the tightening lever slightly

2. Rotate the *czoom* along the rosettes to your desired angle.

3. Once you have established your desired position, tighten the tightening lever again.

Note: The *czoom* can also be attached to the pan-bar with the Oppenheimer adapter (See Fig. 3. 20).

3.3.3 *Various connections of czoom/chandle*

When the *czoom* is connected to the *chandle* it can be operated in various configurations using the CBUS cable (FI 7p, FI 7p)

3.3.3.1 *czoom* directly to the *camin*

Using the CBUS cable (FI 7p, FI 7p) you can connect the *czoom* directly to the *camin* e.g. the *czoom* is on the pan-bar and **hardwired** directly to the *camin.* The *czoom/chandle* can be attached to either side of the pan-bar.

3.3.3.2 *czoom* to the *coperate*

Fig. 3. 21

Using the CBUS cable (FI 7p, FI 7p) you can connect the *czoom* to the *coperate* (see Fig. 3. 21) e.g. The *czoom* is attached to the *coperate* using the CBUS (FI 7p, FI 7p) and the second assistant is holding the *czoom/ chandle* in his or her hand.

3.3.4 *czoom Stand Alone*

The *czoom* also functions without the *chandle.* The *czoom* can be connected to the *camin* or the *coperate* using the CBUS (FI 7p, FI 7p) cable e.g. steadicam operators.

3.3.5 *Powering up the czoom*

Note: The *czoom* does not have a power button!

The *czoom* will turn on automatically as soon as it has been attached to the *coperate* or to a CBUS (FI 7p, FI 7p) cable, as long as the *camin* and/or the *coperate* are turned on.

1. Check LEDs

RDY LED	Off		*czoom* has no power
	Green		System is ready
	Red/ Green Blinking		Searching for *camin*
	Red		Error has occurred (e.g. another unit is in control of the motor. System is not ready)
LENS LED	Off		No limits have been set
	Green		Limit has been set
	Green Slowly Blinking		Motor is at end-stop
	Green Fast Blinking		• Limits are currently being set • LENS button is currently being pushed
	Red		*Czoom* is not in control of the motor
	Red Blinking		Motor error
	Red/ Green Blinking		Motor is currently being calibrated
LENS LED/ RDY LED	**LENS**	**RDY**	
	Green Blinking	Red Blinking	Software incompatible

Fig. 3. 22

3.4 *cdisplay*

The *cdisplay* is a multi-functional monitor and control unit with a 3,8" TFT-screen (Fig. 3. 22). The *cdisplay* can be used in wireless and hard – wired modes. There are three ways to implement the *cdisplay* into the cmotion Lens Control System.

- In **hard-wired mode** via the CBUS cable (FI 7p, FI 7p) to the *coperate* or to the *camin*
- In **wireless mode** on the *coperate*
- Stand alone in **wireless mode**.

Please follow the following steps:

3.4.1 *cdisplay in Hard–wired Mode*

Fig. 3. 23

Attaching the *cfast-cdisplay* (see Fig. 3. 23) to the *cdisplay* and to any 15-28mm rods e.g. lens motor rods

1. Screw the UNC 3/8" screw from the *cfast-cdisplay* into the hole located at the bottom (or on the right-hand side) of the *cdisplay.*
2. Attach the *cfastener* to any rod 15-28mm e.g. the lens motor rods.
3. Adjust the angle of the *cfast-cdisplay* arm to your desired position.
4. Tighten the lock knob to secure arm angle

Connecting the *cdisplay* to the *camin*

1. Connect the *cdisplay* to the *camin* using the CBUS cable (FI 7p, FI 7p)

Fig. 3. 24

3.4.2 *cdisplay in Wireless Mode* on the coperate

If the *cdisplay* is attached to the *coperate* the user can take advantage of all *cdisplay* programs as well as control the lens motors all in one multi-functional unit (see Fig. 3. 24).

Note: In this configuration, there is no antenna necessary for the *cdisplay*
Attaching the *cdisplay* to the *coperate* using the *clamp*

Note: Attaching the *clamp*
You will find a CBUS connecter and a screw hole on the left hand side of the *coperate* under the green RUN button.

1. Attach the *clamp* as seen in Fig. 3. 25

Fig. 3. 25

Fig. 3. 26

2. Stick your 4mm Allen Key in the screw hole and tighten *clamp* as seen in Fig. 3. 26.

Fig. 3. 27

3. Slide *cdisplay* screen onto the silver mounting found on the *clamp* (as seen in Fig. 3. 27) until you hear an audible click.

3.4.2.1 Releasing the *cdisplay* from the *clamp*

i. Push the Battery Release Button located at the bottom right hand side of display screen and

ii. Slide *cdisplay* off the quick clamp

3.4.3 *cdisplay in Wireless-Mode in Stand Alone*

The *cdisplay* can be used in wireless stand alone mode (see Fig. 3. 28).

Note: In order for the *cdisplay* to be used in stand alone wireless mode it must be equipped with the *cdisplay.ext* (the *cdisplay* wireless extension module)

1. Screw on the antenna
2. The *cdisplay* can be used with the *cfast-cdisplay* or can simply be held in the user's hand.
3. Slide the battery on at the back of the *cdisplay* until you hear an audible click

Fig. 3. 28

Battery

If you are using the cdisplay in wireless stand alone mode you will have attach a battery. The *cdisplay* necessitates standard Canon batteries.

Removing an Empty Battery:

Note: The cdisplay battery release button is located on the right hand side of the cdisplay.

iii. Hold the *cdisplay* so that the battery release button is facing you

iv. Hold the battery in your hand

v. Press the release button and the battery will fall into your hand.

Note: As soon as the *cdisplay* has a power source it will turn on automatically

Note: The blue button located at the top right-hand side of the *cdisplay* is only a stand-by button. To turn the *cdisplay* off you must remove the battery, disconnect the CBUS (FI 7p, FI 7p) cable **or** turn the *camin* or the *coperate* off.

Note: In order to turn the *cdisplay* off you must **either** remove the battery, disconnect the CBUS cable or disconnect the *cdisplay* from the *clamp.*

Check LEDs

1. Check LEDs

		ON LED	RF LED	
D3/ D4	ON LED/ RF LED	Off		*cdisplay* off **or** in standby mode
		Red	--	**During Start-Up:** System is not yet ready **or** *cdisplay* cannot find communication with other unit **or** battery empty
		Red Blinking	Red Blinking	System is searching for connection
		Green	Green	Normal wireless operation
		Green Blinking	--	*cdisplay* is reading transponder
		--	Off	Unit is in hard-wired mode
		Red	Red	Channel is currently being changed **or** no RF connection
		Red Blinking	Off	Battery critically low

Fig. 4. 1

Fig. 4. 2

4 SYSTEM OPERATION

In order to operate the cmotion Lens Control System you must first complete the "Set-Up" steps (Please see section 3). Section 4 will describe the system operation steps. It will start with the *camin, coperate* and *czoom* and will then describe the *cdisplay* and its software.

4.1 *camin*

Once the *camin* (see Fig. 4. 1) has been set up you must turn it on. You will also be able to change channels and change motor direction on the *camin.*

4.1.1 *Turning the camin "ON"*

Note: The ON switch is located on the CHANNEL side of the *camin*

1. Slide on/ off switch to the right

4.1.2 *Channel Selection*

Note: The channel selector (rotary switch) is located on the CHANNEL side (see Fig. 4. 2) of the *camin*

1. Using your finger nail, or a coin, rotate the channel selector to your desired channel

Note:

CHANNEL	Region
0	OFF
1	Europe/USA/Canada
2	Europe/USA/Canada
3	Europe/USA/Canada
4	Europe/USA/Canada
5	Europe/USA/Canada
6	Europe/USA/Canada
7	Europe/USA/Canada
8	Europe/USA/Canada/Japan/Australia
9	Europe/USA/Canada/Japan/Australia

Fig. 4. 3

Note: Make sure that all cmotion units that you wish to operate are set to the same channel

4.1.3 *Changing Motor Direction*

Note: On the MOTOR side (see Fig. 4. 3) of the camin you will see a DIR switch for each motor.

To change the direction of the motor during operation:

1. Slide the DIR switch, and the motor will change direction. You can can change the motor diretction again by simply sliding the switch back again.

Note: By changing the direction of the motor you are also changing the direction of the knob, respectively of the slider or the *czoom* joystick as well as the depiction of the lens on the *cdisplay.*

4.2 *coperate*

The *coperate* can carry out motor calibration, motor control of the focus and iris including limit setting and camera run.

Fig. 4. 4

4.2.1 *Channel Selection*

Note: The channel selector is located at the bottom underside of the *coperate* (see Fig. 4. 4).

1. Using your finger nail, or a coin, rotate the channel selector to your desired channel

Note: Make sure the *coperate* is set to the same channel as the *camin.*

Note: The *coperate* can also be used in hard-wired mode. It can be connected to the *camin* by means of the CBUS cable (FI 7p, FI 7p). Once you have powered the *coperate* through the *camin* the wireless function will turn off automatically.

Fig. 4. 5

4.2.2 *Turning the coperate "ON"*

Note: The *coperate* "ON" button is a blue button, set in a dip, located at the bottom of the *coperate* (see Fig. 4. 5).

1. Hold down the "ON" button for half a second

Before turning the *coperate* on please look over the following:

Warning! Make sure all motors are securely fastened to their support e.g. rods.

Warning! Make sure that the rods are securely fastened.

Warning! Make sure motor gear rings are secured to the lens barrel as tightly as possible.

4.2.3 *Motor Calibration*

Note: Motors **must** be calibrated each time a lens is attached, each time a motor is attached and if the lens motor has been moved/adjusted manually.

You can either calibrate all attached motors simultaneously or calibrate them singularly.

Note: The CAL button is located above the Slider on the *coperate* (see Fig. 4. 6)

Note: If the CAL LED is blinking, its respective motor needs to be calibrated.

Note: If the CAL LED in illuminated, its respective motor is currently being calibrated.

Note: You cannot calibrate lens motors while camera is running.

Fig. 4. 6

Simultaneous Calibration of all Connected Motors

1. Push the yellow CAL button located at the top of the *coperate* for a second

Single Motor Calibration

1. Push and hold the CAL button (see Fig. 4. 7)
2. While holding the CAL button, push the respective LENS Button of the motor you wish to calibrate

Fig. 4. 7

Fig. 4. 8

4.2.4 *Focus Pulling*

Knob/ Slider Selection

Note: The Knob/ Slider switch is located below the Slider, above the RF LED. (see Fig. 4. 9)

1. Slide the Knob/ Slider Switch up or down to change control of Focus and Iris between the knob and the slider.

Knob

Depending on the Iris/ Slider selector (see Fig. 4. 9) the Focus can be controlled by either the Slider or the Knob. Knob control of the focus is most common.

To move the focus (or iris) motor: rotate the knob in the direction you wish to move the motor. The faster you rotate the knob the faster the motor will move.

Note: The speed of the motors depends on the motor itself and the power supply.

Fig. 4. 9

Note: If you are having trouble with your motor speed and require a voltage boost please see the *cboost*, a cmotion accessory, in chapter 2 of this user's manual.

Note: Motor direction can be changed by using the DIR switch on the *camin.*

4.2.5 *Limit Setting*

Limits can be set to allow for more focus pulling accuracy. **Motor limits** can be set to allow you to use the entire rotation of the knob to control only a portion of the engraved lens scale. **Knob limits** allow you to use a portion of the knob rotation to control the entire engraved scale. **Motor limits** and **Knob limits** can be used in combination with each other to maximize accuracy.

Note: All limits will remain programmed until they have been erased intentionally by user.

Note: If the mechanical end-stop locks are not located at their end – stops i.e. the knob does not turn its entire rotation:

i. Unscrew both of the mechanical locks found on the Knob's outside ring.

ii. Rotate the Knob to one of it's end – stops

iii. Move screws so that they are next to each other and one is touching the Knob index.

iv. Tighten screws

Note: The limit rotation circumference must be 5° of the knob rotation circumference.

4.2.5.1 Setting Knob Limits

Motor limits allow you to use the entire rotation of the knob to control only a portion of the engraved scale.

1. Using the Knob, move motor to one of the two desired limit – stops

2. Push **AND** hold the Knob LENS Button (see Fig. 4. 10)

Note: The LENS LED will blink green while limits are being set.

Fig. 4. 10

3. While still holding the LENS Button, move the motor to the other desired limit – stop

4. Release the LENS Button and the limits are programmed

Fig. 3. 29

Fig. 3. 30

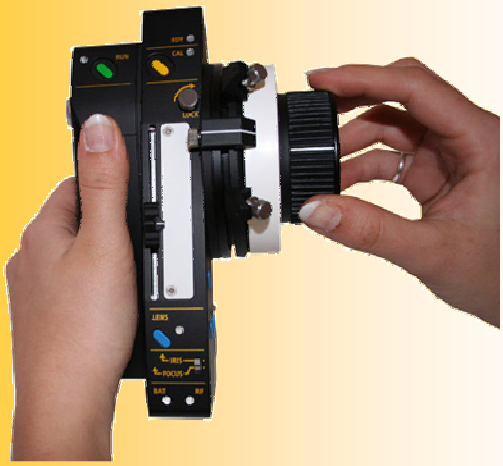

Fig. 3. 31

Note: As long as there is a limit currently set the LENS LED will illuminate green.

To Erase Limits:

1. Push the Knob LENS Button

4.2.5.2 Setting Motor Limits

Knob Limits allow you to use a portion of the knob rotation to control the entire engraved scale

1. Unscrew the mechanical lock that is not touching the Knob index and fasten it at your desired position (see Fig. 3. 29).

2. Move and fasten the other Knob lock so that the space which the index moves within the two locks represents the portion of the Knob rotation that you wish to define (see Fig. 3. 30).

3. Move the Knob to one of your mechanical stops (see Fig. 3. 31).

4. Push **AND** hold the KNOB Button

Note: The KNOB LED will blink green while setting the limits

5. While still holding the KNOB Button, move the knob to the other mechanical lock

   Note: As long as a limit is set the KNOB LED will be illuminated green

6. Release the KNOB Button and the limits are programmed

To Erase Limits:

1. Push the KNOB Button

4.2.5.3 Setting Motor Limits in Combination with Knob Limits

Knob limits can be used in combination with motor limits. This allows you to control a portion of the engraved scale with a portion of the knob rotation. This can make things a lot easier for you because you don't have to always go from one end of the knob rotation to the other for a portion of the lens barrel.

Note: Limits will remain programmed until they have been erased intentionally by user, or the *camin* has been turned off.

1. Set a motor limit as described in 4.2.5.1

2. Set a knob limit as described in 4.2.5.2

Note: As long as a limit is set both the KNOB and LENS LEDs will be illuminated green

To Erase Limits:

Push **both** the LENS Button and the KNOB Button

Fig. 4. 11

4.2.6 *Locking the Knob*

You can use the Knob Lock (Fig. 4. 11) to lock a position for both the knob and its respective motor.

1. Using the knob, move the focus motor to the desired position.

2. Lock the Knob Lock tightly

Fig. 4. 12

4.2.7 *The Marker Ring*

The marker ring (Fig. 4. 12) for the knob can be used to mark focus (and iris) values. It can also be easily exchanged.

Slider

4.2.8 *Iris Control*

Fig. 4. 13

Knob/ Slider Selection

Note: The Knob/ Slider switch is located below the Slider, above the RF LED. (see Fig. 4. 17)

1. Slide the Knob/ Slider Switch up or down to change control of Focus and Iris between the knob and the slider.

Depending on the Iris/ Slider selector Iris can be controlled by either the slider of the knob. Slider control of the iris is more common.

To move the iris (or focus) motor: slide the slider in the direction you wish to move the motor. The faster you slide the slider the faster the motor will move.

Note: The speed of the motors depends on the motor itself and the power supply.

Note: If you are having trouble with your motor speed and require a voltage boost please see the *cboost*, a cmotion accessory, in chapter 2 of this user's manual.

Note: Motor direction can be changed by using the DIR switch on the *camin.*

4.2.9 *Setting Motor Limits for the Slider*

Motor limits allow you to use the entire length of the Slider to control only a portion of the engraved scale

Note: Limits will remain programmed until they have been erased intentionally by user.

1. Using the Slider, move motor to one of the two desired limit – stops

2. Push **AND** hold the Slider LENS Button

Note: The Slider LENS LED on the *coperate* will blink green

3. While still holding the LENS Button, move the motor to the other desired limit – stop

4. Release the LENS Button

Note: As long as there is a limit currently set the LENS LED will illuminate green.

To Erase Limits:

Push the Slider LENS Button

Fig. 4. 14

4.2.10 *Locking the Slider*

You can use the Slider Lock to lock a position for both the Slider and its respective motor (see Fig. 4. 14).

1. Using the Slider, move the motor to the desired position.

2. Lock the Slider Lock tightly

Fig. 4. 15

4.2.11 *Marker Strips*

By unscrewing the respective screws the marker strip (see Fig. 4. 15) for the knob can be used to mark focus and iris values. It can also be easily exchanged.

4.2.12 *Camera Run*

Fig. 4. 16

The Camera Run Button is located to the left of the CAL button on the *coperate* (see Fig. 4. 16).

1. To start/stop the camera, push the green RUN Button

RUN LED	Off	• No RUN signal received from camera **or** • Camera in standby mode
	Green	Camera running
	Red	Camera error **or** camera is running up/ down

Note: You cannot start the camera when motors are calibrating.

4.2.12.1 *Camera Run Toggle Function*

The RUN LED will read out the real camera information, once the button has been pushed the *coperate* will receive a message back from camera regarding its actual RUN status. Some cameras do not relay this information e.g. Aaton and video cameras. In this case, you can use the Camera Run Toggle Function.

1. Push and hold the camera [RUN] button
2. While holding the [RUN] button, push and hold the [ON] button.

4.2.13 *Marker Button*

Fig. 4. 17

The Marker Button is located at the underside of the *coperate* and can be reached by your pointer finger. It can be used together with the display to make focus marks on the *cdisplay* focus scale (see Fig. 4. 18).

4.2.14 *Battery Control*

The BAT LED on the *coperate* indicates the status of the *coperate* battery. Please note the following:

BAT LED	Off	*coperate* battery is OK
	Red Slowly Blinking	*coperate* battery is running low
	Red Fast Blinking	*coperate* battery is almost empty, CHANGE BATTERY
	Red	*coperate* battery is empty, CHANGE BATTERY

4.2.15 *Battery Charging*

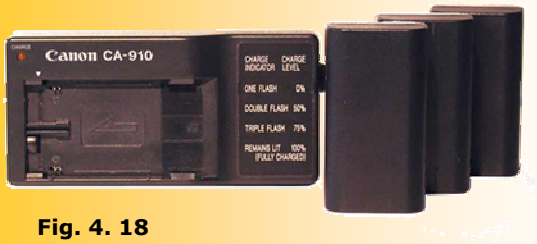

Fig. 4. 18

The cmotion components use standard Canon batteries and standard Canon battery chargers (see Fig. 4. 18).

Note: The batteries can be charged approximately 300 times

Note: Batteries are full in 180 minutes (assuming they were completely empty)

Note: Batteries will work with the *coperate* for more than 10 hours

4.3 *czoom*

Fig. 4. 19

Note: The zoom control button is sensitive to pressure. The speed of the motor depends on the amount of pressure you are putting on the joystick. The buttonm does not physically move.

Note: The CAL Button and the Camera RUN Button are located on the *chandle* **not** on the *czoom*.

4.3.1 *Zooming*

To move the zoom motor: put pressure on the zoom control button in the direction you wish to move the motor. The more pressure you put on the button the faster the motor will move.

4.3.2 *Zoom Speed*

The speed of the zoom motor can also be adjusted with the speed dial located on the *czoom.* The dial gives you the option of speeds 1-9. The speed dial presets the maximum speed of the zoom motor if maximum pressure is put on the zoom control button. If the dial is set at 1 maximum pressure on the zoom control button will yield a slower motor speed then if the dial were set to 9 and maximum pressure is put on the zoom control button.

4.3.3 *Setting Zoom Limits*

Motor limits allow you to use the entire range of the joystick to control only a portion of the engraved scale.

Note: Limits will remain programmed until they have been erased intentionally by user

1. Using the joystick, move motor to one of the two desired limit – stops
2. Push **AND** hold down the zoom LENS Button

   Note: The LENS LED on the *czoom* will blink green
3. While still holding down the LENS Button, move the motor to the other desired limit – stop

4. Release the LENS Button

Note: As long as there is a limit currently set the LENS LED will illuminate green.

To Erase Limits:

Hold down the Zoom LENS Button

4.3.4 *ZAP – Zoom as Fast as Possible*

Fig. 4. 20

Regardless of what speed your speed dial is set at you can move the zoom lens scale as fast as possible by pressing the zoom control button while holding down the ZAP (Zoom as Fast as Possible) Button. The ZAP button is located at the underside of the *czoom.*

1. With your pointer finger, hold down the ZAP button located at the back of the *czoom* unit

2. Using your thumb, put maximum pressure on the joystick in the direction you wish the motor to move

3. While still holding the ZAP button, move to desired zoom position

Note: The speed of the motors depends on the motor itself and the power supply.

Note: If you are having trouble with your motor speed and require a voltage boost please see the *cboost*, a cmotion accessory, in chapter 2 of this user's manual.

4.3.5 *Camera Run*

The *czoom* does not contain a Camera RUN button. The Camera RUN button can be found on the *chandle.*

4.4 *chandle*

Fig. 4. 21

Motor calibration is necessary each time a lens or a lens motor has been changed. You can either calibrate all attached motors simultaneously or calibrate them singularly.

Note: Motors **must** be calibrated each time a new lens or new motor is attached.

Note: The CAL button is located above the *chandle* **not** on the *czoom* (see Fig. 4. 21)

Note: If the CAL LED is blinking, its respective motor needs to be calibrated.

Note: If the CAL LED in illuminated, its respective motor is currently being calibrated.

Warning! Do not calibrate lens motors while camera is running!

4.4.1 *Motor Calibration*

Note: Motors **must** be calibrated each time a lens is attached, each time motor is attached and if the lens motor has been moved/adjusted manually.

You can either calibrate all attached motors simultaneously or calibrate them singularly.

Note: If the CAL LED is blinking, its respective motor needs to be calibrated.

Note: If the CAL LED in illuminated, its respective motor is currently being calibrated.

Note: You cannot calibrate lens motors while camera is running.

Simultaneous Calibration of all Connected Motors

1. Push the yellow CAL button located at the top of the *coperate* for a second.

Single Motor Calibration

1. Push and hold the CAL button
2. While holding the CAL button, push the respective LENS Button of the motor you wish to calibrate

4.4.2 *Camera Run*

The Camera Run Button is located above the CAL button on the *chandle*

1. To start/stop the camera, push the green RUN Button.

Note:

RUN LED	Off	• No RUN signal received from camera **or** • Camera in standby mode
	Green	Camera running
	Red	Camera error **or** camera is running up/ down

Note: You cannot start the camera when motors are calibrating.

Attachments:

Cameras (in alphabetic order)

*u.c.: under construction (our systems are upgraded regularly, please ask for current features)

camera	Start/Stop	Speed Ramp	depth of field ramp	necessary cables camera run	necessary cables camera control/ramping
Aaton 35 III	✓	✓		RAR1 (C019-KE1) or RAI-1	RAI-1 (C019-KF1)
Aaton minima	✓			RAR5 (C019-KE5)	
Aaton XTR	✓	✓		RAR1 (C019-KE1) or RAI-1	RAI-1 (C019-
Arri 16SR3	✓	✓		RRS-8 (C019-38)	RCC-1 (C019-
Arri 16SR3HS	✓	✓		RRS-8 (C019-38)	RCC-1 (C019-
Arri 235	✓	u.c.*	u.c.*	RRS-8 (C019-38)	
Arri 35 III	✓	✓		RCI-1 (C019-K21)	RCI-1 (C019-K21)
Arri 435	✓	✓		RRS-8 (C019-38)	RCC-1 (C019-K91)
Arri 435 ADV	(	u.c.*	u.c.*	RRS-8 (C019-38)	
Arri 435 ES	(	(	(	RRS-8 (C019-38)	RCC-1 (C019-
Arri 535	(	(	(	RRS-8 (C019-38)	RCC-1 (C019-
Arri 535 B	(	(		RRS-8 (C019-38)	RCC-1 (C019-
Arri 765	(			RRS-8 (C019-38)	
Arri BL 4	(	(		RCI-1 (C019-K21)	
Arri BL I-	(	(		RCI-1 (C019-K21)	
Arricam Lite	(	u.c.*	u.c.*	RRS-8 (C019-38)	
Arricam	(	u.c.*	u.c.*	RRS-8 (C019-38)	
Cameras prov. with a	(			RRS-7 (C019-K37) and RVI-1 (C019-KC1)	
Dalsa Origin	(	u.c.*	u.c.*	RRS-8 (C019-38)	
Moviecam Compact	(	u.c.*		RMR-1(C019-KK3) and RMP-1 (C019-KK5) OR only RRS-8 (C019-38)	
Moviecam SL	(	u.c.*		RMR-1(C019-KK3) and RMP-1 (C019-KK5) OR only RRS-8 (C019-38)	
Moviecam Superamerika	(	u.c.*		RMR-1(C019-KK3) and RMP-1 (C019-KK5) OR only RRS-8 (C019-38)	
Pananvision Millenium XL	(	(	(	RPI-1 (C019-KH1)	RPP-1 (C019-KH2) and RPR-1 (C019-KH3)

Motors:

Motor	Necessary Cable
Hedén M26VE	Hedén Motor Cable, we deliver the motor with the cable, as spare part is available: C019-K81 straight plug, C019-K82: with right – angle plug
Preston DM1	Preston Motor Cable RPM-1 (C019-K51)
Preston DM2	Preston Motor Cable RPM-1 (C019-K51)
Scorpio digital motor 42V	Scorpio Motor Cable RSM-1 (C019-K61)
Denz DU-02	Cable attached to the motor. No extra cable necessary
Arri CLM-1	Arri CLM-1 motor cable RLM-1 (C019-K71)
Arri CLM-2	Cable attached to the motor. No extra cable necessary
Panavision RDM	Panavision Motor Cable RDM-1
Canon ENG-Lens	Canon Video Lens (20p) Cable - Adapter C023-K61 necessary
Angenieux ENG-Lens	Angenieux Video Lens (12p) Cable - Adapter C023-K61 necessary
Fujinon ENG-Lens	Fujinon Video Lens (xxp) Cable - Adapter C023-K61 necessary

Notes:

Notes: