



# MIC 520

MASTER INTERGRATED CONTROL UNIT



USER MANUAL  
CARE INSTRUCTIONS  
PRODUCT SPECIFICATION

PLEASE READ CAREFULLY BEFORE OPERATION OF THIS EQUIPMENT

CARE AND USE INSTRUCTIONS  
PRODUCT SPECIFICATION

**DESCRIPTION** MASTER INTERGRATED CONTROL UNIT  
FOR DRAIN AND PIPELINE INSPECTION

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**PRODUCT SPECIFICATIONS**

Crusade Designs Ltd. reserves the right to make changes to the electrical, electronic, optical, mechanical, software and firmware specifications of its products without notification. This product carries a 12-month warranty against defective materials and workmanship without prejudice to the customer's statutory rights. Crusade Designs Ltd. disclaims any responsibility for consequential loss or failure due to incorrect use or use with incompatible equipment.

## INTRODUCTION

These instructions are limited to the use and care of the MIC 150 base unit and are in no way intended to give guidance on the interpretation of data or the techniques of safe access to line entry points.

The MIC 520 is designed for use with CRUSADE DESIGNS range of pipe inspection cameras. Cables supplied with any older CRUSADE DESIGNS MIC series base units fitted with 14 pin connectors are compatible without modification. Your supplier can advise on the compatibility of other existing equipment and details of any modifications required. These instructions assume that the user is conversant with the basic operation of the various camera and tractor systems.

## CONNECTING A CAMERA / TRACTOR TO THE MIC 520

The Crusade series of cameras and tractors may be connected to the MIC 520 base unit via its cable reel and link cable. The link cable is totally reversible as it is wired pin for pin. Please refer to the appropriate manual for each piece of ancillary equipment.

**Always ensure that none of the equipment is powered up when connecting or disconnecting a camera, light head or any cables or drums.**

## OPERATION

### SYSTEM CONNECTION

Assemble the camera, light rings, skid, tractor etc. and connect them to the base unit.

**Before turning the system on please observe the following if you are using a generator. Ensure that it is producing the correct 110v ac voltage within plus or minus 10% and let it operate for one minute before connecting any base unit or ancillary equipment. Ensure that all camera equipment is connected before switching the base unit on.**

1. Connect the mains lead to the 110v AC supply.
2. Depress the power button pad to switch the base unit on.
3. Switch the monitor on and leave it on.
4. Depress the standby button on the recorder to switch it on.
5. Use the channel down button on the recorder or on the remote to locate the AV or line channel if necessary. When this is located the camera picture will appear on the screen.
6. Depress the display button to produce the measurement display on the screen.
7. Use the position button pad to place this display where you want it on the screen.
8. If the MIC 520 cannot identify what camera it is connected to, a black screen with a message will be displayed. Depress the indicated button for colour or black and white camera. This will clear the screen and show the camera picture. The camera is now ready for use. If you wish to disconnect or change any item, please switch the unit off before doing so (for example, changing a skid or disconnecting the camera at the end of a run).

### TO RECORD THE SURVEY

Insert the recording media into the VCR/DVD recorder. On VCRs, please use quality media as this will prolong the life of the VCR heads. Follow the recorders instruction book to make the recording or to play back. Please note that VCRs/DVDs have specific operational working parameters of humidity and temperatures. These are stated in the manual and should be adhered to. Failure to do this will cause media handling problems. Following, are a few hints that may help to avoid these problems:

- Store the media and the recorder in the same temperature and humidity conditions.

- Do not store media on the vehicle dashboard.
- Store all equipment in dry, cool conditions.
- If possible garage the vehicle to prevent equipment becoming very cold, or remove the base unit from the vehicle and store it in dry, cool conditions.
- Before leaving to go to the survey site, plug the system into the supply and switch the system on ensuring the recorder is switched on (this will warm the recorder and hopefully drive any moisture out).
- If you have to remove the base unit from the vehicle, please make sure that you do not place it in a damp area whilst you are working, as this may introduce excessive dampness into the recorder.

## BASE UNIT OPERATION

### FRONT PANEL CONTROLS

- POWER** Switches unit on or off. OK LED indicates a supply is connected to the MIC 520. ON LED illuminates when power is on.
- DRUM ZERO** Depress this button when the system is fully connected, the display is showing on the screen and only sufficient cable has been unwound from the cable drum to connect to the camera. This sets the absolute zero point for a full drum and is the datum for all measurements. Do not use when cable is unwound from drum. See also MEAS ZERO.
- INFO** Depressing this button shows security detail.
- LEFT** Depressing this button moves a pan and rotate head left. It is only active while pressed.
- LAMPS** Default position is off. Depressing this button cycles through OFF, ON and OVERRIDE switching the lamps on where applicable. Using in the OVERRIDE position further increases the lamp intensity but shortens the bulb life. It is advisable to turn down the intensity when not needed.
- INTENSITY** Rotating this knob clockwise increases the bulb intensity where applicable. Set this control to the lowest level needed for a good picture.
- COPY** Default position is off. Depressing this button cycles through OFF, IN and OUT. An ancillary piece of equipment may be connected via the AV in and out connectors at the rear of the unit. This switch will position the external unit in the following manor:-  
 OFF External unit is not used.  
 IN External unit is connected between the camera and the character generator.  
 OUT External unit is connected between the VCR and the Monitor.
- MEAS ZERO** This button pad has two functions. Depress this button when the cable has been pulled off the drum and you wish to start measuring from zero, e.g. at the start of the pipe run or between subsequent manholes. Depress and hold down this button when you wish to zero and insert a focal factor at the start of the pipe run, release it when the desired factor is showing on the screen. The measurement factor increases in 0.1 metre increments up to a maximum of 2.0 metre and then reverts to 0.
- UP** Depressing this button rotates a pan and rotate head clockwise. It is only active while pressed.

<b>STOP</b>	Depressing this button stops the tractor drive system, or if already stopped, homes a pan and rotate head.
<b>DOWN</b>	Depressing this button rotates a pan and rotate head anticlockwise. It is only active while pressed.
<b>SPEED</b>	Rotating this knob clockwise will increase the speed of the tractor, rotating it anticlockwise will reduce its speed and when fully rotated anticlockwise, it will stop the tractor. In addition to this, increasing the speed past a crawl will automatically home a pan and rotate head.
<b>DISPLAY</b>	Default position is off. Switches measurement display on or off.
<b>POSITION</b>	Depressing this button pad moves the display to different parts of the screen. Cycling through bottom left to top left, to top right, to bottom right and to centre.
<b>FWD</b>	Depressing this button pad puts the tractor drive system into its forward drive mode and inserts the letter F onto the screen in front of the measurement figure. Please note that depressing either FWD or REV while the tractor is in motion will cancel that drive mode; the F or R will be removed from the screen indicating that there is no drive mode connected and the tractor will stop.
<b>RIGHT</b>	Depressing this button moves a pan and rotate head right. It is only active while pressed.
<b>REV</b>	Depressing this button pad puts the tractor drive system into its reverse drive mode and inserts the letter T on to the screen in front of the measurement figure. This indicates a 5 second delay to enable the operator to pick up the cable before the T changes to R and the reverse drive mode comes into operation. Please note that depressing either FWD or REV while the tractor is in motion will cancel that drive mode; the F or R will be removed from the screen indicating that there is no drive mode connected and the tractor will stop.
<b>FOCUS</b>	Lifting this switch will move the focal point of the camera forward. Depressing this switch will move the focal point of the camera backward. It is only active while held.

## SCRIPTWRITER

The scriptwriter has 26 pages designated A to Z, which can be selected individually by holding down the Ctrl key and pressing the corresponding letter key (A to Z), or in sequence by holding down the Fn (Function) Key and pressing 'Page Up' or 'Page Down' keys. This action will automatically display the page. Any page displayed on screen can be removed by the use of the Escape key. In this display mode, all other keys are inoperative.

## PRELOADED PAGES

Certain pages are preloaded at the factory but can be edited by the user to suit their own preferences. The initial page, shown only at switch on, cannot be edited as this contains information applicable to the base unit (i.e. version and electronic serial number). The preloaded pages are shown below: -

<b>A</b>	<b>Your company information page</b>	<b>I</b>	<b>COLLAPSE</b>
<b>B</b>	<b>Survey Details</b>	<b>J</b>	<b>SILT/DEBRIS</b>
<b>C</b>	<b>Blank</b>	<b>K</b>	<b>ROOTS</b>
<b>D</b>	<b>WATER 00%</b>	<b>L</b>	<b>SCALE/GREASE</b>
<b>E</b>	<b>DISPLACED JOINT</b>	<b>M</b>	<b>CONNECTION</b>
<b>F</b>	<b>OPEN JOINT</b>	<b>N</b>	<b>CHAMBER</b>
<b>G</b>	<b>RADIAL CRACK</b>	<b>O</b>	<b>END OF SURVEY</b>
<b>H</b>	<b>LONGITUDINAL CRACK</b>	<b>P – Z</b>	<b>These pages are left blank.</b>

## EDITING

Once a page has been displayed on the screen, it can be edited by pressing the EDIT key (F1). In addition to this, a grid of dots can be placed on the screen to show character positions. This is toggled on and off by the GRID key (F3). When displayed, the grid has two sizes of dot; the large one indicates a space with a black background behind it; and a small dot indicates a space with no background, i.e. video.

After editing the page, it can either be saved by pressing the SAVE key (F4) or aborted by pressing Esc, reverting to the original text. Either key will exit the edit mode.

## OTHER FUNCTION KEYS

F5	CLS	Will clear the whole of the screen to transparent blanks.
F6	B/GND	Turns background on or off on a line-by-line basis.
F7	SIZE	Toggles through 3 sizes of character on a line-by-line basis.
F8	INS LINE	Inserts a blank line at the cursor, moving all subsequent lines down.
F9	DEL LINE	Deletes the line at the cursor, moving all subsequent lines up.

## KEYBOARD KEYS

Insert	Toggles between insert and overlay.
Fn Home	Moves to start of line.
Fn End	Moves to end of line.
Arrow Keys	Moves cursor around the screen.
← Backspace	Deletes the character before the cursor, moving all subsequent characters left.
Del	Deletes the character at the cursor, moving all subsequent characters left.
Tab	Moves the cursor 8 places right for small characters and 4 places for large.

## EDITING TEXT

When entering the edit mode, the keyboard will be set up as follows: -

Caps Lock	on for uppercase; can be taken off by pressing the Caps Lock key.
Character size	set to intermediate; can be changed by the SIZE key (F7).
Cursor	set to overlay mode; can be changed by the Insert key.

Whilst editing, the cursor has two modes. A large one in overlay, where characters overlay any that were there previously, and a small one in insert mode, where characters will be inserted and the rest of the line moved right. As previously mentioned, a space can have a background or it can be transparent. Typing a space will produce a space with a background. Holding down the shift key whilst typing will result in a space with no background.

## CARE INSTRUCTIONS

### HANDLING

The reliability and lifetime of this camera will depend in large measure on the care it receives. It has been designed for the harsh environment of drain inspection, but as with any other equipment, it will repay a little care taken in its use and regular cleaning and inspection afterwards.

## CLEANING

All exposed metal parts are either anodized aluminium or plastic. Cleaning is always easier and more effective when the deposit is fresh.

## DOS

- All items should be cleaned with a damp cloth moistened with a mild detergent solution (e.g. washing-up liquid).
- Pay particular attention as silt, sand and similar material can be abrasive. A damp toothbrush or a small paintbrush are ideal for cleaning most of the recesses on all items.
- Use a soft lint-free cloth or proprietary lens cleaning tissue to clean any smears left on the monitor glass.

## DON'TS

- The base unit should not be cleaned by immersion.
- Do not scrub the monitor screen to remove particulate material as you may scratch it. Scratches on the monitor screen cannot be removed but particulate matter can be removed by rubbing with a cloth moistened with alcohol.
- Petroleum-based products or proprietary electrical equipment cleaners such as WD40 may contain solvents that attack non-metallic parts and should not be used.
- The electrical connections in the mating sockets are gold plated so should not be abraded.
- Do not use a high-pressure water-jet or steam cleaner.

## MAINTENANCE

There are no user serviceable items inside any of the equipment covered by these instructions. Aside from regular cleaning, the only user serviceable items are recorders monitors or keyboards (replacement).

## TROUBLESHOOTING

If the picture flashes on and off whilst the camera is moving, suspect a cable or connector somewhere in the system and check that all connectors are secure and in the right place; see manuals on each respective camera component.

### **If there is no image on the monitor screen:**

1. Switch the monitor on
2. If there is still no image on the monitor screen, switch the recorder on.
3. If the monitor screen shows blue but there is still no image, set the recorder to its external video input setting using either the remote or the channel control buttons on the recorder front panel, e.g. AV, AV1 etc. or Line 1, Line 2 etc.

### **If the monitor screen is black with an error message:**

Either the equipment has not been completely connected prior to switching on, (see system connections), or an old measurement drum system has been connected. In the latter case, follow the error instructions.

### **If the monitor screen is still black:**

Depress the info button pad on the base unit control panel. The screen should display the security information. Depress the info button pad again, if the camera picture flashes momentarily onto the screen, the camera and monitor are working but the recorder or scriptwriter or their wiring, are not. Check the recorder front panel display to see if an error message is showing, e.g. E11. If so, refer to recorder manual to correct. If no error symbols

are showing on the recorder front panel display, disconnect the two video leads from the rear of the recorder and join them with the supplied BNC to BNC jack plug. The camera picture should now appear. Please contact the factory to make arrangements for your recorder to be repaired. If the monitor screen still stays black then please contact the factory.

If the distance measurement stays at zero whilst the cable is unreeling then replace the link cable. If this cures the problem then repair or return the link cable. If the problem is still present, please contact the factory.

## **ROUTINE SERVICE**

Regularly check all cables for small or large splits. Immediately cover these with amalgamating tape to keep moisture out. This will prolong the life of your cable without upsetting the measurement system. Regularly check cable plugs.

## **TRACING FAULTS IN THE BASE UNIT**

### **The base unit contains:**

- A video cassette recorder or DVD recorder.
- A monitor
- A keyboard

All are connected by signal and power leads to the main control box.

The procedure below should only be undertaken when it is known that power is going to all of the components above. This can be ascertained by inspection of the various items to see if "power on" lights are working normally. Please note that some recorders may not have their usual displays or available functions simply because they are not being fed with a signal. Power fault investigation should only be undertaken by a qualified technician.

The following steps should enable the tracing of a "no picture" fault in most cases to either one of the component parts or one of the leads. The exception is in the case of the monitor or some types of faults on the chassis. Faults of this type are rare and most would have other clues such as non-functioning controls on the chassis or monitor or, for example, a single bright line on the monitor. A known good BNC/BNC lead of 1.5m will be needed for the following tests. These are readily obtained from hi-fi shops and other electrical/electronic suppliers. It may well also be useful to have masking tape or some other means of labelling the ends of the BNC leads as they all look much the same. The most frequent faults found on this series of units are the two described in the following paragraphs.

Remove the access hatch at the rear of the cabinet to reveal a triangle of BNC sockets with connectors fitted to them. There may be an earthing "spade" connection to this hatch which can be removed temporarily but must be refitted prior to the units return to service. The lead connected to the apex of the triangle should be removed and fitted to the socket nearest to the front of the chassis (i.e. furthest away when looking in from the rear). This is the "out" socket of the recorder and the remaining one is the "in" socket. If this results in a picture then the monitor and its leads are working correctly. If there is still no picture, replace the BNC/BNC lead to the monitor with the known good lead (if necessary, access to the rear of the monitor can be improved by removing the four screws on its retaining brackets at the front of the unit). If this fails to restore the picture, the fault lies either in the monitor or chassis and they will need to be tested by means beyond the scope of this document and must be returned to the factory.

Return the monitor lead to its correct position. Use the known good lead to connect the "in" and "out" sockets. If this results in a picture, the chassis is working correctly (this procedure can be used to check any suspect leads at any time in the remaining steps). If there is no picture, there is a fault in the chassis. The unit may be used as a "look see" unit by

replacing the monitor lead in the “out” socket but should be returned to the factory for service as soon as possible.

Return the original lead to the “in” socket on the chassis. Its other end should be traceable to the “out” socket at the rear of the recorder by gently pulling the recorder forward from its shelf. Fit the known good lead from the chassis “out” socket to the recorder “in” socket. If there is a picture, the fault lies in the original lead. If there is no picture, the fault lies in either the recorder or the BNC/BNC lead from the recorder “out” to the chassis “in”. Check the lead by replacement with the known good lead, ensuring that the other leads are in their original position. The recorder can be removed completely from the unit for service by a qualified technician and the unit used as a “look see” as described previously.

## **SPECIFICATION**

Width	430 mm
Height	540 mm
Depth	515 mm
Weight	38.5 kg
Voltage:	110/230 volt
Link Cable	10 meters 14 pin T/B. plug to plug
Power Cable	2 meters
Text Writer	B/W 24 page + security screen
Characters per line	50 Single width, 25 Double width
Lines per screen	16 Single height, 8 Double height
Keyboard	I.B.M. PS2 Compatible Mini Keyboard
Monitor	10” J.V.C. TM-A 101G Metal cased
Resolution	>280 Lines
Picture Tube	0.5 mm DOT Pitch
V.H.S. Recorder	J.V.C. SRL 910 EK 4 Head Dual-azimuth recording

**Compliance:** Electromagnetic Compatibility Directive 89/336/EECElectrical Equipment Directive 73/23/EEC.