**VIVAX
METROTECH**
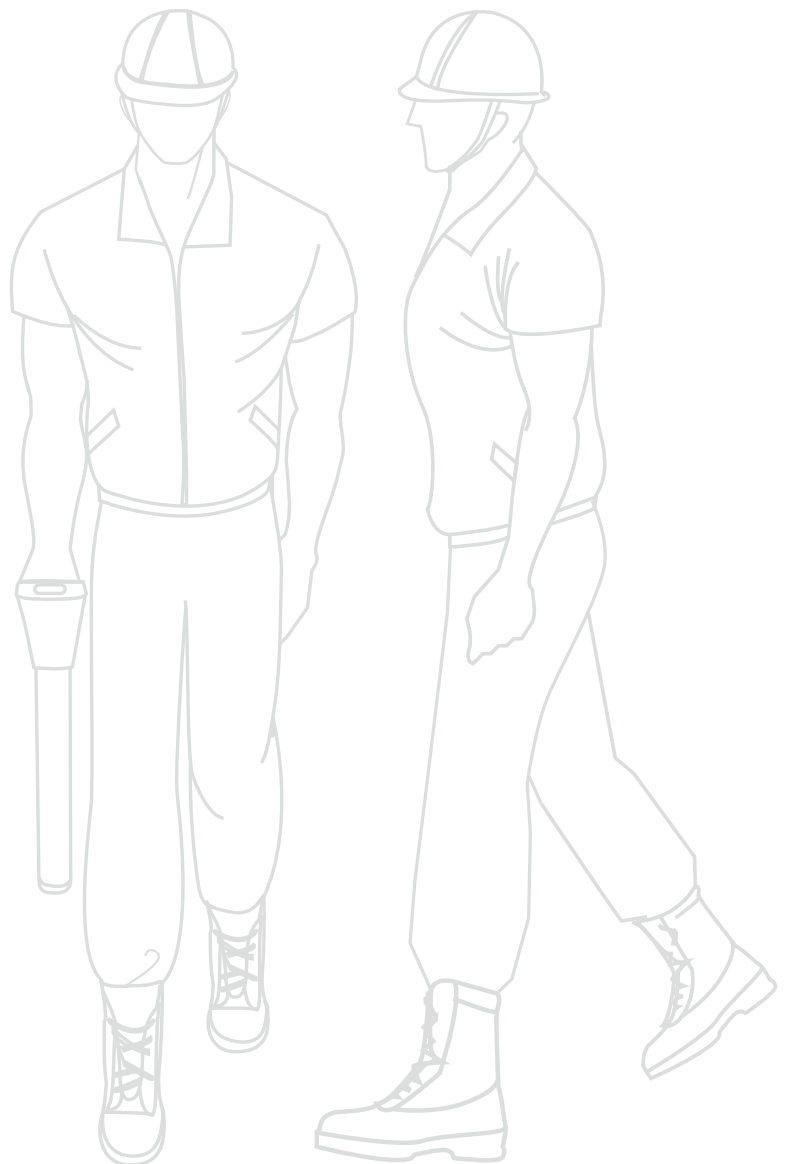
vCam Series User Handbook

vCam Digital/View-Pushrod CCTV

Inspection System

Version 2.0 (English)

Table of Content

General Safety Instructions

Before using for the first time, please read the following items carefully:

1. In general, the vCam can be used in either indoor or outdoor.
2. To ensure safety and reliable operation – DO NOT subject this unit to extreme temperatures, shock or impact.
3. Avoid getting moisture/water inside the enclosure.
4. To avoid the risk of electric shock, do not open the sealed enclosure.
5. Nickel metal hydride (NiMH) rechargeable batteries pack
    a) Do not remove or attempt to access the rechargeable batteries.
    b) Use only specified charger for the rechargeable batteries. Use of an incorrect charger could result in damage to the vCam control module or excessive over-heating.
    c) Do not damage, crush or puncture batteries or subject to extreme heat or fire.
    d) Dispose of these batteries in accordance with your company procedure.
6. Storage temperature: -20°C to +70°C (-4°*F* to 158°*F*).
7. Operating temperature: -10°C to +50°C (14°*F* to 122°*F*).
8. The vCam cameras and termination kit are submergible to 0.6 Bar.
9. The vCam system comply to IP54 standard for water resistance.
10. Control module water resistance (lid closed) also comply to IEC 60529 (Light shower) and shock resistant (lid closed) comply to IEC 60069-2-31.

Service and Support

To contact Vivax-Metrotech for the name of your local Vivax-Metrotech Sales Representative or Service Center call or email the appropriate distribution center listed below:

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Introduction

3.1 System Features

The vCam Digital/View system provides video images from inside pipes, ducts, chimneys and other similar structures. The vCamView is used to view the images from the camera; the vCamDigital includes an internal MPEG4 recording/playback device and software for recording the images seen, adding data, text and audio. With this exception, the systems and the way they are used is the same. This handbook serves as user instructions for both.

Command Module

The command module houses the electronics and controls to operate the system and a LCD display for viewing. Also included in the control module are rechargeable batteries to power the system. The vCam can also be powered by an external 12V DC 3A source or by mains power.

The vCamDigital includes a MPEG4 recorder for recording and playing back the video images and software that enables titles, date, time, distance and an audio commentary to be added to the images recorded.

Both vCamView and vCamDigital include a video out function enabling video to be recorded by an external recording device (VCR or video camera).

Cable Reel

The cable reel is used to store and deploy the pushrod reinforced cable. There are three sizes of cable reel – the standard reel (Type-C) is a cart type assembly in stainless steel, and holds up to 200ft/60m of cable, the mini reel (Type-M) is also manufactured in stainless steel and holds up to 100ft/30m of cable. The largest reel (Type-P) is of painted (powder coat) construction and is used for 400ft/120m lengths of pushrod cable.

This epoxy/Kevlar reinforced pushrod cable enables the user to push the camera considerable distances along a pipe, but retains sufficient flexibility to pass through tight bends and "P" traps. The cable comes in two diameters – 10mm – generally used for small diameter pipes (up to 4inch/100mm) and shorter distances (up to 100ft/30m), - and – 12mm cables used for larger pipes and longer distances. Sensors to indicate how much pushrod cable is deployed are housed in the reel and the length deployed is displayed on the control module front panel and the display.

A spring "termination" assembly is used to mount the camera to the pushrod cable, and provides additional flexibility to push the camera around bends and through "P" traps. The "termination" assembly also includes a transmitting Sonde to enable it to be located from the surface using a pipe and cable locator with 512Hz, 640Hz or 33 kHz modes (some limitations with 33 kHz). The Sonde is positioned approximately 16inches/ 400mm behind the head of the camera.

Camera Module

All cameras are of stainless steel construction and house a color CCD camera module. There are four types of camera – standard and self leveling versions for each of the two (pushrod) cable sizes. Incorporated in the camera assembly are ultra bright LEDs to provide illumination. The number of LED varies dependent on the diameter of the camera.

3.2 System Components

The systems include the following:

The vCamView:
- Control module including internal rechargeable batteries and power supply/charger
- Cable reel includes pushrod cable, Sonde and camera
- Mains power cable
- Interconnect cable (for connecting cable reel to control module)
- Vivax-Metrotech User Handbook

The vCamDigital
- All of the components of the vCamView: plus…
- Internal MPEG4 recorder and playback unit
- Keyboard and titler system
- USB data transfer cable
- A CD containing the CODEC required to view the video file (this CODEC is commonly used and will likely already be on your computer if not however – download this version)

3.3 Important Notes

- It is recommended that the unit is not left on charge for excessive periods of time. This will not damage the unit, but may shorten the batteries life. Recommended charging time is 4-6 hours. The charger should not be turned off/on again during the charging cycle – this could result in over charging and damage to the unit/batteries or reduction of the battery life.

- Power supply/battery charger is internal and operates on 100-240V AC, 1A, 50Hz/60Hz power systems. 100-240V AC 1A power source must be grounded (earthed).

- External 12V DC 3A power source will operate the unit (please note – it does not charge the internal batteries).

- The period of time the vCam can be used on a single charge of the batteries can be extended by having the auxiliary functions turned off when not in use. These included Sonde, microphone and camera lights. Using the unit in "CAMERA" mode (instead of MPEG mode) also uses less power.

- The Sonde in some circumstances can cause interference on the video being viewed/recorded. It is recommended that the Sonde is turned off unless it is actually being used for location. This also saves power.

- The SD slot on the front panel is for programming the MPEG4 player/recorder only. It cannot be used for copying data. To copy date plug in the USB cable into the "DATA" socket on the front panel. To upgrade software – turn off the vCam – insert the SD card into the slot – turn on the vCam, and wait until the main menu appears (this will take several minutes).

- Any computer with USB ports running Windows XP or Vista operating system can be used to import and play video files from the vCam.

- The vCamDigital has two internal clock batteries. The first is for main vCam operating system, the second is for the MPEG device clock. The vCamView has only one internal clock battery. These batteries are similar to those used in a computer – they have a life expectancy of 3 to 5 years.

3.4 Model and Serial Numbers

For quality control and support purposes, each of the main modules of the vCam Digital/View has its own model and serial number.

Control module – model and serial number label is on the base of the housing
Reel assembly – the model and serial number label is on the reel frame
**Camera** – the model and serial number is etched on the body of the camera

NOTE: Always quote the appropriate model and serial number(s) in all communication with the factory, or authorized service centers.

3.5 Command Module, Display, Keyboard & MPEG (vCamDigital) – Controls

The command module contains all of the controls for the operation of vCam Digital/View system. The controls and connector panel are shown as below.
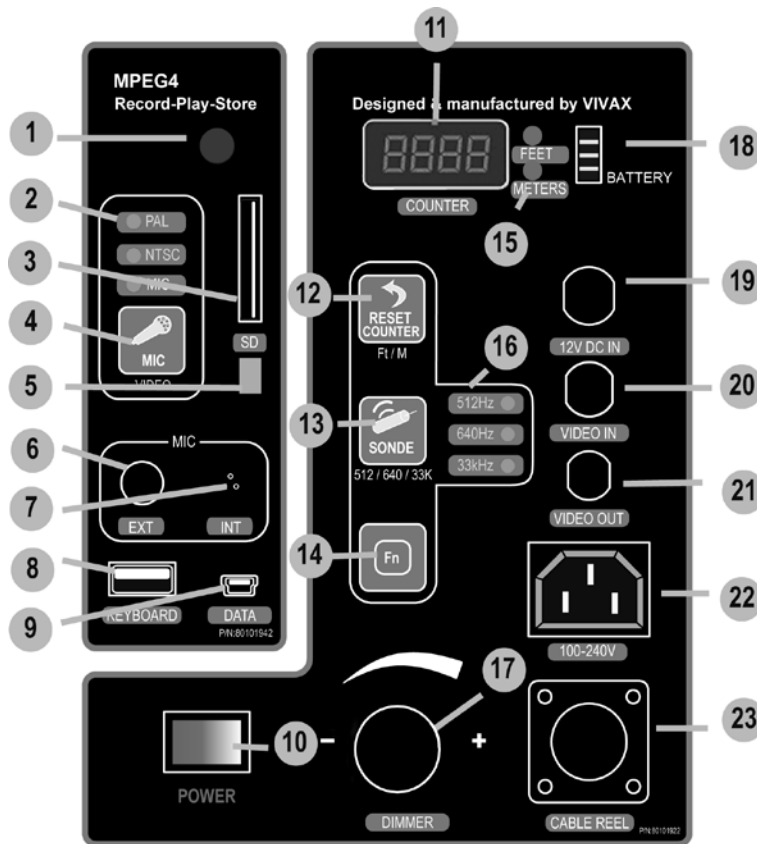
Control panel key to functions:

No	Description	No	Description
1	Infra red receiver (for MPEG)	13	Sonde On/Off button
2	PAL/NTSC & microphone on/off indicators	14	Function key (see below)
3	SD/MMC slot	15	Feet/Meter indicator
4	Microphone On/Off and indicator	16	Sonde frequency (512/640Hz/33kHz) indicator
5	Recorder activity/status indicator	17	Dimmer control for LED camera lights
6	External microphone socket	18	Battery charge indicator
7	Internal microphone	19	12V DC socket (for external 12V DC source-car)
8	USB keyboard	20	Video input (AV)
9	USB data transfer	21	Video output (AV)
10	System mains power On/Off switch	22	Mains power – IN
11	Counter display	23	Interconnect cable socket
12	Reset the counter to zero		

Combinations Functions keys:

Combinations	Functions
Fn and microphone button (#4)	Toggles PAL & NTSC video system
Fn and reset counter button (#12)	Toggles feet & meters
Fn and Sonde button (#13)	Toggles 512Hz – 640Hz – 33kHz
Fn and F12 key	Stores 1st page text
Fn and Alt key	Recalls text memory
Fn and F11	Deletes text memory

The LCD has its own controls; these are in the form of a pushbutton keypad located in the recessed area close to the display. They function as follows:

Camera/MPEG4 : switches between Camera view, VGA view (not used) and MPEG view
Menu **:** used to select items to be adjusted. Items that can be adjusted from the
menu include : BRIGHTNESS, CONTRAST, COLOR, SHARPNESS and VOLUME.
Direction arrows: used to adjust items selected

Items that can be selected or set from the front panel

- Power on, power off.

- Video System – The vCam Digital/View is designed to use with PAL or NTSC system – The video/audio components in the vCam Digital/View adjust video format automatically to suit the camera fitted. PAL and NTSC can also be set manually, by pressing F2 on the keyboard or by holding down the Fn key and pressing the "VIDEO" button.

- Counter mechanism. The counter is used to display the length of pushrod cable deployed. The counter can be reset to ZERO by pressing F6 on the keyboard or "RESET COUNTER" key on the front panel (counter will count up or down, but will not display negative numbers) and the counter display can be toggled to either "feet" or "meters" by pressing F3 on the keyboard or holding down the Fn button, then pressing "RESET COUNTER" on the front panel.

- Dimmer/off control for camera lights (ultra bright LEDs). This is used to dim or brighten the camera lights, or turn them off to save power when the camera is not in the pipe.

- LED's on the front panel confirm the settings of PAL, NTSC, microphone (on/off), and frequency (512Hz, 640Hz, 33 kHz).

3.6 Keyboard function keys

The main software setup functions can be controlled by using the function keys on the keyboard. The keyboard can also be used as an alternate way to set some functions controlled by key pad buttons on the front panel.


ESC   : Clear all text on the screen and previous pages
F1   : Date and time setting
F2   : Toggle between NTSC and PAL video systems
F3   : Toggle between feet and meters
F4   : Add bold or background to text (makes it easier to read)
F5   : Toggle between MM/DD/YYYY, DD/MM/YYYY and YYYY/MM/DD date format
F6   : Reset counter to Zero
F7   : Selects reel type (Type-C, Type-P, Type-M) to ensure counter accuracy
F8   : Changes the position of titler content
F9   : Page Down
F10   : Page Up
F11   : Toggle titler content On/Off
F12   : Edit/Hold titler text
INS   : Insert text
PAUSE : Info On/Off (battery indicator, distance, reel type, date and time)
Ctrl   : Clear/Restore date and time from display

Tips:
1. If the text editor is not functioning, press F12 (the keyboard is in HOLD mode).
2. Press the F12 key to activate 'Edit mode' before entering text.
3. To change Sonde frequency, press and hold the Fn button and then press the "Sonde" button – this will toggle to the next frequency. Release the button then repeat to change frequency again. DO NOT hold the Fn button down and keep pressing Sonde frequency button – this will not work.
4. INS – Is used to insert the text (only). To delete or backspace characters – return to "EDIT (F12) mode".

3.7 Cable Reel Components

The cable reel features are shown below:
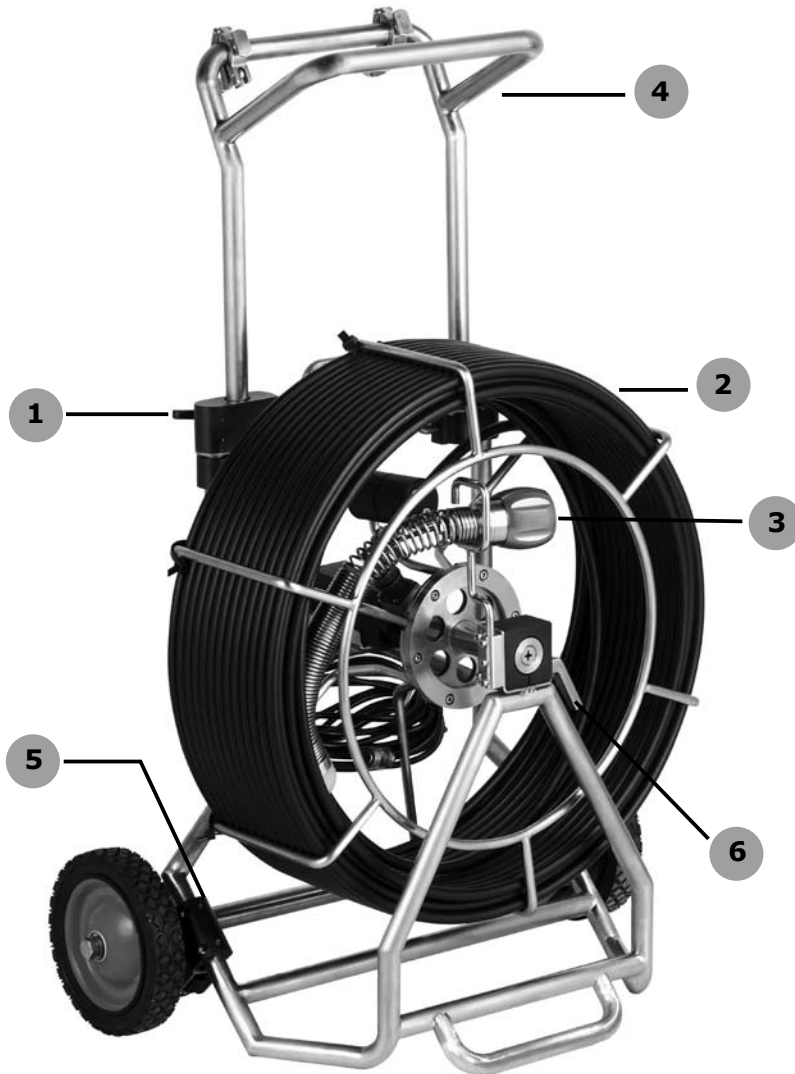
Functions:

NO.	Description
1	Handle locking levers
2	Cable & reel
3	Camera
4	Adjustable handle (Height)
5	Shock absorbed system
6	Brake

3.8 Interconnect cable

This cable is to connect the command module with cable reel. The 90 deg plug fits to the cable reel (and is normally left connected). The straight plug fits the socket on the control module, and is locked in place by the knurled locking collar. Pull on collar when connecting and removing the plug from the socket.

3.9 WARNING – The Reel

 If the brake is released completely the pushrod cable will try and unwind itself. It can move very quickly.

The brake should always be partially applied to slow down cable deployment. Care should be taken when stopping the cable deploying to avoid injury.

Using the vCam

4.1 Setup

Setting up the vCam Digital/View system is easy.

The control module can be placed on the ground and the handle can be rotated (by pulling out both of the contoured knobs, and moving the handle) to set a comfortable viewing angle. Alternately the control module can be mounted to the reel (Type-C) using the two brackets on the handle (optional) (ALWAYS position the handle downwards in parallel with the front panel when putting the control module on top of the reel – this allows the lid/keyboard to rest on the handle for easy use).

Open the lid of the system – this can be removed or left attached to the command module. (There is a storage space inside the lid under the keyboard)

Keyboard – plug the keyboard into the command module (the keyboard can also be removed from the lid, by sliding the release and lifting the metal plate on which it is mounted).

Interconnect cable – ensure that the interface cable plug is correctly connected at the reel, and connect the other end to the appropriate socket on front panel. Ensure that the plug is aligned correctly before pushing into place – locate the plug into the socket using the index slot provided – pull the knurled ring to release the lock when plugging in or unplugging.

Power input – Plug the main cable into the front panel of control module and the other end into an available (grounded) power source (100-240V AC). Alternately plug in a 12V DC power source capable of supplying at least 3A on a continuous basis. The center pin of the 12V DC "power in" socket is "+" and the outer ring is "-". The 12V DC power input does NOT charge the internal batteries – it only serves to run the unit from a 12V DC external source.

Microphone (vCamDigital only) – if an external microphone (optional) is being used plug it in. However if no external microphone is connected, the internal microphone will be used. The microphone system has an on/off control – turn the microphone on only when required to avoid recording general "worksite" conversations. The microphone will only be active when the microphone switched on, and the microphone activated light is illuminated. If using the internal microphone – please get within 3 – 4 inches of the internal microphone when speaking. Always speak clearly and slowly. The audio will be recorded at the same time as the video (provided the microphone is switch on)

NEVER FORCE ANY OF THE PLUGS – always ensure that each of the connections is made before powering up the system.

4 Using the vCam

After setting up as described above,

a) Switch ON, and check that the display is set to "CAMERA" mode.

b) To set the vCam system clock on the screen, press F1 on the keyboard.

c) (vCamDigital only) setup the clock in MPEG recorder in "MPEG" mode – by selecting the "SETTING" screen using the MPEG keypad, then select "TIME".

d) Check the LED on the front panel to ensure that the settings you required for VIDEO, SYSTEM, SONDE FREQUENCY, SONDE ON/OFF, MICROPHONE ON/OFF are correct.

e) The press "RESET COUNTER".

f) Partially release the brake on the vCam reel allowing cable to be pulled off the cable reel. If the cable starts to come off of the reel, without pulling, tighten the brake slightly.

g) Push the camera a short distance inside the pipe and then use the dimmer control on the control module to adjust the lights to an appropriate brightness.

h) This is all it takes – it is extremely simple.

4.2   Titler

This feature is provided on the vCamDigital. The "Titler" system enables the user to add information to the video images being recorded. Basic system information such as date, time, length of pushrod cable deployed, can be captured, and additional text – up to 16 pages of 9 lines with 24 characters per line can be added, storing up to 10 pages.

The titler is toggled on/off by pressing the "F11" key on the keyboard. The content of the titler can be erased by pressing "ESC" at any time the titler is on.

Text is entered using the keyboard. The "F4" key can be used to toggle on/off a feature that makes the text easier to read against the background. The content of the text can be moved to different parts of the viewing screen by using the key "F8".

If the titler information can be seen on the vCamDigital display it will be recorded on the recorder, if it is not visible, it will NOT be recorded.

4.3 Recording and playback – vCamDigital

Record a video file
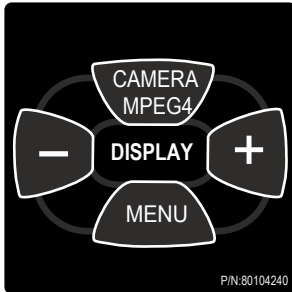
a) Use the "CAMERA /**CAMERA MPEG**" pushbutton to set to "MPEG" mode for recording (It can be used in either "CAMERA" or "MPEG" mode when recording is not required). The " MENU / **MENU**" button and " – ", " + " buttons allow the display features to be set.
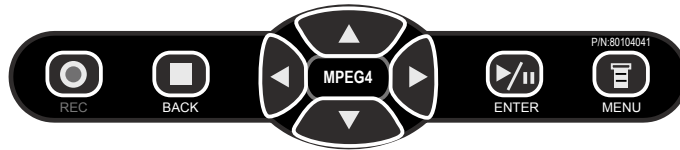
b) When the MPEG system is powered up, press the " /**MENU**" button, the "Main Menu" will appear, use the arrow pushbuttons to select "RECORD NOW", then press " /**ENTER**" to start recording. Alternatively can start recording by pressing on the " /**REC**" buttons.

c) During recording, press " /**ENTER**" to pause recording and press " /**ENTER**" again to restart recording.

d) Press " /**BACK**" to stop recording and save the video file.

View a video file

a) To view the file from the main menu, use the arrow pushbuttons select the "VIEW RECORDED FILE" and press " /**ENTER**". This displays a list of "monthly" folders in numerical order (oldest first).

b) Use the arrow pushbuttons to search the date of the file recorded. Press " /**ENTER**" to select folder. The individual video files are displayed (in a numeric sequence – oldest first). Use arrow pushbuttons to select file and press " /**ENTER**" to play.

c) During playback, press " /**ENTER**" to pause the playback and press " /**ENTER**" again to restart.

d) To stop the playback, press " /**BACK**". To return the system to the "Main Menu" press " /**BACK**" twice.

IMPORTANT – The MPEG recorder/player has its own operating system. It MUST be returned to main menu before powering off the vCam. If the vCam is turned off while the MPEG unit is in VIEW or RECORD mode, an error file is created. The next time the unit is used this error file has to be detected, found and erased, then the files on the MPEG hard drive re-indexed. This is an automatic process and takes approx. 3 minutes (more if the disk contains lots of files). The vCam can still be used in "CAMERA" mode while the MPEG is performing these utility functions, the utility functions will be performed in the background.

4.4   Copying video

Copying video from the MPEG recorder/player to a computer via USB:

a).   Power OFF the vCam – this puts the MPEG player in "slave" mode – which enables your computer to use it as a USB hard drive.

b).   Connect the USB cable between DATA port at the vCamDigital and USB port of the computer.

c).   Using Windows Explorer or alternative computer tools – locate the MPEG drive called "VIVAX-VCAM" (or "Nugate").

d).   All recorded video files on the drive are stored in a file (directory) called "REC_FILE".

e).   Using Windows Explorer or alternative computer tools, copy the file to your computer.

f).   The video file can be viewed using Windows Media Player.

g).   You can also rename files and folders on the MPEG hard drive, but they must remain within the "REC_FILE" to be accessed by the vCam.

Copying video from the MPEG recorder/player to a computer via SD card:

a).   Turn on the vCam and insert SD card into the SD slot.

b).   A screen with "Card Inserted" is shown and press "Enter".

c).   From the main menu, select "View Recorded File" and browse through the files that you want to copy.

d).   With the name of the file highlighted, press "Menu" pushbutton. A series of command will be shown and choose the "Copy to card" using the up and down pushbutton, then press "Enter".

e).   The file will be copied to the SD card and its progress will be shown at a horizontal bar. Do not remove the SD card or turn off the power of the vCam at this moment.

f).   The SD card can only be removed after the file has been copied completely.

IMPORTANT
If your computer doesn't show the image during playback, install the CODEC provided on Vivax-Metrotech vCam program CD. Alternatively, if you are connected to the internet, download the CODEC from www.Vivax-Metrotech.com in "Downloads" section.

4.5   Locating the Camera

The Counter provides a guide to the length of cable deployed, which helps to establish the approximate position of the camera. This length of cable (selectable feet or meters) is displayed on the command module counter. The counter can be set to "Zero" at any time by pressing F6 on the keyboard or the "Reset" button on the front panel of the control module. The counter will count forward and reverse, but will **NOT** display values that are negative (i.e. less than Zero).

Pipe & Cable Locator - the vCam Digital/View is equipped with a Sonde transmitter to enable the exact position of the camera assembly to be located from the surface. This Sonde is located at the end of the camera spring assembly (about 16 inches/ 400mm) behind the camera. A pipe and cable locator is used to locate the position and depth of the camera.

This Sonde is activated by pressing the appropriate button on the front panel. It is recommended to keep the Sonde turned off when not in use, as in some circumstances it can cause interference on the video images being displayed. It also consumes power, which is relevant if running the system on the internal batteries.

Vivax-Metrotech manufactures the vLocCam locator specifically for use with the vCam. The vLocCam can locate 512Hz, 640Hz, 33 kHz the frequencies that the vCam transmits. It also has a "Power" mode for locating metallic pipes and cables that may be adjacent to the target pipe.

⚠️ **IMPORTANT – this does not remove or replace any requirement of the law, local ordinance, or your company/corporation to contact "Call Before You Dig" or Utility companies.**

The vLocCam has been designed for use with the vCam Digital/View systems. It can also be used with CCTV inspections camera systems supplied by other manufacturers using 512Hz/640Hz transmitting frequencies (as many do). In addition, the vLocCam also has 33 kHz and "Power" mode.
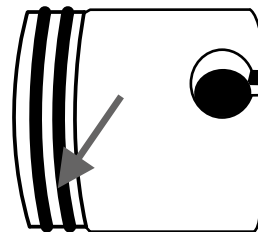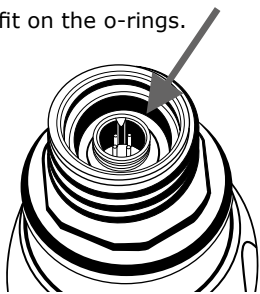
Camera Head Assembly and Disassembly

5.1 Required Tools and Spare Parts

Description	Part Number	Comments
Camera Head Removal Tool	820015293	Enclosed in the equipment of the control unit
Camera Test Cable	820018495	Enclosed in the equipment of the control unit
Camera Head	820013412 (D46/SL, red) 820013413 (D38/STD, gold) 820018906 (D33/SL, black)	For 12mm pushrod cable
	820013414 (D33/SL, green) 820013415 (D33/STD, silver)	For 10mm pushrod cable
O-ring Retermination Kit	820018977 (12mm) 820018980 (10mm)	Required 2x
O-ring Camera Head	820021625 (46mm) 820021627 (33mm)	Required 1x

5.2 Checking the Camera Head

Before the mounting of the camera head the following points have to be checked:

a) O-ring gaskets on reconnection – set and camera head

- fit on the o-rings.

- washers must be clean and a little greased.

b) Lenses and glasses
- Check for jumps and tears.

- If a glass has torn, water can penetrate into the camera head.
- What leads, without fail to the destruction of the camera.

c)   Wire ropes

- The wire ropes under the feather of the reconnection – set should be laid in
   such a way that they do not squeeze the spiral cable.
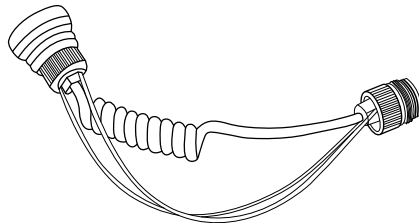
d)   Function check of picture and camera head LED's

- With the help of the test cable, check the function of the camera and the
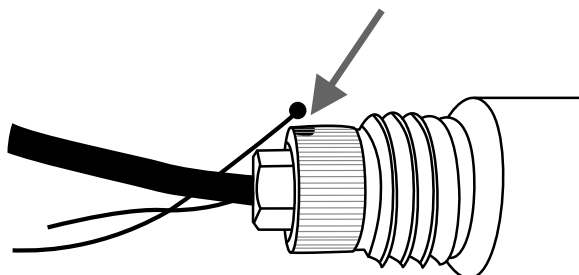   LED's before the head is installed.

5.3   Assembly of the Camera Head

a)   While putting on the camera head pay attention to the fact, that the camera head has a groove and the
   reconnection set has a joint.
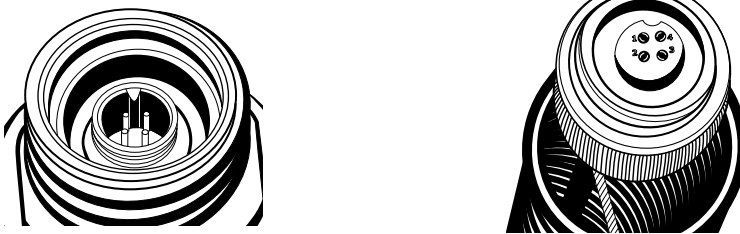
b)   The plug of the reconnection - sets should be inserted smooth in the camera head. Any use of force leads to
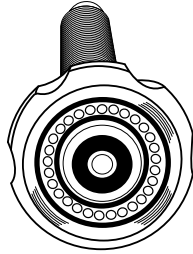   the destruction of the pins, or the socket.
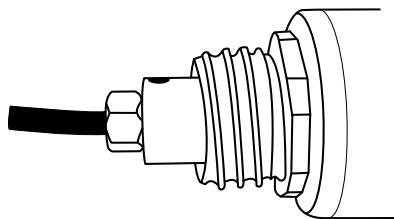
c)   By putting on the camera head, insert the wire ropes in the eyelets and screw together the wrap mother
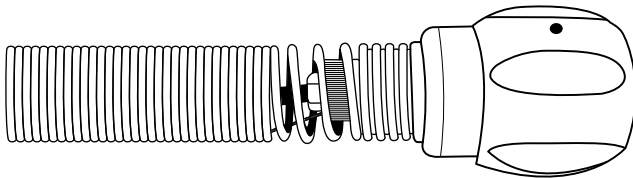   with the camera head. Check the stick of the wire ropes.

d) To prevent twisting around the wire ropes, turn the camera head about 5 full rotations anti-clockwise before you touch it down on the feather.
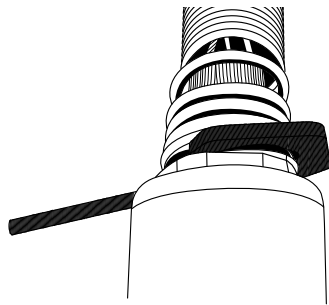
e) Now screw the head clockwise into the feather.

f) Check the stick of the wire ropes by pulling the head.

5.4 Disassembly of the Camera Head

a) To dismantle the camera head, use only the feather opener (820015293) provided.
b) To dismantle the camera head, attach the feather opener as shown in picture below and turn the camera head anti-clockwise.

c) After the head is unscrewed completely from the feather, unscrew the wrap mother.

Note:
Clean and grease the O – rings of the camera head regularly to guarantee the density.
Worn or defective O – rings must be substituted immediately.

Health and Safety

This equipment is primarily used for inspecting sewer pipes, by professionals operating in the sewer industry, and maintained by professionals familiar with the health risks on maintaining equipment that has been in a sewer.

Such professionals will be protected by their own company's recommendations and work practices. If for any reason they are not, or are not familiar with such practices, please email gavin_wong@vivax-cn. biz for a copy of the Health and Safety Document used by Vivax-Metrotech for employees involved in the demonstration, maintenance and handling of sewer camera systems.

Disclaimer: All product availability or product accessory information is subject to change without notice.

Notes:

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