



Operators Guide

Vector 950 E

Pan and Tilt Head

Publication Part No. V4004-4980
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Original Instructions

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Preface

Thank you and congratulations on your new Vector 950E from Vinten Radamec

We want you to get the most from your new Vector 950E, and therefore encourage you to read this operators guide to familiarise yourself with its many features, some of which may be new to you. It also covers essential health and safety information and a section on maintenance that will ensure you keep your new product in perfect condition.

Features and benefits of your new Vector 950E

The Vector 950 has been specifically designed to meet the exacting demands of camera operators working with full facility studio and OB cameras. The Vector 950 offers a high level of control with many unique features.

- **Suitable for a wide range of cameras, from 16-120 kg (35-264.5 lb) at 150 mm (6 in.) C of G and supplied with a wedge adaptor.**
- **The unique Perfect Balance system provides infinite adjustment, enabling you to achieve perfect camera balance throughout the tilt range, regardless of drag setting.**
- **A retractable adjuster provides extensive camera fore and aft movement so that you can position the camera easily and perfectly.**
- **The digital counterbalance display provides an LCD numerical display, indicating the level of counterbalance chosen to balance the camera. This is particularly useful if you regularly change your camera, lens, viewfinder or battery combination, as you can quickly 'dial in' the number that suits that particular combination.**
- **You can keep up with the action as it happens with the responsive TF Drag control. It provides a wide range of infinitely adjustable, frictionless drag from very light to extremely heavy, suitable for operating conditions down to - 40°C and up to + 60°C. The TF drag system also allows you to pan extremely quickly or “whip pan” from one position to another, recovering instantly without any spring back.**
- **You can set up easily in low light conditions using the illuminated level bubble and back-lit display.**
- **Easy to carry, with an integral, fold-away handle.**
- **High resolution pan and tilt encoder output**

Once again, thank you for choosing the Vector 950E.

We are confident it will give you many years of reliable performance.

Safety - read this first

Warning Symbols in this Operators Guide



Where there is a risk of personal injury, injury to others, or damage to the pan and tilt head or associated equipment, comments appear, highlighted by the word **WARNING!** and supported by the warning triangle symbol.

Technical data

Weight	15 kg (33 lb)
Height to wedge adaptor mounting face	24.8 cm (11.3 in.)
Length	22.5 cm (8.9 in.)
Width	34.2 cm (13.5 in.)
Typical payload	16-120 kg (35-264.5 lb) - See balance graph (Fig 3)
Tilt range	60 kg payload to $\pm 90^\circ$, 120 kg payload to $\pm 60^\circ$
Pan range	360°
Tilt resolution	638,031 counts per 360°
Pan resolution	641,280 counts per 360°
Power requirement - Encoders	5V dc $\pm 10\%$
Operating temperature range	- 40°C to + 60°C (- 40°F to + 140°F)
Pedestal/tripod fixing	Four-hole flat base 'Quickfix' adaptor Mitchell adaptor

Further information

For further information or advice regarding this pan and tilt head, please contact Vinten Radamec, your local Vinten Radamec distributor (see back cover) or visit our website.

For details on maintenance and spare parts, please refer to the Vector 950E Pan and Tilt Head Maintenance Manual and Illustrated Parts List (Publication Part No. V4004-4990) This is obtainable from Vinten Radamec or your local Vinten Radamec distributor. For information on-line, visit our website at

www.vintenradamec.com

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Associated publication

Vector 950E Pan and Tilt Head
Maintenance Manual
Publication Part No. V4004-4990

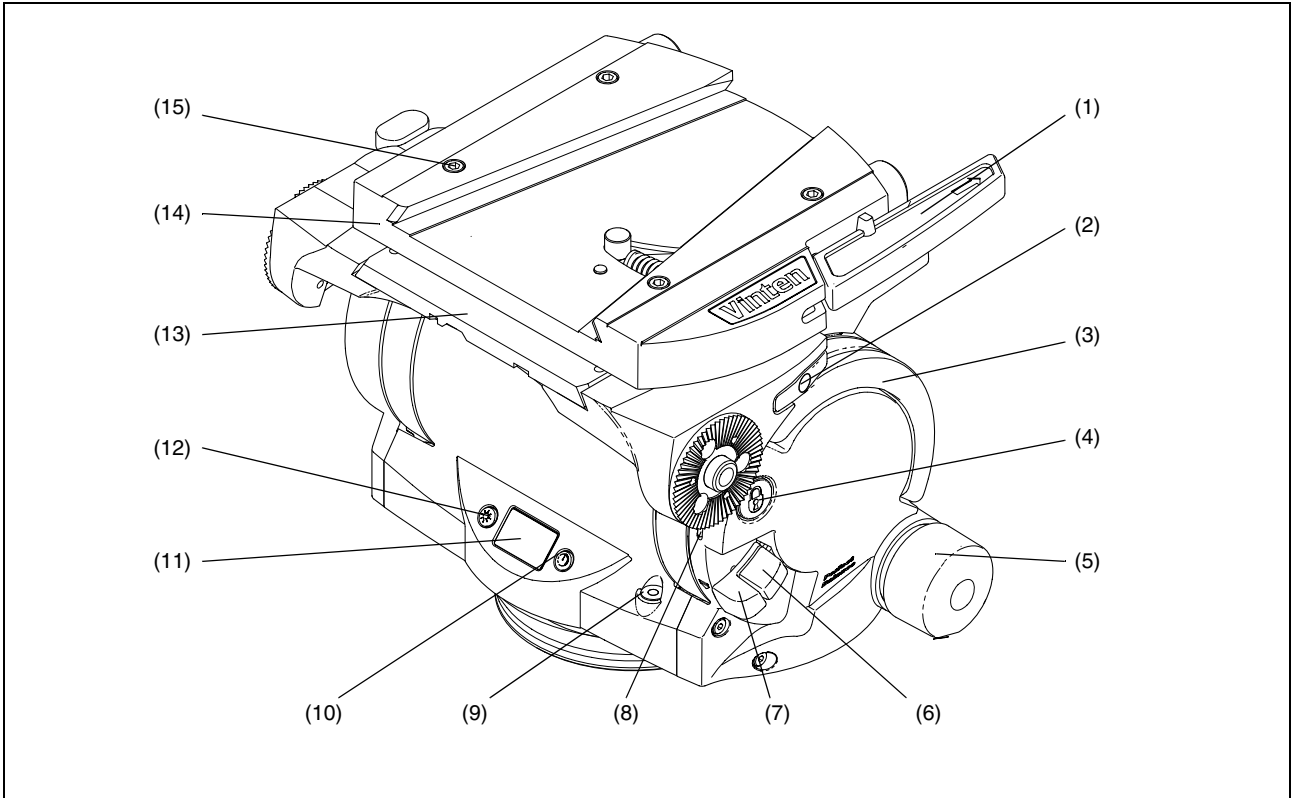


Fig 1 Vector 950E Pan and Tilt Head (Right-Hand Side)

- | | |
|------|---------------------------------|
| (1) | Wedge adapter operating lever |
| (2) | Sliding plate adjustment handle |
| (3) | Carrying handle |
| (4) | Centre lock plunger |
| (5) | Balance knob |
| (6) | Tilt brake lever |
| (7) | Pan brake lever |
| (8) | Centre lock release lever |
| (9) | Illuminated level bubble |
| (10) | Timer button |
| (11) | Digital display |
| (12) | Illumination button |
| (13) | Graduated sliding plate |
| (14) | Wedge adapter |
| (15) | Wedge adapter mounting screw |

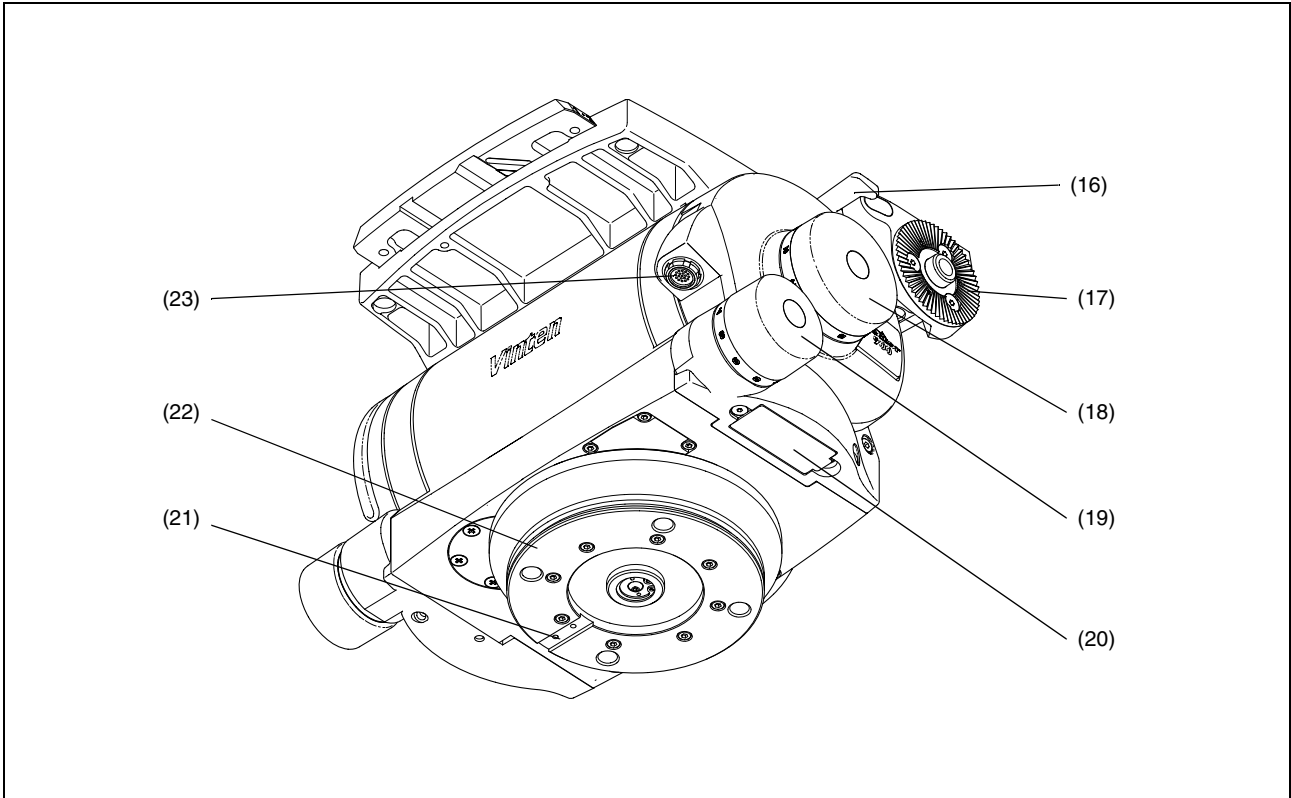


Fig 2 Vector 950E Pan and Tilt Head (Left-Hand Side)

- | | |
|------|---------------------------|
| (16) | Sliding plate clamp lever |
| (17) | Pan bar mounting |
| (18) | Tilt drag adjustment knob |
| (19) | Pan drag adjustment knob |
| (20) | Battery cover |
| (21) | Mitchell adapter key way |
| (22) | Four-hole mounting plate |
| (23) | Encoder connector |

Introduction

The Vector 950E (Figs 1 and 2) combines a manually-operated pan and tilt head with electronic encoders to provide precise real-time digital electronic positioning.

The Vector 950E pan and tilt head also embodies a unique and patented spring counterbalancing mechanism, thin film (TF) drag assemblies for pan and tilt motions and an adjustable camera mounting plate.

Perfect balance

The spring counterbalancing mechanism comprises four springs operating against a three-dimensional cam connected to the camera mounting platform. The balance mechanism is adjusted by a knob (5), situated on the right front lower part of the main body, which varies the mechanical advantage between the cam and the springs. The knob has a 'push in and turn' action and is fitted with a clutch to prevent inadvertent damage to the balance mechanism.

Maximum and minimum payloads that can be balanced, and tilt ranges, are dependent on the weight of the camera and accessories and on the centre of gravity (C of G) height.

The graph (Fig 3) shows the range of load and C of G height that can be maintained in balance. The shaded area of graph corresponds to those load/C of G combinations that can be balanced over the full tilt range. The area to the right indicate the progressively reducing tilt range with greater load and higher C of G.

Where a load/C of G combination falls outside of the graph it will be necessary to increase or decrease the weight or the C of G height - if possible - to enable the head to balance the load.

A digital display (11) indicates the setting of the balance mechanism on a scale of 0-100. The display is active when the balance knob (5) is turned and extinguishes automatically approximately 15 seconds after adjustments are complete. The display may be lit by pressing the illumination button (12). The battery for the system is housed in a compartment in the base of the head, closed by a cover (20).

TF drag

Both the pan and tilt mechanisms incorporate the Vinten thin film (TF) system to ensure smooth movement of the camera about these axes and are fitted with control knobs (18, 19) to adjust the drag setting. The whip-pan facility is unaffected by the pan drag setting. Both drag knobs are provided with scales illuminated by the button (12). The lights will go out after approximately 15 seconds.

Pan and tilt brakes

Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for both brakes (6, 7) are located side-by-side on the right-hand side of the head.

Centre lock

A centre lock (4) allows the head to be locked in the horizontal position.

Illuminated level bubble

A level bubble (9), illuminated by pressing the illumination button (12), is fitted to the rear of the head. The same button also illuminates the pan and tilt drag knob scales and the LCD display. The light will go out after approximately 15 seconds.

Pan bar

Pan bar mounting points (17) are located at the rear of the head, on either side of the camera mounting platform. A telescopic pan bar is supplied and is attached using a pan bar clamp, with angular adjustment available on the mount serrations. A second pan bar may be fitted.

Wedge adaptor

The camera is attached to the head by means of a wedge adaptor (14), which is mounted on a graduated sliding plate (13). The position of the slide plate is adjusted by a retractable knob (2) and a clamp (16) is provided to hold the slide plate in position.

Four-hole mounting plate

The head is provided with a standard Vinten four-hole mounting plate (22), which includes a 'Quickfix' mounting and provision for use of a Mitchell adapter (21).

Carrying handle

A retractable carrying handle (3) is provided on the right-hand side of the head. The handle is spring-loaded to the closed position.

Positioning encoders

The Vector 950E is fitted with rotary optical incremental encoders for pan and tilt, accessed via a connector (23) on the left-hand side of the head. Input power to the encoders is +5 V dc at 200mA maximum.

The quadrature square wave outputs are designed for connection to TTL-compatible circuitry and provide high-resolution real-time digital output of 641,280 counts for 360° of pan and 638,031 counts for 360° of tilt.

Electronic unit

An electronic unit is fitted to the rear of the head, powered by a battery housed in a compartment (20) in the base of the head. The unit comprises a two-row digital display (11) and two push-button buttons - an illumination button (12), which illuminates the LCD display, levelling bubble and the pan and tilt drag knob scales for 15 seconds, and a timer button (10). Pressed singly or in conjunction with each other, the buttons provide control of the time, stopwatch and calibration functions.

For a detailed description of each function, see **Digital display**, on page 13.

Operation

Installing the head



WARNING! If using lifting equipment to raise or lower the head, use slings or straps. **DO NOT use shackles.** Ensure that slings or straps are securely attached to the head. A suitable lifting point is at the rear of the platform, accessed by moving the sliding plate (13) to the fully forward position. **DO NOT attach lifting slings or straps to the carrying handle.**

The Vector 950E head may be installed on a standard 'Vinten' tripod or pedestal using the four mounting bolts and washers provided or by using a 'Quickfix' adaptor.

Adaptors are available which enable the heads to be installed on tripods or pedestals fitted with other mountings. These are listed in the Parts List under Optional accessories.



WARNING! Before installing the head, hold a fixing bolt in position and check that the threaded end does not project more than 12 mm (15/32 in.) above the mounting face.

After mounting the head on a tripod, use the level bubble (9) to set it level. The level bubble may be illuminated by pressing the illumination button (12). The light will go out after approximately 15 seconds.

Pan bars

Fit the pan bars on the mountings (17) and adjust the position of each one before tightening the clamps. Adjust the length of the telescopic pan bar. Optional fixed and short fixed pan bars are available (see Main assemblies in the Parts List).

Fitting a camera



WARNING! Do not rely on the tilt brake when changing the payload. Always engage the centre lock. Ensure that the weight and C of G height of the total payload is within the range for which the head is designed. **If installing on a pedestal, lock the pedestal in the fully depressed position before installing the camera.**

To fit a camera, proceed as follows:

If not already fitted, install the wedge adaptor (14) in the middle position on the sliding plate (13) (see **Servicing**).

Attach the wedge to the camera/lens.

Ensure that the centre lock (4) is engaged (see **Locking the platform**).

Slide the wedge adaptor operating lever (1) forward (parallel to the wedge) about 6 mm (1/4 in.) against spring tension. Pull the operating lever out, away from the body of the wedge adaptor, as far as it will go.

Insert the camera wedge into the wedge adaptor and push it forward into full engagement. Push in the operating lever (1) until it lies parallel with the wedge adaptor body. During this operation resistance of the spring-loaded over-centre mechanism will be felt. As the lever reaches the end of its travel it will slide back (parallel to the wedge) to the locked position.

Confirm that the lever is in the locked position. This is indicated by coloured bands above the lever. When the green band only is visible, the lever is locked. If any of the red band can be seen, the lever is not locked.

Install the remainder of the payload (lens, zoom and focus controls, viewfinder, prompter etc).

Connecting the head

The Vector 950E is supplied with an unwired male 19-pin Fischer connector, which should be wired to suit the installation. Encoder pin designations are listed in Table 1.

Stability



WARNING! When mounting the head on a tripod, it is possible to set the tripod legs so that the centre-of-gravity of the tilted payload falls outside the footprint of the tripod, leading to instability. Use the mid-level or floor spreader to ensure that the tripod legs are spread sufficiently so that the centre-of-gravity of the tilted payload remains within the footprint of the tripod. Where possible, use the tie-down hook on the tripod for additional stability.

Balancing the head

Note: It is important that the pan bar(s) and all camera accessories (lens, zoom and focus controls, viewfinder, prompter etc.) are fitted in their operational position and the system connected before balancing the head. Any equipment fitted or adjusted later will unbalance the head.

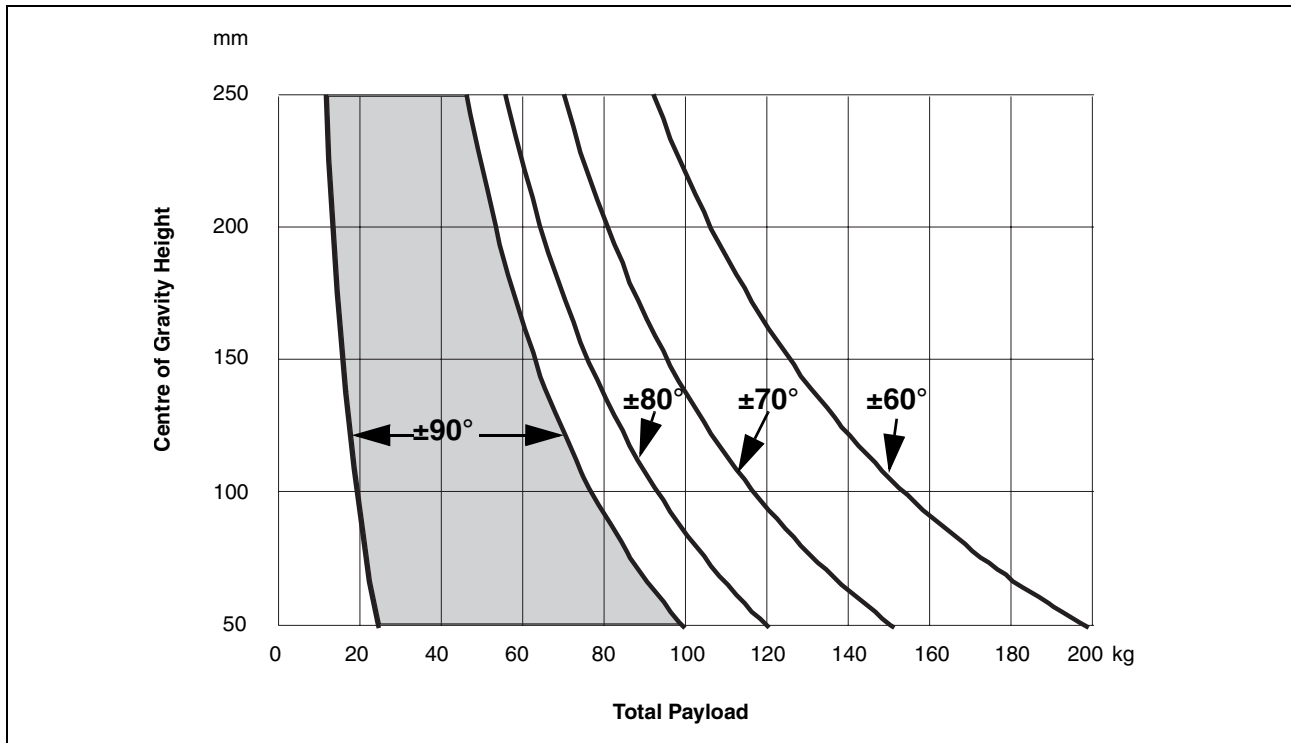


Fig 3 Balance Graph

Balancing the Vector 950E head achieves two objectives. Firstly, when a head is correctly balanced the operator will need a minimum amount of even effort to move the head. Secondly, once balanced, the head and its payload can be set to any tilt position and the head will maintain this position with 'hands off'.

The graph (Fig 3) shows the range of load and C of G height that can be maintained in balance. The shaded area of graph corresponds to those load/C of G combinations that can be balanced over the full tilt range. The area to the right indicate the progressively reducing tilt range with greater load and higher C of G. Fore and aft balance

When positioning the payload it is important to be aware of the potential danger of an unbalanced payload falling away suddenly. Before disengaging the centre lock, set the balance adjustment knob (5) to its mid point setting (50 on the digital display). Depending on the payload weight, it may be necessary to increase or decrease this setting to enable the payload to be correctly balanced fore and aft.

Balance the payload fore and aft as follows:

Ensure that the centre lock is engaged (see Locking the platform) and that the camera and all accessories are fitted.

Turn the tilt drag adjustment knob (18) to minimum.

Push in and turn the balance adjustment knob (5) to its mid point setting.



WARNING! Be prepared to prevent the head falling away suddenly. In the event of the head falling away violently, increase the setting on the balance adjustment knob (5).

Holding the pan bar to steady the platform, disengage the centre lock (see "Locking the platform" on page 13).

Release the sliding plate clamp (16) and pull out the sliding plate adjustment knob (2) until it engages with the platform drive. Turn the knob to move the sliding plate fore and aft to achieve horizontal balance.

Note: The sliding plate is graduated to facilitate balancing. If the balance setting of the payload is known, turn the knob until that setting is reached.

The horizontal balance is correct when no perceptible tilting force can be felt on the pan bar with the platform level. Apply the sliding plate clamp (16) and push in the adjustment knob (2) to its stowed position.

If there is insufficient movement in the sliding plate to achieve balance, reposition the wedge adaptor (see Repositioning the wedge adaptor), refit the load and repeat the horizontal balancing procedure.

The sliding plate is graduated. Make a note of the position to facilitate rebalancing this particular payload.

Payload weight and C of G height adjustment

When fore and aft balance has been achieved, carry out the payload weight and C of G height adjustment as follows:

Note: If the digital balance setting of the payload is known, push in and turn the balance knob (5) until the digital display (11) shows that setting.

Using the pan bar, tilt the platform forward and backward. When correctly balanced, there should be no perceptible tilting force on the pan bar at any angle of tilt and the head should remain in any tilt position to which it is set.

Note: Setting the platform level will facilitate adjusting the balance setting

If the head tends to fall away when the platform is tilted, set the platform level and push in and turn the balance adjustment knob (5) clockwise to increase the balance setting. If the head tends to spring back to centre, set the platform level and push in and turn the balance adjustment knob (5) counter-clockwise to decrease the balance setting.

When the payload weight and C of G height adjustment is complete, check that the fore and aft balance remains satisfactory. Re-adjust the position of the sliding plate if necessary.

The digital display (11) will display the balance setting while balance is being adjusted. Make a note of the final setting to facilitate rebalancing this particular payload.

After balancing, exercise the head through both axes to confirm that it operates smoothly.

Locking the platform

The centre lock mechanism is operated by a plunger on the right-hand side of the head. To engage the lock, hold the platform in the horizontal position and push the plunger (4) inwards until it latches and the release lever (8) appears. Use the pan bar to rock the platform slightly whilst pushing the button.

To release the centre lock, rock the platform slightly and push down on the release lever (8).

Pan and tilt brakes

The pan (7) and tilt brakes (6) are operated by levers on the right of the head. The brakes are applied by pushing the appropriate lever down and released by pulling the lever up.

The brakes should be applied whenever the camera is left unattended.

Pan and tilt drag

Both the pan and tilt mechanisms incorporate the Vinten thin film (TF) system to ensure smooth movement of the camera about these axes and are fitted with control knobs to adjust the drag setting.

Both drag knobs are provided with illuminated scales, graduated from 0 to 9. To illuminate the scales, press the button (12). The light will go out after approximately 15 seconds.

The drag adjustment knobs are mounted on the left-hand side of the head. The smaller pan drag knob (19) is on the front lower part of the main body, with the larger tilt drag knob (18) in the centre on the tilt drag housing.

To increase drag, turn the knob clockwise, towards a higher graduation. To decrease drag, turn the knob anti-clockwise, towards a lower graduation. The whip-pan facility is unaffected by the pan drag setting.

Digital display.

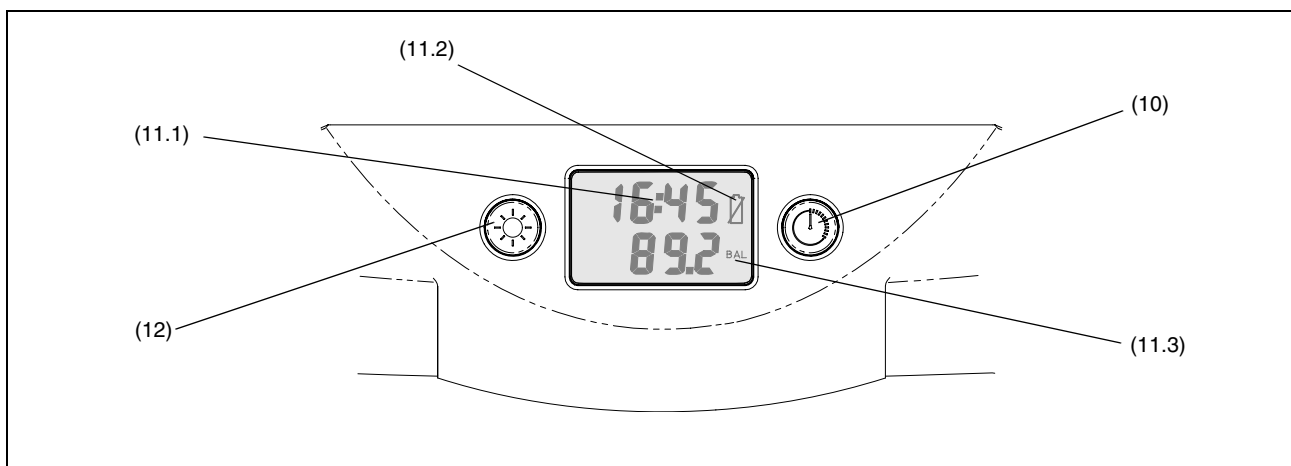


Fig 4 Digital display

The digital display (11) comprises a two-row LCD display. It has three modes of operation, selected by the buttons (10, 12). The display may be illuminated by pressing the illumination button (12) Clock and stopwatch

The top row of the display is a 24-hour clock (11.1), which is always visible. This is the default mode. The bottom row is a stopwatch, counting in seconds and minutes from 00:00 to 59:59.

To set the clock:

Press both buttons (10, 12) momentarily. The hours display will flash.

Use the timer button (10) to increment the hours.

Press the illumination button (12). The minutes display will flash.

Use the timer button (10) to increment the minutes.

Press the illumination button (12) to exit and start the clock.

To display, start, stop or clear the stopwatch:

Momentarily pressing the timer button (10) will display, start, stop or clear the stopwatch in that sequence.

Balance

Balance mode is active any time the balance adjustment knob (5) is turned (unless the stopwatch is running) and remains active for 15 seconds after adjustment has finished. In this mode the bottom row shows the setting of the balance mechanism on a scale of 0.0 to 100.0 The BAL legend (11.3) is also lit. The top row of the display shows the 24-hour clock.

Calibration

This mode allows the balance display to be calibrated (see Balance mechanism digital display calibration). It is activated by pressing and holding both buttons (10, 12) for five seconds.

Low battery



The low battery indicator (11.2) will flash whenever the battery requires replacement (see “Electronic unit battery replacement” on page 15).

Servicing

General

The Vector 950E pan and tilt head is robustly made to high engineering standards and little attention is required to maintain serviceability save regular cleaning.

Refer to the appropriate section in the Maintenance Manual if any defect is apparent. Adjustments and repairs should be carried out only by a competent person.

Routine maintenance

Replace the electronic unit battery whenever the low battery indicator flashes.

During use, check the following:

- Check the effectiveness of the pan and tilt brakes. Reset as necessary.

- Check the effectiveness of the slide plate clamp. Reset as necessary.

- Check the operation of the balance mechanism digital display and the illumination of the LCD, level bubble and drag knobs. Replace battery if necessary.

No further routine maintenance is required.

Cleaning

During normal use the only cleaning required should be a regular wipe over with a lint-free cloth. Dirt accumulated during storage or periods of disuse may be removed with a semi-stiff brush. Particular attention should be paid to the wedge location faces of the wedge adaptor.

Note: Use only detergent-based cleaners. DO NOT use solvent- or oil-based cleaners, abrasives or wire brushes to remove accumulations of dirt as these damage the protective surfaces

Use out-of-doors under adverse conditions may require special attention and the head should be covered when not in use. Salt spray should be washed off using fresh water at the earliest opportunity. Sand and dirt act as an abrasive and should be removed using a semi-stiff brush or a vacuum cleaner.

Electronic unit battery replacement

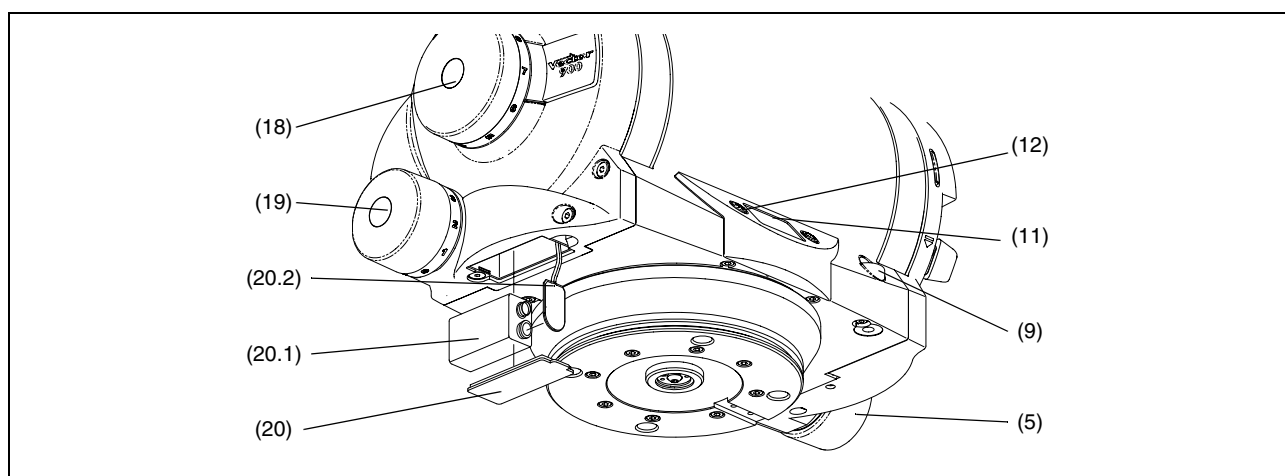


Fig 5 Electronic unit battery replacement

The battery powers the digital display and illuminates the LCD, the level bubble and the drag knob scales. The battery should be replaced whenever the low battery indicator flashes.

Note: Removal of the battery will not affect the calibration of the balance mechanism display.

Prise out the battery cover (20).

Pull the battery (20.1) out of the battery compartment as far as the wiring will allow.

Pull the connector (20.2) off the terminals of the old battery and push it onto the terminals of the new battery (20.1).

Install the battery (20.1) in the battery compartment, ensuring that the wiring is neatly stowed.

Refit the battery cover (20).

Press the illumination button (12) and ensure that the balance mechanism digital display (6), the level bubble (9) and drag knob scales (18, 19) are lit for approximately 15 seconds.

Turn the balance knob (5) and ensure that the balance display (11) is active for approximately 15 seconds.

Reset the clock (see The digital display (11) comprises a two-row LCD display. It has three modes of operation, selected by the buttons (10, 12). The display may be illuminated by pressing the illumination button (12) Clock and stopwatch).

Balance mechanism digital display calibration

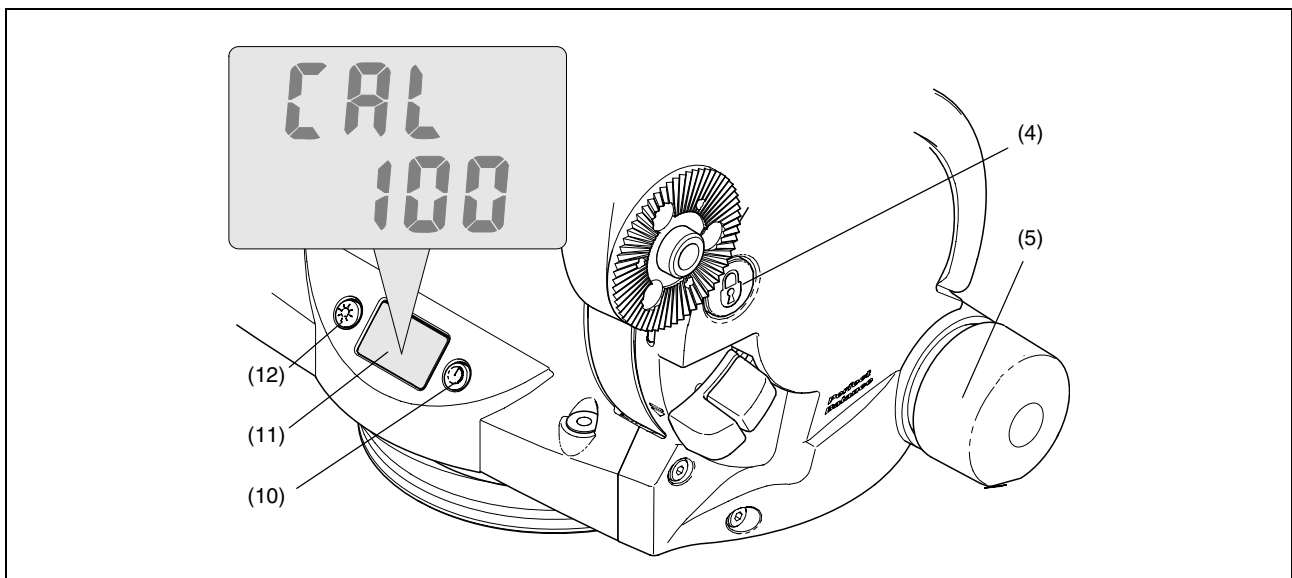


Fig 6 Digital display calibration

The digital display (11) indicates the setting of the balance mechanism on a scale of **0** (minimum setting) to **100** (maximum setting). In the unlikely event of this system requiring calibration, proceed as follows:

Note: If more than five minutes is allowed to elapse before completion, the system will shut down and revert to its previous settings.

Level the platform and apply centre lock (4).

Press and hold both buttons (10, 12) until CAL is displayed on the top row of the display.

Push in and turn the balance knob (5) counterclockwise until its minimum end stop is reached, then turn back two full turns. The bottom row of the display will flash 0.

Press and release the timer button (10). The bottom row of the display will flash 100.

Push in and turn the balance knob (5) clockwise until its maximum end stop is reached, then turn back two full turns.

Press and release the timer button (10). Calibration is now complete and the display will revert to the default clock mode.

After calibration, rebalance the head (see “Balancing the head” on page 11).

Adjustments

To enable the payload to be correctly balanced, the wedge adaptor may require repositioning.

The following adjustments may be necessary after prolonged use:

- The platform slide clamp may require adjustment.

- The pan and tilt brakes may require adjustment.

Repositioning the wedge adaptor (Fig 1)

The wedge adaptor (14) is secured by four cap head screws (15) which pass through the wedge adaptor into the sliding plate (13). The wedge adaptor may be fitted in three positions.



WARNING! Overlong screws will prevent the sliding plate from operating. Always use the screws provided (M6 x 30 mm).

To reposition the wedge adaptor:

- Engage the centre lock (see Locking the platform) and remove the payload.

- Hold the body of the wedge adaptor (14) and use a 4 mm hexagon wrench to remove four securing screws (15).

- Reposition the wedge adaptor (14) on the sliding plate (13), ensuring that the narrow end of the wedge adaptor faces forwards

- Insert the four screws (15) in the holes in the wedge adaptor and tighten.

Platform slide clamp adjustment

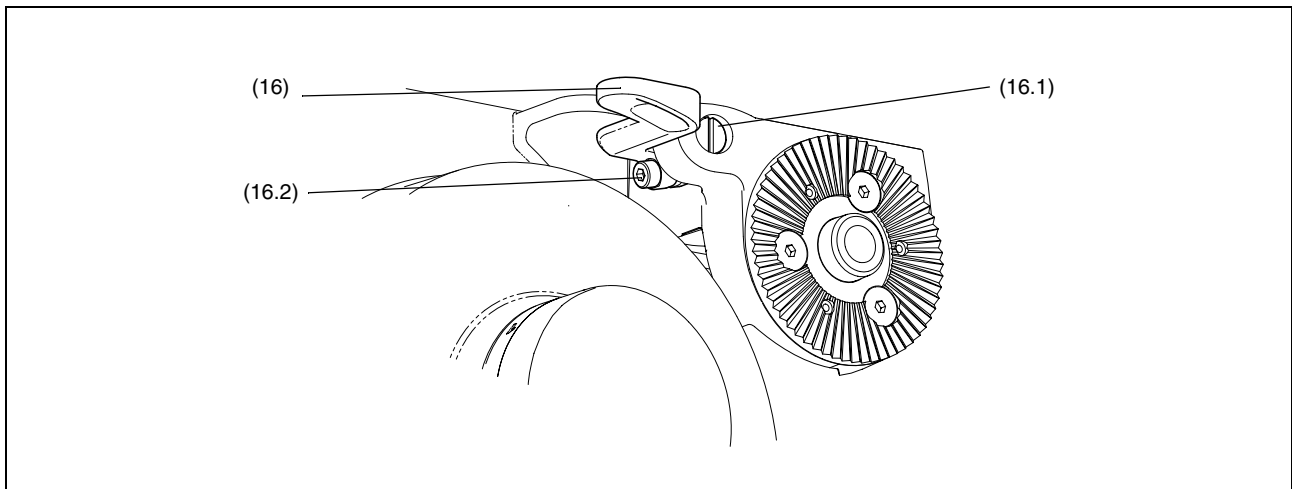


Fig 7 Platform slide clamp adjustment

The platform slide clamp should be set so that, in the up or clamped position it prevents the platform slide from being moved, while in the down or released position it allows free adjustment of the slide. To adjust the clamp, proceed as follows:

Pull the slide clamp lever (16) fully upwards.

Slacken the clamp screw (16.2).

Turn the slotted shaft (16.1) fully clockwise to apply the clamp.

Tighten the clamp screw (16.2).

Move the lever over its full range and ensure that, in the clamped position, it prevents the slide from being moved, while in the released position it allows free adjustment of the slide. Re-adjust if necessary.

Pan and tilt brake adjustment

The pan (7) and tilt brakes (6) are operated by levers on the right of the head. The brakes are applied by pushing the appropriate lever down and released by pulling the lever up.

If the brakes become ineffective, adjustment should be carried out by qualified personnel in accordance with the Maintenance Manual (Publication Part No. V4004-4990).

Tables

Table 1 - Encoder Pin Designations

Encoder Connector		Function	Wire Colour	Output Connector Pin No.
Pan	Pan 1	GND	Black	1
	Pan 3	+5Vdc	Brown	2
	Pan 7	I-	Red	3
	Pan 8	I+	Orange	4
	Pan 9	B-	Yellow	5
	Pan 10	B+	Green	6
	Pan 11	A-	Blue	7
	Pan 12	A+	Violet	8
Not used				9
Tilt	Tilt 1	GND	Black	10
	Tilt 3	+5Vdc	Brown	11
	Tilt 7	I-	Red	12
	Tilt 8	I+	Orange	13
	Tilt 9	B-	Yellow	14
	Tilt 10	B+	Green	15
	Tilt 11	A-	Blue	16
	Tilt 12	A+	Violet	17
Not used				18
Not used				19

Parts List

The following list includes the main assemblies, user-replaceable spare parts and optional accessories. For further information regarding repair or spare parts, please contact Vinten Radamec or your local distributor.

For information on-line, visit our website at

www.vintenradamec.com

Main assemblies

Vector 950E pan and tilt head	V4004-0001
Wedge adaptor	3389-3
Standard wedge plate	3053-3
Short wedge plate	3391-3
Telescopic pan bar and clamp	3219-82
Fixed pan bar and clamp	3219-94
Short fixed pan bar and clamp	3219-93
Fixing bolt	L054-714
Washer - for fixing bolt	L602-122
Spanner - for fixing bolts	J551-001

User-replaceable spare parts

Battery - 9V, 6LR61 (PP3, 6AM6, MN1604, E-BLOCK or equivalent)	C550-023
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Optional accessories

Heavy-duty Quickfix adaptor	3490-3
Levelling adaptor Quickfix to 4-bolt flat base	3328-30
Lightweight Mitchell adaptor	3103-3
Heavy-duty Mitchell adaptor - for Vinten pedestal mounting in conjunction with Hi-hat adaptor Part No. 3055-3	3724-3