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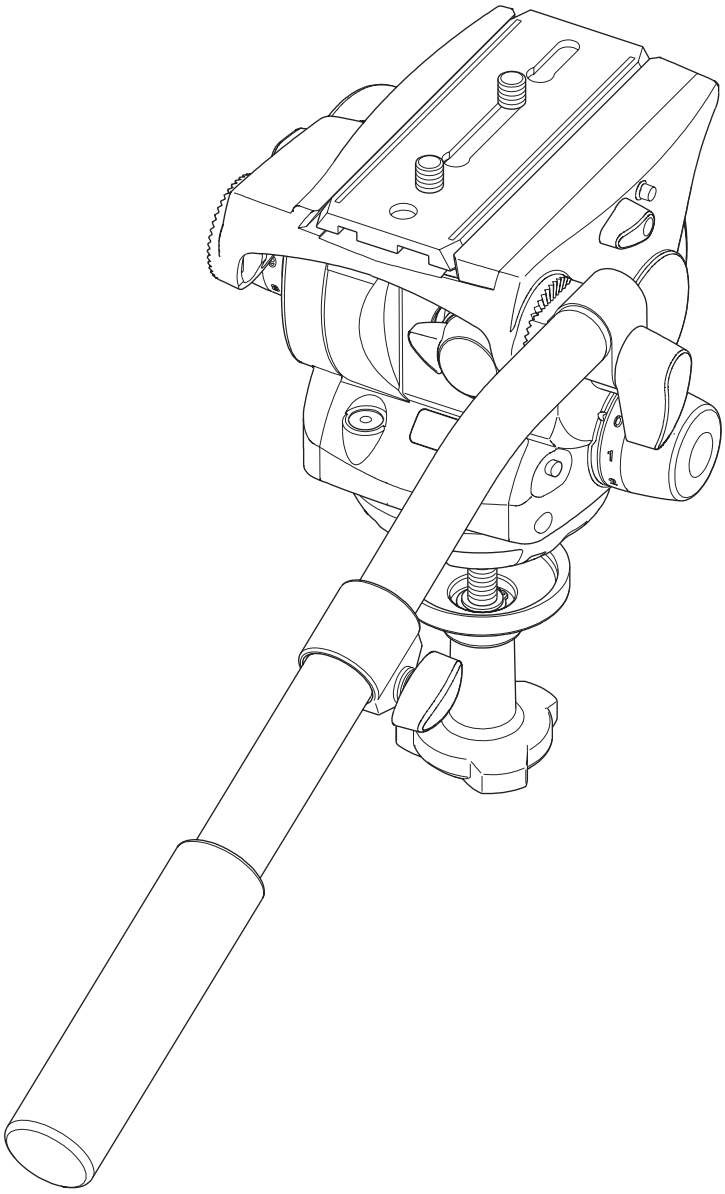
Maintenance Manual

Vision 100

Pan and Tilt Head



Vinten

Camera Control Solutions

Vision 100

PAN AND TILT HEAD
3431

MAINTENANCE MANUAL
AND
ILLUSTRATED PARTS LIST

PUBLICATION PART No. 3431-9

ISSUE 4

Foreword

This manual provides full and detailed maintenance and spare parts information for the Vinten® Vision® 100 pan and tilt head.

WARNING!: Read the Safety Section on page 7 before using this pan and tilt head or attempting any adjustment or repair.

It is recommended that this manual is read carefully and the illustrations studied prior to operating or servicing the pan and tilt head. Attention to the details contained herein will ensure that the pan and tilt head will operate efficiently with the minimum of attention over a long service life. Particular attention must be paid to cleaning, especially after use in adverse conditions.

To order spare parts or to obtain further information, application should be made to Vinten Broadcast Limited or to your local distributor.

NOTE: Information contained in this document is subject to change.
Vinten Broadcast Ltd reserves the right, without notice, to make changes in equipment design or performance as progress in engineering, manufacturing or technology may warrant.

Notes to readers

This is the on-line version of 'Vision 100 Pan and Tilt Head Maintenance Manual' (3431-9). Readers should be aware that the pagination differs between on-line and printed versions.

Navigation

Clicking the mouse on any blue text will move you around the document. For example, if you click on one of the blue call-outs on an exploded drawing, you will be taken to the appropriate line in the relevant parts list.

Contents Clicking here will take you to the Contents Page.

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Associated Publication

Vision 100 Pan and Tilt Head Operators Guide - Publication Part No. 3431-8

Safety - Read This First!

Warning symbols in this maintenance manual

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.

Critical data

Mass

Mass (complete with pan bar and bowl clamp)	3.73 kg (8.2 lb)

Load

Typical payload	12 kg at 125 mm C of G (26.5 lb at 5 in. C of G)

Abbreviations

The following abbreviations are used in this publication:

ac	alternating current	lb	pound (weight)
A	Amps	LF	Lubricated Friction
AF	across flats	LH	left hand
A/R	as required	MISO	metric thread
ASME	American Society of Mech Engineers	m	metre
assy	assembly	mm	millimetre
BS	British Standard	N	Newton
BA	British Association thread	NPT	National Pipe thread
BSF	British Standard Fine thread	NI	not illustrated
BSP	British Standard Parallel Pipe thread	No.	number
BSW	British Standard Whitworth thread	OD	outside diameter
btn	button	PCB	printed circuit board
chs	cheese	PCD	pitch circle diameter
C of G	centre of gravity	pozi	Pozidriv
comp	compression	psi	pounds per square inch
csk	countersunk	pt	point
cu	cubic	PTFE	Polytetrafluoroethylene
c/w	complete with	PVC	Polyvinyl chloride
dc	direct current	RH	right hand
dia	diameter	sect	section
ft	foot	skt	socket
hd	head	SWG	standard wire gauge
hex	hexagon	thk	thick
Hz	Hertz (frequency)	UNC	Unified Coarse thread
IC	integrated circuit	UNF	Unified Fine thread
ID	inside diameter	V	Volts
in.	inch	W	Watts
kg	kilogram		

Technical Specification

Weight (complete with pan bar and bowl clamp)	3.73 kg (8.2 lb)
Height to mounting face	150 mm (5.9 in.)
Length	149 mm (5.9 in.)
Width	174 mm (6.9 in.)
Load capacity	See balance graph
Tilt range	±90°
Pan range	360°
Pedestal/tripod fixing	100 mm ball
Operating temperature	-40°C to +60°C

Design Improvements

DETAILS	SERIAL No. INFORMATION
Changes to tilt brake	00633
Improvements to slide plate release	01522
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Changes to tilt brake	01586
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Improved bowl sealing	01859
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Section 1

Introduction and Description

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Introduction

1 The Vision 100 pan and tilt head is part of a range designed for broadcast professional, corporate and educational use. It is constructed largely in aluminium and magnesium alloys to produce a robust, lightweight unit. The unique counterbalance system enables a wide variety of camera/lens combinations to be maintained in perfect balance over the range of tilt movements. A maximum tilt angle of 90° is available at intermediate loadings, whilst at higher loadings the range of tilt motion is progressively reduced to 40°. A graph is provided in Section 2 which illustrates the relationship between load and centre-of-gravity (C of G) and may be used to ascertain the suitability of the head for any given combination of camera, lens and accessories.

2 Drag is provided by the Vinten thin-film (TF) system which allows wide variation of the drag setting on both pan and tilt axes to suit operator preference, and permits “whip” movements to be executed, irrespective of drag setting. Pan and tilt axes are each provided with a brake.

Description

3 The Vision 100 pan and tilt head (Fig 1.1)embodies a spring counterbalance mechanism, TF drag assemblies, brakes on the pan and tilt mechanisms and a camera mounting plate.

4 The balance system is easily adjusted by a knob (2) on the rear of the head. 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 control compensates for differing platform loads by varying the compressive force on the counterbalance spring. A digital display (9) indicates the setting of the balance mechanism on a scale of 00 - HI. The display is illuminated by pressing the switch (8) and extinguishes automatically approximately 15 seconds after adjustments are complete. The same switch also illuminates the level bubble (10) and the scales of the pan and tilt drag knobs (7)(14). The digital display and illumination systems automatically compensate for ambient light levels. The battery for the system is housed in a compartment in the right-hand side of the mechanism housing, closed by a cap (11).

5 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 (7)(14) 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 switch (8).

6 Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for both brakes (13)(15) are fitted at the left-hand side of the head.

7 Pan bar mounting points (3) are located at the rear of the head, on either side of the camera mounting platform. A telescopic pan bar (6) 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.

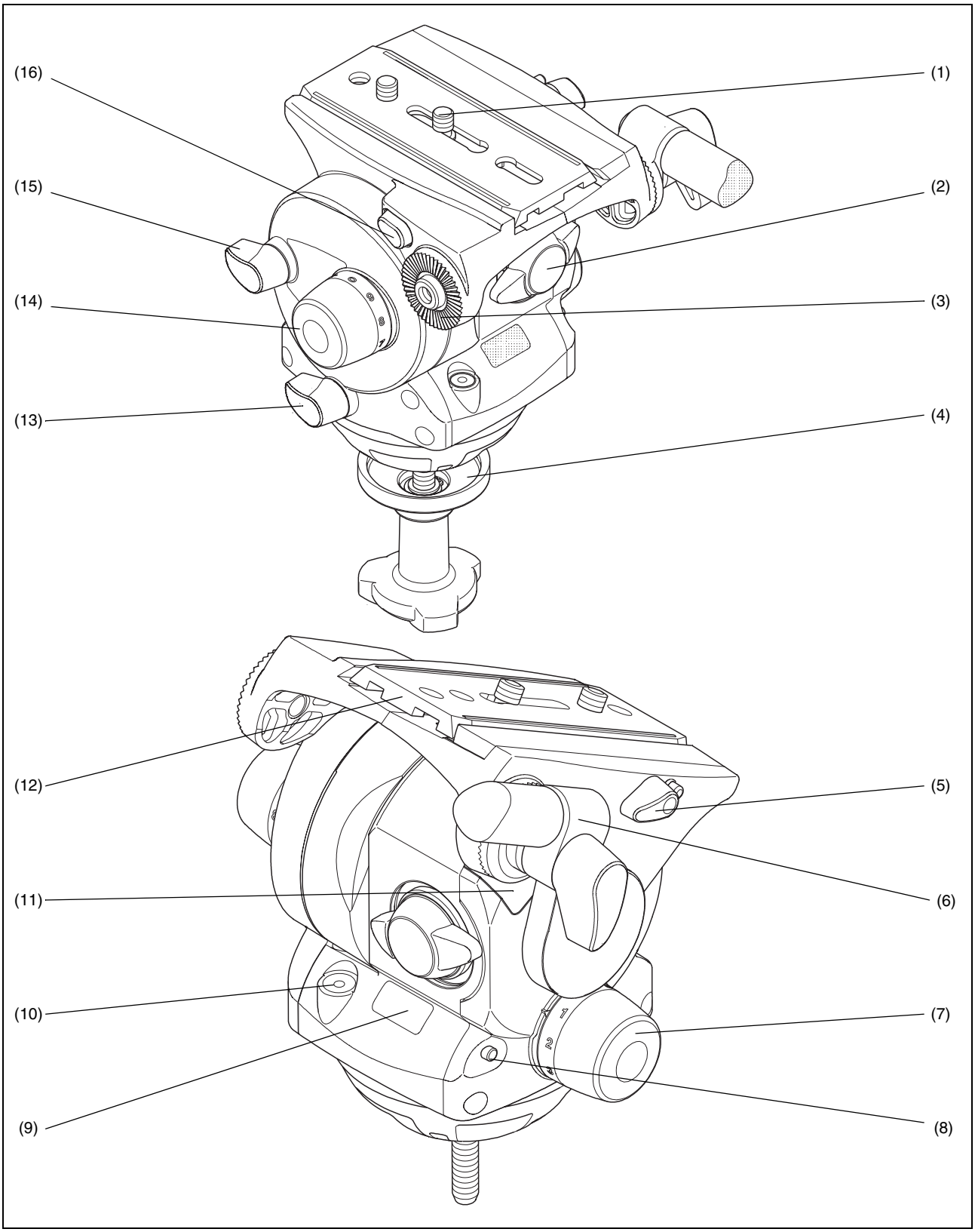

Fig 1.1 Vision 100 pan and tilt head

8 The camera is attached to the head by means of a slide plate (12) or by using the optional Quickfit adaptor. A clamp (5) is provided to hold the slide plate in position and a lock (16) prevents its inadvertent removal from the head.

9 A ball base and clamp (4) for mounting on a 100 mm bowl is provided. Adaptors are available which permit installation on other mounts.

Section 2

Operation

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General

1 To identify components, please refer to Fig 1.1. For further operating instructions, please refer to Vision 100 Operators Guide, Publication Part No. 3431-8.

Installing the head on a tripod

2 The Vision 100 head is supplied with an integral 100 mm ball mount and is designed for installation on a compatible Vinten Vision tripod.

3 Adaptors are available which enable the heads to be installed on tripods or pedestals fitted with other mountings.

4 To install the head, remove the bowl clamp assembly (4) from the head, position the head on the tripod and refit the bowl clamp assembly from below. Level the head with the aid of the level bubble (10) and tighten the bowl clamp. The level bubble may be illuminated by pressing the switch (8). The light will extinguish after 15 seconds.

Mounting the camera

5 Remove the slide plate (12) from the head by releasing the slide clamp (5), pressing the slide lock release (16) and pulling the plate to the rear.

6 Attach the slide plate to the camera or camera mounting plate under the approximate centre of the camera's weight using both fixing screws (1). Position the screws as far apart as possible.

7 Set the platform level and apply both the pan and tilt brakes (13)(15).

8 Push the slide plate and camera into the track in the platform, ensuring slide release (16) snaps into position.

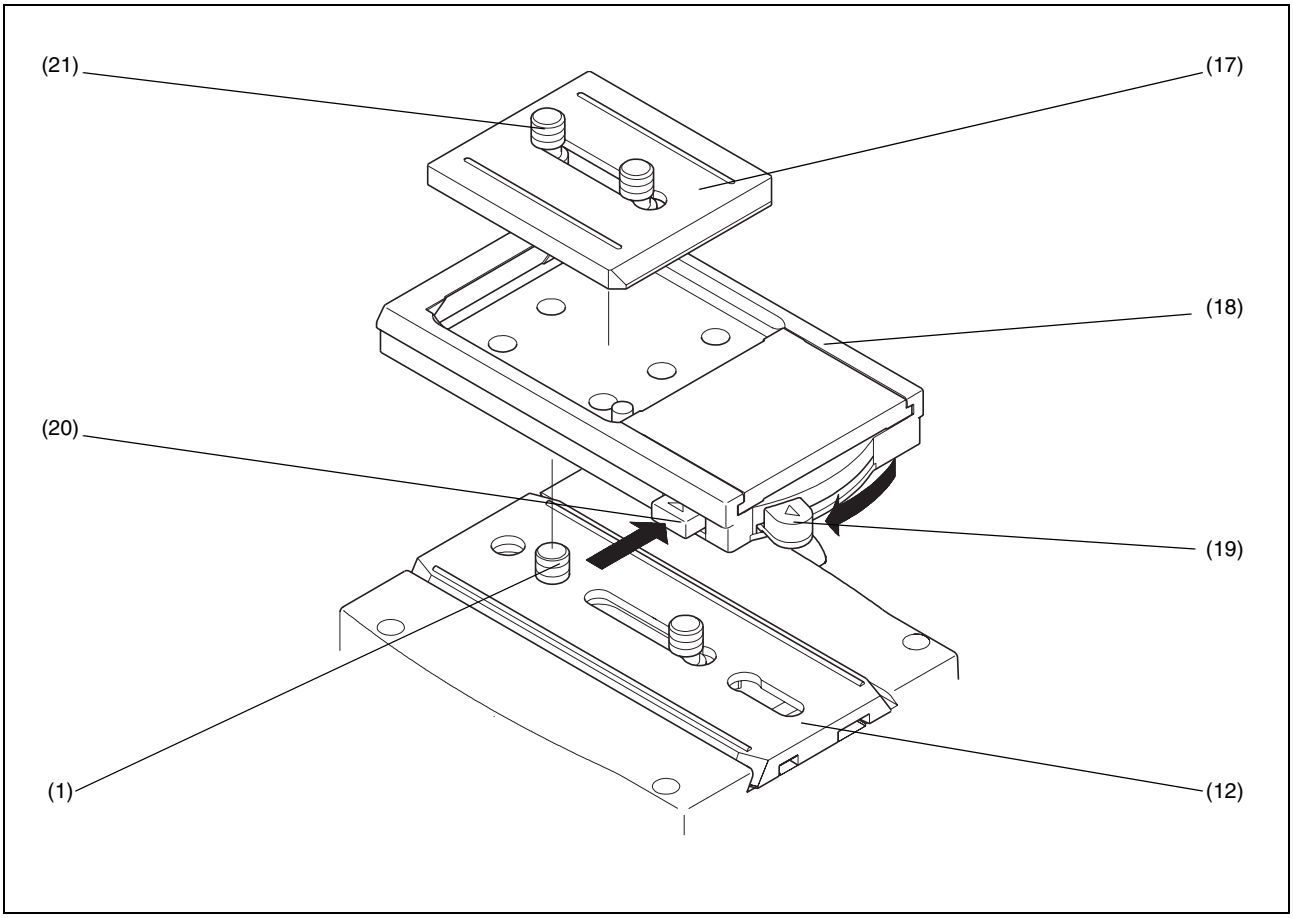


Fig 2.1 Optional Quickfit adapter

Mounting the camera (optional Quickfit adaptor)

9 To mount the camera using the optional Quickfit adaptor, proceed as follows (Fig 2.1):

9.1 If not already attached, secure the Quickfit adaptor (18) to the slide plate (12) with the two screws provided (1).

9.2 Free the Quickfit wedge (17) from the adaptor by simultaneously pushing in on the safety catch (20) and operating the wedge release (19).

9.3 Fit the Quickfit wedge to the camera with the two screws (21) provided.

9.4 Insert the forward end of the wedge into the forward end of the adaptor, pushing against the spring tension of the lock. Lower the rear of the wedge into the adaptor until an audible click indicates that the wedge is engaged with the adaptor.

Balancing the head

10 Balancing the Vision 100 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”.

11 The graph (Fig 2.2) illustrates the relationship between load and centre-of-gravity (C of G) height and may be used to ascertain the suitability of the head for any given combination of camera, lens and accessories. The shaded area of the graph corresponds to those loads/C of G heights that can be balanced over the full tilt range. The areas to the right indicate the progressively reducing tilt range over which the head can balance higher loads.

12 Prior to balancing the head ensure that the pan bars and any ancillary equipment have been fitted in order to prevent upsetting the balance once it has been achieved.

12.1 Release the tilt brake (15). Turn the balance knob (2) counter-clockwise until the head falls away from horizontal under the weight of the camera.

12.2 Release the slide clamp (5) and slide the camera backwards or forward until it balances horizontally. Apply the slide clamp (5).

12.3 Turn the balance knob (2) clockwise until the camera does not fall away when the head is tilted and released.

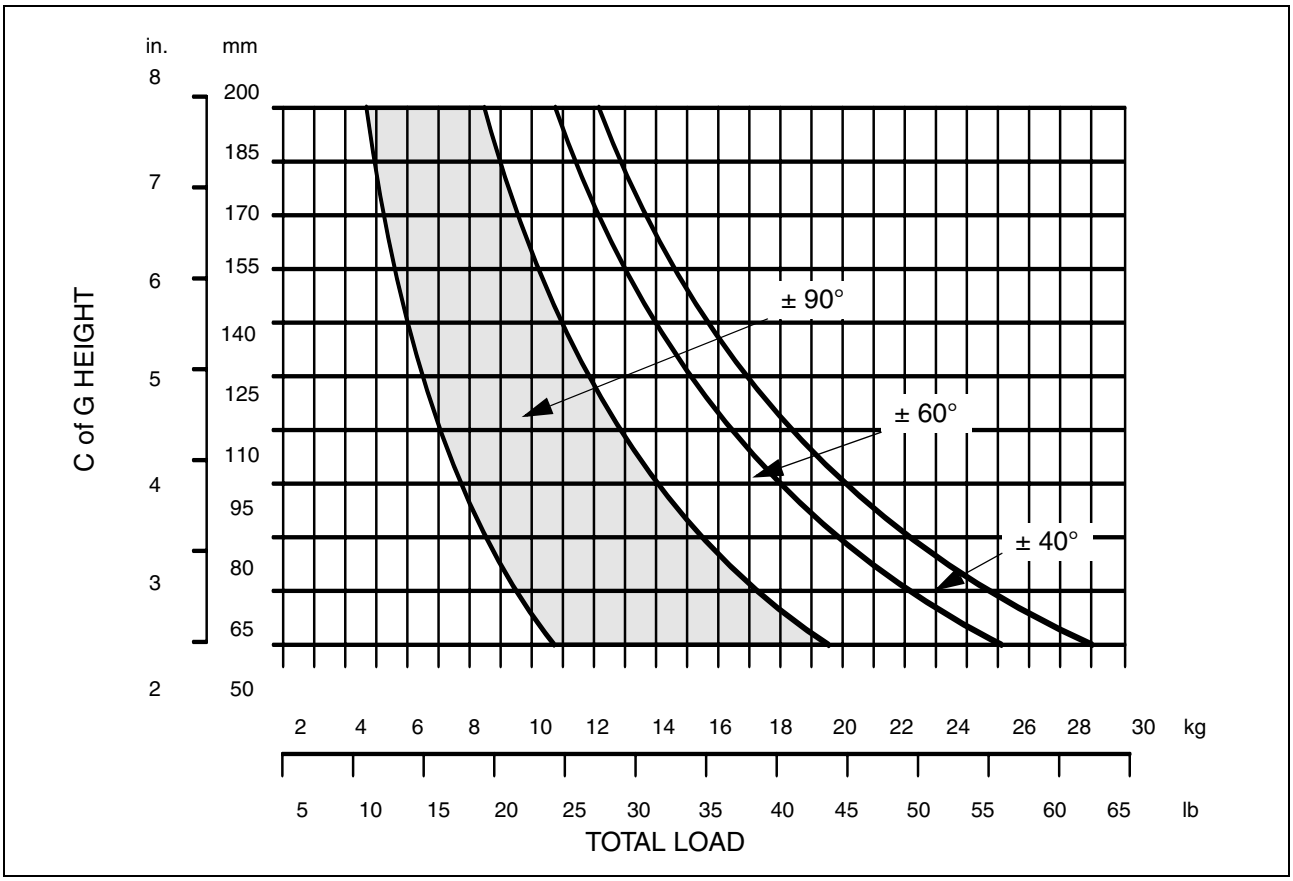


Fig 2.2 Balance graph

NOTE: If the digital balance setting of the particular payload is known, press the switch (8) and turn the balance knob until the digital display (9) shows that setting.

13 Repeat Para 12.2 and Para 12.3 until perfect balance is achieved, when the camera will remain set at any angle from +90° to –90° without falling away or springing back. Re-apply the tilt brake (15).

NOTE: Maximum tilt angle is less than 90° for heavy payloads with high C of G - see balance graph.

14 Press the switch (8) and make a note of the digital display (9). This will facilitate rebalancing this particular payload.

Pan and tilt brakes

15 Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for the pan brake (13) and tilt brake (15) are fitted at the left-hand side of the head.

16 To apply the brake, turn the lever fully clockwise. To release the brake, turn the lever fully counter-clockwise.

Pan and tilt drag

17 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.

18 Both drag knobs are provided with illuminated scales, graduated from 0 to 9. To illuminate the scales, press the switch (8). The lamps will extinguish after 15 seconds.

19 The tilt drag adjustment knob (14) is on the left-hand side of the head, the pan drag knob (7) is on the right -hand side. The whip-pan facility is unaffected by the pan drag setting.

20 To increase drag, turn the knob clockwise, towards a higher graduation. To decrease drag, turn the knob anti-clockwise, towards a lower graduation.

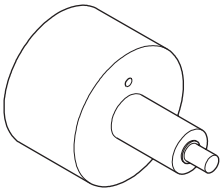
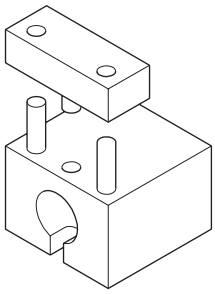
Section 3

Tools and Materials

General

1 The following special tools and consumable materials will be required for servicing, disassembly, repair, assembly and adjustment.

Special tools.

	Item	Part No.	Procedure
	Bearing press tool	3431-911TL	Installing needle bearing in actuator shaft
	Pin press	3431-912TL	Installing dowel pin to connect actuator shaft and adjustment slide

Consumable materials

NOTE: Adhesives and lubricants are not supplied by Vinten Broadcast Ltd and should be obtained under local arrangements

Item	Part No.	Use
Grease, Rocol MT-LM	Z150-134	Lubrication
Grease, white Chesterton	Z150-105	Lubrication
Grease, Castrol LM	Z150-123	Lubrication
Loctite 222E	Z002-075	Screw locking
Loctite 380	Z002-078	Adhesive
Loctite 406	Z002-086	Adhesive
Loctite 415	Z002-062	Adhesive

Item	Part No.	Use
Loctite 495	Z002-059	Spring cap buffer
Loctite 601	Z002-020	Adhesive
Loctite 638	Z002-058	Adhesive
Loctite 641	Z002-074	Bearing retainer
Permabond E31	Z002-070	Securing brake pad
Silcoset 153	Z002-036	Retaining PCB
Silastic RTV silicone adhesive	Z100-034	Retaining wiring

Section 4

Servicing

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General

1 The Vision 100 pan and tilt head is robustly made to high engineering standards and little attention is required to maintain serviceability save regular cleaning. Attention to the following points will ensure a long and useful life with minimum need for repair.

Cleaning

2 During indoor use, the only cleaning required should be a regular wipe over with a lint-free cloth. Dirt accumulated during storage may be removed using a semi-stiff brush. Particular attention should be paid to the levelling bowl and mounting face of the head and to the space between the tilting assembly and the base.

3 All Vision heads are weatherproof. However, use out-of-doors under adverse conditions will require special attention. Salt spray should be washed off with fresh water at the earliest opportunity. Sand and dirt acts as an abrasive and should be removed using a semi-stiff brush or vacuum cleaner

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.

Routine checks

4 Replace the balance mechanism digital display battery yearly.

5 During use, check the following:

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

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

6 No further routine maintenance is required.

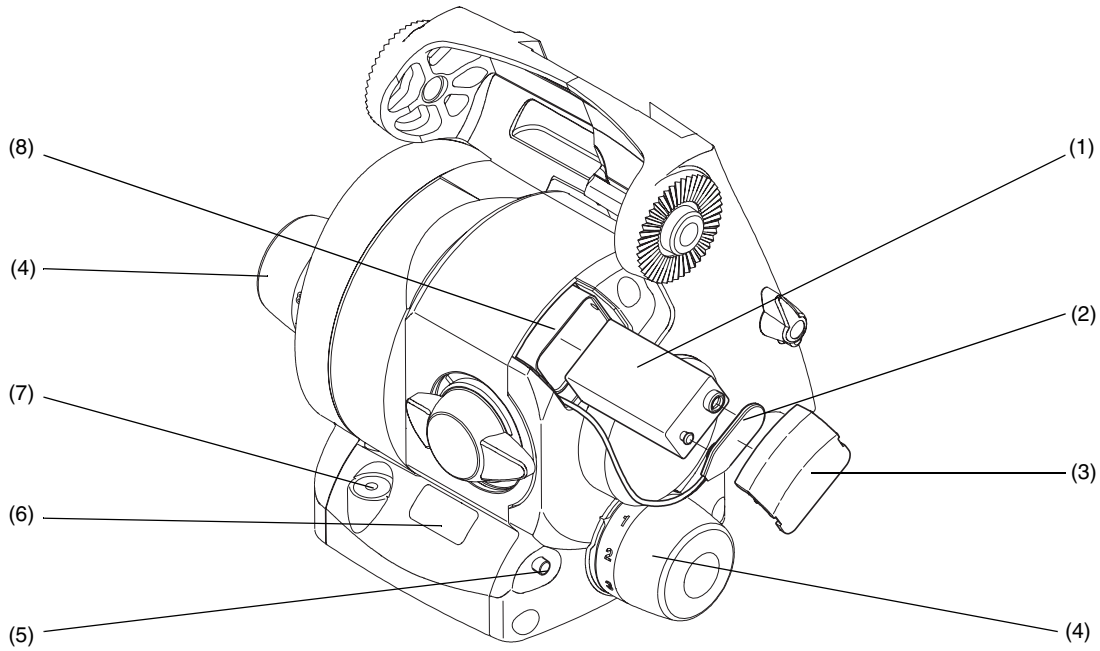

Fig 4.1 Battery replacement

Battery replacement

7 The battery powers the balance mechanism digital display and illuminates the level bubble and the drag knob scales. All are operated simultaneously by pressing the switch and remain active for approximately 15 seconds.

8 The battery should be replaced yearly or whenever the illumination is considered inadequate.

NOTE: The illumination level of the digital display and the level bubble and the drag knob scales varies with the intensity of the ambient light.
Removal of the battery will not affect the calibration of the balance mechanism display.

9 To install or replace the battery (Fig 4.1):

9.1 Tilt the head forwards to allow access to the battery cover (3) and apply the tilt brake.

9.2 Prise out the battery cover (3) using a thin-bladed screwdriver or similar tool.

9.3 Pull the battery (1) out of the battery sleeve (8), as far as the wiring will allow.

9.4 Pull the connector (2) off the terminals of the old battery and push it onto the terminals of the new battery (1).

9.5 Install the battery (1) in the battery sleeve (8), ensuring that the wiring is neatly stowed.

9.6 Refit the battery cover (3).

9.7 Press the switch (5) and ensure that the balance mechanism digital display (6), the level bubble (7) and the drag knob scales (4) are lit for approximately 15 seconds.

Adjustments

Brake knob adjustment

NOTE: The design of the pan and tilt brake knobs was improved at Serial No. 04472. The improved knobs, which are easier to remove and install, are interchangeable with the earlier knobs.

The pan and tilt brake knobs are set during manufacture so that the brakes are fully applied before the knobs reach their upper stops. As the brakes bed in during use it may be necessary to reset the knobs.
The procedure shown is for the tilt brake knob.The pan brake is adjusted in a similar fashion

10 To remove the earlier knob (Fig 4.2):

10.1 Turn the knob counter-clockwise to its lower stop.

10.2 Using a suitable sharp-pointed tool, slide the knob release outwards and grip the brake knob stop with pliers.

10.3 While still gripping the brake knob stop, turn the knob until it is 45° below the horizontal, then pull the knob off the shaft.

11 To install the earlier knob (Fig 4.2):

11.1 Turn the shaft clockwise, by hand, until the brake is applied.

11.2 Turn the shaft 60° counter-clockwise.

11.3 While still gripping the brake knob stop, push the knob onto the shaft at the 45° position.

11.4 Turn the knob clockwise to the 17° position.

11.5 Release the brake knob stop and push it inwards.

12 Turn the knob clockwise and ensure that the brake is fully applied before the upper stop is reached.

13 Turn the knob counter-clockwise and ensure the brake is released before the lower stop is reached.

14 Re-adjust the position of the knob if necessary.

15 To remove the later knob (Fig 4.3):

15.1 Turn the knob counter-clockwise to its lower stop.

15.2 Unscrew the securing screw (1) until its stop is reached

15.3 Turn the knob until it is 45° below the horizontal, then pull the knob off the shaft.

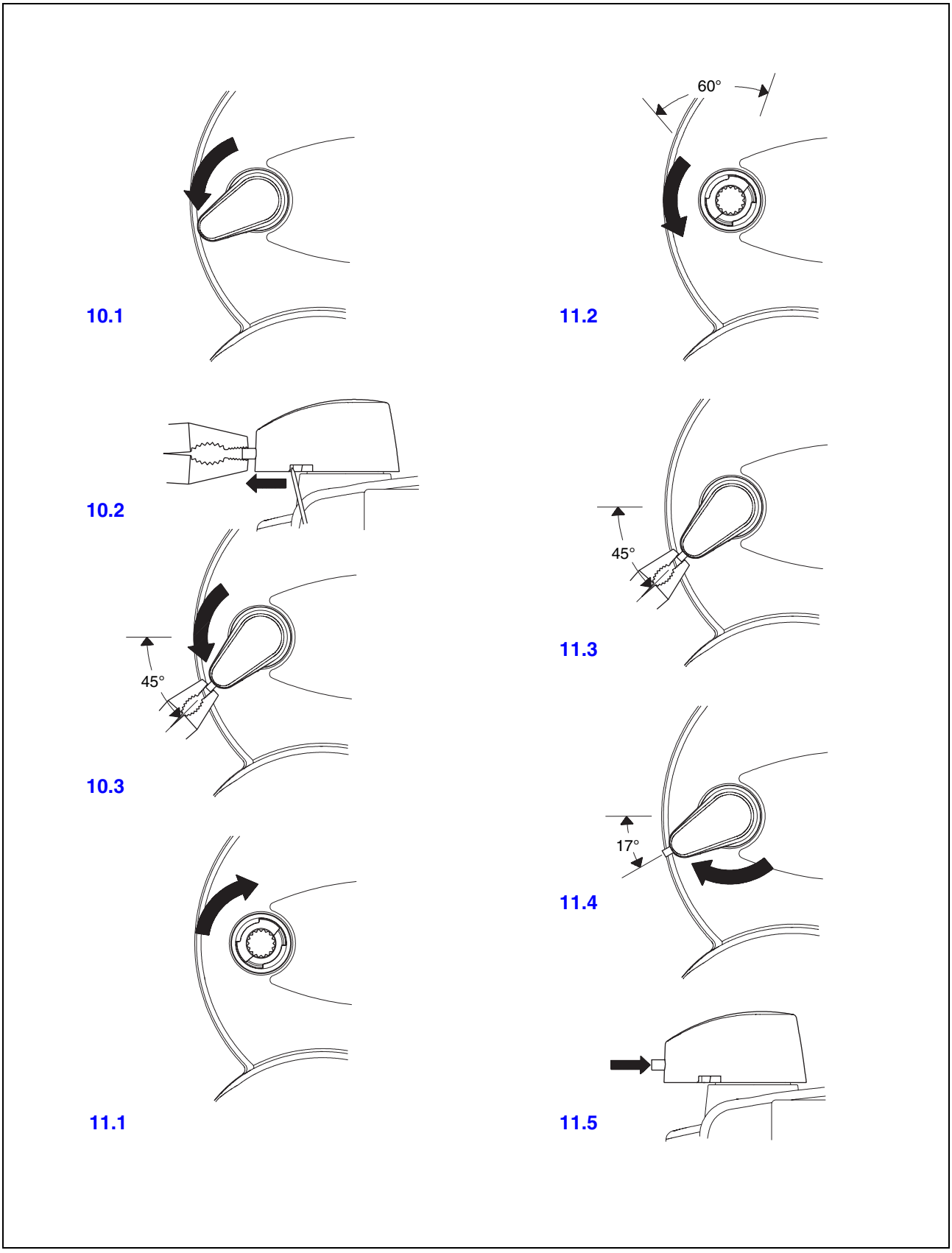

Fig 4.2 Brake knob adjustment - earlier knobs

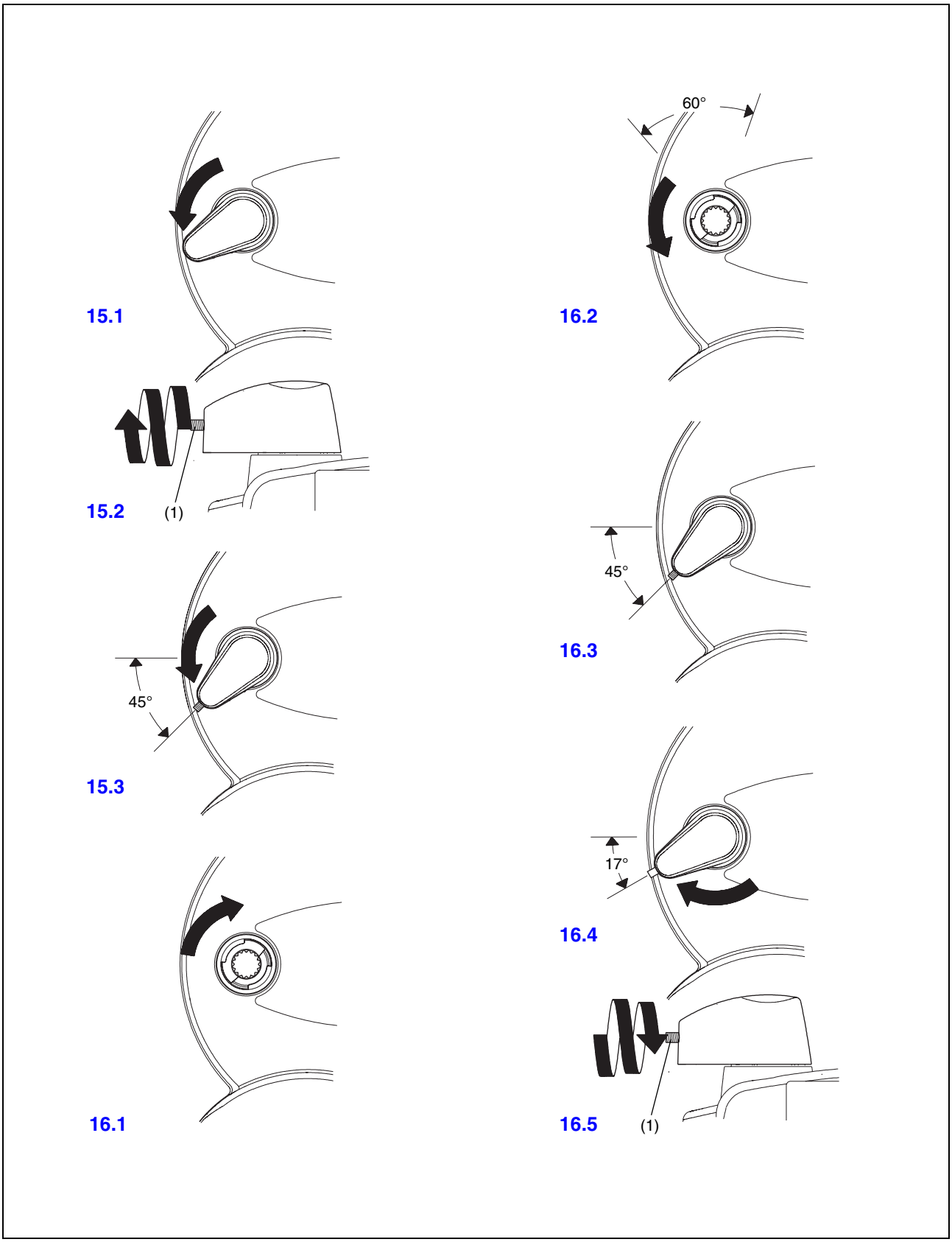

Fig 4.3 Brake knob adjustment - later knobs

16 To install the later knob (Fig 4.3):

16.1 Turn the shaft clockwise, by hand, until the brake is applied.

16.2 Turn the shaft 60° counter-clockwise.

16.3 Push the knob onto the shaft at the 45° position.

16.4 Turn the knob clockwise to the 17° position.

16.5 Screw in the securing screw (1). Do not overtighten.

17 Turn the knob clockwise and ensure that the brake is fully applied before the upper stop is reached.

18 Turn the knob counter-clockwise and ensure the brake is released before the lower stop is reached.

19 Re-adjust the position of the knob if necessary.

Balance mechanism digital display calibration

20 The digital display indicates setting of the balance mechanism on a scale of 00 (minimum setting) to HI (maximum setting). In the unlikely event of this system requiring calibration, proceed as follows (Fig 4.4):

20.1 Level the platform and apply the tilt brake.

20.2 Turn the balance knob (2) fully clockwise to its maximum stop.

NOTE: If more than 15 seconds is allowed to elapse between steps, the system will shut down and revert to its previous settings.

20.3 Press and hold the switch (1) for approximately eight seconds, until the digital display (3) shows ***CA***. Release the switch (1). The display shows ***HI***.

20.4 Ensure balance knob (2) is turned fully clockwise to its maximum stop, then press and release the switch (1). The display will now show ***LO***.

20.5 Turn the balance knob (2) fully counter-clockwise to its minimum stop.

20.6 Press and release switch (1).

20.7 If the calibration is successful, the display will now show ***00***.

20.8 If unsuccessful, ***Er*** will be displayed. Pressing the switch (1) again, or waiting for 15 seconds, will allow the system to revert to its previous settings. Calibration may now be carried out again.

20.9 After calibration, rebalance the head (See “Balancing the head” on page 16).

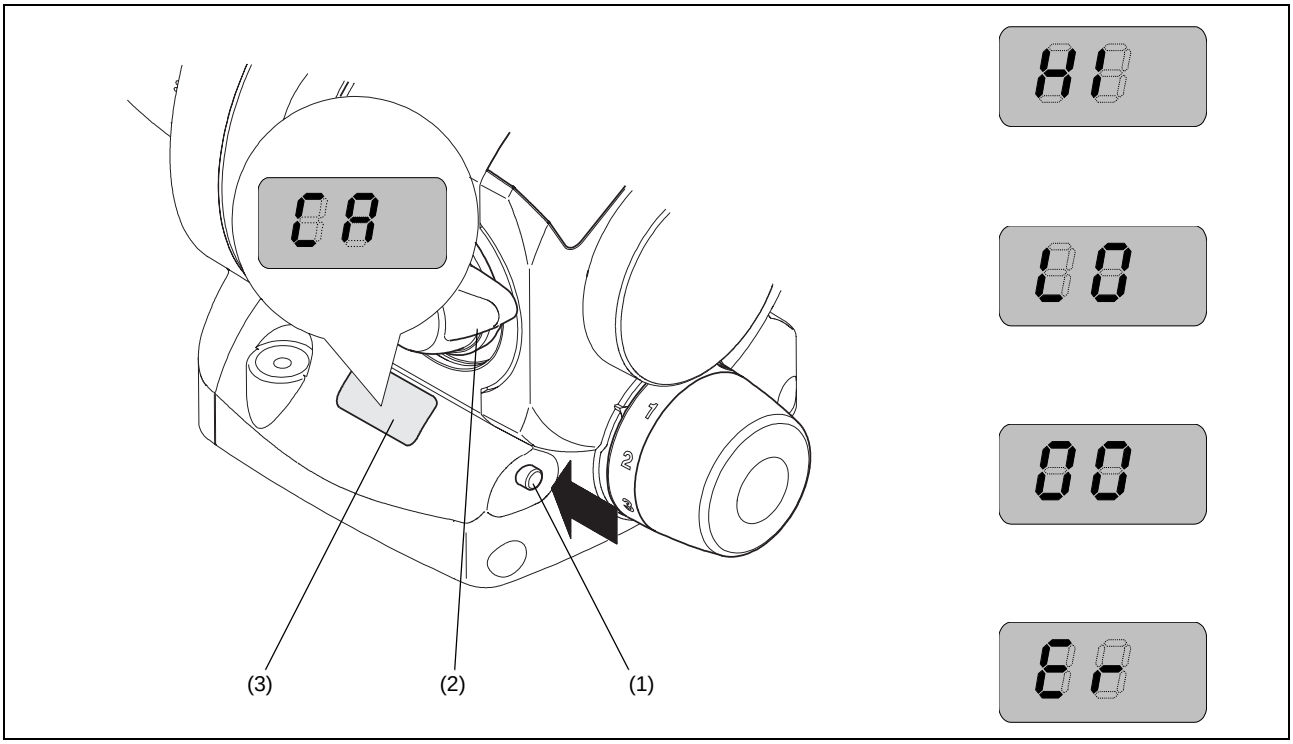

Fig 4.4 Balance mechanism digital display calibration

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General

1 This section details procedures for disassembly and assembly of the Vision 100 pan and tilt head. Reference is made in the procedures to figures in Section 6 - Illustrated Parts List.

2 The head is constructed from precision components, many of which are of aluminium or magnesium alloy. Several of the assembly procedures require the use of specific sealants, adhesives or lubricants. It is advised that only experienced and properly equipped personnel with access to all necessary materials and tools should attempt to overhaul, repair or replace components on these heads. The special tools and consumable materials required for work on Vision 100 heads are listed in Section 3 - Tools and Materials.

WARNING!: To prevent damage to socket screw heads, use the correct hexagonal wrenches and ensure that they are in good condition.

Disassembly

RH side plate

WARNING!: Before attempting to remove the mechanism housing cover and RH side plate, the balance mechanism spring tension must be relieved. Failure to relieve the balance mechanism spring tension may result in serious damage to the head.

3 To remove the RH side plate (Fig 6.2):

3.1 Remove the battery ((See “Balance mechanism digital display calibration” on page 25)).

3.2 Remove platform slide (24) ((See “Mounting the camera” on page 14)).

3.3 Push platform slide release shaft (15) fully to the right against the pressure of the spring (14) and pull slide release button (18) out of the tilt module assembly (17). Remove screw (20).

3.4 Remove platform label (2). Unscrew and remove nut (1).

3.5 Turn the balance knob fully counter-clockwise.

3.6 Remove mechanism housing label (22).

3.7 Referring to Fig 6.5, insert a 5 mm hexagonal wrench though the hole under the mechanism housing label and slacken screw (12) to relieve the balance mechanism spring tension.

3.8 Referring to Fig 6.3, prise out the pan drag knob plug (21), remove the screw (22) and washer (20) and pull off the drag knob (23). Remove the drag knob boss (19), two steel balls (24) and springs (25).

3.9 Referring to Fig 6.2, tilt the platform for access to screw (4). Remove screw (4) and two screws (12).

3.10 Carefully pull the mechanism housing cover and RH side plate assembly (10) off the mechanism housing assembly (13) to the extent allowed by the electrical wiring. Slight tapping of the RH side plate may be necessary to free the assembly.

3.11 Referring to Fig 6.6, disconnect the wiring (6) to free the mechanism housing cover (5) from the mechanism housing assembly (1).

4 To dismantle the mechanism housing cover and RH side plate, proceed as follows:

4.1 Referring to Fig 6.5, remove three screws (11) securing RH side plate (18) in bearing (10). Pull RH side plate out off the bearing.

4.2 If required, remove three screws (11) and Skiffy washers (19) securing bearing (10) in mechanism housing cover (17). The bearing is retained with Loctite 641.

4.3 Referring to Fig 6.2, remove two screws (11) securing platform insert (3) to RH side plate. Pull off the platform insert and slide clamp block (8).

4.4 Remove screw (7) securing platform clamp knob (6) to platform knob shaft (5). Remove knob and screw shaft out of RH side plate.

4.5 Referring to Fig 6.3, prise LED lens (17) out of mechanism housing cover (18), if required, to free illumination wiring (26).

Balance mechanism

5 To remove the balance mechanism, proceed as follows:

5.1 Referring to Fig 6.6, remove screw (4) securing potentiometer (2) to mechanism housing assembly (1). Disengage the potentiometer from the adjustment slide and lift clear.

5.2 Referring to Fig 6.5, remove spiral ring (21) from the groove in mechanism housing (3) and allow it to rest on the neck of balance knob assembly (1).

5.3 Remove screw (12) from actuator shaft (8).

5.4 Pull assembled balance knob (1), adjustment slide (4) and actuator shaft (8) out of mechanism housing.

5.5 Remove thrust bearing (2) from mechanism housing.

5.6 Unscrew and remove balance knob (1) from adjustment slide (4). If required, drive out pin (5) to separate adjustment slide and actuator shaft (8).

5.7 Lift the spring actuator assembly (16), spring (15), buffer (14), spring end cap (13) and screw (12) out of the mechanism housing. Retain all shims (6).

Pan drag mechanism

6 To remove the pan drag mechanism, proceed as follows (Fig 6.3):

6.1 Remove the RH side plate and balance mechanism.

6.2 Turn pan brake knob (1 or 4) fully counter-clockwise to release the pan brake.

6.3 Remove one screw (10) and three screws (11) securing pan module (29) to mechanism housing (12). Note length and position of screws.

6.4 Carefully pull the pan module out of the mechanism housing.

6.5 Remove pan drive shaft (15), with dowel pin (14) and shim washer(s) (16), from mechanism housing (12). Retain shims.

6.6 If required, pull flanged bearing (13) out of mechanism housing (12).

6.7 If required, remove dowel pin (30) from pan module (29).

6.8 If required, remove three screws (22) securing stud carrier (27) to pan module (29). The stud (28) is screwed into the stud carrier and is retained with Loctite 601.

WARNING!: Do not attempt further dismantling of the pan drag module. A faulty assembly must be replaced.

Tilt drag mechanism

7 To remove the tilt drag assembly:

7.1 Remove the RH side plate, balance mechanism and pan drag mechanism.

7.2 Referring to Fig 6.6, disconnect the wiring (11) between the mechanism housing (1) and the outrigger (10).

7.3 Referring to Fig 6.4, turn the tilt brake knob (17 or 20) and tilt drag knob (11) fully counter-clockwise.

7.4 Prise out the tilt drag knob plug (12), remove the screw (13) and washer (14) and pull off the drag knob (11). Remove the drag knob boss (10), two steel balls (9) and springs (8).

7.5 Remove outrigger label (15).

7.6 Referring to Fig 6.2, remove four screws (12),which secure the outrigger (19) to the mechanism housing.

7.7 Referring to Fig 6.4, turn the tilt unit (21) until the brake knob (17 or 20) aligns with the hole for slide release button in the tilt module (1).

7.8 Remove two screws (7) and one screw (16) securing outrigger (21) to tilt module (1). Note length and position of screws. Carefully pull the outrigger off the tilt module. Retain all shims (2).

7.9 Remove two Spirol pins (3)..

WARNING!: Do not attempt further dismantling of the tilt drag module. A faulty assembly must be replaced.

7.10 Referring to Fig 6.6, remove three screws (11) securing tilt module (9) in bearing (10). Pull tilt module out off the bearing.

7.11 If required, remove three screws (11) securing bearing (10) in mechanism housing cover (17). The bearing is retained with Loctite 641.

Outrigger

8 Remove the pan brake as follows (Fig 6.3):

8.1 Remove the pan brake knob ((See “Brake knob adjustment” on page 22)).

8.2 Pull the assembled brake calliper (8 ,9) and shaft (5, 6) out of the outrigger.

8.3 Screw the shaft (5) out of the calliper (8). Remove and discard the ‘O’ ring (5). If required, disengage and remove the brake wedges (9).

NOTE: The tilt brake and pan brake wedges are NOT interchangeable

9 Remove the tilt brake as follows (Fig 6.4):

9.1 Remove the tilt brake knob ((See “Brake knob adjustment” on page 22)).

9.2 Pull the assembled brake calliper (24, 25) and shaft (22, 23) out of the outrigger.

9.3 Screw the shaft (22) out of the calliper (25). Remove and discard the ‘O’ ring (23). If required, disengage and remove the brake wedges (24).

NOTE: The tilt brake and pan brake wedges are NOT interchangeable

10 Remove circlip (4) to free tilt drive shaft (5).

11 Prise LED lens (6) out of outrigger (21), if required, to enable wiring to be removed.

Electrical installation

12 Remove the PCB assembly and associated wiring from the mechanism housing as follows (Fig 6.6):

NOTE: The PCB and wiring is secured in the mechanism housing using silicone adhesive. Do not remove unless required.

12.1 Remove push-button cap (7) and ‘O’ ring (8) from switch on PCB (2).

12.2 Free wiring from channels in the mechanism housing (1).

12.3 Remove screw (9) and free PCB assembly (2) from mechanism housing.

12.4 Remove PCB assembly, potentiometer and associated wiring from mechanism housing.

12.5 Remove dowel pin (12) from mechanism housing.

Assembly

Electrical installation

13 Install the PCB assembly and associated wiring in the mechanism housing as follows (Fig 6.6):

13.1 Install dowel pin (12) in mechanism housing (1).

13.2 Install push-button cap (7) and ‘O’ ring (8) on PCB (2).

13.3 Using Silcoset 153, position PCB in mechanism housing (1). Secure with screw (9).

NOTE: Do not secure the potentiometer to the mechanism housing at this stage.

13.4 Temporarily install mechanism housing cover (5), ensuring push-button cap (7) is correctly located. Allow Silcoset 153 to cure fully, then remove mechanism housing cover.

13.5 Install wiring in appropriate channels in the mechanism housing (1) and secure with Silastic RTV adhesive. Allow Silastic to cure fully.

Outrigger and tilt drag

14 If removed, install wiring and LED lens as follows (Fig 6.4):

14.1 Install wiring so that LED is correctly positioned in relation to LED lens (6).

14.2 Secure LED lens (6) in outrigger (21) using Loctite 406.

14.3 Install wiring in appropriate channels in the outrigger (21) and secure with Silastic RTV adhesive. Allow Silastic to cure fully.

15 Referring to Fig 6.4, lubricate the gear on the tilt drive shaft (5) with Easyrun grease and install in outrigger (21). Secure with circlip (4).

NOTE: The tilt brake and pan brake wedges are NOT interchangeable. Tilt brake wedges have a flat face, pan brake wedges are radiused

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16 Install the pan brake components in the outrigger as follows (Fig 6.3):

16.1 Install the brake wedges (9) in the calliper (8).

16.2 Sparingly lubricate the thread on the shaft (5) using Castrol LM grease. Ensure grease does not contact brake pad or wedges.

16.3 Install an 'O' ring (6) on shaft (5) and screw into calliper (8). Screw down lightly to hold wedges in position.

16.4 Position calliper in outrigger (7). Do not fit the brake knob at this stage.

17 Install the tilt brake components in the outrigger as follows (Fig 6.4):

17.1 Install the brake wedges (24) in the calliper (25).

17.2 Sparingly lubricate the thread on the shaft (22) using Castrol LM grease. Ensure grease does not contact brake pad or wedges.

17.3 Install an 'O' ring (23) on shaft (22) and screw into calliper (25). Screw down lightly to hold wedges in position.

17.4 Position calliper in outrigger (21). Do not fit the brake knob at this stage.

18 Install the outrigger on the tilt drag module as follows:

18.1 Position shims (2) in outrigger (21). Ensure all shims removed during disassembly are replaced.

18.2 Screw brake shaft (22) out of calliper (25) to provide clearance for brake disc.

18.3 Turn the centre of the tilt module (1) so that the location for the tilt drive shaft (5) is diametrically opposite the hole for the slide release button.

18.4 Carefully position the outrigger (21) on the tilt module (1), ensuring tilt drive shaft (5) engages correctly and brake calliper (25) does not foul brake disc.

18.5 Install two screws (7) and one screw (16) to secure outrigger (21) to tilt module (1), using Loctite 222E. Do not tighten screws fully

18.6 Drive two Spirol pins (3) through the outrigger into the tilt module. Tighten screws (7, 16).

18.7 Turn the outrigger counter-clockwise and ensure that the brake calliper (25) engages correctly with the brake disc.

19 Install the assembled tilt drag module and outrigger in the mechanism housing as follows:

19.1 Referring to Fig 6.5, position bearing (10) in tilt drag side of mechanism housing (3) using Loctite 641. Retain bearing with three screws (11).

19.2 Install assembled tilt drag module and outrigger in the bearing (10) and secure with three screws (11).

19.3 Referring to Fig 6.2, turn the outrigger (19) to align fixing holes and secure to the mechanism housing (13) with four screws (12) and Loctite 222E.

19.4 Referring to Fig 6.6, connect the electrical wiring (11) as shown.

19.5 Referring to Fig 6.4, apply the outrigger label (15).

Pan drag mechanism

20 Install the pan drag mechanism as follows (Fig 6.3):

20.1 If removed, install flanged bearing (13) in mechanism housing (12).

20.2 If removed, screw the stud (28) into the stud carrier (27) using Loctite 601.

20.3 Secure the stud carrier (27) to pan module (29) with three screws (22).

20.4 If removed, install dowel pin (30) in pan module (39).

20.5 Lubricate pan drive shaft dowel pin (14) with Castrol LM grease. Lubricate pan drive shaft gear (15) with Easyrun 50 grease, position shim washer(s) (16) on pan drive shaft (15) and install in mechanism housing (12).

20.6 Screw brake shaft (5) out of calliper (8) to provide clearance for brake drum.

20.7 Install pan module (29) in mechanism housing (12), ensuring calliper (8) engages correctly with brake drum. Secure with one screw (10) and three screws (11), using Loctite 222E, in orientation noted during disassembly. Tighten the vertical screws fully before tightening the angled screws.

NOTE: The assembled RH side plate and mechanism housing cover is installed after the balance mechanism

Balance mechanism

21 Install the balance mechanism as follows (Fig 6.5):

21.1 If removed, secure buffer (14) to spring end cap (13) using Loctite 495. Ensure components are concentric.

21.2 Lubricate balance mechanism components as follows:

21.2.1 Needle roller bearing (7), shims (6) and thrust bearing (2) - Castrol LM grease.

21.2.2 Thread of balance knob (1) - Rocol MT-LM grease.

21.2.3 Spring contact face of spring actuator (16) and underside of spring end cap (13) - Easyrun 50 grease

21.2.4 Contact faces of adjustment slide/mechanism housing (4/3) and actuator shaft/spring actuator(8/16) - white Chesterton grease.

21.3 Press needle roller bearing (7) into actuator shaft (8) using tool 3431-911TL.

21.4 Trial assemble actuator shaft (8), complete with needle roller bearing (7), into adjustment slide (44) and install sufficient shim washers (6), equally distributed on each side of the bearing, to leave minimum side play between the bearing and the adjuster slide when dowel pin (5) is installed.

21.5 Degrease dowel pin (5) and cross holes in adjustment slide (4), apply Loctite 601 to dowel pin (5) and assemble with shims (6) in position in actuator shaft (8). Use tool 3431-912TL to install and centralize pin.

21.6 Degrease the threaded bore of actuator shaft (8) and thread of screw (12).

21.7 Install circlip (21) on balance knob (1) and screw into adjustment slide (4).

21.8 Apply Loctite 222E to thread of screw (12). Position spring (15), assembled buffer/spring end cap (13/14) and screw (12) on spring actuator (16).

21.9 Install a shim (6) on each pin of spring actuator (16).

21.10 Position assembled spring actuator in the mechanism housing, engaging pin of spring actuator in needle bearing (7) in tilt module (9).

21.11 Install thrust bearing (2) in mechanism housing.

21.12 Slide assembled balance knob/adjustment slide/actuator shaft into the mechanism housing, ensuring slot in adjustment slide engages with vertical pin. Lightly secure assembled spring actuator to actuator shaft with screw (12).

21.13 Referring to Fig 6.6, install potentiometer (2) on mechanism housing assembly (1), ensuring operating arm engages in the adjustment slide. Secure with screw (4) using Loctite 222E. Ensure ‘O’ ring (7) and push-button cap (6) are installed on PCB switch.

RH side plate

22 To assemble the mechanism housing cover and RH side plate, proceed as follows:

22.1 If removed, install wiring and LED lens as follows (Fig 6.3):

22.1.1 Install wiring so that LED is correctly positioned in relation to LED lens (17).

22.1.2 Secure LED lens (17) in mechanism housing cover (18) using Loctite 406.

22.1.3 Install wiring in appropriate channels in the mechanism housing cover (18) and secure with Silastic RTV adhesive. Allow Silastic to cure fully.

22.2 Referring to Fig 6.2, install slide clamp block (8) in RH side plate (10). Screw platform knob shaft (5) into RH side plate to engage with slide clamp block. Do not install the clamp knob (6) at this stage

22.3 Position platform insert (3) on RH side plate (10) and secure with two screws (11) using Loctite 222E.

22.4 Referring to Fig 6.5, position bearing (10) in mechanism housing cover (17) using Loctite 641. Retain bearing with three screws (11) and Skiffy washers (19).

22.5 Install RH side plate (18) in the bearing (10) and secure with three screws (11).

23 Install the RH side plate/mechanism cover as follows (Fig 6.2):

23.1 Install two dowel pins (16) in the tilt module (17).

23.2 Install grub screw (21) in the tilt module (17) using Loctite 222E.

23.3 Position platform slide release shaft (15) and spring (14) in the tilt module (17).

23.4 Position the RH side plate/mechanism cover (10) so that the trunnion of the spring actuator assembly engages correctly with the needle roller bearing in the RH side plate. Ensure platform halves are correctly aligned.

23.5 Secure the mechanism cover (10) to the mechanism housing (13) using two screws (12) and Loctite 222E. Tilt the platform and install screw (4) using Loctite 222E.

23.6 Referring to Fig 6.3, check the end float on pan drive shaft (15). This should be maximum 0.1 mm. Remove RH side plate/mechanism cover and add or remove shims washers (16) as required.

23.7 Refer to Fig 6.6. Using a 5 mm hexagonal wrench though the hole in the mechanism housing, tighten screw (12) until spring (15) is lightly clamped, then tighten a further two full turns.

23.8 Secure balance knob (1) in mechanism housing with circlip (21).

23.9 Referring to Fig 6.2, install screw (20) using Loctite 222E.

23.10 Install nut (1) using Loctite 222E.

23.11 Push platform slide release shaft (15) fully to the right against the pressure of the spring (14) and push slide release button (18) fully into the tilt module assembly (17). Release platform slide release shaft (15) to secure button.

23.12 Apply self-adhesive platform label (2).

23.13 Install platform slide (24) and screw in platform knob shaft (5) until platform slide is held securely. Position platform knob clamp in the 6 o'clock position and secure with screw (7) and Loctite 222E.

23.14 Apply self-adhesive mechanism housing label (22).

Final assembly

24 Install the pan drag knob as follows (Fig 6.3):

24.1 Use the drag knob boss (19) to turn the pan drive shaft (15) fully counter-clockwise.

24.2 Install two springs (25) and balls (24) in the mechanism housing cover (18). Install the drag knob boss (19) on the pan drive shaft (15) so that its stop is to the right and abutting the stop on the mechanism housing cover (18).

24.3 Install the pan drag knob (23) on the pan drive shaft (15) so that '0' on the knob aligns with the indicator on the mechanism housing cover (18). Secure knob with washer (20) and screw (22), using Loctite 222E.

24.4 Confirm operation of the drag mechanism by turning knob fully clockwise, then counter-clockwise.

24.5 Install drag knob plug (21).

25 Install the tilt drag knob as follows (Fig 6.4):

25.1 Use the drag knob boss (10) to turn the tilt drive shaft (5) fully counter-clockwise.

25.2 Install two springs (8) and balls (9) in the outrigger (20). Install the drag knob boss (10) on the tilt drive shaft (5) so that its stop is to the right and abutting the stop on the outrigger (20).

25.3 Install the tilt drag knob (11) on the tilt drive shaft (5) so that '0' on the knob aligns with the indicator on the outrigger (20). Secure knob with washer (14) and screw (13), using Loctite 222E.

25.4 Confirm operation of the drag mechanism by turning knob fully clockwise, then counter-clockwise.

25.5 Install drag knob plug (12).

26 Install the pan and tilt brake knobs ((See "Brake knob adjustment" on page 22)).

27 Install the battery ((See "Battery replacement" on page 21)). Press the switch and ensure that the balance mechanism digital display, the level bubble and the drag knob scales are lit for approximately 15 seconds.

28 Calibrate balance mechanism digital display ((See "Balance mechanism digital display calibration" on page 25)).

Section 6

Illustrated Parts List

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Introduction

1 This parts list is issued for the Vision 100 pan and tilt head, manufactured by Vinten Broadcast Limited, Western Way, Bury St. Edmunds, Suffolk, IP33 3TB, England.

Ordering spare parts

2 Always quote the head serial number.

3 When ordering a spare part, please quote the part number, NOT the item number.

4 Certain items form part of -900SP series composite spare parts. These are detailed in Fig 6.8 and are indicated in the parts list by an asterisk (*).

5 Due to restrictions placed on the transportation of adhesives and other materials, please obtain supplies of consumable materials from your local distributor.

Main assembly part numbers

6 Ensure that the correct serial and part numbers are quoted when ordering main assemblies.

Assembly	Part No.
Vision 100 pan and tilt head - final assembly	3431-11
Telescopic pan bar	3219-69
Pan drag assembly	3431-12
Tilt drag assembly	3431-13
Bowl clamp assembly	3330-30
Camera mounting plate	3364-900SP

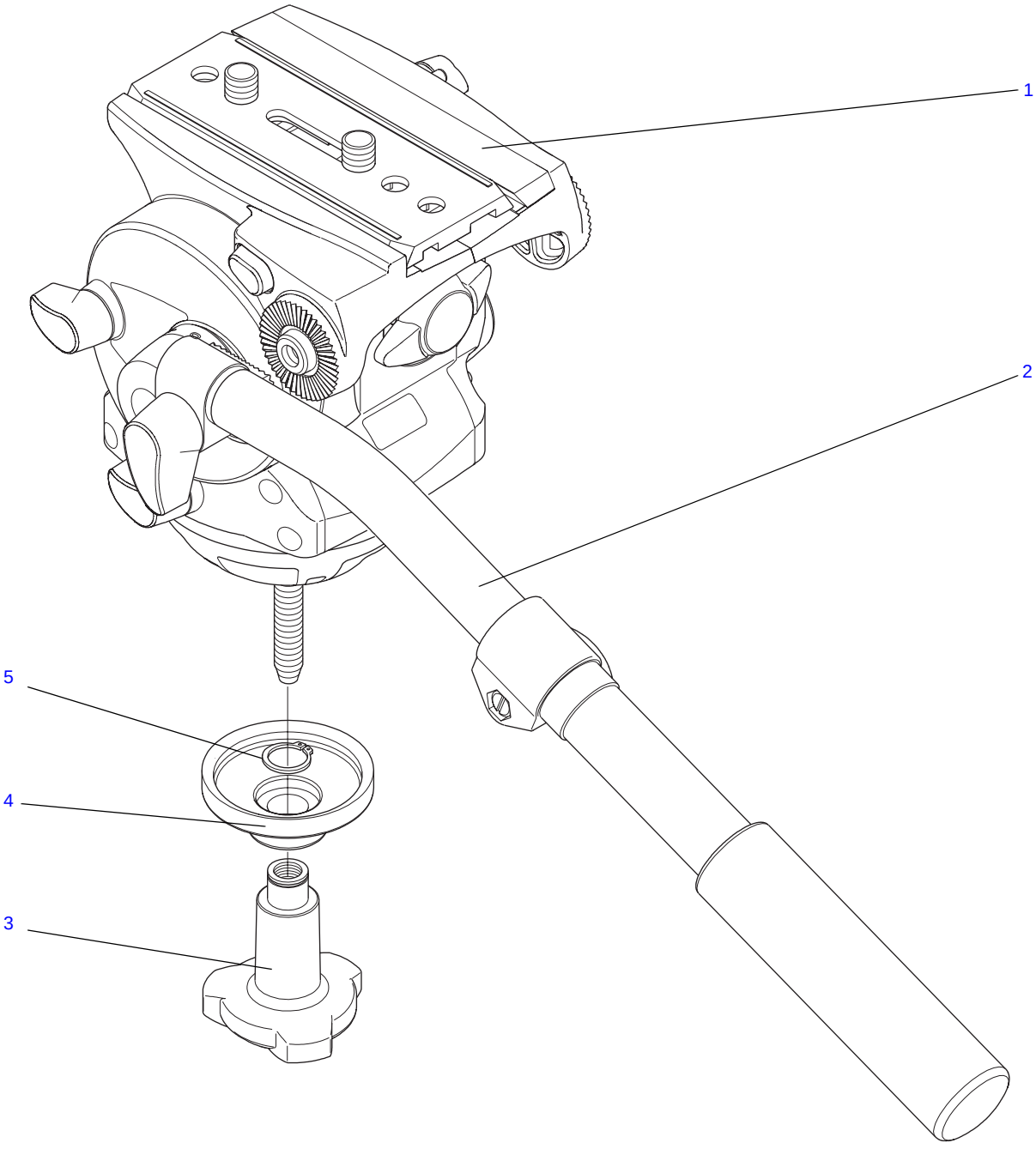

Fig 6.1 Vision 100 Pan and Tilt Head

Fig 6.1 Vision 100 Pan and Tilt Head

Item No.	Part No.	Nomenclature	Qty
1	3431-11	Final assembly (Fig 6.2, Fig 6.3, Fig 6.4, Fig 6.5, Fig 6.6)	1
2	3219-69	Telescopic pan bar assembly (Fig 6.7)	1
	3330-30	Bowl Clamp Knob Assy., comprising:	
3	3330-31	Bowl Clamp Knob	1
4	3330-225	Bowl Clamp Cup	1
5	M701-031	Circlip, external, standard, 14 mm shaft dia. x 1.00 mm thick	1
NI	C500-023	Battery, 9V	1

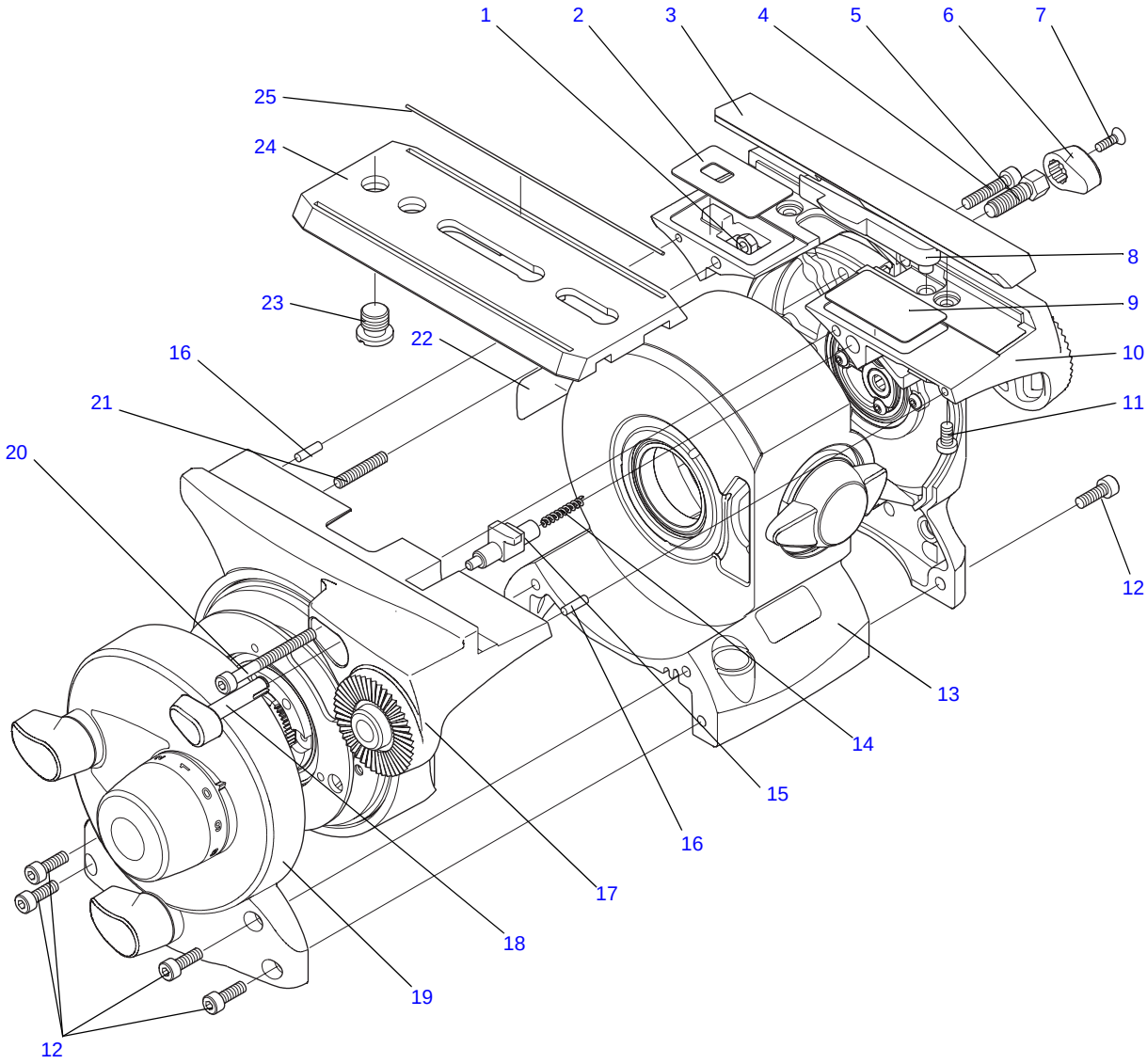

Fig 6.2 Vision 100 Pan and Tilt Head - Mechanism Assembly

Fig 6.2 Vision 100 Pan and Tilt Head - Mechanism Assembly

Item No.	Part No.	Nomenclature	Qty
1	M500-070*	Nut, M4, standard (hex), full	1
2	3431-297*	Platform label	1
3	3431-206	Platform insert	1
4	M005-714*	Screw, cap head, socket, M4 x 20 mm long	1
5	3431-277	Platform knob shaft	1
6	3431-338	Platform clamp knob	1
7	M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	1
8	3431-278	Slide clamp block	1
9	3431-296	Serial number label	1
10	–	Mechanism housing cover and RH side plate assembly (Fig 6.5)	–
11	M005-736	Screw, low-profile, cap head, socket, M4 x 6 mm long	2
12	M005-718*	Screw, cap head, socket, M4 x 12 mm long	6
13	–	Mechanism housing assembly (Fig 6.5)	–
14	J532-197*	Spring, compression, 1.500 in. free length, 0.094 in. OD x 5/32 in. hole dia., 1.60 lbf/in. rate	1
15	3431-275*	Platform slide release shaft	1
16	M801-001*	Pin, dowel, 3 mm dia. x 10 mm long	2
17	3431-23*	Tilt Module assembly (with machined from solid drag housing) (Fig 6.4)	1
18	3431-274*	Slide release button	1
19	–	Outrigger assembly (Fig 6.4)	–
20	M005-711*	Screw, cap head, socket, M4 x 40 mm long	1
21	M005-820*	Screw, grub, cone point, socket head, M4 x 25 mm long	1
22	3431-289*	Mechanism housing label	1
	3364-900SP*	Platform slide assembly, consisting of:	1
23	3170-202*	Screw (large)	2
24	3364-210*	Platform slide	1
25	Q300-128*	Section, rubber, 1.78mm diameter, 124mm long	2

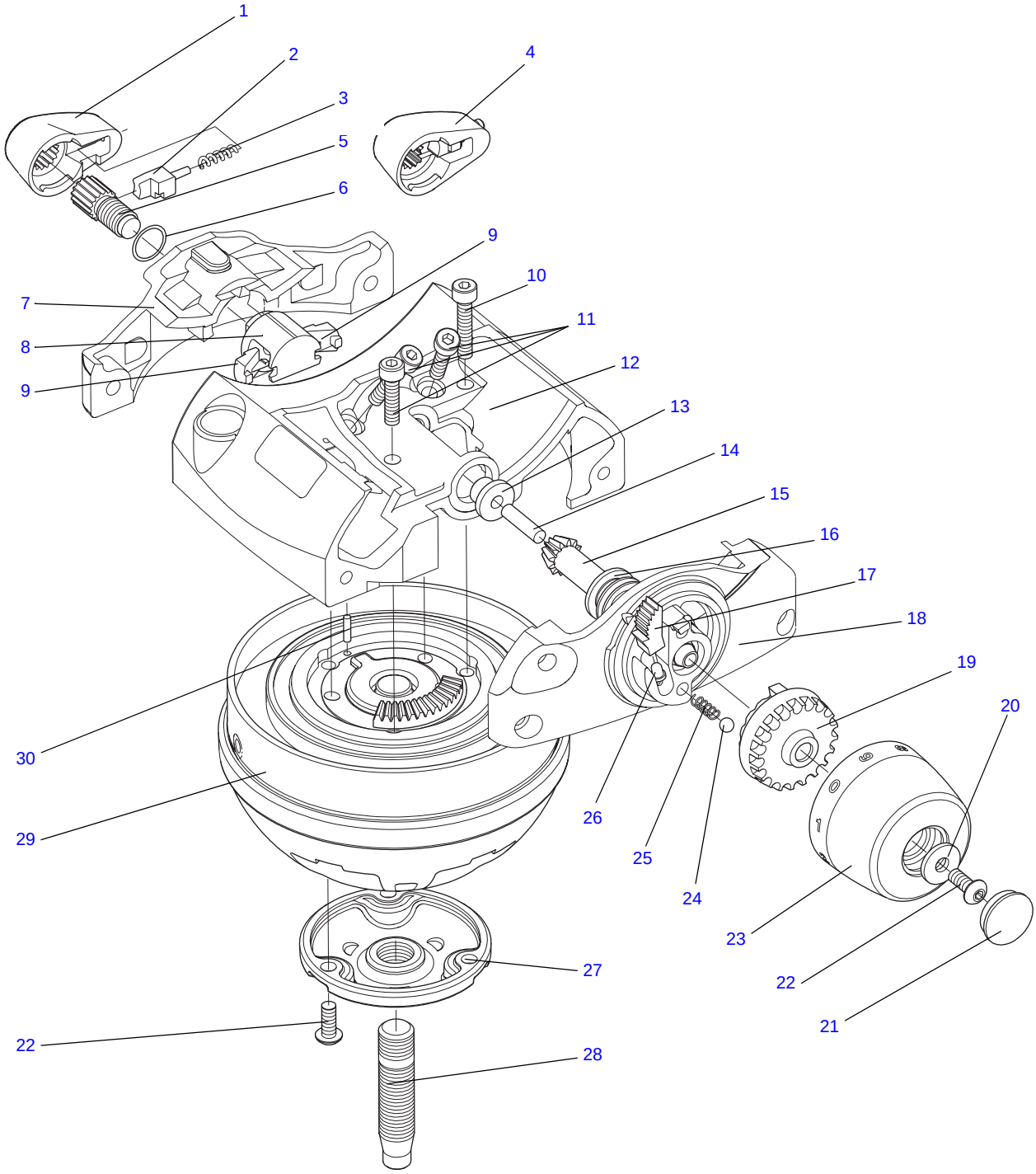

Fig 6.3 Vision 100 Pan and Tilt Head - Pan Brake and Pan Drag

Fig 6.3 Vision 100 Pan and Tilt Head - Pan Brake and Pan Drag

Item No.	Part No.	Nomenclature	Qty
	Brake knob assembly, Serial Nos. before 04472:		
1	3431-336	Brake knob	1
2	3431-337	Brake knob stop	1
3	J532-192	Spring, compression, 0.438 in. free length, 0.120 in. OD x 0.125 in. hole dia., 3.50 lbf/in. rate	1
	Brake knob assembly, Serial Nos. from 04472:		
4	3431-24*	Brake knob assembly	1
5	3431-331	Brake shaft (with "o"-ring groove)	1
6	R900H001	'O'-Ring, 7.5 mm ID x 1.6 mm section, hardness 70 IRHD	1
7	3431-330*	Outrigger (slotted brakes) (Fig 6.4)	1
8	3431-329	Brake calliper with flats	1
9	3431-243	Pan brake wedge	2
10	M005-706	Screw, cap head, socket, M4 x 16 mm long	1
11	M005-714*	Screw, cap head, socket, M4 x 20 mm long	3
12	3431-907SP	Mechanism housing assembly (Fig 6.2)	1
13	P003-002	Bearing, plain flanged, plastic, 4 mm ID x 8 mm OD x 6 mm long, thick/robust	1
14	M801-062	Pin, dowel, 4 mm dia. x 16 mm long	1
15	3431-236	Pan drive shaft	1
16	3431-309	Pan shaft washer	A/R
	3431-343	Pan Shaft Washer 0.90mm Thick	
	3431-344	Pan Shaft Washer 1.00mm Thick	
	3431-345	Pan Shaft Washer 1.10mm Thick	
	3431-346	Pan Shaft Washer 1.20mm Thick	
17	3431-267*	LED lens	1
18	3431-205	Mechanism housing cover (Fig 6.2)	1
19	3431-268*	Drag knob boss	1
20	3431-302*	Drag knob washer	1
21	3431-290*	Drag knob plug	1
22	M005-511*	Screw, button head, socket, M4 x 8 mm long	4
23	3431-265*	Pan drag knob	1
24	P900-008*	Ball, steel, 4 mm dia.	1

Fig 6.3 Vision 100 Pan and Tilt Head - Pan Brake and Pan Drag (Cont)

Item No.	Part No.	Nomenclature	Qty
25	J532-067*	Spring, compression, 25 mm free length, 3.50 mm OD x 2.71 mm ID, 1.123 N/mm rate	1
26	3431-916SP	Pan LED wire assembly (Fig 6.6)	1
27	3431-234*	Stud carrier	1
28	3431-235*	Stud	1
29	3431-22*	Pan Module assembly (with machined from solid drag housing)	1
30	M801-003*	Pin, dowel, 2 mm dia. x 8 mm long	1

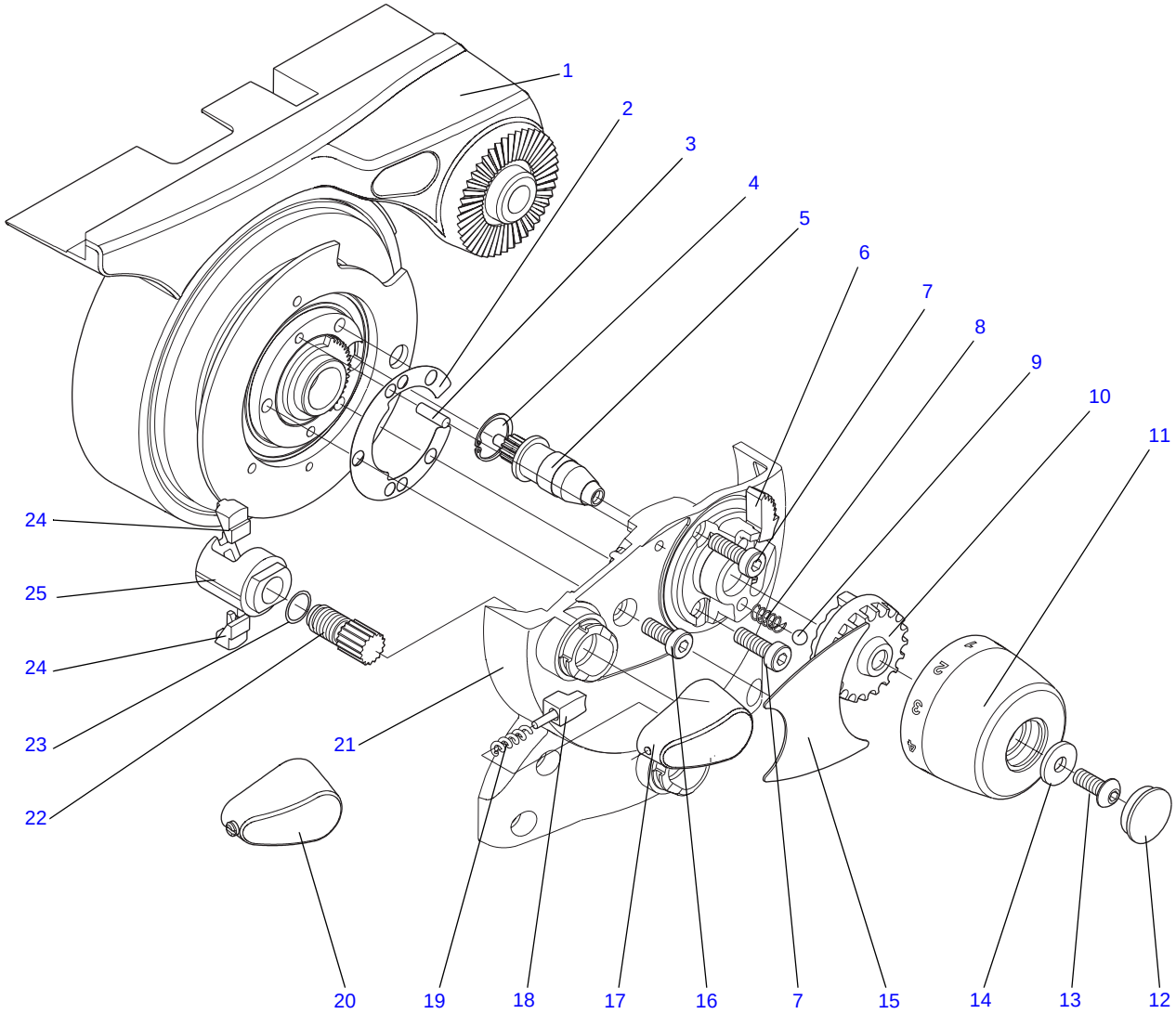

Fig 6.4 Vision 100 Pan and Tilt Head - Tilt Brake and Tilt Drag

Fig 6.4 Vision 100 Pan and Tilt Head - Tilt Brake and Tilt Drag

Item No.	Part No.	Nomenclature	Qty
1	3431-23*	Tilt Module assembly (with machined from solid drag housing)	1
2	3431-286*	Tilt shim - 20 thou	A/R
	3431-300*	Tilt shim- 5 thou	A/R
3	M806-014*	Pin, coiled-spring, 3 mm dia. x 10 mm long, mdp	2
4	M700-043	Circlip, internal, standard, 14 mm bore dia. x 1.00 mm thick	1
5	3431-359	Shaft, tilt drive	1
6	3431-267*	LED lens	1
7	M005-735	Screw, low-profile, cap head, socket, M4 x 12 mm long	2
8	J532-067*	Spring, compression, 25 mm free length, 3.50 mm OD x 2.71 mm ID, 1.123 N/mm rate	1
9	P900-008*	Ball, steel, 4 mm dia.	1
10	3431-268*	Drag knob boss	1
11	3431-266*	Tilt drag knob	1
12	3431-290*	Drag knob plug	1
13	M005-511*	Screw, button head, socket, M4 x 8 mm long	1
14	3431-302*	Drag knob washer	1
15	3431-288*	Outrigger label	1
16	M005-734	Screw, low-profile, cap head, socket, M4 x 10 mm long	1
	Brake knob assembly, Serial Nos. before 04472:		
17	3431-336	Brake knob	1
18	3431-337	Brake knob stop	1
19	J532-192	Spring, compression, 0.438 in. free length, 0.120 in. OD x 0.125 in. hole dia., 3.50 lbf/in. rate	1
	Brake knob assembly, Serial Nos. from 04472:		
20	3431-24*	Brake knob assembly	1
21	3431-330*	Outrigger (slotted brakes)	1
22	3431-924SP*	Tilt brake shaft spares kit, including:	1
23	R900H001*	'O'-Ring, 7.5 mm ID x 1.6 mm section, hardness 70 IRHD	1
24	3431-259	Tilt brake wedge	2
25	3431-329	Brake calliper with flats	1

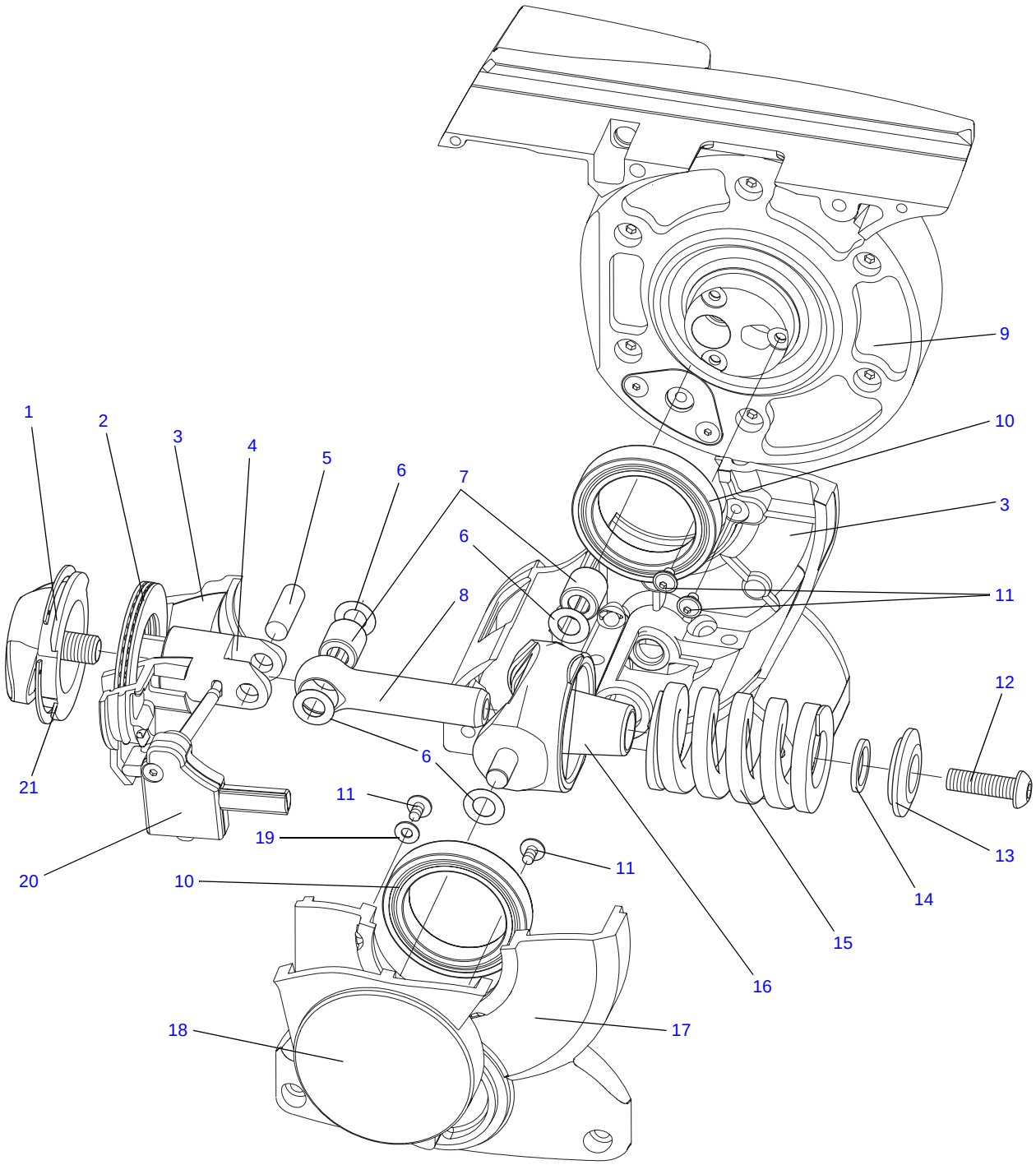

Fig 6.5 Vision 100 Pan and Tilt Head - Balance Mechanism

Fig 6.5 Vision 100 Pan and Tilt Head - Balance Mechanism

Item No.	Part No.	Nomenclature	Qty
1	3431-16	Balance knob moulding assembly	1
2		Thrust bearing, comprising:	
	P602-020	Bearing, needle roller, thrust, 25 mm ID x 42 mm OD x 2 mm long, with cage assembly	1
	P602-021	Washer, thrust, bearing, 25 mm ID x 42 mm OD x 1 mm thick	2
3	3431-907SP*	Mechanism housing assembly (Fig 6.2)	1
4	3431-260	Adjustment slide	1
5	L801-098	Pin, dowel, oversize, 1/4 in. dia. x 3/4 in. long	1
6	3321-222	Shim washer	6
7	N500-023	Bearing, needle roller, radial, full complement, 1/4 in. ID x 7/16 in. OD x 7/16 in. long	2
8	3390-231	Actuator shaft	1
9	3431-23*	Tilt Module assembly (with machined from solid drag housing) (Fig 6.4)	1
10	P302-011	Bearing, ball, radial, 30 mm ID x 42 mm OD x 7 mm INA NO. 61806-2Z / FAG NO. 61806-2Z (identical to P200-105)	2
11	M004-551	Screw, flanged, button head, socket, M3 x 5 mm long	12
12	M007-523	Screw, button head, socket, M6 x 20 mm long	1
13	3364-282	Spring end cap (Hanson spring)	1
14	3321-223	Buffer	1
15	3364-331	ERAM compression spring	1
16	3431-906SP*	Spring actuator assembly	1
17	3431-205	Mechanism housing cover (Fig 6.2)	1
18	3431-901SP*	RH side plate (Fig 6.2)	1
19	M606-015	Washer, nylon spacer, 3.2 mm ID x 7 mm OD x 0.5 mm thick	3
20	3431-15	PCB assembly (Fig 6.6)	1
21	3390-232	Spiral ring	1

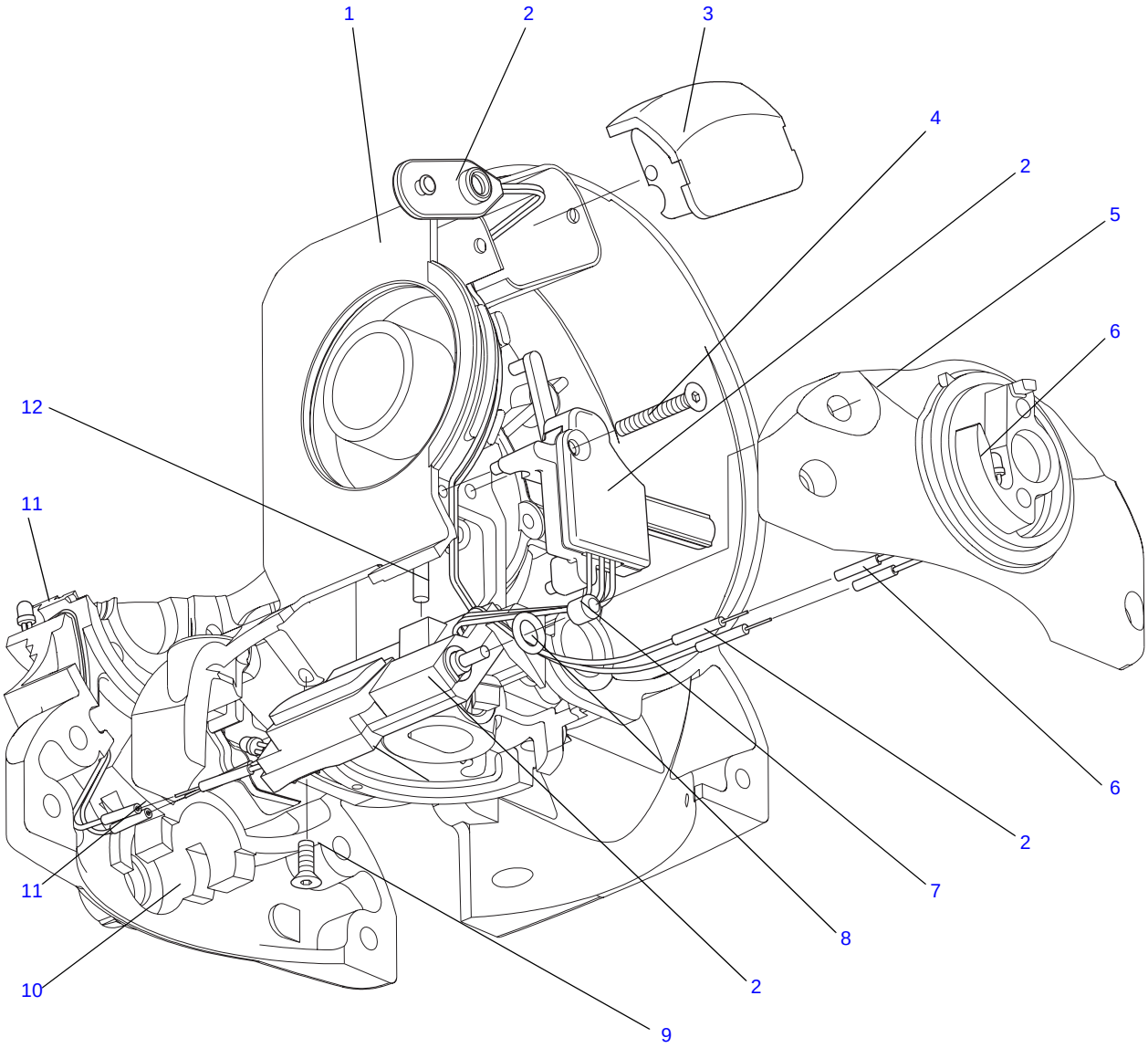

Fig 6.6 Vision 100 Pan and Tilt Head - Electrical Installation

Fig 6.6 Vision 100 Pan and Tilt Head - Electrical Installation

Item No.	Part No.	Nomenclature	Qty
1	3431-907SP*	Mechanism housing assembly	1
2	3431-15	PCB assembly - includes potentiometer, PCB, digital display, LEDs and all wiring, including items 6 and 11	1
3	3431-270	Battery cover	1
4	M004-905	Screw, countersunk head, socket, M3 x 20 mm long	1
5	3431-205	Mechanism housing cover (Fig 6.2)	1
6	3431-916SP*	Pan LED wiring assembly	1
7	J550-108	Cap, push-button for 0.100 in. dia. Plungers	1
8	R900H129	'O'-Ring, 4.5 mm ID x 1.6 mm section, hardness 70 IRHD	1
9	M004-906	Screw, countersunk head, socket, M3 x 6 mm long	1
10	3431-330*	Outrigger (slotted brakes) (Fig 6.2)	1
11	3431-917SP*	Tilt LED wiring assembly	1
12	M801-002	Pin, dowel, 3 mm dia. x 20 mm long	1

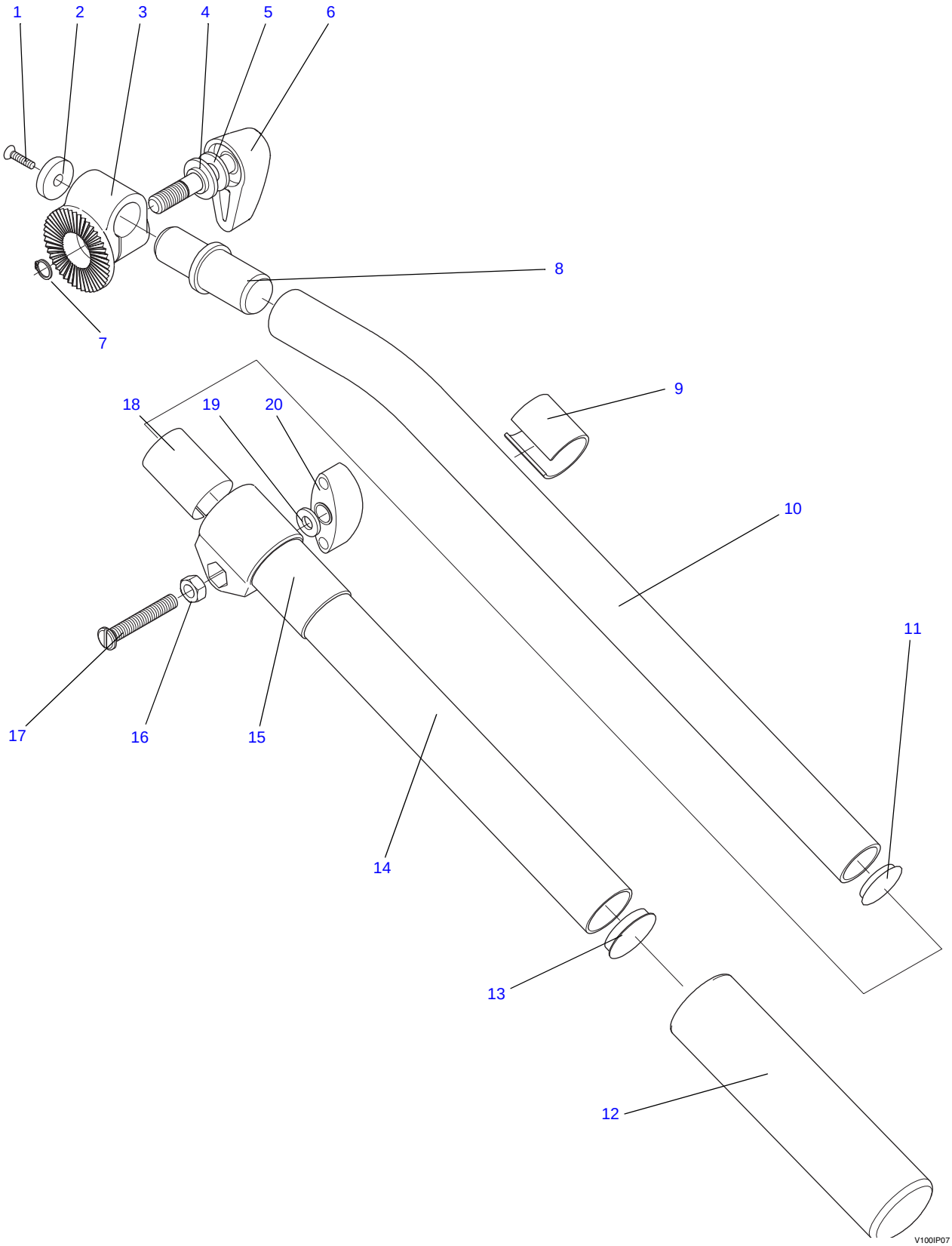

Fig 6.7 Vision 100 Pan and Tilt Head - Pan Bar

Fig 6.7 Vision 100 Pan and Tilt Head - Pan Bar

Item No.	Part No.	Nomenclature	Qty
1	M006-113	Screw, csk Pozi hd, M5 x 12 mm lg	1
2	M606-001	Washer, nylon, Skiffy 07-3-5	1
	3219-70	Pan bar clamp assembly, comprising:	1
3	3219-298	Pan bar clamp	1
4	G249-007	Sleeve, nylon, Skiffy 18-8-2	1
5	M600-009	Washer, M8, heavy	1
6	3219-75	Pan bar clamp knob assembly	1
7	L701-007	Circlip, external, standard, 0.375 in. shaft dia. x 0.025 in. thick	1
	3219-36	Pan bar assembly, comprising:	1
	3219-37	Pan bar fixed, consisting of:	1
8	3219-229	Spigot	1
9	3219-227	Sleeve	1
10	3219-255	Pan bar	1
11	J550-074	Hole plug	1
	3219-38	Pan bar outer, consisting of:	1
12	3219-253	Pan bar grip	1
13	J550-093	Hole plug	1
14	3219-49	Outer tube/clamp assembly	1
15	3219-312	Pan bar sleeve	1
16	M500-082	Nut, M6, full	1
17	3219-299	Pan bar clamp (M6)	1
18	3219-329	Clamp lining 0.08 mm thick	1
19	M600-007	Washer, M6	1
20	K403-004	Knob	1

Fig 6.8 Vision 100 Pan and Tilt Head - Composite Spare Parts

Part No.	Nomenclature	Qty
3364-900SP	Platform slide assembly, comprising	
3364-210	Platform slide	1
Q300-128	Section, rubber, 1.78mm diameter, 124mm long	2
3170-202	Screw (large)	2
3431-900SP	Brake knob kit, comprising:	
3431-24	Brake knob assembly	1
3431-901SP	RH side plate assembly, comprising:	
3431-203	Right hand side plate	1
L850-032	Threaded-insert, wire thread insert (helicoil), 5/16 in. BSF x 1-1/2 Diameters long	1
N500-023	Bearing, needle roller, radial, full complement, 1/4 in. ID x 7/16 in. OD x 7/16 in. long	1
3431-902SP	Pan drag knob kit, comprising:	
3431-265	Pan drag knob	1
3431-290	Drag knob plug	1
3431-268	Drag knob boss	1
3431-302	Drag knob washer	1
M005-511	Screw, button head, socket, M4 x 8 mm long	1
J532-067	Spring, compression, 25 mm free length, 3.50 mm OD x 2.71 mm ID, 1.123 N/mm rate	2
P900-008	Ball, steel, 4 mm dia.	2
3431-903SP	Tilt drag knob kit, comprising:	
3431-266	Tilt drag knob	1
3431-290	Drag knob plug	1
3431-268	Drag knob boss	1
3431-302	Drag knob washer	1
M005-511	Screw, button head, socket, M4 x 8 mm long	1
J532-067	Spring, compression, 25 mm free length, 3.50 mm OD x 2.71 mm ID, 1.123 N/mm rate	2
P900-008	Ball, steel, 4 mm dia.	2

Fig 6.8 Vision 100 Pan and Tilt Head - Composite Spare Parts (Cont)

Part No.	Nomenclature	Qty
3431-905SP	Tilt drag assembly (for heads from serial number 1830 onwards), comprising:	
3431-23	Tilt Module assembly (with machined from solid drag housing)	1
3431-904WA	Tilt drag transit cover	1
3431-286	Tilt shim - 20 thou	3
3431-300	Tilt shim- 5 thou	3
3431-274	Slide release button	1
3431-275	Platform slide release shaft	1
M005-820	Screw, grub, cone point, socket head, M4 x 25 mm long	1
M004-706	Screw, cap head, socket, M3 x 16 mm long	3
M005-711	Screw, cap head, socket, M4 x 40 mm long	1
M005-738	Screw, low-profile, cap head, socket, M4 x 16 mm long	3
M801-001	Pin, dowel, 3 mm dia. x 10 mm long	2
J532-197	Spring, compression, 1.500 in. free length, 0.094 in. OD x 5/32 in. hole dia., 1.60 lbf/in. rate	1
3431-906SP	Spring actuator assembly, comprising:	
3431-261	Spring actuator	1
3431-291	Actuator pin	2
3431-907SP	Mechanism housing assembly, comprising:	
3431-201	Mechanism housing	1
3431-269	Battery sleeve	1
J501-003	Level-bubble, 12 mm dia., 7 mm high, cylindrical, bottom plain white, clear filling, article P12, sensitivity 30 min. per 1 mm bubble movement	1
3431-913SP	Pan drag spares assembly, comprising:	
3431-22	Pan Module assembly (with machined from solid drag housing)	1
3431-234	Stud carrier	1
3431-235	Stud	1
3431-914WA	Pan drag transit cover	1
M005-511	Screw, skt butt hd, M4 x 8 mm lg	3
M005-514	Screw, skt butt hd, M4 x 16 mm lg	3
M801-003	Dowel pin, 2 mm dia x 8 mm lg	2

Fig 6.8 Vision 100 Pan and Tilt Head - Composite Spare Parts (Cont)

Part No.	Nomenclature	Qty
3431-915SP	Slide plate release kit, comprising:	
3431-274	Slide release button	1
3431-275	Platform slide release shaft	1
3431-289	Mechanism housing label	1
3431-290	Drag knob plug	1
3431-297	Platform label	1
J532-197	Spring, compression, 1.500 in. free length, 0.094 in. OD x 5/32 in. hole dia., 1.60 lbf/in. rate	1
M005-711	Screw, skt cap hd, M4 x 40 mm lg	1
M005-714	Screw, skt cap hd, M4 x 20 mm lg	1
M005-718	Screw, skt cap hd, M4 x 12 mm lg	2
M500-070	Nut, hex, M4	1
P900-008	Ball, steel, 4 mm dia.	
3431-916SP	Pan LED wiring assembly	
3431-917SP	Tilt LED wiring assembly	
3431-918SP	Outrigger spares, up to Serial No. 552, comprising:	
3431-202	Outrigger	1
3431-267	LED lens	1
3431-288	Outrigger label	1
3431-297	Platform label	1
3431-312	Tilt brake dowel	2
3431-917SP	Tilt LED wiring assembly	1
M806-014	Spirol pin, 3 mm dia x 10 mm lg	2
P900-008	Steel ball, 4 mm dia	2
R900H002	‘O’ ring, 202-517-4470	2

Fig 6.8 Vision 100 Pan and Tilt Head - Composite Spare Parts (Cont)

Part No.	Nomenclature	Qty
3431-919SP	Outrigger spares, from Serial No. 553 to 1585, comprising:	
3431-327	Outrigger	1
3431-267	LED lens	1
3431-288	Outrigger label	1
3431-297	Platform label	1
3431-312	Tilt brake dowel	2
3431-917SP	Tilt LED wiring assembly	1
M806-014	Spirol pin, 3 mm dia x 10 mm lg	2
P900-008	Steel ball, 4 mm dia	2
R900H002	'O' ring, 202-517-4470	2
3431-920SP	Outrigger spares, from Serial No. 1586, comprising:	
3431-330	Outrigger (slotted brakes)	1
3431-267	LED lens	1
3431-288	Outrigger label	1
3431-297	Platform label	1
3431-917SP	Tilt LED wiring assembly	1
M806-014	Pin, coiled-spring, 3 mm dia. x 10 mm long, mdp	2
P900-008	Ball, steel, 4 mm dia.	2
3431-921SP	Slide release kit, from Serial No. 192 to 1522, comprising:	
3431-341	Slide release button for heads between serial number 191-1522	1
3431-342	Slide release shaft for heads between serial number 191-1522	1
J532-197	Spring, compression, 1.500 in. free length, 0.094 in. OD x 5/32 in. hole dia., 1.60 lbf/in. rate	1
3431-289	Mechanism housing label	1
3431-290	Drag knob plug	1
3431-297	Platform label	1
P900-008	Ball, steel, 4 mm dia.	2
M005-711	Screw, cap head, socket, M4 x 40 mm long	1
M005-714	Screw, cap head, socket, M4 x 20 mm long	1
M005-718	Screw, cap head, socket, M4 x 12 mm long	2
M500-070	Nut, M4, standard (hex), full	1

Fig 6.8 Vision 100 Pan and Tilt Head - Composite Spare Parts (Cont)

Part No.	Nomenclature	Qty
3431-924SP	Tilt brake shaft spares kit, comprising:	
3431-244	Brake shaft	1
3431-242	Brake pad	2
3431-242B	Brake Pad (brass version)	1
3431-331	Brake shaft (with "o"-ring groove)	2
R900H001	'O'-Ring, 7.5 mm ID x 1.6 mm section, hardness 70 IRHD	2