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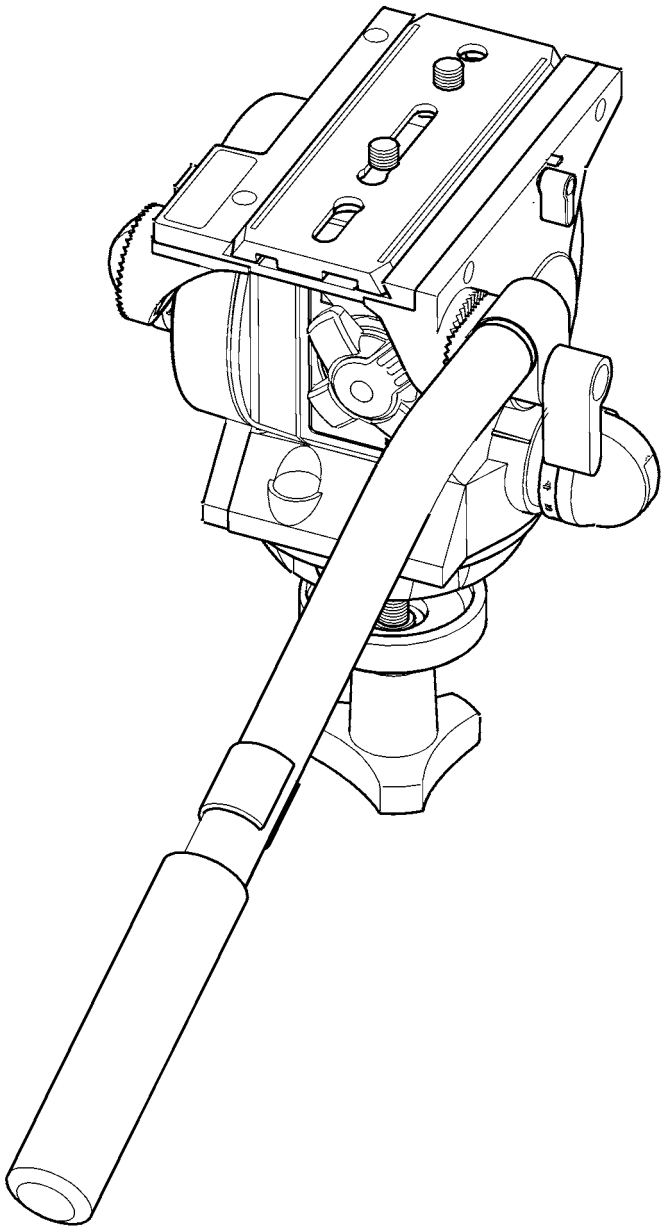
Maintenance Manual

Vision 10LF

Pan and Tilt Head



Vinten

Camera Control Solutions

Vision 10LF

PAN AND TILT HEAD
3390

MAINTENANCE MANUAL
AND
ILLUSTRATED PARTS LIST

PUBLICATION PART No. 3390-9

ISSUE 3

Foreword

This manual provides full and detailed maintenance and spare parts information for the Vinten® Vision® 10LF pan and tilt head.

WARNING!: Read the Safety Section on page 8 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 10LF Pan and Tilt Head Maintenance Manual’ (3390-9). 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 LF Series Pan and Tilt Heads Operators Guide - Publication Part No. 3390-8

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	3 kg (6.6 lb)

Load

Typical payload	13 kg (28 lb)

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 kg (6.6 lb)
Height to mounting face	150 mm (5.9 in.)
Length	145 mm (5.7 in.)
Width	185 mm (7.3 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
Improvements to pan and tilt drag unit seals	1197
Improvements to brake shafts	3282
Bowl clamp - improved clamping efficiency	5330

Section 1

Introduction and Description

Contents **Para**

Introduction

1 The Vision 10LF pan and tilt head is part of a range designed for broadcast professional, corporate and educational use. It is largely constructed in aluminium alloy 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 lubricated friction (LF) 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 movements are each provided with a brake.

Description

3 The Vision 10LF pan and tilt head embodies a spring counterbalance mechanism, lubricated friction drag assemblies and brakes on the pan and tilt mechanisms and a camera mounting plate.

4 The balance system is easily adjusted by a knob (1) 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.

5 Both the pan and tilt mechanisms incorporate the Vinten LF system to ensure smooth movement of the camera about these axes and are fitted with control knobs (7)(11) to adjust the drag setting. The whip-pan facility is unaffected by the pan drag setting. Both drag knobs are provided with scales.

6 Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for both brakes (10)(12) 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 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.

8 The camera is attached to the head by means of a slide plate (1) or by using the optional Quickfit adaptor. A clamp (5) is provided to hold the slide plate in position and a lock (13) prevents its inadvertent removal from the head.

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

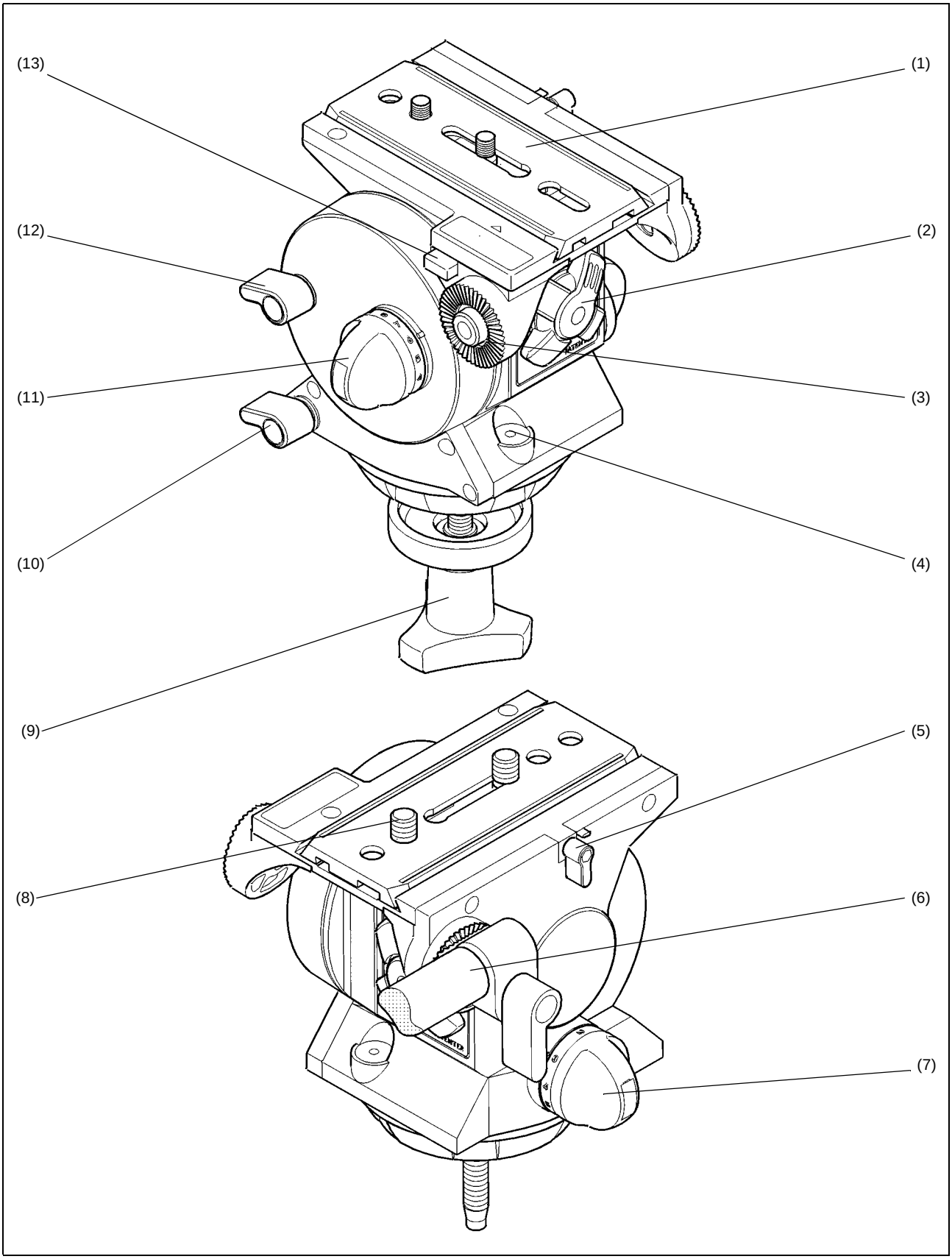


Fig 1.1 Vision 10LF Pan and Tilt Head

Section 2

Installation and Operation

Contents **Para**

General

1 To identify components, please refer to Fig 1.1. For further operating instructions, please refer to Vision LF Series Pan and Tilt Heads Operators Guide, Publication Part No. 3390-8.

Installing the head on a tripod

2 The Vision 10LF 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 (9) 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 (4) and tighten the bowl clamp.

Mounting the camera

5 Remove the slide plate (1) from the head by releasing the slide clamp (5), pressing the slide lock release (13) 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 (8). Position the screws as far apart as possible.

7 Set the platform level and apply both the pan and tilt brakes (10)(12).

8 Push the slide plate and camera into the track in the platform, ensuring slide release (13) snaps into position.

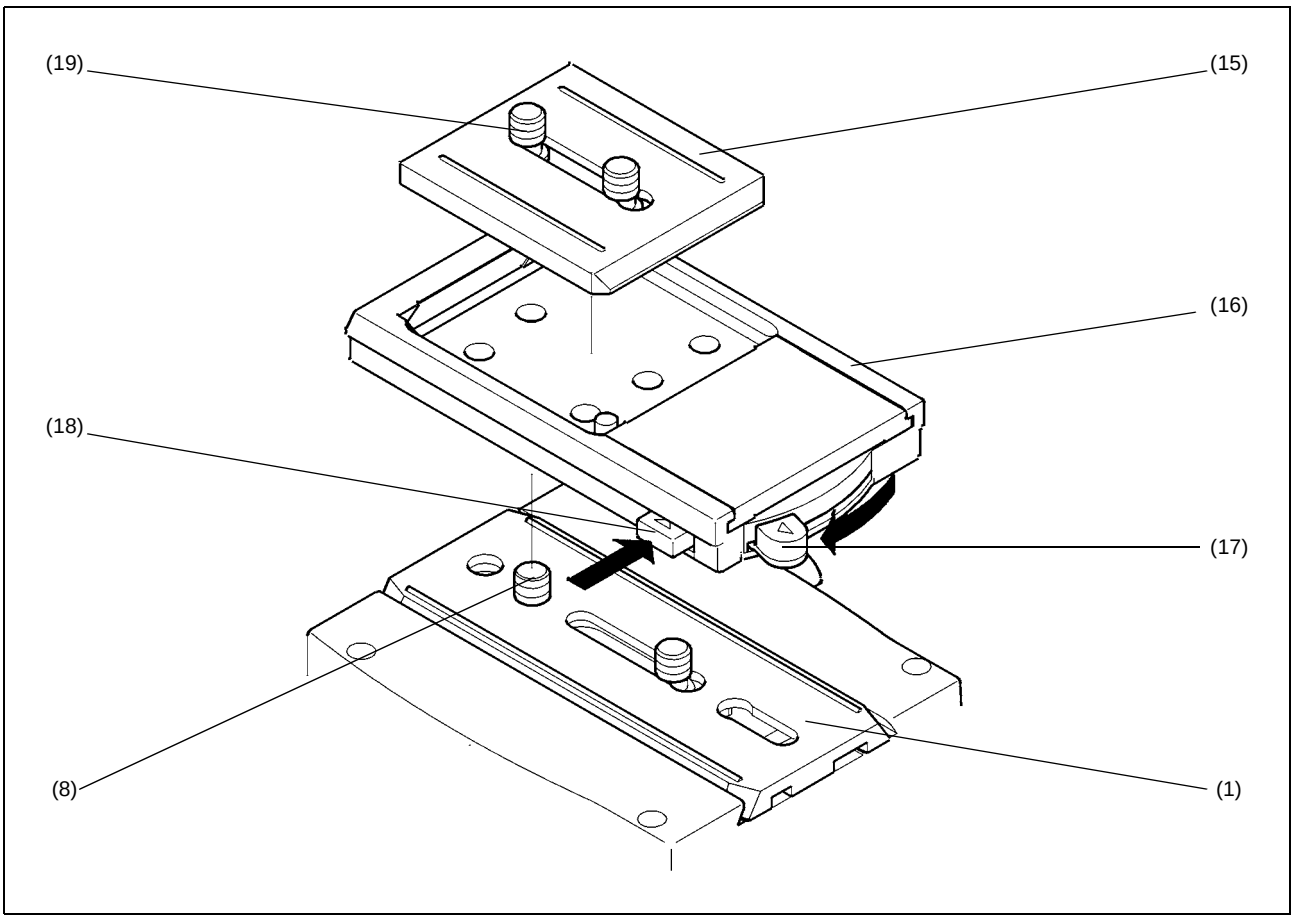


Fig 2.1 Mounting the Camera (Optional Quickfit Adaptor)

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 (16) to the slide plate (1) with the two screws provided (8).

9.2 Free the Quickfit wedge (15) from the adaptor by simultaneously pushing in on the safety catch (18) and operating the wedge release (17).

9.3 Fit the Quickfit wedge (15) to the camera with the two screws provided (19).

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.

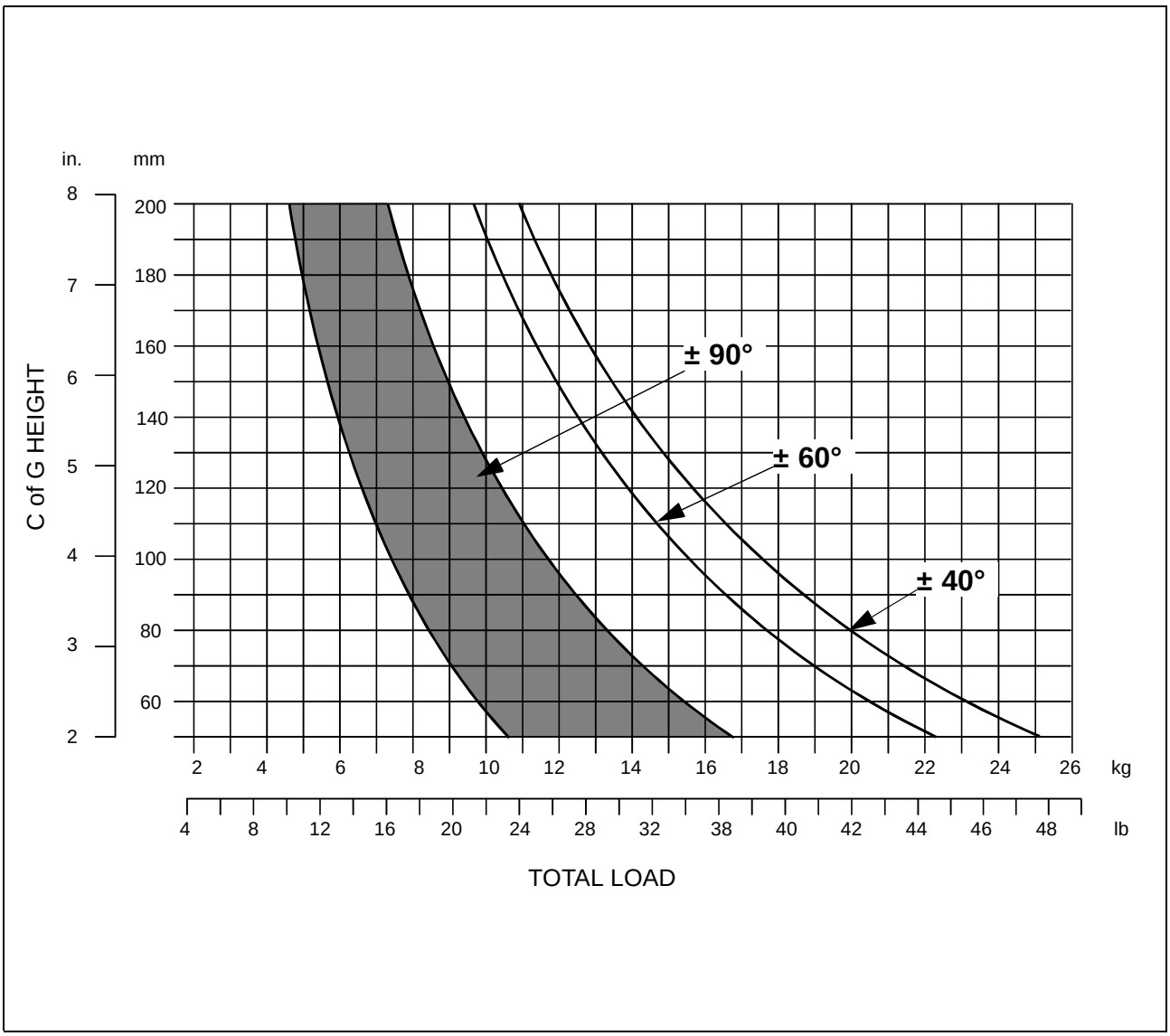


Fig 2.2 Balance Graph

Balancing the head

10 Balancing the Vision 10 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 (12). 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.

12.4 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 (12).

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

Pan and tilt brakes

13 Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for the pan brake (10) and tilt brake (12) are fitted at the left-hand side of the head.

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

Pan and tilt drag

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

16 The tilt drag adjustment knob (11) is on the left-hand side of the head, the pan drag knob (7) is on the right -hand side. Both drag knobs are provided with scales, graduated from 0 to 9. The whip-pan facility is unaffected by the pan drag setting.

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

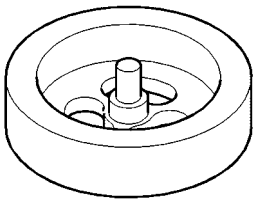
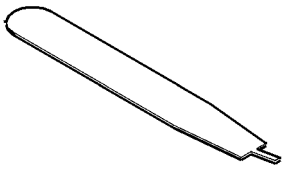
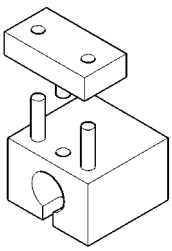
Section 3

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
	Centralizing fixture (pan)	3390-904TL	Centralizing pan drag shoe
	Centralizing fixture(tilt)	3390-905TL	Centralizing tilt drag shoe
	Spring insertion tool	3390-909TL	Assembly of platform
	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 M240G	Z150-072	Adjustment threads
Grease, GP50, Moly-Paul	Z150-081	Moving contact surfaces EXCEPT drag faces
Grease, white bearing	Z150-085	Bearing and general lubrication

ITEM	PART No.	USE
Grease, Chesterton	Z150-105	Actuator shaft
Grease, Castrol LM	Z150-123	Thrust races
Vinten Fluid No. 3	3051-25	Drag housings
Loctite 221	Z002-026	Screw locking
Loctite 222E*	Z002-075	Screw locking
Loctite 241	Z002-022	Screw locking
Loctite 270	Z002-034	Screw locking
Loctite 380*	Z002-078	Adhesive
Loctite 406	Z002-086	Adhesive
Loctite 415	Z002-062	Adhesive
Loctite 495*	Z002-059	Spring cap buffer
Loctite 601*	Z002-020	Adhesive
Loctite 638*	Z002-058	Adhesive
Loctite 641*	Z002-074	Bearing retainer
Loctite primer N	Z002-011	Primer for Loctite 222E
Loctite primer T	Z002-019	Primer for Loctite 221
Silcoset 153*	Z002-036	Brake knob caps

Section 4

Servicing

Contents **Para**

General

1 The Vision 10LF head requires a minimum of periodic servicing. Its rotational and drag mechanisms are totally enclosed to prevent the ingress of dirt or foreign bodies. If the head becomes faulty reference should be made to Section 5 of this manual, or the unit may be returned to Vinten Broadcast Limited or your local distributor for overhaul.

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 ball and mounting face of the head and to the space between the tilting assembly and the base.

3 The Vision 10LF head is 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.

Lubrication

4 The bearings in the pan and tilt head are packed with grease. Under normal operating conditions they will only require re-greasing if there is any harshness or stiffness in movement. Refer to Section 5 to dismantle the head for re-greasing.

5 To check the bearings, turn the balance control as far as possible counter-clockwise, turn the pan and tilt drag controls fully counter-clockwise and release the brakes. At these settings both pan and tilt axes should move smoothly and without perceptible drag.

Adjustments

Drag control knob adjustment

Normal conditions

6 The pan and tilt drag controls on the Vision 10LF head operate by expanding a drag shoe with an actuator. Bedding-in occurs between the actuator and the shoe, which requires resetting of the drag control knob. This simple adjustment should be performed after one month's service and at six monthly intervals thereafter.

7 The procedure for resetting the pan and tilt drag control knob is as follows (Fig 4.1):

7.1 Release the pan and tilt brakes.

7.2 Prise out the centre of the appropriate drag control knob (3).

7.3 Turn the knob (1) fully clockwise to its maximum setting and remove the retaining screw (2).

7.4 Pull off the knob (1), rotate approximately 20 degrees counter-clockwise and refit.

7.5 Turn the knob fully counter clockwise to its minimum setting.

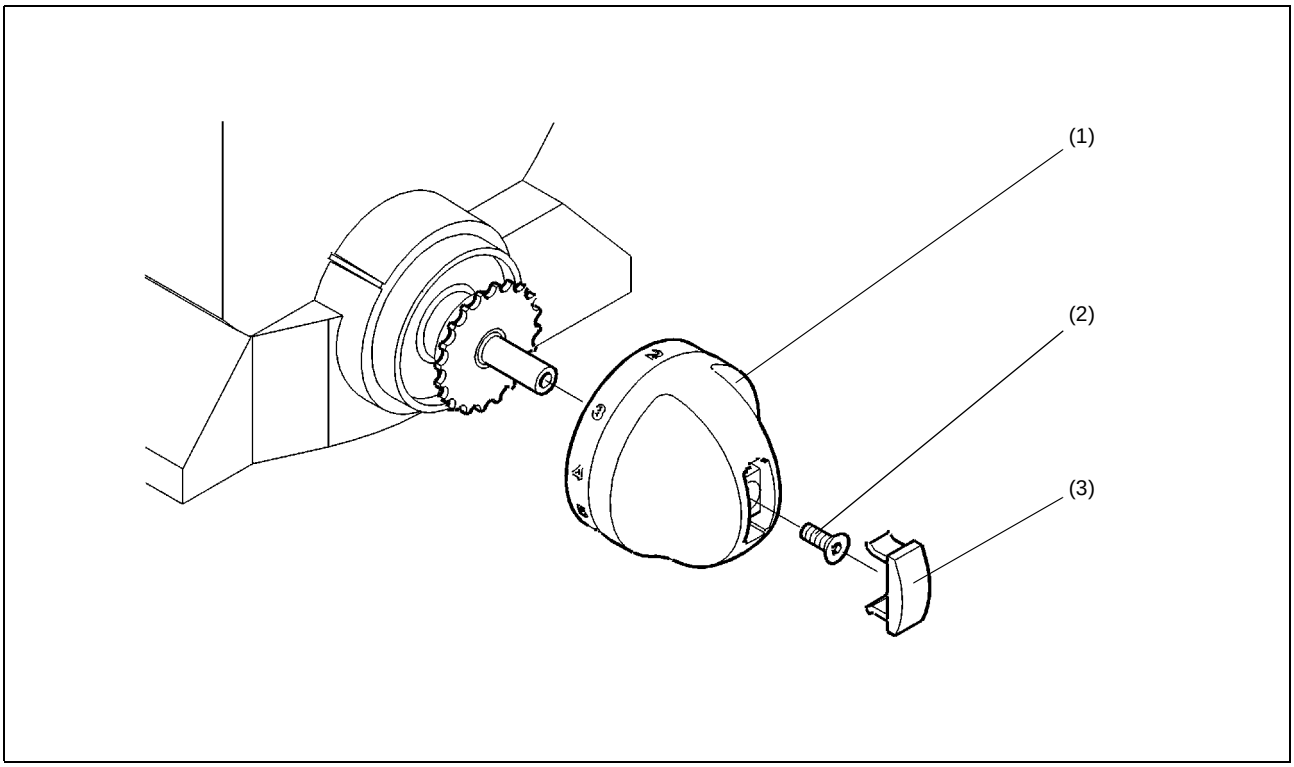


Fig 4.1 Drag Control Knob Adjustment

7.6 Turn knob clockwise and ensure that drag begins to be felt at a setting between 1 and 1.5 on the drag knob. Repeat Para 7.4 until this can be achieved.

7.7 Secure knob with screw (2) and refit knob centre (3).

Operation in low ambient temperatures

8 Use of the Vision 10LF head in ambient temperatures below -20° C may result in excessive drag in the pan and tilt axes. Should this problem arise it can be overcome by adjustment of each drag setting knob as follows (Fig 4.1):

8.1 Release the pan and tilt brakes.

8.2 Prise out the centre of the appropriate drag control knob (3).

8.3 Turn the knob (1) fully counter-clockwise to its minimum setting and slacken the retaining screw (2).

8.4 Pull the knob gently outwards while keeping it turned against the stop.

8.5 While pulling the knob outwards, undo the retaining screw until the knob clears the stop and is free to turn further in a counter-clockwise direction. Do NOT undo the retaining screw any further.

8.6 Turn the knob counter-clockwise until it clears the stop and can be pushed in to its normal position on the shaft.

8.7 The drag mechanism is now at its new maximum setting and can be adjusted to the preferred setting as detailed in Para 7.

8.8 After adjustment secure knob with screw (2) and refit knob centre (3).

9 When the head is returned to normal temperature operation the mechanism may be re-set by reversing the above procedure.

Brake knob adjustment

10 The pan and tilt brakes are set during manufacture so that, when the brakes are fully applied, the knob is vertical. As the brakes bed in during use it may be necessary to reset the knobs to this position.

11 The procedure for resetting the pan and tilt brake knobs is as follows (Fig 4.2):

11.1 Prise out the centre of the appropriate brake knob (4).

11.2 Turn the knob (2) clockwise to fully apply the brake.

11.3 Remove the retaining screw (3) and pull the knob (2) off the shaft (1).

11.4 Refit the knob on the shaft in the vertical position.

11.5 Turn the knob fully counter-clockwise and ensure the brake is released

11.6 Turn the knob clockwise and ensure that the brake is fully applied when the knob is vertical. Adjust the position of the knob if necessary.

11.7 Secure the knob with the screw (3). Refit the knob centre (4), using Silcoset 153.

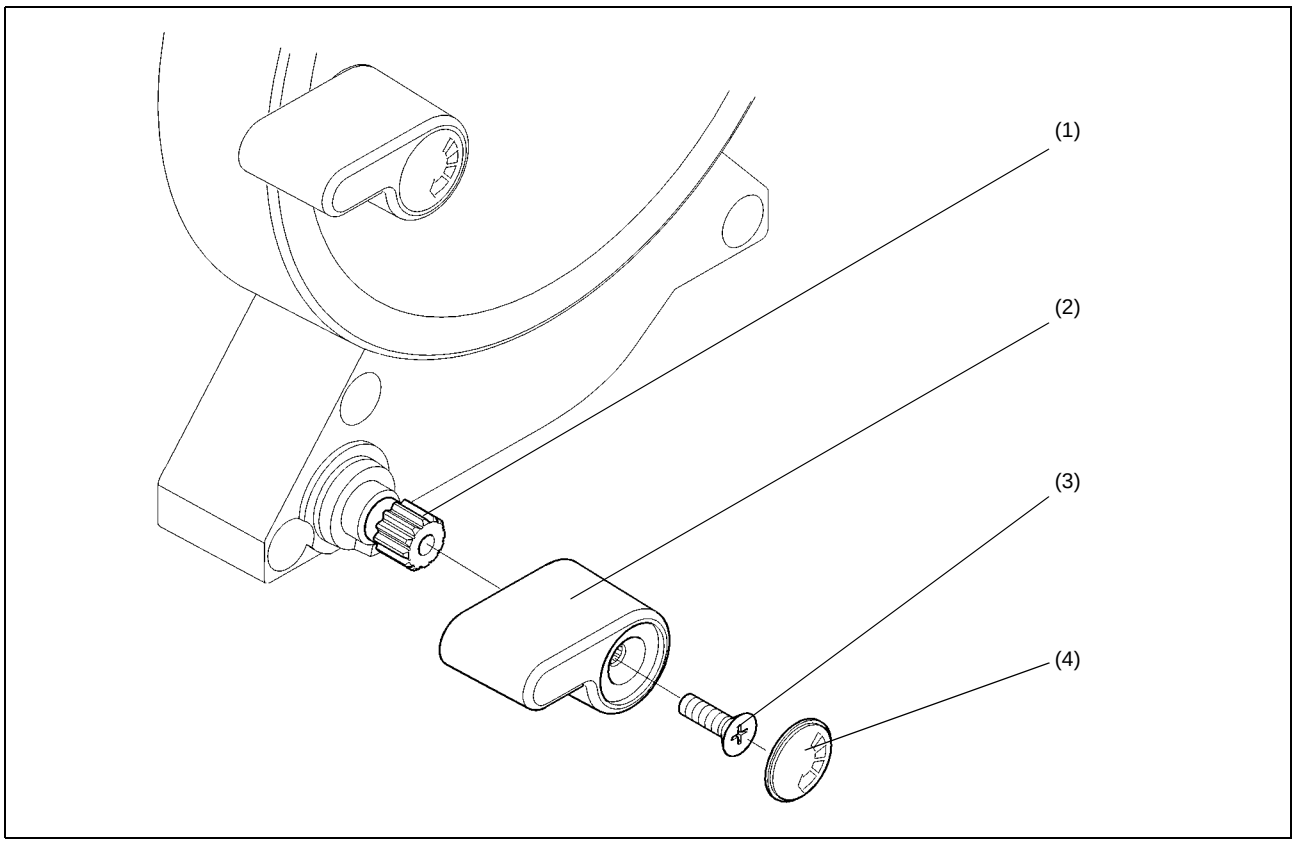


Fig 4.2 Brake Knob Adjustment

Section 5

Repair

Contents **Para**

General

1 This section details procedures for disassembly and assembly of the Vision 10LF Head, where such operations are not self-evident. Reference is made in the procedures to figures in the Illustrated Parts List (Section 6).

2 The head is constructed from precision components, many of which are of aluminium alloy. Several of the assembly procedures require the use of special tools and specific sealants, adhesives or lubricants. It is advised that only experienced and properly equipped personnel with access to all necessary tools and materials should attempt to overhaul, repair or replace components on these heads. The tools and consumable materials required for work on Vision 10LF heads are listed in Section 3.

Disassembly

Platform

3 To remove the platform, proceed as follows (Fig 6.3):

3.1 Remove the platform slide (Section 2)

3.2 Remove the graphic (38).

3.3 Remove one screw (36) and four screws (8), noting that screws are secured with Loctite. Carefully lift the LH side of the platform and retain the platform slide release spring (28) which will be released as the platform is lifted.

3.4 Turn the platform slide clamp lever (4) upwards and separate the platform from RH side plate (7). Collect the slide clamp strip (10) as it is released.

3.5 Remove the platform slide release (27) by feeding it up through the platform.

3.6 If required, unscrew and remove slide clamp screw (3). Unscrew grub screw (5) and remove slide clamp lever (4).

Tilt mechanism

4 To remove the tilt mechanism, proceed as follows (Fig 6.3):

4.1 Remove the platform (Para 3).

WARNING!: Ensure that balance knob is turned fully counter-clockwise before removing the tilt mechanism.

4.2 Turn the balance knob (13) fully counter-clockwise.

4.3 Remove two screws (25) and two screws (26), noting that screws are secured with Loctite.

NOTE: When the tilt mechanism is pulled off the head the balance mechanism will be under spring tension.

4.4 Pull the tilt mechanism off the head. Retain shim (9) and shims (19).

4.5 It is not necessary to remove the mechanism housing cover (21) from the mechanism housing assembly (16) unless replacement of the bearing (22) or access to the balance mechanism or RH side plate is required. The cover is secured by three screws (23). The bearing (22) is a press fit in the housing and is secured with Loctite. Heat the housing to 80°C to facilitate removal.

5 To dismantle the tilt mechanism, proceed as follows (Fig 6.4):

NOTE: This unit contains Vinten Fluid No. 3. A good supply of clean rag should be to hand.

5.1 Remove the tilt drag knob cap (23). Remove the screw (24) and pull off the tilt drag knob (16).

5.2 Remove three screws (25) securing tilt drag knob retainer (26). Remove the retainer, the tilt drag knob boss (10) (complete with drag knob retaining shaft (14) and the two thrust washers and the thrust race (12), noting orientation of components for assembly. The drag knob retaining shaft (14) is secured in the tilt drag knob boss (11) with Loctite.

5.3 On the pan and tilt brakes, prise off the covers (22), remove the screws (21) and pull off the knobs (20). Unscrew the two brake shafts (19 and 27), noting their orientation. Retain the friction element (18) and spring element (17) from each shaft and the insert (28) from the end of the tilt brake shaft.

NOTE: Early brake shafts (to Serial No. 1382) are solid. Later brake shafts are fitted with spring and friction elements (17 and 18) to improve performance. Early brake shafts should be replaced by later brake shafts and spring and friction elements.

5.4 Remove six screws (2) which secure the tilt drag cover/brake disc assembly (31) to the tilt drag housing (1). Separate the cover and housing, remembering that a quantity of Vinten Fluid No. 3 is contained in the housing. Discard `O' ring (32).

NOTE: The design of the tilt brake cover/brake disc assembly changed from Serial No. 1197. Ensure correct housing and 'O' ring are replaced.

5.5 Remove two screws (36) securing drag shoe assembly (35). Remove drag shoe assembly, drag actuator shaft (3), washer (4) and `O' ring (5). Discard `O' ring.

5.6 Turn the tilt drag cover/brake disc assembly (31) so that the cutout in the brake disc aligns with the tilt brake plate (29). Pull the assembly off the tilt bearing housing (33). Note the orientation of the omniseal (8), with the open side facing towards the drag shoe. Remove and discard the omniseal.

5.7 Remove screw (6) and two screws (34) securing tilt bearing housing (33) to outrigger (9). Remove and discard `O' ring (5). Remove bearing (7).

5.8 Remove three screws (30) securing tilt brake plate (29) to outrigger (9).

5.9 Pull out pan brake pivot (13) and remove pan brake shoe assembly (12).

Balance mechanism

WARNING!: The balance mechanism spring tension is preset. Do not remove or dismantle the balance mechanism unless necessary.

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

6.1 Remove the platform (Para 3).

6.2 Remove the tilt mechanism and mechanism housing cover (Para 4).

6.3 Using circlip pliers, remove Spirol ring (14) from groove in mechanism housing assembly (16) and allow it to rest on the neck of the balance knob assembly (13).

6.4 Unscrew and remove the balance knob assembly (13) together with Spirol ring (14).

6.5 Remove the thrust race and two thrust washers (12), noting orientation of components for assembly.

6.6 Remove cap (35) from mechanism housing assembly (16) to gain access to balance mechanism screw (34)

6.7 Undo screw (34) until balance mechanism tension is just relieved.

6.8 Remove needle roller (15).

6.9 Using circlip pliers, release circlip (11) securing RH side plate (7) in mechanism housing assembly. Carefully pull RH side plate out of mechanism housing assembly. Retain shim (9) and shims (19).

6.10 Undo screw (34) as far as possible without separating from actuator shaft (30).

6.11 Manoeuvre balance mechanism out of mechanism housing assembly. Ensure all shims and circlip (11) are removed from mechanism housing assembly.

6.12 The balance mechanism may now be dismantled if required. Do not remove pins from spring actuator (30)

Pan mechanism

7 To remove/dismantle the pan mechanism proceed as follows (Fig 6.5):

NOTE: This unit contains Vinten Fluid No. 3. A good supply of clean rag should be to hand.

7.1 Remove the platform (Para 3).

7.2 Remove the tilt mechanism and mechanism housing cover (Para 4).

7.3 Remove the balance mechanism (Para 6).

7.4 Remove the pan drag knob cap (1). Remove the screw (2) and pull off the pan drag knob (3).

7.5 Unscrew and remove the pan drag shaft (6), together with pan drag push rod (8). Retain washers (7). The pan drag knob boss (5) is secured to the shaft with Loctite.

7.6 Slacken the pan drag lever screw (28) and lift the pan drag lever (29) and actuator shim (27) off the drag actuator (12).

7.7 Remove screw (26) and washer (25) from end of bowl clamp stud (21)

7.8 Remove six screws (18) which secure the spherical base (17) to pan drag top plate (14). Gently ease the base away from the top plate. When the base is removed it will contain most of the Vinten Fluid No. 3. The bowl clamp stud (21) is secured to the base using Loctite. Remove and discard `O' ring (16).

NOTE: The design of the pan drag top plate and spherical base changed from Serial No. 1197. Ensure correct top plate, spherical base and 'O' ring are replaced.

7.9 Remove two screws (19) securing drag shoe assembly (15). Remove drag shoe assembly and the pan drag actuator (12). Remove and discard `O' ring (11).

7.10 Remove pan drag top plate (14) and the thrust race and two thrust washers (13), noting orientation of components for assembly. Note the orientation of omniseal (20), with the open side facing towards the spherical base. Remove and discard the omniseal.

7.11 Remove two screws (22) securing pan bearing housing (10) to mechanism housing assembly (9). Remove and discard `O' ring (21) from groove in pan bearing housing.

7.12 If required, remove bearing (24) from mechanism housing assembly. The bearing is secured with Loctite.

Mechanism housing assembly

8 If required, the bearing (Fig 6.2, item 4) may be removed from mechanism housing assembly. The bearing is a press fit and is secured with Loctite.

Assembly

NOTE: It is important for correct operation of the head that torque settings, where given, are achieved.

Mechanism housing assembly

9 If the bearing (Fig 6.2, item 4) has been removed from mechanism housing assembly a replacement may be installed without heating the housing. It is essential that a suitable press, fitted with a mandrel adaptor and support ring to match the bearing, is used. Proceed as follows:

9.1 Remove all traces of adhesive from bearing and seating in mechanism housing assembly. Degrease bearing seating and outer race of bearing.

9.2 Apply Loctite 641 to outer race of bearing and press into mechanism housing assembly, ensuring bearing is correctly seated.

Pan mechanism

10 Assemble the pan mechanism as follows (Fig 6.5):

10.1 Lightly lubricate components as follows:

10.1.1 All moving surfaces, particularly `O' rings and seals (11, 16, 20 and 23), spherical end of pan drag push rod (8), drag actuator (12) and bearing (24) using white bearing grease. This grease must not be allowed to come into contact with the drag surfaces.

10.1.2 Thread of pan drag shaft (6) with Rocol M204G grease.

10.1.3 Contact surfaces of drag shoe (15) and bearing housing (10), except for the area around clamping screws (19), with grease GP50. This grease must not be allowed to come into contact with the drag surfaces.

10.2 The correct orientation of the Omniseal (20), as shown in Fig 6.5 is important. Renew the seal.

10.3 Fit new `O' rings and seals throughout.

10.4 Prior to assembly fill the base (17) with 12.75 cc of Vinten Fluid No. 3 (Section 3).

10.5 Install bearing (24) in mechanism housing (9) and secure with Loctite 641.

NOTE: The design of the pan drag top plate and spherical base changed from Serial No. 1197. Ensure correct top plate, spherical base and 'O' ring are replaced.

10.6 Install `O' ring (23) in pan bearing housing (10). Secure pan bearing housing to mechanism housing (9) with two screws (22) and Loctite 222E, ensuring pan bearing housing is centralized on mechanism housing.

10.7 Install Omniseal (20) in pan drag top plate (14), observing correct orientation.

10.8 Install the thrust race and two thrust washers (13) in pan drag top plate (14), observing correct orientation.

10.9 Position pan drag top plate and assemble components over the pan bearing housing (10).

10.10 Install `O' ring (11) on drag actuator (12). Position actuator in drag shoe assembly (15) and install both on the pan bearing housing (10). Secure temporarily with two screws (19)

10.11 Install pan drag lever (29) on drag actuator and secure temporarily with screw (28).

10.12 Install washers (7) and pan drag push road (8) in pan drag shaft (6), Screw pan drag shaft (complete with pan drag knob boss (5)) into mechanism housing (9).

10.13 Install assembly in pan centralizing fixture (3390-904TL).

10.14 Screw in pan drag shaft (6) to expand drag shoe assembly.

10.15 Remove screws (19) one at a time and reinstall using Loctite 221. Torque-tighten screws to 5.08 Nm (45 lbf in.).

10.16 Remove pan drag shaft (6), pan drag push road (8) and pan drag lever (29).

10.17 Remove assembly from centralizing fixture.

10.18 Install `O' ring (16) in spherical base (17).

10.19 Prime six screws (18) with Loctite N primer and allow to dry.

10.20 Position spherical base over drag shoe assembly and secure with six screws (18), using Loctite 222E.

10.21 Prime screw (26) with Loctite T primer and allow to dry.

10.22 Install screw (26) and washer (25) in clamp stud (20) using Loctite 241. Tighten screw (26) down hard to bed in parts, then slacken and torque-tighten to 0.56 Nm (5 lbf in.).

10.23 Install actuator shim (27) and pan drag lever (29) on drag actuator (12).

10.24 Prime screw (28) with Loctite N primer and allow to dry.

10.25 Secure pan drag lever (29) with screw (28), using Loctite 222E.

10.26 Screw in pan drag shaft (6) and pan drag push road (8) (complete with pan drag knob boss (5)).

10.27 Turn the pan drag knob boss (5) clockwise until any slack is taken up and drag begins to be felt Install pan drag knob (3) on pan drag shaft (6), with `1' aligned with the index mark on mechanism housing.

10.28 Apply maximum drag and ensure pin (4) does not foul face of casting (9). If necessary, dismantle pan drag shaft (6) and pan drag push road (8) and install washers (7) as required.

10.29 Secure pan drag knob (3) with screw (2), but do not tighten. The pan drag knob is adjusted after assembly of the head.

Tilt mechanism

11 Assemble the tilt mechanism as follows (Fig 6.4):

11.1 Lightly lubricate components as follows:

11.1.1 All moving surfaces, particularly `O' rings and seals (5, 8 and 32), drag actuator (3) and bearing (7) using white bearing grease. This grease must not be allowed to come into contact with the drag surfaces.

11.1.2 Contact surfaces of drag shoe (35) and bearing housing (33), except for the area around clamping screws (36), with grease GP50. This grease must not be allowed to come into contact with the drag surfaces.

11.2 The correct orientation of the Omniseal (8), as shown in Fig 6.4 is important. Renew the seal.

11.3 Fit new `O' rings and seals throughout.

11.4 Install Omniseal (8) in the tilt drag cover/brake disc assembly (31), observing correct orientation.

11.5 Fill the tilt drag housing (1) with 16.25 cc of Vinten Fluid No. 3 (Section 3).

11.6 Install bearing (7) in outrigger (9).

11.7 Degrease and prime two screws (34) and one screw (6) with Loctite N primer and allow to dry.

11.8 Install `O' ring (5) in tilt bearing housing (33) and secure to outrigger (9) with two screws (34) and one screw (6) and Loctite 222E.

11.9 Degrease and prime three screws (30) with Loctite N primer and allow to dry.

11.10 Install tilt brake plate (29) on outrigger (9) and secure with three screws (30) and Loctite 222E.

11.11 Align cutout in tilt drag cover/brake disc assembly (31) with tilt brake plate (29) and push the assembly onto the tilt bearing housing (33). Take care not to damage the omniseal (8).

11.12 Install `O' ring (5) and washer (4) in the tilt bearing housing (33).

11.13 Install drag shoe assembly (35) on the tilt bearing housing (33). Secure temporarily with two screws (36).

11.14 Install drag actuator shaft (3).

11.15 Install assembly in tilt centralizing fixture (3390-905TL).

11.16 Using the fixture, expand the drag shoe assembly.

11.17 Remove screws (36) one at a time and reinstall using Loctite 221 on threads and Loctite 601 under heads. Torque-tighten screws to 7.34 Nm (65 lbf in.).

11.18 Remove from fixture.

NOTE: The design of the tilt brake cover/brake disc assembly changed from Serial No. 1197. Ensure correct housing and 'O' ring are replaced.

11.19 Install `O' ring (32) in tilt drag cover/brake disc assembly (31).

11.20 Degrease and prime six screws (2) with Loctite N primer and allow to dry.

11.21 Install completed outrigger assembly on tilt drag housing (1). Align fixing holes and secure with six screws (2) and Loctite 222E.

11.22 Install pan brake pivot (13) in pan brake shoe assembly (12) and install in tilt mechanism.

11.23 The remaining tilt mechanism components are installed after assembly of the balance mechanism.

Balance mechanism

12 Assemble/install the balance mechanism as follows (Fig 6.3):

12.1 If the bearing (22) has been removed from the mechanism housing cover (21) a replacement may be installed without heating the cover. It is essential that a suitable press, fitted with a mandrel adaptor and support ring to match the bearing, is used. Proceed as follows:

12.1.1 Remove all traces of adhesive from bearing and seating in mechanism housing cover. Degrease bearing seating and outer race of bearing.

12.1.2 Apply Loctite 641 to outer race of bearing and press into mechanism housing cover, ensuring bearing is correctly seated.

12.2 Assemble the pan mechanism (Para 10)

12.3 Assemble the tilt mechanism (Para 11).

12.4 Using Loctite 495, adhere buffer (32) to end washer (33).

12.5 Lightly lubricate components as follows:

12.5.1 All moving contact surfaces of the balance mechanism with grease GP50.

12.5.2 All bearings and shims with white bearing grease.

12.6 Fit equal numbers of shim washer (19) on each side of bearing (18) to minimise side play between the adjuster slide (17) and actuator shaft (29).

12.7 Using tool 3431-912TL, secure dowel (20) in adjustment slide (17) using Loctite 601.

12.8 Assemble actuator shaft (29), spring actuator (30), spring (31) and end washer (33).

12.9 Apply Loctite 270 to screw (34) and tighten to allow about 2 mm (1/12 in.) clearance.

NOTE: The remaining assembly of the balance mechanism, side plate, tilt mechanism and final adjustment of the balance spring must be completed before the Loctite on screw (35) sets.

12.10 Position circlip (11) inside the mechanism housing.

12.11 Install two shim washers (19) on spring actuator (30). Holding the assembled balance mechanism with the slot in the adjustment slide (17) facing downwards, position the balance mechanism in the mechanism housing (16).

12.12 Turn the balance mechanism through 90°, until the slot in the adjustment slide (17) aligns with the hole in the mechanism housing (16) and needle roller (15) can be pushed fully home.

12.13 Install bearing shim (9) on RH side plate (7).

12.14 Install RH side plate (7) in mechanism housing (16), ensuring spring actuator (31) engages with needle bearing. Secure with circlip (11).

12.15 Install mechanism housing cover (21) on mechanism housing (16) and secure with three screws (23).

12.16 Before installing the tilt mechanism, degrease the pan brake contact surface on the pan drag top plate (Fig 6.5, item 14)

12.17 Install bearing shim (9) on tilt mechanism (24).

12.18 Install tilt mechanism (24) in mechanism housing (16), ensuring spring actuator (30) engages with needle bearing. Secure with two screws (25) and two screws (26), using Loctite 222E.

12.19 Working through the hole in the mechanism housing assembly (16), tighten the balance mechanism screw (34) until it just nips the spring, then tighten a further two full turns to preload the spring.

12.20 Using Loctite, install cap (35) in hole in the mechanism housing assembly (16).

12.21 Lubricate the thrust washer components (12) with white bearing grease and install in mechanism housing (16), ensuring orientation is as noted during disassembly.

12.22 Lubricate the shaft of the balance knob assembly (13) with M204G grease screw into the adjustment slide (17). Secure balance knob with Spirol ring (14).

13 Install the remaining tilt mechanism components as follows (Fig 6.4):

13.1 Install spring element (17) and friction element (18) in each brake shaft (19, 27). Install tilt brake insert (28) in tilt brake shaft (27).

13.2 Screw both brake shafts into outrigger (9) as far as they will go and install a brake knob (20) on each shaft so that, when fully applied the knob is vertical and, when turned fully counter-clockwise, the brake is off. Secure each knob with a screw (21) and Loctite 222E. Secure cap (22) to each knob with Silcoset.

13.3 Lubricate the thrust washer components (10) with white bearing grease and install in outrigger (9), ensuring orientation is as noted during disassembly.

13.4 Lubricate the tilt drag knob boss (11) with M204G grease and install, complete with drag knob retaining shaft (14), in the thrust bearing (10). Secure with tilt drag retainer/stop (26) and three screws (25).

13.5 Turn the tilt drag boss (11) clockwise until any slack is taken up, then turn the outrigger in both directions to confirm that movement is smooth and quiet. Degrease thread in drag knob retaining shaft (14).

13.6 Install tilt drag knob (16) on drag knob retaining shaft (14), with `0' aligned with the index mark on outrigger. Secure with screw (24), but do not tighten. The tilt drag knob is adjusted after assembly of the head.

Platform

14 To install the platform, proceed as follows (Fig 6.3):

14.1 If removed, install dowel pin (42) in platform (41) to leave the end projecting 3.5 mm. Loctite 638 may be used to secure the dowel pin if required.

14.2 Degrease three threaded holes in the top face of tilt housing (24), two threaded holes in the edge of platform (7), one screw (36). and four screws (8).

14.3 Support the head securely in an upright position and set the top surfaces of the tilt drag housing and the RH side plate approximately level.

14.4 Locate slide clamp strip (10) in the slot in the underside of the platform and hold it in position using the rounded end of tool 3390-909TL inserted from the top face of the platform. Insert slide release (27) downwards through the hole in the platform to locate in the underside of the platform. Ensure that the slide release is free to move and is inserted with its slot towards the centre of the platform.

14.5 Holding the slide release in the fully out position, tilt the RH edge of the platform down and engage the lug on the side of the platform in the notch in the RH side plate. Lower the LH side of the platform into position on the top face of the tilt unit housing, ensuring that the lugs on the underside of the platform enter the corresponding slots in the top face of the tilt unit housing and the 2 mm dia Spirol pin in the top of the tilt unit housing enters the slot in the slide release. Remove tool 3390-909TL.

14.6 Position spring (28) on the cylindrical end of tool 3390-909TL. Holding the tool so that the cylindrical end points slightly downward, lift the LH side of the platform just enough to allow the spring to be introduced between the top face of the slide release and the underside of the platform. Use the tool to guide the free end of the spring into the slot in the slide release, compress the spring against the 2 mm dia Spirol pin until its outer end drops into the slot in the slide release, lower the platform to rest on the tool and withdraw the tool.

14.7 Apply Loctite 222E to screw (26) and four screws (8) and secure the platform to the RH side plate and the tilt unit housing.

14.8 Confirm that the slide release operates freely and that the spring returns it to the outward position.

14.9 Insert platform slide (1) into the rear end of the platform dovetails, check that it is retained at the front end by the dowel pin and at the back end by the slide release.

14.10 Apply white bearing grease to the threads of clamp screw (3) and screw it into the lug on the RH side of the platform to clamp the platform slide.

14.11 Degrease grub screw (5), apply Loctite 222E to the threads and install in knob (4). Fit knob (4) on the hexagonal part of clamp screw (3) so that the platform slide is clamped when the arm points vertically downwards and is free when the knob is turned counter-clockwise to the stop. Tighten grub screw (5) to secure the knob.

Final assembly

15 The pan and tilt drag control knobs are set so that drag begins to be felt between 1 and 1.5 on the scale. Set the drag knobs as detailed in Section 4.

Section 6

Illustrated Parts List

Contents Para

Illustrations Page

Introduction

1 This parts list is issued for the VISION 10LF 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 when ordering a spare part.

3 When ordering a spare part, please quote the part number, NOT the item number. Certain part numbers have a -900SP series suffix, which denotes a composite spare part. These items are detailed in Fig 6.7 and indicated in the parts lists by an asterisk (*) against the part number.

4 Due to restrictions placed on the transport of adhesives and other materials, please obtain supplies of consumable materials, listed in Section 3, from your local distributor.

Main assembly part numbers

5 Please ensure that the correct part number is quoted when ordering main assemblies.

Assembly	Part No.
Vision 10LF pan and tilt head - final assembly	3390-11
Pan bar	3219-21
Bowl clamp assembly	3390-18
Camera mounting plate	3364-900SP

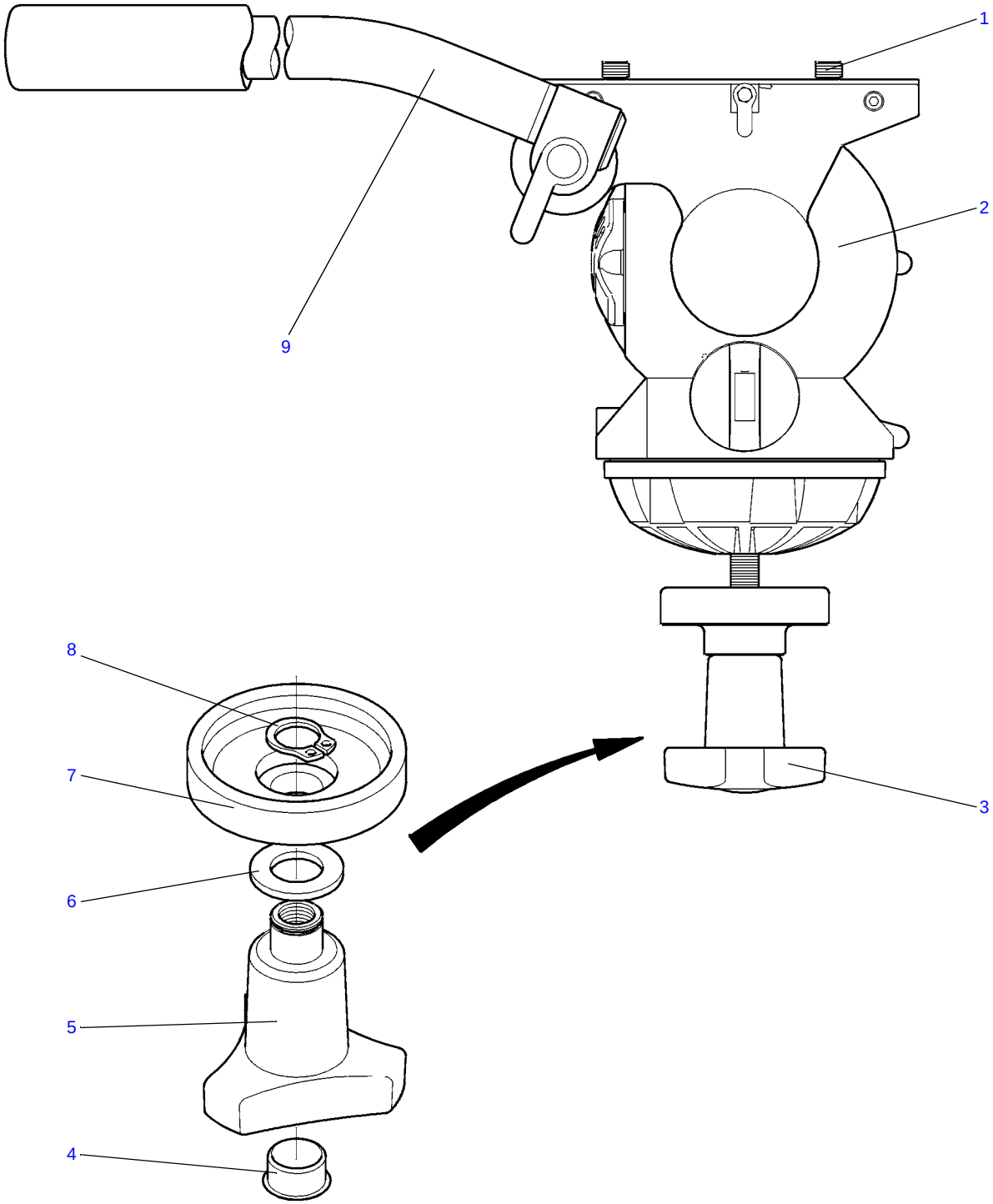
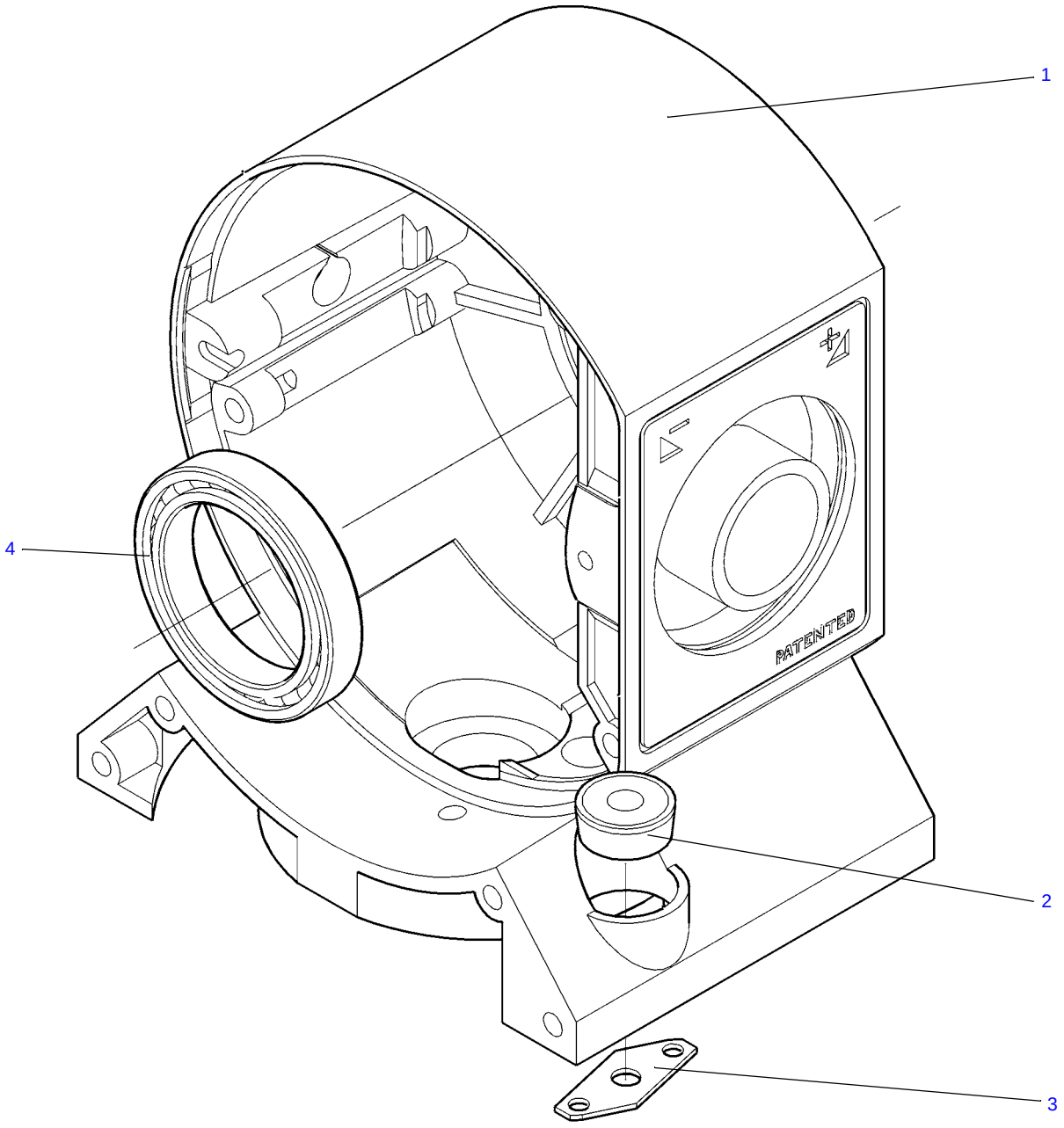


Fig 6.1 Vision 10LF Pan and Tilt Head

Fig 6.1 Vision 10LF Pan and Tilt Head

Item No.	Part No.	Nomenclature	Qty
1	3170-202	Screw, large	2
2	3390-11	Final assembly (Fig 6.2)	1
3	3390-18	Bowl clamp knob assembly, comprising:	1
4	J550-068	Hole plug	1
5	3390-228	Bowl clamp knob	1
6	3390-238	Washer	1
7	3390-229	Clamp cup	1
8	M701-031	Circlip	1
9	3219-21	Pan bar assembly (Fig 6.6)	1

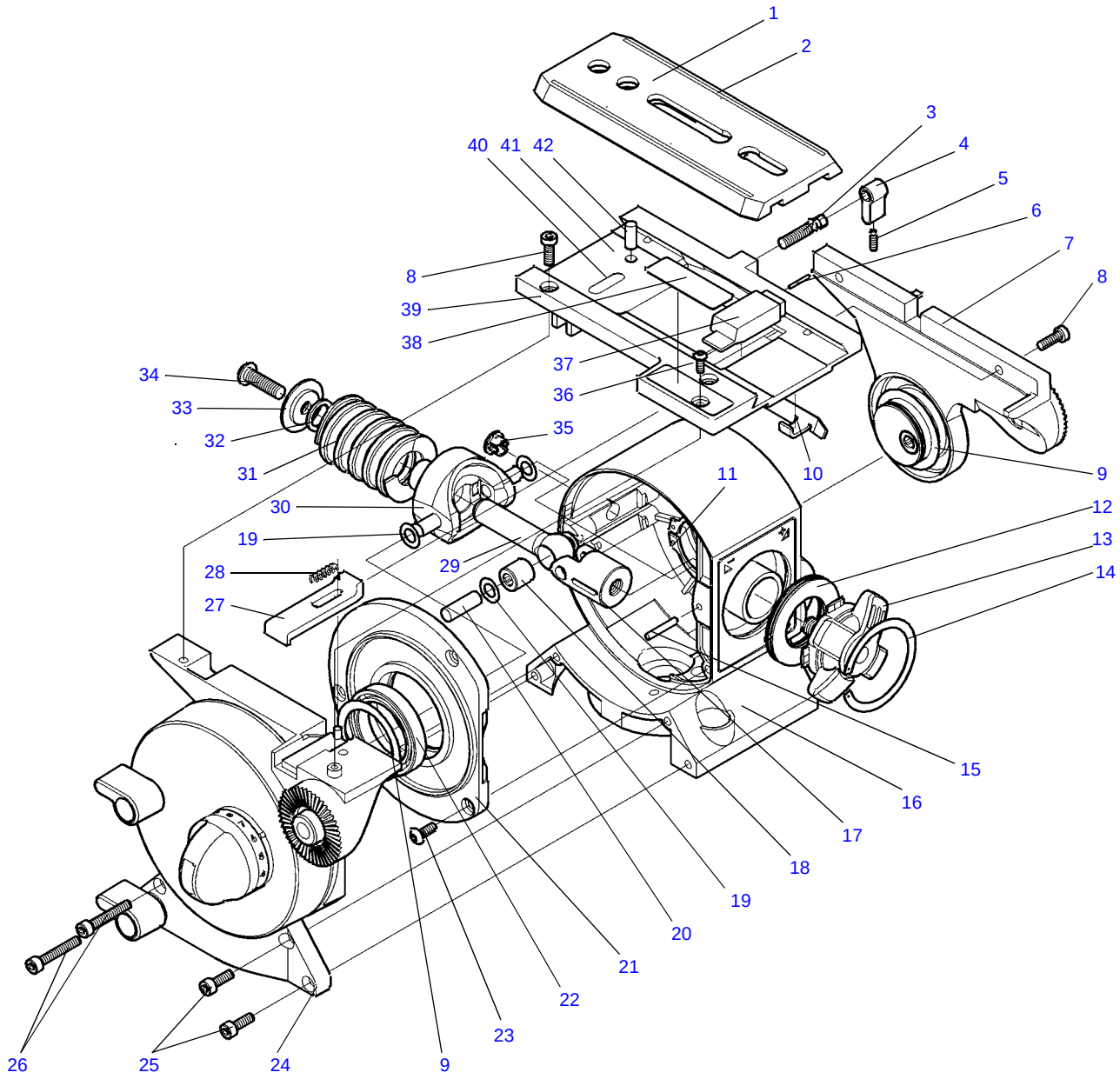


V10_IPO2

Fig 6.2 Vision 10LF Pan and Tilt Head - Mechanism Housing Assembly

Fig 6.2 Vision 10LF Pan and Tilt Head - Mechanism Housing Assembly

Item No.	Part No.	Nomenclature	Qty
1	3390-201	Mechanism housing	1
2	3322-263	Level bubble	1
3	3321-214	Level bubble sealing strip	1
4	P302-011	Bearing, ball, radial, 30 mm ID x 42 mm OD x 7 mm long	1



V10_IPO3

Fig 6.3 Vision 10LF Pan and Tilt Head - Platform and Balance Mechanism

Fig 6.3 Vision 10LF Pan and Tilt Head - Platform and Balance Mechanism

Item No.	Part No.	Nomenclature	Qty
1	3364-210*	Platform slide	1
2	Q001-093*	'O' ring, 3 3/4 in. id x 1/16 in. sect	1
3	3321-278	Screw, slide clamp	1
4	3325-343	Slide clamp lever	1
5	M004-804*	Grub screw, skt M3 x 10 mm lg	1
6	M806-033	Spirol pin, 1.5 mm dia. x 12 mm lg	1
7	3390-903SP*	RH side plate assembly	1
8	M005-735*	Screw, low profile, cap hd, m4 x 12 mm lg	4
9	3321-226	Bearing shim	2
10	3321-255	Slide clamp strip	1
11	M701-036	Circlip, external (30 mm shaft)	1
12		Thrust bearing, comprising:	
	P602-021	Thrust washer, 25 mm x 42 mm x 1 mm	2
	P602-020	Thrust race, needle, 25 mm x 42 mm x 1 mm	1
13	3390-17	Balance knob assembly	1
14	3390-232	Spirol ring	1
15	P600-012	Needle roller, 3 mm dia x 17.8 mm lg	1
16	3390-14	Mechanism housing assembly (Fig 6.2)	
17	3321-220	Adjustment slide	1
18	N500-023	Bearing, needle, 1/4 in. x 7/16 in. x 7/16 in.	1
19	3321-222	Shim washer	6
20	L801-098	Dowel pin, 1/4 in. oversize dia x 3/4 in. lg	1
21	3390-223	Mechanism housing cover	1
22	P302-011	Radial bearing, 30 mm x 42 mm x 7 mm	1
23	M005-504*	Screw, button hd, M4 x 10 mm lg	3
24		Tilt mechanism (Fig 6.4)	
25	M005-718*	Screw, skt cap hd, M4 x 12 mm lg	2
26	M005-721*	Screw, skt cap hd, M4 x 25 mm lg	2
27	3364-285	Slide release	1
28	J532-109	Spring, compression, 5/32 in. OD x 3/32 in. ID x 3/4 in. lg	1
29	3390-231	Actuator shaft	1

Fig 6.3 Vision 10LF Pan and Tilt Head - Platform and Balance Mechanism (Cont)

Item No.	Part No.	Nomenclature	Qty
30	3364-908SP*	Spring actuator	1
31	J532-108	Spring, compression, 1 1/4 in. OD x 5/8 in. ID x1 3/4 in. lg	1
32	3321-223	Buffer	1
33	3321-224	End washer	1
34	M007-523*	Screw, skt button hd, M6 x 20 mm lg	1
35	3325-354	Cap	1
36	M004-503*	Screw, skt button hd, M3 x 8 mm lg	1
37	3321-284	Platform insert	1
38	3364-284	Top graphic	1
39	3321-254	Platform	1
40	3390-225	Serial No. label	1
41	3390-224	Platform graphic	1
42	M801-048	Dowel pin, 5 mm dia x 12 mm lg	1

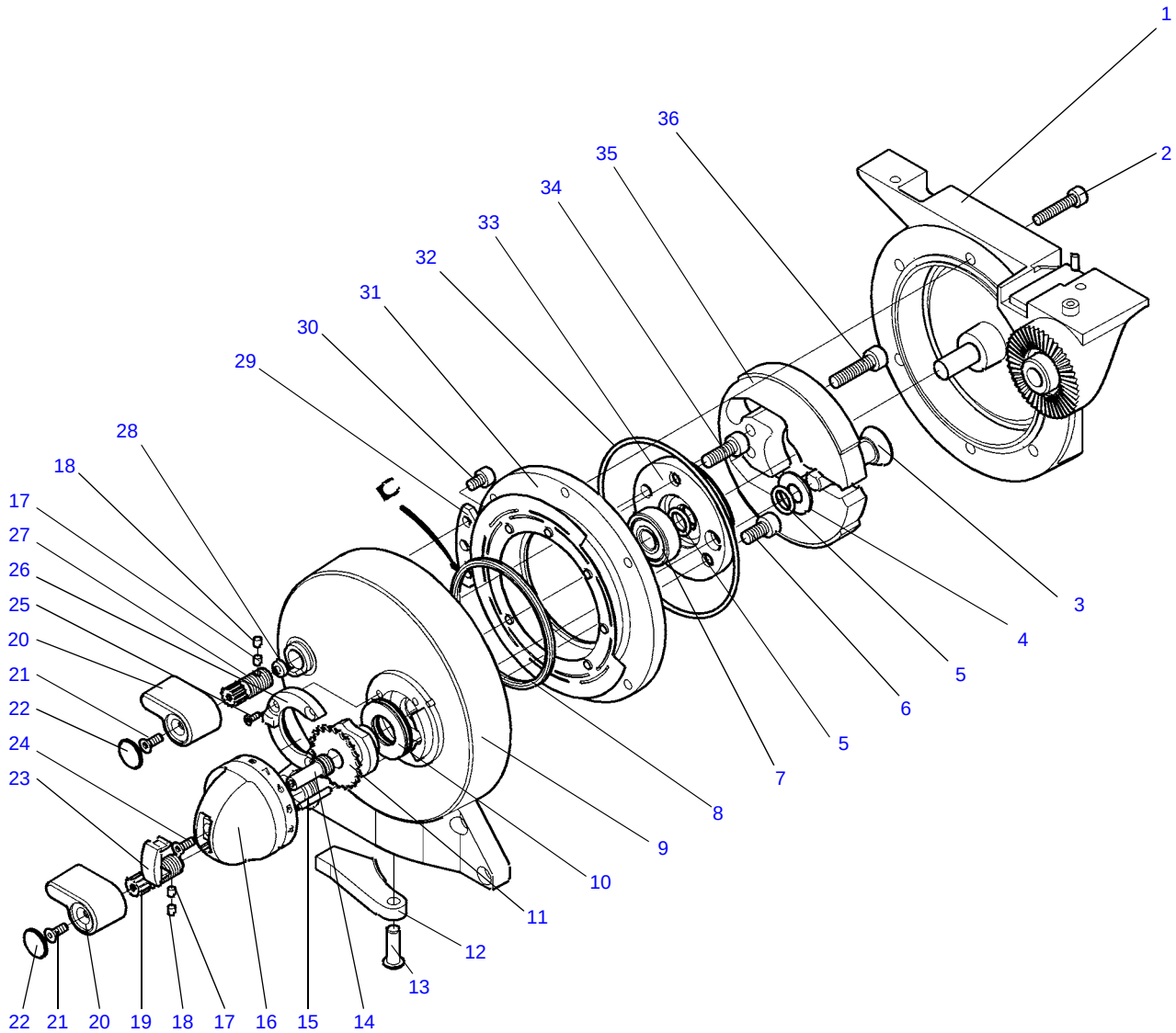


Fig 6.4 Vision 10LF Pan and Tilt Head - Tilt Mechanism

Fig 6.4 Vision 10LF Pan and Tilt Head - Tilt Mechanism

Item No.	Part No.	Nomenclature	Qty
1	3390-902SP*	Tilt drag housing	1
2	M005-714*	Screw, skt cap hd, M4 x 20 mm lg	6
3	3321-234	Drag actuator shaft	1
4	M600-106*	Washer, M8, type B	1
5	Q001-012	`O' ring, 5/16 in. ID x .070 in. section	2
6	M006-737*	Screw, low profile skt cap hd, M5 x 6 mm lg	1
7	P200-223	Bearing, radial ball, 22 mm x 8 mm x 7 mm	1
8	Q500-032	Omniseal, 2.118 in. x 1.940 in.	1
9	3390-202	Outrigger	1
10		Thrust bearing, comprising:	
	N552-019	Thrust race, 1/2 in. x 15/16 in. x .078 in.	1
	N552-020	Thrust washer, 1/2 in. x 15/16 in. x .032 in.	2
11	3321-236	Tilt drag knob boss	1
12	3321-21	Pan brake shoe assembly	1
13	3321-246	Pan brake pivot	1
14	3321-240	Drag knob retaining shaft	1
15	M806-025	Spirol pin, 2.5 mm dia x 16 mm lg	1
16	3390-214	Tilt drag knob	1
17	3364-352	Spring element	2
18	3364-351	Friction element	2
19	3390-226	Pan brake shaft	1
20	3321-248	Brake knob	2
21	M004-103*	Screw, Pozi csk hd, M3 x 8 mm lg	2
22	3321-253	Brake knob cover	2
23	3321-218	Drag knob cap	1
24	M004-104*	Screw, Pozi csk hd, M3 x 10 mm lg	1
25	M003-103*	Screw, Pozi csk hd, M2.5 x 8 mm lg	3
26	3390-208	Tilt drag knob retainer/stop	1
27	3390-220	Tilt brake shaft	1
28	3364-256	Tilt brake insert	1
29	3390-219	Tilt brake plate	1

Fig 6.4 Vision 10LF Pan and Tilt Head - Tilt Mechanism (Cont)

Item No.	Part No.	Nomenclature	Qty
30	M005-702*	Screw, skt cap hd, M4 x 6 mm lg	3
31	3390-901SP*	Tilt drag cover/brake disc assembly	1
32	Q900H024	`O' ring, 3 1/4 in. ID x .070 in. section	1
33	3390-216	Tilt bearing housing	1
34	M006-702*	Screw, skt cap hd, M5 x 10 mm lg	2
35	3390-16	Drag shoe assembly	1
36	M006-705*	Screw, skt cap hd, M5 x 20 mm lg	2

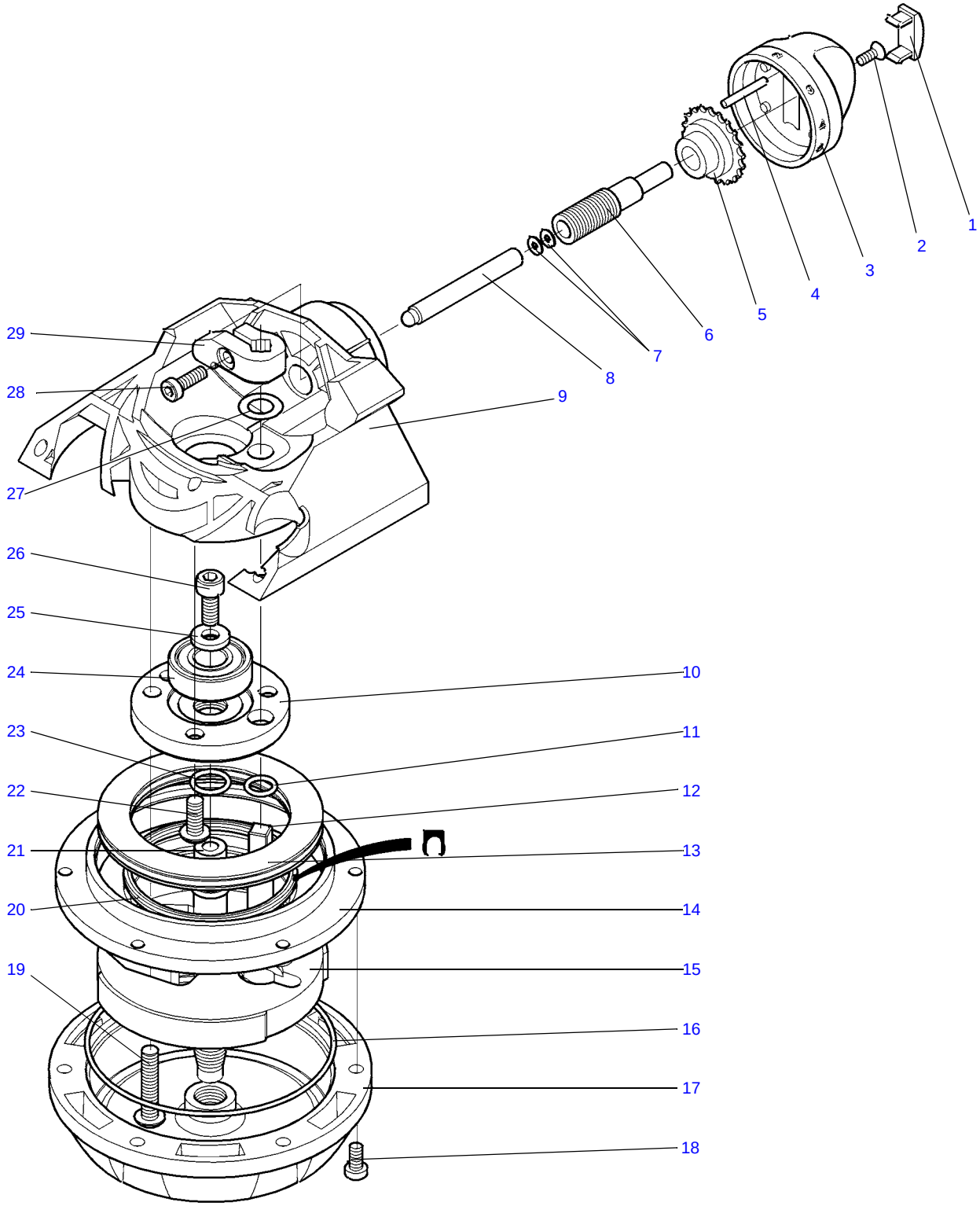


Fig 6.5 Vision 10LF Pan and Tilt Head - Pan Mechanism

Fig 6.5 Vision 10LF Pan and Tilt Head - Pan Mechanism

Item No.	Part No.	Nomenclature	Qty
1	3321-218	Drag knob cap	1
2	M004-104*	Screw, Pozi csk hd, M3 x 10 mm lg	1
3	3390-213	Pan drag knob	1
4	M806-052	Spirol pin, 2.5 mm dia x 18 mm lg	1
5	3390-212	Pan drag knob boss	1
6	3390-233	Pan drag shaft	1
7	M600-014*	Washer M2.3	A/R
8	3390-234	Pan drag push rod	1
9	3390-14	Mechanism housing assembly (Fig 6.2)	1
10	3390-215	Pan bearing housing	1
11	R900H001	`O' ring, 7.1 mm ID x 1.6 mm section	1
12	3321-210	Drag actuator	1
13		Thrust bearing, comprising:	
	P602-023	Thrust race, 50 mm x 70 mm x 3 mm	1
	P602-024	Thrust washer, 50 mm x 70 mm x 1 mm	2
14	3321-207 or 3390-222	Pan drag top plate (for head from Serial No. 1197) or Pan drag top plate (for head up to Serial No. 1196)	1
15	3390-15	Drag shoe assembly	1
16	R900H033* or R900H010*	‘O' ring, 72 mm ID x 1.5 mm section (for head from Serial No. 1197) or ‘O' ring, 75 mm ID x 1.5 mm section (for head up to Serial No. 1196)	1
17	3390-235* or 3390-205*	Spherical base (for head from Serial No. 1197) or Spherical base (for head up to Serial No. 1196)	1
18	M005-733*	Screw, low profile skt cap hd, M4 x 8 mm lg	6
19	M006-503*	Screw, skt butt hd, M5 x 25 mm lg	2
20	Q500-032	Omniseal 2.118 in. x 1.940 in.	1
21	3390-217*	Bowl clamp stud	1
22	M006-505*	Screw, skt butt hd, M5 x 12 mm lg	2
23	R900H034	`O' ring, 10.1 mm ID x 1.6 mm section	1
24	P200-220	Radial ball bearing, 10 mm x 26 mm x 8 mm	1
25	3321-211	Special washer	1

Fig 6.5 Vision 10LF Pan and Tilt Head - Pan Mechanism (Cont)

Item No.	Part No.	Nomenclature	Qty
26	M006-703*	Screw, skt cap hd, M5 x 12 mm lg	1
27	3322-229	Actuator shim	1
28	M005-735*	Screw, low profile skt csk hd, M4 x 12 mm lg	1
29	3390-207	Pan drag lever	1

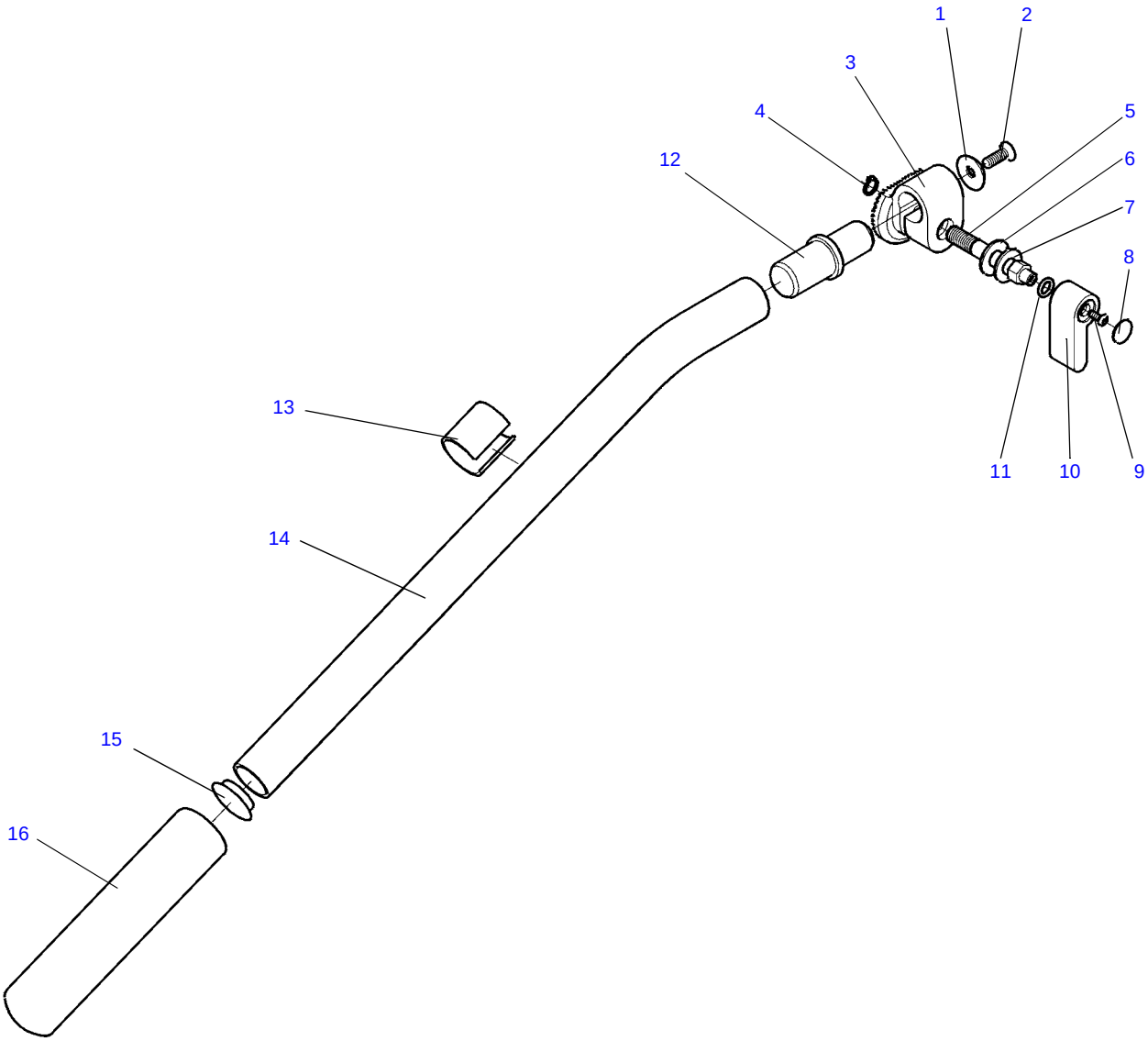


Fig 6.6 Vision 10LF Pan and Tilt Head - Pan Bar

Fig 6.6 Vision 10LF Pan and Tilt Head - Pan Bar

Item No.	Part No.	Nomenclature	Qty
1	M606-001	Washer, black nylon, 18 mm OD x 5.3 mm ID x 3.8 mm thk, Skiffy 07-3-5	1
2	M006-113	Screw, pozi csk hd, M5 x 12 mm lg	1
	3219-22	Pan bar clamp assembly, consisting of:	1
3	3219-298	Pan bar clamp	1
4	L701-004	Circlip, 5100-31 Anderton	1
5	3219-303	Shaft, clamp, long	1
6	G249-007	Nylon sleeve, 18-8-2 Skiffy	1
7	M600-009	Washer, type A, M8	1
8	3390-227	Brake knob cover	1
9	M004-503*	Screw, butt hd, M3 x 8 mm lg	1
10	3219-225	Knob, pan bar clamp	1
11	Q001-010	'O' ring, 1/4 in. ID x 3/8 in. OD x 1/16 in. sect	1
	3219-20	Pan bar assembly, Vision 10, consisting of:	1
12	3219-229	Spigot, pan bar	1
13	3219-227	Sleeve, pan bar	1
14	3219-228	Pan bar	1
15	J550-074	Round insert	1
16	3219-239	Grip, pan bar	1

Fig 6.7 Vision 10LF Pan and Tilt Head - Composite Spare parts

Part No.	Nomenclature	Qty
3364-900SP	Platform slide assembly, comprising:	
3364-210	Platform slide	1
Q001-093	'O' ring, 200-044-44	2
3170-202	Screw, large	2
3364-908SP	Spring actuator assembly, comprising:	
3364-283	Spring actuator	1
3321-280	Spring actuator pin	2
3390-901SP	Tilt drag cover/brake disc assembly, comprising:	
3390-206	Tilt drag cover	1
3390-218	Tilt brake disc	1
3390-902SP	Tilt drag housing assembly, comprising:	
L850-032	Wire thread insert, 5/16 in. BSF	1
M806-042	Spirol pin, .25 mm dia x 8 mm lg	1
N500-023	Bearing, needle roller, 1/4 in. x 7/16 in. x 7/16 in.	1
3321-229	Shaft	1
3390-903SP	RH side plate assembly, comprising:	
3390-204	RH side plate	1
L850-032	Wire thread insert, 5/16 in. BSF	1
N500-023	Bearing, needle roller, 1/4 in. x 7/16 in. x 7/16 in.	1
3390-906SP	Bowl and stud spares assembly (early heads), comprising:	
3390-205	Spherical base	1
3390-217	Bowl clamp stud	1
3390-907SP	Bowl and stud spares assembly (later heads), comprising:	
3390-235	Spherical base	1
3390-217	Bowl clamp stud	1

Fig 6.7 Vision 10LF Pan and Tilt Head - Composite Spare parts

Part No.	Nomenclature	Qty
3390-908SP	Seal kit, comprising:	
Q001-010	‘O’ ring, 1/4 in. ID 200-010-4470	1
Q0001-093	‘O’ ring, 3 3/4 in. ID 200-044-4460	1
Q500-032	Omniseal	2
Q900H024	‘O’ ring, 3 1/8in. ID 200-532-4470	1
Q900H033	‘O’ ring, 7.6 mm ID 200-011-4470	2
R900H001	‘O’ ring, 7.1 mm ID 202-509-4470	1
R900H010	‘O’ ring, 75 mm ID 206-075-4470	1
R900H033	‘O’ ring, 72 mm ID 206-072-4470	1
R900H034	‘O’ ring, 10.1 mm ID 202-512-4470	1
3390-910SP	Brake shafts kit, comprising:	
3390-226	Pan brake shaft	1
3390-220	Tilt brake shaft	1
3364-351	Friction element	2
3364-352	Spring element	2
3321-2548	Brake knob	2
3390-227	Brake knob cap	2
3364-256	Tilt brake insert	1
M004-103	Screw, Pozi csk hd, M3 x 8 mm lg	2