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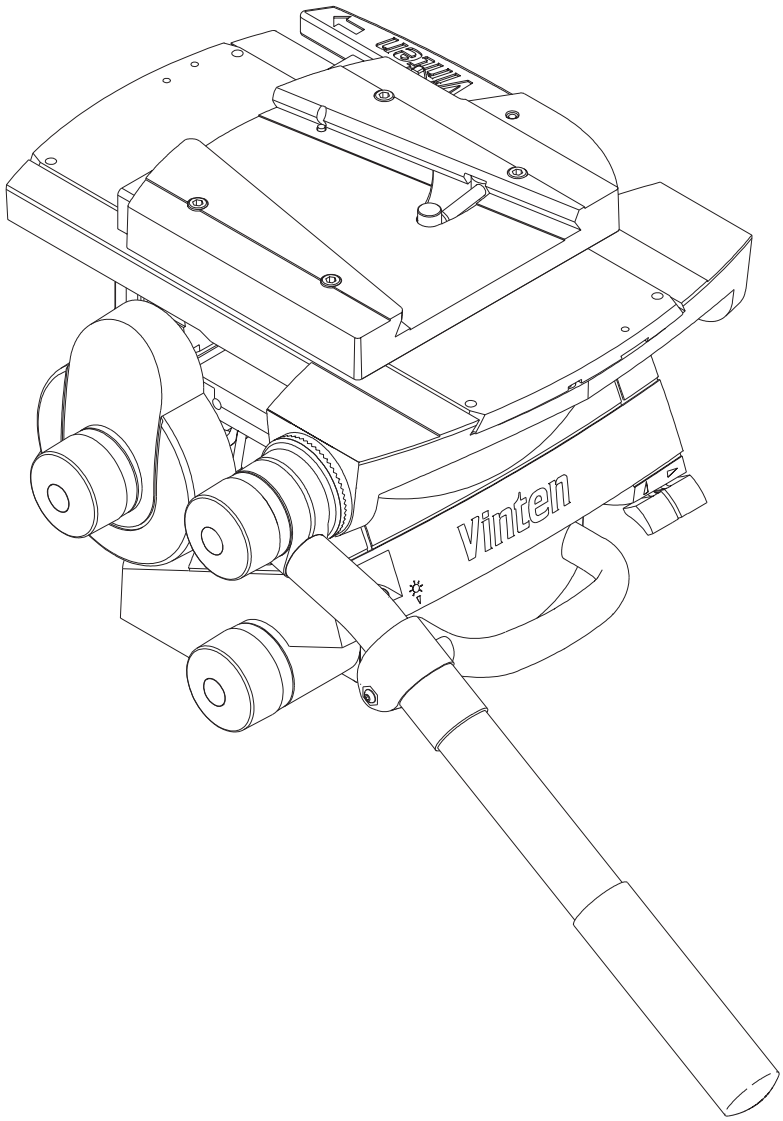
Maintenance Manual

Vector 70/70H

Pan and Tilt Head



Vinten

Camera Control Solutions

Vector 70/70H

PAN AND TILT HEAD
3354

MAINTENANCE MANUAL
AND
ILLUSTRATED PARTS LIST

PUBLICATION PART No. 3354-9

ISSUE 4

Foreword

This manual provides full and detailed information on the maintenance and spare parts for the Vinten® Vector 70 and 70H pan and tilt heads.

WARNING!: Read the Safety Section on page 5 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 head. Attention to the details contained herein will ensure that the 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 ‘Vector 70/70H Pan and Tilt Head Maintenance Manual’ (3354-9). 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.

Clicking here will take you to the first page.

Clicking here will take you to the previous page.

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Click here to go back to the previous view.

Alternatively, you may use the Acrobat Reader navigation buttons.

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 wedge adapter) . . . . . 18 kg (39 lb)

Load

Maximum payload . . . . . 70 kg (154 lb)

Contents

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

Maximum payload . . . . . 70 kg (154 lb)

Payload Centre of Gravity height range

- Vector V70 . . . . . 80 mm (3 in.) to 200 mm (8 in.)
- Vector V70H . . . . . 80 mm (3 in.) to 250 mm (10 in.)

Weight (complete with pan bar and wedge adaptor) . . . . . 18 kg (39 lb)

Overall dimensions

- Height (flat base with wedge adaptor)
  - Minimum balance setting . . . . . 247 mm (9.7 in.)
  - Maximum balance setting . . . . . 349 mm (13.7 in.)
- Length (without pan bar) . . . . . 360 mm (14.0 in.)
- Width (without pan bar) . . . . . 350 mm (13.8 in.)
- Width (with two pan bars) . . . . . 432 mm (17.0 in.)

Tilt range

- Vector 70 . . . . . ±60°
- Vector 70H . . . . . ±52°

Pan range . . . . . 360°

Design Improvements

DETAILS	SERIAL No. INFORMATION
Improved pan bar fixing	342
Improvements to balance mechanism	686
Base modified to accept longer fixing bolts	1145
Tilt drag actuator links strengthened	1239
Redesigned base casting	1780
Changes to pan drag actuator	3051
Vertical track member strengthened	2428
Changes to adjustment housing	3307
Platform strengthened	V70 - 3429 V70H - 3188

Introduction and Description

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Introduction

1 The Vinten Vector 70 and 70H pan and tilt heads are designed for studio and outside broadcast (OB) use and will support a variety of camera, lens and prompter combinations up to 70 kg (154 lb) in weight.

2 The unique counterbalance system enables payloads with centre of gravity (C of G) heights from 80 mm (3 in.) to 200 mm (8 in.) for Vector 70 and 80 mm (3 in.) to 250 mm (10 in.) for Vector 70H to be maintained in perfect balance over the tilt movement range of ±60° (±52° for Vector 70H).

3 Drag is provided by the patented Vinten lubricated friction (LF) system which provides stepless adjustment of drag. A wide variation of the drag setting to suit operator preference is available on both pan and tilt axes and ‘whip’ movements may be executed irrespective of drag setting. The pan and tilt axes are each provided with a brake.

4 The head is fitted with a sliding plate giving a large range of fore and aft adjustment. This adjustment can be extended by moving a wedge adaptor to one of three positions on the sliding plate.

5 The head is available with either a standard flat base or a light-weight Mitchell adaptor and can be mounted on tripods, pedestals or any suitable firm surface. It is fitted with an illuminated level bubble to facilitate levelling. A carrying handle is provided.

Description

6 The Vector 70 pan and tilt head (Fig 1.1) embodies a linkage counterbalancing mechanism, LF drag assemblies for pan and tilt motions and an adjustable camera mounting plate.

7 The balance system is easily adjusted by a knob (10) on the right-hand side of the head. The balance adjustment control compensates for differing platform load C of G heights by varying the mechanical advantage of a bell-crank in the counterbalance mechanism.

8 Both the pan and tilt mechanisms incorporate LF drag systems to ensure smooth movement of the camera about these axes and are fitted with control knobs (16)(18) to adjust the drag setting. The drag controls are mounted on the left-hand side of the head. The whip-pan facility is unaffected by the pan drag setting.

9 Friction brakes on each axis allow the head to be locked at any chosen position. The operating levers for both brakes (2)(3) are fitted at the right-hand rear of the head. A tilt axis centre lock (11) is provided on the right-hand side of the head to secure the platform in the horizontal position during transport or load changing.

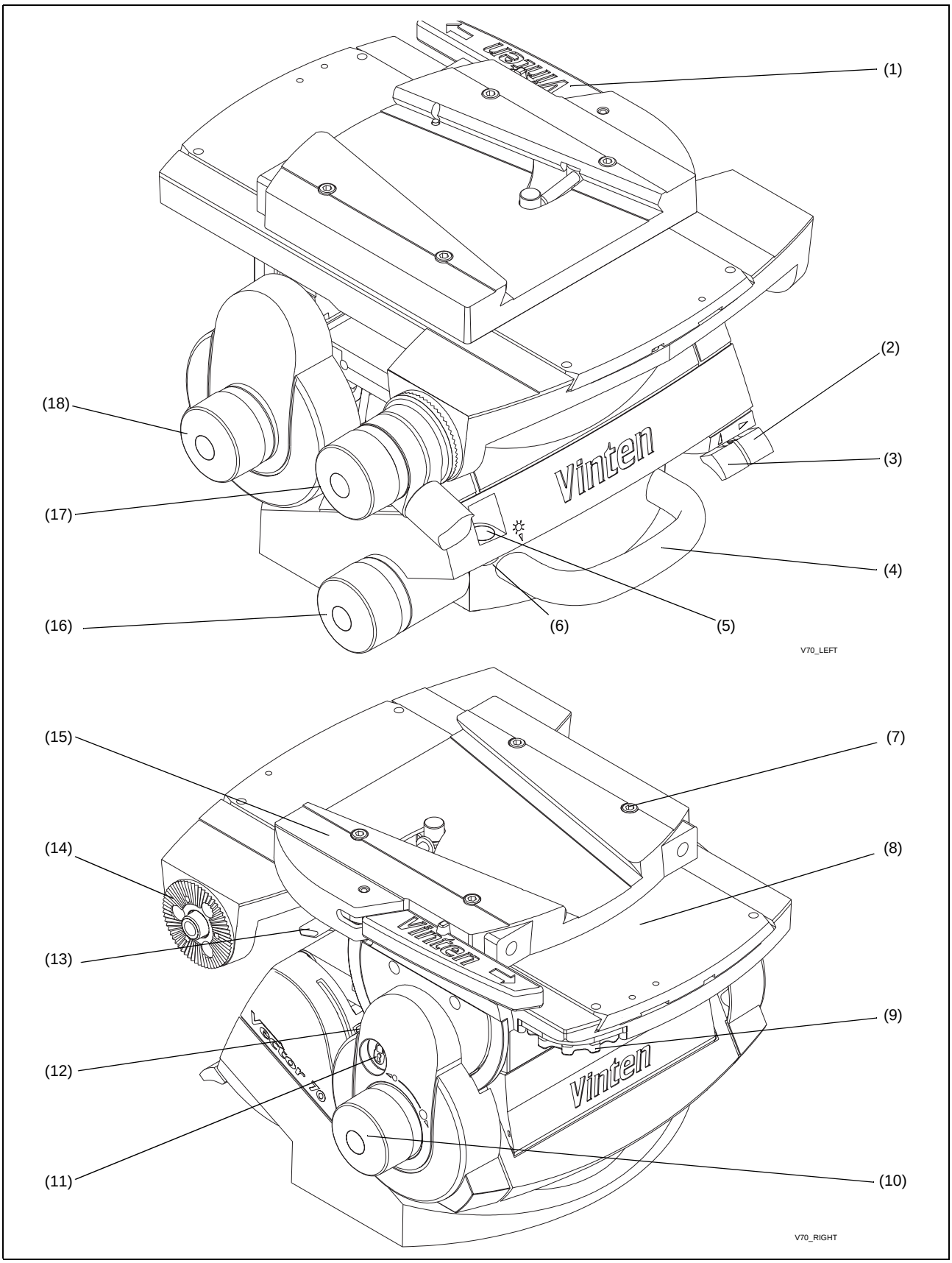


Fig 1.1 Vector 70/70H Pan and Tilt Head

10 A level bubble (5) is fitted to the rear of the head and is provided with a time-delay illumination unit, operated by a switch (6).

11 Pan bar mounting points (14) are located at the rear of the head, on either side of the camera mounting platform. A telescopic pan bar (17) 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.

Section 2

Installation and Operation

Contents Para

Introduction

1 This section includes instructions for mounting the Vector 70 pan and tilt head, fitting and balancing a camera and operating the head. Refer to Fig 1.1 to identify the parts and controls. For further operating instructions, please refer to Vector 70/70H Operators Guide, Publication Part No. 3354-8.

Installation

Unpacking

2 The head is supplied with one pan bar, a battery (fitted) for the level bubble illumination unit and an Operators Guide. The flat base version is supplied with four mounting bolts, four washers and a spanner. The Mitchell fixing version is supplied with a light-weight Mitchell adaptor. A second telescopic pan bar or short pan bar for use with a zoom or focus controller are optional. Ensure that all items are unpacked prior to disposal of the packing materials.

3 After unpacking ensure that:

3.1 The centre lock (11) is engaged (See “Locking the platform” on page 16). Always engage the centre lock before lifting or carrying the head. Lift the head by the base and/or the carrying handle, not the platform.

3.2 The pan and tilt brakes are on (See “Pan and tilt brakes” on page 17).

Mounting the head

NOTE: When mounted on Vinten ‘Hawk’ or ‘Teal’ pedestals, clearance between the head and the pedestal weight tray prevents the use of 5.5 lb (1.6 kg) and 1.0 lb (0.47 kg) trim weights. Use alternative weights or fit the adaptor plate kit (Part No. 3354-900SP) between the head and pedestal.

Flat base

WARNING!: Before installing the head, hold a fixing bolt in position and check that the threaded end does not project more than 12 mm (1/2 in.) above the mounting face.

4 The head is mounted on a tripod, pedestal or suitable firm surface using the four fixing bolts and washers. Tighten the bolts with the spanner provided.

5 After mounting the head, use the level bubble (5) to set it level. The level bubble may be illuminated by pressing the switch (6). The light will go out after approximately 15 seconds.

Mitchell-type fixing

6 Remove the clamp knob and washer. Position the head on the tripod or pedestal, ensuring that the spigot is seated and the key is engaged in the slot. Refit the clamp washer and knob and tighten securely.

7 After mounting the head, use the level bubble (5) to set it level. The level bubble may be illuminated by pressing the switch (6). The light will go out after approximately 15 seconds.

Pan bars

8 Fit the pan bar(s) (18) to the head and adjust the position of each one before tightening the clamp on the mounting (14). Adjust the length of the telescopic pan bar(s).

Fitting a camera

WARNING!: Do not rely on the tilt brake when changing the payload. always engage the centre lock.
Ensure that the weight and C of G height of the total payload is within the range for which the head is designed - up to 70 kg (154 lb) with C of G height from 80 mm (3 in.) to 200mm (8 in.) for Vector 70 or 80 mm (3 in.) to 250 mm (10 in.) for Vector 70H.

9 To fit a camera, proceed as follows:

9.1 Lower the mounting to a convenient working height.

9.2 If not already fitted, install the wedge adaptor (15) in the middle position on the sliding plate (8) (See “Repositioning the wedge adaptor” on page 25).

9.3 Attach the wedge to the camera/lens.

9.4 Ensure that the centre lock is engaged (See “Locking the platform” on page 16).

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

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

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

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

Balancing the head

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

10 Balancing the head consists of positioning the payload fore and aft on the head so that its C of G is immediately above the platform pivot, then compensating for the payload C of G height using the balance adjustment knob.

11 Position the payload fore and aft as follows:

11.1 Ensure that the centre lock is engaged (See “Locking the platform” on page 16) and that the camera and all accessories are fitted.

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

WARNING!: If the balance control is set to minimum, a heavy out-of-balance payload will cause the platform to tip violently when the centre lock is disengaged. Increase the C of G height setting (see below) prior to balancing a heavy payload.

11.3 Holding the pan bar to steady the platform, disengage the centre lock (12).

11.4 Release the sliding plate clamp (13) and turn the sliding plate adjustment knob (9) to move the sliding plate fore and aft to achieve horizontal balance. The horizontal balance is correct when no perceptible tilting force can be felt on the pan bar with the platform level. Apply the sliding plate clamp.

11.5 If there is insufficient movement in the sliding plate to achieve balance, reposition the wedge adaptor (See “Repositioning the wedge adaptor” on page 25), refit the load and repeat the horizontal balancing procedure.

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

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

12.2 If the head tends to fall away when the platform is tilted, push in and turn the balance adjustment knob (10) clockwise to increase the C of G height setting. If the head tends to spring back to centre, push in and turn the balance adjustment knob (10) counter-clockwise to decrease the C of G height setting.

NOTE: The balance adjustment knob is a multi-turn control. To enable the knob to be turned more easily, tilt the platform using the pan bar whilst turning the knob.

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

14 After balancing, release the brakes (2)(3) and exercise the head through both axes to confirm that it operates smoothly.

Operation

Locking the platform

15 The centre lock mechanism is operated by a plunger (11) on the right-hand side of the head. The lock is engaged by holding the platform level and pushing the plunger inwards until the release lever (12) appears. Use the pan bar to rock the platform slightly whilst pushing the button. To release the centre lock, rock the platform slightly and push down on the release lever (12).

Pan and tilt brakes

16 The pan and tilt brakes are operated by levers (2)(3) at the rear of the head. They are applied by pulling the appropriate lever up and back and released by pushing the lever forwards. The brakes should be applied whenever the camera is left unattended.

Pan and tilt drag

17 The pan drag adjustment knob (16) is mounted on the left-hand lower part of the main body. Tilt drag is adjusted by a knob (18) mounted on the face of the tilt drag housing on the left-hand side of the head. The pan and tilt drag adjustment knobs are multi-turn controls. Turn the knobs clockwise to increase drag and counter-clockwise to decrease drag.

WARNING!: Use only hand force to adjust drag. Do not over-tighten. Always set pan and tilt drag to minimum when head is not in use.

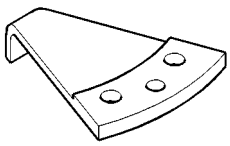
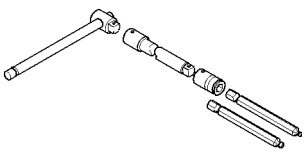
Section 3

Tools and Materials

General

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

Tools

	ITEM	PART No.	USE
	Dummy lid	3354-930TL	Centralizing and adjusting pan drag shoes
	Extended 3 mm/4 mm AF spherical-ended hex wrench	3354-931TL	Removing tilt drag mechanism and support caps

Consumable materials

ITEM	PART No.	USE
Loctite 222E	Z002-075	Thread locking
Loctite 270	Z002-034	Spring assembly
Loctite 290	Z002-012	Friction shoe pivots
Loctite 380	Z002-078	Adhesive
Loctite 415	Z002-062	Adhesive
Loctite 601	Z002-020	Lift-off stop pin
Loctite 638	Z002-058	Adhesive
Loctite 641	Z002-074	Bearing installation
Grease, Castrol LM	Z150-122	General lubrication
Grease, Easyrun 50	Z150-081	Balance adjuster and balance mechanism bearings
Grease, Chesterton	Z150-105	Brake levers
Vinten Fluid No. 3	3051-25	Drag housings
Loctite 406	Z002-086	Adhesive
Permabond	Z-002-073	Adhesive (70H)

Section 4

Servicing

Contents **Para**

Introduction

1 The Vector 70/70H Pan and Tilt Heads are 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 service life with minimum need for repair.If the head becomes faulty reference should be made to Section 5 of this manual, or the unit may be returned to Vinten Broadcasting limited or your local dealer for repair.

Cleaning

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

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

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

Cleaning balance mechanism track

4 The balance mechanism tracks are automatically cleaned by built-in wipers, but after use in particularly adverse conditions the tracks may require cleaning. Some dismantling of the head is necessary and it is recommended that this be carried out in clean workshop conditions.

Vertical tracks

5 To clean the vertical tracks it is necessary to remove the platform. Proceed as follows (Fig 4.1):

5.1 Remove the payload (if fitted). It is not necessary to remove the wedge adaptor.

5.2 Release the sliding plate clamp (9). Use the adjustment knob (10) to wind the sliding plate(3) backwards until it is clear of fixing screws (1).

5.3 Level the platform.

5.4 Remove six screws (1) securing the platform (2) to the balance mechanism (4). Lift off the platform.

5.5 Using a pipe cleaner (or similar) moistened with an isopropanol-based cleaner (3M VBH or similar), clean the two vertical tracks (11). Upwards pressure on the balance mechanism will allow the area of track under the vertical rollers to be cleaned.

5.6 Install the platform (2) on the balance mechanism (4) and secure with six screws (1), using Loctite 222E.

5.7 Using the adjustment knob (10) wind the sliding plate forwards to the central position.

5.8 Refit the payload (if required) and rebalance the head.

Horizontal tracks

6 No dismantling is necessary to clean the horizontal tracks. Proceed as follow (Fig 4.1):

6.1 Remove the payload (if fitted). Set the balance mechanism to its maximum setting by pushing in the knob (8) and turning it clockwise to its stop.

6.2 Tilt the platform fully backwards and apply the tilt brake (7).

6.3 Pull down the flap guard (6) to reveal the bevel gear (5). Access to the horizontal tracks is through the holes in the bevel gear, which may be rotated freely.

6.4 Using a pipe cleaner (or similar) moistened with an isopropanol-based cleaner (3M VBH or similar), clean the two horizontal tracks. Upwards pressure on the balance mechanism will allow the area of track under the horizontal rollers to be cleaned.

6.5 Release the flap guard (6) and the tilt brake (7) and return the platform to the horizontal position.

6.6 Refit the payload (if required).

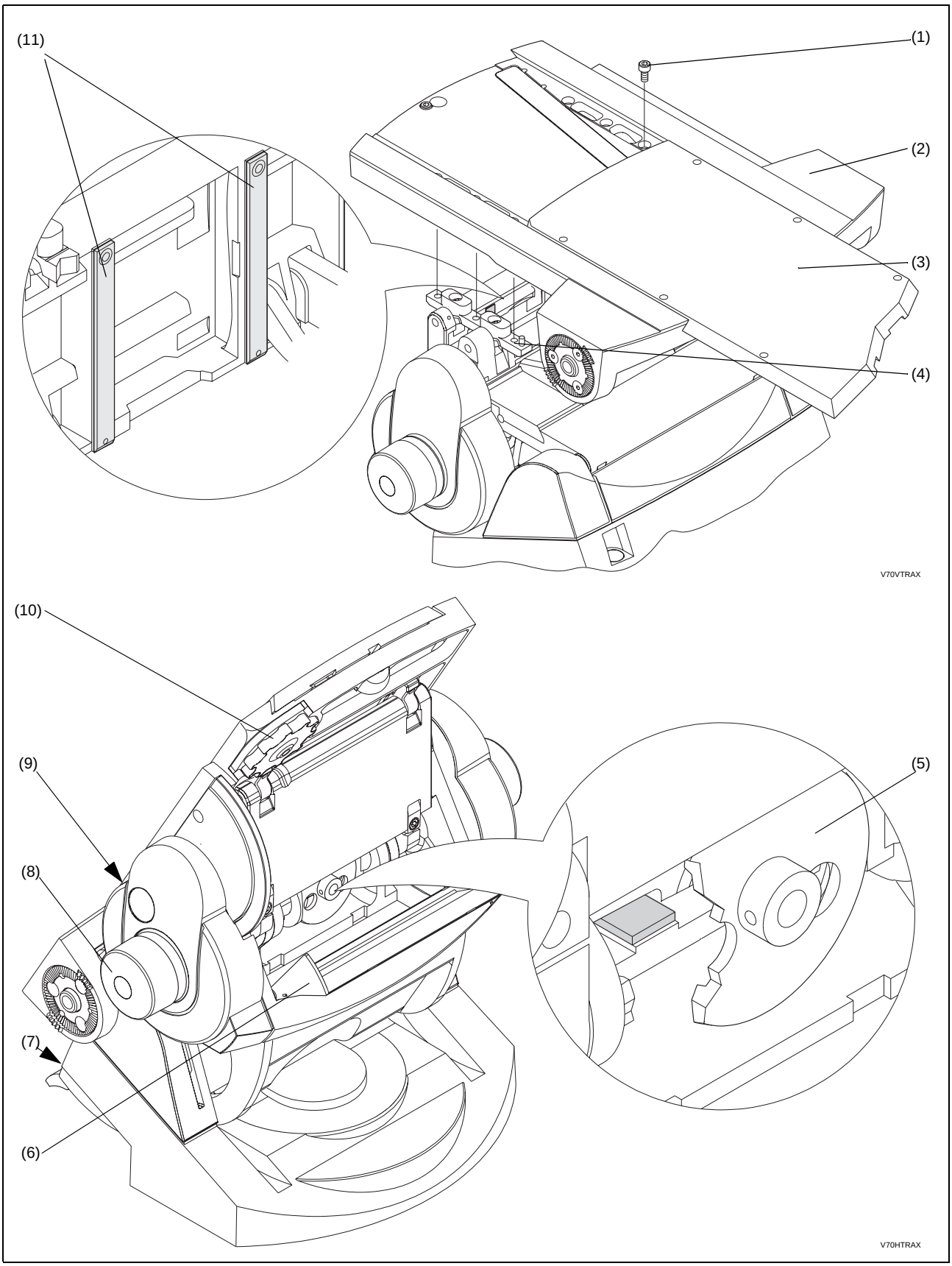


Fig 4.1 Cleaning Balance Mechanism Tracks

Routine checks and replacements

7 During normal use check the illumination of the level bubble. The battery should be replaced at yearly intervals or whenever the illumination is considered inadequate.

Level bubble illumination unit battery replacement

8 The level bubble on the Vector 70H pan and tilt head is illuminated by a battery-powered light-emitting diode (LED). A time-delay circuit initiated by a switch controls the LED. The battery should be replaced at yearly intervals or whenever the illumination is considered inadequate.

NOTE: Dependent on the type of mounting, it may be necessary to remove the head from the mounting for access to the battery compartment.

9 To install or replace the battery (Fig 4.2):

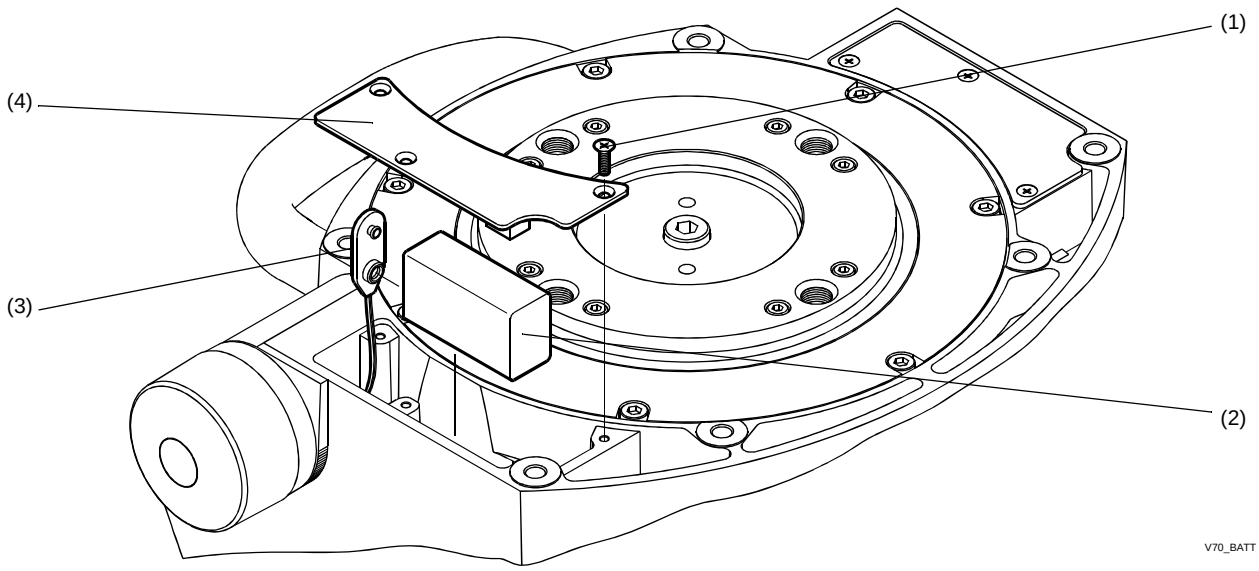
9.1 Remove three screws (1) which secure the battery compartment cover plate (4) to the head.

9.2 Install or replace the battery (2), pushing the connector (3) onto the battery terminals.

9.3 Position the battery in the battery compartment, ensuring that the wiring is not trapped.

9.4 Refit the battery cover plate (4), ensuring battery locates in cover plate. Secure with three screws (1).

9.5 Press the switch and ensure the lamp is lit for approximately 15 seconds.



BATTERY TYPE: 9V,6LR61 (PP3, 6AM6, MN1604, E-BLOCK) Vinten Part No. C550-023

Fig 4.2 Level Bubble Illumination Unit Battery Replacement

Adjustments

10 After considerable use the platform slide clamp or pan and tilt brakes may require adjustment.

Platform slide clamp adjustment

11 The platform slide clamp should be set so that, in the up or clamped position it prevents the platform slide from being moved, while in the down or released position it allows free adjustment of the slide. To adjust the clamp, proceed as follows (Fig 4.3):

11.1 On the right-hand side of the platform, carefully remove the self-adhesive label (2) to reveal the slotted shaft (1).

11.2 Pull the slide clamp lever (4) fully upwards.

11.3 Slacken the clamp screw (3).

11.4 Using a torque screwdriver, turn the slotted shaft (1) fully clockwise to a torque of 4.0 Nm (35 lbf in.).

11.5 Tighten the clamp screw (3).

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

11.7 Replace the self-adhesive label (2) in the recess in the platform.

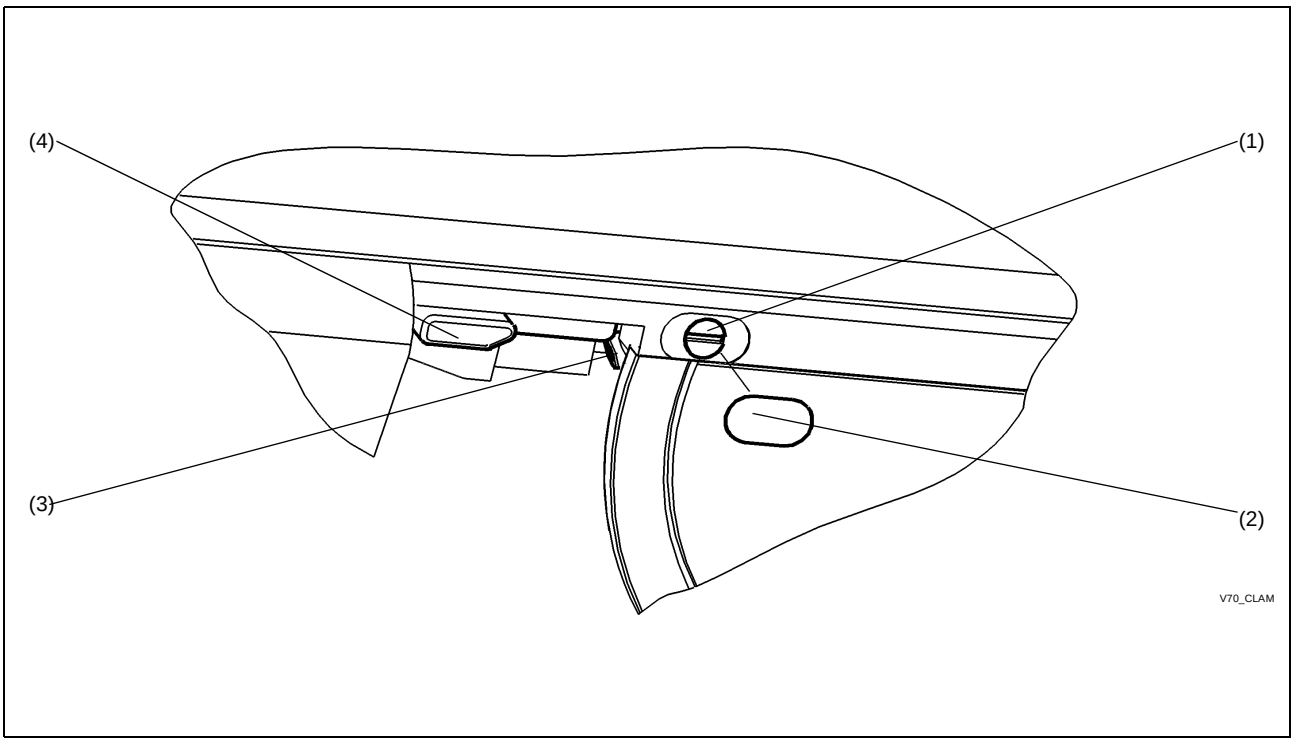


Fig 4.3 Platform Slide Clamp Adjustment

Pan and tilt brake adjustment

12 Following bedding-in, the pan and tilt brakes may require adjustment. The pan and tilt brakes should be set so that the brakes begin to be applied after approximately one-third of the lever travel (Fig 4.4).

13 The tilt brake is adjusted by inserting a 2 mm hexagon wrench through the hole (2) in the bottom of the tilt unit cover and turning the grub screw (1). To adjust the tilt brake, proceed as follows:

13.1 Operate the tilt brake lever (6) from the OFF to the ON position.

13.2 If brake pressure is not felt after approximately one-third of the lever travel, turn the grub screw (1) clockwise until this is achieved.

13.3 Operate the tilt brake lever (6) to the OFF position and ensure that the platform is free to move.

14 The pan brake is adjusted by turning the locating pin (5). To gain access to the pin it is necessary to remove the payload from the head, remove the head from its mounting and remove a cover plate (3) from the underside of the head. To adjust the pan brake, proceed as follows:

WARNING!: Remove the payload before adjusting the pan brake.

14.1 Remove the payload from the head.

14.2 Remove the head from its mounting.

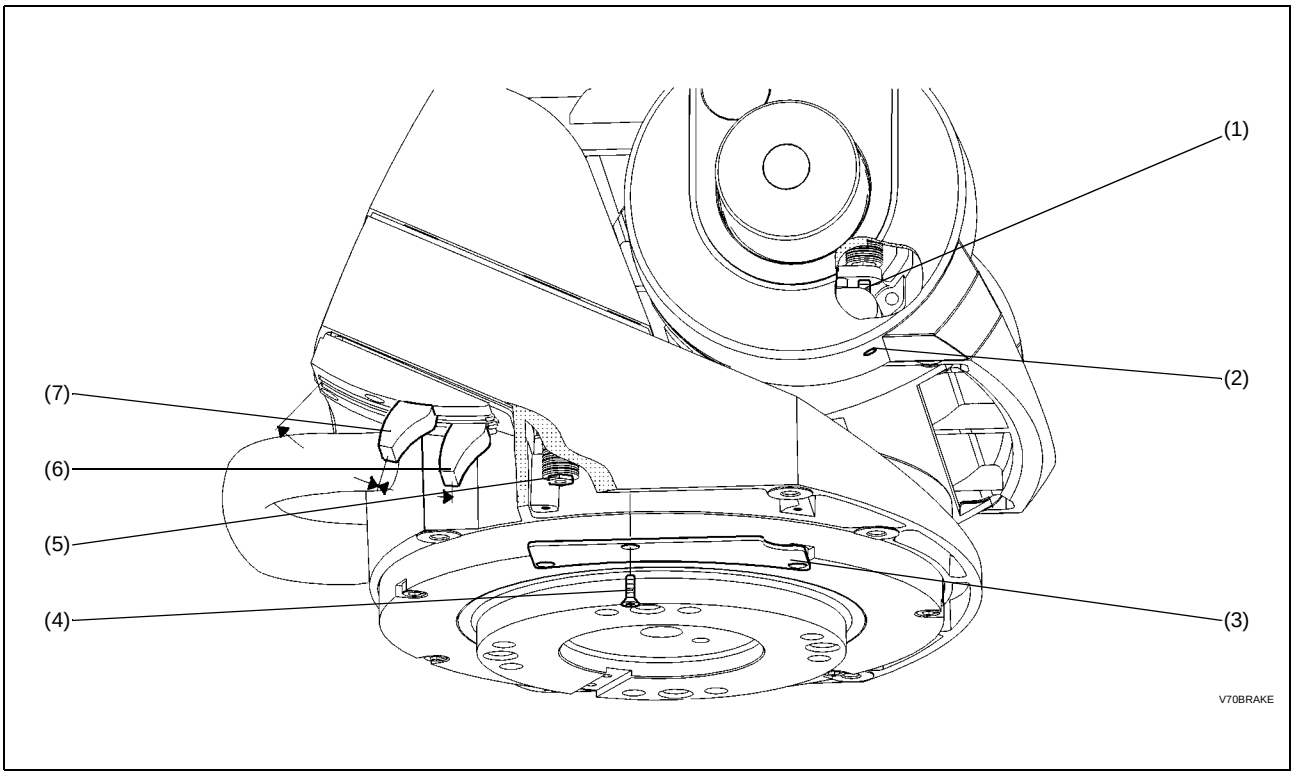


Fig 4.4 Pan and Tilt Brake Adjustment

14.3 On the underside of the head, remove three screws (4) securing cover plate (3).

14.4 Operate the pan brake lever (7) from the OFF to the ON position.

14.5 If brake pressure is not felt after approximately one-third of the lever travel, turn the locating pin (5) clockwise until this is achieved.

14.6 Operate the pan brake lever (7) to the OFF position and ensure that the head is free to rotate.

14.7 Refit cover plate (3) and secure with three screws (4).

Repositioning the wedge adaptor

15 The wedge adaptor is secured by four cap head screws which pass through the wedge adaptor into the sliding plate.

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

16 To reposition the wedge adaptor (Fig 4.5):

16.1 Engage the centre lock (3) and remove the load.

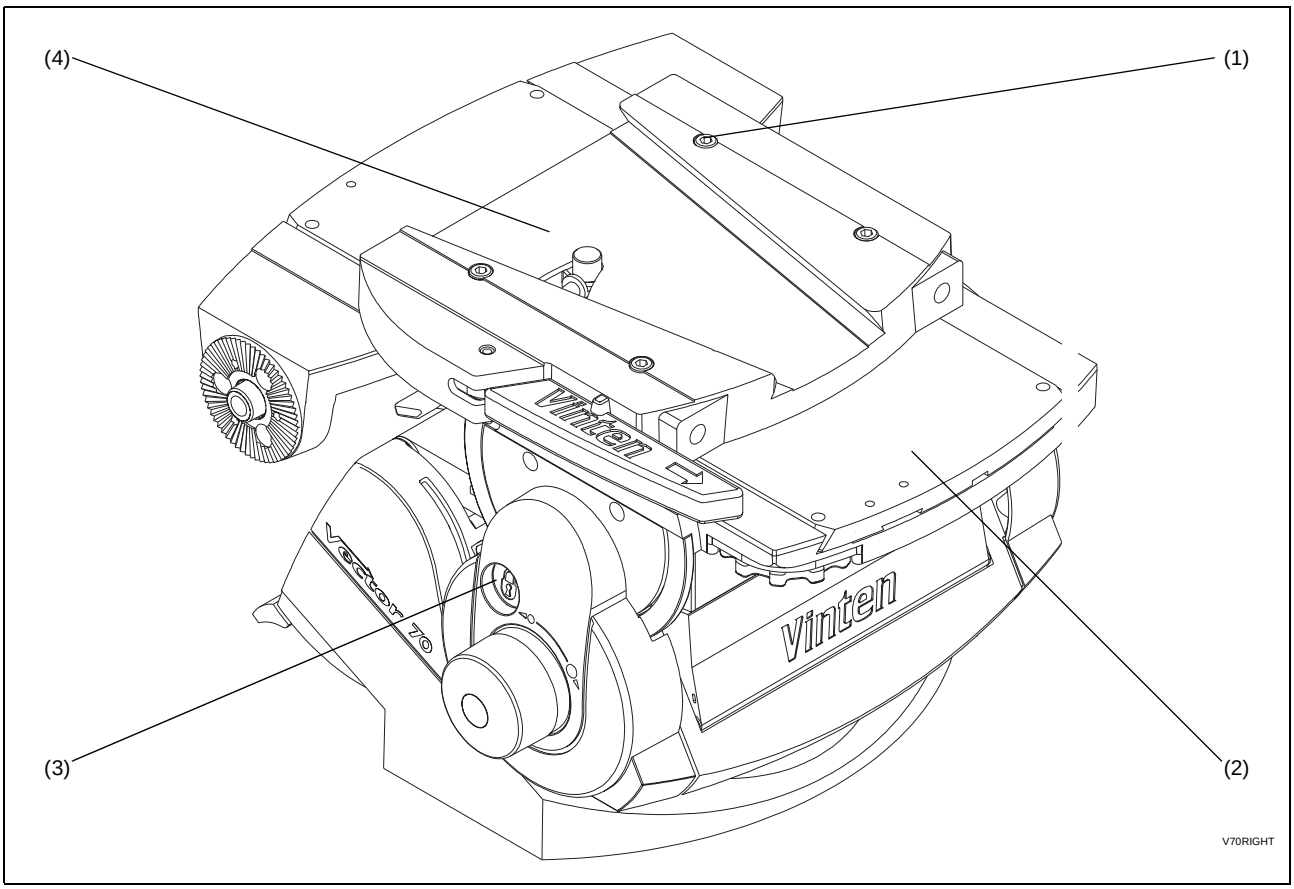


Fig 4.5 Repositioning the wedge adaptor

16.2 Hold the body of the wedge adaptor (4) and use a 4 mm hexagon wrench to remove four securing screws (1).

16.3 Reposition the wedge adaptor on the sliding plate (2), ensuring that the narrow end of the wedge adaptor faces forwards

16.4 Insert the four screws (1) in the holes in the wedge adaptor and tighten.

Section 5

Repair

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General

1 This section details procedures for disassembly and assembly of the Vector 70/70H 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 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 Vector 70 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

Platform Assembly

3 To remove the platform assembly, proceed as follows:

3.1 Remove the payload (if fitted).

3.2 Level the platform.

3.3 Referring to Fig 6.11, release the sliding plate clamp (23). Use the adjustment knob (14) to wind the sliding plate (1) fully backwards.

3.4 Referring to Fig 6.6, remove six screws (1) securing the platform (2) to the two platform pivot blocks (5). Lift of the platform.

3.5 The two Spirol pins (4) will remain in the platform pivot blocks, but may be removed if required.

4 To dismantle the platform assembly, proceed as follows (Fig 6.11):

4.1 Remove two screws (21) securing tilt brake centre (20) and brake disc (tilt) assembly (19) to the platform (27). Pull out two Spirol pins (3).

4.2 Release the sliding plate clamp (23). Using the platform adjustment knob (14), move the platform slide (1) to gain access to each stop screw (7). Remove both stop screws. Turn the adjustment knob until rack (28) disengages from worm on shaft (6). Slide out the platform slide (1).

4.3 If required, pull out three Spirol pins (29) to release the rack strip (28), which may then be slid out of the platform slide (1).

4.4 Remove slide clamp cover (24). Slacken screw (22) and unscrew slide clamp screw (25). Remove slide clamp (18) and slide clamp lever (23) from platform. Remove screw (22) from slide clamp lever.

4.5 Remove platform adjustment cover (5).

4.6 Remove screw (15) securing platform adjustment knob (14) to pinion (10).

4.7 Remove two screws (13) securing bearing bracket (12) to platform. Remove bearing bracket complete with pinion (11).

4.8 Remove two screws (17) securing shaft support (16) to platform.

4.9 Remove adjustment shaft assy (6) from platform.

4.10 Remove self-adhesive PTFE strip (10) from platform

4.11 Remove buffer (9) from platform. On Vector 70H, remove front stop bung (8) if required.

4.12 Remove three screws (2) securing each serrated disc (4) to platform. Remove three Spirol pins (3) from each location.

Spring-Loaded Flap

5 To remove the spring-loaded flap, proceed as follows (Fig 6.10):

5.1 Hold the flap (6) open and push the pins (4) inwards until the flap pins (2) are clear of the mechanism housing (1).

5.2 Pull the flap clear of the mechanism housing.

6 To dismantle the spring-loaded flap, proceed as follows (Fig 6.10):

NOTE: The flap springs (3, NI) are handed. Note orientation for assembly.

6.1 At each side of the flap, remove Spirol pin (4) to release flap pin (2), spring (5) and flap spring (3, NI).

Tilt brake/balance knob/centre lock

7 Remove the balance knob and associated components as follows (Fig 6.10):

7.1 Carefully prise out the knob bung (29)

7.2 Remove screw (28) and washer (27). Pull off the balance knob (26) and remove drag knob boss (25). Remove the pin (24).

7.3 Remove spring (22) and washer (21) from shaft (23).

8 To remove the tilt cover/centre lock assembly, proceed as follows (Fig 6.10):

8.1 Remove three screws (10) securing the tilt cover/centre lock assembly (30-37) to the tilt back plate (41).

8.2 Pull off the tilt cover/centre lock assembly. Slight tapping of the tilt unit cover (33) may be required.

8.3 Remove 'O' ring (20).

9 To dismantle the tilt cover/centre lock assembly, proceed as follows (Fig 6.10):

9.1 Remove screw (37) to free centre lock release lever spring (36). Remove spring.

9.2 Push out dowel (31) and remove centre lock plunger (30). Remove spring (32) from inside centre lock plunger.

9.3 Lift centre lock release lever (34) off dowel (35).

9.4 Remove dowel (35) and two Spirol pins (12) from tilt unit cover (33) if required.

10 To remove/dismantle the tilt brake assembly, proceed as follows (Fig 6.10):

10.1 Pull out the tilt brake shoe axle (11) to free the tilt brake shoe assembly (39)

10.2 Remove the tilt brake shoe assembly (39) and spring (40).

10.3 Remove the push rod/spring fork assembly (14-19).

NOTE: Do not dismantle the push rod/spring fork assembly (14-19) unless necessary.

10.4 Remove four screws (13) securing tilt back plate (41) to the mechanism housing (1). Remove tilt back plate.

NOTE: The tilt brake bell crank (8), connecting link (43) and associated components are removed with the RH support cap assembly (para 15).

10.5 If required, scrape the tilt brake reaction lining (45) off the mechanism housing (1), taking care not to damage the surface of the mechanism housing. Clean the mating face on the mechanism housing.

10.6 Remove two Spirol pins (12) and two grubscrews (42) from tilt back plate (41) if required.

Tilt drag mechanism

NOTE: An extended 3 mm AF spherical-ended hex wrench (Vinten Part No. 3354-931TL) is required to remove the tilt drag mechanism.
The tilt drag mechanism contains Vinten fluid No. 3. A good supply of clean rags should be to hand.

11 To remove the tilt drag mechanism (Fig 6.9):

11.1 Prepare for fluid loss or collection.

11.2 Remove five screws (2) securing the tilt drag cover assembly to the mechanism housing (1).

11.3 Pull off the tilt drag cover assembly. Slight tapping of the tilt drag cover (24) may be required.

11.4 Drain off the Vinten fluid No. 3.

12 To dismantle the tilt drag mechanism, proceed as follows (Fig 6.9):

12.1 Carefully prise out the knob bung (17).

12.2 Remove screw (18) and washer (16). Pull off the drag knob (15).

12.3 Remove three screws (20) securing drag knob retainer (21) to outer boss (22). Remove the retainer and unscrew the knob boss/threaded shaft (19). This will free the actuator cam shaft (30), which may be removed from the rear of the unit. Remove the knob boss/threaded shaft (19) and the two thrust washers and the thrust race (13) from the outer boss, noting orientation of components for assembly. Discard 'O' ring (14) from the knob boss/threaded shaft and 'O' ring (29) from the actuator cam shaft (30).

12.4 Remove three screws (12) securing outer boss (22) to the tilt drag cover (24). Remove and discard 'O' ring (23).

12.5 Remove and discard gasket (3).

NOTE: The drag shoe assemblies (5, 28) and actuator links (6, 26) are handed. Note orientation for assembly.

12.6 Pull assembled drag shoes and actuator links off two dowel pins (10).

12.7 Pull drag shoe assemblies (5, 28) off dowel pins (4) in actuator links (6, 26).

12.8 Remove Spirol pins (9) attaching extension spring (8) to actuator links (6, 26).

12.9 Slacken grubscrew (25) and drive out dowel pin (27) to separate actuator links (6, 26)

12.10 Remove dowel pins (4) from actuator links (6, 26) if required.

12.11 Remove two dowel pins (7), two dowel pins (10) and dowel pin (1) from the tilt drag cover (24) if required.

Balance mechanism

13 To remove/dismantle the balance mechanism, proceed as follows:

13.1 Remove the platform (Para 3), spring-loaded flap (Para 5), tilt brake/balance knob/centre lock (Para 7) and tilt drag mechanism (Para 11).

13.2 Referring to Fig 6.3, remove all base cover plates as follows:

13.2.1 Remove three screws (5) securing RH cover plate (7).

13.2.2 Remove three screws (5) securing LH cover plate (23). Disconnect and remove the battery.

13.2.3 Remove four screws (5) securing brake lever guide assy (6) and brake lever cover plate (4).

13.2.4 Remove two screws (5) securing switch cover plate (8). Remove screw (9) securing PCB to base and carefully remove switch cover plate PCB and battery connector. Note the position of the LED and carefully manipulate it from its location

13.3 Referring to Fig 6.6, on the vertical track member (7), slacken the two top grubscrews (8) and pull out the two top pins (31). An M3 screw may be installed in the pins to assist in removal. Note the position of and retain all shims (17).

13.4 On the mechanism housing (10), slacken the two top grubscrews (8) and pull out the two pins (9). An M3 screw may be installed in the pins to assist in removal. Note the position of and retain all shims (17).

13.5 Remove the two platform pivot blocks (5). If required, the plain bearings (6) may be removed by slackening screws (3).

13.6 At the RH and LH actuators (42, 34), slacken screws (32).

13.7 Pull the bevel pinion shaft (37) sharply outwards to unseat the RH actuator shaft (36) and bearing (11).

13.8 At the bevel pinion (41) unscrew the two grubscrews (40) until the shaft (37) can be pulled out of the mechanism housing.

13.9 Remove the RH actuator shaft (36), complete with bearing (11), two snap rings (38) and flanged bush (39). Dismantle as required.

13.10 Turn the tilt drag shaft (29) to align the holes and remove three screws (27). Pull out the tilt drag shaft, complete with omniseal (28), tilt drag shaft seal plate (26), bearing (24) and snap ring (23). Dismantle as required, noting the orientation of omniseal (28). Remove and discard gasket (25).

13.11 Lift out the vertical track member (7) together with the RH and LH actuators (42, 34). To remove the actuators, slacken grubscrews (8) and pull out the two lower pins (31). An M3 screw may be installed in the pins to assist in removal. Note the position of and retain all shims (17).

13.12 If required, the plain bearings (6) may be removed from the actuators (34, 42) by slackening screws (33).

13.13 Pull the adjuster assembly (13) and two shims (12) out of the mechanism housing. Recover bevel pinion (41) if not already removed.

NOTE: An extended 4 mm AF spherical-ended hex wrench (Vinten Part No. 3354-931TL) is required to remove the support caps.

13.14 Referring to Fig 6.3, remove three screws (1, 24, 25) securing LH support cap (27) to base (26).

13.15 Referring to Fig 6.5, remove three screws (26, 27, 29) securing RH support cap (1) to base (28).

13.16 Lift the mechanism housing and support caps off the base, manipulating brake mechanism through base aperture.

13.17 Pull the LH and RH support caps off the linkage. Note the position of and retain any shims (item 43, Fig 6.6). The bushes (item 28, Fig 6.3 and item 25, Fig 6.5) are a push fit in the support caps.

13.18 Referring to Fig 6.6, on the upper drive arm (14) drive in two horizontal track arm pins (15), taking care not to damage bearings in the horizontal track arm (16).

13.19 On the mechanism housing, release two grubscrews (8) securing upper arm pivot pins (20). Pull out the two pins. An M3 screw may be installed in the pins to assist in removal. Remove the upper drive arm (14). Note the position of and retain all shims (17). At the left-hand pin position, remove seal insert (22) and discard 'O' ring (21) if required.

13.20 On the mechanism housing, pull out the two lower arm pivot pins (31). An M3 screw may be installed in the pins to assist in removal. Retain all shims (17).

13.21 The lower drive arm (19) and the horizontal track arm (16) are now freed from the mechanism housing. To separate these components, drive in two horizontal track arm pins (15), taking care not to damage bearings in the horizontal track arm (16). Note the position of and retain all shims (17).

13.22 In the mechanism housing, remove bearings (11) if required. Remove rear tilt buffer (18) if required.

Balance adjuster assembly (Vector 70)

NOTE: The balance adjuster was improved at Serial No. 3307. The earlier balance adjuster (3354-14) should be replaced with the redesigned balance adjuster (3554-54).

14 To dismantle the balance adjuster assembly, proceed as follows (Fig 6.7)

14.1 Remove Spirol pin (15) securing bevel gear (14) to adjuster shaft (11). Slacken grubscrew (8) and pull gear off shaft.

14.2 Remove 'E' clip (12) from shaft.

14.3 Pull bush (13) out of housing (7) if required.

14.4 Turn adjuster shaft (11) to position carriage (9) in mid position. Manipulate shaft and carriage out of housing (7).

14.5 Unscrew adjuster shaft (11) from carriage (9). To remove track rollers (1), shims (2), track wiper mouldings (3) and track wiper outers (4) from carriage, undo grub screws (8) and pull out roller axles (5,

10). Note orientation of roller axles. Separate track wiper mouldings (3) and track wiper outers (4) if required.

14.6 Drive out lift-off stop pin (16) if required.

14.7 Pull out the bearings (6) if required.

Balance adjuster assembly (Vector 70H)

NOTE: The balance adjuster was improved at Serial No. 3307. The earlier balance adjuster (3354-44) should be replaced with the redesigned balance adjuster (3554-55).

15 To dismantle the balance adjuster assembly, proceed as follows (Fig 6.8)

15.1 Remove Spirol pin (16) securing bevel gear (15) to adjuster shaft (11). Slacken grubscrew (8) and pull gear off shaft.

15.2 Remove ‘E’ clip (13) from shaft.

15.3 Pull bush (14) out of housing (7) if required.

15.4 Turn adjuster shaft (11) to position carriage (9) in mid position. Manipulate shaft and carriage out of housing (7).

15.5 Unscrew adjuster shaft (11) from carriage (9). To remove track rollers (1), shims (2), track wiper mouldings (3) and track wiper outers (4) from carriage, undo grub screws (8) and pull out roller axles (5, 10 and 12). Note orientation of roller axles. Separate track wiper mouldings (3) and track wiper outers (4) if required.

15.6 Drive out lift-off stop pin (17) if required.

15.7 Pull out the bearings (6) if required.

RH support cap assembly

16 To dismantle the RH support cap assembly, proceed as follows (Fig 6.5):

16.1 Unscrew stud (8) from pan brake fork end (6) to free spring assembly (8-14).

NOTE: Do not dismantle the spring assembly (8-14) unless necessary.

16.2 Remove pan brake rocker arm (7) from pivot in support cap (1).

16.3 Slacken grubscrew (24) and push out link arm pivot pin (20).

16.4 Withdraw brake lever pivot pin (21). An M2.5 screw may be installed in the pin to assist in removal.

16.5 Remove all components from inside the support cap. Note the position of and retain all shims (15).

16.6 Note orientation and remove self-locking ring (3) and pin (4) to separate pan brake link arm (5) and pan brake fork end (6).

16.7 Remove pin (17) from tilt brake link arm (18) to free connecting link (22) if required.

16.8 Referring to Fig 6.10, remove self-locking ring (9) and headed pin (44) to separate connecting link (43) and tilt brake bell crank (8). If required, pull out tilt brake pivot pin (7).

Pan drag/brake mechanism

17 To remove the pan drag/brake mechanism, proceed as follows (Fig 6.3):

17.1 Carefully prise out the knob bung (17)

17.2 Remove screw (16) and washer (15). Pull off the drag knob (18) and remove drag knob boss (14).

17.3 Remove three screws (19) securing pan drag knob shaft disc (20) to base. Remove the pan drag knob shaft assembly.

17.4 If required, drive out pin (13) to separate disc (20), washer (21) and pan drag knob shaft (22).

NOTE: When seven screws (11, 12) are removed the brake reaction plate (item 25, Fig 6.4) will be freed from the pan drag/brake assembly.

17.5 Note orientation and remove four screws (11) and three screws (12) securing pan drag/brake assembly (10) and brake reaction plate (item 25, Fig 6.4) to base

17.6 To dismantle the pan drag/brake mechanism, proceed as follows (Fig 6.4):

NOTE: The drum enclosure contains Vinten fluid No. 3. A good supply of clean rags should be to hand.

17.7 Remove screw (2), bonded seal (3) and three screws (39) from lid/rivet bush assembly (1). Install two M4 screws in threaded holes in lid to assist in removal of lid/rivet bush assembly. Discard 'O' ring (4) and three 'O' rings (38).

17.8 Clean out the Vinten fluid No. 3.

NOTE: The design of the pan drag actuator components was changed at Serial No. 3051 to improve serviceability. Discard and replace rod (37), locknut (36) and coupling (29) on earlier heads. Note that these components have left-hand threads and are secured with Loctite 638. Careful application of heat to these components may separate them. If not, rod (37) should be cut through at its unthreaded portion and manoeuvred out of the drag plate subassembly.

17.9 Remove circlip (31) and wave washer (32). Slacken locknut (36), noting that the locknut has a left-hand thread. Unscrew coupling (29) to withdraw coupling seal disc (33) from drag plate subassembly (16). Remove and discard ‘O’ ring (34) from coupling seal disc.

17.10 Remove screw (28) from coupling seal disc (33) to release coupling (29). Remove and discard ‘O’ ring (30) from coupling.

17.11 Remove friction shoe assemblies (7) from drag plate subassembly (16). Remove locknut (36) from adjuster shaft (37) and unscrew shaft to free trunnions (5,6)

17.12 If required, remove two pivot pins (35) from drag plate subassembly (16). These pins are secured with Loctite.

17.13 Remove screw (24). Remove four-hole mounting plate (22) complete with brake disc clamp/ thrust bearing guide ring (19) and pan brake/ lower thrust bearing race disc (26).

17.14 Remove eight screws (23) securing pan brake/ lower thrust bearing race disc (26) and brake disc clamp/thrust bearing guide ring (19) to four-hole mounting plate (22). Drive out two Spirol pins (20).

17.15 Remove thrust race (27) and upper thrust bearing race disc (17) from drag plate subassembly (16).

17.16 Pull off friction drum (8), complete with omniseal (9) and bearing (10). Discard omniseal. Remove two dowel pins (21).

17.17 Remove circlip (11) and ‘V’ ring (12) from brake plunger. Remove and discard 'O' ring (13) from the boss in the drag plate subassembly (16). Remove self-locking ring (14) and spring (15) from each pillar of the brake shoe assembly (18) and remove brake shoe assembly from the drag plate subassembly (16).

Assembly

NOTE: All ‘O’ rings, seals and spring clips removed during disassembly should be renewed.

Pan drag/brake mechanism

18 To assemble the pan drag/brake mechanism, proceed as follows (Fig 6.4):

18.1 Lightly lubricate face of omniseal (9) with LM grease and instal on friction drum (8), ensuring omniseal is correctly oriented - open side towards drum top surface. Lubricate bearing (10) with LM grease and install on friction drum (8).

18.2 Install trunnions (5,6) in friction shoe assemblies (7), ensuring that left-hand-threaded trunnion (6), indicated by turned ring, is installed in left-hand friction shoe. Install adjuster rod (37) and locknut (36), noting that the locknut has a left-hand thread. Ensure unthreaded length of adjuster rod is central to friction shoes.

NOTE: Ensure grease does not contaminate brake surface of brake shoe assembly (18).

18.3 Sparingly lubricate the shaft and pillars of brake shoe assembly (18) with LM grease and install in the drag plate subassembly (16). Install spring (15) and self-locking ring (14) on each pillar of the brake shoe assembly. Install ‘O’’ ring (13) over the boss in the drag plate subassembly (16). Install ‘V’ ring (12) and circlip (11) on brake plunger, ensuring ‘V’ ring is correctly oriented.

18.4 Install assembled friction drum in the drag plate subassembly (16).

18.5 Install two dowel pins (35) in the drag plate subassembly (16). Do not use any adhesive on pins.

18.6 Fit dummy lid (3354-930TL) to drag plate subassembly (16). Using a screwdriver in the slot in adjuster rod (37), tighten friction shoes so that they centralize around friction drum (8).

18.7 Install 'O' ring (30) on coupling (29) and install in coupling seal sleeve (33). Install drag coupling screw (28) in coupling seal sleeve, ensuring point engages in groove in coupling (29). Install 'O' ring (34) in face of coupling seal disc, using LM grease to retain ‘O’ ring.

18.8 Screw coupling (29) onto adjuster rod (37), ensuring that drag coupling screw (28) engages in slot in drag plate subassembly (16). Secure coupling seal sleeve (33) with wave washer (32) and circlip (31).

18.9 Adjust coupling (29) so that drag coupling screw (28) is central in groove in coupling, then lightly tighten locknut (36).

18.10 Remove drag coupling screw (28) and unscrew and remove coupling (29). Apply Loctite 638 to thread of coupling (29) and refit to previous position. Tighten the locknut to a torque of 5.65 Nm (50 lbf in.) and refit drag coupling screw (28).

18.11 Remove dummy lid.

18.12 Turn assembly upside-down. Install upper thrust bearing race disc (17) on drag plate subassembly (16), using LM grease to retain disc. Lightly lubricate thrust race (27) with LM grease and install on drag plate subassembly (16).

NOTE: Do not allow grease to contaminate the braking surfaces of the brake disc (26).

18.13 Install pan brake/lower thrust bearing race disc (26) and brake disc clamp/thrust bearing guide ring (19) on four-hole mounting plate (22). Secure lightly with eight screws (23), then install two Spirol pins (20), ensuring pins are underflush with top face of guide ring (19). Tighten screws (23).

NOTE: Pins (21) must be a tight fit in both four-hole mounting plate and friction drum.

18.14 Install assembled four-hole mounting plate onto thrust race (27) on drag plate subassembly (16) and secure lightly with screw (24). Install two dowel pins (21), ensuring pins are underflush with lower face of four-hole mounting plate (22).

NOTE: Screw (24) is tightened during final assembly of the head.

18.15 Turn assembly right way up. Fill drum enclosure with 60ml of Vinten fluid No. 3.

18.16 Install three 'O' rings (38) in recesses in drag plate subassembly (16).

18.17 Install 'O' ring (4) in groove in lid/rivet bush assembly (1) and secure lid/rivet bush assembly to drag plate subassembly (16) using three screws (39) and Loctite 222E.

18.18 Install bonded seal (3) and screw (2) in lid/rivet bush assembly (1).

18.19 Position brake reaction plate (25) over four-hole mounting plate and align holes in reaction plate with those in drag plate subassembly.

19 To install the pan drag/brake mechanism in the base, proceed as follows (Fig 6.3):

19.1 Position the assembled pan drag/brake mechanism in the base, ensuring pan drag coupling aligns with base knob boss, holes in drag plate subassembly align with holes in base and 'O' ring on brake boss locates correctly in base. Secure with four 25 mm. long screws (11) and three 20 mm. screws (12) noting that longer screws are installed to the rear of the base.

19.2 Instal washer (22) and pan drag knob shaft disc (20) on pan drag knob shaft (22) and secure with pin (13).

19.3 Position assembled pan drag knob shaft in base, ensuring end of shaft locates over coupling in pan drag mechanism. Secure with three screws (19).

19.4 Install knob boss on shaft, engaging slot with pin (13). Fit knob over boss and secure with washer (15) and screw (16). Install bung (17).

Balance adjuster assembly (Vector 70)

NOTE: The balance adjuster was improved at Serial No. 3307. The earlier balance adjuster (3354-14) should be replaced with the redesigned balance adjuster (3554-54).

20 To assemble the balance adjuster assembly, proceed as follows (Fig 6.7):

20.1 Using Easyrun 50 grease, lubricate track rollers (1), shims (2) thread of adjuster shaft (11) and running surfaces of housing (7) and carriage (9).

NOTE: If bevel gear (14) or adjuster shaft (11) require replacement, both items must be replaced and drilled to accept pin (15).

20.2 If removed, fit lift-off stop pin (16) in housing (7) using Loctite 601. Ensure pin is correctly oriented.

20.3 If removed, install two bearing (6) in housing (7), ensuring bearings are correctly seated and secure with Loctite 641.

20.4 Assemble four track wiper mouldings (3) in four track wiper outers (4). Slide each assembly onto a track roller (1).

20.5 Position a shim (2) on each side of two track rollers/wipers and install in the housing (7), ensuring wiper blades face outwards. Install two 18 mm. roller axles (5), ensuring ends of axles are slightly under-flush with the sides of the housing. Apply Loctite 222E to threads of two grubscrews (8) and secure each axle.

20.6 Position a shim (2) on each side of two track rollers/wipers and install in the carriage (9), ensuring wiper blades face downwards. Install a 15 mm. roller axle (10) on side of carriage adjacent to lift-off stop pin (15) and a 18 mm. roller axle (5) on side of carriage opposite to lift-off stop pin. Ensure roller axle (5) protrudes 4.5 mm. (Fig 6.7). Apply Loctite 222E to threads of two grubscrews (8) and secure each axle.

20.7 Screw the adjuster shaft (11) into the carriage (9) to the mid position. Position the assembly in the housing (7), locating the end of the adjuster shaft in the end bracket on the housing.

20.8 If removed, push the bush (13) into the housing.

20.9 Install the ‘E’ clip (12) on the adjuster shaft (11).

20.10 Install the bevel gear (14) on the adjuster shaft (11) and secure with Spirol pin (15). Tighten grubscrew (8). If a new bevel gear is being installed, proceed as follows:

20.10.1 Install the bevel gear (14) on the adjuster shaft (11). Push the bevel gear onto the shaft to take up end float and tighten the grubscrew (8).

20.10.2 Using a 4 mm. dia drill in the pilot hole provided, drill through the boss of the bevel gear and the shaft.

20.10.3 Install Spirol pin (15).

Balance adjuster assembly (Vector 70H)

NOTE: The balance adjuster was improved at Serial No. 3307. The earlier balance adjuster (3354-14) should be replaced with the redesigned balance adjuster (3554-54).

21 To assemble the balance adjuster assembly, proceed as follows (Fig 6.8):

21.1 Using Easyrun 50 grease, lubricate track rollers (1), shims (2) thread of adjuster shaft (11) and running surfaces of housing (7) and carriage (9).

NOTE: If bevel gear (15) or adjuster shaft (11) require replacement, both items must be replaced and drilled to accept pin (16).

21.2 If removed, fit lift-off stop pin (17) in housing (7) using Loctite 601. Ensure pin is correctly oriented.

21.3 If removed, install two bearing (6) in housing (7), ensuring bearings are correctly seated and secure with Loctite 641.

21.4 Assemble four track wiper mouldings (3) in four track wiper outers (4). Slide each assembly onto a track roller (1).

21.5 Position a shim (2) on each side of two track rollers/wipers and install in the housing (7), ensuring wiper blades face outwards. Install two 27 mm. roller axles (5), ensuring ends of axles are slightly under-flush with the sides of the housing. Apply Loctite 222E to threads of two grubscrews (8) and secure each axle.

21.6 Position a shim (2) on each side of two track rollers/wipers and install in the carriage (9), ensuring wiper blades face downwards. Install a 15 mm. roller axle (10) on side of carriage adjacent to lift-off stop pin (15) and a 18 mm. roller axle (12) on side of carriage opposite to lift-off stop pin. Ensure roller axle (12) protrudes 4.5 mm (Fig 6.8). Apply Loctite 222E to threads of two grubscrews (8) and secure each axle.

21.7 Screw the adjuster shaft (11) into the carriage (9) to the mid position. Position the assembly in the housing (7), locating the end of the adjuster shaft in the end bracket on the housing.

21.8 If removed, push the bush (14) into the housing.

21.9 Install the ‘E’ clip (13) on the adjuster shaft (11).

21.10 Install the bevel gear (15) on the adjuster shaft (11) and secure with Spirol pin (16). Tighten grubscrew (8). If a new bevel gear is being installed, proceed as follows:

21.10.1 Install the bevel gear (15) on the adjuster shaft (11). Push the bevel gear onto the shaft to take up end float and tighten the grubscrew (8).

21.10.2 Using a 4 mm. dia drill in the pilot hole provided, drill through the boss of the bevel gear and the shaft.

21.10.3 Install Spirol pin (16).

Balance mechanism

NOTE: The balance mechanism, RH support cap, LH support cap, tilt brake, balance knob and centre lock are all assembled/installed during this procedure.

22 To assemble the balance mechanism, proceed as follows (Fig 6.6):

NOTE: Shim (17) is available in two thicknesses - 0.005 in. (3354-206) and 0.003 in. (3354-299). Shim (43) is available in three thicknesses - 0.005 in. (3354-209), 0.003 in. (3354-217) and 0.002 in. (3354-433). Combinations of shims should be used as required, ensuring that components are shimmed equally on each side.
All shims, bearings, bushes and pivot pins should be lightly lubricated with LM grease prior to assembly.

22.1 If bearings (11) were removed from mechanism housing (10), install centrally and secure with Loctite 641.

22.2 If rear tilt buffer (18) was removed from mechanism housing (10), install using Loctite 415.

22.3 If roller bearing (30) was removed from tilt drag shaft (29), install using Loctite 641.

22.4 Referring to Fig 5.1, calculate the shims required between the upper drive arm (14) and the horizontal track arm (16) as follows:

22.4.1 Measure the width across the upper bearing faces of the horizontal track arm - dimension A

22.4.2 Measure the distance between the bearing faces of the upper drive arm - dimension B

22.4.3 Subtract A from B, divide by 2 and, using shims (17), assemble two shim packs to this figure, allowing not more than 0.002 in. clearance.

22.5 Position the horizontal track arm (16) and two shim packs in the upper drive arm (14). Install two horizontal track arm pivot pins (15) from the inside, ensuring bearings are not damaged and pins are underflush with the upper drive arm.

22.6 Referring to Fig 5.1, calculate the shims required between the upper drive arm (14) and the mechanism housing (10) as follows:

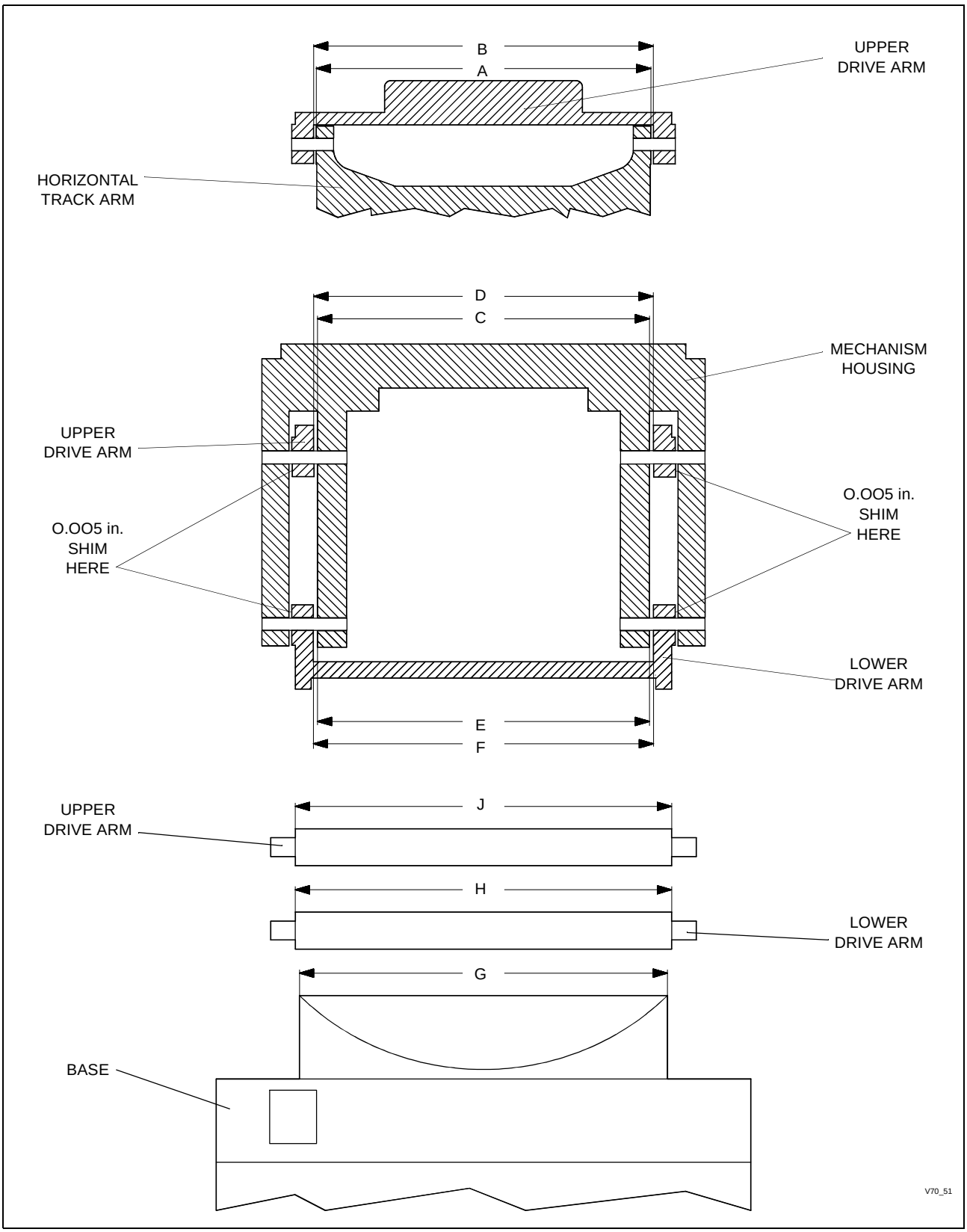

Fig 5.1 Balance mechanism shims

22.6.1 Measure the width across the upper bearing faces of the mechanism housing - dimension C.

22.6.2 Measure the distance between the bearing faces of the upper drive arm - dimension D.

22.6.3 Subtract C from D, divide by 2 and, using shims (17), assemble two shim packs to this figure, allowing not more than 0.002 in. clearance.

22.7 If removed, lubricate 'O' ring (21) with LM grease and install in RH side of mechanism housing (10). Install seal insert (22).

22.8 Position the upper drive arm/horizontal track arm in the mechanism housing with the shim packs between the inside bearing faces and one 0.005 in. shim (5) between each outside bearing face. Install two upper arm pivot pins (20), ensuring pins are underflush with the faces of the mechanism housing. Secure pins with grubscrews (8).

22.9 Referring to Fig 5.1, calculate the shims required between the lower drive arm (19) and the mechanism housing (10) as follows:

22.9.1 Measure the width across the lower bearing faces of the mechanism housing - dimension E.

22.9.2 Measure the distance between the bearing faces of the lower drive arm - dimension F.

22.9.3 Subtract E from F, divide by 2 and, using shims (17), assemble two shim packs to this figure, allowing not more than 0.002 in. clearance.

22.10 Position the lower drive arm in the mechanism housing with the shim packs between the inside bearing faces and one 0.005 in. shim (17) between each outside bearing face. Install two lower arm pivot pins (31) from the outside, ensuring bearings are not damaged and pins are underflush with the faces of the mechanism housing.

22.11 Align the lower end of the horizontal track arm (16) in the lower drive arm (19), install a 0.005 in. shim (17) at each side and install two horizontal track arm pivot pins (15) from the inside, ensuring pins are underflush with the lower drive arm.

22.12 In the mechanism housing, lubricate the inside faces of bearings (11) with Easyrun 50 grease.

22.13 On the adjuster assembly (13), lubricate the outside faces of bearings with Easyrun 50 grease.

22.14 In the mechanism housing, position a shim (12) on the inside faces of bearings (11) and install the adjuster assembly, aligning the holes in the bearings and shims.

22.15 If removed, install a bearing (6) in RH actuator (42) and LH actuator (34). Centralize the bearing and position the slot in the bearings diametrically opposite to the slot in the actuators. Secure lightly with screw (33).

NOTE: Actuators (42, 34) are handed. Ensure RH actuator (42), with round hole, is installed at RH end of vertical track member (7) and LH actuator (34), with pear-shaped hole, at LH end.

22.16 Position RH actuator (42) in lower RH end of vertical track member (7), with a 0.005 in. shim (17) on each side. Install pivot pin (31) and secure with grubscrew (8).

22.17 Position LH actuator (34) in lower LH end of vertical track member (7), with a 0.005 in. shim (17) on each side. Install pivot pin (31) and secure with grubscrew (8).

NOTE: Final adjustment of bearings is carried out after assembly of the head.

22.18 At each actuator, tighten screw (33) until all slack in the bearing is eliminated but actuator moves freely on its pivot. Actuator should just fall from the horizontal position under its own weight.

22.19 Position the assembled vertical track member and actuators in the mechanism housing so that the lift off stop pin (item 16, Fig 6.7 or item 17, Fig 6.8) engages in the slot behind the RH vertical track. Align holes in actuators with holes in bearings (11).

22.20 Install flanged bush (39) in RH actuator shaft (36). Instal two snap rings (38) and bearing (11) on RH actuator shaft.

22.21 Install RH actuator shaft in mechanism housing, passing shaft through RH actuator (42), bearings (11) and shim (12), Do not push the shaft fully home.

22.22 Position bevel pinion (41) in adjuster assembly. Push bevel pinion shaft (37) through RH actuator shaft and into bevel pinion. Secure bevel pinion with two grubscrews (40), which engage in dimples in bevel pinion shaft (37).

22.23 Push the RH actuator shaft fully home in the mechanism housing.

22.24 Install omniseal (27) in tilt drag shaft seal plate (26), ensuring seal is correctly oriented with open side outwards. Slide plate and omniseal over tilt drag shaft (29). Adhere gasket (25) to seal plate (26) using Hylomar gasket sealant.

22.25 Install bearing (24) on tilt drag shaft (29) and secure with snap ring (23). Install tilt drag shaft in mechanism housing, passing shaft through LH actuator (34), bearings (11) and shim (12),

22.26 If removed, install two bearings (6) in each platform pivot block (5). Centralize the bearings and position the slots in the bearings diametrically opposite to the slots in the pivot blocks. Secure lightly with screw (3).

NOTE: Final adjustment of bearings is carried out after assembly of the head.

22.27 At the front bearing of each platform pivot block, install a pivot pin (31) and tighten screw (3) until all slack in the bearing is eliminated but pivot block moves freely on its pivot pin. Pivot block should just fall from the horizontal position under its own weight. Remove pivot pins (31).

22.28 On the tilt brake side pivot block (5), position a 0.005 in. shim (17) on the outside and sufficient shims (17) on the inside to take out side play and install the pivot block (5) in the mechanism housing (10). Install pivot pin (9) slightly underflush and secure with grubscrew (8). At the platform pivot block, tighten screw (3) until all slack in the bearing is eliminated but pivot block moves freely on its pivot pin. Pivot block should just fall from the horizontal position under its own weight.

22.29 Install and adjust the tilt drag side pivot block (5) in the mechanism housing in a similar manner, but do not fit any shims (17).

22.30 On the tilt brake side pivot block (5), position a 0.005 in. shim (17) on the outside and sufficient shims (17) on the inside to take out side play and install the pivot block (5) in the vertical track member (7). Install pivot pin (31) slightly underflush and secure with grubscrew (8).

22.31 Install the tilt drag side pivot block (5) in the vertical track member in a similar manner, but do not fit any shims (17).

22.32 Ensure LH and RH actuators (42, 34) are central in mechanism housing and fully tighten screws (32),

Support caps

NOTE: Lubricate all shims, pins and other moving parts of the support caps with LM grease.

23 To assemble the RH support cap assembly, proceed as follows (Fig 6.5):

23.1 If removed, install two bushes (24) in support cap (1).

23.2 If dismantled, assemble the spring assembly (8-14) as follows:

23.2.1 Secure stud (8) in pin (14) using Loctite 270. Adjust to length shown in Fig 6.5.

23.2.2 On the pin (14) arrange 20 disc springs (13) as shown in Fig 6.5.

23.2.3 Install washer (12) and washer (11) and secure with nut (10),

23.2.4 Install cap (9).

23.3 Position pan brake lever (15) and tilt brake lever (19) in support cap (1) and install brake lever pivot pin (21).

23.4 Referring to Fig 6.10, connect tilt brake bell crank (8) and connecting link (43) using pin (44). Secure with self-locking ring (9).

23.5 Referring to Fig 6.5, pass connecting link (22) through slot in support cap (1) and between brake levers (15, 19).

23.6 Position tilt brake link arm (18) on connecting link (22) and install pin (17).

NOTE: Self locking ring (3) is installed inside the pan brake fork end (6), on the outside of the pan brake link arm (5).

23.7 Position pan brake fork end (6) on pan brake link arm (5). Instal pin (4) and secure with self-locking ring (3).

23.8 Position assembled pan brake link arm in support cap (1). Install shims (15) between each of the components in the support cap, align all pivot holes and slots and install link arm pivot pin (20), noting orientation. Secure with grubscrew (24).

NOTE: The pan brake push rod (2) is longer than the tilt brake push rod (23).

23.9 Install the pan brake push rod (2) between the cup on the pan brake link arm (5) and the cup on the pan brake lever (15).

23.10 Install the tilt brake push rod (23) between the cup on the tilt brake link arm (19) and the cup on the tilt brake lever (18).

23.11 Position the pan brake rocker arm (7) in the support cap pivot (1). Apply Loctite 222E to the threaded stud of the spring assembly (8) and pass it through the rocker arm and screw it into the pan brake fork end (6).

NOTE: Final adjustment of the pan brake spring assembly is carried out after assembly of the head.

23.12 Check moving parts for freedom and fit. Add or remove shims (15) as required.

24 Referring to Fig 6.3, install two bushes (28) in LH support cap (27).

25 Referring to Fig 5.1, calculate the shims required between the upper and lower drive arms and the two support caps as follows:

25.1 Measure the width across the support cap bearing faces on the base - dimension G.

25.2 Measure the distance between the bearing faces of the lower drive arm - dimension H.

25.3 Measure the distance between the bearing faces of the upper drive arm - dimension J.

25.4 Subtract G from H, divide by 2 and, using shims (item 43, Fig 6.6), assemble two shim packs to this figure for the lower drive arm, allowing not more than 0.002 in. clearance.

25.5 Subtract G from J, divide by 2 and, using shims (item 43, Fig 6.6), assemble two shim packs to this figure for the upper drive arm, allowing not more than 0.002 in. clearance.

26 Position LH and RH support caps on the balance mechanism, ensuring correct shims are installed on drive arm pins

Tilt brake

27 To assemble the tilt brake components, proceed as follows (Fig 6.10):

27.1 If the push rod/spring fork assembly was dismantled, assemble as follows:

27.1.1 On the pin (18) arrange 19 disc springs (17) as shown in Fig 6.10.

27.1.2 Open the fork (14) sufficiently to install pin and springs.

27.1.3 Secure pin with washer (16) and screw (15), using Loctite 222E.

27.1.4 Install grubscrew (19), using Loctite 222E and adjust assembly to dimension shown in Fig 6.10

27.2 Adhere the tilt brake reaction lining (45) to the mechanism housing (1) using Loctite 380.

27.3 If removed, install two Spirol pins (12) and two grubscrews (42) in tilt back plate (41). The ends of grubscrews (42) should be flush with the bottom of the recess in the tilt back plate (41).

27.4 Position the tilt brake bell crank (8) (attached to RH support cap) on the mechanism housing (1).

27.5 Install tilt back plate (41) on the mechanism housing (1) and secure with four screws (13).

27.6 Align the tilt brake bell crank (8) and push tilt brake pivot pin (7) into position.

27.7 Install the push rod/spring fork assembly (14 -19).

27.8 Position the tilt brake shoe assembly (39) and spring (40) in the tilt back plate (41) and push in the tilt brake shoe axle (11) to secure.

Balance mechanism installation

28 To install the balance mechanism, proceed as follows:

28.1 Install balance mechanism assembly on base assembly.

NOTE: An extended 4 mm AF spherical-ended hex wrench (Vinten Part No. 3354-931TL) is required to install the support caps.

28.2 Referring to Fig 6.3, secure LH support cap to base with three screws (1, 24 and 25) using Loctite 222E. Ensure correct length screws are used in appropriate positions. Tighten the vertical screws (24, 25) until just gripping, tighten the horizontal screw (1) fully, then tighten the vertical screws fully.

28.3 Referring to Fig 6.5, secure RH support cap to base with three screws (26, 27 and 29) using Loctite 222E. Ensure correct length screws are used in appropriate positions. Tighten the vertical screws (26, 27) until just gripping, tighten the horizontal screw (29) fully, then tighten the vertical screws fully.

28.4 Ensure tilt brake is released, then operate balance mechanism through its range. Check for freedom of movement, knocks or other irregularities.

Centre lock

29 To assemble the tilt cover/centre lock assembly, proceed as follows (Fig 6.10):

29.1 If removed, install dowel (35) and two Spirol pins (12) in tilt unit cover (33).

29.2 Install centre lock release lever (34) on dowel (35).

29.3 Install spring (32) in centre lock plunger (30). Install plunger in tilt unit cover (33) and insert dowel (31) in plunger to retain spring (32).

29.4 Install centre lock release lever spring (36), engaging hook in centre lock release lever (34) and securing leg to tilt unit cover (33) with screw (37), using Loctite 222E.

Tilt unit cover and balance knob

30 Install tilt unit cover and balance knob as follows (Fig 6.10):

30.1 Install ‘O’ ring (20) in the tilt unit cover (33).

30.2 Install the tilt cover/centre lock assembly (30-37) on the tilt back plate (41), ensuring dowel (31) engages in appropriate slot. Secure assembly with three screws (10).

30.3 Install washer (21) and spring (22) on shaft (23) and secure with pin (24).

30.4 Centralize pin (24) and install drag knob boss (25).

30.5 Install the balance knob (26) and secure with washer (27) and screw (28).

30.6 Install knob bung (29).

Platform assembly

31 To assemble the platform, proceed as follows (Fig 6.11):

31.1 Slide the rack strip (28) into the slide plate (1) and secure with three Spirol pins (29).

31.2 Install two serrated discs (4) on the platform (27) and secure each with three screws (2) and three spirol pins (3).

31.3 Affix the self-adhesive PTFE strip (10) to the platform.

31.4 Secure the front stop bung (8) (Vector 700H only) to the platform using Permabond ESP 110, ensuring flat face faces forwards

31.5 Secure the platform buffer (9) to the platform (or front stop bung (8)) using Loctite 415, ensuring flat face faces forwards.

31.6 Lubricate the adjustment shaft assy worm (6), platform adjustment pinion (11) and both bearings on adjustment shaft assy shaft (6) with LM grease.

31.7 Install platform adjustment pinion (11) in bearing bracket (12). Fit bearing bracket to adjustment shaft assy (6) and position on platform. Secure bracket lightly with two screws (13).

31.8 Install shaft support (16) on adjustment shaft assy (6) and secure lightly to platform with two screws (17). Position shaft support to remove end float on adjustment shaft assy and tighten two screws (17).

31.9 Install platform adjustment knob (14) and secure with screw (15). Turn knob and ensure mechanism operates freely. Remove screw (15) and knob (14) and fully tighten two screws (13). Replace knob (14) and secure with screw (15) using Loctite 222E.

31.10 Affix the self-adhesive platform adjustment cover (5) to the platform.

31.11 Install two brake disc Spirol pins (3) in platform (27), so that pins protrude 5 mm

31.12 Pass two screws (21) through tilt brake centre (20) and brake disc (tilt) assembly (19). Install on Spirol pins (3) and secure with two screws (21).

31.13 Loosely install screw (22) in slide clamp lever (23) Position lever in platform and screw in slide clamp screw (25) until it engages with lever. Position slide clamp (18) in platform and fully screw in slide clamp screw (25).

NOTE: The slide plate is installed after the platform is attached to the head.

32 To install the platform assembly, proceed as follows (Fig 6.6):

32.1 If removed, install a Spirol pin (4) in each platform pivot block (5).

NOTE: Ensure the mechanism housing is level prior to installation of the platform.

32.2 Position the platform (2) over the pivot blocks and fully engage. Ensure pins (4) do not protrude above the surface. Secure the platform to the pivot blocks with six screws (1).

32.3 Referring to Fig 6.10, slide the slide plate (1) into the platform and engage with the worm gear. Using the platform adjustment knob (13), position the platform so that the two stop screws (7) can be installed.

32.4 Adjust the slide clamp as follows:

32.4.1 Pull the slide clamp lever (23) fully upwards.

32.4.2 Screw in the slide clamp screw (25) to apply the clamp.

32.4.3 Tighten screw (22).

32.4.4 Move the lever (23) over its full range and ensure that, in the clamped position it prevents the platform slide from being moved, while in the released position it allows free adjustment of the slide. Re-adjust if necessary.

32.5 Affix the self-adhesive slide clamp cover (24) to the platform.

Tilt drag mechanism

33 To assemble the tilt drag mechanism, proceed as follows (Fig 6.9):

33.1 If removed, install two dowel pins (9), two dowel pins (10) and dowel pin (11) in tilt drag cover (25).

33.2 Install ‘O’ ring (23) in outer boss (22).

33.3 Install outer boss (22) on the tilt drag cover (24) and secure with three screws (12).

33.4 Lubricate the two thrust washers and the thrust race (13) with LM grease and Install in the outer boss (22).

33.5 Install ‘O’ ring (14) on the knob boss/threaded shaft (19) and install knob boss/threaded shaft in the outer boss (22). Install drag knob retainer (21) and secure with three screws (20).

NOTE: The drag shoe assemblies (5, 28) and actuator links (6, 26) are handed.

33.6 If removed, install dowel pins (4) in actuator links (6, 26).

33.7 Install actuator link ‘A’ (26) in actuator link ‘B’ (6), align pivot holes and install dowel pin (27). Centralize pin and secure with grubscrew (25).

33.8 Secure extension spring (8) to actuator links (6, 26) with two Spirol pins (9).

33.9 Install drag shoe assemblies (5, 28) on dowel pins (4) in actuator links (6, 26) ensuring drag shoe assembly ‘A’ (28) is installed on actuator link ‘A’ (26) and drag shoe assembly ‘B’ (5) is installed on actuator link ‘B’ (6).

33.10 Install the assembled actuators/drag shoes over dowel pins (10).

33.11 Apply Easyrun grease to the thread of knob boss/threaded shaft (19). Install ‘O’ ring (29) on the actuator cam shaft (30). Position the cam shaft between the actuator links and screw the knob boss/ threaded shaft into it.

33.12 Using Hylomar gasket sealant, adhere the gasket (3) to the tilt drag cover (24).

33.13 Turn the drag knob fully counter-clockwise.

33.14 Fill the tilt drag cover with 120ml of Vinten fluid No. 3.

33.15 Apply Hylomar gasket sealant to mating face of gasket (4).

33.16 Taking care not to spill the Vinten fluid, position mechanism housing (1) on assembled tilt drag mechanism, ensuring actuator cam shaft (30) engages with bearing and pins (7, 10) engage with holes in mechanism housing. Secure the tilt drag cover to mechanism housing with five screws (2) using Loctite 222E, ensuring screws are tightened evenly.

33.17 install the drag knob (15) on the knob boss/threaded shaft (19) and secure with washer (16) and screw (18). Install the knob bung (17).

Final adjustment

Tilt brake (Fig 6.10)

34 The tilt brake is adjusted by inserting a 2 mm. hexagon wrench through the hole in the bottom of the tilt unit cover (33) and turning the pushrod/spring assembly grub screw (19). Adjust the tilt brake as follows:

34.1 Turn the tilt drag knob fully counterclockwise.

34.2 Operate the tilt brake between the ‘ON’ and ‘OFF’ positions. Ensure that in the ‘ON’ position the brake is on, the platform cannot be moved and the brake lever is in the fully rearward position. Ensure that in the ‘OFF’ position the brake is off, the platform is free to move and the brake lever is in the fully forward position.

34.3 Screw grubscrew (19) in or out to achieve above condition.

Pan brake (Fig 6.5)

35 The pan brake is adjusted by turning the pin (14), accessible from under the right-hand side of the base. Adjust the pan brake as follows:

35.1 Turn the pan drag knob fully counterclockwise.

35.2 Operate the pan brake between the ‘ON’ and ‘OFF’ positions. Ensure that in the ‘ON’ position the brake is on, the head cannot be rotated and the brake lever is in the fully rearward position. Ensure that in the ‘OFF’ position the brake is off, the head is free to rotate and the brake lever is in the fully forward position.

35.3 Screw pin (14) in or out to achieve above condition.

Pan bearing (Fig 6.4)

36 The pan bearing is adjusted by tightening or slackening screw (24). Adjust the pan bearing as follows

36.1 Mount the head on a suitable mount that will support the head and payload and allow access to screw (24). A Vinten HD1 heavy-duty tripod is recommended.

36.2 Fit a 70 kg payload to the head.

36.3 Apply the tilt brake.

36.4 Turn the pan drag knob fully counterclockwise.

36.5 Turn the head through 360° in both directions and ensure no noise or rumble is perceptible in the pan bearing. Slacken screw (24) to achieve this condition if required.

36.6 With a finger on the gap between the four-hole mounting plate (22) and the brake reaction plate (25), rock the head using the pan bar and ensure no movement is perceptible between the mounting plate and the reaction plate. Tighten screw (24) to achieve this condition.

36.7 Repeat paras 35.5 and 35.6 until a position is reached where both conditions are achieved.

36.8 Remove the payload.

Balance mechanism bushes (Fig 6.6)

37 The balance mechanism bushes (6) are retained in their housings and adjusted by M5 cap head screws (3,33). Screws (3), in the platform pivot blocks (5), are accessible by moving the platform slide fully rearwards. Screws (33) in the actuators (34, 42), are accessible when the platform is tipped fully back. Adjust the balance mechanism bushes as follows:

37.1 Turn the tilt drag knob fully clockwise to apply maximum drag. Allow drag to stabilize.

37.2 Using the pan par, attempt to move the platform and examine each bush (6) for slackness. Tighten the appropriate screw until all slackness is eliminated, without compromising overall movement quality

Base cover plates

38 Install the base cover plates as follows (Fig 6.3):

38.1 Position PCB in base, carefully ensuring LED locates in hole and secure with screw (9). Route battery connector into forward compartment.

38.2 Install switch cover plate assembly (8) and secure with two screws (5).

38.3 Connect the battery and position in forward LH compartment. Install LH cover plate (23) and secure with three screws (5).

38.4 Press bubble illumination switch and ensure LED is lit for approximately 15 seconds.

38.5 Install RH cover plate (7) and secure with three screws (5).

38.6 If removed, adhere buffer pad (3) to brake lever cover plate (4) using Loctite 406. Lubricate the brake lever area using Chesterton grease

38.7 Install brake guide housing (6) and brake lever cover plate (4) and secure with four screws (5).

Spring-loaded flap

39 To assemble the spring-loaded flap, proceed as follows (Fig 6.10):

NOTE: The flap springs (3, NI) are handed.

39.1 At each side of the flap (6), install the appropriate flap spring (3, NI), ensuring that right-angle bend in spring faces outwards and engages with slot in flap.

39.2 At each side of the flap, install a spring (5) and flap pin (2) and secure with Spirol pin (4). Ensure assembly slides freely in flap.

40 To install the spring-loaded flap, proceed as follows (Fig 6.10):

40.1 Hold the pins (4) inwards and position the flap, ensuring straight legs of flap springs (3, NI) engage in holes in mechanism housing (1).

40.2 Operate the flap and ensure that springs return it to the closed position.

Section 6

Illustrated Parts List

Contents Para

Illustrations Page

Introduction

1 This parts list is issued for the VECTOR 70/70H pan and tilt heads 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 6.14 and indicated in the other 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 - Tools and Materials, 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.
Vector 70 Pan & Tilt Head - with four-hole flat base	3354-3
Vector 70 Pan & Tilt Head (USA) - with lightweight Mitchell adaptor	3354-5
Vector 70H Pan & Tilt Head - with four-hole flat base	3354-3H
Vector 70H Pan & Tilt Head (USA) - with lightweight Mitchell adaptor	3354-5H
Wedge Adaptor	3389-3
Camera Wedge for Wedge Adaptor	3391-3
Telescopic Pan Bar Assembly and Clamp	3219-62
Fixed Pan Bar Assembly and Clamp	3219-65
Short Fixed Pan Bar Assembly and Clamp	3219-66
Fixing Bolt	L054-714
Washer (for fixing bolt)	L602-122
Spanner (for fixing bolt)	J551-001
Lightweight Mitchell Adaptor	3103-3
Level bubble illumination unit battery - 9V, 6LR61 (PP3, 6AM6, MN1604, E-BLOCK or equivalent)	C550-023

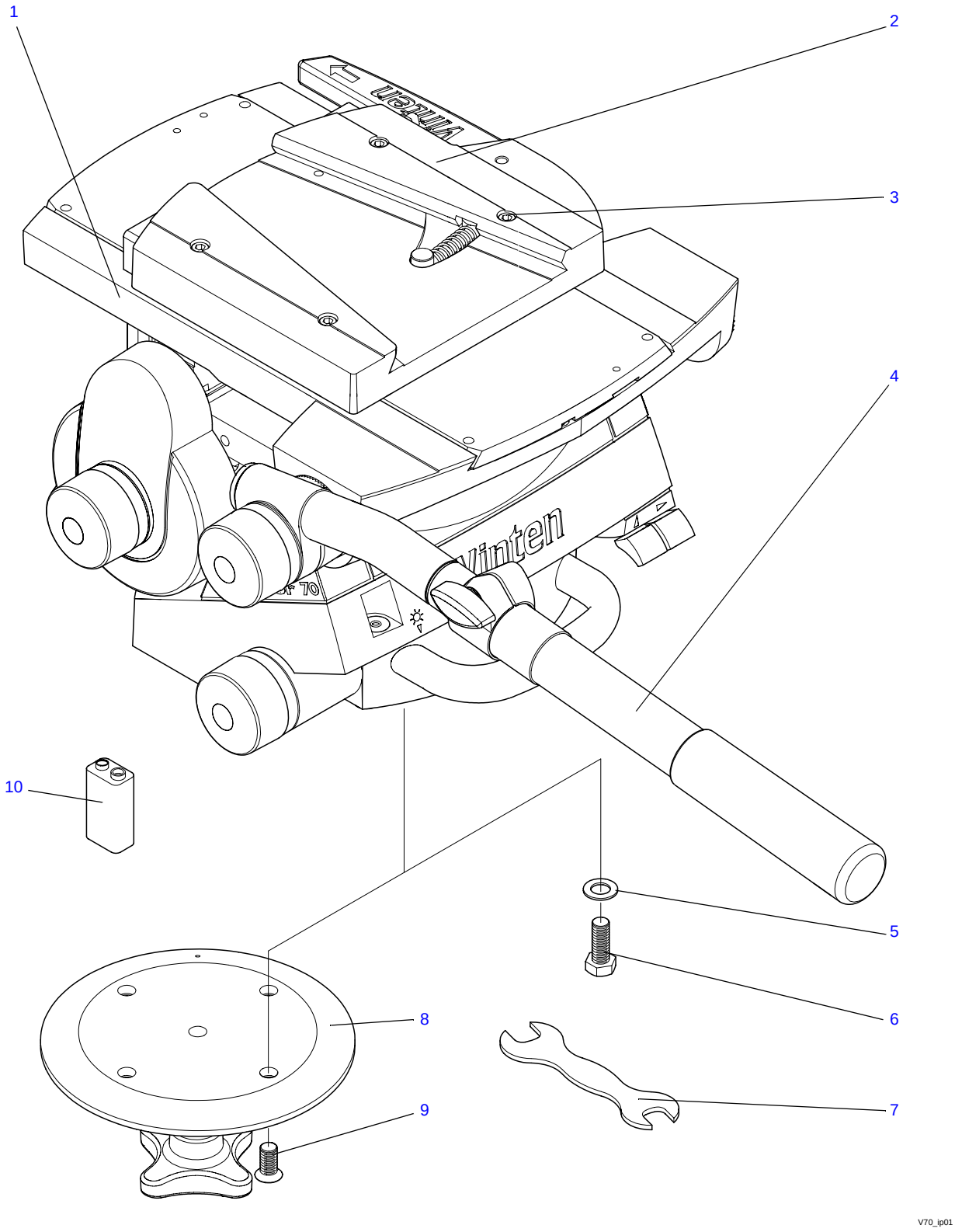

Fig 6.1 Vector 70/70H Pan and Tilt Head

Fig 6.1 Vector 70/70H Pan and Tilt Head

Item	Part No	Nomenclature	Qty
	3354-3	Final assembly - Vector 70, comprising	
1	3354-11	Main assembly - Vector 70 Head (Fig 6.2)	1
2	3389-3	Wedge adaptor assembly	1
3	M007-707	Screw, cap head, socket, M6 x 30 mm long	4
4	3219-62	Pan bar and clamp assembly (Fig 6.12)	1
5	L602-122	Washer, plain, small, heavy, 3/8 in.	4
6	L054-714	Bolt, hex head, 3/8 in. BSW x 1 in. long	4
7	J551-001	Spanner, open jaw, 1/4 in., and 5/16 in.	1
10	C550-023	Battery, 9 Volts, Size - PP3	1
	3354-3H	Vector 70H pan and tilt head, comprising:	
1	3348-42	Main assembly (Fig 6.2)	1
2	3389-3	Wedge adaptor assembly	1
3	M007-707	Screw, cap head, socket, M6 x 30 mm long	4
4	3219-62	Pan bar and clamp assembly (Fig 6.12)	1
5	L602-122	Washer, plain, small, heavy, 3/8 in.	4
6	L054-714	Bolt, hex head, 3/8 in. BSW x 1 in. long	4
7	J551-001	Spanner, open jaw, 1/4 in., and 5/16 in.	1
10	C550-023	Battery, 9 Volts, Size - PP3	1
	3354-5	Vector 70 pan and tilt head (USA), comprising:	
1	3348-11	Main assembly (Fig 6.2)	1
2	3389-3	Wedge adaptor assembly	1
3	M007-707	Screw, cap head, socket, M6 x 30 mm long	4
4	3219-62	Pan bar and clamp assembly (Fig 6.12)	1
8	3103-3	Lightweight adapter assembly (Mitchell to Vinten standard), including:	1
9	L054-010	Screw, countersunk head, socket, 3/8in. BSW x 3/4 in. long	4
10	C550-023	Battery, 9 Volts, Size - PP3	1
	3354-5H	Vector 70H pan and tilt head (USA), comprising:	
1	3348-42	Main assembly (Fig 6.2)	1
2	3389-3	Wedge adaptor assembly	1
3	M007-707	Screw, cap head, socket, M6 x 30 mm long	4
4	3219-62	Pan bar assembly (Fig 6.12)	1
8	3103-3	Lightweight adapter assembly (Mitchell to Vinten standard), including:	1

Fig 6.1 Vector 70/70H Pan and Tilt Head (Cont)

Item	Part No	Nomenclature	Qty
9	L054-010	Screw, countersunk head, socket, 3/8in. BSW x 3/4 in. long	4
10	C550-023	Battery, 9 Volts, Size - PP3	1

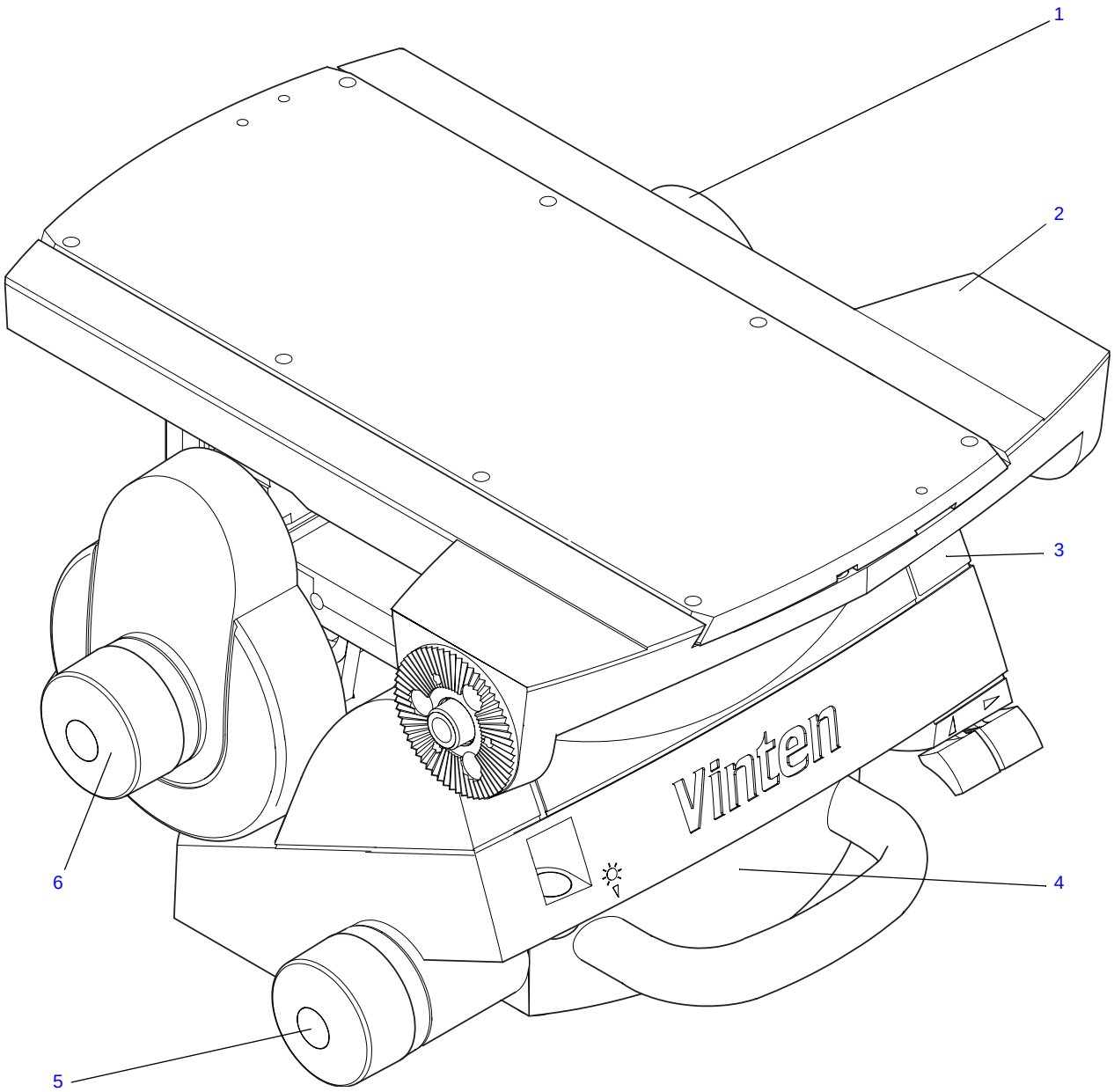

Fig 6.2 Vector 70/70H Pan and Tilt Head - Main Assembly

Fig 6.2 Vector 70/70H Pan and Tilt Head - Main Assembly

Item	Part No	Nomenclature	Qty
	3354-11	Vector 70 main assembly, comprising:	
1	–	Tilt brake/balance knob/centre lock (Fig 6.10)	
2	3354-16	Platform assembly (Fig 6.11)	
3	3354-23	Brake lever support cap assembly (Fig 6.5)	
4	–	Base (Fig 6.3)	
5	–	Pan drag/brake mechanism (Fig 6.4)	
6	3354-13	Mechanism housing assembly (Fig 6.6)	
	3354-42	Vector 70H main assembly, comprising:	
1	–	Tilt brake/balance knob/centre lock (Fig 6.10)	
2	3354-46	Platform assembly (Vector 70H) (Fig 6.11)	
3	3354-48	Brake lever support cap assembly (Vector 70H) (Fig 6.5)	
4	–	Base (Fig 6.3)	
5	–	Pan drag/brake mechanism (Fig 6.4)	
6	3354-43	Mechanism housing assembly (70H)(Fig 6.6)	

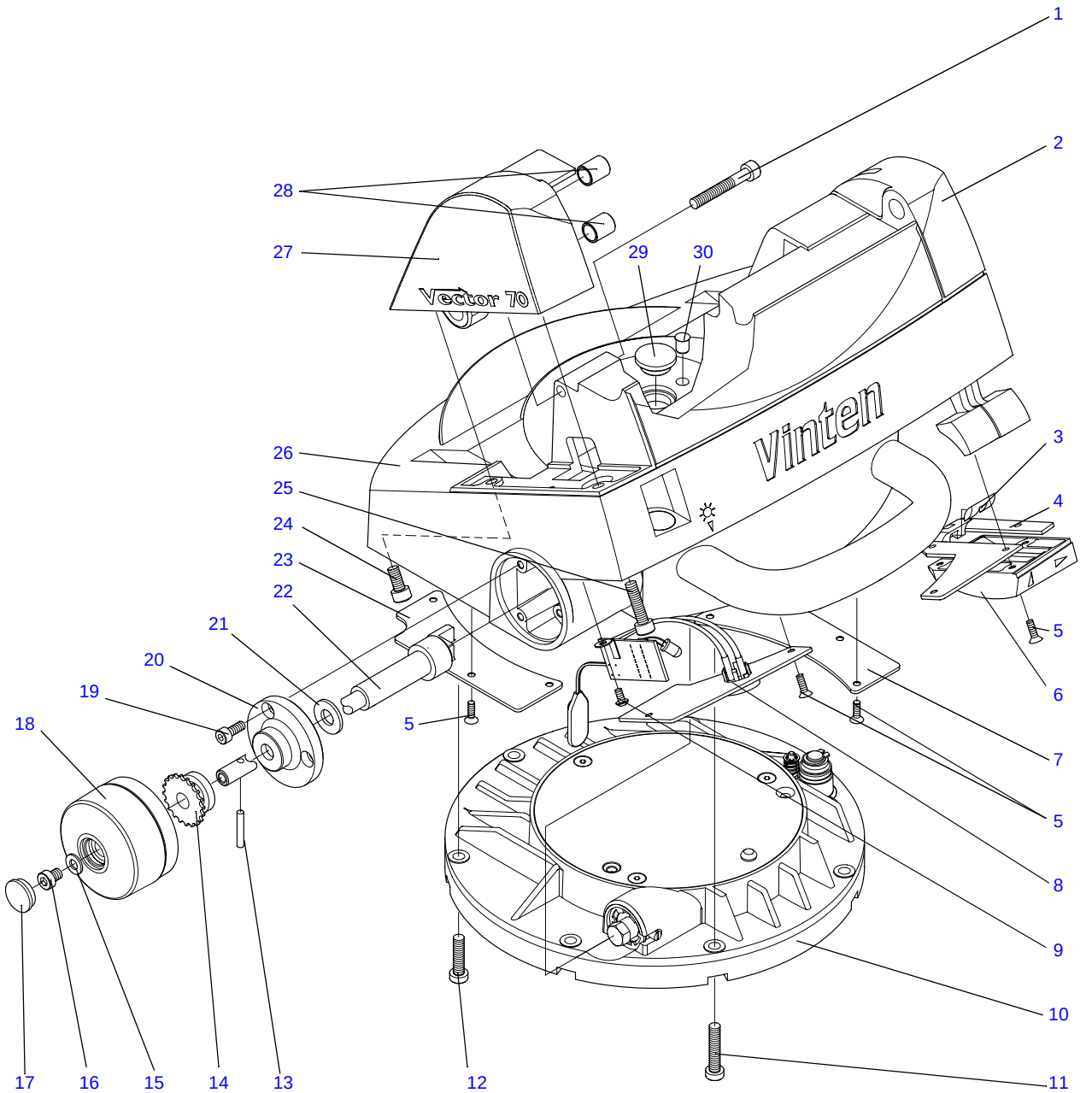

Fig 6.3 Vector 70/70H Pan and Tilt Head - Base

Fig 6.3 Vector 70/70H Pan and Tilt Head - Base

Item	Part No	Nomenclature	Qty
1	M006-718	Screw, cap head, socket, M5 x 40 mm long	1
2	3354-23	Brake lever support cap assembly (Fig 6.5), OR	1
	3354-48	Brake lever support cap assembly (Vector 70H) (Fig 6.5)	1
3	3354-347*	Buffer pad	1
4	3354-337*	Cover plate (plastic)	1
5	M004-103*	Screw, countersunk head, pozidrive, M3 x 8 mm long	12
6	3354-53	Brake lever guide bonding assembly	1
7	3354-304	Cover plate (Right hand)	1
8	3354-25*	Cover plate /PCB assembly (complete with switch, PCB, LED and battery connector)	1
9	M004-511*	Screw, button head, socket, M3 x 5 mm long	1
10	3354-20	Pan drag/brake assembly (Fig 6.4)	1
11	M006-738	Screw, low-profile, cap head, socket, M5 x 25 mm long	4
12	M006-740	Screw, low-profile, cap head, socket, M5 x 20 mm long	3
13	L801-105	Pin, dowel, 1/8 in. dia. x 9/16 in. long	1
14	3354-293	Serrated boss	1
15	M600-006*	Washer, plain, heavy, M5	1
16	M006-737*	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
17	3354-292*	Knob bung	1
18	3354-340*	Drag knob	1
19	M005-717	Screw, cap head, socket, M4 x 10 mm long	3
20	3354-305	Location disk	1
21	M600-106	Washer, plain, light, M8	1
22	3354-307	Shaft (Pan drag knob)	1
23	3354-334	Cover (Base housing left hand)	1
24	M006-704	Screw, cap head, socket, M5 x 16 mm long	1
25	M006-705	Screw, cap head, socket, M5 x 20 mm long	1
26	3354-24*	Base housing (bonding) assembly	1
	3354-32	Support cap assembly left hand, comprising:	1

Fig 6.3 Vector 70/70H Pan and Tilt Head - Base (Cont)

Item	Part No	Nomenclature	Qty
27	3354-438	Support cap (left hand) new hole positions	1
28	P001-018*	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long	2
	3354-49	Support cap assembly - left hand (Vector 70H), comprising:	1
27	3354-440	Support cap (left hand) 70H new hole position	1
28	P001-018*	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long	2
29	3448-241	Blanking plug - base housing	1
30	3448-254	Hole plug	2

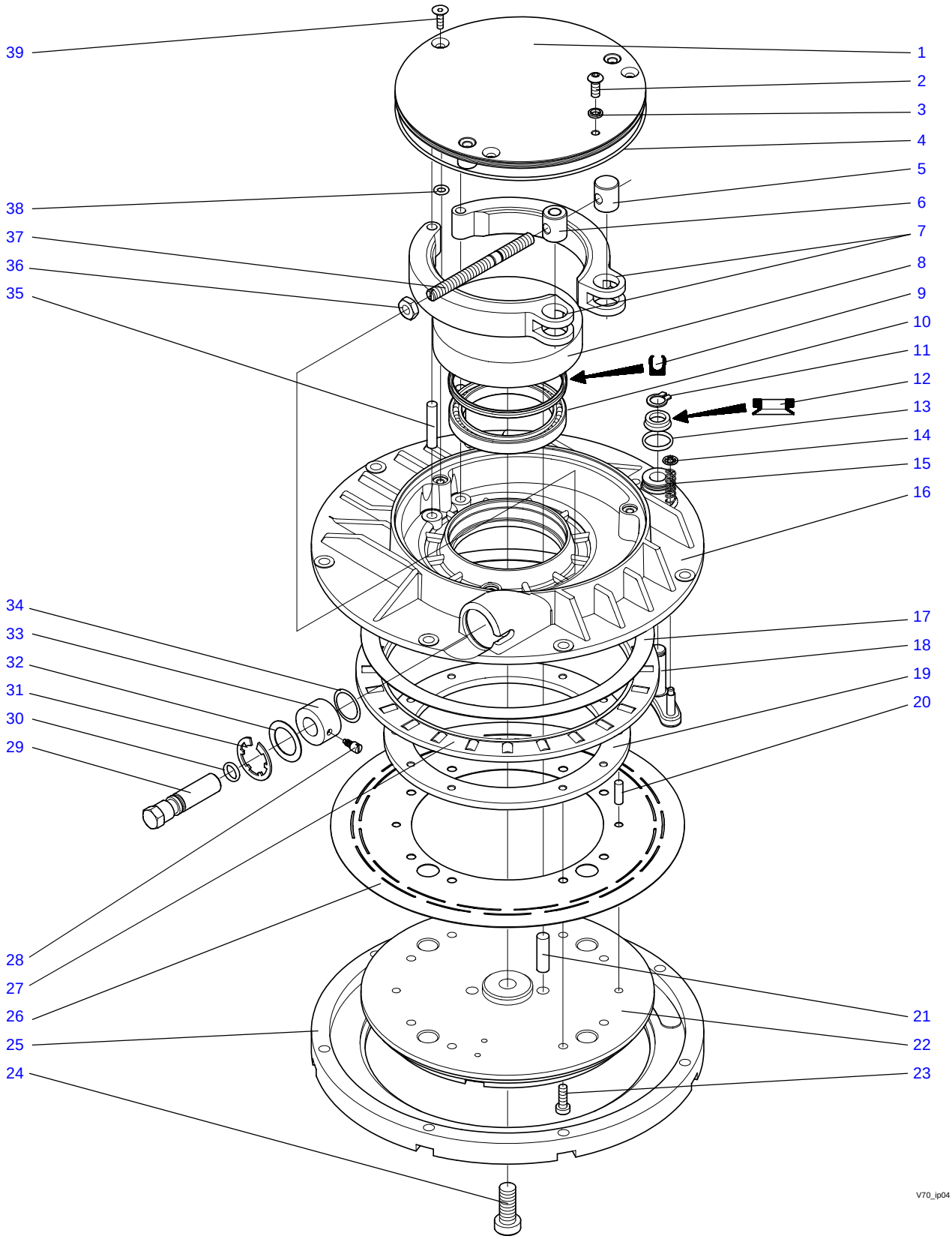

Fig 6.4 Vector 70/70H Pan and Tilt Head - Pan Drag/Brake Mechanism

Fig 6.4 Vector 70/70H Pan and Tilt Head - Pan Drag/Brake Mechanism

Item	Part No	Nomenclature	Qty
1	3354-22	Pan drag lid (rivet bush) assembly	1
2	M005-513	Screw, button head, socket, M4 x 6 mm long	1
3	R200-004*	Seal, bonded, M4, 4.5 mm ID x 7.0 mm OD x 1.0 mm thick	1
4	Q900H040*	'O' ring, 4.75 in. ID x 0.0625 in. sect, Dowty 200-048-4460	1
5	3354-322	Trunnion right hand	1
6	3354-323	Trunnion left hand	1
7	3354-21*	Pan friction shoe assembly	2
8	3354-321	Friction drum - pan drag, with:	1
NI	M850-034	Threaded-insert, wire thread insert (helicoil), M8 x 1-1/2 diameters long	1
9	Q500-051*	Omniseal, 2.127 in. shaft dia. x 3/32 in. nominal section	1
10	P200-229*	Bearing, ball, radial, 45 mm ID x 58 mm OD x 7 mm long, open	1
11	M701-005	Circlip, external, standard, 8 mm shaft dia. x 0.80 mm thick	1
12	Q500-052*	'V'-Seal, to fit 6.5 to 8 mm shaft dia.	1
13	R900H019*	'O' ring, 21.1 mm ID x 1.6 mm sect, Dowty 202-514-4460	1
14	M701-060	Fastener, push-on, reinforced, 3 mm shaft dia. x 0.25 mm thick	2
15	J532-167	Spring, compression, 3/4 in. free length, 1/4 in. hole dia., 7.9 lbf/in. rate	2
16	3354-38	Pan drag plate sub-assembly	1
17	3354-328	Disc	1
18	3354-27*	Pan brake shoe bonding assembly	1
19	3354-319	Ring	1
20	M806-005	Pin, coiled-spring, 4 mm dia. x 12 mm long, hdp	2
21	M801-014	Pin, dowel, 6 mm dia. x 25 mm long	2
22	3354-316	Mounting plate, with:	1
NI	L850-053	Threaded-insert, wire thread insert (helicoil), 3/8 in. BSW x 1-1/2 diameters long	4
23	M005-740	Screw, locking, cap head, socket, M4 x 18 mm long	8
24	M008-704	Screw, cap head, socket, M8 x 20 mm long	1
25	3354-29	Pan brake reaction plate bonding assembly	1
26	3354-318	Brake disk	1
27	3354-34	Thrust bearing assembly, pan unit	1
28	3354-333	Pan coupling screw	1
29	3354-308*	Coupling (drag shoe assembly)	1

Fig 6.4 Vector 70/70H Pan and Tilt Head - Pan Drag/Brake Mechanism (Cont)

Item	Part No	Nomenclature	Qty
30	R900H009*	'O' ring, 9.1 mm ID x 1.6 mm sect, Dowty 202-511-4470	1
31	M700-037	Circlip, internal, increased abutment, 22 mm bore dia. x 1.00 mm thick	1
32	M601-016	Washer, wave, 16 mm ID x 22 mm OD x 0.25 mm thick	1
33	3354-309*	Sleeve (coupling seal)	1
34	R900H002*	'O' ring, 15.1 mm ID x 1.6 mm sect, Dowty 202-517-4470	1
35	M801-009	Pin, dowel, 5 mm dia. x 25 mm long	2
36	3354-325	Locknut left hand	1
37	3354-324	Adjuster rod	1
38	R900H018*	'O' ring, 3.1 mm ID x 1.6 mm sect, Dowty 202-505-4460	3
39	M005-903	Screw, countersunk head, socket, M4 x 12 mm long	3

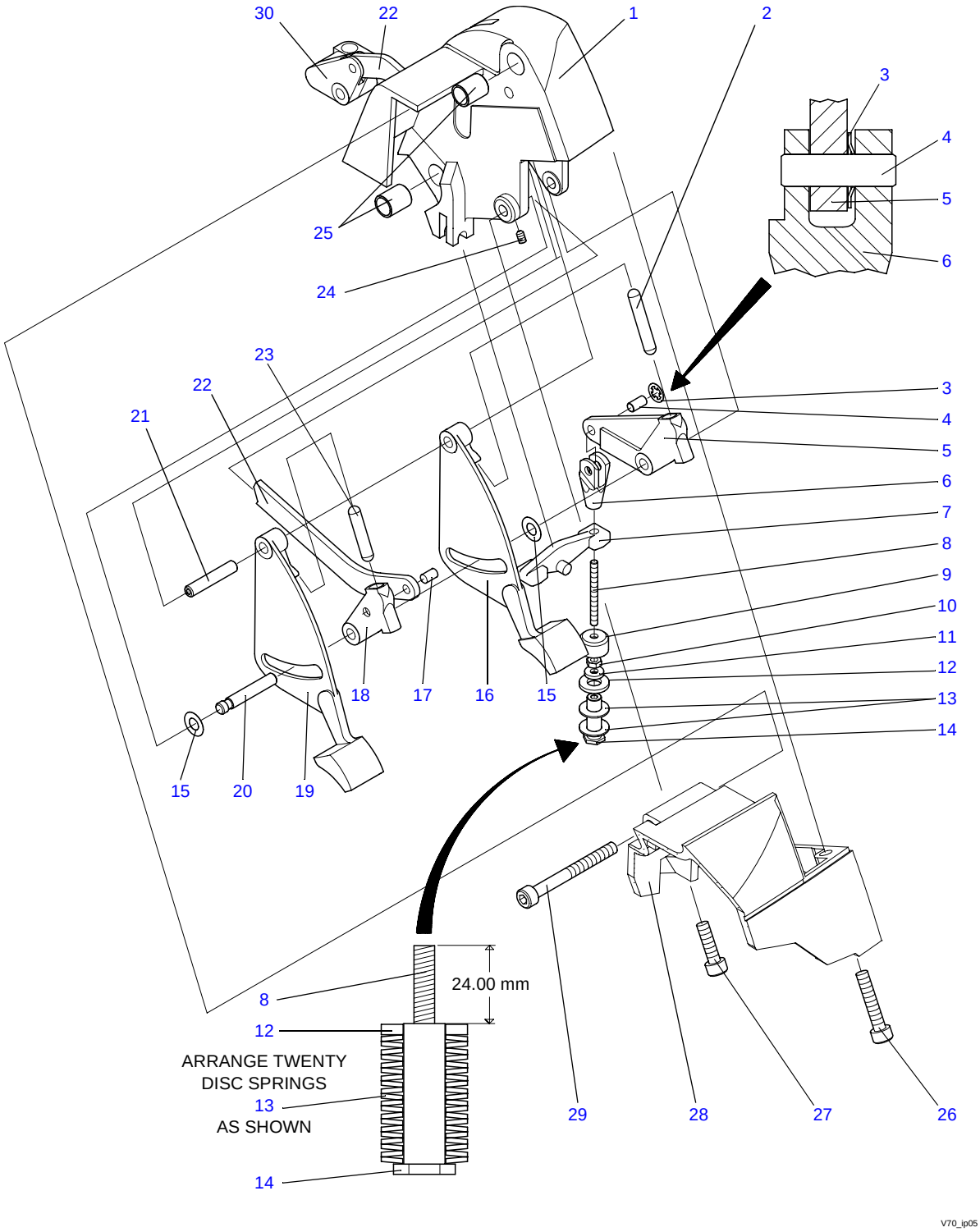

Fig 6.5 Vector 70/70H Pan and Tilt Head - Brake Lever Support Cap Assembly

Fig 6.5 Vector 70/70H Pan and Tilt Head - Brake Lever Support Cap Assembly

Item	Part No	Nomenclature	Qty
	3354-23	Brake lever support cap assembly (Vector 70), comprising:	1
1	3354-439	Support cap (right hand) new hole positions	1
2	3354-250	Actuator rod	1
3	L701-082*	Fastener, push-on, standard, 0.156 in. shaft dia. x 0.010 in. thick	1
4	3354-276	Pin (Pan brake arm / Fork end pivot)	1
5	3354-311	Link arm (Pan brake casting)	1
6	3354-313	Fork end	1
7	3354-312	Rocker arm (Pan brake)	1
	3354-31	Spring sleeve assembly, pan brake, comprising:	1
8	3354-339	Stud	1
9	3354-338	Cup	1
10	M500-060	Nut, M3, standard (hex), full	1
11	3354-269	Washer	1
12	M600-007	Washer, plain, heavy, M6	1
13	M601-261	Spring, disc, 6.2 mm ID x 12.5 mm OD x 0.7 mm thick	20
14	3354-268	Pin	1
15	3354-272	Shim (brake link pivot)	A/R
16	3354-248*	Brake lever, pan	1
17	3354-273	Pin (Tilt brake arm con.) Link	1
18	3354-244	Link arm (Tilt brake)	1
19	3354-247*	Brake lever, tilt	1
20	3354-275	Pin (Pan/tilt Link arm pivot)	1
21	3354-274	Pin (brake lever pivot)	1
22	3354-249	Connecting link (Fig 6.10)	1
23	3354-270	Actuator rod	1
24	M004-807	Screw, grub, knurled cup point, socket head, M3 x 5 mm long	1
25	P001-018*	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long	2

	3354-48	Brake lever support cap assembly (Vector 70H), comprising:	

Fig 6.5 Vector 70/70H Pan and Tilt Head - Brake Lever Support Cap Assembly (Cont)

Item	Part No	Nomenclature	Qty
1	3354-441	Support cap (right hand) 70H new hole position	1
2	3354-250	Actuator rod	1
3	L701-082	Fastener, push-on, standard, 0.156 in. shaft dia. x 0.010 in. thick	1
4	3354-276	Pin (Pan brake arm / Fork end pivot)	1
5	3354-311	Link arm (Pan brake casting)	1
6	3354-313	Fork end	1
7	3354-312	Rocker arm (Pan brake)	1
	3354-31	Spring sleeve assembly, pan brake, comprising:	
8	3354-339	Stud	1
9	3354-338	Cup	1
10	M500-060	Nut, M3, standard (hex), full	1
11	3354-269	Washer	1
12	M600-007	Washer, plain, heavy, M6	1
13	M601-261	Spring, disc, 6.2 mm ID x 12.5 mm OD x 0.7 mm thick	20
14	3354-268	Pin	1
15	3354-272	Shim (brake link pivot)	A/R
16	3354-248*	Brake lever, pan	1
17	3354-273	Pin (Tilt brake arm con.) Link	1
18	3354-244	Link arm (Tilt brake)	1
19	3354-247*	Brake lever, tilt	1
20	3354-275	Pin (Pan/tilt Link arm pivot)	1
21	3354-274	Pin (brake lever pivot)	1
23	3354-249	Connecting link	1
22	3354-270	Actuator rod	1
23	M004-807	Screw, grub, knurled cup point, socket head, M3 x 5 mm long	1
24	P001-018*	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long	2
26	M006-705	Screw, cap head, socket, M5 x 20 mm long	1
27	M006-704	Screw, cap head, socket, M5 x 16 mm long	1
28	3354-24*	Base housing (bonding) assembly (Fig 6.3)	
29	M006-718	Screw, cap head, socket, M5 x 40 mm long	1
30	3354-246	Bell crank (Tilt brake) (Fig 6.10)	

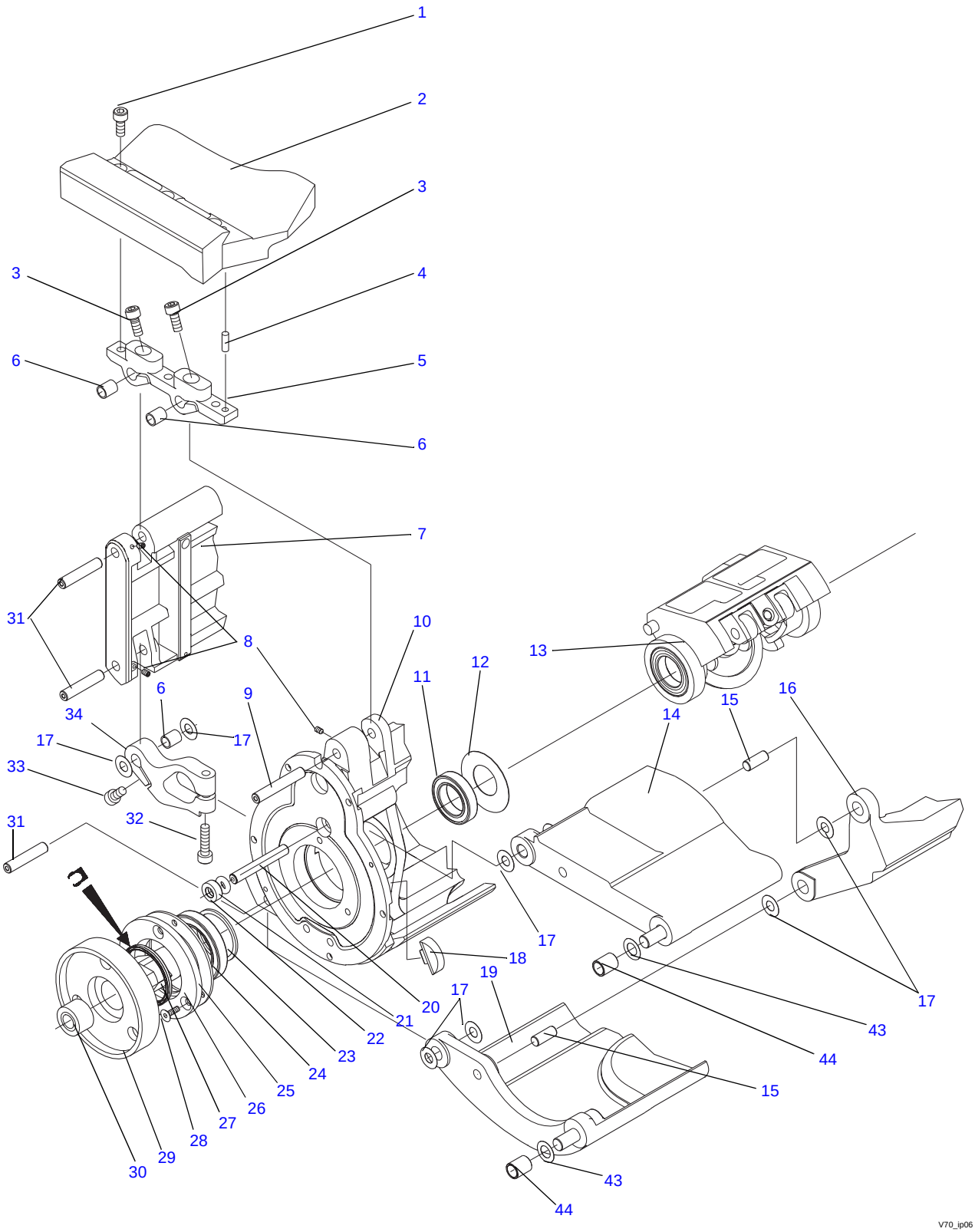

Fig 6.6 Vector 70/70H Pan and Tilt Head - Mechanism Housing Assembly (Sheet 1)

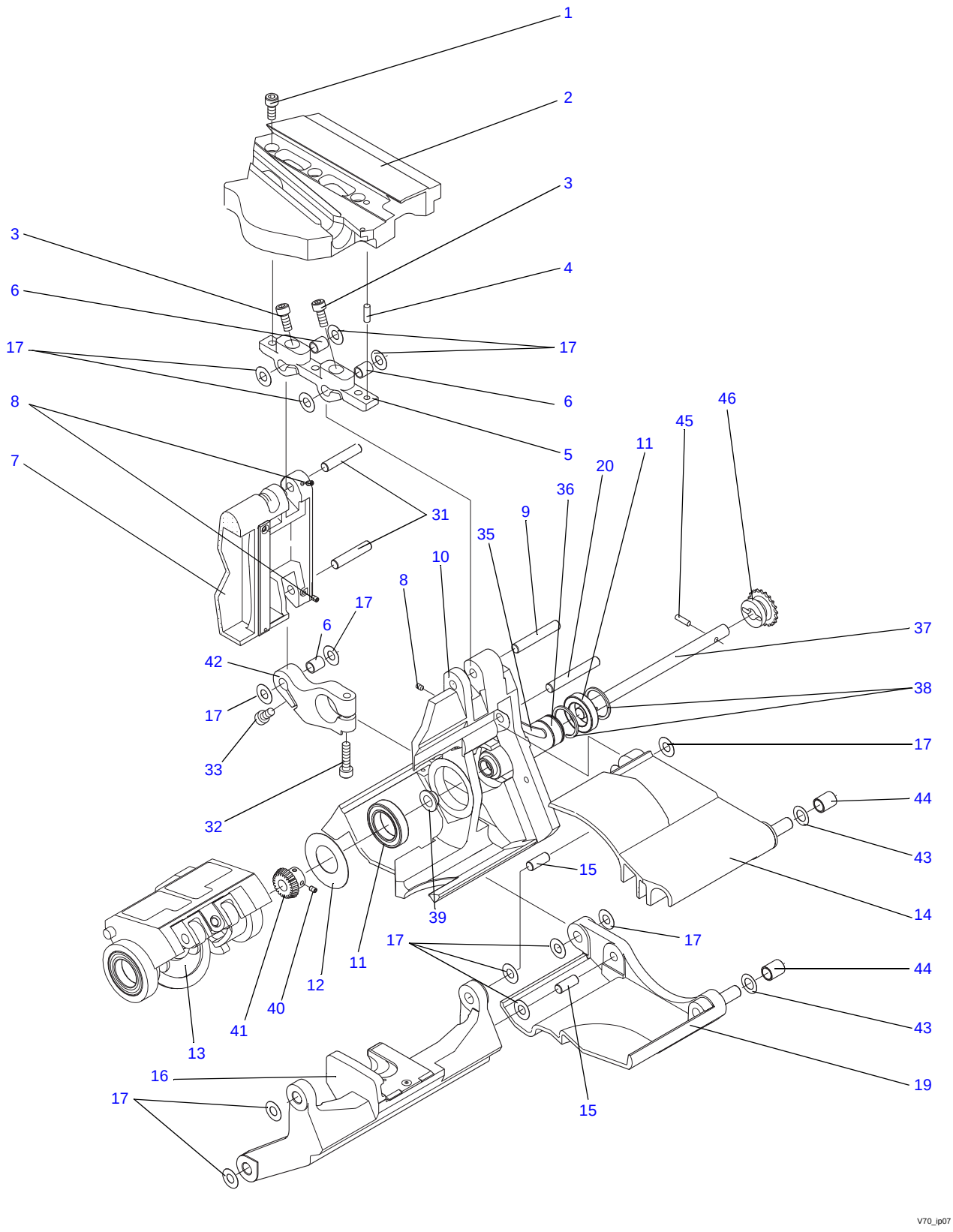

Fig 6.6 Vector 70/70H Pan and Tilt Head - Mechanism Housing Assembly (Sheet 2)

Fig 6.6 Vector 70/70H Pan and Tilt Head - Mechanism Housing Assembly

Item	Part No	Nomenclature	Qty
1	M006-702	Screw, cap head, socket, M5 x 10 mm long	6
2	3354-16	Platform assembly (Vector 70) (Fig 6.11) OR	1
	3354-46	Platform assembly (Vector 70H) (Fig 6.11)	
	3354-13	Mechanism housing assembly (Vector 70) OR	1
	3354-43	Mechanism housing assembly (Vector 70H)	
3	M006-703	Screw, cap head, socket, M5 x 12 mm long	4
4	M800-151	Pin, coiled-spring, 4 mm dia. x 12 mm long, mcp	2
5	3354-280	Block	2
6	N001-043*	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 3/8 in. long	6
7	3354-923SP*	Vertical track assembly (Vector 70) OR	1
	3354-924SP*	Vertical track member assembly (Vector 70H)	1
8	M004-807	Screw, grub, knurled cup point, socket head, M3 x 5 mm long	8
9	3354-296	Pivot pin	2
10	3354-201	Balance mechanism housing	1
11	P302-016*	Bearing, ball, radial, 20 mm ID x 32 mm OD x 7 mm long, two seals	3
12	3354-229	Shim (adjustment housing)	2
13	3354-54*	Balance adjuster assembly (Vector 70) (Fig 6.7) OR	1
	3354-55*	Balance adjuster assembly (Vector 70H) (Fig 6.8)	
14	3354-926SP*	Drive arm assembly	1
15	3354-294	Pivot pin	4
16	3354-925SP*	Horizontal track assembly	1
17	3354-206*	Slim (Horizontal track member) (0.005 in.)	A/R
	3354-299*	Shim (Horizontal track member) (0.003 in.)	
18	3354-264	Rear tilt buffer (left hand) (Vector 70) OR	1
	3354-51	Rear tilt buffer assembly (Vector 70H)	1
19	3354-936SP*	Lower drive arm assembly	1
20	3354-297	Pivot pin	2
21	Q900H039*	‘O’ ring, 1/4 in. ID x 3/8 in. OD, Dowty 200-010-4460	1
22	3354-415	Seal insert	1
23	P605-003	Snap ring, external, 30 mm shaft dia. x 1.5 mm thick	1
24	P302-017*	Bearing, ball, radial, 30 mm ID x 42 mm OD x 7 mm long, two seals	1
25	3354-414*	Inner gasket	1

Fig 6.6 Vector 70/70H Pan and Tilt Head - Mechanism Housing Assembly (Cont)

Item	Part No	Nomenclature	Qty
26	3354-410	Seal plate	1
27	M005-912	Screw, countersunk head, socket, M4 x 10 mm long	3
28	Q500-040*	'Omniseal', 1.380 in. shaft dia. x 3/32 in. nominal section	1
29	3354-406	Tilt Drag shaft	1
30	P600-014*	Bearing, needle roller, radial, 19 mm ID x 27 mm OD x 20 mm long	1
31	3354-295	Pivot Pin	6
32	M006-714	Screw, cap head, socket, M5 x 25 mm long	2
33	M006-734	Screw, low-profile, cap head, socket, M5 x 10 mm long	2
34	3354-212	Actuator 40 mm (Left Hand)	1
35	3354-288*	Lining (Tilt brake reactor) (Fig 6.10)	1
36	3354-265	Actuator shaft	1
37	3354-218	Pinion shaft	1
38	P605-007	Snap ring, external, 20 mm shaft dia. x 1.2 mm thick	2
39	P003-001*	Bearing, plain flanged, plastic, 8 mm ID x 10 mm OD x 5.5 mm long	1
40	M004-812	Screw, grub, cone point, socket head, M3 x 5 mm long	2
41	3354-214	Bevel gear (pinion)	1
42	3354-216	Actuator 40 mm (Right hand)	1
43	3354-209	0.125 mm (0.005 in.) Shim.	A/R
	3354-217	0.075 mm (0.003 in.) Shim	
	3354-433	0.05 mm (0.002 in.) Shim	
44	P001-018*	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long (Fig 6.3)(Fig 6.5)	-
45	L801-105	Pin, dowel, 1/8 in. dia. x 9/16 in. long (Fig 6.10)	1
46	3354-293	Serrated boss (Fig 6.10)	1

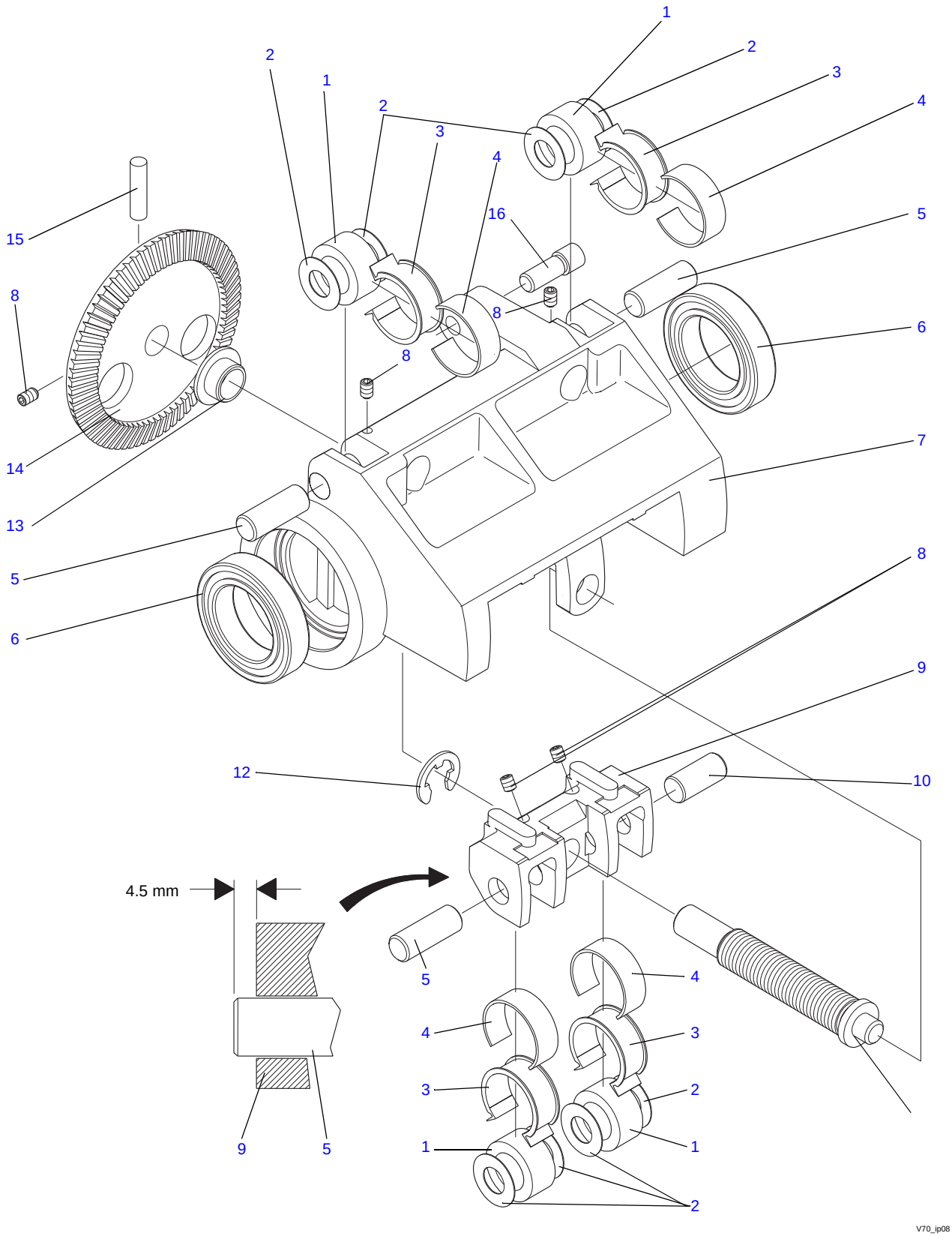

Fig 6.7 Vector 70 Pan and Tilt Head - Balance Adjuster Assembly

Fig 6.7 Vector 70 Pan and Tilt Head - Balance Adjuster Assembly

Item	Part No	Nomenclature	Qty
	3354-54*	Adjustment housing assembly (Vector 70), comprising:	1
1	P603-003*	Bearing, track roller, yoke type, 7 mm bore dia., 16 mm roller dia. x 7.8 mm roller width	4
2	3354-220	Shim (Roller axle)	8
3	3354-227	Track wiper	4
4	3354-226	Track wiper outer	4
5	3354-231	Roller axle (18 mm long)	3
6	P302-016*	Bearing, ball, radial, 20 mm ID x 32 mm OD x 7 mm long, two seals	2
7	3354-446	Adjustment housing	1
8	M004-807	Screw, grub, knurled cup point, socket head, M3 x 5 mm long	4
9	3354-445	Adjustment carriage	1
10	3354-219	Roller axle (15 mm long)	1
11	3354-223	Adjustment thread	1
12	M701-004	'E'-Clip, standard, 9.50 mm shaft dia. x 0.90 mm thick	1
13	P003-001*	Bearing, plain flanged, plastic, 8 mm ID x 10 mm OD x 5.5 mm long	1
14	3354-443	Lift off pin (flat end)	1
15	3354-213	Gear	1
16	M806-006	Pin, coiled-spring, 4 mm dia. x 16 mm long, mcp	1

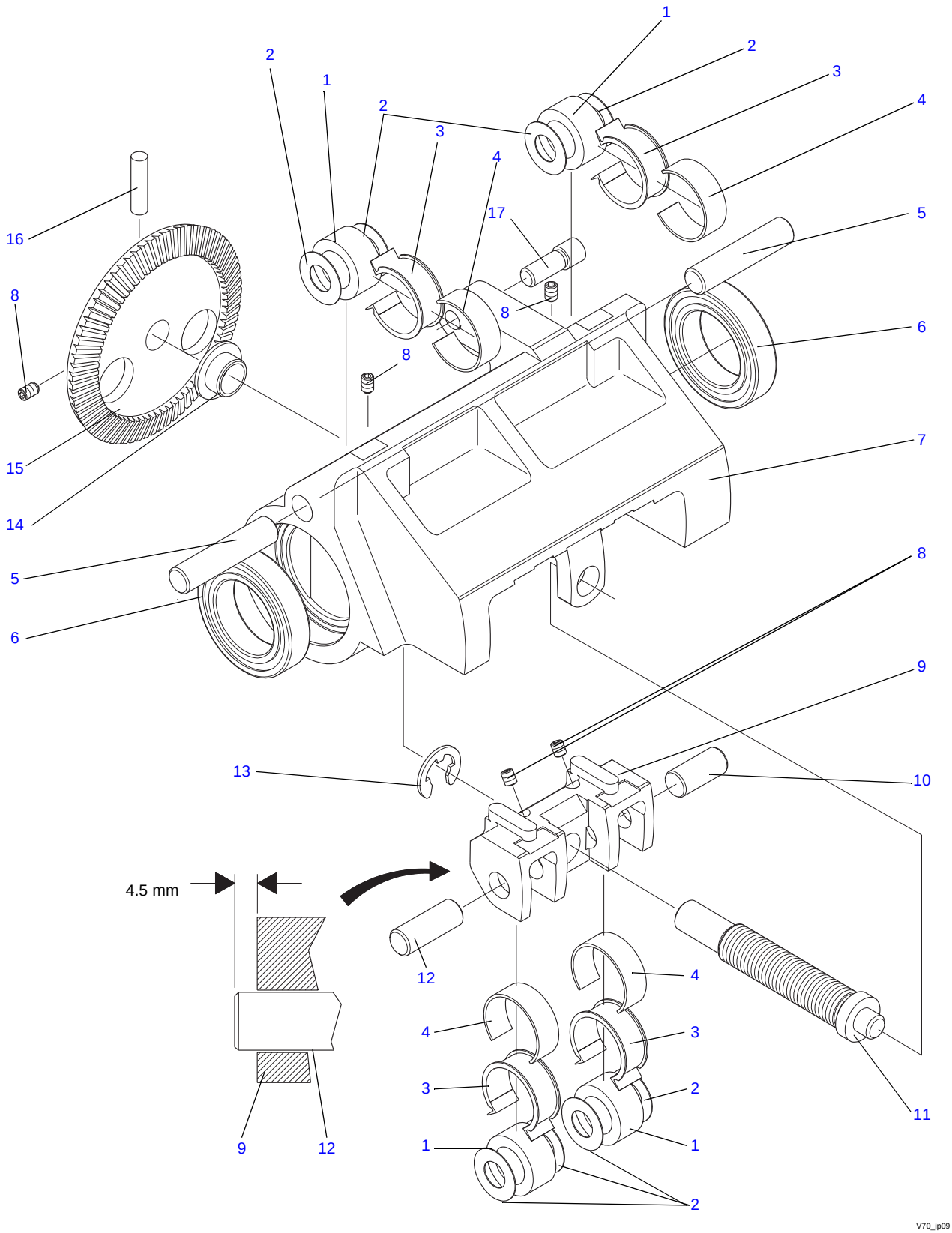

Fig 6.8 Vector 70H Pan and Tilt Head - Balance Adjuster Assembly

Fig 6.8 Vector 70H Pan and Tilt Head - Balance Adjuster Assembly

Item	Part No	Nomenclature	Qty
	3354-55	Balance adjuster assembly (Vector 70H), comprising:	1
1	P603-003*	Bearing, track roller, yoke type, 7 mm bore dia., 16 mm roller dia. x 7.8 mm roller width	4
2	3354-220	Shim (Roller axle)	8
3	3354-227	Track wiper	4
4	3354-226	Track wiper outer	4
5	3354-428	Roller axle (27 mm long)	2
6	P302-016*	Bearing, ball, radial, 20 mm ID x 32 mm OD x 7 mm long, two seals	2
7	3354-447	Adjustment housing	1
8	M004-806	Screw, grub, knurled cup point, socket head, M3 x 4 mm long	5
9	3354-445	Adjustment carriage	1
10	3354-219	Roller axle (15 mm long)	1
11	3354-426	Adjustment thread	1
12	3354-231	Roller axle (18 mm long)	1
13	M701-004	'E'-Clip, standard, 9.50 mm shaft dia. x 0.90 mm thick	1
14	P003-001*	Bearing, plain flanged, plastic, 8 mm ID x 10 mm OD x 5.5 mm long	1
15	3354-213	Gear	1
16	M806-006	Pin, coiled-spring, 4 mm dia. x 16 mm long, mcp	1
17	3354-443	Lift off pin (flat end)	1

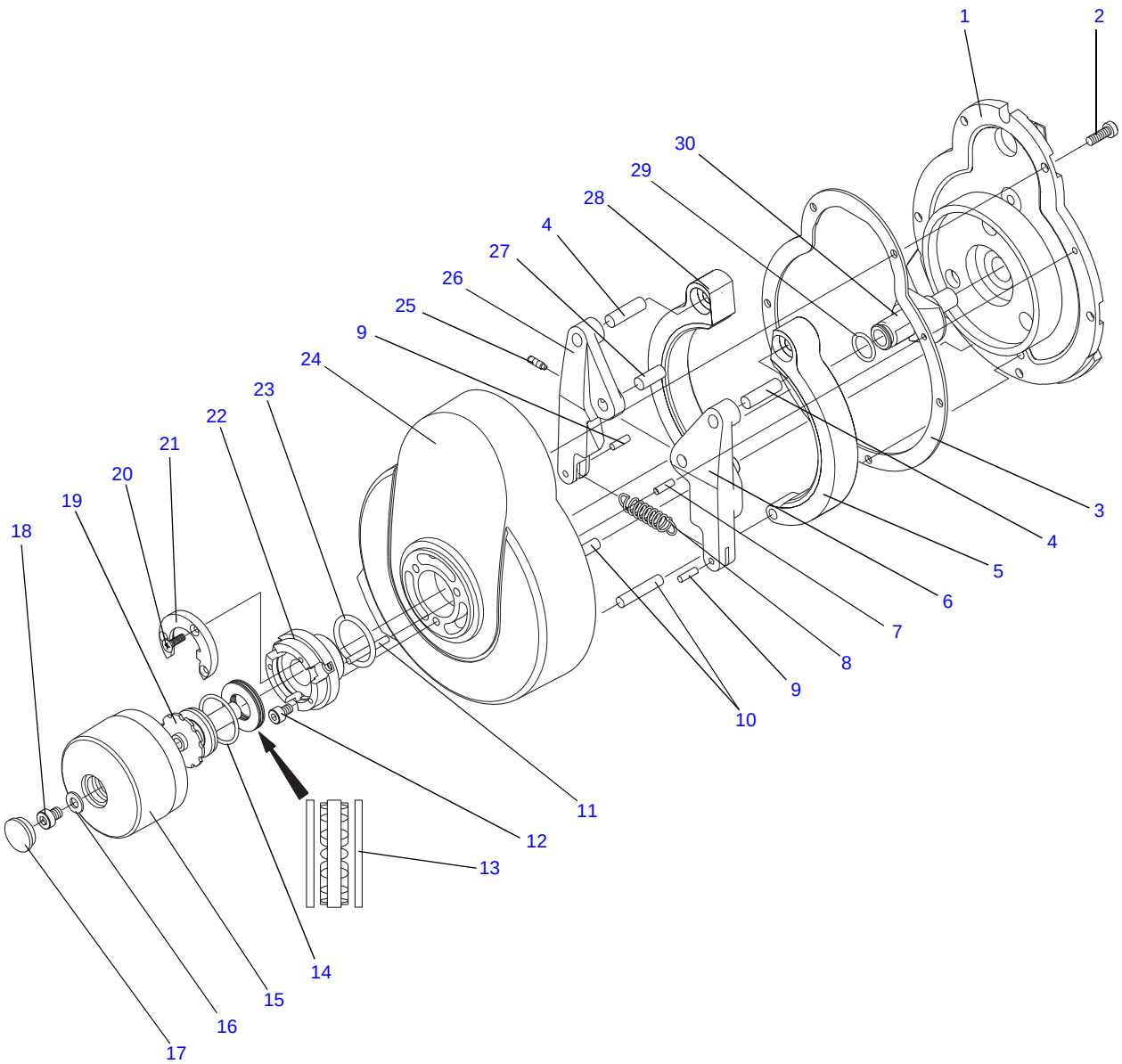

Fig 6.9 Vector 70/70H Pan and Tilt Head - Tilt Drag Mechanism

Fig 6.9 Vector 70/70H Pan and Tilt Head - Tilt Drag Mechanism

Item	Part No	Nomenclature	Qty
1	3354-201	Balance mechanism housing (Fig 6.6)	1
2	M005-734	Screw, low-profile, cap head, socket, M4 x 10 mm long	5
3	3354-412*	Gasket	1
4	M801-021	Pin, dowel, 6 mm dia. x 20 mm long	2
5	3354-17*	Tilt drag shoe assembly (typeA)	1
6	3354-402	Actuator Link "A"	1
7	M801-001	Pin, dowel, 3 mm dia. x 10 mm long	2
8	J530-031	Spring, tension, 1.375 in. length, 0.313 in. OD, 5.20 lbf/in. rate	1
9	M806-014	Pin, coiled-spring, 3 mm dia. x 10 mm long, mdp	2
10	M801-009	Pin, dowel, 5 mm dia. x 25 mm long	2
11	M801-047	Pin, dowel, 3 mm dia. x 25 mm long	1
12	M005-736	Screw, low-profile, cap head, socket, M4 x 6 mm long	3
13		Thrust bearing, comprising:	1
	N552-019*	Bearing, needle roller, thrust, 0.502 in. ID x 0.927 in. OD x 0.078 in. long, with cage assembly	1
	N552-020*	Washer, thrust, bearing, 0.502 in. ID x 0.927 in. OD x 0.030 / 0.032 in. thick	2
14	R900H011	'O' ring, 20 mm ID	1
15	3354-340*	Drag knob	1
16	M600-006*	Washer, plain, heavy, M5	1
17	3354-292*	Knob bung	1
18	M006-737*	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
19	3354-416	Knob Boss/ Threaded shaft	1
20	M003-103	Screw, countersunk head, pozidrive, M2.5 x 8 mm long	3
21	3322-286	Drag knob retainer/stop (pan) detent version	1
22	3354-413	Outer boss	1
23	Q900H038	'O' ring, 3/4 in. ID	1
24	3354-400	Tilt drag cover	1
25	M004-803	Screw, grub, dog point, socket head, M3 x 8 mm long	1
26	3354-403	Actuator link "B"	1
27	M801-032	Pin, dowel, 6 mm dia. x 14 mm long	1
28	3354-18*	Tilt drag shoe assembly (type B)	1

Fig 6.9 Vector 70/70H Pan and Tilt Head - Tilt Drag Mechanism (Cont)

Item	Part No	Nomenclature	Qty
29	Q001-014*	'O'-Ring, 3/8 in. nominal ID x 0.070 in. section, hardness 70 IRHD	1
30	3354-444	Actuator cam shaft (increased sealing length)	1

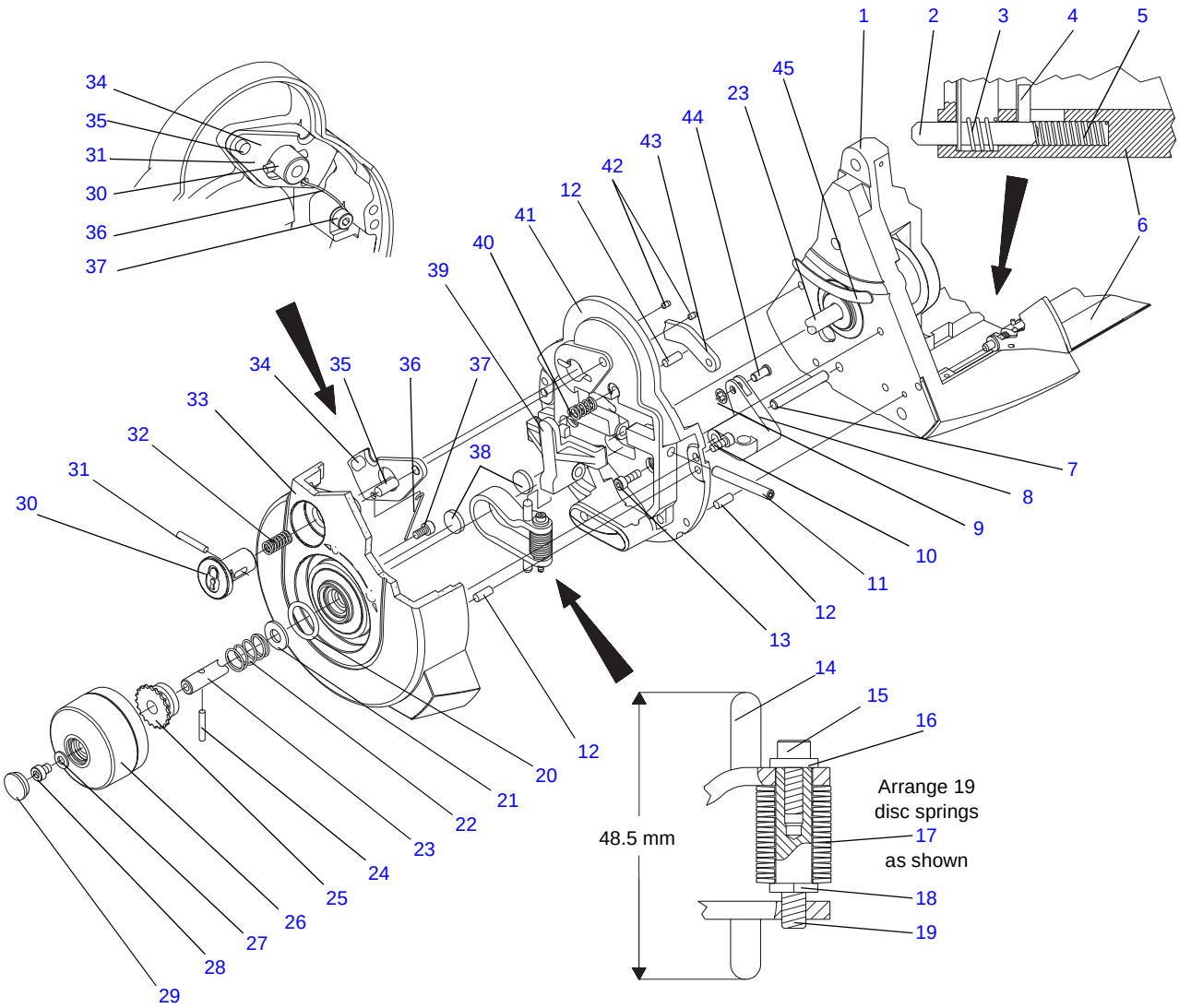

Fig 6.10 Vector 70/70H Pan and Tilt Head - Tilt Brake/Balance Knob/Centre Lock

Fig 6.10 Vector 70/70H Pan and Tilt Head - Tilt Brake/Balance Knob/Centre Lock

Item	Part No	Nomenclature	Qty
1	3354-13	Mechanism housing assembly (Vector 70H) OR	
	3354-43	Mechanism housing assembly (Vector 70H) (Fig 6.6)	1
2	3354-279	Flap pin	2
3	3354-210	Flap spring (left hand)	1
NI	3354-215	Flap spring (Right hand)	1
4	M806-028	Pin, coiled-spring, 2 mm dia. x 10 mm long, mdp	2
5	J532-166	Spring, compression, 1/2 in. free length, 5/32 in. hole dia., 9.2 lbf/in. rate	2
6	3354-211	Flap guard (Moulding)	1
7	3354-285	Pin (Tilt brake bell crank pivot)	1
8	3354-246	Bell crank (Tilt brake)	1
9	L701-082	Fastener, push-on, standard, 0.156 in. shaft dia. x 0.010 in. thick	1
10	M005-734	Screw, low-profile, cap head, socket, M4 x 10 mm long	3
11	3354-284	Pin (Tilt brake shoe pivot crank)	1
12	M806-004	Pin, coiled-spring, 4 mm dia. x 10 mm long, hdp	2
13	M005-706	Screw, cap head, socket, M4 x 16 mm long	4
	3354-30	Push rod/spring fork assembly tilt brake, comprising:	1
14	3354-267	Push rod / Spring fork.	1
15	M004-718	Screw, cap head, socket, M3 x 10 mm long	1
16	3354-269	Washer	1
17	M601-261	Spring, disc, 6.2 mm ID x 12.5 mm OD x 0.7 mm thick	19
18	3354-268	Pin	1
19	M005-811	Screw, grub, cone point, socket head, M4 x 10 mm long	1
20	Q001-015*	'O'-Ring, 5/16 in. nominal ID x 0.103 in. section, hardness 75 IRHD	1
21	M600-106	Washer, plain, light, M8	1
22	J532-164	Spring, compression, 5/8 in. free length, 1/2 in. hole dia., 15.6 lbf/in. rate	1
23	3354-218	Pinion shaft (Fig 6.6)	1
24	L801-105	Pin, dowel, 1/8 in. dia. x 9/16 in. long	1
25	3354-293	Serrated boss	1
26	3354-341*	Counter balance knob	1
27	M600-006*	Washer, plain, heavy, M5	1
28	M006-737*	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
29	3354-292*	Knob bung	1

Fig 6.10 Vector 70/70H Pan and Tilt Head - Tilt Brake/Balance Knob/Centre Lock

Item	Part No	Nomenclature	Qty
	3354-37	Tilt cover/centre lock assembly, comprising:	1
30	3354-258	Centre lock plunger	1
31	L801-106	Pin, dowel, 1/8 in. dia. x 3/4 in. long	1
32	J532-165	Spring, compression, 0.500 in. free length, 0.180 in. OD x 0.188 in. hole dia., 7.00 lbf/in. rate	1
33	3354-256	Tilt housing cover R.H	1
34	3354-259	Centre lock release lever	1
35	M801-048	Pin, dowel, 5 mm dia. x 12 mm long	1
36	3354-260	Spring, Centre lock release lever	1
37	M005-716	Screw, cap head, socket, M4 x 8 mm long	1
38	3354-424	Buffer pad	2
39	3354-33*	Tilt brake shoe bonding assembly	1
40	J532-145	Spring, compression, 0.500 in. free length, 0.300 in. OD x 0.313 in. hole dia., 46.00 lbf/in. rate	1
41	3354-257	Tilt back plate	1
42	M004-807	Screw, grub, knurled cup point, socket head, M3 x 5 mm long	2
43	3354-249	Connecting link (Fig 6.5)	1
44	3354-283	Pin (Conn. Link/bell crank)	1
45	3354-288	Lining (Tilt brake reactor) (Part of 3354-13/3354-43)	1

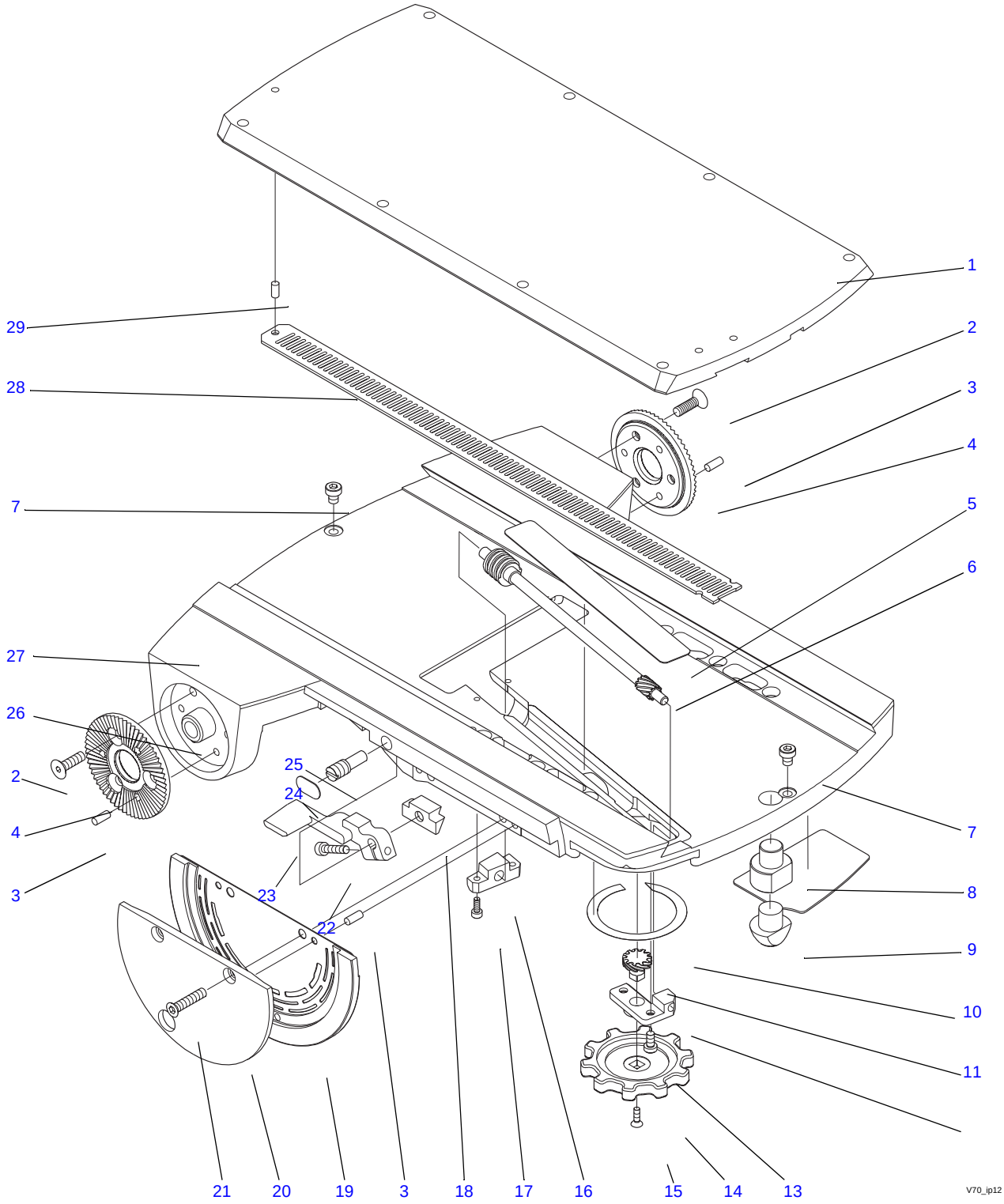

Fig 6.11 Vector 70/70H Pan and Tilt Head - Platform Assembly

Fig 6.11 Vector 70/70H Pan and Tilt Head - Platform Assembly

Item	Part No	Nomenclature	Qty
1	3354-242	Standard platform slide	1
2	M006-921*	Screw, countersunk head, socket, M5 x 10 mm long	6
3	M806-004*	Pin, coiled-spring, 4 mm dia. x 10 mm long, hdp	8
4	3354-261*	Serrated disc (Mk7 type)	2
5	3354-255*	Label	1
6	3354-52	Adjustment shaft assembly	1
7	M006-737	Screw, low-profile, cap head, socket, M5 x 6 mm long	2
8	3354-425*	Front stop bung (Vector 70H only)	1
9	3354-266*	Platform buffer	1
10	3354-278*	PTFE Strip	1
11	3354-238	Platform adjuster pinion	1
12	3354-243	Bearing bracket	1
13	M005-733	Screw, cap head, socket, M4 x 8 mm long	2
14	3354-239*	Platform adjuster knob	1
15	M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	1
16	3354-240	Shaft support	1
17	M004-703	Screw, cap head, socket, M3 x 8 mm long	2
18	3354-448*	Slide clamp block	1
19	3354-36*	Brake disk tilt assembly	1
20	3354-263*	Tilt brake centre	1
21	M006-923*	Screw, countersunk head, socket, M5 x 16 mm long	2
22	M005-706	Screw, cap head, socket, M4 x 16 mm long	1
23	3354-235*	Slide clamp lever	1
24	3354-234*	Cover, slide clamp lever	1
25	3354-233	Slide clamp screw	1
26	L850-036*	Threaded-insert, wire thread insert (helicoil), 3/8 in. BSF x 1-1/2 Diameters long	2
27	3354-230*	Platform	1
28	3354-236	Rack strip	1
29	M806-031	Pin, coiled-spring, 4 mm dia. x 8 mm long, mdp	3

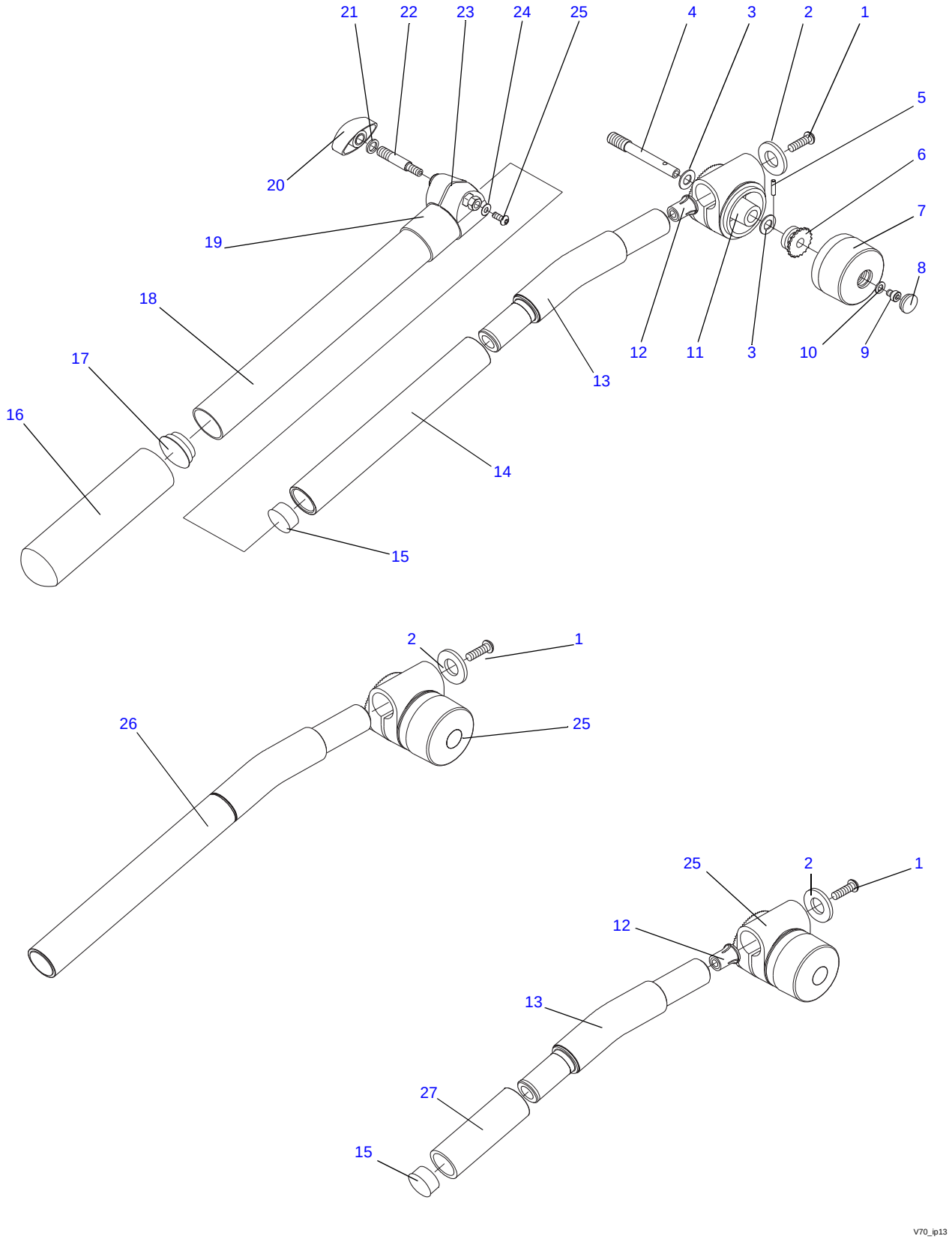

Fig 6.12 Vector 70/70H Pan and Tilt Head - Pan Bars

Fig 6.12 Vector 70/70H Pan and Tilt Head - Pan Bars

Item	Part No	Nomenclature	Qty
	3219-62	Pan bar and clamp assembly, comprising:	
1	M007-506	Screw, button head, socket, M6 x 20 mm long	1
2	3308-159	Washer	1
	3219-60	Pan bar clamp assembly (Vector 70), consisting of:	
3	M600-009	Washer, plain, heavy, M8	2
4	3219-283	Pan bar clamp shaft [was 3354-295]	1
5	L801-105	Pin, dowel, 1/8 in. dia. x 9/16 in. long	1
6	3354-293	Serrated boss	1
7	3354-290	Knob	1
8	3354-292*	Knob bung	1
9	M006-737*	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
10	M600-006*	Washer, plain, heavy, M5	1
11	3219-280	Pan bar clamp (Vector)	1
	3219-61	Pan bar assembly (Vector 70), consisting of:	
	3219-65	Fixed bar assembly (Vector 70), consisting of:	
12	M500-085	Threaded-insert, blind captive nut, M6	1
13	3219-290	Fixed tube spigot end for long bar	1
14	3219-291	Fixed tube control end long	1
15	J550-093	Plug, tube-end, to fit 1 in. tube OD	1
	3219-64	Sliding tube assembly (Vector 70), consisting of:	
16	3219-276	Pan bar grip (Mk 7B)	1
17	J550-104	Plug, tube-end, to fit 1-1/4 in. tube OD	1
18	3219-63	Sliding tube / clamp assembly (Vector 70)	1
19	3219-289	Shrink wrap sleeve (Vector 70)	1
20	K403-014	Knob, locking-key, female, M8 thread, 40 mm wide	1
21	3219-211	Washer	1
22	3219-288	Clamp shaft (telescopic pan bar) (Vector 70)	1
23	M500-082	Nut, M6, standard (hex), full	1
24	M600-304	Washer, plain, large, M4	1
25	M005-511	Screw, button head, socket, M4 x 8 mm long	1
	3219-67	Short pan bar and clamp assembly (Vector 70), comprising:	

Fig 6.12 Vector 70/70H Pan and Tilt Head - Pan Bars (Cont)

Item	Part No	Nomenclature	Qty
1	M007-506	Screw, button head, socket, M6 x 20 mm long	1
2	3308-159	Washer	1
25	3219-60	Pan bar clamp assembly (Vector 70) - parts as above	1
26	3219-65	Fixed bar assembly (Vector 70) - parts as above	1
	3219-66	Fixed bar / clamp assembly (Vector 70), comprising:	
1	M007-506	Screw, button head, socket, M6 x 20 mm long	1
2	3308-159	Washer	1
	3219-68	Short pan bar assembly (Vector 70), consisting of:	
12	M500-085	Threaded-insert, blind captive nut, M6	1
13	3219-290	Fixed tube spigot end for long bar	1
15	J550-093	Plug, tube-end, to fit 1 in. tube OD	1
25	3219-60	Pan bar clamp assembly (Vector 70) - parts as above	1
27	3219-297	Short fixed tube	1

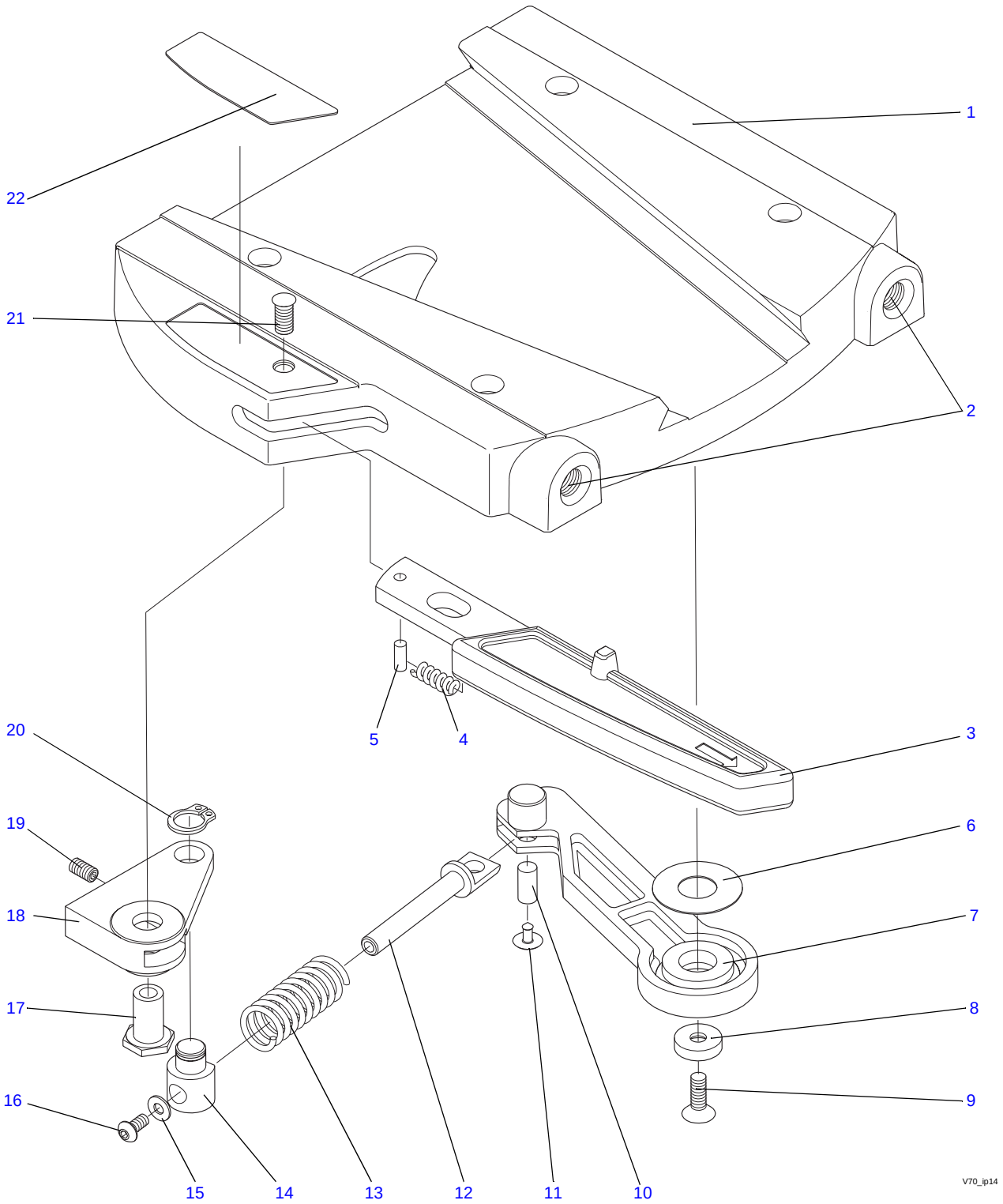

Fig 6.13 Vector 70/70H Pan and Tilt Head - Wedge adaptor assembly

Fig 6.13 Vector 70/70H Pan and Tilt Head - Wedge adaptor assembly

Item	Part No.	Nomenclature	Qty
	3389-3	Automatic wedge adaptor, comprising:	1
1	3389-301	Body	1
2	L850-054	Threaded-insert, wire thread insert (helicoil), 3/8 in. BSW x 2 Diameters long	2
3	3389-21	Handle assembly (10mm pivot)	1
4	J532-159	Spring, compression, 0.750 in. free length, 0.180 in. OD x 0.188 in. hole dia., 17.00 lbf/in. rate	1
5	M806-004	Pin, coiled-spring, 4 mm dia. x 10 mm long, hdp	1
6	3389-210	Washer	1
7	3389-208	Swing Arm	1
8	3389-212	Screw head spacer	1
9	M006-911	Screw, countersunk head, socket, M5 x 12 mm long	1
10	L801-103	Pin, dowel, extractable, 1/4 in. dia. x 1/2 in. long	1
11	3389-310	Running plate	1
12	3389-206	Shaft	1
13	J532-161	Spring, compression, 1.516 in. free length, 0.473 in. OD x 0.792 in. hole dia., 109.744 lbf/in. rate	1
14	3389-205	Pivot bush	1
15	M600-004	Washer, plain, heavy, M4	1
16	M005-513	Screw, button head, socket, M4 x 6 mm long	1
17	3389-304	Lever pivot (10mm diameter)	1
18	3389-302	Lever mounting (adjustable 10mm pivot)	1
19	M006-812	Screw, grub, dog point, socket head, M5 x 8 mm long	1
20	M701-002	Circlip, external, standard, 5 mm shaft dia. x 0.60 mm thick	1
21	M100-003	Stud, self-clinching, M6 thread x 12 mm long	1
22	3389-309	Name label	

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts

Part No	Nomenclature	Qty
3354-914SP	Seal kit, comprising:	
3354-412	Gasket	1
3354-414	Inner gasket	1
R200-004	Seal, bonded, M4, 4.5 mm ID x 7.0 mm OD x 1.0 mm thick	1
R900H001	'O' ring, 7.1 mm ID, Dowty 202-509-4470	
R900H002	'O' ring, 15.1 mm ID x 1.6 mm sect, Dowty 202-517-4470	1
R900H018	'O' ring, 3.1 mm ID x 1.6 mm sect, Dowty 202-505-4460	3
R900H019	'O' ring, 21.1 mm ID x 1.6 mm sect, Dowty 202-514-4460	1
R900H020	'O' ring, 22.1 mm ID x 1.6 mm sect, Dowty 202-524-4470	1
Q001-014	'O'-Ring, 3/8 in. nominal ID x 0.070 in. section, hardness 70 IRHD	1
Q001-015	'O'-Ring, 5/16 in. nominal ID x 0.103 in. section, hardness 75 IRHD	1
Q500-040	'Omniseal', 1.380 in. shaft dia. x 3/32 in. nominal section	1
Q500-051	'Omniseal', 2.127 in. shaft dia. x 3/32 in. nominal section	1
Q500-052	'V'-Seal, to fit 6.5 to 8 mm shaft dia.	1
Q900H039	'O' ring, 1/4 in. ID x 3/8 in. OD, Dowty 200-010-4460	1
Q900H040	'O' ring, 4.75 in. ID x 0.0625 in. sect, Dowty 200-048-4460	1
R900H009	'O' ring, 9.1 mm ID x 1.6 mm sect, Dowty 202-511-4470	1
3354-915SP	Bearings kit, comprising:	
N001-043	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 3/8 in. long	10
N001-044	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 1/4 in. long	4
N552-019	Bearing, needle roller, thrust, 0.502 in. ID x 0.927 in. OD x 0.078 in. long, with cage assembly	1
N552-020	Washer, thrust, bearing, 0.502 in. ID x 0.927 in. OD x 0.030 / 0.032 in. thick	2
P001-018	Bearing, plain, du bush, 8 mm ID x 10 mm OD x 12 mm long	4
P003-001	Bearing, plain flanged, plastic, 8 mm ID x 10 mm OD x 5.5 mm long	2
P200-229	Bearing, ball, radial, 45 mm ID x 58 mm OD x 7 mm long, open	1
P302-016	Bearing, ball, radial, 20 mm ID x 32 mm OD x 7 mm long, two seals	5
P302-017	Bearing, ball, radial, 30 mm ID x 42 mm OD x 7 mm long, two seals	1
P600-014	Bearing, needle roller, radial, 19 mm ID x 27 mm OD x 20 mm long	
P600-015	Roller, cylindrical, 5 mm x 8 mm long	24
P603-003	Bearing, track roller, yoke type, - mm bore dia., 16 mm roller dia. x 7.8 mm roller width	4

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts (Cont)

Part No	Nomenclature	Qty
3354-916SP	Set of drag shoes, comprising:	
3354-21	Pan friction shoe assembly	2
3354-17	Tilt drag shoe assembly (type A)	1
3354-18	Tilt drag shoe assembly (type B)	1
3354-917SP	Brake pads kit, comprising:	
3354-27	Pan brake shoe bonding assembly	1
3354-33	Tilt brake shoe bonding assembly	1
3354-288	Lining (Tilt brake reactor)	1
3354-336	Lining (brake shoe)	1
3354-918SP	Knobs kit, comprising:	
3354-292	Knob bung	3
3354-239	Platform adjuster knob	1
3354-340	Drag knob	2
3354-341	Counter balance knob	1
M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	1
M006-737	Screw, low-profile, cap head, socket, M5 x 6 mm long	3
M600-006	Washer, plain, heavy, M5	3
3354-919SP	Levers kit, comprising:	
3354-235	Slide clamp lever	1
3354-247	Brake lever (Tilt brake)	1
3354-248	Brake lever (Pan)	1

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts (Cont)

Part No	Nomenclature	Qty
3354-922SP	Platform assembly (Spares), comprising:	
3354-230	Platform	1
3354-261	Serrated disc (Mk7 type)	2
3354-448	Slide clamp block	1
3354-266	Platform buffer	1
3354-425	Front stop bung	1
3354-278	PTFE Strip	1
3354-255	Label	1
3354-234	Cover, slide clamp lever	1
M006-921	Screw, countersunk head, socket, M5 x 10 mm long	6
L850-036	Threaded-insert, wire thread insert (helicoil), 3/8 in. BSF x 1-1/2 Dias lg	2
M806-004	Pin, coiled-spring, 4 mm dia. x 10 mm long, hdp	6
3354-923SP	Vertical track assembly (Vector 70), comprising:	
3354-207	Vertical track member	1
3354-208	Vertical track	2
L804-161	Rivet, blind-captive, countersink head, open type, 1/8 in. dia. x 0.236 in. long x 0.258 / 0.242 in. head dia.	2
L800-007	Pin, coiled-spring, headed, 5/64 in. dia. x 1/4 in. long, mbt	2
3354-924SP	Vertical track assembly (Vector 70H), comprising:	
3354-427	Vertical track member (HR)	1
3354-208	Vertical track	2
L804-161	Rivet, blind-captive, countersink head, open type, 1/8 in. dia. x 0.236 in. long x 0.258 / 0.242 in. head dia.	2
L800-007	Pin, coiled-spring, headed, 5/64 in. dia. x 1/4 in. long, mbt	2
3354-925SP	Horizontal track assembly, comprising:	
3354-204	Horizontal track member	1
3354-205	Horizontal track	1
M004-901	Screw, countersunk head, socket, M3 x 8 mm long	1
L800-007	Pin, coiled-spring, headed, 5/64 in. dia. x 1/4 in. long, mbt	1
N001-044	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 1/4 in. long	4

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts (Cont)

Part No	Nomenclature	Qty
3354-926SP	Drive arm assembly, comprising:	
3354-202	Upper drive arm	1
3354-298	Pivot pin	2
N001-043	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 3/8 in. long	2
3354-927SP	Base assembly with electronics, comprising:	
3354-24	Base housing (bonding) assembly	1
3354-25	Cover plate /PCB assembly	1
M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	2
M004-511	Screw, button head, socket, M3 x 5 mm long	1
3354-929SP	Cover plate & buffer pad assembly, comprising:	
3354-337	Cover plate (plastic)	1
3354-347	Buffer pad	
3354-935SP	Tilt brake plate assembly, comprising:	
3354-36	Brake disk tilt assembly	1
3354-263	Tilt brake centre	1
M006-923	Screw, countersunk head, socket, M5 x 16 mm long	2
M806-004	Pin, coiled-spring, 4 mm dia. x 10 mm long, hdp	2
3354-936SP	Lower drive arm assembly, comprising:	
3354-203	Lower drive arm	1
3354-298	Pivot pin	2
N001-043	Bearing, plain, du bush, 1/4 in. ID x 5/16 in. OD x 3/8 in. long	2

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts (Cont)

Part No	Nomenclature	Qty
3354-937SP	Vert. Track /Act repair kit V70, comprising:	
3354-923SP	Vertical track assembly	1
3354-54	Adjustment housing assembly	1
3051-25	Vinten fluid in tin (sales service)	2
3354-206	Slim (Horizontal track member)	10
3354-299	Shim (0.075mm)	10
3354-412	Gasket	1
3354-414	Inner gasket	1
L701-082	Fastener, push-on, standard, 0.156 in. shaft dia. x 0.010 in. thick	1
M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	12
M004-812	Screw, grub, cone point, socket head, M3 x 5 mm long	2
M005-706	Screw, cap head, socket, M4 x 16 mm long	4
M005-734	Screw, low-profile, cap head, socket, M4 x 10 mm long	8
M005-912	Screw, countersunk head, socket, M4 x 10 mm long	3
M006-704	Screw, cap head, socket, M5 x 16 mm long	2
M006-705	Screw, cap head, socket, M5 x 20 mm long	2
M006-718	Screw, cap head, socket, M5 x 40 mm long	2
M006-737	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
Q500-040	'Omniseal', 1.380 in. shaft dia. x 3/32 in. nominal section	1

Fig 6.14 Vector 70/70H Pan and Tilt Head - Composite Spare Parts (Cont)

Part No	Nomenclature	Qty
3354-938SP	Vert. Track / Act. Repair kit V70H, comprising:	
3354-924SP	Vertical track member assembly (70H)	1
3354-55	Balance adjuster assembly (70H)	1
3051-25	Vinten fluid in tin (sales service)	2
3354-206	Slim (Horizontal track member)	10
3354-299	Shim (0.075mm)	10
3354-412	Gasket	1
3354-414	Inner gasket	1
L701-082	Fastener, push-on, standard, 0.156 in. shaft dia. x 0.010 in. thick	1
M004-103	Screw, countersunk head, pozidrive, M3 x 8 mm long	12
M004-812	Screw, grub, cone point, socket head, M3 x 5 mm long	2
M005-706	Screw, cap head, socket, M4 x 16 mm long	4
M005-734	Screw, low-profile, cap head, socket, M4 x 10 mm long	8
M005-912	Screw, countersunk head, socket, M4 x 10 mm long	3
M006-704	Screw, cap head, socket, M5 x 16 mm long	2
M006-705	Screw, cap head, socket, M5 x 20 mm long	2
M006-718	Screw, cap head, socket, M5 x 40 mm long	2
M006-737	Screw, low-profile, cap head, socket, M5 x 6 mm long	1
Q500-040	'Omniseal', 1.380 in. shaft dia. x 3/32 in. nominal section	1
3354-941SP	Pan drag coupling and sleeve assembly, comprising:	
3354-308	Coupling (Drag shoe assembly)	1
3354-309	Sleeve (Coupling seal)	1
R900H009	'O' ring, 9.1 mm ID, Dowty 202-511-4470	1
R900H002	'O' ring, 15.1 mm ID x 1.6 mm sect, Dowty 202-517-4470	1