

***Illustrated Parts List
and
Maintenance Instructions
with Initial Installation Instructions***

FOR

INSTANTANEOUS VERTICAL SPEED INDICATOR (IVSI)
Part No. 369H90044

USED ON HUGHES 500HS (MODEL 369HS) AND 500D (MODEL 369D) HELICOPTERS

AND

Part No. 369H90044-503

USED ON HUGHES 500E AND 530F (MODEL 369E/F) HELICOPTERS

**THIS REISSUE SUPERSEDES ALL
PREVIOUS ISSUES OF THIS PUBLICATION**



Hughes Helicopters, Inc. Culver City, California 90230
A Subsidiary of McDonnell Douglas

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES.

* THE ASTERISK INDICATES PAGES CHANGED, ADDED, OR DELETED BY THE CURRENT CHANGE.

Page	Date
Title	Original
A thru B.....	Original
C Blank	Original
i	Original
ii Blank	Original
F-1	Original
F-2 Blank.....	Original
1-1 thru 1-5	Original
1-6 Blank	Original
2-1 thru 2-3	Original
2-4 Blank	Original
3-1 thru 3-2	Original

HUGHES HELICOPTERS TECHNICAL MANUAL RECOMMENDED CHANGE REPORT

This manual has been prepared and distributed by the Commercial Service Publications Department and is intended for use by personnel responsible for the maintenance of Hughes Helicopters. Periodic revision of this manual will be made to incorporate the latest information. If, in the opinion of the reader, any information has been omitted or requires clarification, please direct your comments to this office via this form (or a duplicate). An endeavor will be made to include such information in future revisions.

Hughes Helicopters
Centinela and Teale Streets
Culver City, California 90230

Attention: R. M. Impens, Commercial Service Publications
6/A141

Originator _____

Address _____

Book Identification:

Date:

Helicopter Model _____

Volume Title _____

Issue Date _____

Revision No. _____

Discrepant Area (as applicable): _____

Revision Date _____

Page Number(s) _____

Paragraph Number(s) _____

Step(s) _____

Table Number(s) _____

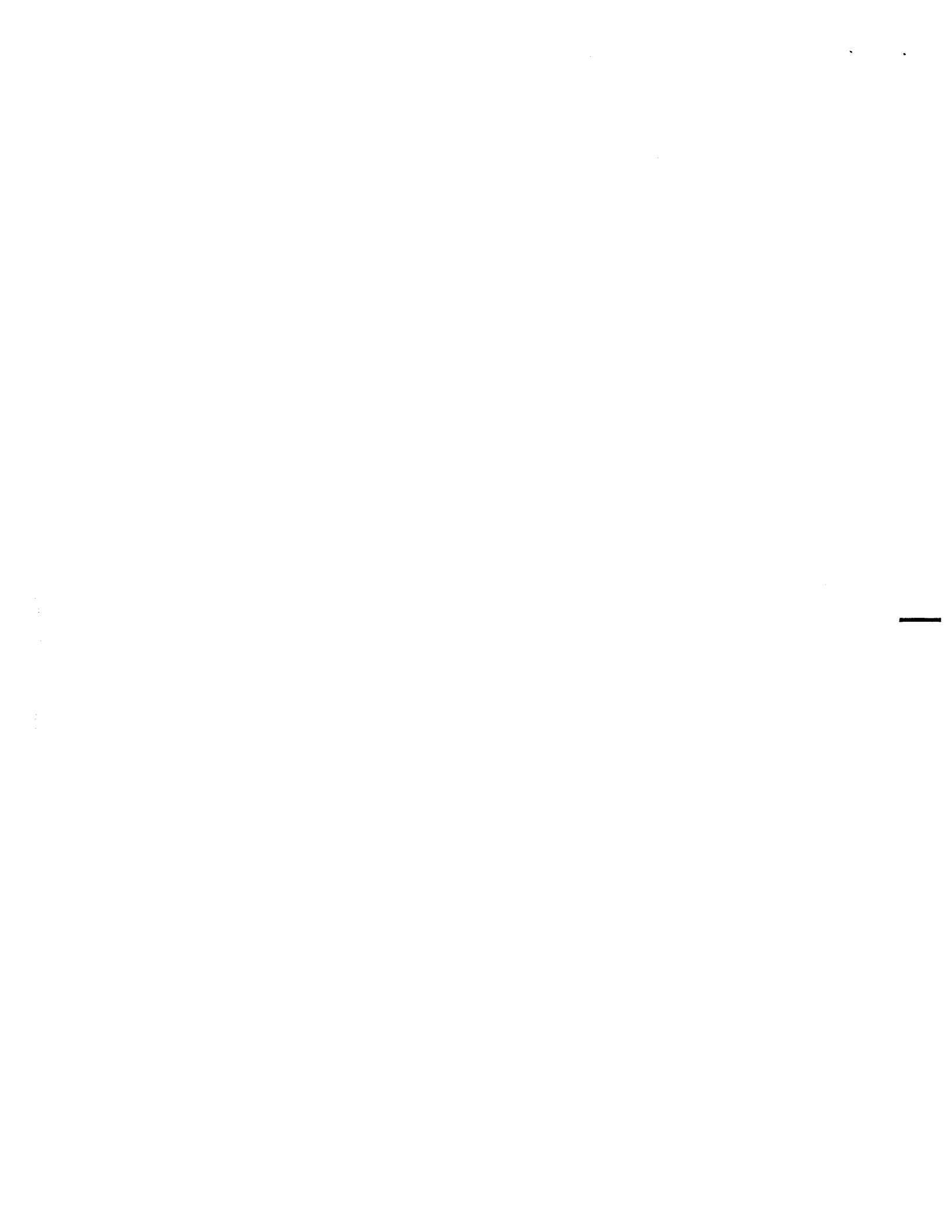
Figure Number(s) _____

Remarks/Recommendations -



TABLE OF CONTENTS

Section	Page	Section	Page
FOREWORD	F-1	2-5. Maintenance of Vertical Speed Indicator	2-1
F-1. Purpose and content of this Manual	F-1	2-6. Replacement of Vertical Speed Indicator - Model 369HS and 369D Helicopter	2-1
F-2. Applicability	F-1	2-7. Replacement of Vertical Speed Indicator - Model 369E/F Helicopters	2-1
F-3. Compatibility of Combined Optional Equipment	F-1		
F-4. Organization of Contents . . .	F-1	3 INSTALLATION INSTRUCTIONS . .	3-1
F-5. Use of this Manual	F-1	3-1. General Information	3-1
F-6. Related Publications	F-1	3-2. Preparation	3-1
F-7. Literature Changes and Revisions	F-1	3-3. Removal of Instrument Panel Equipment	3-1
1 ILLUSTRATED PARTS LIST	1-1	3-4. Installation of Vertical Speed Indicator - Model 369HS and 369D Helicopters	3-1
1-1. Scope and Contents	1-1	3-5. Installation of Vertical Speed Indicator and Bolt Light - Model 369E/F Helicopters	3-1
1-3. Group Assembly Parts List	1-1	3-6. Completion of Installation . .	3-1
1-5. Illustrations	1-1	3-7. Weight and Balance	3-1
1-7. Usable on Code	1-1	3-8. General	3-1
2 MAINTENANCE INSTRUCTIONS . .	2-1		
2-1. General Information	2-1		
2-2. Description	2-1		
2-3. Reference Data	2-1		
2-4. Troubleshooting	2-1		



FOREWORD

F-1. PURPOSE AND CONTENT OF THIS MANUAL. This manual supplements information contained in the Basic Handbook of Maintenance Instructions (HMI - Vol 1) and the Illustrated Parts Catalog (IPC), and contains instructions for initial installation and continuing maintenance for the instantaneous vertical speed indicator. Weight and balance data is included. This manual also contains parts lists for procuring replacement parts for the instantaneous vertical speed indicator.

F-2. APPLICABILITY. The 369H90044 instantaneous vertical speed indicator (IVSI) is applicable for use on any Hughes 500HS (Model 369HS) and 500D (Model 369D) helicopter. The 369H90044-503 IVSI is applicable for use on any Hughes 500E (Model 369E) and 530F (Model 369F) helicopter.

F-3. COMPATIBILITY OF COMBINED OPTIONAL EQUIPMENT. For compatibility information on which optional equipment may or may not be used in combination at the same time, refer to Section 21, HMI - Vol 1.

F-4. ORGANIZATION OF CONTENTS. The contents of this manual are grouped into sections as

outlined in the Table of Contents. Each section is organized to provide comprehensive coverage of entire systems, major equipment groupings and major components that are similar or associated. Procedures for each of these are presented in sequence as defined in Section 1, HMI - Vol 1.

F-5. USE OF THIS MANUAL. This manual is for use by operators of the Model 369HS and 369D/E/F helicopters equipped with the instantaneous vertical speed indicator. Although this manual is a separate publication, it should be kept with HMI - Vol 1, HMI - Vol 2, the IPC and other handbooks listed in Section 1, HMI - Vol 1 that form the primary information file for the helicopter.

F-6. RELATED PUBLICATIONS. Reference is made to applicable portions of HMI - Vol 1 and the IPC as required to accomplish instructions contained herein.

F-7. LITERATURE CHANGES AND REVISIONS. Changes and revisions to contents of this manual are made as defined in Section 1, HMI - Vol 1.



SECTION I

ILLUSTRATED PARTS LIST

1-1. SCOPE AND CONTENTS.

1-2. This illustrated parts list provides, by means of text (parts lists) and companion illustrations, a complete parts definition of the instantaneous vertical speed indicator system, manufactured by Hughes Helicopters, Inc., Culver City, California.

NOTE: The illustrated parts list is organized and presented in the same manner as the Illustrated Parts Catalog (IPC). (For information on use, refer to the IPC.)

1-3. GROUP ASSEMBLY PARTS LIST.

1-4. The parts list furnish information for procuring replacement parts for the instantaneous vertical speed indicator installation and shall not be used for any other purpose. For information or procurement of other replacement parts, refer to the appropriate IPC.

1-5. ILLUSTRATIONS.

1-6. Isometric illustrations are provided for each group assembly parts list. Each illustration is exploded to the extent necessary to show parts relationship for the complete installation of the instantaneous vertical speed indicator.

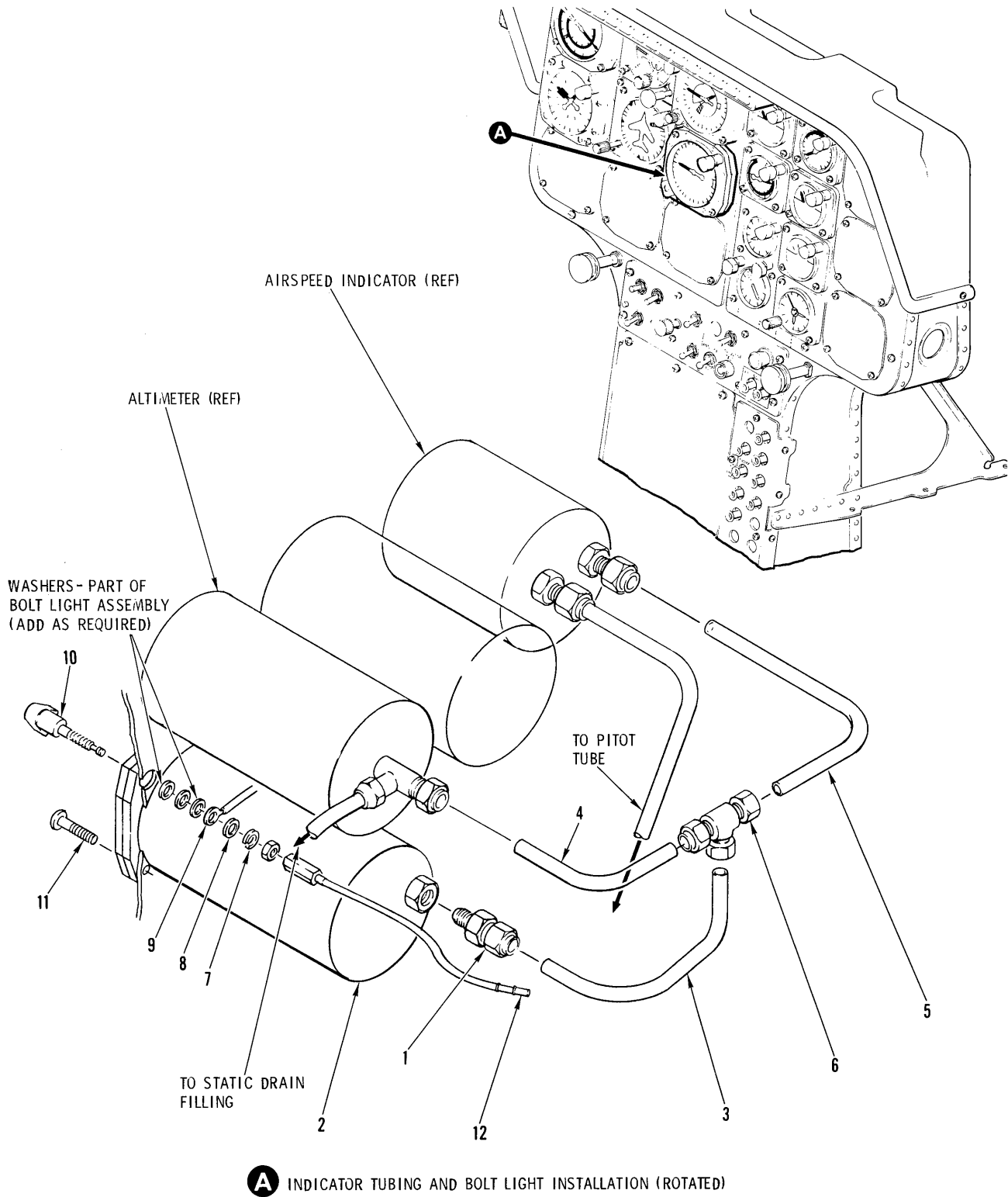
1-7. USABLE ON CODE.

1-8. The USABLE ON CODE column located at the right-hand side of the Group Assembly Parts List pages indicates the effectivity of parts by aircraft serial number. In many cases two different parts are listed, one representing the original installation and another representing an improved replacement item. Alphabetic codes are used to indicate the aircraft serial number applications of a given part. When no USABLE ON CODE is listed, items are understood to have full effectivity.

A = 369E/F S/N 0001 through subsequent

B = 369HS S/N 411 through 874

369D S/N 0003 through 1204



47-1190

Figure 1-1. Vertical Speed Indicator Installation and Bolt Light - 369E/F Helicopters

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-1-	369H90044-503	INSTANTANEOUS VERTICAL SPEED		A
		INDICATOR INSTALLATION		
-1	NY400-1-OR	. UNION	1	A
-2	7130	. INDICATOR	1	A
-3	369H90044-43	. TUBE	1	A
-4	369H90044-39	. TUBE	1	A
-5	369H90044-37	. TUBE	1	A
-6	NY400-3	. TEE	1	A
-7	AN935-8L	. LOCKWASHER	1	A
-8	NAS620ABL	. WASHER	1	A
-9	60336-1	. TAB	1	A
-10	5952-8ND-CW-28	. BOLT LIGHT	1	A
-11	MS35214	. SCREW	2	A
-12	M39029/22-20-20	. CONTACT	1	A

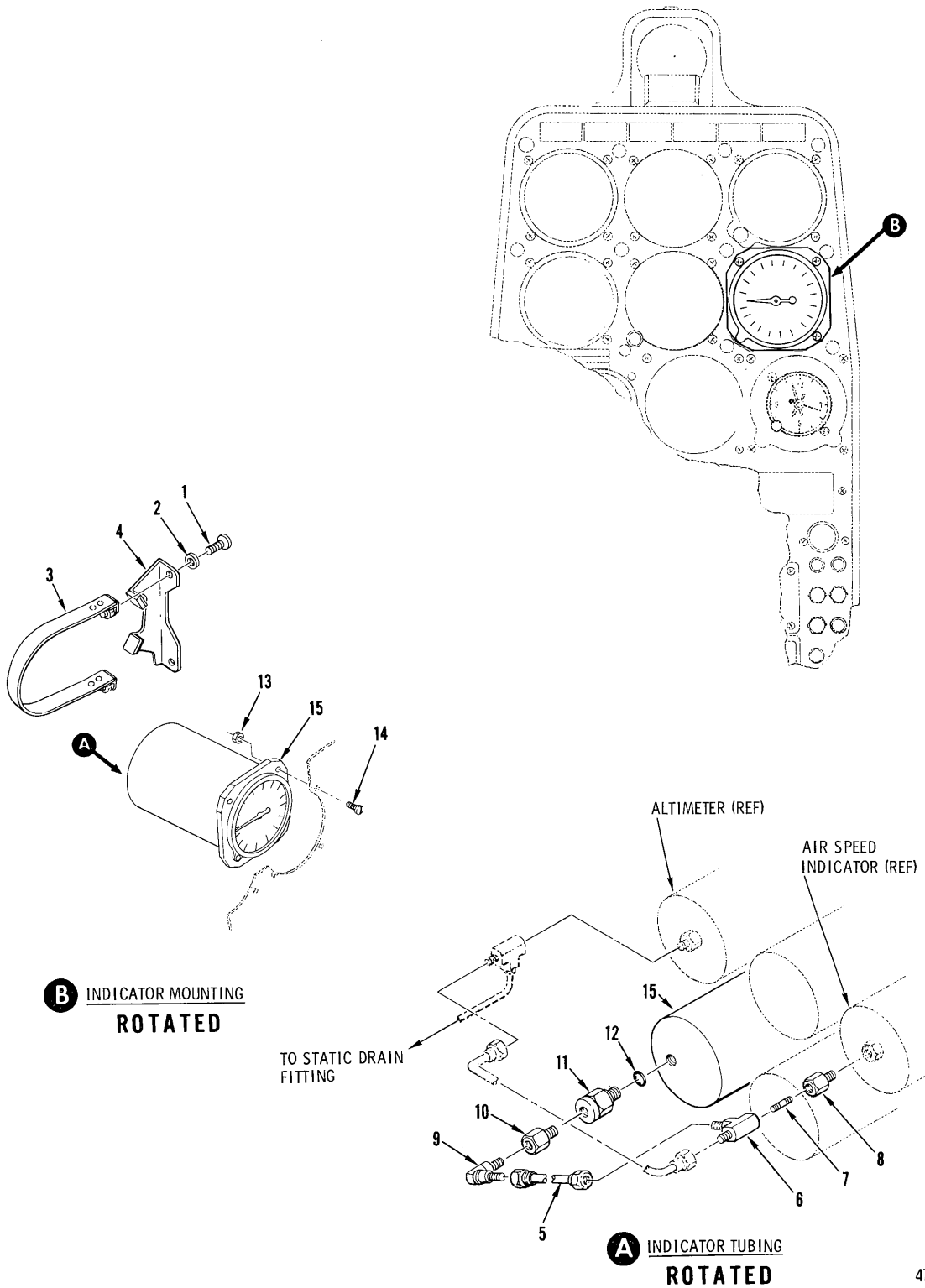


Figure 1-2. Vertical Speed Indicator Installation – 369HS and 369D Helicopters

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-2-	369H90044	INSTANTANEOUS VERTICAL SPEED INDICATOR INSTALLATION	1	B
-1	NAS603-8	. SCREW	2	B
-2	AN960PD10L	. WASHER	2	B
-3	369H90044-31	. CLAMP ASSY	1	B
-4	369H90044-21	. BRACKET ASSY	1	B
-5	369H6612-3	. TUBE	1	B
-6	NY400-3	. TEE	1	B
-7	369H90044-17	. TUBE	1	B
-8	NY400-1-2OR	. CONNECTOR	1	B
-9	NY400-9	. UNION ELBOW	1	B
-10	NY401AOR	. ADAPTOR	1	B
-11	NY-(AND-4)-1- 1/2-20	. REDUCER	1	B
-12	AN6290-5	. O-RING	1	B
-13	MS33737-14	. NUT	3	B
-14	MS35214-31	. SCREW	3	B
-15	SLZ9066	. INDICATOR	1	B



SECTION II MAINTENANCE INSTRUCTIONS

2-1. GENERAL INFORMATION. The instantaneous vertical speed indicator presents helicopter climb and dive information. Helicopter ascent is indicated by clockwise rotation of the pointer from zero at the 9 o'clock position. Descent is indicated by counterclockwise rotation. Internal stops prevent excessive pointer movement. Range of indicator is 0 - 3,000 feet per minute, ascent or descent.

2-2. DESCRIPTION. The instantaneous vertical speed indicator is a coupled inertial lead and barometric pressure instrument that indicates the rate of change in feet-per-minute due to climb or dive maneuvers. A pendulum mass within the instrument provides an instantaneous reaction to change that is sustained by barometric pressure. The instantaneous vertical speed indicator is mounted inside the instrument panel directly below the altimeter (fig. 1-1 or fig. 1-2). A small slotted screw in the lower left face of instrument provides for zero adjustment.

2-3. REFERENCE DATA. Instrument panel and indicating systems: Section 17, HMI - Vol 1. Weight and balance data: HMI - Vol 2.

2-4. TROUBLESHOOTING. Use information in table 2-1 for troubleshooting the vertical speed indicator.

2-5. MAINTENANCE OF VERTICAL SPEED INDICATOR. Maintain vertical speed indicator as outlined for instruments in Section 17,

HMI - Vol 1, except replace indicator according to paragraph 2-6 (369HS and 369D) or 2-7 (369E/F) herein.

2-6. REPLACEMENT OF VERTICAL SPEED INDICATOR - MODEL 369HS AND 369D HELICOPTERS. Replace vertical speed indicator as shown in figure 2-1 and as follows.

- a. Check that all electrical power is OFF.
- b. Remove instrument panel hood and left and right fairings (Section 17, HMI - Vol 1).
- c. Remove adapter, reducer and O-ring from rear of indicator. Remove clamp assembly, mounting hardware and vertical speed indicator.
- d. Install replacement indicator in reverse order of removal.

2-7. REPLACEMENT OF VERTICAL SPEED INDICATOR - MODEL 369E/F HELICOPTERS. Replace vertical speed indicator as shown in figure 2-2 and as follows.

- a. Check that all electrical power is OFF.
- b. Disconnect static line from rear of vertical speed indicator.
- c. Remove plug, nut, lockwasher, washer, and tab from bolt light.
- d. Remove bolt light from upper right corner of vertical speed indicator.
- e. Remove two screws and remove vertical speed indicator from instrument panel.
- f. Remove union from rear of vertical speed indicator.
- g. Install replacement indicator in reverse order of removal.

Table 2-1. Troubleshooting Vertical Speed Indicator

Symptom	Probable Trouble	Corrective Action
Excessive lag in vertical speed indication.	Vertical speed indicator defective.	Replace vertical speed indicator.
Erroneous vertical speed indication (airspeed or altimeter erratic).	Disconnected or loose static pressure line.	Reconnect or repair static pressure line.
Erroneous vertical speed indication (airspeed and altimeter correct).	Vertical speed indicator defective.	Replace vertical speed indicator.

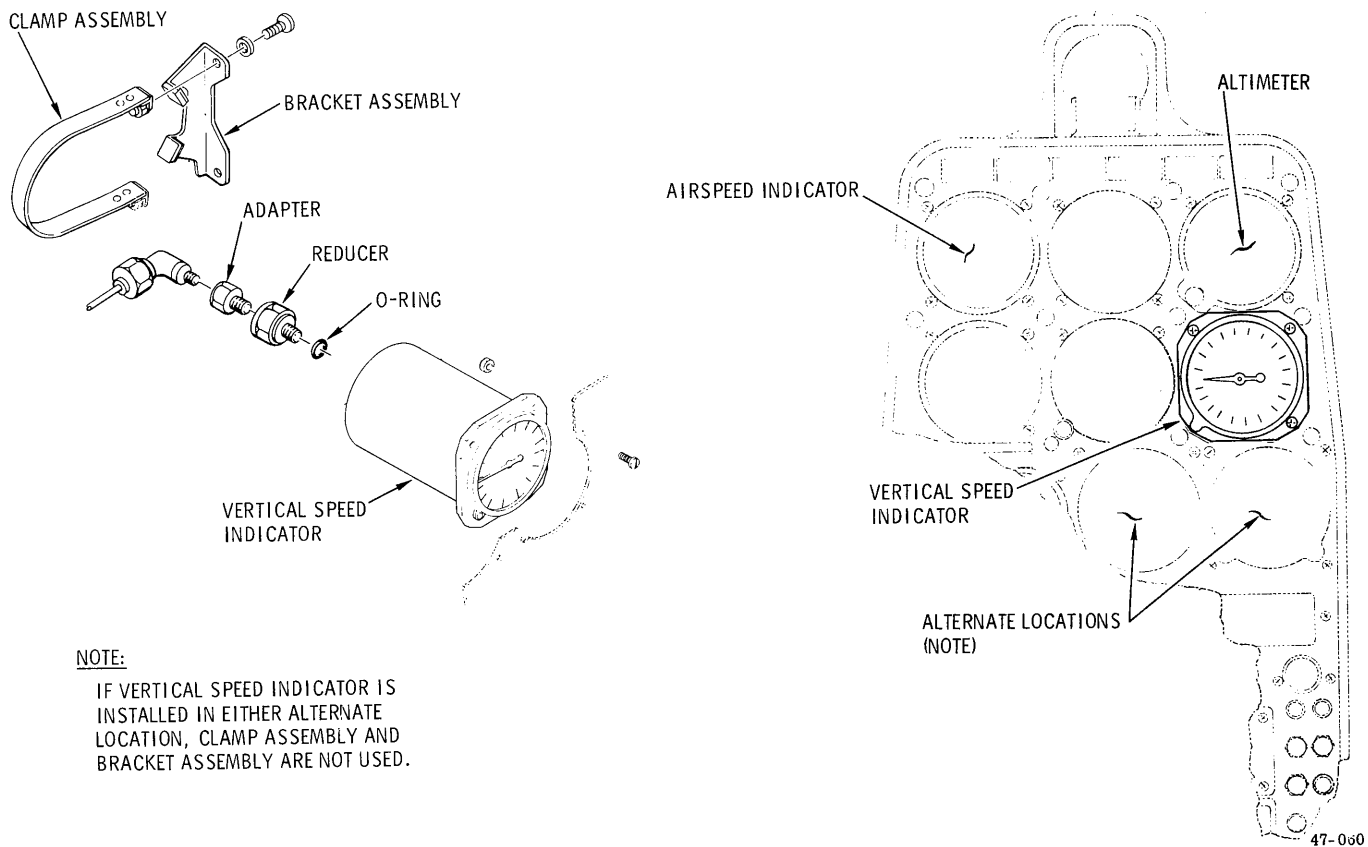
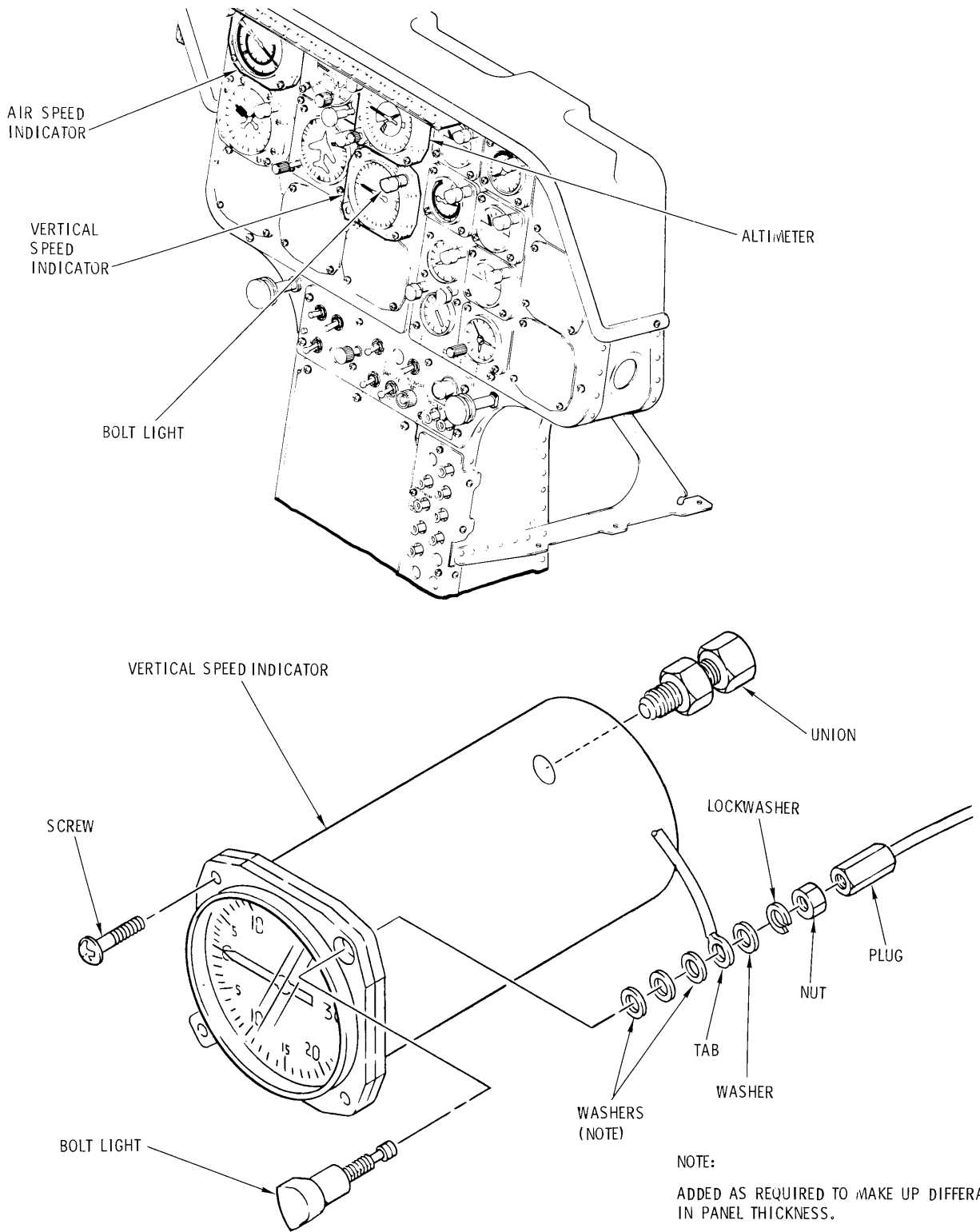


Figure 2-1. Vertical Speed Indicator 369HS and 369D Helicopters Replacement



47-1191

Figure 2-2. Vertical Speed Indicator Replacement – 369E/F Helicopters

SECTION III

INSTALLATION INSTRUCTIONS

3-1. GENERAL INFORMATION. Procedures in this section may be performed at operator's discretion and provide complete instructions for initial installation of the vertical speed indicator. Information in the installation instructions is presented as additional procedures to those for maintenance of standard instruments in HMI - Vol 1. (Reference is made in instructions to applicable data in HMI - Vol 1 to accomplish installation of the vertical speed indicator.)

3-2. PREPARATION. Preparation for installation of the vertical speed indicator includes the following.

a. Identify all components, including attaching hardware, or components removed for access to work areas. Protect components from damage and foreign matter until installed.

b. Check all cockpit electrical switches for OFF condition.

NOTE: Make sure BATT-OFF-EXT switch is OFF.

3-3. REMOVAL OF INSTRUMENT PANEL EQUIPMENT.

a. Remove instrument panel hood and left and right instrument panel fairings (Section 17, HMI - Vol 1) - 369D and 369HS helicopters only.

b. Remove blank panel from space directly below altimeter (A, fig. 1-2 on 369D and 369HS helicopters or A, fig. 1-1 on 369E/F helicopters).

3-4. INSTALLATION OF VERTICAL SPEED INDICATOR - MODEL 369D AND 369HS HELICOPTERS.

a. Using mounting hardware 13, 14, bracket assembly (4), and clamp assembly (3), install vertical speed indicator (15) in instrument panel as shown in figure 1-2.

b. Remove static line and fitting from airspeed indicator; replace fitting with connector (8), tube (7) and tee (6). Connect static line to tee as shown in figure 1-2.

c. Remove protective plug from rear of vertical speed indicator (15) and install O-ring (12), reducer (11), adapter (10) and union elbow (9) in indicator.

d. Connect line (5) to tee (6) and union elbow (9).

3-5. INSTALLATION OF VERTICAL SPEED INDICATOR AND BOLT LIGHT - MODEL 369E/F HELICOPTERS.

a. Remove protective plug from rear of vertical speed indicator (2) and install union (1) as shown in fig. 1-1.

b. Insert vertical speed indicator (2) into instrument panel and secure with two screws (11) as shown in fig. 1-1.

c. Remove plug and nut from bolt light (10) and install in mounting hole on vertical speed indicator (2). Position bolt light (10) to illuminate over indicator face as shown in fig. 1-1.

d. Retrieve wire L537J20N from console electrical wire harness 369D24155 and attach it to tab (9).

e. Install washers (as required), tab (9), washer (8), lockwasher (7), nut, and plug to bolt light (10) as shown in fig. 1-1.

f. Attach contact (12) to white pigtail wire DS134 (from plug on bolt light) and connect to TB503-1L.

g. Remove static line from altimeter and connect tube (4) as shown in fig. 1-1.

h. Remove static line from airspeed indicator and connect tube (5) as shown in fig. 1-1.

i. Install tee (6) between tubes (4) and (5) in position shown in fig. 1-1.

j. Connect one end of tube (3) to union (1) on vertical speed indicator (2) and the other end to tee (6) as shown in fig. 1-1.

3-6. COMPLETION OF INSTALLATION.

a. Check entire installation for completeness.

b. Check all static pressure lines (tubes).

c. Clean all foreign material from instrument panel.

d. Reinstall instrument panel left and right fairing and hood (Section 17, HMI - Vol 7) - 369HS and 369D helicopters only.

e. Perform operational check of completed vertical speed indicator installation.

f. Revise weight and balance records (para 3-7).

3-7. WEIGHT AND BALANCE.

3-8. GENERAL. Weight and balance changes resulting from installation of the vertical speed indicator are listed in table 3-1. After installation of vertical speed indicator, incorporate changes in helicopter weight and balance records as instructed in HMI - Vol 2.

Table 3-1. Weight and Balance Data

Version	Weight Change (lbs)	Longitudinal Arm (in)	Longitudinal Moment Change (in-lbs)
Basic	+1.7	43.1	+73
-503	+1.6	43.1	+69