Publication No. CSP-089

Illustrated Parts List and Maintenance Instructions with Initial Installation Instructions

FOR

DUAL STARTING KIT

Part No. M30306

USED ON HUGHES 500D (MODEL 369D) HELICOPTERS

Hughes Helicopters, Inc. Culver City, California 90230

COD081582

Issued 1 October 1982

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Hughes Helicopters
Centinela and Teale Streets
Culver City, California 90230

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FOREWORD

F-1. PURPOSE AND CONTENT OF THIS MANUAL. This manual supplements information contained in HMI - Vol 1. (CSP-D-2). 369D - IPC (CSP-D-4) and Dual Controls Opt. Eqpt Manual (CSP-018), and contains instructions for initial installation and continuing maintenance for the dual starting equipment. Weight and balance data is included. This manual also contains parts lists for procuring replacement parts for the dual starting equipment.

F-2. APPLICABILITY. The dual starting kit is applicable for use on any Hughes model 369D helicopter equipped with optional dual controls.

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 I. HMI - Vol 1.

F-5. USE OF THIS MANUAL. This manual is for use by operators of the Model 369D helicopter equipped with dual starting kit. Although this manual is a separate publication. it should be kept with HMI - Vol 1. HMI - Vol 2. (CSP-D-3) 369D - 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 369D - 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 1
ILLUSTRATED PARTS LIST

1-1. SCOPE AND CONTENTS. This illustrated parts list provides. by means of text (parts lists) and companion illustrations. a complete parts definition of the M30306 Dual Starting Kit, manufactured by Hughes Helicopters. Inc.. Culver City. California.

NOTE: The illustrated parts list is organized and presented in the same manner as the 369D Series Illustrated Parts List (369D - IPC). (For information on use. refer to the 369D - IPC.)

1-2. GROUP ASSEMBLY PARTS LIST. The parts lists furnish information for procuring replacement parts for the dual starting kit equipment, and shall not be used for any other purpose.

1-3. ILLUSTRATIONS. Illustrations are provided for each group assembly parts list. Each illustration is exploded to the extent necessary to show parts relationship for the complete dual starting kit installation.

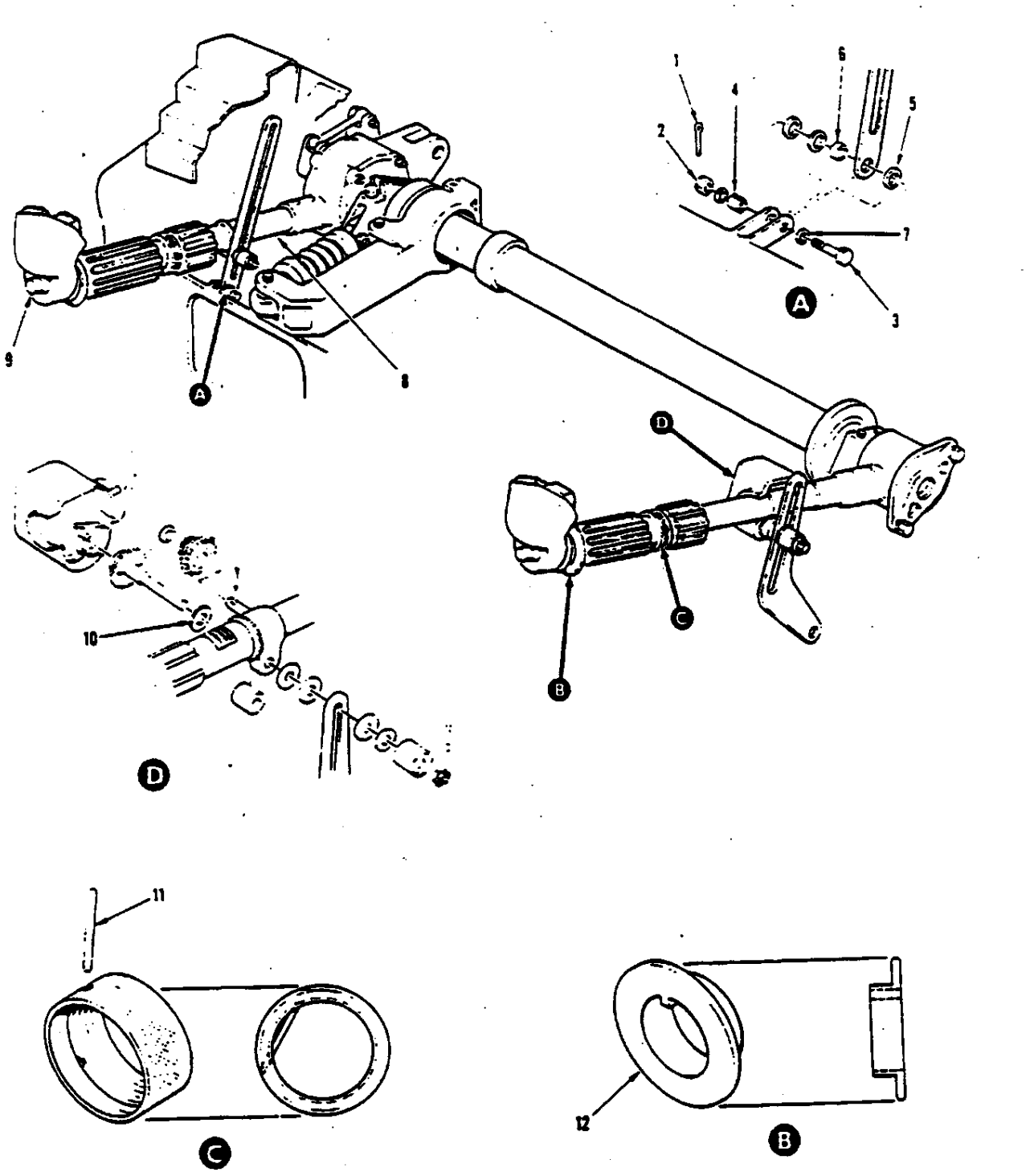


Figure 1-1. Dual Starting Kit

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-1-	M30306	DUAL STARTING KIT	1	
-1	MS324665-143	. PIN, COTTER	1	
-2	MS17826-4	. NUT	1	
-3	NAS6204-15D	. BOLT	1	
-4	HS626-4-340	. BUSHING	1	
-5	AN960PD616	. WASHER	3	
-6	HS610C3745 R252T320	. BUSHING	1	
-7	AN960PD416L	. WASHER	2	
-8	369A7307-603	. STICK ASSY, Pilots collective (Refer to 369D - IPC for bkdn)	1	
-9	269A4637	. SWITCH	1	
-10	MS25440-6	. WASHER	1	
-11	MS35672-1	. PIN	1	
-12	M30306-5	. RING	1	

SECTION 2
MAINTENANCE INSTRUCTIONS

2-1. GENERAL INFORMATION. The dual starting kit installation modifies the optional 369D helicopter dual controls installation (CSP-018) to permit starting of the helicopter from either the pilot (left hand) or copilot (right hand) position. Collective friction and throttle friction is adjusted using the inboard (copilot's) collective pitch stick and is accessible by either the pilot or copilot. With the dual starting kit installed, provisions for collective and throttle friction adjustment are removed from the pilot's (left hand) collective stick.

2-2. DESCRIPTION. The dual starting kit consists of a pilot's collective stick assembly (8, fig. 1-1) installed in place of the copilot's collective pitch stick. provided as part of the optional dual controls equipment. and the inboard collective pitch stick socket. Hardware necessary to modify the pilot's collective pitch stick friction and throttle friction mechanisms is also included. All switches on the pilot's and copilot's collective sticks are duplicated.

2-3. REFERENCE DATA. Sections 7 and 19. HMI - Vol 1 and CSP-018.

2-4. TROUBLESHOOTING. Troubleshooting dual collective controls with the dual start kit installed requires the same procedures as those in Section 7. HMI - Vol 1 for the 500MD helicopter.

NOTE: When troubleshooting and rigging collective controls with dual starting kit installed. the copilot's collective pitch stick must be treated as the 500MD pilot's collective pitch stick. and instructions peculiar to the 500MD copilot's collective pitch stick apply to the left hand. or pilot's collective stick.

2-5. RIGGING COLLECTIVE CONTROLS. Rig collective controls according to Section 7. HMI - Vol 1 and above note. Rigging fixture (1. table 3-1) must be used. If necessary. extend slot in pilot's collective friction guide link to allow proper rigging using the inboard collective stick.

2-6. INBOARD COLLECTIVE PITCH CONTROL TRIM COVER. Remove. install. inspect and repair inboard collective pitch control trim cover as directed in Section 2. CSP-018.

2-7. MAINTENANCE OF COPILOT'S COLLECTIVE PITCH STICK. Remove. disassemble. and install copilot's collective pitch stick as instructed in Section 7. HMI - Vol 1 for 500MD pilot's collective pitch stick. Refer to Section 19. HMI - Vol 1 for replacement of pitch stick switches.

2-8. REMOVAL OF PILOT'S COLLECTIVE PITCH STICK. Remove pilot's collective pitch stick according to instructions in Section 7. HMI - Vol 1.

2-9. DISASSEMBLY OF PILOT'S COLLECTIVE PITCH STICK (369D LEFT POSITION). (See figure 2-1.)

a. Cut two nylon straps. and remove stick friction mechanism guard.

b. Remove setscrews that secure switch housing.

NOTE: Removal of additional setscrew is also required on helicopters equipment with cargo release mechanism (Opt Eqpt Manual CSP-005).

c. Cut nylon strap or twine that secures electrical wiring to stick tube. Push wire slack into stick carefully pull housing and wiring from end of stick tube and disconnect wiring from switches. (For switch replacement. refer to Section 19 HMI - Vol 1.)

d. Remove setscrew and wire guide from forward end of stick. Tie string on each wire bundle to aid reassembly and remove wiring.

e. Remove spring and Nylafil ring.

f. Remove grip attach bolts and grip from stick tube.

g. Remove adjusting nut pin and throttle friction nut only if stick tube replacement is necessary. or if end play must be adjusted. (Refer to paragraph 2-12.)

h. Remove friction mechanism and guide from stick fitting.

i. Remove idler gear from stick fitting.

NOTE: In following steps. do not remove bearings or pinion unless replacement is necessary.

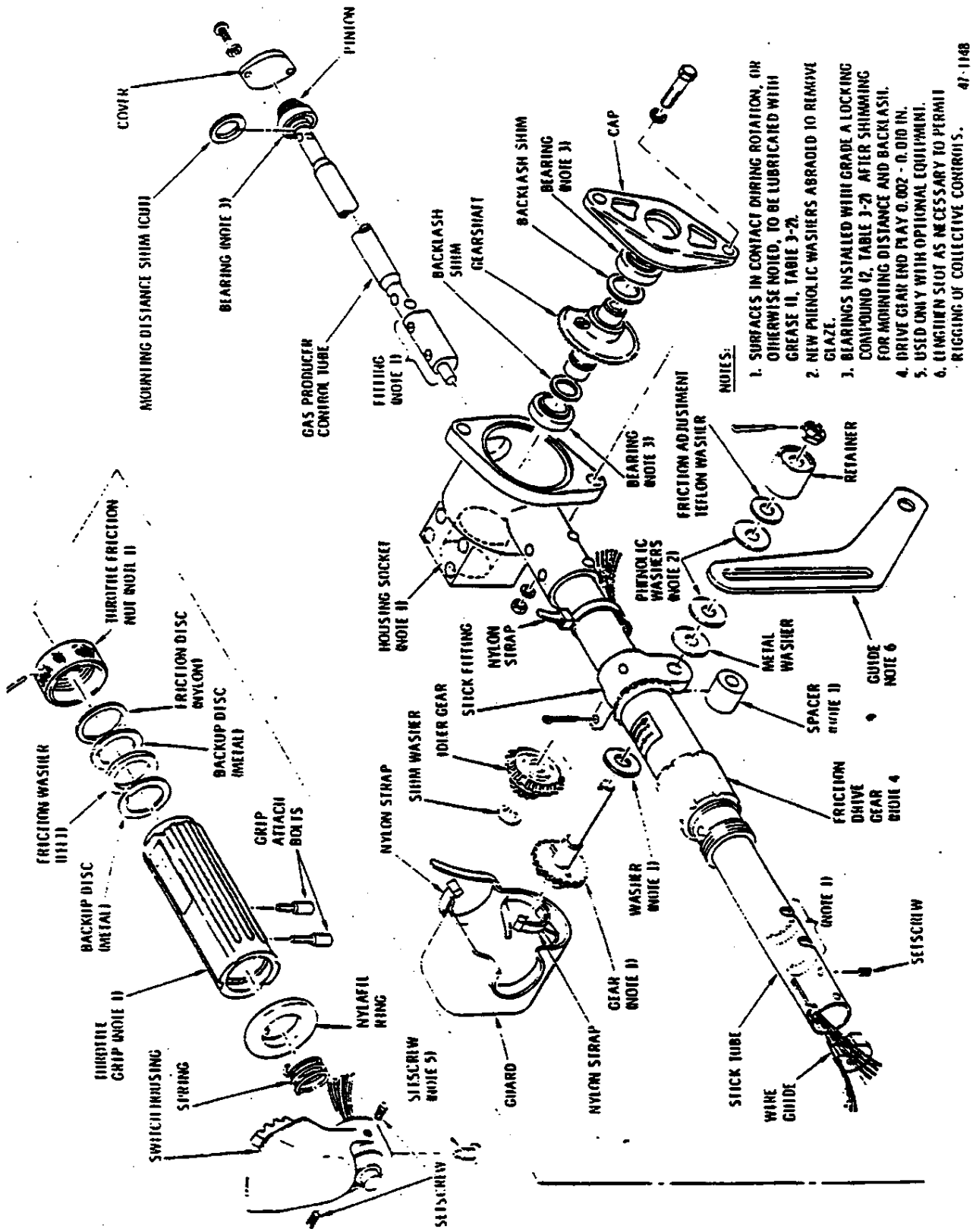


Figure 2-1. Pilot's Collective Pitch Stick - Exploded View

j. Remove cap from stick housing.
k. Remove gear shaft assembly. Keep backlash shims with gear shaft.
l. Remove cover from back of stick housing.
m. Remove gas producer control tube through access hole at back of stick housing. Remove mounting distance shim housing. Remove adjust pinion gear mounting distance. (Refer to Section 7. HMI - Vol 1.)

2-10. INSPECTION OF PILOT'S COLLECTIVE PITCH STICK (LEFT POSITION).

a. Inspect bearings for binding or looseness.
b. Inspect all gears for cracks, and chipped or broken teeth.
c. Inspect stick tube and gas producer control tube for corrosion. deformation and loose rivets.

NOTE: Pitch stick housing and cap may be either magnesium or allov casting. (For corrosion control and identification of magnesium or aluminum alloys. refer to Section 2. HMI - Vol 1.)

2-11. REPAIR OF PILOT'S COLLECTIVE PITCH STICK (LEFT POSITION).

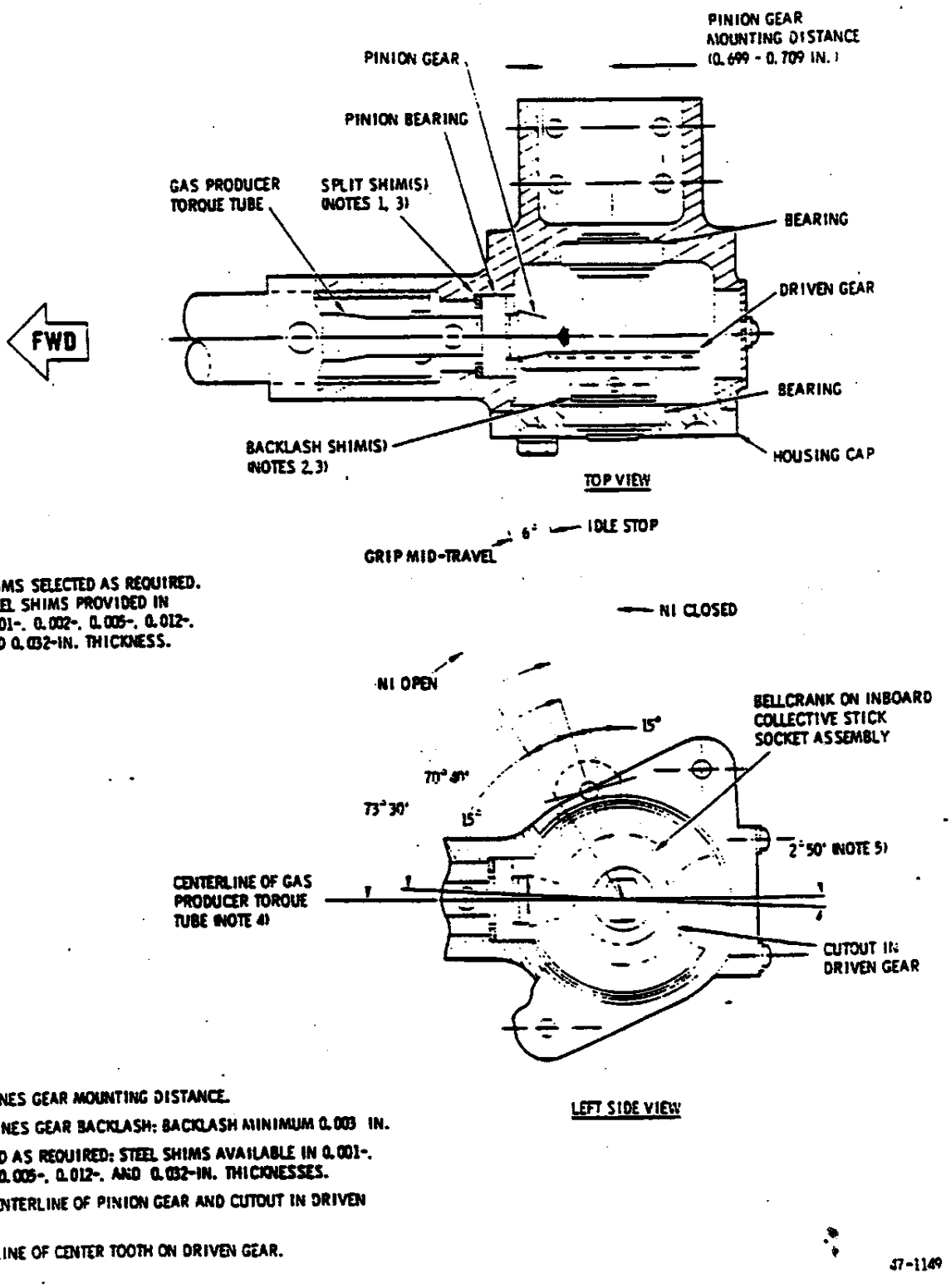
a. Replace bearings if corroded. excessively worn. or if outer or inner races of bearings rotate on mating surfaces and locking compound is inadequate to prevent rotation.
b. Replace loose rivets in gas producer control tube.
c. Replace friction drive gear or idler gear with cracked. chipped or broken teeth.
d. Replace phenolic friction washers against guide if worn to less than 1/32 inch thickness.
e. Replace friction gear assembly if driven gear has cracked. chipped or broken teeth. Replace damaged spacer.

2-12. REASSEMBLY OF PILOT'S COLLECTIVE PITCH STICK (LEFT POSITION).

a. Check gearshaft bearings in housing cap and housing for security of outer races (fig. 2-1). Use grade A locking compound (2. table 3-2) to install replacement bearings. Use care to prevent compound from entering bearings. and make sure that each bearing is seated against its bore shoulder.
b. Using grease (1). lubricate stick tube interior where gas producer control tube fitting makes contact.
c. Attach strings routed through stick tube during disassembly. and thread electrical wire bundles from plug through exit hole. throttle friction nut. friction washers and discs. and throttle grip. and spring (fig. 2-1). Pull wiring out through front end of stick tube.
d. Install wire guide so that it divides switch wiring: three wires in one cutout and four in the other. Align guide with marching hole in stick tube and install setscrew. When tightened. screw must be flush or not recessed more than 0.010 inch below outer tube surface.
e. Install gas producer control tube through access hole in back of stick housing. and through stick tube until control tube fitting engages wire guide bore. Reinstall mounting distance shims at forward side of pinion bearing if removed during disassembly. (One edge of shim must be cut for installation.)

NOTE: Steps f through h below are used to determine gas producer control tube pinion mounting distance (fig. 2-2).

f. Install approximate required thickness of split shims between pinion bearing and housing to establish gas producer control tube pinion mounting distance.
g. Apply 10 pound load pulling gas producer torque tube forward compressing shims.
h. Add or subtract shims to provide 0.699 - 0.709 inch dimension shown in figure 2-2. Repeat step g during each measurement.
i. After mounting distance shimming is correct. remove gas producer control tube and apply grade A locking compound (2. table 3-2) to outside diameter pinion bearing outer race and stick housing bore. Reinstall control tube. and check that compound does not enter bearing and that bearing outer race and shims are firmly seated against housing bore.
j. Using grease (1. table 3-2). lubricate ID of throttle grip and install grip on stick tube. Align grip and gas producer control tube fitting and install grip attach bolts. When tightened. bolts must be at least flush and not recessed more than 0.010 inch below outer surface of grip.
k. Check throttle grip for zero end play on stick tube and that not more than 5 inch-pound-torque is required to rotate the grip. If these conditions exist, proceed with o below. If there is end play. or too much torque is required to rotate the grip. perform steps l. m. and n.
l. Remove grip attach bolts and grip.
m. Insert 3.64-inch-diameter drift punch into access hole on forward face of throttle friction nut and drive roll pin from nut and threaded fitting of stick tube.
n. Reinstall grip with grip attach bolts and establish zero end play and correct rotational friction (5 inch-pounds maximum) between nut and grip. Using 5/64-inch drill. match-drill stick tube fitting threads to existing pin groove in nut. and install pin. Clearance between forward end of nut and grip must not exceed 0.010 inch.
o. Establish gas producer control tube pinion and shaft assembly bevel gear backlash (fig. 2-2) by temporarily installing driven gear. shaft. and two bearings. plus approximate required



NOTE:

SHIMS SELECTED AS REQUIRED. STEEL SHIMS PROVIDED IN 0.001-, 0.002-, 0.005-, 0.012-, AND 0.032-IN. THICKNESS.

NOTES:

1. DETERMINES GEAR MOUNTING DISTANCE.
2. DETERMINES GEAR BACKLASH; BACKLASH MINIMUM 0.009 IN.
3. SELECTED AS REQUIRED; STEEL SHIMS AVAILABLE IN 0.001-, 0.002-, 0.005-, 0.012-, AND 0.032-IN. THICKNESSES.
4. ALSO CENTERLINE OF PINION GEAR AND CUTOUT IN DRIVEN GEAR.
5. CENTERLINE OF CENTER TOOTH ON DRIVEN GEAR.

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Figure 2-2. Gas Producer Drive Mounting Distance and Backlash (Pilot's Collective Pitch Stick)

thickness of backlash shims in housing as shown in figure 2-2. Temporarily install housing cap. Add or subtract shims to provide maximum backlash of 0.003 inch without bind in gears. Make certain that bearings are completely seated in bores while establishing this backlash adjustment.

p. After backlash shimming is correct, remove housing cap and gear shaft.

q. Lubricate teeth of pinion gear and shaft assembly bevel gear with grease (1, table 3-2).

r. Apply grade A locking compound (2), to secure gearshaft to bearings. Do not allow compound to enter bearings. With throttle grip at mid-travel, install driven gear as shown in figure 2-2. Note that at throttle-grip mid-travel, cut out portion of the driven gear is to be opposite pinion gear. (Centerline of center tooth of driven gear is two degrees and fifty minutes from center of driven gear cutout.)

NOTE: With throttle grip at mid-travel, two grip attach bolts (fig. 2-1) are positioned approximately straight down.

s. Install housing cap on shaft assembly and seat with hand pressure while slowly rotating.

t. Route wiring through Nylafil ring and spring, and using solder (3, table 3-2) connect wiring to switches on switch housing.

u. Position Nylafil ring and spring on grip and pull slack from wiring in stick tube through exit hole at bottom of tube. Attach switch housing to grip with setscrews.

v. Secure wiring to stick approximately one inch aft of exit hole using nylon strap or twine (3, table 3-2).

w. Place friction mechanism guard on stick tube and secure with two nylon straps.

2-13. INSTALLATION OF PILOT'S COLLECTIVE PITCH STICK (369D LEFT POSITION).

(See figure 2-2.)

a. Lubricate stick housing socket with grease (1, table 3-2).

b. Install stick by sliding housing on collective control interconnecting torque tube. Install bolts, washers and nuts. Tighten nuts equally and by small increments until correct torque is applied (Section 2, HMI - Vol 1).

NOTE: On completing attachment of pilot's collective pitch stick (step b) and inboard collective stick assembly on collective control interconnecting torque tube (step c), check that both pilot's and copilot's throttle grips are at mid-travel position. Also at mid-travel, two pilot's throttle grip attaching bolts should be approximately straight down. Both grips should be set to and held at these positions while socket and stick gearing is interconnected by gas producer interconnect torque tube. If mid-travel positions are not synchronized, further adjustment of installation is required.

c. Complete insertion of collective torque tube, install cradle cap, position bungee bracket in mounting position, connect droop control override link, install copilot's collective stick assembly (para 2-7) and install collective bungee (Section 7, HMI - Vol 1).

d. Place friction guide in seat structure bracket. Arrange three washers and bushings, loosely spaced between bracket ears, so that guide is in line (parallel) with stick. Install attaching hardware.

e. Connect electrical plug.

f. Install outboard collective stick cover (Section 2, HMI - Vol 1). Raise and lower stick, verify that wiring does not foul.

g. Remove snap plug from exterior skin, rotate throttle and visually check for zero backlash between gas producer interconnect torque tube and hexagonal interior surfaces of drive gearshaft in stick housing. Eliminate any backlash by tightening pipe plug (Section 7, HMI - Vol 1) in end of torque tube; zero backlash is required at both ends of tube.

h. Check that copilot's stick throttle grip is at mid-travel when pilot's stick throttle grip is set to mid-travel. If not, adjust collective pitch stick gas producer control linkage (para 2-14).

2-14. ADJUSTMENT OF GAS PRODUCER LINKAGE IN INSTALLED COLLECTIVE PITCH STICKS.

Adjust linkage as described in Section 7, HMI - Vol 1.

2-15. COLLECTIVE PITCH STICK FRICTION.

Check and adjust collective pitch stick friction using copilot collective pitch controls according to instructions in Section 7, HMI - Vol 1.

2-16. ELECTRICAL WIRING AND SWITCHES.

Electrical wiring and switches are duplicated on pilot's and copilot's collective pitch sticks. Refer to Section 19, HMI - Vol 1 for repair of switches and to wiring diagrams, Section 20, HMI - Vol 1.

SECTION 3
INSTALLATION INSTRUCTIONS

3-1. GENERAL INFORMATION. Installation of dual starting kit is applicable to any 369D helicopter equipped with optional dual controls (CSP-018). Procedures as given are the approved methods to be used when installing the dual starting kit and are performed at owner's and operator's discretion. Reference is made in these instructions to data in HMI – Vol 1 and CSP-018 to accomplish installation of the dual starting kit.

3-2. REFERENCE DATA. Tables are used to list special tools (table 3-1), consumable materials and expandable items (table 3-2). Items listed in tables 3-1 and 3-2 are recommended by the manufacturer for use on Hughes 369D helicopters. All items listed in table 3-2 are of a commercial nature and should be procured locally. Alternate but equivalent items are acceptable.

3-3. PREPARATION FOR INSTALLATION. Refer to illustrated parts lists (Section I) before installation to ensure that all required parts are included in the dual start kit. The list can also be used to identify any parts that may have been damaged during shipment.

3-4. PILOT'S COLLECTIVE PITCH STICK. The collective friction and throttle friction mechanisms on the pilot's collective pitch stick must be deactivated when the dual start kit is installed. Modification of the friction mechanisms and stick assembly is required.

3-5. REPLACEMENT OF FRICTION ADJUST CAM. The friction adjust cam in the pilot's collective stick friction mechanism must be replaced with a washer (10, fig. 1-1). (See figure 2-1.)

a. Cut two nylon straps securing friction mechanism guard to collective stick and remove guard.

b. Remove cotter pin, nut, retainer and teflon and metal washers securing friction gear to guide.

c. Slide friction gear out, disengaging it from idler gear. Remove friction gear and friction adjustment cam from stick fitting.

d. Remove cam from gear assembly and replace with washer (10, fig. 1-1).

e. Insert gear shaft through stick fitting and guide. Ensure friction idler gear teeth mesh.

f. Reinstall washers, retainer and nut removed in step b. Install new cotter pin.

NOTE: Do not install friction guard on pilot's collective stick until modification of pilot's collective stick is completed.

3-6. PILOT'S COLLECTIVE PITCH STICK MODIFICATION. The stop release ring in the pilot's collective stick must be replaced with a Nylafil ring (12, fig. 1-1) and the throttle friction nut must be drilled and locked in position by pin (11).

Table 3-1. Special Tools

Item No.	Part Number	Nomenclature	Application or Use
1	369A9927	Collective rigging fixture.	Rigging main rotor collective controls.
2	369D29936	Collective bungee installation tool.	Holding collective bungee in compression.

Table 3-2. Consumable Materials and Expendable Items

Item No.	Material	Specification No. (1)	Commercial Product (2) Name No.	Commercial Product (2) Manufacturer
1	Grease	MIL-G-2387	Bray Cote 627	Bray Oil Company
			Aero Shell 7	Shell Oil Company
			Exxon 5114EP	Exxon Oil Company
2	Locking Compound Grade A	MIL-S-22473 MIL-R-46082	LOCKTITE No. 35	Loctite Inc. 705 No. Mountain Road Newington CT 06111
3	Solder. Tin Alloy	QQS-571 (Composition SN60WRP2)	(3)	
4	Twine. Nylon	MIL-T-713	(3)	

NOTES: (1) Numbers are U.S.A. Specifications and Standards. The prefix symbols are defined as follows: AMS - American Material Standard; MS - Military Standard: MIL - Military Specification; Single. double or triple alpha prefix of the same letter - Federal Specification; AN - Air Force-Navy Aeronautical Standard; NAS - National Aerospace Standard.

(2) Primary selection. Any equivalent material may be used as an alternate selection.

(3) Use the best comparable grade material when the conformity of available materials of the same type with the listed Specification No. cannot be determined.

a. Remove setscrews that secure switch housing.

NOTE: Removal of additional setscrew is also required on helicopters equipped with cargo release mechanism (Opt Eqpt Manual CPS-005).

b. Cut nylon strap or twine that secures electrical wiring to stick tube. Push wire slack into stick. carefully pull housing and wiring from end of stick tube and disconnect wiring from switches. (For switch replacement. refer to Section 19. HMI - Vol 1.)

c. Remove setscrew and wire guide from forward end of stick. Tie string on each wire bundle to aid reassembly and remove wiring.

NOTE: Idle step release ring will not be reinstalled at reassembly.

d. Remove spring and idle stop release ring.

e. Remove grip attach bolts. Slide throttle grip. friction washer and discs. and friction nut from stick tube.

f. Place throttle friction nut in suitable holding device and using 5/64-inch drill. drill hole from side to side of throttle friction nut as shown in figure 3-1.

g. Using fish string attached to wire bundles during disassembly. feed wires through exit hole at bottom of stick and pull them through opening at top of stick.

h. Install wire guide in stick tube with one wire bundle in each cutout. Align guide with matching hole in stick tube and install setscrew. When tightened. setscrew must be at least flush and not recessed more than 0.010 inch below outer surface of tube.

i. Using grease (1. table 3-2) lubricate ID of throttle grip and install grip on stick tube. Align grip and gas producer control tube fitting

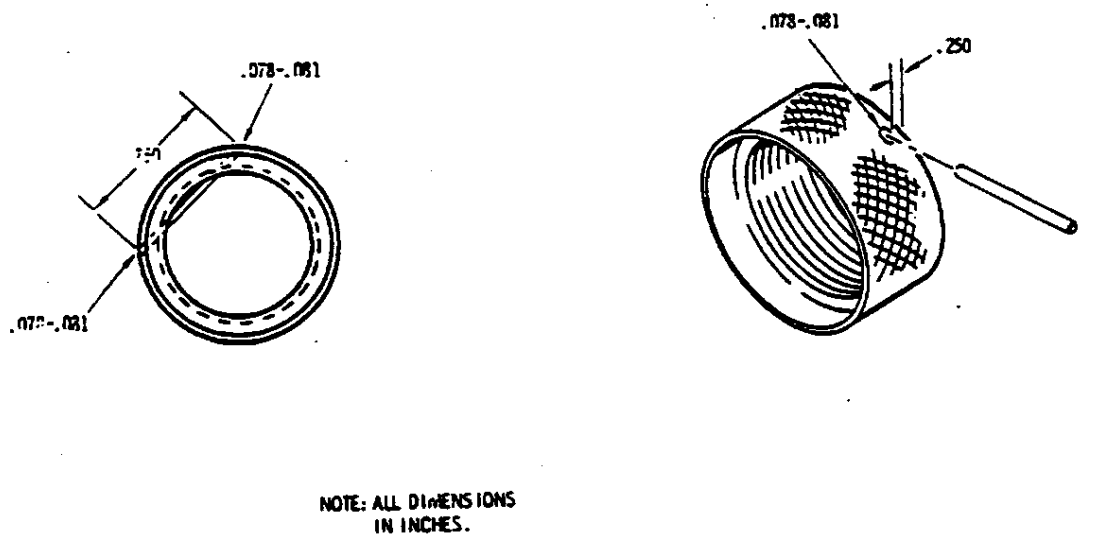


Figure 3-1. Drilling Throttle Friction Nut - Pilot's Collective Pitch Stick

and install grip attach bolts. When tightened, bolts must be at least flush and not recessed more than 0.010 inch below outer surface of grip.

j. Establish zero end play, add correct rotational friction (5-inch pounds maximum), then match drill stick tube fitting threads to hole drilled in adjust nut. Install roll pin (11, fig. 1-1). Forward end of friction nut must not be more than 0.010 inch grom grip.

k. Route wiring through ring (12) and spring. Using solder (4, table 3-2) connect wiring to switches on switch housing.

l. Position ring and spring on grip and pull slack from wiring in stick tube through exit hole at bottom of tube. Attach switch housing to grip swith setscrews.

m. Secure wiring to stick approximately one inch aft of exit hole, using nylon strap or twine (4, table 3-2).

n. Place friction mechanism guard (removed in paragraph 3-5) on stick tube and secure with two nylon straps.

3-7. REPLACEMENT OF COPILOT'S COLLECTIVE PITCH STICK AND INBOARD COLLECTIVE PITCH STICK SOCKET. The copilot's collective pitch stick and the inboard collective pitch stick socket must be removed and replaced with the new copilot's collective pitch stick assembly (8, fig. 1-1) provided.

3-8. REPLACEMENT OF START SWITCH IN COPILOT'S COLLECTIVE PITCH STICK. Before installing copilot's collective pitch stick (8, fig. 1-1), the installed start switch must be replaced with the start switch (9) provided with the dual starting kit.

a. Remove attaching hardware securing stick grip switch housing. Remove housing and switchplate.

b. Disconnect installed start switch wiring and remove switch.

c. Connect wiring using solder (3, table 3-2) to start switch (9, fig. 1-1).

d. Reinstall switchplate and housing and secure housing to stick grip with attaching hardware.

3-9. REMOVAL OF COPILOT'S COLLECTIVE STICK AND SOCKET.

a. Remove copilot's collective pitch stick cover and collective pitch stick. (Refer to CSP-018.)

WARNING: Install bungee installation tool (2, table 3-1) before disconnecting any collective stick hardware (either pilot's or copilot's). There is strong bungee spring pressure present in the stick linkage: if suddenly released, spring reaction in the linkage can cause personal injury, or parts damage.

b. Remove inboard collective pitch stick socket. (Refer to Section 7. HMI - Vol 1).

3-10. INSTALLATION OF COPILOT'S COLLECTIVE PITCH STICK ASSEMBLY.

a. Lubricate surfaces that are in contact during rotation with grease (1, table 3-2) (fig. 3-2).

b. Ensure that pilot's and copilot's throttle grips are in same relative positions. Slide copilot's stick housing on collective interconnecting torque tube. align matching holes and secure stick to torque tube.

c. With pilot's and copilot's stick grips at mid-travel. rotate bellcrank back and forth slightly to engage socket assembly to gearshaft on hexagonal end of gas producer interconnect torque tube.

d. Align and/or match bellcrank centerline. gearshaft assembly gear cutout and pilot's throttle as shown in figure 3-3.

e. Position friction guide in seat structure bracket with bushing (4. fig. 1-1). bushing (6). and three washers (5) loosely spaced between bracket ears so guide is in line (parallel) with stick. Install bolt (3). two washers (7). nut (2) and new cotter pin (1).

f. Connect electrical plug.

g. Perform operational check of collective stick friction and adjust friction mechanism as necessary (Section 7. HMI - Vol 1).

h. Remove collective bungee installation tool. (Refer to Section 7. HMI - Vol 1.)

i. Reinstall collective pitch stick cover and other hardware removed for access.

j. Move collective stick through full travel to ensure there is no binding or interference from electrical wiring.

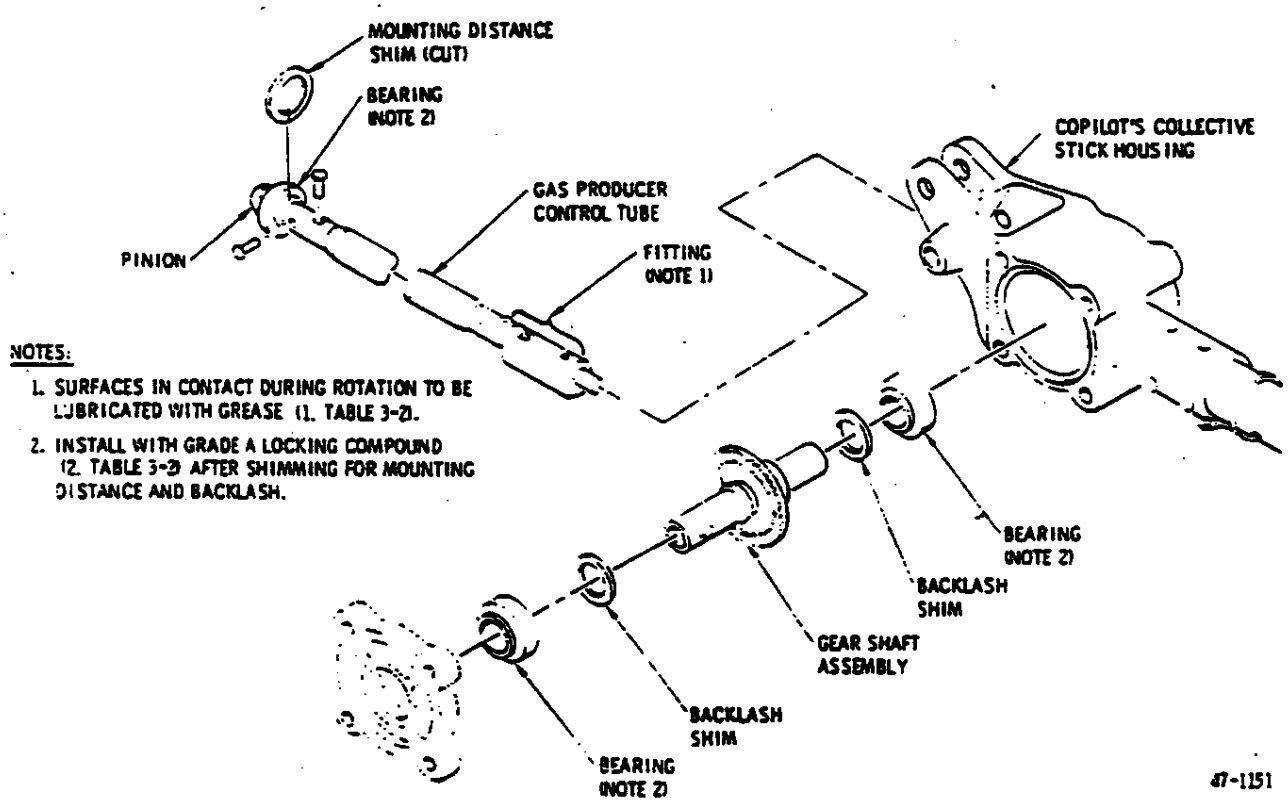
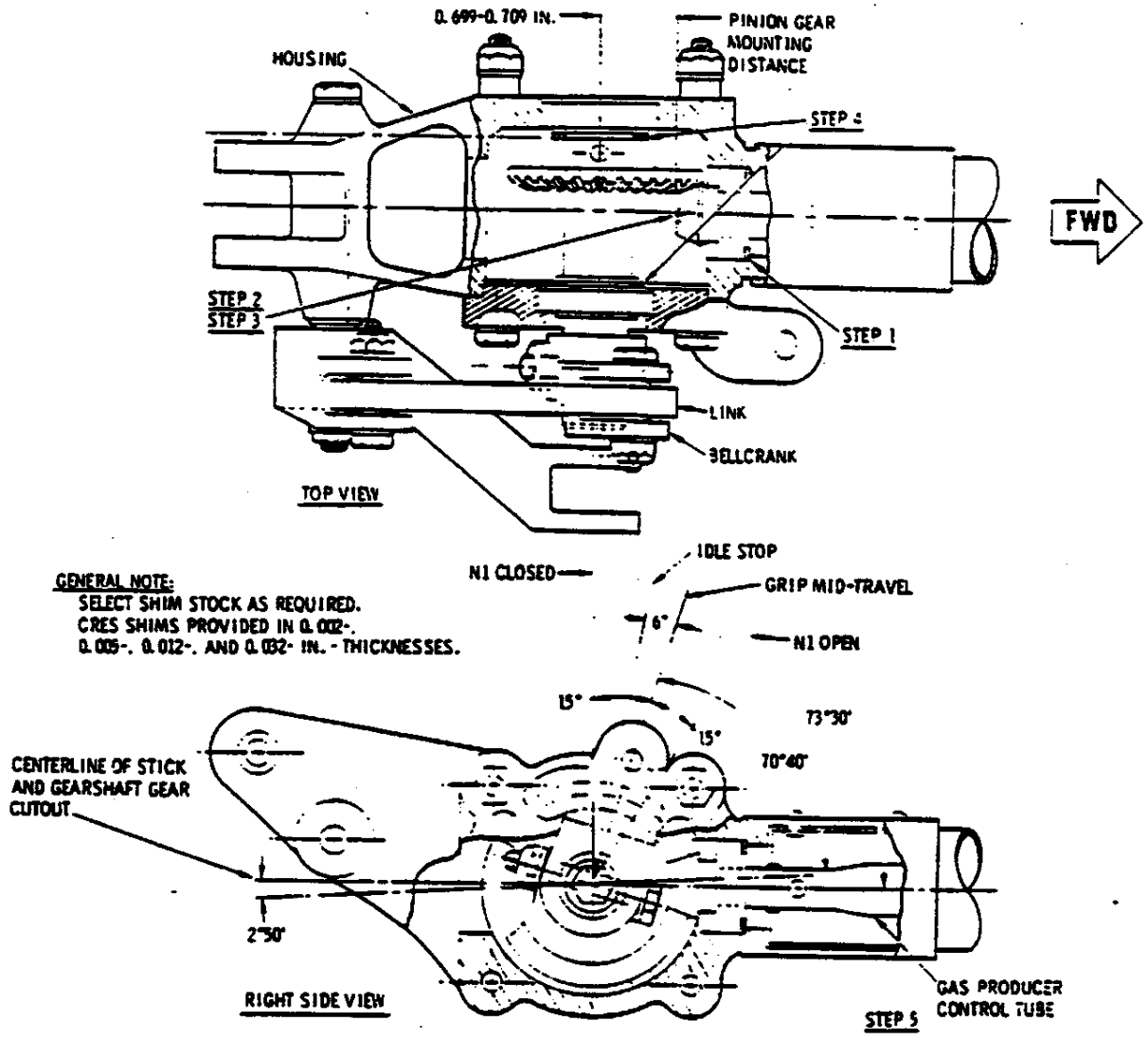


Figure 3-2. Gas Producer Control Tube - Exploded View



STEP 1: INSTALL MOUNTING DISTANCE SHIMS FOR 0.699-0.709 IN. PINION GEAR MOUNTING DISTANCE. AFTER SHIMMING IS CORRECT, INSTALL BEARING IN HOUSING WITH GRADE A LOCKING COMPOUND (2, TABLE 3-2).
NOTE: SHIMS ARE CUT THROUGH ONE EDGE FOR INSTALLATION.

STEP 2: APPLY 10 LB MINIMUM LOAD TO END OF PINION DURING CHECK OF MOUNTING DISTANCE DIMENSION.
NOTE: TIGHTENING THROTTLE FRICTION NUT APPLIES SUFFICIENT LOAD.

STEP 3: POSITION THROTTLE GRIP AT MID-TRAVEL.
NOTE: ONE PINION GEAR TOOTH EQUALS 5°38'.

STEP 4: INSTALL BACKLASH SHIMS TO OBTAIN 0.003 IN. MAXIMUM BACKLASH
CAUTION: HOUSING AND CAP BEARINGS MUST BE SEATED AGAINST BORE SHOULDER, GEARS MUST NOT BIND, AND PINION MOUNTING DISTANCE MUST BE CORRECT.

STEP 5: AFTER SHIMMING IS CORRECT, INSTALL GEARSHAFT BEARINGS WITH GRADE A LOCKING COMPOUND. INSTALL GEARSHAFT WITH LINK ATTACHED TO BELLCRANK) SO THAT POSITION OF BELLCRANK, AND CENTERLINE OF GEARSHAFT GEAR CUTOUT ARE AS SHOWN. CENTERLINE OF GEARSHAFT CUTOUT SHOULD MATCH CENTERLINE OF STICK.
NOTE: CENTERLINE OF GEARSHAFT GEAR CENTER TOOTH IS 2°50' OFF THE CUTOUT CENTERLINE. 47-1152

Figure 3-3. Adjustment of Gas Producer Drive Mounting Distance and Backlash - Copilot's Collective Stick