LAMAR Starter

Overhaul & Maintenance for:

Lycoming Engine

Applications

Effective: June 1, 2011

This manual includes assembly, disassembly of the starter motor, cleaning, visual inspection, tools, torques, service inspection limits; and test specifications as well as troubleshooting guidelines and an illustrated parts list. Models covered in this manual:
PM1201,PM1202,PM1203,PM1204
PM2401,PM2402,PM2403,PM2404

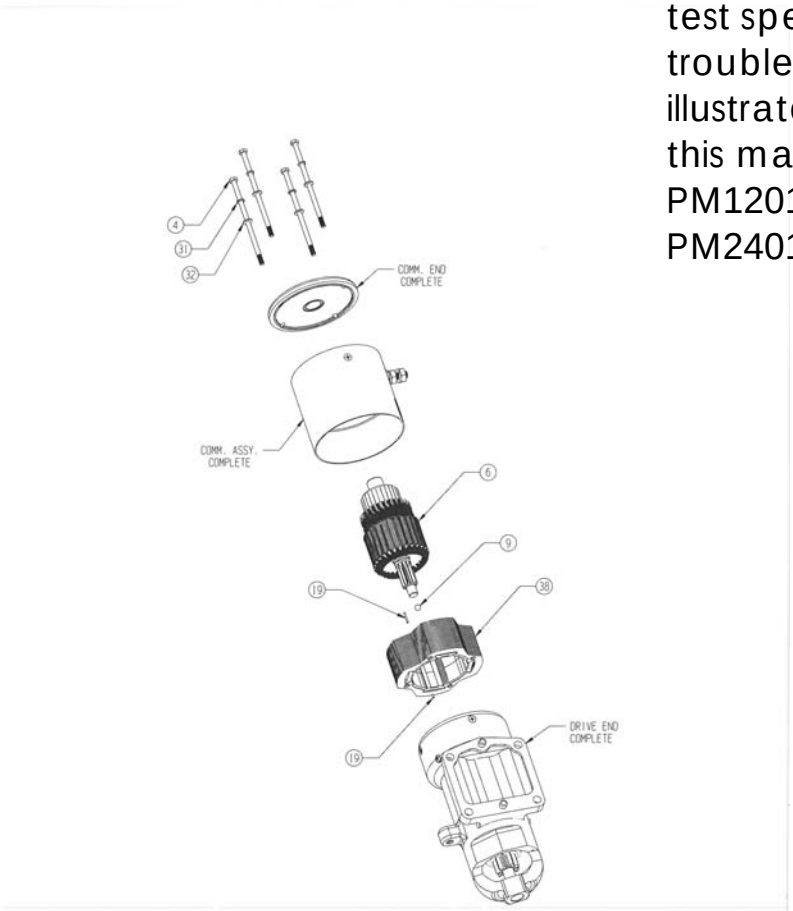


Table of Contents

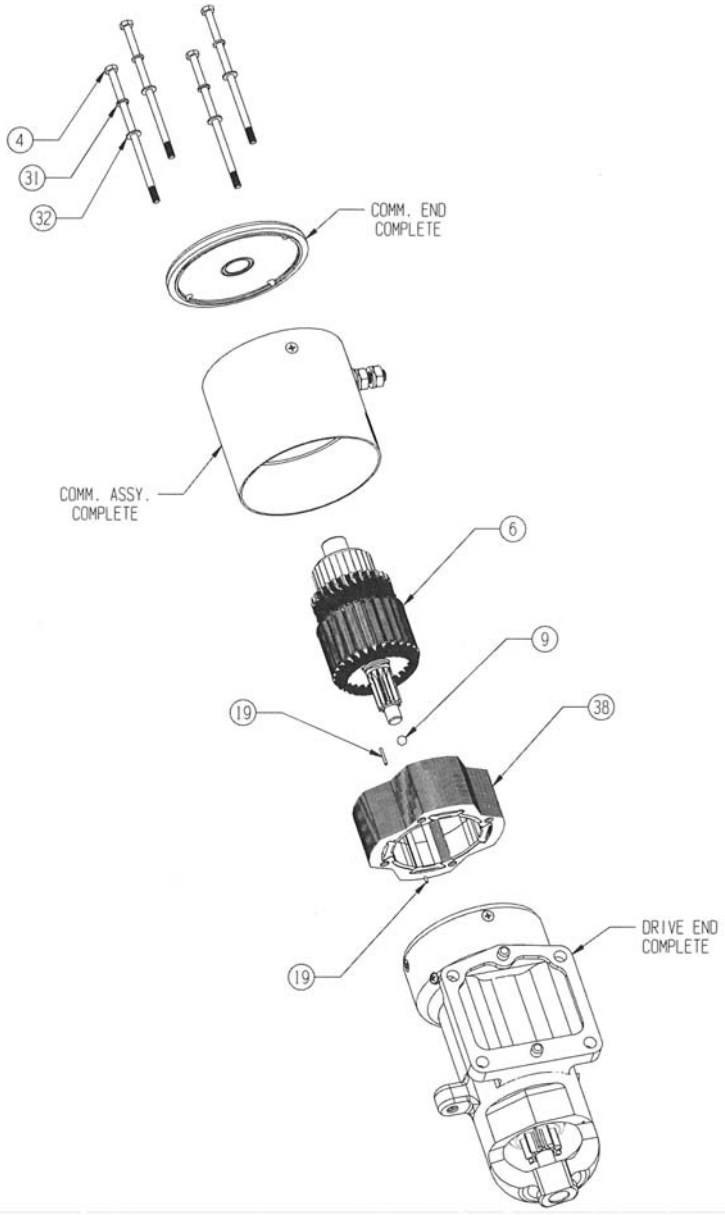


Fig 1: Starter, Exploded View

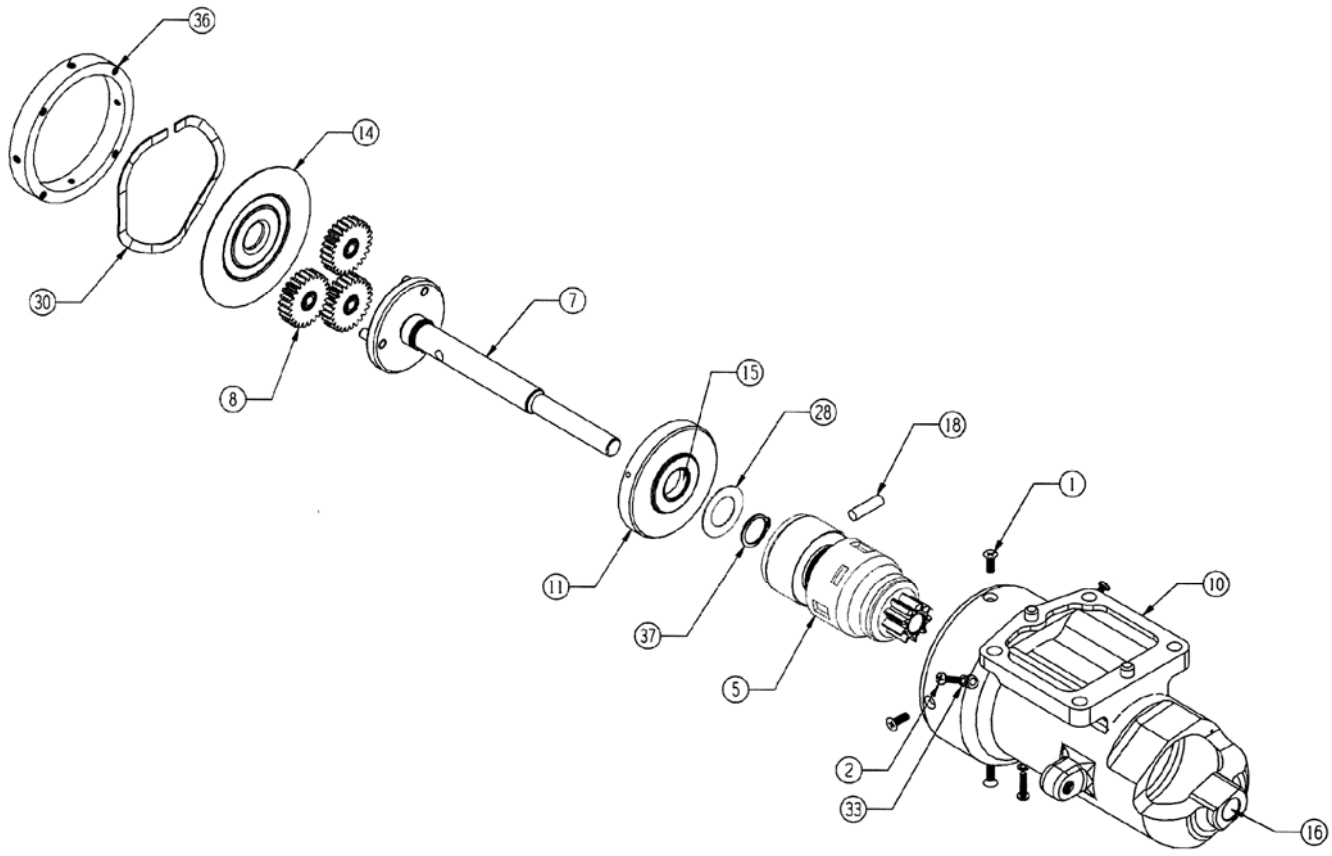


Fig 2: Starter Drive End, Exploded View

DISASSEMBLY PROCEDURE

1) Separate the comm. assy. by removing four Thru-bolts. (#4). (see figure 1)
2) Remove comm. end assembly (comm. end complete) (see figure 1)
3) Remove Bearing (#17) from comm. end (#13) and discard bearing. (see figure 6)
4) Remove item *comm. assy. Complete*. In most cases the comm. assy. will separate from the nose case with the Flux Ring assembly (#38) and armature assembly (#6). Remove armature (#6) from comm. Assy. by pushing Commutator end of the shaft with thumbs until it is free. (see figure 1)
5) Remove flux ring assembly (#38) from comm. assy. complete by pushing from the comm. end of the starter. It may be necessary to gently tap the flux ring from the brush end of the comm. assy. With a non metallic punch or a soft faced hammer to get it started. Pay attention not to damage or break the flux ring pins (#19). These pins are included in kit, if replacement is necessary. (see figure1)
6) From the comm. assy. complete remove brushes (#24&25), brush bracket (#21), brush spring (#22) and related hardware items (#2, 29&35) and discard. (see fig 12&13)
7) Remove and discard four screws (#1) from the Anchor Ring (#36). Remove the Anchor Ring (#36), Wave Washer (#30), Grease Shield (#14) Planetary Gears (#8). Discard planetary gears. (see figure 2)
8) Remove and discard the three screws (#2) and washers (#33) from Drive End. (see figure 2)

9) To dislodge the shaft assembly from housing tap open end of casting on a solid wood surface with enough force to dislodge shaft assembly.
10) Remove and discard Drive End Housing Bushing (#16). (see figure 2)
11) Remove Starter Drive Pin and discard (#18). To remove, compress Starter Drive to gain access to pin for removal. Remove and discard Starter Drive (#5). (see figure 2)

12) Remove and discard Snap Ring (#37) and Thrust Washer (#28) from shaft. (see figure 2)

13) Remove Intermediate Shaft Support (#11) then remove and discard Bushing (#15). (see figure 2)

CLEANING AND VISUAL INSPECTION

NOTES:

- Clean all parts to ensure all grease, oil and foreign materials are removed. Use of Stoddard Solvent Federal Specification CS3-40 or equivalent is recommended. Do not soak armature or Flux Ring, blow dry with compressed air.
- **Do not** use Carbon Tetrachloride when cleaning the Motor section.
- Use standard aircraft inspection techniques to determine serviceability of Starter components.
- Abnormal wear, cracks, warping or damage are cause for rejection.
- Wear beyond the limits shown in service inspection limits is also cause for rejection.
- If starter has #8 Thru Bolts (fig1#4, 31, 32), OHK-0003 can be ordered to upgrade to current standard (#10 thru bolts). This will include hardware and Anchor Ring.

1) Inspect Flux Ring Magnets for chipping and, or separation. Replace the Flux Ring Assembly if this occurs.

2) Armature Assembly: Make certain to remove carbon or copper particles imbedded in the insulation material between the commutator bars. Inspect the Armature shaft for signs of scoring, galling, signs of over heating or other damage. Inspect gear end of shaft for excessive wear. Replace armature as necessary. Commutator: Replace Armature assembly if any high or delaminated commutator bars are found. Inspect the contact surface of the Commutator. Satisfactory condition is indicated by an even, highly burnished copper color. If the contact surface is rough, pitted, scored, or darkened by a hardened film of carbon or oil which cleaning failed to remove, the Commutator must be resurfaced. (Refer to Service Inspection Limits). Use Scotch-Brite to clean armature and commutator.

3) Output Shaft: Inspect output Shaft pins), which support planetary gears (#8) for excessive wear. (Refer to Service Inspection limits, pg.21). Inspect output Shaft bushing for uneven or excessive wear. (Refer to Service Inspection Limits). If either pins or bushing are out of tolerance, the output shaft must be replaced. (see figures 9&10)

4) Starter Nose Assembly: Inspect Ring Gear for play or excessive tooth wear. Inspect Engine Pad pins for signs of being loose or missing. Replace Starter Nose Assembly if either of these happens. Inspect nose casting (#10) for cracks, unapproved modifications, or corrosion, replace if any of these conditions are found. (see figures 3,9, &10)

5) Intermediate Shaft Support: Clean and inspect Intermediate Shaft Support for stripped threads and general condition. Replace as necessary. (see figure 7)

6) Threaded Anchor Ring: Clean and inspect Threaded Anchor Ring (#36) for stripped threads, warping, and general condition. Replace as necessary. Refer to “Notes” for upgraded bolt size. (see figure 11)

Assembly Instructions

NOTE: Use loctite sparingly.

1) Starter Nose Assembly

Bushing Replacement:

Apply RC680 Loctite to outer surface of new Bushing (#16) and press from inside flush with inner surface of casting (#10). (see figure 3)

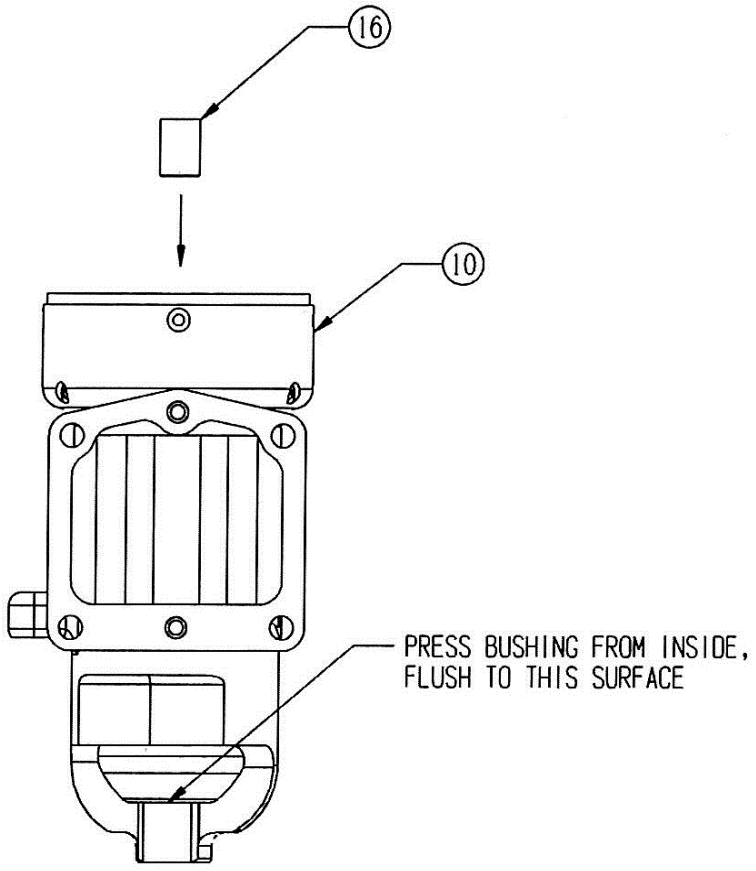


Fig 3: Nose Bushing Installation

2) Intermediate Carrier Assembly

Bushing replacement:
Apply Loctite RC680 to outer surface of Bushing (#15), press flush into Intermediate Carrier from the cup side of the assembly. Burnish to size using supplied tooling ball (#41)supported with a 15/16th socket, press ball thru bushing as shown. (see figure 4&5)

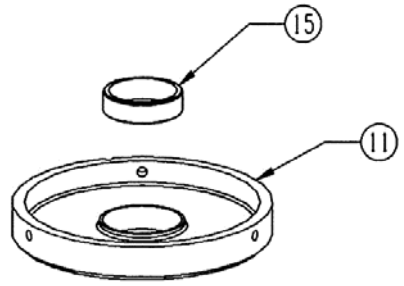


Fig 4: Intermediate Bushing Installation

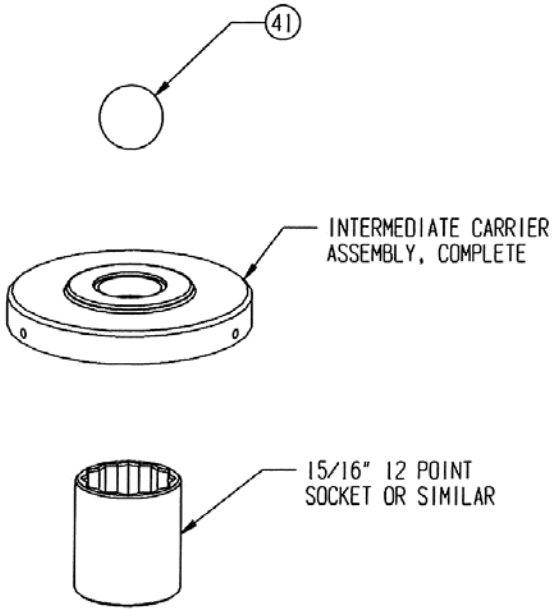


Fig 5: Ball Burnishing the Bushing

3) Comm. End Assembly - Ref: figure 6

Bearing replacement:

Apply Loctite RC680 to outer surface of Bearing (#17) and press in flush with outside surface of comm. end (#13). (see figure 6)

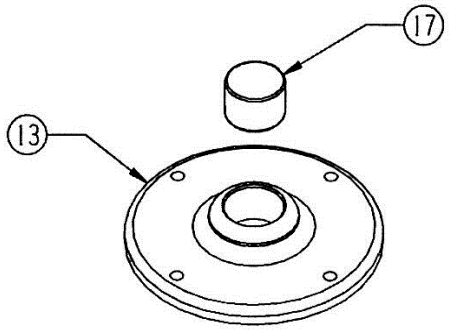


Fig 6: Bearing Installation

1) Output Shaft: Install Intermediate Carrier Assy complete, new Thrust Washer (#28), and new Snap Ring (#37) on shaft (#7). (see figure 7)

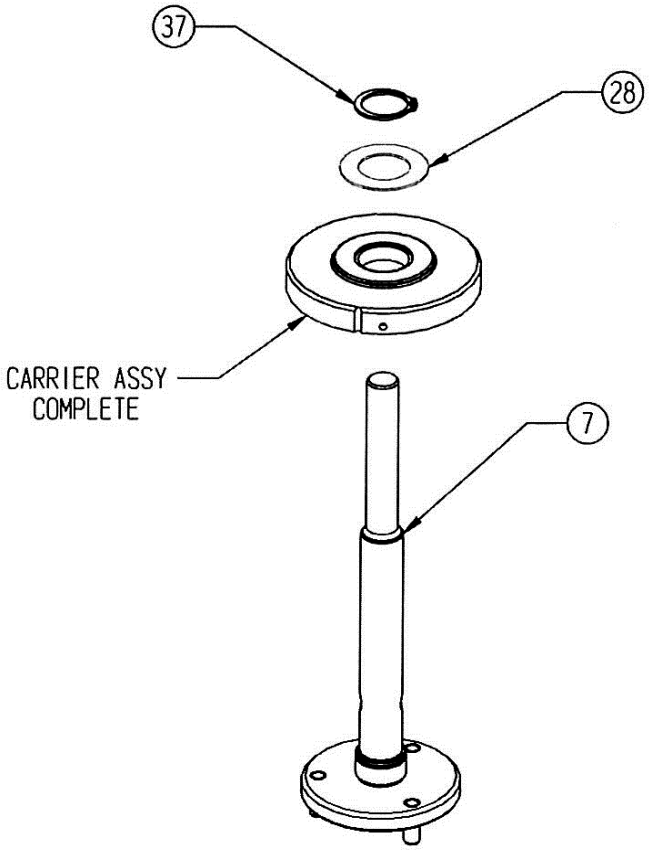


Fig 7: Shaft Assembly

2) Starter Drive: Coat shaft with silicone lube (#7), prior to installing starter drive. Install new Starter Drive assembly (#5) and new Starter Drive Pin (#18). To install Drive Pin depress the Drive to gain access to the pin hole. Install new Pin flush with output shaft (starter drive end should fully seat over the pin). (see figure 8)

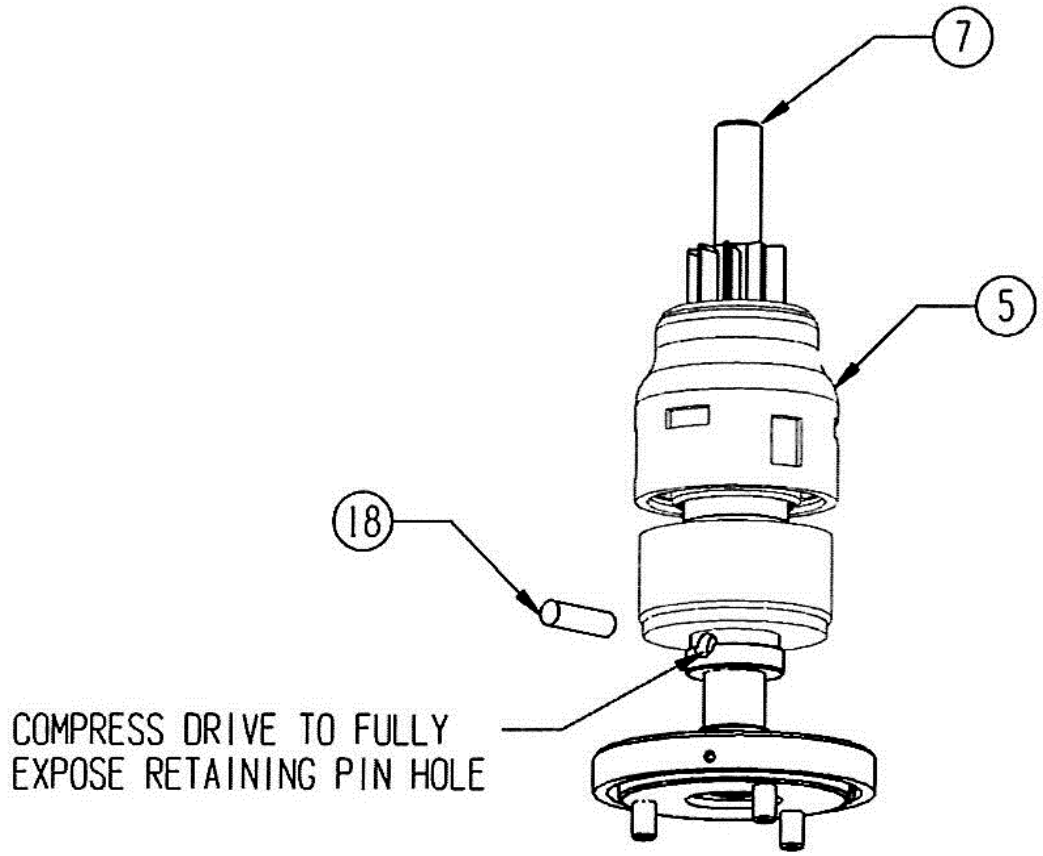
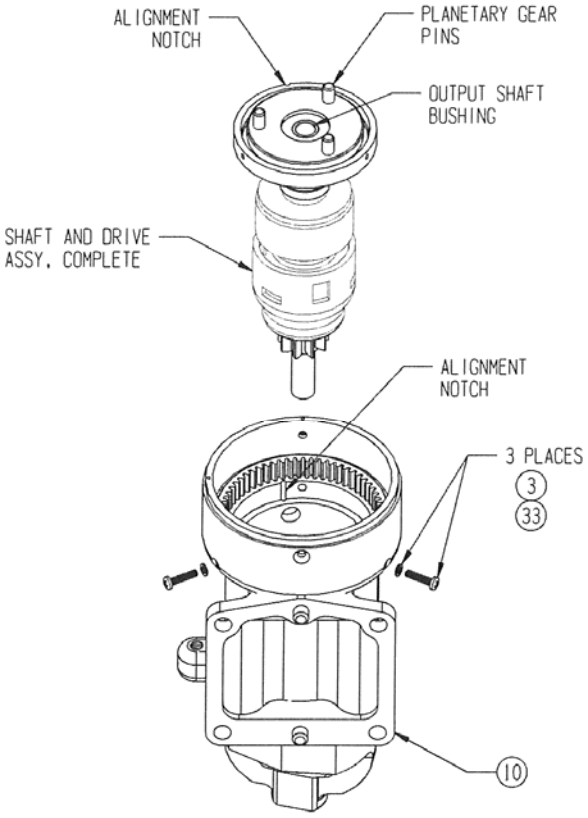


Fig 8: Starter Drive Installation

Note: If the starter drive pinion is rolled out it will lock in place in the extended position. If this happens it will stay in that position until the starter is mounted on the aircraft and started.

3) Drive End: Insert complete shaft assembly into nose housing, ensuring the alignment notches are aligned. Install three new split lock washers (#33) and three new screws (#33).Apply Locktite 242 to screws prior to installation, (Refer to Service Inspection Limits for torque). (see figure 9)

Fig 9: Shaft Assy Installation



4) Planetary Gears: Apply a coat of supplied grease to output shaft pins , face of shaft and ring gear (fig.10). Install Planetary Gears (#8) onto shaft pins. Apply remaining grease around both the sun gear (in nose housing) and planetary gears, with a thin coat on top of the planetary gears. (see figure 10)

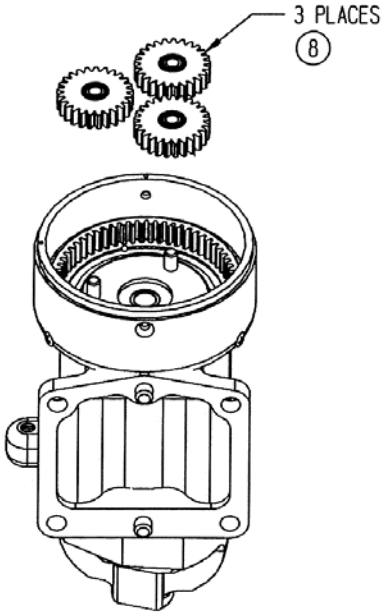


Fig 10: Planetary Gear Installation

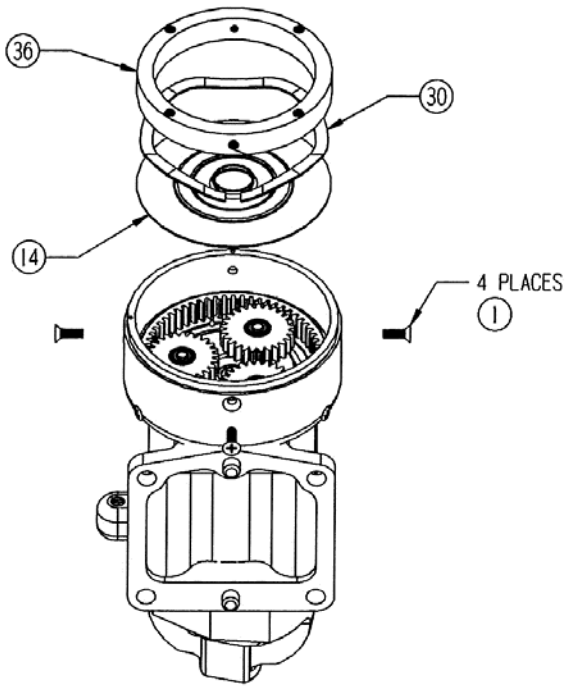


Fig 11: Anchor ring Installation

5) Anchor Ring: Install Grease Shield (#14) with raised center ridge facing away from planetary gears, Wave Washer (#30) and Threaded Anchor Ring (#14). Attach Anchor Ring to Nose Housing with four new screws (#14) using Loctite 242, (Refer to Service Inspection Limits for torque). (see figure 11)

6) Positive Brush replacement: Install new Brushes (#23). Ensure that the oval steel washer goes on the stud first then nylon shoulder washer next. Insert the brush assembly (#23) from the inside of the motor case with the nylon shoulder washer inserted into the stud hole with the long brush lead to the right looking down on the assembly. Next install the black insulating washer followed by the flat washer (#26) then lock washer (#25) then nut (#34) torque to spec and then temporarily install second lock washer (#25) and nut (#34) on the outside of the motor case. (Refer to Service Inspection Limits for torque). (see figure 12)

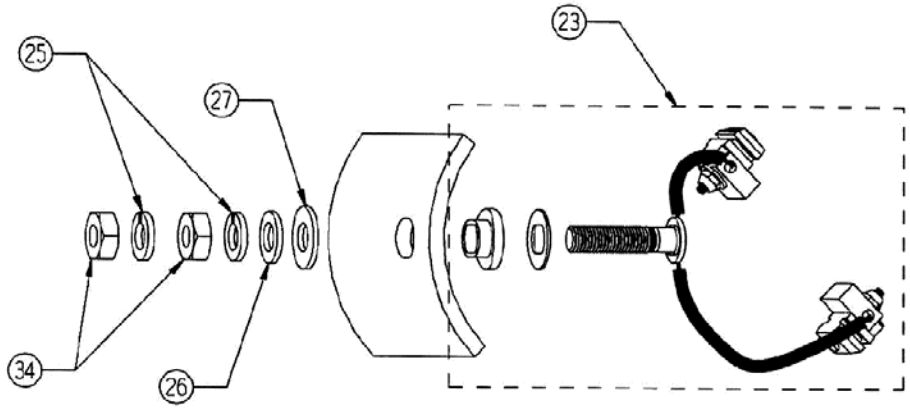


Fig 12: Positive Brush Installation

Fig 12: Positive Brush Installation

6) Negative Brush replacement: Install new Brushes (#24). First insert the brush mounting bracket in the brush bracket slot with the tab cutout (cutout) facing down (#21) and the brush spring (#22) with mounting screw (#2) followed by the brush (#24). Ensure the brush wire on mounting tab is on top with the exposed copper wire against the spring (Refer to Service Inspection Limits for torque). Note: ensure the brush bracket is parallel to the rim of the Comm Can and the brush springs compress completely without binding on the brush guides. (see figure 13)

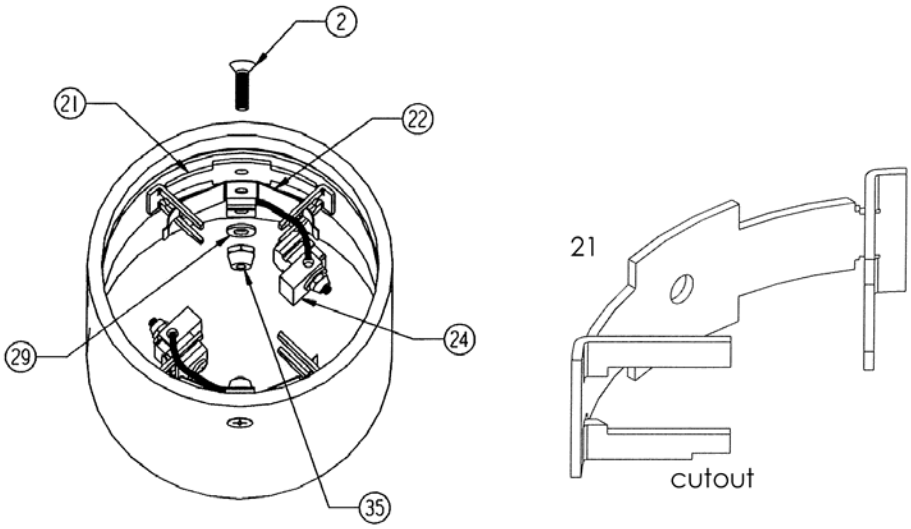
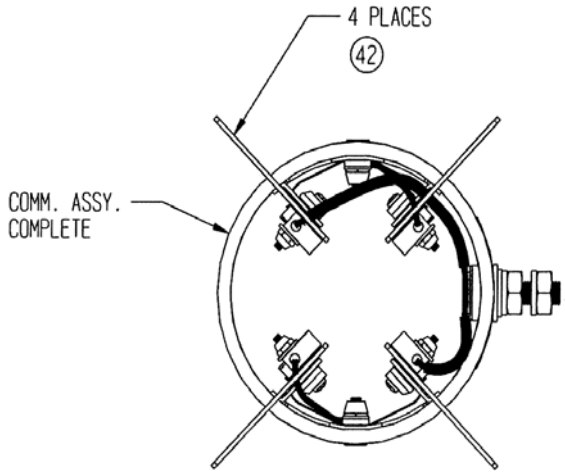


Fig 13: Negative Brush Installation



Important: Brushes must be oriented 90° as shown in (Fig.14) for proper starter performance. Install brush retaining clips by sliding the brush on the brush holder and compressing as shown, for ease of assembly.

Fig 14: Comm. Assembly complete w/brush retainers

7) Flux Ring Installation:

A) For Starter part numbers; PM1201 PM2401, PM1202 PM2402, PM1203 PM2403, refer to Fig 16 for proper Flux Ring orientation.

B) For Starter part numbers; PM1204 PM2404, refer to Fig 17 for proper Flux Ring orientation.

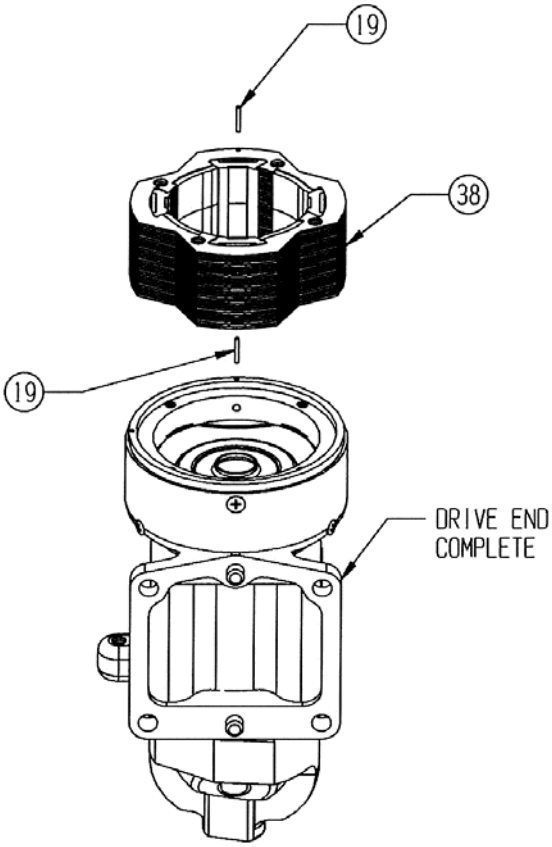


Fig 15: Flux Ring Installation

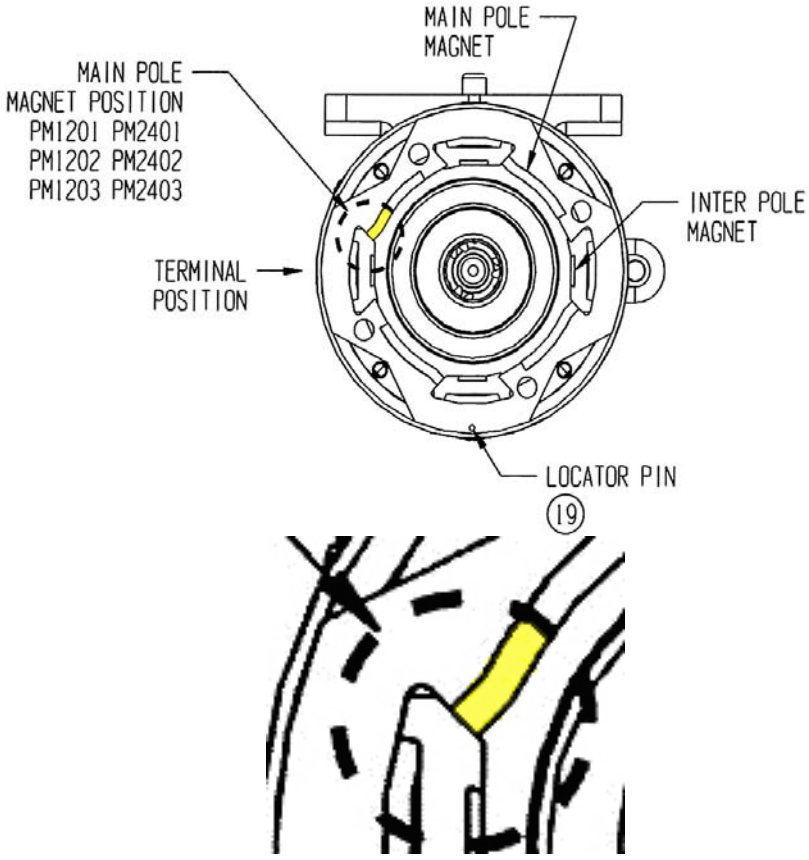
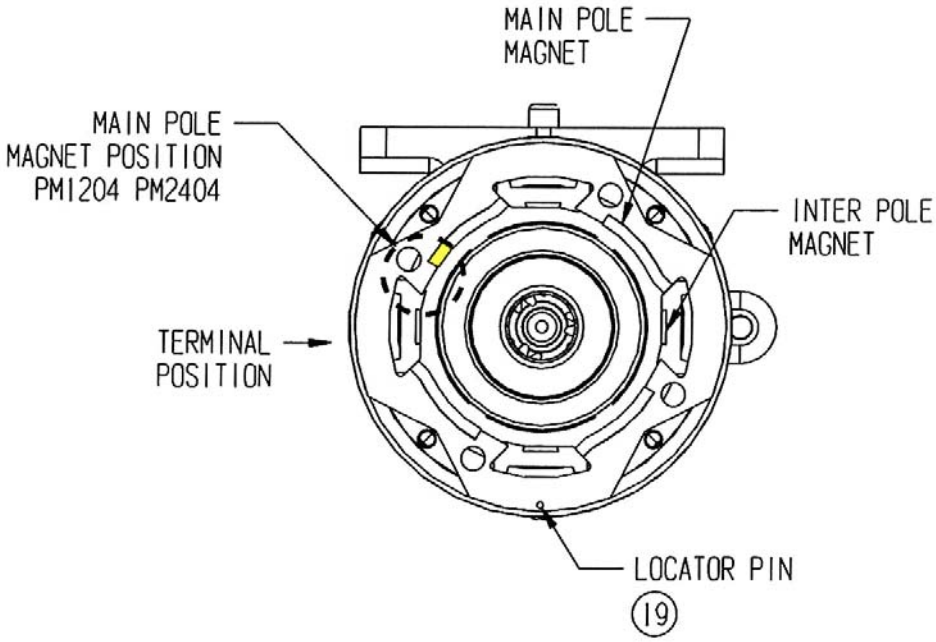


Fig 16: Flux Ring Orientation (right hand rotation)



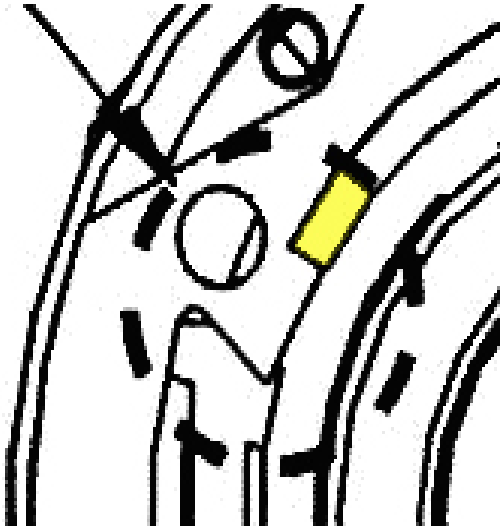


Fig 17: Flux Ring Orientation (left hand rotation)

IMPORTANT: Installing the Flux Ring backwards or upside down will result in incorrect rotation.

8) Armature: Insert Thrust Ball (#9) ensuring that it is fully seated in the end of the shaft assembly. If ball gets into gear assembly, extreme damage and starter failure will occur. Slide Armature (#6) into flux ring. (be cautious as magnets will want to pull it in very fast). (see figure 18)

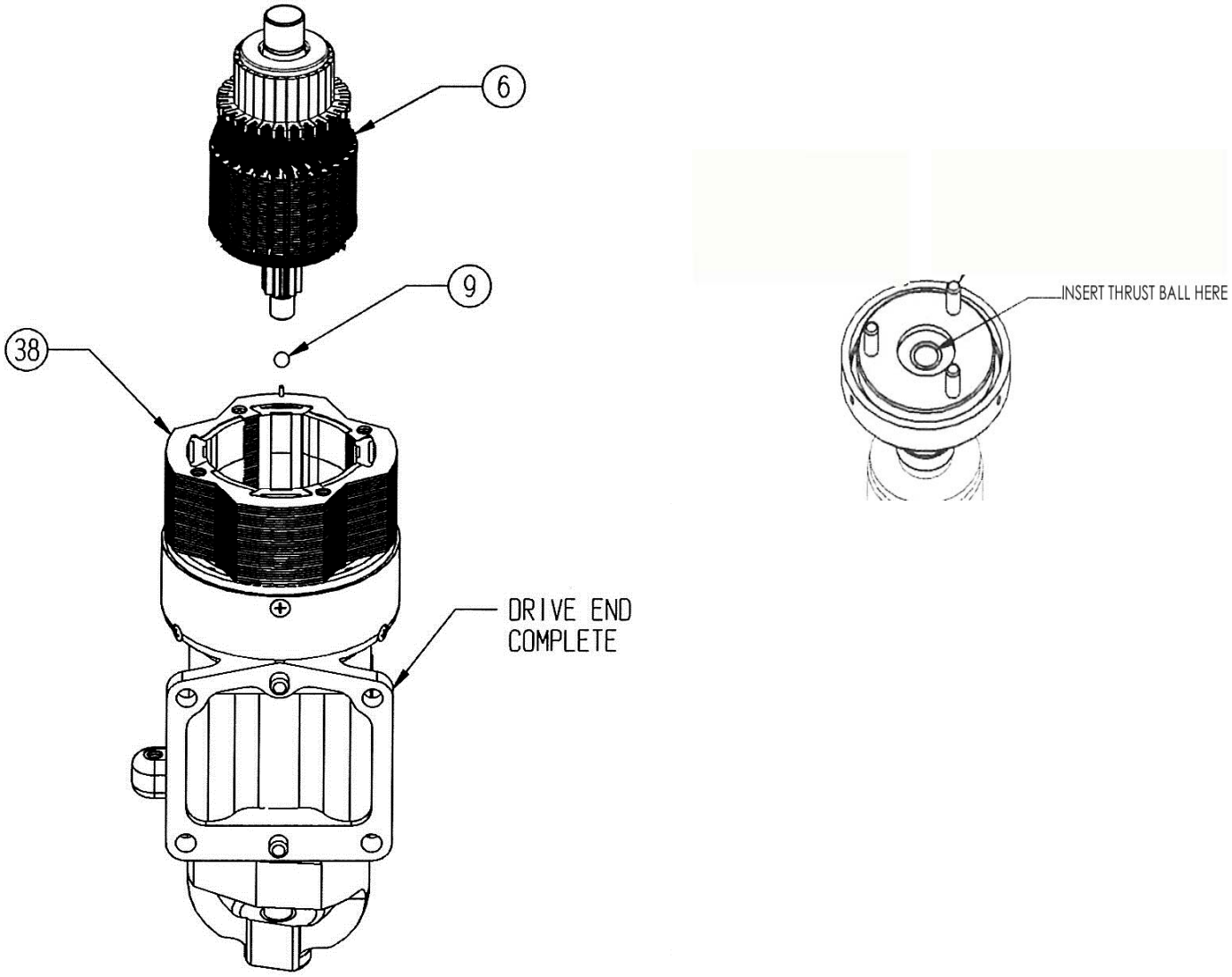


Fig 18: Armature Installation

9) Motor Case: With brush retainers in place, ensure the locating pin (#38) and hole inside the motor case align. Slide comm. assembly over the flux ring making sure the pin slides into locating hole. The power terminal should be opposite the bracket mount. Remove brush retainers to release Brush tension on to the commutator end of armature. (see figure 19)

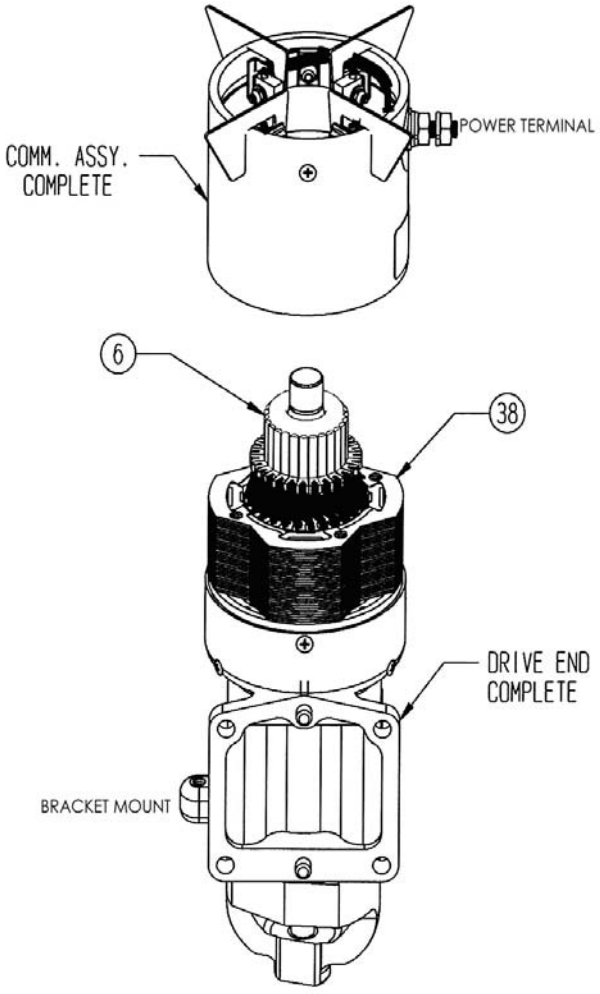


Fig 19: Comm Case Installation

10) Attach comm. end assembly to motor case with four Thru-Bolts (#4), four split lock Washers (#31) and four Flat Washers (#32), (Refer to Service Inspection Limits for torque). Make sure that the brush leads are on the inside of the thru bolts and the thru bolts are next to the comm can, so there is no pinching or rubbing during operation. (see figure 20)

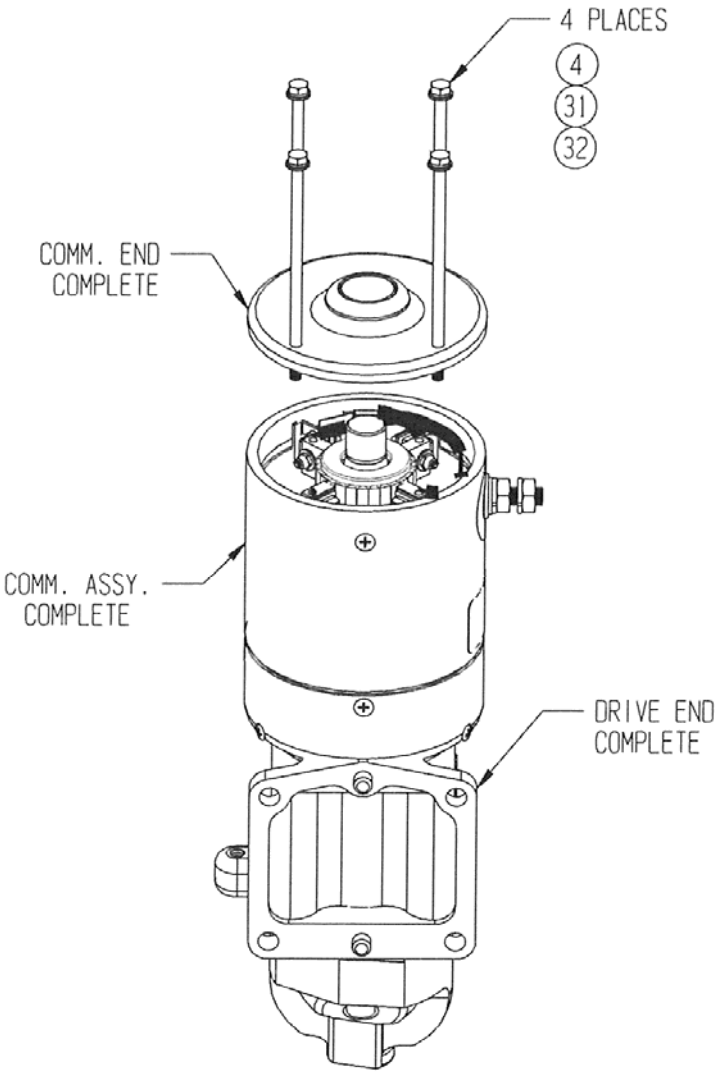


Fig. 20: Comm End installation

11) Final inspection: Verify all hardware installed per instructions

TOOLS, TORQUES, SERVICE INSPECTION LIMITS AND TEST SPECIFICATIONS

DESCRIPTION	LIMITS	TORQUES
Commutator	Commutator shall not be smaller than 1.600 in. after re-surfacing	
Output Shaft Pins (47)	.236 -.237 in.	
Output Shaft Bushing (46)	.395 - .397 in.	
Intermediate Bearing Support Bearing (50)	Ball Burnish to size, .75 in. Lamar P/N LT102	
Intermediate Bearing Support Screws (43)		15 - 25 in.- lb.
Anchor Ring Screws (42)		15 - 25 in. - lb.
Brushes:		
Screws, 8-32 x 5/8" (30) Nut, self-locking (22)		10 - 15 in. - lb.
Screw, 4-40 x 7/8" (21) Nut, self-locking (26)		9 - 10 in. - lb.
Thru-bolts (1)		10 - 15 in. - lb.
Starter Terminal		55 - 60 in.- lb.

SPECIAL TOOLS

Tooling BALL LT-102

Brush Retaining Tool LT-103

TEST SPECIFICATIONS

In the absence of a test bench a motor test can be performed as listed below, however it is recommended the starter is tested on an engine. When a starter is bench tested the starter drive will stay engaged until it is spun up to 350 RPM with out current. (the engine starts)

Pre-installation test: Clamp Starter (soft jawed vise), with Starter Drive visible, and Terminal Stud accessible. Refer to Test Specifications for test.

No Load Test

Part Numbers: PM1201, PM1202, PM1203, PM1204
Apply 12 volts D.C. Verify Starter Motor turns while power is applied (3 sec. Max.).

Part Numbers: PM2401, PM2402, PM2403, PM2404
Apply 24 volts D.C. Verify Starter Motor turns while power is applied (3 sec. Max.)

Torque Test

VOLT (constant)	AMP (max.)	TORQUE (constant)	R.P.M. (min.)
Parts Numbers: PM1201, PM1202, PM1203, PM1204			
12.0 ± 0.5 V	200 ± 5 amps	75 ft/lbs.	85
Parts Numbers: PM2401, PM2402, PM2403, PM2404			
24.5 ± 0.5 V	100 ± 5 amps	75 ft/lbs.	85

TROUBLESHOOTING AND MAINTAINING
STARTER DRIVE

NOTE: The Starter Drive is 100% replaced at overhaul.

PROBLEM	CAUSE	SOLUTION
• Starter Drive remains engaged too long.	• Engine idle speed is below 450 RPM • Faulty drive. • Dirty or gummy drive.	• To check, lightly advance throttle and see if pinion gear disengages. • Replace Starter Drive. • Clean Starter Drive as described below.
• Starter Drive fails to engage engine ring gear.	• Excessive amount of dirt, a gummy or dry Starter Drive. • Voltage too low	• Clean Starter Drive as described below • Verify voltage at the starter is above 10 volts for a 14 volt system and above 18 volts on a 28 volt system
• Starter Drive is noisy.	• Improper drive action or lack of lubrication.	• Clean as described below. If symptoms persist drive should be replaced.
• Starter Drive does not disengage.	• This is noted by a highly objectionable noise at any normal engine speeds. • Faulty drive. • Dirty or gummy drive.	• Replace Starter Drive • Clean as described below. If symptoms persist drive should be replaced.

Starter Drive Maintenance

Clean and lubricate drive spline when dirty or sluggish (every 50 hrs.) per Lamar service information letter LS1-001(page 23).

Do not dip the entire drive in any cleaning solution, as this will remove grease from the Starter Drive assembly which can not be replaced.

Do not disassemble the Starter Drive.

After cleaning the Starter Drive, rotate the pinion to the engaged position***. Wipe the spiral threads as clean as possible. If the threads are exceptionally gummy, or covered with foreign matter, apply a reliable cleaning solution such as stoddard solvent with a small brush and tilt the drive so that a little of it will run between spiral splines. Wipe clean, lubricate with very light molybdenum grease .

The Starter Drive must be lubricated after cleaning to ensure satisfactory operation.

*** note starter drive will not retract until it is placed on the engine and the engine is started.

LAMAR TECHNOLOGIES CORPORATION

Service Information Letter - Starters

SIL LSI-001

SMALL RECIPROCATING ENGINES
PM Series Starters
Issued 2/15/02
Page 1 of 1

SUBJECT: STARTER DRIVE LUBRICATION.

A. EFFECTIVITY: PM Series Starters installed on Lycoming Engines.

B. REASON: Provides instructions for periodic maintenance of starter drives.

C. DESCRIPTION: Operation of the affected starter motors will be improved, especially during cold weather, if the following procedure is accomplished after each 50 hours of engine operation.

1. Wash Bendix starter drive assembly with clean petroleum spirits.
2. Lubricate the Bendix starter drive assembly with spray silicone.

CAUTION: Do not use solvents other than petroleum spirits to wash the starter drive. Also, do not use grease, oil, or graphite lubricants; only silicone spray lubricants are recommended for satisfactory operation.

D. REFERENCE: Lycoming Service Instruction No. 1278

LAMAR STARTERS
ILLUSTRATED PARTS LIST
(For 12 Volt & 24 Volt Lycoming inline Starters)

PM1201-OHK Overhaul Kit, PM1201/PM1202

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ
		LOH-CD	Starter Overhaul Manual	
	LT-EBB-131A		**Starter Drive Kit, Lycoming 149T**	**1ea**
5		2005001	Starter Drive, Lycoming 149T	1ea
18		6201003	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea
	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0004		**Kit, Brush Assembly, 12V pos.**	**1ea**
25		7505001	Assembly, Brush, 12V pos	2ea
26		7801001	Washer, Lock, 5/16 Cad, Split	1ea
27		7801002	Washer, Flat, 5/16, Cad	1ea
34		7801003	Washer, Insulating, 5/16, Fiber	2ea
39		8101001	Nut, 5/16-24, Bronze	1ea
23		L51-0009	Label, 12V, Round, Green	1ea
	OHK-0005		**Kit, Brush Assembly, 12V neg**	**1ea**
24		7505002	Assembly, Brush, 12V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea
	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea
16		6001007	Bushing, Starter, Drive End	1ea
17		6101001	Bearing, Comm End	1ea

19	6201005	Pin, Flux Ring	2ea
28	7801005	Washer, Thrust	1ea
37	8501001	Ring, Snap, External, 3/4"	1ea
OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1	1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3	1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33	7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4	1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3	7801009	Washer, Lock, #10, Split	4ea
2	7801012	Washer, Flat, #10, Cad	4ea
6	8101008	Ring, Threaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305002	Armature, 12V, Lycoming	1ea
7	2305017	Assy, Shaft, Output	1ea
10	5005001	Assy, Starter Nose	1ea
11	5101002	Support, Intermediate, Shaft	1ea
12	5201001	Case, Motor, Lycoming	1ea
13	5301001	Comm end	1ea
14	5401001	Shield, Grease	1ea
20	6301003	Label, Starter Drive Maintenance	1ea
30	7801008	Washer, Wave	1ea
38	9005001	Assy, Flux Ring, Lyc, Complete	1ea
40	L52-0044	Label, Product I.D., 2" x 1"	1ea

PM2401-OHK Overhaul Kit, PM2401/PM2402

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ
		LOH-CD	Starter Overhaul Manual	
	LT-EBB-131A		**Starter Drive Kit, Lycoming 149T**	**1ea**
5		2005001	Starter Drive, Lycoming 149T	1ea
18		6201003	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea
	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0006		**Kit, Brush Assembly, 24V pos.**	**1ea**
25		7801001	Washer, Lock, 5/16 Cad, Split	2ea
26		7801002	Washer, Flat, 5/16, Cad	1ea
27		7801003	Washer, Insulating, 5/16, Fiber	1ea
34		8101001	Nut, 5/16-24, Bronze	2ea
39		L51-0010	Label, 24V, Round, Yellow	1ea
23		7505003	Assembly, Brush, 24V pos	1ea
	OHK-0007		**Kit, Brush Assembly, 24V neg**	**1ea**
24		7505004	Assembly, Brush, 24V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea

	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea
16		6001007	Bushing, Starter, Drive End	1ea
17		6101001	Bearing, Comm End	1ea
19		6201005	Pin, Flux Ring	2ea
28		7801005	Washer, Thrust	1ea
37		8501001	Ring, Snap, External, 3/4"	1ea
	OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1		1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3		1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33		7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

	OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4		1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3		7801009	Washer, Lock, #10, Split	4ea
2		7801012	Washer, Flat, #10, Cad	4ea
6		8101008	Ring, Threaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305003	Armature, 24V, Lycoming	1ea
7	2305017	Assy, Shaft, Output	1ea
10	5005001	Assy, Starter Nose	1ea
11	5101002	Support, Intermediate, Shaft	1ea
12	5201001	Case, Motor, Lycoming	1ea
13	5301001	Comm End	1ea
14	5401001	Shield, Grease	1ea
20	6301003	Label, Starter Drive Maintenance	1ea
30	7801008	Washer, Wave	1ea
38	9005001	Assy, Flux Ring, Lyc, Complete	1ea
40	L52-0044	Label, Product I.D., 2" x 1"	1ea

PM1203-OHK Overhaul Kit, PM1203

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ
		LOH-CD	Starter Overhaul Manual	
	LT-EBB-124A		**Starter Drive Kit, Lycoming 122T**	**1ea**
5		2005003	Starter Drive, Lycoming 122T	1ea
18		6201003	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea
	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0004		**Kit, Brush Assembly, 12V pos.**	**1ea**
23		7505001	Assembly, Brush, 12V pos	1ea
25		7801001	Washer, Lock, 5/16 Cad, Split	2ea
26		7801002	Washer, Flat, 5/16, Cad	1ea
27		7801003	Washer, Insulating, 5/16, Fiber	1ea
34		8101001	Nut, 5/16-24, Bronze	2ea
39		L51-0009	Label, 12V, Round, Green	1ea

	OHK-0005		**Kit, Brush Assembly, 12V neg**	**1ea**
24		7505002	Assembly, Brush, 12V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea
	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea
16		6001007	Bushing, Starter, Drive End	1ea
17		6101001	Bearing, Comm End	1ea
19		6201005	Pin, Flux Ring	2ea
28		7801005	Washer, Thrust	1ea
37		8501001	Ring, Snap, External, 3/4"	1ea
	OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1		1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3		1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33		7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

	OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4		1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3				
1		7801009	Washer, Lock, #10, Split	4ea
3				
2		7801012	Washer, Flat, #10, Cad	4ea
3				
6		8101008	Ring, Threaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305002	Armature, 12V, Lycoming	1ea
7	2305017	Assy, Shaft, Output	1ea
10	5005001	Assy, Starter Nose	1ea
11	5101002	Support, Intermediate, Shaft	1ea
12	5201001	Case, Motor, Lycoming	1ea
13	5301001	Comm End	1ea
14	5401001	Shield, Grease	1ea
20	6301003	Label, Starter Drive Maintenance	1ea

30	7801008	Washer, Wave	13ea
38	9005001	Assy, Flux Ring, Lyc, Complete	1ea
40	L52-0044	Label, Product I.D., 2" x 1"	1ea

PM2403-OHK Overhaul Kit, PM2403

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ
		LOH-CD	Starter Overhaul Manual	
	LT-EBB-124A		**Starter Drive Kit, Lycoming 122T**	**1ea**
5		2005003	Starter Drive, Lycoming 122T	1ea
18		6201003	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea

	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0006		**Kit, Brush Assembly, 24V pos.**	**1ea**
25		7801001	Washer, Lock, 5/16 Cad, Split	2ea
26		7801002	Washer, Flat, 5/16, Cad	1ea
27		7801003	Washer, Insulating, 5/16, Fiber	1ea
34		8101001	Nut, 5/16-24, Bronze	2ea
39		L51-0010	Label, 24V, Round, Yellow	1ea
23		7505003	Assembly, Brush, 24V pos	1ea
	OHK-0007		**Kit, Brush Assembly, 24V neg**	**1ea**
24		7505004	Assembly, Brush, 24V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea
	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea
16		6001007	Bushing, Starter, Drive End	1ea
17		6101001	Bearing, Comm End	1ea
19		6201005	Pin, Flux Ring	2ea
28		7801005	Washer, Thrust	1ea
37		8501001	Ring, Snap, External, 3/4"	1ea
	OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1		1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3		1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33		7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

	OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4		1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3				
1		7801009	Washer, Lock, #10, Split	4ea
3				
2		7801012	Washer, Flat, #10, Cad	4ea
3				
6		8101008	Ring, Threaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305003	Armature, 24V, Lycoming	1ea
7	2305017	Assy, Shaft, Output	1ea

10			1ea
11	5005001	Assy, Starter Nose	1ea
12			1ea
13	5101002	Support, Intermediate, Shaft	1ea
14			1ea
15	5201001	Case, Motor, Lycoming	1ea
16			1ea
17	5301001	Comm End	1ea
18			1ea
19	5401001	Shield, Grease	2ea
20	6301003	Label, Starter Drive Maintenance	1ea
21	7801008	Washer, Wave	3ea
22	9005001	Assy, Flux Ring, Lyc, Complete	1ea
23	L52-0044	Label, Product I.D., 2" x 1"	1ea

PM1204-OHK Overhaul Kit, PM1204

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ

		LOH-CD	Starter Overhaul Manual	
	LT-EBB-142A		**Starter Drive Kit, Lyc 149T, Rev Rotation**	**1ea**
5		2005004	Starter Drive, Lyc 149T, Rev Rotation	1ea
18		6201006	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea
	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0004		**Kit, Brush Assembly, 12V pos.**	**1ea**
23		7505001	Assembly, Brush, 12V pos	1ea
25		7801001	Washer, Lock, 5/16 Cad, Split	2ea
26		7801002	Washer, Flat, 5/16, Cad	1ea
27		7801003	Washer, Insulating, 5/16, Fiber	1ea
34		8101001	Nut, 5/16-24, Bronze	2ea
39		L51-0009	Label, 12V, Round, Green	1ea
	OHK-0005		**Kit, Brush Assembly, 12V neg**	**1ea**
24		7505002	Assembly, Brush, 12V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea
	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea
16		6001007	Bushing, Starter, Drive End	1ea
17		6101001	Bearing, Comm End	1ea
19		6201005	Pin, Flux Ring	2ea
28		7801005	Washer, Thrust	1ea
37		8501001	Ring, Snap, External, 3/4"	1ea
	OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1		1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3		1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33		7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4	1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3	7801009	Washer, Lock, #10, Split	4ea
2	7801012	Washer, Flat, #10, Cad	4ea
6	8101008	Ring, Theaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305002	Armature, 12V, Lycoming	1ea
7	2305006	Assy, Shaft, Output	1ea
10	5005001	Assy, Starter Nose	1ea
11	5101002	Support, Intermediate, Shaft	1ea
12	5201001	Case, Motor, Lycoming	1ea
13	5301001	Comm End	1ea
14	5401001	Shield, Grease	1ea
20	6301003	Label, Starter Drive Maintenance	1ea
30	7801008	Washer, Wave	1ea
38	9005001	Assy, Flux Ring, Lyc, Complete	1ea
40	L52-0044	Label, Product I.D., 2" x 1"	1ea

PM2404-OHK Overhaul Kit, PM2404

ITEM #	KIT #	PART #	DESCRIPTION	QTY REQ
		LOH-CD	Starter Overhaul Manual	
	LT-EBB-142A		**Starter Drive Kit, Lyc 149T, Rev Rotation**	**1ea**
5		2005004	Starter Drive, Lyc 149T, Rev Rotation	1ea
18		6201006	Pin, Starter Drive	1ea
	OHK-0001		**Kit, Tools, OHK, Lycoming**	**1ea**
41		LT-102	Tooling Ball	1ea
42		LT-104	Brush Retaining Tool	4ea
43		X99-0071	Locktite, 680, Single Use Tab	1ea
44		X99-0072	Locktite, 242, Single Use Tab	1ea
45		X99-0073	Grease, OHK	1ea
	OHK-0002		**Kit, Planetary Gears, 3ea.**	**1ea**
8		2505002	Planetary Gear Assembly	3ea
	OHK-0006		**Kit, Brush Assembly, 24V pos.**	**1ea**
25		7801001	Washer, Lock, 5/16 Cad, Split	2ea
26		7801002	Washer, Flat, 5/16, Cad	1ea
27		7801003	Washer, Insulating, 5/16, Fiber	1ea
34		8101001	Nut, 5/16-24, Bronze	2ea
39		L51-0010	Label, 24V, Round, Yellow	1ea
23		7505003	Assembly, Brush, 24V pos	1ea
	OHK-0007		**Kit, Brush Assembly, 24V neg**	**1ea**
24		7505004	Assembly, Brush, 24V neg	2ea
	OHK-0008		**Kit, Brush Bracket & Spring**	**1ea**
2		1501005	Screw, PFH, #8-32 x 5/8", Cad	2ea
21		7301001	Bracket, Brush Holder	2ea
22		7401001	Spring, Brush	2ea
29		7801006	Washer, Lock, #8, Split	2ea
35		8101003	Nut, Lock, #8-32, Nyloc, zinc	2ea
	OHK-0009		**Kit, Hardware, Starter, Lycoming**	**1ea**
9		3701001	Ball, Thrust, .250	1ea
15		6001003	Bushing, Intermediate Support	1ea

16	6001007	Bushing, Starter, Drive End	1ea
17	6101001	Bearing, Comm End	1ea
19	6201005	Pin, Flux Ring	2ea
28	7801005	Washer, Thrust	1ea
37	8501001	Ring, Snap, External, 3/4"	1ea

OHK-0010		**Kit, Fasteners, Starter, Lycoming**	**1ea**
1	1501003	Screw, PFH, #8-32 x 1/2", Cad	4ea
3	1501010	Screw, PPH, #6-32 x 11/16", Cad	3ea
33	7801013	Washer, Lock, #6, Split, Cad	3ea

Available Components, not included in Overhaul Kit

OHK-0003		**Kit, Thru Bolt and Anchor Ring #10**	**1ea**
4	1501019	Bolt, Thru, #10 x 4-3/8"	4ea
3	7801009	Washer, Lock, #10, Split	4ea
2	7801012	Washer, Flat, #10, Cad	4ea
6	8101008	Ring, Threaded Anchor, #10	1ea

The following are not included in any kits and, if needed, must be purchased individually.

6	2305003	Armature, 24V, Lycoming	1ea
7	2305006	Assy, Shaft, Output	1ea
10	5005001	Assy, Starter Nose	1ea
11	5101002	Support, Intermediate, Shaft	1ea
12	5201001	Case, Motor, Lycoming	1ea
13	5301001	Comm End	1ea
14	5401001	Shield, Grease	1ea
20	6301003	Label, Starter Drive Maintenance	1ea
30	7801008	Washer, Wave	1ea
38	9005001	Assy, Flux Ring, Lyc, Complete	1ea
40	L52-0044	Label, Product I.D., 2" x 1"	1ea

Support

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