

STIHL

Model	Bore mm (in.)	Stroke mm (in.)	Displacement cc (cu. in.)	Drive Type
020, 020AV, 020AVPE	38 (1.496)	28 (1.102)	32 (1.95)	Direct
020AVS, 020AVSE, 020AVSEQ	40 (1.57)	28 (1.102)	35.2 (2.15)	Direct
040, 041, 041AV, 041AVE, 041AVQ, 041FB, 041AVFB, 041AVEFB	44 (1.73)	40 (1.57)	61 (3.72)	Direct
041G	44 (1.73)	40 (1.57)	61 (3.72)	Gear
041S, 041AVSE	48 (1.89)	40 (1.57)	72 (4.4)	Direct
050AV, 051AV, 051AVE, 051AVEQ	52 (2.05)	42 (1.65)	89 (5.42)	Direct
075 AVE, 076 AVE, 076AVEQ	58 (2.28)	42 (1.65)	111 (6.77)	Direct

MAINTENANCE

SPARK PLUG. Recommended spark plug is Bosch WSR6F, Champion RCJ6Y or NGK BPMR-7A. Spark plug electrode gap should be 0.5 mm (0.020 in.) for all models. Tighten spark plug to 25 N·m (18 ft.-lbs.).

CARBURETOR. Saws may be equipped with Tillotson Series HU or HS or Walbro Series WA, WS or WT diaphragm carburetor. Carburetor model designation is stamped on carburetor.

Refer to the appropriate section of CARBURETOR SERVICE section for carburetor overhaul procedure and exploded views.

Initial adjustment of carburetor low speed and high speed mixture screws is one turn open from a lightly seated position. Make final adjustments with engine warm and running. Make certain engine air filter is clean before adjusting carburetor.

Adjust idle speed screw (3—Fig. ST11) so engine idles just below clutch engagement speed. Adjust low speed mixture screw (2) to obtain highest idle speed, then turn screw counterclockwise approximately $\frac{1}{8}$ turn. Engine should accelerate smoothly without hesitation. If engine stumbles or seems sluggish when accelerating, adjust low speed mixture screw until engine accelerates without hesitation. Adjust high speed mixture screw (1) to obtain optimum performance under cutting load. Do not adjust high speed mixture screw too lean (turned too far clockwise) as engine may be damaged from lack of lubrication and overheating.

IGNITION. Models 020AV, 040, 041, 041FB, 041AV, 041AVFBQ, 050AV and 051AV are equipped with a conventional breaker point controlled flywheel magneto ignition system. Models 041AVEQ, 041AVE Super and 041G are equipped with a breakerless capacitor discharge ignition system. Models

020AVEP, 020AVSEQ, 051AVEQ, 075AVE, 076AVE and 076AVEQ are equipped with a breakerless transistor ignition system.

Breaker Point Ignition. Flywheel must be removed for access to breaker points. Breaker point gap on all models so equipped should be 0.35-0.40 mm (0.014-0.016 in.). Ignition timing should occur as follows: 2.0-2.2 mm (0.080-0.087 in.) BTDC on Model 020AV; 2.4-2.6 mm (0.095-0.102 in.) BTDC on Models 040, 041, 041FB, 041AV and 041AVFBQ; 2.3-2.7 mm (0.090-0.106 in.) BTDC on Models 050AV and 051AV to serial number 2981245 and 1.9-2.1 mm (0.075-0.083 in.) after serial number 2981245. Loosen magneto base plate screws and rotate magneto base plate to adjust ignition timing.

Ignition edge gap should be checked whenever ignition timing is adjusted. Edge gap should also be checked if engine is difficult to start or misfires at full throttle. To check edge gap, rotate flywheel counterclockwise until breaker points just start to open. On Models 040, 041, 041FB, 041AV and 041AVFBQ, edge gap is measured from trailing edge of flywheel magnet and adjacent edge of ignition coil leg as shown in Fig. ST12. Edge gap should be 6-9 mm (0.24-0.35 in.). On all other models, edge gap is measured from trailing edge of flywheel magnet and adjacent edge of ignition coil center leg as shown in Fig. ST13.



Fig. ST11—View of carburetor adjustment points typical of all models. High speed mixture needle (1) and low speed mixture needle (2) may be positioned differently on some models. Refer to text for adjustment procedure.

Edge gap should be 4-6 mm (0.16-0.24 in.) on Model 020AV. On 050AV and 051AV models to serial number 2981245, edge gap should be 9-13 mm (0.35-0.51 in.) and 12-16 mm (0.47-0.63 in.) after serial number 2981245. On all models, adjust edge gap by changing breaker point gap.

Air gap between flywheel magnets and ignition coil should be 0.20-0.30 mm (0.008-0.012 in.) on Models 020AV, 040, 041, 041FB, 041AV and 041AVFBQ and 0.15-0.30 mm (0.006-0.012 in.) on all other models. Loosen ignition coil mounting screws and move coil assembly to adjust air gap.

Capacitor Discharge Ignition. Early Models 041AVE and 041G are equipped with Bosch capacitor discharge ignition systems shown in Fig. ST14. Later model Bosch capacitor discharge ignition is identical in function, but all components are sealed in stator plate casting and are not individually serviceable. If malfunction occurs, entire stator assembly must be renewed. Models after serial number 9158250 are equipped with SEM capacitor discharge ignition. Operation of SEM and Bosch ignitions are basically the same and are interchangeable if entire ignition sys-

tems are exchanged. SEM ignition can be identified by a removable ignition coil. On all models, flywheel must be removed for access to ignition components.

To properly time early model Bosch ignition, trigger coil (IC—Fig. ST14) must be in correct relationship with flywheel magnet. Ignition timing should be 1.9 mm (0.075 in.) BTDC for Models 041AVE and 041G. To check ignition timing, install a timing gage in spark plug hole and rotate crankshaft until piston is at ignition position as specified above. Note if flywheel mark (F—Fig. ST15) is aligned with mark (C) on crankcase. Remove flywheel and note if mark on stator plate is aligned with crankcase mark (Fig. ST16). If either of these marks is not aligned, ignition must be adjusted.

To adjust ignition, rotate flywheel until piston is at correct ignition timing position as indicated above. Make a mark on crankcase adjacent to mark on flywheel. Remove flywheel, loosen stator plate mounting screws (S—Fig. ST14) and rotate stator plate until mark on plate is aligned with previously made mark on crankcase. Retighten stator plate mounting screws. A timing light may also be used to check ignition timing as follows: Remove spark plug, install timing gage and rotate crankshaft until correct piston position for ignition is indicated. Make two aligned marks on rotating screen and starter housing cover. Install spark plug and connect timing light. Using a tachometer, run engine at 6000 rpm and check alignment of previously made marks with timing light. Loosen stator plate mounting screws and turn plate to adjust timing as required. Recheck timing with light.

If early model Bosch ignition is defective, check for faulty spark plug, high tension lead, ignition switch and all terminals and ground connections. An ohmmeter may be used to check for a faulty ignition coil (IC—Fig. ST14). Connect one test lead to high tension lead and other test lead to ground. Ohmmeter reading should be 1000-3000 ohms. To check primary windings, disconnect yellow wire at terminal "B" on stator plate and connect one lead of ohmmeter to yellow wire and other test lead to ground. Ohmmeter reading should be less than one ohm. To check charging coil (CC), disconnect coil wire from terminal "C" on stator plate. Connect one lead of ohmmeter to coil wire and other lead to ground. Note ohmmeter reading, then reverse lead connections of ohmmeter and again note ohmmeter reading. One reading should be at least ten times larger or smaller than the other reading. Capacitor capacitance should be 0.6-0.9 mfd. Capacitor and stator plate must be re-

newed as an assembly. Air gap between ignition coil and flywheel magnets on early Bosch ignition should be 0.25-0.35 mm (0.010-0.014 in.). Individual compo-

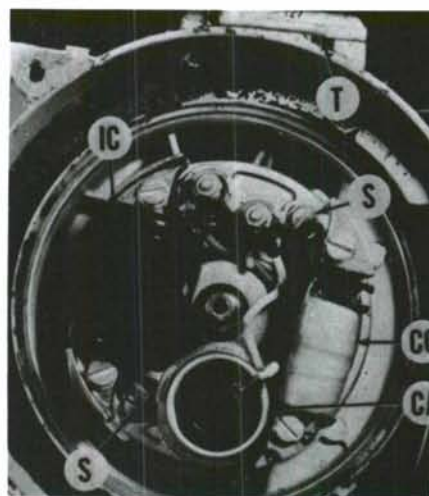


Fig. ST14—View of Bosch capacitor discharge ignition found on early Models 041AVE and 041G. Trigger module (T) contains diodes and thyristor. All components are sealed in stator plate casting on later models.

CA. Capacitor
CC. Charging coil
IC. Ignition coil
S. Stator mounting screws
T. Trigger module

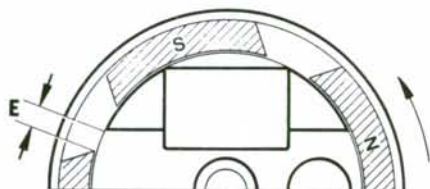


Fig. ST12—On Models 040, 041, 041FB, 041AV and 041AVFBQ, magneto edge gap (E) is measured between trailing edge of flywheel north pole shoe and adjacent edge of ignition coil leg. Refer to text for specifications.

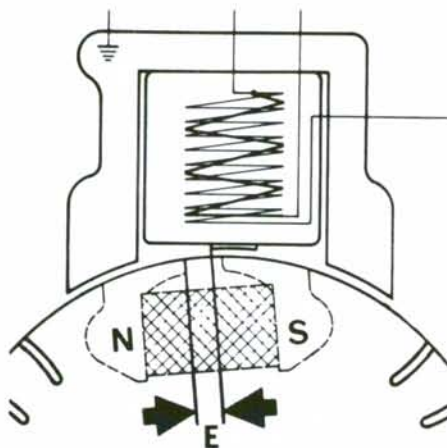


Fig. ST13—On all other breaker-point ignition models, magneto edge gap (E) is measured between trailing edge of flywheel north pole shoe and adjacent edge of ignition coil center leg. Refer to text for specifications.

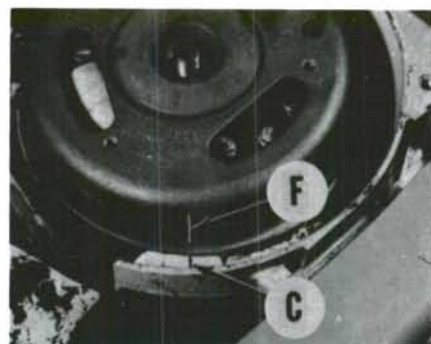


Fig. ST15—Flywheel mark (F) and crankcase mark (C) should be aligned for correct ignition timing on early models with earlier style Bosch capacitor discharge ignition. Most models with breaker-point ignition have similar marks.

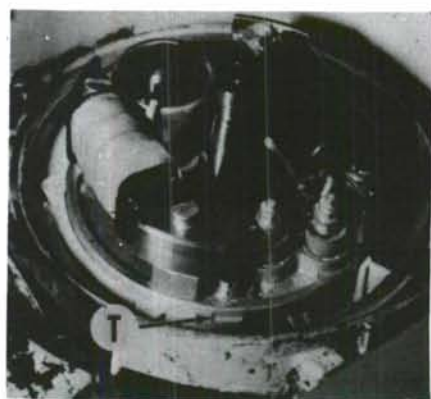


Fig. ST16—View of stator plate and crankcase timing marks (T) on early Bosch capacitor discharge models.

nents cannot be tested on later Bosch ignition. Complete stator plate assembly must be renewed if malfunction is noted.

To test ignition coil primary winding on SEM ignition, disconnect primary wire and connect ohmmeter to primary connection and ground. Reading should be 0.4-0.5 ohm. To test secondary wind-

ing, connect ohmmeter to spark plug end of high tension lead and ground. Reading should be 2700-3300 ohms. Renew ignition coil if correct readings are not obtained. Air gap between ignition coil and flywheel magnets should be 0.2-0.3 mm (0.008-0.011 in.).

To check ignition timing on later Bosch and SEM ignitions, remove spark plug and install dial indicator into spark plug hole. Remove saw chain and guide bar and install special tool number 0000 850 4000 on guide bar studs with pointer toward clutch as shown in Fig. ST17. Rotate flywheel clockwise and make a reference mark (M) on clutch shoe (3) opposite of pointer (2) when piston is at 1.9 mm (0.075 in.) BTDC on models up to serial number 2783541 and 2.5 mm (0.098 in.) BTDC on models after serial number 2783541. Replace spark plug and connect a suitable power timing light. Using a tachometer, check ignition timing at 6000 rpm. When timing light is directed at the clutch, scribe mark on hub should appear to be in alignment with arrow of timing tool if timing is correct. If reference marks do not align, adjust by rotating stator plate. Recheck timing after adjusting plate.

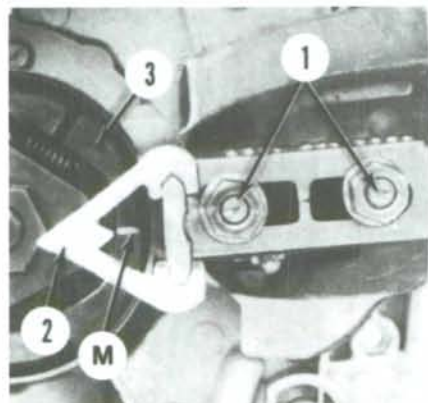


Fig. ST17—View showing reference mark (M), guide bar studs (1), special tool 0000 850 4000 (2) and clutch shoe. Refer to text for ignition timing instructions.

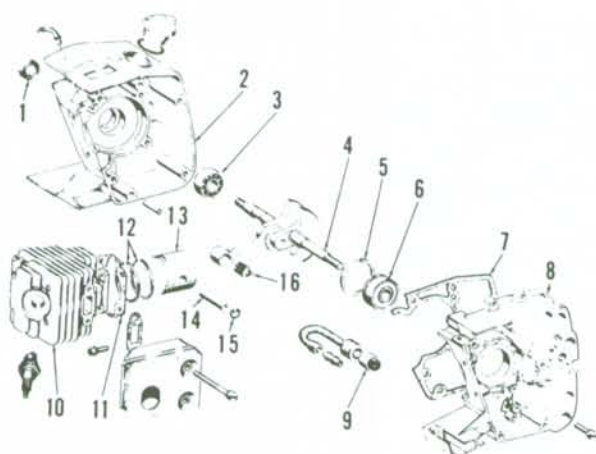


Fig. ST18—Exploded view of engine typical of Models 020AV, 020AVPE and 020AVSEQ.

1. Seal
2. Crankcase half
3. Bearing
4. Crankshaft & connecting rod assy.
5. Snap ring
6. Bearing
7. Gasket
8. Crankcase half
9. Oil pickup
10. Cylinder
11. Gasket
12. Piston rings
13. Piston
14. Piston pin
15. Pin retainer
16. Roller bearing

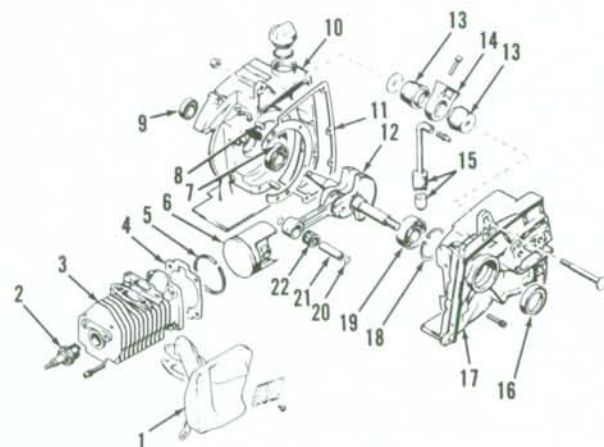


Fig. ST19—Exploded view of engine typical of Models 041AVQ, 041AVEQ and 041AVFB. Models 041, 041AV, 041AVE, 041AVE Super and 041G are similar.

1. Muffler
2. Spark plug
3. Cylinder
4. Gasket
5. Piston ring
6. Piston
7. Bearing
8. Dowel pin
9. Seal
10. Crankcase half
11. Gasket
12. Crankshaft & connecting rod assy.
13. Rubber mounts
14. Support
15. Oil pickup tube & strainer
16. Seal
17. Crankcase half
18. Snap ring
19. Bearing
20. Retaining ring
21. Piston pin
22. Needle bearing

Transistor Ignition. Models 020AVPE, 020AVSEQ, 051AVEQ, 075AVE, 076AVE and 076AVEQ are equipped with a Bosch breakerless transistor ignition. The transistor circuit is designed to take the place of breaker points in a conventional ignition system. The transistor ignition system is triggered magnetically by a magnet in the flywheel. The ignition coil is mounted outside the flywheel and the electronic trigger unit is mounted behind the flywheel.

Because the electronic trigger plate is not subject to any mechanical wear, ignition timing will remain constant as long as trigger plate is operating properly. To check ignition timing, install Stihl timing tool 0000 850 4000 on chain bar studs as shown in Fig. ST17. Using a piston locating tool, set piston at 2.3 mm (0.090 in.) BTDC on Model 020AVPE and 2.5 mm (0.098 in.) on all other models. At this point, scribe a line (M) on clutch hub in line with arrow of timing tool (2). Reinstall spark plug and connect timing light to spark plug wire. Start engine and set engine speed at 6000 rpm. When timing light is directed at the clutch, scribe mark on hub should appear to be in alignment with arrow of timing tool if timing is correct. Ignition timing may be adjusted slightly by loosening flywheel nut and rotating flywheel on crankshaft as there is a small clearance between flywheel groove and crankshaft key.

Recommended air gap between ignition coil armature legs and flywheel magnets is 0.15-0.25 mm (0.006-0.010 in.) on all models. Loosen ignition coil mounting screws and move ignition coil to adjust air gap.

LUBRICATION. The engine is lubricated by mixing oil with the fuel. Fuel:oil ratio is 40:1 when using Stihl two-stroke engine oil. If Stihl two-stroke oil is not available, a good quality oil designed for two-stroke air-cooled engines may be used when mixed at a 25:1 ratio. Use a separate container when mixing the oil and gasoline.

All models are equipped with an automatic chain oiler system. Manufacturer recommends using oil designed specifically for saw chain lubrication. If necessary, clean automotive oil may be used to lubricate saw chain. Use SAE 30 oil in warm weather and SAE 10 oil in cold weather.

Model 041G is equipped with a chain drive gear reduction assembly that should be lubricated with SAE 30 oil. Fill drive housing until oil reaches lower edge of fill plug hole.

CARBON. The muffler assembly should be removed from the engine and the carbon scraped from the exhaust

ports and muffler periodically. Be careful not to damage piston or exhaust ports when scraping carbon.

REPAIRS

CRANKCASE PRESSURE TEST. An improperly sealed crankcase can cause the engine to be hard to start, run rough, have low power and overheat. Refer to ENGINE SERVICE section of this manual for crankcase pressure test procedure. If crankcase leakage is indicated, pressurize crankcase and use a soap and water solution to check gaskets, seals, pulse line and castings for leakage.

CYLINDER, PISTON, RINGS AND PIN. Refer to appropriate Fig. ST18, ST19 or ST20 for exploded view of engine components. To disassemble, remove fan housing, sprocket cover, bar and chain. Remove air filter housing, handle bar and frame, carburetor, cylinder shroud and muffler. Remove cylinder mounting screws and slide cylinder off piston. Remove piston pin retainer rings. Support piston and connecting rod to prevent side force being applied to connecting rod and push piston pin out of piston. If pin is stuck, tap it out lightly with hammer and drift.

The aluminum alloy piston may be equipped with either one or two piston rings. The floating piston pin is retained in the piston with a snap ring at each end. The pin bore of the piston is unbushed. The connecting rod has a caged needle roller piston pin bearing. An oversize piston pin is not available.

Cylinder is available only with a fitted piston. Piston and cylinder on early Models 040, 041, 041AV, 041AVE, 041AVE Super and 041G and on Model 050AV prior to 1971, are grouped into

different size ranges. Each group is marked with letters "A" to "E." Letter "A" denotes smallest size and letter "E" the largest size. On later models, the cylinders are still coded "A" to "E," but pistons are available only in "B" and "C" codes. The "B" code piston is used in "A," "B" and "C" cylinders and the "C" code piston is used in "D" and "E" cylinders. The revised cylinder-piston groups are interchangeable with the early pistons and cylinders. In other words, a new "B" piston may be used in early "A," "B" or "C" cylinder and a new "C" piston may be used in early "D" or "E" cylinder. The code letter is stamped on the top of the piston on all models, at the bottom of the cylinder on early models, and at the top of the cylinder on later models.

The piston and cylinder matching code has been simplified on later Model 050AV and Models 051AV, 051AVE, 051AVEQ, 075AVE and 076AVE. New cylinder and piston assemblies are coded "A," "B" and "C." The cylinder is available only with a matched piston. New pistons for installation in used cylinders are available in code "B" only and may be used with any cylinder.

Cylinder bore on all models except some 075AVE and 076AVE models is chrome plated. Cylinders that do not have chrome plated bores are identified by the letters "SIL" on cylinder base. Pistons for use with "SIL" cylinders are identified by a circle around the cylinder matching code letter stamped in the piston crown. Do not interchange pistons used with chrome bore cylinders with pistons used in "SIL" cylinders.

Installation of piston and cylinder will be simplified by the use of a wood block that will fit between piston skirt and crankcase, supporting the piston as shown in Fig. ST21. A notch should be

cut in the wood block so it will fit around the connecting rod. To reinstall piston on connecting rod, first install one snap ring in piston. Lubricate the piston pin needle bearing with engine oil and slide bearing into pin bore of connecting rod. Install piston on rod so arrow (2—Fig. ST21) on piston crown points toward exhaust port. Use an assembly drift to align piston pin bore and connecting rod bearing bore, then push piston pin in far enough to install second snap ring. Locating pins are present in piston ring grooves to prevent ring rotation. Make certain ring end gaps are properly positioned around locating pins when installing cylinder. Install a new cylinder gasket. Lubricate piston rings and cylinder bore with engine oil. Use suitable ring compressor to compress piston rings and push cylinder down over piston. Remove ring compressor and wooden support. Tighten cylinder mounting screws in a diagonal pattern to 8 N·m (70 in.-lbs.).

CONNECTING ROD, CRANKSHAFT AND CRANKCASE. Refer to Figs. ST18, ST19 and ST20 for an exploded view of engine. The connecting rod and crankshaft are a unit assembly and must be removed and serviced as a unit.

Crankcase must be split to remove connecting rod and crankshaft. Remove fan housing, sprocket cover, bar and chain. Remove air filter housing, handle bar and frame, carburetor, cylinder shroud and muffler. Remove spark plug and install a piston stop tool in spark plug hole or use other suitable means to prevent crankshaft from rotating. Remove clutch retaining nut and clutch assembly. Note that both nut and clutch hub have left-hand threads (turn clock-

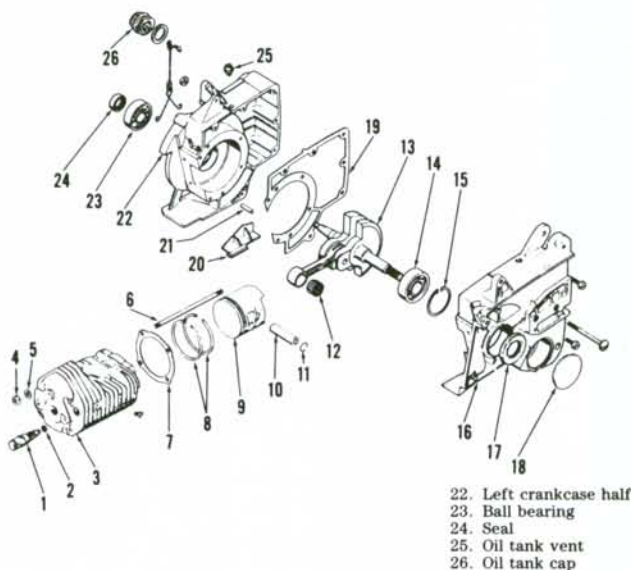


Fig. ST20—Exploded view of engine assembly used on 050AV, 051AV, 051AVE, 051AVEQ, 075AVE and 076AVE models. Decompression valve (1) is optional on some models.

1. Decompression valve
2. Seal
3. Cylinder
4. Nut
5. Washer
6. Stud
7. Gasket
8. Piston rings
9. Piston
10. Piston pin
11. Pin retainer
12. Needle bearing
13. Crankshaft & connecting rod assy.
14. Ball bearing
15. Snap ring
16. Right crankcase half
17. Seal
18. Cover
19. Gasket
20. Insert
21. Dowel pin
22. Left crankcase half
23. Ball bearing
24. Seal
25. Oil tank vent
26. Oil tank cap

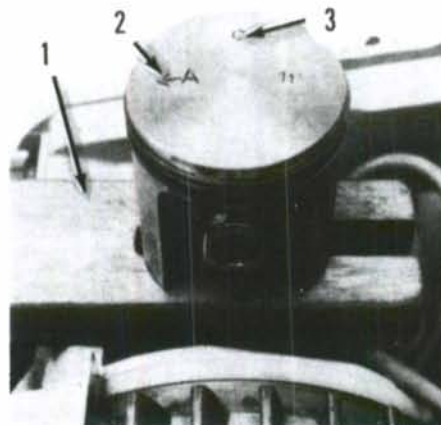


Fig. ST21—To facilitate removal and installation of piston, a wooden block (1) may be fabricated and installed between piston and crankcase as shown. When installing piston, be sure arrow and "A" (2) point toward cylinder exhaust port. Piston size code letter (3) is stamped on piston crown.

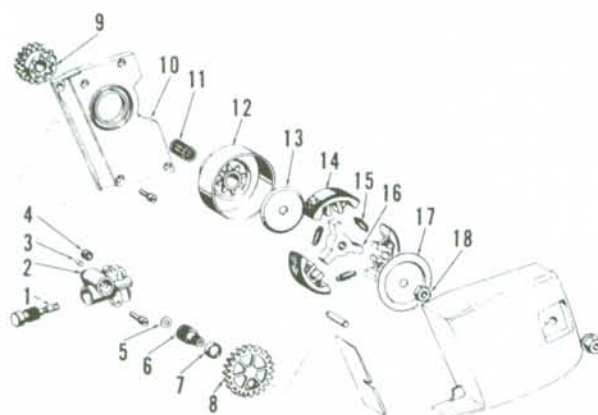


Fig. ST22—Exploded view of Model 020AV and 020AVPE automatic oil pump and clutch assembly. Refer to Fig. ST23 for view of clutch used on models with chain brake.

1. Plunger
2. Body
3. Pin
4. Seal
5. Washer
6. Worm gear
7. Seal
8. Driven gear
9. Drive gear
10. Cover
11. Clutch bearing
12. Clutch drum
13. Washer
14. Clutch shoe
15. Spring
16. Clutch hub
17. Washer
18. Nut

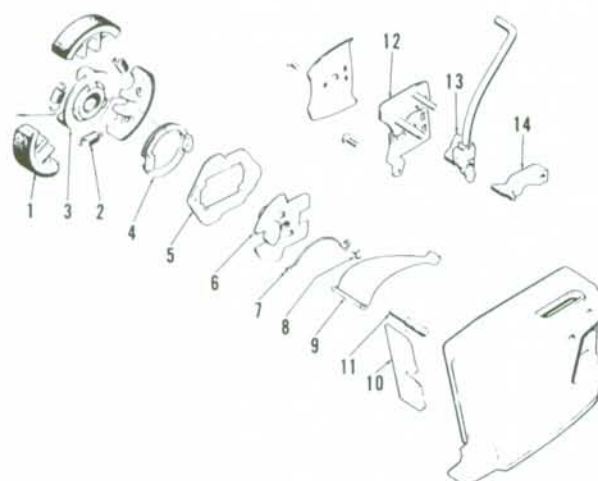


Fig. ST23—Exploded view of clutch and chain brake used on some 020AV and 020AVPE models.

1. Clutch shoe
2. Clutch spring
3. Clutch hub
4. Locking slider
5. Retainer
6. Clutch nut plate
7. Spring
8. Pin
9. Brake spring
10. Cover
11. Pin
12. Brake plate
13. Brake rod
14. Brake shoe

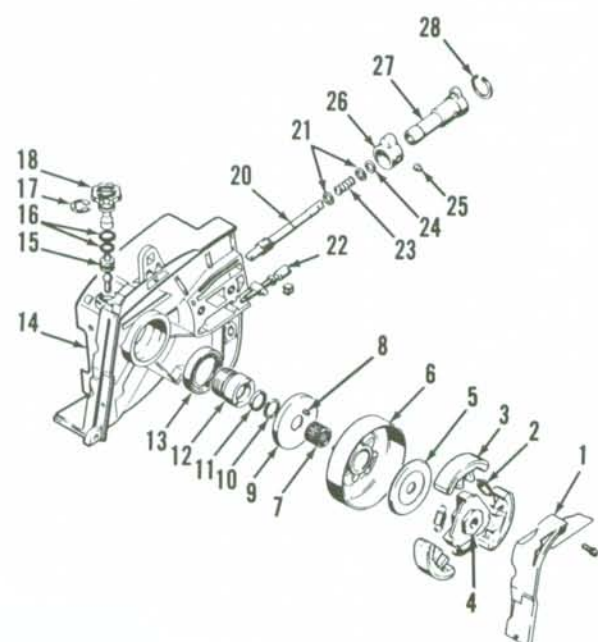


Fig. ST24—Exploded view of clutch assembly and automatic chain oiler pump used on Models 040, 041, 041AV, 041AVE, 041AVEQ, 041G, 050AV, 051AV and early 051AVE and 051AVEQ. Oil pump operates only when clutch is engaged and rotating. Oil output is adjusted by turning control knob (18) except on Models 050AV, 051AV and 051AVE. Output is adjusted on Models 050AV, 051AVE and 051AVEQ by moving lever under hand grip frame on exhaust side of saw.

1. Guard
2. Spring
3. Clutch shoe
4. Clutch hub
5. Washer
6. Clutch drum
7. Needle bearing
8. Pump drive pin
9. Plate
10. Ring
11. Seal
12. Worm gear
13. Seal
14. Crankcase half
15. Control bolt
16. "O" rings
17. "E" ring
18. Oil control knob
19. Pump plunger
20. Washers
21. Chain adjusting screw
22. Spring
23. Bushing
24. Rubber ring
25. Pump housing
26. Snap ring

wise to remove). Remove flywheel nut (right-hand threads) and use suitable puller to remove flywheel. Remove ignition components, oil pump, oil pump worm, cylinder and piston. Remove screws holding crankcase halves together, drive the two locating dowel pins into ignition side crankcase half and separate crankcase. It may be necessary to tap clutch end of crankshaft with a soft hammer if halves do not separate easily.

Crankshaft and connecting rod unit assembly should not be disassembled. Connecting rod big end rides on a roller bearing and should be inspected for excessive wear and damage. Check rotation of connecting rod on crankpin. If roughness is noted, renew crankshaft and connecting rod assembly. The upper end of connecting rod is equipped with a needle bearing. Inspect main bearings and crankshaft journals for wear or damage and renew as necessary. Oil seals should be renewed. Crankcase halves are available only as matched unit.

When reassembling, heat crankcase halves on a hot plate to approximately 175°C (350°F) to ease installation of main bearings in crankcase bores. Main bearing inner races should also be heated to ease assembly of crankshaft into main bearings. Assemble crankshaft and crankcase halves using a new bearing. Drive alignment pins into clutch side half of crankcase, then tighten crankcase screws evenly. Assembly of remaining parts is reverse of disassembly procedure.

CLUTCH. All models are equipped with a three-shoe centrifugal type clutch. Refer to Figs. ST22, ST23, ST24 and ST25 for exploded views of clutch assemblies used. A locking bolt should be screwed into the spark plug hole or some other suitable means used to prevent crankshaft rotation when removing clutch nut and/or hub. Clutch nut and hub have left-hand threads (turn clockwise to remove).

Check clutch shoes, drum and needle bearing for wear and damage and renew as necessary. Clutch shoes should be renewed as a unit to prevent unbalanced clutch operation.

Make certain drive plate (9—Fig. ST24) properly engages oil pump worm gear (12) on models so equipped before installing clutch. On all models, install all clutch retaining washers so inner face of washers is against clutch hub.

GEAR TRANSMISSION. Model 041G is equipped with a gear reduction chain drive transmission. Refer to Fig. ST26 for exploded view of gear transmission. Disassembly is evident with inspection of unit. A suitable puller should be used

to remove chain sprocket (3) and gear (10) from shaft (9).

Inspect components for excessive wear or damage. Refill drive housing with SAE 30 oil until oil level reaches lower edge of oil fill hole.

OIL PUMP. All models are equipped with an automatic chain oiler system. The oil pump used on all models except Models 020AV, 020AVPE and 020AVSEQ is driven by a cover plate (9—Fig. ST24 and 27—Fig. ST27) that engages clutch drum on one side and the oil pump worm gear (12—Fig. ST24 and 25—Fig. ST25) on the other side. Oil pump used on Models 020AV, 020AVPE and 020AVSEQ is driven by a spur gear (9—Fig. ST22) that engages clutch drum.

If oiler system fails to work properly, drain oil tank and inspect first for plugged or broken oil pickup tube and strainer. To check pump drive components, remove sprocket cover, bar and chain and clutch assembly.

On Models 020AV, 020AVPE and 020AVSEQ, remove cover plate (10—Fig. ST22) and check for worn or damaged spur gears (8 and 9). Remove oil pump mounting screw and withdraw pump assembly (2). Pin (3) must be removed before pump plunger (1) can be removed from pump housing.

On all other models, check for worn or damaged pins in drive plate. Check lugs on pump worm gear for wear. To remove worm gear, rotate drive plate counterclockwise and remove from crankshaft. To remove oil pump assembly, remove snap ring (28—Fig. ST24 or 36—Fig. ST27). Thread a M5 screw into end of pump body (27 or 35) and pry against head of screw to remove pump assembly from crankcase. Remove bushing (25 or 35) and separate pump components for inspection.

CHAIN BRAKE. Some models are equipped with a chain brake system designed to stop chain movement should kickback occur. Refer to Figs. ST23, ST25 and ST28 for exploded views of chain brake systems used. On all models, brake is activated when operator's hand strikes hand guard, pushing hand guard and brake rod forward. Forward movement of brake rod activates brake mechanism and allows brake spring to force brake shoe tight against clutch drum. To reset brake mechanism, pull back hand guard.

On models equipped with chain brake shown in Fig. ST23, retainer (5) and locking slider (4) disengage clutch at the same time brake is applied, allowing engine to continue running freely.

On models equipped with chain brake shown in Fig. ST25, drive plate (7) engages dogs on clutch hub carrier (3).

Spring plate (6) holds drive plate against release plate (22) causing inner teeth of drive plate to engage clutch hub (9). When chain brake is activated, actuating lever (14) releases cam (17) allowing spring (18) to draw brake band (20) tight around clutch drum. At the same time, release plate (22) pushes drive plate (7) into flat spring plate (6), disengaging hub (9) allowing engine to continue to run freely.

Chain brake must be in disengaged position before chain cover can be re-

moved. Inspect all parts for excessive wear and renew as necessary. Models 041, 041AV and 041AVE use coil springs instead of flat brake springs (9—Fig. ST23). When reassembling coil springs, install large diameter spring to the front directly above brake shoe lining. Install small diameter spring toward rear of brake shoe. On models equipped with chain brake shown in Fig. ST23, make certain retainer (5) and locking slider (4) will move easily and clutch rotates freely with locking slider (4) disengaged. On

Fig. ST25—Exploded view of clutch isolating chain brake system used on some models.

- | | |
|-----------------------|--------------------------|
| 1. Clutch drum | 17. Cam |
| 2. Washer | 18. Brake spring |
| 3. Clutch hub carrier | 19. "E" ring |
| 4. Clutch shoe | 20. Brake band |
| 5. Spring plate | 21. Release plate spring |
| 6. Drive plate | 22. Release plate |
| 7. Needle bearing | |
| 8. Hub | |
| 9. Side cover | |
| 10. Hand guard | |
| 11. Spring | |
| 12. Brake lever | |
| 13. Actuating lever | |
| 14. Washer | |
| 15. "E" ring | |

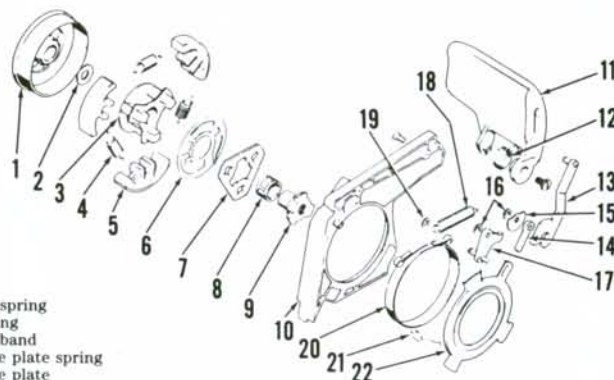


Fig. ST26—Exploded view of reduction gear transmission used on Model 041G.

- | |
|---------------|
| 1. Nut |
| 2. Washer |
| 3. Sprocket |
| 4. Spacer |
| 5. Gearcase |
| 6. Bearing |
| 7. Snap ring |
| 8. Seal |
| 9. Shaft |
| 10. Gear |
| 11. Bearing |
| 12. Shaft |
| 13. Bearing |
| 14. Gear |
| 15. Washer |
| 16. Snap ring |
| 17. Cover |

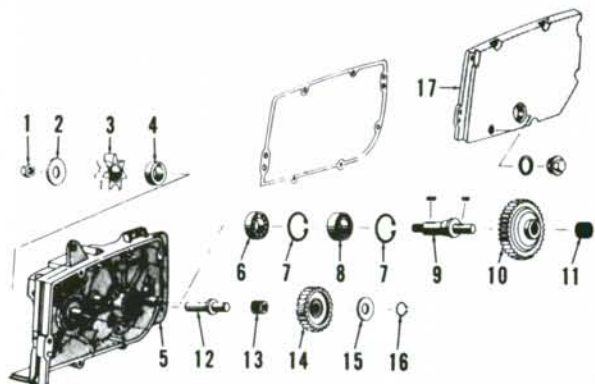
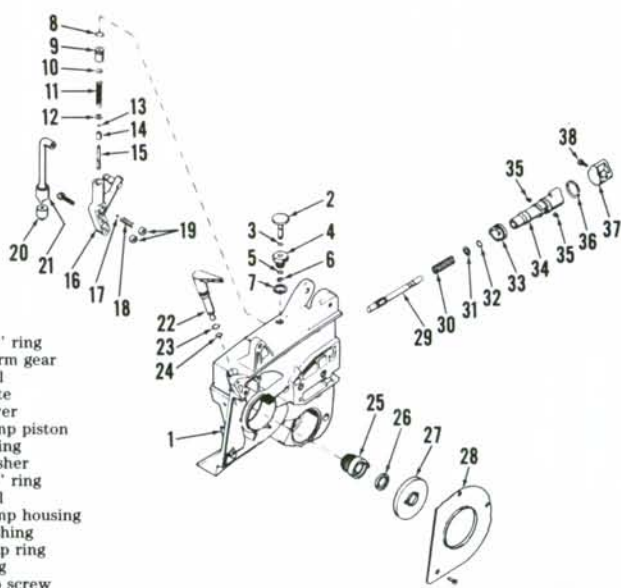


Fig. ST27—Exploded view of chain oiler components used on later 051AVE and 051AVEQ models and all 075AVE and 076AVE models. Manual oil pump components (2 through 19) are used on 075AVE and 076AVE models.

- | | |
|-------------------------|------------------|
| 1. Right crankcase half | 24. "O" ring |
| 2. Button | 25. Worm gear |
| 3. "O" ring | 26. Seal |
| 4. Cap | 27. Plate |
| 5. "O" ring | 28. Cover |
| 6. Snap ring | 29. Pump piston |
| 7. Seal | 30. Spring |
| 8. "O" ring | 31. Washer |
| 9. Pump piston | 32. "O" ring |
| 10. Spring retainer | 33. Seal |
| 11. Spring | 34. Pump housing |
| 12. Washer | 35. Bushing |
| 13. "O" ring | 36. Snap ring |
| 14. Bushing | 37. Plug |
| 15. Rod | 38. Cap screw |
| 16. Housing | |
| 17. Check ball | |
| 18. Spring | |
| 19. Seals | |
| 20. Oil pump pickup | |
| 21. Hose | |
| 22. Oil control lever | |
| 23. "O" ring | |



models equipped with chain brake shown in Fig. ST25, make certain spring tabs on spring plate (6) are facing outward when reassembling.

On models equipped with chain brake similar to type shown in Fig. ST28, brake components can be removed after first removing sprocket cover (7) and brake cover (2).

On all models, lightly lubricate moving parts with grease. No adjustment of chain brake system is required.

REWIND STARTER. Several different friction shoe type and pawl type rewind starters have been used. Refer to Fig. ST29 for an exploded view of typical friction shoe type starter used on some models and to Figs. ST31 and ST32 for typical pawl type starters used on some models.

On models equipped with starter shown in Fig. ST29, unbolt and remove fan housing (1). Pull starter rope out of housing about 30 cm (12 in.), then pull loop of rope back through rope guide opening and unwind rope from pulley two turns while holding pulley. Allow pulley to slowly unwind to release rewind spring tension. Remove "E" ring (24) while holding thrust washer (23) down to prevent rewind spring from flying out. Carefully remove components from starter housing. If rewind spring (12) is to be removed, use care to prevent spring from unwinding uncontrolled.

New rope length should be 100 cm (39 in.) long and 4.5 mm ($\frac{3}{16}$ in.) in diameter. The leading edges (E—Fig. ST30) of friction shoes (17) must be sharp for proper starter operation. If leading edge

is blunt from wear, shoes may be turned 180 degrees one time. Shoes should be renewed if both edges of shoe are blunt.

When reassembling, be sure rewind spring is wound in housing in clockwise direction starting with outer coil. Be sure that friction washers (18 and 20—Fig. ST29) are positioned on each side of brake lever (19) and that lugs of brake lever point in clockwise direction as shown in Fig. ST30. Wind rope on pulley in clockwise direction as viewed from flywheel side of pulley. Turn pulley one turn clockwise to preload rewind spring, then pull rope through opening in fan housing and install rope handle. When rope is properly tensioned, rope handle should fit snugly against fan housing. When starter rope is fully extended, it should be possible to rotate rope pulley at least another half turn clockwise.

On models equipped with starter shown in Fig. ST31, starter can be disassembled without removing fan housing (10) from engine. Remove starter cover mounting screws and pry starter cover (1) out of fan housing. Remove "E" ring (9) and withdraw rope pulley (7) from cover. Lift rewind spring assembly (3) from cover being careful not to allow spring to unwind uncontrolled.

To reassemble, lubricate rewind spring with a few drops of oil. Install spring and housing in starter cover making sure spring outer loop engages lug on cover. If spring becomes disengaged from spring housing during installation, wind spring in housing in a counter-clockwise direction, starting with outer end and working inward. Rope length should be 96 cm (38 in.) long and 3.5 mm ($\frac{1}{8}$ in.) in diameter. Lubricate starter cover pivot shaft with oil, then install rope pulley, bushing and "E" ring. Insert end of rope through starter hous-

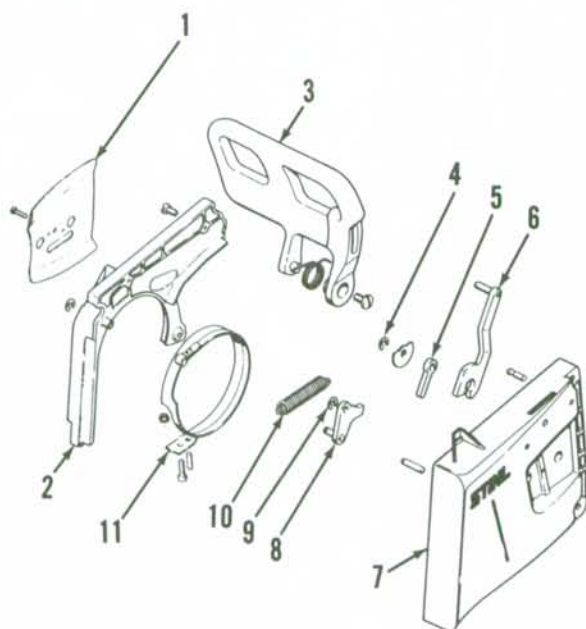


Fig. ST28—Exploded view of chain brake assembly typical of models not equipped with clutch isolating system.

1. Side plate
2. Brake cover
3. Hand guard
4. "E" ring
5. Actuating lever
6. Brake lever
7. Sprocket cover
8. Cam
9. "E" ring
10. Brake spring
11. Brake band

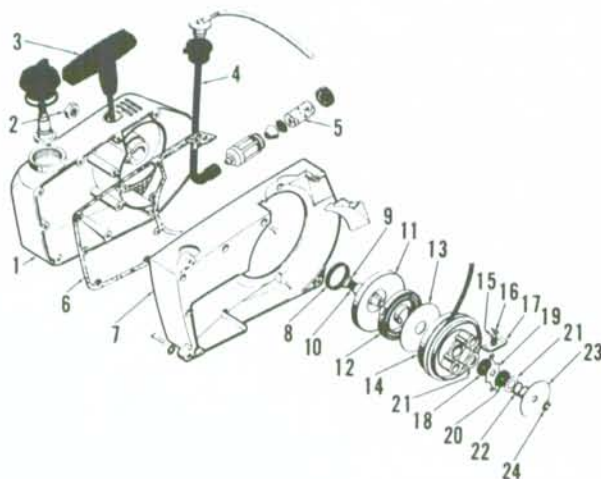


Fig. ST29—Exploded view of typical friction shoe type rewind starter used on some models.

1. Starter housing/fuel tank
2. Nut
3. Rope handle
4. Fuel pickup
5. Filter
6. Gasket
7. Fan cover
8. Felt ring
9. Spring washer
10. Pulley shaft
11. Cover
12. Rewind spring
13. Washer
14. Rope pulley
15. Spring
16. Spring retainer
17. Friction shoe
18. Slotted washer
19. Brake lever
20. Slotted washer
21. Washer
22. Spring
23. Washer
24. "E" ring

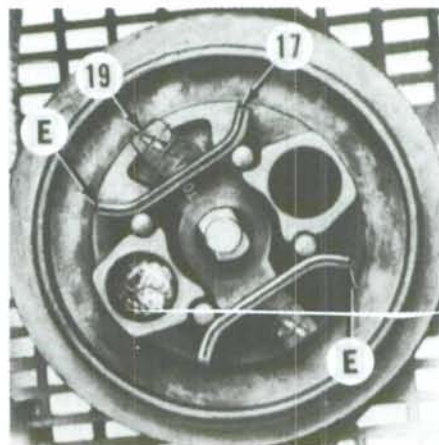


Fig. ST30—View of starter friction shoe assembly showing correct installation of brake lever (19). Leading edges (E) of friction shoes (17) must be sharp for proper starter operation.

ing and install rope handle. Wind rope on pulley in clockwise direction as viewed from flywheel side of pulley. To preload rewind spring, turn pulley three turns clockwise, then position starter cover in shroud. Pull out starter rope until resistance is felt, then release rope so flywheel pawls can engage rope pulley. Rope handle (5) should rest snugly against shroud when spring is correctly tensioned. With rope fully extended, it should be possible to turn pulley a minimum of $\frac{1}{2}$ turn further clockwise.

On models equipped with starter of the type shown in Fig. ST32, start-

er/fan housing (1) must be removed to service starter. On some models, fan housing and starter housing are two separate parts and fan housing should be separated from starter housing for better access to starter components. Remove rope handle (9) and allow rope pulley (11) to slowly unwind to relieve tension on rewind spring. Remove retainer clip (14) and withdraw rope pulley and pawl (12). If necessary, lift rewind spring (10) from housing being careful not to allow spring to unwind uncontrolled.

Rewind spring should be wound in clockwise direction in housing starting

with outer coil. Starter rope length should be 100 cm (39 in.) long and 4.5 mm ($\frac{3}{16}$ in.) in diameter. Wind rope on pulley in clockwise direction as viewed from flywheel side of pulley. To preload rewind spring, pull rope out of housing about 30 cm (12 in.). While holding rope pulley from turning, wind two turns of rope on pulley, then release pulley. Spring tension is correct if rope handle is pulled snugly against starter housing. With rope fully extended, it should be possible to rotate pulley a minimum of $\frac{1}{2}$ turn further clockwise.

Fig. ST31—Exploded view of pawl type rewind starter used on some models.

1. Starter housing
2. Washer
3. Rewind spring assy.
4. Rope
5. Rope handle
6. Rope guide
7. Rope pulley
8. Bushing
9. "E" ring
10. Fan housing
11. Screw
12. Pawl
13. Spring
14. Flywheel

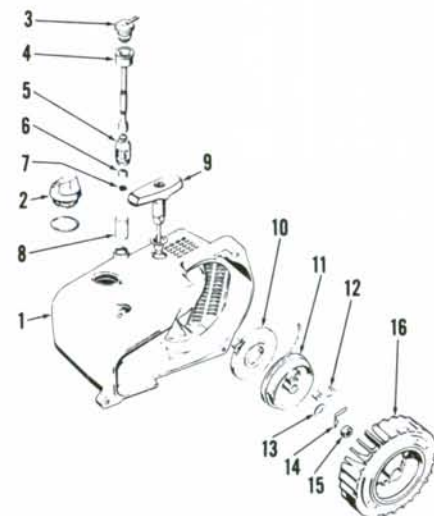
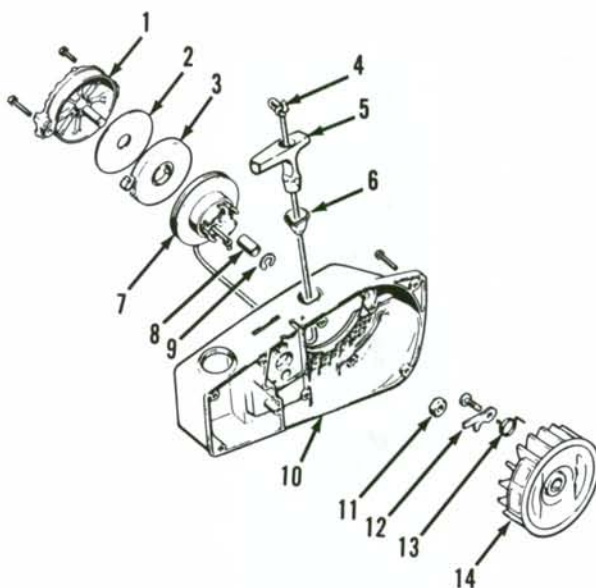


Fig. ST32—Exploded view of pawl type rewind starter used on some models. Starter housing (1) and fan housing are two separate parts on some models.

- | | |
|------------------------|-------------------|
| 1. Starter/fan housing | 9. Rope handle |
| 2. Fuel tank cap | 10. Rewind spring |
| 3. Connector | 11. Rope pulley |
| 4. Hose | 12. Pawl |
| 5. Pickup body | 13. Washer |
| 6. Insert | 14. Spring clip |
| 7. Strainer | 15. Nut |
| 8. Filter | 16. Flywheel |

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