TC1000 GAS TRIMMER, MODEL 51641

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TORO®

TC 1000 gas trimmer

SERVICE MANUAL

ABOUT THIS MANUAL

This Service Manual was written expressly for the TORO TC1000 Gas Powered Trimmer. The Toro Company had made every effort to make the information in this manual complete and correct.

This manual was written with the service technician in mind. It is organized so that information used most often is up front. As a result, you will find reference information on safety, maintenance, specifications, special tools and troubleshooting all in the front third of the manual.

Disassembly, inspection and reassembly procedures are covered in the last two-thirds of the manual and are grouped by component. We tried to cover each common repair with its own section or sub-section. For example, you will find that air gap adjustment and ignition coil replacement are called out separately.

And, because certain components are often difficult to troubleshoot without a good understanding of how they work, we have included some component theory. This information can be found at the beginning of most service procedure sections.

We are hopeful that you will find this manual a valuable addition to your shop. If you should come across any errors or if you have any questions regarding this manual, please contact us at the following address:

The Toro Company
8111 Lyndale Avenue South
Minneapolis, MN, USA 55420

The Toro Company reserves the right to change product specifications or this manual without notice.

The Toro Company gratefully acknowledges the assistance of Mitsubishi Heavy Industries, Ltd. in the production of this manual.

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SAFETY INSTRUCTIONS

This safety symbol means WARNING or CAUTION — PERSONAL SAFETY INSTRUCTION — Read the instruction because it has to do with the safety. Failure to comply with the instruction may result in personal injury or death.

This manual is intended as a service and repair manual only. The safety instructions provided in this manual are for the troubleshooting and service of the product only. The individual Operator's Manual will contain safety information on the operation of the TC1000.

Operator's Manuals with complete operational safety instructions are available through:

The Toro Company
Publications Department
8111 Lyndale Avenue South
Minneapolis, MN 55420 U.S.A.

FOR YOUR SAFETY . . .

Avoid possible explosions . . .
Store fuel in a container designed for gasoline and **never** smoke while working around gasoline.

Avoid fires . . .
Never allow the trimmer engine closer than one meter (three feet) to any combustible material.

Avoid accidental misuse of fuel . . .
Always store fuel in a container designed for gasoline that is properly labeled.

Avoid falls . . .
Always wipe up spilled fuel or oil.

Avoid asphyxiation . . .
Never operate an engine in a confined area without proper ventilation.

Avoid unexpected starting of the engine . . .
Always disconnect the spark plug wire before attempting any cleaning, adjustment or repair.

Avoid contact with a moving cutter head . . .
Always stay clear of the cutter head when the engine is running. The clutch is a mechanical device which could fail. Do not rely on it to keep the cutter head from turning.

Avoid blindness . . .
Always wear eye protection when repairing or running a gas trimmer.

Avoid hearing loss . . .
Wear ear protection when running a gas trimmer.

MAINTENANCE

Maintenance - Air Cleaner

Servicing of the air cleaner is recommended after every **25** hours of operation or more often in very dusty conditions.

See Fig. 1.

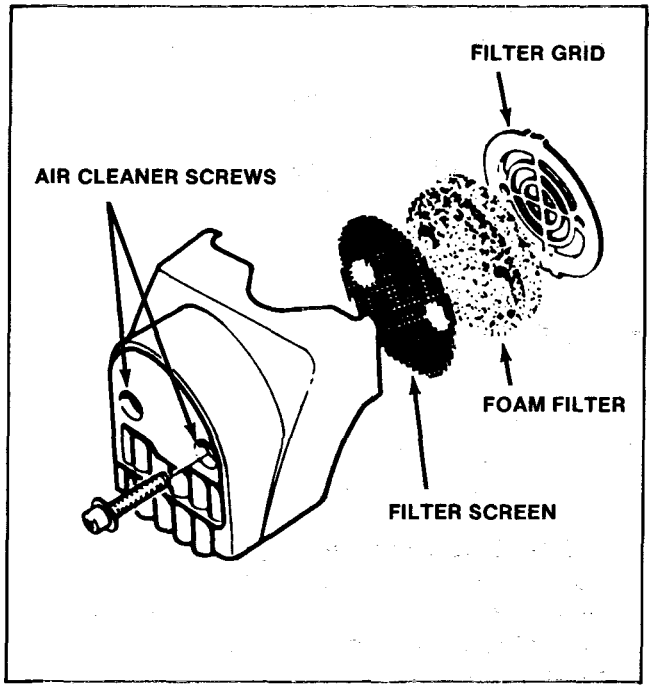

Figure 1

1. Remove the two screws securing the air cleaner cover to the trimmer
2. Carefully remove the filter grid, foam filter and filter screen.
3. Wash the foam filter in a soap and water solution and dry thoroughly. If the filter shows any sign of damage, replace it.
4. Saturate the foam filter with 5 ml (one teaspoon) of SAE 30 oil, then squeeze to distribute the oil evenly and to remove excess oil. The element should be damp but not wet.
5. Wash the filter screen in a clean solvent and air dry. If the filter screen shows any signs of damage, replace it.
6. Reinstall the air cleaner components as shown in Fig. 1. Note that the flat side of the filter grid faces the foam filter.
7. Tighten the air cleaner screws to 0.1 to 0.15 kg m (9 to 13 in lbs)

Maintenance - Muffler

Decarbonizing the muffler is recommended after every 50 hours of operation or if engine speed decreases drastically.

1. Remove the three screws securing the muffler cover to the trimmer. See Fig. 2. Be careful not to lose the spacer and gasket material beneath the spark plug protector screw.

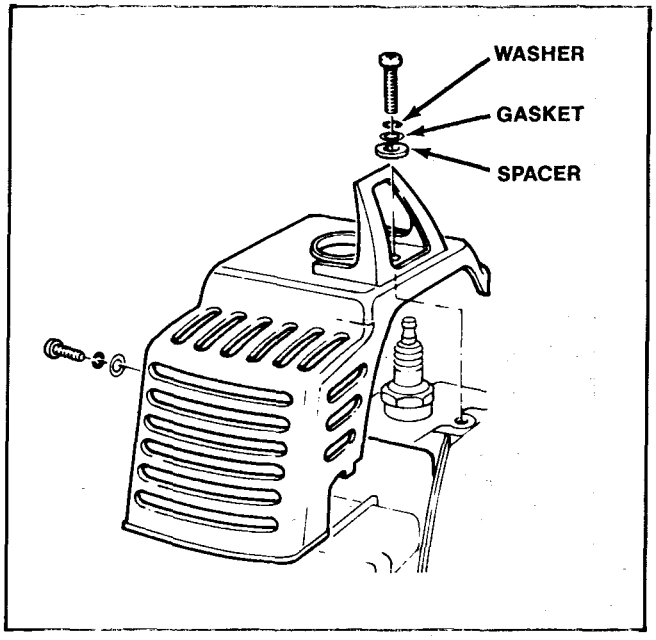

Figure 2

2. Remove the screw securing the muffler lid and gasket to the muffler body. See Fig. 3.

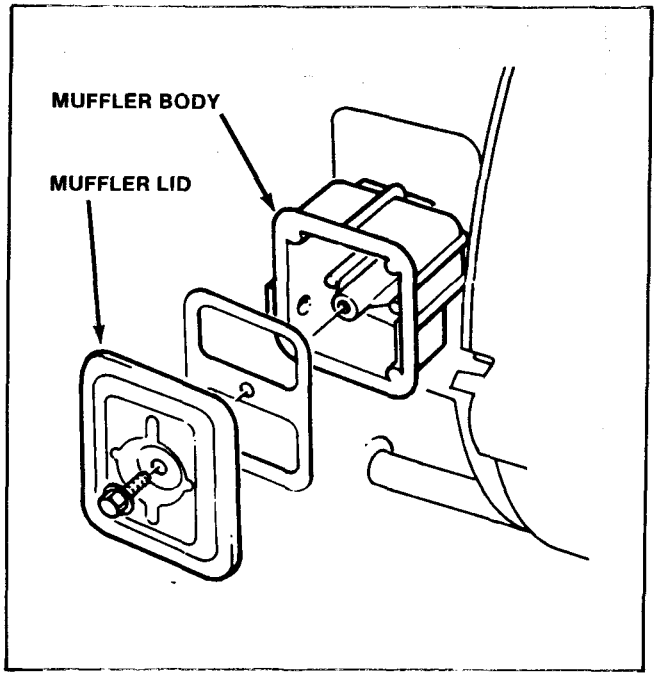

Figure 3

Maintenance - Muffler (cont'd)

3. Rotate the engine crankshaft until the piston totally covers the exhaust port. Clean the exhaust port area by using a clean flat piece of hardwood. Remove all loose particles.

   IMPORTANT: Use extreme care when cleaning the exhaust port. Stay clear of the piston so it will not be damaged.

4. Clean any carbon buildup inside the muffler body.

5. Make sure the muffler gasket is still useable (replace if necessary) and install gasket, muffler body and muffler lid to trimmer.

6. Reinstall muffler cover and tighten all fasteners securely. Be sure to install the spacer underneath the spark plug protector as shown in Figure 2.

Maintenance - Spark Plug

The TC1000 uses an NGK BM6A spark plug or equivalent. Correct gap is 0.6-0.7 mm (0.024-0.028"). The recommended servicing interval for the spark plug is 25 hours of operation.

1. Stop the engine and pull off the spark plug wire.

2. Clean around the spark plug and remove the spark plug from the engine using a 19mm (3/4 inch) socket.

   IMPORTANT: Replace a cracked, fouled or dirty spark plug. Do not sand blast, scrape or clean electrodes because engine damage could result from grit entering the cylinder.

3. Set the plug gap to 0.6-0.7mm (0.24-0.28").

4. Reinstall the plug and gasket in the engine. Tighten to 1.2 kg m (104 in lbs).

Maintenance - Fuel Filter

Fuel filter replacement is recommended after every 25 hours of operation.

1. Drain the fuel from the fuel tank into a container designed for gasoline. Start the engine and let it run at idle speed until it stops and all fuel is expended.

2. Remove the fuel tank cap. Insert a clean wire with a hooked end into the tank and hook the pickup tube above the filter. Pull the filter and hose out the fuel tank opening. See Fig. 4.

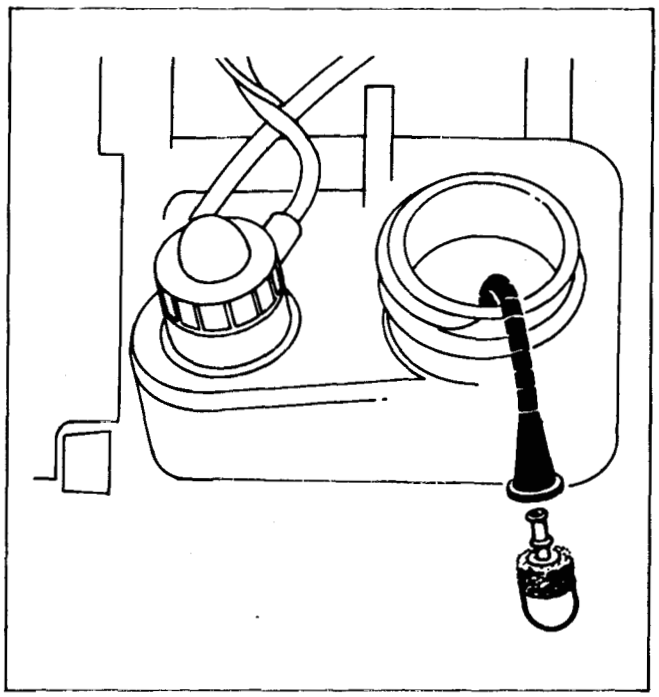

Figure 4

3. Remove the filter by holding the black tubing and pulling the filter straight off.

4. Replace the filter assembly.

5. Push the pickup assembly back into the tank and install the gas cap.

Maintenance - Cooling System

Before each use, visually inspect the cooling air inlet, the cooling fins, and the openings around the muffler for debris. Obstruction of these areas could lead to overheating and possible engine damage.

IMPORTANT: Be careful not to damage the cooling fins during cleaning.

Maintenance - Trimmer Implement

The trimmer implements require no lubrication. However, cleaning of the implement and the drive shaft area is recommended after every 25 hours of operation. More frequent cleaning may be required if trimming in very tall grass or if the implement area gets excessively hot.

Refer to either **Tap and Trim Head®**, page 46, or **Flex Blade,** page 48, for information on removal and cleaning of your particular implement.

Maintenance - Flex Shaft

After every 40 hours of operation, the flexible drive shaft should be removed from the drive shaft housing and all surfaces should be evenly greased with a number 2 general purpose lithium base grease.

1. Remove the machine screw and nylon locknut that secures the bearing housing to the drive tube. See Fig. 5.

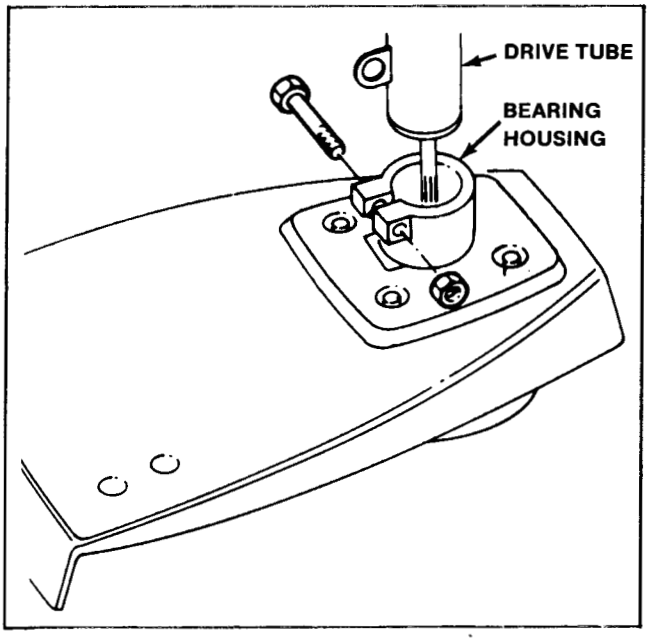

Figure 5

2. Pull the bearing housing, shield and trimmer implement off the drive tube as an assembly.
3. Using a needle nosed pliers, pull the flexible shaft out of the drive tube.
4. Grease the entire length of the shaft with a light coat of #2 general purpose lithium base grease.
5. Insert the flexible shaft into the nylon sleeve. Make sure that the shaft seats properly in the clutch drum. Proper seating is obtained when the flexible shaft is 10 mm (3/8 inch) inside the drive tube. See Fig. 6

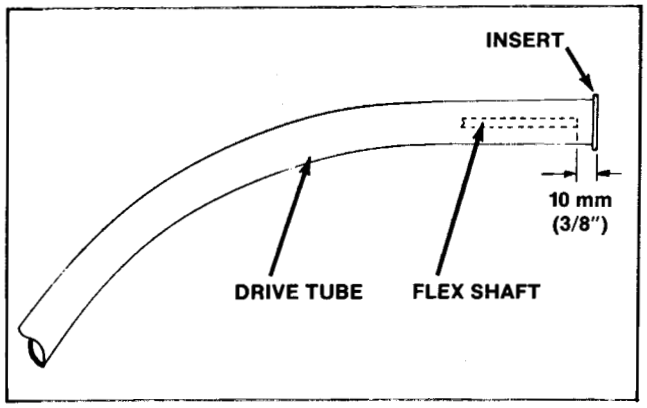

Figure 6

6. Mount the bearing housing, shield and trimmer implement assembly on the drive tube. It may be necessary to turn the trimmer implement slightly in order to get the flexible shaft to mate properly with the cutter head drive shaft.
7. Install the machine screw that fastens the bearing housing to the drive tube and secure with a new nylon locknut.

Maintenance - Preparation for Storage

The following procedure is recommended to ensure proper operation of the trimmer before storage of more than a month.

1. Drain the fuel from the tank into a container designed for gasoline. Start the engine and let it run at idle speed until it stops and all fuel is expended.
2. Remove dirt and grime from external parts of the trimmer. Ensure that the cooling fins are clean.
3. Pull the spark plug wire off the spark plug. Clean around the plug so that debris will not fall into the spark plug hole when the plug is removed. Remove the spark plug.
4. Pour 5 ml (one teaspoon) of two-cycle oil into the spark plug hole. This will prevent corrosion from damaging internal engine components.
5. Pull the recoil starter handle several times to distribute the oil throughout the engine.
6. Reinstall the spark plug. Tighten it to 1.2 kg m (104 in lbs). DO NOT CONNECT PLUG WIRE TO THE SPARK PLUG.

SPECIFICATIONS

Engine Specifications

Type	Air Cooled, 2 cycle, gasoline
Bore x Stroke	26 x 30 mm (1.02 x 1.18 in.)
Displacement	15.9 cc (0.97 cu. in.)
Compression Ratio	8.0 to 1
Continuous Rated Output	0.5 PS @ 7000 rpm (0.50 BHP @ 7000 rpm)
Maximum Output	0.8 PS @ 7000 rpm (0.55 BHP @ 7000 rpm)
Maximum Torque	0.07 kg m @ 7000 rpm (6.0 in lbs @ 7000 rpm)
Engine Rotation	Counterclockwise (as viewed from PTO end)
Idle Speed	3000 ± 300 rpm
Clutch Engagement Speed	3900 ± 300 rpm
Fuel	32 parts unleaded gasoline to 1 part B.I.A. certified 2 cycle oil
Fuel Tank Capacity	0.4 l (13.5 oz)
Carburetor	Diaphragm with piston valve
Ignition System	Solid state, transistorized
Spark Plug	NGK BM-6A, Champion CY6, or AC CS45
Starting System	Recoil
Lubrication	Oil mixed directly with gasoline

Service Specifications

Item	Standard Dimension	Allowable Limit
Spark Plug Gap	0.6 to 0.7 mm (0.024 to 0.028")	N/A
Ignition Coil Air Gap	0.4 to 0.5 mm (0.016 to 0.020")	N/A
Crankshaft Runout	0 to 0.05 mm (0 to .002")	0.06 mm (.0025")
Cylinder Diameter	26.00 to 26.02 mm (1.0236 to 1.0244")	Until plating exfoliates
Piston Diameter	25.94 to 25.96 mm (1.021 to 1.022")	See piston to cylinder clearance
Piston to Cylinder Clearance	0.04 to 0.08 mm (.00016 to 0.0032")	0.05 mm
Piston Ring End Gap	0.1 to 0.3 mm (0.004 to 0.012")	0.7 mm
Piston Ring Side Clearance	0.02 to 0.06 mm (0.0008 to 0.0024)	0.15 mm

SPECIFICATIONS

Carburetor Specifications

Item	Standard
Throttle Valve Needle Jet	Clip positioned in middle groove
High Speed Mixture Screw	3 turns out ± 1/2 turn
Idle Speed Adjusting Screw	Adjust so idle is 2300 to 2700 rpm
Inlet Needle Arm Height (from body surface)	1.4 to 1.6 mm (0.055 to 0.063")
Free Length of Inlet Valve Spring	8 mm (0.315")
Valve Opening Pressure	0.9 ± 0.2 kg/cm^2 (13.5 ± 3 psi)
Valve Closing Pressure	0 to 0.5 kg/cm^2 (0 to 7 psi)

Fastener Torques

Item	Torque
Crankcase Screws	0.4 to 0.5 kg m (35 5o 43 in lbs)
Cylinder Bolts	0.4 to 0.5 kg m (35 to 43 in lbs)
Fan Case Screws	0.4 to 0.5 kg m (35 to 43 in lbs)
Flywheel Nut	0.8 to 1.0 kg m (70 to 87 in lbs)
Starter Pulley	0.8 to 1.0 kg m (70 to 87 in lbs)
Carburetor Insulator Screws	0.3 to .45 kg m (26 to 39 in lbs)
Carburetor Screws	0.3 to .45 kg m (26 to 39 in lbs)
Air Cleaner Screws	0.1 to .15 kg m (9 to 13 in lbs)
Muffler Nuts	0.5 to 0.6 kg m (43 to 52 in lbs)
Recoil Starter Screws	0.2 to 0.3 kg m (17 to 26 in lbs)
Fuel Tank Screws	0.2 to 0.25 kg m (17 to 22 in lbs)
Spark Plug	1.2 kg m (104 in lbs)
Ignition Coil Bolts	0.4 to 0.5 kg m (35 to 43 in lbs)
Clutch Bolts	0.6 to 0.8 kg m (52 to 70 in lbs)
Trigger Module Screw	0.2 to 0.3 kg m (17 to 26 in lbs)

TOOL REQUIREMENTS:

Flywheel Puller Toro P/N 41-7650	Dial Indicator
Spark Tester Toro P/N 41-7890	Magnetic V Blocks & Dial Indicator Stand
Tachometer Toro P/N 42-2730	Spark Plug Gapping Tool
Feeler Gauge	Torque Wrench (14/16)
Compression Gauge	Threebond #1104 Toro P/N 505-80
Metric Socket Set 3/8" Drive	Loctite #242 Toro P/N 505-76
Spark Plug Socket	Micrometer
#2 Phillips Screwdriver	Snap Ring Plier (inside & outside type)
12 oz. Ball Peen Hammer	Hex. Key Set
Needle Nose Pliers	

TROUBLESHOOTING

Engine Does Not Produce Spark

Possible Causes	Remedy
Stop Switch in "off" Position	Move switch to "on" position
Stop Switch in Backwards	Disassemble control and turn switch around
Spark Plug Damaged or Fouled	Replace spark plug
Spark Plug Wire Damaged or Broken	Replace coil
Coil Primary Wire Grounding Out	Repair damaged wire with electrical tape
Ignition Coil has Failed	Replace ignition coil
Trigger Module has Failed	Replace trigger module

Engine Floods During Starting

Possible Causes	Remedy
Operator not Depressing Tickler Valve During Priming	Explain proper starting procedure to operator
Stale Gasoline	Mix fresh fuel
Choke Not Opening	Replace damaged or broken parts
Incorrect Gas:Oil Ratio	Use fuel with 32:1 gas:oil ratio
Tank not Venting Properly	Repair or replace gas cap
Debris in Carburetor	Clean carburetor

Engine Not Getting Fuel

Possible Causes	Remedy
Fuel Tank Empty	Fill fuel tank
Fuel Filter Clogged	Replace fuel filter
Leak in Fuel Line	Replace defective fuel line
Gas Cap not Venting Properly	Repair or replace gas cap
Diaphragm Pump not Functioning	Rebuild carburetor
Crankcase Leak	Repair leak

TROUBLESHOOTING

Engine Lacks Power

Possible Causes	Remedy
Grass Wound around Trimmer Head	Clean trimmer head
Improper Gas:Oil Ratio	Use 32:1 gas:oil ratio
Stale Fuel	Mix fresh fuel
Carburetor Improperly Adjusted	Adjust carburetor
Flywheel Key Sheared or Missing	Replace flywheel key
Low Compression	See "Low Compression" troubleshooting section

Engine Has Low Compression

Possible Causes	Remedy
Insufficient Oil in Fuel	Use fuel with 32:1 gas:oil ratio
Piston Rings Excessively Worn	Rebuild engine
Air Leak in Lower Crankcase	Replace lower crankcase seals
Air Leak in Cylinder Mounting Area	Replace gasket and tighten mounting bolts
Air Leak at Spark Plug	Replace defective plug or cylinder

Engine Backfires *(indicated by burnt air cleaner element)*

Possible Causes	Remedy
Muffler and Exhaust Port Plugged with Carbon	Decarbonize muffler and exhaust ports
Sheared or Missing Flywheel Key	Replace flywheel key
Operator Constantly Revving Engine	Educate Operator

SECTION 1 CARBURETOR

Carburetor Operation

The carburetor for the TC1000 is a diaphragm style carburetor. It uses alternating pulses from the crankcase to pump fuel from the fuel tank to the carburetor.

To adequately describe the function of the carburetor, it is necessary to break its operation down into three systems:

— The Diaphragm Pump
— Fuel Metering and Mixing System
— The Primer System

Carburetor Operation - The Diaphragm Pump

The diaphragm pump requires alternating positive and negative air pressures working upon it in order to fluctuate and perform a pumping function. The source of the positive and negative pressures is the lower crankcase where these pressures are alternately being created by the up and down movement of the piston.

Transfer of these pressure pulses is accomplished by a passage which leads from the lower crankcase, to a point just below the intake port. See Fig. 7.

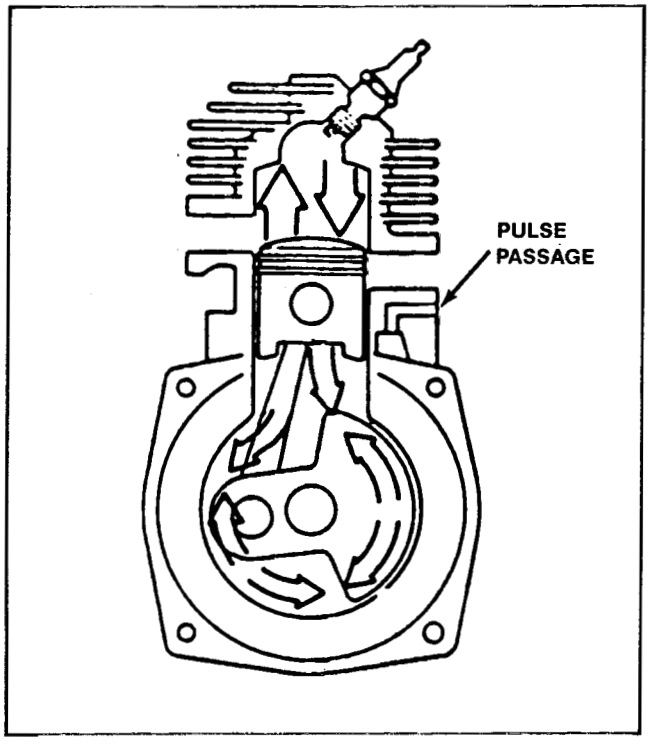

Figure 7

From there, the passage leads through the intake flange and into the carburetor. It /terminates in the diaphragm chamber at a point called the pulse hole. See Fig. 8

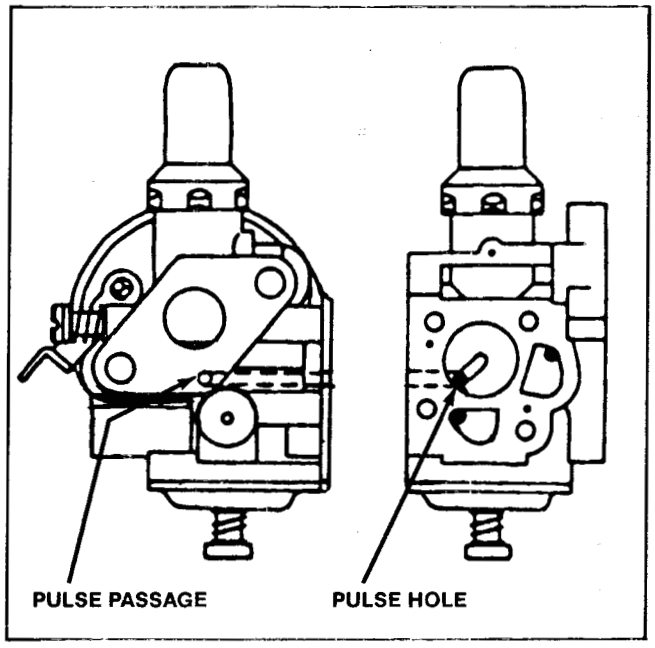

Figure 8

The pulses vary with the movement of the piston. As the piston moves upward, vacuum is created which pulls the diaphragm toward the pulse hole. This movement results in three things happening on the pump cover side of the diaphragm. See Fig. 9.

1. The oulet flapper valve is drawn toward the pump cover. This seals the outlet passage to ensure that fuel is drawn only through the fuel inlet.
2. The inlet flapper valve is pulled open to allow fuel to flow from the fuel line into the fuel inlet cavity.
3. Fuel is drawn into the fuel pump cavity.

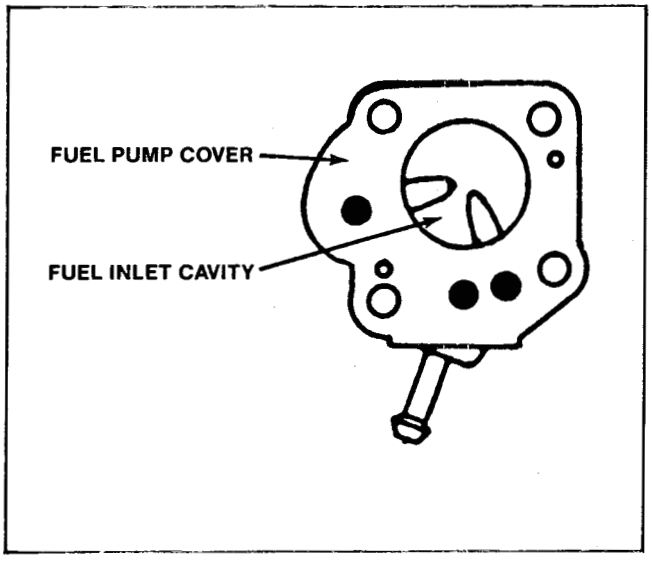

Figure 9

Carburetor Operation - The Diaphragm Pump (cont'd)

As the piston moves downward, another sequence occurs which pumps the fuel from the pump cavity into the the main diaphragm cavity: See Fig. 10.

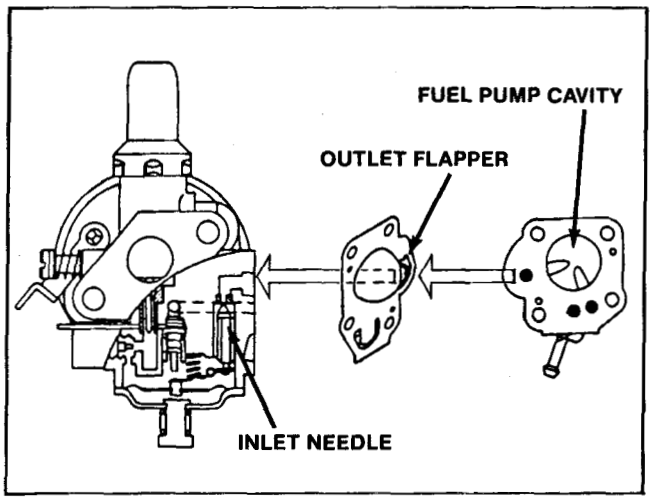

Figure 10

1. The exhaust stroke sends a positive pressure pulse to the pump diaphragm which pushes the diaphragm toward the pump cover.
2. The positive pressure in the fuel pump cavity seals the inlet flapper valve to prevent fuel from being forced back into the fuel line.
3. The outlet flapper valve is pushed open.
4. Fuel is forced out of the pump cavity and past the inlet needle.

   Note: The inlet needle is spring loaded in the closed position. The spring pressure is very slight and is easily overcome by the force of the fuel coming through the passage.
5. The fuel enters the main diaphragm cavity. See Fig. 11.

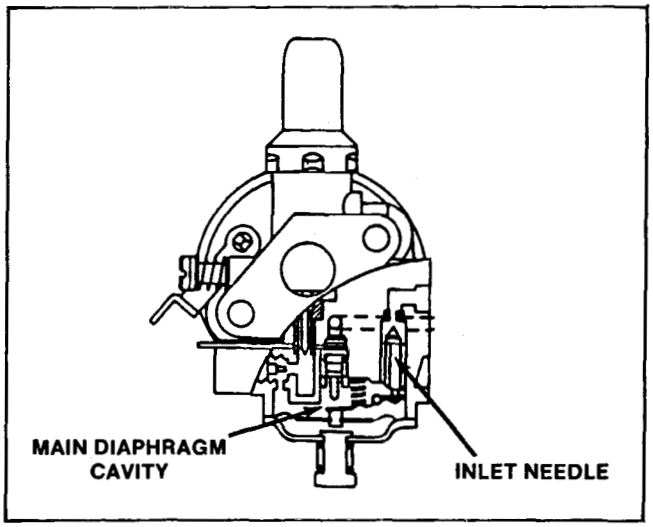

Figure 11

Note: The main diaphragm serves only as a reservoir so that fuel can be properly metered before entering the venturi. It does not do any pumping of fuel during normal operation.

6. Once the positive pressure is gone, the needle valve is reseated. This allows fuel to be drawn from the sealed main diaphragm cavity and into the carburetor throat on the intake stroke.

Carburetor Operation - Fuel Metering & Mixing

With the main diaphragm filled with fuel, the carburetor meters the amount going into the engine by using the high speed mixture screw and the needle jet. Before entering the intake port of the engine, the fuel is mixed with air to further atomize it and increase its combustibility.

The metering and mixing operation is described below: See Fig. 12.

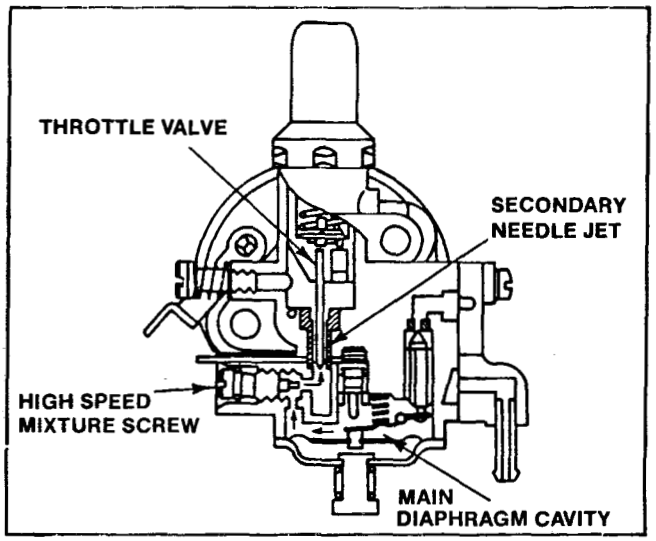

Figure 12

1. On the intake stroke, vacuum in the carburetor throat draws fuel from the main diaphragm cavity. Note that as the intake stroke begins, the main diaphragm cavity is filled with fuel and that the diaphragm is bowed toward the cover.
2. The fuel is drawn through the hole in the top of the main diaphragm chamber and past the high speed mixture screw. The high speed mixture screw regulates the **maximum** amount of fuel that can enter the carburetor throat.
3. The fuel is then drawn past the secondary needle which is attached to the throttle valve. It moves with the throttle valve and regulates the amount of fuel allowed into the carburetor throat in proportion with the throttle setting.

Carburetor Operation - Fuel Metering & Mixing (cont'd)

4. The venturi is the portion of a carburetor throat that is narrowed in order to increase air velocity. On the TC1000 carburetor, the venturi size is variable and is controlled by the postion of the throttle valve. See Fig. 13.

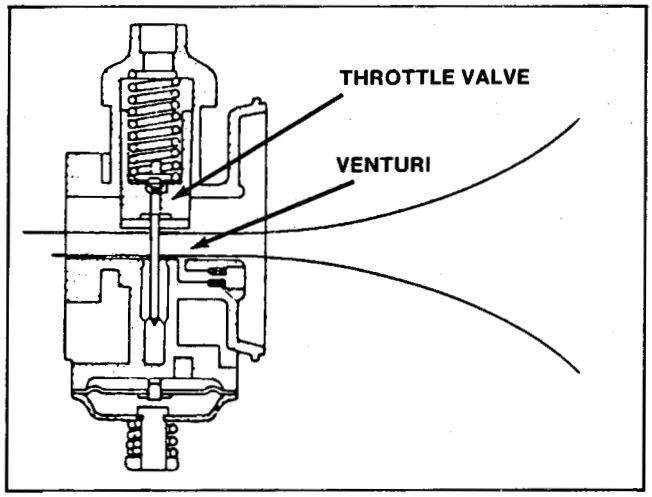

Figure 13

5. The vacuum in the venturi area draws the fuel past the secondary needle jet and into the carburetor throat.
6. To better atomize the fuel, an air correction jet was added. The air correction jet allows filtered air to enter the carburetor throat perpendicular to the normal air flow. This action creates turbulence in the venturi area and helps mix the fuel with air as it enters the carburetor throat. See Fig. 14

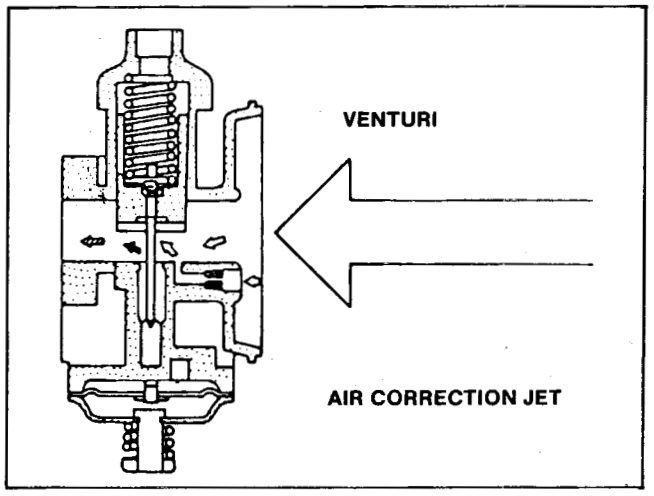

Figure 14

7. The air/fuel mixture enters the engine.

Carburetor Operation - The Primer System

The TC1000 uses a primer system that ensures fuel is present throughout the fuel system. When properly used, this primer system should not induce flooding.

The recommended procedure for priming is as follows: (See Fig. 15)

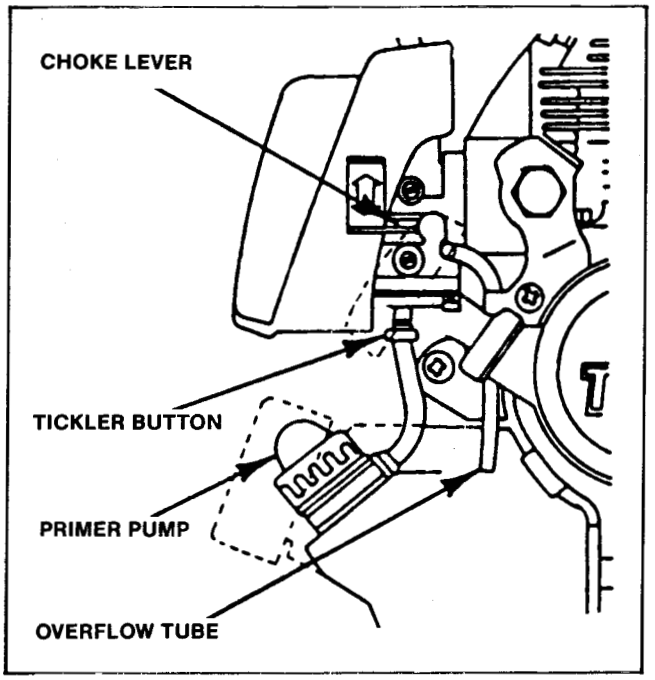

Figure 15

- — Push the tickler button fully inward.
- — Manually pump the primer pump until a small amount of fuel is emitted from the overflow tube.
- — Stop pumping the primer pump and release the tickler valve. The engine is now ready to start.

The operation of the primer system is as follows: See Fig. 16.

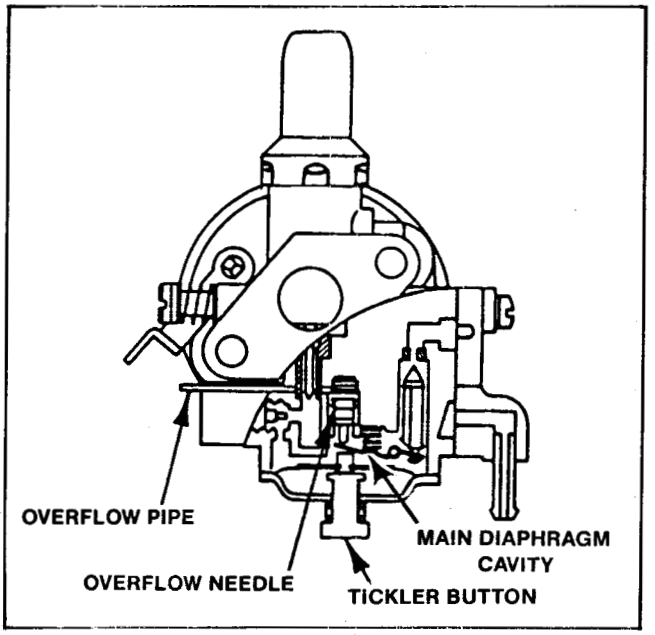

Figure 16

Carburetor Operation - The Primer System (cont'd)

1. When the tickler valve is depressed slightly, the inlet needle is unseated.
2. Depressing the tickler valve fully keeps the inlet needle unseated and also opens the overflow needle.
3. Pumping the primer pump forces fuel into the entire fuel system. This action ensures that the fuel line, diaphragm pump, and main diaphragm cavity are all filled with fuel.

   Note: If the tickler valve is not fully depressed during priming, the overflow valve will not open and fuel will be forced into the carburetor throat thereby flooding the engine.
4. Releasing the tickler valve seats the overflow valve and the inlet needle. At this point the engine is ready for starting.

Carburetor - Removal

1. Remove the 2 screws with flat washers and lock washers, securing the air cleaner assembly and remove the assembly. See Fig. 17.

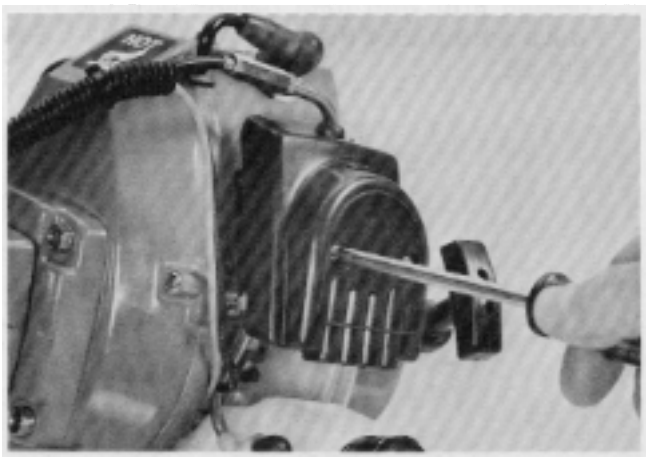

Figure 17

2. Pull from the carburetor the overflow line and the fuel feed line. Remove the carburetor with attached throttle wire. Next, remove the 2 screws with lock washers, that secure the carburetor onto the intake flange. See Fig. 18.
3. Remove the intake flange, gasket and insulators.
4. Remove the 2 screws securing the intake assembly to the cylinder and carefully remove the intake flange, insulator gasket, insulator and plate.

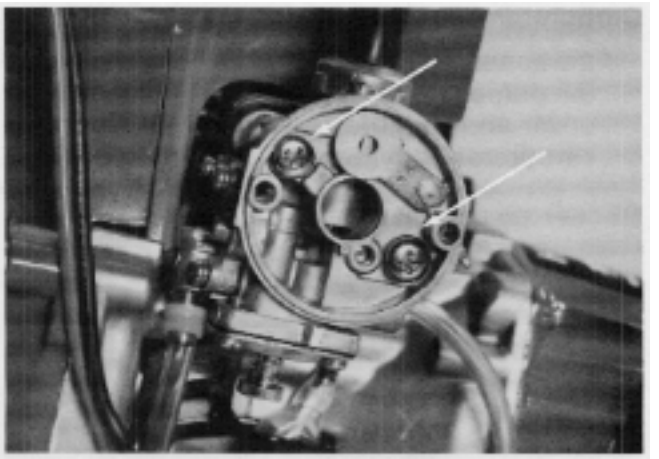

Figure 18

IMPORTANT: Before removing the intake flange, note the position of the pulse orifice through the flange: this orifice should be positioned toward the fuel tank as it matches a corresponding orifice in the carburetor. The intake flange can be incorrectly positioned. This will result in fuel starvation.

NOTE: The screws securing the intake flange may have become heat seized and difficult to remove. They can be loosened by firmly tapping the screwdriver into the screws. During reassembly, a sparse application of anti-seize compound to these threads can prevent future heat seizure.

Carburetor - Disassembly

1. Separate the carburetor from the throttle by unscrewing the mixing chamber cap and removing the throttle cable and the attached throttle valve, needle jet, throttle spring and spring retainer. See Fig. 19.

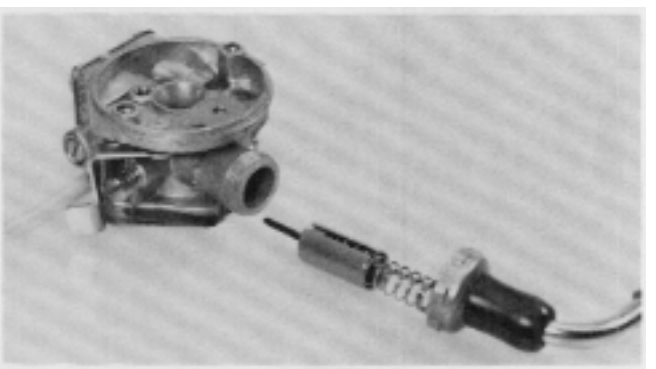

Figure 19

2. Remove the fuel pump by removing the 4 screws with lock washers securing the pump cover then lifting off the pump diaphragm and pump cover gasket.

   NOTE: The gasket and the diaphragm are extremely thin and may stick together giving

the appearance of one piece. Remember that the pump diaphragm seals against the pump cover and that the gasket seals against the carburetor body. See Fig. 20.

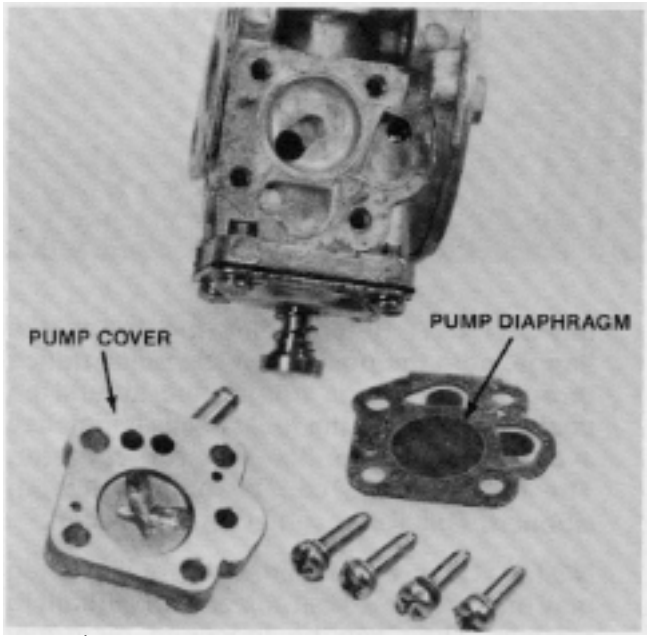

Figure 20

3. Remove the 4 screws with lock washers securing the main diaphragm cover assembly to the carburetor. Carefully lift off the main diaphragm cover assembly.

   NOTE: The main diaphragm assembly and the main diaphragm packing are thin and may stick together giving the appearance of one piece, not two. Remember that the main diaphragm gasket seals against the carburetor body. See Fig. 21.

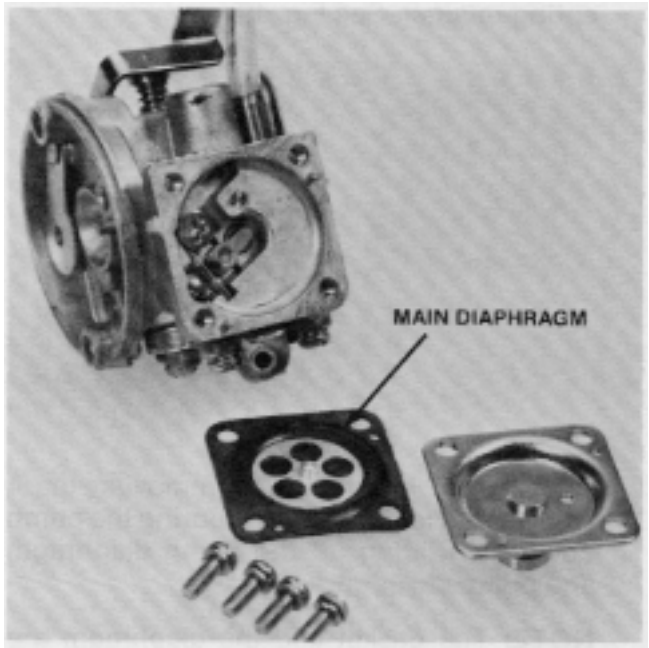

Figure 21

NOTE: Before removing inlet needle pieces, inspect inlet needle arm height using the special "Height gauge" or a depth micrometer. The correct height is 1.4 - 1.6 mm (.055 - .062"). See Fig. 22.

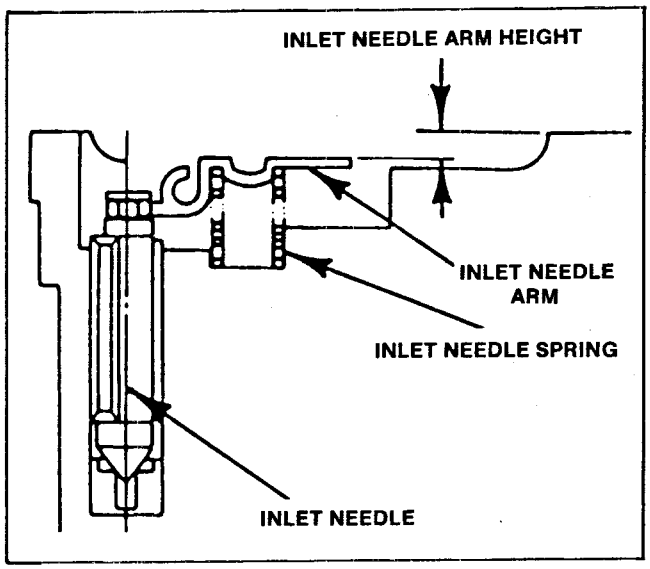

Figure 22

4. Remove the inlet needle pieces from the carburetor by removing the inlet needle pin set screw and carefully lifting out the inlet needle arm with inlet needle pin, the inlet valve spring and the inlet needle valve. See Fig. 23.

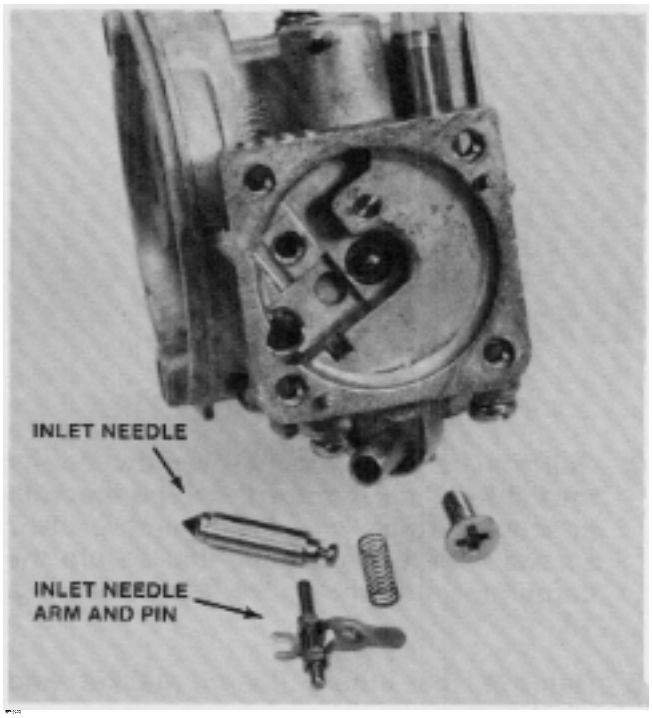

Figure 23

5. Remove the throttle adjusting screw, throttle adjusting screw spring and the high speed mixture screw. See Fig. 24.

Carbuertor - Disassembly (cont'd)

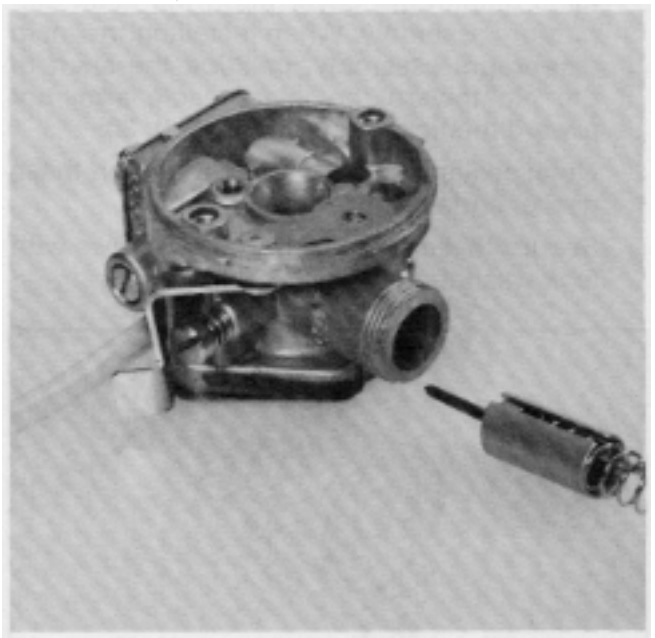

Figure 24

6. If it is necessary to remove the throttle parts from the throttle cable perform the following. Compress the throttle return spring and pull the lead-lugged end of the cable from the slot in the throttle valve. Remove the throttle spring from throttle cable. From the throttle valve, push out the retainer and the needle jet assembly. See Fig. 25.

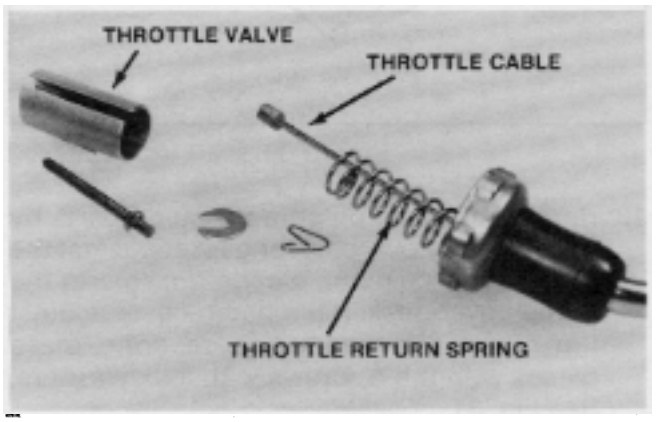

Figure 25

Carburetor - Reassembly

IMPORTANT: Make certain all parts are clean and in good condition. Do not use worn or damaged parts.

1. Install the E clip on the secondary needle. Nominal placement of the E clip is in the middle groove. The upper groove will yield a leaner mixture and the lower groove yields a richer mixture. See Fig. 26.

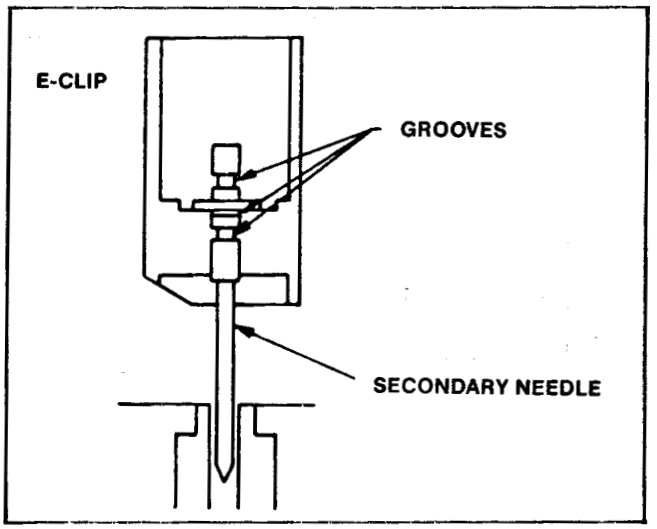

Figure 26

2. Position the needle with the retainer clip into the throttle valve.
3. Install the special washer and spring clip as shown in Figure 27. Push the needle assembly into the throttle valve and line up the slots in the special washer and the throttle valve.

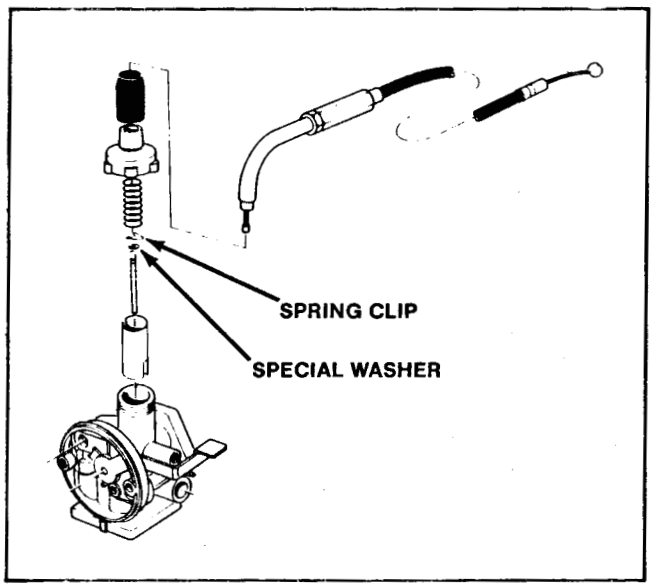

Figure 27

4. Slide the throttle spring on the throttle cable and position the throttle cable into its groove in the throttle valve.
5. Install the throttle adjusting screw with the adjusting screw spring into the carburetor.
6. Install the high speed mixture screw. Gently seat the screw, then back-out approximately 3 full turns to give a nominal setting.
7. Replace the inlet needle pieces by installing the inlet needle, the inlet needle spring, the inlet needle arm and secure with the screw. See Fig. 28.

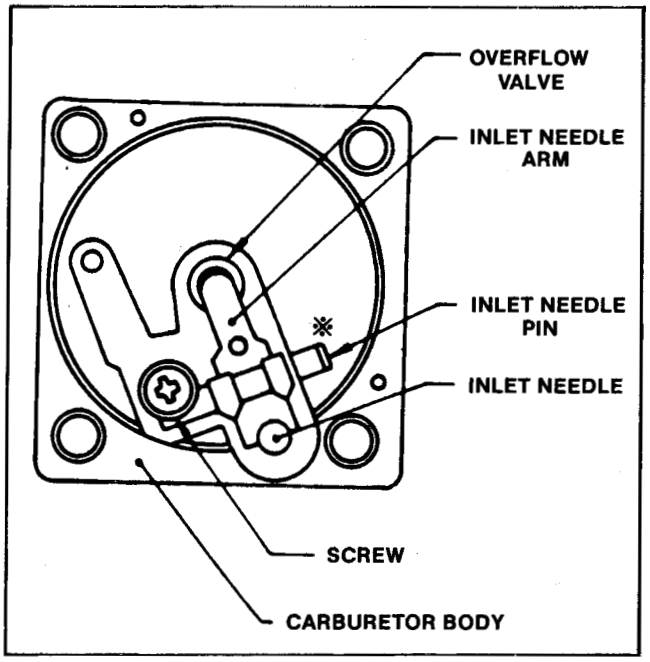

Figure 28

Make certain the spring is securely seated in the inlet needle arm and that the inlet arm positively engages the inlet needle.

8. Using the carburetor body surface as reference, check the inlet valve height. Inlet valve height can be checked with a height gauge or with an accurate depth gauge. See Fig. 29.

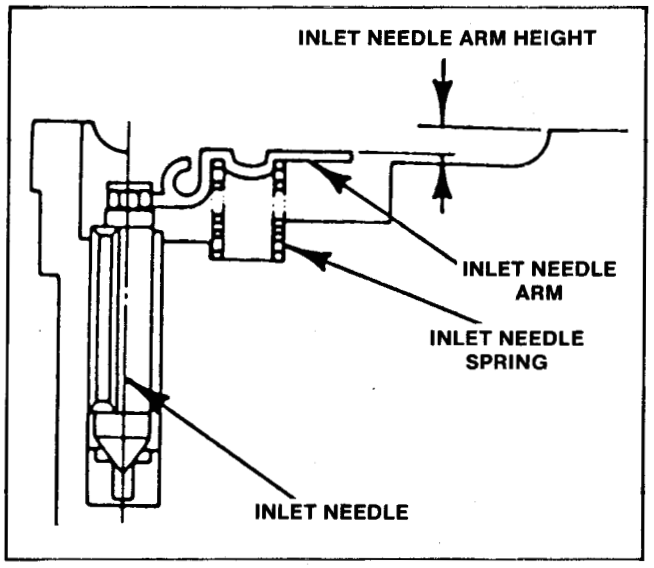

Figure 29

Carburetor Inlet Needle Arm Height
1.4 to 1.6 mm (.055 to .063")

9. Replace the main diaphragm parts by installing the main diaphragm gasket against the carburetor, the main diaphragm assembly upon the main diaphragm gasket and the main diaphragm cover upon the main diaphragm assembly. When installing the main diaphragm assembly, position the shaft of the pin toward the inlet needle arm, not toward the tickler button. See Fig. 30.

Note: sealant is not recommended on these gasket surfaces.

Secure these pieces with the 4 screws with lock washers.

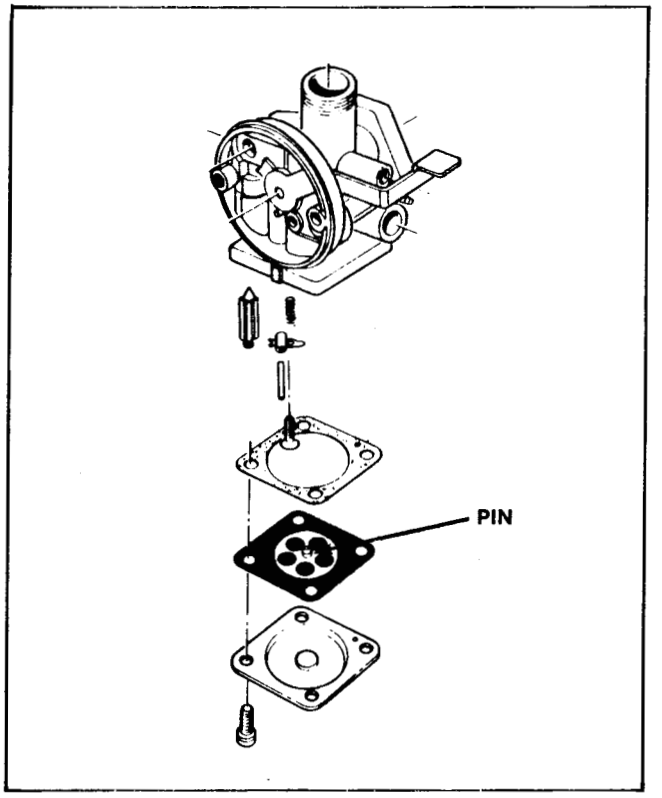

Figure 30

10. Replace the fuel diaphragm pump parts by installing the pump cover gasket against the carburetor, the pump diaphragm against the pump cover gasket, the pump cover against the pump diaphragm and securing these pieces with the 4 screws with lock washers. See Fig. 31.

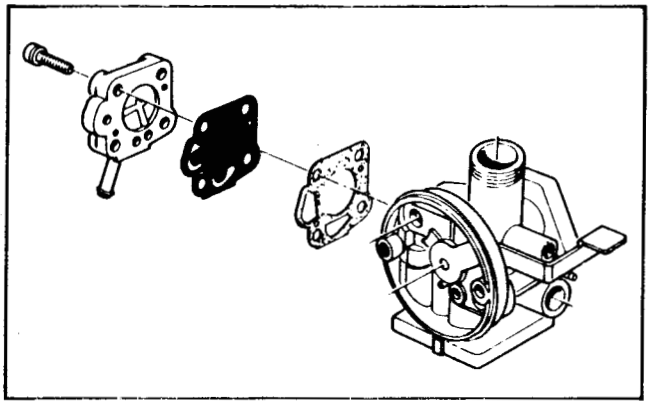

Figure 31

Carburetor - Reassembly (cont'd)

NOTE: Sealant is not recommended on these gasket surfaces.

11. Install the throttle cable with attached throttle parts into the carburetor and secure by tightening the throttle fitting.

    The carburetor is completely reassembled and ready for installation to the intake flange.

Carburetor - Installation

1. Install the intake flange with gaskets and heat shield making certain that the pulse hole is not obstructed by any of the intake components. Secure by tightening the screws to .3 to .45 kg m (26 to 38 in lbs). See Fig. 32.

   The proper order for installing the intake components is:

   — gasket
   — heat shield
   — gasket
   — intake flange

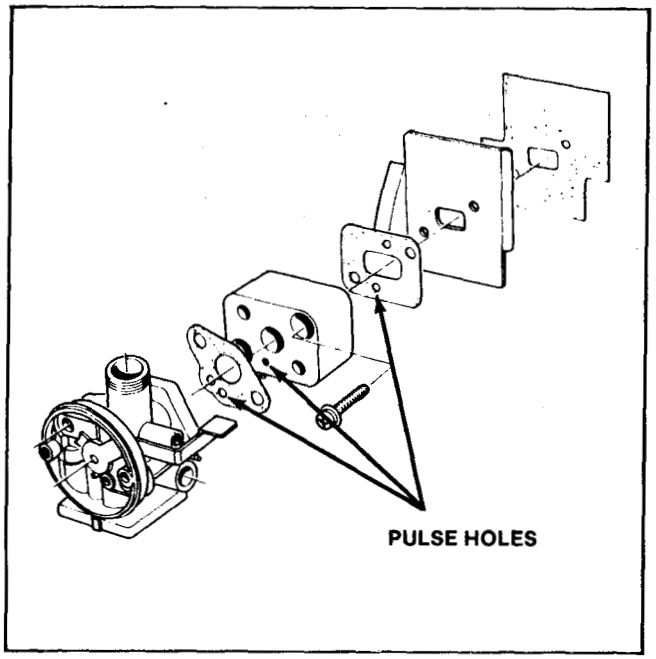

Figure 32

2. Place the carburetor gasket on the intake flange making sure that the pulse hole is not obstructed. Install the carburetor.

   Tighten the screws to .3 to .45 kg m, (25 to 38 in lbs). See Fig. 33.

3. Ensure that the throttle cable is positioned as shown in Figure 33 to prevent throttle cable damage.

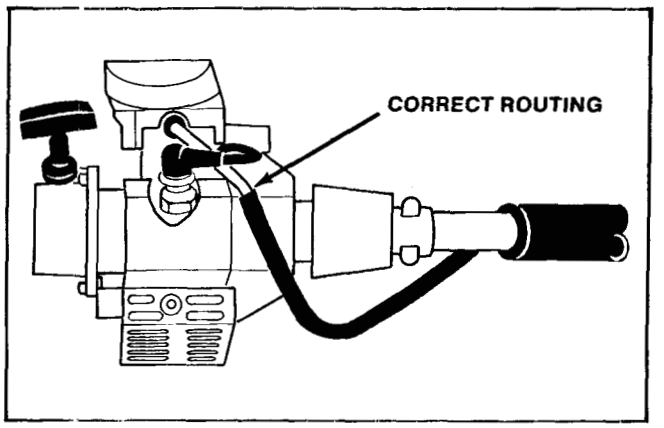

Figure 33

4. Attach the fuel feed line and the overflow line to the carburetor.
5. Place the air cleaner steel net, element and grid into the air cleaner cover and install the assembled air cleaner onto the carburetor. Secure with the 2 screws with lock washers and flat washers.

Carburetor Adjustment - Idle Speed

CAUTION: Stay clear of cutter head whenever engine is running.

1. With the engine running at operating temperature, the choke fully opened and, no load applied to the engine, turn the idle speed adjusting screw to achieve an idle between 2300 and 2700 rpm. See Fig. 34.

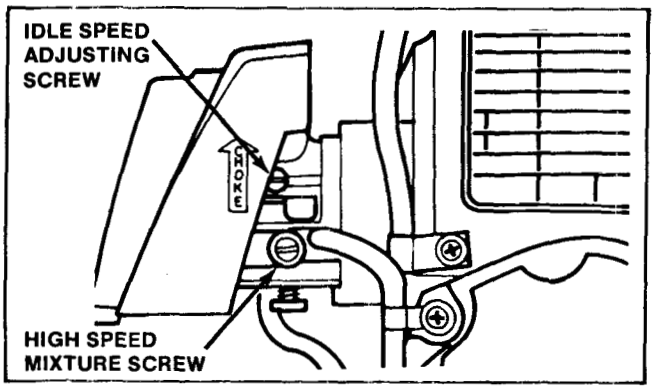

Figure 34

Carburetor Adjustment - Mixture

CAUTION: Stay clear of cutter head whenever engine is running.

Carburetor Adjustment - Mixture (cont'd)

1. The high speed mixture screw (see Fig. 34) controls the fuel flow requirements during the engine's optimum demand. With the engine running at operating temperature, the choke fully opened and, no load applied to the engine, turn the high speed mixture screw to obtain the highest RPM. This should be approximately 2½ to 3½ turns out from fully closed.

   Turning the screw clockwise will make the air/fuel mixture lean (less fuel/more air).

   Turning the screw counterclockwise will make the air/fuel mixture rich (more fuel/less air).

   IMPORTANT: Turning the high speed mixture screw in too tightly may damage the tip.

Carburetor Adjustment - Throttle Valve

CAUTION! Be sure to wear safety glasses when using compressed air.

1. Remove two (2) screws securing the air cleaner cover to the trimmer and remove the air cleaner as an assembly.
2. Squeeze the throttle trigger and note the travel of throttle valve in the carburetor opening. The throttle valve should travel to the top of the carburetor opening when the trigger is in full throttle position.
3. To adjust, loosen the jam nut on the throttle cable and rotate the turnbuckle to increase or decrease the travel of the throttle valve. See Fig. 35.

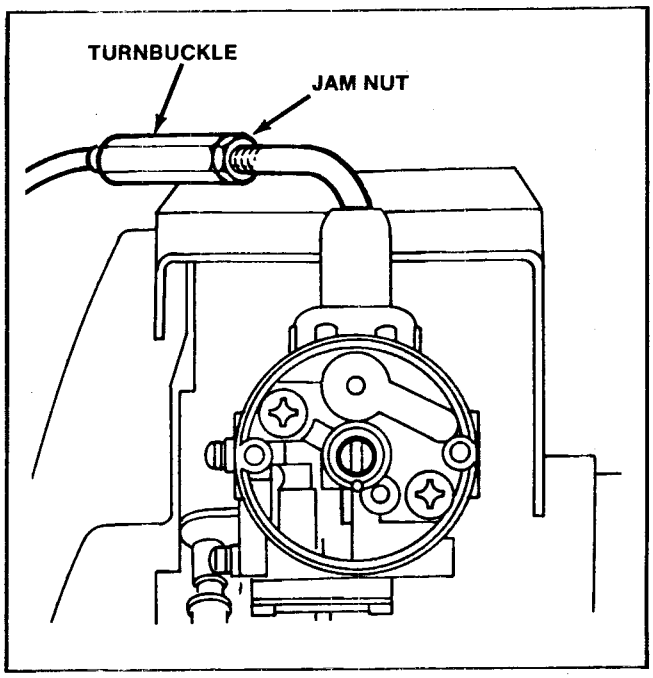

Figure 35

4. Once adjusted, tighten the jam nut and recheck the adjustment.
5. Reinstall the air cleaner cover assembly and secure using the two screws with flat washers and lock washers.
6. Check the idlle speed and adjust if necessary. Refer to **Carburetor Adjustment - Idle Speed,** page 17.

SECTION 2 FUEL SYSTEM

FUEL TANK

Fuel Tank - Removal

1. Remove the primer fuel line by slipping the retainer ring off the tank fitting. Pull the primer fuel line off.
2. Remove the two screws fastening the tank to the crankcase and remove the tank

   NOTE: Be careful not to lose the brass inserts that fit in the tank mounting holes.

Fuel Tank - Installation

1. Position the fuel tank on the crankcase and fasten using the original two machine screws.

   NOTE: The ignition kill wire should be connected to the tank mounting screws closest to the fuel cap.
2. Slide the retaining ring onto the primer fuel line, then push the line onto the tank fitting near the primer bulb. Slide the retainer ring down, over the fitting to secure the line.

PRIMER PUMP

Primer Pump - Proper Use

Proper operation of the primer system is as follows: See Fig. 36.

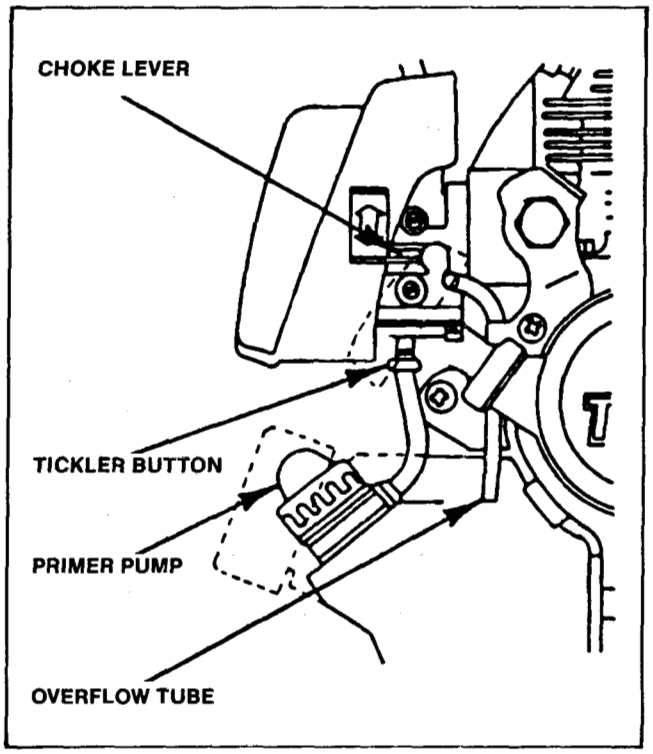

Figure 36

- Push the tickler button fully inward.
- Manually pump the primer pump until a small amount of fuel is emitted from the overflow tube.
- Stop pumping the primer pump and release the tickler valve. The engine is now ready to start.

Primer Pump - Operation

The primer system on the TC1000 is used on cold starts only and ensures that fuel is present throughout the entire fuel system. It relies on manual pumping action to draw fuel into the primer and to pump it into the fuel line and the carburetor.

The primer pump uses a two step operation to pump fuel to the carburetor: Pushing on the primer diaphragm does the following: See Fig. 37.

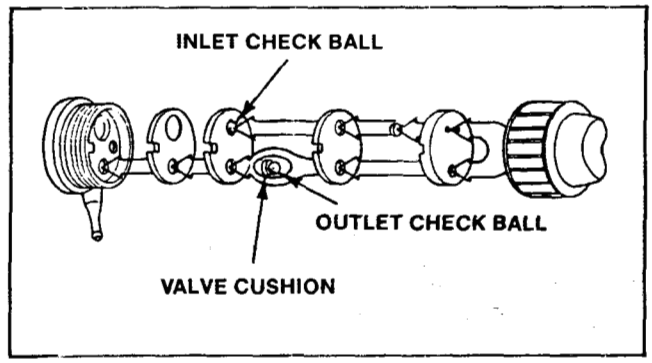

Figure 37

1. The inlet check ball seats.
2. The outlet valve is pushed against the porous valve cushion to allow fuel or air (whatever is in the primer diaphragm) to pass into the fuel line and carburetor.

Releasing the primer diaphragm allows it to come back to its original shape which results in the following: See Fig. 38.

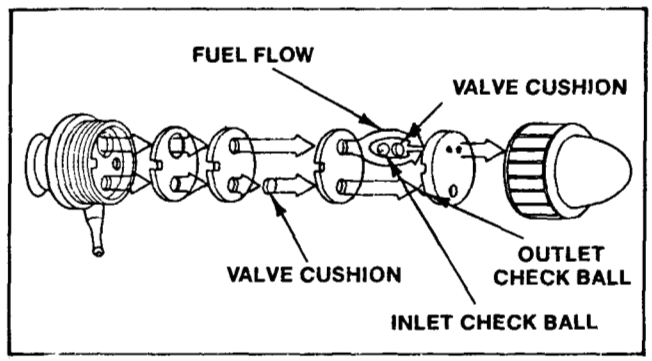

Figure 38

Primer Pump - Operation (cont'd)

1. The vacuum produced by the diaphragm seals the outlet check valve. This prevents fuel from being drawn from the fuel line.
2. The inlet valve is drawn toward the porous valve cushion which allows fuel to be drawn from the pickup line inside the tank. This action fills the primer diaphragm with fuel and readies it for the next pump.

Primer Pump - Disassembly

1. Pull the primer pump from the tank and remove the fuel line. The primer pump is press fit into the fuel tank. See Fig. 39.

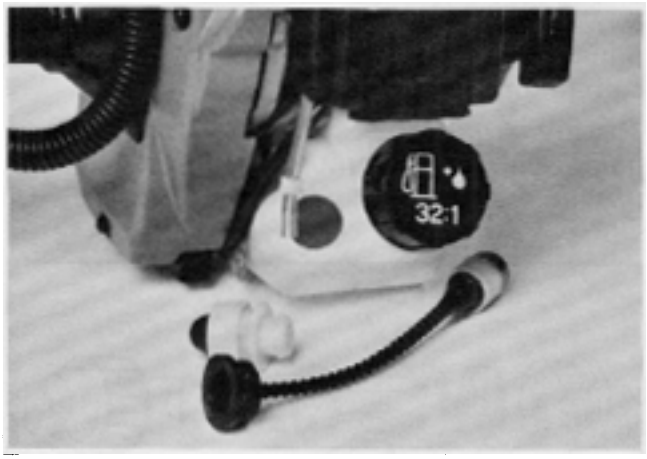

Figure 39

2. Unscrew the rubber cap/button from the pump. See Fig. 40.

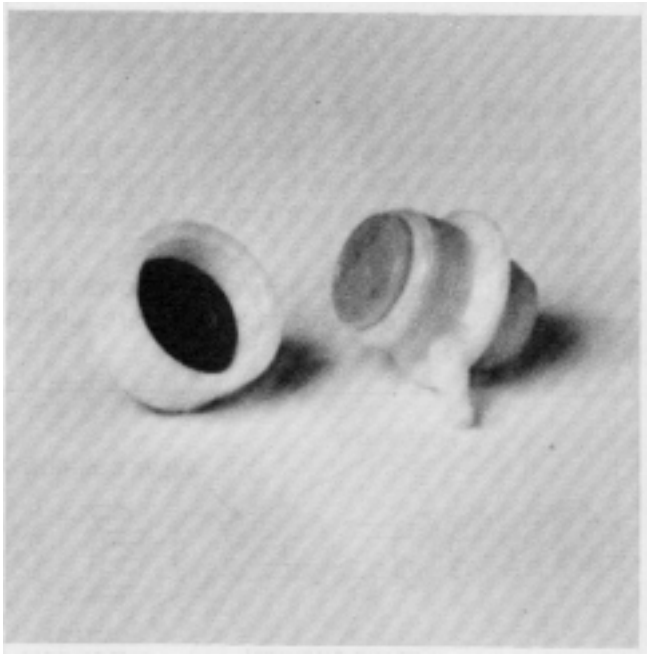

Figure 40

3. Carefully lift out the top valve seat with the valve cushion, and 2 ball valves. See Fig. 41

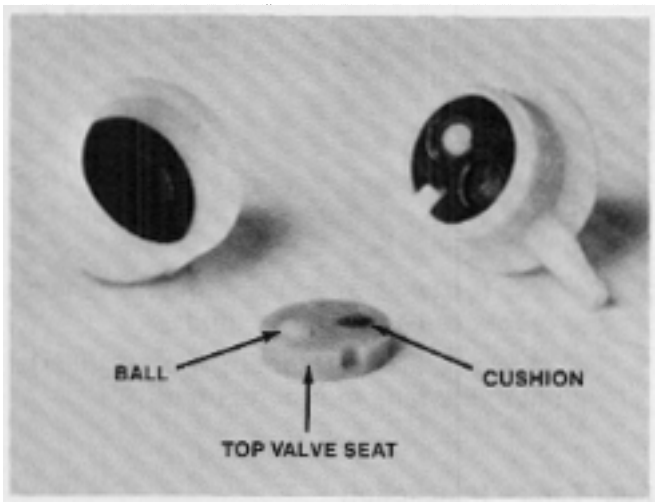

Figure 41

4. Insert a thin, non-puncturing punch through the hole in the bottom of the pump and carefully push out gasket A, valve seat A with valve cushion and gasket B.

Primer Pump Inspection

1. Inspect the disassembled primer pump for contamination or damaged parts.
2. Clean thoroughly in a mild soap and water solution.
3. If the primer pump is suspect after inspection, the entire primer pump assembly should be replaced.

Primer Pump Reassembly

1. Before reassembling, familiarize yourself with the configuration of the parts to ensure they are properly installed. See Fig. 42.

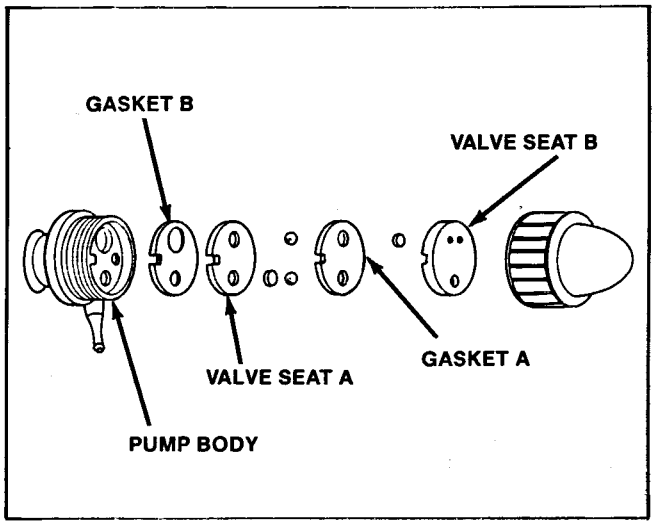

Figure 42

Primer Pump - Reassembly (cont'd)

a. Gasket "B" has two sizes of fuel orifices — one large and one small.

   Gasket "A" has one size of fuel orifices — both large.

b. Valve seat "A" has a locating notch that is cut through the seat.

   Valve seat "B" has a locating notch that is partially cut into the seat.

c. Gasket "A" and valve seat "A" are inside the pump. Gasket "B" and valve seat "B" are to the outside.

2. Reassemble parts into the pump body. Position gasket B so the small fuel orifice is toward the outlet nozzle of the pump body.
3. Place valve seat A with valve seats up, on gasket B.
4. Push one valve cushion into valve seat A so it covers the double holed fuel orifice.
5. Place gasket A on valve seat A.
6. Drop the two ball valves through gasket A to seat in valve seat A.
7. Place one valve cushion into valve seat B so that it covers the double-holed fuel orifice.
8. Set valve seat B with valve cushion into the pump body with assembled parts.
9. Secure all parts by screwing the rubber cap/button on the pump body.
10. Reinstall the pump into the tank opening and attach the fuel line.

Fuel Pickup Tube and Filter Service

1. The fuel filter on the pickup tube can be inspected without removing the pickup assembly by "fishing" the filter out through the filter hole. See Fig. 43.

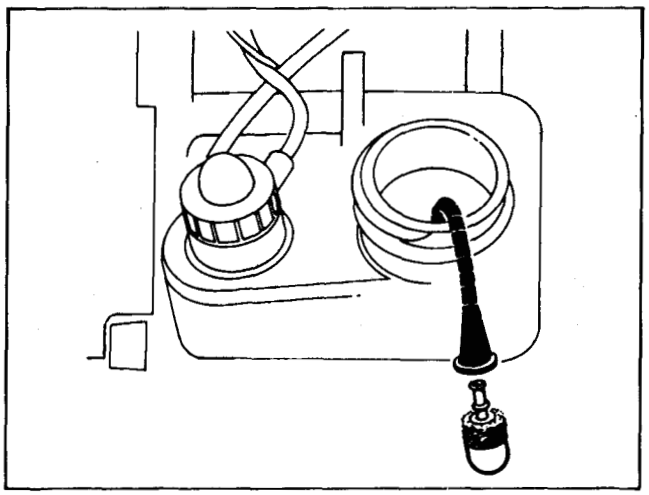

Figure 43

2. Pull the pickup weight from the end of the tube and remove the fiber filter element. Inspect the element and the fuel strainer located inside the pickup weight. Clean or replace as necessary.
3. Reassemble the pickup assembly making sure that the pickup tube fits snugly on the top of the fiber filter element.
4. If pickup tube removal is desired, it can be removed by removing the primer pump as described under step 1 of Primer Pump Disassembly.
5. Remove the fuel pickup tube by pulling it out of the tank. It is also pressed in.
6. Inspect the pickup tube for cracks or punctures and replace if necessary.
7. Reinstall the fuel pickup tube by lightly coating the barbed end with two cycle oil and pressing it into the proper tank orifice.

FUEL CAP

Fuel Cap - Operation

The fuel tank cap on the TC1000 is somewhat complex due to the requirements of the application. The cap must vent in order to prevent a vacuum or pressure buildup within the tank but must also prevent leakage of fuel.

The cap accomplishes the above by using a system of valves which work under different conditions. When the tank is under **pressure**, the following occurs: See Fig 44.

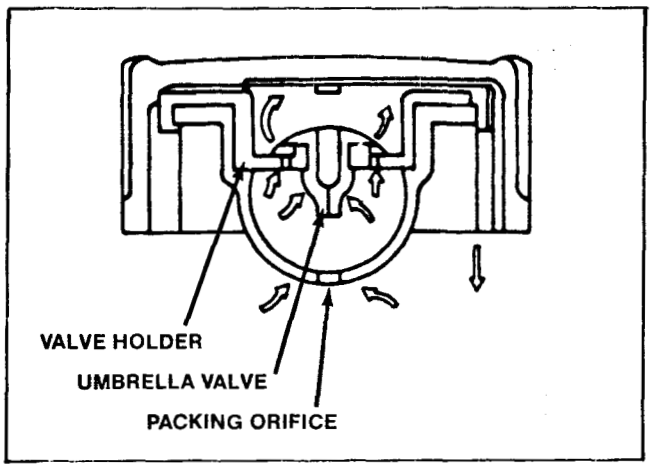

Figure 44

1. The pressure passes through the packing orifice so that it can act upon the umbrella valve.
2. The pressure passes through the two small orifices in the valve holder and lifts the umbrella portion of the umbrella valve off its seat.

Fuel Cap - Operation (cont'd)

3. Pressure passes into the top of the gas cap and is emitted to the atmosphere through the slits in the threads of the gas cap.

When a **vacuum** occurs within the tank, the following occurs: See Fig. 45.

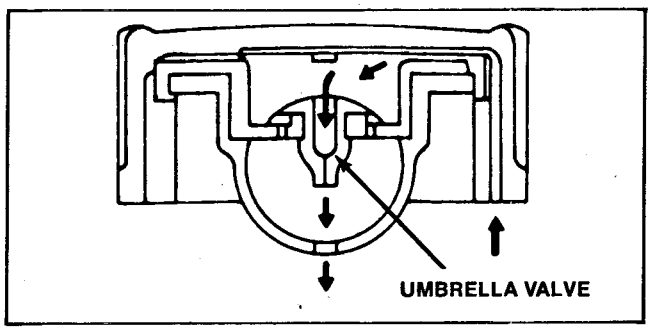

Figure 45

1. Atmospheric pressure enters the top of the gas cap through the slits in the gas cap threads.
2. Because a vacuum in the tank means that higher pressure is present outside the tank than within, the higher pressure passes down the stem of the umbrella valve and forces the stem orifice open.
3. The higher pressure passes through the packing orifice and enters the fuel tank thereby equalizing the pressure.

Fuel Cap - Disassembly

1. Remove the fuel cap from the tank.
2. Pry the gasket, holder and breather valve out of the tank cap. See Fig 46.

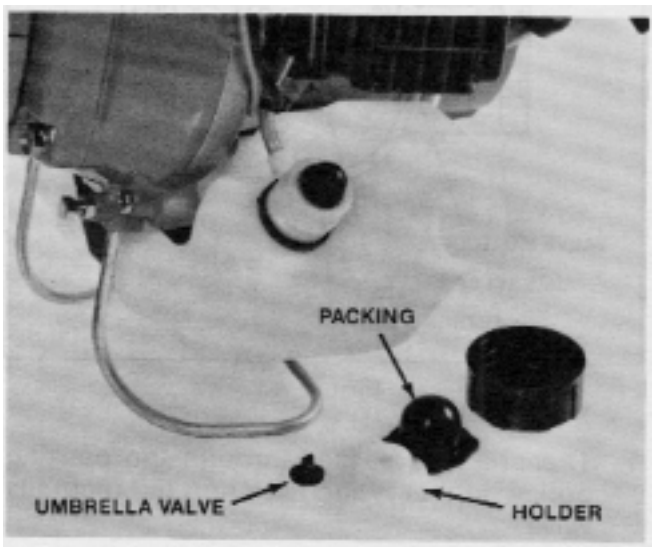

Figure 46

3. Clean these parts thoroughly.

Fuel Cap - Inspection

1. It is important that the fuel cap properly vents the tank. Check to ensure that the packing orifice is unobstructed.
2. Check the two small pressure outlet holes in the valve holder to ensure that they are open.
3. The stem of the umbrella valve allows air into the tank to compensate for the fuel being used by the engine. Ensure that it will open and close by holding the flat end lengthwise between your thumbs and squeezing. See Fig. 47.

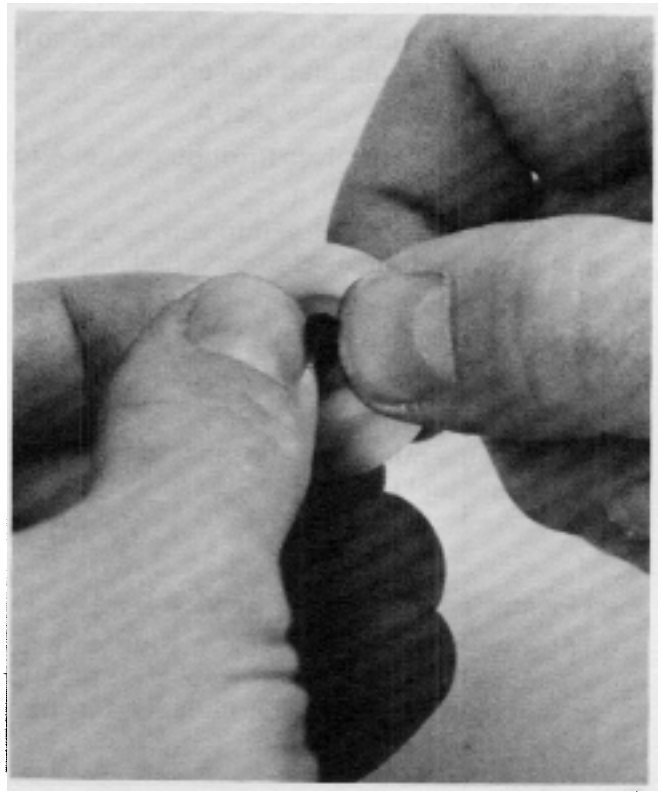

Figure 47

4. Clean all fuel cap parts thoroughly.

Fuel Cap - Reassembly

1. Position the holder inside the gasket then screw this assembly into the fuel cap until it is fully seated in the top of the fuel cap.
2. Reinstall the cap on the fuel tank.

SECTION 3 IGNITION

Ignition Operation

The firing of the spark plug at the proper time is the culmination of a number of components working together. In the TC1000, the components used are:

Flywheel
Ignition Coil
Trigger Module
Spark plug

See Fig. 48.

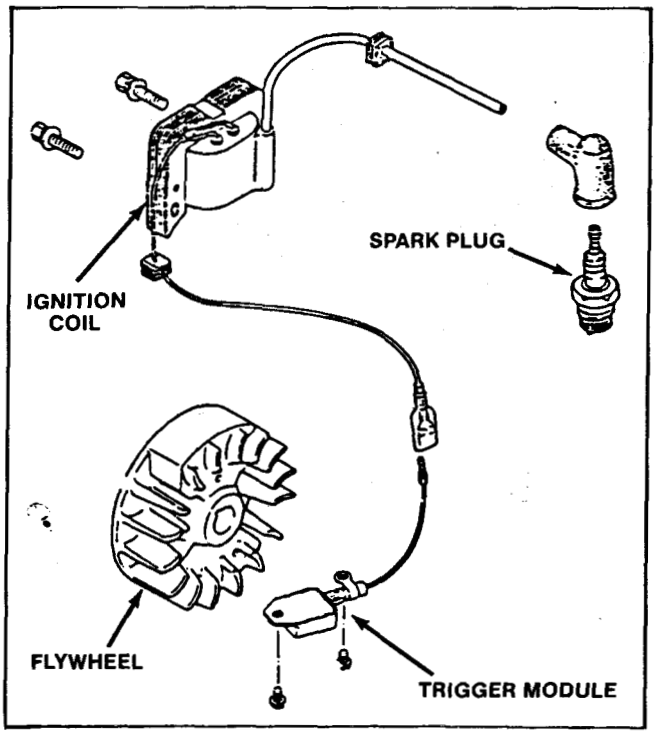

Figure 48

The following describes the function of each of the above components.

Ignition Operation - Flywheel

The flywheel is connected directly to the crankshaft and turns at the same speed as the engine. Imbedded in the flywheel are three magnets. These magnets rotate past the coil to generate electricity.

Imbedded in the opposite side of the flywheel is a steel counterweight which offsets the weight of the three magnets. It is **not** magnetic.

Ignition Operation - Ignition Coil

The ignition coil is actually a transformer. It is positioned close to the flywheel to allow the magnetic field of the flywheel magnets to cut through the coils to generate electricity. See Fig. 49.

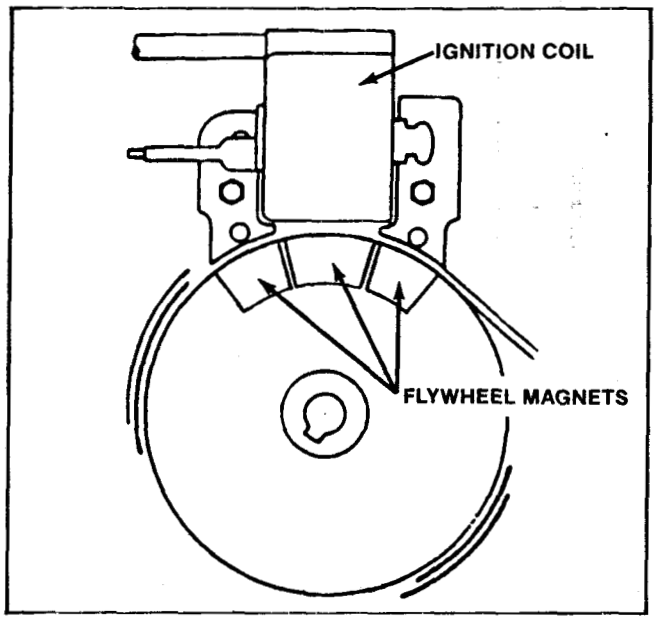

Figure 49

Low voltage is produced in the primary coil which is sent to the trigger module. The primary voltage is much too low to produce a spark at the spark plug.

The secondary coil serves to amplify the voltage produced in the primary. To accomplish this, the secondary coil must have many more windings than the primary. The higher the ratio between the primary coil windings to secondary coil windings, the greater the voltage amplification will be.

However, even though the secondary coil in the TC1000 has many more windings than the primary, the voltage produced is still not high enough to produce spark across the spark plug electrodes. To further amplify the voltage, the trigger module is used . . .

Ignition Operation - Trigger Module

The trigger module amplifies the voltage in the secondary coil by breaking the primary circuit just as the primary voltage reaches its peak. This breaking of the primary circuit results in a rapid collapse of the magnetic field surrounding the primary coil. The collapse of the primary magnetic field induces a large voltage surge in the secondary which is sufficient to produce a spark across the spark plug electrodes.

Before getting into the actual electronics used inside the trigger module, it is important to have an understanding of the voltage waveform produced by the flywheel magnets moving by the ignition coil. See Fig. 50.

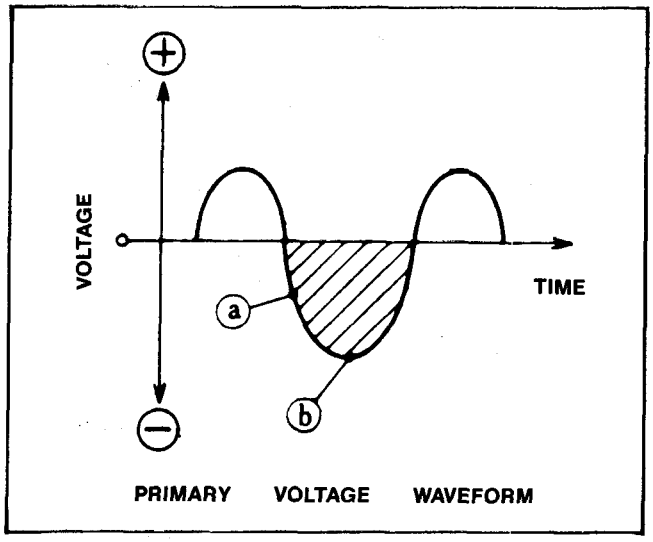

Figure 50

As the magnets rotate past the coil, voltage is produced. This voltage, when uninterrupted, is first positive, then negative as the magnet passes by the coil. This effect is caused by the two opposing poles of the magnet.

Explanation of the trigger module also requires an understanding of the NPN transistor. See Fig. 51.

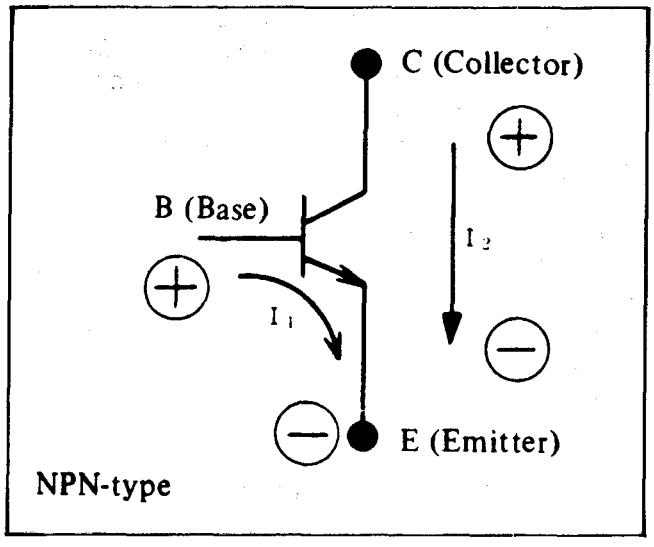

Figure 51

A transistor has a certain minimum voltage that it requires across the base and emitter (points B and E in the Figure above) before it will "turn on". Once it has turned on, it allows a small current, I1, to flow as shown above. At the same time, the transistor allows a large current, I2, to flow from point C to E. The magnitude of current I2 will vary in proportion to the smaller current, I1.

Thus, the transistor functions as an amplifier in that it allows a small current to control a large one.

The following is the process the trigger module uses to break the primary circuit to produce spark: See Fig. 52

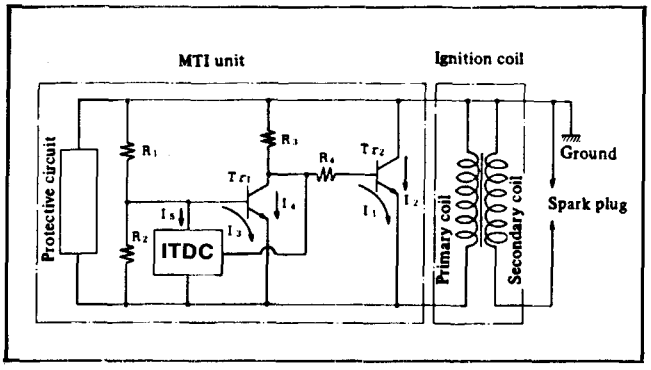

Figure 52

1. The magnet passes by the primary coil and induces an alternating voltage.
2. As the voltage begins to increase, (approximately point "a" in Fig. 50) transistor Tr2 is turned on and current flows from point "C" to point "D" through R3, R4, and Tr2. See Fig. 53.

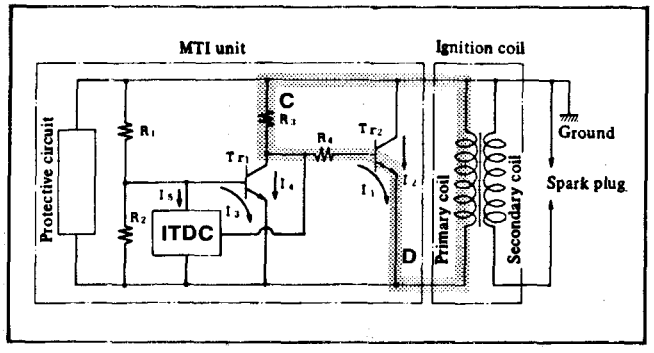

Figure 53

3. *Current I1 flowing through Tr2 induces a* larger current I2. Note that current I1 is **very** small and that I2 is much larger.

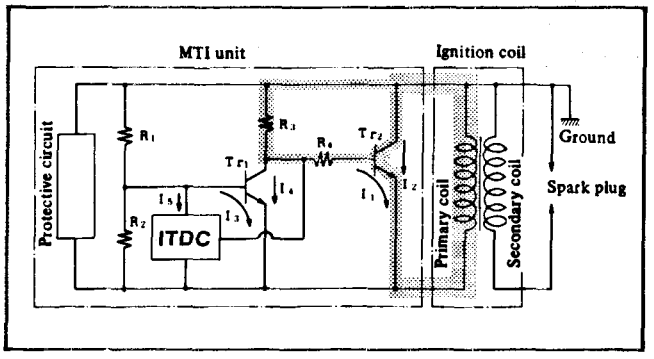

Figure 54

4. When the voltage is at the point "a" level as denoted above in Figure 50, Tr1 is still in the "off" mode and allows no current I3 or I4 to flow.

Ignition Operation - Trigger Module (cont'd)

5. As the voltage produced in the primary coil reaches its negative peak (point "b" in Figure 50). transistor Tr1 is turned on and allows small current I3 and large current I4 to flow. See Fig. 55.

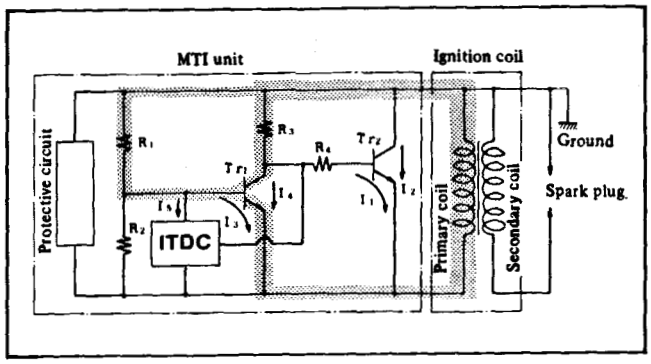

Figure 55

6. When transistor Tr1 turns on, nearly all of the current flow through R4 and Tr2 is diverted through path I4 since it is the path of least resistance. This drop in current I1 results in transistor Tr2 turning off.

7. When Tr2 turns off, current I2 drops rapidly and causes the magnetic field surrounding the primary coil to rapidly collapse. This in turn causes a voltage surge in the secondary which is sufficient to produce a spark across the spark plug.

Another task the trigger module performs is to limit the maximum revolutions per minute that the engine will attain. It does this by means of the ITDC (ignition timing delay circuit) which can also be seen in Figure 55.

This circuit senses the engine speed, and, as it approaches 10,000 rpm, it delays the turning on of transistor Tr1 slightly. This retards the timing and protects the engine from further acceleration.

Ignition Operation - Spark Plug

The spark plug is used to ignite the air/fuel mixture by producing a spark just before the piston reaches top dead center. A spark plug is typically constructed as shown in Figure 56.

There are two critical areas important to proper spark plug function. The first is that the electrodes are properly gapped and are clean. This ensures that a strong spark will be present and that it occurs at the proper time. Excessive gap or fouling can delay firing enough to cause a loss of power or stalling.

The other important area is the insulator. The insulator prevents arcing from taking place in another portion of the plug, away from the electrodes. Because of the extremely high voltage present, even a slight crack or fouling of the head insulator can result in arcing and a malfunction of the plug.

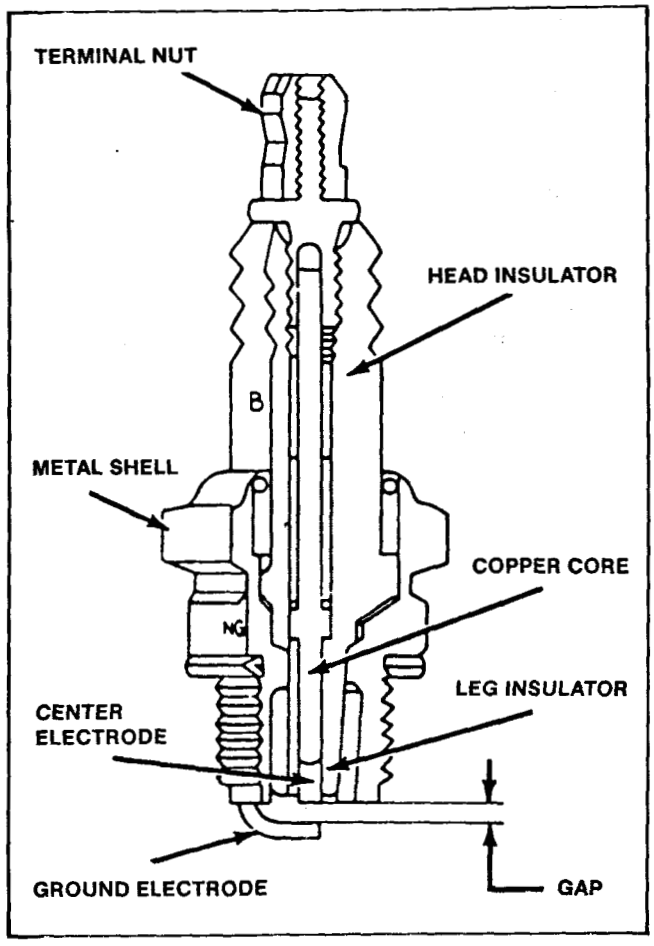

Figure 56

AIR GAP ADJUSTMENT

The space between the coil and the flywheel magnets is called the "air gap". Because the coil mounting holes are oversized, air gap on the TC 1000 is adjustable. It is important to set it to the proper specification to ensure strong spark and proper timing.

Air Gap Adjustment - Preparation

1. For convenience, remove the engine from the drive tube as described under **Engine — Removal from Drive Tube,** page 34.
2. Remove the three Phillips screws retaining the plastic fan housing cover to the fan housing. Remove the cover.
3. With the recoil assembly on a hard flat surface, use an impact wrench to remove the four fan housing screws. Remove the fan housing.

Air Gap Adjustment (cont'd)

Air Gap Adjustment

NOTE: If coil performance is suspect, check the air gap with a feeler gauge prior to loosening the two coil mounting screws. It should be 0.4 to 0.5 mm (0.016 to 0.020").

1. Loosen the two coil mounting screws. Position a feeler gauge between the coil and the flywheel near one of the coil mounting screws and tighten. Repeat this procedure for the other end of the coil. Air gap adjustment is now complete. See Fig. 57.

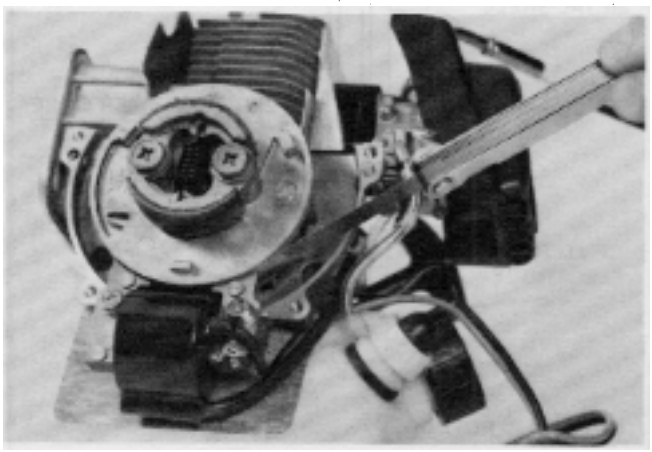

Figure 57

Air Gap Adjustment - Reassembly

1. Install the fan housing. Tighten the screws to 0.4 to 0.5 kg m (35 to 43 in lbs).
2. Install the plastic fan housing cover using three Phillips screws.
3. Mount the engine on the drive tube as described in **Engine - Installation on Drive Tube**, page 39.

COIL

Coil - Removal

1. Remove the engine from the drive tube as described under **Engine - Removal from Drive Tube,** page 34.
2. Remove the three Phillips screws retaining the plastic fan housing cover to the fan housing. Remove the cover.
3. Remove the fuel tank as described under **Fuel Tank — Removal,** page 19, to gain access to ignition wiring.
4. Pull out the two male connectors leading into the female connector found beneath the carburetor.
5. Position the engine assembly so that the recoil housing is resting on a hard flat surface. Remove the four phillips head screws retaining the fan housing with an impact wrench and lift off the fan housing.
6. Remove the trigger module and gasket. See Fig. 58.

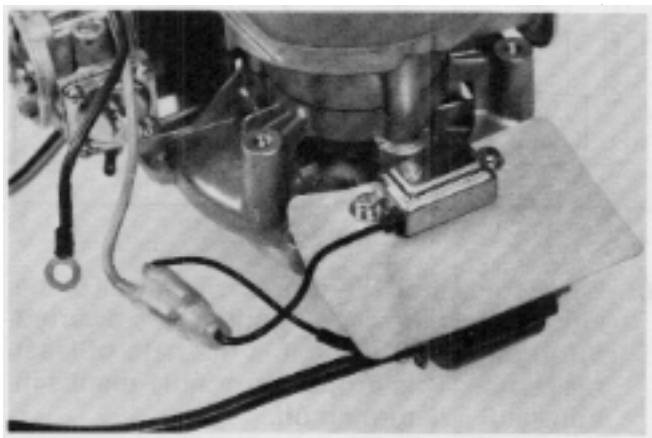

Figure 58

Coil - Installation

1. Install the trigger module using two machine screws. Be sure to install the rubber insulating gasket beneath it. See Fig. 58.
2. Install the coil with the proper air gap by following the procedure found under heading: **Air Gap Adjustment,** page 26.

   NOTE: The kill wire should be on the intake port side.
3. Install the fan housing. Tighten the screws to 0.4 to 0.5 kg m (35 to 43 in lbs).
4. Plug the two male leads into the female connector on the ignition wire.

   NOTE: The wires have the same polarity so it does not matter how they are plugged in.
5. Install the fuel tank as described under **Fuel Tank - Installation,** page 19.
6. Install the fan housing cover with three Phillips screws.
7. Mount the engine assembly on the drive tube as described under **Engine - Installation on Drive Tube,** page 39.

SECTION 4 RECOIL STARTER

Recoil Starter - Operation

The recoil starter on the TC1000 uses a pawl which engages a ratchet on the reel to turn over the engine when the starter rope is pulled. See Fig. 59. The pawl is spring loaded in the "engaged" position and relies on centrifugal force to move it to the outside, or "disengaged" position once the engine is running.

The reel uses a clock type spring to rewind the rope once it has been pulled out.

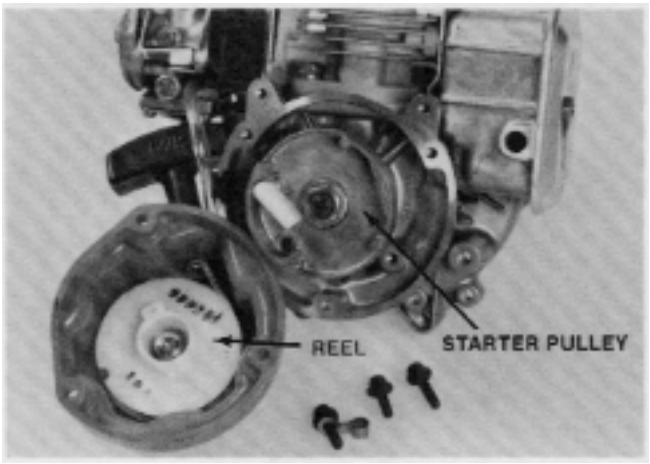

Figure 59

Recoil Starter - Removal

1. Remove the three screws retaining the recoil housing to the crankcase and remove the recoil starter unit.

   NOTE: There is no spring tension against the recoil starter housing. It should not fly off or unwind during removal from the crankcase.

Recoil Starter - Installation

1. Position the recoil assembly on the engine so that the Toro logo is upright.

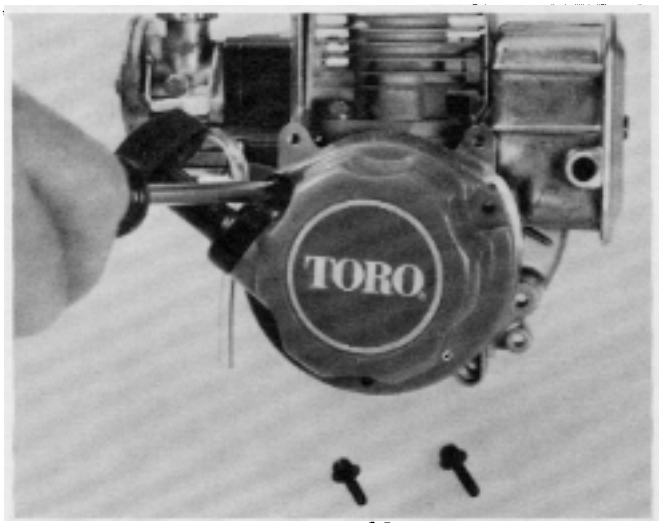

Figure 60

2. Secure with three machine screws. Note that the longer screw is used in the bottom hole and that the upper left hand screw has a small retaining bracket for the overflow line. See Fig. 60.

Recoil Starter - Reel Disassembly

1. Pull the starter rope out approximately 25 cm (12 inches) and tie a **tight** slip knot in the rope. This will provide you enough slack to work on the "T" handle.

   See Fig. 61.

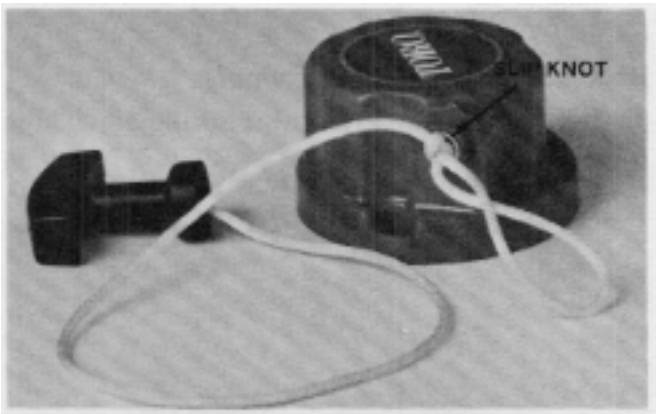

Figure 61

2. Use an awl or Phillips screwdriver to pull the end of the recoil rope out the top of the "T" handle and untie the knot.
3. Remove the "T" handle complete with the small metal reinforcement that fits inside the slot.
4. Remove the slip knot in the starter rope by giving it a sharp tug, and allow the starter rope to slowly retract all the way into the reel.
5. Remove the bind screw by turning it counter-clockwise See Fig. 62.

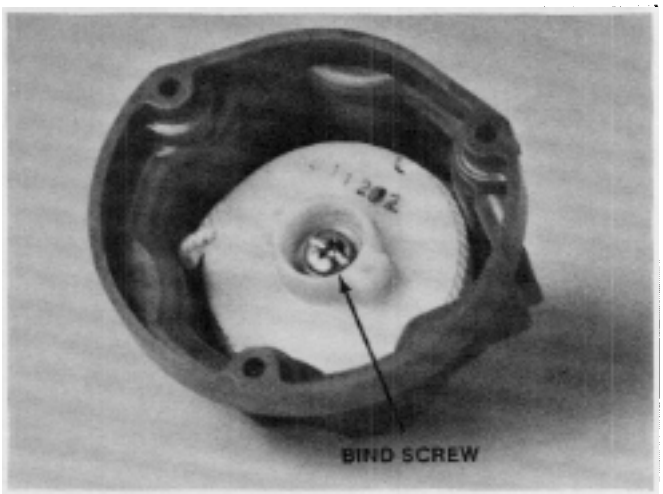

Figure 62

Recoil Starter - Reel Disassembly (cont'd)

NOTE: Be careful not to lose the accompanying washer.

6. Gently lift the reel out of the recoil housing.

CAUTION: Jerking the reel out may dislodge the recoil spring from the recoil housing.

7. Inspect for worn parts and replace as necessary.

Recoil Starter - Reel Reassembly

1. If the spring was removed during servicing, lubricate it with a number 2 general purpose lithium base grease, and reinstall as shown in Fig. 63.

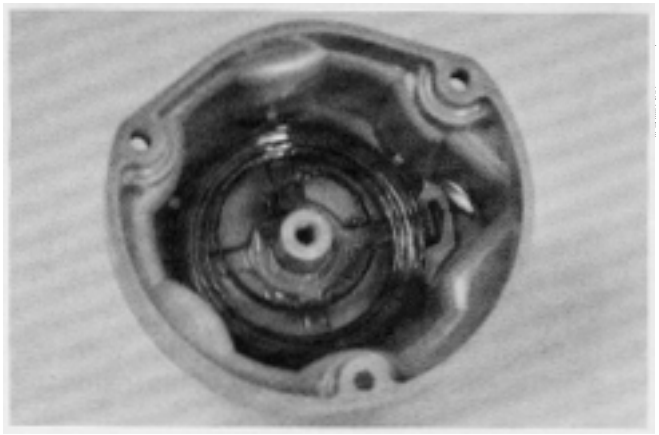

Figure 63

2. If installing a new recoil rope, tie a knot in one end making sure that no more than 2 cm (3/4 inch) of rope extends beyond the knot.

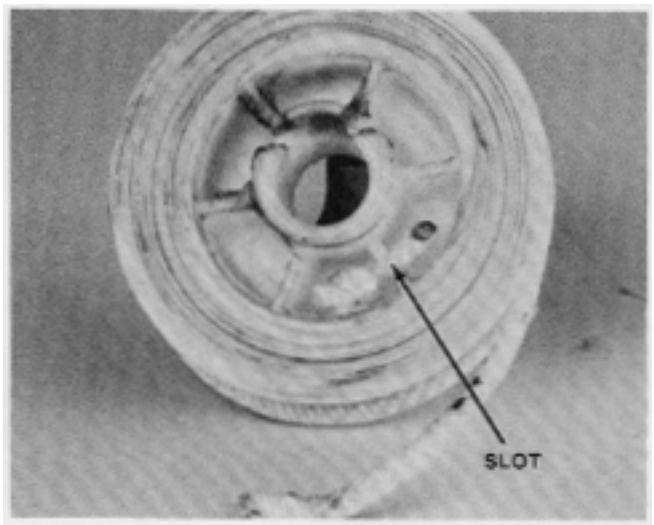

Figure 64

Thread the rope through the hole in the reel and push the knot fully into the recess provided. See Fig. 64.

3. Holding the reel with the knotted side toward you, wind the rope on the reel in a clockwise direction. Hook the end of the rope in the slot provided in one of the reel flanges leaving about 15 cm (6 inches) hanging loose. See Fig. 65.

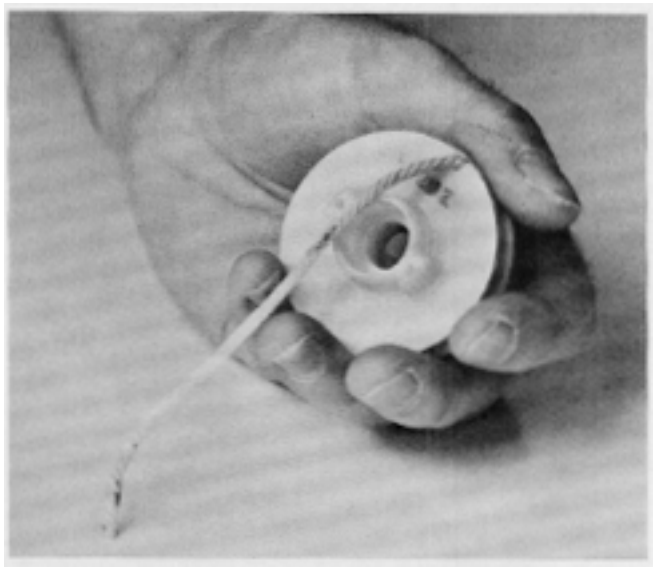

Figure 65

4. Line up the slot in the reel that retains the clock spring with the end of the clock spring and set the reel in place. Gently rotate back and forth until the reel falls into place.
5. Insert the bind screw with washer and tighten to 0.8 to 1.0 kg m (70 to 87 in lbs).
6. Prewind the spool counterclockwise (when looking at the bind screw) about one turn.
7. Thread the starter rope through the eyelet. Pull about 25 cm (12 inches) of rope out then tie a **tight** slip knot about in the center. This will provide slack for "T" handle installation.
8. Slide the "T" handle then the metal reinforcement onto the recoil rope. Secure by tying a knot in the end of the rope then inserting it into the slot in the top of the "T" handle. See Fig. 66.

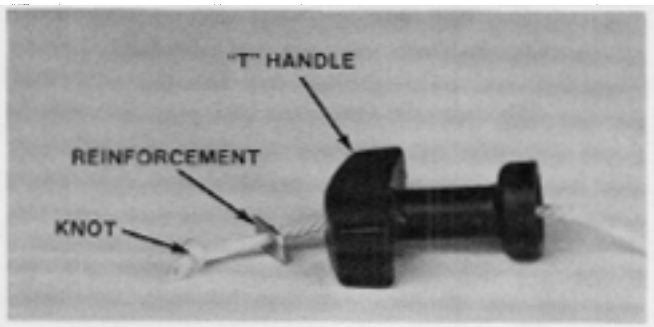

Figure 66

Recoil Starter - Reel Reassembly (cont'd)

9. Release the slip knot by giving it a sharp tug.

Recoil Starter - Starter Pulley Disassembly

1. Remove the nut securing the starter pulley to the crankshaft. See Fig. 67.

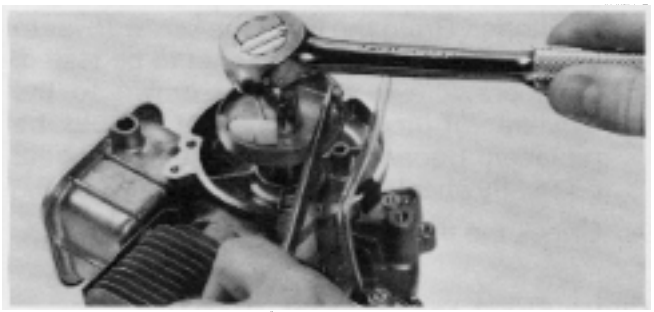

Figure 67

2. Remove the starter pulley by turning counter-clockwise until it is completely unscrewed. Be careful not to lose the washer.
3. Remove the "E" clip that secures the pawl to the starter pulley. See Fig. 68.

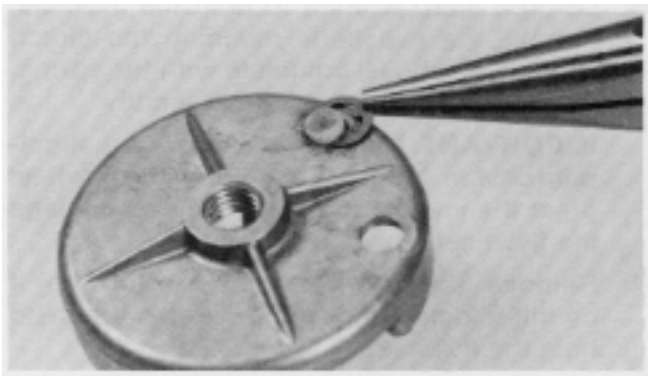

Figure 68

4. Remove the pawl being careful not to lose the return spring.
5. Inspect parts for wear or damage and replace as necessary.

Recoil Starter - Starter Pulley Reassembly

1. Install the return spring onto the pawl as shown in Figure 69.

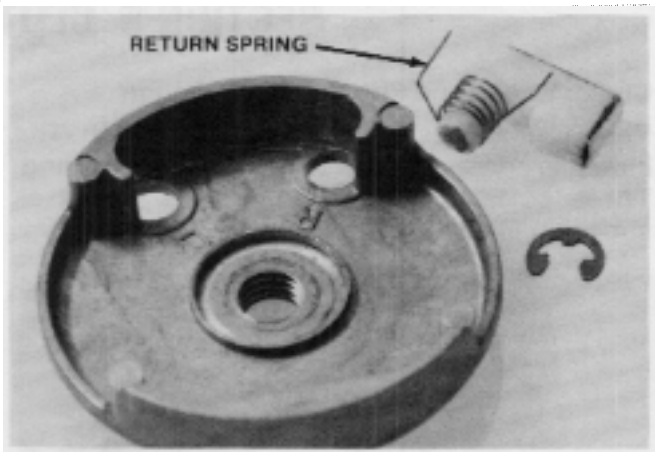

Figure 69

2. Insert the pawl and spring assembly into the starter pulley hole marked "R". See Fig. 70.

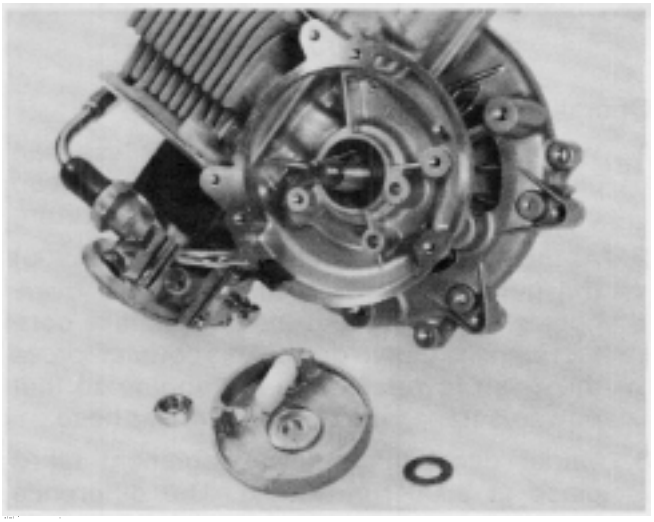

Figure 70

3. Secure with an "E" clip. Check for free operation of the pawl.
4. Screw the starter pulley onto the crankshaft by turning clockwise.
5. Place the washer on top of the starter pulley and secure with the nut. Tighten to 0.8 to 1.0 kg m (70 to 87 in lbs).

SECTION 5 CLUTCH AND FLYWHEEL

Clutch Shoes and Flywheel - Operation

The TC1000 uses a centrifugal type clutch. The clutch is constructed of two shoes and a spring. These parts are fastened to the flywheel as shown in Figure 71.

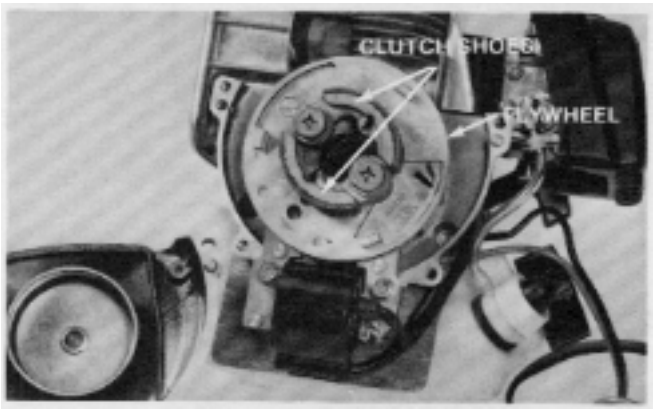

Figure 71

Operation of the clutch is as follows:

1. When the trimmer engine speed is less than 3900 rpm (±300) the spring holds the two clutch shoes in, away from the clutch drum.
2. As the engine speed reaches 3900 rpm (±300) the centrifugal force of the shoes overcomes the spring and the shoes make contact with the clutch drum. This contact forces the drum to rotate with the engine so that power is transmitted to the trimmer head.
3. Under deceleration, disengagement takes place at 3500 rpm (±300). The difference between engagement and disengagement speeds occurs because the shoes resist disengagement slightly when they are in contact with the clutch drum.

NOTE: Operating the trimmer for long periods of time near the engagement speed may cause the clutch to slip and overheat. This can result in peeling of the clutch shoes.

Clutch Shoes and Flywheel - Inspection

1. Remove the engine from the drive tube as described under **Engine - Removal from Drive Tube,** page 34.
2. With the recoil assembly on a hard flat surface, use an impact wrench to remove the four housing screws.
3. Remove the fan housing.
4. Inspect the clutch pads for even wear. Also inspect the clutch shoes for evidence of cracking.
5. Inspect the clutch drum (found in the fan housing) for roundness and even wear.
6. Check the flywheel magnets using the screwdriver method. Hold the handle end of a flat bladed screwdriver between your thumb and forefinger. Bring the tip of the screwdriver to within 3/4" to 1" of the magnet to be tested. The screwdriver should be drawn to the flywheel. If not, the flywheel should be replaced. Repeat this step for each magnet on the flywheel.
7. Check the flywheel for cracks or broke fins.

Clutch Shoes and Flywheel - Removal

1. Make note of the markings on the top of the clutch shoes to ensure proper installation later.
2. For convenience, remove the two fasteners securing the coil to the block and move the coil to the side.
3. Using a strap wrench to hold the flywheel, remove the two bolts retaining the clutch shoes. The shoes, complete with the spring, can then be removed as an assembly.

   IMPORTANT: The flywheel is of cast aluminum design. Methods of holding the flywheel other than with a strap-wrench may damage the flywheel.
4. Remove the flywheel nut by turning it counterclockwise using a strap-wrench to hold the flywheel.
5. Remove the flywheel using Toro flywheel puller part number 41-7650. See Fig. 72.

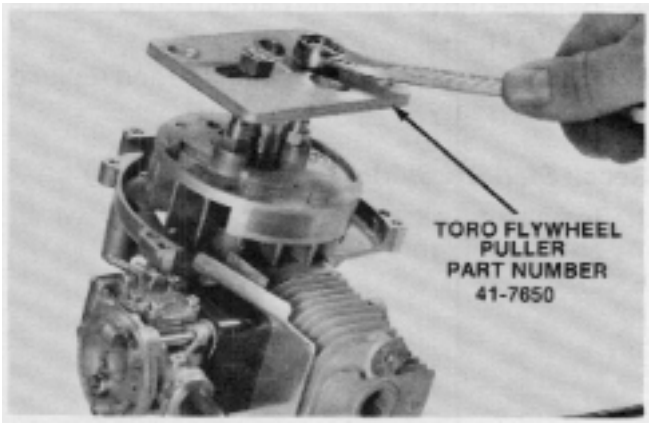

Figure 72

IMPORTANT: Use of a knockoff tool may dimple the balls in the crankshaft ball bearing. This could lead to early failure of the bearing.

6. Replace any damaged or worn parts.

Clutch Shoes and Flywheel - Reassembly

1. If the flywheel was removed, install the flywheel key, then place the flywheel, fan side down, onto the crankshaft. Hold the flywheel using a strap wrench and tighten the flywheel nut to 0.8 to 1.0 kg m (70 to 87 in lbs).
2. Insert the clutch bolts through the clutch shoes making sure that the markings you made note of earlier are facing up. Then slide a flat washer over the threads of each bolt so that the washer rests between the flywheel and the clutch shoes. See Fig. 73.

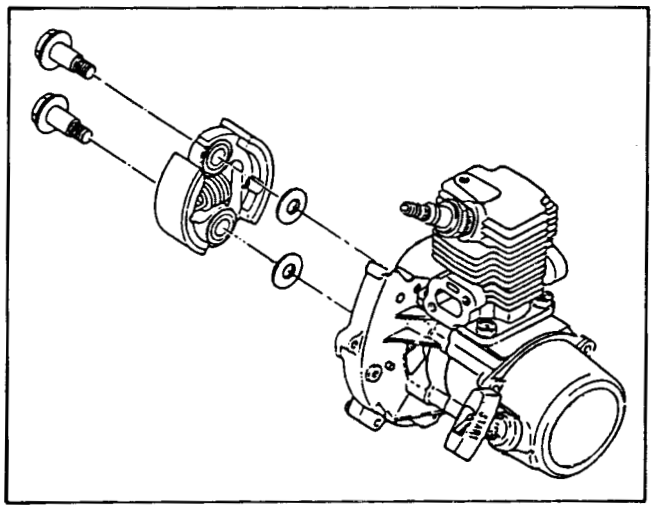

Figure 73

3. Use a small amount of Blue "Loctite" on the clutch bolt threads and install the clutch shoe assembly. Tighten the clutch bolts to 0.6 to 0.8 kg m (52 to 70 in lbs).
4. Refer to **Coil - Installation** page 26, for the remainder of the reassembly procedure.

CLUTCH DRUM and CLUTCH HOUSING

Clutch Drum and Clutch Housing - Disassembly

1. Remove the snap ring from the drive shaft end of the clutch drum.
2. Press the clutch drum out of the clutch case by pressing on the drive shaft only.

   NOTE: Removing the clutch drum requires pressing or driving on the drive shaft. This will dimple the ball bearings and could lead to a premature failure. **Whenever the clutch drum is removed, the clutch housing ball bearing should be replaced.**
3. Remove the large snap ring retaining the bearings.
4. Press out the bearing on an arbor press and remove the washer.
5. Inspect all parts and replace as necessary.

Clutch Drum and Clutch Housing - Reassembly

The clutch drum and clutch housing is assembled as shown in Fig. 74.

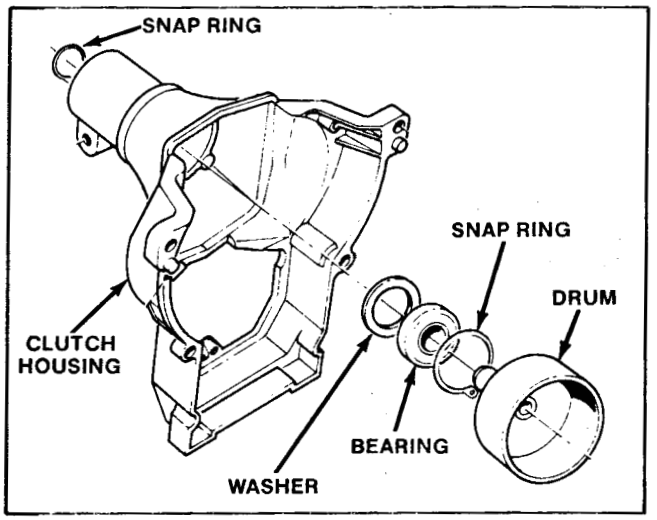

Figure 74

1. Insert the washer into the clutch housing.
2. Press a new bearing into the clutch housing.

   IMPORTANT: Press only on the *outer* race of the bearing. Pressing on the inner race will damage the balls inside the bearing and may lead to premature failure.
3. Install the large snap ring.
4. Support the **inner** race of the clutch housing bearing from the drive shaft end with a sleeve or deep well socket and press the clutch drum into the housing. See Fig. 75.

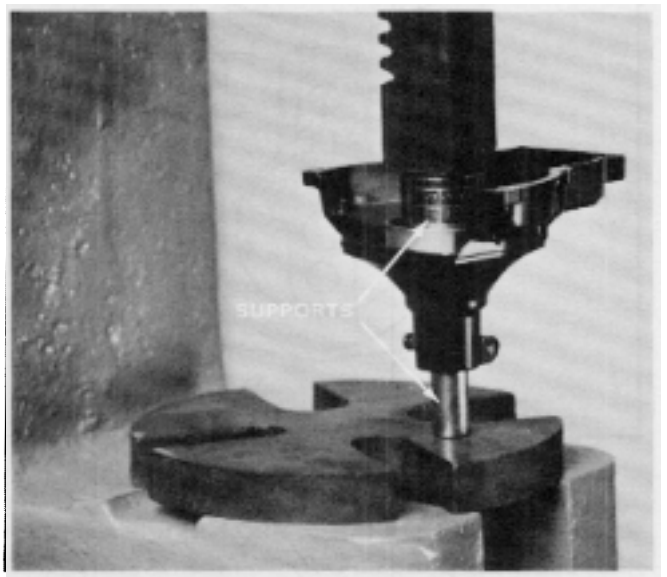

Figure 75

5. Install the small snap ring in the drive shaft end of the housing.
6. Check to ensure that the clutch drum rotates freely and is true.

Engine - Operation

The TC1000 engine is based upon a two-stroke, port to port design. The term "two-stroke" refers to the number of operations the piston goes through in order to complete a single combustion cycle. Those two operations are called an intake stroke (where an air/fuel mix is drawn into the combustion chamber), and an exhaust stroke (where the exhaust gases are purged from the combustion chamber).

The term port to port refers to the way in which the intake and exhaust gases enter and exit the engine. The TC1000 engine uses no valves, but rather, relies on the piston passing by the intake and exhaust ports to control the flow of gases. Hence the term: port to port.

There are four major components that are involved in the combustion cycle:

— Piston
— Intake Port
— Exhaust Port
— Scavenger Ports

Their relative locations can be seen in Figure 76.

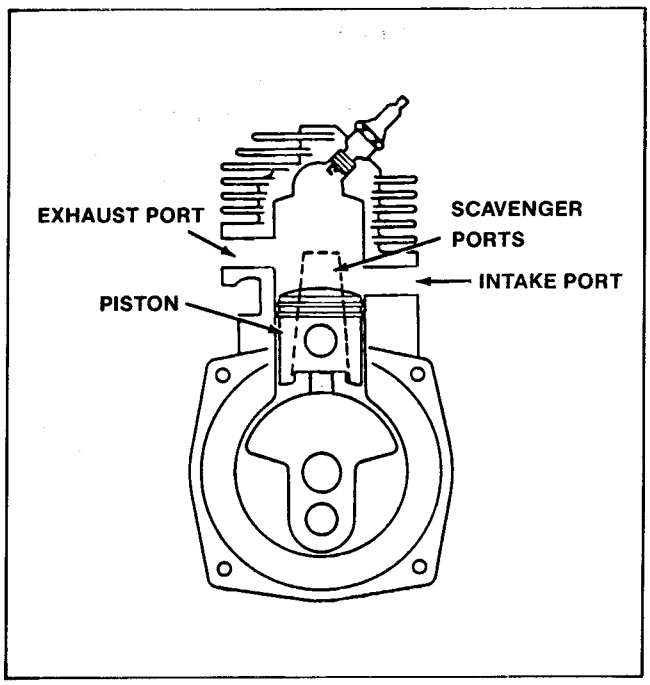

Figure 76

Proper operation of the TC1000 engine relies on nine separate phases. Beginning with the piston at a midway point of its upward stroke, those nine phases are described below.

1. The piston closes the scavenger ports. This prevents prevents equalization of pressures between the lower crankcase and the combustion chamber. See Fig. 77.

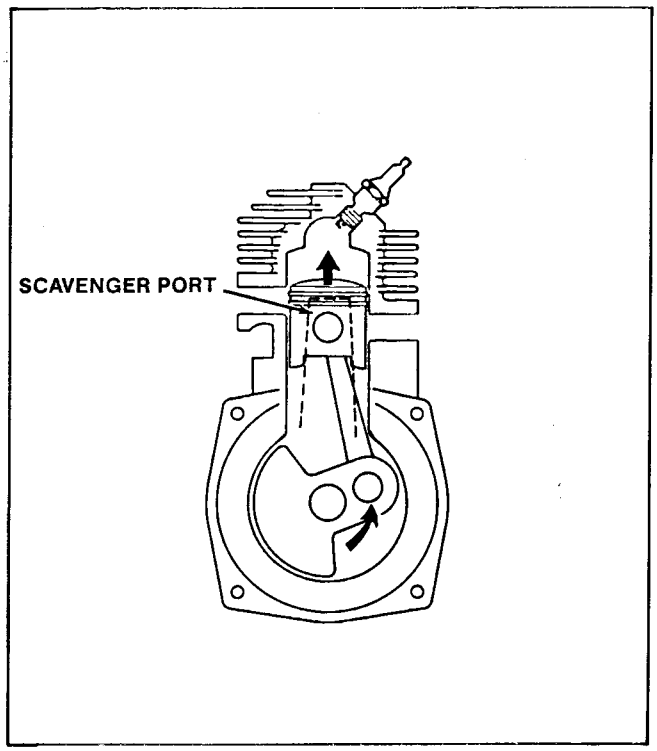

Figure 77

2. As the piston continues its upward stroke, vacuum begins to build within the lower crankcase. That vacuum will later be used to draw the intake mixture. See Fig. 78.

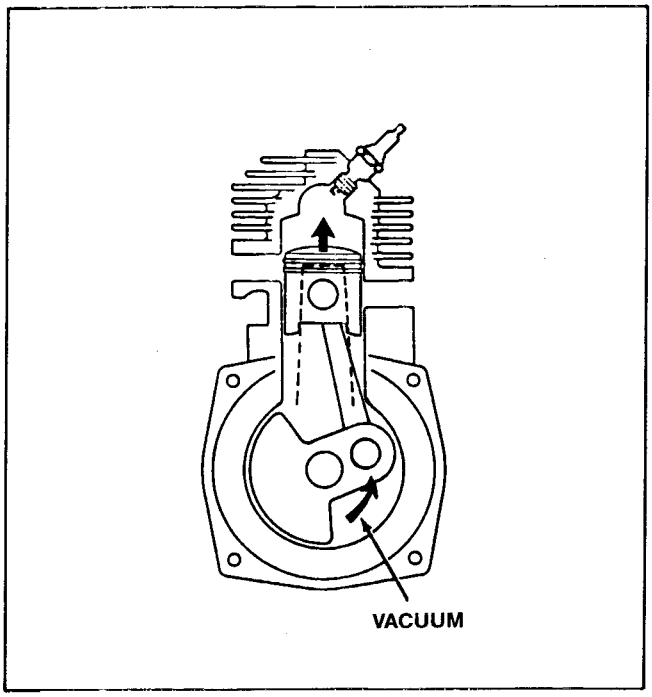

Figure 78

3. The piston covers the exhaust port which completely seals the combustion chamber. See Fig. 79.

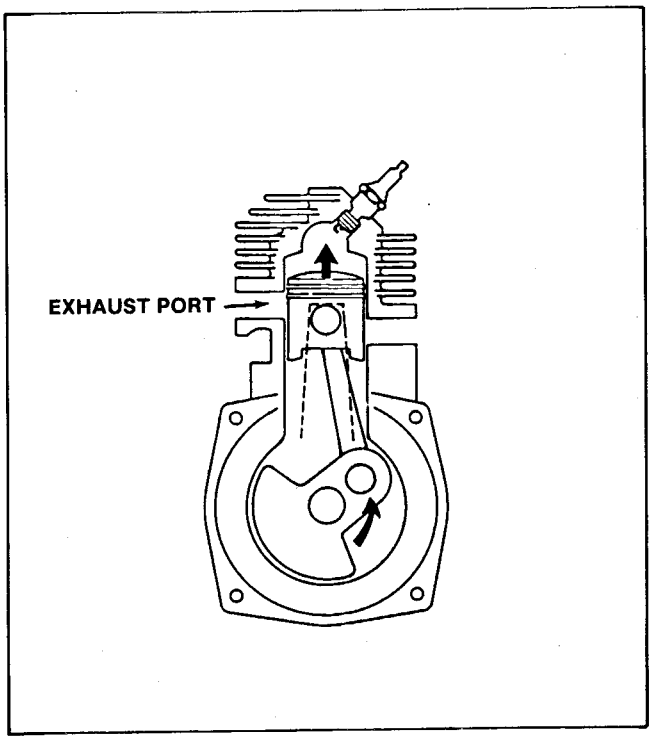

Figure 79

4. The upward movement of the piston builds pressure (compression) in the combustion chamber. See Fig. 80.

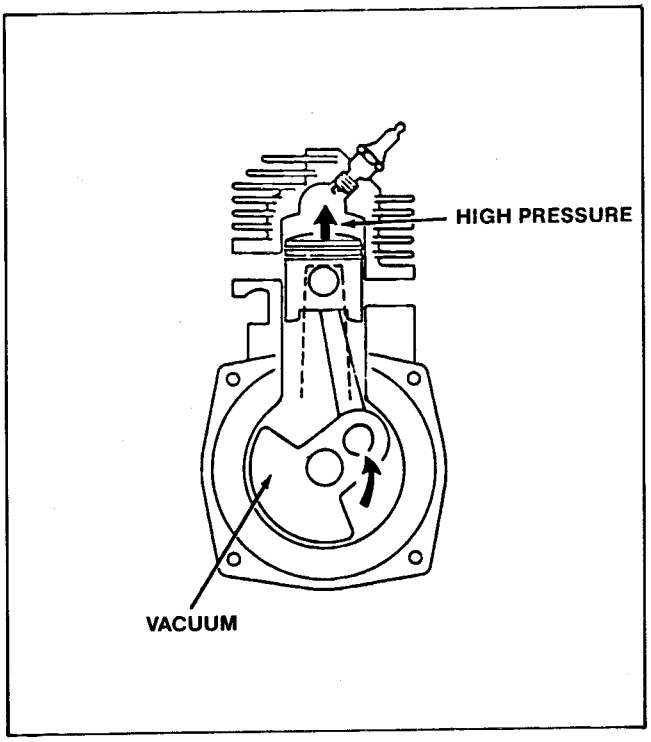

Figure 80

5. The lower skirt of the piston rises above the intake port and allows a fresh air/fuel mixture to be drawn into the lower crankcase. See Fig. 81.

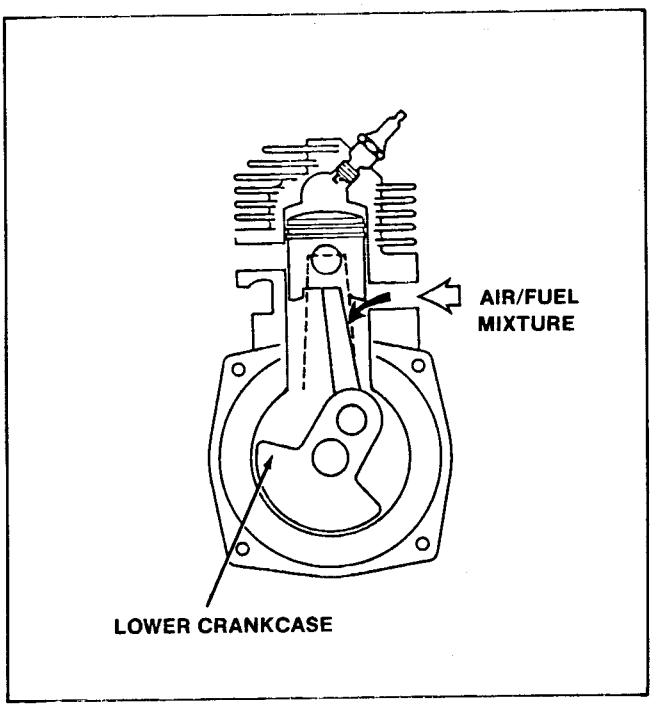

Figure 81

6. The spark plug fires before the piston reaches the top of its stroke. This sets off combustion of the air/fuel mixture sealed in the combustion chamber.

   Note that the piston continues its upward movement even after the plug has fired. This "post combustion compression" continues until the piston reaches top dead center and results in a more complete burn. See Fig. 82.

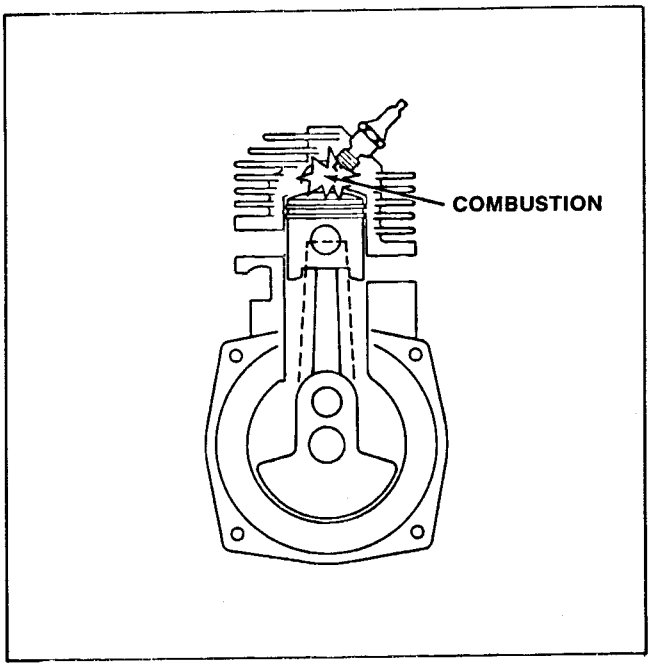

Figure 82

7. The piston then begins its downward stroke. As this occurs, pressure begins to build in the lower crankcase. See Fig. 83.

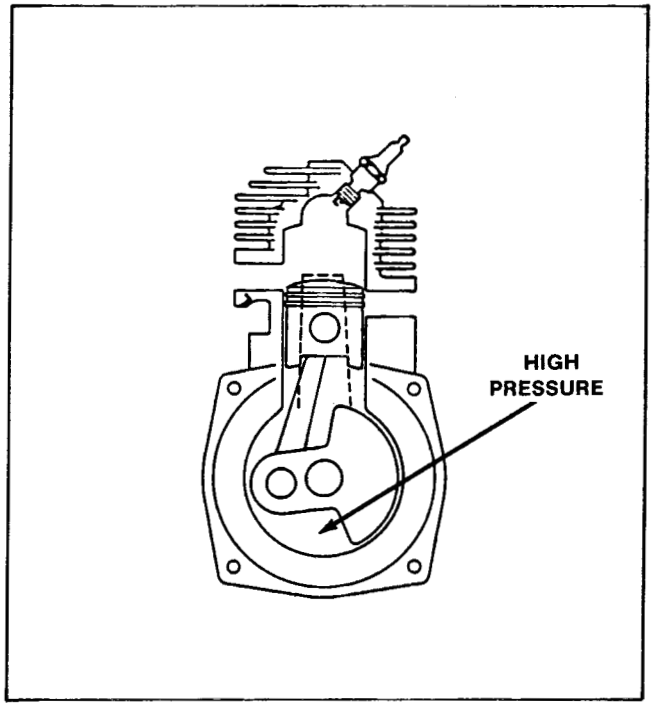

Figure 83

8. The exhaust port is uncovered by the piston and the exhaust gases are allowed to exit. See Fig. 84.

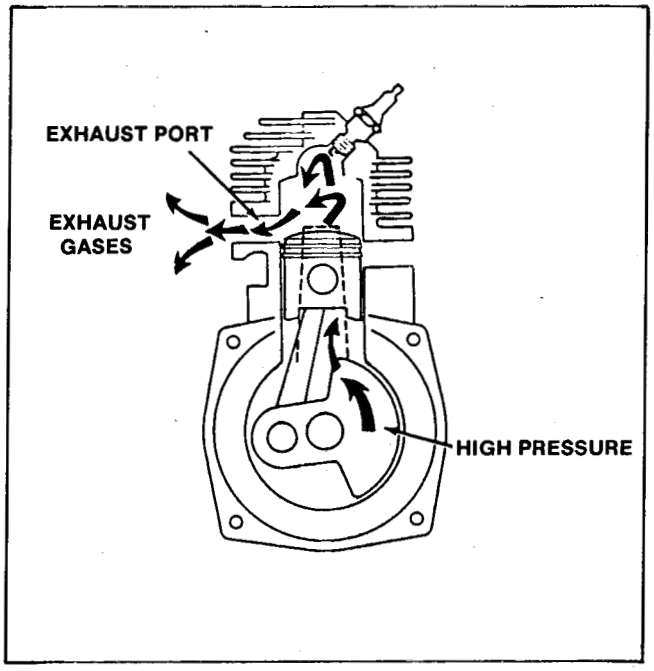

Figure 84

9. The scavenger ports are uncovered resulting in a fresh air/fuel mixture being forced into the combustion chamber by the lower crankcase pressure. Note that this process is not 100% efficient and that some exhaust gases are mixed with the fresh air/fuel mixture. See Fig. 85.

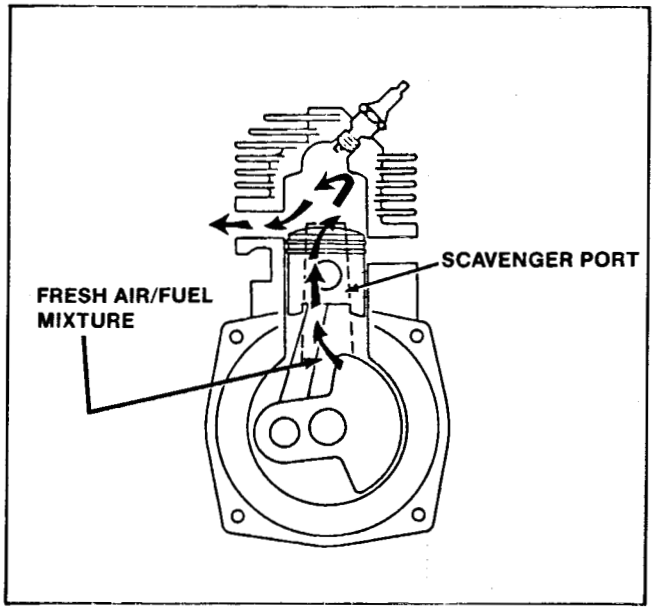

Figure 85

Drawing a fresh mixture into the combustion chamber completes the combustion cycle. The complete cycle took one full turn of the crankshaft.

Engine - Removal From Drive Tube

1. Pull the spark plug lead from the spark plug.
2. Pull the ignition switch wires from the rear of the throttle control grip. A needle nose plier may help. See Fig. 86.

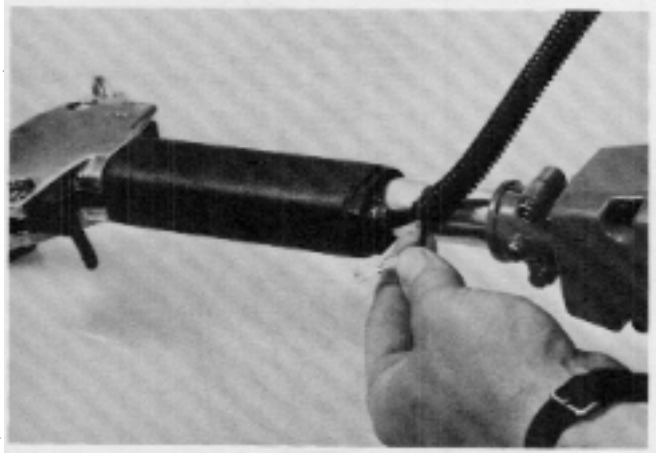

Figure 86

3. Remove the two screws retaining the throttle control housing to the drive tube and remove the throttle cable from the trigger.
4. Pull the throttle cable out of the throttle control grip.
5. Loosen the locating screw and the clamping screw. See Fig. 87.

Engine - Removal From Drive Tube (cont'd)

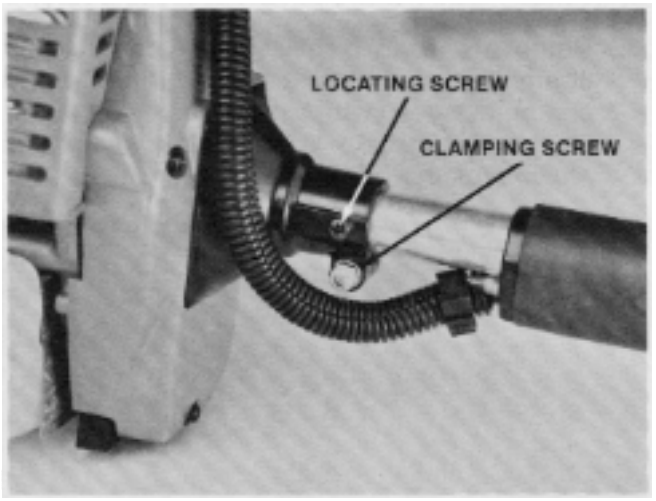

Figure 87

6. Pull the engine off the tube.
7. Wipe off excessive grease, oil and dirt, using lintless rags and commercial degreaser.
8. Look for obvious damage and wear, e.g.: cracked fuel lines, cracked dust covers, broken and chipped cooling fins on the cylinder head, loose screws, or signs of leakage.

Engine - Disassembly

1. Remove the air cleaner and carburetor as described under **Carburetor - Removal,** page 13.
2. Remove the muffler cover, muffler and spark plug.
3. Remove the clutch shoes and flywheel as described under **Clutch Shoes and Flywheel - Inspection and Removal,** page 30.
4. Remove the recoil assembly as described under **Recoil Starter - Removal** page 27.
5. Remove the nut securing the starter pulley to the crankshaft. See Fig. 88.

Figure 88

6. Remove the starter pulley by turning it counterclockwise until it is completely unscrewed. Be careful not to lose the washer.
7. Remove the two bolts securing the cylinder to the crankcase.
8. Carefully pull the cylinder and cylinder gasket from the crankcase being careful not to damage the cylinder bore or piston assembly.

   NOTE: The exhaust port is on the right side when viewed from the recoil end.

   NOTE: If crankshaft axial (end) play is suspect, use a dial indicator to check the axial (end) play before disassembling the crankcase. Make note of this measeurement. See Fig. 89

maximum allowable end play .55 mm (.020")

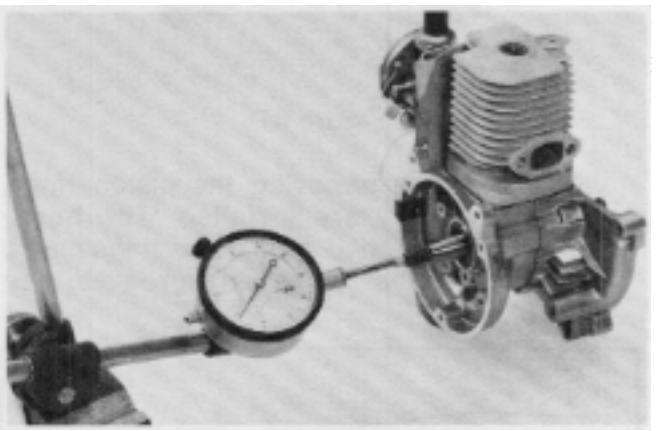

Figure 89

9. From the flywheel end, remove the three screws with lock washers securing the crankcase halves together and pull apart the crankcase halves. Carefully remove the crankshaft with attached connecting rod and piston. The crankshaft ends on the TC1000 are identical. See Fig. 90.

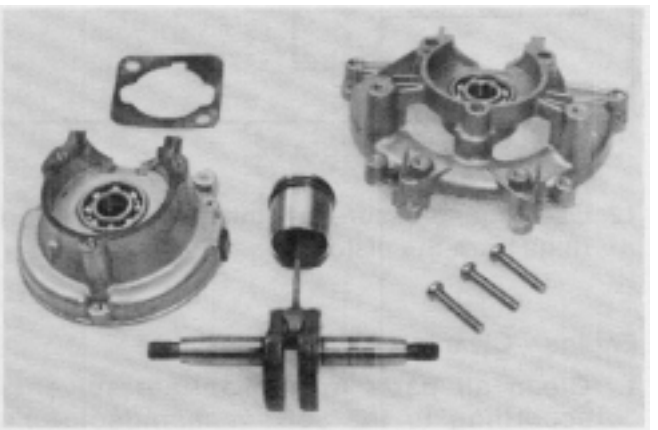

Figure 90

Engine - Disassembly (cont'd)

10. Remove the two snap rings retaining the piston pin in the piston.
11. Carefully push out the piston pin and lift the piston from the connecting rod. See Fig. 91. The connecting rod cannot be removed from the crankshaft. Note the position of the dot on the head of the piston. Reinstall the piston with the dot in the same direction.

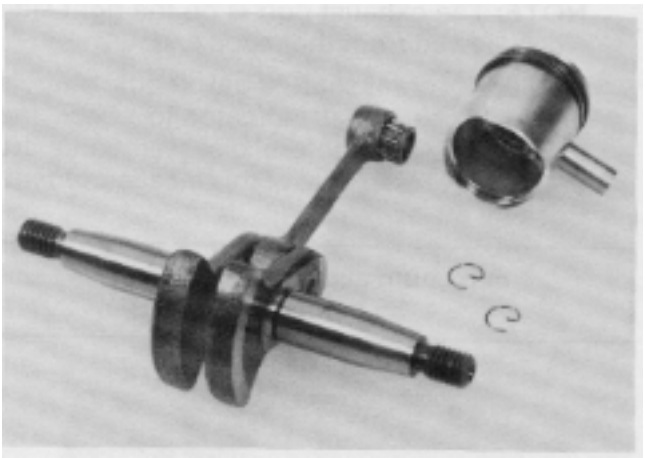

Figure 91

NOTE: Before removing the piston rings, note how they are installed. The hemispherically notched ends of the rings match the knock pins in the ring grooves. See Fig. 92.

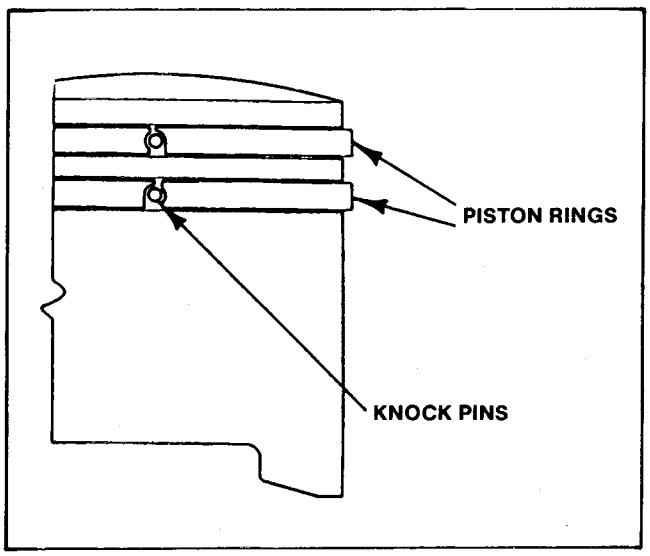

Figure 92

12. Use finger pressure to remove the two piston rings from the piston.

Engine - Cleaning After Disassembly

1. Clean all parts in appropriate solvents according to the solvent manufacturer's recommendations.
2. Inspect all parts for wear and damage. Make certain that moving parts will move freely.
3. Remove carbon from cylinder combustion chamber, exhaust port and piston. Carbon can be removed with a non-marring scraper. Be careful not to damage the cylinder's chrome plated bore. See Fig. 93.

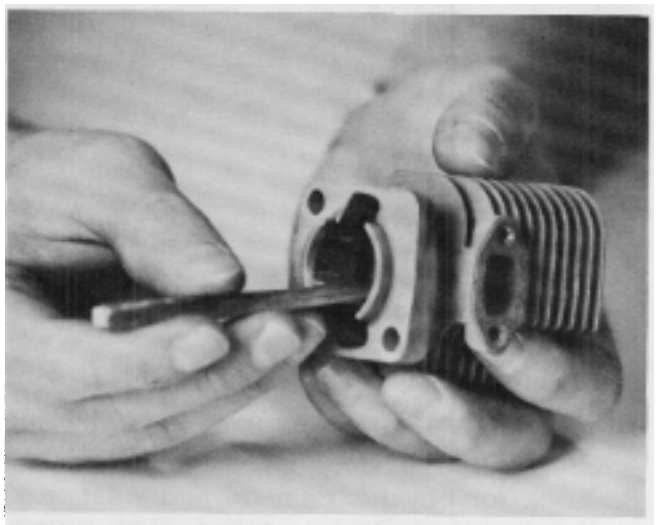

Figure 93

4. Decarbonize the muffler. Use a scraping tool to remove the carbon.
5. If the spark plug is to be reused, clean the spark plug.
6. Clean the air filter element in soap and water. Moisten the air filter element with clean lightweight engine oil before installation.
7. Replace the fuel filter on the pick-up tube inside the fuel tank. See Fig. 94.

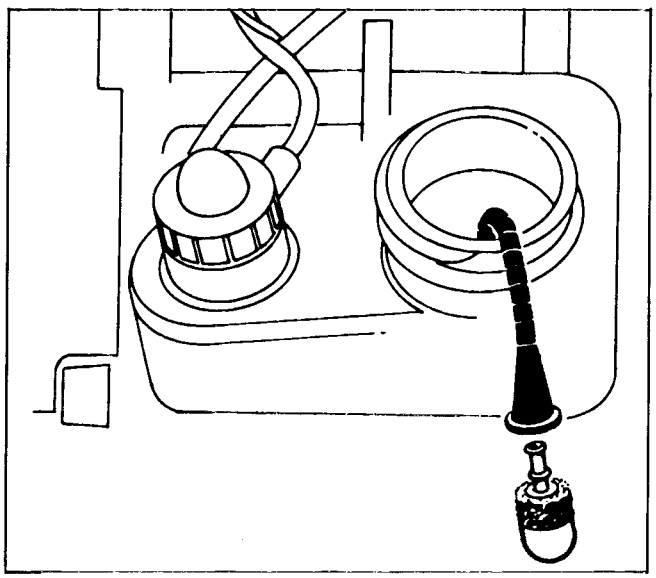

Figure 94

8. Clean the primer pump passages, valve cushions and ball valves.

Engine - Inspection

Inspect all parts for wear and damage. Do not reuse parts that are damaged or worn beyond specification.

1. Crankshaft Axial Play

maximum allowable axial play: 0.55 mm (0.020")

Axial play can only be measured when the crankshaft and crankcase are assembled. If the axial play was not measured during disassembly, reassemble the crankshaft and crankcase with the bearings making certain to properly torque the crankcase screws to 0.4 to 0.5 kg m (35 to 43 in lbs). See Fig. 95.

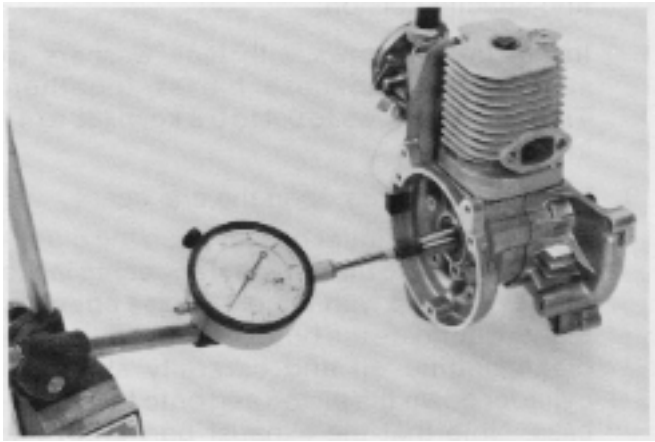

Figure 95

2. Crankshaft Run-out

maximum allowable run-out: 0.05 mm (.002")

With the crankshaft removed from the crankcase, support the crankshaft on V-blocks. The V-blocks should be positioned no closer than 4 mm (3/16") from the counter weights.

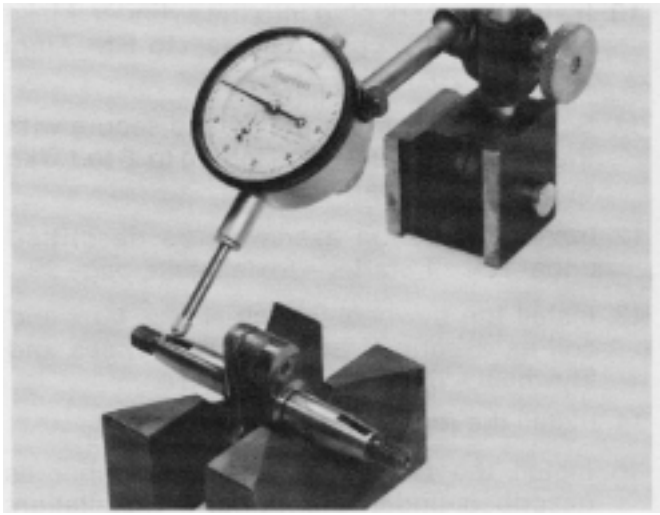

Figure 96

Use a dial indicator and measure run-out at the positions specified in Fig. 96.

If any measurement is greater than the maximum allowable limit, the crankshaft should be replaced. Off-size crankshaft bearings are not available.

3. Piston Ring End Gap.

maximum allowable end gap: .7 mm (0.027")

Insert a piston ring into the cylinder skirt, making certain the ring is not tilted. Use a piston to push in the ring and ensure the ring is perpendicular in the cylinder bore. Use a feeler gauge to measure the piston ring gap between the ends of the piston ring. If the measured clearance is greater than the .7 mm (0.027"), the piston rings may require replacement. See Fig. 97

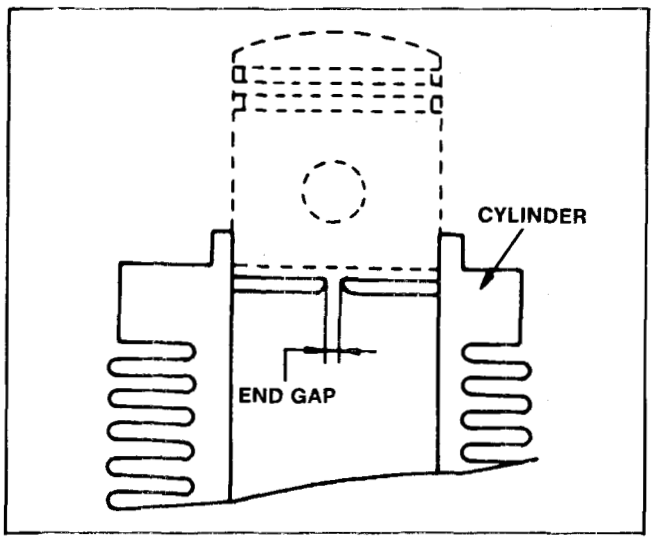

Figure 97

NOTE: Before replacing the piston rings, make certain that the piston to cylinder clearance is within specification.

4. Cylinder Bore

Use a bore gauge to measure the cylinder bore. By itself, this measurement does not indicate much, however it is important in determining the piston to cylinder clearance. The cylinder can be used until the chrome plating on the bore is worn away ("Exfoliates").

5. Piston Diameter

Use a micrometer to measure the diameter of the piston in several places, recording the largest. As with the cylinder bore measurement, this measurement is important only in determining the piston to cylinder clearance.

6. Piston to Cylinder Bore Clearance

Engine - Inspection (cont'd)

maximum allowable clearance 0.08 mm (.0032")

The difference between the recorded piston outer diameter and the cylinder bore measurement is the clearance. If the difference is greater than the maximum allowable clearance, replacement of the piston, piston pin and needle bearing **as a set** is recommended.

Engine - Reassembly

All parts, even if new should be thoroughly cleaned. Make certain all parts have been inspected and are within specification.

Do not use worn and damaged parts. Use of worn or damaged parts may cause personal injury or engine failure.

1. Use finger pressure to install the two piston rings on the piston.

   IMPORTANT: The hemispherically notched ends of the rings match the knock pins in the ring grooves. Also note that the top side (toward piston crown) of the ring is stamped with a "T". See Fig. 98.

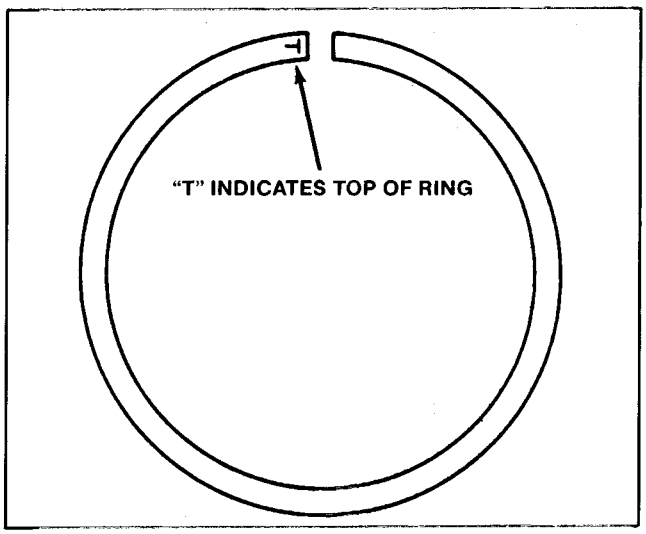

Figure 98

2. Install one of the piston pin retaining rings in the piston.
3. Insert the upper connecting rod bearing into the connecting rod.
4. Install the piston on the connecting rod by lightly lubricating the piston pin with clean engine oil, positioning the piston onto the connecting rod and pressing on the piston pin. If necessary, the piston pin can be driven into place by lightly tapping the pin with a hammer and a non-marring punch or drift pin.
5. Install the remaining piston pin retainer.
6. If the main bearings have been removed, install the main bearings into the crankcase.
7. Lightly grease the lips of the crankcase oil seals to prevent seal damage when the crankshaft is installed.

   Carefully install the crankshaft with attached connecting rod and piston into the crankcase halves.

   NOTE: On the TC1000, both ends of the crankshaft are the same.
8. Use sealant Three Bond 1104 (Toro part number 505-80) on the gasket between the crankcase halves. Position the gasket between the crankcase halves and assemble the crankcase halves with connecting rod and attached piston.

   Install the 4 screws with lock washers to secure the crankcase halves together. Tighten the screws to 0.4 to 0.5 kg m (35 to 43 in lbs)
9. Install the cylinder upon the crankcase.

   Position the cylinder gasket upon the crankcase. **Make sure the pulse hole opening in the gasket lines up with the crankcase opening.** Lightly lubricate the bore of the cylinder with clean engine oil and carefully slide the cylinder down the piston and onto the crankcase. Note that the exhaust port is on the right when the engine is viewed from the recoil starter end.

   IMPORTANT: The piston rings are aligned with knock pins. Make sure that the end gap is aligned with these pins when inserting the piston into the cylinder.

   Secure the cylinder onto the crankcase with the two hex. head screws with lock washers. Tighten the fasteners to 0.4 to 0.5 kg m (35 to 43 in lbs).
10. Install the spark plug into the cylinder. Make certain the spark plug gap is set to .6 to .7 mm (.024 to .028").
11. Screw on the starter pulley and secure with the nut and the washer. Tighten to .8 to 1.0 kg m (70 to 87 in lbs).
12. Install the recoil assembly as described under **Recoil Starter - Installation,** page 29.
13. Install the flywheel, clutch shoes, tank and coil as described under **Clutch Shoes and Flywheel - Reassembly,** page 31.
14. Install the muffler and muffler cover.
15. Install the carburetor and air cleaner as described under **Carburetor - Installation,** page 17.

Engine - Installation on Drive Tube

1. Remove the locating screw from the clutch housing and mount the engine on the tube.

   NOTE: It may be necessary to turn the trimmer implement slightly to get the flex shaft and clutch drive shaft to mate.

2. Align the holes in the clutch housing and the drive tube and install the locating screw. Tighten the locating and clamping screw.

3. Feed the throttle cable through the throttle control grip and insert the end into the recess in the trigger.

4. Place the switch in the throttle control housing. Test for proper operation of the switch. The switch should be open in the "on" position and closed in the "off" position.

5. Mate the two throttle control case halves and secure with the two machine screws.

6. Plug the two wires into the female connectors in the throttle control. They may be connected either way as the ignition switch has no certain polarity.

7. Adjust the carburetor as described under **Carburetor - Adjustment,** page 17.

SECTION 7 CONTROLS

The control unit on the TC1000 houses the on/off switch and the throttle control trigger. The actual housing was cast aluminum in 1985 although subsequent production uses a plastic version.

Directly behind the control unit is a padded grip which covers the connectors for the ignition ground leads and a portion of the throttle cable.

Control and Grip - Removal from Drive Tube

1. Remove the engine as described under **Engine - Removal from Drive Tube,** page 34.
2. Remove the two screws and locknuts securing the throttle control case halves. Separate and remove the halves. See Fig. 99.

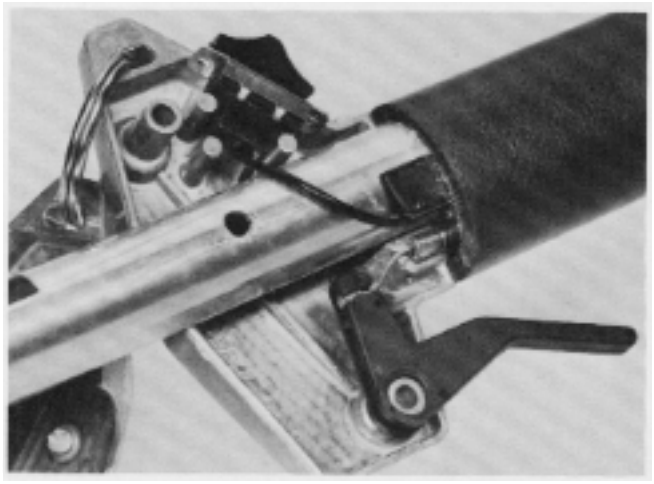

Figure 99

3. Disconnect the throttle cable and switch wires. Insert a small drill bit or small diameter wire to release the switch wires from the switch. See Figure 100.
4. Slide the grip assembly off the tube.

   NOTE: The grip is located on the tube with a plastic pin. The pin can be released by pulling or prying down on the front of the grip housing while sliding the grip back, off the end of the tube. It may help to lubricate the tube with soapy water prior to this procedure.
5. The ignition wire terminals may now be removed from the grip.

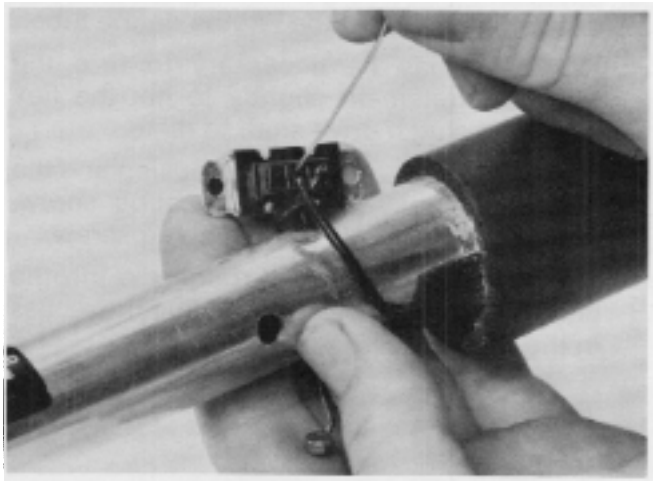

Figure 100

Control and Grip - Installation on Drive Tube

1. Reinstall the switch wire terminals in the grip housing.
2. Slide the rubber grip over the housing.
3. Lubricate the tube with a soap solution and slide the grip assembly on to the tube until the locating pin snaps into the hole in the tube.
4. Reinstall the engine on the drive tube as described under **Engine - Installation on Drive Tube,** page 39.
5. Mount the right hand throttle control case half on the tube.
6. Mount the switch and throttle control trigger. Use a VOM or test light to ensure that the switch is closed in the "off" position and open in the "on" position.
7. Slide the throttle cable through the grip and install the cable as shown in Figure 99.
8. Mount the left-hand case half and install the two retaining screws.
9. Reconnect the wires from the engine by pushing them into the terminals in the grip. It makes no difference which way they are plugged into the grip as they have the same polarity.

SECTION 8 HANDLE

Handle - Removal from Drive Tube

1. Remove the engine as described under **Engine - Removal from Drive Tube,** page 34.
2. Remove the grip and the control unit as described under **Control and Grip - Removal from Drive Tube,** page 40.
3. Loosen the handle knob. See Fig. 101.

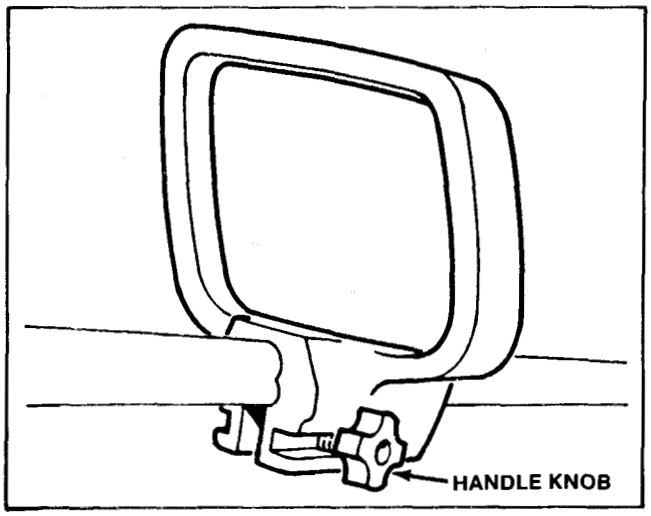

Figure 101

4. Slide the handle up, and off the drive tube. (Soaping the drive tube may aid in removing the handle.)

Handle - Installation on Drive Tube

1. With the engine, grip and control unit removed, slide the handle onto the drive tube. (Soaping the handle may facilitate installation.)
2. Insert the carriage bolt into either side of the handle and secure with the knob.
3. Install the control and grip as described under **Control and Grip - Installation on Drive Tube,** page 40.
4. Mount the engine as described under **Engine - Installation on Drive Tube,** page 39.

Handle - Adustment

1. Loosen the handle knob.
2. Adjust to the desired handle height but do not cover the eye protection safety decal. See Fig. 102

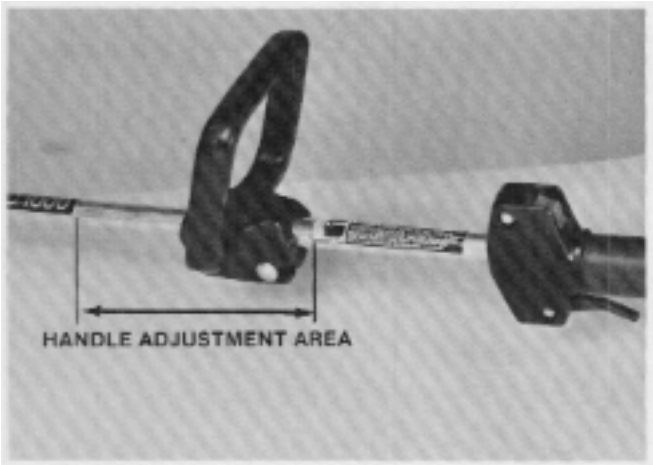

Figure 102

3. Hand tighten the handle knob.

SECTION 9 SHIELD

Shield - Knife Replacement

1. Remove the two hex screws securing the bracket and knife to the shield.
2. Replace the bracket and knife asembly and secure with the original hex screws.

Shield - Removal from Drive Tube

1. Remove the trimmer implement from the drive tube as described under **Tap and Trim Head® - Disassembly,** page 46, or **Flex Blade - Removal from Drive Shaft,** page 48.
2. Remove the locknut and the machine screw from the bearing housing. See Fig. 103.

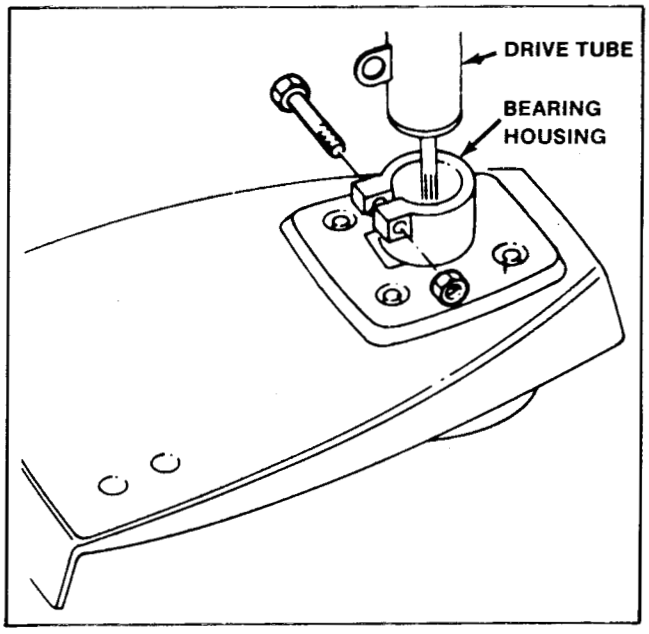

Figure 103

3. Pull the bearing housing and shield assembly off the bottom of the drive tube.
4. Remove the four machine srews that attach the shield to the bearing housing. Separate the shield from the bearing housing.

Shield - Installation on Drive Tube

1. Using four new nylon locknuts, fasten the shield to the bearing housing.
2. Mount the bearing housing and shield assembly on the drive tube and secure with the machine screw and a new nylon locknut. It may be necessary to rotate the drive shaft slightly to get the implement drive shaft and flex shaft to properly align.
3. Mount the trimmer implement on the drive shaft as described under **Tap and Trim Head - Reassembly,** page 47, or under **Flex Blade - Installation,** page 48.

SECTION 10 CUTTER HEAD BEARINGS

Cutter Head Bearings - Removal

1. Remove the cutter head as described under **Tap and Trim® Head - Disassembly,** page 47, or **Flex Blade - Removal from Drive Tube,** page 48.
2. Remove the locknut and the machine screw from the bearing housing. See Fig. 104.

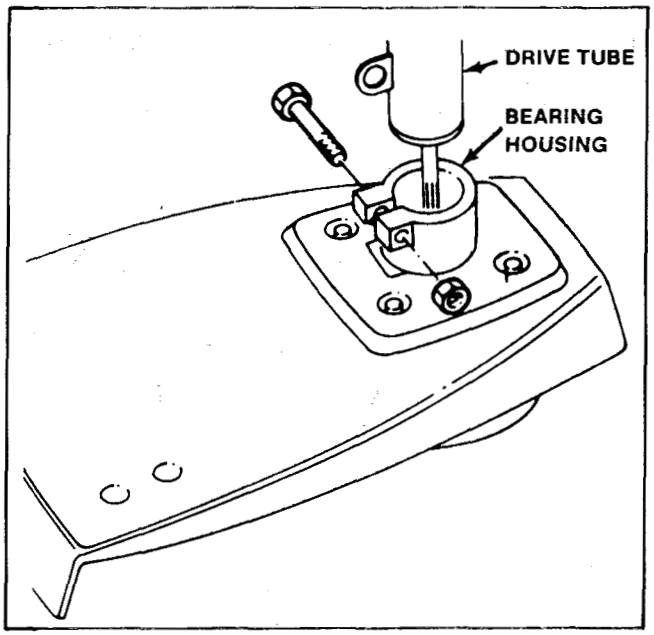

Figure 104

3. Pull the bearing housing and shield assembly off the bottom of the drive tube.
4. Remove the four machine screws that attach the shield to the bearing housing. Separate the shield from the bearing housing.
5. Pry the star shaped spring grip out of the bottom of the bearing housing.

CAUTION: Use extreme care and make sure you are wearing eye protection when removing the star shaped spring grip.

6. Press the power shaft and bearings out of the housing.

   IMPORTANT: Anytime the bearings are pressed out of the housing they should be replaced because pressing against the inner race typically damages the bearing.
7. Press the upper bearing off the power shaft.
8. Remove the grip rings.
9. Press the lower bearing off the power shaft.

   Note: *The roll pin does not have to be removed for this operation.*

Cutter Head Bearings - Installation

See Fig. 105.

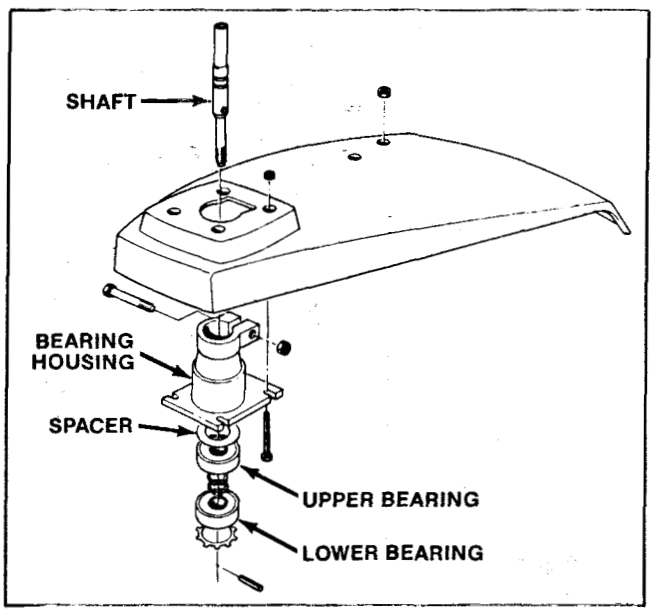

Figure 105

1. Press the spacer and upper bearing into the housing.
2. Press the lower bearing onto the power shaft, slightly past the lower snap ring groove.
3. Install the two grip rings.
4. Press the shaft, grip rings and bearings into the housing. Make sure that the lower bearing seats against the grip ring.
5. Install the star spring grip
6. Using four new nylon locknuts, fasten the shield to the bearing housing.
7. Mount the bearing housing and shield assembly on the drive tube and secure with the machine screw and a new nylon locknut. It may be necessary to rotate the drive shaft slightly to get the drive shaft and flex shaft to properly align.
8. Mount the trimmer implement on the drive shaft as described under **Tap and Trim® Head - Reassembly,** page 47, or under **Flex Blade - Installation,** page 48.

SECTION 11 FLEXIBLE DRIVE SHAFT

The TC1000 uses a flexible shaft inside a nylon sleeve to drive the cutter head. The shaft is 128.7 cm (50.65") long and 6.8 mm (.268") in diameter. Each end of the shaft is formed to a 5 mm (.198") square which is 3.18 cm (1.25") in length.

Flexible Drive Shaft - Removal

1. Remove the machine screw and nylon locknut that secures the bearing housing to the drive shaft. See Fig. 106.

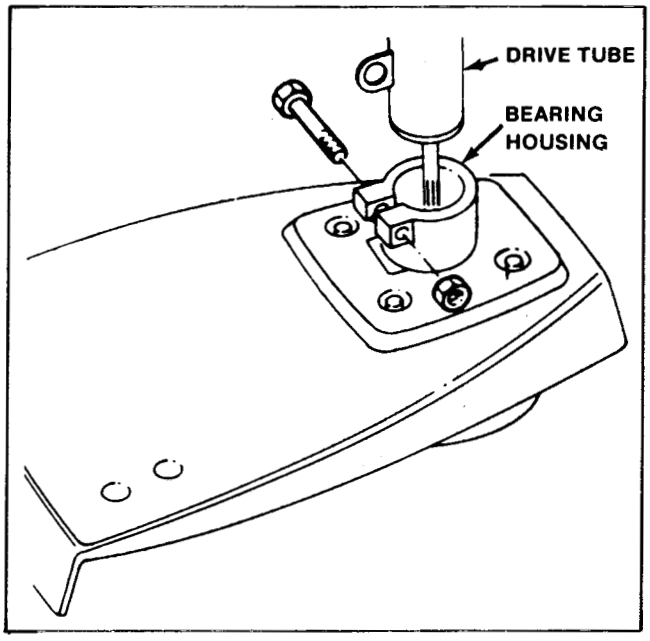

Figure 106

2. Pull the bearing housing, shield and trimmer implement off the drive tube as an assembly.
3. Using a needle nosed pliers, pull the flexible shaft out of the drive tube.

Flexible Drive Shaft - Service

The flexible shaft should be lubricated every 40 hours with a #2 general purpose grease.

1. Grease the entire length of the cable with a light coat of #2 general purpose lithium base grease.

Flexible Drift Shaft - Installation

1. Insert the flexible shaft into the nylon sleeve. Make sure that the shaft seats properly in the clutch drum. Proper seating is obtained when the flexible shaft is 10 mm (3/8") inside the drive tube. See Fig. 107

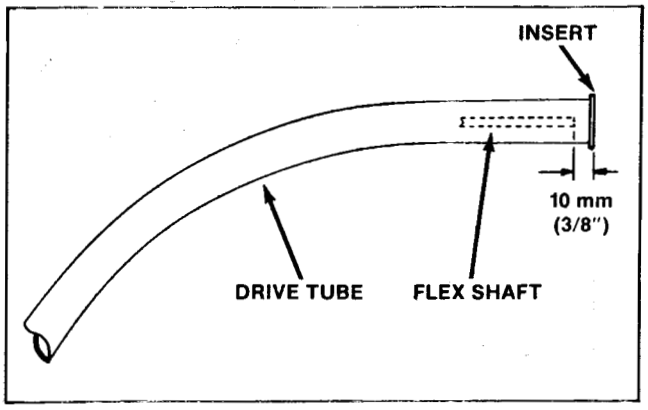

Figure 107

2. Mount the bearing housing, shield and trimmer implement assembly on the drive tube. It may be necessary to turn the trimmer implement slightly in order to get the flexible shaft to mate properly with the cutter head drive shaft.
3. Install the machine screw that fastens the bearing housing to the drive tube and secure with a new nylon locknut.

SECTION 12 DRIVE TUBE

Drive Tube - Removal

1. Remove the engine as described under **Engine - Removal from Drive Tube,** page 34.
2. Remove the control as described under **Control and Grip - Removal from Drive Tube,** page 40.
3. Remove the handle as described under **Handle - Removal from Drive Tube,** page 41.
4. Remove the machine screw and nylon locknut that secures the bearing housing to the drive shaft. See Fig. 108.

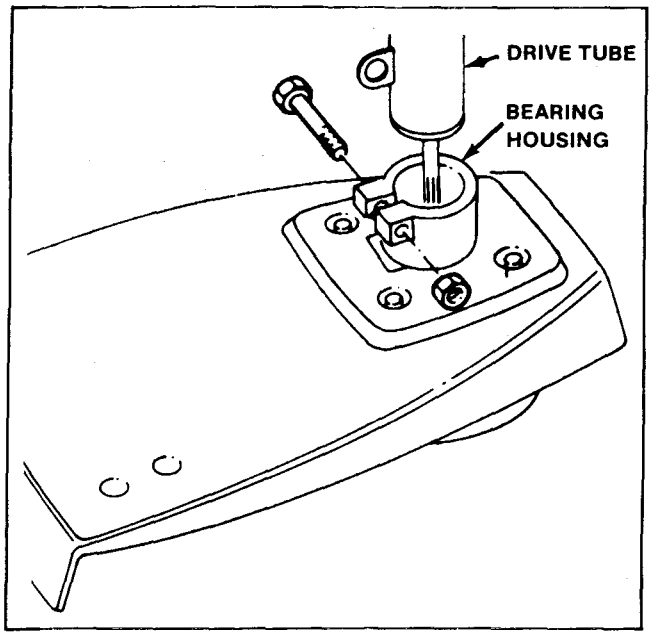

Figure 108

5. Pull the bearing housing, shield and trimmer implement off the drive tube as an assembly.

Drive Tube - Service

1. Insert a 5/8" diameter hose into the curved end of the shaft and push the nylon liner out the top of the tube.
2. Inspect the nylon sleeve for wear and replace if necessary.
3. Insert the flex shaft liner into the top of the drive tube with the corrugated casing material nearer the top of the drive tube. Using the 5/8" diameter hose that was used earlier, push the liner into the drive tube until it bottoms in the pole end insert. See Fig. 109.

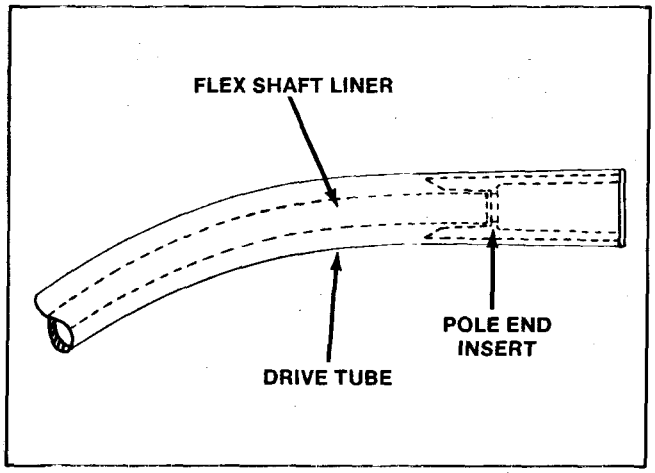

Figure 109

Drive Tube - Installation

1. Mount the bearing housing, shield and cutter implement assembly on the drive tube.
2. Secure with the original machine screw and a new nylon locknut.
3. Install the handle as described under **Handle - Installation on Drive Tube,** page 41.
4. Install the control as described under **Control - Installation on Drive Tube,** page 40.
5. Mount the engine on the drive tube as described under **Engine - Installation on Drive Tube,** page 39.
6. Ensure that the eye protection safety decal is applied to the drive shaft in its proper location. See Fig. 110.

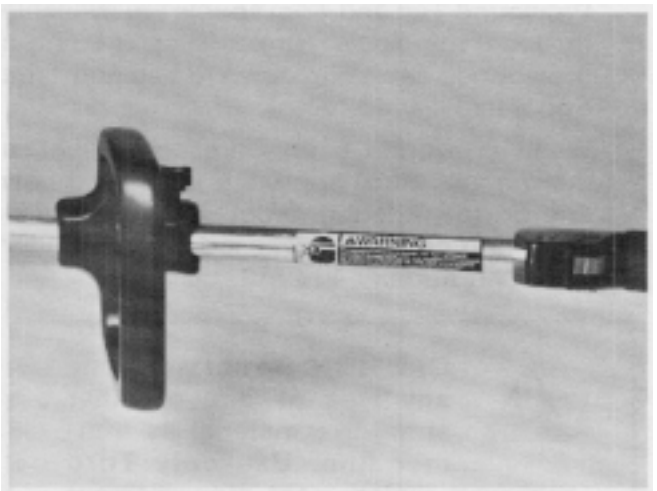

Figure 110

SECTION 13 TAP AND TRIM® HEAD

Caution: Never attempt any service of the trimmer head without first shutting off the engine and allowing the implement to come to a complete stop.

TAP AND TRIM® SPOOL

Tap and Trim® Spool - Removal

1. Insert a medium blade screwdriver into one of the two slots on the bottom of the spool and twist 1/4 turn to release the spool. See Fig. 111.

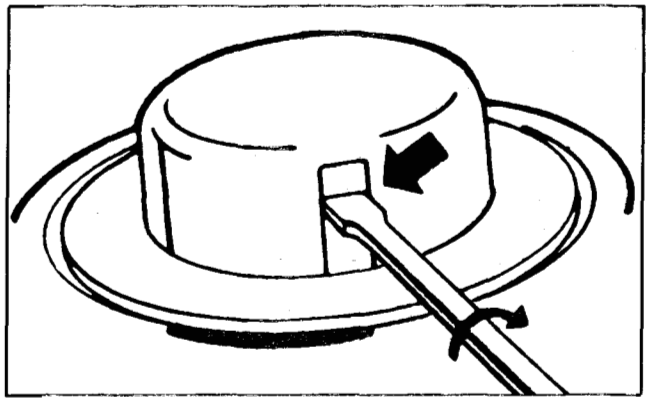

Figure 111

2. Remove the spool.

Tap and Trim® Spool - Line Replacement

Prewound Tap and Trim spools are available through your local Toro retailer. If using a prewound spool, skip down to Tap and Trim Spool Installation below.

While prewound spools are convenient, a more economical approach is to wind new line on the existing spool. Toro monofilament line can be purchased in bulk under Toro part number 46-2710.

CAUTION: Do not substitute any type of wire or other string-like material as trimmer line. Use only Toro approved replacement monofilament line of .080" diameter. Use of improper line could result in personal injury.

1. To wind replacement line on the spool, first hook one end of the line into the keyhole slot in the top flange of the spool. See Fig. 112.

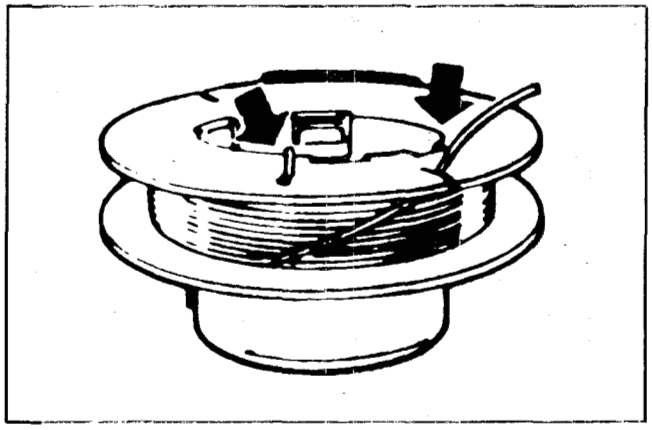

Figure 112

2. Wind the line on the spool in the direction of the arrow shown on the spool. Use no more than 48 feet of line as it will otherwise extend beyond the spool flanges and cause binding. Avoid criss-crossing to help prevent line advancing problems later.
3. Hook the end of the line in one of the two slots provided in the upper flange of the spool to keep the line tight while installing the spool.
4. Cut the line protruding from the keyhole slot so that only 1/2" remains.

Tap and Trim® Spool - Removal

1. Align the keys molded into the core with the eyelet on the drum. It may be necessary to depress the core and rotate to get the keys to line up properly. See Fig. 113

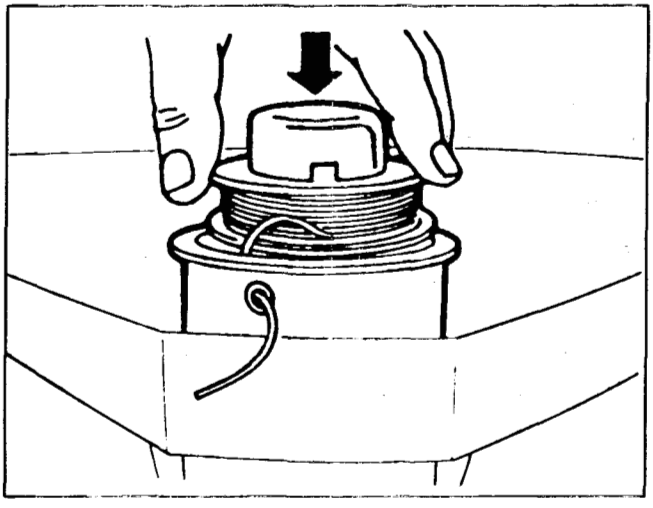

Figure 113

2. With the trimmer line still in the slot in the top of the spool flange, thread the line through the eyelet in the drum.

Tap and Trim® Spool - Installation (cont'd)

3. Align the two screwdriver slots with the keys in the core and push the spool partially onto the core.
4. Pull on the line to release it from the spool flange then push the spool firmly onto the core until it "snaps" into place.

TAP AND TRIM® HEAD

Tap and Trim® Head - Disassembly

1. Insert a medium blade screwdriver into one of the two slots on the bottom of the spool and twist 1/4 turn to release the spool.
2. Remove the spool.
3. While holding the drum stationary, unscrew the core and driver assembly by rotating them counterclockwise. See Fig. 114.
4. Remove the core, the driver, the washer and the spring.
5. Pull the drum up and off the drive shaft.

Tap and Trim® Head - Inspection

1. Inspect the drum and spool for any obvious damage to the plastic.
2. Make sure that the eyelet in the drum is intact and that the areas that contact the trimmer line are smooth.
3. Check that the rivet directly opposite the eyelet is still in place. (The purpose of the rivet is to counterbalance the eyelet.)

Tap and Trim® Head - Reassembly

1. Mount the drum on the drive shaft making sure that it mates properly with the coil pin.
2. Center the spring on the drive shaft and then place the washer, driver and core onto the shaft as an assembly. See Fig. 114.

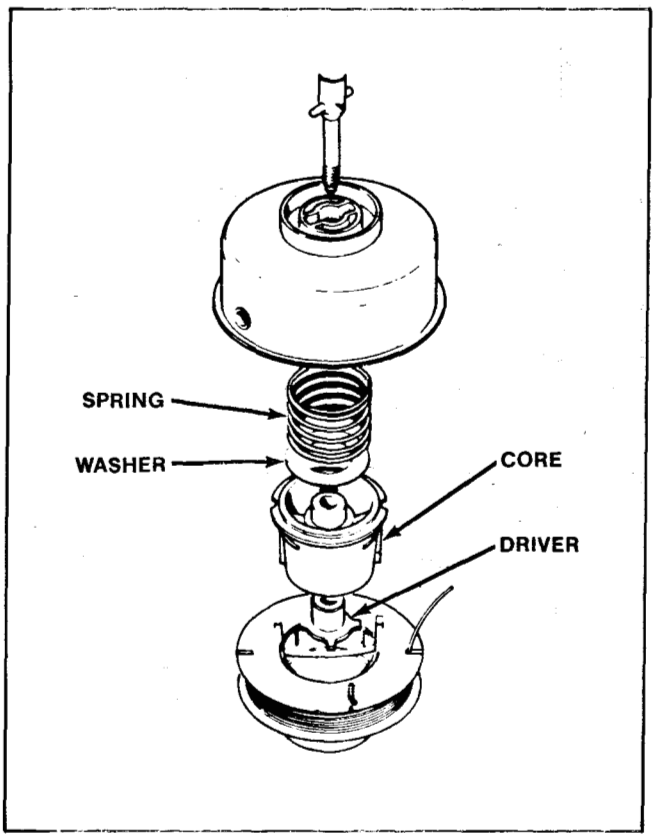

Figure 114

3. Screw the core and driver onto the drive shaft while holding the drum. It may be necessary to press on the driver in order to get it started on the threads. Screw the driver/core assembly on finger tight.
4. Make sure that the core indexes freely on the driver.
5. Install the spool as described under **Tap and Trim® Spool - Installation,** page 46.

SECTION 14 FLEX BLADE

The TC1000 can be adapted to cut heavy grass and weeds by installing the Flex Blade in place of the Tap and Trim cutter head. The blade is 25.4 cm (10 inches) in diameter and is reversible for long life.

CAUTION: Never attempt any service of the trimmer head without first shutting off the engine and allowing the implement to come to a complete stop.

Flex Blade - Removal from Drive Shaft

1. Grasp the Flex Blade to prevent it from rotating then remove the nut by turning it counterclockwise. See Fig. 115.

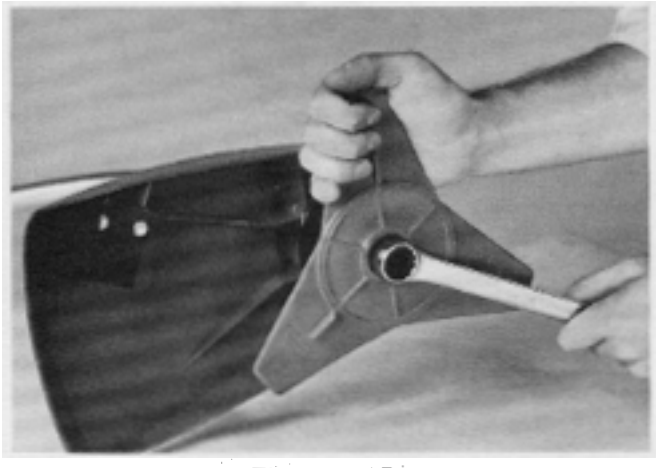

Figure 115

2. Remove the washer, flex blade and the blade adapter.

Flex Blade - Installation on Drive Tube

1. Mount the blade adapter, the Flex Blade and the washer on the drive shaft. See Fig. 116.

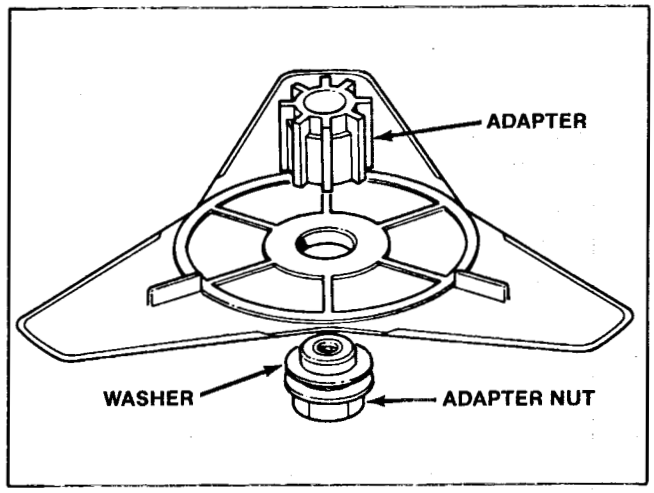

Figure 116

2. Secure with the adapter nut by turning it clockwise.

SECTION 15 ACCESSORIES

Standard and Deluxe Harness - Assembly

1. Slip the ring into the clamp.

   NOTE: 1985 TC1000s used an aluminum control housing that had a hole in the top for the harness ring. On these models, simply slide the ring into the hole and proceed to step 3. See Fig. 117.

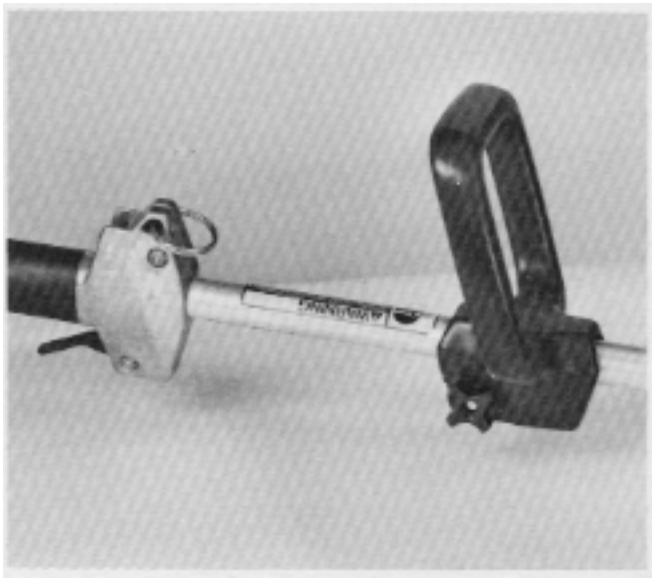

Figure 117

2. Mount the clamp and ring assembly onto the tube just below the control. Secure with the nut and machine screw. See Fig. 118.

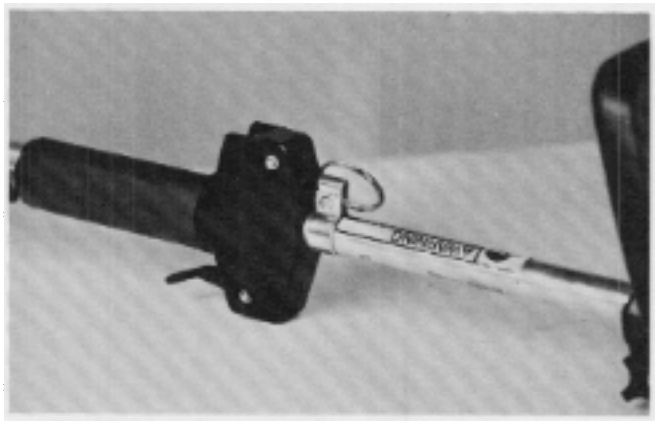

Figure 118

3. Adjust the harness so that the trimmer line or Flex Blade rotates in a nearly level plane with a slight forward tilt.
4. (Deluxe Harness Only) Fasten the belt by threading the loose end through the buckle. See Fig. 119.

Figure 119