Sno Jet

A Conroy Company

1975 THUNDER JET

PART NO: 209351

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Foreword

This manual is intended to offer a parts list and racing suggestions for the 1975 ThunderJet. The manual assumes that the operator has a basic knowledge of snowmobile maintenance. The information included in this manual was correct at the time of printing and should be of great assistance in setting up your new ThunderJet to race competitively. As new information becomes available it will be sent to your dealer.

Warranty Policy

A. General Statement

Sno*Jet, Inc. guarantees each Sno*Jet snowmobile against defects in materials and workmanship, provided the snowmobile is properly maintained and used in normal conditions, for the following period:

Ninety days from the date of retail purchase, or from December 1, whichever date is the latest in the same snowmobile season, subject to the specific limitations listed below.

(The snowmobile season is considered as December 1 through April 30.)

In the case of a purchase made after March 1, the warranty will apply from the date of purchase until December 31 of the same year, subject to the specific limitations listed below.

The warranty is limited to the original retail purchaser.

The obligation of Sno*Jet, Inc., under this warranty is limited to the repair or replacement of defective parts by an authorized Sno*Jet dealer, when parts are proven to be defective in either material or workmanship and does not cover any consequential damages.

This warranty is not valid if the Sno*Jet snowmobile has been: misused, improperly maintained, damaged by accident, immersed in water, altered, RACED, repaired by unauthorized persons, repaired with other than genuine Sno*Jet parts or used on surfaces other than ice or snow.

All warranties are invalid on any Sno*Jet snowmobile delivered to the retail purchaser in the shipping crate and not properly prepared for delivery.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTY OBLIGATIONS, EXPRESSED OR IMPLIED, LEGAL OR CONVENTIONAL, INCLUDING THE LEGALLY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PURPOSE INTENDED ON THE PART OF SNO*JET, INC., WHICH NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT, ANY OTHER WARRANTY RESPONSIBILITY IN CONNECTION WITH SNO*JET SNOWMOBILES.

B. Sno*Jet Warranty — Specific Limitations

Sno*Jet, Inc. limits or excludes from the terms of the Warranty General Statement, the following parts or services:

Excluded:

Time spent in the diagnosis of a cause of malfunction.

Consumable items, including: Spark plugs, condensers, light bulbs, coil suspension springs, fuel filters, brake linings, ski-runners, slide runners, gaskets, windshields, carburetor diaphragms or needle valves, oil seals, track cleats or rivets.

Pistons damaged by improper conditions of use.

Assemblies, unless they cannot be placed in good condition by replacement of component parts.

Normal operating services, including: Engine tune-ups, adjustments and alignments.

Limited to 30 Days From Commencement of Warranty:

Leaf springs, throttle and brake control cables, electrical wiring, upholstery.

Drive belts. (Only manufacturing defects acceptable.)

Skis. (Only welding failures acceptable.)

Engines:
Sno*Jet engines are guaranteed for the same period as the snowmobile to which they are fitted, but for late season sales there is no extension beyond April 30.

Storage:
Off-season storage and pre-season preparation are at the discretion and expense of the owner. However, any failure which occurs as a result of inadequate seasonal preparation shall not be covered under warranty.

High Performance Models:
The Thunder Jet is considered a high performance model and as such is manufactured with high performance components. These components tend to be less durable and when coupled with the more severe riding applications that a high performance model is subjected to, premature failures can result which are not considered to be a defect in material or workmanship. Any such failures would not be covered by warranty if such abuse was present.

Warranty Repairs:
Your machine must be delivered to an authorized Sno*Jet dealer for warranty repairs. While we expect that you will return to your selling dealer for warranty repairs, if you are vacationing or have moved more than 50 miles away from your selling dealer, any Sno*Jet dealer can perform warranty repairs. If you travel out of your local area to purchase your machine, you are expected to go back to that selling dealer for your warranty service.

Safety Precautions

1. Before starting the engine:
   a. Be sure throttle lever operates freely and returns to idle position.
   b. Check brake control.
   c. Be sure no one is in front or back of snowmobile.
2. Check operation of kill switch and tether switch.
3. During warm up, use a stand with a protective guard that will prevent any objects being thrown from the machine and causing injury. Figure 1

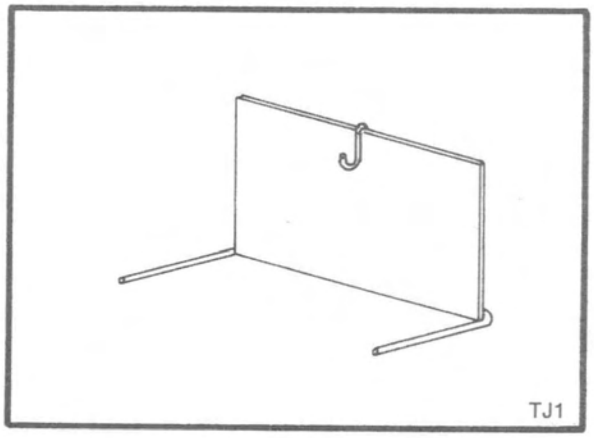


Figure 1

4. Be sure braking system is working properly.
5. Gasoline is highly flammable, use caution when filling the gas tank. Always keep a fire extinguisher nearby.
6. Wear protecting clothing as designated by your racing association. Never ride without a helmet and eye protection.
7. Test your machine only in designated areas.
8. Courtesy and good sportsmanship is very important on the race track. Do not block or cut off fellow racers.
9. Snowmobile racing is normally controlled by flags. Always obey the flag and stay alert. Figure 2
10. If you should experience problems during a race, raise your left hand to warn other racers and get off the track.

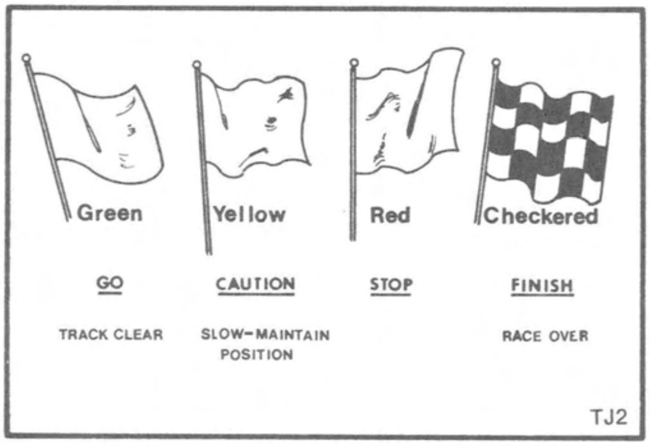


Figure 2

DRIVE SYSTEM

The 1975 Thunder Jet Drive System is adjustable for different tracks or track conditions. There are adjustments for both the drive clutch as well as the driven clutch (convertor.)
Before attempting to change clutching, we should discuss the terms involved.
Hold R.P.M.— Hold R.P.M. is the maximum R.P.M. the engine will achieve with the drive clutch fully shifted. **Engagement R.P.M.** is the point at which the drive clutch sheaves squeeze the drive belt and move the sled. The recommended maximum R.P.M. for the 1975 Thunder Jet 440 is 8000 R.P.M. In the past some snowmobile racers have felt that by increasing R.P.M., more horsepower could be obtained. This is not true! As indicated by the graph below, horsepower actually decreased over 8000 R.P.M. Figure 3.

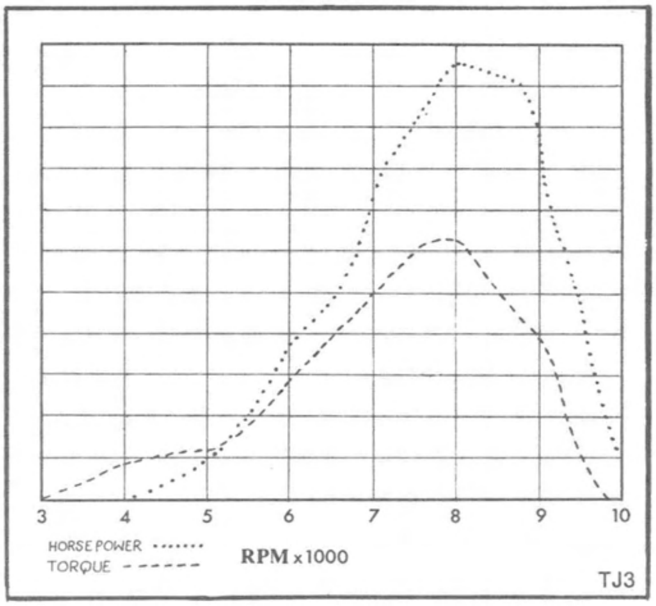


Figure 3

Since 8000 R.P.M. must be maintained for maximum output, the clutch must be adjusted to this specification. The driven clutch can be adjusted to achieve this setting or the drive clutch can be corrected.
Drive Clutch: The drive clutch has three possible variables which are the spring, roller arm weights, and ramps.
Spring: The clutch spring primarily controls the engagement R.P.M. However, a stronger spring will also slightly increase the hold R.P.M. and increase shift back. A yellow spring is standard, but to increase engagement R.P.M. you could install a green spring which is stronger.

Part Number	Color	Spring Compression Rate
050760	Yellow	50 lbs. @ in.
050786	Green	64 lbs. @ in.

NOTE: New springs will have a higher tension than a used spring. Normally, a spring will "seat" after approximately 50 miles. Be sure to install a used spring when adjusting your drive system since spring changes could later alter your adjustments.

Weights: The roller arm weights primarily control the hold R.P.M. The weight will also have a slight effect on the engagements and shift pattern. 8000 R.P.M. must be maintained for best efficiency. Below is a weight chart listing heavier and lighter weights. Lighter weights would increase the hold R.P.M. and a heavier weight would decrease the R.P.M.

CAUTION: All six weights must be the same. Never mix lighter or heavier weights.

WEIGHT CHART

Part Number	I.D. Number	Outside Dia.	Weight in Grams
050780	175	.437	3.725 lighter
050779	135	.471	4.479 lighter
050777	107	.491	4.958 lighter
050776	106	.530	5.958 standard
050778	123	.568	6.992 heavier

NOTE: Some racing associations may not allow changing clutch weights from standard in stock classes.
Ramps: Engagement, shift pattern, and Hold R.P.M. are all affected by the ramp angle. We do not recommend modification of the ramp since this must be accurately matched to the torque curve of the engine. Below is a chart which indicates effect of ramp angle on the shift pattern. (Figure 4)

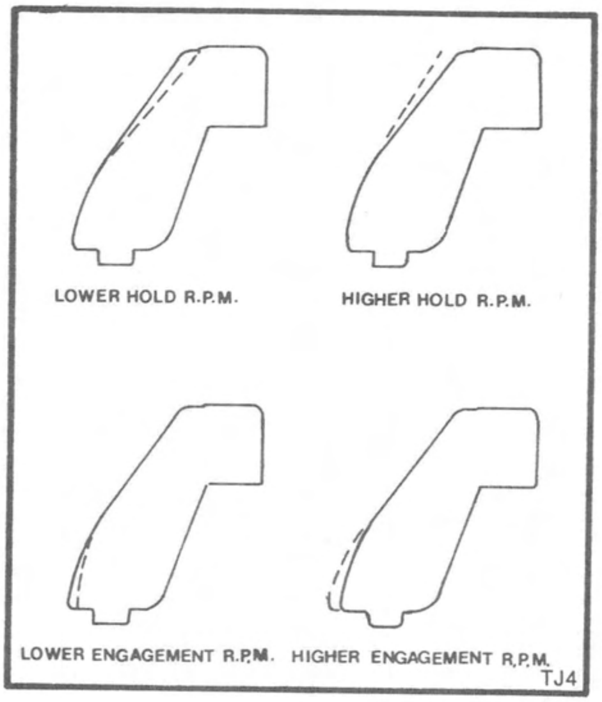


Figure 4

Driven Clutch (Convertor): Spring tension can be adjusted for different conditions or desired hold R.P.M. The driven clutch spring is always set with 120° of preload. There are four settings possible for the spring. If the spring is set tighter, the Hold R.P.M. of the clutch will increase. If the spring is set looser, the Hold R.P.M. will be lower. (Figure 5.)

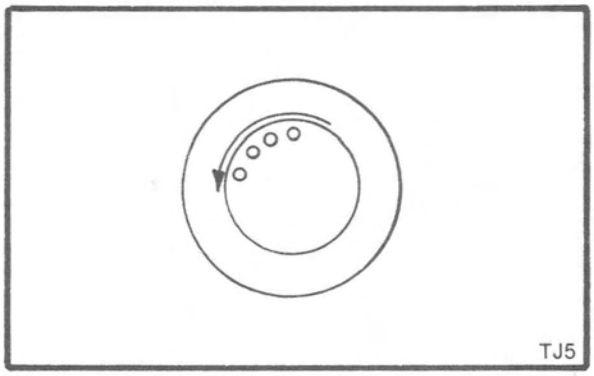


Figure 5

Clutch Alignment: Clutch alignment is important to both performance and belt life. There are three considerations when considering clutch alignment. Namely, parallelism, offset, and center to center distance. Offset is important to keep the drive belt centered. Offset can be checked by placing a straight edge from the drive clutch to the driven clutch as shown in Figure 6. Distance "A" should be set at .550.

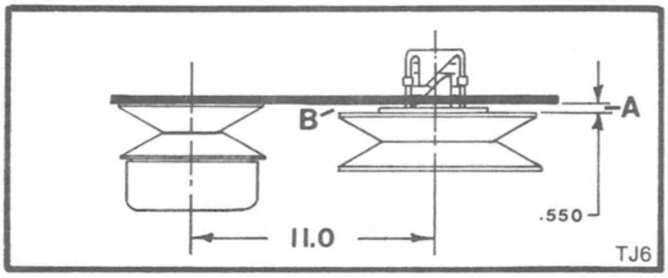


Figure 6

Parallelism: Parallelism can be checked by placing a straight edge at the top and bottom of the clutch diameters and comparing the measurement. The measurement should be identical. If Dimension "A" was different than B, the engine or jackshaft may be forward or backward.

If the same check is made at top and bottom locations on the clutches, these dimensions should also be the same. If these dimensions were different, this would indicate that the engine or jack shaft was too high or too low.

Center to Center Dimension: The clutches must be the proper distance apart for proper operation of the drive system. See Figure 6 for proper adjustment. Be sure the drive belt is 44 ± 3/16". Since variances in drive belt circumference would make center to center distance incorrect. After adjustment the drive belt must have 1/8" clearance around the drive clutch hexagon shaft.

D. Checking Clutch Wear

The following is a positive method to check for allowable wear tolerance. Remove the clutch from engine and remove cover housing and spring from clutch. With the spring removed, replace the cover housing and secure with the three cap screws.

While holding the stationary sheave securely, rotate the movable sheave/cover assembly counterclockwise until all clearance is taken up in that direction. With a combination square, scribe a line on the stationary and movable sheaves (Figure 7). Then rotate the movable sheave/cover assembly clockwise until all clearance is taken up in that direction. With the square, scribe a second line on the movable sheave in line with mark on stationary sheave (see figure 7.)

The distance between the two lines on the movable sheave is to be measured. The allowable tolerance is up to .156" (5/32"). Anything below .156" is within tolerance and will function properly. Any clutch that has .156" or more play as described must be repaired.

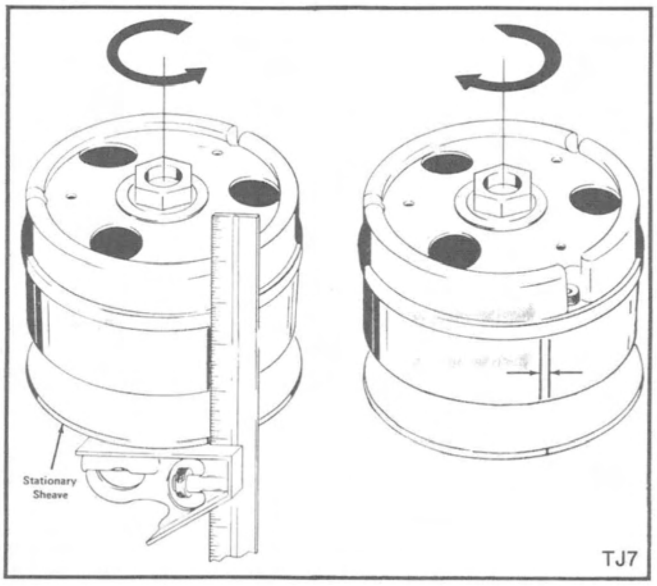


Figure 7

DRIVE CLUTCH TROUBLE SHOOTING

Problem	Cause and Remedy
Clutch Engagement Too Low	Wrong ramp. Check for proper spring, ramp, and weights for engine cc size.
Clutch Engagement Too High	Wrong ramp or spring. Check ramp and weight application or dirty moveable parts. Lubrication on drive clutch—very little graphite or dry lubricant.
Hold RPM Too High	Weight is too light or wrong ramp. Install heavier weight or correct ramps.
Hold RPM Too Low	Weight too heavy. Install lighter weight and check engine for possible horsepower loss.
Black or Rubber From Belt on Clutch	Check offset. No grease, gas or oil to be evident on belt and clutch.

DRIVEN PULLEY TROUBLE SHOOTING

Problem	Cause and Remedy
RPM Too High	Too much tension on spring. Move back one notch at a time and test.
RPM Too Low	Too little tension on spring. Move one notch at a time and test.
Black or Rubber From Belt on Driven Pulley	Check offset. No grease or oil is to be evident on belt or driven pulley.

Varying terrain and operating conditions may require spark plugs of different heat ranges. Sustained cross-country operation, full throttle operation or pulling may require a cold plug. Trail riding or extensive slow speed operation may require a somewhat hotter plug.

After operating the engine as it will be run in normal snow conditions, remove the spark plugs and observe the color of the center electrode insulator. (Figure 8)

A cracked, fouled or dirty plug is to be replaced. Do Not clean and use old spark plugs, grit may be released into the cylinder, causing severe damage.

1. Tan or light brown insulator tip — indicated correct type and proper heat range.
2. Light gray or white insulator tip — indicates overheating caused by a lean carburetor setting, improper timing, overloading or incorrect (hot) spark plug. Continued operation can damage plug as shown. If not corrected engine damage will occur. If the carburetor is properly adjusted, replace the plug with one of a colder heat range.
3. Black insulator Tip — indicates fouling caused by excessive oil, a rich carburetor setting or incorrect (cold) spark plug. If gas/oil mixture and carburetor adjustment is correct, replace spark plug with one of a hotter heat range.

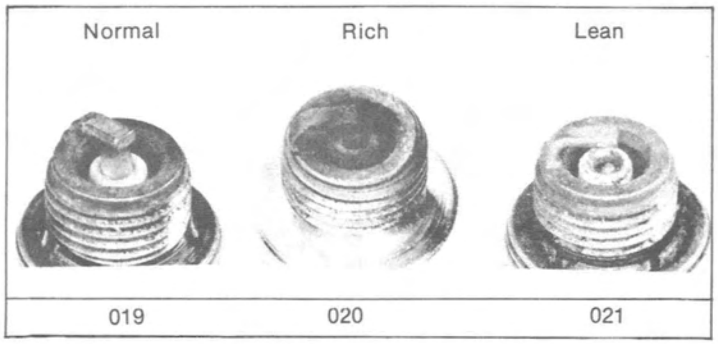


Figure 8

Engine

A. Recoil Starter

Disassembly

1. The starter pulley assembly is held to the flywheel magneto. (Figure 9)
2. The parts from the starter assembly can be removed after the nut, spring washer and flat washer are removed.
   Care should be taken not to mislocate the three return springs.

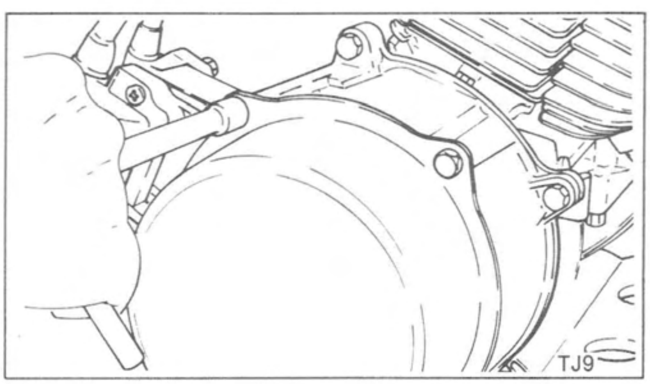


Figure 9

Assembly

1. Install the starter spring in the starter case, and hook the outer end of the starter spring onto the starter case hook.

Note: Apply Aeroshell no. 7A to the entire surface of the starter spring.

2. Untie the knot of the starter handle side, and insert the starter rope end into the center of the sheave drum. Wind the starter rope around the sheave drum, and bring out the starter rope end through the starter case hole. Then, thread the starter rope through the starter handle and connector, and make a knot on the rope end. When the starter rope is drawn out of the starter case, it is necessary to turn the sheave drum about ⅓ turn to the left from the free state of the starter spring and tie the starter rope to the starter handle. This procedure is needed to allow the starter handle to return smoothly to position.
3. Install the thrust washer and drive plate spring on the starter case center bolt.
   Position the drive pawls so that they fit respectively in the three recessions in the drum sheave. (The pawls must be directed to the left.) Place the return spring on the pawls. The return spring helps the drive pawls return to their original positions. Take care not to mislocate it.
4. Hook one end of the shorter return spring onto the drum sheave, and insert the bent end into the drive plate hole. Then, turn the drive plate to the left from the free state of the return spring so that each pawl will move into the next recession.
5. Install the flat screw and spring washer, and lock with the nut.

B. Drive Clutch

Removal

1. The drive clutch assembly is attached to the crankshaft on the left side of the engine.
2. To remove the drive clutch a special tool (shaped like a bolt) must be inserted in and tightened. Figure 10

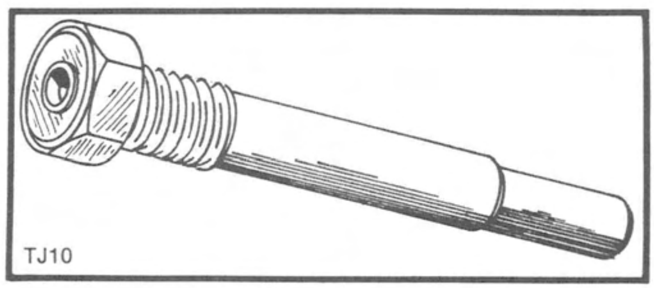


Figure 10

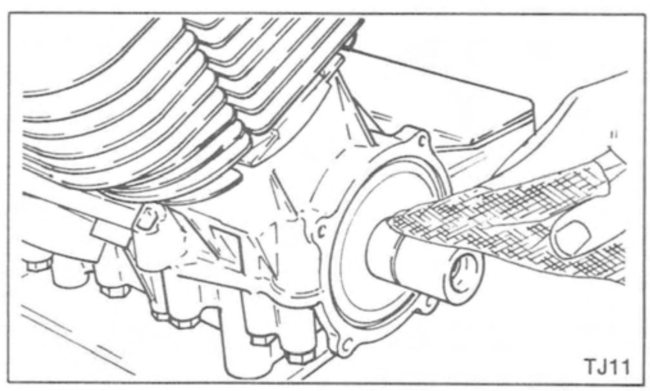


Figure 11

3. Before installing the drive clutch on the crankshaft, clean the crankshaft and fixed sheave with a dry cloth.

C. REMOVAL OF FLYWHEEL MAGNETO

1. Loosen the four bolts and remove the crankcase cover.

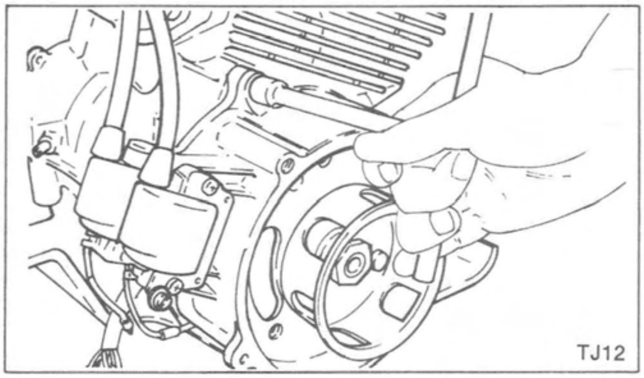


Figure 12

2. With the starter assembly removed you will not be able to remove the magneto assembly. The first step in this procedure is to remove the flywheel securing nut with a socket wrench 1.02 ins. (26 mm.).
   (In this case, to loosen or tighten the flywheel, a "bar" should be inserted into the hole in the pulley. The flywheel can be locked.)

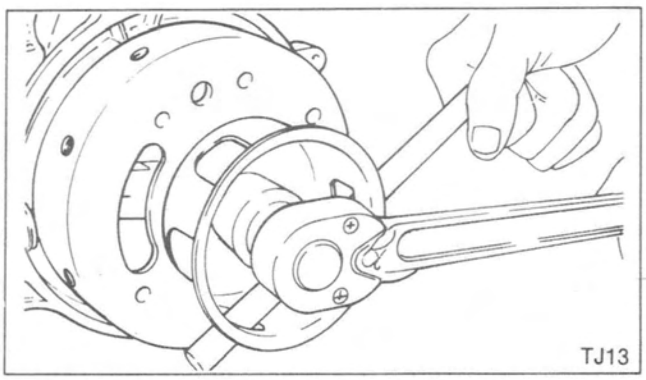


Figure 13

3. Remove the bolts that hold the starter pulley. Once these bolts are removed, the pulley can be set aside.

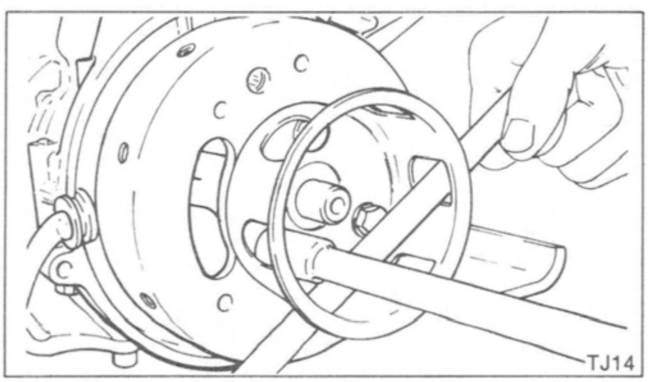


Figure 14

4. The flywheel magneto can now be removed. This requires the use of special puller. Be sure to use the three short screws with the puller when removing the flywheel.
   (Note: Immediately after the flywheel is removed, take the woodruff key off the shaft and attach it to the flywheel so that it does not become lost.)

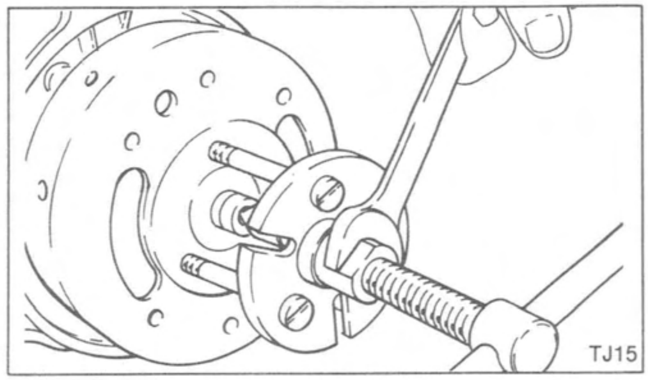


Figure 15

5. All parts of the magneto assembly, except for the magneto backing plate, have been removed. The only time that the magneto backing plate needs to be removed is in the case of complete engine teardown. The backing plate has to be removed in order to split the cases and this is accomplished by removing the hold-down screws, with an impact screw driver.

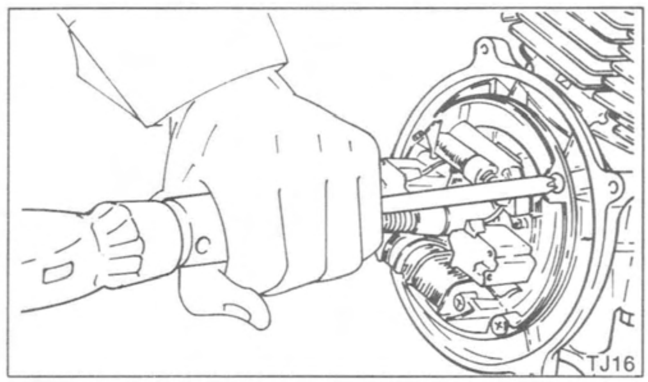


Figure 16

D. REMOVAL OF TOP END

Note:

During disassembly keep matching parts together; right piston with right cylinder, etc.

Remove the cylinder heads. Each head is held down by eight nuts.

Break each nut loose, in pattern, before removing completely.

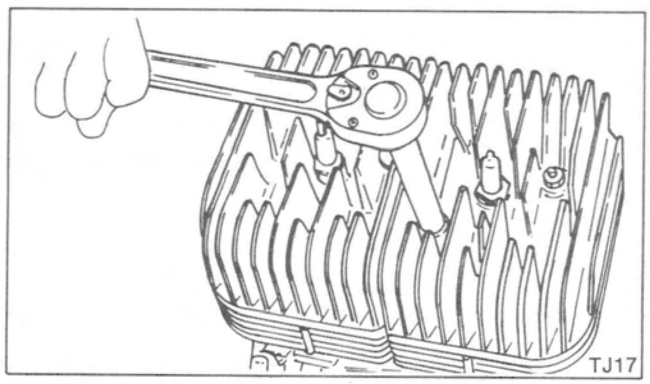


Figure 17

Note:
On reassembly, the head bolts are torqued, gradually and in pattern to:
16.6 — 19.5 ft-lbs. (2.3 — 2.7 m-kgs.)

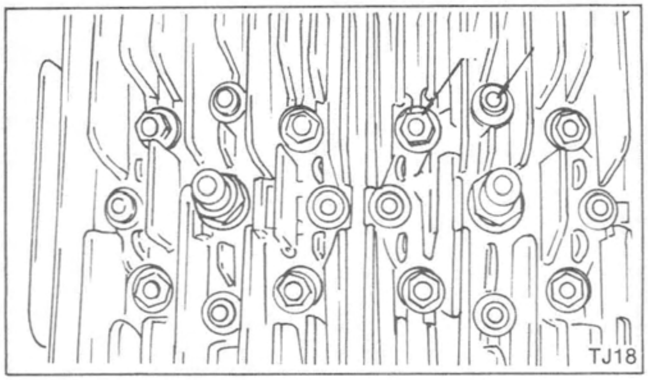


Figure 18

2. The next step is to remove the cylinders.
   when the cylinders are lifted off it is advisable to slip a clean rag beneath the piston. This will stop any carbon, broken parts, or other contamination from falling into the engine.

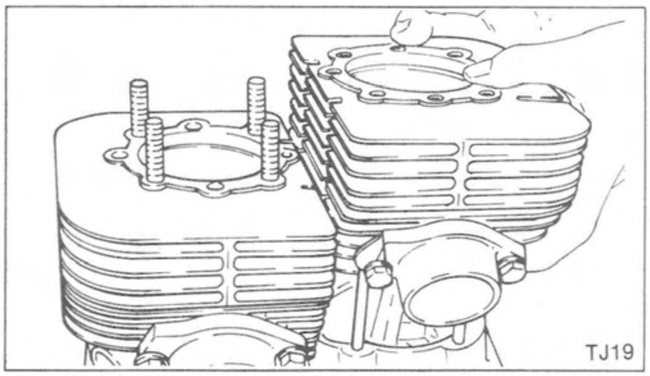


Figure 19

3. The piston assembly is removed at this time. Use needle nose pliers to remove the piston pin clip.
   Use a soft drift pin to push the piston pin out to allow a pair of pliers to grip and completely remove the piston pin. Once the piston pin has been removed the piston can be lifted off the rod and set aside. Be sure to remove the needle bearings in the upper rod end so as not to loose them when the engine is moved.

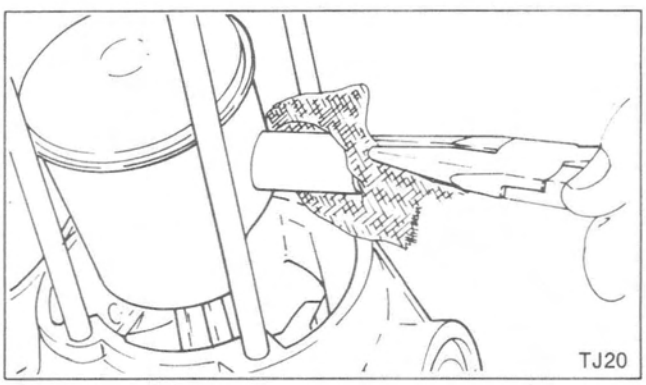


Figure 20

E. REMOVAL OF CRANKSHAFT ASSEMBLY

1. Remove the four bolts that hold the engine mounting bracket. The engine is now free of all extra external parts and attachments. The cases are now ready to be split, if so desired.

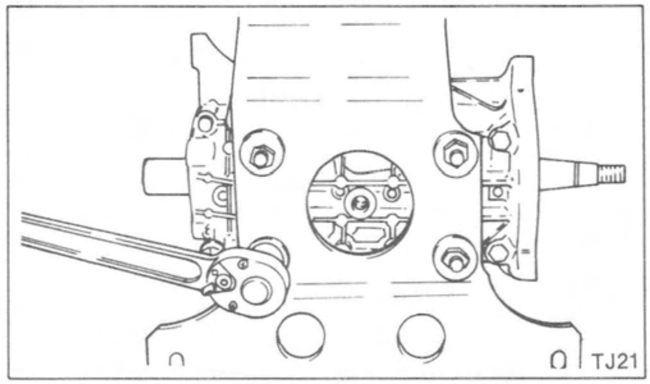


Figure 21

2. This illustration shows the proper sequence for removing the case bolts. This sequence must be followed in order to avoid distortion of the two crank cases.

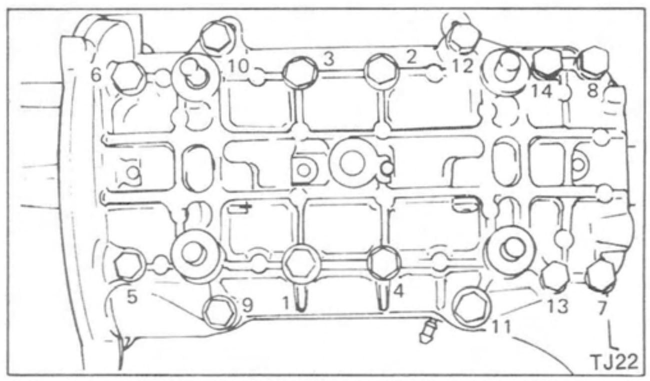


Figure 22

3. Use soft hammer to lightly tap around the entire edge of the cases. This will free the cases in case any adhesion is present. The cases can now be split by hand. As is shown in the illustration, the cases have knock pins (locating pins).
   Be sure that the locating pins are immediately gathered up and kept in a safe place so that none are lost before the engine is assembled again.

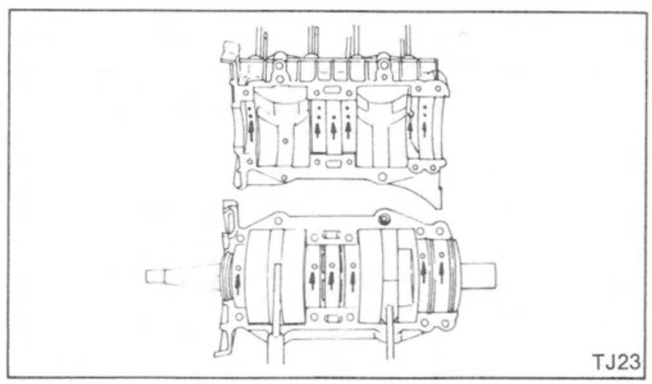


Figure 23

A. CRANKSHAFT ASSEMBLY

1. After removal of the crankshaft, wear of the connecting rod big end, crank pin and bearing should be checked. Excessive wear of the connecting rod big end is checked by measuring the axial play of the connecting rod small end when it is moved from side to side with your fingers. The axial play should not exceed 0.08 in. (2 mm.).
   After the Crank pin and bearing are replaced, maximum axial play should not exceed 0.032 — 0.04 in. (0.8 — 1.0 mm.).

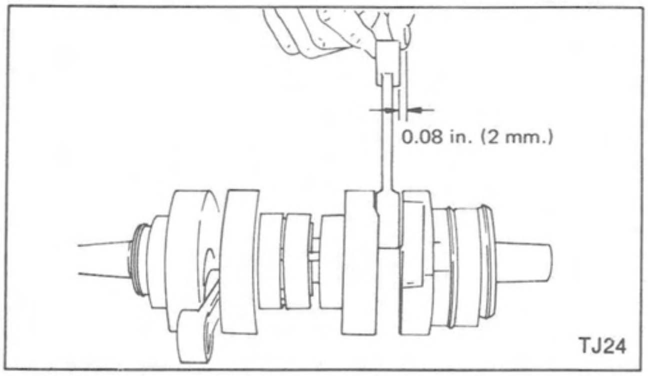


Figure 24

2. Use a feeler gauge to measure for the correct free play of 0.01 — 0.03 in. (0.25 — 0.75 mm.).
   Free play should not be confused with axial play. Free play is the clearance between the rod and crank shims.

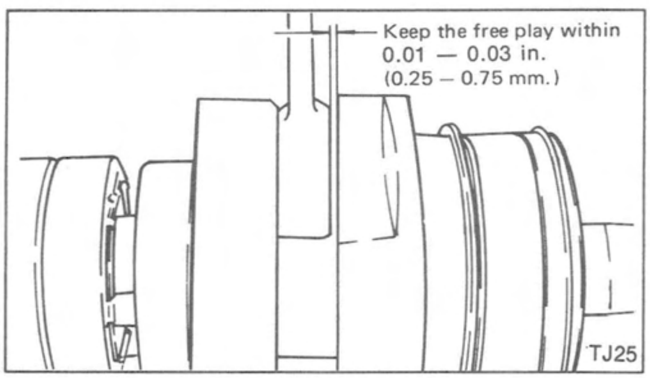


Figure 25

3. Set the crankshaft on V-blocks so that the bearing sections are positioned on the V-blocks, and check for alignment with a dial gauge.

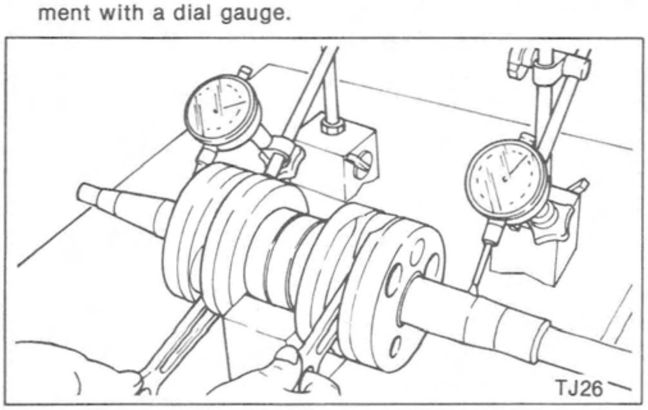


Figure 26

4. Crankshaft run-out can be checked by placing the crankshaft ends in V-blocks.
   By using a dial indicator the deflection of the crankshaft should be measured at the places shown.

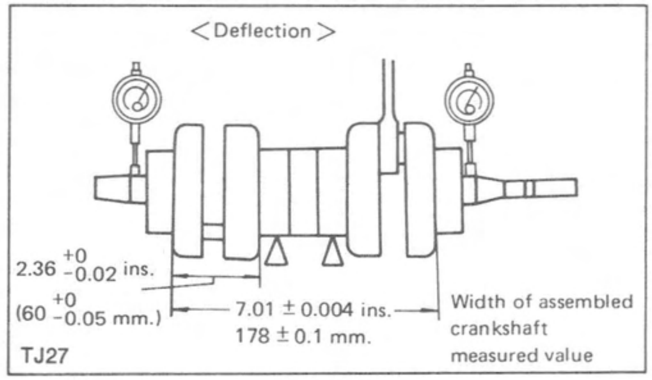


Figure 27

5. Correction of the crankshaft deflection can be accomplished by tapping the flywheels with a brass hammer and/or using wedges placed between the flywheels.

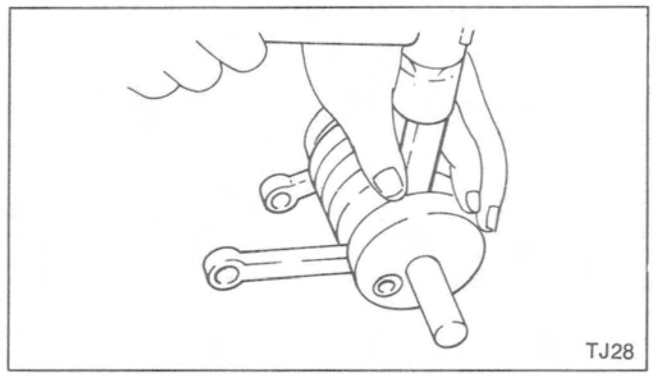
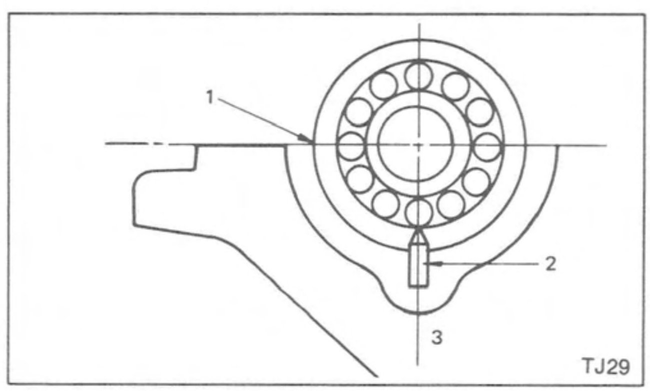


Figure 28

6. Installation of the crankshaft in the crankcase should be carefully done. Each of the crankshaft bearings has a lock pin hole in the outside race and two aligning marks offset 90° from the lock pin hole. The aligning marks should be matched with the sealing surface of the upper crankcase half so as to insure correct matching of the knock pin in the knock pin hole.
   Should the crankshaft be assembled in the cases with the bearings misaligned, the knock pin will be pushed into the body of the crankcase and the bearing will not be properly secured after the crankcases are sealed. Damage to both the crankshaft and crankcases can therefore occur.



1. Align the marking with sealing surface
2. Knock pin
3. Upper case

Figure 29

7. The bottom half of the crankcase can now be fitted over the crankshaft and onto the upper crankcase half. The crankcase bolts can now be placed in the case. Torque the crankcase bolts to 7.2 ft-lbs. (1.0 m-kgs.) for initial tightening and 14.5 ft-lbs. (2.0 m-kgs.) for final torque.

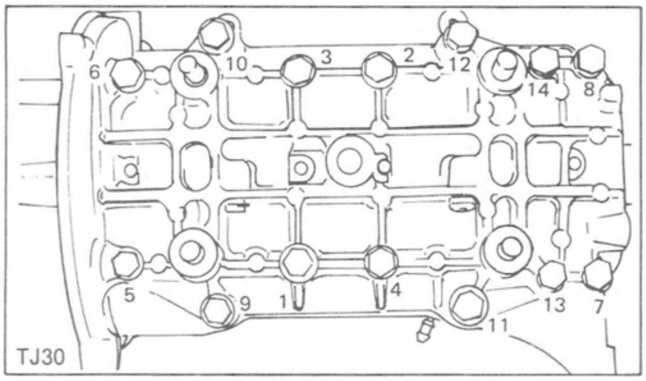


Figure 30

B. PISTON AND PISTON RING MAINTENANCE

1. The piston-to-cylinder wall clearance should be checked before reassembly.
   This is done by measuring the largest outside diameter of the piston and the smallest inside diameter of the cylinder bore. The largest diameter of the piston is checked 0.4 in. (10 mm.) above the bottom of the piston skirt.
   New piston to cylinder wall clearance is 0.018 — 0.019 in. (0.045 — 0.050 mm.).

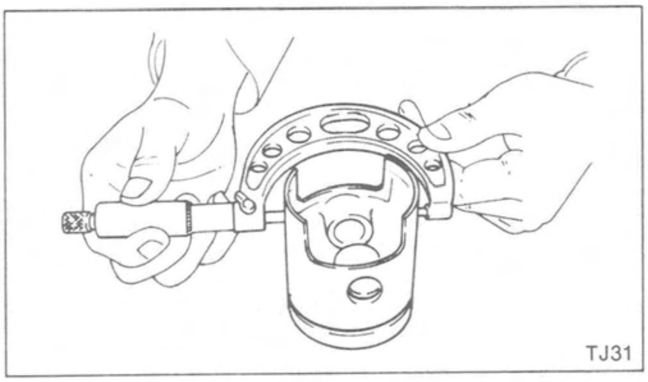


Figure 31

2. The piston pin fit can be checked by inserting the piston pin into the piston and checking the amount of resistance encountered.
   The piston pin should fit into the piston with a snug thumb-press fit.
   Also check the needle bearings and needle bearing cage for excessive wear, or overheating.

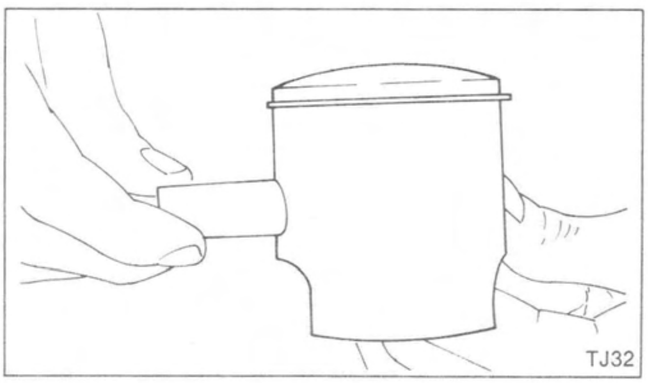


Figure 32

3. Remove the piston ring from the piston, and place it in the cylinder so that it is in tight contact with the cylinder wall. By using the piston head, position the ring in parallel to the cylinder top edge. Measure the ring end gap with a feeler gage. If the gap measured is in the range of 0.014 — 0.020 in. (0.35 — 0.55 mm.), the ring is in satisfactory condition. If more than 0.020 in. (0.55 mm.), the ring face is excessively worn.
   Remove the ring from the cylinder, and keep it in a free position. Then, measure the ring end gap. If the gap measured is less than 0.014 in. (0.35 mm.), the ring is considered to be fatigued with heat. Replace it with a new one; otherwise, power loss or ring breakage may result. When installing a ring on the piston, avoid opening the end gap apart more than 0.63 in. (16 mm.), because the ring may break.

Note:

If piston dome or piston skirt is badly scored or damaged, it would be advisable to replace the piston. Once seizure has occurred and the piston has been damaged seizure can more readily reoccur.

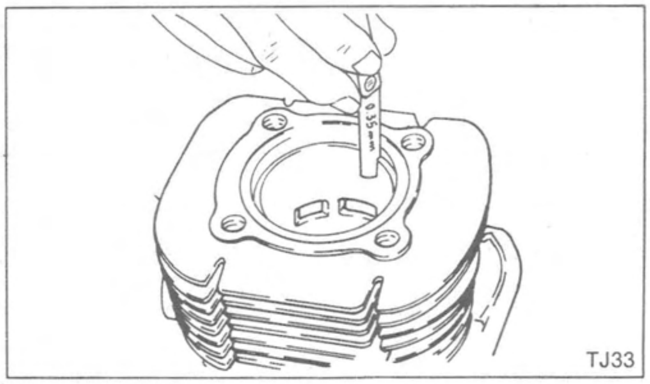


Figure 33

4. Before replacing the piston ring, remove carbon accumulations from the gap between the ring and the groove. The piston ring must be installed so that the locating pin in the groove is between both ends of the ring as illustrated. This is the most vital requirement to be observed when the piston is inserted into the cylinder.

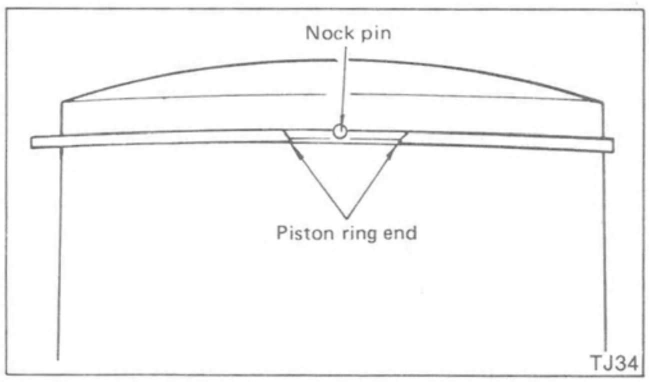


Figure 34

5. The up and down movement of the piston ring in the piston groove can be calculated from the side clearance as illustrated. This side clearance is created by wear on the ring bottom. If the side clearance is measured more than 0.019 in. (0.05 mm.), the ring should be replaced. The illustration shows the sectional view of a new piston ring installed in the ring groove.

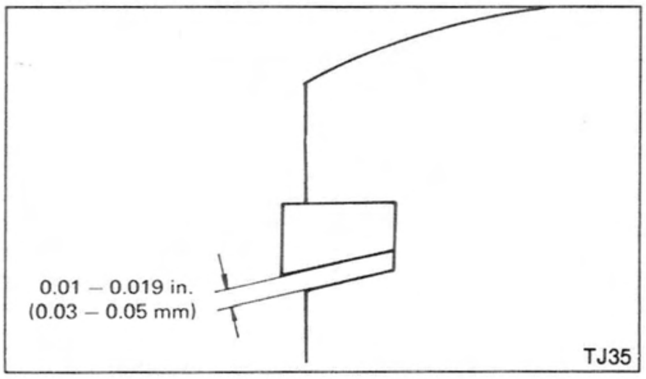


Figure 35

Installing the piston

The piston should be installed so that the arrow mark on the piston crown points to the exhaust port (toward the front of the engine). (Figure 36)

Remedies:

1) If any piston ring is found stuck, poor sealing will result.
2) If the cylinder wall is scuffed, poor sealing will result as in the case of the piston ring being stuck. In the above two cases, the piston ring should be replaced with a new one, and at the same time, the cylinder wall should be checked for scratches.
3) Whether the contact between the piston ring and the cylinder wall is good or not will have a great effect on sealing. The entire area of the piston ring face must be in tight contact with the cylinder wall. If excess wear is found on the upper or the lower half of the piston ring face, the piston ring groove is considered to be worn unevenly, causing the ring to twist.
   If imitation piston rings (other than genuine Yamaha parts) are used, defects may easily occur, and in the worst case, serious engine troubles may result.

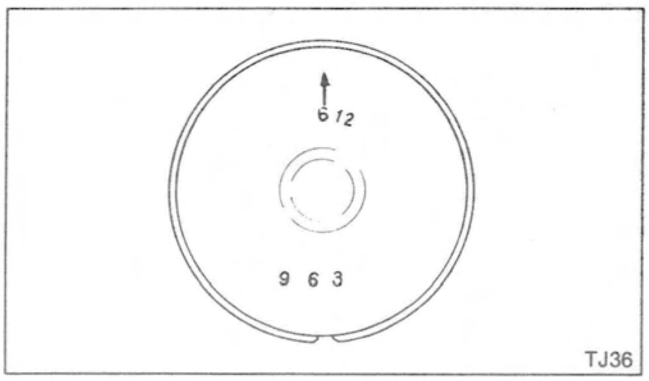


Figure 36

C. CYLINDER MAINTENANCE

1. When the cylinder and piston are removed, there are several checks which should be performed. First of all the cylinder bore should be checked for wear or scoring each time it is removed. The "out of round" and "taper" can be checked with an inside micrometer. The "out of round" of the cylinder bore is checked by moving the micrometer in a circular direction 90° at a time. The difference in measurements should not exceed 0.04 in. (0.10 mm.). (Figure 38)

Honing or reboring should be done if this tolerance is exceeded. "Taper" of the cylinder bore is measured by moving the micrometer from the top to the bottom of the cylinder being careful to miss the port openings. (Figure 39) The difference in these measurements (between top and bottom) should not exceed 0.002 in. (0.05 mm.). If upon inspection of the cylinder bore, scoring of the cylinder wall is observed, hone or rebore until these scores disappear.

Before assembly, always clean the carbon from the exhaust port. Also wash out the cylinder with solvent or soap and water to insure that all hone material has been removed.

Failure to do this may result in premature wearing or scoring of the cylinder and piston.

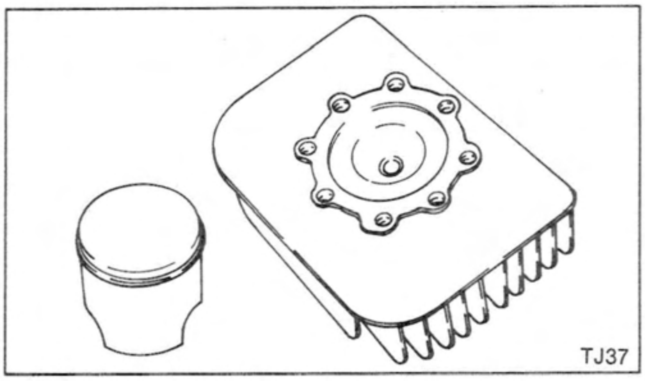


Figure 37

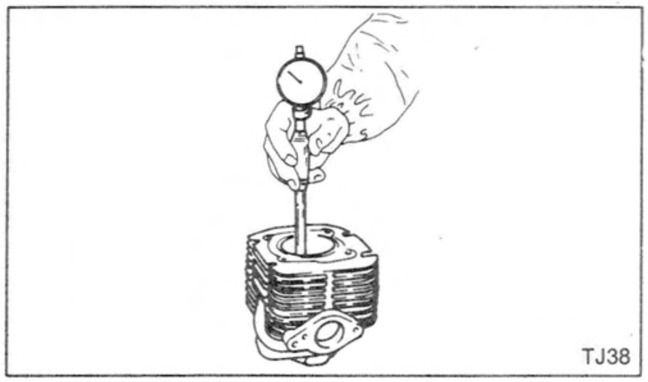


Figure 38

2. Since the formation of carbon is a product of two-stroke operation, decarbonization at regular intervals is essential. Removing the cylinder head and scraping the carbon from piston crown and cylinder head should be done at every tune-up or every 40 hours of operation. (Figure 37) During every other decarbonization, the cylinder should be removed and the exhaust port decarbonized.

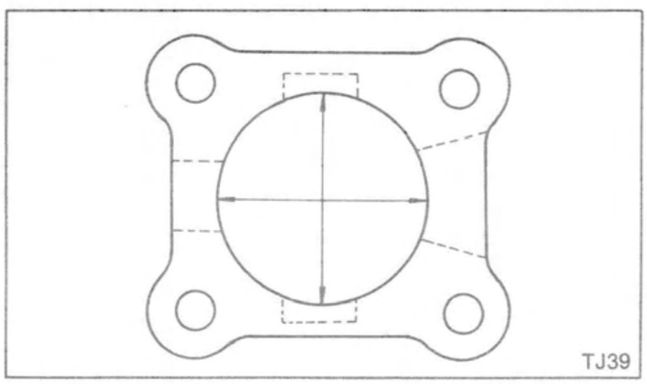


Figure 39

Installing the cylinder head
Cylinder head tightening torque:

16.6 – 19.5 ft-lbs. (2.3 – 2.7 m-kgs.)	M10P1.25 x 4

All nuts must be tightened evenly.

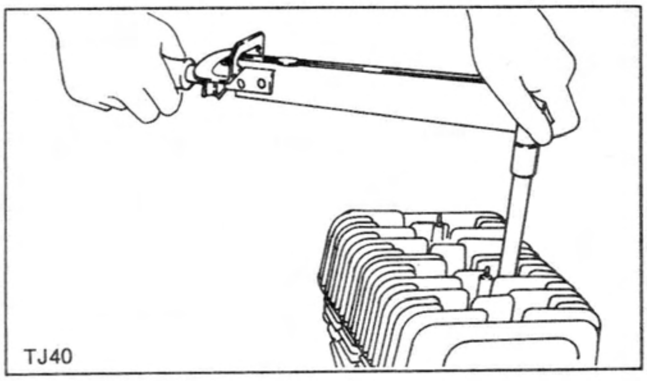


Figure 40

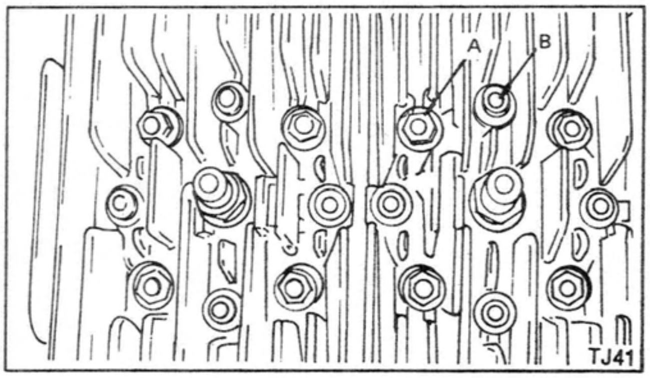


Figure 41

D. IGNITION TIMING ADJUSTMENT

1. Install the dial gauge and dial gauge stand in the plug hole of the cylinder head.
2. Turn the flywheel magnet to bring the piston to top dead center, and set the dial guage to zero.

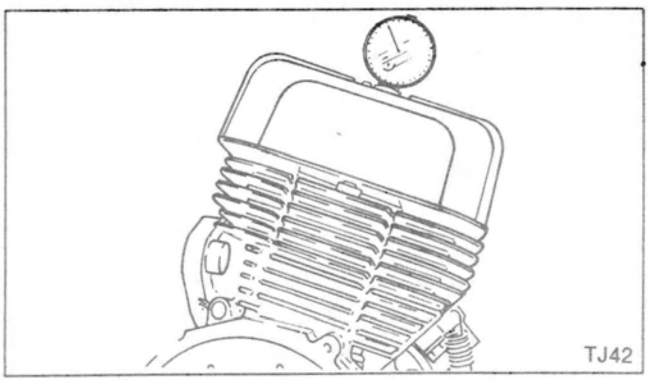
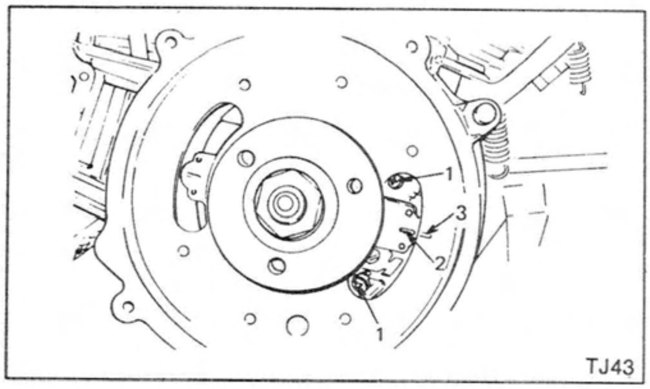


Figure 42

3. Turn the flywheel magnet in the direction counterclockwise, and set the ignition timing at (1.8 mm.) B.T.D.C.. This adjustment can be done by turning the pulser. Loosen the two pan head screws tightening the pulser, adjust the pulser so that alignment mark on the flywheel magnet is aligned with timing mark on the pulser.



1. Pan head screw
2. Timing mark
3. Alignment mark

Figure 43

Note:
The difference in the ignition timing between the two cylinders should be zero.

E. ELECTRICAL

1. Wiring Notes

a. Connections must be done accurately.
Special care is required for connection of the ground circuit and ignition coil.

b. The C.D.I. unit and ignition coil are installed in the specified position. If the position is to be changed, a dry and airy place should be selected.

c. To remove the rotor, be sure to use the rotor puller (an accessory tool). Avoid using a hammer, or the rotor may be damaged.

d. Handle the C.D.I. unit with special care.
If you should drop carelessly, the incorporated electronic components will be damaged.

2. Assortment of C.D.I. Unit, Coil & Magneto

Ignition	Magneto	C.D.I. unit
811528 811279	811693	811692

3. Electric Circuit

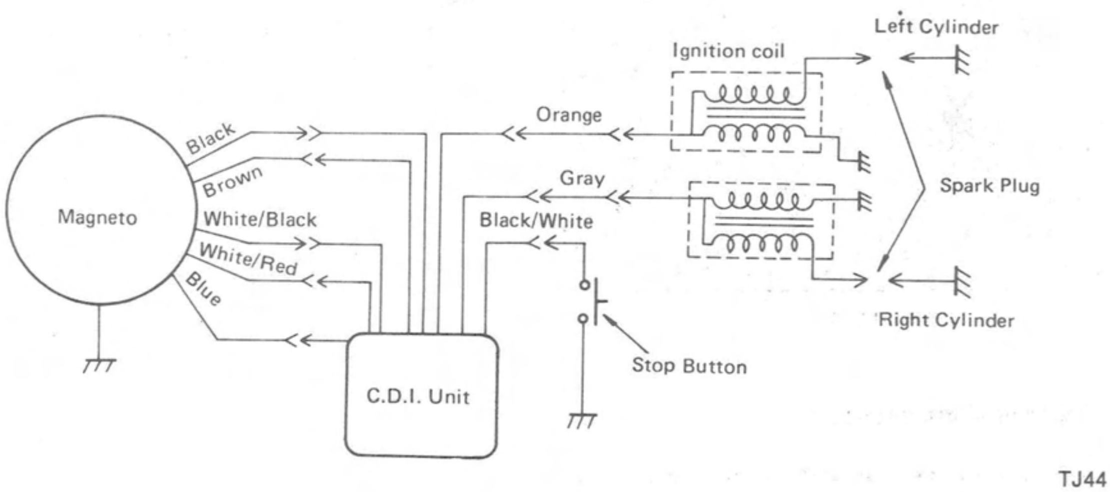


Figure 44

ENGINE TROUBLE SHOOTING

Problem	Symptom	Check
Engine turns freely but will not start	No Spark	Ignition switch 'off' Emergency switch 'off' Spark plug Ignition coils CDI Unit Ignition wiring cut, pinched, or frayed
	No Fuel (spark plug dry)	Fuel tank empty Vapor lock (Hot engine only) Fuel filter plugged Fuel line disconnected Fuel pump impulse line disconnected Foreign material or ice in carburetor Choke disconnected Carburetor loose on engine Hole in piston Broken ring(s)
	No Compression	Spark plug loose Head gasket blown Hole in piston Broken ring(s) Excessive wear
	Flooded (spark plug wet)	Check for no spark (above) Choke engaged Too much oil in fuel mixture Wrong spark plug Exhaust plugged Check for low compression (above) Carburetor inlet valve leaking Carburetor float level too high
	Back Firing	Spark plug wires reversed Impulse line disconnected Bad spark plug High tension lead resistor defective (if equipped) CDI unit defective Loose or frayed ignition wiring Ignition switch faulty Improper ignition timing
Engine will not turn over	Seized	**Before Disassembly** of engine check: Carburetor adjustments Spark plug heat range and reach Fuel for oil, additives, etc. Ignition timing **During Disassembly** of engine check: Loose components Gaskets-torn, missing, damaged Seals-leaking, missing, damaged Unauthorized modifications Foreign material in engine
Engine starts but has no power, poor acceleration	Spark plug(s) wet	Bad spark plug Choke partially engaged Carburetor low speed mixture Spark plug resistor bad (if equipped) Low compression
	Spark plug(s) dry	Fuel system (same as no fuel check)

GAS/OIL REQUIREMENTS

Your Sno*Jet is equipped with a 2-cycle engine.

THE ONLY LUBRICATION IT GETS IS FROM THE OIL THAT YOU MIX WITH THE GASOLINE.

Follow the recommendations and procedures below to ensure maximum engine performance and reliability.

GASOLINE

Never use Naptha, Methanol, Fuel oil or similar products.

Use PREMIUM GAS for all Sno*Jet/Yamaha engines.

OIL

- Use only high quality AIR-COOLED 2-CYCLE OIL.
- If the container is not printed to show that oil is suitable for air cooled engine, DO NOT USE IT.
- Never use outboard motor oil, or the pre-mixed gas/oil fuel that is available in some locations.
- There are some specially formulated "synthetic" oils available that require a different mixing ratio to normal. If these are used, the mixing ratio shown on the container should be employed.

MIXING RATIO

For all Sno*Jet F/A engines is 15:1.

MIXING PROCEDURE

Use a separate container to mix the oil and gasoline.

IT CANNOT BE MIXED PROPERLY IN THE SNOWMOBILE TANK.

1. Half-fill container with gas.
2. Add the full quantity of oil (oil at room temperature mixes easier).
3. Agitate.
4. Add balance of gas. Agitate well until gas and oil are completely blended.

NOTE: A paddle is more effective for mixing the fuel than shaking the container.

CAUTION: If you store a container of pre-mixed fuel, always agitate it will before using.

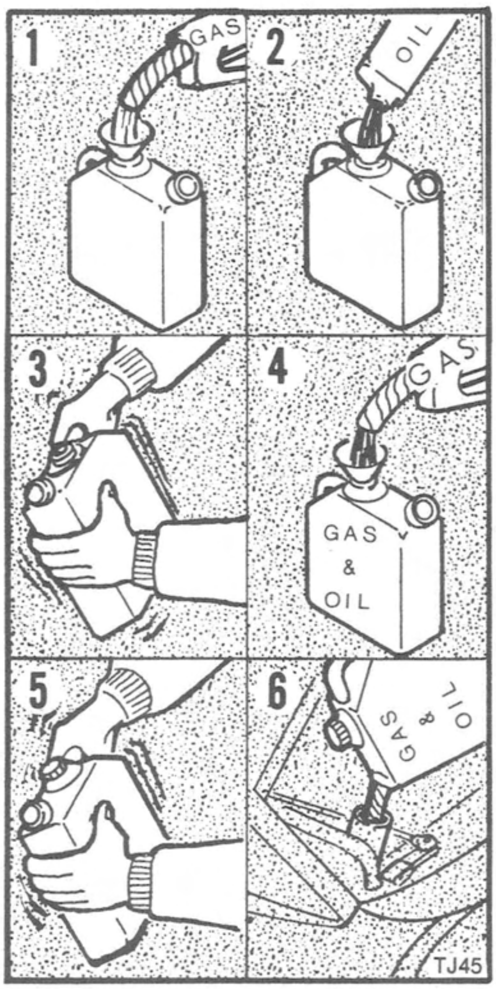
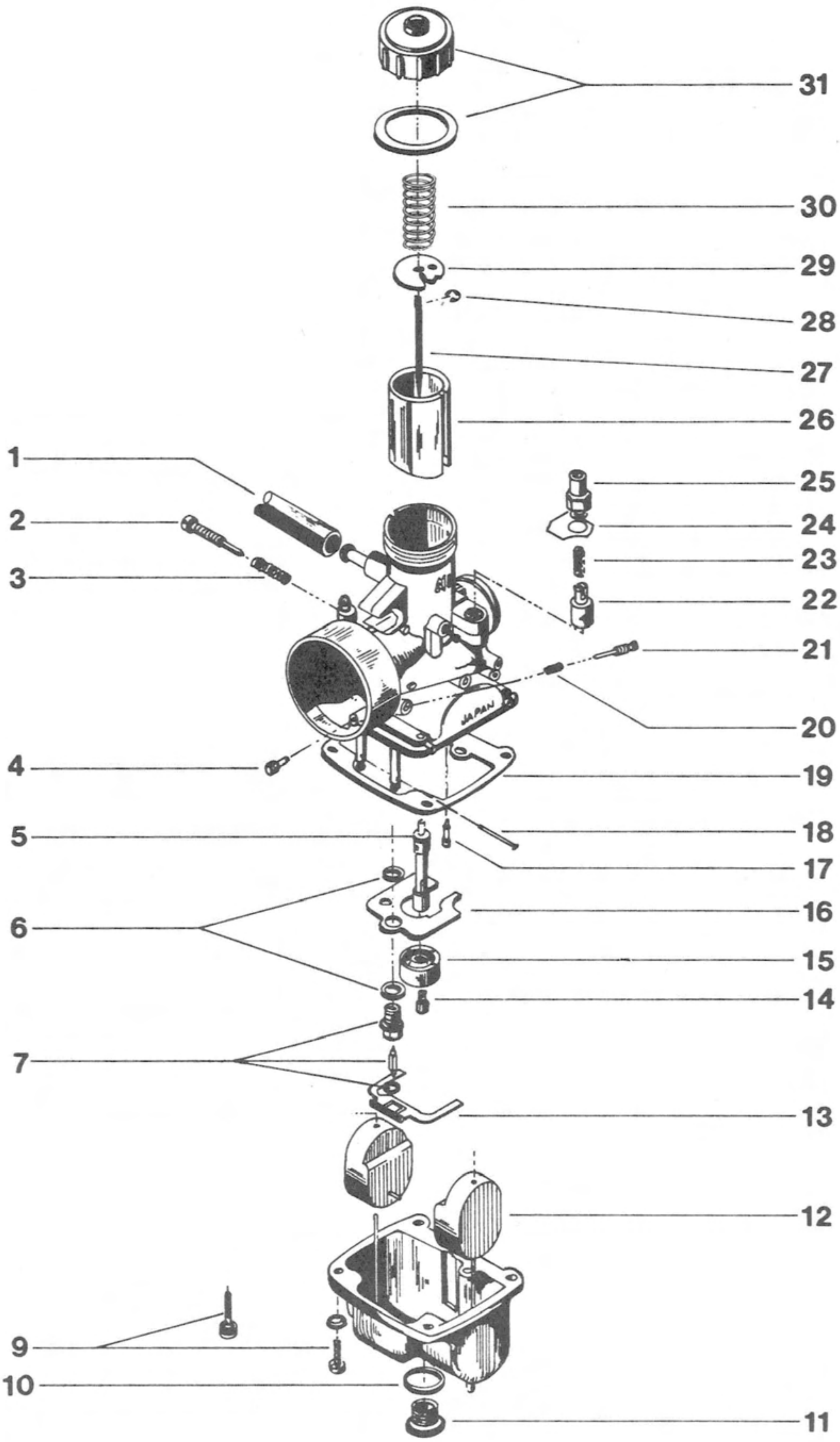


Figure 45

CARBURETION



The 1975 Thunder Jet is equipped with dual 36 mm Mikuni VM type slide carburetors. Experience has shown the Mikuni VM carburetor provides the best performance and tuning capacity available at this time. There are several distinct functions of the Mikuni, and it is important to understand their operation.

MIKUNI CARBURETOR

Operation

A. Starter System (Choke) (Figure 46)

The purpose of the starter system is to enable easy starting when the engine is cold. In the starter system, fuel and air for starting the engine are metered with entirely independent jets. The air metered in the starter jet is mixed with fuel from the float bowl and is broken into tiny particles in the emulsion tube. The mixture then flows into the plunger area, mixed again with air coming from the air intake port for starting and is delivered to the engine in the proper air-fuel ratio through the fuel discharge outlet. The starter is opened and closed by means of the starter plunger. Since the starter is constructed so as to utilize the negative pressure of the inlet pipe, it is important that the throttle valve is closed when starting the engine.

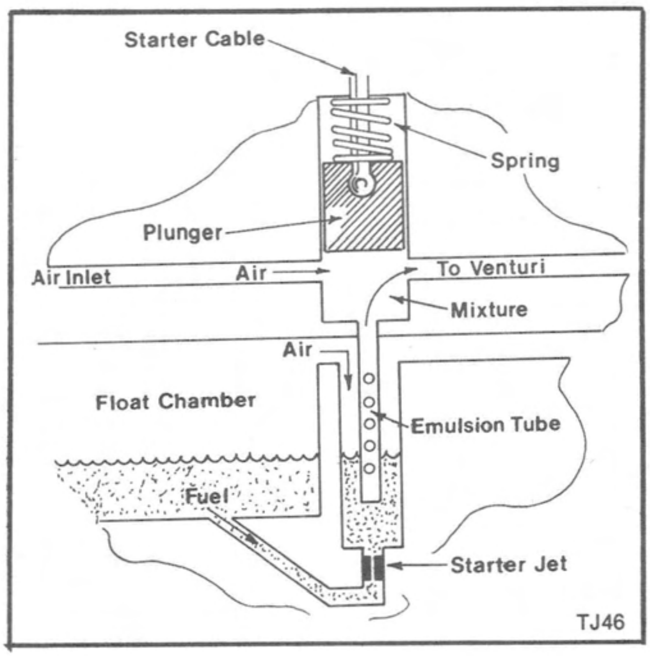


Figure 46

B. Idle System (Figure 47)

The air which enters through the pilot air intake passes around the outside of the air screw where it is metered and enters the pilot jet bleed holes. The air entering the pilot jet bleed holes mixes with the fuel that is being metered by the pilot jet. The fuel and air mixture being drawn further up the fuel channel is again mixed with air that enters through the bypass. This mixture is drawn into the pilot outlet to mix with air flowing through the main bore into the engine.

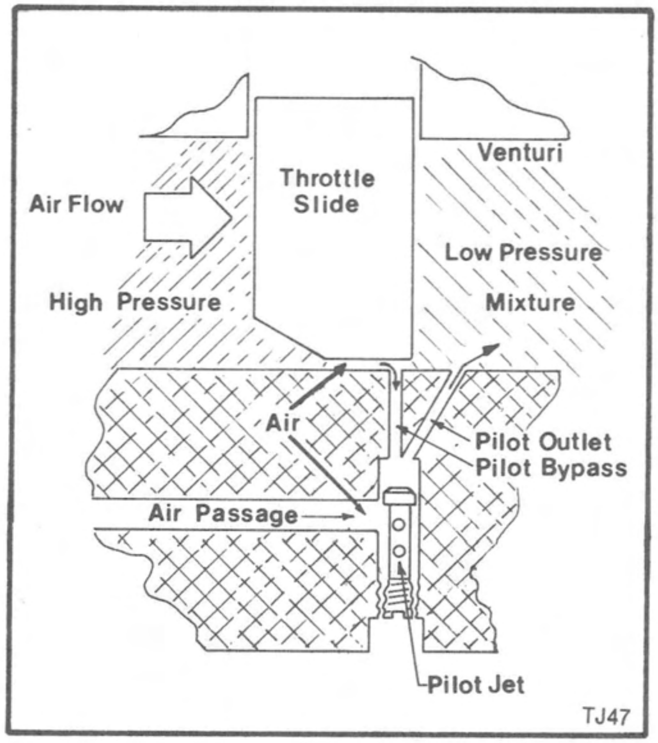


Figure 47

C. Intermediate System (Figure 48)

When the throttle valve is opened further, the pilot outlet of the idle system cannot supply the required fuel. This shortage has to be made up with fuel entering from the bypass and main system needle jet. Fuel passing through the main jet in the intermediate range is metered by the clearance between the needle jet and jet needle. Air entering from the main air intake mixes with the fuel being discharged from the needle jet. The jet needle moves up and down with the throttle valve to control the fuel mixture in the intermediate range. The throttle cutaway also affects the mixture in the intermediate range, but has no effect above one half throttle opening.

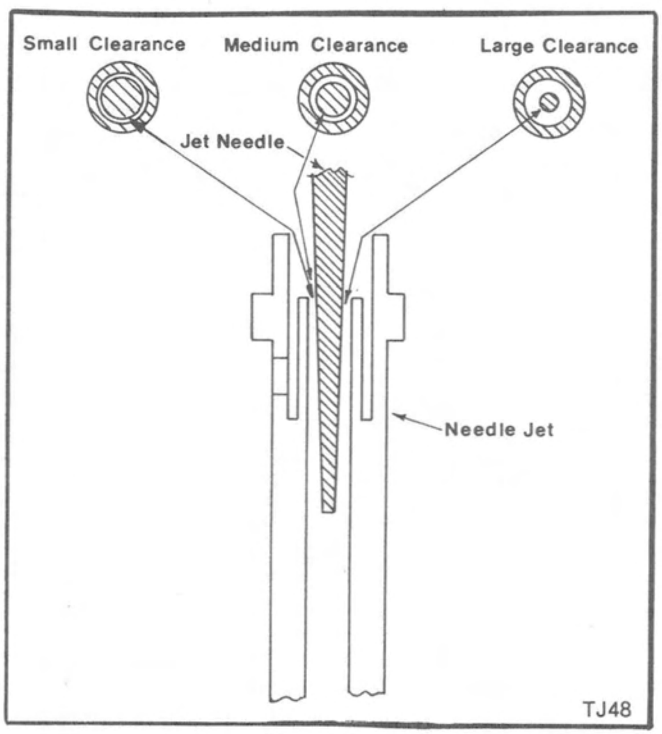


Figure 48

D. High Speed System
Fuel from the float chamber passes through the main jet and enters the needle jet. Air entering the main air intake passes through the air bleed in the needle jet and mixes with the fuel being discharged from the needle jet. Air entering from the main bore also mixes with the fuel and then enters the engine at the proper air fuel mixture. The clearance between the needle jet and the jet needle is greater than the metered orifice of the main jet. Therefore, the jet needle has no affect on the high speed system. Note: The main jet only affects the high speed system. (From one half to full throttle.)

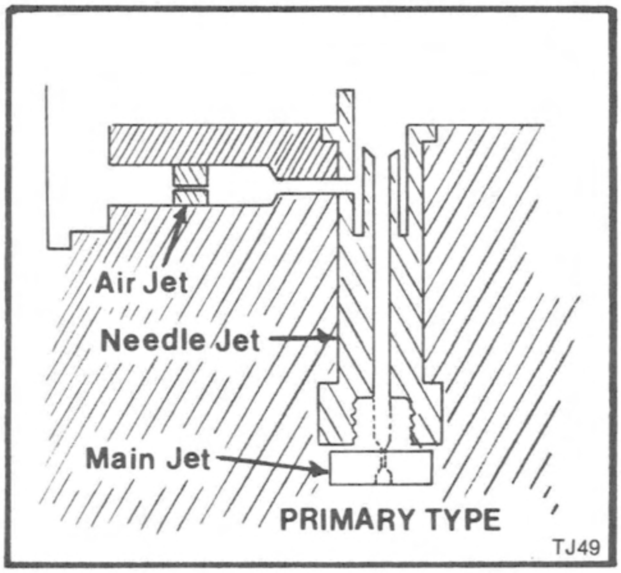


Figure 49

E. Float System
The carburetor must provide a proper mixture of fuel at different throttle openings and engine speeds. To accomplish this, the fuel level in the carburetor must be maintained. The float chamber functions to serve this purpose. The fuel from the tank enters the float chamber through the fuel inlet passage between the inlet needle valve and seat. This fills the chamber to the level where the float arm rises to shut off the flow of the fuel by seating the inlet needle valve against the valve seat. As the fuel is consumed, the float needle will open and then close to maintain a constant fuel level. A spring is incorporated in the needle valve which is in contact with the float arm lip. The purpose of this spring is to prevent the needle valve from vibrating so that a constant fuel level can be maintained even when riding over rough terrain.

FUNCTION, SELECTION, AND IDENTIFICATION OF COMPONENTS

A. Pilot Air Screw and Pilot Jet
The pilot air screw regulates air that mixes with fuel from the pilot jet. Turning pilot air screw IN, richens mixture, OUT, leans mixture. The pilot air screw should be normally positioned ½ to 2 turns out from full in, or seated position. Less than ½ turn indicates pilot jet to be too small and the next size larger pilot jet should be used. More than 2 turns out, shows the pilot to be too large and a smaller jet is needed. An engine may idle smoothly out of these settings, however problems may occur in the transition to mid range throttle operation. Pilot jets are numbered in increments, of 5, such as 20-25-30. The lowest number being the smaller orfice and leanest, while higher numbers are the richest mixtures.

B. Slide Figure 50
The slide controls fuel mixture between 0 & ½ throttle. The use of the throttle valve with different size cutaways will control the discharge rate of fuel which affects the fuel air ratio. The largest throttle valve cutaway number provides a leaner mixture. This is only effective within the lower range of throttle opening and has no effect above one half throttle opening. (Figure 50)

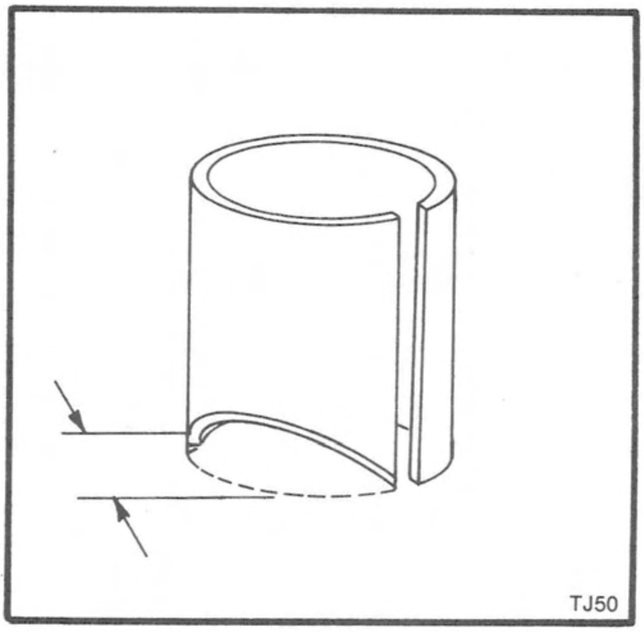


Figure 50

Throttle slides are stamped with a number (1.5, 2.0, 2.5, 3.0, 3.5, etc.); these numbers reflect the degree of cutaway. The larger the number, the greater portion of throttle slide cut-away, which results in a leaner initial fuel-air mixture.

C. Jet Needle
The needle can be set in one of five different positions by moving the needle clip to a different groove. For fine tuning purposes, number the grooves from 1-5, starting from the top groove down. The number 1 groove gives the leanest setting, whereas the number 5 groove gives the richest setting. (Figure 51).

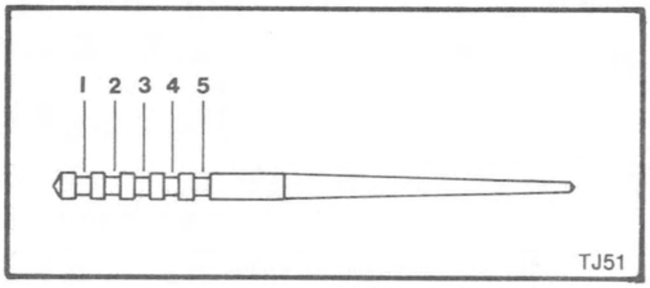


Figure 51

Jet needles can be identified by the number stamped on them. Example 60P1-3. The first number is the length of the needle, #6 being 60 millimeters in length, #2 is the shortest and #9 is the longest. The letter indicates a scale of richness resulting from needle taper measured from the middle notch, 2 letters show double taper. A, being the leanest and Z, the richest. The second number is a production model number that may indicate a change in beginning point of taper. The last number after the dash is the clip position in notches from the top of needle.

D. Needle Jet

The needle jet comes in various sizes and works in direct relation with the needle. The needle jet orifice diameter remains constant through the entire length of the jet, and therefore, changing the needle jet will have a greater affect on mid-range operation than a groove change on the jet needle. Needle jets can be identified by a number stamped on them. Example 159P4, first three digits are model number. First alphabet is scale of richness. A is lean, Z is rich. Last number is minor change. 0 is leanest, 9 is richest. Letter indicates orfice size, earliest alphabet letter is leanest. Number indicates orfice size also, however it is more exact in calibration, being in increments of 10 digits, the larger number being the richest.

MID-RANGE TUNING — Fine tuning the mid-range is similar to tuning the main jet. For example, use a rich needle position and a rich needle jet until four-cycling is evident. When the four-cycling affect exists, install the next leaner needle or needle jet to insure the proper fuel-air mixture is obtained.

NOTE: All the adjustments mentioned previously will overlap into the next graduated range, which is necessary to provide smooth acceleration. A main jet change will affect the mid-range operation by approximately 10%. If a one groove needle change is made, it will affect the main jet by approximately 10%.

ADJUSTMENT OF FUEL LEVEL				
MODEL	32	34	36	
H= inch	.59-.66	.82-.90	.66-.77	
H= mm	15-17	21-23	17-19	

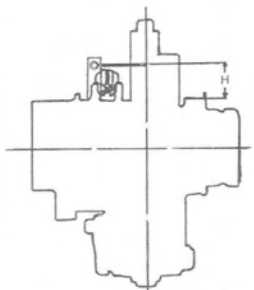


Figure 52

E. Main Jet

Main jet — the function of the main jet is to control the fuel discharge in the high speed range. However, the main jet will also have a varying degree of effect in the vicinity of one half throttle opening. The main jets are numbered so that the larger the number, the bigger the opening and consequently a richer fuel air mixture. Main jets are numbered from "0" to "200" in increments of 5, and over "200" in increments of 10. A 10% mixture adjustment is realized with each change of main jet. The main jet controls the mixture from ¾ to full throttle.

To determine if the correct main jet is installed:

1. Run the machine on hard packed surface at full throttle, and
2. After operation at full throttle, do not idle engine.
3. Stop engine and remove the spark plug.
4. Spark plug porcelain should be a brown color. If plug is dark and sooty, the main jet may be too large. Conversely, if the porcelain is light gray or white, the main jet may be too small.

   NOTE: Operate engine a sufficient time to achieve spark plug coloration.

Float Adjustment

The float adjustment should be checked for proper location. Measure the distance shown in Figure 52. The 36 mm carburetor should be .70". If adjustment is necessary, bend the small tab on the float arm which regulates the inlet needle.

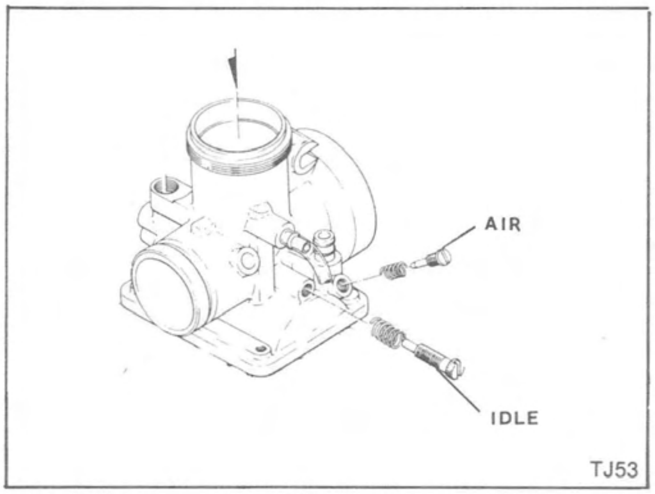


Figure 53

Adjustment and Synchronization

Idle Adjustment (Figure 53)

1. Carefully rotate the idle air screw(s) clockwise until it contacts the carburetor seat.
2. Rotate both idle mixture screws one (1) revolution counterclockwise. This is the normal idle air location.
3. If the idle mixture is too rich, rotate the idle mixture screw out (counter clockwise) to lean out mixture. Reverse this procedure if mixture is too lean.
4. Idle R.P.M. should be set just below clutch engagement.
5. To adjust idle speed, rotate idle adjusting screw(s) clockwise until carburetor slide just begins to rise.
6. When the throttle slide(s) just begins to rise. Rotate idle screw ¾ turn clockwise or until required idle R.P.M. is reached. NOTE: Models with dual carbs, adjust both carburetor idle speed screws equally for proper idle.

Synchronizing Carburetors

The slides must be synchronized so that they top-out together. This should not be done at idle position because the adjustment here may vary from one to the other, but should rather be done at an intermediate point. (Figure 54)

1. Remove intake silencer.
2. Raise one slide until it is positioned near the top of the bore.
3. Then, holding the throttle steady, observe the other carburetor slide and see if it is in the same position.
4. If not, adjust the cable housing end to make the slides the same.

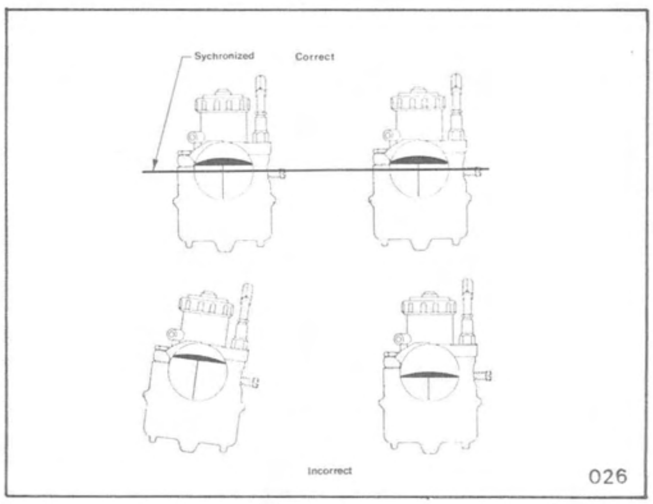


Figure 54

Trouble Shooting

Malfunctions that occur when adjusting a carburetor can be traced to either too rich a mixture or too lean a mixture. Symptoms are as follow:

1. When air fuel mixture is too rich:
   a. Engine noise is dull and intermittent.
   b. The condition grows worse when the engine is hot.
   c. The condition grows worse when the starter (choke) is opened.
   d. The condition may improve slightly when the air silencer is removed.
   e. Exhaust gases are heavy.
   f. Spark plugs become fouled.
2. When air fuel mixture is too lean:
   a. The engine becomes overheated.
   b. The condition improves when the starter is opened.
   c. Acceleration is poor.
   d. Spark plugs burn.
   e. The revolutions of the engine fluctuate and lack of power is noticed.

Carburetor Specifications

Carburetor Type	VM 36
Main Jet	250
Jet Needle	6DH3-3
Needle Jet	159Q-8
Slide	3.0
Pilot Jet	35
Air Screw	1½
Bypass	1.4

Suspension

The suspension is designed to permit maximum adjustments for varying track and snow conditions. There are basically two (2) adjustments.

Front Springs

The front springs control ski pressure and track angle. Increasing front swing arm spring tension will lighten ski pressure and allow for better track contact. Decreasing front spring tension will increase ski pressure and permit skid frame and track to move up into the tunnel for better flotations in heavy snow conditions.

Rear Springs

The rear swing arm springs should be adjusted for rider weight. The suspension should be adjusted to allow arm movement for good ride but prevent bottoming on all but severe bumps.

Track

The track is a steel cleated type for good traction and ease of studding.

Adjustment

The track should have one inch slack between the cleat and the hi-fax. This should be checked with the machine supported in the rear and pulling down at the bottom center of the track. If incorrect, adjust the two idler wheel adjustment bolts located in the rear of the skid frame (Figure 55).

Alignment

Track alignment is very important to both durability and performance. The track should be aligned so the slide rail hi-fax is centered on the cleat and not rubbing on track belts or guides.

To Adjust:

1. Run track slowly, if track runs to one side.
2. Turn adjuster bolt, on that side only (Figure 55).
3. Recheck track alignment and if correct, tighten locknut.

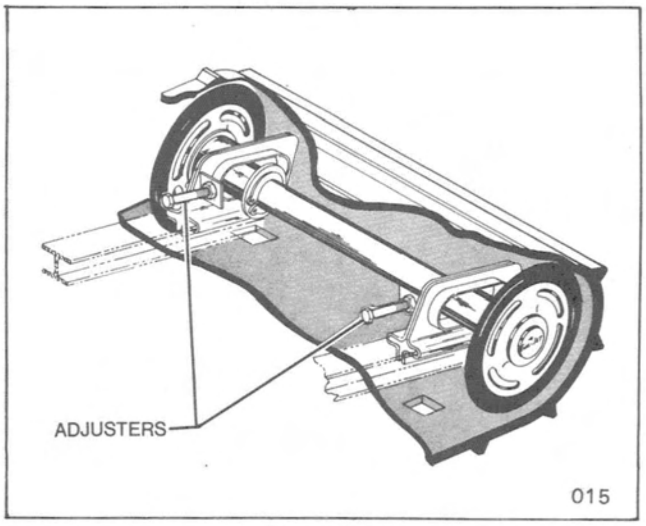


Figure 55

SUSPENSION TROUBLE SHOOTING

Problem	Symptom	Check
Track jumping	Loose track, slide bars grooved and damaged, track riding off towards tunnel sidewall	Improper track tension Track adjuster bolt bent or broken
Track ratcheting	Loose track, worn or damaged drive sprockets	Improper track tension Suspension arm bolts loose or missing
Hard steering	Sled turns hard—difficult to turn skis	Front suspension adjuster bolts too loose. Carbide too far left on ski Improper ski toe-in adjustment Lack of lubrication on steering components
Poor steering	Sled will not turn properly Poor control on corners	Front suspension adjuster bolts too tight Ski wear bars worn
Clicking or rattling noise under sled		Loose components Broken drive shaft bearing Ice buildup Bent or broken cleats Loose track clip
Track wearing on sides	Fraying or gouging holes in tunnel	Track adjustment Broken or bent adjuster bolt Damaged slide bars Track clips missing

Track & Studding

A. General

The finest tuned racing engine in the world is no good unless it can convert its power potential to motion. The snowmobile racer uses the track and skis to convert engine potential to speed. Careful attention to track studding and ski wear bars will insure maximum traction and handling.

B. Track Studding

Racing traction means studs. Below are four principles to get the most out of studs:

1. Too many studs is worse than too few. Too few studs will give some traction, though it will waste some of your engine's performance through slippage. Too many studs will cause your sled to float rather than hook up and waste even more of your engine's potential. And too many studs can also cause difficulty in turning. In order to turn, the front of the track must slide somewhat. Too many studs can prohibit this and cause poor steering. The correct number of studs hook up to use all your engine's acceleration potential, yet still let you turn.
2. Sharpness counts more than number. Fewer sharp, fresh studs work much better than a great many dull studs with a few new ones thrown in. Replace dull studs, do not try to add a couple new ones to 'freshen them up.'
3. Place studs where weight will be concentrated. Acceleration type studs should be placed in the center of the track because they are aggressive. Square, four-pointed studs which give side traction should be placed at the edge of the track to assist in turning.
4. Use studs designed for a specific function. Some studs have side points to give the sled side traction. Others have just front points for aggressive acceleration.
5. Track should also be studded to suit your particular riding style. The best way to determine this is to stud up and test it. Compare several patterns for acceleration and cornering. The fastest way around a corner is to drive around rather than slide around. Properly set up, the sled will give maximum acceleration and still permit driving around the corner with a minimum of sliding.

C. Types of Studs

Thunder Klaws Part #060624 are directional (one-sided) studs designed for maximum acceleration. They are held on with two bolts and locking nuts and should also be placed within the cleat. They mount with the aggressive edge of the stud to the rear, so the pointed edge hits the ground first when the track turns. Since they are extremely aggressive, too many Thunder Klaws can overcome steering effectiveness and cause severe turning problems. (Figure 56)

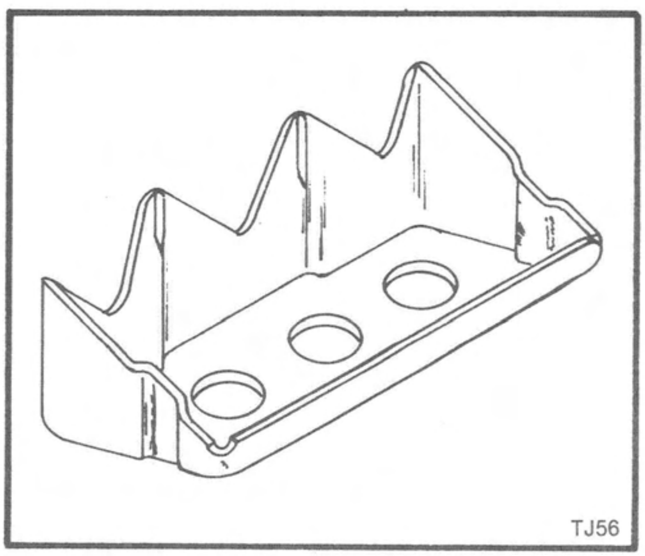


Figure 56

Spikes have a single, chisel-shaped point of carbide on a conical, steel prong. They are designed for running on a course which has an ice base. Frozen dirt with rocks will cause the carbide piece to break. Carbide studs are fastened with a special retainer and may be placed anywhere on the track (belt or cleat) once the track is drilled out to size. Carbide studs may be sharpened for greater performance. They will perform better if the chisel shaped cutting edge is maintained.

Typical Studding Procedure

Before studding remember: Locating the studs in the cleats makes the weight of the sled push directly on the stud points. This results in deeper penetration and better traction. Mounting the stud on the belt gives less penetration. The weight goes through the cleat to the belt and finally to stud.

The following set-up is a good starting point. (Figure 57)

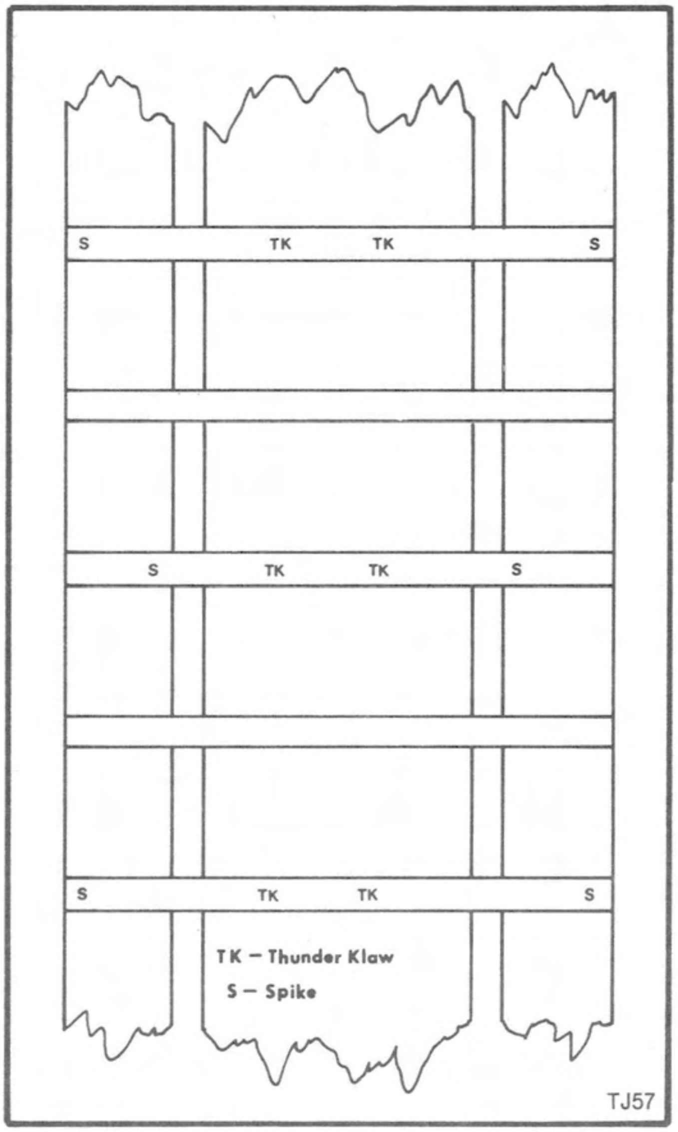


Figure 57

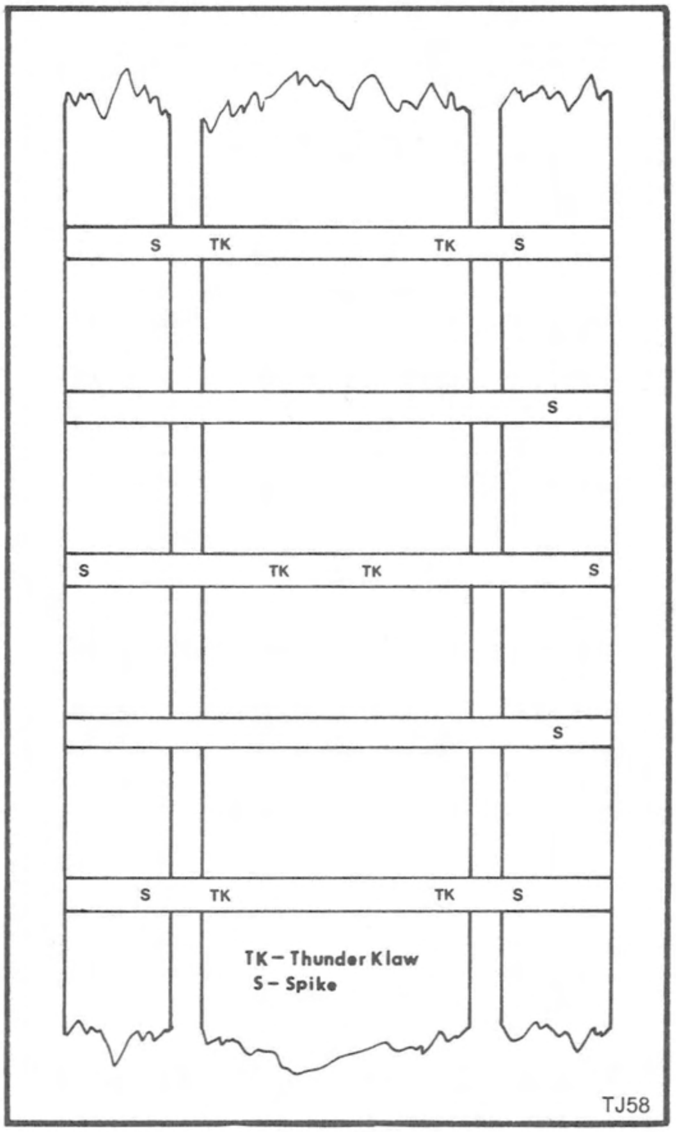


Figure 58

Figure 57 shows an all purpose set-up. The Thunder Klaws in the center of the track give straight ahead dig for good acceleration. Notice they are an equal distance from the center within the cleat yet not in the same spot on every cleat. This staggering affect establishes a broad base of traction. However, studs placed in a row, on the same spot on every cleat would dig a trench instead of moving the snowmobile.

Spikes are placed on the outside of the track to resist centrifugal force on turns. Notice they are also staggered on an inside-outside pattern.

Start your testing with this pattern. It is a good reference point for comparing modifications or making changes if your traction does not improve.

Figure 58 is provided as a suggestion for variation or as a starting point for a more experienced racer.

In this set-up extra spikes have been placed on the right side of the track. This causes a tractional imbalance which tends to turn the sled left and helps you get around a corner easier. The effect can be magnified even more by using Thunder Klaws instead of regular spikes on the right side. Again, the principle of 'if a little does a little good then a lot must do super good' DOES NOT apply here at all. You must experiment to get the right number of studs in the right place to match *your* style of driving.

The secret of proper studding is to consider what you will need from your sled to meet different weather conditions and type of track. Then apply the basic stud principles to create a studding pattern to answer those traction needs. For example, on a course with very short corners you might try using Thunder Klaws placed backwards on the left side of your track. The aggressive edge to the front would give you extremely good braking so you could hit the corner flying; yet with the edge to the front would not significantly reduce your acceleration coming out of the corner.
Studding is all a matter of applying the principles of experimenting. Do Not Forget: the right number of sharp studs of specific design placed where the weight will be concentrated is the key to *your* best studding pattern.

D. Carbide Wear Bars

Once you can accelerate to racing speeds your next need is to control that speed through a corner. Basically, cornering is the ability to enter corner one and exit corner two with the least possible delay.
There are three basic principles to follow in checking wear bars:

1. Sharp edges dig. Dull edges do not.
   Carbide must be sharp to cut through frozen earth, yet this same frozen earth dulls the carbide very quickly. The more efficiently your wear bar handles and transmits turn pressures, the better you go around a corner, and the more your Carbide dulls. Keep your wear bars sharp.

2. Turn forces try to roll a wear bar off its edge. (Figure 59)

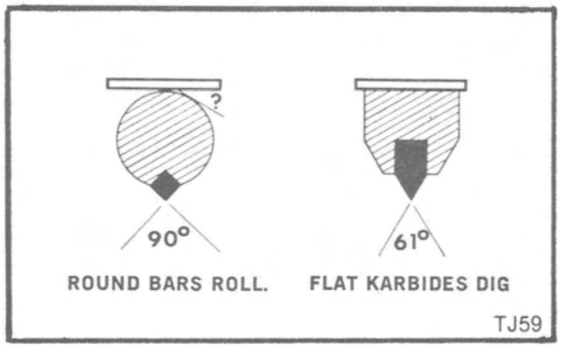


Figure 59

Centrifugal force created by turning will be pushing your wear bar over and trying to make it run on its side. Use flat backed wear bars and keep them bolted *tight* to your ski.

3. Carbide will both chip and wear, but it works best.
   Carbide, as it is used in wear bars, is actually a combination of two elements: Carbon (which chips but resists wear) and cobalt (which wears quickly but resists chipping). Different grades of Carbide are made by varying the percentage of each, but it is impossible to have both excellent wear resistance and excellent chip resistance.

E. Wear Bar Maintenance

Worn pieces — because frozen earth will dull any sharp edge, your carbide wear bars will need to be sharpened. The easiest way is with a carbide grinding wheel (available from Kalmazoo Engineering) on an electric grinder. A hand sharpening stone is also available from Kalamazoo Engineering. Two cautions in sharpening your carbide wear bar. One — be sure to get a straight and even edge. This will make your steering easier. Two — do not remove any more carbide than is necessary to get an edge as this will just shorten the life of your bar.
Replacing carbide inserts — whether through chipping, breakage or just plain wearing out, eventually you will need to replace your wear bars. You can buy a complete new set and bolt them on. Or you can use your existing host bar and just buy a Carbide Replacement Kit (from Kalamazoo Engineering). If you choose the kit, proceed as follows:

Heat the wear bar with a torch. Avoid heating the bar too hot because it will remove the strength from the carbide inserts and the host bar. When the bar starts to turn red hot (about 1200°), remove worn insert with a pair of pliers. Let bar cool and clean the groove. Brush the groove with flux from the kit and insert the new carbide piece. Heat the bar again and touch the silver wire to the carbide so it just flows along the edge of the carbide. Heat just enough to bond the insert to the bar.

With the same engines, proper track and ski set-up can provide a considerable performance advantage. Sharp, flat-backed wear bars for maximum turn carve and a custom stud pattern of sharp, well-designed studs to give you acceleration down the straight aways and let you drive through the corners will make you competitive in any race you enter.

Align Skis

The skis should be equipped with carbide skags that will greatly improve handling characteristics. So as not to damage the carbide, installation should be made just before actual field testing.
Correct ski alignment is essential to winning a race and for the safety of the operator. Correct ski alignment is when the skis are PARALLEL. Absolutely no "toe-in" or "toe-out" is to be evident.

1. Open the hood and separate the tie rod ends from the spindle arms.

2. Position the skis straight forward and establish a parallel relationship, (Figure 60).

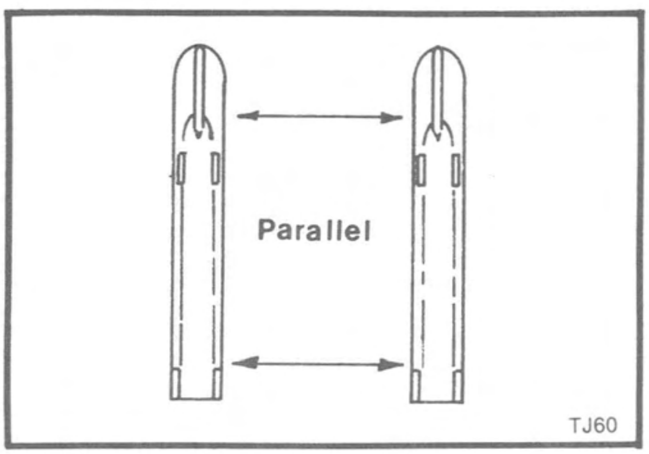


Figure 60

Sprockets and Chaincase

The Thunder Jet is equipped with a 19 tooth top sprocket and a 34 tooth bottom sprocket. This gear ratio will be adequate for short tracks and will provide good acceleration. However, racing on ½ mile or "fast" tracks may require higher gearing such as 20/34 sprockets.

Gearing should be adjusted to maintain a maximum R.P.M. of 8000 as mentioned in the clutch section. This means that if the drive system (clutches) has shifted into a 1 to 1 ratio and the maximum R.P.M. exceeds 8000, then a higher gear ratio is needed (larger top sprocket or smaller bottom.) Sno*Jet has several different sprockets available.

Top Sprockets

Part Number	Tooth
050272	15
050062	16
050039	17
050403	18
050063	19
050273	20
050274	21
	22

Bottom Sprockets

Part Number	Tooth
050196	34
050358	35
050197	36
050064	37

NOTE: It will be necessary to use a different chain with some of the sprocket options listed.

Chain Tension

The drive chain tension is adjustable (Figure 61). The chain tension should be adjusted so there is no slack, but also no preload on the chain.

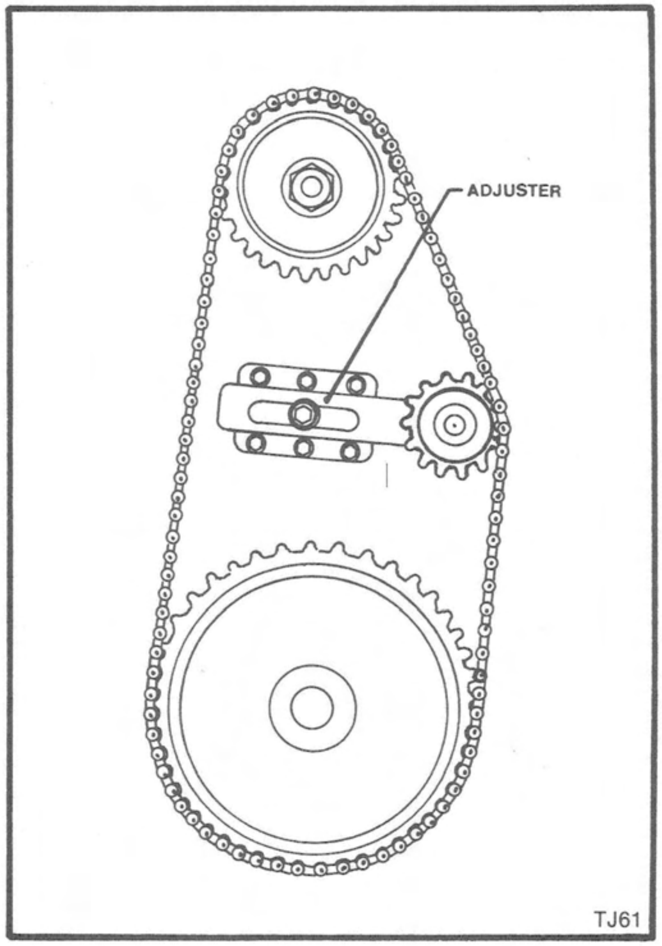


Figure 61

Mod Kits

Sno*Jet has a modification kit available for use on the 1975 440 Thunder Jet. The kit Part Number is 811726. The kit includes cylinders, cylinder heads, pistons, rings, fuel injector, tuned exhaust, and necessary gaskets. A substantial increase in horsepower can be obtained by installation of this kit.

NOTE: Installation of this kit will void any Sno*Jet warranty and disqualify the snowmobile from stock racing.

SPECIFICATIONS

MODEL	SX 440
Bore	2.68 in. (68 mm)
Stroke	2.35 in. (59.6 mm)
Displacement	26.43 cu. in. (433 cc)
Compression Ratio	7.0:1
Lubrication	Fuel/Oil Mixture
Fuel Mixture	15:1
Ignition Timing	0.073 in. (1.8 mm)
Point Gap	CDI
Idle RPM	3800
Spark Plug	B9EV NGK
Spark Plug Gap	.018 in.
Electrical System	12 v 100 w
Light Coil Resistance	.4≙ (75 w) Yellow to Ground — 1.1 (25 w) Gn. to GD
Exciter Coil Resistance	200≙ Brown to Blue
Ignition Coil Resistance	.8 Primary Or. to GD. Gray to GD. — 7200 Sec. H.T. to GD.
Pulser Coil Resistance	80≙ White/Red to Ground White/Black to Ground
Max. R.P.M.	8000 R.P.M.
Light Coil Air Gap	Fixed
Ignition Coil Air Gap	Fixed
Cylinder Head Torque	16.5–19.5 ft. lbs. (2.3–2.7 m-kgs.)
Manifold Torque	45 in. lbs. (0.5 m-kgs.)
Crankcase Torque	18.0 ft. lbs. (2.49 m-kgs.)
Flywheel Nut Torque	55 ft. lbs. (7.1 m-kgs.)
Clutch Bolt Torque	75 ft. lbs. (10.5 m-kgs.)
Maximum Cylinder Wear	0.04 in. (0.10 mm)
Piston to Cylinder Clearance	0.018-0.019 in. (0.04-0.05 mm)
Piston Ring End Gap	0.014-0.020 in. (0.35-0.55 mm)
Piston Ring Clearance	0.01-0.019 in (0.03-0.05 mm)
Max. Crankshaft Runout-Magneto End	0.01 in. (0.03 mm)
Max. Crankshaft Runout-PTO End	0.01 in. (0.03 mm)
Crankshaft Assembled Width	7.01 in. (178 + 0.1 mm)
Connecting Rod Max. Axial Play	0.080 in. (2 mm)
Clutch Offset	.550
Clutch Center to Center	11″
Drive Belt O.C.	44 ± 3/16
Drive Belt Width	1¼″

PARTS MANUAL
HOW TO READ THIS MANUAL

ENGINE 02-6

Group	Group No.	Page
UNIT ASSEMBLY	01	
ENGINE MOUNT	02	
EXHAUST SYSTEM	03	
• MUFFLER • INLET PIPE		
ELECTRICAL SYSTEM	04	
• LIGHTS • IGNITION • WIRING • BATTERY ETC. . .		

COMPONENT PARTS: Component parts of an assembly are preceded by a dot. (•). Component Parts of a sub-assembly are preceded by two dots (••) as follows:

EXAMPLE:

Driven pulley assembly ⟶ Assembly

- • Shaft converter
- • Plate-converter
- • Spring

} ⟶ Assembly Components

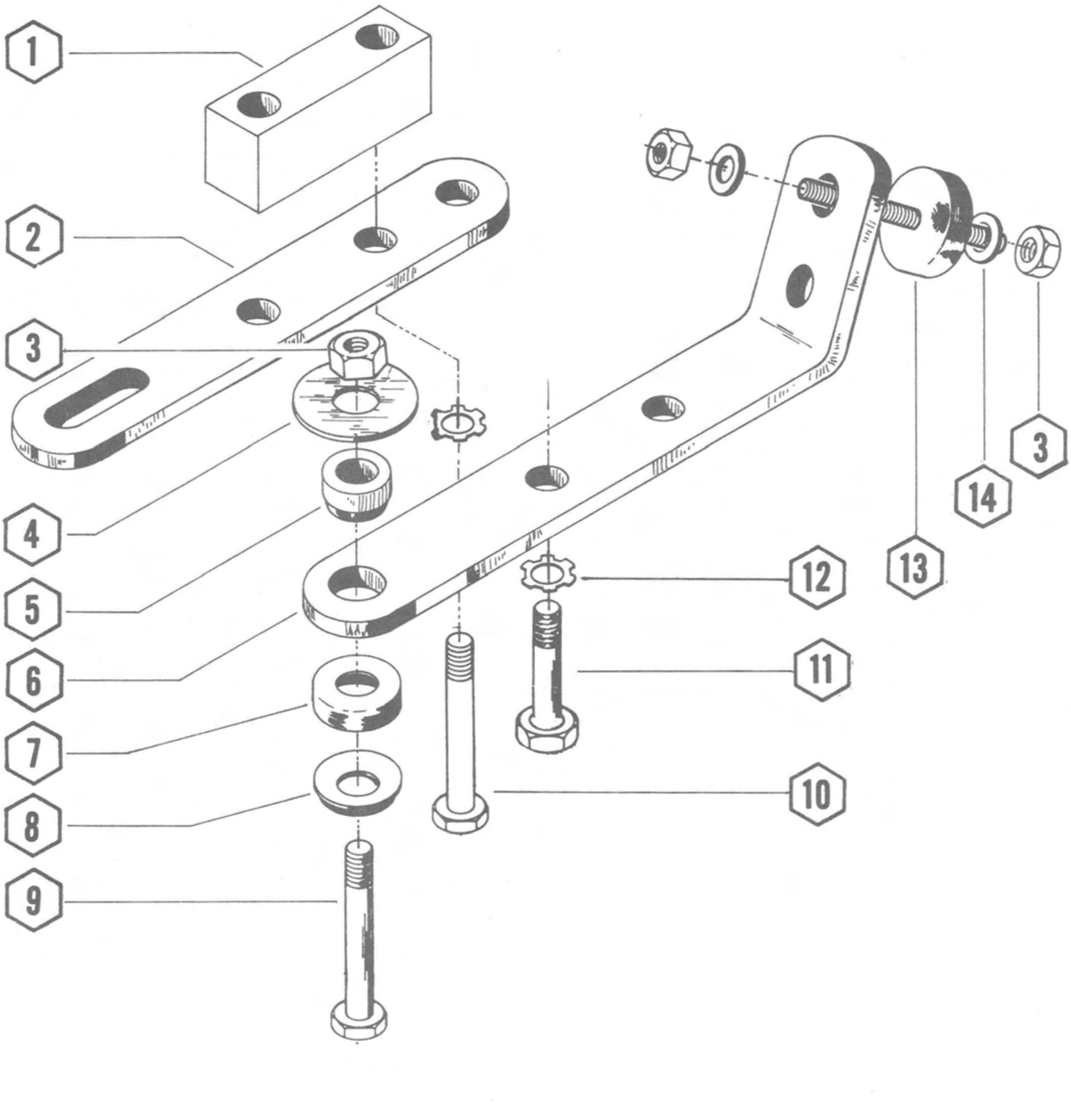
- • Drive cam Assembly — Sub-Assembly
- •• Drive cam
- •• Woodruff key

} ⟶ Sub-Assembly Components

> **NOTE:**
> All assembly components can be purchased separately unless mentioned on the illustration concerned.

INDEX

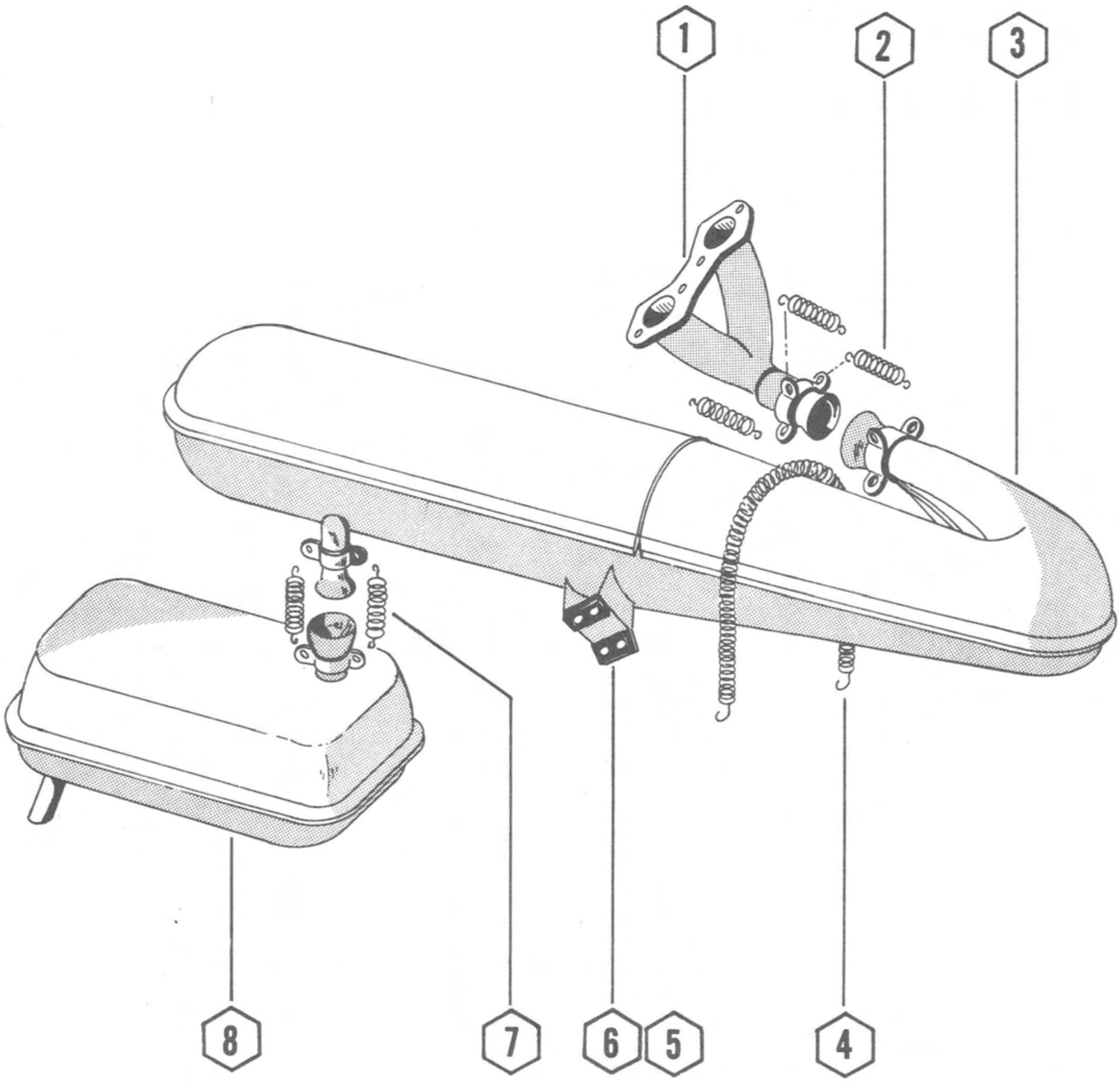
ENGINE MOUNT



ENGINE MOUNT

No.	Sno*Jet	Description	Qty
1	181872	Spacer	1
2	181843	Engine Mount Center Plate	1
3	912740	Nut 3/8 NF Nyloc	9
4	050223	Washer	2
5	020113	Rubber Mount	1
6	181871	Engine Mount L.H.	1
7	020085	Pad	1
8	020086	Special Washer	1
9	910251	Cap Screw 3/8 NF X 2"	1
10	181636	Cap Screw 10 MM X 2.87"	2
11	916610	Cap Screw 10 MM X 1.00 LG	2
12	916530	Star Washer	4
13	181203	Rubber Engine Mount	4
14	912831	Washer	7

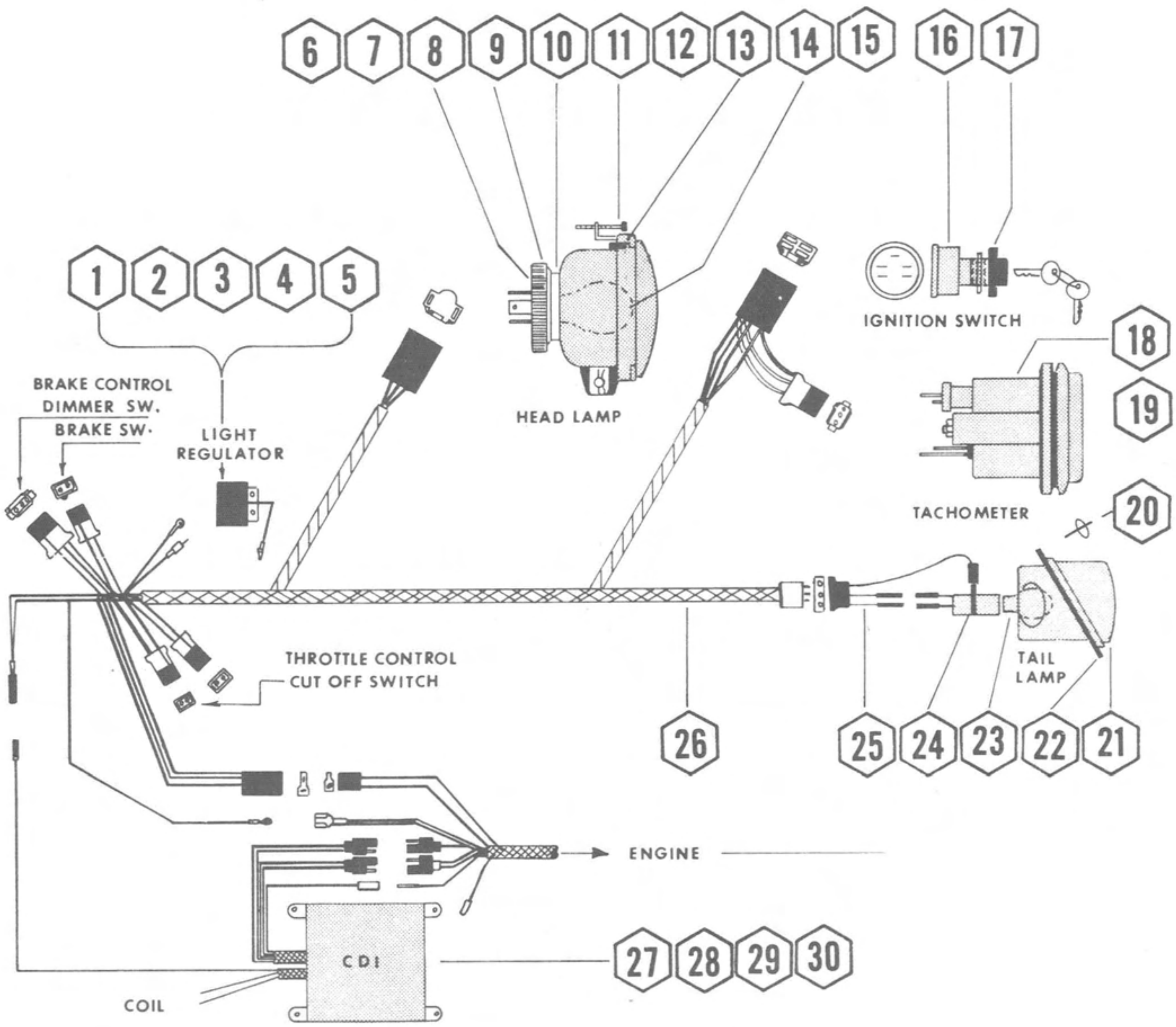
EXHAUST



EXHAUST

No.	Sno*Jet	Description	Qty
1	030623	Exhaust Manifold	1
2	110087	Exhaust Spring 1.5 Long	3
3	030625	Muffler	1
4	181946	Muffler Support Spring	1
5	030634	Rubber Pad	2
6	916945	Pop Rivet	4
7	110092	Exhaust Spring 1.0 Long	2
8	030624	Resonator	1
–	810537	Bolt 8mm x 1.00 LG (Y–Manifold)	4

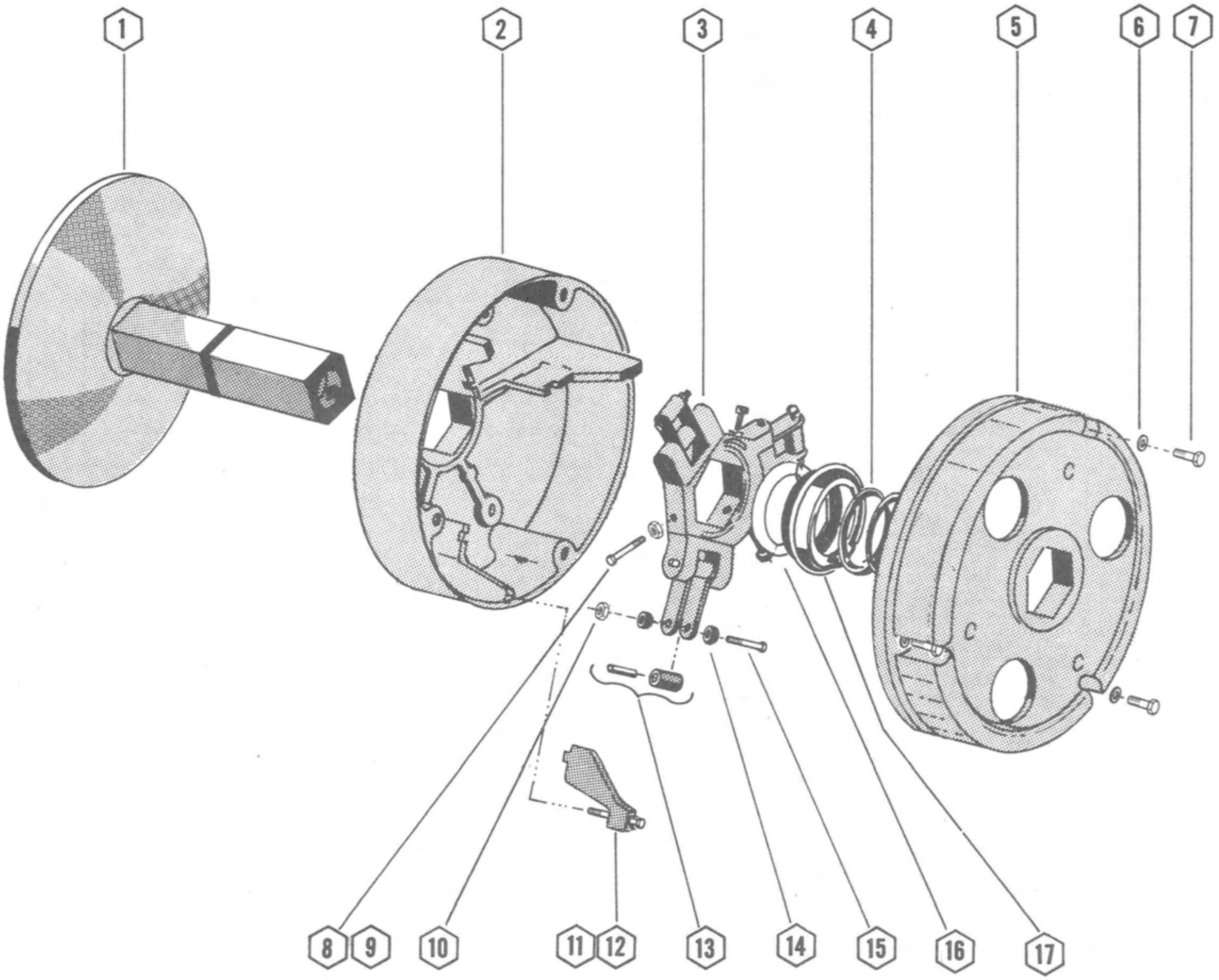
ELECTRIC SYSTEM



ELECTRIC SYSTEM

No.	Sno*Jet	Description	Qty
1	040530	Light Regulator	1
2	120564	Spacer	1
3	916796	Machine Screw 10-24 x .75	2
4	916535	Star Washer	2
5	912716	Hex Nut 10-24 Nyloc	2
6	916503	Rawlnut	4
7	916580	Screw	4
8	040543	Headlamp Assembly	1
9	040383	• Socket Holder	1
10	040382	• Socket Washer	1
11	040372	• Adjust Screw & Nut	2
12	040384	• Seal,Head Lamp	1
13	120414	Spacer	4
14	040385	• Bulb	1
15	040540	• Headlamp Unit	1
16	040186	Ignition Switch	1
17	040175	Rubber Boot	1
18	181892	Tachometer	1
19	160185	Bulb (Tachometer)	1
20	916741	Rivet (Tail Lamp)	2
21	040368	Tail Light	1
22	140382	Backing Plate	1
23	040369	Bulb	1
24	040367	Socket Assembly	1
25	040611	Wiring Harness Extension	1
26	181894	Wiring Harness	1
27	811527	C.D.I. Unit	1
28	910047	Cap Screw 1/4-28 x 1.25	4
29	912829	Washer	8
30	912738	Hex Nut 1/4 Nyloc	4

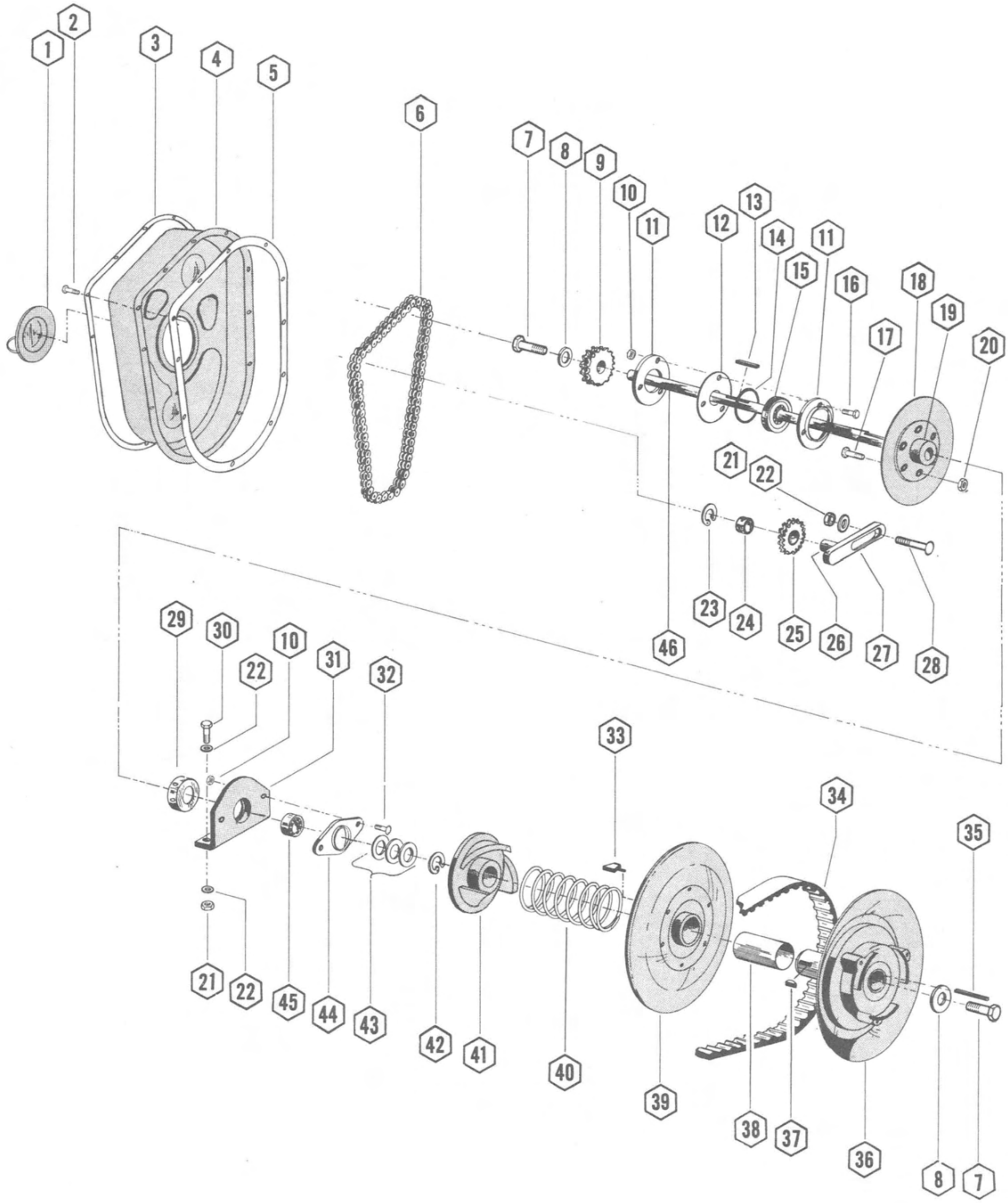
DRIVE CLUTCH



DRIVE CLUTCH

No.	Sno*Jet	Description	Qty
–	050730	Drive Clutch Assembly	1
1	050754	Stationary Sheave	1
2	050755	Moveable Sheave	1
3	050756	Spider Assembly	1
4	050760	Spring	1
5	050762	Housing & Bearing Assembly	1
6	050763	Lockwasher	3
7	050764	Cap Screw	3
8	050759	Set Screw	3
9	050765	Nut	3
10	050758	Locknut	3
12	050782	Ramp 257	3
13	050766	Roller-Bearing Kit	1
14	050776	Weight 106	6
14	050777	Weight 107 (Optional)	–
14	050778	Weight 123 (Optional)	–
14	050779	Weight 135 (Optional)	–
14	050780	Weight 175 (Optional)	–
15	050757	Screw	3
16	050761	Split Ring	2
16	050785	Hex Screw	3
16	050784	Cupped Washer	1

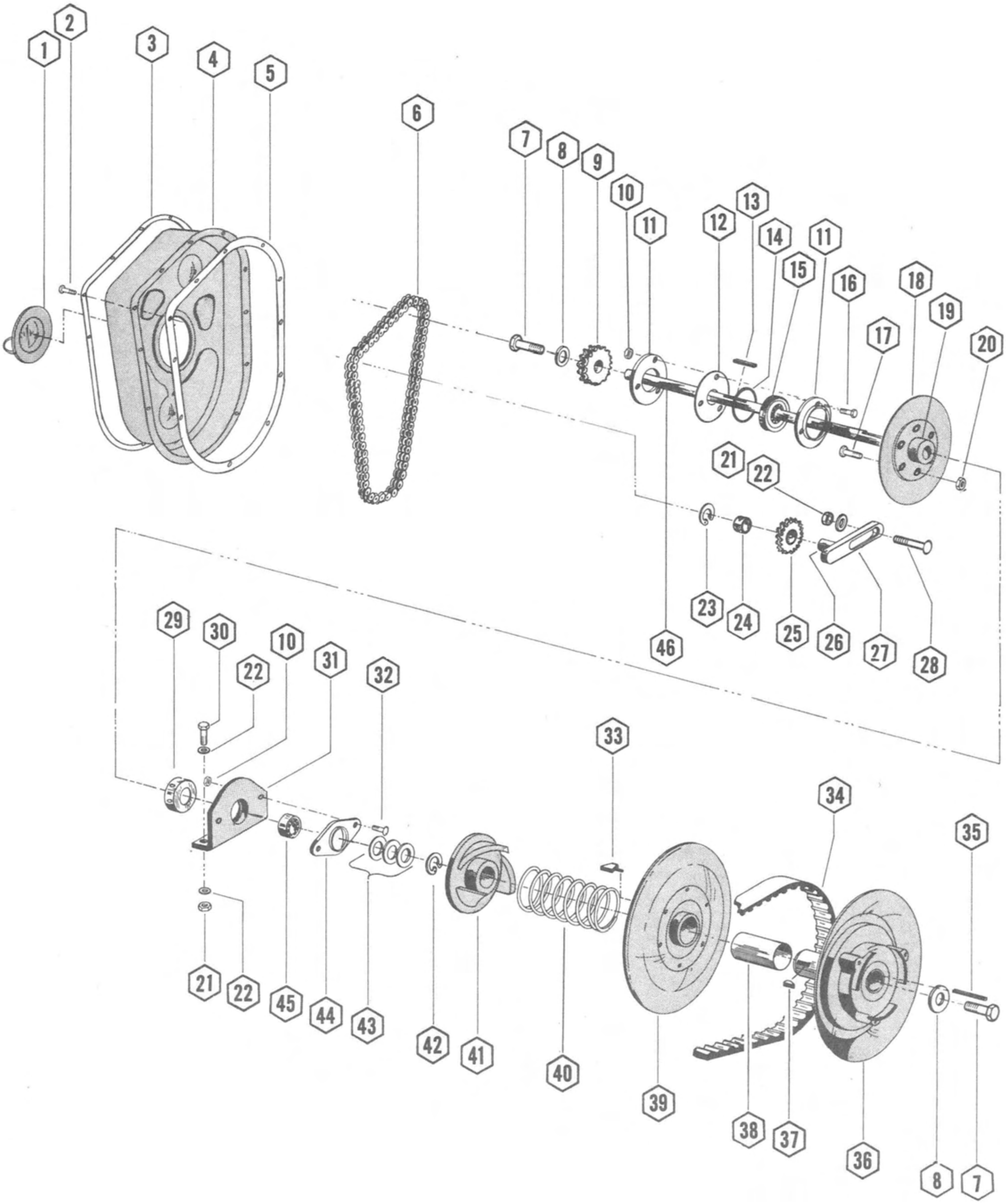
CONVERTER/CHAIN CASE



CONVERTER/CHAIN CASE

No.	Sno*Jet	Description	Qty
1	181231	Cover Plug	1
2	181838	Screw	11
3	181804	Retaining, Cover	1
4	181202	Cover, Chain	1
5	181237	Gasket, Cover	1
6	181101	Chain 68 Pitch	1
7	910204	Cap Screw 3/8-16 NC x 1.0	2
8	050223	Washer, Special	2
9	050379	Sprocket 19 Teeth (Standard)	1
9	050063	Sprocket 16 Teeth (Optional)	1
9	050039	Sprocket 17 Teeth (Optional)	1
9	050403	Sprocket 18 Teeth (Optional)	1
10	912725	Locknut 5/16 NC	5
11	770007	Flange	2
12	181273	Gasket, Flange	1
13	917001	Key, Brake	1
14	181271	"O" - Ring	1
15	770009	Bearing	1
16	910104	Cap Screw 5/16 NC x 1.0"	3
17	911243	Bolt #10 NF x .5	6
18	181514	Brake Disc	1
19	070150	Hub	1
20	912756	Nut, Hex #10 NF	1
21	912740	Locl.nut 3/8 NF	3
22	912831	Washer	5
23	916751	Ring, Retaining	1
24	770008	Bearing	1
25	050447	Sprocket 11 Teeth (Idler Chain)	1
26	050679	Shaft, Idler	1
27	181806	Bracket, Idler	1
28	913372	Cap Screw 3/8-24 x 1½	1
29	770006	Collar, Locking	1
30	913356	Cap Screw 3/8-24 NF x 1.0	2
31	181540	Pillow Block	1
32	914320	Carriage Bolt 5/16 NC x .75	2
33	050773	Slide, Shoe Ramp	3
34	050736	Drive Belt	1
35	181746	Key	1
36	050769	Stationary Sheave Assembly	1
37	050770	Key	1
38	050771	Bearing	1
39	050772	Moveable Sheave Assembly	1
40	050774	Spring	1
41	050783	Torque Bracket	1

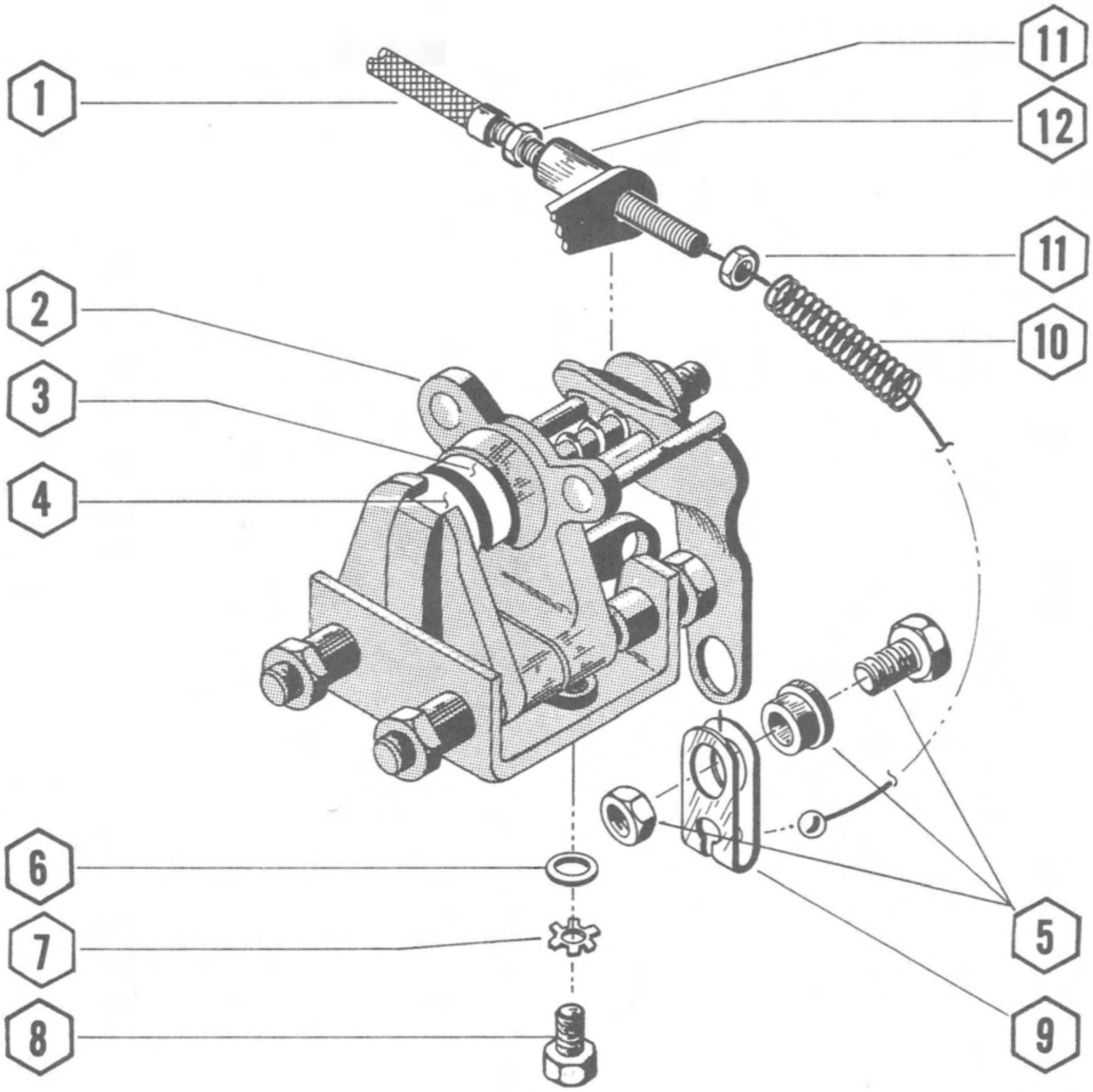
CONVERTER/CHAIN CASE



CONVERTER/CHAIN CASE

No.	Sno*Jet	Description	Qty
42	050775	Ring, Retaining	1
43	060366	Washer Bearing	3
44	181541	Pillow Block, Flange	1
45	770005	Bearing	1
46	050726	Shaft, Converter 1	1

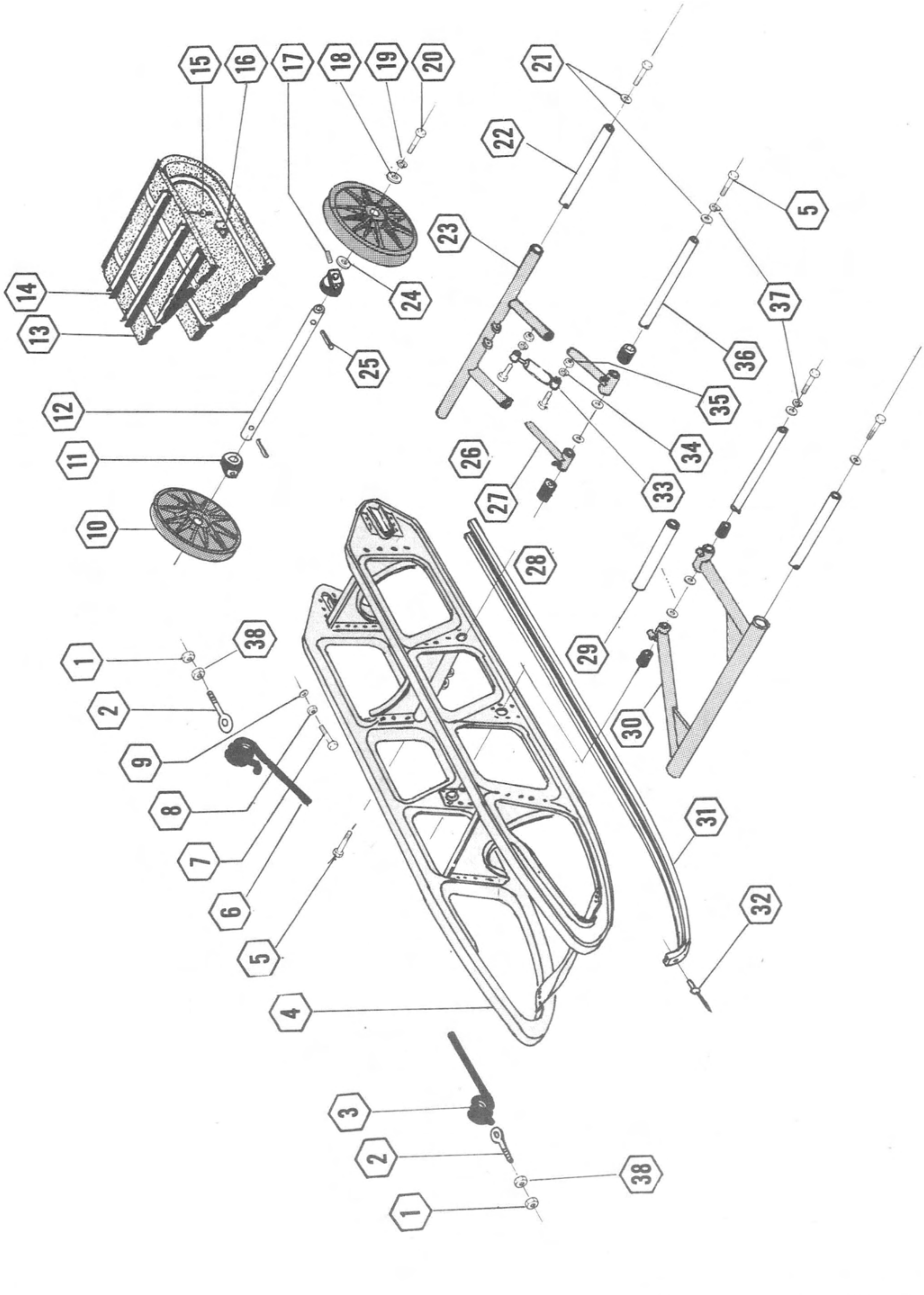
BRAKE



BRAKE

No.	Sno*Jet	Description	Qty
1	070205	Brake Cable	1
2	181847	Brake Assembly	1
3	070010	• Puck 1/2"	1
4	070009	• Puck 5/16"	1
5	181895	• Cap Screw, Sleeve and Nut	1
6	912830	Washer	2
7	916709	Star Washer	2
8	910100	Cap Screw 5/16-18 x 1/2"	2
9	070041	Clevis	1
10	181969	Spring	1
11	914418	Jam Nut, Hex	2
12	181951	Extension	1

SUSPENSION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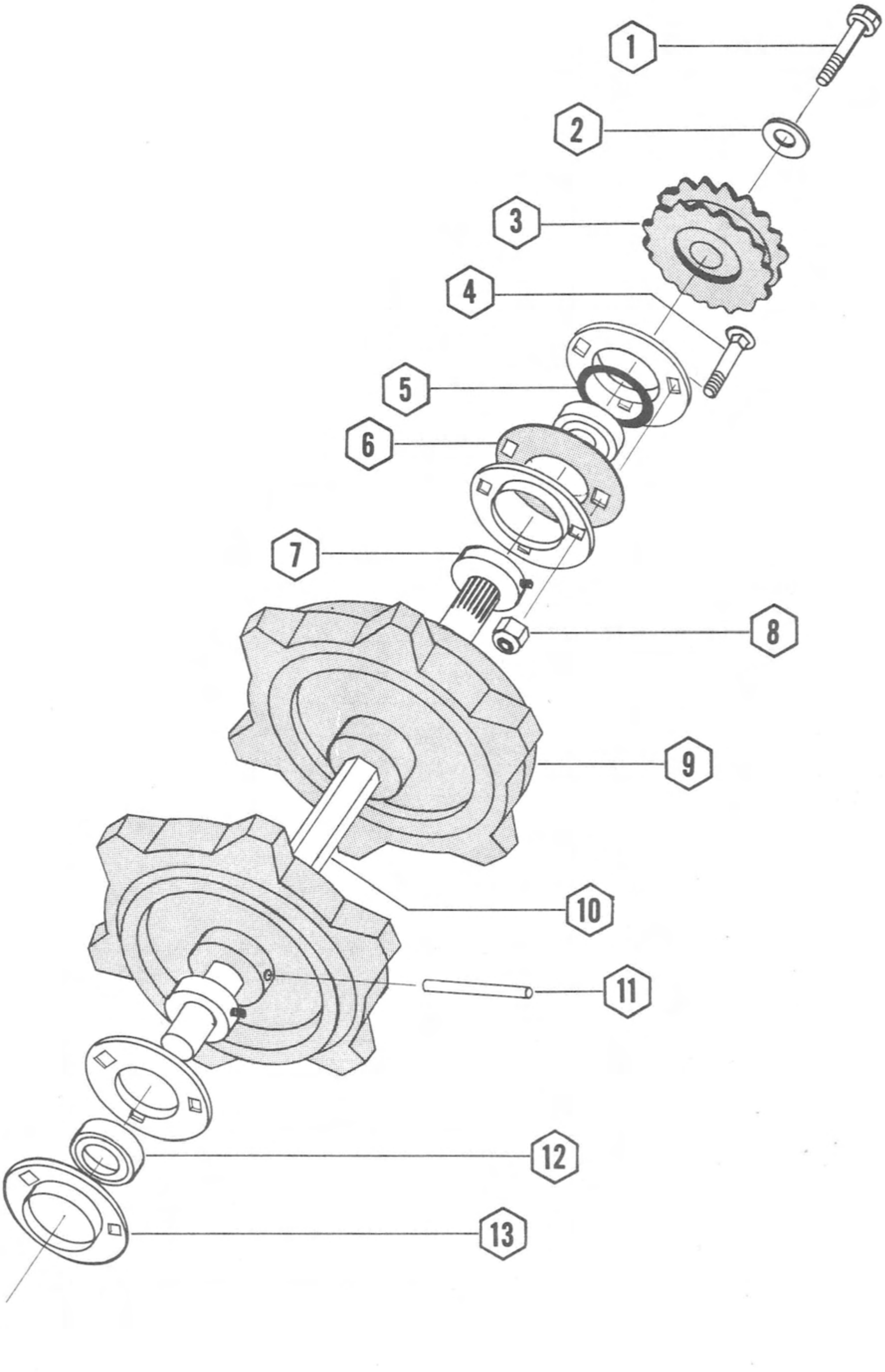
SUSPENSION

No.	Sno*Jet	Description	Qty
1	912726	Nut, Nylock 3/8 NC	4
2	181447	Eye bolt 3/8 NC	4
3	181436	Spring L.H. Front	1
3	181437	Spring R.H. Front	1
4	181821	Frame	1
5	910204	Cap Screw 3/8 NC x 1.0	8
6	181438	Spring R.H. Rear	1
6	181439	Spring L.H. Rear	1
7	181451	Bolt 7/16 NC x 4.0	2
8	912663	Jam Nut 7/16 NC	2
9	912832	Washer	2
10	181449	Idler Wheel	2
11	181450	Axle Holder	2
12	181442	Idler Axle	1
13	181880	Track Assembly	1
14	060618	• Cleat	36
15	060300	• Rivet (Cleats)	312
15	060301	• Rivet (Track Guide)	48
16	060292	• Track Guide	24
17	181455	Set Screw	2
18	181445	Washer	2
19	912873	Lockwasher	2
20	910104	Cap Screw 5/16 NC x 1.0	2
21	050223	Washer	8
22	181432	Carrier Shaft	2
23	181466	Outer Telescoping Tube	1
24	181444	Thrust Washer	2
25	181456	Roll Pin	2
26	910351	Cap Screw 7/16 NF x 2.0	2
27	181464	Inner Telescoping Tube R.H.	1
27	181465	Inner Telescoping Tube L.H.	1
28	181430	Bushing	4
29	181443	Spacer, Bush	1
30	181160	Front Control Arm	1
31	181446	Hifax Runner	2
32	916674	Rivet	32
33	181535	Shock Absorber	1
34	912875	Lock Washer	2
35	912603	Hex Nut 7/16 NF	2
36	181431	Axle	2
37	912874	Lock Washer	4
38	914357	Hex Nut 3/8 NC	4
	060624	F/A Klaws (Option)	Kit
	060625	F/A Carbide Spikes (Option)	Kit

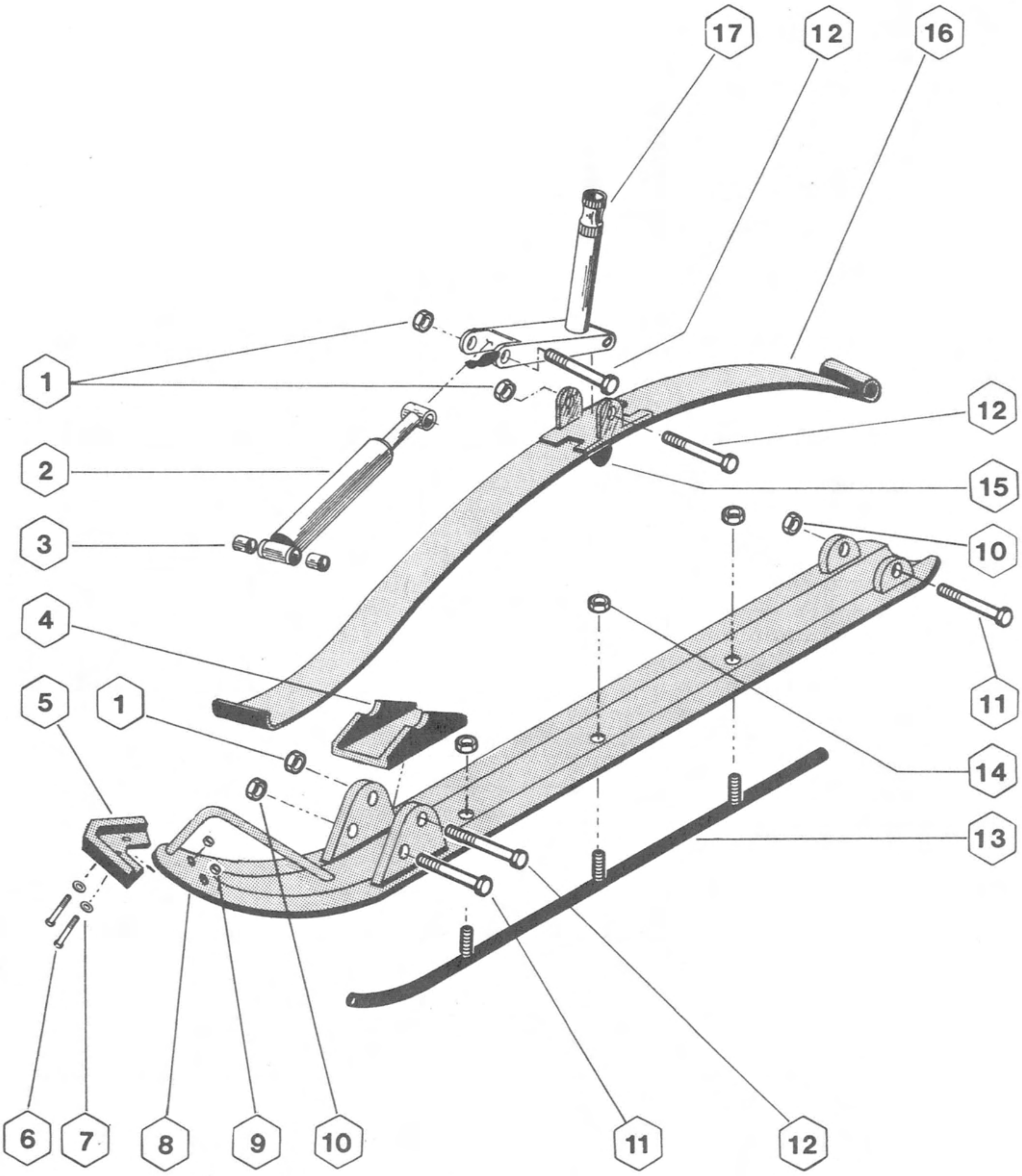
FRONT SHAFT



FRONT SHAFT

No.	Sno*Jet	Description	Qty
1	910204	Cap Screw 3/8-16 NC x 1.0	1
2	050223	Washer	1
3	050197	Sprocket 36 Teeth	1
4	914154	Carriage Bolt 5/16-18 NC x 1.0	6
5	181271	"O" - Ring	1
6	181273	Flange Gasket	1
7	770006	Locking Collar	2
8	912725	Nut 5/16-18 NC	6
9	181953	Drive Sprocket	2
10	181904	Hex Drive Shaft	1
11	916997	Roll Pin	2
12	770005	Bearing	2
13	770007	Bearing Flange	4

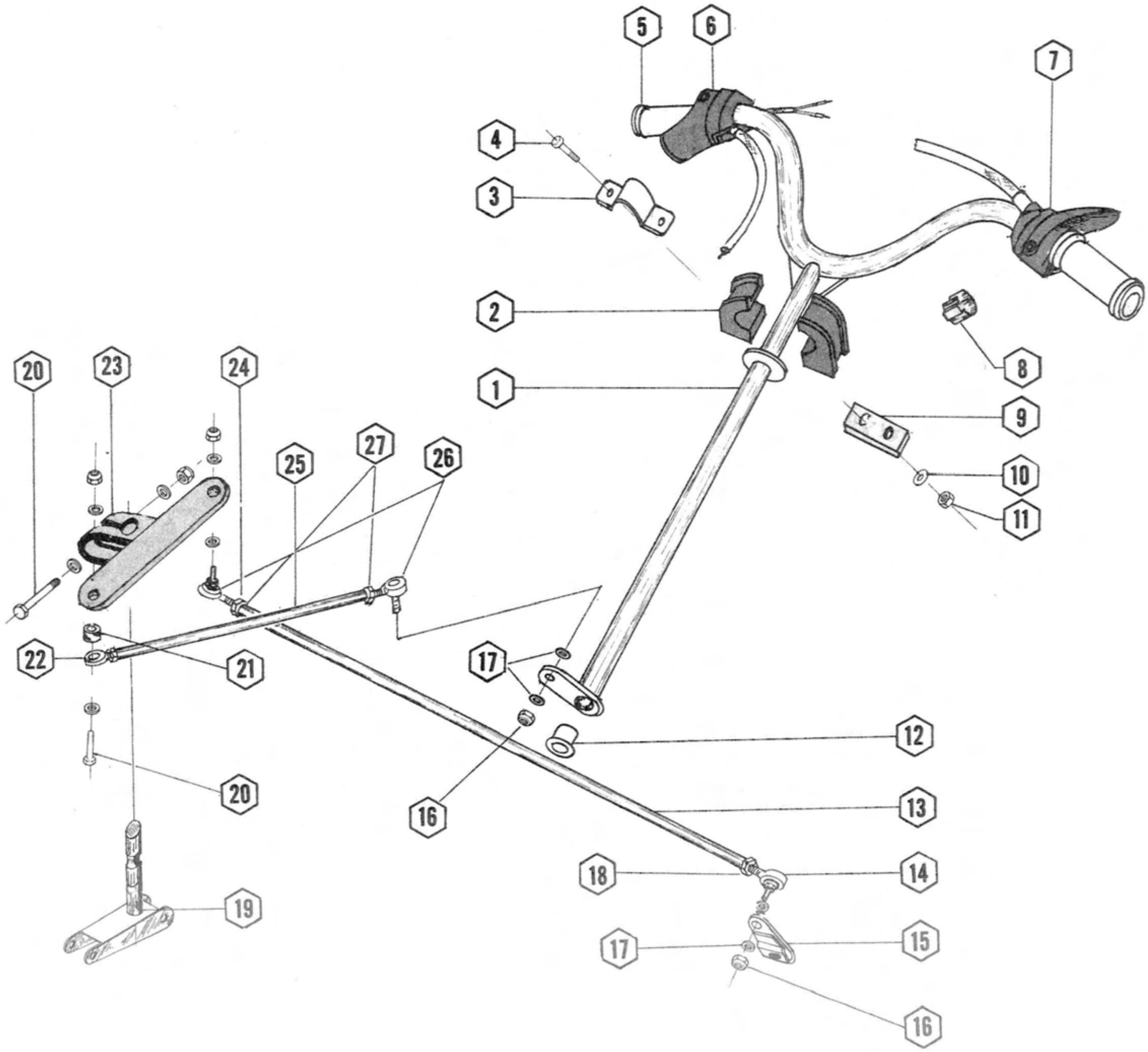
SKI



SKI

No.	Sno*Jet	Description	Qty
1	912741	Locknut 7/16 NF	3
2	181527	Shock Absorber	1
3	080123	Shock Spacer	2
4	080046	Spring Pad	1
5	181968	Ski Boot	1
6	914087	Mach. Screw 10-24NC x 1.00	2
7	912827	Washer	2
8	181363	Ski Weld	1
9	912716	Locknut 10-24NC	2
10	912739	Locknut 7/16 NF	2
11	910163	Cap Screw 5/16 NF x 3.5	2
12	910363	Cap Screw 7/16 NF x 3.5	3
13	181930	Ski Runner (Carbide)	1
14	912726	Locknut 3/8 NC	3
15	080148	Ski Bumper	1
16	080131	Monoleaf Spring	1
17	090625	Ski Spindle	1
–	181098	Bushing,Spindle	2

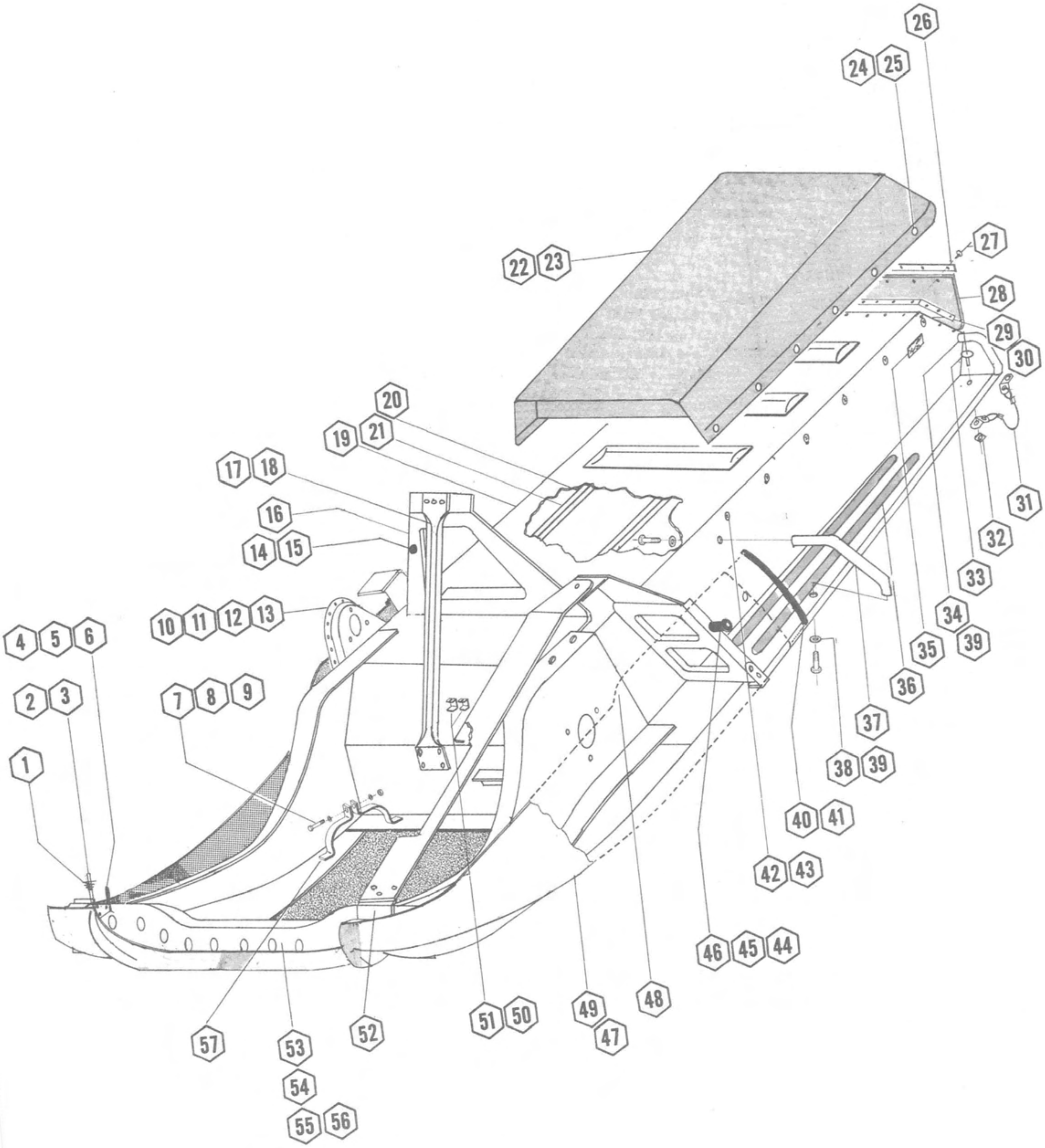
STEERING



STEERING

No.	Sno*Jet	Description	Qty
1	181912	Steering Weld	1
2	090044	Half Guide Bushing	2
3	090565	Steering Holder	1
4	910047	Cap Screw 1/4 NF x 1.25	2
5	090246	Handle Grip	2
6	090521	Throttle Control	1
7	090522	Brake Control	1
8	916732	Clamp	4
9	181220	Spacer	1
10	912829	Washer 1/4	2
11	912738	Locknut 1/4 NF	2
12	181497	Bushing	1
13	181306	Tie Rod	1
14	181282	Tie Rod End	1
15	090163	Steering Arm	1
16	912740	Locknut 3/8 NF	6
17	912831	Washer 3/8	12
18	914378	Locknut 3/8 NF R.H.	2
19	090625	Ski Spindle (Ref Ski)	
20	913364	Cap Screw 3/8 NF x 2.0	3
21	181573	Spacer	1
22	916404	Tie Rod End	1
23	181915	Steering Arm	1
24	916514	Locknut 3/8 NF L.H.	2
25	181505	Drag Link	1
26	181283	Tie Rod End	2
27	916414	Washer, Internal Tooth	4
–	916800	Klip Ring (Throttle & Brake Control)	2

BODY & SEAT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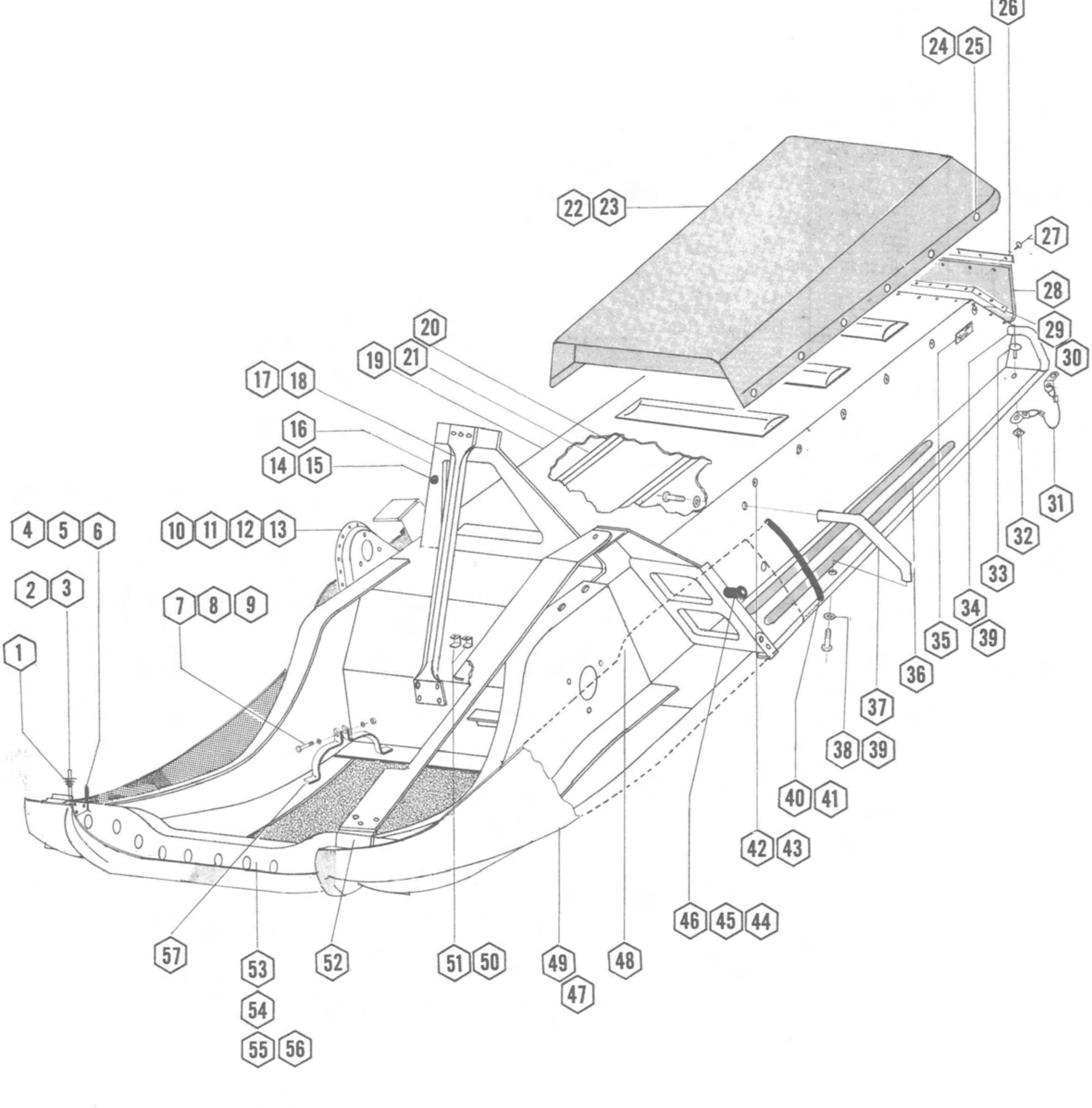
BODY & SEAT

No.	Sno*Jet	Description		Qty
1	181893	Spring		2
2	181926	Hood Pin R.H.		1
2	181927	Hood Pin L.H.		1
3	916407	Rivet		6
4	181929	Stopper, Steering		1
5	912831	Washer		1
6	912740	Locknut 3/8 NF		1
7	910009	Hex Screw 1/4-20 x 1.50		1
8	916524	Washer		2
9	912822	Locknut 1/4-20		1
10	181530	Backing Plate (Chain Case)		1
11	910043	Bolt 1/4-28NF x .75	Order only when	7
12	912829	Washer 1/4	replacing part	7
13	912738	Nut 1/4 NF	No. 181530	7
14	020269	Halfguide, Rope		2
15	916797	Retaining Ring		1
16	181802	Steering Stanchion		1
17	181468	Steering Brace		1
18	181671	Rivet		8
19	100733	Frame		1
20	181650	Wear Strip		2
21	916674	Rivet		18
22	140384	Seat Foam		1
23	140383	Seat Cover		1
24	916734	Snap		16
25	916735	Snap Button		16
26	181538	Backing Plate		1
27	916419	Rivet		5
28	181818	Mud Flap		1
29	181199	Tunnel Rear		1
30	916407	Rivet		8
31	181848	Lanyard		2
32	916525	Square Washer		4
33	916744	Rivet		4
34	181488	Lift Handle L.H. Rear		1
34	181489	Lift Handle R.H. Rear		1
35	120318	Reflector, Red		2
36	181318	Non-Skid Strips		4
37	181544	Stirrup		2
38	181556	Washer		4
39	913315	Cap Screw 3/8-16 x 3/4		6
40	460070	Trim 11.0" (Nose Pan)		2
41	916873	Rivet		4
42	916791	Stud, Seat Snap		16

BODY & SEAT



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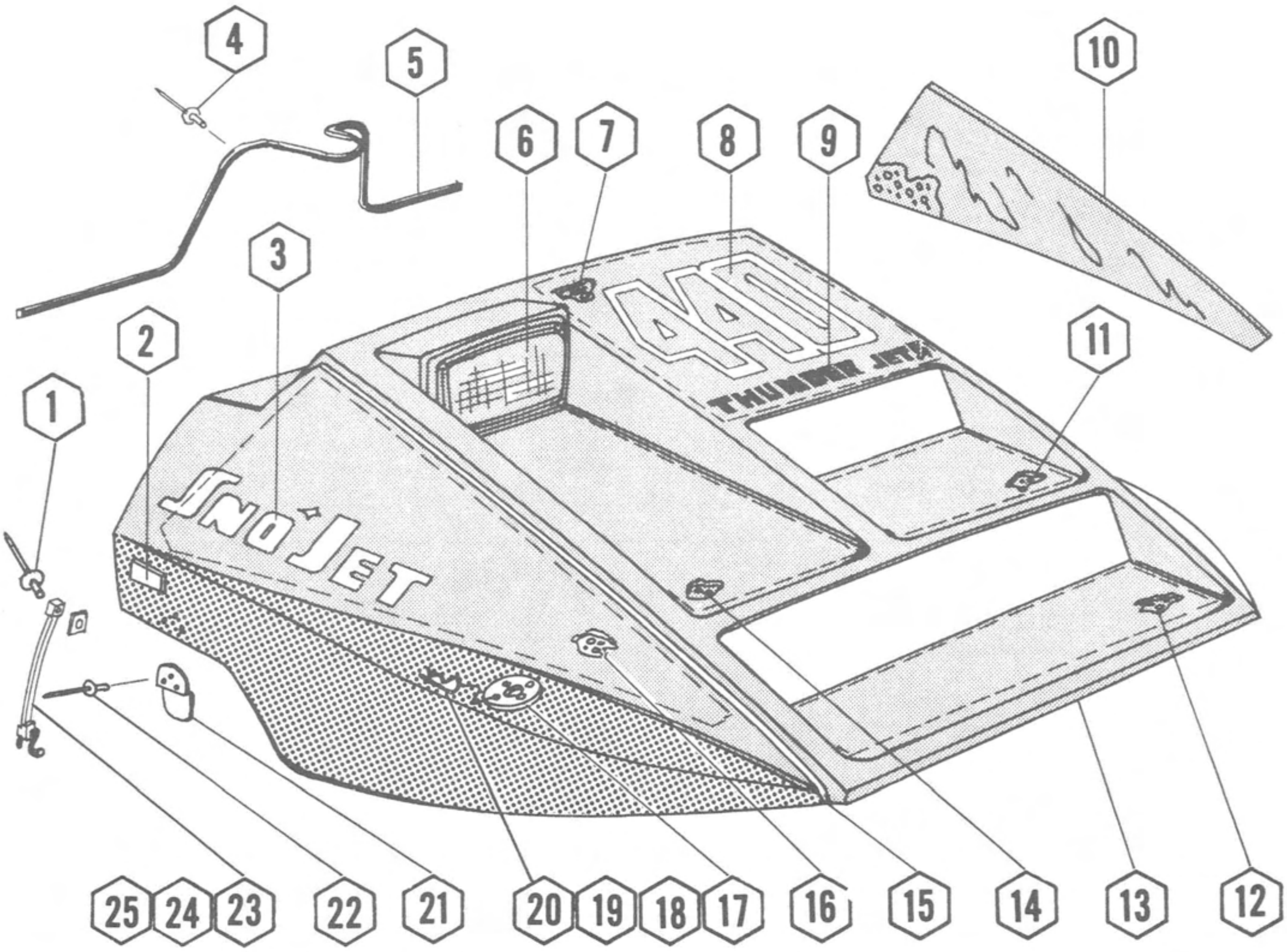
BODY & SEAT

No.	Sno*Jet	Description	Qty
43	916792	Rivet, Seat Snap	16
44	150164	Washer	2
45	181992	Nylon Spacer	2
46	916546	Rivet (Nose Pan Spacer)	2
47	916687	Rivet (Nose Pan)	13
48	181485	Main Frame L.H.	1
48	181198	Main Frame R.H.	1
49	181972	Nose Pan (Fiberglass)	1
50	791234	Fuel Pump Bracket	2
51	916419	Rivet	2
52	181822	Belt Guard	1
53	181189	Front Cross Member	1
54	910043	Bolt 1/4-28NF x .75	22
55	912829	Washer	22
56	912738	Nut 1/4 NF	22
57	030627	Resonator Bracket	2

HOOD & DASH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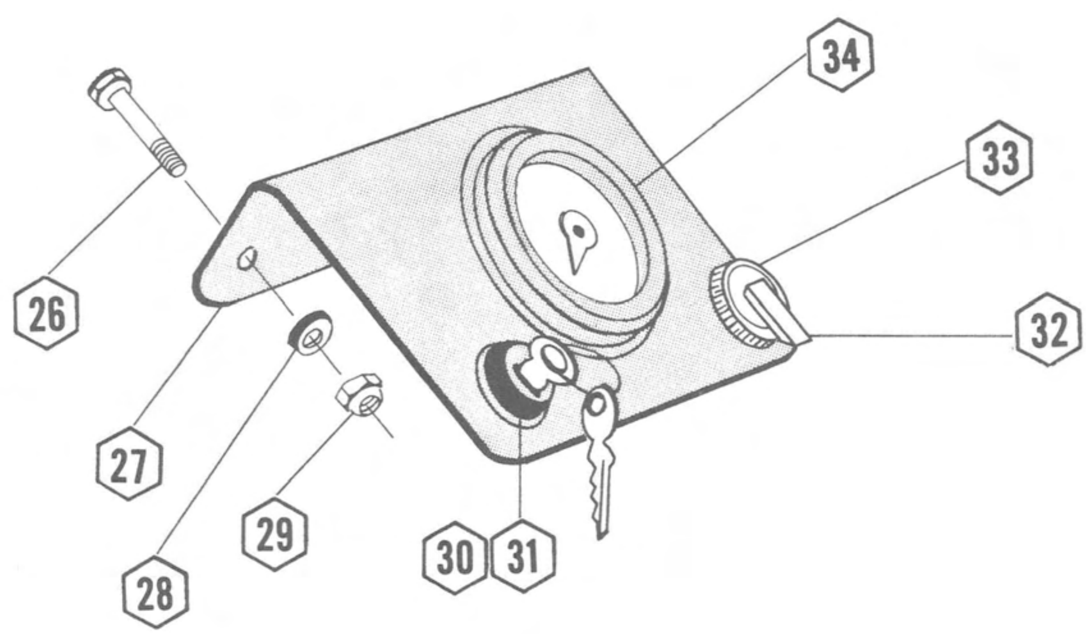
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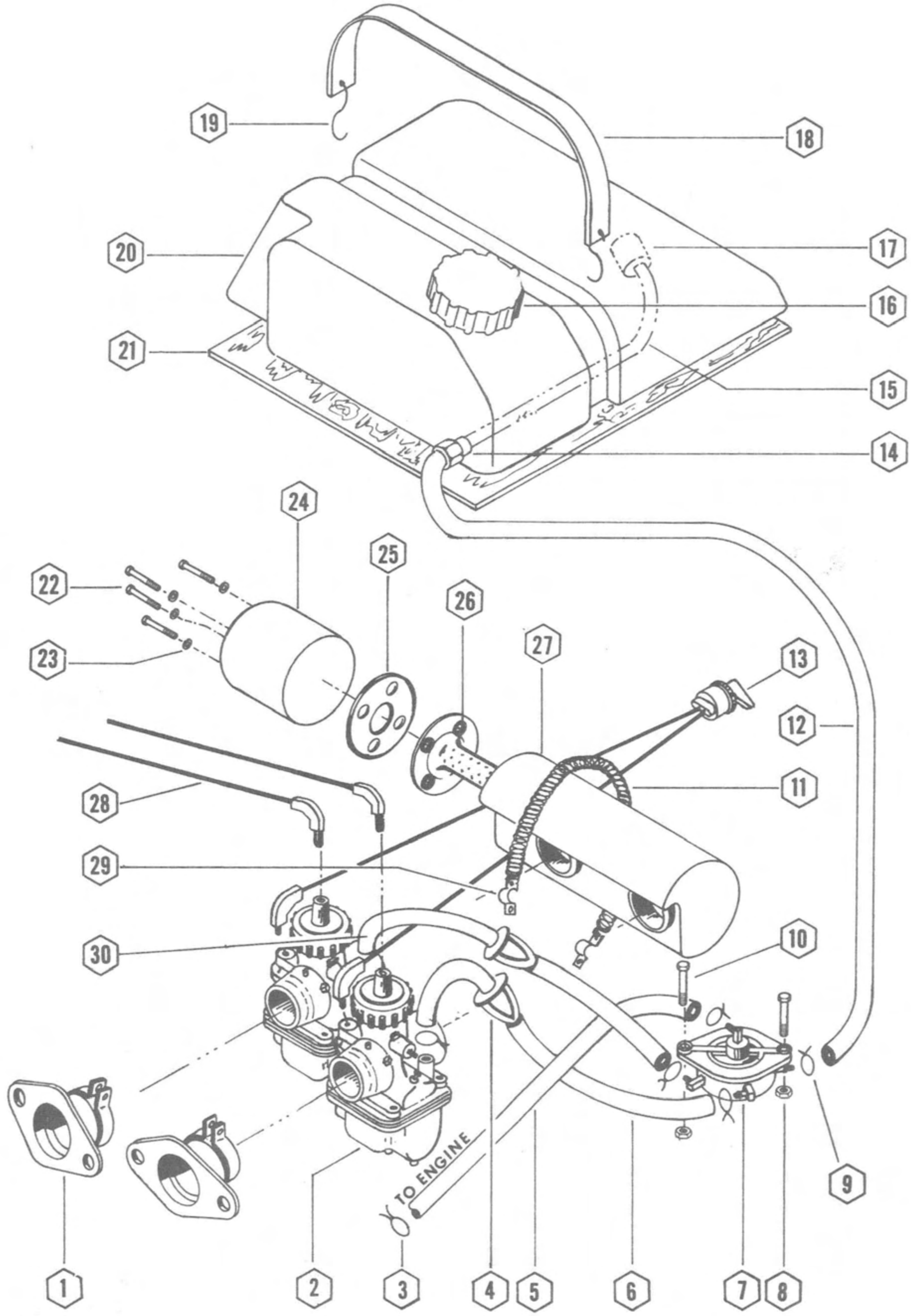
HOOD & DASH

No.	Sno*Jet	Description	Qty
1	916687	Rivet	2
2	120319	Reflector, Amber	2
3	120709	Decal, Sno-Jet	2
4	916873	Rivet	4
5	460070	Trim 50"	1
6	–	Headlamp (See Electrical)	–
7	182055	Acoustical Foam	1
8	121213	Decal, 440	1
9	181981	Decal, Thunder Jet F/A	1
10	182054	Acoustical Foam	1
11	181984	Acoustical Foam	1
12	182056	Acoustical Foam	1
13	181971	Hood (Painted Only)	1
14	181985	Acoustical Foam	1
15	181983	Decal, Stripe	2
16	181986	Acoustical Foam	1
17	181932	Plate, Hood Pin	2
18	916549	Rivet	8
19	181955	Lanyard	2
20	181931	Hood Pin	2
21	120831	Hood Guide	2
22	916407	Rivet	6
23	160200	Strap, Rubber	2
24	791020	"S" Hook	2
25	916525	Special Washer	2
26	910047	Cap Screw (See Steering)	–
27	181911	Tachometer Mount Bracket	1
28	912829	Washer (See Steering)	–
29	912738	Locknut (See Steering)	–
30	040186	Ignition Switch (See Electrical)	–
31	040175	Rubber Boot (See Electrical)	–
32	791232	Choke Assembly (See Fuel)	–
33	917041	Panel Nut (See Fuel)	–
34	181892	Tachometer (See Electrical)	–

FUEL SYSTEM



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FUEL SYSTEM

No.	Sno*Jet	Description	Qty
1	791185	Carburator Adapter	2
2	791249	Carburator (See Carburator Book For Parts)	2
3	790740	Clip, Pulse Line	2
4	791257	Fuel Filter	2
5	410054	Pulse Line 7" x 1/4 I.D. x 1/2 O.D.	1
6	410052	Fuel Line 1.5" x 1/4 I.D.	2
7	791202	Fuel Pump	1
8	912724	Locknut	2
9	790436	Clip, Fuel Line	8
10	910003	Cap Screw 1/4-20 x .75	2
11	110099	Spring	1
12	410052	Fuel Line 7-3/8" x 1/4 I.D.	1
13	791232	Assembly, Choke	1
14	791199	Fitting, Fuel Tank	1
15	410052	Fuel Line 8" x 1/4 I.D.	1
16	181861	Cap, Fuel Tank	1
17	181834	Pick-up, Tank	1
18	791021	Strap, Fuel Tank	1
19	791020	"S" Hook	2
20	181826	Fuel Tank	1
21	181828	Base, Fuel Tank (Foam)	1
22	916915	Machine Screw 10-32 x .75	4
23	916535	Lockwasher	4
24	790830	Cap	1
25	790832	Joint, Intake	1
26	916914	Wellnut	4
27	791254	Shell, Air Silencer	1
28	791231	Cable, Throttle Assembly	1
29	916922	Clip, Spring	2
30	410052	Fuel Line 12-1/2" x 1/4 I.D.	2

ENGINE & TOOL KIT

No.	Sno*Jet	Description	Qty
	811565	Engine Yamaha SX433	1
	810931	Tool Kit Complete	1
	810018	• Socket 13 & 21 MM	1
	810019	• Wrench 22 & 29 MM	1
	810020	• Open Wrench 13 & 17 MM	1
	810022	• Pliers 6" Standard Yamaha	1
	810023	• Screw Driver Handle	1
	810024	• Double Bit	1
	810025	• Single Bit	1
	810026	• Ignition Point Wrench	1
	810027	• Canvas Bag	1
	810930	• Open Wrench 8 & 10 MM	1
	810933	• Allen Key 6 MM	1