

Harley-Davidson Singles

Model Coverage

50 cc	M-50		ML (M-125)	
	M-50S		MLS (Rapido)	
65 cc	M-65		TX 125	
	M-65S		SX 125	
	MC-65	165 cc	ST (Model 165)	250 cc
90 cc	X-90		STU (Model 165)	
	Z-90		BT (Super-10)	
100 cc	MSR (Baja)		BTU (Pacer)	
	SR-100	175 cc	BT (Pacer)	350 cc
125 cc	B (Hummer)		BTH (Scat)	
			BTH (Bobcat)	
			SS 175	
			SX 175	
			C (Sprint)	
			H (Sprint)	
			SS (Sprint)	
			SS 250 (Two-Stroke)	
			SX 250 (Two-Stroke)	
			SS (Sprint)	
			SX (Sprint)	

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Maintenance

Common maintenance procedures are explained in detail in "General Information."

Lubrication

ENGINE

Two-Stroke Models

The crankshaft assembly (piston, con rod bearing, and left-side crankshaft bearing) is lubricated by the gas-oil mixture. 1973 and later models have an oil pump driven off the crankshaft which injects oil into the intake port. This system does not require maintenance except for a periodic check on the oil pump cable adjustment provided that the oil tank is kept full of oil. 1972 and earlier models use a pre-mix. When mixing the oil, on all models other than the M-100, use a ratio of one part oil to 25 parts gas (5 ounces oil to one U.S. gallon). This comes to about three measuring cupfuls (the oil cup attached to the gas tank cap) to one gallon of gas.

When mixing oil for the M-100, do so in a ratio of one part oil to 20 parts gas (6½ oz to one U.S. gal) or about four cupfuls to one gallon.

Sprint Models

The transmission and engine are both lubricated by a common oil supply which is made accessible by a filler hole located on the right-side crankcase cover. When checking the oil level, unscrew the filler cap, wipe it clean, insert the dipstick but do not screw in the cap, then remove it and observe where the oil line ends. This must be done with the machine standing vertically on a flat surface. The oil level should be no higher than the "max" mark, and must never be any lower than the "min" mark.

Change the engine oil every 1,000 miles in the summer, or every 500 miles in the winter for normal use.

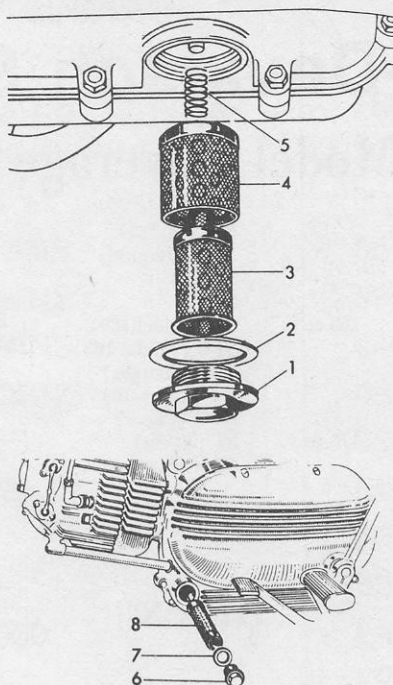
1. Run the engine until its normal operating temperature is reached, remove the drain plug, gasket, and the inner and outer oil filters or the oil cap assembly (1972 and later models), and allow the oil to drain into a suitable receptacle. The filter stop spring may drop off so be aware of its location.

2. Slowly kick the engine through several times with the ignition turned off to remove the last traces of oil which remain in the crankcase.

3. Clean the filters in a suitable solvent, then blow them dry. If the filter screens are clogged or damaged, they should be replaced.

4. Inspect the condition of the drain plug gasket, filter stop spring, oil filter cap, and cap O-ring for a damaged condition and replace them as necessary.

5. On 1963 and earlier models, remove the scavenger pump filter magnetic plug, plug gasket, and the filter screen, and allow the oil to drain into a suitable receptacle. Lean the bike over to the left to make sure that all the oil drains out.



- | | |
|-----------------------|------------------|
| 1. Oil drain plug | 6. Magnetic plug |
| 2. Drain plug gasket | 7. Plug gasket |
| 3. Inner screen | (1963 & earlier) |
| 4. Outer screen | 8. Filter screen |
| 5. Filter stop spring | (1963 & earlier) |

6. Clean the filter screen and magnetic cap in a suitable solvent and blow them dry.

7. Inspect the condition of the screen, gasket, and cap for a worn, clogged, or damaged condition and replace them as necessary.

8. Replace the drain assemblies taking care to seat the filter stop spring against the closed end of the outer filter. The inner filter closed end seats against the closed end of the outer filter, and the O-ring goes between the outer filter and the filter cap. Make sure there is no grit on the plug threads, then install and tighten them securely.

9. Add 2 qt of Harley-Davidson oil, check the level, secure the filler cap, and kick the engine through a couple times with the ignition off before starting the engine.

When changing the oil, replace it with an oil the grade of which is compatible with the lowest temperature expected before the next oil change. Use Harley-Davidson grade 58 oil for use in temperatures below 40 degrees Fahrenheit (40° F), grade 75 oil for temperatures above 40° F, and grade 105 oil for touring or high-speed operation in hot weather.

CHECKING OIL PRESSURE (SPRINT)

In order for the engine to operate with a sufficient amount of lubrication, the oil pump must deliver between 3-6 psi at 25 mph in high gear. The oil pump has no provision for adjustment, and must be re-

moved and repaired if the pressure drops below the specified limits.

Check the pressure by attaching Oil Pressure Gauge (H-D part no. 96921-52) and the associated hardware to the crankcase rocker arm oil feed line connection. Run the machine on the center stand until a reading can be obtained. If the pump does not check out, inspect it for blockage somewhere along the oil lines which could cut down the oil flow.

TRANSMISSION OIL

All of the two-stroke models have separate transmission compartments, for which the state of lubrication requires periodic attention. The Sprint models have a common oil supply for the engine and transmission assemblies.

The oil level in the transmissions of all of the two-stroke models should be checked monthly or every 750 miles. The oil should be changed to suit the season, annually, every 5,000 miles, or immediately if the transmission is ever immersed in water.

CHANGING FORK OIL

All of the fork models except the Tele-Glide fork used on the Model 165, Hummer, Super-10, Scat, Pacer, Ranger, and the Bobcat have a filler cap located at the top of each fork leg, and a drain plug located at the bottom of each leg. The Tele-Glide model has only a filler plug located in the center of the large hex-head cap screw into which the oil is poured. Harley-Davidson Sprint Fork Oil is recommended for use in all but the Tele-Glide forks which use Harley-Davidson Chain-Saver or engine oil.

1. Remove the fork filler caps, place a suitable receptacle beneath the fork leg drain plugs, remove the drain plugs, and allow the oil to drain out. Hold the front brake on and pump the forks to remove the last of the oil. On 1969 and earlier ML and MLS Models, remove the upper fork plug, invert the forks, and let them drain.

2. If it is necessary to flush the forks to remove traces of an incompatible oil or foreign particles, fill the fork with kerosene, pump them several times, and drain them out again.

3. Replace the drain plugs and pour in the correct quantity plus 10 cc to compensate for the oil which will remain in the filler device, or ½ oz if the forks have been taken down and are perfectly dry. Refer to the "Maintenance Data" chart for capacities.

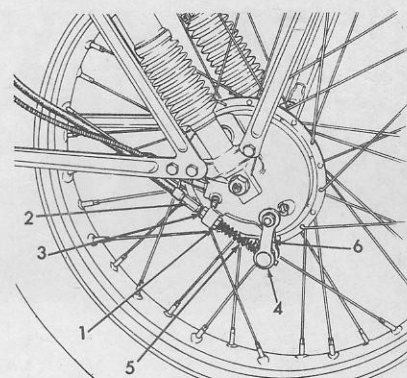
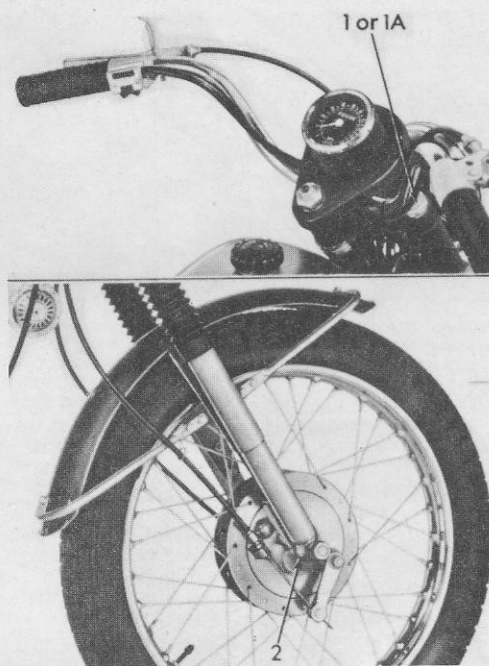
4. Replace and secure the filler caps and check the forks for smooth operation.

The Tele-Glide type forks don't require fork oil changes. Instead, the fork oil is replenished every 750 miles with one tube cap oil plug full of oil. The tube cap oil plug is located in the center of the tube caps.

AIR CLEANER

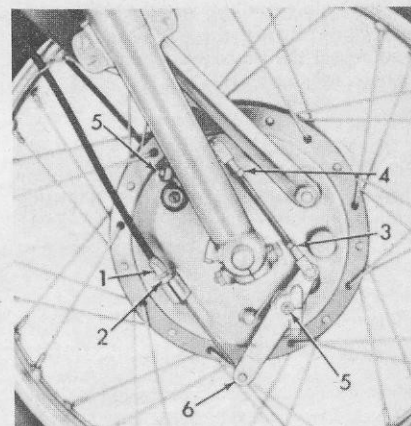
The metal, mesh filter elements can be cleaned in clean gasoline or a suitable solvent. Dip the element in clean, light-viscos-

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1. Adjusting sleeve lower lock nut
2. Adjusting screw
3. Adjusting sleeve upper lock nut
4. Operating lever slotted clevis pin
5. Control coil spring
6. Brake operating lever

Front wheel brake adjustment (S and B Models).



1. Adjusting screw
2. Locknut
3. Lower clevis adjustment
4. Upper clevis adjustment
5. Brake camshaft grease fittings
6. Cable block

Front wheel brake adjustment (1970 and later Sprint Models).

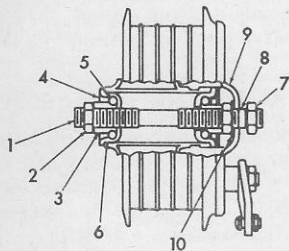
ity engine oil and allow it to drain thoroughly before installing it. Take care to place the filter gasket beneath the element when assembling the filter assembly.

The dry, corrugated paper element is cleaned by tapping the element to shake the dirt free and blowing on it with compressed air. If the element is exceptionally dirty, it may be cleaned in clean gasoline to remove oil or soot deposits. The element must be replaced at least every 10,000 miles, or more often if used in dusty conditions. Replace the element if it is ever immersed in water. This also applies to the cartridge elements (H-D part no. 29037-61) except they should be replaced every 2,500 miles.

Service Checks and Adjustments

Adjusting Cone Type Wheel Hub Bearings

Bearings such as these (found on some of the M and MS models) must be adjusted every 1,000 miles to keep the wheel spinning freely on the axle with only the smallest amount of drag.



1. Axle
2. Locknut
3. Bearing cone
4. Dust cover
5. Ball bearings
6. Bearing cup
7. Outer locknut, brake side
8. Outer spacer, brake side
9. Brake sideplate
10. Inner washer, brake side

Cone type wheel hub bearings.

Adjust the bearings in the following manner:

1. Remove the front wheel.
2. Loosen the wheel bearing cone locknut with a $1\frac{1}{16}$ in. wrench while holding the flat sides of the cone with a 15 mm open-end wrench or a suitable adjustable wrench.
3. Rotate the cone toward the wheel until it seats snugly against the bearing, then back it off $\frac{1}{4}$ turn so there is slight play when the axle is moved sideways.
4. Secure the cone locknut when the adjustment is correct, while holding the cone to prevent it from moving.
5. Mount the wheel and recheck the adjustment as it may be lost when the axle nuts are secured.

Brake Adjustments

FRONT BRAKE

When properly adjusted, the front brake lever will move about $\frac{1}{8}$ ($\frac{1}{4}$ on the S and B Models) of its total distance before the brake begins to engage. Raise the wheel, spin it to check for drag, and readjust it as necessary.

Loosen the adjusting screw locknut and rotate the adjusting screw clockwise to increase the free movement of the handle lever; counterclockwise to decrease its motion. If it becomes necessary to adjust the cable length, do so by loosening the cable set-screw or clamp stud and nut, and then pulling on the cable. Always take care to secure the adjusting apparatus after the adjustment is completed.

Whenever new shoes are installed on 1970 and later Sprint models, they must be equalized to make sure that both shoes contact the drum at the same time. Perform this operation by adjusting them both at their respective ends of the brake rod clevis while holding the brake on. The clevis adjuster should be loosened before the brake is operated, and retightened before it is released.

REAR BRAKE

Adjust the rear brake by turning the knurled nut, or the adjusting nut, until the brake begins to engage after the brake lever is depressed $\frac{1}{2}$ in. ($\frac{3}{4}$ –1 in. for the S and B Models). The adjusting nut has a notch which sits against the clevis pin in the brake actuating lever to keep the adjustment constant. Turn the nut in to tighten the brake, and out to loosen it. After the adjustment is complete, raise the wheel and spin it to check for drag, and readjust it as necessary.

Clutch Adjustment

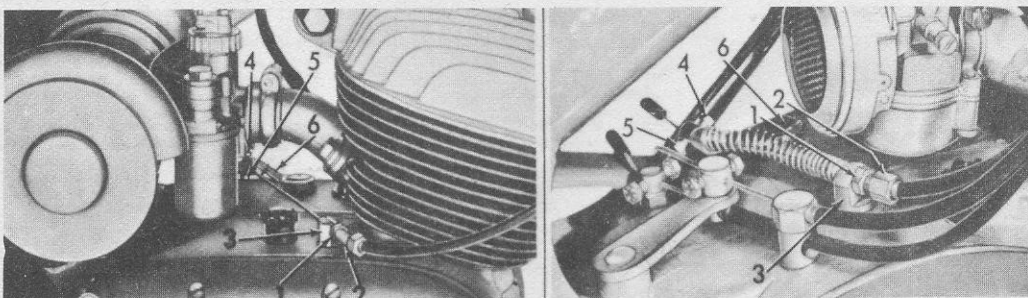
M-MODELS

All adjustments for these clutches are performed at the cable. If the clutch fails to hold and release properly after being adjusted, it will have to be taken apart to determine the reason.

Adjust the cable so the handle lever moves $\frac{1}{8}$ – $\frac{1}{4}$ of its total movement before the clutch begins to disengage. Loosen the cable screw locknut, turn the adjusting screw out to increase the play, or in to decrease it, and then secure the locknut.

If you run out of room at the cable adjuster, if the cable clamp has been re-

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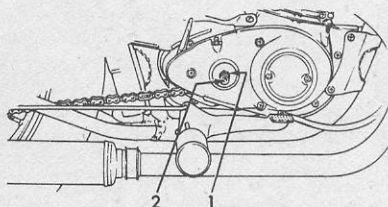
1. Clutch control cable screw locknut
2. Clutch control cable adjuster screw
3. Crankcase anchor
4. Clamping block setscrew
5. Clamping block setscrew
6. Clutch release lever

Clutch adjustment, M Models.

moved, or if a new cable is installed, loosen the two clamping block setscrews, screw in the adjuster so there are several threads remaining between the locknut and the crankcase anchor, tighten the setscrews while pulling on the cable with pliers to provide the necessary tension, and repeat the procedure described in the above paragraph.

S AND B MODELS

These clutches are adjusted by turning an adjusting screw which places tension directly on the push rods. The adjusting screw regulates the play in the clutch



1. Clutch adjusting screw lock nut
2. Clutch adjusting screw

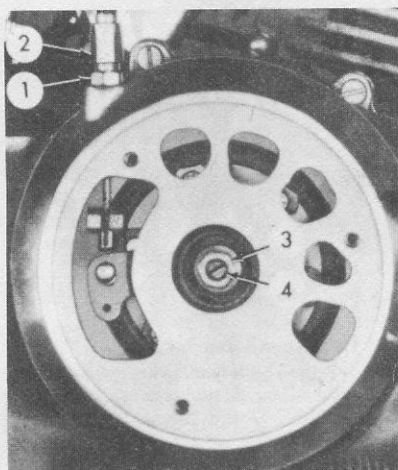
Clutch adjustment, S and B Models.

cable which should be about $\frac{1}{4}$ of its total movement before there is a noticeable increase in tension. Adjust the clutch by loosening the adjusting screw locknut, turning the adjusting screw counterclockwise one full turn to be certain that the clutch is fully engaged, and then turning the screw clockwise until you feel the release rod contacting the release disc. At this point the clutch is beginning to disengage and there will be an increase of tension on the adjusting screw. From this point, turn the screw counterclockwise $\frac{1}{4}$ turn and secure the locknut while holding the screw steady with a screwdriver. If the clutch still fails to hold and release properly, it should be taken apart to determine the cause.

SS/SX 175/250

1. Remove three screws from the clutch adjuster cover on the right crankcase cover. Remove the adjuster cover.

2. Loosen the locknut on the lower cable adjuster, and screw the adjuster all the way into the crankcase cover. The adjuster on the handlebar should be turned out a few turns.



1. Clutch cable adjuster locknut
2. Cable adjuster
3. Adjusting screw locknut
4. Adjusting screw

Clutch adjustment SS/SX 175/250

3. Loosen the clutch adjuster screw locknut, and turn the adjuster screw in until resistance is felt, continue to turn the screw in two more full turns.

4. Using the lower cable adjuster remove all the slack from the cable.

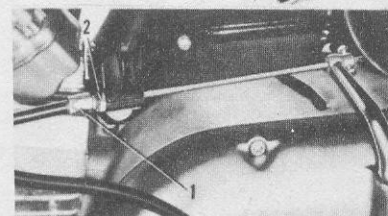
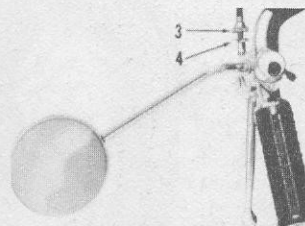
5. Back the clutch adjuster screw out until it just begins to turn easily, then turn it back in until resistance is just felt. From the point where resistance is just felt back the screw out $\frac{1}{8}$ turn to allow a small amount of free-play.

6. Using the cable adjuster on the handlebar adjust the cable free-play so that the lever can be moved $\frac{1}{8}$ – $\frac{1}{4}$ in. before the clutch begins to disengage. The free-play is measured between the lever and the lever housing.

SPRINT MODELS

All adjustments for these clutches are performed at the cable. If the clutch fails to hold or release properly after being adjusted, it should be taken apart to determine the reason.

There should be play of between $\frac{1}{8}$ – $\frac{1}{4}$ of the total movement of the handlebar before the clutch begins to disengage. Adjust the cable at the cable adjuster screw located at the crankcase. Loosen the locknut and turn the screw clockwise, for increased play, or counterclockwise, for less play, then secure the locknut. Minor adjustments can be made at the handlebar



1. Cable adjuster screw
2. Cable adjuster screw locknut
3. Hand lever adjuster
4. Hand lever adjuster locknut

Clutch adjustment, Sprint Models.

knurled nut.

Chain Adjustment

Chains should be adjusted with the rear wheel on the ground and someone sitting on the seat.

MODELS M-50 AND M-65

Loosen the axle nuts, then alternately rotate each of the adjusting nuts until there is $\frac{1}{2}$ in. free-play in the middle. The chain at its tightest point. Each of the adjusting nuts must be in the same position to align the rear wheel. The wheel should be directly in the middle of the rear forks and the chain should be aligned with the rear wheel sprocket. Secure the axle nuts and adjust the rear brake when the chain is properly adjusted and aligned.

MODELS M-125, M-100, SX/SS 175/200

These models are the same as the above two, except that the adjustment is made with a cam. The cam is operated by tapping on its ear. Make sure the two sides are kept even.

S AND B MODELS

These models are adjusted in the same manner as the previous models except that the adjusting nuts are located in front of the axle nut.

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SPRINT MODELS

These models are adjusted in the same manner as the previous models. The lock-nut must be loosened before and tightened after the adjustment procedure.

Recommended Lubricants

Oil Tank	H-D Two-Cycle injection oil
Pre-mix	H-D Two-Cycle oil
Transmission	H-D Two-Cycle oil
Two-Stroke	
Engine	H-D 75 above 40° F
Four-Stroke	H-D 58 below 40° F
	H-D 105 severe use
Forks	HDMCO Type C *
Cables	Light motor oil
Grease Fittings	H-D grease

* Ceriani forks use H-D type A

Periodic Maintenance

SERVICE

Interval	Operation
Every 1,000 miles	Clean and gap spark plugs Clean air filter element Clean the oil pump filters Adjust the drive chain Adjust the brakes Check the transmission oil Change the engine oil Check the battery Check the tire pressure Tighten all the nuts and bolts
Every 2,000 miles	Contact point condition, gap, and timing Adjust the clutch Adjust the tappets Gas filter
Every 5,000 miles	Change the transmission oil Decarbonize Replace spark plug Check the fork bearings Check the wheel spokes Check generator brushes and commutator Check the shock bushings
Every 10,000 miles	Clean and adjust the carburetor
OIL	
Every 1,000 miles	Drive chain Front forks
Every 2,000 miles	Clutch handle lever and gearshift control Clutch handle lever Brake handle lever Brake cable Clutch cable Gearshift cable Saddle hinge assembly (1965 and earlier) Contact breaker felt oilers Brake control joints

GREASE

Every 2,000 miles	Speedometer drive unit Tachometer drive unit Front brake operating shaft Rear brake pedal Rear brake operating shaft Rear fork pivot bushings Contact breaker cam
Every 5,000 miles	Throttle grip Wheel bearings Speedometer cable Tachometer cable
Every 10,000 miles	Repack steering head bearings

Tire Specifications

Model	Front (in.)	Front Pressure (psi)	Rear (in.)	Rear Pressure (psi)
M (1965)	2.00 X 18	23	2.00 X 18	35
M, MS (1966-70)	2.00 X 17	23	2.00 X 17	35
ML (1968)	2.50 X 17	21	2.50 X 17	28
MS (1971)	2.50 X 17	22	2.50 X 17	30
MS (1972)	2.50 X 17	25	3.00 X 16	21
MLS (1968-69)	2.50 X 17	21	3.00 X 17	28
MLS (1970-71)	3.00 X 18	22	3.50 X 18	22
MLS (1972)	3.00 X 19	18	3.50 X 18	18
MSR (1970-72)	3.00 X 21	18	3.50 X 18	22
MC (1972)	3.00 X 10	18	3.00 X 10	22
Model 165, Hummer, and the 1960 Super-10	3.50 X 18	12	3.50 X 18	14
Super-10 (1961)	3.50 X 16	12	3.50 X 16	14
BT, BTU (1962-66)	3.50 X 16	12	3.50 X 16	14
BTH, BTF (1962-66)	3.50 X 18	12	3.50 X 18	14
Sprint C	3.00 X 17	20	3.00 X 17	24
Sprint H	3.00 X 18	18	3.50 X 18	18
Sprint SS	3.25 X 19	18	3.50 X 18	22
Sprint SX	3.50 X 19	18	4.00 X 18	18
MC-65, X-90	3.00 X 10	18	3.00 X 10	22
Z-90	2.50 X 17	25	3.25 X 16	22
SR-100	3.00 X 21	18	3.50 X 18	21
TX-125	3.00 X 19	18	3.50 X 18	18
SX-175 (1974-75)	3.00 X 19	22	3.50 X 18	25
SX-175 (1976)	3.00 X 19	20	4.00 X 18	24
SS-175	3.25 X 19	20	4.00 X 18	24
SV-250 (1974-75)	3.00 X 19	22	3.50 X 18	25
SX-250 (1976)	3.00 X 21	22	4.00 X 18	26
SS-250 (1974-75)	3.25 X 19	22	4.00 X 18	25
SS-250 (1976)	3.25 X 19	22	4.00 X 18	26

Maintenance Data

Model	Engine Oil Capacity (qts)	Gearbox Oil Capacity (pts)	Fork Oil Capacity (oz)	Gas Tank Capacity (gal)	Reserve Tank Capacity (qts)
M-50 (M, MS)	NA	1	2.25	⑧	—
M-65 (M, MS)	NA	1	2.25	⑧	⑤
Baja (MSR)	NA	1	②	2.5	1
Hummer (B)	NA	1.25	one capful	1.5	1.5
M-125 (ML)	NA	1	②	2.5	—
Rapido (ML, MLS)	NA	①	②	2.4	1
Model 165 (ST, STU)	NA	1.25	one capful	1.75	—
Super-10 (BT, BTU)	NA	1.25	one capful	1.87	—
Pacer (BT, BTU)	NA	1.25	one capful	1.87	—
Scat (BTH)	NA	1.25	one capful	1.87	—
Ranger (BTF)	NA	1.25	one capful	1.87	—
Bobcat (BTH)	NA	1.25	one capful	1.87	—
Sprint (C)	2	NA	4.50	4	⑥
Sprint (H)	2	NA	4.50	④	⑥
Sprint (SS/SX)	2.1	NA	4.50	④	1
MC 65	NA	1	NA	1.4	1.75
X 90	NA	1.3	NA	1.4	1.7
Z 90	NA	1.3	NA	2.4	1.0
SR 100	NA	1.3	4.5	2.5	1.0
TX 125	NA	1.3	4.5	2.4	1.0
SX 125	NA	1.3	4.5	2.4	1.0
SS/SX 175	NA	2.5	⑦	2.2	1.2
SS/SX 250	NA	2.5	⑦	2.2	1.2

① Gearbox Capacity (pt)

ML—1.0
MLS—1.3 (1970 and later models)

② Fork Oil Capacity (oz)

3.75 (pre-1970 ML, MLS, and MSR)
4.50 (post-1969 ML, MLS, and MSR)

③ Gas Tank Capacity (gal)

M—1.6
MS—2.5

④ Gas Tank Capacity (gal)

Model H—2.64 (1966 and earlier models)
5.1 (1967 and later models)
Model SS—2.9 (1966 and earlier models)
2.6 (1967 and later models)

⑤ Reserve Tank Capacity (qt)

1—1970 and later Leggero models only

⑥ Reserve Tank Capacity (qt)

Model C—2 (1961 only)
1.4 (1962-65)
1 (1966 and later)
Model H—0.62 (1963-65)
1 (1966 and later)

⑦ Marzocchi 6—Type C

Ceriani 5¼—Type A
Betor 5¼—Type C

NA Not applicable

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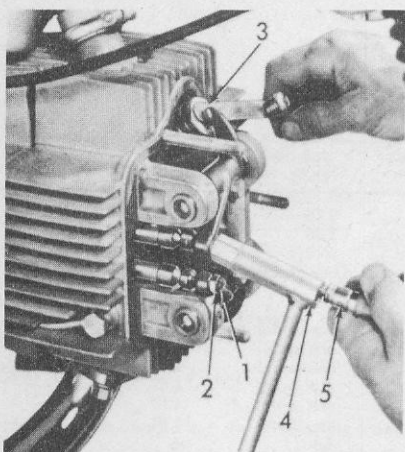
Tune-Up

NOTE: Common Tune-up procedures are explained in detail in "General Information."

Valve Tappet Adjustment

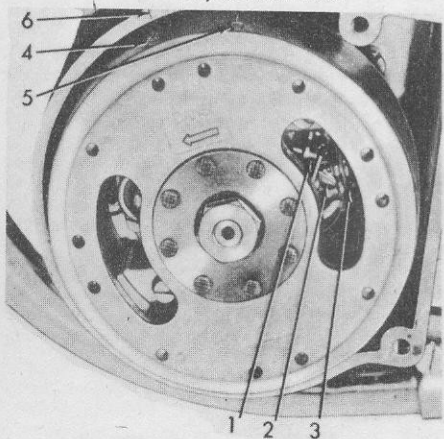
Valves must be adjusted with the engine cold.

1. Remove the rocker arm or tappet covers.
2. Remove the spark plug and place the transmission in high gear to facilitate engine rotation.
3. Rotate the engine until either rocker arm is at the bottom of its travel (valve open). The opposite valve is now closed and may be adjusted.
4. Insert a feeler gauge between the valve stem and the rocker arm pad to measure clearance. A slight drag while removing the gauge indicates a correctly adjusted valve. Try using the next over and undersize feeler gauges to determine whether or not the selected gauge is the correct one.
5. Loosen the adjusting screw locknut to adjust the tappet.



1. Adjustment screw (2)
2. Locknut (2)
3. Feeler gauge
4. Wrench
5. Screwdriver

Tappet adjustment. A box-end wrench makes a good substitute for the factory tool shown here.



6. Rotate the tappet screw clockwise to reduce clearance or counterclockwise to increase it. Secure the locknut while holding the screw steady with a screwdriver, and recheck the clearance.
7. Rotate the engine until the opposite valve is closed and repeat the above procedure.
8. Secure the cover, taking care not to damage the cover gasket.

Breaker Point Ignition

CONTACT BREAKER POINTS REPLACEMENT AND IGNITION ADJUSTMENT

M, X, Z, TX, SX125, SR MODELS

Contact Point and Condenser Replacement

When points become excessively worn, uneven, burned, or pitted, they must be replaced in the following manner:

1. Remove the crankcase side cover as described in the "Starter" section.
2. Remove the rotor nut, washer, and rotor. The rotor may be pulled with Puller Tool (H-D part no. 97344-65P) or (97302-70M) for MSR models, or a suitable substitute.
3. Remove the contact point screw, retaining clip, and washers to free the points.
4. Replace points in the reverse order of disassembly, making sure that the point mating surfaces seat evenly against one another.

Replace the condenser while replacing the points. The condenser leads must be soldered to the magneto coil. Consult the appropriate wiring diagrams for the correct connections.

Contact Point Adjustment

1. Disconnect the spark plug and remove the crankcase side cover as described in the "Starter" section.
2. Rotate the engine until the points open to their farthest travel.
3. Insert a feeler gauge and check the gap. Gap is correctly set when there is slight drag on the gauge when moved in and out.

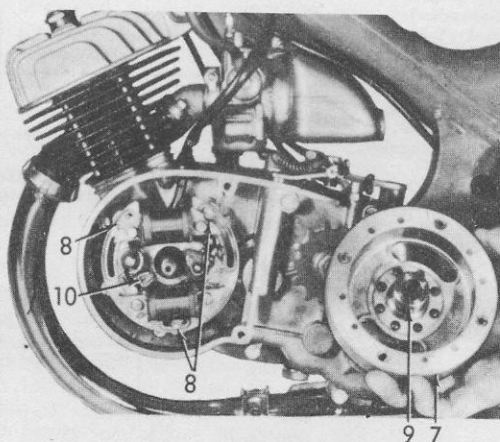
4. If adjustment is necessary, loosen the lock screw and pry at the adjustment slot with a screwdriver to open or close the points as required.
5. Secure the lock screw when the points are correctly set. Consult the specifications chart for proper setting.
6. Recheck the gap to make sure that tightening the lock screw did not affect the adjustment.
7. Apply a few drops of engine oil to the felt cam follower oiler.

Ignition Timing Adjustment

Ignition timing should be checked whenever points are replaced, once a year, or whenever necessary. The "A" mark on the rotor indicates the proper rotor position for timing the engine and the "O" mark indicates top dead center.

1. Adjust the contact points as described in "Contact Point Adjustment."
2. Place the transmission in high gear and remove the spark plug to facilitate engine rotation. By rotating the rear wheel, the rotor may be moved to align the timing mark on the crankcase with the rotor "A" mark. The points just begin to open at this position causing spark to occur.
3. Static-time the engine using a timing light, a buzz box, or some similar device which indicates the moment the points open. A test lamp can be fabricated by wiring a 3 candle power (c.p.) taillight bulb in series with a 6 V storage battery.
4. Rotate the engine in the direction indicated by the arrow on the rotor until the timing marks align. At this point, the bulb should glow dimly or flicker rather than glow brightly as it will when the points are closed. If it does not become dim, remove the rotor as described in "Contact Point and Condenser Inspection and Replacement" and perform the following operations:

- a. Loosen the base plate securing screws and shift the magneto base plate to the right to advance the timing or to the left to retard it.
- b. Inserting a piece of cellophane between the points and tugging gently on it while moving the base plate will help find out when the points begin to open



Contact breaker and timing marks.

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since the cellophane will be released at the proper position.

c. Secure the base screws and check to see that the point gap has not changed. Reset the gap and repeat the timing procedure if the gap has been affected.

5. Strobe-time the ignition with the engine operating at its normal operating temperature at a fast idle.

6. Aim the light at the timing marks and note whether they appear in alignment. Correct advanced or retarded timing in the same manner as described in step four.

B MODELS

Contact Point and Condenser Replacement

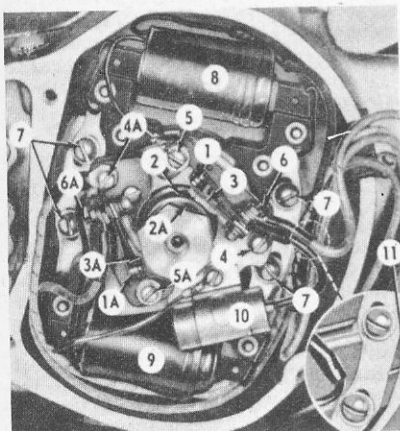
Replace points in the following manner:

1. Remove the sprocket and magneto-generator cover screws, then shift the cover out of the way.

2. Remove the point pivot and lock-screws from the ignition and stop light contact points.

3. Disconnect all contact point leads from their respective terminals and remove the point assemblies.

4. Replace the points in the reverse order of disassembly, making sure that the point mating surfaces seat evenly against one another.



Contact breaker for all B Models except the Ranger (BTF).

1. Contact breaker points (Ignition)
2. Contact breaker cam (Ignition)
3. Fiber cam follower and felt oiler (Ignition)
4. Contact breaker assembly pivot screw (Ignition)
5. Contact breaker assembly terminal (Ignition)
6. Contact breaker assembly terminal (Ignition)
- (Condenser and spark coil wires connected here)
- 1A. Contact breaker points (Stoptight)
- 2A. Contact breaker cam (Stoptight)
- 3A. Fiber cam follower and felt oiler (Stoptight)
- 4A. Contact breaker assembly pivot screw (Stoptight)
- (Spark coil and ignition-stop light coil wires connected here)
- 5A. Contact breaker assembly lock screw (Stoptight)
- 6A. Contact breaker assembly terminal (Stoptight)
- (Stop lamp wire connected here)
7. Magneto-generator mounting screws (4)
8. Head lamp and tail lamp lighting coil
9. Ignition-stop light coil
10. Condenser
11. Timing marks on magneto-generator base and crankcase, indicating original factory timing

Contact Point Adjustment

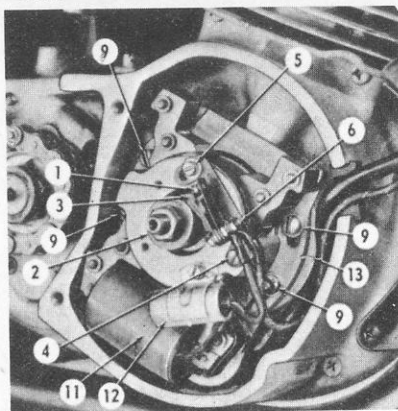
The cam felt oiler should be kept lightly lubricated with engine oil.

1. Disconnect the spark plug and remove the magneto cover.

2. Rotate the engine until the cam follower is at the cam's highest point. Check the gap by inserting a 0.018 in. wire feeler gauge between the points.

3. If the points are in need of adjustment, do so in the following manner:

a. Place the transmission in high gear and rotate the rear wheel until the cam follower is at its highest point on the cam.



Contact breaker for the Ranger (BTF).

1. Breaker points
2. Breaker cam
3. Fibre cam follower and felt oiler
4. Pivot screw
5. Lock screw
6. Condenser and spark coil terminal
9. Mounting screws (4)
11. Ignition coil
12. Condenser
13. Timing marks

b. Loosen the pivot screw slightly and then the lock screw enough to allow the point base to shift when tapped.

c. Tap the point base at the lock-screw until a gap of 0.018 in. is obtained and then secure the lock and pivot screws.

d. Check the gap.

Procedure for stop light points adjustment:

1. Perform the same operation as for the ignition points.

Ignition Timing Adjustment

The timing marks are located on the magneto base and crankcase and serve as a guide when using a timing light.

1. Remove the magneto cover and cylinder head. The cylinder may be secured in position by placing a stack of washers on the cylinder studs to approximate the thickness of the cylinder head, and then securing them with a stud nut.

2. Adjust the contact point gap as described in the previous section.

3. Rotate the engine in the manner described in the previous section until the piston reaches its highest point of travel (top dead center) then measure the distance from the top of the piston to the top edge of the cylinder bore, taking care not to move the piston.

4. Rotate the engine backward $\frac{7}{32}$ in. from the point found in step three.

5. Loosen the base mounting screws and shift the base until the timing marks are in alignment. Clockwise movement will retard the timing and counterclockwise motion will advance it. Secure the base screws.

6. Check and reset the point gap, if necessary, and repeat the timing operation if the gap has changed.

7. A test light can be used as described in the Model M "Ignition Timing Adjustment" section, except that the timing is retarded when the base is moved clockwise. This method should be used if the base has been replaced and the timing marks are no longer accurate.

8. Secure the cylinder head and the magneto cover.

MODEL 165

Contact Point and Condenser Replacement

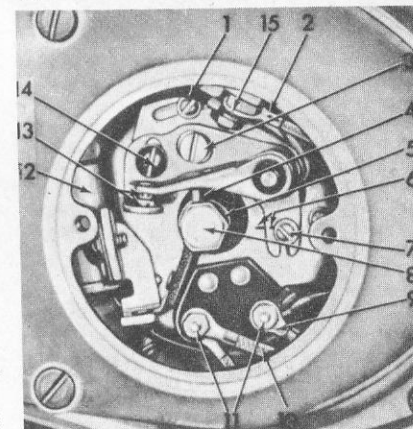
1. Remove the condenser lead from the contact point plate terminal.

2. Remove the spring lever and point from the terminal.

3. Remove the lock screw and lift the remaining point and support plate free.

4. Replace the points in the reverse order of disassembly making sure the spring and lever notch are secured by the terminal screw between the nut and the condenser lead.

5. Bend the breaker plate, if necessary, to seat the point mating surfaces squarely against one another.



Contact breaker for the Model 165.

1. Lock screw
2. Wire to coil
3. Eccentric adjusting screw
4. Fiber cam follower
5. Cam
6. Timing marks
7. Lock screw
8. Cap screw
9. To "Gen." terminal of voltage reg.
10. To "F" terminal of voltage reg.
11. Generator terminals
12. Condenser
13. Breaker points
14. Lock screw
15. Contact breaker plate terminal

Contact Point Adjustment

1. Remove the contact breaker cover, place the transmission in high gear, and rotate the engine until the cam follower is at its highest point on the cam.

2. Check the point gap with a 0.020 in. wire feeler gauge. If the gap is in need of adjustment, do so in the following manner:

a. Loosen the point lock screw and rotate the eccentric adjusting screw until the points are open exactly 0.020 in. when the follower is at its highest point on the cam.

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- b. Secure the lock screw and check the gap. There should be a slight tugging on the gauge when trying to remove it. Check the gap by comparing the fit of the next size over and under gauges.
- c. Replace the breaker cover.

Ignition Timing Adjustment

The following method is not dependent on the factory timing marks and should be performed whenever the points are replaced or at least once annually.

1. Steps 1-3 as given for the B Models.
2. Rotate the engine backward $\frac{1}{4}$ in. from the point found in step three.
3. Loosen the point lock screws and shift the point base so the follower is approaching the highest point of the cam and the points are just beginning to open.
4. Use a test lamp as described in the Model M "Ignition Timing Adjustment" section. The leads are connected to ground, the positive terminal, and to the black timer wire from the generator frame.
5. Secure the lock screws and recheck the point gap. If the gap has changed, it must be reset along with the timing.
6. Secure the breaker cover and the cylinder head.

SPRINT MODELS

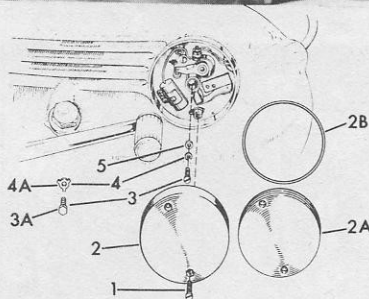
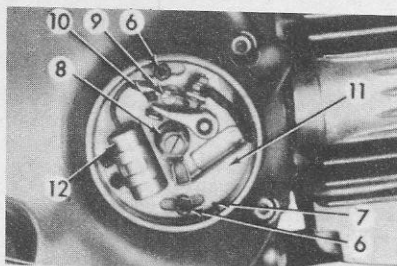
Contact Point and Condenser Replacement

1. Remove the contact breaker cover screws. Remove the cover by screwing 5 mm screws in the cover holes until the cover is forced off. Screws are available from your dealer (H-D part no. 2863P).
2. Remove the lock screw and the lead to the points to remove the points from the pivot stud.
3. Replace the points in the reverse order of disassembly.
4. Bend the point contact plate to seat the point faces squarely against one another.

Contact Point Adjustment

Apply a small daub of High-Temperature Lubricant (H-D part no. 99862-72) to the cam follower taking care to avoid excessive lubrication. Engine oil or another high-quality grease may be substituted but will probably require renewal more often.

1. Remove the circuit breaker cover as described in the previous section.
2. Place the transmission in high gear and rotate the rear wheel until the points are fully open.
3. Insert a wire feeler gauge set at 0.018 in. between the points. If the gap is in need of adjustment, do so in the following manner:
 - a. Loosen the lock screw.
 - b. Pry at the prying notch to shift the fixed contact until a gap of 0.018 in. is attained. There should be a slight tugging on the gauge when trying to remove it.
 - c. Secure the lock screw and recheck the gap by inserting the next over and undersize gauges and then comparing them.
 - d. Replace the breaker cover.



Contact breaker for the Sprint Models.

1. Contact Breaker Cover Screw (2)
2. Contact Breaker Cover (1971 and earlier SS)
- 2A. Contact Breaker Cover (1971 & later SX, 1972 & later SS)
- 2B. O-Ring (1971 & later SX, 1972 & later SS)
3. Cam Screw
- 3A. Cam Screw (1962 & later)
4. Cam Lockwasher
- 4A. Cam Lockwasher (1962 & later)
5. Cam Washer (1961)
6. Hex Screw (2)
7. Timing Marks
8. Cam
9. Lock Screw
10. Notch to Support Screw Driver
11. Contact Breaker Plate
12. Condenser

Ignition Timing Adjustment

If the base plate has been removed or if the factory timing marks are no longer valid for any reason, static-time the engine. If a strobe light is available, a more accurate adjustment can be attained. If the timing marks are not valid, new ones may be scribed by static-timing the engine and making arbitrary marks on the base plate and crankcase.

STATIC TIMING PROCEDURE:

1. Clean and adjust the contact points as described in the above section.
2. Set the advance mechanism in the advance position in the following manner:
 - a. Remove the breaker plate hex screws and plate.
 - b. Loosen the cam lock screw.
 - c. Insert a wedge to spread the advance weights or place a Timing Washer (H-D part no. 97334-62 for 1968 and earlier) or a suitable substitute under the cam screw and secure the cam. This will hold the weights in the advance position.
3. Attach a test light in the following manner:
 - a. If the engine is installed in the frame, connect one lead to the black coil wire at its terminal and ground the other on the engine.
 - b. If the engine is out of the frame, connect a ground lead from the engine to the battery negative terminal and

another from the points wire stud screw to the test light and from the test light to the battery positive terminal.

c. With the engine in the chassis, the light will dim as the points open and glow brightly when they close. With the engine removed from the frame, the light will glow when the points open and dim when they close.

4. Place the transmission in high gear and rotate the rear wheel until the left flywheel timing mark is in the center of the access hole. (1971 and later models), or find top dead center (TDC) with the aid of a dial gauge or by removing the head and rotating the engine until the piston is just approaching the highest point of its travel.

5. If the top dead center method is being used, consult the B Models section for measuring instructions. The piston position should be:

1961-66	$\frac{1}{32}$ in. (0.406 in.) BTDC;
1967 (original factory specification)	$\frac{1}{32}$ in. (0.350 in.) BTDC;
1967-68	$\frac{1}{4}$ in. (0.250 in.) BTDC;
1969-72	$\frac{1}{32}$ in. (0.219 in.) BTDC;
1973-74	$\frac{1}{32}$ in. (0.338 in.) BTDC.

1961	41°	21°
1962-66	41°	5°
1967-68	35°	5°
1969-72	28°	7°
1973-74	34°	12°

6. Rotate the engine in the direction of normal operation to note whether the light comes on before this position is reached. If the light comes on too early, the timing is too advanced and the base plate must be rotated clockwise. If it comes on late, the timing is too retarded and the base plate must be rotated counterclockwise. Secure the plate screws and recheck the timing. Make sure you release the advance weights before replacing the breaker cover.

STROBE LIGHT TIMING PROCEDURE (1970 AND EARLIER MODELS)

1. Remove the breaker and tachometer drive covers from the right and left sides of the crankcase respectively.
2. Install a Crankshaft Degree Indicator Tool (H-D part no. 95860-67P) in the end of the left-hand threaded generator armature and an indicator bracket on one of the crankcase screw holes. A degree wheel, such as the one in the back of the book, may be made out of cardboard or something similar, and a piece of mechanic's wire may be used as an indicator.
3. Locate TDC as described in the above section.
4. Adjust the indicator or degree wheel until 0° is in line with the indicator. Rotate the engine to make certain that 0° will be indicated when the piston is at TDC. Since the crankshaft will move in either direction a few degrees before the piston begins to move, 0° should be set halfway between the points at which the piston begins to move.
5. Connect the strobe leads to ground, the spark plug terminal, and the ignition coil negative terminal or as directed by the strobe manufacturer.
6. With the engine running at normal operating temperature, observe the degree

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indication of the strobe light on the degree wheel. The engine was on the exhaust stroke rather than the compression stroke if the 0° reading is 180° off the indicated bracket mark position, and the degree wheel must be loosened and reset on the compression stroke.

7. With the engine operating at 4500 revolutions per minute (rpm) for advanced timing or 800 rpm for retarded timing, observe the indicated degree of crankshaft rotation and shift the breaker base until the proper position is attained.

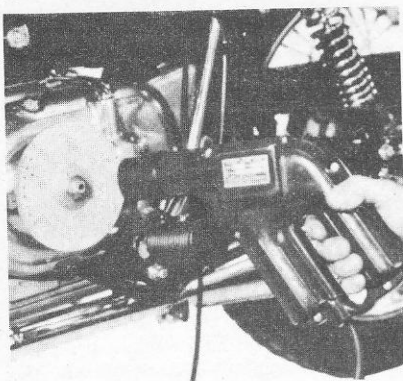
Model Year	Advance (BTDC @ 4500 rpm)	Retard (BTDC @ 800 rpm)
1961	41°	21°
1962-66	41°	5°
1967-68	35°	5°
1969-70	28°	7°

8. Secure the breaker base and recheck the timing.

STROBE LIGHT TIMING PROCEDURE (1971-72 MODELS)

1-2 Same as above.

3. Rotate the engine until the flywheel timing mark is aligned in the inspection hole.



Strobe timing 1971 and later models.

4. Set the degree wheel so the indicator reads 28°, and secure the wheel. This relates to the flywheel timing mark which is also at 28° advance.

5. Secure the inspection hole cover to avoid oil spray.

6. Operate the engine at normal operating temperature at an idle speed of 1200-1500 rpm and observe the indicated timing with the strobe light as directed in the above section. Retarded timing should be at 7° BTDC.

7. Operate the engine at 5000 rpm to check advance timing which should be from 26-30°.

8. Adjust the breaker base as described in the above section to correct timing.

9. If repeated attempts to adjust advanced timing fail, inspect the advance unit or replace it.

STROBE LIGHT TIMING PROCEDURE (1973-74 MODELS)

1. Remove the timing hole plug from the left crankcase cover.

2. At idle (1200-1500 rpm) the "R" mark (retard timing mark) should align with the pointer in the middle of the timing hole.

3. With the engine running at 5000 rpm

the "A" mark (advance timing mark) should be visible in the timing hole.

4. The timing should be adjusted in the retarded position. If, when the retarded timing is correct, the "A" mark can not be seen in the timing hole at 5000 rpm, inspect the spark advancer for proper operation and replace if necessary.

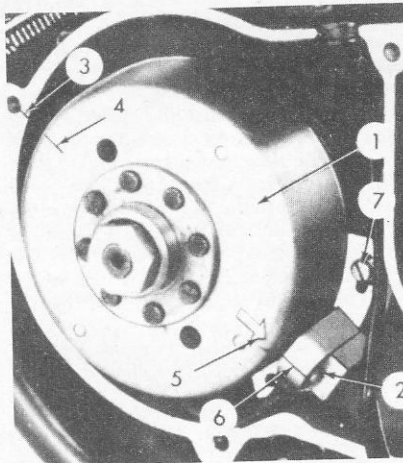
Capacitor Discharge Ignition

SS/SX 175/250 models are equipped with a capacitor discharge ignition system (CDI). This type of ignition does not use contact breaker points. Instead a pick-up coil is used to trigger the silicon controlled rectifier (SCR) which then allows the capacitor to discharge the energy it has stored into the secondary winding of the coil, causing a spark to jump across the spark plug gap.

Ignition Timing

1. Ignition timing is adjusted by moving the pick-up coil so that it aligns with the arrow on the rotor when the piston is positioned 20.5° (0.1 in./2.5 mm) BTDC.

2. The piston can be positioned by aligning the slash mark on the rotor with the slash mark on the front of the crankcase. With the rotor in this position, the slash mark on the pick-up coil should be aligned with the arrow on the rotor.



When the timing marks (3 and 4) align the arrow (5) on the rotor (1) should align with the slash mark (6) on the pick-up coil (2). If adjustment is necessary, loosen the screw (7) and move the pick-up coil

3. Although the factory timing marks will provide satisfactory timing in most cases, timing can also be adjusted using a dial indicator to position the piston. If the dial indicator is to be used proceed as follows:

a. Remove the head and mount the dial indicator to the top of the cylinder so that the actuating arm rests on the top of the piston. Position the piston at TDC and zero the indicator

b. Turn the rotor in the opposite direction of normal rotation until the indicator shows the piston has moved 0.1 in. (2.5 mm). Align the pick-up coil with the arrow on the rotor.

4. Adjust the gap between the pick-up

coil and the rotor to 0.012-0.016 in. (0.3-0.4 mm).

Carburetor Adjustments

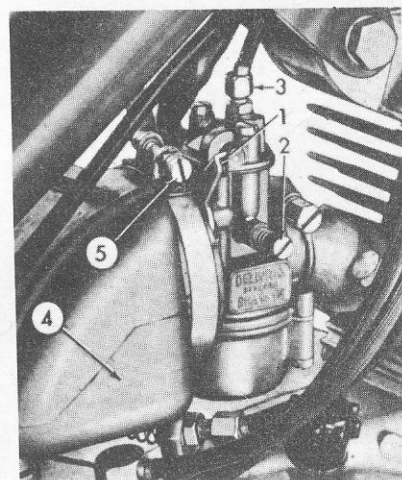
M-50 AND M-65 CARBURETORS

1. Check to see that the throttle and choke are fully closed and adjust the throttle cable if necessary by loosening the carburetor control locknut and adjusting nut, and increasing or decreasing the cable length as required.

2. Adjust the idle with the throttle fully closed. Turning the idle stopscrew in increases the idle speed, and backing it out will decrease it.

3. On 1966 and later models, adjust the idle mixture screw to get the smoothest idle at low speeds. Avoid excessively low speeds as this will cause hard starting.

4. Adjust the mixture by altering the position of the metering pin in its clip. Raising the pin will richen the mixture and lowering it will make the mixture leaner.



Carburetor adjustments (shown is the 1965 Model M-50).

1. Choke
2. Idle stop screw
3. Carburetor control coil adjusting nut
4. Air cleaner silencer
5. Screw

The middle groove is for normal operation.

5. If additional mixture adjustments are necessary, the mainjet should be replaced.

6. If the engine still runs irregularly due to the carburetor, disassemble the carburetor and clean it thoroughly in a suitable solvent and blow all passages clear.

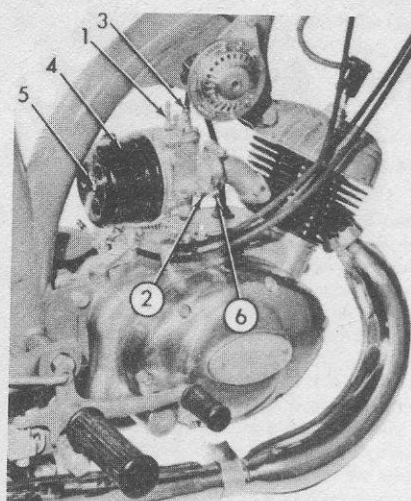
M-100 AND M-125 CARBURETORS

1. Adjust the idle speed by manipulating the idle stopscrew. Loosen the lock-screw and turn the stopscrew clockwise to raise the idle speed and counterclockwise to decrease it, then secure the lock-screw. Readjust the throttle cable if necessary to remove any excess play or tension.

2. Adjust the idle mixture by manipulating the idle mixture screw. The normal setting is 3/4 turn off its seat but may be adjusted richer by turning it counterclockwise. If the engine runs irregularly adjust it slightly leaner.

3-6. Same as for the M-50 and M-65.

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1. Choke
2. Idle stop screw
3. Carburetor control coil adjusting nut
4. Air cleaner silencer
5. Screw
6. Idle mixture screw

Carburetor adjustments (shown is the 1966 and later Models M-50 and M-65).

MODEL 165 CARBURETOR

1. Adjust the idle speed by loosening the adjusting sleeve locknut and turning the adjusting sleeve up to increase idle speed and down to decrease it. Secure the locknut.

2. The mixture is regulated by the position of the metering pin in the pin retainer. There are four positions available. The normal setting is in the second groove from the top. A richer mixture can be attained by lowering the pin (placing it in the top groove); a leaner mixture can be attained by raising the pin.

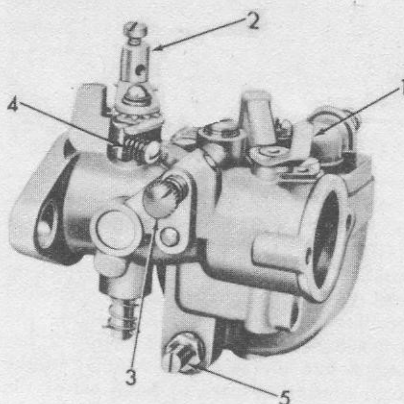
3. To adjust the pin remove the cap, spring, and throttle piston from the carburetor body. Reposition the pin as desired.

4. When replacing the control wire, take care not to bend the retainer.

5-6. Same as for the M-50 and M-65.

B-MODEL CARBURETOR

1. Screw the idle mixture adjusting screw gently in to its seat then back it out $\frac{3}{4}$ turn.



1. Choke lever (open position)
2. Throttle lever
3. Idle mixture adjusting screw
4. Throttle stop screw—with which closed throttle idling speed is adjusted
5. Mixture main adjusting screw

Carburetor adjustments, B Model.

2. Screw the main mixture adjusting screw gently in to its seat then back it out one full turn.

3. Open throttle halfway and hold it so the engine runs at a constant speed. Slowly turn the main adjusting screw in until the engine speed begins to decrease. Slowly back out the screw until optimum speed and power is attained. This should require no more than $\frac{1}{8}$ – $\frac{1}{4}$ turn.

4. Check to see that the throttle cable allows the throttle to close fully, then adjust the throttle speed slightly higher than usual by turning in the throttle stop screw.

5. Slowly turn the idle mixture adjusting screw clockwise until the engine speed begins to decrease. Slowly back out the screw until engine operation is its smoothest. This should require no more than $\frac{1}{8}$ turn.

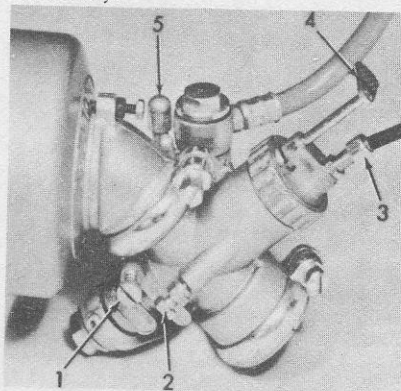
6. Back out throttle stop screw until a satisfactory idle speed is achieved. Turn-

ing the screw in raises the idle speed; backing it out reduces it.

7. If the engine still runs irregularly due to the carburetor, disassemble the carburetor and clean it thoroughly in a suitable solvent and blow all passages clear.

SPRINT CARBURETORS

1. Adjust the idle speed by loosening the locknut (1968 and earlier models) and turning the throttle piston stop screw. Turning the screw clockwise raises the idle speed; counterclockwise reduces it. An idle speed of 1,200 rpm will prove most satisfactory.



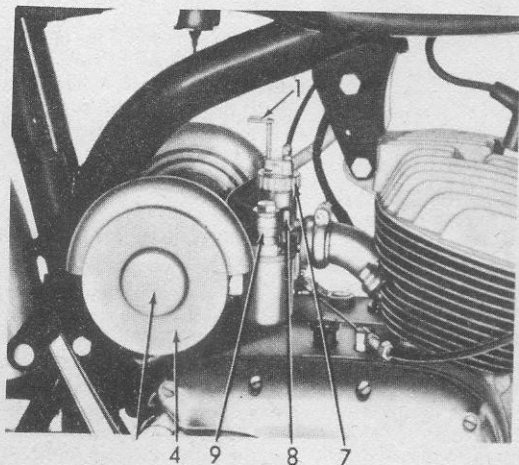
1. Low speed mixture adjusting screw
2. Throttle piston stop screw
3. Control coil adjusting screw
4. Choke
5. Float pin

Carburetor adjustments (1968 and earlier Sprint Models).

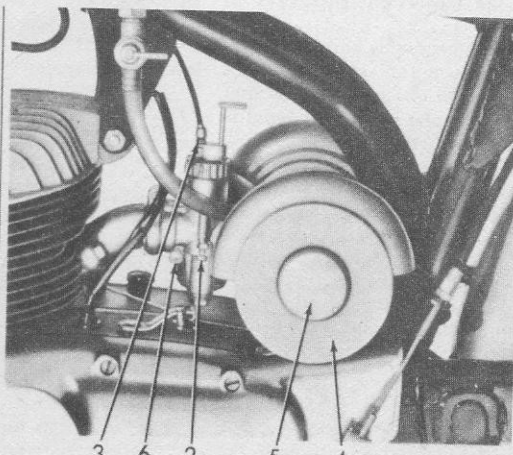
2. Loosen the control coil adjustment screw locknut and adjust the cable to remove excessive tension or slack, then secure the locknut.

3. Turn the low-speed mixture adjusting screw gently in to its seat, then back it out $\frac{3}{4}$ turn for 1968 and earlier models and $1\frac{3}{4}$ turns for 1969 and later models. If the engine runs irregularly at low speeds, the mixture is probably too rich. Turning the screw counterclockwise on 1968 and earlier models, and clockwise on 1969 and later models, will lean out the mixture.

4-6. Same as for the M-50 and M-65.



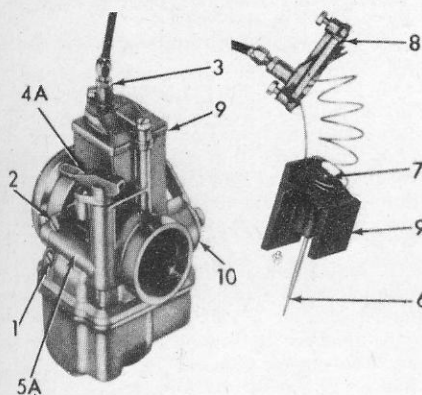
1. Choke
2. Throttle piston stop screw
3. Carburetor control coil adjusting screw



4. Air cleaner cover
5. Fastener
6. Idle mixture screw
7. Throttle piston cap
8. Float pin
9. Fuel filter screen

Carburetor adjustments, M-100 and M-125.

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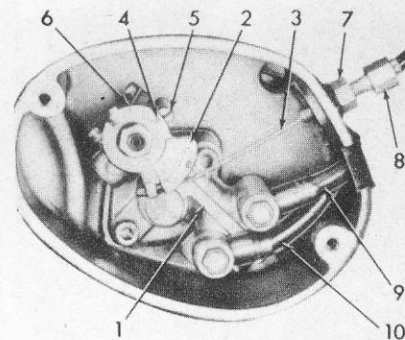
Carburetor adjustments (1969 and later Sprint Models).

- | | |
|---------------------------------|------------------------------|
| 1. Low speed mixture adjustment | 6. Metering pin |
| 2. Throttle piston stop screw | 7. Clip |
| 3. Control coil adjustment | 8. Throttle chamber cap |
| 4A. Starting jet lever | 9. Throttle piston |
| 5A. Starting passage | 10. Carburetor filter screen |

OIL INJECTED MODELS

1. The following adjustments should be made with the engine at normal operating temperature.
2. Use the throttle stop screw on the side of the carburetor to set the idle to 1200-1300 rpm.
3. Adjust the idle mixture with the mixture screw until the engine idles smoothly. Readjust the idle if necessary to keep it between 1200-1300 rpm.
4. Use the cable adjuster on the top of the carburetor to adjust the throttle cable free-play to near zero. This can be measured by pulling the cable sheath. The slightest movement of the sheath should raise the throttle slide.
5. Adjust the oil pump cable.

open position the maximum flow mark on the pump control lever should align with the index mark on the body. If the marks do not align, use the cable adjuster to adjust the cable so that they do.



Oil pump assembly

OIL PUMP CABLE ADJUSTMENT

1. Adjust the oil pump cable after adjusting the throttle cable.
2. Remove the oil pump cover.
3. With the throttle held in the wide

- | | |
|-------------------------|----------------------|
| 1. Lubricating oil pump | 6. Minimum flow mark |
| 2. Control lever | 7. Locknut |
| 3. Control cable | 8. Adjusting nut |
| 4. Maximum flow mark | 9. Inlet line |
| 5. Reference mark | 10. Outlet line |

Engine and Transmission

NOTE: For engine component inspection techniques and procedures, refer to "Engine Rebuilding" under the General Information section.

Two-Cycle Engine Service

ENGINE REMOVAL AND INSTALLATION

Models M, MS, MC, X, and Z

1. Disconnect the spark plug lead and remove the spark plug.
2. Turn off the petcock.
3. Disconnect the fuel line at the tank.
4. Remove the chain guard.
5. Disconnect the drive chain master link and remove the chain.
6. Remove the engine mounting nuts but do not remove the bolts.
7. Disconnect the clutch cable at the release mechanism.
8. Remove the exhaust manifold ring nut and gasket at the cylinder, and shift the pipe out of the way.
9. On 1973 and later models, disconnect the oil pump cable from the control lever. Unscrew the adjuster from the crankcase on the pump. Disconnect the oil pump delivery line, and plug it with a small screw to prevent oil from leaking.
10. Remove the carburetor intake manifold nuts and carburetor assembly from the engine, block the intake port with a clean cloth, and support the assembly out of the way.
11. Disconnect the wires at the terminal

- block.
12. Drift the front upper mounting bolt free.
13. Support the cylinder head while drifting the rear upper engine mounting bolt free. Gently lower the front end of the engine onto something soft.
14. Support the engine from below and remove the rear mounting bolt. The engine
15. Install the engine in the reverse order of removal.

Models ML, MLS, MSR, SR, and SX/TX 125

1. Disconnect the spark plug lead.
2. Shut off the petcock.
3. Disconnect the fuel line at the tank.
4. Disconnect the drive chain master link and remove the chain.
5. Remove the exhaust manifold ring

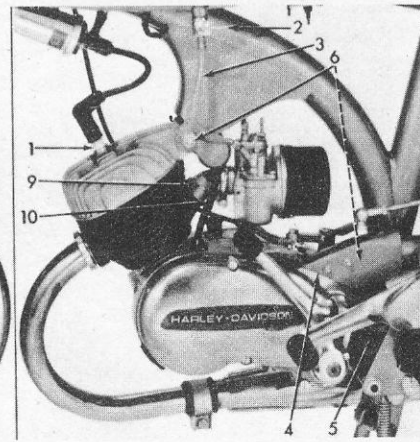
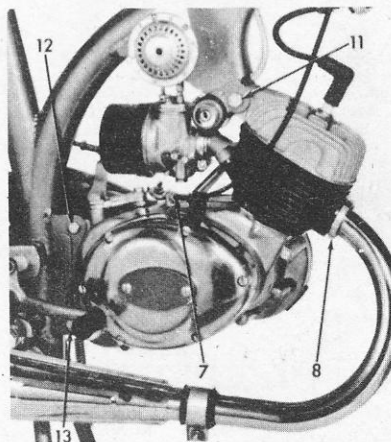
nut and gasket at the cylinder, and shift the pipe out of the way.

6. Remove the rear muffler mounting bolt and the exhaust assembly.
7. Remove the carburetor air cleaner assembly.

8. On 1973 and later models, disconnect the oil pump cable from the oil pump control lever. Remove the cable from the engine. Disconnect the oil lines and plug them with a small screw.

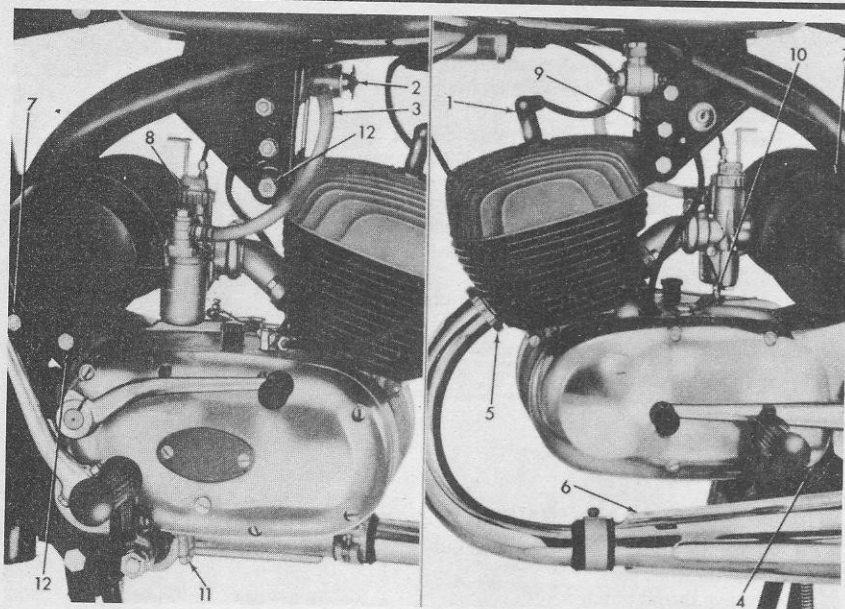
9. Remove the carburetor throttle piston cap, remove the piston, and disconnect the throttle cable.
10. Disconnect the wires at the terminal block.

11. Disconnect the clutch cable at the release mechanism.
12. Remove the bottom mounting cap nuts and washers.



Engine removal points (shown is the Model MS).

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Engine removal points (shown is the Model ML).

13. Remove the rear and top engine mounting bolt nuts, lockwashers, and bolts. Be prepared to support the engine in case it tips forward.

14. Carefully support the engine in the front, pry under the bottom of the crankcase rear end to free the engine from the rubber mount, and lift the engine free.

15. Install the engine in the reverse order of removal.

Model 165

1. Disconnect the yellow generator lead and the black and white ground wire from the regulator terminals.

2. Remove the exhaust manifold clamp, muffler support bolt, and the exhaust assembly.

3. Remove the chain guard screws and slide the chain guard from the rear of the frame.

4. Disconnect the drive chain master link and remove the chain.

5. Remove the carburetor cover bolts and covers.

6. Remove the crankcase cover screws and cover. It is not necessary to disconnect the clutch cable and housing.

7. Disconnect the spark plug lead, and

remove the spark plug and fuel line at the carburetor and tank.

8. Disconnect the throttle cable at the carburetor.

9. Disconnect the black wire from the rear fender terminal and the green wire from the fuse container, then remove the fuse and disconnect the "bat" and "gen" leads from the regulator terminal.

10. Disconnect the remaining battery lead and loosen the battery retaining strap nut until the strap, cover, and battery are free to be removed.

11. Remove the battery holder and regulator as a unit after removing the flat head screw under the battery and the top rear motor mount.

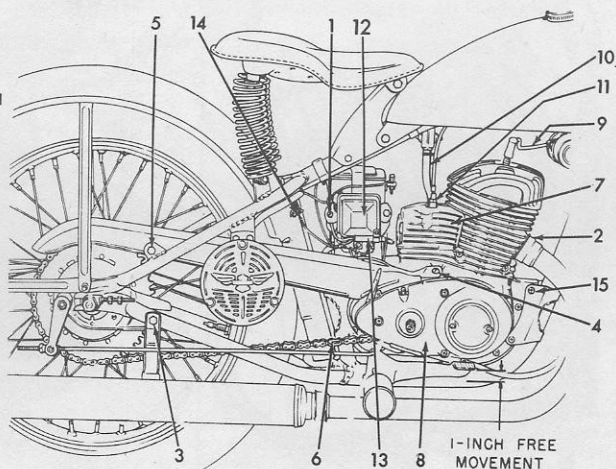
12. Remove the remaining engine mounting bolts and then the engine from the left side of the frame.

13. Install the engine in the reverse order of removal, consulting the wiring diagram for the proper electrical connections.

B-Models (Consult the Model 165 Illustration)

1. Consult the above section steps two,

1. Regulator ground terminal
2. Exhaust pipe clamp
3. Muffler support bolt
4. Front chain guard screw
5. Rear chain guard screw
6. Rear chain master link
7. Carburetor cover (2)
8. Crankcase cover
9. High tension lead
10. Gasoline line
11. Carburetor cap, control housing and cable
12. Voltage regulator
13. Fuse
14. Rear fender terminal
15. Engine mounting bolts (4)



Engine removal points (shown is the Model 165).

three, four, six, and seven.

2. Disconnect the throttle cable at the carburetor.

3. Disconnect the red magneto wire at the stop light switch, and the yellow and green magneto leads from the ignition coil.

4. Disconnect the red lead from the magneto to the ignition switch from its connection at the magneto, and remove the insulating tube (all models except BTF).

5. Disconnect the black wire from the magneto to the handlebar kill button (BTF models).

6. Remove the engine mounting bolts and the engine from the left side of the frame.

7. Install the engine in the reverse order of removal, and do the following:

a. Replace the red magneto-to-ignition switch and insulating sleeve with new ones. Soaking the tube in lacquer thinner to make it pliable will ease installation. Consult the wiring diagrams to complete all connections.

b. Tape the wires to the frame tube located beneath the crankcase.

SS/SX 175/250

1. Disconnect the spark plug lead and remove the spark plug.

2. Turn off the fuel petcock. Disconnect the fuel line from the carburetor by removing the banjo fitting.

3. Remove the exhaust system.

4. Remove the gas tank.

5. Remove the air cleaner. Loosen the carburetor clamp on the intake manifold, pull the carburetor back and remove it. Tie the carburetor out of the way and plug the intake port with a clean rag.

6. Remove the shift lever, and right crankcase cover. Remove the oil pump cover. Disconnect the oil pump cable from the control lever on the pump. Disconnect the oil line from the oil pump and plug the tank outlet.

7. Remove the horn.

8. Drain the oil from the crankcase.

9. Remove the drive chain masterlink and disengage the chain from the countershaft sprocket.

10. Disconnect the tachometer cable from the engine.

11. Disconnect the alternator wiring from the connector, ignition module, and the rectifier.

12. Remove the clutch cover, turn the clutch cable adjuster in, and disconnect the clutch cable from the release mechanism. Unscrew the cable adjuster and remove the cable from the engine.

13. Remove the four engine bolts and lift out the engine from the right side.

14. Install the engine in the reverse order of removal.

CYLINDER AND PISTON

Disassembly

M, X, Z, AND SX/TX 125 MODELS

1. Thoroughly clean the crankcase around the cylinder and blow it dry to prevent any foreign objects from falling into the crankcase.

2. Disconnect the spark plug lead, and remove the spark plug, carburetor silencer, air cleaner, exhaust pipe screw nut, and

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remove or shift the exhaust pipe out of the way.

3. Turn off the petcock, disconnect the gas line at the tank, and remove the carburetor at the manifold.

4. On 1973 and later models disconnect the oil line from the intake manifold by removing the banjo bolt. Place a plastic bag around the oil line and banjo fitting to prevent dirt from entering the system.

5. Remove the cylinder head nuts, washers or lockwashers, cylinder head, and head gasket (if applicable). Loosen the head if necessary by tapping gently with a wooden block and hammer.

6. Carefully work the cylinder free of the cylinder studs far enough to allow a clean, oil-soaked rag to be inserted over the crankcase opening to prevent foreign objects from falling into the crankcase. Lift the cylinder free and remove and discard the base gasket.

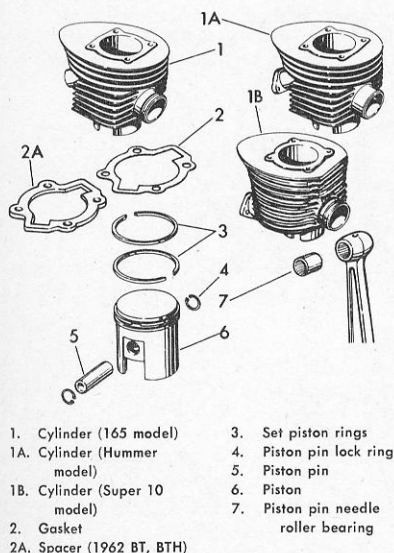
7. Remove the piston ring or rings by prying one end free of the piston grooves, then freeing the other end, and removing the rings while keeping them spread wide enough to clear the piston. Take care not to score the piston during this operation.

8. Using a sharp, pointed instrument, pry one of the piston pin circlips (locking) free.

9. Press or gently tap the piston pin free by hand while firmly supporting the piston. Remove the piston and remaining circlip.

S AND B MODELS

1. Perform all the steps in the preceding section. It will be necessary to raise the tank to provide sufficient clearance for cylinder removal. There is a cylinder spacer used on 1962 BT and BTH models.



Cylinder and piston assemblies.

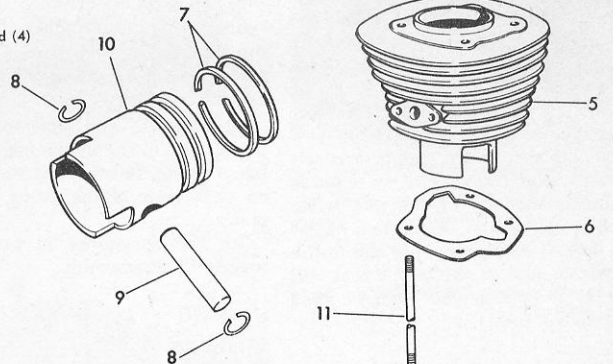
SS/SX 175/250 MODELS

1. Clean the engine thoroughly before beginning. The areas around the cylinder head and cylinder base gaskets are particularly important.

2. Remove the gas tank, and exhaust system. Remove the horn.

3. Loosen the carburetor clamp on the

1. Nut (4)
2. Lockwasher (4)
(M-50, M-65)
3. Plain washer (4)
4. Head
- 4A. Head gasket (1967 and later)
5. Cylinder
6. Gasket
7. Rings (2) MSR (1 or 2)
8. Lock ring (2)
9. Piston pin
10. Piston
11. Cylinder stud (4)



Cylinder and piston assemblies (shown is the M-50).

intake manifold, and pull the carburetor back to remove it. The carburetor can be tied out of the way with the cables connected.

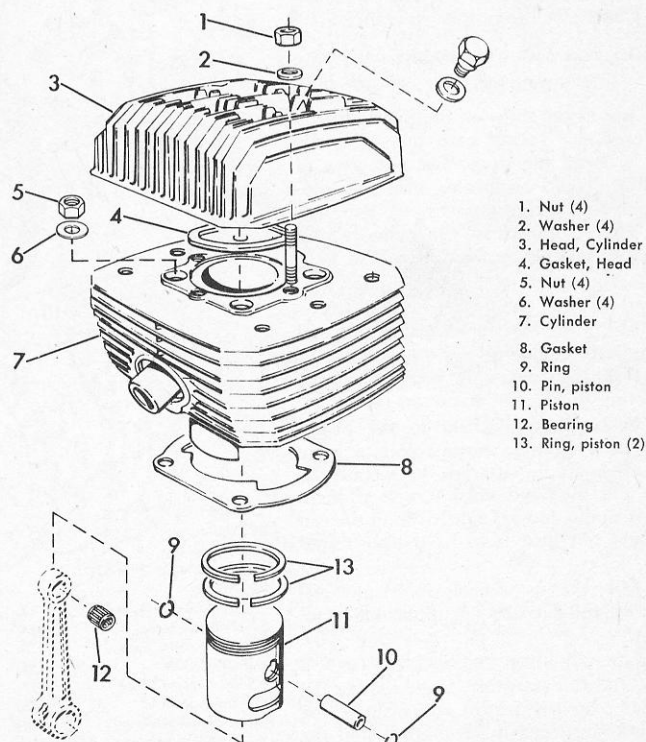
4. Disconnect the oil line from the intake manifold by removing the banjo bolt. Place a plastic bag around the end of the oil line and banjo fitting to prevent dirt from entering the system.

5. Loosen the four cylinder head nuts one-quarter turn at a time, and in an "X" pattern. When all the nuts are loose, remove them and their washers from the studs. Carefully lift off the cylinder head

and remove the head gasket beneath it as well.

6. Turn the engine over until the piston is at tip dead center. Remove the four nuts that secure the cylinder to the crankcase. These nuts are located in the cooling fin area. Lift the cylinder up until the spigot clears the crankcases. Insert a clean, lint-free rag between the cylinder and crankcase. Continue lifting the cylinder until the piston comes out of the bore.

7. Remove one of the wrist pin circlips and tap out the wrist pin with a suitable drift. Be careful to support the connecting



Top end assembly SS/SX 175/250

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rod when tapping out the wrist pin. Removal will be easier if the piston is heated gently with a propane torch in the area of the wrist pin.

Inspection

The cylinder bore of the SS/SX 175/250, and SXT 125 is chrome plated aluminum. This type of cylinder cannot be bored to an oversize, and therefore, if the bore is damaged, the piston and cylinder should be replaced as a set. Pistons and cylinders are color-coded; the piston has the color mark on the crown while the cylinder is coded on the top cooling fin. When replacing these parts they should be the same color. New wrist pins and pistons are supplied in sets that are also color coded. The wrist pin is marked inside the end of the pin, while the piston is marked on the bottom of the wrist pin boss. If a new wrist pin and piston are needed, be sure to obtain one that will fit the cylinder (piston and cylinder must have same color code).

Connecting Rod Needle Roller Bearing Replacement (except SS/SX 175/250)

1. When bearings are worn or damaged, and replacement becomes necessary, either the crankcase must be disassembled so the connecting rod may be supported (a means of support must be devised if the operation is to be performed while the bottom end is still assembled) or the Piston Pin Needle Roller Bearing Tool (H-D part no. 95971-52) and Connecting Rod Clamping Tool (H-D part no. 95952-33) may be used.

2. Since there is only one size piston pin, appropriate oversize bearings must be used to take up any excess play. Consult the "Engine and Transmission Specifications Chart" for the proper clearances.

Cylinder and Piston Assembly

ALL MODELS

1. Install the rings on the piston with a ring expander taking care not to break, twist, or bend the rings. The end gaps of the rings should be located over the locating pins in the ring grooves.

2. Thoroughly clean the cylinder and crankcase mating surfaces, apply a suitable gasket sealer to a new cylinder gasket, and position the gasket.

3. Lubricate the upper connecting rod bearing with engine oil.

4. Place the piston in position on the connecting rod so the arrow on the crown faces forward. Apply heat to the piston crown in a circular motion with a blow torch. Repeatedly attempt to install the piston pin by hand until it will slide in without undue force. Lightly oiling the pin may help but heat is to be mainly relied on.

5. After the piston cools, insert new circlips with the flat side (if applicable) facing out.

6. Liberally lubricate the cylinder walls, piston, and rod assembly. Slowly lower the cylinder over the piston while squeezing shut first the top two rings and then the bottom one. If the piston is not perfectly straight in the cylinder, rings may be bro-

ken. Do not change the position of the rings as dictated by the positions of the locating pins.

7. Replace the cylinder head gasket and install it in place after applying a suitable gasket sealer. On the Super-10, which uses no head gasket, apply a coat of aluminum paint to the head and cylinder mating surfaces.

8. Place the cylinder head on the cylinder mounting studs, then assemble the washers, tighten the nuts finger-tight, and secure the head nuts evenly in diagonal pairs.

9. On 1973 and later models, connect the oil line to the intake manifold with the banjo fitting. Be sure that there is a washer on either side of the fitting. Bleed the oil pump.

10. The remainder of assembly is the reverse of disassembly.

CLUTCH

Disassembly

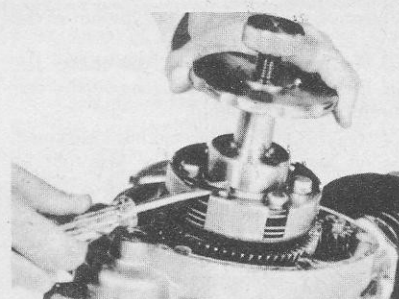
M-50 AND M-65

1. Place a drip pan beneath the clutch cover, remove the cover screws, cover, and cover gasket.

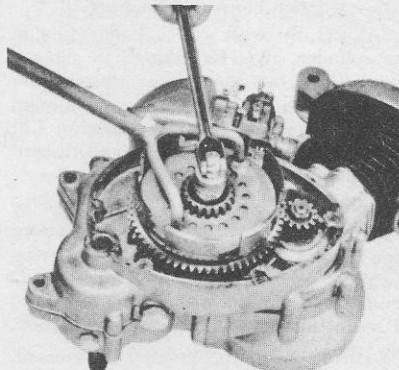
2. Compress the clutch springs with Clutch Spring Compressor (H-D part no. 97345-65P) or a suitable substitute and pry the lockring free.

3. Remove the spring plate, spring caps, springs, pressure plate, clutch discs and plates, and the clutch release pin. Use a piece of wire to lift the clutch plates and discs, then slide them out, or tip the machine over to let them slide out.

4. Remove the clutch hub nut by holding the clutch steady with Clutch Holding



Removing the clutch locking.

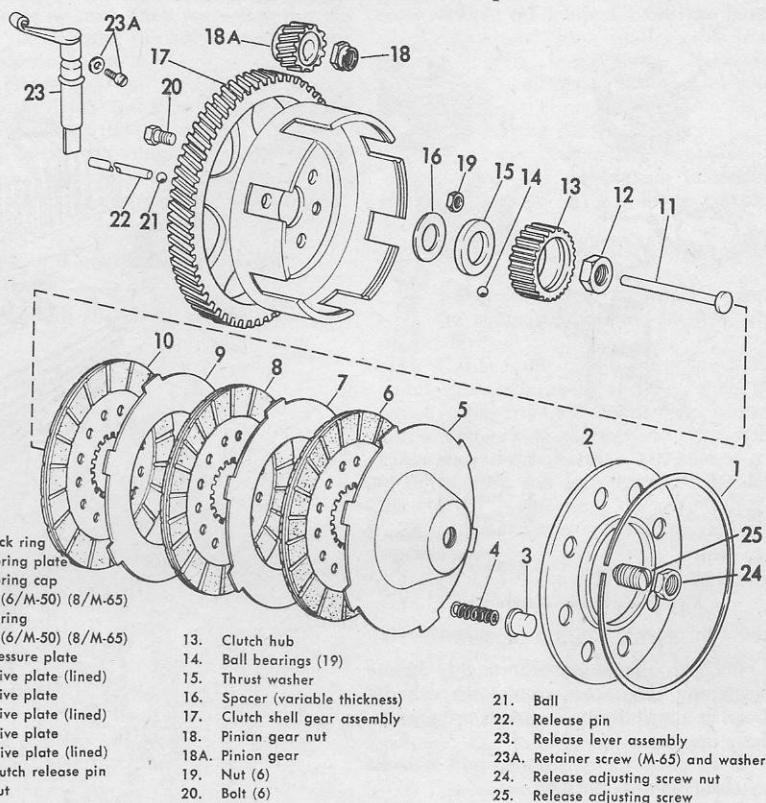


Removing the clutch hub nut.

Tool (H-D part no. 97431-65P) and then removing the nut. Any means of holding the hub steady, such as wedging a wooden door stop between the hub gear teeth and the side of the case, will work.

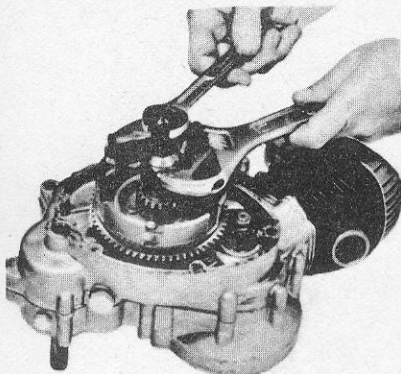
5. Pull the hub with Clutch Hub Puller (H-D part no. 97343-65P) or a suitable gear puller.

6. Remove the bearing assembly, thrust washer, and spacer.

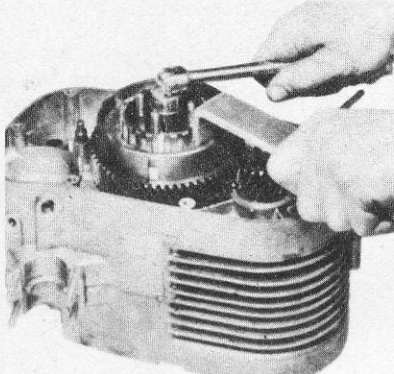


Clutch assembly.

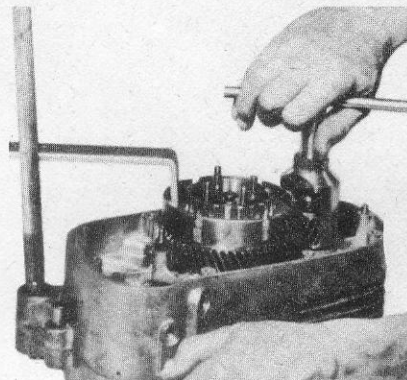
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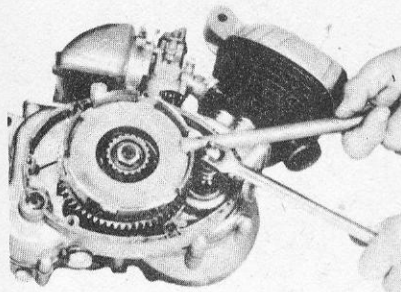
Removing the clutch hub.



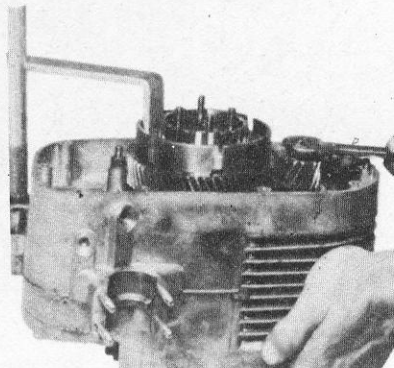
Removing the clutch hub nut.



Removing the drive pinion gear.



Removing the drive pinion gear nut.



Removing the drive pinion gear nut.

7. Secure the clutch shell assembly with Clutch Shell Gear Holding Tool (H-D part no. 97340-65P) or any substitute means such as the one described in step four and remove the drive pinion gear nut, then remove the pinion gear with Primary Drive Pinion Puller (H-D part no. 97346-65PA for the M-50, and 97348-68P for the M-65) or a suitable gear puller.

8. Lift the clutch housing free, and remove the clutch housing gear nuts and bolts to free the gear if so desired.

M-100, M-125, X-90, Z-90
SR-100, AND SX/TX 125

1. Place a drip pan under the clutch cover and remove the shift lever, kick-start lever, cover screws, cover, and cover gasket.

2. Remove the stud nuts by loosening them one turn each so undue pressure is not placed on the pressure plate.

3. Remove the springs, spring cups, pressure plate, clutch plates and discs, and clutch release pin. The discs and plates are easily removed with a piece of wire which can be used to lift and slide them free, or by tipping the machine over on its side to let them slide out.

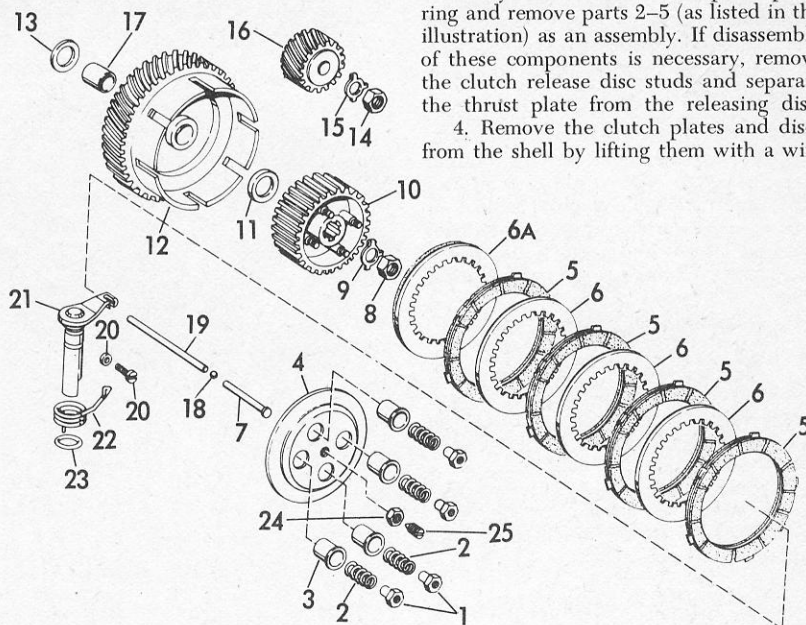
4. Remove the clutch hub nut by holding the clutch steady with the Clutch Holding Tool (H-D part no. 97237-68P), or a suitable substitute, and then removing the nut. Any means of holding the clutch steady, such as wedging a wooden door stop between the hub gear teeth and the side of the case, will work.

5. Remove the nut lock, clutch hub, thrust washer, clutch shell gear, and the variable-thickness spacer.

6. Secure the clutch with Clutch Holding Tool (H-D part no. 97237-68P) and re-

move the pinion gear nut and nut lock.

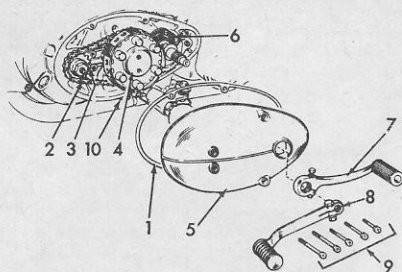
7. Pull the pinion gear with Puller (H-D part no. 97348-68P) or a suitable gear puller.



Clutch assembly.

- | | | |
|-----------------------------------|---------------------------------|---------------------------------------------|
| 1. Stud nut (4) | 9. Nut lock | 18. Ball |
| 2. Spring (4) | 10. Hub | 19. Release rod |
| 3. Spring cup (4) | 11. Thrust washer | 20. Release lever retainer screw and washer |
| 4. Pressure plate | 12. Shell gear | 21. Release lever |
| 5. Friction (lined) disc (4) | 13. Spacer (variable-thickness) | 22. Release lever spring |
| 6. Drive (unlined) disc (3) | 14. Pinion gear nut | 23. Release lever washer |
| 6A. Back disc (lined on one side) | 15. Pinion gear nut lock | 24. Release adjusting screw nut |
| 7. Release pin | 16. Pinion gear | 25. Release adjusting screw |
| 8. Hub nut | 17. Shell gear bushing | |

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1. Clutch case cover gasket
2. Front drive chain
3. Engine sprocket
4. Clutch
5. Clutch case cover
6. Starter spring
7. Starter crank
8. Gear shifter pedal
9. Clutch cover hold down screws
10. Transmission drain plug

Removing the clutch cover assembly.

and pulling them free, or by tilting the machine over and allowing them to slide out.

5. Remove the clutch release rod and install the Clutch Lock Plate (H-D part no. 95930-48) or fabricate some means of securing the clutch such as a wooden door stop jammed between the clutch gear and the crankcase. Remove the left-hand, threaded clutch hub nut and the engine sprocket nut which has a right-hand thread, then remove the locking device.

6. Pull the clutch hub using the Clutch Hub Puller (H-D part no. 95960-48) or a suitable gear puller. Take care not to lose any of the clutch ball bearings. If any bearings are lost, they should be replaced as a complete set.

7. Loosen, but do not remove the engine sprocket using Engine Sprocket Puller (H-D part no. 95910-48) or a suitable gear puller.

8. Remove the clutch shell, primary chain, and engine sprocket as an assembly.

9. Remove the clutch bushing, bushing thrust washer, engine sprocket bearing shims, and the engine sprocket key.

10. Pry the starter spring collar locking from its groove and remove the starter ratchet gear, ratchet spring, and the spring collar.

11. Disassemble the release mechanism, if so desired, in the following manner:

a. Remove the sprocket cover screws and cover, disengage the clutch cable from the clutch release lever, disengage the release lever spring, and loosen the clutch adjusting screw locknut.

b. Remove the adjusting screw, dust cover, and release lever.

c. Drift the release rods free with an appropriately sized drift.

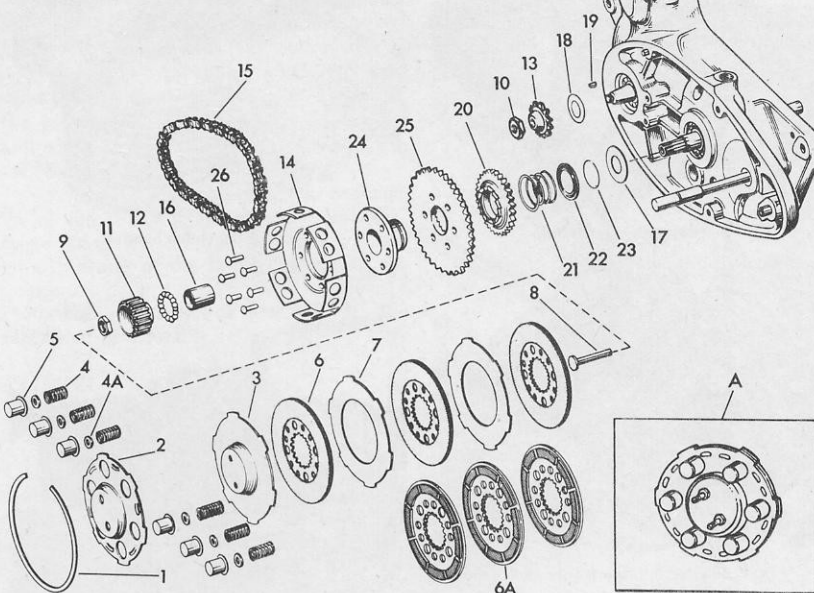
SS/SX 175/250 EARLY CLUTCH

1. Drain the oil from the crankcase and remove the right crankcase cover.

2. Remove the clutch release bearing assembly from the center of the clutch.

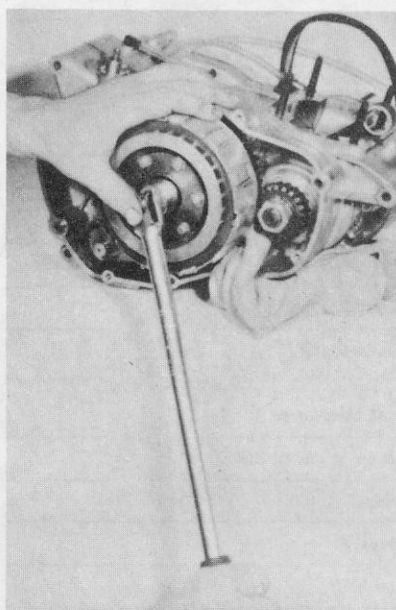
3. Bend back the tabs of the lockwasher and remove the nut from the center of the clutch hub. To prevent the hub from turning when the nut is removed, insert a soft metal wedge, or wood wedge between the primary drive gears.

4. Remove two opposing screws from the hub. Install the clutch hub puller (H-D part no. 95960-52A) in the place of the two screws. Using the puller pull the clutch hub and plates from the clutch housing. Remove the remaining screw from the hub and remove the clutch release plate.



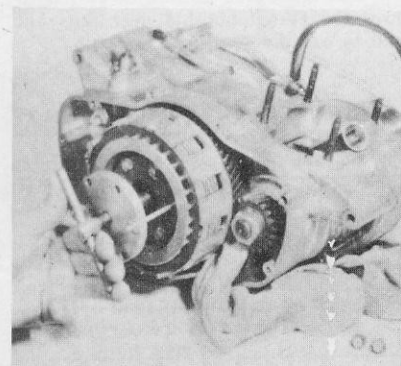
- | | | |
|--------------------------------------------------------|----------------------------------|------------------------------------------|
| 1. Clutch thrust plate spring ring | 7. Clutch disc—steel (2) | 18. Sprocket shaft bearing shim—.007 in. |
| 2. Clutch thrust plate | 8. Clutch release rod—left | 19. Sprocket shaft key |
| 3. Clutch releasing disc | 9. Clutch hub nut | 20. Starter ratchet gear |
| 4. Clutch spring (6) | 10. Engine sprocket nut | 21. Starter ratchet spring |
| 4A. Clutch spring shim washer (6) 1972 and later BTH | 11. Clutch hub | 22. Starter ratchet spring collar |
| 5. Clutch spring cup (6) | 12. Clutch steel ball (15) | 23. Starter spring collar lock ring |
| 6. Clutch disc—with fabric lining (3) | 13. Engine sprocket | 24. Clutch sprocket hub |
| 6A. Clutch disc—with lining (3) 1962 to early 1964 BTH | 14. Clutch shell | 25. Clutch sprocket |
| | 15. Front chain | 26. Clutch sprocket rivet (6) |
| | 16. Clutch bushing | A. Disc, plate, spring assembly |
| | 17. Clutch bushing thrust washer | |

Clutch assembly.



Removing the clutch hub nut

5. To remove the clutch plates from the hub a special tool (H-D part no. 97353-74P) and a press are necessary. To remove the plates, mount the hub on the press and using the special tool compress the clutch



Removing the clutch hub and plates

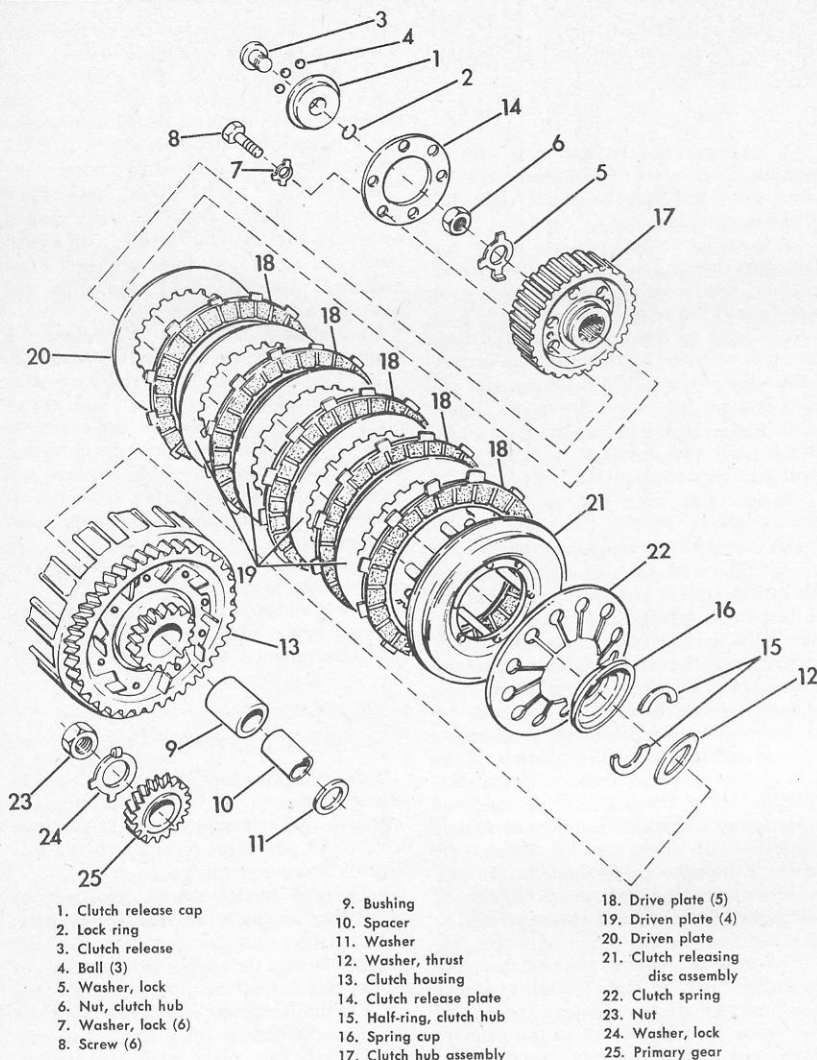
spring until the two half rings can be removed. Once the two half rings are removed the components can be disassembled.

6. Bend back the tabs of the lockwasher and remove the nut from the right end of the crankshaft. To remove the nut it may be necessary to keep the gears from turning, this can be done as before by inserting a soft metal or wood wedge between the gears.

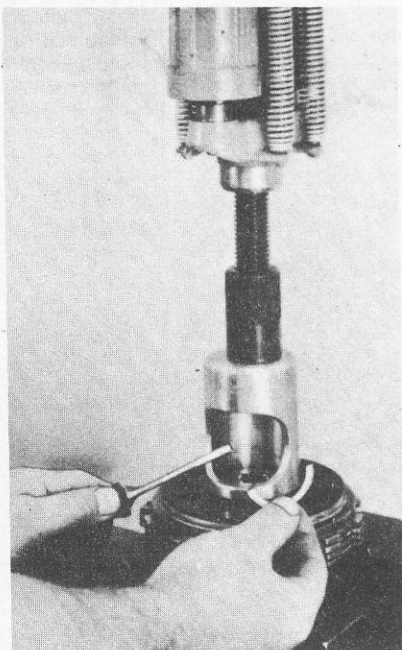
7. Remove the clutch housing and primary gear.

8. To remove the release mechanism from the right crankcase cover, loosen the

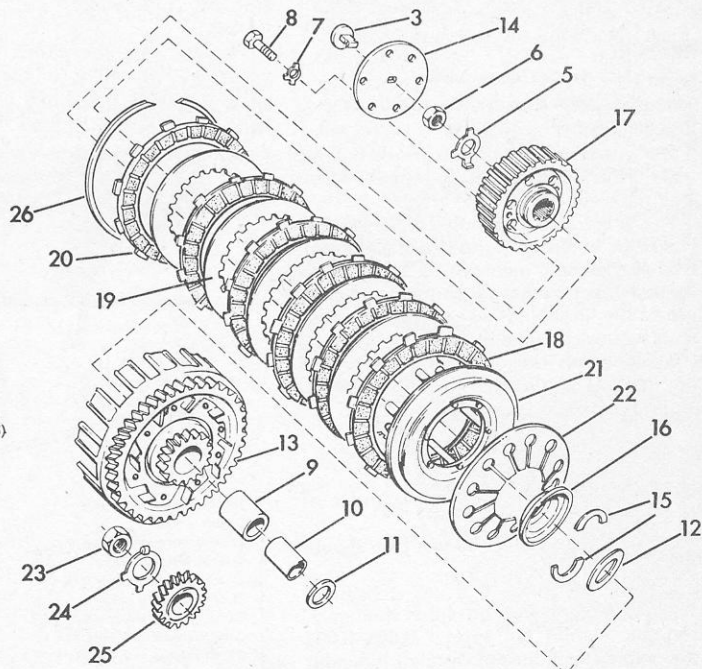
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Early SS/SX 175/250 clutch



Removing the half rings



Late SS/SX 175/250 clutch

locknut on the clutch adjusting screw, and unscrew the adjusting screw. The release lever and three ball bearings can now be removed. The release plate will remain in the crankcase cover and should not be removed unless replacement is necessary.

SS/SX 175/250 LATER CLUTCH

1. Drain the oil and remove the right right crankcase cover.

2. A special tool (H-D part no. 97354-74P) is available which will allow the clutch plates to be removed and installed without further disassembly of the clutch. If this tool is available follow steps 3 and 4 below. If the tool is not available move on to step 5.

3. Install the special tool (H-D part no. 97354-74P) onto the right crankcase. Use the tool to compress the release plate until the large ring in the clutch housing can be removed. Once the tool is removed the clutch plates can be removed.

4. To install the plates, place them in position in the clutch housing. Install the release plate. Use the special tool to compress the release plate until the large ring can be installed into the clutch housing.

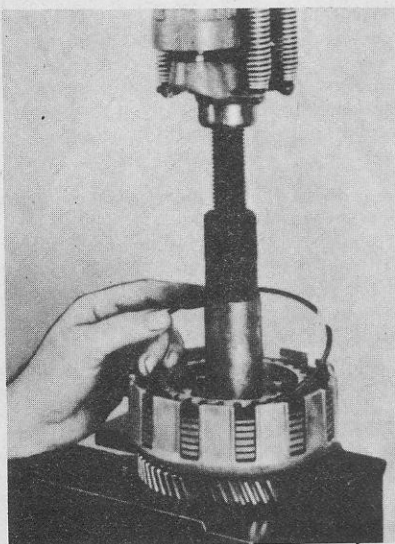
5. Bend back the locktabs on the washers securing the six release plate bolts in place. Remove the six release plate bolts, and the washers beneath them.

6. Bend back the tab on the lockwasher and remove the nut from the center of the clutch hub. To prevent the clutch from turning when the nut is removed it may be necessary to insert a soft metal or wood wedge between the primary gears.

7. The clutch hub can now be removed from the mainshaft. If the hub resists removal use the factory clutch hub puller (H-D part no. 95960-52A) as described in step 5 under "Early Clutch".

8. Reinstall the release plate using two screws placed 180° apart. Mount the assembly in a press and using a suitable

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Removing the retaining ring from the clutch housing

spacer, compress the release plate until the large ring in the clutch housing can be removed.

9. Once the large ring is removed from the clutch housing, remove the assembly from the press. Remove the release plate, and the clutch plates from the hub.

10. To remove the spring plate, and pressure plate from the clutch housing a special tool (H-D part no. 97353-74P) and a press are needed. Mount the housing in a press with the gear side up. Position the special tool over the center of the housing and compress the spring plate until the two half rings can be removed. Once the two half rings are removed the spring plate and pressure plate can be removed from the clutch housing.

11. The release mechanism can be removed from the right crankcase cover as described in step 8 under "Early Clutch".

Assembly

M-50 AND M-65

1. Assembly is in the reverse order of disassembly.

2. Grease the clutch hub thrust bearing balls with Harley-Davidson Grease-All or a suitable substitute.

3. Once the clutch hub nut is secured, check the end-play of the clutch shell gear. End-play should not exceed 0.001-0.004 in. and can be adjusted through judicious use of the variable-thickness spacer which seats against the clutch shell.

4. Replenish the oil supply and adjust the clutch as directed in the "Maintenance" section.

M-100, M-125, X-90, Z-90, SR-100, AND SX/TX 125

1. Assembly is in the reverse order of disassembly.

2. The lined side of the last disc should face the crankcase wall.

3. Once the clutch hub nut is secured, check the end-play of the clutch shell gear. End-play should not exceed 0.002-0.004 in., and can be adjusted through judicious use of the variable-thickness washer which sits against the clutch shell.

4. Replenish the oil supply and adjust the clutch as directed in the "Maintenance" section.

S AND B MODELS

1. Lubricate the pushrod tips with engine oil, then insert them in the mainshaft—the short rod first—from the right side of the motorcycle.

2. Assemble the release lever and spring to the sprocket cover, then the adjusting screw, locknut, and the worm cover loosely into the release worm.

3. Check to make sure that the lever action is smooth; lubricate it if necessary. Secure the cable end in the cover slot and lever fingers, and install the cover.

4. Place the starter ratchet gear on the clutch shell and sprocket assembly so the shell and gear teeth mesh.

5. Seat the large end of the starter ratchet spring in the indentation on the starter ratchet gear, place the ratchet spring collar over the spring and compress the spring until a new spring locking can be installed. Rotate the ratchet gear several times to make sure it operates freely.

6. Place the engine sprocket and sprocket nut on the shaft but do not permanently secure them. Using a screwdriver for leverage, press the flywheel assembly as far to the left as it will go. Measure the clearance between the back of the sprocket and the face of the ball bearing mounted in the case. Clearance should not exceed 0.003-0.012 in., and may be adjusted by inserting the appropriate number of 0.007 in. thick shims (H-D part no. 6760) behind the engine sprocket and then rechecking the clearance.

7. Secure the engine sprocket key, slip the clutch bushing thrust washer on the transmission mainshaft, engage the engine and clutch sprockets teeth in the primary chain, and install the two sprockets on their respective shafts. Secure the engine sprocket nut which has a right-hand thread.

8. Lubricate the clutch bushing with grease and install it in the clutch shell.

9. Assemble the clutch bearings in the shell, using grease to hold them in place.

10. Carefully drive the clutch hub onto the mainshaft with a suitable drift.

11. Block the motion of the clutch with Lock Plate (H-D part no. 95930-48), or a suitable substitute, and install and secure the left-hand threaded hub nut to 70 ft lbs torque. Remove the blocking device.

12. Slip the Clutch Disc Back Plate (H-D part no. 38015-49) into the shell if necessary. Slip on a fabric disc, then a steel plate, and so on until there are three discs and two plates installed other than the back plate.

13. Lubricate the tip of the release rod in engine oil and insert it in the mainshaft.

14. Assemble the clutch releasing disc, clutch springs, spring cups, and thrust plate together, then secure the assembly with release disc studs and compression nuts. Slip the entire assembly in place and secure it with the spring ring. Once the assembly is secured, remove the compression studs and nuts.

15. Continue the assembly in the reverse order of disassembly.

16. Replenish the transmission oil supply and adjust the clutch as described in the "Maintenance" section.

SS/SX 175/250 ALL MODELS

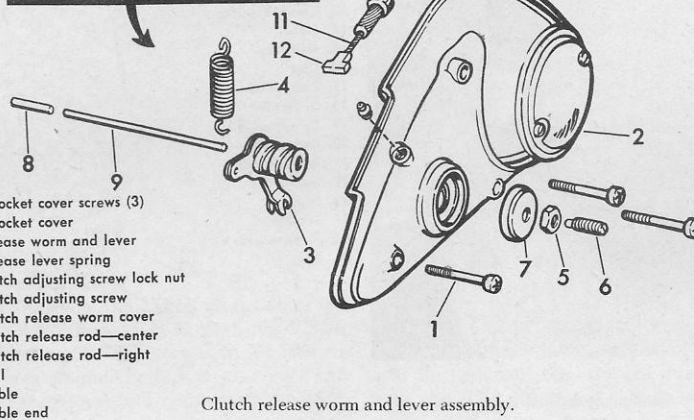
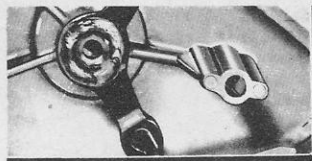
1. Assembly is in the reverse order of disassembly.

2. Use the special tool (H-D part no. 97353-52A) and a press to install the half rings to the rear of the hub.

3. On some models the oil drain notches in the friction plates are cut at an angle. These plates must be installed with the notches facing the opposite direction of normal clutch rotation.

4. On the later type clutch the last plate to be installed has friction material on one side. Install this plate with the friction material facing in toward the other plates.

5. On the later clutch, if the plates are being installed with the clutch assembly removed from the engine, be sure that the washer on the back of the hub is aligned with the mounting hole before installing the large ring into the clutch housing.



1. Sprocket cover screws (3)
2. Sprocket cover
3. Release worm and lever
4. Release lever spring
5. Clutch adjusting screw lock nut
6. Clutch adjusting screw
7. Clutch release worm cover
8. Clutch release rod—center
9. Clutch release rod—right
10. Coil
11. Cable
12. Cable end

Clutch release worm and lever assembly.

Harley-Davidson Singles



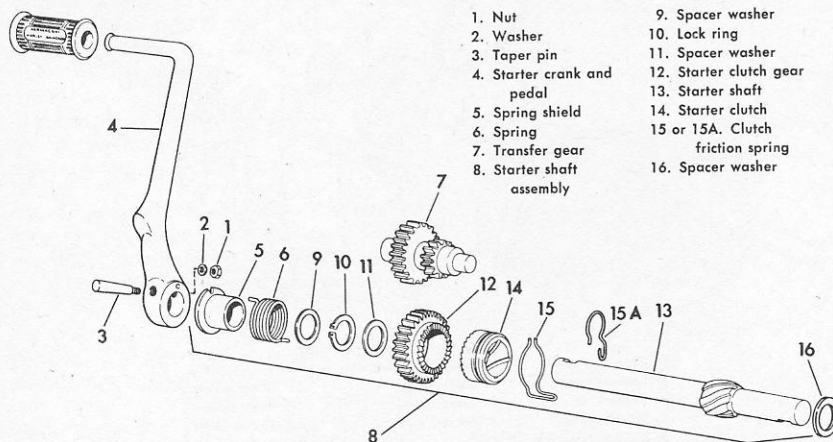
The clutch plates should be installed with the oil drain notches facing the opposite direction of normal rotation

KICK-STARTER

Models M-50 and M-65

DISASSEMBLY

1. Remove the engine from the frame as described in the engine "Removal and Installation" section.
2. Remove the kick-starter lever taper pin nut and washer, then tap the pin out with a soft mallet, taking care not to damage the pin's threads.
3. Pull the kick-starter lever off the starter shaft with a suitable gear puller, then remove the spring shield and spring from the shaft.
4. Remove the left-side cover assembly.
5. Remove the sprocket nut and pull the sprocket from the shaft with Two-Jaw Puller (H-D part no. 97292-61) or a suitable substitute.
6. Remove the magneto-generator as described in the "Magneto-Generator" section.
7. Disassemble the crankcases as described in the "Crankcase" section.
8. Remove the transfer gear, slip the starter shaft assembly free of the transmission, and disassemble it in the following manner.
 - a. Remove the spacer washer and then the lockring with a pair of snap-ring



Starter assembly, M-50 and M-65.

pliers.

b. Slip the spacer washer and starter clutch gear from the starter shaft.

c. Slip the starter clutch and friction spring free of the shaft.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the starter clutch gear, clutch, and the transfer gear for a worn or damaged condition, paying special attention to the gear teeth. If any of the gears is in need of replacement, they should all be replaced as a set since they all mesh in one way or another.
3. Inspect the remaining components for a worn, pitted, gouged, warped, or otherwise damaged condition and replace them as necessary.

ASSEMBLY

1. Assembly is essentially the reverse of disassembly.
2. Slip the starter clutch gear and the first spacer washer on the starter shaft. These washers are available in various thicknesses from 0.2–0.8 mm to bring the shaft end-play clearances to within the specified range of 0.004–0.008 in. Temporarily install the original spacers or new ones of the same thickness as the originals.
3. Secure the lockring, then slip the next spacer onto the shaft.
4. Assemble the clutch friction spring to the clutch, then slip this assembly into place on the shaft.
5. Place the inner spacer washer, one of at least 0.4 mm thickness, on the end of the shaft and insert the shaft and transfer gear into the left crankcase taking care to properly insert the ear of the friction spring in its correct position in the crankcase.
6. Install the left side cover, then check the starter shaft end-play with a dial indicator by moving the shaft in the limit of its movement, and then pulling it out so it depresses the indicator's plunger. Avoid exerting pressure on the shaft while taking a reading, and make sure the indicator is absolutely motionless. Repeat this procedure several times to make sure the reading arrived at is accurate.
7. Disassemble the assembly once again

and correct the clearance to specifications by using the appropriate spacers.

8. Once the end-play has been corrected, mount the kick-starter lever and secure it with the tapered pin, washer, and nut.

Models M-100 and M-125

DISASSEMBLY

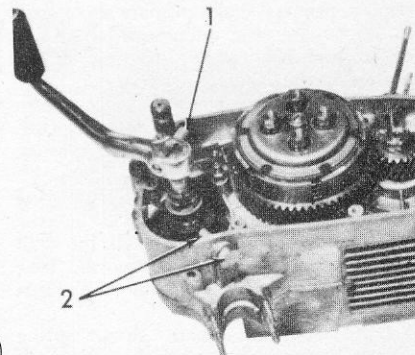
1. Remove the starter lever nut, washer, and tapered pin by tapping it out with a soft mallet, taking care not to damage its threads. Pull the lever off with a suitable gear puller.
2. Remove the gear shifter lever, clutch cover screws, and the clutch cover. Gently tap on the sides of the cover with a soft mallet to aid in removing it.
3. Remove the return spring and spring shield from the return spring stud.
4. Remove the stop pin and washer, and slip the starter shaft assembly free of the case.
5. The starter shaft assembly components freely slip off the shaft to complete the disassembly procedures.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the gears for a worn or damaged condition, especially the gear teeth, and replace them as a set if necessary.
3. Inspect the remaining components for a worn or damaged condition and replace them as necessary. Take note of the condition of the rubber O-ring and replace it if age cracks are present.

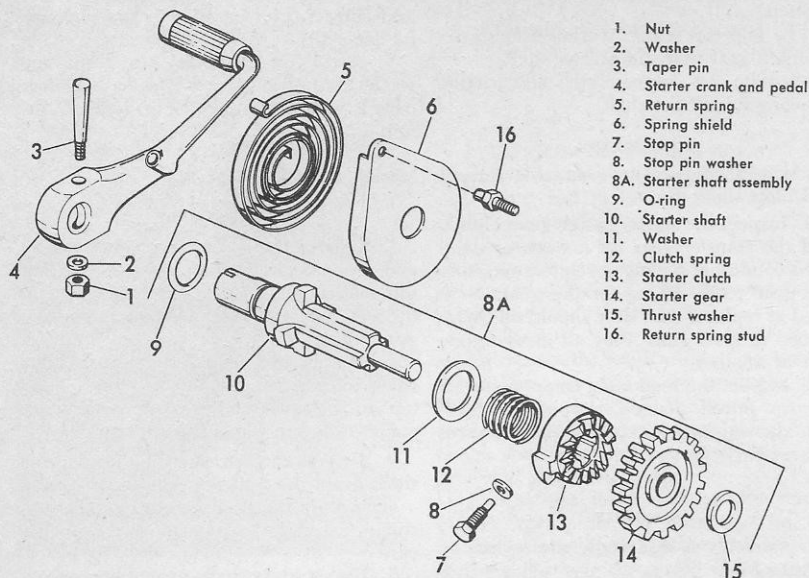
ASSEMBLY

1. The correct position for the starter lever is determined by the position of the starter clutch on the splined starter shaft. Locate this position in the following manner:
 - a. Assemble the crankcase side thrust washer, starter gear, starter clutch, clutch spring, and the thrust washer on the starter shaft.
 - b. Insert this assembly into the crankcase, then install the starter lever and the stop pin washer and pin. The stop pin should engage the flat portion of the starter clutch in that position which will allow the starter lever to remain in the correct position when not in use.
2. Remove the starter lever and install the spring cover on the return spring stud.



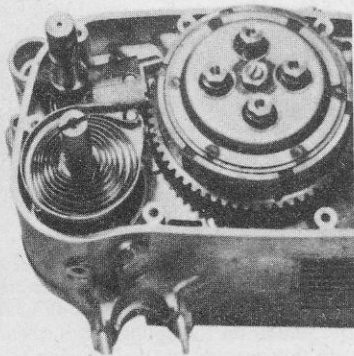
1. Taper pin 2. Stop pin
Positioning the starter lever.

Harley-Davidson Singles



Starter assembly, M-100 and M-125.

3. Install the return spring in one of the



The clutch spring installed.

two shaft end grooves, then rotate it to the right to bring it to the correct tension, then engage the spring end on the return spring stud.

4. Install the clutch cover, gearshift lever, press the starter lever onto the shaft, and secure it with the tapered pin, washer, and nut.

S and B Models

DISASSEMBLY

1. Remove the clutch cover, clutch assembly, primary chain, primary drive gear, starter ratchet gear, ratchet spring, ratchet collar, and the ratchet locking as described in the "Clutch" section.

2. Remove the shaft thrust washer, starter shaft, sector gear, starter spring, starter spring plate, shaft spring washer, and the shaft shim.

3. Rotate the starter shaft while exerting a gentle pulling pressure on it. When the starter spring tension is relieved, the shaft assembly will be free for removal. Take care not to drop any parts into the crankcase.

4. Remove the shaft shim, spring washer, spring plate, and the spring. If these parts were not on the shaft, they may have fallen into the crankcase and there-

fore the cases may have to be separated to retrieve them.

5. The sector gear is a light press fit on the starter shaft and need not be removed unless inspection indicates the need for replacement.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect the ratchet and starter sector gears for a worn or damaged condition, especially at the gear teeth, and replace them as a set if necessary.

3. Inspect the engaging teeth of the ratchet and clutch sprocket gears for a worn or damaged condition and replace them as a set if necessary, as described in the "Clutch" section.

4. Inspect the ratchet spring, starter spring, and the shaft spring washer for a collapsed or damaged condition and replace them as necessary.

5. Replace the ratchet locking regardless of its condition.

6. Inspect the shifter shaft oil seal for a worn, cracked, or damaged condition and replace it if necessary.

7. Inspect the remaining components for a worn or damaged condition and replace them if necessary. If the shifter shaft is warped or damaged in any way it can be replaced as directed in the "Transmission" section.

ASSEMBLY

1. Mount the starter sector gear on the starter shaft with the shoulder of the gear away from the shoulder of the shaft. The gear is a light press fit on the shaft.

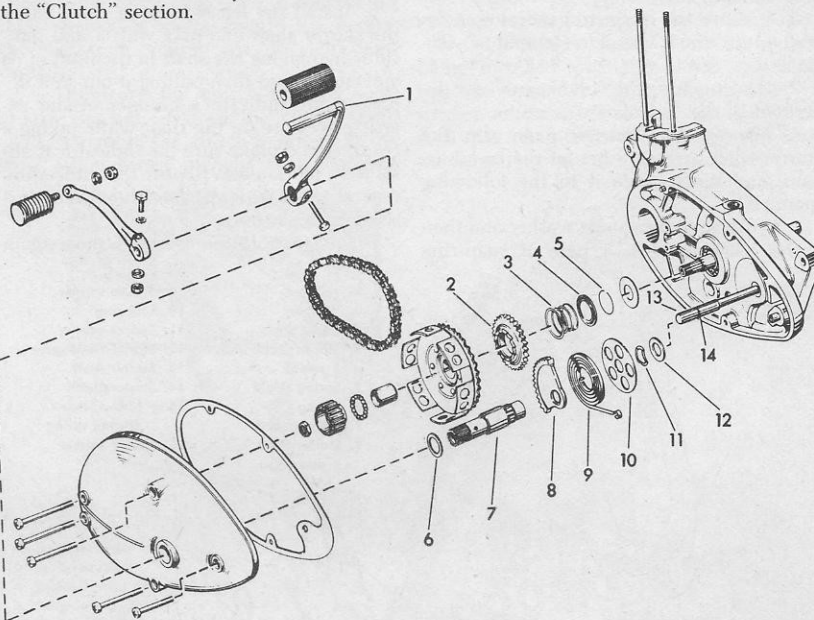
2. Slip the starter spring onto the shaft so the spring rests against the sector gear, and is coiled clockwise from the center as viewed from the crankcase side.

3. Install the starter spring plate, spring washer, and the shaft shim, using a small daub of grease to hold the parts temporarily in place.

4. Lightly grease the shifter shaft oil seal, then slip the shaft assembly over the shifter shaft and engage the end loop of the starter spring with its slot in the crankcase. Take care not to allow the shim and washer to fall out of position during this operation.

5. Rotate the starter shaft slightly less than one full turn and then carefully push it in until seated against the crankcase. The sector gear should rest against its stop which keeps the assembly from rotating and therefore releasing the spring tension.

6. Slip the shaft thrust washer onto the shaft, then manipulate the starter shaft to



- | | | |
|----------------------|------------------------|----------------------------|
| 1. Starter crank | 6. Shaft thrust washer | 10. Spring plate |
| 2. Ratchet gear | 7. Starter shaft | 11. Shaft spring washer |
| 3. Ratchet spring | 8. Sector gear | 12. Shaft shim |
| 4. Ratchet collar | 9. Starter spring | 13. Shifter shaft |
| 5. Ratchet lock ring | | 14. Shifter shaft oil seal |

Starter assembly, B Models and 165.

make sure its motion is smooth and positive.

7. Continue the assembly process in the reverse order of disassembly.

DISASSEMBLY

1. Drain the oil from the crankcase.
2. Remove the right crankcase cover.
3. Remove the ratchet gear and the washers located on either side of the gear, from the right crankcase.

4. Loosen the kick-starter lever pinch-bolt.

5. Holding the starter ratchet with one hand to prevent it from springing loose, rotate the kick-starter lever down until the ratchet is free of the release plate. Remove the ratchet and the spring from the kick-starter shaft.

6. Remove the kick-starter lever from the kick-starter shaft, then remove the shaft from the right crankcase cover.

7. Bend back the tabs of the lockplate and remove the two bolts securing the release plate to the right crankcase cover. Note the direction that the bend ends of the release plate are facing so that the plate can be installed in the same direction. Remove the spacer and the stop plate from beneath the release plate in the crankcase cover.

INSPECTION

1. Inspect the condition of the teeth on the starter ratchet and the ratchet gear. If the teeth are worn to a point where they will allow the gears to rotate in either direction, both components should be replaced.

2. If the return spring is broken or has deformed ends it should be replaced.

3. Inspect the lips of the oil seal in the right crankcase cover. If the lips are nicked, or otherwise deformed, the seal should be replaced.

ASSEMBLY

1. Install the stop plate, spacer, release plate, and lockplate onto the right crankcase cover with two bolts. Bend the tabs on the lockplate up against the flats on the heads of the bolts. If the tabs are fatigued the lockplate should be replaced.

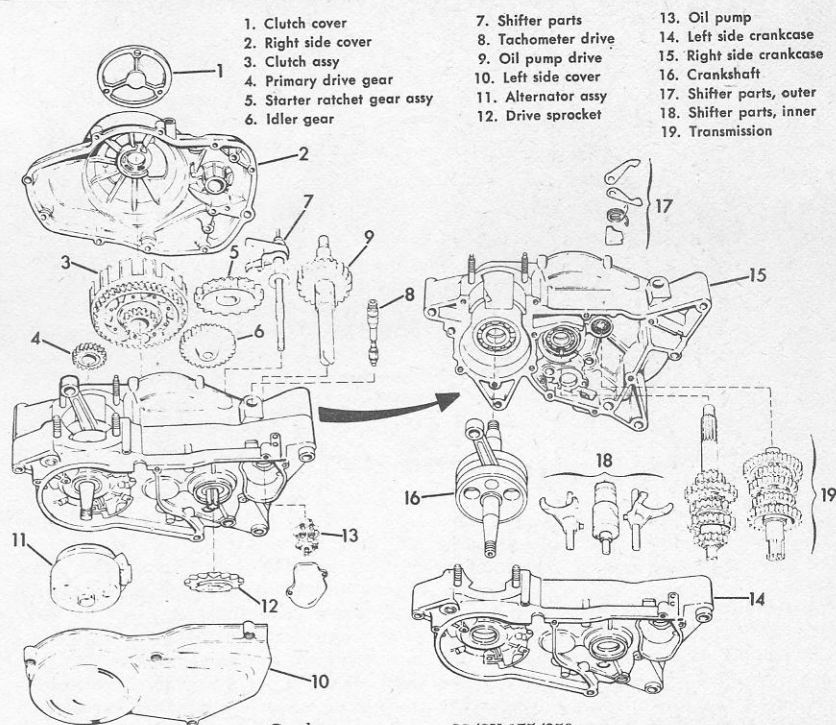
2. Install the shaft into the right crankcase cover. Grease the lips of the oil seal in the cover before installing the shaft through it. Install the return spring on the shaft with the larger hooked end facing the right crankcase cover. Hook the end of the spring on the projection in the crankcase cover.

3. Install the ratchet on the shaft until the splines mesh, then hook the end of the return spring onto the projection on the ratchet.

4. Temporarily install the kick-starter lever on the shaft. Using the lever rotate the shaft while pushing the ratchet in on the shaft so that it catches under the release plate.

5. Remove the kick-starter lever and position it in the correct position. Install and tighten the kick-lever pinch-bolt.

6. Install the washer, ratchet gear, and another washer onto the end of the kick-starter shaft, then install the right crankcase cover.



Crankcase components SS/SX 175/250

CRANKCASE

Disassembly

MODELS M-50 AND M-65

1. Remove the engine from the frame as described in the engine "Removal and Installation" section, and disassemble the top end as described in the "Cylinder and Piston" section.

2. Remove the left side cover assembly as described in the "Starter" section.

3. Remove the magneto-generator assembly as described in the "Magneto-Generator" section.

4. Using Puller Tool (H-D part no. 97292-61), or a suitable substitute, pull the drive sprocket free. A gear puller may be used if care is taken not to damage the sprocket teeth. Remove the woodruff key.

5. Remove the drive pinion gear as described in the "Clutch" section.

6. Remove the crankcase studs which secure the right and left crankcase halves together.

7. Separate the crankcase halves with Crankcase Disassembly Tool (H-D part no.

97326-65), or a suitable substitute, while tapping on the cases with a soft mallet to make sure that they separate evenly. The tool mounts on the magneto's seat and presses on the crankshaft.

8. Bushings and bearings may be pressed out if worn, cracked, rough in motion, or otherwise damaged.

9. Remove the clutch actuating lever; if worn or damaged, by removing the shaft lock screw (Model M-65 only) and then pulling the lever straight out.

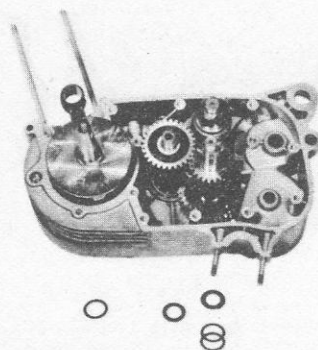
10. Remove the crankshaft assembly from the crankcase.

M-125, M-100, X-90, Z-90, SR-100, AND SX/TX 125 MODELS

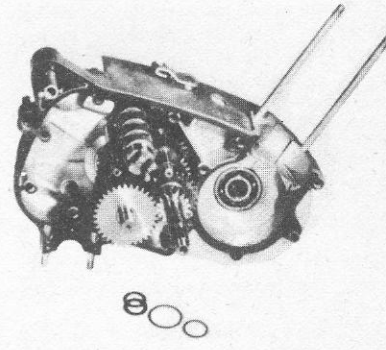
1. Remove the right side cover and clutch assembly as described in the "Clutch" section, and disassemble the top end as described in the "Cylinder and Piston" section.

2. Remove the shifter pawl carrier as described in the "Transmission" section.

3. Remove the magneto generator as described in the "Magneto-Generator" section.



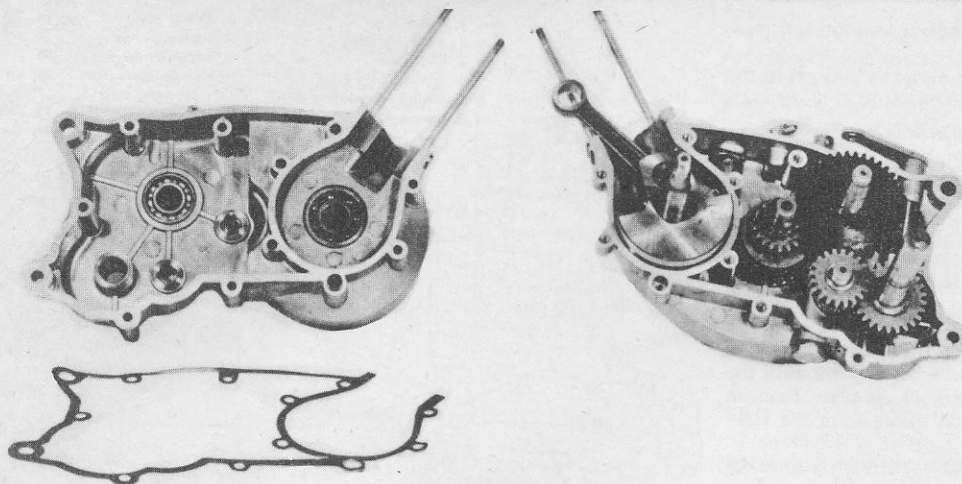
Right Crankcase and Parts, M-125



Left Crankcase and Parts, M-100

The separated crankcase halves.

Harley-Davidson Singles



4. Using a suitable gear puller remove the drive sprocket. Remove the woodruff key.

5. Remove the drive pinion nut and pinion as described in the "Clutch" section.

6. Remove the crankcase studs which secure the crankcase halves together, then use Crankcase Disassembling Tool (H-D part no. 97347-68P), or a suitable substitute, while tapping the cases with a soft mallet to separate the crankcase halves. The tool mounts on the left crankcase pad and presses on both the crankshaft and countershaft.

7. Bushings and bearings may be pressed out if worn, cracked, rough in motion, or otherwise damaged. Blind bearings may be pulled free with Snap-On Puller (H-D part no. CG-40A) or a suitable substitute.

8. Continue as described in steps 9 and 10 in the previous section.

S AND B MODELS

DISASSEMBLY

1. Remove the engine from the frame as described in the engine "Removal and Installation" section, and disassemble the top end as described in the "Cylinder and Piston" section.

2. Remove the generator (Model 165) as described in the "Generator" section, or the magneto-generator (Hummer, Super-10, etc.) as described in the "Magneto-Generator" section.

3. Remove the transmission mainshaft sprocket and the outer gear shifter indicator arm as described in the "Transmission" section.

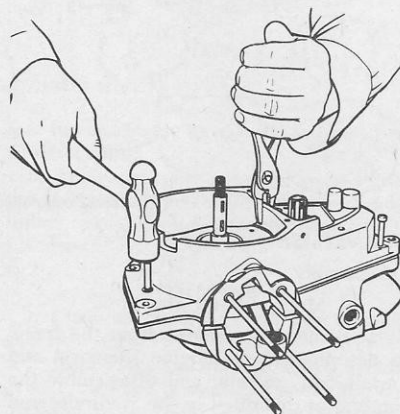
4. Remove the clutch cover, drain the transmission oil, and remove the engine sprocket, primary chain, and clutch assembly as described in the "Clutch" section.

5. Remove the starter assembly as described in the "Starter" section.

6. Remove the oil seal screws and star washers, pry the oil seal from the crankcase side, and remove and discard the gasket.

7. Remove all the crankcase securing screws.

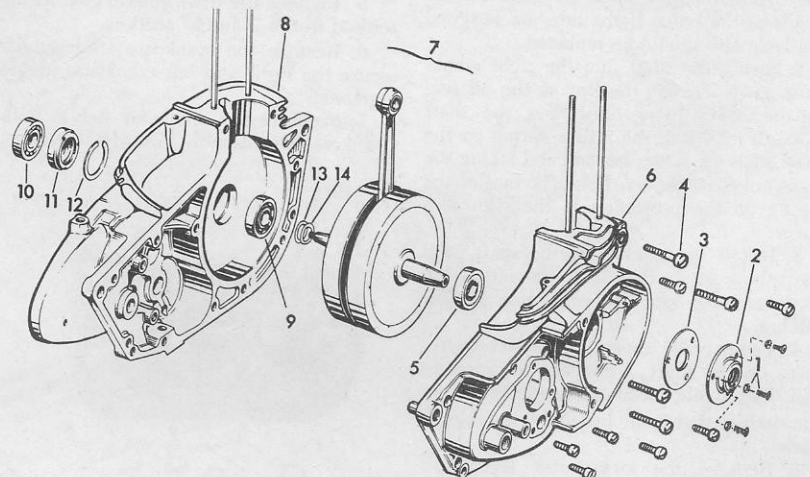
8. Separate the crankcase halves by inserting two engine-frame mounting screws as depicted, then alternately strike each



Separating the crankcase halves.

screw with a soft mallet while supporting the crankcase with pliers. Apply heat with a blow torch to the cases around the magneto-generator or generator shaft, and around the locating dowel pins if the cases are difficult to separate.

9. If the crankshaft bearing remains in the case, it may be drifted out at this time with a suitably sized drift.



1. Oil seal screw and washer (3)
2. Oil seal
3. Oil seal gasket
4. Crankcase screws (11)

5. Generator-magneto shaft bearing
6. Right crankcase side
7. Flywheel and connecting rod assembly
8. Left crankcase side
9. Sprocket shaft bearing—inner

10. Sprocket shaft bearing—outer
11. Oil seal and retainer
12. Oil seal spring ring
13. Shim (.036) 1964 or (.060) 1965
14. Shim (.014) 1964

Crankcase assembly.

10. Remove the transmission as described in the "Transmission" section.

11. Remove the crankshaft assembly by holding the case with the shaft down and tapping the front of the case on a block of wood until the crankshaft assembly is loose. Apply heat with a blow torch around the sprocket shaft bearing if the flywheel assembly is reluctant to leave the case, but avoid placing direct heat on the bearing.

12. Remove the shaft bearings. If the bearings will not come free easily, then a puller bar must be fabricated for use with Wedge Puller (H-D part no. 95637-46) or a suitable substitute. You'll need the following items:

a. A piece of flat stock $\frac{1}{2}$ in. thick and $1\frac{1}{2}$ x 4 in. for the puller bar with $\frac{7}{16}$ in. wide by 1 in. deep slots at the edges.

b. A puller screw from a Harley-Davidson puller or one with $\frac{1}{2}$ x 18 thread.

c. A pair of $4\frac{1}{2}$ in. long cap screws with $\frac{3}{8}$ x 16 thread.

d. A $\frac{1}{2}$ in. hex nut.

Secure the shaft in a copper or wood-jawed vise and use the puller to remove the bearing, then invert the crankshaft and

Harley-Davidson Singles

pull the other bearing. Place the $\frac{1}{2}$ in. hex nut between the end of the shaft and the puller screw to protect the shaft while pulling the bearing from the generator or magneto-generator shaft.

13. Drift the sprocket shaft inner and outer bearings free of the case with a suitably sized drift. The oil seal and retainer will come out with the bearings. There are two spacing shims between the inner bearing and the flywheel on 1964 models and one shim on 1965 models. Apply heat with a blow torch to the case around the outer bearings if they are difficult to remove.

SS/SX 175/250

1. Remove the engine from the frame, and disassemble the top end.

2. Remove the clutch and primary gear as described in the "Clutch" section.

3. Remove the kick-starter ratchet gear and the washers located on either side of the gear. These should be laying loose in the right crankcase but may be on the end of the kick-starter shaft.

4. Remove the gear shift lever from the left-side of the engine. Pull the shift shaft and the oil pump drive shaft from the right crankcase.

5. If desired the tachometer drive can be removed from the right crankcase after

the retaining clamp is removed.

6. Remove the left crankcase cover and alternator as described in "Alternator" in the "Electrical Systems" section.

7. Remove the two bolts from the countershaft sprocket and rotate the lock-plate so that it can be removed. Remove the countershaft sprocket.

8. Remove the oil pump as described in the "Lubrication System" section.

9. Using an impact driver, remove the 13 crankcase securing screws from the left side. These screws should be loosened gradually and evenly in an "X" pattern so as not to distort the crankcases.

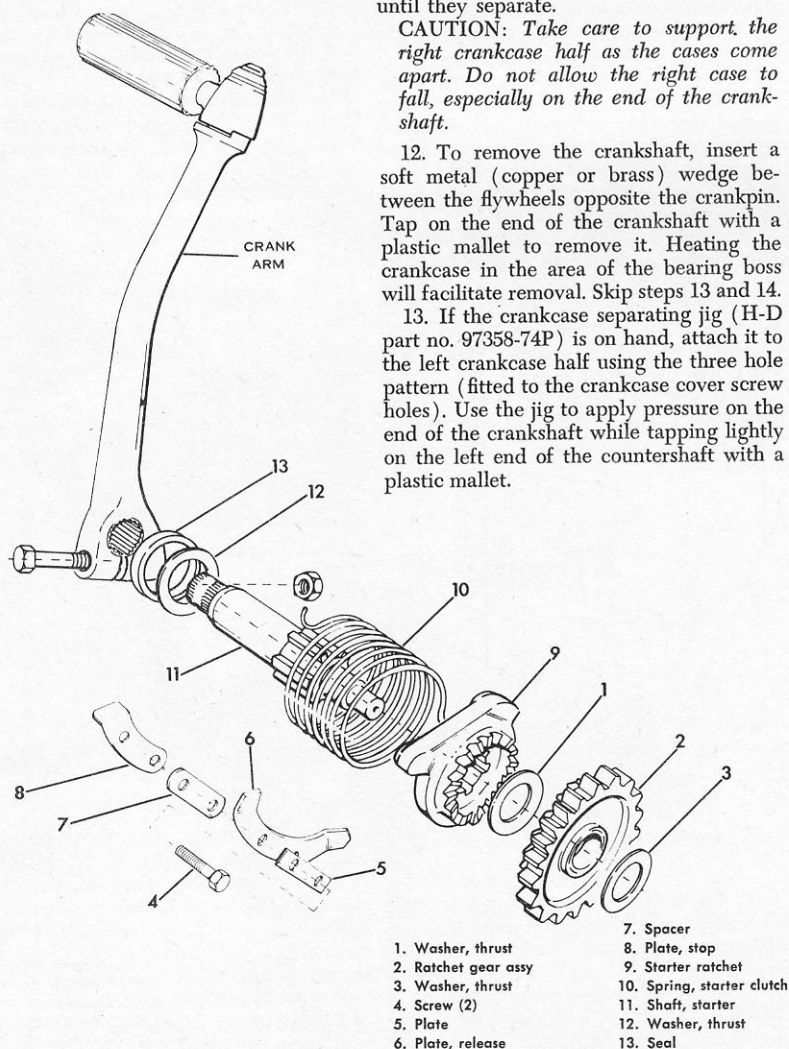
10. To split the cases and remove the crankshaft a special tool (H-D part no. 97358-74P) is recommended. If this tool is not available the cases can be split and the crankshaft removed by following Steps 11 and 12 below. If this special tool is on hand skip to Step 13 below.

11. Hold the crankcases up with the right side facing down. While supporting the left case half, tap alternately on the end of the crankshaft and countershaft with a plastic mallet. Extreme caution must be used when tapping on the crankshaft as too hard of blow will pinch the flywheels together. Continue tapping the cases apart being sure that they are separating evenly until they separate.

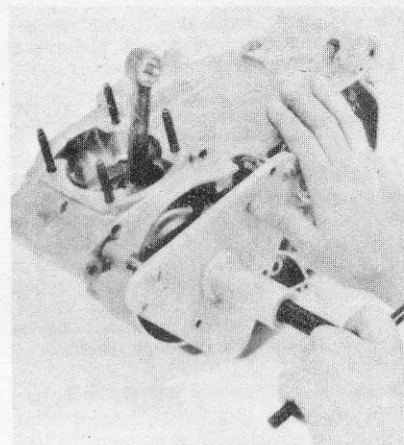
CAUTION: Take care to support the right crankcase half as the cases come apart. Do not allow the right case to fall, especially on the end of the crankshaft.

12. To remove the crankshaft, insert a soft metal (copper or brass) wedge between the flywheels opposite the crankpin. Tap on the end of the crankshaft with a plastic mallet to remove it. Heating the crankcase in the area of the bearing boss will facilitate removal. Skip steps 13 and 14.

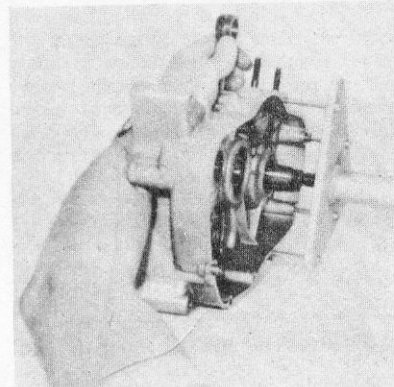
13. If the crankcase separating jig (H-D part no. 97358-74P) is on hand, attach it to the left crankcase half using the three hole pattern (fitted to the crankcase cover screw holes). Use the jig to apply pressure on the end of the crankshaft while tapping lightly on the left end of the countershaft with a plastic mallet.



Starter assembly, M-100, M-125, SX/TX 125, SR-100, X-90, and Z-90



Splitting the cases with the special tool



Removing the crankshaft

14. To remove the crankshaft, mount the crankcases separating jig to the right crankcase using the four hole pattern. Use the tool to push the crankshaft out of the right main bearing.

15. Remove the transmission mainshaft, countershaft, and shifter components from the right crankcase as described in the "Transmission" section.

16. Bearings and seals can be inspected in place in the cases. If damaged, the seals can be pried out, however, care must be taken to avoid scoring the seal seats. When removing bearings, gentle heat applied to the cases in the area of the bearing will make removal easier. Do not heat the bearing itself.

Assembly

MODELS M-50 AND M-65

1. Assembly is in the reverse order of disassembly.

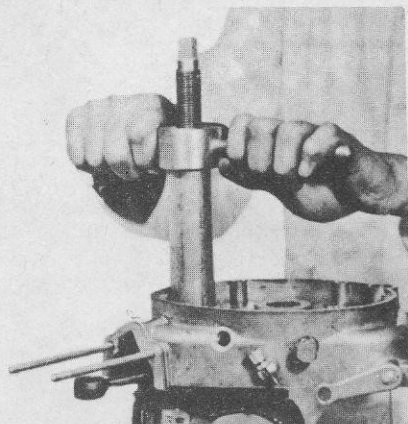
2. Use Crankshaft Assembling Tool (H-D part no. 97342-65P), or a suitable substitute, to pull the right crankshaft assembly into the right case ball bearing.

3. Assemble the transmission components as described in the "Transmission" section.

4. Install the left crankcase half on the crankshaft using the same tool as in step two, taking care not to damage the oil seal.

5. Measure the crankshaft end-play between the two main bearings with a dial indicator by shifting the crankshaft all the

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Assembling the right crankcase.

way to one side then shifting it all the way to the other side while positioning the indicator in such a way as to allow the plunger to measure the distance the crankshaft moves. Add more or less shims to the right crankshaft until play is within 0.004–0.008 in.

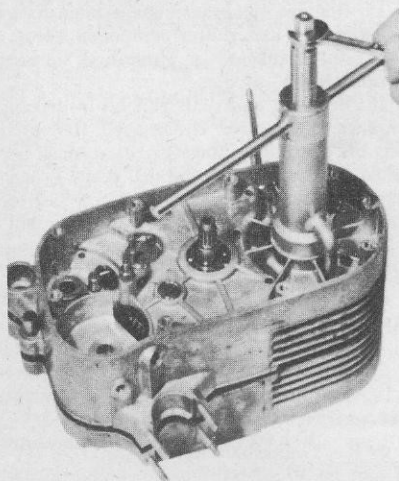
6. Complete assembly in the reverse order of disassembly.

M-125, M-100, X-90, Z-90, SR-100,
AND SX/TX 125 MODELS

1. Assembly is in the reverse order of disassembly.

2. Assemble the transmission components as directed in the "Transmission" section, taking care to remove the shifter cam stop before assembling the cases.

3. Install the left case over the left crankshaft using Crankshaft Assembling Tool (H-D part no. 97342-65P) or a suitable substitute, taking care not to damage any oil seals while pulling the shaft into the ball bearing.



Assembling the right crankcase.

4. Using Crankshaft Assembling Tool (H-D part no. 96110-68P) or a suitable substitute, assemble the right shaft into the right bearing.

5. Measure the crankshaft end-play between the two main bearings with a dial indicator by shifting the crankshaft all the way to one side then shifting it all the way to the other while positioning the indicator

in such a way as to measure the distance the crankshaft moves. Add more or less shims to the left shaft until play is within 0.002–0.004 in. Crankshaft Assembling Tool (H-D part no. 96110-68P) can be used to shift the crankshaft from left to right.

6. Complete assembly in the reverse order of disassembly.

S AND B MODELS

1. Support the flywheel assembly on two 5 in. blocks and lightly press the bearings onto their respective shafts until they bottom. The 1964 and earlier models have two spacers between the sprocket shaft bearing and the flywheel. Use a piece of pipe $\frac{3}{4}$ in. in diameter and $4\frac{1}{2}$ in. long as a sleeve for pressing the bearing in place.

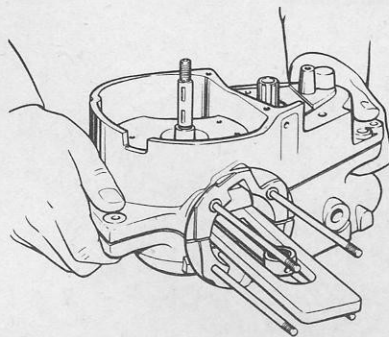
2. With the left crankcase clutch side up on a workbench, install the oil seal spring ring, lubricate the oil seal and retainer with engine oil, and drift or press it into place with the slotted side facing in.

3. Invert the case and assemble the transmission as directed in the "Transmission" section.

4. Place the flywheel tapered spacer which comes in the Tool Set around the lower connecting rod bearing to prevent the flywheels from closing during installation. Anything which will keep the flywheels aligned, and which will fit snugly between the two, may be substituted.

5. Assemble the flywheel assembly in the left case. The sprocket shaft bearing should seat against the oil seal retaining ring. Apply heat to the case around the bearing bore with a blow torch if the bearing will not readily slip into the case. Take care not to damage the oil seal.

6. Apply a suitable sealer to the crankcase mating surfaces and carefully assemble the right case to the left case, making sure that the inner gear indicator arm and the gear shifter ratchet yoke are properly engaged. Apply heat to the dowel pin holes, and around the bearing bore if the bearing will not readily slip into the case. Test for a positive engagement of the indicator arm then secure the crankcase screws.



Assembling the crankcase halves.

7. Assemble the transmission mainshaft oil seal, drive sprocket, and outer gear indicator arm as described in the "Transmission" section.

8. Apply a suitable gasket sealer to a new oil seal gasket and assemble it and the oil seal to the right case.

9. Remove the flywheel tapered spacer.

10. Install the generator on the Model 165 as described in the "Generator" section.

11. Install the magneto-generator on the B Models as described in the "Magneto-Generator" section.

12. Place the engine clutch side up and install the starter assembly as described in the "starter" section.

13. Install the countershaft sprocket, primary chain, and clutch assembly as described in the "Clutch" section.

14. Install the top end as described in the "Cylinder and Piston" section.

15. Install the clutch and magneto side covers, and install the engine in the frame as described in the "Engine Removal and Installation" section.

16. Adjust the ignition timing as described in the "Tune-Up" section.

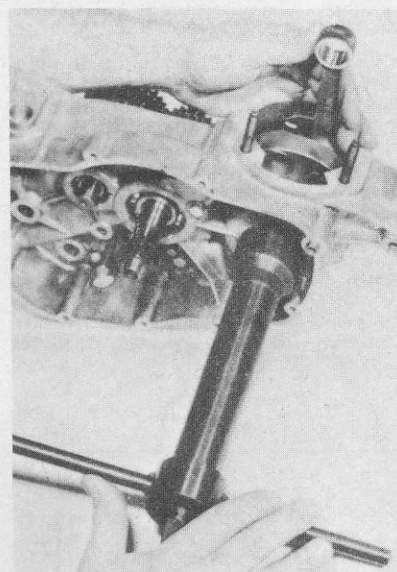
SS/SX 175/250

1. Install all bearings and oil seals into the case halves. Install the transmission as described in the "Transmission" section.

2. Install the crankshaft into the right case half using the special tool (H-D part no. 97297-61PA) and spacer (H-D part no. 96111-74) as shown.

3. Apply a light coat of liquid gasket compound to the right crankcase and install the crankcase gasket.

4. Install the left crankcase into position over the end of the crankshaft and countershaft. Install the special tool (H-D part no. 96110-68P) and spacer (H-D part no. 96111-74) on the left end of the crankshaft. Using the tool pull the cases together evenly, tap the rear of the cases with a plastic mallet if necessary.

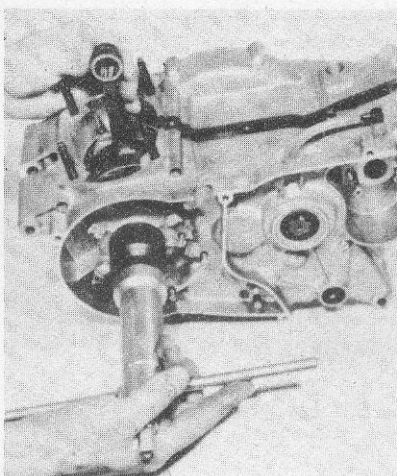


Installing the crankshaft

5. Measure the crankshaft end-play with a dial gauge by shifting the crankshaft all the way to one side then shifting it all the way to the other side while positioning the gauge in such a way as to allow the plunger to measure the distance the crankshaft moves. Add more or less shims to the left side of the crankshaft until the play is within 0.002–0.004 in. (0.05–0.10 mm).

6. Complete assembly in the reverse order of disassembly.

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Tightening the cases together

TRANSMISSION

Models M-50 and M-65

REMOVAL AND INSTALLATION

1. Remove the engine from the frame as described in the engine "Removal and Installation" section.
2. Separate the crankcase halves as described in the "Crankcases" section.
3. Installation is in the reverse order of removal.

PRELIMINARY INSPECTION

1. Inspect the gear teeth for a worn, damaged, pitted, or scored condition.
2. Inspect the gear dogs for a worn or damaged condition.

3. Inspect the mainshaft, countershaft, transfer shaft, and starter shaft for a pitted, grooved, warped, or worn condition especially at the bearing surfaces.

4. Inspect the shifter finger for a grooved, damaged, warped, or worn condition.

5. Once the necessary repairs have been determined, proceed to disassemble those assemblies which are to be repaired. Gears should be replaced in sets because when a countershaft gear is damaged, all those gears which have been in contact with it have been affected and, therefore, require attention.

DISASSEMBLY

1. Place the transmission in third gear, then remove the transfer shaft, countershaft, and spacer washer.
2. Remove the countershaft lock and thrust washers, and the first, second, and third gears from the countershaft.
3. Remove the mainshaft assembly from the crankcase. Remove the mainshaft spacer washer, pull third gear from the shaft with a suitable gear puller, and slip the mainshaft second gear from the shaft.
4. Remove the shift lever locating guide, gasket, lever ball, and ball spring.
5. Remove the shifter shaft nut, lockwasher, spacer, lever, spacer, and O-ring from the shaft, and pull the shaft from the crankcase. Remove the shifter finger from the shifter lever.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect all parts for a worn or dam-

aged condition and replace them as necessary. Don't reuse any part if its life expectancy is dubious.

ASSEMBLY

1. Assembly is basically the reverse order of disassembly.

2. Secure first gear on the countershaft with the spacer and lockring, then mount the remaining countershaft gears. Make sure that the smaller side of the third gear clutch holes are facing the second gear lugs.

3. Slip the mainshaft second gear in place on the shaft then press first gear into place.

4. Assemble the mainshaft and countershaft assemblies to the right crankcase half, taking care to engage the shifter finger and the mainshaft second gear collar into the countershaft second gear groove.

5. Engage the starter clutch spring in the crankcase recess as shown in the Transmission Gear Shaft Assemblies illustration. On models before engine no. 65M3539, engage the spring at "A," and for later models engage the spring at "B."

6. Replace the spacer washers in their original locations if no new gear or shaft parts have been incorporated. Where new parts are used determine the correct spacer thickness in the following manner:

a. Install the mainshaft with a 0.6 mm washer in the right crankcase half.

b. Install the countershaft with an 0.8 mm washer in the right crankcase half.

c. Manipulate the shifter lever so the transmission is in third gear, and insert a 0.004 in. thickness gauge between the countershaft second and third gears to determine whether there is at least that much clearance between them.

d. Shift the transmission and repeat the above measuring sequence on the countershaft first and second gears.

e. Check the clearance between the mainshaft first and second gears, with the transmission in first gear, and use the appropriate size washer to bring the clearance to at least 0.004 in.

f. Assemble the appropriate spacer washers to the mainshaft, countershaft, and starter shaft to bring the clearance to within 0.004–0.006 in. for the mainshaft, and to within 0.004–0.008 in. for the other two shafts. This is also a good time to check the crankshaft end-play.

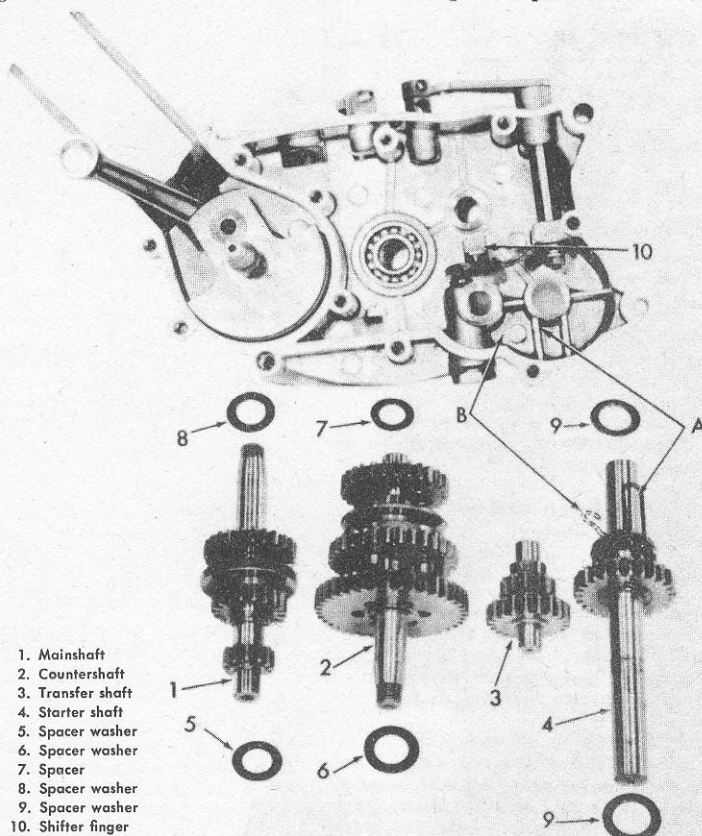
g. Assemble the two crankcase halves with all the components installed, then check the various shaft end-plays with a dial indicator by shifting the shaft to one side and then to the other side. A soft mallet may be necessary to stimulate the shafts into motion.

h. Separate the crankcase halves and install the appropriate size spacer to correct the end-play, then repeat step "g."

7. Complete the assembly process in the reverse order of disassembly and replenish the oil supply.

HANDSHIFT CABLE ADJUSTMENT AND INSTALLATION

1. Place the transmission in neutral and loosen both upper and lower cable adjuster locknuts.

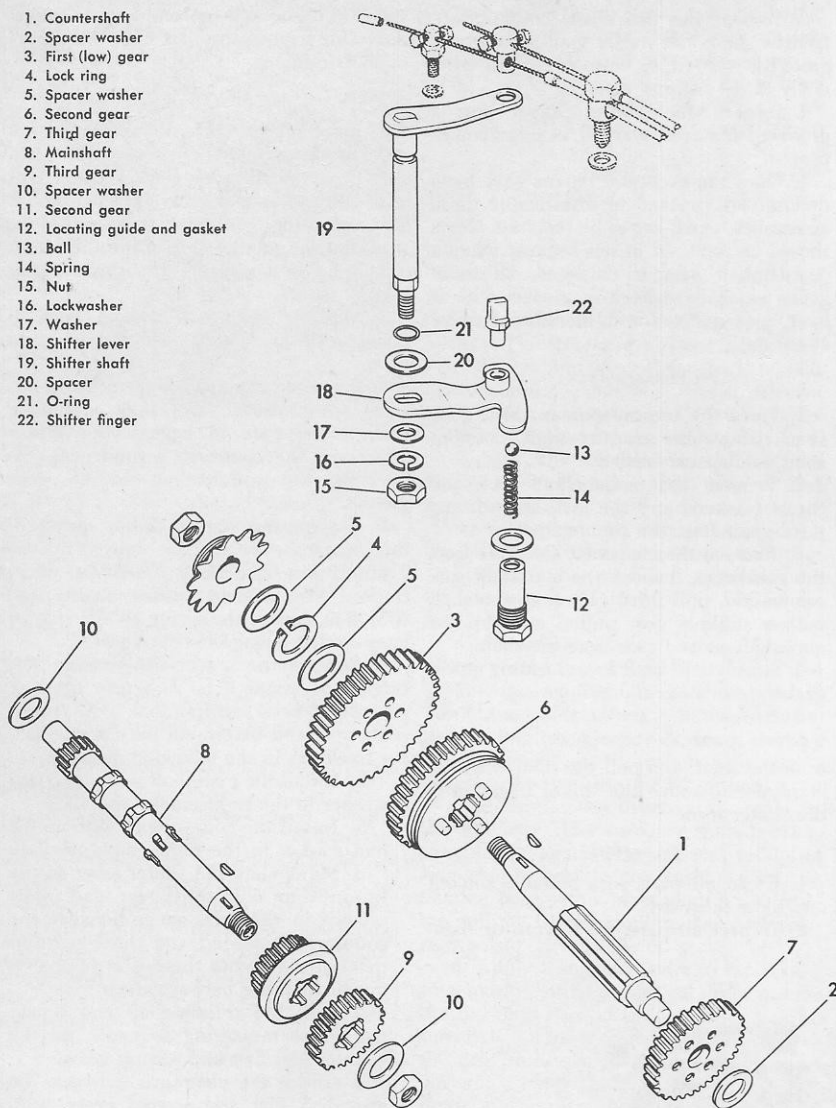


1. Mainshaft
2. Countershaft
3. Transfer shaft
4. Starter shaft
5. Spacer washer
6. Spacer washer
7. Spacer
8. Spacer washer
9. Spacer washer
10. Shifter finger

Transmission gear shaft assemblies.

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1. Countershaft
2. Spacer washer
3. First (low) gear
4. Lock ring
5. Spacer washer
6. Second gear
7. Third gear
8. Mainshaft
9. Third gear
10. Spacer washer
11. Second gear
12. Locating guide and gasket
13. Ball
14. Spring
15. Nut
16. Lockwasher
17. Washer
18. Shifter lever
19. Shifter shaft
20. Spacer
21. O-ring
22. Shifter finger



Transmission assembly.

2. Turn the knurled adjuster nuts counterclockwise to reduce the cable slack, taking care not to make the cable too taut, then secure the locknuts.

3. If the adjuster runs out of thread space or if the cable clamps have been removed, proceed in the following manner:

a. Loosen the upper and lower clamping block setscrews.

b. Place the transmission hand control in the neutral position.

c. Adjust the cable adjusters so there are several threads left between the locknut and cable coil.

d. Shift the shift lever position to make sure the transmission is in neutral. Moving the lever toward the left will place the transmission in first. One step to the right should be neutral and the rear wheel should rotate freely with the clutch in or out.

e. Secure the upper and then the lower cable clamping block setscrews while pulling on the cable to provide the necessary tension. The upper cable housing must be seated on the crankcase anchor.

4. Adjust the cable as described in steps one and two. When correctly adjusted, the engine will run while the hand indicator is on neutral without slipping into first or second gear.

5. Install the cable in the following manner:

a. Loosen the housing clamp screw located near the control cables and slip the handgrip off the handlebar.

b. Slip the cables through the housing slots.

c. Inspect all parts for a worn or damaged condition and replace them as necessary. Always grease the cable or lubricate it with engine oil or a chain lubricating compound before replacing it.

d. Replace the cable in the reverse order of removal.

FOOTSHIFT LINKAGE ADJUSTMENT AND REPAIR

1. Remove the cotter pin, washer, and link rod from the hole in the shifter lever.

2. Place the transmission in second gear by moving the shift lever clockwise to

third gear and then back one step to second gear.

3. Rotate the link rod in the threaded ball joint until it is aligned so it can be inserted in the lever hole. Secure the rod locknut and secure the link arm with the washer and a new (if possible) cotter pin.

4. Remove the cover screw, acorn nut, washer, cover, pawl spring, and pawls.

5. Remove the shifter lever nut, washer, shifter lever, spring cups, springs, and ratchet.

6. Clean all parts in a suitable solvent then blow them dry.

7. Replace all worn or damaged parts as necessary.

8. Liberally grease all pawl and ratchet parts before assembly which is the reverse of disassembly.

Models M-100 and M-125

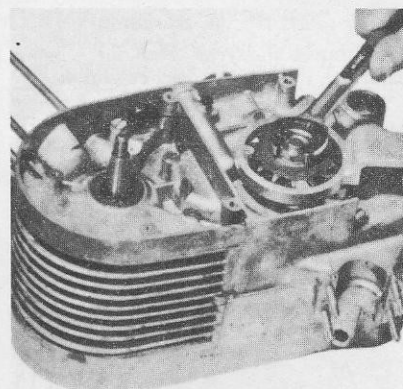
DRIVE SPROCKET

Removal

1. Remove the sprocket cover screws and cover.

2. Secure the sprocket with Transmission Sprocket Wrench (H-D part no. 97305-68P, for 14 tooth sprockets, and no. 97297-68P for 15 tooth sprockets), or a suitable substitute, then remove the sprocket nut.

3. Remove the nut lock and pull the sprocket free with a suitable gear puller.



Removing the drive sprocket.

Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all parts for a worn or damaged condition and replace them as necessary.

Installation

1. Place the sprocket on its shaft with the hub facing the crankcase.

2. Secure the lock and nut and bend the locktab against the flat side of the nut.

3. Replace the cover and secure it with the cover screws.

SHIFTER PAWL CARRIER

Disassembly

1. Remove the pawl carrier assembly from the crankcase, and remove the return spring from the rear of the shifter carrier.

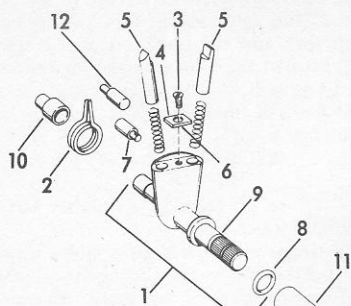
2. Check the shifter pawl movement. If the movement is awkward or if any of the components are visibly damaged, the as-

Harley-Davidson Singles

sembly must be disassembled by removing the spring plate screw, pawl spring retainer plate, pawls, pawl springs, and the shifter lever stop pin.

Inspection

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the shifter pawls and springs for a worn, grooved, cracked, or damaged condition, and replace them as necessary. Replace the pawl springs as a set if either are less than 1.5 in. long.



- | | |
|----------------------------------|-------------------------------------|
| 1. Shifter pawl carrier assembly | 7. Stop pin |
| 2. Return spring | 8. O-ring |
| 3. Screw | 9. Pawl carrier |
| 4. Pawl spring retainer plate | 10. Crankcase carrier shaft bushing |
| 5. Pawl (2) | 11. Cover carrier shaft bushing |
| 6. Pawl spring (2) | 12. Return spring pin |
- Shifter pawl carrier assembly.

3. Insert the pawls and springs in the carrier holes so the flat portions face each other, then check their action for a smooth, free operation.

4. The crankcases must be split if the shifter carrier bushing is in need of replacement. The bushing is a press fit which may be removed with a suitable shouldered drift from the inside out, and replaced by pressing in from the outside. The new bushing will not require reaming.

5. Inspect the carrier for a worn or damaged condition and replace it as necessary.

6. Inspect the rubber O-ring for a worn, cracked, or damaged condition and replace it if necessary. It is a good practice to replace such items whenever possible.

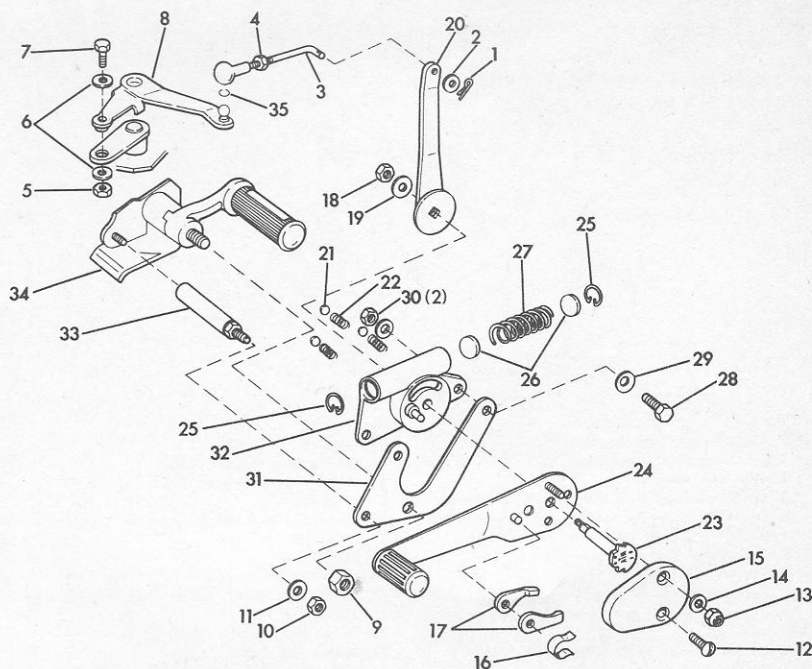
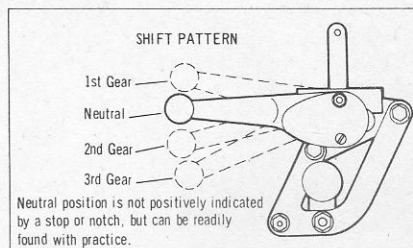
7. Inspect the cover bushing for a worn or damaged condition and replace it if necessary by pressing with a suitable shouldered drift from the inside out. When installing the new bushing, make sure the chamfered side is facing in. Press the bushing from the outside in until flush with the bushing boss. Reaming this bushing will not be necessary.

Assembly

1. Slip the pawl springs into the pawls, then install the pawls into the carrier so the flat portions are facing each other.

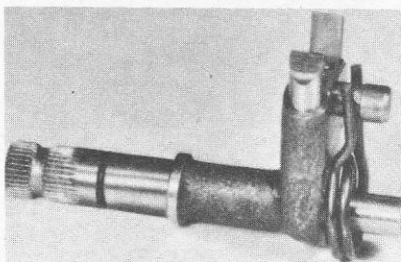
2. Press down on the pawls, slip the pawl spring retainer plate down against the carrier, insert the stop pin with its hole facing upward, and secure the assembly with the screw which goes through the carrier and into the stop pin.

3. Slip the return spring on the carrier with the offset portion facing the crankcase and the stop pin between the spring arms.



- | | | |
|--------------------------------------|--------------------------|----------------------|
| 1. Cotter pin | 13. Cover nut | 25. Lock ring (2) |
| 2. Washer | 14. Cover washer | 26. Retainer (2) |
| 3. Link rod | 15. Cover | 27. Return spring |
| 4. Link rod locknut | 16. Pawl spring | 28. Bolt (2) |
| 5. Bell crank bolt nut | 17. Pawl (2) | 29. Washer (4) |
| 6. Bell crank bolt nut washer | 18. Shifter lever nut | 30. Nut (2) |
| 7. Bell crank bolt | 19. Shifter lever washer | 31. Shifter bracket |
| 8. Bell crank | 20. Shifter lever | 32. Shifter housing |
| 9. Shifter bracket footrest nut | 21. Spring cup (3) | 33. Extension stud |
| 10. Shifter bracket extension nut | 22. Spring (3) | 34. Footrest support |
| 11. Shifter bracket extension washer | 23. Ratchet | 35. Ball socket ring |
| 12. Cover screw | 24. Shifter foot lever | |

Footshift linkage.



Positioning the return spring on the carrier.

4. Secure the rubber O-ring in its groove on the carrier shaft.

5. Slip the carrier assembly into the case and engage the return spring on the return spring pin. When the spring is properly engaged, the shaft should not turn.

Models M-100, M-125, X-90, Z-90, SR-100, SX/TX 125

REMOVAL AND INSTALLATION

1. Remove the engine from the frame as

described in the engine "Removal and Installation" section.

2. Remove the magneto-generator as described in the "Magneto-Generator" section.

3. Disassemble the shifter cam stop parts 1-4 (as listed in the exploded view illustration) from the crankcase.

4. Separate the crankcase halves as described in the "Crankcases" section.

5. Replacement is in the reverse order of removal.

DISASSEMBLY

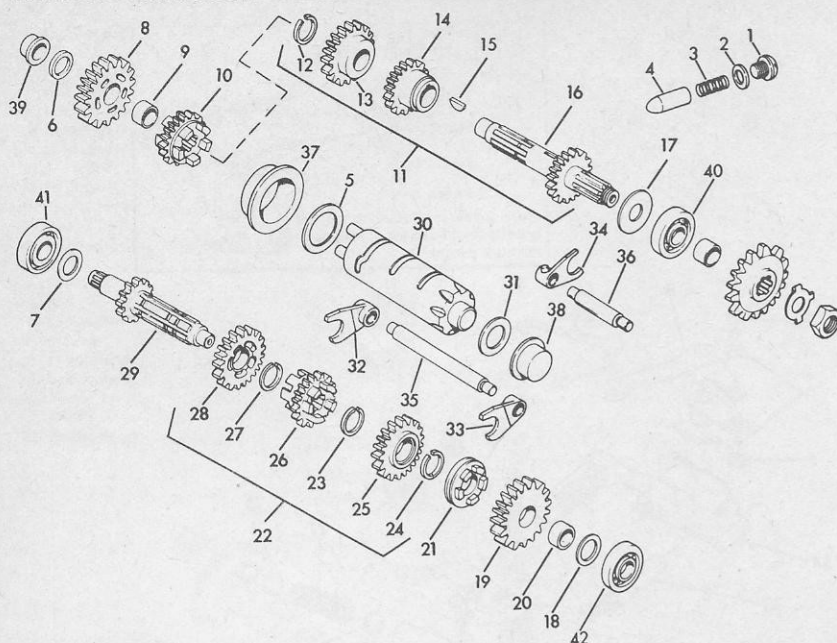
Model M-100, SR-100, SX/TX 125

1. Place the left crankcase on the work bench with the gear assemblies pointing up.

2. Remove the variable-thickness shifter cam, countershaft, and mainshaft spacer washers.

3. Hold the countershaft gears together while tapping on the countershaft splined end with a soft mallet, lift all three assem-

Harley-Davidson Singles



Transmission assembly.

- | | |
|----------------------------------------------------|----------------------------------------------------|
| 1. Cam stop plunger plug | 23. Lockring |
| 2. Cam stop plunger plug washer | 24. Lockring |
| 3. Cam stop plunger spring | 25. Mainshaft third gear (26T.) |
| 4. Cam stop plunger | 26. Mainshaft second gear (20T.) |
| 5. Shifter cam spacer washer (variable-thickness) | 27. Lockring |
| 6. Countershaft spacer washer (variable-thickness) | 28. Mainshaft fourth (high) gear (29T.) |
| 7. Mainshaft spacer washer (variable-thickness) | 29. Mainshaft |
| 8. Countershaft first (low) gear (35T.) | 30. Shifter cam |
| 9. Countershaft low gear bushing | 31. Shifter cam assembly |
| 10. Countershaft fourth gear | 32. Shifter cam spacer washer (variable-thickness) |
| 11. Countershaft and gear assembly | 33. Shifter fork |
| 12. Lockring | 34. Shifter fork |
| 13. Countershaft second (sliding) gear (28T.) | 35. Shifter fork shaft |
| 14. Countershaft third gear (24T.) | 36. Shifter fork |
| 15. Key | 37. Shifter cam right crankcase bushing |
| 16. Countershaft | 38. Shifter cam left crankcase bushing |
| 17. Counter spacer washer (variable-thickness) | 39. Countershaft right crankcase bushing |
| 18. Mainshaft spacer washer (variable-thickness) | 40. Countershaft left crankcase ball bearing |
| 19. Mainshaft fifth gear | 41. Mainshaft right crankcase ball bearing |
| 20. Mainshaft fifth gear bushing | 42. Mainshaft left crankcase ball bearing |
| 21. Mainshaft fifth gear shifter clutch | |
| 22. Mainshaft and gear assembly | Shifter fork cotter pin (2) |

blies free, and remove the left-side washers. Note the positions of the shifter forks in the sliding gears for replacement purposes.

4. Disassemble the countershaft assembly in the following manner:

- Slip the countershaft first gear and bushing free from the shaft.
- Remove the countershaft fourth gear from the splined shaft.
- Remove the lockring, second gear, third gear—with the aid of a suitable gear puller, and the countershaft key (if replacement is necessary).

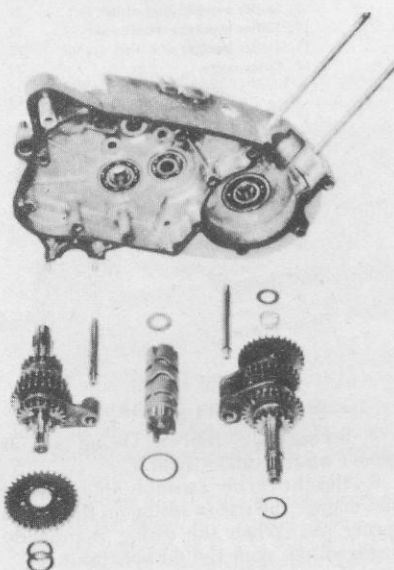
5. Disassemble the mainshaft assembly in the following manner:

- Remove the mainshaft fifth gear, bushing, and the fifth gear shifter clutch.
- Remove the lockring, third gear, second gear, the fourth gear lockring, and fourth gear.
- Remove the shifter cam, shifter forks, and shifter fork shafts.

Model M-125, X-90, Z-90

1. Place the right crankcase half on a work bench so the gear assemblies are pointing up.

2. Remove the variable-thickness shifter



Transmission gear shaft assemblies.

cam, countershaft, and mainshaft spacer washers.

3. Remove the shifter cam and countershaft assemblies, and the mainshaft fourth

and third gears all at once. Take careful note of the shifter fork positions in relation to the sliding gears for replacement purposes.

4. Remove the mainshaft assembly by tapping on the end of the shaft with a soft mallet.

5. Remove the variable-thickness shifter cam, countershaft, and mainshaft spacer washers.

6. Remove the countershaft first gear, second gear, lockwasher, and third gear.

7. Remove the shifter fork cotter pins, pins, forks, and cam. Take note of the position of the countershaft fork to the mainshaft fork and the locations of the shifter fork pins in the cam grooves for reassembly purposes.

8. Remove the mainshaft locking and second gear.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all parts for a worn, scored, warped, or otherwise damaged condition and replace them as necessary.

3. Inspect the gear dogs, dog slots, and shifter fork grooves for a chipped or damaged condition and replace them as necessary.

4. Pay special attention to the gear teeth. If one gear is damaged and is to be replaced, it is a good practice to replace the other teeth which mesh with it.

5. Inspect the shifter cam for grooved or worn slots at the various gear positions.

6. Inspect the shifter forks and fork pins for a warped or damaged condition, and for grooves worn into the fork fingers, then replace them as necessary.

7. Inspect the shifter cam stop plunger and spring for rough motion or a worn or damaged condition, especially on the plunger face, and replace them as necessary. The spring must be replaced if shorter than 1.535 in.

8. Inspect the bushings and bearings for excessive side or radial (up-and-down) play, pitting, damage, or rough motion, and replace them as necessary. Do not remove any bearing or bushing which doesn't require replacement.

9. Press the mainshaft and countershaft bearings out from the outside-in. The mainshaft left side bearing is blind and must be pulled with Bearing Puller (H-D part no. CG-40A) or a suitable bearing extractor.

10. Remove the left-side sprocket gear oil seal, then press the bearing free from the outside-in.

11. Ream the left and right shifter bushings after installation, using Large Bushing Reamer (H-D part no. 97322-61P) and Small Bushing Reamer (H-D part no. 97318-61P) or suitable substitutes.

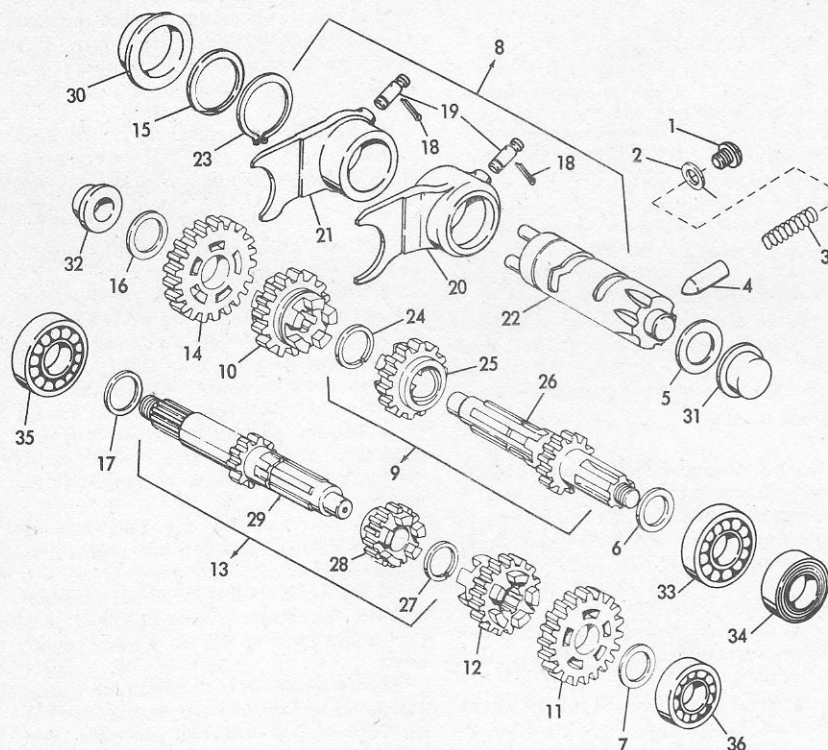
ASSEMBLY

1. Press in all bearings until they are firmly seated.

2. Use the same number and size of spacers as were removed. Any corrections will have to be made after the end-play has been determined.

3. Make the preliminary assembly without the flywheel assembly so that the most accurate mainshaft, countershaft, and shifter camshaft end-plays can be achieved.

Harley-Davidson Singles



Transmission assembly.

1. Cam stop plunger plug
2. Cam stop plunger plug washer
3. Cam stop plunger spring
4. Cam stop plunger
5. Shifter cam spacer washer (variable-thickness)
6. Countershaft spacer washer (variable-thickness)
7. Mainshaft spacer washer (variable-thickness)
8. Shifter cam assembly
9. Countershaft and gear assembly
10. Countershaft second (sliding) gear (28T.)
11. Mainshaft fourth (high) gear (29T.)
12. Mainshaft third (sliding) gear (26T.)
13. Mainshaft and gear assembly
14. Countershaft first (low) gear (35T.)
15. Shifter cam spacer washer (variable-thickness)
16. Countershaft spacer washer (variable-thickness)
17. Mainshaft spacer washer (variable-thickness)
18. Shifter fork cotter pin (2)
19. Shifter fork pin (2)
20. Countershaft second gear shifter fork (male)
21. Mainshaft third gear shifter fork (female)
22. Shifter cam
23. Shifter cam locking
24. Lockring
25. Countershaft third gear (24T.)
26. Countershaft
27. Lockring
28. Mainshaft second gear (20T.)
29. Mainshaft
30. Shifter cam right crankcase bushing
31. Shifter cam left crankcase bushing
32. Countershaft right crankcase bushing
33. Countershaft left crankcase ball bearing
34. Sprocket oil seal
35. Mainshaft right crankcase ball bearing
36. Mainshaft left crankcase ball bearing

Model M-100, SR-100, SX/TX 125

1. Assemble the mainshaft group, then insert it and the left-side spacer washer into the left crankcase half.

2. Assemble the countershaft second and third gears to the shaft, then insert the shaft through the left side spacer washer and into the left crankcase half, tapping gently with a soft mallet if necessary. Assemble the countershaft fourth and first gears.

3. Position the left-side shifter cam spacer then assemble the shifter cam to the left crankcase half.

4. Assemble the fifth gear shifter fork to the shifter clutch so the cam pin on the back of the fork pivot section rides in the lower, left-side cam slot. Assemble the second gearshifter fork into the mainshaft second gear groove so the cam pin rides in the upper, right-side slot in the shifter cam.

5. Install the shifter fork shaft, taking care not to disturb the positions of the forks.

6. Install the countershaft shifter fork into the groove in the countershaft fourth

gear so the cam pin rides in the middle slot in the shifter cam, and install the shifter fork shaft.

Model M-125, X-90, Z-90

1. Slip the shifter forks in position on the shifter cam so the male fork is assembled into the female fork. Secure the forks in their respective grooves by inserting the shifter fork pins and securing them with cotter pins.

2. Assemble the countershaft gears to the shaft so the mainshaft third gear shifter fork engages the countershaft second gear groove, and the countershaft second gear shifter fork engages the mainshaft third gear groove.

3. Install the above assembly in the right crankcase half along with the mainshaft and countershaft assemblies and their respective spacer washers. Make sure that the flat face of the countershaft first gear is toward the countershaft second gear, and the flat face of the mainshaft fourth gear is facing the mainshaft third gear.

4. Place the appropriate spacer washer on the end of each of the three shafts, and

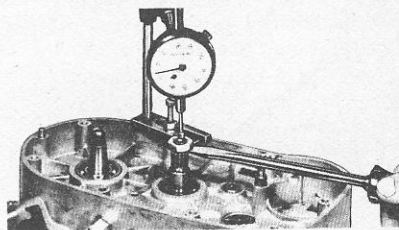
rotate the shifter cam until the transmission is in the neutral position.

5. Temporarily assemble the crankcase halves and secure them together with at least two screws directly opposite one another.

6. Assemble the cam stop plunger, plunger spring, washer, and plunger plug so the plunger engages the middle of the three grooves located sideways on the cam stop end of the shifter cam.

CHECKING THE TRANSMISSION SHAFTS END-PLAY

1. With the crankcase halves assembled, mount a dial indicator on one side, then shift the shaft to be measured to the extreme opposite side and then back to the extreme other side. Use a screwdriver to aid in shifting the shafts, but remove the screwdriver before taking a reading.



Checking the mainshaft end-play.

2. Disassemble the crankcase halves and install the appropriate size spacer washer on the shaft ends to bring the endplay to within the specified limits. Rather than just using one larger washer, use two slightly smaller ones to maintain the proper balance.

3. If the crankshaft assembly has been worked on, check the crankshaft end-play.

4. Reassemble the crankcases and recheck the end-play. Repeat the above operations until the end-play is correct. The shifter cam end-play should be within 0.008–0.012 in.; the countershaft end-play should be within 0.002–0.006 in., and the mainshaft end-play should be within 0.002–0.006 in. Consult the following chart for the appropriate size washer.

Transmission Shim Washer Sizes

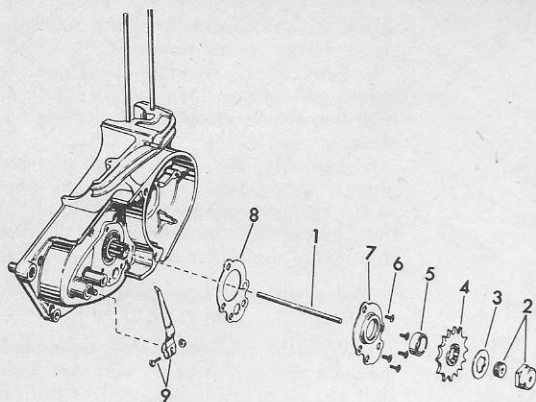
Size		Right Side			Left Side		
		Shifter Cam (Large)	Counter- Shaft	Main Shaft	Shifter Cam (Small)	Counter- Shaft	Main Shaft
0.2	0.008				X		
0.3	0.012	X		X		X	
0.4	0.016		X	X	X	X	X
0.5	0.020	X	X	X		X	X
0.6	0.024		X	X	X	X	X
0.7	0.028	X	X	X		X	X
0.8	0.032		X	X	X	X	X
0.9	0.035	X	X	X	X	X	X
1.0	0.039	X	X	X	X	X	X
1.1	0.043	X	X	X	X	X	X
1.2	0.047	X	X	X	X	X	X
1.3	0.051		X				X
1.4	0.055		X				X
1.5	0.059		X				X

S and B Models

REMOVAL AND INSTALLATION

1. Remove the engine from the frame as described in the "Engine Removal and Installation" section.

Harley-Davidson Singles



Drive sprocket and oil seal assembly.

2. Separate the crankcase halves as described in the "Crankcases" section.
3. Replacement is in the reverse order of removal.

DRIVE SPROCKET REMOVAL AND INSTALLATION

1. Remove the clutch release rod.
2. Bend back the mainshaft sprocket nut lockwasher ear from the mainshaft sprocket nut and oil seal, then remove the nut (which has a left-hand thread) and lockwasher.
3. Remove the mainshaft drive sprocket with a suitable gear puller.
4. Remove the main drive gear collar, oil seal screws, oil seal, and the oil seal gasket which should be replaced every time it is removed.
5. Clean all parts in a suitable solvent and blow them dry.
6. Inspect all the parts for a worn or damaged condition and replace them as necessary.
7. Assembly is in the reverse order of disassembly. The replacement gasket should be coated on both sides with a suitable gasket sealer before assembly.

DISASSEMBLY

1. Place the left crankcase on the work bench with the gear assemblies pointing up.
2. Remove the countershaft assembly and disassemble the countershaft gear thrust washer, sliding gear, and first gear.
3. Remove the mainshaft sliding gear then drift the shaft out of the left bearing with a suitable drift.
4. Slip the mainshaft into the main drive gear and check for excessive clearance, wear, or damage which would necessitate the removal of the gear. If necessary, tap the gear and its bearing free of the case with a soft mallet. The bearing and bushing need not be removed unless worn, damaged, or excessively loose in the case.
5. Inspect the left mainshaft bearing for excessive play, wear, damage, or rough motion before removing it. Remove the inner and outer spring rings and drift the bearing free with a suitable drift if replacement is necessary.

6. Remove the countershaft gear from the shaft with a suitable gear puller if replacement is necessary. The gear is a press fit on the shaft.

1. Clutch release rod
2. Mainshaft sprocket nut and oil seal
3. Mainshaft sprocket nut lock washer
4. Mainshaft sprocket
5. Main drive gear collar
6. Oil seal screw (5)
7. Oil seal
8. Oil seal gasket
9. Gear indicator outer arm complete

in the depressed condition when pressed down into the retainer. Drift them free with a suitable drift from their press fit position in the case if replacement is necessary.

10. Remove the inner arm of the gear indicator from the case with pliers if replacement is necessary.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect the mainshaft sprocket nut and oil seal and the inner oil seal for a worn, cracked, or otherwise damaged condition which might cause leaks, and replace them as necessary. The sprocket nut seal must be pried free.

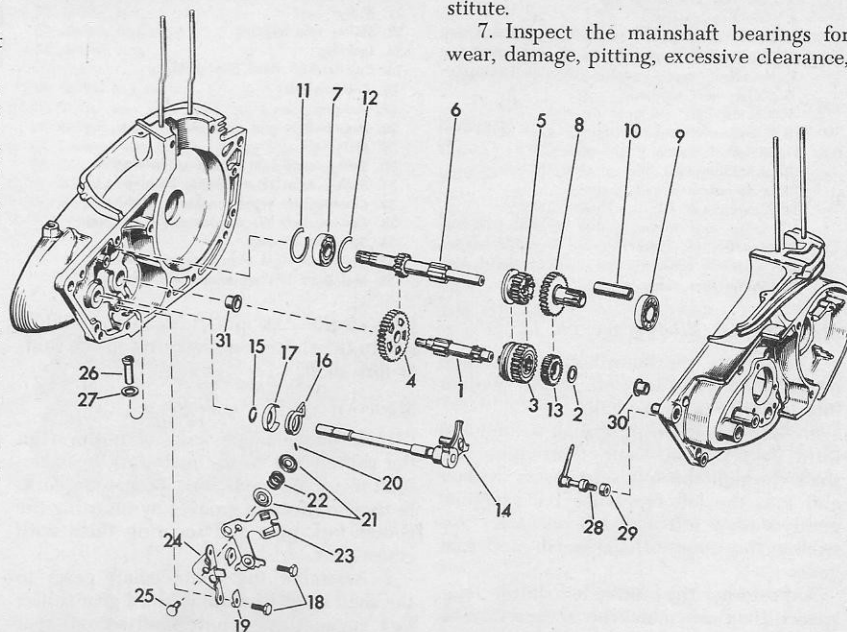
3. Inspect all the gears for a worn, chipped, damaged, or excessively loose fit on their respective shafts and replace them as necessary.

4. Inspect the gear dogs and slots for wear or damage at the thrust points and replace the gears as necessary.

5. Inspect all points on which the bearings ride for excessive wear, pitting, grooving, or scoring, and replace them as necessary.

6. Inspect the fit of the main drive gear and its bushing for play in excess of 0.0025 in. and replace them if necessary by drifting them out with an appropriate size drift or by threading a tap into the bushing then drifting it free from the opposite side. Ream a new bushing with Reamer (H-D part no. 95924-48) or a suitable substitute.

7. Inspect the mainshaft bearings for wear, damage, pitting, excessive clearance,



- | | | |
|-----------------------------------------|------------------------------------------|---------------------------------------|
| 1. Countershaft | 11. Mainshaft bearing spring ring—outer | 20. Ratchet spring key |
| 2. Countershaft high gear thrust washer | 12. Mainshaft bearing spring ring—inner | 21. Ratchet spring collar (2) |
| 3. Countershaft sliding gear | 13. Countershaft gear | 22. Ratchet spring |
| 4. Low gear | 14. Gear shifter shaft | 23. Gear shifter ratchet |
| 5. Mainshaft sliding gear | 15. Pawl retaining clip | 24. Gear shifter ratchet bracket |
| 6. Mainshaft | 16. Shifter pawl spring | 25. Gear shifter ratchet spring pin |
| 7. Mainshaft ball bearing—left | 17. Shifter pawl spring cover | 26. Ball retainer |
| 8. Main drive gear | 18. Ratchet bracket bolt (2) | 27. Ball retainer washer |
| 9. Main drive gear ball bearing | 19. Ratchet bracket bolt lock washer (2) | 28. Gear indicator inner arm |
| 10. Main drive gear bushing | | 29. Gear indicator inner arm oil seal |
| | | 30. Countershaft bushing—right |
| | | 31. Countershaft bushing—left |

Transmission assembly.

Harley-Davidson Singles

or rough motion and replace them as necessary with a suitable drift.

8. Inspect the countershaft bushings for excessive play by measuring the shaft side-movement from the end opposite the bushing to be inspected. If the clearance is correct (0.0005–0.0015 in.) there will be $\frac{1}{64}$ – $\frac{1}{32}$ in. side-motion. When the motion exceeds these limits by $\frac{1}{16}$ in. or more, the need for replacement is indicated. Replace the bushings in the following manner:

a. Drift the bushings out with a suitable drift.

b. Press in the new bushings, taking care to align the bushing shoulder oil slot which should be pointed upward.

c. Securely assemble the crankcase halves to check for proper alignment. It may be necessary to heat the cases around the dowel pin holes to make them come together.

d. Line-ream the bushings using Reamer (H-D part no. 95924-48) or a suitable substitute. Use the bushing opposite the one to be reamed as a guide, then switch and ream the other bushing. Continue to rotate the reamer clockwise while withdrawing it.

9. Inspect the pawl claws of the gear shifter shaft and the mating surfaces of the gear shifter ratchet for a worn or damaged condition which may cause sloppy gear changes, and replace them as necessary.

10. Replace the pawl retaining clip, and inspect the shifter pawl spring for a worn or damaged condition. Replace it as necessary. It is a good idea to replace this spring since, if it fails, the shift lever will not automatically return to a ready position and will have to be manipulated by hand.

11. Inspect the ratchet spring and gear shifter ratchet spring pin for a worn or damaged condition and replace them as a set if either is in need of replacement.

12. Inspect the gear shifter ratchet and ratchet bracket for a worn or damaged condition and replace them as necessary. Do not attempt to straighten out either part.

13. Inspect the ball retainer and washer as described in "Disassembly" step nine.

14. Inspect the tip of the gear indicator inner arm for a worn or damaged condition and replace it if its condition is questionable since failure of this part will immobilize the transmission.

ASSEMBLY

1. Place the left crankcase on a work bench with the transmission compartment facing upward.

2. Press the ball retainer and washer into the crankcase, if they have been removed, taking care to align the retainer slot with the crankcase joint face.

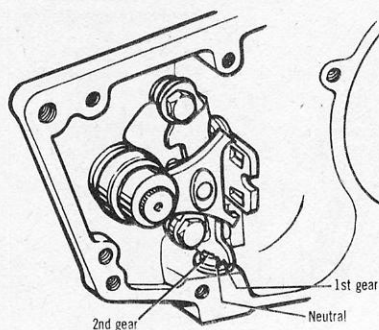
3. Assemble the gear shifter ratchet spring pin, ratchet bracket, ratchet, spring collar, spring, and spring key, in that order, then secure the bracket with the bracket bolt lockwashers and cap screws. Fold the tabs of the washers up and engage the ratchet teeth with the ball retainer.

4. Assemble the pawl retaining clip, shifter pawl spring cover, pawl spring, and the gear shifter shaft, taking care to install

the spring on the shaft so the end of the spring is as far from the pawl as possible so the spring ends will properly engage the shifter bracket lug.

5. Slip the shaft and pawl assembly into the left case half so the pawl claws extend halfway over the ratchet plate. The ratchet plate should be able to be pushed far enough forward for the pawl to clear the plate in either of its extreme positions. Place the transmission in second gear before continuing.

6. Install the outer mainshaft bearing spring ring, then press the left-side mainshaft bearing into the case from within until seated against the spring ring. Install the inner bearing spring ring in its groove in the case.



Shifter mechanism in second gear.

7. Press the main drive gear bearing and the drive gear into position in the right crankcase.

8. Lightly oil the mainshaft with clean engine oil then press it into the left-side mainshaft bearing until flush with the outer face of the bearing.

9. Place the countershaft first gear on the left-side countershaft bushing with the flat side facing up.

10. Hold the mainshaft and countershaft sliding gears in mesh together, slide the mainshaft gear onto the mainshaft and engage the fingers of the gear shifter ratchet while maintaining the gears in the meshed position, then slip the countershaft through the countershaft sliding and first gears and into the left-side countershaft bushing. Assemble the countershaft third gear and the third gear thrust washer to the shaft.

11. Install the gear indicator inner arm and oil seal if it has not yet been done.

12. Lubricate the gears thoroughly with clean engine oil, then shift the gears several times to make sure the transmission will operate smoothly and accurately.

13. Complete the reassembly procedure in the reverse order of disassembly and replenish the transmission oil supply.

SS/SX 175/250

REMOVAL AND INSTALLATION

1. Remove the engine and split the crankcases as described in "Crankcase."

2. Remove the circlip from the end of shift fork shaft protruding through the right crankcase. Pry the two pawl arms away from the shift drum and remove them and the spring behind them.

3. Remove the retaining plate mounting screw and the retaining plate from the right

crankcase. Pull the shift fork shafts and the shift forks. Remove the shift drum.

4. Using a plastic mallet tap the mainshaft and countershaft from the right crankcase. Tap the shafts so that they come out at the same time.

5. Installation is the reverse of removal. Note that both transmission shafts are installed together.

DISASSEMBLY

1. Remove each snap-ring and the gear below it until all of the gears are removed. On later SX-250 models the gears ride on needle bearings, with the exception of the countershaft first gear these needle bearings are uncaged with 25 needles in each of four gears. Take care not to loose the bearings.

2. When each component of the transmission is removed, it should be laid out so that it can be installed in the same location.

ASSEMBLY

1. Assembly is the reverse of disassembly.

2. When installing needle bearings in gear so equipped, use light grease to hold the bearings in place.

3. A special tool (H-D part no. 97361-74P) is available to install the transmission snap-rings. If this tool is not used take care not to distort the snap-rings.

4. Check side clearance of the gears in the neutral position. If the clearance exceeds 0.002–0.0024 in. (0.037–0.060 mm) install additional thrust washers until the clearance is brought into specifications.

5. Check the end-play with the gears in the neutral position. If excessive install thrust washers until correct.

Four-Cycle Engines (Sprint Models)

ENGINE REMOVAL AND INSTALLATION

1. Disconnect the battery ground wire (–) and the spark plug lead, then remove the spark plug.

2. Close the petcock, remove the fuel line fitting at the carburetor, release the fuel tank hold-down spring, tilt the tank forward to unhook the front mounting, and remove the tank.

3. Unhook the footbrake lever-return spring and remove the left footrest.

4. Remove the left crankcase cover securing screws and the cover.

5. Disconnect the generator wires at the generator and pull them free from the frame compartment.

6. Disconnect and remove the drive chain.

7. Remove the upper mounting bolt nuts but do not remove the bolts.

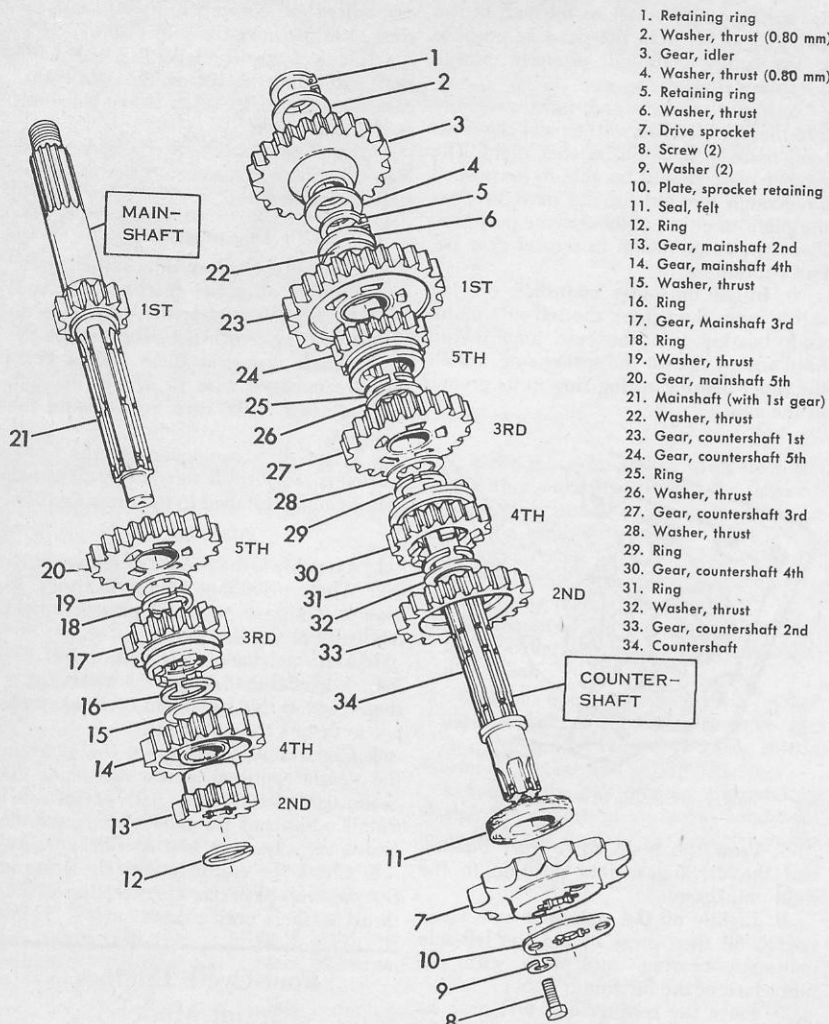
8. Rotate the clutch release lever forward and disconnect the clutch cable.

9. Remove the contact breaker cover, disconnect the contact breaker leads, and pull the wires free of the case.

10. Remove the nuts and washers from the exhaust manifold clamp, remove the rear footrest and muffler support, and lift the entire exhaust assembly free.

11. Remove the intake manifold nuts, on early-model carburetors, plug up the in-

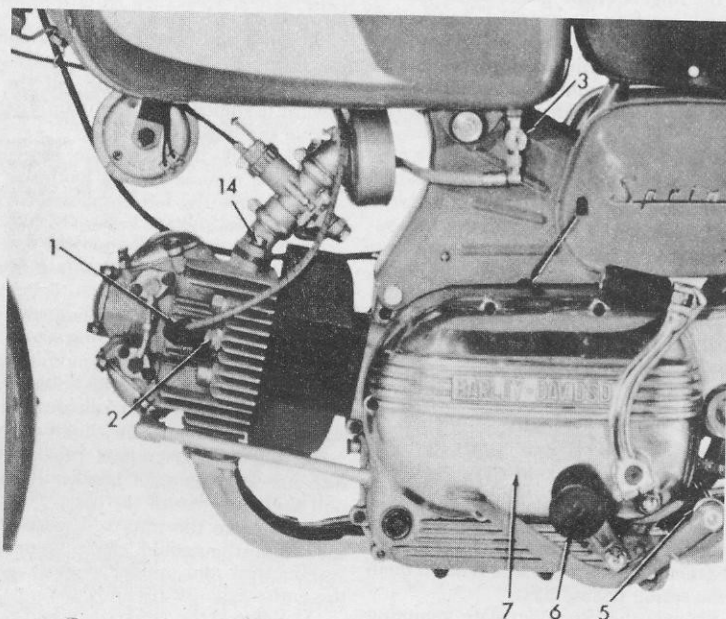
Harley-Davidson Singles



Bushing type transmission assembly

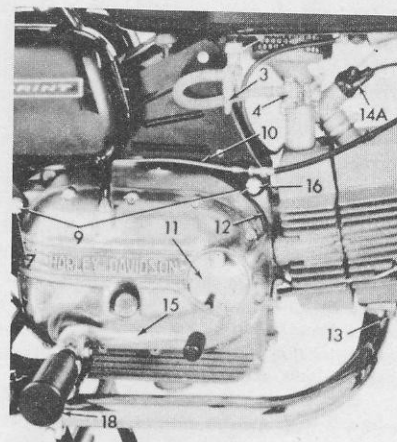
take port with a clean rag, and place the carburetor out of the way without disconnecting the throttle cable.

12. On late-model carburetors, pull back the rubber boot, unscrew the coil control adjusting screw (the screw the cable runs



Engine removal points (shown is the Model C).

1. Retaining ring
2. Washer, thrust (0.80 mm)
3. Gear, idler
4. Washer, thrust (0.80 mm)
5. Retaining ring
6. Washer, thrust
7. Drive sprocket
8. Screw (2)
9. Washer (2)
10. Plate, sprocket retaining
11. Seal, felt
12. Ring
13. Gear, mainshaft 2nd
14. Gear, mainshaft 4th
15. Washer, thrust
16. Ring
17. Gear, Mainshaft 3rd
18. Ring
19. Washer, thrust
20. Gear, mainshaft 5th
21. Mainshaft (with 1st gear)
22. Washer, thrust
23. Gear, countershaft 1st
24. Gear, countershaft 5th
25. Ring
26. Washer, thrust
27. Gear, countershaft 3rd
28. Washer, thrust
29. Ring
30. Gear, countershaft 4th
31. Ring
32. Washer, thrust
33. Gear, countershaft 2nd
34. Countershaft



1. Spark Plug Cover
2. Spark Plug
3. Fuel Supply Valve
4. Fuel Line Fitting
5. Brake Footlever Spring
- 5A. Tank Spring
- 5B. Tank
- 5C. Tank Front Mounting
6. Left Footrest
7. Left Crankcase Cover
8. Generator Wires
9. Upper Engine Mount Bolt Nuts
10. Clutch Control Wire
11. Circuit Breaker Cover
12. Circuit Breaker Wires
13. Exhaust Pipe Mounting Nuts & Washers
14. Intake Manifold Mounting Nuts
- 14A. Carburetor Boot
15. Shifter Lever
16. Front Upper Engine Mounting Bolt
17. Rear Upper Engine Mounting Bolt
18. Right Footrest
19. Tachometer Cable

Engine removal points (shown is the Model SS).

through), lift the throttle piston clear of the carburetor body, and plug the top with a clean rag.

13. Remove the shifter lever screw and pry, or use a wheel puller, to remove the lever from its splined shaft.

14. Drift the front upper engine mounting bolt free.

15. Carefully support the cylinder head so the engine won't drop, and remove the rear upper mounting bolt.

16. Gently lower the front of the engine onto something soft, support the rear of the engine, and remove the right footrest.

17. Install the engine in the reverse order of removal, taking note of the following:

- a. Connect the condenser and contact point leads to the contact breaker wire stud screw.
- b. Connect the red wire at the generator DF terminal and the white wire at the D+ (D plus) terminal.
- c. Replace the drive chain before replacing the left side cover. Always point the rounded end of the master link in the direction of normal rotation.
- d. Clean the oil filters and replenish the oil supply before attempting to turn over the engine.

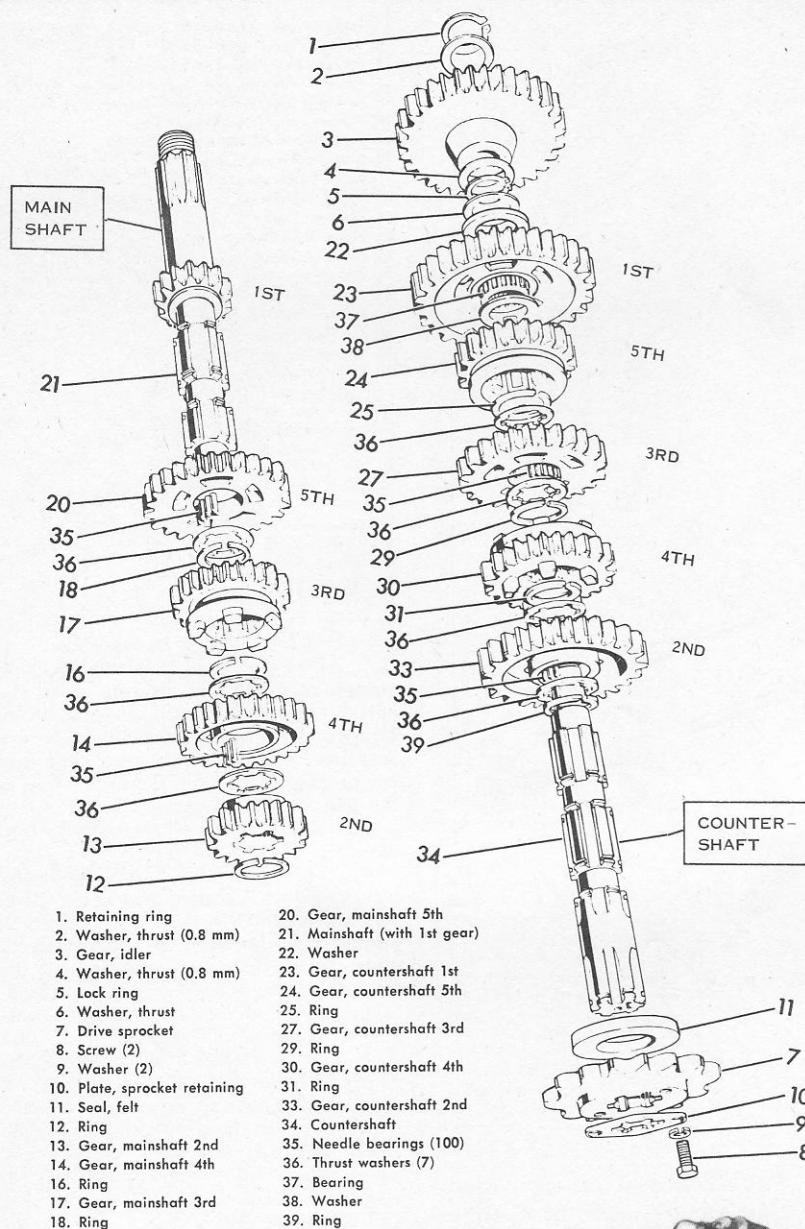
TOP END SERVICE

Cylinder Head

REMOVAL

1. Remove the head on 1966 and earlier, and 1973 and later models in the following manner:

Harley-Davidson Singles



- | | |
|-------------------------------|-------------------------------|
| 1. Retaining ring | 20. Gear, mainshaft 5th |
| 2. Washer, thrust (0.8 mm) | 21. Mainshaft (with 1st gear) |
| 3. Gear, idler | 22. Washer |
| 4. Washer, thrust (0.8 mm) | 23. Gear, countershaft 1st |
| 5. Lock ring | 24. Gear, countershaft 5th |
| 6. Washer, thrust | 25. Ring |
| 7. Drive sprocket | 27. Gear, countershaft 3rd |
| 8. Screw (2) | 29. Ring |
| 9. Washer (2) | 30. Gear, countershaft 4th |
| 10. Plate, sprocket retaining | 31. Ring |
| 11. Seal, felt | 33. Gear, countershaft 2nd |
| 12. Ring | 34. Countershaft |
| 13. Gear, mainshaft 2nd | 35. Needle bearings (100) |
| 14. Gear, mainshaft 4th | 36. Thrust washers (7) |
| 16. Ring | 37. Bearing |
| 17. Gear, mainshaft 3rd | 38. Washer |
| 18. Ring | 39. Ring |

Bearing type transmission assembly

pliable), and remove the hose.

d. Remove the push rod housing rubber gasket, and cover the cylinder with a clean, oil-soaked rag.

DISASSEMBLY

1. Disassemble the 1966 and earlier and 1973 and later cylinder head in the following manner:

a. Remove the rocker arm oil feed pipe connections, washers, and the rocker arm oil line taking care not to bend the oil line. This type of line will easily break from repeated bending.

b. Remove the tappet cover screws, washers, cover, gasket, and all mounting screws to the intake and exhaust rocker arm covers, gaskets, valve and shaft side rocker arm support flange covers, and gaskets.

c. Remove the intake manifold assembly by removing the nuts, washers, bushing, manifold, and insulator bushing.

d. Remove the rocker arm assembly if necessary by removing the rocker arm set screw, tapping the rocker shaft free of the head, and lifting the rocker arm free. It is not necessary to disassemble the rocker arms to remove the valves.

e. Continue as described in step three.

2. Disassemble the 1967 to 1972 cylinder head in the following manner:

a. Remove the rocker arm oil feed pipe connections, washers, and the rocker arm oil line, taking care not to bend the oil line. This type of line will easily break from repeated bending.

b. Remove the intake manifold assembly by removing the screws, washers, manifold, and insulating block.

c. Remove the rocker arm assemblies if repair of the valves or rocker arms is necessary, by removing the clamping bolt and lock, tapping the shaft free of the head, and lifting the rocker arm free.

d. Continue as described in step three.

3. Disassembly continued for all models.

a. Each rocker arm assembly has a spring washer among thrust washers on

a. Remove the feed line connector, washers, cylinder head nuts, and washers.

b. Remove the cylinder head assembly, push rods, rocker arm oil return pipe, and the push rod housing rubber gasket. Tap gently on the head with a soft mallet if it is reluctant to come off.

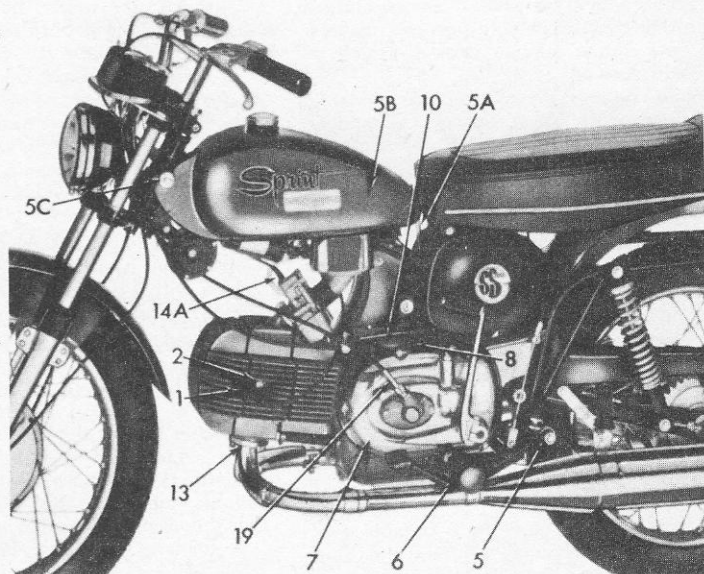
c. Cover the cylinder with a clean, oil-soaked rag.

2. Remove the head on 1967 to 1972 models in the following manner:

a. Remove the feed line connectors, washers, rocker arm oil line, rocker arm cover nuts or bolts, washers, rocker arm cover, and gasket.

b. Remove the cylinder head nuts, collars, O-rings, hose clamp (if applicable), head assembly, and head gasket. Tap gently on the head with a soft mallet if it is difficult to remove.

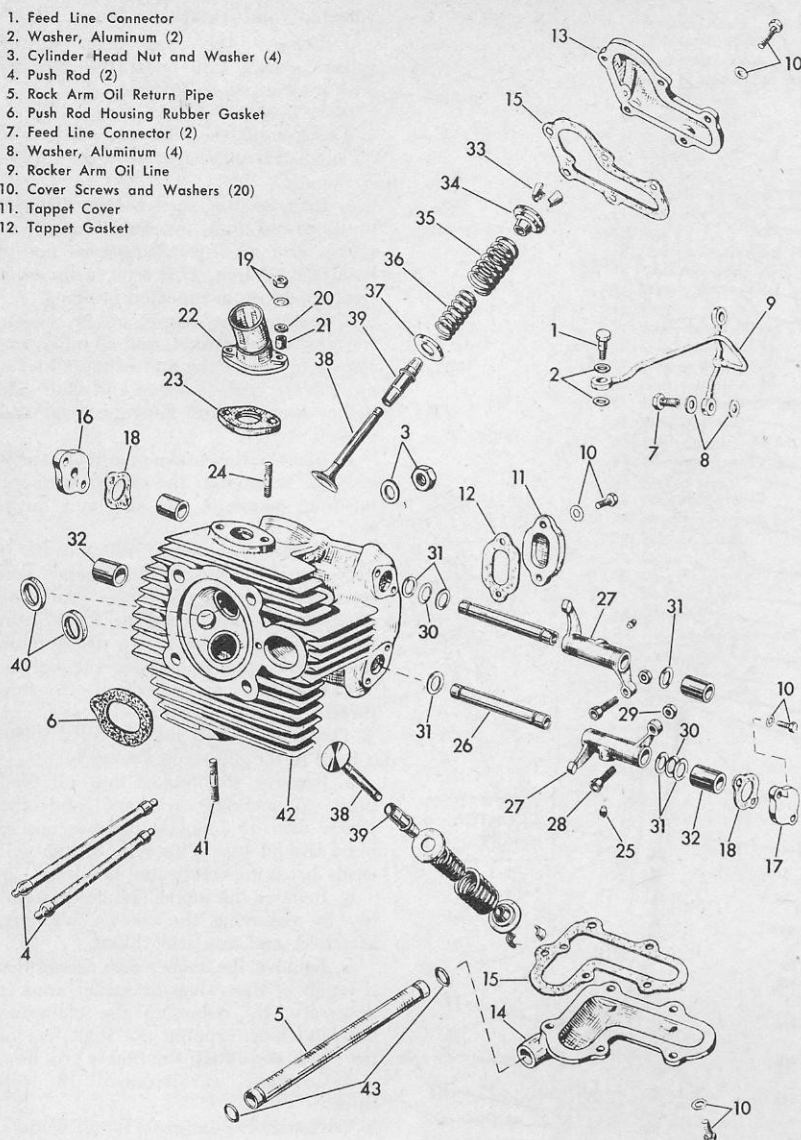
c. Remove the oil return pipe and O-rings, loosen the hose clamps (if ap-



Engine removal points (shown is the Model H).

Harley-Davidson Singles

1. Feed Line Connector
2. Washer, Aluminum (2)
3. Cylinder Head Nut and Washer (4)
4. Push Rod (2)
5. Rock Arm Oil Return Pipe
6. Push Rod Housing Rubber Gasket
7. Feed Line Connector (2)
8. Washer, Aluminum (4)
9. Rocker Arm Oil Line
10. Cover Screws and Washers (20)
11. Tappet Cover
12. Tappet Gasket



13. Intake Rocker Arm Cover
14. Exhaust Rocker Arm Cover
15. Rocker Cover Gasket (4)
16. Valve-Side Rocker Arm Support Flange Cover (2)
17. Push Rod Side Rocker Arm Support Flange Cover (2)
18. Flange Cover Gaskets (4)
19. Intake Manifold Nut and Washer (2)
20. Insulating Washer (2)
21. Insulating Bushing (2)
22. Intake Manifold
23. Insulator Block
24. Intake Pipe Stud (2)
25. Rocker Arm Screw (2)
26. Rocker Arm Shaft (2)
27. Rocker Arm (2)
28. Tappet Adjusting Screw (2)
29. Tappet Lock Nut (2)
30. Spring Washer (2)
31. Thrust Washer (as required)
32. Rocker Arm Bushing (4)
33. Valve Key (4) (2 per valve)
34. Valve Spring Upper Collar (2)
35. Outer Valve Spring (2)
36. Inner Valve Spring (2)
37. Valve Spring Lower Collar (2)
38. Valve (2)
39. Valve Guide (2)
40. Valve Seat (2)
41. Exhaust Pipe Stud (2)
42. Cylinder Head
43. O-Ring (2)

1966 and earlier Sprint cylinder head assembly.

one side and thrust washers only on the other. For reassembly purposes make a note of the number and placement of said devices.

b. Remove the valves by compressing them with Valve Spring Compressor (H-D part no. 97290-61P), or any suitable compressor or means of compressing the valves spring long enough to remove the valve keys.

c. Remove the valve spring upper collar, inner and outer springs, lower spring collar, and valve, and keep all the parts separate for reassembly in their original locations.

d. Remove the valve seats and guides only if replacement is necessary as described in the "Inspection and Repair" and the "Refacing and Replacing Valve Seats" sections.

INSPECTION

1. Clean all parts in a suitable gum and carbon-dissolving solution and blow them dry, taking care to blow all passages clear.

2. Inspect and repair the rocker arm, shaft, and bushing if worn or damaged in the following manner:

a. Remove any burrs from the rocker shaft with a hone.

b. Inspect the rocker arm pads for an unevenly worn, pitted, or damaged condition. If possible, inspect a new pad, then grind the damaged one until a similar contour is attained.

c. Replace the bushings if loose or damaged by heating the head to about 250° F with a blow torch and then driving or pressing the bushing free using a shouldered drift with a 0.469 in. pilot.

d. Drill a 0.118 in. oil hole in the intake left bushing.

e. Press the new bushing into the head after heating the head as described above. Line-ream the bushing with Reamer (H-D part no. 97414-61P) or a suitable substitute, and check to see that the oil hole is not blocked.

d. Replace the rocker arm adjusting screw ball sockets if worn or elongated.

e. Replace any springs or thrust

washers in questionable condition.

3. After the head has soaked long enough to soften any deposits, clean the outside thoroughly with a wire brush. Scrape the combustion chamber and valve port areas with a blunt blade, taking care not to gouge or scratch the head's face as this may cause combustion leakage.

4. Reclean the head as described in step one.

5. Inspect the valve spring length and tension with a Valve Spring Tester (H-D part no. 96797-47) or a suitable substitute. Springs must be replaced when $\frac{1}{8}$ in. or more shorter than a new spring or if the tension is 5 lbs or more below the specifications listed in the "Engine and Transmission Specifications" charts.

6. Valve stem and head carbon deposits can be removed with a blunt blade or a wire wheel. Once all deposits have been removed, polish the stem with a fine grade emery cloth or steel wool. Replace any valves which are severely scored, pitted, warped or bent. Consult the "Refacing and Replacing Valve Seats" section for directions on how to clean pitted, burned, or corroded valves.

7. Inspect the valves stems and guides for an excessively loose fit, worn, or damaged condition, and replace in the following manner:

a. Consult the "Engine and Transmission Specifications Chart" for the proper fit.

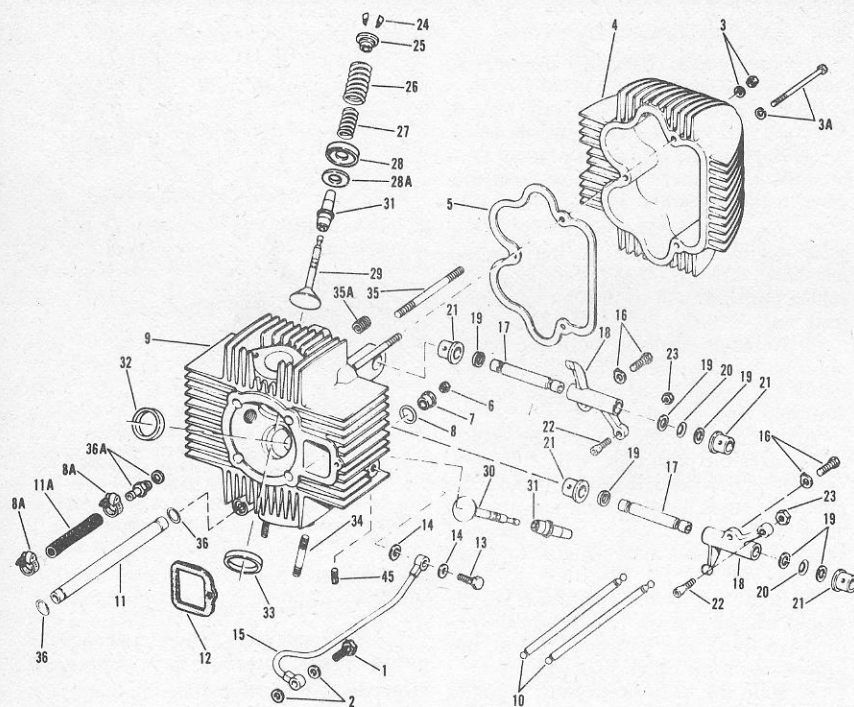
b. Remove the guides by heating the head with a blow torch to about 250° F and then drifting the guide free from the chambered side with an appropriately sized, shouldered drift.

c. Choose the necessary size of oversized guide until a very tight press fit is achieved. Make sure you don't mix the guides as they are not interchangeable.

d. Replace the guide by heating the head as described above, then arbor-press the guide into place, taking care to seat the guide squarely.

e. Ream the guides using a Valve Guide Reamer (H-D part no. 97310-61) or a suitable reamer.

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1967 and later Sprint cylinder head assembly.

- | | |
|-------------------------------------------|---------------------------------------------------|
| 1. Feed Line Connector | 19. Thrust Washer (as required) |
| 2. Washer, Aluminum (2) | 20. Spring Washer (2) |
| 3. Rocker Arm Cover Nut and Washer (3) | 21. Rocker Arm Shaft Bushing (4) |
| 3A. Bolt and Lockwasher (Late 1970) (3) | 22. Tappet Adjusting Screw (2) |
| 4. Rocker Arm Cover | 23. Tappet Locknut (2) |
| 5. Rocker Cover Gasket | 24. Valve Key (4) (2 per valve) |
| 6. Cylinder Head Nut (4) | 25. Valve Spring Upper Collar (2) |
| 7. Collar (4) | 26. Outer Valve Spring (2) |
| 8. O-ring Seal (4) | 27. Inner Valve Spring (2) |
| 8A. Hose Clamp (1969 SS) | 28. Valve Spring Lower Collar (2) |
| 9. Cylinder Head | 28A. Exhaust valve spring lower collar shim |
| 10. Push Rod (2) | 29. Valve (Intake) |
| 11. Oil Return Pipe | 30. Valve (Exhaust) |
| 11A. Oil Return Hose (1969 SS) | 31. Valve Guide (2) |
| 12. Push Rod Housing Rubber Gasket | 32. Valve Seat (Exhaust) |
| 13. Feed Line Connector | 33. Valve Seat (Intake) |
| 14. Washer, Aluminum (4) | 34. Exhaust Pipe Stud (2) |
| 15. Rocker Arm Oil Line | 35. Rocker Arm Cover Stud (3) |
| 16. Rocker Arm Clamping Bolt and Lock (2) | 35A. Helicoil (Late 1970) (3) |
| 17. Rocker Arm Shaft (2) | 36. Oil Return Pipe O-ring (2) |
| 18. Rocker Arm (2) | 36A. Oil Return Hose Fitting and Gasket (1969 SS) |

Valves are available in the following oversizes.

Valve Guide Outside
Diameter Oversize
(in./mm)

0.001/0.025
0.002/0.050
0.003/0.075
0.004/0.100
0.006/0.150
0.008/0.200

No. of Grooves on
Outside Diameter

1
2
3
4
5
6

8. Inspect the valve face for a pitted, burned, or worn condition. The face, which should be $\frac{5}{64}$ in. wide, may be repaired as described in the "Refacing and Replacing Valve Seats" section, but only after the valve guides are attended to.

9. Inspect the intake and exhaust pipe bolts or studs for a damaged condition and replace them if necessary.

10. On 1966 and earlier models, make sure that the rocker cover oil hole is clear.

11. Inspect any gaskets you wish to reuse for a damaged or collapsed condition and replace them as necessary. It is a

good practice to always replace gaskets which are under strain whenever they are removed.

REPLACING VALVE SEATS

Valves often become pitted or worn to such an extent that they don't properly seat and compression is lost. The valve seats on an insert which is pressed into the aluminum head to provide a surface which will retain its original dimensions longer than the aluminum would. When the seat becomes wider than $\frac{1}{16}$ in., proper seating becomes impossible and the seat relief must be counterbored or a new insert must be installed.

When the valve face becomes seriously burned or pitted, or the stem becomes heavily laden with carbon deposits, the valve must be replaced. When the valve is replaced it's good to replace the guide, especially if the stem had a lot of carbon on it.

Replace the valve seat insert in the fol-

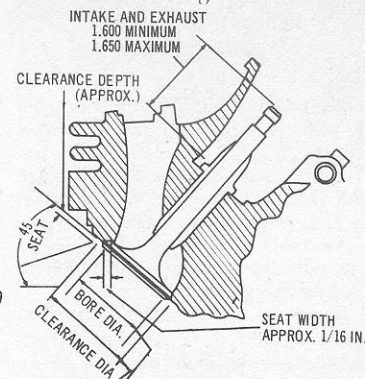
lowing manner:

a. Using progressively larger reamers, bore out the old insert.

b. Heat the head with a blow torch to about 540° F and press the new insert in place. Make sure you are using the correct insert as they are not interchangeable.

GRINDING VALVE SEATS

1. If the valve guides are to be replaced, do so before refacing the valves and seats.



MODEL C	MODEL H	1972 & EARLIER MODEL SS/SX	1973 MODEL SS/SX
IN. 1.259 in.	1.339 in.	1.420 in.	1.480 in.
EX. 1.023 in.	1.023 in.	1.110 in.	1.185 in.
IN. 1.545 in.	1.625 in.	1.740 in.	1.740 in.
EX. 1.348 in.	1.348 in.	1.420 in.	1.495 in.

Valve seat specifications.

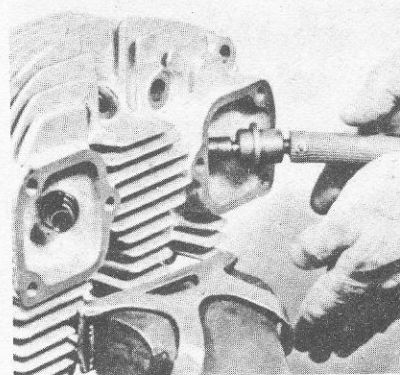
2. Use a valve grinding tool to grind the seat to a 45° angle so that the seat is $\frac{1}{16}$ in. wide.

3. If the seat is greater than $\frac{1}{16}$ in. wide, it may be narrowed by grinding the valve seat relief at a 15° angle with a suitable cutting stone.

4. Grind the valve faces to 45°, applying pressure only long enough to clean and true the surface. Avoid excessive grinding and replace the valve if the face is worn too thin.

LAPPING VALVES AND SEATS

1. After the faces and seats are ground, apply a light coat of fine lapping compound and insert the valve in the guide.



Lapping in a valve face and seat.

2. Rotate the valve several times with a grinding tool while applying light pressure at the face and seat by pulling on the valve stem. This may also be done by hand by placing a length of fuel line over the valve stem, holding the head so the stem is up, and rotating the fuel line back and forth several times.

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3. To check for a well-seated valve, clean the valve and seat thoroughly and insert the valve. Apply light pressure to the seat and face by pulling on the valve, then pour some gasoline on the valve from the combustion chamber side. If it takes several seconds (10–15 is a good indication) before leakage occurs, the lapping has been successful.

CYLINDER HEAD ASSEMBLY

1. Assembly is basically the reverse of disassembly.

2. Install the valves in the following manner:

a. Lightly oil the intake valve stem and insert it in the guide.

b. Secure the Valve Compressor Tool (H-D part no. 97290-61P), or a suitable substitute, in a vise so the movable parts are on top, then hold the head in place so the intake valve head is in contact with the compressor's stationary jaw.

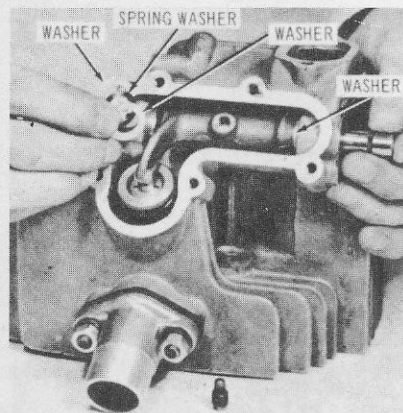
c. Assemble the lower collar, inner spring, outer spring, and upper collar in place over the valve stem.

d. Compress the springs with the compressor until there is enough room to install the keys. Place a dab of grease on the tip of a screwdriver to easily handle the keys, and always install them with the narrow part down.

e. Release the compressor and remove the head.

f. Perform the above operations on the exhaust valve. Late models have a shim which fits under the lower collar.

3. Install the rocker arm assemblies in the following manner:



Installing the rocker arm assemblies (shown is the intake valve).

a. Place the intake rocker arm in the head and slip the rocker arm shaft into the bushing on the push rod side until it can be seen between the bushing and the arm.

b. Place the appropriate number of thrust and spring washers in position.

c. Push the shaft through the washers and into the arm until the flat portion or hole is visible through the hole in the rocker arm. Position the rocker arm pad on the valve stem by increasing or decreasing the number of washers.

d. Secure the setscrew or bolt and lock.

e. Perform the above operations on the exhaust rocker arm assembly.

CYLINDER HEAD INSTALLATION

1. Assembly is basically the reverse order of disassembly.

2. Make sure the mating faces of both the head and cylinder are perfectly clean.

3. Replace the oil return pipe oil seals on 1966 and earlier models, and insert the pipe in the left crankcase oil return hole.

4. Place the intake push rod in the push rod housing closest to the flywheel assembly. When the head is installed, the intake push rod will be above the exhaust push rod.

5. Install the exhaust push rod in the outer push rod housing. The exhaust rod is 0.040 in. longer than the intake rod on 1967 and later models.

6. Install the push rod housing rubber gasket over the push rods.

7. Slip the head in position over the mounting studs, leaving sufficient space to allow needle-nosed pliers to be inserted between the head and cylinder to grasp the push rod.

8. Rock the rocker arm down so the tappet adjusting screw can engage the appropriate push rod ball end. Repeat this procedure on the other push rod.

9. Slide the head down until it comes in contact with the cylinder mating surface.

10. Secure the head nuts until finger-tight, then diagonally torque them to 30 ft lbs.

11. Assemble the rocker arm oil line to the cylinder. Position the line on 1966 and earlier models so the crankcase connection end is between the cylinder head and rocker arm housing, and so it runs between the cooling fins along the lower right side of the cylinder and head. Place an aluminum washer on both sides of the connections, and install the connectors with the longest feed line connector in the crankcase. Wait until you are certain that all three connectors are properly aligned before securing the connectors.

12. Adjust the tappets as described in the "Tune-Up" section.

13. Assemble the remaining components in the reverse order of disassembly. Take care not to overtighten the tappet cover screws on 1966 and earlier models as damage will result.

Cylinder and Piston

DISASSEMBLY

1. Remove the cylinder head as described in the cylinder head removal section.

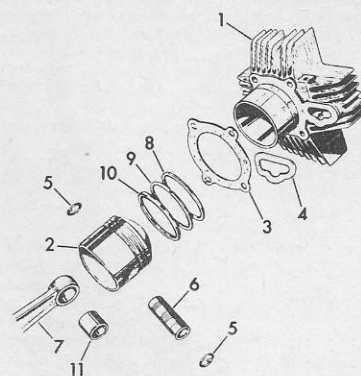
2. Thoroughly clean the crankcase around the base of the cylinder to prevent dirt or any other alien particles from falling into the crankcase.

3. Lift the cylinder enough to allow a clean, oil-soaked rag to be placed over the crankcase opening.

4. Remove the cylinder from the mounting studs.

5. Pry the circlips free with a sharp, pointed instrument or remove them with snap-ring pliers.

6. Heat the piston to about 250° F with a blow torch, then drift the piston pin free with a suitable drift while supporting the piston.



- | | |
|-------------------------|---------------------------|
| 1. Cylinder | 7. Connecting rod |
| 2. Piston | 8. Upper compression ring |
| 3. Cylinder base gasket | 9. Lower compression ring |
| 4. Push rod gasket | 10. Oil control ring |
| 5. Piston pin lock ring | 11. Piston pin bushing |
| 6. Piston pin | |

Cylinder and piston assembly.

7. Using snap-ring pliers, remove the piston rings by spreading them until they'll clear the piston, and then lift them free. Once the rings have been removed, they must be replaced.

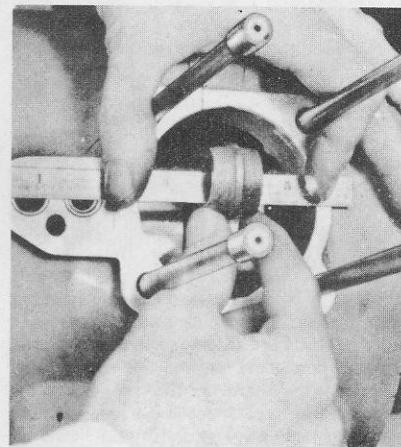
INSPECTION

1. Clean all parts in a suitable carbon and gum-dissolving solution until the deposits are soft, then scrub with a soft, wire brush or scrape with a blunt blade, taking care not to gouge or scratch the aluminum until all the deposits are gone. Clean the parts again and blow them dry, carefully blowing all the passages clear. Carefully clean the ring grooves with a piece of broken ring.

2. Inspect the piston pin for a pitted or grooved condition and replace it if necessary.

3. If piston pin fit in the connecting rod upper bushing has play in excess of 0.002 in., both parts must be replaced. The pin should be a light, hand press in the bushing with play not in excess of 0.001 in.

4. Inspect the piston and cylinder for cracks, burrs, gouges, grooves, or burned spots on the piston crown, and replace them if necessary.



Checking the connecting rod for lower end bearing shake.

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5. If the connecting rod has vertical or side shake (as measured at the top of the connecting rod) in excess of $\frac{1}{16}$ in., the need for a new bottom end bearing and rod assembly is indicated. Consult the "Crankcase" section for additional information.

6. Replace the circlips, piston rings, and gaskets. The gaskets may be reused if they are in perfect condition but replacement is always wise.

CYLINDER REFINISHING

1. Using a micrometer, measure the piston from front to rear at the base of its skirt.

2. Using an inside micrometer, measure the cylinder bore from front to rear and from side to side at a point $\frac{1}{2}$ in. from the top. Repeat this procedure at various points in the middle and bottom of the ring travel area to determine whether or not the cylinder is still round.

3. Subtract the piston measurement from the cylinder measurement to arrive at the overall clearance.

4. If the cylinder is not damaged, scored, grooved, or worn 0.0025 in. or more, it need not be refinished oversize. If the clearance is not excessive, quieter operation can be achieved with standard sized pistons or the appropriate oversize pistons to fit the already oversize cylinders. If the clearance is excessive, the cylinder may be refinished to the next oversize and fitted with corresponding oversize pistons.

5. Add the desired clearance to the size of the piston to arrive at the appropriate oversize piston measurement. Pistons are available in 0.008 in. gradations from 0.008–0.032 in. oversize.

6. Hone or bore the cylinder to the piston size. Use a boring bar only if the cylinder has been scored or worn, and always leave the last 0.001 in. to be hone-finished. If the cylinder is not in bad shape, just use a hone to refinish it. If a cylinder requires reboring which will make it 0.036 in. or more oversize, it should be replaced.

CONNECTING ROD BUSHING REPLACEMENT

1. When the connecting rod bushing and the piston pin have clearance in excess of 0.002 in., the clearance must be eliminated by one of the following methods:

a. Ream the bushing out until the proper clearance can be attained by fitting a 0.004 or 0.008 in. oversize piston pin, and reaming the piston bosses to fit.

b. Replace the bushing and ream it to fit a standard size piston pin unless the piston has already been fitted with an oversize pin.

2. If the engine has been taken down and the connecting rod has been removed, a suitably sized press may be used to remove and install the bushing. Always press the bushing in so the oil holes are aligned.

3. If the bushing is to be replaced during a top-end job, proceed in the following manner:

a. Secure the connecting rod to prevent damage to it and the lower bearing.

b. Remove the old bushing with Piston Pin Bushing Tool (H-D part no. 95970-32A) or by heating the rod with a blow torch and then carefully pressing the bushing free.

c. Install the new bushing with the same tool or a suitable substitute, taking care to align the oil holes while pressing the bushing into place.

4. After the bushing is installed in the rod it must be reamed to provide the necessary 0.0006–0.0012 in. piston pin clearance. Use Expansion Reamer (H-D part no. 94810-65), or a suitable substitute, to perform this operation.

5. Remove the rod from whatever has been securing it and visually check the rod alignment. If the rod has been bent, it should be replaced since bending fatigues metal and one doesn't want a tired rod.

ASSEMBLY

1. Select the appropriate size piston ring by adding the desired piston-to-cylinder clearance to the piston measurement and then subtracting that figure from the measurement of the cylinder bore. The result is the size of the necessary ring. Rings are available in 0.008 in. gradations from 0.008–0.032 in. oversize. Do not use oversize pistons in a standard bore.

2. Check ring gap by holding the piston in the cylinder, in an inverted position, laying the ring on top of the piston skirt, and measuring the gap. The gap must be within 0.010–0.016 in. If the gap is too small, it may be increased by filing with a fine-cut file.

3. Install one of the piston circlips with snap-ring pliers, heat the piston with a blow torch, and lubricate the piston pin, upper rod bushing, and piston pin bosses with engine oil.

4. Cover the crankcase with a clean, oil-soaked rag. Place the piston in position on the connecting rod so the large relief valve is facing the intake side, slip the piston pin into position, and secure the remaining circlip. Remove the rag from the crankcase.

5. Dip the piston and rings in engine oil and install the piston rings by using a ring expander, or by carefully spreading the ring by hand then slipping it over the piston crown and then into place. The top ring is a plain-type compression ring, the next ring is a compression ring with a stepped inner diameter, and the bottom ring, which is installed first, is a slotted oil ring. Stagger the ring gaps but avoid having gaps on the thrust faces of the piston.

6. Check the ring side-clearance for 0.001–0.002 in. end-play. If the ring is too loose, the ring groove is probably worn and the piston must be replaced. If the ring has been installed and then removed, it still may be used since rings break rather than bend.

7. Place the cylinder base gaskets in position over the mounting studs.

8. Rough up the cylinder bore with no. 150 carborundum emery paper or a no. 300 hone if the cylinder wasn't refinished. This will provide a surface conducive to efficient ring seating and lubrication.

9. If a ring compressor is to be used assemble it now. Lubricate the cylinder

walls with engine oil, and rotate the engine until the piston is at its lowest point of travel.

10. Carefully start the cylinder on the mounting studs until about $1\frac{1}{2}$ –2 in. of the studs is covered. Gently rotate the engine until the piston is aligned with the cylinder bore. Compress the first ring by hand and insert the piston into the bore by rotating the engine slightly. It is best to rotate the engine by placing the machine in high gear and then turning the rear wheel by hand. Continue to insert the piston until it is entirely in the cylinder.

11. Lower the cylinder onto its crankcase mating surface while holding the push rod housing rubber gasket in place.

12. Complete assembly in the reverse order of disassembly as directed in the section on the cylinder head.

CRANKCASE

Disassembly

1. Remove the engine from the frame as described in the engine "Removal and Installation" section.

2. Remove the generator as described in the "Generator" section on pre-1972 models. On 1973 and later models remove the alternator as described in the "Alternator" section.

3. Remove the starter clutch as described in the "Starter" section.

4. Remove the drive sprocket as described in the "Transmission" section.

5. Remove the cylinder head as described in the "Cylinder Head" section.

6. Remove the cylinder and piston assembly as described in the "Cylinder and Piston" section.

7. Remove the gearcase cover, camshaft, tappet assemblies, oil pump, pinion shaft gears, and the pinion shaft bearing locking and spacers as described in the "Transmission" and "Lubrication" sections.

8. Remove the clutch assembly as described in the "Clutch" section for 1968 and earlier models. On 1973 and later models remove the electric starter.

9. On pre 1972 models; check the crankshaft end-play with a dial indicator in the following manner:

a. Mount Crankshaft Tool (H-D part no. 97295-61P) on the right crankcase and the dial indicator on the left crankcase.

b. Push the crankshaft as far to the left as it will go.

c. Remove the tool and mount Crankshaft Tool (H-D part no. 97297-61P) in its place.

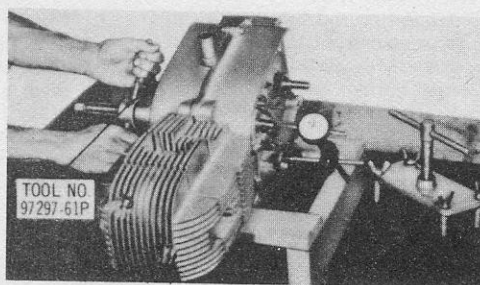
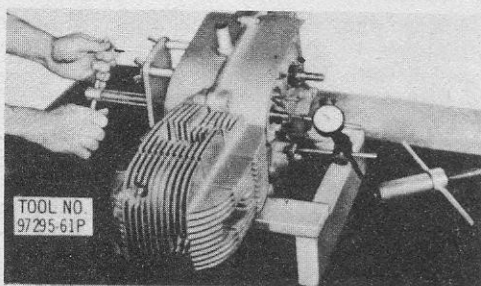
d. Pull the shaft all the way back to the right.

e. End-play is regulated by the number of spacer washers used. Washers are available in 0.05 and 0.10 mm sizes or may be replaced with two spring washers (which is the recommended technique).

f. If the tools are not available the crankshaft may be manipulated with hand tools.

10. Drift the dowel pins free with a suitably sized drift and remove the three allen screws and seven bolts and washers which secure the crankcase halves. If the dowel pins are difficult to remove, heat the case

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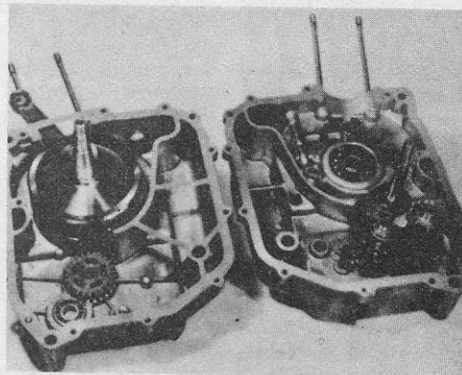


Measuring crankshaft end-play.

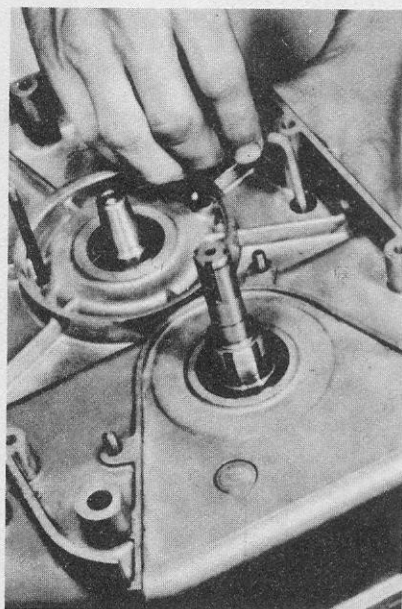
around each pin with a blow torch.

11. Separate the crankcase halves with Crankshaft Tool (H-D part no. 97295-61P) or a suitable substitute. The tool mounts on the right case over the flywheel pinion shaft and presses the cases apart by exerting pressure on the flywheel assembly. Tap on the mainshaft with a soft mallet while using the tool and make sure the cases remain parallel during the entire operation.

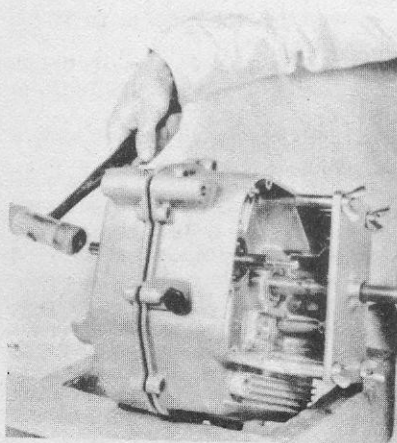
12. Remove the transmission as described in the "Transmission" section.



The separated crankcases.



Removing recessed allen screw from the left crankcase half.



Separating the crankcase halves.

13. Remove the pinion bearing locking with snap-ring pliers, then press the pinion shaft bearing from the crankcase. Bearing damage can be avoided by covering the bearing with a flat plate before pressing. Remove the crankshaft orifice plug (if applicable).

14. Press the flywheel assembly from the left case using Crankshaft Tool (H-D part no. 97295-61P) or a suitable substitute.

15. The countershaft ball bearing may now be removed with a puller if so desired.

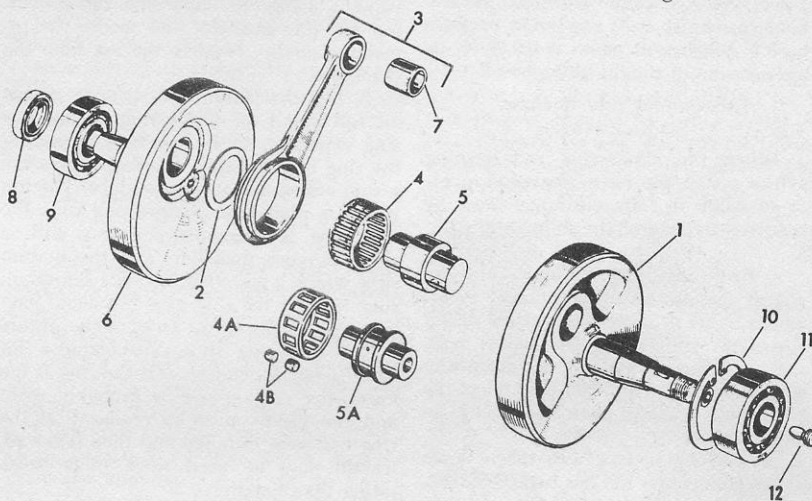
16. Remove the generator shaft bearing oil seal and press the bearing free.

Inspection

1. Clean all parts in a suitable solvent and blow them dry, taking care to clear the oil passages in the right flywheel and crankpin.

2. Check the main bearings for a pitted, worn, or damaged condition, excessive play, or rough action, and replace them as necessary by removing the seals and lockrings and pressing the bearings in and out. Heating the case around the bearing boss will aid in installation.

3. Inspect the pinion shaft cover bushing for a worn or damaged condition or



1. Right side flywheel
2. Thrust washer (2) (to early 1968)
3. Connecting rod assembly
4. Crank pin roller bearing
- 4A. Crank pin roller bearing retainer (1963)
- 4B. Crank pin bearing roller (24) (1963)
5. Crank pin
- 5A. Crank pin (1963)

6. Left side flywheel
7. Piston pin bushing
8. Generator shaft oil seal
9. Generator shaft ball bearing
10. Lock ring
11. Pinion shaft ball bearing
12. Orifice plug (late models to 1968)

Crankshaft and connecting rod assembly.

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excessive play and replace it as necessary.

4. Inspect the camshaft support plate for a worn or damaged condition and replace it as necessary.

5. Inspect the connecting rod, connecting rod bearing set, crankpin, and flywheel thrust washers for a worn, damaged, or loose condition, and replace them as an entire assembly.

Assembly

1. Press all bearings, bushings, and oil seals which have been removed back into the crankcase. Heating the case with a blow torch will aid in installing the bearings and bushings.

2. Install the pinion shaft bearing locking.

3. Secure the left flywheel shaft in a copper or wood-jawed vise. Lightly oil the pinion shaft and position the right case on it.

4. Assemble the Crankshaft Tool (H-D part no. 97297-61P), or a suitable substitute, to the pinion shaft and draw the flywheel assembly through the right case, taking care not to damage the generator frame stud. Secure the pinion shaft bearing locking in its groove.

5. Install the transmission as described in the "Transmission" section.

6. Assemble the cases in the following manner:

a. Place Oil Sleeve Installing Tool (H-D part no. 95629-63), or a suitable substitute, on the flywheel shaft to avoid damaging the oil seal lip while assembling the case.

b. Secure the crankcase and engine mounting stud boss gaskets to the right case with a suitable sealer, using new gaskets only.

c. Slide the cases together and rotate the main drive gear to test for positive meshing of the transmission gears.

d. Draw the cases evenly together while tapping with a soft mallet using Crankcase Tool (H-D part no. 97295-61P) or a suitable substitute.

e. Tap the cases so the dowel pins fit into their receptacles once the case mating surfaces have seated against one another. Secure the remaining seven bolts, washers, nuts, and three allen screws.

7. Install the oil filter screens as described in the "Maintenance" section.

8. Install the gear shifter pawl carrier assembly, pinion shaft gears, and tappets and camshaft assemblies as described in the "Gearcase" section.

9. Install the oil pump as described in the "Lubrication" section.

10. Install the clutch assembly as described in the "Clutch" section.

11. On all Sprint H and 1963 Model C models, use a wood block to tap in a new crankshaft orifice plug, then use a piece of wire or a no. 53 (0.0595 in.) drill to make sure the oil hole is clear and of the proper size (if applicable).

12. Install the gearcase cover as described in the "Gearcase" section.

13. Install the piston, cylinder, and cylinder head as previously described in the "Top End" section.

14. Install the drive sprocket and cover

as described in the "Transmission" section.

15. Install the starter clutch assembly as described in the "Starter" section.

16. Install the generator as described in the "Electrical" section.

17. Install the engine in the chassis as described in the engine "Removal and Installation" section.

CLUTCH

Disassembly

(1968 and Earlier Models)

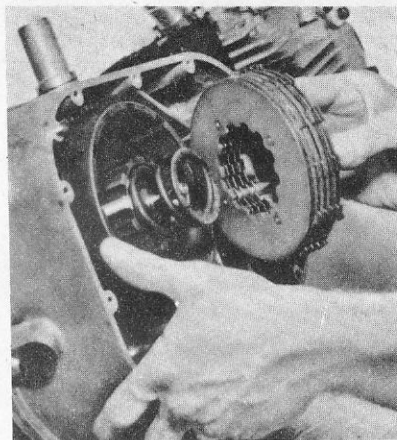
1. Place a drip pan beneath the right side clutch cover, use a wrench to rotate the release lever forward, disengage the cable from the lever, and remove the foot shift lever, cover screws, cover, and cover gasket. Cover all gear case openings with a clean, oil-soaked towel.

2. Compress the clutch spring with Clutch Spring Compressor (H-D part no. 97293-61P) or a suitable substitute. The compressor's end bolts screw into the gearcase cover holes. When the spring is compressed enough, pry the drive outer plate locking free and remove the compressor.

3. Remove the releasing disc cap, bearing, and the entire clutch plate and disc assembly. A piece of wire can be used to lift each disc and plate to slide them out, if so desired, once the backing plate nuts and washers have been removed. The machine can also be tilted over far enough to let the plates and discs slide out.

4. Remove the clutch spring from the clutch hub and assemble the Clutch Holding Tool (H-D part no. 97291-61PA) or substitute some means of securing the clutch, such as blocking the clutch gear with a wooden door stop. Remove the clutch hub nut and lock, then pull the hub from its splined shaft with Crankshaft Pinion Gear and Clutch Hub Puller (H-D part no. 97294-61B) or a suitable gear puller. The mounting studs fit in the tapped holes in the hub. Remove the hub keys and spacer shim.

5. Pull the clutch shell gear free with a suitable gear puller. Pull the clutch shell gear inner bearing free if it remains on the



Removing the clutch plate assembly.

shaft with Puller (H-D part no. 95960-48) and Two-Claw Puller (H-D part no. 97292-61P) or a suitable substitute which will grab the notches in the puller body. Remove the spacing shim if applicable.

Inspection

1. Clean all parts other than the friction discs in a suitable solvent and blow them dry.

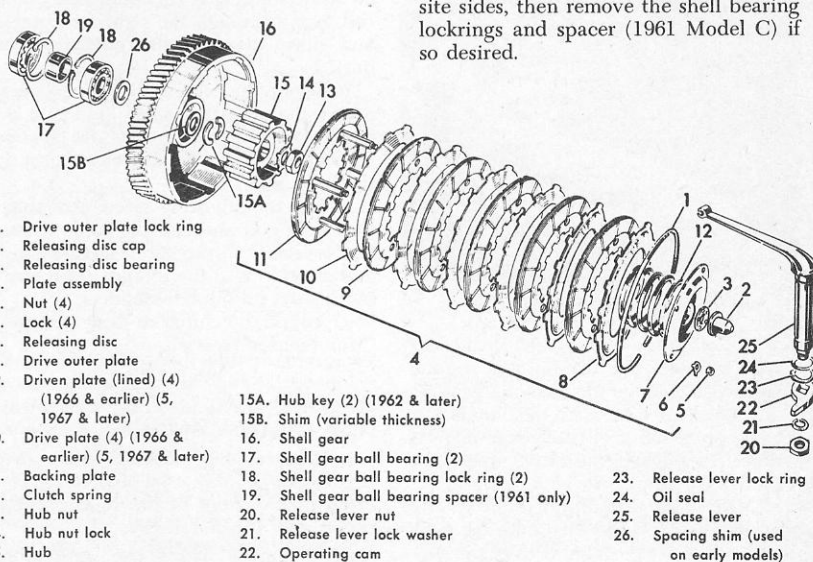
2. Inspect the clutch spring for a collapsed or damaged condition. If the spring measures $\frac{3}{32}$ in. less than the standard $1\frac{1}{32}$ in. or if it is damaged, it must be replaced.

3. Inspect the clutch plates and discs for a warped, scored, or heat-damaged condition, and replace if necessary. When replacing clutch plates and discs, it is a good practice to replace them as a set. Burrs may be filed off the teeth of the discs.

4. Examine the clutch hub, clutch shell gear, and the primary drive gear for worn or damaged teeth and replace them if necessary. The shell and primary gears must be replaced as a set.

5. Inspect the clutch shell bearings for excessive side or vertical play, wear, or rough motion, and replace if necessary in the following manner:

a. Press the bearings out from opposite sides, then remove the shell bearing lockrings and spacer (1961 Model C) if so desired.



Clutch assembly (1968 and earlier models).

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b. When installing the new bearings, first install the lockrings and spacer, then press the bearings in until seated against the lockrings.

6. Inspect the clutch releasing disc, disc bearing, and disc cap for a worn or damaged condition or rough bearing motion and replace them if necessary. The bearing action must be free and the disc cap must be free on the transmission mainshaft.

Release Lever Removal and Installation

1. Remove the contact breaker wires from the clutch cover.

2. Remove the release lever nut, lockwasher, operating cam, lockring, and release lever.

3. Inspect the oil seal for a worn or damaged condition and replace it and any other worn or damaged components as necessary.

4. Assemble the lever assembly in the following manner:

a. Slip the oil seal in place on the release lever and install the lever in the cover.

b. Secure the lever with the lockring which seats in a groove in the lever.

c. Position the operating cam on the release lever so the lever points to the center and the cam is to the rear of the engine when the cover is installed.

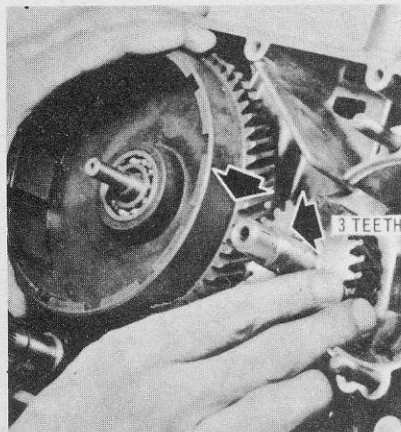
d. Secure the assembly to the cover with the release lever lockwasher and nut.

Assembly

1. Assembly is in the reverse order of disassembly.

2. Proceed as follows for units equipped with a drive take-up gear:

a. Slip the clutch shell gear onto the transmission mainshaft far enough to engage the shell and take-up gear teeth.



Preloading the clutch take-up gear.

b. Rotate the clutch shell gear clockwise to rotate the take-up gear counter-clockwise. When the take-up gear has advanced three teeth on the clutch drive gear, press the shell the remaining distance to engage the drive gear completely.

3. On units with a single-piece drive gear, merely press the shell onto the mainshaft until it engages the teeth of the drive gear.

4. Install the spacer shim and hub keys if applicable. Select the appropriate shim which will reduce shell end-play to a minimum when the keys are installed.

5. Assemble the clutch hub so the small hole faces out. Hold the hub in the same manner as in step four of the "Disassembly" section while installing the hub nut.

6. Install the clutch plates and discs with a steel plate on the inside against the backing plate then a friction disc and so on until six steel plates and five friction discs have been installed.

7. Slip the releasing disc on the backing plate studs so the spring seat is facing in toward the clutch plates, then secure the stud locks and nuts.

8. Slip the clutch spring into the clutch hub and then position the clutch plate and disc assembly onto the hub, pressing in until seated.

9. Place the drive outer plate over the clutch plate assembly so the shouldered side faces out.

10. Assemble the releasing disc bearing and cap on the releasing disc and assemble the Clutch Spring Compressor (H-D part no. 97293-61P), or a suitable substitute, to compress the spring.

11. When the plates and discs are properly aligned with the hub and shell, secure the entire assembly with the drive outer plate lockring which seats in a groove in the shell. Remove the compressing device and install the clutch cover and shift lever.

Clutch Cable Replacement

1. Rotate the release lever forward with a wrench and disengage the clutch cable.

2. Loosen the cable block screws and remove the cable block from the cable.

3. Disengage the cable and housing from the cable adjusting screw.

4. Align the slots in the handle lever adjusting screw and nut, and free the cable at the handle lever.

5. The cable may now be slipped out through the top of the coil or the cable and coil may be removed from the frame.

6. Grease the cable or lubricate it with a chain lubricating compound or engine oil while slipping it back into the coil. The coil is run through the right fork brackets and down through the guide near the horn.

7. Secure the cable at the handle lever and adjust the adjusting screw and nut in as far as they will go. (On 1961-62 C models, the cable end button short end goes into the lever first.)

8. Slip the adjusting screw assembly on the cable end and run the cable through, and secure it to the cable securing block, and position it so the shoulder of the cable block seats on the release lever.

9. Adjust the clutch as described in the "Maintenance" section.

Disassembly (1969 and Later Models)

1. Remove the footshift lever, clutch cover screws (from the smaller cover located on the front of the right crankcase cover), and the clutch cover.

2. Diagonally loosen the clutch spring nuts, so there is even pressure exerted

against the pressure plate at all times, with Clutch Releasing Disc Nut Wrench (H-D part no. 94670-66P) or a screwdriver. Using a screwdriver may damage the nuts; they should be replaced if removed in this manner.

3. Remove the springs, cups, pressure plate, clutch plates and discs, and the steel-lined backing plate.

4. Secure the clutch hub with Clutch Lock Tool (H-D part no. 97177-69P) or by jamming a wooden door stop between the shell gear and the crankcase. Remove the hub nut and lock, then pull the hub free with a gear puller.

5. Remove the clutch hub O-ring, bend back the ears of the clutch shell nut lock, and remove the shell nut with Clutch Shell Nut Wrench (H-D part no. 97235-66P) or a suitable substitute. Remove the nut lock.

6. Remove the clutch shell, washer, clutch drive gear, clutch gear needle bearings, and the gear spacer washers.

Inspection

1. Clean all parts other than the friction discs in a suitable solvent and blow them dry.

2. Check the clutch springs for a collapsed or damaged condition and replace them if necessary. The free-length of a new clutch spring is $1\frac{19}{32}$ in.; any spring which is shorter by $\frac{3}{32}$ in., or more, should be replaced. Springs should be replaced as a complete set.

3. Inspect the clutch plates and discs for a warped, scored, burned, or damaged condition, and replace as necessary. When replacing clutch plates and discs, it is a good practice to replace them as a set. Burrs may be removed from the disc teeth with a file.

4. Examine the O-ring for a cracked, rough, warped, or damaged condition and replace it if necessary. If a new O-ring is available, it should be used.

5. Examine the lip seal of the crankcase for a worn or damaged condition and replace it if necessary.

6. Inspect the clutch hub studs for a loose, stripped, or damaged condition and replace them if necessary by drilling out the old stud with a $\frac{5}{16}$ in. drill and riveting in a new stud.

Release Lever Removal and Installation

1. Remove the left crankcase cover screws then tap on the cover with a soft mallet while pulling on the kick-starter lever.

2. Remove the release lever nut, lockwasher, operating cam, retaining screw, lock, and release lever.

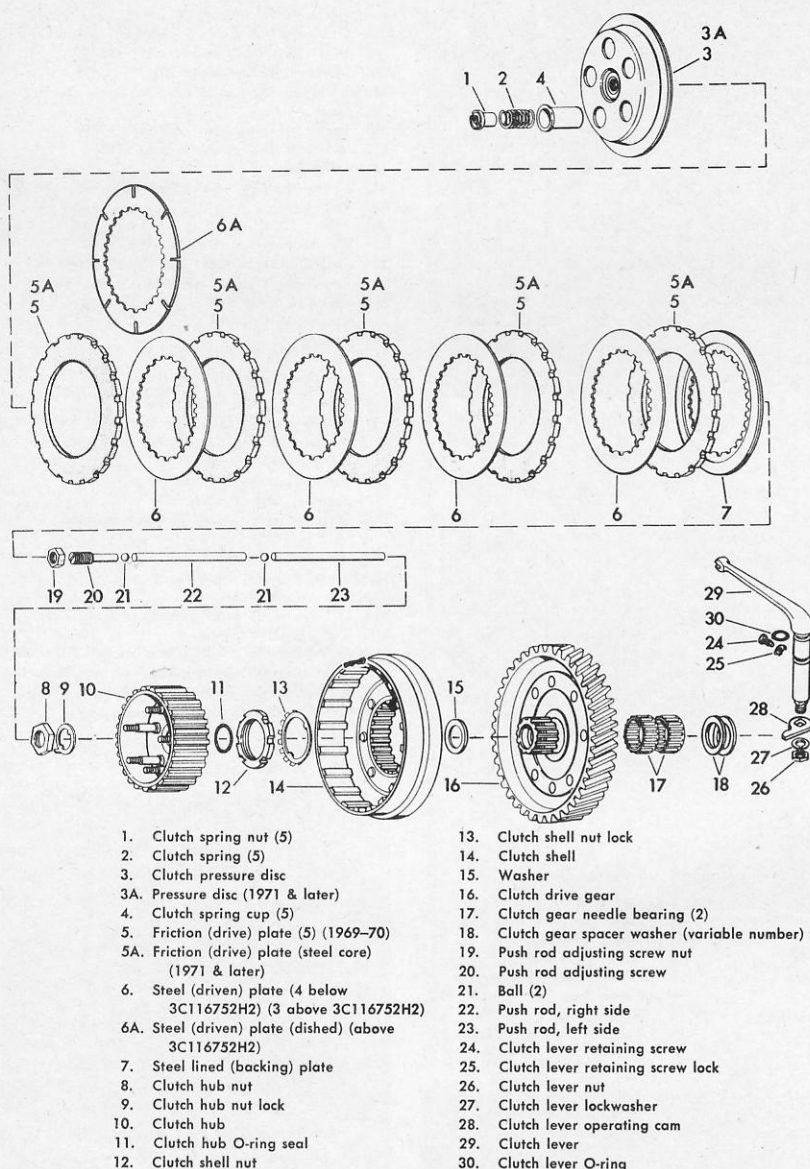
3. Inspect the oil seal and all other parts for a worn or damaged condition and replace them as necessary.

4. Assemble the release lever assembly in the following manner:

a. Slip the oil seal on the release lever and install the lever in the crankcase cover.

b. Position the operating cam on the release lever so the lever points to the center and the cam is to the rear of the engine when the cover is installed.

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- | | |
|-------------------------------------------------------------------|-------------------------------------------------|
| 1. Clutch spring nut (5) | 13. Clutch shell nut lock |
| 2. Clutch spring (5) | 14. Clutch shell |
| 3. Clutch pressure disc | 15. Washer |
| 3A. Pressure disc (1971 & later) | 16. Clutch drive gear |
| 4. Clutch spring cup (5) | 17. Clutch gear needle bearing (2) |
| 5. Friction (drive) plate (5) (1969-70) | 18. Clutch gear spacer washer (variable number) |
| 5A. Friction (drive) plate (steel core) (1971 & later) | 19. Push rod adjusting screw nut |
| 6. Steel (driven) plate (4 below 3C116752H2) (3 above 3C116752H2) | 20. Push rod adjusting screw |
| 6A. Steel (driven) plate (dished) (above 3C116752H2) | 21. Ball (2) |
| 7. Steel lined (backing) plate | 22. Push rod, right side |
| 8. Clutch hub nut | 23. Push rod, left side |
| 9. Clutch hub nut lock | 24. Clutch lever retaining screw |
| 10. Clutch hub | 25. Clutch lever retaining screw lock |
| 11. Clutch hub O-ring seal | 26. Clutch lever nut |
| 12. Clutch shell nut | 27. Clutch lever lockwasher |
| | 28. Clutch lever operating cam |
| | 29. Clutch lever |
| | 30. Clutch lever O-ring |

Clutch assembly (1969 and later models).

c. Secure the assembly with the clutch lever lockwasher and nut, then install the retaining screw and lock.

Clutch Release Push Rod Removal and Installation

1. Remove both crankcase covers.
2. Loosen the push rod adjusting nut and remove the adjusting screw from the clutch pressure disc.
3. Push the two rods and balls out with a piece of wire or a spare rod.
4. When installing the rods again, be sure that the rounded end of the left-side push rod seats against the clutch lever operating cam.

Clutch Cable Replacement

1. Consult the "Clutch Cable Replacement" section for the 1968 and earlier models.

TRANSMISSION

If it becomes necessary to take down your transmission, you may as well go over the entire machine and overhaul the top

and bottom ends since they will have to be dismantled in the process.

Removal and Replacement

1. Remove the engine from the frame as described in the engine "Removal and Installation" section.
2. Separate the crankcase halves as described in the "Crankcase" section.
3. Replacement is in the reverse order of removal.

Disassembly

1. Place the right crankcase on a work bench so the gear assemblies are pointing up.
2. Remove the small shifter cam spacer, the countershaft thrust washer, the shifter fork cotter pins, the shifter fork pins, and the mainshaft first gear locking (if applicable).
3. Mount Clutch Spring Compressor (H-D part no. 97293-61P) or a suitable substitute to the outer portion of the crankcase and press the mainshaft assembly free of the right-side mainshaft bear-

ing, then remove the shifter fork connected to the mainshaft from the shifter cam.

4. Drift the countershaft assembly free of the right-side countershaft bearing, and remove the shifter fork, which is connected to the countershaft, from the shifter cam.

5. Remove the cam stop plunger plug, plug washer, plunger spring, plunger, shifter cam locking, large shifter cam spacer, and the shifter cam.

6. Further work on the transmission should be carried out by your local dealer or by a qualified machinist.

Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all the gears for wear, damage, chipped dogs, battered dog slots, pits, and grooves, and replace them as necessary. Those gears which mesh together should be replaced in sets.

3. Inspect the mainshaft and countershaft for a warped, worn, pitted, grooved, or excessively worn condition, especially at the bearing surfaces, and replace them as necessary.

4. Inspect all bushings for wear, damage, or an excessively loose fit and replace them as necessary by drifting them in and out with a suitably sized drift. Ream the mainshaft third gear, countershaft first gear, and the countershaft second gear bushings with Reamer (H-D part no. 94806-64) or a suitable substitute, and the sprocket gear bushings with Reamer (H-D part no. 94806-63) or a suitable substitute.

5. Inspect the sprocket gear needle bearings and shaft (1969 and later models) for a worn, pitted, warped, or damaged condition, or for rough bearing motion, and replace them as necessary.

6. Inspect the shifter clutches for worn or damaged dogs and shifter fork grooves, and replace them as necessary.

7. Inspect the shifter cam for grooved or worn cam slots in the running gear positions and replace it if necessary.

8. Inspect the shifter forks for a worn, warped, or grooved condition at the fork fingers. Do not try to save the forks by bending them straight since this will merely tax the metal and cause them to fail before too long.

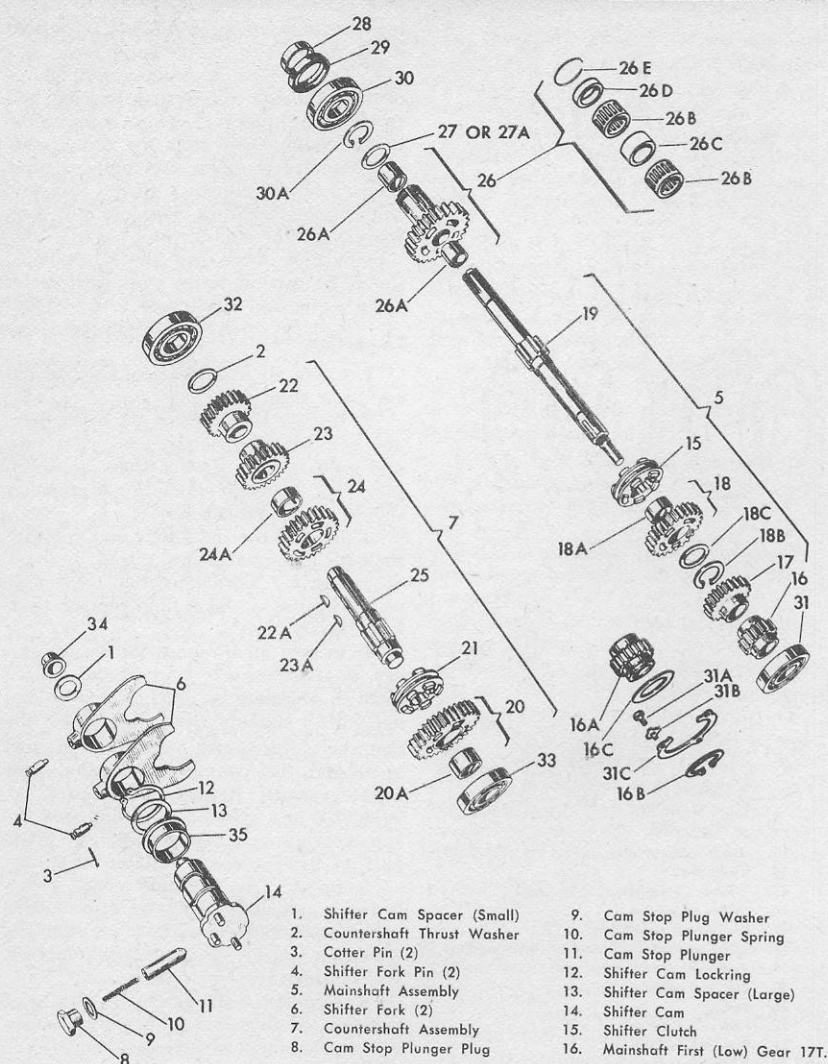
9. Inspect the shifter fork pins, the shifter cam stop plunger, and the plunger spring for a worn or damaged condition, especially on the plunger thrust face, and for free plunger and spring movement, and replace them as necessary. The spring free-length should be 1.535 in., and must be replaced if collapsed to a shorter length.

10. Inspect the bushings and bearings for wear, pitting, damage, excessive play, or rough motion and replace them as necessary in the following manner:

- a. Using a suitable drift, press out the right-side mainshaft, countershaft, and shifter cam bearings from the right crankcase half. The right-side mainshaft retainer bolt, lock, and retainer (if applicable) will have to be removed before the bearing can be removed.

- b. Use a suitable puller device to remove the blind left-side countershaft bearing.

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Transmission assembly.

c. Press the left-side shifter cam bushing from the outside-in using a suitable drift.

d. Pry out the left-side sprocket gear oil seal then press the left-side mainshaft bearing from the outside-in using a suitable drift.

e. Line-ream the right-side shifter cam bushing with Right Bushing Reamer (H-D part no. 97322-61P), or a suitable substitute, and the left-side shifter cam bushing with Left Bushing Reamer (H-D part no. 97318-61P) or a suitable substitute. Always rotate the reamer clockwise, even when withdrawing it.

Assembly

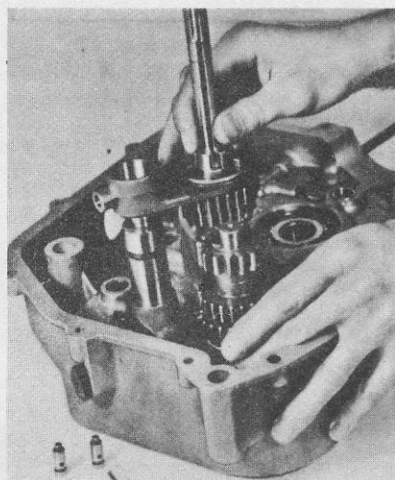
1. Press the replacement oil seals into place if they have been removed.

2. Install the right mainshaft bearing retainer bolt, lock, and retainer (if applicable).

3. Slip the shifter cam into place in the right crankcase, then install the shifter cam lockring, cam stop plunger, plunger spring, plug washer, and the plunger plug which must be snugly tightened down.

4. Install the countershaft assembly in the following manner:

a. Position the shifter fork so the fork



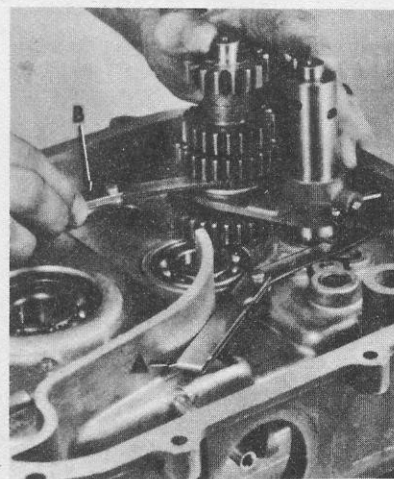
The countershaft and mainshaft assemblies.

fingers engage the shifter clutch shoulder closest to the second gear.

b. Slip the shifter fork onto the shifter cam while installing the countershaft with the first gear seating in the right-side countershaft bearing, tapping the shaft with a soft mallet if necessary.

5. Determine the size of the appropriate

- 16A. Mainshaft First (Low) Gear 17T. (Late 1962)
- 16B. Mainshaft First (Low) Gear Lockring (Late 1962)
- 16C. Shim (Variable-Thickness) (Late 1962)
- 17. Mainshaft Second Gear 23T.
- 18. Mainshaft Third Gear 27T.
- 18A. Bushing
- 18B. Mainshaft Third Gear Lockring (1969)
- 18C. Mainshaft Third Gear Washer (1969)
- 19. Mainshaft
- 20. Countershaft First (Low) Gear 33T.
- 20A. Bushing
- 21. Shifter Clutch
- 22. Countershaft Fourth (High) Gear 16T.
- 22A. Key, C/S Fourth Gear (1971 and Later)
- 23. Countershaft Third Gear 23T.
- 23A. Key, C/S Third Gear (1971 and Later)
- 24. Countershaft Second Gear 27T.
- 24A. Bushing
- 25. Countershaft
- 26. Sprocket Gear 24T.
- 26A. Bushing (2) (1968 and Earlier)
- 26B. Needle Bearing (2) (1969 and Later)
- 26C. Needle Bearing Spacer (1969 and Later)
- 26D. Bushing (1969 and Later)
- 26E. Bushing Lockring (1969 and Later)
- 27. Sprocket Gear Spacer
- 27A. Sprocket Gear Spacer (Variable-Thickness) (Late 1963)
- 28. Mainshaft Sprocket Spacer
- 29. Sprocket Gear Oil Seal
- 30. Left Mainshaft Bearing
- 30A. Left Mainshaft Bearing Retainer (Late 1963)
- 31. Right Mainshaft Bearing
- 31A. Right Mainshaft Bearing Retainer Bolt (Late 1962)
- 31B. Right Mainshaft Bearing Retainer Lock (Late 1962)
- 31C. Right Mainshaft Bearing Retainer (Late 1962)
- 32. Left Countershaft Bearing
- 33. Right Countershaft Bearing
- 34. Left Shifter Cam Bushing
- 35. Right Shifter Cam Bushing



Determining the correct shifter cam spacer thickness.

large shifter cam spacer in the following manner:

a. Install the shifter fork pin and cotter pin into the shifter fork mounted on the shifter cam.

b. Place the transmission in the Neutral position.

c. Use a feeler gauge inserted between the shifter cam bushing and the shifter cam lockring (the gauge designated by "A" in the accompanying illustration) to raise the cam by increasing the number of the feeler gauge blades. Use a second feeler gauge (designated by "B") to measure the distance between the first gear and the shifter clutch, and the shifter clutch and the second gear. Increase the size of "A" until the two distances measured by "B" are exactly equal.

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d. Subtract 0.003 in. (the correct amount of end-play for the shifter cam) from the measurement of "A" to arrive at the appropriate size large shifter cam spacer. Spacers are available in 0.012, 0.020, 0.028, 0.036, 0.040, and 0.044 in. sizes. Use the spacer which comes closest to the measurement arrived at.

e. Remove and disassemble the shifter cam assembly, insert the large shifter cam spacer, and reassemble and install the shifter cam.

6. Rotate the shifter cam until the shifter fork pin holes align with the appropriate grooves in the cam. Secure the fork pins and install new cotter pins.

7. Temporarily assemble the original small shifter cam spacer and countershaft thrust washer on their respective shafts.

8. Insert the two sprocket gear bushings into the sprocket gear (if applicable) or install the bearings and bushings used in 1969 and later models. On the 1968 and earlier models where bushings are exclusively used, the bushings must be reamed with Sprocket Gear Bushing Reamer (H-D part no. 94806-63) or a suitable substitute if a new sprocket gear, gear bushings, or mainshaft is to be installed.

9. Insert the mainshaft sprocket spacer into the sprocket gear oil seal.

10. Place the sprocket gear spacer on the splined end of the gear, secure it with the left bearing retainer (if applicable), and install the assembly in the left mainshaft bearing.

11. Select appropriately sized spacers to take up the shaft's end-play in the following manner:

a. Remove the flywheel from the left crankcase half as described in the "Crankcase" section, and check all bearings to make sure they are completely seated.

b. Install the crankcase gasket and assemble the crankcase halves with at least two bolts.

c. Mount a dial indicator to one of the crankcase halves so the plunger rests on the end of one of the shafts.

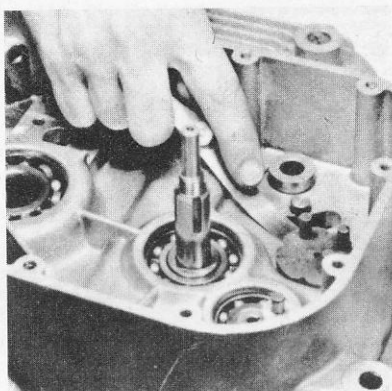
d. Shift the shafts to the end of their travel opposite the dial indicator and remember to tap the sprocket gear down, in addition to the mainshaft.

e. Shift the shafts all the way toward the dial indicator so the indicator's plunger is depressed by the shaft. Place no pressure on the shaft when reading the indicator, and repeat the operation for each of the shafts several times to be sure you have arrived at an accurate reading.

f. The end-play specifications are as follows:

1. The shifter cam end-play is measured on the right side and must be within 0.004–0.008 in. The shim is assembled on the left end of the shaft. The cam can be moved with the aid of a pair of pliers, or measured with a feeler gauge.

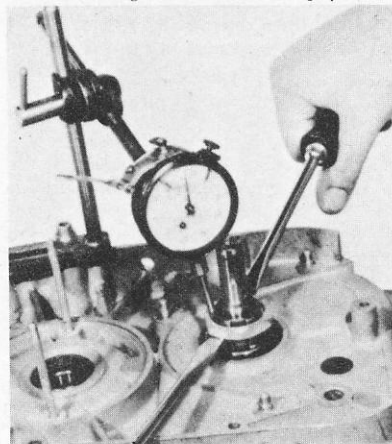
2. The countershaft end-play is measured on the right side and must be within 0.004–0.008 in. The shim is assembled on the left end of the shaft. The countershaft may be shifted with the aid of a long screwdriver inserted



Checking the shifter cam end-play.



Checking the countershaft end-play.



Checking the mainshaft end-play.

through the cylinder base opening and under the countershaft fourth gear, or measured with a feeler gauge.

3. The mainshaft end-play is measured on the left side of the crankcase and must be within 0.008–0.010 in. The shim is assembled on the right side of the shaft. The mainshaft can be shifted with the aid of two screwdrivers as indicated in the illustration, and measured with a dial indicator or a feeler gauge.

g. If the end-play exceeds the set limits, it can be corrected by inserting the appropriate size of shim washer which will reduce the play the necessary

amount. Consult the chart of available shims.

13. Disassemble the crankcases and insert the correct size shims. Reassemble the cases once more and recheck the end-play. The crankshaft end-play can also be corrected at this time if so desired.

Transmission Shim Washer Sizes (1971 and Later SX, 1972 and Later SS)

Size		Right Side			Left Side		
		Shifter Cam	Coun- ter- Shaft	Main Shaft	Shifter Cam	Coun- ter- Shaft	Main Shaft
MM	In.						
0.10	0.004					X	
0.20	0.008			X	X	X	
0.25	0.010			X			
0.30	0.012	X		X		X	
0.35	0.014			X			
0.40	0.016			X	X	X	
0.50	0.020	X				X	
0.60	0.024				X	X	
0.70	0.028	X				X	
0.80	0.032				X	X	
0.90	0.036	X			X		
1.0	0.040	X					
1.1	0.044	X			X		
1.2	0.048	X			X		

14. Install the crankshaft, then reassemble and install the engine in the frame in the reverse order of disassembly. Remember to replenish the transmission oil supply as well as the engine oil before attempting to turn the engine over.

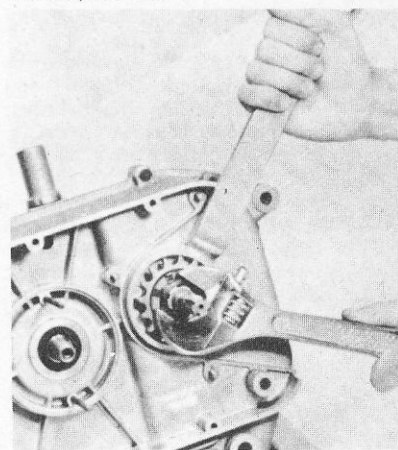
Drive Sprocket

REMOVAL

1. Remove the left side cover by removing the cover screws then tapping on the sides of the cover with a soft mallet while pulling on the kick-start lever.

2. Remove the starter gear assembly as described in the "Starter" section.

3. Remove the sprocket cover nuts, washers, and cover.



Removing the drive sprocket.

4. Hold the sprocket with the Sprocket Holding Tool (H-D part no. varies with the number of sprocket teeth), or some other means of immobilizing the sprocket, then remove the sprocket nut with a suitable wrench.

5. Remove the lock and pull the sprocket from the sprocket gear. It may be necessary to use a gear puller.

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ASSEMBLY

1. Slip the sprocket on the sprocket gear with the shouldered side facing the crankcase.
2. Install the lockwasher and nut in the reverse method of removal.
3. Complete the assembly process in the reverse order of disassembly.

Gearcase Timing Gears

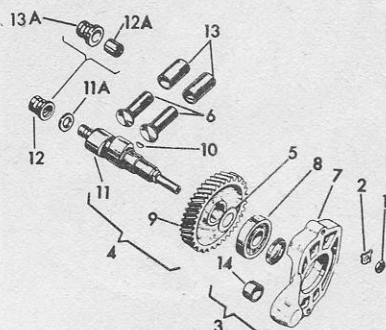
GEARCASE COVER REMOVAL AND INSTALLATION

1. If the engine is to be removed from the chassis, do so as directed in engine "Removal and Installation."
2. If the engine is to remain in the chassis, the motorcycle must be tipped over on the left side, at an angle which is sufficient to keep the oil from draining out, or a drip pan should be placed under the gearcase.
3. Disconnect the clutch cable at the release lever on 1968 and earlier models by rotating the lever forward with a wrench and then freeing the cable from the lever.
4. Remove the footshift lever, contact breaker cover screws, cover, contact breaker cam screw, the clutch assembly on 1969 and later models (as described in the "Clutch" section), the eleven cover screws, the crankcase dipstick, the cover gasket, and the cover. On 1968 and earlier models, the release lever must be rotated forward to remove the cover. As soon as the cover is removed, place a clean, oil-soaked rag over all open holes to prevent foreign objects from entering the crankcase.
5. Before installing the cover, make sure the O-rings from the shifter pawl carrier shaft and the cover pad hole recess are correctly positioned.
6. Make sure the automatic spark advance is correctly located on the camshaft as described in the "Contact Breaker" section.
7. Mount and temporarily secure the cover gasket and cover by inserting, but not tightening, the cover screws.
8. Insert the crankcase dipstick in the cover but do not secure it.
9. Evenly tighten down all of the cover screws until the cover is uniformly secure. Tighten down the dipstick after checking the oil level.
10. Secure the shifter cam assembly.
11. Mount the engine in the frame if it has been removed as described in the engine "Removal and Installation" section.
12. Install the contact breaker cover with the smaller hole on the bottom, and secure the cover screws.
13. Engage the clutch cable in the release lever. Rotate the lever forward using a suitable wrench on 1968 and earlier models.
14. Adjust the clutch as described in the "Maintenance" section.
15. Install the shift lever so the arm is just below the contact breaker cover.

Camshaft and Tappets

REMOVAL

1. Remove the camshaft support assembly nuts, locks, and assembly on 1968 and earlier models.



- | | |
|--------------------------------------|---------------------------------------------------------|
| 1. Nut (2) (1968 & earlier) | 11A. Camshaft washer, variable thickness (1964 & later) |
| 2. Lock (2) (1968 & earlier) | 12. Camshaft crankcase bushing (1963 & earlier) |
| 3. Support assembly (1968 & earlier) | 12A. Camshaft crankcase needle bearing (1964 & later) |
| 4. Camshaft assembly | 13. Tappet bushing (2) |
| 5. Thrust washer | 13A. Needle bearing bushing (1964 & later) |
| 6. Tappets (2) | 14. Pinion shaft bushing |
| 7. Support | |
| 8. Support ball bearings | |
| 9. Gear | |
| 10. Key | |
| 11. Camshaft | |

Camshaft assembly.

2. Remove the camshaft assembly from the camshaft bushing or bearing, then remove the thrust washer and free the tappets from the tappet bushings. The tappets must be kept separate for reassembly in their original positions. The inner tappet is the intake tappet; the outer one is the exhaust.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the camshaft for a worn, pitted, rough, or damaged condition and replace if necessary.
3. Inspect the cam gear for a worn or damaged condition, and, if replacement is necessary, press it from the camshaft, install a new key in the shaft, and press a new gear into place with the recessed side facing out. Blow the shaft oil passages clear to make sure they haven't been clogged.
4. Inspect the camshaft bushings and bearing for excessive wear, play, pitting, damage, or rough motion, and replace as necessary in the following manner:
 - a. The camshaft bushings come in two varieties. Any 1963 or earlier models have a plain bronze bushing which is pressed directly into the crankcase; 1964 and later models have a steel bushing mounted in the case into which a needle bearing is pressed. To replace either type, the crankcases must be separated as described in the "Crankcase" section. The bearing or bushing is pressed out with a suitable, shouldered drift from the inside, and pressed in from the outside in a similar manner.
 - b. Line-ream the camshaft bushings with Camshaft Bushing, and Shifter Cam Left Crankcase Bushing Reamer Set (H-D part no. 97318-61P) or a suitable substitute. The pilot can be mounted on the camshaft support.
5. Inspect the tappets and their bushings for a worn or damaged condition, or

for play in excess of the specified 0.0002–0.0005 in. clearance. If the tappets are worn on the cam follower faces, they must be replaced. Ideally the tappets and their bushings should be replaced as sets although individual replacement components are available. Check the bushings for excessive wear by inserting a new tappet and then checking the play.

6. Tappet bushings must also be replaced if loose in the case. The bushings are a press fit and are pressed from the outside of the case with a shouldered, .472 in. (12 mm) drift. Heat the case with a blow torch around the bushing to aid in the removal and replacement process if necessary.

7. Inspect the support bearing for a worn or damaged condition, for excessive side or radial play, or for rough motion and replace as necessary by pressing from the outside of the cover (1969 and later models) with a suitable drift or a block of wood.

8. Inspect the pinion shaft bushing for a worn or damaged condition and replace in the following manner:

- a. Remove the bushing with Bushing and Bearing Puller (H-D part no. 95760-69 or 96729-63) or a suitable substitute, and a 2 in. length of pipe with a $\frac{7}{8}$ in. inside diameter as a support sleeve.

- b. Press the new bushing into the camshaft support or cover and install the cover or support on the right crankcase but do not secure the mounting screws or nuts as yet.

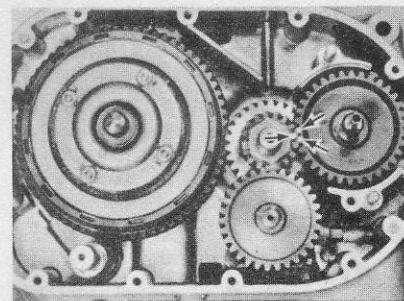
- c. Line-ream the bushing with a suitably sized reamer and pilot which can be inserted through the crankshaft ball bearing mounted in the case. Once the reamer is installed securely, tighten the support or cover and ream the bushing using a tap holder if the reamer is not equipped with a handle.

INSTALLATION

1. Lightly oil the tappets with clean engine oil and slip them into the appropriate tappet bushing.

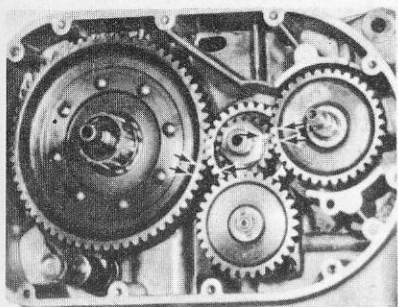
2. Install the crankshaft assembly in the crankcase bushing, taking care to align the cam gear timing mark with the pinion gear timing mark.

3. Place the cam gear thrust washer and support assembly onto the camshaft (1968 and earlier models), then tap the support assembly into place by placing a piece of tubing or a socket on the support bearing inner race.



Aligning the timing marks (1968 and earlier models).

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Aligning the timing marks (1969 and later models).

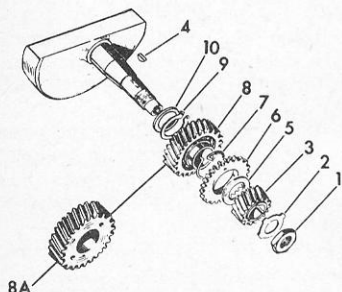
4. Install the locks and nuts to secure the assembly.

5. Install the gearcase cover as described in the "Gearcase Cover Removal and Installation" section.

Pinion and Drive Gears

REMOVAL (1968 AND EARLIER MODELS)

1. Remove the gearcase cover as described in "Gearcase Cover Removal and Installation."



1. Nut
2. Lock
3. Pinion gear
4. Key
5. Thrust washer, early 1961
6. Drive takeup gear, early 1961
7. Drive takeup gear spring, early 1961
8. Clutch drive gear, early 1961
- 8A. Clutch drive gear, late 1961 to 1968
9. Lock ring
10. Spacer washer (variable number)

Pinion gear assembly.

2. Remove the assemblies covered in the "Camshaft and Tappets" section.

3. Remove the clutch plates assembly as described in the "Clutch" section.

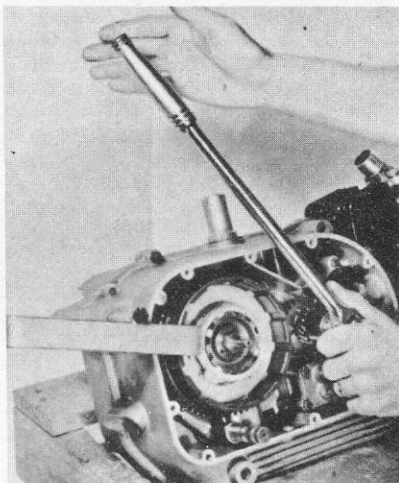
4. Remove the oil pump drive gear as described in the "Lubrication" section.

5. Remove the pinion shaft nut in the following manner:

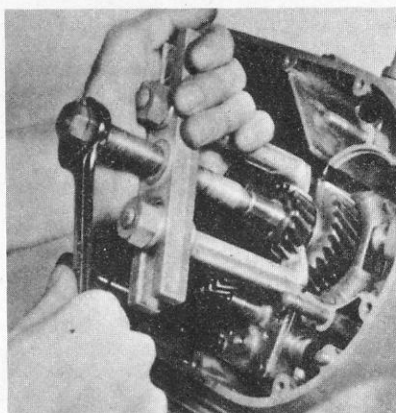
a. Assemble the Clutch Lock Tool (H-D part no. 97175-61P), or some other means of securing the clutch—such as jamming a wooden door stop between the clutch gear teeth and the crankcase—to the clutch shell to prevent the pinion shaft from rotating while the shaft nut is removed.

b. Secure the clutch hub with Hub Holding Tool (H-D part no. 97291-61PA), or a suitable substitute, and secure the wrench by placing a bolt in the crankcase mounting stud hole as illustrated in the accompanying illustration.

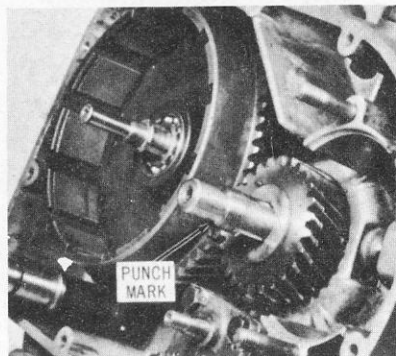
c. Remove the pinion shaft nut with a suitable socket wrench, then remove the lock.



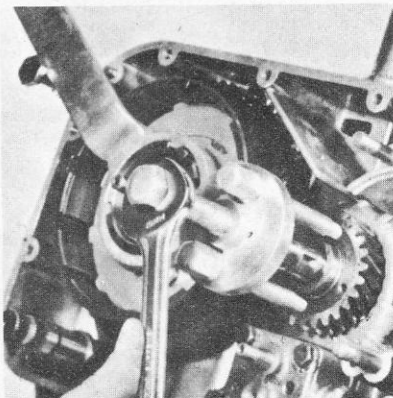
Pinion gear nut removal and installation.



Removing the pinion gear.



Marking the correct keyway.



Removing the clutch drive gear.

6. Remove the clutch shell and gear assembly as described in the "Clutch" section.

7. Pull the pinion gear free with Two-Jaw Puller (H-D part no. 97292-61P) or a suitable substitute.

8. Mark the keyway in which the key is mounted (there are three keyways but only one takes a key) with a small punch mark, and then remove the key.

9. Remove the thrust washer, drive take-up gear, and the take-up gear spring (if applicable).

10. Secure the clutch hub with Hub Holding Tool (H-D part no. 97291-61PA), or a suitable substitute, then pull the clutch drive gear free with Drive Gear Puller (H-D part no. 97294-61P) or a suitable substitute.

REMOVAL (1969 AND LATER MODELS)

1. Remove the clutch assembly as described in the "Clutch" section (1969 and later models).

2. Remove the gearcase cover as described in the "Gearcase Cover Removal and Installation" section.

3. Remove the camshaft thrust washer and camshaft as described in the "Camshaft and Tappets" section.

4. Remove the oil pump drive gear as described in the "Lubrication" section.

5. Remove the pinion shaft nut in the following manner:

a. Disassemble the top end as described in the "Top End" section.

b. Slip a cross-shaft through the connecting rod piston pin hole to freeze the motion of the engine.

c. Remove the pinion shaft wrench with a suitable socket wrench then remove the nut lock.

6. Pull the pinion gear free with Two-Jaw Puller (H-D part no. 97292-61P) or a suitable substitute.

7. Mark and remove the key as directed in the 1968 and earlier models "Removal" section.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all gears for a worn or damaged condition and replace as necessary. If the clutch drive or pinion gears are replaced, those gears with which they mesh must also be replaced.

3. Inspect the take-up spring for a worn, collapsed, or damaged condition, and replace as necessary.

4. Inspect the thrust washer (if applicable) for a worn or damaged condition which would indicate that the clutch drive gear is slipping on the pinion shaft and that the pinion shaft or the gear or both are in need of replacement. Replace the thrust washer if necessary.

5. Inspect the pinion shaft and gear for a worn or damaged condition and replace as necessary by consulting the "Crankcase" section.

INSTALLATION (ALL MODELS)

1. Replace the spacer washers, spring washers, and the locking, with the spring washers between the pinion shaft bearing mounted in the crankcase, and the primary

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drive gear. The dished outer diameters of the washers should face each other, and therefore reduce the crankshaft end-play to nothing.

2. Inspect the tapers on the pinion shaft and drive gear for a clean, burr-free condition before going any further.

3. Install the drive gear on the pinion shaft, slip the drive take-up gear spring over the shaft so it seats in the gear, slip the take-up gear on the shaft, and slip the thrust washer in place (1968 and earlier models).

4. Insert a new pinion shaft key in the marked keyway. If the mark has been obliterated or if you have failed to correctly mark the appropriate keyway, do the following:

a. Situate the pinion shaft flywheel so the piston is at TDC (or so the crank pin is).

b. Insert the key in the forward (top center) keyway for 1963 and earlier, and 1969 and later models.

c. Insert the key in the bottom (seven o'clock) keyway for 1964-68 models.

d. Insert the key in any keyway which has been designated by a grind mark on the face of the gear at one of the keyway positions.

5. Install the pinion gear with the timing mark in the forward position as indicated in the illustration in the camshaft and tappet "Installation" section, then mount and secure the lock and nut to finger-tightness. If the lock is new, one tab may be bent up to engage the groove on the gear. The valve timing is controlled by the proper positioning of the gear and key and must be as shown in the following chart.

	Year	Crank Angle		
		Opens	Closes	Lift (in.)
Intake Valve	1973-74	36° BTDC	58° ABDC	0.380
	1969-72	36° BTDC	67° ABDC	0.361
	1967 and later	13° BTDC	50° ABDC	0.296
	1966	15° BBDC	45° ABDC	0.296
	1973-74	68° BBDC	24° ATDC	0.370
Exhaust Valve	1969-72	70° BBDC	20° ATDC	3.50
	1967 and later	54° BBDC	9° ATDC	0.292
	1966 and earlier	55° BBDC	4° ATDC	0.292

6. Complete assembly in the following manner for all 1968 and earlier models:

a. Install the clutch shell gear and hub using Clutch Lock Tool (H-D part no. 97175-61P) or an alternative method as described in the "Removal" section. Secure the clutch hub with Clutch Hub Holding Tool (H-D part no. 97291-61PA), or a suitable substitute, and block the handle with a bolt inserted in one of the crankcase holes. Using a suitable wrench, secure the pinion gear nut to 35 ft lbs torque, then complete the clutch assembly procedures as described in the "Clutch" section.

b. Install the oil pump drive gear as described in the "Lubrication" section.

c. Install the cam gear and support plate as described in the "Camshaft and Tappets Assembly" section.

d. Install the gearcase cover as described in the "Gearcase Cover Removal and Installation" section.

7. Complete assembly in the following

manner for all 1969 and later models:

a. Freeze the motion of the engine by inserting a rod through the connecting rod piston pin hole, then secure the pinion gear nut to 35 ft lbs torque.

b. Install the oil pump drive gear, camshaft, camshaft thrust washer, and the primary drive gear as described in their respective sections.

c. Complete the clutch assembly procedures as described in the "Clutch" section.

d. Install the gearcase cover as described in the "Gearcase Cover Removal and Inspection" section.

Shifter Pawl Carrier

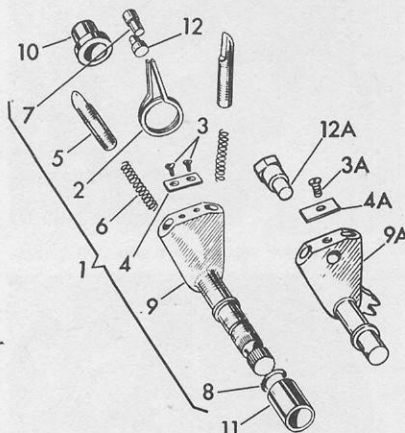
DISASSEMBLY

1. Remove the gearcase cover as described in the "Gearcase Cover Removal and Inspection" section.

2. Remove the clutch assembly on 1968 and earlier models as described in the "Clutch" section.

3. Remove the shifter pawl carrier thrust washer.

4. Remove the assembled shifter pawl carrier assembly from the case, then remove the return spring from the assembly.



- | | |
|------------------------------------------------|------------------------------------------------------|
| 1. Shifter pawl carrier assembly | 8. O-ring |
| 2. Return spring | 9. Pawl carrier (1972 & earlier) |
| 3. Screw (2) (1972 & earlier) | 9A. Pawl carrier (1973 & later) |
| 3A. Screw (1) (1973 & later) | 10. Crankcase carrier shaft bushing (1972 & earlier) |
| 4. Pawl spring retainer plate (1972 & earlier) | 11. Cover carrier shaft bushing (1972 & earlier) |
| 4A. Pawl spring retainer plate (1973 & later) | 12. Return spring pin (1972 & earlier) |
| 5. Pawl (2) | 12A. Return spring pin (1973 & later) |
| 6. Pawl spring (2) | |
| 7. Stop pin (1972 & earlier) | |

Shifter pawl carrier assembly.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect the pawls for a worn, grooved, cracked, or damaged condition and replace them as necessary.

3. Inspect the pawl springs for a collapsed or damaged condition and replace as necessary. The springs must be replaced if they are less than 1½ in. long.

4. Insert the springs and pawls into the carrier and check their motion for smooth and free operation. If the springs and pawls are in good condition and the motion is rough, replace the carrier. If the carrier is worn or damaged on its other surfaces, it must then be replaced also.

5. Inspect the crankcase carrier shaft bushing for a worn or damaged condition and replace as necessary by removing the engine from the frame as directed in the engine "Removal and Inspection" section and then separating the crankcase halves as directed in the "Crankcase" section. The bushing may then be pressed out from the inside with a suitable, shouldered drift, and then pressed in from the outside with the same drift.

6. Inspect the shifter carrier rubber O-ring for a cracked or damaged condition and replace as necessary.

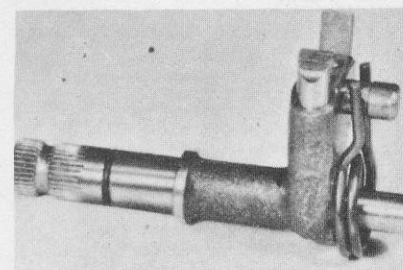
7. Inspect the cover carrier shaft bushing for a worn or damaged condition and replace as necessary by pressing it out from the inside of the cover with a suitable, shouldered drift and then back in with the chamfered side first until flush with the bushing boss.

ASSEMBLY

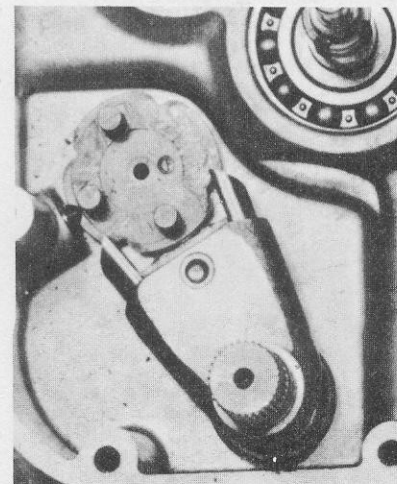
1. Insert the pawl springs into the pawls, and then slip the pawls and springs into the carrier so the flat portions of the pawls face each other.

2. Install the retainer plate and secure it with the plate screws while holding the pawls down.

3. Press new stop pins into place in the carrier so that the flat portions of the pins are parallel with the retainer plate.



Shifter pawl carrier with the spring mounted.



Positioning the carrier assembly in the crankcase.

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4. Assemble the return spring to the assembly so the offset portion of the spring is toward the crankcase, and so the stop pin is between the spring arms.

5. Slip the rubber O-ring into position in its groove in the carrier shaft.

6. Install the carrier in the crankcase and engage the return spring on its pin as illustrated. If the spring is properly engaged the shaft will not be able to turn.

7. Install the clutch assembly on 1968 and earlier models as described in the "Clutch" section.

8. Install the gearcase cover as described in the "Gearcase Cover Removal and Installation" section.

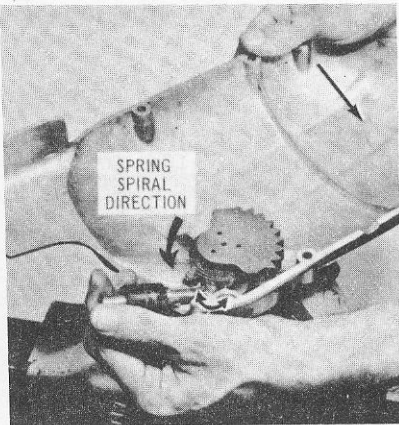
KICK-STARTER

Disassembly

1. Remove the left side cover screws and remove the cover by tapping on its sides with a soft mallet while pulling on the starter crank.

2. Remove the starter crank nut, bolt, the crank and pedal assembly, and the crank clevis (if applicable).

3. Remove the crank gear shaft support bolts, washers, and the support, then remove the stop stud acorn nut and washer (1971 and later models).



Removing the crank gear stop stud.

4. Secure the crank gear's shaft in a wood or copper-jawed vise, then rotate the cover to relieve the spring tension while removing the crank gear stop bumper and stud from the cover.

5. Carefully release the spring tension and remove the cover assembly from the vise.

6. Remove the crank gear and the starter spring from the cover.

7. Remove the clutch gear locking, using snap-ring pliers, or press the clutch against the clutch spring and pry the outer ring free (late 1970 models).

8. Remove the clutch spring collar, spring, clutch, clutch gear assembly, and the gear locking. Carefully examine the illustration since there are discrepancies in the order of assembly for the 1969 and later models.

Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect the crank gear, clutch, and

the clutch gear assembly for wear, damage, or chipped or battered teeth, and replace them as a set if necessary. Crank gears since late 1961 have had 10 teeth rather than eight, and replacement should be with the newer variety.

3. Inspect the clutch gear bushing for a worn, loose, or damaged condition and replace it as necessary with a 0.570 in. shouldered drift. This bushing will not need to be reamed.

4. Inspect the starter clutch spring for a collapsed or damaged condition and replace it as necessary. The spring must be replaced if it has become shorter than 0.984 in.

5. Inspect the lockrings for a worn, warped, or damaged condition and replace them as necessary.

6. Inspect the crank gear shaft bushings for a worn, excessively loose fit with the core or shaft, or a damaged condition, and replace them as necessary. The bushings may be pressed out with a shouldered drift having a small diameter of 0.669 in. and a large diameter of 0.866 in. When replacing the bushings, press them in until flush with the bushing boss, and so the chamfered side is to the inside of the cover. These bushings will not need to be reamed.

7. Inspect the starter spring for a worn, collapsed, or damaged condition, and replace it as necessary.

8. Inspect the crank gear stop bumper and the stop stud for a worn or damaged condition and replace it as necessary. Pay special attention to the metal sheath around the bumper and replace the bumper if it is damaged.

9. Inspect the spring dowel pin for a worn or damaged condition and remove it

only if replacement is necessary. The pin is a press fit into the cover.

10. Rotate the crank pedal in both directions and check to see if it locks in both extreme positions. If it fails to lock, the pedal spring should be replaced.

Assembly

1. Assemble parts to the mainshaft in the reverse order of disassembly. The clutch gear bushing is pressed into the gear.

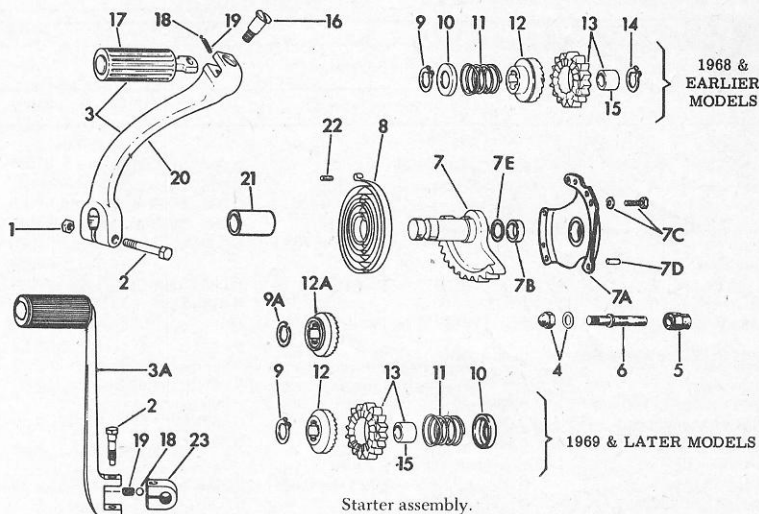
2. Position the starter spring on the crank gear so the spring is wound counterclockwise from the center when viewed from the cover side.

3. Install the crank gear in the gear shaft cover bushing, taking care to secure the loop of the spring on the spring dowel pin.

4. Secure the crank gear shaft in a wood or copper-jawed vise, rotate the cover until the spring is properly tensioned, unwind the cover 1-1/2 turns, and then mount the crank gear stop stud and bumper to the cover. Remove the cover assembly from the vise, and secure the stop stud acorn and washer.

5. Secure the crank gear shaft support assembly (if applicable).

6. Assemble the crank and pedal assembly or the crank clevis and then the crank and pedal assembly (if applicable). Before securing the assembly with the crank bolt and nut, and the cover to the crankcase, make sure the crank is so positioned on the shaft splines as to allow the crank to be operated without smashing your shin or the crank against the footrest while kicking the engine over.



Starter assembly.

1. Crank nut (1968 and earlier)
2. Crank bolt
3. Crank and pedal assembly (1968 and earlier)
- 3A. Crank and pedal assembly (1969 and later)
4. Stop stud acorn nut and washer
5. Crank gear stop bumper
6. Crank gear stop stud
7. Crank gear
- 7A. Crank gear shaft support (1971-72)
- 7B. Crank gear shaft inner bushing

- 7C. Crank gear shaft support bolt & L.W. (5) (1971-72)
- 7D. Crank gear shaft support dowel pin (2) (1971-72)
- 7E. Washer (1973 & later)
8. Spring
9. Clutch gear lock ring
- 9A. Clutch gear lock ring (late 1970)
10. Clutch spring collar
11. Clutch spring
12. Clutch
- 12A. Clutch gear lock ring (late 1970)

13. Clutch gear assembly
14. Clutch gear lock ring
15. Clutch gear bushing
16. Crank pedal screw (1968 and earlier)
17. Crank pedal
18. Crank pedal ball
19. Crank pedal spring
20. Crank (1968 and earlier)
21. Crank gear shaft bushing
22. Spring dowel pin
23. Crank clevis (1969 and later)

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Engine and Transmission Specifications

M-Models, X, Z, SR, TX/SX 125

Piston

Cylinder Clearance (1965-66 M-50)	.0005-.0010 in.
(1967 and later M-65)	.002-.0025 in.
(1968-72 M-125)	.002-.0027 in.
(1970 and later M-100, SR-100)	.002-.0027 in.
(1973 and later X-90, Z-90, TX/SX 125)	.001-.002 in.
Piston ring side clearance M-50, M-65 (1965)	Upper .002-.004 in. Lower .001-.004 in.
M-50, M-65 (1966 and later)	Both .002-.004 in.
M-125, X-90, Z-90, TX/SX 125	Both .003-.0045 in.
M-100	.004-.006 in.
SR-100	Upper .005-.006 in. Lower (where used) .003-.004 in.
Piston ring end gap	.008-.014
Piston pin fit in piston	Light press at 70° F
Piston pin fit in connection rod roller bearing	.0001-. in. at 70° F

Connecting Rod and Crankshaft

End play between crank throws M-50, M-65	.002-.004 in.
M-125	.004-.006 in.
M-100	.006-.008 in.
X-90, Z-90, SR-100, TX/SX 125	.012-.020 in.
Fit on crank pin bearing M-50, M-65	.00015 in.
M-125, M-100	.0002-.0004 in.
Crankshaft endplay All models (1973 & earlier)	.002-.004 in.
X, Z, SR, SX (1974)	.004-.008 in.

Ignition

Spark plug gap (1965)	.020-.025 in.
(1966 and later)	.025-.030 in.
Circuit breaker gap (M-125) MSR-100	.016 in.
(M-50, M-65)	.018 in.
(1973 and later, all models)	.016 in.

Timing

Timing Mark "A"	
M-50	27° (.115 in.) BTC
M-65 (1967-70)	23° (.073 in.) BTC
(1971-72)	22½° (.080 in.) BTC
X-90, Z-90	20½° (.077 in.) BTC
M-100, M-125, SR-100, TX-125	20° (.073 in.) BTC

S and B Models

165, Hummer and Super-10

BT, BTU, BTF, and BTH

Piston Assembly

Fit in cylinder	0.0025-0.0035 in.	0.0045-0.0055 in.
Ring end-gap	0.012-0.020 in.	0.008-0.019 in.
Ring end-clearance	①	0.006-0.008 in. (top ring) 0.002-0.004 in. (bottom ring)

Piston pin fit	0.0001 in. interference fit at 70° F	0.0001 in. interference fit at 70° F
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Connecting Rod

Piston pin fit	0.0002-0.0012 in. loose	0.0002-0.0012 in. loose
End-play between flywheels	0.011-0.017 in.	0.011-0.018 in.
Fit on crank pin	0.0010-0.0013 in. loose	②

Flywheel Assembly

Sprocket shaft	Must resist a turning torque of 75 ft lbs in flywheel	
Generator shaft	Must resist a turning torque of 75 ft lbs in flywheel	
Flywheel maximum run-out	0.009 in.	0.009 in.
Mainshaft maximum run-out	0.002 in.	0.002 in.
End-play in crankcase	0.003-0.012 in.	0.003-0.012 in.

Crankcase Assembly

Main bearing fit in case	0.0005 in. tight—0.0005 in. loose	0.0005 in. tight—0.0005 in. loose
Main bearing fit on shaft	0.0001-0.0007 in. loose	0.0001-0.0007 in. loose
Generator armature commutator maximum run-out	0.003 in. (model 165 only)	—
Cam maximum run-out	0.005 in.	0.005 in.
Minimum air gap at pole piece	0.002 in. (except model 165)	0.002 in.

Clutch

Type	Bonded fabric disc wet clutch	Bonded fabric disc wet clutch
Torque capacity	35 ft lbs	35 ft lbs
Clutch disengagement	0.056-0.064 in.	0.056-0.064 in.

Chain

Type	¾ in. single strand pitch chain	¾ in. single strand pitch chain
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Mainshaft Group

Bearing fit in bore	0.0005 in. loose—0.0005 in. tight	0.0005 in. loose—0.0005 in. tight
Bearing fit on shaft	0.0001 in. loose—0.0005 in. tight	0.0001 in. loose—0.0005 in. tight
Drive gear fit on mainshaft	0.001-0.0025 in. loose	0.001-0.0025 in. loose
Mainshaft end-play	0.000-0.022 in.	0.000-0.022 in.

Lubrication System

Oil Injected Models

OIL PUMP

Removal

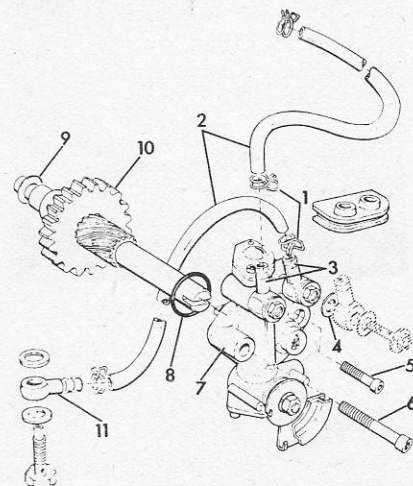
1. Disconnect the oil pump cable from the control lever on the pump.
2. Loosen the oil line clamps and move them back on the oil lines. Disconnect the oil line from the pump fittings. Note to which fitting each oil line is connected to so they will not be reversed upon installation.

CAUTION: If for any reason the banjo fittings are removed the aluminum washers on either side of the fittings must be replaced with new items.

3. Remove the two mounting screws, and pull off the oil pump. The O-ring behind the oil pump should be replaced every time the oil pump is removed.

Installation

1. Mount the oil pump to the engine with the two mounting bolts. Use a new O-ring behind the pump.
2. Connect the oil line to the pump, and reposition the clamps.
3. Bleed the oil pump. Connect the oil pump cable, and adjust it.



1. Hose clamp
2. Oil line
3. Oil line fitting
4. Aluminum washer
5. Screw (short)
6. Screw (long)
7. Oil pump
8. O-ring
9. Washer, thrust
10. Oil pump drive shaft
11. Intake fitting with check ball

Oil pump assembly

BLEEDING THE OIL PUMP

1. Disconnect the oil line from the fitting on the manifold. Do not remove the fitting.
2. Drain the gas tank of gas, and fill with a gas/oil mixture of 50/1 for the SS/SX 175/250 or 25/1 for the other models.
3. Make sure that the oil tank is filled with H-D "Two-cycle Lubricant."
4. Start the engine and allow it to idle. Hold the oil pump control lever in the wide open position until the oil coming from

Harley-Davidson Singles

Engine and Transmission Specifications (cont.)

S and B Models	165, Hummer and Super-10	BT, BTU, BTF, and BTH
Countershaft Group		
Bushing fit on shaft ends	0.0005–0.0015 in. loose	0.0005–0.0015 in. loose
First gear fit on shaft	0.0007–0.0022 in. loose	0.0007–0.0022 in. loose
① Ring end-clearance		
165 and Hummer models (top and bottom rings) 0.004–0.005 in.		
1960 Super-10 (top and bottom rings) 0.009–0.011 in.		
1961 Super-10 (top ring) 0.009–0.011 in.		
1961 Super-10 (bottom ring) 0.004–0.005 in.		
② Connecting rod fit on crank pin		
BTU 0.0010–0.0013 in. loose		
BT, BTF, and BTH 0.0013–0.0025 in. loose		
<hr/>		
Piston	SS/SX 175/250	
Ring size		
1st comp.—width	0.059 in. (1.5 mm)	
2nd comp.—width	0.059 in. (1.5 mm)	
Piston clearance		
	SX-175/SS-175	
	0.0006–0.0018 * (0.015–0.045 mm)	
	SX-250/SS-250	
	0.0013–0.0021 * (0.003–0.054 mm)	
	* Measured on major diameter as follows: SX1-75—0.87 in. (22 mm), SX-250—1.0 in. (25 mm) from bottom of skirt	
Top compression ring:		
End gap	SX-175/SS-175	
	0.008–0.014 in. (0.20–0.35 mm)	
	SX-250/SS-250	
	0.01–0.016 in. (0.25–0.40 mm)	
Side clearance	0.0043–0.0060 in. (0.11–0.152 mm)	
Bottom compression ring:		
End gap	SX-175/SS-175	
	0.008–0.014 in. (0.20–0.35 mm)	
	SX-250/SS-250	
	0.01–0.016 in. (0.25–0.40 mm)	
Side clearance	0.0031–0.0048 in. (0.08–0.12 mm)	
Pin fit in piston #	White—0.00004–0.0002 in. (0.001–0.0065 mm)	
	Black—0.00002–0.0002 in. (0.0005–0.006 mm)	
# Piston and pin are both color coded either black or white and must match.		
Pin fit in connecting rod	0.0001–0.0002 in. loose (0.002–0.006 mm loose)	
Connecting Rod		
End play between flywheels	0.012–0.016 in. (0.30–0.40 mm)	
Fit on crankpin	0.0004–0.0008 in. (0.01–0.02 mm)	

SPRINT MODELS

Piston Assembly		
Fit in cylinder (1968 and earlier)	0.002 in. loose	
(1969 and later)	0.004 in. loose	
Compression rings end-gap	0.010–0.016 in.	
Compression rings side-clearance	0.001–0.002 in.	
Oil control ring end-gap	0.010–0.014 in.	
Oil control ring side-clearance	0.001–0.002 in.	
Piston pin fit in piston	Light hand press at 70° F	
Piston pin fit in upper connecting rod bushing	0.0006–0.0012 in. loose	
Connecting Rod		
End-play between flywheels (1968 and earlier)	0.004–0.008 in.	
(1969 and later)	0.006–0.010 in.	
Fit on crankpin bearing	0.0005–0.001 in.	
Valves		
Fit in guide (exhaust)	0.002 in. loose	
Fit in guide (intake) (1968 and earlier)	0.0015 in. loose	
(1969 and later)	0.001 in. loose	
①		
Valve Springs		
Rocker Arms		
Shaft fit in bushings	0.0005–0.0015 in.	
End-play	Select those spacer washers which are needed to compress the spring washer.	
Oil Pump		
Minimum pressure measured at 25 mph in fourth gear	3 psi	
Gearcase		
Camshaft in crankcase bushing	0.0005–0.0015 in.	
Camshaft end-play	0.001–0.004 in.	
Flywheel Assembly		
Mainshafts run-out	0.001 in. maximum	
End-play in crankcase	0.0005–0.0025 in.	
Mainshaft fit in camshaft support plate bushing	0.0005–0.002 in.	
Clutch		
Type (1968 and earlier)	Wet-multiple disc	
(1969 and later)	Dry-multiple disc	
Capacity	②	
Spring free-length	1.90 in.	
Spring set up	③	

the oil line at the manifold is free of air bubbles.

5. Drain the gas tank of any gas/oil mixture and fill with pure gas.

6. Adjust the oil pump cable.

OIL PUMP CABLE ADJUSTMENT

1. Adjust the oil pump cable after adjusting the throttle cable.

2. Remove the oil pump cover.

3. With the throttle held in the wide open position the maximum flow mark on the pump control lever should align with the index mark on the body. If the marks do not align, use the cable adjuster to adjust the cable so that they do.

Sprint Models

The Sprint employs a pressure-fed oil pump which forces the oil to circulate through and lubricate the lower end connecting rod, camshaft, rocker arm bearings, and the valve train, while the excess oil which is thrown off the connecting rod and crankshaft splash lubricates the cylinder assembly, the main bearings, and the transmission. The gearcase is kept well-oiled by the oil which drains down from the cylinder head through the push rod housing, and the remaining oil from the head drains into the crankcase through the exhaust rocker arm cover and oil return pipe.

There are two scavenger methods employed to return the oil into circulation once it has reached the crankcase. On 1963 and earlier models, the oil is passed from the scavenger pocket through a filter by the action of a duplex oil pump which then forces the oil through the pump body and into the gearcase. The oil then returns to the crankcase for recycling by passing through a gap between the two compartments as it attempts to seek its own level.

On the 1964 and later models, the oil drains directly into the crankcase sump where it is picked up for recirculation by an inlet pipe in the center of the feed pump filter.

Oil Pump

DISASSEMBLY

1. Drain all the engine oil as described in "Maintenance".

2. Remove the gearcase cover as described in the "Gearcase" section and plug up all the openings into the crankcase.

3. On 1968 and earlier models remove the camshaft support assembly as described in the "Gearcase" section.

4. Remove the drive gear locknut and lock while holding the pinion gear steady.

5. Remove the drive gear using Two-Jaw Puller (H-D part no. 97292-61P) and Cap (H-D part no. 95652-43A), or suitable substitutes, taking care not to damage the threads that the cap protects.

6. Remove the scavenger line connection and both washers from 1963 and earlier models.

7. Remove the pump bolts and locks, then remove the entire pump assembly from the gearcase.

Harley-Davidson Singles

Engine and Transmission Specifications (cont.)

SPRINT MODELS

Primary Drive

Type (1968 and earlier)

Helical gears with provision for automatic backlash take-up on early 1961 models.

(1969 and later)

Helical gears in the crankcase.

Gearbox

Gear shifter cam end-play in cases

0.004-0.008 in.

Gear shifter cam clearance in right-side cam bushing

0.0005-0.0015 in.

Gear shifter cam clearance in left-side cam bushing

0.0005-0.0015 in.

Shifter fork clearance on gear shifter cam

0.001-0.0015 in.

Shifter pawl carrier shaft in cover bushing

0.0005-0.0015 in.

Shifter pawl carrier shaft in crankcase bushing

0.0005-0.0015 in.

Mainshaft Group

Sprocket gear on mainshaft

0.0005-0.0015 in.

Mainshaft third gear on mainshaft

0.001-0.002 in.

Mainshaft end-play

0.008-0.010 in.

Countershaft Group

Countershaft first gear on countershaft

0.001-0.002 in.

Countershaft second gear on countershaft

0.001-0.002 in.

Countershaft end-play

0.004-0.008 in.

① Valve springs

Model	Free- Length Spring	Valve Posi- tion	Com- pressed Length	Pound- age	Part No.
All C Models and 1968 and Earlier Models H and SS	1.64 Inner 1.77 Outer	Open Closed Open Closed	0.98 1.28 1.14 1.42	44.0 25.0 88.0 50.0	18205-61P (Inner) 18206-61P (Outer)
1962-63	1.64 Inner 1.77 Outer	Open Closed Open Closed	0.98 1.30 1.10 1.42	48.0 28.0 105.0 55.0	18203-61P (Inner)
Model H Only	1.64 Inner 1.77 Outer	Open Closed Open Closed	1.00 1.36 1.14 1.49	45.1 18.0 97.9 41.8	18204-61P (Outer)

② Capacity

1966 and earlier 1800 lbs/in.

1967-68 2250 lbs/in.

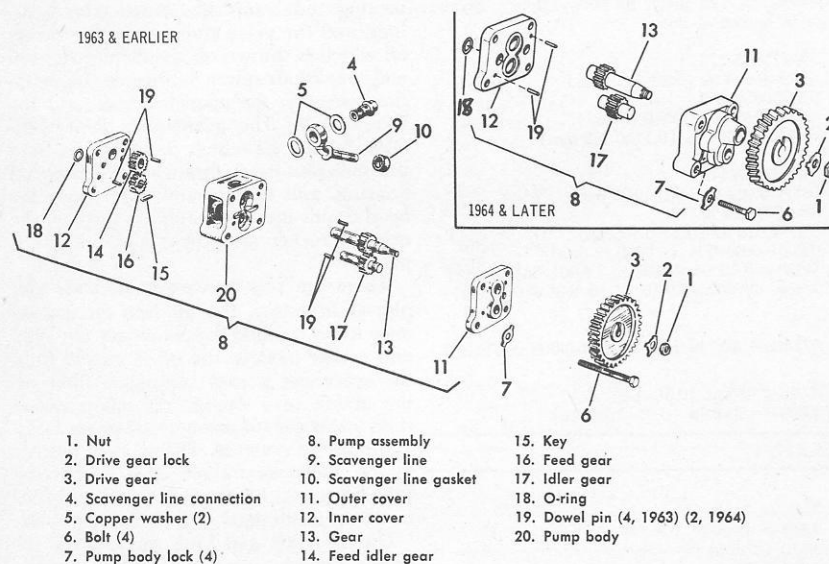
1969 and later 2040 lbs/in.

③ Spring set up

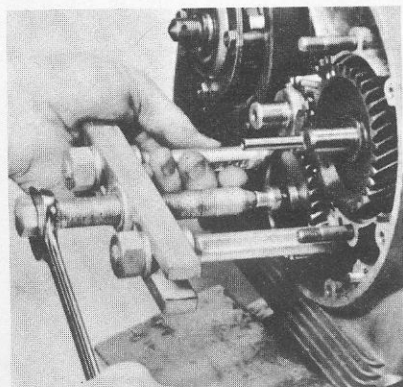
1963 223 lbs @ 1.12 in.

1964-68 265 lbs @ 1.12 in.

1969 and later 220 lbs @ 1.12 in.



Oil pump assembly.



Removing the oil pump drive gear.

8. Remove the scavenger line and gasket from 1963 and earlier models.

9. Remove the inner and outer covers, the upper gear (when looking at the pump

body from the outer cover side), the feed idler gear, the feed driving gear key and gear, and the idler gear.

10. Remove the O-ring from the inner cover, inspect the dowel pins for a worn or damaged condition, and remove them only if necessary.

INSPECTION

1. Clean all the parts in a suitable solvent and blow them dry, remembering to blow all the oil passages clear.

2. Inspect all the gears for a worn or damaged condition and replace them as necessary. Gears should be replaced in sets.

3. Inspect the remaining components for a worn or damaged condition and replace them as necessary.

ASSEMBLY

1. Assembly is basically the reverse order of disassembly.

2. Lightly oil all moving parts with clean engine oil before assembling them.

3. Press the new dowel pins into the pump body (if applicable).

4. Proceed in the following manner for all 1963 and earlier models:

a. Slip the upper gear and idler gear shafts into the upper hole on the outer cover side of the pump body.

b. Assemble the feed gear and key onto the idler gear shaft, and the feed idler gear shaft onto the scavenger gear shaft.

c. Assemble the inner and outer covers onto the pump body, then install the O-ring to the inner cover.

d. Position the scavenger line gasket then install the scavenger line.

e. Place the oil pump into position in the crankcase, making sure that the O-ring remains in position in the inner cover.

f. Hold the copper gaskets in place on either side of the scavenger line and assemble the scavenger line connection to the pump body without securing it.

g. Install the pump body bolts and new locks, then tighten them finger-tight before securing them in diagonal pairs.

5. Proceed in the following manner for all 1964 and later models:

a. Insert the upper and idler gear shafts into the outer cover, then position the inner cover over the shafts, taking care to correctly register the dowel pins.

b. Install the O-ring on the inner cover, and mount the pump in the crankcase with the pump body bolts and new locks.

6. Wipe the gear shaft and drive gear tapers clean, then install and secure the drive gear to the shaft with a nut and a new lock. The shaft can be kept from rotating by pressing down on one side of the driving gear.

7. Install the gearcase cover as described in the "Gearcase" section.

Harley-Davidson Singles

Fuel Systems

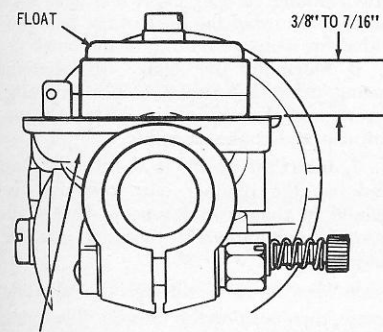
NOTE: For an operational theory, general inspection, and troubleshooting chart, refer to the "Carburetor" section under "General Information."

Carburetors

MODELS M-50 AND M-65

Disassembly (1965 Model)

1. Close the petcock and remove the fuel line at the carburetor.
2. Loosen the clamp screw and remove the silencer, clamp, air filter, and the filter gasket.
3. Remove the intake manifold clamp screw and pull and twist the carburetor free of the intake port.
4. Remove the mixing chamber cap screws, close the throttle, compress the throttle slide spring by hand, disengage the throttle cable from the throttle slide, then remove the pivot pin and the choke control lever and spring.
5. Remove the pivot screw and choke return spring, then remove the choke plate.
6. Remove the gas strainer cap screw, washer, and the strainer cap.
7. Remove the bowl cover screw, bowl, and bowl gasket. The float can now be removed by first removing the float lever pin and float needle.
8. Unscrew the main jet, then remove the idle speed adjusting screw and spring.



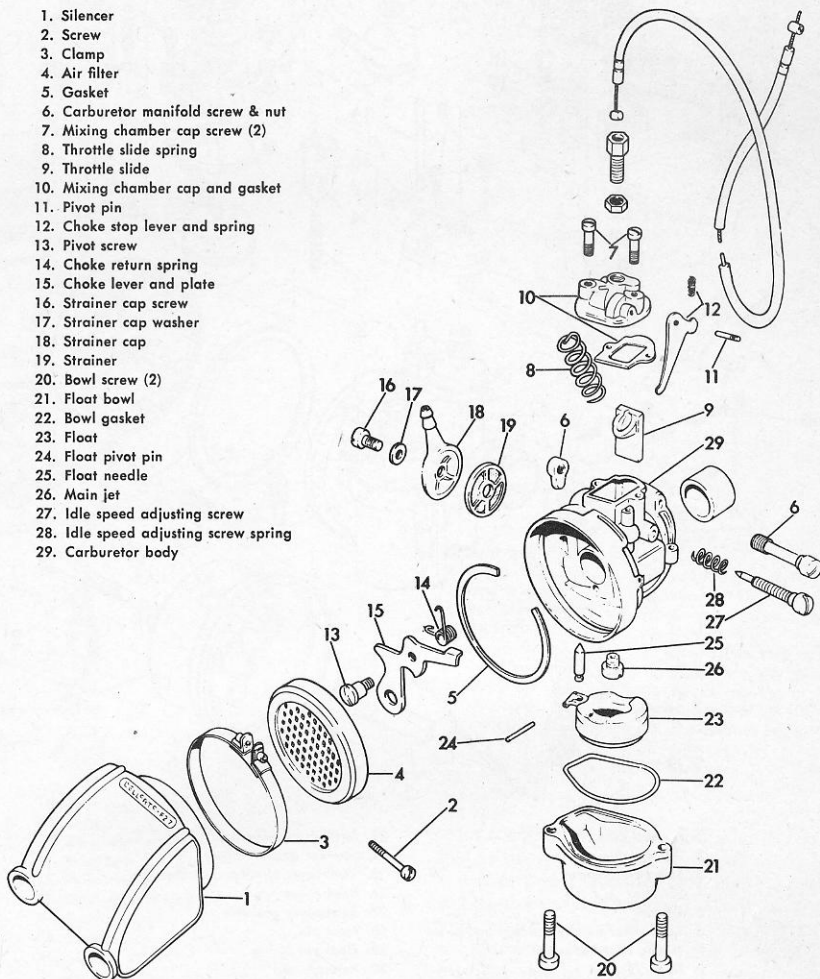
CARBURETOR

Checking the float level, M-50 and M-65.

Disassembly (1966 and Later Models)

1. Close the petcock and remove the fuel line at the carburetor.
2. Remove the silencer mounting screw, silencer, spacer and spring, air filter, and the silencer gasket but only if inspection of the gasket indicates that it should be replaced.
3. Loosen the manifold clamp screw and pull and twist on the carburetor until free.
4. Loosen the mixing chamber cap screws and pull the cap and throttle slide assembly free of the carburetor body.
5. Close the throttle, compress the throttle slide spring by hand, disengage the throttle cable from the slide fastener, unscrew the fastener from the slide, and remove the needle and retainer clip.

1. Silencer
2. Screw
3. Clamp
4. Air filter
5. Gasket
6. Carburetor manifold screw & nut
7. Mixing chamber cap screw (2)
8. Throttle slide spring
9. Throttle slide
10. Mixing chamber cap and gasket
11. Pivot pin
12. Choke stop lever and spring
13. Pivot screw
14. Choke return spring
15. Choke lever and plate
16. Strainer cap screw
17. Strainer cap washer
18. Strainer cap
19. Strainer
20. Bowl screw (2)
21. Float bowl
22. Bowl gasket
23. Float
24. Float pivot pin
25. Float needle
26. Main jet
27. Idle speed adjusting screw
28. Idle speed adjusting screw spring
29. Carburetor body



Carburetor assembly (1965 models), M-50 and M-65.

6. Remove the choke plate from the choke pin, push out the choke pin retainer clip, and remove the pin and pin spring.
7. Inspect the throttle cable adjusting screw and nut, and remove and replace them only if necessary.
8. Remove the gas strainer cap screw, cover, large and small strainer gaskets, strainer, bowl cover screws and washers, and then separate the cover from the gasket.
9. Remove the float retainer clip, float pin, pin spring, and float.
10. Unscrew the needle jet plug, remove the plug gasket, and remove the main nozzle.
11. Remove the pilot jet, main jet carrier, main jet, idle-speed adjusting screw and spring, throttle slide adjusting screw and spring, and the insulating bushing, only if it requires replacement.

Assembly

1. Assembly is basically the reverse order of disassembly with the following exceptions, which pertain to the 1965 model:
 - a. Position the float needle in the carburetor body, then insert the pivot pin

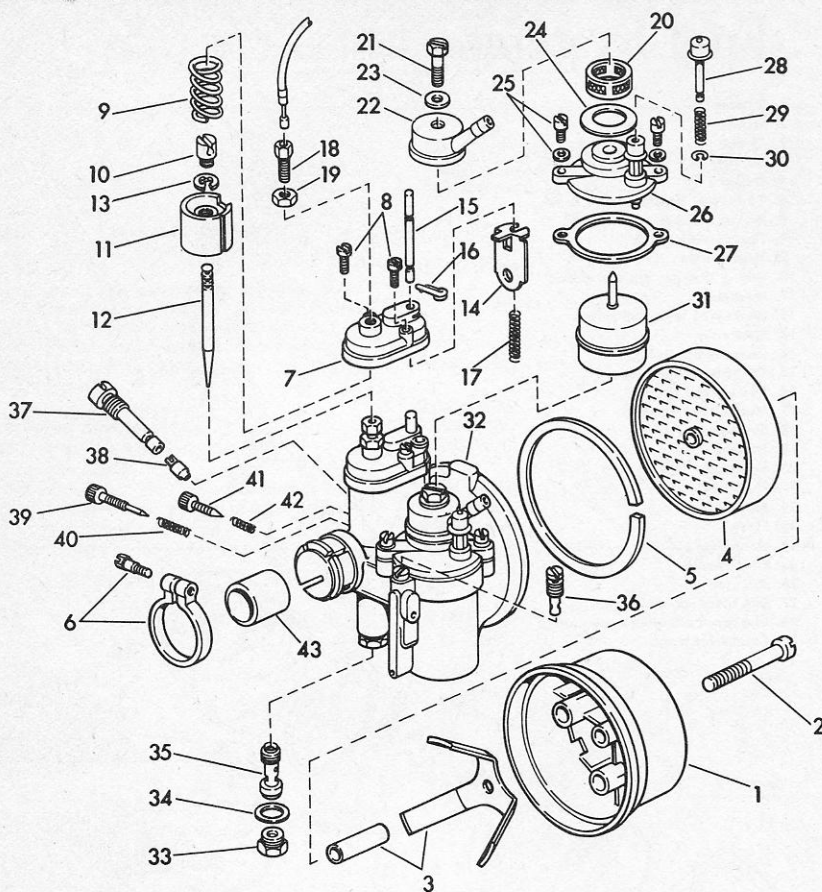
- b. Hold the carburetor so the float is up and resting on the float pin, then measure the distance from the float's top ridge to the bowl seat.
- c. If the above measurement is not within $\frac{3}{8}$ – $\frac{7}{16}$ in., the situation may be corrected by carefully bending the float tang slightly. If this doesn't correct the problem, the float or the needle or both may be damaged and in need of replacement.
2. Open the throttle and engage the cable sheath in the piston cap and the cable itself to the piston body, and then mount the piston cap on the carburetor body.
3. Install the carburetor on the intake manifold.
4. Adjust the throttle cable as described in the "Tune-Up" section.
5. Mount and secure the air cleaner and silencer assemblies.
6. Connect the fuel line to the carburetor and fuel tank.
7. Adjust the carburetor as described in the "Tune-Up" section.

MODELS M-125 AND M-100

Disassembly

1. Remove the air cleaner assembly.

Harley-Davidson Singles



- | | |
|----------------------------------------|-------------------------------------------|
| 1. Silencer cover | 23. Strainer gasket (small) |
| 2. Screw | 24. Strainer gasket (large) |
| 3. Spacer and spring | 25. Bowl cover screw and washer (2) |
| 4. Air filter | 26. Bowl cover |
| 5. Gasket | 27. Bowl cover gasket |
| 6. Carburetor manifold clamp and screw | 28. Float pin |
| 7. Mixing chamber cap | 29. Float pin spring |
| 8. Screw (2) | 30. Retainer clip |
| 9. Throttle slide spring | 31. Float |
| 10. Cable fastener | 32. Main body |
| 11. Throttle slide | 33. Needle jet plug |
| 12. Needle | 34. Needle jet plug gasket |
| 13. Retainer clip | 35. Needle jet |
| 14. Choke plate | 36. Pilot jet |
| 15. Choke pin | 37. Main jet carrier |
| 16. Retainer clip | 38. Main jet |
| 17. Choke pin spring | 39. Idle speed adjusting screw |
| 18. Cable adjusting screw | 40. Idle speed adjusting screw spring |
| 19. Cable adjusting nut | 41. Throttle slide adjusting screw |
| 20. Gas strainer | 42. Throttle slide adjusting screw spring |
| 21. Screw | 43. Insulating bushing |
| 22. Strainer cover | |

Carburetor assembly (1966 and later models), M-50 and M-65.

2. Close the petcock and disconnect the fuel line at the carburetor.

3. Close the throttle, depress the choke, unscrew the mixing chamber cap nut, and pull the throttle assembly free of the carburetor body.

4. With the throttle closed, compress the throttle slide spring, disengage the throttle cable from the slide, remove the needle retainer clip, needle, and the throttle slide spring.

5. Inspect the cable adjusting screw, nut, and the choke rod hair pin spring and remove them only if they are in need of replacement.

6. Remove the gas strainer cap, gas line fitting, strainer gaskets, strainer, bowl

cover screws and washers, and carefully pull the bowl straight down and away from the carburetor body.

7. Remove the bowl gasket, the float, float lever pivot screw, float lever, and the float needle. Remove the float pin locking from the bowl cover to remove the float pin and spring.

8. Unscrew the jet cap, remove the cap washer, unscrew the main jet, needle jet and the pilot jet.

9. Remove the throttle stop screw and nut, and the pilot air screw and spring.

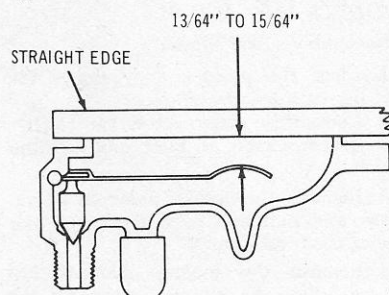
Assembly

1. Assembly is basically the reverse order of disassembly, but take note of the following exceptions.

2. Install the pilot jet in the carburetor body before installing the needle and the main jet.

3. Install the float needle in the bowl cover, engage the fingers of the float lever in the slot provided in the neck of the float needle, and insert the pivot screw through the pivot hole in the end of the float lever and into the bowl cover.

4. Check the float level in the following manner:



Checking the float level.

a. Invert the bowl cover and lay a straightedge across its face.

b. Measure the distance from the highest point of the float lever to the straightedge. Carefully bend the lever if necessary to bring the measurement within $\frac{13}{64}$ – $\frac{15}{64}$ in.

c. If repeated attempts to correct the level fails, either the lever, needle, or float are at fault, and one or more of these items will have to be replaced.

5. Assemble the float pin locking and the pivot screw, engage the float with the float lever, and mount the assembly in the bowl, taking care to insert the float shaft on the bottom of the float in the hole provided for it in the bottom of the bowl.

6. Assemble the choke rod hairpin spring, cable adjusting nut, cable adjusting screw, and the piston cap nut on the piston cap and choke assembly.

7. Insert the needle in the throttle slide and use the retainer clip to secure the needle in the desired groove. Unless abnormal carburetion is required, use the middle groove.

8. Slip the cable through the adjusting screw, then position the throttle slide spring on the cable.

9. Press down on the choke slide and position the throttle slide assembly on it. The cable can be secured in the slide once the spring is compressed by hand.

10. Mount the carburetor on the intake manifold.

11. Open the throttle handgrip and slip the throttle assembly in place in the carburetor body taking care to align the mixing chamber cap lug with the carburetor notch. Install and secure the mixing chamber cap nut.

12. Mount the fuel line and the air cleaner assembly.

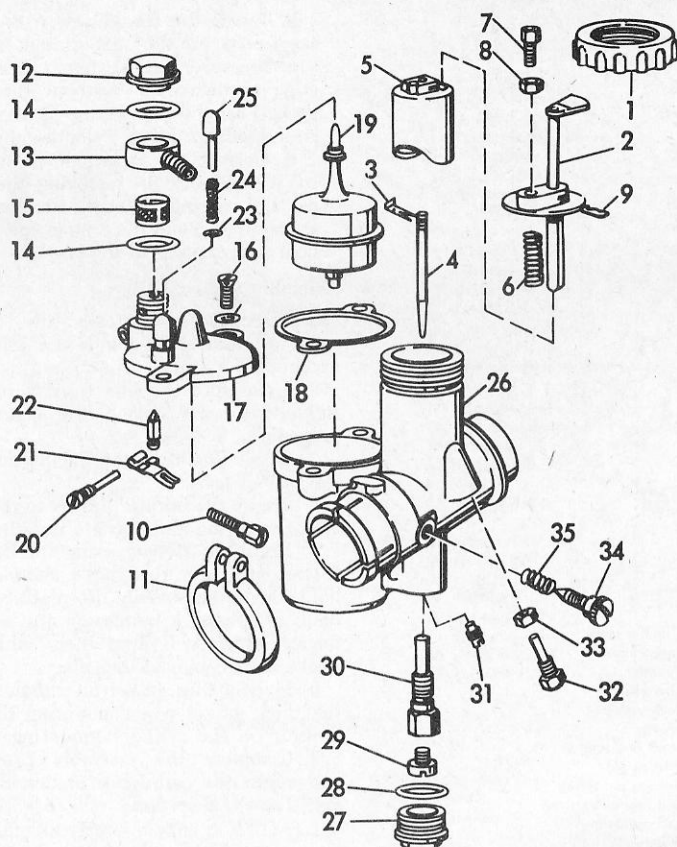
13. Adjust the carburetor as described in the "Tune-Up" section.

MODEL 165

Disassembly

1. Remove the carburetor cover and air cleaner assemblies.

Harley-Davidson Singles



- | | |
|------------------------------------------|-----------------------------------|
| 1. Mixing chamber cap nut | 18. Bowl gasket |
| 2. Mixing chamber cap and choke assembly | 19. Float |
| 3. Needle retainer clip | 20. Float lever pivot screw |
| 4. Needle | 21. Float lever |
| 5. Throttle slide | 22. Float needle |
| 6. Throttle slide spring | 23. Float pin lock ring |
| 7. Spring adjusting screw | 24. Float pin spring |
| 8. Spring adjusting nut | 25. Float pin |
| 9. Choke rod hairpin spring | 26. Body |
| 10. Intake pipe clamp screw | 27. Jet cap |
| 11. Intake pipe clamp | 28. Washer |
| 12. Gas strainer cap | 29. Main jet |
| 13. Gas line fitting | 30. Needle jet |
| 14. Gas strainer gasket (2) | 31. Pilot jet |
| 15. Gas strainer | 32. Throttle slide stop screw |
| 16. Bowl cover screw and washer (2) | 33. Throttle slide stop screw nut |
| 17. Bowl cover | 34. Pilot air screw |
| | 35. Pilot air screw spring |

Carburetor assembly, M-125 and M-100.

2. Shut the petcock and disconnect the fuel line at the carburetor inlet connection.

3. Unscrew the carburetor cap and pull on the throttle cable to remove the slide cap, spring, slide, slide needle retainer, and the needle as an assembly.

4. Close the throttle at the handgrip, squeeze the slide and cap together, and disengage the cable from the slide by carefully prying it free with a small, flat screwdriver. The assembly is now free to be disassembled.

5. Loosen the mounting screw and remove the carburetor body from the intake manifold along with the carburetor gasket, bushing, and insulator.

6. Remove the jet holder, needle jet, and gasket from the bottom of the carburetor body using a suitable socket or open-end wrench only. If inspection indicates the need for replacement or special attention, the main jet can be removed from the

holder with a suitably sized screwdriver.

7. Remove the bowl cover screws, cover, float, and also remove the float needle from the float.

8. Inspect the float needle seat. Remove and replace it only if necessary.

9. Remove and replace the float primer cotter pin, and remove the float primer spring, and the primer pin if inspection indicates the need for replacement.

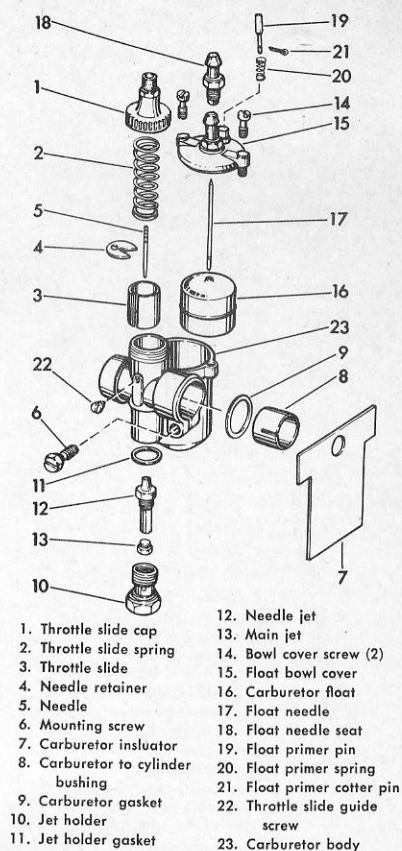
10. The throttle slide guide screw can be removed from the carburetor if so desired.

Assembly

1. Assembly is basically the reverse order of disassembly, with certain exceptions.

2. Insert the float needle in the float and install the assembly in the float bowl.

3. Mount the bowl cover on the carburetor body so the primer pin is away



- | | |
|-----------------------------------|--------------------------------|
| 1. Throttle slide cap | 12. Needle jet |
| 2. Throttle slide spring | 13. Main jet |
| 3. Throttle slide | 14. Bowl cover screw (2) |
| 4. Needle retainer | 15. Float bowl cover |
| 5. Needle | 16. Carburetor float |
| 6. Mounting screw | 17. Float needle |
| 7. Carburetor insulator | 18. Float needle seat |
| 8. Carburetor to cylinder bushing | 19. Float primer pin |
| 9. Carburetor gasket | 20. Float primer spring |
| 10. Jet holder | 21. Float primer cotter pin |
| 11. Jet holder gasket | 22. Throttle slide guide screw |
| | 23. Carburetor body |

Carburetor assembly, Model 165.

from the slide cap. The float needle should seat in the needle seat.

4. Position the carburetor gasket, bushing, and insulator on the carburetor body and mount the carburetor to the carburetor mounting flange. The slotted end of the bushing should be up and toward the cylinder.

5. Slip the needle retainer into the proper groove in the needle.

6. Complete the assembly of the throttle components and adjust the carburetor as described in the "Tune-Up" section.

B-MODELS

Disassembly

1. Remove the air cleaner assembly (if applicable), disconnect the throttle cable at the carburetor, shut the petcock, disconnect the fuel line at the carburetor, and remove the carburetor from the cylinder mounting flange.

2. Remove the thin and heavy carburetor-to-cylinder gaskets, the bowl cover screws and lockwashers, and the bowl cover and gasket.

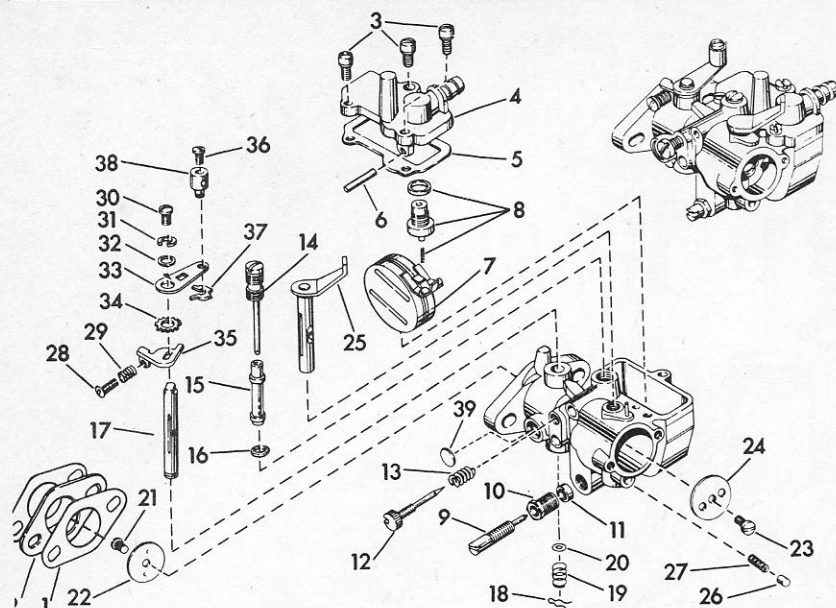
3. Free the float by pressing the float pin free of the cover, then remove the inlet needle, seat, spring, and gasket with a screwdriver that has a thick blade.

4. Unscrew the main adjusting screw and remove the packing nut and packing.

5. Remove the idle adjusting screw, spring, idle tube, nozzle, and the nozzle gasket, which may have to be pried out and replaced.

6. Inspect the throttle shaft and bearing assembly for signs which would indicate

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- | | |
|-------------------------------------------|----------------------------------------------------|
| 1. Carburetor to cylinder gasket—thin (2) | 21. Throttle shutter screw and lock washer |
| 2. Carburetor to cylinder gasket—heavy | 22. Throttle shutter |
| 3. Bowl cover screw and lock washer (3) | 23. Choke shutter screw and lock washer |
| 4. Bowl cover | 24. Choke shutter |
| 5. Bowl cover gasket | 25. Choke shaft and lever |
| 6. Float lever pin | 26. Choke friction pin |
| 7. Carburetor float | 27. Choke friction pin spring |
| 8. Inlet needle, spring, seat and gasket | 28. Idle speed regulating screw |
| 9. Main adjusting screw | 29. Idle speed regulating screw spring |
| 10. Main adjusting screw packing nut | 30. Throttle lever retaining screw |
| 11. Main adjusting screw packing | 31. Throttle lever retaining lock washer |
| 12. Idle adjusting screw | 32. Throttle lever retaining washer |
| 13. Idle adjusting screw spring | 33. Throttle lever |
| 14. Idle tube | 34. Throttle lever spring lock washer |
| 15. Carburetor nozzle | 35. Throttle stop lever |
| 16. Nozzle gasket | 36. Throttle wire retaining screw |
| 17. Throttle shaft | 37. Throttle wire connection retaining clip washer |
| 18. Throttle shaft retaining clip | 38. Throttle wire connection |
| 19. Throttle shaft spring | 39. Channel welch plug |
| 20. Throttle shaft seal | |

Carburetor assembly, B Models.

the need for replacement, and remove them if necessary in the following manner:

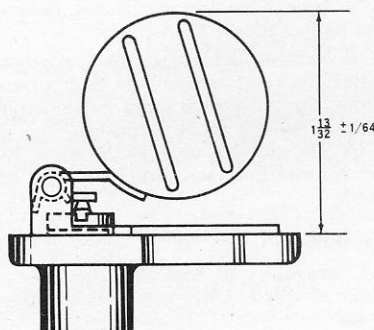
- Pry the throttle shaft retaining clip free of its groove on the shaft and remove the shaft spring, seal, shutter screw, and shutter. The shaft is now free to be removed from the carburetor body.
- If the choke shaft is to be removed, take care not to lose the friction pin and spring by holding your thumb over them while withdrawing the shaft.

Inspection

- Clean all parts other than the gaskets and float in a suitable solvent and blow them dry, taking care to blow all the passages clear. Do not attempt to scrape deposits off with metal instruments.
- To inspect the idle mixture discharge ports, the welch plug will have to be removed by carefully punching a small, shallow hole in the plug at a point near the rim, and then prying the plug free. When installing a new plug, do so with a suitably sized drift, taking care to make it a tight fit.
- Inspect all the parts for a worn, scored, grooved, or otherwise damaged condition, and replace them as necessary.

If the tip of the inlet needle is not in good condition, the fuel level will not be correct. If the throttle or choke shaft bearings are worn or damaged, air leakage will occur which causes rough idling.

- Inspect the gaskets and float for a worn, damaged, or gas-logged condition, and replace them as necessary.
- Check the float level in the following manner:



Checking the float level, B Models.

- Assemble the float lever pin, float, inlet needle, spring, seat, and gasket to the bowl cover.

- Invert the float bowl so the lever tang rests on the seated inlet needle.
- Measure the distance from the edge of the cover (without the cover gasket) to the top of the float with a straightedge ruler or a depth gauge.
- Correct the measurement to $1\frac{13}{32}$ in. if necessary by removing the lever pin and carefully bending the float tang as required. Bend the tang evenly so the float sits squarely in the bowl.

Assembly

- Assembly is basically the reverse order of disassembly, with the following exceptions.
- Make sure the idle tube is securely tightened down during the installation procedure.
- Check the float for free-motion and the correct level.
- Secure the throttle shutter to the shaft after the spring and clip are installed.
- Insert the friction spring and then the friction pin into the choke channel and hold them temporarily in place with a dab of grease, a match, or any suitable device which will hold them while the choke shaft is moved into place.
- Place a thin gasket on either side of the thick gasket when mounting the carburetor on the cylinder mounting flange.
- Complete the assembly procedure and adjust the carburetor as described in the "Tune-Up" section.

X-90, Z-90, SR-100, TX/SX 125

Disassembly

- Turn the fuel petcock to the off position, and disconnect the fuel line from the petcock.
- Remove the air cleaner and the air cleaner housing.
- Loosen the intake manifold clamp, and using a twisting motion pull the carburetor off from the rear.
- Remove the two screws from the carburetor cover, and remove the cover and slide assembly.
- Disconnect the throttle cable from the throttle slide. Remove the throttle slide, return spring, cover gasket, and carburetor cover from the cable.
- Remove the screw from the center of the inlet fitting and the gasket beneath it. Remove the inlet fitting, fitting gasket, and fuel filter screen.
- Remove the choke valve assembly and the O-ring beneath it.
- Remove two float bowl screws, and remove the float bowl and gasket.
- Remove the float pivot pin. Withdraw the float, and the float needle.
- Remove the main jet, needle jet, pilot jet, and the starter jet.
- Remove the idle speed and idle mixture adjusting screws and their springs.

Assembly

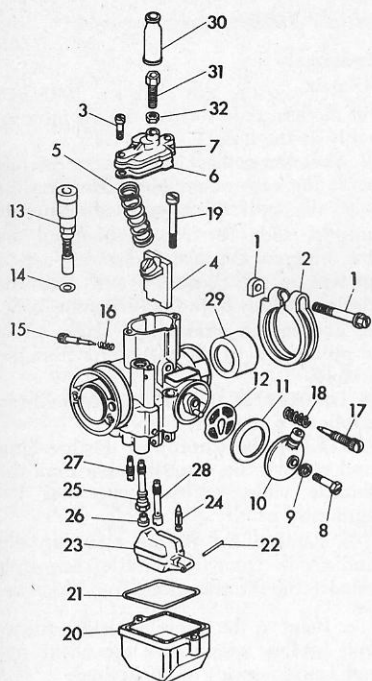
- Assembly is the reverse of disassembly.

SS/SX 175/250

Disassembly

- Turn the fuel petcock to the off position and disconnect the fuel line from the petcock.

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Carburetor assembly, X-90, Z-90, SR-100, TX/SX-125

2. Remove the air filter assembly.
3. Loosen the intake manifold clamp and using a twisting motion pull the carburetor off from the rear.

4. Remove the two screws from the carburetor cover, and remove the cover along with the slide assembly.

5. If the slide assembly is not in need of servicing, it may be placed in a plastic bag secured around the throttle cable with a rubber band, and placed out of the way. If the slide is to be disassembled, disengage the cable from the slide and remove the slide, return spring, and carburetor cover from the slide. The needle can be removed from the slide if necessary. If the needle is removed be sure to note which groove the retainer clip was located in so that it can be installed in the same groove unless tuning changes have been made.

6. Remove the screw from the center of the inlet fitting and the gasket beneath the screw. Remove the inlet fitting and the filter screen beneath it.

7. Remove the idle speed and idle mixture adjusting screws and the spring behind them. On some models there is a washer and a O-ring behind the screws, take care that if fitted they are not lost.

8. Remove the retaining screw, and pull the choke assembly from the carburetor.

9. Remove the nut from the bottom of the float bowl. On SS/SX 175 models the main jet is removed with this nut. Remove the float bowl.

10. On SS/SX 250; remove the main jet and the main jet holder.

11. Remove the float pivot pin, and remove the float and the float needle. On SS/SX 250 models, unscrew the float needle seat and remove the washer beneath it.

12. Remove the starting jet, needle jet, and the pilot jet.

1. Manifold clamp screw and nut
2. Manifold clamp
3. Carburetor cover screw (2)
4. Throttle slide
5. Throttle slide spring
6. Cover gasket
7. Carburetor cover
8. Screw
9. Washer
10. Inlet fitting
11. Gasket
12. Fuel filter
13. Choke valve assembly
14. O-ring
15. Idle mixture screw
16. Idle mixture screw spring
17. Idle speed adjusting screw
18. Idle speed adjusting screw spring
19. Float bowl screw (2)
20. Float bowl
21. Gasket
22. Float pivot pin
23. Float
24. Float needle
25. Needle jet
26. Main jet
27. Pilot jet
28. Starting jet
29. Insulating sleeve
30. Cable adjuster
31. Lock nut

Assembly

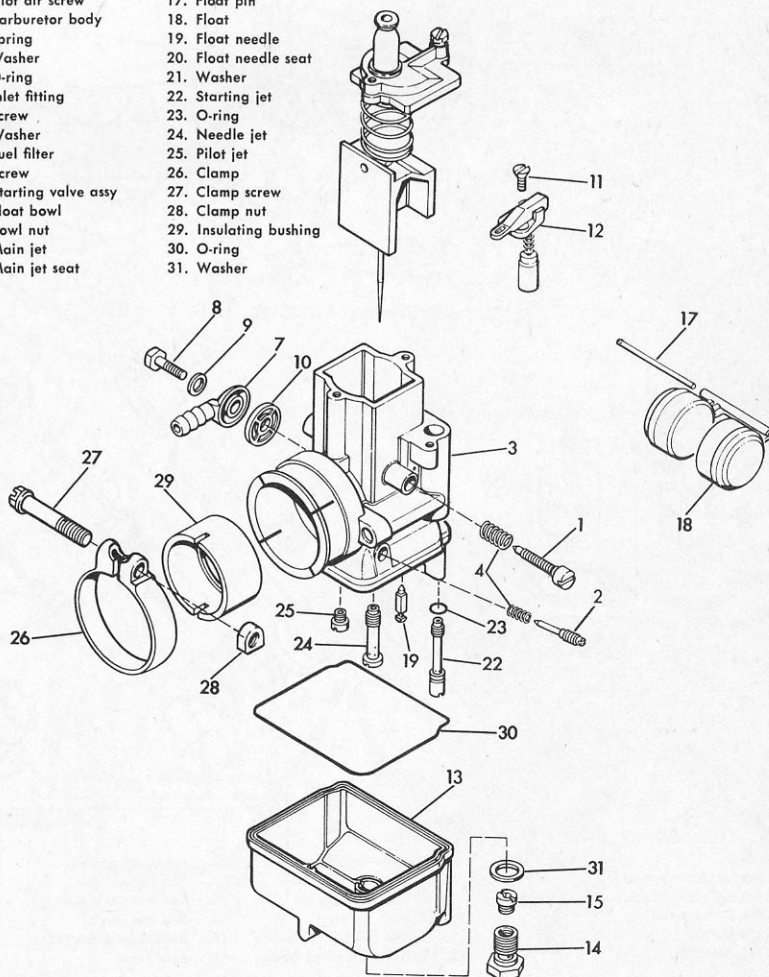
1. Assembly is the reverse of disassembly, note the following:

a. The float level should be checked and corrected if necessary. The float level is measured between the top of each of the floats and the float bowl mating surface of the carburetor body with the float needle seated. The correct measurement is 0.925-0.965 in. (23.5-24.5 mm) for 175 models or 0.689-0.728 in. (17.5-18.5 mm) for 250 models. A special tool (H-D part no. 97362-74P) is made especially to check the float level on these models although a short steel rule or vernier calipers can also be used. If the float level is incorrect, bend only the float tang to correct adjustment. Make sure that both floats are the same height.

b. Slip the needle into the throttle slide, and engage the retainer clip in the desired groove of the needle. The middle groove is used normally.

c. Run the throttle cable through the rubber boot, adjusting screw, and throttle slide spring, then compress the spring by hand and insert the cable into the throttle slide. When installing the throttle slide into the carburetor bore be sure that the cutaway portion of the slide is facing the air cleaner.

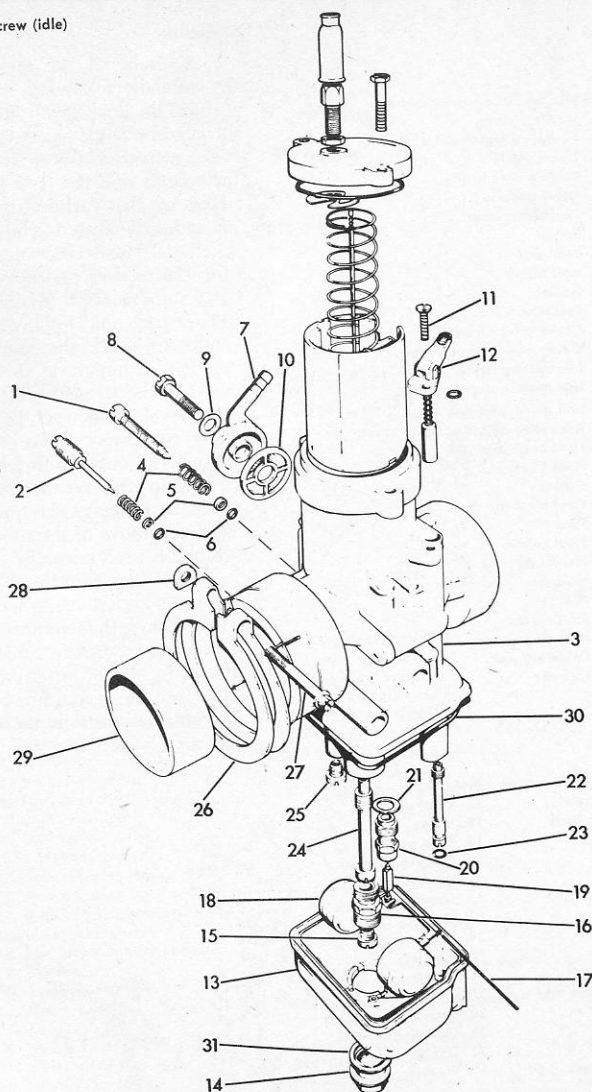
1. Throttle slide stop screw (idle)
2. Pilot air screw
3. Carburetor body
4. Spring
5. Washer
6. O-ring
7. Inlet fitting
8. Screw
9. Washer
10. Fuel filter
11. Screw
12. Starting valve assy
13. Float bowl
14. Bowl nut
15. Main jet
16. Main jet seat
17. Float pin
18. Float
19. Float needle
20. Float needle seat
21. Washer
22. Starting jet
23. O-ring
24. Needle jet
25. Pilot jet
26. Clamp
27. Clamp screw
28. Clamp nut
29. Insulating bushing
30. O-ring
31. Washer



Carburetor assembly, SS/SX-175

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1. Throttle slide stop screw (idle)
2. Pilot air screw
3. Carburetor body
4. Spring
7. Inlet fitting
8. Screw
9. Washer
10. Fuel filter
11. Screw
12. Starting valve assy
13. Float bowl
14. Bowl nut
15. Main jet
17. Float pin
18. Float
19. Float needle
22. Starting jet
23. O-ring
24. Needle jet
25. Pilot jet
26. Clamp
27. Clamp screw
28. Clamp nut
29. Insulating bushing
30. O-ring
31. Washer



Carburetor assembly, SS/SX-250

SPRINT MODELS

Disassembly

1. Remove the gas tank on 1967 and later models, then remove the air filter assembly or the hose.

2. Shut the petcock, disconnect the fuel line at the carburetor, push down on the choke (if applicable), open the throttle handgrip, slide the rubber boot up the cable, unscrew the mixing chamber cap or cap screws and washers, and pull the throttle assembly from the carburetor body.

3. Loosen the intake pipe clamp screw and pull and twist the carburetor from the manifold.

4. Disassemble the throttle assembly in the following manner:

a. Close the throttle at the handgrip and remove the throttle cable from the throttle slide while compressing the spring by hand.

b. Remove the needle retaining clip and needle from the throttle slide, then remove the throttle spring from the slide.

c. Remove the cable adjusting screw, nut, friction spring, and the choke rod rod hairpin spring if so desired.

5. Disassemble the float bowl assembly on 1968 and earlier models in the following manner:

a. Remove the gas strainer cap, gaskets, and the strainer.

b. Remove the bowl cover screws and also the cover and gasket.

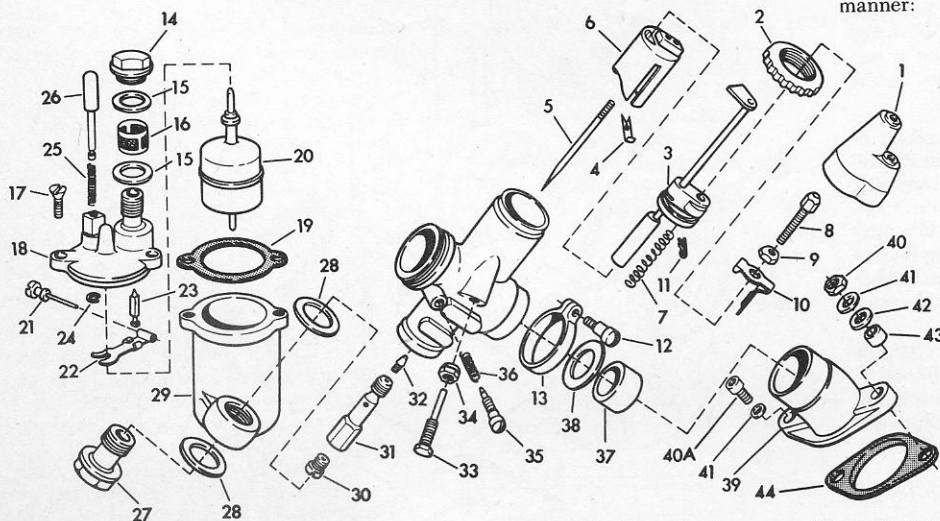
c. Remove the float, float lever pivot screw, lever, and float valve.

d. Remove the float pin locking, then remove the float pin and spring.

e. Remove the bowl connection cap, bowl, and the fiber washers.

6. Disassemble the 1969 and later-model float bowl by removing the bowl nut, the main jet, and the nut gasket, then remove the bowl and the O-ring gasket.

7. Disassemble the carburetor body on 1968 and earlier models in the following manner:



25. Float pin spring
26. Float pin
27. Bowl connection cap
28. Fiber washers (2)
29. Float bowl
30. Main jet
31. Needle jet
32. Pilot jet
33. Throttle slide stop screw
34. Throttle slide stop screw nut
35. Pilot air screw
36. Pilot air screw spring
37. Insulating bushing
38. Insulating washer
39. Manifold
40. Nut (2) 1966 and earlier
- 40A. Screw (2) 1967 to 1968
41. Washer (2)
42. Insulator washer (2)
43. Insulator bushing (2)
44. Manifold gasket

1. Boot
2. Mixing chamber cap nut
3. Mixing chamber cap and choke assembly
4. Needle retainer clip
5. Needle
6. Throttle slide

7. Throttle slide spring
8. Cable adjusting screw
9. Cable adjusting nut
10. Friction spring
11. Choke rod hairpin spring
12. Intake pipe clamp screw
13. Intake pipe clamp
14. Gas strainer cap
15. Gas strainer gasket (2)
16. Gas strainer
17. Bowl cover screw (2)
18. Bowl cover
19. Bowl gasket
20. Float
21. Float lever pivot screw
22. Float lever
23. Float needle
24. Float pin locking

Carburetor assembly (1968 and earlier Sprint Models).

Harley-Davidson Singles

a. Remove the main jet, needle jet, and the pilot jet.

b. Remove the throttle slide stop screw, nut, pilot air screw, spring, and the insulating bushing and washer.

8. Disassemble the 1969 and later-model carburetor in the following manner:

a. Remove the float lever pivot pin, float, and the float needle.

b. Remove the needle jet, pilot and starting jets, starting jet O-ring, starting valve and lever assembly screw, assembly, inlet fitting screw, washer, fitting, and inlet screen.

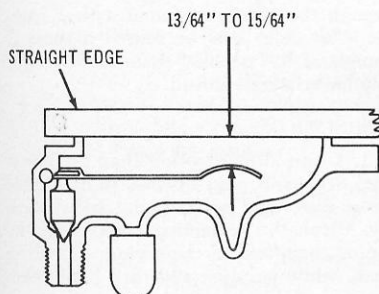
c. Remove the throttle slide stop-screw, the pilot air screw, and their respective springs.

Assembly

Assembly is basically the reverse order of disassembly with the following exceptions:

1. Install the pilot jet, needle jet, and the main jet, in that order, on 1968 and earlier models.

2. Insert the float needle into the bowl cover, and engage the fingers of the float lever with the neck of the float needle, then slip the pivot screw through the pivot hole in the float lever and insert the screw and lever into the bowl cover, on 1968 and earlier models.



Checking the float level, 1968 and earlier Sprint models

3. Check the float level on 1968 and earlier models in the following manner:

a. Invert the bowl cover and lay a straightedge across the cover's face.

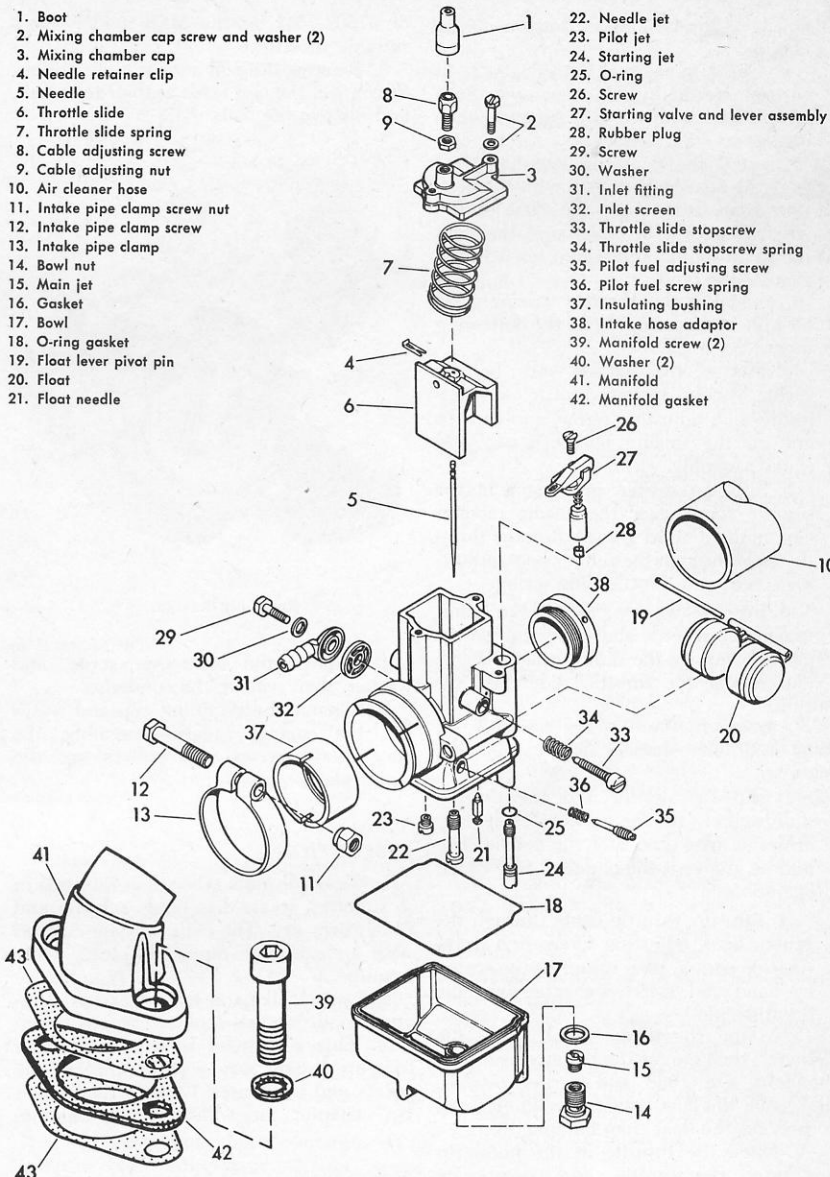
b. Measure the distance from the straightedge to the highest point on the float lever.

c. If the distance is not within $\frac{13}{64}$ – $\frac{15}{64}$ in., the lever can be bent to compensate for the difference if care is taken to bend it evenly. If repeated attempts to get within the specified limits fail, either the lever or the needle is faulty and must be replaced.

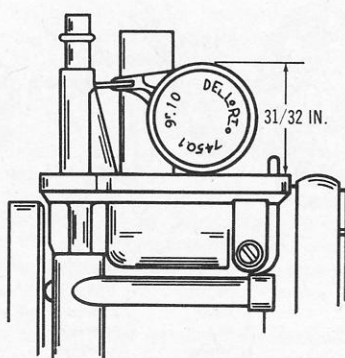
4. Check the float level on 1969 and later models in the following manner:

a. Measure the distance from the top of both of the floats to the gasket surface when the inlet valve is seated. The distance should be $\frac{31}{32}$ in. and is best measured with Carburetor Float Gauge (H-D part no. 94751-69) although substitute gauges may easily be made from cardboard or balsa.

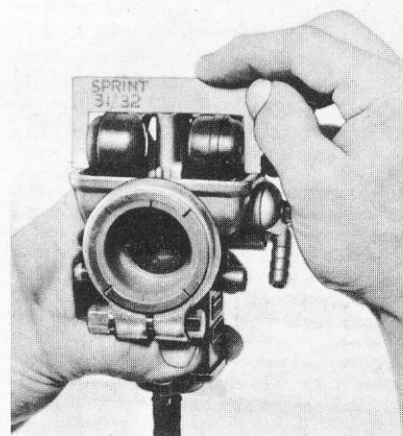
b. If the distance is not within specifications, place the float on a flat surface



Carburetor assembly (1969 and later Sprint Models).



Checking the float level, 1969 and later Sprint models



Harley-Davidson Singles

and bend the tang up or down as necessary.

c. Check to see that both floats are at an even height by seeing whether both are parallel with the pin support when resting on a flat surface.

5. Install the float pin locking, then engage the float lever fingers with the neck of the float and mount the float in the bowl, taking care to make sure the float shaft sits in the hole provided for it in the bottom of the bowl.

6. Assemble the throttle assembly on 1968 and earlier models in the following manner:

a. Mount the choke rod hairpin spring, friction spring, throttle cable adjusting nut, adjusting screw, and the cap nut on the mixing chamber cap and choke assembly.

b. Slip the needle into place in the throttle slide, place the needle retainer clip on the desired groove. Run the throttle cable through the rubber boot, adjusting screw, and throttle slide spring.

c. Push down on the choke slide, mount the throttle slide assembly on the cable, compress the slide spring by hand, and mount the throttle slide onto the cable.

7. Assemble the throttle assembly on 1969 and later models in the following manner:

a. Slip the needle into the throttle slide, and engage the needle retainer clip in the desired groove of the needle. The middle groove is the one used for normal operation.

b. Run the throttle cable through the rubber boot, adjusting screw, and throttle slide spring, then compress the spring by hand and insert the cable into the throttle slide.

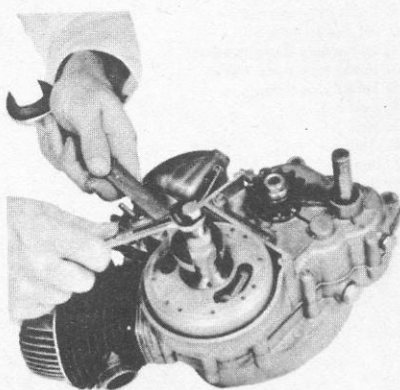
8. Mount the intake manifold on the cylinder, then mount the carburetor on the manifold. On 1968 and earlier models, make sure the float bowl is absolutely level to prevent the float from hanging up.

9. Open the throttle at the handgrip and insert the throttle slide assembly in the carburetor body. Make sure the slide is free and operating smoothly before securing the piston cap.

10. Mount the fuel line and air cleaner assembly, then adjust the carburetor as described in the "Tune-Up" section.

or 97302-70M for the MSR models) or a suitable substitute.

3. Remove the coil screws and washers, disconnect the coil leads at their terminals, and remove the coils.



Removing the rotor.

4. Remove the condenser screw and washer, then remove the condenser.

5. Remove the retaining clip and washers, the contact breaker assembly, the stator plate screws and washers, and the stator plate.

INSPECTION

1. Clean all parts other than the coils in a suitable grease-dissolving solvent and blow them dry. The coils may be cleaned with a clean cloth dipped in clean, white gasoline.

2. Inspect all parts for a worn or damaged condition and replace them as necessary. This is a good time to perform a tune-up so you may want to replace the points and condenser. Consult the "Tune-Up" chapter for additional information.

ASSEMBLY

1. Assembly is in the reverse order of disassembly.

2. Check the moving parts for a smooth, free operation.

Generator (Model 165)

DISASSEMBLY

1. Remove the generator cover.

2. Remove the brush spring clips, springs, insulators, and the frame mounting screws, and pull the frame clear of the armature.

3. Remove the armature mounting screws and lockwashers, and remove the contact breaker cam by tapping gently on its sides with a soft mallet.

4. Remove the armature from the flywheel shaft using Generator Armature Puller (H-D part no. 95900-48) or a suitable substitute. If you don't have the correct tool, consult your dealer for assistance as the armature is easily damaged. Remove the sprocket shaft key from the flywheel shaft.

5. Disconnect the red and green wires in the cable from the fiber terminal block.

6. Disconnect the brush leads and remove the brushes, then disconnect the black wire at the contact point terminal.

7. Remove the contact breaker and condenser if so desired. This is an excellent time to consider replacing these parts.

8. Inspect the pole shoes and field coils for a worn or damaged condition and remove them only if replacement is necessary. The shoes may be removed by sharply striking the portion which extends through the generator frame with a hammer. The shoes may be reused if there is enough of the peening material left after they have been removed.

INSPECTION

1. Clean all parts other than the armature, field coils, and brushes in a suitable grease-dissolving solvent and blow them dry. Clean the remaining components by wiping them with a clean cloth dipped in clean, white gasoline and then blow them dry.

2. Inspect the insulators, armature windings, field coil wrappings, and the surfaces of the pole shoes nearest the armature for a worn or damaged condition and replace them as necessary.

3. Inspect the brushes for a worn or damaged condition and compare them

Electrical System

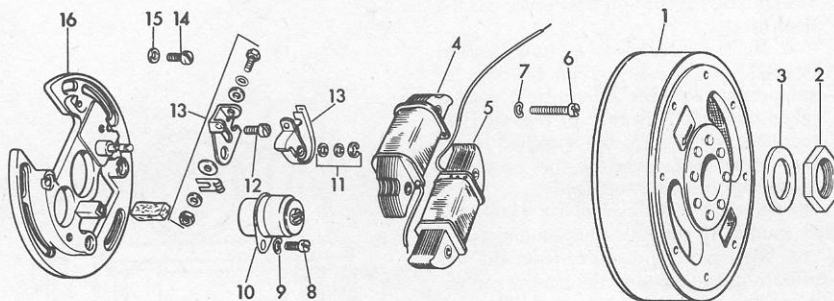
Magneto-Generator

M-MODELS, SR-100, SX/TX 125, X-90, Z-90

DISASSEMBLY

1. Remove the left crankcase side cover as described in the "Starter" section.

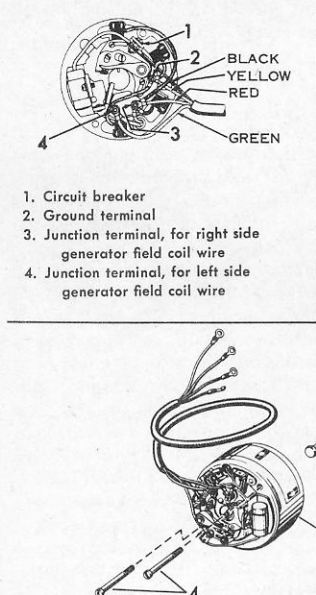
2. Remove the rotor shaft nut and washer, then pull the rotor free with Magneto Rotor Puller (H-D part no. 97344-65P



Magneto-Generator assembly (M Models).

- | | | |
|--------------|-----------------------------|------------------------------|
| 1. Rotor | 7. Washer (4) | 12. Screw |
| 2. Nut | 8. Screw | 13. Contact breaker assembly |
| 3. Washer | 9. Washer | 14. Screw (3) |
| 4. Coil | 10. Condenser | 15. Washer (3) |
| 5. Coil | 11. Retaining clip, washers | 16. Stator plate |
| 6. Screw (4) | | |

Harley-Davidson Singles



Generator assembly (Model 165).

- | | | |
|-------------------------------|-----------------------------|-----------------------------|
| 1. Brush spring clip (4) | 7. Lockwasher | 14. See item 11 |
| 2. Brush spring (4) | 8. Circuit breaker cam | 15. See item 11 |
| 3. Brush spring insulator (4) | 9. Armature | 16. Field coil wire grommet |
| 4. Frame mounting screw (2) | 10. Sprocket shaft key | 17. Pole shoe (6) |
| 5. Generator frame | 11. Generator brush (4) | 18. South field coil (3) |
| 6. Armature mounting screw | 12. See item 11 | 19. North field coil (3) |
| | 13. Brush wire ground screw | |

with new brushes, if possible, to determine their wear. Replace them if necessary.

4. Inspect the brush holder plate for a warped, burned, loose, or otherwise damaged condition and replace them if necessary in the following manner:

- Remove the heads by chiseling off the plate rivet heads and drifting the rivets free.
- Remove the brush holder plate from the generator frame.
- Drill four holes in the new plate using a no. 20 bit, then tap four corresponding holes into the frame with an $\frac{5}{32}$ in. tap.
- Mount and secure the new plate to the frame with four screws and lockwashers (H-D parts no. 2626 and 7115) or suitable substitutes.
- Take care not to damage the pole shoes and not to allow the screws to contact the shoes. If necessary, use additional lockwashers to keep the screws away from the shoes.
- Inspect the cam fiber follower for a worn or damaged condition and replace it if necessary by knocking out the old part and riveting in a new one. Always keep the felt portion clean and lightly oiled with clean engine oil.
- Inspect the coils for a worn or damaged condition and replace them as necessary in the following manner:

- When installing the field coils, there must be a north ("N") coil to the left of the coil lead hole in the generator frame when the frame is held so the engine side is up and the coil lead hole is to the near side of the frame. Coils are mounted in opposite pairs of "N" and "S," and the coils adjacent to one an-

other must also be opposites. (Consult the accompanying illustration for the proper positioning.) North coils may be identified by the white swatch of paint. South coils may be identified by their red marking.

- Hold a south coil with the concave side up and the leads pointing away. Slip a yellow insulator over the left-side lead then solder the wire tip of the right-side lead to the connector of the left lead.

- Perform the above operation on a north coil in the same manner except that the insulator and connector are on the right-side lead.

- Place the south coil to the right of the generator frame coil lead hole.

- Place a north coil, without an insulator or connector, with a shoe in the frame shoe slot directly to the right of the south coil of step "d."

- Continue to install coils in an alternating order (the next one will be a south coil) so the last coil—the north coil prepared in step "c"—sits to the left of the generator frame coil lead hole.

- Place insulation under the coils where the frame mounting screws pass so they don't short out against the frame; use the mounting screws as guides.

- Secure a length of $2\frac{1}{4}$ in. outside diameter (OD) pipe horizontally in a vise, then slip the generator frame, complete with coils and shoes, over the pipe as far as is necessary to completely support the frame shoes.

- Tap the frame down around the shoes with a $\frac{1}{4}$ in. chisel ground to a dull edge until it bottoms on the shoe shoulders. After each shoe is seated, stake the

shoe corners over the generator frame with the chisel, then peen the entire shoe surface of each shoe with a ball peen hammer. Use only as much force as is necessary, and use a light hammer to avoid using excessive force.

- Inspect the fit of the armature in the frame. If the clearance is less than 0.014 in. (0.007 in. per side) check to see that all of the shoes are well seated. If this was not the problem, the shoes will have to be carefully bored until the clearance is correct.

- Check each coil for proper current draw and ground as described in the "Component Testing and Repair" section of this section before twisting the coil ends together, then connect the coils in one of the following manners:

- Twist the adjacent leads together, clip them off at a point $\frac{1}{2}$ in. beyond the edge of the generator frame, and fuse the wires together with a blow torch. (This is the preferred method.)

- Scrape the coil leads until the varnish is removed, twist the adjacent leads together, and solder the connections.

- Bend the coil leads back between the coils taking care to keep them from touching the generator frame. Install a rubber grommet over the leads and press them all into the frame hole.

- Slip the coil leads onto their respective terminal posts mounted on the insulated terminal strip, taking care not to cross any of the leads.

- Perform the final field coil polarity test in the following manner:

- Connect wires from the positive terminal of a 6 V battery to the south coil post, and from the negative terminal to the north coil post.

- Hold a compass outside the generator frame near the pole shoe of the coil to be tested and observe the reaction of the compass. The south needle of the compass will swing toward the pole shoe if the coil is a south coil.

ASSEMBLY

- Assembly is basically the reverse order of disassembly.

- Secure the sprocket shaft key and install the armature.

- Gently tap the contact breaker cam until it begins to seat, then secure it with the lockwasher and armature mounting screw.

- Mount a dial indicator to the crankcase and check the armature run-out. If the run-out exceeds 0.002 in., the brushes will act erratically at high speeds, causing excessive heat and the damage that is associated with it. The run-out may be reduced by drifting the armature with a small hammer and a suitable brass drift, then recheck the run-out.

- Check the breaker cam run-out at the portion of the cam nearest the armature (the concentric portion). If the run-out exceeds 0.002 in., it may be reduced by drifting it as you did the armature. Recheck the run-out after drifting the cam.

- Place a small dab of grease on the cam, and lightly oil the felt cam follower

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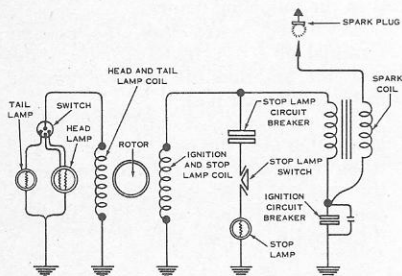
with a small drop of clean engine oil, then assemble the generator frame.

7. Install the brush spring insulators, springs, and spring clips, reconnect the wires as depicted on the wiring diagrams, tune the engine as described in "Tune-Up," and install the generator and sprocket cover.

Magneto-Generator (B Models)

DISASSEMBLY (ALL MODELS OTHER THAN THE BTF)

1. Remove the right side cover.
2. Carefully pry off the outer and inner cams with a small screwdriver, then remove the cam keys.
3. Disconnect the coil leads from the terminals, pry the large ends of the coil core clamps from the cores, and remove the headlight and ignition coils.
4. Remove the flange mounting screws, lockwashers, flatwashers, and the flange.
5. Pull the rotor using All Purpose Claw Puller (H-D part no. 95635-46) or a suitable substitute. If necessary, grind down the bottoms of the claws to make it fit properly. Remove the rotor key after the rotor is out.
6. Consult the "Tune-Up" section for additional information concerning removing and replacing the breaker point assemblies.



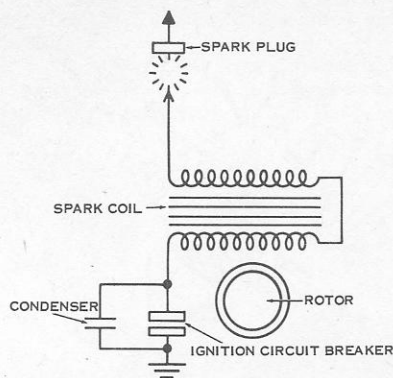
Magneto-Generator circuit for the B Models other than the Ranger.

DISASSEMBLY (BTF MODELS)

1. Remove the right side cover.
2. Pry off the cam with a small screwdriver and remove the key.
3. Disconnect the coil leads from the terminals, then pry the large end of the coil core clamps from the cores and remove the flange.
4. Remove the rotor and key as described in the above section.

INSPECTION

1. Clean all parts, other than the coils, in a suitable grease-dissolving solvent and blow them dry. The coils may be cleaned with a clean cloth dipped in clean, white gasoline.
2. Inspect all components for a worn or damaged condition which may impair their performance, and replace them as necessary.
3. Inspect the connection of all wires, and their terminals, for a secure fit.



Magneto-Generator circuit for the Ranger (BTF) model.

ASSEMBLY (BOTH MODELS)

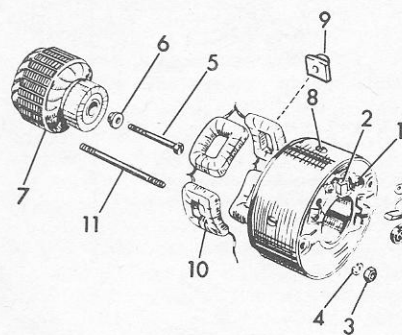
1. Assembly is basically the reverse order of disassembly.
2. Pull the rotor onto the shaft, taking care to avoid jarring it as this could cause it to lose its magnetic properties, by using the cams as drive collars and by turning the shaft nut onto the shaft until the rotor seats itself.
3. Press the coil core clamps into position by applying pressure to the curved portion. Never hammer or tap them into place.
4. Apply a daub of grease to the cam and a small drop of clean engine oil to the fiber cam follower. Reconnect the wires by consulting the wiring diagrams and tune the engine as described in the "Tune-Up" section.

Generator (1972 and Earlier) Sprint Models

DISASSEMBLY

1. Remove the left side cover screws and then the cover by tapping on its sides

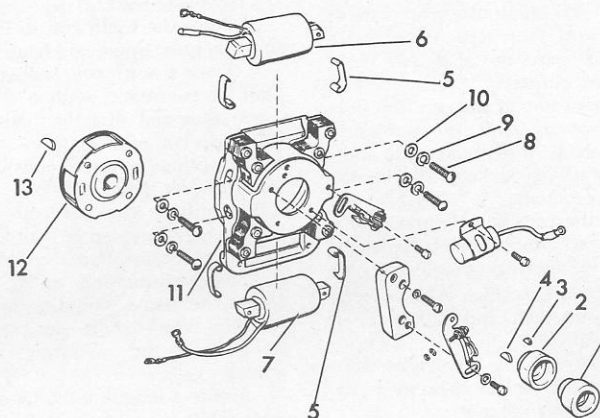
with a soft mallet while pulling on the kick-starter lever.



1. Brush Spring (2)
2. Generator Brush (2)
3. Mounting Nut (2)
4. Mounting Nut Lockwasher (2)
5. Armature Mounting Screw
6. Armature Mounting Screw Spacer
7. Armature
8. Pole Shoe (4)
9. Pole Shoe (4)
10. Field Coil (set of four)
11. Generator Frame Stud (2)

Generator assembly (Sprint).

2. Remove the brush springs from the brushes, then remove the brushes.
3. Disconnect the wires at the "D+" and "DF" terminals, remove the generator mounting nuts and lockwashers, then pull the generator from the frame studs.
4. Remove the tachometer drive unit (if applicable), the armature mounting screw, and the screw spacer.
5. Using Generator Armature Puller (H-D part no. 97296-61P), or a suitable substitute, pull the armature from the shaft. If you don't have access to this tool or one very much like it, you should consult your dealer for assistance since the armature is easily damaged. The tool has both right- and left-hand threads to suit either type of armature.
6. Inspect the pole shoes and field coils for a worn or damaged condition, and re-



Magneto-Generator assembly (B Models).

1. Outer cam
2. Inner cam
3. Cam key
4. Cam key
5. Coil core clamp (4)
6. Headlamp and tail lamp coil
7. Ignition and/or stop lamp coil
8. Flange mounting screw (4)
9. Flange mounting screw lockwasher (4)
10. Flange mounting screw flat washer (4)
11. Flange
12. Rotor
13. Rotor key (see item 4)

Harley-Davidson Singles

move them if necessary by removing the pole shoe screws which will allow the shoes and coils to come free.

INSPECTION

1. Clean all parts, other than the field coils and brushes, in a suitable grease-removing solvent and blow them dry. The coils and brushes may be cleaned with a clean cloth dipped in clean gasoline.

2. Inspect all components for a worn or damaged condition and replace them as necessary, paying particular attention to the insulators, armature windings, field coil wrappings, and the surfaces of the pole shoes nearest the armature. If possible, compare the brushes with new ones, and replace them if it appears that they may interfere with the normal operation of the generator.

NOTE: On models after serial no. 3672, the armature and tapered shaft have been altered. Make sure to use the correct replacement parts if replacement is necessary.

3. Replace the field coils in the order depicted in the illustration. The lead on each end coil is marked with a colored insulating sleeve. The red sleeve is connected to the generator "D+" terminal and the yellow lead goes to the "DF" terminal. Use the Generator Pole Shoe Arbor (H-D part no. 97302-61), or a suitable substitute, to force the coils into position in the frame.

4. Check the twisted connections between the adjacent coils for a positive connection, scrape the leads free of varnish, solder the twisted connections, clip 1/2 in. off each connection beyond the generator frame, and bend the leads back between the coils, taking care not to touch them to the generator frame.

5. Check the clearance between the armature and the shoes for clearance. If the clearance is less than 0.014 in. (0.007 in. per side) and the shoes have been properly seated, the shoes will have to be bored to fit.

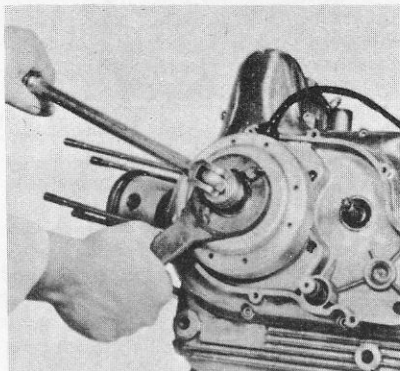
ASSEMBLY

1. Assembly is basically the reverse order of disassembly.

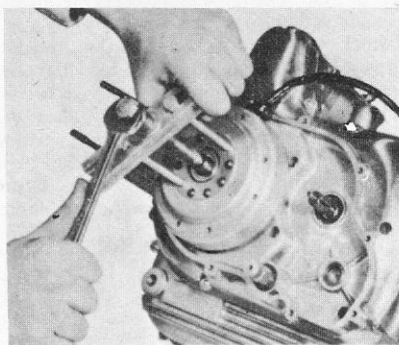
2. Secure the armature with the armature mounting screw spacer and screw, then check the armature run-out for run-out in excess of 0.002 in. Consult the Model 165 Generator section for additional information.

3. Slip the generator frame onto the frame studs and secure it with the lock-washers and nuts.

4. Install the brushes and springs, re-connect the wiring as depicted in the wiring diagrams, and mount and secure the left crankcase cover.



Removing the alternator rotor nut



Removing the alternator rotor

move the alternator rotor nut (left-hand thread) and washer from the end of the crankshaft. The crankshaft will have to be held while the rotor nut is being removed. This can be accomplished with the use of a special tool (H-D part no. 97306-73P) or, if the engine is in the frame, place the transmission in gear and apply the rear brake. An impact driver will make removal easier.

2. To remove the rotor a special puller is needed. The puller can be constructed using the body of the gear puller (H-D part no. 97292-61P) and two bolts (H-D part no. 52081-63P). Slip the two bolts through the puller and thread them into the alternator rotor. Use the puller to remove the rotor. Remove the key from the crankshaft.

3. Remove the four mounting screws securing the stator to the left crankcase.

Installation

1. Mount the stator to the left crankcase.
2. Install the key into the slot in the crankshaft.

3. Mount the rotor on the crankshaft. Draw the rotor down on the crankshaft with the rotor nut and washer.

CAUTION: Never strike the rotor to seat it as this may decrease its magnetic properties.

4. Check that the rotor does not rub on the stator as it rotates.

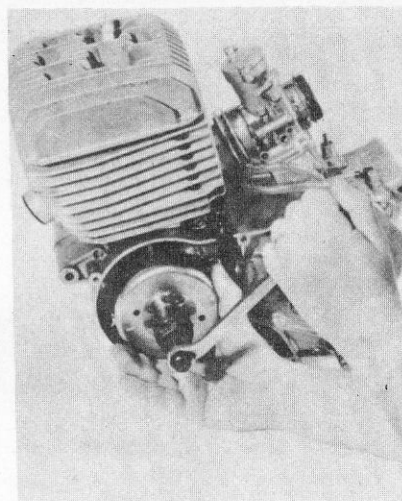
move the alternator rotor nut and washer from the end of the crankshaft. The crankshaft will have to be held while the rotor nut is being removed. This can be accomplished with the use of a special tool (H-D part no. 97352-71MA) or, if the engine is in the frame, place the transmission in gear and apply the rear brake. An impact driver will make removal easier.

2. Remove the rotor from the end of the crankshaft with the special tool (H-D part no. 97302-70M).

3. Remove the pick-up coil mounting screws and remove the pick-up coil. Disconnect the neutral switch lead, and stator wiring.

4. Remove the three mounting screws, and remove the stator from the crankcase.

5. The key in the crankshaft should be inspected in place and replaced if necessary.



Removing the rotor with a special puller

Installation

1. Installation is the reverse of removal. Note the following:

a. Draw the rotor down on the crankshaft with the rotor nut and washer.

NOTE: Never strike the rotor to seat it as this may decrease its magnetic properties.

b. When installation is complete, check that the rotor does not rub the stator when rotated.

c. Reset the ignition timing.

Component Testing

MAGNETO-GENERATOR (ALL MODELS)

On 1969 and earlier M models the brake light circuit is tied into the ignition circuit. In normal operation the brake light switch is closed, providing the necessary ground. When the brake is applied, the switch opens and the light filament provides the ground. If the machine stalls out when the brake pedal is operated, the problem is probably in the brake light bulb or wiring. After replacing the bulb or fixing the wir-

Alternator (1973 and Later) Sprint Models

Removal

1. Remove the left crankcase cover. Re-

Alternator SX/SS 175/250

Removal

1. Remove the left crankcase cover. Re-

Harley-Davidson Singles

ing, recheck the ignition for spark as previously described. If you still haven't located the source of the problem, it's probably in the lower coil of the magneto-generator.

Testing for a Grounded Coil

1. Remove the rotor and disconnect both of the leads from the coil in question.
2. Connect a taillight bulb in series with a 6 V battery, then connect one lead of the test circuit to one of the coil leads and ground the other to the generator frame.
3. Wrap the remaining coil lead to insulate it, or place it in such a way that it is not touching the frame.
4. If the test light comes on, the coil is grounded or faulty. Inspect the coil windings for a worn, frayed, or damaged condition and replace as necessary.

Testing for a Shorted Coil

There is no accurate method of testing for a shorted coil without elaborate test equipment. The best method is to replace the bulbs which are in circuit with the coil in question and the coil, and then compare the intensity with another bulb. Since your dealer probably won't let you return any electrical component you use, what it boils down to is that if you've eliminated all other possibilities, it's time to replace the coil.

Testing for an Open Coil

1. Remove the rotor and coil, and connect both test leads of a taillight bulb in series with a 6 V battery to the two coil leads.
2. If the bulb doesn't light, the coil has an open circuit and must be replaced.

Testing the Rotor

When all other tests fail to reveal the source of the malfunction, the rotor may be considered. If damaged or roughly handled, the rotor may lose some of its magnetic properties. The only test is to compare the strength of the magnets with a new rotor, and replace the rotor if the tests prove it to be low in magnetic energy.

GENERATOR (MODEL 165)

Testing the Charging System

1. Disconnect the red wire at the voltage regulator "gen" terminal and connect one lead of an ammeter to the red wire and the other lead to the terminal. Turn on the headlight, then start and run the engine until the normal operating temperature is reached. Open the throttle until the engine is running at a speed equivalent to 20–25 miles per hour (mph) road speed. (This may be done by blocking the machine up so the rear wheel spins freely and then running the engine in high gear until the speedometer indicates the appropriate speed.) The ammeter should indicate a charge under these circumstances, but if it doesn't, go on to the next step.
2. If the above procedure fails to produce a charge on the ammeter, disconnect the green wire at the regulator "F" terminal (without disconnecting the test circuit) and ground it on the crankcase while observing the ammeter. If the ammeter records a charge of five or more amps, either

the voltage regulator is not properly grounded or it is defective. Check to see that the regulator is properly grounded before going on to the next test.

3. Compare the regulator connections to the wiring diagrams to make sure everything is properly connected. Flash the regulator "gen" and "bat" terminals by momentarily touching a piece of wire to both of them. This will correctly polarize the generator to keep it charging and to keep the relay points from arcing and burning. Run the engine after polarizing the generator and see if the generator charges as in step one. If the generator fails to charge, go on to the next step.

4. Disconnect the test circuit ammeter lead from the "gen" terminal and connect it to the positive (+) battery terminal, then ground the wire from the "F" terminal on the crankcase. Run the machine as described in step one and read the ammeter. If the ammeter doesn't record a charge, the trouble is within the generator.

5. Inspect the brushes and brush springs for a worn or damaged condition and replace them if necessary. At least clean them with trichloroethylene or a suitable solvent such as clean white gasoline. Polish the commutator with no. 00 sandpaper and blow the assembly clear. Recheck the output as in the above step and proceed to disassemble the generator as described earlier in this chapter if the generator still is not working properly, and go on to the next section.

Testing the Field Coils

Perform the following tests with the generator frame in place after disconnecting the red and green wires from the regulator terminals, and removing the positive brushes which are connected to the same terminal as the red wire. If the ammeter is connected to a short circuit, it will overload and be damaged. If the needle starts to go off the range, the contact should immediately be broken. For this reason it is advisable to momentarily touch the ammeter leads to the terminals or leads to check for a short before securing them.

1. Connect a fully charged 6 V battery and an ammeter in series with the red and green leads and consult the ammeter. The correct reading should be 2 amps. If it is not, go on to the next step.
2. If the above test results in a reading which is higher or lower than the specified amount, or if the test reveals a short circuit, disconnect the red and green wires and the field coil leads from the terminals. Connect the test circuit to the field coils and repeat the test described in step one before going on to the next step.
3. If the reading in step two is correct, inspect the condition of the red and green wires for wear or damage and replace them as necessary. If the wires are all right but a short was discovered in the first step, check to see that the frame terminals are insulated from each other and from the generator frame as well. Inspect the positive brush holders also to make sure they are fully insulated from the generator frame.
4. If tests of the field coils, independent of all terminals and leads, fail to provide the correct reading, the generator frame

must be thoroughly cleaned before proceeding to the next step.

5. If an open (no reading) or low reading is arrived at after cleaning the frame, inspect all the connections of the coil leads and of the twisted connections between the coils before proceeding to the next step.

6. If everything checked out in the previous step, cut off the fused portion between the coils and separate them for individual testing. Each coil may be tested with a fully charged 2 V battery instead of the 6 V used in the first step. A correct reading for individual coils is about 3.3 amps.

7. An alternate method to step six is to replace the 6 V battery as the power source for the circuit tester, wire a taillight bulb into the test circuit, and then connect one test lead to the generator frame, and use the other to individually test each coil by touching one coil lead while observing the test light and ammeter responses. If the light lights, the coil is grounded. If there is no reading, the coil is open. If the reading is high the coil is shorted. In any of these cases the coil must be replaced as described in the "Generator (Model 165)" section.

Testing the Armature

Remove the armature from the generator as described in the "Generator (Model 165)" section. Connect a taillight in series with a 6 V battery, then touch one lead to the commutator surface and the other to the armature core. If the light comes on, replace the armature.

Repairing the Commutator

If a lathe is available, the commutator may be turned down enough to remove the rough surface. Armature Commutator Turning Arbor (H-D part no. 96170-50) may be used since it easily mounts in the lathe chuck, but any suitable substitute may be used. Once the commutator is turned down (never remove more metal than necessary), it may be finished with some no. 00 sandpaper. Emery cloth should not be used since the particles will embed themselves in the mica and cause an electrical malfunction.

The mica between the commutator segments will have to be cut to a depth of 0.025 in. if the commutator has been turned or worn down. The cutting may be done with an under-cutting tool or with a piece of hacksaw blade that has been thinned to the appropriate size. Try to make the surface of the mica as flat and as even as possible. Smooth the commutator with no. 00 sandpaper after everything is done, and recheck the armature as described in the above section before installing it.

If all of the above sounds too complicated or if no lathe is available, the commutator may be cleaned by hand, using no. 00 sandpaper. Always make sure that the armature is perfectly clean before reinstalling it.

GENERATOR (SPRINT MODELS)

Testing the Charging System

1. Compare the regulator wiring to the

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wiring diagram located at the end of this chapter to make sure it is correct.

2. Disconnect the two white wires at the voltage regulator no. 61 terminal, then connect the negative lead of an ammeter (0-15 amp DC type) to the no. 61 terminal and the positive lead to both of the white leads. Turn on the headlight, then start and run the engine until normal operating temperature is reached. With the engine running at a speed equivalent to 20-25 mph, the ammeter should register some charge. The bike may be blocked up and run in high gear to approximate the moving speed. Go on to the next step if the ammeter fails to register a charge.

3. Remove the red wire from regulator "DF" terminal if the ammeter didn't register, and briefly touch the wire to the crankcase without disconnecting the test circuit. If the ammeter indicates a charge of five or more amps, the generator is healthy and the problem lies in the voltage regulator or any of the charging system wiring. Inspect the wiring for bad connections, breaks, or a poor grounding of the battery negative terminal or regulator base.

4. Polarize the generator with the battery by momentarily connecting a jumper wire between the battery positive terminal and the regulator no. 61 terminal or the generator "D+" insulated brush (depending on which component or wiring has been worked on). Do this before running the engine as otherwise the relay points may be burned. Repeat step one and go on to step five if the generator does not charge.

5. Remove the wire from the regulator "DF" terminal (after turning off the bike) and place it so it can't make contact with the terminal. Disconnect the negative ammeter lead from the no. 61 terminal and start and run the engine as described in step one. While the engine is running, connect the negative lead of the ammeter to the positive terminal of the battery, and connect the red regulator wire to the regulator base or any other ground on the motorcycle. Observe the ammeter and keep these connections in place only as long as is necessary to get a reading or the battery will discharge through the generator since these connections completely bypass the regulator. If the ammeter shows either no charge or one which is erratic and very low, the trouble is in the generator.

6. Inspect the brushes for a worn or damaged condition and replace them as necessary. At least clean them with trichloroethylene or a suitable solvent such as clean white gasoline. Polish the commutator with no. 00 sandpaper and blow the assembly clear. Recheck the output as in the above step and proceed to disassemble the generator as described earlier in this chapter if the generator is still not working properly, and go onto the next section.

Testing the Voltage Regulator

Perform the following tests to make sure the regulator is operating correctly. All tests should be made with the engine at its normal operating temperature and all the lights and accessories turned off. If the regulator proves to be defective in these or in the previous "Generating System" tests, it must be replaced.

1. Connect the voltmeter positive lead to the regulator's "B+" terminal, and ground the negative lead.

2. Run the engine at about 3500 revolutions per minute (rpm) or about 30 mph road speed, with the regulator cover in place, and read the voltmeter.

3. A properly operating regulator will read 7.0-7.5 V.

4. An overactive regulator will read above 7.5 V and will damage the battery by overcharging it.

5. A tired regulator will read below 7.0 V and will constantly allow the battery to discharge.

Testing the Field Coils

Perform the following tests with the generator frame in place after disconnecting the red and white wires from the regulator terminals, and removing the positive brush (the brush connected to the same terminal as the white wire) from the generator frame. The testing procedures are the same as in the "Generator (Model 165)" section earlier in this chapter, except that the complete field circuit should draw 4.4-4.8 amps for 1961-62 C models at 6 V and 2.0-2.2 amps at the same voltage for 1963-66 C models and 1962 and later SS models. In step six, the reading should be the same as those given here instead of being different as they are for the Model 165.

Testing the Armature

Consult the "Generator (Model 165)" section.

Repairing the Commutator

Consult the "Generator (Model 165)" section.

ALTERNATOR (SPRINT MODELS)

Testing for a Grounded Coil

Connect a test light between the black coil lead and ground. If the bulb lights, one or both of the coils are grounded. In this case, disconnect the black wire connecting the coils together. Connect the test light between each coil and ground. If the bulb lights the coil is grounded.

Testing for an Open Circuit

Connect the leads of a test light to the two coil leads (black and green). If the bulb doesn't light, the coil has an open circuit and must be replaced.

Testing for a Shorted Coil

Connect an ohmmeter to the brown and green coil leads. The resistance should be about 0.8 ohms (both coils). Then connect the ohmmeter between the brown and black leads and the green and black leads, in either case the resistance should be about 0.4 ohms (one coil). If the resistance is less than specifications, it is shorted, and should be replaced.

Testing the Rotor

When all other tests fail to reveal the source of the malfunction, the rotor may be considered. If damaged or roughly handled, the rotor may lose some of its magnetic properties. The only test is to compare the strength of the magnets with a new rotor, and replace the rotor if the tests prove it to be low in magnetic energy.

Starter Motor

REMOVAL

1. Remove the left crankcase cover and the kick-starter assembly.

2. Remove the circlip from the starter motor shaft.

3. Use a small gear puller to remove the starter motor sprocket. Remove the chain and the large crankshaft sprocket at the same time as the starter motor sprocket. Remove the flat washer and any thrust washers located behind the starter motor sprocket. Remove the spacer from the crankshaft.

4. Use a gear puller or the special tool (H-D part no. 97309-73P) to pull the starter clutch from the crankshaft. Remove the key and the starter clutch spacer from the crankshaft.

5. Remove the two mounting bolts securing the starter motor to the crankcase and remove the starter motor. Avoid tapping on the starter motor shaft, if necessary, tap the motor on the case to remove it.

INSTALLATION

1. Inspect the O-ring on the starter motor case and replace it if damaged in any way. Position the starter motor on the crankcase and install the two mounting bolts and lockwashers.

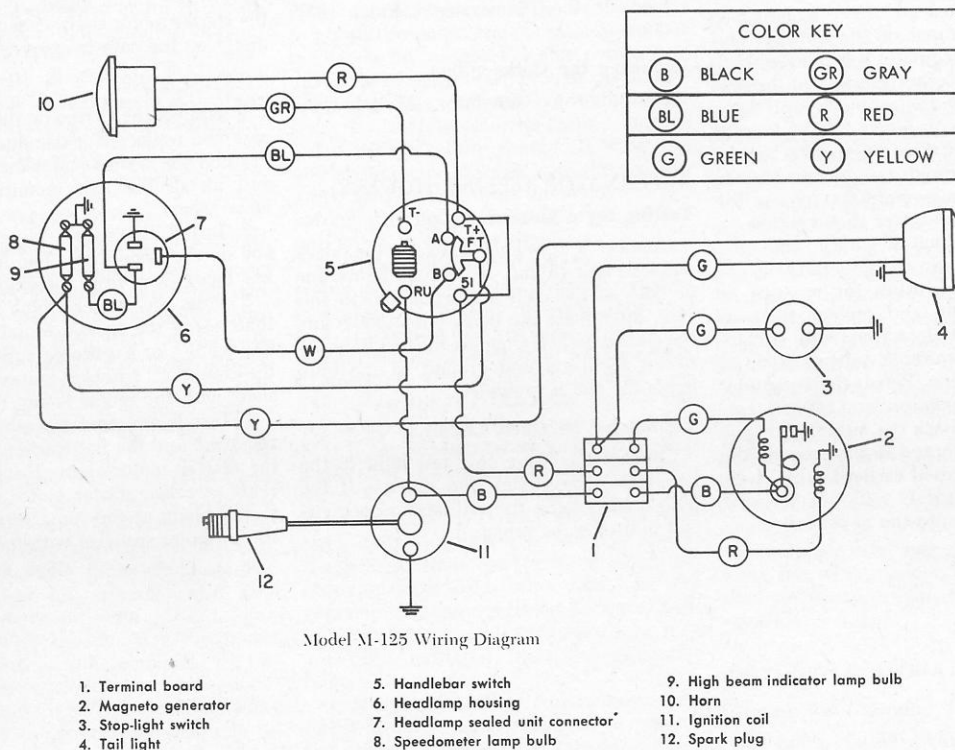
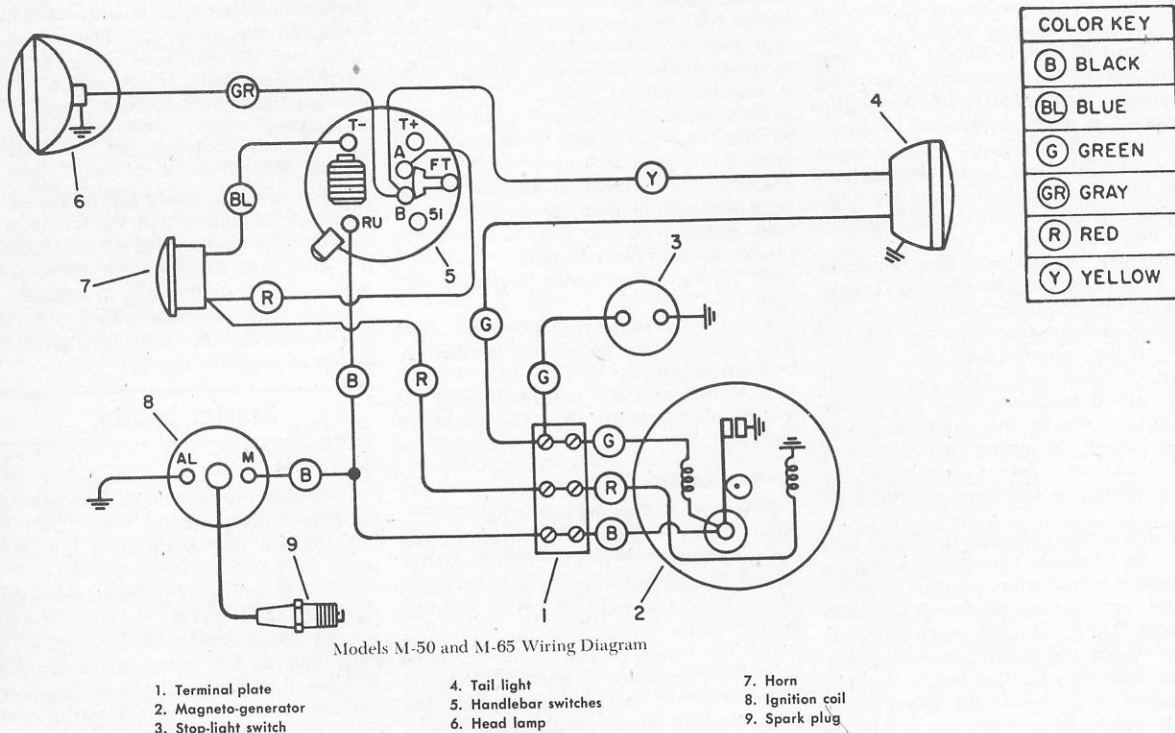
2. Install the starter clutch spacer and key on the crankshaft. The flat side of the key faces away from the engine.

3. Press the starter clutch on the crankshaft using the special tool (H-D part no. 97308-73P) or a suitable substitute. Install the crankshaft sprocket spacer on the crankshaft with the recess facing the engine.

4. Install any thrust washers that were removed, and the flat washer on the end of the starter motor shaft. Install the crankshaft sprocket, starter motor sprocket, and starter chain at the same time. Secure the starter motor sprocket with the circlip.

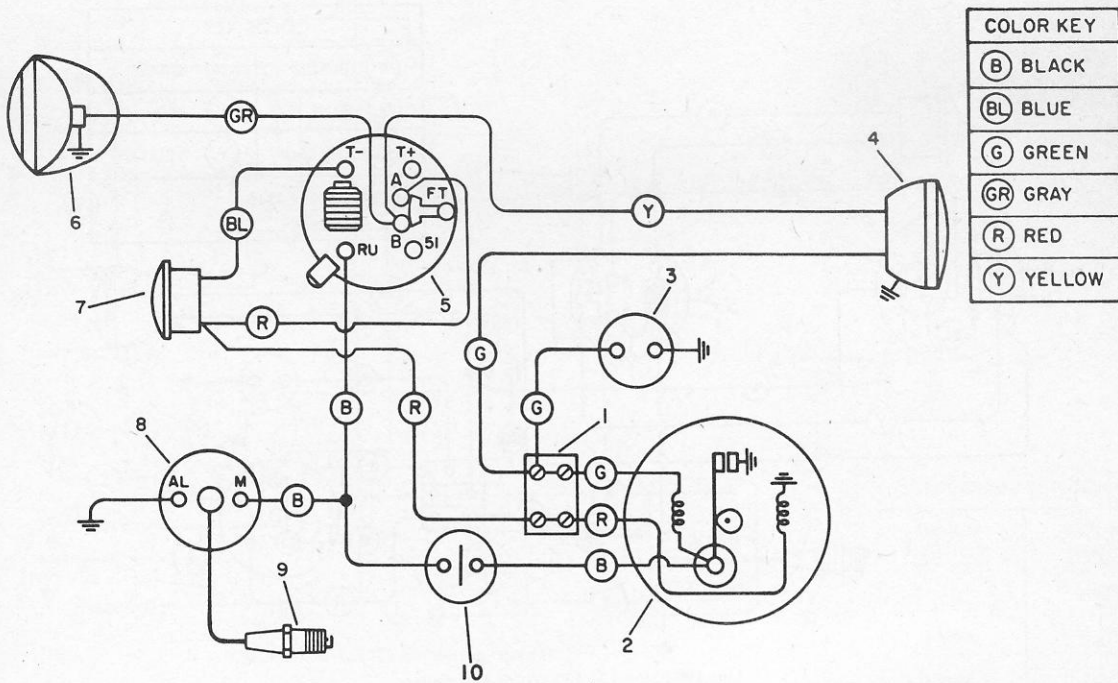
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Wiring Diagrams



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Wiring Diagrams

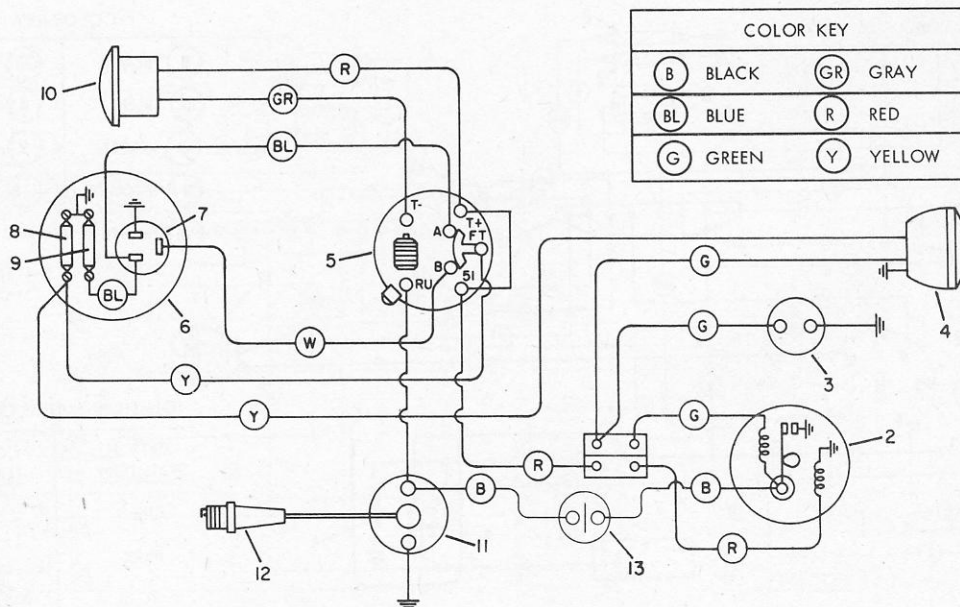


1969 Model M-65 Wiring Diagram

1. Terminal plate
2. Magneto-generator
3. Stop-light switch
4. Tail light

5. Handlebar switches
6. Head lamp
7. Horn
8. Ignition coil

9. Spark plug
10. Ignition switch



1969 Model M-125 Wiring Diagram

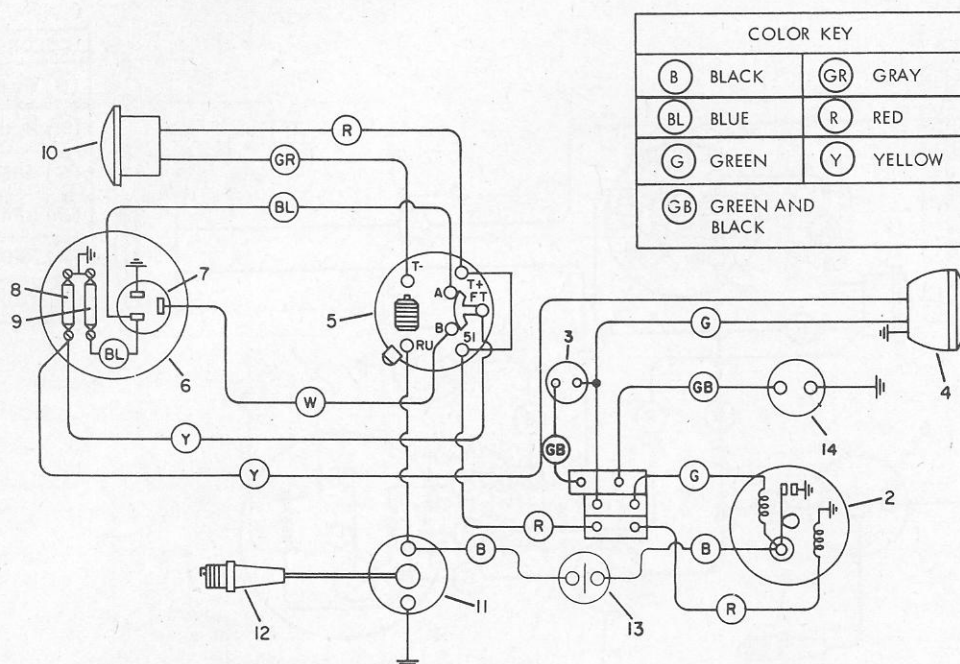
1. Terminal board
2. Magneto generator
3. Stop-light switch
4. Tail light
5. Handlebar switch

6. Headlamp housing
7. Headlamp sealed unit connector
8. Speedometer lamp bulb
9. High beam indicator lamp bulb
10. Horn

11. Ignition coil
12. Spark plug
13. Ignition switch

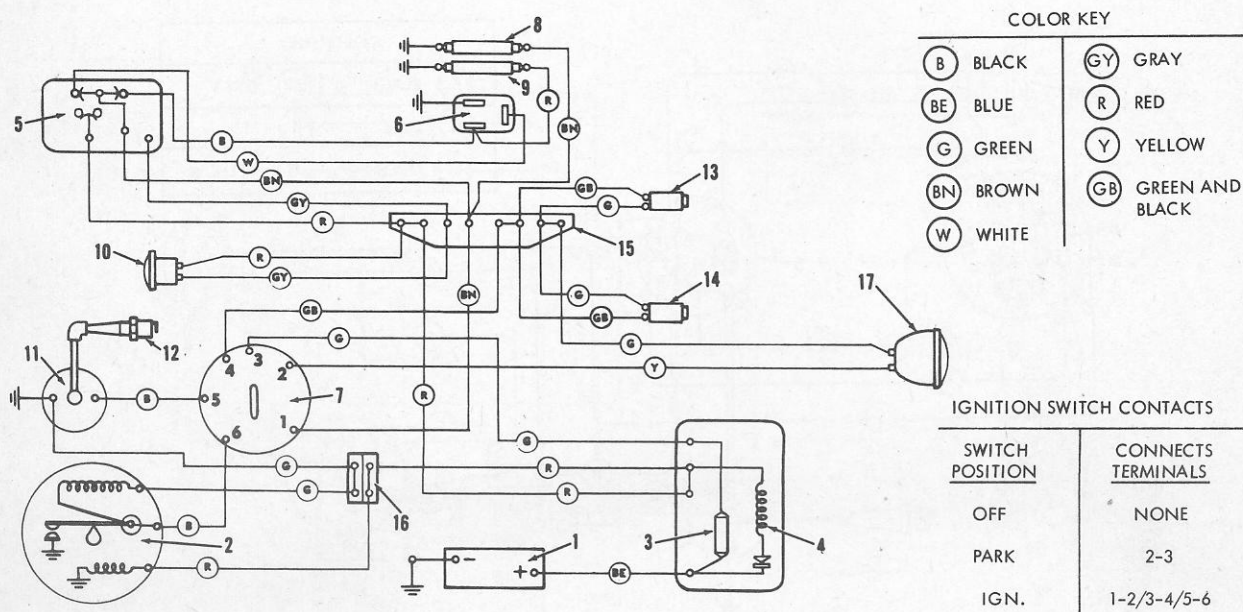
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Wiring Diagrams



Late 1969 Model M-125 Wiring Diagram

- | | | |
|----------------------------|-----------------------------------|----------------------------|
| 1. Terminal board | 6. Headlamp housing | 11. Ignition coil |
| 2. Magneto generator | 7. Headlamp sealed unit connector | 12. Spark plug |
| 3. Front stop light switch | 8. Speedometer lamp bulb | 13. Ignition switch |
| 4. Tail light | 9. High beam indicator lamp bulb | 14. Rear stop light switch |
| 5. Handlebar switch | 10. Horn | |

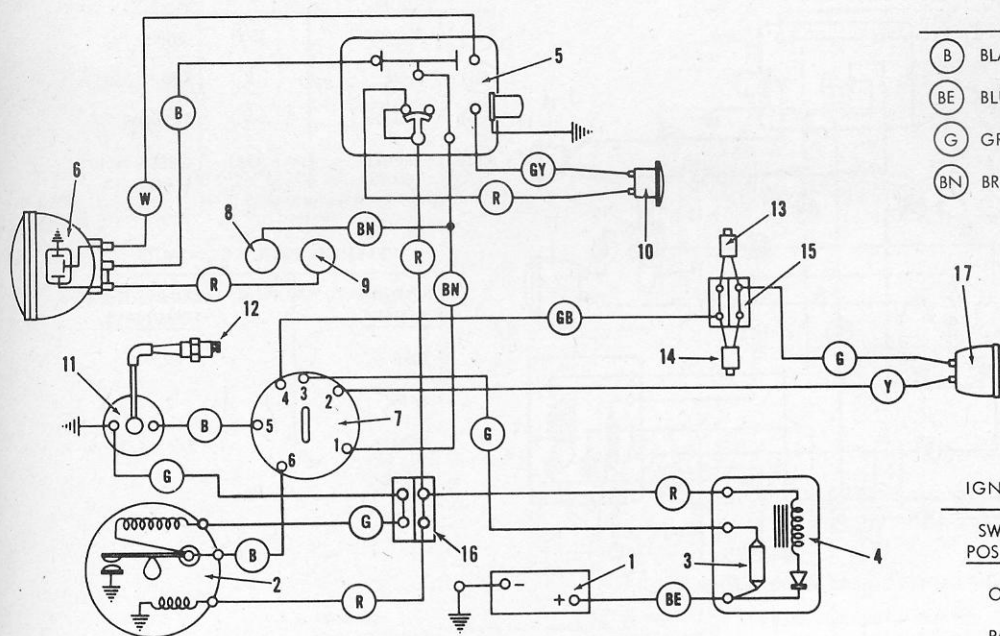


1970 M-65 (Leggero) Wiring Diagram

- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| 1. Battery | 7. Ignition-light switch | 13. Stoplamp front switch |
| 2. Magneto generator | 8. Speedometer lamp | 14. Stoplamp rear switch |
| 3. Fuse | 9. High beam indicator lamp | 15. Headlamp terminal board |
| 4. Rectifier coil and diode | 10. Horn | 16. Terminal block |
| 5. Handlebar switch | 11. Ignition coil | 17. Tail and stop lamp |
| 6. Headlamp connector | 12. Spark plug | |

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Wiring Diagrams



1970 Model M-125 Rapido Wiring Diagram

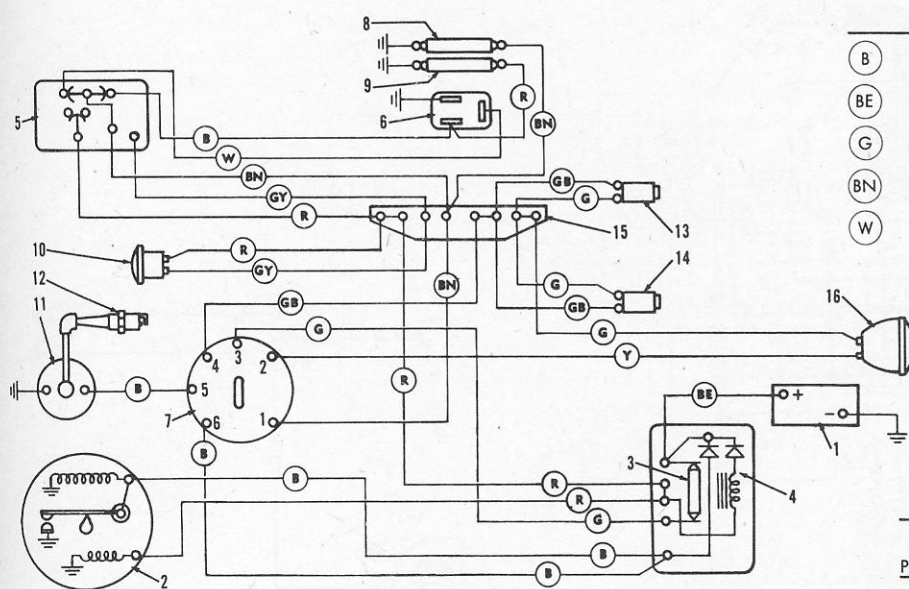
- | | | |
|-----------------------------|-----------------------------|---------------------------|
| 1. Battery | 7. Ignition-light switch | 13. Stoplamp front switch |
| 2. Magneto generator | 8. Speedometer lamp | 14. Stoplamp rear switch |
| 3. Fuse | 9. High beam indicator lamp | 15. Terminal block |
| 4. Rectifier coil and diode | 10. Horn | 16. Terminal block |
| 5. Handlebar switch | 11. Ignition coil | 17. Tail and stoplamp |
| 6. Headlamp | 12. Spark plug | |

COLOR KEY

(B) BLACK	(GY) GRAY
(BE) BLUE	(R) RED
(G) GREEN	(Y) YELLOW
(BN) BROWN	(GB) GREEN AND BLACK

IGNITION SWITCH CONTACTS

SWITCH POSITION	CONNECTS TERMINALS
OFF	NONE
PARK	2-3
IGN.	1-2/3-4/5-6



1971 M-65 (Leggero) Wiring Diagram

- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| 1. Battery | 7. Ignition-light switch | 13. Stoplamp front switch |
| 2. Magneto | 8. Speedometer lamp | 14. Stoplamp rear switch |
| 3. Fuse | 9. High beam indicator lamp | 15. Headlamp terminal board |
| 4. Rectifier coil and diode | 10. Horn | 16. Tail lamp |
| 5. Handlebar switch | 11. Ignition coil | |
| 6. Headlamp connector | 12. Spark plug | |

COLOR KEY

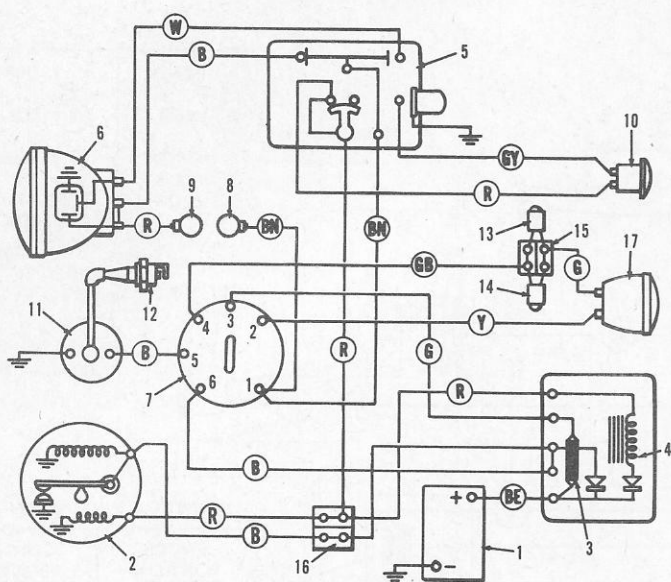
(B) BLACK	(GY) GRAY
(BE) BLUE	(R) RED
(G) GREEN	(Y) YELLOW
(BN) BROWN	(GB) GREEN AND BLACK
(W) WHITE	

IGNITION SWITCH CONTACTS

SWITCH POSITION	CONNECTS TERMINALS
OFF	NONE
PARK	2 - 3
IGN.	1 - 2/3 - 4/5 - 6

Harley-Davidson Singles

Wiring Diagrams



1971 M-125 (Rapido) Wiring Diagram

1. Battery
2. Magneto generator
3. Fuse
4. Rectifier coil and diode
5. Handlebar switch
6. Headlamp

7. Ignition-light switch
8. Speedometer lamp
9. High beam indicator lamp
10. Horn
11. Ignition coil
12. Spark plug

13. Stoplamp front switch
14. Stoplamp rear switch
15. Terminal block
16. Terminal block
17. Tail lamp

COLOR KEY

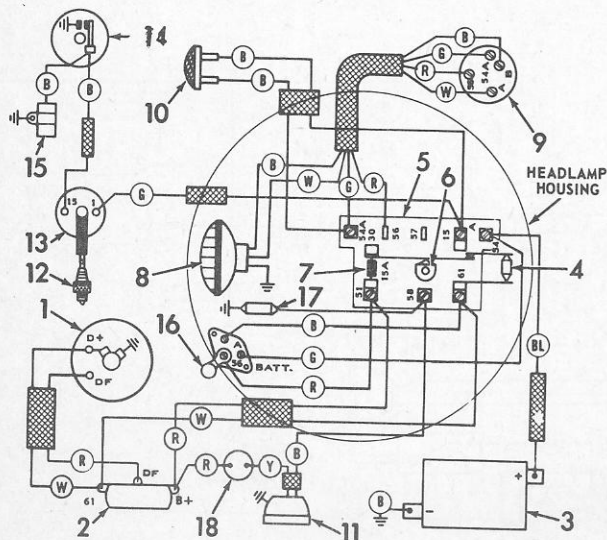
(B) BLACK	(GY) GRAY
(BE) BLUE	(R) RED
(G) GREEN	(Y) YELLOW
(BN) BROWN	(GB) GREEN AND BLACK

IGNITION SWITCH CONTACTS

SWITCH POSITION	CONNECTS TERMINALS
OFF	NONE
PARK	2 - 3
IGN.	1 - 2/3 - 4/5 - 6

KEY TO COLOR CODE

(B) BLACK	(BL) BLUE	(G) GREEN	(R) RED	(W) WHITE	(Y) YELLOW
-----------	-----------	-----------	---------	-----------	------------

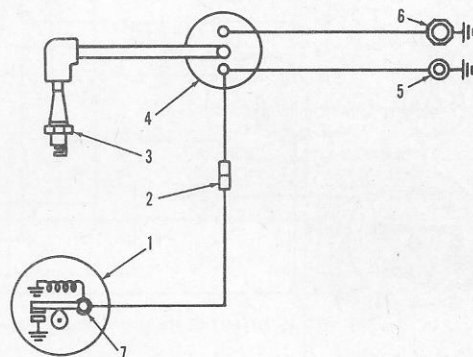


Wiring Diagram (1961-62)

1. Generator
2. Regulator
3. Battery (6v.)
4. Warning lamp (1.5 watts)
5. Ignition-light switch board
6. Ignition-light switch
7. Fuse (15 A)

8. Headlamp unit
9. Headlamp dimmer and horn switch
10. Horn
11. Tail and stop lamp
12. Spark plug
13. Ignition coil

14. Circuit breaker
15. Condenser
16. Emergency starting switch
17. Speedometer lamp
18. Stoplight switch



1970-71 MSR-100 (Baja) Wiring Diagram

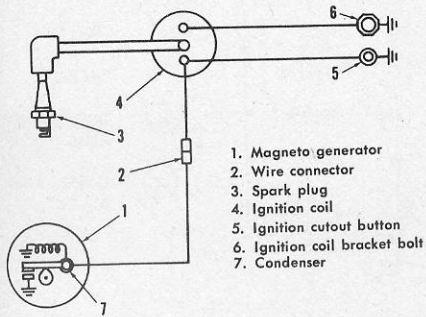
1. Magneto generator
2. Wire connector
3. Spark plug
4. Ignition coil
5. Ignition cutout button
6. Ignition coil bracket bolt
7. Condenser

Harley-Davidson Singles

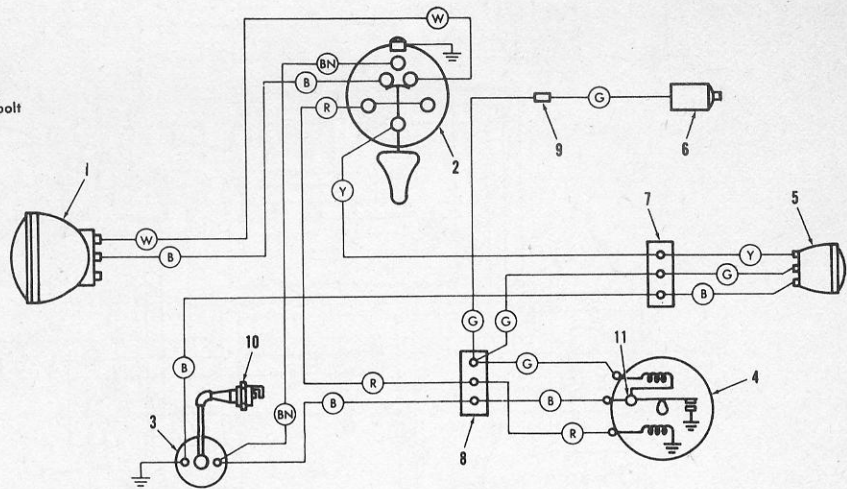
Wiring Diagrams

COLOR KEY

(W)	WHITE	(B)	BLACK
(Y)	YELLOW	(R)	RED
(BN)	BROWN	(G)	GREEN



WIRING DIAGRAM (WITHOUT LIGHTS)



1. Headlamp
2. Handlebar switch
3. Ignition coil
4. Magneto generator

5. Tail lamp
6. Stoplamp switch
7. Terminal block
8. Terminal block

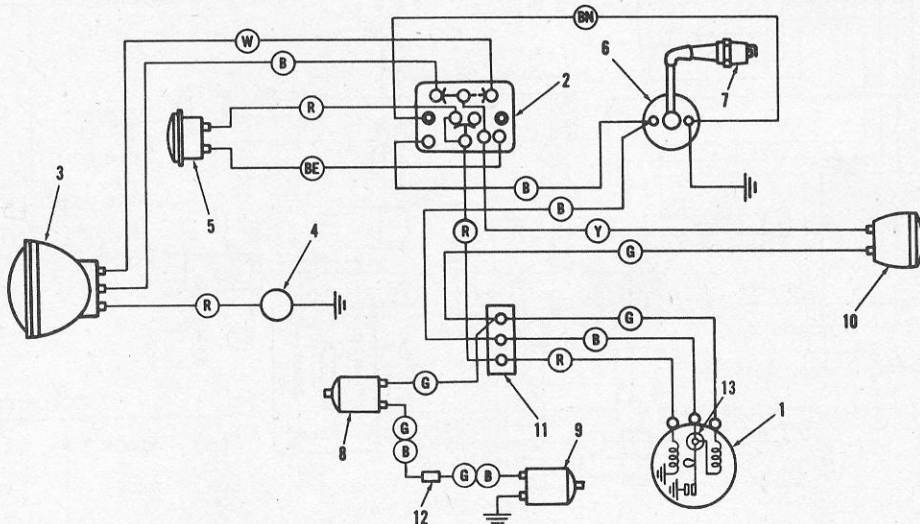
9. Connector
10. Spark plug
11. Condenser

WIRING DIAGRAM (WITH LIGHTS)

1972 MSR-100 (Baja) Wiring Diagram

COLOR KEY

(B)	BLACK	(W)	WHITE
(BE)	BLUE	(R)	RED
(G)	GREEN	(Y)	YELLOW
(BN)	BROWN	(G B)	GREEN AND BLACK



MC-65 (Shortster) Wiring Diagram

1. Magneto generator
2. Handlebar switch
3. Headlamp
4. High beam indicator lamp
5. Horn

6. Ignition coil
7. Spark plug
8. Stoplamp front switch
9. Stoplamp rear switch
10. Tail lamp

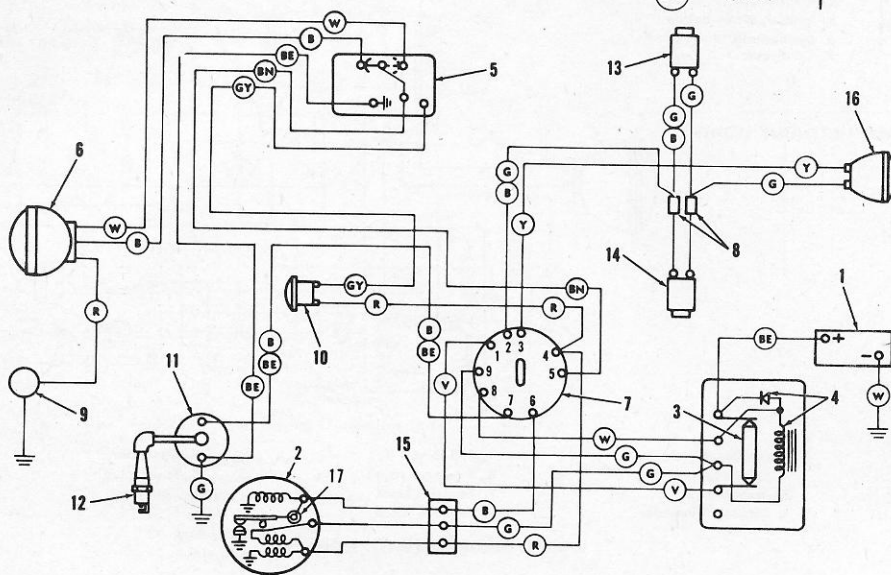
11. Terminal block
12. Connector
13. Condenser

Harley-Davidson Singles

IGNITION SWITCH CONTACTS	
SWITCH POSITION	CONNECTS TERMINALS
OFF	NONE
IGNITION	1 - 2/6 - 7
IGN. & LIGHTS	1 - 2 - 3/4 - 5/6 - 7/8 - 9

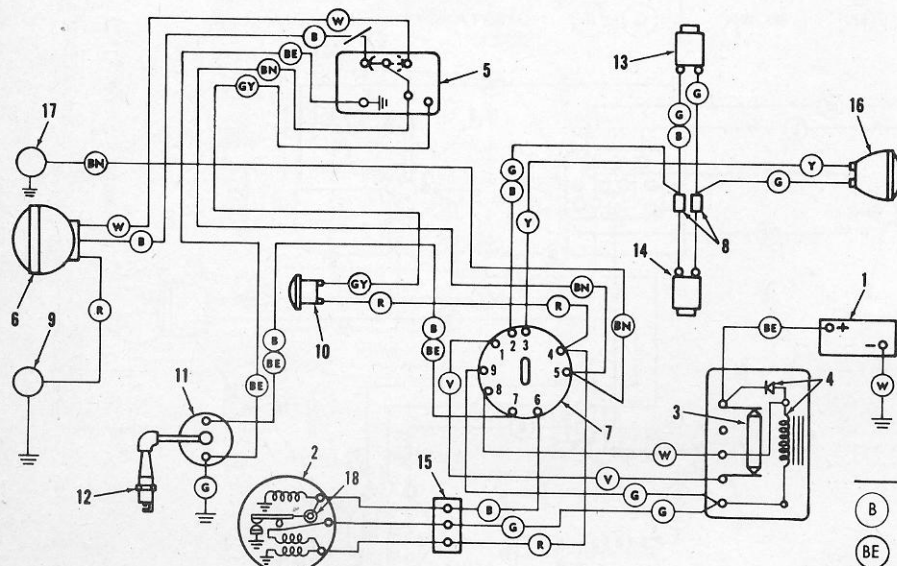
Wiring Diagrams

COLOR KEY			
(B)	BLACK	(R)	RED
(BE)	BLUE	(Y)	YELLOW
(G)	GREEN	(V)	VIOLET
(BN)	BROWN	(B) (BE)	BLACK AND BLUE
(W)	WHITE	(G) (B)	GREEN AND BLACK
(GY)	GRAY		



1972 M-65 (Leggero) Wiring Diagram

- | | | |
|-----------------------------|-----------------------------|---------------------------|
| 1. Battery | 7. Ignition-light switch | 13. Stoplamp front switch |
| 2. Magneto generator | 8. Connector (2) | 14. Stoplamp rear switch |
| 3. Fuse | 9. High beam indicator lamp | 15. Terminal block |
| 4. Rectifier coil and diode | 10. Horn | 16. Tail lamp |
| 5. Handlebar switch | 11. Ignition coil | 17. Condenser |
| 6. Headlamp | 12. Spark plug | |



1972 M-125 (Rapido) Wiring Diagram

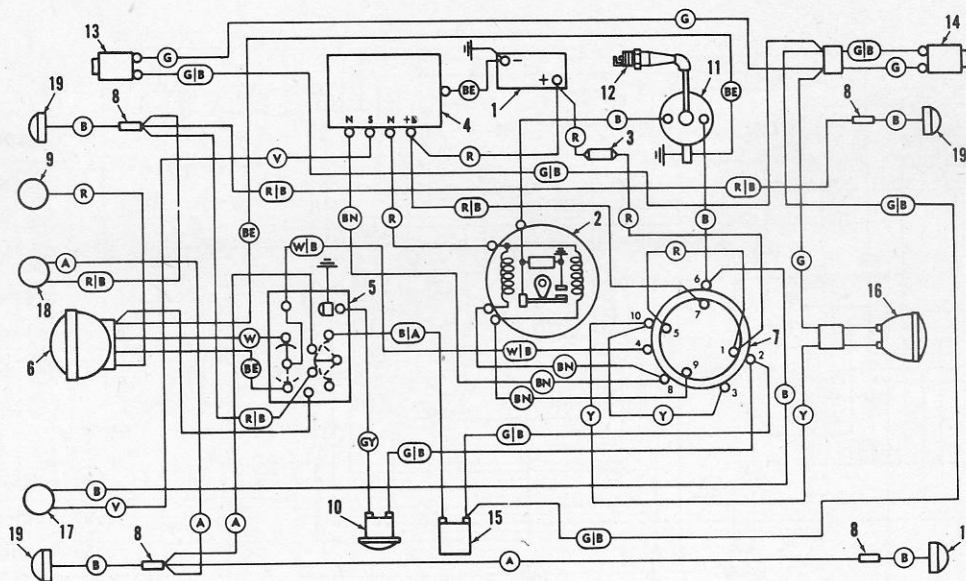
- | | | |
|-----------------------------|-----------------------------|---------------------------|
| 1. Battery | 7. Ignition-light switch | 13. Stoplamp front switch |
| 2. Magneto generator | 8. Connector (2) | 14. Stoplamp rear switch |
| 3. Fuse | 9. High beam indicator lamp | 15. Terminal block |
| 4. Rectifier coil and diode | 10. Horn | 16. Tail lamp |
| 5. Handlebar switch | 11. Ignition coil | 17. Speedometer lamp |
| 6. Headlamp | 12. Spark plug | 18. Condenser |

IGNITION SWITCH CONTACTS	
SWITCH POSITION	CONNECTS TERMINALS
OFF	NONE
IGNITION	1 - 2/6 - 7
IGN. & LIGHTS	1 - 2 - 3/4 - 5/6 - 7/8 - 9

COLOR KEY			
(B)	BLACK	(R)	RED
(BE)	BLUE	(Y)	YELLOW
(G)	GREEN	(V)	VIOLET
(BN)	BROWN	(B) (BE)	BLACK AND BLUE
(W)	WHITE	(G) (B)	GREEN AND BLACK
(GY)	GRAY		

Harley-Davidson Singles

Wiring Diagrams

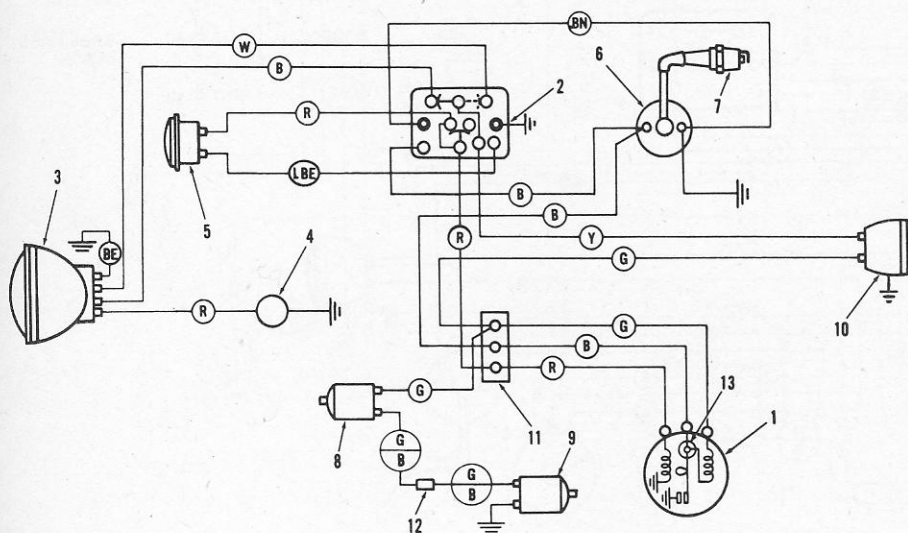


1973 and earlier Z-90

- | | |
|-----------------------------|---------------------------------|
| 1. Battery | 11. Ignition coil |
| 2. Alternator | 12. Spark plug |
| 3. Fuse | 13. Stoplamp front switch |
| 4. Rectifier-regulator | 14. Stoplamp rear switch |
| 5. Handlebar switch | 15. Flasher |
| 6. Headlamp | 16. Tail lamp |
| 7. Ignition-light switch | 17. Generator signal lamp |
| 8. Connector (4) | 18. Direction signal pilot lamp |
| 9. High beam indicator lamp | 19. Direction signal lamp (4) |
| 10. Horn | |

COLOR KEY

(B) BLACK	(Y) YELLOW
(BE) BLUE	(V) VIOLET
(G) GREEN	(A) AZURE (Light Blue)
(BN) BROWN	(B/A) BLACK AND AZURE
(W) WHITE	(G/B) GREEN AND BLACK
(GY) GRAY	(W/B) WHITE AND BLACK
(R) RED	(R/B) RED AND BLACK



1973 and earlier X-90

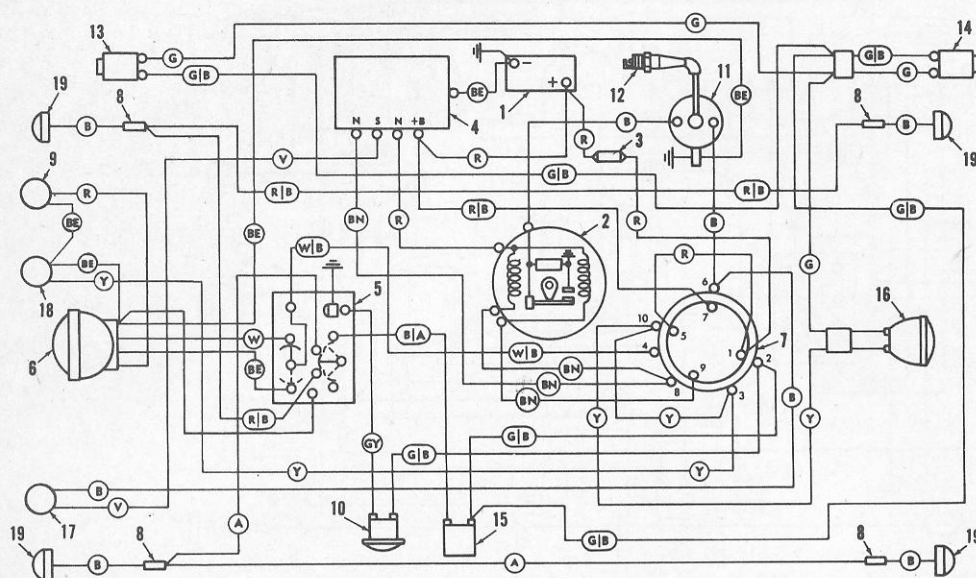
- | | |
|-----------------------------|--------------------------|
| 1. Magneto generator | 8. Stoplamp front switch |
| 2. Handlebar switch | 9. Stoplamp rear switch |
| 3. Headlamp | 10. Tail lamp |
| 4. High beam indicator lamp | 11. Terminal block |
| 5. Horn | 12. Connector |
| 6. Ignition coil | 13. Condenser |
| 7. Spark plug | |

COLOR KEY

(B) BLACK	(W) WHITE
(BE) BLUE	(R) RED
(G) GREEN	(Y) YELLOW
(BN) BROWN	(G) GREEN AND BLACK
(LBE) LIGHT BLUE	

Harley-Davidson Singles

Wiring Diagrams

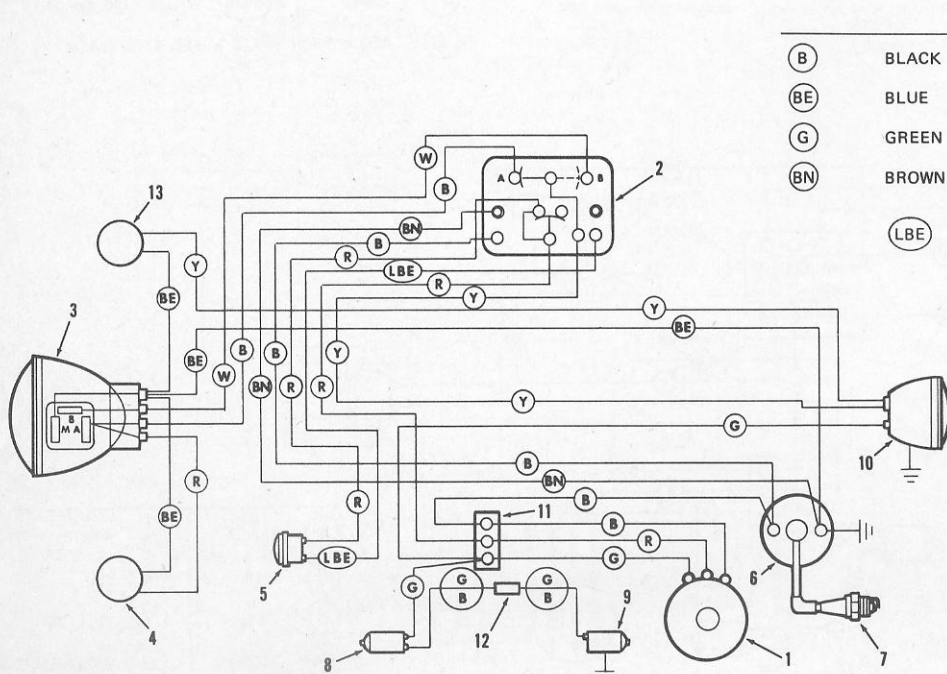


1974 Z-90

- | | |
|-----------------------------|-------------------------------|
| 1. Battery | 11. Ignition coil |
| 2. Alternator | 12. Spark plug |
| 3. Fuse | 13. Stoplamp front switch |
| 4. Rectifier-regulator | 14. Stoplamp rear switch |
| 5. Handlebar switch | 15. Flasher |
| 6. Headlamp | 16. Tail lamp |
| 7. Ignition-light switch | 17. Generator signal lamp |
| 8. Connector (4) | 18. Speedometer lamp |
| 9. High beam indicator lamp | 19. Direction signal lamp (4) |
| 10. Horn | |

COLOR KEY

- | | |
|-------|--------------------|
| (B) | BLACK |
| (BE) | BLUE |
| (G) | GREEN |
| (BN) | BROWN |
| (W) | WHITE |
| (GY) | GRAY |
| (R) | RED |
| (Y) | YELLOW |
| (V) | VIOLET |
| (A) | AZURE (Light Blue) |
| (B A) | BLACK AND AZURE |
| (G B) | GREEN AND BLACK |
| (W B) | WHITE AND BLACK |
| (R B) | RED AND BLACK |



1974 X-90

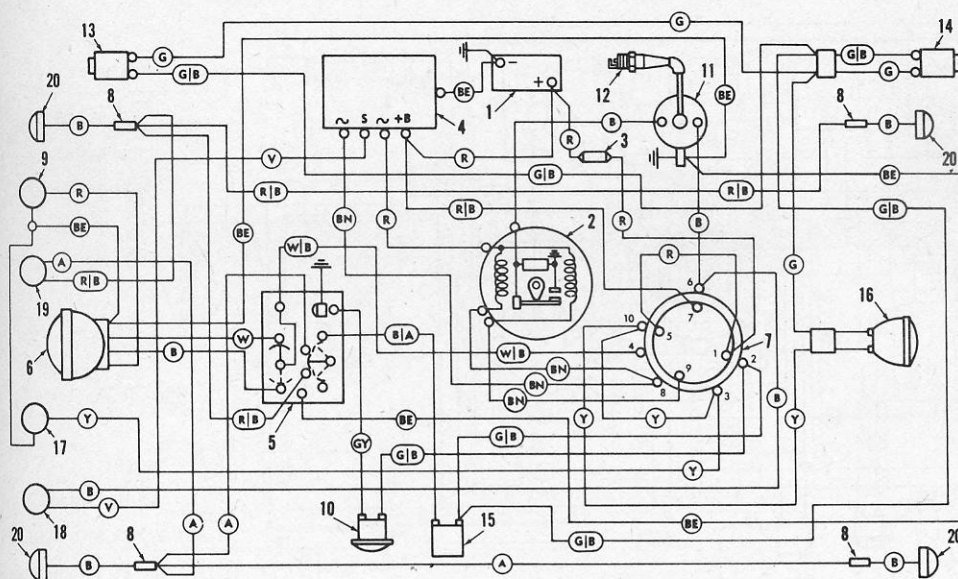
- | | |
|-----------------------------|--------------------------|
| 1. Magneto generator | 7. Spark plug |
| 2. Handlebar switch | 8. Stoplamp front switch |
| 3. Headlamp | 9. Stoplamp rear switch |
| 4. High beam indicator lamp | 10. Tail lamp |
| 5. Horn | 11. Terminal block |
| 6. Ignition coil | 12. Connector |
| | 13. Speedometer lamp |

COLOR KEY

- | | | | |
|-------|------------|-------|-----------------|
| (B) | BLACK | (W) | WHITE |
| (BE) | BLUE | (R) | RED |
| (G) | GREEN | (Y) | YELLOW |
| (BN) | BROWN | (G B) | GREEN AND BLACK |
| (LBE) | LIGHT BLUE | | |

Harley-Davidson Singles

Wiring Diagrams



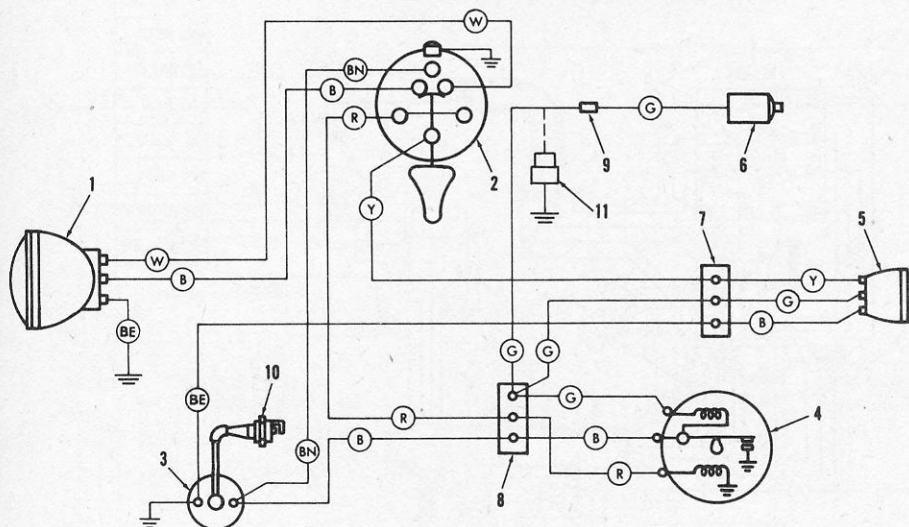
TX-125

- | | |
|-----------------------------|---------------------------------|
| 1. Battery | 11. Ignition coil |
| 2. Alternator | 12. Spark plug |
| 3. Fuse | 13. Stoplamp front switch |
| 4. Rectifier-regulator | 14. Stoplamp rear switch |
| 5. Handlebar switch | 15. Flasher |
| 6. Headlamp | 16. Tail lamp |
| 7. Ignition-light switch | 17. Speedometer lamp |
| 8. Connector (4) | 18. Generator signal lamp |
| 9. High beam indicator lamp | 19. Direction signal pilot lamp |
| 10. Horn | 20. Direction signal lamp (4) |

COLOR KEY

(B)	BLACK
(BE)	BLUE
(G)	GREEN
(BN)	BROWN
(W)	WHITE
(GY)	GRAY
(R)	RED
(Y)	YELLOW

(V)	VIOLET
(A)	AZURE (Light Blue)
(B/BE)	BLACK AND BLUE
(G/B)	GREEN AND BLACK
(R/BE)	RED AND BLUE
(W/B)	WHITE AND BLACK
(R/B)	RED AND BLACK



SR-100

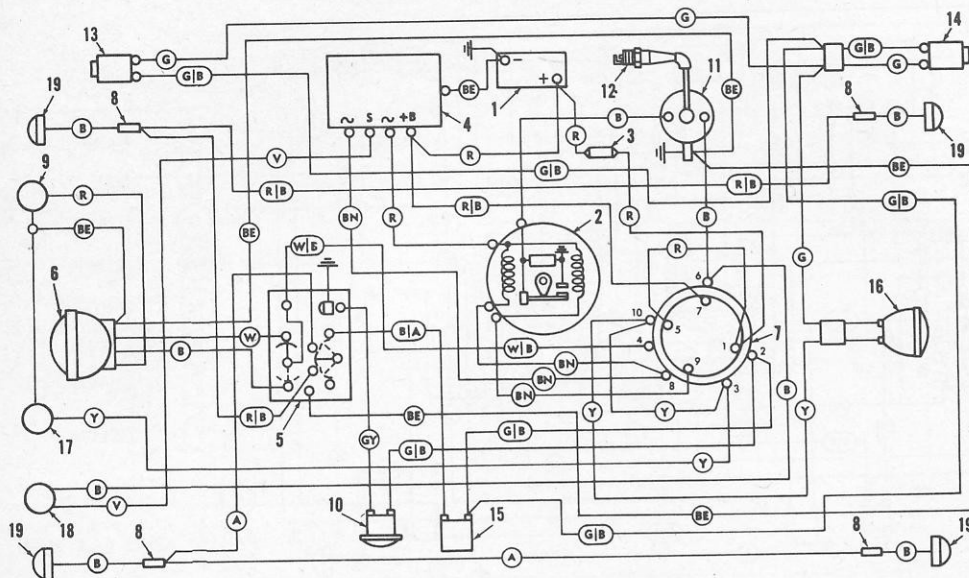
- | |
|----------------------------------|
| 1. Headlamp |
| 2. Handlebar switch |
| 3. Ignition coil |
| 4. Magneto-generator |
| 5. Tail lamp |
| 6. Stop lamp switch |
| 7. Terminal block |
| 8. Terminal block |
| 9. Connector |
| 10. Spark plug |
| 11. Emergency ignition connector |

COLOR KEY

(W)	WHITE
(Y)	YELLOW
(BN)	BROWN
(B)	BLACK
(R)	RED
(G)	GREEN
(BE)	BLUE

Harley-Davidson Singles

Wiring Diagrams



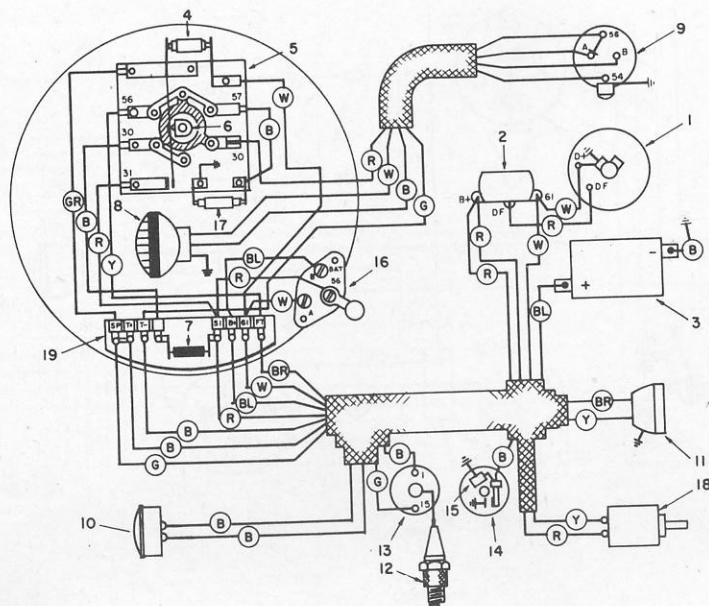
1974 SX-125

- | | |
|-----------------------------|-------------------------------|
| 1. Battery | 10. Horn |
| 2. Alternator | 11. Ignition coil |
| 3. Fuse | 12. Spark plug |
| 4. Rectifier-regulator | 13. Stoplamp front switch |
| 5. Handlebar switch | 14. Stoplamp rear switch |
| 6. Headlamp | 15. Flasher |
| 7. Ignition-light switch | 16. Tail lamp |
| 8. Connector (4) | 17. Speedometer lamp |
| 9. High beam indicator lamp | 18. Generator signal lamp |
| | 19. Direction signal lamp (4) |

COLOR KEY

- | | |
|------|--------|
| (B) | BLACK |
| (BE) | BLUE |
| (G) | GREEN |
| (BN) | BROWN |
| (W) | WHITE |
| (GY) | GRAY |
| (R) | RED |
| (Y) | YELLOW |

- | | |
|--------|--------------------|
| (V) | VIOLET |
| (A) | AZURE (Light Blue) |
| (B BE) | BLACK AND BLUE |
| (G B) | GREEN AND BLACK |
| (R BE) | RED AND BLUE |
| (W B) | WHITE AND BLACK |
| (R B) | RED AND BLACK |



1962 Model H, 1963 Models C & H

- | | | |
|--------------------------------|------------------------------------|-------------------------------|
| 1. Generator | 8. Headlamp unit | 14. Circuit breaker |
| 2. Regulator | 9. Headlamp dimmer and horn switch | 15. Condenser |
| 3. Battery (6v.) | | 16. Emergency starting switch |
| 4. Warning lamp (1.5 watts) | 10. Horn | 17. Speedometer lamp |
| 5. Ignition-light switch board | 11. Tail and stop lamp | 18. Stoplight switch |
| 6. Ignition-light switch | 12. Spark plug | 19. Terminal board |
| 7. Fuse (20 A) | 13. Ignition coil | |

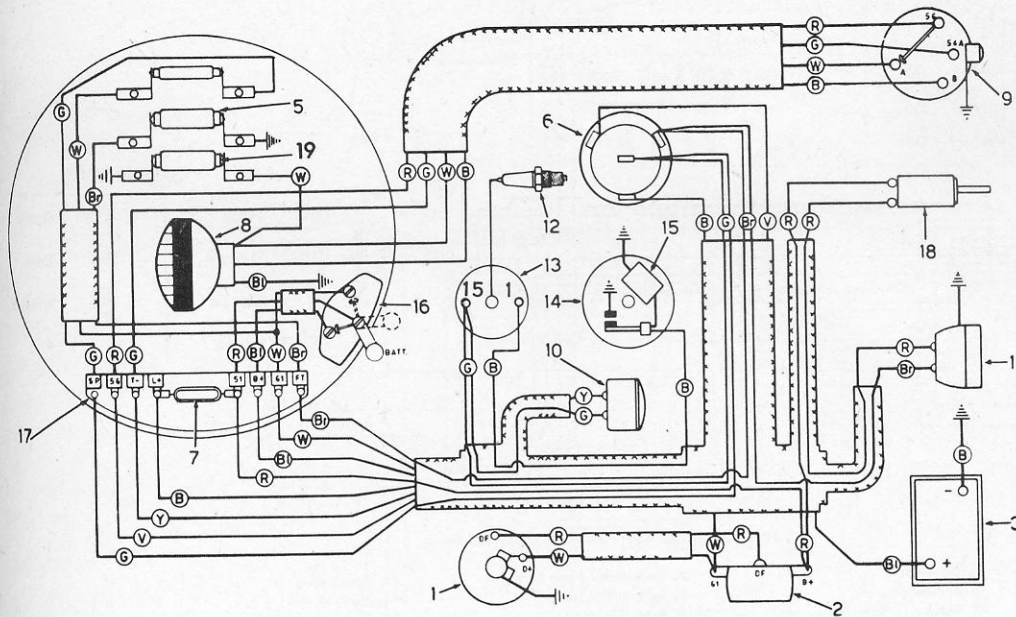
- | | |
|------|--------|
| (B) | BLACK |
| (BL) | BLUE |
| (G) | GREEN |
| (R) | RED |
| (W) | WHITE |
| (GR) | GREY |
| (BR) | BROWN |
| (Y) | YELLOW |

Harley-Davidson Singles

Wiring Diagrams

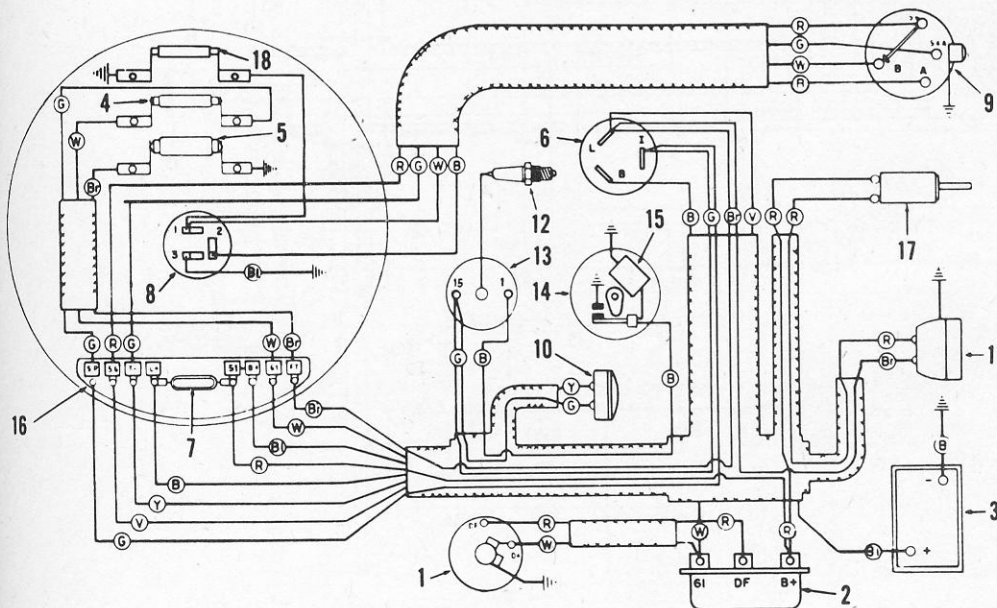
COLOR CODE

(B)	Black
(Bl)	Blue
(Br)	Brown
(G)	Green
(R)	Red
(V)	Violet
(W)	White
(Y)	Yellow



1964 to 1966 Models C and H

- | | | |
|-------------------------------|------------------------------------|------------------------------------------------|
| 1. Generator | 9. Headlamp dimmer and horn switch | 16. Emergency starting switch (1964 & earlier) |
| 2. Regulator | 10. Horn | 17. Terminal board |
| 3. Battery (6v.) | 11. Tail and stop lamp | 18. Stoplight switch |
| 4. Warning lamp (1.5 watts) | 12. Spark plug | 19. High beam indicator lamp (late 1966) |
| 5. Speedometer lamp (3 watts) | 13. H.T. ignition coil | |
| 6. Ignition-light switch | 14. Circuit breaker | |
| 7. Fuse (20 A) | 15. Condenser | |
| 8. Headlamp unit | | |



1967 Sprint H Wiring Diagram

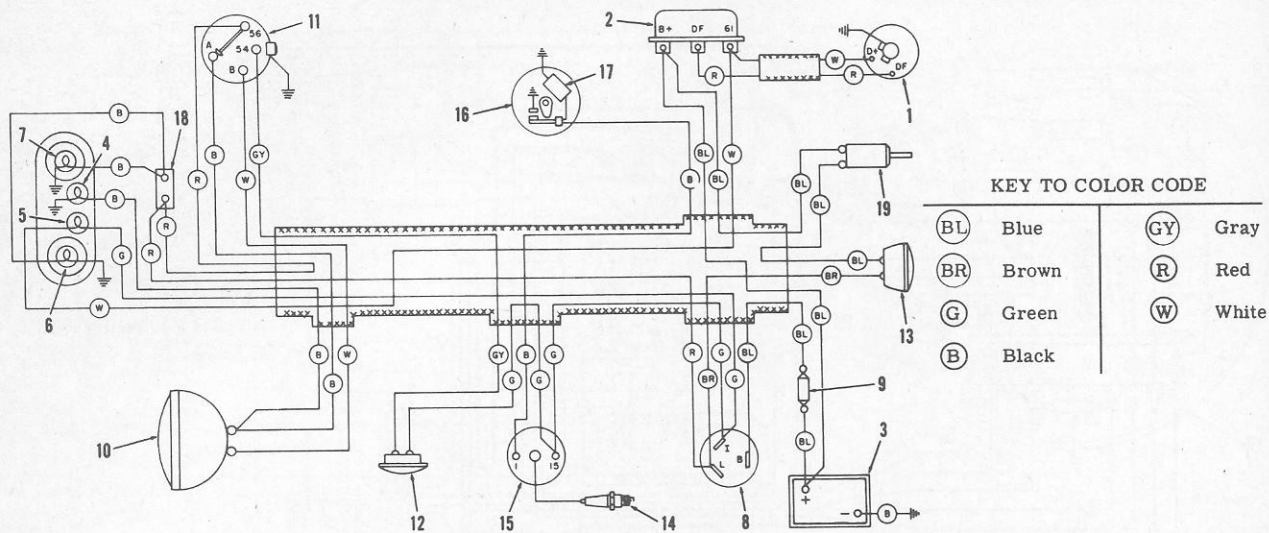
- | | | |
|-------------------------------|------------------------------------|-----------------------------------------|
| 1. Generator | 8. Headlamp unit | 14. Circuit breaker |
| 2. Regulator | 9. Headlamp dimmer and horn switch | 15. Condenser |
| 3. Battery (6 volt) | 10. Horn | 16. Terminal board |
| 4. Warning lamp (1.5 watts) | 11. Tail and stop lamp | 17. Stoplight switch |
| 5. Speedometer lamp (3 watts) | 12. Spark plug | 18. High beam indicator lamp (1.5 watt) |
| 6. Ignition-light switch | 13. H.T. ignition coil | |
| 7. Fuse (20 A) | | |

COLOR CODE

(R)	Red
(V)	Violet
(W)	White
(Y)	Yellow
(B)	Black
(Bl)	Blue
(Br)	Brown
(G)	Green

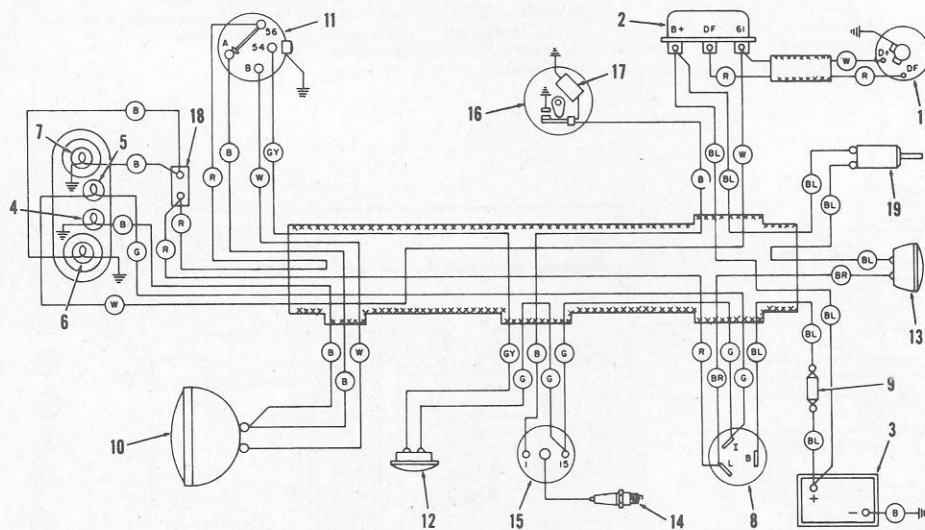
Harley-Davidson Singles

Wiring Diagrams



1967-68 Sprint SS Wiring Diagram

- | | | |
|-----------------------------------------|-------------------------------------|----------------------|
| 1. Generator | 7. Tachometer lamp (3 watts) | 14. Spark plug |
| 2. Regulator | 8. Ignition-light switch | 15. Ignition coil |
| 3. Battery (6 volts) | 9. Fuse (20 amp.) | 16. Circuit breaker |
| 4. High beam indicator lamp (1.5 watts) | 10. Headlamp | 17. Condenser |
| 5. Generator warning lamp (1.5 watts) | 11. Headlamp dimmer and horn switch | 18. Terminal strip |
| 6. Speedometer lamp (3 watts) | 12. Horn | 19. Stoplight switch |
| | 13. Tail and stop lamp | |



KEY TO COLOR CODE

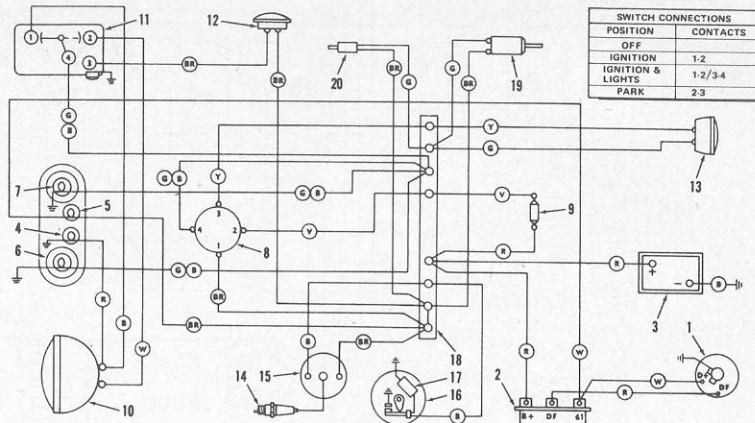
1969 Sprint SS Wiring Diagram

- | | | |
|-----------------------------------------|-------------------------------------|----------------------|
| 1. Generator | 7. Tachometer lamp (3 watts) | 14. Spark plug |
| 2. Regulator | 8. Ignition-light switch | 15. Ignition coil |
| 3. Battery (6 volts) | 9. Fuse (15 amp.) | 16. Circuit breaker |
| 4. High beam indicator lamp (1.5 watts) | 10. Headlamp | 17. Condenser |
| 5. Generator warning lamp (1.5 watts) | 11. Headlamp dimmer and horn switch | 18. Terminal strip |
| 6. Speedometer lamp (3 watts) | 12. Horn | 19. Stoplight switch |
| | 13. Tail and stop lamp | |

Harley-Davidson Singles

Wiring Diagrams

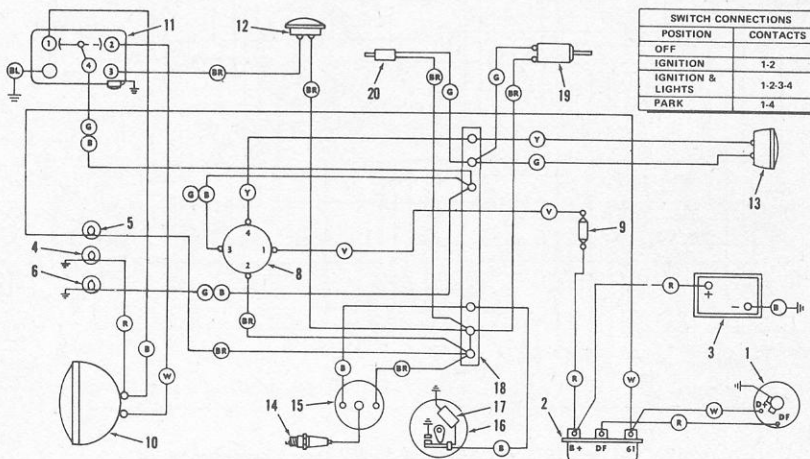
COLOR CODE KEY		
(BL) Blue	(B) Black	(W) White
(G) Green	(R) Red	(Y) Yellow
(BR) Brown	(GB) Green Black Tracer	(V) Violet



1970-71 Sprint SS Wiring Diagram

- | | | |
|-----------------------------------------|-------------------------------------|----------------------------|
| 1. Generator | 7. Tachometer lamp (3 watts) | 14. Spark plug |
| 2. Regulator | 8. Ignition-light switch | 15. Ignition coil |
| 3. Battery (6 volts) | 9. Fuse (15 amp.) | 16. Circuit breaker |
| 4. High beam indicator lamp (1.5 watts) | 10. Headlamp | 17. Condenser |
| 5. Generator warning lamp (1.5 watts) | 11. Headlamp dimmer and horn switch | 18. Terminal block |
| 6. Speedometer lamp (3 watts) | 12. Horn | 19. Stoplight rear switch |
| | 13. Tail and stop lamp | 20. Stoplight front switch |

COLOR CODE KEY		
(BL) Blue	(B) Black	(W) White
(G) Green	(R) Red	(Y) Yellow
(BR) Brown	(GB) Green Black Tracer	(V) Violet

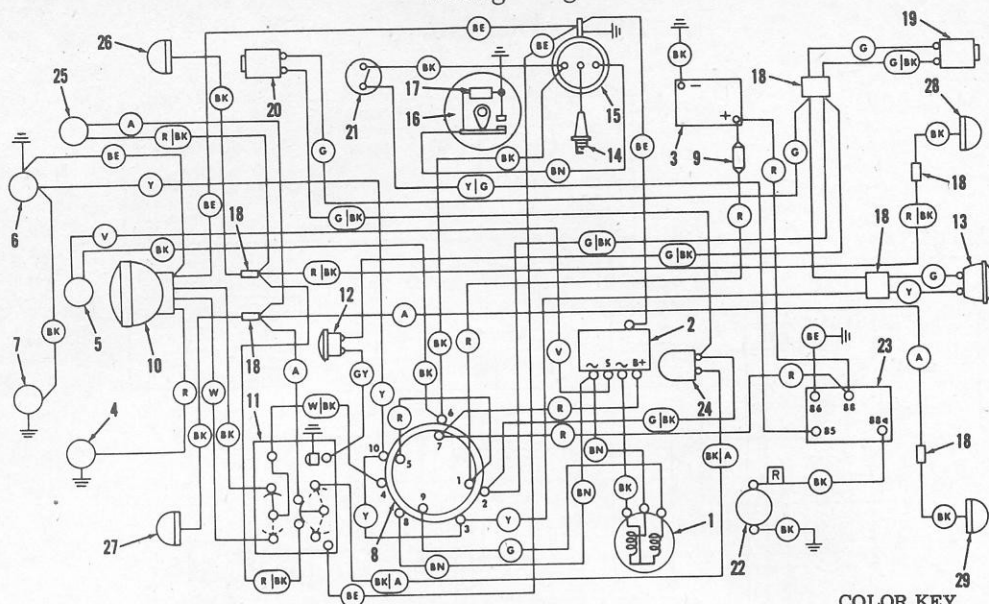


1971-72 Sprint SX, and 1972 SS Wiring Diagram

- | | | |
|-----------------------------------------|-------------------------------------|----------------------------|
| 1. Generator | 8. Ignition-light switch | 15. Ignition coil |
| 2. Regulator | 9. Fuse (15 amp.) | 16. Circuit breaker |
| 3. Battery (6 volts) | 10. Headlamp | 17. Condenser |
| 4. High beam indicator lamp (1.5 watts) | 11. Headlamp dimmer and horn switch | 18. Terminal block |
| 5. Generator warning lamp (1.5 watts) | 12. Horn | 19. Stoplight rear switch |
| 6. Speedometer lamp (3 watts) | 13. Tail and stop lamp | 20. Stoplight front switch |
| | 14. Spark plug | |

Harley-Davidson Singles

Wiring Diagrams

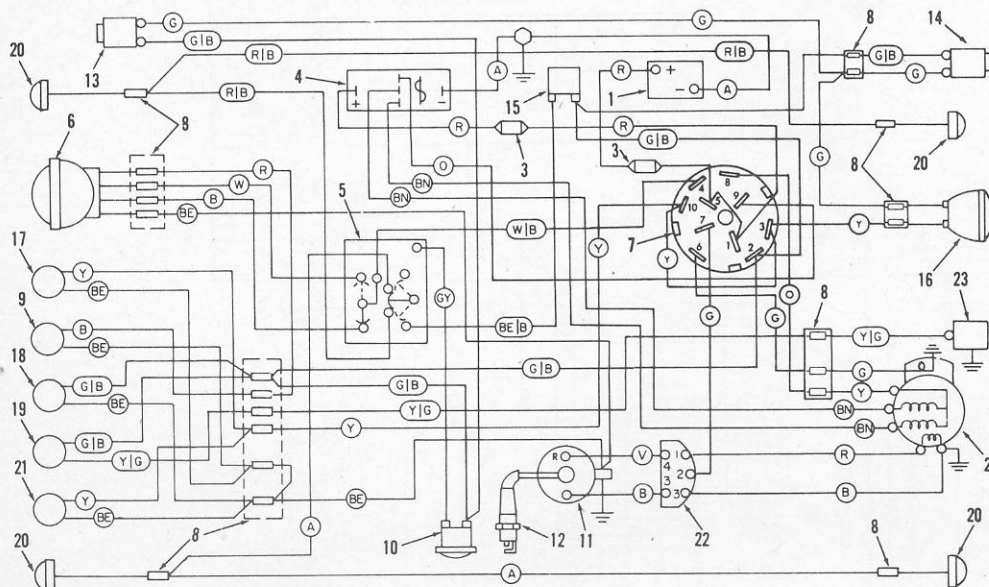


1973 Sprint SS/SX

- | | |
|--------------------------------------------------------|-------------------------------------------|
| 1. Alternator | 16. Ignition circuit breaker |
| 2. Rectifier-regulator | 17. Condenser |
| 3. Battery (12 volts) | 18. Connector |
| 4. High beam indicator lamp (3 watts) | 19. Stoplight rear switch |
| 5. Generator warning lamp (1.5 watts) | 20. Stoplight front switch |
| 6. Speedometer lamp (3 watts) | 21. Starter button |
| 7. Tachometer lamp (3 watts) (SS only) | 22. Starter motor |
| 8. Ignition-light switch | 23. Starter solenoid |
| 9. Fuse (25 amp.) | 24. Direction signal flasher |
| 10. Headlamp (35/35 watts) | 25. Direction signal pilot lamp (3 watts) |
| 11. Headlamp dimmer, horn, and direction signal switch | 26. Right-front signal lamp (21 watts) |
| 12. Horn | 27. Left-front signal lamp (21 watts) |
| 13. Tail and stop lamp (5/21 watts) | 28. Right-rear signal lamp (21 watts) |
| 14. Spark plug | 29. Left-rear signal lamp (21 watts) |
| 15. Ignition coil | |

COLOR KEY

(BK) BLACK	(V) VIOLET
(BE) BLUE	(A) AZURE (Light Blue)
(G) GREEN	(B A) BLACK AND AZURE
(BN) BROWN	(Y G) YELLOW AND GREEN
(W) WHITE	(W BK) WHITE AND BLACK
(GY) GRAY	(R BK) RED AND BLACK
(R) RED	(G BK) GREEN AND BLACK
(Y) YELLOW	



1974 and early 1975 SX175/250 and SS-250 Type A handlebar switch

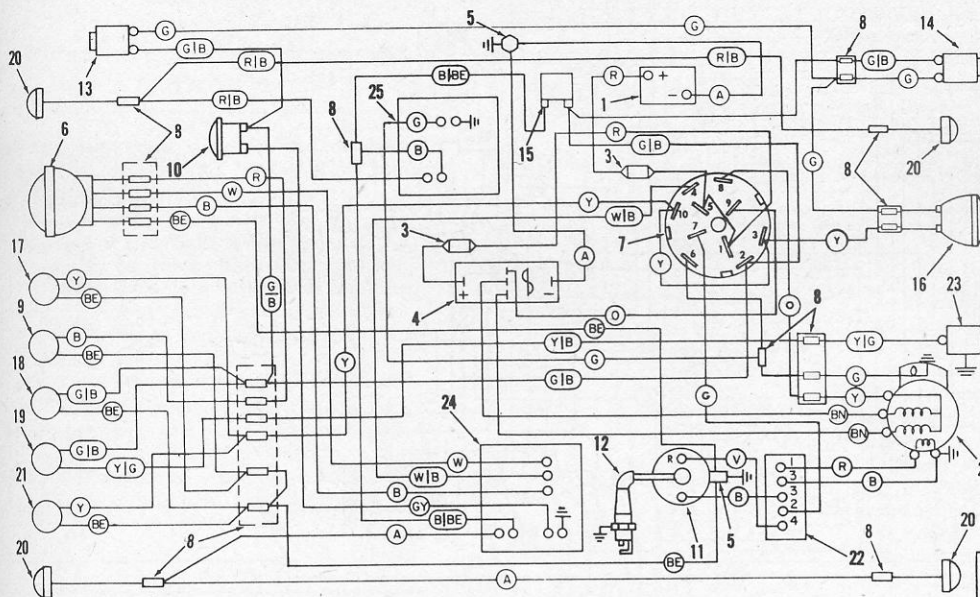
- | | | |
|------------------------------|-----------------------------|------------------------------|
| 1. Battery | 9. High beam indicator lamp | 17. Speedometer lamp |
| 2. Alternator | 10. Horn | 18. Ignition indicator lamp |
| 3. Fuse (15 amp.) | 11. Ignition coil | 19. Neutral indicator lamp |
| 4. Rectifier | 12. Spark plug | 20. Direction signal lamp |
| 5. Handlebar switch | 13. Stoplamp front switch | 21. Tachometer lamp |
| 6. Headlamp | 14. Stoplamp rear switch | 22. Ignition module |
| 7. Ignition-light key switch | 15. Flasher | 23. Neutral indicator switch |
| 8. Connector | 16. Tail lamp | |

COLOR KEY

(B) BLACK	(V) VIOLET
(BE) BLUE	(A) AZURE (Light Blue)
(G) GREEN	(B BE) BLACK AND BLUE
(BN) BROWN	(G B) GREEN AND BLACK
(W) WHITE	(W B) WHITE AND BLACK
(GY) GRAY	(R B) RED AND BLACK
(R) RED	(O) ORANGE
(Y) YELLOW	(Y G) YELLOW AND GREEN

Harley-Davidson Singles

Wiring Diagrams



Late 1975 SX-175/250 and SS-250 Type B handlebar switch (71505-73PA key switch)

1. Battery
2. Alternator
3. Fuse (15 amp.)
4. Rectifier
5. Frame bolt
6. Headlamp
7. Key switch
8. Connector
9. High beam indicator lamp

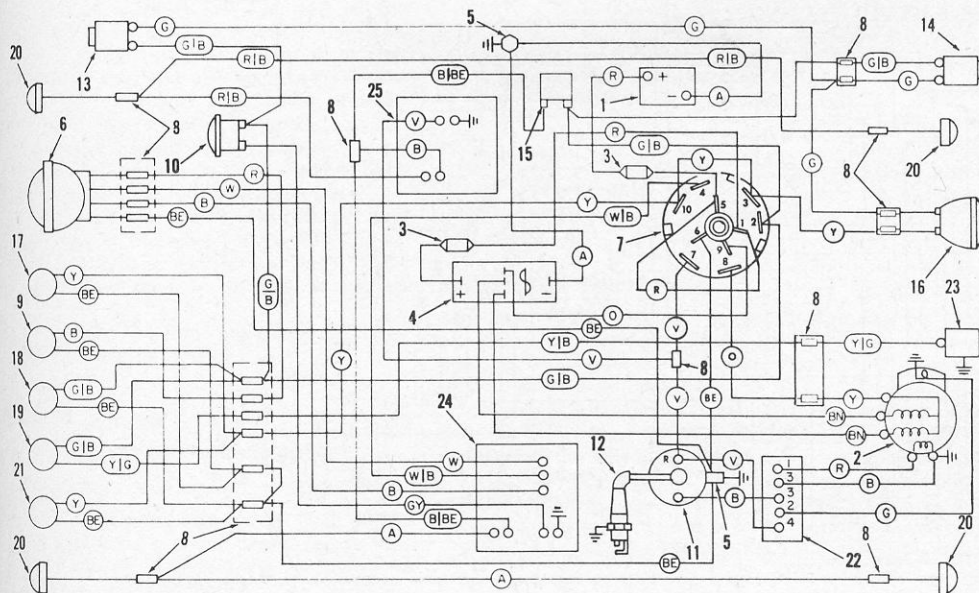
10. Horn
11. Ignition coil
12. Spark plug
13. Stoplamp front switch
14. Stoplamp rear switch
15. Flasher
16. Tail lamp
17. Speedometer lamp
18. Ignition indicator lamp

19. Neutral indicator lamp
20. Direction signal lamp
21. Tachometer lamp
22. Ignition module
23. Neutral indicator switch
24. Left handlebar switch
25. Right handlebar switch

COLOR KEY

- | | |
|------|--------|
| (B) | BLACK |
| (BE) | BLUE |
| (G) | GREEN |
| (BN) | BROWN |
| (W) | WHITE |
| (GY) | GRAY |
| (R) | RED |
| (Y) | YELLOW |

- | | |
|--------|--------------------|
| (V) | VIOLET |
| (A) | AZURE (Light Blue) |
| (B BE) | BLACK AND BLUE |
| (G B) | GREEN AND BLACK |
| (W B) | WHITE AND BLACK |
| (R B) | RED AND BLACK |
| (O) | ORANGE |
| (Y G) | YELLOW AND GREEN |



Late 1975 SX-175/250 and SS-250 Type B handlebar switch (71505-75P key switch)

1. Battery
2. Alternator
3. Fuse (15 amp.)
4. Rectifier
5. Frame bolt
6. Headlamp
7. Ignition-light key switch
8. Connector
9. High beam indicator lamp

10. Horn
11. Ignition coil
12. Spark plug
13. Stoplamp front switch
14. Stoplamp rear switch
15. Flasher
16. Tail lamp
17. Speedometer lamp
18. Ignition indicator lamp

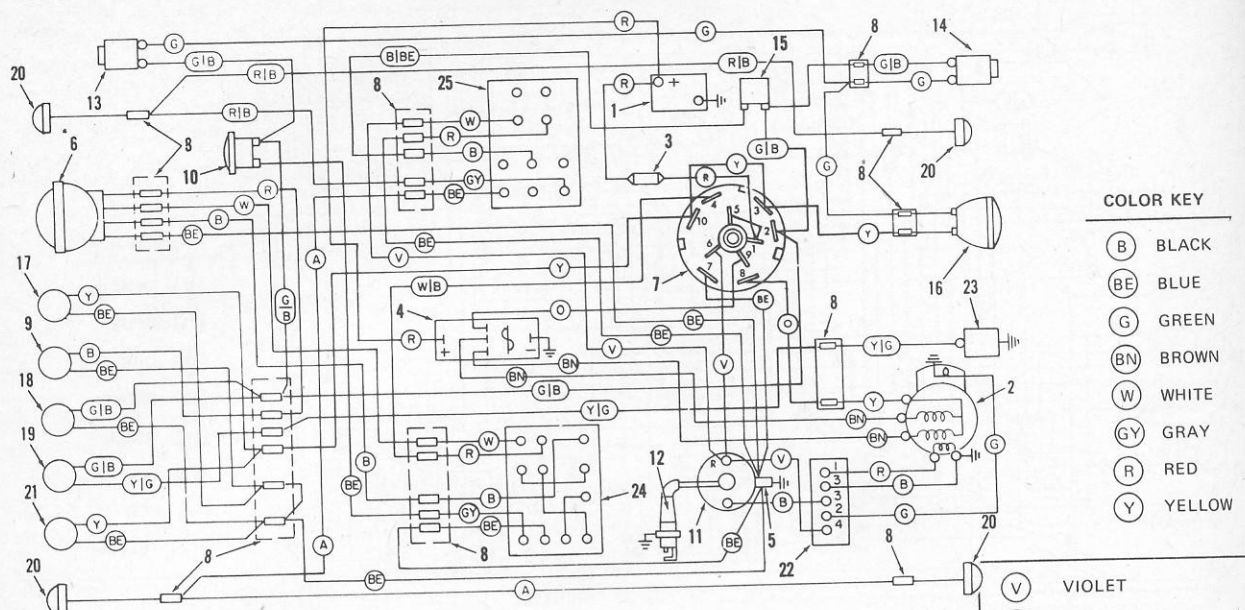
19. Neutral indicator lamp
20. Direction signal lamp
21. Tachometer lamp
22. Ignition module
23. Neutral indicator switch
24. Left handlebar switch
25. Right handlebar switch

COLOR KEY

- | | |
|--------|--------------------|
| (B) | BLACK |
| (BE) | BLUE |
| (G) | GREEN |
| (BN) | BROWN |
| (W) | WHITE |
| (GY) | GRAY |
| (R) | RED |
| (Y) | YELLOW |
| (V) | VIOLET |
| (A) | AZURE (Light Blue) |
| (B BE) | BLACK AND BLUE |
| (G B) | GREEN AND BLACK |
| (W B) | WHITE AND BLACK |
| (R B) | RED AND BLACK |
| (O) | ORANGE |
| (Y G) | YELLOW AND GREEN |

Harley-Davidson Singles

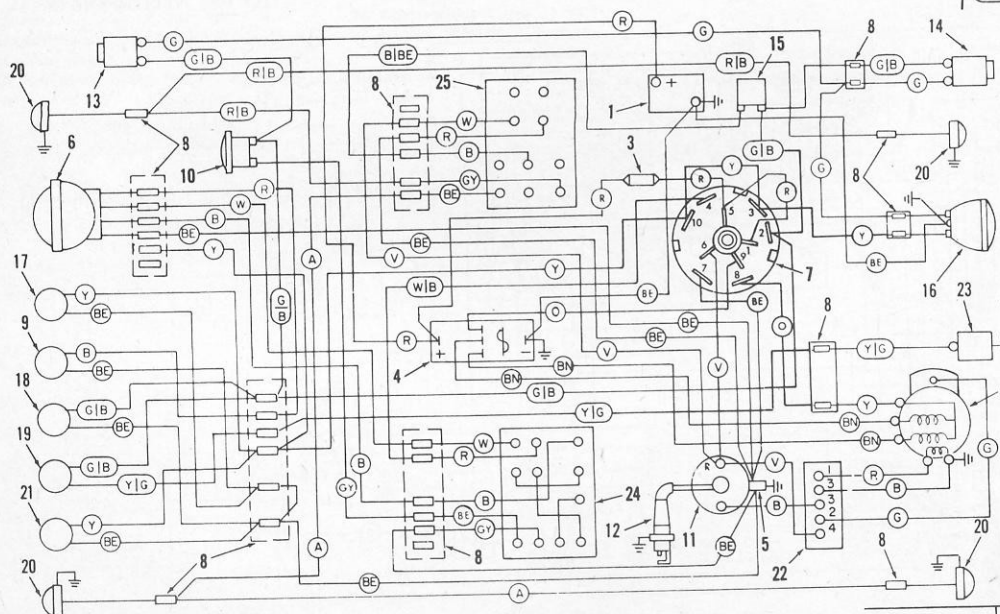
Wiring Diagrams



Late 1975 Type C handlebar switch (71505-75P or 71514-75P key switch)

- | | | |
|------------------------------|-----------------------------|------------------------------|
| 1. Battery | 10. Horn | 19. Neutral indicator lamp |
| 2. Alternator | 11. Ignition coil | 20. Direction signal lamp |
| 3. Fuse (15 amp.) | 12. Spark plug | 21. Tachometer lamp |
| 4. Rectifier | 13. Stoplamp front switch | 22. Ignition module |
| 5. Frame bolt | 14. Stoplamp rear switch | 23. Neutral indicator switch |
| 6. Headlamp | 15. Flasher | 24. Left handlebar switch |
| 7. Ignition-light key switch | 16. Tail lamp | 25. Right handlebar switch |
| 8. Connector | 17. Speedometer lamp | |
| 9. High beam indicator lamp | 18. Ignition indicator lamp | |

- | | |
|--------|--------------------|
| (V) | VIOLET |
| (A) | AZURE (Light Blue) |
| (B BE) | BLACK AND BLUE |
| (G B) | GREEN AND BLACK |
| (W B) | WHITE AND BLACK |
| (R B) | RED AND BLACK |
| (O) | ORANGE |
| (Y G) | YELLOW AND GREEN |



1976 SX/SS-175/250

- | | |
|------------------------------|------------------------------|
| 1. Battery | 14. Stoplamp rear switch |
| 2. Alternator | 15. Flasher |
| 3. Fuse (15 amp.) | 16. Tail lamp |
| 4. Rectifier | 17. Speedometer lamp |
| 5. Frame bolt | 18. Ignition indicator lamp |
| 6. Headlamp | 19. Neutral indicator lamp |
| 7. Ignition-light key switch | 20. Direction signal lamp |
| 8. Connector | 21. Tachometer lamp |
| 9. High beam indicator lamp | 22. Ignition module |
| 10. Horn | 23. Neutral indicator switch |
| 11. Ignition coil | 24. Left handlebar switch |
| 12. Spark plug | 25. Right handlebar switch |
| 13. Stoplamp front switch | |

- | | | | |
|------|--------|--------|--------------------|
| (B) | BLACK | (V) | VIOLET |
| (BE) | BLUE | (A) | AZURE (Light Blue) |
| (G) | GREEN | (B BE) | BLACK AND BLUE |
| (BN) | BROWN | (G B) | GREEN AND BLACK |
| (W) | WHITE | (W B) | WHITE AND BLACK |
| (GY) | GRAY | (R B) | RED AND BLACK |
| (R) | RED | (O) | ORANGE |
| (Y) | YELLOW | (Y G) | YELLOW AND GREEN |

Chassis

Drive

The large trail sprocket used on 1970 and later MLS and TX Models is put into operation in the following manner:

1. Disconnect the master link and wire the ends of the chain to the frame so the chain does not come off the front sprocket.
2. Remove the four bolts which hold the sprocket dowel pins in place against the standard sprocket and disconnect the drive chain.
3. Rotate the sprocket so the dowel pins seat in their respective holes in the standard sprocket, and secure the four bolts.
4. Add a short length of chain to the standard chain and secure the master link.
5. Adjust the chain and rear brake as described in the "Maintenance" section.

Wheels

M, MS, and 1973 Z-90

Front Wheel

REMOVAL AND INSTALLATION

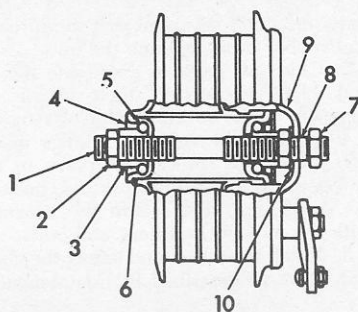
1. Block up the motorcycle so there is enough room to remove the front wheel. The machine must be well balanced.
2. Remove the axle nuts and washers from both sides of the axle, and let the wheel slip down and away from the forks.
3. Remove the speedometer drive unit from the axle and also remove the brake securing nut, spacer, and washer (if applicable) to free the front brake.
4. Installation is the reverse order of removal, taking care to have the side-plate slot straddle the fork side anchor boss.
5. Install the speedometer drive unit, then mount the wheel in the fork and secure it with the washers and nuts, taking care to seat the axle correctly in the fork side slots.
6. Adjust the front brake and check the axle nuts for tightness.

Wheel Bearings

REMOVAL AND INSTALLATION

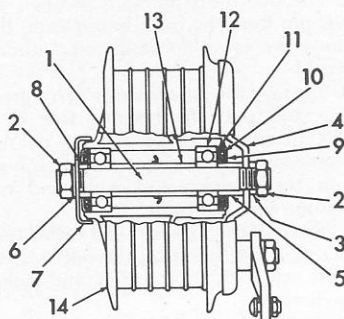
Cone Type Bearings

1. Remove the front wheel as described in the above section, loosen the locknut and bearing cone, and slip the axle from the hub.
2. Remove both sets of bearings, inspect the bearing cups for a worn, scored, or damaged condition, and, if they are in need of replacement, tap them out.
3. Inspect the dust covers for a worn or damaged condition and remove them only if in need of replacement.
4. Carefully tap the bearing cups into place in the hub, pack them with fresh grease, install the bearings (11 to a side), and install the dust cover.
5. Slip the axle into place, and replace the bearing cones and locknuts.



Cone type bearing assembly.

- | | |
|------------------|------------------------------|
| 1. Axle | 6. Bearing cup |
| 2. Locknut | 7. Outer locknut, brake side |
| 3. Bearing cone | 8. Outer spacer, brake side |
| 4. Dust cover | 9. Brake sideplate |
| 5. Ball bearings | 10. Inner washer, brake side |



Retained ball type bearing assembly.

- | | |
|----------------------------|----------------------------|
| 1. Axle, front wheel | 8. Spacer, left side |
| 2. Locknut (2) | 9. Retainer, felt seal (2) |
| 3. Spacer, sideplate outer | 10. Felt seal (2) |
| 4. Brake sideplate | 11. Seal washer (2) |
| 5. Spacer, sideplate inner | 12. Ball bearing (2) |
| 6. Washer, left side | 13. Spacer |
| 7. Dust shield | 14. Hub, front wheel |

6. Adjust the bearings as described in "Maintenance."

Retained Ball Type Bearings

1. Remove the locknut, spacer, brake side-plate, and inner spacer to free the axle, and remove the axle with the left-side locknut, dust shield, and spacer.
2. Carefully pry the felt seal retainers from the hub with a suitable screwdriver, and remove the felts and washers.
3. Tap the bearings out from their respective opposite sides, and remove the bearing spacer.
4. Install the spacer in the hub, then press the bearings into the hub until the outer races bottom on the hub shoulders.
5. Assemble the seal washers, felts, and the felt seal retainers to the hub. When tapping in the retainers, take care to do so evenly to avoid damaging them.
6. Continue the assembly procedure in the reverse order of disassembly.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect all parts for a worn or damaged condition, paying particular attention

to the cones, cups, and bearings. If any of the bearings are in need of replacement or if any are lost, they must be replaced as a complete set. Always repack the bearings in fresh grease before reinstallation in the hubs.

3. Inspect the brake shell and shoes for a worn, damaged, or glazed condition, and repair or replace them as directed in the "Brakes" section.

Rear Wheel

REMOVAL AND INSTALLATION

1. Block up the rear wheel of the motorcycle so there is enough room to allow removal of the rear wheel. Make sure the machine is well balanced.
2. Disconnect the drive chain master link and wire the chain to the frame to keep it from coming off the front sprocket.
3. Remove the brake rod adjusting nut and disconnect the brake rod from the brake actuating lever.
4. Loosen the axle nuts and slip the wheel out the back of the frame along with the adjusting mechanism.
5. Install the wheel in the reverse order of removal, making sure that the wheel is aligned in the fork, and that the chain and rear brake are adjusted.

Wheel Bearings

1. Consult the "Wheel Bearings" section under "Front Wheel" for removal, installation, and inspection procedures.

ML, MLS, MSR, SR, SS/TX 125, AND 1974 AND LATER Z-90

Front Wheel

REMOVAL AND INSTALLATION

1. Block up the motorcycle so there is enough room to remove the front wheel, making sure the machine is well balanced.
2. Remove the axle nut and washer, loosen the axle pinch bolt located on the fork leg, and tap on the right side of the axle with a soft mallet to get the axle started out. Pull the axle the rest of the way out while holding the wheel steady with one hand.
3. Remove the speedometer drive unit from the left side and slip the wheel down and out of the forks.
4. Remove the brake side-plate and the wheel hub spacers.
5. Installation is basically the reverse order of removal.
6. Position the brake side-plate so the side-plate slot engages the fork leg anchor boss.
7. Slip the stepped spacer on the speedometer drive unit side and the thinner spacer on the brake side. Position the brake side-plate and the speedometer drive unit on the hub and slip a thin washer between the drive unit and the fork leg.
8. Juggle the wheel assembly into place, and insert the axle from the left side. Secure the axle washer and nut on the right side, remove the bike from the blocks, and pump the forks up and down to center the fork legs.
9. Secure the axle pinch bolt and adjust the brake as described in "Maintenance."

Harley-Davidson Singles

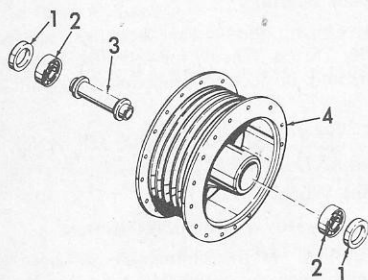
Rear Wheel

REMOVAL AND INSTALLATION

1. Block up the motorcycle so there is enough room to remove the wheel, making sure the machine is well balanced.
2. Remove the drive chain master link and wire the chain ends to the frame to keep the chain from coming off the front sprocket.
3. Remove the brake adjusting nut and remove the cable from the actuating lever.
4. Remove the axle nut, washer, adjusting cam, axle, and wheel. The axle may be tapped out with a soft mallet.
5. Installation is in the reverse order of removal.
6. Slip the shorter spacer into place between the brake side-plate and the right-side wheel bearing, and the longer spacer between the axle clip and the left-side wheel bearing. The brake side-plate slot must engage the fork anchor stud.
7. Secure the axle washer and nut and adjust the chain and brake as described in "Maintenance."

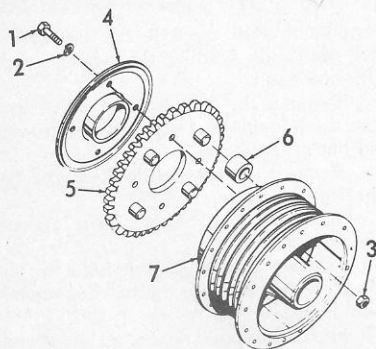
Wheel Bearings

1. Consult the "Wheel Bearings" section under M, and MS models for removal, installation, and inspection procedures.



Front hub assembly.

- | | |
|---------------------|-------------------|
| 1. Dust cover (2) | 3. Bearing spacer |
| 2. Ball bearing (2) | 4. Wheel hub |



Rear hub and sprocket assembly.

- | | |
|--------------------|-----------------------|
| 1. Bolt (4) | 5. Sprocket |
| 2. Lock washer (4) | 6. Rubber bushing (4) |
| 3. Nut (3) | 7. Wheel hub |
| 4. Outer disc | |

Rear Sprocket Removal and Installation

1. Remove the rear wheel as described in the rear wheel "Removal and Installation" section.
2. Remove the hub bolts, lockwashers,

nuts, and outer disc, and pull the sprocket and rubber bushings from the hub.

3. Clean all parts in a suitable solvent and blow them dry, then install the sprocket in the reverse order of removal.

4. Position the rubber bushings in the hub, place the sprocket in place so the dowel pins engage the bushings, position the outer disc, and secure the assembly with the nuts, lockwashers, and bolts.

5. Install the wheel and adjust the chain and brake as described in "Maintenance."

S AND B MODELS

Front Wheel

REMOVAL AND INSTALLATION

1. Block up the motorcycle so there is enough room to remove the front wheel, making sure the machine is well balanced.
2. Remove the cotter pin, washer, and clevis pin from the front brake lever, then remove the lower locknut and withdraw the cable.
3. Remove the speedometer drive grease fitting and pull the housing free of its socket to remove the cable. Do not lose the speedometer drive gear which is a slip fit on the speedometer cable and may come out with the cable.
4. Remove the axle nut and lockwasher, loosen the pinch bolt on the left side, tap out the axle with a soft mallet, and remove the wheel.
5. Repack the wheel bearings with fresh grease before replacing the wheel which is done in the reverse order of removal.
6. Make sure the brake side-plate torque pin engages the fork anchor stud.
7. Lubricate the speedometer drive unit and adjust the front brake as described in "Maintenance."

Wheel Bearings

REMOVAL AND INSTALLATION

1. Remove the front wheel as described in the above section.
2. Remove the bearing grease retainer, retainer felt seal, bearing inner race, and unscrew and remove the bearing locknut.
3. Carefully drift out the bearing with a suitable drift from the opposite side of the hub, if necessary, and remove the bearing spacer.
4. Invert the hub and drift out the needle bearing from the opposite side of the hub using a suitable drift.
5. Pack the ball bearing in fresh grease and carefully press it into place in the hub until seated against the hub shoulder.
6. Install the bearing locknut, slip the

bearing spacer into place, and press the needle bearing into place until seated against the remaining hub shoulder. When pressing on the bearing make sure only to press on the printed side.

7. Grease the bearing and insert the inner race, then install the grease retainer felt seal and the retainer.

8. Mount the wheel and adjust the brake as described in the front wheel "Removal and Installation" section.

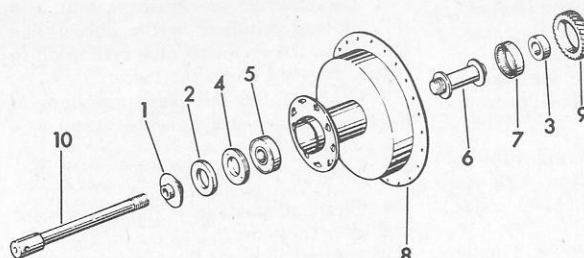
INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the bearings for a worn, pitted, burned, or damaged condition, excessive side or radial play, or rough motion and replace them as necessary.
3. Inspect the brake shell and shoes for a worn, scored, glazed, or otherwise damaged condition and replace or repair them as described in the "Brakes" section.
4. Inspect the speedometer drive gear for wear or damage, especially to the gear teeth. The Speedometer drive gear can be removed for replacement with Sprocket Shaft Extension Puller (H-D part no. 96015-56) or a suitable substitute, and the Sprocket Shaft Extension Collar. A suitably sized press plug will have to be used, and the plug must allow sufficient clearance so the gear can move over it. Press the gear flush with the face of the hub when replacing it.

Rear Wheel

REMOVAL AND INSTALLATION

1. Block up the motorcycle so there is enough room to remove the rear wheel, making sure the machine is well balanced.
2. Disconnect the master link and wire the chain to the frame to prevent it from running off the front sprocket.
3. Loosen the rear wheel adjusting stud nuts on both sides, disconnect the brake rod at the lever, loosen the right-side axle nut until the adjusting studs can be removed from their slots in the sides of the frame, and remove the rear wheel.
4. Remove the axle nuts, lockwashers, adjusting studs, the right side spacer (1963 and later models), and the brake side-plate.
5. Installation is in the reverse order of removal.
6. Repack the wheel bearings before replacing the wheel. To do this, the felt seals will have to be removed.
7. Make sure the brake side-cover slot engages the fork leg anchor stud, and adjust the chain and brake as described in "Maintenance" after the wheel is mounted.



Front hub assembly.

- | |
|------------------------------|
| 1. Bearing grease retainer |
| 2. Grease retainer felt seal |
| 3. Bearing inner race |
| 4. Bearing lock nut |
| 5. Ball bearing |
| 6. Bearing spacer |
| 7. Needle bearing |
| 8. Front wheel hub |
| 9. Speedometer drive gear |
| 10. Front wheel axle |

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Wheel Bearings

REMOVAL AND INSTALLATION

NOTE: The Model 165 hub is not interchangeable with the hubs used on the B Models.

1. Remove the rear wheel as described in the above section.

2. Remove the bearing grease retainer and the left and right felt seals, then screw off the bearing locknut.

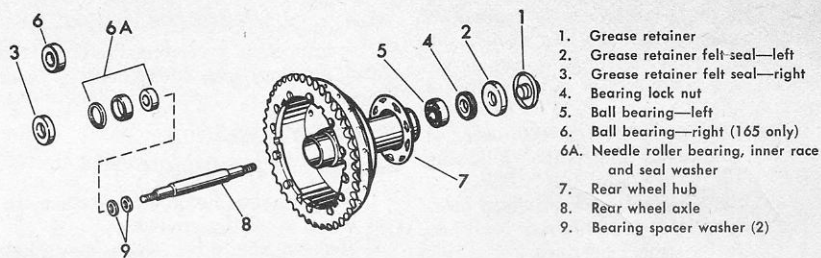
3. Drift out the left and right ball bearings (only the Model 165 has a right-side bearing), if necessary, from the opposite sides of the hub, and drift out the needle roller bearing, inner race, and washer on Hummer and Super-10 models.

4. Pack the left-side bearing with grease and carefully press it into place against the hub shoulder until seated, and secure it with the bearing locknut.

5. Slip two washers onto the sprocket side of the rear axle, and slip the axle into place in the hub.

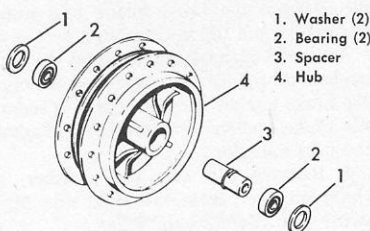
6. Pack the left bearing or the needle bearing (whichever is applicable) with grease and press it into place in the hub until seated.

7. Mount the felt seals and the felt seal retainer, then install the rear wheel as described in the "Rear Wheel Removal and Installation" section.

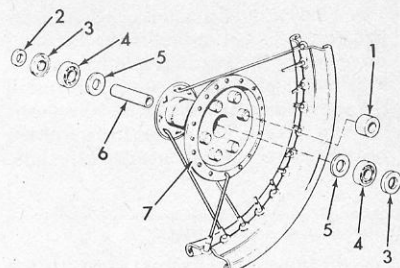


Rear hub assembly.

Tighten the axle nut before the slider pinch-bolts. Torque the axle nut to 56-59 ft lbs.



Front hub assembly SX/SS-175/250



Rear hub assembly (steel hub)

- | | |
|--------------------|---------------|
| 1. Coupling (6) | 5. Washer (2) |
| 2. Spacer | 6. Spacer |
| 3. Felt washer (2) | 7. Wheel |
| 4. Bearing (2) | |

Wheel Bearings

REMOVAL AND INSTALLATION

1. Remove the wheel.
2. Remove the speedometer drive, and the brake plate. Note the location of any washers or spacers.

3. Using a thin screwdriver, pry the washers out of either side of the hub.

4. Remove the wheel bearings by reaching through the center of the hub with a long drift and tapping one of the bearings evenly around its circumference until it is removed. Be careful not to turn the bearing sideways in its seat on removal as there is danger of causing damage to the hub.

5. When either bearing is removed, the spacer tube can be removed from the hub. After removing the spacer tube, remove the other bearing in the same manner as the first.

6. Installation is in the reverse order of removal; however, note the following points:

a. Obtain a good grade of wheel bearing grease (such as Lithium or Moly) to lubricate the wheel bearings.

b. Pack the wheel bearings until they are completely filled.

c. Place a small amount of wheel bearing grease to the inside of the hub and drive one of the bearings into its seat. Install the retainer if so equipped. Install the spacer tube and drive the other bearing into its seat. The sealed surface of the bearing must face the outside of the hub.

INSPECTION

1. Clean the bearings and spacer tube in a suitable solvent, removing all of the old grease. At this point, it would be wise to clean out the hub as well.

2. Check the bearing bosses in the hub for scuffs, cracks, or distortion. If they are in any way damaged, the hub must be replaced.

3. Check the condition of the spacer tube, and replace it if damaged.

4. Bearing condition is very important. Check the balls themselves for pitting, wear, or rust.

5. Apply a few drops of light oil to the bearing and spin it. The bearing must rotate smoothly and freely. Any roughness or binding in rotation will necessitate a new bearing.

6. Note that the bearings must be replaced in pairs.

Rear Wheel

REMOVAL AND INSTALLATION

NOTE: The following procedure is to remove the wheel only. To remove the brake and sprocket assembly, refer to "Sprocket Assembly" following.

1. Support the motorcycle so that the rear wheel is off the ground.

2. Remove the axle nut, washer, and chain adjuster from the right-side of the swing arm.

3. Pull the axle out from the left-side. If necessary, tap the right-side of the axle with a plastic mallet to free it up.

4. Remove the spacer from the right-side of the hub.

5. Pull the wheel over to the right-side of the swing arm to free it from the sprocket assembly, then remove it.

6. Install the wheel by reversing the removal procedure.

Wheel Bearings

REMOVAL AND INSTALLATION (STEEL HUB)

1. Remove the wheel as described above.
2. Remove the rubber coupling from the hub or sprocket assembly.

3. Pry the small spacer from the right-side of the hub. Remove the felt dust seals from either side of the hub.

4. Tap the bearings out of the hub from the opposite side of the hub using a long

Rear Sprocket Removal and Installation

1. Remove the wheel from the bike as described in the "Rear Wheel Removal and Installation" section.

2. Center-punch the rivet heads from the outside sprocket face, then drill them out. Punch the rivets out and install the new sprocket using the bolts which come with the replacement kit. Drilling is not necessary.

3. Install the wheel and adjust the chain and brake as described in the "Rear Wheel Removal and Installation" section.

SS/SX 175/250

Front Wheel

REMOVAL AND INSTALLATION

1. Support the front wheel off the ground by placing a crate or another suitable object beneath the engine.

2. Remove the fitting from the lower end of the brake cable, and withdraw the cable from the brake plate.

3. Remove the axle nut and the washer behind it. Remove the nut securing the brake anchor to the brake plate.

4. Loosen the fork slider pinch-bolt(s). Note that some models have only one pinch-bolt on the right-side while others have one fitted to either fork leg.

5. Using a plastic mallet, tap the axle lightly on the left-side to free it up. Remove the axle and withdraw the wheel.

6. Installation is the reverse of removal. Be sure that the tab on the speedometer drive is fitted to the hole in the hub.

Harley-Davidson Singles

drift. Tap the bearing evenly around its circumference so that it comes straight out of its seat. After the first bearing is removed, remove the spacer in the center of the hub.

5. Installation is in the reverse order of removal; however, note the following points:

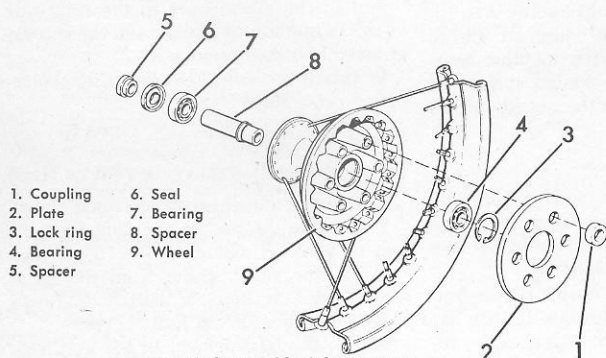
- Obtain a good grade of wheel bearing grease (such as Lithium or Moly) to lubricate the wheel bearings.
- Pack the wheel bearings until they are completely filled.
- Place a small amount of wheel bearing grease to the inside of the hub and drive one of the bearings into its seat. Install the retainer if so equipped. Install the spacer tube and drive the other bearing into its seat. The sealed surface of the bearing must face the outside of the hub.

Removal and Installation

REMOVAL AND INSTALLATION (ALUMINUM HUB)

- Remove the wheel.
- Remove the rubber coupling from the hub or sprocket assembly.
- Remove the plate from the right-side of the hub.
- Remove the snap-ring from the right-side of the hub and pull the right wheel bearing from the hub. Remove the center spacer from inside the hub.
- Remove the short spacer from the left-side of the hub, and pry out the seal beneath it. Take care that the seal is not damaged if it must be reused.
- The left wheel bearing can be removed by tapping it out from the right-side. Do not allow it to become cocked in its seat on removal as the hub may be damaged.
- Installation is in the reverse order of removal; however, note the following points:

- Obtain a good grade of wheel bearing grease (such as Lithium or Moly) to lubricate the wheel bearings.
- Pack the wheel bearings until they are completely filled.
- Place a small amount of wheel bearing grease to the inside of the hub and drive the right wheel bearing into its seat. Install the snap-ring into the right-side of the hub. Install the center spacer into the hub and drive the left wheel bearing into its seat. The sealed surface of the bearing must face the outside of the hub.



Rear hub assembly (aluminum hub)

INSPECTION

For inspection procedures refer to the wheel bearing inspection under "Front Wheel."

SPROCKET ASSEMBLY

Removal and Installation

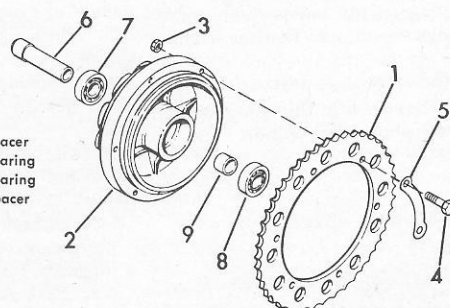
- Support the motorcycle so that the rear wheel is off the ground.
- Remove the drive chain masterlink spring clip, cover plate, and masterlink. Remove the drive chain from the rear sprocket. The chain need not be removed from the countershaft sprocket.
- Unscrew the nut from the end of the brake cable. Unscrew the brake adjuster fitting from the brake plate, and remove the cable from the brake plate.
- Remove the nut securing the brake anchor to the brake plate and disengage the brake anchor. Remove the bolt securing the brake anchor to the frame and remove the brake anchor.
- Remove the axle nut, washer, and chain adjuster from the right-side of the swing arm. Remove the axle.
- Remove the wheel and sprocket assembly from the swing arm as a unit. Pry the sprocket from the hub.
- Installation is in the reverse order of removal.

SPRINT MODELS

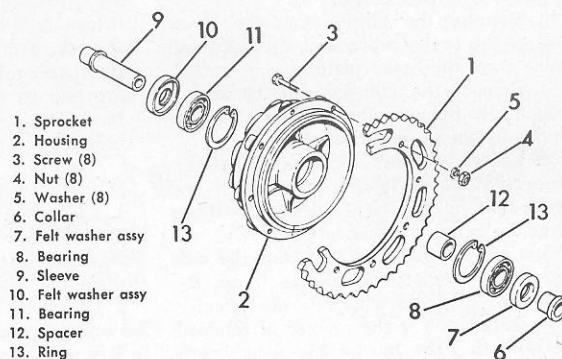
Front Wheel

REMOVAL AND INSTALLATION

- Block up the front end of the bike so there is enough room to remove the front wheel, making sure the machine is well balanced.
- Remove the axle nut and washer from the left side, and loosen the pinch bolt on the right side.



Sprocket assembly (aluminum hub)



Sprocket assembly (steel hub)

3. Remove the anchor arm nut and washer from the anchor stud, then remove the upper arm cap screws and remove the anchor arm.

4. Tap the axle out with a soft mallet while supporting the wheel with one hand, then remove the speedometer drive unit from the hub and allow the wheel to slip down and out of the forks.

5. Remove the brake side-plate and the thick and thin spacers from the hub.

6. Installation is in the reverse order of removal.

7. Position the thin spacer on the brake side of the hub, and the thicker spacer on the speedometer drive side. Mount the brake side-plate and the speedometer drive unit on the hub, and slip the axle into position from the right side.

8. Position the anchor arm on its stud and secure it with the anchor arm nut and washer, then tighten the upper anchor arm cap screws.

9. Position the axle washer on the axle with the chamfered side facing out and secure the axle nut. Remove the bike from the blocks and vigorously pump the forks to align the fork legs, then secure the pinch bolt.

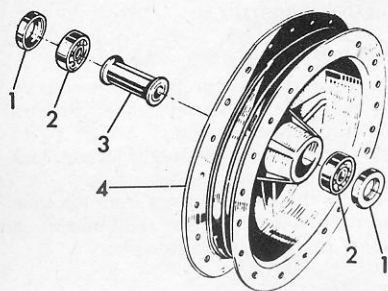
10. Adjust the front brake as described in "Maintenance."

Wheel Bearings

REMOVAL AND INSTALLATION

- Remove the front wheel as described in the above section.
- Drift out the dust cover from the opposite side of the hub, then pull the bearing out with Puller (H-D part no. 96729-63) or a suitable substitute, but only if replacement is necessary.
- Remove the bearing spacer, invert the hub, and remove the other dust cover and bearing in the same manner.

Harley-Davidson Singles



Front wheel hub assembly.

- | | |
|---------------------|-------------------|
| 1. Dust Cover (2) | 3. Bearing Spacer |
| 2. Ball Bearing (2) | 4. Wheel Hub |

4. Press the new bearing in place until it is seated against the hub shoulder, then press the dust cover into place against the bearing, after making sure the dust seal is in place in the cover.

5. Invert the hub and install the bearing spacer, then press the remaining bearing into place until seated against the spacer, and press the dust cover into place until seated against the bearing in the same manner as the first.

6. Mount the wheel and adjust the brake as described in the front wheel "Removal and Installation" section.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.
2. Inspect the bearings for a worn, pitted, or damaged condition, or rough motion, and replace them as necessary. Always repack the open type bearings before installing them. (Late models have sealed bearings which require no attention.)
3. Inspect the dust seals inside the dust cover for a worn, dirty, or damaged condition, and replace them as necessary.
4. Inspect the brake shell and shoes for a worn, scored, grooved, glazed, or otherwise damaged condition and replace them as necessary as described in the "Brakes" section.

Rear Wheel

REMOVAL AND INSTALLATION

1. Block up the motorcycle so there is enough room to remove the rear wheel, making sure the machine is well balanced.
2. Disconnect the drive chain and wire it to the frame to prevent it from coming off the front sprocket.
3. Remove the brake adjusting nut and disengage the brake rod from the actuating lever, remove the brake anchor arm nut and washer, then slip the arm from the brake side-plate stud.
4. Remove the axle nut and washer, then tap out the axle with a soft mallet while holding the chain adjuster against the swing arm to prevent it from binding the axle. Allow the wheel to fall down between the forks and roll it clear.
5. Remove the brake side-plate and spacer.
6. Installation is in the reverse order of removal. Make sure the spacer washer is

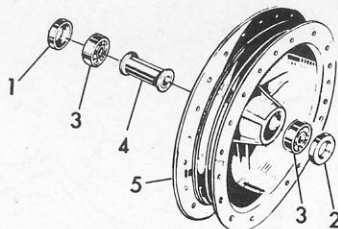
properly positioned between the side-plate and the hub.

7. Adjust the brake and chain as described in "Maintenance."

Wheel Bearings

REMOVAL AND INSTALLATION

1. Remove the wheel as described in the above section.



Rear hub assembly.

- | |
|--------------------------|
| 1. Left Bearing Retainer |
| 2. Dust Cover |
| 3. Ball Bearing (2) |
| 4. Spacer |
| 5. Wheel Hub |

2. Unscrew the bearing retainer, drift out the dust cover from the opposite side of the hub, and remove the bearing if necessary with Puller (H-D part no. 95760-69) or a suitable substitute.

3. Remove the bearing spacer, invert the hub, and remove the remaining bearing in the same manner as the first.

4. Press a new bearing into place until seated against the brake-side hub shoulder, then press the dust cover into place after making sure the dust seal is in place in the cover.

5. Invert the hub, insert the bearing spacer, press in the remaining bearing until seated against the spacer, and screw down the bearing retainer.

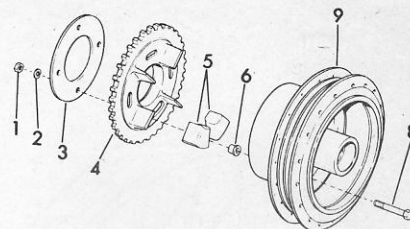
6. Install the rear wheel as described in the rear wheel "Removal and Installation" section.

INSPECTION

1. Consult the front wheel "Inspection" section.

Rear Sprocket Removal and Installation

1. Remove the rear wheel as described in the rear wheel "Removal and Installation" section.
2. Remove the nuts, lockwashers, outer disc, and the sprocket, and then remove the rubber bushings, spacers, inner disc (if applicable), and bolts from the sprocket.
3. Clean all parts in a suitable solvent and blow them dry.
4. Assembly is in the reverse order of disassembly.
5. Insert the bolts through the hub, mount the inner disc on the hub bolts, insert the rubber bushings and spacers into the sprocket, mount the sprocket on the hub bolts with the shouldered side toward the hub, position the outer disc on the hub bolts with the chamfered side out, and secure the whole assembly with the hub bolts nuts and lockwashers.



Drive sprocket assembly (1970 and later models).

- | | |
|--------------------|-----------------------|
| 1. Nut (4) | 5. Rubber Bushing (8) |
| 2. Lock Washer (4) | 6. Spacer (4) |
| 3. Outer Disc | 8. Bolt (4) |
| 4. Sprocket | 9. Wheel Hub |

6. Install the wheel as described in the rear wheel "Removal and Installation" section.

Brakes

M MODELS

Disassembly

1. Remove the wheel as described in the front wheel "Removal and Installation" section.
2. Disconnect the brake return springs and pull the shoes off at right angles to the side-plate.
3. Remove the operating shaftnut, washer, operating lever, and operating cam if so desired.

Inspection

1. Clean all parts other than the brake shoes in a suitable solvent and blow them dry.
2. Inspect the brake shoes for a worn, glazed, oil-soaked, cracked, or otherwise damaged condition, and replace them as necessary. The shoes may be reused if only slightly glazed. Rough up the glazed surface of the shoes and drum with some medium grade sandpaper and blow them clean before reusing.
3. Inspect the remaining parts for a worn or damaged condition and replace them as necessary.

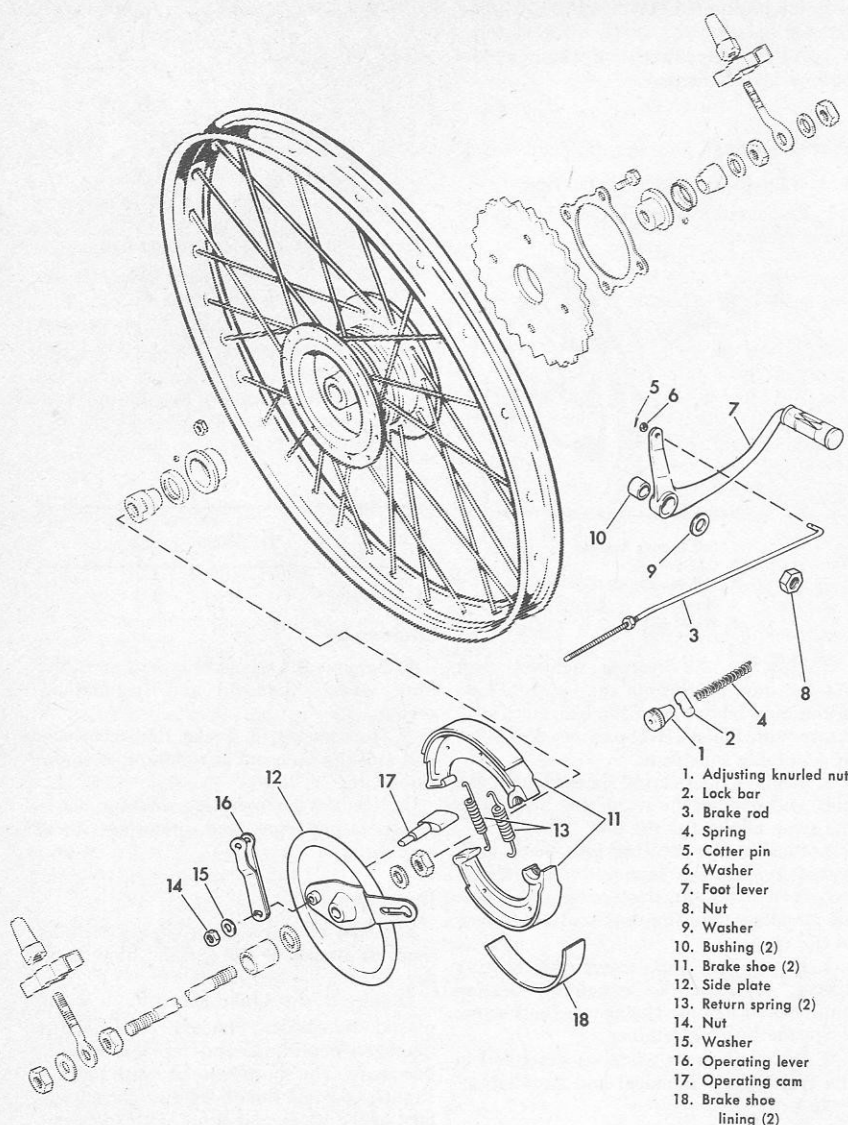
Assembly

1. Install the operating cam and lever, and secure them with washer and nut.
2. Hook the return springs into the shoe holes so that the spring hooks are facing the opposite direction on the same shoe, then fold the shoes and mount them on the operating shaft and pivot studs and press down on the shoes to unfold them onto the side-plate. Use a screwdriver if additional leverage is required.
3. Mount the wheel as described in the appropriate section.

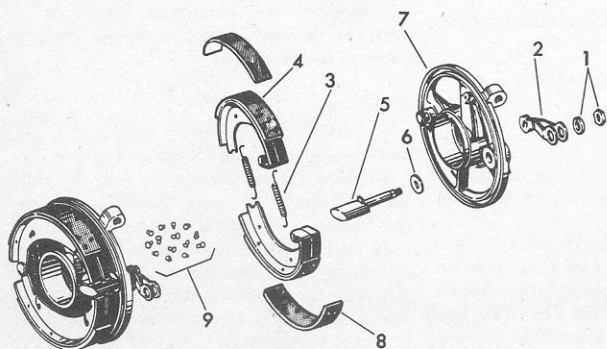
Rear Brake Crossshaft Disassembly and Assembly.

1. Remove the brake adjusting knurled nut, lockbar, and brake rod spring, then remove the cotter pin and washer to free the rod from the brake pedal.
2. Remove the footlever mounting nut and washer, and pull the lever from the shaft. Both footrests are also mounted on

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Brake and cross-shaft assembly.



Front brake assembly, S and B Models.

the shaft and can be removed at this time by pulling the shaft free of the frame.

3. Inspect the footlever bushings for a worn or damaged condition and replace them as necessary.

4. To assemble the cross-shaft, insert the shaft and both footrests, lightly grease the

right-side end of the shaft, and mount the footlever.

5. Position the footlever so its under the foot rest, then secure the assembly with the washer and nut.

6. Install the brake rod assembly and adjust the brake as described in the "Maintenance" section.

S AND B MODELS

Disassembly

1. Remove the appropriate wheel as described in the appropriate wheel "Removal and Installation" section.

2. Remove the operating shaft nut, lockwasher, and lever.

3. Pry the return springs from the shoes and remove the operating shaft and spring washer from the brake side-plate.

Inspection

1. Consult the M Models "Inspection" section.

2. New linings may be riveted onto the shoes as described in the Sprint "Inspection" section.

Assembly

1. Lay the brake side-plate on a bench with the outside face facing down.

2. Position the operating shaft spring washer on the shaft so the raised portion of the shaft seats against the shaft shoulder, and then insert the shaft into the side plate.

3. Place the shoes on the side-plate, connect them with the spring located nearest the pivot post, and attach the remaining spring.

4. Invert the side-plate and install the operating lever, lockwasher, and shaft nut.

5. Mount the wheel, and lubricate the brakes as described in the "Maintenance" section.

SPRINT MODELS

Disassembly (All Models Except 1970 and Later Front Brakes)

1. Remove the wheel as described in the front wheel "Removal and Installation" section.

2. Pull the brake shoes from the brake side plate at a right angle from the plate, and disconnect the return springs.

3. Remove the operating shaft nut, washer, lever, and shaft, then remove the pivot stud nut, washer, and pivot stud.

Disassembly (1970 and Later Front Brakes)

1. Remove the wheel as described in the front wheel "Removal and Installation" section.

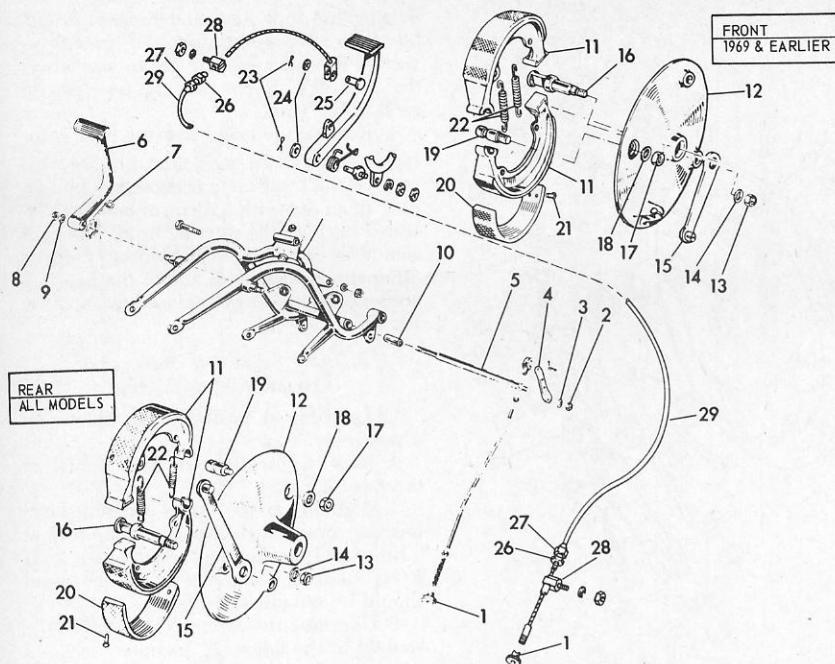
2. Remove the brake shoe lockrings with Snap-Ring Pliers (H-D part no. 96215-49) or a suitable substitute, remove the washers, and pull the shoes away from the operating shafts together and off the pivot studs with both shoes still attached by the return springs. Separate the springs from the shoes.

3. Remove the washers from the pivot pins and remove the operating levers if so desired. Mark the position of the lever slot on the splines with a small chisel mark so they can be reassembled in their original positions. The levers should be parallel and at right angles to the brake cable.

Inspection and Repair

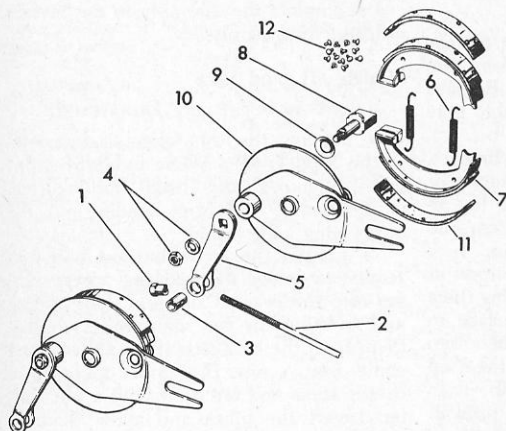
1. Consult steps 1-3 of the M Models "Inspection" section.

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Front and rear brake other than SS double front type

- | | | | |
|--------------------------|-------------------------------|---------------------------|---------------------------------------------|
| 1. Adjusting knurled nut | 9. Washer | 16. Operating shaft | 25. Clevis pin (model SS) |
| 2. Nut | 10. Crossover shaft | 17. Nut | 26. Cable coil adjuster lock nut (model SS) |
| 3. Washer | 11. Brake shoe and lining (2) | 18. Washer | 27. Cable coil adjuster (2) (model SS) |
| 4. Shaft lever | 12. Side plate | 19. Pivot stud | 28. Cable coil frame fitting (2) (model SS) |
| 5. Crossover shaft | 13. Nut | 20. Brake lining (2) | 29. Cable assembly (model SS) |
| 6. Foot lever | 14. Washer | 21. Rivet (16) | |
| 7. Lever spring | 15. Operating lever | 22. Shoe spring (2) | |
| 8. Nut | | 23. Cotter pin (model SS) | |
| | | 24. Washer (model SS) | |



1. Brake rod adjusting nut
2. Rear brake rod
3. Brake rod clevis pin
4. Operating shaft nut and lockwasher
5. Brake operating lever
6. Brake shoe (2)
7. Operating shaft
8. Operating shaft spring washer
9. Brake side plate
10. Brake lining (2)
11. Brake lining rivet (14)

Rear brake assembly, S and B Models.

2. If the brake shoes are serviceable but the linings are shot, new linings can be riveted to the shoes, or new shoes with the linings already attached can be purchased.

3. Replace the brake linings in the following manner:

a. Install the center rivet first and then alternate the remaining rivets so the next one goes to the right of the first, to the left of the first, to the right, etc., so the lining is drawn down evenly.

b. The rivets may be set by hand or machine, and the end of the lining should be beveled in either case. The rivets should seat the linings tightly against the shoe.

Assembly (All Models Except 1970 and Later Front Brakes)

1. Insert the pivot stud into the side-plate and secure it with the washer and nut.

2. Slip the operating shaft into the side-plate, mount the operating lever onto it so the large flats of the shaft and lever are at right angles to one another, secure the assembly with the washer and nut, and position the lever so it's pointing away from the anchor stud.

3. Attach the return springs to one of the shoes so the spring hooks are facing in the opposite direction from each other.

4. Connect the shoes together with the

springs then fold and mount them on the operating shaft and pivot studs, then press down on them to make them unfold onto the side-plate. Use a screwdriver to gain the added leverage that may be necessary.

4. Mount the wheel as described in the appropriate rear wheel "Removal and Installation" section.

Assembly (1970 and Later Front Wheels)

1. Assembly is basically in the reverse order of disassembly except for the shoe assembly.

2. Mount the shoes after lightly greasing the pivot pin and operating shaft ends. Position the shoes without attaching the return springs, then engage the springs using a screwdriver to gain the necessary leverage.

3. Install the wheel as described in the appropriate rear wheel "Removal and Installation" section.

Rear Brake Cross-shaft Disassembly and Assembly (All Models Except the SS)

1. Remove the brake rod knurled adjusting nut, the cross-shaft lever nut and washer, then tap on the shaft to remove the lever.

2. Pull the footlever and shaft assembly clear of the frame, then remove the brake lever spring, securing nut and washer, and remove the shaft from the lever.

3. Clean all parts in a suitable solvent and blow them dry. Inspect all the parts for a worn or damaged condition, especially the fit of the shaft in the frame bushings, and replace any parts as necessary.

4. Lightly grease the frame tube, assemble the footlever to the threaded end of the shaft so the notches engage, mount the spring to the shaft so it will support the lever from beneath, and insert the shaft into the frame tube.

5. Mount the crossover shaft lever to the shaft while holding the footlever in its normal position, and draw the shaft lever into position by screwing on the mounting nut and washer.

6. Attach the footlever spring to the lever and secure the lever with the mounting nut and washer.

7. Adjust the brake as described in the "Maintenance" section.

Suspension

FRONT FORKS

Models M and MS

FORK REMOVAL AND DISASSEMBLY

1. Remove the front wheel as described in the Models M and MS front wheel "Removal and Installation" section.

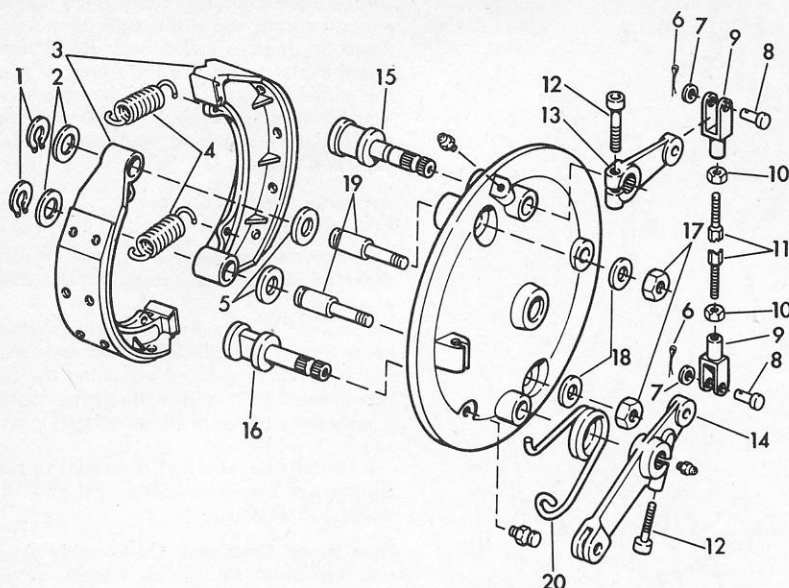
2. Remove the front fender and drain the fork oil as described in the "Maintenance" section.

3. Loosen the lower bracket bolts and remove the legs by wedging a screwdriver into the bracket slot and pulling and twisting on the main tubes.

4. Disassemble the fork leg in the following manner:

a. Remove the oil seal from the top of

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- | | |
|--------------------------|---------------------------|
| 1. Lock Ring (2) | 11. Control Rod |
| 2. Washer (2) | 12. Clamp Screw (2) |
| 3. Brake Shoe (2) | 13. Upper Operating Lever |
| 4. Brake Shoe Spring (2) | 14. Lower Operating Lever |
| 5. Washer (2) | 15. Upper Operating Shaft |
| 6. Cotter Key (2) | 16. Lower Operating Shaft |
| 7. Washer (2) | 17. Pivot Pin Nut (2) |
| 8. Pin (2) | 18. Pivot Pin Washer (2) |
| 9. Clevis (2) | 19. Pivot Pin (2) |
| 10. Nut (2) | 20. Lever Return Spring |

Front brake assembly for the 1970-71 and 1973 and later SS models

the leg, then remove the fork spring, spacer, lower spring, and the lower cover.

b. Pull the main tube from the slider assembly by sharply jerking them apart.

c. Remove the damper lockring, damper assembly, and the tire assembly tube seal.

5. Remove the headlight mounting bolt and allow the light assembly to hang down on the fork bracket.

6. Remove the speedometer drive unit from the end of the cable and remove the cable from the left fork, upper cover, cable loop, then remove the brake cable locknut and ferrule, and slide the cable out from the right fork upper cover cable loop.

7. Loosen the fork stem nut enough to relieve the tension on the upper fork bracket.

8. If the fork side is to remain assembled, loosen the fork plug several turns so the fork cover can be removed from the bracket assemblies. This will also allow the rubber ring and cap to be removed.

9. The covers are installed in the reverse order of removal.

INSPECTION

1. Before tearing into a fork because the action is poor, change the oil to eliminate the possibility of water contamination which might be the cause.

2. If this doesn't appear to be the problem, or if the fork leaks or is damaged, disassemble it as described in the above section, clean all parts in a suitable solvent

and blow them dry, and inspect all the parts for a worn or damaged condition and replace them as necessary. Replace the slider if there is any appreciable play in the fit of slider and tube.

3. Inspect the fork stem and bracket, and the upper bracket for a damaged or misaligned condition. They must be replaced as directed in the "Fork Stem and Bracket Assembly Removal" section.

4. Check the fork tubes for a warped or out-of-round condition by first rolling them on a perfectly clean and flat surface to check for warping, and then slip them into a new slider if possible and work them up and down several times. If the tube is in serviceable condition, it will not bind at any point.

5. Tubes can be straightened unless they are severely bent. If the stem and bracket assembly or a slider is damaged, it must be replaced.

FORK STEM AND BRACKET ASSEMBLY REMOVAL

1. Disassemble the forks as described in the "Fork Removal and Disassembly" section, then remove the fork upper covers.

2. Remove the handlebar clamp nuts, washers, spacers, U-bolts, and pads, then lift the entire handlebar assembly with the cables and levers still attached and place it out of the way. Try to avoid bending the cables any more than necessary.

3. Remove the fork stem nut and upper washer to free the upper bracket, remove the upper steering head cone while sup-

porting the fork stem and bracket assembly, then remove the stem and bracket assembly while taking care not to lose any of the bearings. There are 23 bearings in each of the cups.

4. Remove the lower steering head bearing cone from the stem and bracket, and remove the head cups if necessary by tapping them out with a piece of bar stock inserted through the steering head. The cups should be removed only if worn, pitted, or otherwise damaged. If any of the bearings are lost, they must be replaced as an entire set.

FORK STEM AND BRACKET ASSEMBLY INSTALLATION

1. Assembly is basically the reverse of disassembly.

2. Pack the bearings in fresh grease in the head cups.

3. Tighten up the upper steering head bearing cone and then back it off a turn at a time until the steering action of the forks is as desired. The action of the head should be smooth and free.

4. Continue the assembly process as described in the following section.

FORK ASSEMBLY AND INSTALLATION

1. Assemble the upper covers and forks in the reverse order of disassembly.

2. Wedge apart the fork bracket by inserting a screwdriver in the bracket slot, and force the fork side up through the brackets by twisting, pushing, and tapping with a soft mallet on the bottom of the leg.

3. When the upper tube is flush with the top of the bracket, fill the fork with oil as described in the "Maintenance" section.

4. Complete the assembly in the reverse order of disassembly.

Models ML and MLS

FORK REMOVAL AND DISASSEMBLY

1. Remove the front wheel as described in the Models ML, MLS, and MSR front wheel "Removal and Installation" section.

2. Remove the front fender and the upper plug and washer.

3. Loosen the lower bracket bolt and remove the legs by wedging a screwdriver into the bracket slot and then pulling and twisting on the main tubes to free them from the brackets. If the tubes won't come free, screw the upper plug in a couple turns and tap on it with a soft mallet. Invert the tubes and allow them to drain.

4. Disassemble the fork slides on 1969 and earlier models in the following manner:

a. Remove the fork spring and spring washer.

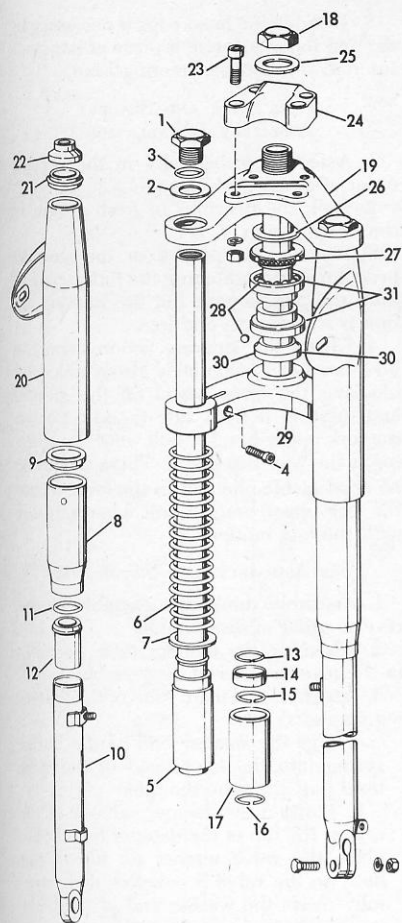
b. Secure the reinforced portion of the fork lower cover in a copper or wood-jawed vise and rotate the slider to the left to remove it. Slip the axle through the axle hole and use it as a lever to aid in removal.

c. Remove the main fork slide tube from the slider assembly by yanking on it sharply.

d. Remove the tube oil seal, O-ring, and the lower bushing, only if the need for replacement is indicated.

e. Remove the damper lockring, collar, upper and lower lockrings, and then

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Models ML and MLS front fork assembly (1969 and earlier models).

- | | |
|---------------------------|------------------------------------------|
| 1. Upper plug (2) | 19. Fork upper bracket |
| 2. Washer (2) | 20. Fork upper cover (2) |
| 3. Seal (2) | 21. Rubber ring (2) |
| 4. Lower bracket bolt (2) | 22. Cap (2) |
| 5. Main tube (2) | 23. Screw (4) |
| 6. Fork spring (2) | 24. Clamp |
| 7. Washer | 25. Washer |
| 8. Fork lower cover (2) | 26. Washer |
| 9. Tube seal (2) | 27. Upper steering head bearing cone |
| 10. Slider assembly (2) | 28. Steering head ball bearings (23 x 2) |
| 11. O-ring (2) | 29. Fork stem and lower bracket |
| 12. Bushing (2) | 30. Lower steering head bearing cone |
| 13. Damper lock ring (2) | 31. Head cup (2) |
| 14. Collar (2) | |
| 15. Lock ring (2) | |
| 16. Lock ring (2) | |
| 17. Collar | |
| 18. Fork stem nut | |

press the collar from the tube to complete the damper disassembly.

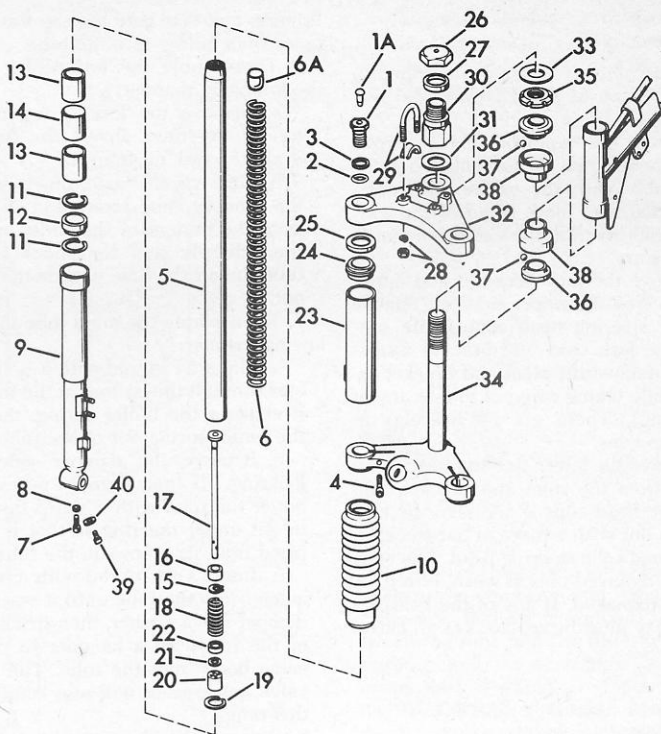
5. Disassemble the fork slides on 1970-71 models in the following manner:

a. Remove the fork spring and spacer (if applicable), the slider-to-tube screw and gasket, pull the slider assembly from the tube, and remove the boot (if applicable).

b. Invert the tube and tap on its surface with a soft mallet to free the damper valve assembly and buffer spring.

c. Disassemble the damper valve assembly by removing the lockring from the groove in the bottom of the damper tube.

d. Remove the valve components by slipping the damper tube assembly back



Model MLS front fork assembly (1970-71 models).

- | | |
|-----------------------------------------|-------------------------------------------|
| 1. Upper plug (2) | 20. Damper valve body (2) |
| 1A. Upper plug rubber (2) | 21. Damper valve washer (2) |
| 2. Upper plug washer (2) | 22. Damper valve spacer (2) |
| 3. Upper plug O-ring seal (2) | 23. Upper cover (2) (1970) |
| 4. Lower bracket bolt (2) | 24. Upper cover rubber ring (2) (1970) |
| 5. Main tube (2) | 25. Upper cover cap (1970) |
| 6. Fork spring (2) | 26. Fork stem cap nut |
| 6A. Fork spring spacer (2) | 27. Fork stem washer |
| 7. Slider to tube screw (2) | 28. Handlebar U-bolt nuts and lockwashers |
| 8. Slider to tube screw gasket (2) | 29. Fork stem nut |
| 9. Slider assembly (2) (left and right) | 30. Fork stem nut washer |
| 10. Boot (2) (1970) | 31. Upper fork bracket |
| 11. Lock ring (4) | 32. Upper fork bracket washer |
| 12. Slider seal (2) | 33. Fork stem and bracket |
| 13. Slider bushing (4) | 34. Fork stem cone nut |
| 14. Slider bushing spacer (2) | 35. Fork stem cone (2) |
| 15. Damper piston lock ring (2) | 36. Fork stem bearing balls (23x2) |
| 16. Damper piston (2) | 37. Head cup (2) |
| 17. Damper (2) | 38. Drain screw |
| 18. Buffer spring (2) | 39. Drain screw washer |
| 19. Damper valve lock ring (2) | |

into the fork tube, inserting a long rod into the tube, and tapping the rod with a hammer to force the valve assembly from the tube.

e. Remove the damper piston by removing the locking with a pair of locking pliers.

f. If the slider seal is in need of replacement, remove the upper locking with a pair of snap-ring pliers and pry the seal from the slider.

g. If the slider bushing is in need of replacement, cut it carefully with a hacksaw blade, pry the bushing away from the slider wall with a suitable chisel, and grab the bushing with pliers and pull it out. There is a spacer between the two bushings which will also have to be removed.

6. Remove the headlight mounting bolt and allow the light assembly to hang down on the fork bracket.

7. Remove the speedometer drive unit from the end of the cable and remove the

cable from the left fork, upper cover, cable loop, then remove the brake cable locknut and ferrule and slide the cable out of the right fork, upper cover, cable loop.

8. Loosen the fork stem nut enough to relieve the tension on the upper fork bracket.

9. If the fork side is to remain assembled, loosen the fork plug several turns so the fork cover can be removed from the bracket assemblies. This will allow the rubber ring and cap to be removed.

10. The covers are replaced in the reverse order of removal.

INSPECTION

1. Consult the Model M and MS "Inspection" section.

2. If the sliders have any appreciable play on 1969 and earlier models, inspect the inside of the slider bushings, the outside of the collar, and the inside of the slider.

Harley-Davidson Singles

FORK STEM AND BRACKET ASSEMBLY REMOVAL

1. Disassemble the forks as described in the "Fork Removal and Disassembly" section.

2. Remove the handlebar clamp screws and the clamp, then lift the entire handlebar assembly with the cables and levers still attached, and place it out of the way. Try to avoid bending the cables any more than necessary.

3. Remove the fork stem nut and upper washer to free the upper bracket, remove the upper steering head cone while supporting the fork stem and bracket assembly, then remove the stem and bracket assembly while taking care not to lose any of the bearings. There are 23 bearings in each of the cups.

4. Remove the lower steering head bearing cone from the stem and bracket, and remove the head cups if necessary by tapping them out with a piece of bar stock inserted through the steering head. The cups should be removed only if worn, pitted, or otherwise damaged. If any of the bearings are lost, they must be replaced as an entire set.

FORK STEM AND BRACKET ASSEMBLY INSTALLATION

1. Assembly is basically the reverse order of disassembly.

2. Pack the bearings in fresh grease in the head cups.

3. Tighten up the upper steering head bearing cone and then back it off a turn at a time until the steering action of the forks is as desired. The action of the head should be smooth and free.

4. Continue the assembly process as described in the following section.

FORK ASSEMBLY AND INSTALLATION

1. Assemble the upper cover and forks in the reverse order of disassembly.

2. Wedge apart the fork bracket by inserting a screwdriver in the bracket slot, and force the side up through the brackets.

3. When the upper tube is flush with the top of the bracket, fill the fork with oil as described in "Maintenance."

4. Complete the assembly in the reverse order of disassembly.

Model MSR and 1972 Model MLS

FORK REMOVAL AND DISASSEMBLY

1. Remove the front wheel as described in the Models ML, MLS, and MSR front wheel "Removal and Installation" section.

2. Remove the headlight and bracket assembly (if applicable).

3. Remove the cap screws or anchor nuts to remove the front fender and brake side-plate anchor strap.

4. Loosen the fork bracket pinch bolts and pry a screwdriver upward into the bracket slot.

5. Remove the fork plug, washer, and seal, then screw the Fork Tool (H-D part no. 97305-61), or a suitable substitute, into the upper tube and strike it with a copper or lead mallet to drive the fork leg out of the brackets. Make sure the tool has seated before striking it, in order to protect the

threads, and take care to keep foreign particles from falling into the tube.

6. Disassemble the fork slider tube in the following manner:

a. Remove the fork spring from the top of the tube, invert the tube, and drain the fork oil from it.

b. Remove the axle pinch bolt and the damper tube screw and its washer from the bottom of the slider assembly, then sharply pull the slider from the tube. Invert the tube to slide the damper out.

7. Disassemble the main tube in the following manner:

a. Slip a 24 in. rod with a $\frac{1}{8}$ in. diameter through the bottom of the tube until it engages the buffer spring, then push the buffer spring out of the tube.

b. Remove the damper valve body lockring. It may prove necessary to notch the tube with a sharp instrument to get under the ring so that it may be pried from its groove in the tube.

c. Insert a 24 in. rod with a $\frac{5}{8}$ in. diameter into the tube until it seats on the damper valve washer, then strike the top of the rod with a hammer to drift the valve body from the tube. The damper valve and washer will also come free at this time.

8. Remove the damper piston lockring and piston from the damper tube.

9. Remove the fork boots, pull the slider free, and remove the tube seal lockring and the upper and lower oil seals from the slider.

INSPECTION

1. Consult the Models M and MS "Inspection" section.

FORK STEM AND BRACKET ASSEMBLY REMOVAL

1. Disassemble the forks as directed in the "Fork Removal and Disassembly" section.

2. Disconnect and lift away the handlebar assembly with all the cable still attached and place it out of the way while taking care not to bend the cables any more than is absolutely necessary.

3. Remove the headlight assembly (if applicable).

4. Remove the damper assembly on MSR models by removing the steering damper rod cotter pin, unscrewing the damper rod assembly, and removing the steering damper lower nut, spring washer plate, spring washer, rod lock, anchor plate, friction disc, and the fork stem nut and washer.

5. Remove the fork upper bracket by placing a block of wood under the bracket and drifting the bracket up and off of the fork stem and bracket, then push the stem and bracket down through the upper bearing cone until the lower cone bearings are accessible for removal.

6. Remove and separate the bearings for replacement in their original positions. If any of the bearings are lost, or if the sets are mixed, both sets will have to be replaced.

7. Slip the stem and bracket down the rest of the way and remove and separate the upper bearings and cone, then remove the lower cone.

8. Remove the head cups if necessary by drifting them out with a piece of bar stock inserted through the steering head.

FORK STEM AND BRACKET ASSEMBLY INSTALLATION

1. Assembly is basically in the reverse order of disassembly.

2. Pack the bearings in fresh grease in the bearing cups.

3. Remove the play from the steering head cones by tightening the fork stem nut until the play is gone but the steering action is still smooth and free.

4. Check the steering action once the bike has been completely reassembled by blocking the front wheel off the ground and rotating it from side to side. Loosen the fork upper bracket bolt until the steering is the way you like it. There should be no appreciable play left in the fork. Secure the fork upper bracket bolt when satisfied with the fork motion.

FORK ASSEMBLY AND INSTALLATION

1. Assemble the slider assembly in the reverse order of disassembly.

2. Assemble the damper tube assembly in the reverse order of disassembly.

3. Assemble the main tube in the following manner:

a. Slip the smaller end of the buffer spring into the lower end of the tube until past the tube shoulder.

b. Position the damper valve in its recess at the top of the damper tube body, place the valve washer on top of the body so the valve is covered, then carefully insert the washer end of the body into the bottom of tube and press it into place against the tube shoulder.

c. Install the damper valve body lockring in its groove in the bottom of the tube.

d. Slip the damper tube assembly into the tube at the top so it drops down through the damper valve assembly. Shaking the tube will help it find its seat.

e. Slip the fork spring into position, then install the Fork Tool (H-D part no. 97305-61) in the top of the tube. Clean the tube thoroughly then insert the tube into the slider and compress the two until the damper tube snaps into position. Install and secure the damper tube screw and washer in the bottom of the slider.

4. Install the fork side in the brackets in the following manner:

a. Install the Fork Tool then slip the tube and tool up through the brackets and pull the tube into place.

b. Add the fork oil as described in "Maintenance," install the fork plug washer, seal, and plug, then secure the lower fork bracket pinch bolt.

c. Complete the assembly in the reverse order of disassembly.

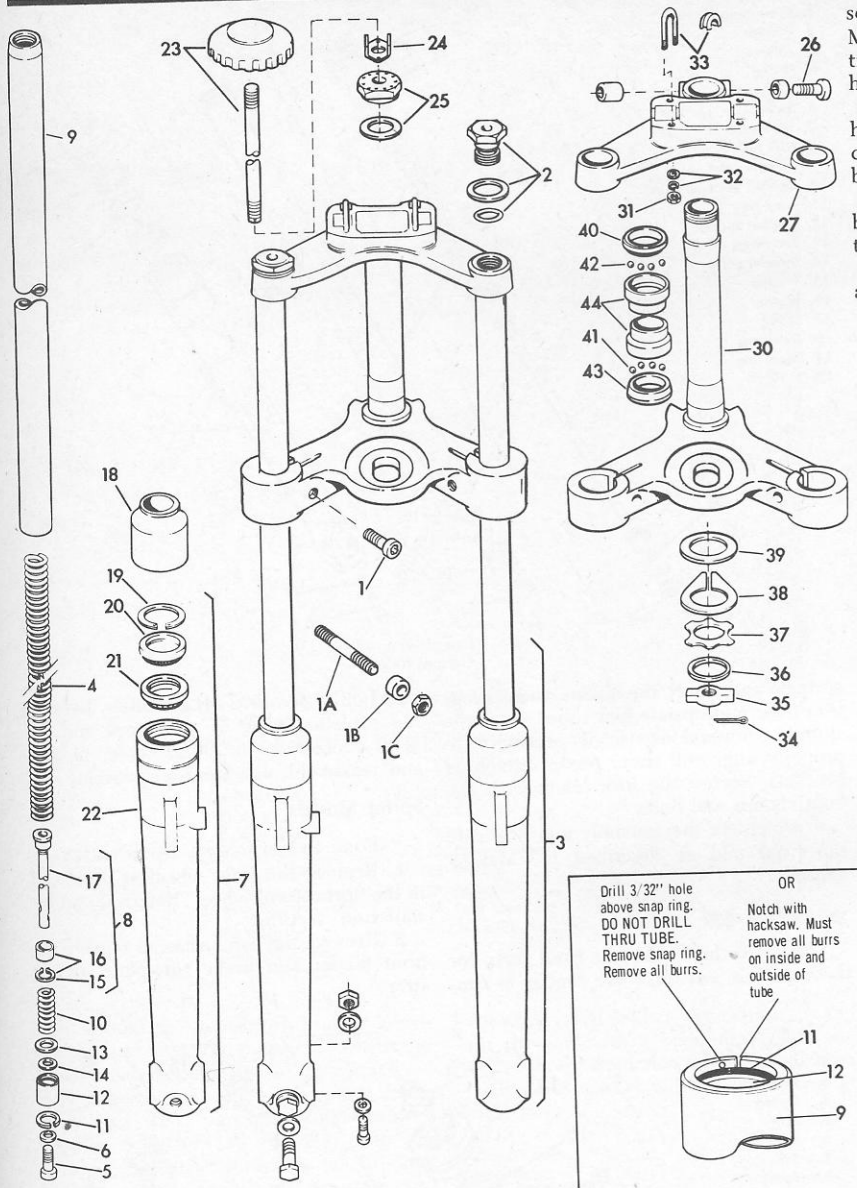
5. Install the steering damper (if applicable) in the reverse order of disassembly. The damper star washer should be dished side up on the damper rod assembly.

S and B Models

FORK REMOVAL AND DISASSEMBLY

1. Remove the front wheel and brake as-

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Models MSR-100, SR-100, 1972 MLS, and 1973 and later TX-125

1. Lower bracket fork bolt (2) (1971 and earlier)
- 1A. Fork stud (2) (1972 and later)
- 1B. Fork stud spacer (2) (1972 and later)
- 1C. Fork stud nut (2) (1972 and later)
2. Fork plug (2), washer (2), seal (2)
3. Fork side assembly (2)
4. Fork spring (2)
5. Damper tube screw (2)
6. Damper tube screw washer (2)
7. Fork slider assembly (2)
8. Damper tube assembly (2)
9. Main tube (2)
10. Buffer spring (2)
11. Damper valve body locking (2)
12. Damper valve body (2)
13. Damper valve washer (2)
14. Damper valve (2)
15. Damper piston locking (2)
16. Damper piston (2)
17. Damper tube (2)
18. Fork boot (2)
19. Tube seal locking (2)
20. Fork tube upper seal (2) (1971 and later)

21. Fork tube lower seal (2)
22. Fork slider assembly (2) right and left
23. Steering damper knob assembly*
24. Steering damper rod lock*
25. Fork stem nut and washer
26. Fork upper bracket bolt
27. Fork upper bracket
30. Fork stem and bracket
31. Handlebar U-bolt clamp nut (4)
32. Handlebar U-bolt clamp washer (4)
33. Handlebar U-bolt (2)
- 33A. Handlebar clamp (62 and later)
34. Steering damper rod cotter pin*
35. Steering damper lower nut*
36. Steering damper spring washer plate*
37. Steering damper spring washer*
38. Steering damper anchor plate*
39. Steering damper friction disc*
40. Upper steering head bearing cone
41. Lower steering head ball bearings (25)
42. Upper steering head ball bearings (25)
43. Lower steering head bearing cone
44. Head cup (42)

semblies as described in the S and B Models front wheel "Removal and Installation" section, then remove the front fender, headlight, and fork panel assemblies.

2. Remove the fork tube pinch bolts, headlight bracket, and fork outer tube caps, then wedge a screwdriver into the bracket slot.

3. Loosen the fork boot clamps and bolts and pull the sliders and springs from the outer tube.

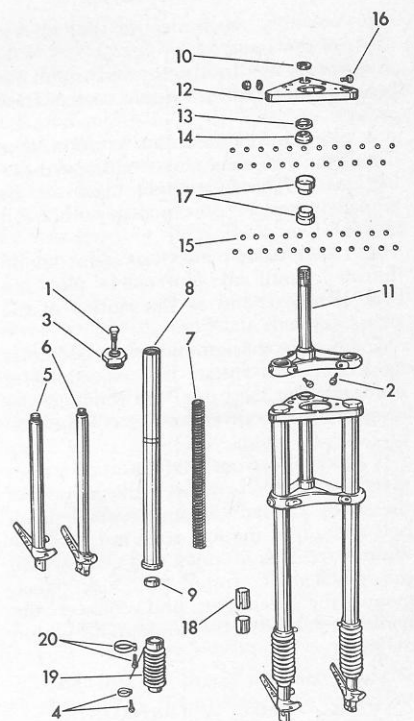
4. Pry the oil seals from their seats with a screwdriver if replacement is necessary.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect the condition of all the components for wear or damage and replace them as necessary. The fork springs should be $12\frac{21}{64}$ in. long and must be replaced if collapsed shorter.

3. Inspect the sliders for a worn, scored, or damaged condition and replace them as necessary. If there is appreciable play between the tube and the slider bushing, the bushing and oil seal must be replaced using Fork Bushing Tool Set (H-D part no. 97030-54), or a suitable substitute, and then reamed until the bushing groove aligns with the flanged end of the fork tube.



Models S and B front fork assembly.

1. Tube cap oil plug
2. Tube pinch bolt (2)
3. Tube cap (2)
4. Boot clamp and bolt (2)
5. Slider tube—right
6. Slider tube—left
7. Fork spring (2)
8. Outer tube (2)
9. Seal (2)
10. Stem nut
11. Fork stem and bracket
12. Upper plate
13. Frame head upper bearing guard
14. Stem cone
15. Frame head ball bearings (46)
16. Upper plate pinch bolt
17. Frame head bearing cup (2)
18. Tube bushing (4)
19. Fork boot (2)
20. Boot lower clamp (2)

*Used only on MSR

Harley-Davidson Singles

4. Inspect the bearings and cups for a worn, pitted, or otherwise damaged condition and replace them as necessary. If any bearings are lost, or if bearing sets are mixed, the whole set must be replaced.

FORK STEM AND BRACKET ASSEMBLY REMOVAL

1. Disassemble the fork sides as directed in the "Fork Removal and Installation" section.

2. Disconnect the speedometer cable from the speedometer head, and free the head from the fork upper plate, then disconnect the handlebars and shift them out of the way taking care to bend the cables no more than is absolutely necessary.

3. Remove the fork stem nut, loosen the upper pinch bolt, then carefully tap the stem and bracket from the steering head with a soft mallet. While the stem and bracket assembly is coming free, the fork upper plate, upper bearing guard, stem cone, and the bearings may also be removed. On the Hummer model, the ignition wires leading to the fork upper plate will have to be disconnected.

4. The head cups may be removed if replacement is necessary by inserting a piece of bar stock up through the opposite cup and tapping them out.

FORK STEM AND BRACKET ASSEMBLY INSTALLATION

1. Assembly is basically the reverse order of disassembly.

2. Mount the head cups and install the bearings along with a heavy coat of fresh grease.

3. Slip the fork stem into position, then install the fork stem cone and upper bearing guard. The fork upper plate can be tapped into place on the stem with a soft mallet.

4. Tighten down the fork stem nut on the stem until all appreciable play has been removed, and so the motion of the stem is smooth and free.

5. Connect the ignition wires (Hummer models only), install the speedometer head, connect the cable, and complete the assembly in the reverse order of disassembly.

6. Once the front end has been completely assembled, recheck the motion of the forks. Loosen the upper plate pinch bolt and adjust the fork stem nut until the desired result is attained and then secure the pinch bolt. Install the fork panel, mount the headlight, and connect the wires as shown in the appropriate wiring diagram.

FORK ASSEMBLY AND INSTALLATION

1. Assembly is basically in the reverse order of disassembly.

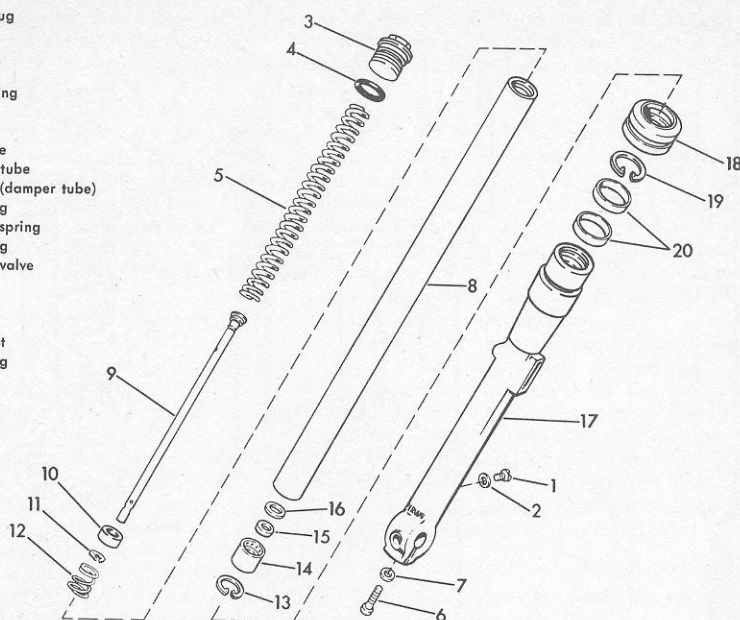
2. Install the outer tube oil seal.

3. Wedge a screwdriver in the fork bracket slot, slip the tubes into place until flush with the top of the bracket, install the tube caps, and secure the fork tube pinch bolts.

4. Install the fork boots and secure them with the clamps.

5. Screw the springs onto the threaded ends of the fork sliders, heavily grease the

1. Drain plug
2. Washer
3. Fork cap
4. O-ring
5. Fork spring
6. Screw
7. Washer
8. Fork tube
9. Damper tube
10. Bushing (damper tube)
11. Snap ring
12. Damper spring
13. Snap ring
14. Damper valve
15. Washer
16. Washer
17. Slider
18. Dust boot
19. Snap ring
20. Seals (2)



Ceriani fork

springs, and insert the sliders and springs into their appropriate fork tubes. Turn the sliders counterclockwise if necessary to properly align the slider fender attaching brackets. Secure the fork boots with the boot clamps and bolts.

6. Complete the assembly and lubricate the front end as described in "Maintenance."

SS/SX 175/250

There are three different front forks for these models. All three are similar in construction to the 1972-MLS models. Refer to the exploded view of your fork and the MLS procedures to disassemble, inspect, and reassemble the front suspension.

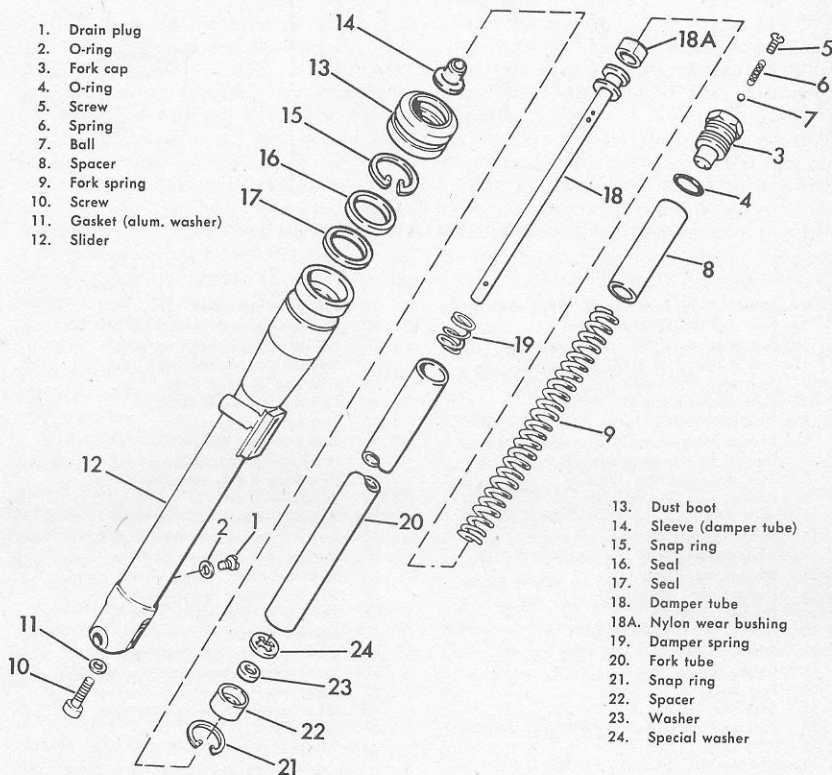
Sprint Models

FORK REMOVAL AND DISASSEMBLY

1. Remove the front wheel as described in the Sprint front wheel "Removal and Installation" section.

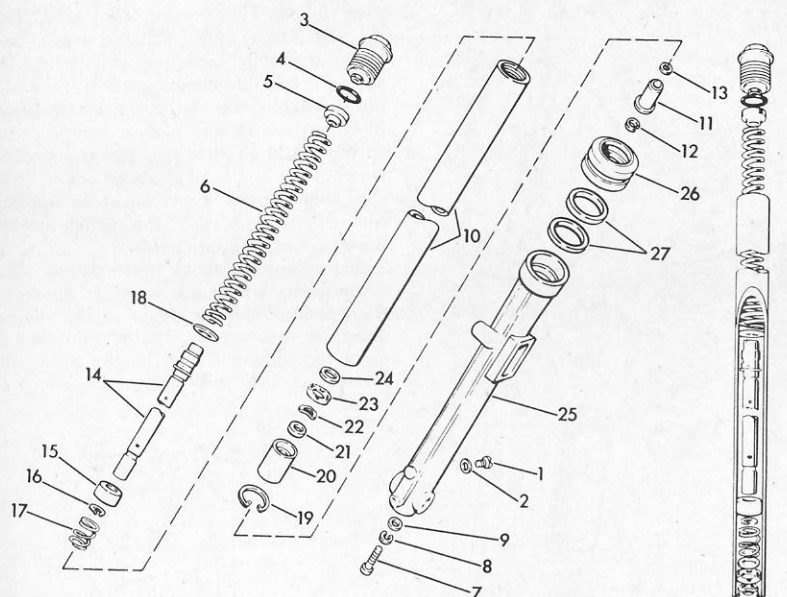
2. Remove the cap screws to remove the front fender and brake side-plate anchor strap.

1. Drain plug
2. O-ring
3. Fork cap
4. O-ring
5. Screw
6. Spring
7. Ball
8. Spacer
9. Fork spring
10. Screw
11. Gasket (alum. washer)
12. Slider



Marzocchi fork

Harley-Davidson Singles



Before fork

- | | |
|--------------------------|---------------------------|
| 1. Drain plug | 15. Bushing (damper tube) |
| 2. Washer | 16. Snap ring |
| 3. Fork plug assy | 17. Damper spring |
| 4. O-ring | 18. Washer |
| 5. Spacer | 19. Snap ring |
| 6. Fork spring | 20. Special spacer |
| 7. Screw | 21. Special washer |
| 8. Lock washer | 22. Spring washer |
| 9. Washer | 23. Damper valve |
| 10. Fork tube | 24. Washer |
| 11. Sleeve (damper tube) | 25. Slider |
| 12. O-ring | 26. Dust boot |
| 13. Washer | 27. Seals (2) |
| 14. Damper tube | |

ASSEMBLED VIEW

3. Loosen the lower fork bracket pinch bolt or stud nuts, and wedge a screwdriver into the bracket slot.

4. Remove the upper fork plug, screw Fork Tool (H-D part no. 97305-61) or a suitable substitute all the way into the tube until seated, taking care not to allow foreign particles to fall into the tube, and strike the tool with a copper or lead hammer to drive the tube from the brackets, or pull the fork leg out through the bottom.

5. Disassemble the fork side in the following manner:

a. Remove the fork spring from the top of the tube, then invert the tube and allow the fork oil to drain out.

b. Remove the axle pinch bolt and the damper tube screw and washer, then separate the tube from the slider with a sharp jerk.

c. Invert the tube and allow the damper assembly to slide out.

6. Disassemble the main tube in the following manner:

a. Slip a 24 in. rod with a $\frac{1}{8}$ in. diameter through the bottom of the tube until it engages the buffer spring, then push the buffer spring out of the tube.

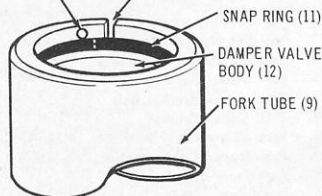
b. Remove the damper valve body locking. It may prove necessary to notch the tube with a sharp instrument to get under the ring so that it may be pried from its groove in the tube.

c. Insert a 24 in. rod with a $\frac{5}{16}$ in. diameter into the tube until it seats on the

damper valve washer, then strike the top of the rod with a hammer to drift the valve body from the tube. The damper valve and washer will also come free at this time.

Drill $\frac{3}{32}$ " hole above snap ring. DO NOT DRILL THRU TUBE. Remove snap ring. Remove all burrs.

OR
Notch with hacksaw. Must remove all burrs on inside and outside of tube.



Removing the damper valve body snap ring.

7. Remove the damper piston locking and piston from the damper tube.

8. Remove the clamps securing the fork boots on H Models. Rotate the fork lower cover $\frac{1}{4}$ turn counterclockwise, pull off the fork slider, and remove the locking ring and oil seal on C Models.

9. Remove the fork upper cover assembly in the following manner:

a. Disconnect the headlight and allow it to hang down on the fork bracket.

b. Remove the speedometer drive unit from the cable end, and slip the cable

out through the loop on the left fork cover. Disconnect the brake cable at the handlebars and slip the cable out through the loop on the right fork cover.

c. Loosen the steering damper knob until the tension is taken off of the damper rod lock, then loosen the fork stem nut and upper bracket bolt several turns each.

d. If one fork side is to remain assembled, loosen its fork plug.

e. Place a piece of wood under the upper bracket, and carefully drift the upper bracket up until the cover and rubber ring assembly is free to be removed.

INSPECTION

1. Consult the Models M and MS "Inspection" section.

FORK STEM AND BRACKET ASSEMBLY REMOVAL

1. Consult the Model MSR and 1972 Model MLS "Fork Stem and Bracket Assembly Removal" section. Models SS and SX are equipped with steering dampers.

FORK STEM AND BRACKET ASSEMBLY INSTALLATION

1. Consult the Model MSR and 1972 Model MLS "Fork Stem and Bracket Assembly Installation" section.

FORK ASSEMBLY AND INSTALLATION

1. Install the fork cover in the reverse order of disassembly, making sure the rubber ring and O-ring are held in place as the cover assembly is slipped into place.

2. Assemble the fork slider in the reverse order of disassembly.

3. Assemble the damper tube in the reverse order of disassembly.

4. Assemble the main tube and fork side as described in steps three and four of Model MSR and 1972 Model MLS "Fork Assembly and Installation."

5. On 1970 and later SS models (from serial no. 12216) and on 1971 and later SS and SX models, a vent valve and baffle assembly is used. If these parts require replacement, or if there is oil leakage from the fork sides on older models, a replacement kit is available which may be installed. Use all of the parts in the kit rather than only those which appear to be in need of replacement.

REAR SUSPENSION

M Models

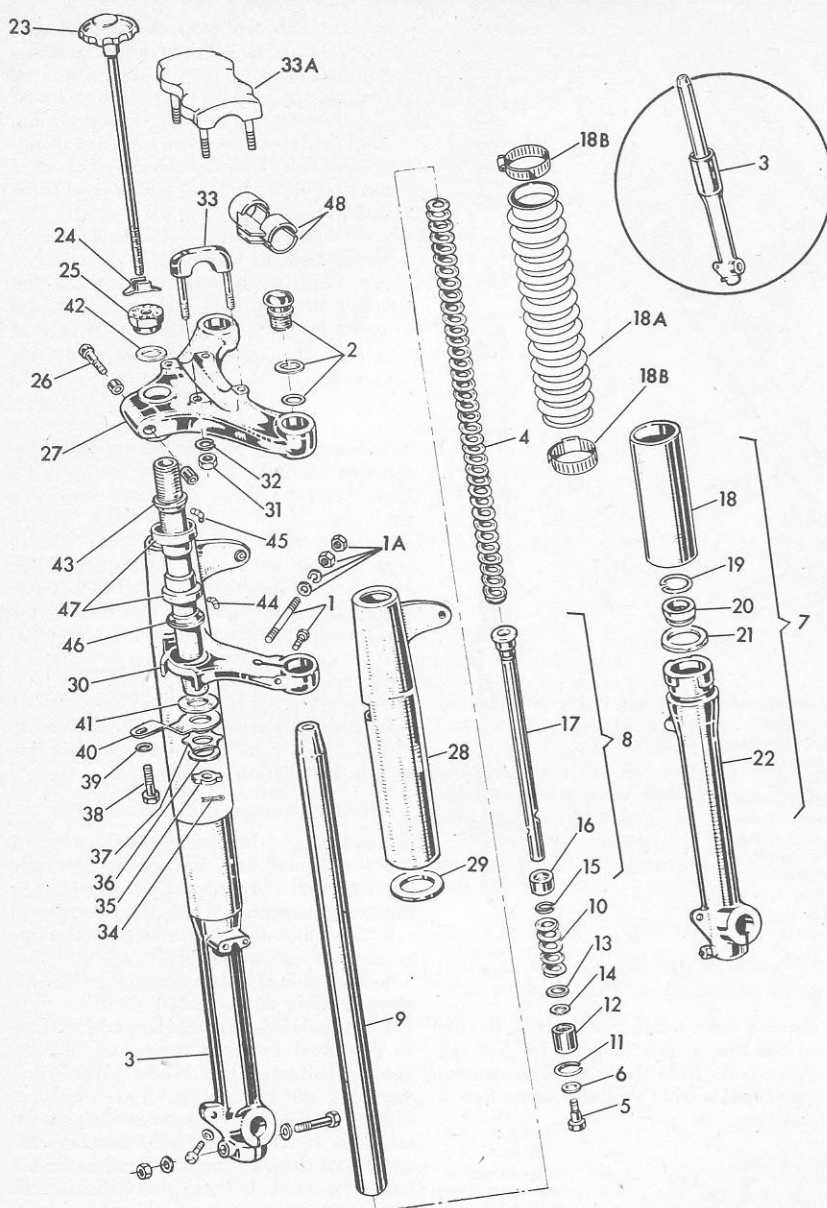
SHOCK ABSORBER DISASSEMBLY AND ASSEMBLY

1. Remove the shock absorber locknuts (if applicable), then remove the mounting bolts and their associated apparatus, and pull the shock off of the upper and lower mounting studs.

2. Disassemble 1969 and earlier shocks by compressing them in a vise. The lower cover's lip should seat on the edge of one vise jaw, and the top mounting eye should seat on the other jaw. Cover the top cover to protect it, then compress the spring while holding the upper cover. When the spring is sufficiently compressed, remove the split retainer ring.

3. Disassemble 1970 and later shocks by

Harley-Davidson Singles



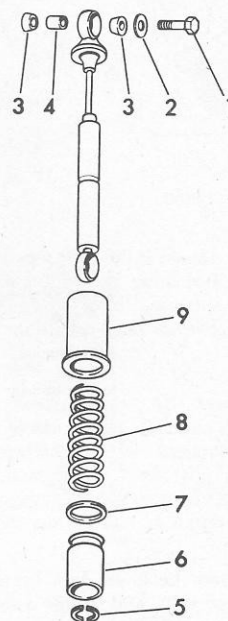
Front fork assembly (1970 and earlier Sprint Models).

- | | |
|----------------------------------------------------------------|--------------------------------------------------|
| 1. Lower Bracket Fork Bolt (2) (C Models) | 23. Steering Damper Knob Assembly |
| Lower Bracket Fork Stud (2) (63 and Later H Models) | 24. Steering Damper Rod Lock |
| 1A. Stud Nuts, Washers and Lockwashers (63 and Later H Models) | 25. Fork Stem Nut |
| 2. Fork Plug (2) Washer (2) Seal (2) | 26. Fork Upper Bracket Bolt |
| 3. Fork Side Assembly (2) | 27. Fork Upper Bracket |
| 4. Fork Spring (2) | 28. Fork Upper Cover Assembly (2) Right and Left |
| 5. Damper Tube Screw (2) | 29. Fork Upper Cover Rubber Ring (2) |
| 6. Damper Tube Screw Washer (2) | 30. Fork Stem and Bracket |
| 7. Fork Slider Assembly (2) | 31. Handlebar U-Bolt Clamp Nut (4) |
| 8. Damper Tube Assembly (2) | 32. Handlebar U-Bolt Clamp Washer (4) |
| 9. Main Tube (2) | 33. Handlebar U-Bolt (2) |
| 10. Buffer Spring (2) | 33A. Handlebar Clamp (62 and Later) |
| 11. Damper Valve Body Lockring (2) | 34. Steering Damper Rod Cotter Pin |
| 12. Damper Valve Body (2) | 35. Steering Damper Lower Nut |
| 13. Damper Valve Washer (2) | 36. Steering Damper Spring Washer Plate |
| 14. Damper Valve (2) | 37. Steering Damper Spring Washer |
| 15. Damper Piston Lockring (2) | 38. Steering Damper Anchor Plate Bolt |
| 16. Damper Piston (2) | 39. Steering Damper Anchor Plate Washer |
| 17. Damper Tube (2) | 40. Steering Damper Anchor Plate |
| 18. Fork Lower Cover Assembly (2) (C Models) | 41. Steering Damper Upper Friction Disc |
| 18A. Fork Boot (H and SS Models) | 42. Fork Stem Nut Washer |
| 18B. Boot Clamp (2) (H and SS Models) | 43. Upper Steering Head Bearing Cone |
| 19. Tube Seal Lockring (2) | 44. Lower Steering Head Ball Bearings (25) |
| 20. Fork Tube Upper Cover Seal (2) | 45. Upper Steering Head Ball Bearings (25) |
| 21. Fork Tube Lower Cover Seal (2) | 46. Lower Steering Head Bearing Cone |
| 22. Fork Slider Assembly (2) Right and Left | 47. Head Cup (2) |
| | 48. Handlebar Rubber Mounts (2) (62 and Later) |

using Shock Compressor Tool (H-D part no. 97010-52A) and a suitable washer. Remove the split retaining ring when the spring is suitably compressed. If the tool is not available, the shock can be disassembled by having one person compress the spring while another removes the retainer ring.

4. Remove the lower cover (if applicable), the spring washer, the spring, and the upper cover (if applicable).

5. Replace the shock unit and any other components which are worn or damaged, then reassemble the shock in the reverse order of disassembly, taking care not to catch the lower cover in the split ring groove as this will cause the cover to bend.



1. Bolt (2)
2. Washer (2)
3. Rubber bushing (4)
4. Spacer (2)
5. Split retaining ring
6. Lower cover
7. Washer
8. Spring
9. Upper cover

Rear shock absorber assembly.

REAR SWING ARM REMOVAL

1. Remove the rear wheel as described in the rear wheel "Removal and Installation" section.

2. Remove the rear shock absorber as described in the above section.

3. Remove the pivot bolt nut, washers, and bolt on all M, MS, MC models.

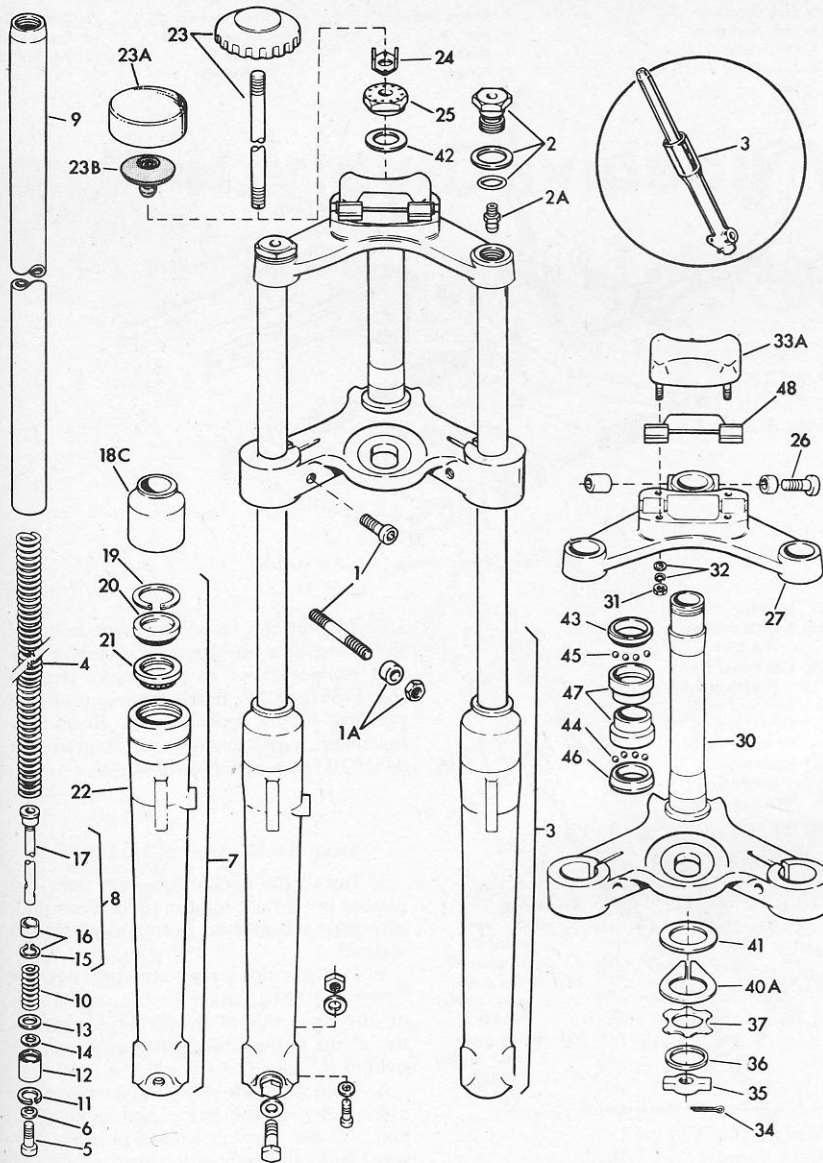
4. Remove the rear brake lever and spring, then unscrew the pivot bolt and remove the bolt nut and washers on all MLS and MSR models.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

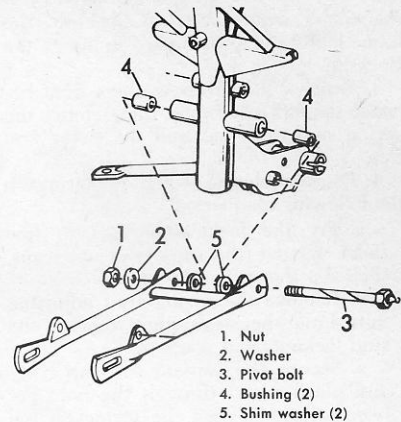
2. Inspect the fit of the pivot bolt in the fork bushings for excessive play and re-

Harley-Davidson Singles

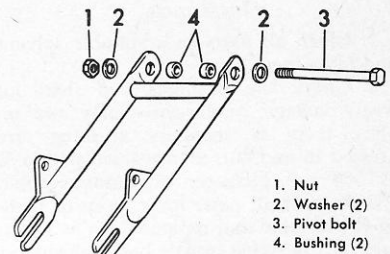


Front fork assembly (1971 and later Sprint Models).

- | | |
|-----------------------------------------------|--------------------------------------------|
| 1. Lower Bracket Fork Bolt (2) (SS) | 23. Steering Damper Knob Assembly |
| Lower Bracket Fork Stud (2) (SX) | 23A. Fork Plug Cap |
| 1A. Stud Nut and Spacer (2) (SX) | 23B. Rubber Pad |
| 2. Fork Plug (2), Washer (2), Seal (2) | 24. Steering Damper Rod Lock |
| 2A. Fork Plug Valve (2) | 25. Fork Stem Nut |
| 3. Fork Side Assembly (2) | 26. Fork Upper Bracket Bolt |
| 4. Fork Spring (2) | 27. Fork Upper Bracket |
| 5. Damper Tube Screw (2) | 30. Fork Stem and Bracket |
| 6. Damper Tube Screw Washer (2) | 31. Handlebar Clamp Nut (4) |
| 7. Fork Slider Assembly (2) | 32. Handlebar Clamp Nut Washer (4) |
| 8. Damper Tube Assembly (2) | 33A. Handlebar Clamp |
| 9. Main Tube (2) | 34. Steering Damper Rod Cotter Pin |
| 10. Buffer Spring (2) | 35. Steering Damper Lower Nut |
| 11. Damper Valve Body and Lockring (2) | 36. Steering Damper Spring Washer Plate |
| 12. Damper Valve Body (2) | 37. Steering Damper Spring Washer |
| 13. Damper Valve Washer (2) | 40A. Steering Damper Anchor Plate |
| 14. Damper Valve (2) | 41. Steering Damper Upper Friction Disc |
| 15. Damper Piston and Lockring (2) | 42. Fork Stem Nut Washer |
| 16. Damper Piston (2) | 43. Upper Steering Head Bearing Cone |
| 17. Damper Tube (2) | 44. Lower Steering Head Ball Bearings (25) |
| 18C. Fork Boot (2) | 45. Upper Steering Head Ball Bearings (25) |
| 19. Seal Lockring (2) | 46. Lower Steering Head Bearing Cone |
| 20. Fork Seal (2) | 47. Head Cup (2) |
| 21. Fork Tube Lower Cover Seal (2) | 48. Handlebar Rubber Mounts (2) |
| 22. Fork Slider Assembly (2) (Right and Left) | |



Rear swing arm for models M-50 and M-65



Rear swing arm for M-125

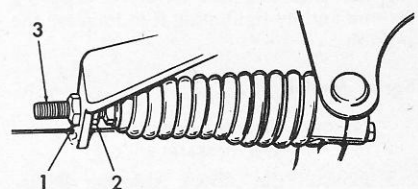
REAR SWING ARM INSTALLATION

1. Install the swing arm in the reverse order of removal.
2. Adjust swing arm side-play on M and MS models by loosening the pivot bolt locknut and tighten the pivot bolt until the play is minimal. Secure the locknut and lubricate the bushings with engine oil. The bushings should be lubricated every 1,000 miles.
3. Adjust the side-play on ML and MLS models by adding or removing the necessary amount of variable-thickness washers, which come in various thicknesses from 0.3 to 1.0 mm. Grease the pivot bolt at the grease fitting after the swing arm is assembled.

S and B Models

SWING ARM AND SPRING DISASSEMBLY

1. Remove the muffler and its support tube, disconnect the rear brake rod, and remove the rear wheel as described in the rear wheel "Removal and Installation" section.
2. Remove the plug and nipple assemblies then drift the shaft out with a brass drift and hammer. Since shaft is secured in



Swing arm spring.

1. Nut 2. Nut 3. Stud

place the bushings if necessary by drifting them out and pressing them back in.

3. If the swing arm itself appears to be

bent or damaged, it must be replaced since bending it back into shape may cause metal fatigue.

Harley-Davidson Singles

the frame with Grade C Locktite, the frame may have to be heated to loosen the Locktite.

3. Remove the thrust washers from between the fork and frame, then remove the spring stud nuts and pull the swing arm free.

4. Disassemble the swing arm springs in the following manner:

a. Pry the lockwasher ears to free them, remove the capscrews and caps, then slip the spring assembly free.

b. Remove the spring stud adjusting nuts from the studs, then remove the stud locknuts and washers.

c. Secure the cap on the cap body and place a rod through the hole between them to twist the spring off the cap body.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Check the bushings and shaft for wear, damage, or excessive play and replace them as necessary. Bushings are pressed in and out, then reamed with a $\frac{3}{4}$ (0.7500 in.) diameter expansion reamer.

3. Inspect all parts for a worn or damaged condition and replace them as necessary. If the swing arm is bent, sprung, or otherwise damaged, it must be replaced.

SWING ARM AND SPRING ASSEMBLY

1. Assembly is basically the reverse order from disassembly. All parts which are to be coated with Locktite must be thoroughly cleaned in an oil-free solvent.

2. Assemble the fork spring in the reverse order of disassembly.

3. Position the swing arm in the frame so the rubber stop is facing up, then screw the adjusting nuts on the spring studs.

4. Coat the center of the fork support shaft with Grade C Locktite, leaving about $1\frac{1}{2}$ in. clean on each end of the shaft.

5. Position the swing arm so the shaft holes are in alignment, then start the shaft into the holes. Before the shaft passes from the frame to the swing arm, position a thrust washer between the two. When the shaft has passed through the frame, washer, and swing arm, position another thrust washer on the other side and pass the shaft through it.

6. Coat the threads of the end plugs with Grade C Locktite before assembling them. Grease the swing arm through the plug nipples immediately after the plugs are installed to displace any Locktite which may have gotten on the bushings.

7. Complete the assembly in the reverse order of disassembly.

8. Adjust the spring tension by loosening the adjusting nut to decrease spring tension and by tightening it to increase the tension.

Sprint Models

SHOCK ABSORBER DISASSEMBLY AND ASSEMBLY

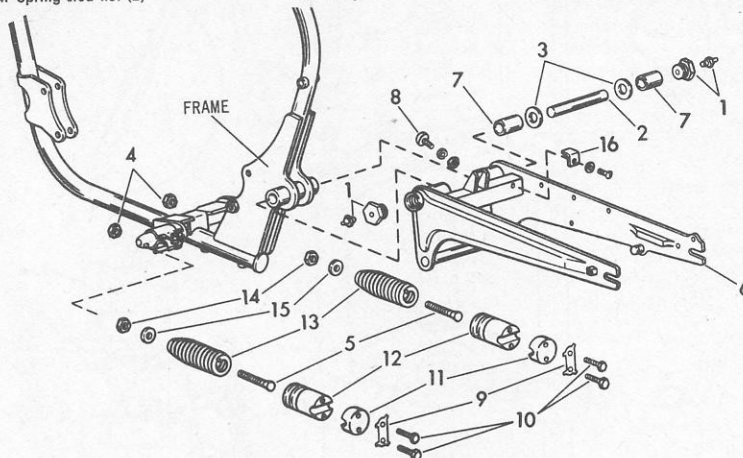
1. Consult the "Shock Absorber Disassembly and Assembly" section for M models. The Sprint shocks are disassembled like the 1969 and earlier shocks.

1. Plug and nipple (2)
2. Fork pivot shaft
3. Thrust washer (2)
4. Spring stud nut (2)

5. Spring stud (2)
6. Rear fork
7. Bushing (2)
8. Bumper

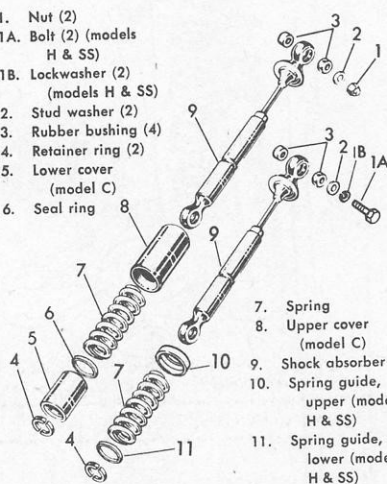
9. Lockwasher (2)
10. Capscrew (4)
11. Cap (2)
12. Body (2)

13. Spring (2)
14. Locknut (2)
15. Washer (2)
16. Chain pad



Rear swing arm assembly, S and B Models.

1. Nut (2)
- 1A. Bolt (2) (models H & SS)
- 1B. Lockwasher (2) (models H & SS)
2. Stud washer (2)
3. Rubber bushing (4)
4. Retainer ring (2)
5. Lower cover (model C)
6. Seal ring



Sprint rear shock absorber assembly.

REAR SWING ARM REMOVAL

1. Remove the rear wheel as described in the rear wheel "Removal and Installation" section.

2. Remove the rear shocks as described in the above section.

3. Remove the crossover shaft nut and washer on models C and H, then tap on the shaft end with a soft mallet until the brake operating lever is free of the shaft.

4. Bend back the pivot bolt lockwasher ear and remove the pivot bolt nut and lockwasher, then tap out the bolt with a brass drift.

5. Remove the swing arm assembly and the thrust washers from between the frame mounting ears.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all parts for a worn or damaged condition and replace them as necessary. If the swing arm is bent or damaged, it must be replaced.

3. Inspect the fit of the pivot bolt and the swing arm bushings for excessive play and replace them as necessary. Replace the bushings by drifting them out and pressing in the replacements. Ream new bushings with Reamer (H-D part no. 94810-65) or a suitable substitute.

REAR SWING ARM INSTALLATION

1. Install the anchor arm nut, bolt, and washer but do not tighten them down until the rear wheel has been installed and aligned.

2. Position the swing arm between the frame mounting ears with the anchor arm on the right side of the frame. Make sure the chain is over the swing arm and not behind it.

3. Hold the left-side thrust washer in place between the frame and swing arm, and slip the pivot bolt into position part way. Hold the right-side thrust washer in place and push the pivot bolt the rest of the way through.

4. Rotate the pivot bolt until the locating lugs on the pivot bolt's left end are in alignment with the mounting ear notches, then position the lockwasher so the bent prong seats in the groove in the frame, and mount and secure the pivot bolt nut. Secure the nut by bending the lockwasher ear up against the nut.

5. Check the motion of the swing arm for excessive play or too tight a fit which is indicated by binding, and adjust the play by adding or removing the spacer washers. Variable-thickness thrust washers are available in assorted sizes from 0.6-1.2 mm.

6. Lubricate the swing arm assembly by greasing the pivot bolt grease fitting until grease comes out from both bushings.

7. Mount the brake crossover shaft lever on the crossover shaft and secure it with a nut and lockwasher.

8. Mount the shock absorbers, carefully mounting the right shock so the brake rod is on the inside.

9. Mount the rear wheel as described in the rear wheel "Removal and Installation" section.