

Product: 1959-1969 Harley-Davidson Sportster Motorcycle Service Repair Workshop Manual
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Harley-Davidson

SERVICE MANUAL

1969

Sportster

1959 to

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1959 to 1969 SPORTSTER SERVICE MANUAL

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The maintenance and repair information in this manual applies to the 1959 to 1969 Harley-Davidson Sportster and K-KH models

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FOREWORD

This service and repair manual has been prepared with two purposes in mind. First, it will acquaint the reader with the construction of the Harley-Davidson product and assist him in performing basic maintenance and repair. Secondly, it will introduce to the professional Harley-Davidson mechanic the latest field-tested and factory-approved major repair methods. We sincerely believe that this manual will make your association with Harley-Davidson products more pleasant and profitable.

HOW TO USE YOUR SERVICE MANUAL

Your Service Manual is arranged for quick, easy reference. This manual is divided into numbered sections. Sections are then divided into sub-sections. Use this manual as follows:

1. Check the TABLE OF CONTENTS located in the front of each section to find subject desired.
2. Page number is listed across from subject. Page number consists of section number and page number.
3. Information is presented in a definite order as follows:

Adjustments
Disassembly
Cleaning, Inspection and Repair
Assembly

In figure legends, the number following a name of a part indicates the quantity necessary for one complete assembly.

NOTE

All information for servicing a part should be read before repair work is started to avoid needless disassembly.

PREPARATION FOR SERVICE

Proper preparation is very important for efficient service work. A clean work area at the start of each job will allow you to perform the repair as easily and quickly as possible, and reduce the incidence of misplaced tools and parts. A motorcycle that is excessively dirty should be cleaned before work starts. Cleaning will occasionally uncover trouble sources. Tools, instruments and parts needed for the job should be gathered before work is started. Interrupting a job to locate tools or parts is a needless delay. Special tools required for a job are listed at the end of each section.

WARNING

Gasoline is extremely flammable and highly explosive under certain conditions. Always stop engine, and do not smoke or allow open flame or sparks when refueling or servicing the fuel system.

SERVICE BULLETINS

In addition to the information given in this Service Manual, Service Bulletins are issued to Harley-Davidson Dealers from time to time, which cover interim engineering changes and supplementary information. Service Bulletins should be consulted for complete information on the models covered by this manual.

USE GENUINE REPLACEMENT PARTS

WARNING

When replacement parts are required, use only genuine Harley-Davidson parts or parts with equivalent characteristics including type, strength and material. Failure to do so may result in product malfunction and possible injury to the operator and/or passenger.

To ensure a satisfactory and lasting repair job, follow the manual instructions carefully and use only genuine Harley-Davidson replacement parts. Behind the emblem bearing the words GENUINE HARLEY-DAVIDSON is more than half a century of designing, research, manufacturing, testing and inspecting experience.

This is your insurance that the parts you are using will fit right, operate properly and last longer. When you use genuine Harley-Davidson parts, you use the best.

PRODUCT REFERENCES

When reference is made in this manual to a specific brand name product, tool or instrument, an equivalent product, tool or instrument may be used in place of the one mentioned.

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All photographs and illustrations may not necessarily depict the most current model or component, but are based on the latest production information available at the time of publication.

Harley-Davidson Motor Co., Inc., reserves the right to change specifications, equipment, or designs at any time without notice and without incurring obligation.

WARNINGS AND CAUTIONS

Statements in this manual preceded by the words **WARNING** or **CAUTION** and printed in bold face are very important.

WARNING

Means there is the possibility of personal injury to your self or others.

CAUTION

Means there is the possibility of damage to the vehicle.

We recommend you take special notice of these items.

WARNING

Proper service and repair is important for the safe, reliable operation of all mechanical products. The service procedures recommended and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. These special tools should be used when and as recommended.

It is important to note that some warnings against the use of specific service methods which could damage the motorcycle or render it unsafe are stated in this service manual. However, please remember that these warnings are not all inclusive. Since Harley-Davidson could not possibly know, evaluate and advise the service trade of all possible ways in which service might be done or of the possible hazardous consequences of each way, we have not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Harley-Davidson must first thoroughly satisfy himself that neither his nor the operator's safety will be jeopardized by the service methods selected.

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GENERAL

SPECIFICATIONS

DIMENSIONS

	<u>XL, XLH</u>	<u>XLCH</u>
Wheel Base		
(to 1966) . . .	56-1/2 in.	57 in.
(1967) . . .	58-1/2 in.	
Overall Length		
(to 1966) . . .	87 in.	83-1/4 in.
(1967) . . .	89 in.	
Overall Width . . .	34 in.	(to 1966) 29-1/2 in.
		(1967) 34 in.
Overall Height . . .	40-1/2 in.	42 in.
Road Clearance		
(1966 & earlier) .	2-1/2 in. Min.	4-1/8 in. Min.
(1967)	5-1/2 in.	6-7/8 in.
	6-3/4 in.	6-1/2 in.

CAPACITIES

	<u>XL, XLH</u>	<u>XLCH</u>
Gasoline Tank (U.S. Gallons) . . .	4.0	2.2
Oil Tank (Quarts)	3	3
Transmission (Pints)	1-1/2	1-1/2

ENGINE

Model Designation Letters	XL, XLH, XLCH
Type of Engine	4 Cycle OHV
Number of Cylinders	2
Placement of Cylinders	45 Degree, V Type
Horsepower	XL 42 HP at 5,500 R.P.M.
	XLCH, XLH 55 HP at 6,300 R.P.M.
Taxable Horsepower	7.2
Weight	XLCH 188 lbs.
	XL, XLH 204 lbs.
Bore	(76.2 mm) 3.000 in.
Stroke	(96.8 mm) 3.8125 in.
Piston Displacement	(883 c.c.) 53.9 cu. in.
Torque	XL 48 lb-ft at 3,600 R.P.M.
	XLCH, XLH 52 lb-ft at 3,800 R.P.M.
Compression Ratio	XL 7.5 to 1
	XLCH, XLH 9.0 to 1

Spark Plugs (Heat Range for Average Use) . . . No. 4

NOTE

After break-in period, No. 5 plug is recommended for hard service - XLCH and XLH Models.

The engine (serial) number is stamped on the left side of the engine crankcase. Always give this number when ordering parts or making an inquiry.

TRANSMISSION

Type Constant Mesh - Foot Shift
Speeds 4 Forward

	1966 & Earlier XL-XLH 1967 XLH- XLCH (Optional)	1966 & Earlier XLCH 1967 & Later XLH-XLCH (Standard)
Number of Sprocket Teeth		
Engine	34	34
Clutch	59	59
Transmission	21	20
Rear Wheel	51	51
Gear Ratios	1966 & Earlier XL-XLH 1967 XLH- XLCH (Optional)	1966 & Earlier XLCH 1967 & Later XLH-XLCH (Standard)
First (Low) Gear	10.63 to 1	11.16:1
Second Gear	7.69 to 1	8.08:1
Third Gear	5.82 to 1	6.11:1
Fourth (High) Gear	4.21 to 1	4.42:1

TIRE DATA

Tire Size	
XLCH, 1967 & Later XLH . .	Front - 3.25/3.50 x 19 Rear - 4.00 x 18
1966 & Earlier XL, XLH	3.50 x 18
Tire Pressure	
XLCH, 1966 & Earlier XLH	Front - 14 lbs. Rear - 18 lbs.
1967 & Later XLH	Front - 16 lbs. Rear - 20 lbs.

NOTE

The tire inflation pressures given are based on a rider weighing approximately 150 lbs. or more, increase tire pressure as follows: For each 50 lbs. of overload, increase pressure of rear tire 2 lbs., front tire 1 lb.

SERVICE

SERVICING A NEW MOTORCYCLE

RECOMMENDED OPERATIONS AT FIRST 500
AND 1000 MILES

AT 500 MILES

1. Drain oil tank through drain plug, flush with kerosene and refill with fresh oil.
2. If motorcycle is equipped with oil filter, service the filter.
3. Drain transmission and front chain compartments, clean transmission magnetic drain plug, and refill with fresh oil. Use same grade oil used in engine.
4. Lubricate all points indicated for 2000 mile servicing as described in the Regular Service Intervals Chart.
5. Inspect and service air cleaner if needed.
6. Check and adjust chains.
7. Check lubrication of rear chain and adjust rear chain oiler if necessary.
8. Check all nuts, bolts and screws, and tighten any found loose.
9. Check wheel mounting bolts which secure rear wheel to brake assembly. These bolts must be kept very tight.
10. Check XLH battery solution level and add distilled water if needed. Make sure terminals are clean and connections tight.
11. Check tightness of all cylinder head bolts and all cylinder base nuts.
12. Check tappet adjustment and readjust if necessary.
13. Check spark plug electrodes, clean and regap if necessary.
14. Check ignition timing and circuit breaker point gap.
15. Check wheel spokes and tighten if necessary.

16. Check front fork and rear fork bearing adjustment.
17. Lubricate tachometer drive (XLCH).
18. Check clutch adjustment.
19. Check brake adjustment.
20. Aim headlight.
21. Check tire pressure and inspect tread.
22. Road test.

AT 1000 MILES

1. Drain oil tank through drain plug and refill with fresh oil.
2. Clean oil filter (if applicable).
3. Check level of oil in transmission and front chain compartments and add oil if needed. Use same grade of oil used in engine.
4. Service air cleaner.
5. Check and adjust chains.
6. Check lubrication of rear chain and adjust rear chain oiler if necessary.
7. Check XLH battery solution level and add distilled water if needed. Make sure terminals are clean and connections tight.
8. Check tappet adjustment and readjust if necessary.
9. Check circuit breaker points and adjust if needed.
10. Check clutch adjustment.
11. Check brake adjustment.
12. Check tire pressure and inspect tread.
13. Road test

All operations are fully described in subsequent sections.

REGULAR SERVICE INTERVALS
SUGGESTED OPERATIONS FOLLOWING THE INITIAL BREAK-IN PERIOD

REGULAR SERVICE INTERVAL	FIG. 1B-2 INDEX NO.	GREASE	FIG. 1B-2 INDEX NO.	OIL	FIG. 1B-2 INDEX NO.	SERVICE
EVERY 1000 MILES			7	Rear Chain	4 25 7	Air Cleaner Battery Rear Chain Adjustment
EVERY 2000 MILES	19 8 31 15 14 6 16 32	Rear Brake Shaft Front Brake Shaft Rear Brake Cross-over Shaft Clutch Release Worm Foot Shift Lever Seat Bar Roller and Bolt (Seat post saddle only) Kick Starter Shaft Rear Wheel Hub Tachometer drive gear (special equip.)	17 9 21 1 22 2 28 11 26 29	Rear Brake Rod Clevis Front Brake Cable Clevis Clutch Hand Lever Brake Hand Lever Clutch Control Cable Front Brake Cable Throttle Control Cable Spark Control Cable (if used) Seat post (saddle only) Generator Bearing (1960 & earlier)	13 5 30 20 12	Tappet Adjustment Clutch Adjustment Brake Adjustment Oil Filter Front Chain Adjustment Rear Chain Oiler Circuit Breaker Points
EVERY 5000 MILES OR 1 YEAR (whichever comes first)	3 23 12 27 34	Throttle Control Spiral Spark Control Spiral (if used) Circuit Breaker Camshaft Front Wheel Hub (1964 & earlier) Speedometer and Tachometer Cables			10 24 5 12 29 33	Check Front and Rear Fork Bearing Adjustment Replace: Spark Plugs Oil Filter Element Inspect and Switch Tires Time Ignition Clean Gas Tank Strainer Check Generator Brushes Check Shock Rubber Bushings
EVERY 10,000 MILES	18 29	Repack Rear Fork Pivot Bearings Generator Bearing (1961 and later)				
EVERY 50,000 MILES	10	Repack Steering Head Bearings				
WEEKLY						Check Tires Check Battery

SERVICE INTERVAL ENGINE AND TRANSMISSION

	300 MILES	1000 MILES	2000 MILES	5000 MILES or 1 YEAR	SPRING AND FALL
ENGINE OIL	Check	Check	Change		Change
TRANSMISSION OIL		Check		Change	Change

LUBRICANTS TO USE

Use proper grade of oil for the lowest temperature expected before next oil change period as follows:

USE Harley-Davidson Oil	Use Grade	Air Temperature (Cold Engine Starting Conditions)
Medium Heavy	75	Above 40° F.
Special Light	58	Below 40° F.
Regular Heavy	105	Severe operating conditions at high air temperatures.

HARLEY-DAVIDSON GREASE-ALL GREASE

Use for all bearings on motorcycle.

HARLEY-DAVIDSON CHAIN GREASE, CHAIN SAVER
AND CHAIN SPRAY

Designed especially as chain lubricants. Penetrates inner bearings for long chain life.

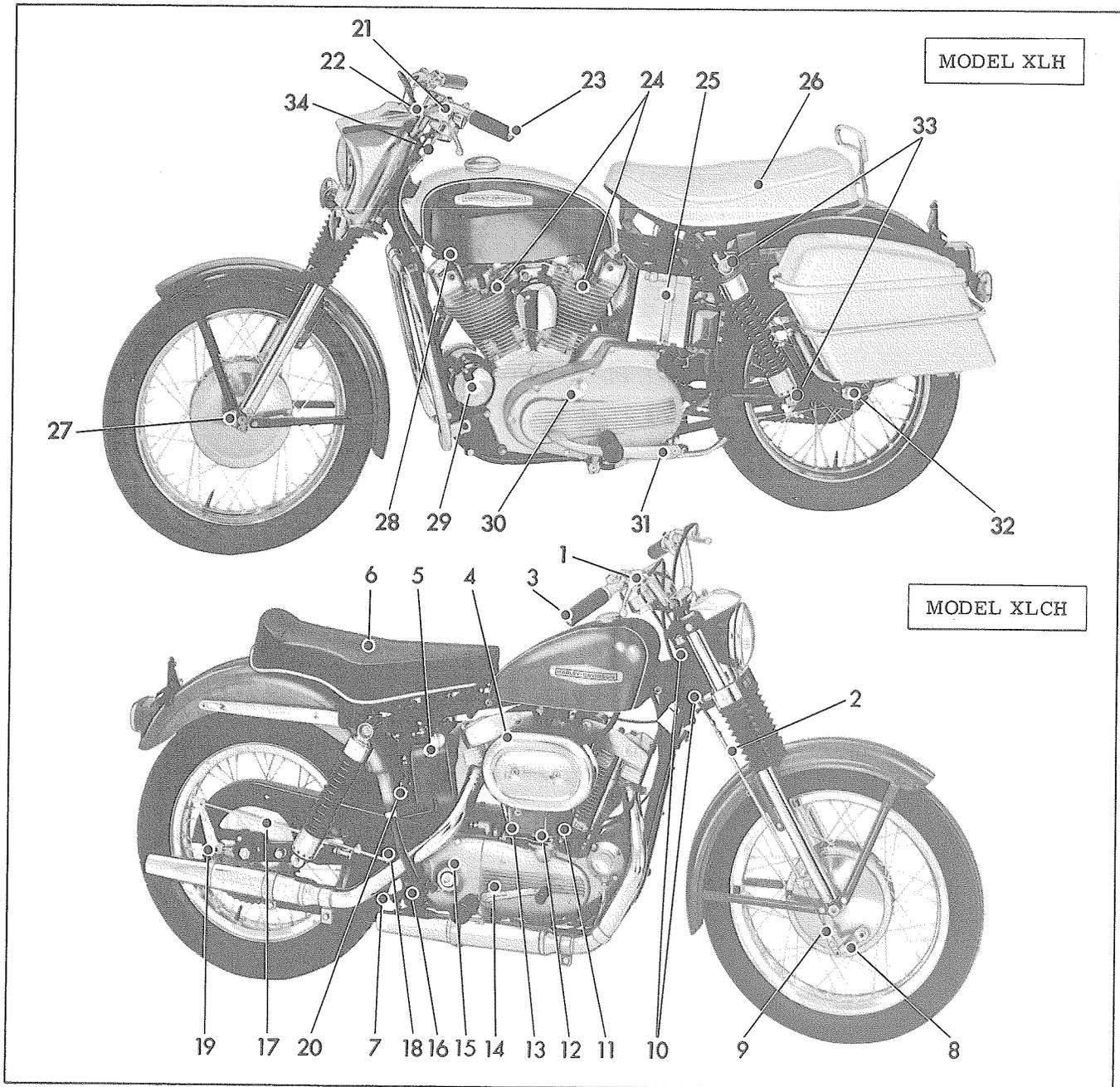


Figure 1B-2. Service Chart

LOCATING TROUBLES

The following check list will be helpful in locating most operating troubles:

IF ENGINE STARTS HARD

1. Spark plugs in bad condition, or partially fouled.
2. Spark plug cables in bad condition and "leaking."
3. Circuit breaker points out of adjustment or in poor condition.
4. Battery nearly discharged.
5. Loose wire connection at one of battery terminals, or at coil or circuit breaker.
6. Carburetor not adjusted correctly.
7. Defective ignition coil.
8. Defective condenser.
9. Engine and transmission oil too heavy. (Winter operation.)
10. Engine ignition spark not timed properly.
11. Circuit breaker cam sticking in advance position.

IF ENGINE STARTS BUT RUNS IRREGULARLY OR MISSES

1. Spark plugs in bad condition, or partially fouled.
2. Spark plug cables in bad condition and "leaking."
3. Spark plug gap too close or too wide.
4. Circuit breaker points out of adjustment or in need of cleaning.
5. Condenser connections loose.
6. Defective ignition coil.
7. Defective condenser.
8. Battery nearly discharged.
9. Loose wire connection at one of battery terminals, or at coil or circuit breaker.
10. Intermittent short circuit due to damaged wiring insulation.
11. Water or dirt in fuel system and carburetor.
12. Gasoline tank cap vent plugged or carburetor vent line closed off restricting fuel flow.
13. Carburetor not adjusted correctly.
14. Weak or broken valve springs.

IF CRANKING MOTOR DOES NOT OPERATE OR DOES NOT TURN ENGINE OVER.

1. Ignition switch is not on.
2. Discharged battery, or loose or corroded connections.
3. Starter control circuit or solenoid defective.
4. Clutch slipping.
5. Electric starter shaft pinion gear not engaging.

IF ENGINE TURNS OVER BUT DOES NOT START

1. Gasoline tank empty.
2. Gasoline valve shut off.
3. Gasoline line clogged.
4. Discharged battery or loose or broken battery terminal connection. Check by turning light switch "ON."

5. Fouled spark plugs.
6. Spark plug cables in bad condition and "leaking."
7. Badly oxidized ignition circuit breaker points.
8. Circuit breaker and/or ignition timing points badly out of adjustment.
9. Loose wire connection at one of battery terminals, or at coil or circuit breaker.
10. Defective ignition coil.
11. Defective condenser.
12. Clutch slipping and starter not turning engine over.
13. Sticking valves, or tappets too tight.
14. Engine flooded with gasoline as a result of over-choking.
15. Engine and transmission oil too heavy (winter operation).

IF A SPARK PLUG FOULS REPEATEDLY

1. Too cold a plug for the kind of service or for type of engine.
2. Piston rings badly worn or in bad condition otherwise.

IF ENGINE PRE-IGNITES

1. Excessive carbon deposit on piston head or in combustion chamber.
2. Too hot a spark plug for the kind of service or for type of engine.
3. Defective spark plugs.
4. Ignition timing too advanced.

IF ENGINE OVERHEATS

1. Insufficient oil supply, or oil not circulating.
2. Leaking valves.
3. Heavy carbon deposit.
4. Carburetor adjustment too lean.
5. Ignition timing too late.
6. Low power - circuit breaker cam sticking in retard position.

IF ENGINE DETONATES

1. Unsuitable fuel (octane rating too low).
2. Heavy deposit of carbon on piston head and in combustion chamber (decreases combustion space, thereby increasing compression ratio. The higher the compression ratio, the higher the octane rating of fuel required).

IF OIL DOES NOT RETURN TO OIL TANK

1. Oil tank empty.
2. Scavenger pump gear key sheared.
3. Oil feed pump not functioning.

IF ENGINE USES TOO MUCH OIL

1. Breather valve incorrectly timed.
2. Piston rings badly worn or in bad condition otherwise.
3. Chain oiler adjusting screw adjusted for an excessive amount of oil.
4. Oil leak to outside.

EXCESSIVE VIBRATION

1. Cylinder head bracket loose or broken.
2. Engine mounting bolts loose.
3. Broken frame.
4. Front chain badly worn, or links tight as a result of insufficient lubrication.

IF GENERATOR DOES NOT CHARGE

1. Brushes badly worn.
2. Brushes sticking in holders.
3. Voltage regulator not grounded.
4. Voltage regulator incorrectly adjusted.
5. Defective voltage regulator.
6. Commutator dirty or oily.
7. Positive brush holder grounded.
8. Generator "A" terminal grounded.
9. Loose or broken wire in generator-battery circuit.
10. Broken field coil wire or loose terminal (both coils).
11. Commutator shorted
12. Defective armature.

IF GENERATOR CHARGING RATE IS BELOW NORMAL

1. Voltage regulator incorrectly adjusted.
2. Broken field coil wire or loose terminal (one coil).
3. Commutator worn and not turning true with shaft - throws brushes at high speed.
4. Commutator dirty or oily.
5. Brushes gummy and sluggish in holders.
6. Defective armature.

IF CARBURETOR FLOODS

1. Float set too high (1966 and earlier).
2. Inlet valve sticking.
3. Inlet valve and/or valve seat worn or damaged.

4. Dirt or other foreign matter between valve and its seat.
5. Carburetor float not located correctly in bowl - may be binding (1965 and earlier).
6. Carburetor inlet lever not set correctly (1966).
7. Excessive pumping of hand throttle grip.

IF TRANSMISSION SHIFTS HARD

1. Bent shifter rod.
2. Clutch dragging slightly.
3. Transmission oil too heavy (winter operation).
4. Shifter forks (inside transmission) sprung as a result of using too much force when shifting.
5. Corners worn off shifter clutch dogs (inside transmission) - makes engagement difficult.

IF TRANSMISSION JUMPS OUT OF GEAR

1. Shifter rod improperly adjusted.
2. Shifter forks (inside transmission) improperly adjusted.
3. Shifter engaging parts (inside transmission) badly worn and rounded.

IF CLUTCH SLIPS

1. Clutch controls improperly adjusted.
2. Insufficient clutch spring tension.
3. Worn and/or oil soaked friction discs.

IF CLUTCH DRAGS OR DOES NOT RELEASE

1. Clutch controls improperly adjusted.
2. Clutch spring tension too tight.
3. Friction discs gummy.
4. Clutch sprocket keys badly worn.
5. Clutch discs warped.

IF BRAKE DOES NOT HOLD NORMALLY

1. Brake shoe improperly adjusted.
2. Brake controls binding.
3. Brake linings impregnated with grease as a result of over-lubrication.
4. Brake linings badly worn.
5. Brake drum badly worn or scored.
6. Brake shoes not centered.

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DRIVE

CHAINS

FRONT CHAIN ADJUSTMENT (Fig. 2B-3)

The front chain should be checked every 2000 miles for correct adjustment. Check chain adjustment through oil filler opening located near the top of the chain cover. A correctly adjusted front chain should have free up-and-down movement in the upper stand midway between engine and clutch sprockets as follows: Front chain adjustment: 5/8 to 7/8 in. chain slack with cold engine; 3/8 to 5/8 in. chain slack with hot engine. To adjust chain, disconnect battery cable from starter motor, remove left footrest, and rear brake foot lever. Place an oil drain pan under clutch and remove front chain cover screws, chain cover and gasket.

The front chain is adjusted by means of a shoe underneath the chain which can be raised to tighten or lowered to loosen the chain. The chain adjuster is secured to the inner surface of the chain compartment by 3 bolts (XLH) or two bolts (XLCH). Simply loosen bolts and raise or lower chain adjuster. When chain is correctly adjusted tighten bolts securely and reassemble remaining parts.

FRONT CHAIN LUBRICATION

There is an opening between the front chain and transmission compartments, and the same oil supply automatically lubricates moving parts in both compartments. For complete lubrication service on the front chain see "Gear Box," Section 4D.

REPLACING A WORN FRONT CHAIN

Since the front chain is automatically lubricated by running in oil, little service will be required other than checking chain adjustment every 2000 miles. However, if through hard usage the front chain does become worn, it is essential to replace chain rather than trying to repair it. This will avert chain breakage and possible damage to the crankcases. To remove front chain, see "Disassembling Clutch," Section 4B.

REAR CHAIN ADJUSTMENT (Fig. 2B-3A)

The rear chain should be checked every 1000 miles for correct adjustment. A correctly adjusted rear chain should have 1/2 in. free up-and-down movement midway between mainshaft and rear wheel sprocket. As chains stretch and wear in service, they will run tighter at one point on the sprockets than another; therefore always rotate rear wheel and check adjustment at tightest point of chain.

To adjust rear chain, loosen axle nut (1) on right side of motorcycle. Loosen lock nut (2) from adjusting

nut (3), on both sides of motorcycle. Turn adjusting nut (3) clockwise to move rear wheel back, tightening chain; turn adjusting nut (3) counterclockwise, and at the same time, tap each end of the axle to move the wheel forward, loosening the chain. Turn adjusting nut (3) on either side exactly the same number of turns to maintain alignment of wheel. With lock nut (2) tight against adjusting nut (3), the distance from lock nut to outer end of adjusting stud (4) should be the same on both sides. Check correct alignment of wheel by observing that tire runs about midway between rear frame tubes and rear wheel sprocket runs centrally in the chain. When readjustment is completed, be sure to securely retighten rear axle nut (1) and rear wheel adjusting stud lock nut (2).

After adjusting rear chain, the rear brake may be too tight. Readjust brake rod, if necessary, as described in "Adjusting Rear Wheel Brake," Section 2G.

REAR CHAIN OILER (Fig. 2B-4)

At regular service intervals (1000 miles) make a close inspection of rear chain. If it does not appear to be getting sufficient lubrication, or if there is evidence of an over-supply of oil, adjust rear chain oiler.

To adjust rear chain oiler, proceed as follows. Loosen lock nut (2) and turn screw (1) outward for more oil, and inward for less oil. Turn screw only a fraction of a turn at a time; lock adjusting screw in place with lock nut.

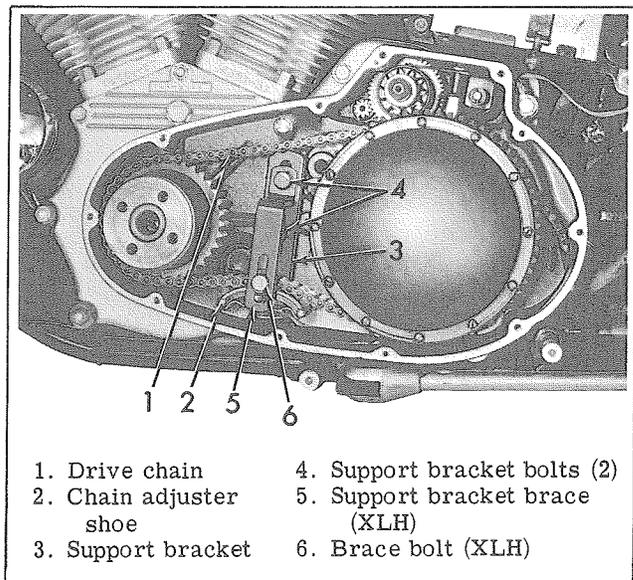


Figure 2B-3. Front Chain Tensioner Adjustment

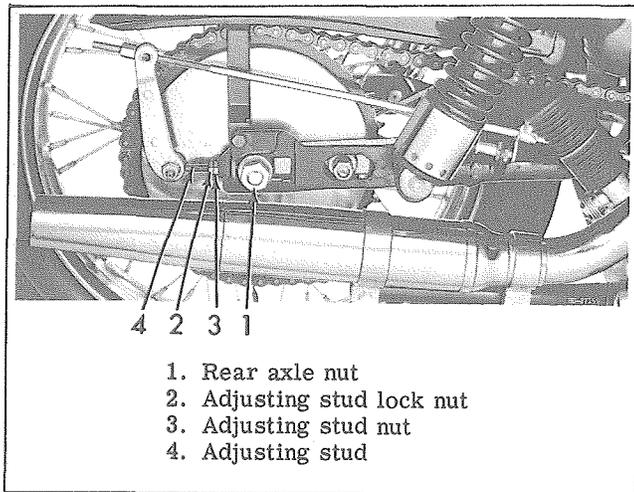


Figure 2B-3A Right Side Rear Wheel (XLH)

The quantity of oil needed to lubricate the rear chain is very small. The size of the opening (orifice) through which oil bleeds to the chain is regulated by the adjusting screw. Sediment and gummy matter, accumulating in the oil supply, deposit in and around this orifice and gradually decrease the oil supply to the chain. A chain that has been lubricated perfectly the first 2000 miles may run short of oil the second 2000 miles. For this reason, even though inspection indicates the chain is amply lubricated, it is advisable to blow away accumulated sediment and restore the orifice to its original size at intervals of approximately 2000 miles.

To clean rear chain oiler, proceed as follows:

1. Back out adjusting screw lock nut as far as possible.
2. Turn adjusting screw in until it bottoms on its seat. Count the number of turns needed to turn the screw in.
3. Remove adjusting screw and blow out orifice with compressed air.
4. Reinstall adjusting screw and turn it in until it bottoms on its seat.
5. Turn adjusting screw out the number of turns counted in Step 2 above, and lock in place with locking nut. This is the original setting.

The rear chain oiler should be set to permit oil to flow at a rate of 2 to 3 drops per minute. This setting is approximately 1/4 turn open for 1968 and earlier models and 3/4 turn open for 1969 models.

SERVICING REAR CHAIN

At regular service intervals of 1000 miles, examine the rear chain for adequate lubrication and worn chain links. If additional chain lubrication is needed, adjust chain oiler according to the procedure described in "Rear Chain Oiler."

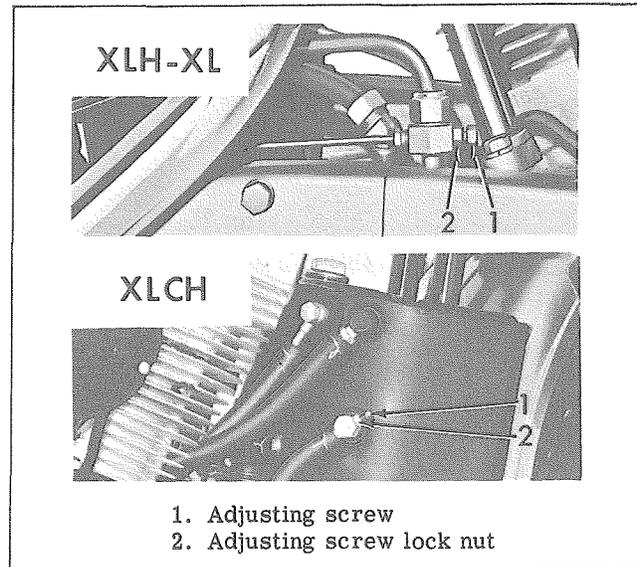


Figure 2B-4. Rear Chain Oiler (1966 Models Shown)

Occasionally the chain should be removed from the motorcycle, inspected for worn condition and receive additional lubrication. Free chain from motorcycle by removing spring-locked connecting link. Connecting link pins which have press fitted side plates can be pressed apart with Chain Repair Tool, Part No. 95020-38 which is supplied in accessory rider tool kit. A shop tool is available for this purpose under Part No. 95021-29. Lay clean chain out flat and contract chain by taking up all slack in its links. Measure the chain length. Then stretch chain out to its full length and again measure chain length. If the difference between the two measurements exceeds 1 in., the chain should be replaced. In addition, if the chain has any stiff links, is visibly worn or damaged, it should be replaced. If a new chain is not available and it is necessary to repair the old chain, remove damaged links by pressing out riveted link pins with Chain Repair Tool.

Before installing chain on motorcycle proceed as follows: Soak and wash thoroughly in a pan of kerosene. Remove chain from kerosene and hang to allow kerosene to drain off. Immerse for a short time in a pan of grease heated to the consistency of light engine oil. If grease or facilities for heating are not available, substitute light engine oil. While immersed, move chain around to be sure that hot grease or oil works through inner chain bearings. Remove from lubricant and allow chain to drain. Wipe all surplus grease or oil from chain surface.

Install chain on motorcycle. Inspect connecting link and spring clip closely for bad condition. Replace if at all questionable. To install new press fitted connecting link, use Rear Chain Assembling Tool, Part No. 95020-66. Be sure spring clip is securely locked on pin ends, open end of clip on outside, trailing direction of chain travel, as positioned on motorcycle.

WHEELS

WHEELS AND TIRES

Maximum tire mileage and good handling qualities are directly related to care given wheels and tires. A front tire kept in continuous service will wear irregularly and peaked and may affect handling, especially if over-inflated. Therefore, it is extremely

important that front and rear tires be interchanged at recommended service intervals and correct tire pressure be maintained at all times.

At regular intervals of 5000 miles, or at any time handling irregularities are experienced, see the chart below for recommended service.

WHEEL SERVICE CHART

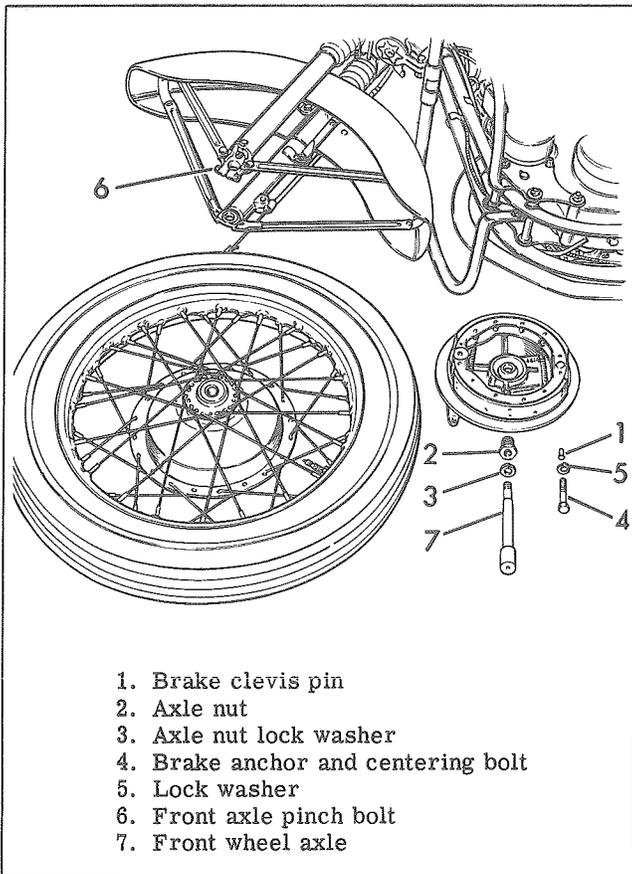
CHECK FOR	REMEDY
1. Loose axle nuts.	Tighten axle nuts.
2. Excessive side-play or radial (up and down) play in wheel hubs.	Replace wheel hub bearings as described in "Inspecting and Repairing Wheel Hubs."
3. Loose spokes.	Tighten or replace spokes as described under "Truing Wheels" and "Spoking Wheels."
4. Alignment of rear wheel in frame and with front wheel.	Check wheel alignment as described in this section, or, inspect and straighten frame as described in "Frame," Section 2E or repair rear fork as described in "Rear Fork," Section 2F.
5. Rims and tires out-of-true sideways, (should not be more than 3/64 in.).	True wheels, replace rims or replace spokes as described under, "Spoking Wheels" and "Truing Wheels."
6. Rims and tires out-of-round or eccentric with hub (should not be more than 3/32 in.).	See Item 5, above.
7. Irregular or peaked front tire wear.	Transpose tires as described in "Removing and Installing Front and Rear Wheel," and "Removing and Installing Tire and Tube."
8. Correct tire inflation.	Inflate tires as described in "Specifications", General (1A).
9. Correct tire and wheel balance.	Static balance may be satisfactory if dynamic balancing facilities are not available, however, dynamic balancing is also recommended.
10. Steering head bearings	Correct adjustment and replace pitted or worn bearings. See Section 2F.
11. Shock absorbers.	Check damping action and mounting stud rubbers. See Section 2F.
12. Rear fork bearings.	Check for looseness. See Section 2F.

REMOVING AND INSTALLING FRONT WHEEL (Fig. 2C-9)

Raise front end of motorcycle high enough to permit removing wheel; support motorcycle by suitable blocking underneath frame. Disconnect brake control by removing brake clevis pin (1). Remove axle nut (2), and axle nut lock washer (3). Remove brake anchor and shoe centering bolt (4), and lock washer (5). Loosen axle pinch bolt (6). With a soft hammer

loosen axle (7) and remove from hub and fork assembly. Remove front wheel and brake assembly complete.

To reinstall front wheel and brake assembly, reverse the disassembly procedure. Center brake shoes as described in "Adjusting Front Wheel Brake," Section 2G. Inject one ounce of "Grease-All" grease into the wheel hub and spin wheel, to make sure it has free movement.



1. Brake clevis pin
2. Axle nut
3. Axle nut lock washer
4. Brake anchor and centering bolt
5. Lock washer
6. Front axle pinch bolt
7. Front wheel axle

Figure 2C-9. Front Wheel Removal

REMOVING AND INSTALLING REAR WHEEL (Fig. 2C-10)

Raise rear end of motorcycle high enough to permit removing wheel; support motorcycle by suitable blocking underneath frame. Locate and remove chain connecting link (1) and disengage chain from rear sprocket. Remove brake adjusting nut (2) from brake rod. Remove axle nut (3), axle nut lock washer (4) and centering collar (5). With a soft hammer tap right end of axle (6) to loosen from left side of frame. Remove axle from hub and frame assembly. Remove axle spacer (7) from left side. Slide wheel and brake assembly to extreme rear end of frame. Lift wheel up to pass brake drum over brake shoes. Remove wheel from motorcycle.

To reinstall rear wheel, reverse the disassembly procedure. Center brake shoes as described in "Adjusting Rear Wheel Brake," Section 2G. Inject one ounce of "Grease-All" grease into the wheel hub and spin wheel to make sure it turns free.

DISASSEMBLING FRONT WHEEL HUB
1963 AND EARLIER (Fig. 2C-11)

Remove front wheel from motorcycle as described in "Removing and Installing Front Wheel." Turn threaded bearing lock nut (1) from hub, breaking stake locks as it is being removed. Drift out ball bearing (2) from opposite side of hub. Free bearing

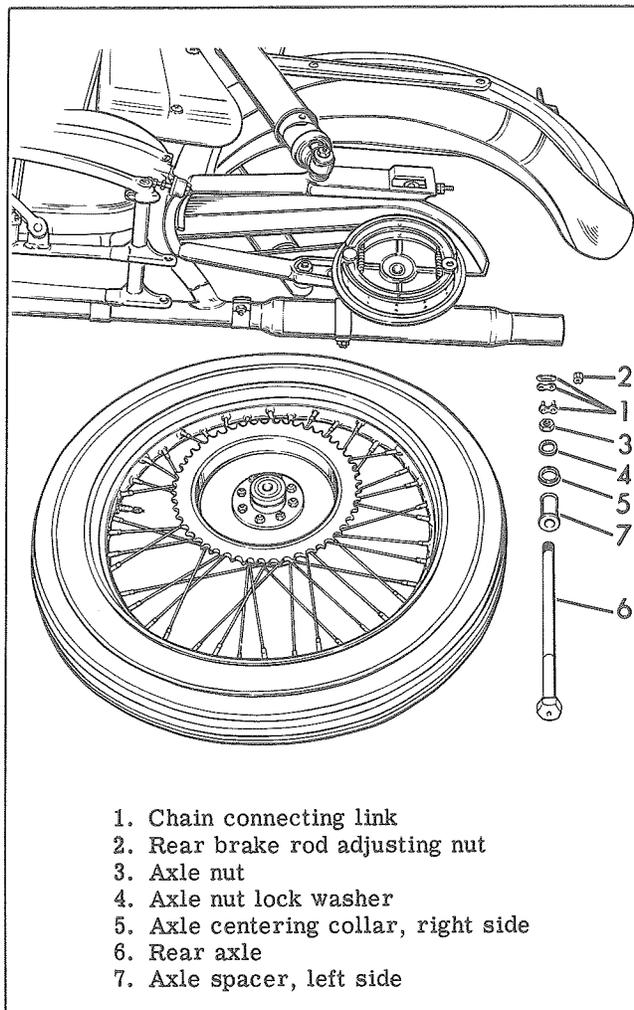
washer (3) and spacer (4). Drift out ball bearing (5) and grease retainer (6) from opposite side of hub.

1964 and Later (Fig. 2C-11A)

Pry grease seal (1) from wheel hub. Remove retaining ring (2) with Tru-arc lock ring pliers. Tap ball bearing (3) inward all the way against its seat in hub. This will move bearing (4) out far enough so that spacer (5) can be moved away from bearing (4). Then use a drift to tap out bearing (4) from opposite end of hub. Bearing (3) can now be tapped out from opposite end.

DISASSEMBLING REAR WHEEL HUB (Fig. 2C-12)

Remove rear wheel from motorcycle as described in "Removing and Installing Rear Wheel." Using tool, Part No. 94630-67, turn threaded bearing lock nut (1) from hub, breaking stake locks as it is being removed. Drift out bearing oil seal (2) and outer spacer (3) from opposite side of hub. Repeat operation for ball bearing (4) and washer (5). Free bearing spacer (6). Drift out ball bearing (7 or 7A), spacer (8 or 8A) and grease retainer (9 or 9A) from opposite side of hub.



1. Chain connecting link
2. Rear brake rod adjusting nut
3. Axle nut
4. Axle nut lock washer
5. Axle centering collar, right side
6. Rear axle
7. Axle spacer, left side

Figure 2C-10. Rear Wheel Removal

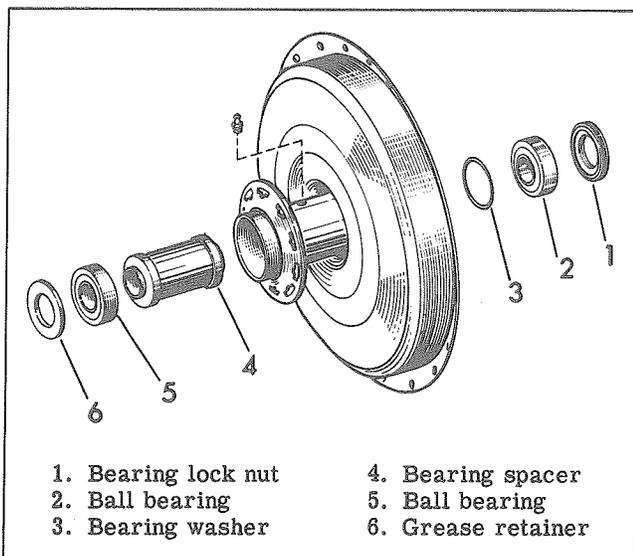


Figure 2C-11. Front Wheel Hub (1963 and Earlier)

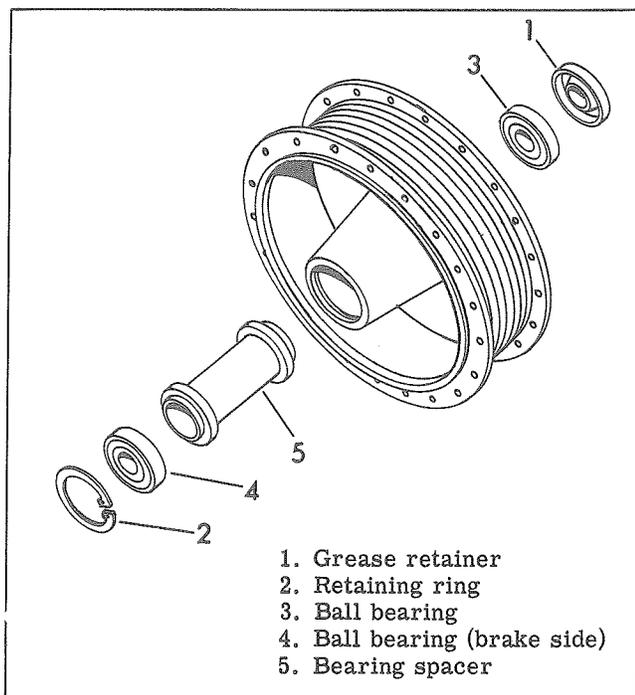


Figure 2C-11A. Front Wheel Hub (1964 And Later)

INSPECTING AND REPAIRING WHEEL HUBS (Fig. 2C-11, 2C-11A and 2C-12)

Clean and inspect all parts, paying particular attention to the wheel hub bearings. If bearings have excessive side play or radial (up and down) play in the wheel hubs, they should be replaced. If ball bearings have been removed from the hubs, carefully examine for visible wear, heat discoloration or damage to inner and outer races. Inspect brake shells for scoring, grooving and worn running surfaces. Check spoke flanges for bent or damaged condition. Recommended hub repair is replacement of worn or damaged parts.

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ASSEMBLING FRONT WHEEL HUB

1963 and Earlier (Fig. 2C-11)

Assemble washer (3) open end ball bearing (2) bearing lock nut (1). Peen lock nut to hub in two places. Insert front wheel bearing spacer (4) and press closed end ball bearing (5) into hub against bearing spacer (4), closed end facing out. Insert retainer (6). Install front wheel in motorcycle as described in "Removing and Installing Front Wheel."

1964 and Later (Fig. 2C-11A)

Clean and pack both ball bearings with fresh Grease-All grease. Press brake side ball bearing (4) against shoulder in hub, shielded side out. Install retaining ring (2) using Tru-arc lock ring pliers. Install bearing spacer (5). Press ball bearing (3) against shoulder in hub and tap grease retainer (1) in place.

ASSEMBLING REAR WHEEL HUB (Fig. 2C-12)

Press oil seal (2) into lock nut (1) and insert outer spacer (3) in oil seal (2) and lock nut (1). Install washer (5) and ball bearing (4). Assemble lock nut (1), oil seal (2), and outer spacer (3) into hub as one unit. Peen lock nut to hub in two places and insert bearing spacer (6).

1962 and Earlier

Press ball bearing (7) into hub against bearing spacer (6). Insert bearing spacer (8) and grease retainer (9). Install rear wheel in motorcycle as described in "Removing and Installing Rear Wheel."

1963 and Later

Press unshielded bearing (7A) against bearing spacer (6). Install bearing spacer (8A), and shielded bearing (9A) with oil seal (9) on outside.

REPLACING REAR WHEEL SPROCKET

To replace a worn rear wheel sprocket remove wheel from motorcycle as described in "Removing and Installing Rear Wheel." Disassemble brake drum from wheel by removing 8 bolts. Chisel heads off all rivets and dowel pins from brake shell side and punch them out. If the rivet holes are not worn, use the rivet holes again. If the rivet holes are found slightly worn or elongated and drum is in good condition, drill a new set of rivet holes in drum flange midway between original dowel and rivet holes.

To drill new rivet holes, proceed as follows using new sprocket as a template for locating holes.

1. Drill a 9/64 in. hole from the brake shell side.
2. Drill one hole and insert rivet (do not head rivet).
3. Drill a hole directly opposite first hole and insert rivet (do not head rivet).
4. Drill remaining 14 rivet holes.

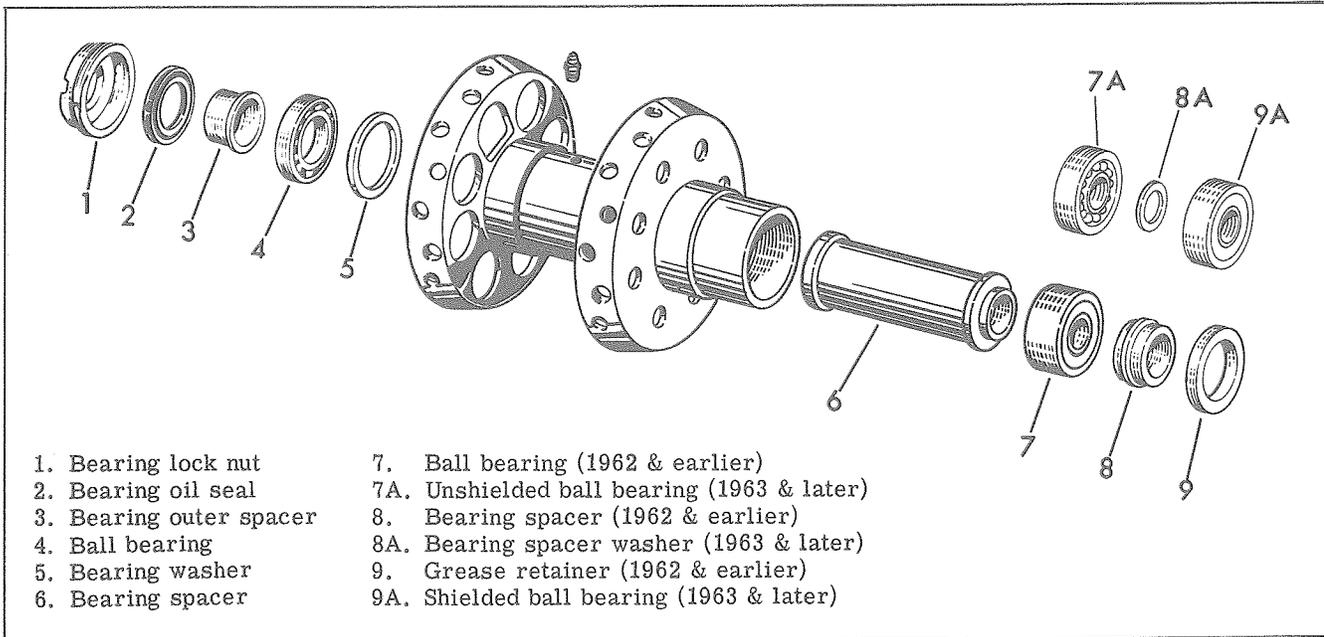


Figure 2C-12. Rear Wheel Hub - Exploded View

5. Remove rivets and separate sprocket from drum.
6. Remove burrs from newly drilled holes.

Whenever a rear wheel sprocket is replaced it is very important to drill new dowel holes to insure a press fit for the dowel pins. Use the new sprocket as a template and drill the four dowel pin holes 3/16 in. dia. for a press fit.

Position sprocket and drum on center support flange of Riveting Jig, Part No. 95600-33A. Proceed as follows, inserting and seating dowel pins first, and then rivets.

1. Insert dowel pin and rivet from brake shell side.
2. Use hollow driver and seat dowel pin and rivet at the same time driving sprocket and hub flange together.
3. Use concave punch and flare dowel pin end. Head rivet end until head extends 3/64 in. above sprocket face.
4. Repeat steps 1, 2 and 3 seating opposite dowel pins and rivets until all are in place.

This procedure will prevent distortion of sprocket.

Install brake drum on wheel and wheel in motorcycle as described in "Removing and Installing Rear Wheel."

SPOKING FRONT WHEEL

1963 AND EARLIER (Fig. 2C-13 AND 2C-14)

Front wheel rim is identified by Part No. stamped in rim-well as follows: 18" steel 43002-30, 18" aluminum 43009-60, 19" steel 43003-53 and 19" aluminum

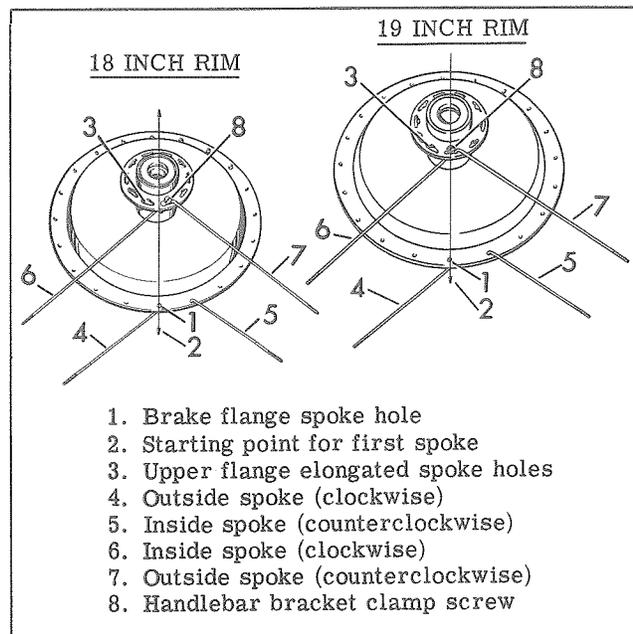


Figure 2C-13. Inserting Spokes in Front Wheel (1963 And Earlier)

43010-60. Spoke holes in hub flanges are in one row around each flange - 20 holes in the brake side flange and 10 elongated holes (2 spokes to a hole) in the small flange. (See Fig. 2C-13.)

1. Place hub on bench with brake drum end of hub down.

2A. 18" Wheel: Select a brake flange spoke hole (1) that is located midway (2) between two elongated spoke holes (3) of the small flange (upper flange as positioned on workbench), and insert spoke (4) from

inside of hub. Follow through, and insert spokes in every other brake flange hole until 10 spokes are in place.

2B. 19" Wheel: Select a brake flange hole (1) that is located through the center of the elongated spoke hole in the small flange (upper flange as positioned on workbench), and insert spoke (4) from inside of hub. Follow through, and insert spokes in every other brake flange hole until 10 spokes are in place.

3. Turn hub over. Insert spokes (5) from the outside of hub, filling the remaining 10 spoke holes of the brake flange.

4. Again, place hub on bench with brake drum end of hub down.

5. Swing the 10 outside spokes (4) clockwise.

6. Swing the 10 inside spokes (5) counterclockwise.

7. Place the rim over the hub with the spoke holes having the most acute angle facing down. Check by inserting nipples in spoke holes as shown in (1, Fig. 2C-14).

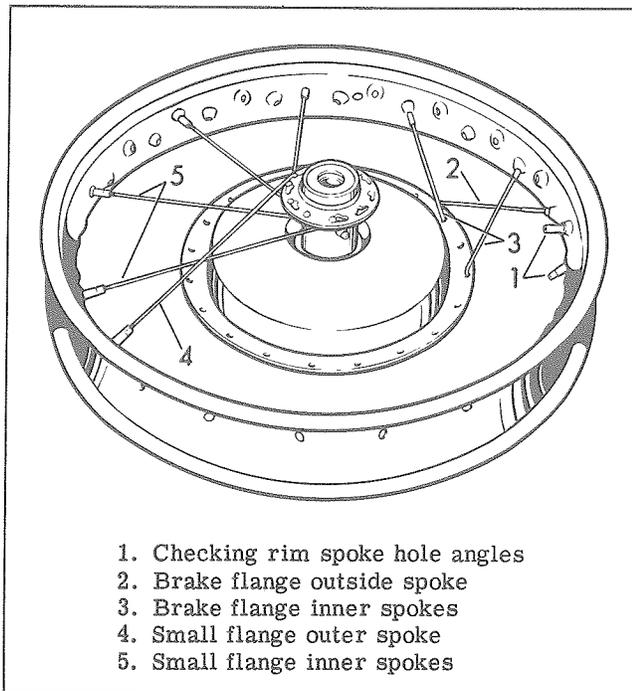


Figure 2C-14. Lacing Front Wheel (1963 and Earlier)

8. Cross a brake flange outside spoke (2), under two inner spokes (3) and insert in lower row of holes in rim that angle in same direction as spokes. Start nipples on spokes as they are inserted in rim.

9. Follow around hub repeating the operation described in step, 8, until all spokes are secured to rim.

10. With hub in same position, insert ten spokes (6, Fig. 2C-13) in small flange (upper flange as positioned on workbench) elongated holes, with head of

spoke up and to the left in the elongated hole. Swing spokes clockwise and insert in nearest upper row of rim holes that angle in same direction as spokes. Just start nipples on spokes as they are inserted in rim.

11. Insert the 10 remaining spokes (7, Fig. 2C-13) in the elongated holes - head of spoke down and to the right in the hole. Swing spokes counterclockwise.

12. See Fig. 2C-14. Select any small flange outer spoke (4), cross it over four inner spokes (5) on 18 in. wheel, and three on 19 in. wheel. Insert spoke in nearest upper row of rim holes that angle in same direction as spokes. Just start nipples on spokes as they are inserted in rim.

13. Insert 10 handlebar bracket clamp screws Part No. 1214, (8, Fig. 2C-13), in the elongated holes between the spoke heads to prevent the spokes from falling out when truing up the wheel.

SPOKING FRONT WHEEL

1964 AND LATER (Fig. 2C-14A)

Front wheel rim is identified by part No. stamped in rim well as follows: 18" steel 43001-64, 18" aluminum 43009-64, 19" steel 43003-64, and 19" aluminum 43010-64. 20 spoke holes are equally spaced around each side flange of hub. 20 spoke holes are arranged in pairs on each side of rim well. Holes are spaced the same on each side of both rim and hub.

Note that there are two types of spokes, long and short at bent end as shown in Figure 2C-14A. One long and one short spoke are used in each pair. The long spoke (L) of each pair on rim crosses over to opposite side of hub while the short spoke (S) of each pair on rim connects to same side of hub. Spoke arrangement is shown in figure 2C-14A.

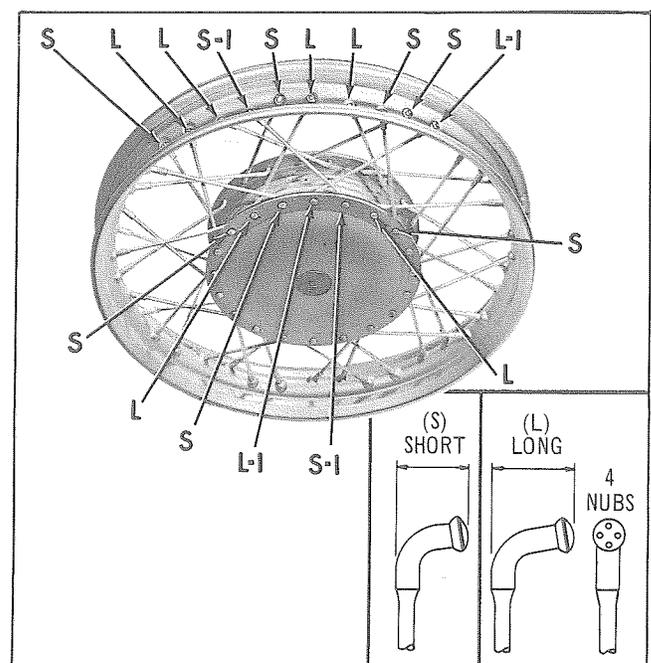


Figure 2C-14A. Lacing Front Wheel (1964 And Later)

1. Place hub on bench with brake drum side of hub up.
2. Insert 10 short spokes in every other hole from outside of brake side flange.
3. Insert 10 long spokes in remaining holes.
4. Turn hub over on bench with brake drum side of hub down.
5. Insert 10 short spokes in next holes to right (clockwise) from long spoke holes in opposite flange.
6. Insert 10 long spokes in remaining holes.
7. Swing short spokes counterclockwise and long spokes clockwise crossing underneath short spokes and forming pairs.
8. Place rim over hub (either side down).

9. Cross long spokes clockwise underneath short spokes and insert into right (clockwise hole) of each pair of holes that angles in same direction as spoke on opposite side of rim well. See L-1 in figure 2C-14A.

10. Cross short spokes counterclockwise above long spokes and insert into right (clockwise hole) of each pair on near side of rim well that angles in same direction as spoke. See S-1 in Figure 2C-14A.

Spoke will enter 6th hole to left of clockwise long spoke hole in rim. Repeat for remaining spokes. Start nipples on spokes as they are inserted in rim until all spokes are secured.

11. Turn wheel over and repeat procedure for spokes on brake side.

SPOKING REAR WHEEL (Fig. 2C-15 and 2C-16)

Rear wheel rim is identified by Part No. stamped in rim-well as follows: 18" steel 43004-60, 18" aluminum 43008-60. Spoke holes in hub flanges are in two rows around each flange - ten inner row holes (1) and ten outer row holes (2, Fig. 2C-15) in each flange. All spokes must be inserted from inside of flange.

1. Place hub on bench with brake drum end of hub down as shown in Fig. 2C-15.
2. Insert spokes (3) in ten outer spoke holes of brake side flange and swing loose end of spokes counterclockwise, as far as hub will allow.
3. Place rim over hub (either side down) and insert spokes in lower row of holes in rim, that angle in same direction as spokes.
4. Just start nipples on spokes as they are inserted in rim.
5. Insert spokes (4) in ten inner spoke holes of brake side flange and swing loose end of spokes clockwise as far as hub will allow.

6. See Fig. 2C-16. Select any inner spoke (1), cross it over four outer spokes (2), and insert spokes in nearest lower rim holes. Start nipples.

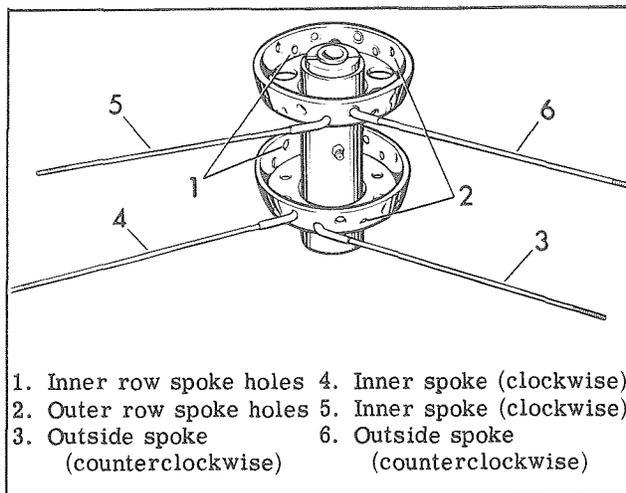


Figure 2C-15. Inserting Spokes in Rear Wheel Hub

7. Insert spokes (5, Fig. 2C-15) in ten inner spoke holes of opposite flange, (upper flange as positioned on workbench), and swing loose end of spokes clockwise as far as hub will allow. Then, insert inner spokes in nearest upper rim holes that angle in same direction as spokes and start nipples.

8. Insert spokes (6, Fig. 2C-15) in remaining ten outer spoke holes of upper flange and swing end of spokes counterclockwise as far as hub will allow.

9. See Fig. 2C-16. Select any outer spoke (3), cross it over four inner spokes (4), and insert spokes in nearest upper rim holes. Start nipples.

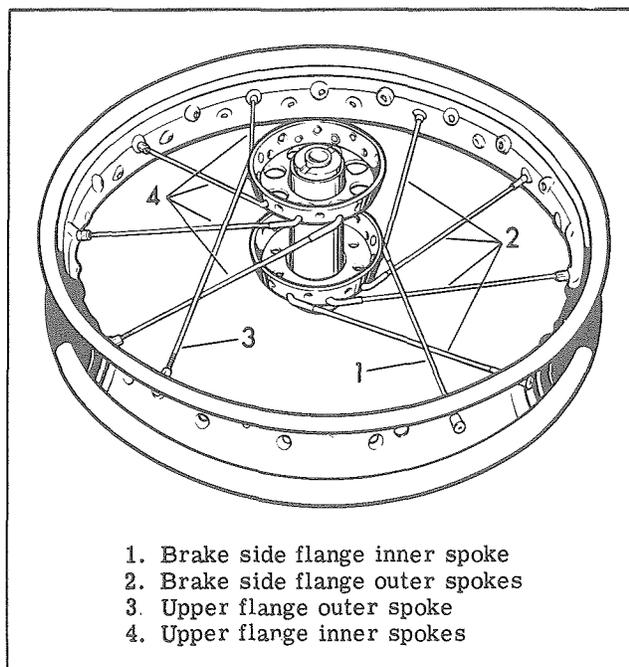


Figure 2C-16. Lacing Rear Wheel

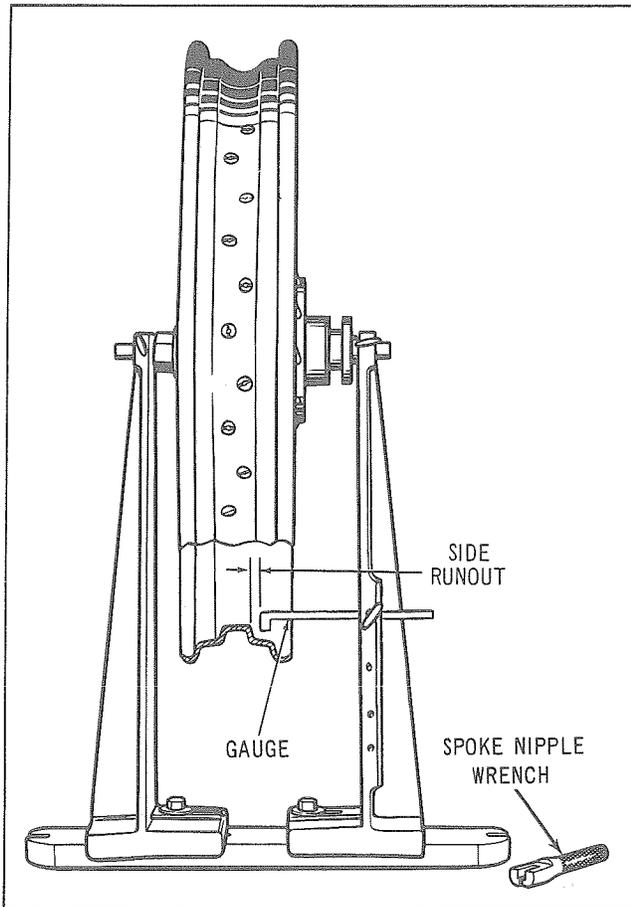


Figure 2C-17. Truing Rim Sideways

NOTE

Outer spokes on both sides should point in same direction.

TRUING WHEELS

1. See Fig. 2C-17 and proceed as follows. Use wheel axle as a truing arbor; insert in wheel hub and place wheel in Truing Stand, Part No. 95500-29.

2. Front Wheel: Starting at valve hole, tighten all nipples opposite brake flange side until end of spokes are approximately 1/16 in. from being flush with head of nipple. Use Nipple Wrench, Part No. 94681-39.

3. Rear Wheel: Turn each nipple on just far enough to cover spoke threads. Start at valve hole and tighten all nipples three full turns each. Then, proceed to tighten all nipples one full turn at a time until spokes are snug in wheel.

4. Front and Rear Wheel: Check rim for concentricity, centering sideways with hub and for running true sideways (Fig. 2C-17 and 2C-18). Centering rim sideways must be done as one operation. Rim must be properly centered sideways in relation to hub for correct alignment and "tracking" of wheels.

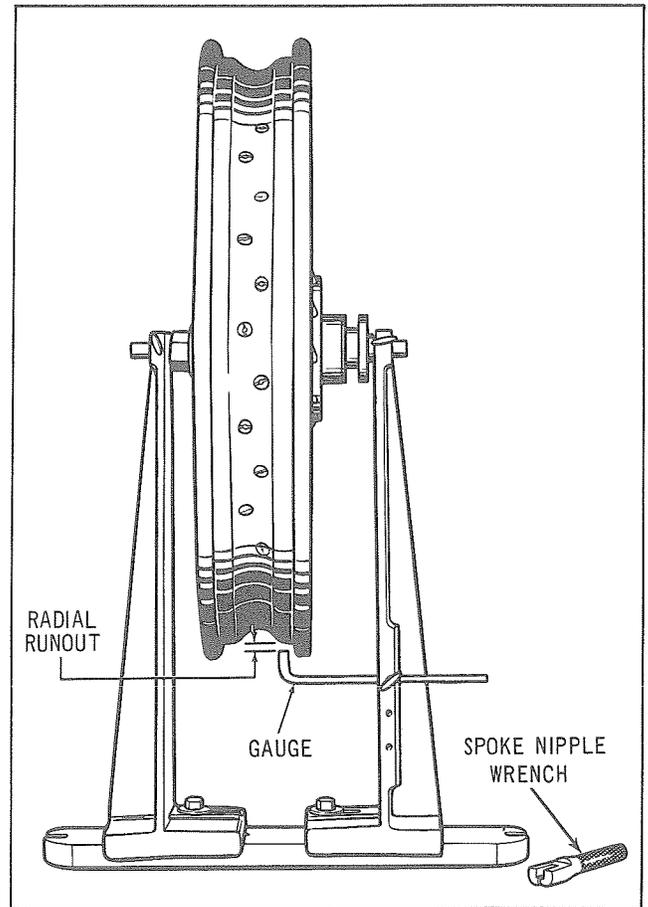


Figure 2C-18. Truing Rim Concentric with Hub

Figure 2C-19 and 2C-19A show method of using a straight edge to determine correct sideways centering of wheel rim. If rim is too close to straight edge, loosen all nipples on brake side and tighten all nipples on opposite side same amount. If rim is too far from straight edge, reverse operations. Lay straight edge across brake side as shown and measure distance from straight edge of rim. When rim is correctly centered, this distance will be as shown for each wheel listed.

Adjust truing stand gauge (Fig. 2C-17), to side of rim well so rim at highest point will strike gauge as wheel is rotated slowly. Loosen nipples at highest point of rim on gauge side, and tighten nipples on opposite side the same number of turns. Repeat this operation until rim runs true sideways. Reverse loosening and tightening of nipples, as explained above, if rim moves too far away from gauge. After each loosening and tightening of spokes, check rim in relation to hub as shown in Fig. 2C-19. Rim should be trued sideways to within 1/32 in.

After rim has been centered sideways with wheel hub and runs true sideways, check for concentricity. Adjust truing stand gauge (Fig. 2C-18) to rim tire bead seat. If rim runs eccentric (radial runout) nipples must be loosened at points rim does not contact gauge, and nipples tightened at points rim contacts

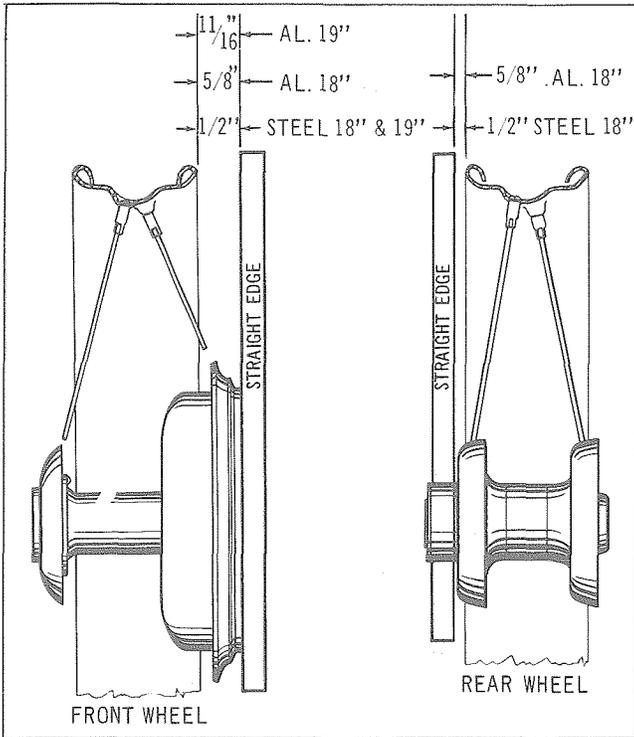


Figure 2C-19. Aligning of Wheel with Straight Edge (1963 and Earlier)

gauge. Amount nipples are to be loosened or tightened is determined by the amount rim is out of round. Rim should be trued concentrically to 1/32 in. or less radial runout.

5. After wheels have been checked and corrected as described in paragraph 4, start at valve hole and tighten nipples one turn at a time all the way around rim until spokes are normally tight. If possible compare with a new wheel. While tightening nipples, repeatedly check rim with gauge according to instructions under paragraph 4.

6. After all nipples have been pulled up, until spokes are normally tight and wheel is true, seat each spoke head into hub flange with a sharp blow, using a flat nose punch and hammer. Then retighten all nipples and finish truing wheel. This method allows spokes to be drawn tighter at the start and prevents possibility of spokes loosening after wheel is put into service as the result of spoke heads seating into the flange.

Do not tighten spokes too tight or nipples may draw through rim, or hub flanges may be distorted. If spokes are left too loose, they will continue to loosen when wheel is put in service.

7. File or grind off ends of any spokes protruding through nipples to prevent puncturing tube when tire is mounted.

REMOVING TIRE AND TUBE FROM RIM

Remove valve cap and valve core to free all air from tube. Remove valve stem nut. If four bead anchor screws are present on each side of rear wheel rim, remove screws. Loosen tube beads from rim flanges by stepping on sides of tire or by using a tire tool.

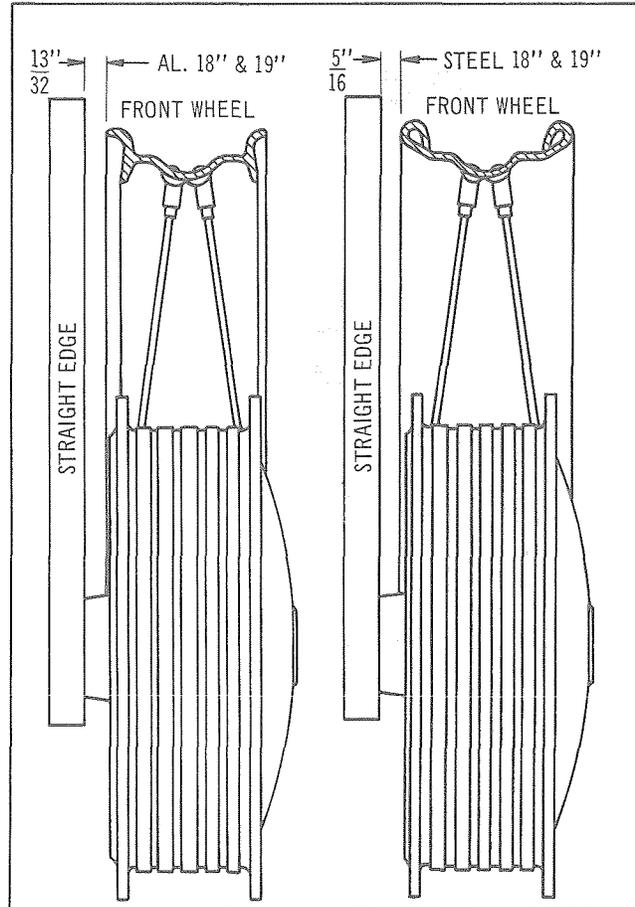


Figure 2C-19A. Aligning Wheel With Straight Edge (1964 and Later)

Stand or kneel on tire opposite valve to push bead into rim-well. Using tire tools, (not sharp instruments), start upper bead over edge of rim at valve. Don't use force when starting bead over edge of rim with tire iron, because bead wires may be broken or stretched and the tire ruined. Carefully remove inner tube before attempting to remove second bead. Push lower bead into rim-well on one side and insert tire iron on opposite side and pry bead over flange. After a portion of second bead is started over rim edge, tire can be further removed from rim without aid of tire iron.

It is not always necessary to completely remove casing from rim. Removing one side only allows inner tube to be removed and installed and also allows inside of casing to be inspected.

MOUNTING TIRE AND TUBE ON RIM

Steel rear wheel rims should be barbed. If not, add barbs to inner wall of bead using a cold chisel. Locate the barbs in three groups, one group symmetrical about valve stem hole, and two additional groups located approximately 120° either way from valve stem hole as shown in Fig. 2C-19B. Each group should include 16 barbs, 8 barbs to a side, with 4 barbs facing opposite the other four. Barbs should extend approximately 1/32 in. to 1/16 in. in height from surface of rim.