



SERVICE MANUAL

1981

D/D4

HARLEY-DAVIDSON

Gasoline Golf Car

PATENT NOTICE

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1981 D/D4 SERVICE MANUAL

The maintenance and repair information in this manual applies to the 1981 Harley-Davidson D/D4 Golf Car.

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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 golf car 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.

WARNING

Working on heavy golf cars without following proper procedures and using proper lifting equipment may result in car damage or personal injury.

WARNING

Safety procedures are essential. A running golf car must be worked on with great care. Avoid spinning clutch, belts and wheels. Use caution and common sense.

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 golf car 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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SPECIFICATIONS

GENERAL INFORMATION

Automatic transmission with reverse and forward speed, adjustable up to a maximum of 15 mph (24 kph).

Turning Radius (measured from turning center to center of outside tire tread)

4-Wheel — Right12'
Left12'3"
3-Wheel (Tiller) — Right10'8"
Left10'8"
3-Wheel (Steering Wheel) — Right8'3"
Left9'0"

Clearance Radius (measured from turning center to outside edge of bumper)

4-Wheel — Right12'6"
Left12'10"
3-Wheel (Tiller) — Right12'4"
Left12'4"
3-Wheel (Steering Wheel) — Right9'11"
Left10'8"

DIMENSIONS

Model D, 3-Wheel Car (Equipped with Tiller Bar and Cradle Bag Holder)

Wheelbase60.5 in. (154 cm)
Ground Clearance4.5 in. (11 cm)
Weight693 lbs. (314 kg)
Max. Load capacity750 lbs. (340 kg)
Overall Length91 in. (231 cm)
Overall Width45.2 in. (114 cm)
Overall Height47 in. (119 cm)

Model D4, 4-Wheel Car

Wheelbase67 in. (170 cm)
Ground Clearance4.5 in. (11 cm)
Weight821 lbs. (372 kg)
Max. Load capacity750 lbs. (340 kg)
Overall Length102 in. (259 cm)
Overall Width45.2 in. (114 cm)
Overall Height47 in. (119 cm)

CAPACITIES

Fuel Tank8.5 U.S. gals. (32.2 liters)
(Approx.)
Transmission12 oz. (355 cc)
Differential24 oz. (710 cc)

ENGINE

Model designationD
Type2 cycle, loop-scavenged,
1 cylinder, reed valve intake
Bore2.75 in. (69.8 mm)
Stroke2.50 in. (63.5 mm)
Piston Displacement14.85 cu. in. (245.8 cc)
Compression Ratio
Full Stroke9.5:1
After port closing7.4:1
Air CleanerWashable dry-type
Spark plug
TypeHarley-Davidson No. 5-6
Size14 mm, 3/4" reach
Gap0.025 in. (6.3 mm)
Torque15-20 ft-lbs (2-2.7 kg/m)
Breaker Point Gap Setting0.018-0.024 in. (0.5 mm)
Ignition Timing25°, .150 in. (3.8 mm) B.T.C.

POWER TRANSMISSION

Automatic variable-pitch V-belt transmission. Overall drive ratio variable from 14.3 to 41.5.

BRAKES

Disc brake on drive shaft mechanically operated. Brake pedal incorporates ratchet lock for parking, with automatic release controlled by accelerator pedal.

Brake disc diameter7.5 in.

MODEL IDENTIFICATION

The golf car vehicle identification number is located on a metal tag above the left rear tire on the rear frame cross brace. The engine serial number is located on top of the engine housing.

NOTE

Always give these numbers when ordering parts or making inquiries about your golf car.

Letters	Model No.	Serial No.	Mfr.	Year
D D4	3B 7C	10000 & up (5 digits)	J Harley- Davidson	1 1981

FLUIDS AND LUBRICANTS

Harley-Davidson 58W ENGINE OIL (or equivalent) for lubricating linkages.

High quality chassis grease for front suspension components.

Harley-Davidson HEAVY WEIGHT DIFFERENTIAL LUBRICANT Part No. 99890-61A (12 oz.) 99891-80 (Gal.) (or equivalent) for differential, steering gear, transmission.

Harley-Davidson ANTI-SEIZE Part No. 99632-77 (or

equivalent) for brake caliper mechanism and steering shaft splines.











Harley-Davidson GOLF CAR LUBRICANT (or a good quality 2-cycle oil, certified B.I.A.-TC-W) to mix with gasoline (85 to 1). Case of 6 gallons Part No. 99803-76V, 55 gallon drum Part No. 99810-76V.

TORQUES

Individual component torques are listed in the SPECIFICATIONS at the beginning of the respective section. When a specific fastener torque is not specified, use the chart below as a guide in determining the proper torque.

Torque Table

Torque to the values given in this table unless specified otherwise . Torque figures are in ft.-lbs.

FINE OR COURSE THREAD FASTENER	GRADE DESIGNATION	TENSILE STRENGTH MINIMUM	MATERIAL	SCREW, STUD, OR BOLT SHANK SIZE OR DIAMETER																
				2	3	4	5	6	8	10	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
 CAP SCREW	S. A. E. 2 A. S. T. M. A-307 STEEL	64,000 P. S. I.	Low Carbon Steel								6	11	19	30	45	66	93	150	202	300
 CAP SCREW	S. A. E. 3 STEEL	100,000 P. S. I.	Medium Carbon Steel								9	17	30	47	69	103	145	234	372	551
 CAP SCREW	A. S. T. M. A-449 S. A. E. 5 STEEL	105,000 P. S. I.	Medium Carbon Steel or Low Alloy Heat Treated								9	18	31	50	75	110	150	250	378	583
 CAP SCREW	A.S.T.M.354BB STEEL																			
 CAP SCREW	A.S.T.M. A-325														100		200	355	525	790
 CAP SCREW	A. S. T. M. A-354-BC STEEL	125,000 P. S. I.	Low Alloy or Med. Carb. Quenched Tempered								11	20	34	54	81	119	167	269	427	644
 CAP SCREW	S. A. E. 6 STEEL	133,000 P. S. I.	Med. Carbon Steel Quenched Tempered								12.5	24	43	69	106	150	209	350	550	825
 CAP SCREW	S. A. E. 7 STEEL		Med. Carbon Alloy quenched Tempered Roll Threaded																	
 CAP SCREW	S.A.E. 8 STEEL	150,000 P. S. I.	Med. Carbon Alloy Quenched Tempered								13	28	46	75	115	165	225	370	591	893
 CAP SCREW	A-354-BD. A490*	150,000 P. S. I.	Med. Carbon Alloy Quenched Tempered										55	90	138	198	270	444	709	1071

Foot Pounds to Kilogrameters

	0	1	2	3	4	5	6	7	8	9	
—		0.138	0.277	0.415	0.553	0.691	0.830	0.968	1.106	1.244	—
10	1.383	1.521	1.659	1.797	1.936	2.074	2.212	2.350	2.489	2.627	10
20	2.765	2.903	3.042	3.180	3.318	3.456	3.595	3.733	3.871	4.009	20
30	4.148	4.286	4.424	4.562	4.701	4.839	4.977	5.116	5.254	5.392	30
40	5.530	5.668	5.807	5.945	6.083	6.221	6.360	6.498	6.636	6.774	40
50	6.913	7.051	7.189	7.328	7.466	7.604	7.742	7.881	8.019	8.157	50
60	8.295	8.434	8.572	8.710	8.848	8.987	9.125	9.263	9.401	9.540	60
70	9.678	9.816	9.954	10.093	10.231	10.369	10.507	10.646	10.784	10.922	70
80	11.060	11.199	11.337	11.475	11.613	11.752	11.890	12.028	12.166	12.305	80
90	12.443	12.581	12.719	12.858	12.996	13.134	13.272	13.411	13.549	13.687	90

METRIC CONVERSION TABLE

MILLIMETERS to INCHES Millimeters (mm) x .03937 = inches (in)								INCHES to MILLIMETERS Inches (in) x 25.4 = millimeters (mm)							
mm	IN	mm	IN	mm	IN	mm	IN	IN	mm	IN	mm	IN	mm	IN	mm
.1	.0039	25	.9842	58	2.283	91	3.582	.001	.025	.6	15.240	1 ¹ / ₈	49.21	3 ⁵ / ₈	84.14
.2	.0078	26	1.024	59	2.323	92	3.622	.002	.051	³ / ₁₆	15.875	2	50.80	3 ⁷ / ₈	85.72
.3	.0118	27	1.063	60	2.362	93	3.661	.003	.076	¹ / ₈	17.462	2 ¹ / ₈	52.39	3.4	86.36
.4	.0157	28	1.102	61	2.401	94	3.701	.004	.102	.7	17.780	2.1	53.34	3 ³ / ₈	87.31
.5	.0197	29	1.142	62	2.441	95	3.740	.005	.127	³ / ₁₆	19.050	2 ³ / ₈	53.97	3 ¹ / ₂	88.90
.6	.0236	30	1.181	63	2.480	96	3.779	.006	.152	.8	20.320	2 ⁵ / ₈	55.56	3 ⁵ / ₈	90.49
.7	.0275	31	1.220	64	2.519	97	3.819	.007	.178	¹ / ₈	20.638	2.2	55.88	3.6	91.44
.8	.0315	32	1.260	65	2.559	98	3.858	.008	.203	³ / ₁₆	22.225	2 ⁷ / ₈	57.15	3 ⁷ / ₈	92.07
.9	.0354	33	1.299	66	2.598	99	3.897	.009	.229	.9	22.860	2.3	58.42	3 ¹ / ₈	93.66
1	.0394	34	1.338	67	2.638	100	3.937	.010	.254	¹ / ₈	23.812	2 ⁵ / ₈	58.74	3.7	93.98
2	.0787	35	1.378	68	2.677	101	3.976	³ / ₁₆	.397	1	25.40	2 ³ / ₈	60.32	3 ³ / ₈	95.25
3	.1181	36	1.417	69	2.716	102	4.016	.020	.508	¹ / ₈	26.99	2.4	60.96	3.8	96.52
4	.1575	37	1.456	70	2.756	103	4.055	.030	.762	1.1	27.94	2 ⁵ / ₈	61.91	3 ¹ / ₈	96.84
5	.1968	38	1.496	71	2.795	104	4.094	¹ / ₂	.794	¹ / ₈	28.57	2 ¹ / ₂	63.50	3 ⁵ / ₈	98.42
6	.2362	39	1.535	72	2.834	105	4.134	.040	1.016	¹ / ₈	30.16	2 ⁷ / ₈	65.09	3.9	99.06
7	.2756	40	1.575	73	2.874	106	4.173	.050	1.270	1.2	30.48	2.6	66.04	3 ¹ / ₈	100.01
8	.3149	41	1.614	74	2.913	107	4.212	.060	1.524	¹ / ₈	31.75	2 ⁵ / ₈	66.67	4	101.6
9	.3543	42	1.653	75	2.953	108	4.252	³ / ₁₆	1.588	1.3	33.02	2 ¹ / ₈	68.26	4 ¹ / ₈	102.19
10	.3937	43	1.693	76	2.992	109	4.291	.070	1.778	¹ / ₈	33.34	2.7	68.58	4.1	104.14
11	.4331	44	1.732	77	3.031	110	4.331	.080	2.032	¹ / ₈	34.92	2 ³ / ₈	69.85	4 ³ / ₈	104.77
12	.4724	45	1.772	78	3.071	111	4.370	.090	2.286	1.4	35.56	2.8	71.12	4 ⁵ / ₈	106.36
13	.5118	46	1.811	79	3.110	112	4.409	.1	2.540	¹ / ₈	36.51	2 ¹ / ₈	71.44	4.2	106.68
14	.5512	47	1.850	80	3.149	113	4.449	³ / ₁₆	3.175	¹ / ₈	38.10	2 ⁷ / ₈	73.02	4 ³ / ₈	107.95
15	.5905	48	1.890	81	3.189	114	4.488	¹ / ₈	4.762	¹ / ₈	39.69	2.9	73.66	4.3	109.22
16	.6299	49	1.929	82	3.228	115	4.527	.2	5.080	1.6	40.64	2 ¹ / ₈	74.61	4 ⁵ / ₈	109.54
17	.6693	50	1.968	83	3.268	116	4.567	³ / ₁₆	6.350	¹ / ₈	41.27	3	76.20	4 ⁷ / ₈	111.12
18	.7086	51	2.008	84	3.307	117	4.606	.3	7.620	¹ / ₈	42.86	3 ¹ / ₈	77.79	4.4	111.76
19	.7480	52	2.047	85	3.346	118	4.645	⁵ / ₁₆	7.938	1.7	43.18	3.1	78.74	4 ⁵ / ₈	112.71
20	.7874	53	2.086	86	3.386	119	4.685	³ / ₈	9.525	¹ / ₈	44.45	3 ³ / ₈	79.37	4 ⁷ / ₈	114.30
21	.8268	54	2.126	87	3.425	120	4.724	.4	10.160	1.8	45.72	3 ⁵ / ₈	80.96	4 ⁹ / ₈	115.89
22	.8661	55	2.165	88	3.464	121	4.764	⁵ / ₁₆	11.112	¹ / ₈	46.04	3.2	81.28	4.6	116.84
23	.9055	56	2.205	89	3.504	122	4.803	³ / ₈	12.700	¹ / ₈	47.62	3 ⁷ / ₈	82.55	4 ⁷ / ₈	117.47
24	.9449	57	2.244	90	3.543	123	4.842	⁷ / ₁₆	14.288	1.9	48.26	3.3	83.82	4 ¹ / ₈	119.06

NOTES

GENERAL INFORMATION

SAFE OPERATING RULES

1. This vehicle is for golf play only.
2. It is hazardous to use golf cars anywhere other than on designated car paths and car areas.
3. This vehicle is designed for transporting no more than two golfers and their equipment. Never exceed load capacity or vehicle stability and control will be endangered.
4. Always drive vehicle straight up and down inclines to avoid overturning vehicle or losing vehicle stability and control. Be cautious while turning or backing up vehicle.
5. Personal injury may result if arms, legs, or other parts of body are not kept inside vehicle while it is moving.
6. Do not start vehicle until all occupants are seated. Remain seated while vehicle is in motion.
7. Before leaving your seat, bring vehicle to a complete stop and lock parking brake to prevent vehicle from moving. If vehicle is to be left unattended, switch key OFF and remove key.
8. Do not use accelerator to hold car on an incline — use the brake.
9. Make sure forward/reverse lever is in position for desired direction of travel before depressing accelerator. **DO NOT MOVE FORWARD/REVERSE LEVER UNLESS CAR AND ENGINE ARE STOPPED!**

WARNING

Failure to comply with the above instructions may result in bodily injury and property damage.

These basic rules of operation, combined with courtesy and common sense will help to make driving the Harley-Davidson Golf Car a safe and pleasant experience.

CONTROLS AND OPERATION (Figure 1-1)

Simple Controls Make It Easy To Operate The Harley-Davidson Golf Car. To drive, move forward/reverse lever to desired position, turn key on and depress accelerator. Depress brake pedal to slow or stop.

WARNING

Be sure forward/reverse lever is in desired position before depressing accelerator.

Key Switch

The switch requires a key to operate. Turn key to ON position to run car. Key can only be removed when in the OFF position. Switch locks automatically when key is removed.

Accelerator

Accelerator pedal starts the engine automatically when depressed. Further movement of pedal operates car at desired speed. The engine stops running when pedal is released. To slow or stop vehicle depress brake.

Brake

Depress brake pedal to slow or stop vehicle. To lock brake for parking, depress pedal and tilt forward. Parking brake remains applied until automatically released by depressing accelerator pedal. Parking brake can also be released by tilting brake pedal backward.

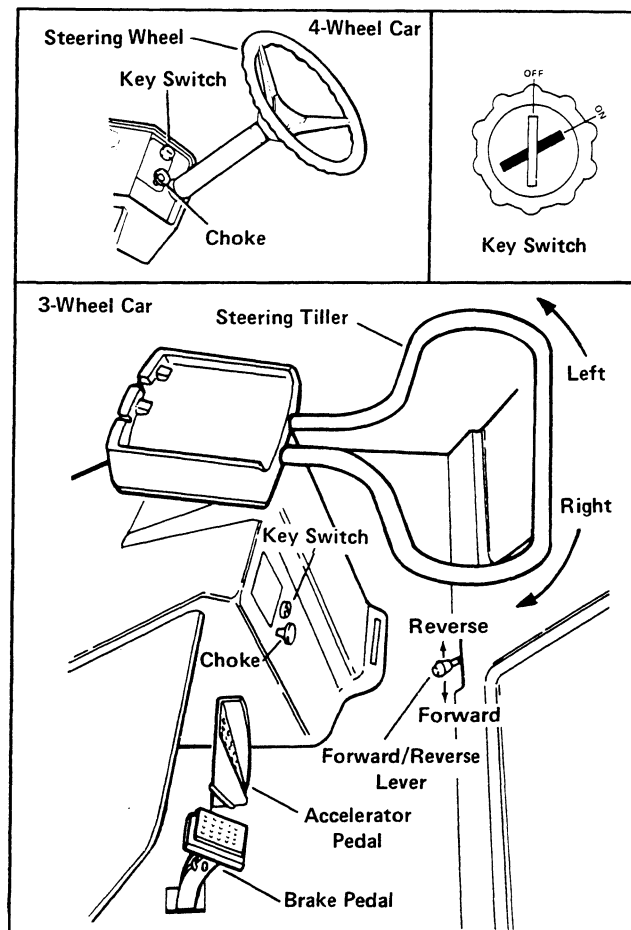


Figure 1.1 Golf Car Controls

Choke

Use choke knob on panel when starting a cold engine. Pull knob outward to choke and move inward gradually as engine warms up.

Forward/Reverse Lever

Move lever to FORWARD position to go forward or to REVERSE position to move backward. DO NOT move lever unless car and engine are stopped. Keep lever in FORWARD position except when backing up.

Steering Tiller/Steering Wheel

Steering tiller is standard on three wheel cars. Steering wheel is standard on four wheel cars and an option on three wheel cars.

STORAGE

Engine

Add a good quality fuel stabilizer to the fuel following the manufacturers' recommendations on the container.

Battery

With battery fully charged, store battery in as cold a place as possible. If stored above 50°F (27 °C), check state of charge every 8 to 10 weeks.

LIFTING INSTRUCTIONS

WARNING

Use extreme caution lifting, or working on lifted golf car. Car should be on a flat, hard and level surface when lifting.

Three-Wheel Car

When lifting the golf car for service, use a sturdy lifting device such as a hoist or floor jack. Lift the left side of car and place jack stand under frame. Repeat for the right side.

Four-Wheel Car

When lifting the golf car for service, use a sturdy lifting device such as a hoist or floor jack. Wedge wheels of car to keep it from rolling. When using a floor jack, lift only on sturdy parts under the car. After the car is lifted to a 10° to 25° angle, place jack stands under bumper to support vehicle weight for added safety.

SERVICE

SERVICING A NEW GASOLINE GOLF CAR

Before a new car is put into operation, make a predelivery inspection and service check to see that car is in good operating condition. Again, after 30 days, make another check to be sure that car remains in good operating condition and to uncover any minor misadjustments or conditions in the early stages before any

serious trouble can develop.

Recommended new car service and inspection check operations are shown in the initial service chart below. Service operations should be performed by a qualified Harley-Davidson Golf Car Dealer.

All operations are fully described in this manual. Refer to the TABLE OF CONTENTS for location of proper procedures.

INITIAL SERVICE CHART

STEERING WHEEL — install with front wheels straight ahead, install steering wheel with one spoke at bottom.

BAG RACK — install and fully secure rack ends with bolts and lockwashers.

SEAT — mount seat backs at preferred height, check and secure mounting bolts and seat cushion studs.

BRAKE — inspect brake actuation and parking brake locking. Brake should lock in upper most ratchet tooth for extended service life.

BRAKE CALIPER — inspect mounting and caliper to disc side clearance.

BRAKE PEDAL — inspect mount, ratchet assembly attachment, and ratchet stop bolt.

BRAKE RATCHET AND PAWL — check material hardness with file, pieces should produce a high pitch ring without being damaged.

FRONT WHEEL — inspect for proper attachment on axle shaft and presence of axle shaft keys.

REAR WHEEL — inspect for secure attachment on axle shaft and presence of axle shaft keys.

ALL WHEELS — (3 or 4) inspect for properly torqued lug nuts.

TIRES — deflate tires to 18 PSI for proper inflation.

FUEL — fill fuel tank with sufficient fuel for delivery. mix gas and oil at a ratio of 3 oz. oil per gallon of gasoline (break-in mixture only).

FUEL LINES AND FITTINGS — check for proper routing and clearance with exhaust pipe and other vehicle components (fittings and lines must not show leakage).

THROTTLE — check for smooth operation, throttle plate fully open only with pedal depressed to floorboard.

CHOKE — check for smooth operation and full travel.

CARBURETOR — check adjustment.

GENERATOR AND REGULATOR — check system operation.

CIRCUIT BREAKER — check point gap, unit operation, and ignition timing.

ACCELERATOR PEDAL — inspect for secure mounting.

TIGHTNESS OF ALL NUTS, BOLTS AND SCREWS, specifically:

- cylinder head bolts
- carburetor mounting
- engine mounting
- transmission mounting
- axles
- exhaust system and clamps
- ignition switch

DRIVING AND SAFETY SUGGESTIONS — check that driving techniques and safety suggestions in Owner's Manual were explained to customer.

WARNING LABELS — check that all vehicle warning and operating labels are attached.

OWNER'S MANUAL — check that vehicle is delivered to customer with Owner's Manual.

WARRANTY — check that terms and conditions of warranty were explained to customer and that warranty registration has been completed and sent to factory.

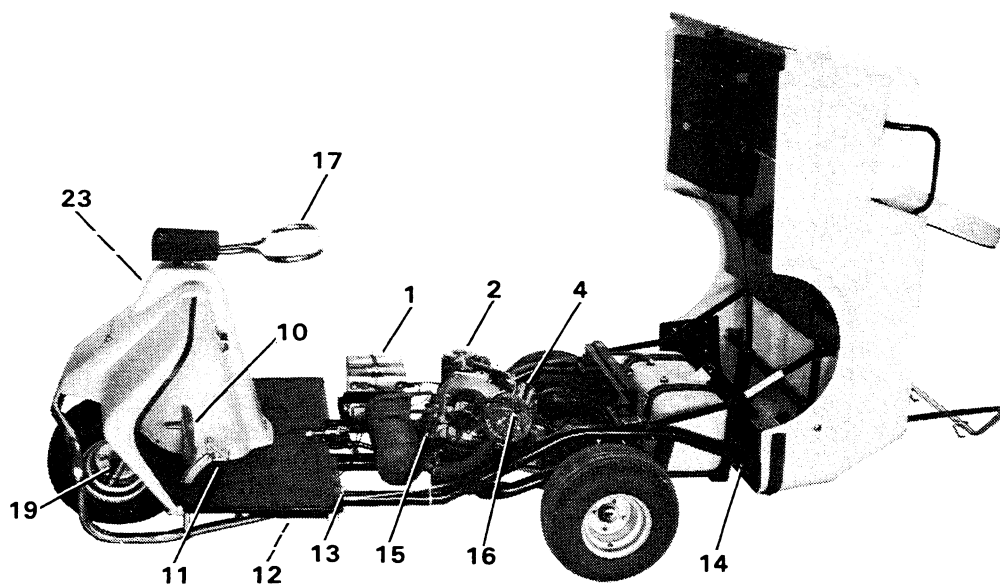
REGULAR SERVICE INTERVALS

The following chart outlines recommended maintenance and lubrication operations to be performed regularly after new car checks have been made. Refer to Figure 1-2 and 1-3 when using the chart.

Figure 1-2 and 1-3 when using the chart.

EACH TIME FUEL TANK IS FILLED			
Index No.	Service	Index No.	Lubrication
2	Inspect air cleaner. Clean or replace as necessary. Clean debris from air fan screen and cylinder head cooling fins.		
EVERY MONTH, 24 HOURS OPERATING TIME OR 32 ROUNDS			
18	Adjust brake shoes	5	Oil carburetor throttle lever and choke lever swivel blocks.
3	Check tire pressure	6, 12	Oil brake, throttle and choke cable ends
EVERY 6 MONTHS			
1	All monthly service operations	14	Oil body hinge
22	Clean battery and terminals	20	Grease the front fork sides (3-wheel)
	Starter-generator belt tension		
16	Clean and gap electrodes (new plug is recommended for hard service).		Check fuel filter and replace if necessary.
2	Inspect air cleaner. Clean or replace as necessary.		

EVERY SEASON			
Index No.	Service	Index No.	Lubrication
15	Check circuit breaker condition and adjust gap to .018-.024 in. Check ignition timing. Inspect starter-generator brushes. Check steering wheel or tiller handle free play and adjust as necessary Adjust low speed mixture Adjust idle speed stop screw Adjust governor	7	Check lubricant in axle differential housing.
22		5	Check lubricant in transmission primary drive.
17		19, 21	Grease front suspension
5		4	Anti-Seize disc brake shoe operating cam.
5		9	Grease transmission secondary drive nylon rollers
19		10, 11	Oil the brake and accelerator pedal bearings.
		12	Oil the brake linkage.
		13	Grease the accelerator pedal micro-switch
		23	Clean steering slider block and channel. Lubricate with dry lubricant.
		21	Check steering gear unit lubricant level.
STORAGE			
	See the storage procedure under GENERAL INFORMATION		



- | | | |
|-------------------------------|------------------------------------|---------------------------|
| 1. Battery | 9. Transmission secondary drive | 17. Tiller/Steering wheel |
| 2. Air cleaner | 10. Accelerator pedal | 18. Governor |
| 3. Tire | 11. Brake pedal | 19. Front fork |
| 4. Brake shoe | 12. Brake linkage and cable | 20. Steering gear unit |
| 5. Carburetor | 13. Accelerator pedal micro switch | 21. Steering support arms |
| 6. Throttle and choke cables | 14. Body hinge | 22. Starter-generator |
| 7. Axle differential housing | 15. Ignition circuit breaker | 23. Steering slider block |
| 8. Transmission primary drive | 16. Spark plug | |

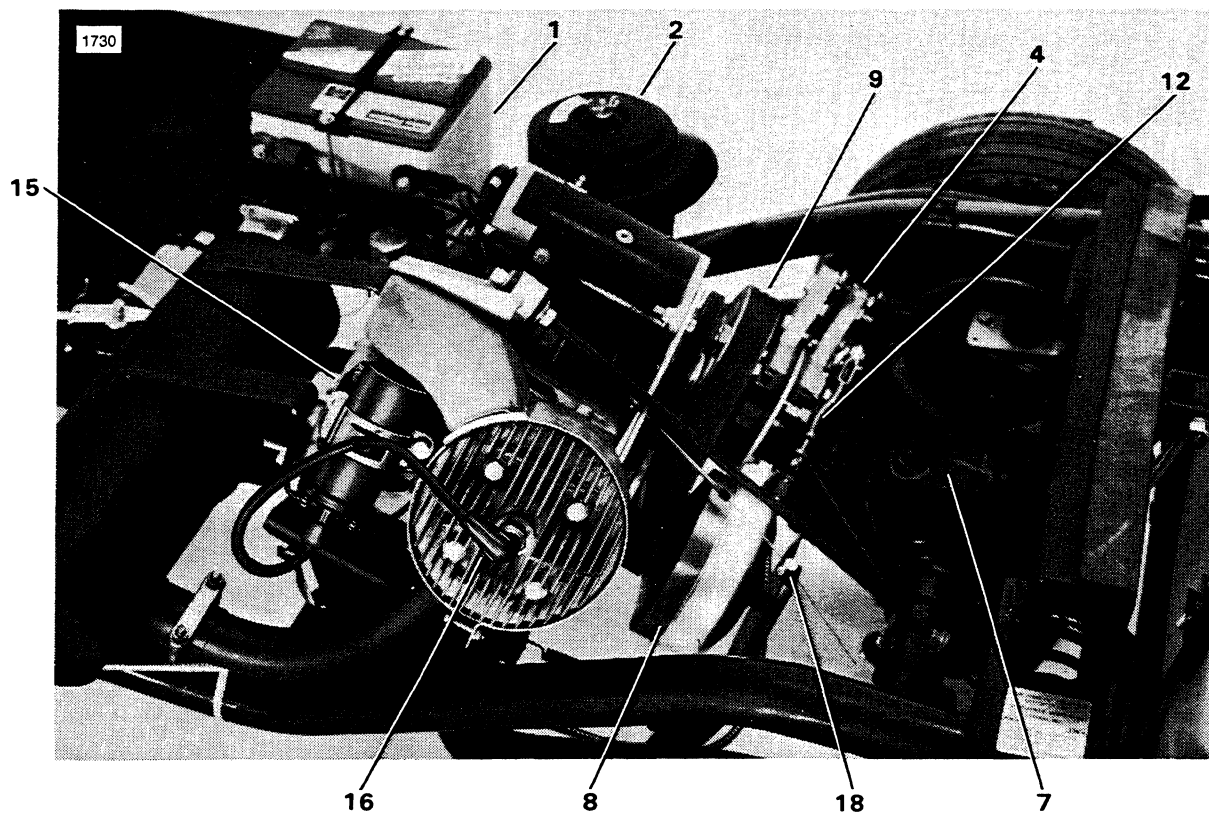
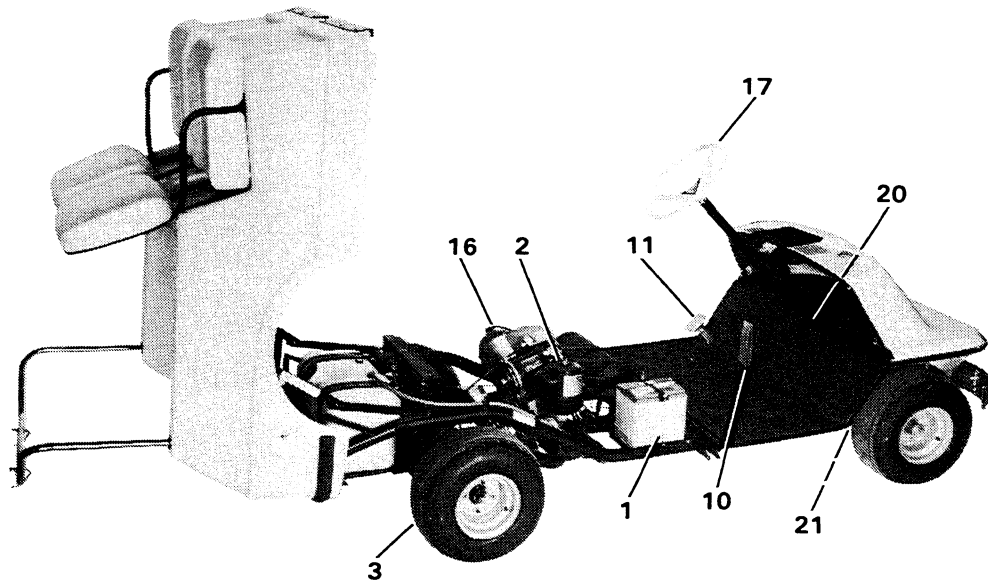


Figure 1-2. 1981 Model D3 Golf Car



- | | | |
|-------------------------------|------------------------------------|---------------------------|
| 1. Battery | 9. Transmission secondary drive | 17. Tiller/Steering wheel |
| 2. Air cleaner | 10. Accelerator pedal | 18. Governor |
| 3. Tire | 11. Brake pedal | 19. Front fork |
| 4. Brake shoe | 12. Brake linkage and cable | 20. Steering gear unit |
| 5. Carburetor | 13. Accelerator pedal micro switch | 21. Steering support arms |
| 6. Throttle, choke cables | 14. Body hinge | 22. Starter-generator |
| 7. Axle differential housing | 15. Ignition circuit breaker | 23. Steering slider block |
| 8. Transmission primary drive | 16. Spark plug | |

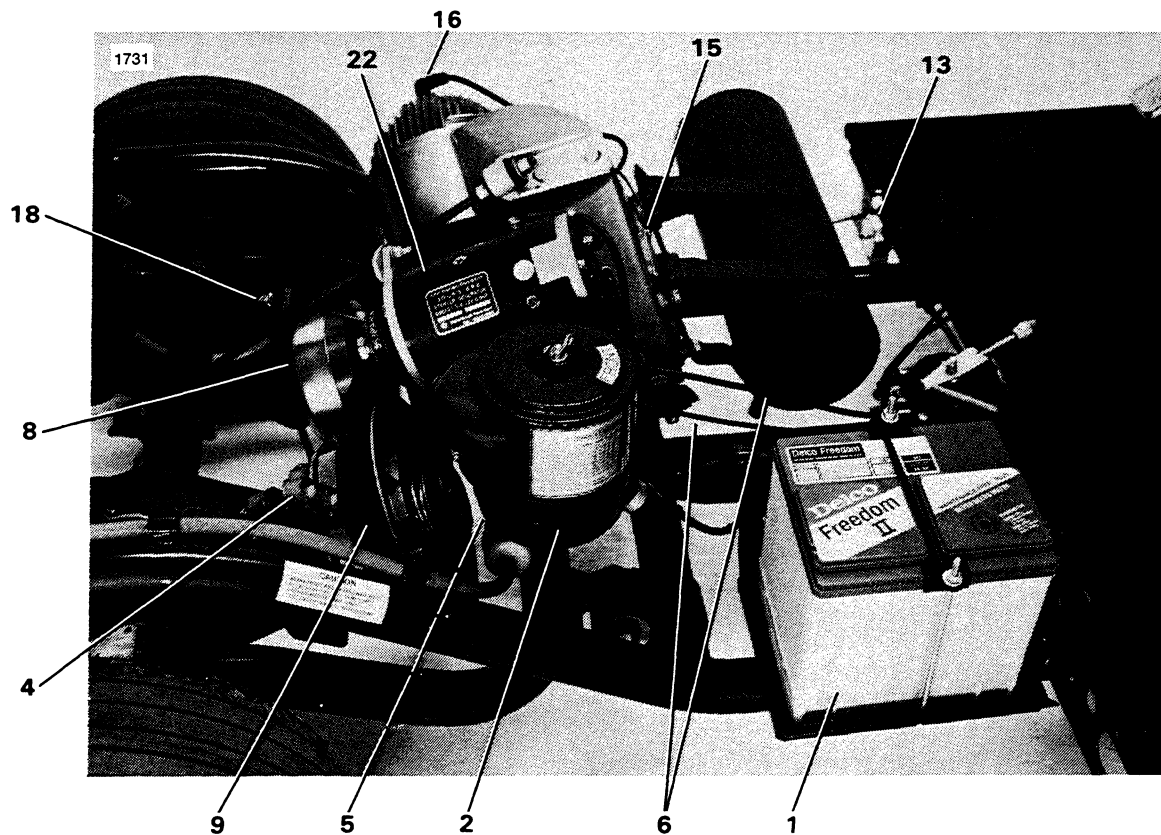


Figure 1-3. 1981 Model D4 Golf Car

NOTES

TROUBLESHOOTING

Your Harley-Davidson Gasoline Car will operate a long time without repairs if it is given proper care and maintenance. The following check list will be helpful in locating operating difficulties should they occur. The

check list includes the difficulty, probable causes and suggested checks to make. The procedures used in making these checks can be found in the sections of the service manual referred to.

SYMPTOM AND CAUSE	REFER TO SECTION
ENGINE STARTS HARD	
<ol style="list-style-type: none"> 1. Spark plug partially fouled or in poor condition. 2. Circuit breaker points out of adjustment, or ignition timing incorrect. 3. Loose wire connection at coil or circuit breaker. 4. Defective ignition coil 5. Defective condenser. 6. Poor cylinder compression. 7. Water or dirt in fuel system and/or carburetor. Dirty plugged fuel filter. 8. Carburetor not adjusted correctly or dirty. 9. Spark plug wire damaged. 	<ol style="list-style-type: none"> 8 SPARK PLUGS 8 CIRCUIT BREAKER 8 CIRCUIT BREAKER 8 IGNITION COIL 8 CIRCUIT BREAKER 5 CYLINDER 6 FUEL SYSTEM 6 FUEL SYSTEM 8 SPARK PLUGS
ENGINE STARTS BUT RUNS IRREGULARLY OR MISSES	
<ol style="list-style-type: none"> 1. Spark plug partially fouled or in poor condition. 2. Spark plug wire damaged. 3. Circuit breaker points out of adjustment or in need of cleaning. 4. Condenser connections loose. 5. Defective ignition coil. 6. Defective condenser. 7. Loose wire connections at coil or circuit breaker. 8. Water or dirt in carburetor. Dirty plugged fuel filter. 9. Water or dirt in fuel system. Dirty plugged fuel filter. 10. Gasoline tank vent plugged, and tank air bound. 11. Carburetor improperly adjusted. 12. Improper gas and oil mixture. 	<ol style="list-style-type: none"> 8 SPARK PLUGS 8 SPARK PLUGS 8 CIRCUIT BREAKER 8 CIRCUIT BREAKER 8 IGNITION COIL 8 CIRCUIT BREAKER 8 IGNITION COIL 8 CIRCUIT BREAKER 7 FUEL SYSTEM 7 FUEL SYSTEM 7 FUEL SYSTEM 7 FUEL SYSTEM 1 SERVICE
ENGINE FAILS TO START	
<ol style="list-style-type: none"> 1. Gasoline tank empty. 2. Gasoline line or filter clogged. 3. Fouled spark plug. 4. Circuit breaker points badly out of adjustment. 5. Loose wire connection at coil or circuit breaker. 6. Engine flooded with gasoline as a result of overchoking. 7. Defective ignition coil. 8. Defective condenser. 9. Starter-Generator drive belt slipping. 10. Spark plug wire damaged. 	<ol style="list-style-type: none"> 1 SERVICE 7 FUEL SYSTEM 8 SPARK PLUGS 8 CIRCUIT BREAKER 8 IGNITION COIL 8 CIRCUIT BREAKER 1 CONTROLS AND OPERATION 8 IGNITION COIL 8 CIRCUIT BREAKER 8 STARTER-GENERATOR 8 SPARK PLUGS
STARTER FAILS TO OPERATE	
<ol style="list-style-type: none"> 1. Battery dead. 2. Starting control circuit not operating. 3. Starter-generator defective. 4. Starter-solenoid defective (not closing). 5. Micro-switch open. 6. Circuit breaker open. 7. Key switch circuit defective. 	<ol style="list-style-type: none"> 8 BATTERY 8 STARTER-GENERATOR 8 STARTER-GENERATOR 8 STARTER-GENERATOR 8 SWITCHES 8 IGNITION 8 IGNITION

SYMPTOM AND CAUSE	REFER TO SECTION
STARTER OPERATES WITH KEY SWITCH OFF	
1. Starter solenoid defective (contacts stuck closed). 2. Micro switch improperly adjusted. 3. Defective key switch.	8 SWITCHES 8 SWITCHES 8 SWITCHES
SPARK PLUG FOULS REPEATEDLY	
1. The wrong type of spark plug for the kind of service or for type engine. Unsuitable gasoline or wrong fuel mixture. 2. Ignition timing incorrect. 3. Low battery. 4. Spark plug wire damaged. 5. Defective ignition coil.	8 SPARK PLUGS 5 ENGINE 8 CIRCUIT BREAKER 8 BATTERY 8 SPARK PLUG 8 IGNITION COIL
ENGINE OVERHEATS	
1. Not enough oil used in gasoline mixture. 2. Oil and gasoline not mixed thoroughly. 3. Exhaust port or pipe partially blocked by carbon. 4. Ignition timing too late or too early. 5. Fan screen plugged. 6. Incorrect governor adjustment.	1 PRODUCT 1 PRODUCT 5 CYLINDER 8 CIRCUIT BREAKER 5 ENGINE 6 CARBURETOR
ENGINE DETONATES	
1. Unsuitable fuel. 2. Heavy deposit of carbon on piston head and in combustion chamber. 3. Spark plug of the wrong heat range for the type of service involved. 4. Defective spark plug. 5. Incorrect ignition timing. 6. Lean fuel mixture.	1 PRODUCT 5 CYLINDER 8 SPARK PLUGS 8 SPARK PLUG 8 IGNITION 5 ENGINE
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 type of engine. 3. Unsuitable fuel. 4. Not enough oil used in gasoline mixture. 5. Incorrect timing.	5 CYLINDER 8 SPARK PLUG 1 PRODUCT 1 PRODUCT 1 PRODUCT
ENGINE SHOWS LOSS OF POWER	
1. Exhaust ports, muffler or pipe in need of cleaning. 2. Air cleaner blocked — clean or replace element. 3. Circuit breaker points out of adjustment or timed incorrectly.	5 CYLINDER 8 CIRCUIT BREAKER
STARTER-GENERATOR DOES NOT CHARGE BATTERY	
1. Loose or broken wire in starter-generator circuit. 2. Defective generator field coil. 3. Brushes worn or commutator dirty. 4. Drive belt slipping. 5. Defective regulator. 6. Defective battery.	8 STARTER-GENERATOR 8 STARTER-GENERATOR 8 STARTER-GENERATOR 8 STARTER-GENERATOR 8 REGULATOR 8 BATTERY
CARBURETOR FLOODS	
1. Inlet valve leaking, dirty, worn or damaged. 2. Diaphragms or check valve leaking.	6 FUEL SYSTEM 6 FUEL SYSTEM

SYMPTOM AND CAUSE	REFER TO SECTION
TRANSMISSION DOES NOT ENGAGE OR DISENGAGE SMOOTHLY	
1. Primary front floating (outer) flange weights out of position.	7 TRANSMISSION
2. Defective drive belt.	7 TRANSMISSION
3. Secondary drive stuck open.	7 TRANSMISSION
BRAKES DO NOT HOLD NORMALLY	
1. Brake improperly adjusted.	4 BRAKE
2. Brake controls binding as result of improper lubrication or damage.	4 BRAKE
3. Brake linings badly worn.	4 BRAKE
EXCESSIVE VIBRATION	
1. Engine mounting bolts or nuts loose.	5 ENGINE
2. Engine rubber mounts damaged or rivets loose.	5 ENGINE
3. Misaligned exhaust system.	5 CYLINDER
4. Damaged belt.	7 TRANSMISSION
5. Stabilizer bar out of adjustment.	5 ENGINE

When an engine is not operating properly, the trouble in many cases is mistakenly attributed to the coil, condenser or points when actually the spark plug is at fault.

Remove the spark plug from the cylinder head and clean and regap the electrodes as described in SPARK PLUGS, Section 8.

NOTES

SECTION	PAGE NO.
1. Specifications	2-1
2. Wheels, Tires and Front Hub — 3 Wheel	2-3
3. Wheels, Tires and Front Hubs — 4 Wheel	2-7
4. Steering — 3 Wheel — Tiller Bar Equipped	2-11
5. Steering — 3 Wheel — Steering Wheel Equipped	2-13
6. Steering — 4 Wheel	2-19
7. Front Suspension — 3 Wheel	2-25
8. Front Suspension — 4 Wheel	2-27
9. Rear Suspension	2-31
10. Frame	2-35
11. Tools	2-39

SPECIFICATIONS

TIRES/WHEELS

Type High Flotation
Tire Size 8.50 x 8 Std.
Air Pressure 18 psi (1.2 atm), Front and Rear

STEERING/FRONT SUSPENSION

Steering Gear Lubricant

(If Equipped With Steering Wheel)

Type Harley-Davidson TRANSMISSION

LUBRICANT Part No. 99890-61A

Level Fill to Overflowing

TORQUES

Wheel (Lug) Nuts 35-40 ft-lbs (4.8-5.5 kgm)

Tie Rod Castle Nuts 25-28 ft-lbs (3.5-3.9 kgm)

Steering Gear Unit Bolts 31-33 ft-lbs (4.3-4.6 kgm)

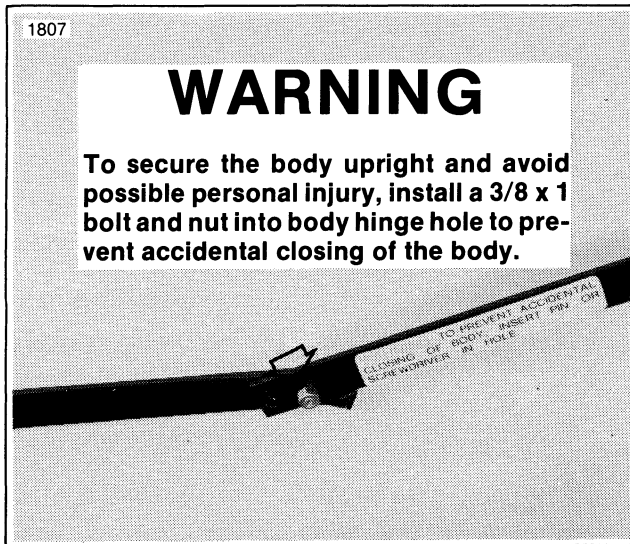
Instrument Panel Clamp Bolts ... 6-8 ft-lbs (.83-1.1 kgm)

NOTES

WHEELS, TIRES AND FRONT HUB — 3 WHEEL

GENERAL

Maximum tire life and good handling qualities are directly related to the care given wheels and tires. At regular intervals, or if handling irregularities are experienced, see the CHECK CHART below for recommended service.



FRONT WHEEL (Figure 2-1)

Removal

1. Wedge rear wheels of car to keep it from rolling and raise front of vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of frame to support vehicle weight for additional safety. See LIFTING INSTRUCTIONS under SERVICE, Section 1.
2. Loosen the set screw (1) located on the bottom of the right side front fork.
3. Place a rod in the hole at the end of the axle (2) and unscrew the axle from the fork. Remove the axle (2), spacer (3) and wheel assembly (4).

4. Pry off the hub caps (5) to expose the wheel hub assembly. Remove lug nuts (6) and pull hub assembly (7) from the wheel.

Installation

1. Install hub assembly (7) on wheel and fasten with nuts (6). Tighten nuts to 35-40 ft-lbs. (4.8-5.5 kgm) torque. Install hubcaps (5).
2. Insert spacer (3) in left side hub cap hole and locate it in the seals. Place wheel assembly in front fork with valve stem to left side of car.
3. Insert axle (2) through right side fork, wheel and spacer and screw it into left side fork.
4. While turning wheel, tighten axle to 10-15 ft-lbs (1.4-2.1 kgm) torque, which will provide a drag on bearings. While still turning wheel, loosen axle until wheel turns freely but no more than 1/4 turn. Tighten and lock setscrew (1).

REAR WHEELS (Figure 2-2)

Removal

1. Remove hub cap and slightly loosen wheel rim mounting nuts.
2. Wedge wheels of car to keep it from rolling and raise vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of bumper to support vehicle weight for additional safety. See LIFTING INSTRUCTIONS under SERVICE, Section 1.
3. Remove wheel rim mounting nuts (2), and wheel.

Installation

1. Install wheel to hub with wheel rim mounting nuts (2), and let car down off jacks.
2. Tighten wheel rim mounting nuts to 35-40 ft-lbs (4.8-5.5 kgm) torque, and install hub cap.

CHECK CHART

CHECK FOR	REMEDY
1. Loose axle nuts and wheel mounting nuts.	1. Tighten loose nuts.
2. Incorrect tire inflation.	2. Inflate front and rear tires to 18 psi (1.2 atm).
3. Excessive freeplay in steering mechanism.	3. Adjust steering mechanism. See STEERING AND SUSPENSION Section.

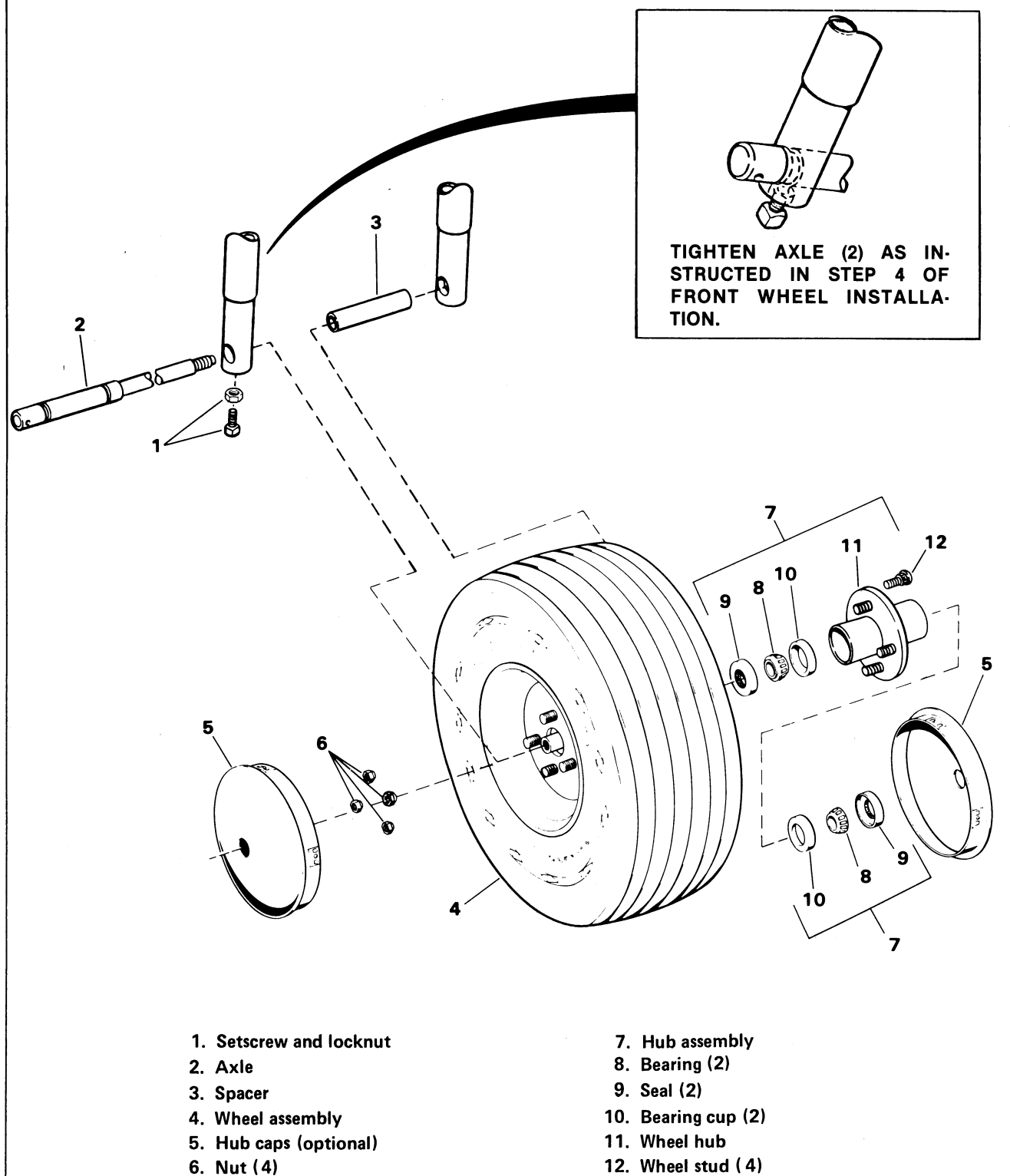


Figure 2-1. D3 Front Wheel and Hub — Exploded View

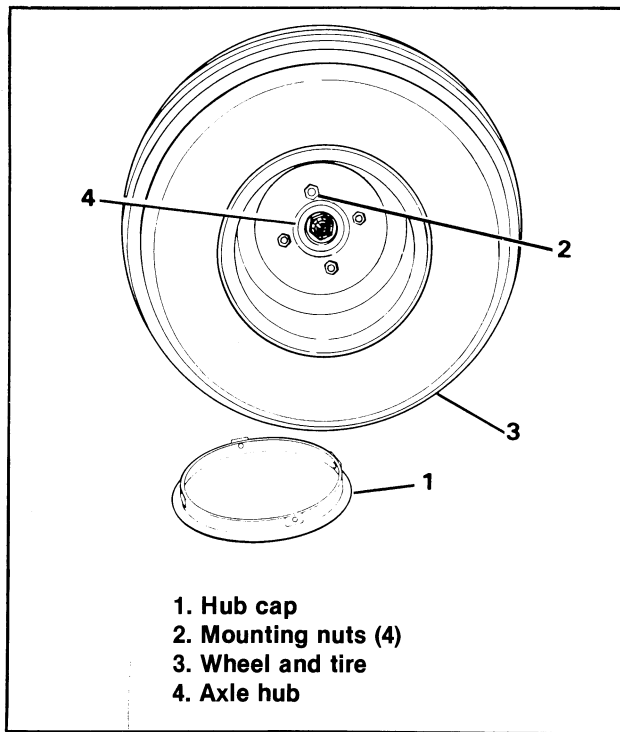


Figure 2-2. Wheel Removal and Installation

TIRES (Figure 2-3)

General

In the event of a flat tire, remove wheel as described in preceding section and inflate tire to 20 psi (1.33 atm). Immerse tire in water to determine point of leak. Mark point where bubbles escape. Leak could be due to any of the following: Punctured casing, faulty valve core, valve stem improperly seated in rim or tire bead improperly seated on rim.

When reason for loss of air has been determined, remove tire from rim.

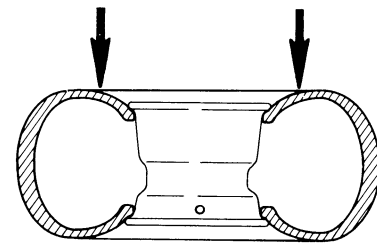
The standard tubeless tire repair procedure can be followed.

Removal

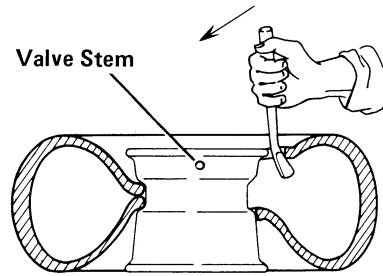
NOTE

Tire must be removed or installed from valve stem side of rim.

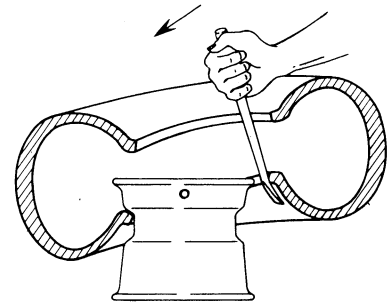
1. Remove tire and wheel assembly from car as described in preceding section.
2. Remove valve cap and valve core to free air from tire.
3. If tire machine is unavailable, loosen both tire beads by applying pressure to tire side walls (Step I, Figure 2-3).



Step I. Break Tire Beads Free of Rim



Step II. Removing Upper Bead From Rim



Step III. Removing Lower Tire Bead From Rim

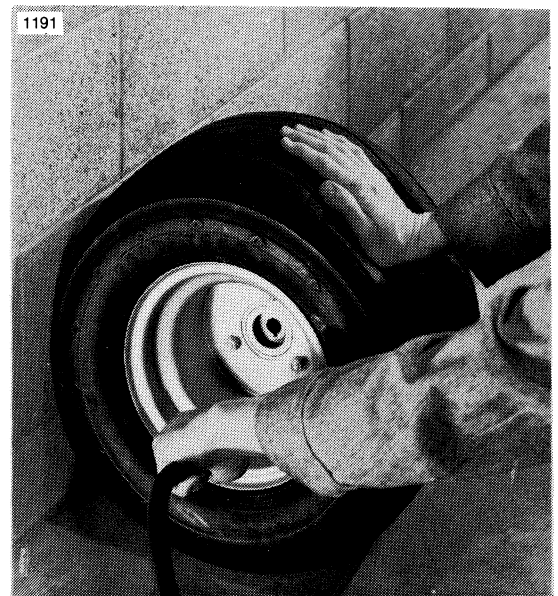


Figure 2-3. Tire Replacement

4. Push tire beads off of rim flange into rim well.
5. Apply tire mounting lubricant to tire beads.
6. With valve stem side up, carefully start upper bead over edge of wheel rim with tire tool (Step II, Figure 2-3).

CAUTION

Do not use excessive force when starting bead over edge of rim or tire bead may be damaged.

7. When top bead is free of rim, shift lower bead into rim well on one side of wheel and insert tire tool on opposite side. Pry lower bead over rim flange (Step III, Figure 2-3).
8. When lower bead is started over rim flange, tire can be removed the rest of the way by hand.

Installation

WARNING

Keep hands, fingers, etc., from exposed areas between bead and rim while inflating or mounting tire.

1. Clean both tire beads to remove dirt or foreign matter.
2. Clean wheel rim where tire beads seat with a wire brush.

NOTE

Cleaning tire and rim is very important as tubeless tires require a perfect seat to seal.

3. Apply a liberal amount of tire mounting solution to both tire bead and rim flange.
4. Install tire on rim valve stem side. If tire machine is unavailable, use rubber mallet and tire iron to install tire on rim.
5. Remove valve core and position tire so tire bead is seated on rim flange narrow bead seat.
6. Place tire upright against wall and push against tire on side opposite wall (Figure 2-3). This three point contact will tend to bring bead out in contact with rim so that internal pressure is formed and beads snap into place when air is applied through valve stem.

WARNING

Caution must be used when reinflating or bringing a tire up to recommended pressure from a high pressure air supply. Due to the low pressure requirements of a small tire, overinflation can be reached in a matter of two or three seconds. Overinflation could cause the tire to explode resulting in possible personal injury.

7. Apply high pressure air through valve stem. 30 to 35 psi should be used to seat tire on rim.
8. Quickly remove air pressure and install valve core.
9. Correct air pressure in tire to 18 psi, (1.2 atm), and immerse in water to check for leaks.
10. Install tire and wheel assembly onto car as described in preceding section.

FRONT HUB (Figure 2-1)

Disassembly

1. Remove front tire and wheel assembly from car and remove hub from wheel.
2. Pry out oil seals (9) and remove bearings (8) from each side of hub.
3. Examine all parts for wear and replace as necessary. If bearing cups (10) are pitted or worn, replace them by drifting them out from opposite ends of hub (11).

NOTE

Bearings cones (8) and cups (10) are sold as matched sets. Never replace one without replacing the other.

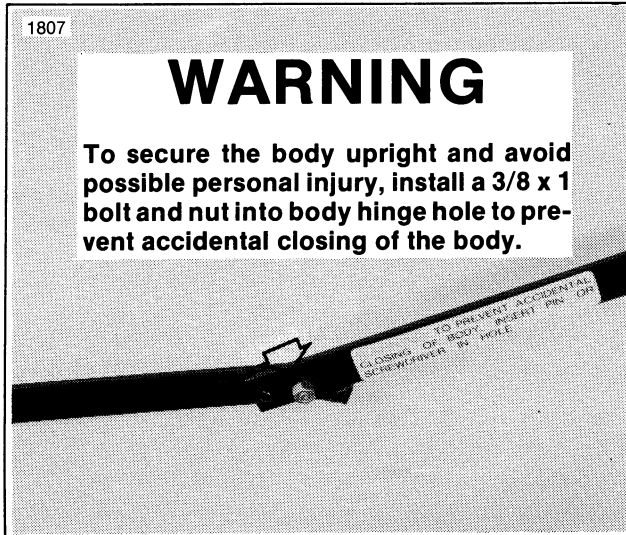
Assembly

1. Pack wheel bearings (8) with golf car SPECIAL GREASE, Part No. 99857-81.
2. If wheel bearing cups (10) have been removed, press new cups in hub.
3. Install wheel bearings (8) and press in new oil seals (9) lip side to hub.
4. Install tire and wheel assembly on hub and mount entire assembly onto car as described in preceding section.

WHEELS, TIRES AND FRONT HUBS — 4 WHEEL

GENERAL

Maximum tire life and good handling qualities are directly related to the care given wheels and tires. At regular intervals, or if handling irregularities are experienced, see the CHECK CHART below for recommended service.



WHEELS (Figure 2-2)

Removal

1. Remove hub cap and slightly loosen wheel rim mounting nuts.
2. Wedge wheels of car to keep it from rolling and raise vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of bumper to support vehicle weight for additional safety. See LIFTING INSTRUCTIONS under SERVICE, Section I.
3. Remove wheel rim mounting nuts (2), and wheel.

Installation

1. Install wheel to hub with wheel rim mounting nuts (2), and let car down off jacks.

2. Tighten wheel rim mounting nuts (2) to 35-40 ft-lbs. (4.8-5.5 kgm) torque, and install hub cap.

TIRES (Figure 2-3)

General

In the event of a flat tire, remove wheel as described in preceding section and inflate tire to 20 psi (1.33 atm). Immerse tire in water to determine point of leak. Mark point where bubbles escape. Leak could be due to any of the following: Punctured casing, faulty valve core, valve stem improperly seated in rim or tire bead improperly seated on rim.

When reason for loss of air has been determined, remove tire from rim.

The standard tubeless tire repair procedure can be followed.

Removal

NOTE

Tire must be removed or installed from valve stem side of rim.

1. Remove tire and wheel assembly from car as described in preceding section.
2. Remove valve cap and valve core to free air from tire.
3. If tire machine is unavailable, loosen both tire beads by applying pressure to tire walls (Step I, Figure 2-3).
4. Push tire bead off of rim flange into rim well.
5. Apply tire mounting lubricant to tire beads.
6. With valve stem side up, carefully start upper bead over edge of wheel rim with tire tool (Step II, Figure 2-3).

CAUTION

Do not use excessive force when starting bead over edge of rim or tire bead may be damaged.

CHECK CHART

CHECK FOR	REMEDY
1. Loose axle nuts and wheel mounting nuts.	1. Tighten loose nuts.
2. Incorrect tire inflation.	2. Inflate front and rear tires to 18 psi (1.2 atm).
3. Excessive freeplay in steering mechanism.	3. Adjust steering mechanism. See STEERING AND SUSPENSION Section.

- When top bead is free of rim, shift lower bead into rim well on one side of wheel and insert tire tool on opposite side. Pry lower bead over rim flange (Step III, Figure 2-3).
- When lower bead is started over rim flange, tire can be removed the rest of the way by hand.

Installation

WARNING

Keep hands, fingers, etc., from exposed areas between bead and rim while inflating or mounting tire.

- Clean both tire beads to remove dirt or foreign matter.
- Clean wheel rim where tire beads seat with a wire brush.

NOTE

Cleaning tire and rim is very important as tubeless tires require a perfect seat to seal.

- Apply a liberal amount of tire mounting solution to both tire bead and rim flange.
- Install tire on rim from valve stem side. If tire machine is unavailable, use rubber mallet and tire iron to install tire on rim.
- Remove valve core and position tire so tire bead is seated on rim flange narrow bead seat.
- Place tire upright against wall and push against tire on side opposite wall (Figure 2-3). This three point contact will tend to bring bead out in contact with rim so that internal pressure is formed and beads snap into place when air is applied through valve stem.

WARNING

Caution must be used when reinflating or bringing a tire up to recommended pressure from a high pressure air supply. Due to the low pressure requirements of a small tire, overinflation may be reached in a matter of two or three seconds. Overinflation could cause the tire to explode, resulting in possible personal injury.

- Apply high pressure air through valve stem. 30 to 35 psi should be used to seat tire on rim.
- Quickly remove air pressure and install valve core.
- Correct air pressure in tire to 18 psi (1.2 atm), and immerse in water to check for leaks.
- Install tire and wheel assembly onto car as described in preceding section.

FRONT HUBS (Figure 2-4)

Disassembly

- Remove tire and wheel assembly from car as described in preceding section.
- Remove grease cap (1), cotter pin (2) and axle nut (3). Remove hub assembly (4) from axle (5).
- Pry out oil seal (8) and remove bearings (6 & 7) from each side of hub.
- Clean all parts and examine for damage and wear. Replace any damaged or worn parts.

NOTE

Wheel bearing cup and cones are available in matched sets only, never replace one without the other.

- If bearing cups (9 & 10) are worn or pitted, drift out from opposite side of hub.

Assembly

- Pack wheel bearings (6 & 7) with golf car SPECIAL GREASE, Part No. 99857-81.
- If wheel bearing cups (9 & 10) have been removed, press new cups in hub (11).
- Install wheel bearing (7) and press in new oil seal (8) lip side to hub.
- Install hub assembly (4) on axle (5), install wheel bearing (6), and turn on nut (3).

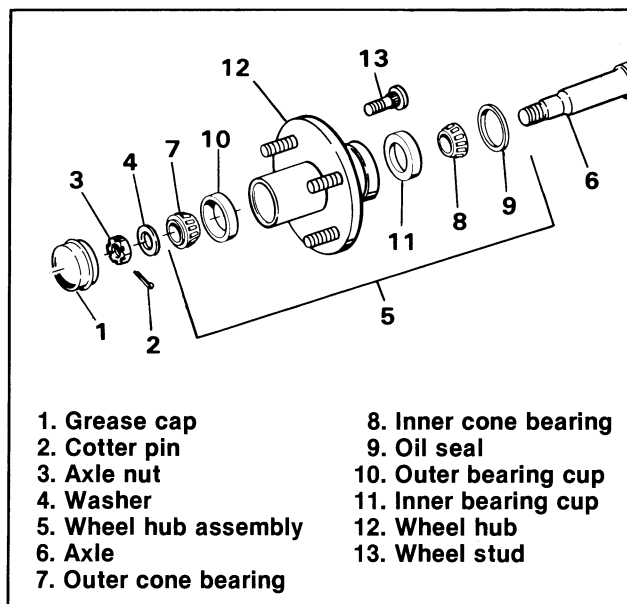


Figure 2-4. Front Wheel Hub

5. Tighten axle nut (3) until bearing play is taken up and hub turns freely.

NOTE

Bearings should be slightly loose rather than preloaded.

6. Install cotter pin (2) so that when the ends are

crimped over and trimmed they will not contact the dust cap or hub. Cotter pins which contact the dust cap or hub will create contaminants during operation which cause bearing wear. Install grease cap (1).

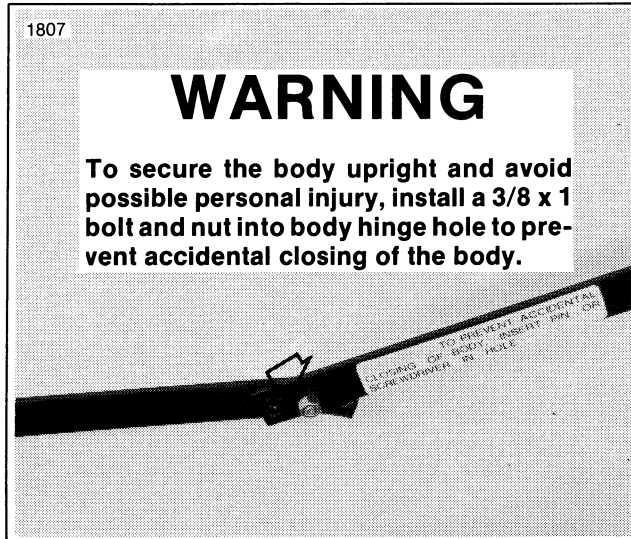
7. Install tire and wheel assembly onto car as described in preceding section.

NOTES

STEERING — 3 WHEEL — TILLER BAR EQUIPPED

GENERAL

The golf car comes equipped with a tiller steering assembly as standard equipment. The tiller requires no maintenance except for periodic adjustments as listed, following.



ADJUSTMENT (Figure 2-5)

If excessive free play or slack (1/2 inch or more at loop in tiller bar) develops in the tiller bar, make the following adjustment.

1. Raise the front of the car as described in the LIFTING INSTRUCTIONS in Section 1.
2. Remove the two bolts (13), nuts (14), spacers (12) and tiller guide (11).
3. Remove the slider block (15) and reposition it 90° so the unused sides contact the guide (11).
4. Re-install the guide (11), spacers (12), bolts (13) and nuts (14). Check tiller for free play.

NOTE

If free play remains excessive, try turning the slider block (15) over. If free play is still excessive, slider is worn out and should be replaced. Also inspect guide (11) for excessive wear.

CAUTION

Slide block is self-lubricating. Do not use oily lubricant because it collects grit which causes wear.

REMOVAL (Figure 2-5)

1. Remove accessory panel (1) (score card holder) by loosening screws (2) and turning mounting plates (3) 90° degrees.
2. Remove the nut (4), washer (5) and tiller bar head (6).
3. Remove the cowl assembly (not shown) from the car. See BODY.
4. Remove the bolts (7), tiller bar tube (8) and bracket (9). Slide the tiller bar tube off the tiller shaft (10). Pull the slider (15) and washer(s) (16) off the tiller bar shaft.
5. Remove the bolts (13), nuts (14), spacers (12) and tiller guide (11).
6. Clean all parts and inspect for wear and damage. Replace any parts as necessary.

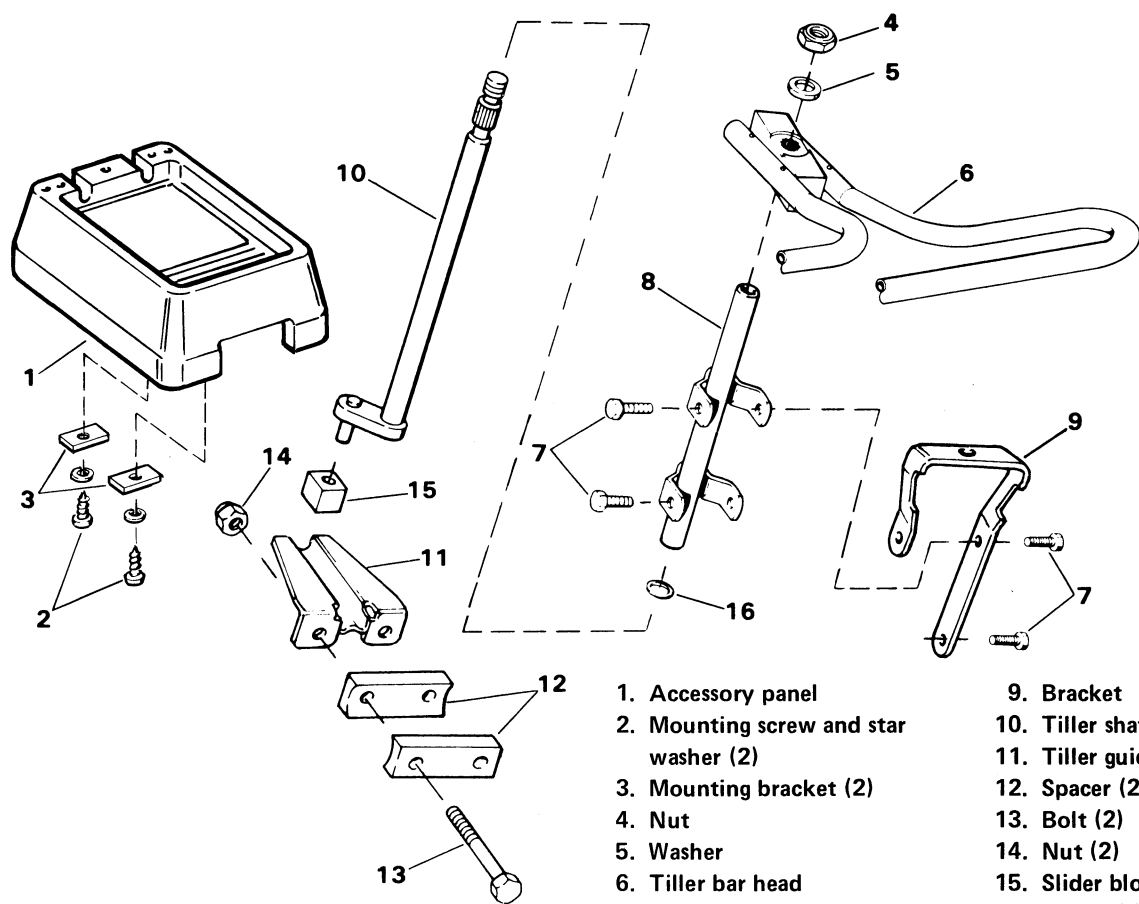
INSTALLATION (Figure 2-5)

1. Install the tiller guide using the bolts (13), spacers (12) and nuts (14).
2. Place the washer(s) (16) onto the tiller shaft (10) and slide the tiller bar tube (8) onto the shaft.
3. Install the slider block (15) on bottom of shaft and place it in the guide (11).
4. Fasten the tube (8) to the frame head using the bracket (9) and bolts (7).
5. When the tiller is reassembled, check the axial free play by pulling up on the tiller shaft. Play should be no more than .040 in. and is adjusted by either adding or removing washers (16).
6. Install the front cowl as described in BODY, Section 9.

CAUTION

If the tiller bar head (6) has to be driven on to the tiller shaft (10), support the tiller shaft from below to avoid bending the tiller guide (11). A bent tiller guide (11) will make it impossible to obtain proper end play spacing and could result in disengagement of the slider block (15) from guide (11) during operation.

7. Point the front wheel straight ahead and install the tiller bar (6) on the shaft splines. The tiller bar should be parallel to the seat backs. Re-install the washer (5) and nut (4). Tighten nut (14) to 40-50 ft-lbs (5.5-6.9 kgm) torque.
8. Install the accessory panel (1) (score card holder).



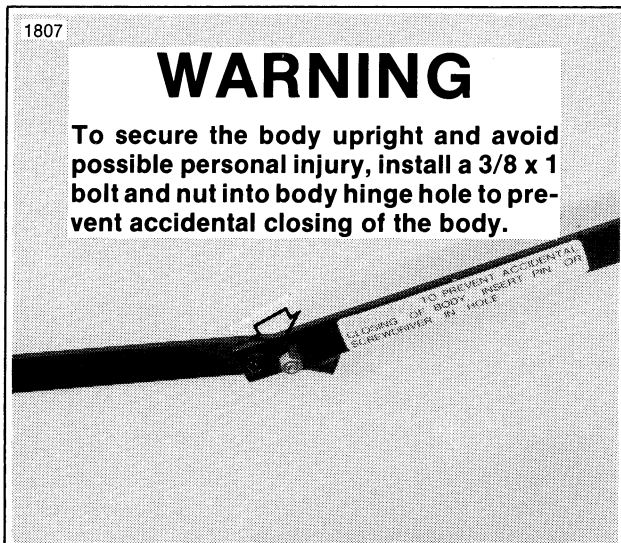
- | | |
|---------------------------------------|------------------|
| 1. Accessory panel | 9. Bracket |
| 2. Mounting screw and star washer (2) | 10. Tiller shaft |
| 3. Mounting bracket (2) | 11. Tiller guide |
| 4. Nut | 12. Spacer (2) |
| 5. Washer | 13. Bolt (2) |
| 6. Tiller bar head | 14. Nut (2) |
| 7. Bolt (4) | 15. Slider block |
| 8. Tiller bar tube | 16. Washer(s) |

Figure 2-5. Tiller Bar Steering Assembly

STEERING — 3 WHEEL — STEERING WHEEL EQUIPPED

GENERAL

A steering wheel assembly is offered as optional equipment. The steering gear box lubricant level should be checked yearly and filled to overflowing through the filler plug (19, Figure 2-9). Use Harley-Davidson TRANSMISSION LUBRICANT Part No. 99890-61A. If water is evident in the steering box, drain and flush it with light engine oil before refilling. This steering assembly has a tie rod assembly which is sealed at the time of manufacture. Each tie rod end is equipped with a plug that can be removed to accept a grease fitting. The tie rod should be greased annually.



ADJUSTMENTS

Worm Gear Bearing Preload and Over-Center

There are two parts to the steering gear unit adjustment.

1. Worm gear bearing preload adjustment.
2. Over-center adjustment.

IMPORTANT

The worm gear bearing preload adjustment must be checked, and corrected if necessary, before the over-center adjustment is made.

1. Check worm gear bearing preload by pulling up and pushing down on steering wheel. There should be no play.

NOTE

Locking cup (25, Figure 2-9) is bent down into notch in housing in one spot. This is original factory adjustment.

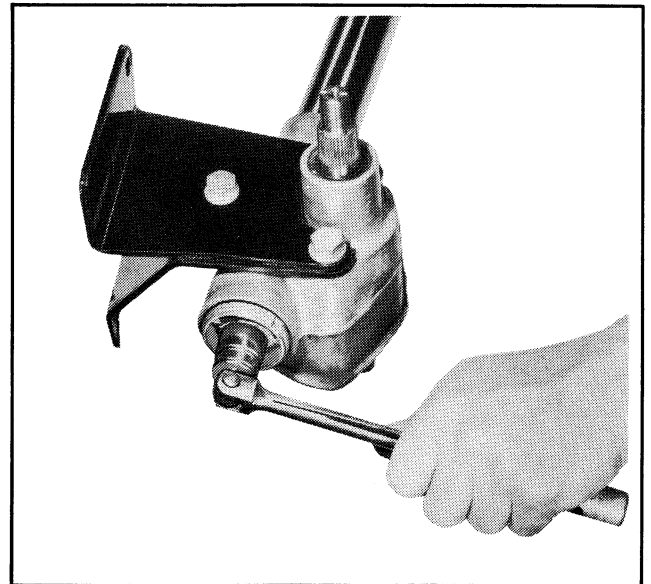


Figure 2-6. Worm Bearing Adjustment

2. If worm gear bearing preload needs adjustment, pry out locking cup from notch, and remove locking cup.
3. See Figure 2-6. Turn end cap in to take up any up and down looseness in steering wheel shaft.
4. When adjustment is correct, replace locking cup, and bend edge of cup into housing notch to hold end of cup in position. Also stake edge of locking cup to keep it from turning.
5. Set steering wheel at the midpoint of its travel (1-7/8 turns from either extreme). At this point the two worm fingers on the steering arm are tightest in the worm grooves. The over center adjustment should be made with the steering wheel in this position.
6. See Figure 2-7. Loosen locknut (2) and turn adjusting screw (1) in just enough to eliminate play. It will be necessary to use a right angle screwdriver to turn screw (1) if adjustment is made with steering gear unit mounted in car.

NOTE

Play can be felt by holding pitman arm and turning steering wheel back and forth over the center position. A slight drag over the center will be felt if adjustment is too tight.

7. Hold adjusting screw (1) in desired position and retighten locknut (2).

Tie Rod

The tie rod (Figure 2-8) is made up of two ball joints

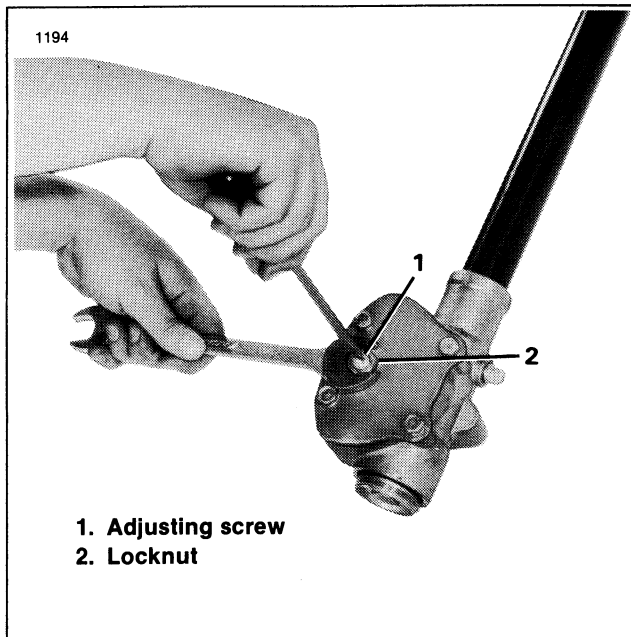


Figure 2-7. Making Over Center Adjustment

threaded into a sleeve. The distance from the centers of the ball joints should be 5-7/8 in. as shown in Figure 2-8. Each ball joint should be adjusted an equal amount of threads to achieve this measurement.

1. Follow the steps in steering gear unit, REMOVAL and front fork REMOVAL.
2. Remove the nut and cotter pin (9, 10, Figure 2-9) from the front fork. Remove the tie rod.

NOTE

Ball joint on tie rod is a tapered fit on fork. Use a claw puller or tap lightly with a copper mallet to loosen the joint from the fork. Leave nut on ball joint threads to prevent damage to threads while striking with mallet.

CAUTION

Care should be taken when removing the tie rod so rubber boots on ball joint are not damaged — they are not replaceable.

3. See Figure 2-8. Loosen the clamp nuts and turn ball joints in or out of sleeve to achieve proper length.
4. Position the clamps so they will not strike the fork bracket or gear unit when fork is turned. Tighten the clamp bolts.
5. Install tie rod on front fork and follow the procedures in front fork, INSTALLATION and steering gear unit, INSTALLATION.

NOTE

When connecting ball joint stud to steering arm, tighten

the attaching castle nut 25-28 ft-lbs (3.5-3.9 kgm) torque before backing off to insert cotter pin.

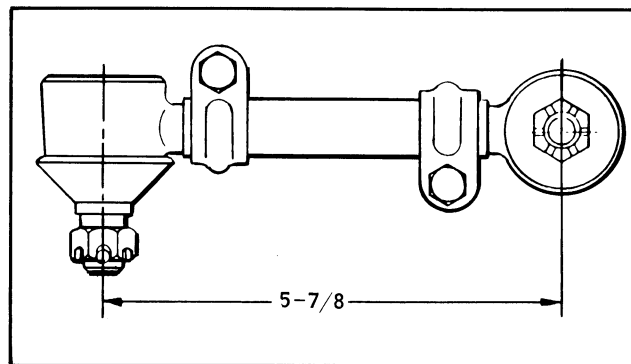


Figure 2-8. Tie Rod Adjustment

STEERING WHEEL

Removal

1. See Figure 2-9. Remove the steering wheel hub cover (1).
2. Mark the steering wheel and steering shaft so steering wheel can be replaced in the exact position as originally installed.
3. See Figure 2-9. Loosen the steering wheel nut (2) until flush with the end of shaft and apply penetrating oil to the shaft splines.
4. See Figure 2-10. Install Harley-Davidson WEDGE ATTACHMENT, Part No. 95637-46, under the steering wheel. Cup (4, Figure 2-9) can be depressed to gain clearance. Place a thick washer on top of the steering wheel nut to prevent damage to the shaft from the puller. (I.D. of washer should be smaller than O.D. of steering shaft.) Pull steering wheel loose from shaft using Harley-Davidson PULLER, Part No. 97292-61.
5. Remove nut and steering wheel from shaft.
6. See Figure 2-9. Cup (4), dust seal (5) and bushing (6) can be removed from the steering shaft housing if necessary.

Installation

1. See Figure 2-9. Install bushing (6), seal (5) and cup (4) in steering shaft housing.

NOTE

Before installing the steering wheel, apply oil to steering shaft splines to minimize corrosion and facilitate easy future removal of steering wheel.

2. Install steering wheel on splines of steering shaft aligning the reference marks (Step 2 of removal procedure).

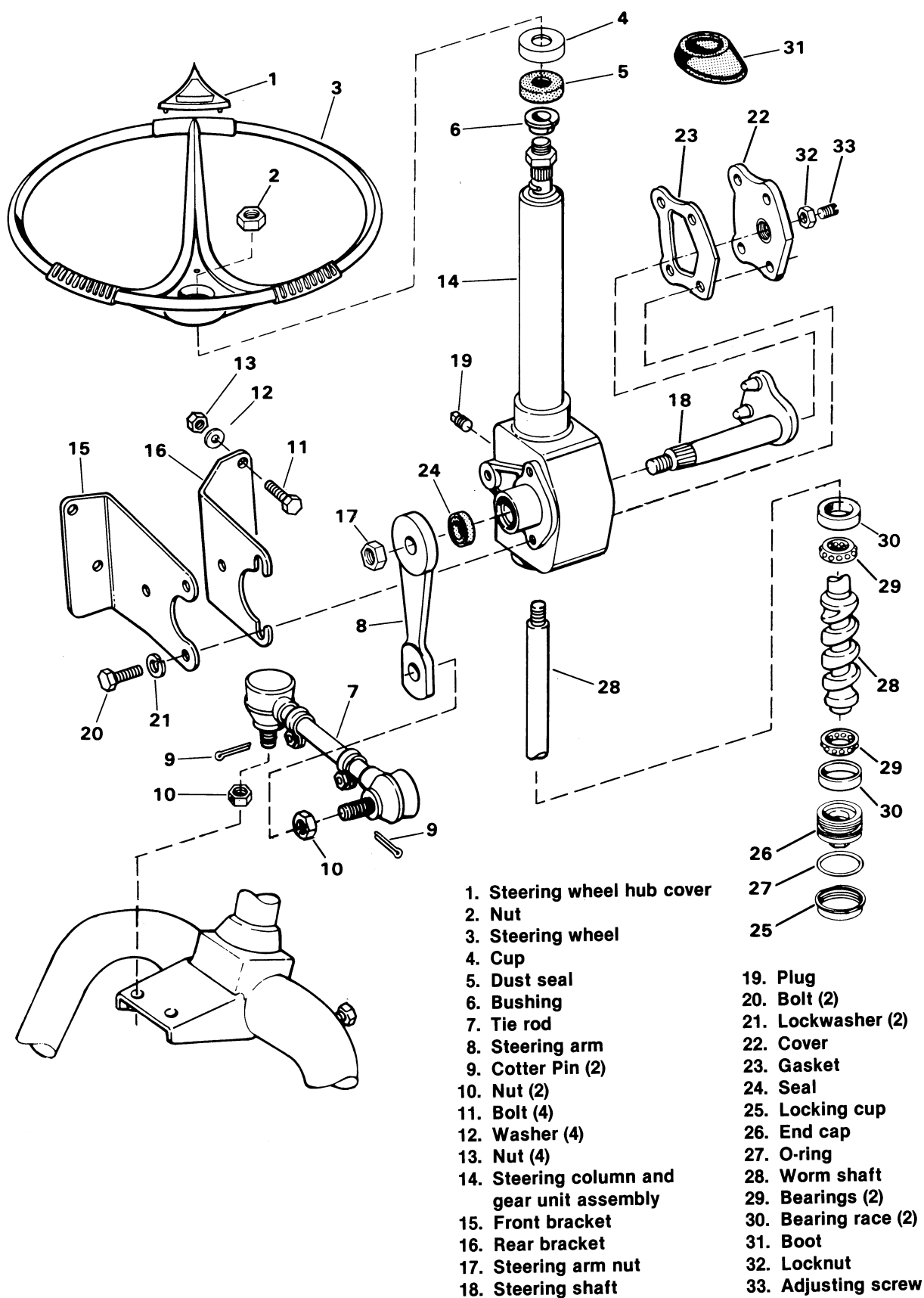


Figure 2-9. Steering Wheel and Steering Gear Unit — Exploded View

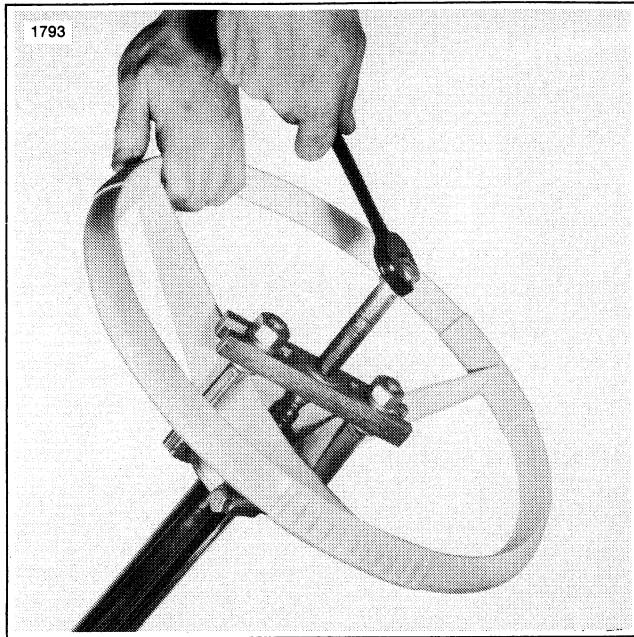


Figure 2-10. Pulling the Steering Wheel

3. See Figure 2-9. Install steering wheel nut and tighten it to 40-50 ft-lbs (5.5-6.9 kgm) torque. Install the cover (1).

STEERING GEAR UNIT (Figure 2-9)

Removal

1. Remove the steering wheel as described in steering wheel, REMOVAL.
2. Wedge rear wheels to keep car from rolling and raise the front of vehicle approximately 10° to 25° See LIFTING INSTRUCTIONS, Section 1.

NOTE

Removing front cowl will greatly increase accessibility to steering gear unit.

3. Disconnect the tie rod (7) from the steering arm (8) by removing the cotter pin (9) and nut (10).

NOTE

Ball joint on tie rod is a tapered fit on steering arm. Use a claw puller or tap lightly with copper mallet to loosen the joint from the steering arm. Leave nut on balljoint threads to prevent damage to threads while striking with mallet.

CAUTION

Care should be taken when removing tie rod so rubber boots on ball joints are not damaged — they are not replaceable.

Disassembly

1. Remove steering gear unit as described in steering gear unit, REMOVAL.
2. Remove plug (19) and drain lubricant from housing.
3. Remove nut (17) from steering shaft (18).
4. Use Harley-Davidson's CLAW PULLER, Part No. 97292-61, to pull steering arm from shaft as shown in Figure 2-11.
5. Remove bolts (20), lockwashers (21), left and right brackets (15, 16), cover (22), gasket (23) and steering shaft (18). If seal (24) is damaged and/or leaking, pry it out and replace with a new seal.
6. Pry edge of locking cup (25) from notch in housing and remove the cup.

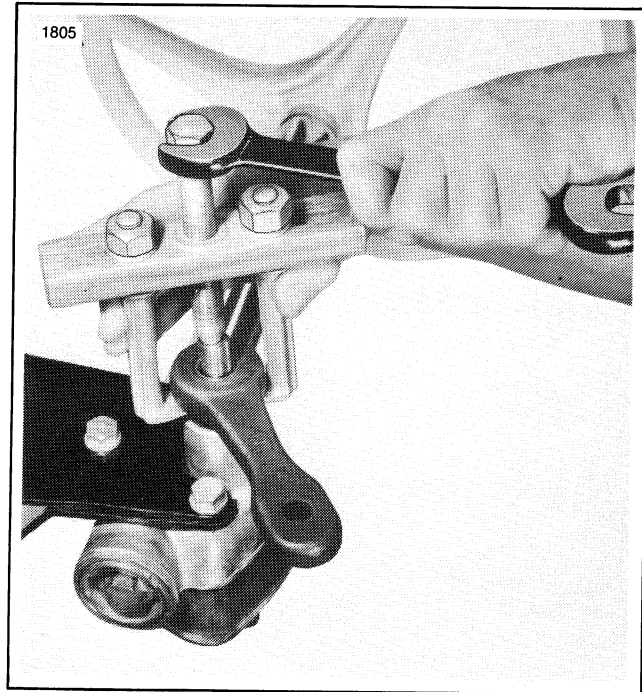


Figure 2-11. Pulling the Steering Arm

7. Turn out the end cap (26) with O-ring (27) attached.
8. Remove the worm shaft (28) and bearings (29) from gear unit assembly.
9. Bearings (29), if worn, can be slipped off worm shaft (28).
10. Bearing races (30) must be pulled from end cap and gear unit using a suitable pulling tool.

NOTE

Bearings (29) and races (30) must be replaced in sets only.

11. Bearings ride on worm gear as well as races. Check condition of worm gear and replace the entire steering gear unit assembly if the worm gear is badly worn.

Assembly

1. Press bearing races (30) into steering gear unit (14) and end cap (26).
2. Install bearings (29) on worm shaft (28).
3. Install worm shaft (28) with bearings into steering gear unit (14) from gear unit end.
4. Install end cap (26) with O-ring (27).
5. Install steering shaft (18) in gear unit so that it meshes with worm gear.
6. Install gasket (23), side cover (22), and brackets (15, 16) with bolts (20) and lockwashers (21).
7. Remove fill plug (19), hold unit to allow maximum

filling and add Harley-Davidson TRANSMISSION LUBRICANT Part No. 99890-61A until unit is full. Install fill plug (19).

8. Adjust steering gear unit as described under steering gear unit, ADJUSTMENT.
9. Install steering gear unit in car as described under steering gear unit, INSTALLATION.

Installation

1. Place steering gear unit into car from underside of vehicle with steering column protruding through hole in cowl.
2. Connect the tie rod (7) to the steering arm (8) and install castle nut (10). Tighten castle nut to 25-28 ft-lbs (3.5-3.9 kgm) torque, then install cotter pin (9).
3. Fasten the brackets (15, 16) to the frame using bolts (11), washers (12) and nuts (13).
4. Let car down off stands and install steering wheel as described in steering wheel, INSTALLATION.

NOTES

STEERING — 4 WHEEL

GENERAL

The D4 golf car steering is controlled by a steering wheel through a worm gear type steering box. The lubricant level in the steering box should be checked yearly and filled to overflowing through the filler plug (27, Figure 2-12) hole with Harley-Davidson TRANSMISSION LUBRICANT Part No. 99890-61A.

If water is evident in the steering box, drain and flush with light engine oil before refilling. The steering is further controlled by two tie rod assemblies (3 and 5, Figure 2-23) which are lubricated and sealed at time of manufacture. Each of the four tie rod ends is equipped with a plug that can be removed to accept a fitting for grease gun use. The tie rods should be lubed annually. The tie rods also provide a means for adjusting front wheel alignment.

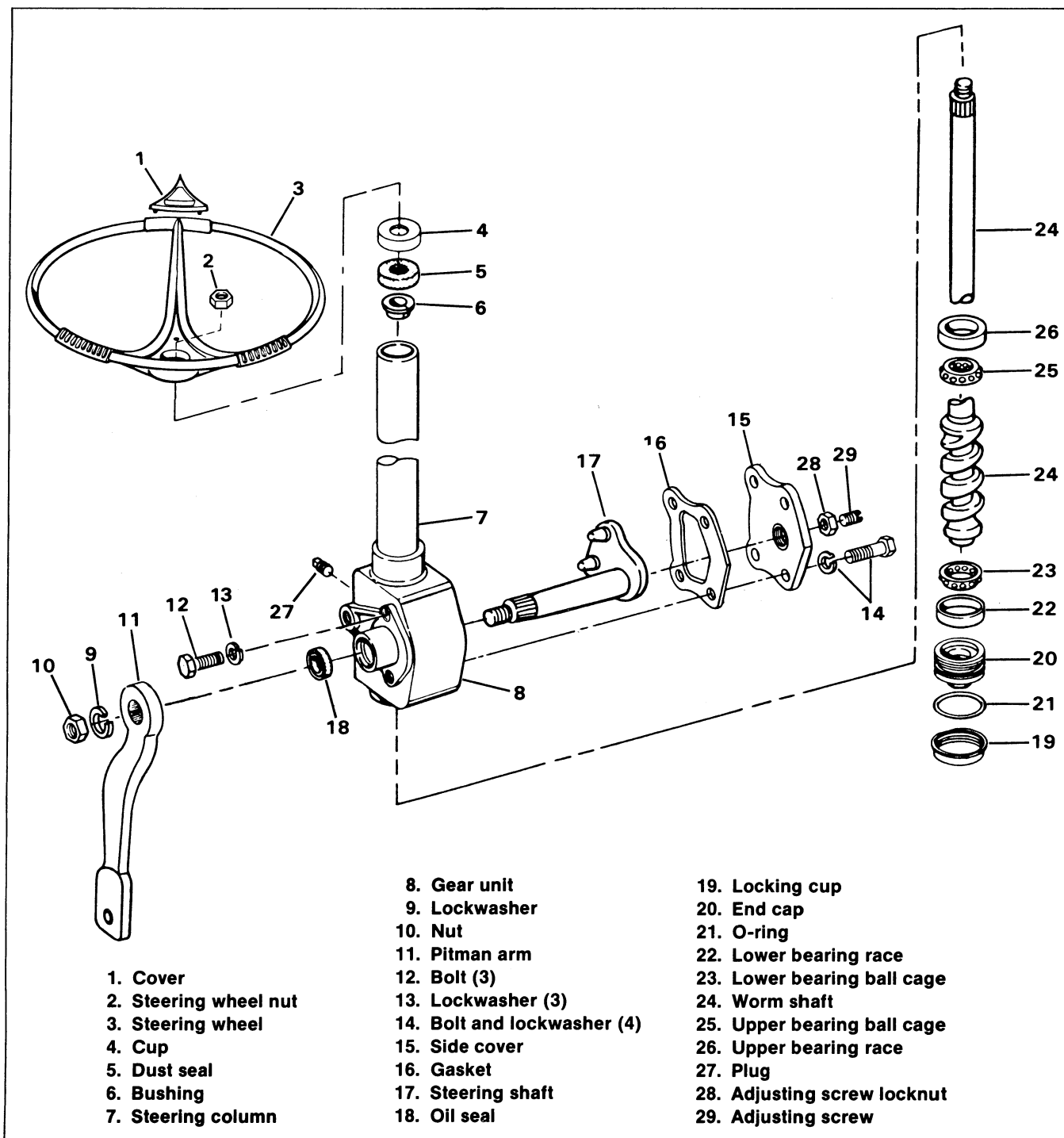
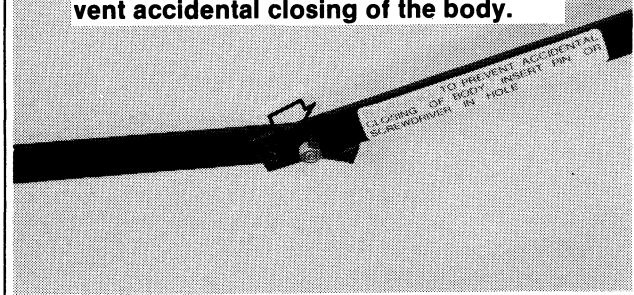


Figure 2-12. Steering Wheel and Steering Gear

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WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of the body.



ADJUSTMENT

Steering Gear Unit

There are two parts to the steering gear unit adjustment.

1. Worm gear bearing preload adjustment.
2. Over-center adjustment.

IMPORTANT

The worm gear bearing preload adjustment must be checked, and corrected if necessary, before the over-center adjustment is made.

1. Check worm gear bearing preload by pulling up and pushing down on steering wheel. There should be no play.

NOTE

Locking cup (19, Figure 2-12) is bent down into notch in housing in one spot. This is original factory adjustment.

2. If worm gear bearing preload needs adjustment, pry out locking cup from notch, and remove locking cup.
3. Turn end cap in to take up any up and down looseness in steering wheel shaft (Figure 2-13).
4. When adjustment is correct, replace locking cup, and bend edge of cup into housing notch to hold end cap in position. Also stake edge of locking cup to keep it from turning.
5. Set steering wheel at the midpoint of its travel (1-7/8 turns from either extreme). At this point the two worm fingers on the steering arm are tightest in the worm grooves. The over center adjustment

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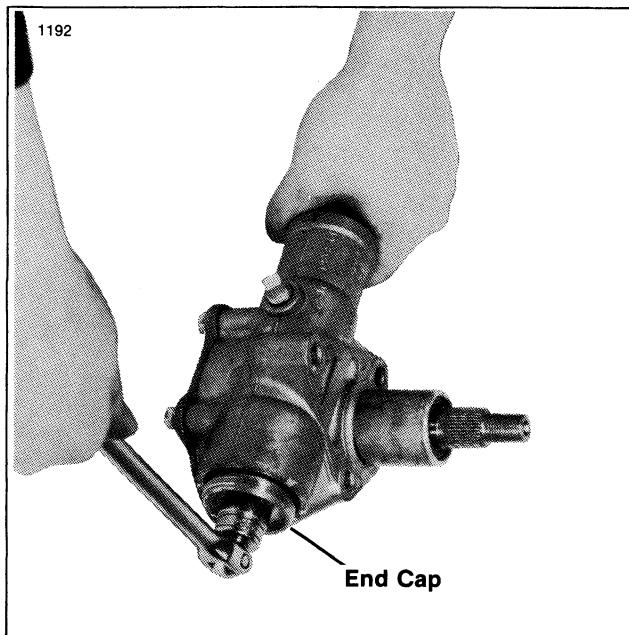


Figure 2-13. Adjusting Worm Bearings

should be made with the steering wheel in this position.

6. See Figure 2-14. Loosen locknut (2) and turn adjusting screw (1) in just enough to eliminate play. It will be necessary to use a right angle screwdriver to turn screw (1) if adjustment is made with steering gear unit mounted in car.

NOTE

Play can be felt by holding pitman arm and turning steering wheel back and forth over the center position. A slight drag over the center will be felt if adjustment is too tight.

7. Hold adjusting screw (1) in desired position and retighten locknut (2).

STEERING WHEEL (Figure 2-15)

Removal

1. See Figure 2-12. Pry cover (1) from steering wheel.
2. Mark steering wheel and steering shaft so steering wheel can be replaced in the exact position as originally installed.
3. Loosen steering wheel nut (2) until flush with end of shaft and apply penetrating oil to shaft splines.
4. See Figure 2-15. Install Harley-Davidson WEDGE ATTACHMENT, Part No. 95637-46, under the steering wheel. Cup (4, Figure 2-12) can be depressed to gain clearance. Place a thick washer on top of the steering wheel nut to prevent damage to the shaft

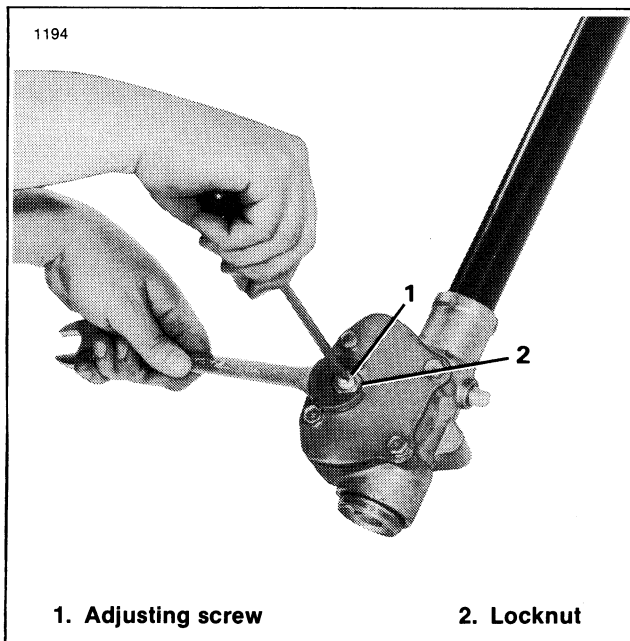


Figure 2-14. Making Over-Center Adjustment

from the puller. (I.D. of washer should be smaller than O.D. of steering shaft.) Pull steering wheel loose from shaft using Harley-Davidson PULLER, Part No. 97292-61.

5. Remove nut and steering wheel from shaft.
6. Cup (4), dust seal (5) and bushing (6) can be removed from steering shaft housing if necessary.

Installation

1. Install bushing (6), seal (5) and cup (4) in steering shaft housing.

NOTE

Before installing steering wheel, apply oil to steering shaft splines to minimize corrosion and facilitate easy future removal of steering wheel.

2. Install steering wheel on splines of steering shaft aligning reference marks (Step 2 of removal procedure).
3. Install steering wheel nut (2) and tighten to 40-50 ft-lbs (5.5-6.9 kgm) torque.
4. See Figure 2-12. Install cover (1) onto steering wheel.

STEERING GEAR UNIT (Figure 2-12)

Removal

1. Remove steering wheel as described in steering wheel, REMOVAL.

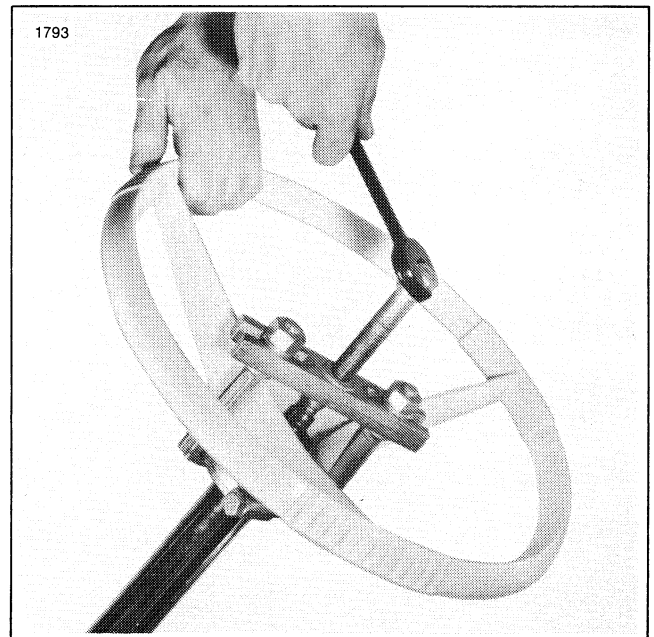


Figure 2-15. Pulling the Steering Wheel

3. Remove front body housing. See BODY Section 9.
4. Remove nut (10) and lockwasher (9) from steering shaft (17).
5. Remove pitman arm (11) by using Harley-Davidson CLAW PULLER TOOL, Part No. 97292-61. See Figure 2-16.

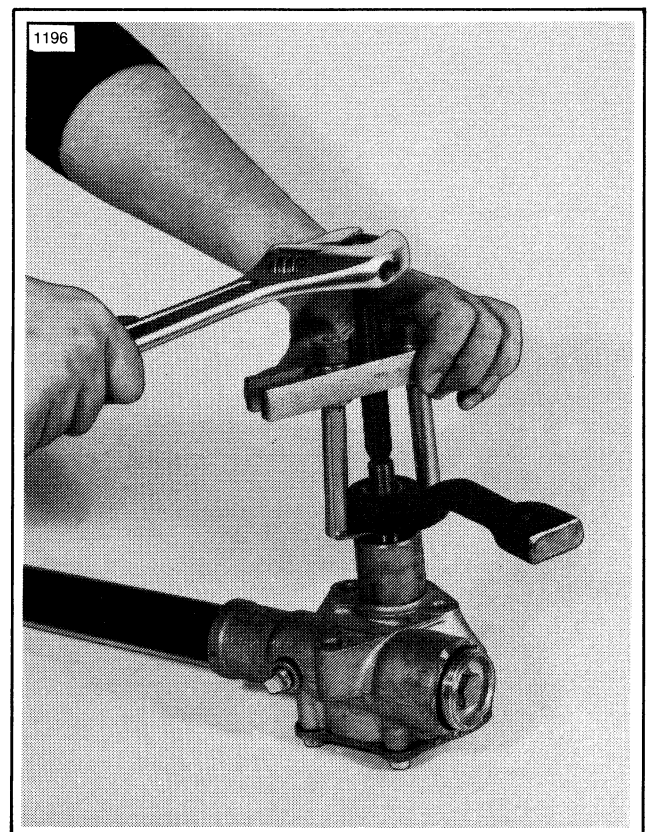


Figure 2-16. Pulling Pitman Arm

6. Remove steering gear unit mounting bolts (42) and lockwashers (13).
7. Pull out steering unit.

Disassembly

1. Remove steering gear unit from car as described in REMOVAL.
2. Remove plug (27) and drain lubricant from housing.
3. Remove four side cover bolts and lockwashers (17) and lift off side cover (15) and gasket (16).
4. Remove steering shaft (17) from cover side of housing.
5. If seal (18) is damaged and/or leaking, pry it out and replace with a new seal.
6. Pry edge of locking cup (19) from notch in housing and remove locking cup.
7. Turn out end cap (20) with O-ring (21) attached.
8. Remove worm shaft (24) and bearings (23 and 25) from gear unit assembly.
9. Bearings (23 and 25), if worn, can be slipped off worm shaft (28).
10. Bearing races (22 and 26) must be pulled from end cap and gear unit using a suitable pulling tool.

NOTE

Bearings and bearing races (22, 23, 25 and 26) must be replaced as a set.

11. Bearings (23 and 25) ride on worm gear as well as races, check condition of worm gear and replace entire steering gear assembly if worm gear is badly worn.

Assembly

1. Press bearing race (26) into steering gear unit (8) and bearing race (22) into end cap (20).
2. Install bearings (22 and 25) on worm shaft (24).
3. Install worm shaft (24) with bearings into steering gear unit (8) from gear unit end.
4. Install end cap (20) and O-ring (21).
5. Install steering shaft (17) in gear unit so that it meshes with worm gear.
6. Install gasket (16) and side cover (15) with bolts and lockwashers (14).

7. Remove fill plug (27), hold unit to allow maximum filling and add Harley-Davidson TRANSMISSION LUBRICANT, Part No. 99860-61A until unit is full. Install fill plug (27).
8. Adjust steering gear unit as described under steering gear unit, ADJUSTMENT.
9. Install steering gear unit in car as described under steering gear unit, INSTALLATION.

Installation

1. See Figures 2-12 and 2-17. Position steering unit in car and secure with bolts (12) and lockwashers (13). DO NOT tighten bolts (12) at this time.
2. Install front housing. See BODY Section 9.

See Figure 2-17. Steering unit must be secured as follows:

- Tighten instrument panel clamp to 6-8 ft-lbs torque.
- Snugly tighten u-bolt nuts.
- Tighten steering housing cap screws to 33 ft-lbs torque.

NOTE

When installing a new steering unit, see STEERING COLUMN ALIGNMENT PROCEDURE before proceeding any further.

3. Install pitman arm (11) on steering shaft (17) lining up the marks from Step 3 of steering gear unit, REMOVAL.
4. Install nut (10) and lockwasher (9) to steering shaft and tighten securely.
5. Install steering wheel as described in steering wheel, INSTALLATION.

STEERING COLUMN ALIGNMENT PROCEDURE

General

When installing a new steering gear unit, the steering unit may require alignment of the steering column shaft. Proceed as follows:

WARNING

Disconnect the battery cables (negative cable first) to prevent accidental start up and possible personal injury.

1. See Figure 2-12. Remove the black nylon bushing (6) from steering column (7).

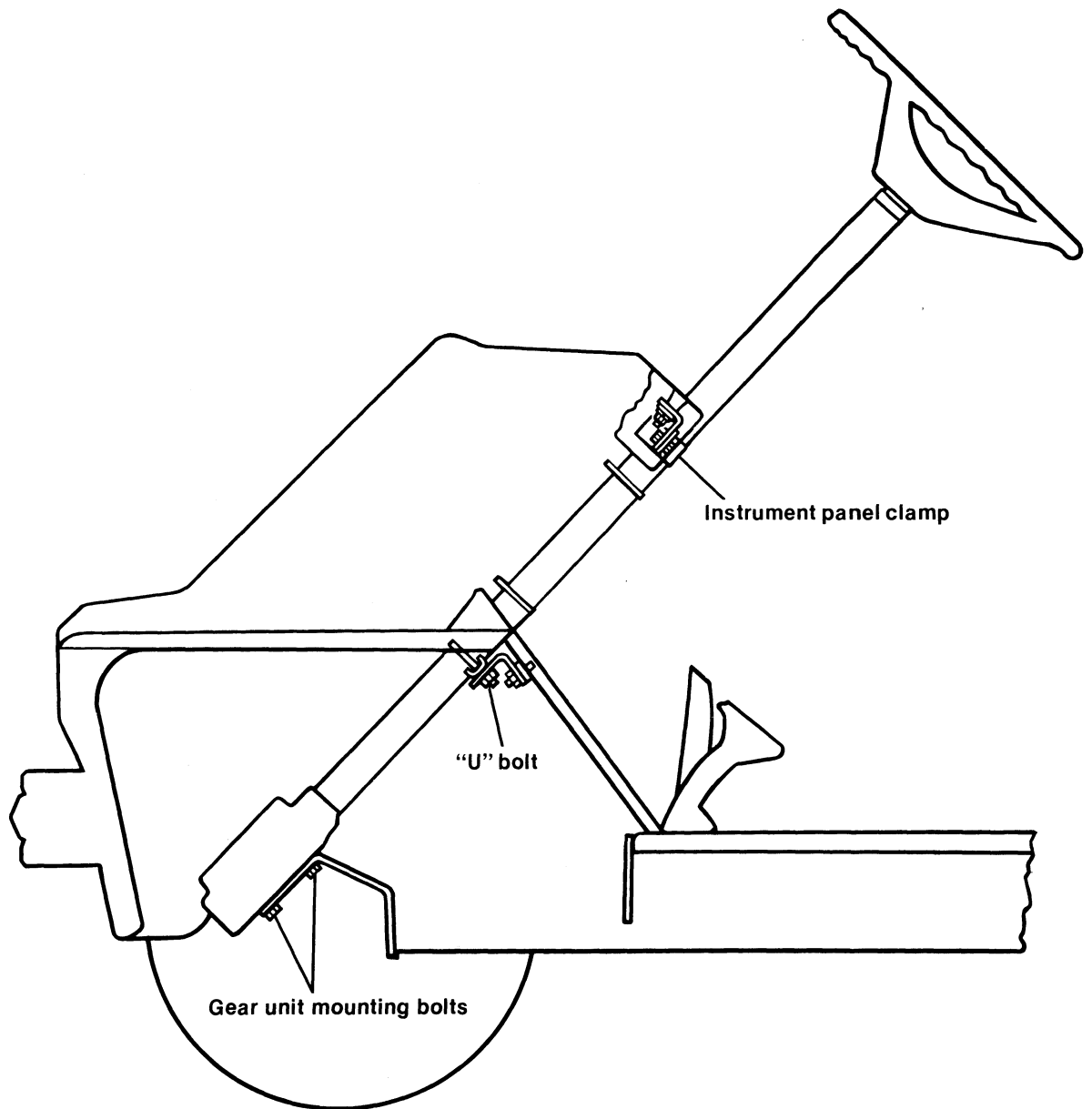


Figure 2-17. Installing Steering Gear Unit

2. See Figure 2-18. Inspect the steering shaft, with respect to the column tube, for proper centering. If properly centered no alignment is necessary. Complete installation. See steering gear unit, INSTALLATION.
3. See Figure 2-19. If slight misalignment is evident; bend the column tube as required using a 1-3/4 in. I.D. pipe approximately 3 ft. long to provide the correct column to shaft alignment.

NOTE

With a slight misalignment the steering shaft may rest on the side of the steering column but with light finger pressure it can be pushed to the center.

4. If extreme misalignment is evident proceed as follows:

NOTE

With an extreme misalignment the steering shaft will be hard against the side of the steering column, light pressure will not move it.

5. See Figure 2-17. Loosen the clamp at the instrument panel, the U-bolt below the bulk head and the three bolts securing the gear unit.
6. Retighten the instrument panel clamp to 6-8 ft-lbs torque, then snugly secure the U-bolt and last tighten the gear unit to 31-33 ft-lbs (4.2-4.6 kgm) torque, and repeat Step 3.

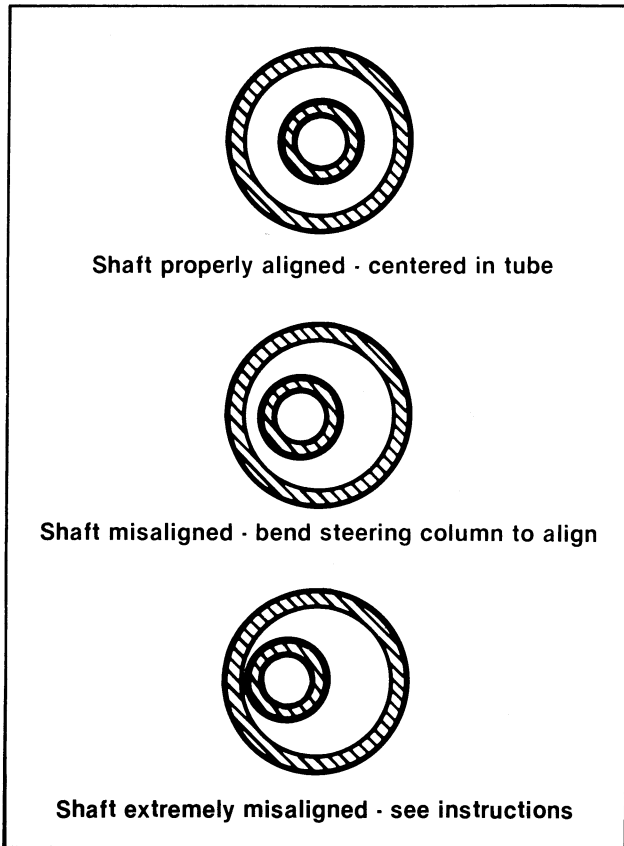


Figure 2-18. Column Alignment

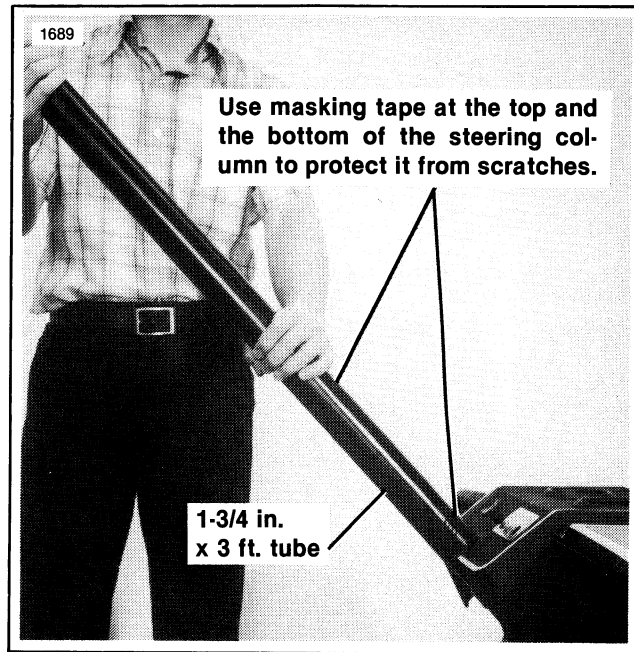


Figure 2-19. Bending Steering Column

FRONT SUSPENSION — 3 WHEEL

GENERAL

High frequency vibration in the floorboard and tiller bar/steering wheel may be caused by dry fork sliders. Grease both fork sides once a year. Using a hand grease gun installed on the grease fittings (16, Figure 2-20) pump two shots of grease into each fork side.

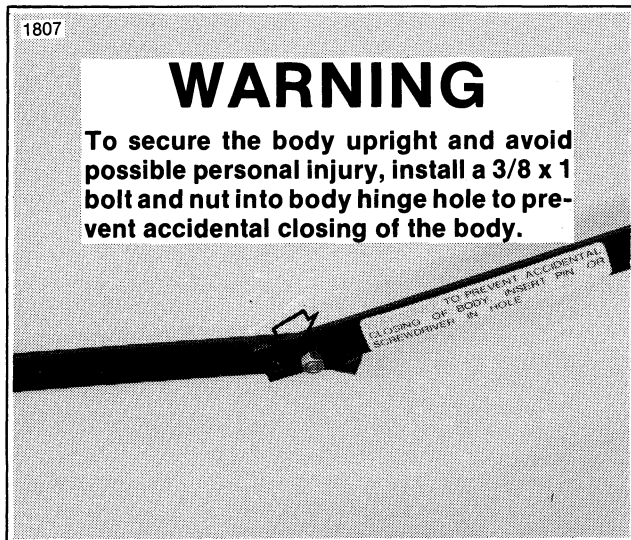
CAUTION

Pumping excessive amounts of grease into fork sides may blow out slider seal.

If the sliders do not travel freely after greasing, disassemble and repair the fork as described in this section.

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.



FRONT FORK TUBES (Figure 2-20)

Removal

It is not necessary to remove the front fork assembly to remove the fork tubes.

1. Remove the front wheel as described in WHEELS, TIRES AND FRONT HUB.
2. Unscrew each fork slider (2) from the fork (1) by turning slider counterclockwise.
3. Disengage the fork spring (3) and spring liner (4) by unscrewing the spring.
4. If seals (5) are leaking or worn, pry out and replace. Press the new seal in with the lip facing inward.

5. Replace the fork tube bushings (6) if worn. Use a slide-hammer type puller to remove bushings.

Installation

NOTE

Lightly coat spring tube assemblies with Harley-Davidson #75 engine oil before re-assembly.

1. Insert spring (3) into each fork side (2). Turn the springs clockwise until they just catch on thread in fork tube. Insert the spring liners (4).
2. Install the slider assemblies into the fork (1).

NOTE

Left side fork slider has the smaller diameter axle hole.

3. Turn left slider clockwise into fork tube until dimension between bottom edge of fork tube and center line of axle hole is 4 to 4-3/16 in. (with spring unloaded). Continue turning slider in until large hole for axle sleeve is toward wheel.
4. Turn right slider clockwise into fork tube until axle hole aligns with left side axle hole.
5. Install the front wheel as described in WHEELS, TIRES AND FRONT HUB.

FRONT FORK (Figure 2-20)

Removal

1. Raise front of car as described in the LIFTING INSTRUCTIONS, Section 1.
2. Remove the tiller bar or steering wheel as described in the respective section. Remove front cowl as described in BODY, Section 9.
3. Loosen front bumper center support by removing the bolt and nut which secure the center support to steering head and the two screws which attach center support to front bumper.
4. Remove cotter pin (7), nut (8), washer (9) and spacer (10). Install nut (8) partially on shaft and tap firmly on nut with a rawhide mallet until fork drops free.
5. Remove the bearings (12) and lower bearing guard (14).
6. Bearing races (13) are a press fit in the steering head. If bearings are pitted or worn, use slide-hammer type puller to remove the bearing races and then press new races in place.

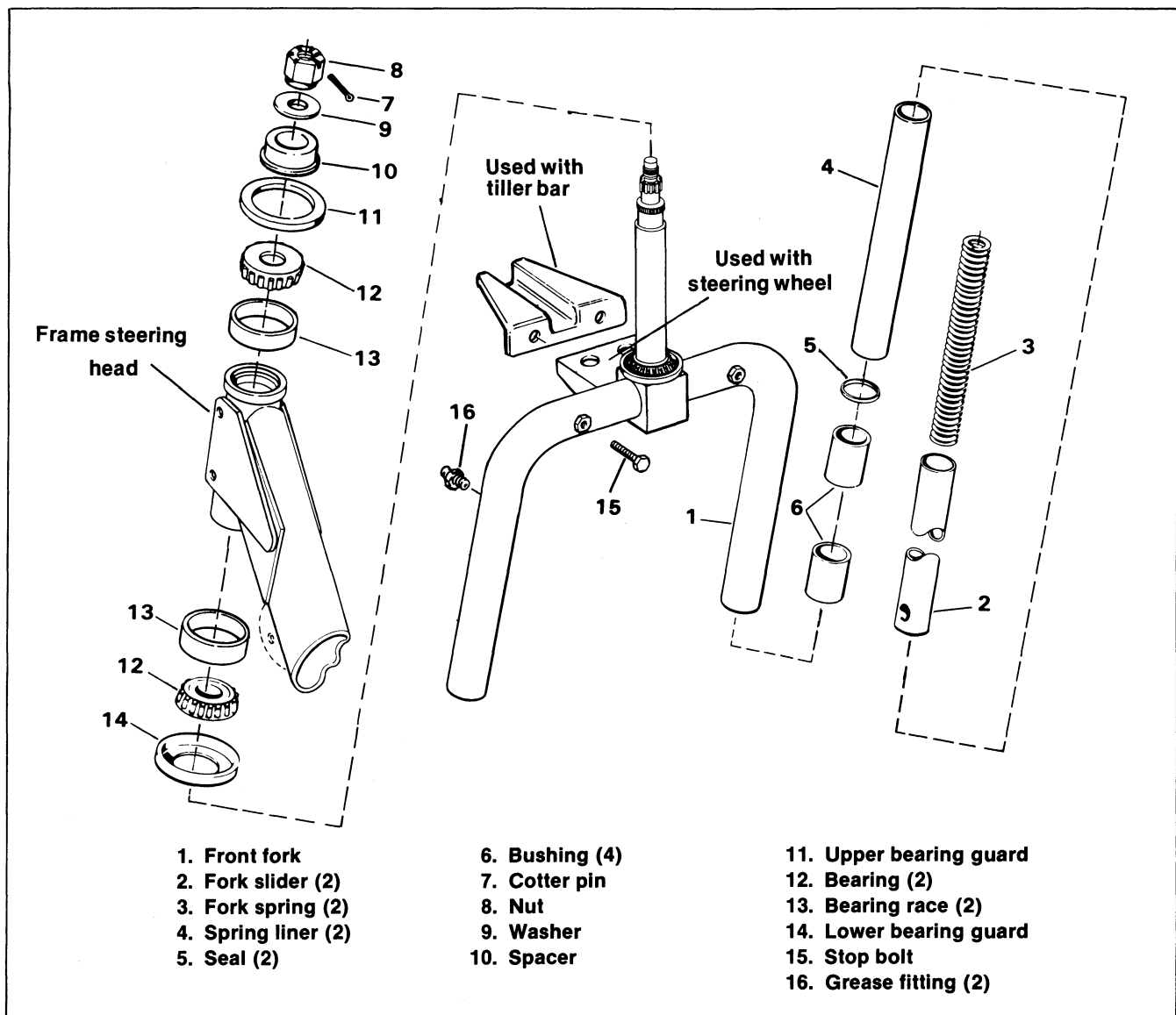


Figure 2-20. Front Fork — Exploded View

NOTE

Bearings (12) and races (13) are sold in sets only and must be replaced in sets only.

7. Replace any parts that are worn or damaged.

Installation

1. Install the lower bearing guard (14) on fork assembly (1).
2. Pack the bearings (12) with golf car SPECIAL GREASE, Part No. 99857-81. Install one bearing on fork shaft and install the other bearing in the top of the frame steering head.
3. Insert fork assembly into steering head with the fork stop bolts (15) facing toward the rear of the car, and bumper center support in position.
4. Install the upper bearing guard (11), spacer (10), washer (9) and nut (8) onto the fork shaft. Tighten the nut (8) until there is no noticeable free play or bind when fork is turned from side to side. Install the cotter pin (7).
5. Fork stop bolts (15) should be adjusted so fork travel is equal on both sides. Also, turning radius must equal distances listed in SPECIFICATIONS, Section 1.
6. Install front fork housing as described in BODY, Section 1.
7. Secure front bumper center support.
8. Lower the car and install the tiller bar or steering wheel as described in the respective section.

FRONT SUSPENSION — 4 WHEEL

WHEEL ALIGNMENT

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.

1. Place car on a flat, hard and level surface.
2. Adjust air pressure in tires to 18 psi (1.2 atm).
3. Set steering wheel at the midpoint of its travel (approximately 2 turns from either extreme). The pitman arm should be at the approximate midpoint of the frame bracket slot (Figure 2-31).

NOTE

It may be necessary to reposition steering wheel so the steering wheel spoke points down towards the seat.

4. See Figure 2-21. Check alignment of right front wheel first with long straightedge extending from right rear wheel to right front wheel. Right front wheel should be in alignment with the rear.
5. See Figure 2-22. To adjust wheel alignment, loosen two bolts (1) on short tie rod (2) and turn adjusting sleeve (3) until front wheel is in alignment with the rear wheel, continually checking to be sure steering wheel remains in centered position.
6. See Figure 2-21. Now check alignment of left front wheel with straightedge extending from left rear wheel to left front wheel. Left front wheel should be in alignment with rear.

7. See Figure 2-22. To adjust left wheel alignment, loosen two bolts (5) on long tie rod (6) and turn adjusting sleeve (4) until front wheel is in alignment with rear. Check to be sure steering wheel remains in centered position.
8. Work suspension several times compressing front of car repeatedly to normalize vehicle stance. Recenter steering wheel and recheck alignment of both front wheels. Readjust if necessary.
9. When alignment is achieved on each front wheel and steering wheel is centered, tighten tie rod adjusting sleeve bolts (1 and 5, Figure 2-22).
10. Connect battery cables.

REMOVAL (Figure 2-23)

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.

1. See Figure 2-2. Remove front hub caps and slightly loosen wheel rim mounting nuts.
3. Wedge wheels of car to keep it from rolling and raise vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of bumper to support vehicle weight for additional safety. See LIFTING INSTRUCTIONS under SERVICE, Section I.
3. See Figure 2-2. Remove front wheel rim mounting nuts (2), and wheels.

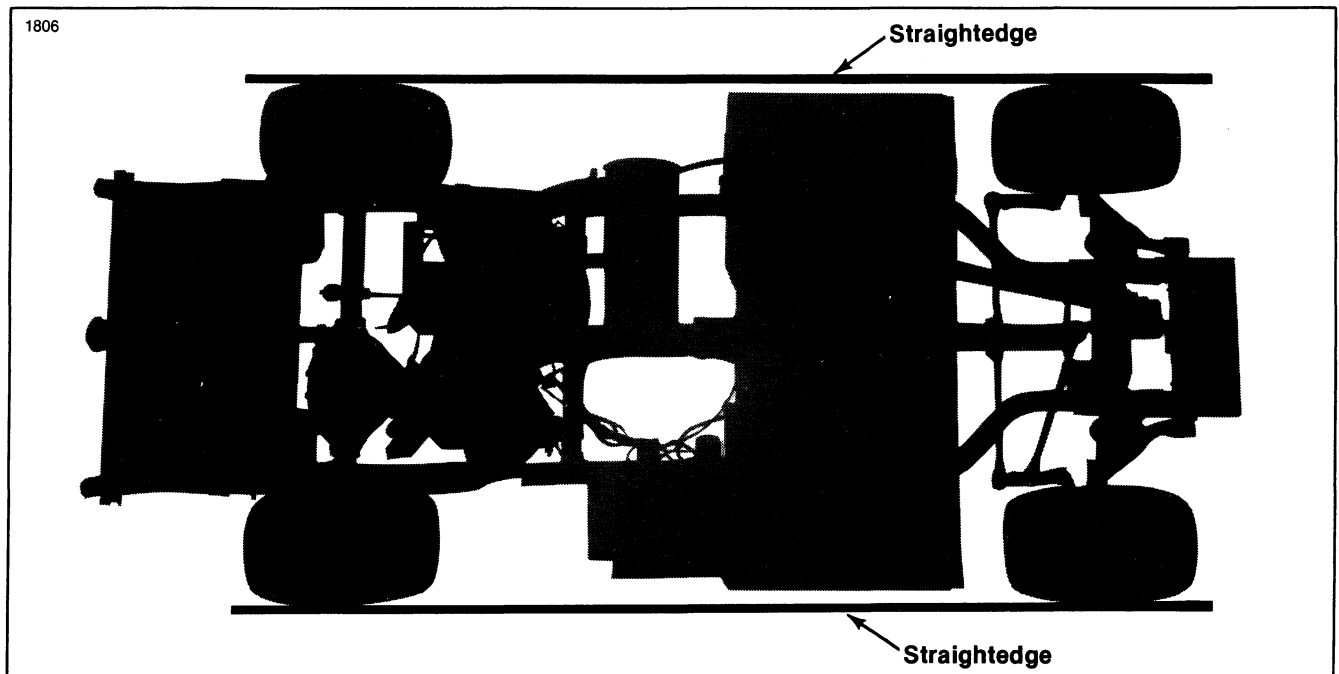


Figure 2-21. Checking Wheel Alignment

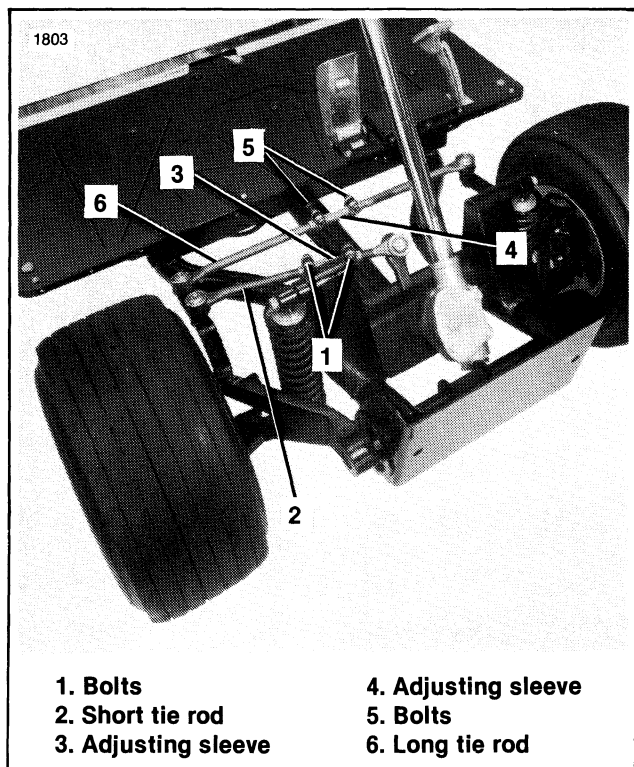


Figure 2-22. Tie Rod Adjustment

4. See Figure 2-12. Remove pitman arm nut (10) and lockwasher (9).
5. See Figures 2-12 and 2-16. Remove pitman arm (11) by using Harley-Davidson CLAW PULLER TOOL, Part No. 97292-61.
6. Remove ball joint nuts and cotter pins (2) and short tie rod assembly (3) from right axle support arm (4), using Harley Davidson CLAW PULLER TOOL, Part No. 97292-61 and WEDGE ATTACHMENT TOOL, Part No. 95637-46.
7. Repeat Step 2 for removing long tie rod assembly (5) from right and left axle support arms (4) and (6).
8. Remove shock absorber assembly (7) by disassembling shock absorber mounting bolts and lockwashers (8).
9. Straighten tabs on the tab lockwasher (9). Remove kingpins (10). Note position of bronze washer (11), then remove axle support arm (4).
10. Remove suspension tube mounting bolts and lockwashers (12).
11. Pull outward on suspension arm (13) while guiding grease fitting (14) through slots in frame.
12. Remove nut (15), spacer (16) and shim(s) (17). Note the quantity and thickness of shim(s).
13. Suspension tube (18) may now be removed from suspension arm (13).

14. Remove rubber sleeve (19) from frame bracket.
15. To disassemble front shock absorber spring assembly. See SHOCK ABSORBERS.

CLEANING, INSPECTION AND REPAIR

1. Clean all parts and inspect for damage or wear.
2. Check ball joints for fit in sockets.
3. Replace tie rod end(s) if play is excessive or if rubber boot is damaged.
4. Before installing tie rod end, remove plug in each tie rod and install a grease fitting. Apply a liberal quantity of grease then remove grease fitting and reinstall plug.
5. Examine bushings in suspension tube (18) and axle support arms (4 and 6). If bushings are worn or damaged the suspension tube and axle support arms must be replaced.

INSTALLATION (Figure 2-23)

1. Install rubber sleeve (19) into frame bracket.

NOTE

Make sure rubber sleeve (19) is in position in frame bracket before suspension tube (18) and suspension arm (13) assembly is assembled to frame.

NOTE

When assembling suspension tube to frame, point grease fittings (14) downward so they are accessible for greasing.

2. Reinstall suspension tube (18) into suspension arm (13), using variable thickness shims (17) to obtain .005 in to .025 in end play.
3. Install spacer (16) and nut (15) after end play is achieved. Secure suspension tube (18) using bolts and lockwashers (12).
4. Position support arm and suspension arm and install bronze washer (11), tab washers (9) and king pins (10). Bend one tab of lockwasher up against king pin hex and one tab down against suspension arm.
5. Install shock absorbers (7) using mounting hardware (8).
6. Pack suspension tubes (18) and axle support arm (4 and 6) with grease using a hand gun, pack till grease comes from seams.

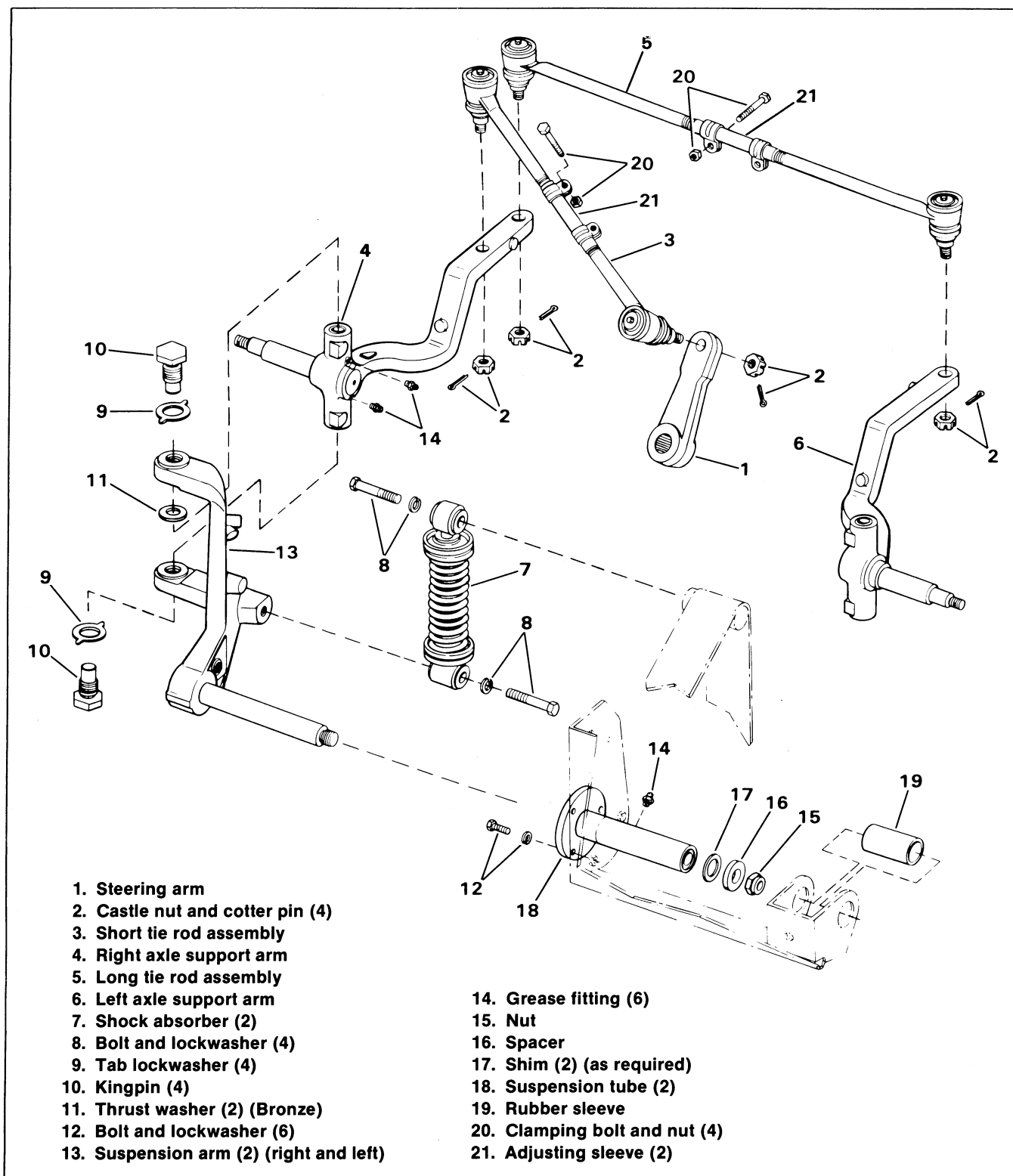


Figure 2-23. Front Suspension, 4 Wheel Car — Exploded View

7. See Figure 2-12. Install pitman arm (1) using lockwasher (9) and nut (10). Tighten nut (10) securely.
8. See Figure 2-31. Position pitman arm so that it is approximate at the midpoint of frame bracket slot.
9. Install tie rods (3 and 5) onto axle support arms (4 and 6) and pitman arm (1). Install a castle nut on each tie rod end and tighten to 25-28 ft-lbs (3.5-3.9 kgm) torque, then install cotter pins (2).
10. Adjust front end alignment as described under WHEEL ALIGNMENT.
11. Install front wheels and lower car.
12. Connect battery cables.

FRONT SHOCK ABSORBERS

Removal

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.

1. Wedge wheels or car to keep it from rolling and raise vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of safety. See LIFTING INSTRUCTIONS under SERVICE, Section 1.

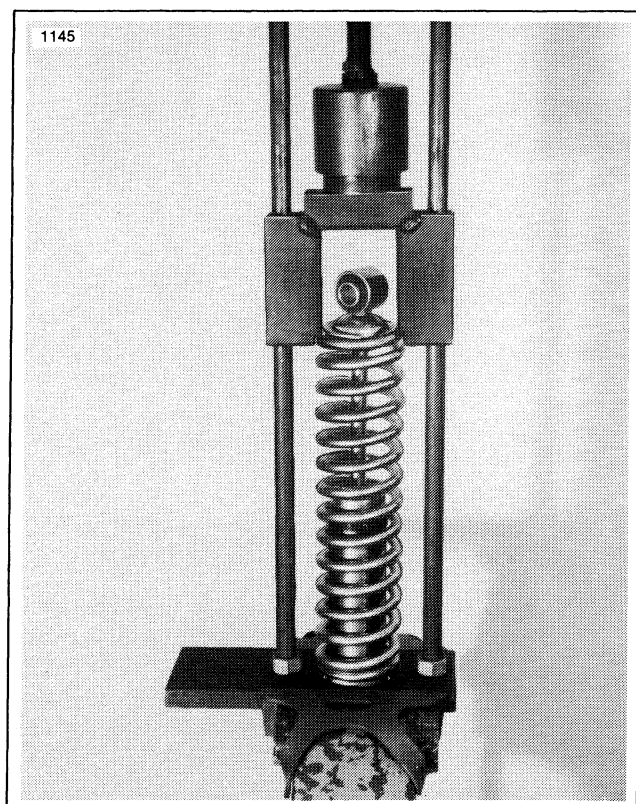


Figure 2-24. Disassembling the Shock Absorber

2. Remove shock absorber from car by removing the two mounting bolts and washers (8, Figure 2-23).

Disassembly (Figure 2-24)

1. Compress shock spring enough to remove each half of upper spring retainers (1).
2. Release spring compressor and remove shock absorber from tool. Remaining items can be removed as shown in Figure 2-25.

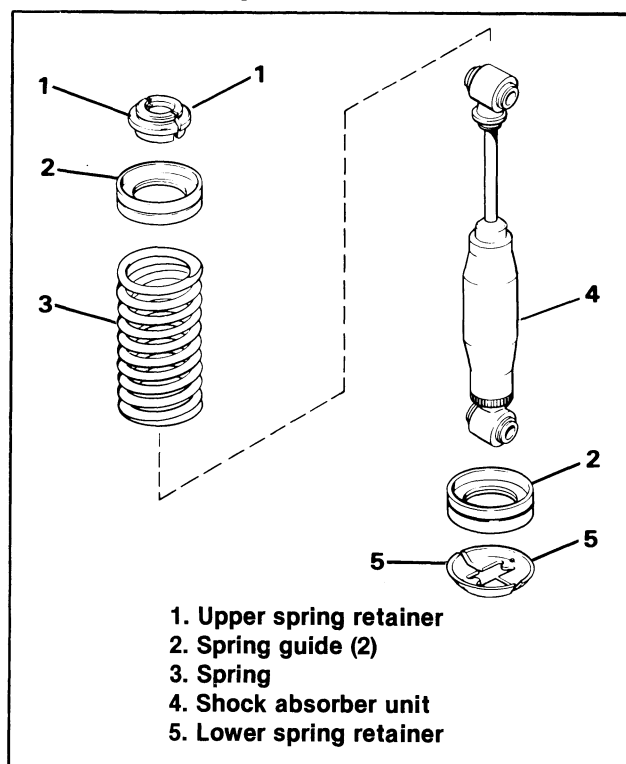


Figure 2-25. Front Shock Absorber

Cleaning, Inspection and Repair

1. Clean and inspect all parts for wear and damage. Examine absorber unit for traces of fluid leaking, especially at upper end.
2. Unit should compress slightly easier than it extends. If possible compare action with a new shock. Shock absorber cannot be repaired. Faulty units must be replaced.

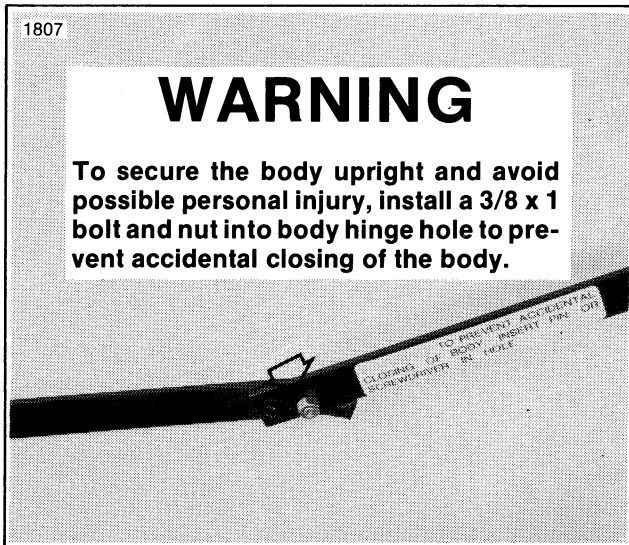
Assembly (Figure 2-25)

1. Install lower spring retainer (5), spring guides (2) and spring (3).
2. Install shock into spring compressor tool and compress spring (3) and install upper spring retainers (1). Remove shock from tool.

Installation

1. Mount shock absorber as shown, using mounting bolts and lockwashers (8).
2. Lower car and connect battery cables.

REAR SUSPENSION



INSPECTING AND REPLACING REAR SHOCK ABSORBER

1. Raise golf car body.
2. Check the shock absorber for fluid leakage at the point where shaft enters body. Leaking shock absorbers should be replaced. Remove as follows:
3. Raise the differential until springs are slightly compressed.



Figure 2-26. Rear Shock Mounting

4. See Figure 2-26. Remove the shock upper and lower mounting hardware. Remove the shock absorber.
5. Test the shock absorber by compressing and extending it. Shock should compress slightly easier than it extends. If possible, compare it with a new unit. The shock absorber is not repairable and should be replaced if faulty.
6. To install the shock, extend it to its full length. Place it in the car, shaft side up, and secure with original mounting hardware. Tighten mounting nuts to 50 ft-lbs (6.9 kgm) torque.

REAR SPRINGS

General

Coil springs are rated by the force required to compress them one inch. For example, the standard straight wound rear spring, rated at 82 in-lbs will compress one inch under a force of 82 lbs. A similar force would be required to compress the spring an additional inch, and so on.

WARNING

The modification of Harley-Davidson golf cars for use in other than golf play is not recommended.

Exceeding golf car load capacities, recommended speed or altering the golf car for other than golf play may result in possible injury or property damage.

Replacing Rear Springs

1. Remove the shock absorber as described in INSPECTING AND REPLACING REAR SHOCK ABSORBER.
2. Raise the chassis or lower the differential and remove the springs.
3. Install springs on spring supports. Lower the chassis or raise the differential until springs are slightly compressed.
4. Install the shock absorber as described in INSPECTING AND REPLACING SHOCK ABSORBER.

REAR FORK

Troubleshooting

The rear fork bushings are designed to allow the fork to pivot radially. The bushing also absorbs the vibration of the rear fork. If the bushings are loose, the vibration from the rear fork will be transmitted to the frame caus-

ing a low rumbling vibration. Use the following procedure to correct this vibration problem.

1. Lift body to full upright position.

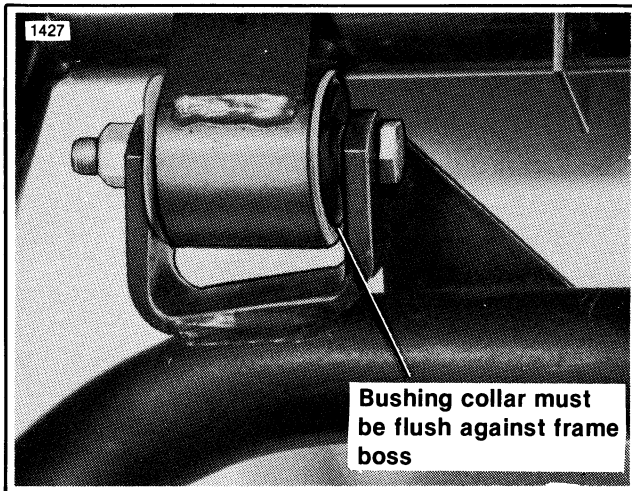


Figure 2-27. Rear Fork Bushing

2. See Figure 2-27. Check the rear fork bushing for wear and make sure the bushing collar is flush against the frame boss.
3. If the bushing is worn replace it as described in REPLACING REAR FORK BUSHINGS.
4. If the bushing is not worn and the collar is not tight against the boss, press the bushing into the boss.
5. See Figure 2-28. Using a No. 25 drill bit, drill a hole in the top center of the right side boss and bottom center of the left side boss. Insert a self tapping screw in each hole to hold the bushings in place.

NOTE

Sometimes the bushings will move out of the bosses, only during sharp turns. If the bushings appear to be in place, but vibration problems continue, perform Step 5.

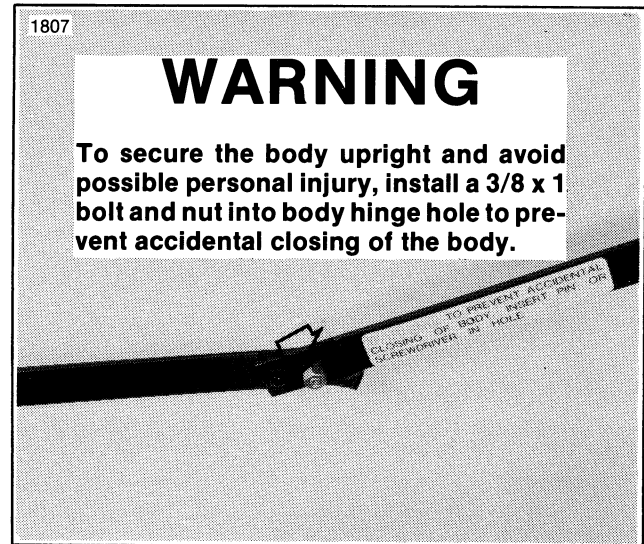
Replacing Rear Fork Bushing(s) (Figure 2-29)

1. Wedge the front wheel to prevent car from rolling and raise rear of the car. See LIFTING INSTRUCTIONS, Section 1.
2. Remove the brake caliper assembly and brake disc. See BRAKES, Section 4.
3. Remove nut (4) and pull bolt (1) free of each mounting boss. Lower the rear fork and let it rest on the ground.
4. Press the bushing (5) towards inside of car to remove it from the frame boss.
5. Pressing from the inside of the car, install a new bushing.

NOTE

Coat bolt shank (1) with Harley-Davidson ANTI-SIEZE, Part No. 99626-77, before installing.

6. Raise rear fork and connect it to the frame bosses using the bolts (1), washers (2), nylon washers (3) and nuts (4). Do not tighten nuts (4) at this time.



8. Let car down off of stands. Compress rear of car to obtain a dimension of 3 inches between top of rear fork rubber bumper and main frame tube. While holding this 3 inch dimension tighten swing arm bushing mounting bolts (4) to 50-60 ft-lbs (6.9-8.3 kgm) torque.
9. Reinstall the brake caliper assembly and disc. See BRAKES, Section 4.

Removing the Rear Fork

1. Block the front wheel to prevent car from rolling and raise rear of car. See LIFTING INSTRUCTIONS, Section 1.
2. Remove differential and brake. See DIFFERENTIAL AND REAR AXLE, Section 3, and BRAKES, Section 4.
3. See Figure 2-29. Remove the nut (4) and pull the bolt (1) free of each mounting boss.
4. Remove the rear fork.

Installing the Rear Fork

NOTE

Coat bolt (1) shank with Harley-Davidson ANTI-SIEZE, Part No. 99626-77, before installing.

1. See Figure 2-29. Place the rear fork in the frame bosses and fasten using bolt (1), washer (2), nylon washer (3) and nut (4). Do not tighten nut (4) at this time.

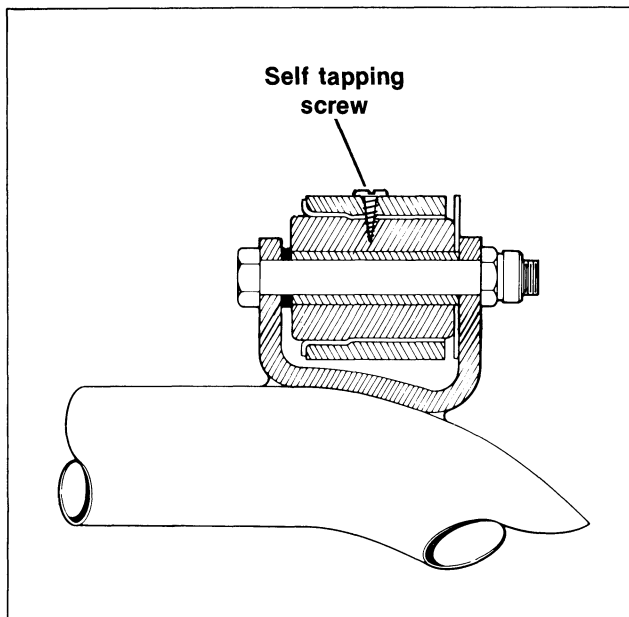


Figure 2-28. Fork Bushing Fix

2. Install differential and brake. See DIFFERENTIAL AND REAR AXLE, Section 3 and BRAKES, Section 4.
3. Let car down off of stands. Compress rear of car to obtain a dimension of 3 inches between top of rear fork rubber bumper and main frame tube. While holding this 3 inch dimension tighten swing arm bushing mounting bolts (4) to 50-60 ft-lbs (6.9-8.3 kgm) torque.

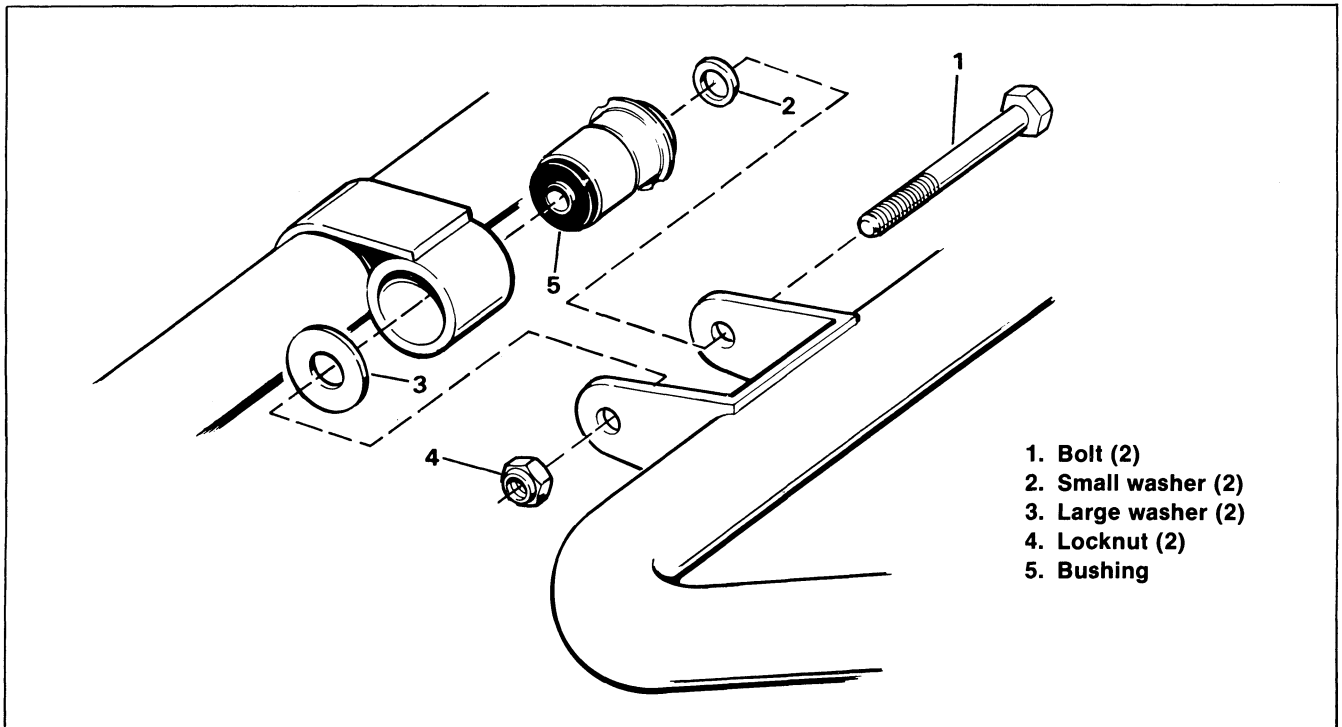


Figure 2-29. Rear Fork Bushing — Exploded View

NOTES

FRAME

SERVICING THE FRAME

To rough check a frame for correct alignment, see Figure 2-30, 2-31 and 2-32. The dimensions shown will provide information sufficient to determine whether a frame requires re-alignment or replacement.

WARNING

Frames or rear forks that are severely bent or damaged should be replaced. Factory repair is not available and welding or repair of frame components is not recommended for maximum safety and reliability.

1807

WARNING

To secure the body upright and avoid possible personal injury, install a $\frac{3}{8}$ x 1 bolt and nut into body hinge hole to prevent accidental closing of the body.

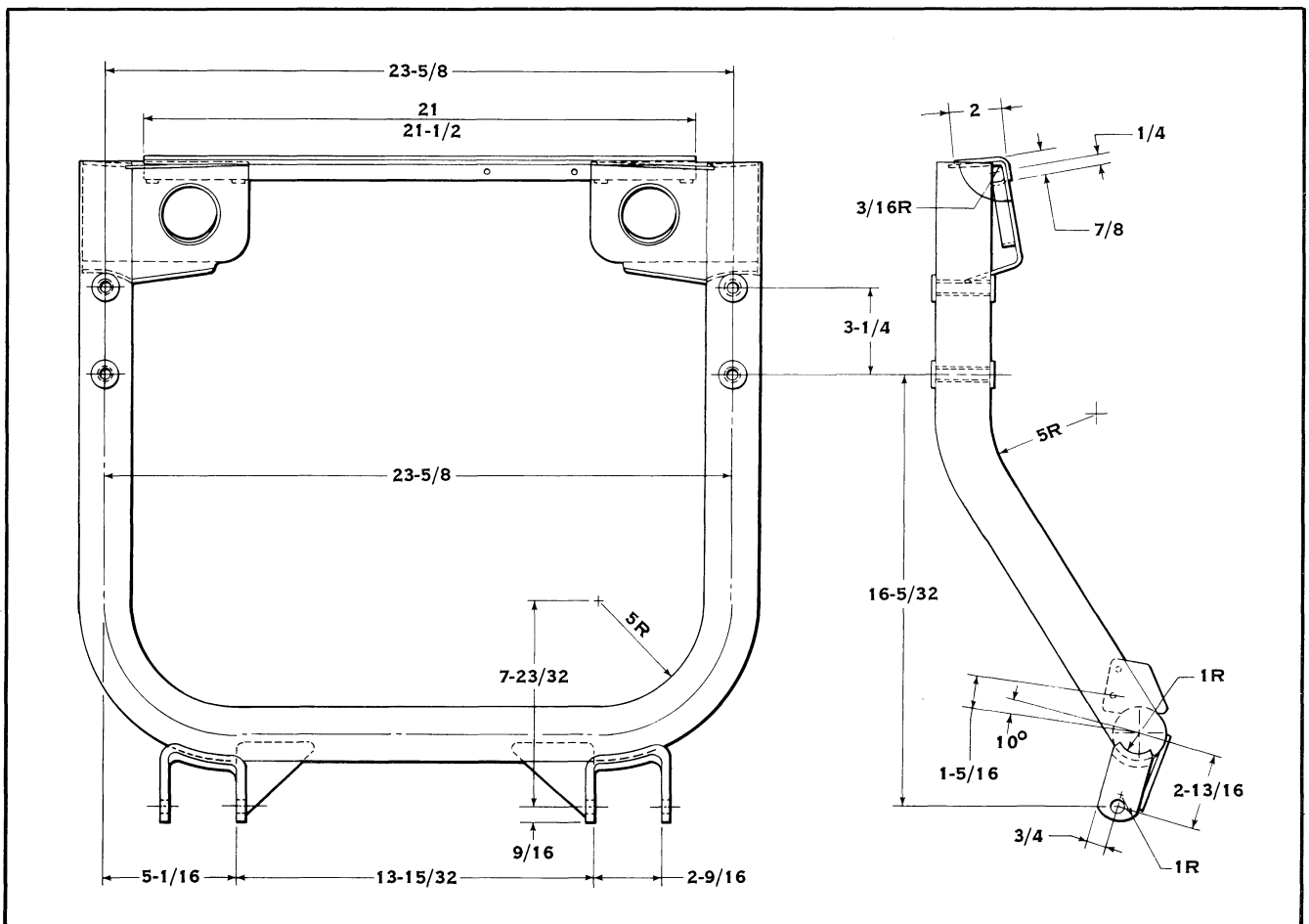
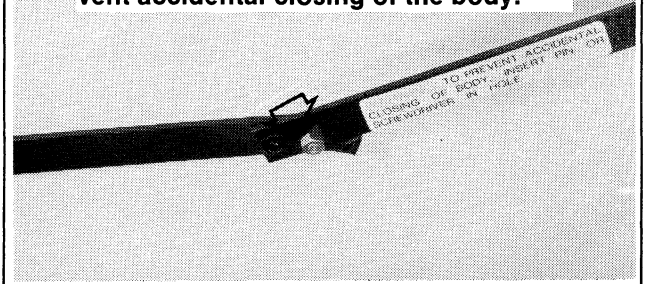


Figure 2-32. Rear Fork Dimensions

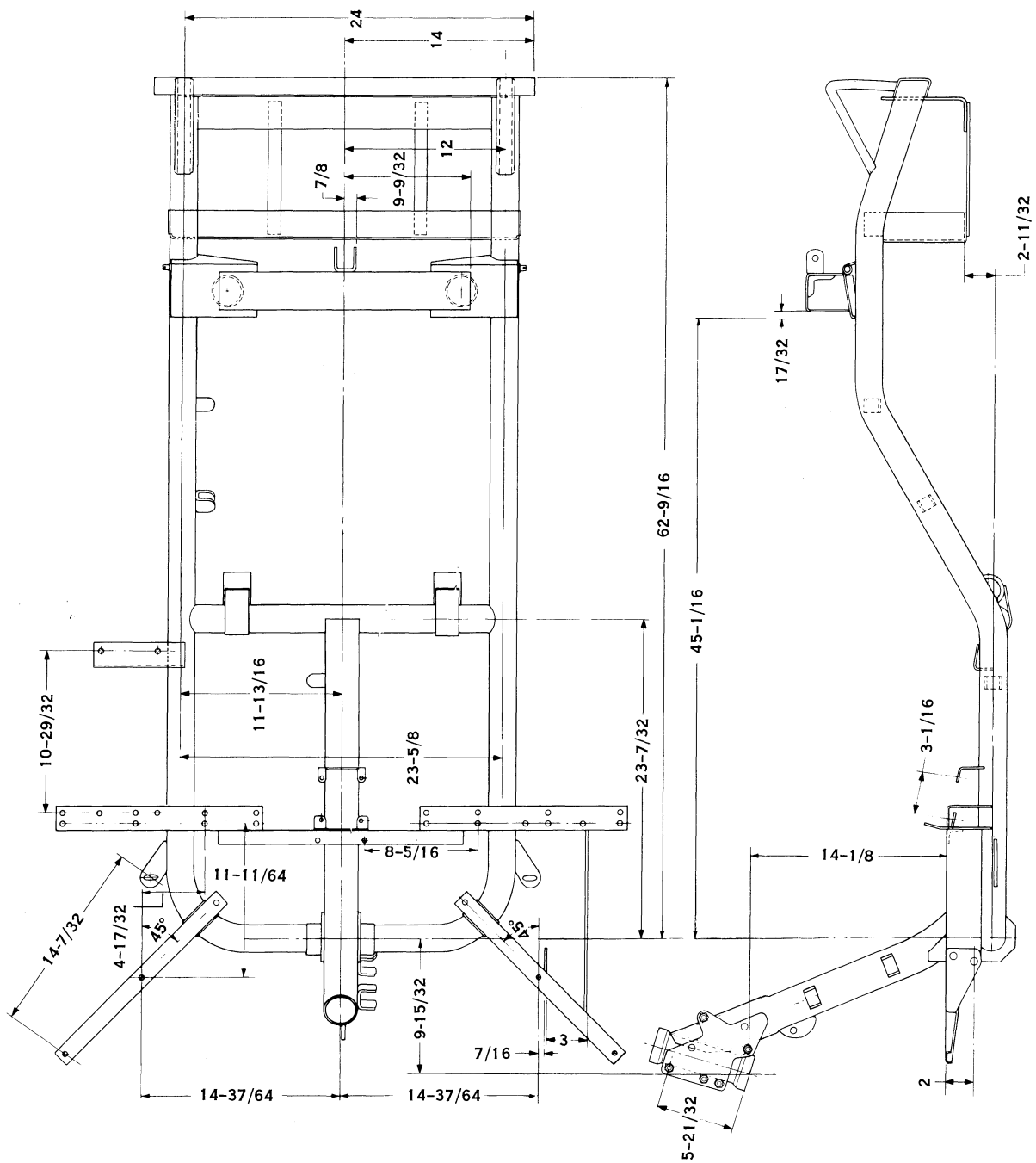


Figure 2-30. Model D Basic Frame Dimensions

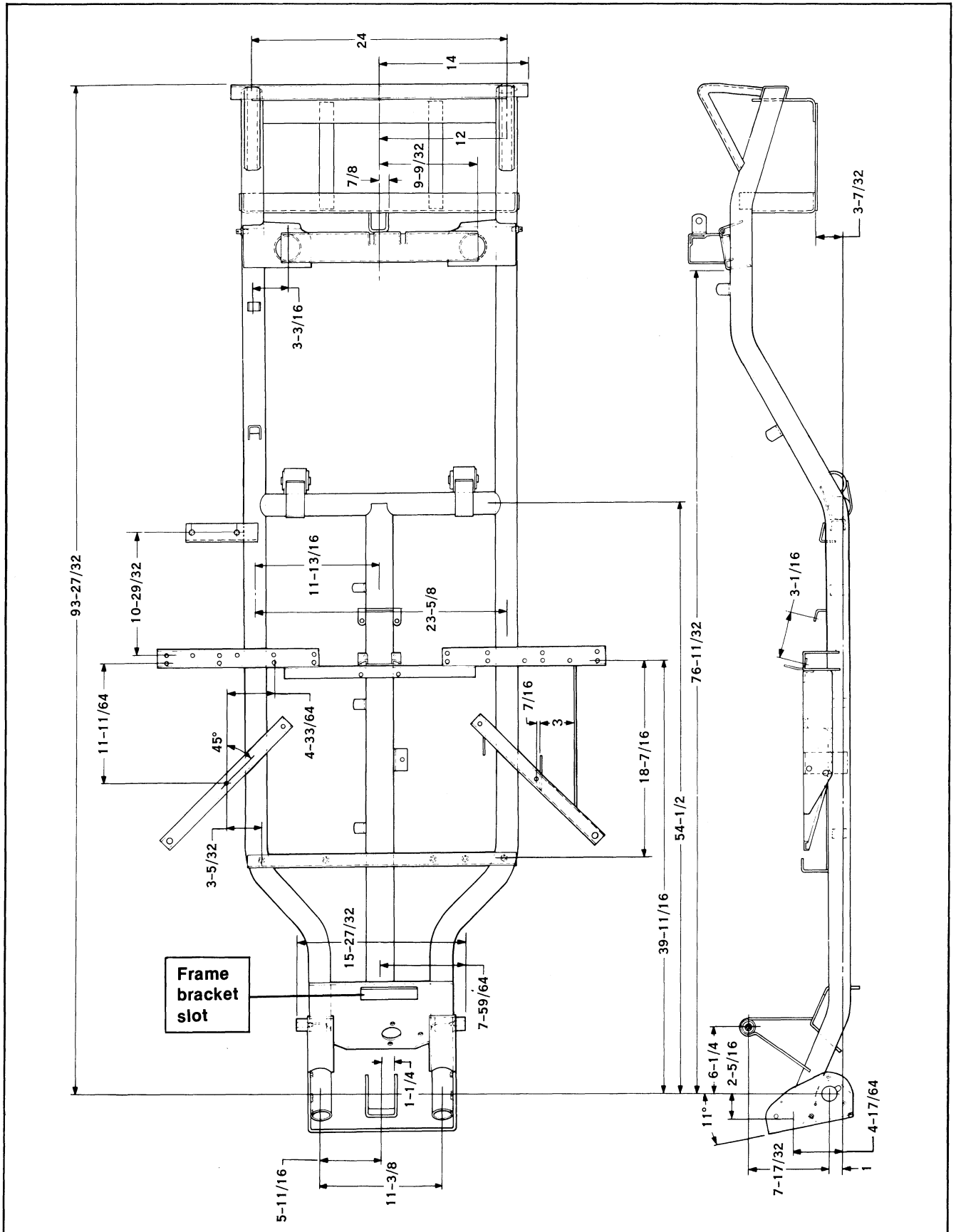
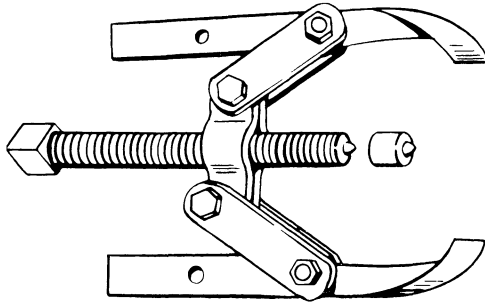


Figure 2-31. Model D4 Basic Frame Dimensions

NOTES

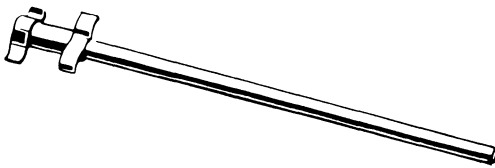
TOOLS

For variety of applications. Has center adapter for pulling objects from a small diameter shaft.

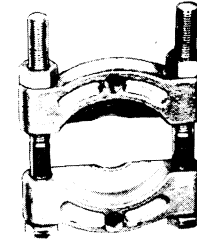


Part No. 95635-46 All Purpose Claw Puller

Used for straightening bumpers. Hooks on bumpers for applying bending leverage.

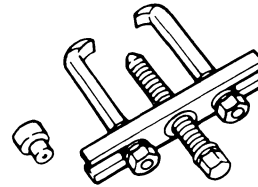


Part No. 96806-40 Bending Bar



Part No. 95637-46 Wedge Attachment

Used to pull steering gear parts, bearings, etc. 95752-43A - Center Cap only.



Part No. 97292-61 Two Jaw Puller

NOTES

SECTION	PAGE NO.
1. Specifications	3-1
2. Differential and Rear Axle	3-3

SPECIFICATIONS

DIFFERENTIAL

Lubricant Type	Harley-Davidson Heavy Weight Differential Lubri- cant Part No. 99890-61A, 12 oz.
Level	1/2 in. (13 mm) below filler plug hole
Capacity	24 oz. (710 cc)
Ring Gear Runout006 in. (.15 mm) maximum
Ring and Pinion Backlash	.004 in. - .008 in. (.1 mm - .2 mm)
Pinion Bearing Pre-load .	2-13 in-lbs (ring gear not in case)

TORQUES

Wheel Nuts	35-40 ft-lbs (4.8-5.5 kgm)
Rear Axle Nut	50 ft-lbs (6.9 kgm)
Differential to Rear Fork Mounting Bolts	30 ft-lbs (4.1 kgm)
Ring Gear Mounting Bolts	35-40 ft-lbs (4.8-5.5 kgm)
Pinion Nut	50-75 ft-lbs (6.9-1.0 kgm)
Bearing Cap Bolts	35-45 ft-lbs (4.8-6.2 kgm)
Differential Cover Bolts	18-23 ft-lbs (2.4-2.8 kgm)

NOTES

DIFFERENTIAL AND REAR AXLE

GENERAL INFORMATION

The differential lubricant level should be checked yearly and lubricant added as required to 1/2 inch (13 mm) below filler plug hole (Figure 3-1). Harley-Davidson DIFFERENTIAL LUBRICANT is recommended. It is not recommended to mix different brands of hypoid lubricants. If replacing lubricant with a different brand, remove differential cover, drain lubricant and flush with light engine oil. Never use kerosene for flushing.

Rear wheel bearings receive their lubrication from grease packed in bearings when assembled. Bearings are sealed and do not require repacking.

Differential and rear axle noise can be confused with other noises in the car. Considerable care should be taken in diagnosis of noises before deciding that the trouble is in the rear axle assembly. If the differential and rear axle are properly maintained, little difficulty will be experienced.

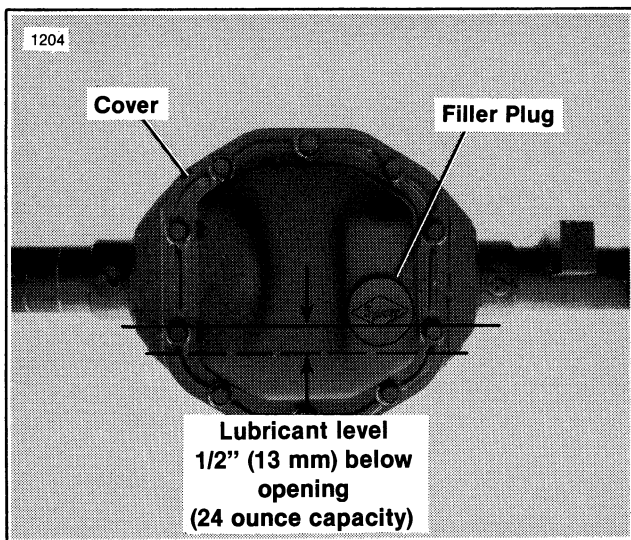


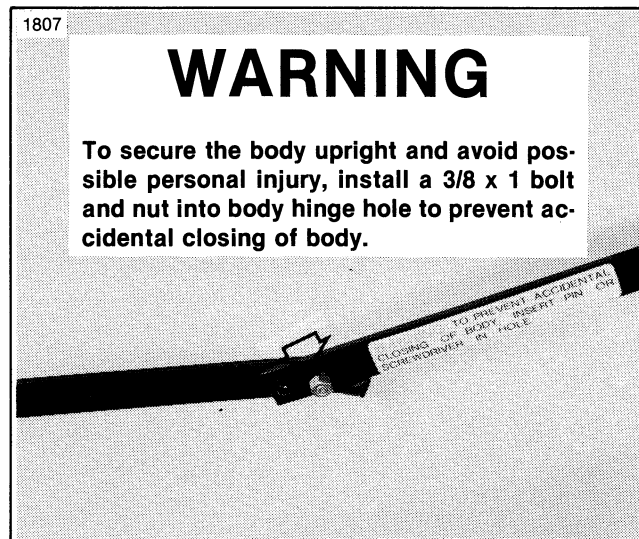
Figure 3-1. Differential Filler Plug and Cover

REAR AXLES

Removing Rear Axle Shaft, Bearing or Seal (Figure 3-2)

If an axle shaft must be removed for straightening or replacement, or for rear wheel bearing service, it can be removed without removing entire differential and axle assembly from car.

1. Remove hub cap and slightly loosen wheel rim mounting nuts.
2. Remove cotter pin (1) and loosen axle shaft nut (2).
3. Wedge front wheel of car to keep it from rolling and raise rear of vehicle to approximately 10° to



25° angle. Place jack stands under car to support vehicle weight for added safety. See LIFTING INSTRUCTIONS in Section 1.

4. Remove wheel and wash flange end of axle free of dirt.
5. Remove nut (2) and washer (3).
6. Remove wheel hub (4) from axle shaft. It may be necessary to use slide hammer to remove the wheel hub.

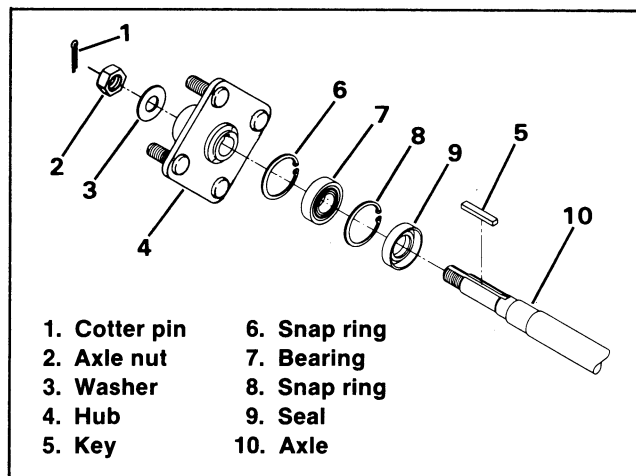


Figure 3-2. Rear Axle

7. Remove key (5) from axle (10) (Figure 3-3).
8. Remove snap ring (6) from axle housing (Figure 3-4).
9. Axle shaft (10), with axle bearing (7) attached, can be removed from the housing with an axle puller.
10. Axle bearing (7) can be pressed from axle shaft (10) by supporting bearing inner race on press bed and applying pressure to the axle nut on end of shaft (Figure 3-5).

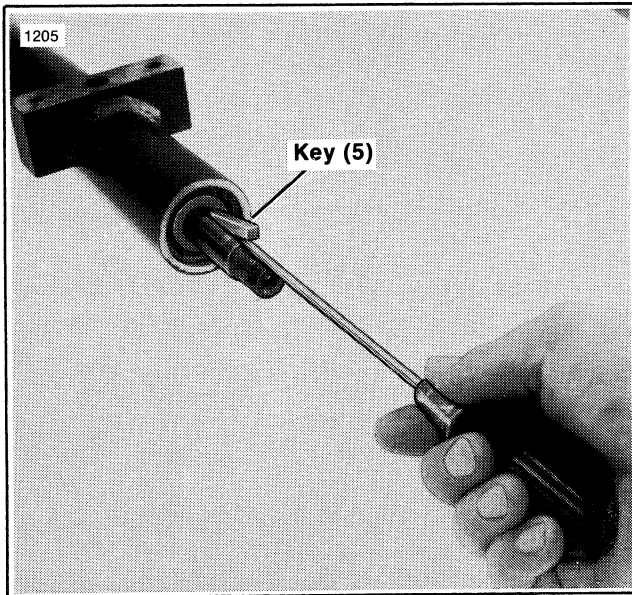


Figure 3-3. Removing Key

CAUTION

Axle nut must be mounted flush with axle end during pressing to avoid damage to axle.

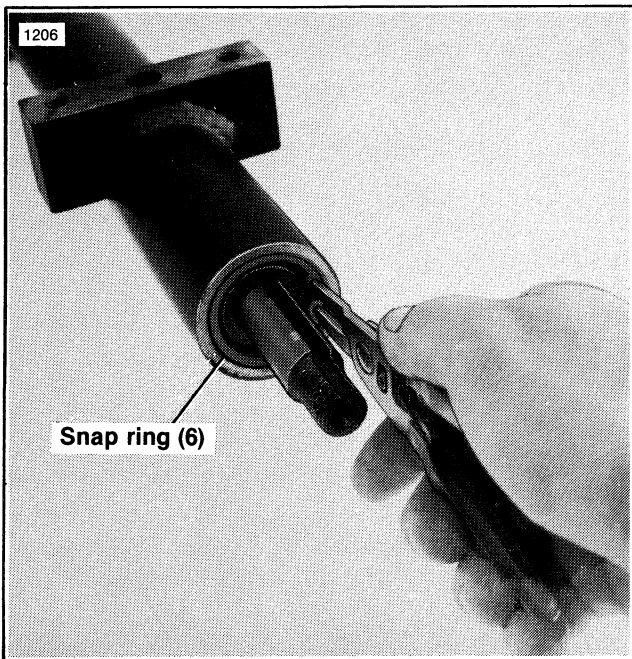


Figure 3-4. Removing Snap Ring

11. See Figure 3-6. To remove seal (9), first remove snap ring (8) then pull or pry seal (9) from housing.

Installing Rear Axle Shaft, Bearing or Seal (Figure 3-2)

1. If axle bearing was removed or new bearing required, press axle bearing (7) onto axle shaft.
2. Lubricate seal lip with differential fluid and press new seal into housing with lip side of seal toward center of axle housing.

3. With seal (9) and snap ring (8) in place in axle housing (Figure 3-6), slide axle with bearing attached into housing until bearing (7) seats on snap ring (8).

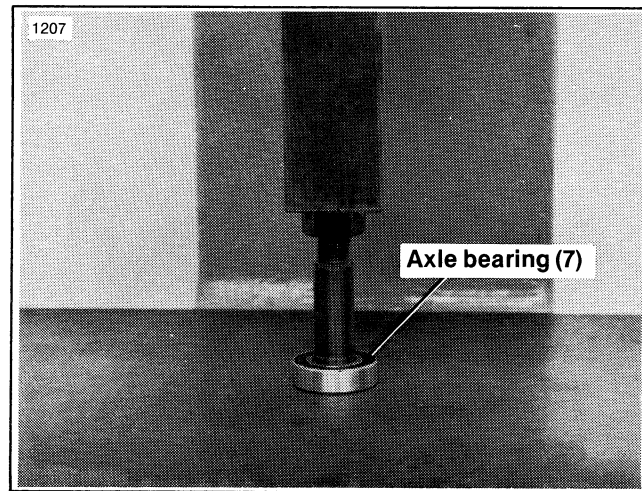


Figure 3-5. Pressing Bearing Off Axle

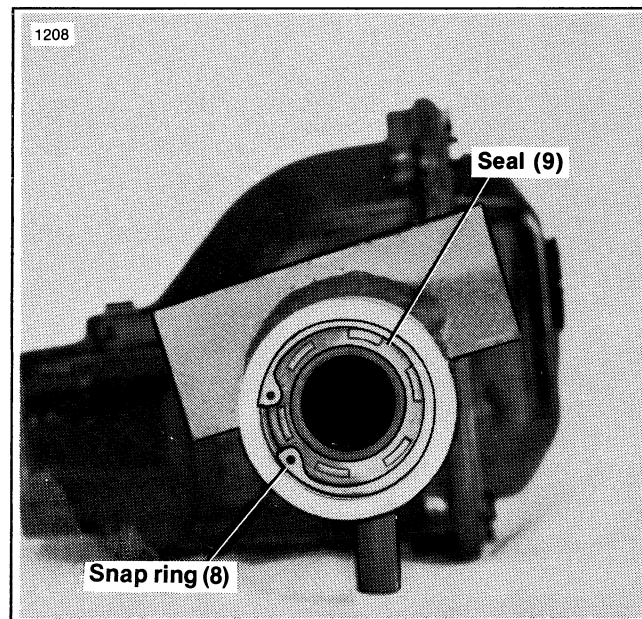


Figure 3-6. Snap Ring and Seal

4. Install snap ring (6) (Figure 3-4).
5. Install key (5) into slot in axle. Position key so tapered end is toward housing, and outside end of key is flush with inside edge of threads (Figure 3-7).
6. Install flange (4), washer (3) and nut (2).
7. Install wheel rim and wheel rim mounting bolts.
8. Let car down off jack stands.
9. Tighten axle nut (2) to 50 ft-lbs (6.9 kgm) torque and continue to tighten until nearest cotter pin hole lines up. Install cotter pin (1).

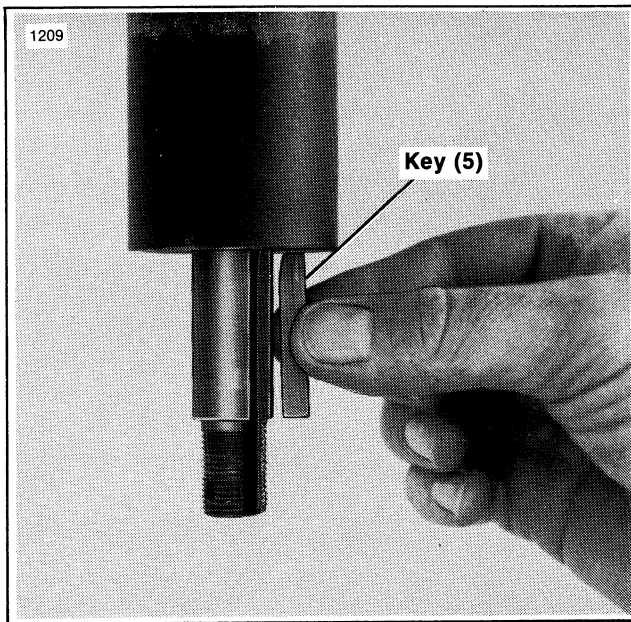


Figure 3-7. Axle Key Installation

10. Torque wheel rim mounting nuts to 35-40 ft-lbs (5.5 kgm) and install hub cap.

DIFFERENTIAL

Removing Rear Axle and Differential Assembly (Figure 3-8)

When repairs to the housing or differential are necessary, the entire rear axle and differential assembly must be removed from the car.

1. Raise golf car body. Remove hub caps and slightly loosen wheel rim mounting nuts.

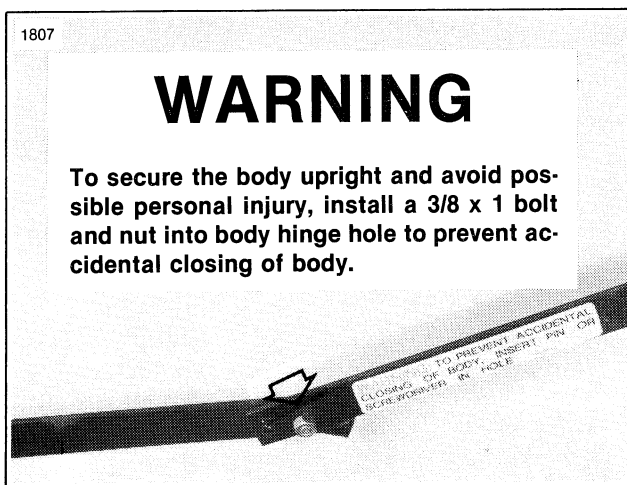


Figure 3-8. Axle Mounting

Disassembling and Inspecting Differential (Figure 3-9)

NOTE

All parts that are to be reused should be installed in the position from which they were removed.

When taking apart complex assemblies with numerous similar pieces requiring the matching of interfacing assemblies or multiple shims, it is suggested to mark individual pieces with grease pencil or tag all components to ease reassembly.

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.

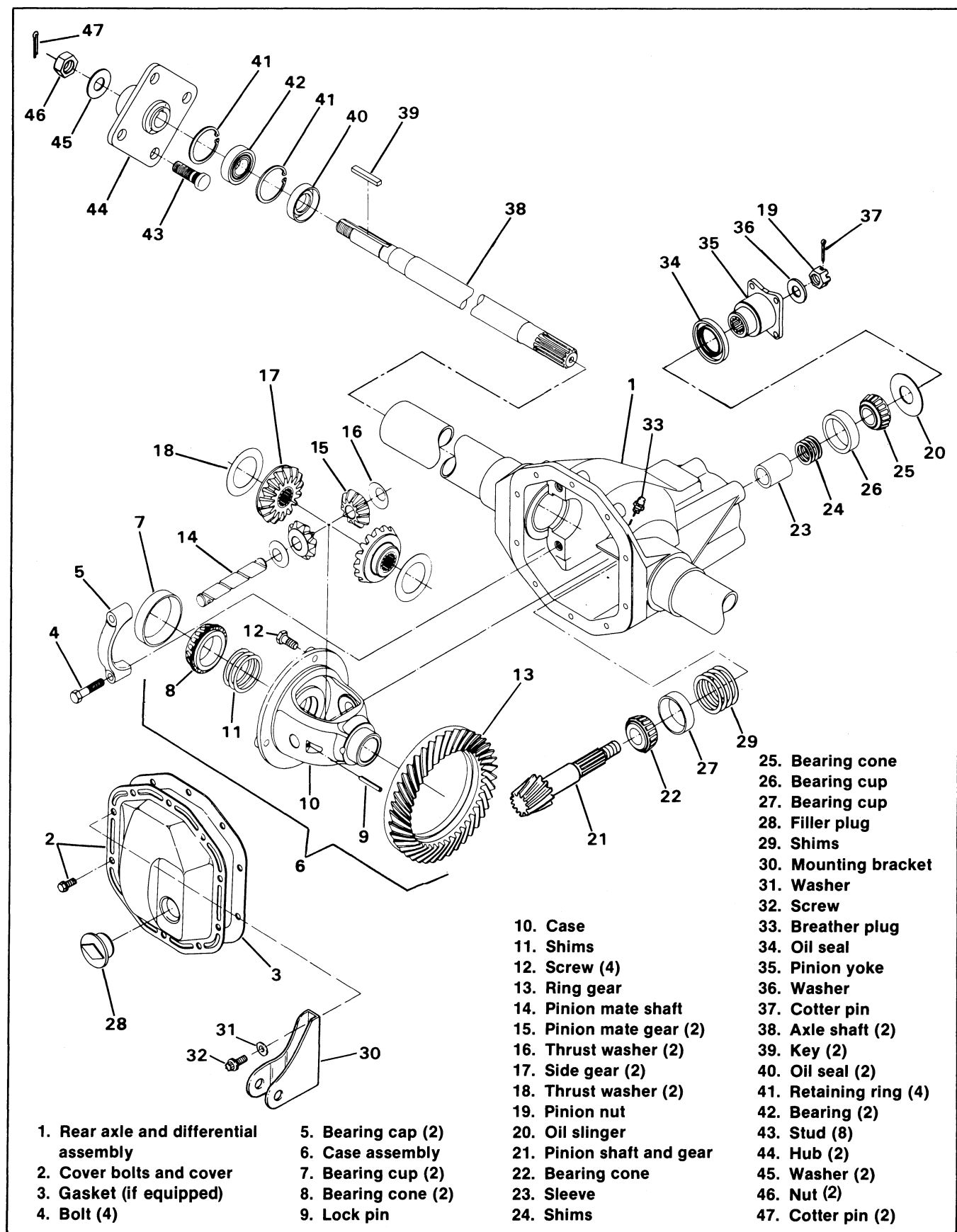


Figure 3-9. Differential Assembly

1. Clean housing and place in a holding fixture or large vise. Grip tubes with carrier cover facing up.
2. Remove both axles as described previously under REMOVING REAR AXLE SHAFTS, BEARING OR SEAL.

NOTE

Some 1981 differentials use a bead of G.E. 1473 HIGH TEMPERATURE SILICON SEALER on the differential housing rather than the gasket (3, Figure 3-9). Harley-Davidson recommends the use of this sealant for reassembly.

3. Remove cover bolts and cover (2) and gasket (3), if equipped and clean gasket material or sealant from housing.
4. Drain lubricant and flush carrier with a non-flammable cleaning solvent.

NOTE

After draining, check lubricant for contaminants. Noting the amount and type of contaminants in the fluid can help in diagnosing differential problems.

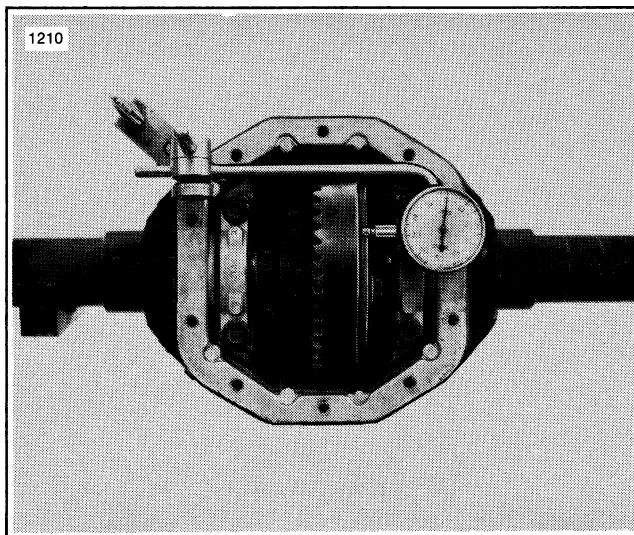


Figure 3-10. Ring Gear Runout Check

5. Check "ring gear runout" with dial indicator (Figure 3-10). Place contact point of dial indicator on back face of ring gear. Rotate ring gear one complete revolution. Maximum runout is .006 in. (.15 mm). Reading in excess of specification indicates loose or warped ring gear, dirt or burr on ring gear mounting surface, or sprung differential case.
6. Check backlash with dial indicator (Figure 3-11). Place contact point of dial indicator on a ring gear tooth. Hold pinion shaft and move ring gear back and forth without moving the pinion gear or shaft. Repeat backlash check at four equally spaced points around ring gear. Backlash must be held between .004 in. (.1 mm) and .008 in. (.2 mm) and must

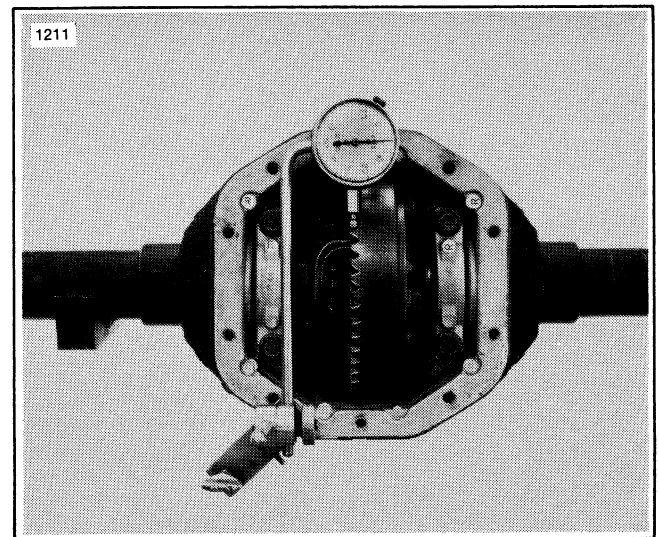


Figure 3-11. Ring and Pinion Backlash Check

not vary more than .002 in. (.05 mm) between positions checked. Readings in excess of specifications indicate worn ring and/or pinion gear or improper backlash adjustment (see ASSEMBLING DIFFERENTIAL for backlash adjustment).

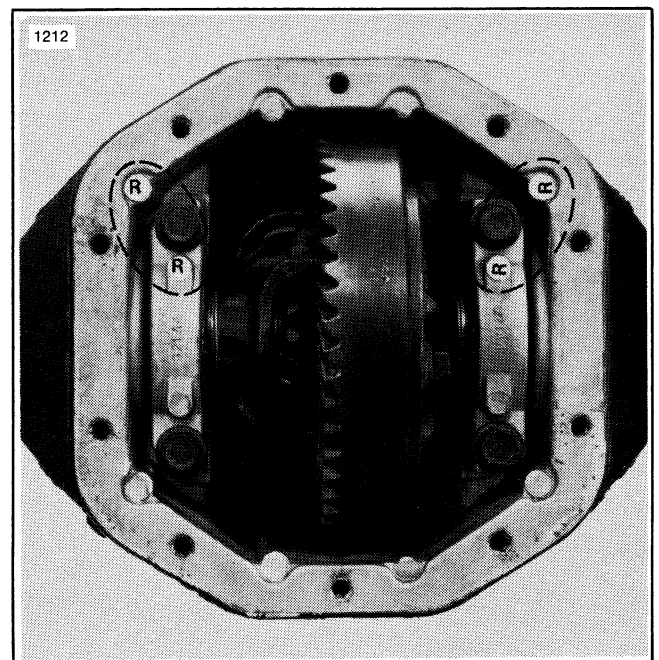


Figure 3-12. Bearing Cap Identification

7. Remove differential bearing cap bolts (4). Bearing caps are marked for location identification along with the carrier (Figure 3-12). When reassembling, the caps must be installed in their original position. Remove bearing caps (5).
8. Pry differential case assembly (6) from carrier with two pry bars (Figure 3-13).

CAUTION

Pry out case assembly as straight up as possible, using pressure against housing, to prevent damaging ring and pinion gears. (Use care when prying to avoid damaging gasket surface.)

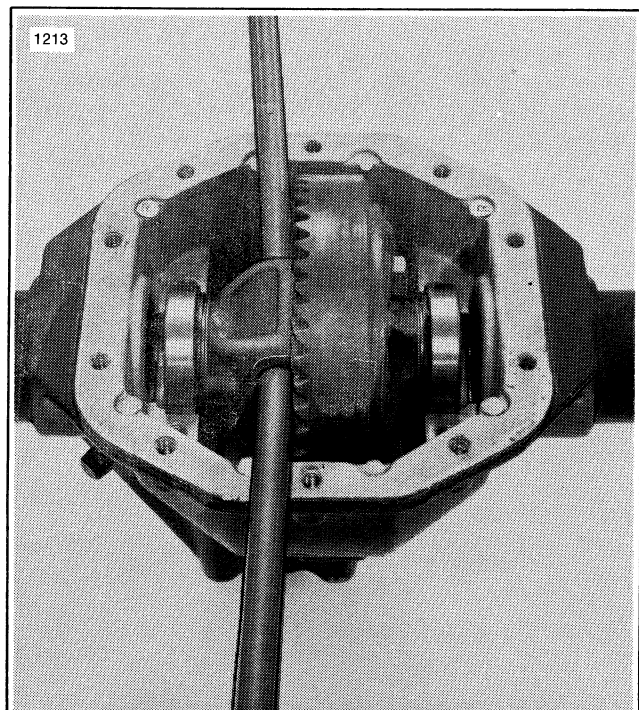


Figure 3-13. Prying Out Case

9. Remove cups (7) from differential bearings (8).

NOTE

If differential bearings are not worn or damaged and are to be reused, make certain that each mated cup and cone are paired together during reassembly.

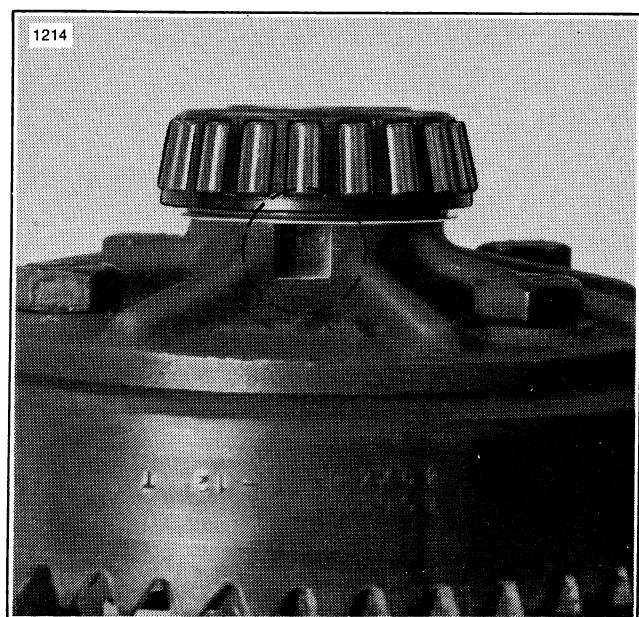


Figure 3-14. Recess for Puller

10. Remove differential bearing cones (8) if they are worn or damaged. (Do not remove differential bearings unless bearing failure is evident.) Care must be taken to ensure that bearing puller jaws are located in cast recesses of differential case so the puller jaws will apply their force to the inner bearing race and not the bearing cage (Figure 3-14).
11. Remove shims (11). Band or wire shims together to avoid losing them.

NOTE

If ring and pinion gears are to be reused, shims (11) must be reinstalled in their original position.

12. Remove bolts (12) from ring gear (13).

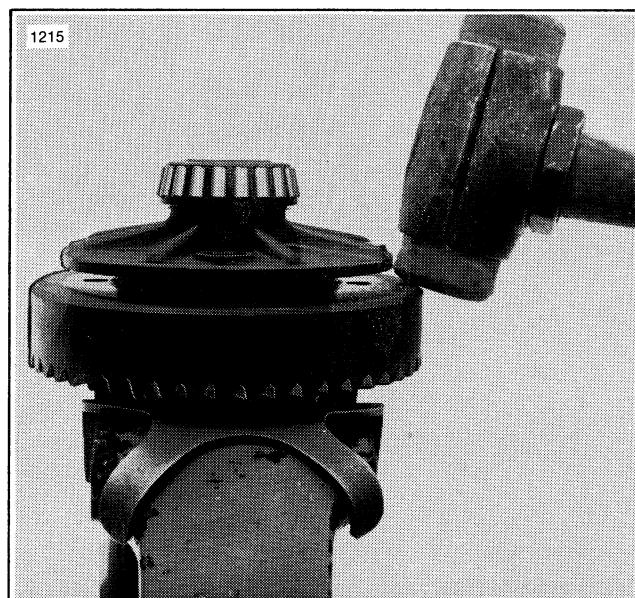


Figure 3-15. Tapping Off Ring Gear

13. Use a soft hammer to tap ring gear from differential case (Figure 3-15). Be careful not to damage ring gear teeth.
14. Drive out lock pin (9) which secures pinion mate shaft (14) to differential case (10) (Figure 3-16).
15. Drive pinion mate shaft (14) from case with long brass drift (Figure 3-17).
16. Remove pinion mate gears (15) and thrust washers (16) (one on back of each pinion mate gear) by rotating both gears 90° to opening in differential case.
17. Remove differential side gears (17) and thrust washers (18) (one on back of each side gear) through opening in differential case.

NOTE

Pinion mate gears and differential side gears, along with their respective thrust washers, must be replaced in their original position upon reassembly.

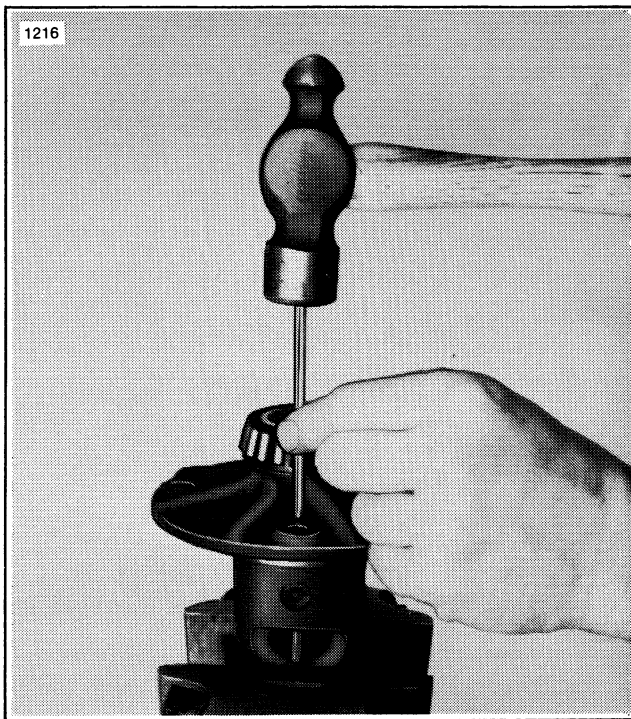


Figure 3-16. Driving Out Lock Pin

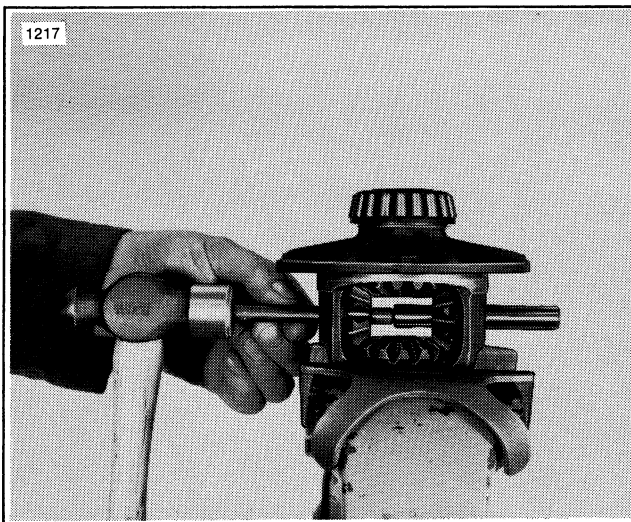


Figure 3-17. Driving Out Pinion Mate Shaft

18. Turn housing in vise or holding fixture so that drive pinion shaft is vertical, extended spline facing up.
19. Remove cotter pin (37), pinion nut (19), washer (36), pinion yoke (35), and oil seal (34) using a 1 1/4 inch offset box wrench and spline socket. Hold pinion nut with box wrench and turn pinion shaft clockwise with spline socket until nut is completely loose.

CAUTION

Procedure other than suggested could cause damage.

20. See Figure 3-18. Remove oil slinger (20), pinion shaft (21), sleeve (23), shims (24) and bearing cones (22 and 25). Retain pinion gear backlash shims (24) for reassembly.
21. Rear bearing cup (27) can be drive out with drift (Figure 3-19). Shims (29) are located between bearing cup (27) and carrier bore. Retain these shims for reassembly. Shims (29) are used to set pinion depth.
22. Front bearing cup (26) can be driven out of housing with brass drift. Use caution to avoid nicking carrier bore.
23. Wash all parts including housing with non-flammable cleaning solvent. Do **not** steam clean because water and condensation are very difficult to remove from differential parts.

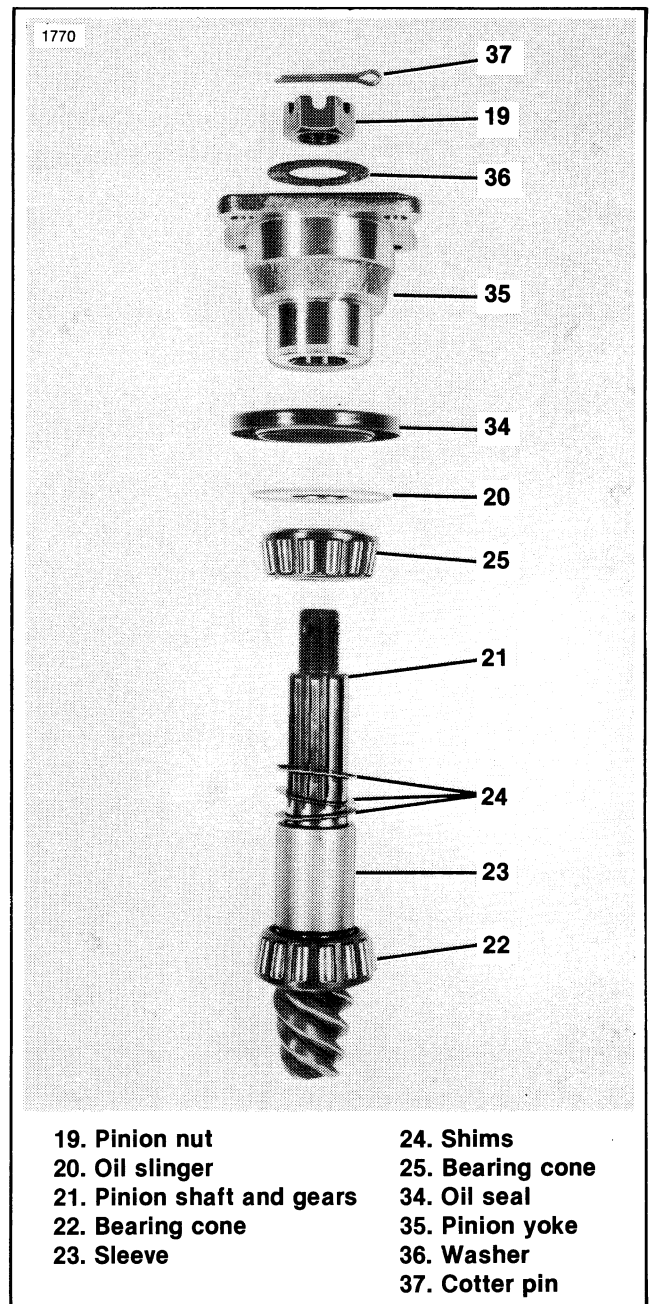


Figure 3-18. Pinion Assembly

24. Examine all bearing surfaces, mating surfaces and splines for burrs or scoring. Remove burrs with hand stone.
25. Check all bearing cups and cones for nicks, roller end wear, grooves and any damage. Do not replace a worn cup or cone individually, renew in sets only if either is worn. Bearings develop wear patterns in both the cup and cone and replacing one without the other will cause the new part to wear prematurely. Any seal, once removed, must be replaced with a new seal.

NOTE

Ring gear (13) and pinion gear (21) are available in matched sets only. Do not replace one without replacing the other. Failure to replace both gears will result in excessive wear, noisy operation and premature breakdown.



Figure 3-19. Driving Out Rear Pinion Bearing Cup

Assembling Differential (Figure 3-9)

NOTE

All parts that are to be reused should be installed in the position from which they were removed.

Lubricate all frictional surfaces with Harley-Davidson DIFFERENTIAL LUBRICANT during assembly.

1. Install thrust washers (18) behind their respective side gear (17) and install in differential case.

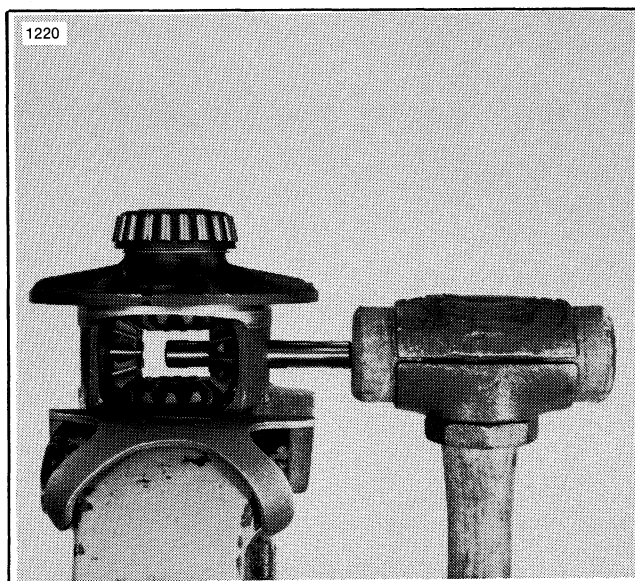


Figure 3-20. Installing Pinion Mate Shaft

2. Install thrust washers (16) and pinion mate gears (15).
3. Rotate pinion mate gears (15) until pinion mate shaft (14) can be inserted. Use soft hammer if necessary to drive mate shaft into case (Figure 3-20).

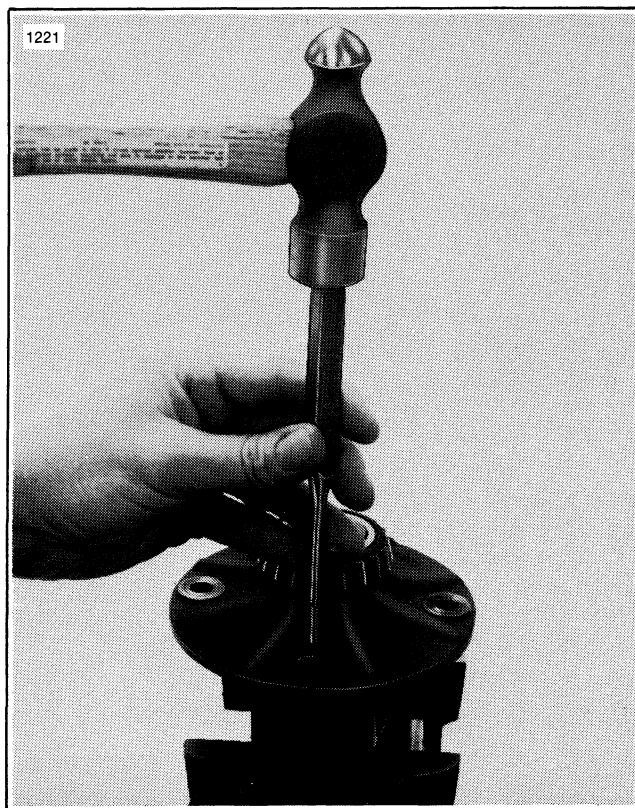


Figure 3-21. Installing Lock Pin

4. Align lock pin hole in pinion mate shaft (14) with hole in case and drive lock pin (9) to approximate center location of pinion mate shaft (Figure 3-21).

5. When pressing on new differential bearings (8), original shims (11) may be reused in their original location if they were not damaged during disassembly. If new shims are used, be sure they are the same thickness as originals. Press on inner race of bearing only (Figure 3-22).

CAUTION

Mating surfaces on differential case and ring gear must be perfectly clean and free of nicks and burrs. Contaminated mating surfaces will cause excessive ring gear runout resulting in premature failure and noisy operation.

6. Position ring gear (13) on differential case and start bolts (12) into ring gear. Tighten bolts (12) alternating back and forth across gear to pull ring gear evenly into place. Tighten bolt (12) to 35-45 ft-lbs (4.8-6.2 kgm) torque.
7. Drive or press pinion bearing cup (26) into housing.
8. Install original pinion depth shims (29) or new shim pack of same thickness into housing. Drive or press bearing cup (27) into housing against shims (29).

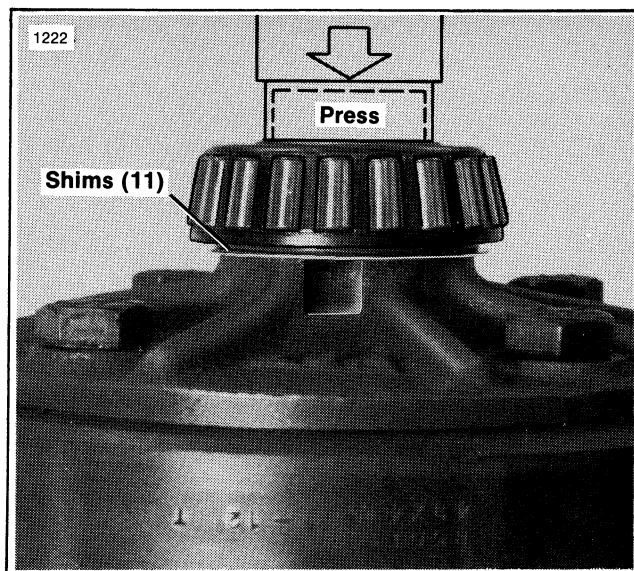


Figure 3-22. Pressing On Differential Bearing

9. Install pinion bearing (22), spacer (23) and original preload shims (24) on pinion shaft (21). If original preload shims (24) are damaged, replace with new shim pack of same thickness (Figure 3-23).

NOTE

Two numbers of significance will be found on the pinion shaft. The number painted on the shaft itself should match a number painted on the outside diameter of the ring gear, matching these two numbers will identify a matched ring and pinion set.

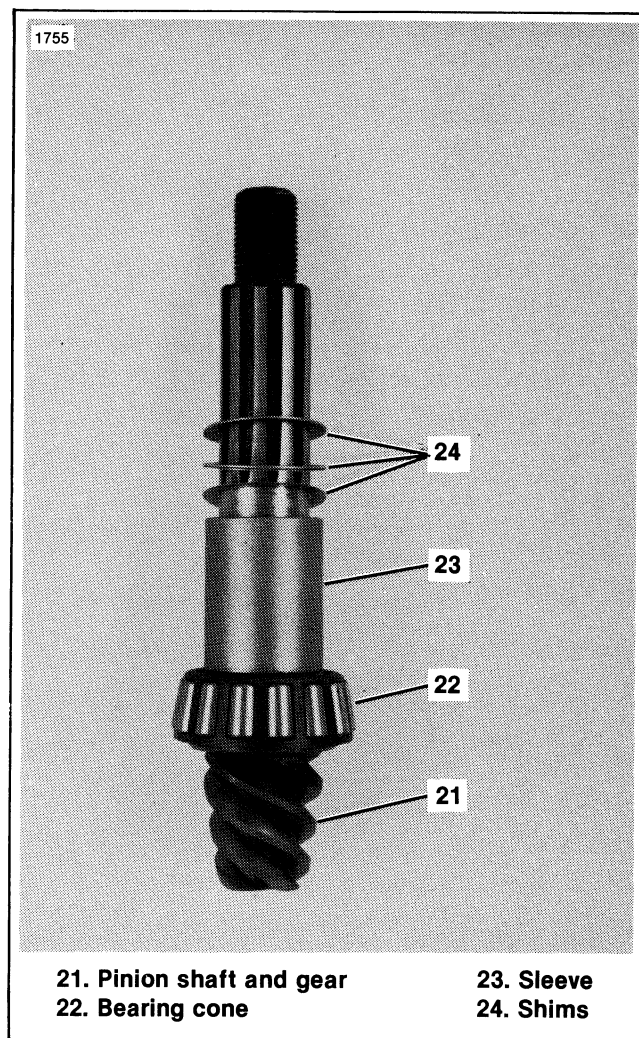


Figure 3-23. Pinion Assembly Ready to Install in Housing

On the gear end of the pinion shaft is found a number preceded by a plus or minus sign. This number relates to the depth which the pinion shaft is set into the housing. If no number appears, the number will be 0. This depth is regulated by the number of shims (29). Shims will be added or subtracted when changing pinion shafts according to the change in numbers between the old and new shaft. For example, if an old shaft had a "- 1" stamped on the end and the new shaft had a "+ 2," ".003" of shims would be subtracted to make the difference. Proper shimming is important to provide for proper meshing of the ring and pinion gears. (See Figure 3-24, 3-25).

10. See Figure 3-23. Install pinion shaft (21) along with bearing (22), spacer (23), and shims (24) into housing.
11. Install bearing (25), oil slinger (20), oil seal (34), pinion yoke (35), washer (36), and pinion nut (19) on pinion shaft (Figure 3-18). Tighten pinion nut to 50-75 ft-lbs (6.9-10.3 kgm) torque aligning cotter pin hole and nut. Use a 1 1/4 inch offset box wrench to hold the pinion nut and a spline socket to turn pinion shaft.

Old Pinion Marking	New Pinion Marking								
	- 4	- 3	- 2	- 1	0	+ 1	+ 2	+ 3	+ 4
+ 4	+ 0.008	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0
+ 3	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001
+ 2	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002
+ 1	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	+ 0.002	- 0.003
0	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004
- 1	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005
- 2	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	+ 0.005	+ 0.006
- 3	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005	- 0.006	- 0.007
- 4	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005	- 0.006	- 0.007	- 0.008

Figure 3-24. Pinion Setting — English U.S. Standards

Old Pinion Marking	New Pinion Marking								
	- 10	- 8	- 5	- 3	0	+ 3	+ 5	+ 8	+ 10
+ 10	+ .20	+ .18	+ .15	+ .13	+ .10	+ .08	+ .05	+ .03	0
+ 8	+ .18	+ .15	+ .13	+ .10	+ .08	+ .05	+ .03	0	- .03
+ 5	+ .15	+ .13	+ .10	+ .08	+ .05	+ .03	0	- .03	- .05
+ 3	+ .13	+ .10	+ .08	+ .05	+ .03	0	- .03	- .05	- .08
0	+ .10	+ .08	+ .05	+ .03	0	- .03	- .05	- .08	- .10
- 3	+ .08	+ .05	+ .03	0	- .03	- .05	- .08	- .10	- .13
- 5	+ .05	+ .03	0	- .03	- .05	- .08	- .10	- .13	- .15
- 8	+ .03	0	- .03	- .05	- .08	- .10	- .13	- .15	- .18
- 10	0	- .03	- .05	- .08	- .10	- .13	- .15	- .18	- .20

Figure 3-25. Pinion Setting — Metric

12. Pinion preload is checked with in-lbs torque wrench. Turning torque of pinion shaft should be between 2-13 in-lbs. Pinion shaft must be vertical for this check. Torque reading to start shaft turning should be disregarded (Figure 3-26). If torque reading is high, add shims to increase shim pack (24) thickness. If torque reading is low, remove shims to decrease shim pack (24) thickness. Preload shims are available in the following thicknesses: .003 in. (.076 mm), .005 in. (.13 mm), .010 in. (.25 mm), and .030 in. (.76 mm). When turning torque is correct, install cotter pin (37).

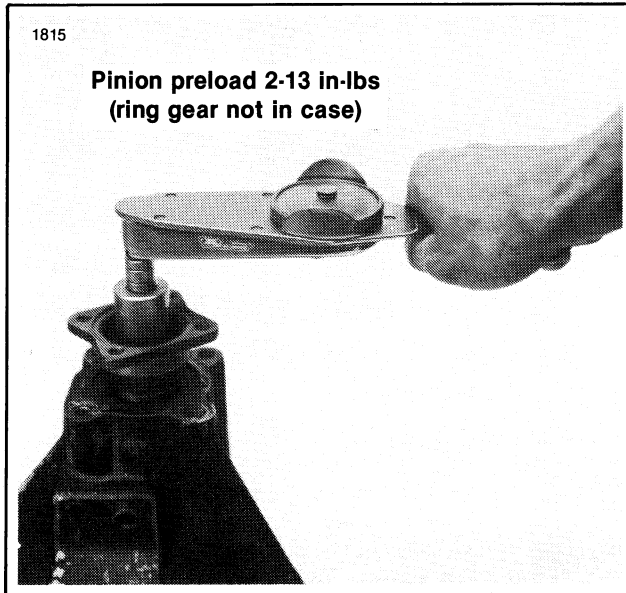


Figure 3-26. Checking Pinion Preload

13. Install differential case assembly (6) along with bearing cups (7) into housing aligning ring and pinion gears to avoid nicking teeth. Tap ring gear lightly with soft hammer to seat case assembly, in housing (Figure 3-27).
14. Install bearing caps (5) making sure the letter stamped on them corresponds to the letter on the

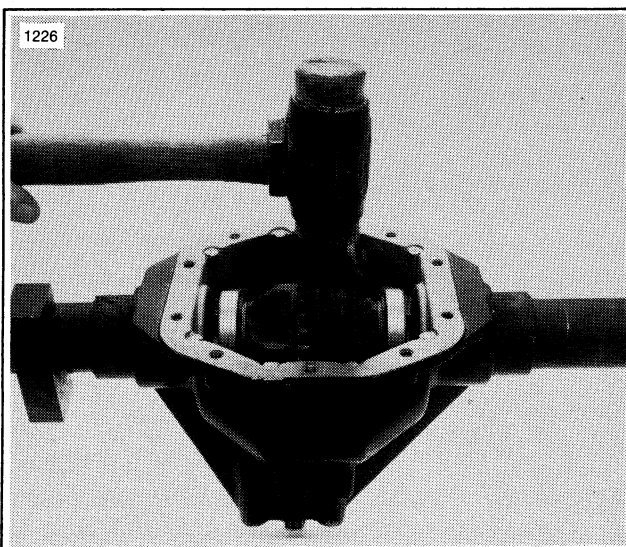


Figure 3-27. Seating Differential Case Assembly

housing. Install bearing cap bolts (4) and tighten to 35-45 ft-lbs (5.5 kgm) torque (Figure 3-28).

15. Check ring and pinion gear backlash as described in Step 6 of disassembly. High backlash is corrected by moving ring gear closer to pinion gear. Low backlash is corrected by moving ring gear away from pinion gear. Backlash adjustment is made by switching shims (11) from one side of differential case to the other.

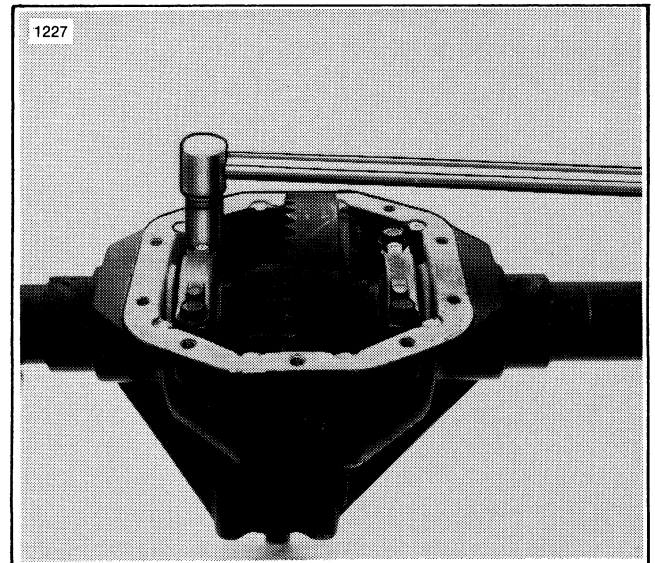


Figure 3-28. Torque Bearing Cap Bolts

16. Reinstall axles and hubs as described in INSTALLING REAR AXLE SHAFT.

NOTE

Some 1981 differentials use a bead of G.E. 1473 HIGH TEMPERATURE SILICON SEALER on the differential housing rather than the gasket (3, Figure 3-9). Harley-Davidson recommends the use of this sealant for reassembly.

17. Apply a bead of Sealant to differential housing, cover and cover holes. Tighten cover bolts (2) to 18-23 ft-lbs (3.8 kgm) torque.
18. Install Harley-Davidson HEAVY WEIGHT DIFFERENTIAL LUBRICANT, Part No. 99890-61A.

Installing Rear Axle And Differential Assembly (Figure 3-8)

1. Support differential assembly under car and position mounting pads on rear fork.
2. Install rubber bumpers (5) to top of rear fork.
3. Secure axle housing to rear fork with bolts (4) and nuts (3). Tighten nuts (3) to 30 ft-lbs (4.1 kgm) torque.

4. Install rear drive assembly. See TRANSMISSION Section.
5. Install disc brake caliper (see BRAKE).
6. Install rear wheels.
7. Let car down off jacks, tighten wheel rim mounting nuts to 35-40 ft-lbs (5.5 kgm) torque and install hub caps.

SECTION	PAGE NO.
1. General Information	4-1
2. Brake Pedal Assembly	4-5
3. Brake Caliper	4-9
4. Brake Disc	4-11

GENERAL INFORMATION

FOOT BRAKE

The Golf Car is equipped with a disc type brake. When the brake pedal is depressed, it transmits a clamping action to the brake pads of the caliper through the brake cable assembly. The brake pads apply this clamping action against the brake disc attached to the transmission hub thus stopping the car.

PARKING BRAKE

When the brake pedal is tilted forward while held in the depressed position, it will lock the brake. Tilting the brake pedal rearward or depressing the accelerator pedal will automatically release the brake. This feature provides a parking brake by simply tilting the brake pedal and also prevents any possible damage by automatically releasing the brake when the accelerator is depressed.

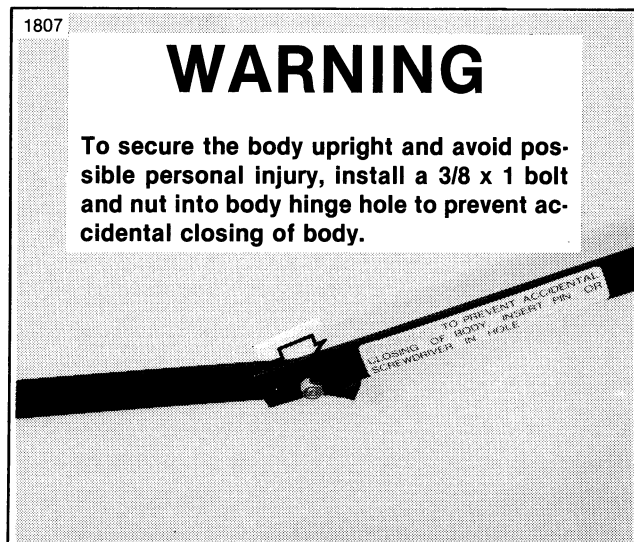
BRAKE ADJUSTMENT (Figure 4-1)

When brake pedal free travel becomes excessive, it indicates brake caliper adjustment is required. It is important to remember that proper brake adjustment and pedal height is only achieved by adjusting the brake caliper, not the brake cable. Brake cable adjustment is to assure proper cable attachment and compensate for the normal variable cable length only.

NOTE

If brake pads are worn thin or unevenly they should be replaced, see BRAKE CALIPER — DISASSEMBLY.

If brake pedal travel is excessive, perform the following 5-Step adjustment completely.



WARNING

Disconnect battery cables (negative cable first) to prevent accidental start up and possible personal injury.

Step I.

1. Disconnect brake cable from cam by removing cotter pin, washer and clevis pin.
2. Check alignment between caliper support bracket and brake disc. If disc is not perfectly aligned with support bracket, it may be necessary to slightly bend caliper support bracket or brake bracket to achieve perfect alignment. If support bracket and disc do not align perfectly brake will not function properly.
3. Remove cotter pin from castle nut.

Step II.

1. Hold cam lever bolt and tighten castle nut until brake pads grip disc snugly. Disc should not turn when car is gently rolled backward and forward.
2. Loosen pivot bolt a few turns.

Step III.

1. If necessary hold through bolt and tighten through bolt nut until brake caliper halves are parallel and brake pads contact disc evenly.

CAUTION

Do not crush spring washers.

2. Tighten pivot bolt until it contacts left caliper half.

NOTE

At this point caliper should have snug, even grip on disc, when car is gently rolled backward and forward, and caliper halves should be parallel.

Step IV.

1. Hold cam lever bolt and loosen castle nut until .030 in. clearance (.015 in. each side) is obtained between disc and brake pads.

NOTE

Normally, loosening castle nut two castellations gives correct clearance.

2. Install new cotter pin through castle nut.

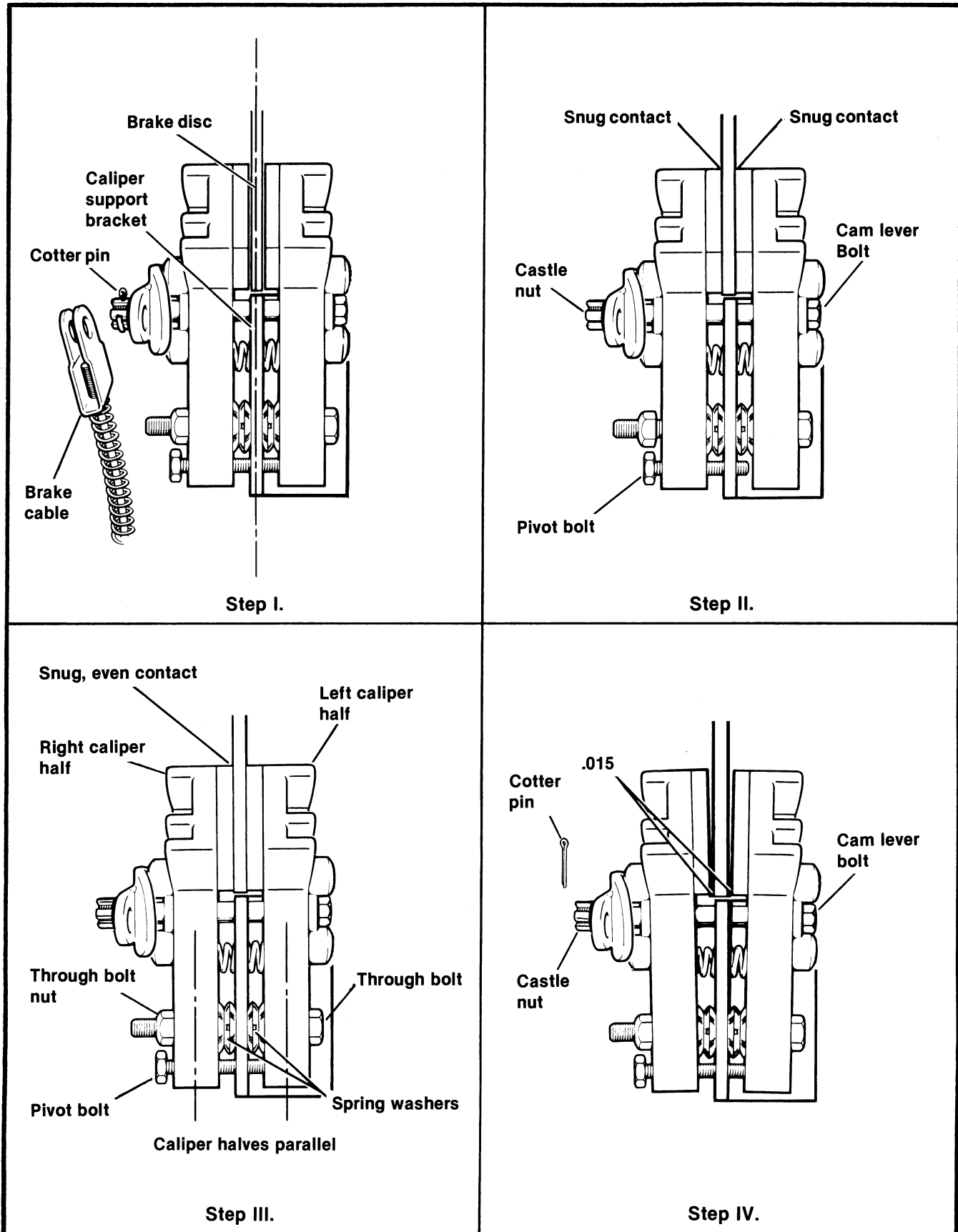


Figure 4-1. Brake Adjustment

Step V.

1. Loosen jam nuts and move cable adjusting sleeve until clevis pin can be slide into place without upsetting the cam lever position.
2. Install washer and new cotter pin to clevis pin.
3. Check brake operation.

NOTE

Brake caliper halves must be parallel when engaged. When at rest, the calipers are normally skewed apart at the pad area and not parallel.

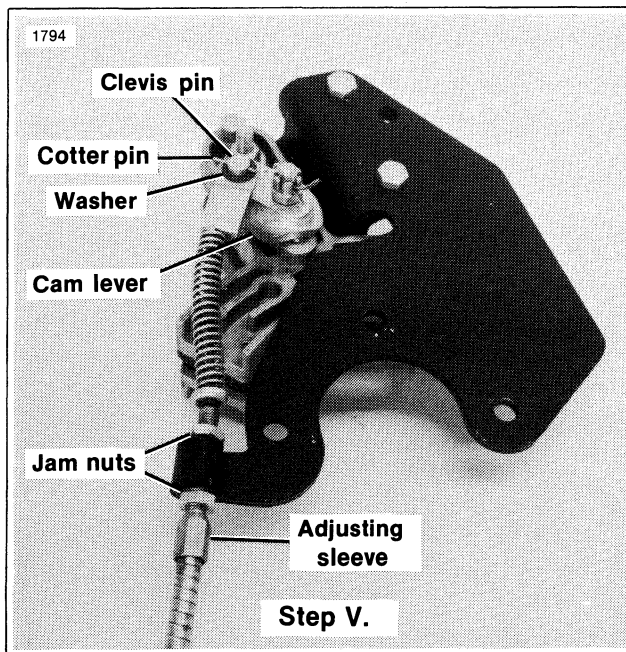


Figure 4-2. Brake Adjustment — Final Step

BRAKE RATCHET AND PAWL ADJUSTMENT (Figure 4-3)

If brake ratchet fails to engage (4) or release from the accelerator pawl when the brake pedal is tilted, the accelerator bracket must be repositioned for proper brake locking and releasing.

1. Loosen but do not remove two accelerator mounting bolts (Figure 4-3).
2. Depress brake and tilt pedal (1) forward.
3. Shift accelerator mounting bracket so that pawl engages one of the notches of the brake ratchet.
4. Hold in this position and tighten mounting bolts (Figure 4-3) to 10-12 ft-lbs (1.4-1.6 kgm) torque.
5. Check parking brake operation.

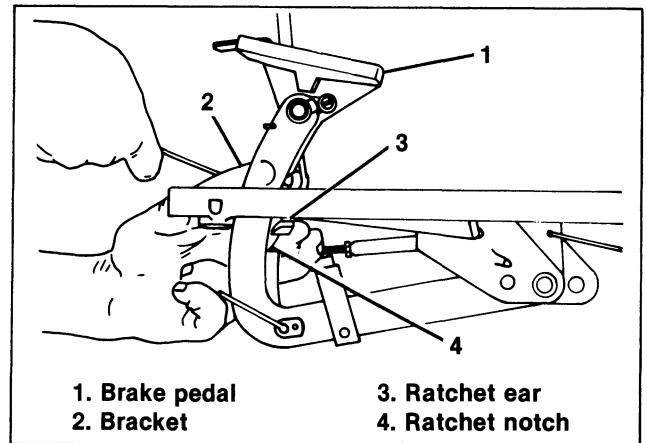


Figure 4-3. Brake Ratchet and Pawl Adjustment

NOTES

BRAKE PEDAL ASSEMBLY

BRAKE PEDAL

Removal

(Figure 4-4)

1. To remove pedal (1), remove e-clip and washer (2) and screw and washer (3), slide pedal (1) from bushing (17). If brake pedal bushing (17) is worn it should be replaced.
2. Disconnect return spring and hook (8).
3. Remove mounting bolt (9) and nut (10).
4. Disconnect brake cable (5) by removing cotter pin and washer (6) and cable retaining pin (7). Remove brake pedal assembly from underside of car.

Disassembly

(Figure 4-4)

1. To disassemble brake ratchet (13) from brake lever (12), remove screw and washer (14) and nut (15). Note position of shouldered spacer (16).

2. Remove ratchet spring (4).

3. Replace brake lever bumper (19) if worn.

Cleaning, Inspection and Repair

1. Note condition of O-rings (11), replace if worn.
2. Check brake pedal bushing (17) and lever bushing (18) for wear, replace if worn.
3. Check brake ratchet (13) teeth, replace ratchet (13) if teeth are worn to the point where they do not hold accelerator pawl when parking brake is applied.

Assembly

(Figure 4-4)

1. When reassembling brake ratchet (13) to brake lever (12) position spacer (16) so shoulder is toward ratchet (13). Tighten screw (14) to 25-30 in-lbs (2-2.5 ft-lbs) torque.

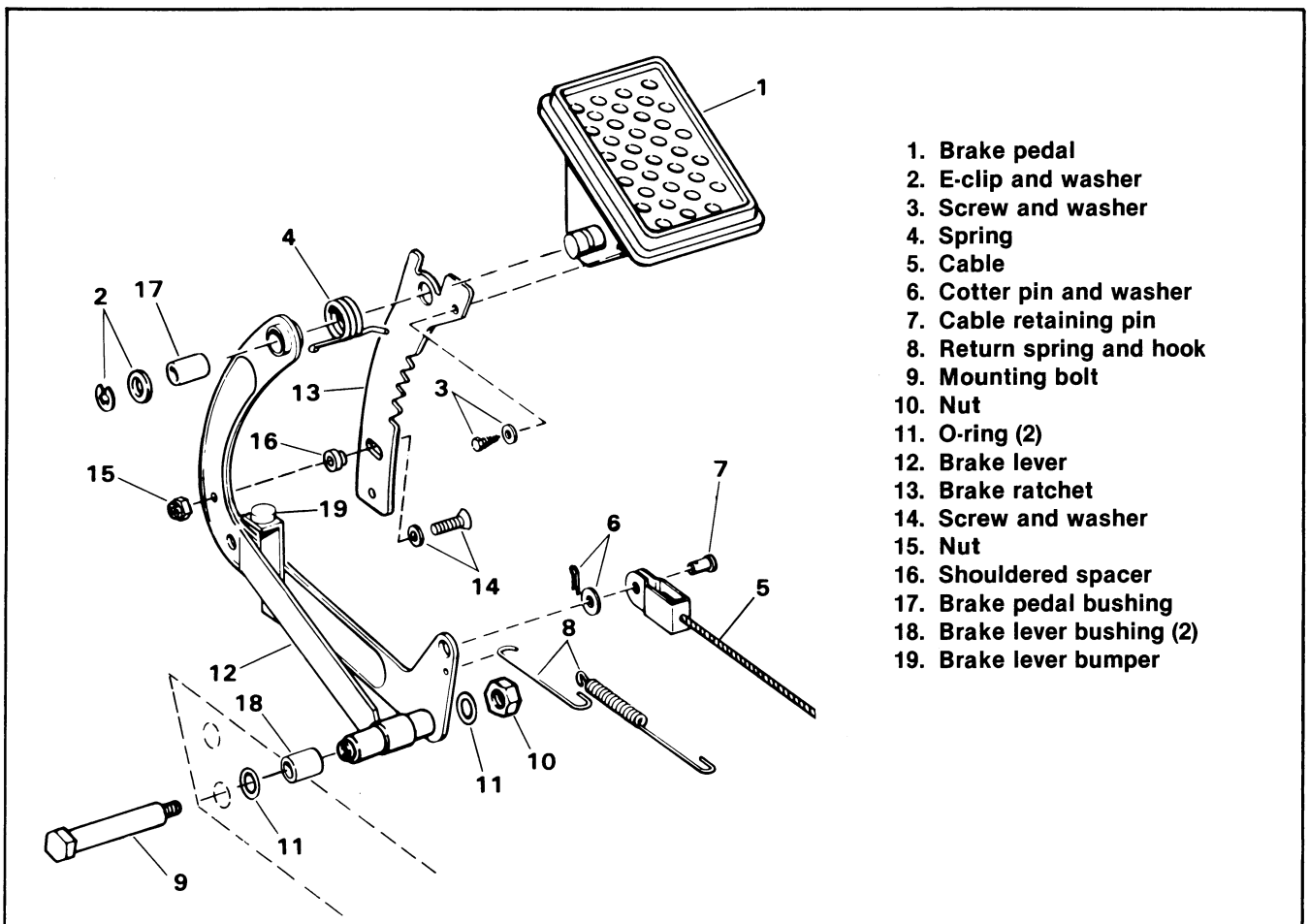


Figure 4-4. Brake Pedal Assembly

Installation (Figure 4-4)

1. Install pedal assembly through floorboard from underside of car.
2. Install brake (5) with retaining pin (7) washer and new cotter pin (6).
3. Apply grease to inside of brake lever bushings (18) and mounting bolt (9).
4. Install O-rings (11) on brake lever and install in frame. Install mounting bolt (9) and tighten nut (10) to 10-12 ft-lbs torque.
5. Install return spring and hook (8).
6. Apply grease to inside of pedal bushing (17) and mounting stud on pedal (1).

7. Position spring (4) and install on pedal (1). Install washer and e-clip (2).
8. Install screw and washer (3).
9. Install brake cable (5), pin (7), washer and cotter pin (6).
10. Adjust the brakes. See BRAKE ADJUSTMENT.

BRAKE CABLE

Removal (Figure 4-5)

WARNING

Disconnect battery cables (negative cable first) to avoid accidental start-up of vehicle and possible personal injury.

1. Raise golf car body.

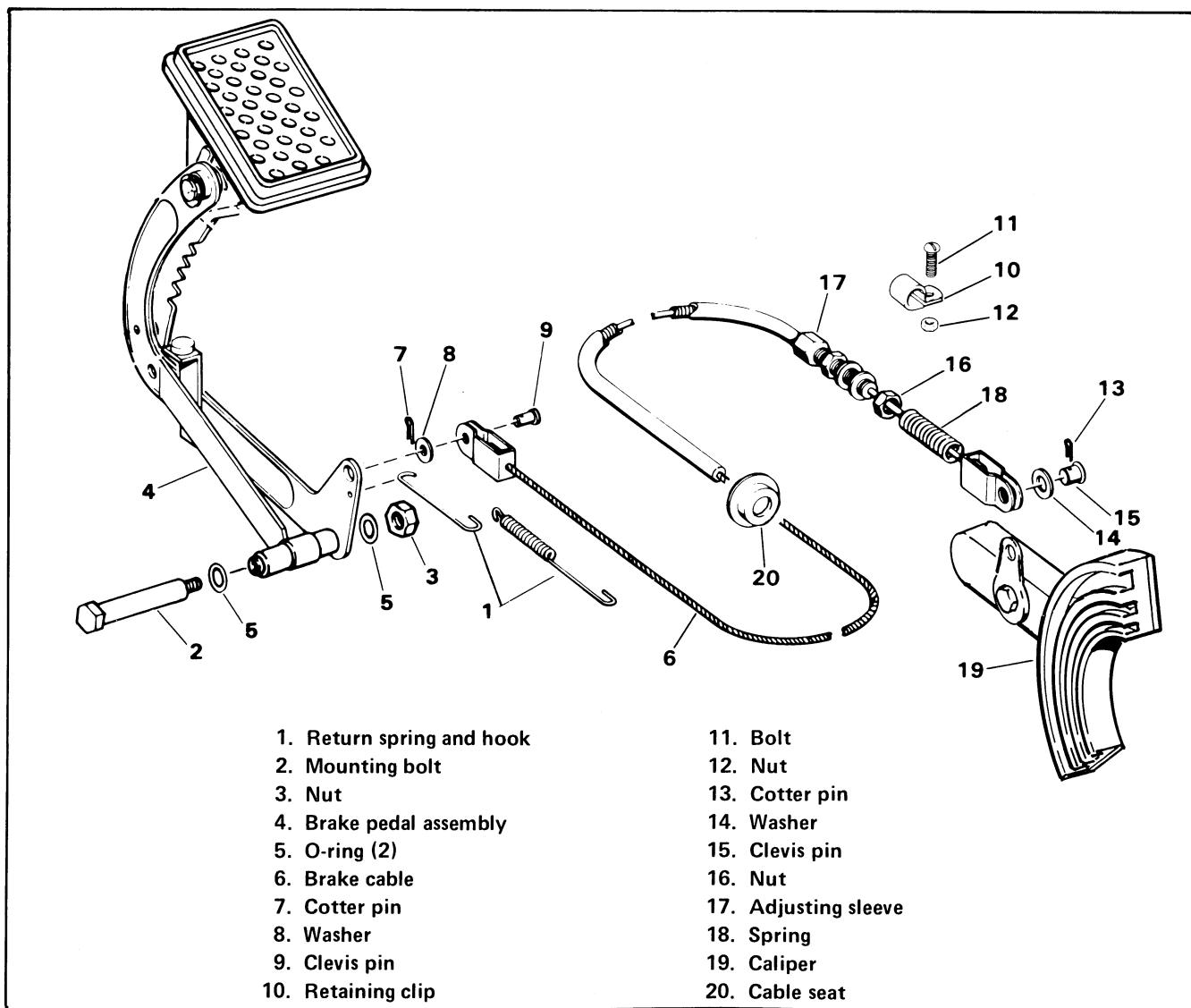


Figure 4-5. Brake Cable

2. Disconnect brake return spring and hook (1).
3. Remove mounting bolt (2) and nut (3).
4. Pull brake pedal assembly (4) down and remove and inspect O-rings (5). Replace O-rings if worn.
5. Disconnect brake cable (6) from brake pedal assembly by removing cotter pin (7), washer (8) and pin (9).
6. Disconnect cable retaining clip (10) from front battery carrier by removing bolt (11) and nut (12). Retain clip (10), bolt (11) and nut (12) for reassembly.
7. Disconnect brake cable (6) from brake caliper by removing cotter pin (13), washer (14), and pin (15).
8. Thread nut (16) completely off of adjusting sleeve (17).
9. Pull back on cable, compressing spring (18), and remove cable from brake bracket.

Installation (Figure 4-5)

1. Thread nut (16) off of adjusting sleeve (17) and install cable in brake bracket with a washer on each side of brake bracket.
2. Thread nut (16) onto adjusting sleeve (17).
3. Install other end of cable through hole in chassis and connect to brake pedal assembly (4) with pin (9), washer (8) and new cotter pin (7).
4. Install O-rings (5) to pedal assembly (4), grease mounting bolt (2) and install pedal assembly to chassis with bolt (2) and nut (3). Tighten to 10-12 ft-lbs torque.
5. Install hook and spring (1).
6. Install retaining clip (10) with bolt (11) and nut (12).

7. Adjust brake, see BRAKE ADJUSTMENT.
8. Lower car body.

Compensating for Long Brake Cable (Figure 4-6)

If the brake cable is too long to provide adequate braking, and is in good condition, a CABLE SPACER, Part No. 47741-63, can be installed between the cable sheath and the adjusting sleeve to increase adjustability (Figure 4-6).

CAUTION

If cable is frayed it must be replaced with new cable. Do not use cable spacer on worn cable.

After installing spacer adjust brake, see BRAKE ADJUSTMENT.

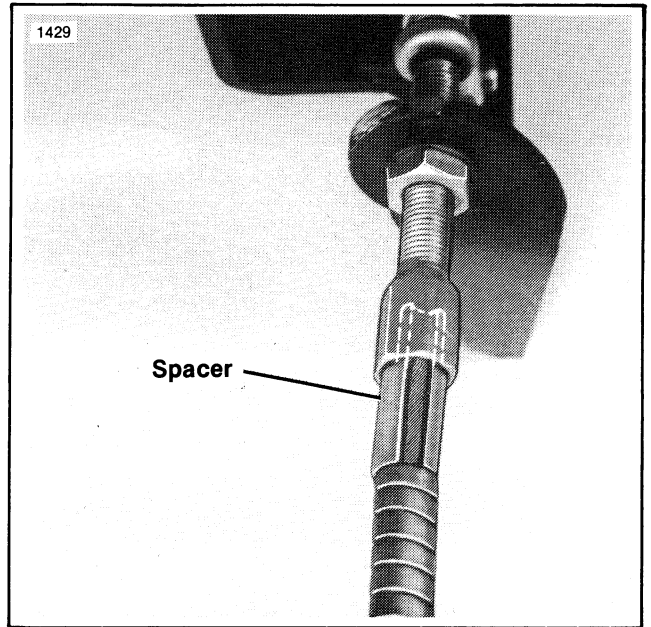


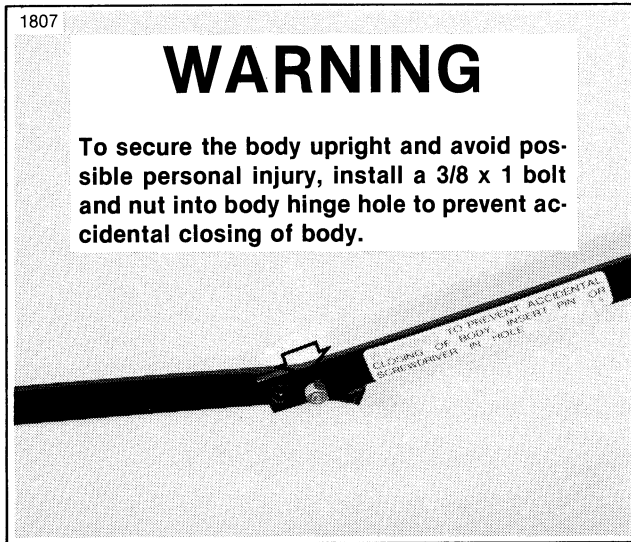
Figure 4-6. Brake Cable Spacer

NOTES

BRAKE CALIPER

REMOVAL (Figure 4-7)

1. Raise the golf car body.



WARNING

Disconnect battery cables (negative cable first) to avoid accidental start-up of vehicle and possible personal injury.

2. Remove cable from caliper by removing cotter pin (1), washer (2) and clevis pin (3) from brake cam lever (4).

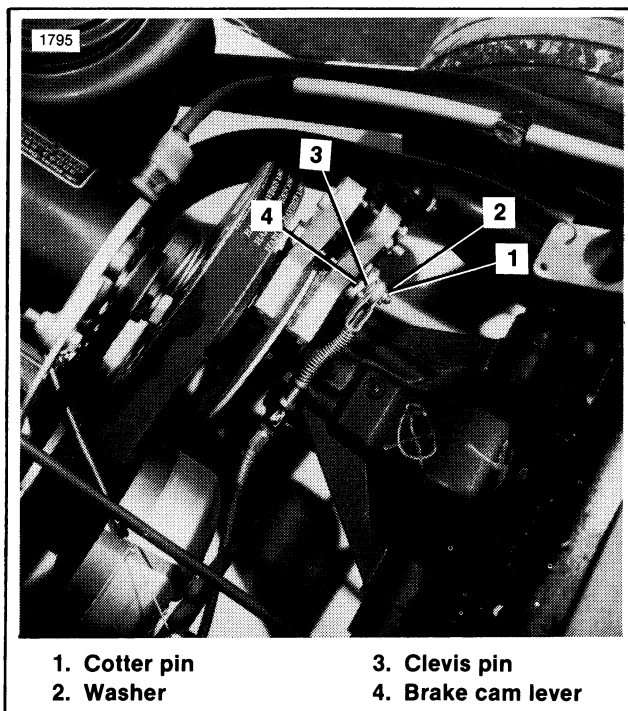


Figure 4-7. Removing Caliper

3. See Figure 4-8. Remove two bolts and locknuts which secure caliper support bracket to brake bracket.
4. Remove caliper.

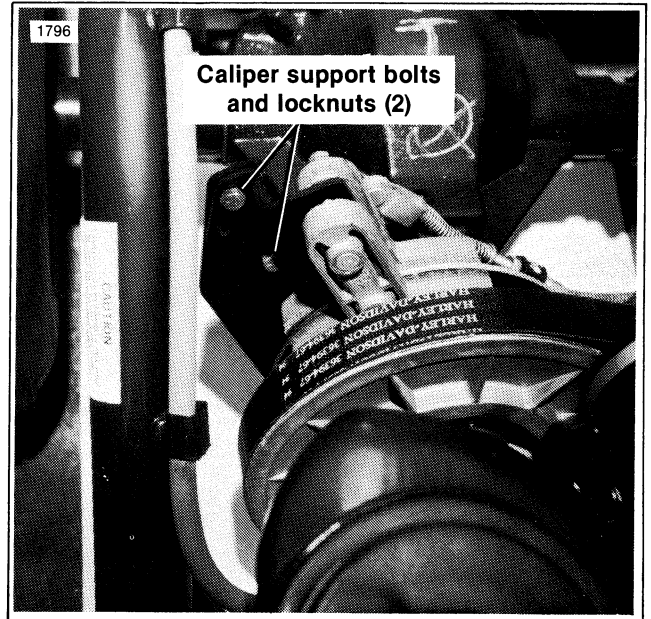


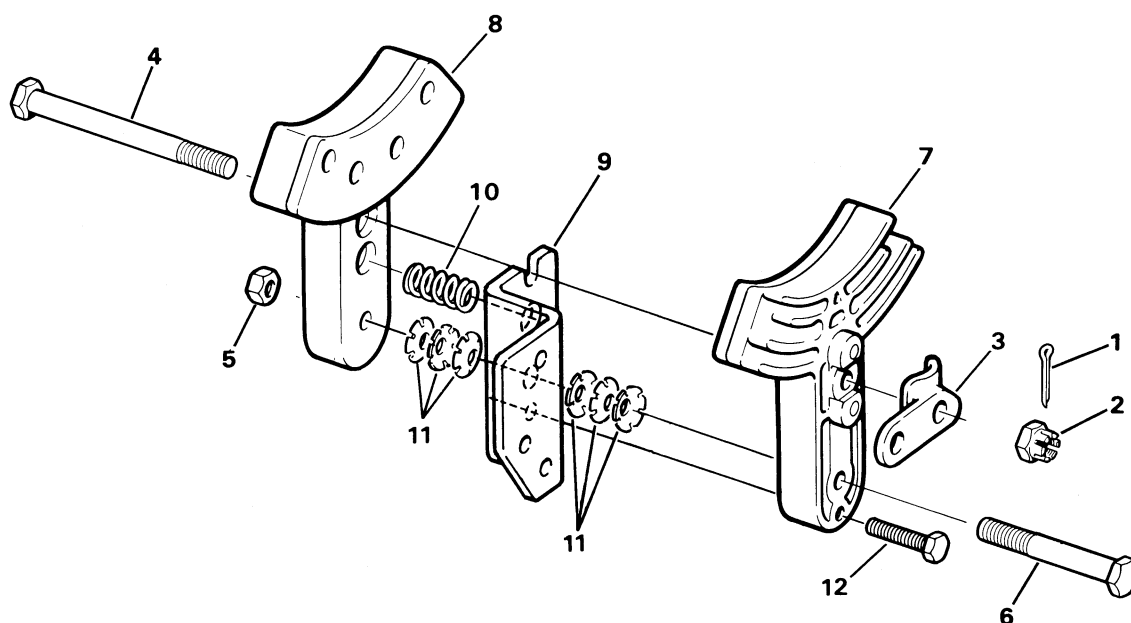
Figure 4-8. Mounting Hardware

DISASSEMBLY (Figure 4-9)

1. Remove brake caliper (with support bracket attached) from car. See REMOVAL.
2. Remove cotter pin (1) and castle nut (2).
3. Remove cam lever (3) and cam lever bolt (4). Check condition of cam side caliper (7) in the area around cam lever balls. Badly worn calipers, or caliper with loose or missing balls, should be replaced.
4. To separate caliper halves remove through bolt and nut (5 and 6).
5. Check condition of spring (10) and spring washers (11). Replace if worn or broken.
6. Check brake pads. If brake pads are worn to within 1/32 in. (.0312 in.) of rivet heads, pads should be replaced.

NOTE

If pads are worn out, but caliper halves are in good condition, the pads themselves can be replaced using REPLACEMENT PADS, Part No. 41810-64A, and suitable brake pad riveting tool.



- | | |
|---------------------|----------------------------|
| 1. Cotter pin | 7. Rear caliper half |
| 2. Castle nut | 8. Front caliper half |
| 3. Cam lever | 9. Caliper support bracket |
| 4. Cam lever bolt | 10. Spring |
| 5. Through bolt nut | 11. Spring washers (6) |
| 6. Through bolt | 12. Pivot bolt |

Figure 4-9. Caliper Assembly

ASSEMBLY (Figure 4-9)

1. Install through bolt (6) through rear caliper half (7).
2. Stack three spring washers (11) on through bolt (6) as shown.
3. Install caliper support bracket (9) and spring (10).
4. Stack three remaining spring washers (11) on through bolt (6) in sequence shown.
5. Install front caliper half (8) and through bolt nut (5). Tighten through bolt nut until spring washers (12) compress slightly.
6. Apply a small amount of grease to cam lever (3) where it rides on cam lever balls.

7. Install cam lever (3) and cam lever bolt (4).

8. Install castle nut (2).

9. Install brake caliper in car. See INSTALLATION.

10. Adjust brake. See BRAKE ADJUSTMENT.

INSTALLATION (Figure 4-8)

1. Install caliper support bracket to brake bracket with bolt and nuts. Tighten mounting bolts to 18 ft-lbs torque.
2. Adjust brake, see BRAKE ADJUSTMENT.
3. Connect battery cables.
4. Lower car body.

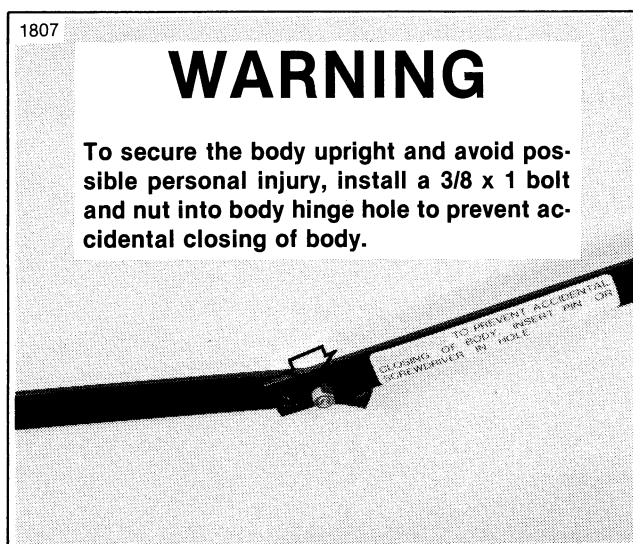
BRAKE DISC

CHECKING BRAKE DISC RUNOUT (.020 in. max.)

1. Attach dial indicator base to brake mounting bracket.
2. Place contact point of dial indicator on disc friction surface as close as possible to outside edge and rotate disc one complete revolution.
3. Maximum allowable runout is .020 in. Runout in excess of specification indicates loose, worn or damaged disc, also the disc should be checked to be sure it is properly seated between disc and axle hub.

REMOVAL

1. Raise the golf car body.



WARNING

Disconnect battery cables (negative cable first) to avoid accidental start-up of vehicle and possible personal injury.

2. See Figure 4-8. Remove brake mounting hardware.
3. See Figure 4-7. Disconnect brake cable by removing cotter pin (1), washer (2) and cable pin (3). Lift brake out.

NOTE

It may be necessary to loosen brake adjusting bolts to free brake pads from brake disc.

4. Remove V-belt as described under GENERAL INFORMATION, Section 7.
5. Remove secondary drive. See SECONDARY DRIVE, Section 7.
6. Remove disc brake.

INSTALLATION

1. Install brake disc and secondary drive. See SECONDARY DRIVE, Section 7.
2. Install V-belt as described under GENERAL INFORMATION, Section 7.
3. See Figure 4-8. Install brake caliper and mounting hardware.
4. See Figure 4-7. Connect brake cable using cable pin (3), washer (2) and cotter pin (1).
5. Adjust brake caliper. See BRAKE ADJUSTMENT.
6. Connect battery cables.
7. Lower the body.

NOTES

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2. General Information	5-3
3. Cylinder and Piston	5-7
4. Crankcase	5-13
5. Tools	5-21

SPECIFICATIONS

GENERAL INFORMATION

Type Reversible — two-cycle
Number of Cylinders One
Cooling Blower air-cooled
Mounting Rubber
Bore 2.75 in. (70 mm)
Stroke 2.50 in. (64 mm)
Displacement 15 cu. in. (246 cc)
Compression Ratio 9.5:1

PISTON

Fit in cylinder006-.007 in.
(measured at the gauge line — .380 in. below bottom ring)
Piston ring end gap007-.017 in.
Piston ring side clearance002-.004 in.
Piston pin fit in piston0001 in.
Light hand press at 72° F.

CONNECTING ROD

Fit on crankpin0004-.0018 in.
Piston pin fit0002-.001 in.
End play between crankshaft throws011-.018 in.

CRANKSHAFT ASSEMBLY

Crank pin Must resist on turning torque of 200 ft-lbs.
Mainshaft maximum runout
When turned on bearings —
Right002 in.
Left004 in.
When turned on centers —
Right less than .002 in.
Left less than .004 in.

CRANKCASE ASSEMBLY

Crankshaft end play (without Loctite)001-.005 in.
Main ball bearing fit in crankcase001 in.
Main bearing fit on shaft (loose)
Ball0001-.0008 in.
Roller0006-.0029 in.
Circuit breaker cam maximum runout005 in.

TIMING

Transfer port from crankcase to cylinder
Opens at $61^{\circ} \pm 1^{\circ}$ BBC (1.969 in. below TDC)
Closes at $61^{\circ} \pm 1^{\circ}$ ABC (1.969 in. below TDC)
Exhaust port
Opens at $84^{\circ} \pm 1^{\circ}$ BBC (1.559 in. below TDC)
Closes at $84^{\circ} \pm 1^{\circ}$ ABC (1.559 in. below TDC)

TORQUES

Cylinder head bolts 25–30 ft-lbs
(3.4–4.1 kgm)
Engine mounting nuts 30–35 ft-lbs
(4.1–4.8 kgm)
Spark plug 15–20 ft-lbs
(2.0–2.7 kgm)
Flywheel nut 70–75 ft-lbs
(9.6–10.3 kgm)
Cam screws 29–35 in-lbs
(.2–.4 kgm)
Fan shroud screws 126–154 in-lbs
(1.3–1.7 kgm)
Crankcase screws 7–9 ft-lbs
(.97–1.2 kgm)
Crankcase stud nut 7–9 ft-lbs
(.97–1.2 kgm)

NOTES

GENERAL INFORMATION

DESCRIPTION

The gasoline golf car uses a single cylinder, 2-cycle, air-cooled engine. Oil is mixed with gasoline for fuel and lubrication. The engine has two major component assemblies — cylinder and crankcase.

The cast iron cylinder assembly includes an aluminum head and aluminum piston. The cylinder and head are bolted to the engine crankcase. The gasoline charge is admitted to the cylinder and the exhaust gas is ejected from the cylinder through ports in the cylinder wall.

During the upstroke of the piston, a vacuum is created in the crankcase and the reed valve opens drawing a gasoline and air mixture from the carburetor into the crankcase. At the same time, compression of the previous charge takes place above the piston.

After ignition, on the downward power stroke of the piston, the exhaust gas is ejected from the cylinder. At the same time, gases in the crankcase are compressed and forced up through the cylinder transfer ports, into the combustion chamber as the descending piston uncovers these ports.

The reciprocating, linear motion of the piston in the cylinder is converted into circular motion in the crankcase. The crankshaft consists of an off-center crank pin interposed between two counterweighted crank throws which rotate on two end shafts supported by anti-friction bearings. One end shaft drives the automatic transmission. The lower end of the connecting rod is fitted with roller bearings and connected to a single crank pin. Rod upper bearing is of the retained needle roller bearing type.

The crankshaft makes one revolution for intake, compression, power and exhaust events, firing every time the piston reaches the top of its stroke.

Ignition timing is produced by operation of a circuit breaker, condenser, ignition coil, and spark plug. The opening and closing of a set of breaker points by a single-lobe cam, determines the spark timing.

For further description of part function, see pertinent manual sections.

LUBRICATION

General

The two cycle engine does not incorporate a crankcase oil reservoir or oil supply for lubricating the engine. Oil is mixed with the gasoline which enters the crankcase and lubricates the engine.

We recommend that you use only Harley-Davidson

GOLF CAR OIL, Part No. 99803-76V (case of 6 gallons) mixed with "Regular" grade leaded gasoline, for clean, smokeless, trouble-free operation.

Break-In Lubrication — 40 to 1 Ratio

The first tankfull of fuel should be mixed at a ratio of 40 to 1, 3 oz. oil per U.S. gallon (25cc per liter), 1-1/2 pints per 8 U.S. gallons. This break-in mixture is richer than normal to provide maximum lubrication to critical engine parts during initial wear-in. Do not operate vehicle at full throttle for prolonged periods of time for the first tankfull of fuel. Normal golf car use is recommended with frequent starts and stops.

After Break-In — 85 to 1 Ratio

Use Harley-Davidson GOLF CAR LUBRICANT (or a good quality 2-cycle oil, certified B.I.A.-TC-W) to mix with gasoline (85 to 1). Case of 6 gallons Part No. 99803-76V, 55 gallon drum Part No. 99810-76V.

IMPORTANT

Mix oil and fuel in a separate gas can and then pour the mixture into the fuel tank. Do not mix fuel in the golf car fuel tank.

ENGINE REPAIR

General

When an engine needs repair, it is not always possible to determine beforehand whether repair can be made without removing the entire engine from the car.

Removal of the engine is necessary to repair rod bearing and perform crankcase work. It is not necessary to remove the engine for top end repair of cylinder and piston. Refer to the individual sections for repair procedures.

Removing the Engine

1. Raise the golf car body.

WARNING

Disconnect the battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.

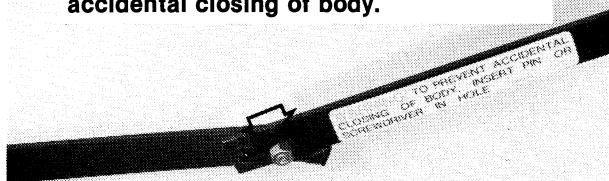
FUEL MIXTURE TABLE — 85 Parts Gas to 1 Part H-D Golf Car Oil

U.S. Gal. Gas	1/2	1	2	3	4	5	6	7	8	9	10	25	50	85	100
H-D Oil amount	3/4	1-1/2	3	4-1/2	6	7-1/2	9	10-1/2	12	13-1/2	15	37-1/2	75	128	150
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
1 U.S. pint = 16 oz. 1 U.S. quart = 32 oz. 1 U.S. gal. = 128 oz.												1 qt. 4-1/2 oz.	2 qt. 11 oz.	1 gal.	1 gal.
1 liter = 33.82 oz. 1 Imp. gal. = 143.7 oz. 1 Imp. gal. = 1.2 U.S. gal.															22 oz.

1719

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.



1701

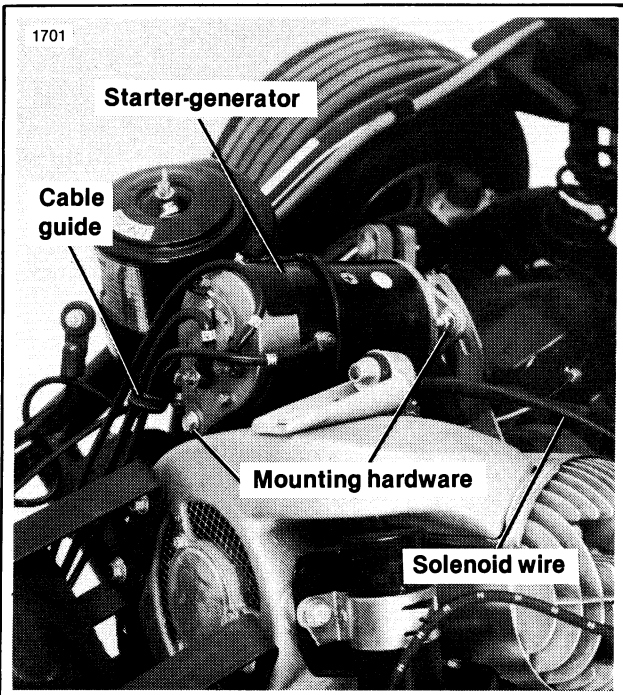


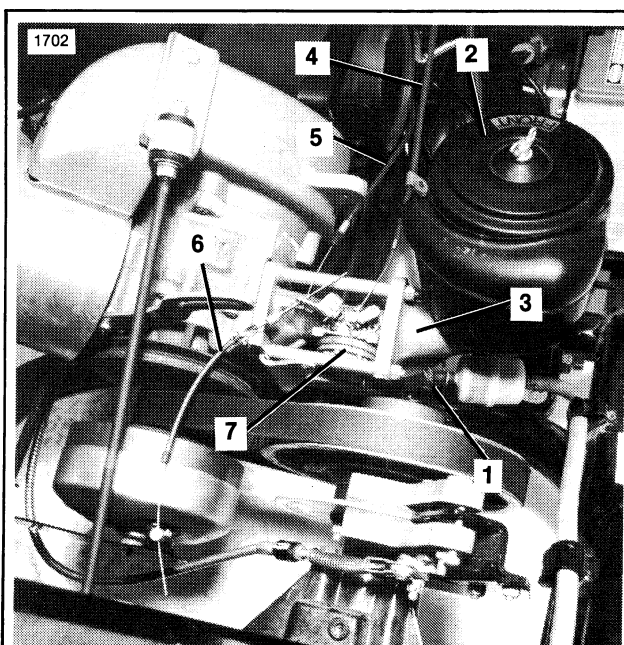
Figure 5-1. Starter-Generator Mounting

2. Disconnect the wire, leading from the starter motor to the solenoid, at the solenoid. Remove the cable guide and starter-generator from the engine and place them on the car front floorboard. See Figure 5-1.

3. See Figure 5-2. Cut the cable strap securing the fuel line to the air cleaner mounting bracket. Remove the air cleaner and mounting bracket. Disconnect the carburetor controls and fuel line. Disconnect the choke, throttle and governor bracket. Disconnect the coil wire.

4. Remove the V-belt as described in Section 7.

1702



- | | |
|---------------------|-------------------|
| 1. Cable strap | 5. Throttle cable |
| 2. Air cleaner | 6. Governor cable |
| 3. Mounting bracket | 7. Carburetor |
| 4. Choke cable | |

Figure 5-2. Air Cleaner/Carburetor Mounting

5. Remove the four muffler mounting bolts. Disconnect the exhaust pipe from the cylinder and remove the exhaust system as an assembly.
6. See Figure 5-3. Disconnect the stabilizer from the engine. Remove the four engine mounting bolts. Remove the engine from the frame.
7. Remove the carburetor and manifold assembly and place it to one side.

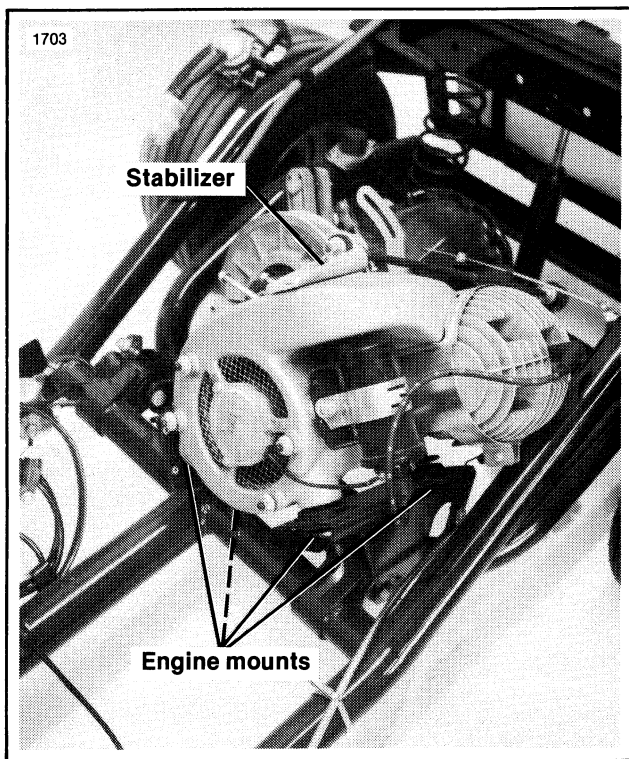


Figure 5-3. Engine Mounting

Cleaning, Inspection and Repair

1. The following sub-sections contain all the procedures necessary for repairing the engine components. Refer to the appropriate section for cleaning, inspection and repair procedures.
2. Inspect the engine mounts and rivets. Replace any that appear loose, worn or broken.

To replace the engine mount, drill out the rivets and remove the mount. Install a new mount using new pop rivets.

Installing the Engine

1. Install the carburetor/manifold assembly and air cleaner. See Section 6.
2. See Figure 5-3. Place the engine in the frame. Secure the engine to the mounts using the original hardware. Tighten the bolts and nuts to 30-35 ft-lbs (4.1-4.8 kgm) torque.
3. Connect the stabilizer to the top of the engine. Adjust the stabilizer so there is no pressure on the rubber mounts, then tighten the locknuts.
4. Install the exhaust assembly using a new manifold gasket.

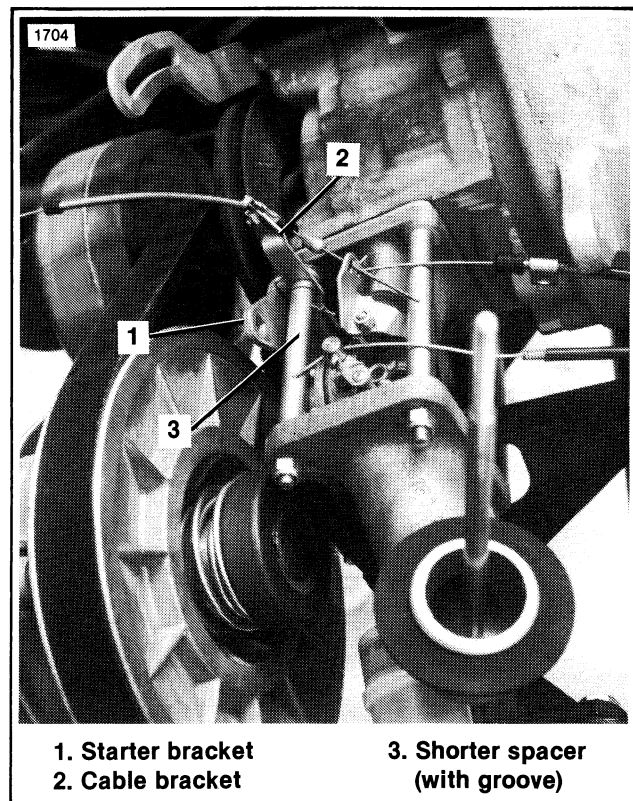


Figure 5-4. Carburetor Mounting

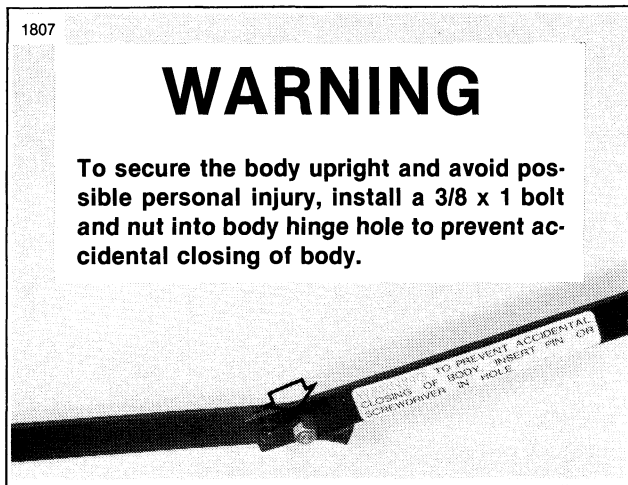
5. Install the new belt by placing it on the primary flange first and then rolling it on the secondary flange. Install the carburetor rear mounting spacers.
6. See Figure 5-4. Install the starter mounting bracket and cable bracket on the upper rear stud. One of the spacers is shorter than the other three to facilitate the mounting brackets. It is identified by a groove and should be installed in this location.
7. See Figure 5-2. Install air cleaner assembly. Secure the fuel line to the carburetor. Attach the fuel line to the bottom of the air cleaner bracket with a cable strap. Do not overtighten cable strap or fuel supply will be restricted. Install the carburetor control cables.
8. See Figure 5-1. Install the starter-generator and cable guide. Connect the solenoid wire to the solenoid.
9. Reconnect the battery and lower the body.
10. Check for fuel leaks, etc. See the FUEL Section.
11. Check the ignition timing. See the ELECTRICAL Section.

NOTES

CYLINDER AND PISTON

DISASSEMBLY

1. Raise the golf car body.



WARNING

Disconnect the battery cables (negative cable first) to avoid accidental start-up of the vehicle and possible personal injury.

2. Remove the exhaust system.
3. Disconnect the spark plug wire from the plug.

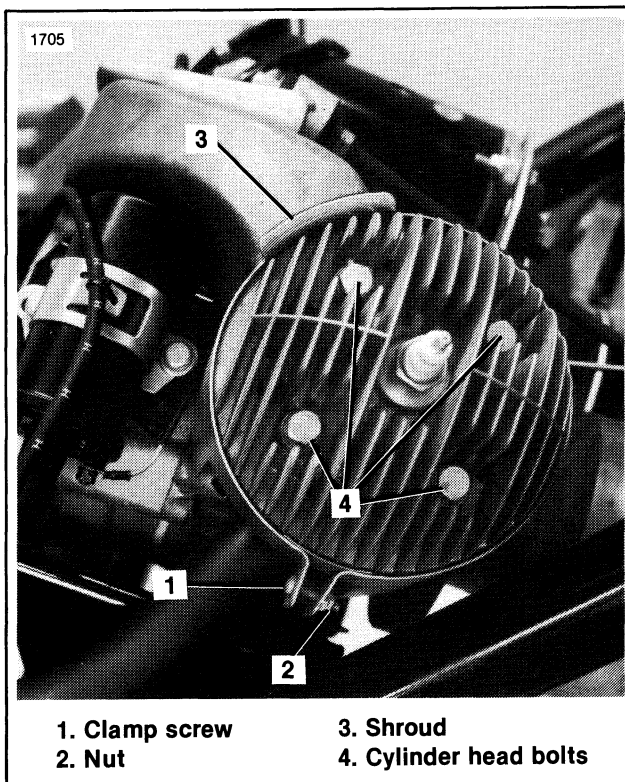


Figure 5-5. Cylinder Head Mounting

4. See Figure 5-5. Remove the clamp screw, nut and shroud. Remove the four bolts and cylinder head.
5. Turn the engine over until the piston is at top dead center. Lift the cylinder far enough to place a rag into the crankcase opening, this will prevent any foreign matter from getting into the crankcase. Remove cylinder.
6. If rings are to be replaced, remove the top piston ring, then the 2nd and 3rd rings.

NOTE

Before removing piston, check to see if the connecting rod is bent, if bent rod is suspected, using the CONNECTING ROD HOLDING PLATE, Part No. 94403-80, place the plate under the piston as shown in Figure 5-6. If the carburetor side or exhaust side of the piston fail to seat squarely on the plate, the rod is bent and must be replaced. See CRANKCASE.

7. See Figure 5-7. Remove both piston pin lock rings using an internal snap ring pliers. Heat the piston pin bosses and remove the pin by drifting it out using the PISTON PIN TOOL, Part No. 96777-72.

WARNING

Gas and oil under certain conditions are extremely flammable and combustible when heating the piston, keep flame and sparks away from gas tank. Also, do not point flame into cylinder.

CAUTION

Support piston and connecting rod so rod is not bent while removing the piston pin.

8. Remove the cylinder base gasket.

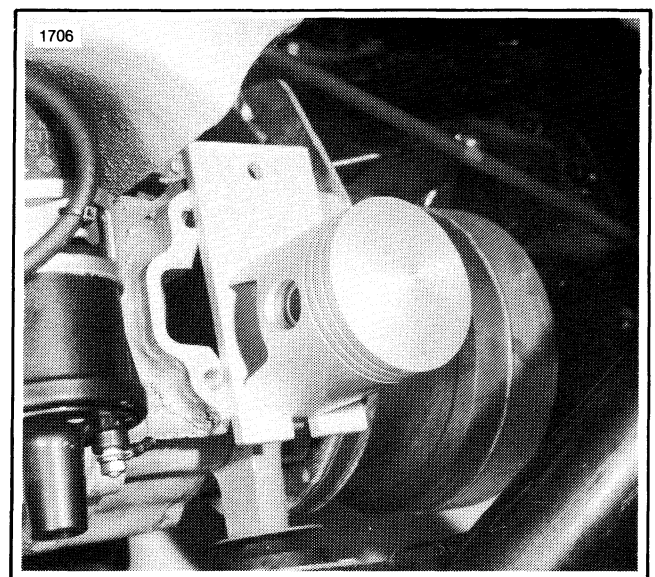


Figure 5-6. Checking Piston and Connecting Rod Squareness

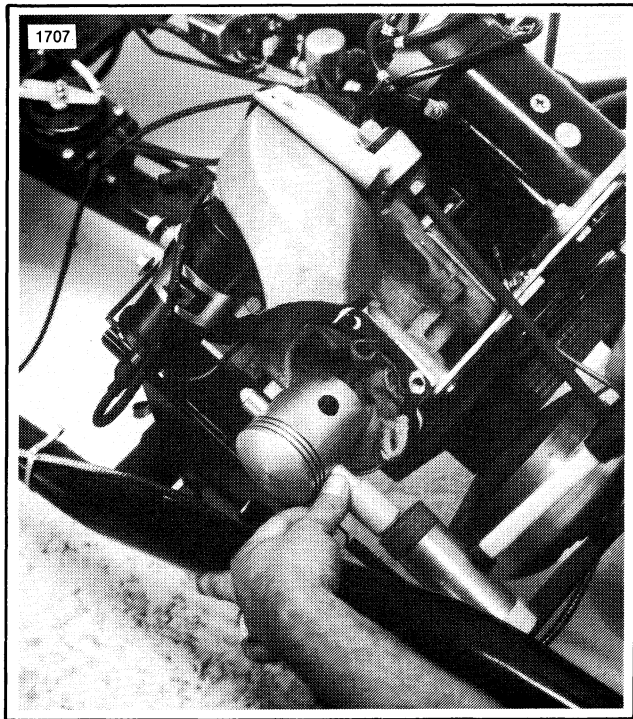


Figure 5-7. Removing the Piston

CLEANING AND INSPECTION

Cylinder Head

1. Clean the head with a non-flammable solvent.
2. Bead blast or scrape carbon deposits from head. When scraping carbon, be careful to avoid scratching or nicking the cylinder head, combustion chamber or joint faces.
3. Remove the spark plug and inspect spark plug port threads for damage. If threads are damaged, replace the head.
4. Smooth any rough spots in the combustion chamber using a small grinder. Sharp edges in the combustion chamber may cause pre-ignition. DO NOT remove any more material than is necessary or change the shape of the combustion chamber.

Cylinder

1. Wash thoroughly in a non-flammable solvent.
2. Inspect the cylinder walls for gouging or scoring. Scored cylinders will require refinishing to oversize.
3. Scrape carbon and lead deposits from the exhaust port and top of cylinder bore. Be careful to avoid damaging the cylinder.

Piston

1. Wash thoroughly in a non-flammable solvent.
2. Remove the rings and clean all deposits from the ring grooves.
3. Check to make sure the piston ring locating pins are not loose in the piston. If they are loose, replace the piston.

NOTE

A used piston ring, broken in half and ground to a chisel point, can be used to clean the ring grooves. Use caution not to damage the locating pins.

4. Scrape carbon and lead deposits from the top of the piston. Be careful not to gouge the aluminum.

REPAIR

Measure piston and cylinder to determine if they are worn to the point where cylinder must be rebored and an oversize piston installed.

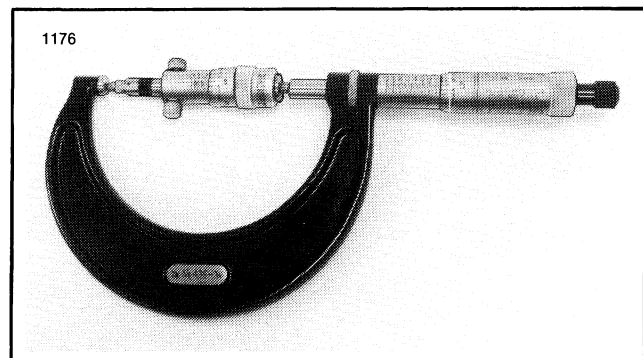


Figure 5-8. Adjusting Micrometers

NOTE

Inside and outside micrometers should be checked and adjusted to read exactly the same as shown in Figure 5-8.

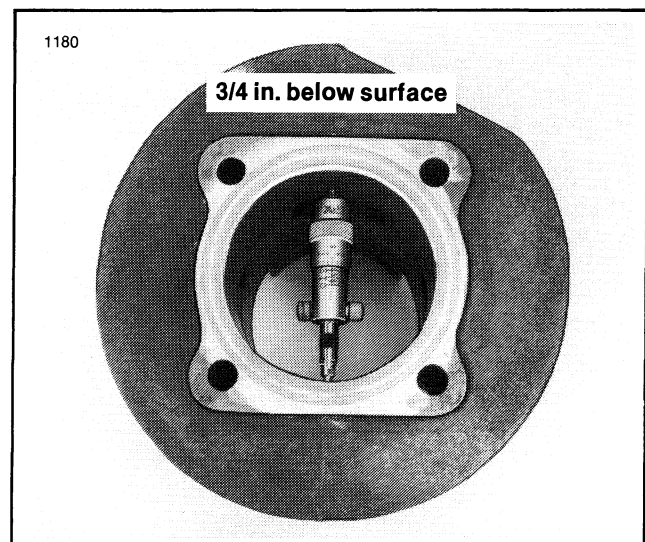


Figure 5-9. Measuring Cylinder Near Top

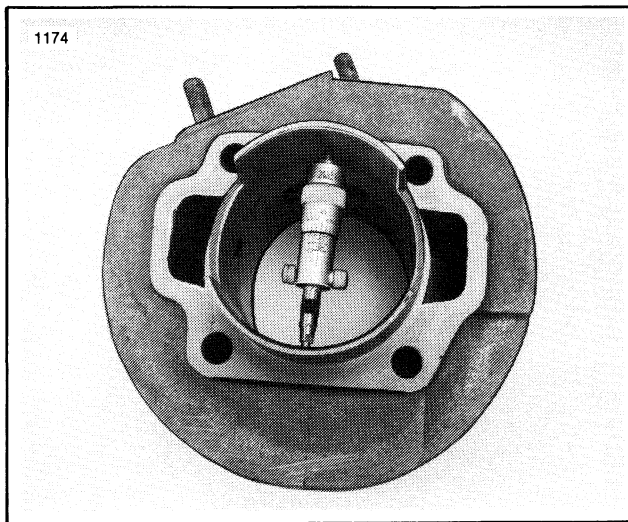


Figure 5-10. Measuring Cylinder 1 1/2" From Bottom

Measuring Cylinder and Piston

1. If cylinder is in good condition, remove cylinder wall glaze with a No. 220 grit hone.
2. See Figure 5-9. Take cylinder bore measurement 3/4 in. from top of bore, measuring from front to rear, then left to right. Record the measurements.
3. See Figure 5-10. Take cylinder bore measurement 1-1/2 in. from bottom of bore, measuring from front to rear, then left to right. Record the measurements.
4. See Figure 5-11. Measure piston 3/8 in. below bottom ring groove, 90° from piston pin bore.
5. If the difference between front-to-rear and left-to-right measurements exceed 0.001 in., the cylinder is out of round, and should be refinished to the next O.S. piston.
6. If the measurements in Step 3 vary more than 0.0015 in. from the measurements in Step 2, the cylinder has excessive taper and should be refinished to the next O.S. piston.

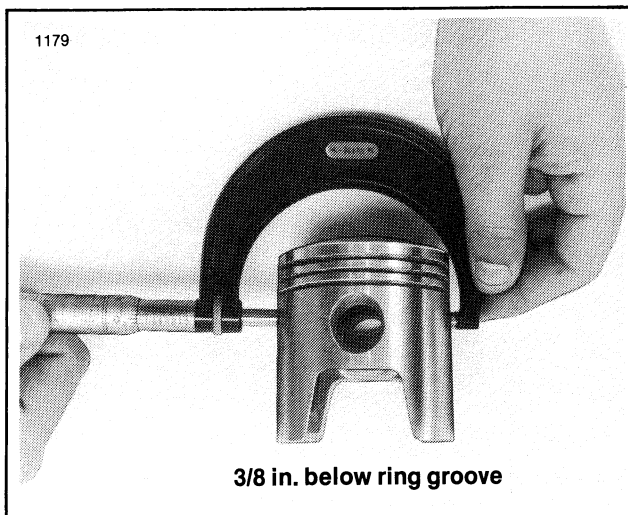


Figure 5-11. Measuring Piston

7. Subtract the measurement in Step 4 from Step 2 to obtain piston-to-cylinder clearance. If it exceeds 0.010 in., cylinder clearance is excessive and should be refinished to the next O.S. piston.
8. If piston and cylinder are out of specifications (see specifications) proceed to FITTING PISTON IN CYLINDER. If they are within specs and not scored, new rings may be fitted after cylinder is refinished.

Fitting Piston In Cylinder

Pistons are available in standard, .010, .020, .030 and .040 in. oversize. The cylinder may be bored and final honed, or rough honed and final honed to fit any of the above pistons. Piston-to-cylinder clearance is .006-.007 in. See MEASURING CYLINDERS AND PISTON.

Always measure the piston to be used in any given cylinder before machining because the cylinder must be final honed to match the piston.

NOTE

Harley-Davidson does not recommend the use of spring tension cylinder hones. Use a high quality expandable rack hone such as SUNNEN No. AN-111.

1. Measure the cylinder to determine smallest size piston that can be used.
2. Measure new piston 3/8 in. below bottom ring groove, 90° from piston pin bore.
3. Bore or rough hone cylinder .003 in. larger than piston being used.
4. Final hone the cylinder the last .003 in. to achieve desired piston clearance of .006 in.

EXAMPLE	
Actual piston diameter (As measured)	2.749
Add clearance desired	+ .006
Final bore size after finish honing should be	2.755
First	
Bore or rough hone	2.755
Cylinder to .003 inch	- .003
Less than final bore size	2.752
Then	
Finish hone cylinder the	2.752
Last .003 inch to reach	+ .003
The final bore size of	2.755

5. Chamfer all edges of cylinder ports with a hand grinder to .010-.030 in. wide to prevent rings from catching on ports during operation.
6. After honing the cylinder, wash it in warm water with a strong soap or detergent and dry thoroughly with compressed air to remove any abrasives from the pores in the cylinder. **DO NOT WASH IN SOLVENT.** Solvent will allow any abrasives to work even deeper into the pores. Any abrasives not removed will cause a lapping action on both the piston and rings resulting in rapid wear.
7. Coat the cylinder with 2-cycle oil to provide lubrication and prevent rust.

NOTE

Once the cylinder and piston have been fitted, keep them together as a matched set to ensure proper clearance.

Piston Rings

New piston rings should always be used whether a new or used piston is being installed.

The three rings are identical. They are plain rings with stepped ends, located in the piston grooves with pins. Rings are available in .005, .010, .020, .030 and .040 in. If cylinder and piston are worn only slightly (not enough to oversize), .005 in oversize rings may be installed. Before installing new rings, perform the following steps:

1. See Figure 5-12. Check the side clearance of the rings in the piston grooves using a feeler gauge. Side clearance should be .002-.004 in.
2. See Figure 5-13. Check the ring gap clearance as shown. Place a ring in the cylinder, 1/2 in. from the

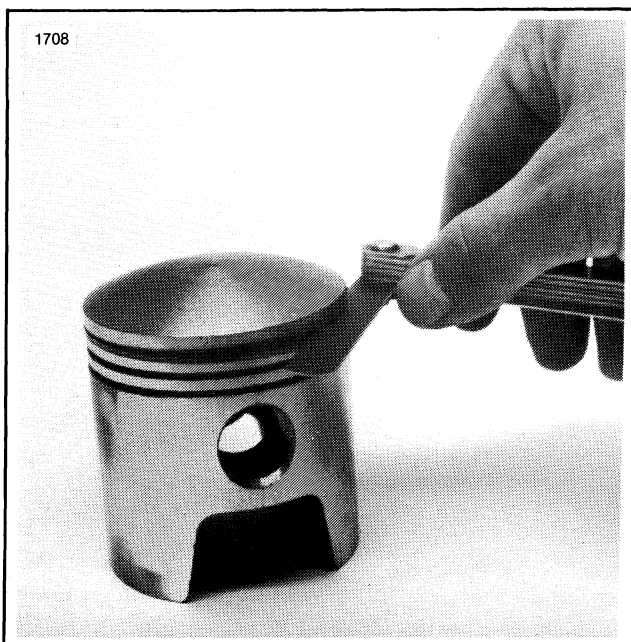


Figure 5-12. Checking Ring Side Clearance

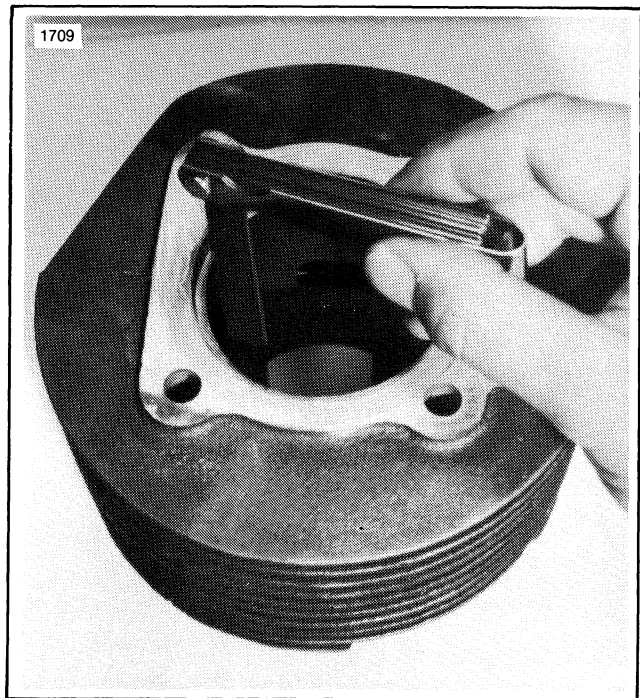


Figure 5-13. Checking Ring End Gap

top. Ring gap should be .007-.017 in. If ring gap is less, ring ends could butt against each other when the ring expands. This will cause the rings to break, damaging the cylinder and piston. Ring gaps may be increased by carefully filing excess material from ring ends.

CAUTION

Notch for ring retaining pin must also be enlarged if ring ends are filed.

Piston Pin and Bearing

1. The piston pin fit in the piston is .0001 in. at 72°. If the pin is too loose in the piston, both piston and pin must be replaced. Pistons and pins come as matched sets, so pins are not available in oversize.
2. The piston pin fit in the connecting rod is .0002-.001 in. (loose). When the pin fit exceeds these specs, replace the piston and pin along with the needle bearing in the connecting rod. Procedures for replacing the needle bearing are in the CRANKCASE section under CLEANING, INSPECTION AND REPAIR.

ASSEMBLY

The dome of the piston has EX stamped on it. The side of the piston with these letters must face to the exhaust port. This positions the hole in the piston skirt towards the intake.

1. Install a new lock ring into the piston. **DO NOT** use old rings because they are stretched during disassembly. Make sure ring seats firmly in the groove.
2. Lightly coat the connecting rod bearing and piston pin with 2-cycle oil. Heat the piston at the pin bosses and install it and the pin on the connecting

rod using the PISTON PIN TOOL, Part No. 96777-72. Tap piston pin into place with tool and a hammer.

CAUTION

Always pre-heat piston before installing piston pin otherwise piston damage may occur.

3. Install a new second lock ring in the other piston pin groove. Make sure retaining ring seats firmly in the groove.

CAUTION

One side of each piston pin retaining ring is flat. Install the ring with the flat side facing outward.

4. Install the piston rings on the pistons. Install the bottom ring first, then the 2nd groove ring and then the top ring. Make sure the locating pin in each ring groove is positioned in the ring gap. Also, be careful not to over-expand or twist the rings during installation.
5. Remove all traces of old gasket from the crankcase and cylinder mating surfaces. Place gasket in position on the crankcase.
6. Apply a light coat of oil to the piston rings. Carefully work the cylinder down over the piston. Compress each ring, one at a time, as the cylinder is slipped into position. The cylinder base is chamfered to assist in compressing the rings.

CAUTION

Do not turn or twist the cylinder when installing it or the piston rings may break.

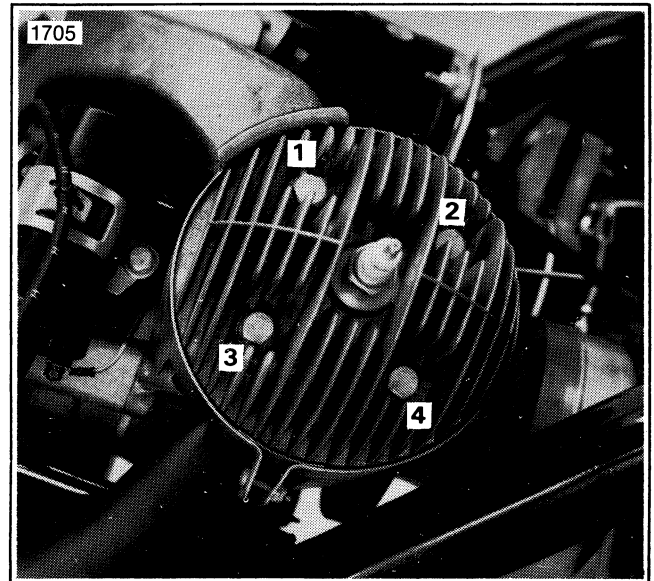


Figure 5-14. Head Bolt Torque Sequence

7. Clean the cylinder and cylinder head mating surfaces. Apply a very thin coat of Loctite® Stainless Steel Pipe Sealant with Teflon, to head surface with fingertip and install the cylinder head and bolts. See SPECIFICATIONS at the beginning of the section for cylinder head bolt torque. Position head with fins vertical. See Figure 5-14 for cylinder head bolt torque sequence. Tighten diagonally, 10 ft-lbs at a time.
8. See Figure 5-5. Install the shroud, nut and screw. Install the spark plug and tighten it to the proper torque. See SPECIFICATIONS.
9. Install the exhaust system along with new manifold gasket.
10. Re-connect the spark plug wire and battery cables.
11. Test run. Check for leaks. Check exhaust and compression.

NOTES

CRANKCASE

DISASSEMBLY

General

1. Remove the engine from the chassis as described under GENERAL INFORMATION.

NOTE

When the crankcase is disassembled it is recommended that all seals and bearings in the case and rod be replaced. Seals and bearings are damaged when removed.

2. Remove the transmission primary drive as described in Section 7.
3. Remove the cylinder and piston as described under CYLINDER AND PISTON.
4. Remove the coil and ignition system as described in Section 8.

Fan-Flywheel

5. See Figure 5-15. Remove the three screws securing the fan housing to the crankcase.
6. See Figure 5-16. If the fan is to be replaced, remove the screws (1) and fan (2). Remove the cam (3) and screws (4).

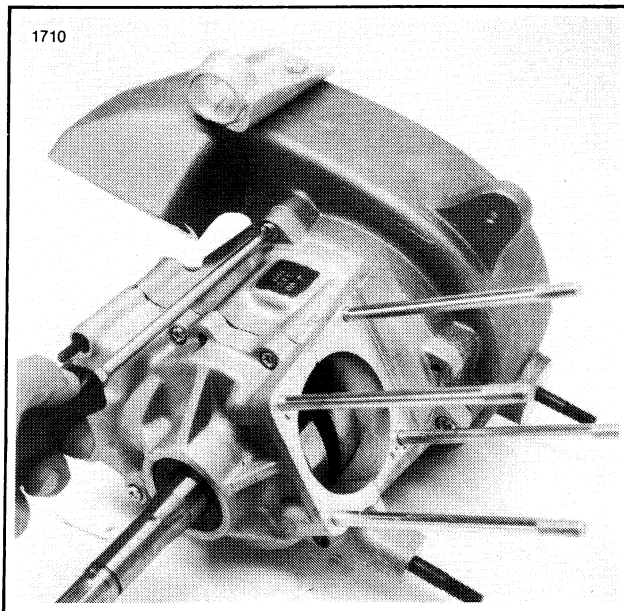


Figure 5-15. Fan Housing Mounting

7. See Figure 5-17. Place the CONNECTING ROD HOLDING PLATE, Part No. 94403-80, under the rod upper end and remove the nut.
8. See Figure 5-18. Remove the flywheel using FLYWHEEL PULLER, Part No. 97336-80.

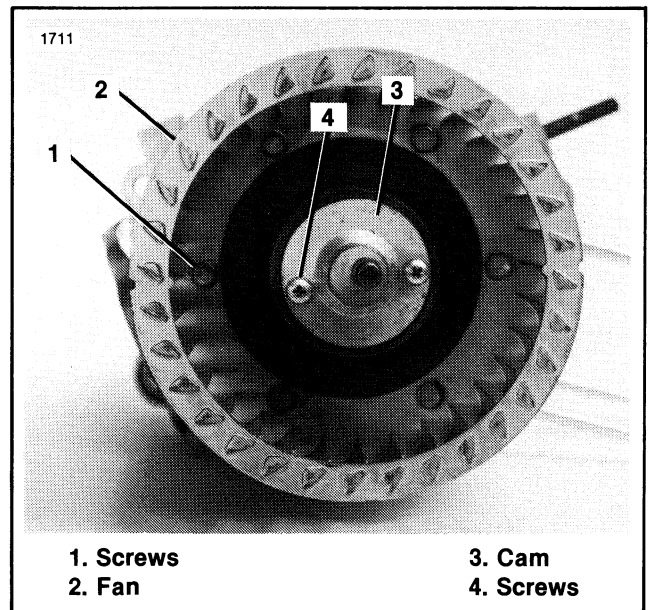


Figure 5-16. Fan And Cam Mounting

NOTE

You do not have to remove the fan to pull the flywheel.

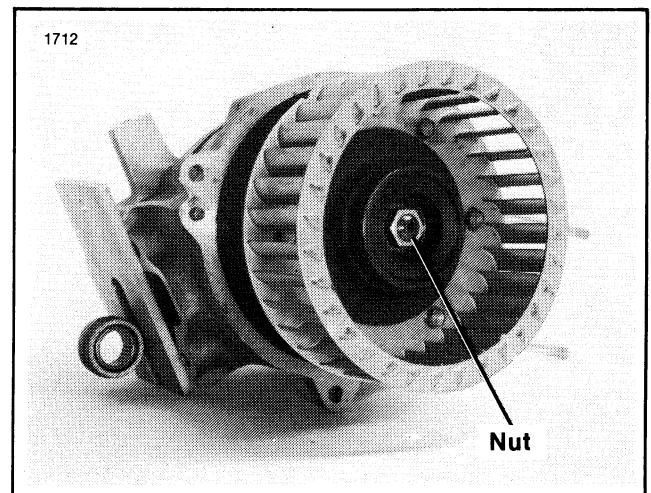


Figure 5-17. Removing Flywheel Nut

NOTE

If the flywheel does not break loose, the flywheel area directly around the taper should be heated. If after both heating the flywheel and tightening the center screw, the flywheel still will not break loose, remove the fan and strike the flywheel on the outside with a copper mallet. (See Figure 5-19).

WARNING

Gas and oil, under certain conditions, are extremely flammable and combustible. Keep all sparks and flames away from the fuel tank.

1396

Align center screw on end of shaft and flywheel.
Install shells in grooves found on flywheel and center screw.

Slide sleeve over center screw and shells to lock in place.

Tighten the screw until flywheel breaks loose.

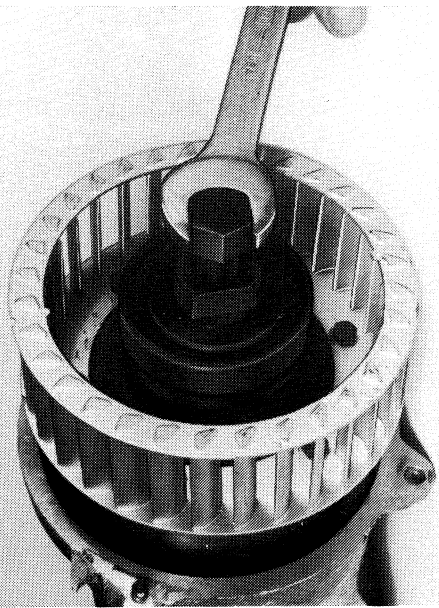


Figure 5-18. Proper Procedure For Flywheel Tool

Fan (need not be removed to use the tool)

Heat this area

Fan-flywheel removing tool

Cast iron flywheel

If heating does not loosen flywheel remove fan and strike this area with a copper mallet.

Figure 5-19. Puller Tool Installed

1713

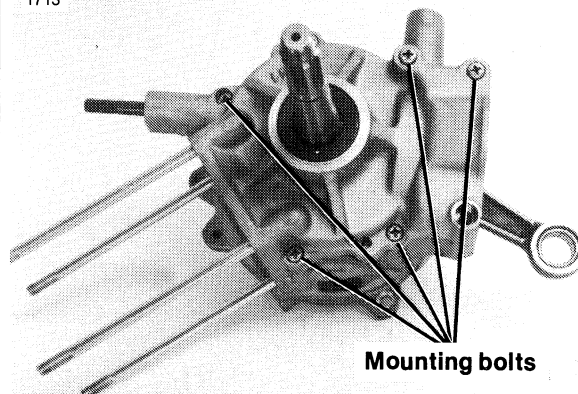


Figure 5-20. Crankcase Screws

CAUTION

Do not strike the center screw of the tool with a hammer or mallet as it will damage the screw thread and shorten the life of the tool or damage the crankshaft.

Crankcase

9. See Figure 5-20. Remove the crankcase screws. Tap lightly on the motor mount bases and separate the crankcase halves.
10. See Figure 5-21. Remove the retaining ring from the circuit breaker shaft. Support the fan side of the crankcase on a press bed and press the crankshaft assembly from the case, 300-350 lbs of force may be required.
11. See Figure 5-22. In some instances, the inner bearing and seal will be forced from the case and remain on the crankshaft. Place a WEDGE ATTACHMENT, Part No. 95637-46, under the seal and support on a press bed. Press the shaft from the bearing and seal.

1371

Press

Remove retaining ring

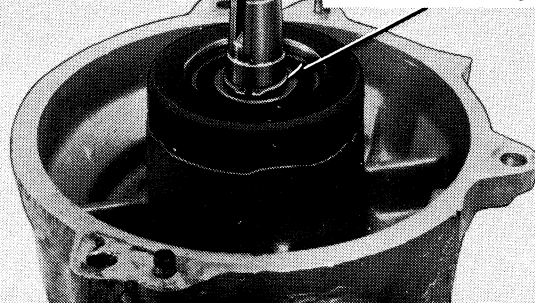


Figure 5-21. Press Crankshaft From Case

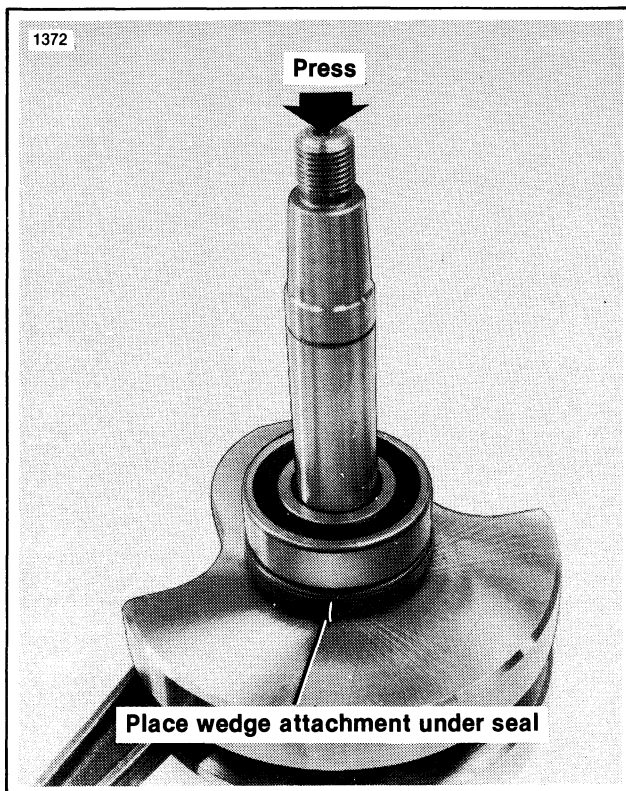


Figure 5-22. Press Crankshaft From Inner Bearing

See Figure 5-23. If the bearing and seal remain in the case, remove bearings and the seal using a brass drift and hammer.

NOTE

If there are any shims under the outer bearing, retain them for re-assembly.

12. Using a suitable press plug, press the needle bearing and seal out of the right crankcase half. A tool may be made as shown in Figure 5-24.

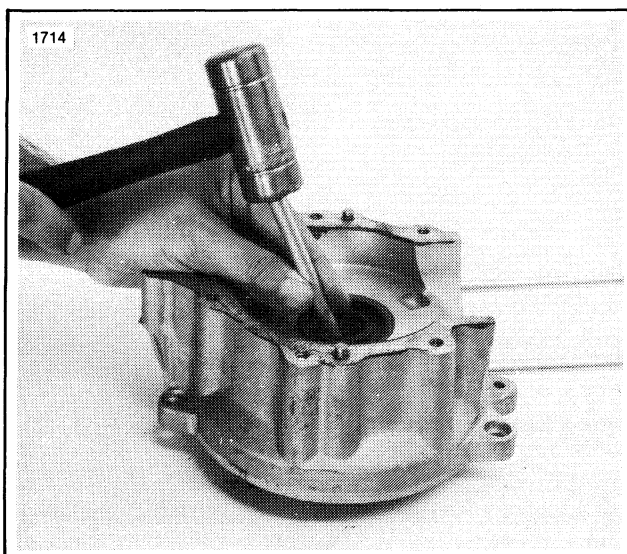


Figure 5-23. Removing Bearings From Case

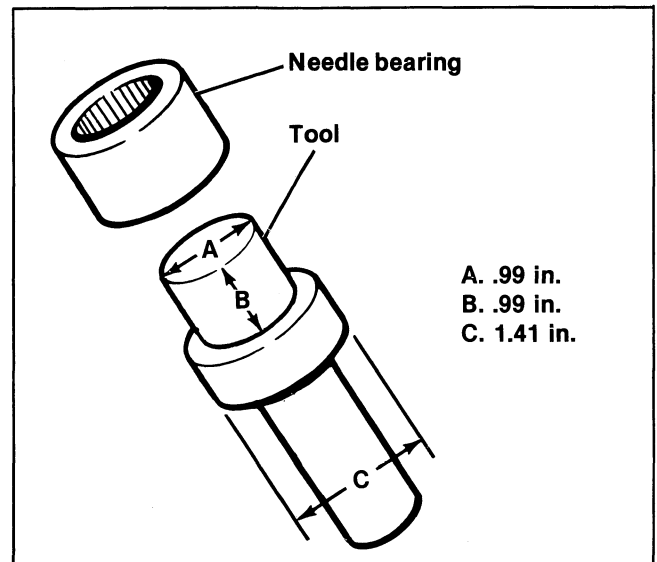


Figure 5-24. Needle Bearing Tool

Crankshaft (Figure 5-25)

13. Fabricate a press plate that will fit between the crankshaft (12, 13). Using a suitable press plug, press the crank pin (15) from one crankshaft.
14. Remove the washers (16), connecting rod (18) and bearing (17) from the crank pin.
15. Press the crank pin from the other crankshaft.

CLEANING, INSPECTION AND REPAIR

1. Clean all parts in a non-flammable solvent and blow dry with compressed air.
2. See Figure 5-25. Examine the rod (18), washers (16) and crankshaft halves (12, 13). Replace them if they appear worn, grooved or damaged.

ASSEMBLY

Crankshaft

NOTE

All needle bearings should be installed by pressing on the lettered side of the bearing.

1. If replacing the bearing, press the needle bearing (19, Figure 5-25) from the connecting rod. Coat a new needle bearing with 2-cycle engine oil and press it into the connecting rod upper end. See Figure 5-26. On some engine assemblies, the bearing and connecting rod each have a lubrication hole. These holes must be aligned when the bearing is installed.

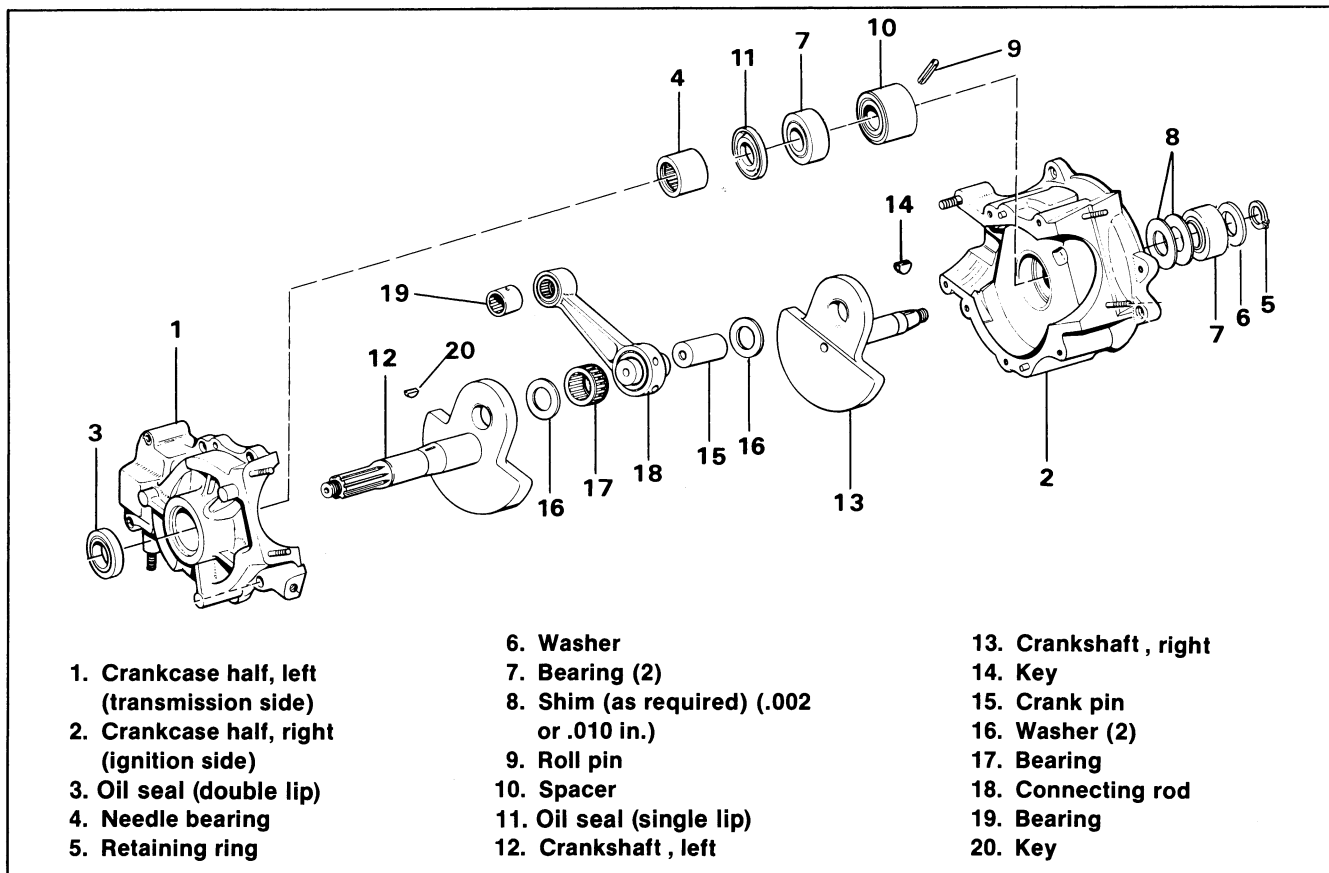


Figure 5-25. Crankcase Assembly — Exploded View

2. See Figure 5-28. Place one crankshaft on a press bed and press the crank pin in until it is flush with the outside surface of the crankshaft.
3. See Figure 5-24. Install bearing (17) and connecting rod on the crankpin (18) with one thrust washer (16) on each side of the rod.
4. See Figure 5-27. Place the other crankshaft on the pin. Align the two crankshafts using a straight-edge, then press the crankshaft assembly together until correct connecting rod side play is achieved. See SPECIFICATIONS at the beginning of this section. Check side play using a feeler gauge. Lubricate the pin (15) and a new bearing (17) with 2-cycle engine oil.

Truing Crankshaft

5. Using a truing device, lathe centers, vee blocks and dial indicators (not shown) check shaft run-out as shown in Figure 5-29.

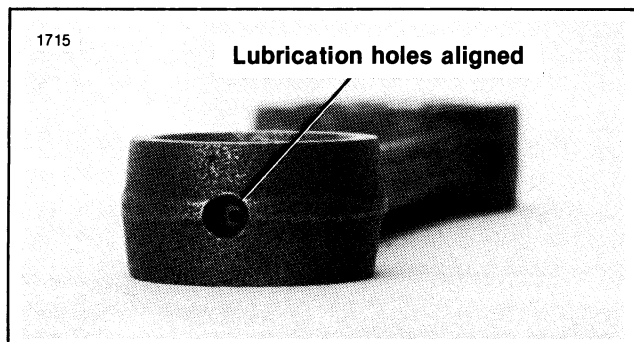


Figure 5-26. Connecting Rod And Bearing Lubrication Hole

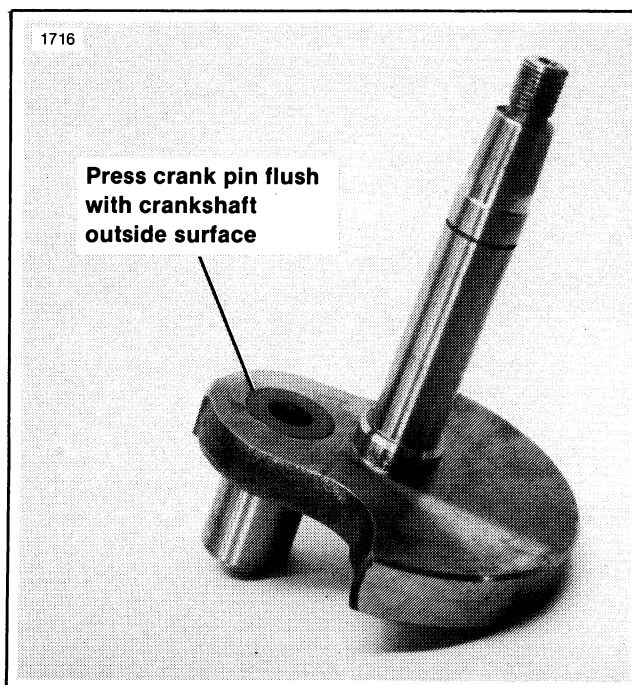


Figure 5-27. Installing Crank Pin

Shafts must run true within .002 inches on fan side and .004 inches on clutch side. See Figure 5-30. and correct flywheel alignment as follows:

- A. If the shafts run high as the crank pin passes the indicators, mark high spots with chalk, remove crank from truing device, position hard wood wedge as shown and strike wedge. Remove wedge and take another reading. If the same condition exists, repeat operation.
- B. If the shafts run high as the crank pin passes directly opposite the indicators, install a C clamp on the bottom of the crank throw and apply pressure on C clamp. Remove C clamp and take another reading. Repeat if same condition exists.

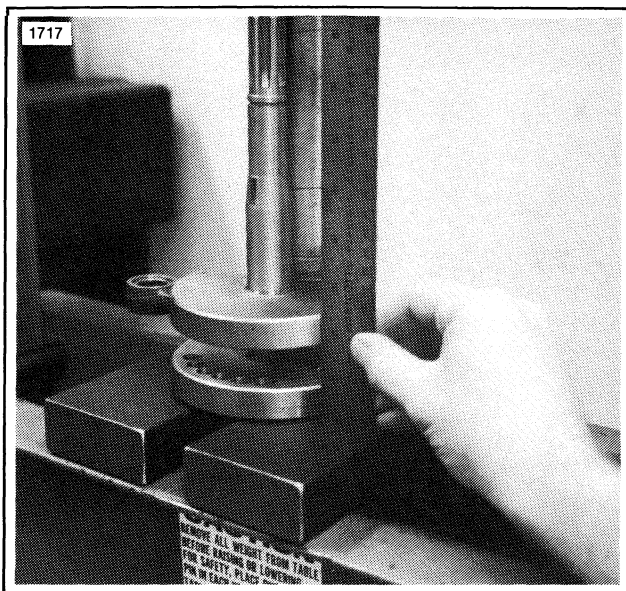


Figure 5-28. Aligning Crankshaft

- C. If one shaft runs high and the other low as the crank pin passes 90° from the indicators, mark the high crank throw at point closest the indicator and remove crankshaft assembly from truing device. Hold crankshaft assembly firmly in one hand and strike the marked crank throw on the mark, firmly with a copper hammer, a steel hammer will damage crankshaft. Reinstall assembly in truing device and take another reading. Repeat above procedure if same condition exists. Recheck connecting rod side play.

Crankcase

6. See Figure 5-30. Install the original shims (if any) and a new outer bearing into the crankcase right half.
7. See Figure 5-31. Press a new inner bearing into the case and install a new oil seal so the lip side of the seal faces to the inside of the case. Press bearing in until it rests against spacer.

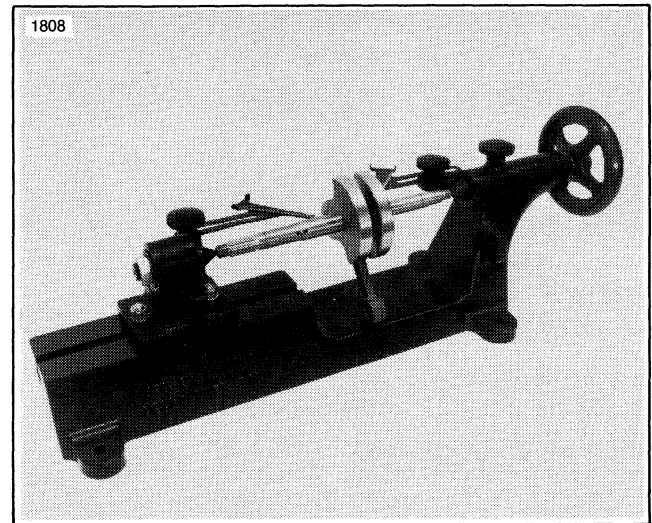


Figure 5-29. Checking Crankshaft Runout

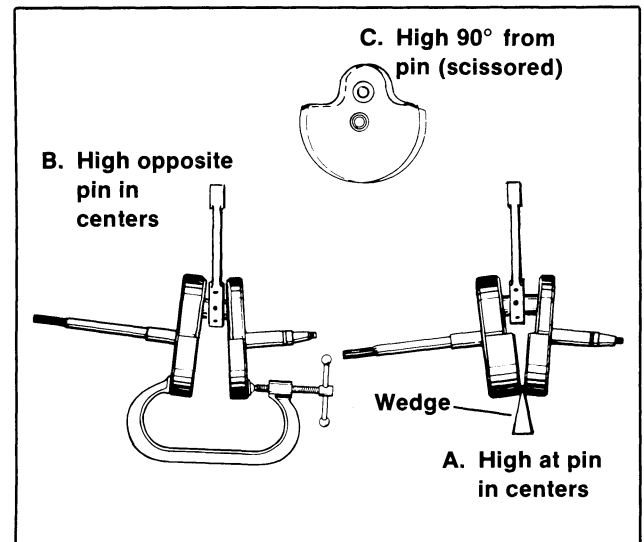


Figure 5-30. Correcting Crankshaft Misalignment

8. See Figure 5-24. Install the crankshaft assembly into the case right half (2) and install the washer (6) and retaining ring (5) onto the shaft.

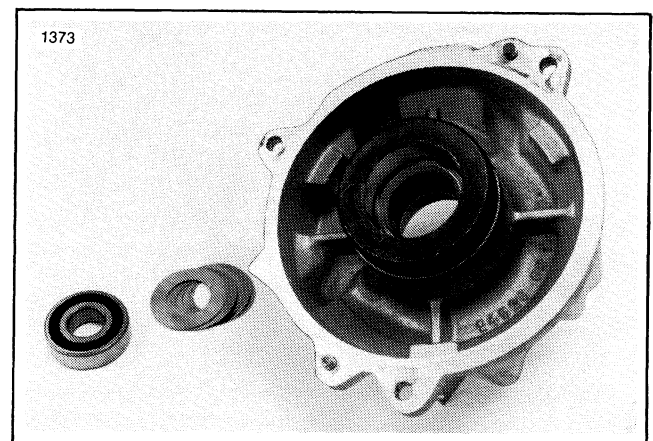


Figure 5-31. Install Shims And New Outer Bearing

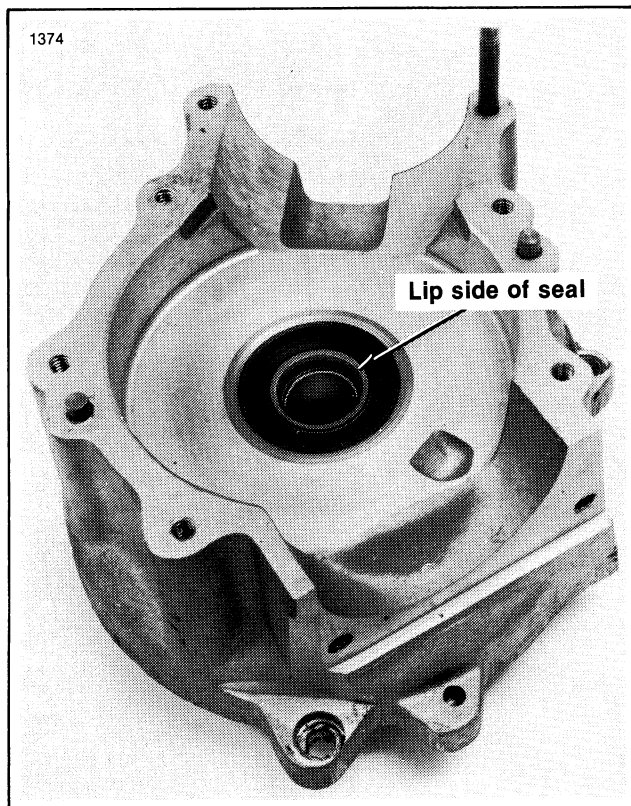


Figure 5-32. Install New Inner Bearing And Seal

9. See Figure 5-32. Measure the crankshaft end play with a dial indicator by moving crankshaft in and out of case as far as it will go. End play should be .001-.005 in. End play is increased by removing shims (8, Figure 5-25), or decreased by adding shims. When correct end play is achieved, remove the crankshaft.

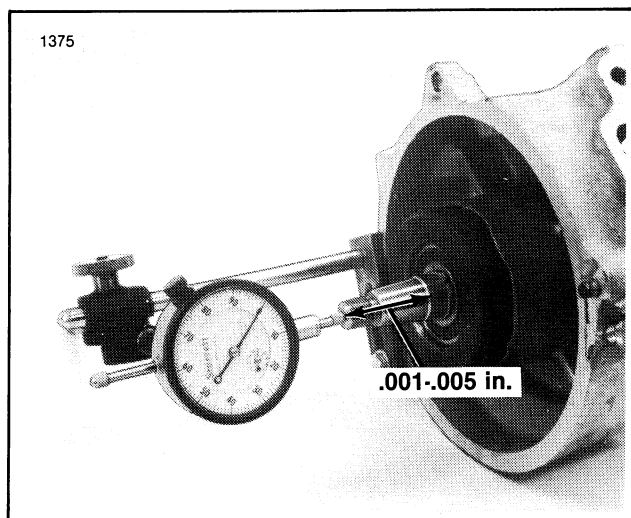


Figure 5-33. Measure And Adjust End Play

10. See Figure 5-33. Clean crankshaft with a lacquer thinner to remove all traces of oil. Polish both crankshaft ball bearings inner race surfaces with #400 wet or dry paper. Now clean and prime the ignition side of the crankshaft and bearing inner races

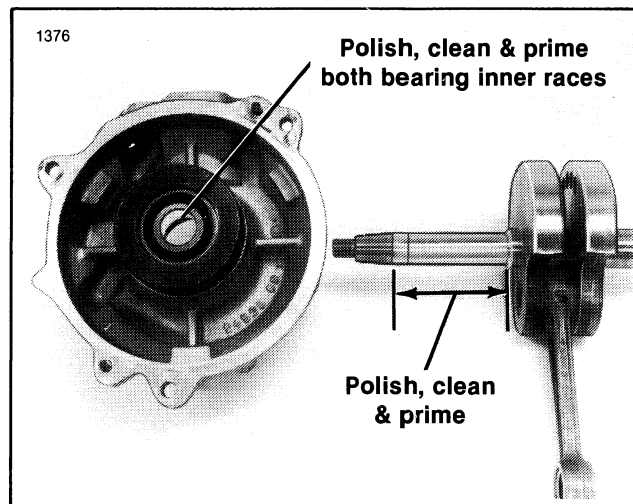


Figure 5-34. Polish, Clean And Prime As Shown

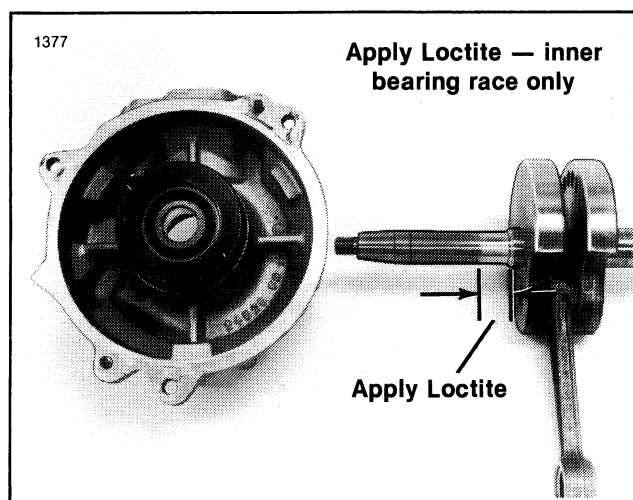


Figure 5-35. Apply Loctite As Shown

with Harley-Davidson KLEEN AND PRIME, Part No. 99634-80 (Grade T).

NOTE

It is very important to perform Step 9 on ALL crankshafts, old or new, before proceeding to Step 10. New crankshafts are coated with a rust preventative which must be removed as described in Step 9.

11. See Figure 5-34. Apply Harley-Davidson SLEEVE RETAINER, Part No. 99628-77 (Loctite 601 or 640) sparingly to the inner race of the outer bearing and to the crankshaft as shown.

CAUTION

Do not apply Loctite to needle bearing or transmission side of crankshaft.

12. See Figure 5-24. Install the crankshaft into the case right half (2). Install the washer (6) and a new retaining ring (5). Allow the Loctite to cure for 24 hours.

CAUTION

One side of the retaining ring is flat. Install the ring with the flat side facing outward. This will prevent the ring from coming out of the groove. A new ring should always be used during assembly because the old ring becomes stretched during disassembly.

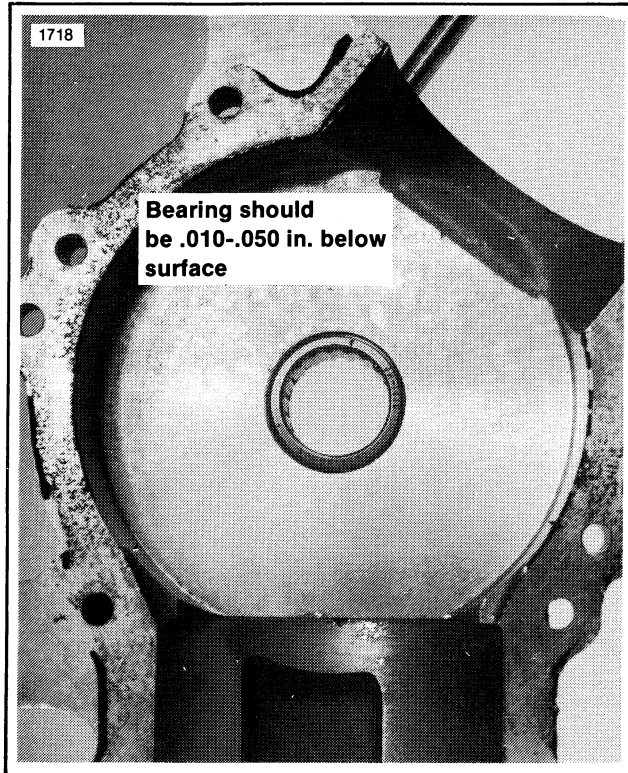


Figure 5-36. Install Crankcase Needle Bearing

13. See Figure 5-36. Install a new needle bearing into the case left half. Bearing should be pressed from inside the case so it is .010-.050 in. below the surface.

Install a new oil seal into the left case half. Lip side of seal should face toward the crankshaft.

14. Coat the case halves mating surfaces with 3M-800 INDUSTRIAL SEALER. Secure the case halves together with the original screws as shown in Figure 5-20.

Fan-Flywheel

15. See Figure 5-17. Place the flywheel key and flywheel onto the crankshaft. Place the CONNECTING ROD HOLDING TOOL under the connecting rod upper end and tighten the nut to proper torque. See SPECIFICATIONS.

16. See Figure 5-16. Install the cam (3), screws (4), fan (2) and screws (1). See SPECIFICATIONS for torques.

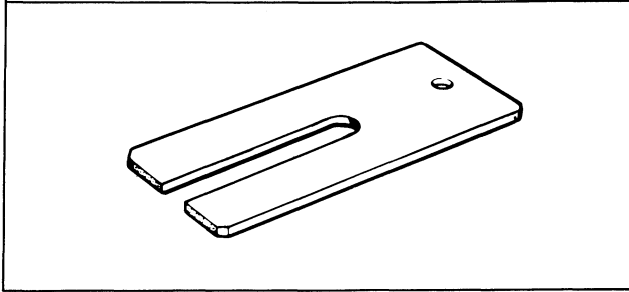
See Figure 5-15. Secure the fan housing to the case using the original screws. See the SPECIFICATIONS at the beginning of this section for torques.

General

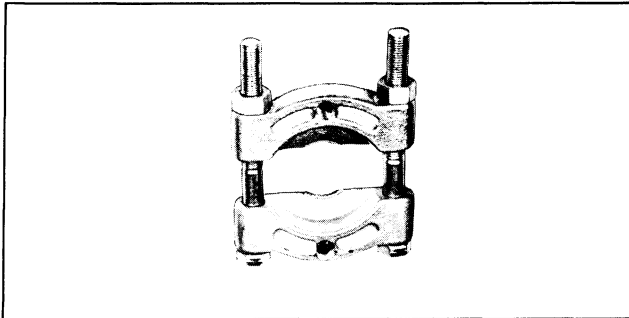
17. Install the coil and ignition system. See Section 8.
18. Install the transmission primary drive. See Section 7.
19. Install the carburetor and reed valve as described in Section 6.
20. Install the cylinder and piston. See the preceding section.
21. Follow the procedures for installing the engine under GENERAL INFORMATION.

NOTES

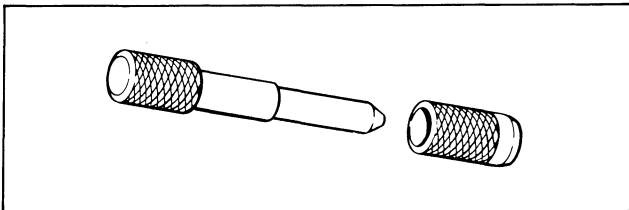
TOOLS



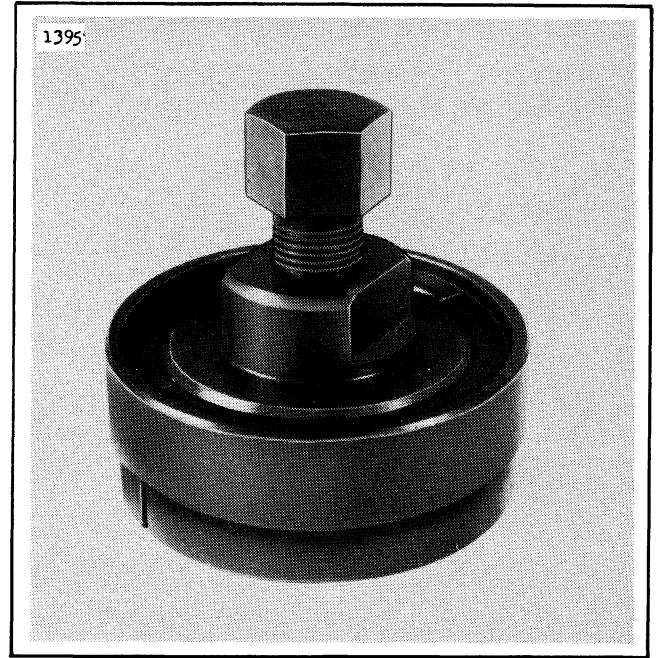
Part No. 94403-80 Connecting Rod Holding Plate



Part No. 95637-46 Wedge Attachment



Part No. 96777-72 Piston Pin Spiral Ring Tool (Old Style)



Part No. 97336-80 Flywheel Puller

NOTES

SECTION**PAGE NO.**

1. Carburetor	6-1
2. Reed Valve	6-11
3. Air Cleaner	6-13
4. Fuel Tank	6-15

CARBURETOR

SPECIFICATIONS

Main Jet Sizes

Part No.	In. Dia.
27819-63.....	.037
27820-63 (std.)039
27821-63.....	.041
27822-63.....	.043

Fuel Tank

Capacity (Approximately) 8.5 Gal. (U.S.)
(32.19 lt.)

OPERATION (Figure 6-1)

The golf car engine is equipped with a diaphragm carburetor having a diaphragm fuel pump which operates on crankcase pulsations. There is no bowl, or fuel reservoir with external vent. The carburetor has a pressure fed fuel supply, rather than gravity fed. For this reason, it will operate in any position.

1. Crankcase pulsations are transmitted to the fuel pump diaphragm and chamber through drilled passages in the carburetor flange, flange gaskets,

reed valve and reed valve gaskets to crankshaft chamber.

2. On piston upstroke, fuel enters the carburetor at the inlet connection (1) flowing through the filter screen (2). Crankcase vacuum, working through the impulse channel (3), opens the diaphragm pump inlet valve (5) drawing fuel into the pump chamber (7).
3. On piston downstroke, crankcase pressure, working through the impulse channel (3), forces fuel out the chamber (7) through the diaphragm pump outlet valve (6) and into the fuel inlet supply channel (8).
4. Fuel is metered past the inlet needle and seat (9) through the action of the main diaphragm (10) which is subjected to engine vacuum on top side and atmospheric pressure on the bottom side. Engine vacuum transmitted to the diaphragm fuel chamber (11) pulls the diaphragm (10) upward. This action unseats the needle (9) allowing fuel to enter the diaphragm fuel chamber (11).
5. During the engine operation, engine vacuum is transmitted through the idle discharge ports (13, 14) and main discharge port (15) depending upon the throttle disc (16) and choke disc position (17). This creates a low pressure area on the top side of the main diaphragm (10). Atmospheric pressure on the

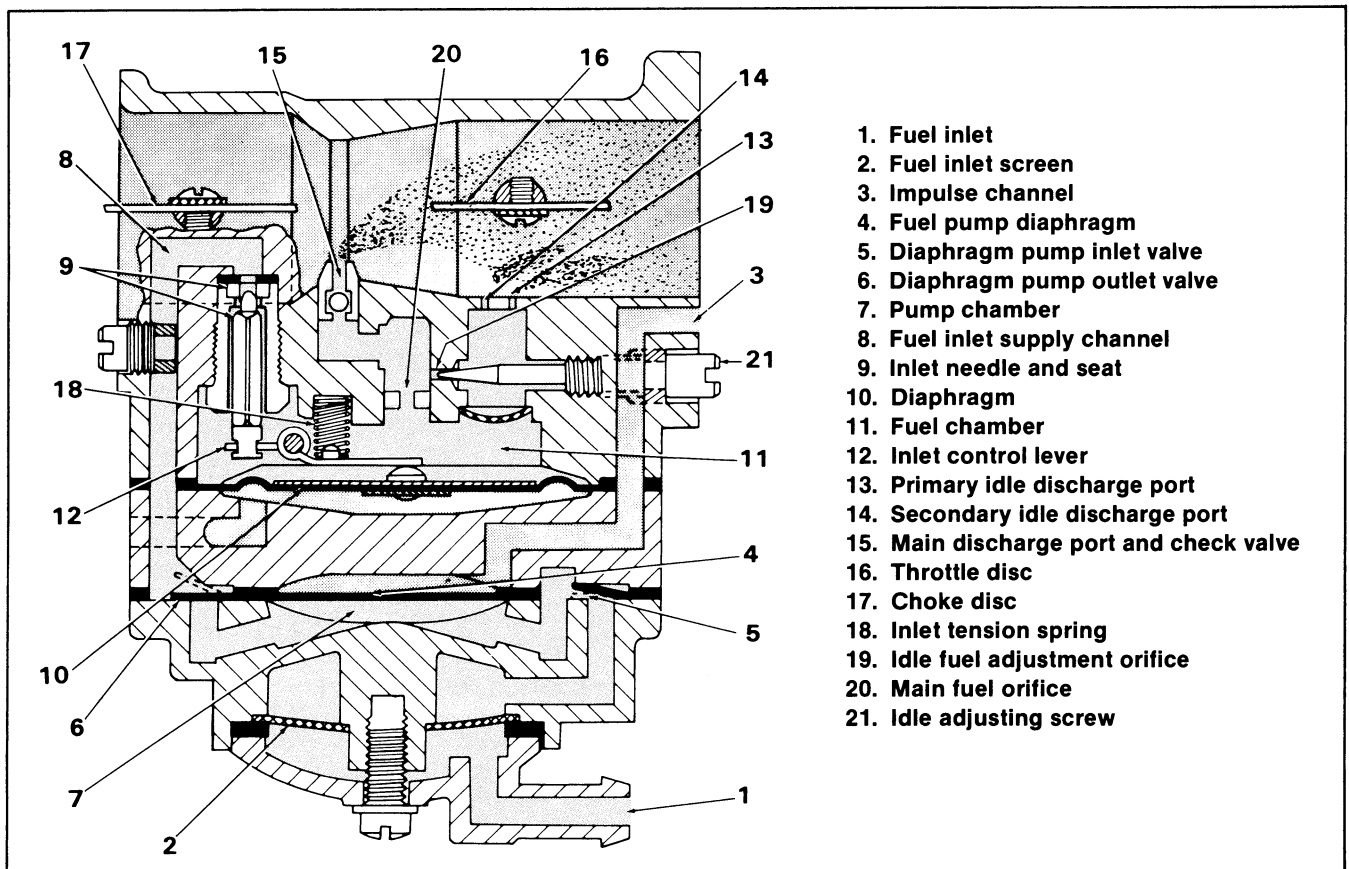


Figure 6-1. Carburetor Operation

bottom side will force the main diaphragm (10) upward causing the button to depress the inlet control lever (12) and permitting pressurized fuel to enter through the inlet seat (9).

- Fuel enters the fuel chamber (11), travels through the main fuel orifice (20), the idle adjustment (19) and out the discharge ports (13, 14, 15) into the engine.

NOTE

The main fuel orifice is fixed and various sizes are used depending on the type of service. See SPECIFICATIONS.

ADJUSTMENTS

- Raise the left rear wheel of the car so that the wheel turns freely. Support the frame with suitable blocking and wedge the other wheels to keep car from moving.

CAUTION

When making carburetor adjustments, turn adjustment screws carefully and gently. DO NOT force adjustment screws into the seats.

Low Speed Mixture (Figure 6-2)

- Connect a tachometer to the engine. Start the engine and run it at 1500-2000 rpm (fast idle).
- Turn the low speed mixture screw (1) in or out until engine runs smoothly. Normal setting is 1/2-3/4 turns open.

Throttle Stop Screw Adjustment (Figure 6-2).

- With the ignition off and the accelerator pedal fully released, back off the screw (2) until the throttle disc is fully closed, then turn screw back in 1/4 turn.
- Start up the engine to check throttle operation. When the accelerator pedal is released, the throttle lever (3) must return throttle against the stop screw. If the throttle lever does not return fully, check the cable and casing. See REPLACING CABLES AND CASINGS.

Throttle Control Adjustment (Figure 6-3).

- Disconnect the throttle cable from the carburetor throttle lever.
- Remove the cotter pin (1) and washer (2). Then remove the swivel block (3) from the accelerator pedal bracket.
- Unscrew the locknut (4), swivel block (3) and shield tube (5) from the threaded end of the cable (6).

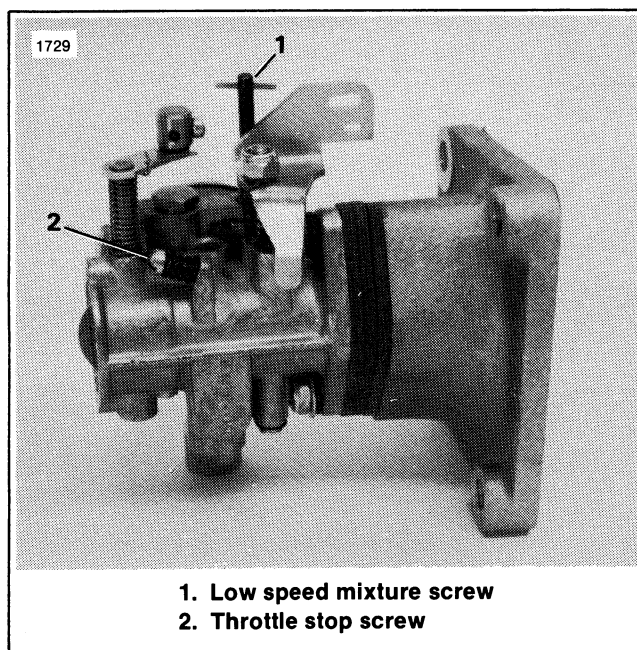


Figure 6-2. Carburetor Adjustments

- Thread the swivel block (3) back onto the cable (6) so there is only 1/16 in. of thread showing at the casing end. See Figure 6-4. Temporarily re-install the swivel block to the accelerator pedal bracket.
- See Figure 6-4. With the accelerator pedal fully depressed, the threads on the cable end must not enter the seal on the end of the cable casing.
- See Figure 6-3. Loosen the screws (8) and move the casing (7) in the bracket (9) to achieve the adequate clearance. When adequate clearance is obtained, remove the swivel block from the accelerator pedal bracket.
- Thread the shield tube (5) all the way onto the cable. Install the swivel block (3) on the cable so it rests against the shield tube, then install the locknut (4) on the cable and tighten it against the swivel block.
- Connect the swivel block to the accelerator pedal bracket and secure it with washer (2) and cotter pin (1).
- See Figure 6-5. Re-connect the throttle cable to the accelerator lever on the carburetor so that the hook is positioned horizontally.

With the accelerator pedal fully depressed and throttle fully open, at rest, there should be 1/16 in. clearance between the cable hook and the accelerator lever on the carburetor. Bend the cable hook to achieve the proper clearance.

- When the accelerator pedal is fully released, the throttle lever should return against the idle stop screw.
- Check and adjust the microswitch as specified in Section 8 under SWITCHES.

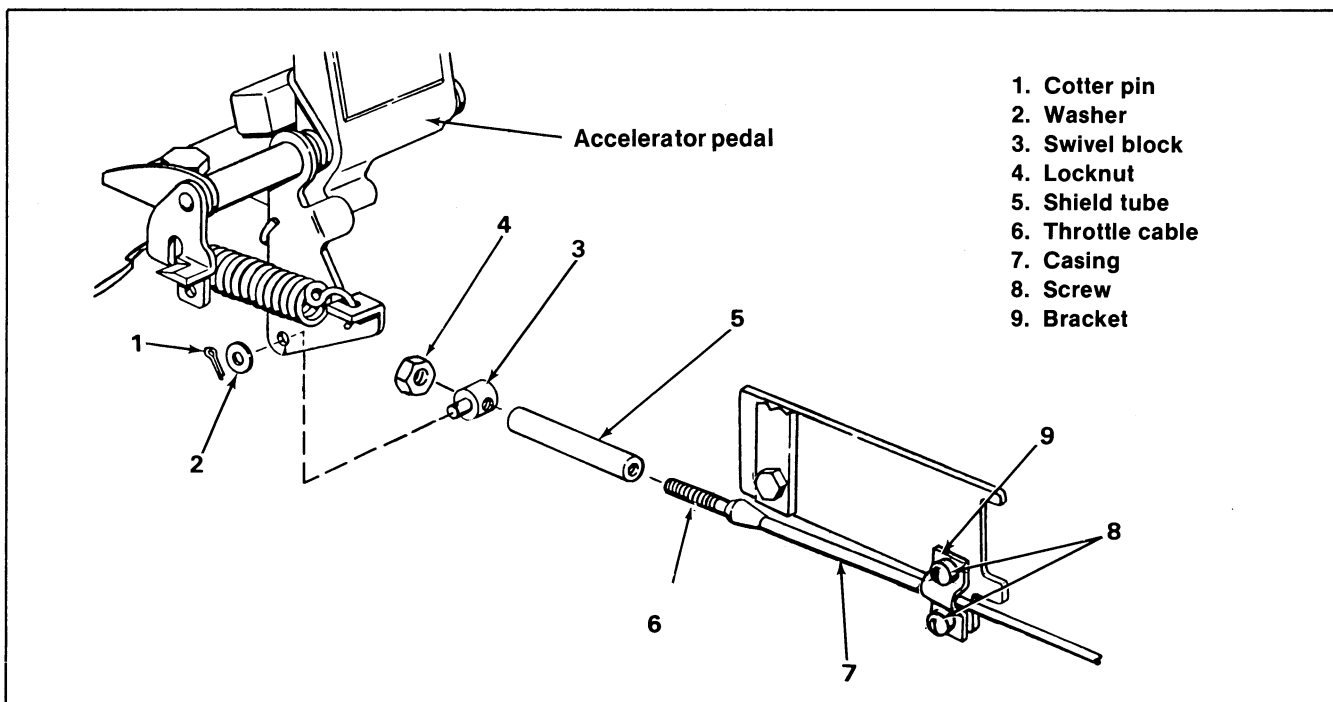


Figure 6-3. Throttle Control Adjustment

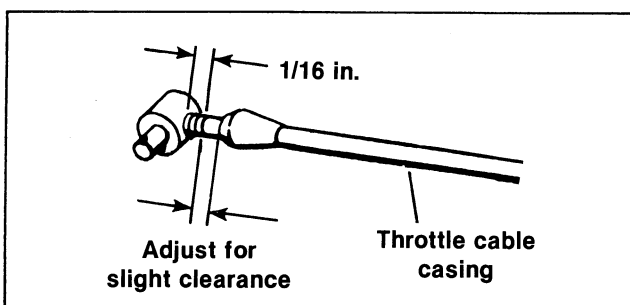


Figure 6-4. Throttle Closing Adjustment

Governor Control Adjustment (Figure 6-6)

1. Start engine and set governor speed at 3700-4000 rpm.
2. To increase rpm's loosen screw (1) and slide cable toward back of car. To decrease rpm's slide cable towards front of car. Tighten screw securely after adjustment.

WARNING

Maximum governed speed is 12 mph (19.3 kph) (4000 rpm). Exceeding these figures can be hazardous, resulting in loss of control or loss of vehicle stability.

CAUTION

Any appreciable speed change due to governor readjustment will require re-adjustment of the low speed mixture on the carburetor.

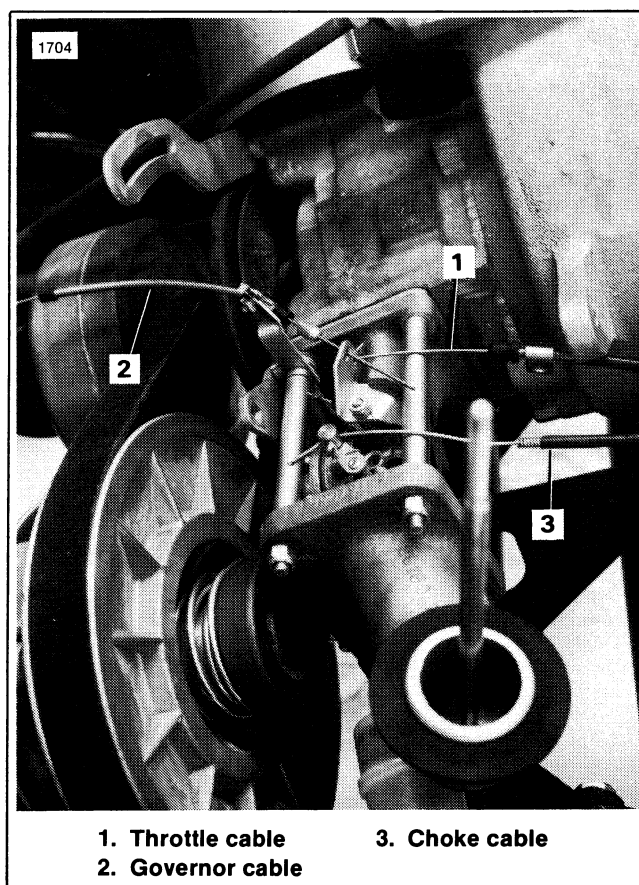
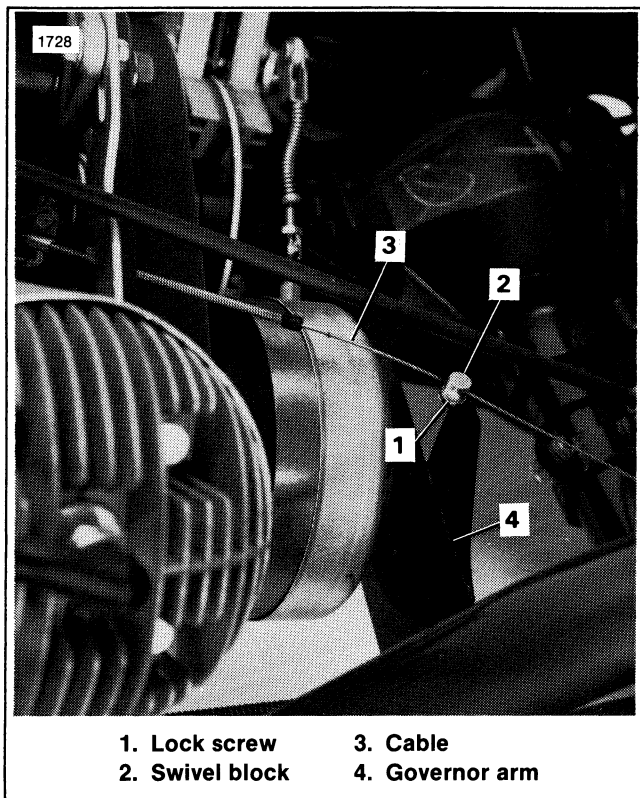


Figure 6-5. Carburetor Controls

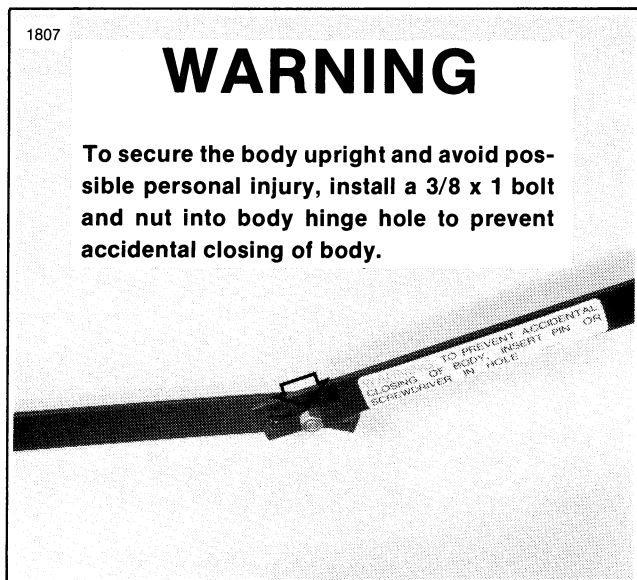


- | | |
|-----------------|-----------------|
| 1. Lock screw | 3. Cable |
| 2. Swivel block | 4. Governor arm |

Figure 6-6. Governor Adjustment

REPLACING CABLES AND CASINGS

Raise the golf car body.

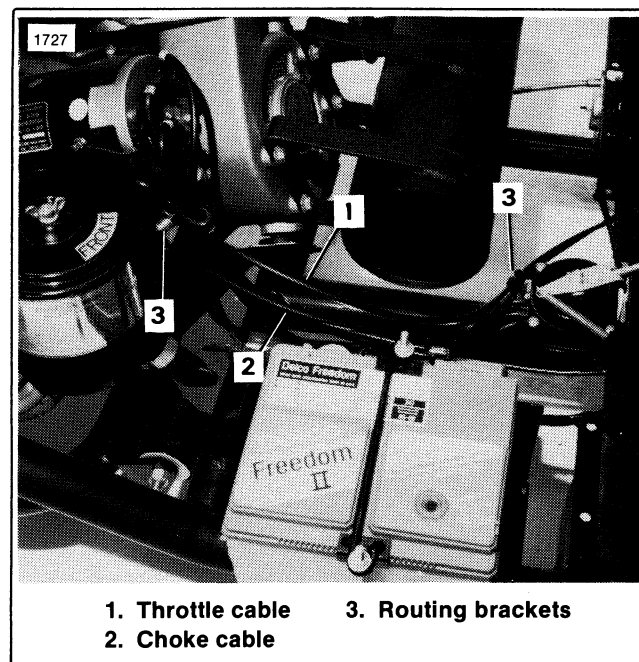


- | | |
|-------------------|---------------------|
| 1. Throttle cable | 3. Routing brackets |
| 2. Choke cable | |

Figure 6.7 Cable Routing

Throttle

1. Disconnect the throttle cable at the carburetor.
2. See Figure 6-3. Remove the cotter pin (1) and washer (2). Remove the swivel block from the accelerator pedal bracket.
3. See Figure 6-3. Remove the lock nut (4), swivel block (3) and shield tube (5) from the cable (6). Remove the two screws (8) and bracket (9).
4. See Figure 6-7. Cut the cable straps securing the throttle and choke cables together. Remove the throttle cable and casing from the routing brackets.
5. Replace the cable and casing if they are bent, kinked or broken.
6. Coat cable with grease and install it into the casing. Route cable through brackets as shown in Figure 6-7. Casing should have no sharp bends.
7. Perform the steps listed under ADJUSTMENTS for the throttle cable.



Choke

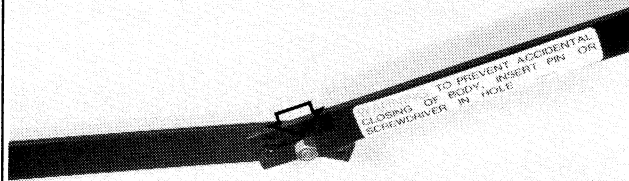
1. Disconnect the choke cable from the carburetor.
2. Disconnect the choke knob from the front housing and pull the cable and casing from the routing brackets. See Figure 6-7. Cut any cable straps securing the choke casing to the throttle casing.
3. Replace the cable and casing if they are bent, kinked or broken.

NOTE

If the choke control is sticky, but cable and casing

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.



WARNING

Disconnect battery cables (negative cable first) to avoid accidental startup of vehicle and possible personal injury.

are not damaged, clean the cable and casing with a non-flammable cleaning solvent, then lubricate both with grease.

4. Coat cable with grease and install it into the casing. Route the cable assembly through the brackets as shown in Figure 6-7. Casing should have no sharp bends.
6. Connect the cable to the carburetor. See Figure 6-5. Make sure cable slides freely and does not interfere with the throttle cable.
7. Test the choke to make sure it opens and closes fully. Adjust cable in swivel block on carburetor accordingly.

TROUBLESHOOTING

General

Before suspecting the fuel system and carburetor for poor engine performance, make sure the ignition system is in proper operating condition by checking the following items.

1. Spark plug gap and condition.
2. Circuit breaker point gap (.018-.024) and cam lubrication.
3. Ignition circuit wiring including engine ground strap and switches.
4. Check coil and condenser condition and connections.
5. Check the ignition timing.
6. Check the fuel mixture. An over-rich fuel/air mixture will cause excessive smoking, loss of power, engine roughness or flooding. An over-lean condition will cause hard starting or surging speed.
7. Check the air cleaner.
8. Make sure the exhaust is not restricted.
9. Check for a leaking crankcase oil seal on the transmission side.

Carburetor Leakage Test

One way to check the carburetor is with the Harley-Davidson CARBURETOR LEAK TESTER, Part No. 94750-68. This test can be made without removing the carburetor.

1. Disconnect the fuel line from the carburetor inlet fitting.

WARNING

Gasoline is extremely flammable and highly ex-

plosive under certain conditions. Do not smoke or allow open flame or sparks anywhere in the area when refueling or servicing the fuel system.

2. See Figure 6-8. Install the LEAK TESTER to the carburetor inlet fitting. The carburetor should hold 5 psi for at least one minute without dropping.
3. If pressure does not hold, check all cover screws for tightness. If screws are tight, the carburetor has an internal leak and should be disassembled.

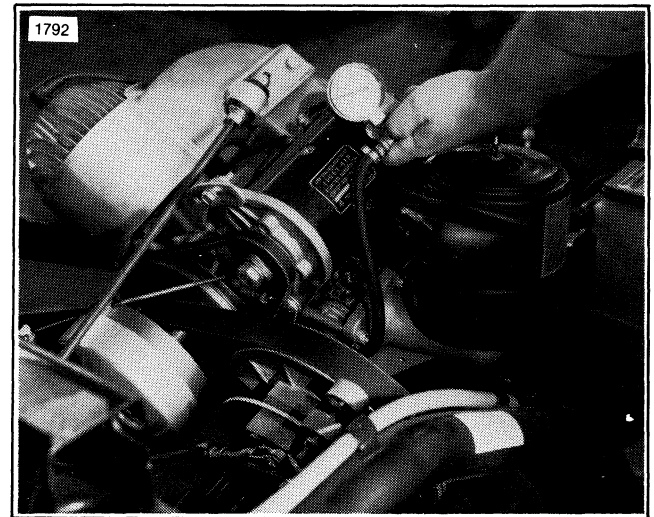
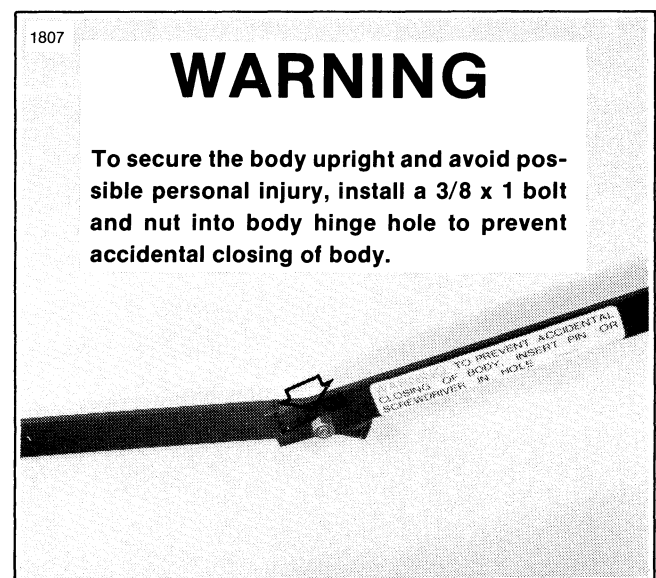


Figure 6-8. Carburetor Leakage Test

REMOVAL

1. Raise golf car body.



WARNING

Disconnect battery cables (negative cable first) to avoid accidental startup of vehicle and possible personal injury.

2. Disconnect the fuel line from the inlet fitting.

WARNING

Gasoline is extremely flammable and highly explosive under certain conditions. Do not smoke or allow open flame or sparks anywhere in the area when refueling or servicing the fuel system.

3. See Figure 6-9. Remove the air cleaner and mounting bracket. Disconnect the throttle, choke and governor cables.

4. See Figure 6-9. Remove the nuts, spacers and carburetor/manifold assembly.

DISASSEMBLY

Intake Manifold (Figure 6-10)

1. Remove the locknuts (1), washers (2) and bushings (3).
2. Remove the gasket (4), insulators (5) and intake manifold (6).

Prior to disassembly of carburetor, use the following troubleshooting guide to locate the problem.

TROUBLESHOOTING THE CARBURETOR

IF THE:	THE PROBLEM COULD BE:	HOW TO FIX IT
Carburetor Floods	<ol style="list-style-type: none"> 1. Dirt or foreign particles preventing inlet needle from seating. 2. Diaphragm lever spring not seated on lever dimple, wrong spring. 3. Diaphragm improperly installed in carburetor. 	<p>Remove, clean and replace.</p> <p>Remove lever and reinstall. Replace spring. Replace diaphragm or correct installation.</p>
Engine Will Not Accelerate	<ol style="list-style-type: none"> 1. Idle adjusting screw set too lean. 2. Incorrect setting on diaphragm lever. 3. Diaphragm cover plate loose. 4. Diaphragm gasket leaking. 5. Main fuel orifice partially plugged. 6. Main nozzle ball stuck closed. 	<p>Enrich idle adjustment. Reset.</p> <p>Tighten. Replace. Remove diaphragm cover, diaphragm lever and main adjusting screw. Clean out orifice by blowing through main adjustment threaded hole.</p>
Engine Will Not Run at Low Speed	<ol style="list-style-type: none"> 1. Incorrect idle adjustment. 2. Idle discharge ports or channels clogged. 3. Diaphragm lever set incorrectly. 4. Throttle shutter cocked in the throttle bore causing fast idle. 5. Dirty nozzle check valve. 6. Welch plug covering the idle discharge port does not seal. This causes the engine to idle with idle adjustment shut off. 7. Main nozzle check valve not sealing. 	<p>Reset to best idle. Blow out with compressed air. If compressed air is not available, clean and flush with safety solvent. Reset diaphragm lever so it is flush with the floor of the diaphragm chamber. Reset.</p> <p>Clean or replace. Replace welch plug.</p> <p>Clean or replace.</p>
Engine Runs Lean	<ol style="list-style-type: none"> 1. Tank vent not operating correctly. 2. Leak in fuel system from tank to pump. 3. Ruptured fuel pump diaphragm. 4. Main fuel orifice partially plugged. 	<p>Clean, if possible, or replace. Tighten or replace fittings or line.</p> <p>Replace. Clean.</p>

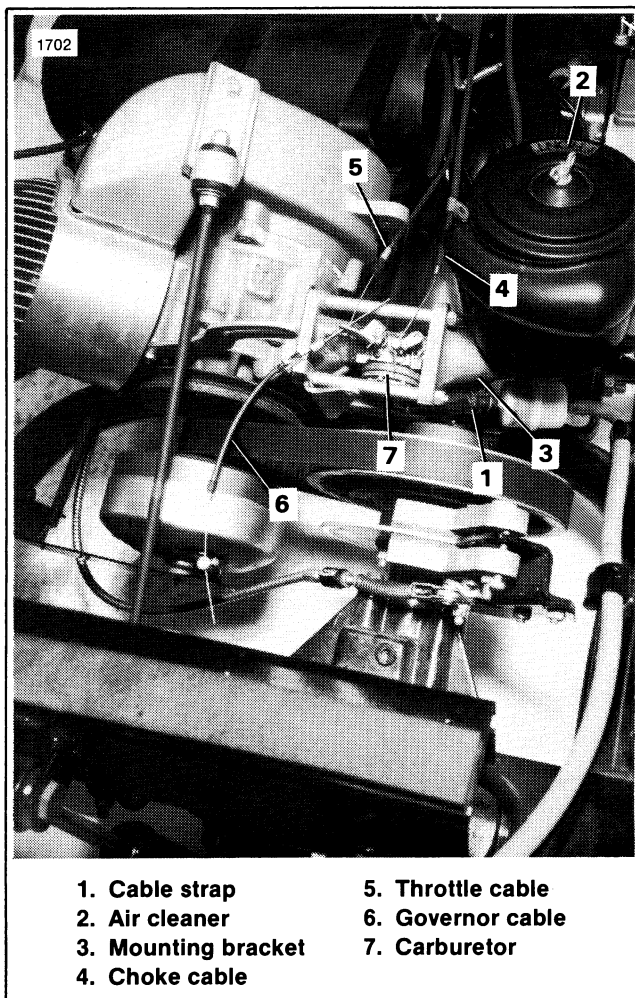


Figure 6-9. Air Cleaner/Carburetor Mounting

Fuel Pump (Figure 6-10)

1. Remove the screw (7), fuel inlet cover (8), gasket (9) and screen (10).
2. Remove the six screws (11) and lockwashers (12).
3. Remove the fuel pump body (13), diaphragm (14), gasket (15), diaphragm cover (16), diaphragm (17) and cover gasket (18).
4. Loosen the screw (19) and remove the pin (20), inlet valve lever (21), spring (22) and valve needle (23).
5. Use a 5/16 in. thinwall socket and carefully remove the seat (24) and gasket (25).

Idle Mixture and Main Jet (Figure 6-10)

1. Remove the screw plug (28), washer (29), main jet (30) and gasket (31).
2. Remove the idle mixture adjusting screw (32), spring (33), washer (34) and seal (35).
3. Remove the stop screw (36) and spring (37).

Throttle and Choke Shafts (Figure 6-11)

NOTE

The carburetor throttle and choke assemblies rarely require replacement. However, if replacement is necessary perform the following procedure.

1. Remove the screw (1) and choke plate (2).
2. Remove the choke shaft (3), spring (4), washer (5) and seal (6).
3. Remove the clip (7), swivel block (8), screw (9) and washer (10).
4. Remove the screw (11) and throttle plate (12).
5. Remove the screw (13), washer (14) and retaining clip (15).
6. Remove the locknut (16), lockwasher (17) and throttle lever (18). Remove the throttle shaft (19), spring (20), washer (21) and seal (22).

CLEANING, INSPECTION AND REPAIR

1. Clean all metal parts in a nonflammable cleaning solvent and blow dry with compressed air.
2. Inspect the diaphragm for holes, cracks or deformation and replace as necessary.

CAUTION

Clean rubber parts with denatured alcohol or brake fluid. Do not use mineral base cleaning solvents such as acetone or paint thinner. Mineral base solvents will cause deterioration of the part, even after assembly, which could result in component failure.

CAUTION

Never scrape carbon deposits from the carburetor using steel instruments. Do not use wire or drills to clean passages. Any one of these things can change the size of the passage holes or alter the carburetor. Do not use carburetor cleaner on rubber or plastic parts.

3. Blow out passages from the opposite side to prevent the check valve from closing.
4. Replace any parts that appear worn or damaged.
5. Under extreme flooding conditions, it might be necessary to inspect the check valve (27). Drill a 1/8 in. diameter hole, 1/16 in. deep, in the Welch plug (26). Carefully pry out plug with a small punch.

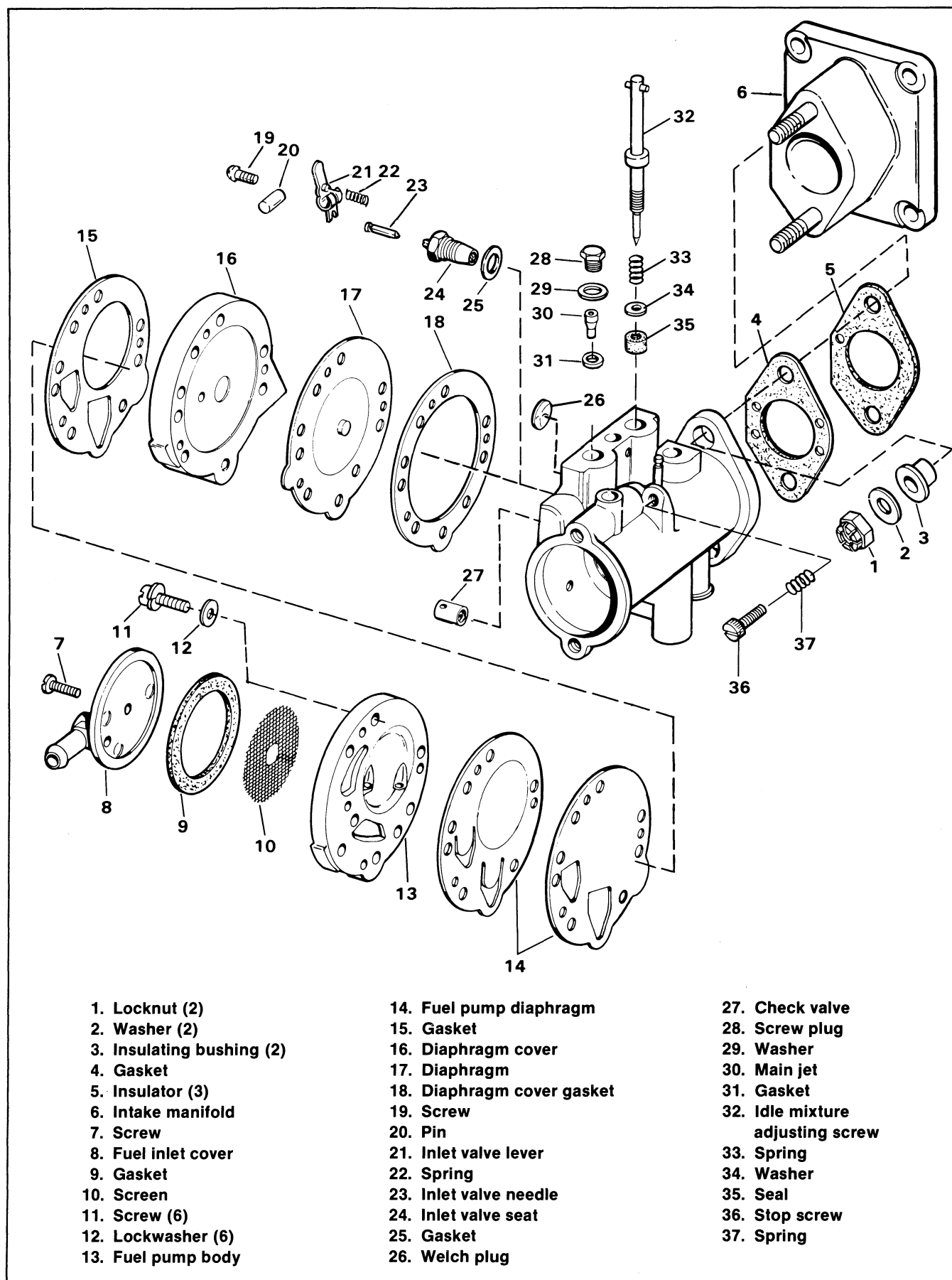


Figure 6-10. Carburetor Fuel Pump — Exploded View

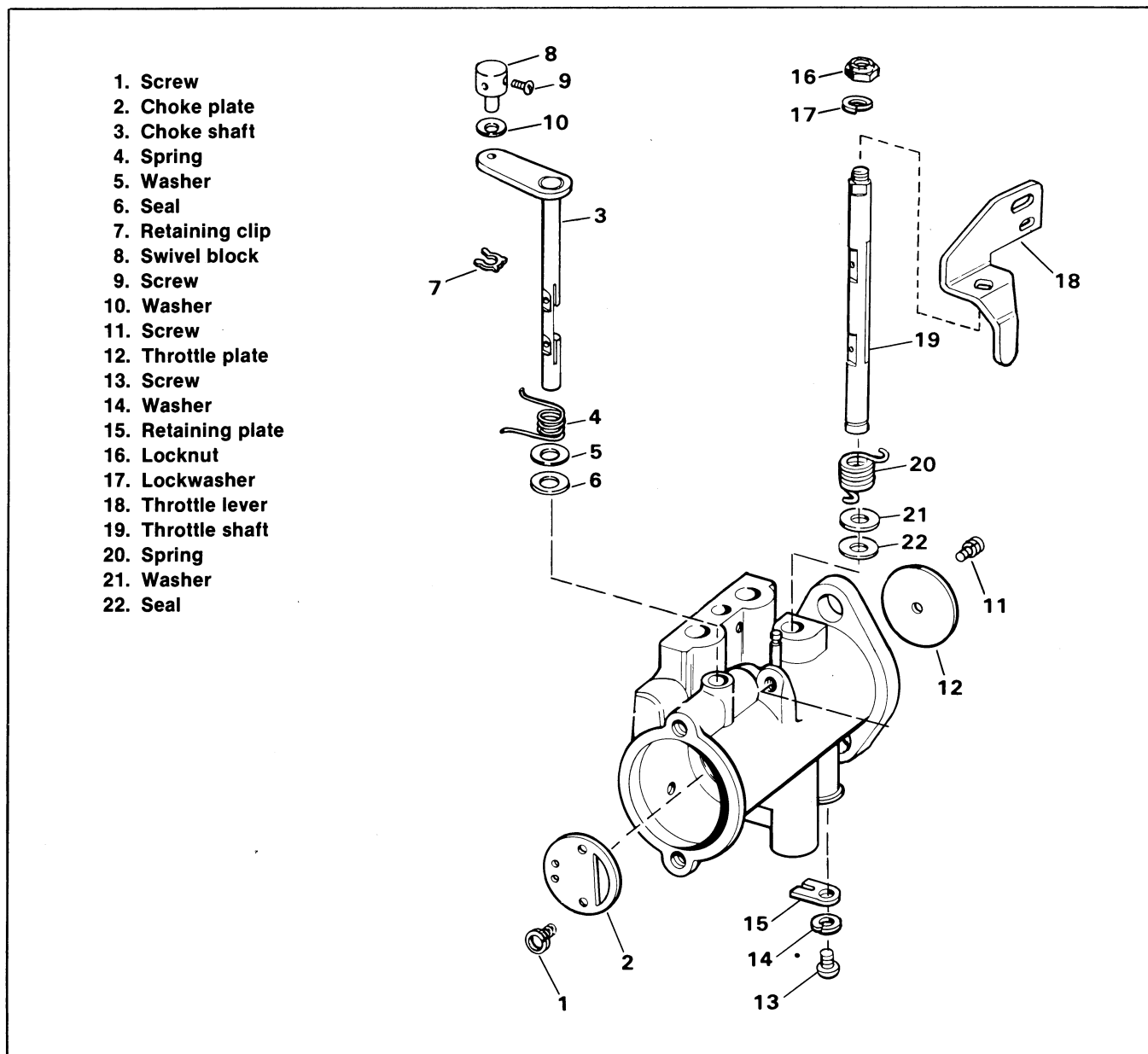


Figure 6-11. Throttle And Choke Shafts - Exploded View

CAUTION

Do not drill any deeper than 1/16 in. or damage will occur to the carburetor body.

6. If the main nozzle check valve (27) does not seat, it should be replaced. To replace, press the nozzle into the carburetor bore using a 3/16 in. punch. Press the new nozzle into the carburetor so it is flush with the fuel chamber floor.
7. Install the welch plug (26) so the dome side faces outward. Flatten the plug with a punch to seat it.

ASSEMBLY

Throttle And Choke Shafts (Figure 6-11)

1. Install the throttle shaft (19) into the carburetor body and secure it with the retaining clip (15), washer (14) and screw (13).
2. Install the throttle plate (12) and screw (11).
3. Install the seal (22), washer (21), spring (20), throttle lever (18), lockwasher (17) and locknut (16).
4. Install the choke shaft (3), choke plate (2) and screw (1). The reed valve side of the choke plate should face to the inside of the carburetor when properly assembled.
5. Install the seal (6), washer (5) and spring (4). Install the washer (10), swivel block (8), screw (9) and retaining clip (7).

Idle Mixture And Main Jet (Figure 6-10)

1. Install the spring (37) and stop screw (36).
2. Install the seal (35), gasket (34), spring (33) and idle mixture adjusting screw (32).
3. Install the gasket (31), main jet (30), washer (29) and screw plug (28).

Fuel Pump (Figure 6-10)

1. Install the gasket (25), valve seat (24), needle (23), spring (22), valve lever (21), pin (20) and screw (19).

NOTE

See Figure 6-12. The valve lever has a tang which must engage the valve needle as shown. Also the valve lever should be set flush to .015 in. above chamber floor.

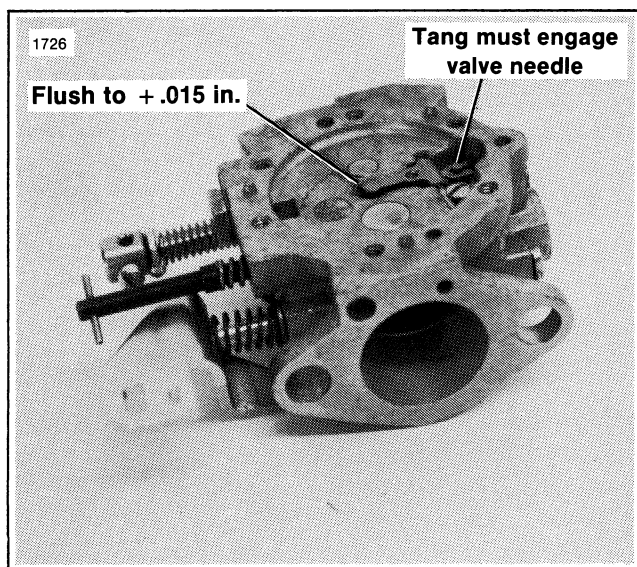


Figure 6-12. Installing Valve Needle and Lever

2. Position the gasket (18), diaphragm (17) and diaphragm cover (16) on the carburetor body locating pins. Then position the gasket (15), diaphragm (14) and fuel pump body (13) on the diaphragm cover. Install the washers (12) and screws (11). Tighten screws to 10-12 in-lbs (254-304.8 km) torque.
3. Install the screen (10), gasket (9), inlet cover (8) and screw (7). Inlet must be positioned with the nipple facing right side of carburetor as shown.
4. When carburetor is fully assembled, perform the leakage test as shown in Figure 6-8, before installing it on the engine.

Intake Manifold (Figure 6-10)

1. Install the gasket (4), insulators (5) and intake manifold (6) on the carburetor. Make sure the vacuum holes are aligned.

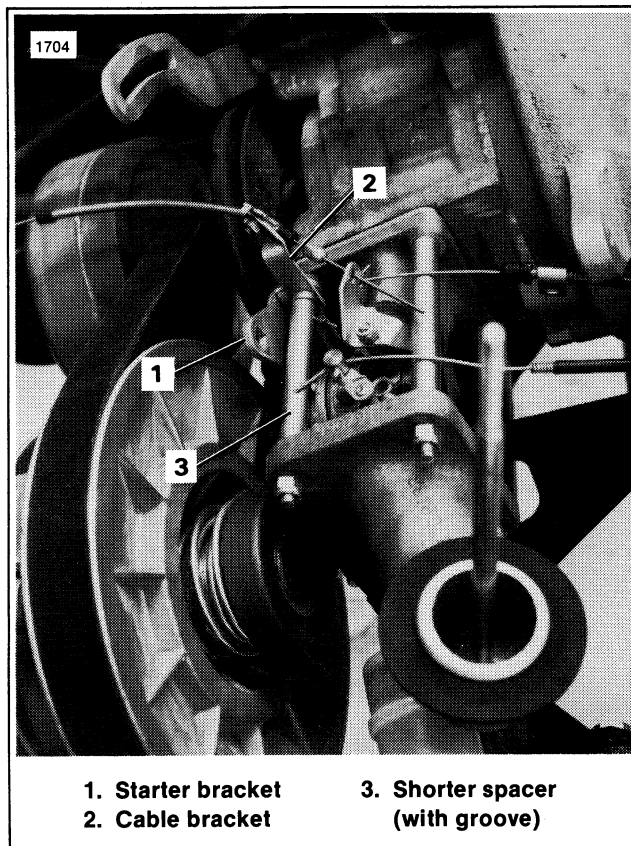


Figure 6-13. Carburetor Mounting

2. Install the bushings (3), washers (2) and locknuts (1).

INSTALLATION

1. See Figure 6-13. Install the carburetor/manifold assembly. Install the starter bracket (1) and governor bracket (2) as shown.
2. See Figure 6-13. Install the four spacers. One of the spacers (3) is shorter than the others to allow for the brackets (1, 2). This spacer is identified by a groove machined in one end.
3. Connect the governor, choke and throttle cables as shown in Figure 6-13. Perform the adjustments listed at the beginning of this section.
4. Install the air cleaner and bracket.
5. Connect the fuel line to the inlet nipple. Make sure hose clamp faces towards the front of the car to prevent interference with the transmission secondary drive.

REED VALVE

GENERAL

The reed valve is a oneway valve consisting of a leaf spring with 8 petals over 8 holes in a plate. The petals open to allow the fuel mixture to enter the engine crankcase on piston upstroke and close on piston downstroke to prevent fuel blowback from the crankcase to the carburetor. The reed valve requires little maintenance, however, if one or more of the petals should become bent or broken, the valve leaf must be replaced.

Hard starting, poor performance, or fuel soaked air cleaners in Gas Golf Cars can be caused by broken reed leafs or reed leafs which are not seated properly due to rough or irregular reed plates.

It is important that the reed valve assembly be in proper working condition. Its function is to trap the combustible fuel-air mixture during the downstroke of the piston so that it can be forced through the transfer ports into the combustion chamber. If the leaf is inadequately seated or broken, a reduced amount of fuel and air is transferred into the combustion chamber resulting in lost torque and horsepower.

DISASSEMBLY (Figure 6-14)

1. Remove carburetor as described in the preceding section.
2. Remove the reed valve assembly.
3. To disassemble the reed valve assembly, remove the nut (4), lockwasher (5), stop (7) and leaf (8).

CLEANING, INSPECTION AND REPAIR

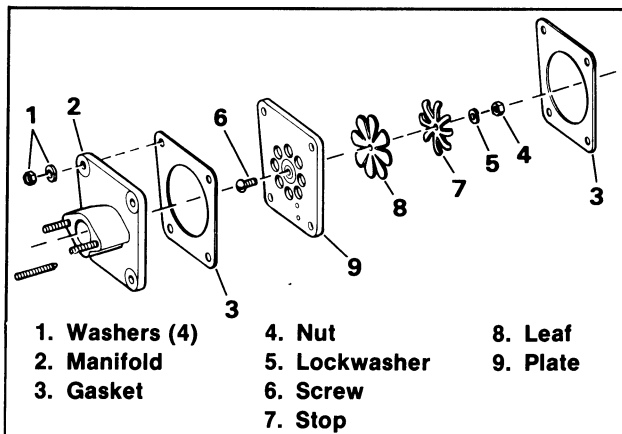


Figure 6-14. Reed Valve And Manifold

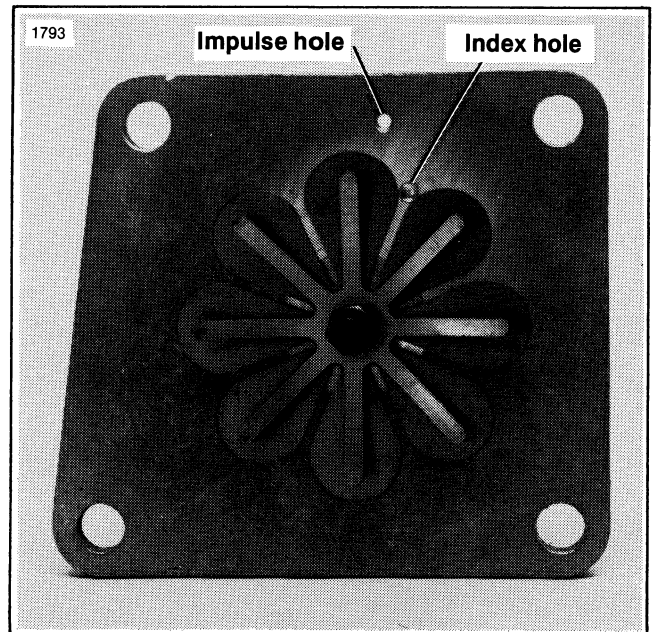


Figure 6-15. Reed Valve Position

1. All leaf petals (8) must be intact and fully seated against the base plate. If petals are bent, replace the leaf.
2. Remove all burrs from plate (a) with a lapping block and grinding compound, or a fine emery cloth. Be sure to remove all metal shavings before reassembly.
3. Check gasket to make sure pulse passage is not blocked.

ASSEMBLY

1. See Figure 6-15. Position leaf (8) on side of plate with index hole used for positioning the leaf petals. Align the leaf so the hole is in between the petals.
2. Center the reed stop (7) over the leaf petals. Make sure there is no gap between the stop and leaf. The leaf must lie flat on the plate.
3. Apply a small amount of Harley-Davidson LOCK N' SEAL, Part No. 99625-77 to the screw (6) threads. Install the lockwashers (5) and nut (4). Tighten the nut to 25-30 in-lbs (635-762 kmg) torque.
4. Install the reed valve and gaskets (3) with the leaf facing into the crankcase.
5. Install the carburetor/manifold assembly and air cleaner.

NOTES

AIR CLEANER

SERVICING (Figure 6-16)

Air cleaner should be serviced at least every month — more frequent service may be necessary under extremely dirty operating conditions.

Need for immediate servicing will be indicated by loss of power, sluggish acceleration, or excessive exhaust smoke. These are also indications of a dirty exhaust system.

Service as follows:

1. Unscrew wing nut at top of filter can and remove cover and clear element.
2. Clean element by tapping the side or end gently against palm of the hand.

CAUTION

Do not tap element against a hard surface because the element may be damaged by doing so.

Compressed air can be used also, but hold nozzle away to prevent damage to element.

3. Inspect element by holding light inside element. An even, fine pattern of light through element indicates element is clean. Any large spot of light indicates that element is damaged and should be replaced. Also if light does not show through, it indicates that pores are blocked and element should be replaced.
4. Check condition of sealing surface at the end of the element — if damaged, replace element. Check condition of rubber unloader valve. Opening in slit should be uniformly wide — not deformed, and must be free of any obstruction.

NOTE

If element becomes greasy or oily, it is possible to clean the filter element by agitating in warm water containing a non-sudsing detergent. Follow with a reverse direction flush from the inside out using clear water. Shake out excess water and allow to dry. Do not use solvents or gasoline. Do not dry with compressed air. Element should be replaced after 10 washings because of possible deterioration.

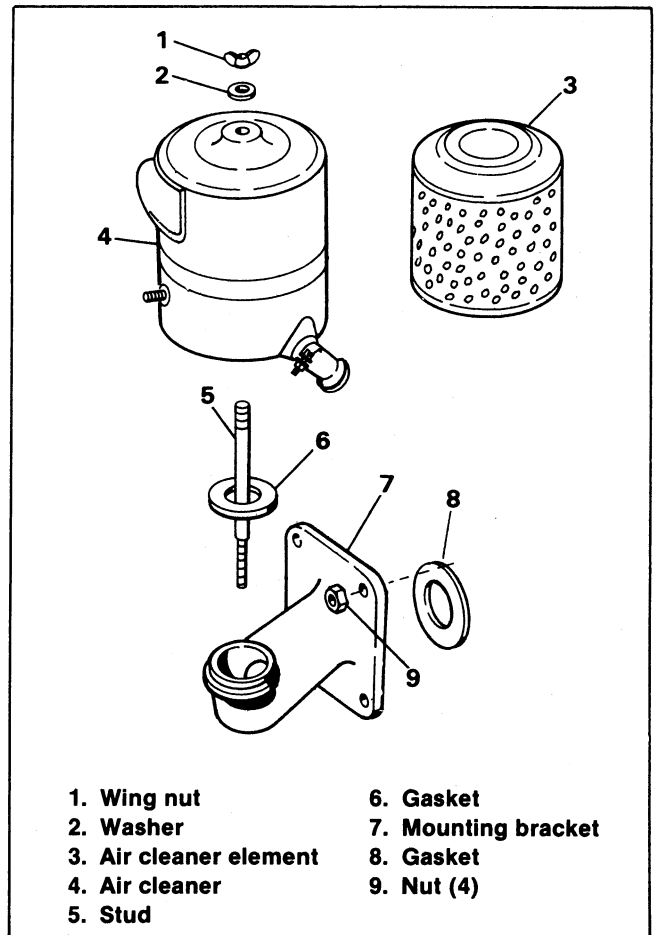


Figure 6-16. Air Cleaner — Exploded View

To ensure maximum air filtration, and canister sealing, coat air filter top and bottom gasket with grease before inserting in filter canister. Top of housing labeled "front" must face front of vehicle to ensure clearance between air intake and starter/generator terminals.

CAUTION

Do not use solvent to clean element.

5. Clean filter cup and reinstall element, facing cleaner inlet toward the starter-generator and unloader valve should face forward. Tighten wing nut securely by hand.

NOTES

FUEL TANK

SERVICING (Figure 6-17)

The fuel tank is made of a high density polyethylene material. The hose fitting (6) and atmospheric vent (3) are a friction fit in the fuel tank and may be removed by prying out. If vehicle is not to be run for a lengthy period of time, such as extend-off-season storage, stabilizer should be added to the fuel mixture following the manufacturer's recommendations on the container.

A cartridge type fuel filter is located in the fuel supply line to the carburetor. If there is an indication of restricted fuel flow at the carburetor, filter should be replaced and fuel strainer screen (4) should be cleaned.

REMOVAL AND INSTALLATION

1. To remove the fuel tank, disconnect the fuel line (8).
2. Remove the mounting hardware (10, 11) and lift the tank up off the frame.
3. When installing the tank, make sure vinyl pads (13) are positioned under the mounting straps.

WARNING

Gasoline is extremely flammable and highly explosive under certain conditions. Do not smoke or allow open flame or sparks anywhere in the area when refueling or servicing the fuel system.

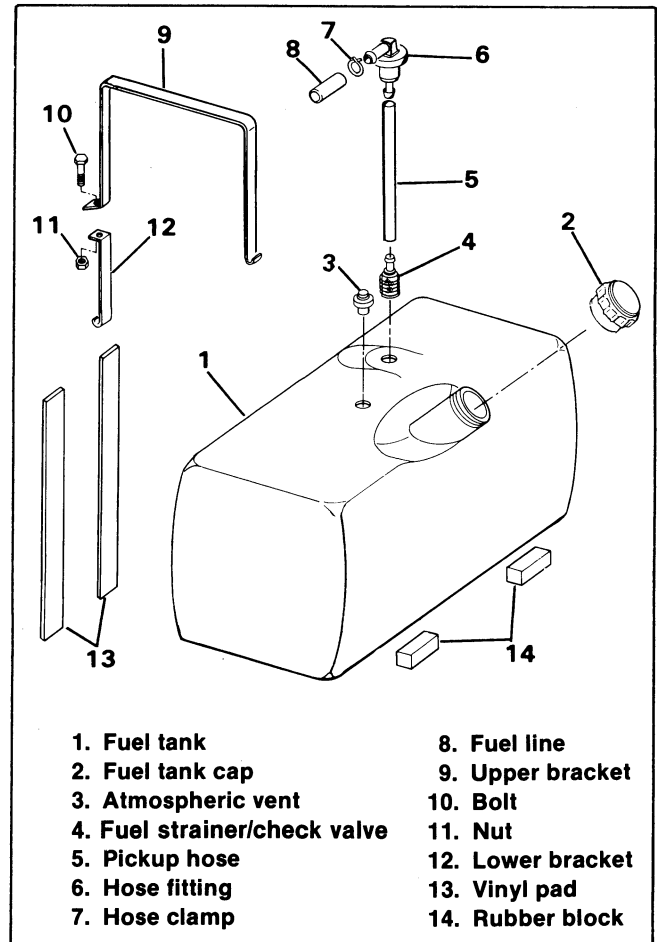
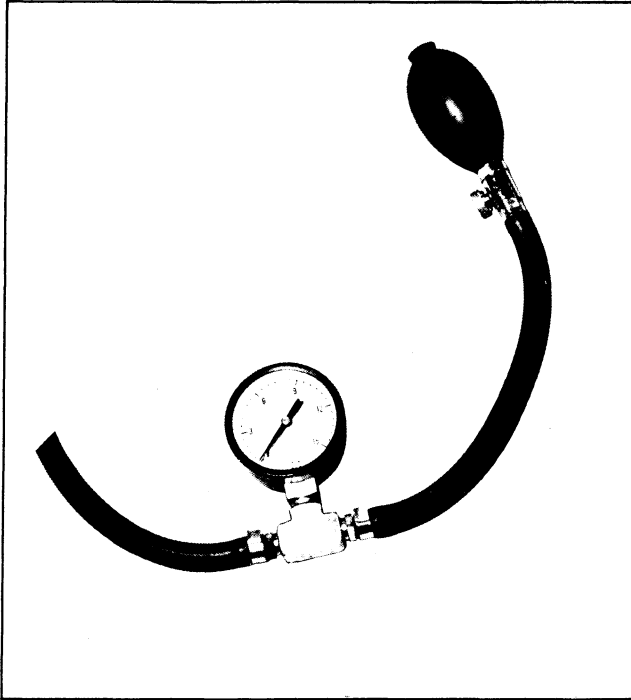


Figure 6-17. Fuel Tank — Exploded View

NOTES

TOOLS



Part No. 94750-68. Carburetor Leak Tester

NOTES

SECTION

PAGE NO.

- 1. General Information 7-1
- 2. Primary Drive 7-3
- 3. Secondary Drive 7-7

TRANSMISSION

7

GENERAL INFORMATION

DESCRIPTION

The Harley-Davidson transmission automatically changes the driving ratio by altering the diameter of the primary and secondary flanges, on which the drive belt runs. When the throttle is opened and the engine speeds up, the primary drive flanges are moved together by the force of three weights operating on cams in the primary floating flange. When the throttle is closed, the engine slows down, reducing the force on the three weights, which causes the flanges to separate. At idle speed, the belt rides on an anti-friction bearing, disengaging the transmission.

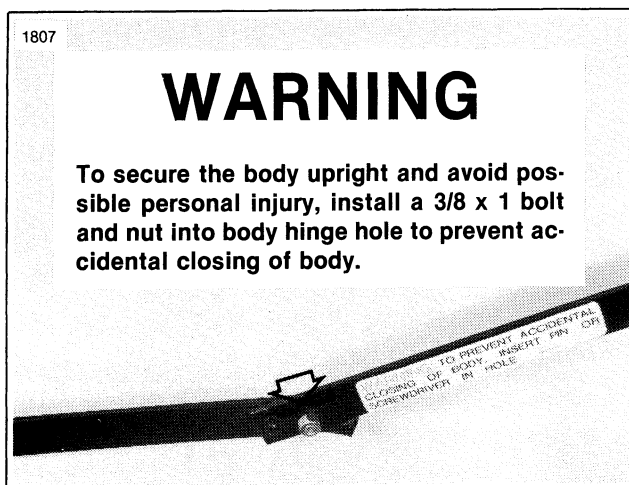
As engine speed is increased, the primary drive flanges are forced together engaging the sides of the V-belt. At the moment of engagement, the drive ratio is at maximum range as shown in Figure 7-1. As the engine speed increases, the belt rides higher up on the flanges of the primary drive decreasing the driving ratio.

The secondary drive flanges are spring loaded and correspondingly separate and close according to the amount of belt pull. When the primary drive flanges are apart in the idle position, the secondary flanges are held in the closed position by spring force applied against the secondary floating flange. As the primary drive flanges assume a larger driving diameter, the V-belt is pulled down moving the secondary flanges apart until the minimum ratio is achieved.

The transmission is torque reponsive. When ascending a hill or opening the throttle suddenly, the primary flanges come together, increasing the useful diameter of the pulley and creating a lower overall drive gear ratio.

FLANGE ALIGNMENT

To obtain maximum drive belt life and to minimize primary flange wear, it is important to check and maintain primary and secondary flange alignment. The drive belt should be perpendicular to flange centers.



1. Raise the fiberglass body.

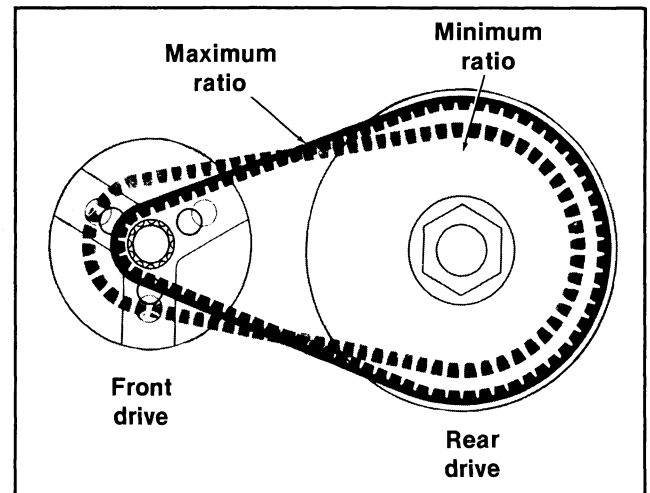


Figure 7-1. Transmission Ratios

2. See Figure 7-2. Check the alignment with a straightedge as shown. If flanges are misaligned, SPACER KIT, Part No. 36421-77 is available from the factory to correct misalignment. Install the spacer between the flange hub and differential flange to move the secondary drive forward. See SECONDARY DRIVE for repair procedures.

NOTE

The spacer in the kit is 5/16 in. thick. If smaller spacer is required, it will be necessary to turn down the spacer on a lathe. If misalignment is caused by the secondary drive being too far forward, it will be necessary to turn down the flange hub.

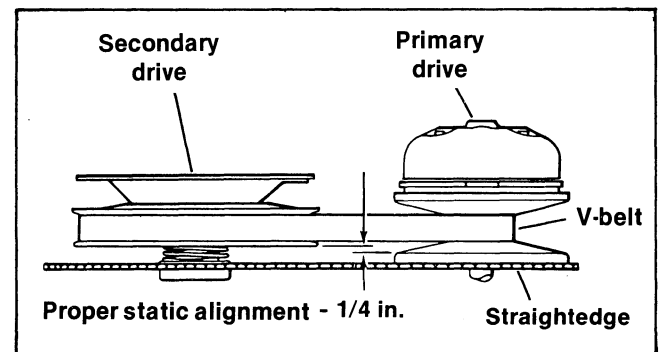


Figure 7-2. Transmission Static Alignment

3. Check to make sure that the primary and secondary flanges are aligned horizontally. If misalignment is present, add washers to a maximum of 3/16 in. at the axle mounting pads as shown in Figure 7-3. Washers must be added to both sides of car to achieve alignment. Do not exceed 3/16 in. spacing.

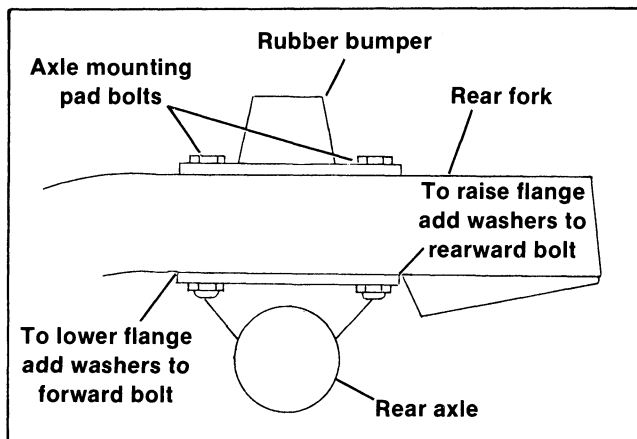


Figure 7-3. Transmission Horizontal Alignment

NOTE

Do not use the engine stabilizer bar to correct misaligned flanges. When properly adjusted, the stabilizer bar should exert no pressure on the rubber pads.

DRIVE BELT

General

The belt should be cleaned with non-flammable cleaning solvent when it becomes greasy and dirty.

If the belt becomes frayed or worn, replace it. If it slips or drags on the primary drive, install the proper amount of shims as described under PRIMARY DRIVE.

The belt is approximately 1-3/16 in. wide. After belt has worn 1/16 in. at widest point, the belt should be replaced.

Replacing the Belt

1. Grasp the V-belt midway between the primary and secondary drives. Jerk up sharply on the belt and roll it off the secondary flange.
2. Install the new belt by placing it on the primary flange first and then rolling it on the secondary flange.

NOTE

When installing or removing the drive belt, DO NOT push the primary floating flange toward the fixed flange. This could cause the weights to fall out of position within the floating flange assembly. If this occurs, the floating flange will not function properly.

IMPORTANT

When installing a V-belt, install it on the primary first — secondary last.

When removing a V-belt, remove it from the secondary first — primary last.

CAUTION

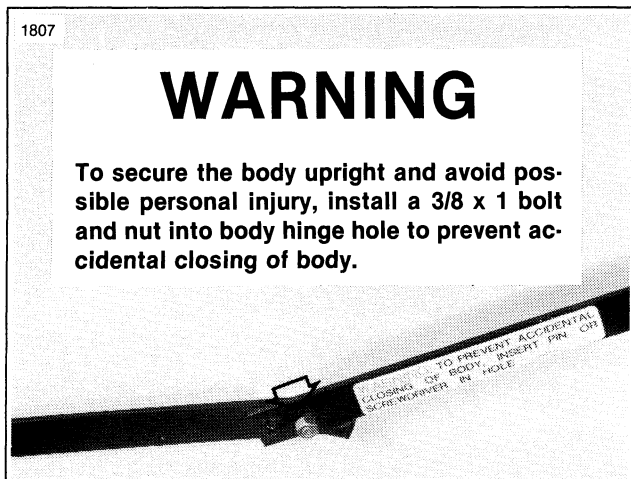
Avoid working primary floating flange in and out by hand with the belt removed. If floating flange movement must be checked, do it by running engine with the V-belt in position.

PRIMARY DRIVE

DISASSEMBLY

The transmission front drive unit may be disassembled in the chassis.

1. Raise the golf car body.



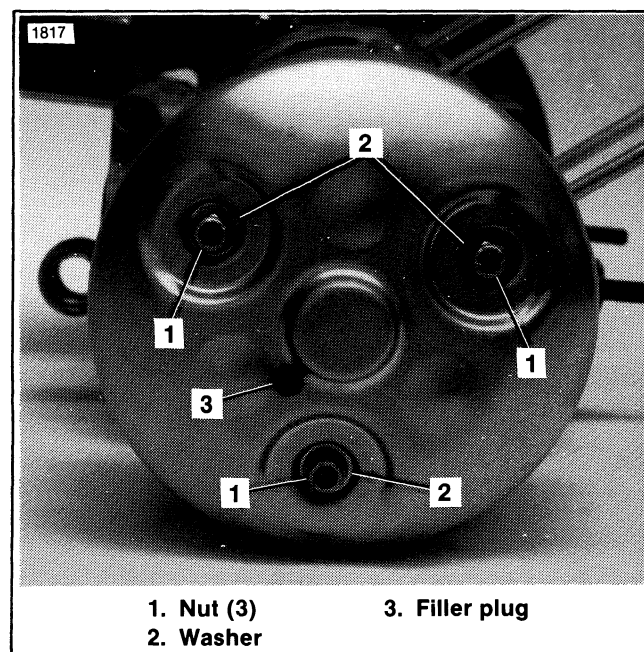
WARNING

Disconnect the battery cables (negative cable first) to avoid accidental start-up of vehicle and possible personal injury.

2. Remove the governor arm assembly. Grasp the V-belt midway between the primary and secondary drives. Jerk up sharply on the belt and roll it off the secondary drive flange. Remove the belt.
3. The transmission front drive unit contains 12 oz. of Harley-Davidson TRANSMISSION LUBRICANT. Loosen, but do not remove, the three acorn nuts as shown in Figure 7-4. Remove the filler plug (3). Insert an air nozzle into the filler plug opening and slowly apply air pressure until drive cup cover is forced off the floating flange O-ring. When air pressure in transmission escapes, remove the acorn nuts, washers and cover allowing the lubricant to drain into a pan.
4. See Figure 7-5. Remove the spring collars (1), springs (2) and retainers (3).

See Figure 7-6. Install the TRANSMISSION HOLDING TOOL, Part No. 97330-62A, on the transmission and remove the nut lock and nut.

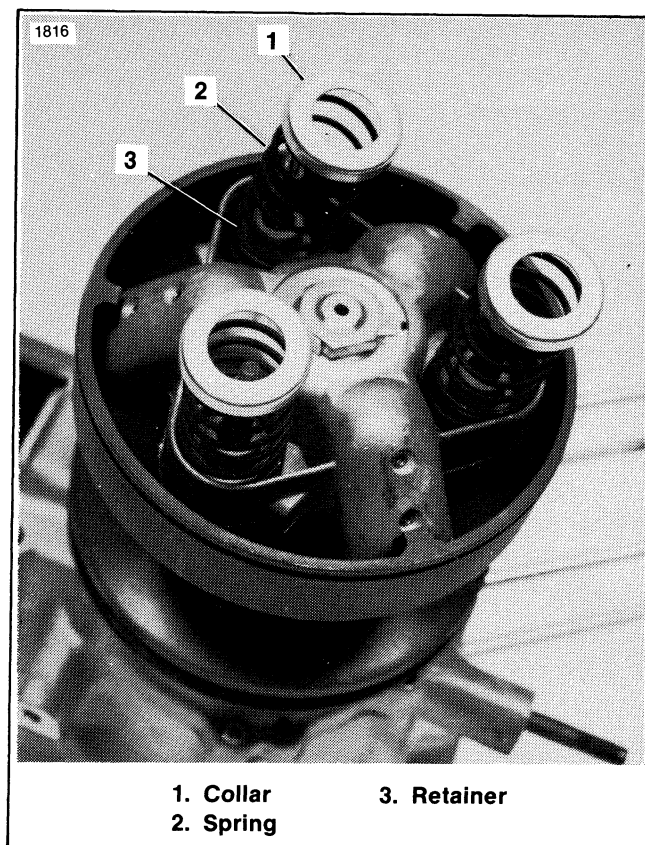
5. See Figure 7-9. Remove the drive cup (10), floating flange (20) and sleeve (13) as an assembly. Remove the felt seal (14) and the sleeve (13).
6. Separate the drive cup, floating flange and weights.



1. Nut (3)
2. Washer

3. Filler plug

Figure 7-4. Primary Drive Cover



1. Collar
2. Spring

3. Retainer

Figure 7-5. Primary Drive Springs

7. See Figure 7-9. Remove the O-ring (21), shim(s) (22), bearing (24), race (23) and thrust washer (26).
8. See Figure 7-9. Remove the driving flange (27) using a claw puller. Remove the key (28).

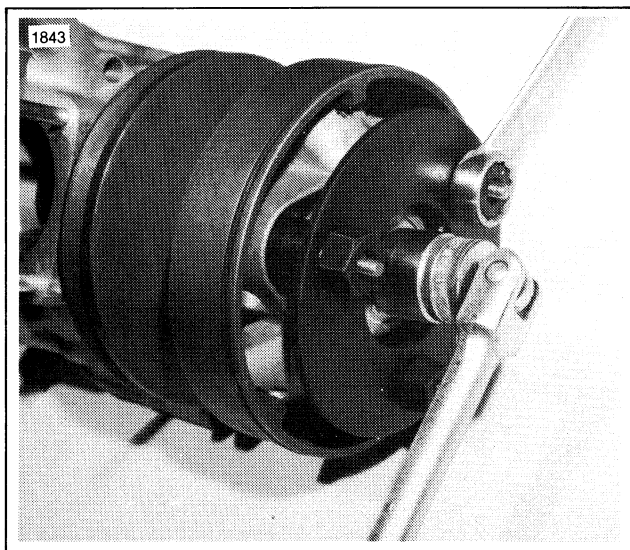


Figure 7-6. Removing drive cup nut

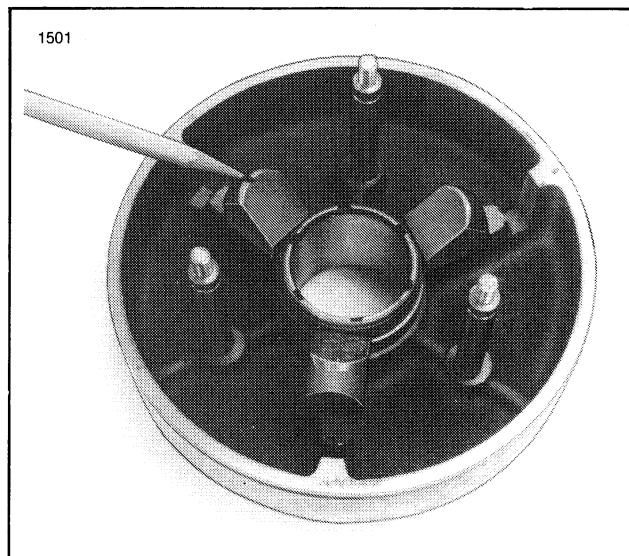


Figure 7-7. Correct Weight Position

CLEANING, INSPECTION AND REPAIR (Figure 7-8)

1. Clean all parts in a non-flammable cleaning solvent and blow dry with compressed air.
2. Check for wear of area that V-belt contacts the surfaces of the flanges. Severe wear will affect transmission operation.
3. Check the drive cup weight slide strips for wear. If strips require replacement, drill out rivets and replace the strips. All strips should be replaced if any one strip requires replacement.

CAUTION

When riveting in new slide strips, support opposite side on 5/8 in. diameter brass rod which will fit the curvature of the slide strip. If this is not done, track will be damaged.

4. Check for wear of the bushing (15) in the floating flange. If bushing is to be replaced, install a new one using a shouldered press plug with 1.560 in. outside diameter. Install the bushing flush with the flange hub at the O-ring end.
5. If the studs (19) are damaged, they can be replaced. Heat the stud mounting area to 400°F to break down the Loctite, then remove the stud. Apply Harley-Davidson STUD 'N' BEARING MOUNT, Part No. 99626-77 to threads of new stud, then install the stud.

6. See Figure 7-8. The cast iron flange has the O-ring seal retainer (18) Loctited to the flange (20). If it becomes necessary to replace the retainer, it should be installed using Harley-Davidson STUD 'N' BEARING MOUNT, Part No. 99626-77. First apply the STUD 'N' BEARING MOUNT to the flange hub surface, then push the retainer until it bottoms on the end of the flange hub. Allow enough curing time before installing the O-ring or proceeding any further on assembly.
7. Check all seals and O-rings. Replace any that appear worn or damaged. Lubricate rubber seals with oil before installing.

ASSEMBLY

1. See Figure 7-8. Install the key (28) and driving flange (27) on the shaft. Install the thrust washer (26), bearing (24), race (23), shim(s) (22) and O-ring (21).
2. See Figure 7-8. Install the felt seal (14) on the sleeve (13) then insert the sleeve into the floating flange. A piece of writing paper or shim stock can be used to hold felt seal in groove while pushing sleeve into flange bushing. Install the floating flange (20) on the shaft.
3. Position the weights in the floating flange as shown in Figure 7-7. Place the drive cup (10) in proper position on the floating flange. Holding drive cup and floating flange firmly together, slide unit onto crankshaft. Install slide nut lock and nut.

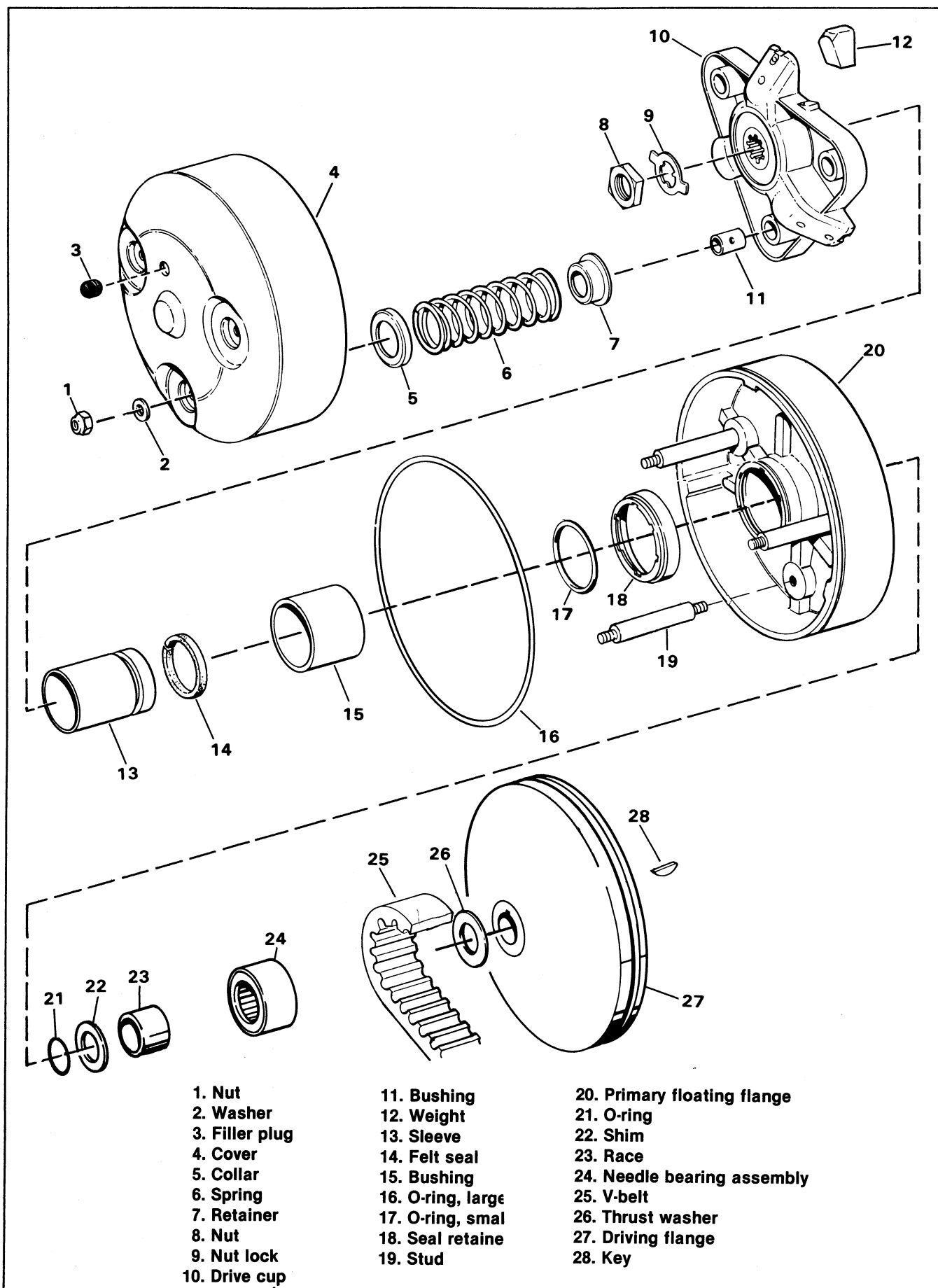


Figure 7-8. Primary Drive — Exploded View

4. Measure the V-belt side clearance using a feeler gauge. If it is less than .010 in., or if belt tends to drag at idle speed, remove the floating flange, drive cup assembly and inner sleeve. Add the necessary number of .007-.020 in. shims on the shaft to space out the floating flange.

If the side clearance is greater than .060 in., remove the necessary amount of shims.

5. See Figure 7-6. Place TRANSMISSION HOLDING TOOL, Part No. 97330-62A, on drive cup and tighten nut to 75-85 ft-lbs torque. Bend the nut lock tabs down against the nut flats.
6. See Figure 7-8. Install the O-ring (16), retainers (7), springs (6) and collars (5). Install the cover (4), washers (2) and nuts (1). Tighten the nuts to 54-66 in-lbs torque.

7. Fill the primary drive with 12 oz. of transmission lubricant. Install the filler plug (3).

NOTE

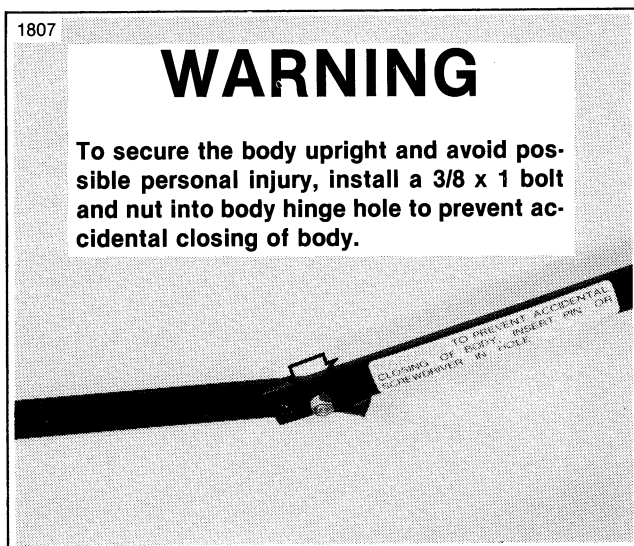
When installing or removing the drive belt, DO NOT push the primary floating flange toward the fixed flange. This could cause the weights to fall out of position within the floating flange assembly. If this occurs, the floating flange will not function properly.

8. Install the V-belt and air cleaner.
9. Connect battery cables and lower the body.

SECONDARY DRIVE

DISASSEMBLY (Figure 7-10)

1. Raise the golf car body.



WARNING

Disconnect battery cables (negative cable first) to avoid accidental start-up of vehicle and possible personal injury.

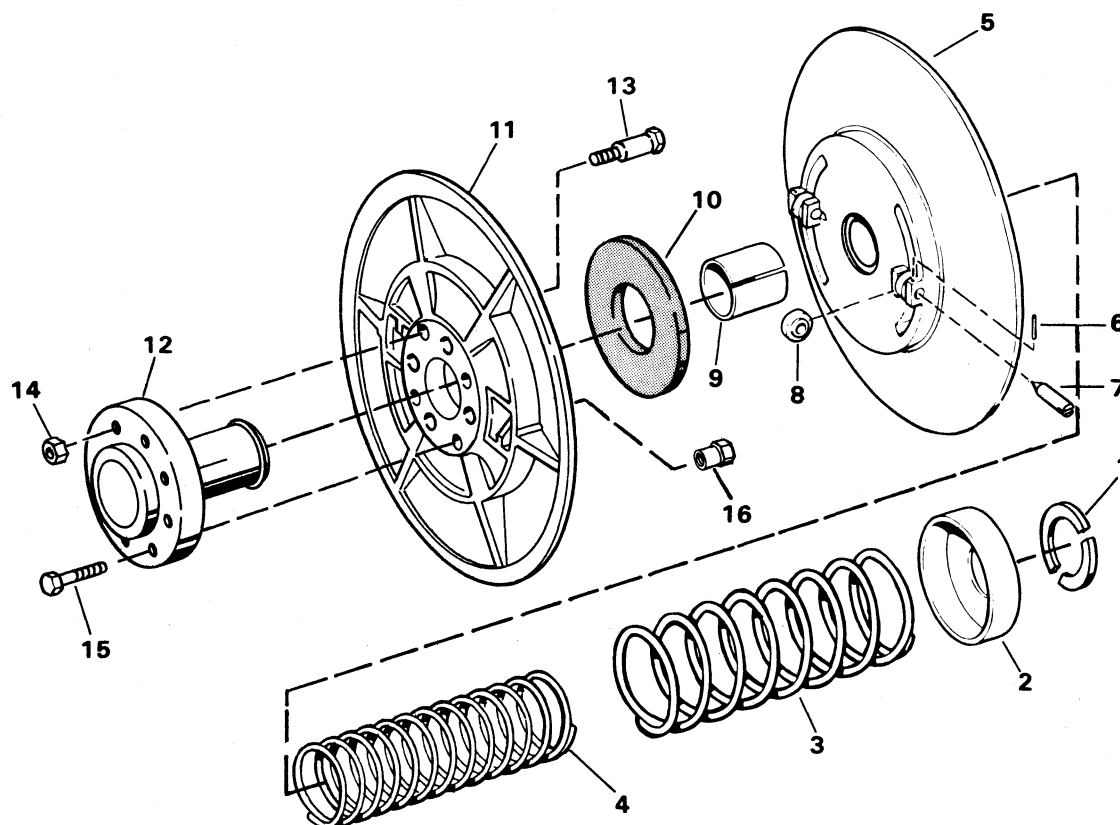
2. Remove the V-belt as described under GENERAL INFORMATION.
3. Disconnect the brake assembly from the axle housing and place it out of the way.
4. Remove the four nuts (13) or bolts (15). Remove the secondary drive and brake disc from the differential flange.
5. Apply downward pressure on the spring cup (2). Remove the retainers (1), spring cup (2), springs (3, 4), floating flange (5), spacer (10) and stationary flange (11) from the hub (12).

CLEANING, INSPECTION AND REPAIR

1. Clean all parts in a non-flammable cleaning solvent and blow dry with compressed air.
2. Check for wear at flange surfaces where V-belt makes contact. A wear surface of 1/32 in. or more in either flange is usually enough to affect vehicle operation of the transmission. Replace the flanges if worn 1/32 in. or more.
3. Check for wear of the cam tracks in the flange (11). Check looseness of cam rollers and pins on the flange (5). Replace these parts as necessary.
4. Check to see that bushing in the floating flange is centered and tight. If bushing is loose, worn or damaged, replace it with a new one. Using a hacksaw blade, saw through bushing 180° opposite and parallel to split. Heat hub to 500°. Use drift punch to remove bushing. When flange has cooled, wipe inside of boss free of any residue. Apply a thin coat of Harley-Davidson WICK 'N LOCK, Part No. 99627-77, to inside diameter of boss and outside diameter of new bushing. Press new bushing into boss until it rests against shoulder. Wipe off any excess WICK 'N LOCK and allow 15 minutes curing time.

ASSEMBLY (Figure 7-9)

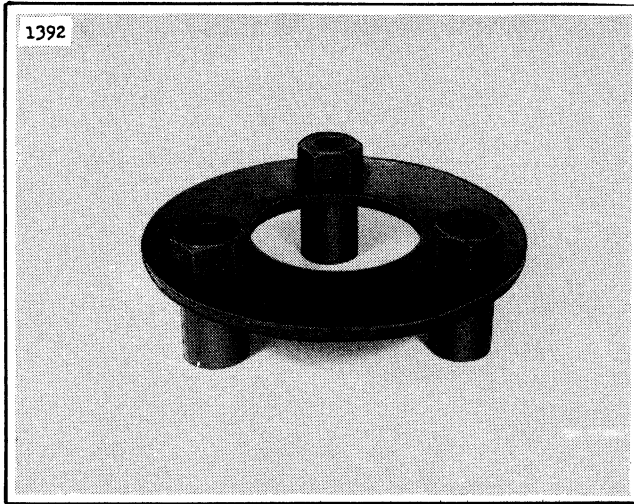
1. Install the stationary flange (11) and mounting hardware (13 or 16) on the hub (12).
2. Install the spacer (10), floating flange (5), springs (4, 3) cup (2) and retainers (1).
3. Install the secondary drive assembly using the four nuts (14) or bolts (15). Install the V-belt and air cleaner.
4. Install the brake assembly.
5. Connect the battery cables and lower the body.



- | | |
|--------------------|------------------------|
| 1. Retainer | 9. Bushing |
| 2. Spring cup | 10. Spacer |
| 3. Spring, outer | 11. Stationary flange |
| 4. Spring, inner | 12. Flange hub |
| 5. Floating flange | 13. Bolt (early 1981) |
| 6. Roll pin | 14. Nut (early 1981) |
| 7. Pin, cam roller | 15. Bolt (late 1981) |
| 8. Cam roller | 16. Insert (late 1981) |

Figure 7-9. Secondary Drive — Exploded View

TOOLS



Part No. 97330-62A Transmission Holding Tool

NOTES

SECTION**PAGE NO.**

1. Specifications	8-1
2. Ignition Key Switch	8-5
3. 3-Step Solenoid Test	8-7
4. Accelerator Micro-Switch	8-9
5. Reversing Switch	8-11
6. Breaker Points	8-13
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8. Spark Plugs	8-19
9. Starter Generator	8-21
10. Voltage Regulator	8-31
11. Battery	8-33
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SPECIFICATIONS

STARTER GENERATOR

Model Hitachi
Type Series wound, reversible
Rating 12 Volts
Output 0.9 HP (30 Sec.) Starter
14 Volts
11 Amps Cont. generator at 5000 RPM

Cut in Speed Under 3000 RPM @ 14 Volts
Brushes -

Original length 7/8 in.
(22.225 mm)

Minimum length 5/8 in.
(15.875 mm)

Brush spring tension 28 ± 4 oz.
(680.4 grams)

Commutator —

Original diameter 1.614 in.
(41 mm)

Minimum diameter 1.535 in.
(39 mm)

Under cut depth025 in.
(.63 mm)

Runout after finishing002 in. max.

Pulley 2.62 in. dia.

Breaker points018 - .024 in. gap

Spark plug (H-D 5-6)025 - .030 in. gap
(.63 - .75 mm)

TORQUES

Spark plug 15-20 ft-lbs
(2.074 - 2.765 kgm)

Battery terminals 5-10 ft-lbs
(0.691 - 1.383 kgm)

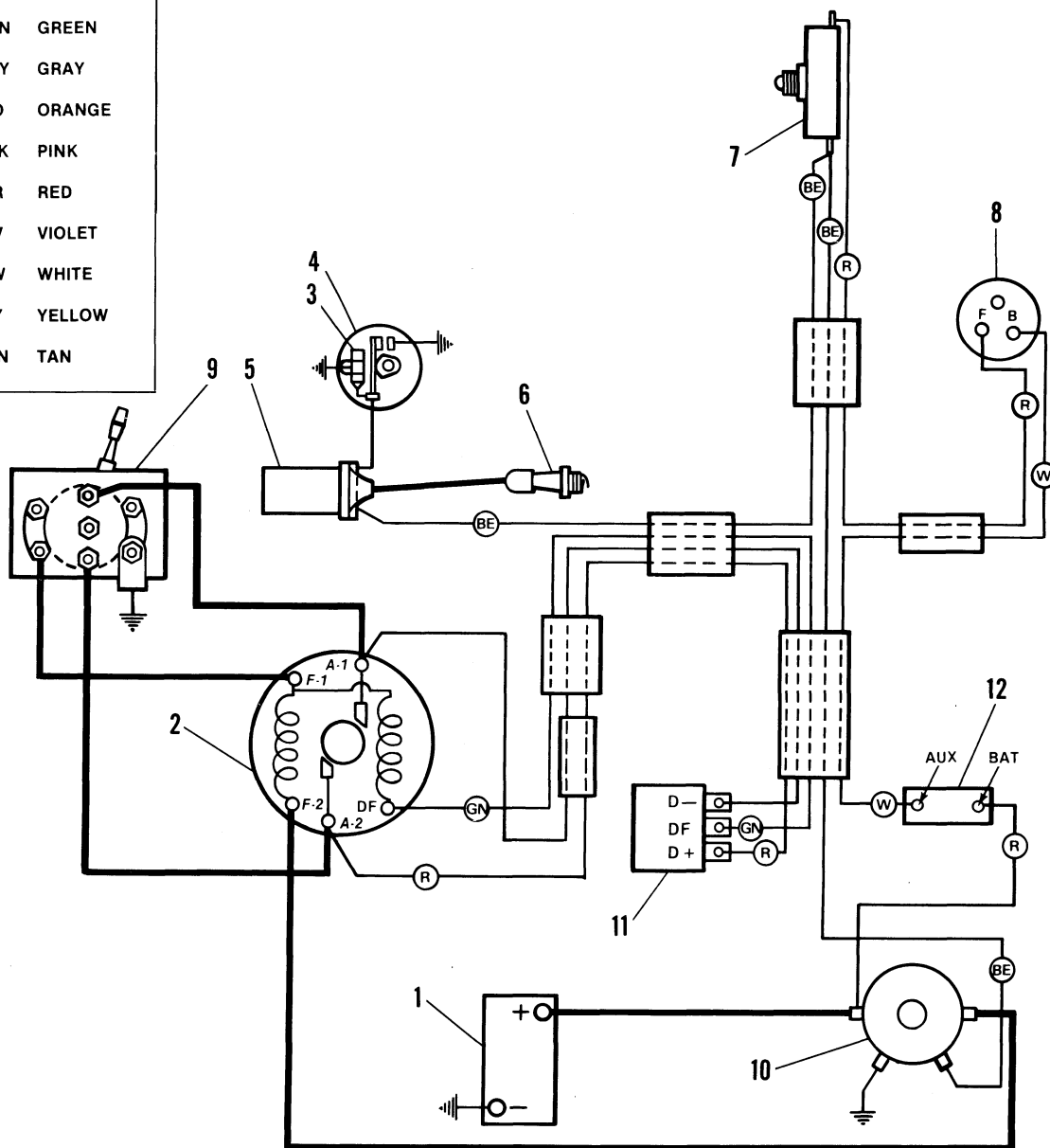
Starter-generator mounting bolts 12 ft-lbs
(1.659 kgm)

Pulley nut 26-33 ft-lbs
(3.59 - 4.56 kgm)

Pole shoe screws 9 ft-lbs
(1.244 kgm)

KEY TO COLOR CODE

BE	BLUE
BK	BLACK
BN	BROWN
GN	GREEN
GY	GRAY
O	ORANGE
PK	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW
TN	TAN



1. Battery
2. Starter-generator
3. Condensor
4. Ignition circuit breaker
5. Ignition coil
6. Spark plug

7. Accelerator micro switch
8. Key switch
9. Reversing switch
10. Solenoid switch
11. Voltage regulator
12. Overload circuit breaker

Figure 8-1. Wiring Diagram — D, D4

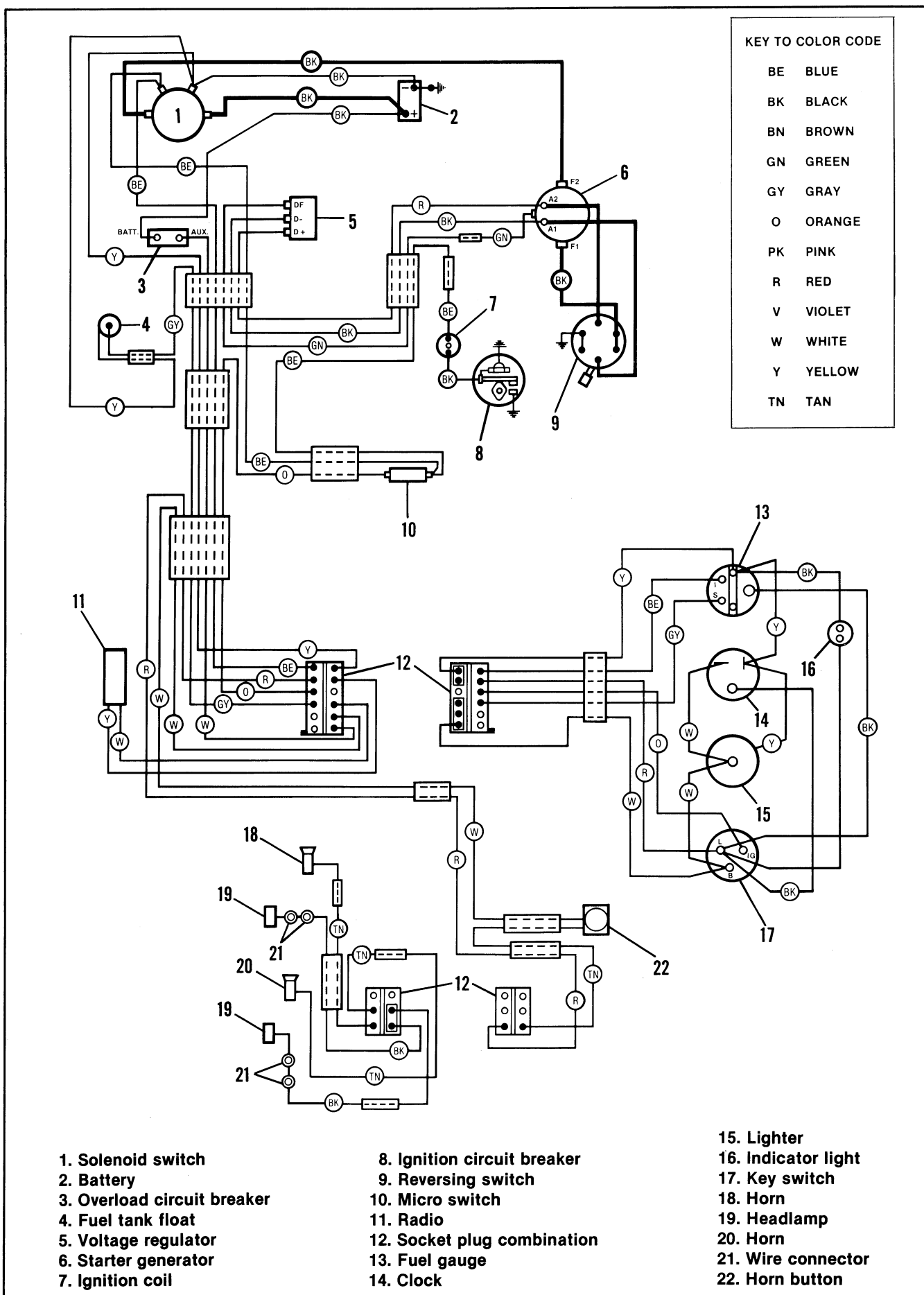


Figure 8-2. Wiring Diagram — Classic America D4

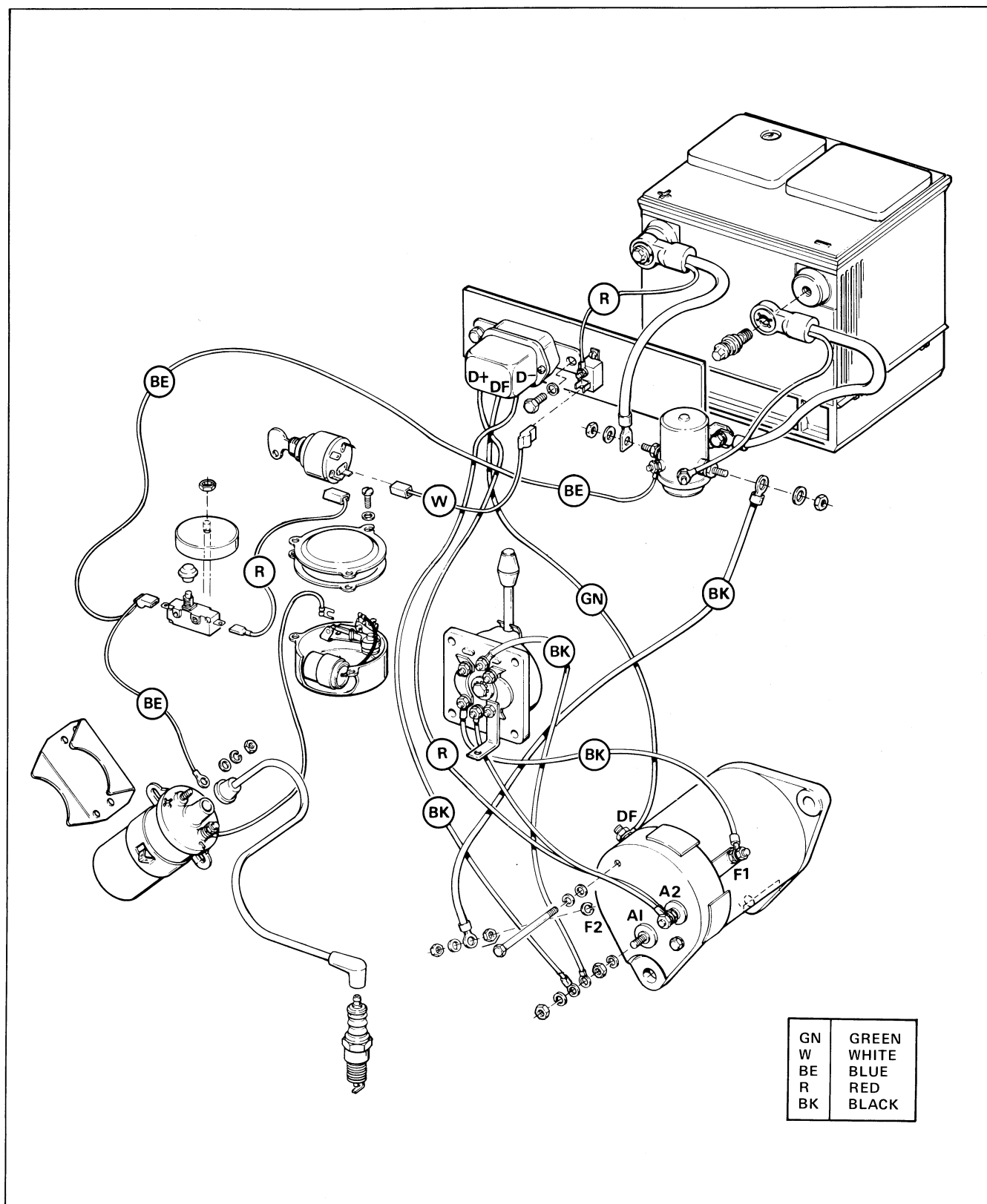


Figure 8-3. Wiring Layout

IGNITION KEY SWITCH

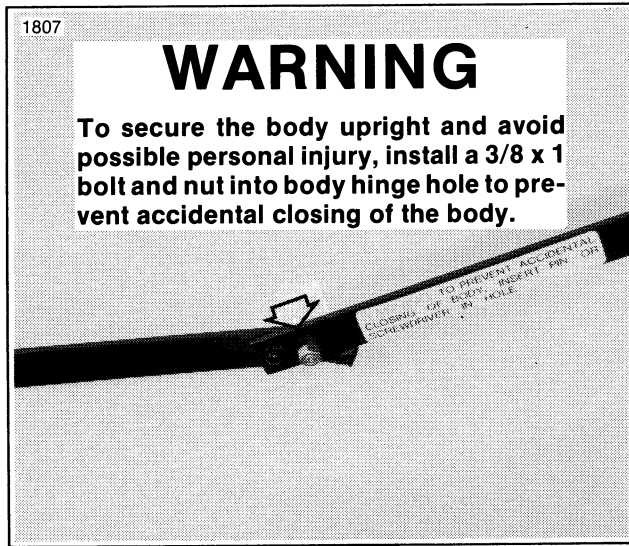
TESTING IGNITION KEY SWITCH IN CAR (Figure 8-4)

Testing

Equipment required for test:

Ohmmeter (set at RX1), or

Battery powered continuity tester.



WARNING

Before making any tests, disconnect spark plug wire to prevent accidental start-up of vehicle and possible personal injury.

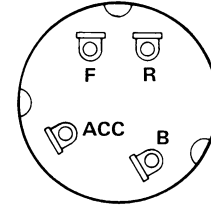
NOTE

This ignition key switch is not repairable. If this switch becomes defective, it must be replaced.

1. Use a continuity tester or ohmmeter to test ignition key switch. If key switch is good, the light will glow, or the ohmmeter will show "0" ohms resistance as checked between "F" and "B" terminals with key in ON position.

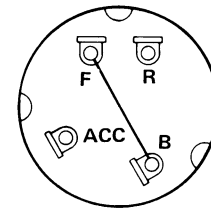
Key Switch Bench Test

Key in "OFF" Position



No continuity between any terminals or case.
Continuity tester light out or ∞ ohms.

Key in "ON" Position



Continuity between B and F only.
Continuity tester light "on" or 0 ohms.

Figure 8-4. Testing Key Switch for Continuity

Removal

1. Remove spanner nut, washer and ignition plate.
2. Remove ignition key switch from housing and disconnect wires from rear of ignition key switch.

Installation

1. See Figure 8-4. Plug red wire onto terminal marked "F" and white wire onto terminal marked "B."
2. Install ignition key switch into housing using ignition plate, washer and spanner nut. Tighten the nut.

NOTES

3 STEP SOLENOID TEST

TESTING SOLENOID (Figure 8-7)

Equipment needed for test

12 volt battery

Battery powered continuity tester (Figure 8-5) or ohm-meter (Figure 8-6 set at RX1 scale).

NOTE

Bench tests can be made with component out of car or with all wires and connections removed from component being tested.

1. Check continuity across side terminals.
2. Apply 12 volts to small terminals, check for solenoid energizing (click).
3. Apply 12 volts to small terminals, check continuity across side terminals.

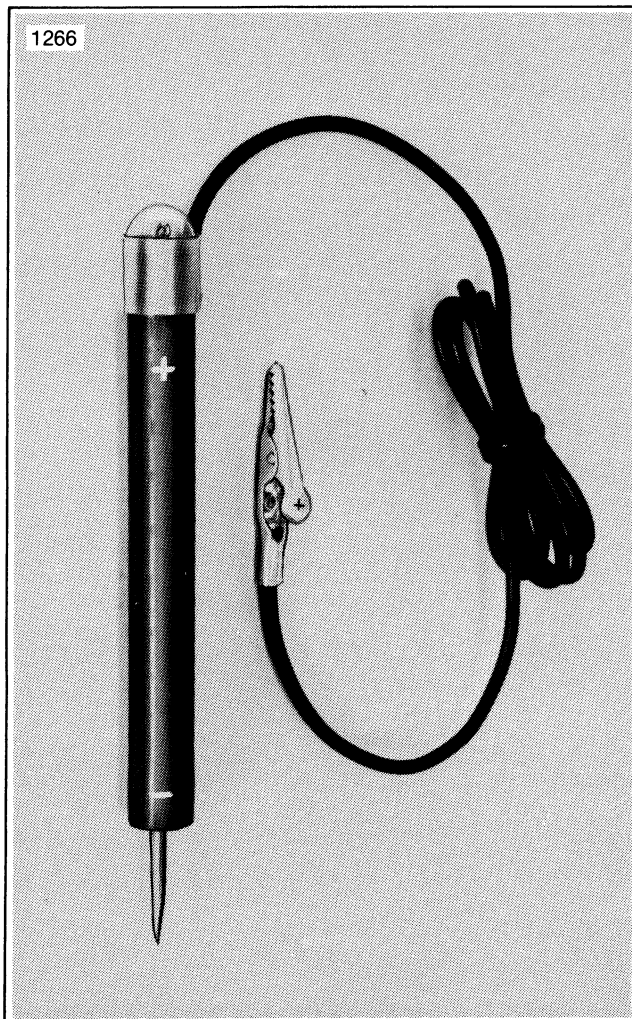


Figure 8-5. Battery Powered Continuity Tester



Figure 8-6. Volt-Ohm Meter

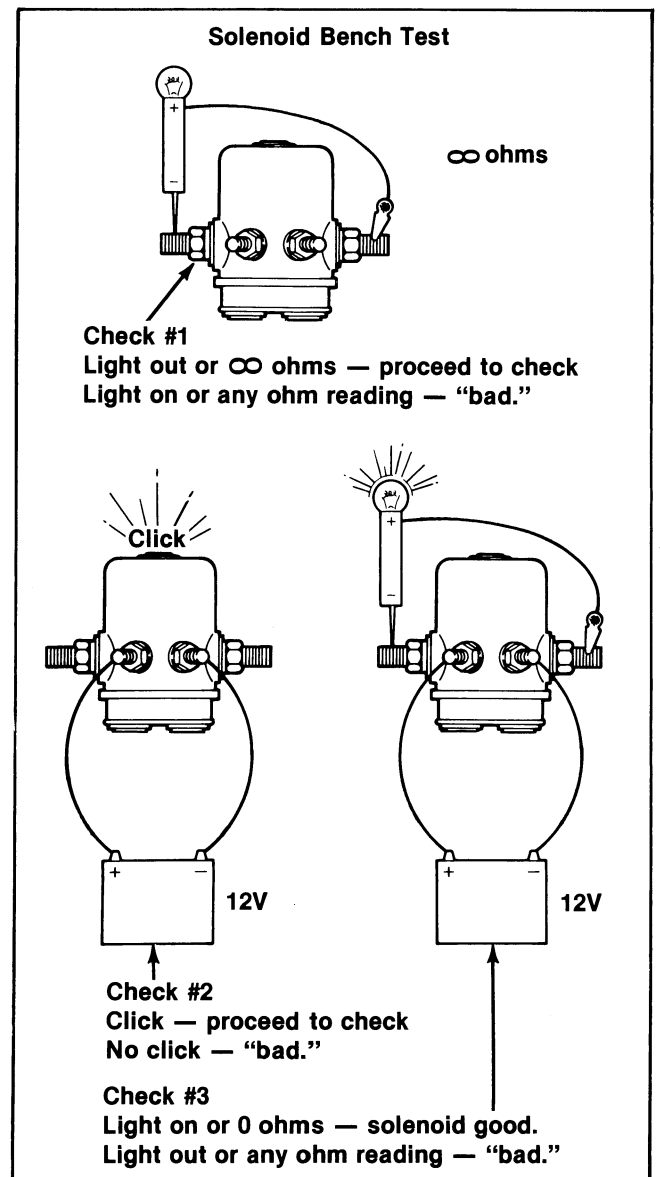


Figure 8-7. 3-Step Solenoid Test

NOTES

ACCELERATOR MICRO-SWITCH

GENERAL

The accelerator micro-switch is mounted under the left side frame cross-channel. The switch is operated by a rod running from the accelerator pedal through the frame cross-channel with cup on end to actuate the micro-switch plunger. See Figure 8-8.

ADJUSTMENT

(Figure 8-8)

1. Cup (2) is adjustable by turning on rod (3) threads after loosening locknut (1).
2. Adjust the cup so micro-switch clicks (closes) when the accelerator pedal is pushed down approximately half of the free play distance.

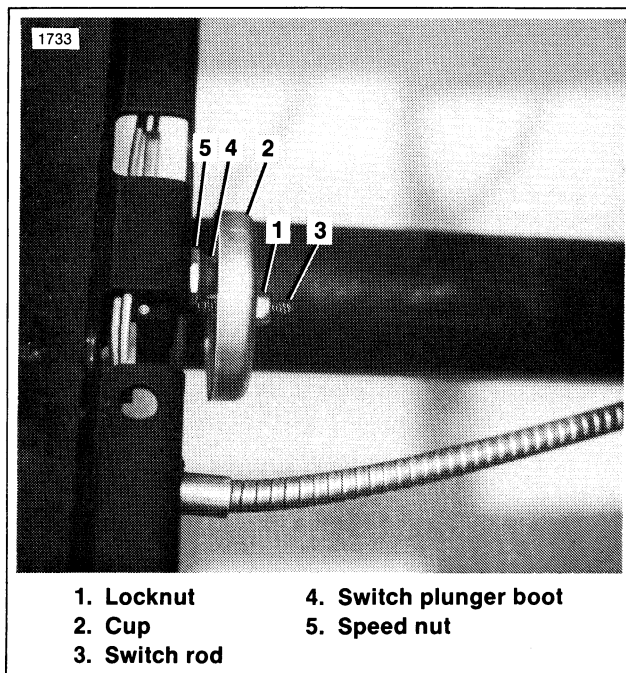


Figure 8-8. Accelerator Micro-Switch

REMOVAL (Figure 8-8)

1. Raise the golf car body.

WARNING

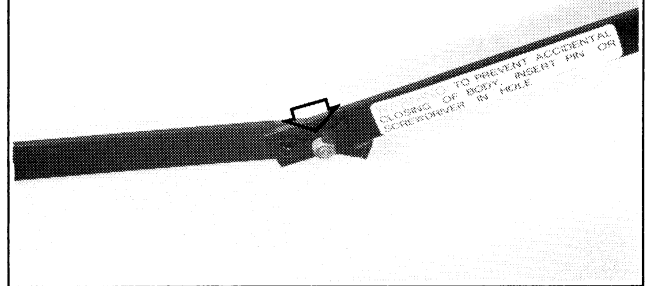
Disconnect the battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.

2. Remove locknut (1), spin off cup. Remove switch plunger boot (4).
3. Remove speed nut (5) and pull micro-switch free.

1807

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.



4. See Figure 8-9. Disconnect single red wire (1) and double blue wire (2).

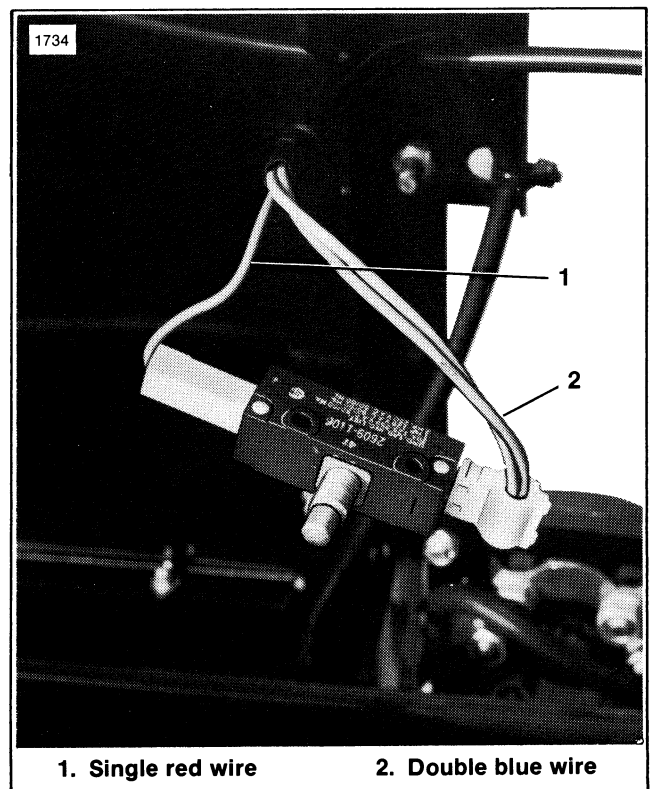


Figure 8-9. Micro-Switch

TESTING ACCELERATOR MICRO-SWITCH OUT OF CAR (Figure 8-10)

Equipment required for test:

- Ohmmeter (set at RX1) or
- Battery powered continuity tester.

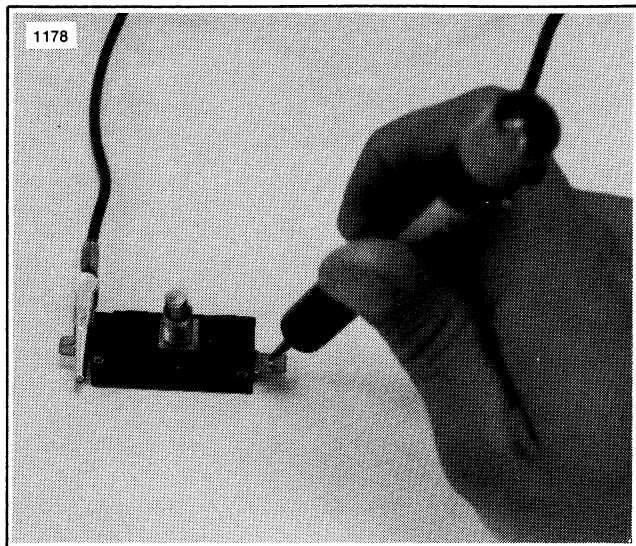


Figure 8-10. Testing Micro-Switch for Continuity

1. Remove switch and disconnect wires. See REMOVAL.
2. Using ohmmeter or continuity tester, check for

continuity. The ohmmeter should be set at RX1 and should have 0 ohms reading. If continuity tester is used the lamp should light.

3. Push switch plunger to see if continuity through switch is broken. Replace switch if defective in either test.
4. Reinstall switch, see INSTALLATION.

INSTALLATION (Figure 8-8)

1. See Figure 8-9. Reconnect single red wire (1), double blue wire (2) and mount switch using speed nut (5, Figure 8-7).
2. Install switch plunger boot (4) to switch, spin on cup (2) and locknut (1).
3. Adjust micro-switch. See ADJUSTMENTS.
4. Connect battery cables.
5. Lower car body.

REVERSING SWITCH

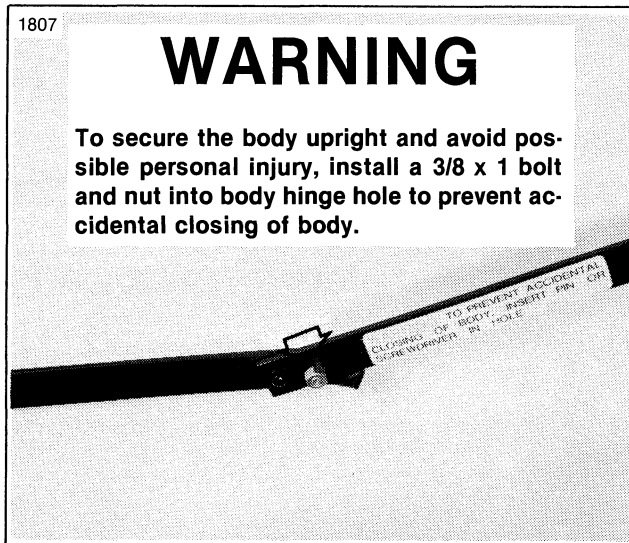
GENERAL

The reversing switch is a built up assembly which can be taken apart for cleaning, inspection and repair of contact screws, connecting strips, floating contact buttons, etc. Cleaning with fine sandpaper is all that is required to correct imperfect contact.

REMOVAL

(Figure 8-11)

1. Raise the golf car body.



WARNING

Disconnect the battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.



Figure 8-11. Reversing Switch

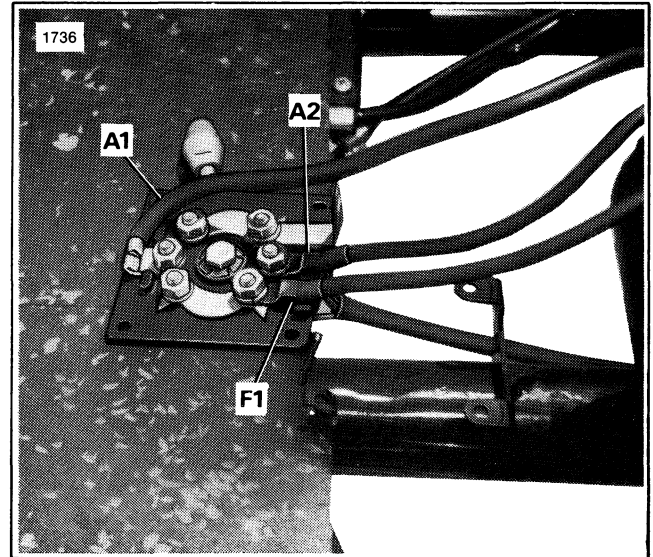


Figure 8-12. Reversing Switch Wires

2. Remove reversing switch mounting screws, rubber washers and locknuts. Disconnect lever return spring.
3. Remove reversing switch ground screw, internal tooth washers, lockwasher and nut, lift switch out and disconnect switch wires. (See Figure 8-12).

DISASSEMBLY

(Figure 8-13)

1. Remove cotter pin (1), castle nut (2), bracket (3), arm (4) and spacer (5). Remove cover (6) from switch base (7).

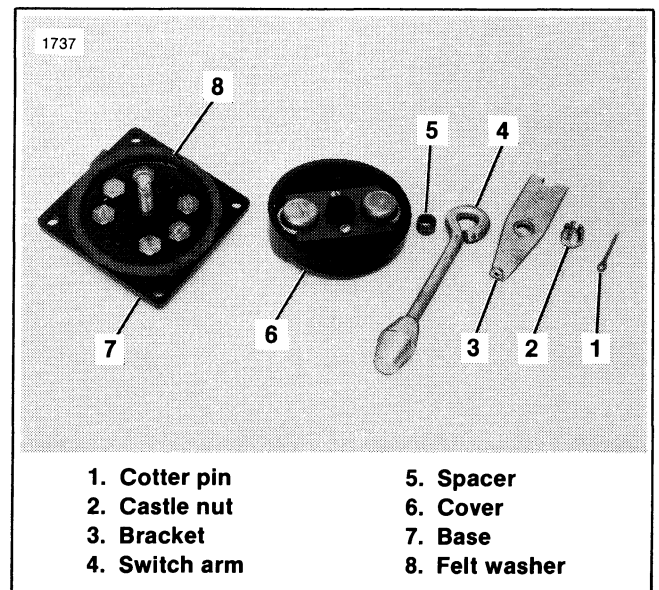


Figure 8-13. Reversing Switch Assembly

CLEANING, INSPECTION AND REPAIR

1. Clean switch contacts with Harley-Davidson CLEANING SOLVENT, Part No. 99631-77. Using fine sandpaper, polish contacts. Remove all particles and apply a light coat of MULTI-PURPOSE GREASE to contacts before reassembly.

ASSEMBLY

1. See Figure 8-13. Install cover (6) on to base (7). Install spacer (5), arm (4), bracket (3), castle nut (2) and cotter pin (1). The castle nut (2) should be tightened till cover is touching the felt washer (8).

TESTING

Equipment required for test:

Ohmmeters (set at RX1), or
Battery powered Continuity tester.

1. Remove REVERSING SWITCH and disconnect wires. See REMOVAL.
2. Using ohmmeter or continuity tester, check for continuity in both forward and reverse positions. The ohmmeter should be set at RX1 and should have 0 ohms reading. If continuity tester is used the lamp should light. See Figure 8-14 and 8-15.
3. Reinstall reversing switch. See INSTALLATION.

INSTALLATION

1. Mount switch to frame bracket. The rubber washers are installed between switch and frame, install screws and locknuts.
2. See Figure 8-11. Connect lever return spring and switch ground, using screw, internal tooth washer, lockwasher and nut.
3. See Figure 8-12. Connect switch wires to switch, making sure correct wire is fastened to correct switch terminal.
4. Connect battery cables, and see Figure 8-3 if wires were not marked when removed.
5. Lower car body.

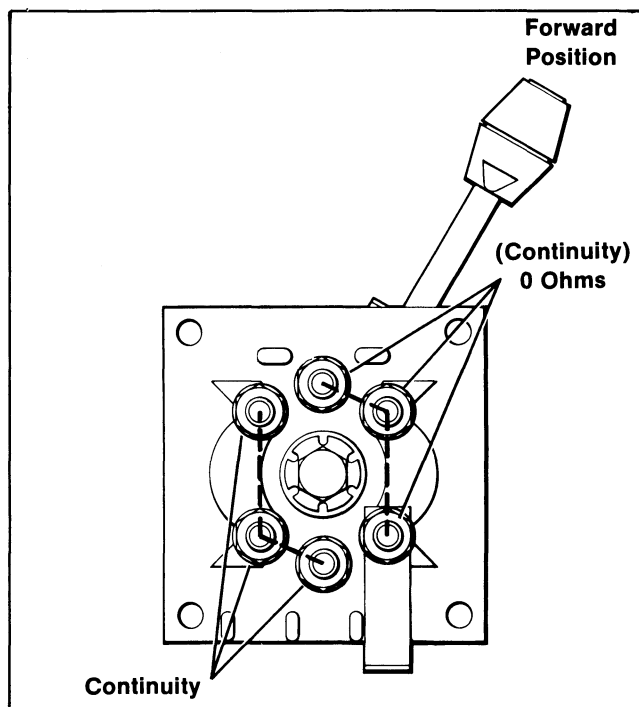


Figure 8-14. Correct Continuity in Forward Position

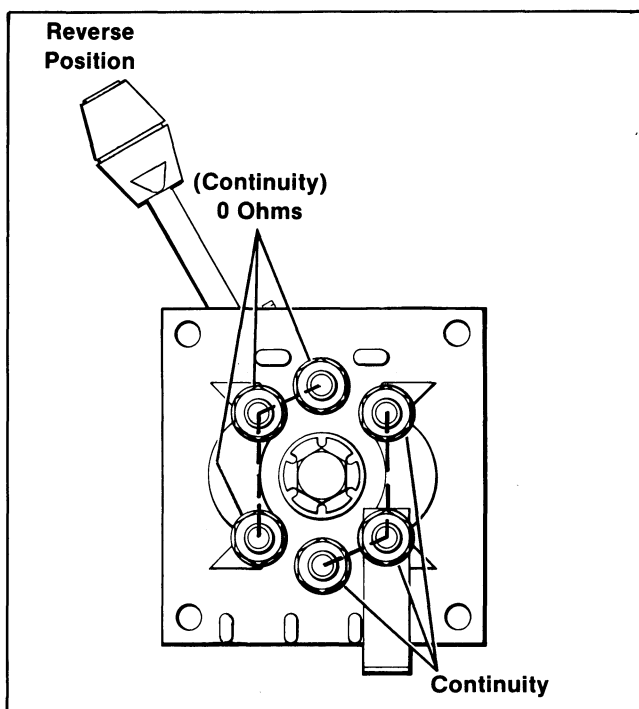


Figure 8-15. Correct Continuity in Reverse Position

BREAKER POINTS

GENERAL INFORMATION

The ignition system has two circuits, the primary circuit and the secondary circuit. The primary circuit consists of the battery, key switch, accelerator switch, primary coil winding, breaker points, condenser and associated wiring. The secondary circuit consists of the secondary coil winding, the spark plug wire and spark plug.

The breaker points have two functions. First, the breaker cam and contact points open and close the low tension circuit between the battery and ignition coil primary circuit causing the coil to produce high voltage discharge from the secondary circuit to the spark plug. Second, the circuit breaker points time the discharge for proper engine firing.

The D and D4 have fixed ignition timing (no advance mechanism). In tracing the current through the ignition system, the initial current comes from the battery. The current flows from the battery through the primary coil to ground and back to the battery while the points are closed. When the cam opens the points, (cam shaft rotates at engine speed) the circuit is broken so that a high voltage surge is produced from ignition coil primary to secondary. This voltage will cause a spark to jump the air gap of the plug.

The condenser is connected to the circuit breaker points and functions to produce a quick collapse of the magnetic field in the primary circuit so that high voltage will be produced. In doing this, the condenser acts to prevent current from continuing to flow across the contact points after points open.

In trouble shooting the ignition system, start with spark plug to see if it is getting a spark according to the following procedure.

Disengage spark plug cable and insert a metal rod, screw or nail into the spark plug cable. Arrange cable end so tip of inserted metal object is 1/4 in. away from cylinder head. Turn on the ignition key switch, depress accelerator to crank engine and see if a "hot" or "blue" spark is obtained. If not, it is an indication of a weak coil, broken or loose wires, points not opening, etc. Arcing of the points indicates a faulty condenser.

NOTE

If a "hot" or "blue" spark is obtained, replace spark plug in cable end, rest hex head portion of plug on cylinder head and again crank engine. If no spark or a very weak spark jumps the gap between the spark plug electrodes, the spark plug is faulty. Clean and regap or replace.

CLEANING, INSPECTION AND REPAIR

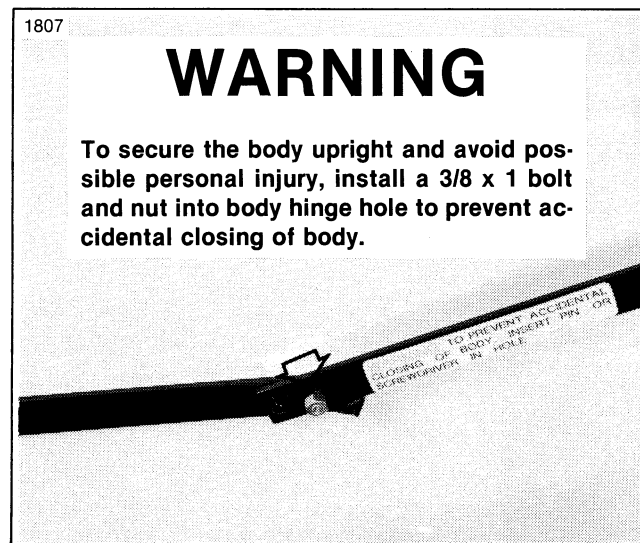
1. Circuit breaker is located on the front of engine.

The circuit breaker points should be checked for gap and contact surface condition as specified in regular service interval chart. Remove the circuit breaker cover. See REMOVAL.

2. Point contact surfaces should appear clean, dull gray, slightly rough. If they are found dirty but otherwise in apparent good condition, clean with a strip of hard surfaced, heavy paper saturated with clean naphtha or white gasoline. If points are pitted, a new set should be installed.

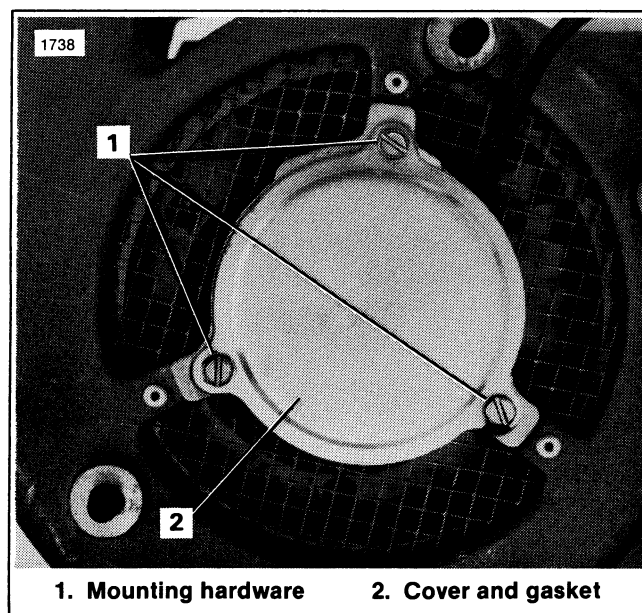
REMOVAL

1. Raise the golf car body.



WARNING

Disconnect spark plug wire to prevent accidental start-up of vehicle and possible personal injury.



1. Mounting hardware 2. Cover and gasket

Figure 8-16. Circuit Breaker Cover

2. See Figure 8-16. Remove circuit breaker hardware (1), cover and gasket (2).
3. See Figure 8-17. Remove condenser and coil wires from point set terminal.
4. Remove lock screw and washer (10).
5. Remove point set.

INSTALLATION

(Figure 8-17)

1. Install point set, connect coil wire to points (8).
2. Connect condenser wire to points.
3. Set points. See ADJUSTMENT — BREAKER POINTS.
4. See Figure 8-16. Mount gasket and cover (2) and mounting hardware (1).
5. Connect spark plug wire.

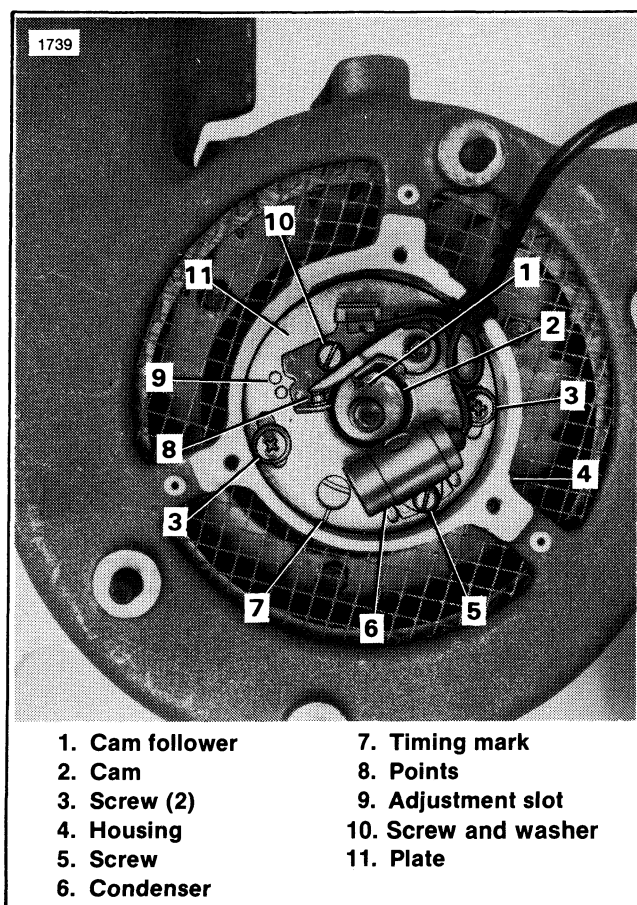


Figure 8-17. Circuit Breaker

ADJUSTMENT-BREAKER POINTS

(Figure 8-17)

1. Rotate the engine shaft a small amount until cam

follower (1) has reached highest point on cam (2).

2. Place a .022 in. wire gauge between breaker point contacts (8). If a slight drag is noted when the wire is passed between the points, no adjustment is required. When adjustment is required, loosen lock screw and washer (10) and use screwdriver on adjustment slot (9) to move adjustable point a slight amount to obtain the correct point gap.
3. When adjustment is completed, tighten the screw and washer (10). Recheck the gap and correct if necessary.
4. See Figure 8-18. Circuit breaker points should be removed, if breaker point pressure is not within prescribed limits of 14 to 18 oz. Check pressure with a spring gauge. The scale should be hooked to the breaker lever at an angle of 90° with the point surface and reading taken just as points break. Excessive pressure causes rapid fiber block wear, cam and breaker point wear, while insufficient pressure will permit high speed point bounce which will, in turn, cause arcing and burning of the points and missing of the engine. Point faces must seat squarely against each other. If not, square up by bending stationary and/or movable point.

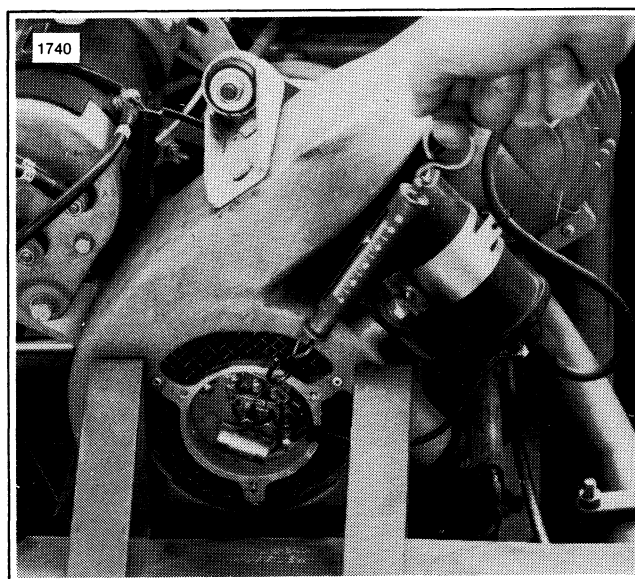


Figure 8-18. Breaker Points — Spring Retension

5. If the condenser is suspected of being defective, replace with a proven new condenser and note whether engine performance is improved.
6. A condenser that is defective will have either an open or short circuit. An open circuit will be evident by excessive sparking at breaker contact points and a shorted circuit will have no noticeable spark at the contact points or at spark plug.

IGNITION TIMING (Figure 8-17)

Ignition timing is controlled by the circuit breaker. Correct ignition timing and correct setting of circuit breaker contact point gap is absolutely necessary for proper engine operation. After the engine is correctly timed at the factory, the circuit breaker plate (11) and housing (4) are match-marked for guidance (7) when the engine requires tuning and servicing. When these two marks line up, timing is as it was originally set at the factory.

Two timing marks are located on outside of flywheel and are visible through hole in fan housing located next to spark coil. See Figure 8-19. Each mark is 25° before piston top center, one for forward engine operation and the other for reverse engine operation. Check and adjust ignition timing in forward and reverse running direction as follows:

1. Correctly adjust the circuit breaker point gap as described under ADJUSTING BREAKER POINTS.
2. Forward Timing: Turn engine crankshaft clockwise in forward operating direction until **forward** mark (25° BTC) appears in center of hole in fan housing as shown in Figure 8-19. This is the point at which circuit breaker contact should open.

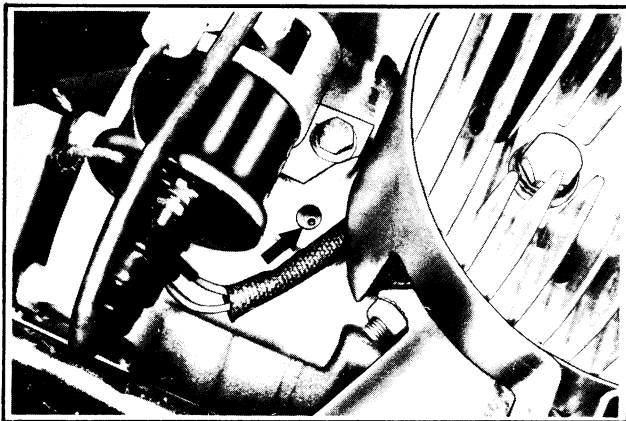


Figure 8-19. Flywheel Timing Marks

3. If it is necessary to readjust timing, loosen the two lock screws (3) and shift the breaker plate assembly so that the fiber cam follower (1) is coming up on the cam (2) just far enough so that the contacts (8) open. The spark occurs when the points open.
4. Retighten lock screws.

5. Reverse Timing: Turn engine crankshaft counterclockwise in reverse operating direction. Points should open when **reverse** mark (25° BTC) appears within limits of hole.

NOTE

If reverse timing mark is past hole in reverse direction (timing too far retarded), open circuit breaker points as necessary to advance timing. If reverse timing mark is in front of hole (timing too far advanced), close circuit breaker points as necessary to retard timing.

It will be necessary to reset circuit breaker plate for correct forward timing after point gap has been changed. If correct forward and reverse timing cannot be obtained within .018 to .024 point gap, replace circuit breaker cam and adjust the ignition timing.

6. A strobe timing light can be used to check ignition timing while engine is operating at governed speed. Raise left rear wheel with jack or suitable blocking so it can turn freely. See LIFTING INSTRUCTIONS, Section 1. Run engine at about 2000 RPM in forward direction. Forward timing mark should appear in center of hole in fan housing (strobe light flashing on timing mark to stop motion). Repeat with engine running reverse direction. Reverse timing mark should be within limits of hole in fan housing. See Figure 8-19.

STATIC TIMING TEST

An accurate check as to when the points just start to open can be made with a CONTINUITY TESTER.

1. Remove spark plug.
2. Remove circuit breaker cover. See REMOVAL.
3. Rotate piston to top dead center.
4. Attach continuity tester to ground and upper arm of points. (Tester light should be out).
5. To check engine timing forward running, rotate the engine counterclockwise beyond where ignition points close and light comes on. Then turn engine clockwise slowly until light goes out. Timing mark on flywheel should appear in center of hole in fan housing. The same procedure can be used to check ignition timing for reverse running.
6. If this reading is not achieved, adjust timing and recheck point gap. See TIMING IGNITION.

NOTES

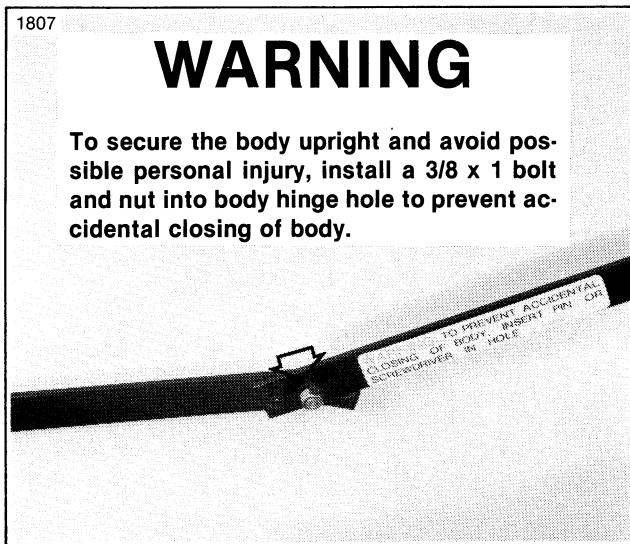
IGNITION COIL

GENERAL

The ignition coil is a pulse transformer that transforms or steps up low voltage to high voltage necessary to jump the electrode at the spark plug in the engine cylinder head. Internally, coil consists of primary and secondary windings with laminated iron core surrounded by oil and sealed in a canister. Case cannot be taken apart or coil repaired.

REMOVAL (Figure 8-20)

1. Raise the golf car body.

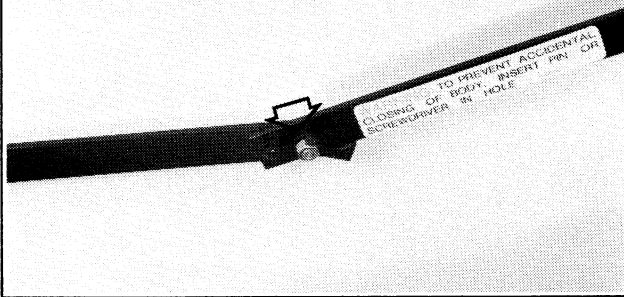


1. Black wire
2. Blue wire
3. Spark plug wire
4. High tension tower
5. Cable strap

Figure 8-20. Spark Plug Wire Routing

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.



WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables (negative cable first) before performing any of the following procedures.

1. Disconnect terminal wires (1) and (2) and spark plug wire (3).
2. See Figure 8-21. Remove mounting bolts (5), washers, lockwashers and nuts (6) to free coil bracket.
3. See Figure 8-21. Loosen coil clamp screw (4) and lift coil out.

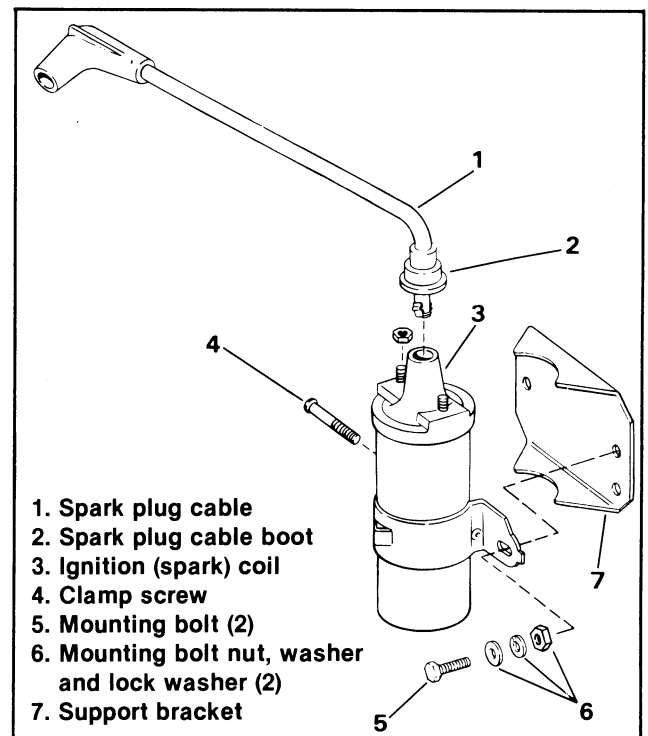


Figure 8-21. Ignition Coil

TESTING

1. Disconnect spark plug wire from coil.
2. Disconnect coil terminal wires.

3. See Figure 8-22. Check primary winding resistance. Set ohmmeter to RX1. Reading should be 3.4 to 4.2 ohms.
4. See Figure 8-23. Check secondary winding resistance. Set ohmmeter to RX100. Reading should be 6000 to 9000 ohms.

CABLE

1. See Figure 8-24. Check cable resistance. Set ohmmeter to RX100. Reading should be 3000 to 7000 ohms per foot. A 16 inch suppression cable will have 4200 to 9100 ohms. Metallic core cable resistance should be 0 ohms.
2. Replace spark plug cable if inspection indicates that cable is faulty.

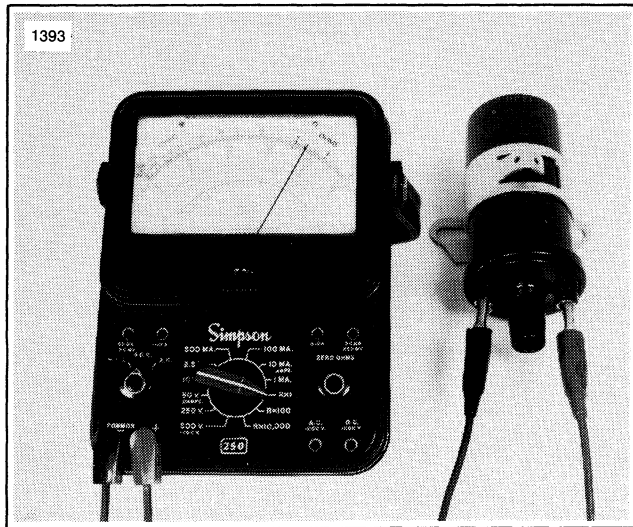


Figure 8-22. Checking Primary Winding Resistance

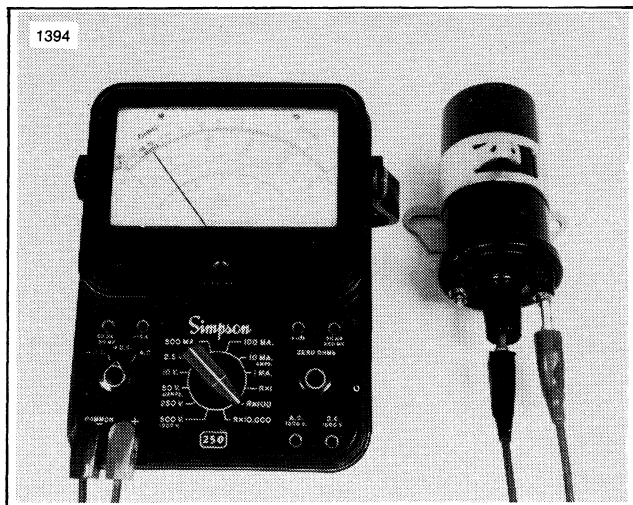


Figure 8-23. Checking Secondary Winding Resistance

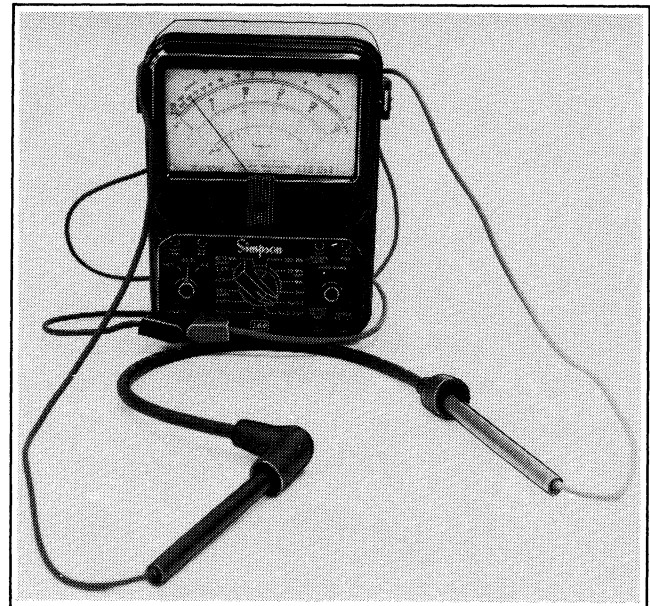


Figure 8-24. Checking Cable Resistance

INSTALLATION

1. See Figure 8-21. Mount coil (3) to bracket (7), fasten coil bracket (7) using washers, lockwashers, nuts (6) and mounting bolts (5).
2. See Figure 8-20. Connect coil terminal wires as follows: blue wire (2) to (+) positive terminal, black wire (1) to (-) negative terminal.
3. See Figure 8-21. Connect spark plug wires (1) to center post on coil (3).

CAUTION

Any excess spark plug wire is to be pulled through the cable strap toward the spark coil. This will prevent the splash shield from contacting the plug wire.

4. Connect battery cables.
5. Lower car body.

SPARK PLUGS

GENERAL

Spark plugs are selected to suit a specific engine design and vehicle operating condition. The Harley-Davidson spark plug is designed to give maximum life and efficient combustion of fuel. The Harley-Davidson 5-6 spark plug incorporates a spark booster gap in the center electrode and an extended core which gives a greater heat operating range. The booster gap gives the plug the ability to resist fouling for long periods under normal operating conditions.

REMOVING SPARK PLUGS

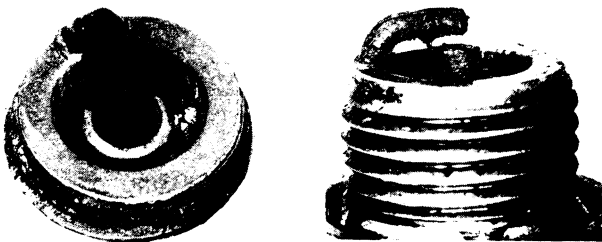
Use a deep socket wrench or special spark plug wrench to loosen the plug. Blow away all dirt from plug base with compressed air before removing plug.

CLEANING, INSPECTION AND REPAIR

Examine the plug. The deposit on the plug base is an indication of the correctness of the plug heat range and efficiency as well as a guide to the general condition of engine, fuel and ignition system.

Spark Plug Conditions and Analysis

Core Bridging, Gap Bridging



Combustion particles wedged or fused between the electrodes or the core nose and shell.

Both core bridging and gap bridging are caused by excessive combustion chamber deposits striking and adhering to the spark plug's firing end. They originate from the piston and cylinder head surfaces. These deposits are formed by one or a combination of the following:

Excessive carbon in cylinder. Use of non-recommended oils. Immediate high-speed operation after prolonged low-speed running. Improper ratio of fuel/oil mixture.

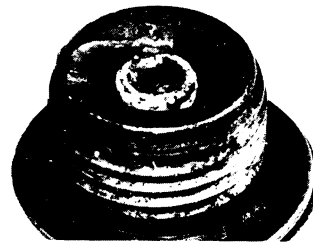
Wet Fouling



Damp or wet, black carbon coating over entire firing end. Forms sludge in some extreme cases.

Wrong spark plug heat range (too cold). Prolonged slow operation. Low-speed carburetor adjustment is too rich. Improper ratio of fuel-to-oil mixture (too much oil). Worn or defective breaker points, resulting in lack of voltage.

Overheating



Electrodes badly eroded. Premature gap wear. Insulator has gray or white "blistered" appearance.

Incorrect spark plug heat range (too hot). Ignition timing overadvanced. Consistent high-speed operation.

Preignition



Melted electrodes and/or white insulator indicates sustained preignition. (Insulator may be dirty due to misfiring or debris in the combustion chamber.)

Check for correct plug heat range, proper lubrication and/or advanced ignition timing. Determine the cause of preignition before putting engine back into service.

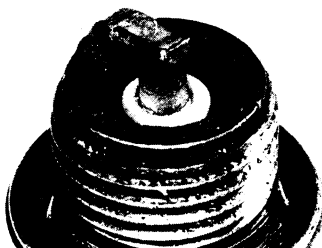
Aluminum Throw-Off



Aluminum deposits on electrodes and insulator core nose.

Caused by first stages of preignition within the cylinder which melts the aluminum alloy of the piston crown. Do not install new plug until piston is examined and the source of preignition is determined.

Normal



Light tan to gray color and slight electrode wear indicate correct heat range.

Change plugs at regular intervals using same heat range.

Testing Spark Plugs

Check the sparking ability of a cleaned and regapped plug on a sparking comparator if possible. An inability to withstand rapid firing under cylinder compression conditions can be discovered.

Setting Spark Gap

1. Before setting the spark gap on a used plug, pass a thin point file (or nail file) between the electrodes to produce flat, parallel surfaces to facilitate accurate gauging.
2. Use only a wire type gauge. Bend the outside or grounded electrode so only a slight drag on the gauge is felt when passing it between the electrodes. Never make adjustments by bending the center electrode. Set gap as follows:

No. 5-6025-.030 in.
(.63-.75 mm) gap

INSTALLING SPARK PLUGS

NOTE

Before turning the spark plug into the cylinder head, check the condition of threads in head and on the plug. Soften deposits in cylinder head with penetrating oil and clean out with tap or old plug.

1. Install a new spark plug gasket and turn the plug down finger tight. Tighten spark plug to 15-20 ft-lbs (2.074 - 2.765 kgm) torque.
2. Check and if necessary, adjust engine low speed mixture setting after installing a new plug.

STARTER GENERATOR

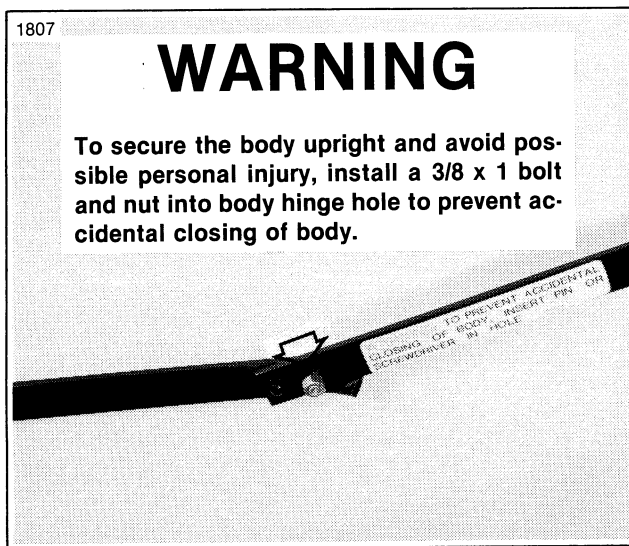
STARTER CIRCUIT TEST (Figure 8-25)

If starter motor fails to turn engine over with ignition key switch ON and the accelerator pedal depressed, the following checks should be made in sequence to find the cause. Proceed as follows:

NOTE

These checks should be made only after eliminating other possible causes such as discharged battery, loose or corroded battery cables, faulty wiring connection, some mechanical failure within the engine or a slipping belt.

1. Raise the golf car body.



WARNING

For all subsequent tests, remove spark plug wire from spark plug to prevent accidental start-up and possible personal injury.

Step I.

1. Using a short jumper of heavy gauge wire, momentarily touch the ends to the large solenoid terminals. If starter fails to turn engine, difficulty is in starter or reversing switch. Proceed to Step IV, Figure 8-25. If starter turns engine continue on to Step II.

Step II.

1. Using the short jumper wire, momentarily touch the ends to solenoid terminals 1 and 4. If the starter fails to turn engine, starter solenoid coil has an open circuit. Replace starter solenoid. If starter solenoid operates and starter turns engine,

fault is in the starter control circuit, and the following procedures should be used to determine if a switch is at fault.

Step III.

1. Using two short wires jump across the terminals of key switch terminals B and F and accelerator micro-switch (switch must be in the ON position), starter may crank engine, with engine turning, remove jumper alternately from switches to find which is defective. Replace switches as necessary. If engine does not crank, fault is in the wiring circuit which connects the circuits.

Step IV.

1. Connect short jumper wire across solenoid. Remove reversing switch from circuit by using heavy jumper wires, connect A2 terminal to F1 terminal and A1 terminal to ground. If starter does turn engine, repair reversing switch. See REVERSING SWITCH.
2. If starter fails to turn engine, difficulty is in the starter and should be removed and tests made as described in this section.

GENERATOR TEST

Make the following test to determine if the charging circuit is functioning correctly. Battery must be in good condition and fully charged (green dot must appear in battery window).

1. Disconnect the green (GN) wire located on starter generator DF terminal.
2. Using a jumper wire, ground the DF terminal.
3. Connect a voltmeter across the battery terminals and run engine at approximately 2000 RPM. The voltmeter should show an increase in voltage. If no increase in voltage is seen, remove starter generator and make tests as described in this section. If increase in voltage is seen, proceed to REGULATOR TEST.

REMOVAL (Figure 8-26)

1. Raise the golf car body.

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.

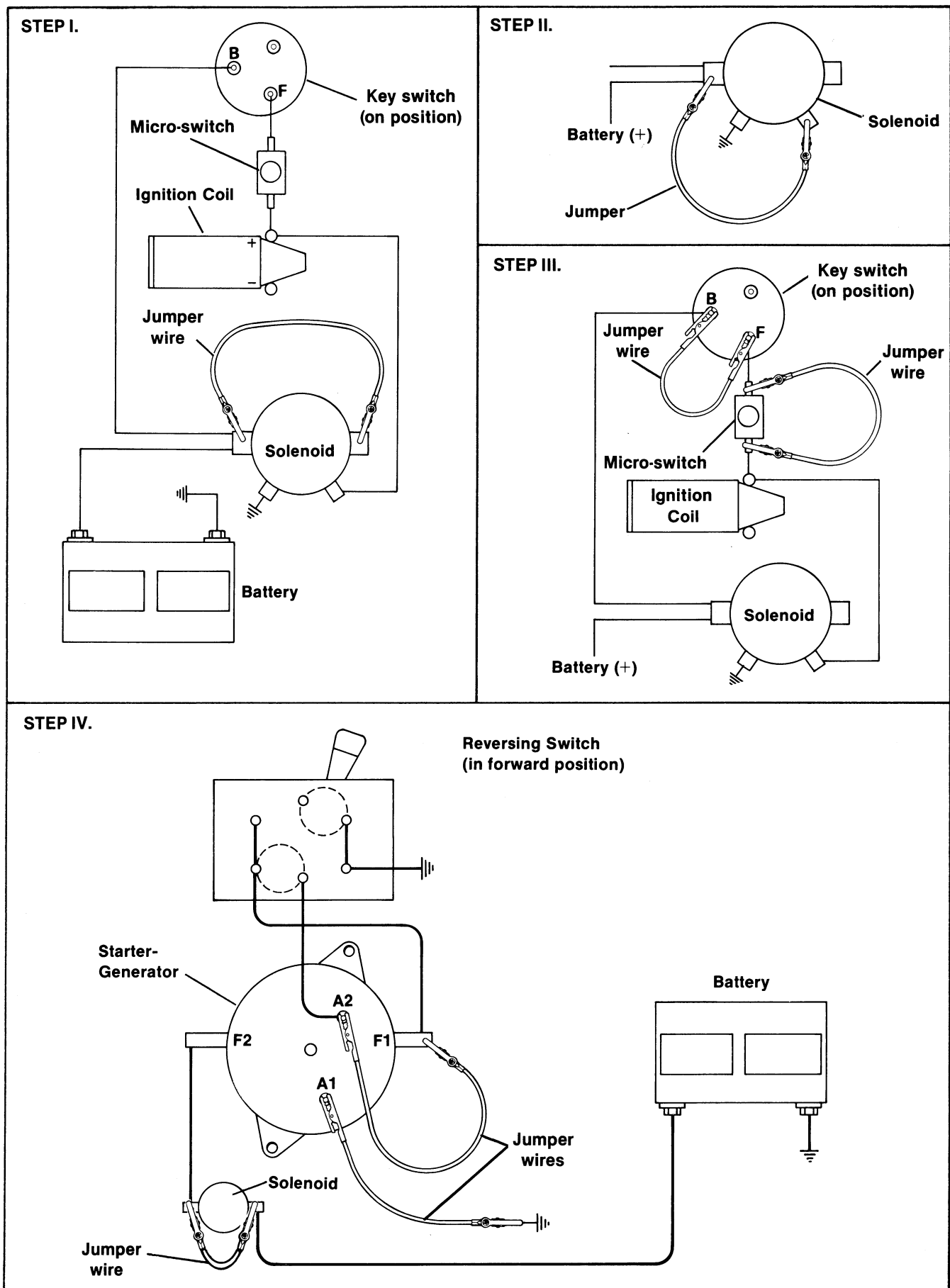
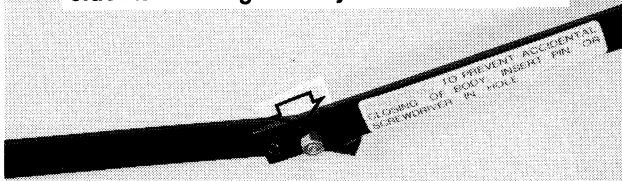


Figure 8-25. 4-Step Circuit Test

WARNING

To secure the body upright and avoid possible personal injury, install a 3/8 x 1 bolt and nut into body hinge hole to prevent accidental closing of body.



2. Disconnect all wires from starter generator. Make sure wires are marked for reassembly.
3. Remove upper mounting bolt (1), locknut (4) from support arm (7) and remove belt (9).

4. Remove lower mounting bolt (2), carriage bolt (3) and locknuts (4).

5. Lift starter generator out of car.

ADJUSTMENTS

General

Belt tension should be checked every month. If starter generator slips when starter motor operates, adjust belt to correct tension. If engine does not turn over with correct belt tension, check engine freeness with spark plug removed.

Rigid Tension Adjustment

1. Install belt on starter generator. Adjust belt tension to 6 lbs, with a 1/8" deflection at the midpoint of the pulleys. Tighten nut (4) to 12 ft-lbs (1.659 kgm) torque.

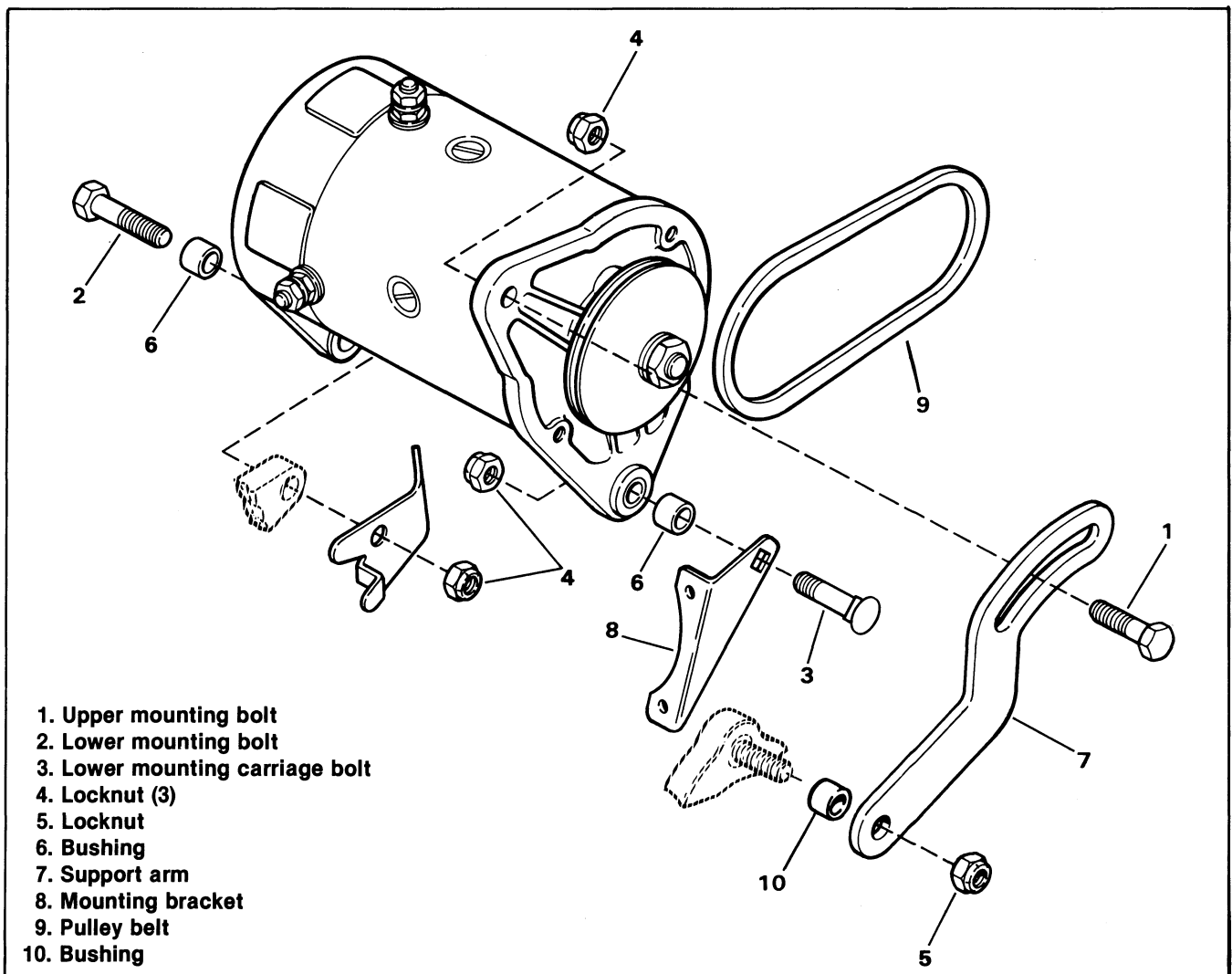


Figure 8-26. Starter-Generator Rigid Mounting

2. Tighten nut (5) to 12 ft-lbs (1.659 kgm) torque.
3. Tighten front and rear mounting nuts (4) to 12 ft-lbs (1.659 kgm) torque.
4. Recheck belt tension.

CAUTION

Belt tension must be rechecked at least within the first hour of operation to account for any initial stretch or seating of components. The belt tensioner could allow the use of a non-standard belt, or a belt that is too long could result in the starter generator being pivoted to such a point that the "DF" terminal of the starter generator could come in contact with the air cleaner and short out the voltage regulator.

DISASSEMBLY

(Figure 8-29)

NOTE

If it is not necessary to remove brushes, they can be held off of commutator with brush springs. See Figure 8-27.

1. Remove thru bolts and washers (1). Pull commutator end cover (2) free of starter frame (3).
2. Remove brush covers (4), screws and lockwashers (5), brush springs (6) and brushes (7).
3. Remove terminal nuts, washers and lockwashers (8), brush holder screws and lockwashers (9) and brush holder (10).

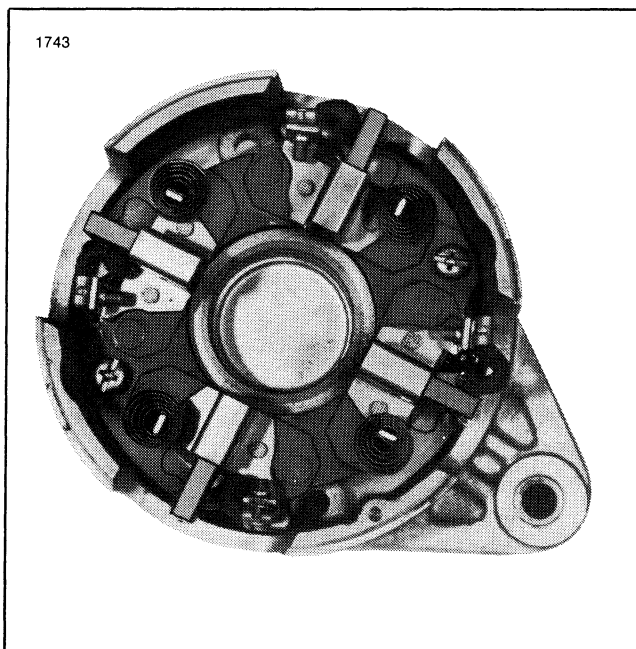


Figure 8-27. Holding Brushes Off Commutator

4. To separate armature (11) from drive end cover (12), remove nut (13), lockwasher (14), pulley (15), shaft key (16), washer (17) and bearing retainer screws (18).
5. To separate commutator bearing (19) or drive end bearing (19A) and spacers (20) from armature (11), use Harley-Davidson ALL PURPOSE CLAW PULLER TOOL, Part No. 95635-46, and WEDGE ATTACHMENT TOOL, Part No. 95637-46. See Figure 8-28.

CAUTION

Use caution while pressing bearing from shaft so as not to damage retainer plate.

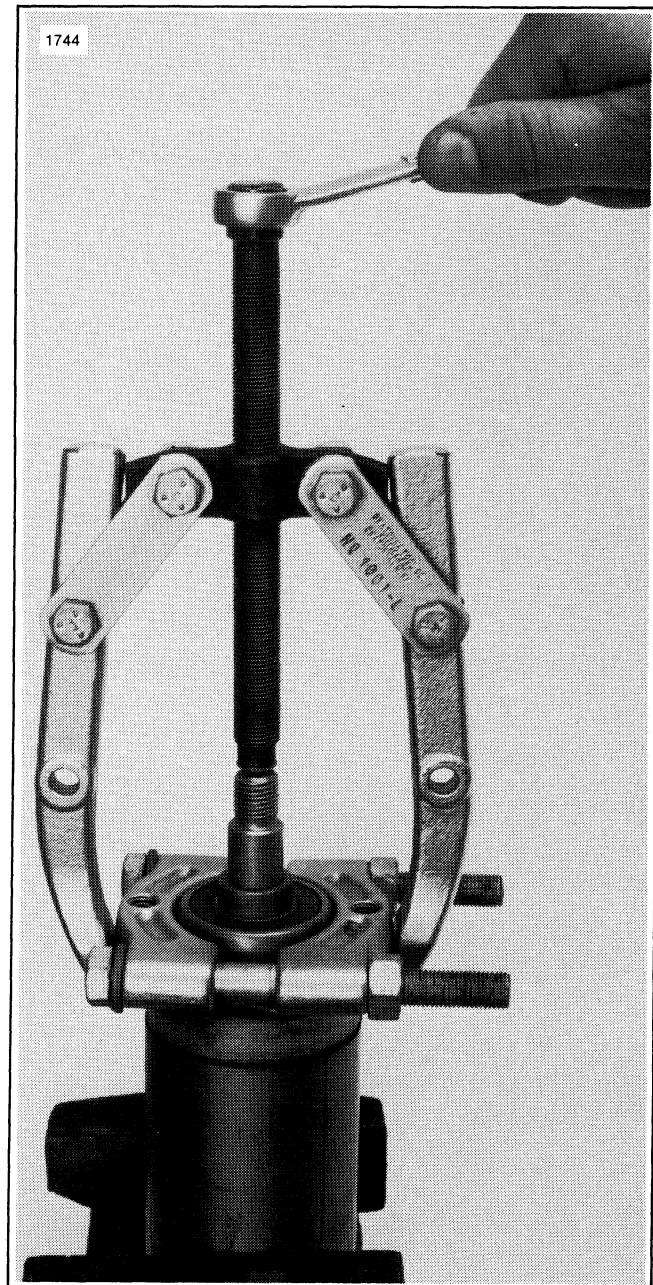
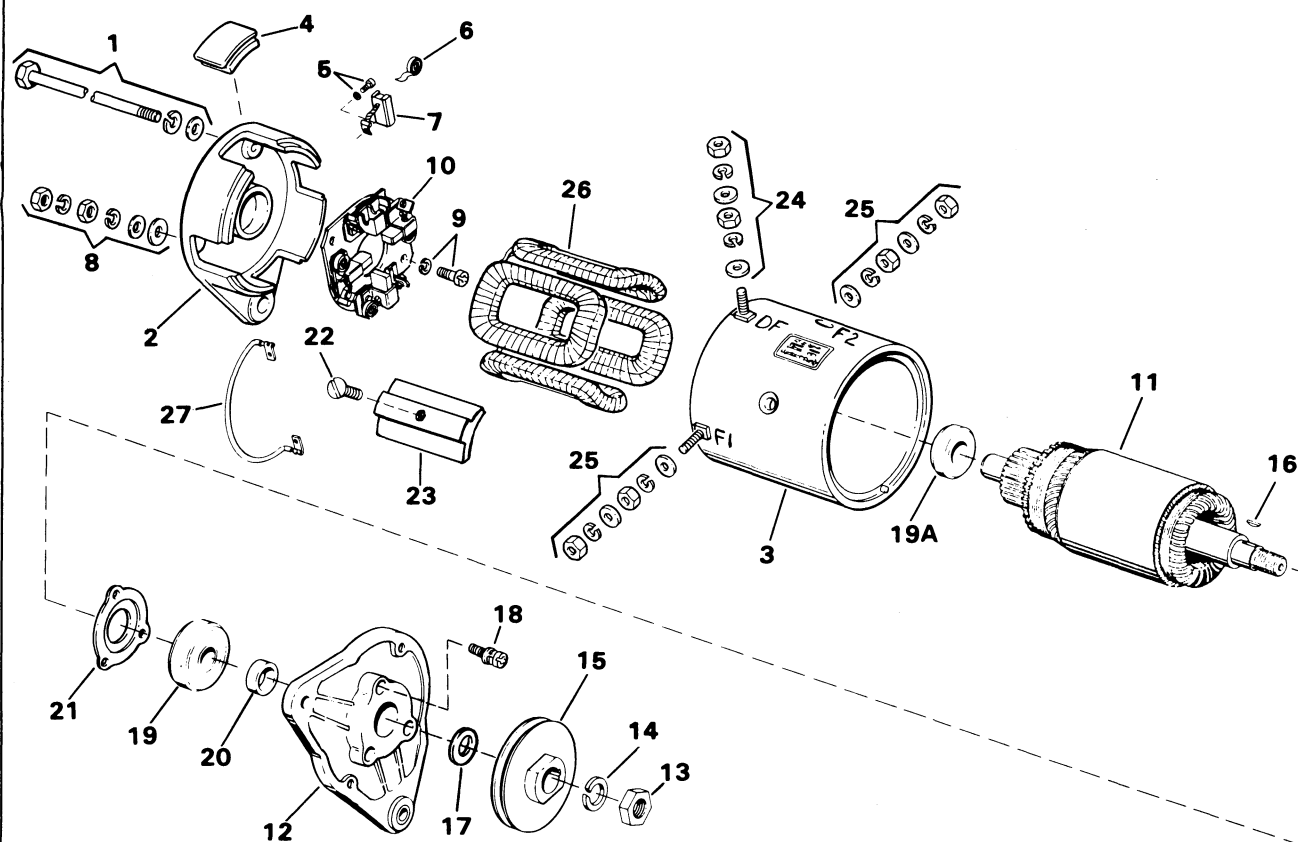


Figure 8-28. Removing Armature Bearings



- | | |
|--|---|
| 1. Thru bolt and washer (2) | 15. Pulley |
| 2. Commutator end cover | 16. Key |
| 3. Frame | 17. Washer |
| 4. Brush cover (4) | 18. Bearing retainer screw (3) |
| 5. Terminal screw and lockwasher (4) | 19. Bearing (1) |
| 6. Brush spring (4) | 19A. Bearing |
| 7. Brush (4) | 20. Spacer |
| 8. Terminal nut, washer and lockwasher (2) | 21. Bearing holder |
| 9. Brush holder screw and lockwasher (3) | 22. Pole shoe screw (4) |
| 10. Brush holder | 23. Pole shoe (4) |
| 11. Armature | 24. DF terminal nut, washer and lockwasher |
| 12. Drive end cover | 25. F1-F2 terminal nut, washer and lockwasher (2) |
| 13. Nut | 26. Field coil assembly |
| 14. Lock washer | 27. Brush connecting wire (2) |

Figure 8-29. Starter Generator — Exploded View

7. Remove bearing retainer (21).

NOTE

Do not remove pole shoes unless electrical test indicates it is necessary. See TESTING FIELD COILS.

8. Remove pole shoe screws (22), pole (23), DF terminal hardware (24) F1 and F2 terminal hardware (25) and remove field coil (26).

CLEANING, INSPECTION AND REPAIR

Testing Brushes

1. Visually inspect brushes. Replace brushes which are cracked or severely chipped.
2. Check brush length (Figure 8-30). If any brush is worn to its minimum length when measured at its shortest point, new brushes are needed. Replace brushes in sets of four only.

Minimum brush length

Hitachi 5/8 in. (15.875 mm)

Brush Springs

1. Inspect springs. Reject springs which are discolored from heat (straw or blue in color).
2. Test brush spring tension. Use a scale (Figure 8-31) to test spring tension. Reject springs which apply a force less than 28 ± 4 oz. (680.4 grams).

CAUTION

When checking brush spring tension, do not pull springs beyond the point they would normally be if there

were new brushes installed. Exerting excessive force, or pulling brush springs beyond normal resting point will damage springs.

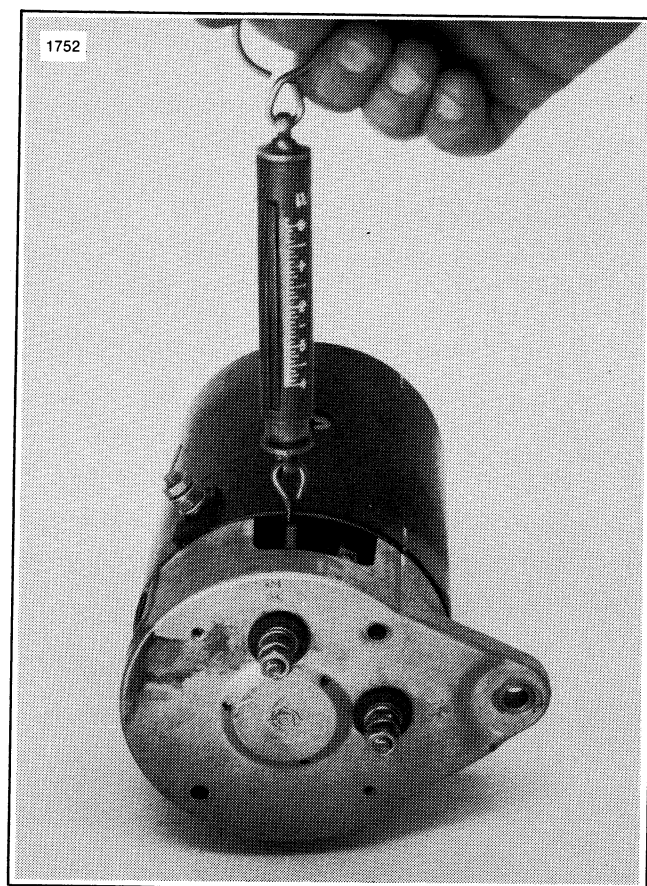


Figure 8-31. Brush Spring Retension

Visual Inspection of Armature

Obvious defects can be seen by examining the armature. If an armature has frayed or charred insulation, broken wires or thrown solder, it is obvious without further testing that it should be replaced.

Faults seen during the visual inspection can aid in diagnosing the original cause of failure.

Visually check armature for:

1. Burned, charred or cracked insulation.
2. Thrown solder.
3. Worn, burned or glazed commutator.
4. Loose commutator bars.
5. Bruised armature core laminations.
6. Worn armature bearing or shaft.
7. Dirty or oily commutator.

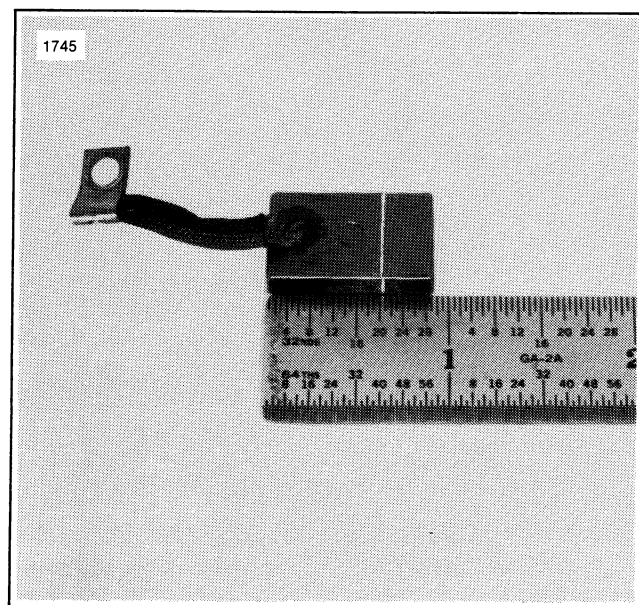


Figure 8-30. Measuring Brush Length

Testing Armature With Armature Tester (Growler) (Sun Model AT-76) (Figure 8-32)

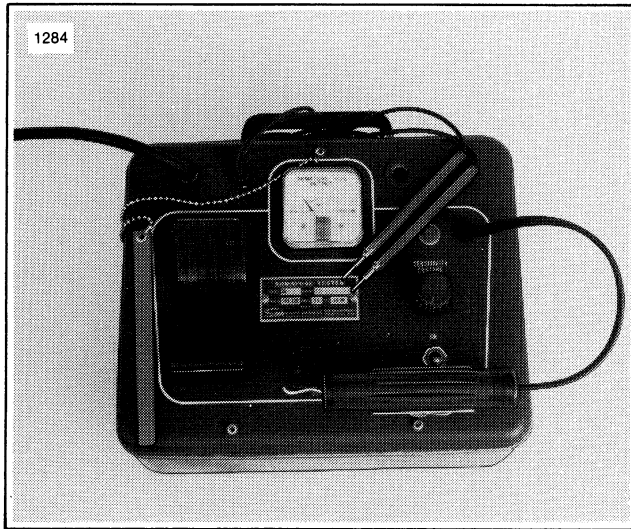


Figure 8-32. Armature Tester

NOTE

Before testing, wipe armature with clean rag and blow carbon dust and metal particles from between commutator bars.

CAUTION

Do not submerge armature in solvent.

A completely GROUND or SHORTED armature will prevent a starter-generator motor from operating. However, an armature may have an open or high resistance winding and still operate at a lower efficiency than normal.

Armature Ground Test (Figure 8-33)

1. Plug in tester.
2. Place armature in growler.
3. Turn on tester.
4. Touch one test probe to commutator and other to armature core. Test lamp should be OFF, indicating no continuity. If the test lamp is on, the armature is grounded and must be replaced.

NOTE

The armature ground test can also be performed in the same manner with a continuity tester or ohmmeter.

Armature Short Test (Figure 8-34)

1. With armature in same position as previous test, turn tester on.

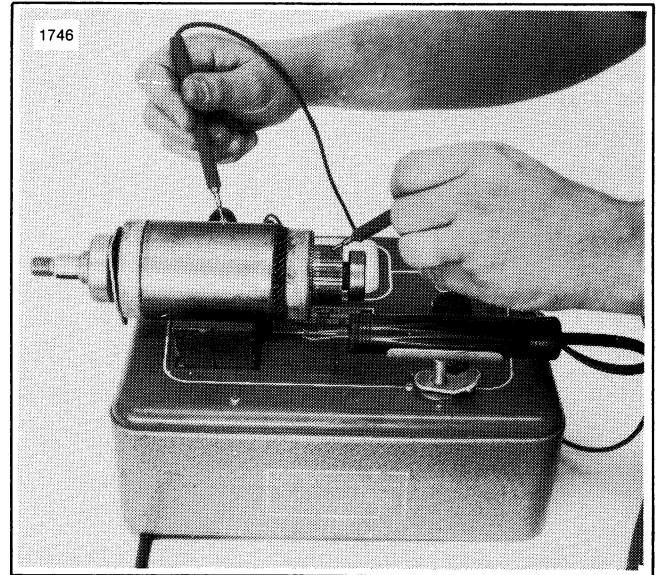


Figure 8-33. Armature Ground Test

2. Using steel blade provided with tester, or hack saw blade, hold blade parallel with and touching armature core.
3. Slowly rotate armature one complete revolution in growler. If the armature is shorted the blade will vibrate on the armature core. Shorted armatures must be replaced.

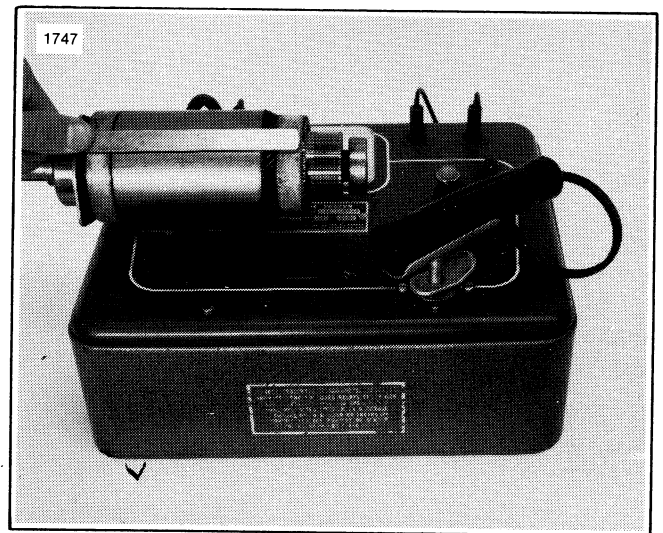


Figure 8-34. Armature Short Test

Armature Coil Balance Test (Figure 8-35)

The armature coil balance test is designed to determine whether all the coils are of equal efficiency. This is essential for maximum motor generator performance and also to prevent rapid commutator burning. A wide variance in coil efficiency will reduce the performance of the starter-generator motor and overheat the entire assembly.

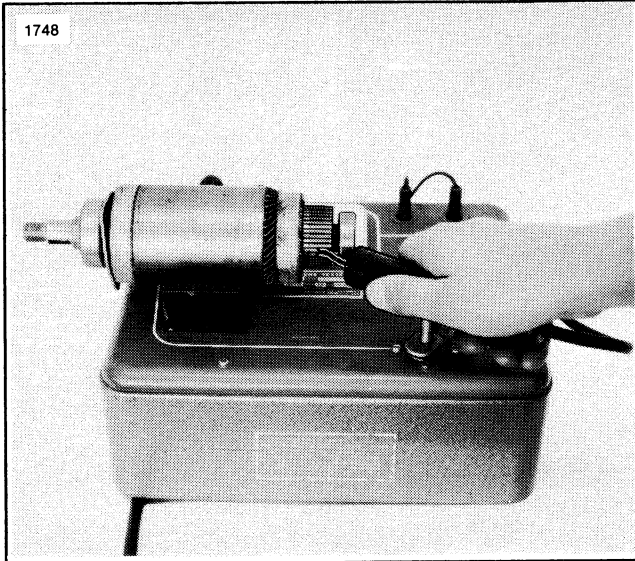


Figure 8-35. Armature Coil Balance Test

1. With armature in same position as previous tests, turn tester on.
2. Turn sensitivity control clockwise to stop.
3. Place contact handle in cradle and position cradle so contacts of handle touch a pair of commutator bars.
4. Position contact handle to obtain highest reading on meter. Set cradle to hold contact handle in this position.
5. Slowly rotate armature one complete revolution pausing to note reading on meter of each pair of commutator bars. The highest reading of each pair of commutator bars should be even within one division of the lowest reading. If reading for a particular pair of bars is noticeably lower, an open or poor connection exists in the winding.

Grounded Field Test (Figure 8-36)

1. Attach continuity tester or ohmmeter between F1 terminal and motor frame. Continuity tester should not light, ohmmeter should read (∞) infinity.
2. Grounded fields should be replaced.
3. Check continuity between F1 and F2 terminals.

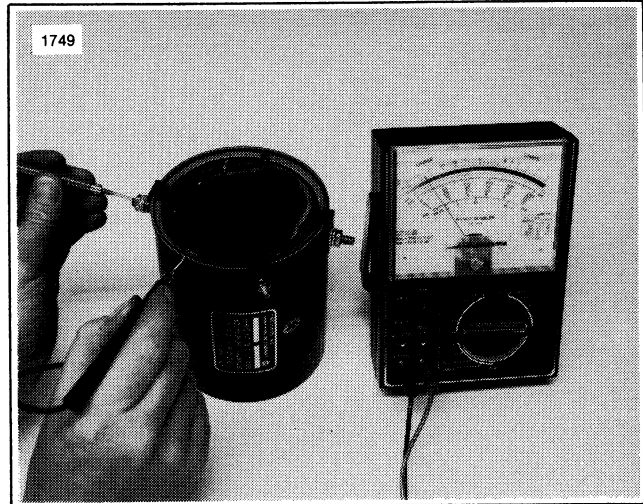


Figure 8-36. Grounded Field Test

Refinishing Commutator (Figure 8-37)

To refinish commutator, mount armature in lathe and diamond turn commutator. Limit depth of cut to .005 in. (1.27 mm) or less and repeat cut as often as required. Do not reduce commutator diameter to less than specified.

Commutator Minimum Diameter

Hitachi 1.535 in. (39 mm)

After commutator is turned, the mica insulation between segments must be undercut .031 (1.32) in. (.8 mm). Undercutting should be done with special undercutting equipment. If one is not available, satisfactory undercutting can be carefully done with a piece of hacksaw blade. Carefully trim blade thickness until offset teeth are the same width as slots in commutator. Slots must be square bottomed for best results. Finish cut commutator after undercutting, and check for excessive commutator runout. Runout should not exceed .001 in. (.025 mm).

Visual Inspection of Field Coils

If the insulation on the field coils appears blackened or charred, the serviceability of the coils is questionable. Burned or scorched coil insulation indicates the motor has overheated due to overloads, grounded or shorted coil windings.

Check for loose pole shoes.

Open Field Test (Figure 8-38)

1. Set ohmmeter to RX1 Scale.
2. Connect ohmmeter to F1 and DF terminals.
3. Resistance should read 4.5 to 5.5 ohms.
4. Connect ohmmeter to DF terminal and housing (∞ reading).

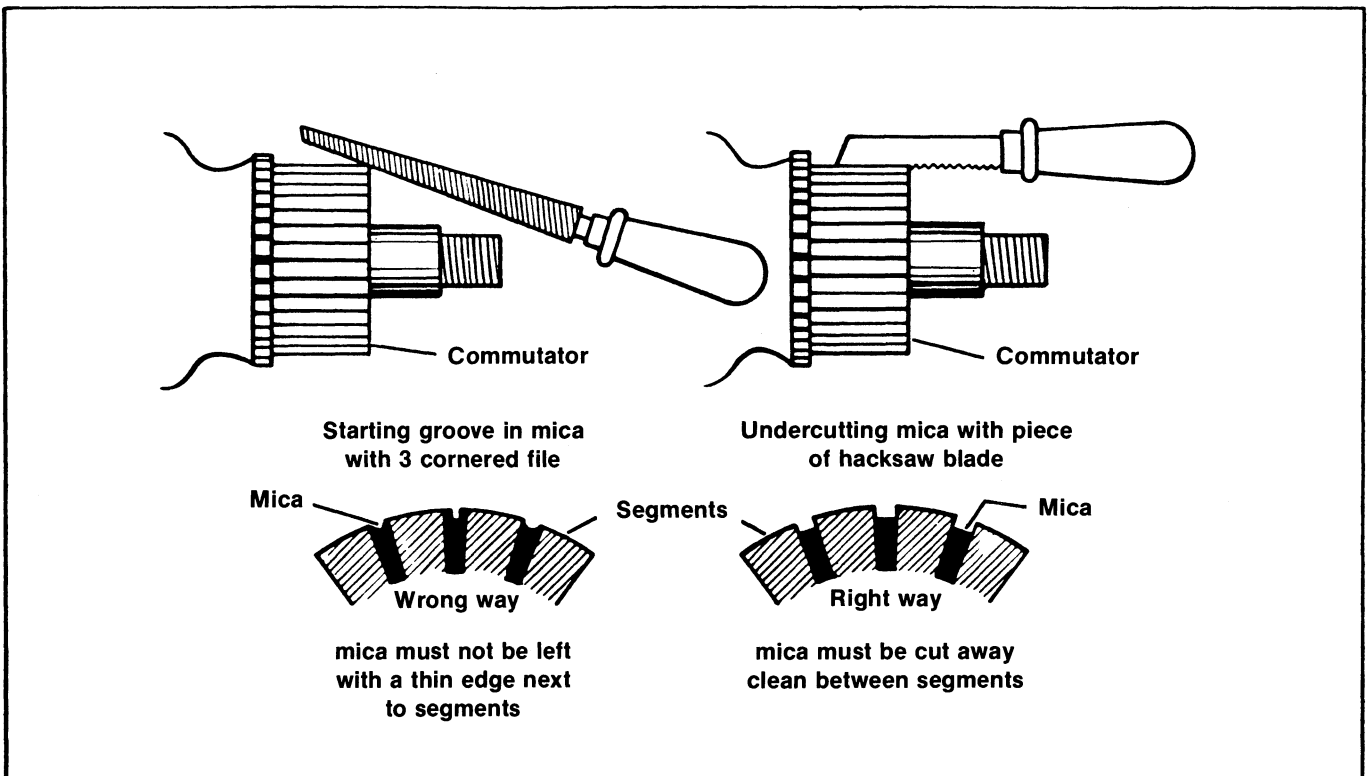


Figure 8-37. Recessing the Mica Separators

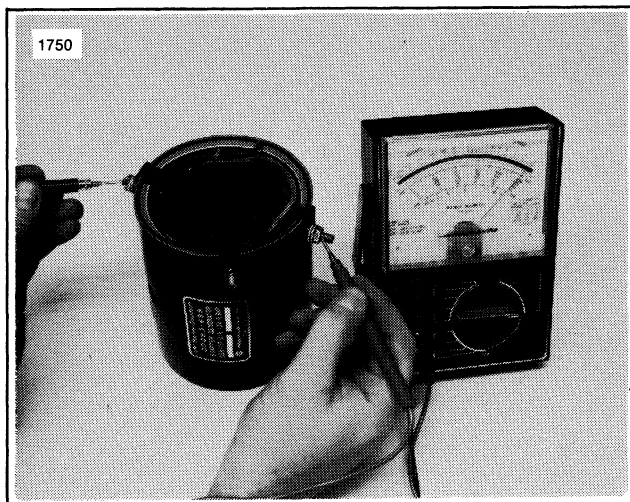


Figure 8-38. Open Field Test

ASSEMBLY (Figure 8-29)

1. Install field coil assembly (26) into frame (3) and secure using pole shoes (23) and pole screws (22). Tighten pole shoe screws to 9 ft-lbs (1.2 kgm) torque.

CAUTION

Route field terminal wires so that they will not contact armature.

2. Connect field coil wires as follows:
 - Single Red Wire to DF terminal.
 - Red Wire and Metal Strap to F1 terminal.
 - Metal Strap to F2 terminal.
3. See Figure 8-39 for correct stacking of wire mounting bolt hardware (24), (25).

CAUTION

Use caution while pressing bearing on shaft so as not to damage bearing retainer (21).

4. Install bearing retainer (21) on drive end of shaft, press bearing (19) onto shaft, pressing bearing (19A) on commutator end of shaft.
5. Install brush springs (6), brushes (7), screw and lockwasher (5) to brush holder (10) and fasten brush holder (10) to commutator end cover (2) with screws and washers (9).
6. Install armature (11) into drive end cover (12) and tighten bearing retainer screws (18).
7. Slide frame (3) over armature (11) and locate pins used for aligning. These locating pins in body should align with holes in end covers.

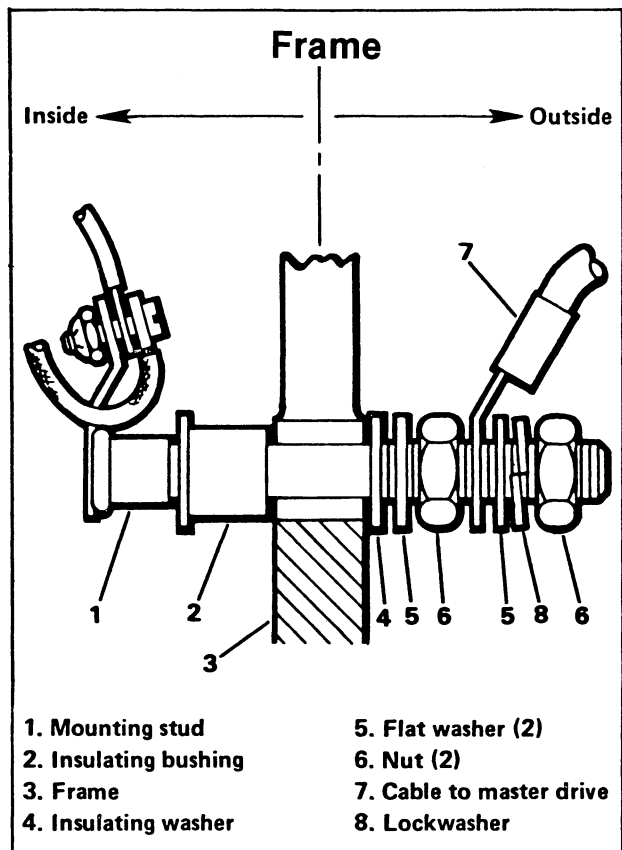


Figure 8-39. Motor Terminals

NOTE

Hold brushes off commutator by lifting brush springs and pulling brushes back till the springs rest on the side of the brushes (Figure 8-27).

8. Install commutator end cover, aligning cover hole with body pin and install thru bolts and washers (1), terminal nuts, washers and lockwashers (8) and install brush covers (4).
9. Install spacer (20), washer (17), shaft key (16), pulley (15), lockwasher (14) and nut (13). Tighten pulley nut (13) to 26-33 ft-lbs (3.59-4.56 kgm) torque.

INSTALLATION

(Figure 8-26)

1. Install carriage bolt (3), mounting bolt (2), locknuts (4) through lower mounting holes of starter generator. Tighten lower mounting bolts (2 and 3) to 12 ft-lbs (1.659 kgm) torque.
2. Install belt (9), upper mounting bolt (1), and locknut (4). Tighten upper adjusting bolt (4) to 12 ft-lbs (1.659 kgm) torque.
3. Adjust pulley belt (9). See ADJUSTMENTS. Tighten nuts after belt adjustment.
4. See Figure 8-3. Connect starter generator wires.
5. Connect battery cables.
6. Lower car body.

VOLTAGE REGULATOR

GENERAL INFORMATION

A voltage regulator is used to control the generator output. The function of the regulator in the circuit is shown in the schematic circuit diagram (Figure 8-40).

If trouble is experienced with the electrical system it is first necessary to determine if the GENERATOR or the REGULATOR is faulty.

To determine if the generator is functioning properly, make the tests specified under GENERATOR TEST.

CAUTION

Do not ground regulator DF terminal with the regulator wire attached. Remove generator field wire from terminal and ground the DF terminal of generator with jumper when making output tests.

TESTING VOLTAGE REGULATOR IN CAR

Make the following electrical test to determine if the regulator is functioning correctly. Battery must be in good condition and fully charged (green dot must appear in battery window). Engine must be warmed up so that regulator is at normal operating temperature.

1. Lift rear wheel. See LIFTING INSTRUCTIONS, Section 1.
2. Attach voltmeter across battery, or across D + and D- terminals of voltage regulator.
3. With the regulator cover in place and the regulator at operating temperature, run the engine at approximately 3000 RMP (governed speed in forward direction) and read the voltmeter.
4. If voltmeter reads within specified voltages 14.5-15.5 at approximately 75° air temperature surrounding the vehicle, it indicates that the voltage regulator is functioning properly.
5. If voltmeter reading is above upper limit, generator charging rate is too high and will overcharge the battery causing possible internal battery damage.
6. If voltmeter reading is under lower limit, charging rate is too low and may result in a discharged battery.

Adjusting Charge Rate (Figure 8-41)

NOTE

*Adjustments **must** be made with golf car battery fully charged and voltage regulator at normal operating temperature, at least 75° F.*

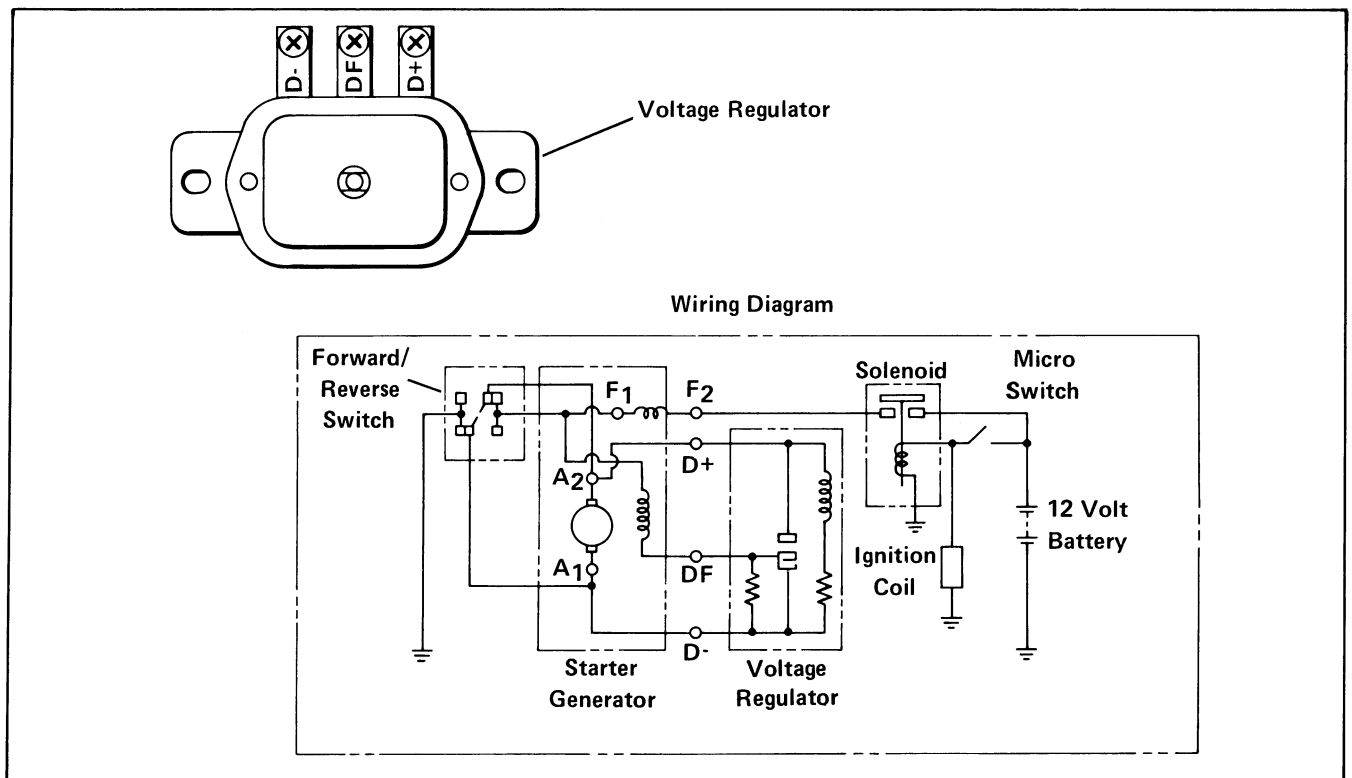


Figure 3-40. Regulator Charging Circuit

1. Run engine to stabilize regulator and bring up to operating temperature.
2. Attach voltmeter across battery, or across D + and D- terminals of voltage regulator.
3. Run engine at governed speed (3000 rpm) in forward direction and check voltage reading. Correct reading is 14.5-15.5 volts.
4. See Figure 8-41. To adjust voltage regulator remove cover, loosen locknut (1) and turn adjusting screw (2) in (clockwise) to increase voltage or out (counterclockwise) to decrease voltage.

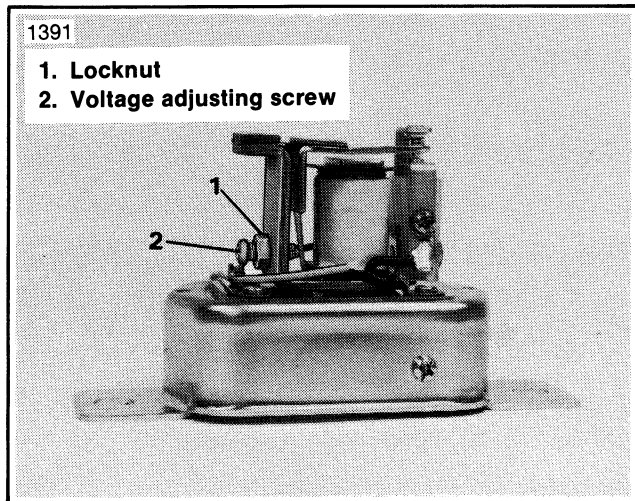


Figure 8-41. Adjusting Voltage Regulator

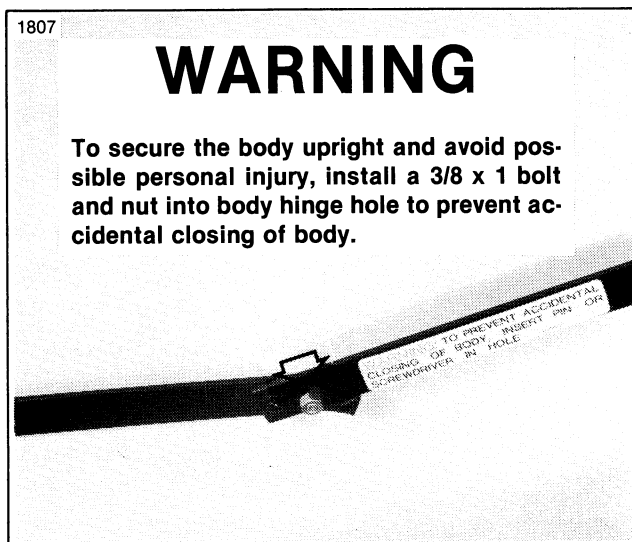
5. When correct voltage reading is obtained, tighten locknut and install voltage regulator cover.
6. Recheck voltage reading with the cover in place. Readjust if necessary.

REMOVAL

1. Raise the golf car body.

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.



1. Disconnect the DF, D + and D- wires from voltage regulator terminals.
2. Remove the two self-tapping screws securing voltage regulator to back plate.

INSTALLATION

1. Install the two self-tapping screws and tighten secure voltage regulator to back plate.
2. See Figure 8-3. Reconnect the voltage regulator wires as follows:

A2 — RED WIRE R to D + terminal
 DF — GREEN WIRE GR to DF terminal.
 A1 — BLACK WIRE BK to D- terminal.

3. Connect battery cables.
4. Recheck voltage regulator wires. See Figure 8-3. Test to see that setting is correct.
5. Lower the body.

BATTERY

GENERAL

Water cannot be added to this battery. The maintenance free is completely sealed except for a small vent in each side. The small amount of gases produced in the battery will escape through these vents.

NOTE

At normal charging rates the gases emitted will be of a small amount, however, a well ventilated area is recommended.

The battery is designed to withstand some of the damaging effects of overcharging, but overcharging can still severely damage the battery.

The vents require keeping the battery in an upright position to prevent electrolyte leakage. Tipping the battery beyond a 45° angle in any direction can allow a small amount of electrolyte to leak out the vent hole. **DO NOT** exceed this 45° angle when carrying or installing the battery because of its dangerous chemicals which could cause severe personal injury when accidentally coming in contact with skin, eyes or clothing.

WARNING

Batteries contain sulphuric acid, which is high corrosive and can cause chemical burns. Avoid contact with skin, eyes or clothing. Always wear approved eye protection when working around batteries.

ANTIDOTE

External — Flush with water.

Internal — Drink large quantities of milk or water, followed by Milk of Magnesia, vegetable oil or beaten eggs. Call doctor immediately.

Eyes — Flush with water, get immediate medical attention.

Visual Inspection and Maintenance

Check for obvious damage such as cracked or broken case or cover that could permit loss of electrolyte. If obvious physical damage is noted, replace battery.

Be sure battery hold downs are properly tightened. A loose hold down may allow the battery to become damaged from vibration or jarring. A hold down that is too tight may buckle or crack the battery case.

See Figure 8-42. To determine whether battery needs charging and/or testing, look at test indicator on top of battery. One of three colors will appear in indicator.

GREEN indicates the battery is adequately charged. **DO NOT CHARGE BATTERY.** A load test can be run.

BLACK indicates the battery **NEEDS CHARGING.** Charge battery in accordance with all specifications.

LIGHT YELLOW indicates A **DEFECTIVE BATTERY.** **DO NOT CHARGE OR TEST.**

REMOVAL (Figure 8-43)

WARNING

Disconnect the battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.

1. Remove the two locknuts (6), washers (5) and lift off cross bracket (4).

WARNING

When lifting out battery DO NOT tip beyond the 45° angle in any direction to avoid electrolyte leakage.

2. Lift out battery.

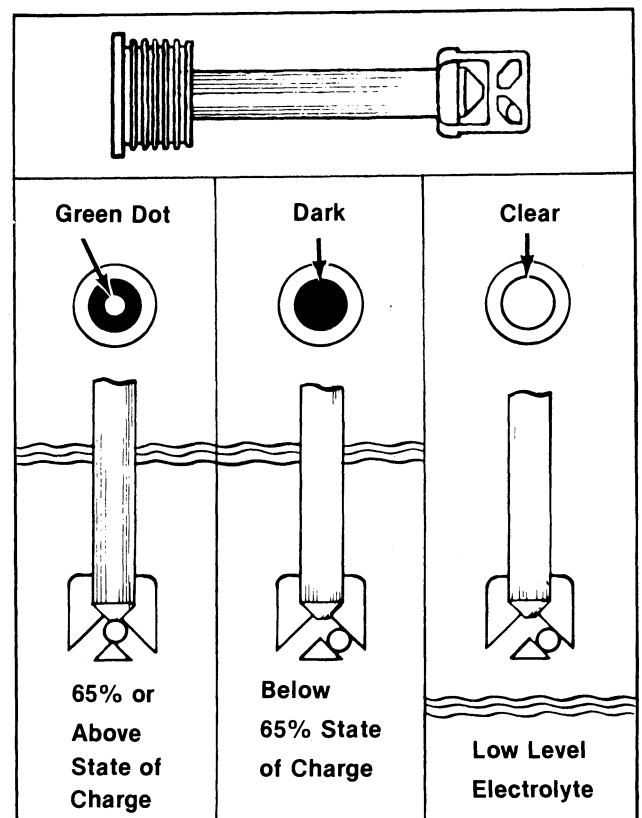


Figure 8-42. Battery Window

CHARGING THE BATTERY

WARNING

The gasses produced by a storage battery on charge are highly explosive. To prevent possible personal injury, charge batteries in a well ventilated area, keep fire and flame away from charging batteries and do not work around charging batteries with tools that could cause a short circuit resulting in a spark. Always shield eyes when working near charging batteries.

Battery In Vehicle

1. Attach positive charger cable (+) to positive (+) terminal on battery.

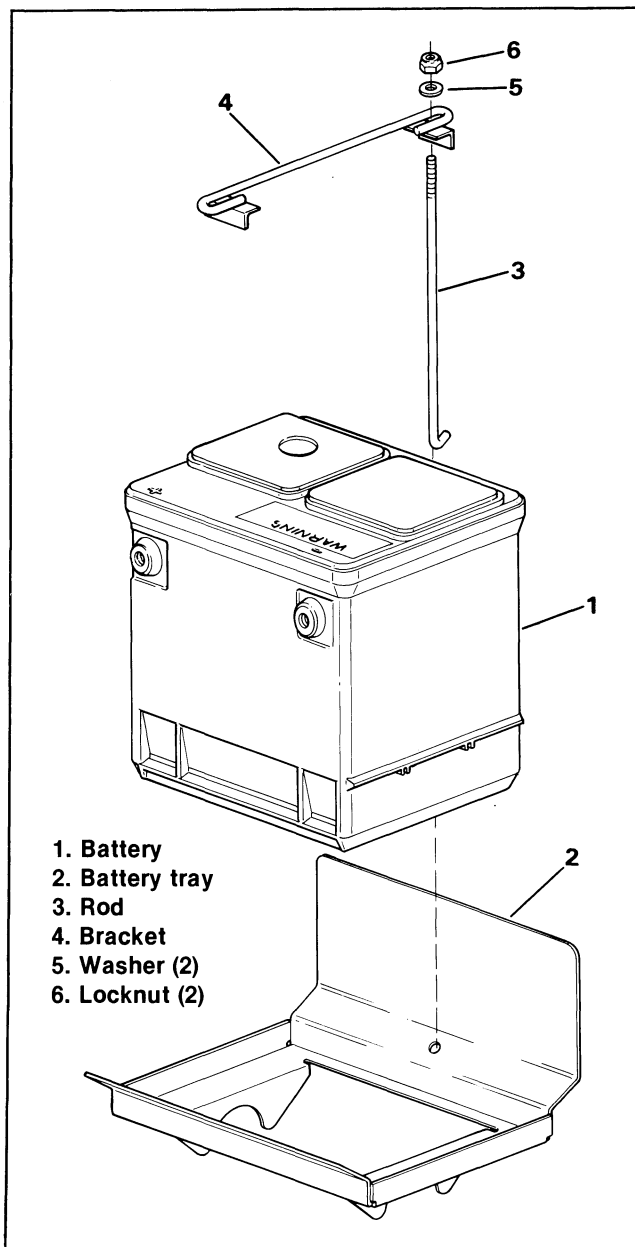


Figure 8-43. Battery Installation

2. Attach negative charger cable (-) to negative (-) terminal on battery.
3. Follow chart for desired charging rate.

Battery Out Of Vehicle

1. Thread a 3/8-16 bolt into each terminal, hand tight (see Figure 8-44).
2. Attach positive charger cable (+) to bolt in positive (+) terminal on battery.
3. Attach negative charger cable (-) to bolt in negative (-) terminal on battery.
4. See chart for desired charging rate.

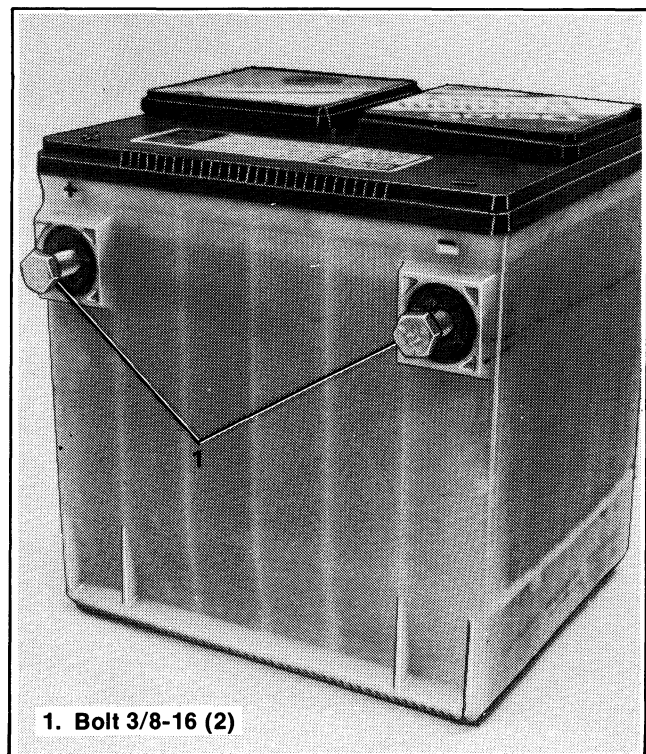


Figure 8-44. Battery — Charging Out Of Car

SLOW CHARGE RATE	FAST CHARGE RATE
5 amps for 10 hours or 10 amps for 5 hours	20 amps for 2½ hours or 30 amps for 1½ hours

WARNING

If battery case feels hot (approximately 125° or more), and/or emits gases and/or fluid boils from vent, stop charging procedure at once. Let battery cool to room temperature and resume charging battery at a lower amp charge per hour. Failure to stop charging procedure could result in personal injury and/or damage to the battery.

CAUTION

Stop charging battery when green dot appears in battery window.

LOAD TESTING

NOTE

Battery **must** be fully charged before load test.

Equipment required for test: SUN BST TESTER or equivalent.

1. Connect load tester (SUN BST) to battery and remove surface charge (excess voltage) by running a 300 amp load across terminals for 15 seconds.
2. Load battery to 130 amps.
3. Read voltage after 15 seconds of load and then remove load.
4. Minimum voltage (see chart) will determine if fully charged battery is good. If voltage is below minimum, replace battery.

INSTALLATION

(Figure 8-43)

WARNING

When setting battery (1) in battery case (2) **DO NOT** tip beyond the 45° angle in any direction to avoid electrolyte leakage.

1. Secure battery (1) with hold down rods (1), cross bracket (4), washers (5) and nuts (6).
2. Attach positive cable (+) to positive (+) terminal on battery. Attach negative cable (-) to negative terminal (-) on battery. Tighten to 5-10 ft-lbs (0.691 -

1.383 kgm) torque.

STORAGE

1. Battery can remain in car.
2. Fully charge battery. See CHARGING BATTERY.
3. Clean battery top and connections.
4. Fully charged battery should be stored in as cold an environment as possible. Batteries “self discharge” when not in use. The colder the temperature, the slower batteries self discharge.

CAUTION

A battery in low state of charge (low specific gravity readings) will freeze at low temperatures.

Check battery every 8 to 10 weeks and recharge as necessary to bring the battery to 75% - 100% specific gravity to prevent battery from freezing.

As ice forms in a freezing battery, the electrolyte expands and can crack the base, ruining the battery.

If a battery is allowed to stand or is operated in a discharged condition for a long period of time, lead sulphate may develop on the plates, which is dense, hard and crystalline, and which cannot be electrochemically converted to normal active material again.

Lead sulphate formed on the plates during discharge is relatively insoluble as long as the specific gravity of electrolyte is kept above 75% specific gravity, but if allowed to drop below this value, the lead sulphate becomes increasingly soluble and may migrate into the pores of the separators and deposit as a white crystalline mass. Subsequent charging may convert these deposits into filamentous metallic lead which may “short” the positive and negative plates through the areas affected. These small shorts may cause a condition of low cell voltage when battery is allowed to stand idle in less than 25% charged condition.

VOLTAGE REQUIREMENTS AT AMBIENT TEMPERATURES

If Temperature is	70°F (20°C) & Above	60°F (16°C)	50°F (10°C)	40°F (4°C)	30°F (-1°C)	20°F (-7°C)	10°F (-12°C)	0°F (-18°C)
Then Minimum Voltage Needed Is	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

State of Charge	Freezing Point		Risk of Sulfation
	F°	C°	
100%	-70°	-57°	Low
75%	-39°	-38°	Low
50%	-16°	-26°	Low
25%	-2°	-19°	Moderate
Discharged	+17°	-8°	High

NOTES

SECTION	PAGE NO.
1. General Information	9-1
2. Front Fork Housing — D3	9-3
3. Front Fork Housing — D4	9-5
4. Seats and Handrails — D3	9-9
5. Seats and Handrails — D4	9-11
6. Body	9-13

GENERAL INFORMATION

GENERAL

The golf car body and front housing are made of fiberglass.

The optional windshield is made of a clear durable plastic. Use a mild soap or detergent with water for normal cleaning. Flush with clear water first to soften dirt. Then wipe clean with sponge or soft cloth using plenty of water.

CAUTION

Do not wipe windshield when dry or with dry towel because dirt particles may scratch surface.

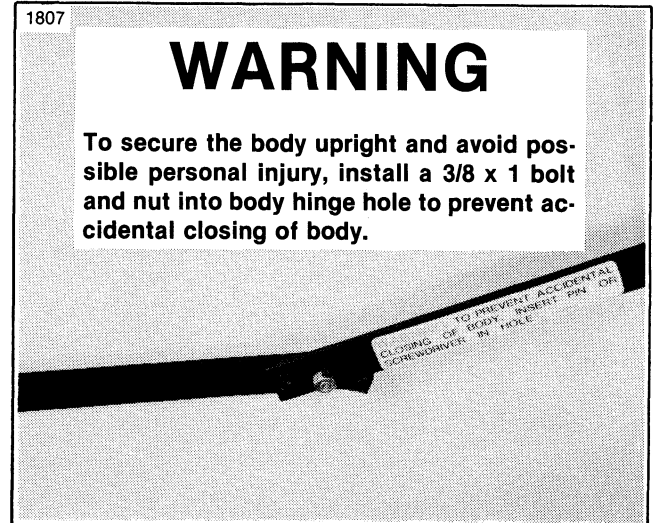
Apply Harley-Davidson PLASTIC CLEANER Part No. 99704-77 per instructions on container to remove small scratches in windshield.

SEAT MAINTENANCE

Proper cleaning of the golf car seats will maintain their appearance and increase their usable life.

CAUTION

Do not use any harsh detergents or cleaning solvents that contain ammonia, aromatic solvents or alkali materials. Consult the chart below for proper cleaning procedures.



WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables, (negative cable first) before performing any of the following procedures.

Seat Cleaning Chart

Ordinary Dirt	Wash material with warm water and a mild soap. Apply soapy water to a large area, allow to soak for a few minutes, then rub briskly with a cloth or sponge. Apply Harley-Davidson VINYL DRESSING, Part No. 99705-77.
Imbedded Dirt	In the case of stubborn or imbedded dirt in the grain of the material, a soft bristle brush may be used after the soap application has been made. If the dirt is extremely difficult to remove, cleaners such as Ajax® or Comet® may also be used. These should be used more cautiously. Apply Harley-Davidson VINYL DRESSING, Part No. 99705-77.
Chewing Gum	Carefully scrape off as much as possible. Apply a dry cleaning fluid. Apply Harley-Davidson VINYL DRESSING, Part No. 99705-77.
Tars, Asphalt, Creosote	These substances will stain if allowed to remain in contact with the seat material. Wipe off excess as quickly as possible and clean the area carefully with a cloth dampened with dry cleaning fluid. Apply Harley-Davidson VINYL DRESSING, Part No. 99705-77.
Paint	Remove immediately if possible. Do not use paint remover or liquid type brush cleaners. Use a cloth dampened with dry cleaning fluid. Apply Harley-Davidson VINYL DRESSING, Part No. 99705-77.

NOTES

FRONT HOUSING — 3 WHEEL

REMOVAL (Figure 9-1)

1. Raise front of car as described in LIFTING INSTRUCTIONS, Section 1.

WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables, (negative cable first) before performing any of the following procedures.

2. Remove floor mats (1 and 2).
3. Remove tiller bar or steering wheel. See STEERING, Section 2.
4. Remove top bolt (3) and washer (4).
5. Remove spanner nut and washer (5) to free the ignition key switch (6) from housing.

WARNING

Eye protection must be worn while drilling out rivets.

6. Remove bolts (7), washers (8) and nuts (9) from bottom of fork housing assembly. Drill out rivets (10) using a 3/16 in. drill bit and remove reinforcement brace (11).
7. Lift off front fork housing (12) and side shields (13) as an assembly. Remove side shields from the housing by drilling out rivets (14).

INSTALLATION (Figure 9-1)

1. Attach side shields (13) to fork housing (12) using rivets (14) and washers (15).

WARNING

Read and follow precautions and handling instructions on contact adhesion container before using contact adhesion.

2. Place housing over tiller bar or steering wheel shaft. Attach fork housing assembly and reinforcement brace (11) using rivets (10), nuts (9), washers (8) and bolts (7).

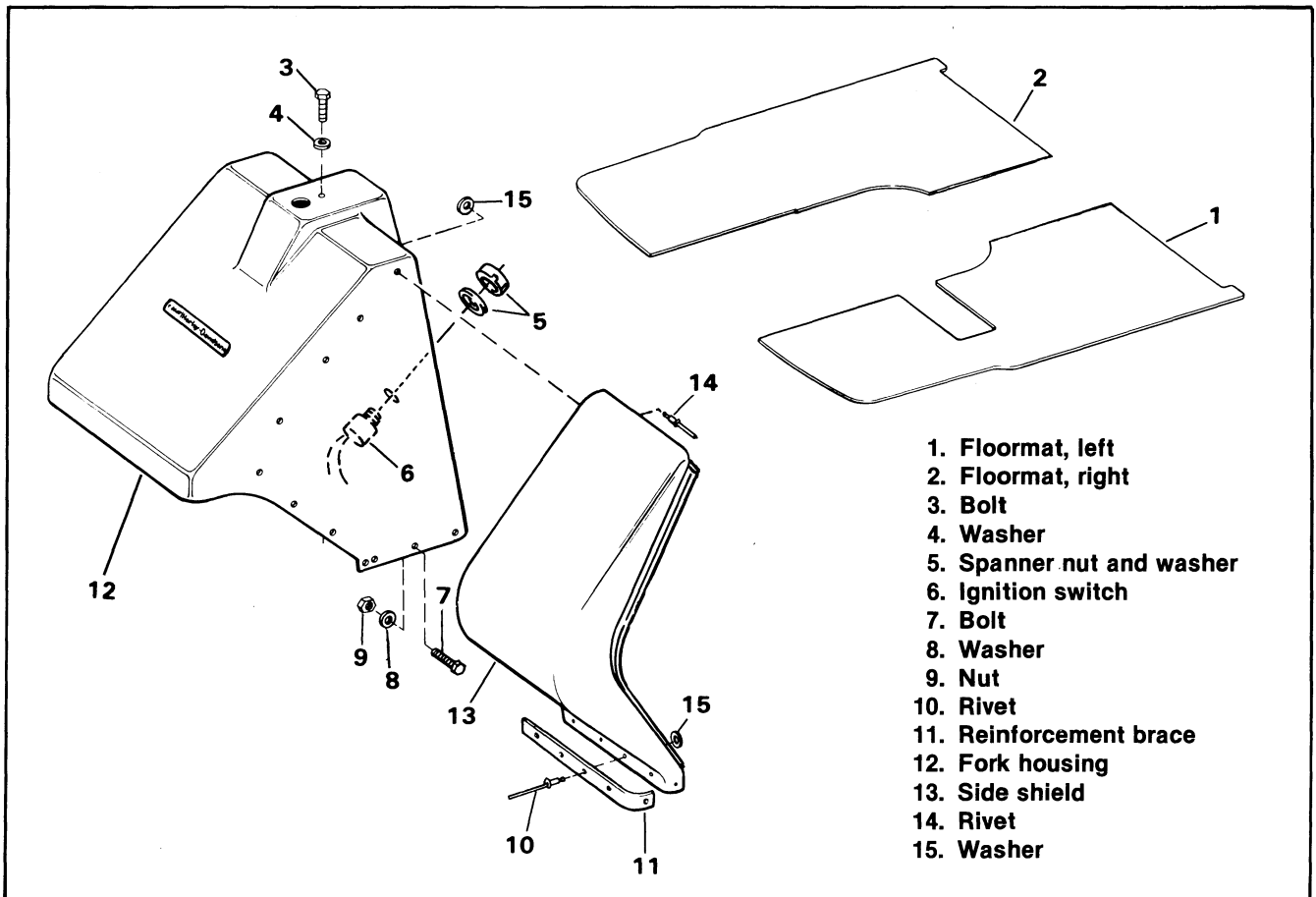


Figure 9-1. Front Housing — 3 Wheel

3. Attach ignition key switch (6) to the housing using the washer and spanner nut (5).
4. Install top bolt (3) and washer (4).
5. Install tiller bar or steering wheel. See STEERING, Section 2.

NOTE

If installing a new front fork housing, drill the necessary holes in housing before installing, as indicated in Figure 9-2.

6. Install floormats (1 and 2) by glueing them to floorboards and fork housing. Use Harley-Davidson CONTACT ADHESIVE, Part No. 99615-69.

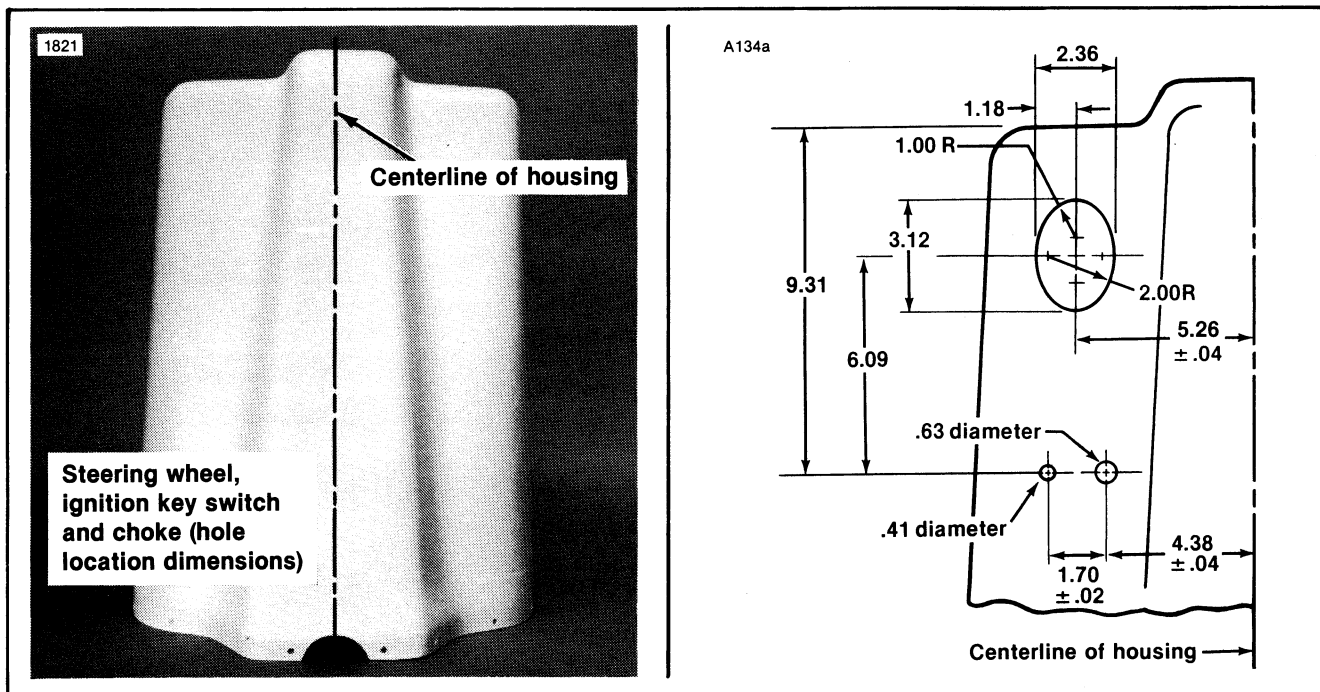


Figure 9-2. Location of Holes for Front Housing — 3 Wheel

FRONT HOUSING — 4 WHEEL

REMOVAL (FIBERGLASS)

(Figure 9-3)

WARNING

Eye protection must be worn while drilling out rivets.

1. Remove steering column clamp (5) by removing the 2 nuts, lockwashers, washers and bolts (7). Drill out rivets (9) using a 3/16 in. drill.
2. Remove instrument panel nuts, lockwashers, washers (11) and spacers (12). Lift instrument panel (6) out.
3. Remove ignition key switch by removing the spanner nut. Disconnect the choke cable from the carburetor and pull choke cable through floor boards. Remove choke nut and pull choke out of housing.
4. Remove plastic bumper strip (21). Using a 3/16 in. drill, drill out rivets (22) and washers (24).
5. Remove bumper mounting bolts, lockwashers, washers and locknuts (18) and lift off bumper.

INSTALLATION (FIBERGLASS)

(Figure 9-3)

NOTE

If installing a new front housing, drill the necessary holes in housing before installing, as indicated in Figure 9-4.

1. Mount fiberglass body section (19) on car so holes line up with sub frame (20).
2. Using a pop rivet tool, insert new pop rivets (22) through channel strip (23) with washers (24).

NOTE

Before replacing the black strip (21), lubricate with tire soap or a small amount of grease. Start the strip at one end of channel and pull it all the way through.

3. Guide choke cable through instrument panel (6) and fasten using spanner nut to secure. Fasten ignition key switch to instrument panel, using the spanner nut.
4. Route choke cable back to carburetor and fasten. See ADJUSTMENTS Section 6.
5. Install instrument housing (6) using pop rivets (9), spacers (12) and washers, lockwashers and nuts (11).
6. Secure steering column clamp (5) using bolts,

washers, lockwashers and nuts (7).

7. Install bumper mounting bolts, lockwashers, washers and locknuts (18). Tighten the 4 bumper bolts to 33 ft-lbs (4.5 kgm) torque.

8. Connect battery cables, and lower body.

REMOVING FRONT BODY SECTION (Figure 9-3)

WARNING

Disconnect battery cables (negative cable first) to prevent accidental start-up and possible personal injury.

1. Remove steering wheel. See REMOVING STEERING WHEEL Section 2.
2. Remove Steering column clamp (1) by removing the two nuts and lockwashers (2). Remove U-bolt clamp bracket (3) from sub frame by removing two nuts, lockwashers and washers (4).
3. Remove instrument column clamp (5) from beneath instrument panel by removing two nuts, lockwashers, washers and bolts (7).
4. Remove floor mats (8).

WARNING

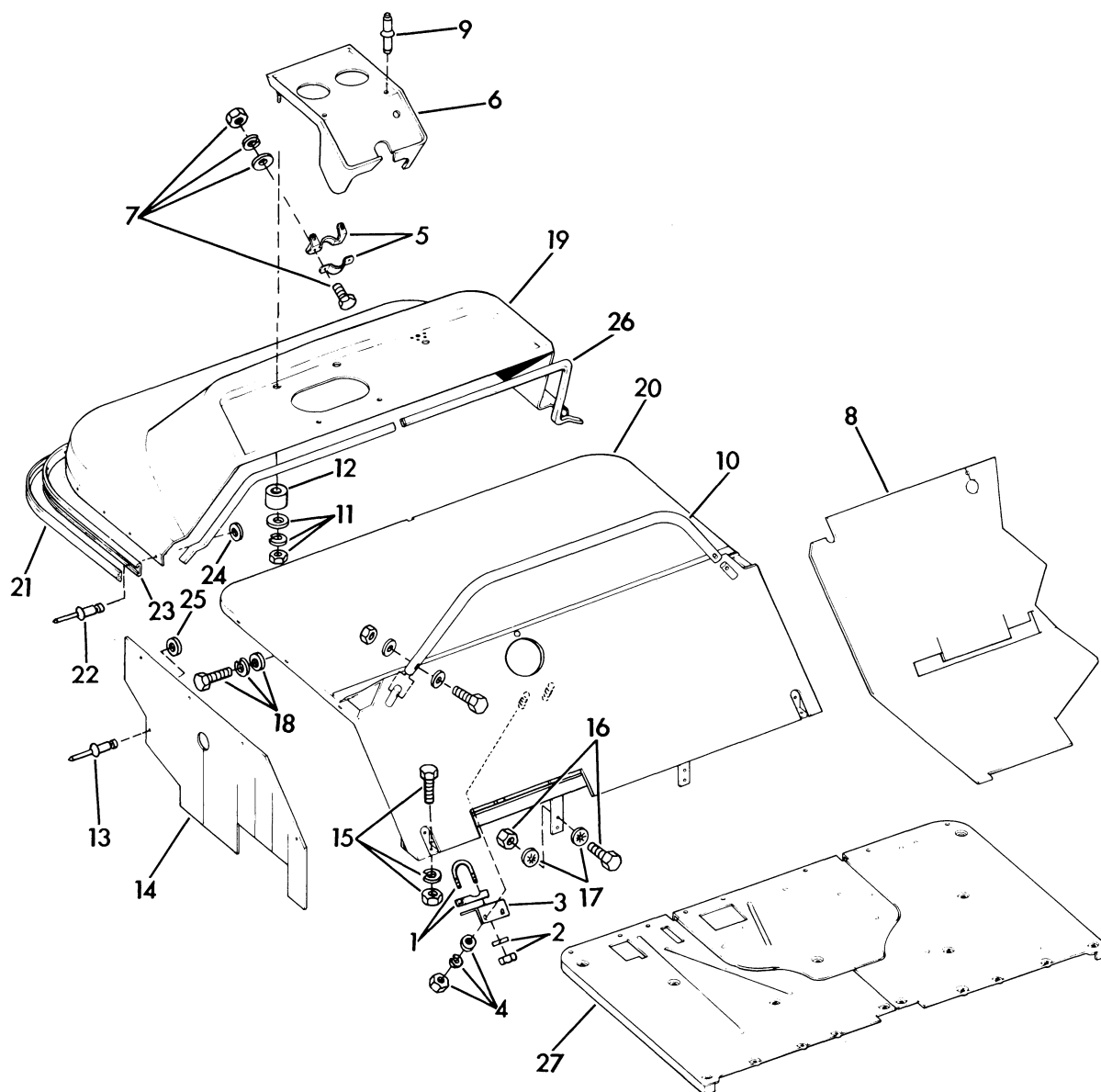
Eye protection must be worn while drilling out rivets.

5. Using a 3/16 in. drill, drill out countersunk pop rivets (9), securing the instrument panel (6) to support tube (10).
6. Remove nut, lockwashers and washers (11) and spacers (12). Lift off instrument panel (6).
7. Remove the ignition key switch by removing the spanner nut. Disconnect choke cable from carburetor and pull choke cable through floor boards. Note straps which secure the ignition wiring harness and choke cable to the frame, and pull choke cable through front housing.
8. Drill out the lower front 3/16 in. pop rivet (13) securing splash shield (14) to car frame.
9. Remove 2 bolts, lockwashers and nuts (15). Remove 4 bolts and nuts (16) and 8 internal tooth lockwashers (17) which secure the subframe to floor panel (6).

NOTE

There are lockwashers under the bolt heads and under the nuts.

10. Remove the bumper bolts, lockwashers, washers and locknuts (18).



- | | |
|--------------------------------------|--|
| 1. Steering column U-bolt clamp | 15. Bolt, lockwasher, nut (2) |
| 2. Nut and lockwasher (2) | 16. Bolt and nut (4) |
| 3. U-bolt clamp bracket | 17. Internal tooth lockwasher (8) |
| 4. Nut, lockwasher, washer (2) | 18. Bumper mounting bolt, washer, lockwasher (4) |
| 5. Steering column clamp | 19. Fiberglass body section |
| 6. Instrument panel | 20. Subframe |
| 7. Bolt, nut, washer, lockwasher (2) | 21. Plastic bumper strip |
| 8. Floor mat | 22. Pop rivet (17) |
| 9. Countersunk pop rivet (2) | 23. Channel |
| 10. Support tube | 24. Pop rivet washer (17) |
| 11. Washer, lockwasher, nut (2) | 25. Pop rivet washer (2) |
| 12. Spacer (2) | 26. Plastic trim (2) |
| 13. Pop rivet (2) | 27. Floor panel |
| 14. Splash shield (2) | |

Figure 9-3. Front Body Section, 4 Wheel Car — Exploded View

11. The body section, fiberglass and subframe may now be lifted free of car.

INSTALLING FRONT BODY SECTION (Figure 9-3)

1. Install fiberglass and subframe.
2. Install subframe bolts, lockwashers and nuts (15).
3. Install the 8 internal tooth lockwashers (17) and the 4 bolts and nuts (16) which secure the subframe (20) to floor panel (6).

NOTE

Pop rivets (13) require the use of washers (25) for installation.

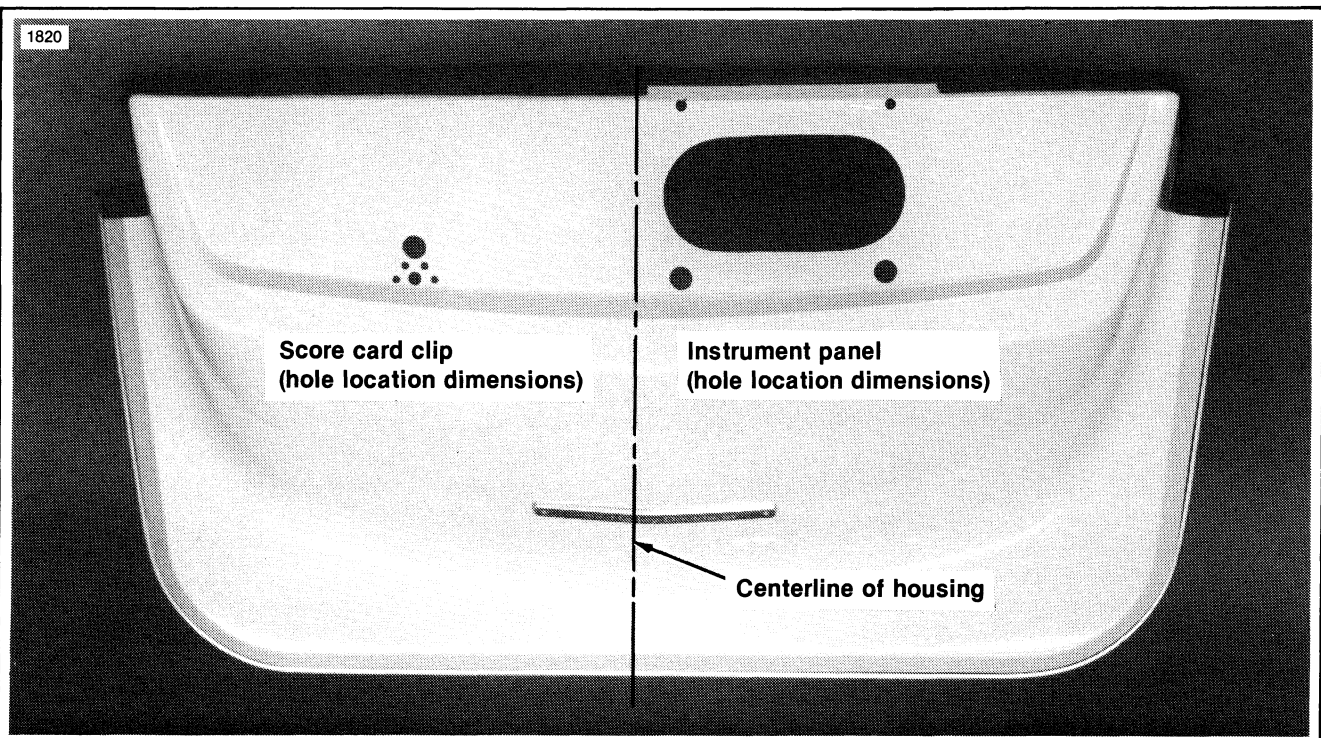
4. Secure the splash shields (14) to car frame using 3/16 in. pop rivets (13) to fasten.
5. Install ignition and choke into instrument housing. Route choke cable back to carburetor and fasten to carburetor. See ADJUSTMENTS Section 6.
6. Fasten the instrument panel (6) to fiberglass (19)

using spacers (12), washers, lockwashers and nuts (11). Install new pop rivets (9).

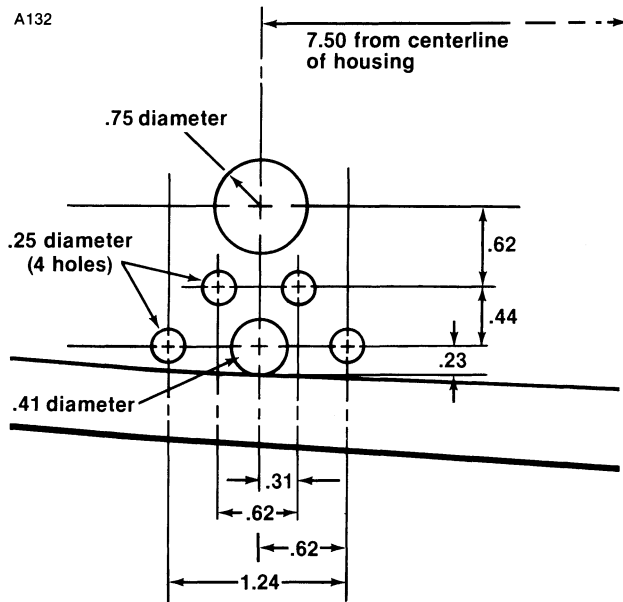
WARNING

Read and follow precautions and handling instructions on contact adhesive container before using contact adhesive.

7. When installing the floor mat (8), use Harley-Davidson CONTACT ADHESIVE, Part No. 99615-69.
8. Install steering column. Steering column clamp (5), bolts, lockwashers, washers and nuts (7).
9. Fasten U-bolt clamp (1) and bracket (3) to subframe (20) using washers, lockwashers and nuts (4) and lockwashers and nuts (2).
10. Install steering wheel. See INSTALLING STEERING WHEEL, Section 2.
11. Fasten front bumper using bolts, lockwashers, washers and lockwashers (18). Tighten bumper bolts to 33 ft-lbs (4.5 kgm) torque.
12. Connect battery cables, and lower body.



A132



A133

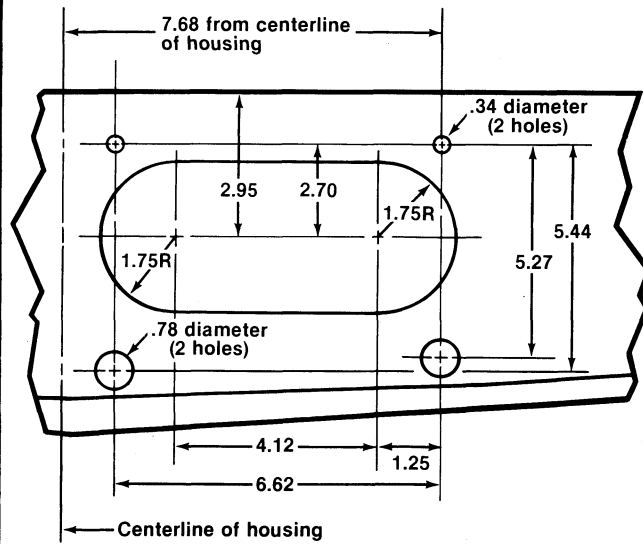


Figure 9-4. Location of Holes for Front Housing — 4 Wheel

SEATS AND HANDRAILS — 3 WHEEL

REMOVAL (Figure 9-5)

1. Lift body to full upright position.
2. Remove nuts (1), lockwashers (2) and washers (3) from seat cushion studs (6) and remove seat cushions (7).
3. Remove bolts (16) and lockwashers (17), which secure backrest (18) to seat supports (5), then remove backrest.

4. Remove bolts (15), nuts (12), lockwashers (13) and washers (14), which secure seat supports and handrails (9) to body, then remove seat supports, handrails and spacer blocks (4) from body.

5. Remove bolt (8), nut (11) and lockwasher (10) which secure handrail to seat support.

INSTALLATION (Figure 9-5)

1. Install handrails (9) onto seat supports (5) using bolts (8), lockwashers (10) and nuts (11).

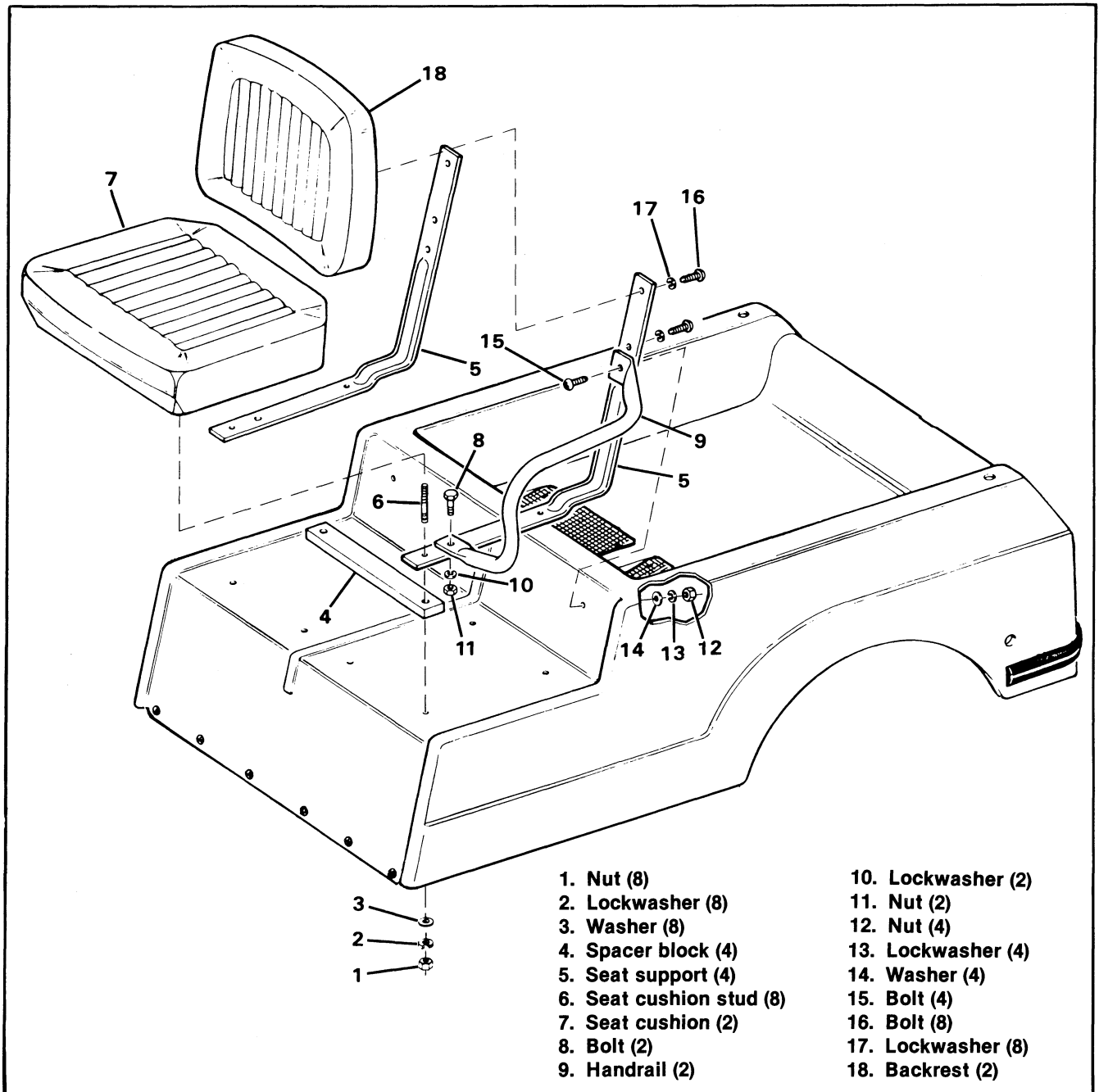


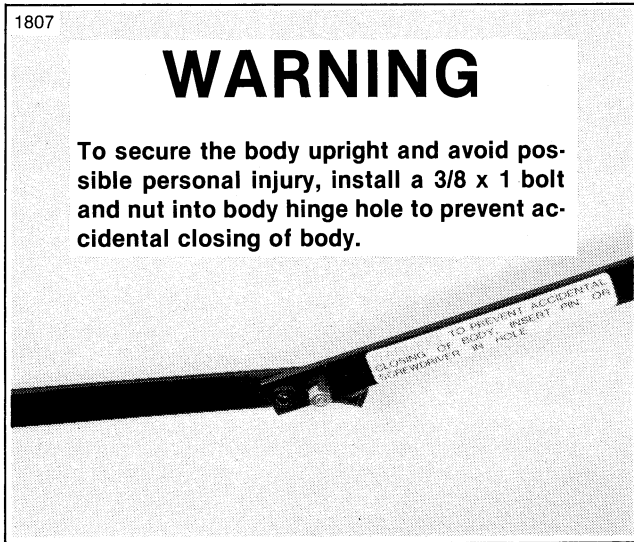
Figure 9-5. Seats and Handrails — 3 Wheel

2. Position spacer blocks (4) and seat supports on body, then install seat cushions (7) and secure them with washers (3), lockwashers (2) and nuts (1).
3. Secure handrails and seat supports to body with bolts (15), washers (14), lockwashers (13) and nuts (12).
4. Secure backrests (18) to seat supports with bolts (16) and lockwashers (17).

SEATS AND HANDRAILS — 4 WHEEL

REMOVAL (Figure 9-6)

1. Raise the golf car body.



2. Remove nuts (1), lockwashers (2) and washers (3) from seat cushion studs (4) and remove seat cushions (5).
3. Remove locknuts (6) and washers (7) from studs (9). Remove backrests (10) and seat frame (11). Re-

move rubber grommets (8) from studs (9) and replace them if they are cracked or worn. If backrest (10) or seat frame (11) must be replaced, remove studs (9) and pull the two pieces apart. Reassemble by inserting frame clips to backrest and installing studs (9).

4. Remove bolts (12), lockwashers (13), washers (14) and handrails (15).

INSTALLATION (Figure 9-6)

1. Install handrails (15) on body using washers (14), lockwashers (13) and bolts (12).
2. Insert grommets (8) on backrest studs (9). Install backrest assembly on body and fasten using washers (7) and locknuts (6).

CAUTION

Locknut threads (6) are destroyed when nuts are removed so always use new nuts when reinstalling the backrest assembly.

3. Install seat cushions (5) and secure them to the car body using washers (3), lockwashers (2) and nuts (1).
4. Lower the body.

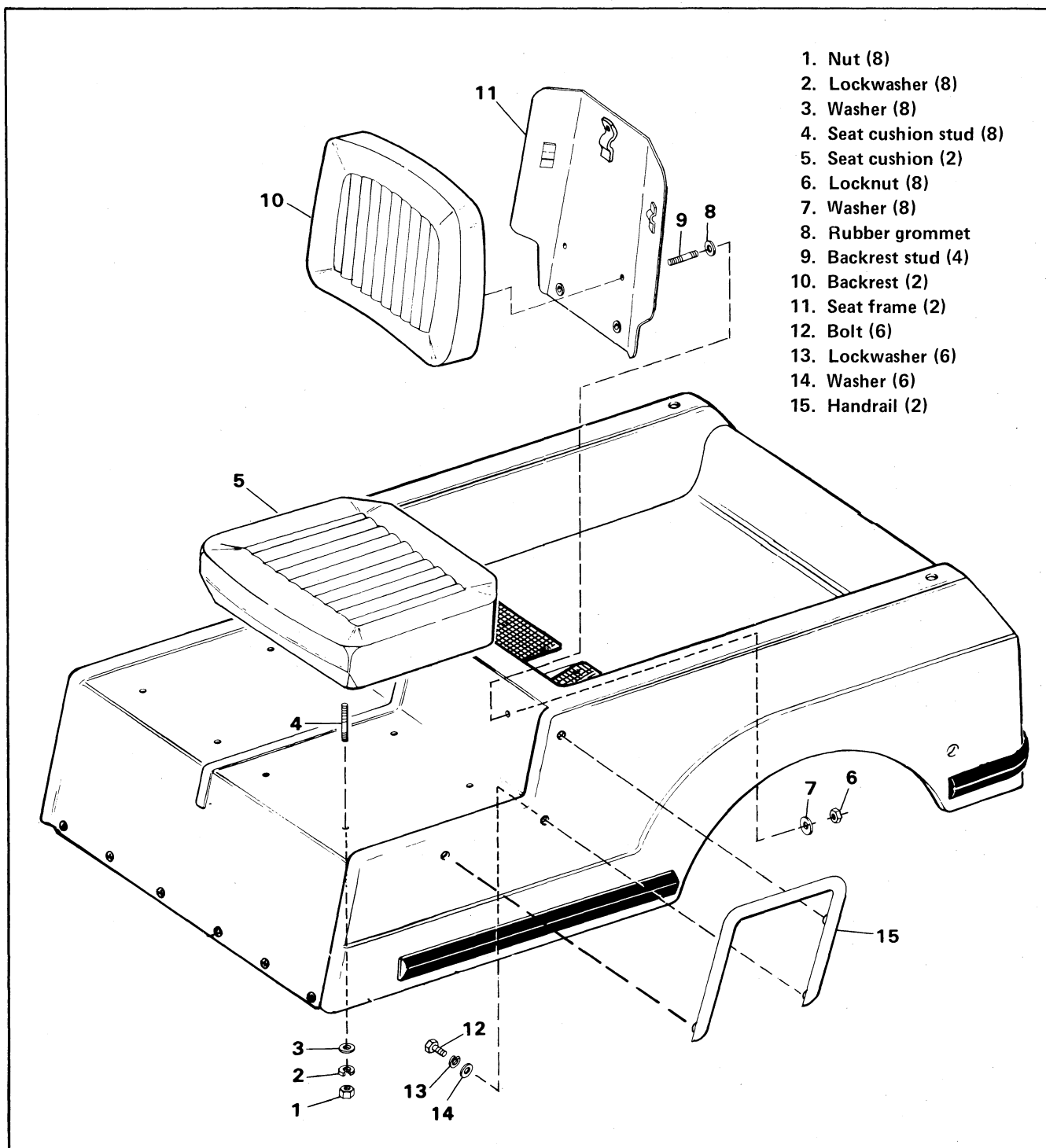
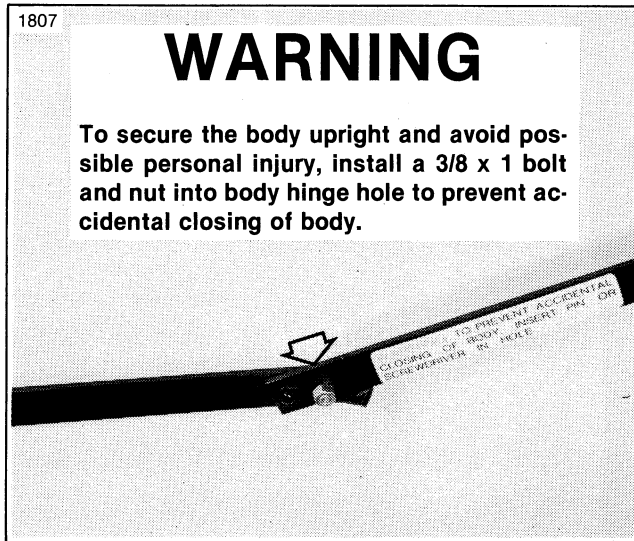


Figure 9-5. Seats and Handrails — 4 Wheel

BODY

REMOVAL

1. Raise the golf car body.



2. See Figure 9-7. Remove the cotter pin, washer, brace and wave spring from each side of frame and then lower body to its original position.

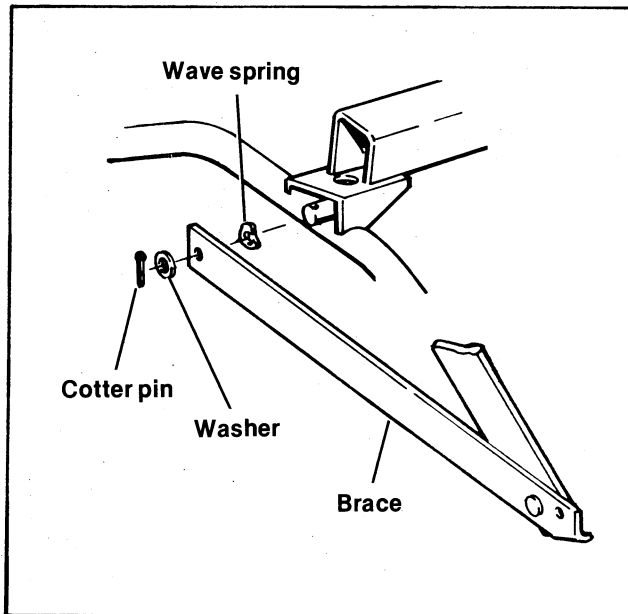


Figure 9-7. Body Side Brace

3. See Figure 9-8. Remove the four screws which secure the body to the rear hinges.
4. Unhook front body latch and lift body off golf car.

INSTALLATION

1. Place the body on golf car so holes in rear of car

line up with hinges. Attach body to hinges using the original screws. See Figure 9-8.

2. Lift body to full upright position.
3. Figure 9-7. Install a wave spring and brace on each side of the frame and secure with a flat washer and cotter pin.
4. Lower the body to its original position.

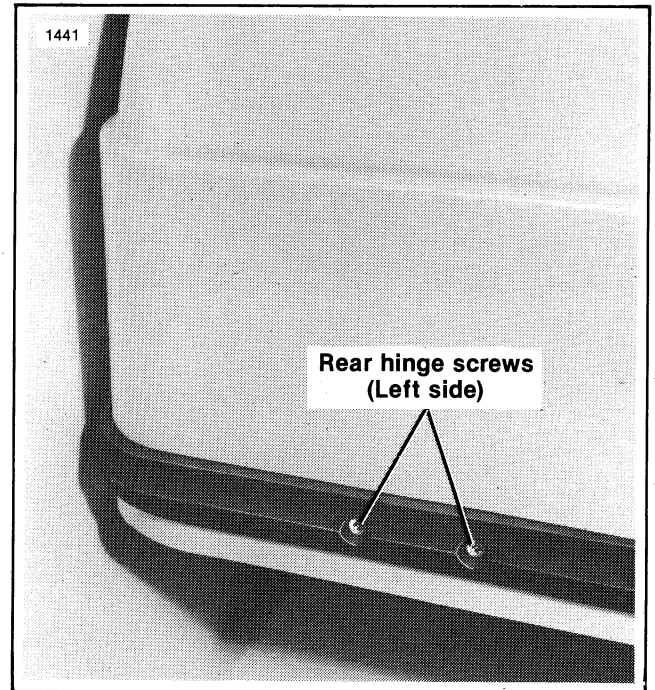
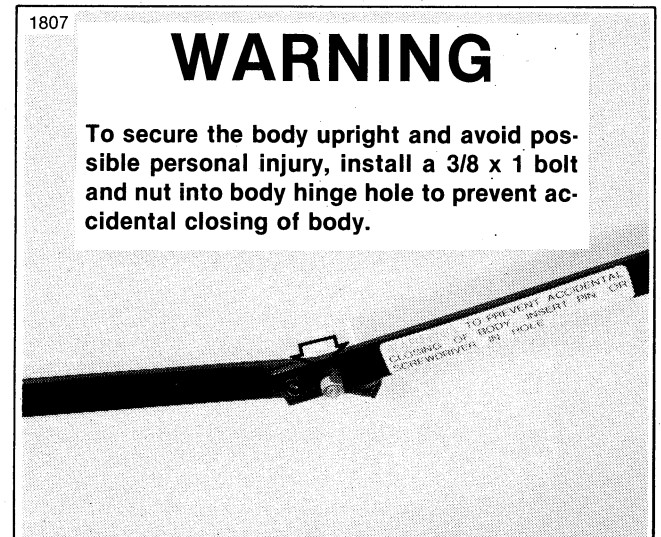


Figure 9-8. Body Hinge Screws

REMOVING AND INSTALLING BAG RACK (Figure 9-9)

1. Raise the golf car body.



2. Remove the bolt and lockwashers from each side of the bag rack. Pull bag rack free from body.
3. Install bag rack by pushing it through the holes in the rear of the body from outside of car. Fasten it to the body cross brace using the lockwashers and bolts. Make sure rubber grommets in body holes are in place. Tighten bolts to 18 ft-lbs (2.4 kgm) torque.

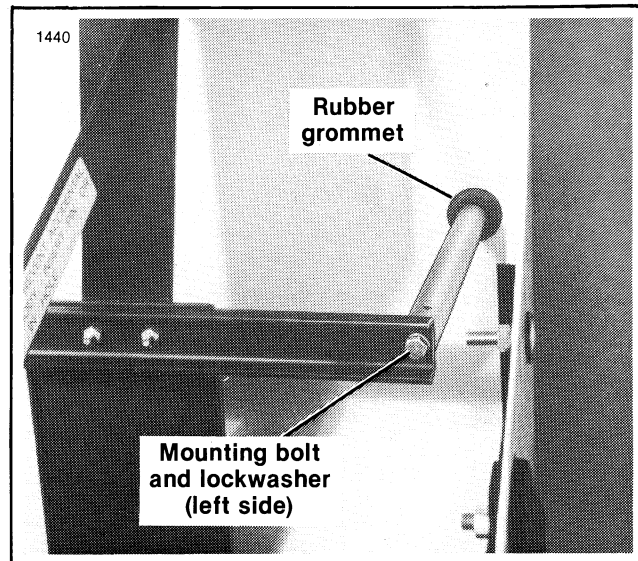


Figure 9-9. Back Rack Installation



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