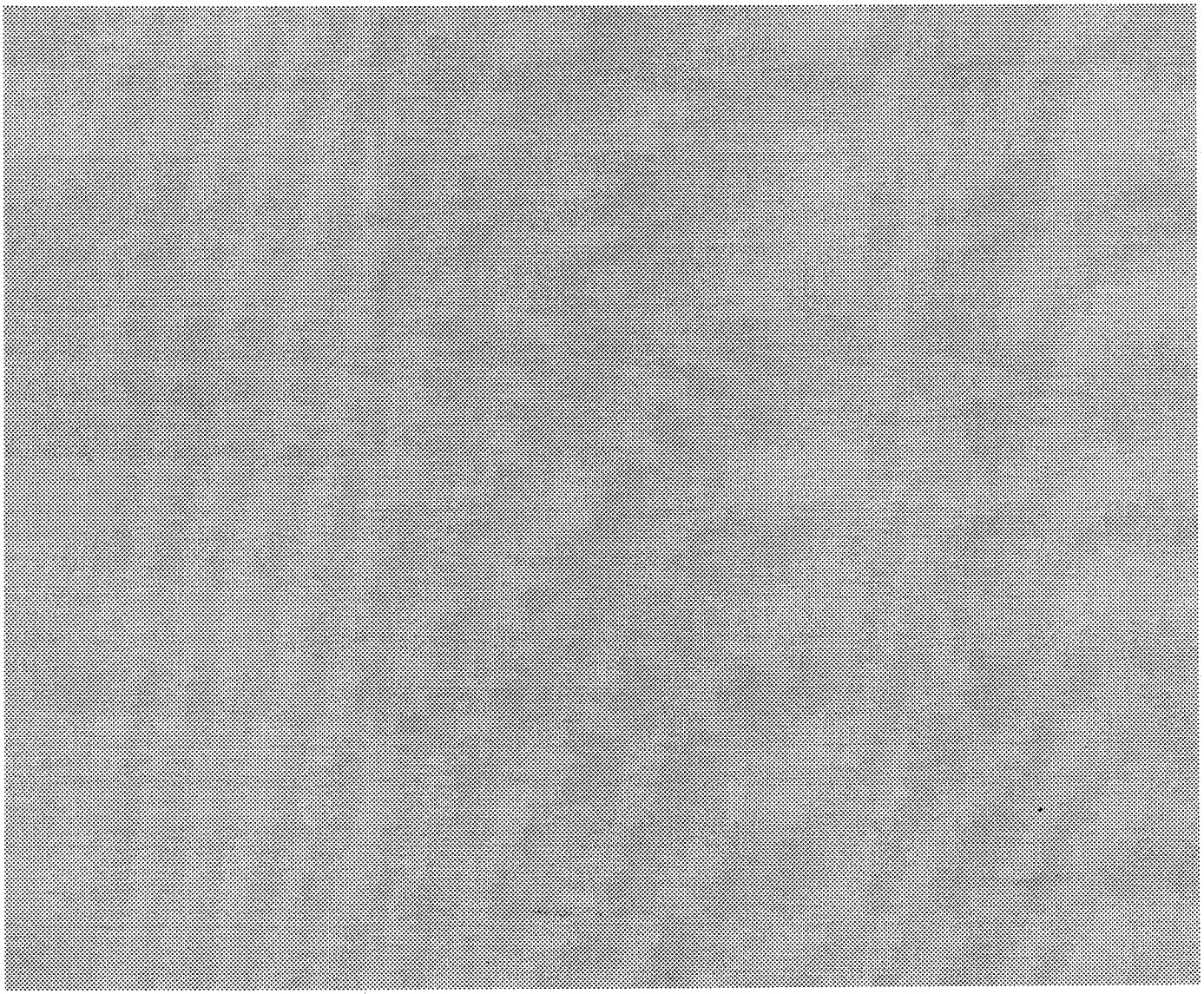
COLUMBIA

Service Manual

1982
HARLEY-DAVIDSON®
D3/DX4
GASOLINE 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 golf car and assist him in performing basic maintenance and repair. Secondly, it will introduce to the professional mechanic the latest field-tested and factory-approved major repair methods. We sincerely believe that this manual will make your association with Columbia 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 Columbia 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 Columbia 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 Columbia replacement parts.

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

CONTENTS

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.

Columbia ParCar Corp. 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 Columbia 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 Columbia 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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1982
D3/DX4

SERVICE MANUAL

The maintenance and repair information in this manual applies to the 1982 Harley-Davidson® D3/DX4 Golf Car.

COLUMBIA PARCAR CORP.

PRODUCT 1

SECTION PAGE NO.

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 — Right	10'5"
Left	11'0"
3-Wheel (Tiller) — Right	10'8"
Left	10'8"
3-Wheel (Steering Wheel) — Right	8'3"
Left	9'0"

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

4-Wheel — Right	11'2"
Left	11'9"
3-Wheel (Tiller) — Right	12'4"
Left	12'4"
3-Wheel (Steering Wheel) — Right	9'11"
Left	10'8"

DIMENSIONS

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

Wheelbase	60.5 in. (154 cm)
Ground Clearance	4.5 in. (11 cm)
Weight	693 lbs. (314 kg)
Max. Load Capacity	750 lbs. (340 kg)
Overall Length	91 in. (231 cm)
Overall Width	45.2 in. (114 cm)
Overall Height	47 in. (119 cm)

Model DX4, 4-Wheel Car

Wheelbase	66.5 in. (169 cm)
Ground Clearance	4 in. (10.16 cm)
Weight	708 lbs. (321 kg)
Max. Load Capacity	750 lbs. (340 kg)
Overall Length	101 in. (256 cm)
Overall Width	44.25 in. (112 cm)
Overall Height	46 in. (117 cm)

CAPACITIES

Fuel Tank	8.5 U.S. gals. (32.2 liters) (Approx.)
Differential	24 oz. (710 cc)

ENGINE

Model designation	D
Type	2 cycle, loop-scavenged, 1 cylinder, reed valve intake
Bore	2.75 in. (69.8 mm)
Stroke	2.50 in. (63.5 mm)
Piston Displacement	14.8 cu. in. (243 cc)
Compression Ratio	
Full Stroke	7.7:1
After Port Closing	6.0:1
Air Cleaner	Washable dry-type
Spark Plug	
Type	Harley-Davidson No. 4-5
Size	14 mm, 1/2" reach
Gap	.040 in.
Torque	15-20 ft-lbs (2-2.7 kg/m)
Breaker Point Gap Setting	.013-.016 in. (3.8 - 4 mm)
Ignition Timing	19° ± 2°, .085 ± .015

POWER TRANSMISSION

Automatic variable-pitch V-belt transmission. Overall drive ratio variable from 10.4 to 38.2.

BRAKES

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

Brake disc diameter	7.5 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
D3 DX4	3B 5K	10000 & up (5 digits)	J Harley-Davidson	2 1982

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 and steering gear.

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	376	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	1G71

Foot Pounds to Kilograms

	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 15/16	49.21	3 5/16	84.14
.2	.0078	26	1.024	59	2.323	92	3.622	.002	.051	5/8	15.875	2	50.80	3 3/8	85.72
.3	.0118	27	1.063	60	2.362	93	3.661	.003	.076	11/16	17.462	2 1/16	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 7/16	87.31
.5	.0197	29	1.142	62	2.441	95	3.740	.005	.127	3/4	19.050	2 1/8	53.97	3 1/2	88.90
.6	.0236	30	1.181	63	2.480	96	3.779	.006	.152	.8	20.320	2 3/16	55.56	3 9/16	90.49
.7	.0275	31	1.220	64	2.519	97	3.819	.007	.178	13/16	20.638	2.2	55.88	3.6	91.44
.8	.0315	32	1.260	65	2.559	98	3.858	.008	.203	7/8	22.225	2 1/4	57.15	3 5/8	92.07
.9	.0354	33	1.299	66	2.598	99	3.897	.009	.229	.9	22.860	2.3	58.42	3 11/16	93.66
1	.0394	34	1.338	67	2.638	100	3.937	.010	.254	15/16	23.812	2 5/16	58.74	3.7	93.98
2	.0787	35	1.378	68	2.677	101	3.976	1/64	.397	1	25.40	2 3/8	60.32	3 3/4	95.25
3	.1181	36	1.417	69	2.716	102	4.016	.020	.508	1 1/16	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 7/16	61.91	3 13/16	96.84
5	.1968	38	1.496	71	2.795	104	4.094	1/32	.794	1 1/8	28.57	2 1/2	63.50	3 7/8	98.42
6	.2362	39	1.535	72	2.834	105	4.134	.040	1.016	1 1/16	30.16	2 9/16	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 15/16	100.01
8	.3149	41	1.614	74	2.913	107	4.212	.060	1.524	1 1/4	31.75	2 5/8	66.67	4	101.6
9	.3543	42	1.653	75	2.953	108	4.252	1/16	1.588	1.3	33.02	2 11/16	68.26	4 1/16	102.19
10	.3937	43	1.693	76	2.992	109	4.291	.070	1.778	1 3/16	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 1/8	34.92	2 3/4	69.85	4 1/8	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 3/16	106.36
13	.5118	46	1.811	79	3.110	112	4.409	.1	2.540	1 7/16	36.51	2 13/16	71.44	4.2	106.68
14	.5512	47	1.850	80	3.149	113	4.449	1/8	3.175	1 1/2	38.10	2 7/8	73.02	4 1/4	107.95
15	.5905	48	1.890	81	3.189	114	4.488	3/16	4.762	1 9/16	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 15/16	74.61	4 5/16	109.54
17	.6693	50	1.968	83	3.268	116	4.567	1/4	6.350	1 5/8	41.27	3	76.20	4 3/8	111.12
18	.7086	51	2.008	84	3.307	117	4.606	.3	7.620	1 11/16	42.86	3 1/16	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 7/16	112.71
20	.7874	53	2.086	86	3.386	119	4.685	3/8	9.525	1 3/4	44.45	3 1/8	79.37	4 1/2	114.30
21	.8268	54	2.126	87	3.425	120	4.724	.4	10.160	1.8	45.72	3 3/16	80.96	4 9/16	115.89
22	.8661	55	2.165	88	3.464	121	4.764	7/16	11.112	1 13/16	46.04	3.2	81.28	4.6	116.84
23	.9055	56	2.205	89	3.504	122	4.803	1/2	12.700	1 7/8	47.62	3 1/4	82.55	4 5/8	117.47
24	.9449	57	2.244	90	3.543	123	4.842	9/16	14.288	1.9	48.26	3.3	83.82	4 11/16	119.06

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 key is in position for desired direction of travel before depressing accelerator. DO NOT CHANGE DIRECTION OF SWITCH WHILE CAR IS MOVING!

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, turn key to desired direction of travel and depress accelerator. Depress brake pedal to slow or stop.

WARNING

Be sure directional key switch is in desired position before depressing accelerator.

Directional Key Switch

The switch requires a key to operate. Turn key to FORWARD position to run car forward. Turn to REVERSE position to run car in reverse. Warning buzzer sounds when in reverse. 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.

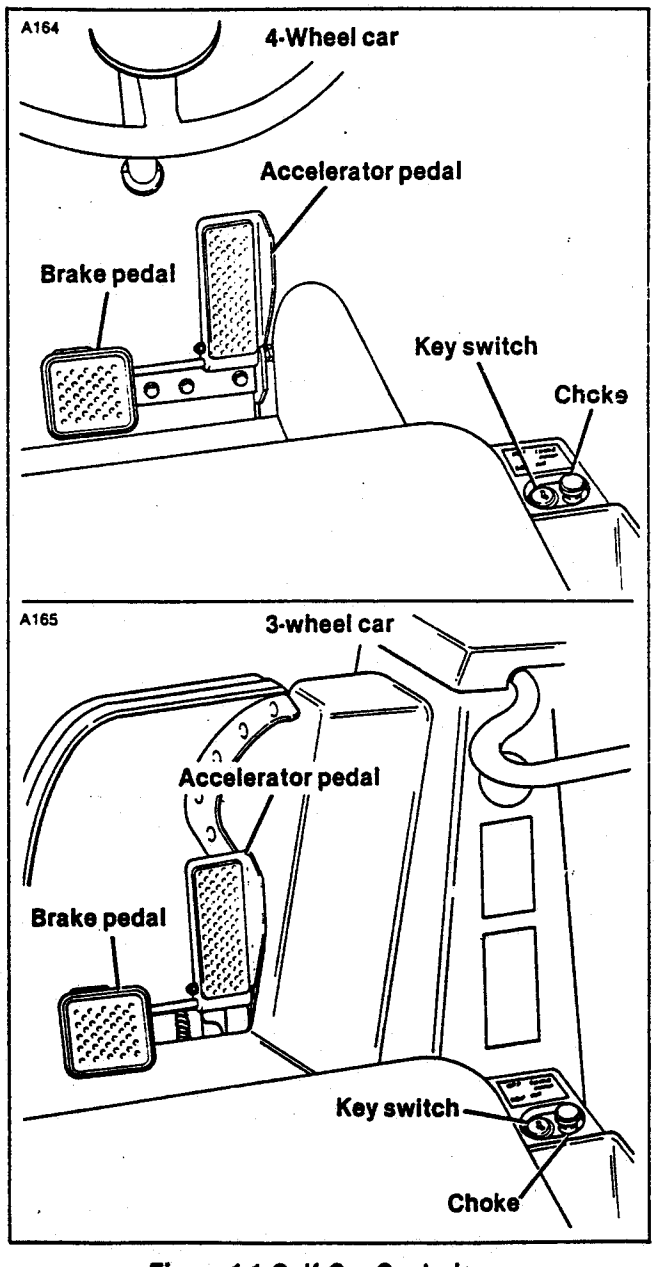

Figure 1.1 Golf Car Controls

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.

Choke

Use choke knob on panel to assist starting a cold engine, if necessary. Pull knob outward to choke and move inward gradually as engine warms 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.

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.

STORAGE

Engine

Drain carburetor bowl and add a good quality fuel stabilizer to the fuel following the manufacturers' recommendations on the container.

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.

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, and recharge if necessary

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 — 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.

SPEED — Set at 2700-2800 rpm governed full speed.

FRONT WHEEL — inspect for proper attachment on axle shaft.

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.

STARTER-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
- — directional key 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 Owner's Manual is delivered to customer with vehicle.

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.

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.		
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			
	All monthly service operations	14	Oil body hinge
1	Clean battery and terminals		
22	Starter-generator belt tension	19	Grease the front fork sides (3-wheel)
16	Clean and gap spark plug 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 point condition and adjust gap to .013-.016 in. Check ignition timing.	7	Check lubricant in axle differential housing.
18	Inspect starter-generator brushes.		
17	Check steering wheel or tiller handle free play and adjust as necessary	19, 21	Grease front suspension
		4	Anti-Seize disc brake shoe operating cam.
5	Adjust low speed mixture		
5	Adjust idle speed stop screw		
19	Adjust governor	10, 11	Oil the brake and accelerator pedal bearings.
		12	Oil the brake linkage.
		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		

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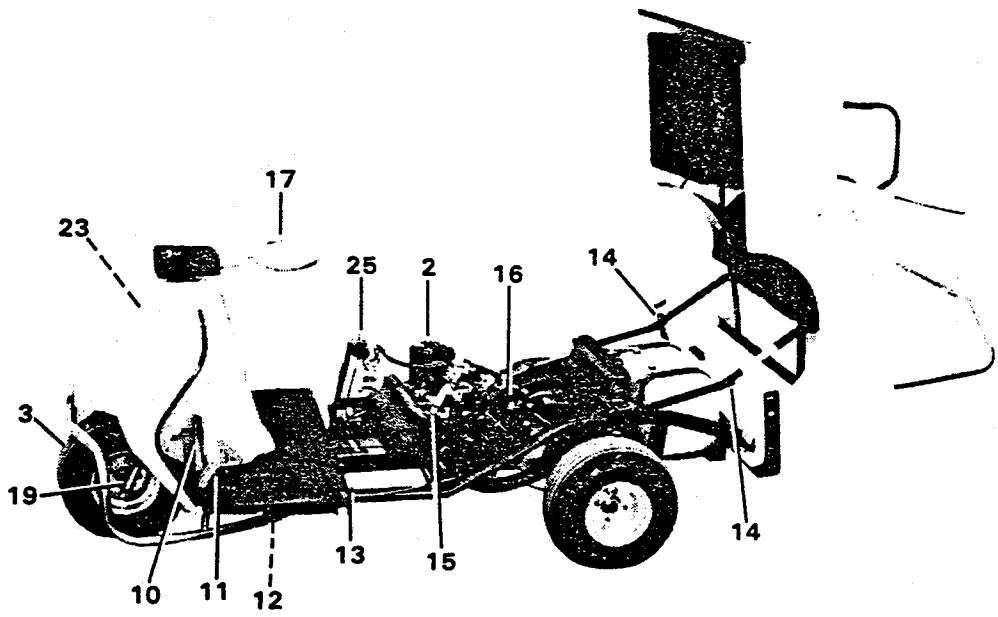


1. Battery
2. Air cleaner
3. Tire
4. Brake shoe
5. Carburetor
6. Throttle and choke cables
7. Axle differential housing
8. Transmission primary drive
9. Transmission secondary drive
10. Accelerator pedal
11. Brake pedal
12. Brake linkage and cable
13. Accelerator pedal micro switch
14. Body support
15.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

1957

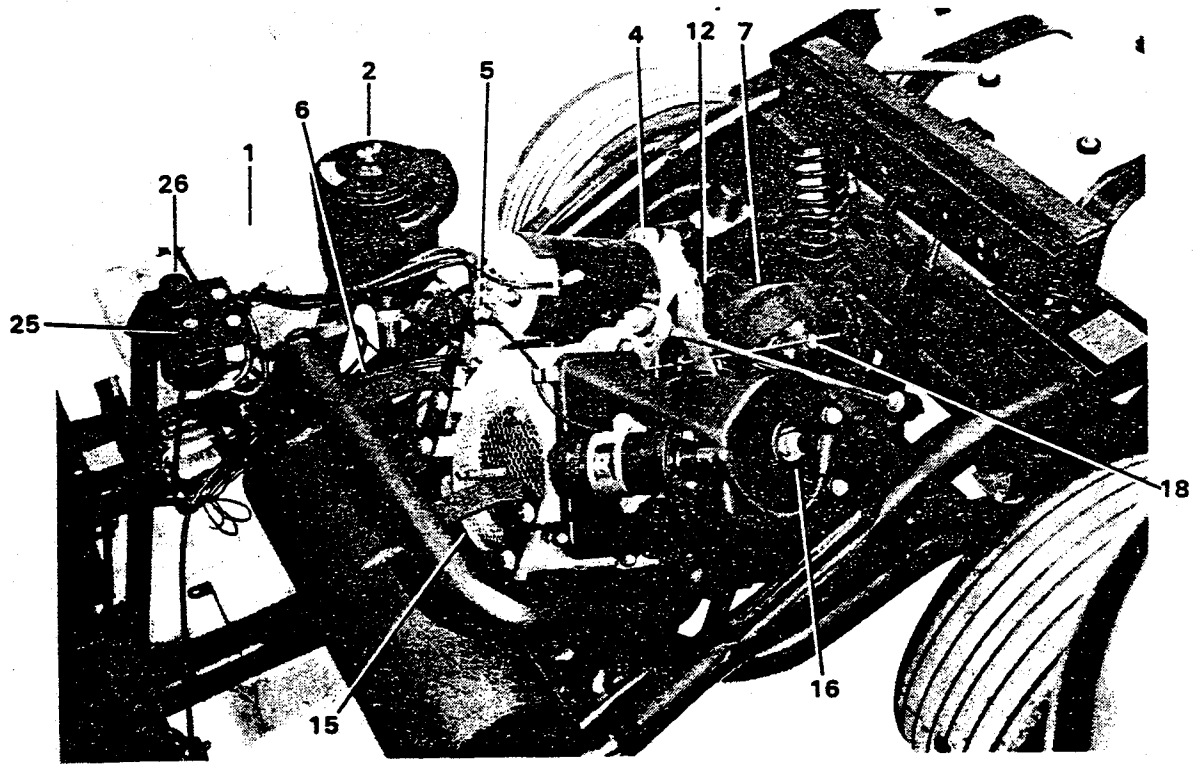
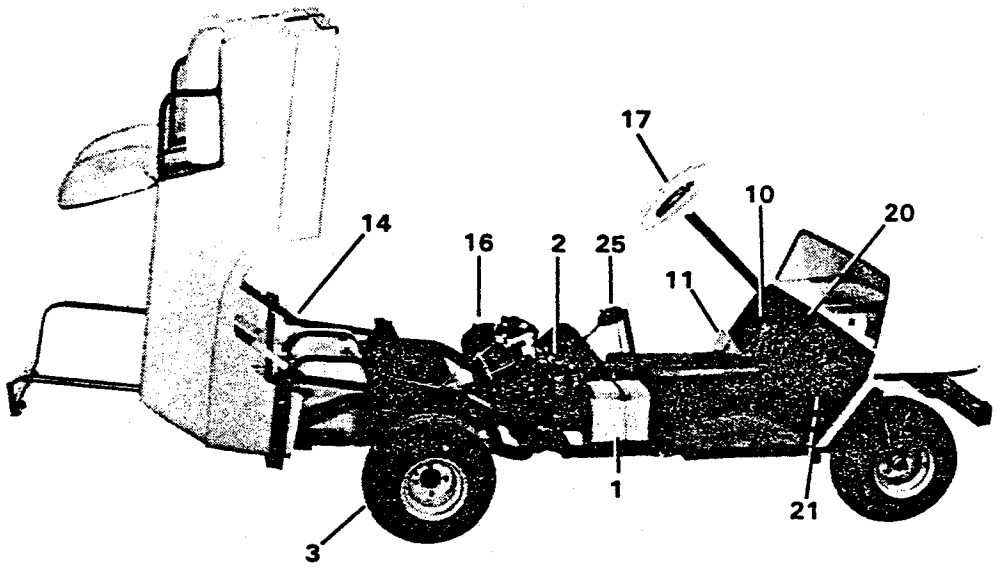


Figure 1-2. 1982 Model D-3 Golf Car

1954



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

1958

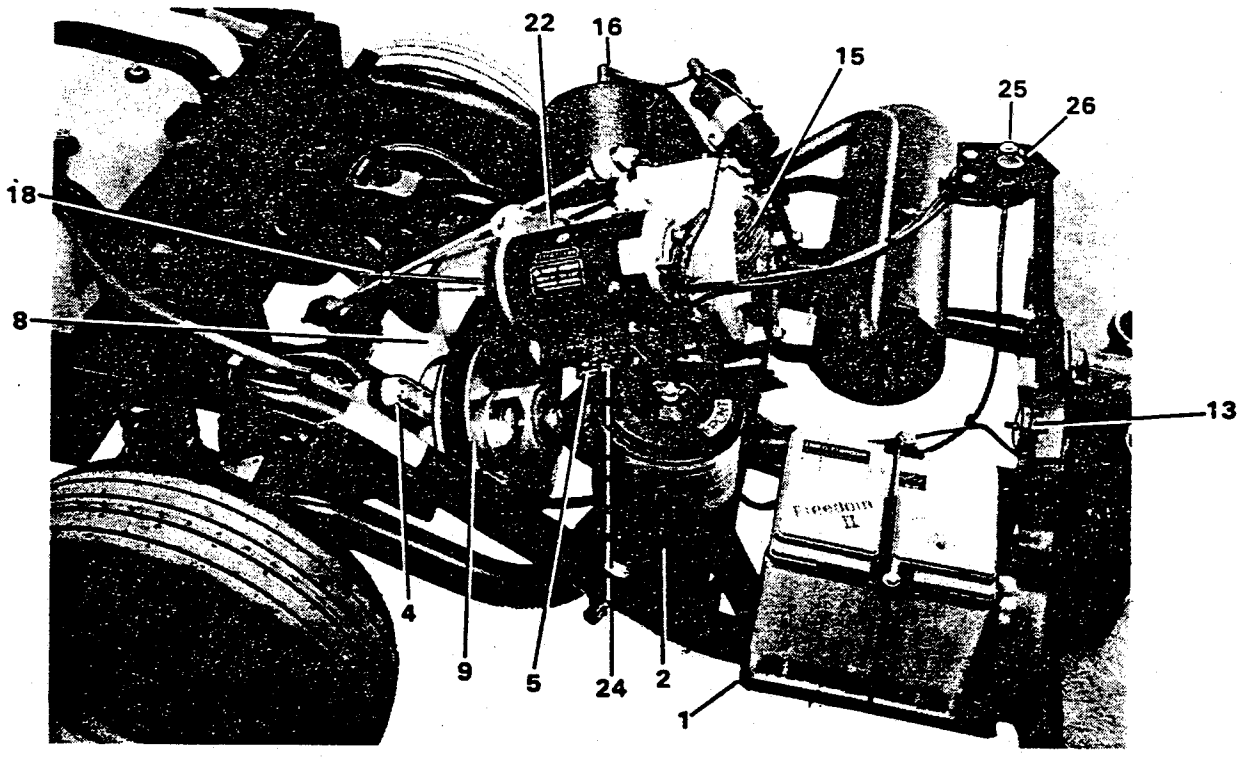


Figure 1-3. 1982 Model DX4 Golf Car

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	
1. Spark plug partially fouled or in poor condition.	8 SPARK PLUGS
2. Circuit breaker points out of adjustment, or ignition timing incorrect.	8 CIRCUIT BREAKER
3. Loose wire connection at coil or circuit breaker.	8 CIRCUIT BREAKER
4. Defective ignition coil	8 IGNITION COIL
5. Defective condenser.	8 CIRCUIT BREAKER
6. Poor cylinder compression.	5 CYLINDER
7. Water or dirt in fuel system and/or carburetor. Dirty plugged fuel filter.	6 FUEL SYSTEM
8. Carburetor not adjusted correctly.	6 FUEL SYSTEM
9. Spark plug wire damaged.	8 SPARK PLUGS
ENGINE STARTS BUT RUNS IRREGULARLY OR MISSES	
1. Spark plug partially fouled or in poor condition.	8 SPARK PLUGS
2. Spark plug wire damaged.	8 SPARK PLUGS
3. Circuit breaker points out of adjustment or in need of cleaning.	8 CIRCUIT BREAKER
4. Condenser connections loose.	8 CIRCUIT BREAKER
5. Defective ignition coil.	8 IGNITION COIL
6. Defective condenser.	8 CIRCUIT BREAKER
7. Loose wire connections at coil or circuit breaker.	8 IGNITION COIL
8. Water or dirt in carburetor.	7 FUEL SYSTEM
9. Water or dirt in fuel system. Dirty plugged fuel filter.	7 FUEL SYSTEM
10. Gasoline tank vent plugged, and tank air bound.	7 FUEL SYSTEM
11. Carburetor improperly adjusted.	7 FUEL SYSTEM
12. Improper gas and oil mixture.	1 SERVICE
ENGINE FAILS TO START	
1. Gasoline tank empty.	1 SERVICE
2. Gasoline line or filter clogged.	7 FUEL SYSTEM
3. Fouled spark plug.	8 SPARK PLUGS
4. Circuit breaker points badly out of adjustment.	8 CIRCUIT BREAKER
5. Loose wire connection at coil or circuit breaker.	8 IGNITION COIL 8 CIRCUIT BREAKER
6. Engine flooded with gasoline as a result of overchoking.	1 CONTROLS AND OPERATION
7. Defective ignition coil.	8 IGNITION COIL
8. Defective condenser.	8 CIRCUIT BREAKER
9. Starter-Generator drive belt slipping.	8 STARTER-GENERATOR
10. Spark plug wire damaged.	8 SPARK PLUGS
STARTER FAILS TO OPERATE	
1. Battery dead.	8 BATTERY
2. Starting control circuit not operating.	8 STARTER-GENERATOR
3. Starter-generator defective.	8 STARTER-GENERATOR
4. Starter-solenoid defective (not closing).	8 STARTER-GENERATOR
5. Micro-switch open.	8 SWITCHES
6. Circuit breaker open.	8 IGNITON
7. Directional key switch circuit defective.	8 IGNITION

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

SYMPTOM AND CAUSE	REFER TO SECTION
TRANSMISSION DOES NOT ENGAGE OR DISENGAGE SMOOTHLY	
1. Defective drive belt.	7 TRANSMISSION
2. 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, or replace.

STEERING AND SUSPENSION 2

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
Camber ..... 0° (wheels at right angle [90°] to ground)
Toe ..... 1/4 in. (6.4mm) toe-in

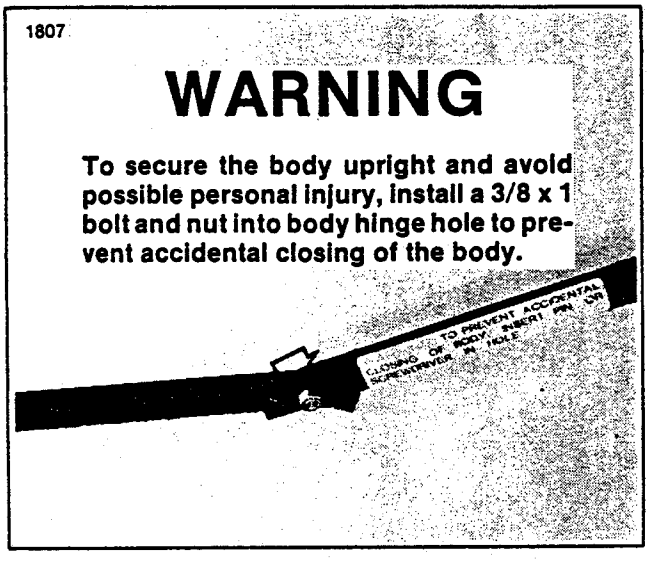
TORQUES

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
Frame Mounting Bolts ..... 31-33 ft-lbs (4.3-4.6 kgm)
Steering Gear Unit
Clamp Bolts ..... 10-15 ft-lbs (1.4-2 kgm)
Leaf Spring to
King Pin Bolts ..... 35-40 ft-lbs (4.8-5.5 kgm)

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 bumper 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

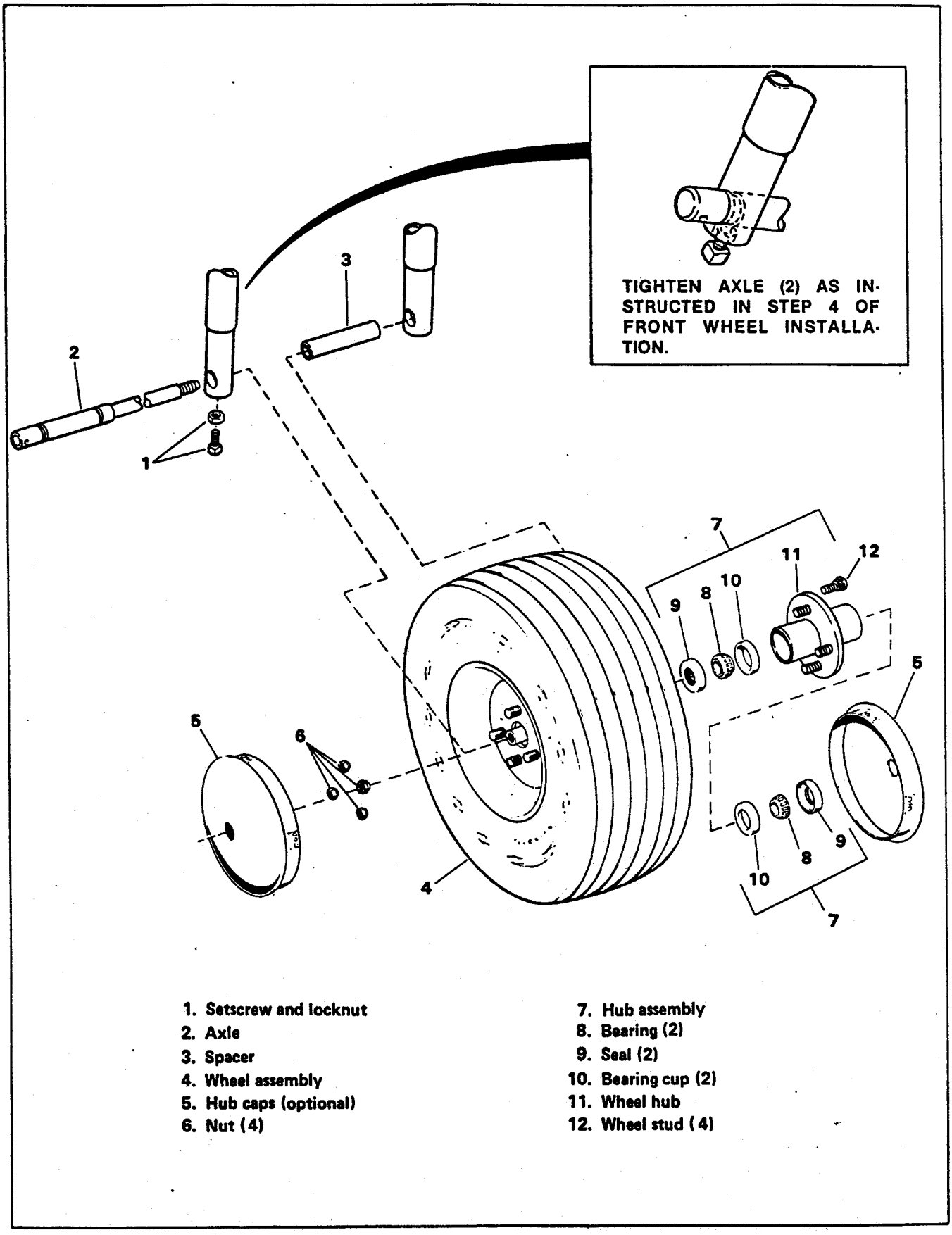
1. Remove hub cap (4) and slightly loosen wheel rim mounting nuts (2).
2. Wedge front wheel of car to keep it from rolling and raise vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of frame to support vehicle weight for additional safety. See LIFTING INSTRUCTIONS 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.

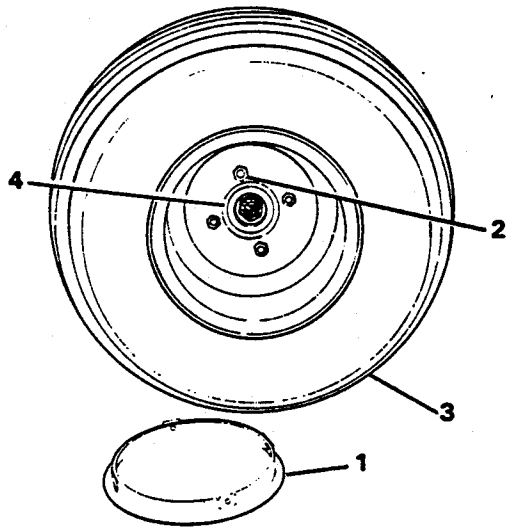
CHECK CHART

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.



1. Setscrew and locknut
2. Axle
3. Spacer
4. Wheel assembly
5. Hub caps (optional)
6. Nut (4)
7. Hub assembly
8. Bearing (2)
9. Seal (2)
10. Bearing cup (2)
11. Wheel hub
12. Wheel stud (4)

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



1. Hub cap
2. Mounting nuts (4)
3. Wheel and tire
4. Axle hub

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.

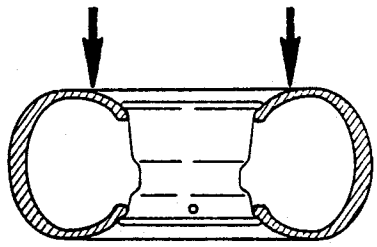
The standard tubeless tire repair procedure can be followed.

Removal

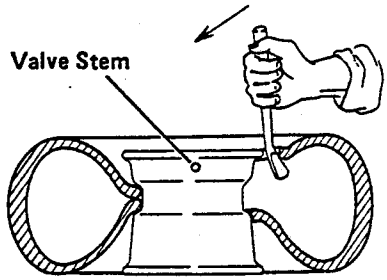
NOTE

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

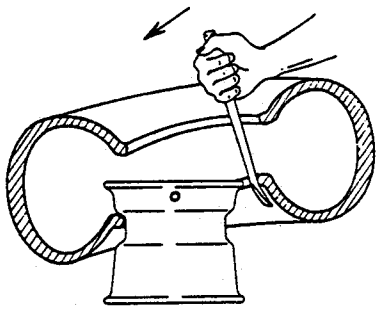
1. Remove tire and wheel assembly from car as described in preceding section.
2. Remove valve cap and valve core to free air from tire.
3. If tire machine is unavailable, loosen both tire beads by applying pressure to tire side walls (Step I, Figure 2-3).



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 BEARING GREASE, Part No. 99857-81.

2. If wheel bearing cups (10) have been removed, press new cups in hub.

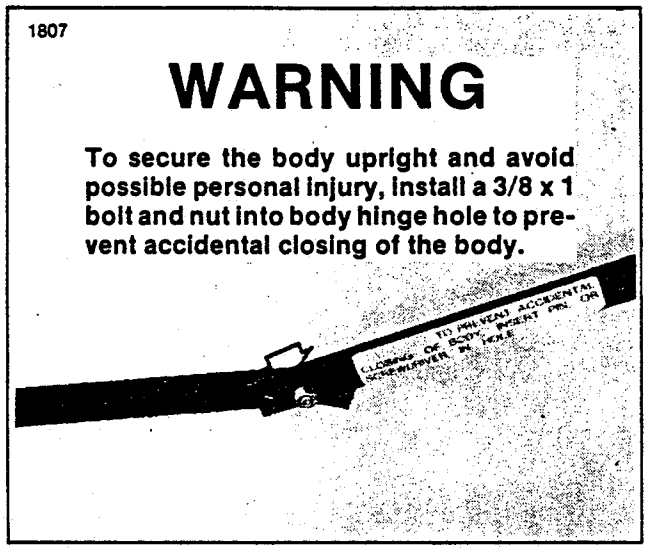
3. Install wheel bearings (8) and press in new oil seals (9) lip side to hub.

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.

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 from 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 may 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 HUBS (Figure 2-4)

Disassembly

1. Remove tire and wheel assembly from car as described in preceding section.

2. Remove grease cap (1), cotter pin (2) and axle nut (3). Remove hub assembly (4) from axle (5).

3. Pry out oil seal (8) and remove bearings (6 & 7) from each side of hub.

4. 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.

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

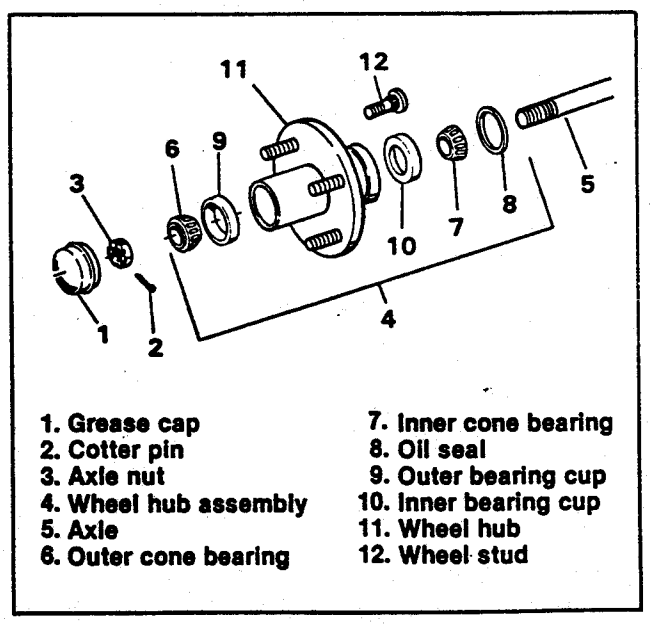
Assembly

1. Pack wheel bearings (6 & 7) with golf car SPECIAL BEARING GREASE, Part No. 99857-81.

2. If wheel bearing cups (9 & 10) have been removed, press new cups in hub (11).

3. Install wheel bearing (7) and press in new oil seal (8) lip side to hub.

4. Install hub assembly (4) on axle (5), install wheel bearing (6), and turn on nut (3).



1. Grease cap
2. Cotter pin
3. Axle nut
4. Wheel hub assembly
5. Axle
6. Outer cone bearing
7. Inner cone bearing
8. Oil seal
9. Outer bearing cup
10. Inner bearing cup
11. Wheel hub
12. Wheel stud

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.

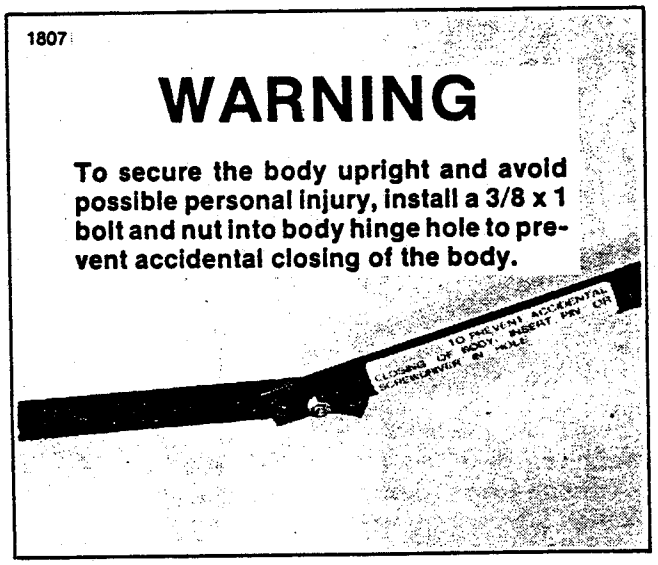
6. Install cotter pin (2) so that when the ends are crimped over and trimmed they will not contact the dust cap or hub. Cotter pins which contact the dust cap or hub will create contaminants during operation which cause bearing wear. Install grease cap (1).

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

STEERING — 3 WHEEL — TILLER BAR EQUIPPED

GENERAL

The golf car comes equipped with a tiller steering assembly as standard equipment. The tiller generally 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

Clean slide block and channel. Lubricate with dry lubricant. 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.

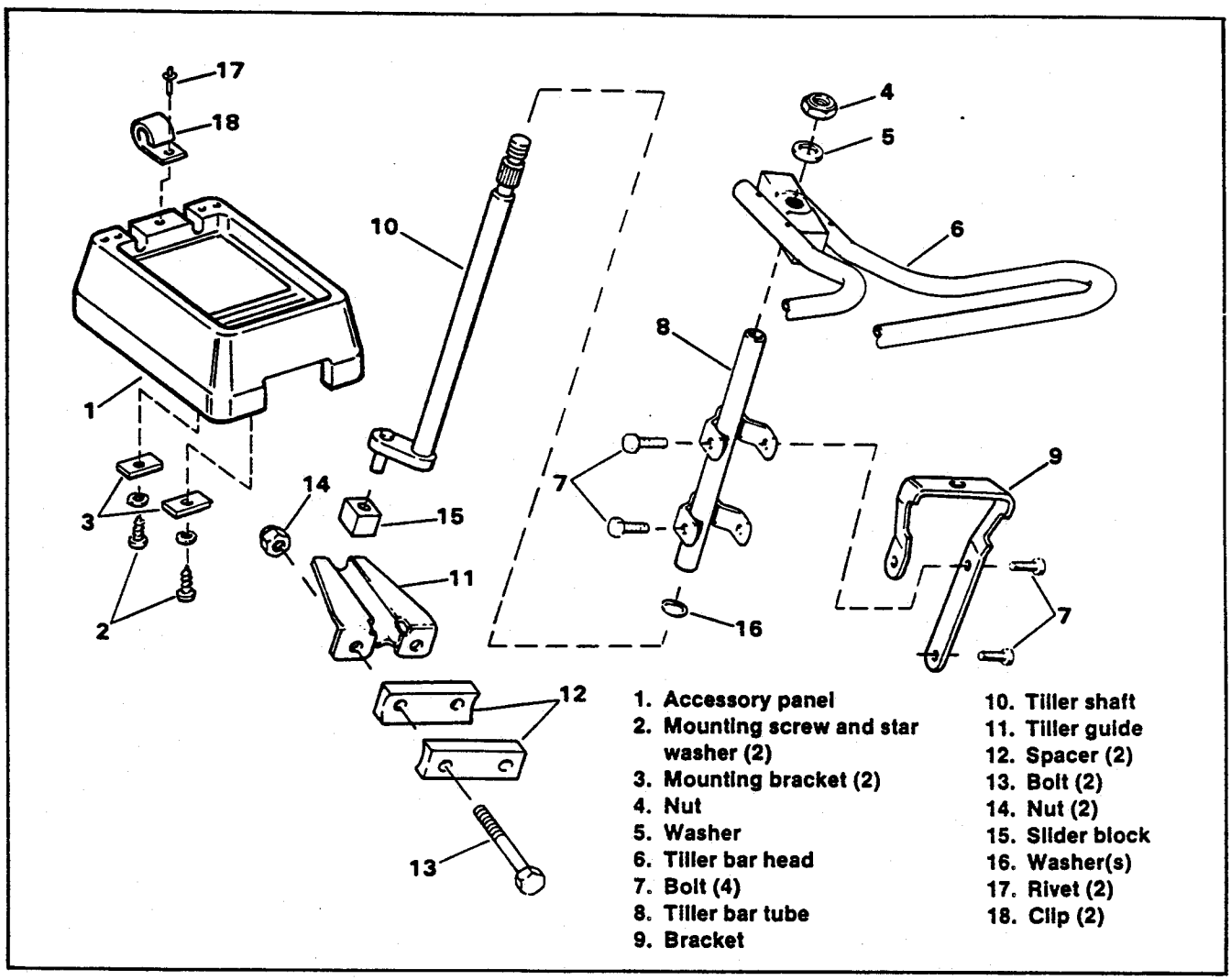
INSTALLATION (Figure 2-5)

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).



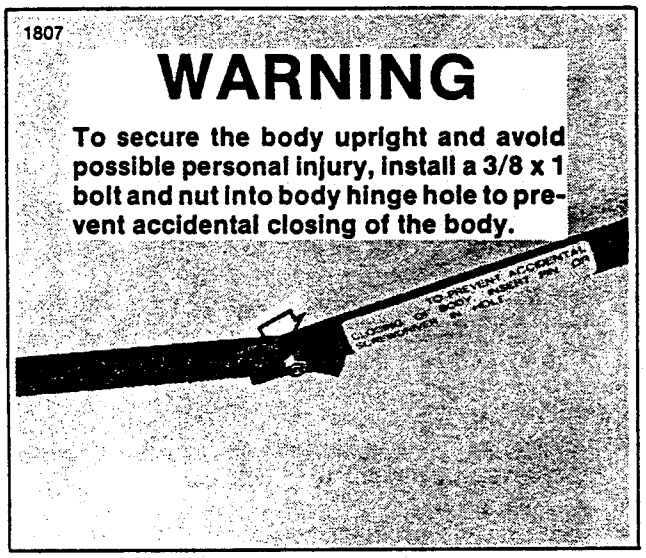
1. Accessory panel
2. Mounting screw and star washer (2)
3. Mounting bracket (2)
4. Nut
5. Washer
6. Tiller bar head
7. Bolt (4)
8. Tiller bar tube
9. Bracket
10. Tiller shaft
11. Tiller guide
12. Spacer (2)
13. Bolt (2)
14. Nut (2)
15. Slider block
16. Washer(s)
17. Rivet (2)
18. Clip (2)

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.

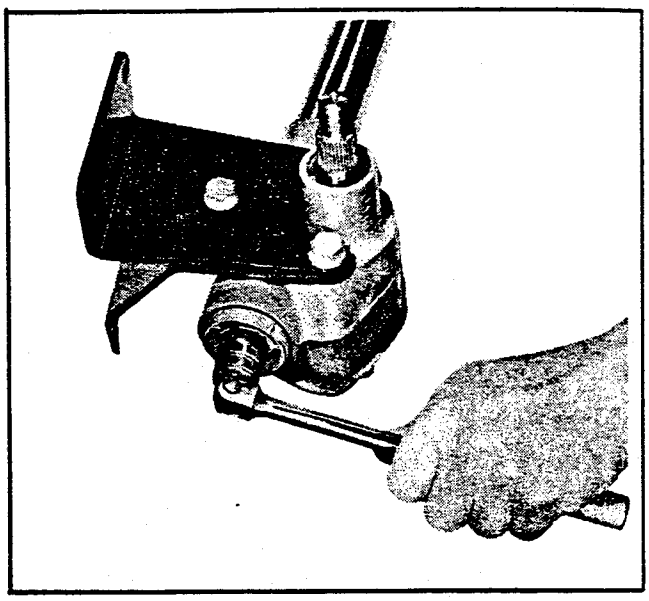


Figure 2-6. Worm Bearing Adjustment

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.

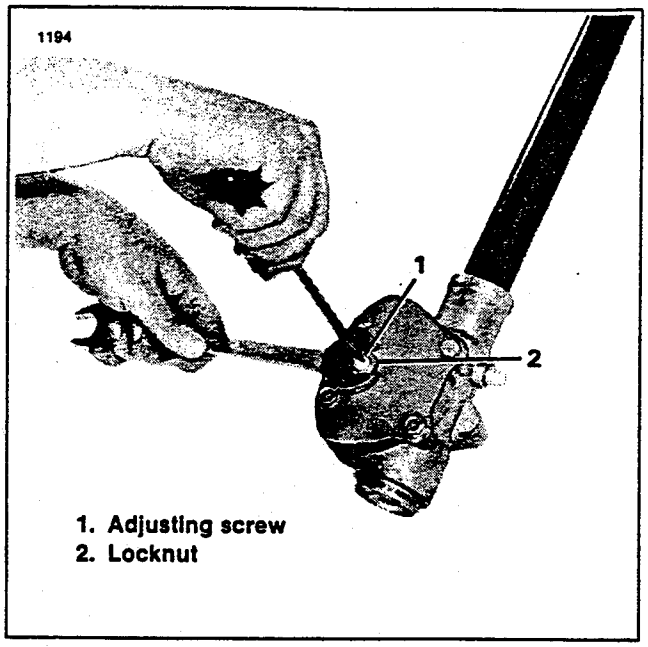
NOTE

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 to 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



1. Adjusting screw
2. Locknut

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.

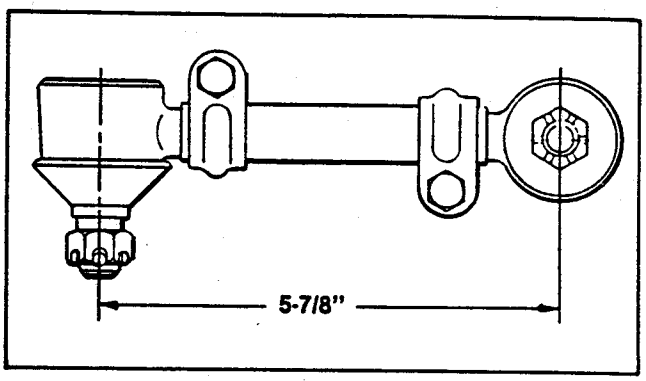


Figure 2-8. Tie Rod Adjustment

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.

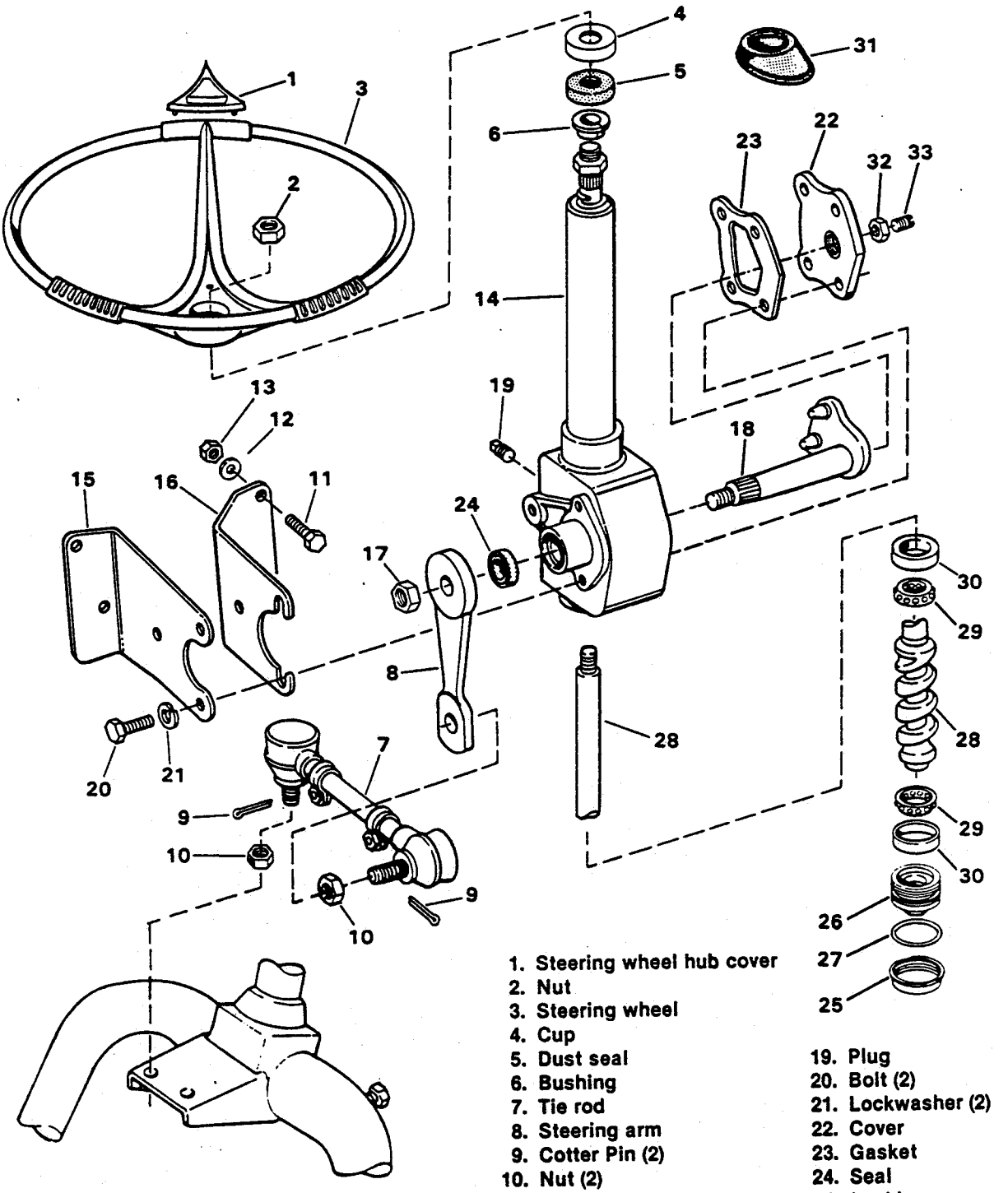
Installation

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

NOTE

Before installing the steering wheel, apply Harley-Davidson ANTI-SEIZE, Part No. 99632-77 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).



1. Steering wheel hub cover
2. Nut
3. Steering wheel
4. Cup
5. Dust seal
6. Bushing
7. Tie rod
8. Steering arm
9. Cotter Pin (2)
10. Nut (2)
11. Bolt (4)
12. Washer (4)
13. Nut (4)
14. Steering column and gear unit assembly
15. Front bracket
16. Rear bracket
17. Steering arm nut
18. Steering shaft
19. Plug
20. Bolt (2)
21. Lockwasher (2)
22. Cover
23. Gasket
24. Seal
25. Locking cup
26. End cap
27. O-ring
28. Worm shaft
29. Bearings (2)
30. Bearing race (2)
31. Boot
32. Locknut
33. Adjusting screw

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

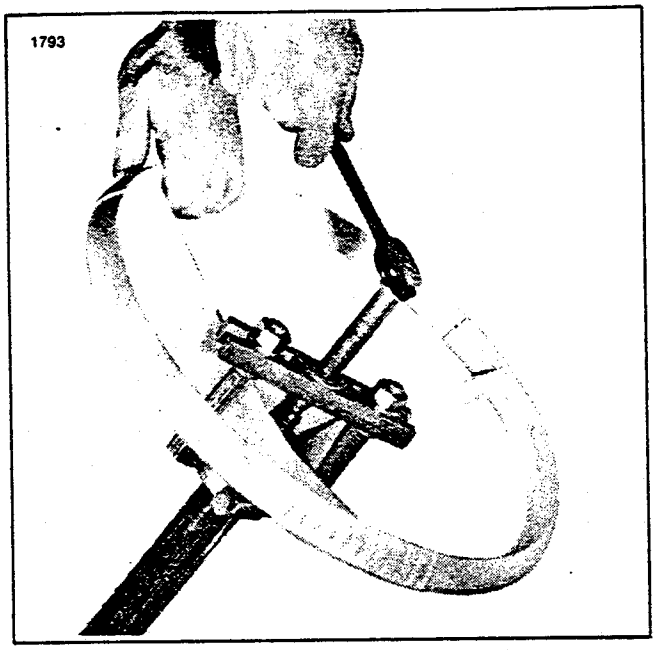


Figure 2-10. Pulling the Steering Wheel

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 2-12)

Removal

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

2. Wedge rear wheels to keep car from rolling and raise front of vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of bumper to support vehicle weight for added safety. See LIFTING INSTRUCTIONS in Section 1.

3. Remove front body housing. See BODY Section 9.

NOTE

Mark steering shaft (21) and Pitman arm (11) so they can be replaced in the exact position as originally installed.

4. Remove nut (10) and lockwasher (9) from steering shaft (21).

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.

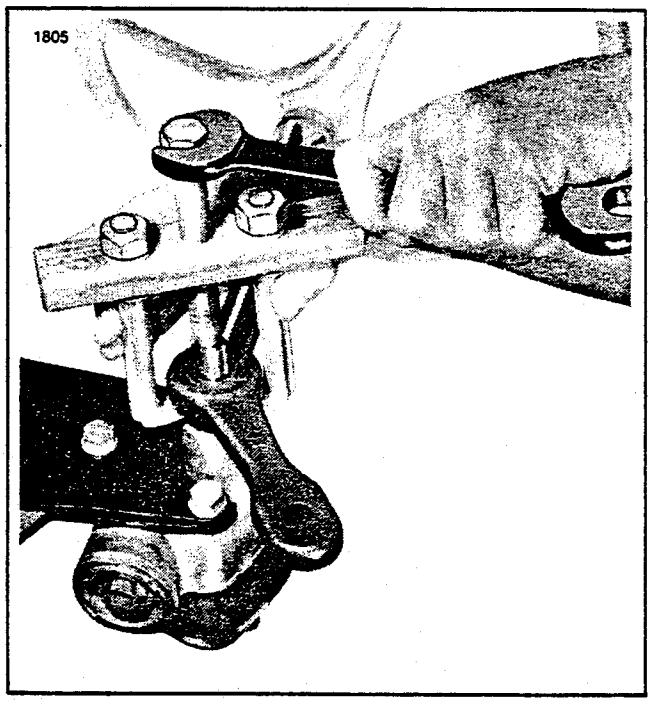


Figure 2-11. Pulling the Steering Arm

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).

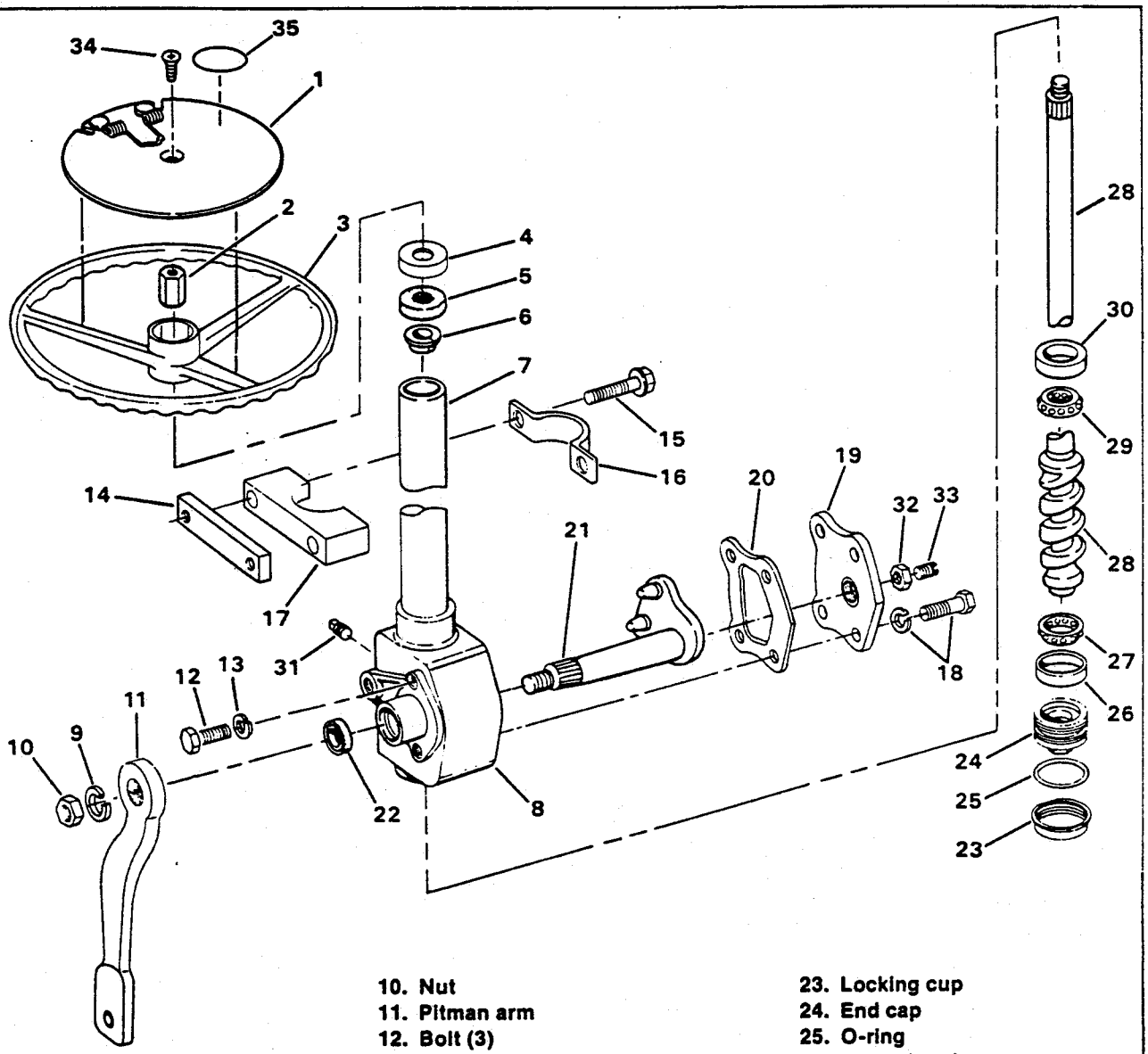
3. Fasten the brackets (15, 16) to the frame using bolts (11), washers (12) and nuts (13).

4. Let car down off stands and install steering wheel as described in steering wheel, INSTALLATION.

STEERING — 4 WHEEL

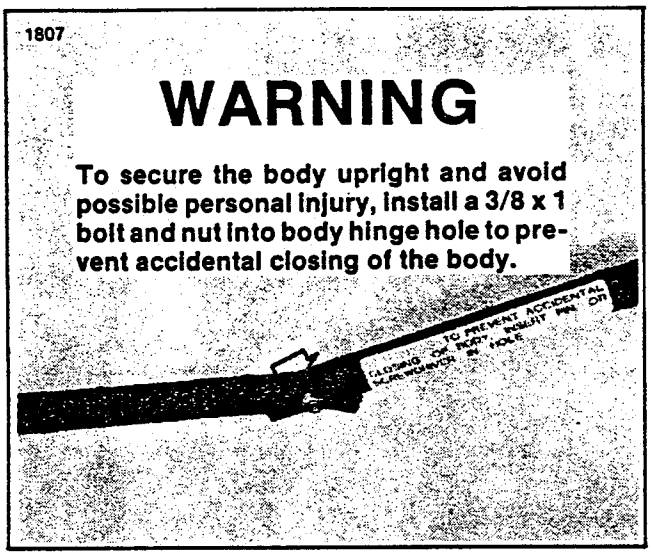
GENERAL

The 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 (31, 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 (3-4, Figure 2-19) 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 toe.



1. Score care holder
2. Steering wheel nut
3. Steering wheel
4. Cup
5. Dust seal
6. Bushing
7. Steering column
8. Gear unit
9. Lockwasher
10. Nut
11. Pitman arm
12. Bolt (3)
13. Lockwasher (3)
14. Lockplate
15. Bolt (2)
16. Clamp
17. Support block
18. Bolt and lockwasher (4)
19. Side cover
20. Gasket
21. Steering shaft
22. Oil seal
23. Locking cup
24. End cap
25. O-ring
26. Lower bearing race
27. Lower bearing ball cage
28. Worm shaft
29. Upper bearing ball cage
30. Upper bearing race
31. Plug
32. Adjusting screw locknut
33. Adjusting screw
34. Score card screw
35. Decal

Figure 2-12. Steering Wheel and Steering Gear



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 (23, 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 should be made with the steering wheel in this position.

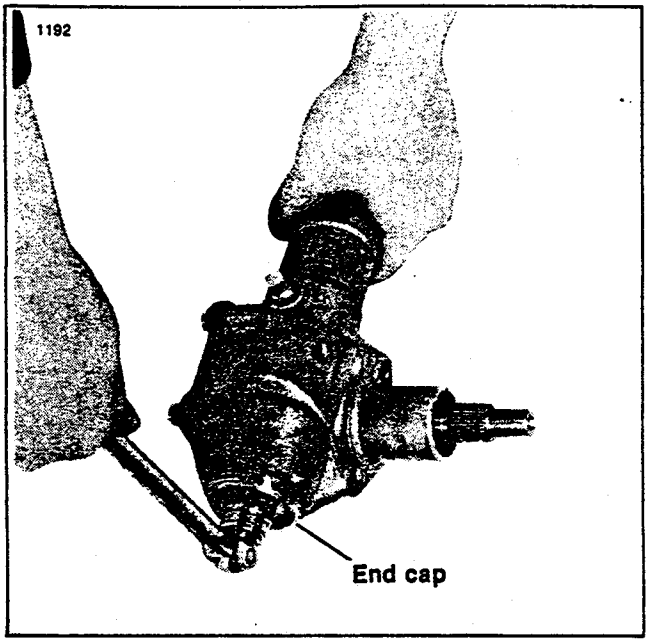


Figure 2-13. Adjusting Worm Bearings

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

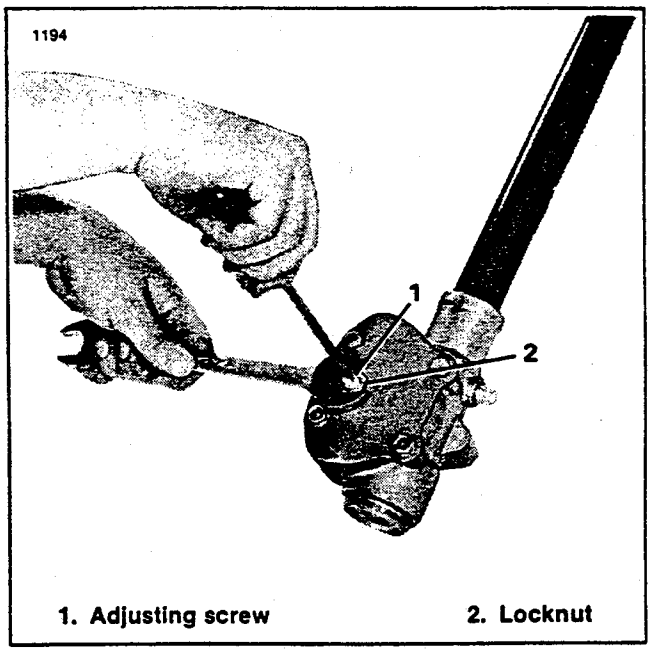
Play can be felt by holding pitman arm and turning steering wheel back and forth over the center position. A slight drag over the center will be felt if adjustment is to tight.

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

STEERING WHEEL (Figure 2-12)

Removal

1. Remove score card holder decal (35), screw (34) and score card holder (1).
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



1. Adjusting screw 2. Locknut

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 Harley-Davidson ANTI-SEIZE, Part No. 99632-77 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 score card holder (1) and screw (34).

5. Install new CAUTION DECAL, Part No. 57102-82, to score card holder (1).

STEERING GEAR UNIT (Figure 2-12)

Removal

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

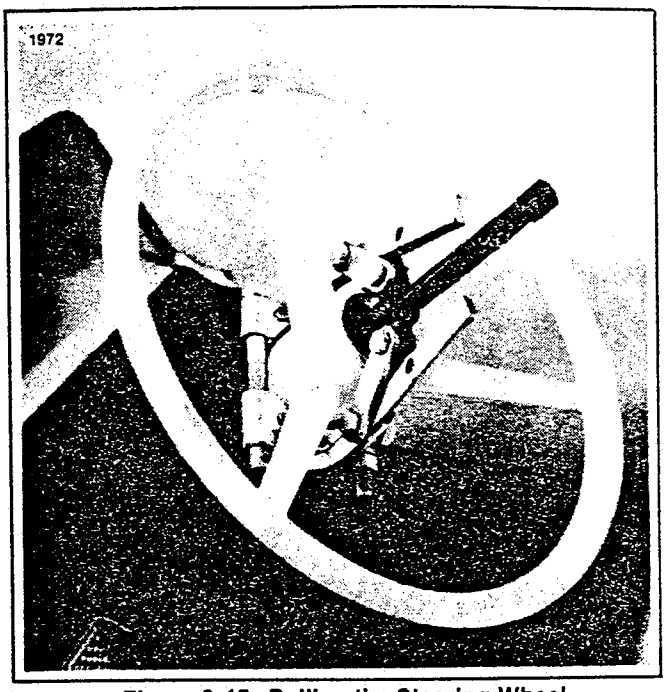


Figure 2-15. Pulling the Steering Wheel

2. Wedge rear wheels to keep car from rolling and raise front of vehicle to approximately 10° to 25° angle. Place jack stands under left and right side of bumper to support vehicle weight for added safety. See LIFTING INSTRUCTIONS in Section 1.

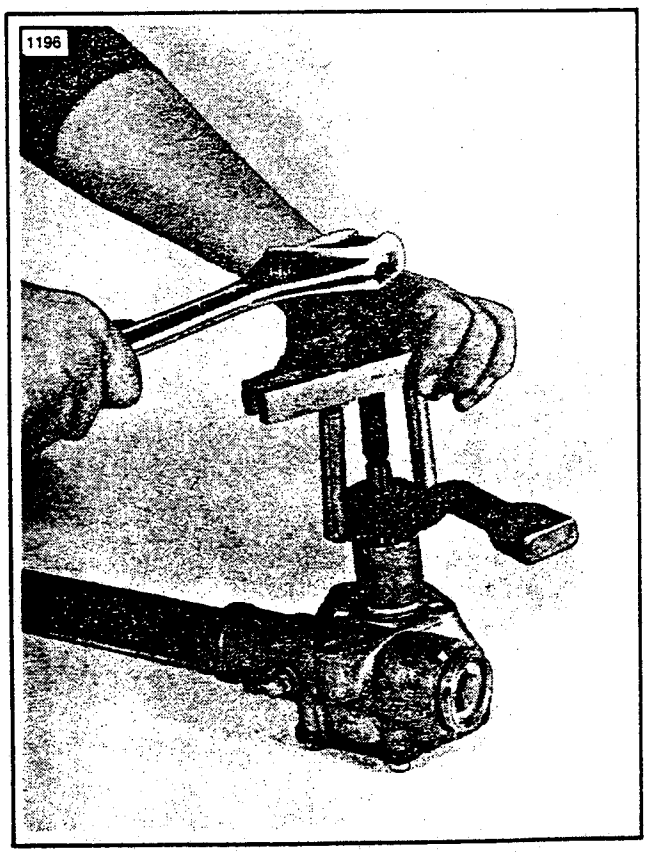


Figure 2-16. Pulling Pitman Arm

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.

6. Remove three bolts (12) and lockwashers (13).

7. Remove two bolts (15), lockplate (14), clamp (16) and support block (17).

8. Remove steering gear unit, with steering shaft, from underside of car.

Disassembly

1. Remove steering gear unit from car as described in steering gear unit, REMOVAL.

2. Remove plug (31) and drain lubricant from housing.

3. Remove four side cover bolts and lockwashers (18) and lift off side cover (19) and gasket (20).

4. Remove steering shaft (21) from cover side of housing.

5. If seal (22) is damaged and/or leaking, pry it out and replace with a new seal.

6. Pry edge of locking cup (23) from notch in housing and remove locking cup.

7. Turn out end cap (24) with O-ring (25) attached.

8. Remove worm shaft (28) and bearings (27 and 29) from gear unit assembly.

9. Bearings (27 and 29), if worn, can be slipped off worm shaft (28).

10. Bearing races (26 and 30) must be pulled from end cap and gear unit using a suitable pulling tool.

NOTE

Bearings and bearing races (26, 27, 29 and 30) must be replaced as a set.

11. Bearings (27 and 29) ride on worm gear as well as races, check condition of worm gear and replace entire steering gear asembly if worm gear is badly worn.

Assembly

1. Press bearing race (30) into gear unit (8) and bearing race (26) into end cap (24).

2. Install bearings (27 and 29) on worm shaft (28).

3. Install worm shaft (28) with bearings into steering gear unit (8) from gear unit end.

4. Install end cap (24) and O-ring (25).

5. Install steering shaft (21) in gear unit so that it meshes with worm gear.

6. Install gasket (20) and side cover (19) with bolts and lockwashers (18).

7. Remove fill plug (31), hold unit to allow maximum filling and add Harley-Davidson TRANSMISSION LUBRICANT, Part No. 99860-61A until unit is full. Install fill plug (31).

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. Install steering gear unit from underside of car through hole in floorboard.

2. Install support block (17), lockplate (14), and clamp (16) with bolts (15). Snug bolts (15).

3. Install three bolts (12) and lockwashers (13) and tighten to 33 ft-lbs (4.6 kgm) torque. Tighten bolts (15) to 10-15 ft-lbs (1.7 kgm) torque.

4. Install pitman arm (11) on steering shaft (21) lining up the marks from Step 3 of steering gear unit, REMOVAL.

5. Install nut (10) and lockwasher (9) to steering shaft and tighten securely.

6. Let car down off stands and install steering wheel as described in steering wheel, INSTALLATION.

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 2-17) pump two shots of grease into each fork side.

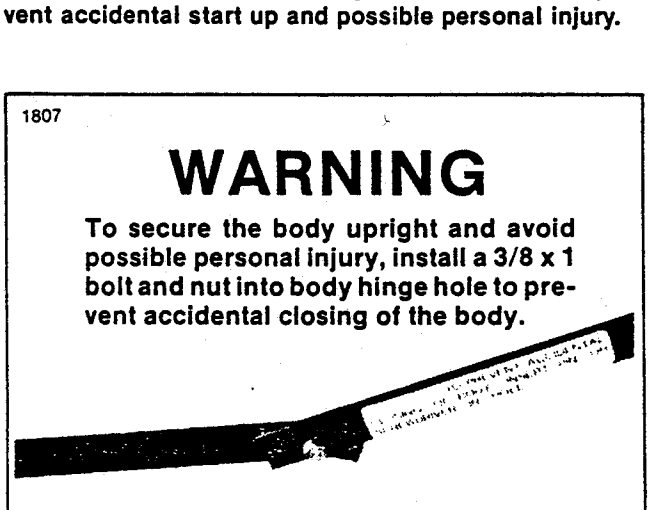
CAUTION

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 2-17)

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

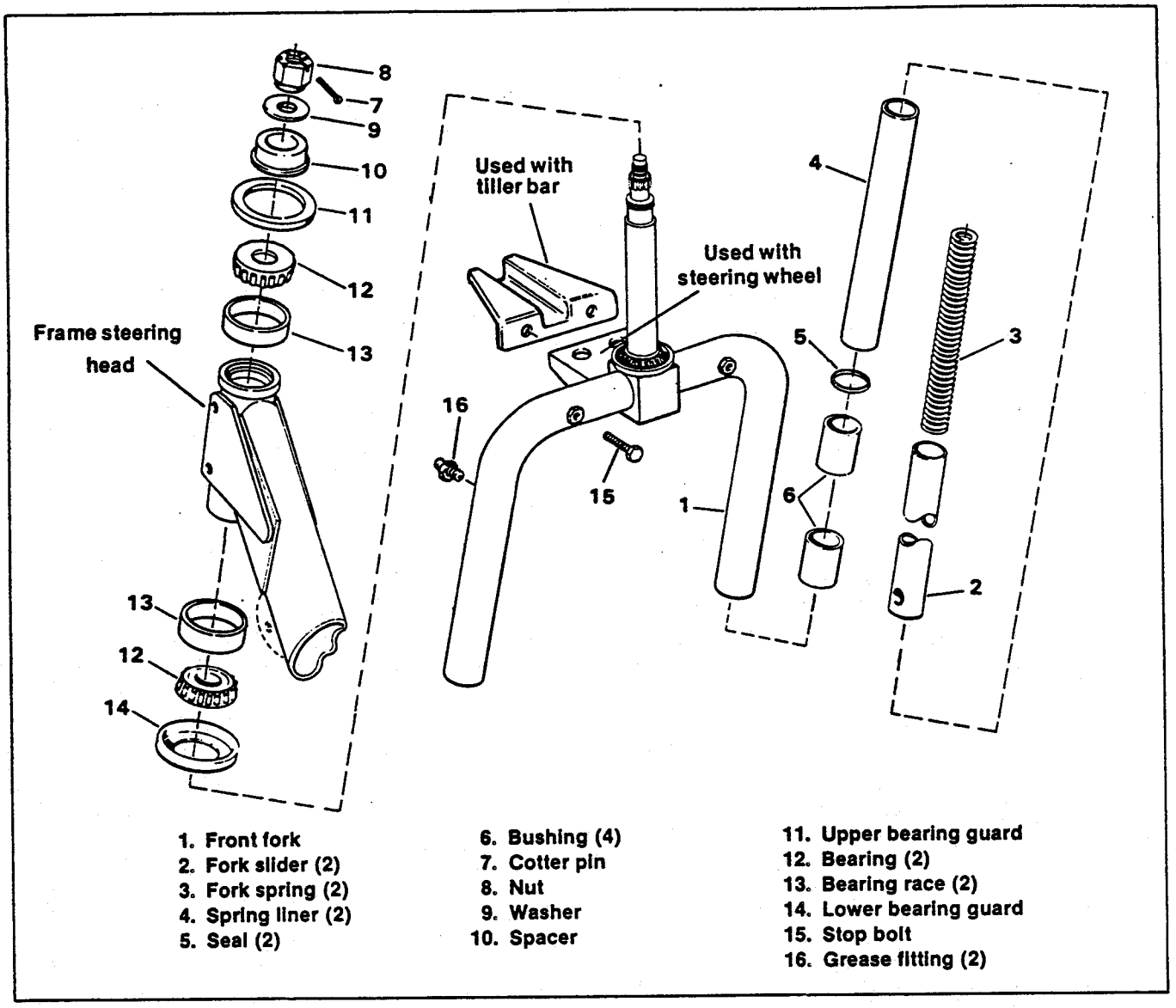
Left side fork slider has the smaller diameter axle hole.

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 2-17)

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.



1. Front fork
2. Fork slider (2)
3. Fork spring (2)
4. Spring liner (2)
5. Seal (2)
6. Bushing (4)
7. Cotter pin
8. Nut
9. Washer
10. Spacer
11. Upper bearing guard
12. Bearing (2)
13. Bearing race (2)
14. Lower bearing guard
15. Stop bolt
16. Grease fitting (2)

Figure 2-17. 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 BEARING 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

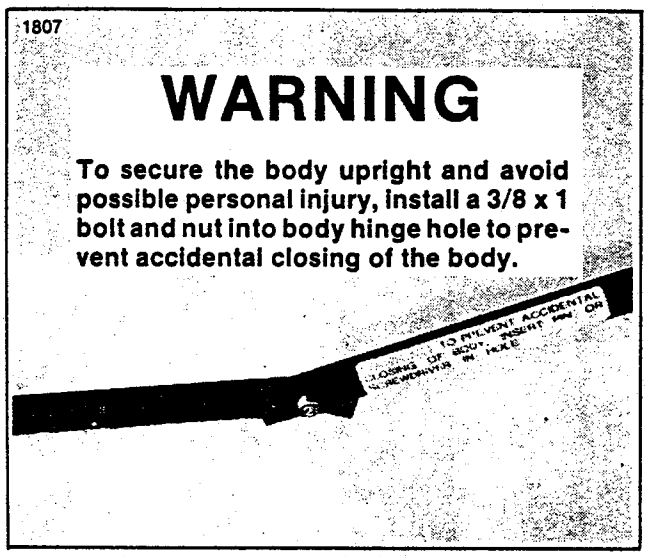
GENERAL

The front suspension is composed of a single transverse leaf spring assembly (24, Figure 2-19), two king pins (9, Figure 2-19) and two upper A-frames (23, Figure 2-19). Two grease fittings (30, Figure 2-19) are provided on each side, and should be lubed semi-annually or every 50 rounds. The front wheels must be removed to gain access to the pivot block grease fittings. Slots in the lower portion of the king pins provide for front wheel camber adjustment.

ADJUSTMENT

Camber

Front wheel camber should be set at 0° (front wheels at right angle to ground with car weight on wheels).



WARNING

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

1. Place car on flat, hard and level surface.
2. Adjust air pressure in each tire to 18 psi (1.2 atm).
3. Set steering wheel at the midpoint of its travel (1-7/8 turns from either extreme) with center post of wheel vertical.
4. Check camber with carpenters square against one front wheel (Figure 2-18).
5. If camber adjustment is required, loosen nut (8, Figure 2-19) and tilt wheel in direction required to achieve 0° camber.
6. Snug nut (8, Figure 2-19), bounce car and recheck camber. When camber is correct tighten nut to 35-40 ft-lbs (5.5 kgm) torque.

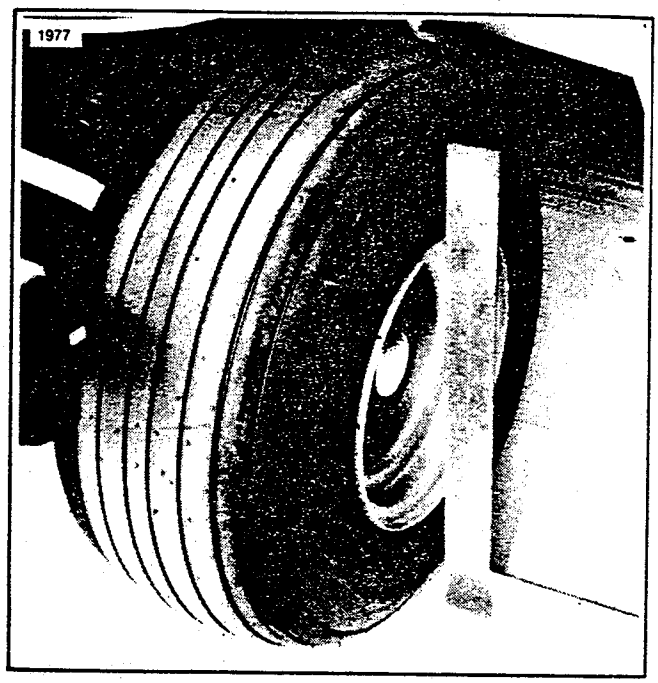


Figure 2-18. Checking Camber

CAUTION

Overtightening nut (8, Figure 2-19) will damage leaf spring spacer making accurate camber adjustment difficult.

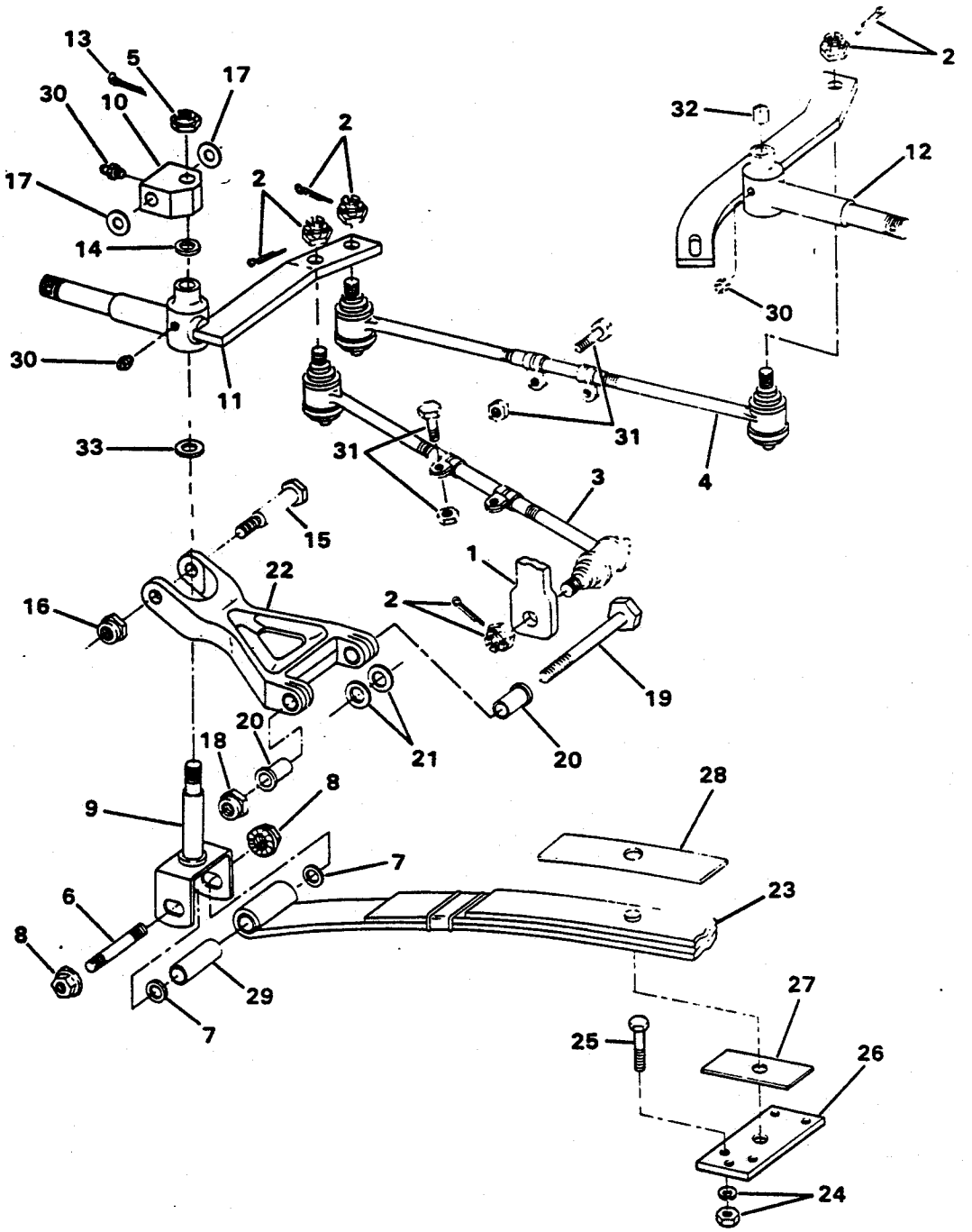
7. Repeat steps 4-6 on other front wheel.

Toe

Check camber and make adjustments, if necessary, before making toe adjustments.

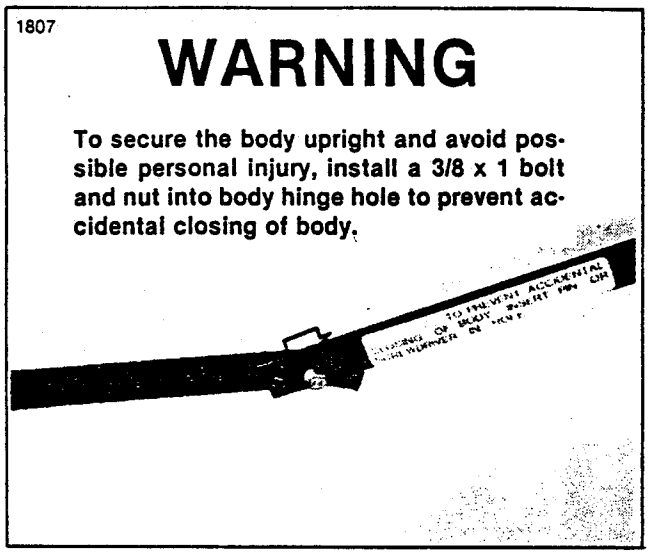
Front wheel toe should be set at 1/4 in. (6.4 mm) toe-in.

1. Place car, on flat, hard and level surface.
2. Adjust air pressure in each tire to 18 psi (1.2 atm).
3. Set steering wheel at the midpoint of its travel (approximately 1-7/8 turns from either extreme) with center post of steering wheel vertical.
4. Check toe of right front wheel first with long straight edge extending from right rear wheel to right front wheel (Figure 2-20). Right front wheel should be toed-in 1/8 in. (3.2 mm) (Figure 2-21).



1. Pitman arm
2. Cotter pin and castle nut (4)
3. Short tie rod assembly
4. Long tie rod assembly
5. Castle nut (2)
6. Stud (2)
7. Washer (4)
8. Nut (4)
9. Kingpin (2)
10. Pivot block (2)
11. Right steering arm
12. Left steering arm
13. Cotter pin (2)
14. Bronze thrust washer (2)
15. Shoulder bolt (2)
16. Locknut (2)
17. Delrin washer (4)
18. Locknut (2)
19. Pivot bolt (2)
20. Spacer (4)
21. Thrust washer (4)
22. A-frame (2)
23. Leaf spring (1)
24. Locknut and washer (4)
25. Bolt (4)
26. Retainer plate
27. Spacer
28. Rubber insert
29. Spacer (2)
30. Grease fitting (4)
31. Clamping bolt and nut (4)
32. Bushing (4)
33. Washer (2)

Figure 2-19. Front Suspension



WARNING

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

5. See Figure 2-22. To adjust right wheel toe loosen two bolts (1) on short tie rod adjusting sleeve (2) and turn threaded adjusting sleeve (2) clockwise to increase toe-in, or counterclockwise to decrease toe-in. Continually check to be sure steering wheel remains in centered position.

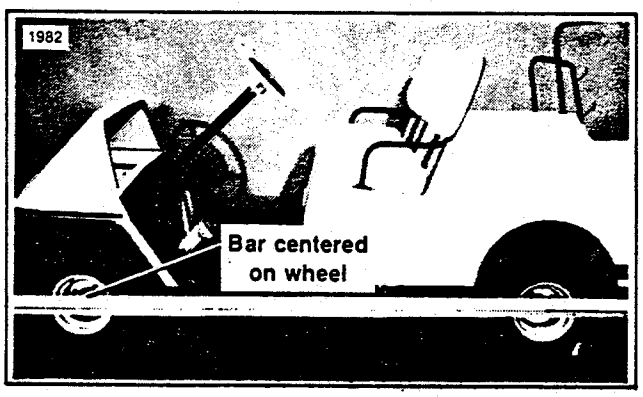


Figure 2-20 Checking Toe

6. See Figure 2-22. To adjust left wheel toe loosen two bolts (3) on long tie rod adjusting sleeve (4) and turn threaded adjusting sleeve (4) clockwise to increase toe-in or counterclockwise to decrease toe-

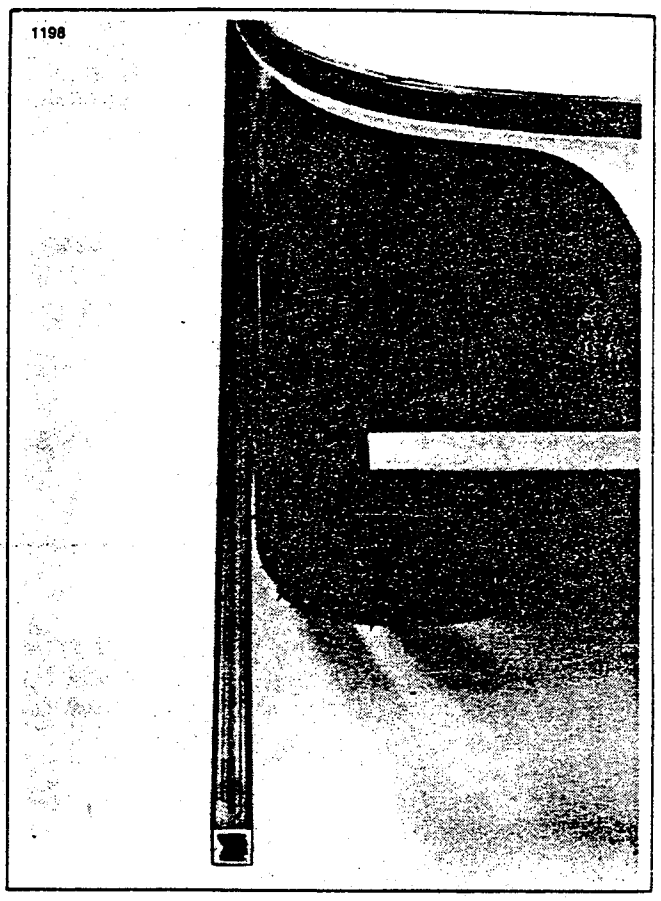


Figure 2-21. Toe In — One Front Wheel

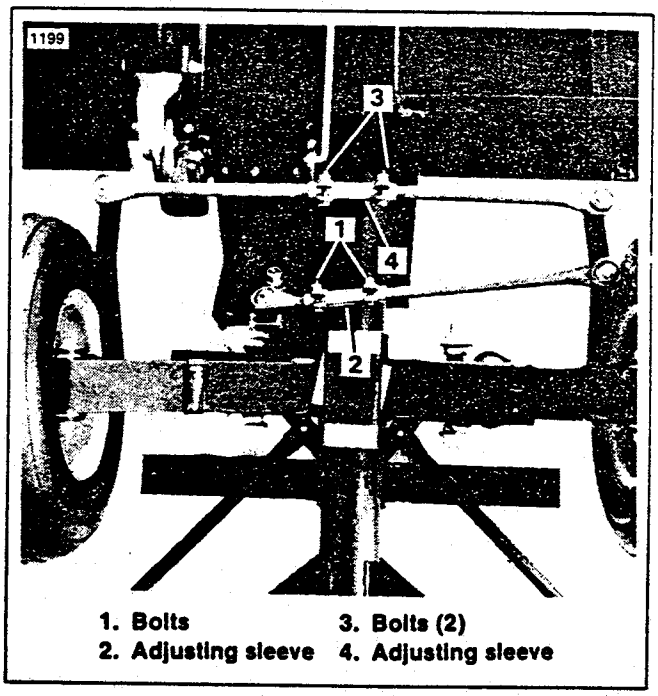


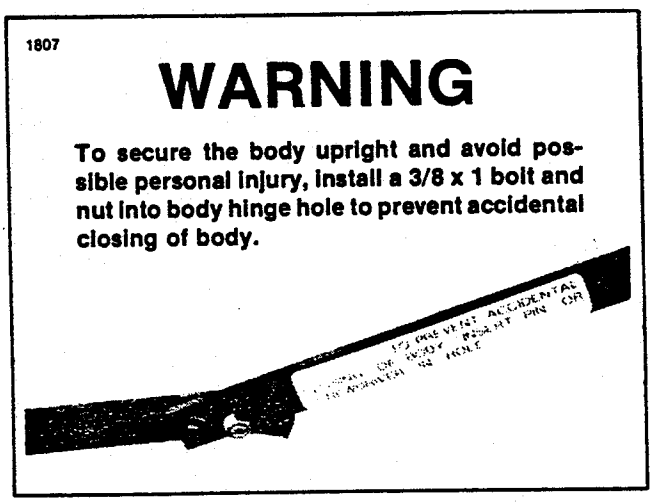
Figure 2-22. Toe Adjustment

in. Continually check to be sure steering wheel remains in centered position.

7. Work front suspension several times compressing front of car repeatedly to normalize vehicle stance, recenter steering wheel and recheck toe-in of both front wheels. Readjust toe-in if necessary.

8. See Figure 2-22. When 1/8" toe-in is achieved on each front wheel (1/4" combined toe-in), and steering wheel is centered, tighten tie rod adjusting sleeve bolts (1 & 3).

REMOVAL
Figure 2-19



WARNING

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

Wedge rear wheels to keep car from rolling and raise front of vehicle to approximately 10° to 25° angle. Place jack stands under left and right sides of bumper to support vehicle weight for added safety. See LIFTING INSTRUCTIONS in SECTION 1.

Pitman Arm

1. Remove pitman arm from steering shaft as described in Steps 3 and 4 under steering gear unit, REMOVAL.

2. Remove cotter pin and castle nut (2, Figure 2-19) from short tie rod end.

3. See Figure 2-23. Use CLAW PULLER, Part No. 97292-61, and WEDGE ATTACHMENT, Part No. 95637-46 to pull pitman arm from tie rod.

Tie Rod

1. Remove cotter pins and nuts (2) from tie rod.

CAUTION

When disconnecting a tie rod, no attempt should be made to drive a wedge between the tie rod and attached part as this could damage the rubber boot, which is not replaceable.

2. Pull tie rod from attached parts with CLAW PULLER, Part No.97292-46threads and WEDGE ATTACHMENT, Part No. 95637-46.

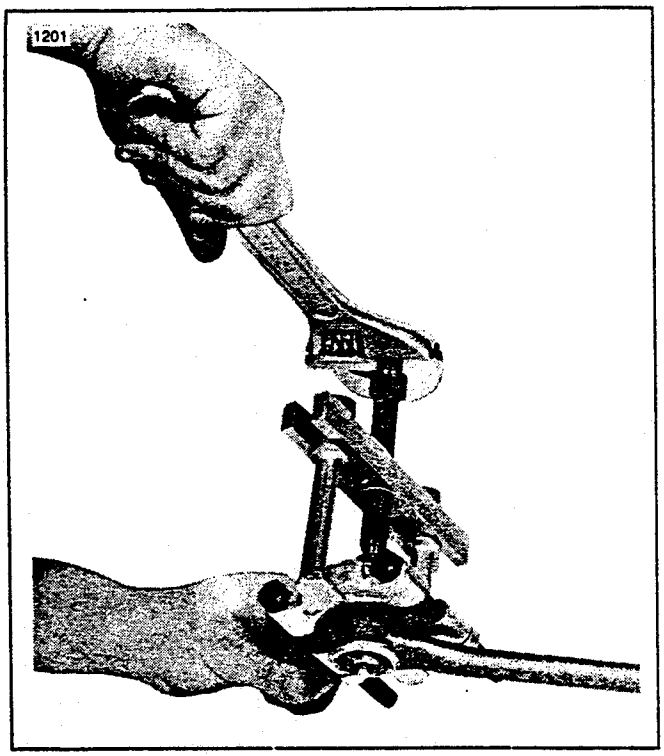


Figure 2-23. Pulling Tie Rod

Leaf Spring (Figure 2-19)

1. Remove both front wheels and tires.

2. Remove one nut (8) from one side king pin lower mounting stud (6).

3. Pull stud (6) from king pin. Remove washers (7).

4. Repeat Steps 1, 2 and 3 on other side of car.

5. Remove four nuts and washers (24), retainer plate (26).

6. The leaf spring can now be removed.

7. Check condition of spacer (27) and rubber insert (30), and replace if worn or damaged.

8. Check condition of spacers (29) and replace if worn.

King Pin or Steering Arm (Figure 2-19)

1. Remove wheel and front hub as described under wheels, tires and front hubs, REMOVAL.
2. Remove cotter pin (13) and nut (5).
3. Remove one nut (8) and stud (6).
4. Pull out king pin (9) to free it from leaf spring (23) and pull king pin down out of steering arm (11 or 12) and pivot block (10). Note position of washer (33) and bronze thrust washer (14). These washers must be replaced in the same position as removed.
5. If kin pin is worn or damaged, replace king pin and check condition of bushings (32).
6. Remove cotter pins and castle nuts (2), and pull tie rod(s) as described under tie rod, REMOVAL, to remove steering arm (11 or 12).

A-Frame

1. Remove wheel as described under wheels, tires and front hubs, REMOVAL.
2. Remove nut (16) and bolt (15). Note position of Delrin washers (17).
3. Remove nut (18) and bolt (19). Note position of thrust washers (21).
4. A-frame can now be removed from car.
5. Check condition of spacers (20) and thrust washers (21) and replace if worn or damaged.

INSTALLATION (Figure 2-19)

Pitman Arm

1. Install short tie rod into pitman arm.
2. Install castle nut and cotter pin (2).
3. Install pitman arm to steering shaft as described in Steps 4, 5 and 6 under steering gear unit, INSTALLATION.

Tie Rod

1. Install tie rod into attached parts.
2. Install castle nut (2) and tighten to 25-28 ft-lbs (3.5-3.9 kgm) torque, then install cotter pin (2).
3. After installation of tie rod, adjust front wheel toe as described under ADJUSTMENT.

Leaf Spring

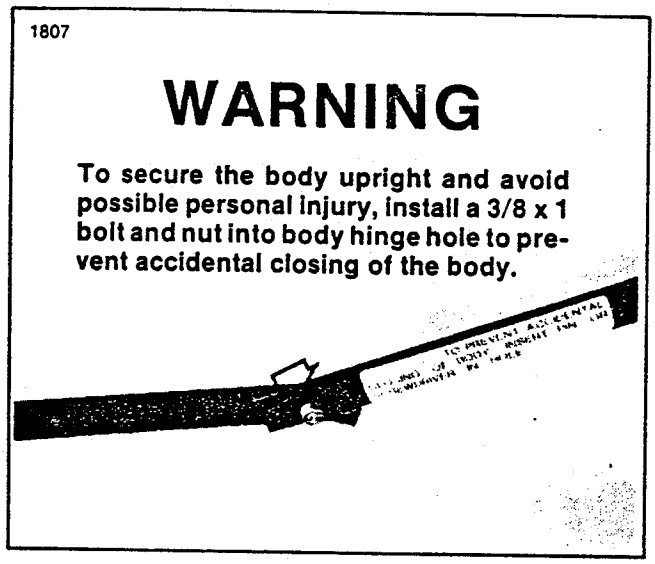
1. Install rubber insert (28), leaf spring (23), spacer (27) and retainer plate (26) to frame with bolts (25), washers and nuts (24). Tighten nuts (24) to 16-19 ft-lbs (2.4 kgm) torque.
2. Install spring in king pin with spacer (29), washers (7), stud (6) and nuts (8).
3. Install wheels and let car down off jacks.
4. Adjust camber as described under ADJUSTMENTS.
5. After camber adjustment, tighten nuts (8) to 35-40 ft-lbs (5.5 kgm) torque.

King Pin or Steering Arm

1. Inspect all attaching parts and replace as necessary.
2. Install washers (33).
3. Insert king pin through steering arm.
4. Insert washer (14) over king pin above steering arm.
5. Insert king pin into pivot block (10).
6. Install castle nut (5) and snug assembly to zero clearance, advance castle nut to next flat and secure assembly with cotter pin (13).
7. Install washers (7), stud (6) and snug nut (8).
8. Grease fitting (30) with grease gun.
9. Install nuts and cotter pins (2).
10. Install hub and wheel and let car down off jacks.
11. Adjust camber as described under ADJUSTMENTS.
12. After camber adjustment, tighten nut (8) to 35-40 ft-lbs (5.5 kgm) torque.

A-Frame

1. Attach A-frame to frame with pivot bolt (19) and nut (18). Thrust washers are positioned between A-frame and mounting boss on car frame.
2. Attach A-frame to pivot block (10) with bolt (15) and nut (16). Delrin washers (17) are positioned between A-frame and pivot block.
3. Install wheel and check camber as described under ADJUSTMENTS.



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.

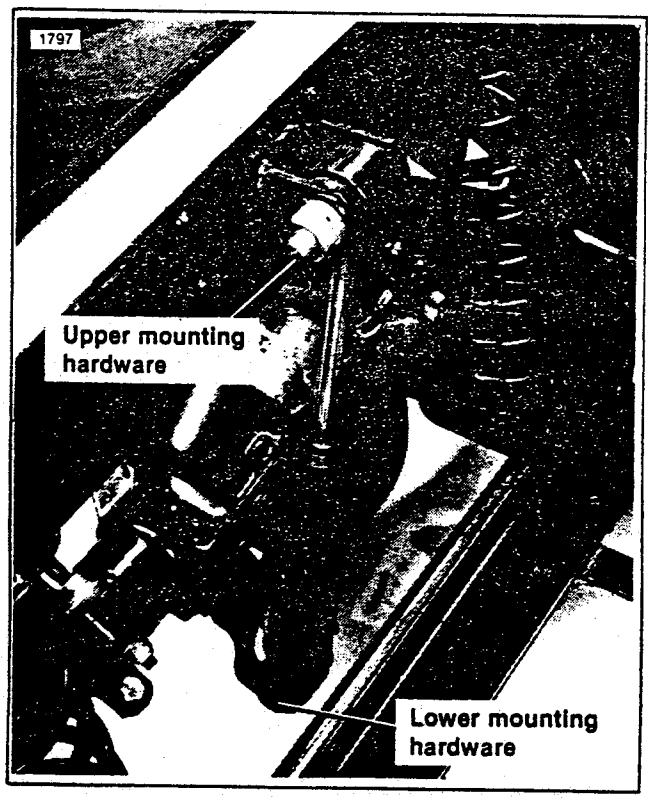


Figure 2-24. Rear Shock Mounting

4. See Figure 2-24. 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 ths 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.

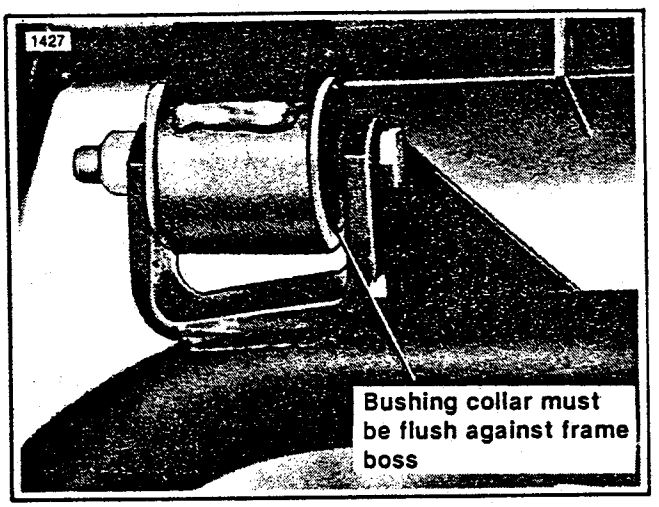


Figure 2-25. Rear Fork Bushing

2. See Figure 2-25. 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 2-26. 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 2-27)

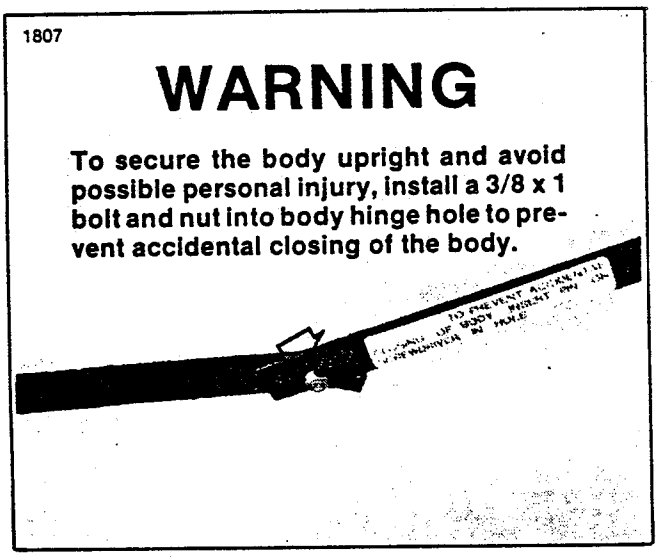
1. Wedge the front wheel to prevent car from rolling and raise rear of the car. See LIFTING INSTRUCTIONS, Section 1.

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.

7. 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.

8. 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 2-27. 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 2-27. Place the rear fork in the frame bosses and fasten using bolt (1), washer (2) and nut (4). Do not tighten nut (4) at this time.

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.

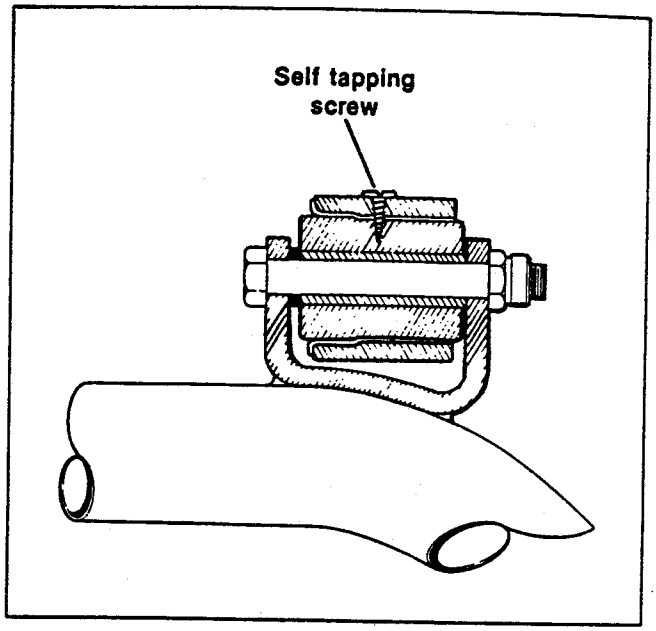


Figure 2-26. Fork Bushing Fix

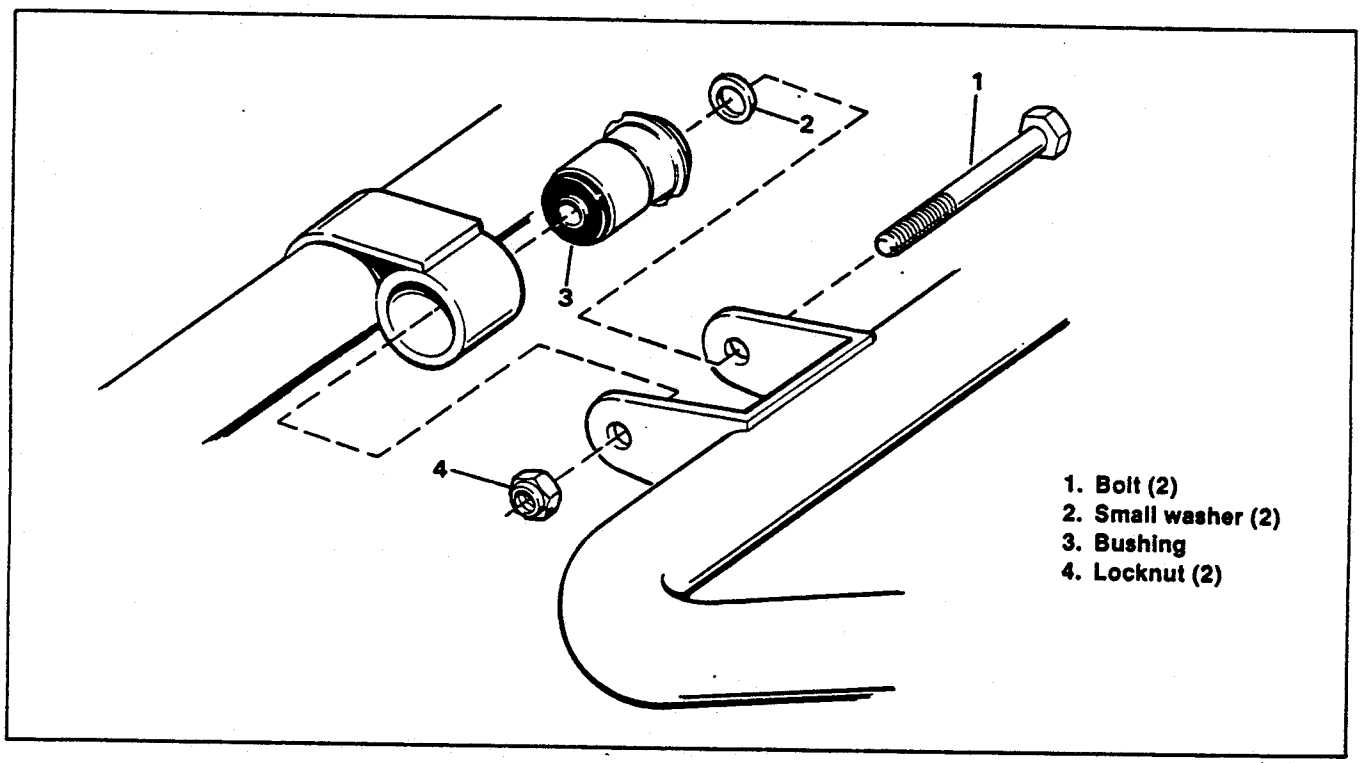


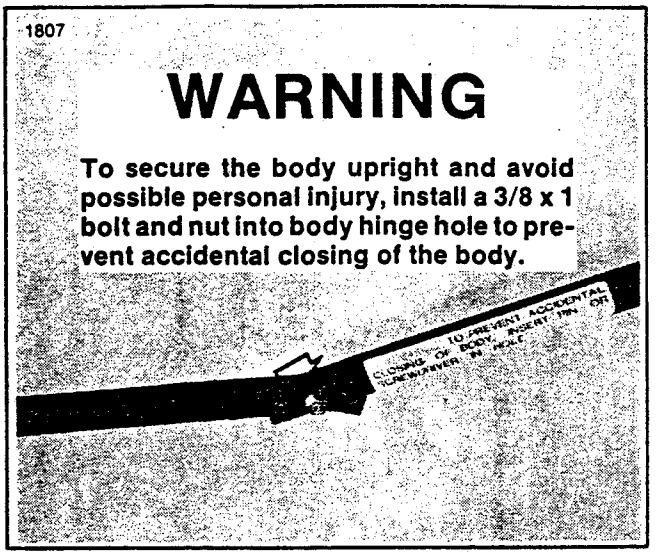
Figure 2-27. Rear Fork Bushing — Exploded View

SERVICING THE FRAME

To rough check a frame for correct alignment, see Figure 2-28, 2-29 and 2-30. 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.



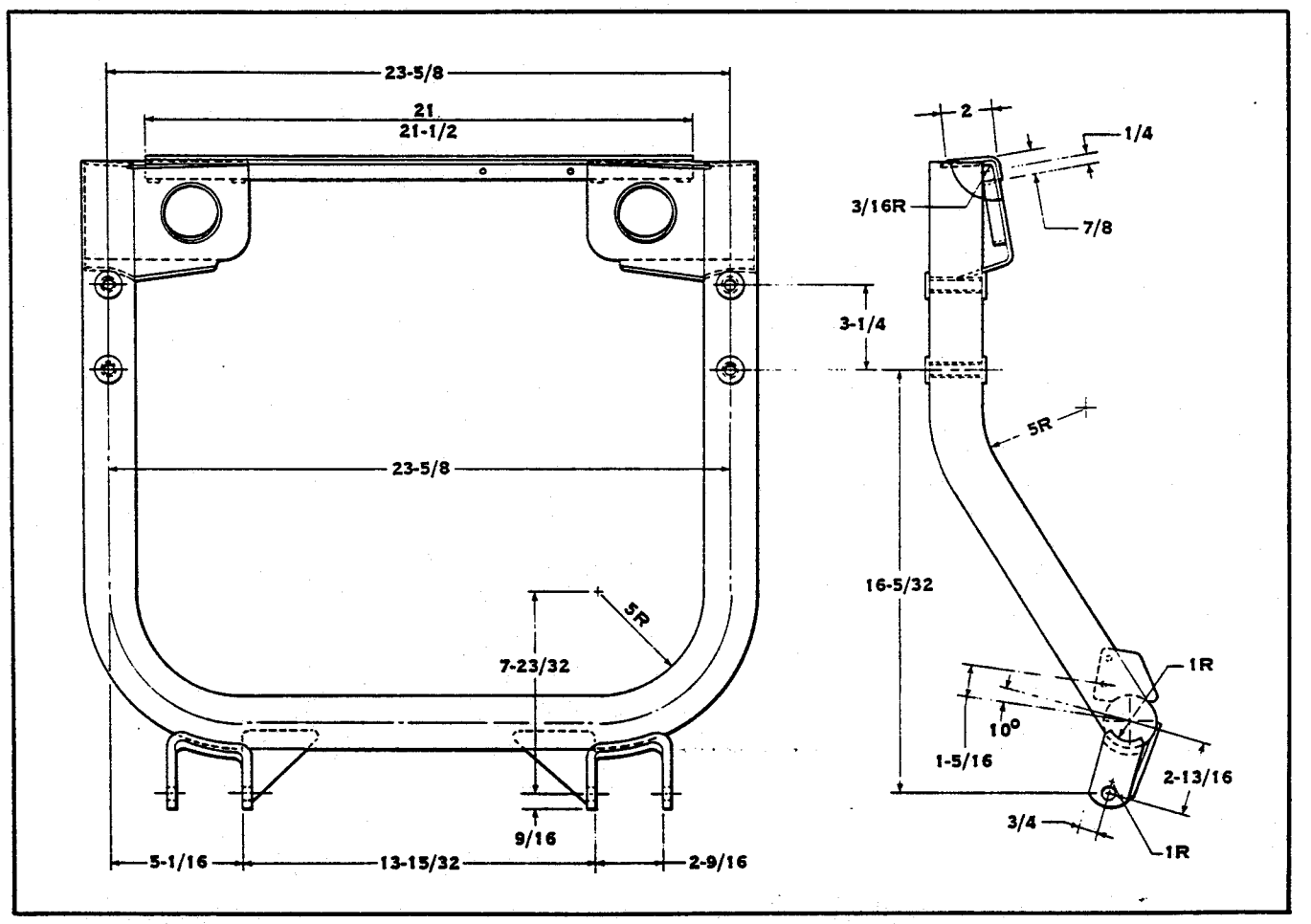


Figure 2-28. Rear Fork Dimensions

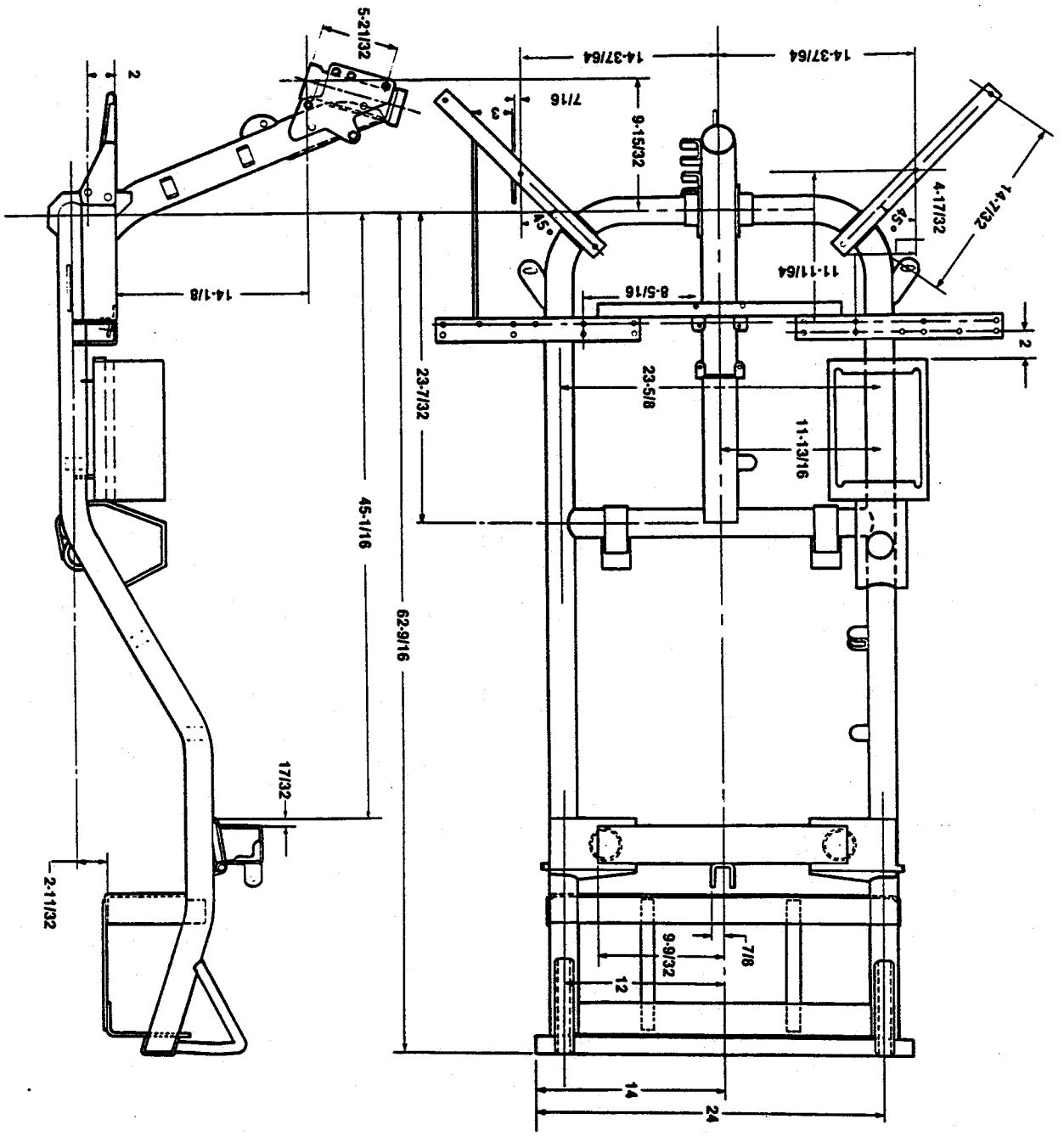


Figure 2-29. Model D Basic Frame Dimensions

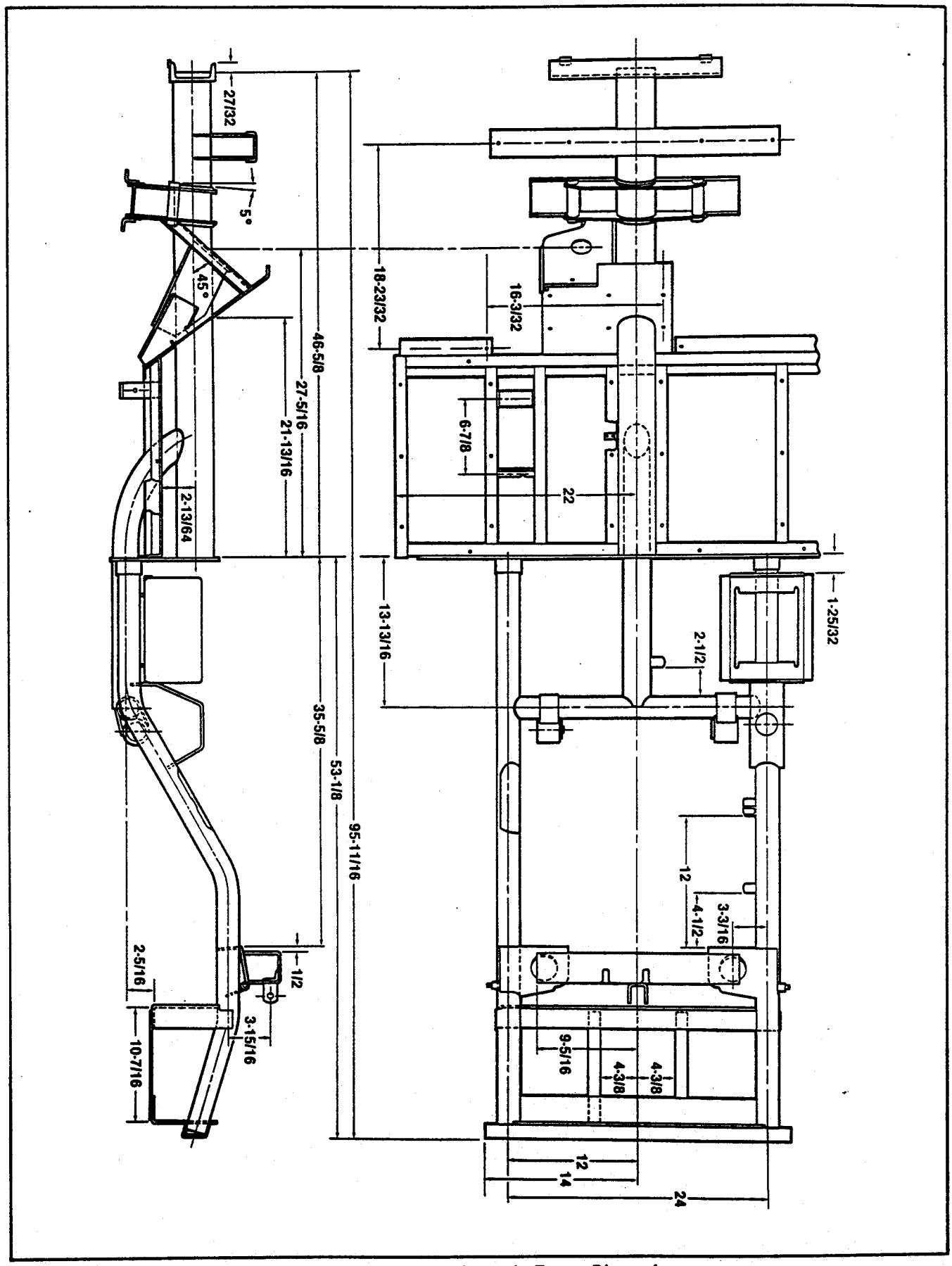
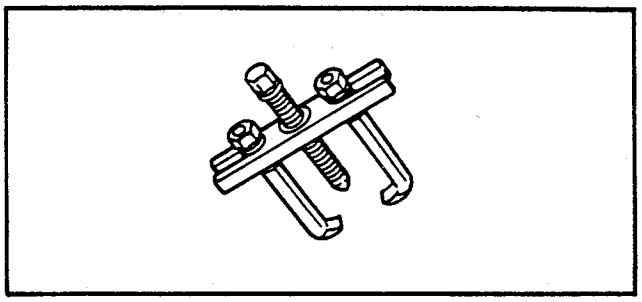
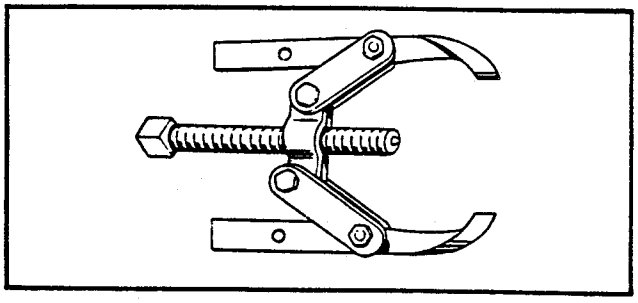


Figure 2-30. Model DX4 Basic Frame Dimensions

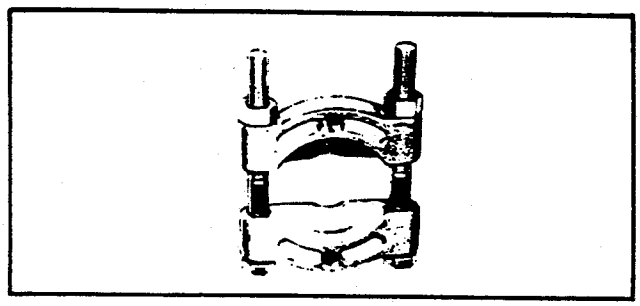
TOOLS



Part No. 97292-61 Two Jaw Puller



Part No. 95635-46 All Purpose Claw Puller



Part No. 95637-46 Wedge Attachment

DIFFERENTIAL AND REAR AXLES 3

SECTION PAGE NO.

SPECIFICATIONS

DIFFERENTIAL

Lubricant Type	Harley-Davidson Heavy Weight Differential Lubricant Part No. 99890-61A, 12 oz.
Level	1/2 in. (13 mm) below filler plug hole
Capacity	24 oz. (710 ml)
Ring Gear Runout	.006 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)

DIFFERENTIAL AND REAR AXLE

GENERAL INFORMATION

The differential lubricant level should be checked yearly and lubricant added as required to 1/2 in. (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.

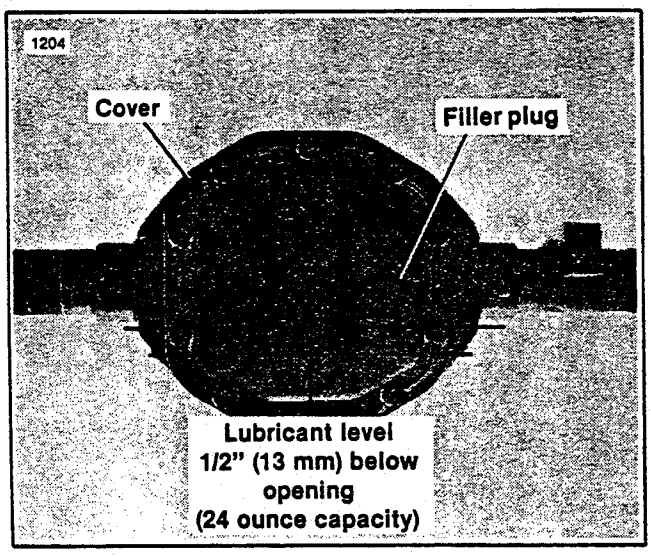


Figure 3-1. Differential Filler Plug and Cover

REAR AXLES

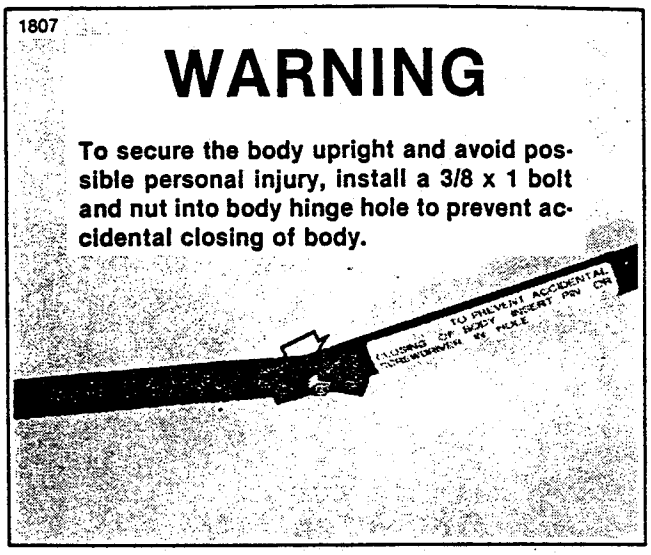
Removing Rear Axle Shaft, Bearing or Seal (Figure 3-2)

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.

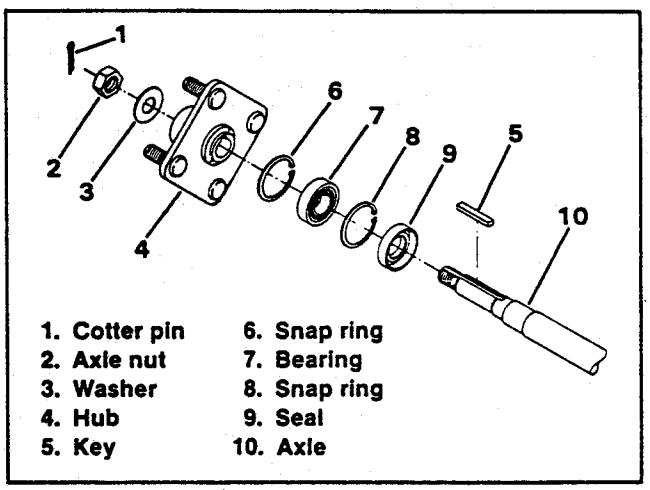


Figure 3-2. Rear Axle

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).

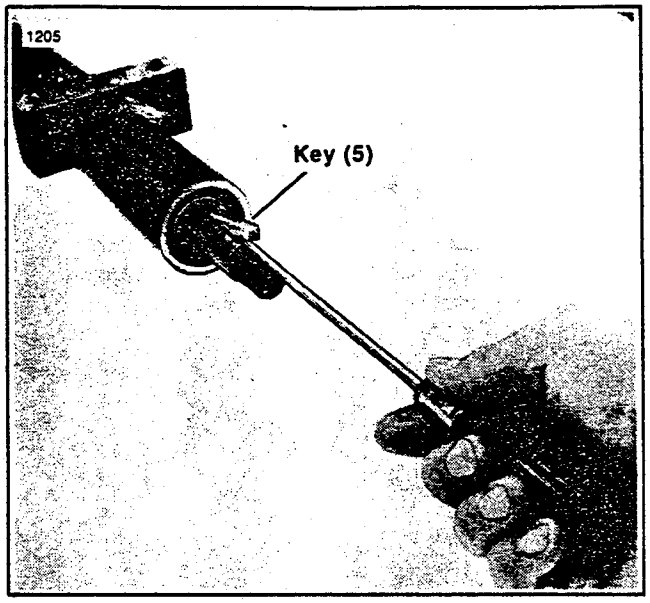


Figure 3-3. Removing Key

CAUTION

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

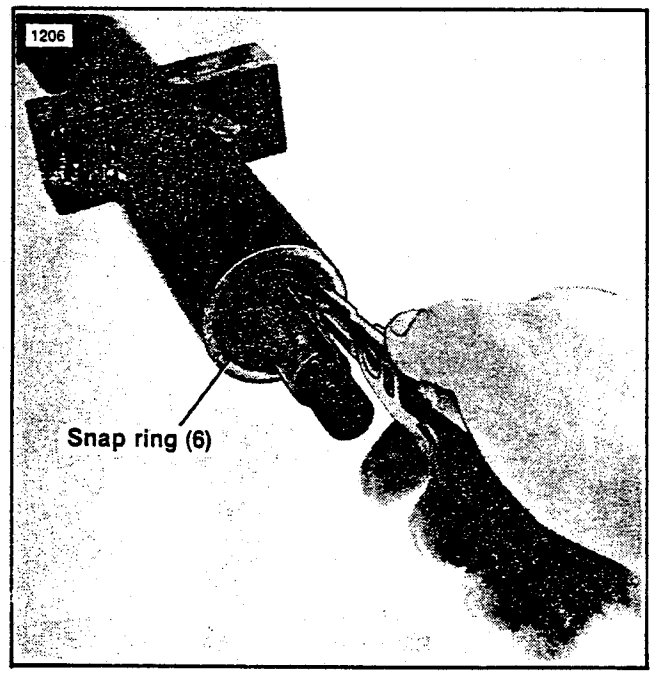


Figure 3-4. Removing Snap Ring

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).

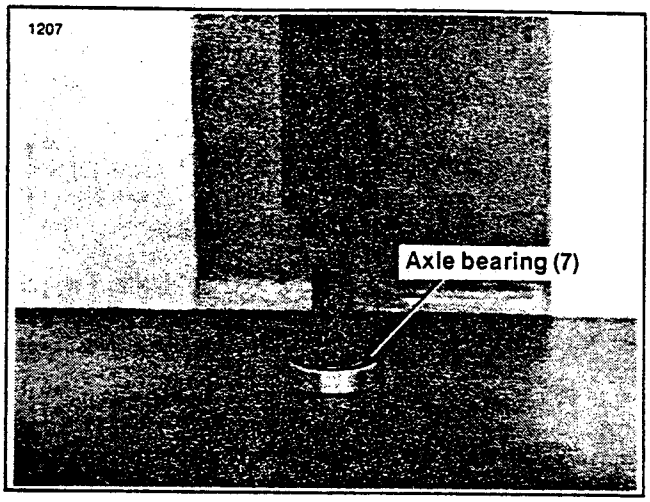


Figure 3-5. Pressing Bearing Off Axle

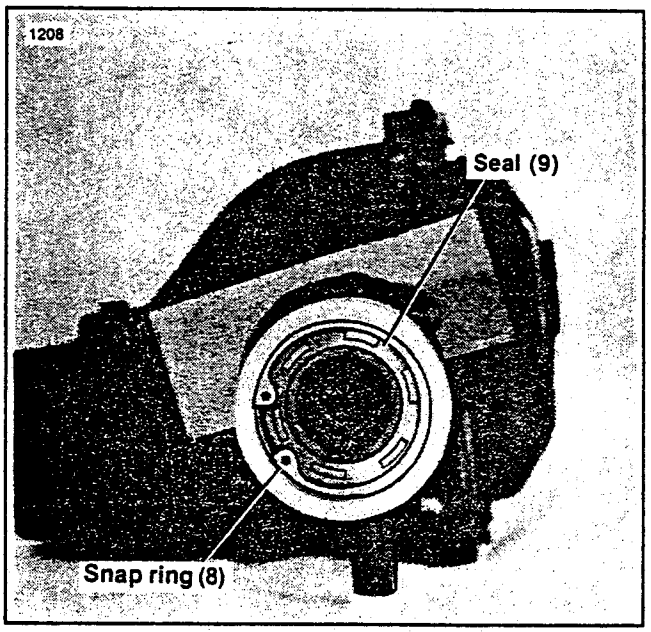


Figure 3-6. Snap Ring and Seal

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).

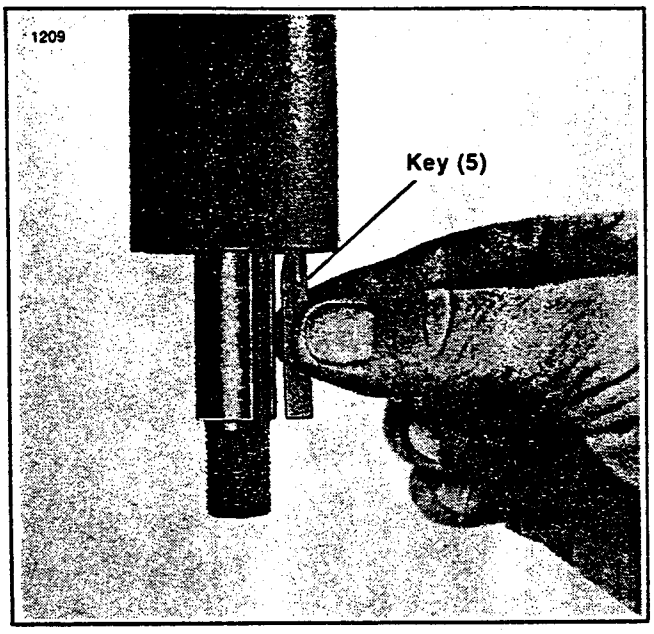


Figure 3-7. Axle Key Installation

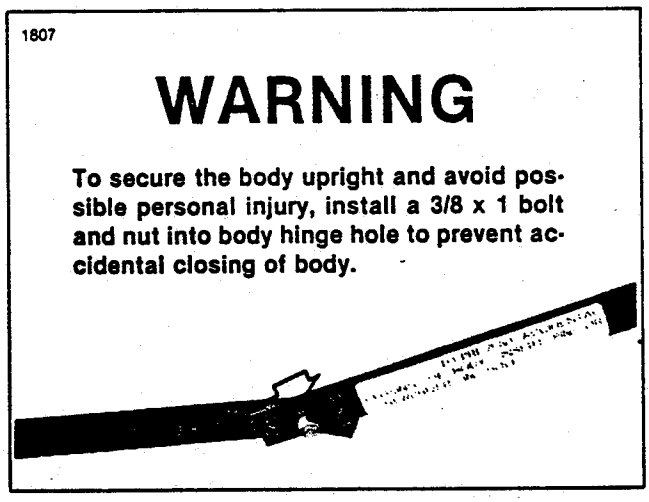
10. Torque wheel rim mounting nuts to 35-40 ft-lbs (5.5 kgm) and install hub cap.

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.



WARNING

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

2. Wedge front wheel to keep car from rolling and raise rear of vehicle to approximately a 10° to 25° angle. Place jack stands under car to support vehicle weight for added safety. See LIFTING INSTRUCTIONS in SECTION 1.

3. Remove rear wheels. See WHEELS AND TIRES, SECTION 2.

4. Remove disc brake caliper assembly. See BRAKE SECTION 4.

5. Remove transmission rear drive assembly. See TRANSMISSION SECTION 7.

6. Support differential assembly and remove lower shock mounting bolt (1) and nut (2).

7. Remove four locknuts (3) and four bolts (4). Remove rubber bumpers (5).

8. Remove differential assembly.

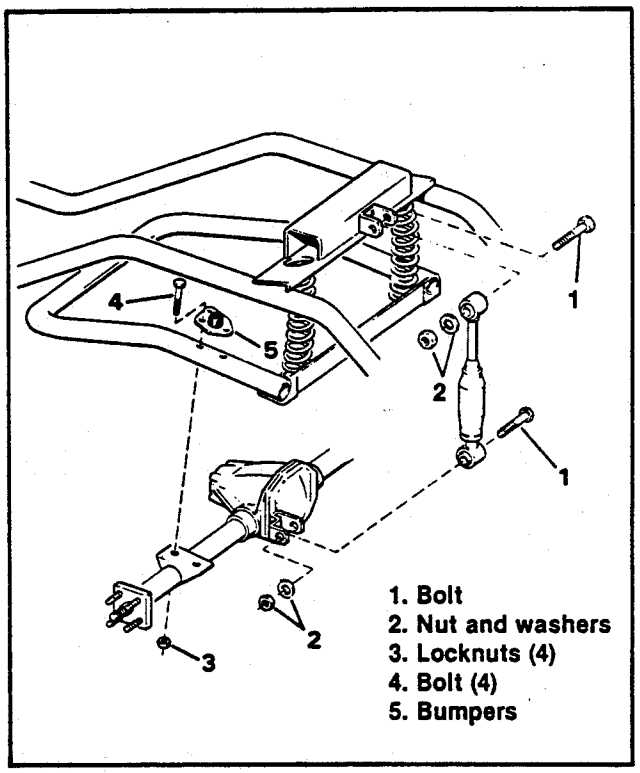


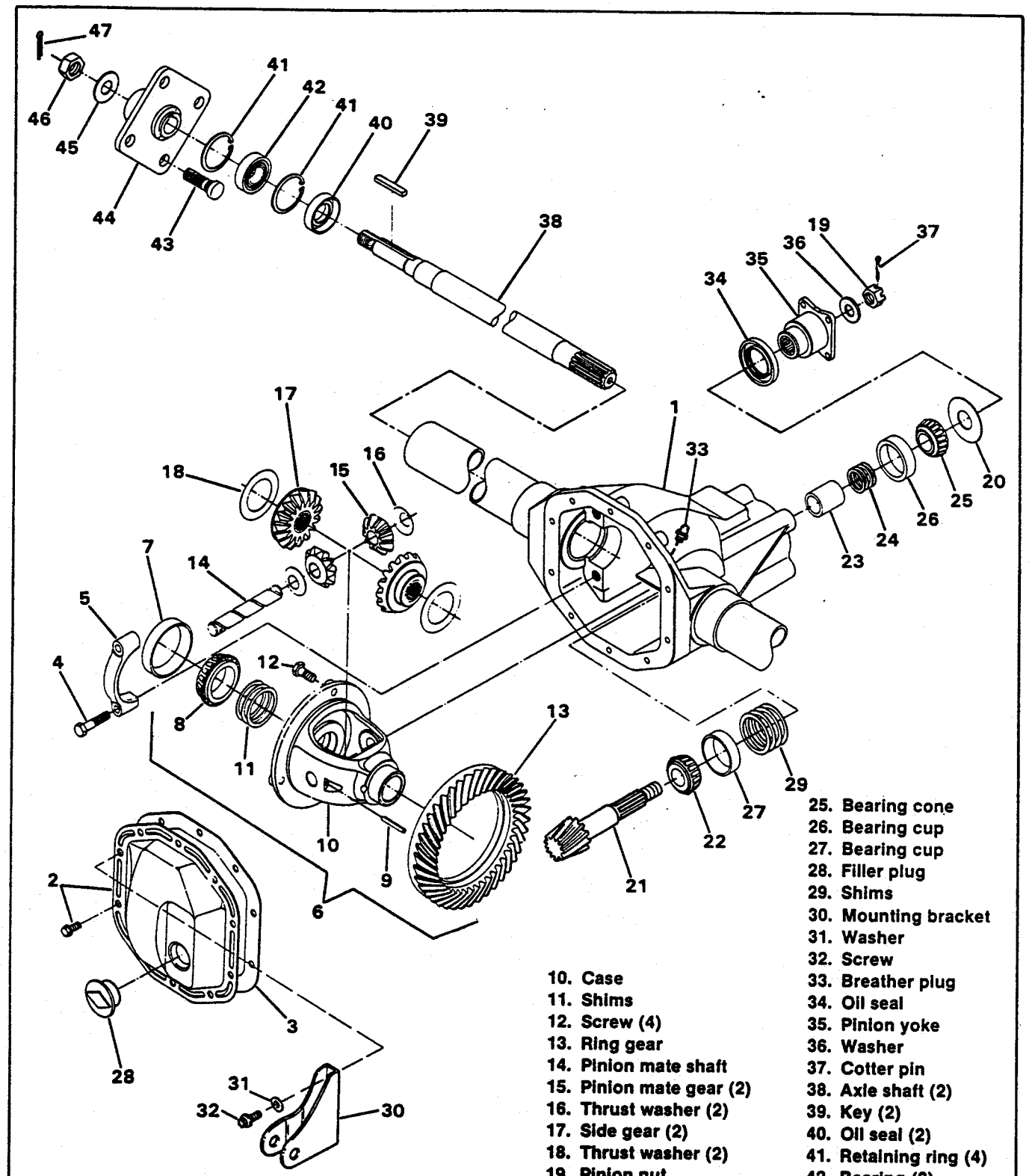
Figure 3-8. Axle Mounting

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.



1. Rear axle and differential assembly
2. Cover bolts and cover
3. Gasket (if equipped)
4. Bolt (4)
5. Bearing cap (2)
6. Case assembly
7. Bearing cup (2)
8. Bearing cone (2)
9. Lock pin
10. Case
11. Shims
12. Screw (4)
13. Ring gear
14. Pinion mate shaft
15. Pinion mate gear (2)
16. Thrust washer (2)
17. Side gear (2)
18. Thrust washer (2)
19. Pinion nut
20. Oil slinger
21. Pinion shaft and gear
22. Bearing cone
23. Sleeve
24. Shims
25. Bearing cone
26. Bearing cup
27. Bearing cup
28. Filler plug
29. Shims
30. Mounting bracket
31. Washer
32. Screw
33. Breather plug
34. Oil seal
35. Pinion yoke
36. Washer
37. Cotter pin
38. Axle shaft (2)
39. Key (2)
40. Oil seal (2)
41. Retaining ring (4)
42. Bearing (2)
43. Stud (8)
44. Hub (2)
45. Washer (2)
46. Nut (2)
47. Cotter pin (2)

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

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.

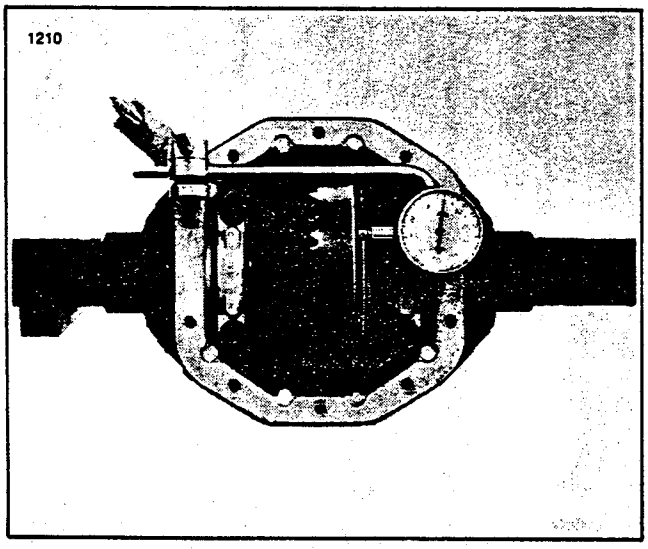


Figure 3-10. Ring Gear Runout Check

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 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).

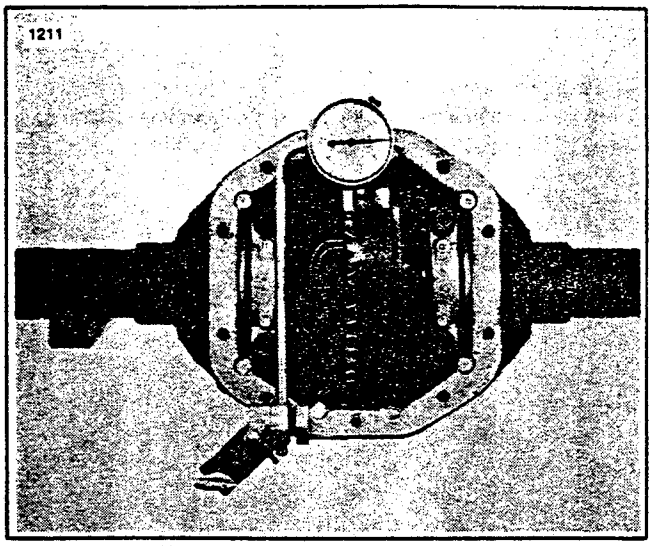


Figure 3-11. Ring and Pinion Backlash Check

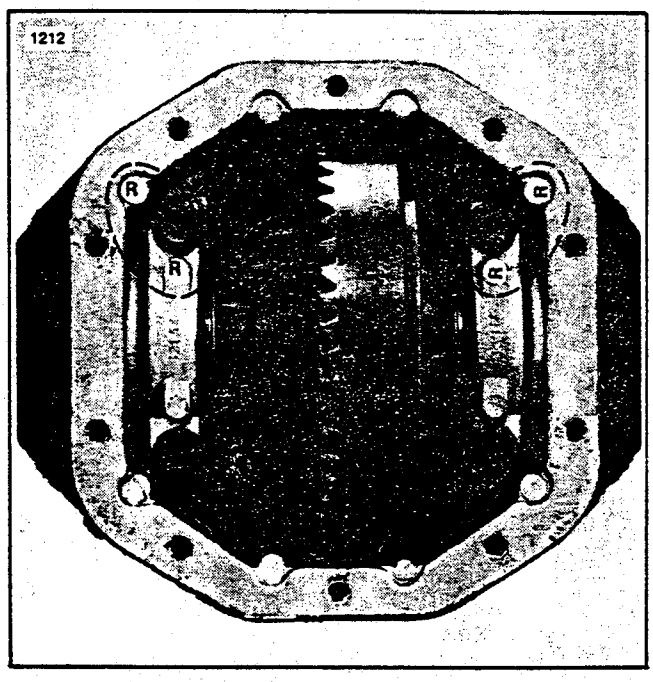


Figure 3-12. Bearing Cap Identification

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.)

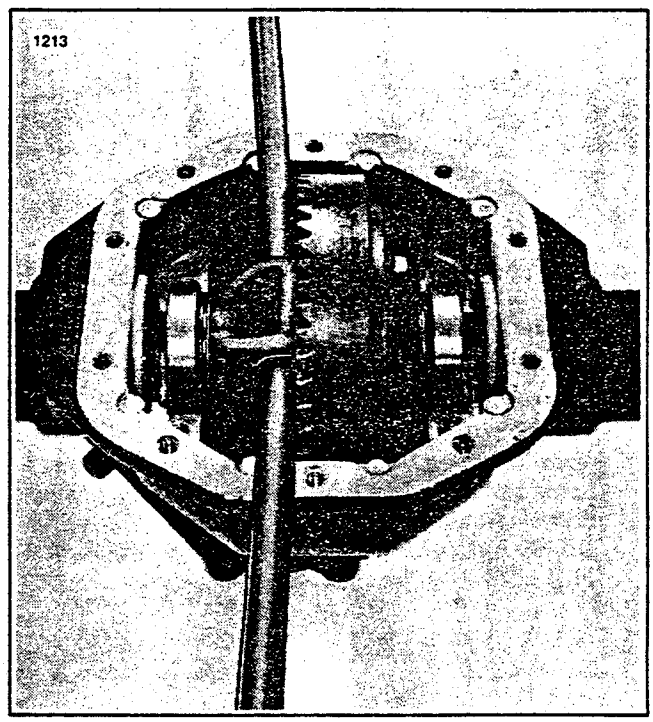


Figure 3-13. Prying Out Case

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.

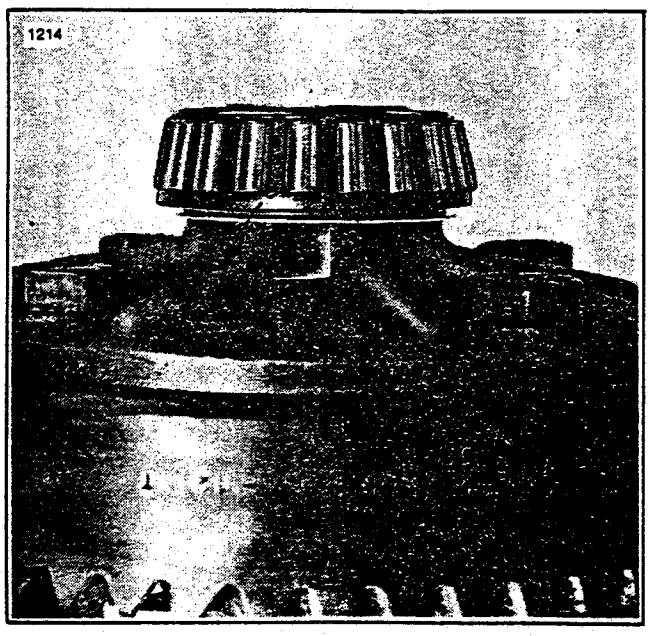


Figure 3-14. Recess for Puller

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).

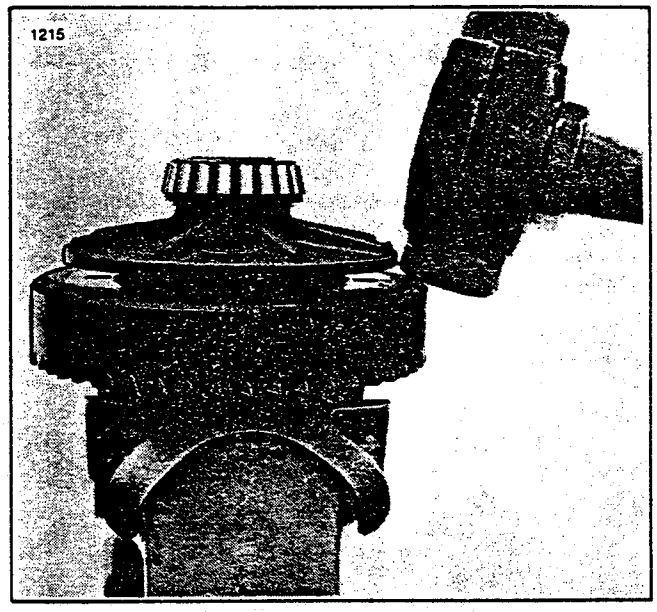


Figure 3-15. Tapping Off Ring Gear

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.

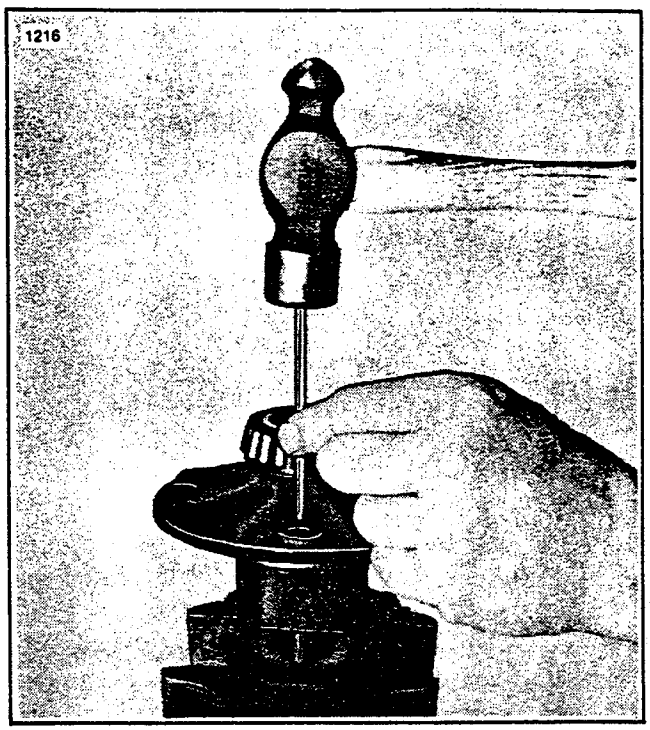


Figure 3-16. Driving Out Lock Pin

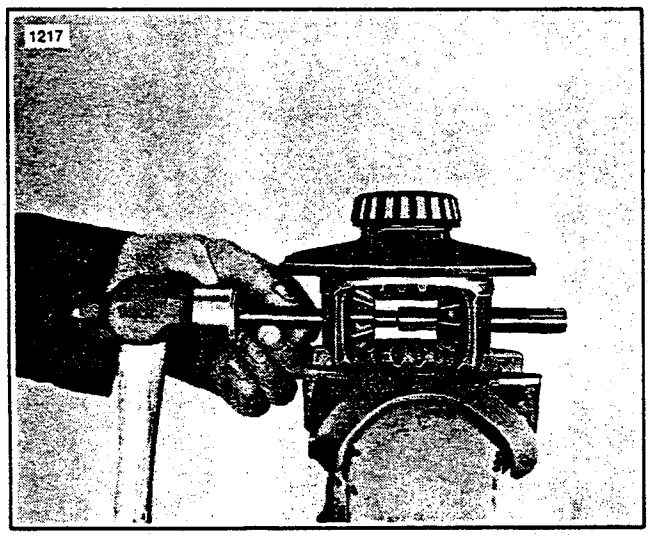


Figure 3-17. Driving Out Pinion Mate Shaft

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 1¼ 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

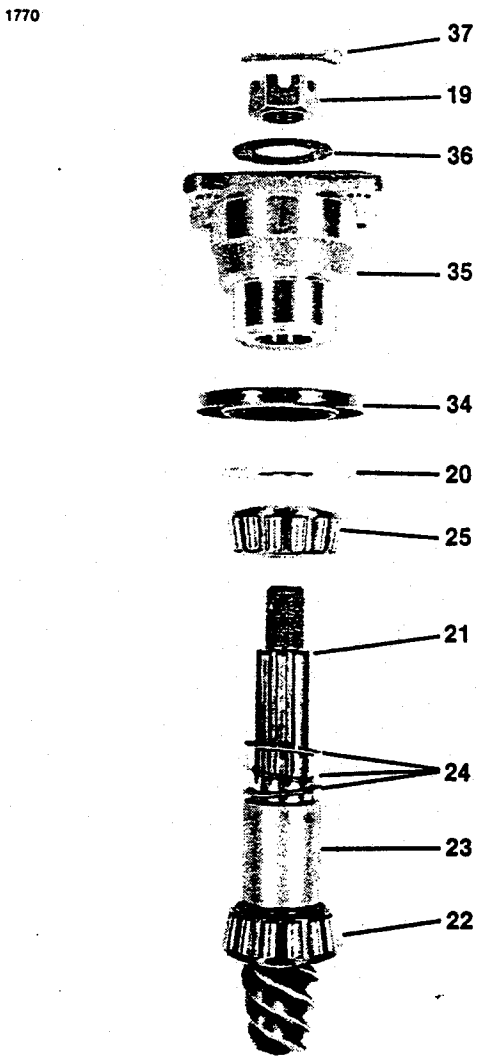
Procedure other than suggested could cause damage.

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 nonflammable cleaning solvent. Do **not** steam clean because water and condensation are very difficult to remove from differential parts.



19. Pinion nut
20. Oil slinger
21. Pinion shaft and gears
22. Bearing cone
23. Sleeve
24. Shims
25. Bearing cone
34. Oil seal
35. Pinion yoke
36. Washer
37. Cotter pin

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.

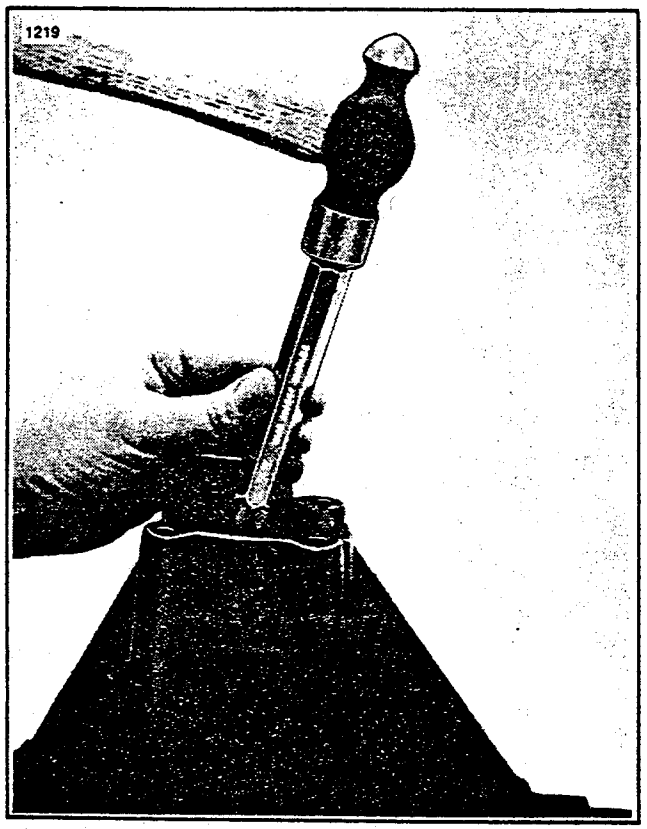


Figure 3-19. Driving Out Rear Pinion Bearing Cup

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.

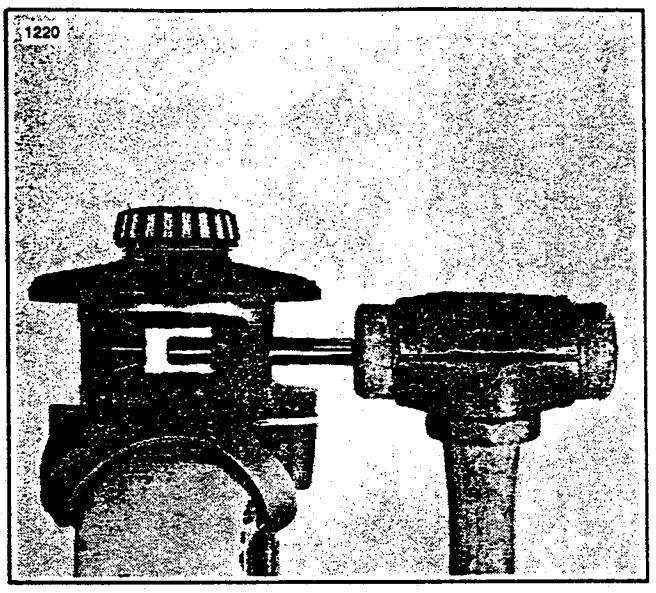


Figure 3-20. Installing Pinion Mate Shaft

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).

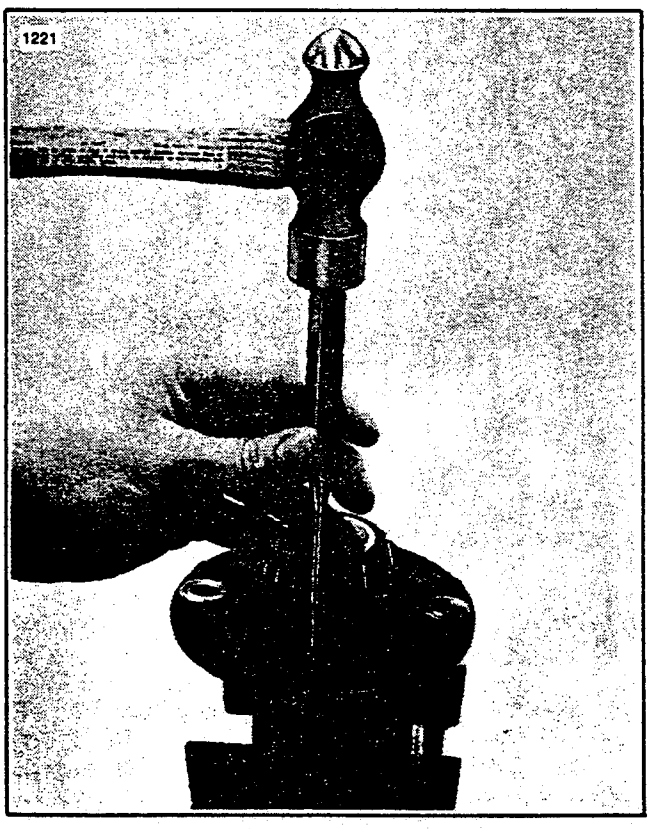


Figure 3-21. Installing Lock Pin

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).

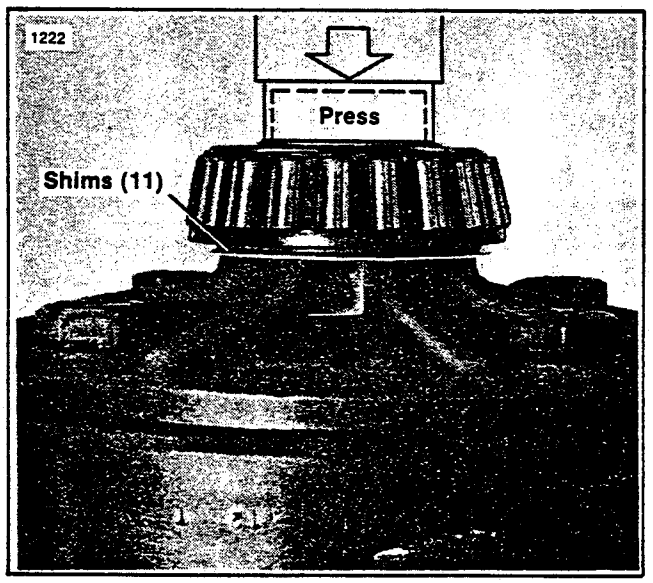
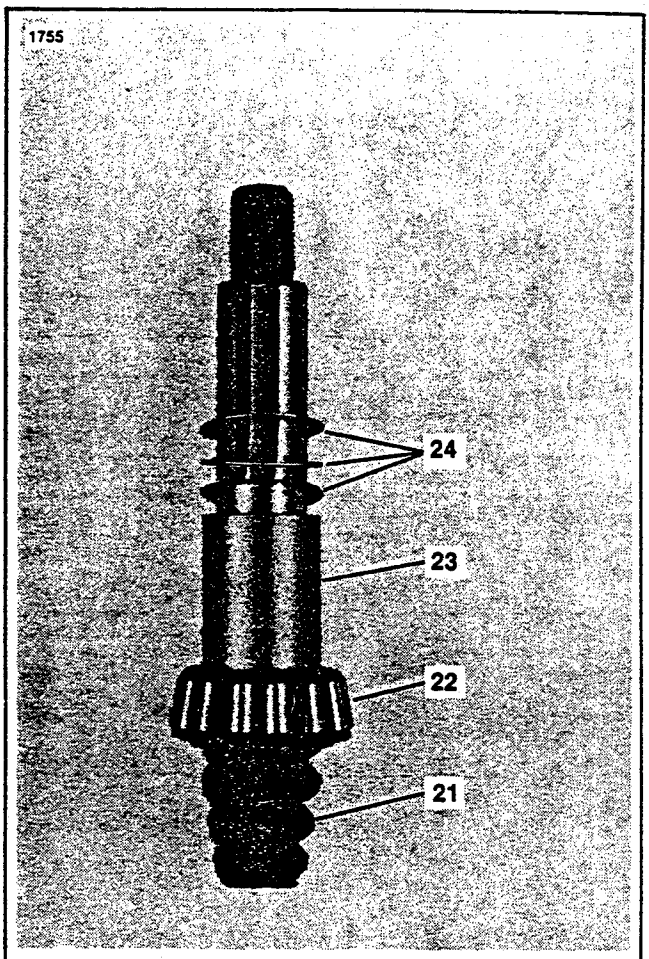


Figure 3-22. Pressing On Differential Bearing

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.



21. Pinion shaft and gear
22. Bearing cone
23. Sleeve
24. Shims

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

On the gear end of the pinion shaft is found a number preceeded 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 pinnion 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 1¼ 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).

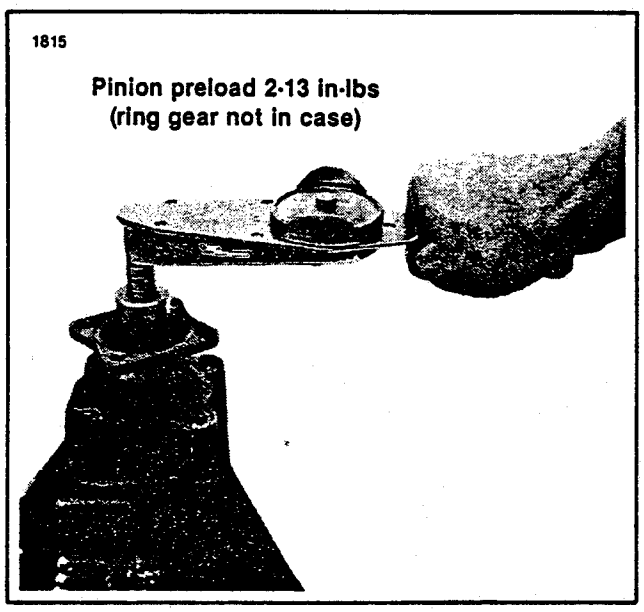


Figure 3-26. Checking Pinion Preload

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

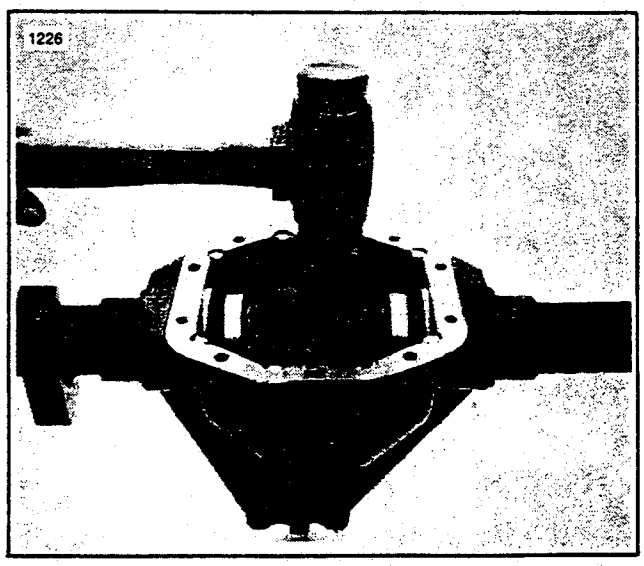


Figure 3-27. Seating Differential Case Assembly

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.

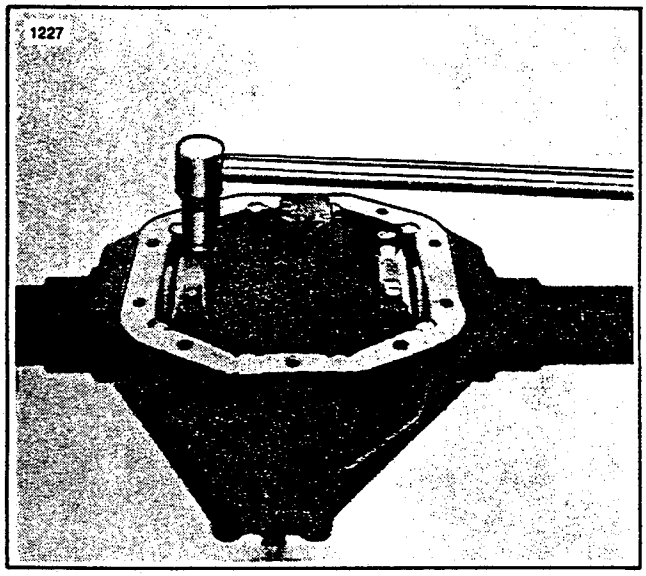


Figure 3-28. Torque Bearing Cap Bolts

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

NOTE

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. See Figure 3-29. 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.

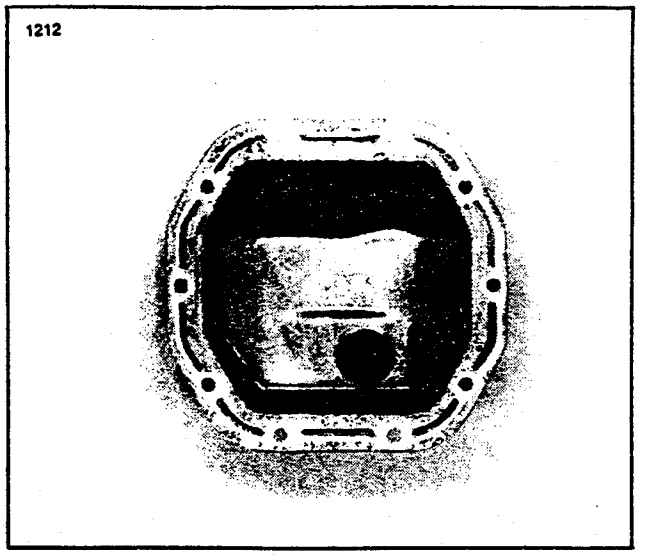


Figure 3-29. Applying Sealant

BRAKES 4

SECTION PAGE NO.

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 claiper through the brake cable assembly. The brake pads apply this clamping action aginst 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.

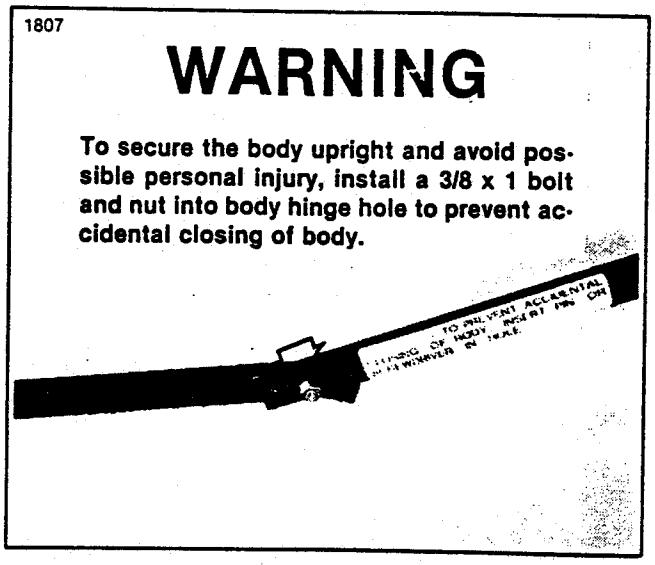
BRAKE ADJUSTMENT (Figure 4-1)

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.**

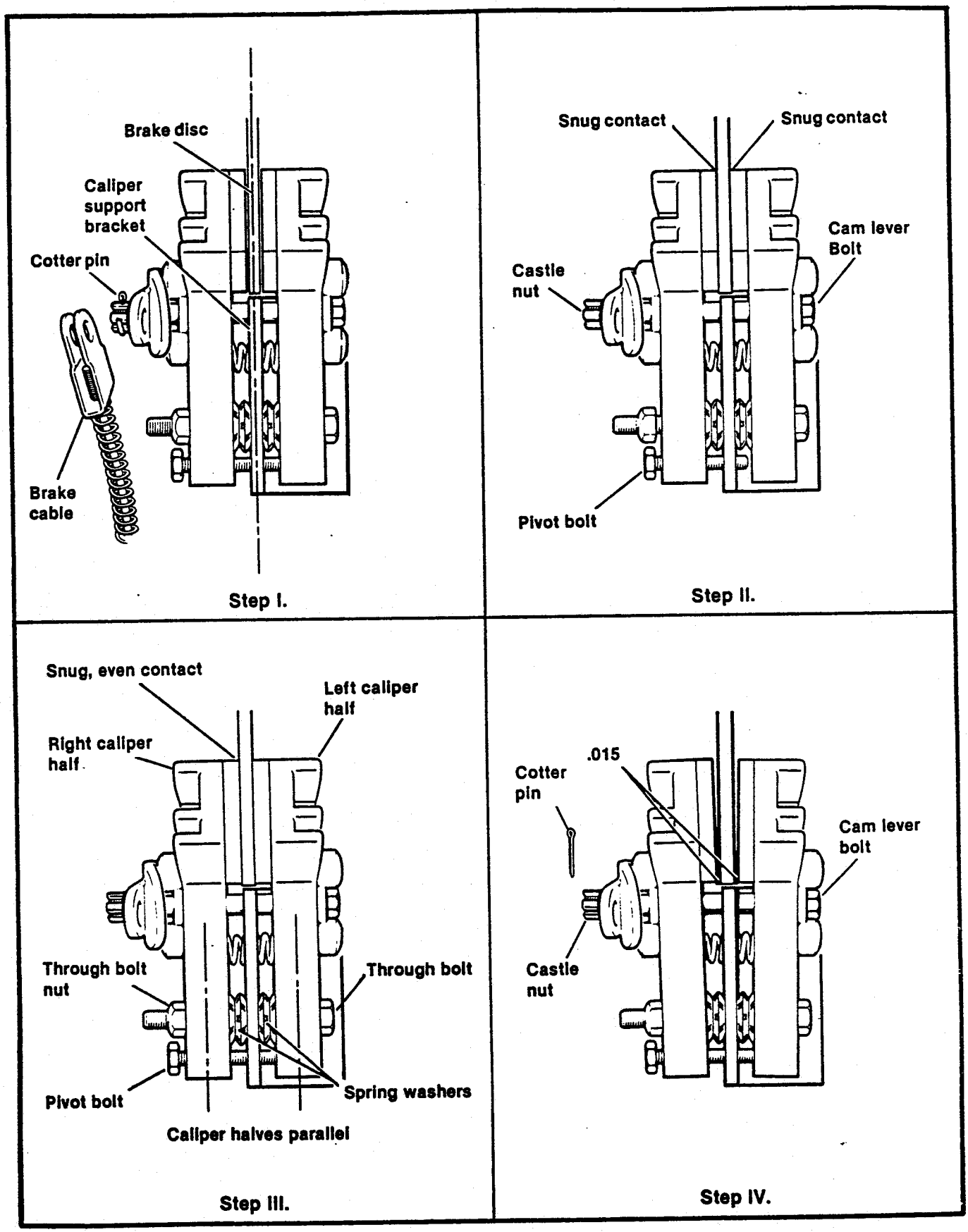


Figure 4-1. Brake Adjustment

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.

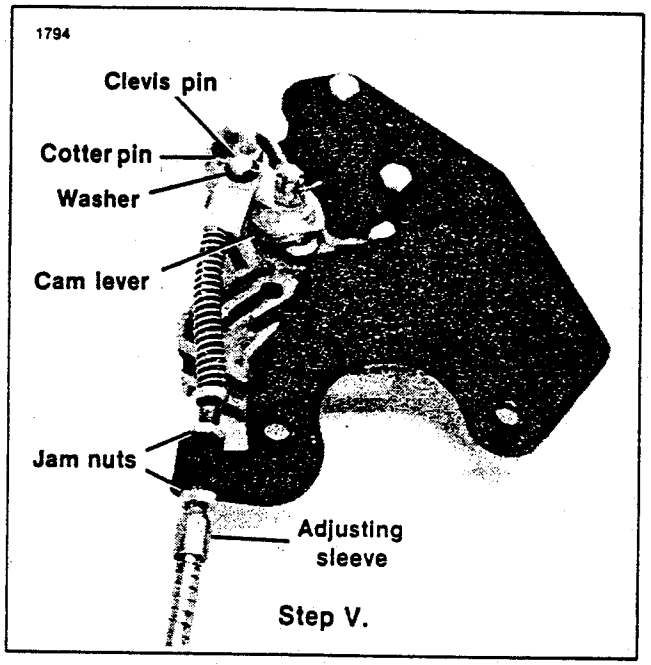


Figure 4-2. Brake Adjustment — Final Step

BRAKE RATCHET AND PAWL ADJUSTMENT — D-3 (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.

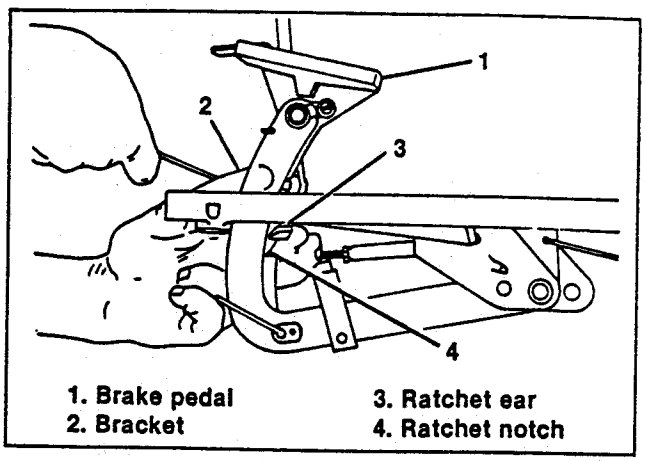


Figure 4-3. Brake Ratchet and Pawl Adjustment — D3

BRAKE RATCHET AND PAWL ADJUSTMENT — DX4

If brake ratchet fails to engage 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. See Figure 4-4. Loosen but do not remove three accelerator mounting bolts.

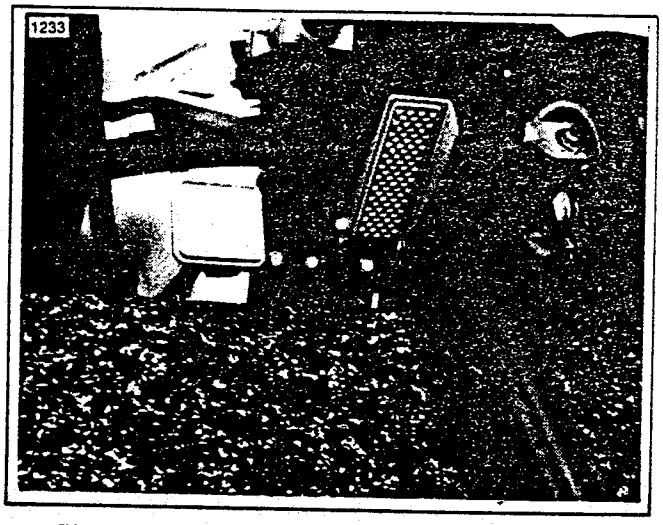


Figure 4-4. Accelerator Bracket Bolts — DX4

2. See Figure 4-5. Hold pawl perpendicular to floorboard with carpenters square. Depress brake pedal and adjust the accelerator bracket until pawl engages ratchet notch about half way. Snug the three accelerator bolts (Figure 4-4).

3. With the parking brake locked, depress accelerator pedal while observing micro-switch. Parking brake

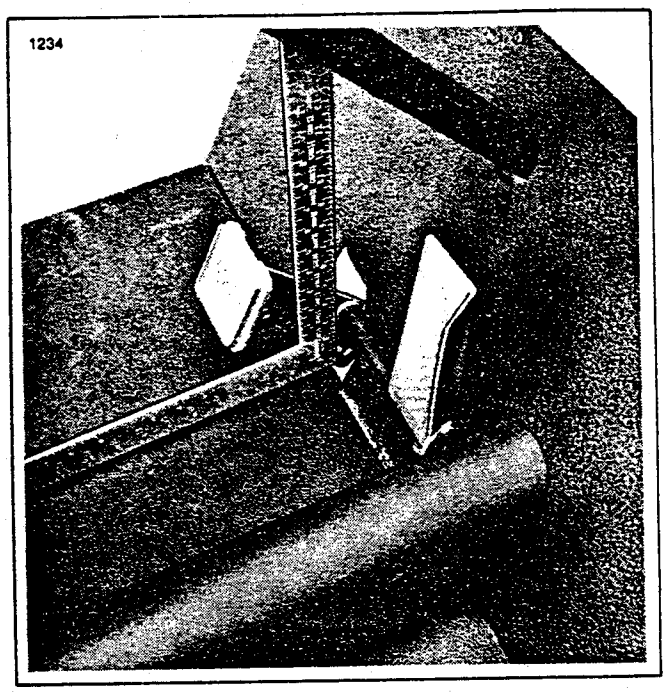


Figure 4-5. Pawl Perpendicular to Floorboard

must fully release before micro-switch closes. If micro-switch closes before parking brake releases, adjust micro-switch. See MICRO-SWITCH ADJUSTMENTS, Section 8.

4. Tighten accelerator bolts to 16-19 ft-lbs torque.

BRAKE PEDAL ASSEMBLY

BRAKE PEDAL — D-3

Removal
(Figure 4-6)

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 4-6)

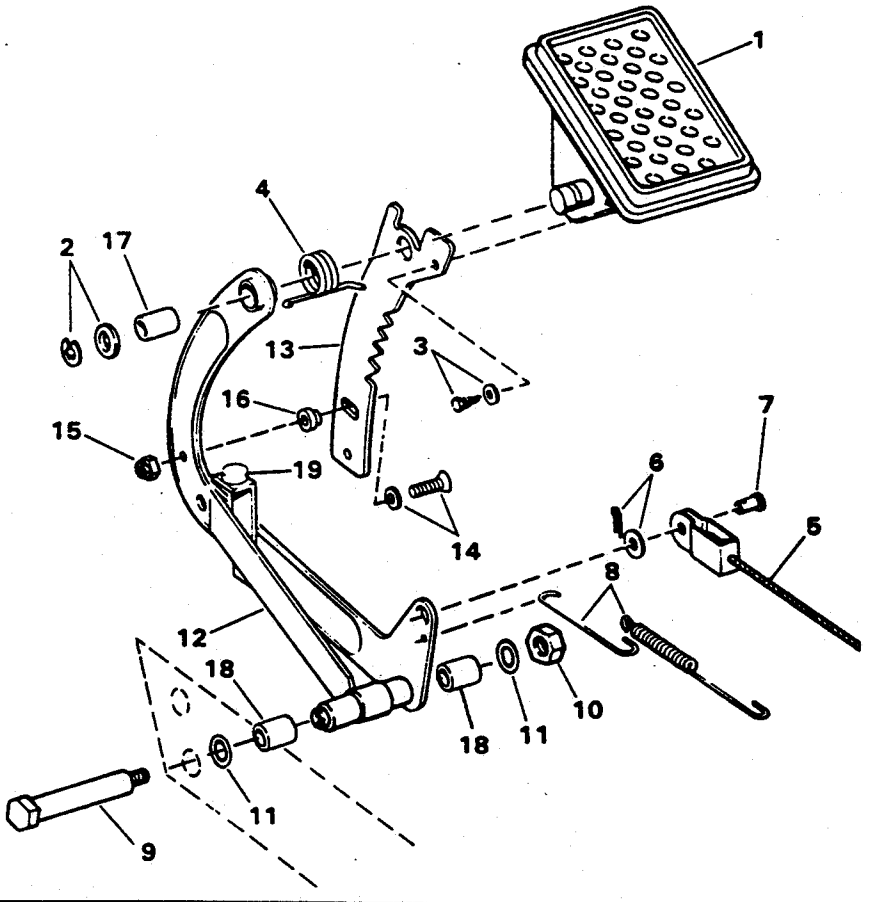
1. To disassemble brake ratchet (13) from brake lever (12), remove screw and washer (14) and nut (15). Note position of shouldered spacer (16).
2. Remove ratchet spring (4).
3. Replace brake lever bumper (19) if worn.

Cleaning, Inspection and Repair

1. Note condition of O-rings (11), replace if worn.
2. Check brake pedal bushing (17) and lever bushings (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 4-6)

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.



1. Brake pedal
2. E-clip and washer
3. Screw and washer
4. Spring
5. Cable
6. Cotter pin and washer
7. Cable retaining pin
8. Return spring and hook
9. Mounting bolt
10. Nut
11. O-ring (2)
12. Brake lever
13. Brake ratchet
14. Screw and washer
15. Nut
16. Shouldered spacer
17. Brake pedal bushing
18. Brake lever bushing (2)
19. Brake lever bumper

Figure 4-6. Brake Pedal Assembly — D-3

Installation (Figure 4-6)

1. Install pedal assembly through floorboard from underside of car.
2. Install brake cable (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. Adjust the brakes. See BRAKE ADJUSTMENT.

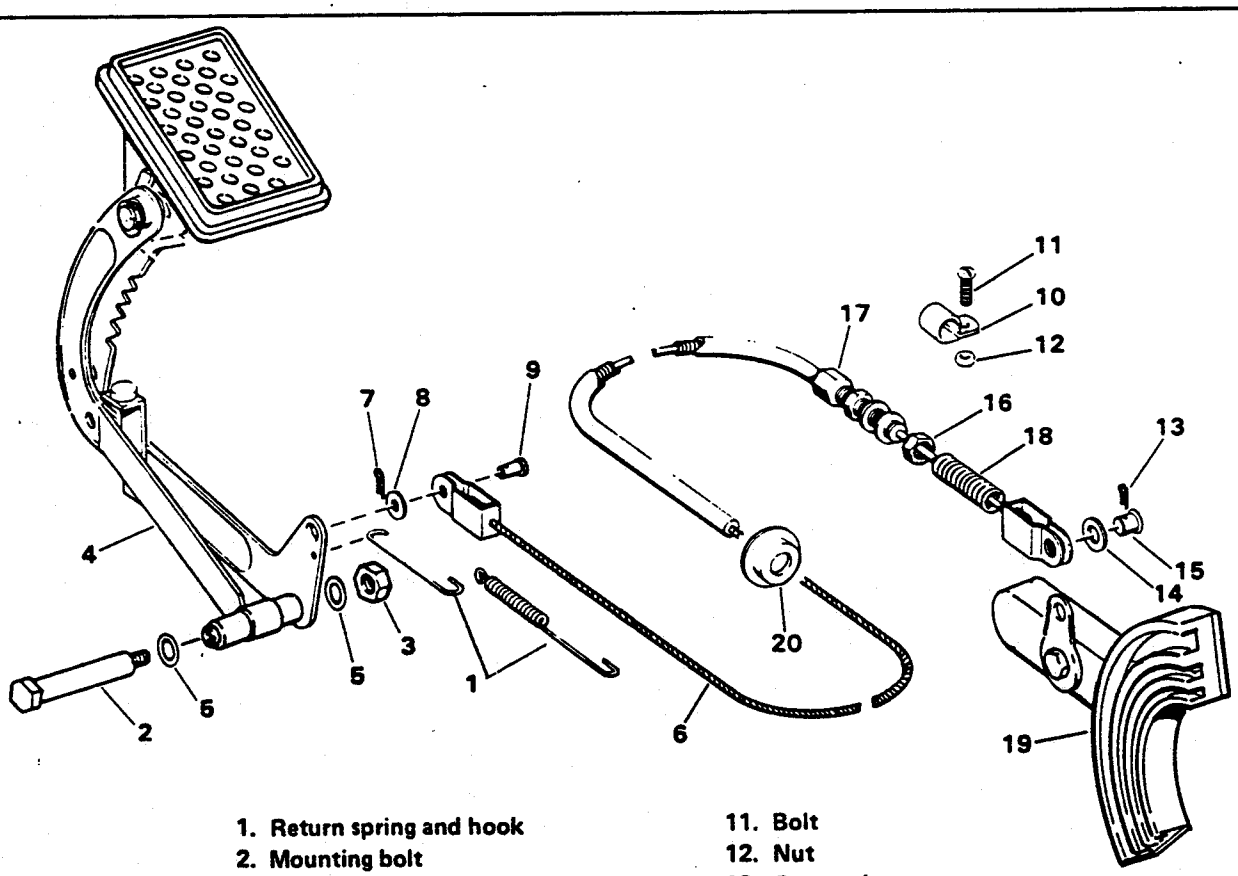
BRAKE CABLE — D-3

Removal (Figure 4-7)

WARNING

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

1. Raise golf car body.



1. Return spring and hook
2. Mounting bolt
3. Nut
4. Brake pedal assembly
5. O-ring (2)
6. Brake cable
7. Cotter pin
8. Washer
9. Clevis pin
10. Retaining clip
11. Bolt
12. Nut
13. Cotter pin
14. Washer
15. Clevis pin
16. Nut
17. Adjusting sleeve
18. Spring
19. Caliper
20. Cable seat

Figure 4-7. 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 4-7)

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.

BRAKE PEDAL — DX4

Removal (Figure 4-8)

1. Disconnect return spring (1), cottern pin (2), clevis pin (3) and washer (4), from brake cable (7).

2. Remove the brake lever bolt (5) and nut (6).

3. Lift brake assembly up and out through floorboard.

Disassembly (Figure 4-8)

1. Remove screws (15) and lockwashers (16).

2. Remove bolt (23) and locknut (24) from brake lever (8).

3. Using a suitable drift, drift out the roll pin (19) through brake lever (8). Drift out pivot pin through brake pedal (17).

4. Remove spring (21) and washers (20).

5. Press out bushings (18) from brake pedal (17).

Assembly (Figure 4-8)

1. Press bushing (18) into brake pedal (17) and apply a light coat of grease to inner bushing surfaces.

2. Position spring (21) on brake lever (8).

NOTE

Align hole in pivot pin with hole in brake lever (8) when pressing in roll pin (19).

3. Align brake pedal (17), brake ratchet (22), washers (20) and brake lever (8) and press pivot pin into brake pedal assembly.

4. Press roll pin (19) into brake lever (8) and pivot pin.

5. Install bolt (23) through slot in brake ratchet (22) then thread locknut (24) onto bolt (23). Thread bolt into brake lever (8) and tighten locknut (24).

NOTE

For brake ratchet stop bolt (23), use only a grade [8] bolt for replacement.

6. Install lockwashers (16) and screws (15) into brake pedal (17) and tighten.

Installation (Figure 4-8)

1. Install brake lever bolt (5) and nut (6).

2. Install brake cable (7), clevis pin (3), washer (4) and cotter pin (2) to brake assembly lever (8).

3. Install return spring (1).

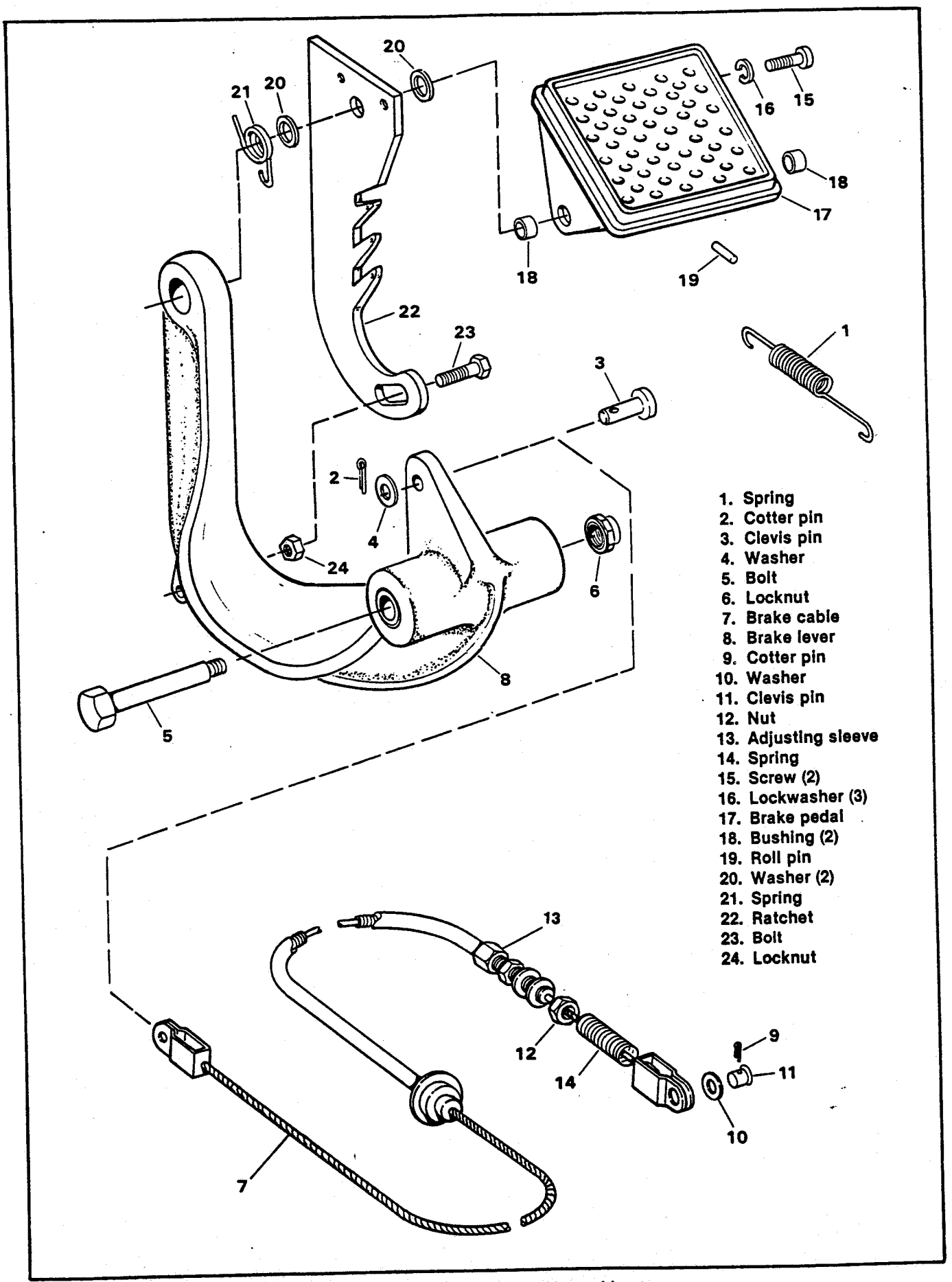


Figure 4-8. Brake and Cable Assembly

BRAKE CABLE — DX4

Removal (Figure 4-8)

1. Raise golf car body.

WARNING

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

2. Disconnect the return spring (1), cotter pin (2), clevis pin (3) and washer (4) from brake cable (7).
3. Pull the cable through the frame cross member and remove the brake cable clamps.
4. Disconnect brake cable (7) from brake caliper by removing cotter pin (9), washer (10) and clevis pin (11).
5. Thread nut (12) completely off of adjusting sleeve (13).
6. Pull back on cable, compressing spring (14), and remove cable from brake bracket.

Installation (Figure 4-8)

1. Thread nut (12) off of adjusting sleeve (13) and install cable in brake bracket with a washer on each side of brake bracket.
2. Thread nut (12) onto adjusting sleeve (13) and connect cable end to brake using clevis pin (11), washer (10) and cotter pin (9).
3. Route the cable to the front, through the frame cross member to the brake lever and attach cable using clevis pin (1), washer (4) and cotter pin (2).
4. Connect return spring (1) and install cable clamps.
5. Adjust brake. See BRAKE ADJUSTMENT.
6. Lower car body.

Compensating for Long Brake Cable (Figure 4-9)

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 4-9).

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.

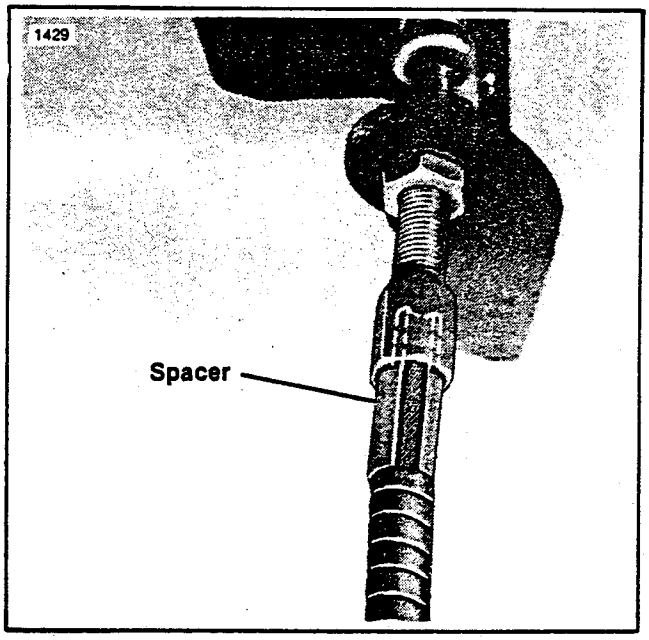
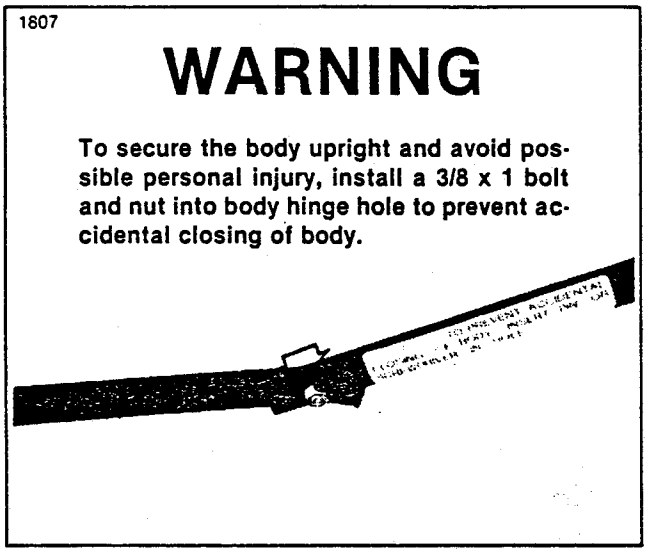


Figure 4-9. Brake Cable Spacer

BRAKE CALIPER

REMOVAL (Figure 4-10)

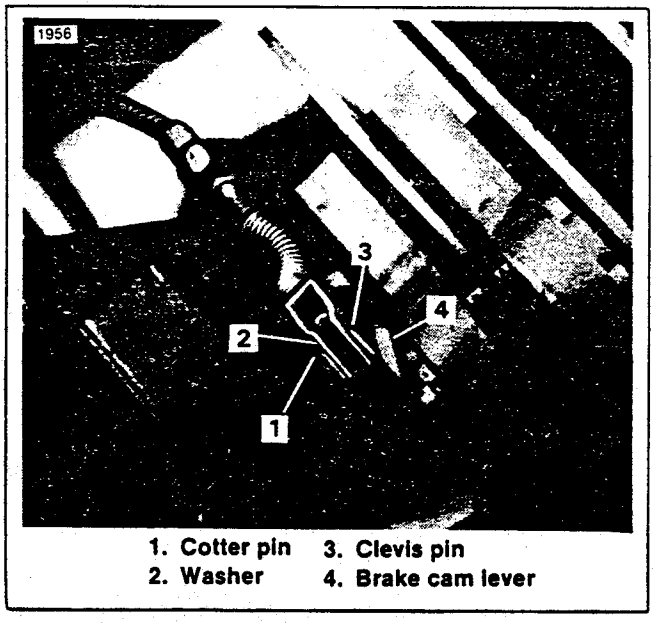
1. Raise the golf car body.



WARNING

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

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



1. Cotter pin
2. Washer
3. Clevis pin
4. Brake cam lever

Figure 4-10. Removing Caliper

3. See Figure 4-11. Remove two bolts and locknuts which secure caliper support bracket to brake bracket.

4. Remove caliper.

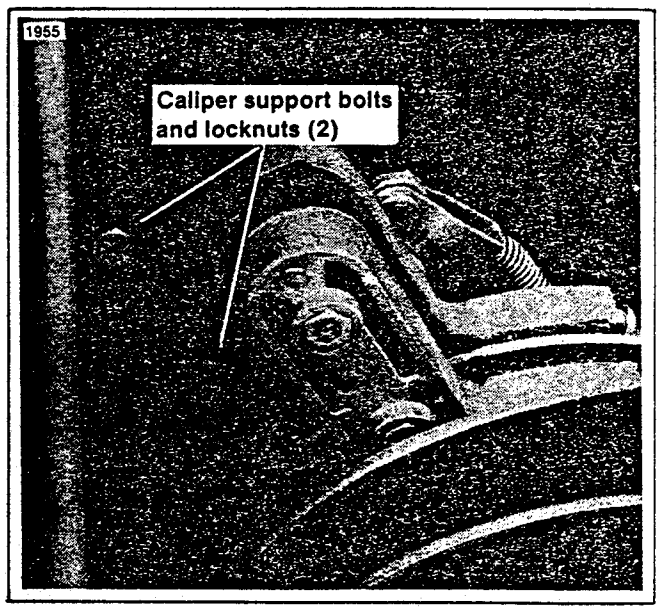


Figure 4-11. Mounting Hardware

DISASSEMBLY (Figure 4-12)

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.

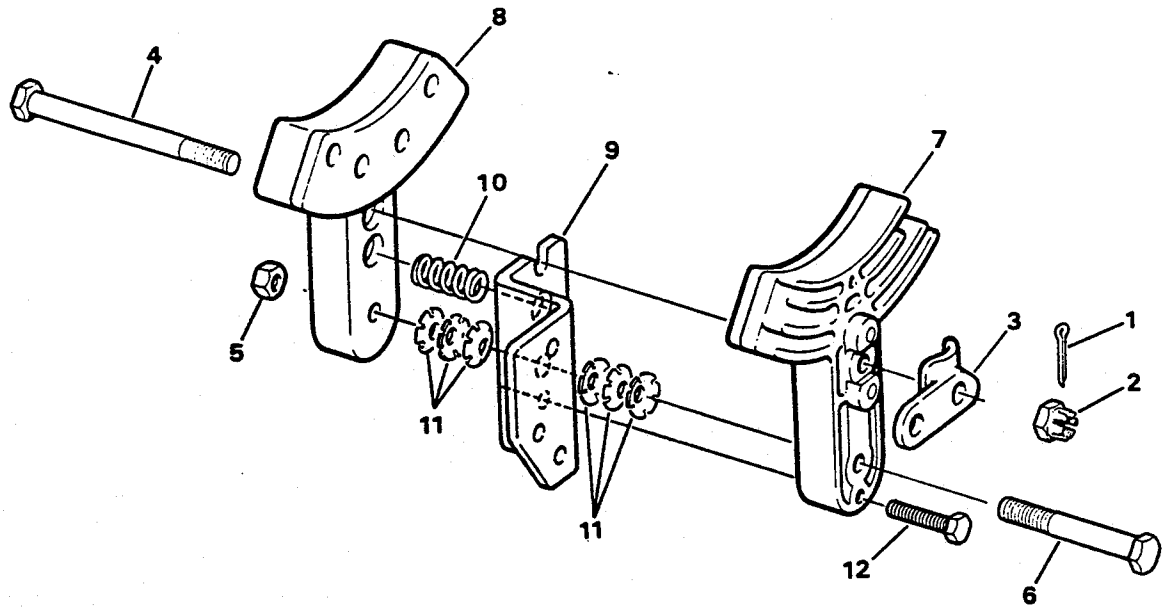
4. To separate caliper halves remove through bolt and nut (5 and 6).

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

Figure 4-12. Caliper Assembly

ASSEMBLY (Figure 4-12)

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 (11) 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.
11. Install cotter pin (1).

INSTALLATION

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. Install cotter pin (1).
4. Connect battery cables.
5. Lower car body.

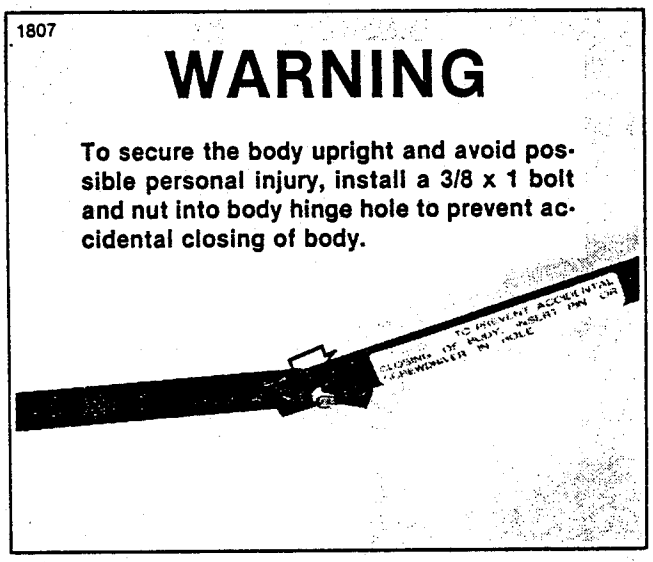
BRAKE DISC

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 4-11. Remove brake mounting hardware.
3. See Figure 4-10. 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 4-11. Install brake caliper and mounting hardware.
4. See Figure 4-10. 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.

SECTION PAGE NO.

ENGINE 5

SPECIFICATIONS

GENERAL

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	14.85 cu. in. (245.8 cc)
Compression ratio (full stroke)	7.7:1
(after port closing)	6.0:1

PISTON

Fit in cylinder	.004-.005 at skirt bottom
Piston ring end gap	.007-.023 in.
Piston ring side clearance	.0025-.0045 in.
Piston pin fit in piston	.0001 in. tight to .0001 in. loose light hand press at 72° F.

CONNECTING ROD

Fit on crankpin	.0004-.0018 in.
Piston pin fit	.0002-.001 in.
End play between crankshaft throws	.010-018 in.

CRANKSHAFT ASSEMBLY

Crankpin	Must resist on turning torque of 350 ft-lbs.
Mainshaft maximum runout	
When turned on bearing jourals —	
Fan and transmission side	.002 in.
When turned on bearings in crankcase —	
Fan and transmission side	.006 in.

CRANKCASE ASSEMBLY

Main bearings fit in crankcase	0-.0015 in. tight
Main bearings fit on shaft —	
Ball	0-.0007 in. tight to .0001 in. loose
Roller	0-.0009 in. tight to .0001 in. tight

TIMING

Transfer port from crankcase to cylinder	
Opens at	54° ± 1° BBC (2.08 in. below TDC)
Closes at	54° ± 1° ABC (2.08 in below TDC)
Exhaust port	
Opens at	69° ± 1° BBC (1.84 in. below TDC)
Closes at	69° ± 1° ABC (1.84 in. below TDC)

TORQUES

Cylinder head bolts	20-25 ft-lbs (2.7-3.4 kgm)
Engine mounting nuts	30-35 ft-lbs (4.1-4.8 kgm)
Spark plug	15-20 ft-lbs (2.0-2.7 kgm)
Crankcase screws	84-108 in-lbs (.97-1.2 kgm)
Crankcase stud nut	84-108 in-lbs (.97-1.2 kgm)
Fan shroud screws	84-120 in-lbs (3.2-4.5 kgm)
Exhaust flange nuts	25-30 ft-lbs (3.4-4.1 kgm)
Fan mounting nut	50-70 ft-lbs (6.9-9.6 kgm)
Breaker plate screws	29-35 in-lbs (.2-.4 kgm)
Air shroud screws	35-50 in-lbs (3.2-4.5 kgm)
Intake manifold bolts	12-16 ft-lbs (5.4-7.2 kgm)
Engine stabilizer bolts	12-16 ft-lbs (5.4-7.2 kgm)
Tensioner nut	84-108 in-lbs (.97-1.2 kgm)
Starter-generator bolts	12-16 ft-lbs (5.4-7.2 kgm)

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, gasket 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 flows 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 flows 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 linear motion of the piston in the cylinder is translated 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 of the 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 an eccentric pin, 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 or unleaded gasoline, for clean, smokeless, trouble-free operation.

Break-In Lubrication — 42 to 1 Ratio

The first tank of fuel should be mixed at a ratio of 42 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 tank 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). This oil is available in cases of 6 gallons, Part No. 99803-76V or 55 gallon drums, Part No. 99810-76V.

IMPORTANT

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

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 oz.	1-1/2 oz.	3 oz.	4-1/2 oz.	6 oz.	7-1/2 oz.	9 oz.	10-1/2 oz.	12 oz.	13-1/2 oz.	15 oz.	37-1/2 oz. or 1 qt. 4-1/2 oz.	75 oz. or 2 qt. 11 oz.	128 oz. or 1 gal.	150 oz. or 1 gal. 22 oz.

1 U.S. pint = 16 oz. 1 U.S. quart = 32 oz. 1 U.S. gal. = 128 oz.

1 liter = 33.82 oz. 1 Imp. gal. = 143.7 oz. 1 Imp. gal. = 1.2 U.S. gal.

ENGINE REPAIR

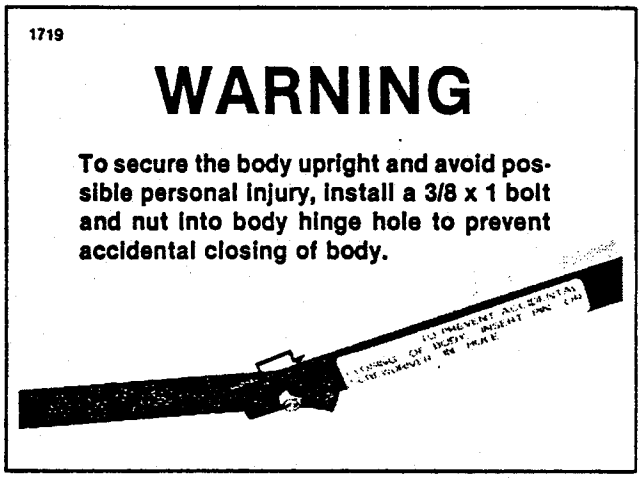
General

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.

2. See Figure 5-1. 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.

3. See Figure 5-2. Disconnect fuel line at the fuel pump. Loosen the air cleaner hose clamp at the carburetor and pull hose free of carburetor. Disconnect choke, throttle and governor at carburetor. Disconnect the coil wires.

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

5. Remove the four muffler mounting bolts. Disconnect the exhaust pipe at the cylinder and remove the exhaust system as an assembly.

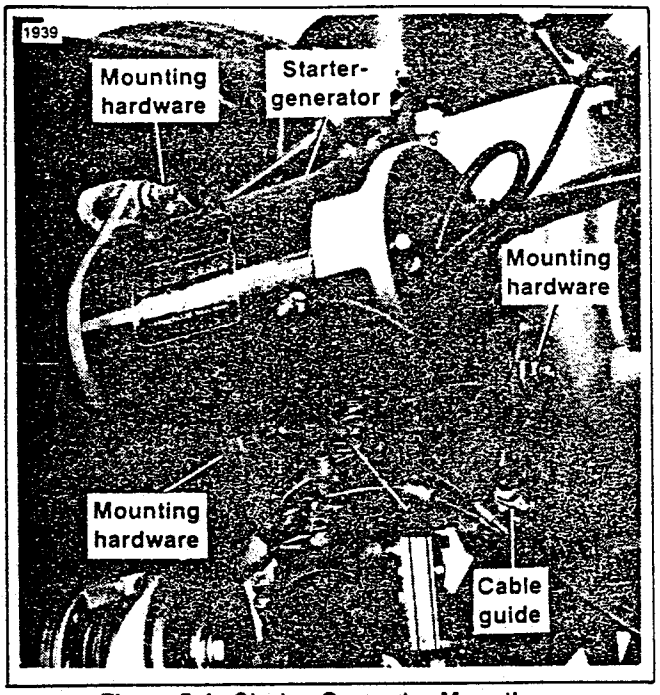


Figure 5-1. Starter-Generator Mounting

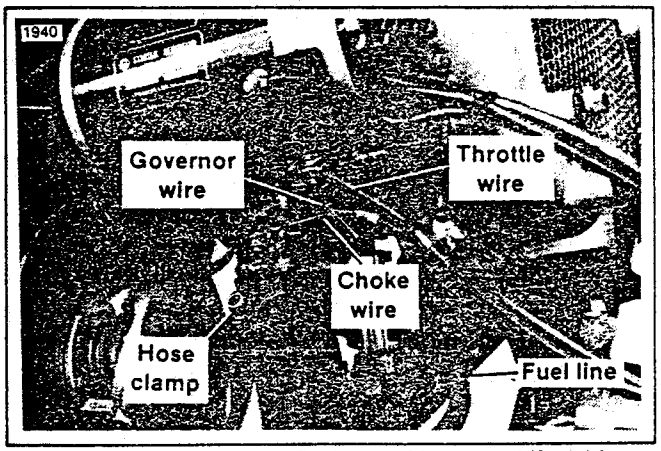


Figure 5-2. Air Cleaner/Throttle, Choke and Fuel Line

6. See Figure 5-3. Disconnect the stabilizer from the engine. Remove the engine mounting hardware. Remove the engine from the frame.

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.

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

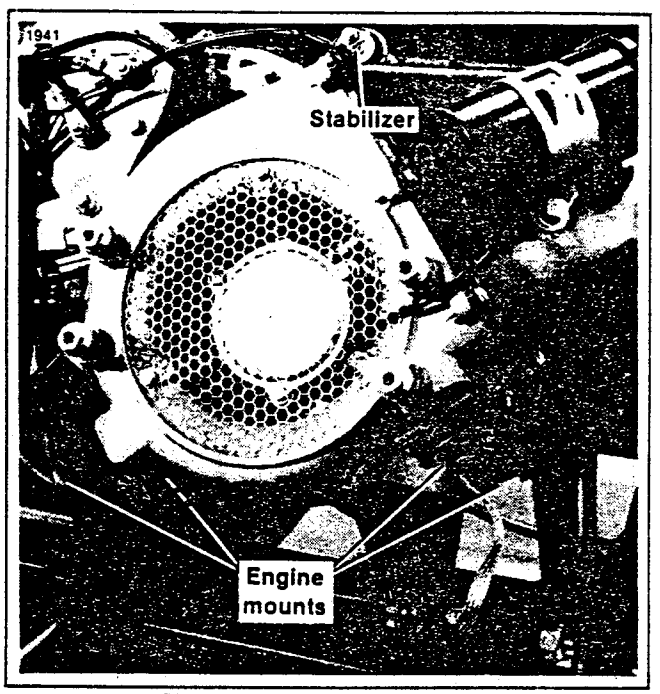


Figure 5-3. Engine Mounting

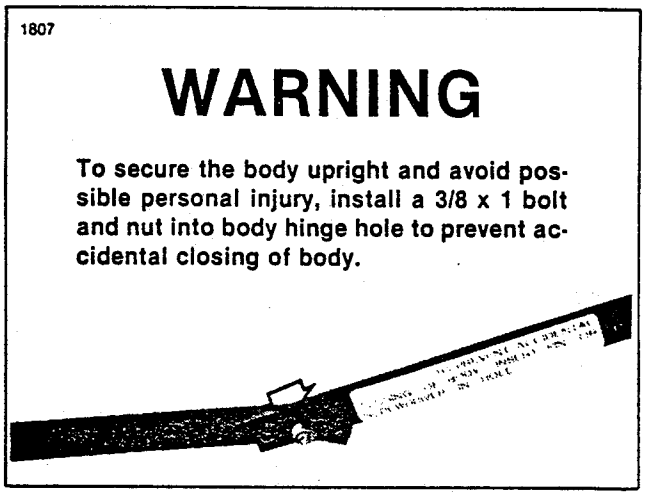
Installing the Engine

1. 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.
2. 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.
3. Install the exhaust assembly using a new flange gasket.
4. Install V-belt by placing it on the primary flange first and then rolling it on the secondary.
5. See Figure 5-2. Install air cleaner hose to carburetor and tighten clamp. Secure the fuel line to the fuel pump.
6. Connect throttle, choke and governor to carburetor. See the FUEL Section.
7. See Figure 5-2. Install the starter-generator and cable guide. Connect coil and solenoid wires.
8. Reconnect the battery.
9. Check for fuel leaks, etc. See the FUEL Section.
10. Check the ignition timing. See the ELECTRICAL Section.
11. Lower the body.

CYLINDER AND PISTON

DISASSEMBLY

1. Raise the golf car body.

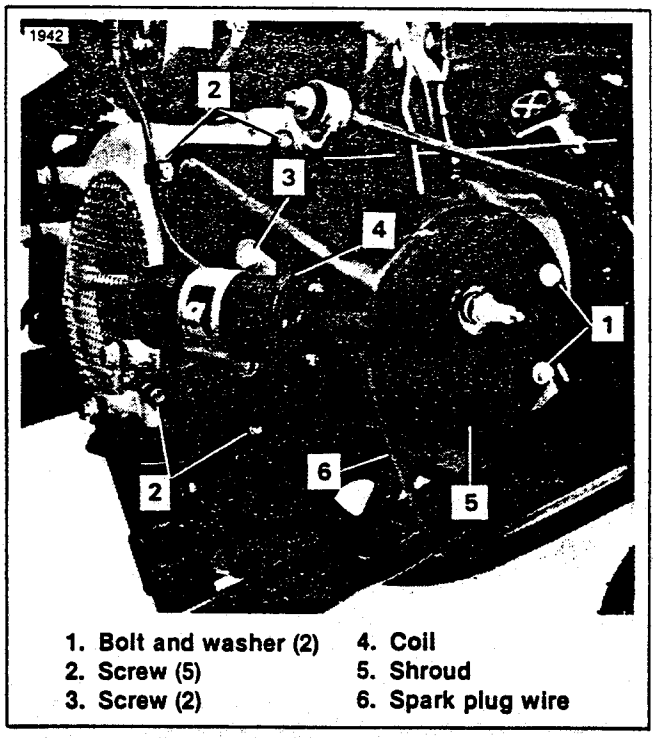


WARNING

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.



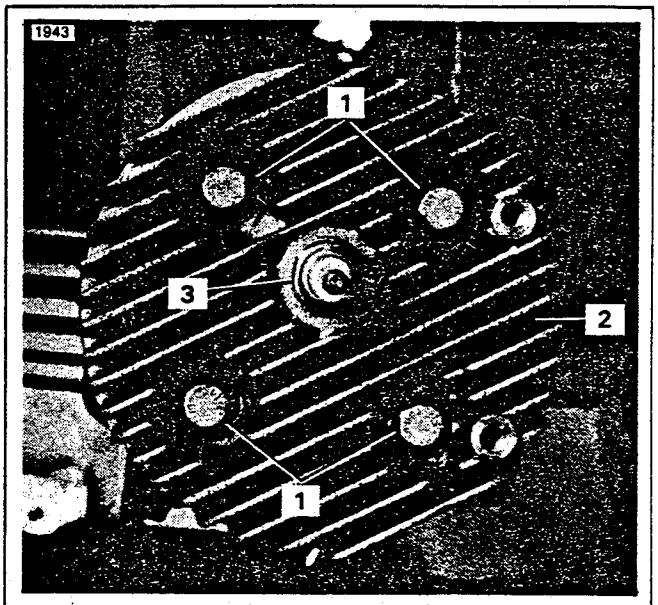
1. **Bolt and washer (2)**
2. **Screw (5)**
3. **Screw (2)**
4. **Coil**
5. **Shroud**
6. **Spark plug wire**

Figure 5-4. Shroud Mounting

4. See Figure 5-4. Remove the top shroud bolts and washers (1).

5. See Figure 5-4. Remove screws (3) and coil (4). Remove the shroud screws (2) and shroud (5).

6. See Figure 5-5. Remove spark plug (3), cylinder head bolts and washers (1) and cylinder head (2).



1. **Bolts and washer (4)**
2. **Cylinder head**
3. **Spark plug**

Figure 5-5. Cylinder Head Mounting

7. 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, and locating ring dowel.

8. If rings are to be replaced, remove the top piston ring, then the second.

NOTE

Before removing piston, check to see if the connecting rod is bent by 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.

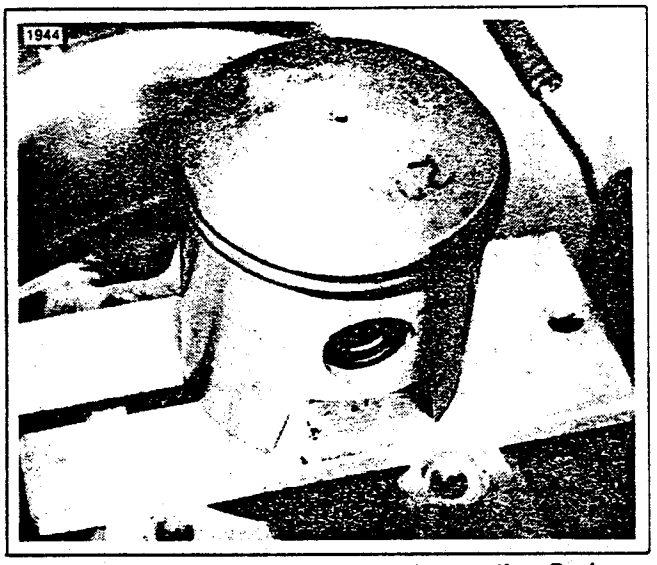


Figure 5-6. Checking Piston and Connecting Rod Squareness

CAUTION

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

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

10. Remove the cylinder base gasket.

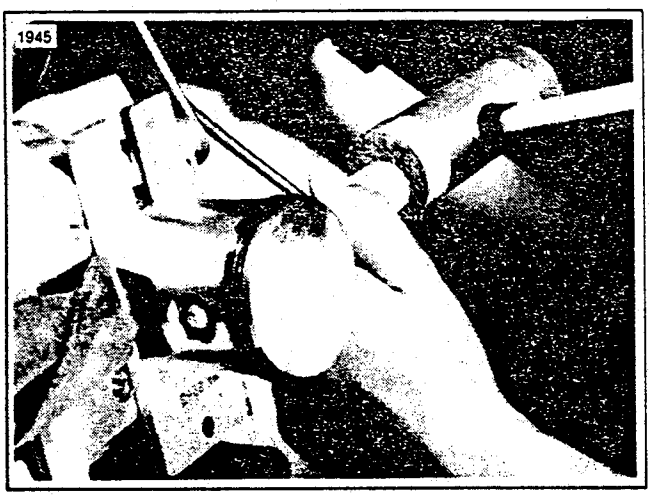


Figure 5-7. Removing the Piston

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. Inspect spark plug port threads for damage. If threads are damaged, replace the head.

4. Smooth any damaged 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 and exhaust outlet chamber. 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.

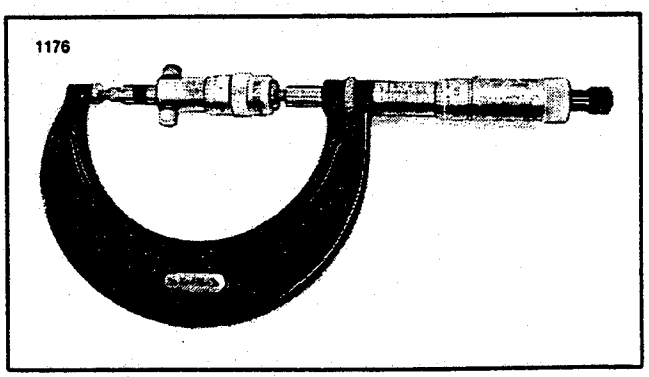


Figure 5-8. Adjusting Micrometers

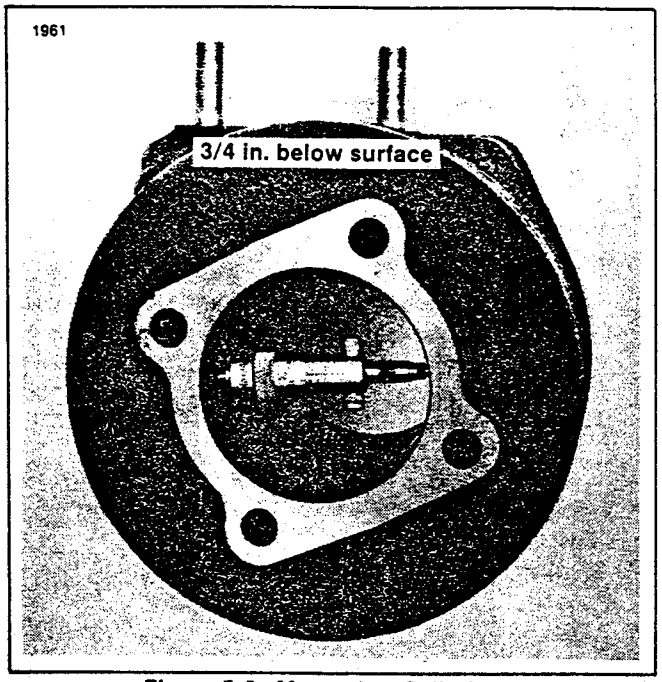


Figure 5-9. Measuring Cylinder

NOTE

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

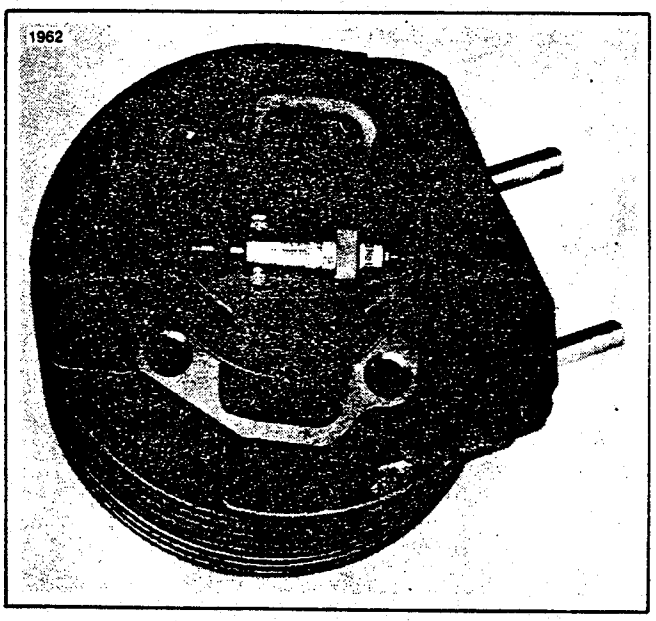


Figure 5-10. Measuring Cylinder 2 In. From Bottom

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 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 at bottom of skirt, 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 re-finished to the next O.S. piston.

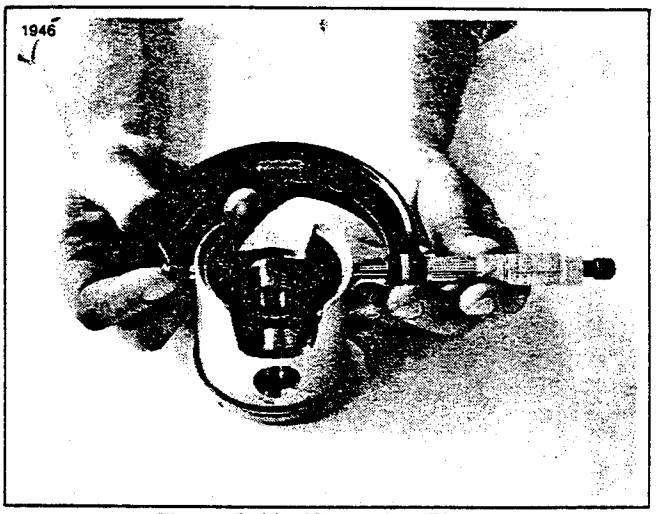


Figure 5-11. Measuring Piston

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 .004-.005 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 at bottom of skirt 90° from piston pin bore.

3. Bore or rough hone cylinder .002 in. larger than piston being used.

4. Final hone the cylinder the last .002-.003 in. to achieve desired piston clearance of .004-.005 in.

EXAMPLE	
Actual piston diameter (As measured)	2.749
Add clearance desired	+.004
Final bore size after finish honing should be	2.753
First	
Bore or rough hone Cylinder to .002-.003 in. Less than final bore size	2.753 .002 2.751
Then	
Finish hone cylinder the Last .002-.003 in. to reach The final bore size of	2.751 +.002 2.753

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 two 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 top. Ring gap should be .007-.023 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.

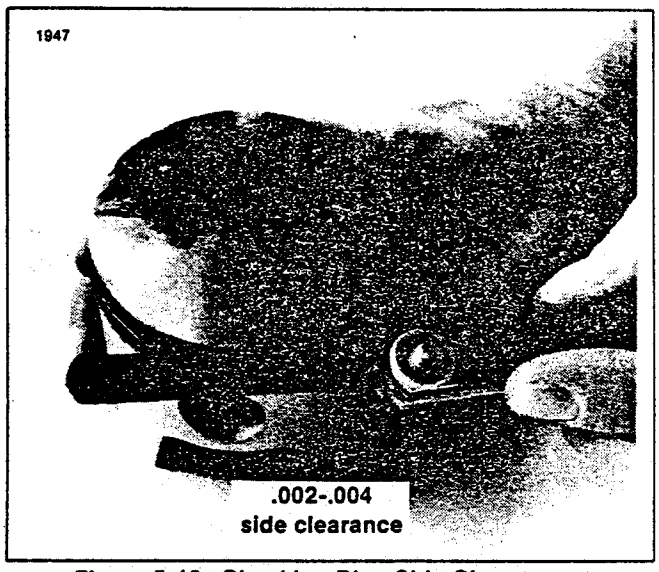


Figure 5-12. Checking Ring Side Clearance

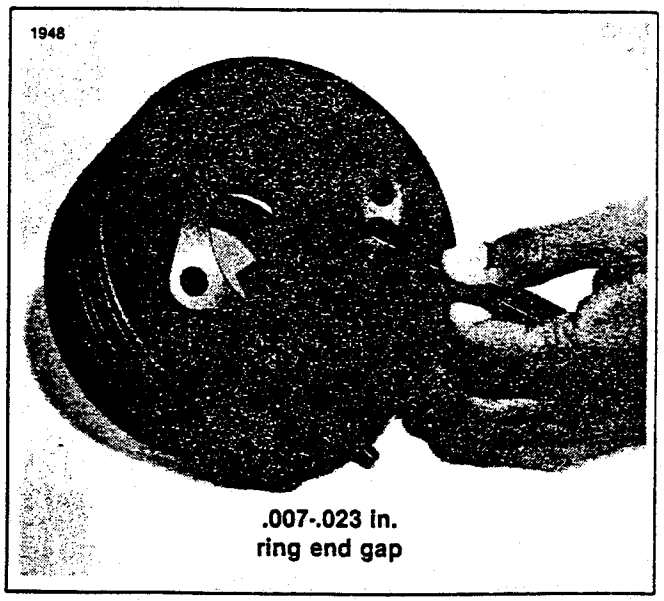


Figure 5-13. Ring End Gap

Piston Pin and Bearing

1. The piston pin fit in the piston is .0001 in. loose 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.

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.

1. Install a retaining ring into the piston. DO NOT use old rings because they are stretched during disassembly. Make sure retaining ring seats firmly in the groove.

2. Heat the piston at the pin bosses on both sides 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 retaining ring in the other piston pin groove. Make sure retaining ring seats firmly in the groove.

4. Install the piston rings on the piston. Install the bottom ring first, 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.

CAUTION

Make sure ring dowel is in proper position.

5. Remove all traces of old gasket from the crankcase and cylinder mating surfaces. Place new gasket and ring dowel in position on the crankcase.

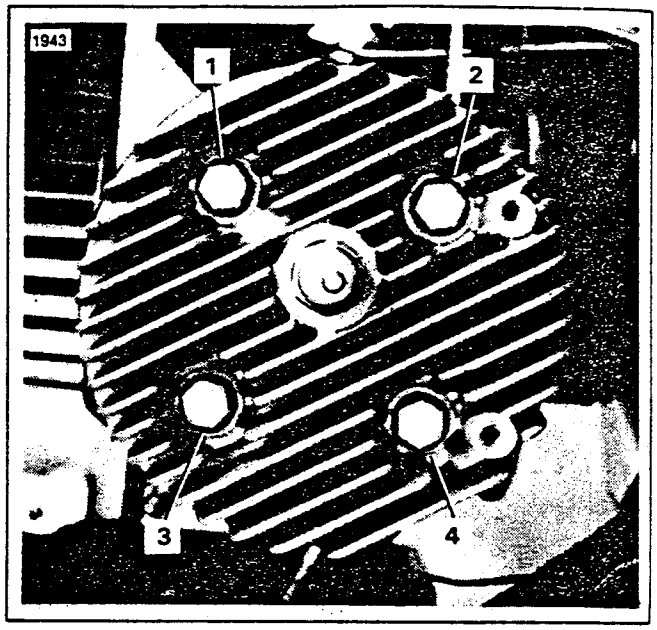


Figure 5-14. Head Bolt Torque Sequence

6. Apply a light coat of oil to the piston, piston rings, crankshaft bearings and pin bearing. 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.

7. Clean the cylinder and cylinder head mating surfaces. Install head gasket, cylinder head and bolts. See SPECIFICATIONS at the beginning of this section for cylinder head bolt torque. See Figure 5-14. for cylinder head bolt torque sequence. Tighten evenly, 10 ft-lbs at a time.

8. See Figure 5-4. Install the shroud (5), bolts and washers (1), screws (2), coil (4) and screws (3).

9. Install spark plug (3, Figure 5-5). Tighten to 15-20 ft-lbs torque.

10. Install the exhaust system with new flange gasket.

11. Reconnect the spark plug wire and battery cables.

12. Test run with 42:1 gas/oil ratio. Check for leaks.

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 gaskets be replaced. Inspect bearings for damage when removed. Replace if necessary.

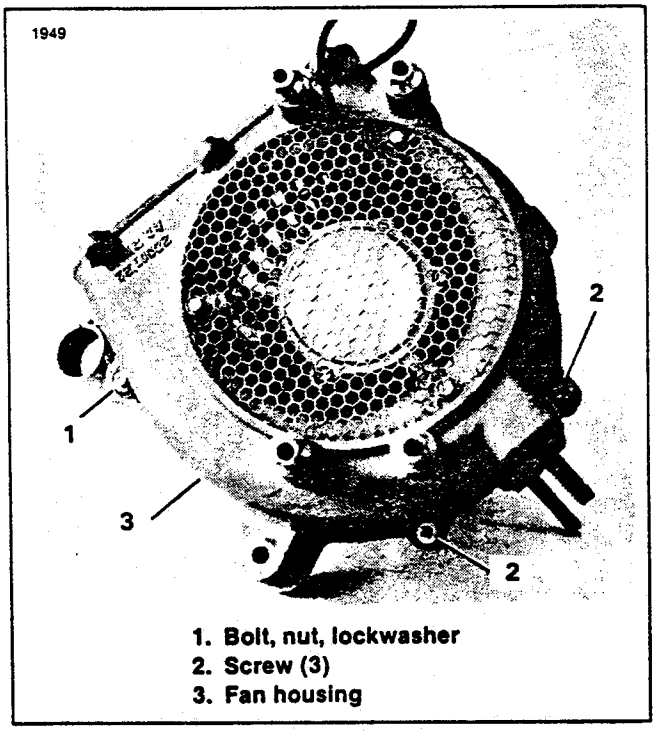
2. Remove the transmission primary drive as described in Section 7.

3. Remove the cylinder and piston as described under CYLINDER AND PISTON.

4. Remove the carburetor/manifold assembly as described in Section 6.

Fan

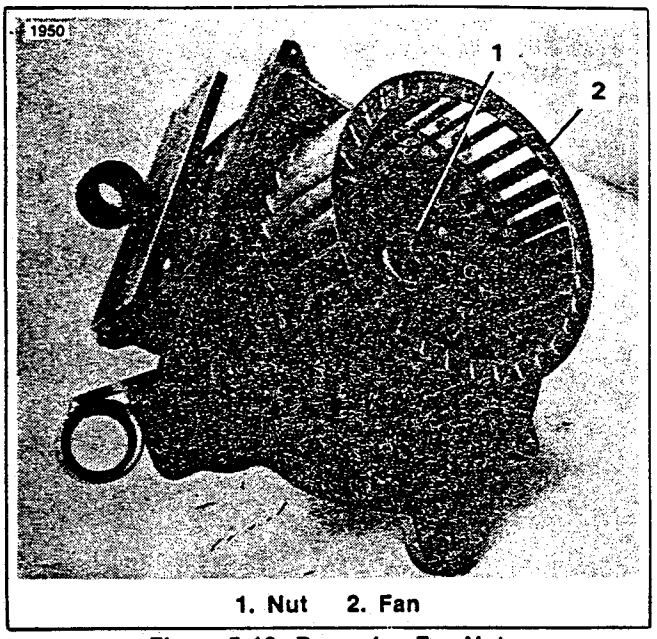
5. See Figure 5-15. Remove the stabilizer bolt and nut (1), screws (2) and pull fan housing (3) free.



1. Bolt, nut, lockwasher
2. Screw (3)
3. Fan housing

Figure 5-15. Removing Fan Housing

6. See Figure 5-16. Place the CONNECTING ROD HOLDING PLATE, Part No. 94403-80, under rod upper end and remove the fan nut (1) and fan (2).



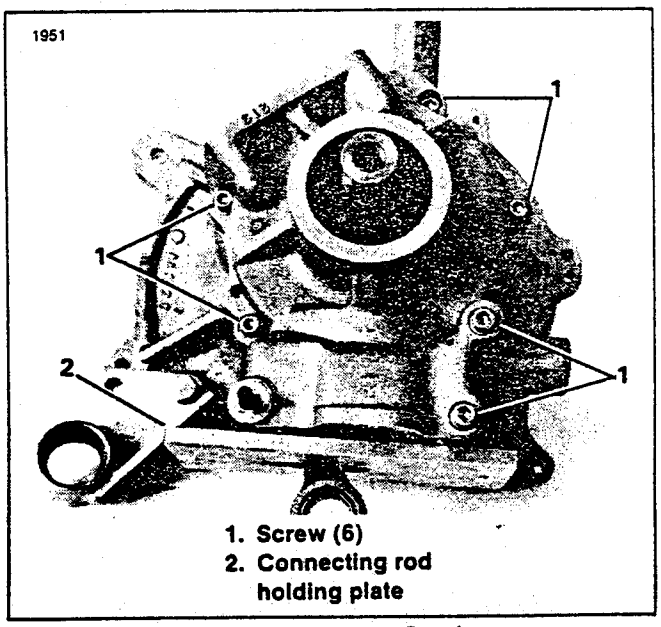
1. Nut 2. Fan

Figure 5-16. Removing Fan Nut

WARNING

Gasoline and oil are extremely flammable and combustible. Keep all sparks and flames away from opened or spilled gasoline.

7. See Figure 5-17. Remove the crankcase screws (1). Tap lightly on the motor mount bosses and separate the crankcase halves.



1. Screw (6)
2. Connecting rod holding plate

Figure 5-17. Separating Crankcases

8. Slip the crankshaft out of the transmission side of crankcase half. Press crankshaft out of fan side of crankcase half.

9. See Figure 5-18. Pull out the oil seals (3).

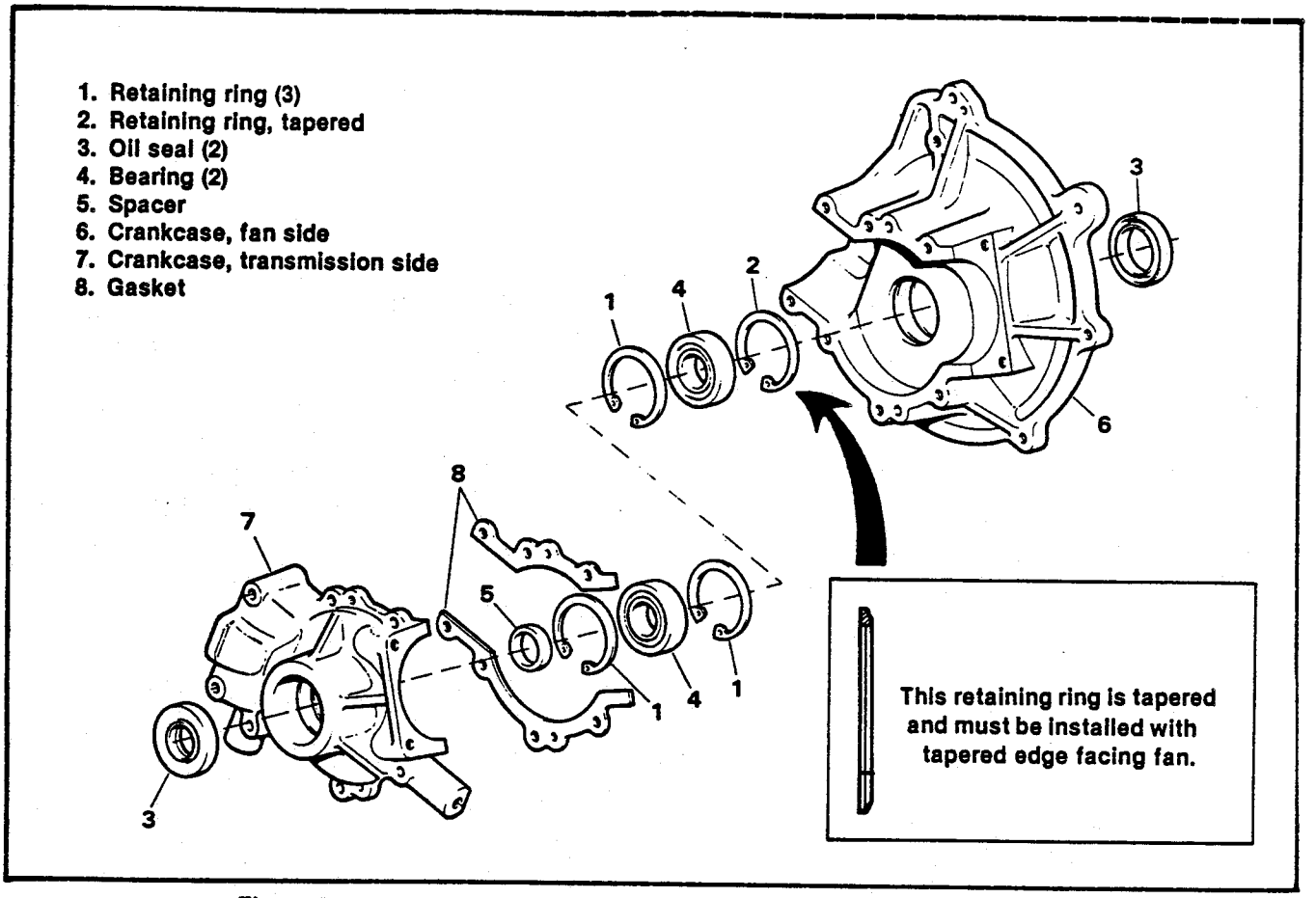


Figure 5-18. Crankcase Oil Seals and Retaining Rings — Exploded View

NOTE

Retaining ring (2, Figure 5-18) is tapered and must be installed with tapered edge facing fan.

10. Remove retaining rings (1) and tapered retaining ring (2) from the crankcase halves.
11. Remove spacer (5) and gasket (8).
12. Instal crankcase halves on press bed and press crankcase bearings (4) out.

NOTE

When the crankcase is disassembled, it is recommended that the oil seals in the crankcase be replaced. Seals are damaged when removed.

CRANKSHAFT (Figure 5-19)

Disassembly

1. Fabricate a press plate that will fit between the crankshaft. Using a suitable press plug press the crankpin (1) from one side of the crankshaft. A press able to exert a six ton load will be required.
2. Remove the thrust washers (2), connecting rod (3), and bearing (4) from crankpin.
3. Press the crankpin (1) from the other side.
4. Remove inner race (6) and ring (7), using Harley-Davidson PULLER TOOL, Part No. 95637-46. First pull ring (7) then inner race (6).

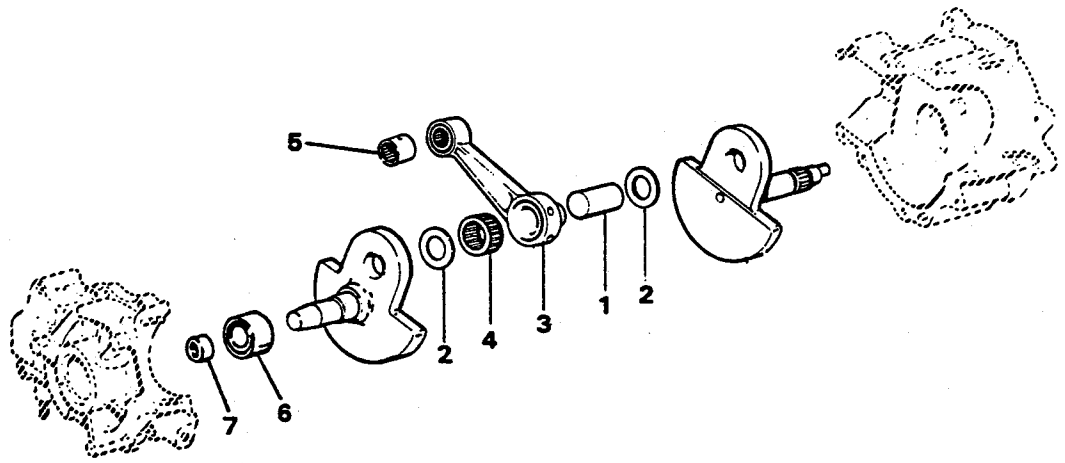
CLEANING AND INSPECTION

1. Clean all parts in a non-flammable solvent and blow dry with compressed air.
2. Examine the rod (3) and thrust washers (2). Replace if damaged.

CRANKSHAFT (Figure 5-19)

Assembly

1. If replacing the connecting rod bearing (5), press the needle bearing (5) from the connecting rod (3). Coat a new needle bearing with 2-cycle engine oil and press on lettered side of bearing into the connecting rod (3) upper end.



1. Crankpin
2. Thrust washer (2)
3. Connecting rod
4. Bearing
5. Bearing
6. Inner race
7. Ring

Figure 5-19. Crankshaft — Exploded View

2. Place one crankshaft half on a press bed and press the crankpin (1) in until it is flush with the outside surface of the crankshaft.

3. Install bearing (4) and connecting rod (3) on the crankpin (1) with one thrust washer (2) on each side of the rod (3).

4. Place the outer crankshaft on the pin (1). Align the two crankshafts using a straightedge, then press the crankshaft assemblies together until the specified rod side clearance is obtained.

5. Press inner race (6) and ring (7) on to crankshaft using Harley-Davidson PULLER TOOL, Part No. 95637-46. First press ring (7) then inner race (6).

Truing Crankshaft

6. See Figure 5-20. Using a truing device and dial indicators as shown check shaft runnout.

7. See Figure 5-21. Shafts must run true within .002 in. on fan side and .002 in. on transmission side. Correct flywheel alignment as follows:

   a. If the shafts run high as the crankpin passes the indicators, mark high spot with chalk, remove crank from truing device, position wedge as shown and strike wedge. Remove wedge and take another reading. Repeat if same condition exists.

   b. If the shafts run high as the crankpin passes directly opposite the indicators, install a C clamp on the bottom of the crank throw and apply pressure on the C clamp. Remove C clamp and take another reading. Repeat if same conditon exists.

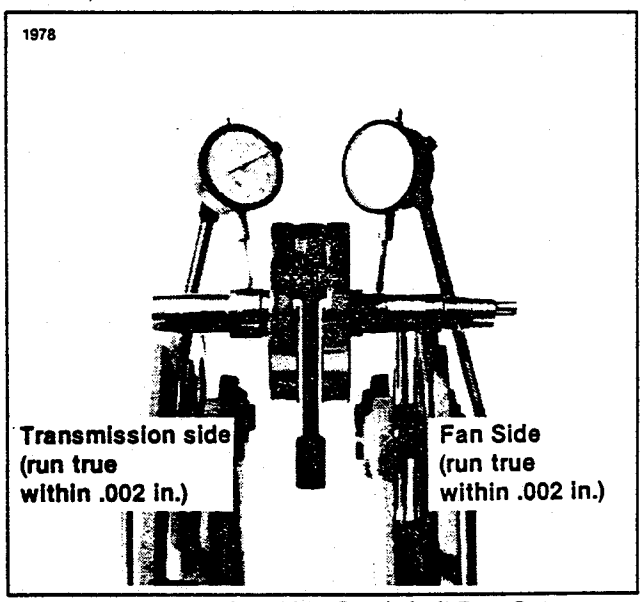


Figure 5-20. Checking Crankshaft Run-Out

   c. If one shaft runs high and the other low as the crankpin passes 90° from the indicators, the crank halves are scissored. Mark the high crank throw at point closest the indicator and remove crankshaft assembly from truing device. Place the low end on a soft surface and strike the marked crank throw on the mark firmly with a copper hammer. A steel hammer will damage the crankshaft. Reinstall assembly in truing device and take another reading. Repeat procedure if same condition exists.

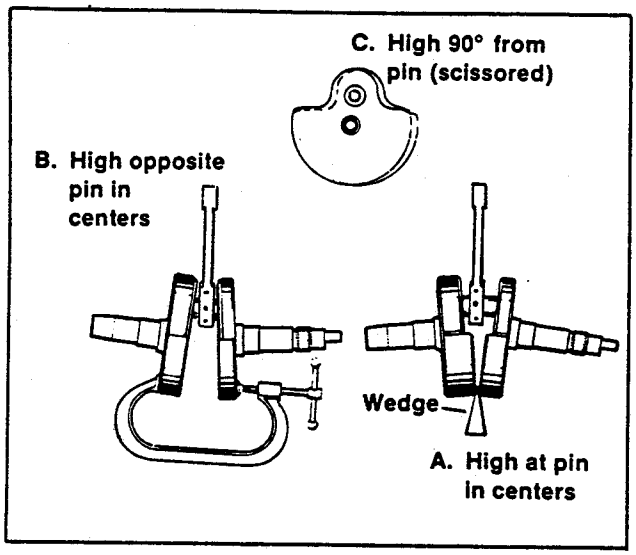


Figure 5-21. Correcting Crankshaft Misalignment

ASSEMBLY CRANKCASE (Figure 5-18)

NOTE

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

NOTE

Retaining ring (2, Figure 5-18) is tapered and must be installed with tapered edge facing fan.

8. See Figure 5-18. Install the external retaining ring (1) and tapered retaining ring (2) to crankcase halves. Install new oil seals (3).

NOTE

Make sure all retaining rings properly seat in ring grooves.

9. Place the crankcase halves on a press bed and press in bearings (4). Install internal retaining rings (1).

10. Press the fan side of crankcase half on to the crankshaft, supporting the crankshaft between the cheeks, press with a sleeve on the ball bearing inner race.

11. Insert the crankshaft in the transmission side of case and gasket (8) into crankcase halves and install the crankcase screws (1, Figure 5-17). Tighten crankcase screw to 7-9 ft-lbs torque.

Fan

12. See Figure 5-16. Install fan (2) on the ignition point side of the crankcase. Using the CONNECTING ROD HOLDING PLATE, Part No. 94403-80 install the fan nut (2). Tighten the fan nut to 50-70 ft-lbs torque.

13. See Figure 5-15. Install fan housing (3), stabilizer bolt and nut (1) and fan housing screws (2).

General

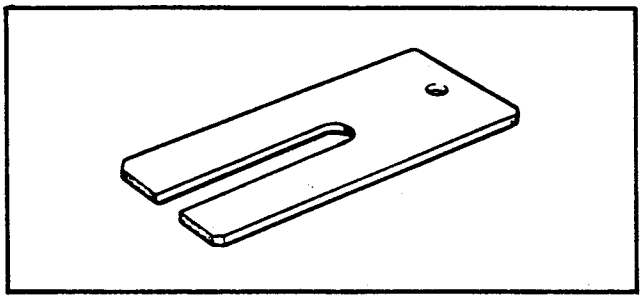
14. Install the transmission primary drive. See Section 7.

15. Install CARBURETOR/MANIFOLD assembly. See Section 6.

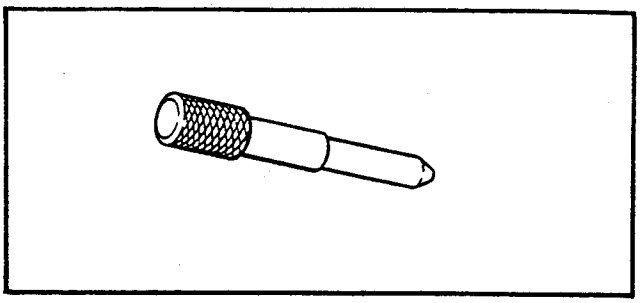
16. Install the cylinder and piston. See the preceding section.

17. Follow the procedures for installing the engine under GENERAL INFORMATION.

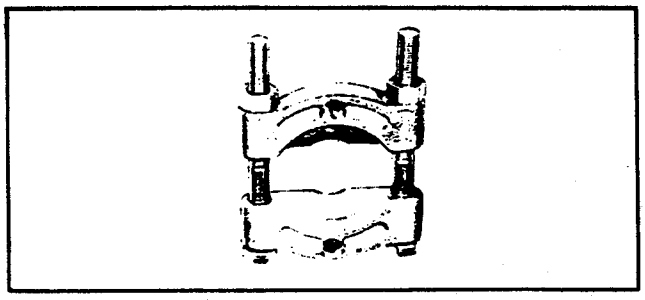
TOOLS



Part No. 94403-80 Connecting Rod Holding Plate



Part No. 96777-72 Drift Tool



Part No. 95637-46 Wedge Attachment

SECTION PAGE NO.

FUEL SYSTEM 6

CARBURETOR

JET SIZES

Part No. 27131-82 Repair kit (std. jet in kit) 038
Part No. 27753-82 (above 6,000 ft.) 035

CAPACITY

Fuel Tank . . . . . (approximately 8.5 Gal. [U.S.] [32.9 Lt.])

TORQUES

Throttle shaft nut . . . . . 20-25 in-lbs
Bolts, intake manifold . . . . . 8-10 ft-lbs
Inlet valve . . . . . 30-40 in-lbs
Main jet . . . . . 40-50 in-lbs
Nuts, manifold . . . . . 8-10 ft-lbs

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 oz.	1-1/2 oz.	3 oz.	4-1/2 oz.	6 oz.	7-1/2 oz.	9 oz.	10-1/2 oz.	12 oz.	13-1/2 oz.	15 oz.	37-1/2 oz. or 1 qt. 4-1/2 oz.	75 oz. or 2 qt. 11 oz.	128 oz. or 1 gal.	150 oz. or 1 gal. 22 oz.

1 U.S. pint = 16 oz. 1 U.S. quart = 32 oz. 1 U.S. gal. = 128 oz.
1 liter = 33.82 oz. 1 Imp. gal. = 143.7 oz. 1 Imp. gal. = 1.2 U.S. gal.

GENERAL

The golf car engine is equipped with a float type carburetor having an external fuel pump which operates on crankcase pulsations.

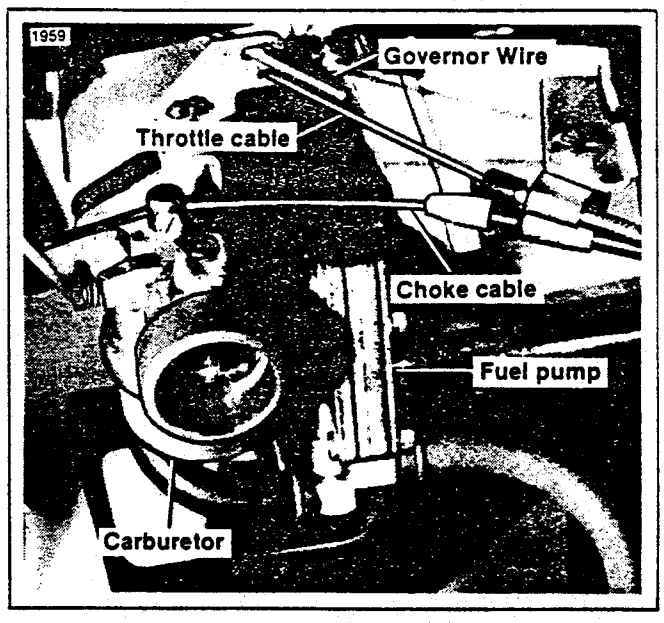


Figure 6-1. Carburetor/Fuel Pump

OPERATION

Choke

The choke is used for cold starting. With the choke pulled all the way out the choke valve is closed, and the fuel mixture is enriched.

Fuel Supply System

Fuel is drawn from the gas tank by the fuel pump and passes through the inlet valve into the float chamber. The fuel entering the chamber causes the float to rise until it shuts off the fuel valve, stopping flow at a level predetermined by the float level setting.

Low Speed Circuit (Figure 6-2)

The low speed circuit functions at low and intermediate speeds, when the throttle valve is closed or only partially open. Fuel passes from the float chamber through the main jet into the low speed circuit and enters the throat of the carburetor through the main idle jet port.

The low speed circuit contains an air bleed to help atomize the fuel. This low speed circuit also contains an adjustment needle for enriching or leaning the fuel mixture.

Mid-Range Circuit (Figure 6-3)

As the throttle valve opens slightly, an additional low speed port is uncovered, allowing more fuel to enter the throat of the carburetor.

As the throttle valve continues to open, air flow through the venturi increases and creates low pressure at the point where the high speed nozzle enters the carburetor throat drawing additional fuel through the high speed nozzle.

High Speed Circuit (Figure 6-4)

During full throttle operation, fuel is metered through the main jet and mixed with air from the main air jet in the main bleed tube and enters the carburetor throat through the main nozzle.

ADJUSTMENTS

1. 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 the car from moving.

CAUTION

When making carburetor adjustments, turn adjustment screw carefully and slowly. DO NOT force adjustment screw into seat.

NOTE

When making carburetor adjustments, pause for several seconds to allow the engine to respond to the new mixture settings.

Low Speed Mixture (Figure 6-2)

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

Throttle Stop Screw Adjustment

1. With the ignition off and the accelerator pedal fully released, back off screw until the throttle disc is fully closed, then turn screw back in a 1/4 turn.
2. Start up the engine to check throttle operation. When the accelerator pedal is released, the throttle lever 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.

Float Level Adjustment (Figure 6-5)

1. Remove the carburetor as listed in the REMOVAL section.
2. Remove the float bowl as described under Carburetor DISASSEMBLY.
3. Turn the carburetor upside down and adjust float so clearance between outer rim of casting and the nearest part of the float is 3/32 in.
4. The adjustment is made by bending the tab resting against the float valve.

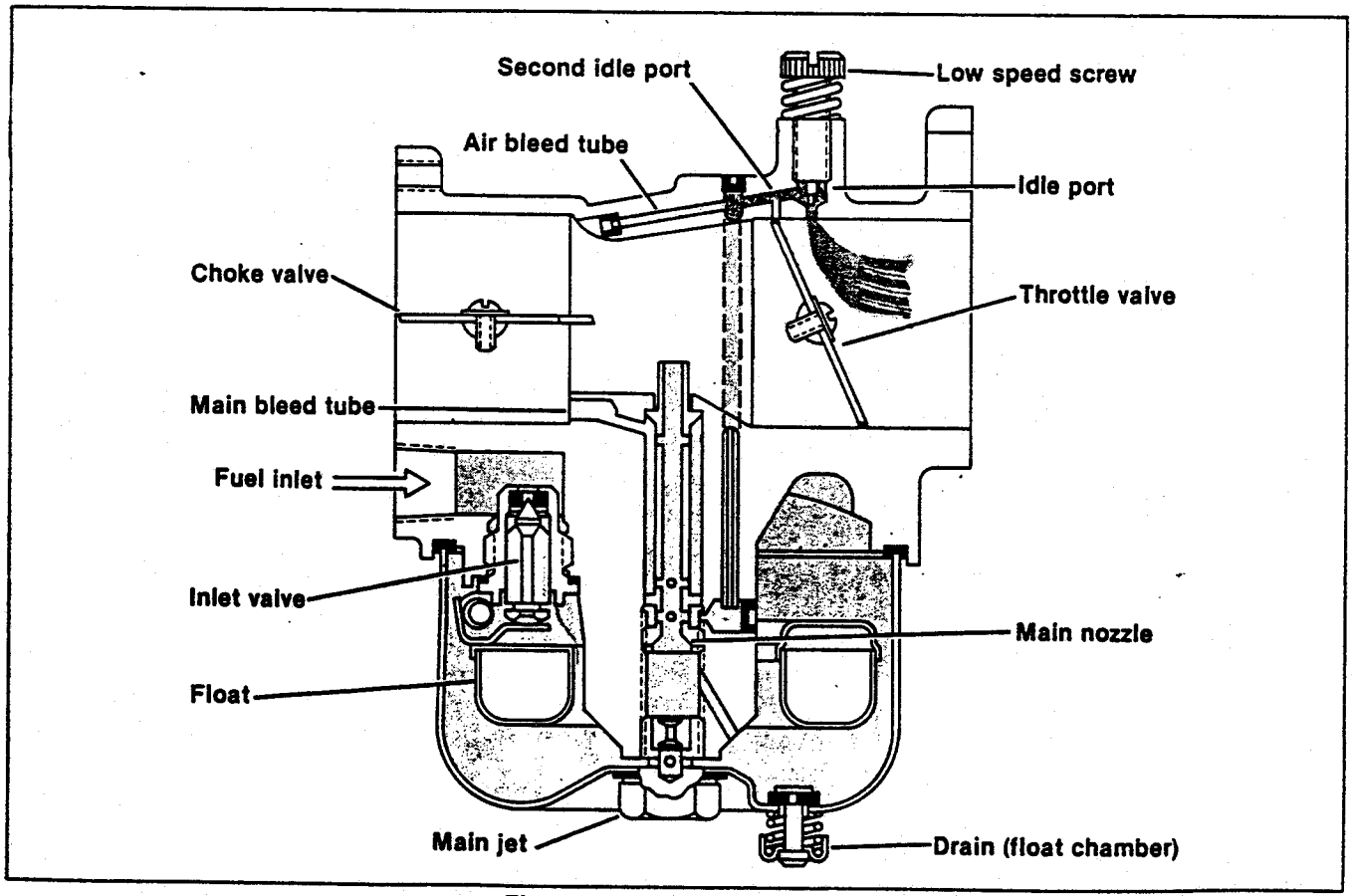


Figure 6-2 Low Speed Circuit

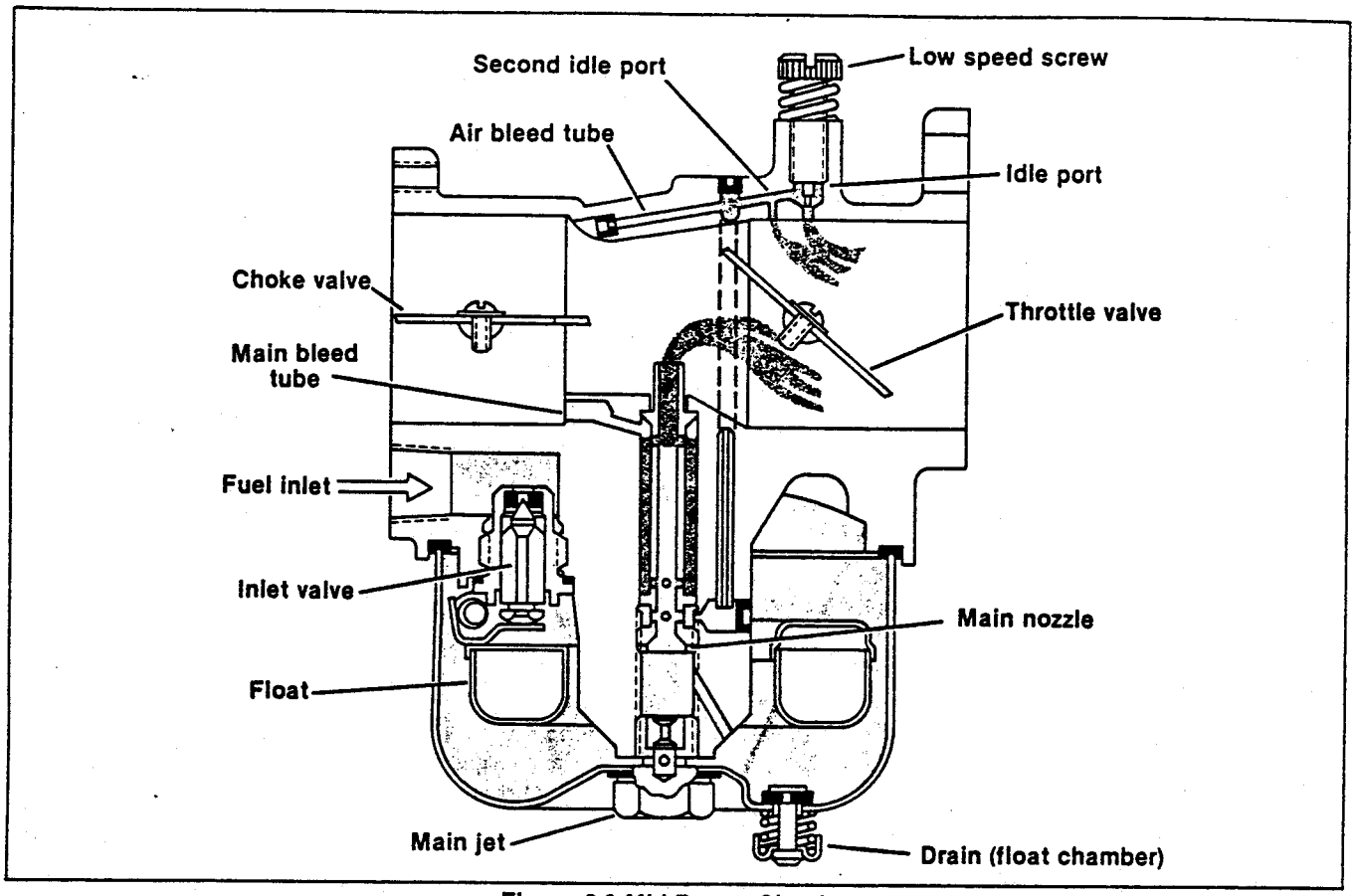


Figure 6-3 Mid-Range Circuit

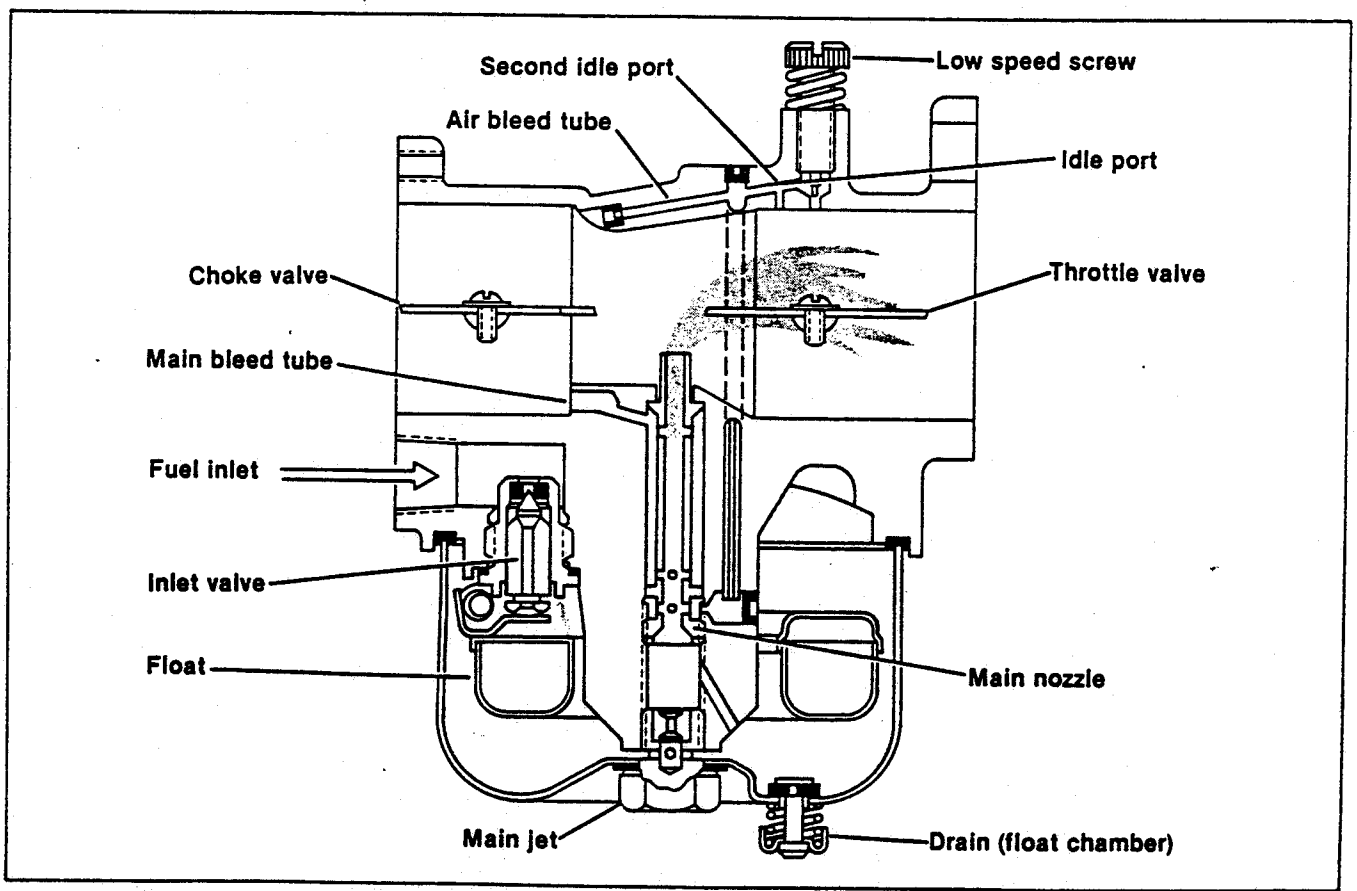


Figure 6-4 High Speed Circuit

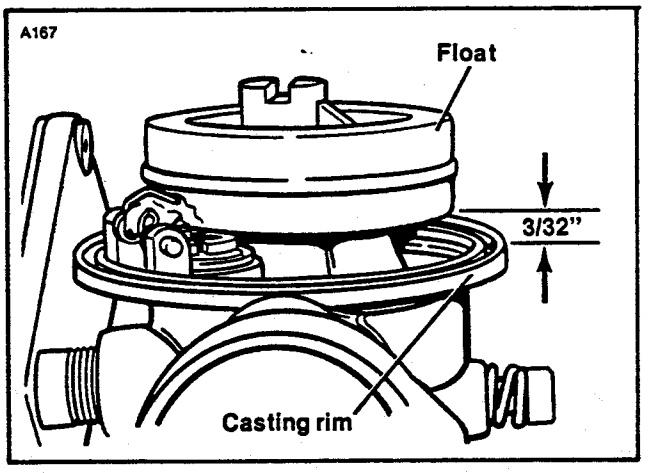


Figure 6-5. Float Level Setting

5. Assemble the float bowl and install the carburetor as described in the ASSEMBLY PROCEDURE.

Throttle Control Adjustment (Figure 6-7).

1. Disconnect the throttle cable from the carburetor throttle lever.

2. Remove the cotter pin (1) and washer (2). Then remove the swivel block (3) from the accelerator pedal bracket.

3. Unscrew the locknut (4), swivel block (3) and shield tube (5) from the threaded end of the cable (6).

4. 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 6-6. Temporarily re-install the swivel block to the accelerator pedal bracket.

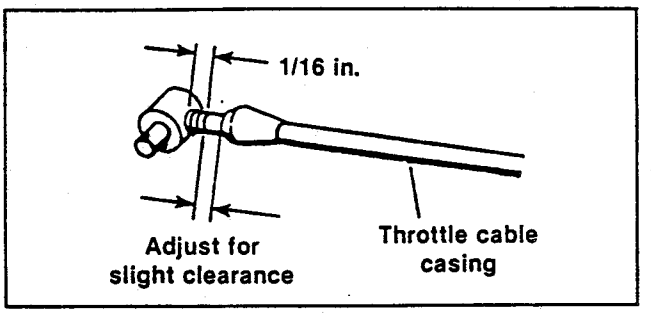


Figure 6-6. Throttle Closing Adjustment

5. See Figure 6-6. With the accelerator pedal fully depressed, the threads on the cable end must not enter the seal on the end of the cable casing.

6. See Figure 6-7. 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.

7. 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.

8. Connect the swivel block to the accelerator pedal bracket and secure it with washer (2) and cotter pin (1).

9. 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.

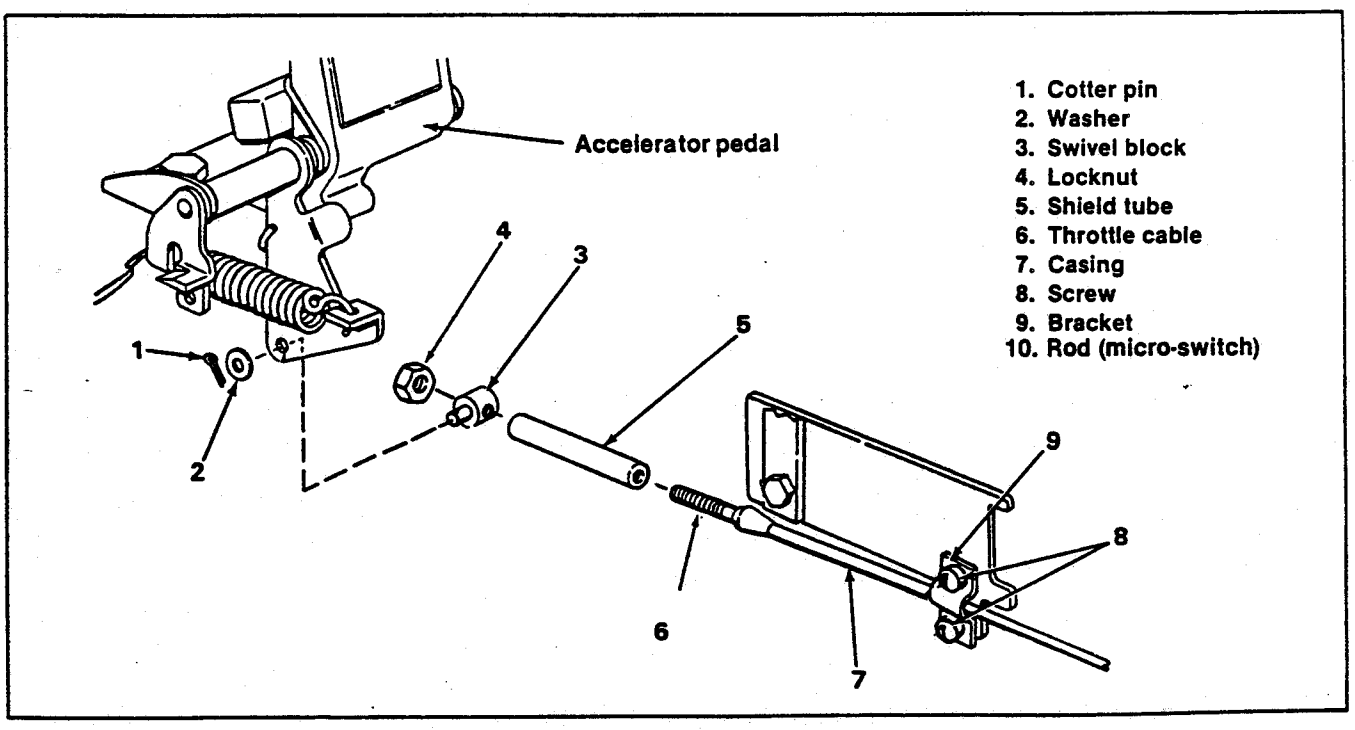


Figure 6-7. Throttle Control Adjustment

10. When the accelerator pedal is fully released, the throttle lever should return against the idle stop screw.

11. Check and adjust the micro-switch as specified in Section 8 under SWITCHES.

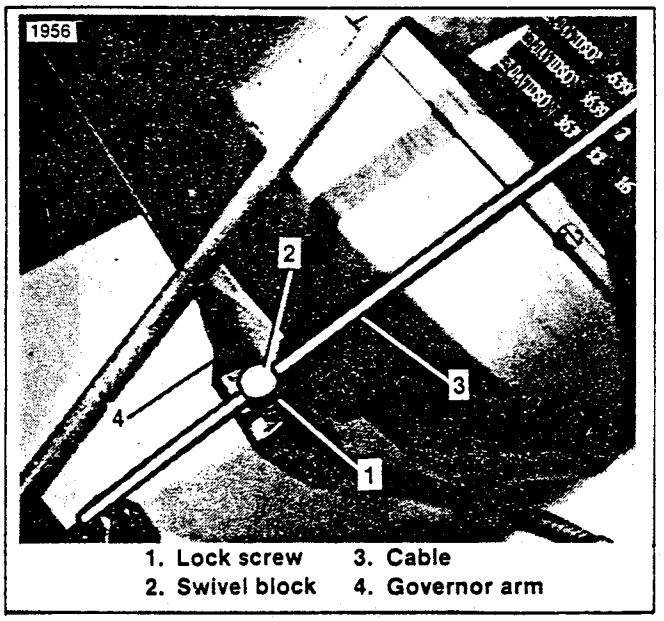
Governor Control Adjustment (Figure 6-8)

1. Start engine and set governor speed at 2800 rpm with one wheel off ground.

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) (2800 rpm). Exceeding these figures can be hazardous, resulting in loss of control or loss of vehicle stability.



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

Figure 6-8. Governor Adjustment

REPLACING CABLES AND CASINGS

Raise the golf car body.

WARNING

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

Throttle

1. Disconnect the throttle cable at the carburetor.

2. See Figure 6-6. Remove the cotter pin (1) and washer (2). Remove the swivel block from the accelerator pedal bracket.

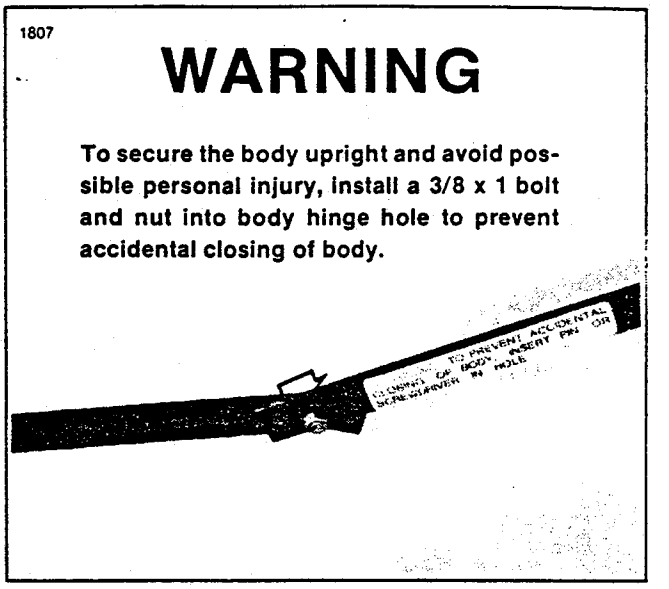
3. See Figure 6-6. Remove the lock nut (4), swivel block (3) and shield tube (5) from the cable (6). Remove the two screws (8) from bracket (9).

4. 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. Casing should have no sharp bends.

7. Perform the steps listed under ADJUSTMENTS for the throttle cable.



WARNING

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

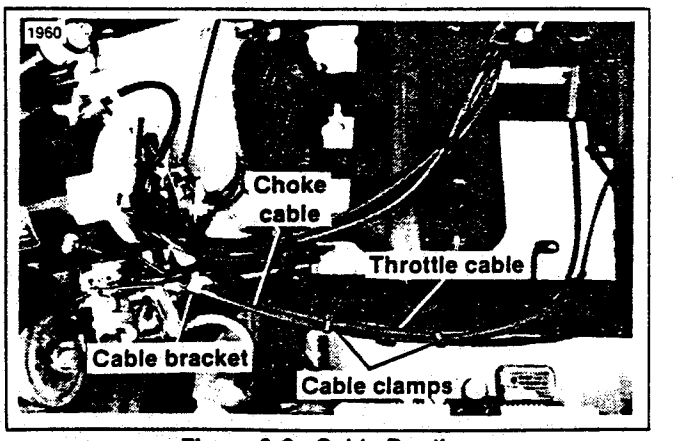


Figure 6-9. Cable Routing

Choke

1. Disconnect the choke cable from the carburetor.
2. Disconnect the choke knob from the mounting tower.
3. Cut any cable straps securing the choke casing to the throttle casing.

NOTE

If the choke control is sticky, but cable and casing are not damaged, clean the cable and casing with a non-flammable cleaning solvent, then lubricate both with grease.

4. Replace the cable and casing if they are bent, kinked or broken.
5. Coat cable with grease and install it into casing. Route cable back to carburetor making sure cable has no sharp bends.
6. Connect the cable to the carburetor. Make sure cable slides freely and does not interfere with the throttle cable.
7. Test choke to make sure it opens and closes fully. Adjust cable on swivel block 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 (.013 - .016) 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. Air cleaner element.
7. 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.
8. Check fuel pump connections to carburetor and intake manifold.
9. Make sure the exhaust is not restricted.

TROUBLESHOOTING THE CARBURETOR (Figure 6-10)

Engine Starts Hard	
Check for:	Remedy:
1. Choke valve (23) not operating properly.	1. Adjust choke system.
2. Dirty carburetor.	2. Disassemble and clean.
3. Loose carburetor mounting nuts.	3. Tighten mounting nuts.
4. Fuel overflow.	4. Inspect float (12) and fuel valve (10) and adjust or replace.
Carburetor Floods	
Check for:	Remedy:
1. Worn fuel valve (10) or dirty fuel valve seat (13).	1. Replace valve (10) or clean valve seat (13).
2. Improper fuel level in float bowl.	2. Adjust float (12).
3. Damaged float bowl gasket (4).	3. Replace gasket (4).
4. Deformed float (12).	4. Replace float (12).
Engine Runs Rich	
Check for:	Remedy:
1. Dirty air filter.	1. Clean.
2. Improper adjustment.	2. Adjust idle screw (17).
3. Plugged air bleeds.	3. Remove float bowl (3), nozzle (15) and clean thoroughly with compressed air.
4. Choke not opening.	4. Adjust choke cable at carburetor.

Engine Runs Lean

Check for:	Remedy:
1. Tank vent plugged.	1. Clean.
2. Leak in fuel line from tank to fuel pump.	2. Tighten or replace fitting or line.
3. Dirt in fuel delivery channels.	3. Remove float bowl (3), idle screw (17) and clean thoroughly with compressed air.
4. Fuel filter plugged.	4. Replace.
5. Fuel pump not working properly.	5. Test run, check for leaks, disassemble and inspect fuel pump gaskets and diaphrams for damage, replace if necessary.
6. Engine air leak.	

Fuel Leak From Carburetor

Check for:	Remedy:
1. Improper float level setting.	1. Adjust, set float parallel to bowl flange with 3/32 in. clearance.
2. Dirty inlet valve seat.	2. Remove fuel valve (10), clean seat (13) with gas.
3. Plugged bowl vent.	3. Remove bowl and blow clean with compressed air.
4. Carburetor gummed from storage.	4. Remove fuel bowl and clean.

Loss of Power (Fuel Insufficient)

Check for:	Remedy:
1. Clogged fuel line. Tank vent plugged.	1. Clean.
2. Dirty fuel system.	2. Clean.
3. Air leaking into system.	3. Check mounting nuts (25) and gaskets (37).
4. Clogged fuel filter.	4. Replace.
5. Generally dirty carburetor.	5. Disassemble and clean.
6. Fuel pump not working properly.	6. Test run, check for leaks, disassemble and inspect fuel pump gaskets and diaphrams for damage, replace if necessary.

Loss of Power (Air Insufficient)

Check for:	Remedy:
1. Dirty air cleaner.	1. Clean or replace air cleaner.
2. Throttle cable not working.	2. Check throttle cable, clean or replace.
3. Correct jetting for high altitude operation.	3. Install high altitude jet.

REMOVAL

1. Raise golf car body.

WARNING

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

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.

2. Loosen air cleaner clamp and pull air cleaner hose free of carburetor.

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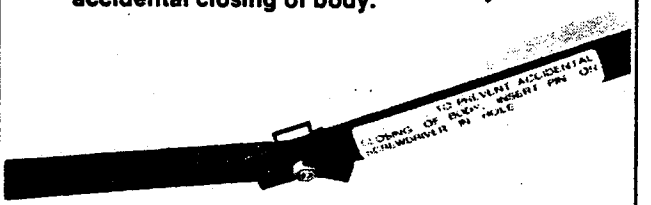
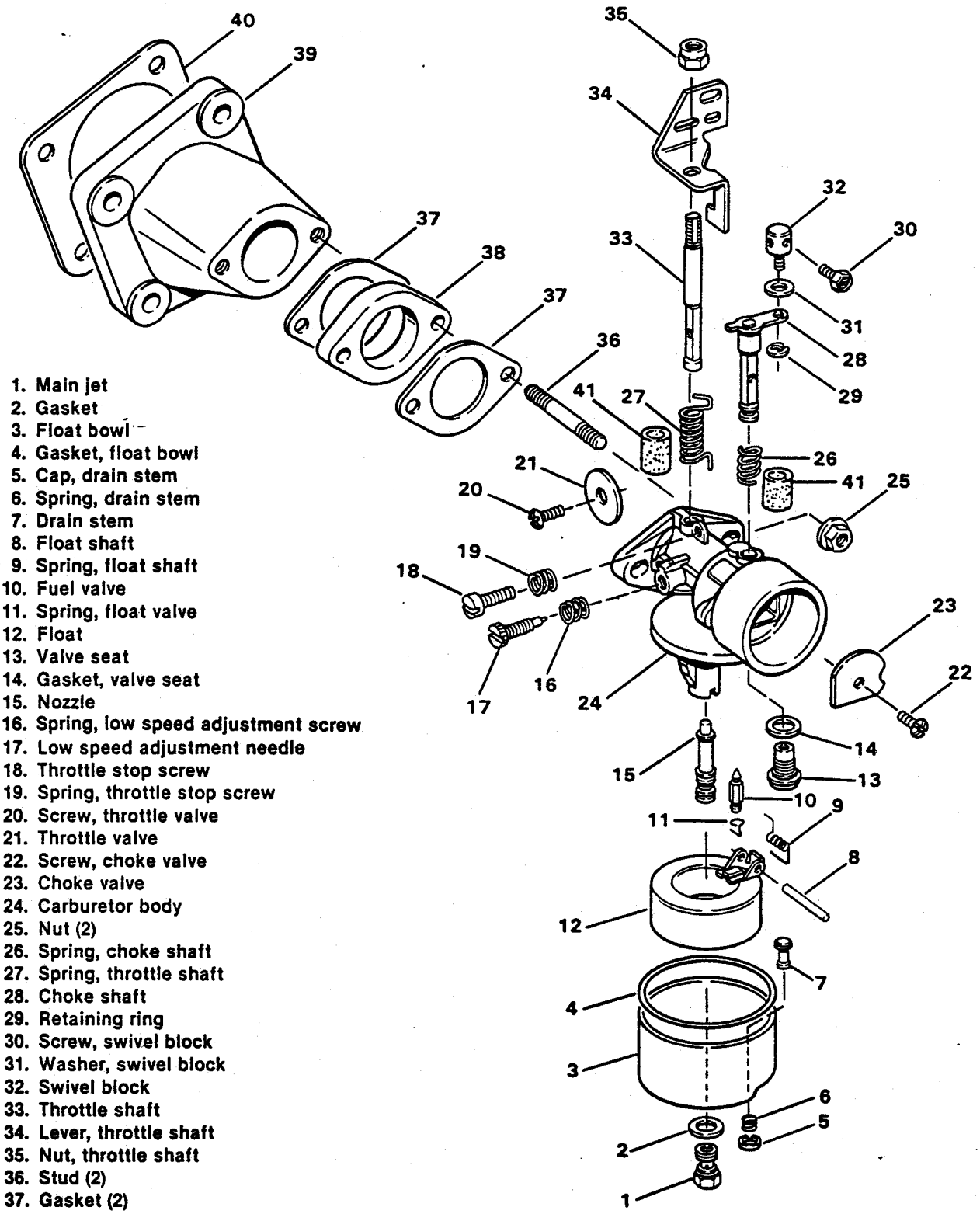
WARNING

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 body.





1. Main jet
2. Gasket
3. Float bowl
4. Gasket, float bowl
5. Cap, drain stem
6. Spring, drain stem
7. Drain stem
8. Float shaft
9. Spring, float shaft
10. Fuel valve
11. Spring, float valve
12. Float
13. Valve seat
14. Gasket, valve seat
15. Nozzle
16. Spring, low speed adjustment screw
17. Low speed adjustment needle
18. Throttle stop screw
19. Spring, throttle stop screw
20. Screw, throttle valve
21. Throttle valve
22. Screw, choke valve
23. Choke valve
24. Carburetor body
25. Nut (2)
26. Spring, choke shaft
27. Spring, throttle shaft
28. Choke shaft
29. Retaining ring
30. Screw, swivel block
31. Washer, swivel block
32. Swivel block
33. Throttle shaft
34. Lever, throttle shaft
35. Nut, throttle shaft
36. Stud (2)
37. Gasket (2)
38. Insulation block
39. Manifold, intake
40. Gasket, intake manifold
41. Foam seal (2)

Figure 6-10. Carburetor — Exploded View

WARNING

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

3. Drain the float bowl and disconnect fuel line, choke cable, throttle cable, and governor control cable.
4. Remove the nuts and lockwashers and pull carburetor out.
5. Remove fuel pump by unscrewing from the carburetor body.

DISASSEMBLY

Float Chamber (Figure 6-10)

1. Remove main jet (1), gasket (2), float bowl (3) and float bowl gasket (4).
2. Remove float shaft (8), float (12), spring (9) and float valve (10).
3. Remove main jet nozzle (15), (if required), float valve seat (13) and gasket (14).

Carburetor Body (Figure 6-10)

NOTE

Note the spring positions for both throttle and choke shafts. This is important for reassembly.

1. Remove the throttle shaft locknut (35), lever (34), foam seal (41), spring (27), screw (20), throttle valve (21) and throttle shaft (33).
2. Remove the throttle stop screw (18) and spring (19).
3. Remove the choke valve screw (22), choke valve (23) and pull the choke shaft assembly (28) out of the carburetor body (24). Remove spring (26) and foam seal (41).
4. Remove low-speed adjustment needle (17) and spring (16).

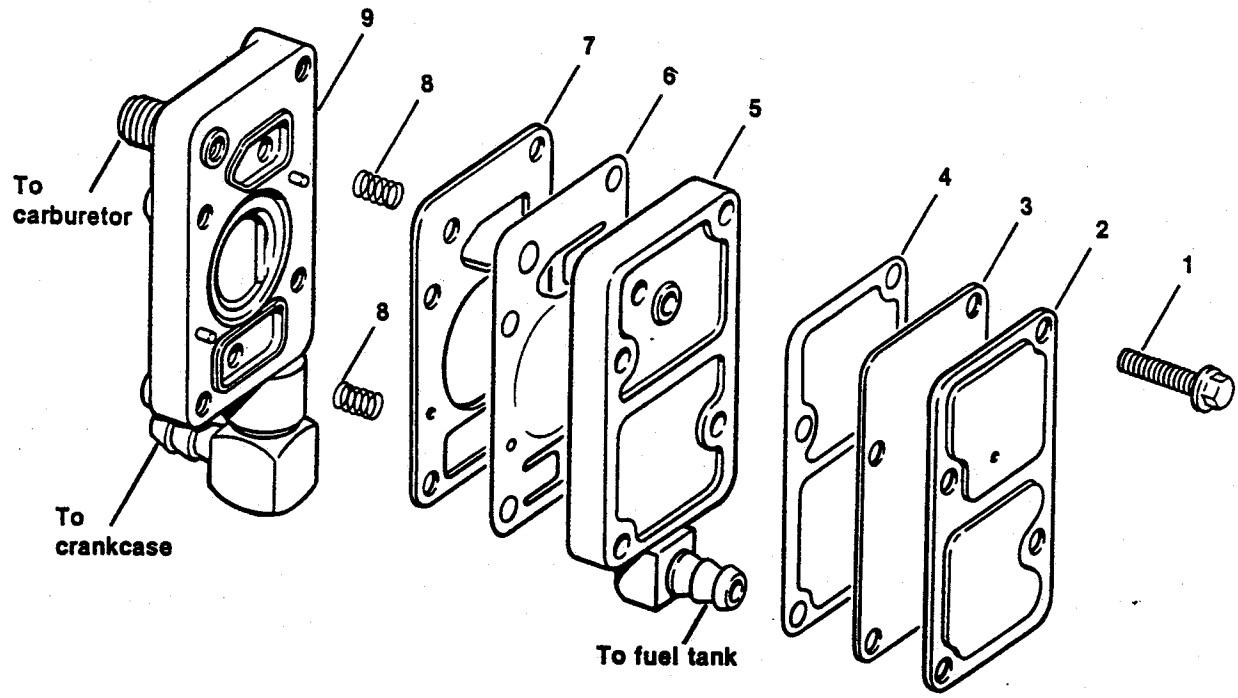
FUEL PUMP

Disassembly (Figure 6-11)

NOTE

To ensure against fuel pump leaks, install new gaskets if fuel pump is disassembled.

1. Remove the fuel pump screws (1) and cover (2).



1. Screws (4)
2. Cover
3. Diaphragm (pumping chamber)
4. Gasket (pumping chamber)
5. Pumping chamber
6. Diaphragm (impulse chamber)
7. Gasket (impulse chamber)
8. Springs (2)
9. Impulse chamber

Figure 6-11. Fuel Pump — Exploded View

2. Separate the pumping chamber (5) from the impulse chamber (9).

3. Separate the gasket (4) and diaphram (3) from the pumping chamber housing.

4. Separate the gasket (7), diaphram check valve (6) and springs (8) from the impulse chamber (9).

CLEANING, INSPECTION AND REPAIR

Fuel Pump

1. Clean fuel pump chamber with Harley-Davidson CLEANING SOLVENT, Part No. 99631-77.

2. Blow any dirt out of fuel pump using compressed air.

3. Replace fuel pump gaskets and diaphrams, using Harley-Davidson FUEL PUMP REPAIR KIT, Part No. 27110-81.

Carburetor

1. Clean the carburetor body in a cleaning solvent such as Harley-Davidson GUNK, Part No. 99750-77 to remove varnish and carbon from the fuel and air passages.

2. Blow with dry compressed air. Reverse the air flow through all passages to remove all dirt particles.

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.

Float Chamber

1. Blow any dirt from float valve passage.

2. Clean all dirt from float valve seat.

3. Replace float if it is cracked or damaged.

ASSEMBLY

Carburetor Body (Figure 6-10)

1. Install throttle shaft (33) into carburetor body (24) and position throttle valve (21).

2. Apply Harley-Davidson LOCK N' SEAL, Part No. 99625-77 to throttle valve screw (20) and tighten to 5-6 in-lbs torque.

3. Throttle spring (27) must be installed to ensure proper throttle return. Install throttle lever (34) and locknut (35). Tighten locknut to 20-25 in-lbs torque.

4. Install choke lever (28) and spring (26) into carburetor body (24) and position choke valve (23).

5. Apply Harley-Davidson LOCK N' SEAL, Part No. 99625-77 to choke screw (22) and tighten to 5-6 in-lbs torque.

6. Choke spring (26) must be installed as shown to ensure proper choke operation.

7. Install idle screw (17) and spring (16). See ADJUSTMENTS.

8. Install stop screw (18) and spring (19). See ADJUSTMENTS.

Float Chamber (Figure 6-10)

NOTE

This float valve and seat is carefully matched, should any parts be damaged or show signs of wear, a complete new float valve, gasket and seat should be installed.

1. Install nozzle (15) (if removed) and tighten to 40-50 in-lbs torque.

2. Install float valve gasket (14) and valve seat (13). Tighten float valve seat to 40-50 in-lbs torque.

3. Install float (12), valve (10), float valve spring (11), spring (9) and float shaft (8).

NOTE

At this time, check the float level as described in ADJUSTMENTS.

NOTE

Position float bowl so drain is facing towards fuel pump (rear of engine).

4. Install gasket (4), float bowl (3), main jet gasket (2) and main jet (1). Tighten main jet (1) to 35 in-lbs. torque.

FUEL PUMP

Assembly (Figure 6-11)

NOTE

Fuel pump repair kit, Part No. 27110-81, will be required before reassembling the fuel pump.

1. Install new valve springs (8), gasket (7) and diaphram (6).
2. Press impulse chamber (9) to pumping chamber (5) and install pumping chamber gasket (4) and diaphram (3).
3. Install cover (2) and screws (1). Tighten cover screws to 18-22 in-lbs torque..
4. Turn fuel pump into carburetor body one turn, then apply Harley-Davidson LOCK N' SEAL, Part No. 99625-77 to fuel pump threads. Continue threading fuel pump into carburetor body to position as orignally installed with 75 in-lbs torque.

INSTALLATION

1. Install carburetor to manifold studs and fasten using nuts. Tighten carburetor nuts to 8-10 ft-lbs torque.
2. Connect fuel line at fuel pump.
3. Connect throttle cable, choke cable and govenor rod.
4. Check throttle and choke operation. See ADJUSTMENTS.
5. Connect air cleaner hose and tighten clamp.
6. Check for leaks.
7. Connect battery cables, lower body and test drive.

REED VALVE

GENERAL

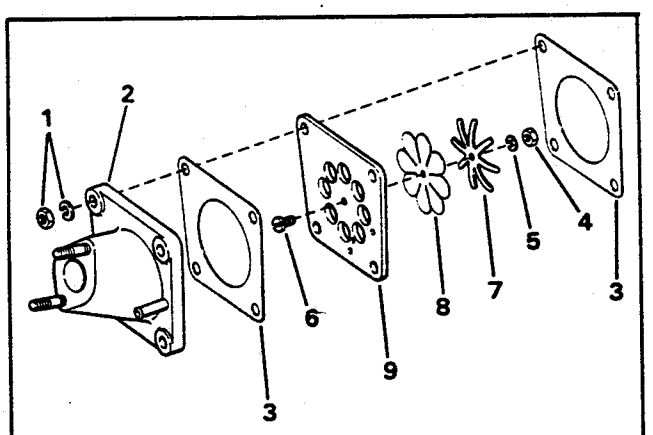
The reed valve is a one way valve consisting of a leaf spring with 8 petals over 8 holes in a plate. The petals open to allow the fuel mixture to enter the engine crankcase on piston upstroke and close on piston downstroke to prevent fuel blowback from the crankcase to the carburetor. The reed valve 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 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 6-12)

1. Remove carburetor and intake manifold assembly as described in the preceeding 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).



1. Washers (4)
2. Manifold
3. Gasket
4. Nut
5. Lockwasher
6. Screw
7. Stop
8. Leaf
9. Plate

Figure 6-12. Reed Valve and Manifold

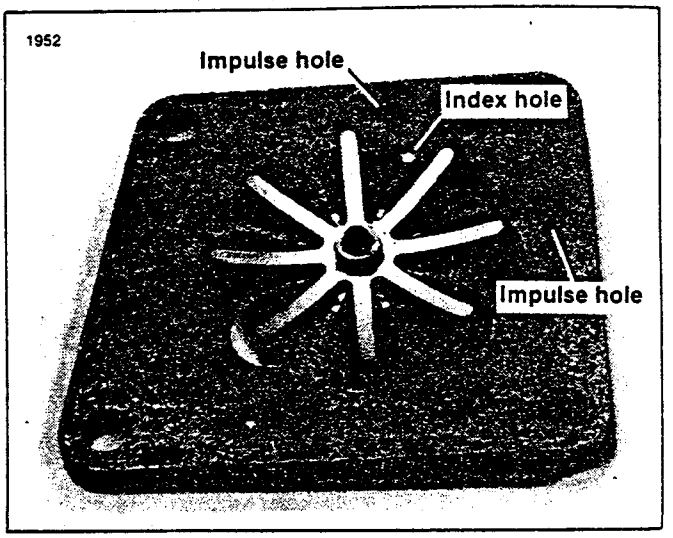


Figure 6-13. Reed Valve Position

CLEANING, INSPECTION AND REPAIR

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 (9) with 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 6-12. 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 plate 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 stop facing into the crankcase.
5. Install the carburetor/manifold assembly and air cleaner hose.

AIR CLEANER

SERVICING (Figure 6-14)

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 (1), washer (2) and rubber washer (10) 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.

Cleaning can also be done with compressed air (35 psi [2.4 atm]) from inside out.

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.

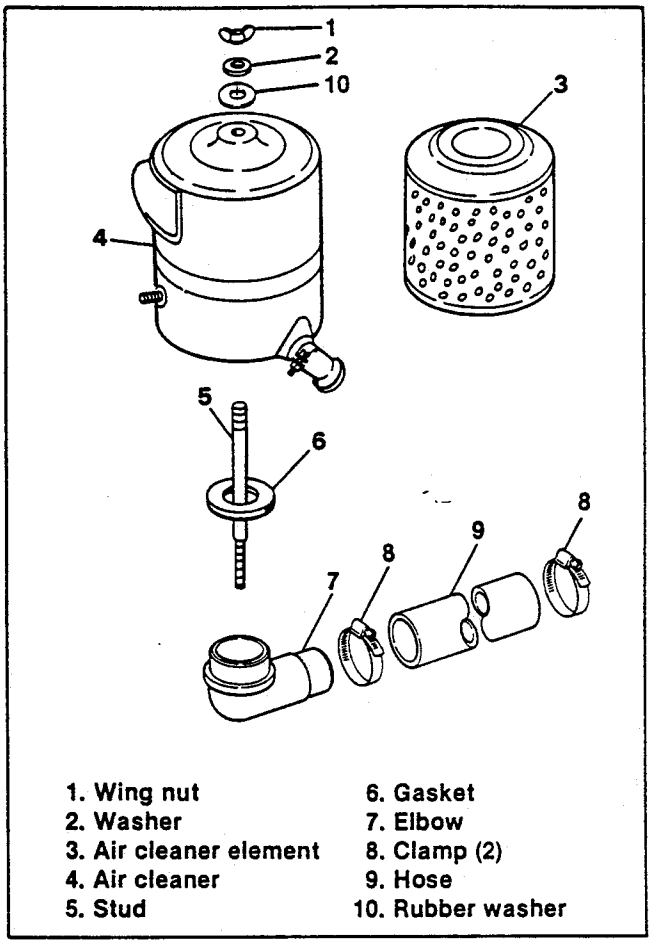
NOTE

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 6 washings because of possible deterioration.

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 proper canister seal, the air cleaner element must have a minimum height of 6.080 in. See Figure 6-15.

CAUTION

Do not use solvent to clean element.



1. Wing nut
2. Washer
3. Air cleaner element
4. Air cleaner
5. Stud
6. Gasket
7. Elbow
8. Clamp (2)
9. Hose
10. Rubber washer

Figure 6-14. Air Cleaner — Exploded View

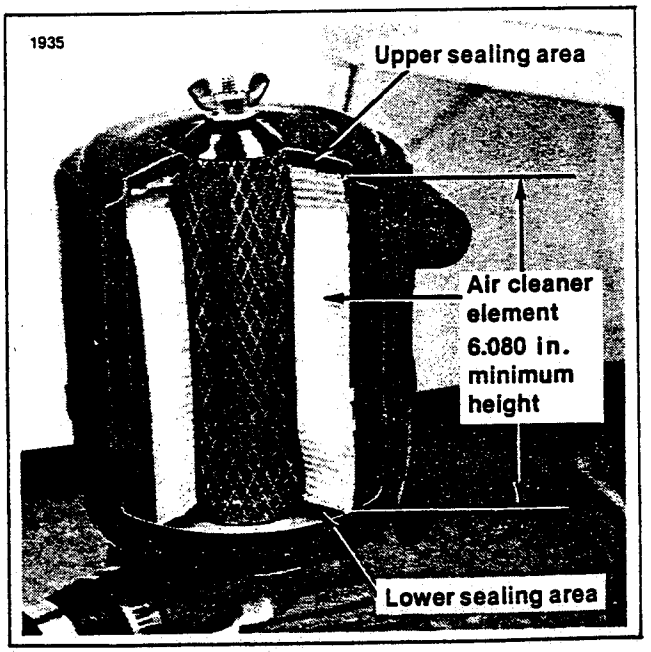


Figure 6-15. Air Filter Element Minimum Height

CAUTION

If the air cleaner element is short, the canister cover will contact before the element can seal, leaving space on top for dirt to pass over element and enter engine. This will damage the engine and void the warranty.

5. Clean bottom of canister and reinstall element.Place top of canister with inlet facing toward the starter-generator and unloader valve should face forward. Tighten wing nut securely by hand.

FUEL TANK

SERVICING (Figure 6-16)

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.

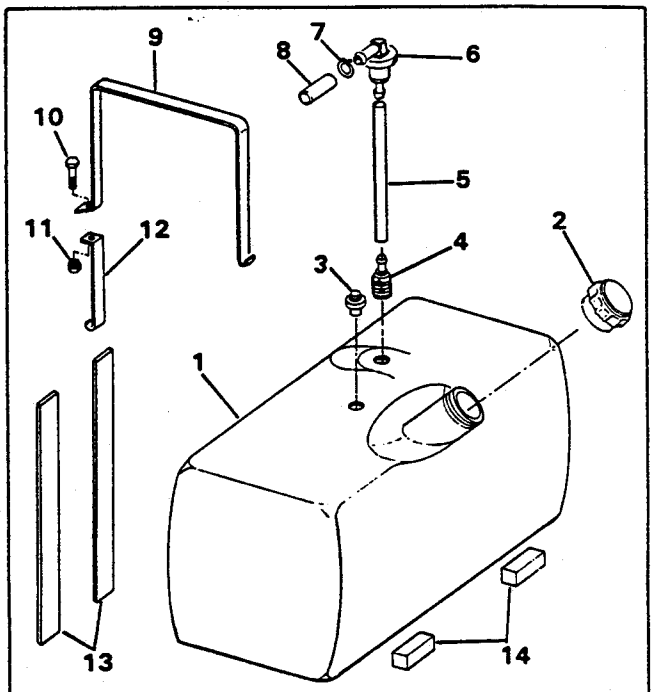
A cartridge type fuel filter is located in the fuel supply line to the carburetor. If there is an indication of restricted fuel flow at the carburetor, filter should be replaced and fuel strainer screen (4) should be cleaned.

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.



1. Fuel tank
2. Fuel tank cap
3. Atmospheric vent
4. Fuel strainer/check valve
5. Pickup hose
6. Hose fitting
7. Hose clamp
8. Fuel line
9. Upper bracket
10. Bolt
11. Nut
12. Lower bracket
13. Vinyl pad
14. Rubber block

Figure 6-16. Fuel Tank — Exploded View

SECTION PAGE NO.

TRANSMISSION 7

GENERAL INFORMATION

DESCRIPTION

The 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 speed increases, the primary drive floating flange moves toward the fixed flange by the force of three weights operating on ramps in the primary floating flange. When the throttle is closed, the engine slows down, reducing the force on the weights and the primary spring separates the flanges. As the engine speed increases the driving ratio changes. See Figure 7-1. The increased speed causes the V-belt to ride higher up on the flanges on the primary drive decreasing the driving ratio.

WARNING

Block vehicle wheels when working on drive to prevent drive components from rotating during servicing.

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.

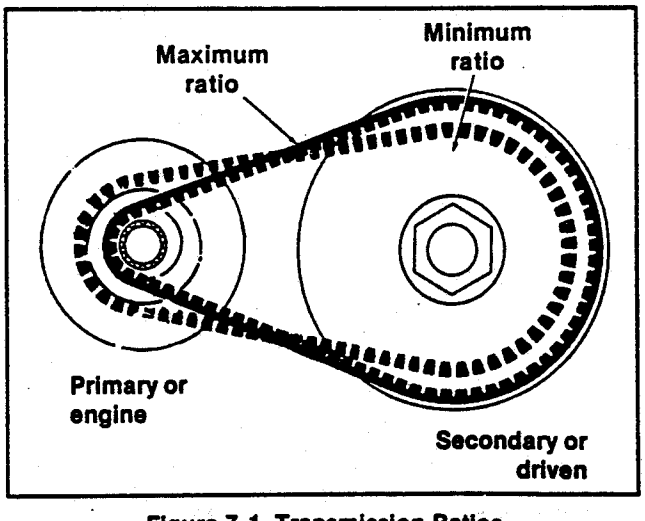
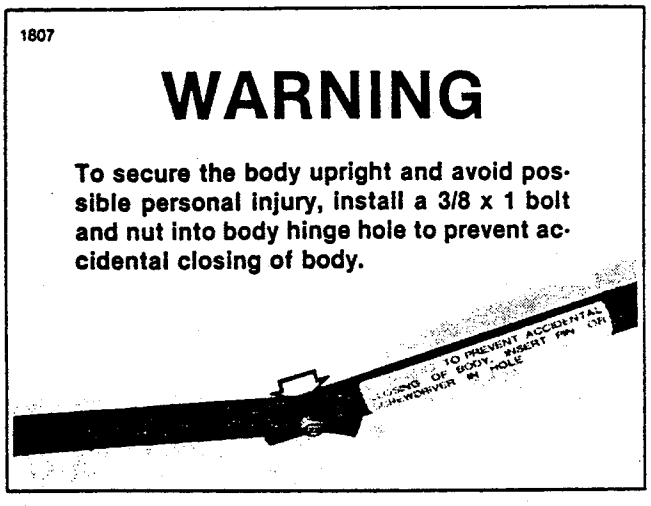


Figure 7-1. Transmission Ratios

DRIVE BELT

General



WARNING

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

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

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, lift upward on the belt and roll off the secondary drive.
2. Pull governor arm back and remove belt from primary.

NOTE

After installing the drive V-belt, make sure the governor wire is properly installed in the carburetor lever.

3. Install the new belt by placing it on the primary first and then rolling it on the secondary.

IMPORTANT

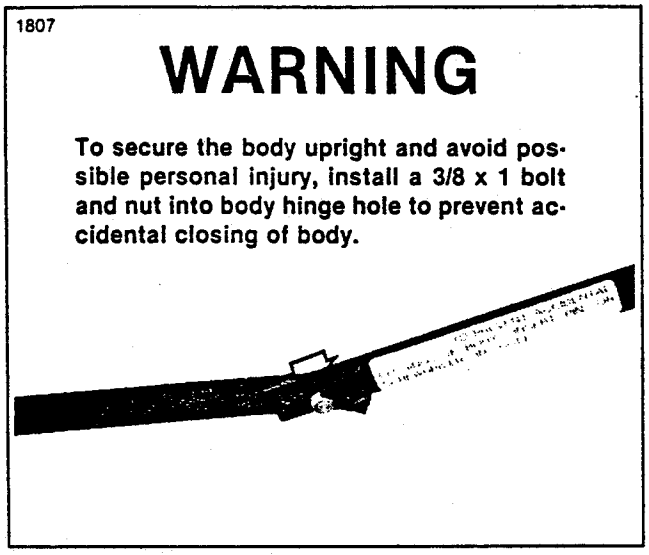
When installing a V-belt, install it on the primary first — secondary last.

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

PRIMARY DRIVE

DISASSEMBLY

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, lift upward on the belt and roll off the secondary drive. Loosen the starter-generator mounting hardware and remove the starter-generator belt.

3. See Figure 7-3. Remove primary cover plug (3) and outer cover screws (2). Pull outer cover (1) off.

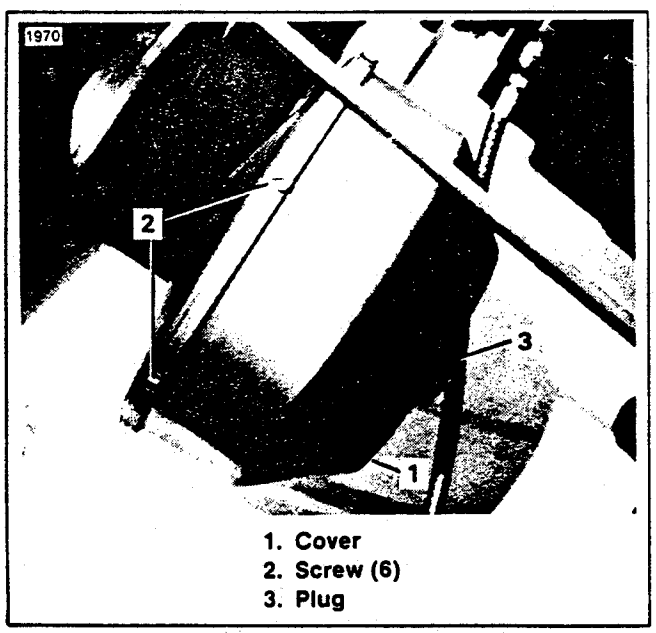


Figure 7-2. Primary Drive Cover

NOTE

The primary can be held from rotation by a rod or large screwdriver inserted into back side of fixed flange to catch any of the three ribs.

4. See Figure 7-3. Remove the bolt (1), washer (2) and lockwasher (3) from the floating flange (4).

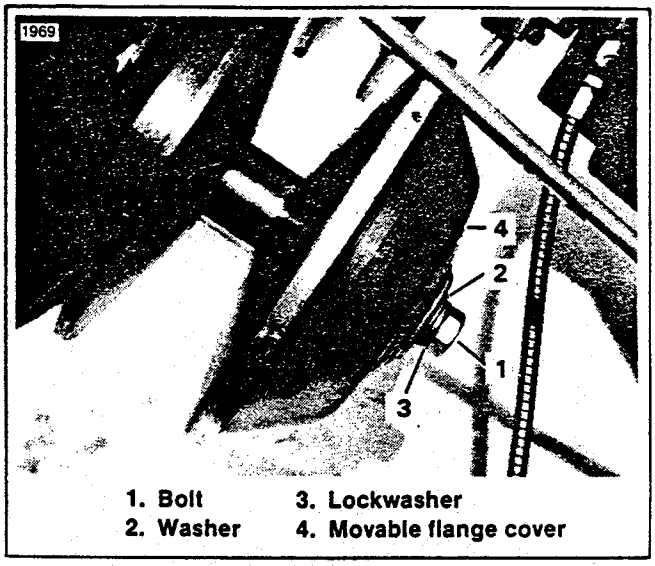


Figure 7-3. Removing Movable Flange Cover Hardware

5. See Figure 7-5. Remove complete primary assembly by using PULLER TOOL. Insert tool rod and bolt into primary shaft and tighten bolt. As the bolt is tightened, the complete primary assembly will come free of the crankshaft. While supporting the primary in your hand, back bolt out of primary shaft and tap the bolt with a hammer to remove the inner cover.

WARNING

Use of a hammer, may damage floating flange face (belt side) and affect transmission operation. Never pry or beat on the cover.

NOTE

The flange pucks form an equal triangle, and must be installed as originally removed, with semi-circular notch of pucks facing outward.

6. See Figure 7-5. Separate the floating flange (1), spring (2) and fixed flange (3).

7. See Figure 7-5. Remove the pucks (4).

CLEANING, INSPECTION

1. Clean all parts in a non-flammable cleaning solvent and blow dry with compressed air.

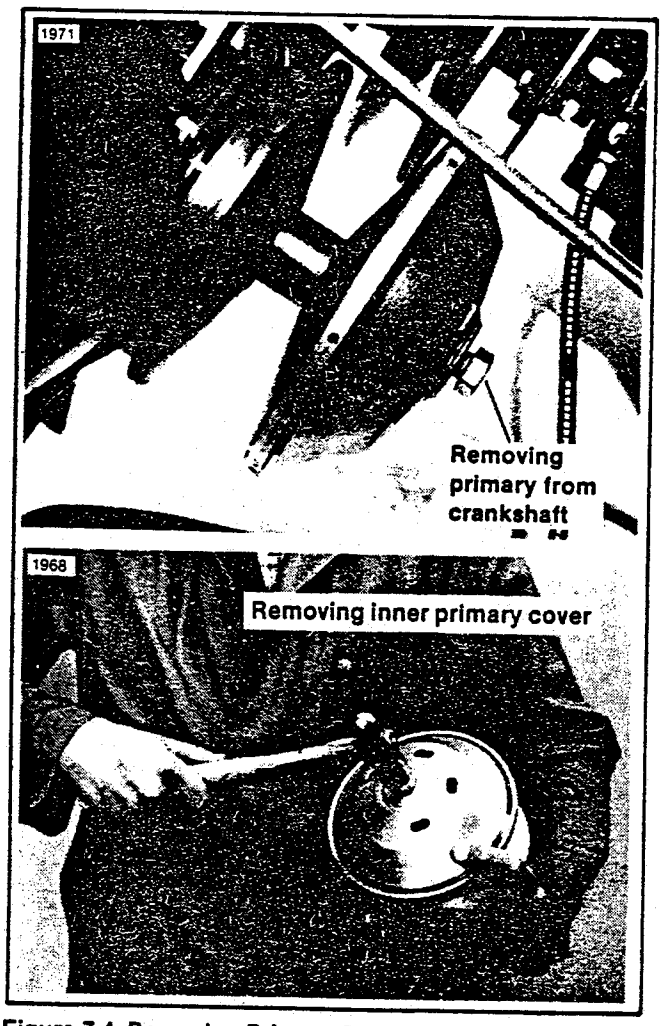


Figure 7-4. Removing Primary Drive Floating Flange and Drive Cover

2. Check for wear of area that V-belt contacts the surfaces of the flanges. Severe wear will affect transmission operation. If severely worn, replace flanges.

ASSEMBLY

1. See Figure 7-5. Install spring (2), floating flange (1) and pucks (4) to fixed flange (3) on a flat surface.

NOTE

The pucks must be equally spaced in the floating flange guides.

2. See Figure 7-5. Install cover (6), by lining up the "D" slot in the cover with the slot of the stem while pressing on the cover to compress the spring (2) until cover (6) contacts the stem. Lightly tap cover onto stem until stem is flush with top of cover.
3. Install washer (7), lockwasher (8) and bolt (9) into stem. Install primary onto crankshaft taper and thread bolt (9) by hand. Hold primary as described in step 4 of DISASSEMBLY and tighten bolt (9) to 38-48 ft-lbs torque.
4. See Figure 7-2. Install outer cover (1), screws (2) and plug (3).
5. Install starter-generator belt.
6. Install the drive belt as described under DRIVE BELT.
7. Install the governor arm assembly.
8. Connect battery cables and lower the body.
9. Check for proper operation.

1. FLoating flange
2. Spring
3. Flange, fixed
4. Puck (3)
5. Screw (3)
6. Cover, drive
7. Washer
8. Lockwasher
9. Bolt
10. Cover, governor
11. Bearing, floating flange
12. Washer
13. Bearing, fixed flange
14. Plug
15. V-Belt
16. Screw (3)
17. Plate (with damper) (3)

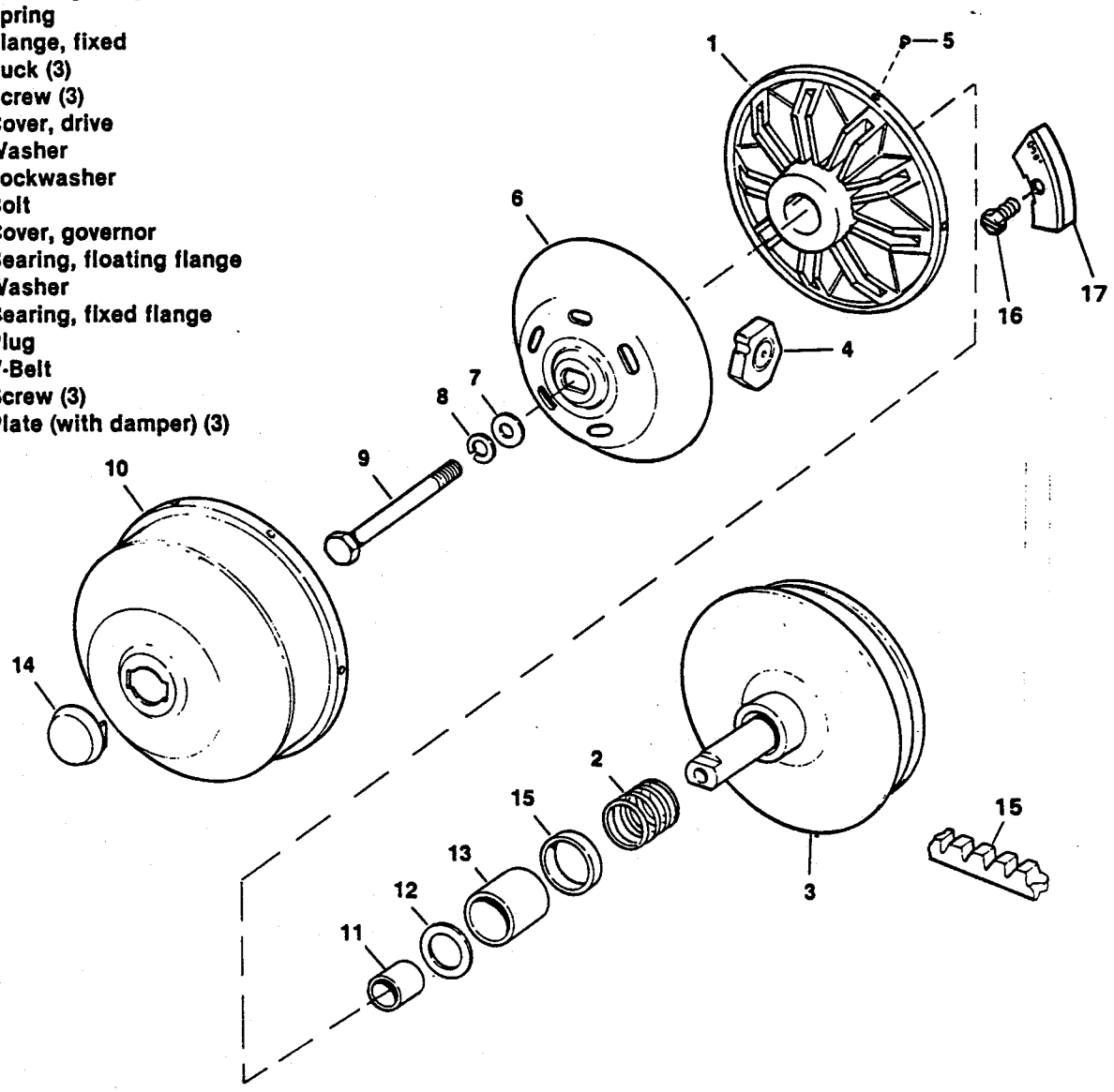
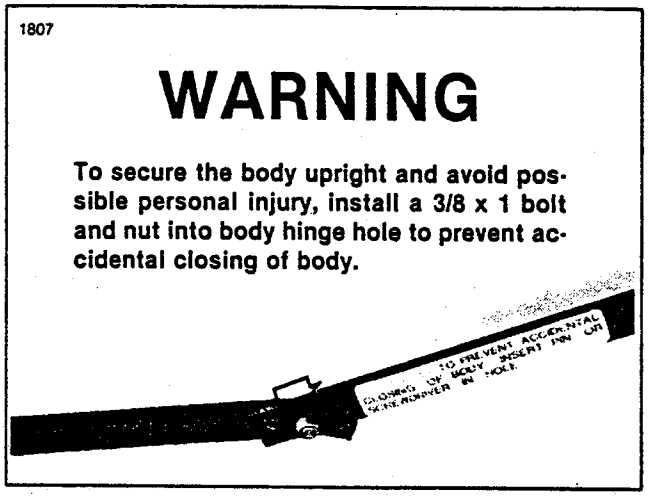


Figure 7-5. Primary Drive — Exploded View

SECONDARY DRIVE

DISASSEMBLY (Figure 7-6)

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 DRIVE BELT.
3. Apply the parking brake and loosen drive hub nuts (2) and center bolt (5).
4. Release the parking brake.
5. Remove the four nuts (2), lockwashers (3) and remove the secondary drive and brake disc from the differential flange.
6. Remove the bolt (5), washer (7) and lockwasher (6) from the hub (4) and remove hub.
7. Apply force to cam (10) and compress spring (11). Remove retaining ring (8), washer (9), cam (10), spring (11), key (13) and separate movable face (15) and fixed face (12).

CLEANING, INSPECTION AND REPAIR

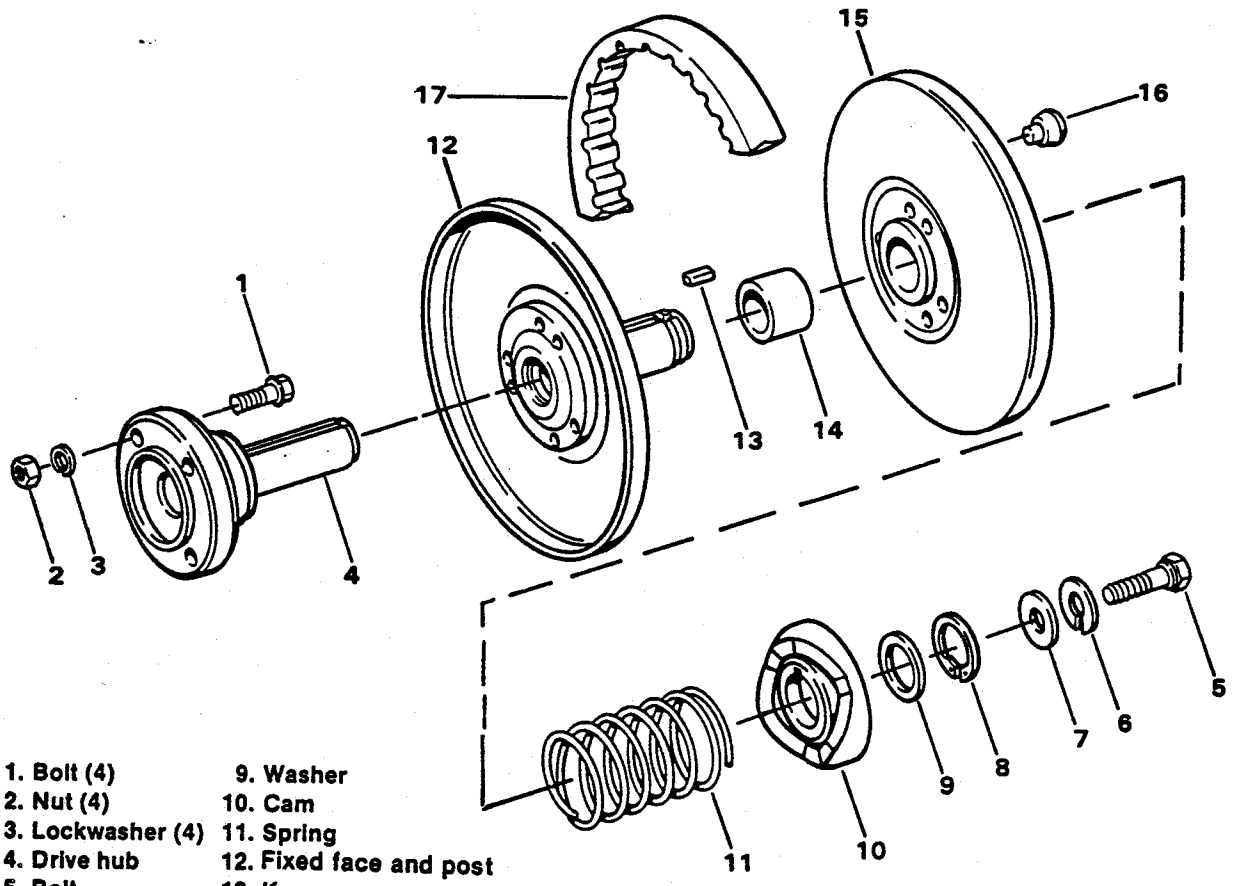
1. Clean all parts in a non-flammable cleaning solvent and blow dry with compressed air.
2. Check for wear at flange surfaces where V-belt makes contact. A wear surface of 1/32 in. or more in either flange is usually enough to affect vehicle operation of the transmission. Replace the flanges if worn 1/32 in. or more.

Removing and Replacing Bushing

1. See Figure 7-6 Press out bushing (14) being careful not bo score bore. Clean with a non-flamable solvent.
2. When installing new bushing, submerge moveable flange (15) in 30 wt. oil and press new bushing in while bore is still submerged. This will fill reservoir cavity behind bushing.

ASSEMBLY (Figure 7-6)

1. Assemble the fixed face (12), and movable face (15) with bushing (14) and buttons (16).
2. Install key (13) into fixed face keyway and install spring (11) and cam (10).
3. Line up keyway in cam with key in flange post, with cam ramps centered between buttons on moveable face. Apply downward pressure on cam (10) compressing spring (11) and sliding cam (10) onto fixed face post (12).
4. When ring groove at end is well exposed, install washer (9), and retaining ring (8) into groove completely.
5. Line up keyways and slide drive hub (4) into secondary drive assembly.
6. Install bolt (5), washer (7) and lockwasher (6) into hub end.
7. Install hub with drive and brake disc to differential flange.
8. Install bolts (1), lockwashers (3) and nuts (2) and tighten.
9. Apply parking brake and tighten bolt (5) to 25-30 ft-lbs torque.
10. Install V-belt by rolling it onto the secondary drive flange.
11. Connect battery cables and lower body.
12. Check for proper operation of secondary drive.
13. Adjust brake. See BRAKE ADJUSTMENTS, Section 4.



1. Bolt (4)
2. Nut (4)
3. Lockwasher (4)
4. Drive hub
5. Bolt
6. Lockwasher
7. Washer
8. Retaining ring
9. Washer
10. Cam
11. Spring
12. Fixed face and post
13. Key
14. Bushing
15. Movable face
16. Button
17. Belt

Figure 7-6. Secondary Drive Assembly — Exploded View

SECTION PAGE NO.

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)

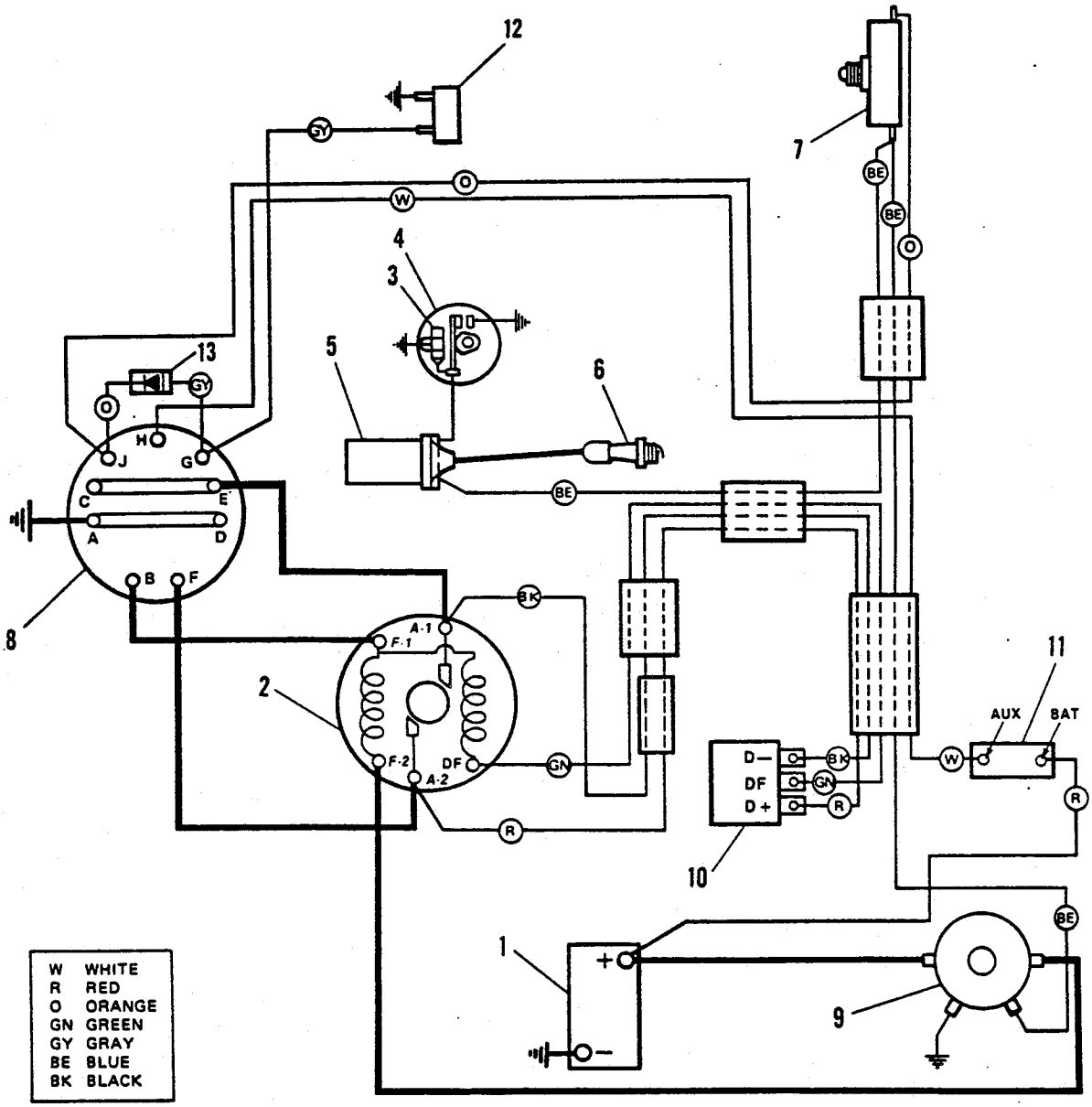
Commutator —
Original diameter ..... 1.614 in.
(41 mm)
Minimum diameter ..... 1.535 in.
(39 mm)
Under cut depth ..... .025 in.
(.63 mm)
Runout after finishing ..... .002 in. max.
Pulley ..... 2.62 in. dia.

IGNITION SYSTEM

Breaker points ..... .015 - .016 in. gap
(.38 - .4mm)
Spark plug (H-D 4-5) ..... .40 in. gap
(1 mm)

TORQUES

Spark plug ..... 15-20 ft-lbs
(2.074 - 2.765 kgm)
Battery terminals ..... 60 - 120 in-lbs
Starter-generator mounting bolts ..... 12 ft-lbs
(1.659 kgm)
Pulley nut ..... 26-33 ft-lbs
(3.59 - 4.56 kgm)
Pole shoe screws ..... 108 in-lbs



1. Battery
2. Starter-generator
3. Condensor
4. Ignition circuit breaker
5. Ignition coil
6. Spark plug
7. Accelerator micro switch
8. Directional key switch
9. Solenoid switch
10. Voltage regulator
11. Overload circuit breaker
12. Reverse buzzer
13. Diode

Figure 8-1. Wiring Diagram

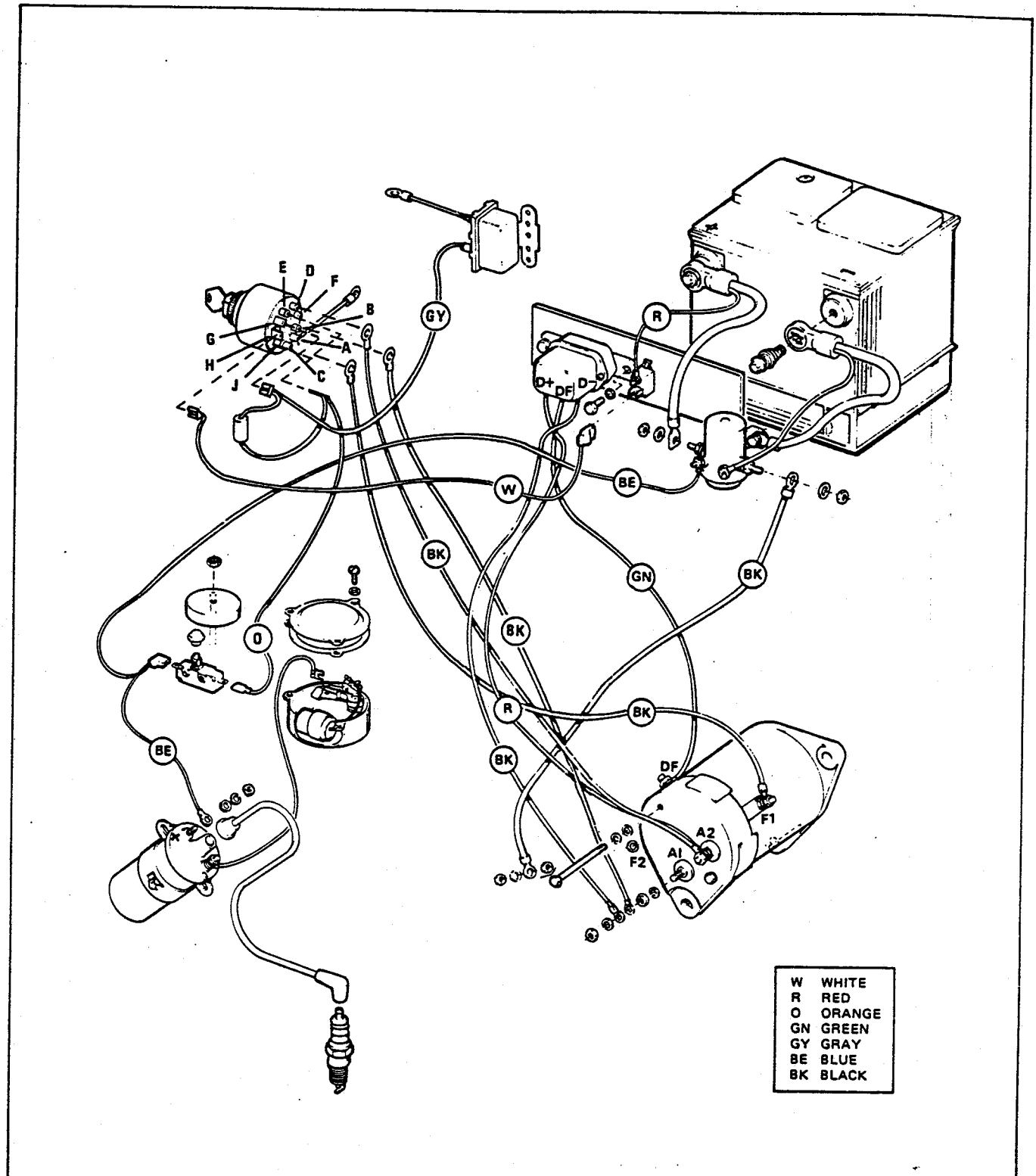
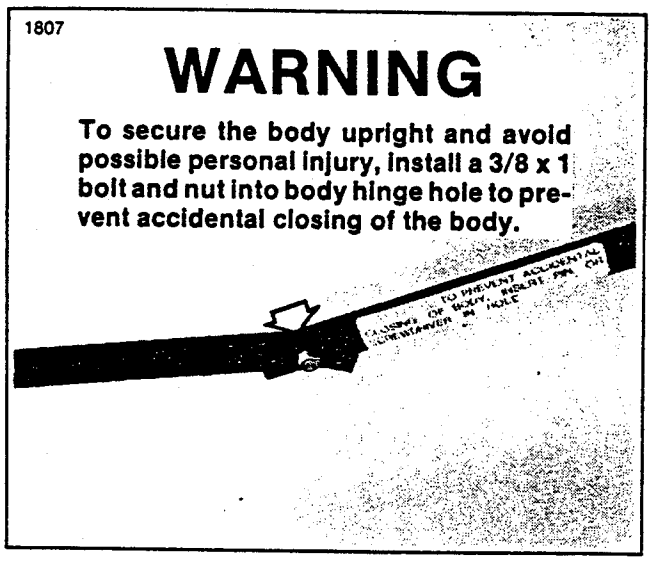


Figure 8-2. Wiring Layout

DIRECTIONAL KEY SWITCH

REMOVAL

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.

NOTE

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

2. See Figure 8-3. Remove spanner nut (1), bolt, nut and lockwasher (2) from cable clamp (3).

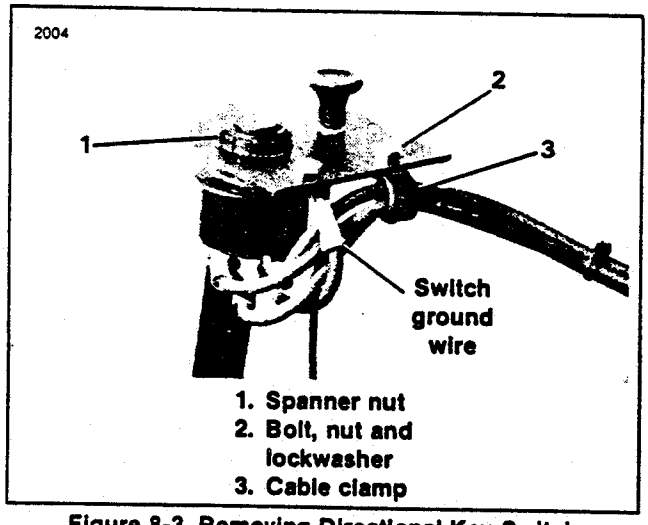


Figure 8-3. Removing Directional Key Switch

3. Disconnect the switch ground wire from the switch tower.
4. Remove switch wires.

TESTING DIRECTIONAL KEY SWITCH FOR CONTINUITY

1. Remove directional key switch wires and remove switch. See Removal. Use a continuity tester to test directional key switch. If switch is good, the light will glow. Check continuity between the H and G terminals with direction key switch in forward. Now switch directional key switch to reverse and check continuity between the H and J terminals. If continuity test light does not glow, switch is defective and must be replaced. See STARTER CIRCUIT TEST.

INSTALLATION

1. See Figure 8-4. From starter-generator to directional key switch, connect switch wires as follows:
   - F1 to E
   - A2 to F
   - A1 to B

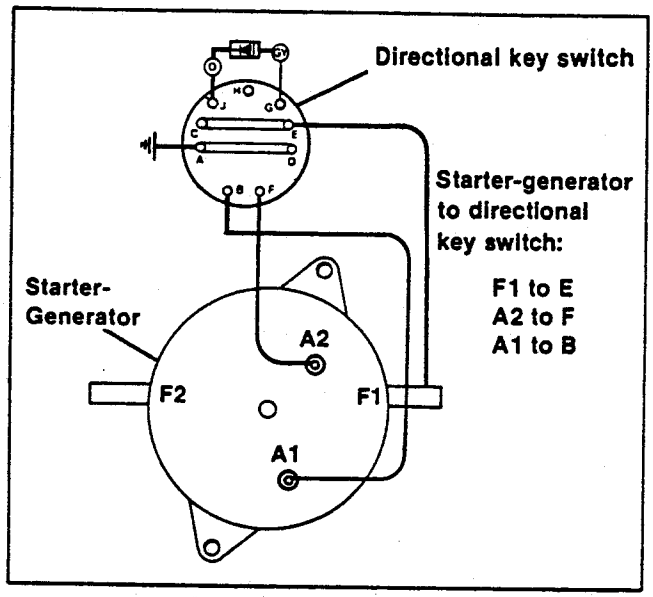


Figure 8-4. Switch Wires

2. See Figure 8-1. Connect white wire (W) to (H) terminal. Gray wires (GY) to (G) terminal. Orange wires (O) to (J) terminal.

3. See Figure 8-3. Route directional key switch wires through cable clamp (3) and fasten with bolt, nut and lockwasher (2).

4. See Figure 8-3. Fasten directional key switch ground wire (A) to switch tower. Install switch using spanner nut (1).

5. Connect the battery cables and lower the car body.

3 STEP SOLENOID TEST

TESTING SOLENOID (Figure 8-7)

Equipment needed for test
12 volt battery
Battery powered continuity tester (Figure 8-5) or ohmmeter (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.

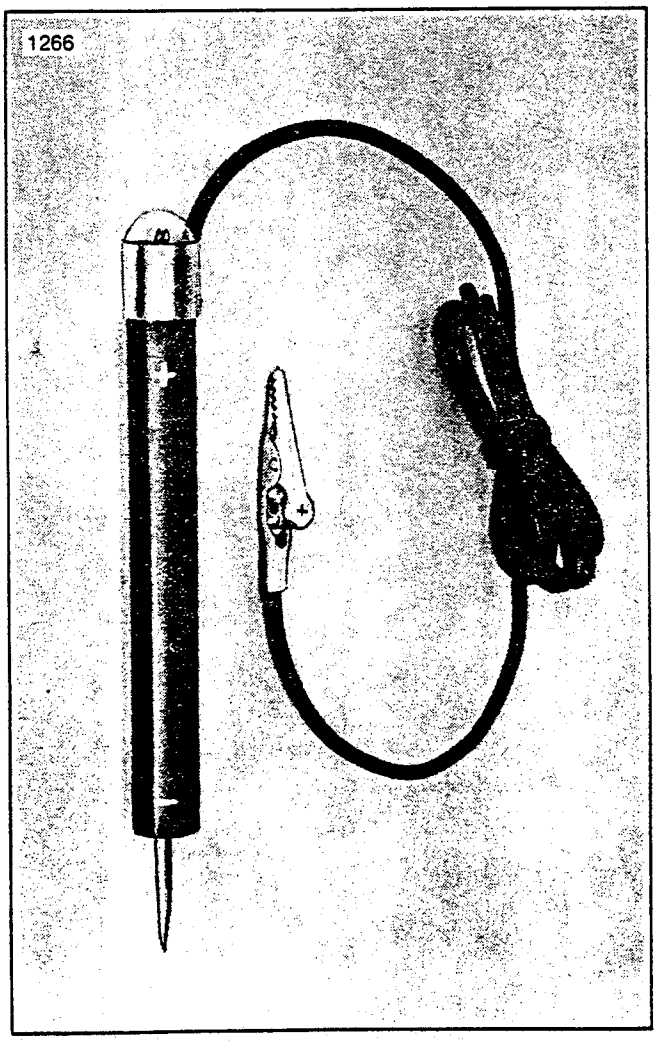


Figure 8-5. Battery Powered Continuity Tester

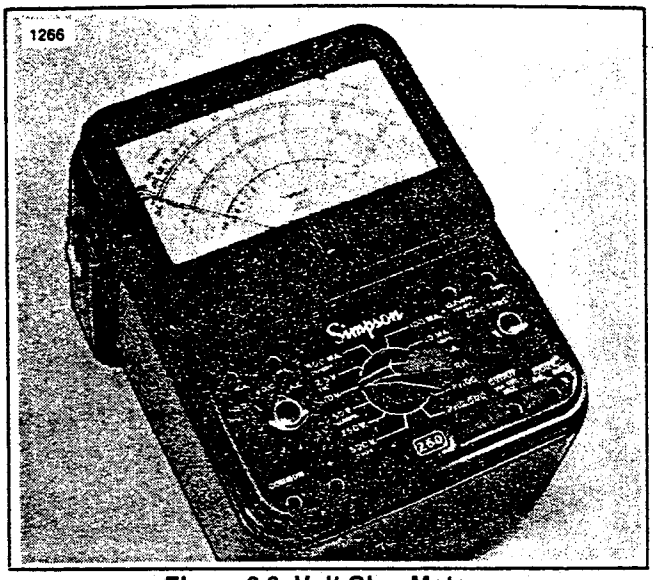


Figure 8-6. Volt-Ohm Meter

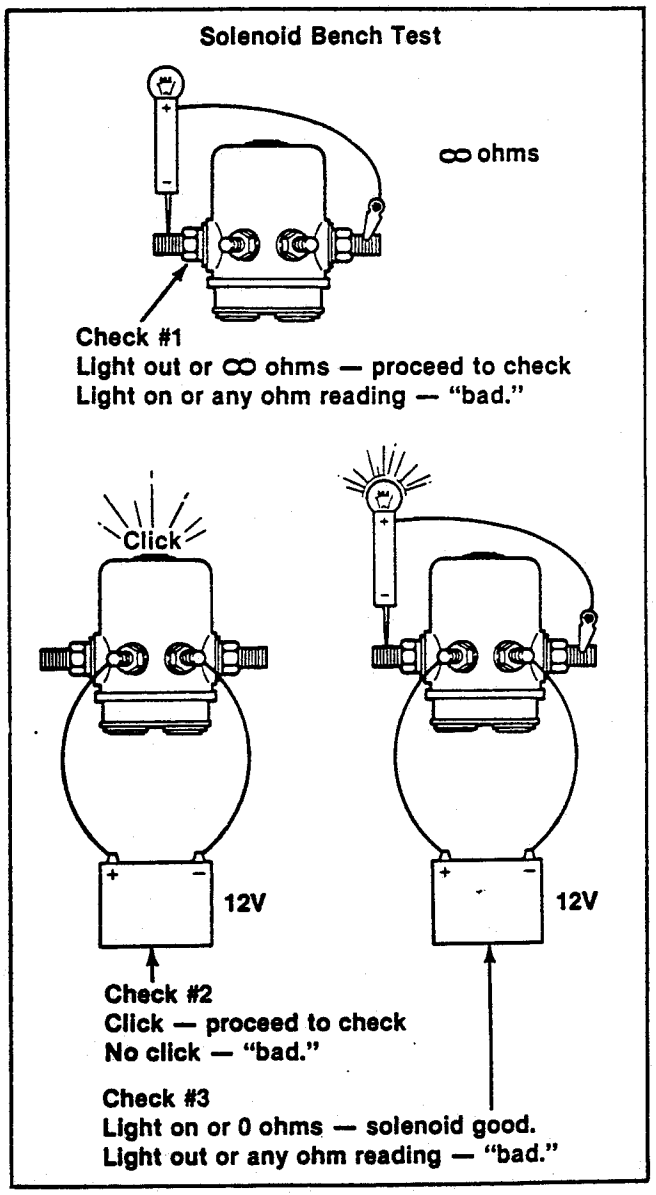


Figure 8-7. 3-Step Solenoid Test

ACCELERATOR MICRO-SWITCH

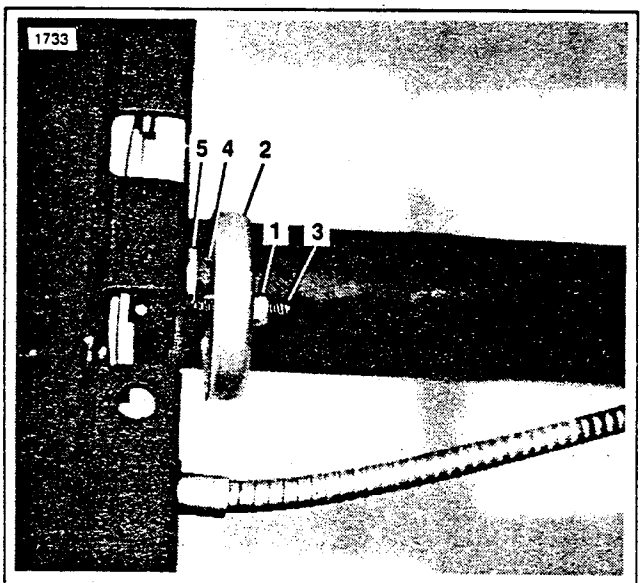
GENERAL

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) after parking brake is released.



1. Locknut
2. Cup
3. Switch rod
4. Switch plunger boot
5. Speed nut

Figure 8-8. Accelerator Micro-Switch

REMOVAL (Figure 8-8)

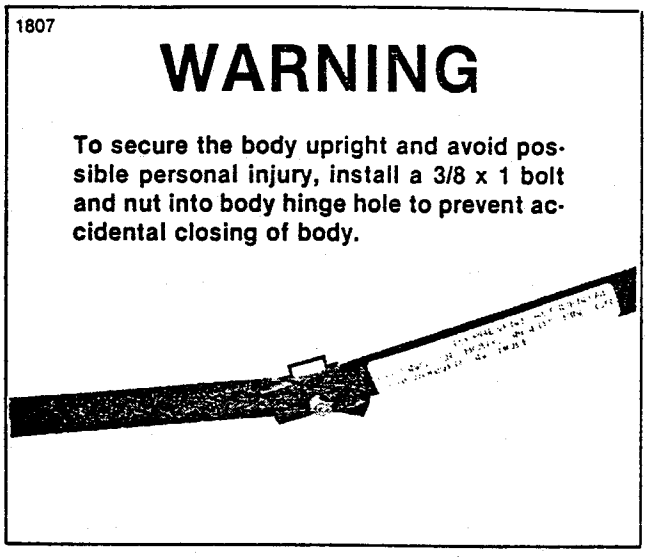
1. Raise the golf car body.

WARNING

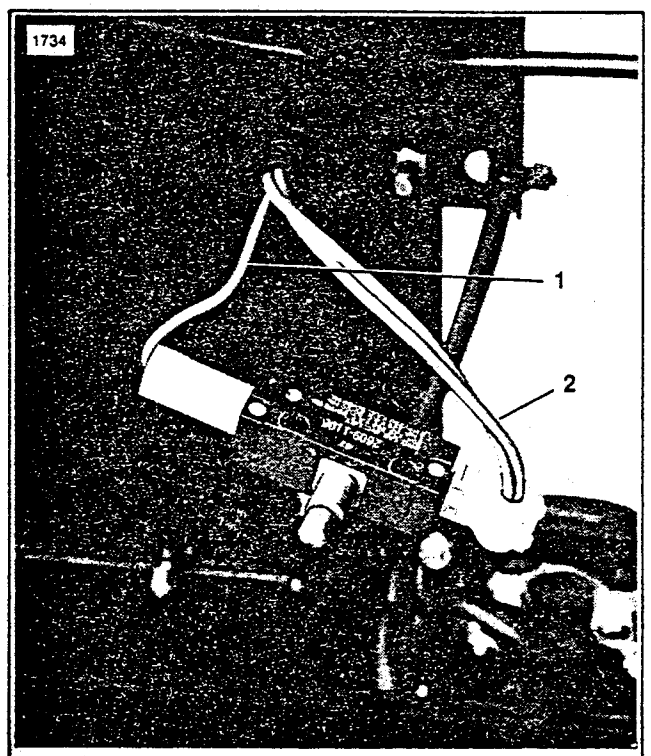
Disconnect the battery cables (negative cable first) to prevent accidental start-up of vehicle and possible personal injury.

2. Remove locknut (1), spin off cup. Remove switch plunger boot (4).

3. Remove speed nut (5) and pull micro-switch free.



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



1. Single red wire
2. Double blue wire

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.

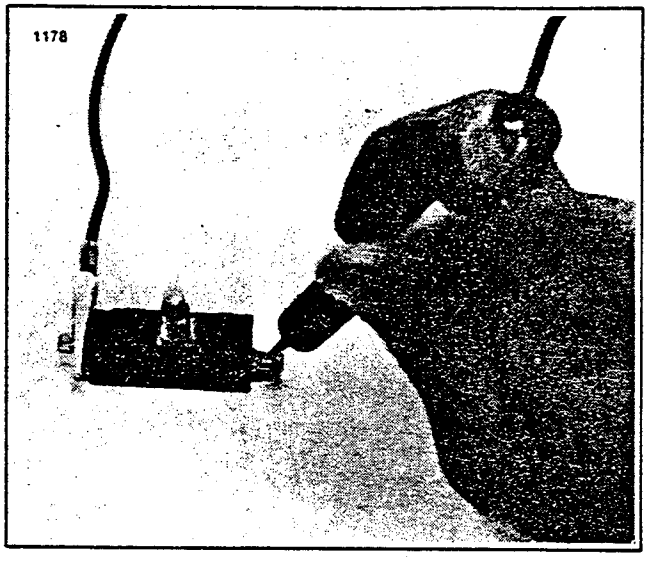


Figure 8-10. Testing Micro-Switch for Continuity

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.

CAUTION

Do not lubricate the micro-switch as oil on contacts will cause micro-switch failure.

BREAKER POINTS

GENERAL INFORMATION

The ignition system has two circuits, the primary circuit and the secondary circuit. The primary circuit consists of the battery, directional 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 DX4 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.

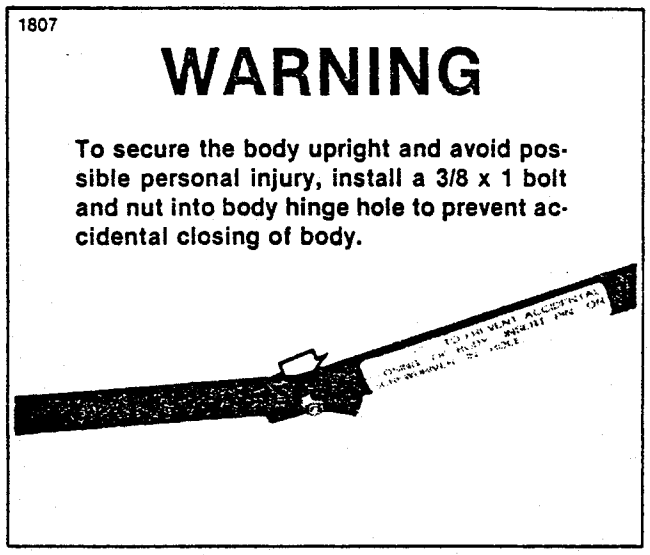
CLEANING, INSPECTION AND REPAIR

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.

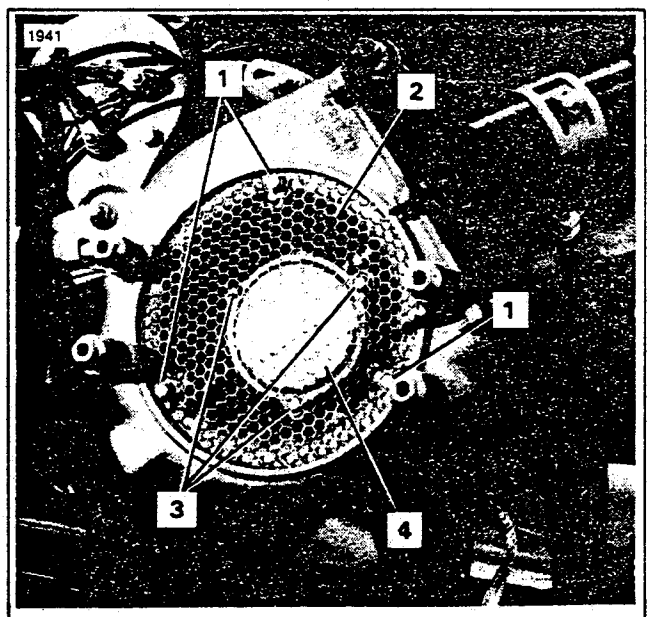
REMOVAL

1. Raise the golf car body.



WARNING

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



1. Screw (3) **3. Screw (3)**
2. Screen **4. Cover and gasket**

Figure 8-11. Circuit Breaker Cover

2. See Figure 8-11. Remove the fan shroud screws (1), screen (2), cover screws (3) and cover and gasket (4).

3. See Figure 8-12. Remove condenser and coil wires from point set terminal.

4. Remove lock screw (2).

5. Remove point set.

INSTALLATION (Figure 8-12)

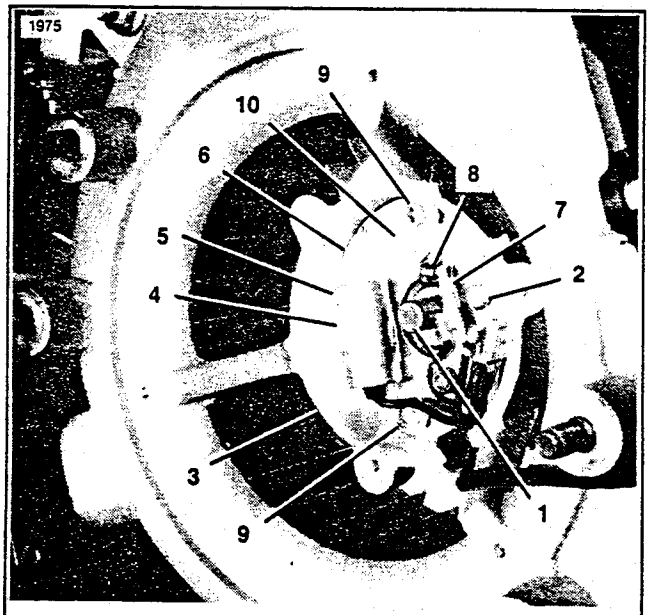
1. Install point set, connect coil wire to points (8).

2. Connect condenser wire to points.

3. Set points. See ADJUSTMENT — BREAKER POINTS.

4. See Figure 8-11. Install cover and gasket (4), cover screws (3), screen (2) and fan shroud screws (1).

5. Connect spark plug wire.



1. Cam
2. Screw
3. Housing
4. Screw
5. Condenser
6. Timing mark
7. Points
8. Adjusting slot
9. Screw and washer
10. Stator plate

Figure 8-12. Circuit Breaker

ADJUSTMENT — BREAKER POINTS (Figure 8-12)

1. Rotate the engine shaft a small amount until cam follower has reached highest point on cam (1).

2. Place a .015-.016 in. wire gauge between breaker point contacts (7). 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 (9) and use screwdriver on adjustment slot (8) to move adjustable point a slight amount to obtain the correct point gap.

3. When adjustment is completed, tighten the screw and washer (9). Recheck the gap and correct if necessary.

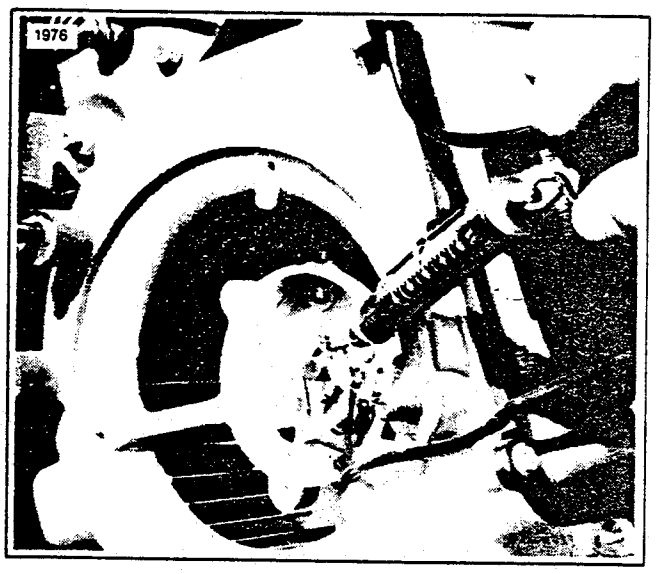


Figure 8-13. Breaker Points— Spring Retension

4. See Figure 8-13. 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.

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 8-12)

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.

The timing marks are located on the fan and fan housing. See Figure 8-14, as viewed through the fan housing screen. When these two marks are aligned the piston is at 19° BTC before top center.

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 timing marks are aligned as shown in Figure 8-14. This is the point at which circuit breaker contact should open.

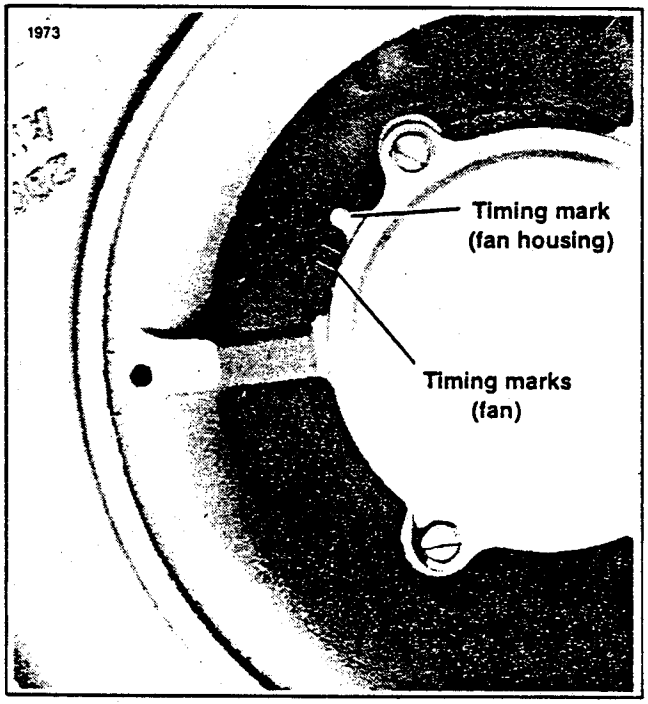


Figure 8-14. Timing Marks

3. If it is necessary to readjust timing, loosen the two lock screws (9) and shift breaker plate assembly so that the fiber cam follower is coming up on the cam (1) just far enough so that the contacts (7) open. The spark occurs when the points open.

4. Retighten lock screws.

NOTE

Correct forward timing will ensure proper reverse timing.

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 marks on fan housing and fan should line up.

6. If this reading is not achieved, adjust timing and recheck point gap. See TIMING IGNITION.

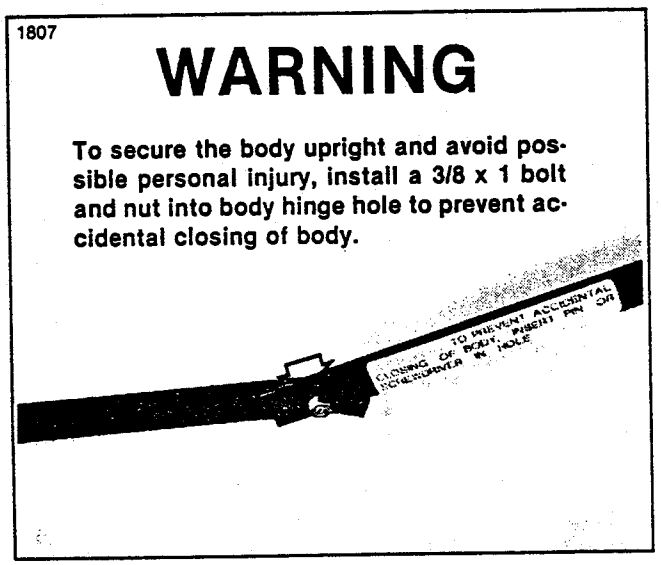
IGNITION COIL

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 cannister. Case cannot be taken apart or coil repaired.

REMOVAL (Figure 8-15)

1. Raise the golf car body.



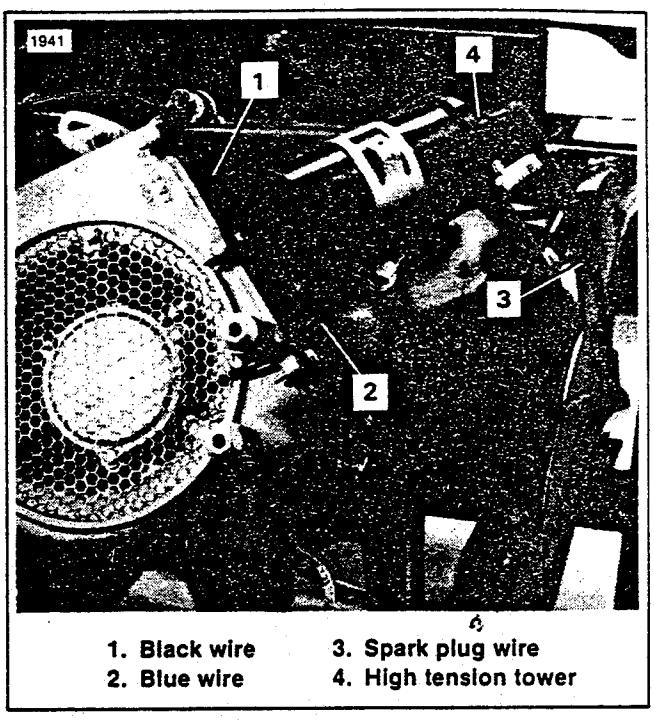
WARNING

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 8-16. Remove the two mounting bolts, washers and lockwashers (1). Remove the coil.
3. See Figure 8-16. Loosen coil clamp screw (4) and lift coil out.

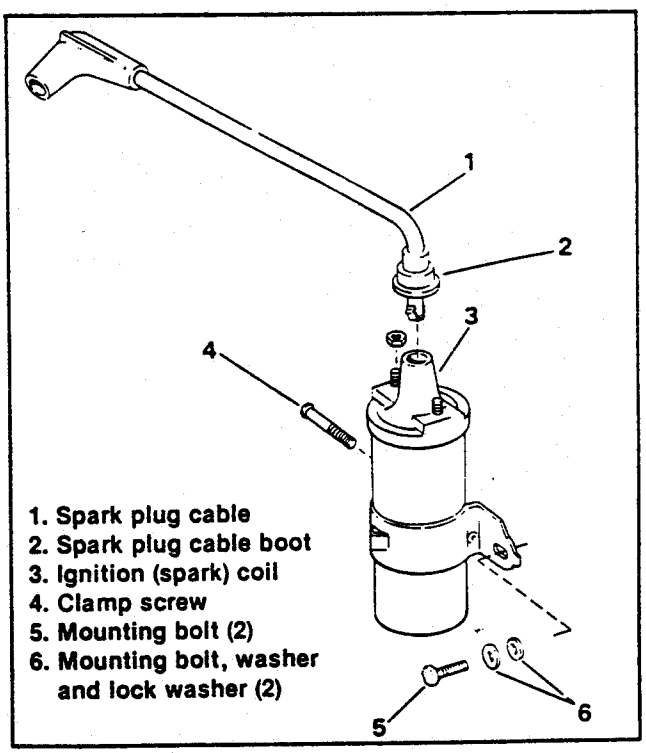
TESTING

1. Disconnect spark plug wire from coil.
2. Disconnect coil terminal wires.
3. See Figure 8-17. Check primary winding resistance. Set ohmmeter to RX1. Reading should be 3.4 to 4.2 ohms.



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

Figure 8-15. Spark Plug Wire Routing



1. Spark plug cable
2. Spark plug cable boot
3. Ignition (spark) coil
4. Clamp screw
5. Mounting bolt (2)
6. Mounting bolt, washer and lock washer (2)

Figure 8-16. Ignition Coil

4. See Figure 8-18. Check secondary winding resistance. Set ohmmeter to RX100. Reading should be 6000 to 9000 ohms.

CABLE

1. See Figure 8-19. Check cable resistance. Set ohm-

meter 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.

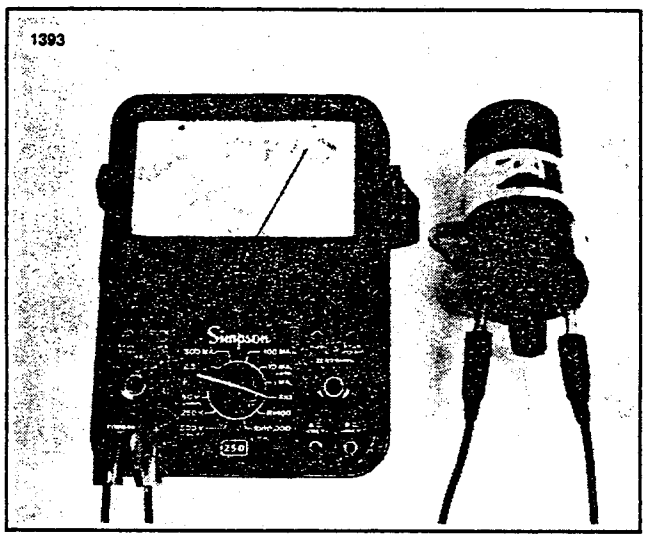


Figure 8-17. Checking Primary Winding Resistance

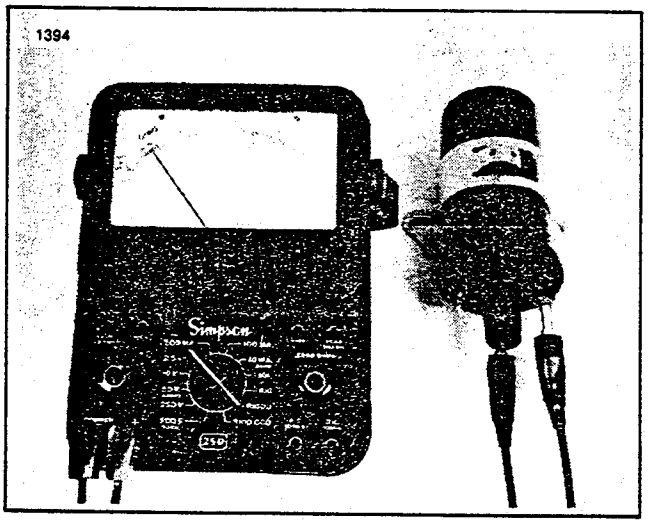


Figure 8-18. Checking Secondary Winding Resistance

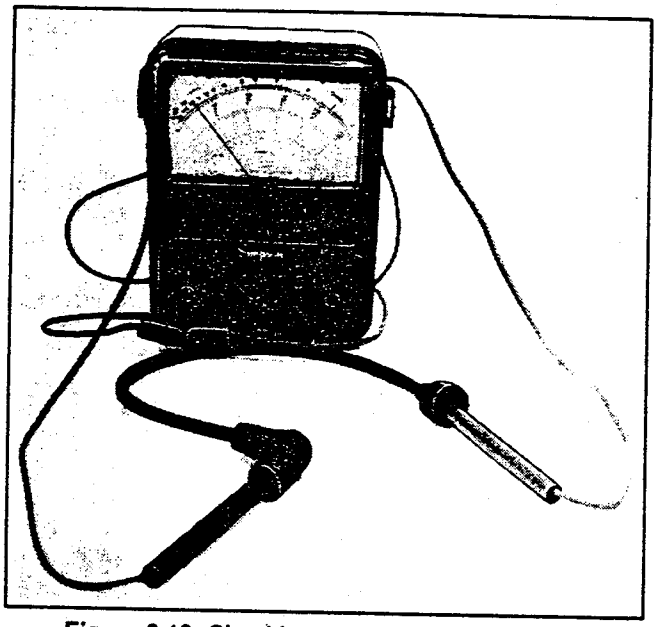


Figure 8-19. Checking Cable Resistance

INSTALLATION

1. See Figure 8-16. Mount coil (3) to bracket (7), fasten coil bracket (7) using washers, lockwashers, nuts (6) and mounting bolts (5).

2. See Figure 8-15. Connect coil terminal wires as follows: blue wire (2) to (+) positive terminal, black wire (1) to (-) negative terminal.

3. See Figure 8-16. 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 4-5 spark plug is designed to give maximum life and efficient combustion of fuel.

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

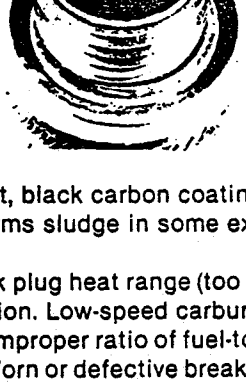
Core Bridging, Gap Bridging

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.

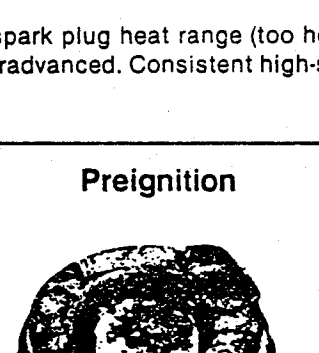
Wet Fouling



Damp or wet, black carbon coating over entier 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.

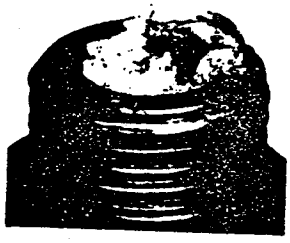
Incorrect spark plug heat range (too hot). Ignition timing overadvanced. Consistent high-speed operation.

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.

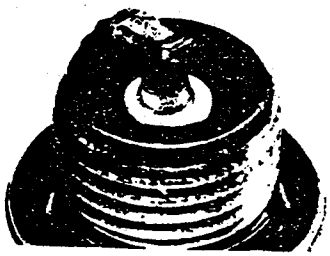
Aluminum Throw-Off



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. 4-5 ..... .040 in. (.38-.4 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

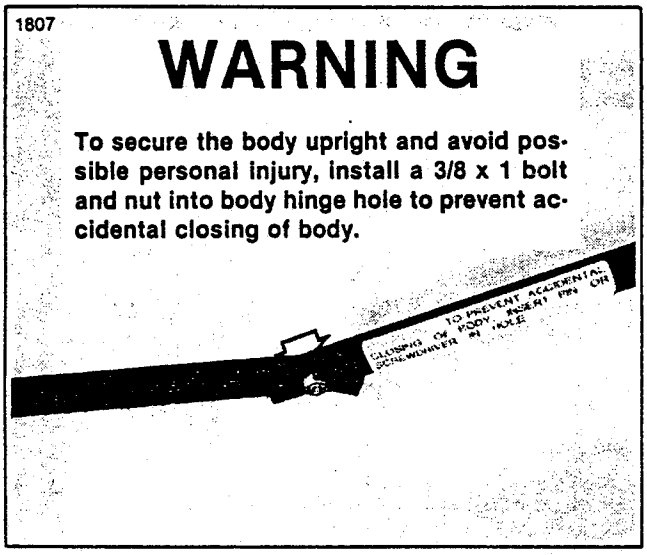
STARTER CIRCUIT TEST (Figure 8-20)

If starter motor fails to turn engine over with directional key switch ON (forward) 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 directional key switch. Proceed to Step IV, Figure 8-20. 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. Turn directional key switch to forward position and using two short wires, jump across the terminals of the directional key switch (H and J) and accelerator micro-switch, starter may crank engine, with engine turning remove jumper alternately from the switches to find which is defective. Now remove the jumper wire from the directional key switch and check reverse operation by connecting the jumper wire to the (G and H) terminals of directional key switch and repeat operation. Replace switches as necessary. If engine does not crank, fault is in the wiring circuit which connects the circuit.

Step IV.

1. Connect short jumper wire across solenoid. Remove directional key switch from circuit by using heavy jumper wires, connect A2 terminal to F1 terminal and A1 terminal to ground. If starter does turn engine, replace directional key switch. See DIRECTIONAL KEY 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 8-21)

1. Raise the golf car body.

WARNING

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

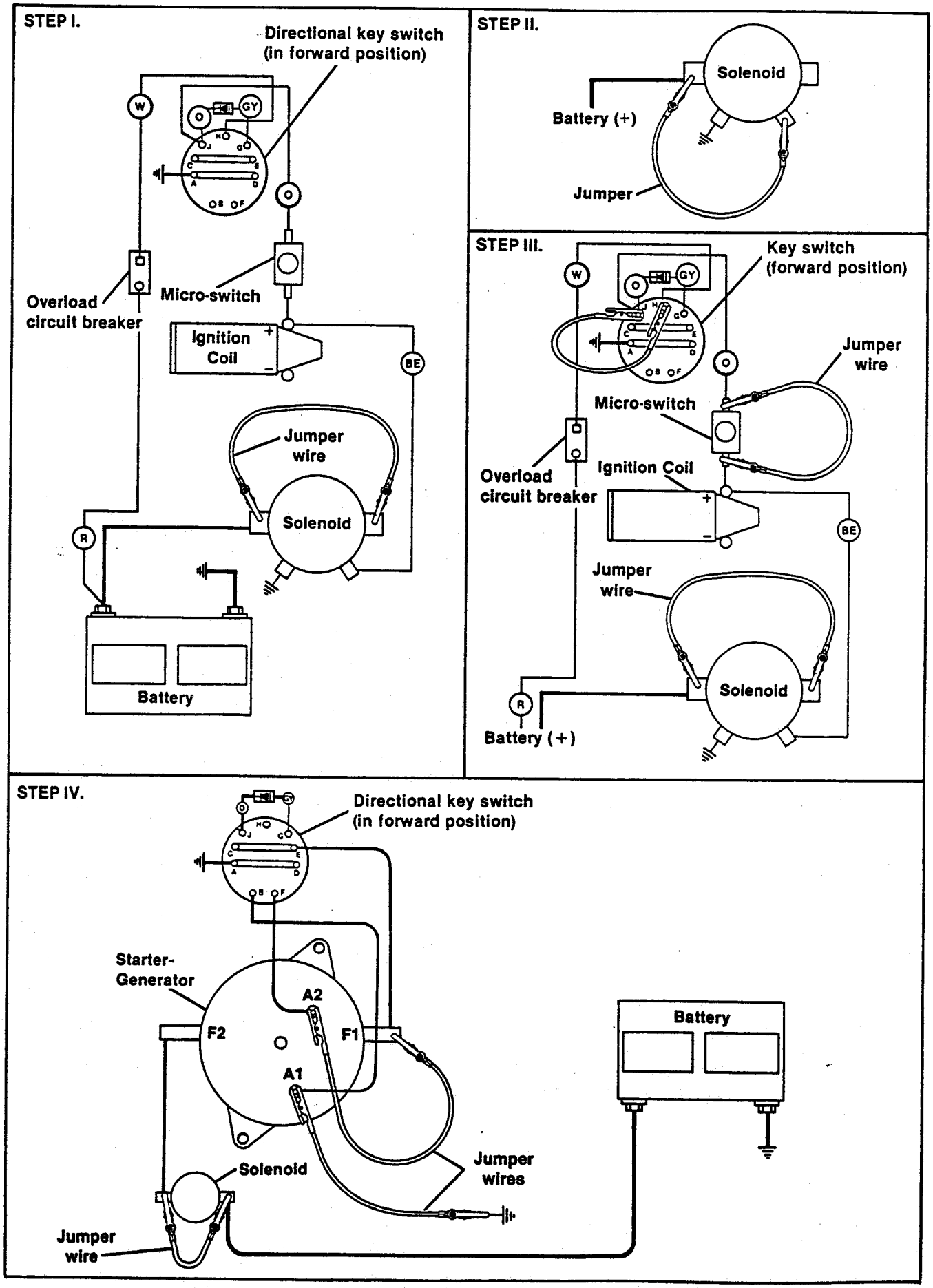
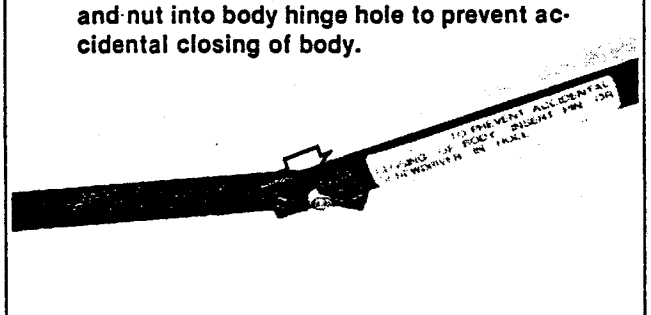


Figure 8-20. 4-Step Circuit Test

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.



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.

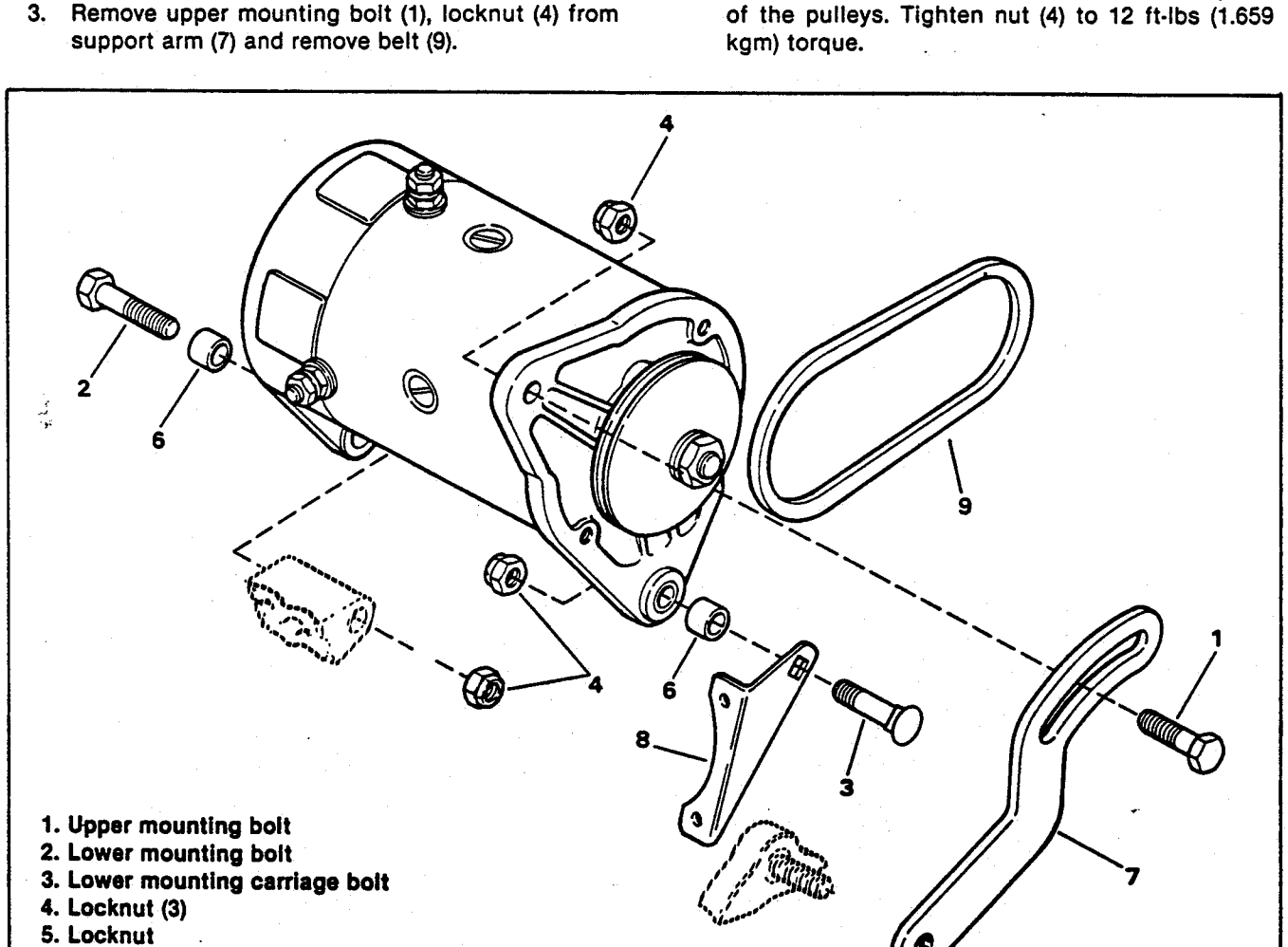
ADJUSTMENTS

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.



1. Upper mounting bolt
2. Lower mounting bolt
3. Lower mounting carriage bolt
4. Locknut (3)
5. Locknut
6. Bushing
7. Support arm
8. Mounting bracket
9. Pulley belt

Figure 8-21. 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.

DISASSEMBLY (Figure 8-24)

NOTE

If it is not necessary to remove brushes, they can be held off of commutator with brush springs. See Figure 8-22.

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).

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).

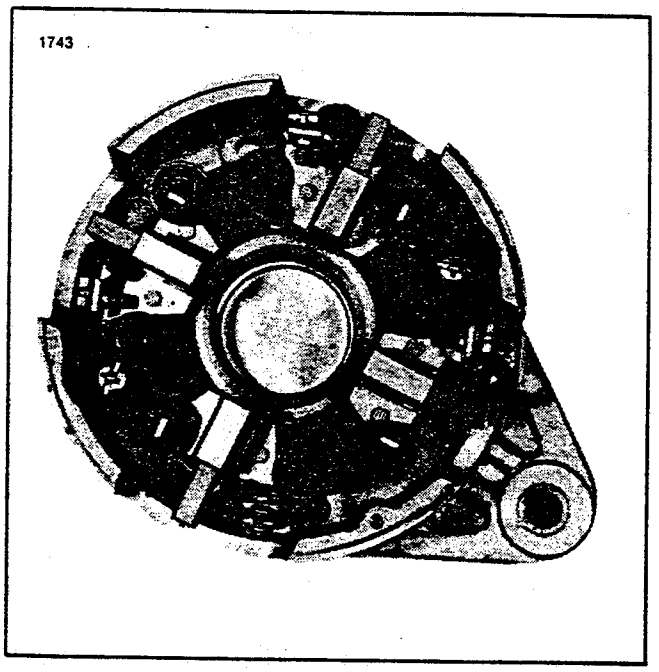


Figure 8-22. Holding Brushes Off Commutator

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 8-23.

CAUTION

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

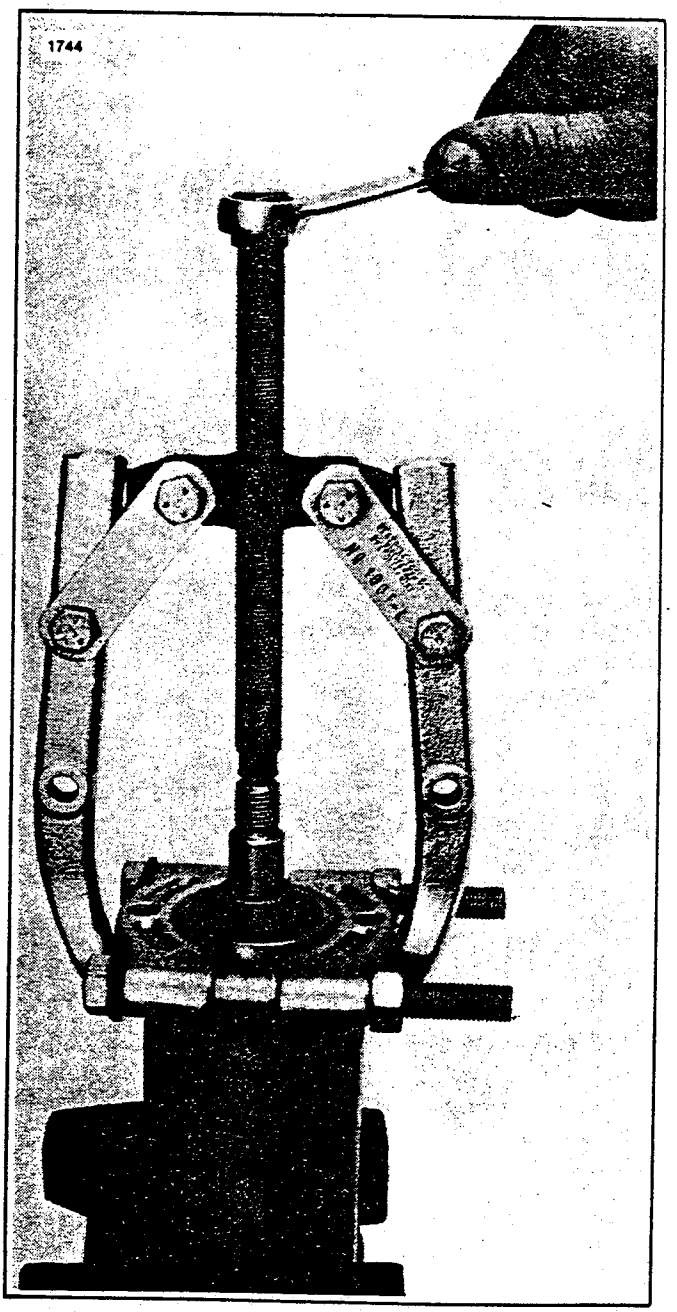
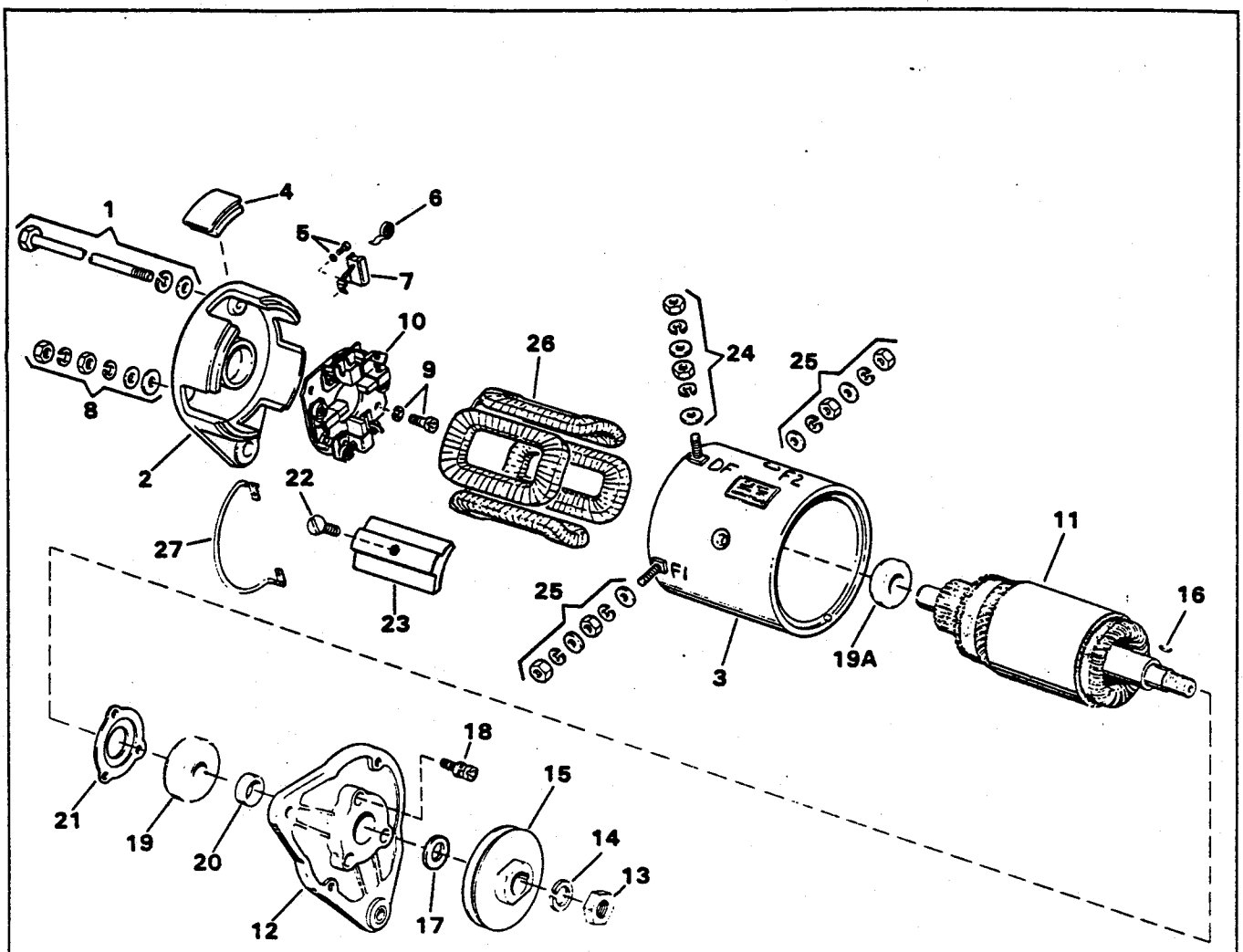


Figure 8-23. Removing Armature Bearings



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

Figure 8-24. 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 8-25). 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 8-26) to test spring tension. Reject springs which apply a force less than 28 ± 4 oz. (680.4 grams).

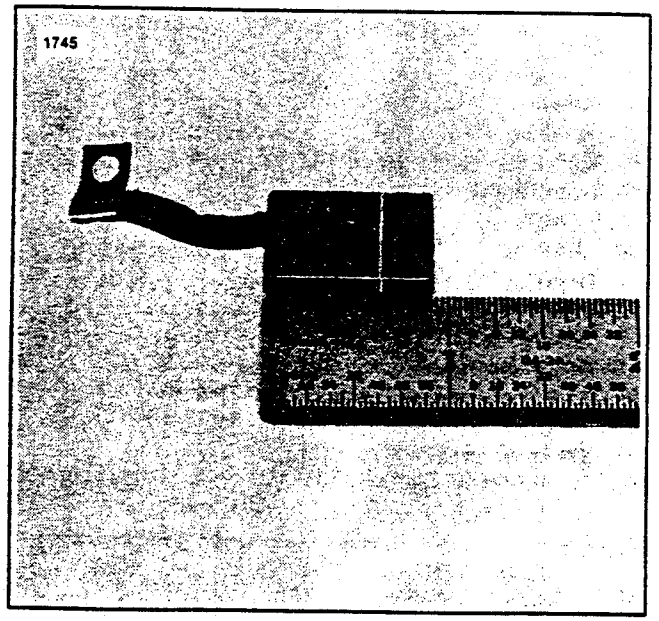


Figure 8-25. Measuring Brush Length

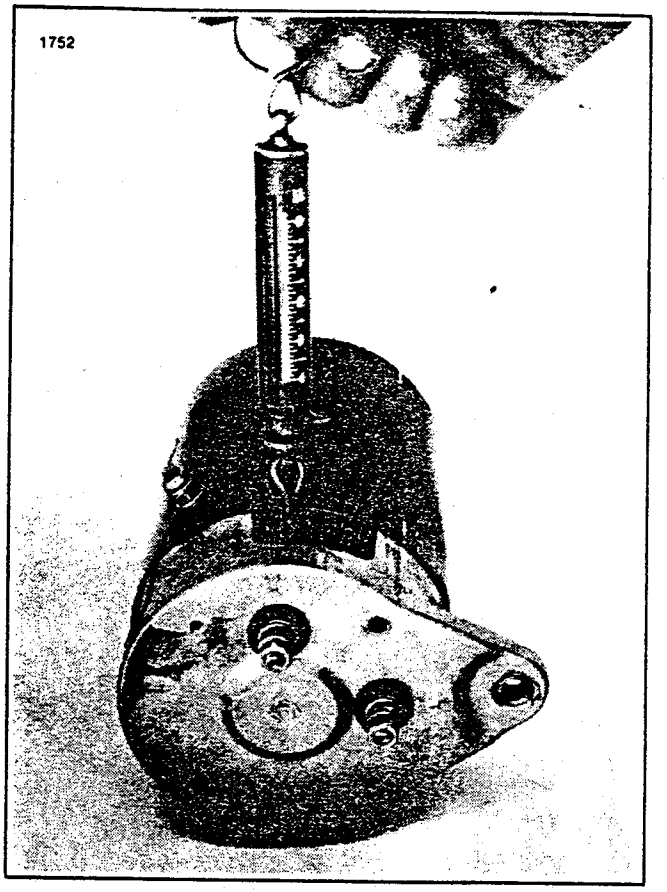


Figure 8-26. Brush Spring Retension

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.

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.

Testing Armature With Armature Tester (Growler) (Sun Model AT-76) (Figure 8-27)

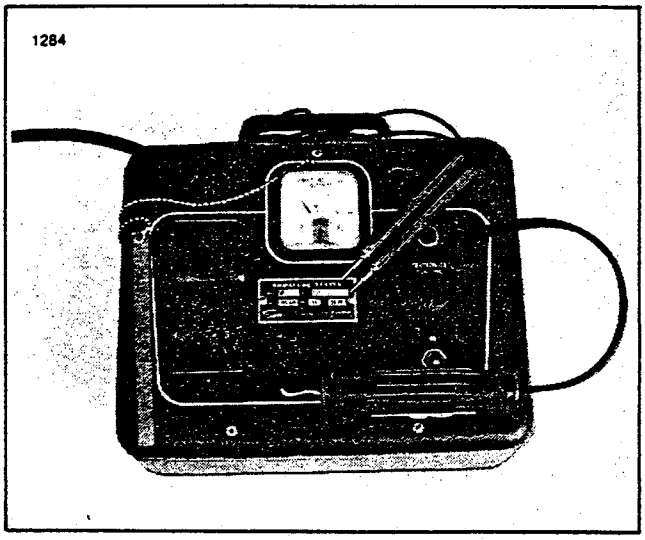


Figure 8-27. Armature Tester

NOTE

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

CAUTION

Do not submerge armature in solvent.

A completely GROUNDED 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 8-28)

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 8-29)

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

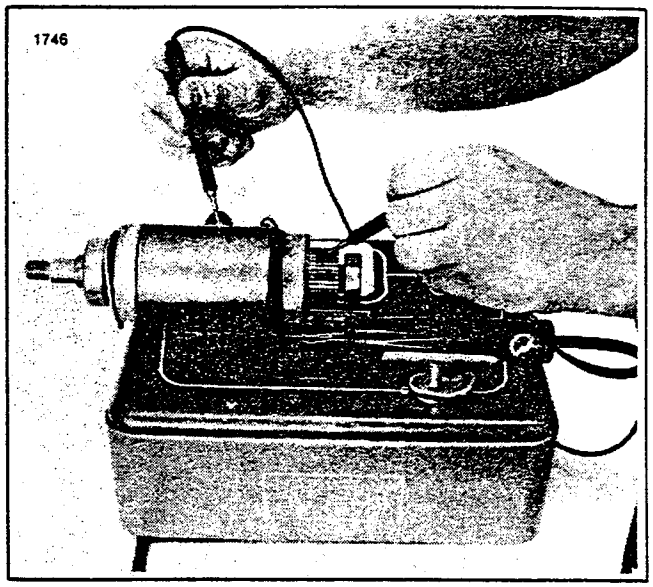


Figure 8-28. Armature Ground Test

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.

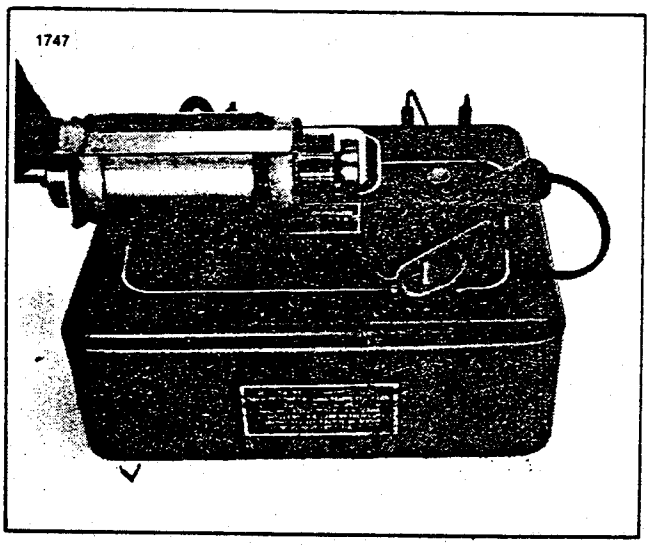


Figure 8-29. Armature Short Test

Armature Coil Balance Test (Figure 8-30)

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.

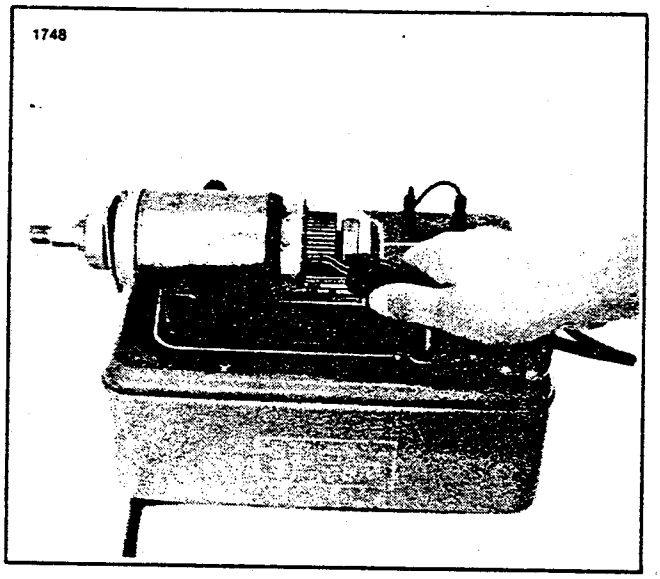


Figure 8-30. Armature Coil Balance Test

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 8-31)

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.

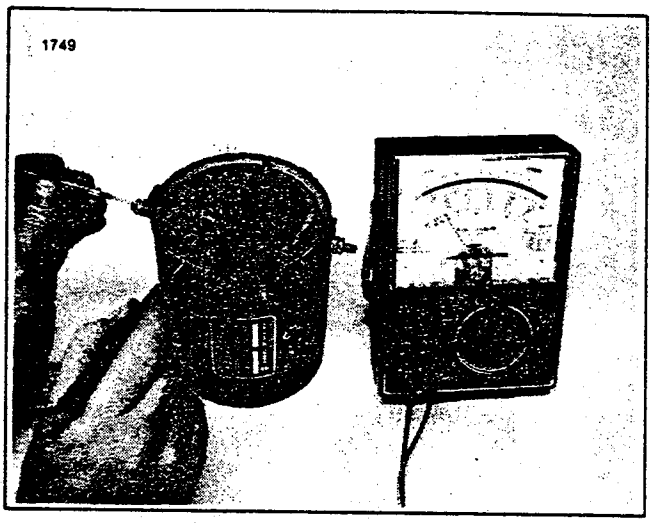


Figure 8-31. Grounded Field Test

Refinishing Commutator (Figure 8-32)

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 8-33)

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).

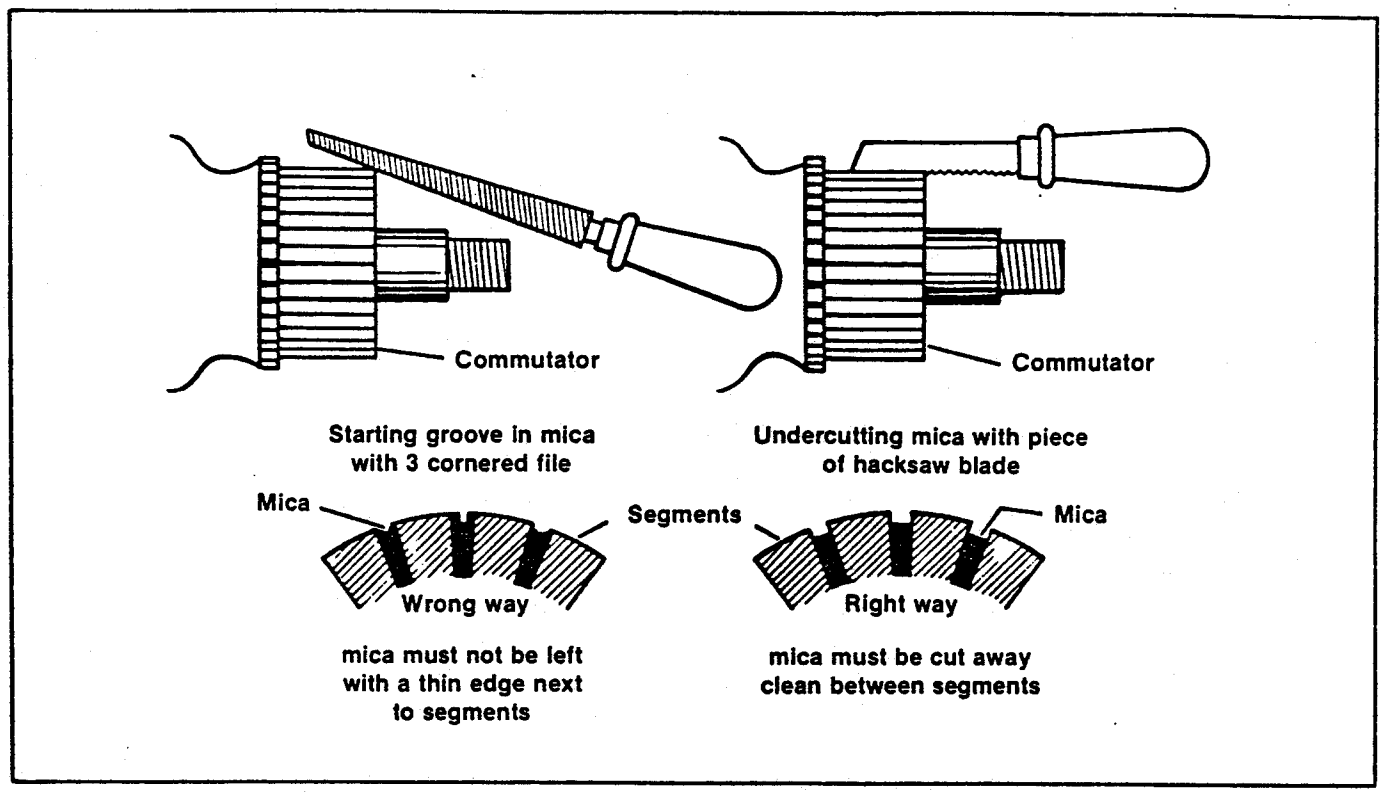


Figure 8-32. Recessing the Mica Separators

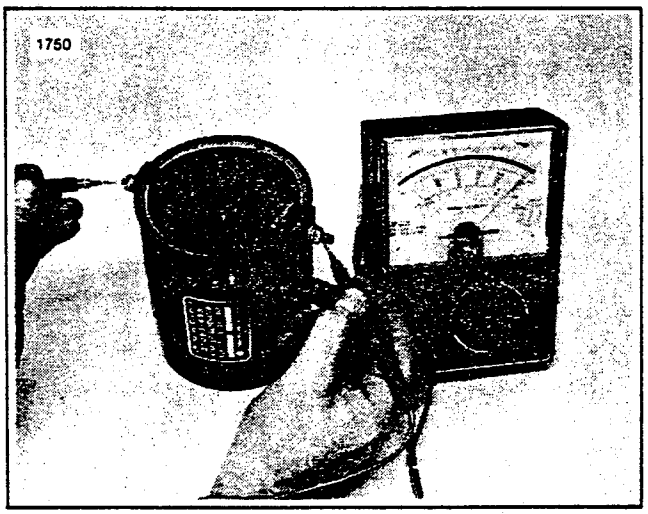


Figure 8-33. Open Field Test

ASSEMBLY (Figure 8-24)

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

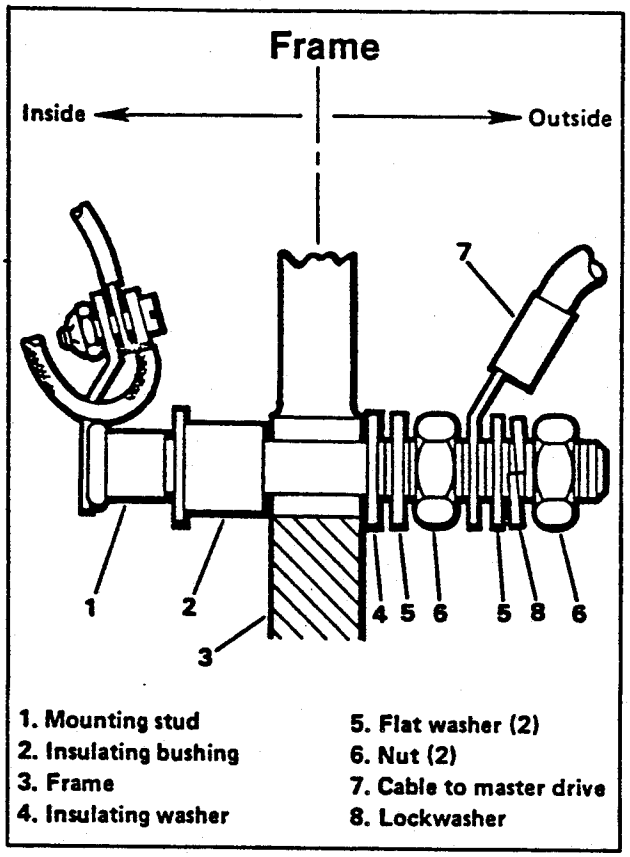
Route field terminal wires so that they will not contact armature.

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 8-34 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.



1. Mounting stud
2. Insulating bushing
3. Frame
4. Insulating washer
5. Flat washer (2)
6. Nut (2)
7. Cable to master drive
8. Lockwasher

Figure 8-34. 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 8-22).

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 8-21)

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 8-2. 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.

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 2800 RPM (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

NOTE

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

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 (2800 rpm) in forward direction and check voltage reading. Correct reading is 14.5-15.5 volts.
4. See Figure 8-35. 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.

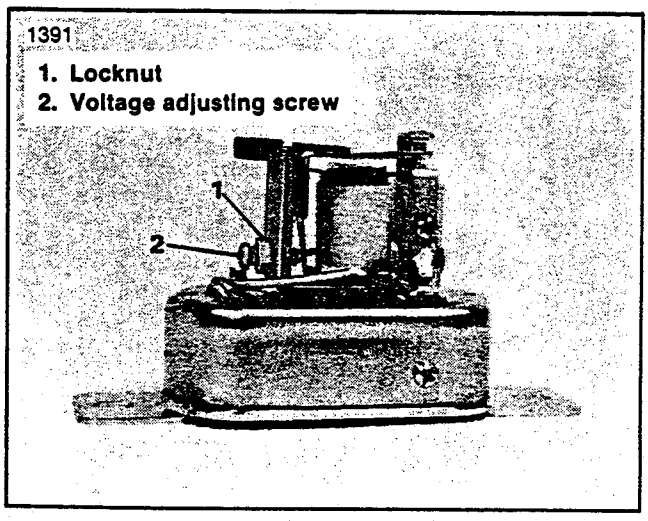
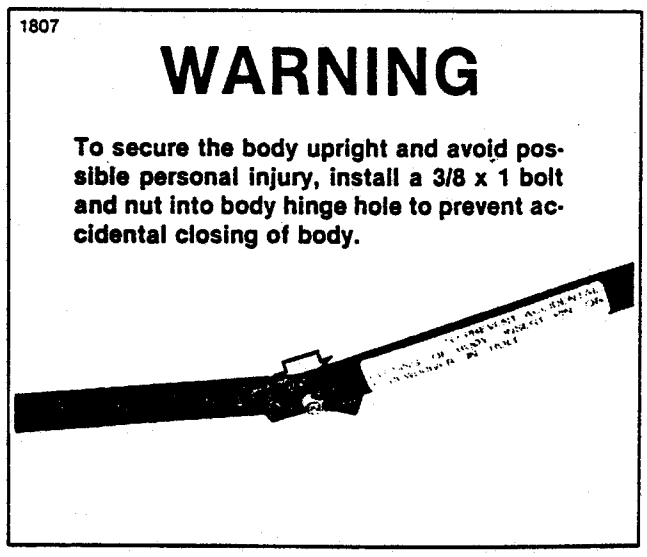


Figure 8-35. Adjusting Voltage Regulator

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 8-2. 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.

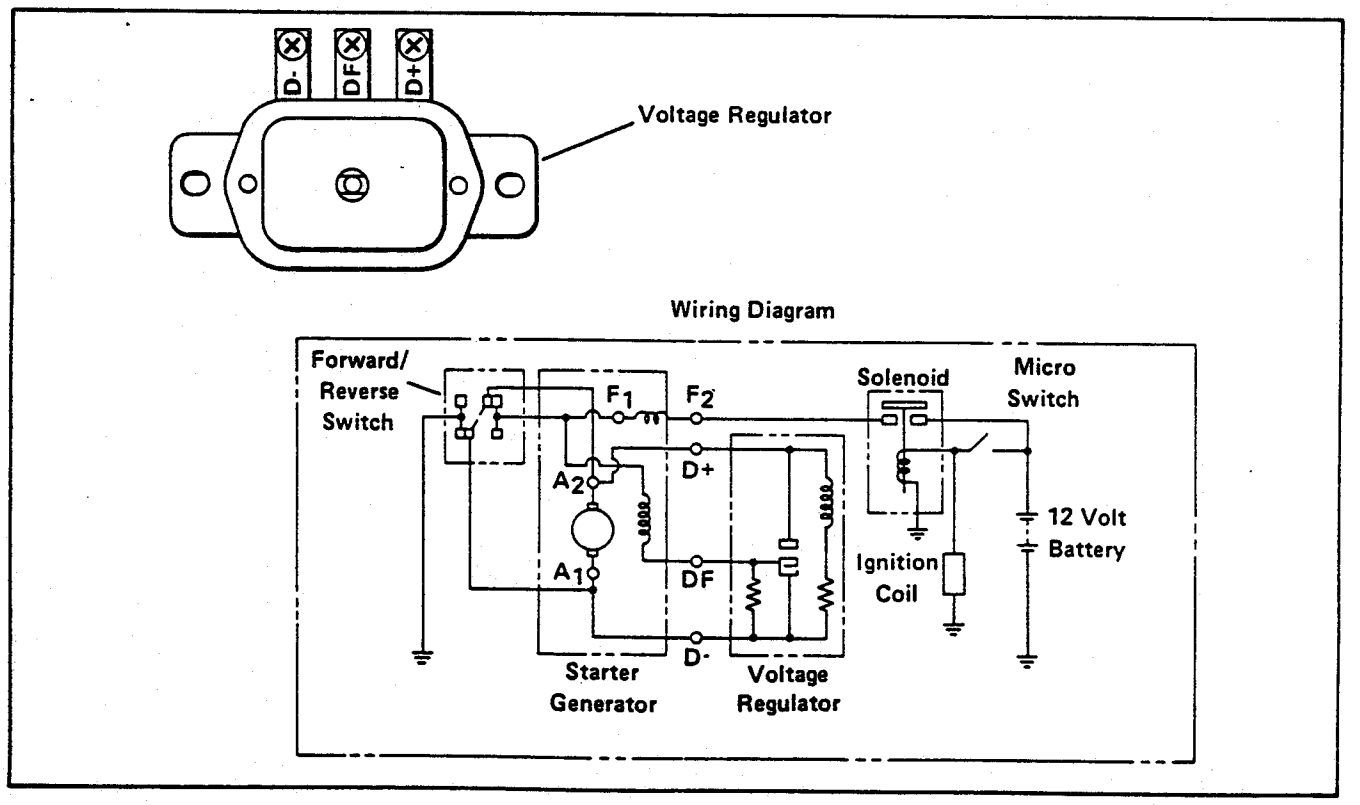


Figure 8-36. Regulator Charging Circuit

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 8-36. 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 indicats 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 8-38)

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.

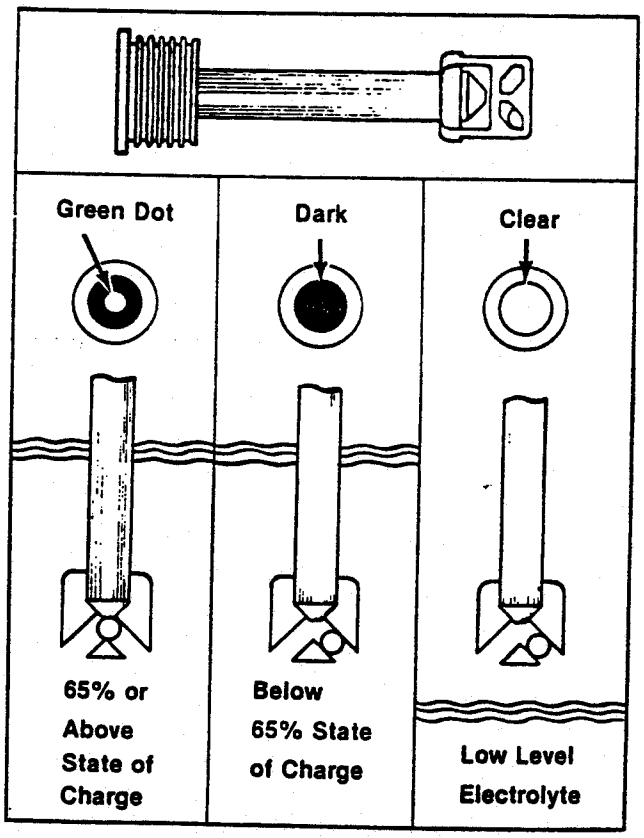


Figure 8-37. Battery Window

CHARGING THE BATTERY

WARNING

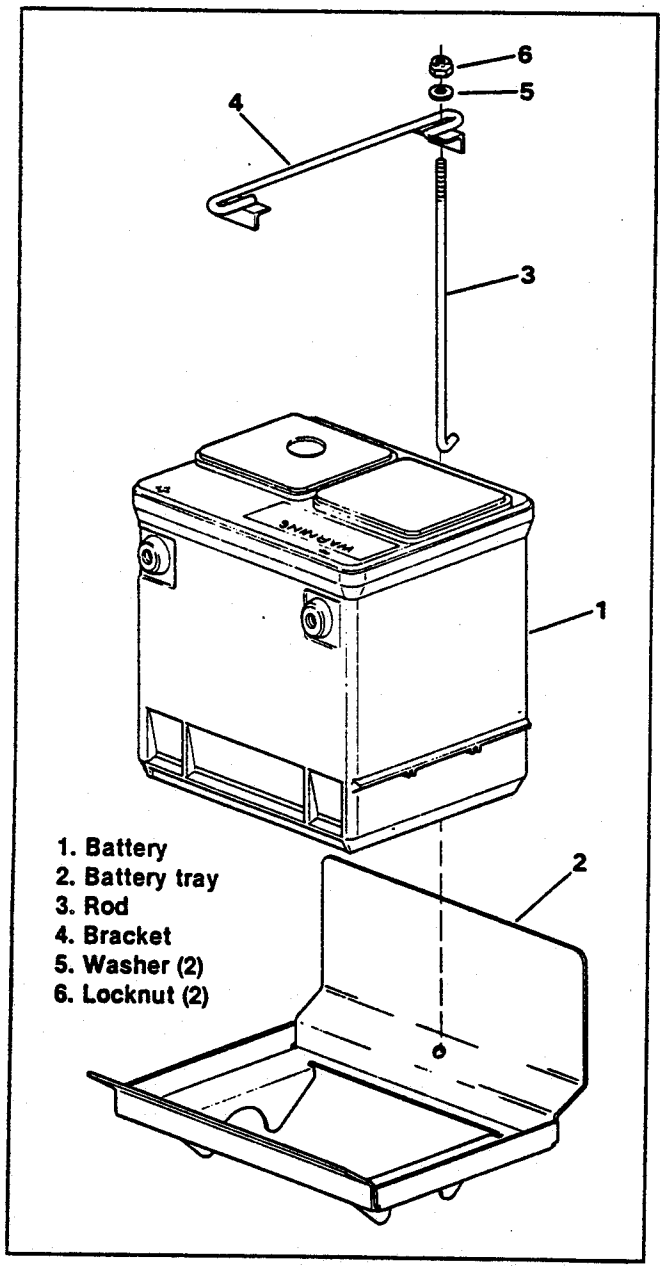
The gasses produced by a storage battery on charge are highly explosive. To prevent possible personal injury, charge batteries in a well ventilated area, keep fire and flame away from charging batteries and do not work around charging batteries with tools that could cause a short circuit resulting in a spark. Always shield eyes when working near charging batteries.

Battery In Vehicle

1. Attach positive charger cable (+) to positive (+) terminal on battery.
2. Attach negative charger cable (−) to negative (−) terminal on battery.
3. Follow chart for desired charging rate.

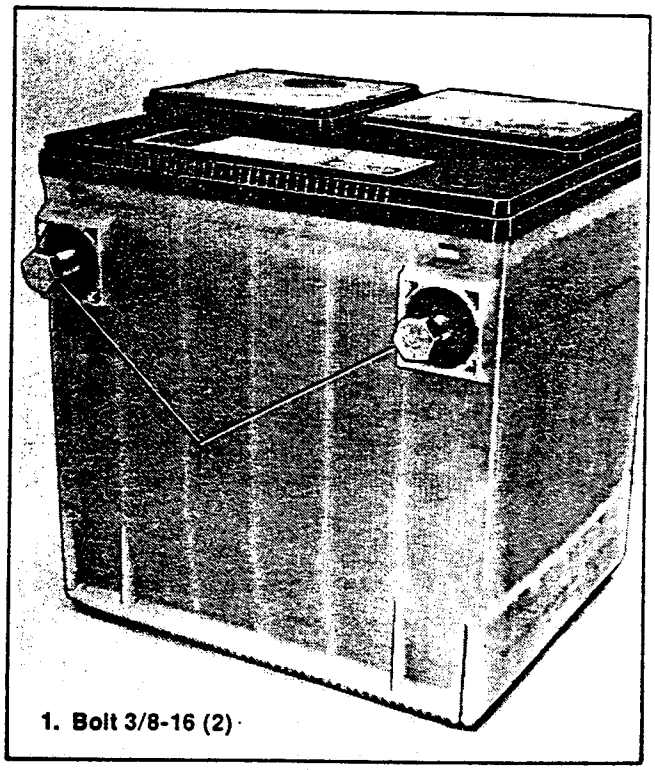
Battery Out Of Vehicle

1. Thread a 3/8-16 bolt into each terminal, hand tight (see Figure 8-39).
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.



1. Battery
2. Battery tray
3. Rod
4. Bracket
5. Washer (2)
6. Locknut (2)

Figure 8-38. Battery Installation



1. Bolt 3/8-16 (2)

Figure 8-39. 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 8-38)

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.

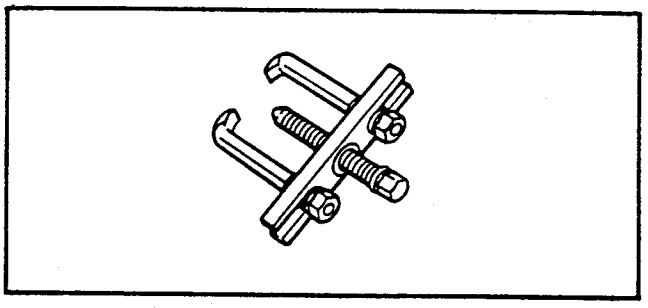
Lead sulphate formed on the plates during discharge is relatively insoluble as long as the specific gravity of electrolyte is kept above 75% specific gravity, but if allowed to drop below this value, the lead sulphate becomes increasingly soluble and may migrate into the pores of the separators and deposit 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

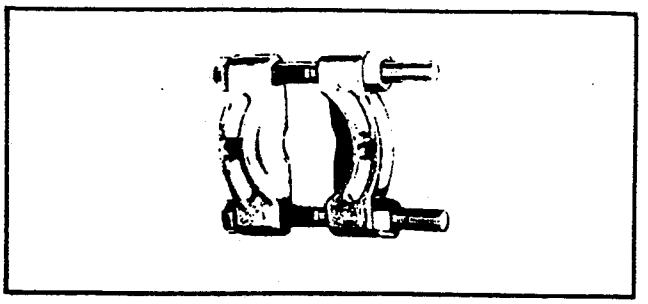
If Temperature is	70°F (20°C) & Above	60°F (16°C)	50°F (10°C)	40°F (4°C)	30°F (-1°C)	20°F (-7°C)	10°F (-12°C)	0°F (-18°C)
Then Minimum Voltage Needed Is	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

State of Charge	Freezing Point F°	Freezing Point C°	Risk of Sulfation
100%	-70°	-57°	Low
75%	-39°	-38°	Low
50%	-16°	-26°	Low
25%	-2°	-19°	Moderate
Discharged	+17°	-8°	High

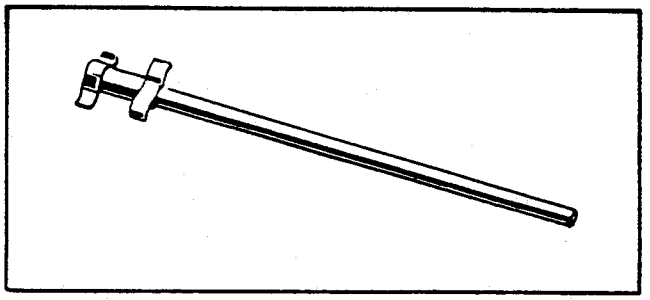
TOOLS



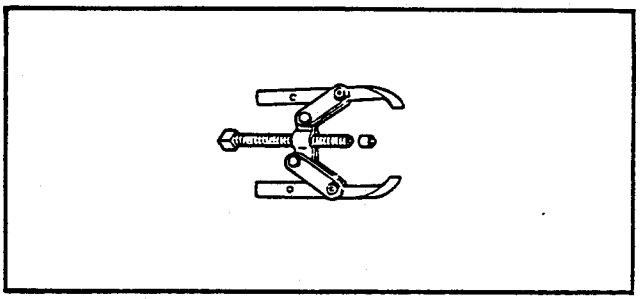
Part No. 97292-61 Two Jaw Puller



Part No. 95637-46 Wedge Attachment for Claw Puller



Part No. 96806-40 Bending Bar



Part No. 95635-46 All Purpose Claw Puller

SECTION PAGE NO.

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.

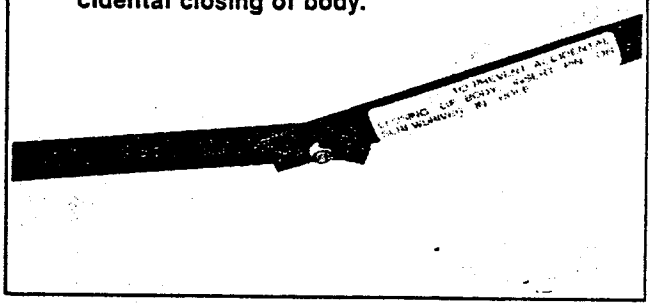
CAUTION

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.

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.



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, liquid detergent cleaners such as used for dishes 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.

FRONT HOUSING D-3

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 floormats (1 and 2).

3. Remove tiller bar or steering wheel. See STEERING, Section 2.

4. Remove top bolt (3) and washer (4).

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 (5).

INSTALLATION (Figure 9-1)

1. Attach side shields (13) to fork housing (12) using rivets (5) and washers (6).

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).

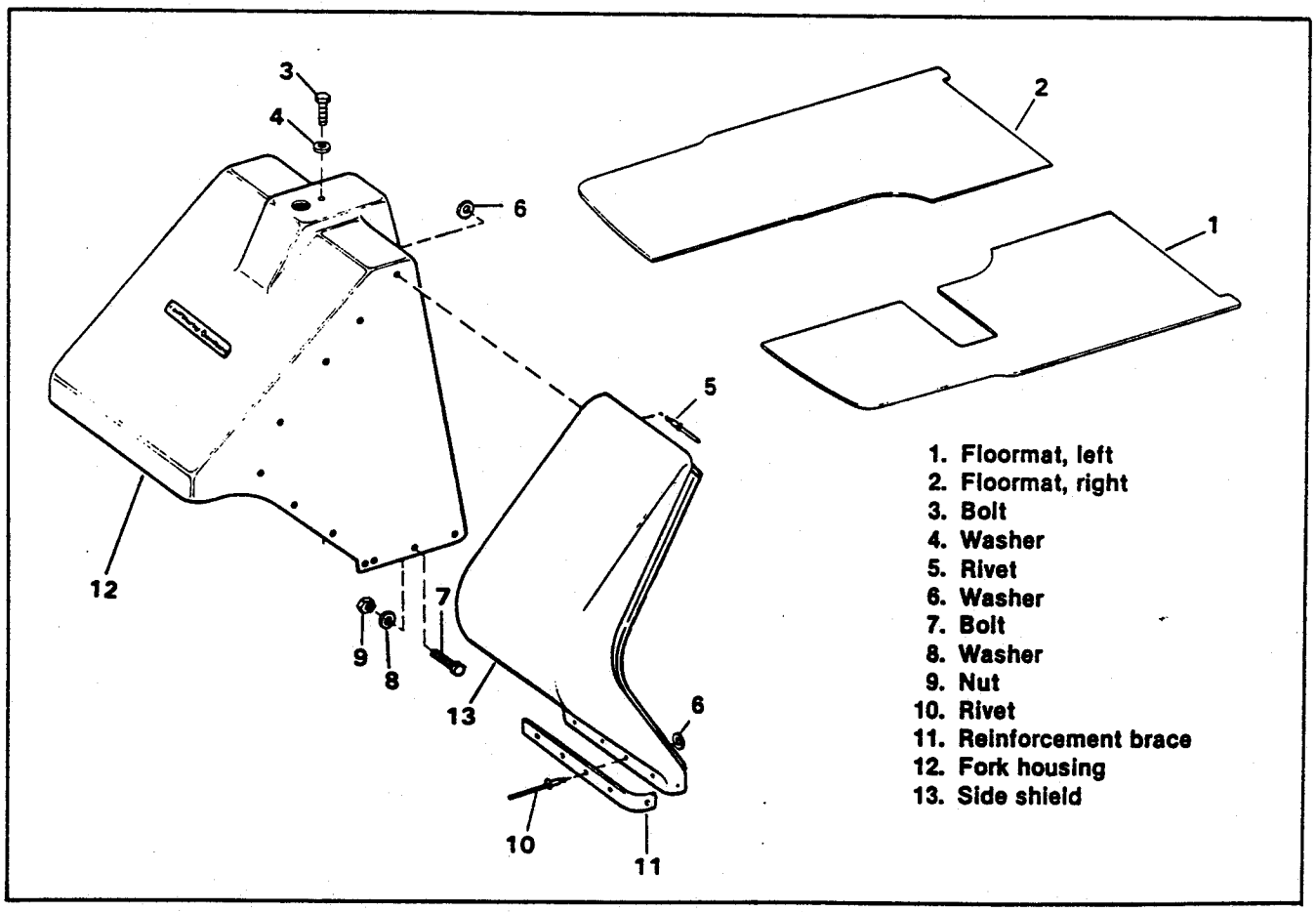


Figure 9-1. Front Housing D-3

3. Install top bolt (3) and washer (4).

4. Install tiller bar or steering wheel. See STEERING, Section 2.

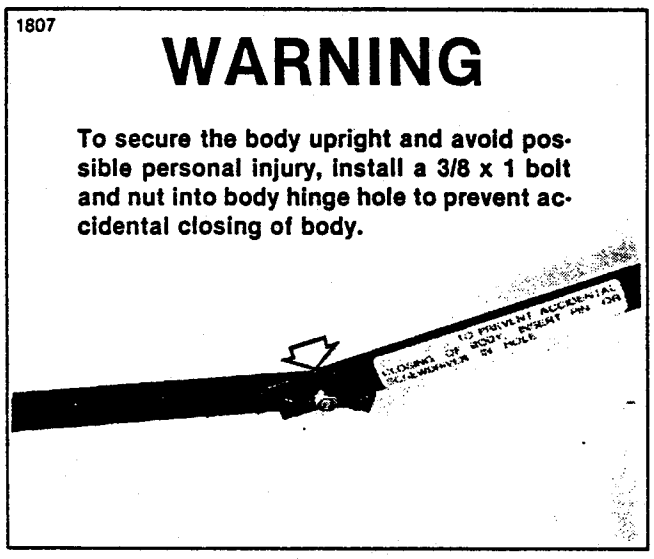
5. Install floormats (1 and 2) by glueing them to floorboards and fork housing. Use Harley-Davidson CONTACT ADHESIVE, Part No. 99615-69.

FRONT HOUSING DX4

REMOVAL (Figure 9-2)

WARNING

Eye protection must be worn while drilling out rivets.



WARNING

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

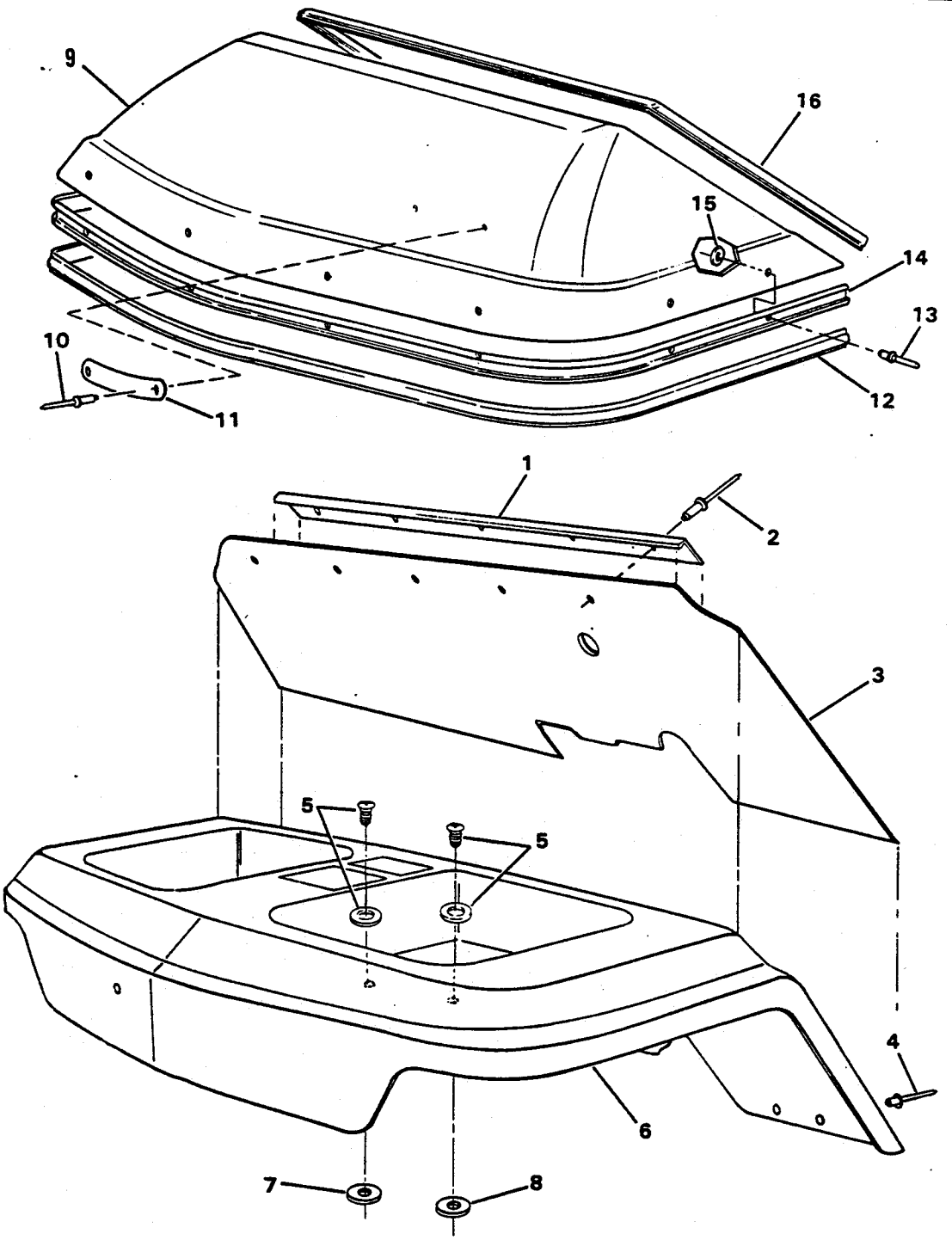
1. Remove plastic bumper strip (12). Drill out rivets (13) and washers (15) using a 3/16 in. drill bit, then remove front housing shield (9).
2. Remove steering wheel. See STEERING, section 2.
3. Remove floor mat molding (1), located at top of floor mat, by drilling out 5 rivets with 3/16 in. drill.
4. Peel off floor mat.
5. Drill out 13 rivets (4) along bottom of housing and around steering column with 3/16 in. drill.
6. Remove 4 Phillips head screws (5) and washers located in well of front housing.
7. Lift front housing off car.

INSTALLATION (Figure 9-2)

WARNING

Read and follow precautions and handling instructions on contact adhesive container before using contact adhesive.

1. Glue four rubber washers on front housing front mounting bar with Harley-Davidson CONTACT ADHESIVE, Part No. 99615-69.
2. Place front housing on car.
3. Install 4 Phillips head screws and washers through housing and rubber washers.
4. Rivet housing to floor board.
5. Glue floor mat to housing with Harley-Davidson CONTACT ADHESIVE, Part No. 99615-69.
6. Rivet floor mat molding to housing.
7. Install steering wheel. See STEERING, section 2.
8. Install front housing shield onto front housing and secure with rivets (13) and washers (15). Install plastic bumper strip (12).



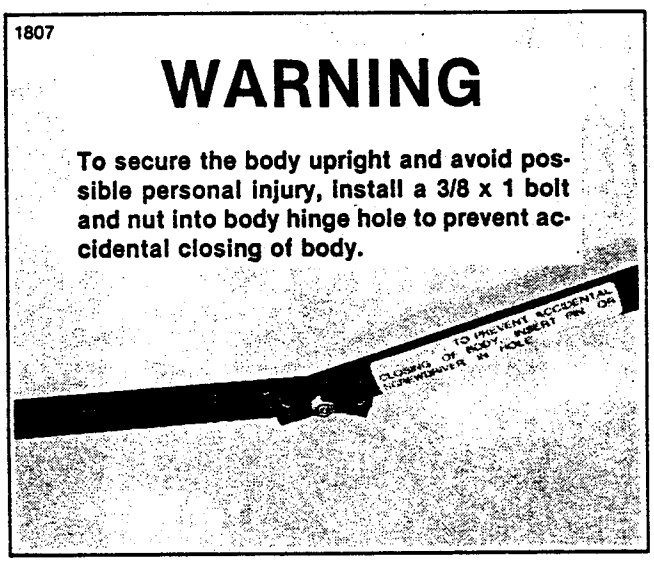
1. Floor mat holding
2. Pop rivet (5)
3. Floor mat
4. Pop rivet (13)
5. Screw and washer (4)
6. Front housing
7. Large rubber washers
8. Small rubber washers
9. Front housing shield
10. Pop rivet (2)
11. Nameplate
12. Plastic bumper strip
13. Pop rivet (8)
14. Bumper
15. Washer (8)
16. Trim

Figure 9-2. Front Body Section, 4 Wheel Car

SEATS AND HANDRAILS

REMOVAL (Figure 9-3)

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 (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.

Disassembly (Figure 9-3)

1. Remove bolts (16) and lockwashers (17), lag bolts (21), extensions (22) which secure backrest (18) to seat supports (5), then remove backrest.

2. Remove bolt (8), nut (11) and lockwasher (10) which secure handrail to seat support.

Assembly (Figure 9-3)

1. Install handrails (9) onto seat supports (5) using bolts (8), lockwashers (10) and nuts (11).

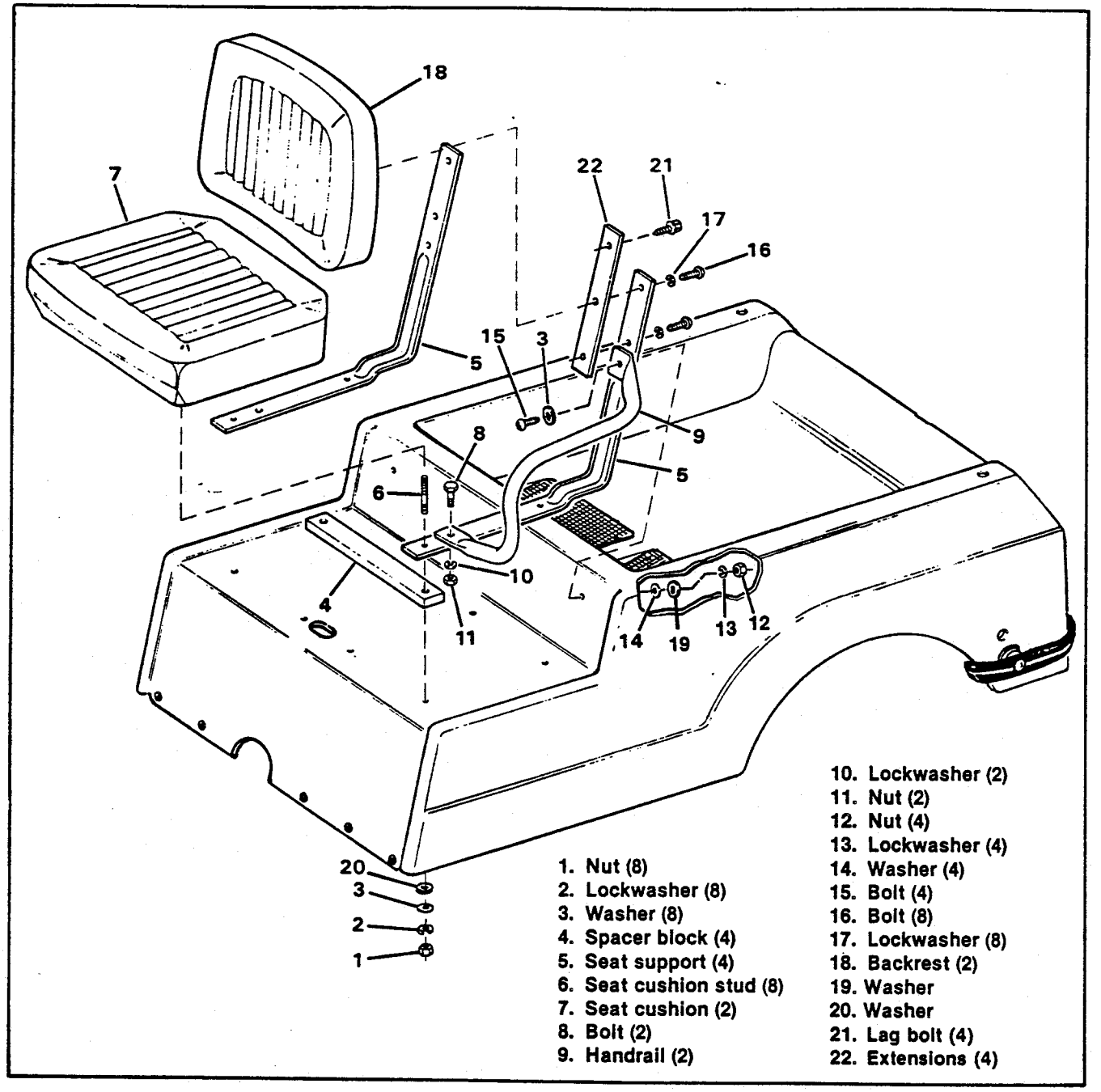
2. Secure handrails (9), seat supports (5), extensions (22) and lag bolts (21). Tighten lag bolts (21) securely; do not overtighten.

3. Secure backrests (18) to seat supports with bolts (16) and lockwashers (17).

INSTALLATION (Figure 9-3)

1. Fasten handrails (9) to body with bolts (15), washers (14), lockwasher (13) and nuts (12).

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).



1. Nut (8)
2. Lockwasher (8)
3. Washer (8)
4. Spacer block (4)
5. Seat support (4)
6. Seat cushion stud (8)
7. Seat cushion (2)
8. Bolt (2)
9. Handrail (2)
10. Lockwasher (2)
11. Nut (2)
12. Nut (4)
13. Lockwasher (4)
14. Washer (4)
15. Bolt (4)
16. Bolt (8)
17. Lockwasher (8)
18. Backrest (2)
19. Washer
20. Washer
21. Lag bolt (4)
22. Extensions (4)

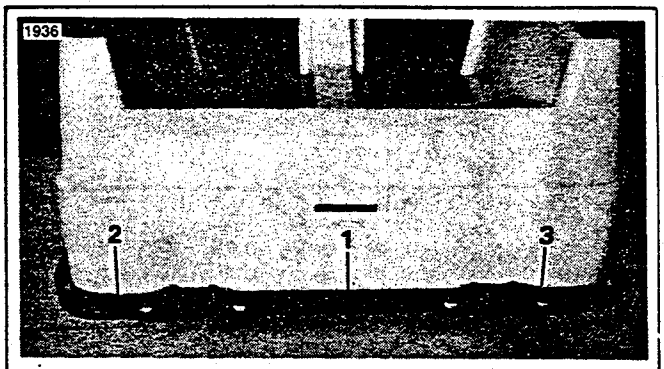
Figure 9-3. Seats and Handrails

BODY AND REAR BUMPER

REAR BUMPER

General (Figure 9-4)

The rear bumper consists of three sections: The center bumper section (1), right bumper section (2) and left bumper section (3), also the rear bumper must be removed before the body can be removed.

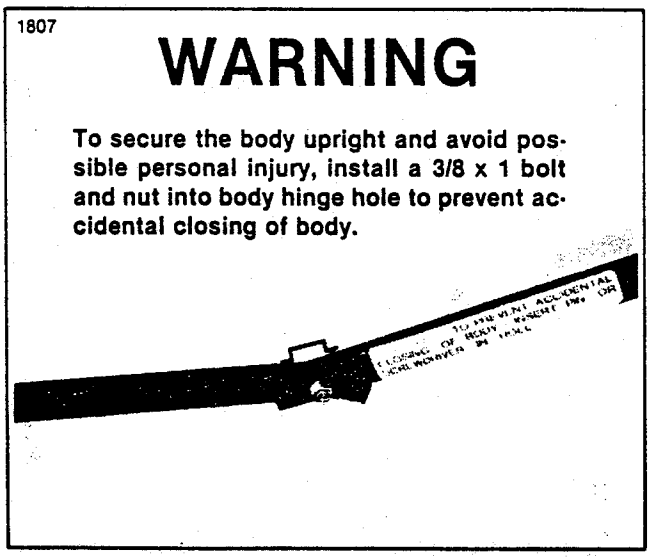


1. Center bumper section
2. Left bumper section
3. Right bumper section

Figure 9-4. Rear Bumper

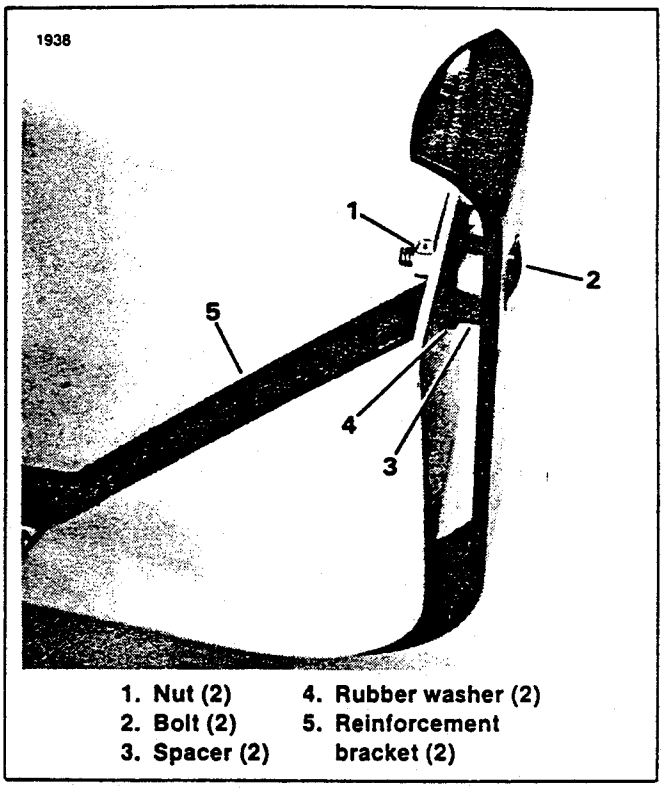
Removal

1. Lift the golf car body.



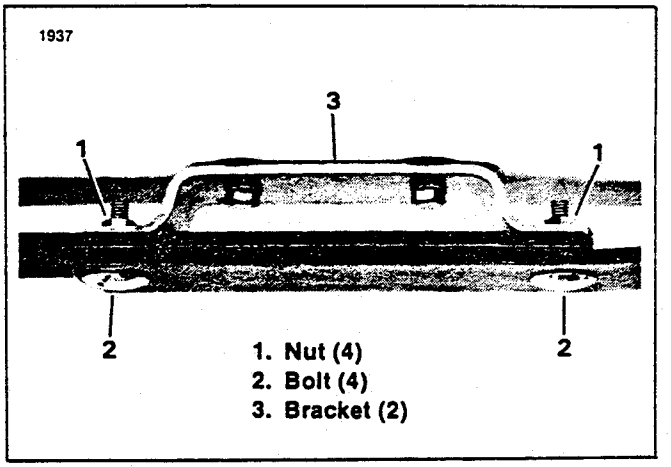
2. See Figure 9-5. Remove the side bumper section locknuts (1), bolts (2), spacers (3) and rubber washers (4).

3. See Figure 9-6. Remove center bumper locknuts (1), bolts (2) from bumper bracket (3) and remove bumper sections.



1. Nut (2)
2. Bolt (2)
3. Spacer (2)
4. Rubber washer (2)
5. Reinforcement bracket (2)

Figure 9-5. Side Bumper Section



1. Nut (4)
2. Bolt (4)
3. Bracket (2)

Figure 9-6. Bumper Bracket

Assembly

1. See Figure 9-5. Install the side bumper section bolts (2), spacers (3), rubber washers (4) and insert through body and body reinforcement (5). Install locknuts (1) and tighten.

2. See Figure 9-6. Install center and side bumper sections to bumper brackets (3) using bolts (2) and locknuts (1).

3. Connect battery cables and lower body.

BODY

Removal

1. Remove bumper. See REAR BUMPER REMOVAL.

2. Lift the golf car body.

WARNING

Secure body in raised position by tying or blocking to prevent body from falling during removal.

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.

3. 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.

4. See Figure 9-8. Remove the four bolts (1), lockwashers (2), bumper brackets (3) which secure the body to the rear hinges.

5. Carefully lift the body off the golf car.

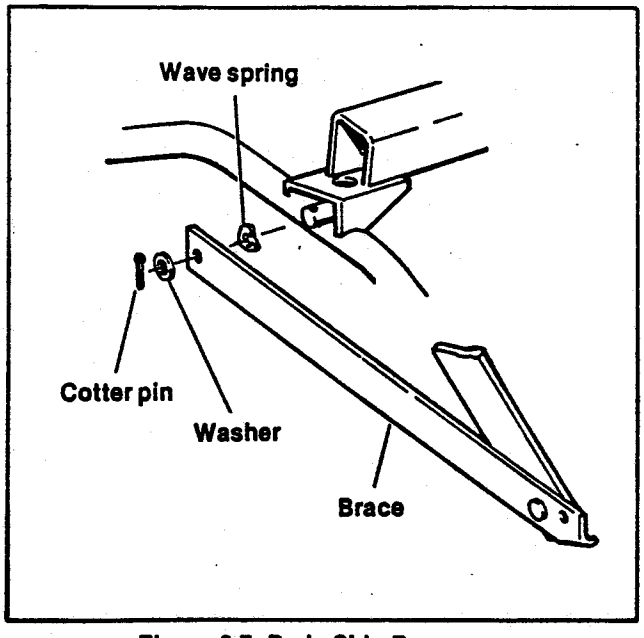
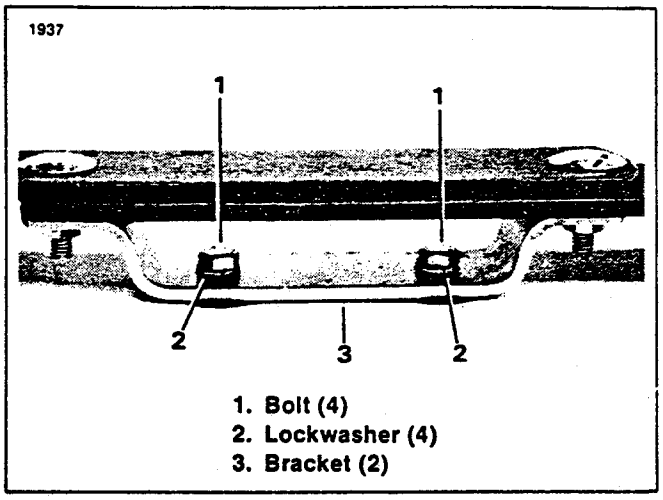


Figure 9-7. Body Side Brace



1. Bolt (4)
2. Lockwasher (4)
3. Bracket (2)

Figure 9-8. Body Hinge Screws

Installation

1. Carefully place the golf car body on the car so the holes in the rear of the car line up with the hinges.

2. See Figure 9-8. Attach bumper brackets (3), lockwashers (2) and bolts (1).

WARNING

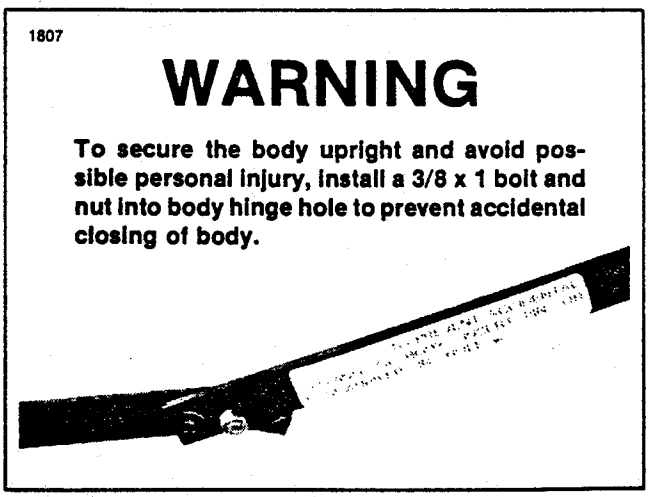
Secure body in raised position by tying or blocking to prevent body from falling during removal.

3. Lift body to full upright position.

4. See Figure 9-7. Install a wave spring and brace on each side of the frame and secure with a flat washer and cotter pin.

5. Install rear bumper. See REAR BUMPER INSTALLATION.

6. Connect battery cables and lower the body to its original position.



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.

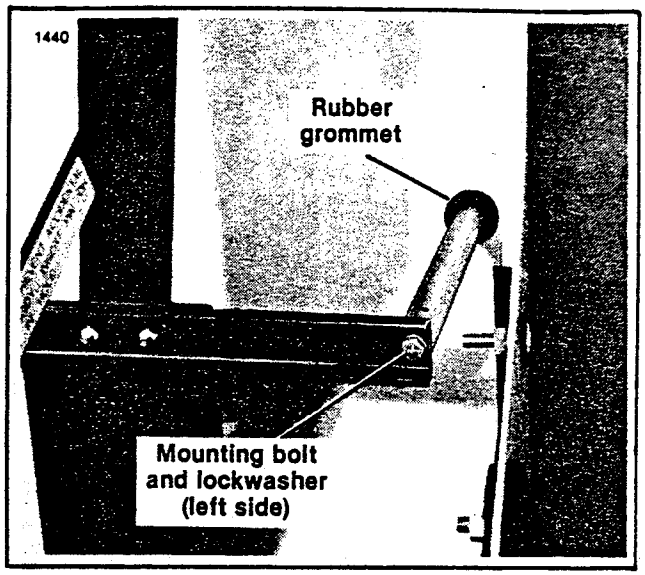


Figure 9-9. Back Rack Installation