

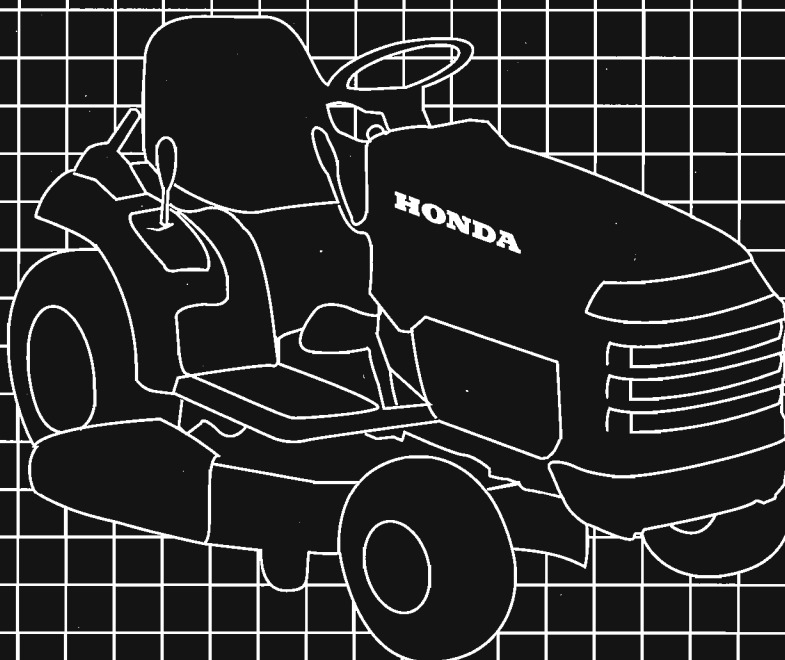
**HONDA**

**Power**

**Equipment**

# SHOP MANUAL

LAWN TRACTOR  
H4514H





### PREFACE

This manual covers the construction, function and servicing procedures of the Honda Lawn Tractor H4514H.

Careful observance of these instructions will result in better, safer service work.

**▲WARNING** Indicates a strong possibility of severe personal injury or death if instructions are not followed.

**CAUTION :** Indicates a possibility of personal injury or equipment damage if instructions are not followed.

**NOTE :** Gives helpful information.

**CAUTION :** Detailed descriptions of *standard* workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause **PERSONAL INJURY** or could damage the product or make it unsafe. Please understand that those warnings could not cover all conceivable ways in which service, whether or not recommended by American Honda, might be done, or of the possible hazardous consequences of each conceivable way, nor could American Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by American Honda, *must satisfy himself thoroughly* that neither personal safety nor product safety will be jeopardized.

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## SPECIFICATIONS

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## SPECIFICATIONS

### DIMENSIONS AND WEIGHTS

MODEL		H4514H
Description code		MZAS
Overall length		1815 mm (71.46 in)
Overall width		1270 mm (50.00 in) : 38 inch mower deck 1460 mm (57.48 in) : 42 inch mower deck
Overall height		1050 mm (41.34 in)
Wheel base		1190 mm (46.85 in)
Wheel tread	Front	730 mm (28.74 in)
	Rear	750 mm (29.53 in)
Dry weight		265 kg(584 lb) : 38 inch mower deck 275 kg(606 lb) : 42 inch mower deck

### FRAME

Cutting width		38 inch		42 inch	
Cutting height	Steps	7		7	
	Height (mm)	1(25), 1-1/2(38), 2(51), 2-1/2(64), 3(76), 3-1/2(89), 4(102)			
Blade	Width	70 mm (2.76 in)			
	Thickness	5 mm (0.20 in)			
	Lift	Left	23 mm(0.91 in)		25 mm(0.98 in)
		Right	37 mm(1.46 in)		
Tire size	Front	15 × 6.00—6			
	Rear	20.5 × 8.50—10			
Air pressure	Front	98 kPa (1.0 kg/cm <sup>2</sup> , 14 psi)			
	Rear	78 kPa (0.8 kg/cm <sup>2</sup> , 11 psi)			
Steering angle		Inside wheel : 60°    Outside wheel : 50°			
Minimum turning radius (approx)		1860 mm (73.23 in)			
Minimum cutting radius (approx)	Clockwise	1550 mm (61.02 in)		1300 mm (51.18 in)	
	Counterclockwise	1550 mm (61.02 in)		1400 mm (55.12 in)	
Battery		12 V 30 AH			
Seat adjustment range		120 mm (4.7 in)			

### POWER TRAIN

Engine to transmission		Drive shaft
Gear shift system		Hydrostatic transmission
Travel speed [at 3,300 r.p.m. of engine speed]	Forward	Mowing : 5.1 km/h (3.2 mph), Transport : 7.6 km/h (4.7 mph)
	Reverse	3.4 km/h (2.1 mph)
Brake system		Leading-trailing type
Actuation		Differential type
Hydrostatic transmission oil	Capacity	5.0 ℓ (5.28 US. qt, 4.40 Imp. qt)
	Type	Hydrostatic transmission fluid

# HONDA

## H4514H

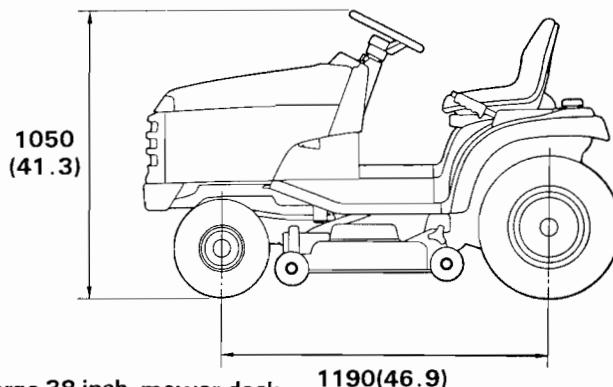
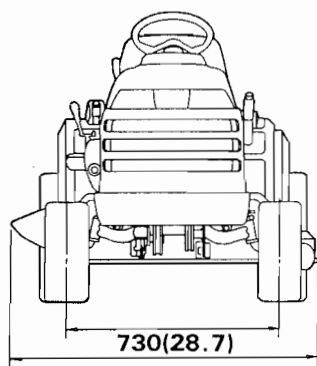
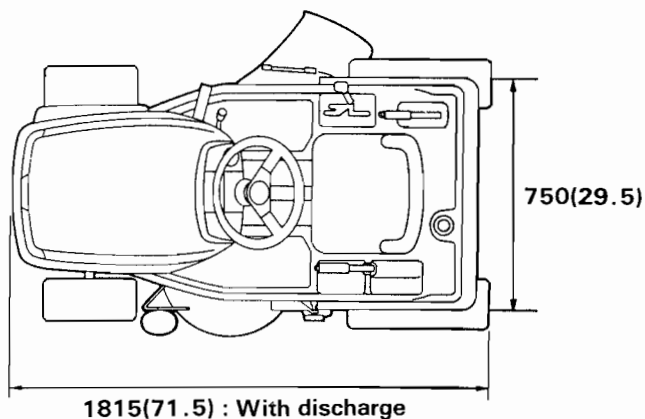
### ENGINE

Type	4-stroke, O. H. C., 2-cylinder
Displacement	359 cm <sup>3</sup> (21.9 cu in)
Bore X Stroke	58 × 68 mm (2.3 × 2.7 in)
Maximum horsepower	13 HP/3,000 rpm
Maximum torque	2.6 kg-m (18.8 ft-lb) 2,500 rpm
Compression ratio	8.5 : 1
Cooling system	Liquid-cooling
Coolant capacity	
Radiator and engine	2.0 ℓ (2.11 US qt)
Reserve tank	0.4 ℓ (0.42 US qt)
Total system	2.4 ℓ (2.54 US qt)
Ignition system	Transistorized magneto ignition
Ignition timing	24 ± 2° B.T.D.C. (Fixed)
Spark plug	BPR4HS (NGK) W14FPR-UL (ND)
Carburetor	Horizontal, butterfly valve
Air cleaner	Dual element type
Governor	Mechanical governor
Lubricating system	Forced oil by trochoid pump
Oil capacity	1.4 ℓ (1.48 US qt)
Starting system	Electric starter
Stopping system	Ground of primary circuit
Fuel tank capacity	9.0 ℓ (2.38 US gal, 1.98 Imp gal)
Recommended fuel	Unleaded or regular gasoline - 86 pump octane
Recommended oil	SAE 10 W-30

NOTE : Specifications are subject to change without notice.

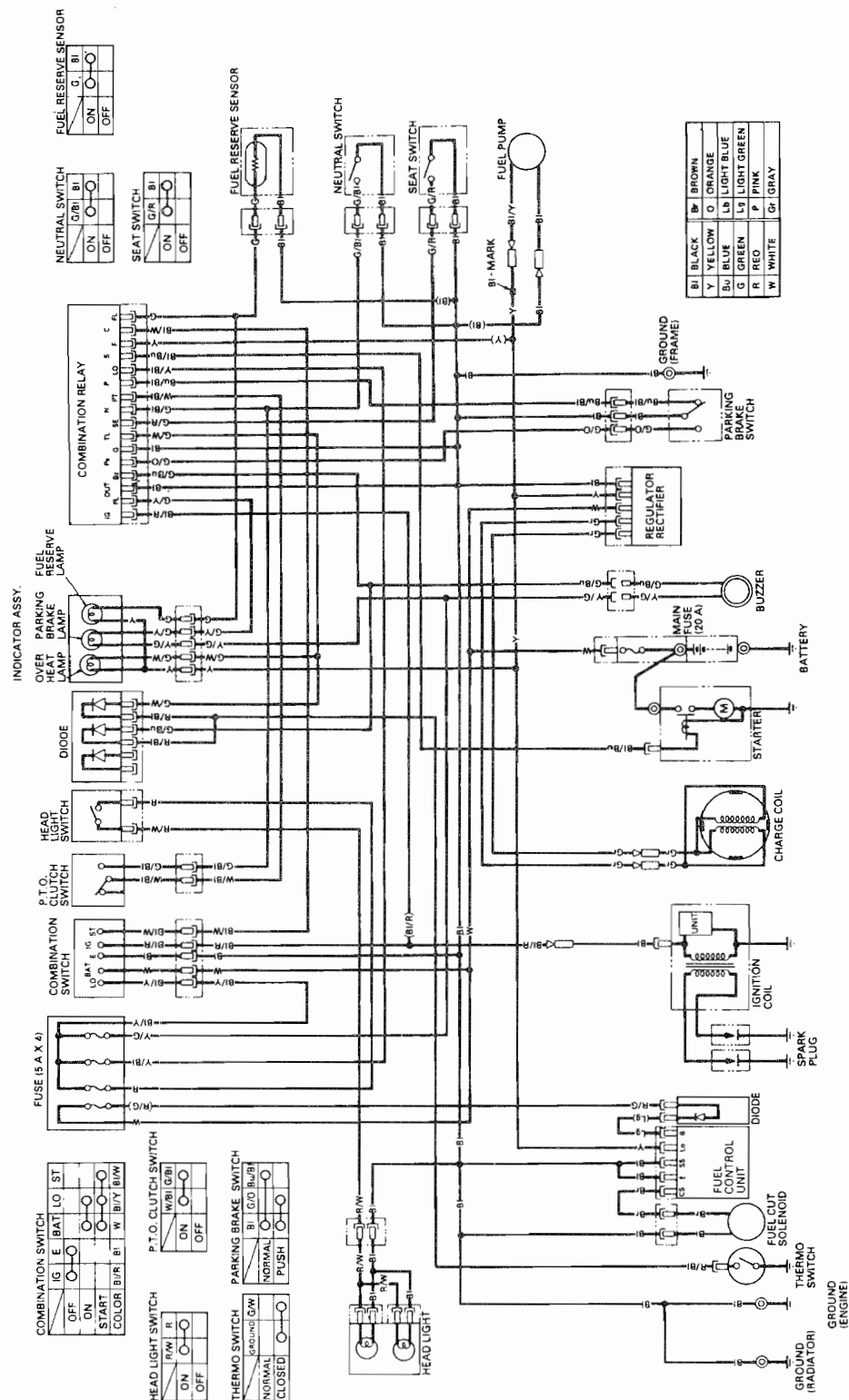
### DIMENSIONAL DRAWINGS

Unit : mm (in)



1270(50.0) : With discharge 38 inch mower deck  
1460(57.5) : With discharge 42 inch mower deck

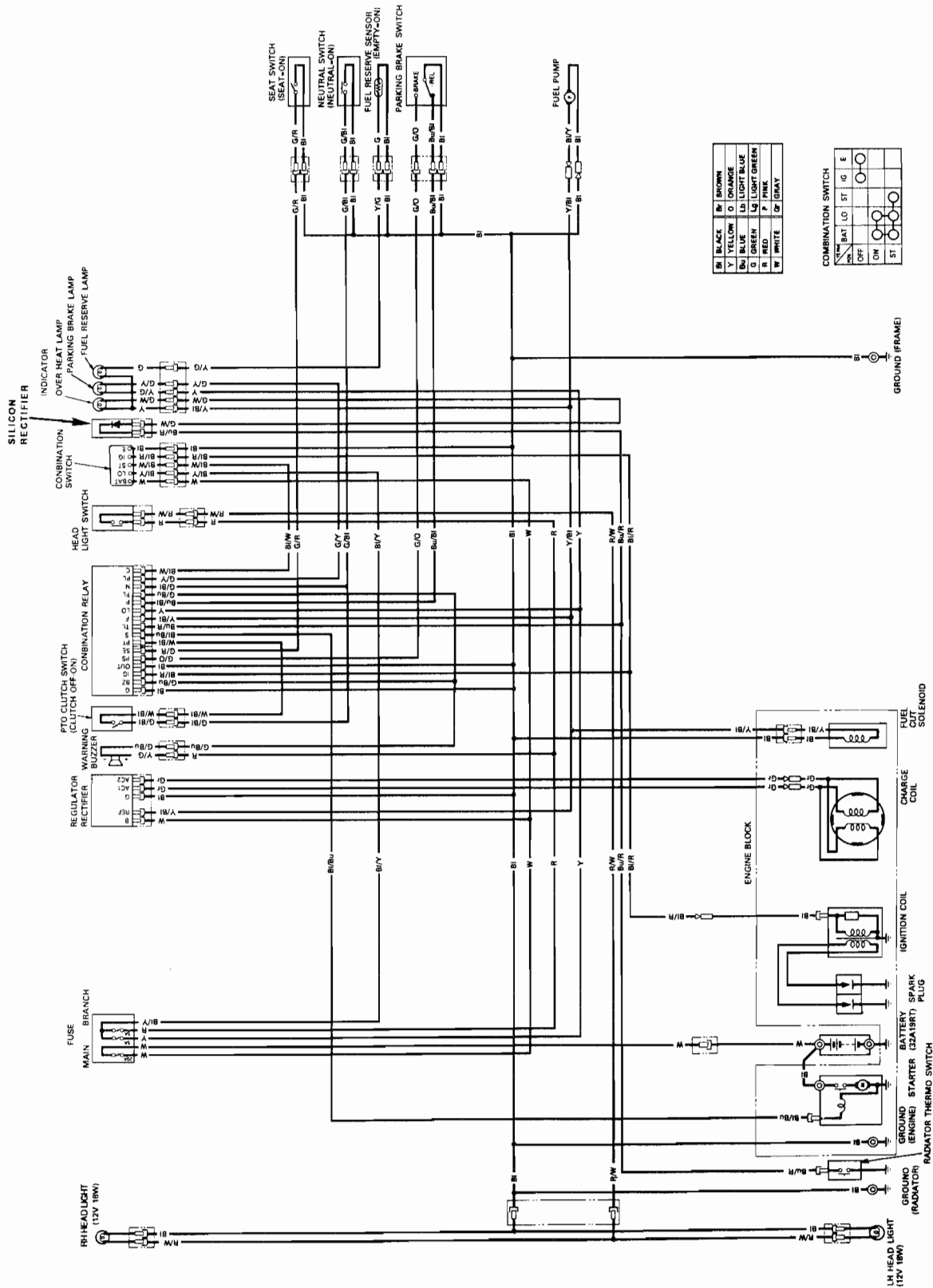
- **Frame serial number 1000001 - 1006846**





## WIRING DIAGRAM

- Frame serial number 1006847 and subsequent



**NOTE**

## SERVICE INFORMATION

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## GENERAL SAFETY

Pay attention to these symbols and their meanings :

- ▲WARNING** Indicates a strong possibility of severe personal injury or death if instructions are not followed.  
**CAUTION** : Indicates a possibility of personal injury or equipment damage if instructions are not followed.

### ▲WARNING

- Stop the engine, and remove the spark plug caps and ignition key before servicing the lawn tractor.
- If the motor must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area ; the exhaust contains poisonous carbon monoxide gas.
- Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

### CAUTION

- Keep away from rotating or hot parts and high voltage wires when the engine is run with the rear body hood is open.

## SERVICE RULES

1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the tractor.
2. Use the special tools designed for the product.
3. Install new gaskets, O-rings, etc. when reassembling.
4. When torquing bolts or nuts, beginning with larger-diameter or inner bolts first and tighten to the specified torque diagonally, unless a particular sequence is specified.
5. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
6. After reassembly, check all parts for proper installation and operation.
7. Many screws used in this machine are self-tapping. Be aware that cross-threading or overtightening these screws will strip the female threads and ruin the hole.
8. Use only metric tools when servicing this tractor. Metric bolt, nuts and screws are not interchangeable with nonmetric fasteners. The use of incorrect tools and fasteners will damage the tractor.
9. Follow the instructions represented by these symbols when they are used :



: Apply oil



: Use special tool



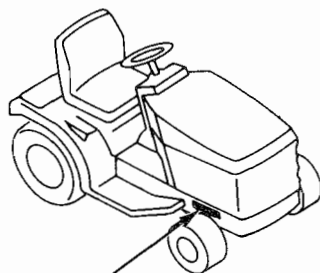
: Apply grease

○ x ○ (○) : Indicates the type, length, and number of the flange bolt used.

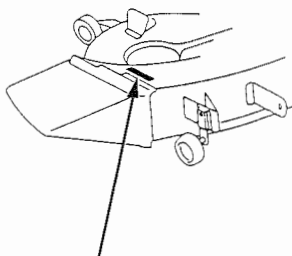
P.    : Indicates the reference page.

## SERIAL NUMBER LOCATION

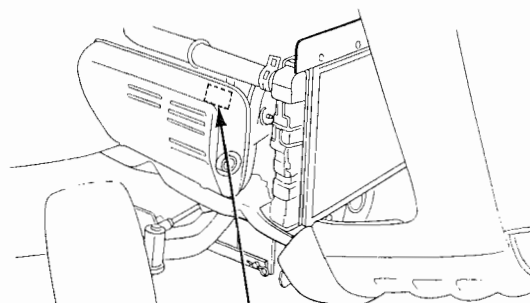
The engine serial number is stamped on the crankcase and the frame serial number is located on the front right side of the frame body. Always specify these numbers when inquiring about the engine or when ordering parts in order to obtain the correct parts for lawn tractor being serviced.



FRAME SERIAL NUMBER



MOWER DECK SERIAL NUMBER



ENGINE SERIAL NUMBER

### MAINTENANCE STANDARDS

PART	ITEM		STANDARD	SERVICE LIMIT
Engine	Idle speed		1,300 $^{+200}_0$ rpm	—
	Maximum speed		3,300 $^{+0}_{-100}$ rpm	—
	Cylinder compression		12.0 kg/cm <sup>2</sup> (171 psi)/500 rpm	10.0kg/cm <sup>2</sup> (142psi)/500rpm
Valves	Valve clearance	IN	0.10–0.14 mm (0.004–0.006 in)	—
		EX	0.18–0.22 mm (0.007–0.009 in)	—
	Stem O.D.	IN	5.48 mm (0.216 in)	5.32 mm (0.209 in)
		EX	5.45 mm (0.215 in)	5.29 mm (0.208 in)
	Guide I.D.	IN/EX	5.5 mm (0.217 in)	5.55 mm (0.219 in)
	Seat width	IN	0.7 mm (0.03 in)	2.0 mm (0.08 in)
		EX	0.7 mm (0.03 in)	2.0 mm (0.08 in)
	Spring free length	IN/EX	29.0 mm (1.14 in)	27.5 mm (1.08 in)
Piston	Skirt O.D.		57.97 mm (2.282 in)	57.9 mm (2.279 in)
	Piston-to-cylinder clearance		0.01–0.05 mm (0–0.002 in)	0.10 mm (0.004 in)
	Pin hole I.D.		14.005 mm (0.5514 in)	14.055 mm (0.553 in)
	Pin O.D.		14.000 mm (0.5512 in)	13.954 mm (0.549 in)
	Ring side clearance	Top/ Second	0.03 mm (0.001 in)	0.17 mm (0.007 in)
	Ring end gap	Top/ Second	0.2 mm (0.008 in)	0.6 mm (0.024 in)
Cylinder	Bore I.D.		58.00 mm (2.283 in)	58.100 mm (2.2874 in)
Connecting rod	Small end I.D.		14.016 mm (0.552 in)	14.070 mm (0.554 in)
	Big end oil clearance		0.025 mm (0.001 in)	0.045 mm (0.002 in)
	Big end axial clearance		0.10 mm (0.004 in)	0.30 mm (0.012 in)
Crankshaft	Journal O. D.	Main	33.009 mm (1.2996 in)	32.96 mm (1.298 in)
		Pin	32.000 mm (1.2598 in)	31.95 mm (1.258 in)

PART	ITEM		STANDARD	SERVICE LIMIT
Camshaft	Cam height	IN	24.96 mm (0.983 in)	24.5 mm (0.96 in)
		EX	25.92 mm (1.020 in)	25.6 mm (1.00 in)
	Journal O. D.	Right	15.98 mm (0.629 in)	15.90 mm (0.626 in)
		Left	15.98 mm (0.629 in)	15.90 mm (0.626 in)
Oil pump	Tip clearance		0.15 mm (0.006 in)	0.30 mm (0.012 in)
	Outer rotor clearance		0.12–0.22 mm (0.005–0.009 in)	0.30 mm (0.012 in)
	Outer-to-body side clearance		0.04–0.09 mm (0.0016–0.0035 in)	0.11 mm (0.0043 in)
Rocker arm	Rocker arm I.D.		13.0 mm (0.52 in)	13.040 mm (0.5134 in)
	Rocker arm shaft O.D.		12.957 mm (0.151 in)	12.940 mm (0.5094 in)
Carburetor	Main jet Float height Pilot screw opening		# 92 13.2 mm (0.52 in) 1-1/4 turns out	— — —
Spark plug	Gap		0.6–0.7 mm (0.024–0.028 in)	—
Ignition coil	Resistance	Primary coil	0.9–1.1 $\Omega$	—
		Secondary coil	8.8–13.2 k $\Omega$	—
		Spark plug cap	7.5–12.5 k $\Omega$	—
	Air gap		0.2–0.6 mm (0.008 $\pm$ 0.02 in)	—
Starter motor	Brush length		12.0 mm (0.47 in)	8.5 mm (0.33 in)
	Commutator mica depth		—	0.2 mm (0.08 in)
Charging coil	Resistance		0.16–0.24 $\Omega$	—
Brake	Brake shoe lining thickness		See page 13–3	—
	Brake drum ID		95.0–95.5 mm (3.74–3.76 in)	96.5 mm (3.79 in)
P.T.O clutch	Brake clearance		More than 0.6 mm (0.02 in)	0.1 mm (0.004 in)

### TORQUE VALUES

Item	Thread Dia. (mm) and pitch (length)	Torque Value		
		N.m	kg-m	ft-lb
ENGINE/TRANSMISSION				
Cylinder head cover bolt	M6×1.0	10	1.0	7
Cylinder head bolt	M8×1.25	23	2.3	17
Governor cover—Cylinder head	M6×1.0	10	1.0	7
Crankcase bolt	M8×1.25	23	2.3	17
Oil drain bolt (Engine)	M12×1.25	45	4.5	33
Connecting rod cap nut	M7×0.75	22	2.2	16
Timing belt cover bolt	M6×1.0	8	0.8	5.8
Radiator shroud bolt	M6×1.0	7	0.7	5
Intake manifold-Cylinder head	M6×1.0	10	1.0	7
Exhaust manifold-Cylinder head	M8×1.25	22	2.2	16
Water pump bolt	M6×1.0	10	1.0	7
Crankshaft center bolt	M8×1.25	45	4.5	33
Timing pully-Crankshaft	M30×1.0	23	2.3	5.6
Camshaft pully-Camshaft	M10×1.25	35	3.5	25
Governor arm—Governor shaft	M6×1.0	10	1.0	7
Flywheel-Crankshaft	M16×1.5	115	11.5	83
Drive shaft joint lock bolt	M8×1.25	22	2.2	16
Drive shaft bolt	M8×1.25	27	2.7	22
Oil pan	M8×1.25	23	2.3	5.6
	M6×1.0	10	1.0	7
R. transmission case bolt	M8×1.25	25	2.5	18
Transmission mounting bolt	M10×1.25	40	4.0	29
	M8×1.25	25	2.5	18
Oil drain bolt (Transmission)	M14×1.5	40	4.0	29
Input shaft holder bolt	M8×1.25	25	2.5	18
P.T.O Special bolt	M8×1.25	22	2.2	16
Charge pump case bolt	M8×1.25	25	2.5	18
Final driven gear bolt	M10×1.25	55	5.5	40
Distributor plate special bolt	M8×1.25	8.5	0.85	6.1
	M10×1.25	17	1.7	12
Brake drum bolt	M8×1.25	22	2.2	16
Check valve bolt	M14×1.5	33	3.3	24
BLADE/MOWER DECK				
Bearing housing bolt	M10×1.25	60	6.0	43
Blade bolt	M10×1.25	60	6.0	43
Tensioner pulley bolt	M8×1.25	27	2.7	20
Driven pulley bolt	M8×1.25	27	2.7	20
Anti-scalp roller bolt	M10×1.25	50	5.0	36
Deck lift rod lock nut	M10×1.25	35	3.5	25
STEERING/WHEEL				
Axle shaft nut	M12×1.25	120	12.0	87
Steering wheel nut	M12×1.25	60	6.0	43
Steering joint lock nut	M8×1.25	22	2.2	16
Tie rod A ball joint nut	M12×1.25	60	6.0	43
Tie rod B lock nut	M10×1.25	22	2.2	16

Item	Thread Dia. (mm) and pitch (length)	Torque Values		
		N.m	kg-m	ft-lb
STEERING/WHEEL (Cont' d)				
Tie rod B ball joint nut	M10×1.25	40	4.0	29
Front axle nut	M12×1.25	120	12.0	87
Front wheel nut (Castel nut)	M14×1.5	60	6.0	43
Rear wheel nut (Castel nut)	M14×1.5	60	6.0	43
Knuckle lock nut	M10×1.25	40	4.0	29
Steering driven gear lock nut	M14×1.5	55	5.5	40
Steering drive gear nut	M10×1.25	40	4.0	29
FRAME/ELECTRICAL				
Engine mounting bracket special bolt	M8×1.25	37	3.7	27
Hood hing bolt	M8×1.25	22	2.2	16
Thermo swith	M16×1.5	11.5	1.15	8.3
Wire harness clamper self lock bolt	M8×1.25	26	2.6	19
Combination switch mounting bolt	M18×1.0	13	1.3	9.4
Battery terminal nut	M6×1.0	10	1.0	7
Starter motor nut	M6×1.0	4	0.4	2.9
Ground cable terminal bolt	M6×1.0	14	1.4	10
Neutral switch	M10×1.25	13	1.3	9.4
Front garnish tapping screw	M5×(12)	5	0.5	3.6
Bumper bolt	M6×1.0	0	0.9	6.5
Instrument bolt	M6×1.0	9	0.9	6.5
Comartment flange bolt	M6×1.0	11	1.1	8.0
Parking brake protector screw	M5×(12)	1.1	0.11	0.8
Parking brake lever bolt	M8×1.25	22	2.2	16
Height adjusting lever protector screw	M5×(12)	1.1	0.11	0.8
Compartment tapping screw	M5×(12)	1.1	0.11	0.8
Shift lever lock nut	M6×1.0	4	0.4	2.9
Fuel pump stay bolt	M6×1.0	11	1.1	8
Friction setting washer	M10×1.25	25	2.5	18
Shift lever bolt	M8×1.25	22	2.2	16
Shift rod (A and B) lock nut	M8×1.25	22	2.2	16

NOTE : Use standard torque values for fasteners that the are not listed in this table.

### (STANDARD TORQUE VALUES)

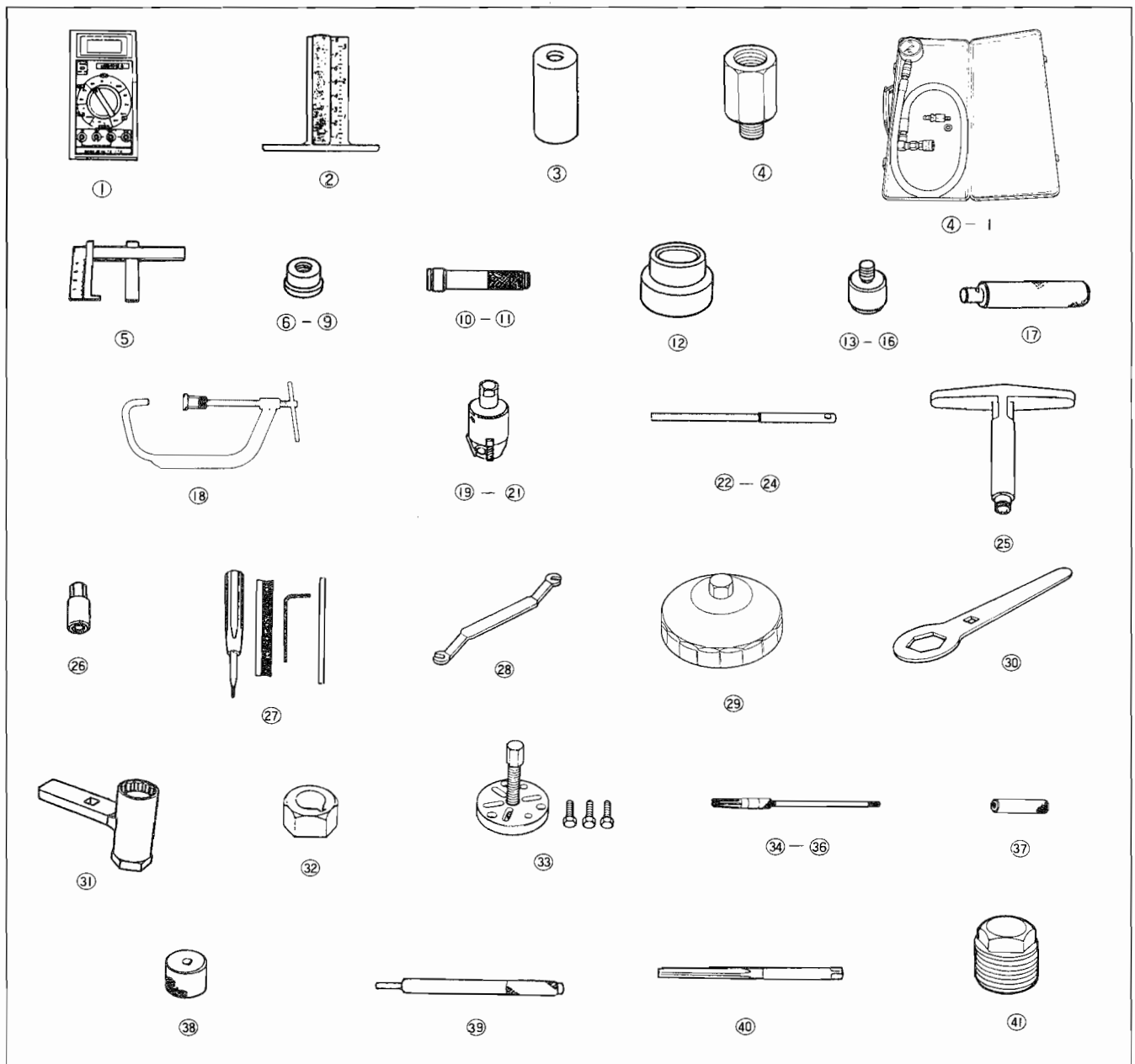
Item	Thread Dia. (mm)	Torque values		
		N·m	kg-m	ft-lb
Bolt and nut	5 mm	5	0.5	3.6
	6 mm	10	1.0	7.2
	8 mm	21	2.1	15
	10 mm	35	3.5	25
	12 mm	60	6.0	43
Flange bolt and nut	6 mm	11	1.1	8
	8 mm	22	2.2	16
	10 mm	40	4.0	29
	12 mm	60	6.0	43
Screw and flange	5 mm	5	0.5	3.6
6 mm bolt with 8 mm head (SH Flange bolt)	6 mm	9	0.9	6.5



### SPECIAL TOOLS

Tool name	Tool number	Application
1. Digital multimeter	KS-AHM-32-003	Electrical parts testing
2. Blade height gauge	07JPJ-750010A	Mower deck height adjustment
3. HST motor spring compressor	07KPF-VD60100	Cylinder pump installation
4. Pressure gauge adapter	07KPJ-VD6010A	HST oil pressure testing, HST air bleeding
4-1. Pressure gauge assembly	07KPJ-VD6020A	
5. Float level gauge	07401-0010000	Carb. float level inspection
6. Attachment, 42×47mm	07746-0010300	Input shaft holder bearing and motor shaft bearing installation and pump shaft bearing 6302 installation
7. Attachment, 52×55mm	07746-0010400	Countershaft bearing 6304 installation
8. Attachment, 62×68mm	07746-0010500	Axle shaft bearing 6206 installation
9. Attachment, 24×26mm	07746-0010700	Pump case needle bearing installation
10. Driver, 22mm I. D.	07746-0020100	Input shaft bearing 2/22 installation
11. Driver, 40mm I. D.	07746-0030100	Driver for attachment(12)
12. Attachment, 30mm I. D.	07746-0030300	Crankshaft oil pump drive gear installation
13. Pilot, 15mm	07746-0040300	Pump shaft bearing 6302 installation
14. Pilot, 17mm	07746-0040400	Pump case needle bearing installation
15. Pilot, 20mm	07746-0040500	Input shaft holder bearing 6204 and countershaft bearing 6304 installation and motor shaft bearing 6204 installation
16. Pilot, 30mm	07746-0040700	Axle shaft bearing 6206 installation
17. Driver	07749-0010000	Driver for attachment( 6 ), ( 7 ), ( 8 ), ( 9 ) and pilots(13), (14), (15) and (16)
18. Valve spring compressor	07757-0010000	Valve removal/installation
19. Valve seat cutter # 122, 45°	07780-P01030A	Valve seat reconditioning
20. Valve seat cutter # 115, 31°	07780-P01040A	
21. Valve seat cutter # 111, 60°	07780-P01050A	
22. Solid pilot bar # 100-5.50mm	07781-P03010A	
23. Solid pilot bar # 100-5.52mm	07781-P03020A	
24. Solid pilot bar # 100-5.55mm	07781-P03030A	
25. T-wrench # 505	07782-P01010A	
26. T-Wrench adapter # 503-1	07782-P01020A	
27. Accessory package # 246	07782-P01030A	
28. Valve adjusting-wrench	07908-KE90200	valve adjustment
29. Oil filter wrench	07912-6110001	Oil filter removal and installation
30. Lock nut wrench	07916-1870001 or 07916-1870002	Timing pulley(Dis/Reassembly)
31. Lock nut wrench	07916-7500000	Input shaft(Dis/Reassembly)
32. Crankshaft holder	07923-ZA00100	Timing pulley(Dis/Reassembly)
33. Flywheel puller	07935-805002 or 07935-805003	Flywheel removal or commercially available puller
34. Bearing remover, 15mm	07936-KC10500	Pump shaft bearing 6302 removal
35. Bearing remover, 17mm	07936-3710300	Pump case needle bearing removal

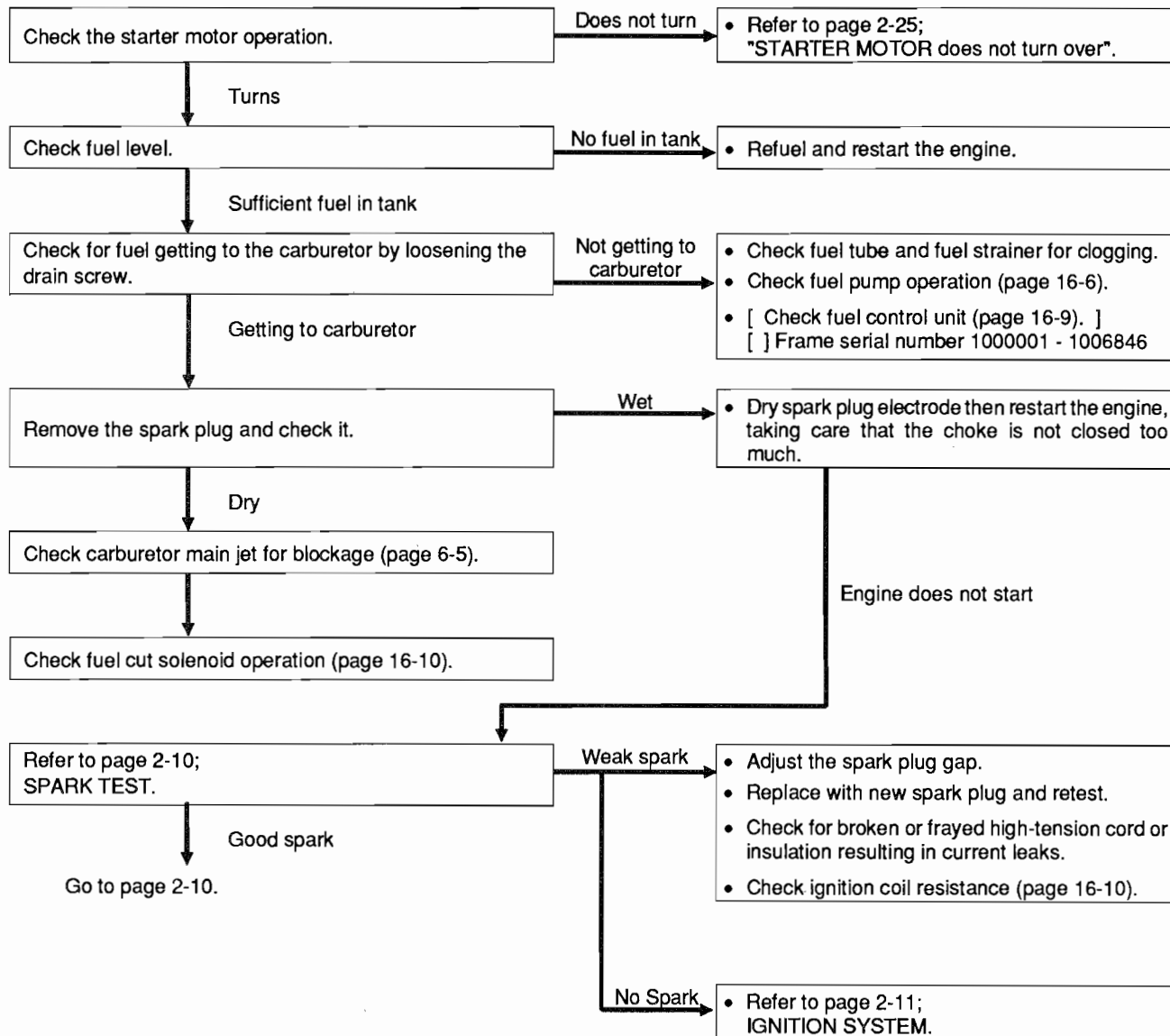
Tool name	Tool number	Application
36. Bearing remover, 20mm	07936-3710600	Countershaft bearing 6304 and motor shaft bearing 6204 removal
37. Bearing remover handle	07936-3710100	Use with bearing removers (35), (36) and remover weight (38)
38. Bearing remover weight	07936 3710200	Weight for bearing removers (34), (35), (36)
39. Valve guide driver	07942-8920000	Valve guide removal/installation
40. Valve guide reamer	07984 - 200000B or 07984-200000C	Valve guide I. D. reaming
41. Rotor puller	89301-400-000	Camshaft pulley removal



## TROUBLESHOOTING

### ENGINE

#### a. HARD START



From page 2-9

Install compression gauge in one of the spark plug holes.  
Operate the electric starter then read the highest compression.

Low compression

- Check that valve clearance is correct.
- Check for defective cylinder head gasket, valves or valve seats.
- Check for worn piston rings/piston and cylinder.
- Check that cylinder head is correctly tightened.
- Check for carbon deposits in combustion chamber.

Normal compression

Start by following normal starting procedure.

### ● SPARK TEST

1. Remove a spark plug, attach it to the spark plug cap, and ground the side electrode against the cylinder.

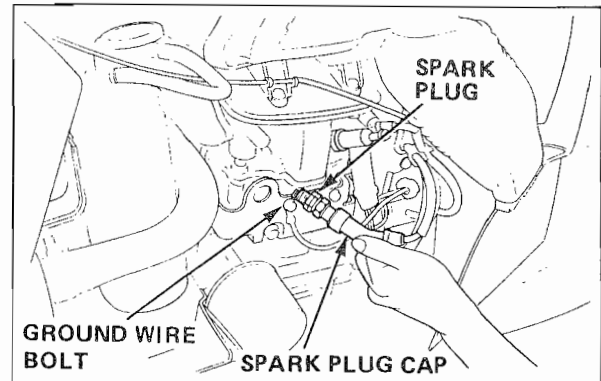
#### NOTE

- Be sure to leave one spark plug cap installed when performing the spark test.

2. Turn the combination switch to START and check to see if sparks jump across the electrodes.

#### ▲WARNING

- Never hold the spark plug lead with wet hands while performing this test.
- Make sure that no fuel has been spilled on the engine and that the plug is not wet with fuel.
- To avoid fire hazards, do not allow sparks near the plug hole.



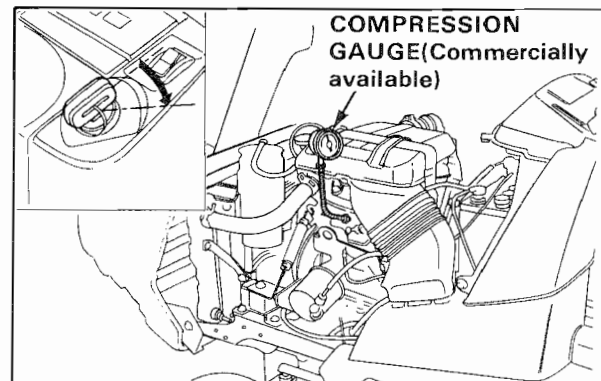
### ● CYLINDER COMPRESSION TEST

#### CAUTION:

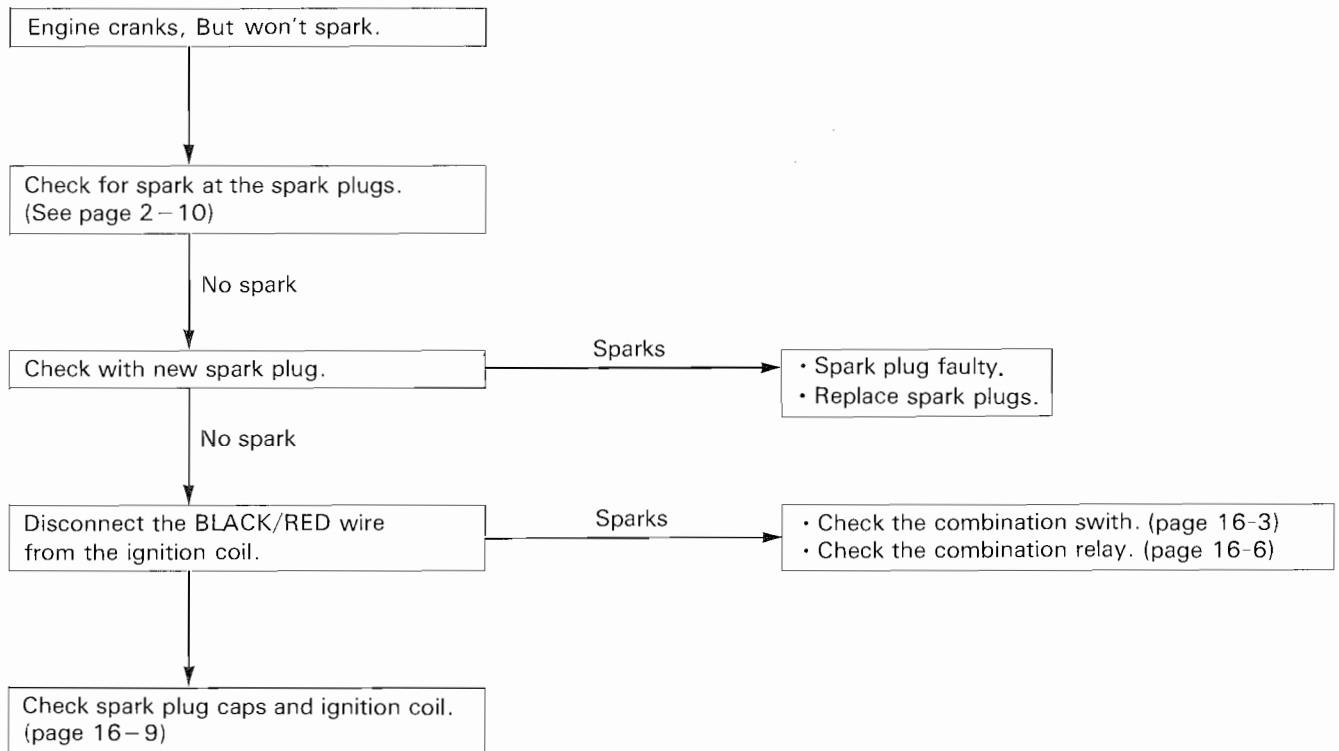
To prevent ignition system damage, ground the BI/R ignition coil wire before performing this test.

- 1) Remove the spark plugs.
- 2) Install a compression gauge in one of the spark plug holes.
- 3) Operate the electric starter until the highest compression reading is obtained.
- 4) Install the compression gauge in the other spark plug hole and repeat Step 3.

Cylinder Compression	
STANDARD 12.0 kg/cm <sup>2</sup> (171 psi) @ 500 rpm	SERVICE LIMIT 10.0 kg/cm <sup>2</sup> (142 psi) @ 500 rpm



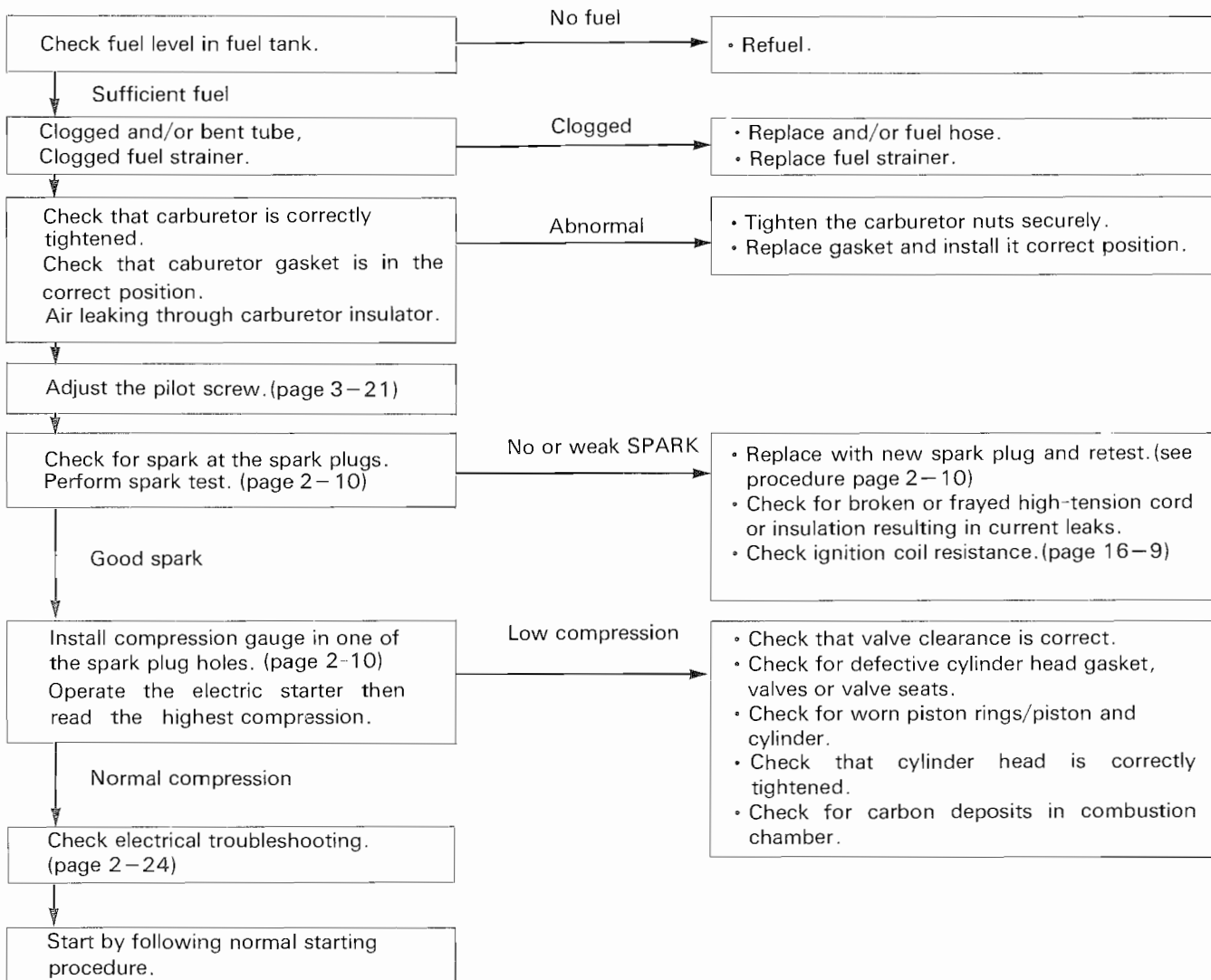
### • IGNITION SYSTEM



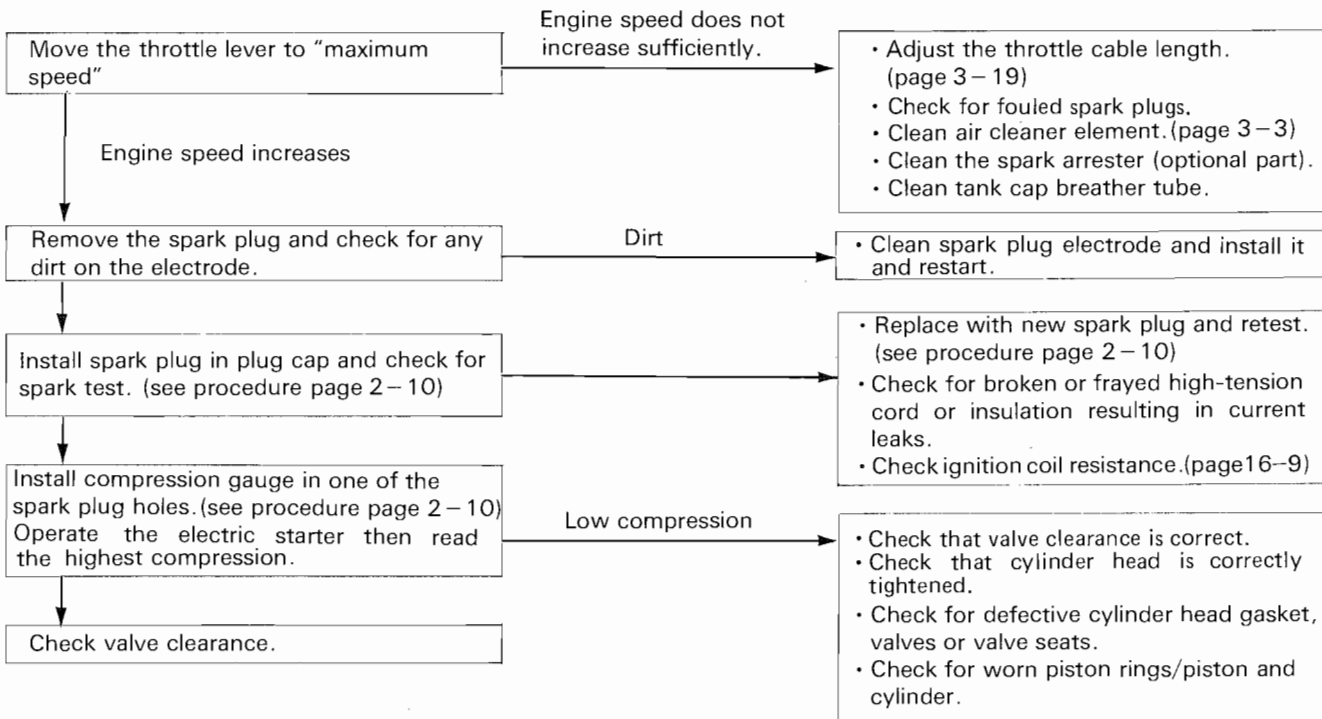
#### NOTE

- If all test are good, but there is still no spark.  
Replace the ignition coil.

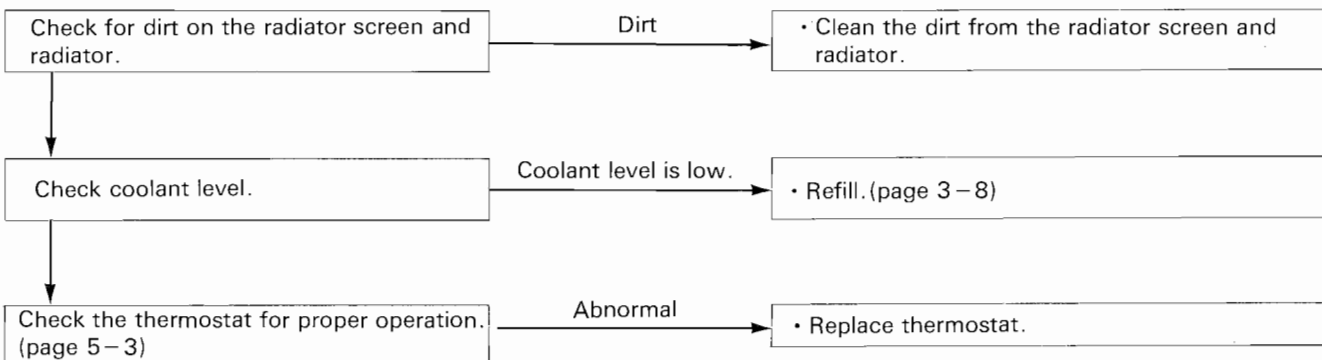
**b. ENGINE STARTS BUT THEN STOPS**



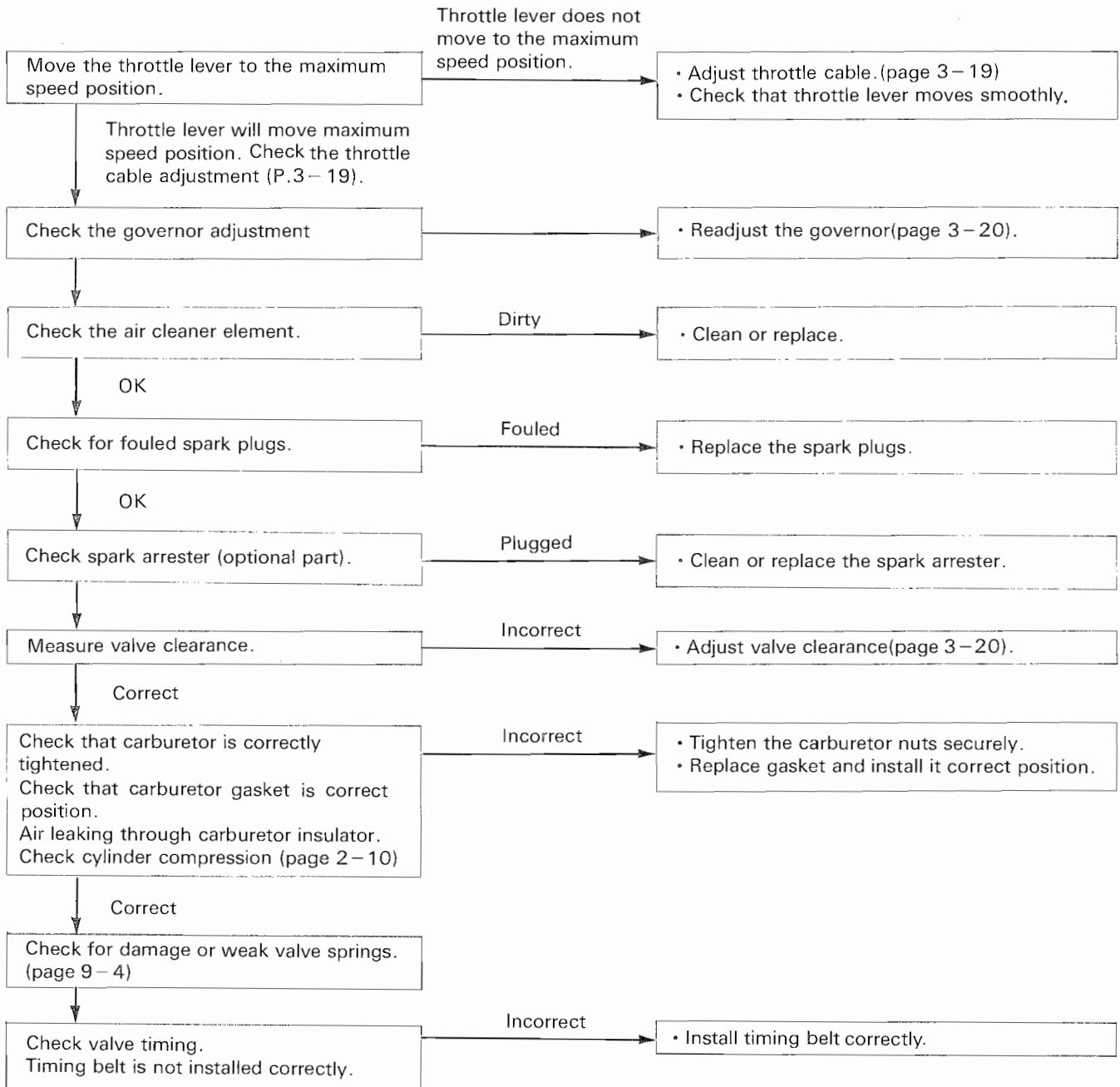
### c. ENGINE LACKS POWER



### d. OVERHEART



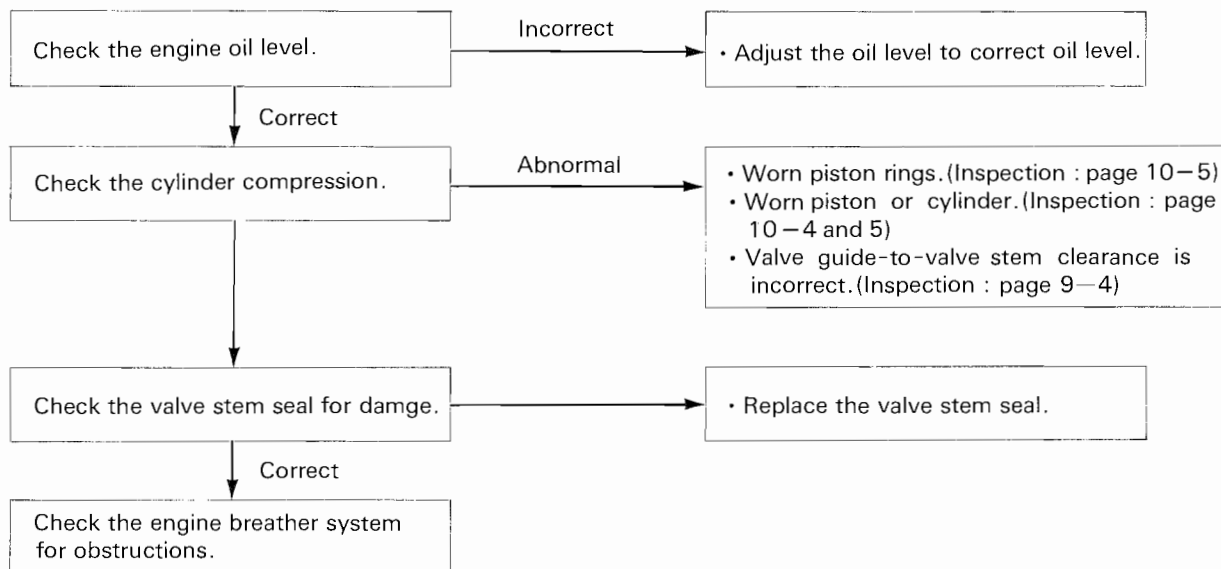
### e. ENGINE SPEED DOES NOT INCREASE SUFFICIENTLY



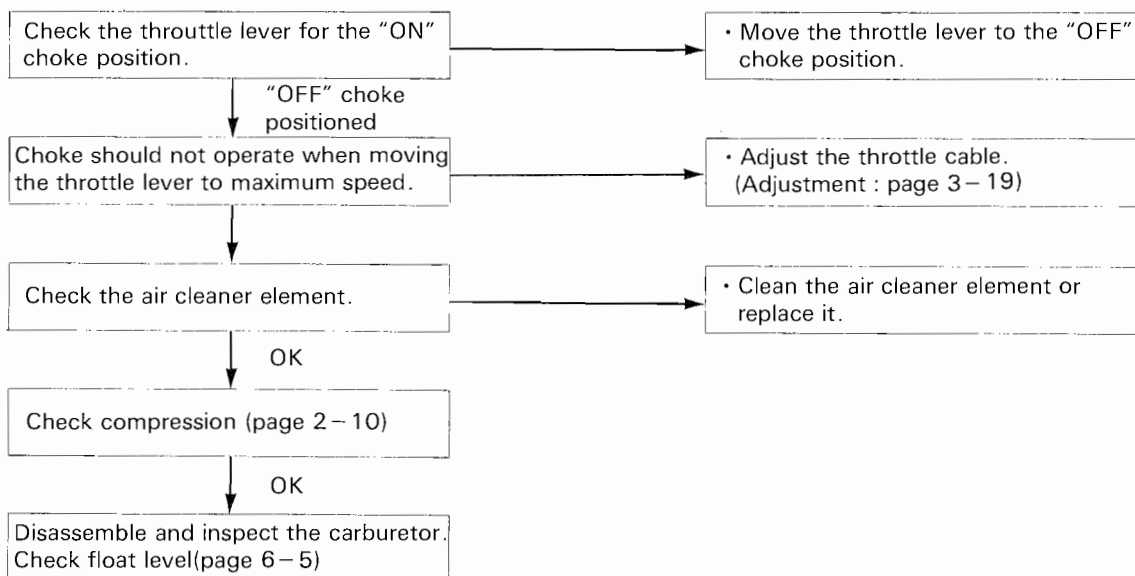


### f. Exhaust gas

Excessive white smoke

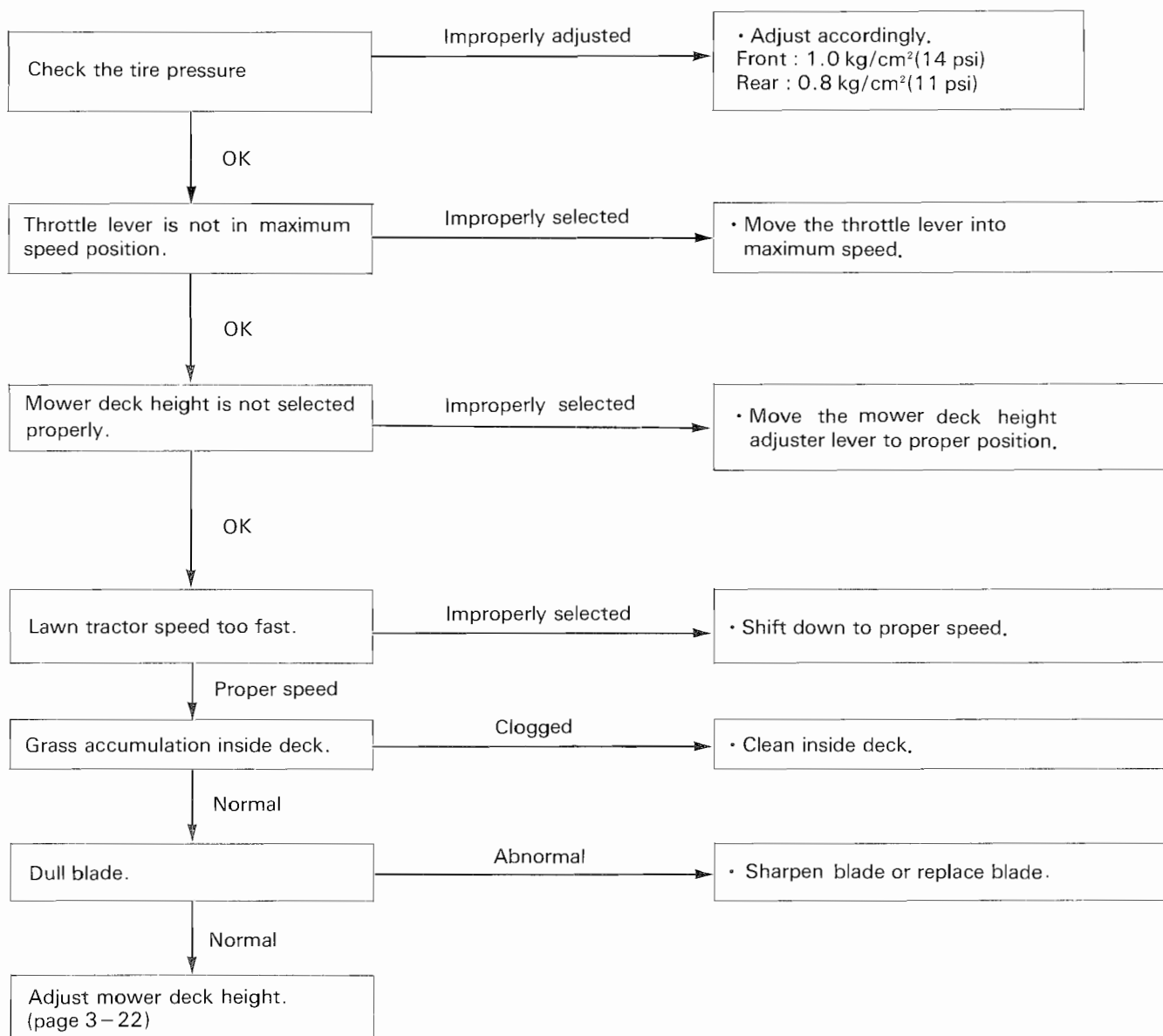


Excessive black smoke

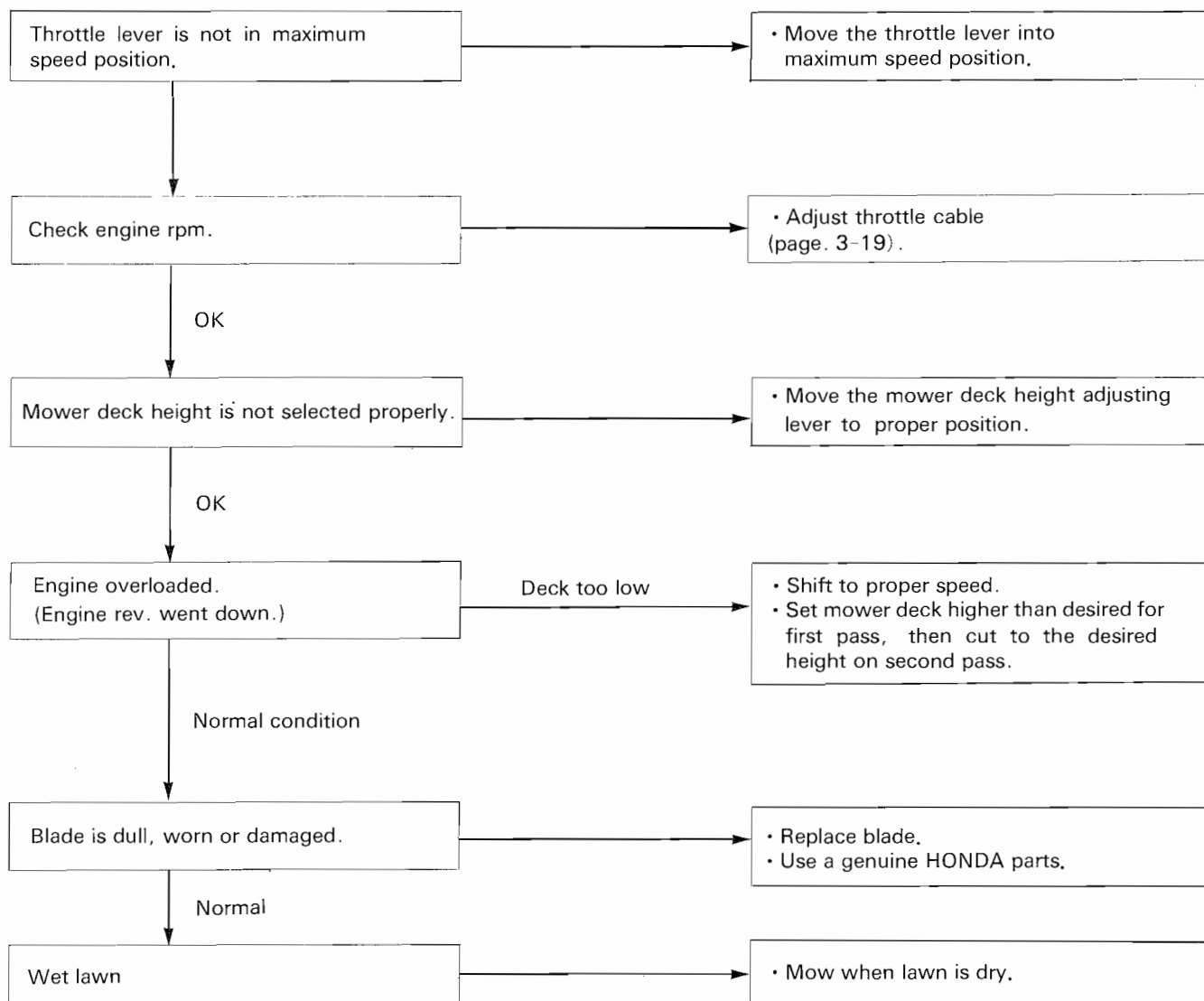


### MOWER DECK

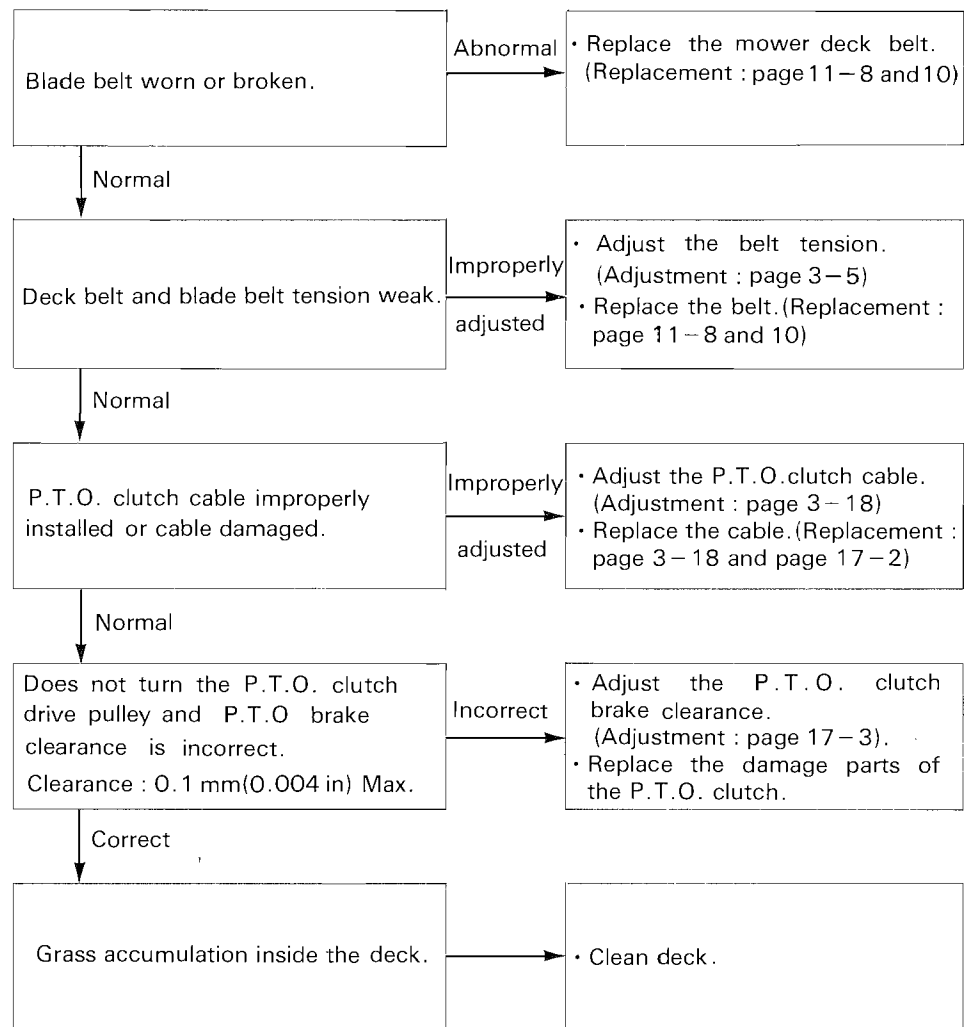
#### a. Unevent mowing



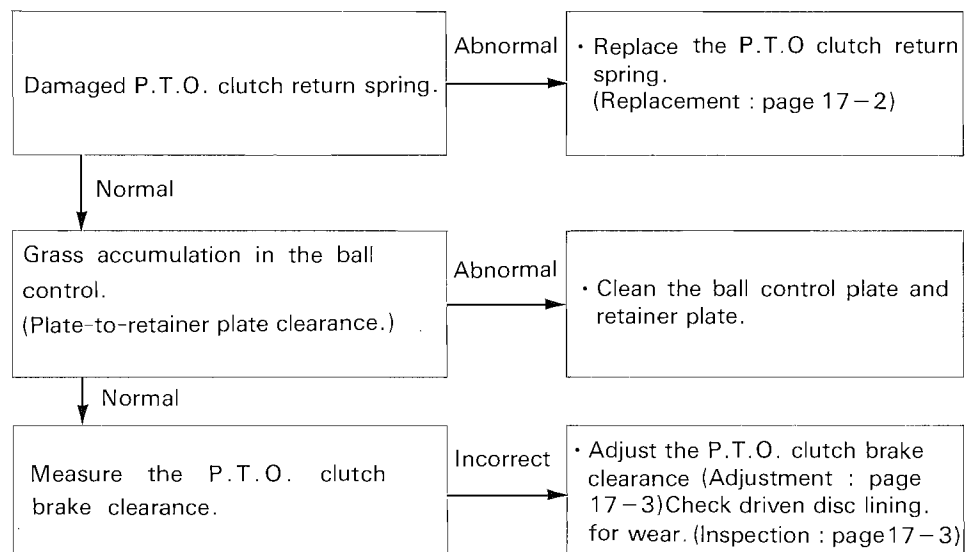
### b. Cutting performance is unsatisfactory



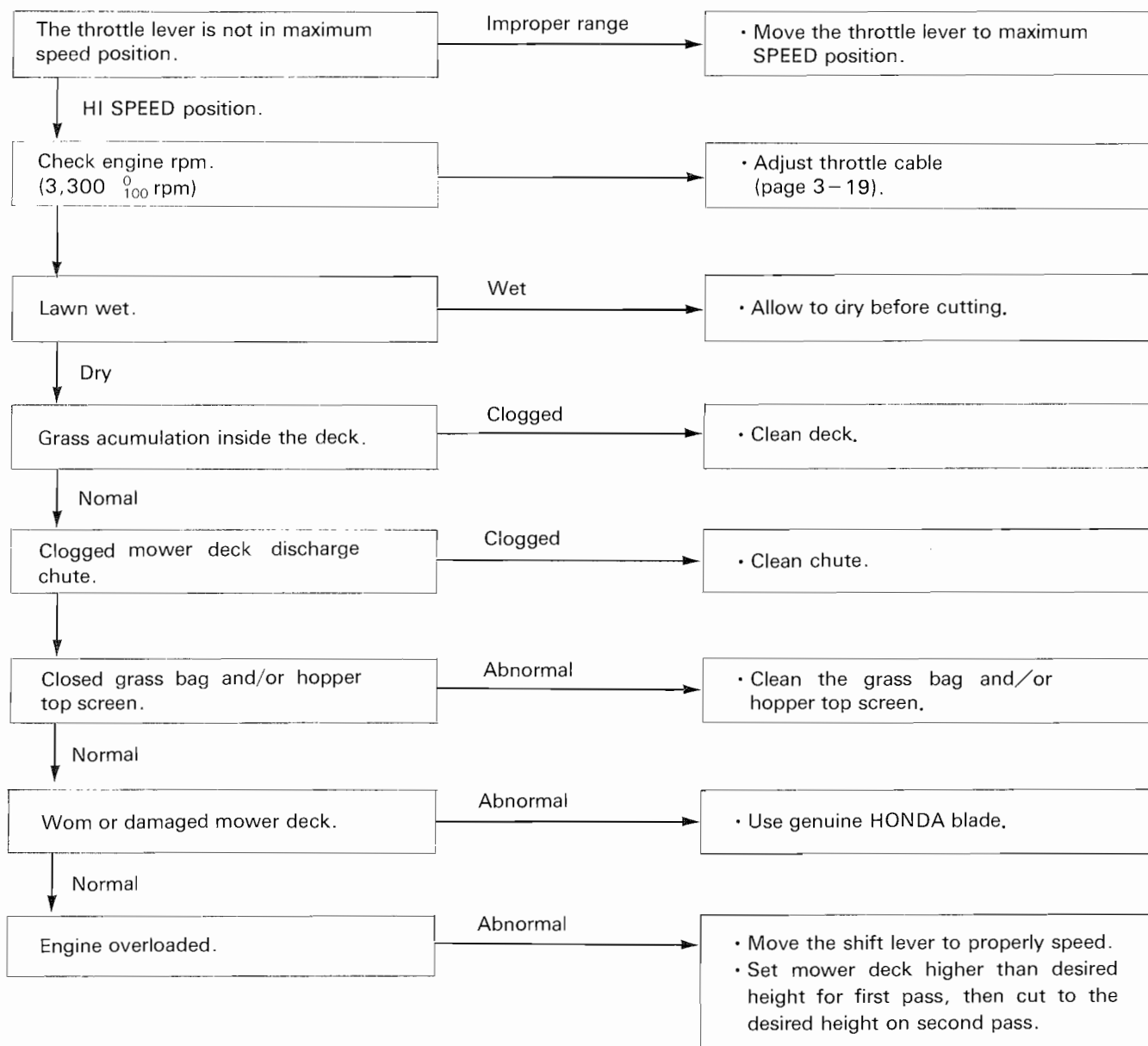
**c. Blade does not rotate.**



**d. Blades does not STOP  
when positioning the  
P. T. O. clutch lever  
"OFF".**

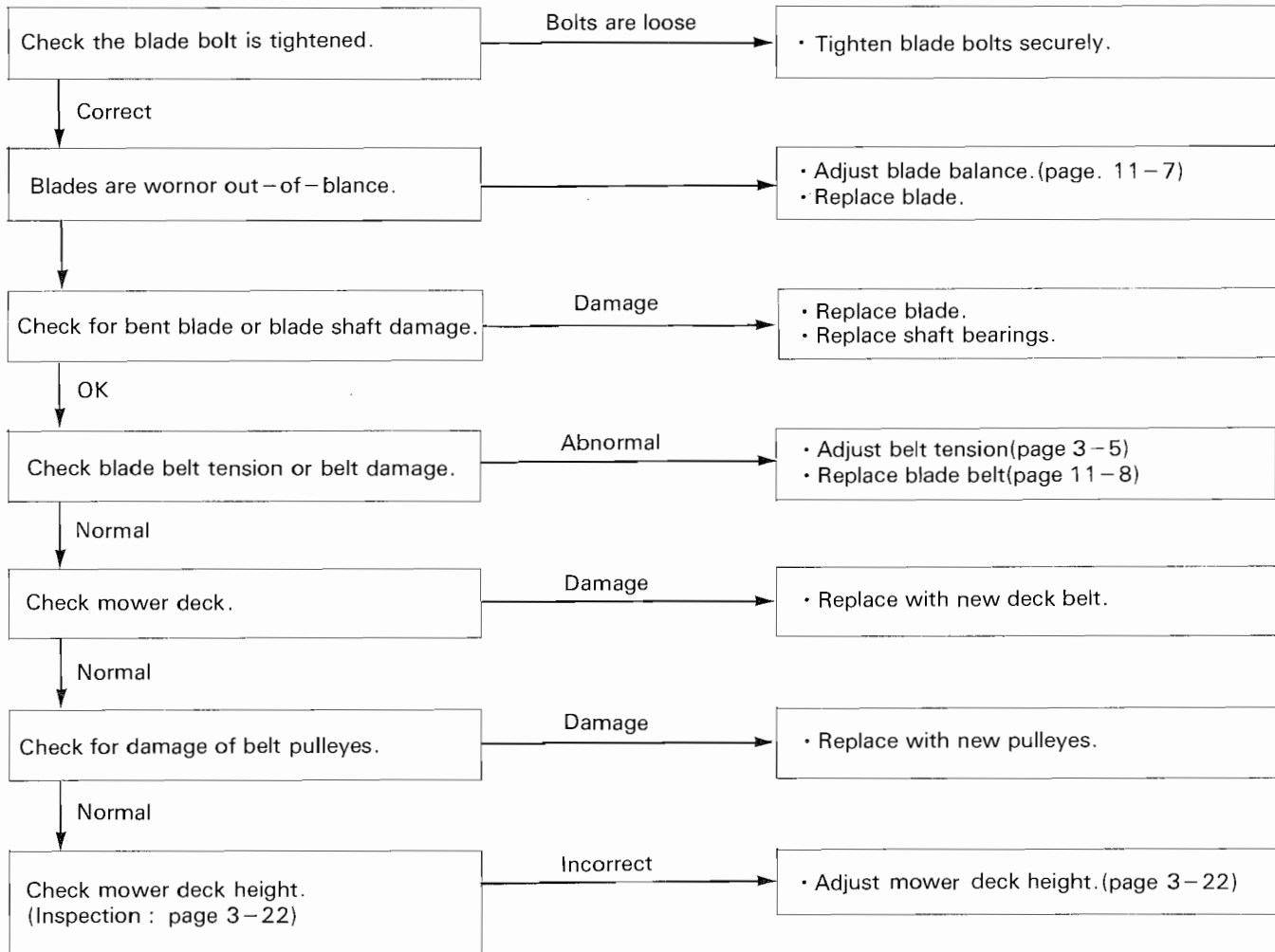


### e. POOR BAGGING PERFORMANCE

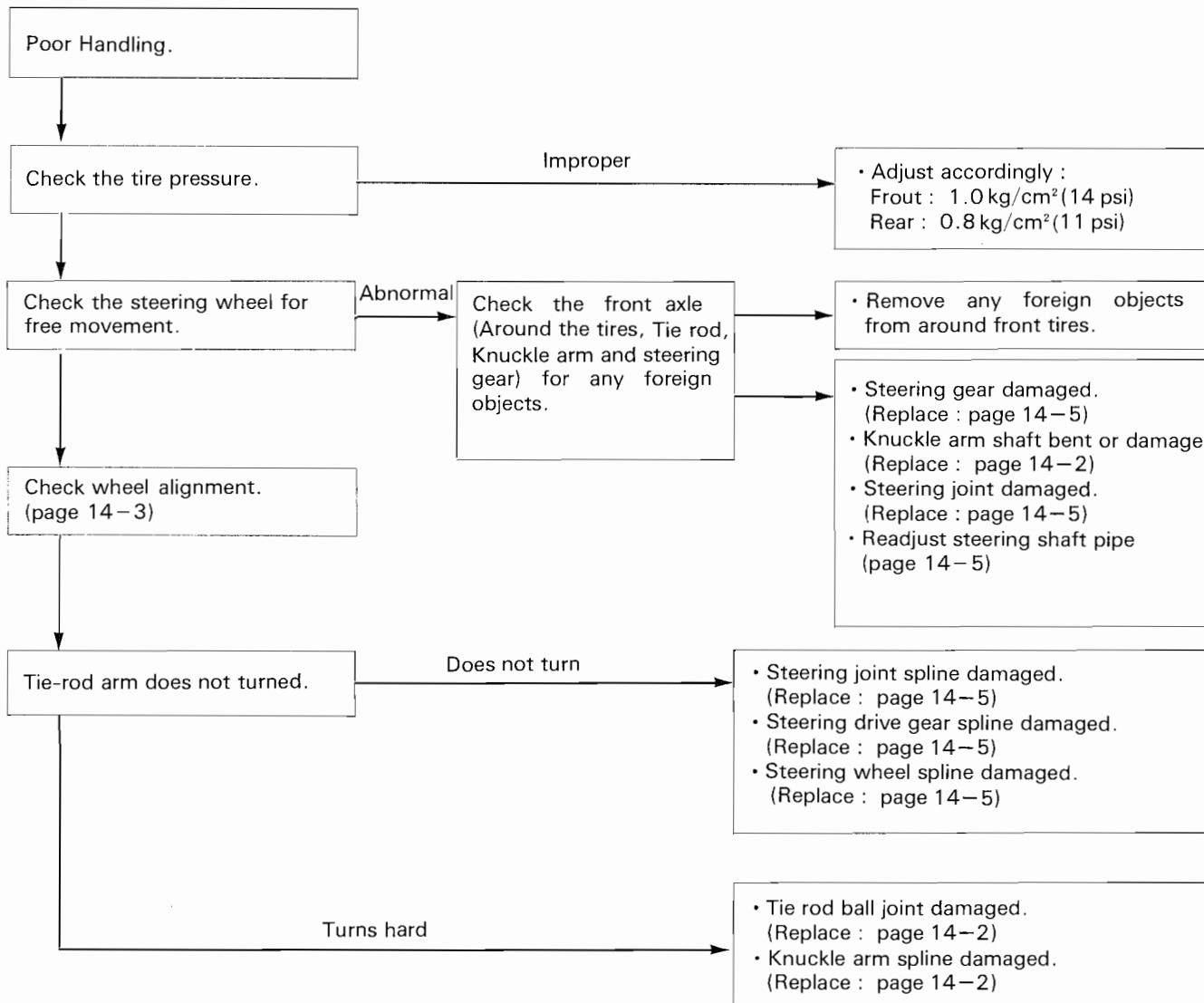


**FRAME**

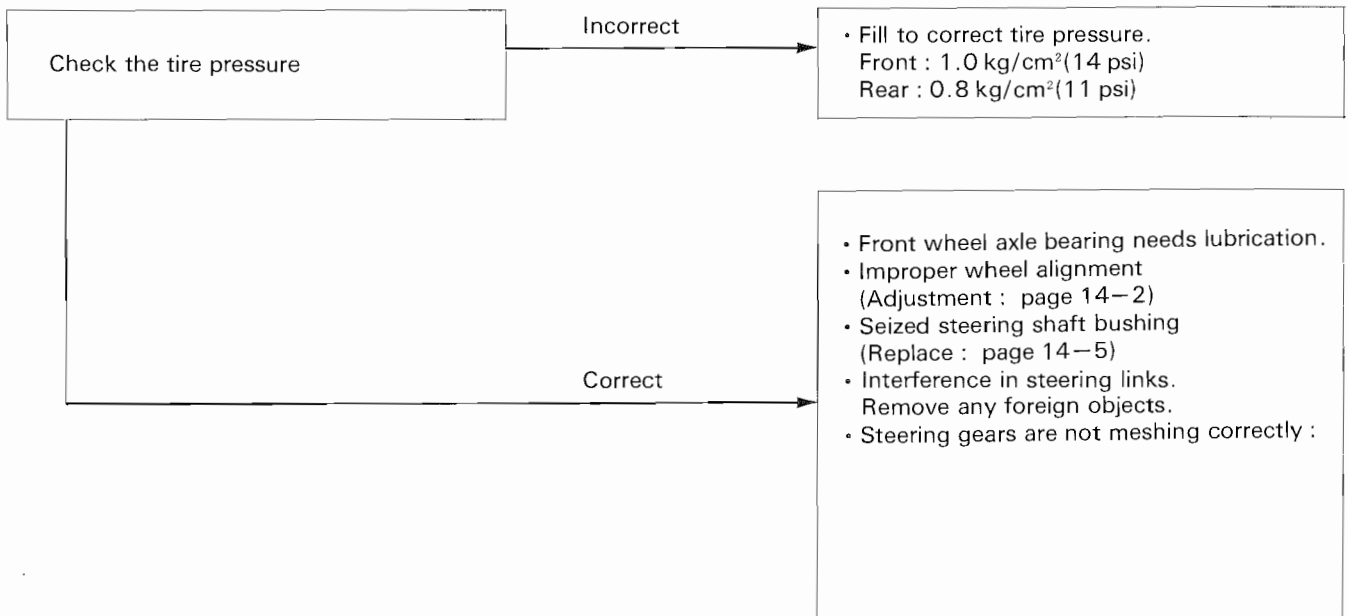
**a. Lawn tractor vibrates excessively**



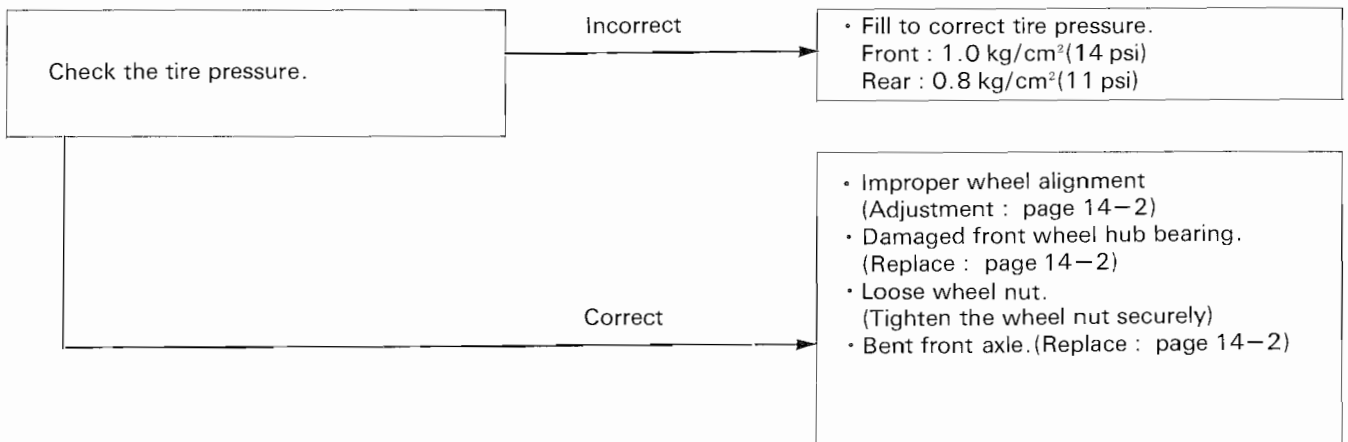
### b. Steering wheel



### c. Heavy handling

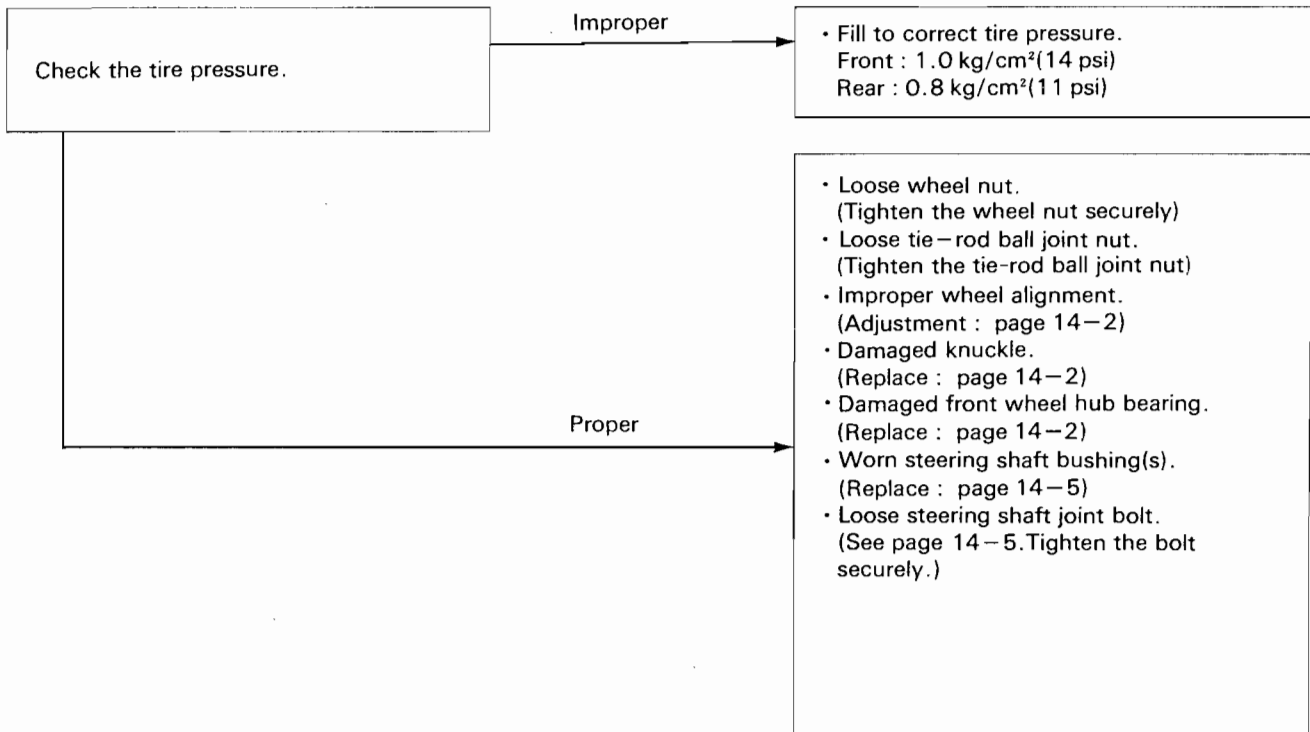


If lawn tractor pulls to one side





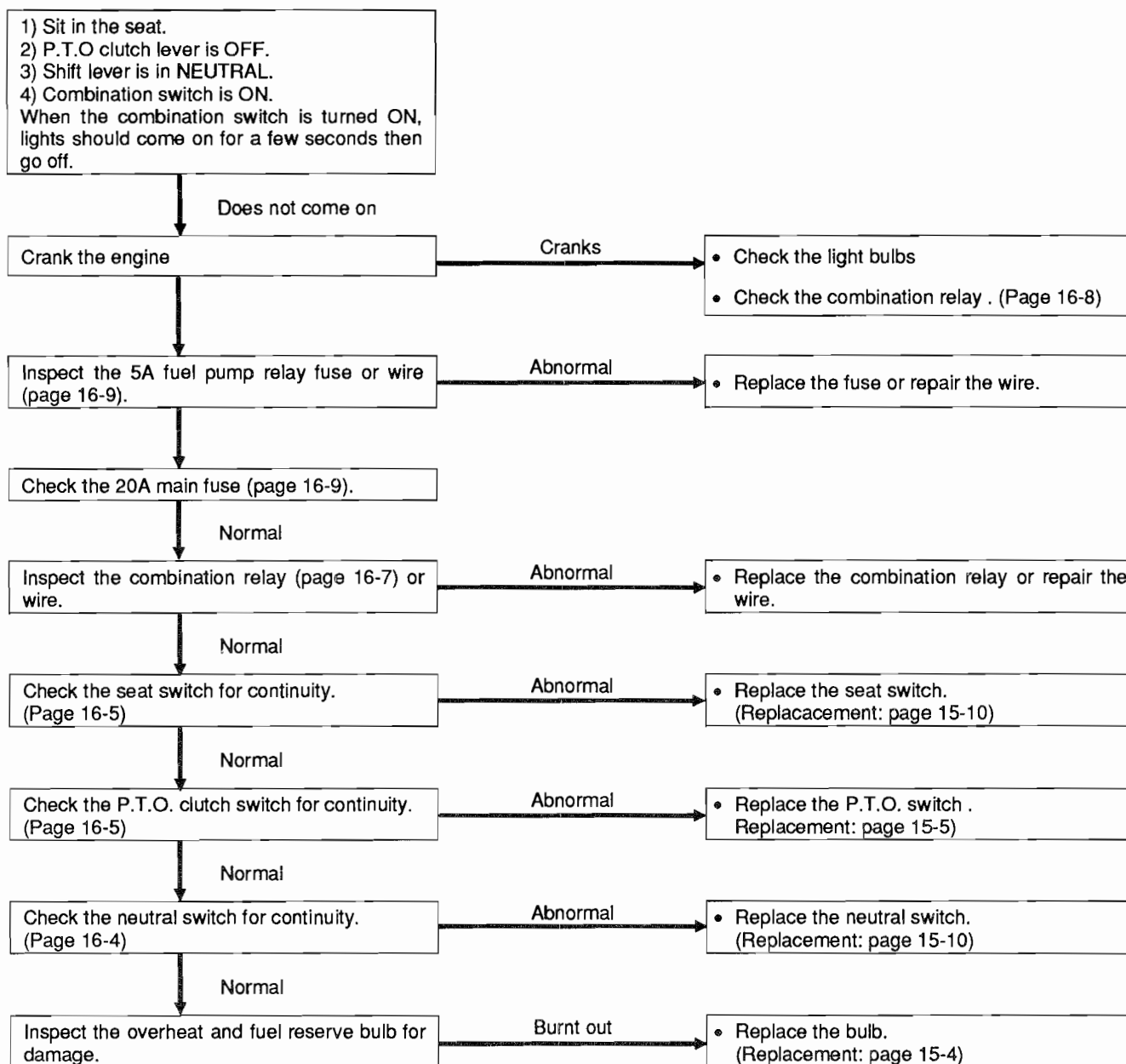
### d. Steering wheel is wobbling



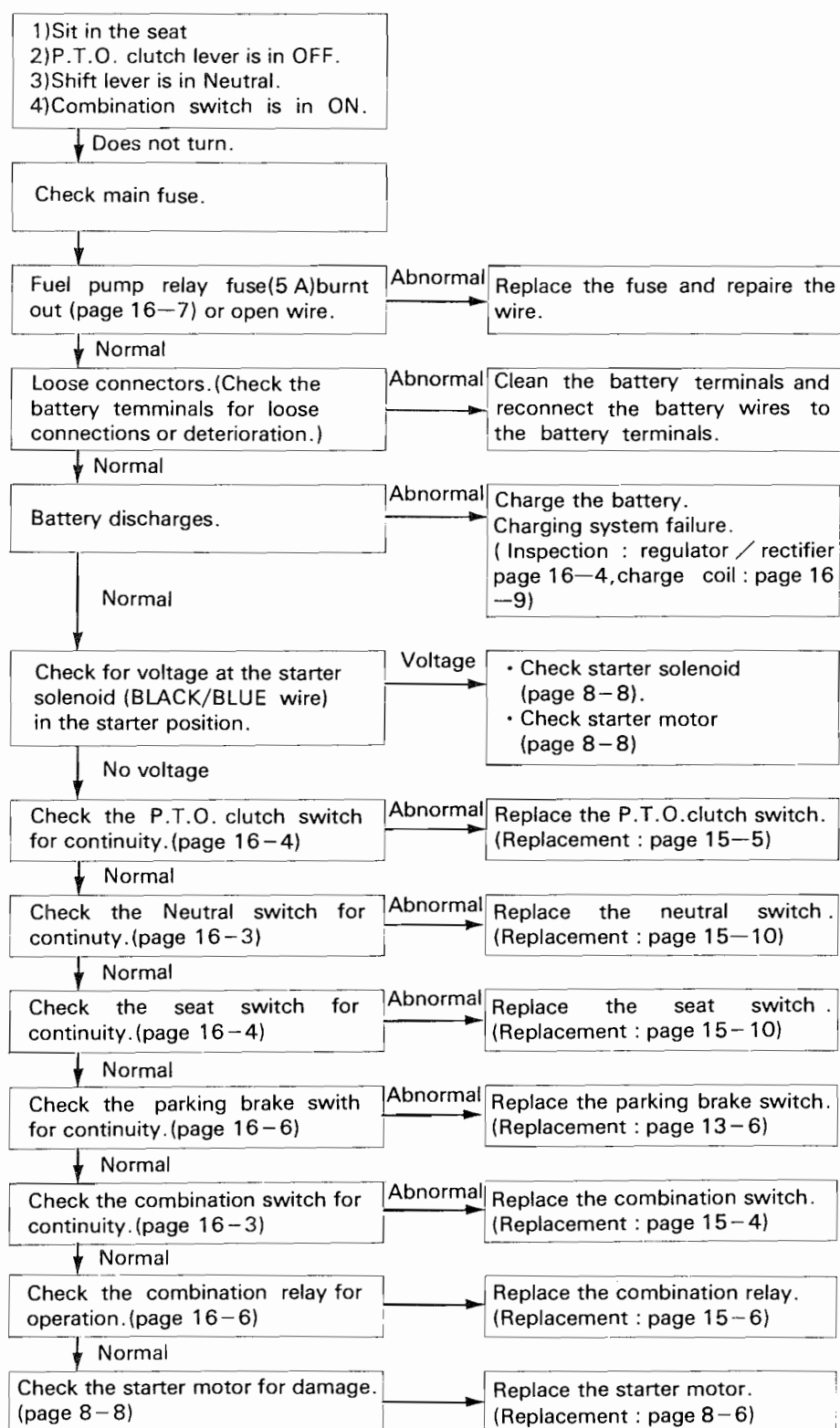
## ELECTRICAL

### a. Fuel reserve light does not come on when the combination switch is in the ON position.

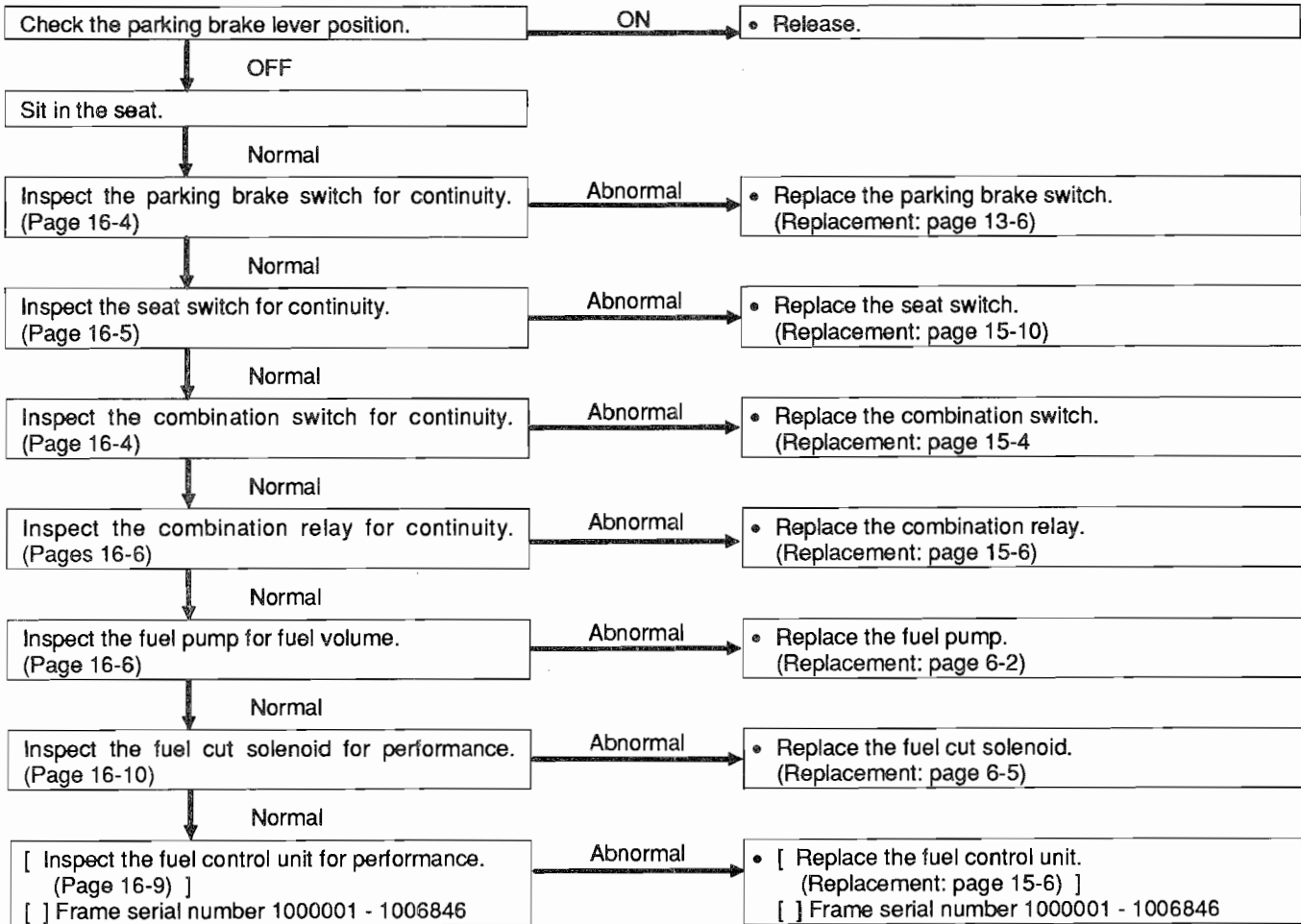
— Frame serial number 1000001 - 1006846



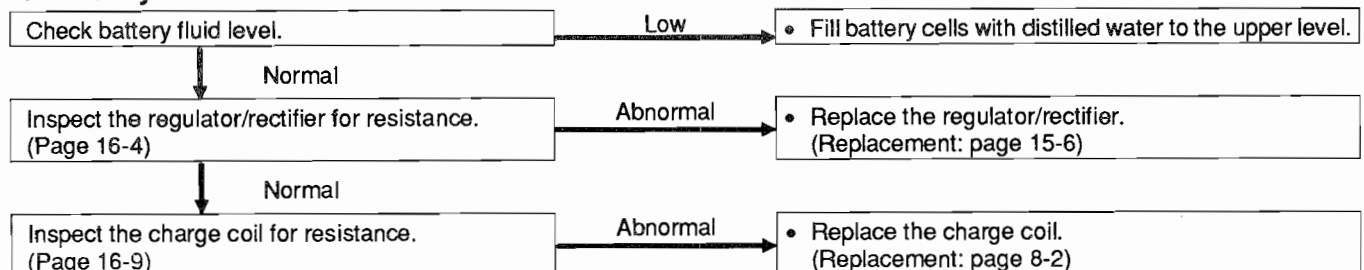
**b. STATER MOTOR does not turn over.**



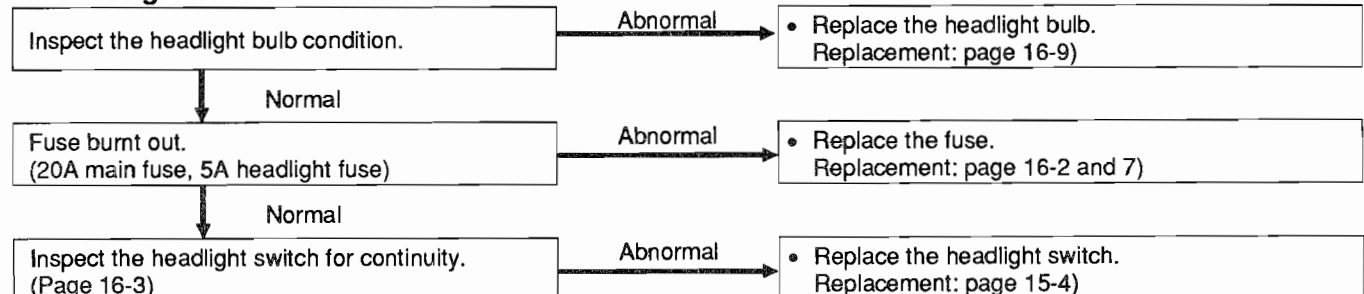
### c. Engine starts but stops quickly.



### d. Battery weak.



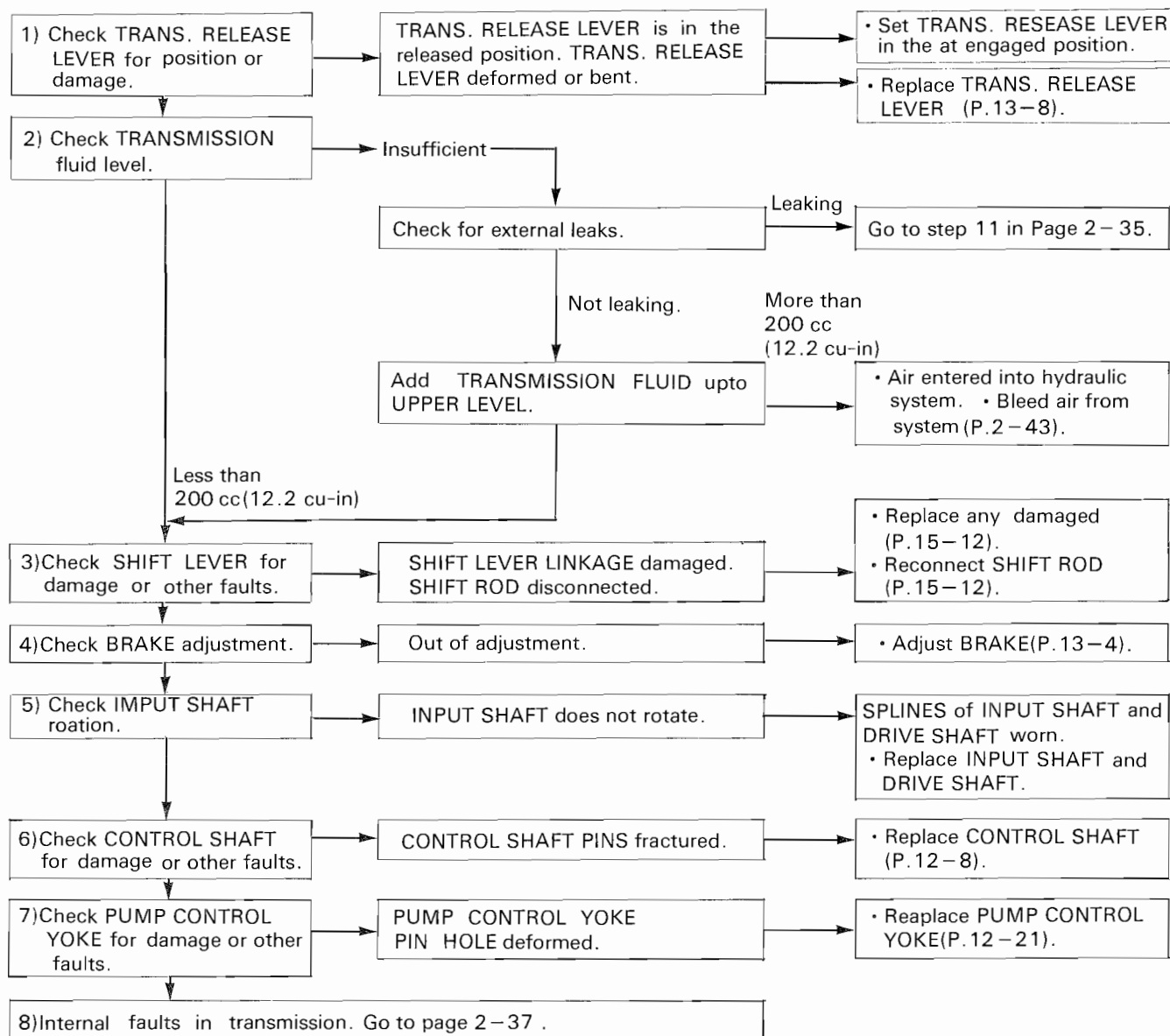
### e. Headlight does not come ON.



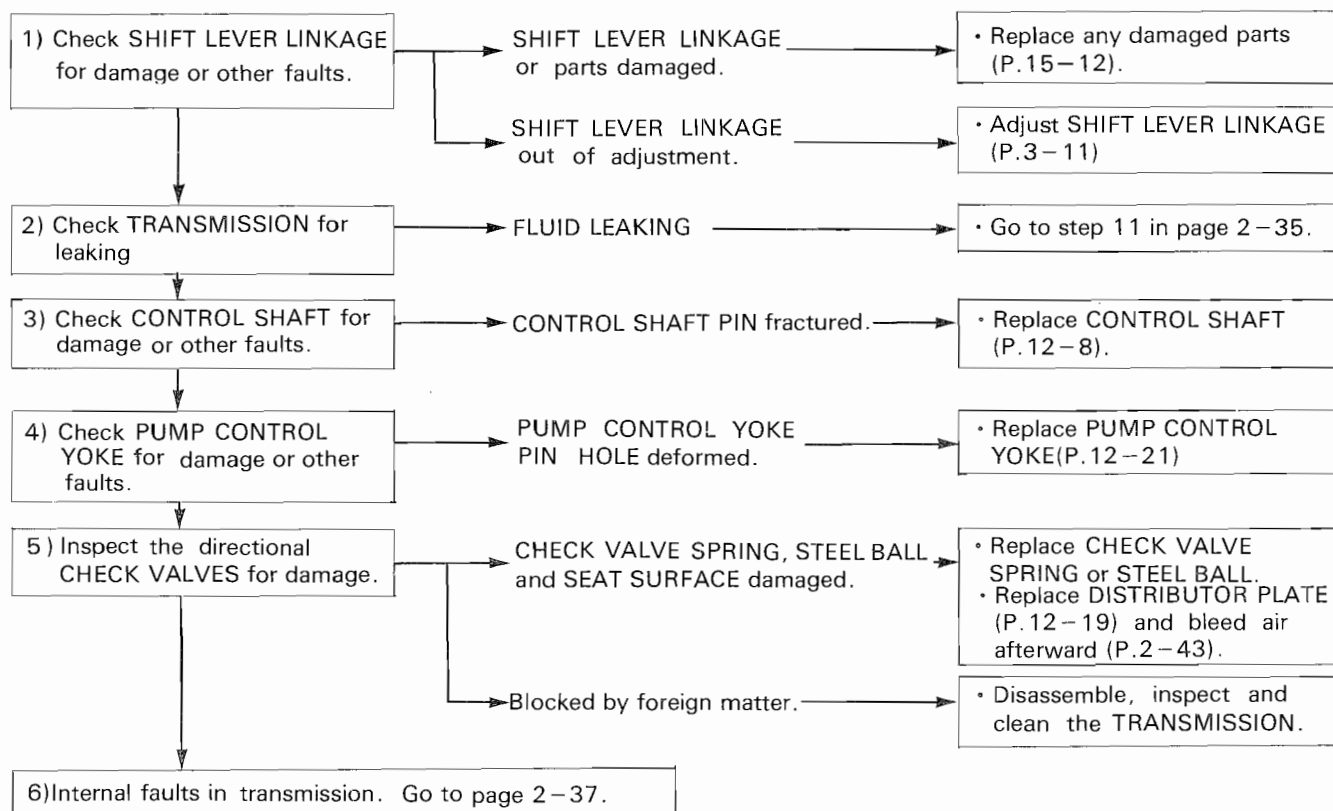
### HYDROSTATIC TRANSMISSION

1. Lawn tractor does not moved.

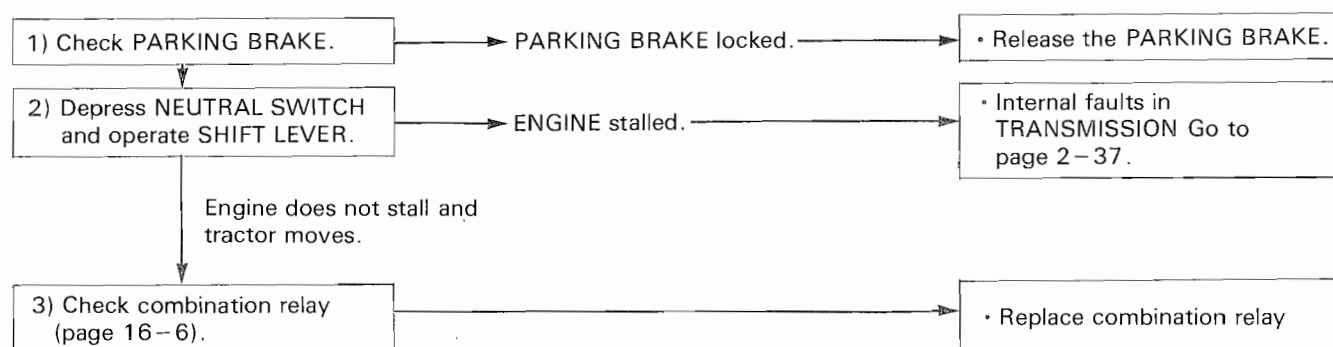
1-1. Tractor does not in TRANSPORT or REVERSE when the shift lever is shifted.



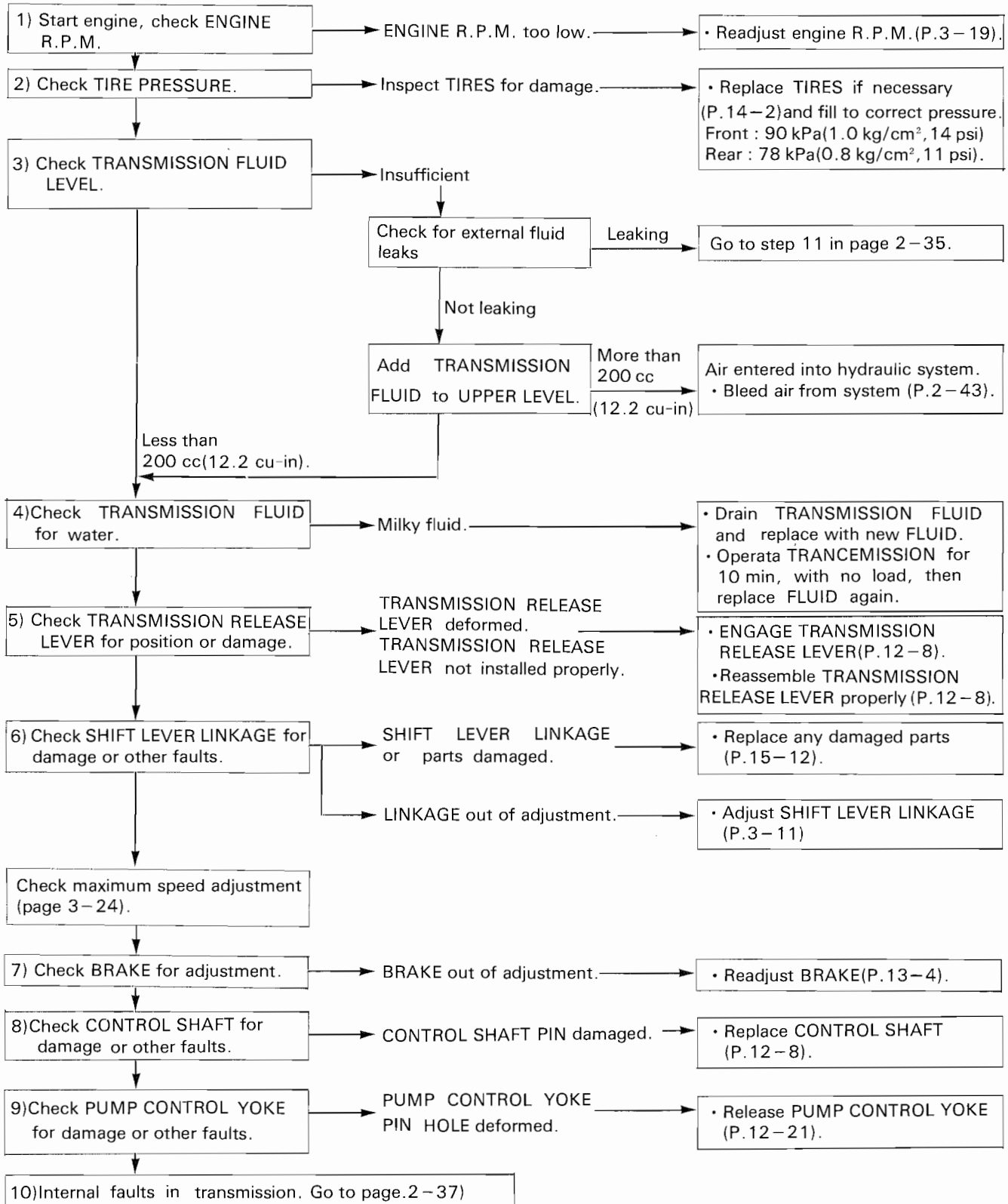
1-2 Lawn tractor only moves in one direction, transport or reverse.



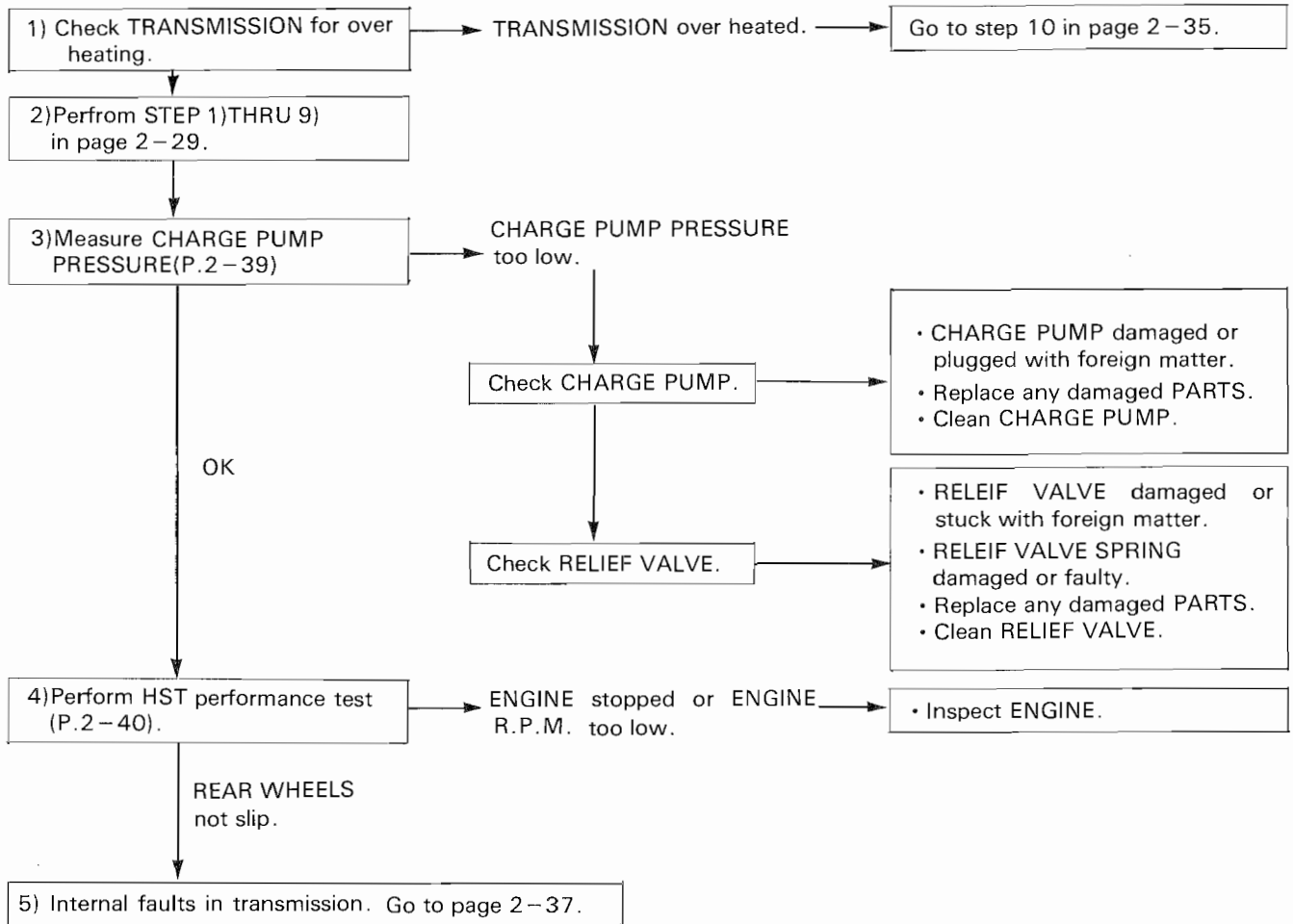
1-3. Engine stalls when operating shift lever.



### 2. Ground speed too slow.

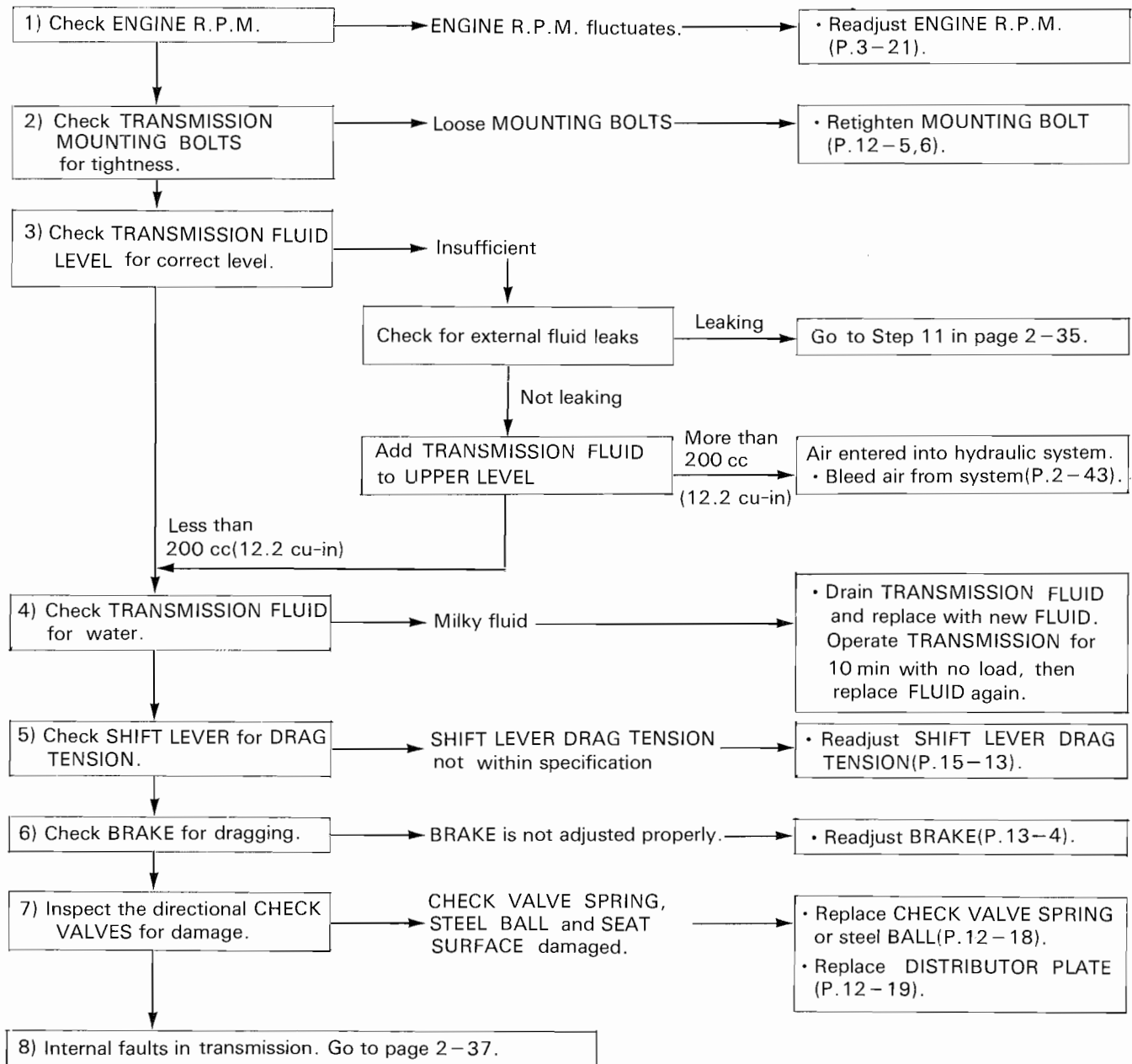


3. Tractor lacks drive power.

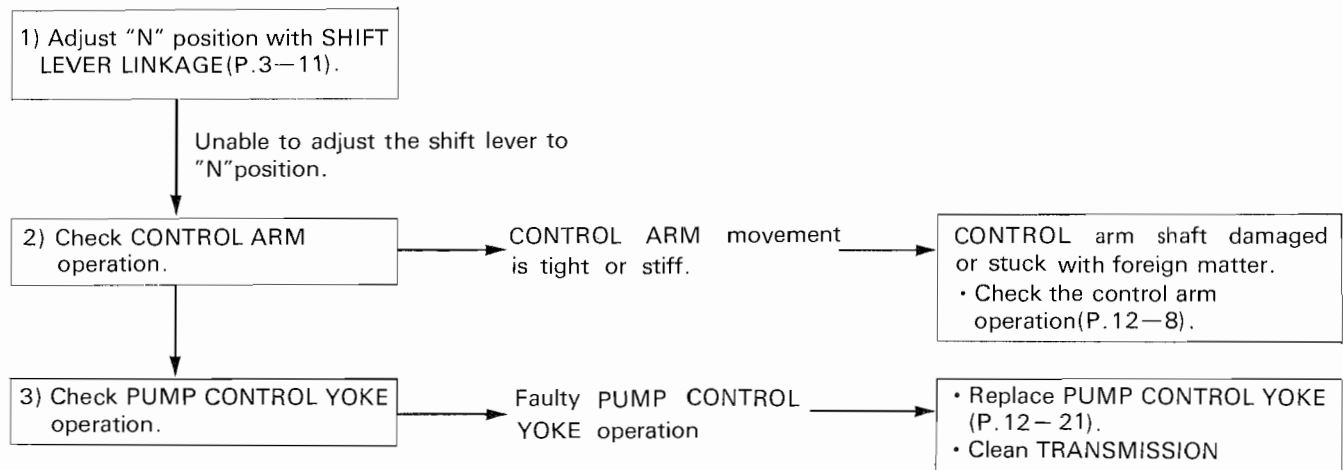




4. Unable to accelerate smoothly or to maintain a constant speed.



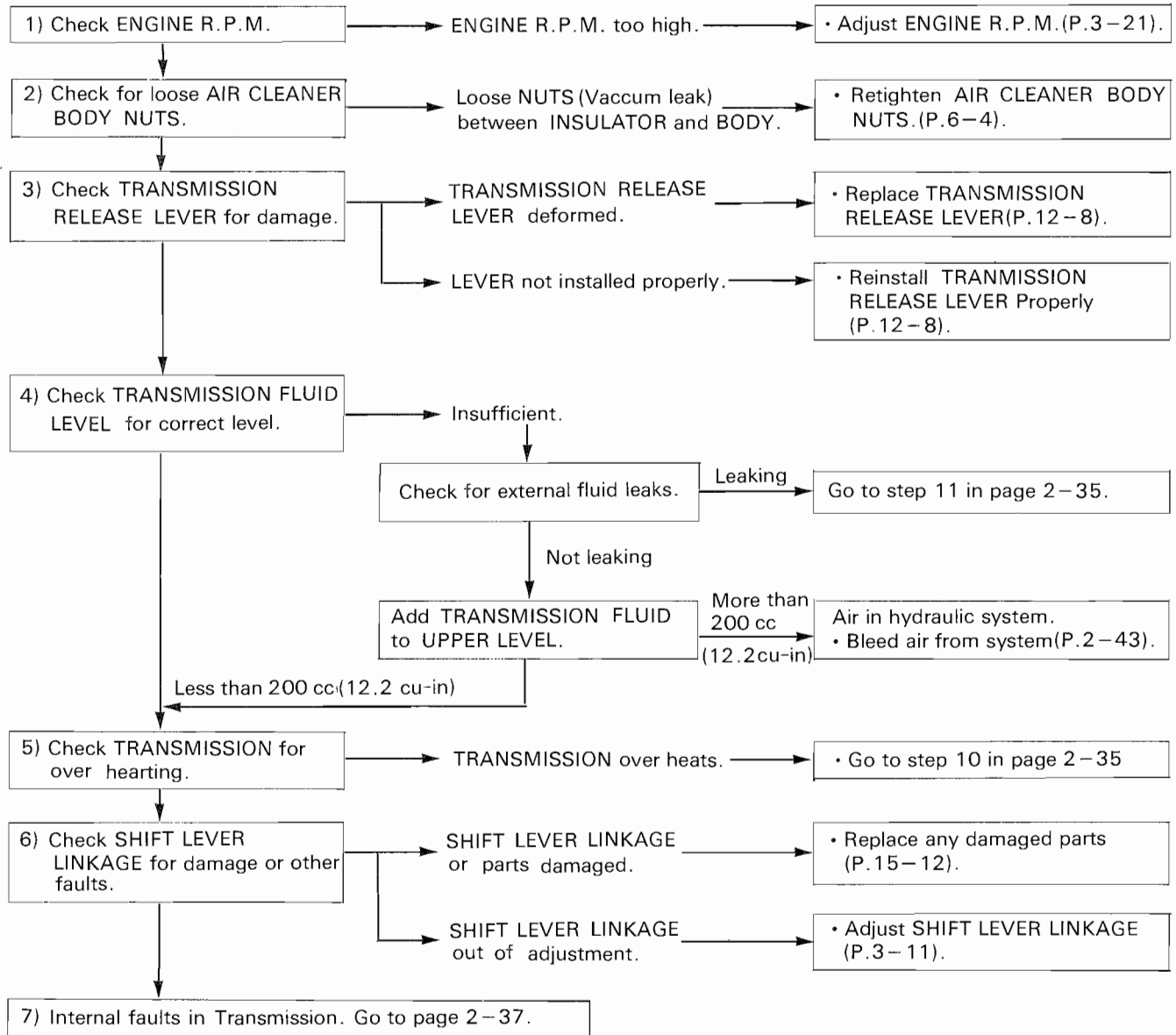
5. Tractor moves or creeps with SHIFT LEVER in "N".



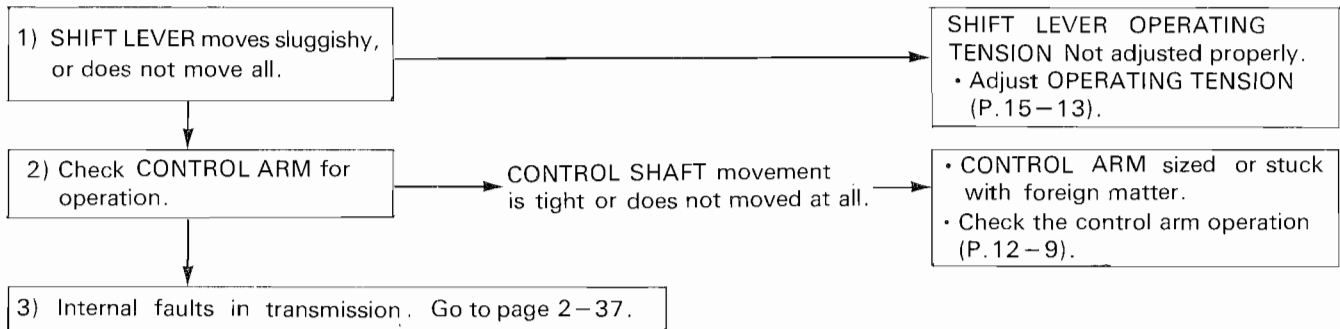
6. Driving speed abnormally fast down hills.

**WARNING**

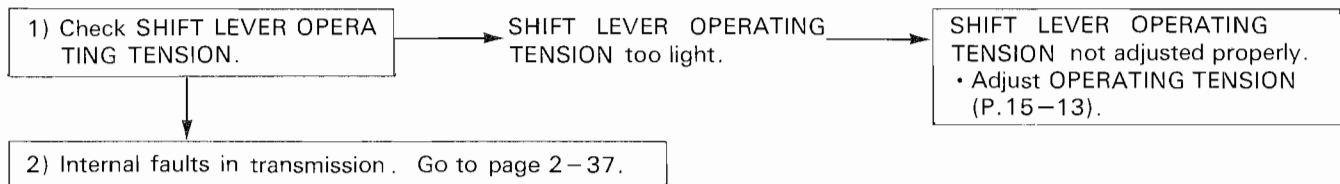
Operating the transmission release lever while on a slope or hill could result in a loss of control, serious injury or equipment damage can result.



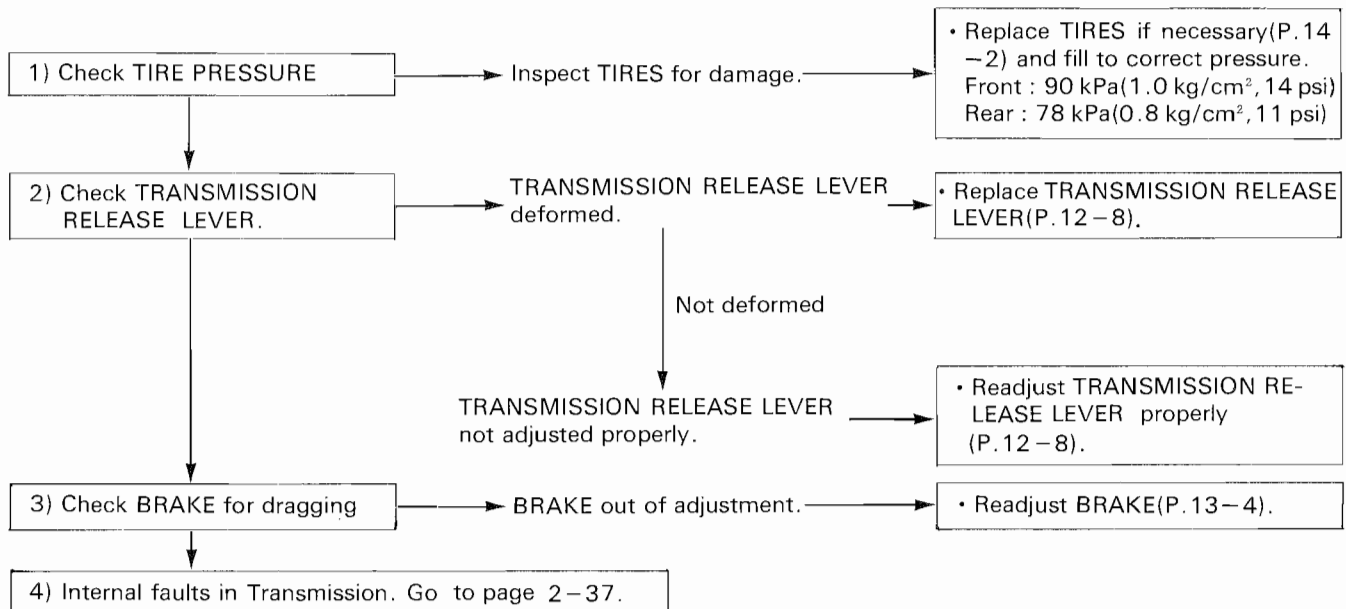
7. SHIFT LEVER is very difficult to move or does not move at all.



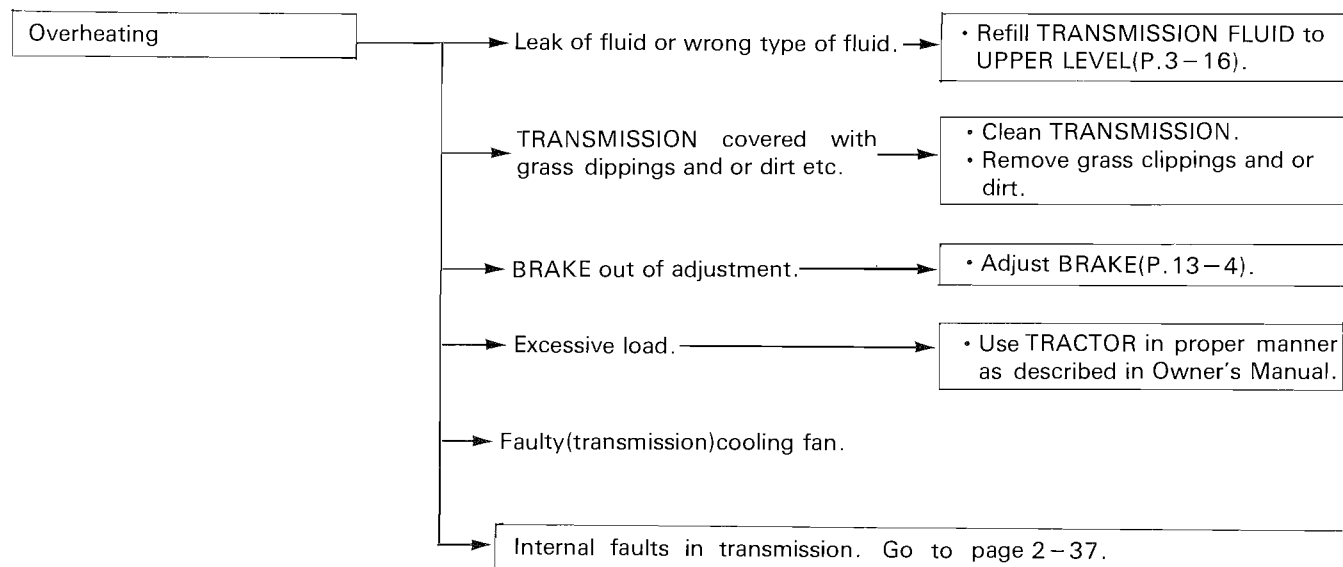
8. SHIFT LEVER moves unintentionally while driving.



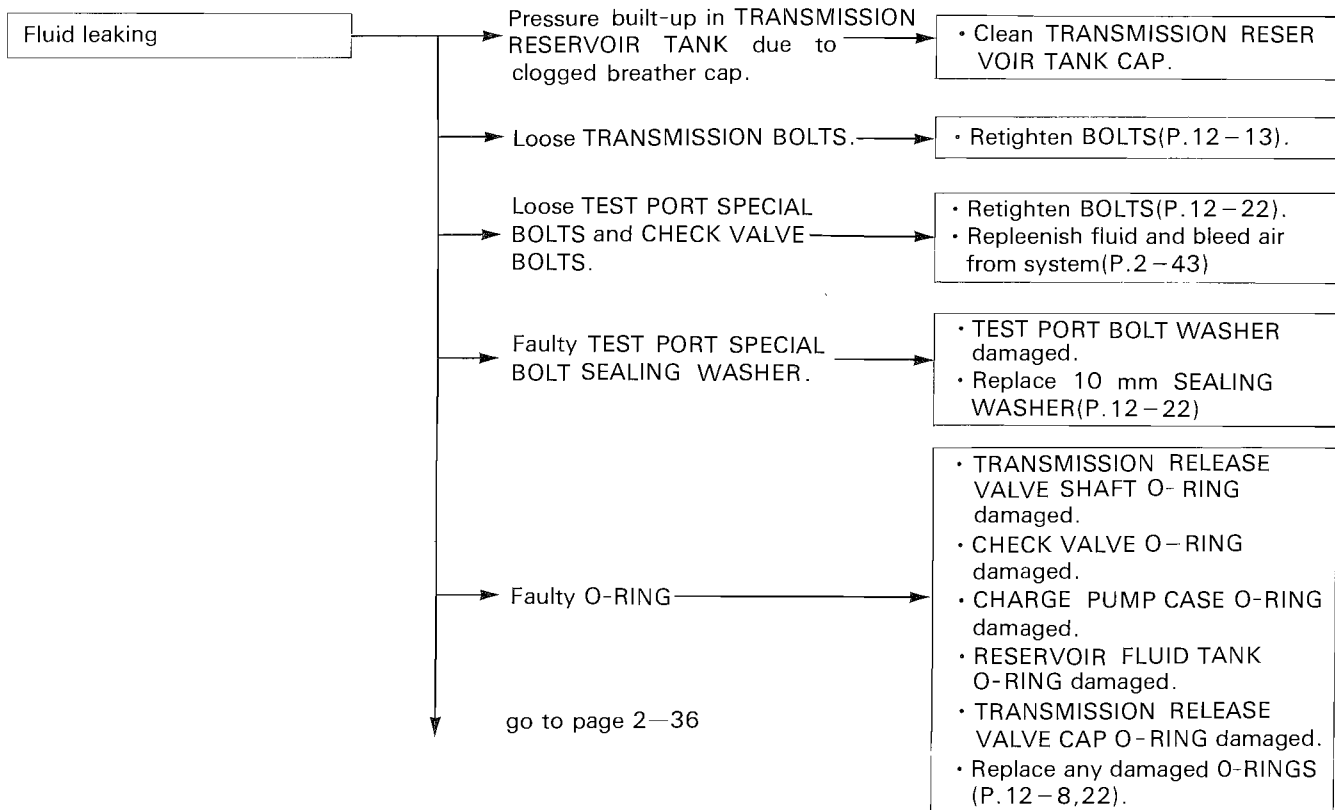
9. Tractor is hard to push or will not move with the transmission release lever in the released position.

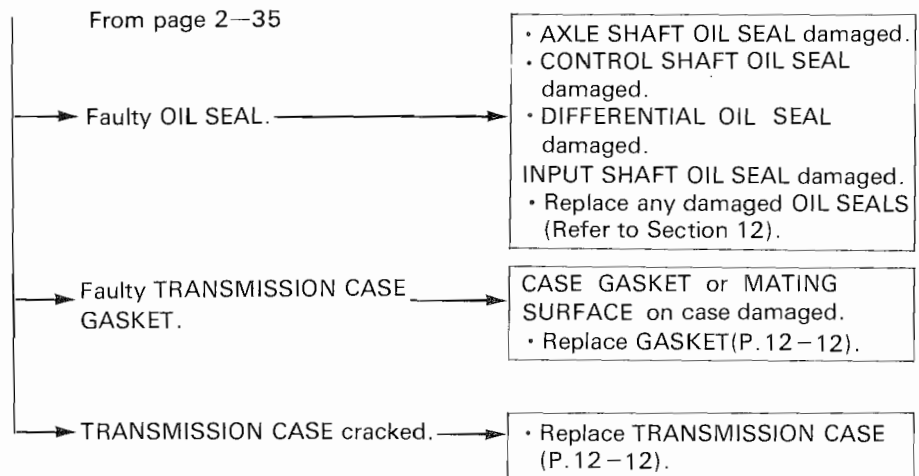


### 10. Over heating (TRANSMISSION FLUID : More than 248° F(120° C))



### 11. Fluid leaking from transmission.





### ● Inspection of Hydrostatic Transmission (HST) for internal faults

#### CAUTION

- Check all sliding or friction surfaces for signs of seizure.
- Keep air-borne dust and abrasives away from the transmission and parts during inspection and reassembly.
- Clean all fluid passages with compressed air.
- Clean working area and use a paper towels for your hands or disassembled parts.
- Solvent wash tanks or contact cleaner for final wash-down.

- |  |        |   |
|--|--------|---|
| 1) Remove and clean the outside of the transmission (P. 12—2)  |        |   |
| 2) Refer to Page 12—8 :<br>Check the control shaft for operation and damage.<br>Check the O-rings, oil seals, transmission fluid reservoir tank for damage or other faults.  | —————→ | Replace any damaged or faulty parts.  |
| 3) Refer to Page 12—10.<br>Check the input shaft for wear on gear or spline.<br>Check the oil seals and gaskets for damage or other faults.  | —————→ | Replace any worn or damaged parts.  |
| 4) Refer to Page 12—14, 15 :<br>Check the rear differential for wear or damage.<br>Inspect all splined gears and shafts for wear and or damage.<br>Check the radial ball bearing for operation, and oil seals for signs of damage.   | —————→ | Replace any worn or damaged parts.<br>Replace bearing if it shows excessive play. |
| 5) Refer to Page 12—17 :<br>Check the charging pump for damage.<br>Check O-rings and oil seal for damage or other faults.<br>Check the suction valve guide for signs of damage.  | —————→ | Replace any damaged parts.  |
| 6) Refer to Page 12—18 :<br>Inspect the steel balls, springs, transmission release valve and O-rings for damage.<br>Check the fluid filter for clogging.   | —————→ | Replace any damaged parts.<br>Clean and or replace the fluid filter thoroughly.   |
| 7) Refer to Page 12—19 :<br>Check the relief valve spring, cylinder, pump and cylinder piston for damage.<br>Inspect the motor shaft and pump shaft for wear or damage to the splines.<br>Check the piston, cylinder and thrust bearings for operation and signs of wear or damage.<br>Check the piston spring for breakage. | —————→ | Replace any worn, damaged or faulty parts.  |

8) Refer to Page 12—20 :

Check the motor cylinder plate and pump cylinder plate for wear.

Check the return shaft and spring for smooth operation or damage.

Inspect the distributor plate for cracks or damage.

Check the steel ball seats for pins, debris, or damage.

Check the main relief valve for slack or other faults.

9) Refer to Page 12—21 :

Check the pump control yoke for operation.

Inspect the pump control for damage.

Inspect the bearing plate, thrust roller bearing, thrust ball bearing, ball bearing plate for operation and or damage.

Check pump control yoke collar and needle bearing for damage.

→ Clean thoroughly, and replace any damaged parts.

→ Replace any worn, damaged or faulty parts.



### • CHARGE PUMP PRESSURE

Perform the following inspections/adjustment before testing the charging pressure.

- Hydrostatic transmission fluid inspection (page 3 - 16).
  - Check that the engine speed is within  $3000 \pm \frac{0}{100}$  rpm.
1. Place the lawn tractor on a level surface. Stop the engine and set the parking brake.
  2. Move the transmission release lever to the released position. (Red Dot)
  3. Remove the inspection cover below the seat.
  4. Remove the center special bolt 10 x 13mm (from B port) and install the special tool as shown, reusing the existing sealing washer. Tighten the pressure gauge adaptor securely.

#### NOTE

- Be sure to use the oil pressure gauge with a range of 0 - 7 kg/cm<sup>2</sup> (0 - 100 psi).
- If leakage occurs, apply thread sealant to the oil pressure gauge hose threads and re-assemble the hose to the special tool.

#### **⚠ WARNING**

Hydraulic oil under pressure can penetrate the skin causing serious injury. Keep hands and body from pressurized lines. Use paper or cardboard, not body parts, to check for leaks.

Make sure that all operating and service personnel know that in the event hydraulic fluid penetrates the skin, it must be surgically removed within a few hours by a doctor familiar with this form of injury, or gangrene may result.

5. Move the shift lever to the "N" position.

6. Start the engine and check the maximum engine speed (Unloaded). Measure the fluid pressure at the gauge.

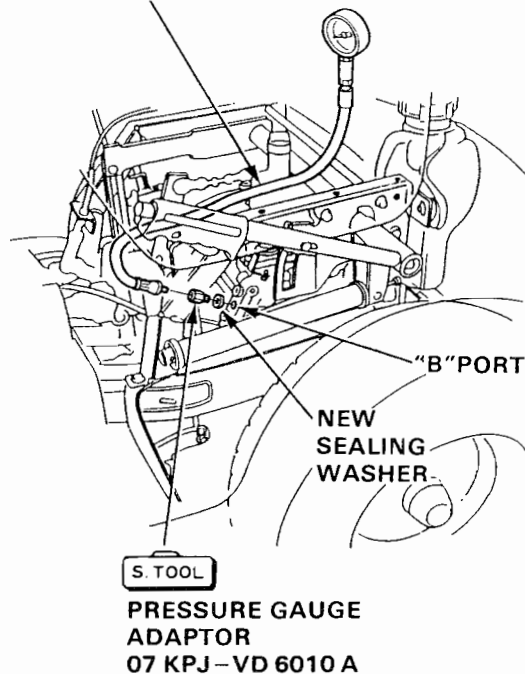
#### CAUTION

- Install an exhaust duct to the muffler if performing this test indoors.

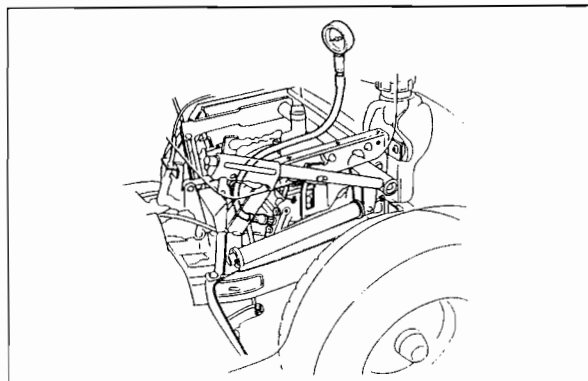
Specified pressure:  $3 \pm 1$  kg/cm<sup>2</sup> (43 ± 14 psi).

7. After inspection, reinstall the special bolt 10 x 13mm (to B port) using a new sealing washer. Tighten the bolt securely.

OIL PRESSURE GAUGE  
(Commercially available)



SHIFT LEVER ("N" POSITION)

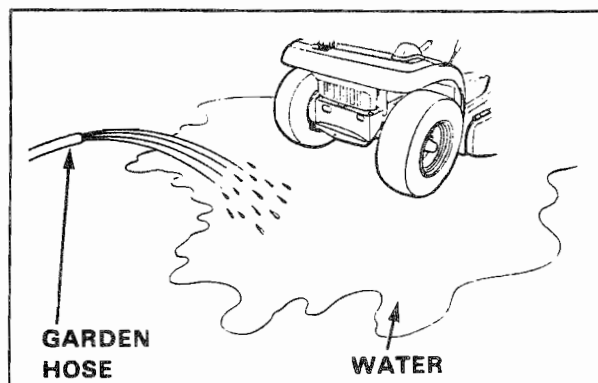
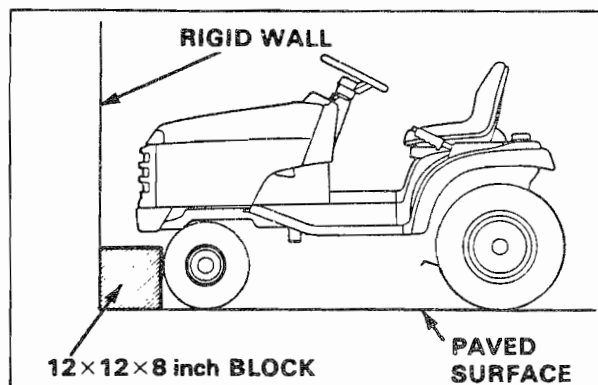
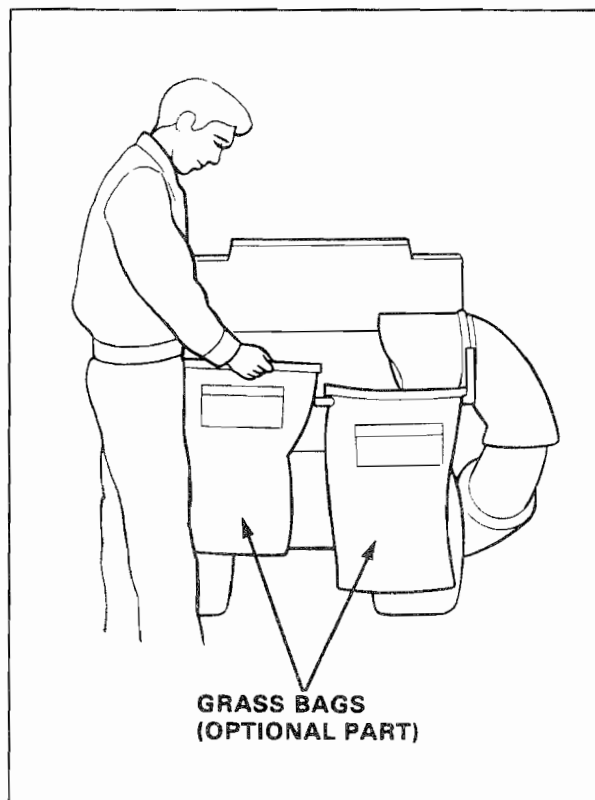


### HST PERFORMANCE TEST

This test will determine whether the transmission has possible internal faults, or if the engine is low on power. The HST pressure test requires two people. Have someone assist you when performing this test.

Before performing this test, check the following items.

- Hydrostatic transmission fluid (page 3—16)
  - Brake pedal adjustment (page 3—6)
  - Hydrostatic transmission shift lever linkage adjustment (page 3—11)
  - Check rear tires for excessive wear.
  - Check for correct tire pressure (page 3—5)
1. If the lawn tractor is equipped with a grass catcher, the bags and mower deck must be removed before testing.
  2. Clean around the transmission area with a garden hose to wash away any dirt or contaminants from the transmission.
  3. Start the engine and operate the transmission until normal operating temperatures is obtained (approximately 10 minutes of operation).
  4. Stop the engine and set the parking brake.
  5. Raise the hood and start the engine.  
Check the engine RPM at full throttle ;  
3200—3300 rpm,  $\pm 0$ .  
If adjustment is necessary, refer to pages 3—19. After the adjustment, stop the engine.
  6. Close the hood and position the tractor on a level paved surface just ahead of a rigid wall.
  7. Place a 12×12×8 inch block ahead of each front tire and against the rigid wall as shown.
  8. Wet the paved surface in the area of the rear wheels.



# HONDA

## H4514H

9. Measure the shift lever guide from the front edge of the "N" position, toward the "MOWING" position 35 mm (1.38 in). Place a piece of tape at the 35 mm mark as shown.
10. Start the engine and move the throttle to the "FAST" position. Carefully ease the lawn tractor forward until the front wheels contact the blocks.
11. The maximum travel for the shift lever while performing this test is approximately 35 mm (1.38 in) from "N". Slowly move the shift lever from "N". Slowly move the shift lever from "N" towards the 35 mm mark in "MOWING". The tires should begin to slip before reaching the mark.

### CAUTION

Allowing the wheels to slip for more than 5 seconds at time can cause internal damage to the transmission.

12. If the shift lever travel is less than 35 mm (1.38 in), but the engine stumbles, or dies, refer to page 2-13 to check the engine for possible faults.
13. If tire slip can not be achieved, stop the engine and perform the following test.

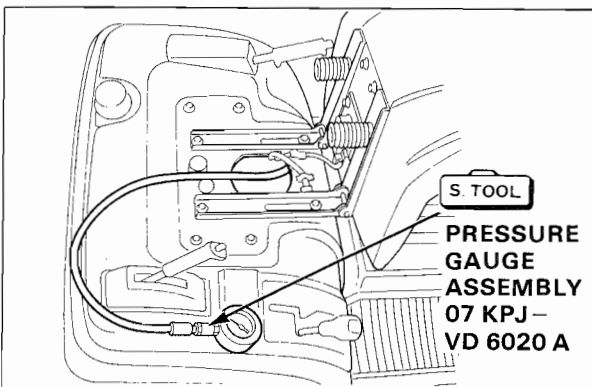
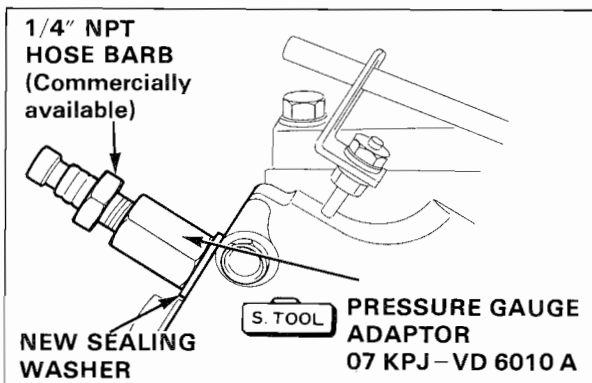
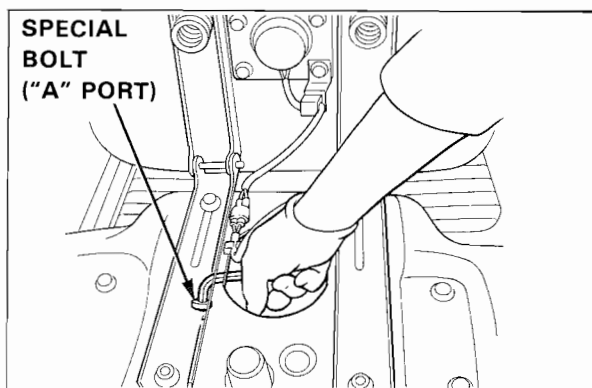
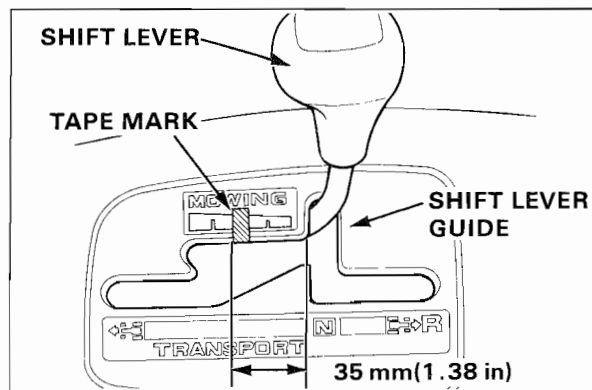
### ● HST PRESSURE TEST

14. Raise the seat and remove the inspection cover.
15. Wear gloves to protect your hands, and remove the 10×13 mm special bolt from test port "A".

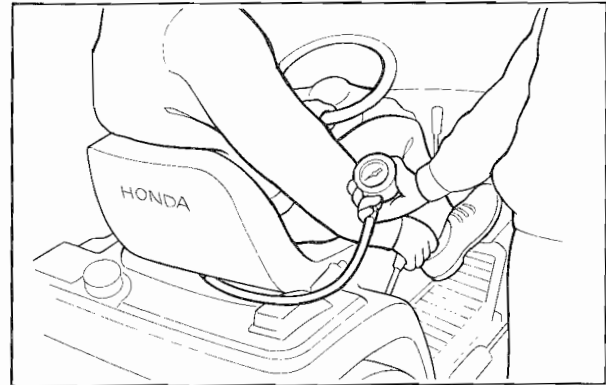
Install the special tools as shown.

### NOTE

- Apply thread sealant to threads of the male quick disconnect coupling included with the pressure gauge. Assemble the coupling to the adaptor.



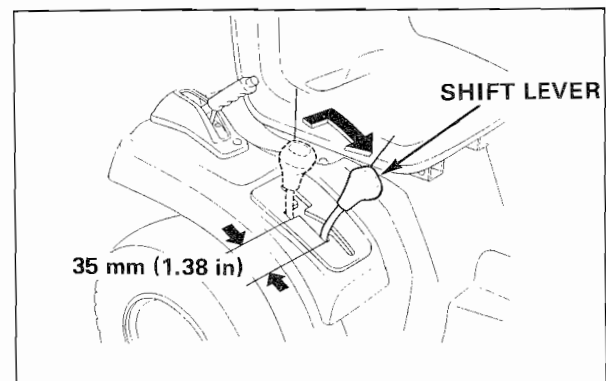
16. Have your assistant hold the gauge and stand clear of the tires while measuring the HST fluid pressure.
17. Lower the seat, ensure it is in the most forward position. Start the engine and move the throttle to the "FAST" position.  
Carefully move the tractor forward until the front wheels contact the blocks.
18. Slowly move the shift lever from "N" toward the 35 mm (1.38 in) mark in "MOWING". Have your assistant note the fluid pressure.
19. Compare the tested fluid pressure reading to the HST PERFORMANCE CHART below.



### HST PERFORMANCE TEST CHART

Testing Operator Weight	45.36–68.04 kg (100–150 lbs.)	68.49–90.72 kg (151–200 lbs.)	91.17–113.4 kg (201–250 lbs.)	113.8–136.0 kg (251–300 lbs.)
Minimum Line Pressure Reading	144 kg/cm <sup>2</sup> (2,048 PSI)	160 kg/cm <sup>2</sup> (2,275 PSI)	176 kg/cm <sup>2</sup> (2,503 PSI)	192 kg/cm <sup>2</sup> (2,730 PSI)

20. If the shift lever travel is more than 35 mm (1.38 in) from "N" to obtain the specified fluid pressure, or wheel slip can not be achieved, refer to page 2–37 to inspect the transmission for internal faults.



# HONDA

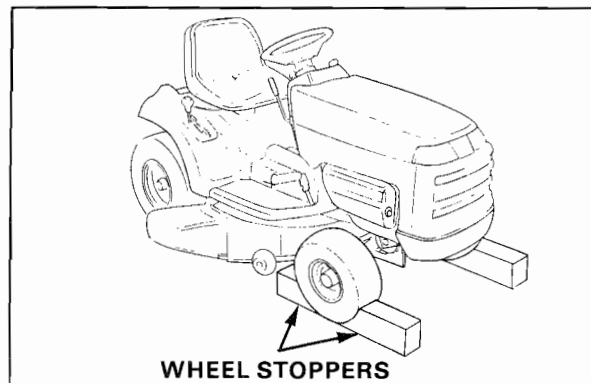
## H4514H

### AIR BLEEDING

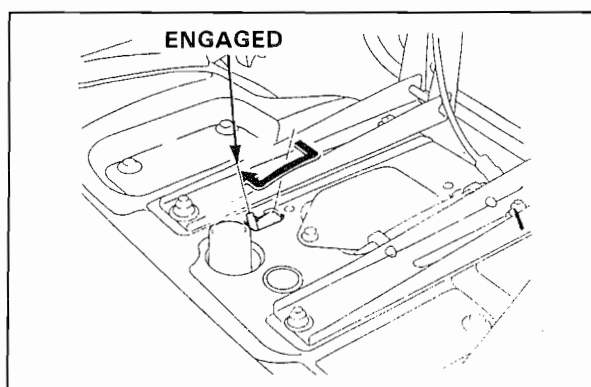
#### CAUTION

- Do not allow foreign material to enter the system when the special bolts are removed.
- Perform the air bleeding on level ground, never on a slope.

1. Place the wheel stopper as shown and jack up the rear wheels.



2. Move the transmission release lever to engaged position.

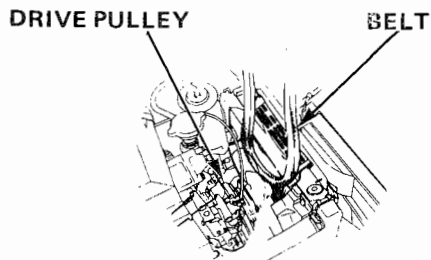


3. Remove the special bolt from the B port as shown.
4. Install the special tool to the B port.

#### NOTE

- Be sure to clean tools before use.

5. Connect a commercially available 1/4"-18 NPT hose barb fitting and a transparent hose onto the special tool. Place the clean container under the hose.
6. Remove the spark plugs from the cylinders.
7. Remove the mower deck drive belt from the mower deck (page 11-8).
8. Move the P. T. O. clutch lever to ON (engage) position. Hook the belt to the P. T. O. clutch drive pulley from the right side.

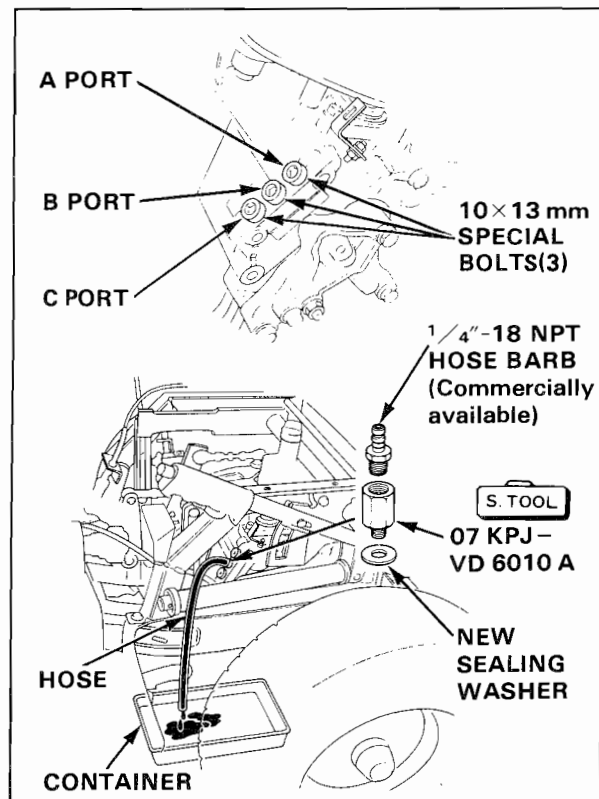


Turn the belt counterclockwise, view from front. When the fluid flows out of the "B" port with no air bubbles in the flowing fluid, remove the special tool from "B" port and install the 10×13 mm special bolt.

**TORQUE : 17N·m (1.7 kg-m, 12 ft-lb)**

#### NOTE

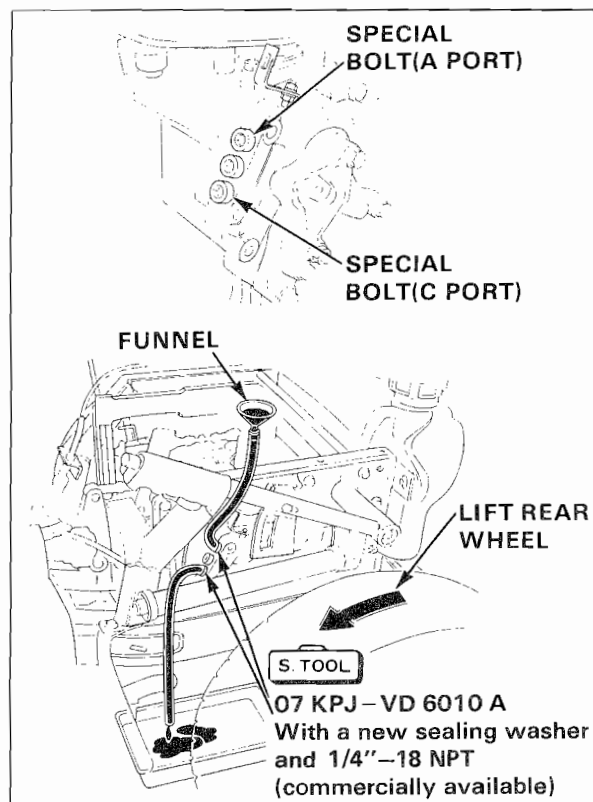
- Use only HONDA Hydrostatic Transmission fluid.



8. Remove the two special bolts from the "A" and "C" ports.
9. Install the air bleeder with the funnel and hose on the A port, and install the bleeder with only a hose on the C port.
10. Block the right rear wheel to prevent it from turning.
11. Turn the left rear wheel counterclockwise slowly until air bubbles cease to appear in the fluid coming out of the C port.

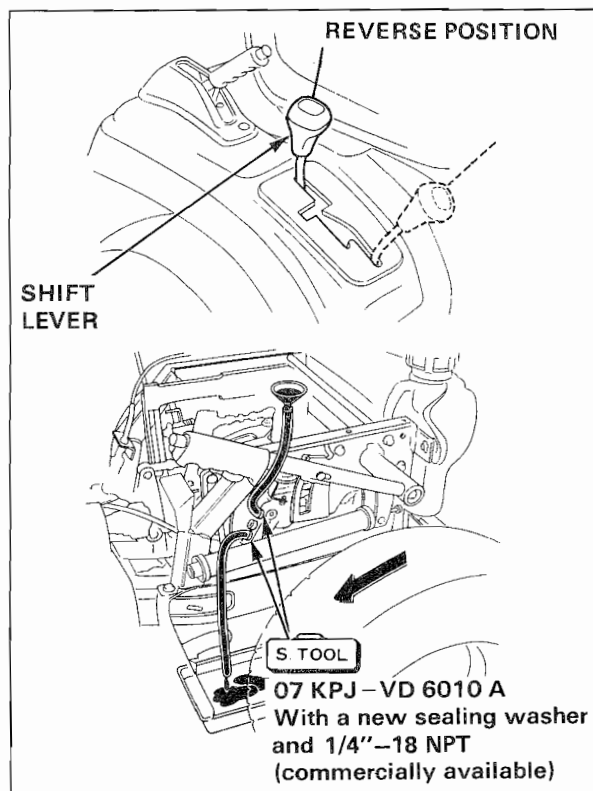
### NOTE

- Add fresh hydrostatic transmission fluid when the fluid level in funnel is low.
- Use only HONDA Hydrostatic Transmission fluid from a sealed container.
- Be careful not to let air enter in from port A when bleeding.
- Be careful not to allow dust, dirt, or foreign material to enter through the ports while.

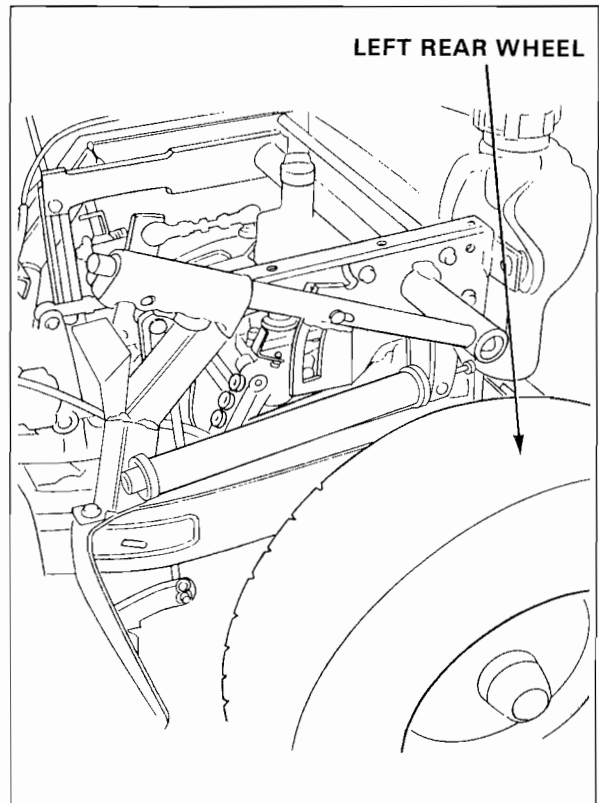


12. Move the shift lever to the REVERSE position and turn the P. T. O. clutch drive pulley counterclockwise, view from front, until air bubbles cease to appear in the fluid coming out of the C port.
13. Remove the air bleeders and torque the special bolts.

**TORQUE : 17 N·m (1.7 kg-m, 12 ft-lb)**



14. Move the shift lever to the TRANSPORT position and turn P. T. O. clutch drive pulley counterclockwise.
15. The left rear wheel should be rotated in counterclockwise.
16. Move the shift lever to the reverse position.
17. The left rear wheel should be rotated in clockwise.
18. Abnormal operation require the repeat in Step 12 through Step 17.
19. Remove the block from right rear wheel and lower the rear of lawn tractor to dismount it from the jack and reinstall the mower deck belt and spark plugs.



### MAINTENANCE SCHEDULE

REGULAR SERVICE PERIOD		EACH USE	FIRST 3 MONTHS OR 20 HRS (3)	EVERY 6 MONTHS OR 50 HRS (3)	EVERY YEAR OR 100 HRS (3)	EVERY 3 YEARS OR 300 HRS (3)	EVERY 5 YEARS OR 500 HRS (3)	Refer to page
ITEM	Perform at every indicated period or operating hour interval, whichever comes first.							
Engine oil	Check level	<input type="radio"/>						3-2
	Change		<input type="radio"/>		<input type="radio"/>			
Oil filter	Change	Every 2 years or 300 HRS						3-2
Air cleaner	Check	<input type="radio"/>						3-3
	Clean			<input type="radio"/>				
Seat switch operation	Check	<input type="radio"/>			<input type="radio"/>			3-28
Radiator screen	Clean	<input type="radio"/>						3-3
Parking brake indicator lamp and buzzer operation	Check	<input type="radio"/>		<input type="radio"/>				3-27
Battery electrolyte	Check level	<input type="radio"/>						3-4
	Check level and gravity			<input type="radio"/>				
Tire pressure	Check	<input type="radio"/>						3-5
Deck belt	Check	<input type="radio"/>						3-5
Blade belt	Check	<input type="radio"/>						3-5
Grass bag (optional parts)	Clean	<input type="radio"/>						18-2
Foot brake	Check	<input type="radio"/>						3-6
Radiator coolant	Check	<input type="radio"/>						3-8
	Change	Every 2 years						
Radiator(core)	Clean					<input type="radio"/>		3-3
Blade bolt tightness	Check		<input type="radio"/>	<input type="radio"/>				3-10
Blade condition		<input type="radio"/>						11-5
Shift lever	Check-Adjust		<input type="radio"/>	<input type="radio"/>				3-11
Brake (fastner tightness)	Check		<input type="radio"/>		<input type="radio"/>			3-6,7
Parking brake	Check			<input type="radio"/>				3-7
Spark plugs	Check-Clean				<input type="radio"/>			3-15
Spark arrester (optional part)	Clean				<input type="radio"/>			3-15
Transmission fluid	Check level	<input type="radio"/>						3-16, 17
	Change						<input type="radio"/>	
Fuel tank	Clean				<input type="radio"/>			3-18
Fuel filter	Check (Replace if necessary)				<input type="radio"/>			3-18
P. T. O. cable	Check-Adjust		<input type="radio"/>		<input type="radio"/>			3-18
P. T. O. clutch	Check				<input type="radio"/>			17-3
Throttle cable	Check-adjust				<input type="radio"/>			3-19
Front axle	Grease			<input type="radio"/>				3-14
Fuel line	Check (Replace if necessary)	Every 2 years						3-18
Valve clearance	Check-Adjust					<input type="radio"/>		3-20

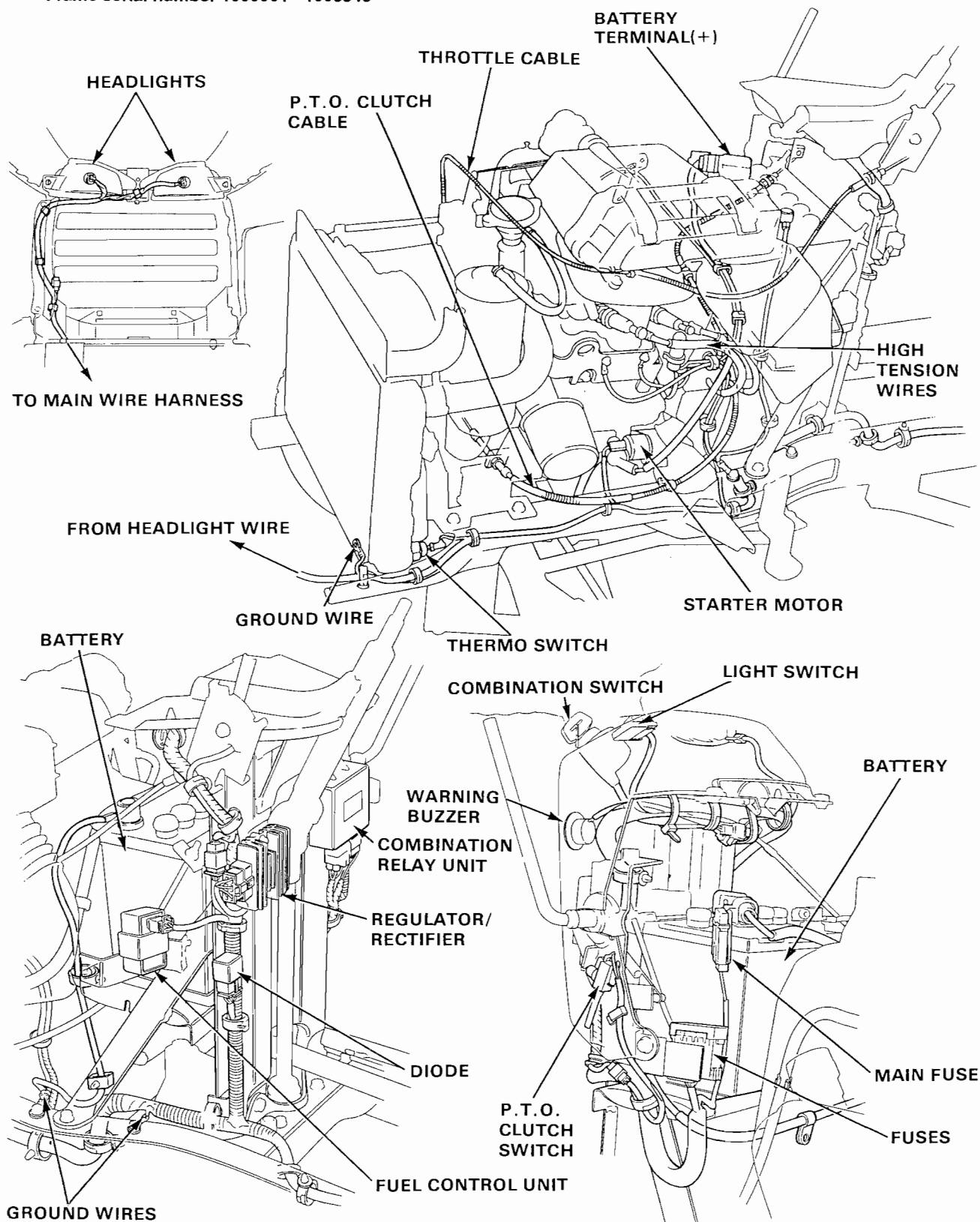
NOTE : (1) Service the air cleaner more frequently when used in dusty areas.

(2) For professional commercial use, log hours of operation to determine proper maintenance intervals.



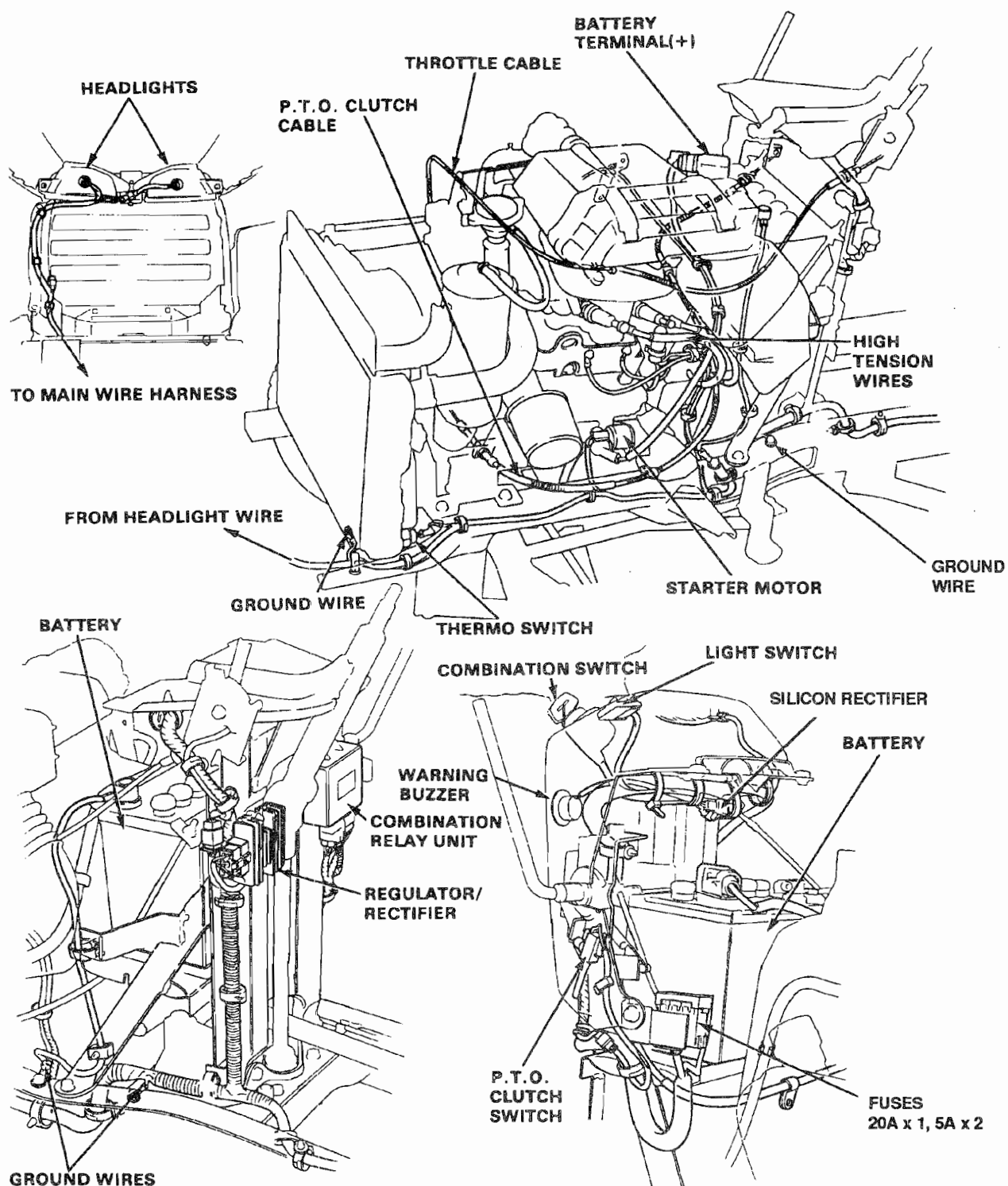
## CABLE/HARNESS ROUTING

- Frame serial number 1000001 - 1006846



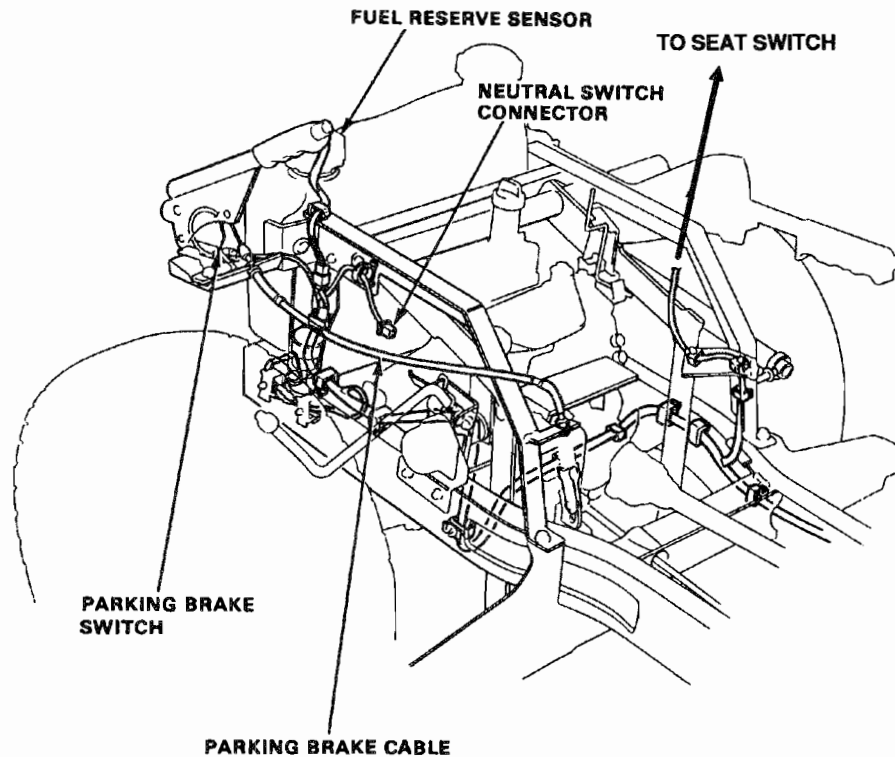
## CABLE/HARNESS ROUTING

- Frame serial number 1006847 and subsequent.

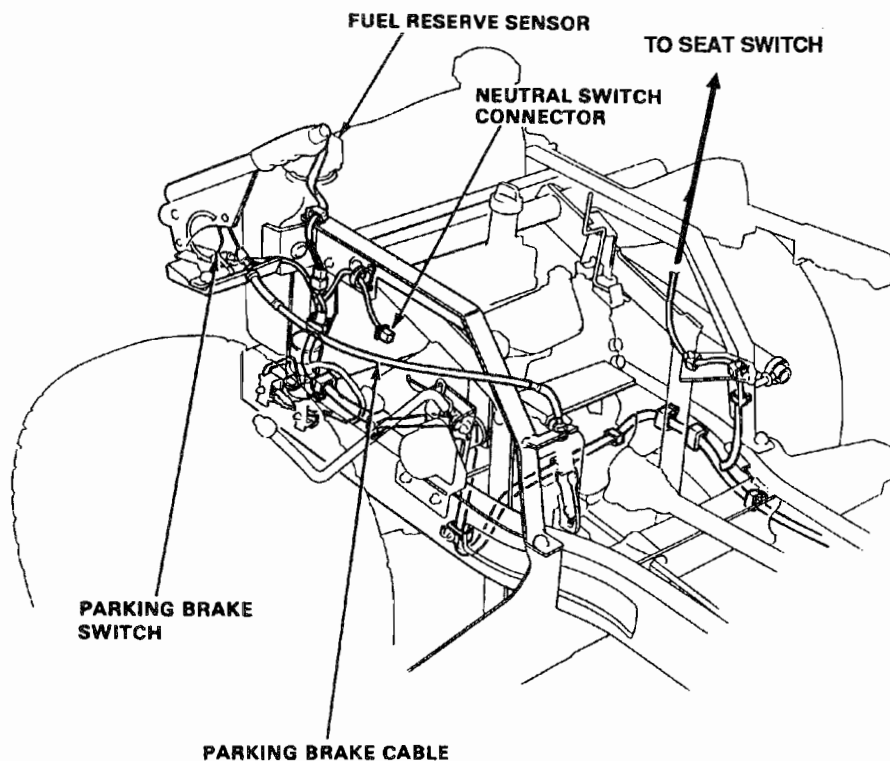


## CABLE/HARNESS ROUTING

- Frame serial number 1000001 - 1006846

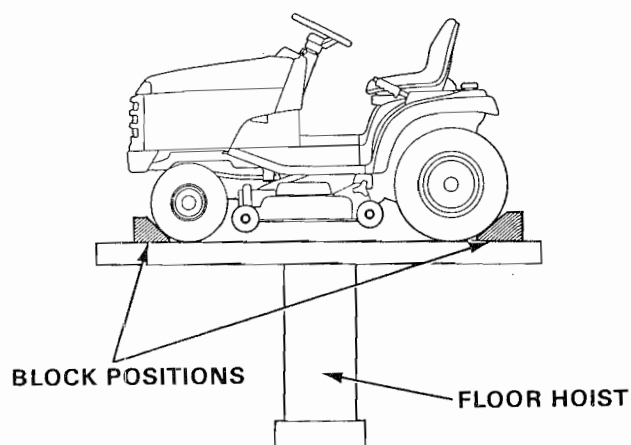


- Frame serial number 1006847 and subsequent.



## LIFT AND SUPPORT POINTS

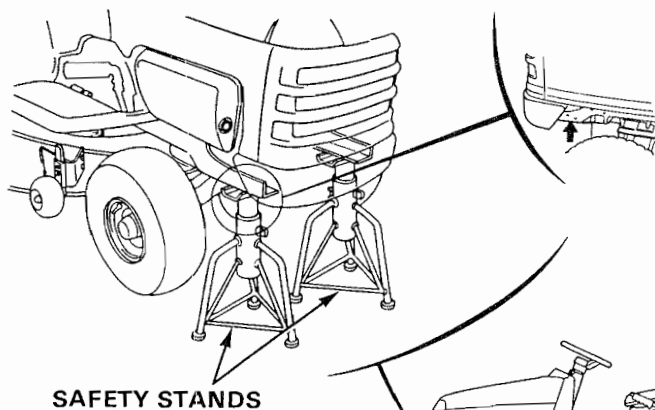
- 1) To support the lawn tractor, place safety stands in proper position as shown.



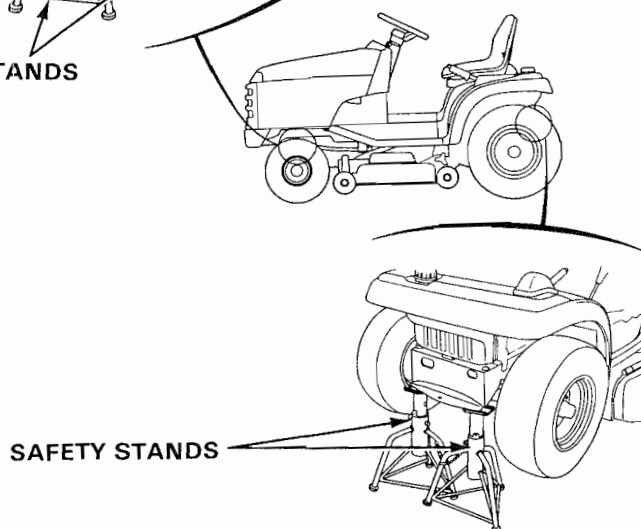
### ⚠ WARNING

- Always support both sides of the tractor for your safety.
  - Always use safety stands when working on or under any tractor that is raised off the floor.
  - Never attempt to use a bumper jack for lifting or supporting the tractor.
- Remove the mower deck before lifting the rear frame.
  - To support the lawn tractor, place safety stands in proper positions as shown.

### FRONT

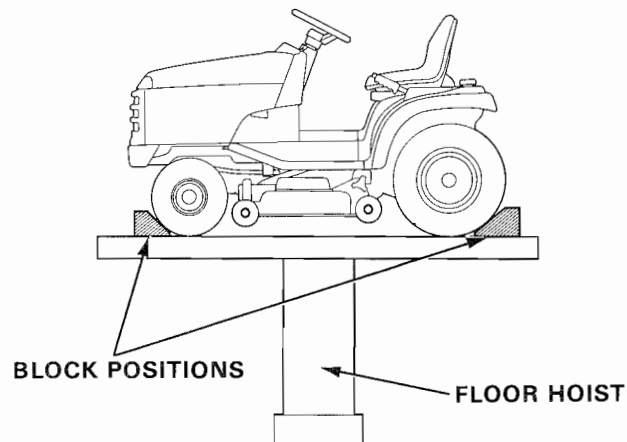


### REAR



### LIFT AND SUPPORT POINTS

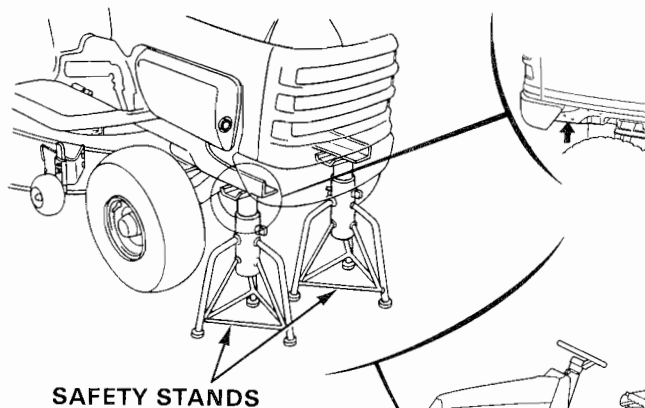
- 1) To support the lawn tractor, place safety stands in proper position as shown.



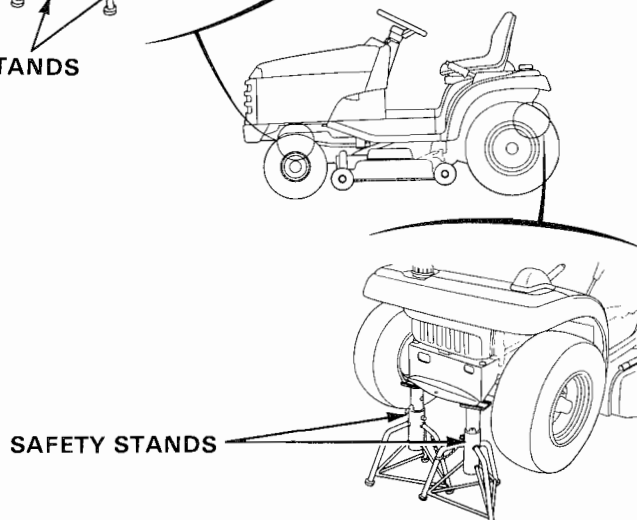
#### ▲WARNING

- Always support both sides of the tractor for your safety.
  - Always use safety stands when working on or under any tractor that is raised off the floor.
  - Never attempt to use a bumper jack for lifting or supporting the tractor.
- Remove the mower deck before lifting the rear frame.
- To support the lawn tractor, place safety stands in proper positions as shown.

#### FRONT



#### REAR



NOTE

## MAINTENANCE

ENGINE OIL .....	3-2	HYDROSTATIC	
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SPARK ARRESTOR (OPTIONAL)			
.....	3-15		

### ENGINE OIL

#### a. INSPECTION

##### ▲WARNING

- Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil. **KEEP OUT OF REACH OF CHILDREN.**

##### NOTE

- Dispose of used motor oil in a manner that is compatible with the environment. We suggest that you take it in sealed container to your local waste disposal site, or service station for reclamation.
- Do not throw it in the dustbin or pour it on to the ground, down sewers or drains.
- Draining can be performed rapidly and completely when the engine is still warm.
- Place the shop towel under the oil filter when removing the oil filter.

1. Place the lawn tractor on a level surface.
2. Open the engine hood, remove the oil filler cap and wipe the dipstick clean.
3. Insert the dipstick into the oil filler neck, but do not screw it in.
4. Check the oil level shown on the dipstick. If near or below the lower level mark, fill to the upper level mark with the recommended oil.

Engine oil capacity	1.4 l (1.48 US qt)
Recommended engine oil	SAE 10W-30 Service Classification SG, SF/CC, CD

##### NOTE

- When a new oil filter has been installed, recheck the engine oil level after running the engine for a few minutes.

#### b. OIL AND FILTER CHANGE

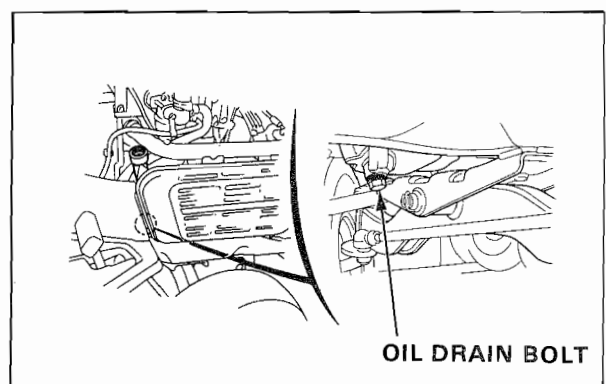
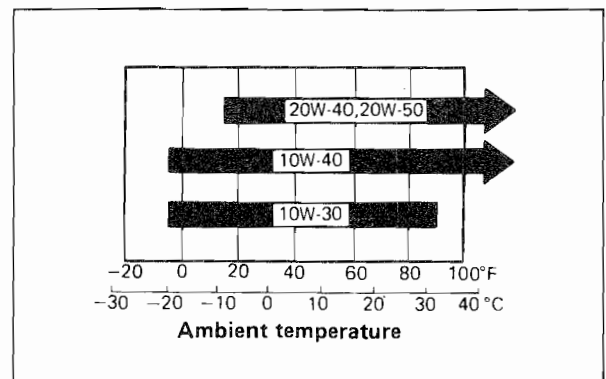
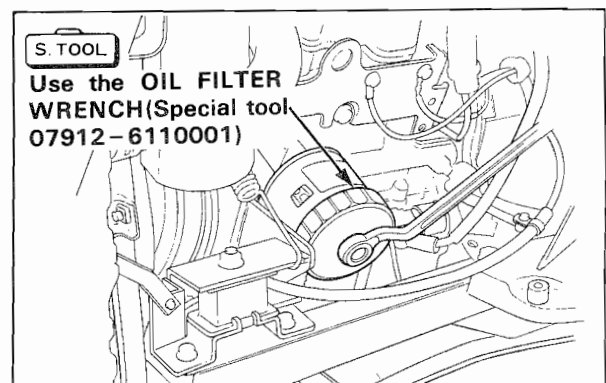
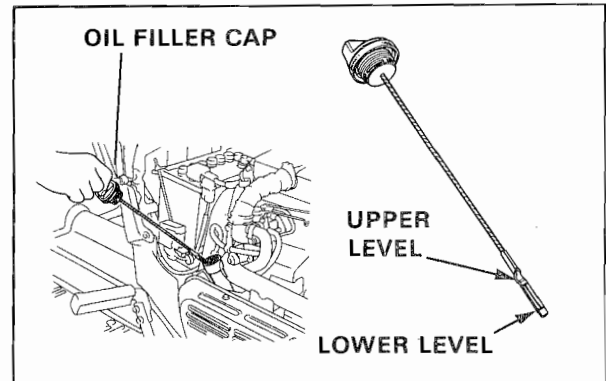
##### NOTE

- Before draining the oil, place a shop towel under the oil drain bolt or remove the mower deck belt if necessary.

1. Remove the oil filler cap and the oil drain bolt and drain the engine oil.  
If the oil filter is to be changed, remove it with an oil filter wrench.

##### NOTE

- To remove the drain bolt, turn the steering wheel to the extreme right and remove the bolt from the left side.





2. Reinstall the drain plug and tighten it securely.  
If changing the oil filter, apply a thin coat of engine oil to the filter seal, and screw the new filter in by hand until it seats against the engine.  
Then use the oil filter wrench to tighten it an additional  $\frac{3}{4}$  turn.
3. Refill to the upper level mark on the dipstick with the recommended oil. Tighten the oil filler cap securely.

### NOTE

- When a new oil filter has been installed, recheck the engine oil level after running the engine for a few minutes.

## AIR CLEANER

### ▲WARNING

- **Never use gasoline or low flash point solvents to clean the air cleaner element. A fire or explosion could result.**

1. Open the engine hood.
2. Release the clip and the air cleaner cover. Remove the elements and separate them. Carefully check both elements for holes or tears and replace if damaged.
3. Foam element : Clean in warm soapy water, rinse and allow to dry thoroughly, or clean with a high flashpoint solvent and allow to dry thoroughly.

### CAUTION

- **Do not allow the element to soak overnight or for long periods of time in solvent, this may cause damage to the element.**

Dip the element in clean engine oil and squeeze out all the excess. The engine will smoke during initial start-up if too much oil is left on the foam element.

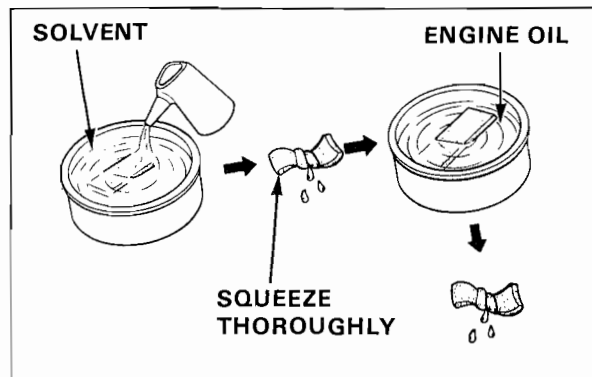
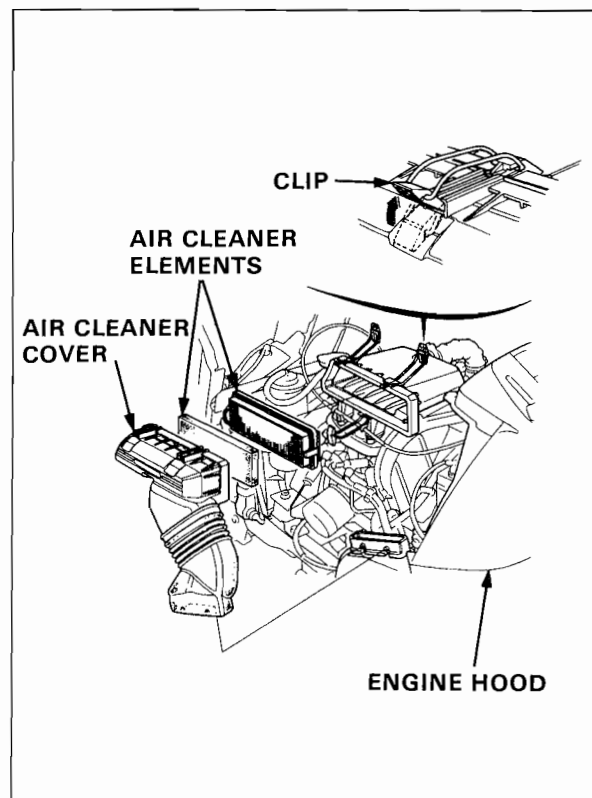
4. Paper element : Tap the element lightly several times on a hard surface to remove any excess dirt, or blow compressed air (30 psi or less) through the filter from the inside out. Never try to brush the dirt off ; brushing will force dirt into the paper fibers.

### CAUTION

- **Carefully check both elements for holes or tears and replace as required. Damaged elements will allow dirt to pass into the system.**
- **Always clean the filter housing and air passages before installing clean elements.**

### NOTE

- The engine will run poorly when the air cleaner needs maintenance. If it runs better without the air cleaner than it does with clean elements, or if the length of time between cleanings keeps getting shorter, replace the elements. Under extremely dusty conditions such as volcanic ash, silt, etc., the system may need daily maintenance.

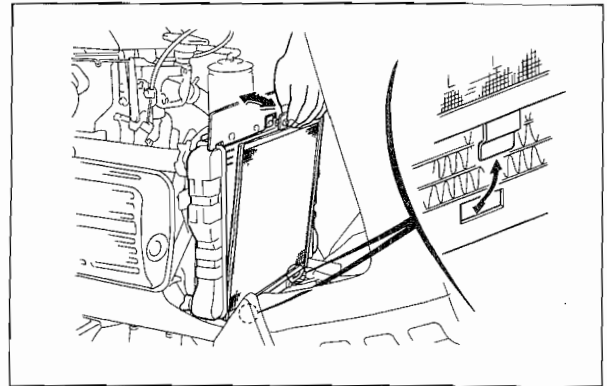


### RADIATOR SCREEN

#### CAUTION

- If the engine has been running, the radiator will be very hot, allow it to cool before proceeding.

1. Open the engine hood.
2. Lift the screen out of its holder. Remove any dirt and clippings from the screen and the radiator core, and then reinstall the screen.



### BATTERY ELECTROLYTE LEVEL

#### ⚠ WARNING

- The battery contains sulfuric acid. Avoid contact with skin, eyes or clothing.

Antidote : EXTERNAL-Flush with water.

INTERNAL-Drink large quantities of water or milk, Follow with milk of magnesia, beaten egg or vegetable oil. Call a physician immediately.

EYES-Flush with water and get prompt medical attention.

- Batteries produce explosive gases. Keep sparks, flames and smoking materials away. Always shield the eyes when working near batteries.

1. Open the engine hood and check the battery top and case for loose parts and cracks. Inspect the cells for signs of sulfation. Replace the battery if it is damaged or sulfated.
2. Check electrolyte level in each cell. If low, add distilled water to bring level to UPPER level.

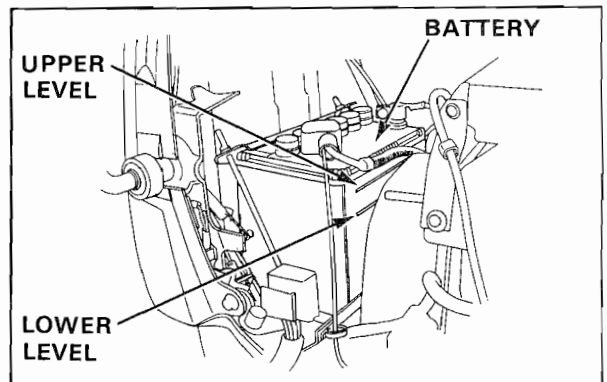
#### CAUTION

- Use only distilled water in the battery. Tap water will shorten the service life of the battery.
- Do not fill the battery beyond the UPPER level. If overfilled, electrolyte may overflow and corrode tractor components. Immediately wash off any spilled electrolyte.

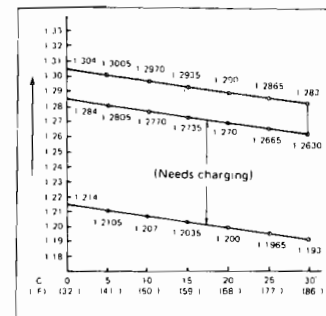
3. Check the specific gravity of the electrolyte with an accurate hydrometer. Use the chart to adjust the reading for temperature variations and recharge the battery if the reading falls within the chart's "Needs charging zone".

#### Charging

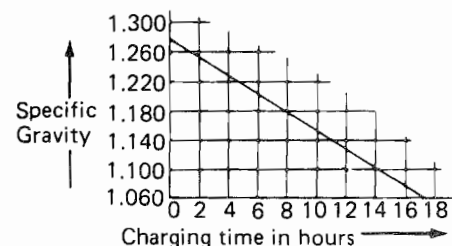
4. Charge at 10 % of the ampere-hour rating until battery specific gravity is at least 1.250.



Variation of Specific Gravity with Temperature



#### SLOW CHARGE PROCEDURE



5. Keep battery and terminals clean. If necessary, brush with baking-soda solution and flush with clean, lukewarm water. Check for loose terminal clamps.
6. If clamps become corroded inside, clean out with a wire brush or coarse emery cloth.

### NOTE

- Coat terminals lightly with petroleum jelly to retard corrosion. Baking soda may be mixed with the jelly for additional protection against acid build-up.

## TIRE PRESSURE

### CAUTION

- Improper Inflation may lead to premature tire failure. Never exceed the manufacture's maximum tire pressure specification.

1. Check the tire pressure with an air pressure gauge.

Pressure	Front	1.0 kg/cm <sup>2</sup> (14 psi)
	Rear	0.8 kg/cm <sup>2</sup> (11 psi)

## MOWER DECK DRIVE BELT AND BLADE BELT

### ▲WARNING

- Remove the ignition key and disconnect the spark plug cap to prevent accidental start-up.

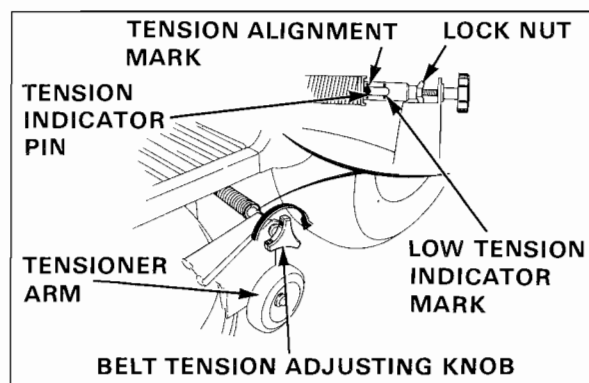
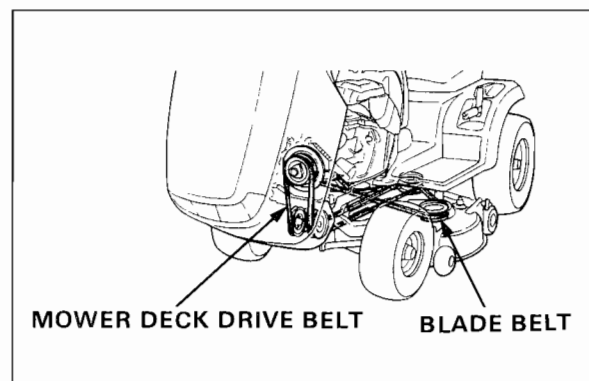
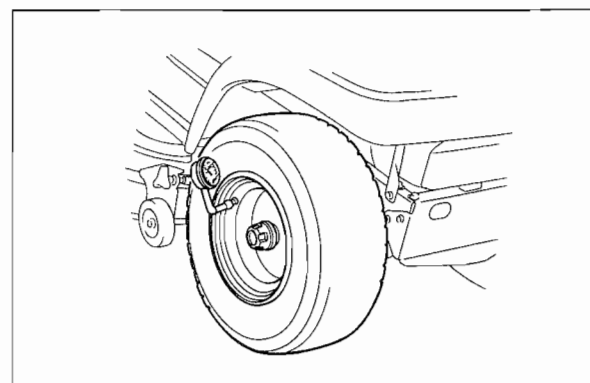
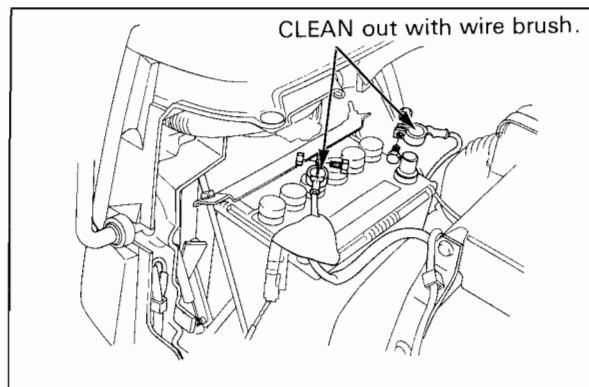
### CAUTION

- Wear heavy gloves to protect your hands when working with the belts and blade.

1. Lower the mower deck by using the mower deck height adjusting lever, and open the engine hood.
2. Inspect the belt for wear or damage. If worn or damaged, replace the belt.
3. If the pin of the adjusting knob lines up with or goes past the low tension indicator mark, loosen the lock nut and turn the adjusting knob and align the pin with the alignment mark.

### NOTE

- After installing a new drive belt, turn the adjusting knob to align the mark with the alignment mark.
- After the drive belt has been adjusted, start the engine and move the P. T. O. lever to ON and check drive belt operation.
- REPLACEMENT : p. 11-8, 11-10

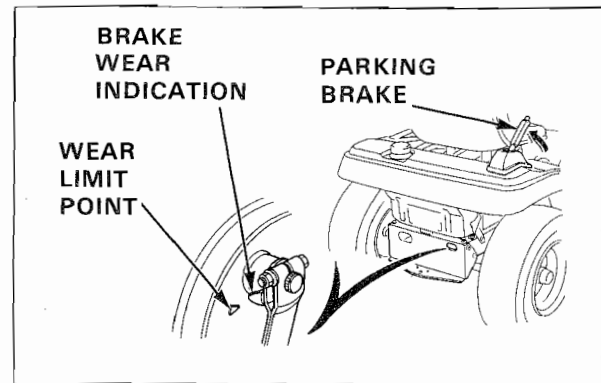


## BRAKES

### ● BRAKE SHOE WEAR

Inspect brake lining condition every time the lawn tractor is used.

1. Firmly set the parking brake, and then check the position of the brake wear indicator.
2. If the indicator lines up with the wear limit pointer, replace the brake shoes. (P. 13-2)

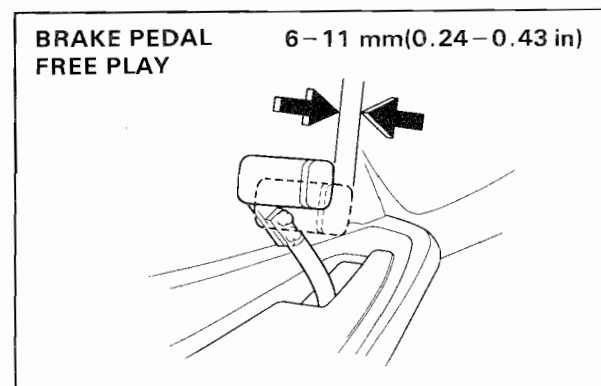


### ● BRAKE PEDAL

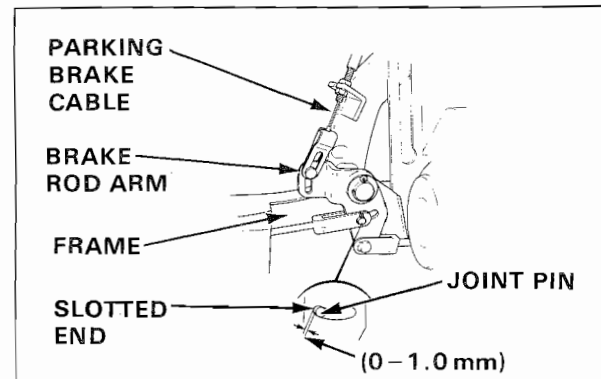
1. Park the tractor on a level surface.  
Move the shift to the NEUTRAL position and release the park brake.
2. Measure the brake pedal free play.

FREE PLAY	6-11 mm(0.24-0.43 in)
-----------	-----------------------

3. If the free is not within the specifications, adjust as follows :
4. Remove the mower deck (P. 11-2)



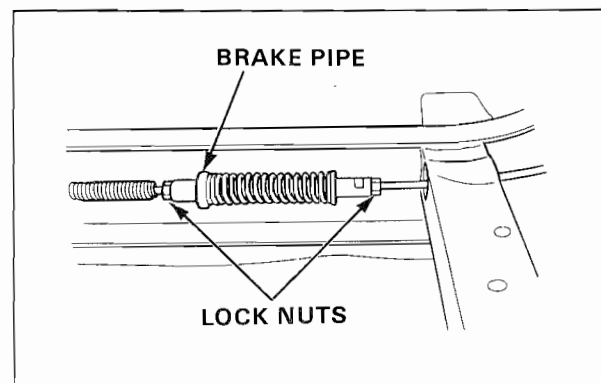
5. Be sure the brake rod arm is contacting the frame.
6. Check the free play between the brake rod joint pin and the slotted end in the brake rod arm. Free play should be more than 0, but less than 1.0 mm.



7. If the clearance is out of specification, loosen the lock nuts on the brake pipe and adjust as needed to obtain the clearance. Tighten the lock nuts securely.

#### NOTE

- The lock nut at the front has left-hand threads.
- Do not twist the brake pipe when tightening the lock nuts.



8. Turn the brake arm rod adjusting nut to obtain the correct brake arm free play.

<b>BRAKE ARM FREE PLAY</b>	3-6 mm (0.12-0.24 in)
--------------------------------	-----------------------

### NOTE

- When the brake arm free play is 3-6 mm (0.12-0.24 in), the BRAKE pedal free play should 6-11 mm (0.24-0.43 in).

9. After adjustment, check the rear brake operation.
  - Pull the parking brake lever full stroke then release it.
  - The transmission release lever is Disengage.
  - Push the tractor, if the tractor does not moved, check for damage of the brake pipe and brake rod.

## PARKING BRAKE

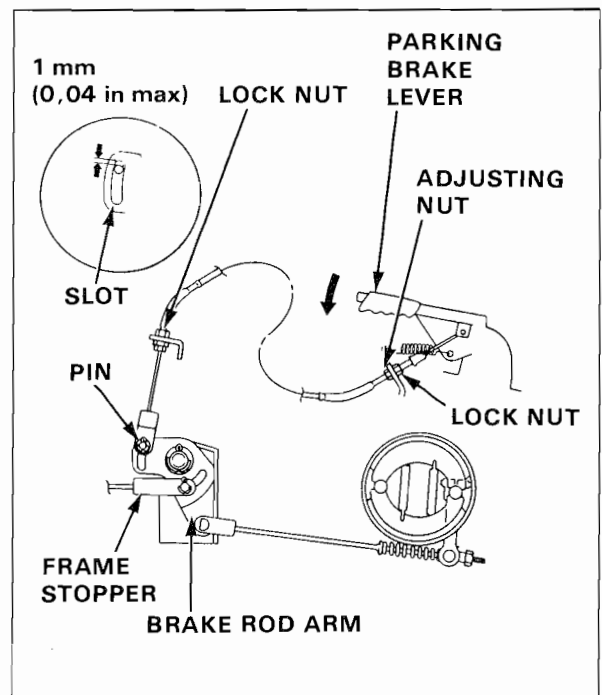
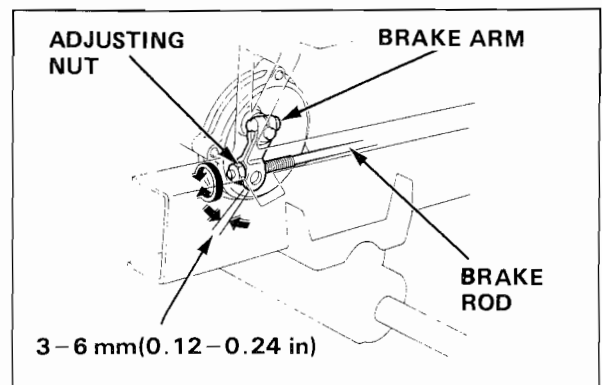
### NOTE

- Perform this adjustment after the brake pedal adjustment is complete.

1. Release the parking brake completely.
2. Contact the brake rod arm to the stopper and check the free play between the cable end joint pin and the slotted end in the brake rod arm. Free play should be 1.0 mm max.

<b>Free play</b>	1 mm max. (0.04 in max.)
------------------	--------------------------

3. To adjust loosen the lock nut at the parking lever side and turn the adjusting nut. After adjustment tighten the lock nut securely.
4. When pulling the parking lever with a force of 10 kg (22.0 lb), count the number of notches (number of audible click sounds). The parking lever adjustment is OK, if there are between 2 and 4 click. If the number of click sounds are below 2 or above 4, adjustment is necessary.



## COOLANT

### Coolant Recommendation

Use high quality ethylene glycol antifreeze that is specifically formulated for use in aluminum engines. Mix the antifreeze with low-mineral drinking water or distilled water.

A50/50 mixture of ethylene glycol antifreeze and water is recommended for most temperatures and provides good corrosion protection. A higher concentration of antifreeze decreases cooling efficiency and is recommended only if additional protection against freezing is needed.

A concentration of less than 40 % antifreeze will not provide proper corrosion protection.

### CAUTION

- The use of unsuitable antifreeze, hard water, or salt water may cause corrosion damage that will shorten the life of the engine.

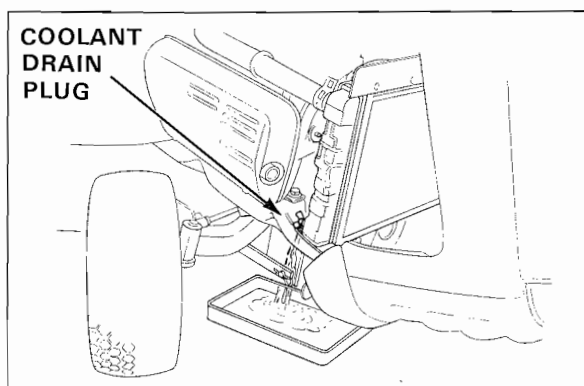
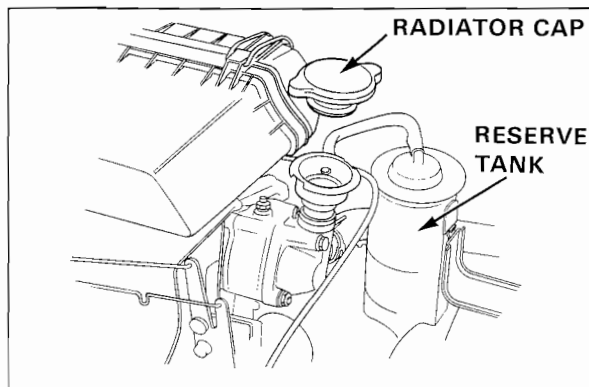
Freezing point (Hydrometer test) :	55% Distilled water + 45% ethylene glycol : $-32^{\circ}\text{C}$ ( $-25^{\circ}\text{F}$ ) 50% Distilled water + 50% ethylene glycol : $-37^{\circ}\text{C}$ ( $-34^{\circ}\text{F}$ ) 45% Distilled water + 55% ethylene glycol : $-44.5^{\circ}\text{C}$ ( $-48^{\circ}\text{F}$ )
Coolant capacity :	
Radiator and engine	2.0 l (2.11 US qt)
Reserve tank	0.4 l (0.422 US qt)
Total system	2.4 l (2.54 US qt)

### Coolant Replacement Procedure

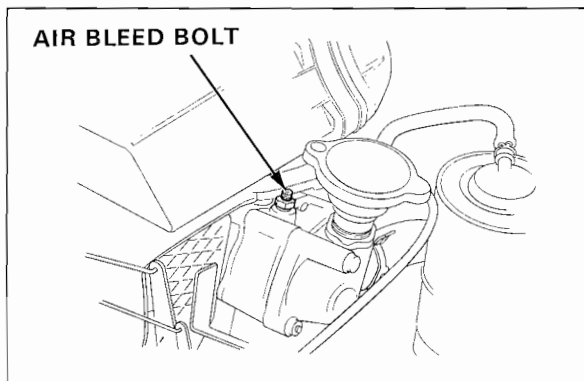
#### **⚠ WARNING**

- Never remove the radiator cap when the engine is hot. The coolant is under pressure and severe scalding could result. Allow the engine and radiator to cool completely before draining. Drain the coolant into a suitable container. Keep coolant away from children and pets.

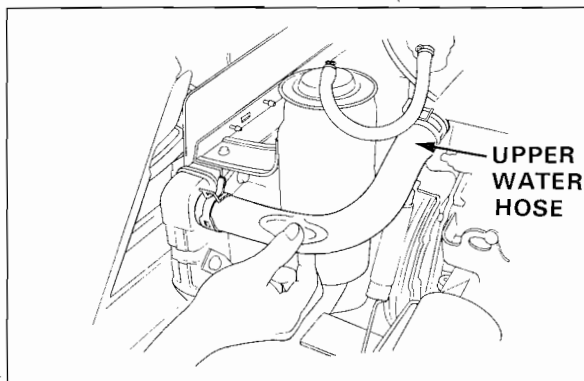
1. Open the engine hood and remove the radiator cap and loosen the coolant drain plug, and drain the coolant into a suitable container.
2. Remove and empty the reserve tank. Then reinstall the tank.
3. Reinstall the drain plug and tighten it securely.



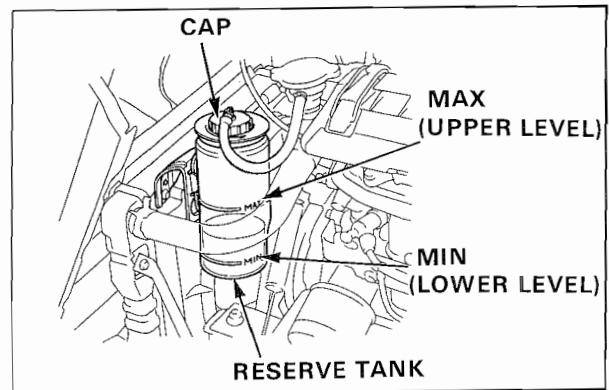
4. Loosen the air-bleed bolt at the side of the cylinder head ; this will allow air to escape when the cooling system is filled. Pour coolant into the radiator until the coolant level reaches the filler opening. Tighten the air-bleed bolt as soon as coolant starts to run out in a steady stream, without bubbles.



5. Put the radiator cap on the filler opening without tightening. Start the engine and let it run until warmed up (upper water hose becomes warm).



6. Stop the engine and remove the radiator cap. Check the coolant level and refill if necessary. Fill the reserve tank to the MAX mark.
7. Install the radiator cap without tightening, and restart the engine. Run the engine for a few minutes, then check the coolant level and add coolant if necessary. Repeat this procedure until the coolant level becomes stable.
8. Tighten the radiator cap.

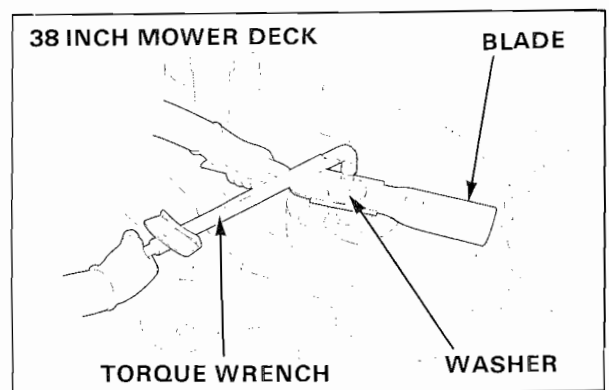


## BLADE AND BLADE BOLTS

1. Remove the mower deck (P. 11-2) and turn it upside-down.
2. Loosen the blade bolts and remove the blades.
3. Check the blade for wear or damage. See page 11-5.

### CAUTION

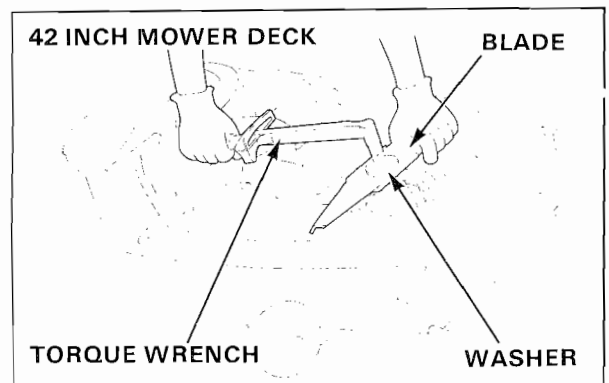
- Blade balance is critical to proper mower deck performance. Replace any blade that is damaged or out of balance.
- Use only a genuine HONDA replacement blade.



4. Clean off any dirt or grass from around the blade shaft and inside the deck.
5. Install the blade. Tighten the bolts securely and install the mower deck. Blade bolt tightening torque : 60 N.m (6.0 kg-m, 43ft-lb)

### CAUTION

- Be sure the blade is properly aligned with the blade holder before tightening the blade bolt. Do not allow the blade to overlap the edge of the holder.
- Install the washer with the side marked "INSIDE" facing the blade.
- The blade bolt and washer are specially designed for this application and must not be replaced with any other bolt or washer.





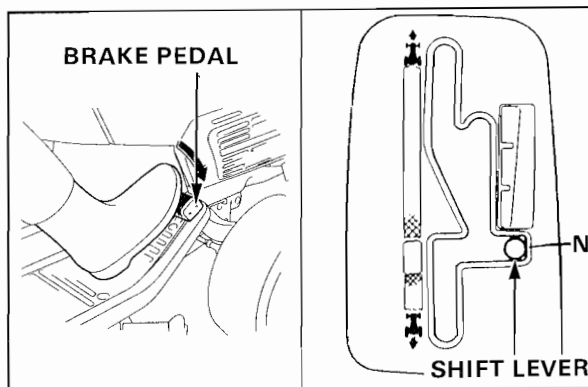
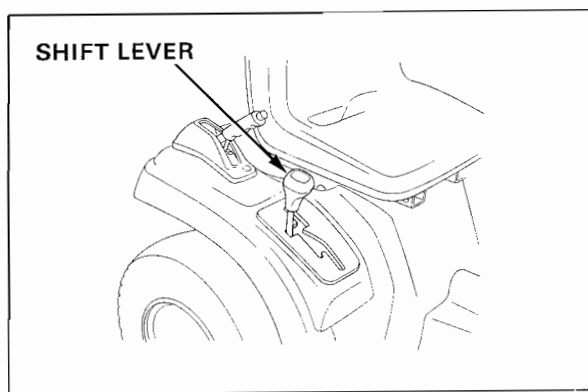
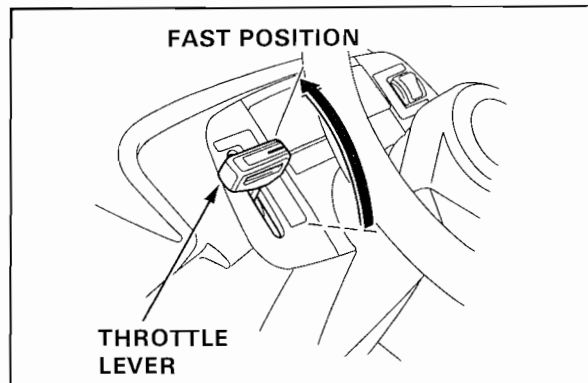
### SHIFT LEVER LINKAGE INSPECTION AND ADJUSTMENT

Park the tractor on a LEVEL surface and Set the parking brake.  
Sit in the seat, and start the engine.

#### **▲WARNING**

- Before inspecting, be sure that the area in front of and behind the tractor is clear of people, pets, and obstacles.

1. Move the throttle to the "FAST" position. With the shift lever in the NEUTRAL position, release the parking brake. The tractor should not move or creep.  
If the tractor moves, adjust the shift rod length. (P. 3-12)
2. Move the shift lever into the mowing range, then slowly return it to the NEUTRAL position. The tractor should come to a stop.  
If the tractor does not stop, adjust the shift rod length. (P. 3-12)
3. Move the shift lever into reverse range, then slowly return it to the NEUTRAL position. The tractor should come to a stop.  
If the tractor does not stop, adjust the shift rod length.
4. Stop the engine.
5. The brake pedal and shift lever are interconnected. When the brake pedal is fully depressed, the shift lever should return to the NEUTRAL from the forward or reverse positions.  
If the shift lever has difficulty returning back to NEUTRAL, adjust the following :
  - Return Arm Bracket (P. 3-13)
  - Return Rod "B" (P. 3-14)



### <Shift rod length adjustment>

#### NOTE

- Always perform steps 1-3 of the shift lever linkage inspection before making this adjustment.

1. Park the tractor on a level surface and set the parking brake.
2. Raise the mower deck height adjustment lever to the 4" position.
3. Block the front wheels with wheel chocks as shown.
4. Jack up the rear of the tractor on the right side and remove the rear wheel.

#### NOTE

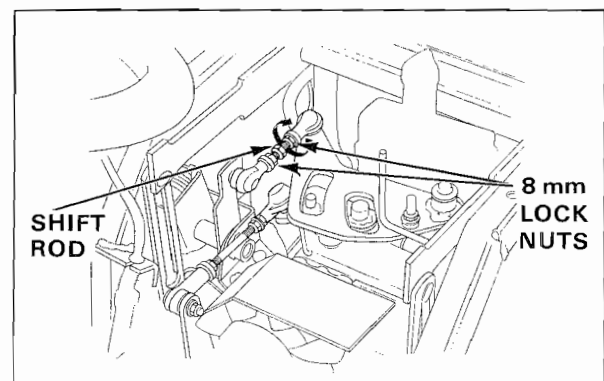
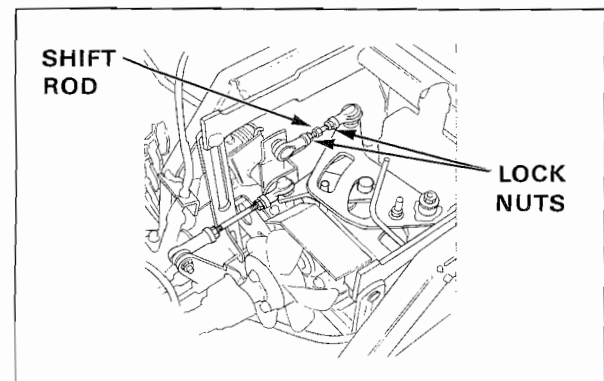
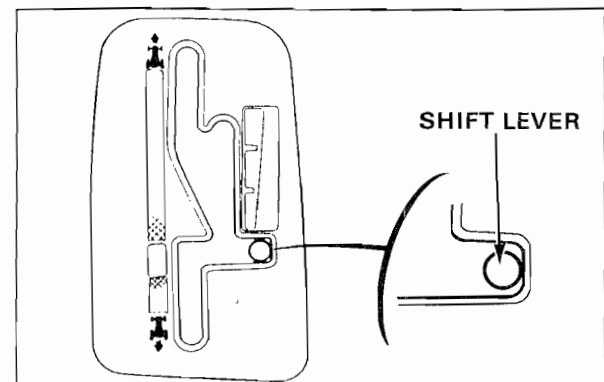
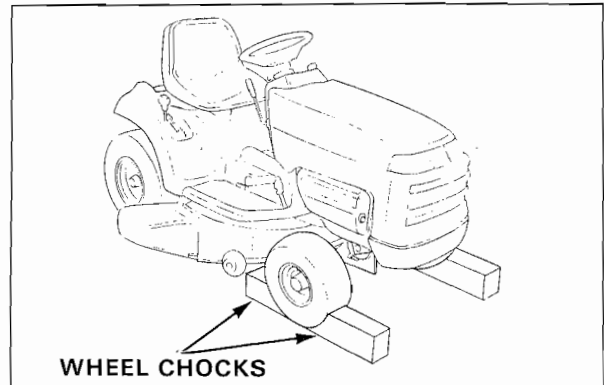
- The left rear wheel must contact the ground.

5. Release the parking brake and place a suitable weight in the seat to activate the seat switch.
6. Move the shift lever to the NEUTRAL position, and center it in the middle of the shift lever guide.
7. Loosen the 8 mm lock nuts on the shift rod.
8. With the transmission release lever engaged and the shift lever centered at NEUTRAL, start the engine.

#### ▲WARNING

- Exhaust gas contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death. **Never run the engine in an enclosed area. Be sure to provide adequate ventilation.**

9. Set the throttle lever midway between the "SLOW" and "FAST" ranges.
10. Rotate the shift rod clockwise until the rear axle starts to move, then rotate the shift rod counterclockwise and note the number of rotations before the axle starts to move in the opposite direction.  
Rotate the shift rod clockwise by half of the recorded rotation number and tighten the 8 mm lock nuts securely.



### <Return arm bracket adjustment>

#### ▲WARNING

- Accidental start-up can cause serious injury. Remove the ignition key and the spark plug caps before proceeding.

#### NOTE

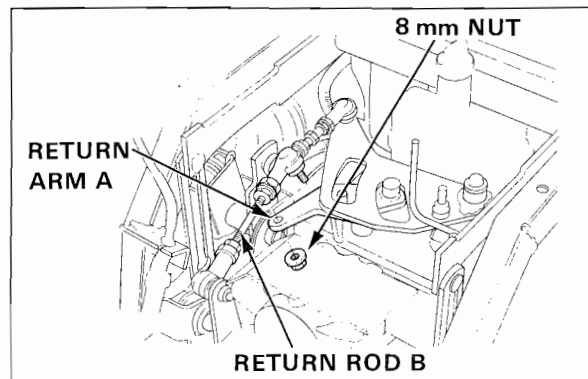
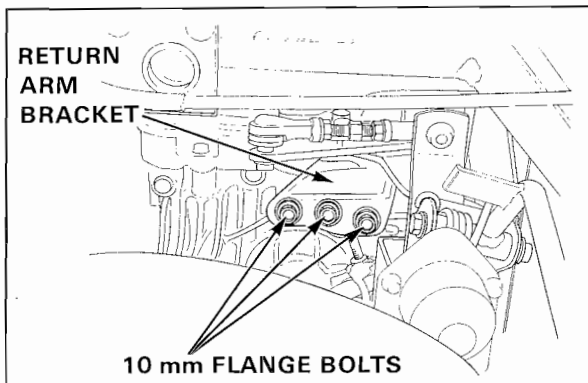
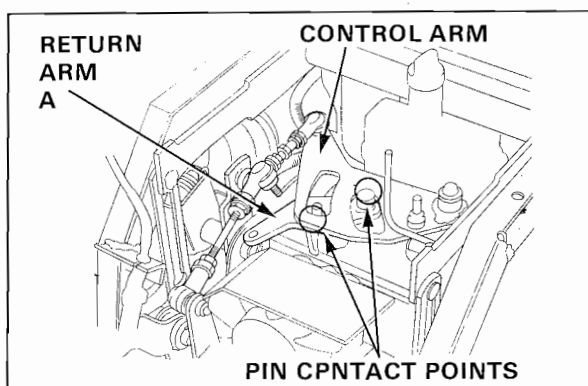
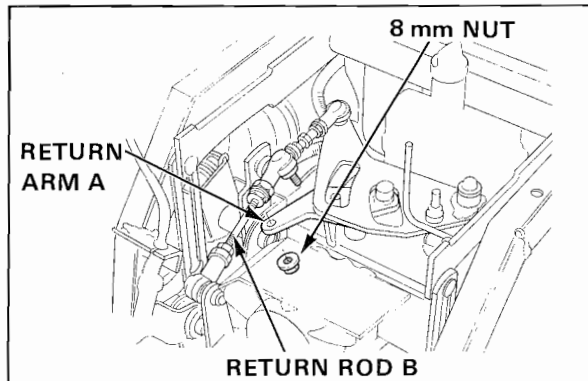
- The rear fender must be installed when making this adjustment.
- Be sure the shift lever is in NEUTRAL and centered in shift guide.

11. Remove the weight from the seat. Tip the seat forward and remove the inspection cover under the seat.
12. Remove the 8 mm self locking nut securing return rod "B" to return arm "A".
13. Rotate the return arm "A" counter-clockwise until the two pins on return arm "A" contacts both ends of the control arm simultaneously.
14. If one or both pins do not contact arm end(s), adjust as follows.

15. Loosen the three 10 mm flange bolts and move the return arm bracket right or left until both pin contact the control arm ends simultaneously. Tighten the three 10 mm flange bolts.

**TORQUE : 40 N·m (4.0 kg-m, 29 ft-lb)**

16. After adjustment, install return rod "B" onto return arm "A" and tighten the nut securely.



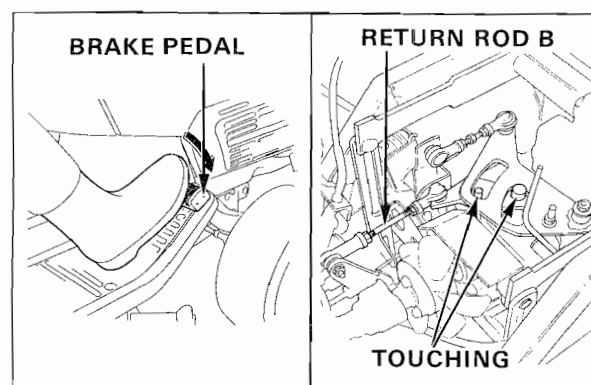
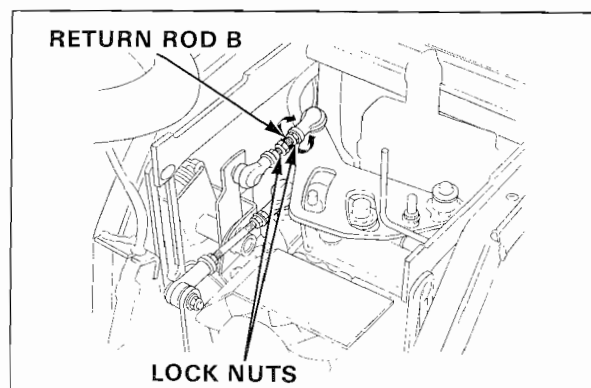
### < Return rod "B" adjustment >

17. Loosen the 8 mm lock nuts at both ends of return rod "B".  
Lengthen the return rod two full turns.
18. Push the brake pedal all the way down and adjust return rod "B" until the two pins just touch the control arm ends.  
Tighten the two 8 mm lock nut securely.
19. Reinstall the right rear wheel. Tighten the axle nut and install a new cotter pin.

#### TORQUE :

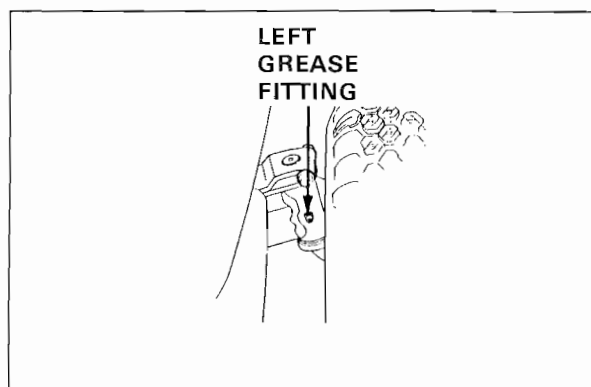
Rear axle nut : 60 N·m (6.0 kg-m, 43 ft-lb)

20. Reinstall the inspection cover.
21. Sit in the seat and move the shift lever into the MOWING position. Slowly depress the brake pedal, the shift lever should return to NEUTRAL.  
Move the shift lever to REVERSE, again, slowly depress the brake pedal, the shift lever should return to NEUTRAL.



## FRONT AXLE

Pump grease the two grease fittings (left and right) once a year or every 100 hours of operation, whichever comes first.



### SPARK PLUG

1. Open the engine hood and remove the spark plug caps.
2. Clean any dirt from around the spark plug bases.
3. Use a spark plug wrench to remove the spark plugs.
4. Visually inspect the spark plug. Discard the plugs if the insulator are cracked or chipped.
5. Remove carbon or other deposits with a stiff wire brush.
6. Measure the plug gap with a wire-type feeler gauge.

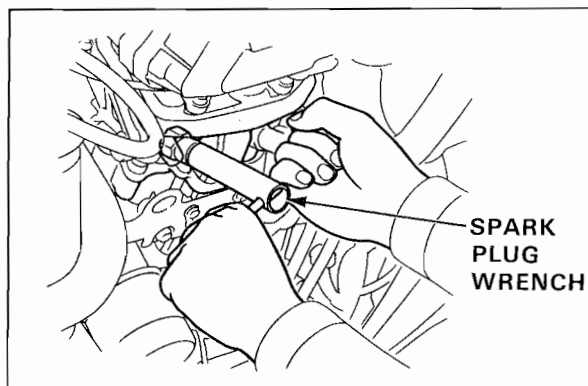
Spark plug gap	0.6–0.7mm (0.024–0.028 in)
----------------	----------------------------

Recommended spark plug	BPR4HS (NGK) W14FPR-UL (ND)
------------------------	--------------------------------

- If necessary, adjust the gap by bending the side electrode.
7. Make sure the sealing washer is in good condition.
  8. Install the plug fingertight to seat the washer, then tighten with a plug wrench (an additional 1/2 turn if a new plug) to compress the sealing washer. If you are reusing a plug, tighten 1/8–1/4 turn after the plug seats.

#### CAUTION

- The spark plug must be securely tightened. An improperly tightened plug can become very hot and possibly damage the engine.
- Never use spark plug with an improper heat range.



0.6–0.7 mm(0.024–0.028 in)



### SPARK ARRESTOR (OPTIONAL)

If the lawn tractor is equipped with an optional spark arrester, the following maintenance must be performed at the interval indicated in the maintenance schedule (P. 2–46).

#### CAUTION

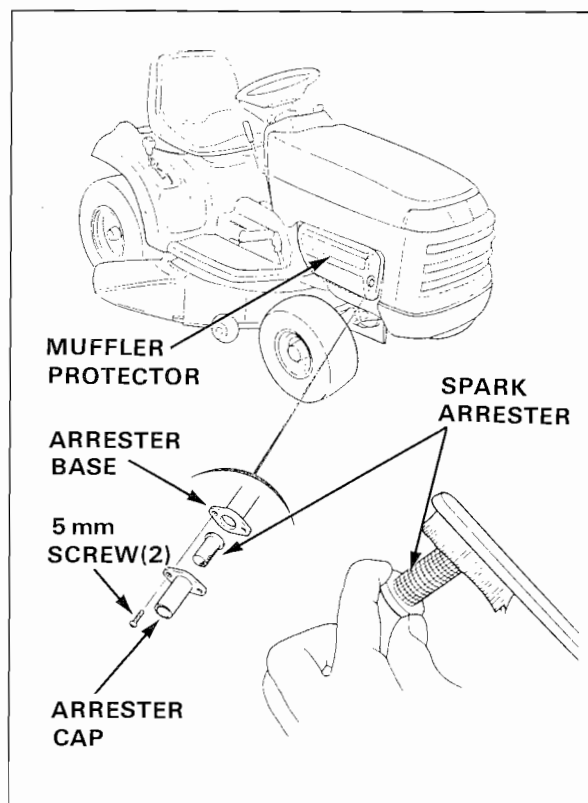
- If the lawn tractor has been running, the muffler will be hot. Allow it to cool before proceeding.

1. Remove the four 6 mm bolts and remove the muffler protector.
2. Remove the two 5mm screws from the arrester cap. Remove the arrester cap and spark arrester (be careful not to damage the spark arrester screen).
3. Use a wire brush to remove carbon deposits from the spark arrester screen.

#### NOTE

- Inspect the spark arrester screen for breaks or tears. Replace if necessary.

4. Reinstall the parts in the reverse order of disassembly.



## HYDROSTATIC TRANSMISSION FLUID

Check the transmission fluid with the lawn tractor parked on level ground and the transmission at ambient temperature.

### NOTE

- HST fluid changes its volume with changes of temperature. The dipstick is calibrated for HST fluid temperatures from 32°F (0°C) to 68°F (20°C). Within this temperature range the oil level should be between the upper and lower marks on the dipstick.

If the fluid temperature is below 32°F, the dip stick may not reach the transmission fluid. To measure the level, start the engine and warm the transmission fluid.

If the fluid temperature is above 68°F, the level may be above the upper mark on the dipstick. This is normal and does not indicate a problem.

### CAUTION

- The use of any other type of hydrostatic fluid or transmission fluid will drastically reduce the transmission's performance. To avoid damaging the transmission, use only HONDA HYDROSTATIC TRANSMISSION FLUID.

### INSPECTION

#### NOTE

- Always check the transmission fluid level when the transmission is COLD, to avoid over filling the transmission.

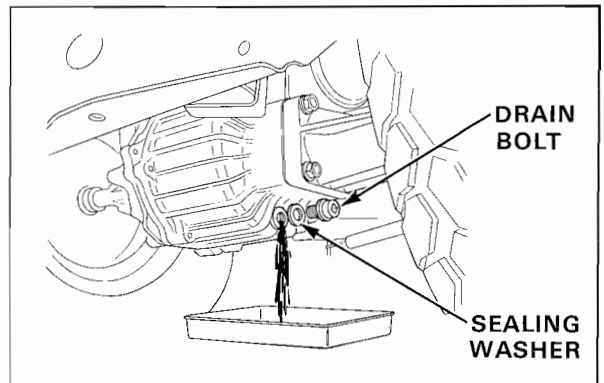
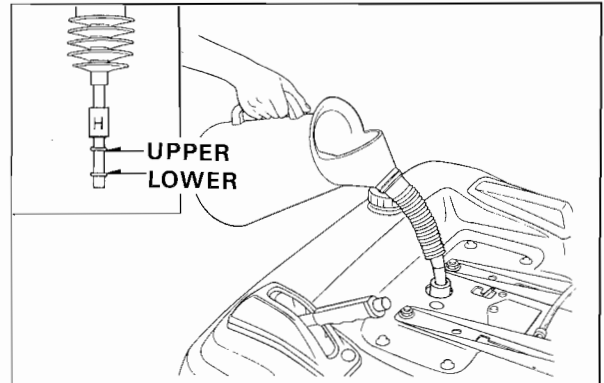
1. Place the lawn tractor on a level surface and set the parking brake.
2. Lift the seat up and clean off any dirt around the dipstick area.
3. Remove the dipstick and check the fluid level. The should be between the "UPPER" and the "LOWER" marks. If the fluid is below the "LOWER" mark, add the recommended fluid until it reaches the "UPPER" mark. DO NOT OVER FILL THE TRANSMISSION.

Recommended fluid	HONDA HYDROSTATIC TRANSMISSION FLUID
-------------------	--------------------------------------

### REPLACEMENT

1. Place the lawn tractor on a level surface and set the parking brake.
2. Lift the seat up and clean off any dirt around the dipstick area.
3. Remove the dipstick and place an oil pan under the transmission.
4. Remove the drain bolt and allow the fluid to drain completely.
5. Install the drain bolt and tighten it securely.  
**TORQUE : 25 N·m (2.5 kg-m, 18 ft-lb)**
6. Refill the transmission with new fluid until the fluid reaches the "UPPER" mark on the dipstick.

Fluid capacity	5.0 l (5.28 US qt)
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## FUEL TANK AND FUEL LINES

### ⚠ WARNING

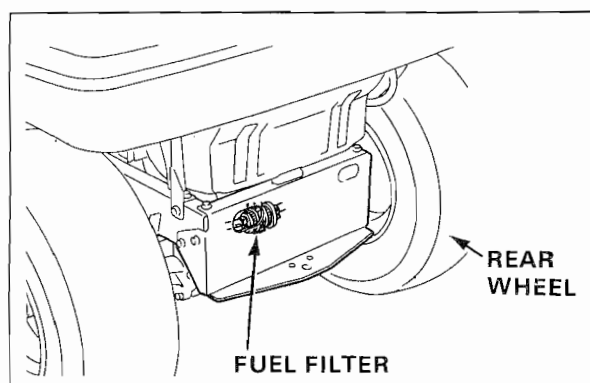
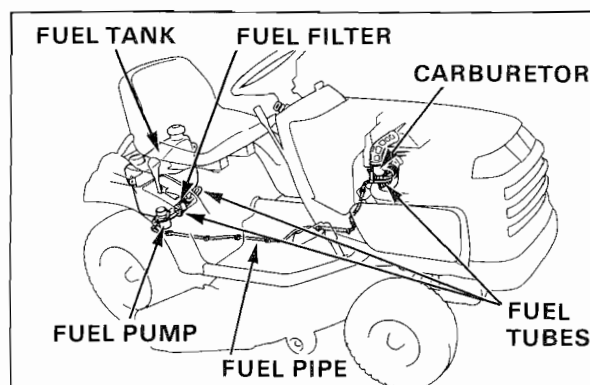
- Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in the area.

1. Drain the fuel from the fuel tank into an approved container, and then remove the fuel tank.
2. Clean the fuel tank thoroughly with solvent.
3. Check the fuel lines for deterioration, cracks or signs of leakage. Replace if necessary (P. 6—6).

### ⚠ WARNING

- Do not smoke while working on the fuel system. Keep open flames away from work area.

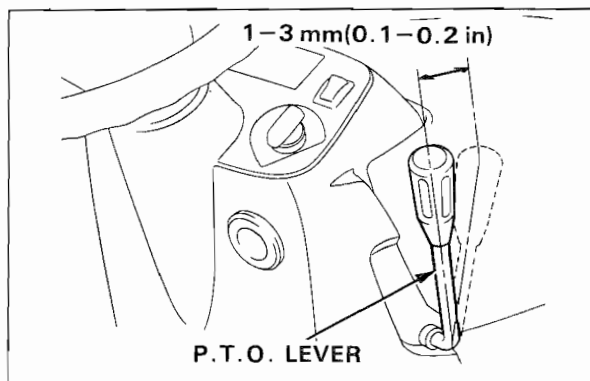
1. Drain the fuel from the fuel tank into an approved container, and then remove the fuel tank.
2. Remove the fuel filter by pulling it out of its clip under the fuel tank and visually inspect it through the opening in the hitch plate.
3. Replace the filter if it is contaminated with dirt or water.



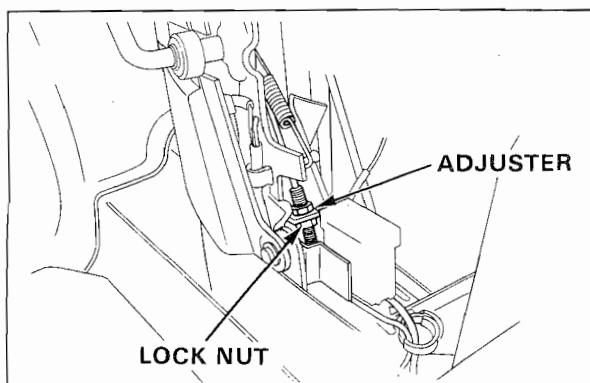
## P.T.O. CLUTCH

1. Measure the free play at the top of the P. T. O. clutch lever. It should be 1—3 mm (0.04—0.1 in).

Free play	1—3 mm (0.04—0.1 in)
-----------	----------------------



2. To adjust the free play, loosen the lock nut and turn the adjuster.





### THROTTLE CABLE

Cable length adjustment :

Move the throttle lever all the way to the FAST position.

NOTE

- Do not place the throttle lever in the choke position.

Align the throttle cable end with the cable clamp lower edge by loosening the clamp attaching screw.

Tighten the screw securely.

Loosen the lock nut and adjust the cable length by turning the adjusting nut.

Adjust the cable length until the throttle arm just touches the choke arm.

Tighten the lock nut.

After adjusting the throttle cable length, start the engine and check the standard maximum speed when positioning the throttle lever at FAST.

#### STANDARD MAXIMUM SPEED

3,300  $\frac{0}{100}$  rpm

NOTE

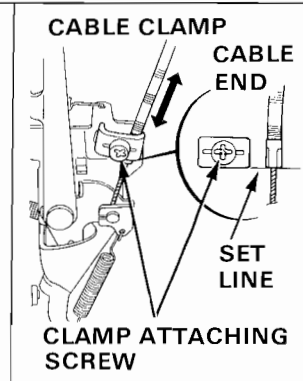
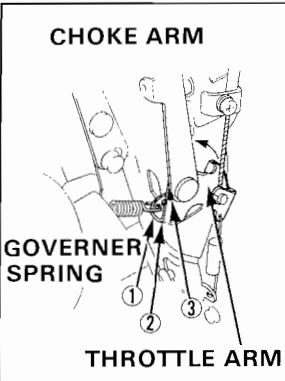
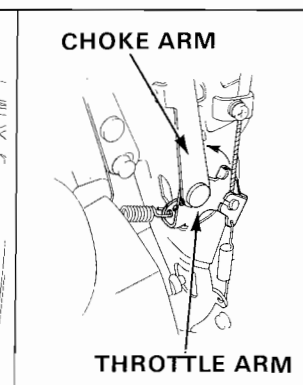
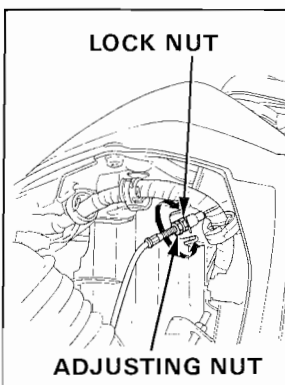
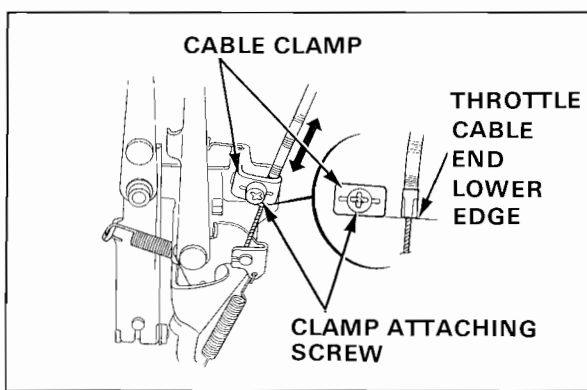
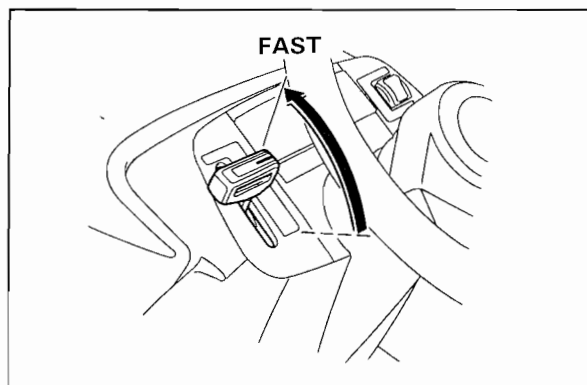
- Move the throttle lever all the way from SLOW position to the FAST position.

If the engine rpm is higher than the standard maximum speed :

1. Change the governor spring hook position on the throttle arm, # 3 (high speed side) # 2-# 1 (low speed side)

If none of spring positions produce the correct maximum speed. Readjust the throttle cable end by loosening the attaching screw and moving the cable up or down. Retighten the screw after adjusting.

- 1) If the engine rpm is HIGHER than the standard maximum speed in the # 1 spring hook position, move the cable end DOWN 1-2 mm (0.04-0.08 in) from the set line.
- 2) If the engine rpm is LOWER than the standard maximum speed in the # 3 spring hook position, move the cable end UP 1-2 mm (0.04-0.08 in) from the set line.



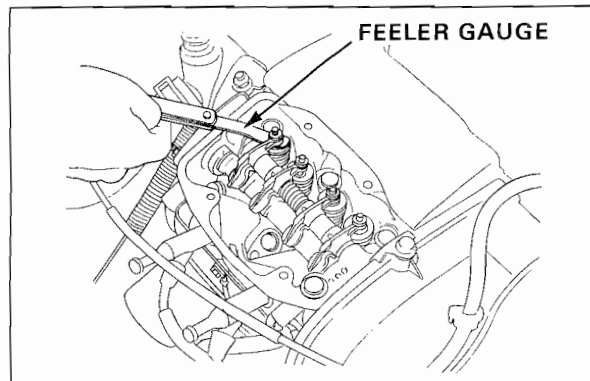
### VALVE CLEARANCE

Valve clearance inspection and adjustment must be performed with the engine cold.

#### INSPECTION

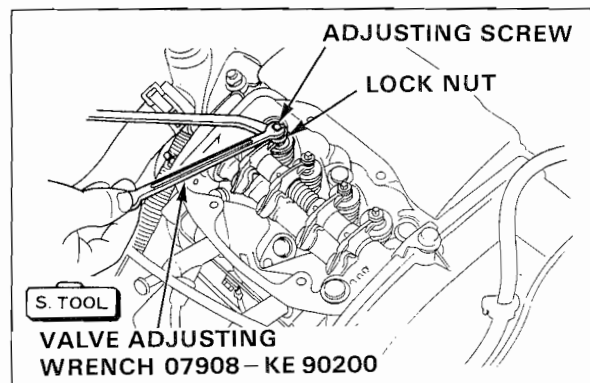
1. Lift the hood and remove the air filter housing (P. 6-3).
2. Remove the cylinder head cover and both spark plugs.
3. Rotate the crankshaft (by turning the cooling fan) until one of the pistons is at top dead center of its compression stroke (both valves closed).
4. Check intake and exhaust valve clearance for the cylinder that is at top dead center of its compression stroke by inserting a feeler gauge between the valve stem and the adjusting screw on the rocker arm.
5. Crank the engine over 360° to put the other cylinder at top dead center of its compression stroke, then check intake and exhaust valve clearance for that cylinder.

Standard valve clearance	IN: 0.10–0.14 mm (0.004–0.006 in) EX: 0.18–0.22 mm (0.007–0.009 in)
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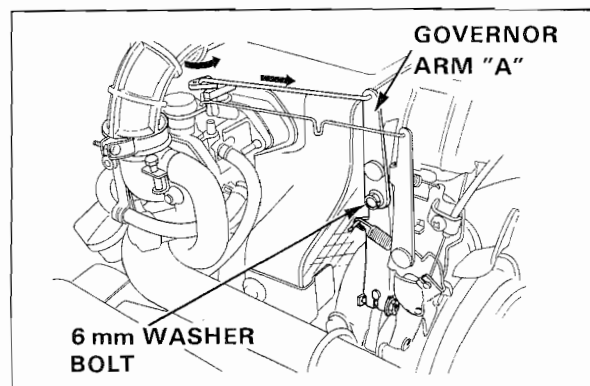
#### ADJUSTMENT

1. With the cylinder at top dead center of its compression stroke, loosen the adjusting screw lock nut, and turn the adjusting screw to obtain the specified intake and exhaust valve clearance.
2. Hold the adjusting screw, and tighten the lock nut.
3. Recheck valve clearance after tightening the lock nut.



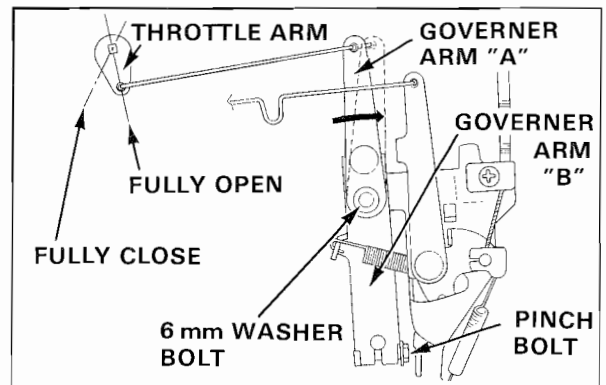
### GOVERNOR

1. Move the throttle lever all the way to the FAST position.
2. Slightly loosen the 6mm washer bolt on governor arm "A".



3. Move the top of governor arm "A" away from the carburetor so that the throttle arm is in the carburetor throttle valve fully open position. Hold the governor arm "B" by hand then tighten the 6mm washer bolt to the specified torque.

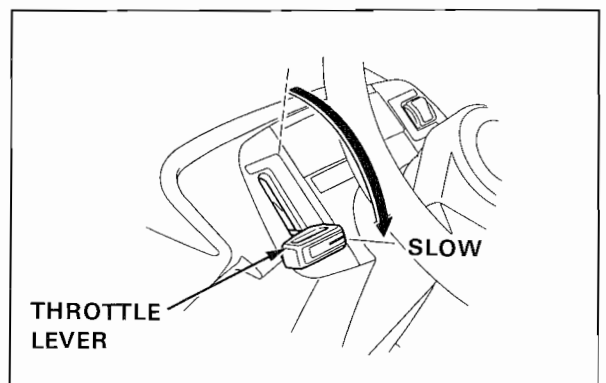
**TORQUE : 10 N·m (1.0 kg-m, 7 ft-lb)**



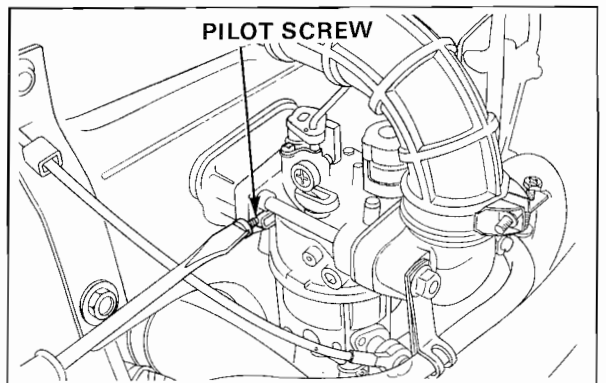
4. Move the throttle lever all the way from the SLOW position to the FAST position. Be sure that the throttle arm on the carburetor goes from fully closed to fully open.

### CARBURETOR (IDLE SPEED)

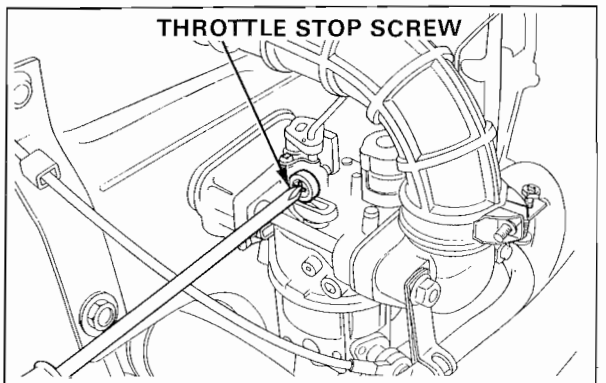
1. Start the engine and allow it to warm up to normal operating temperature. (Approx. 10minutes)
2. Move the throttle lever to the SLOW position.



3. With the engine idling, turn the pilot screw in or out to the setting that produces the highest idle rpm. The correct setting will usually be approximately 1 + 1/4 turns out from the fully closed position.



4. After the pilot screw is correctly adjusted, attach a tachometer to the engine and turn the throttle stop screw to obtain the standard idle speed.



Standard idle speed	1,300 $\pm$ $\frac{200}{0}$ rpm
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Recheck the mixture setting.

### MOWER DECK HEIGHT ADJUSTMENT

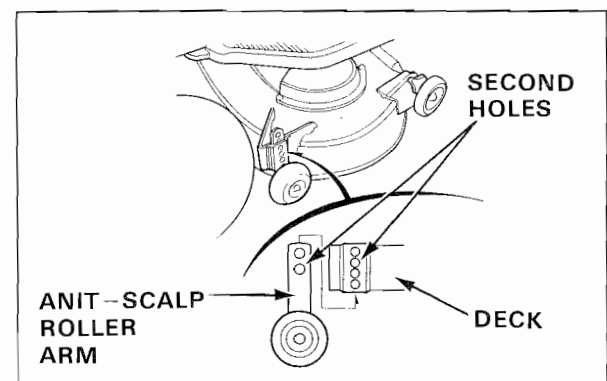
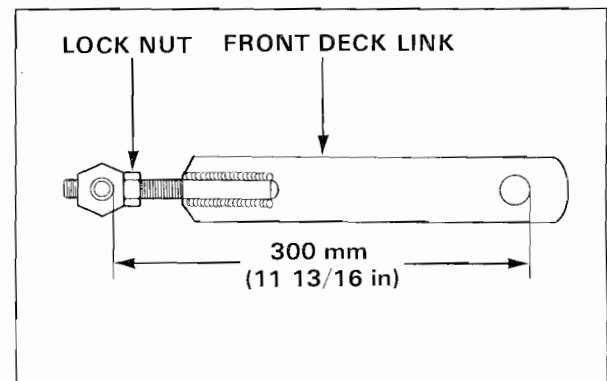
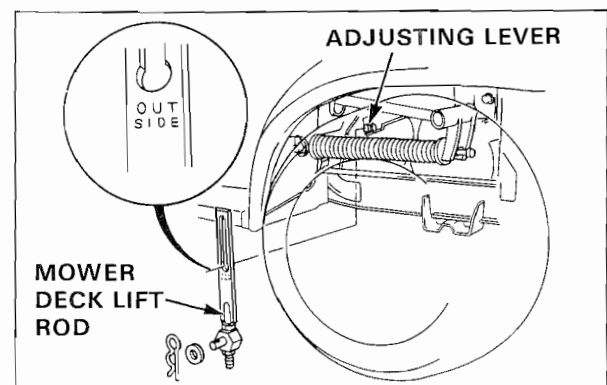
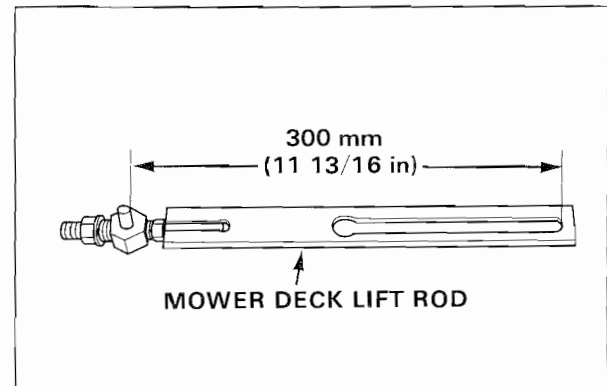
#### 38" Mower Deck

1. Park the riding mower on a firm, flat, level surface.

#### ▲WARNING

• Accidental start-up can cause serious injury. Remove the ignition key and the spark plug caps before proceeding.

2. Remove the mower deck (Removal P. 11-2).
3. Inspect the blade condition (P. 11-5).
4. Lower the height adjusting lever and remove the mower deck lift rods.
5. Loosen the lock nuts and adjust the lift rods to measure 300 mm (11 13/16 in) as shown.
6. Tighten the lock nuts and reinstall the mower deck lift rods as shown.
7. Remove the front deck links from the front of the tractor.
8. Loosen the lock nuts and adjust the right or left front deck link to measure 300 mm (11 13/16 in) as shown.
9. Reinstall the front deck links on the tractor.
10. Reinstall the mower deck (Installation P. 11-2).
11. Set the height adjusting lever to the 2" position.
12. Check the tire pressure and adjust as necessary.  
FRONT : 1.0 kg/cm<sup>2</sup>, (14 psi)  
REAR : 0.8 kg/cm<sup>2</sup>, (11 psi)
13. Remove the side discharge chute.
14. Adjust the front anti-scalp roller arms by aligning the second hole on the arm with the second hole on the deck.



# HONDA

## H4514H

15. Prepare the Blade Height Gauge Tool (T/N 07JPJ-750010A) for use as shown. Roll a piece of the modeling clay (provided) or an equivalent to size, and press it into the gauge's calibrated channel.

### CAUTION

- The blades are sharp and may cause injury. Wear heavy gloves to protect your hands.

16. Rotate the left and right blades so the tips align with points "B" and "C" as shown.
  17. Check the blades for trueness at points "B" and "C" with the Blade Height Gauge Tool. Set the tool upright under the mower deck with its base flat on the floor; slide it towards the blades until the outer tip of the cutting edge marks the clay.
- Rotate the blades 180° and compare the other end of the blades with the mark in the clay, there should be no difference.

### NOTE

- It is important to compare the blades at the same reference point on the deck. If the blades are bent, replace them before making any adjustments.

### • Side-to-Side Adjustment

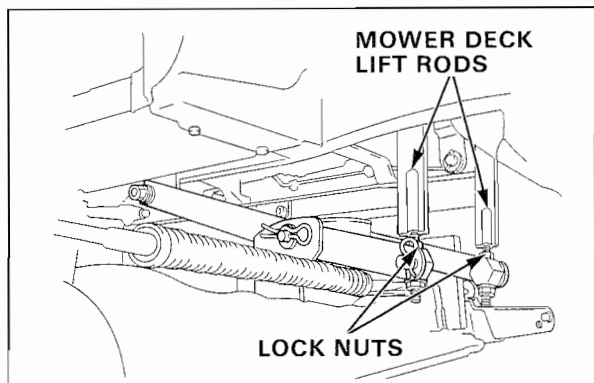
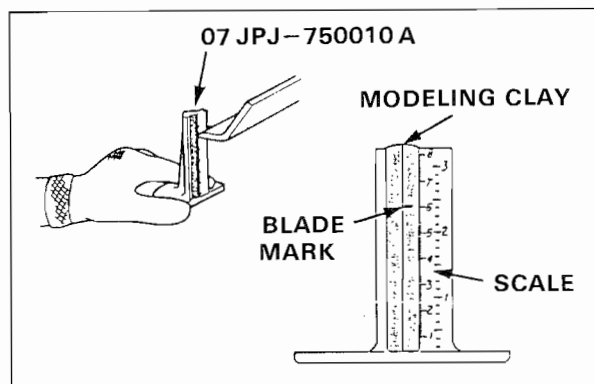
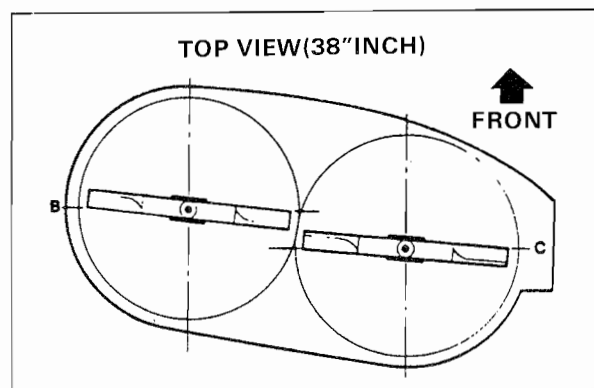
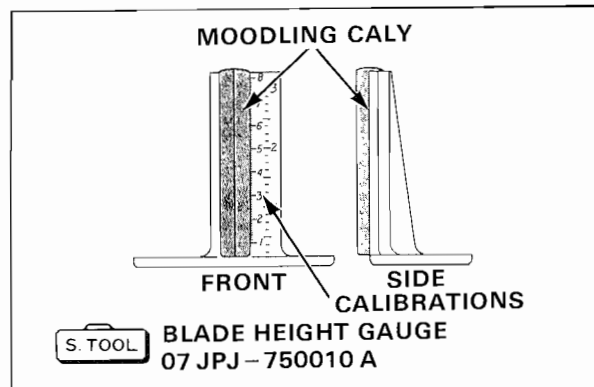
### NOTE

- The anti-scalp rolls should not be contacting the ground when making blade height adjustments.

18. Using the Blade Height Gauge Tool's calibrated scale, measure the distance from the cutting edge of the blade to the ground at points "B" and "C". Point "C" should be 0-5 mm (0-7/32 in) higher than point "B".

19. If adjustment is necessary, loosen the lock nuts on the mower deck lift rods and adjust the self-locking nut as needed to obtain the side-to-side measurement. After adjustments are made, be sure there is no free play between the front deck links and the mounting pins. Tighten the lock nut.

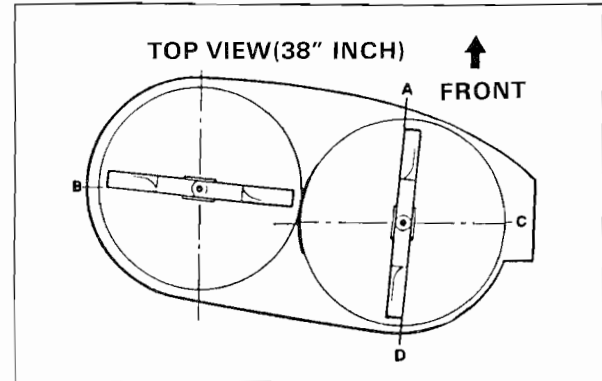
**TORQUE : 35 N·m (3.5 kg-m, 25 ft-lb)**



### ● Front-to-Back Adjustment

20. Rotate the right blade 90° to align the tips with points "A" and "D" as shown. Measure the blade height at points "A" and "D". Point "D" should be 6-10 mm (15/64-13/32 in) higher than point "A".

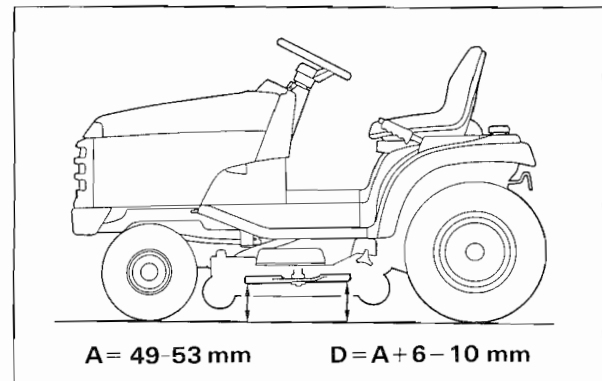
If adjustment is necessary, turn both of the front deck links equal amounts in or out to obtain the blade tilt measurement. After adjustments are made, be sure there is no free play between the front links and the mounting pins.



21. Measure the blade height at point "A". The blade height should be 49-53 mm (1.93-2.09 in).

If adjustment is necessary, turn the mower deck lift rods self-locking nuts equal amounts in or out to obtain the measurement at point "A".

22. After making the adjustments at point "A", recheck point "D" to be sure the blade tilt is still correct and that the front deck links have no free-play.
23. Rotate the blades back to "B" and "C" and check to be sure the side-to-side adjustment is still correct. After all adjustments are made, tighten all the adjusting hardware.
24. Install the side discharge chute.



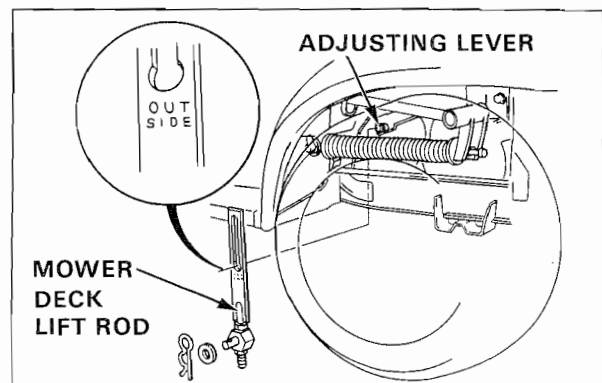
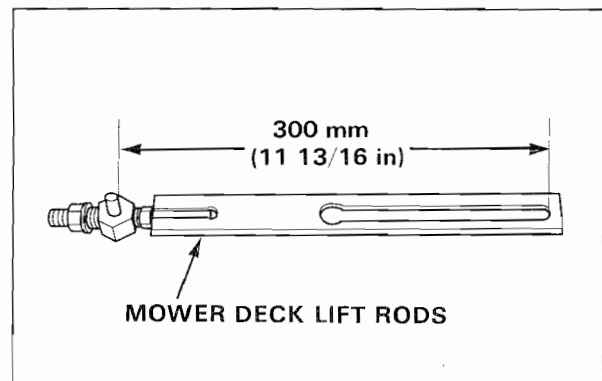
### 42" Mower Deck

1. Park the tractor on a firm, level surface and set the parking brake.

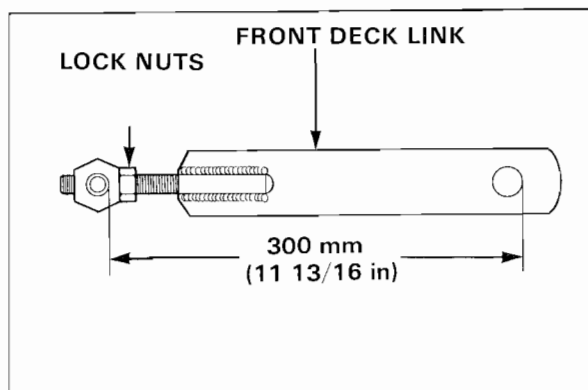
#### ⚠ WARNING

• Accidental start-up can cause serious injury. Remove the ignition key and the spark plug caps before proceeding.

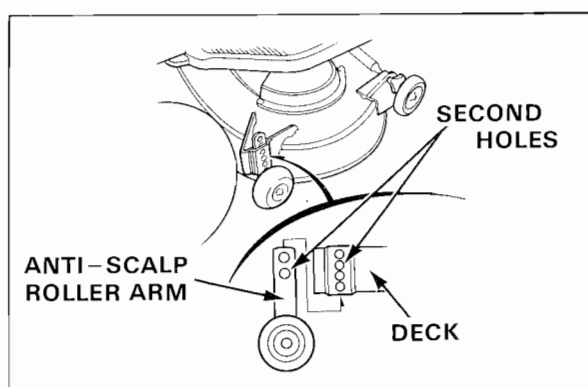
2. Remove the mower deck (Removal P. 11-2).
3. Inspect the blade condition (P. 11-5).
4. Lower the height adjusting lever and remove the mower deck lift rods.
5. Loosen the lock nuts and adjust the lift rods to measure 300 mm (11 13/16 in) as shown.
6. Tighten the lock nuts and reinstall the mower deck lift rods as shown.



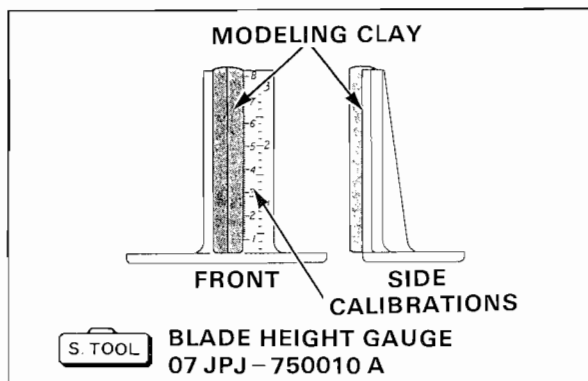
7. Remove the front deck links from the front of the tractor.
8. Loosen the lock nuts and adjust the front deck links to measure 300 mm (11 13/16 in) as shown.
9. Reinstall the front deck links on the tractor.
10. Reinstall the mower deck (Installation P. 11-2).
11. Set the height adjusting lever to the 2" position.
12. Check the tire pressure and adjust as necessary.  
FRONT : 1.0kg/cm<sup>2</sup>, (14 psi)  
REAR : 0.8kg/cm<sup>2</sup>, (11 psi)
13. Remove the side discharge chute.



14. Adjust the front anti-scalp roller arms by aligning the second hole on the arm with the second hole on the deck.



15. Prepare the Blade Height Gauge Tool (07JPJ-750010A) for use as shown. Roll a piece of the modeling clay (provided) or an equivalent to size, and press it into the gauge's calibrated channel.



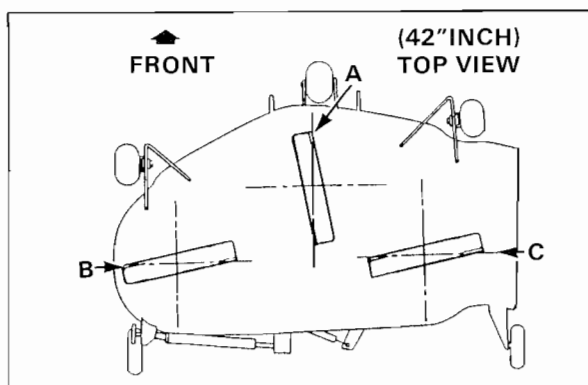
### CAUTION

- The blades are sharp and may cause injury. Wear heavy gloves to protect your hands.

16. Rotate the blades so the tips align with points "A", "B" and "C" as shown.
17. Check the blades for trueness at points "A", "B" and "C" with the Blade Height Gauge Tool. Set the tool upright under the mower deck with its base flat on the floor; slide it towards the blades until the outer tip of the cutting edge marks the clay.  
Rotate the blades 180° and compare the other end of the blades with the mark in the clay, there should be no difference.

### NOTE

- It is important to compare the blades at the same reference point on the deck. If the blades are bent, replace them before making any adjustments.

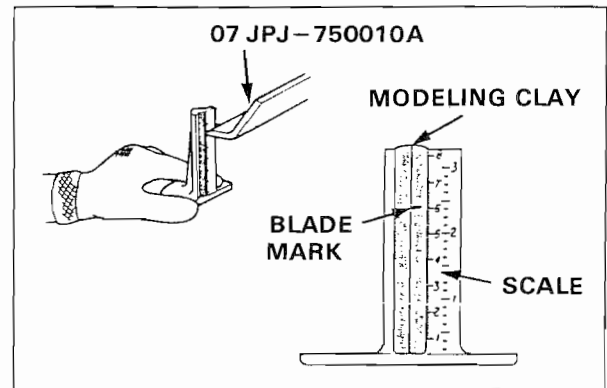


### ● Side-to-Side Adjustment

#### NOTE

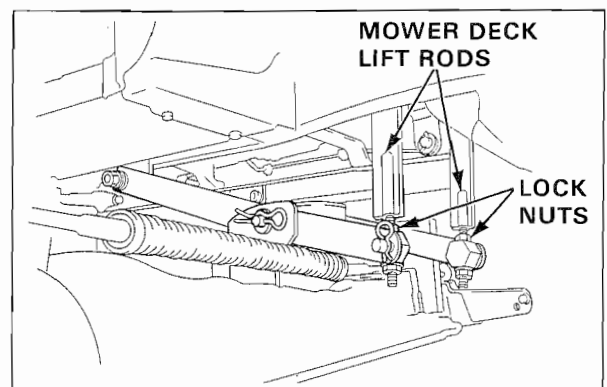
- The anti-scalp rolls should not be connecting the ground when making blade height adjustments.

- Using the Blade Height Gauge Tool's calibrated scale, measure the distance from the cutting edge of the blade to the ground at points "B" and "C". Point "C" should be 0-5 mm (0-7/32 in) higher than point "B".



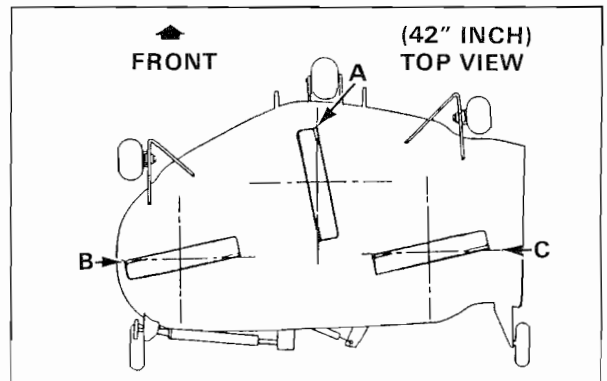
- If adjustment is necessary, loosen the lock nuts on the mower deck lift rods and adjust the self-locking nut as needed to obtain the side-to-side measurement. After adjustments are made, be sure there is no free play between the front deck links and the mounting pins. Tighten the lock nut.

**TORQUE : 35 N·m (3.5 kg-m, 25 ft-lb)**

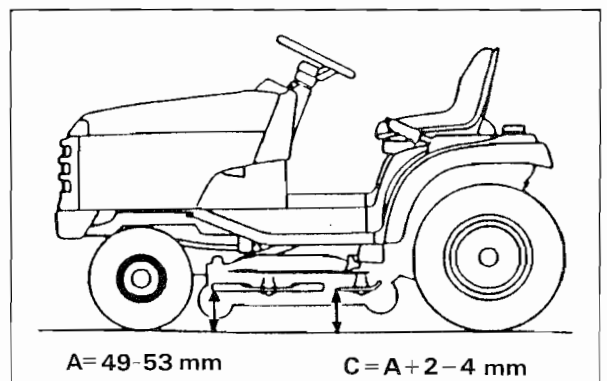


### ● Front-to-Back Adjustment

- Align the center blade with point "A" as shown. Measure the blade height at points "A" and "C". Point "C" should be 2-4 mm (3/32-11/64 in) higher than point "A". If adjustment is necessary, turn both of the front deck links equal amounts in or out to obtain the blade tilt measurement. After adjustments are made, be sure there is no free play between the front links and the mounting pins.



- Measure the blade height at point "A". The blade height should be 49-53 mm (1.93-2.09 in). If adjustment is necessary, turn the mower deck lift rods self-locking nuts equal amounts in or out to obtain the measurement at point "A".
- After making the adjustments at point "A", recheck point "C" to be sure the blade tilt is still correct and that the front deck links have no free-play.
- Rotate the blades back to "B" and "C" and check to be sure the side-to-side adjustment is still correct. After all adjustments are made, tighten all the adjusting hardware.
- Install the side discharge chute.





### INTERLOCK SYSTEM

#### ▲WARNING

- Before inspecting, ensure that the area in front of and behind the lawn tractor is clear of people, pets and obstacles.

This lawn tractor is equipped with the safety interlock system to prevent an accidental engine start.

Check the safety interlock system in the following procedures. To check the system, sit in the seat, and lock the parking brake.

#### a) P. T. O. CLUTCH SWITCH

- 1) Set the parking brake.
- 2) Move the P. T. O. clutch lever to "ON" (Engage) position.
- 3) Move the shift lever to "N" position.
- 4) Turn the combination switch to "START" position and be sure that the starter does not operate.
- 5) Return the combination switch and the P. T. O. clutch lever to "OFF" (Disengage) position.

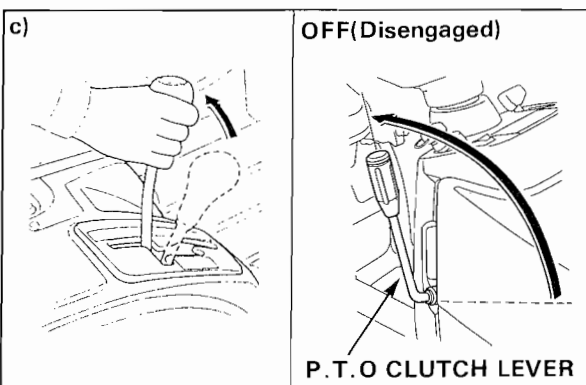
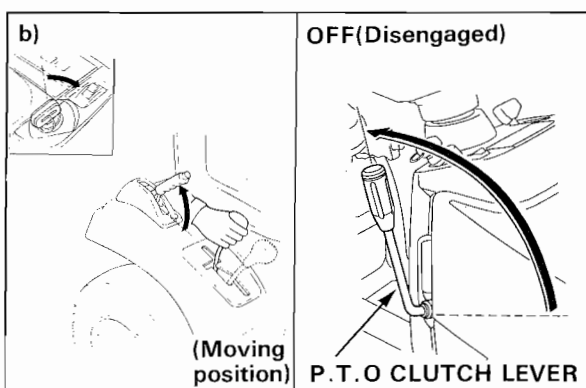
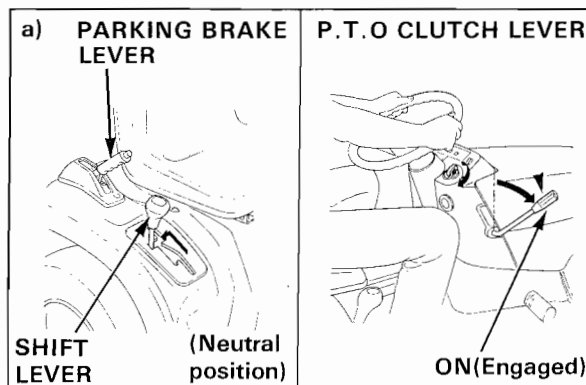
#### b) NEUTRAL SWITCH

- 1) Set the parking brake.
- 2) Move the P. T. O. clutch lever to "OFF".
- 3) Move the shift lever to as shown and keep the lever in this position.
- 4) Turn the combination switch to "START" and be sure that the buzzer sounds and the starter does not operate.
- 5) After confirmation, move the shift lever to "N" and turn the combination switch to "OFF".

#### c) PARKING BRAKE SYSTEM

- 1) Set the parking brake.
- 2) Move the P. T. O. clutch lever to "OFF" position.
- 3) Position the shift lever to N and start the engine.
- 4) Move the shift lever as shown and keep the lever in this position. Engine should stop a few seconds after buzzer sounding.
- 5) After confirmation, move the shift lever to "N" and turn the combination switch to "OFF".

If the interlock system is found to be faulty, check each switch and combination relays. Never operate the lawn tractor with an inoperative safety switch.



### SEAT SWITCH

#### CAUTION

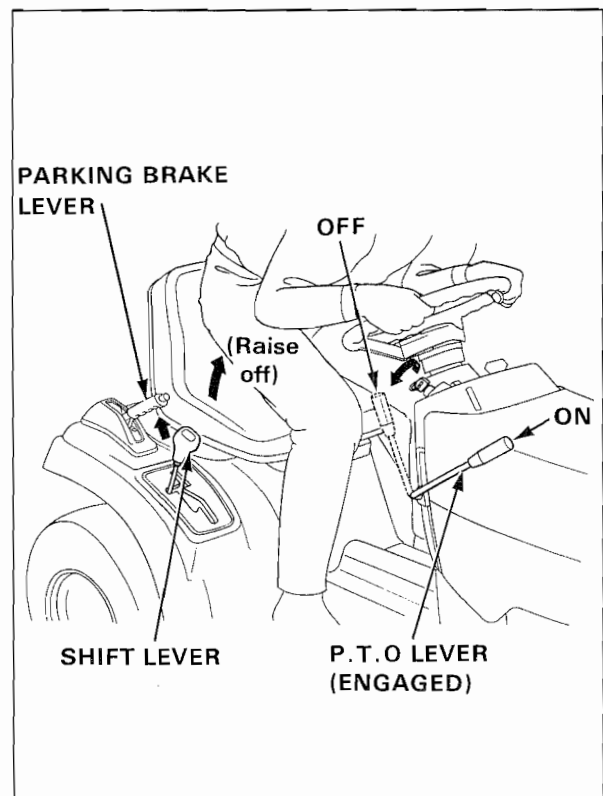
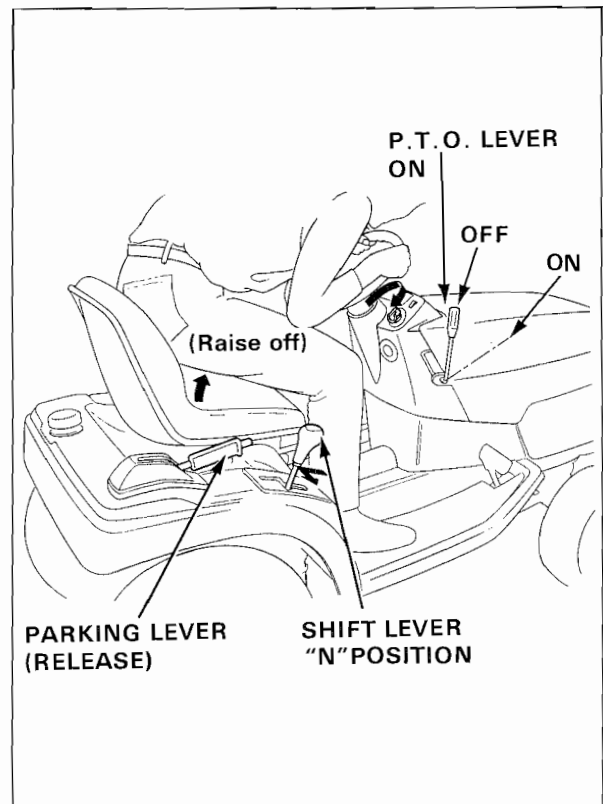
- Perform this check on level ground, never on a slope.

- 1) Move the P. T. O. clutch lever to "OFF".
- 2) Position the shift lever to "N". Release the parking brake lever.
- 3) Start the engine and move the shift lever to "MOWING".
- 4) Rise to your feet slightly to unload your weight from the seat and be sure that the engine stops.
- 5) Start the engine and move the shift lever to "N". Set the parking brake.
- 6) Move the P. T. O. clutch lever to "ON".
- 7) Rise to your feet slightly to unload your weight from the seat and be sure that the engine stops.  
If the engine does not stop, turn the combination switch to "OFF" and perform the following inspections.
  - Seat switch (P. 16-4).
  - Combination relay unit (P. 16-6).
  - P. T. O clutch switch (P. 16-4).
- 8) After confirmation, return the combination switch and the P. T. O. clutch lever to "OFF".

- 9) Move the P. T. O. clutch lever to "OFF".
- 10) Set the parking brake.
- 11) Move the shift lever to "N".
- 12) Start the engine and release the parking brake.
- 13) Rise to your feet slightly to unload your weight from the seat and be sure that the engine stops.  
If the engine does not stop, turn the combination switch to "OFF" and perform the following inspections.
  - Seat switch (P. 16-4).
  - Combination relay unit (P. 16-6).
- 14) After confirmation, turn the combination switch to "OFF" and lock the parking brake.

#### ▲WARNING

- Should the engine fail to stop, immediately turn the ignition switch to OFF, and test the seat switch and combination relay.
- Never operate the lawn tractor with an inoperative seat safety switch.



### MAXIMUM SPEED ADJUSTMENT

#### ▲WARNING

- The maximum speed adjustment is performed by driving the lawn tractor.
- Before proceeding with the inspection, be sure that the area around the lawn tractor is clear of people, pets and obstacles.
- The maximum unloaded speed adjustment requires two people. Have someone assist you during the inspection.

#### NOTE

- The maximum speed adjustment can be performed with the mower deck installed.
- Perform this test on the level ground with paved surface, never on a slope.

Perform the following inspections/adjustments before the maximum speed adjustment.

- Check the tire pressure. Adjust if.  
**Front : 14.0 psi (1.0 kg/cm<sup>2</sup>)**  
**Rear : 11.0 psi (0.8 kg/cm<sup>2</sup>)**
- Check the tires for excessive/abnormal wear.
- Check that the standard rear tires are installed.
- Start the engine and check the maximum engine speed (P. 3-19).

#### MAXIMUM SPEED :

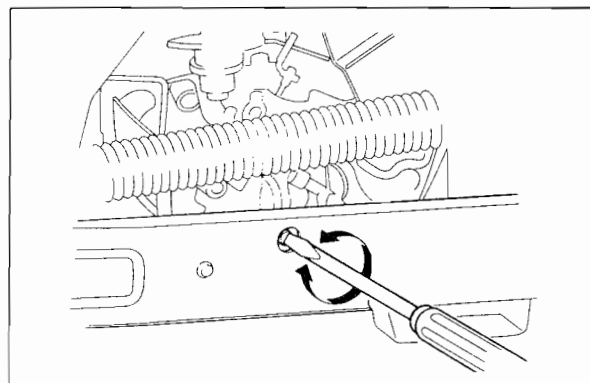
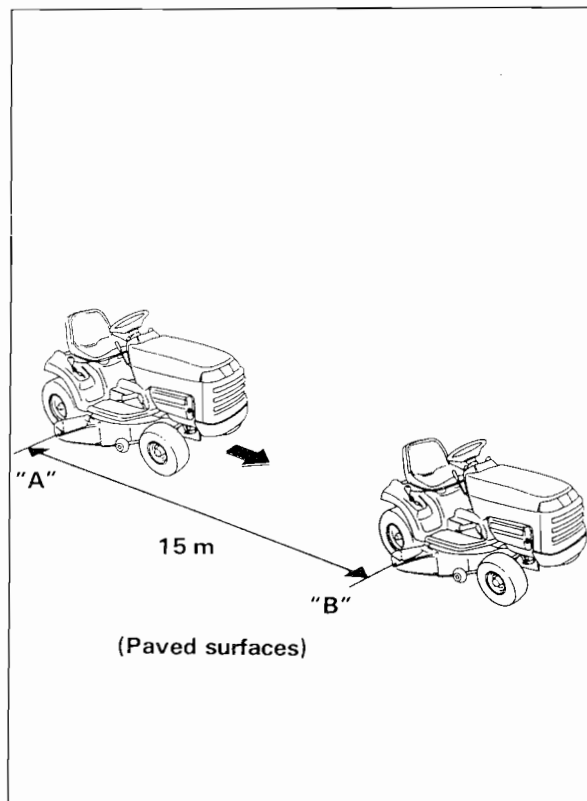
**3,300-<sup>0</sup>/<sub>100</sub> rpm**

- 1) Start the engine.
  - 2) Drive the lawn tractor for 15m (49.2 ft) on a paved surface, two or three times and average the readings.
- Measurement method
- 1) After the center of the rear wheel crosses the start line, measure the time when the center of the rear wheel crosses the 15m (49.2ft) line.
  - 2) To adjust, loosen the 8mm flange nut and turn the 8mm adjusting bolt until the time listed below can be obtained.

#### NOTE

- Turning the adjusting bolt clockwise decreases the speed and turning bolt counterclockwise increases the speed.

Distance	Time
15 m (49.2 ft)	7.0-7.9 sec



NOTE

ENGINE REMOVAL/  
INSTALLATION

**4**

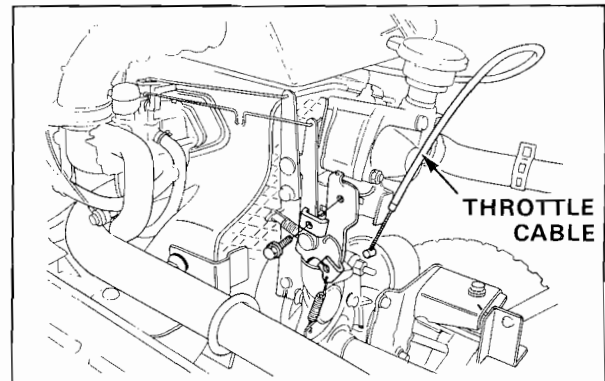
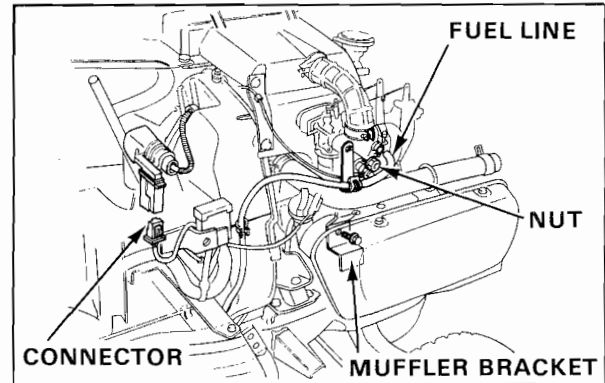
REMOVAL .....	4-2
INSTALLATION .....	4-4

## REMOVAL

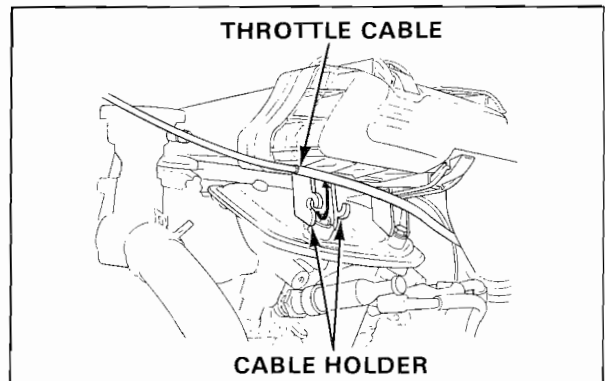
Remove the following items :

- Engine hood (P. 15-2)
- Battery (P. 15-6)
- Radiator and cooling fan (P. 5-2)
- P. T. O. clutch (P. 17-2)
- Steering column cover screws (P. 15-3).
- Front floor mats (P. 15-14)

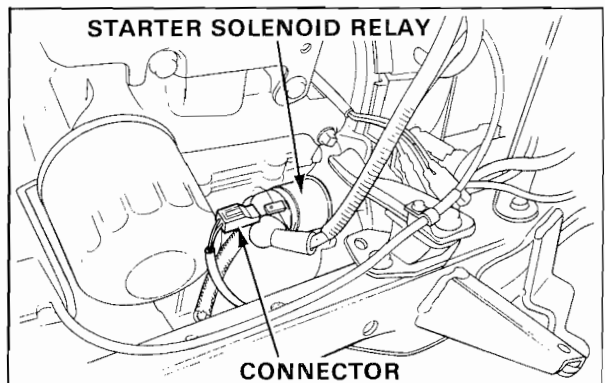
1. Disconnect the 1P connector from the main fuse connector at the positive battery terminal.
2. Disconnect the fuel line and the float bowl vent hose from the carburetor.
3. Remove the muffler bracket bolt (8×20) and nut.
4. Remove the throttle cable from the control plate.



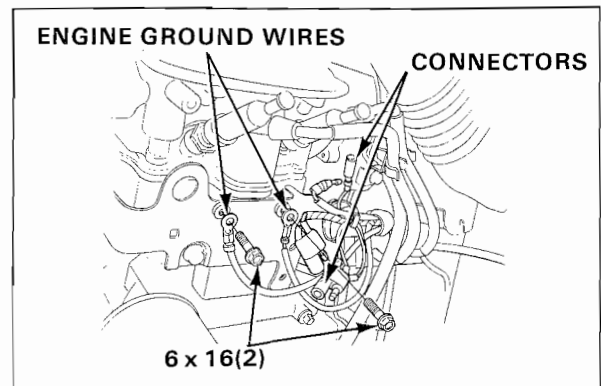
5. Release the throttle cable from the cable holder of the air cleaner case cover.



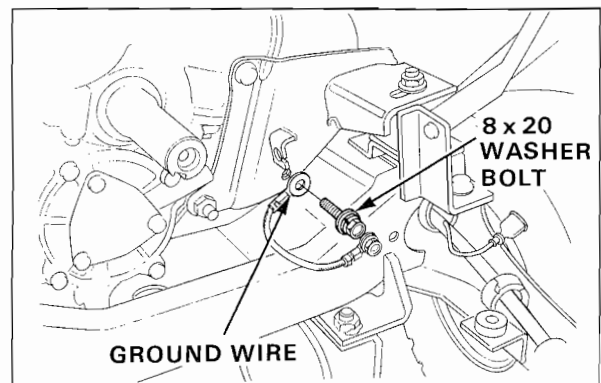
6. Disconnect the relay connector from the starter solenoid relay.



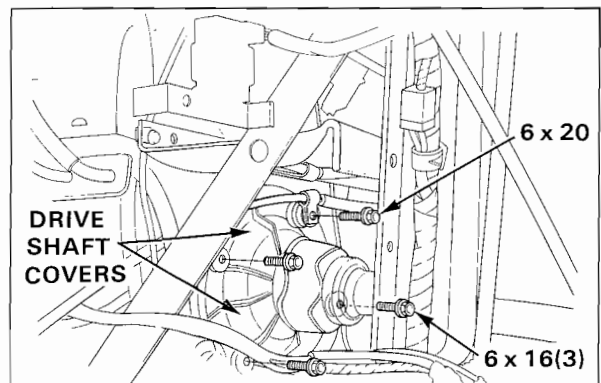
7. Disconnect the ignition coil and charge coil connectors inside the black plastic protector under the spark plugs.
8. Remove the 6×16 flange bolts and engine ground wires.



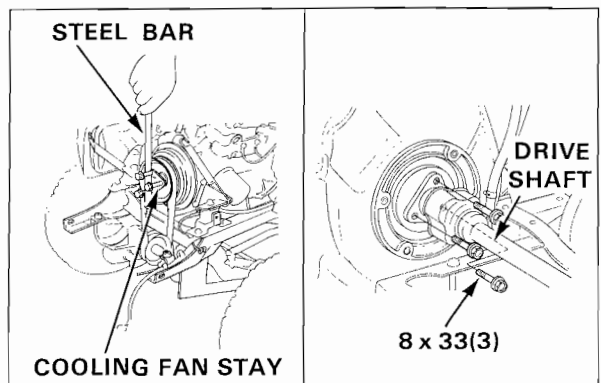
9. Remove the 8×20 washer bolt and ground wire from the left front motor mount.



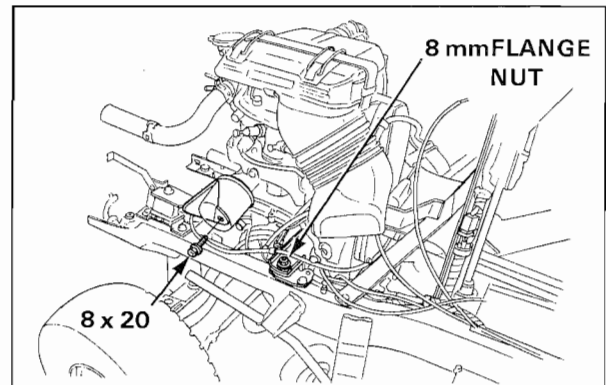
10. Remove the 6 mm flange bolts and drive shaft covers from the engine rear cover.



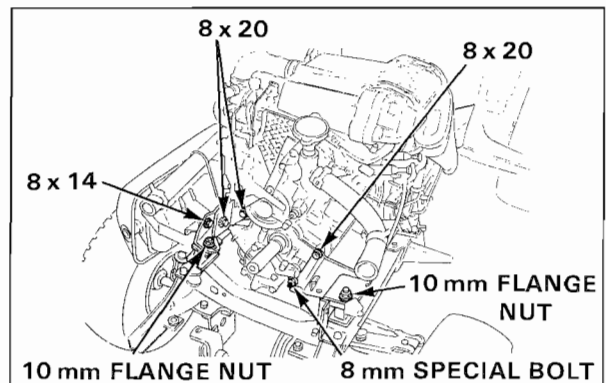
11. Temporarily install the 6 mm bolts to the cooling fan stay and hold it using the suitable steel bar as shown. Remove the three drive shaft mounting bolts (8×33).



13. Remove the 8 mm flange nut and 8×20 mm flange bolt as shown.



14. Remove the engine mount bracket bolts and nuts as shown and remove the engine forward.



## INSTALLATION

Install the engine in the reverse order of removal.

After installation, adjust the following :

- P. T. O. clutch cable(P. 3-18).
- throttle cable(P. 3-19).

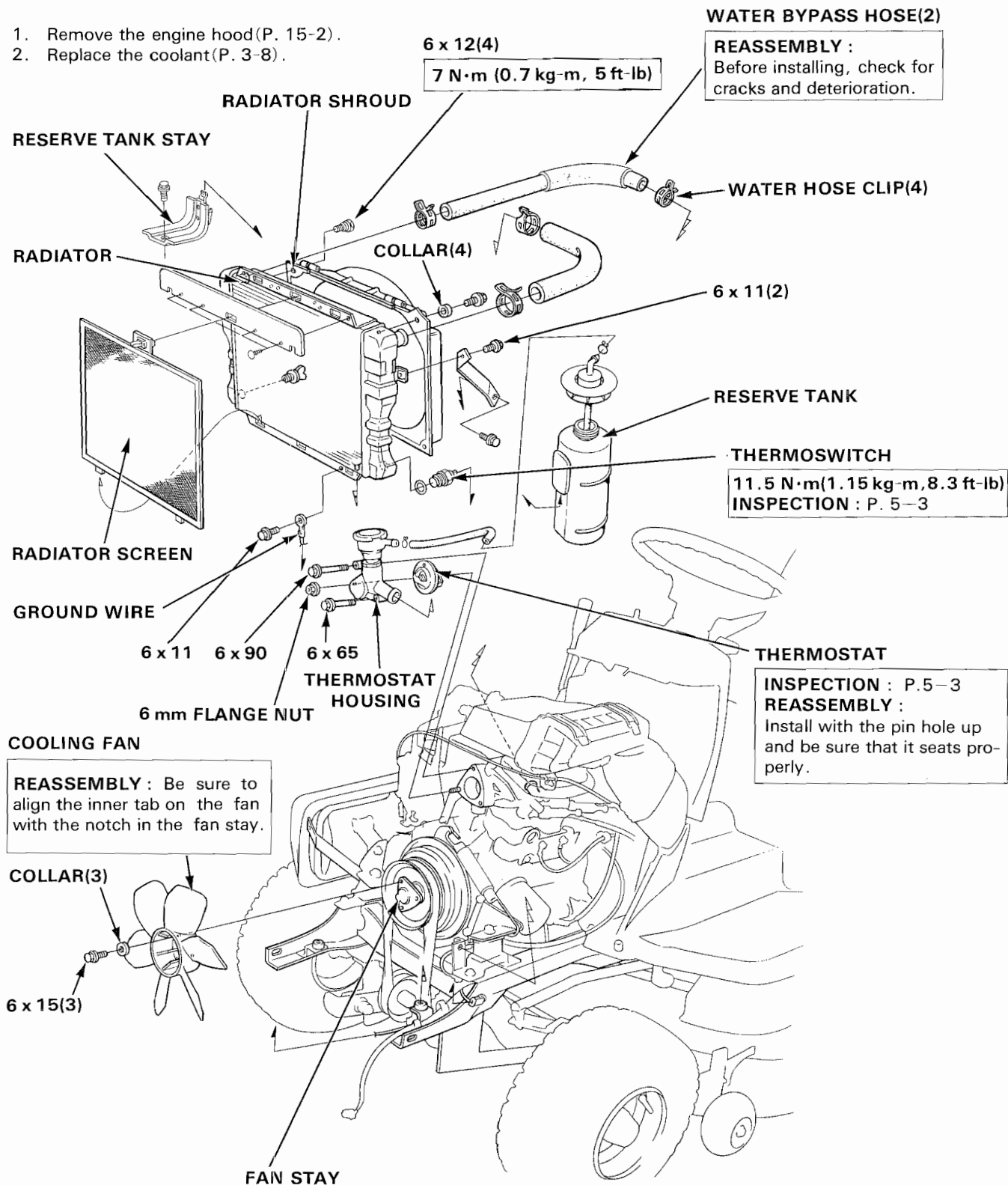


## RADIATOR

DISASSEMBLY/REASSEMBLY .....	5-2
INSPECTION .....	5-3

### DISASSEMBLY/REASSEMBLY

1. Remove the engine hood (P. 15-2).
2. Replace the coolant (P. 3-8).



### INSPECTION

#### ● THERMOSWITCH

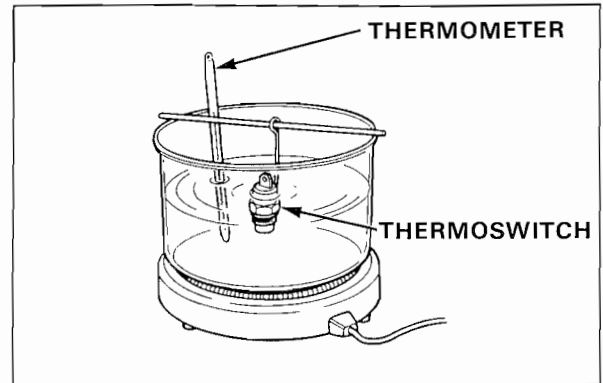
1. Suspend the thermoswitch in a container of coolant or oil. Be sure the switch does not touch the container.
2. Heat the liquid and note its temperature when the thermoswitch closes and there is continuity between the thermoswitch lead and body.

#### NOTE

- Don't allow the thermometer to touch the container.

TEMPERATURE RANGE  
FOR CONTINUITY

98–102°C (208–216°F)



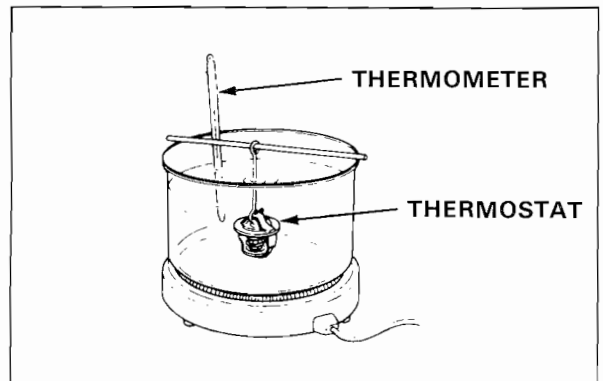
#### ● THERMOSTAT

1. Immerse the thermostat in water.
2. Heat the water and observe the operation of the thermostat as the water temperature increases.
3. Measure the water temperature when the thermostat starts opening.

#### NOTE

- Don't let the thermometer or the thermostat touch the container ; this may cause a false reading.

4. Measure lift height when fully open.



#### Sub valve

Start opening	77°C (171°F)
Fully open	82°C (180°F)

Lift height	1.5 mm (0.06 in)
-------------	------------------

#### Main valve

Fully open	85°C (185°F)
------------	--------------

Lift height	6.5 mm (0.26 in)
-------------	------------------

NOTE

## FUEL SYSTEM

FUEL TANK .....	6-2
AIR CLEANER .....	6-3
CARBURETOR .....	6-4
FUEL LINE .....	6-6

### FUEL TANK

1. Remove the seat and rear fender as an assembly (P. 15-9).
2. Drain the fuel tank and fuel line into an approved container.

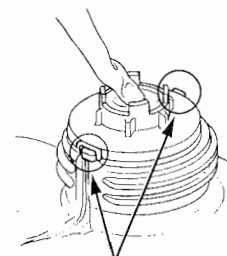
#### WARNING

• Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in the area.

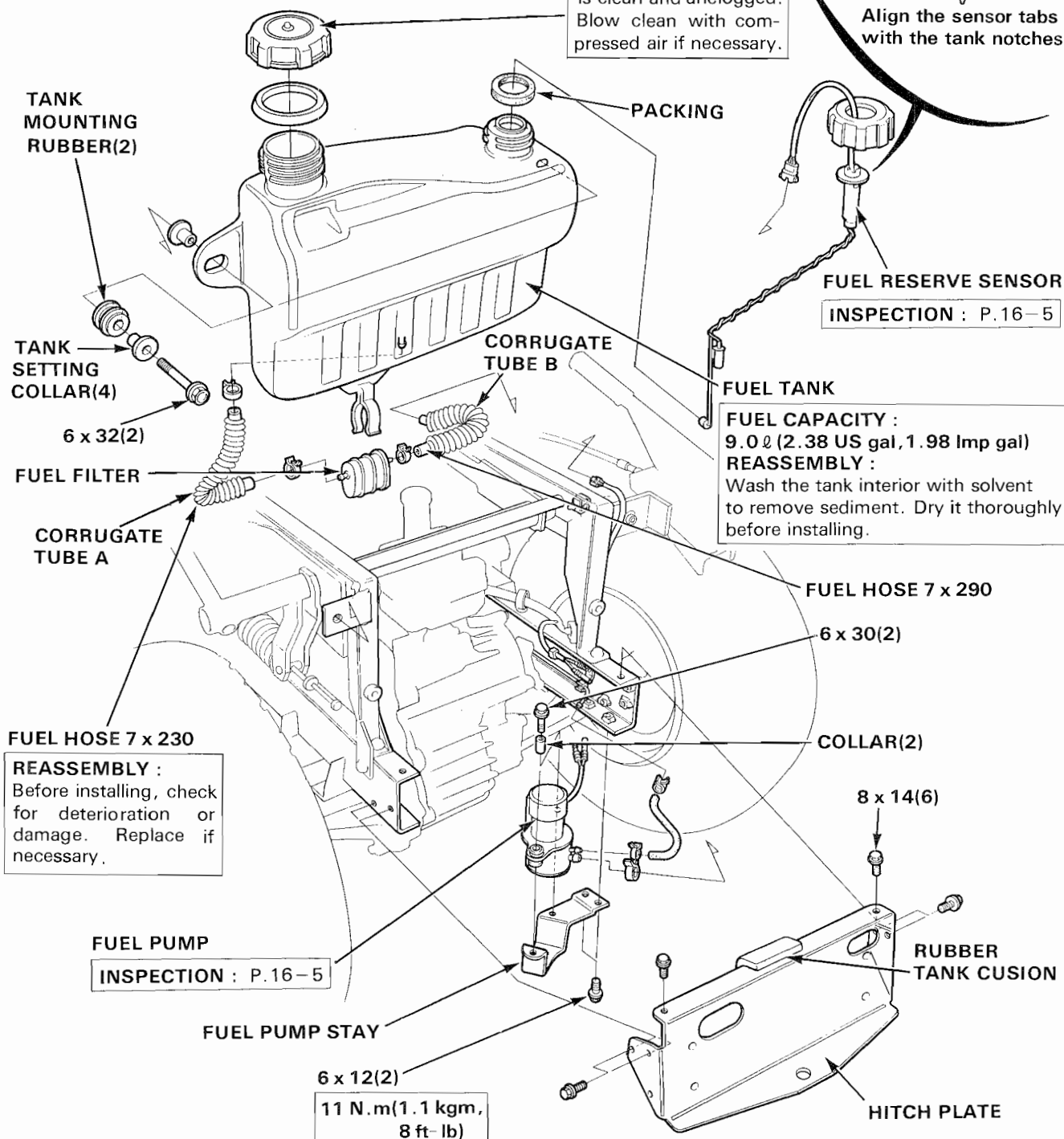
#### FILLER CAP

##### REASSEMBLY :

Make sure the air vent is clean and unclogged. Blow clean with compressed air if necessary.

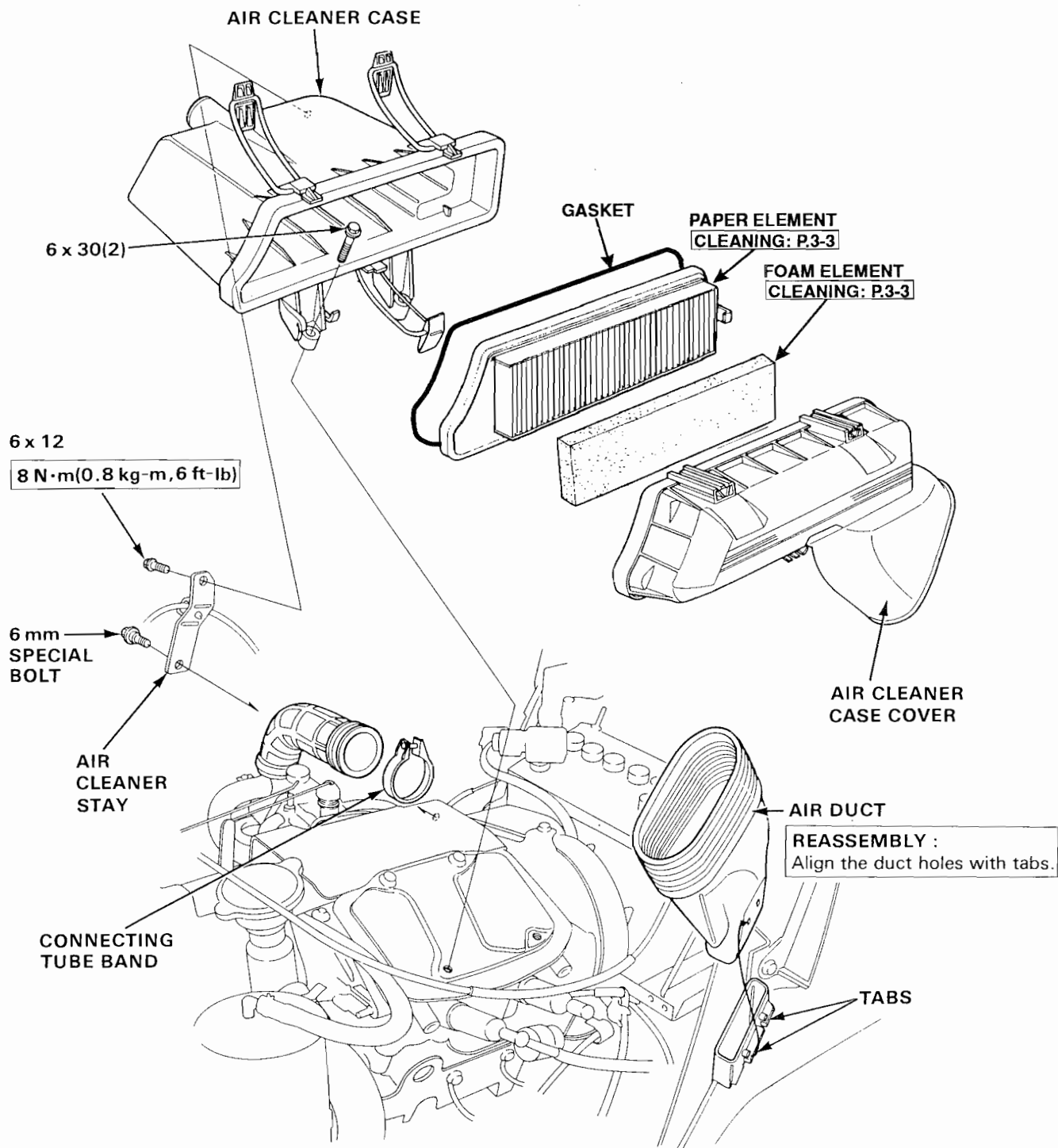


Align the sensor tabs with the tank notches.



### AIR CLEANER

1. Open the engine hood.
2. Remove the three flange bolts and disconnect the connecting tube from the air cleaner.



## CARBURETOR

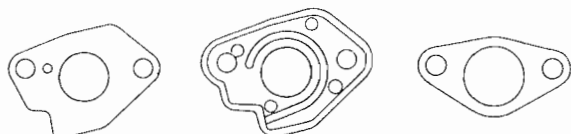
### a. DISASSEMBLY/REASSEMBLY

1. Open the engine hood and remove the air cleaner case Assy. (P. 6-3).
2. Remove the carburetor Assy. as shown.

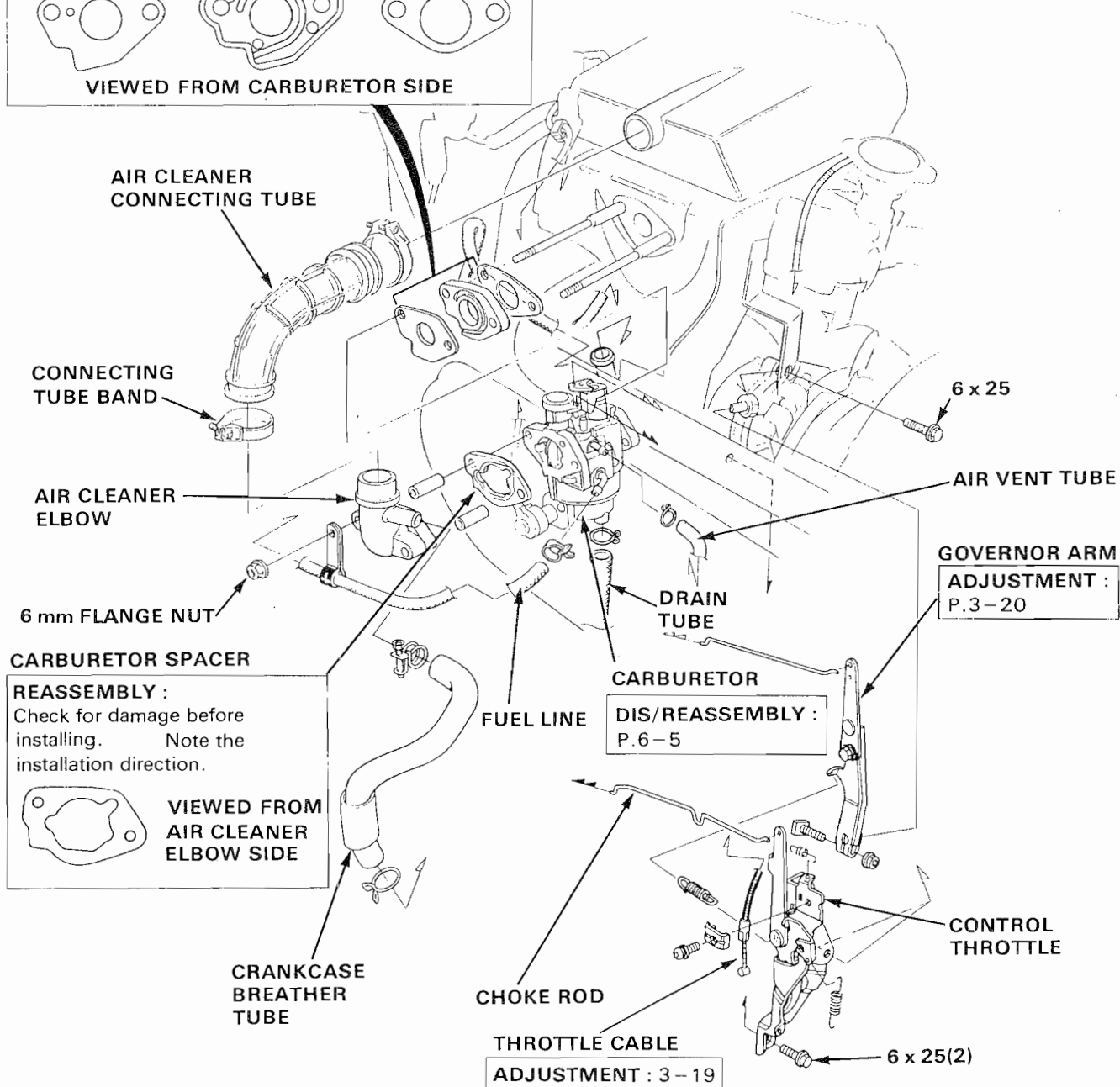
#### CARBURETOR GASKETS AND INSULATOR

##### REASSEMBLY :

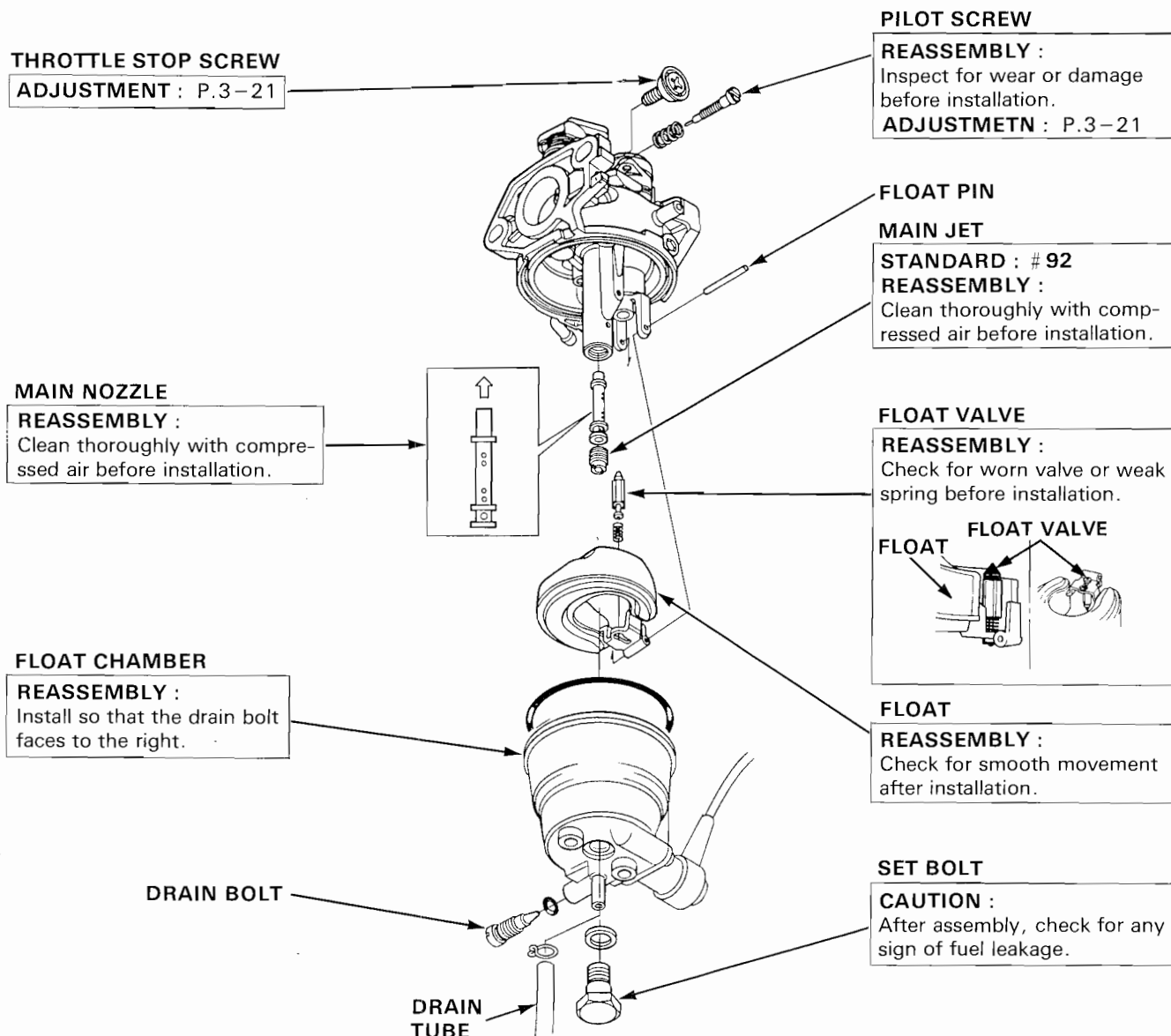
Note the installation direction



VIEWED FROM CARBURETOR SIDE







### b. INSPECTION

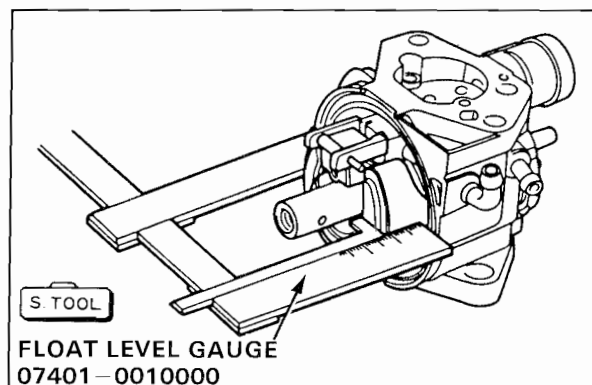
#### ● FLOAT LEVEL HEIGHT

With the carburetor in an upright position, measure the distance between the float top and the carburetor body when the float just contacts the float valve.

Standard float height	13.2 mm (0.52 in)
-----------------------	-------------------

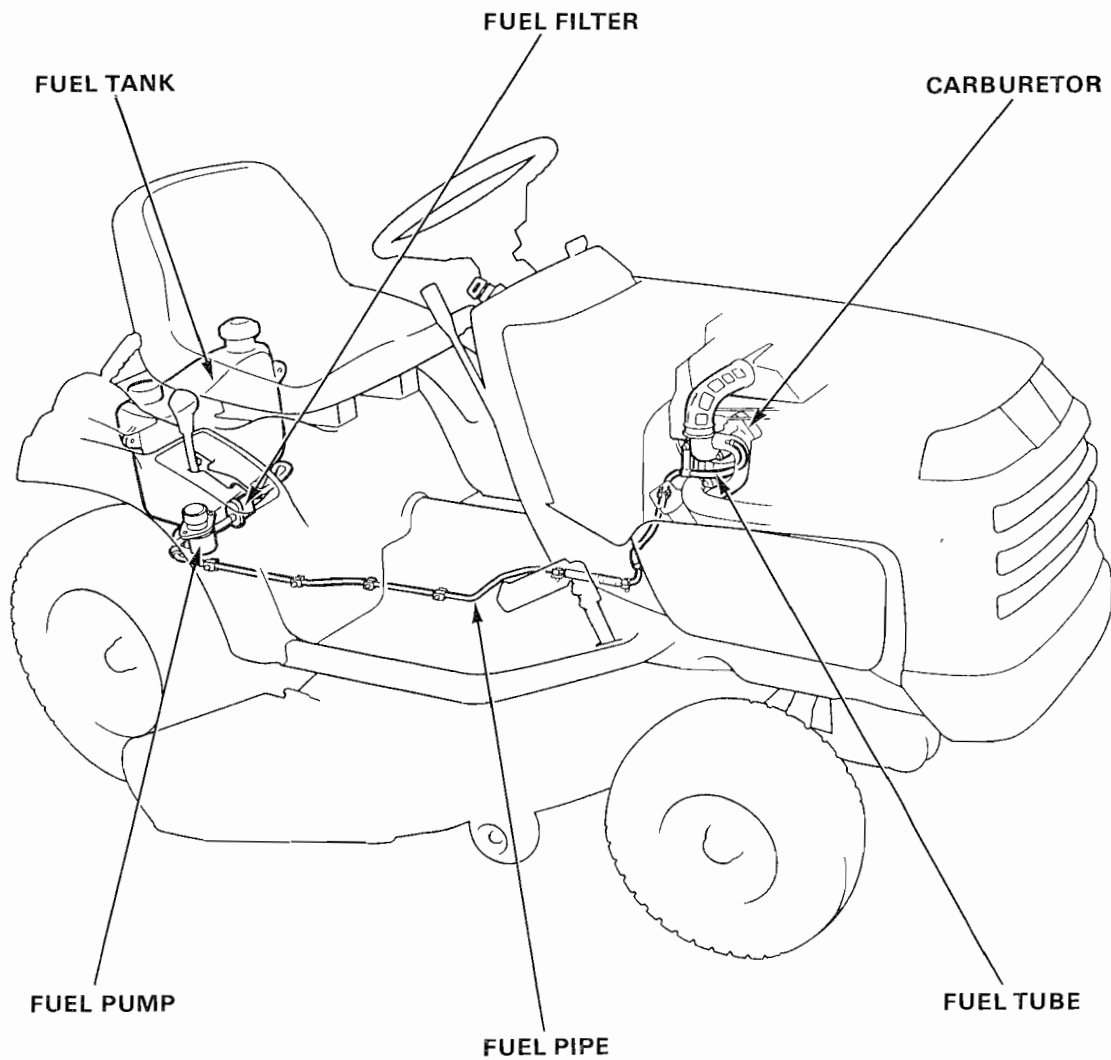
If the height is out of specification, replace the float.

Check the float operation.



## FUEL LINE

1. For fuel line(pipe) replacement, remove the following :
  - seat/rear fender Assy. (P. 15-9).
  - instrument panel/steering column cover(P. 15-3).
  - floor (P. 15-14).



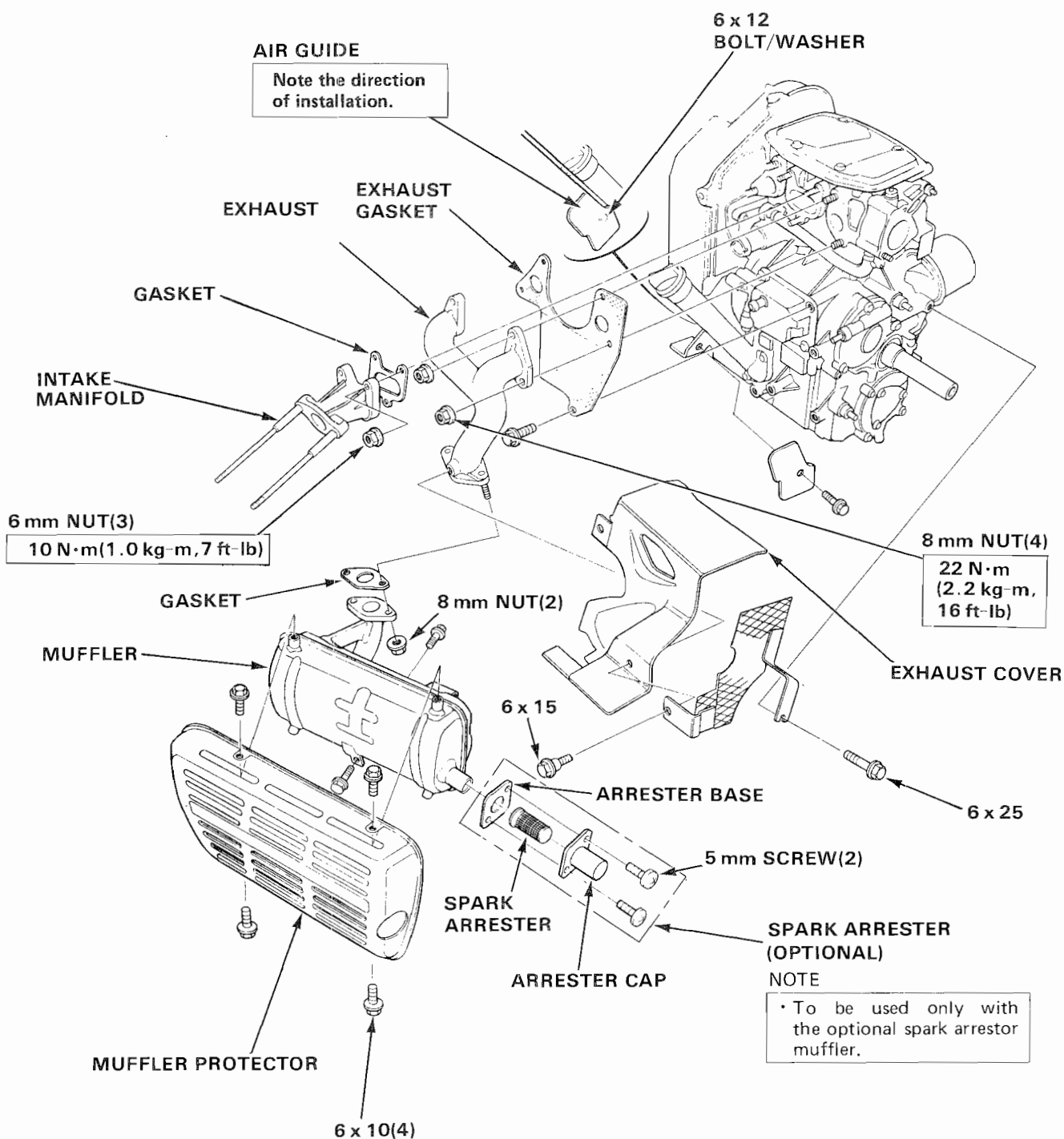
MUFFLER

DISASSEMBLY/REASSEMBLY .....7-2

### DISASSEMBLY/REASSEMBLY

#### NOTE

- The exhaust and intake manifold can be serviced with the engine installed in the frame.



FLYWHEEL/GOVERNOR/STARTER MOTOR

FLYWHEEL/IGNITION COIL .....	8-2
GOVERNOR .....	8-5
STARTER MOTOR .....	8-6

### FLYWHEEL/IGNITION COIL

#### a. DISASSEMBLY/REASSEMBLY

1. Remove the engine (P. 4-2)

#### TIMING BELT

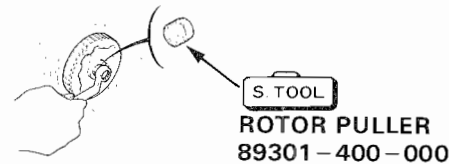
##### REASSEMBLY :

- Use a genuine Honda Timing Belt.
- Check that the belt is not worn or cracked.
- Do not bend or twist the belt.
- Before installing the belt, align the timing marks(P.8-4).
- Timing adjustment(P.8-4).

#### CAMSHAFT PULLEY

##### DISASSEMBLY :

Be sure to use the special tool for removal. Do not strike the camshaft pulley.



#### 10 mm NUT

35 N·m  
(3.5 kg-m, 25.3 ft-lb)

#### WATER PUMP

#### 6 x 22(4)

10 N·m(1.0 kg-m, 7 ft-lb)

#### LOCK WASHER

REASSEMBLY : P.8-3

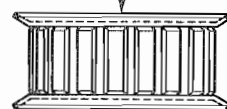
#### 30 mm LOCK NUT

REASSEMBLY : P.8-3

#### PULLEY FLANGE

REASSEMBLY :  
Install the flanges as shown.

#### TIMING PULLEY



#### ENGINE REAR COVER

#### 6 x 10(5)

#### 16 mm SPECIAL NUT

115 N·m(11.5 kg-m, 83 ft-lb)

#### FLYWHEEL

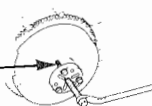
##### DISASSEMBLY :

Be sure to use the special tool to remove. Do not strike the flywheel.



#### FLYWHEEL PULLER

07935-8050003 or  
Commercially available puller.

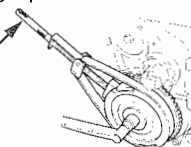


##### REASSEMBLY :

Check that flywheel is not damaged and is free of metal, dust and other foreign particles.

#### BAND STRAP WRENCH

(Commercially available)



#### DOWEL PIN

8 x 10(2)

#### 6 x 22

#### 6 x 32(2)

#### CHARGING COIL

INSPECTION : P.16-9

#### 6 x 32(2)

#### 6 x 3(2)

#### 8 x 40

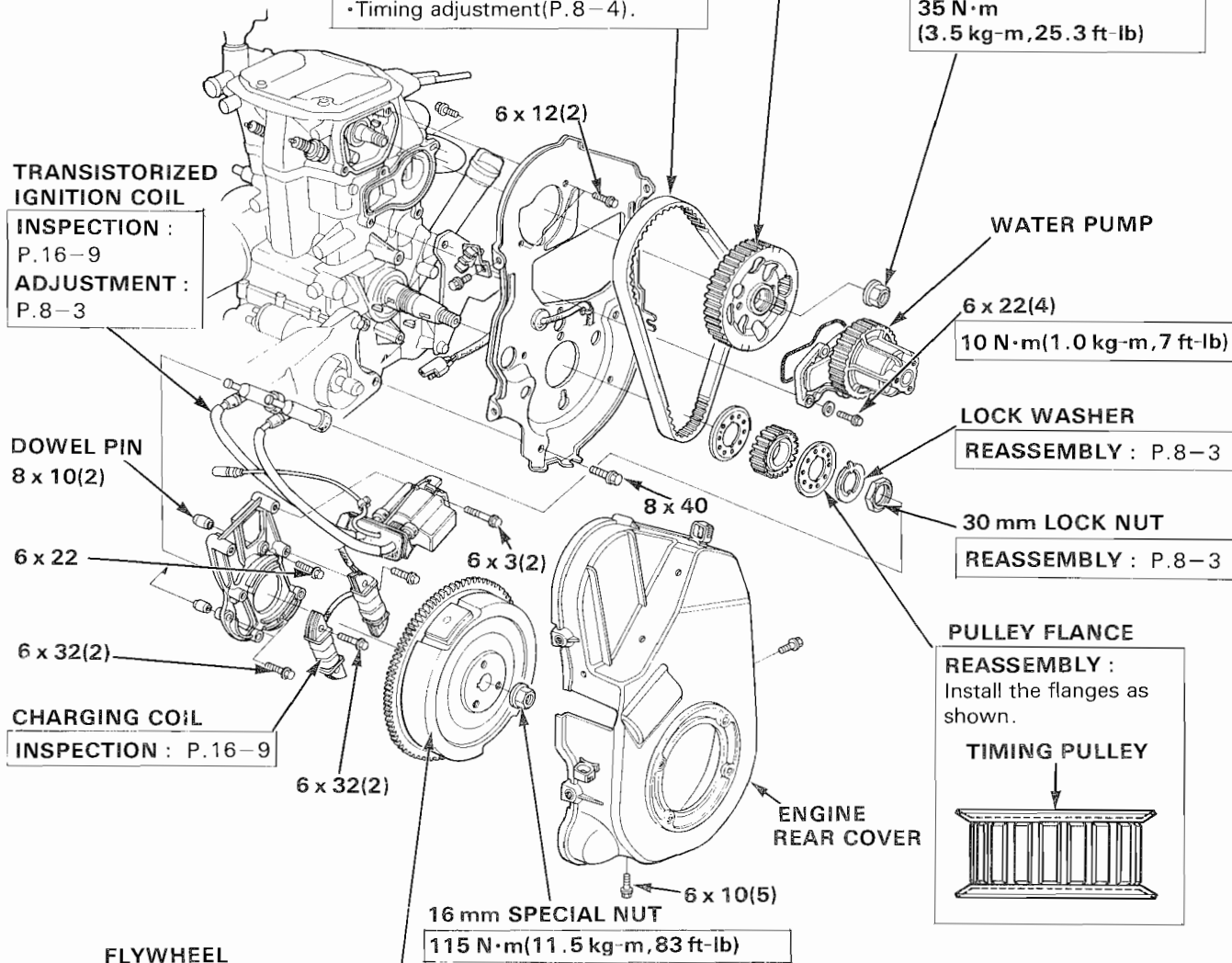
#### TRANSISTORIZED IGNITION COIL

##### INSPECTION :

P.16-9

##### ADJUSTMENT :

P.8-3



# HONDA

## H4514H

### ● 30 mm LOCK NUT DISASSEMBLY :

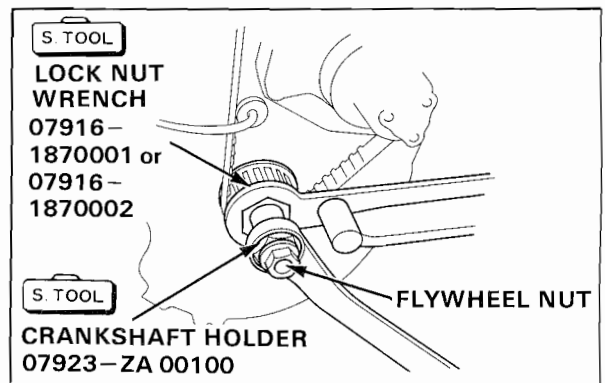
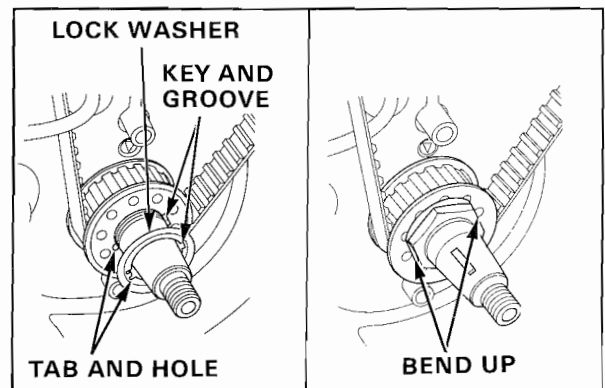
1. Flatten the two sides of the lock washer that secure the 30 mm lock nut.
2. Position the Special Tool on the crankshaft by aligning the keyway groove with the woodruff key.
3. Put the flywheel nut on the crankshaft, and hand-tighten it.
4. Hold the crankshaft with a 32 mm box end wrench and loosen the lock nut.

### REASSEMBLY :

1. Install the lock nut in the reverse order of removal.
2. Tighten the 30 mm lock nut to the specified torque.

**TORQUE : 25 N·m (2.5 kg-m, 18 ft-lb)**

3. Bend up two sides of the lock washer against the flats of the lock nut to secure the nut.

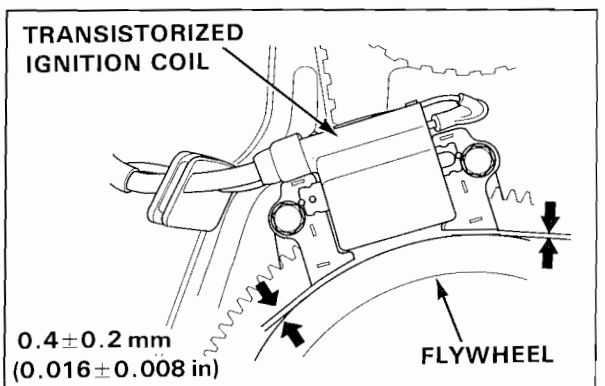
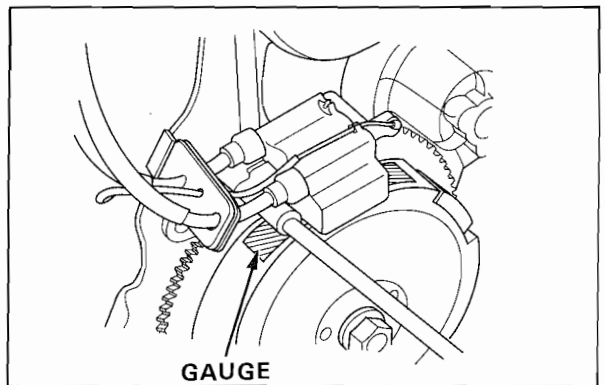


### ● TRANSISTORIZED IGNITION COIL AIR GAP ADJUSTMENT

1. Loosen the transistorized ignition coil tightening bolts.
2. Insert a long thickness gauge or a piece of paper of the proper thickness between the transistorized ignition coil and the flywheel. Both gaps should be adjusted simultaneously.
3. Push the transistorized ignition coil firmly toward the flywheel and tighten the bolts.

#### NOTE

- Avoid the magnet part of the flywheel when adjusting.

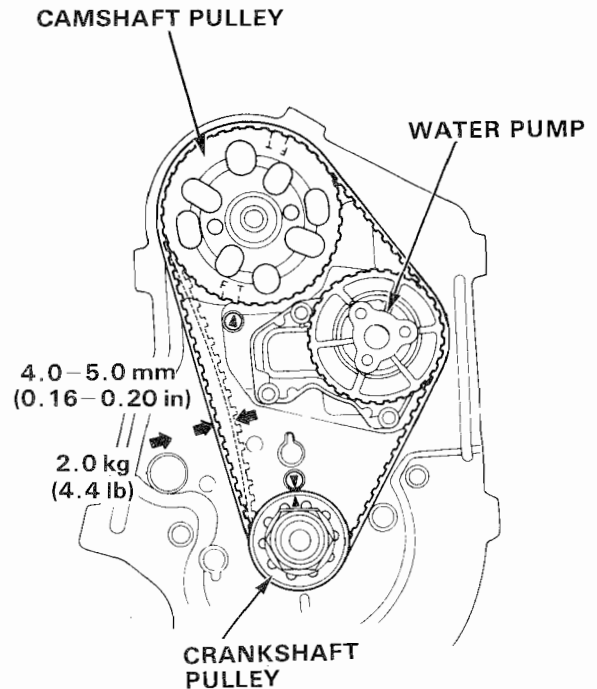


### ● TIMING BELT ADJUSTMENT

1. Remove the timing belt cover, and turn the crankshaft clock wise until the timing marks ("T" and "▲") are aligned ; this will ensure that there is no load on the side of the belt where deflection is measured.
2. Press the belt with a force of 2.0 kg (4.4 lb) at the midway point between the camshaft pulley and the crankshaft pulley. The belt should deflect 4.0—5.0 mm (0.16—0.20 in).
3. If adjustment is necessary, loosen the water pump bolts and slide the pump to obtain the correct belt tension, and then tighten the water pump bolts.

#### CAUTION

- There will be some coolant leakage when the water pump is loosened. Do not loosen the pump when the coolant is hot.



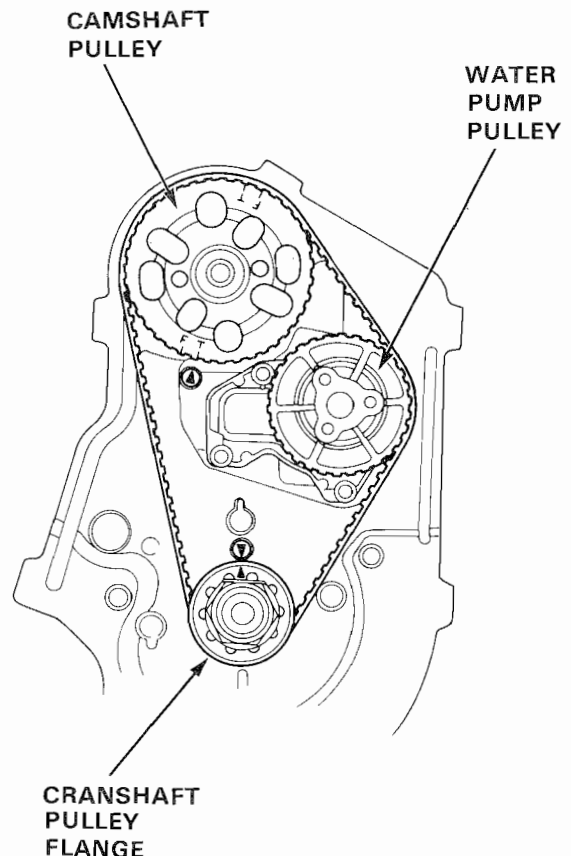
### ● TIMING BELT REPLACEMENT/VALVE TIMING

1. Remove the timing belt cover, loosen the water pump bolts and slide the pump inward. If there is coolant in the engine, temporarily retighten the water pump bolts.

#### CAUTION

- There will be some coolant leakage when the water pump is loosened. Do not loosen the pump when the coolant is hot.

2. Align the "T" mark on the camshaft pulley with the "▲" mark on the cylinder block.
3. Align the "▲" mark on the crankshaft pulley flange with the "▲" mark on the cylinder block.
4. Place the timing belt over the pulleys.
5. Adjust the timing belt tension, and tighten the water pump bolts. Be sure to recheck the timing marks for proper alignment.

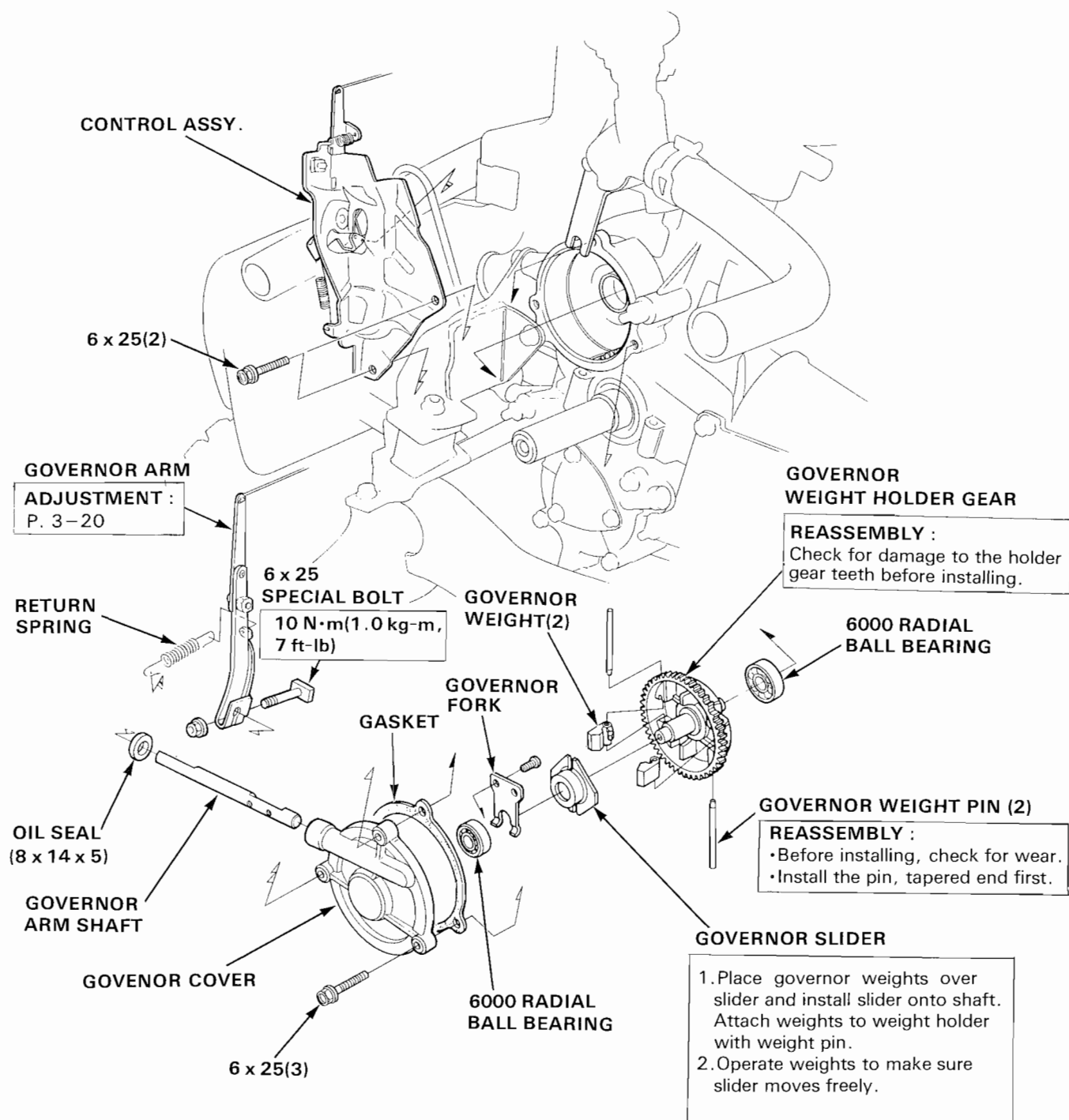




### GOVERNOR

#### a. DISASSEMBLY/REASSEMBLY

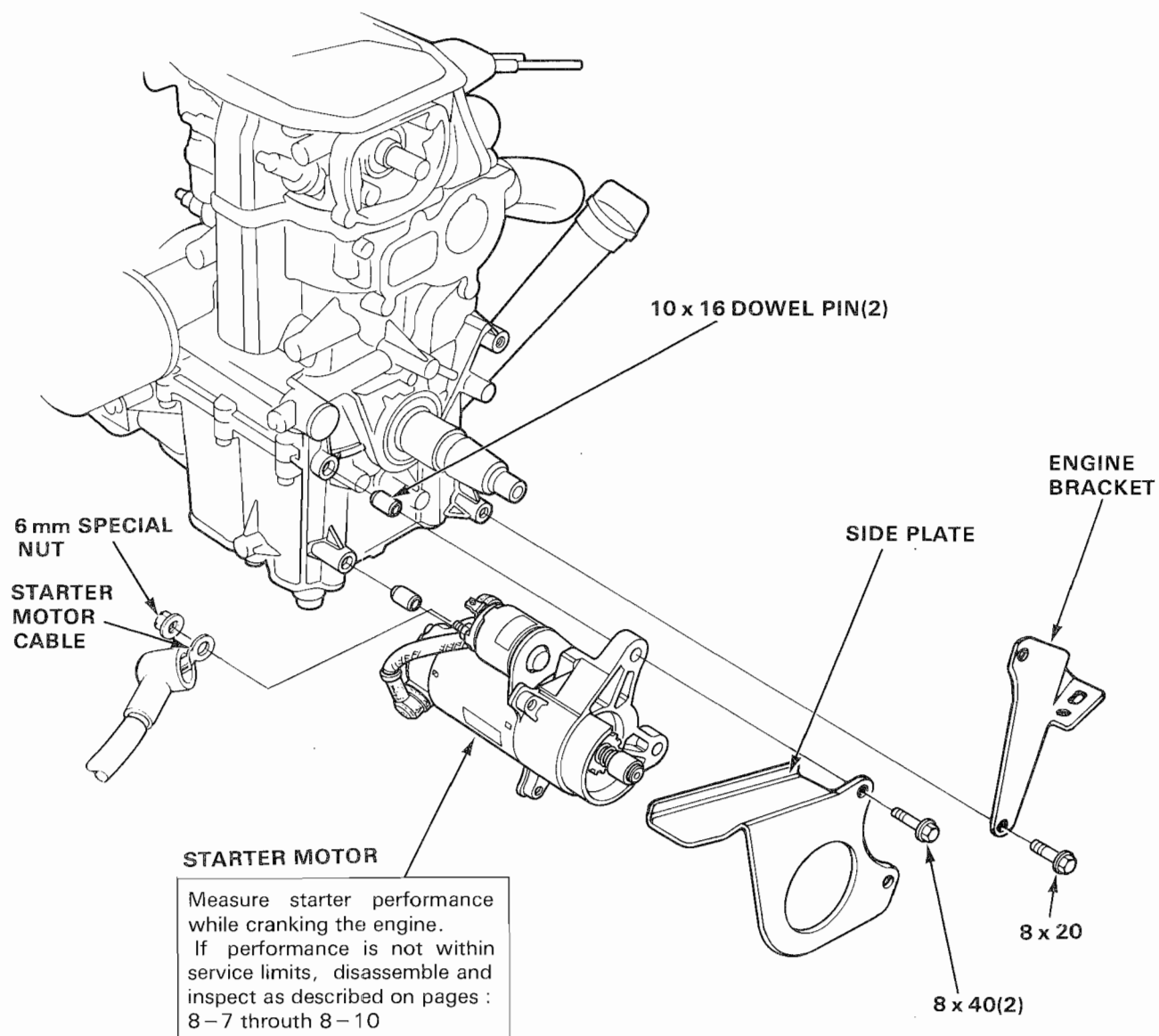
1. Remove the P. T. O. clutch (P. 17-2)



## STARTER MOTOR

### a. REMOVAL/INSTALLATION

1. Remove the engine from the frame (P. 4—2).



### b. DISASSEMBLY/REASSEMBLY

#### NOTE

- For reassembly, refer to the holder, housing, and cover alignment points, page 8-9.

1. Remove the starter motor. (P. 8-6)

#### BRUSH

**INSPECTION :** P.8-8  
**REASSEMBLY :** P.8-9

#### STARTER END COVER

**REASSEMBLY :** P.8-10

#### SETTING BOLT

#### BUSHING

#### O-RING(2)

#### BRUSH HOLDER PLATE

#### COMMUTATOR

#### FIELD COIL AND HOUSING

**REASSEMBLY :** P.8-10  
Make sure that there is nothing stuck on the magnets.

#### ARMATURE

**INSPECTION :** P.8-8,9  
Visually inspect the commutator surface for dust, rust or damage. If necessary, wipe with a clean lint-free cloth. If rusted or damaged, dress with a fine emery cloth.

#### THRUST WASHER

**REASSEMBLY :**  
Do not forget to install.

#### GREASE

#### STARTER SOLENOID

#### DRIVE SIDE HOUSING

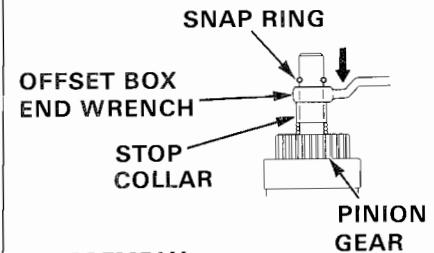
**REASSEMBLY :** P.8-10

#### PINION GEAR

##### DISASSEMBLY :

Holding the armature upright, place an offset box end wrench over the pinion stop collar and push the collar down, exposing the snap ring.

Remove the snap ring, then remove the collar and pinion gear.



##### REASSEMBLY :

Check for smooth movement by rotating the pinion gear.

Check the gear teeth for wear or damage.

Replace if necessary.

Also, check the flywheel ring gear teeth for damage.

##### SNAP RING

##### DISASSEMBLY :

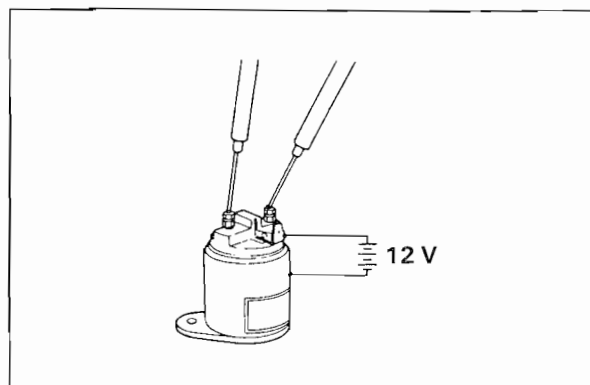
Drive down the stop collar to remove. Replace whenever disassembled.

#### STOP COLLAR

### c. INSPECTION

#### ● STARTER SOLENOID

Connect a 12 V battery between the starter terminal and the solenoid body and check for continuity between the terminals. Continuity should exist when the battery is connected but not when the battery is disconnected.

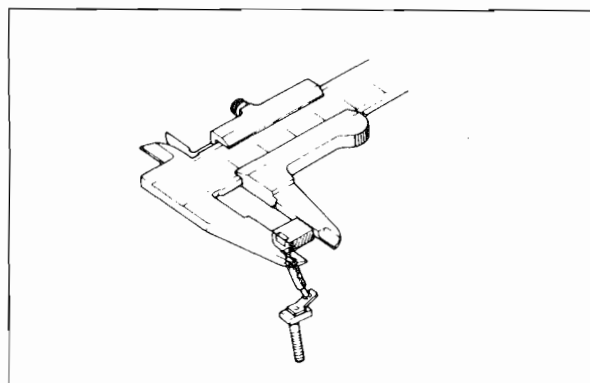


#### ● BRUSH LENGTH

Measure the brush length.

If brush length is less than standard, replace the brush and brush holder plate.

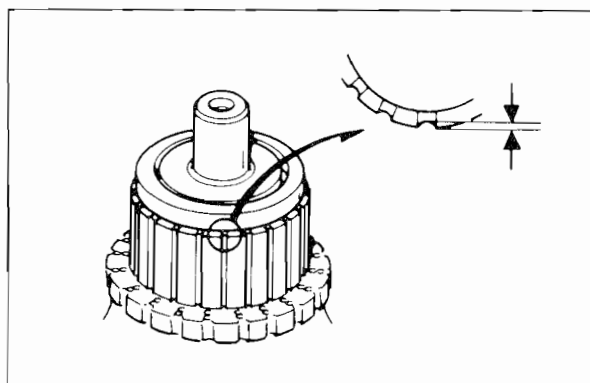
STANDARD	SERVICE LIMIT
12 mm (0.47 in)	8.5 mm (0.33 in)



#### ● MICA DEPTH

If the grooves are clogged or mica depth is less than the service limit, recut the grooves using a hacksaw blade or a small file.

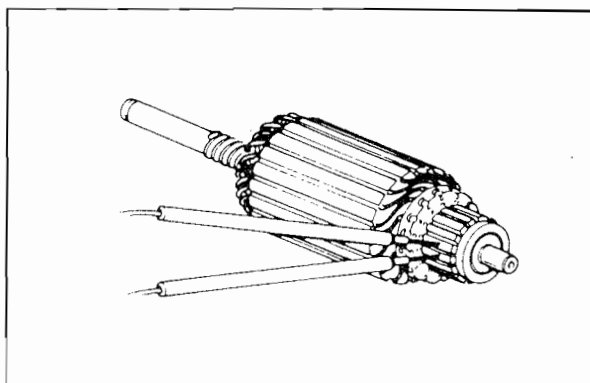
SERVICE LIMIT	0.2 mm (0.008 in)
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#### ● ARMATURE

##### CONTINUITY CHECK-SEGMENTS

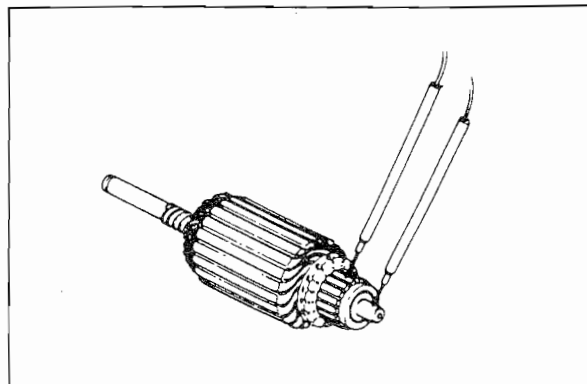
Check for continuity between each segment. If an open circuit exists between any two segments, replace the armature.



### SHORT CIRCUIT TEST-SHAFT TO COMMUTATOR

Check for continuity between the commutator and armature shaft.

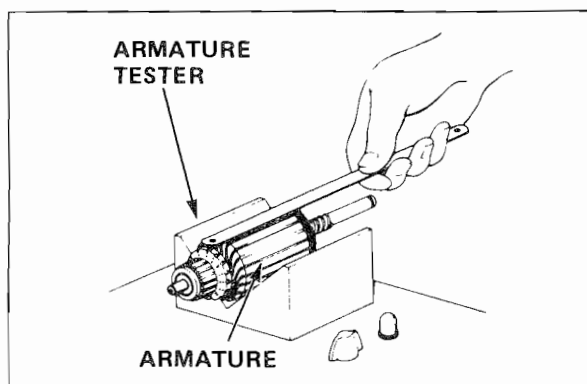
If there is continuity, replace the armature.



### SHORT CIRCUIT TEST-ARMATURE

Place the armature in an armature tester (commercially available).

Hold a hacksaw blade close to the armature core. If the blade is attracted to the core or vibrates when the core is turned, the armature is shorted. Replace the armature.

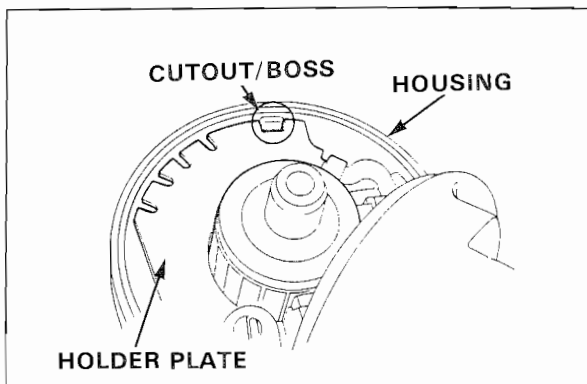
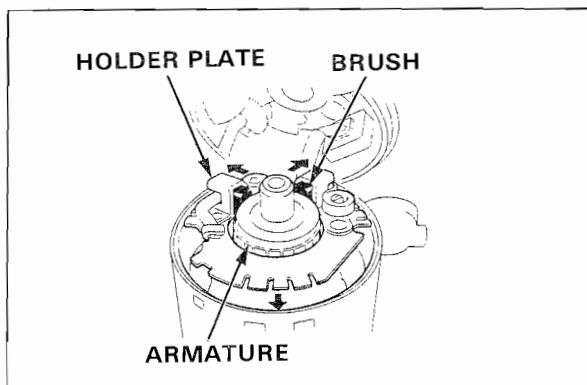


### d. HOLDER, HOUSING, AND COVER ALIGNMENT POINTS

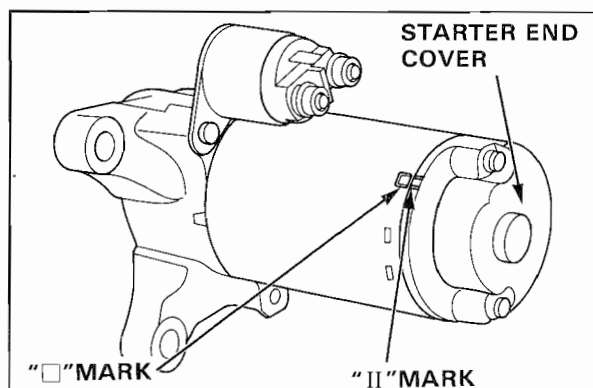
1. Set the brushes on the armature pushing them into the holder plate.

#### NOTE

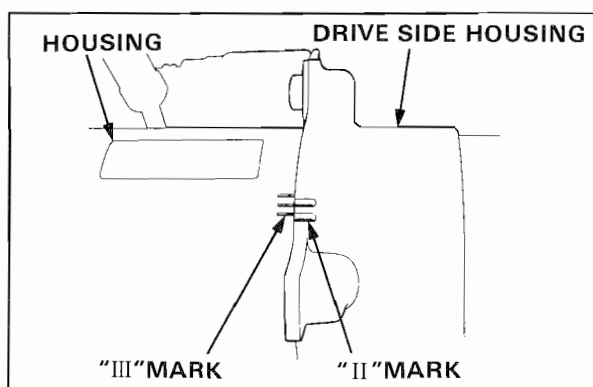
- Make sure the wires do not interfere with the commutator.



2. Install the starter end cover aligning the "II" mark on the cover with the "□" mark on the housing.



3. Install the drive side housing aligning the "II" mark on the drive side housing with the "III" mark on the housing.



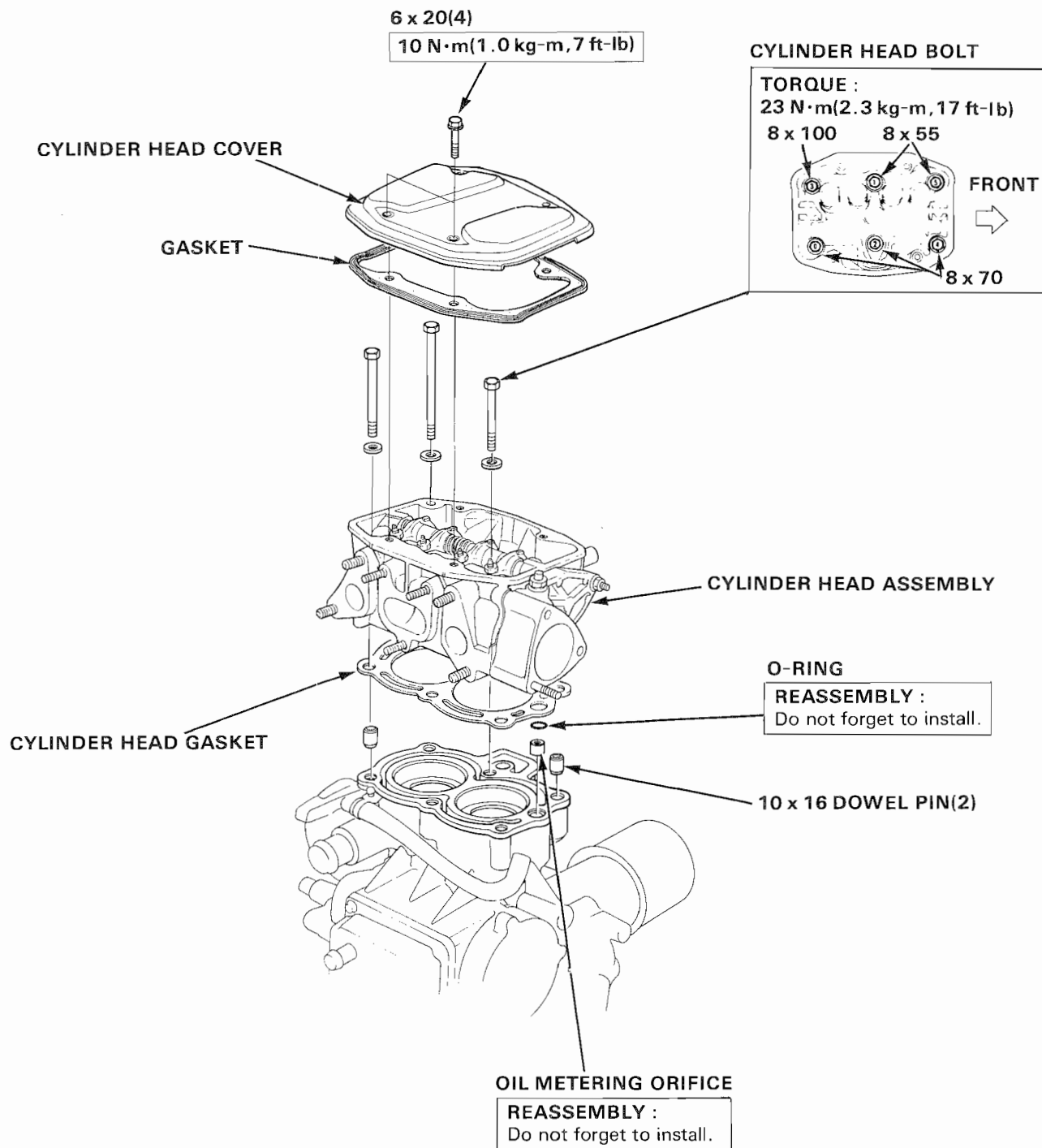
## CYLINDER HEAD/VALVES

REMOVAL/INSTALLATION .....	9-2
DISASSEMBLY/REASSEMBLY .....	9-3
INSPECTION .....	9-4
VALVE GUIDE REPLACEMENT .....	9-7
VALVE SEAT INSPECTION AND RECONDITIONING ..	9-8

## REMOVAL/INSTALLATION

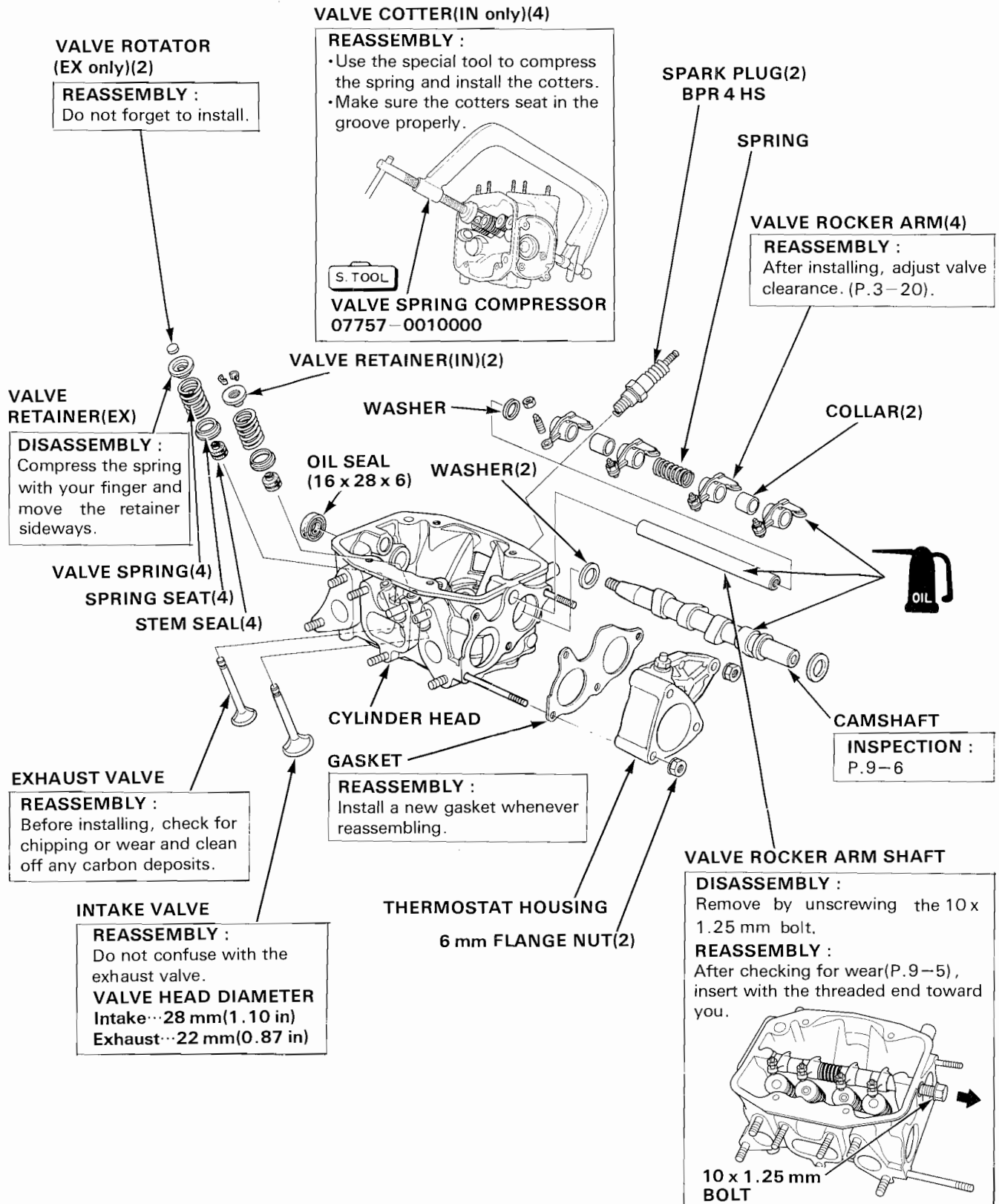
Remove the following :

- engine (P. 4-2).
- air cleaner (P. 3-3).
- carburetor (P. 6-4).
- intake manifold and exhaust manifold (P. 7-2).





### DISASSEMBLY/REASSEMBLY



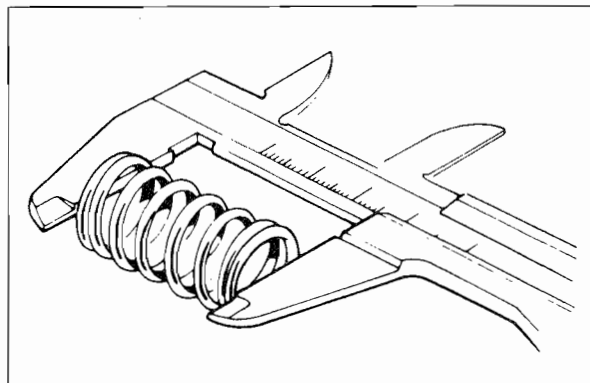
## INSPECTION

### ● VALVE SPRING FREE LENGTH

Measure the free length of the valve springs.

STANDARD	SERVICE LIMIT
29.0 mm (1.14 in)	27.5 mm (1.08 in)

Replace the springs if they are shorter than the service limit.



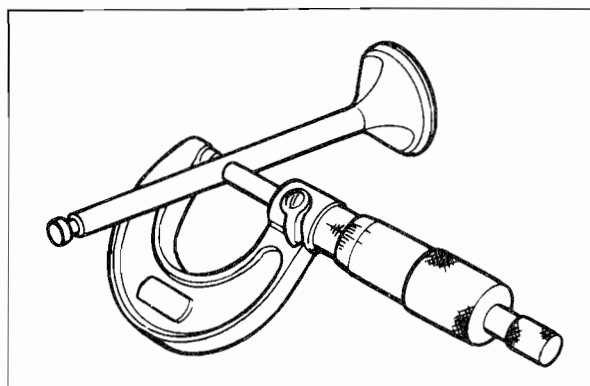
### ● VALVE STEM O. D.

Inspect each valve for face irregularities, bending or abnormal stem wear. Replace the valve if necessary.

Measure and record each valve stem O. D.

	STANDARD	SERVICE LIMIT
IN	5.48 mm (0.216 in)	5.32 mm (0.209 in)
EX	5.45 mm (0.215 in)	5.29 mm (0.208 in)

Replace the valves if their O. D. is smaller than the service limit.



### ● VALVE GUIDE I. D.

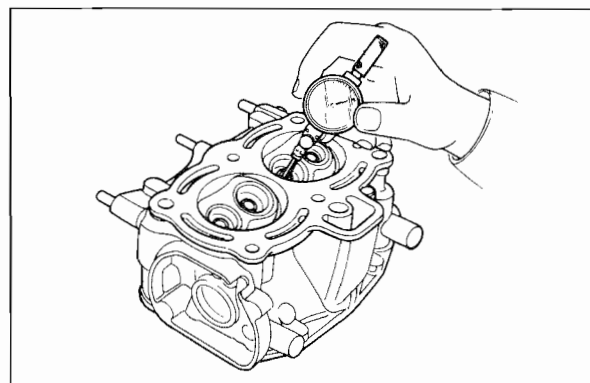
NOTE

- Ream the valve guides to remove any carbon deposits before measuring.

Measure and record each valve guide I. D.

STANDARD	SERVICE LIMIT
5.50 mm (0.217 in)	5.55 mm (0.219 in) max

Replace the guides if they are over the service limit.



### ● VALVE GUIDE-TO-STEM CLEARANCE

Subtract each valve stem O. D. from the corresponding guide I. D. to obtain the stem-to-guide clearance.

	STANDARD
IN	0.10–0.14 mm (0.004–0.006 in)
EX	0.18–0.22 mm (0.007–0.009 in)

If the stem-to-guide clearance exceeds the service limit, determine if the new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guide as necessary and ream to fit.

If the stem-to-guide clearance exceeds the service limit with new guides, replace the valves as well.

NOTE

- Recondition the valve seats whenever the valve guides are replaced.

# HONDA

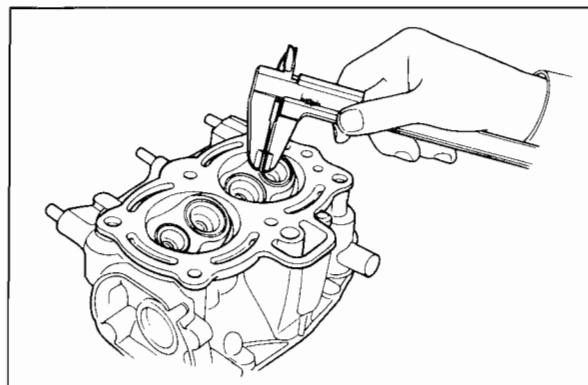
## H4514H

### ● VALVE SEAT WIDTH

Measure the valve seat width.

STANDARD	SERVICE LIMIT
0.07 mm (0.03 in)	2.0 mm (0.08 in) max

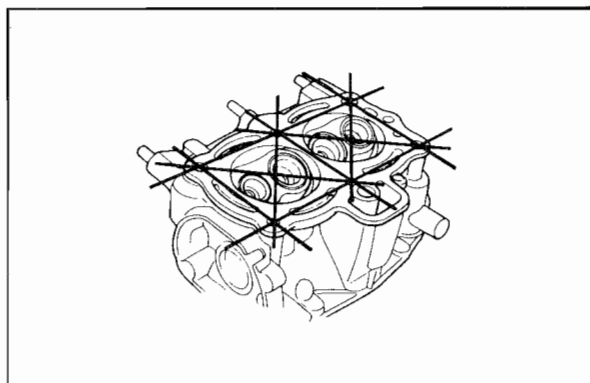
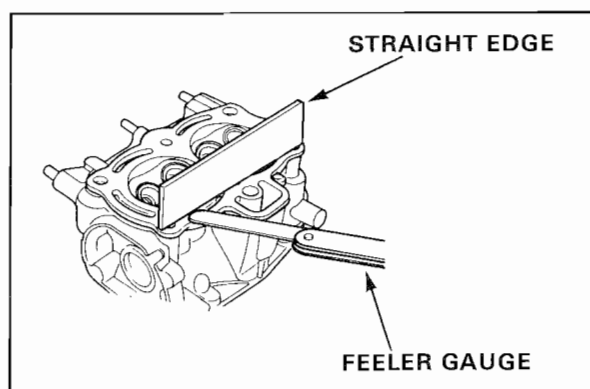
If the valve seat width is under the standard, or over the service limit, recondition the valve seat. (P. 9—8, 9 and 10)



### ● CYLINDER HEAD

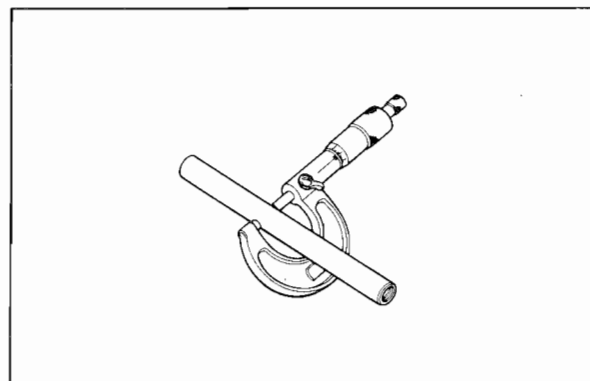
Remove carbon deposits from the combustion chamber. Clean off any gasket material from the cylinder head surface. Check the spark plug hole and valve areas for cracks. Check the cylinder head for warpage with a straight edge and a feeler gauge.

SERVICE LIMIT	0.10 mm (0.004 in)
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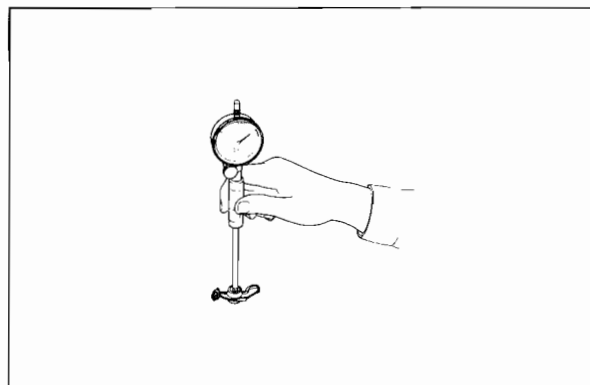
### ● VALVE ROCKER ARM SHAFT O. D.

STANDARD	SERVICE LIMIT
12.957 mm (0.510 in)	12.940 mm (0.509 in)



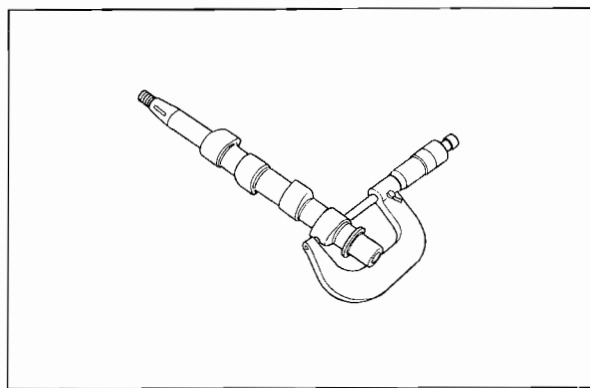
### ●ROCKER ARM I.D.

STANDARD	SERVICE LIMIT
13.0 mm (0.5118 in)	13.040 mm (0.5134 in)



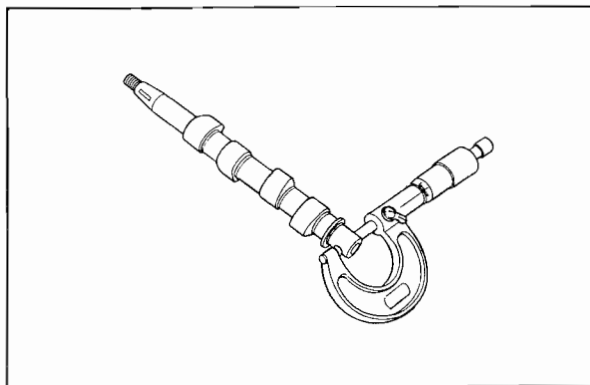
### ●CAM HEIGHT

	STANDARD	SERVICE LIMIT
IN	24.96 mm (0.983 in)	24.5 mm (0.96 in)
EX	25.92 mm (1.020 in)	25.6 mm (1.001 in)



### ●CAMSHFT O.D.

	STANDARD	SERVICE LIMIT
Governor Side	15.98 mm(0.629 in)	15.9 mm(0.626 in)
Timing Side	15.98 mm(0.629 in)	15.9 mm(0.626 in)



### VALVE GUIDE REPLACEMENT

1. Chill the replacement valve guides in the freezer section of a refrigerator for about an hour.
2. Use a hot plate or oven to heat the cylinder head evenly to 150°C (300°F).  
Check the temperature with a temperature indicating stick (available at welding supply stores) or equivalent.

#### ▲WARNING

- To avoid burns, use heavy gloves when handling the heated cylinder head.

#### CAUTION

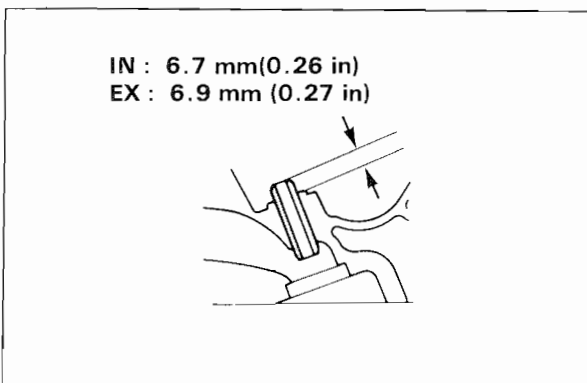
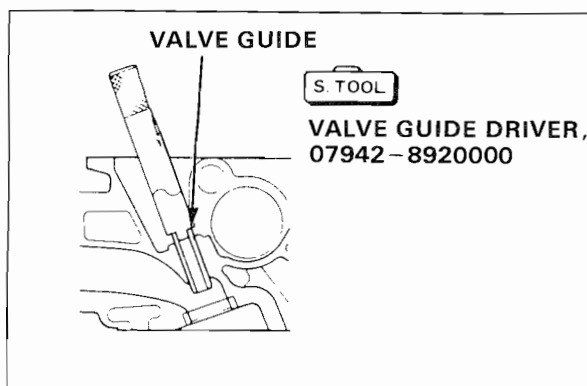
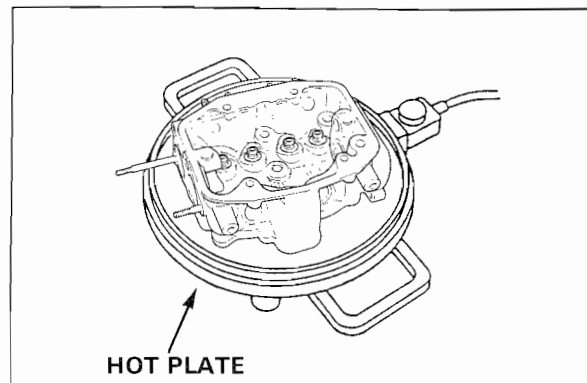
- Do not use a torch to heat the cylinder head ; warpage of the cylinder head may result.
- Do not get the head hotter than 150°C (300°F) ; excessive heat may loosen the valve seats.

3. Remove the heated cylinder head from hot plate and support it with wooden blocks. Drive the valve guides out of the head from the combustion chamber side.

#### CAUTION

- When driving the valve guides out, be careful not to damage the head.

4. Remove the new valve guides from the refrigerator one at a time as needed.
5. Install the new valve guides from the valve spring side of the cylinder head. Drive each valve guide as shown. (measured from the top of the valve guide to the cylinder casting as shown).
6. After installation, inspect the valve guide for damage. Replace the guide if damaged.

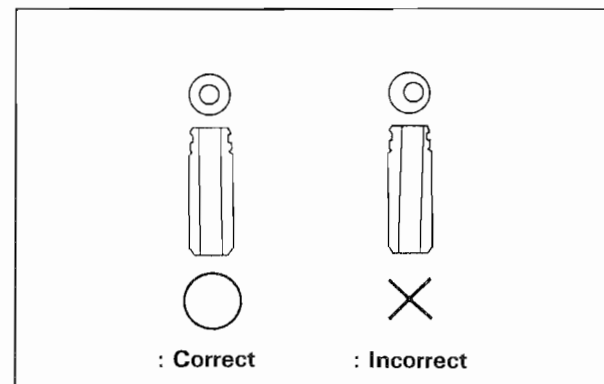
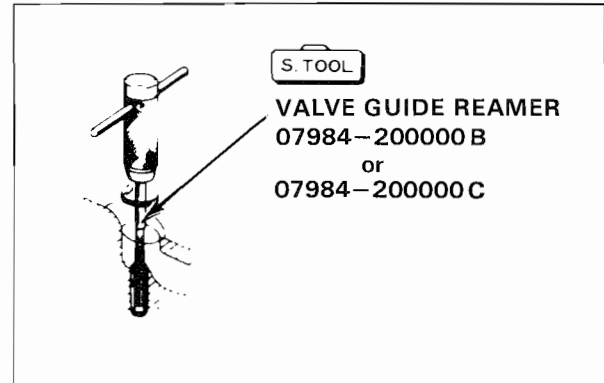


### ● VALVE GUIDE REAMING

#### NOTE

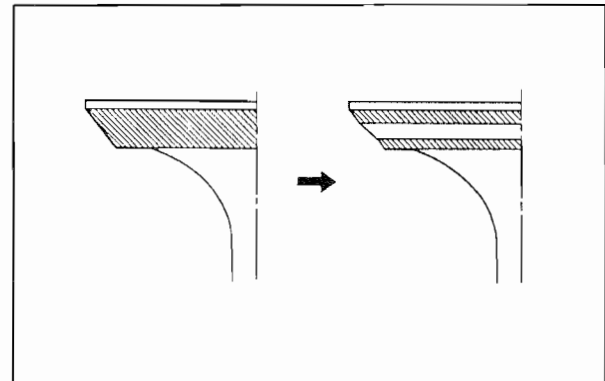
- For best results, be sure the cylinder head is at room temperature before reaming valve guides.

1. Coat the reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise through the valve guide the full length of the reamer.
3. Continue to rotate the reamer clockwise while removing it from the valve guide.
4. Thoroughly clean the cylinder head to remove any cutting residue.
5. Check the valve guide bore ; it should be straight, round and centered in the valve guide. Insert the valve and check operation. If the valve does not operate smoothly, the guide may have been bent during installation. Replace the valve guide if it is bent or damaged.
6. Check the Valve Guide-to-Stem Clearance (P. 9—4).



### VALVE SEAT INSPECTION AND RECONDITIONING

1. Thoroughly clean the combustion chambers and valve seats to remove carbon deposits.  
Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the valve faces.
2. Insert the valves, and then lift them and snap them closed against their seats several times. Be sure the valve does not rotate on the seat. The transferred marking compound will show any area of the seat that is not concentric.



### NOTE

- Follow valve seat cutter manufacturer's instructions.

- Using a 45° cutter, remove enough material to produce a smooth and concentric seat.  
Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.

- Use the 30°–32° and 60° cutters to narrow and adjust the valve seat so that it contacts the middle of the valve face. The 30°–32° cutter removes material from the top edge. The 60° cutter removes material from the bottom edge. Be sure that the width of the finished valve seat is within specification.

**STANDARD VALVE SEAT WIDTH : 0.7mm (0.03 in)**

### S TOOL

#### SOLID PILOT BARS

5.50 mm No. 07781-P03010A

5.52 mm No. 07781-P03020A

5.55 mm No. 07781-P03030A

T-WRENCH, #505

No. 07782-P01010A

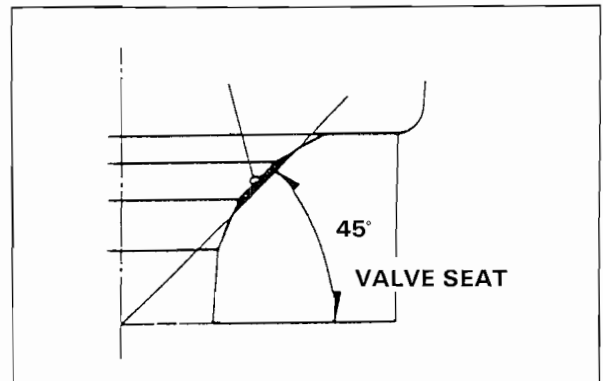
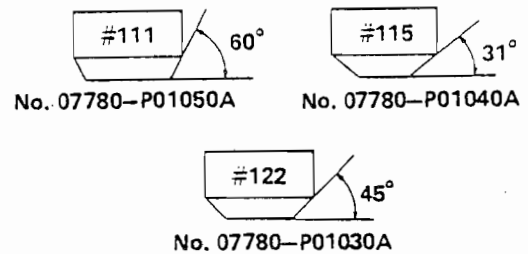
T-WRENCH ADAPTER, #503-1

No. 07782-P01020A

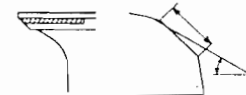
ACCESSORY PACKAGE, #246

No. 07782-P01030A

#### VALVE SEAT CUTTERS



#### CONTACT TOO HIGH



#### CONTACT TOO LOW



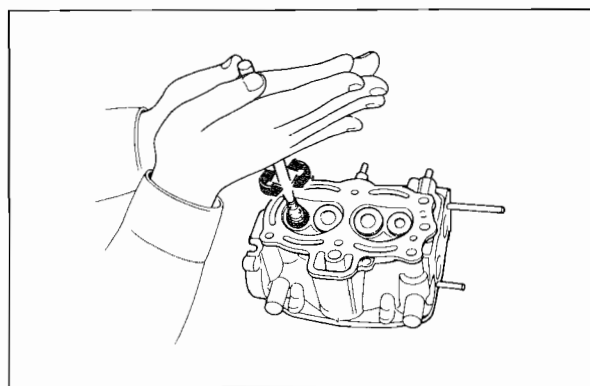
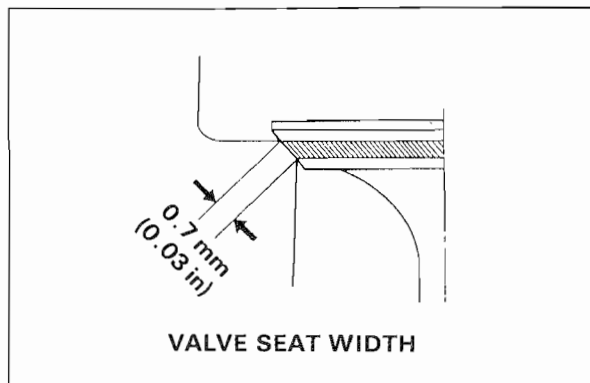
5. Make a light pass with 45° cutter to remove any possible burrs at the edges of the seat.
6. After resurfacing the seats, inspect for even valve seating. Apply Prussian Blue compound or erasable felt-tipped marker ink to the valve faces. Insert the valves, and then lift them and snap them closed against their seats several times. Be sure the valve does not rotate on the seat. The seating surface, as shown by the transferred marking compound, should have good contact all the way around.
7. Lap the valves into their seats, using a hand valve lapper and lapping compound (commercially available).

### CAUTION

- To avoid severe engine damage, be sure to remove all lapping compound from the engine before reassembly.

### NOTE

- Check valve clearance after reassembly.

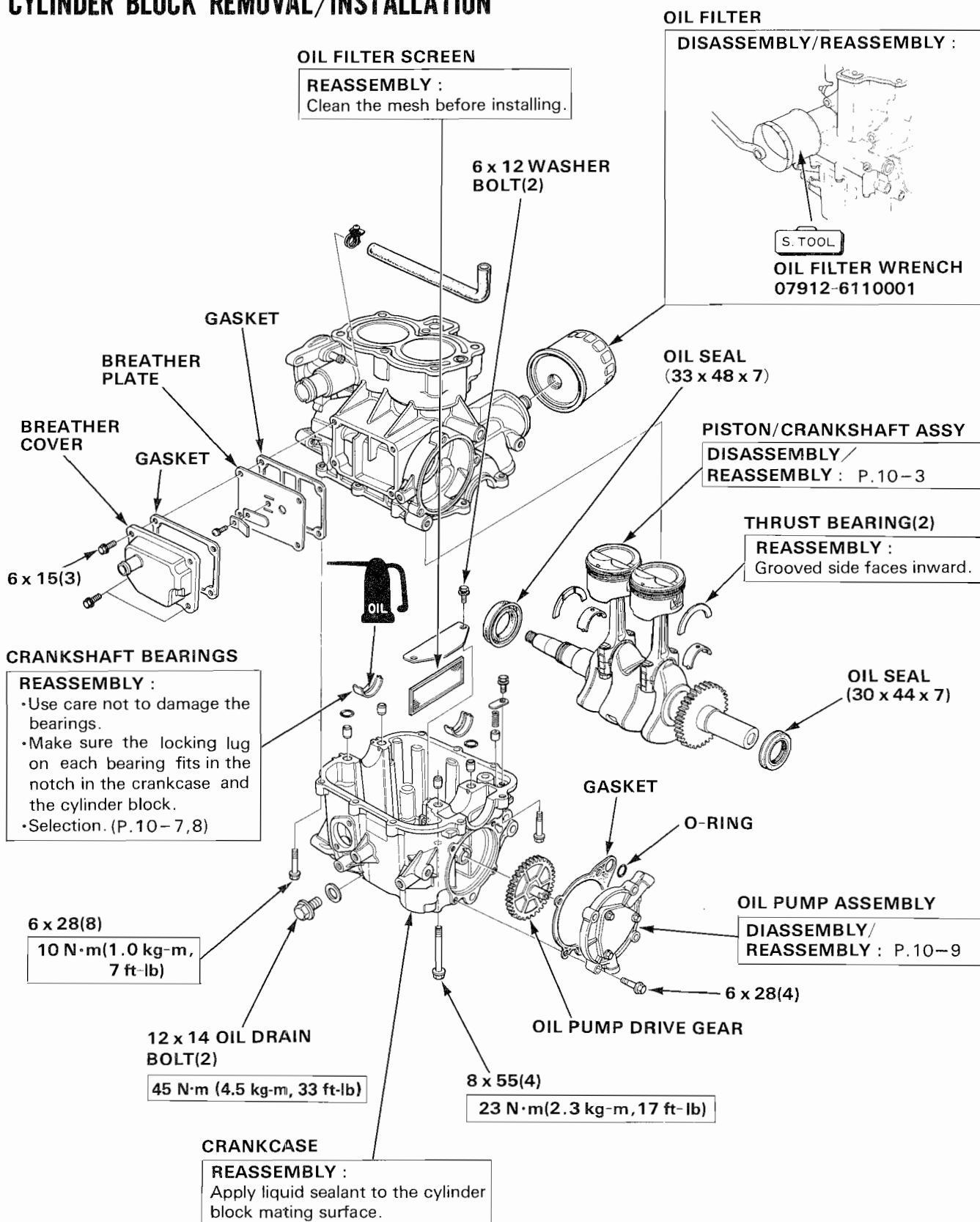




CYLINDER BLOCK/  
CRANKSHAFT/PISTON

CYLINDER BLOCK REMOVAL/ INSTALLATION .....	10-2
PISTON DISASSEMBLY/ REASSEMBLY .....	10-3
INSPECTION.....	10-4
BEARING SELECTION .....	10-7
OIL PUMP .....	10-9

### CYLINDER BLOCK REMOVAL/INSTALLATION



### PISTON DISASSEMBLY/REASSEMBLY

#### REASSEMBLY NOTE

After installing both pistons and connecting rods in the cylinder block, secure the rods to the crankshaft.

#### TOP RING

**REASSEMBLY :**  
Chrome plated. Do not interchange with SECOND RING.

#### SECOND RING

#### OIL RING

**REASSEMBLY :**  
Space the side rail end gaps at least 20 mm (0.8 in) apart.

#### PISTON PIN

#### PISTON PIN CLIP

**REASSEMBLY :**  
Set one end of the clip into the groove in the piston and work the other end around in the groove using a pair of needle nosed pliers. Install so that the end gap does not face the notch in the piston.

#### PISTON RINGS

##### REASSEMBLY :

- Install the rings with the markings facing up.
- Stagger the ring end gaps 120° apart. Do not align with the piston pin or thrust sides.

#### "▲" MARK

#### PISTON

##### REASSEMBLY :

- Install the piston so that the "▲" mark is on the valve side.
- Use a commercially available piston ring compressor.

#### CONNECTING ROD

##### DISASSEMBLY :

Mark the rods so they can be installed in their original positions.

##### NOTE :

Apply oil when the rod and cap are installed.

#### CRANKSHAFT

#### CRANKSHAFT JOURNAL BEARING(4)

SELECTION : P.10-7

#### CONNECTING ROD BEARING(4)

SELECTION : P.10-8

#### CONNECTING ROD CAP(2)

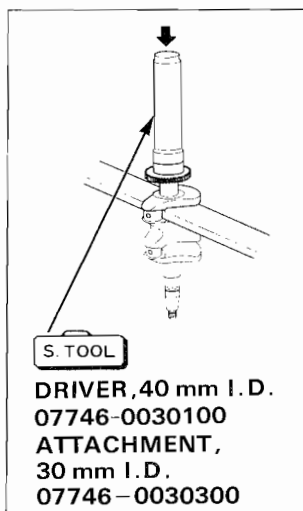
##### DISASSEMBLY :

Mark the rod caps so they can be reinstalled in their original positions.

##### REASSEMBLY :

Align the ribs of the connecting rods and caps.

#### OIL PUMP DRIVE GEAR



#### CONNECTING ROD 7 mm CAP NUT(4)

22 N·m (2.2 kg·m, 16 ft·lb)

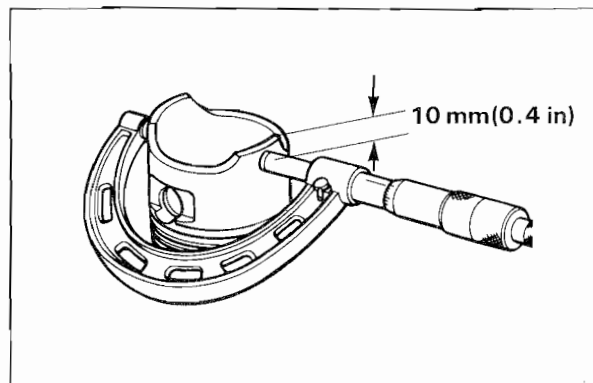
### INSPECTION

For pistons, crankshaft, and cylinder inspection, measure the following. If need be, replace them.

#### ● PISTON SKIRT O. D.

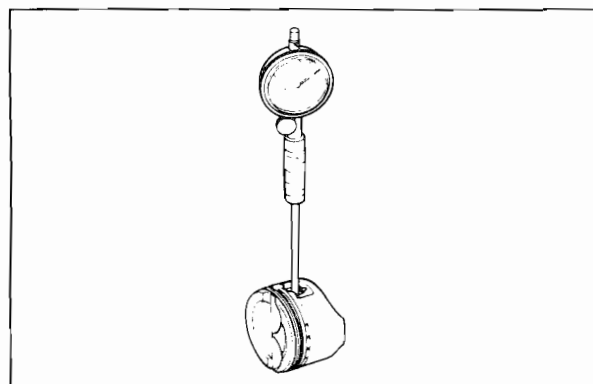
Measure and record the piston O. D. at a point 10 mm (0.4 in) from the bottom, and 90° to the piston pin bore.

STANDARD	SERVICE LIMIT
57.960–57.990 mm (2.2819–2.2831 in)	57.9 mm (2.280 in)



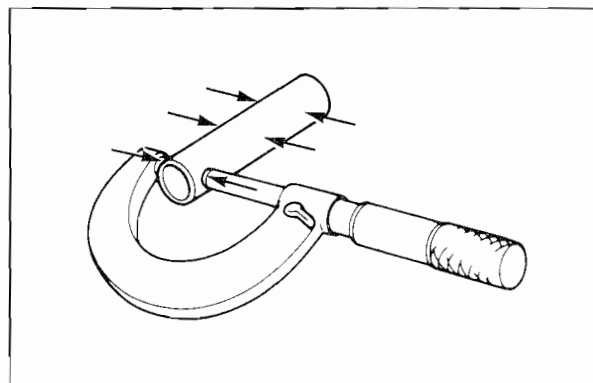
#### ● PISTON PIN HOLE I. D.

STANDARD	SERVICE LIMIT
14.005 mm (0.5514 in)	14.055 mm (0.5533 in)



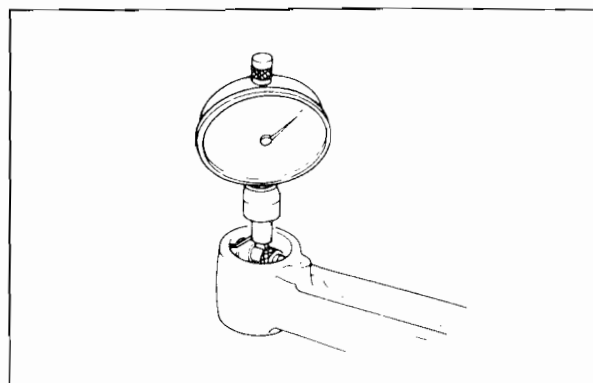
#### ● PISTON PIN O. D.

STANDARD	SERVICE LIMIT
14.000 mm (0.5512 in)	13.954 mm (0.5494 in)



#### ● CONNECTING ROD SMALL END I. D.

STANDARD	SERVICE LIMIT
14.016 mm (0.552 in)	14.070 mm (0.554 in)

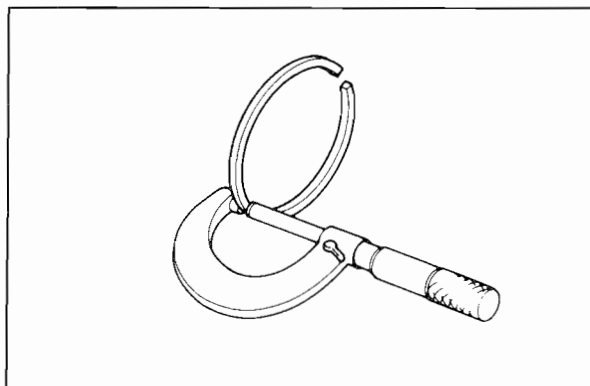


# HONDA

## H4514H

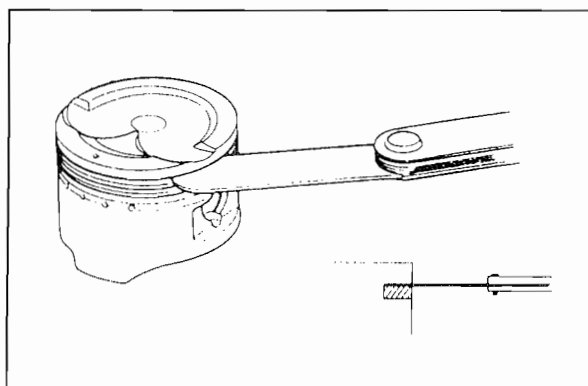
### ● PISTON RING WIDTH

	STANDARD	SERVICE LIMIT
TOP/ SECOND	1.19 mm (0.047 in)	1.10 mm (0.043 in)



### ● PISTON RING SIDE CLEARANCE

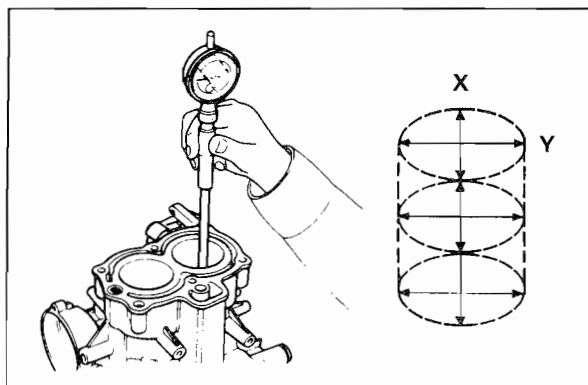
	STANDARD	SERVICE LIMIT
TOP/ SECOND	0.03 mm (0.001 in)	0.17 mm (0.007 in)



### ● CYLINDER I. D.

Measure and record the cylinder I. D. at three levels in both X and Y axis. Take the maximum reading to determine the cylinder wear.

STANDARD	SERVICE LIMIT
58.000–5.8015 mm (2.2835–2.2841 in)	58.100 mm (2.2874 in)

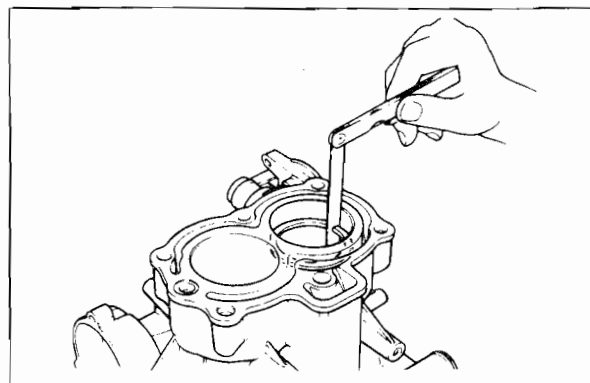


### ● PISTON-TO-CYLINDER CLEARANCE

STANDARD	SERVICE LIMIT
0.01–0.05 mm (0.0004–0.002 in)	0.10 mm (0.004 in)

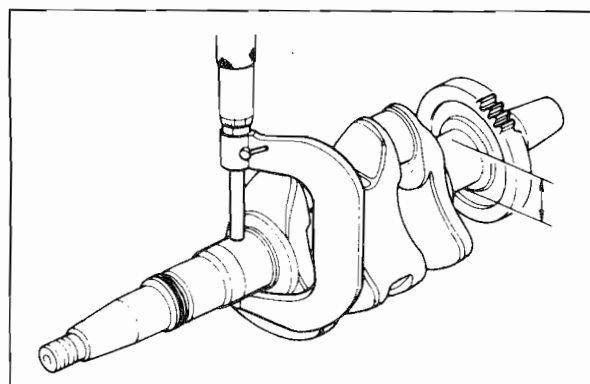
### ● PISTON RING END GAP

	STANDARD	SERVICE LIMIT
TOP/ SECOND	0.2 mm (0.008 in)	0.6 mm (0.024 in)



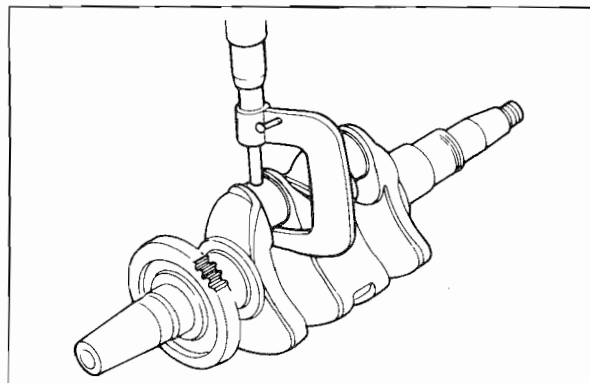
### ● CRANKSHAFT MAIN JOURNAL O. D.

STANDARD	SERVICE LIMIT
33.009 mm (1.2996 in)	32.96 mm (1.298 in)



### ● CRANKPIN O. D.

STANDARD	SERVICE LIMIT
32.000 mm (1.2598 in)	31.95 mm (1.258 in)



### ● CONNECTING ROD BIG END OIL CLEARANCE

1. Clean all oil from the crankpin and connecting rod bearing surfaces.
2. Place a piece of plastigauge on the crankpin, install the connecting rod and cap and tighten the nuts.

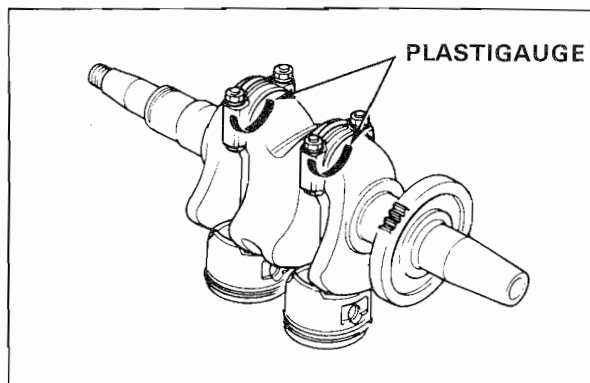
**TORQUE : 22 N·m (2.2 kg-m, 16 ft-lb)**

#### NOTE

- Do not rotate the crankshaft while the plastigauge in place.

3. Remove the connecting rod and measure the plastigauge.

STANDARD	SERVICE LIMIT
0.025 mm (0.0010 in)	0.045 mm (0.002 in)

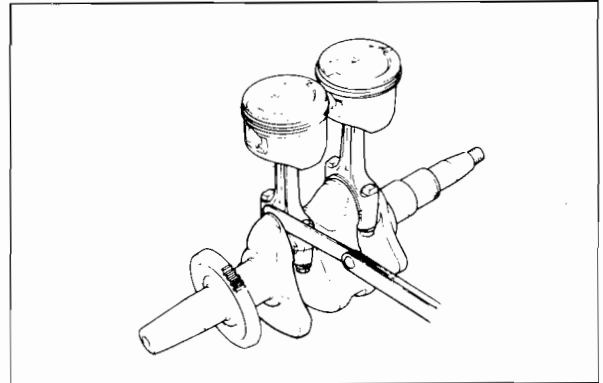


### ● CONNECTING ROD BIG END AXIAL CLEARANCE

#### NOTE

- Measure the clearances with a feeler gauge.

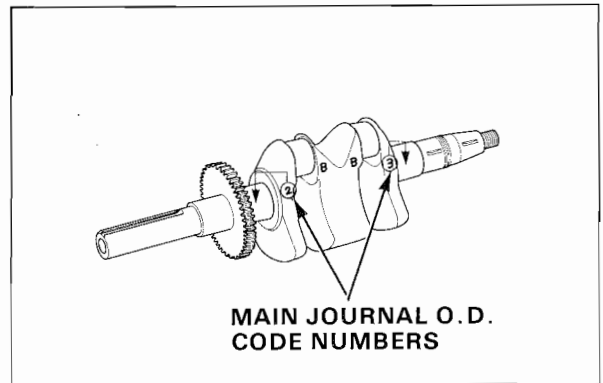
STANDARD	SERVICE LIMIT
0.10 mm (0.004 in)	0.30 mm (0.012 in)



## BEARING SELECTION

### a. CRANKSHAFT JOURNAL

Record the crankshaft main journal O. D. code numbers (or measure the main journal O. D.).

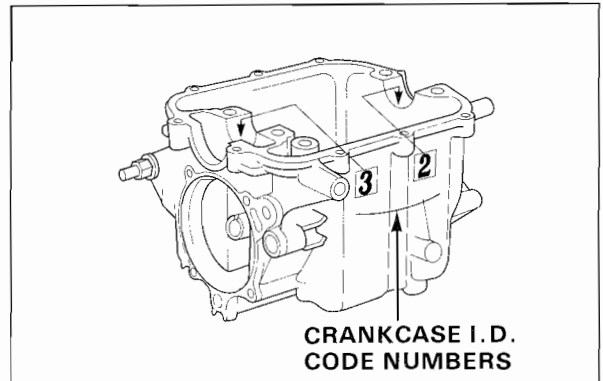


Record the crankcase I. D. code numbers.

#### NOTE

- Numbers on the crankcase are the codes for main journal I. D. s from front to rear.

Cross reference the case and journal codes to determine the replacement bearing color code.



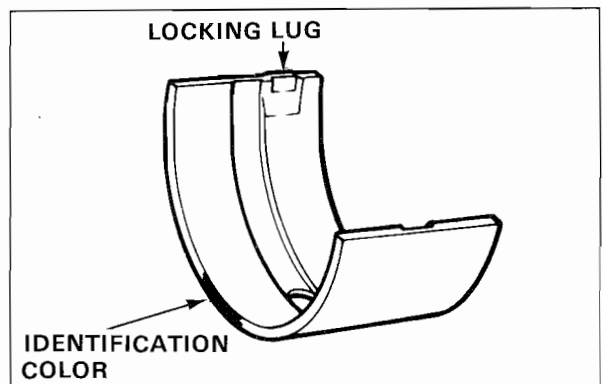
STANDARD OIL CLEARANCE	0.02–0.04 mm (0.0008–0.002 in)
------------------------	-----------------------------------

Crankshaft O.D. 33 φ		Mark 1	Mark 2	Mark 3
Crankcase I. D. 36 φ		+0.018 +0.012	+0.012 +0.006	+0.006 0
Mark 1	0 +0.006	RED	YELLOW	GREEN
Mark 2	+0.006 +0.011	YELLOW	GREEN	BROWN
Mark 3	+0.011 +0.016	GREEN	BROWN	BLACK

### REASSEMBLY :

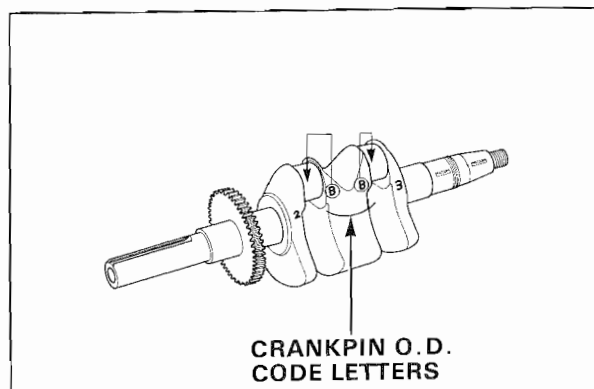
Make sure the locking lug on each bearing fits in the notch in the bearing saddle.

Be careful not to damage the bearings.

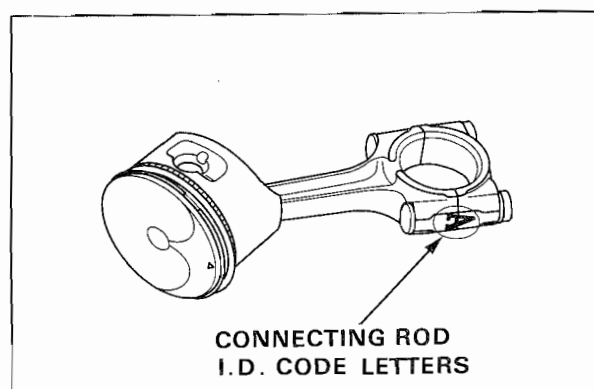


### b. CONNECTING ROD

Record the crankpin O. D. code letters (or measure the crankpin journal O. D.)

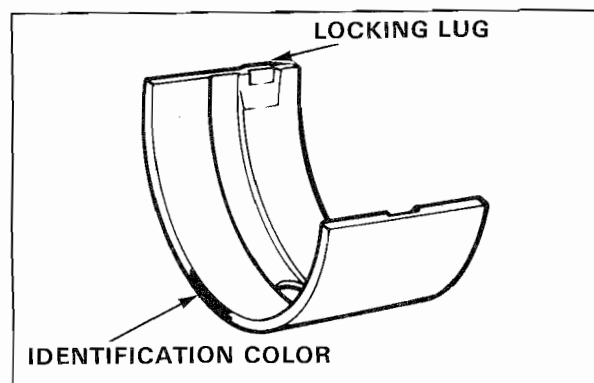


Record the connecting rod I.D. code letters or measure the I. D. with the bearing cap installed without bearing inserts.



Cross-reference the crankpin and rod codes to determine the replacement bearing color.

Connecting rod I.D. 35 $\phi$		Mark A	B	C
Crank pin O.D. 32 $\phi$		0 +0.008	+0.008 +0.016	+0.016 +0.024
	Mark A +0.014 +0.006	RED	YELLOW	GREEN
B +0.006 -0.002	YELLOW	GREEN	BROWN	
C -0.002 -0.010	GREEN	BROWN	BLACK	



### REASSEMBLY :

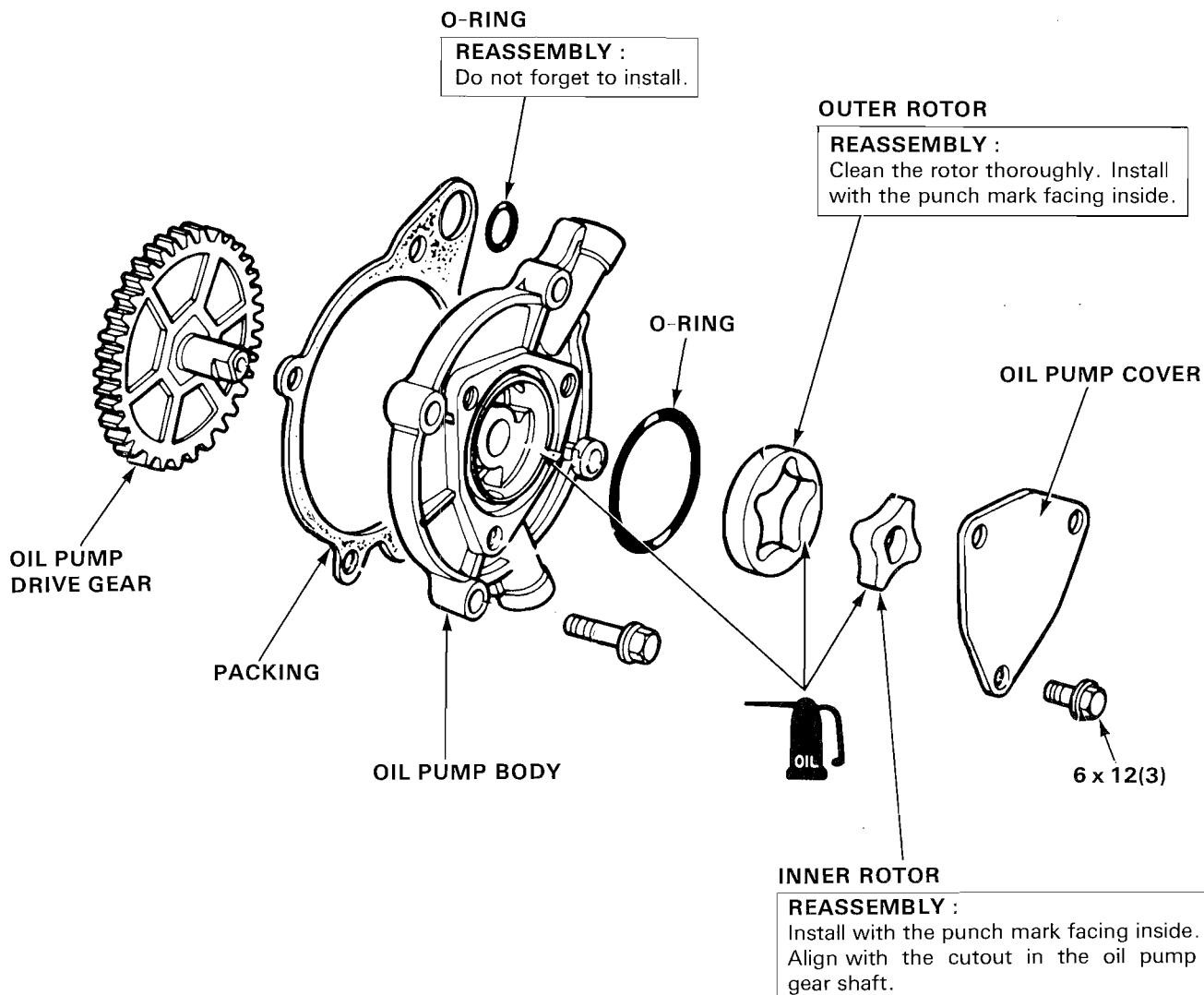
Be careful not to damage the bearings.

Make sure the locking lug on each bearing fits into the notch in the connecting rod.



### OIL PUMP

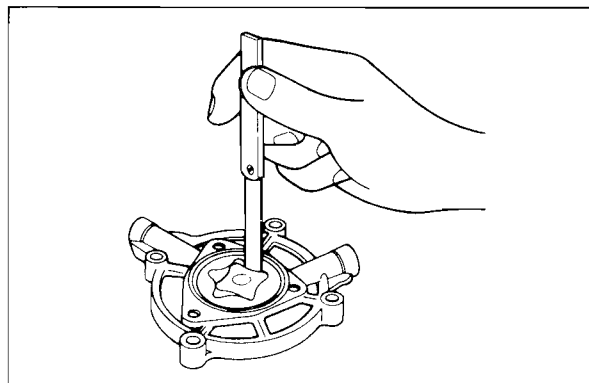
#### a. DISASSEMBLY/REASSEMBLY



#### b. INSPECTION

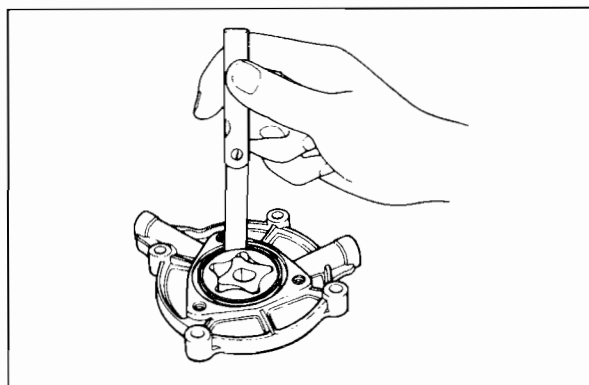
##### ● TIP CLEARANCE

STANDARD	SERVICE LIMIT
0.15 mm (0.006 in)	0.30 mm (0.012 in)



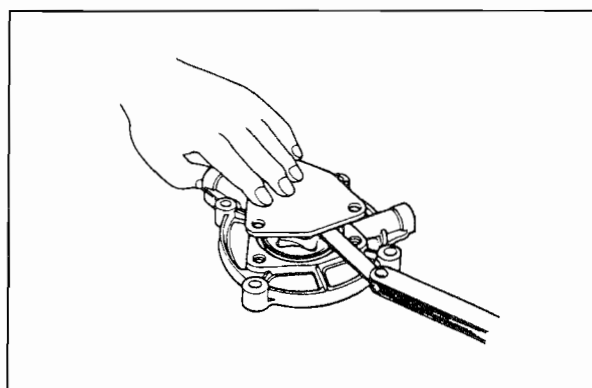
### ● OUTER ROTOR CLEARANCE

STANDARD	SERVICE LIMIT
0.12–0.22 mm (0.005–0.009 in)	0.30 mm (0.012 in)



### ● ROTOR-TO-BODY SIDE CLEARANCE

STANDARD	SERVICE LIMIT
0.04–0.09 mm (0.0016–0.0035 in)	0.11 mm (0.0043 in)



## MOWER DECK

### MOWER DECK REMOVAL/

INSTALLATION .....	11-2
BLADE .....	11-3
MOWER DECK DRIVE BELT .....	11-8
BLADE V-BELT/DRIVEN PULLEY .....	11-10

### MOWER DECK REMOVAL/ INSTALLATION

#### ⚠ WARNING

- Remove the ignition key and disconnect the spark plug caps to prevent accidental start-up.

#### REMOVAL

1. Move the P. T. O. clutch lever to "OFF" (disengaged) and lower the mower deck.
2. Loosen the wing nut and loosen the belt tension adjusting knob.  
Remove the mower deck drive belt (P. 11—8).
3. Remove the 14 mm (Yellow-colored) lock pins and washers to disconnect the front deck links from the mower deck.

#### CAUTION

- When the height adjusting lever is in the 1" position and mower deck is disconnected, the height adjusting lever will spring up quickly. Be sure to grasp the lever firmly when moving the lever.

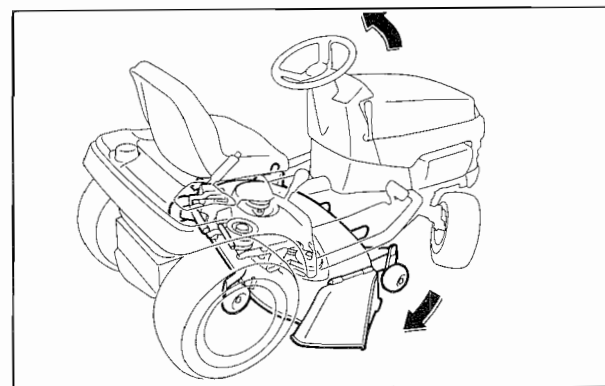
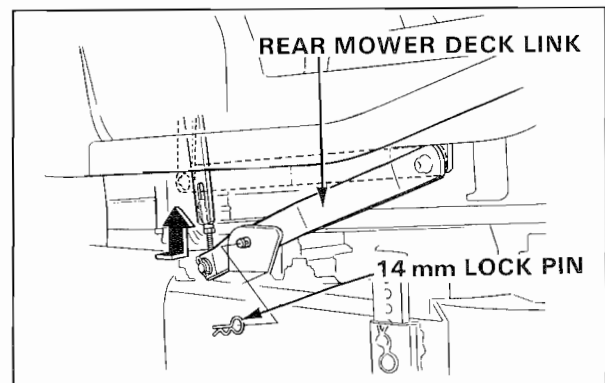
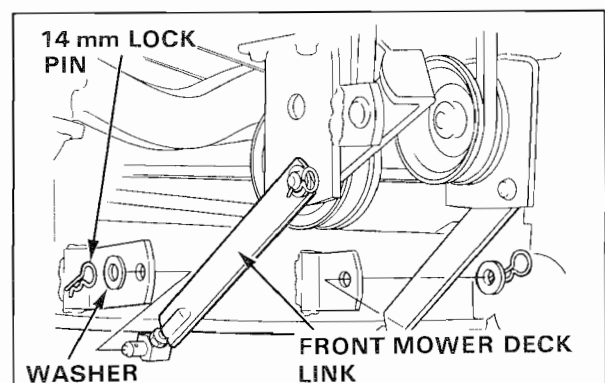
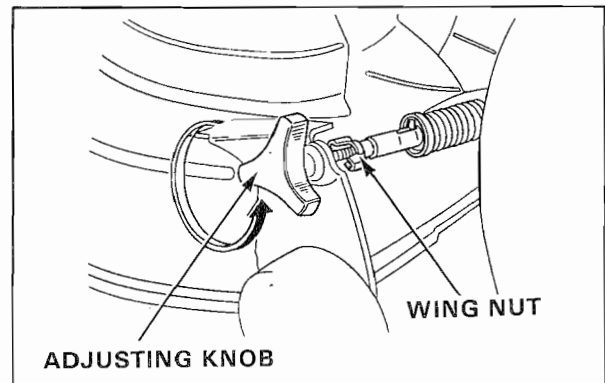
4. Remove the 14 mm (Yellow-colored) lock pins from the mower deck links.
5. Carefully return the height adjusting lever to the 4" position.
6. Turn the steering wheel fully to the left.
7. Remove the mower deck from the right side of the tractor.

#### NOTE

- To prevent damage to the mower deck and the links, be sure the height adjusting lever is in the 4" position before removing the deck.

#### INSTALLATION

Install the mower deck in the reverse order of removal.  
After installation, adjust the mower deck belt tensioner knob with the deck in the lowest position (1 1/2").  
Apply grease to the mower deck link pins.



### BLADE

#### a. DISASSEMBLY/REASSEMBLY

##### • 38 INCH MOWER DECK

##### ROTARY BLADE(2)

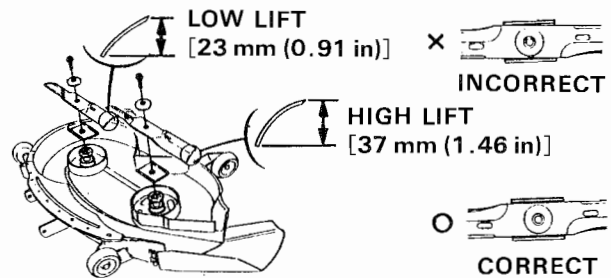
**INSPECTION/BLADE SHARPENING :**  
P. 11-5, 6

##### DISASSEMBLY :

- Remove the mower deck (page 11-2).

##### REASSEMBLY:

- Install the right and left rotary blades correctly as shown.  
Do not interchange left and right blades.  
Rotary blade height :  
Left : Low lift blade 23 mm (0.91 in)  
Right : High lift blade 37 mm (1.46 in)
- Install the rotary blades parallel to blade holder B.



##### BLADE WASHER (2)

##### REASSEMBLY:

Install the washer with the side marked "INSIDE" facing the blade.



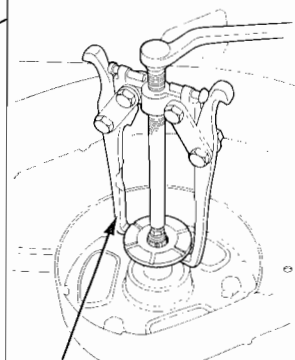
**10 x 28(2)  
BLADE BOLT**

**60 N·m (6.0 kg·m, 43 ft·lb)**

**LEFT  
ROTARY BLADE**

##### BLADE HOLDER A(2)

Remove the holder using the universal puller.



**BLADE HOLDER B(2)**

**BLADE HOLDER  
WASHER(2)**

**20 mm THRUST  
WASHER(2)**

**MOWER DECK**

**JOINT PIN(2)**

**ROLLER HEIGHT  
ADJUSTING  
STAY(2)**

**WASHER**

**FRONT ANTI-SCALP ROLLER BOLT(2)**

**50 N·m (5.0 kg·m, 36 ft·lb)**

**WASHER(2)**

**LOCK PIN(2)**

**RIGHT ROTARY BLADE**

**ANTI-SCALP  
ROLLER(4)**

**ANTI-SCALP  
ROLLER BOLT(2)**

**DISCHARGE  
CHUTE**

**8 mm FLANGE NUT(2)**

### • 42 INCH MOWER DECK

Remove the mower deck (P. 11-2).

#### BLADE WASHER (2)

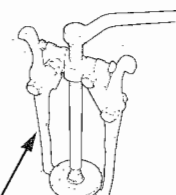
**REASSEMBLY:**  
Install the washer with the side marked "INSIDE" facing the blade.



10 x 28(3)  
BLADE BOLT  
6.0 N·m (6.0 kg-m, 43 ft-lb)

#### BLADE HOLDER A(3)

Remove the holder using the universal puller.



UNIVERSAL PULLER

ROTARY BLADE(3)

BLADE HOLDER B(3)

BLADE HOLDER  
WASHER(3)

20 mm THRUST  
WASHER(3)

COLLAR

JOINT PIN(2)

ROLLER HEIGHT  
ADJUSTING  
STAY(2)

WASHER(2)

WASHER(2)

FRONT ANTI-SCALP  
ROLLER BOLT(2)

50 N·m (5.0 kg-m, 36 ft-lb)

MOWER DECK

ANTI-SCALP  
ROLLER(4)

ANTI-SCALP  
ROLLER BOLT(2)

DISCHARGE CHUTE

8 mm FLANGE NUT(2)

LOCK PIN

### b. CUTTING BLADE

#### ● INSPECTION

##### ▲WARNING

- To avoid severe personal injury, remove the ignition key and disconnect the spark plug cap to prevent accidental starting ; wear heavy gloves to protect your hands from the rotary blade.

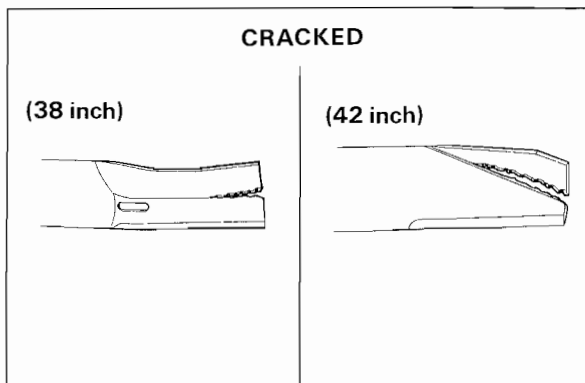
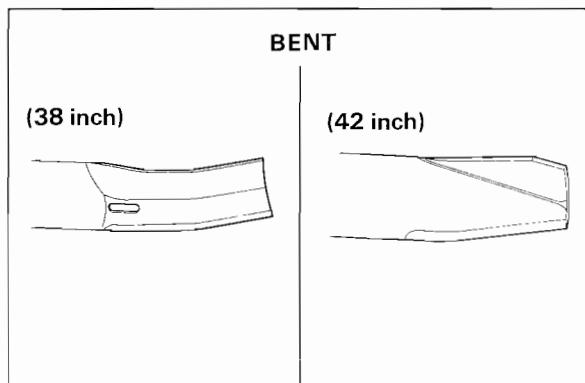
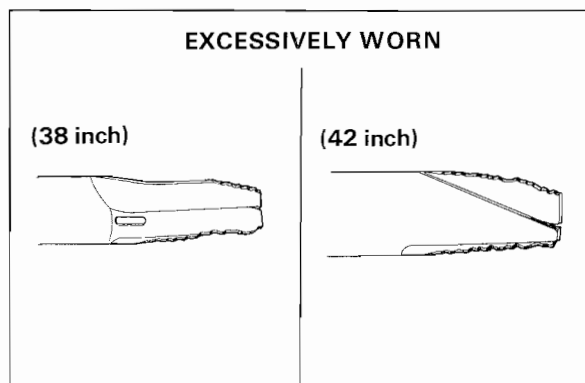
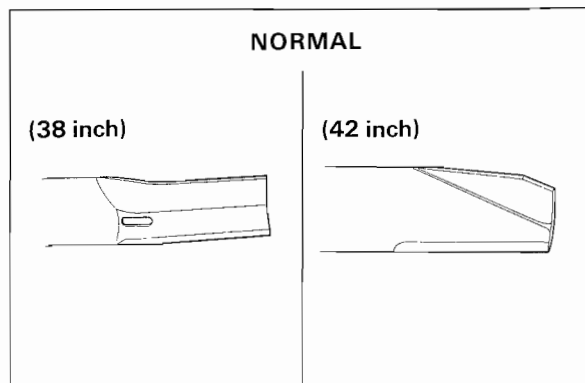
1. Remove the mower deck from the lawn tractor. See page 11—2.
2. Turn the mower deck upside down, and inspect the blade for signs of wear or damage. A blade that is worn out, bent, cracked, or otherwise damaged must be replaced. A dull blade can be sharpened. See page 11—6.

##### ▲WARNING

- Severe personal injury can result if a piece of blade breaks off and is thrown from under the mower deck during operation.
- Never operate the lawn tractor with a worn or damaged blade.
- Never operate the lawn tractor with a blade that is cracked or notched at the base of its upturned rear edge.

#### CAUTION

- Use a genuine Honda replacement blade.



### ● BLADE SHARPENING

#### ▲ WARNING

- To avoid severe personal injury, remove the ignition key and disconnect the spark plug cap to prevent accidental starting ; wear heavy gloves to protect your hands from the rotary blade.
- Severe personal injury can result if a piece of blade breaks off and is thrown from under the mower deck during operation. Never operate the lawn tractor with a blade that is excessively worn or that is bent, cracked, or otherwise damaged. See page 11—5.

#### CAUTION

- To avoid severe personal injury during any blade shaping operation, always wear eye and face protection.

1. Hold the blade firmly, and remove the blade bolt and blade washer.
2. Remove the blade from the blade holder B.
3. Grind or file the blade no more than is necessary to remove nicks and to restore straight, sharp cutting edges that are even with the lower surface of the blade.

#### NOTE

- Grind or file the upper surface of the blade only. The cutting edge must be even with the lower surface of the blade.
- Taper the blade profile, with the maximum amount of material removed at the blade tip and no material removed at the inner end of the cutting surface.

#### CAUTION

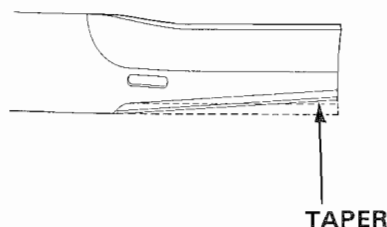
- Grinding or filing a step in the blade can create a weak point, causing cracks to develop during tractor operation.

- Maintain the original blade bevel angle ( $30^{\circ}\sim 40^{\circ}$ ) while sharpening. Do not alter the angle.
- Remove equal amounts of material from both cutting edges to preserve blade symmetry and balance.

DULL CUTTING EDGE



CORRECT SHARPENING

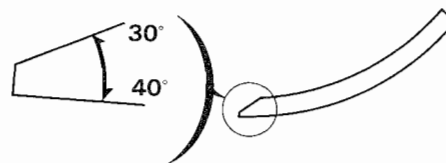


INCORRECT SHARPENING



STEP

SHARPEN AT ORIGINAL ANGEL

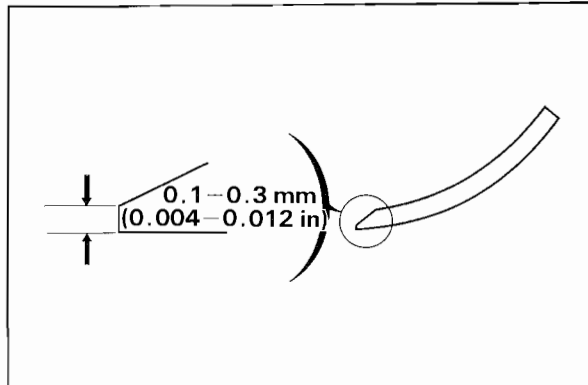




# HONDA

## H4514H

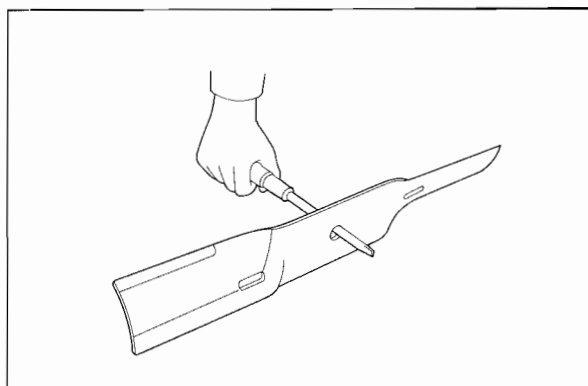
4. After scarping, dress the cutting edges with a file, so they will not be razor-sharp. Razor-sharp edges will easily chip and will quickly become dull. The blade should be 0.1~0.3 mm (0.004-0.012 in) thick at the cutting edges.



5. Test blade balance by placing the clean, sharpened blade on a screwdriver, as shown. A balanced blade will stay horizontal. If one end of the blade dips, grind or file the heavy end until good balance is achieved.

### CAUTION

- An unbalanced blade will cause abnormal vibration and may eventually damage the mower deck.



6. Clean dirt and grass from around the blade holder and the inside of the mower deck.
7. Install the blade holder, blade, blade washer, and blade bolt.

### NOTE

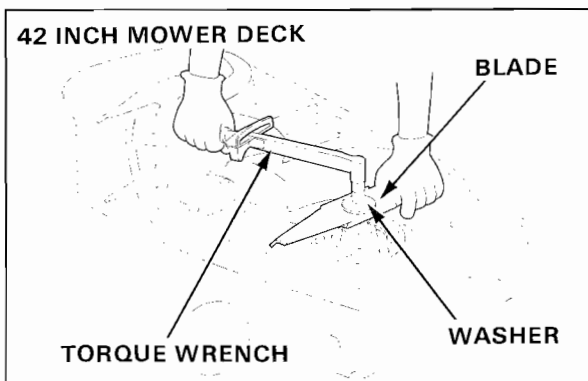
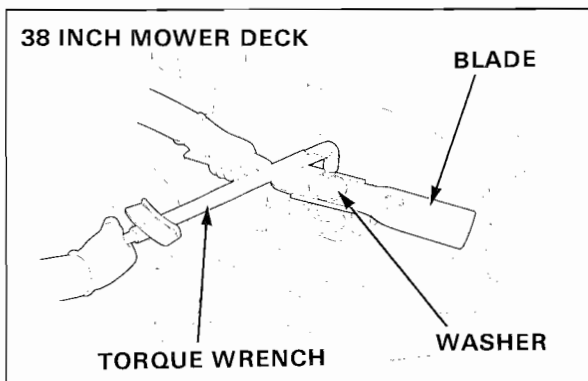
- Left and right blade on the 38" mower deck are not interchangeable.

Hold the blade firmly, and tighten the blade bolts to the specified torque.

**TORQUE : 60 N·m (6.0 kg-m, 43 ft-lb)**

### CAUTION

- Be sure the blade is properly aligned with the blade holder before tightening the blade bolt. Do not allow the blade to overlap the edge of the holder.
- Install the washer with the side marked "INSIDE" facing the blade.
- The blade bolt and washer are specially designed for this application and must not be replaced with any other bolt or washer.



### MOWER DECK DRIVE BELT

#### a. REPLACEMENT

##### **WARNING**

- Never attempt to change drive belts while the engine is running. Remove the ignition key from the ignition and disconnect the spark plug caps to prevent accidental start up.

##### **CAUTION**

- Wear heavy gloves to protect your hands when replacing belts or when working with the blades.
- If the tractor has been running, the engine, muffler and radiator will be very hot. Allow them to cool before proceeding.

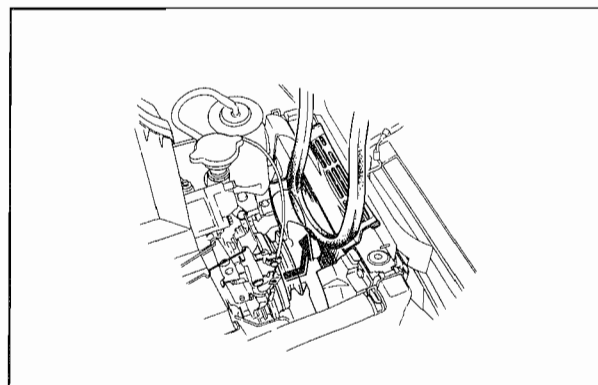
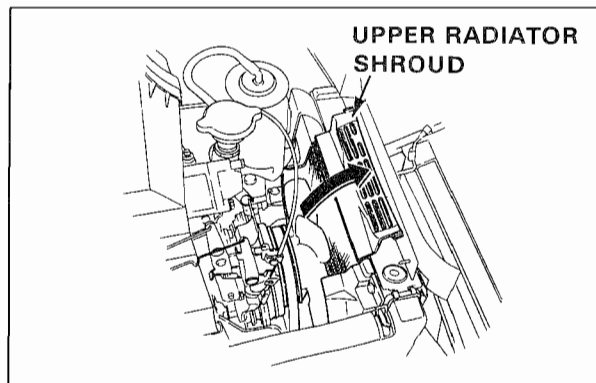
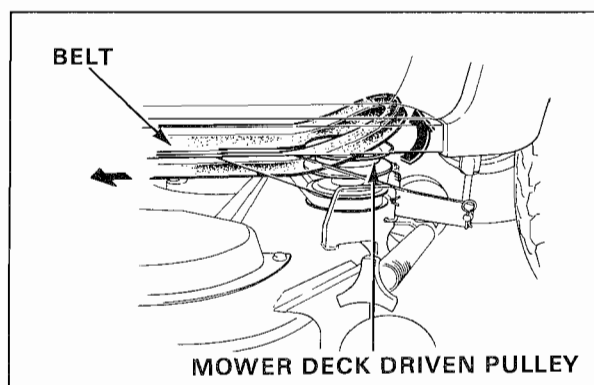
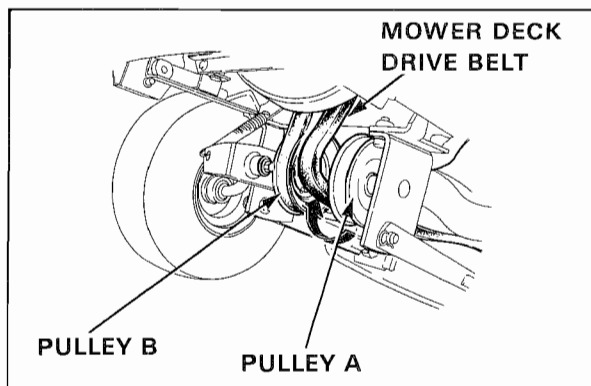
1. Lower the mower deck.
2. Loosen wing nut and the belt tension adjusting knob.
3. Remove the belt from the pulley A and pulley B.
4. Remove the belt from the mower deck driven pulley.

5. Open the engine hood.
6. Open the upper radiator shroud.

7. Remove the belt through the top by first lifting the belt up, and then sliding it sideways toward the radiator as shown.
  8. Install the drive belt in the reverse order of removal.
- After installation, adjust the drive belt tension adjustment.

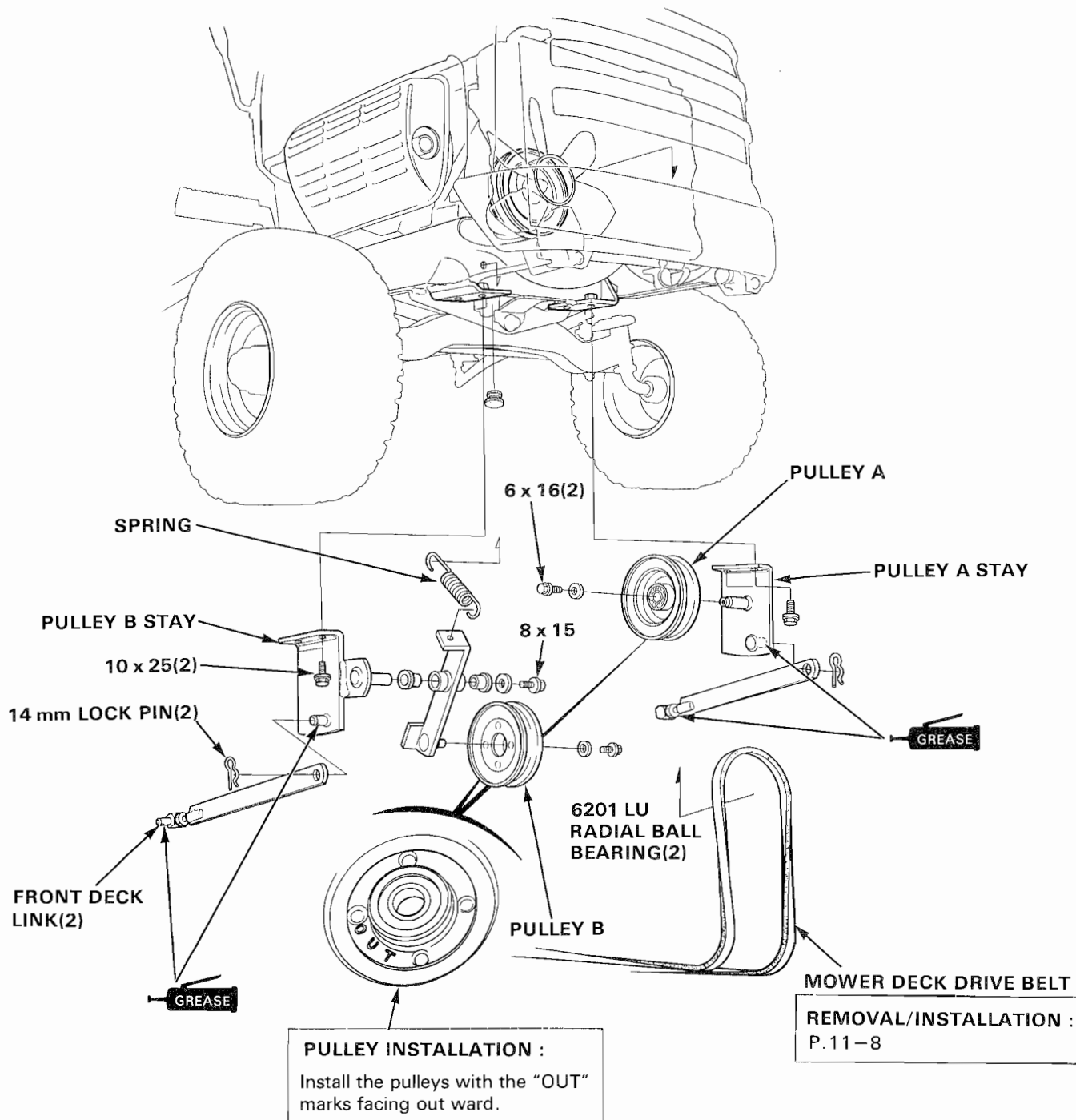
##### **NOTE**

- After installing the belt and adjusting the belt tension, start the engine and shift the P. T. O. clutch lever into ON and OFF to be sure that it operates properly.



### b. IDLE PULLEY DISASSEMBLY/REASSEMBLY

1. Remove the mower deck drive belt (P. 11-8).



## BLADE V-BELT/DRIVEN PULLEY

### a. V-BELT REMOVAL/INSTALLATION

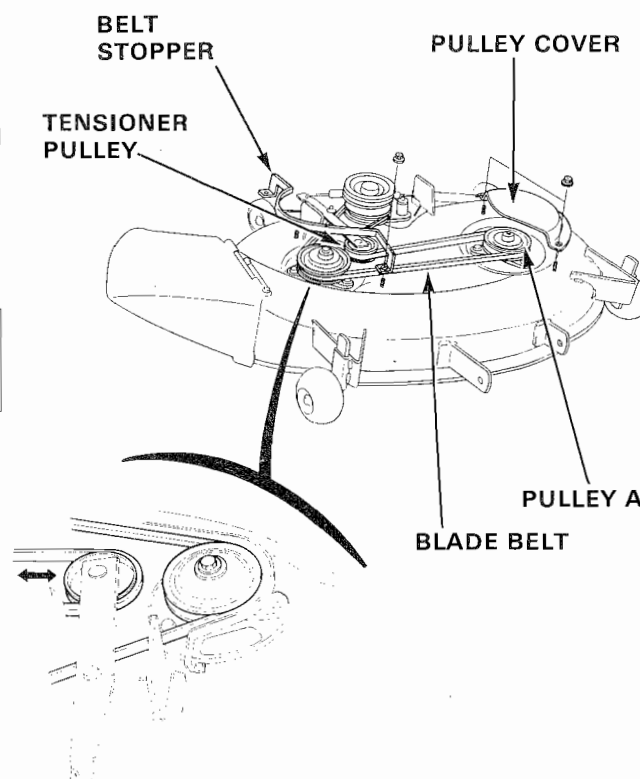
1. Lower the mower deck, remove the six 14 mm (Yellow-colored) lock pins and remove the mower deck (P. 11-2).
2. Remove the nuts and then remove the belt stopper and pulley covers.
3. Pull the belt off the pulley A, hold the belt securely and slowly release the tensioner pulley.

#### CAUTION

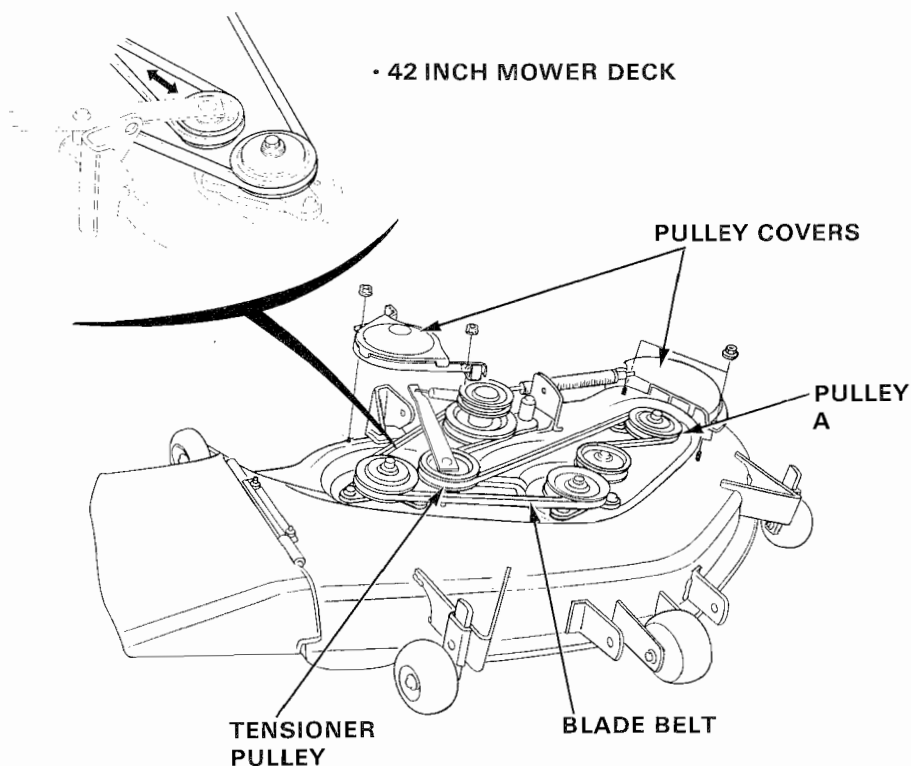
• Wear heavy gloves to protect your hands when replacing the blade belt, and do not put your hands between the pulleys.

4. Remove the belt from the other pulleys.
5. Install the belt in the reverse order of removal.

#### • 38 INCH MOWER DECK



#### • 42 INCH MOWER DECK

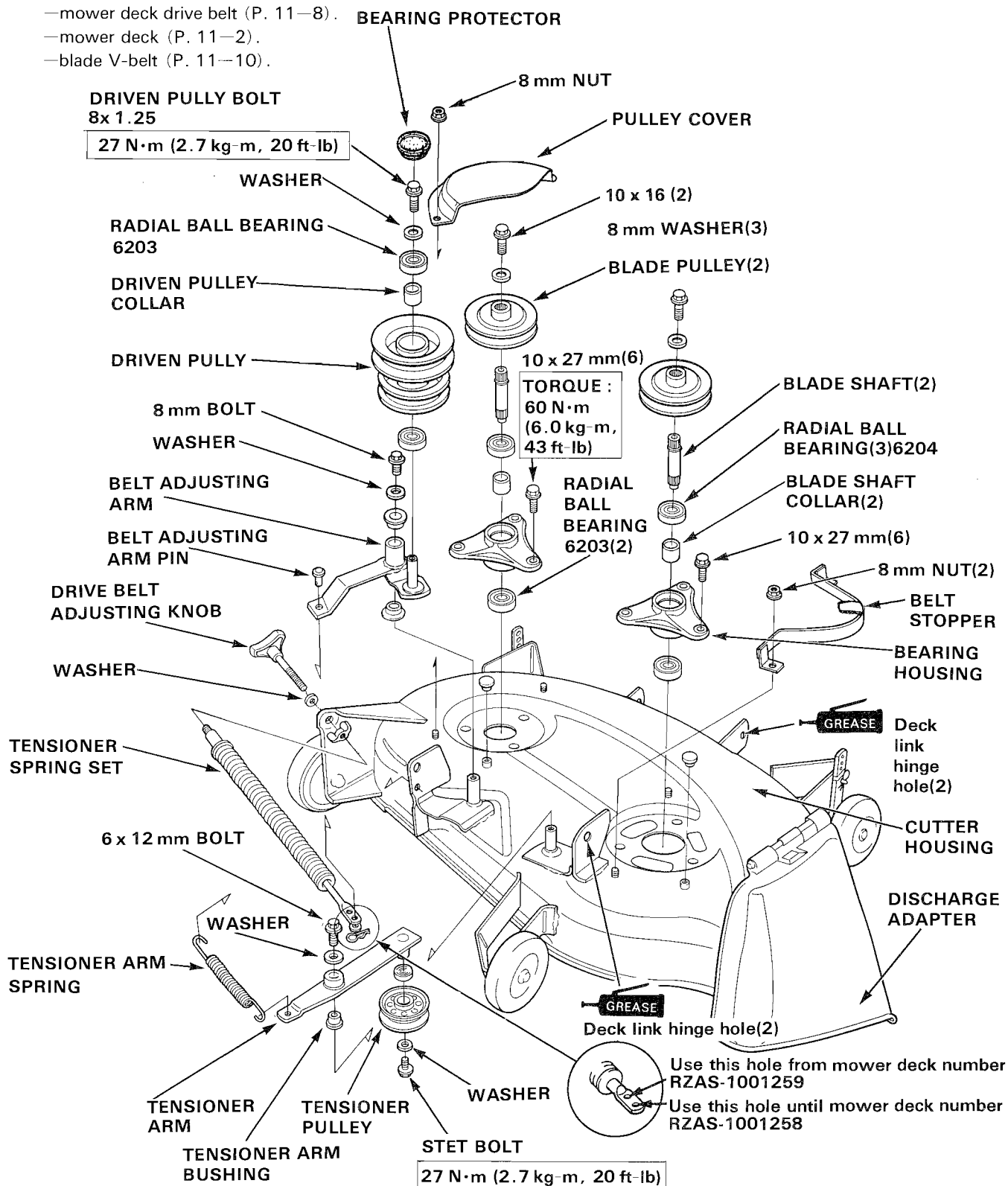


### b. DRIVEN PULLEY

#### ● 38 INCH MOWER DECK

1. Remove the following :

- mower deck drive belt (P. 11—8).
- mower deck (P. 11—2).
- blade V-belt (P. 11—10).

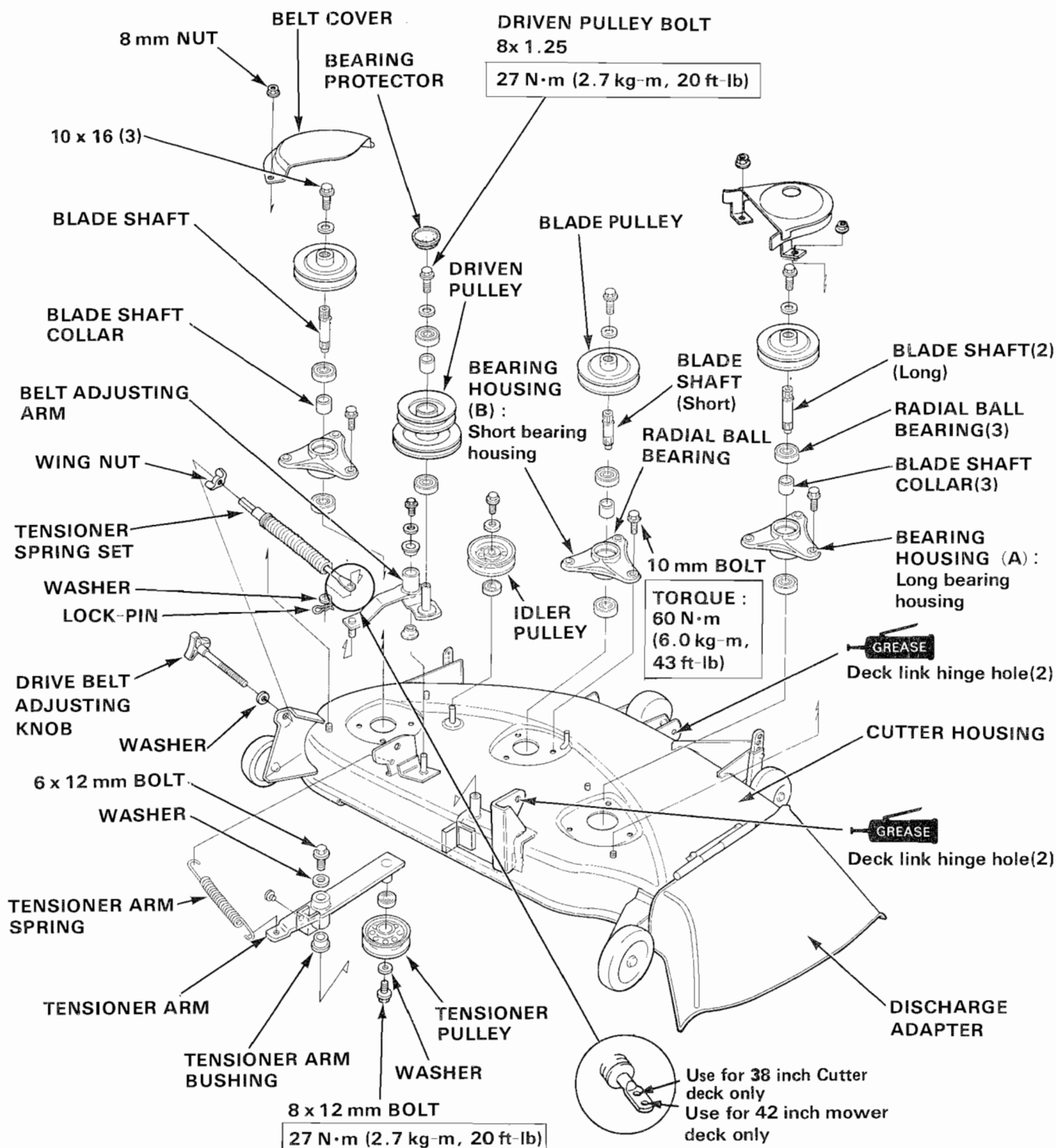


### ● 42 INCH MOWER DECK

1. Remove the following :
  - mower deck drive belt (P. 11—8).
  - mower deck (P. 11—2).
  - blade V-belt (P. 11—10).

#### CAUTION

- Do not interchange bearing housing (A) and (B).



## TRANSMISSION

TRANSMISSION REMOVAL .....	12-2
TRANSMISSION INSTALLATION .....	12-5
CONTROL SHAFT/TRANSMISSION	
FLUID RESERVOIR TANK .....	12-8
INPUT SHAFT .....	12-10
RIGHT TRANSMISSION CASE .....	12-12
RIGHT TRANSMISSION CASE/	
REAR DIFFERENTIAL/COUNTERSHAFT .....	12-14
CHARGE PUMP CASE .....	12-17
TRANSMISSION RELEASE VALVE/	
CHECK VALVE/SUCTION FILTER.....	12-18
PUMP CASE/MOTOR SHAFT/	
PUMP SHAFT/DISTRIBUTER PLATE .....	12-19
TRANSMISSION ASSEMBLY .....	12-22
AIR BLEEDING .....	12-28

### TRANSMISSION REMOVAL

1. Disconnect the battery and remove the following items :
  - Mower deck and deck lift rods (P. 11—2)
  - Seat and rear fender assembly (P. 15—9)
2. Remove the two 6 mm flange bolts from the rear of the floor board.
3. Chock the front wheel and jack up the rear of the tractor. Support the tractor with safety stands as shown.

#### NOTE

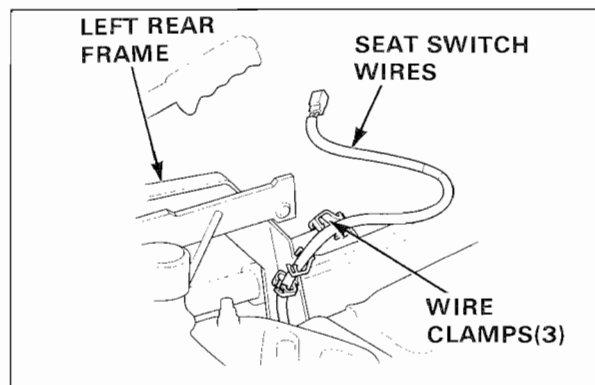
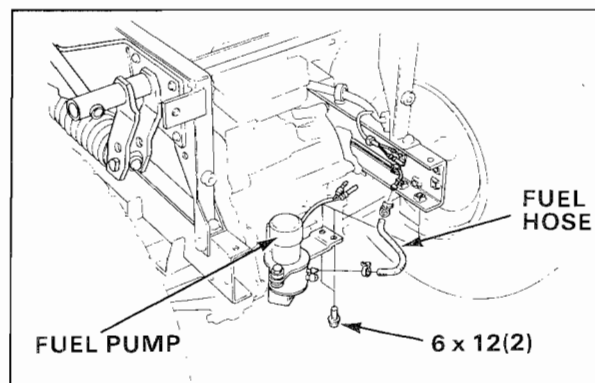
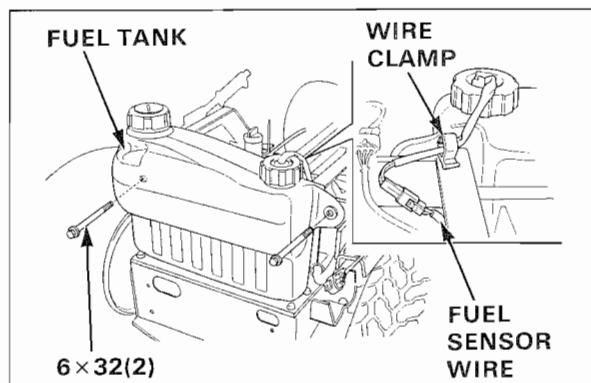
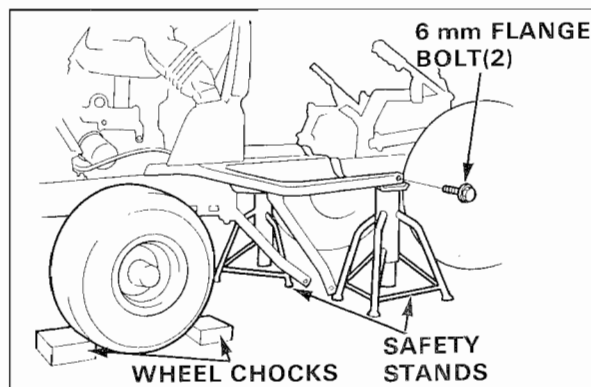
- Be sure to position the safety under the frame and not the floor board.

4. Remove the rear wheels (P. 14—4).

#### CAUTION

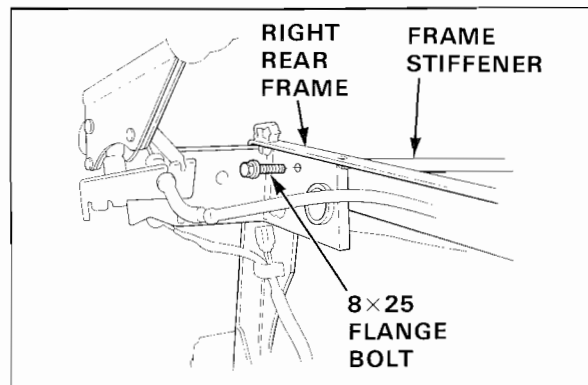
- Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in the area.

5. Remove the hitch plate and drain the fuel tank into an approved container.
6. Disconnect the fuel tank sensor wires and the fuel hose to the fuel pump, and remove the fuel tank.
7. Disconnect the fuel hose from the fuel pipe, and the fuel pump wires. Remove the fuel pump and fuel pump stay as an assembly.
8. Release the seat switch wire attached to the left rear frame.

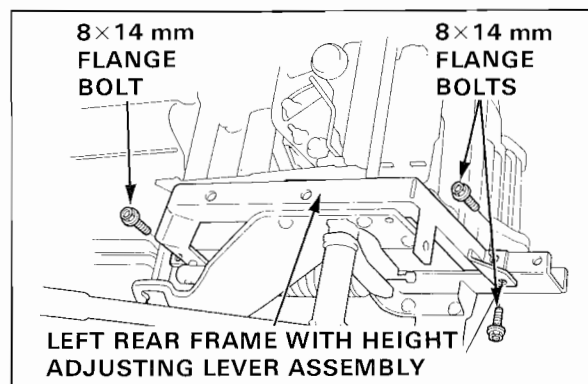




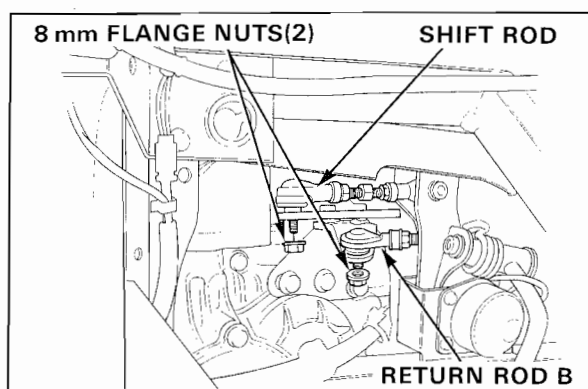
9. Remove the 8×25 mm flange bolt attaching the frame stiffener to the right rear frame.



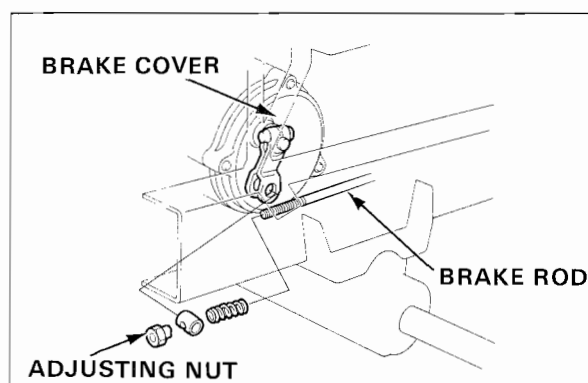
10. Remove the attaching 8×14 mm flange bolts on the left rear frame, and remove the left rear frame and height adjusting lever as an assembly.



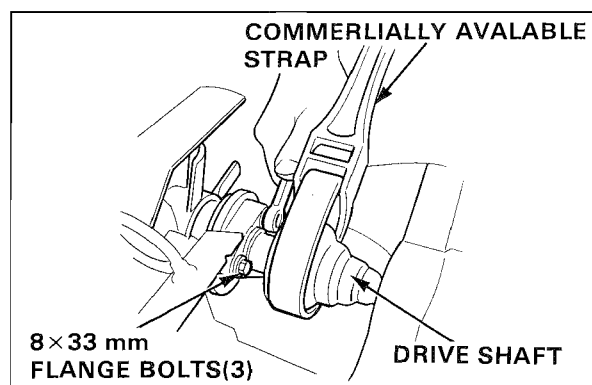
11. Remove the shift rod and return rod "B" from the transmission.



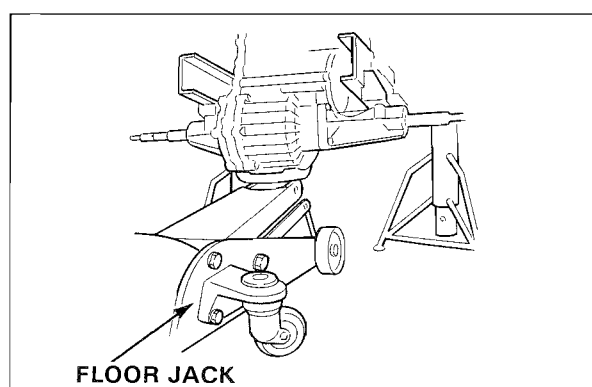
12. Remove the adjusting nut and brake rod from the brake arm.



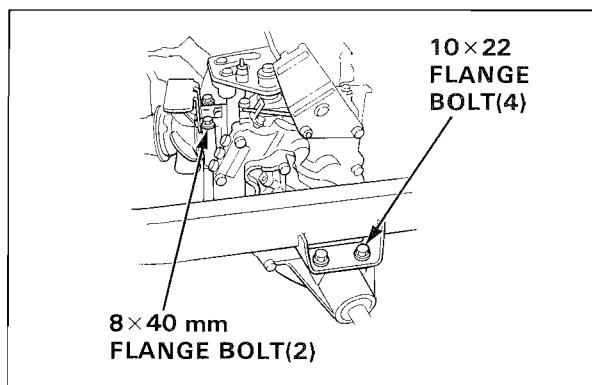
13. Using a commercially available strap wrench, hold the driveshaft and remove the three 8×33 mm flange bolts from the rear driveshaft joint.



14. Support the transmission with a floor jack, and remove the 8×40 mm and 10×22 mm mounting bolts.

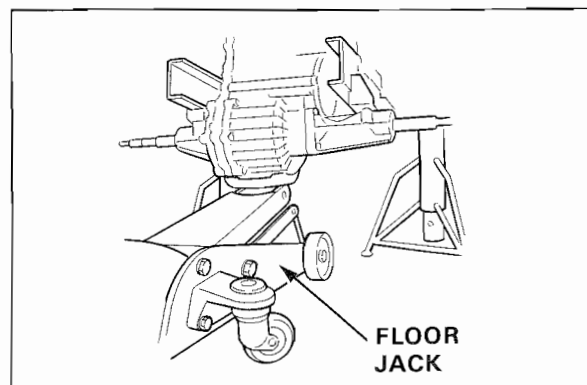


15. Slide the transmission towards the rear to remove it from the frame.



## TRANSMISSION INSTALLATION

1. Position the transmission in the frame and install the 8×40 mm and 10×22 mm flange bolts.

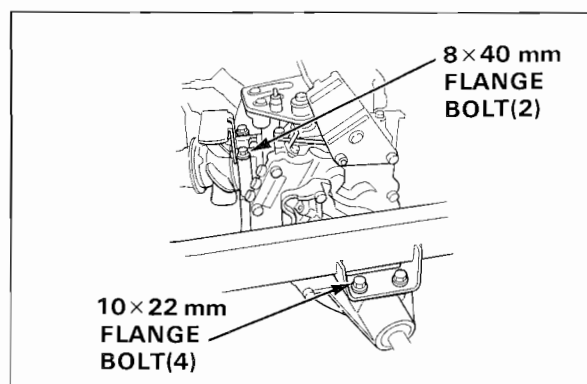


2. Tighten the bolts to the specified torque.

**TORQUE :**

10 mm flange bolt : 40 N·m (4.0 kg-m, 29 ft-lb)

8 mm flange bolt : 24 N·m (2.4 kg-m, 17 ft-lb)

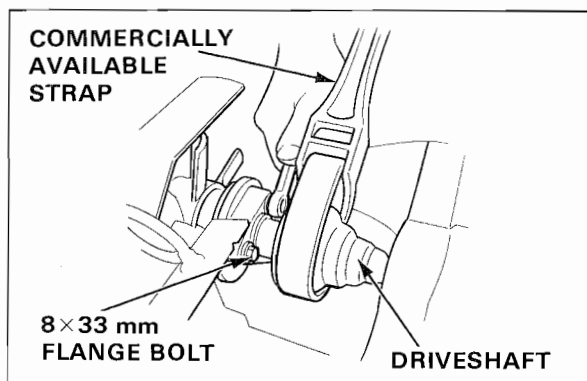


3. Connect the driveshaft and install the three 8×33 mm flange bolts.

4. Use a commercially available strap wrench to hold the driveshaft and tighten the bolts to the specified torque.

**TORQUE :**

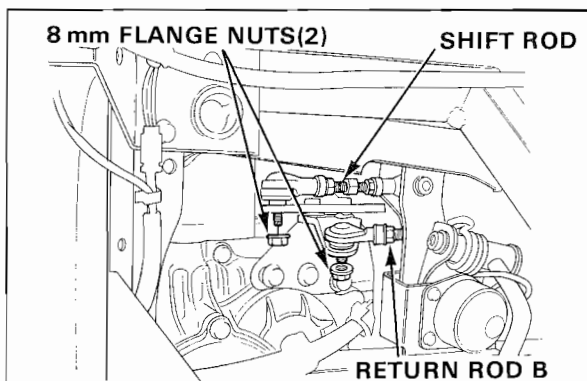
8 mm flange bolt : 27 N·m (2.7 kg-m, 20 ft-lb)



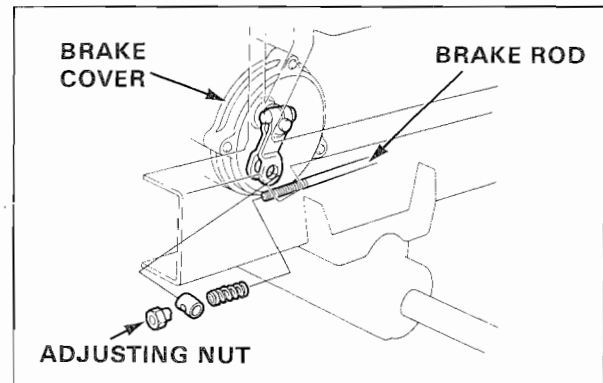
5. Install the shift rod and return rod "B" and tighten the nuts to the specified torque.

**TORQUE :**

8 mm flange nut : 22 N·m (2.2 kg-m, 16 ft-lb)



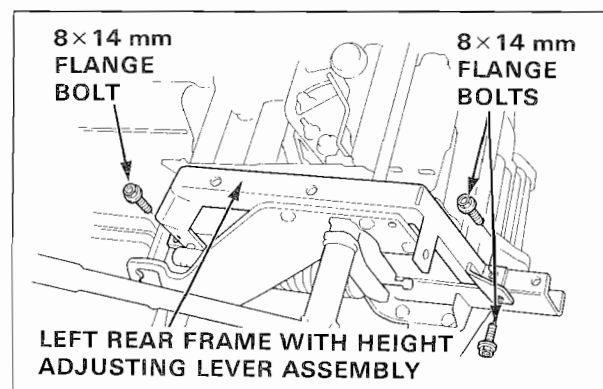
6. Install the brake rod into the brake arm and install the adjusting nut.



7. Install the left rear frame assembly and install the three 8×14 mm attaching bolts. Tighten the bolts to the specified torque.

**TORQUE :**

**8 mm flange bolt : 24 N·m (2.4 kg-m, 17 ft-lb)**

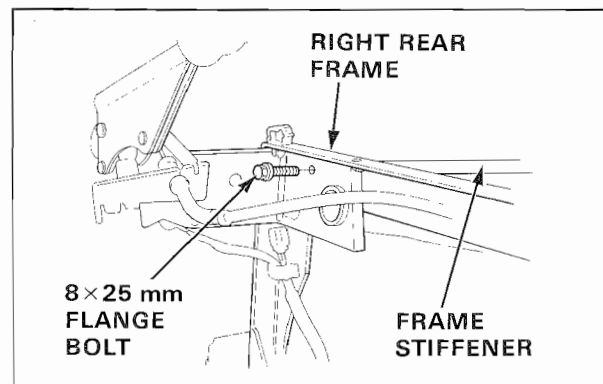


8. Install the 8×25 mm flange bolt through the right rear frame into the frame stiffener and tighten to the specified torque.

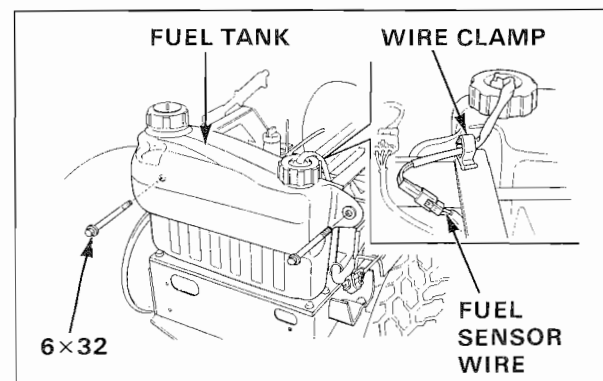
**TORQUE :**

**8 mm flange bolt : 24 N·m (2.4 kg-m, 17 ft-lb)**

9. Install the seat switch wires into the wire clamps along the left rear frame.



10. Install the fuel tank and fuel pump assemblies, and install the hitch plate.



# HONDA

## H4514H

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11. Install the rear wheel assemblies onto the rear axle. Install the wheel washers with the OUTSIDE mark facing out, and install the axle nuts. Tighten the axle nuts as follows :

Torque the axle nuts to 6.0 kg-m (43 ft-lb) and check for cotter pin hole alignment.

If the holes do not align, tighten as needed to align a hole.

### NOTE

- |   |
|---|
| • Do not loosen the axle nut to align a hole. |
|---|

12. Reinstall the rear fender and seat assembly (P. 15—9)

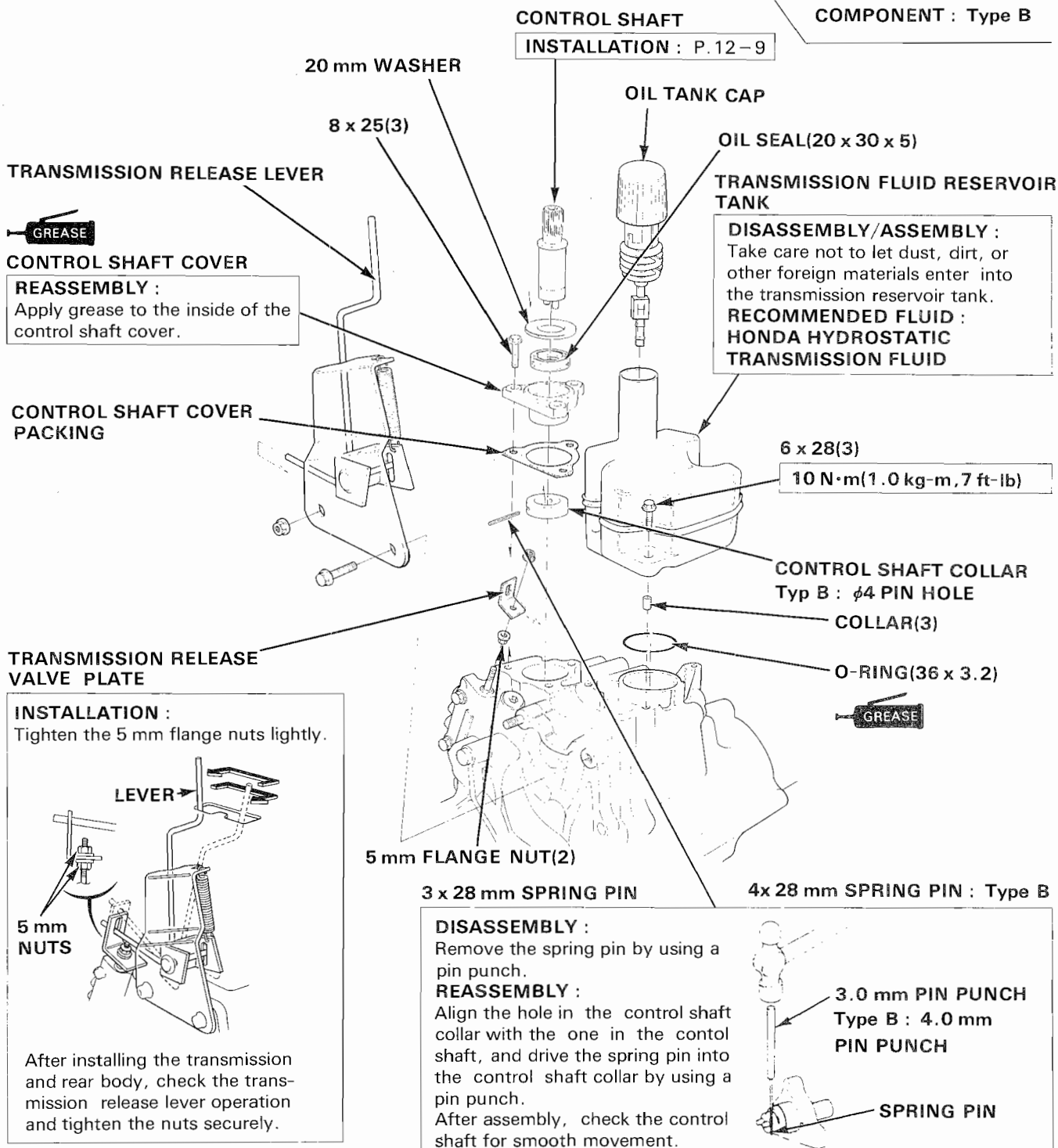
13. Adjust the following :
- Shift lever linkage (P. 3—11)
  - Rear brake (P. 3—6)

14. Reinstall the mower deck (P. 11—2)

### CONTROL SHAFT/TRANSMISSION FLUID RESERVOIR TANK

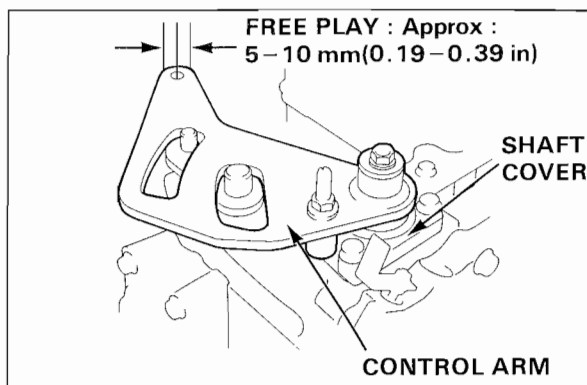
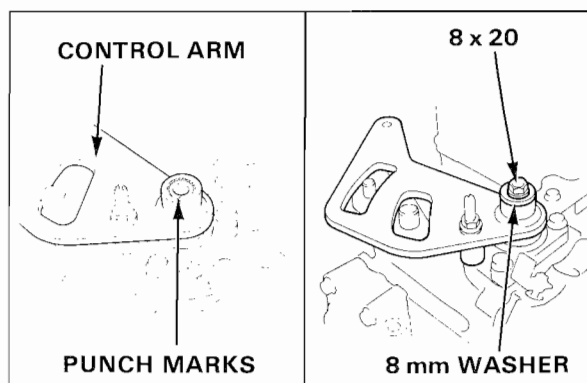
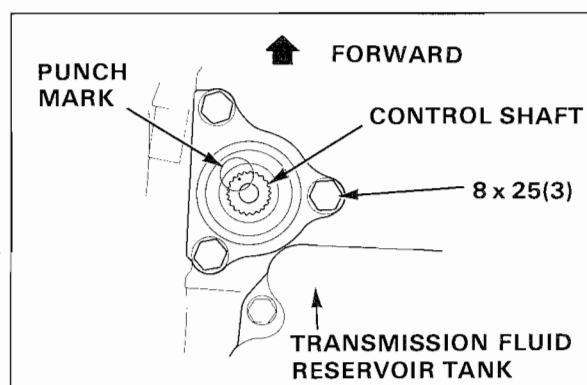
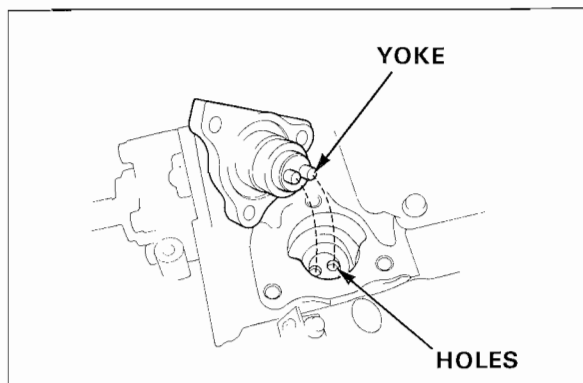
#### a. DISASSEMBLY/REASSEMBLY

- Use the Lithium soap Base Grease NLGI No 2 or Daphne Super Coronex No 2 or equivalent grease to apply to the inside of the control shaft cover.



### b. CONTROL SHAFT ASSEMBLY

1. Install the control shaft assembly onto the transmission, aligning the shaft bosses with the holes of the pump control yoke.
2. Check the installing direction of the control shaft. Without type B : The punch mark on the shaft should be faced forward (Opposite side of the transmission fluid reservoir tank as shown).
3. Install 8×25 mm flange bolts securely.
4. Without type B : Install the control arm onto the control shaft, aligning the punch marks on the shaft and arm.
5. Without type B : Install the 8 mm washer and 8×20 mm flange bolt.
6. Move the end of the control arm to, make sure that the control arm has free play at the yoke as shown. If there is no free play, loosen the 8×25(3) bolts (STEP-3) and move the shaft cover and retighten the bolts.



### INPUT SHAFT

#### a. DISASSEMBLY/REASSEMBLY

- Use the Lithium soap Base Grease NLGI No. 2 or Daphne Super Comonex No. 2 or equivalent grease to apply to the lips of the oil seal.

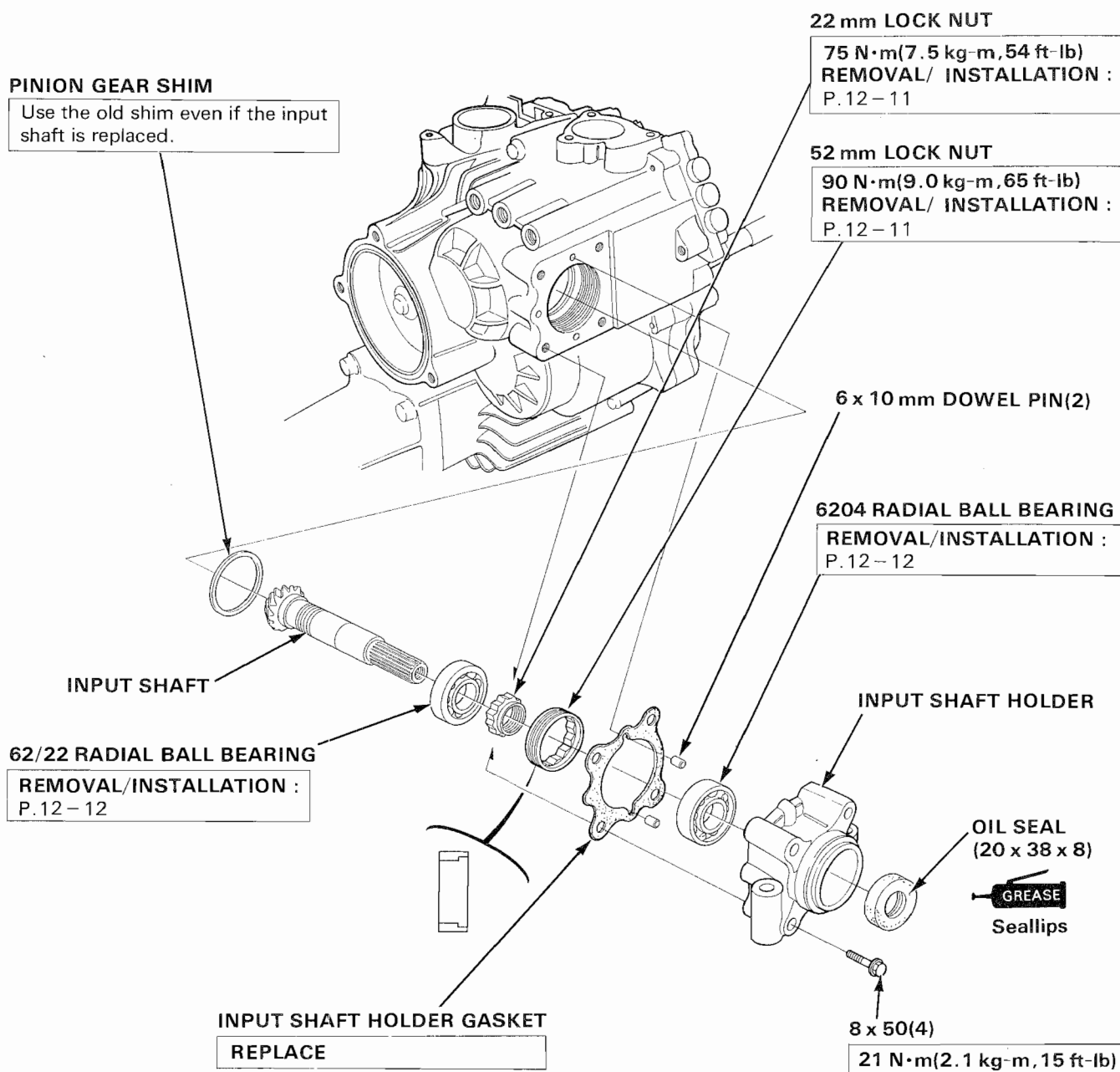
#### NOTE

- It is not necessary to remove the oil tank and control shaft.

1. Remove the transmission from the frame (P. 12-2).

#### PINION GEAR SHIM

Use the old shim even if the input shaft is replaced.

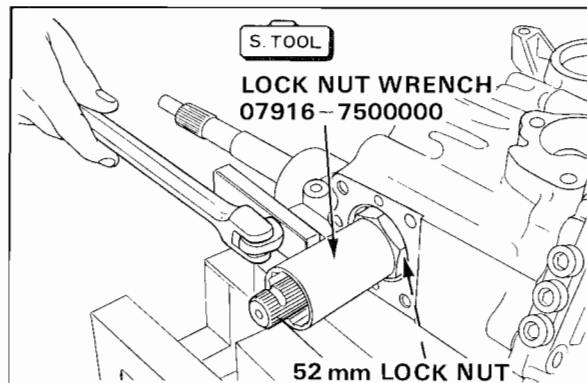




### ● 52 mm LOCK NUT

#### DISASSEMBLY :

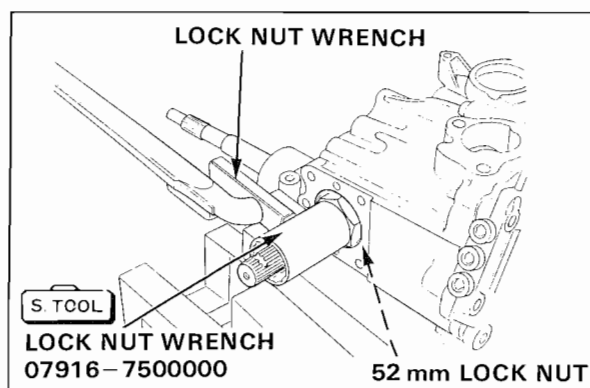
Remove the 48 mm lock nut by using the tools as shown.



#### REASSEMBLY :

Install by using the special as shown.

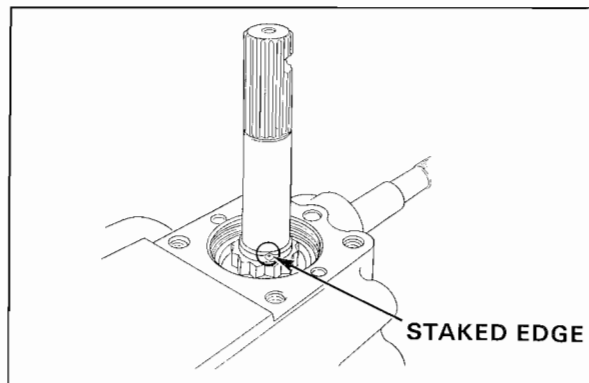
**TORQUE : 90 N·m (9.0 kg-m, 65 ft-lb)**



### ● 22 mm LOCK NUT

#### DISASSEMBLY/REASSEMBLY :

1. Unstake the lock nut.



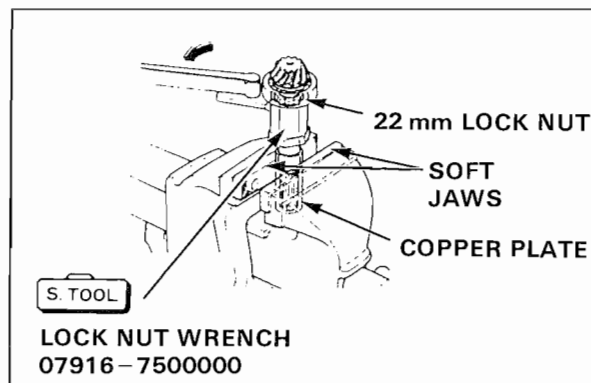
2. Position the special tool over the 22 mm lock nut, and clamp the input shaft in a soft jaw vise. Install and remove the lock nut by turning the special tool.

#### CAUTION

• If a soft-jaw vise is not available, it will be necessary to wrap the splined section with copper sheeting ; a shop rag is not sufficient to withstand the lock nut's torque and the shaft will be damaged.

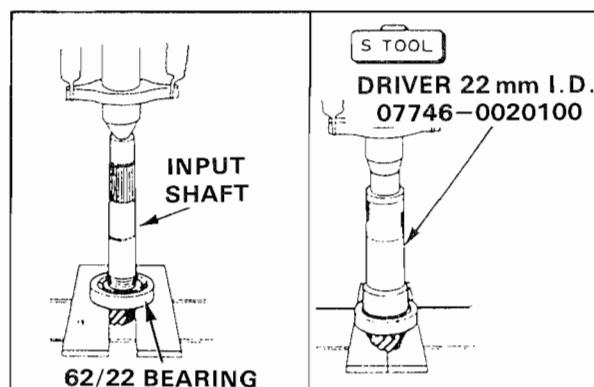
3. On installation, replace the lock nut with a new one.  
4. After installation, stake the lock nut at the indentation in the input shaft.

**TORQUE : 75 N·m (7.5 kg-m, 54 ft-lb)**



### ● 62/22 RADIAL BALL BEARING REMOVAL/INSTALLATION

1. Remove the bearing by using the hydraulic press.
2. Installation must be done by using the hydraulic press and the special tool as shown.



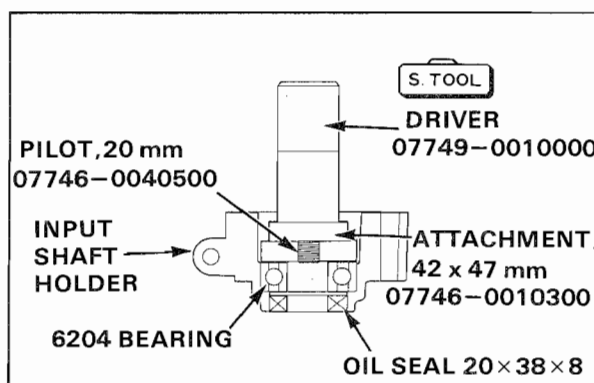
### ● 6204 RADIAL BALL BEARING

#### REMOVAL :

Drive the bearing out of the input shaft holder.

#### INSTALLATION :

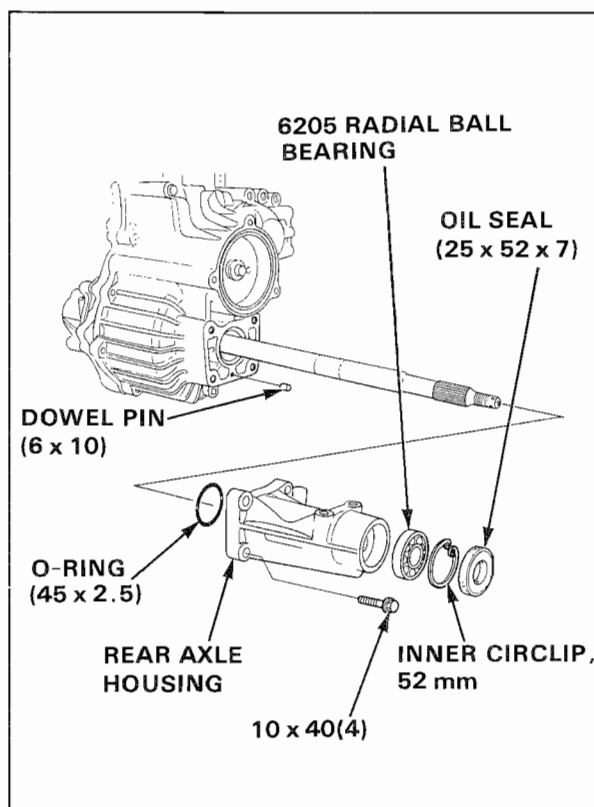
Drive the bearing into the input shaft holder by using the special tools as shown.



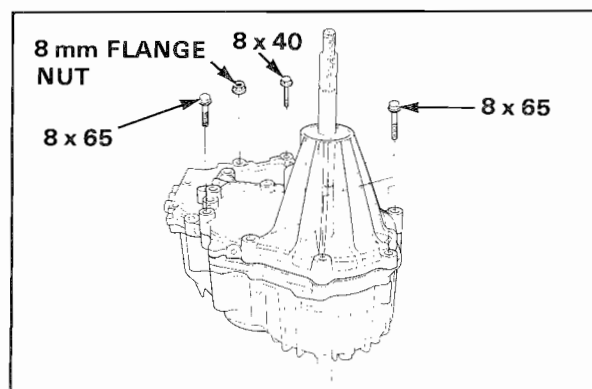
## RIGHT TRANSMISSION CASE

### DISASSEMBLY

1. Remove four 10 x 40 mm flange bolts and rear axle housing.
2. Remove the O-ring and dowel pin.
3. Remove the oil seal, inner circlip and bearing.



4. Remove the six 8 mm flange bolts and the 8 mm flange nut from the charge pump case.



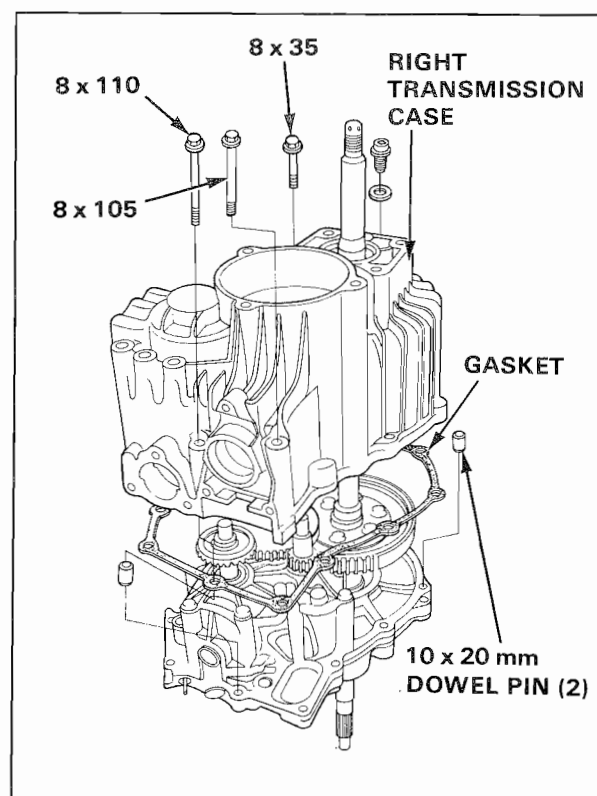
5. Turn the transmission case upside down to remove the three 8 mm transmission case mounting bolts and right transmission case.
6. Remove the gasket and two 10 x 20 mm dowel pins.

### REASSEMBLY

Installation is in the reverse order of removal.

#### TORQUE :

8 mm flange bolts : 25 N·m (2.5 kg-m, 18 ft-lb)



## RIGHT TRANSMISSION CASE/REAR DIFFERENTIAL/COUNTERSHAFT

### a. RIGHT TRANSMISSION CASE DISASSEMBLY/REASSEMBLY

#### 6204 RADIAL BALL BEARING

REMOVAL/INSTALLATION :  
P.12-16

#### 6302 RADIAL BALL BEARING

REMOVAL/INSTALLATION :  
P.12-16

#### 6304 RADIAL BALL BEARING

REMOVAL/INSTALLATION :  
P.12-16

RIGHT TRANSMISSION  
CASE

OIL SEAL(20 x 38 x 8)

#### 6206 RADIAL BALL BEARING

REMOVAL/INSTALLATION :  
P.12-16

### b. REAR DIFFERENTIAL AND COUNTERSHAFT DISASSEMBLY/ REASSEMBLY

#### COUNTERSHAFT DRIVEN GEAR

INSTALLATION :  
With its boss faced inside



↓  
INSIDE

#### REAR DIFFERENTIAL SUB-ASSY.

DISASSEMBLY/REASSEMBLY :  
P.12-15

#### BEVEL GEAR SHIM

INSTALLATION :  
Use the old shim even if the gear  
is replaced.

BEVEL GEAR

6206 RADIAL  
BALL BEARING

### 20 mm CIRCLIP(4)

Install the circlips in the following steps.

- pinions and gears.
- axle shafts.
- circlips.
- pinion shaft.

Check to be sure that the circlips are firmly fixed into the grooves.

### DIFFERENTIAL PINION(2)

#### INSTALLATION :

Install the pinions with the gears as a set into the gear case.

### DIFFERENTIAL PINION WASHER(2)

### DIFFERENTIAL GEAR(2)

### DIFFERENTIAL GEAR WASHER(2)

### DIFFERENTIAL GEAR CASE

### 6206 RADIAL BALL BEARING(2)

### RIGHT AXLE SHAFT (SHORTER SIDE)

### LEFT AXLE SHAFT (LONGER SIDE)

### 10 x 17 mm SPECIAL BOLT(6)

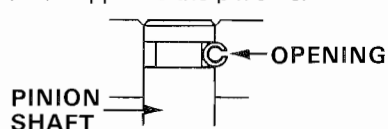
55 N·m(5.5 kg-m, 40 ft-lb)

### FINAL DRIVEN GEAR

### 4 x 32 mm SPRING PIN

#### REASSEMBLY :

Install the pin with its opening side faced opposite the pinion shaft.



### PINION SHAFT

#### REASSEMBLY :

Check the shaft sliding surface for the scratches or burrs. Remove any abnormalities with emery paper if necessary.

### c. DIFFERENTIAL INSPECTION

After reassembly, place the rear differential assy. on the V-blocks and check for smooth rotation.

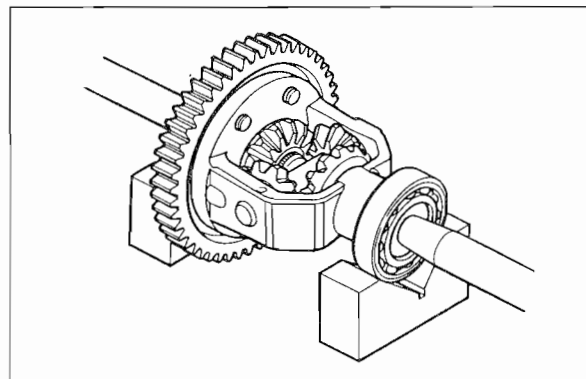
Replace the pinion washers with thinner ones if the shaft does not turn smoothly.

A : 0.7 mm (0.028 in)

B : 0.8 mm (0.031 in)

C : 0.9 mm (0.035 in)

D : 1.0 mm (0.039 in)



### d. RIGHT TRANSMISSION CASE BEARING REMOVAL/INSTALLATION

Using the following tools, remove or install the radial ball bearings.

#### NOTE

- It is not necessary to use the special tools in 6206 radial ball bearing.

#### REMOVAL

6204 and 6304 radial ball bearing ;

##### BEARING REMOVER

-BEARING REMOVER, 20 mm	07936-3710600
-BEARING REMOVER WEIGHT	07936-3710200
-BEARING REMOVER HANDLE	07936-3710100

6302 radial ball bearing ;

BEARING REMOVER, 15 mm	07936-KC10000
BEARING REMOVER WEIGHT	07936-3710200
BEARING REMOVER HANDLE	07936-3710100

#### INSTALLATION

6304 radial ball bearing ;

DRIVER	07749-0010000
ATTACHMENT, 52 x 55 mm	07746-0010400
PILOT, 20 mm	07746-0040500

6302 radial ball bearing ;

DRIVER	07749-0010000
ATTACHMENT, 42 x 47 mm	07746-0010300
PILOT, 15 mm	07746-0040300

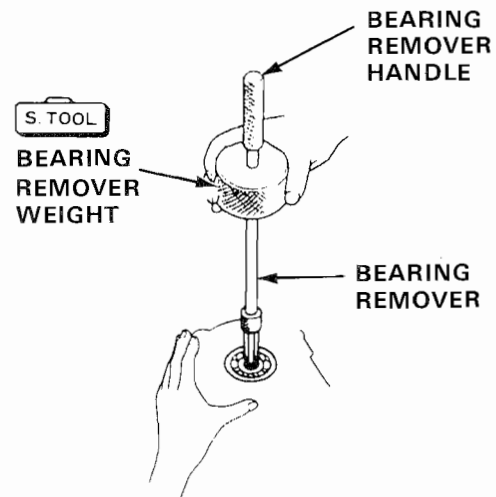
6206 radial ball bearing ;

DRIVER	07749-0010000
ATTACHMENT, 62 x 68 mm	07746-0010500
PILOT, 30 mm	07746-0040700

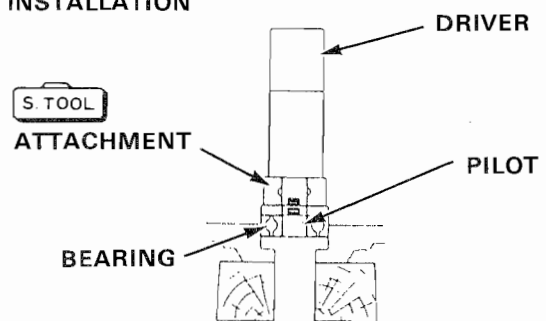
6204 radial ball bearing ;

DRIVER	07749-0010000
ATTACHMENT, 42 x 47 mm	07746-0010300
PILOT, 20 mm	07746-0040500

#### REMOVAL



#### INSTALLATION



### CHARGE PUMP CASE

#### DISASSEMBLY/REASSEMBLY

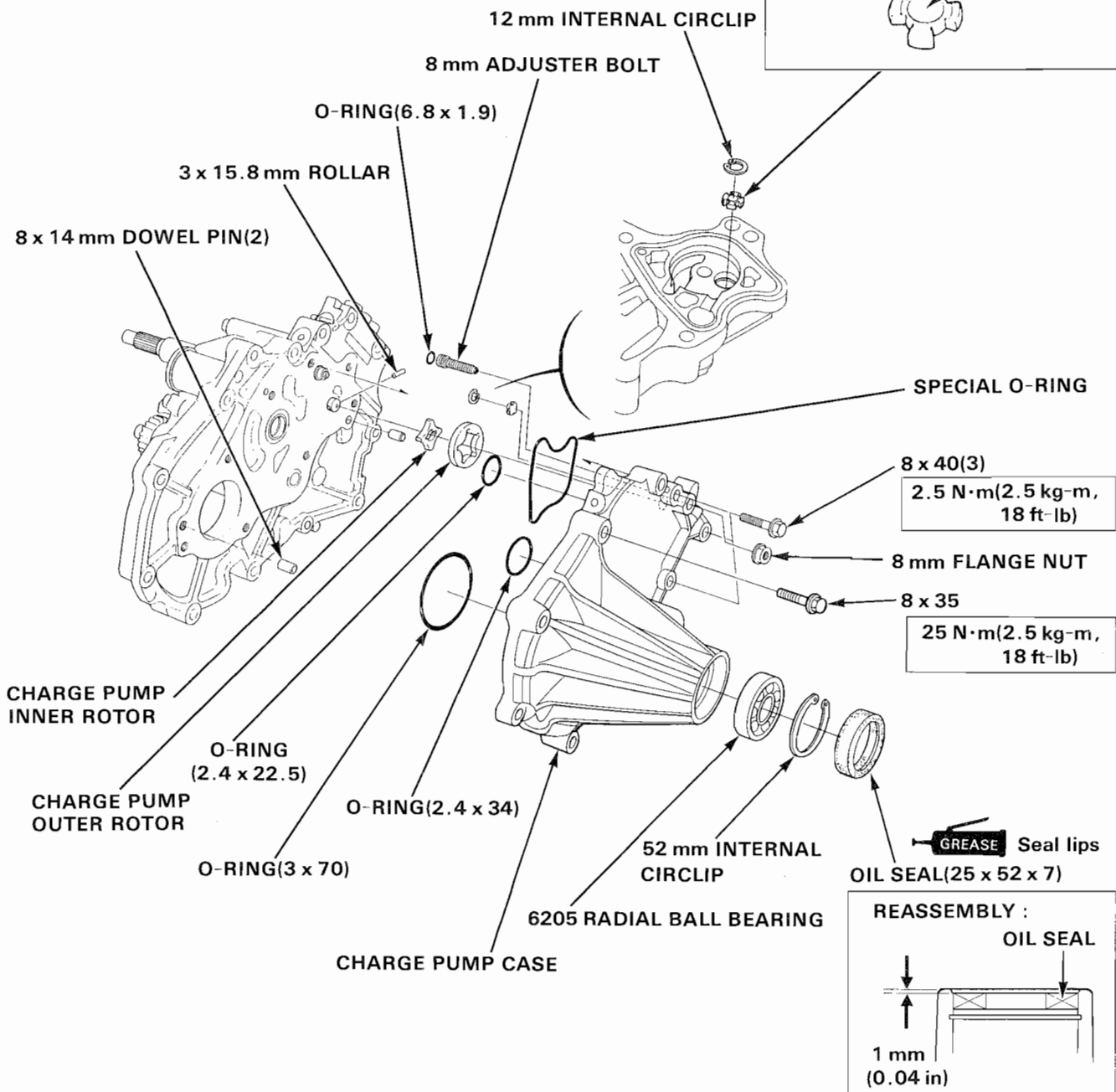
##### CAUTION

- Before installation, coat each O-ring and oil seal lips with Lithium Soap Base Grease NLGI No 2 or Daphne super Coronex No2 or equivalent.

#### RELIEF VALVE SPRING GUIDE

##### INSTALLATION :

Install it with its dent side facing up.





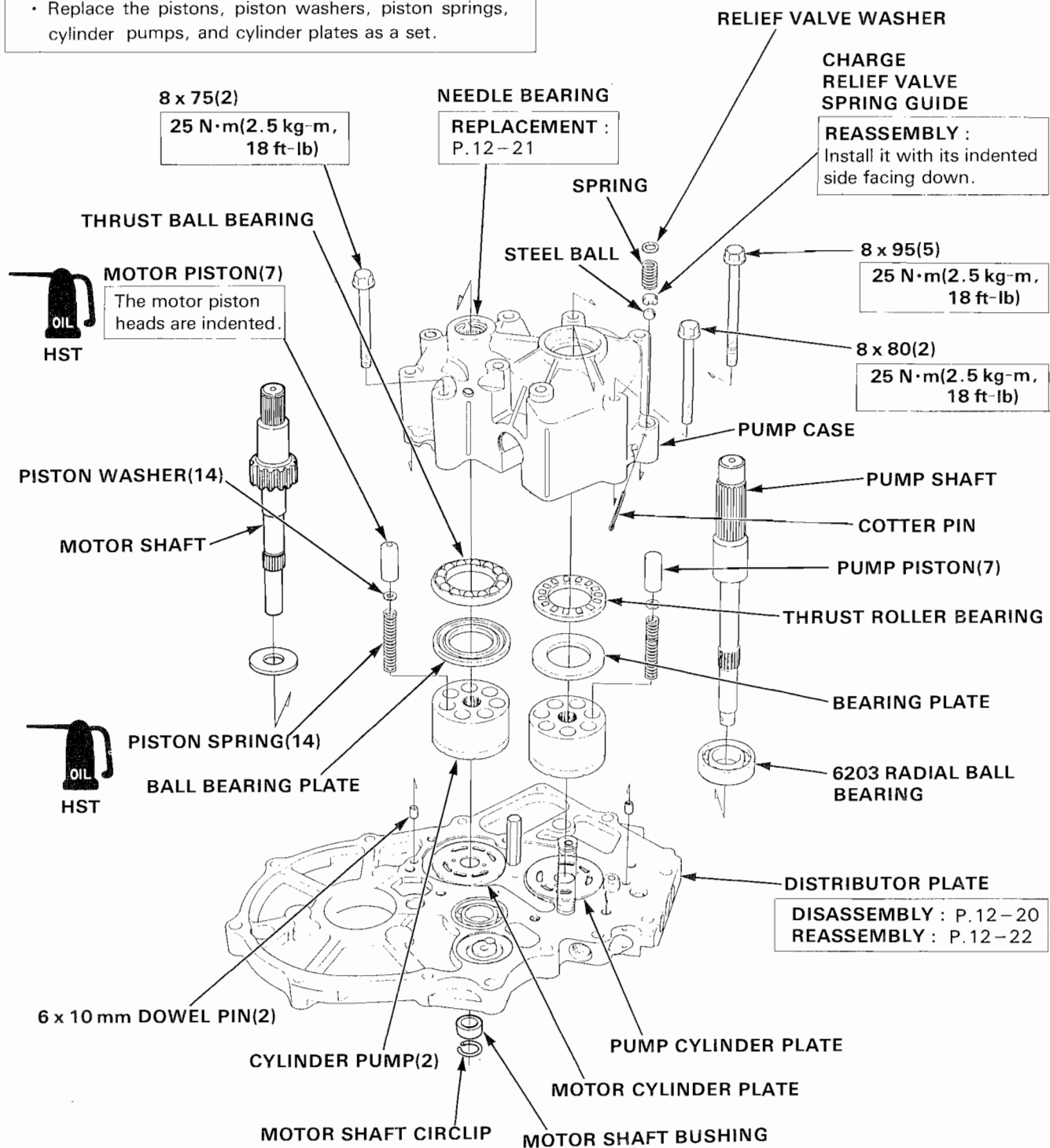


### PUMP CASE/MOTOR SHAFT/PUMP SHAFT/DISTRIBUTOR PLATE

#### a. DISASSEMBLY/REASSEMBLY

##### NOTE

- Replace the pistons, piston washers, piston springs, cylinder pumps, and cylinder plates as a set.



### b. DISTRIBUTOR PLATE

- Use the Lithium soap Base Grease NLGI No 2 or Daphne Super Coronex No 2 or equivalent grease to apply to lips of the oil seal.

### CYLINDER PLATE

The cylinder plates are not exchangeable. Install the plates on the suitable place with their arrow mark facing up. The arrows should be face opposite 6004 ball bearing

#### MOTOR CYLINDER PLATE

#### ARROWS

#### PUMP CYLINDER PLATE

#### 6004 RADIAL BALL BEARING

#### 4 x 7 mm DOWEL PIN(4)

Do not forget to install them. Do not drop them into the oil orifice.

#### MAIN RELIEF VALVE

#### 8 mm SEALING WASHER

#### 6004 RADIAL BALL BEARING

#### OIL SEAL

GREASE

#### 8 x 9 mm SPECIAL BOLT

25 N·m(2.5 kg·m, 18 ft·lb)

#### 8 mm SEALING WASHER

OIL  
HST

OIL  
HST

SHAFT  
RETURN

HST

#### RETURN SHAFT SPRING

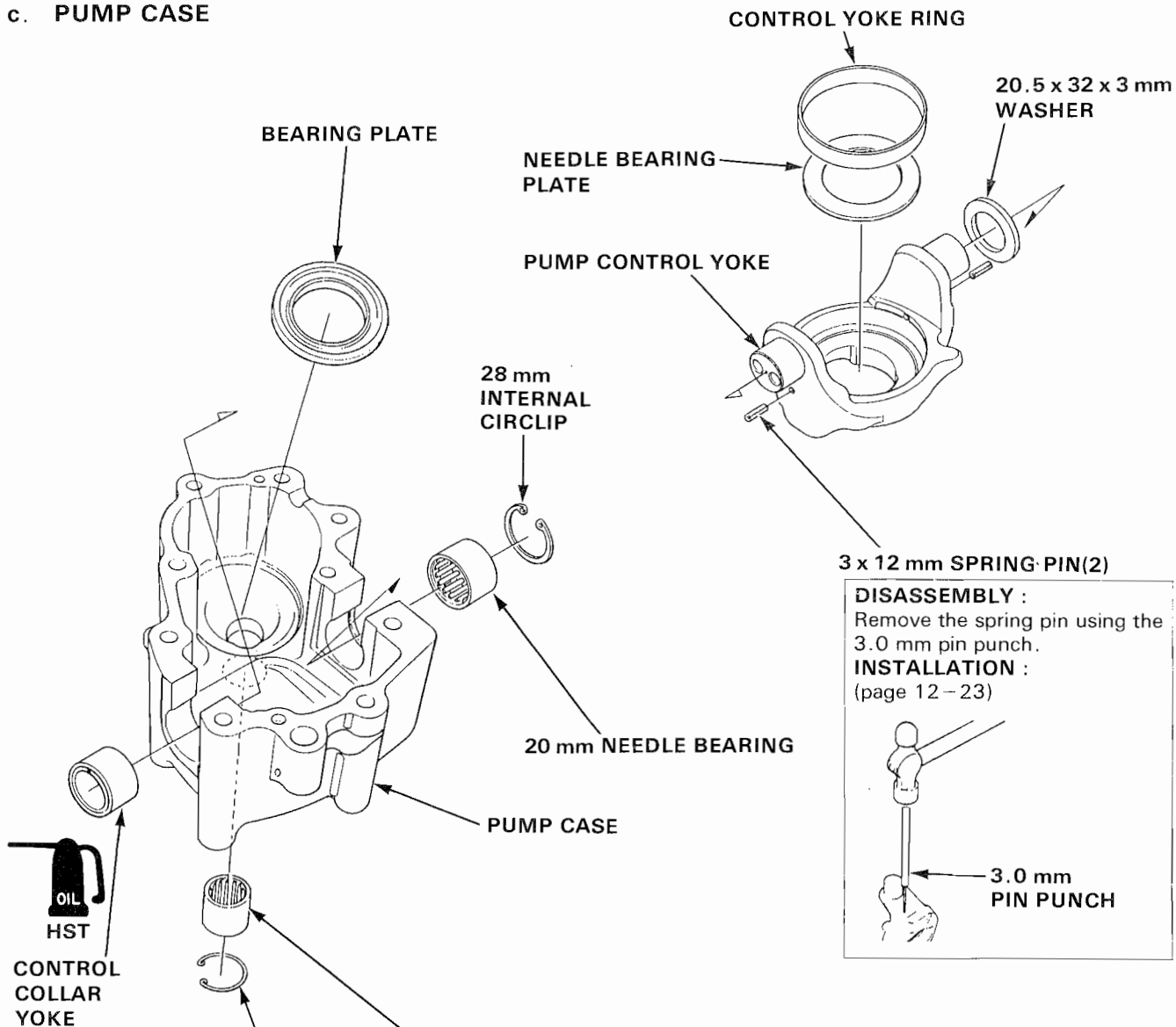
#### 6 mm U-NUT

OIL  
HST

#### MOTOR SHAFT BUSHING

#### DISTRIBUTOR PLATE

### c. PUMP CASE

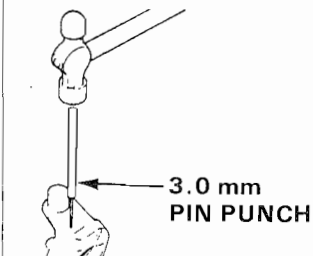


#### DISASSEMBLY :

Remove the spring pin using the 3.0 mm pin punch.

#### INSTALLATION :

(page 12 - 23)



#### REMOVAL:

Break the needle bearing case and remove the needle bearings. Use the special tools below to remove the outer bearing race.

#### S. TOOL

BEARING REMOVER HANDLE  
07936-3710100

BEARING REMOVER WEIGHT  
07936-3710200

BEARING REMOVER, 17 mm  
07936-3710300

#### INSTALLATION:

Drive a new bearing into the pump case with its markings facing up, using the special tools below.

#### S. TOOL

DRIVER  
07749-0010000

ATTACHMENT, 24 x 26 mm  
07746-0010700

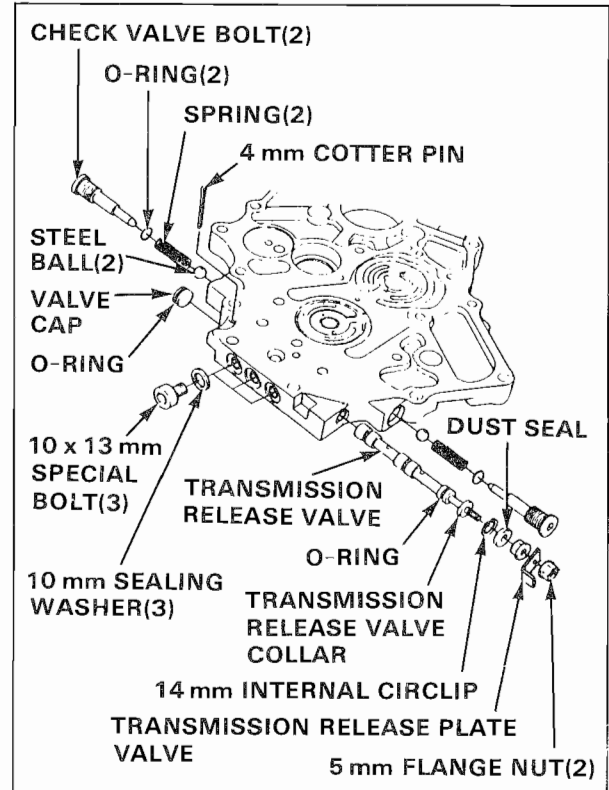
PILOT, 17 mm  
07746-0040400

### TRANSMISSION ASSEMBLY

1. Install two steel balls and check valve springs into the distributor plate.
2. Install the O-rings onto the check valve bolts and torque the bolts.

**TORQUE : 33 N·m (3.3 kg·m, 24 ft-lb)**

3. Install the O-ring and transmission release valve collar onto the transmission release valve. Install the valve into the distributor plate and secure it with a 14 mm internal circlip.
4. Install the O-ring onto the transmission release valve cap and install the cap into the distributor plate. Fix it with a new 4 mm cotter pin.
5. Install the dust seal, neutral valve plate, and 5 mm flange nuts (See page 12—18).  
Check that the transmission release valve is moved smoothly.
6. Install three 10 x 13 mm special bolts.



7. Install the spring and return shaft with the washer and 6 mm U-nut.  
Check the shaft for smooth operation.
8. Install four 4 x 7 mm dowel pins onto the distributor plate.
9. Install the pump cylinder plate and motor cylinder plate (P. 12—20).
10. Install the oil seal and 6004 radial ball bearing.
11. Torque the 8 x 9 mm special bolt with the 8 mm sealing washer.

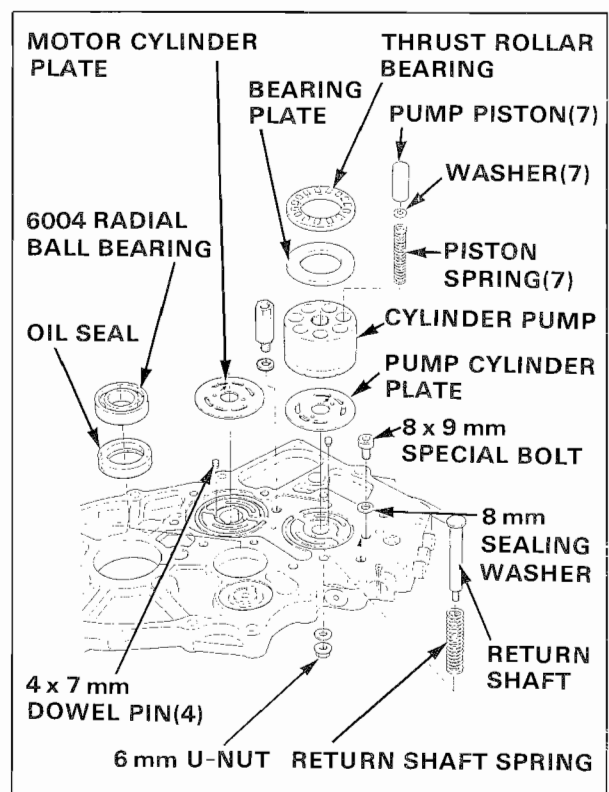
**TORQUE : 25 N·m (2.5 kg·m, 18 ft-lb)**

12. Install seven piston springs, piston washers, and pump pistons into the cylinder pump. Install the cylinder pump onto the pump cylinder plate.

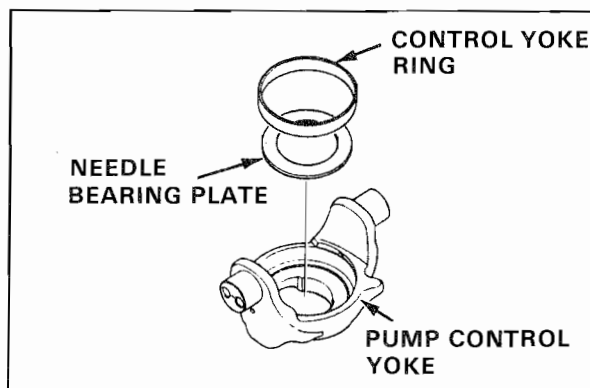
#### NOTE

- The pump piston heads are round ; not dented.  
Check the pistons for smooth operation.

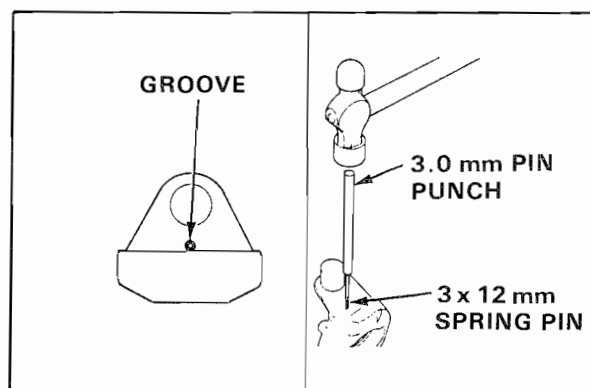
13. Install the bearing plate and thrust roller bearing on the pump piston.



14. Install the needle bearing plate and control yoke ring into the pump control yoke.

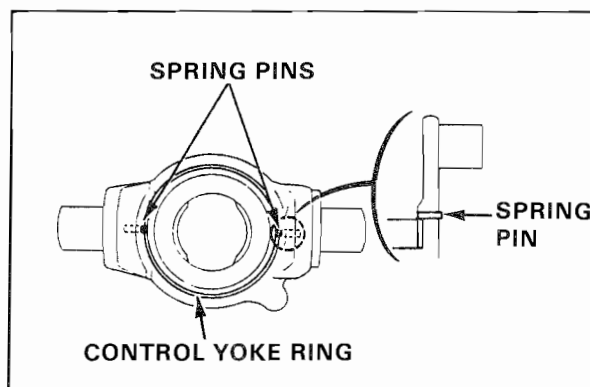


15. Set the 3 x 12 mm spring pin with its opening facing to the boss as shown, and drive the pin using the 3.0 mm pin punch.

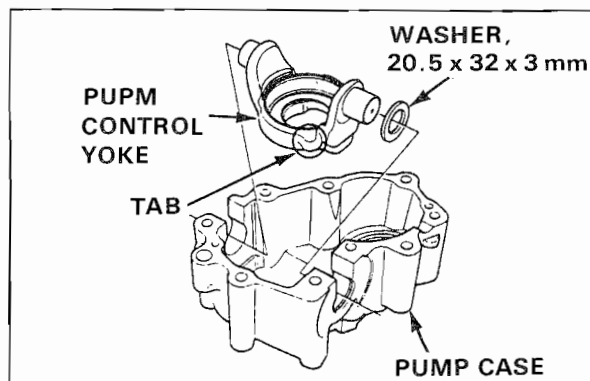


16. The 3 x 12 mm spring pins are the stoppers of the control yoke ring. The pin ends should be flush with the plate surface.

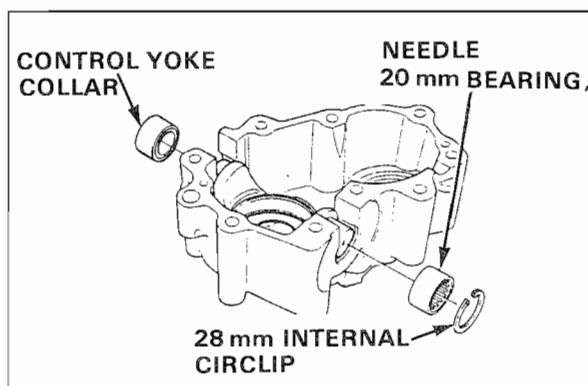
Check the control yoke ring for smooth rotation.



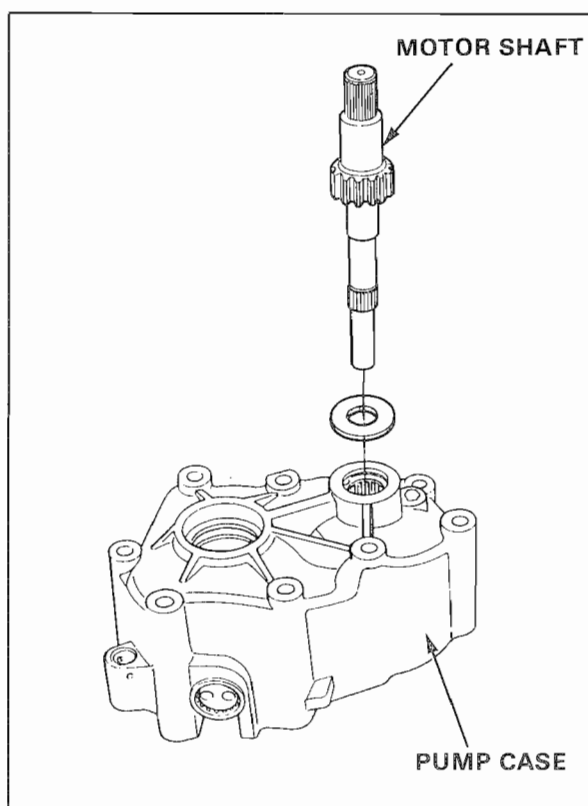
17. Install the washer (20.5 x 32 x 3) onto the boss which is located near the tab. Install the pump control yoke into the pump case.



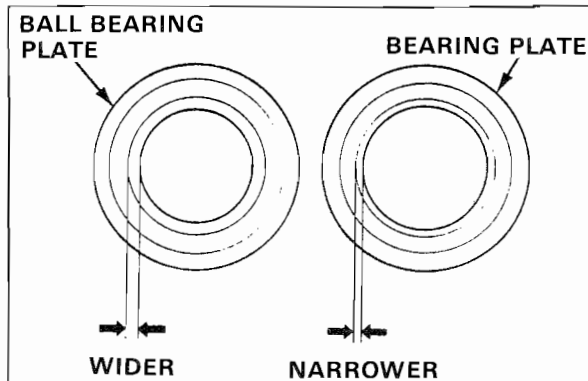
18. Install the 20 mm needle bearing onto the boss which the washer was installed on. Fix the bearing with the 28 mm internal circlip.
19. Install the control yoke collar onto the another boss. Check the pump control yoke for smooth operation.



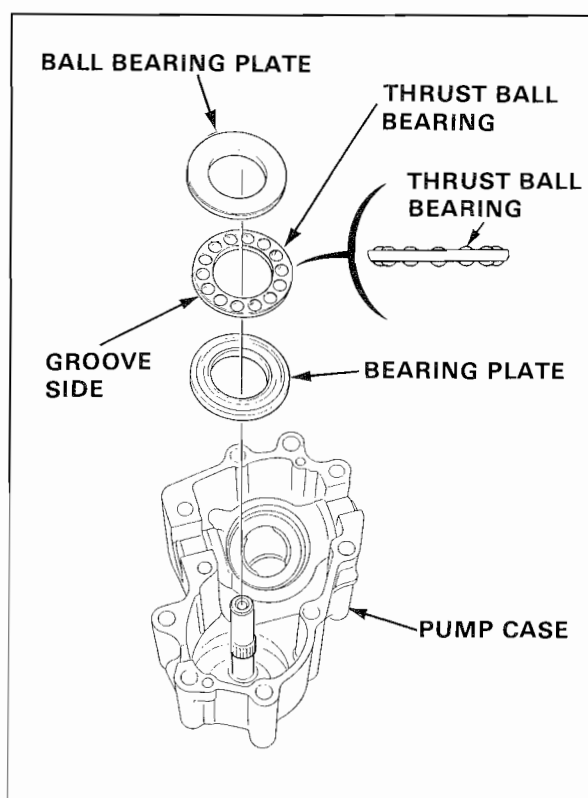
20. Install the motor shaft into the pump case.



21. The ball bearing plate is not exchangeable for the bearing plate as shown.  
Be careful not to exchange them on installation.



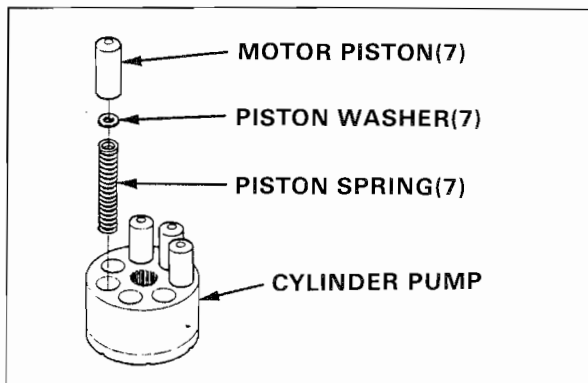
22. Install the bearing plate, thrust ball bearing, and ball bearing plate into the pump case.



23. Install the piston springs, piston washers, and motor pistons into the cylinder pump.

### NOTE

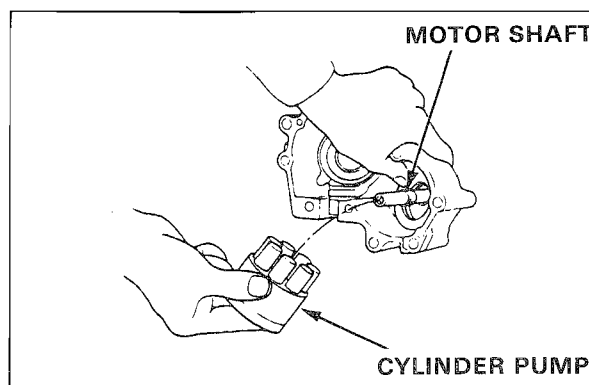
- The motor piston heads are dented.  
Check the pistons for smooth operation.



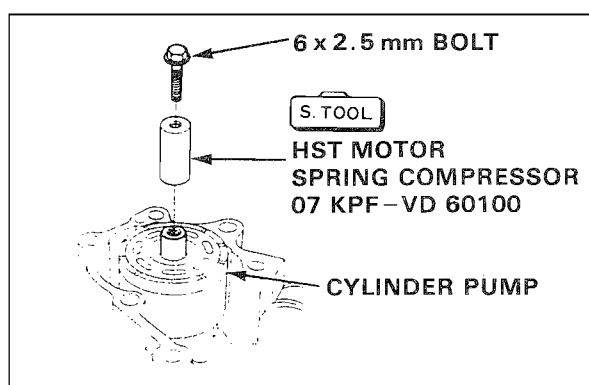
24. Hold the ball bearing plate installed in Step 22 with your finger, and install the motor cylinder pump assy. into the pump case.

**NOTE**

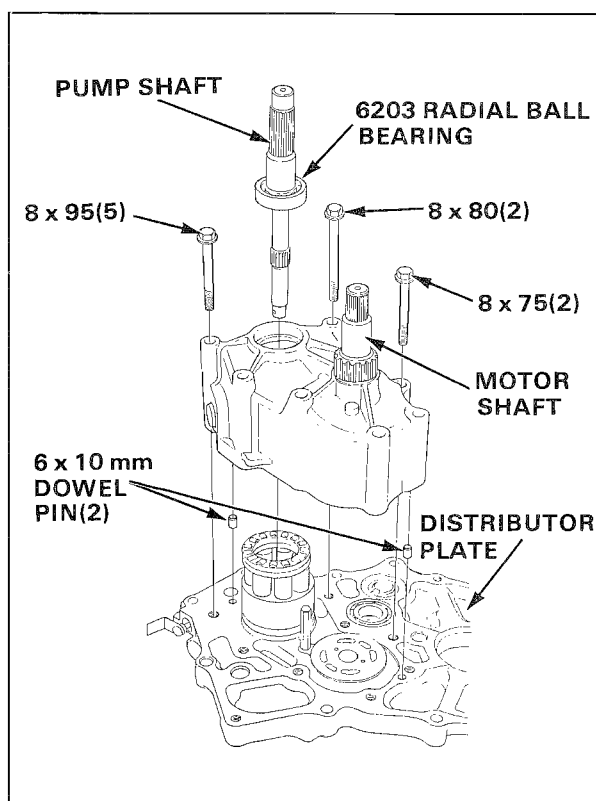
- Be careful not to remove the pistons.



25. While pushing the cylinder pump, install the special tool onto the motor shaft and tighten the 6×2.5 mm bolt.



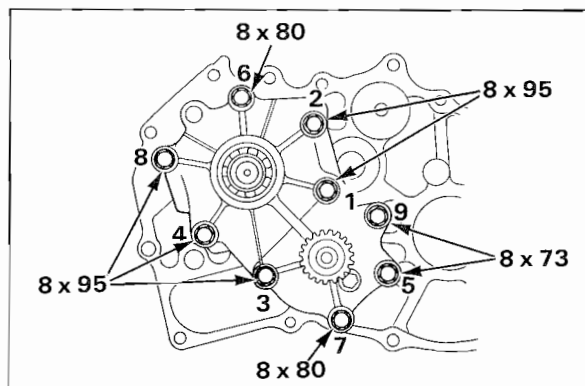
26. Install two 6 x 10 mm dowel pins.
27. Install the pump case onto the distributor plate, holding the pump control yoke installed in Step 17 through 19 and aligning the holes of control yoke and pump case.
28. Loosely install the 8 mm flange bolts, but do not tighten yet.
29. Install the 6203 radial ball bearing onto the pump shaft and then install the shaft into the case. Check the pump shaft and motor shaft for smooth rotation.



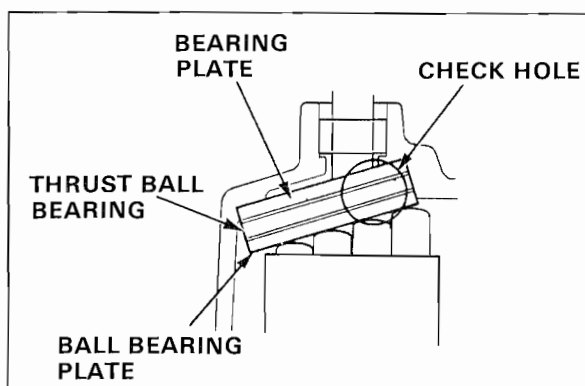


30. Tighten the bolts gradually in the sequence shown.

**TORQUE : 25 N·m (2.5 kg-m, 18 ft-lb)**

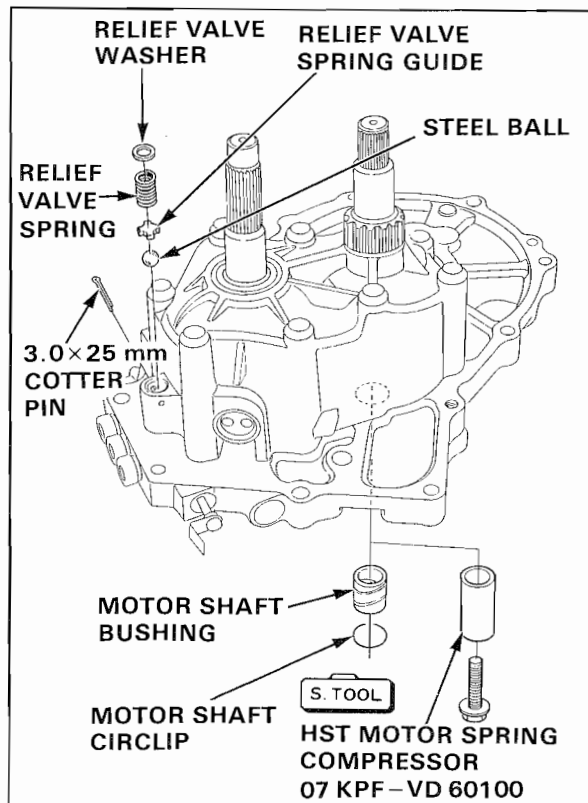


31. Through the check hole, inspect that the bearing plate, thrust ball bearing, and ball bearing plate is installed properly. If not so, disassemble and reassemble them again.



32. Install the steel ball in the pump case and install the relief valve spring guide with its flats face facing up. Install the relief valve spring, relief valve washer, and the cotter pin.

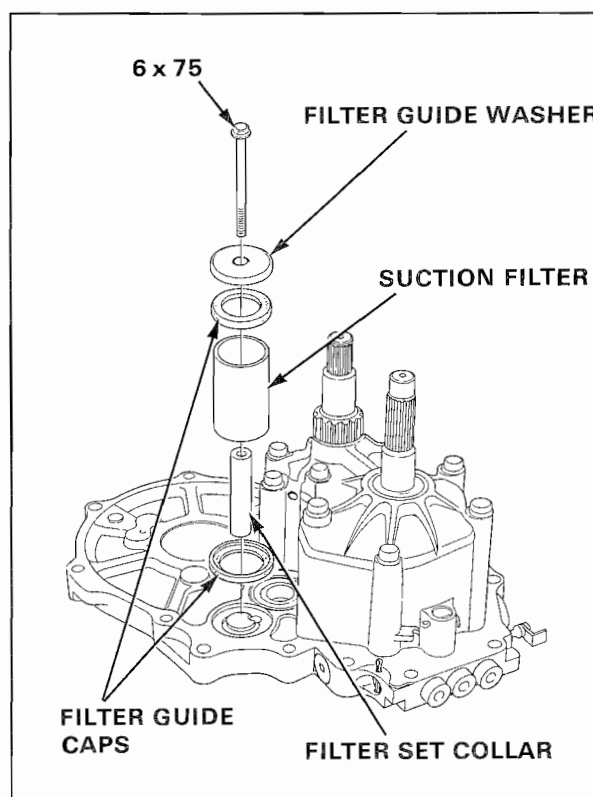
33. Remove the special tool for cylinder pump installation and install the motor shaft bushing and circlip.



34. Install the filter guide caps, filter set collar, suction filter, filter guide washer, and 6 x 75 mm flange bolt.

**TORQUE : 10 N·m (1.0 kg·m, 7 ft-lb)**

35. After installation, check the shafts for smooth rotation.
36. Install the followings :
- charge pump case (P. 12-17).
  - rear differential and countershaft (P. 12-14).
  - right transmission case (P. 12-12).
  - input shaft (P. 12-10).
  - control shaft and oil tank (P. 12-8).
37. Fill the transmission to the upper mark on the dipstick with HONDA HYDROSTATIC TRANSMISSION FLUID. Bleed the air from the transmission (See air bleeding).

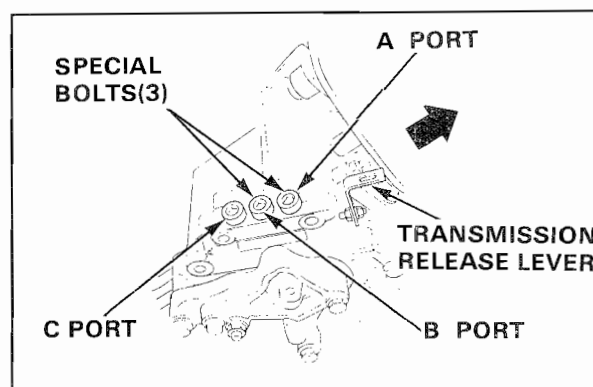
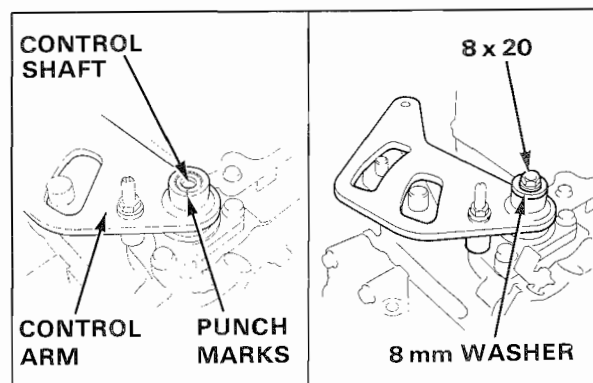


## AIR BLEEDING

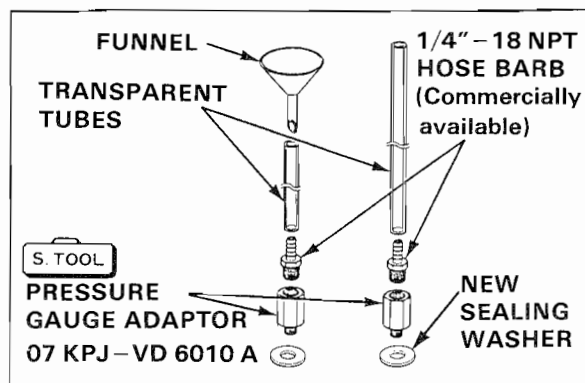
### CAUTION

- Do not allow foreign material to enter the system when the 10 x 13 mm special bolts are removed.

1. Align the punch marks on the shaft and arm and tighten the bolt. (Without type : Refer to page 12-8)
2. Pull up the transmission release lever all the way.
3. Position and hold the transmission with the special bolts facing up.
4. Remove the special bolt of the "B" port as shown.



- Attach a commercially available transparent tube and funnel to one special tool, and 1/4"-18 NPT hose barb. Attach a transparent tube to another special tool and 1/4"-18 NPT hose barb as shown.

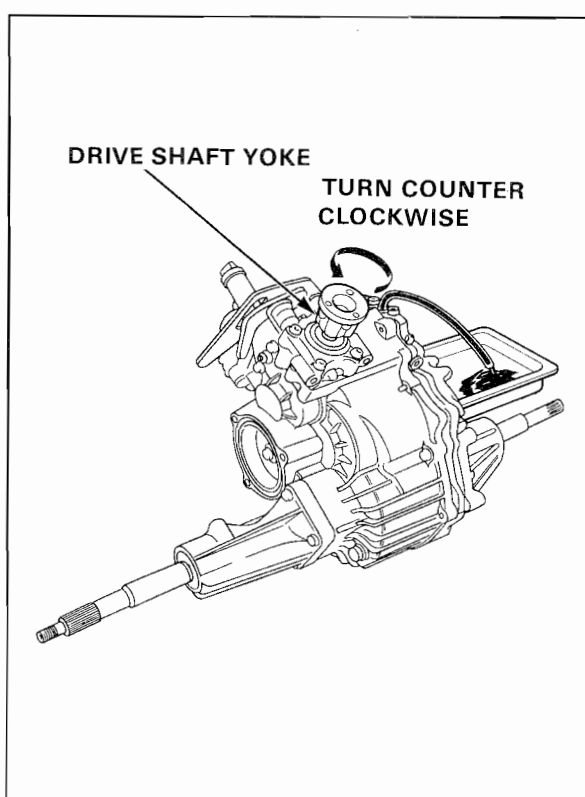


- Connect the transparent tube and special tool to the B port. Be sure to set one end of the tube in the oil pan.
- Turn the input shaft counterclockwise until the bubble-free fluid flows out of the B port. Remove the special tool from the B port and install the 10×13 mm special bolt.

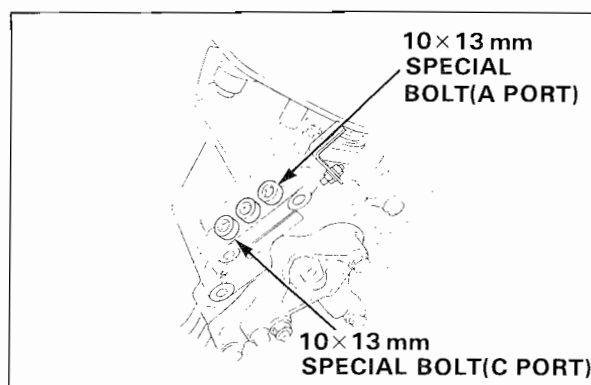
### NOTE

- Use only HONDA Hydrostatic Transmission fluid from a sealed container.
- Temporarily install the drive shaft yoke, as this will mark it easier to rotate the input shaft.

**TORQUE : 17 N·m (1.7 kg-m, 12 ft-lb)**



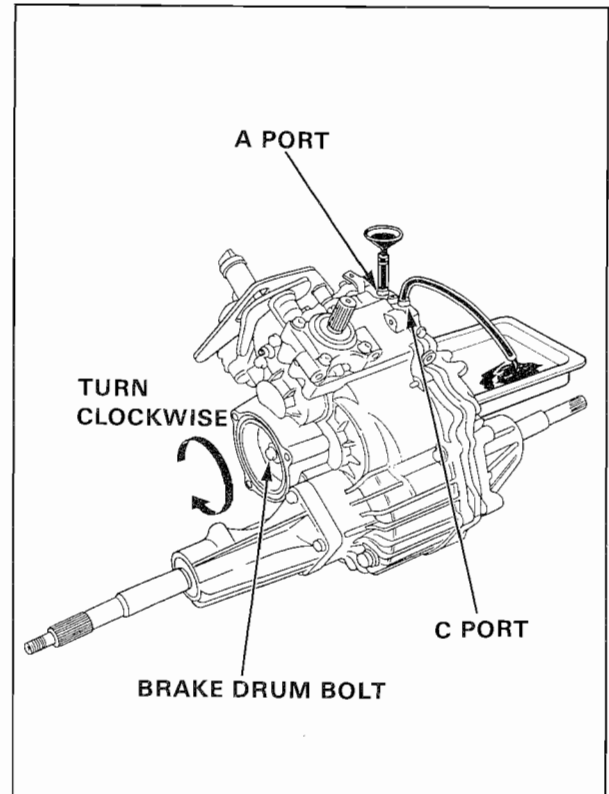
- Remove the 10×13 mm special bolts from the "A" and "C" ports. Install the special tool/hose barb, which is connected with the transparent tube and funnel, to the "A" port and install the special tool/hose barb connected only with the transparent tube to the "C" port.



9. Turn the brake drum bolts on the brake drum clockwise slowly while pouring the oil into the port "A". Turn the brake drum bolt until there are no air bubbles in the fluid flowing out of the port "C". Take care not to let air enter into the port "A".

**NOTE**

- Keep the funnel full of fluid when bleeding. Allowing air to enter the transmission will prolong the bleeding process.
- Use only Honda Hydrostatic Transmission Fluid.

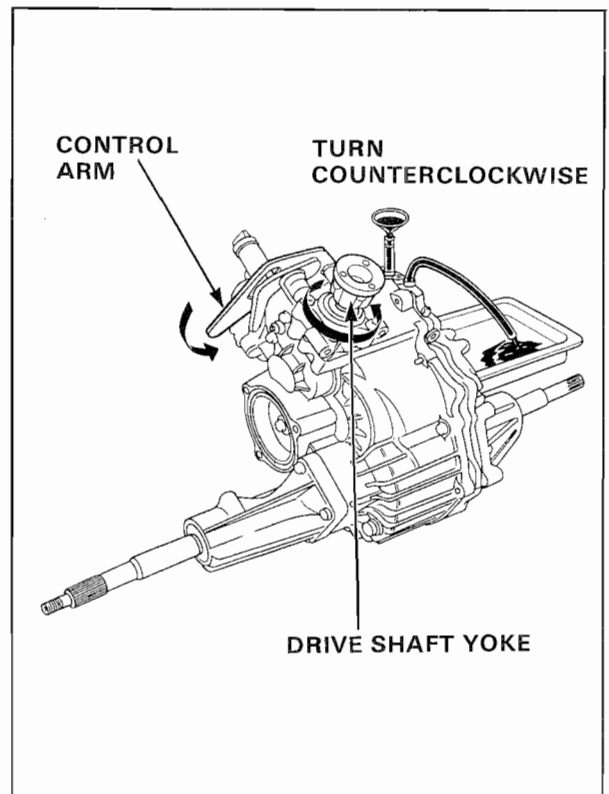


10. When fluid with no air bubbles flows out of port "C", pour the fluid into the funnel with care not to let air enter port "A".
11. Rotate the input shaft counterclockwise and push the control arm down until there are no air bubbles in the fluid flowing out of port "C".
12. When the bubble-free fluid flows out of the "C" port, remove the special tools from the ports and install the 10×13 mm special bolts instead.

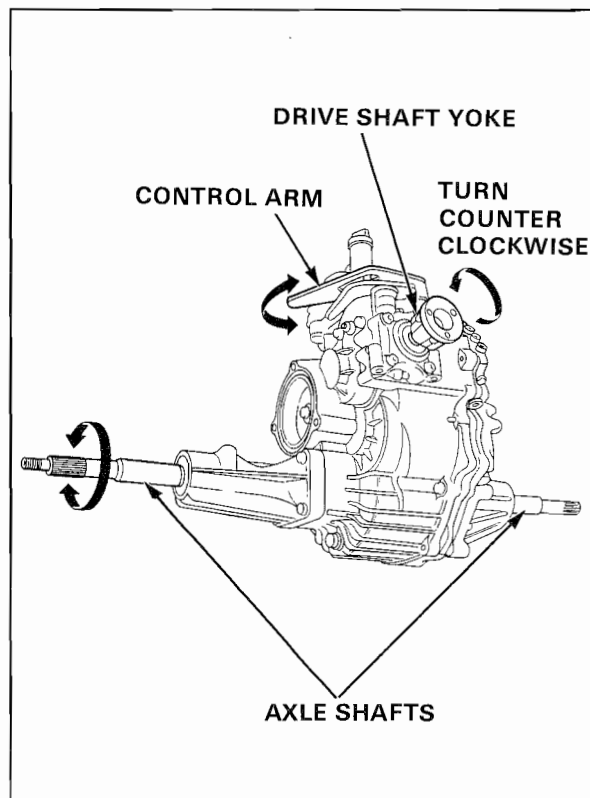
**TORQUE : 17 N·m (1.7 kg·m, 12 ft·lb)**

**NOTE**

- Keep the funnel full of fluid when bleeding. Allowing air to enter the transmission will prolong the bleeding process.
- Use only Honda Hydrostatic Transmission Fluid.
- For ease of turning the input shaft, temporarily install the drive shaft yoke.



13. Rotate the input shaft counterclockwise and move the control arm up and down. Check that the right and left axle shafts rotate in both directions.
14. If the right and left shafts do not rotate in both direction, repeat the procedures in steps 9 through 13.



NOTE

## BRAKES

BRAKE SHOES .....	13-2
FOOT BRAKE .....	13-5
PARKING BRAKE .....	13-6

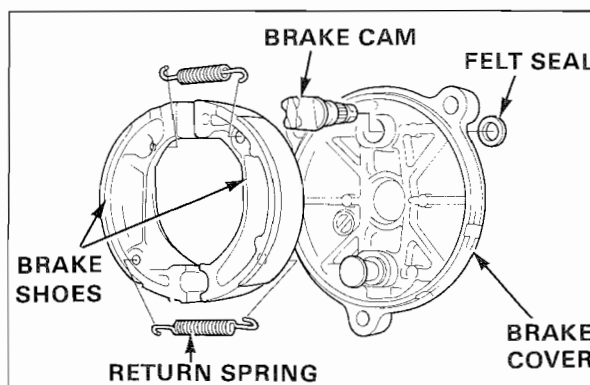
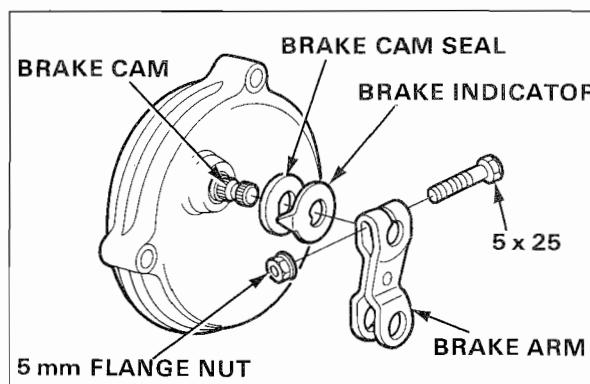
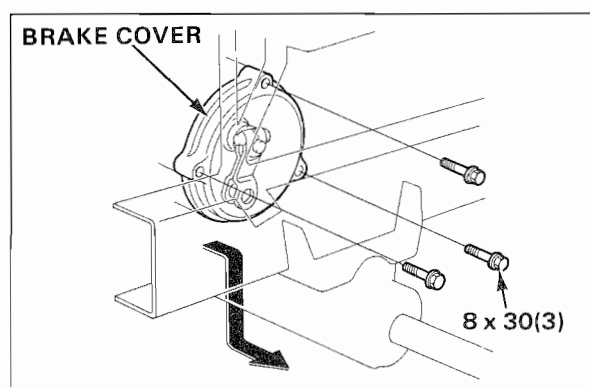
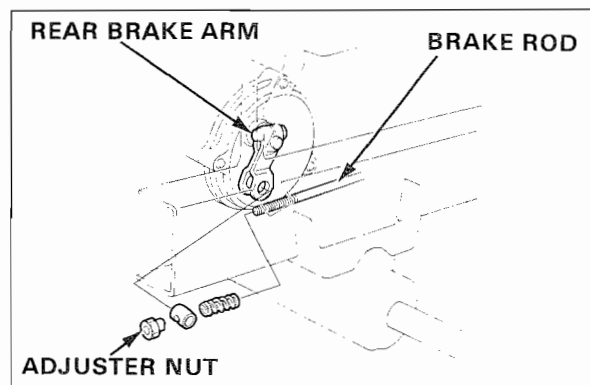
### BRAKE SHOES

#### a. DISASSEMBLY

1. Remove the followings :
  - seat and rear fender Assy. (P. 15-9).
  - hitch plate and fuel tank (P. 6-2).
2. Remove the adjuster nut, then remove the brake rod from the rear brake arm.
3. Remove the three 8×30 mm flange bolts and the brake cover from the transmission.
4. Remove the 5 mm flange nut and 5×25 mm bolt and then remove the brake arm, brake indicator and brake cam seal from the brake cam.
5. Remove the brake shoes, return springs, brake cam, and felt seal from the brake cover.

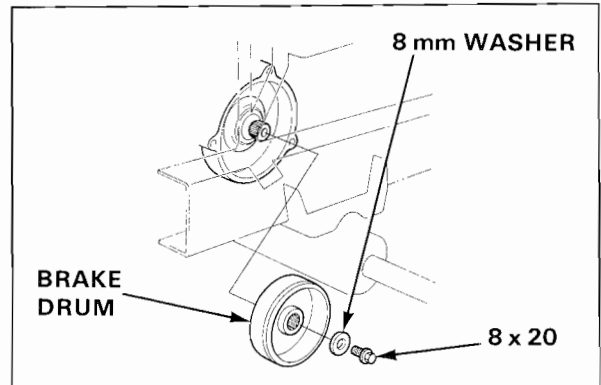
#### NOTE

- Before removing the brake shoes from the brake cover, measure the brake lining O. D. (P. 13-3)





6. Remove the 8×20 mm flange bolt, 8 mm washer, and brake drum.



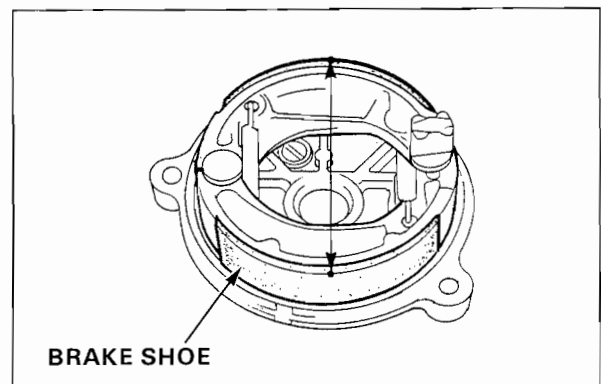
### b. INSPECTION

If the indicator is aligned with the “▼” mark on the brake cover, replace the brake shoes regardless of the following service limit.

#### ● BRAKE SHOE

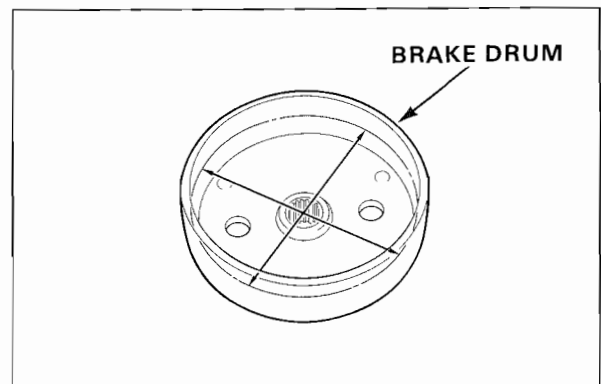
Measure the brake shoe lining O. D. on the brake cover as shown.

STANDARD	SERVICE LIMIT
95.0–94.7 mm (0.12–0.14 in)	93.0 mm (3.66 in)



#### ● BRAKE DRUM I. D.

STANDARD	SERVICE LIMIT
95.0–95.5 mm (3.74–3.75 in)	96.5 mm (3.79 in)



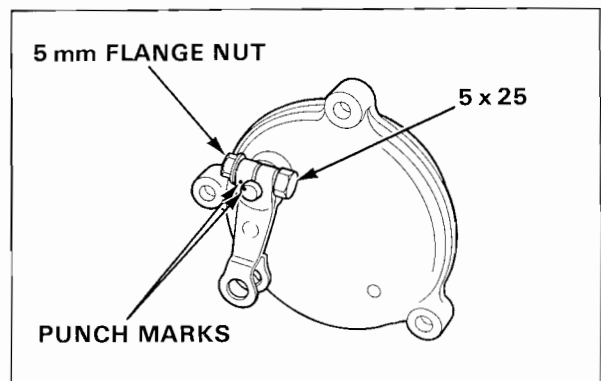
### c. REASSEMBLY

1. Apply high temperature brake grease to the shaft and cam surface of the brake cam and install in the brake cover.
2. Install the felt seal, cam seal, and indicator onto the brake cam.

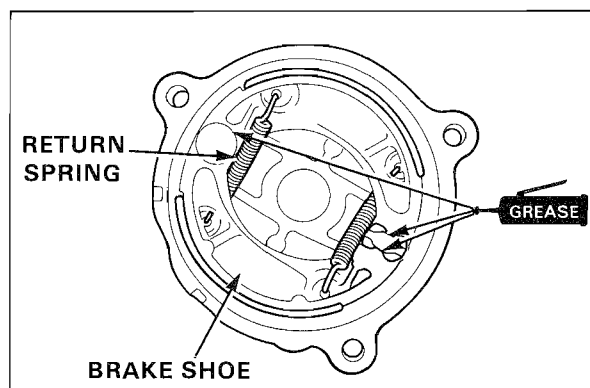
#### ▲WARNING

- Contaminated brake linings reduce stopping power.
- Keep grease off the linings. Wipe excess grease off the cam.

3. Install the brake arm on the brake cam so that the punch mark on the brake arm aligns with the mark on the brake cam.
4. Install the 5×25 mm bolt and 5 mm flange nut.



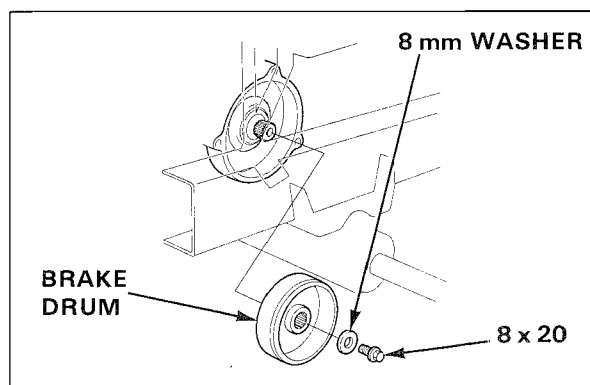
5. Install the brake shoes and return springs onto the brake cover.



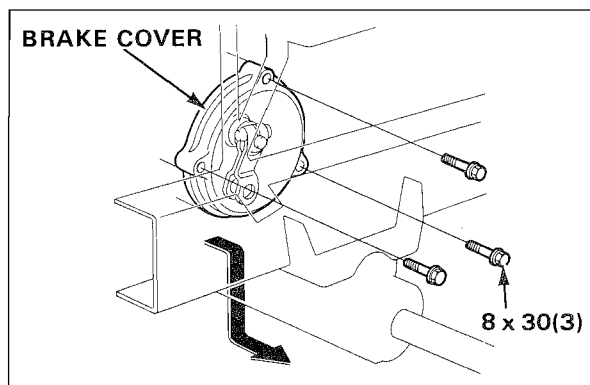
6. Install the brake drum onto the shaft. Install the 8 mm washer and 8×20 flange bolt.

Brake drum bolt.

**TORQUE : 22 N·m (2.2 kg-m, 16 ft-lb)**



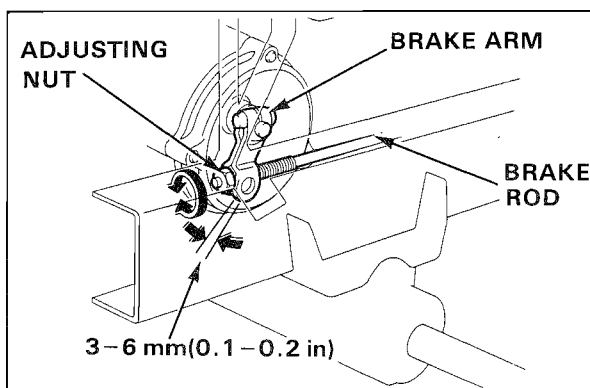
7. Install the brake cover onto the transmission and three 8×30 mm flange bolts.



8. Install the brake rod on the brake arm and screw in the adjuster nut so that brake arm free play is 3-6 mm (0.1-0.2 in).

Check the brake pedal adjustment (page 3-6).

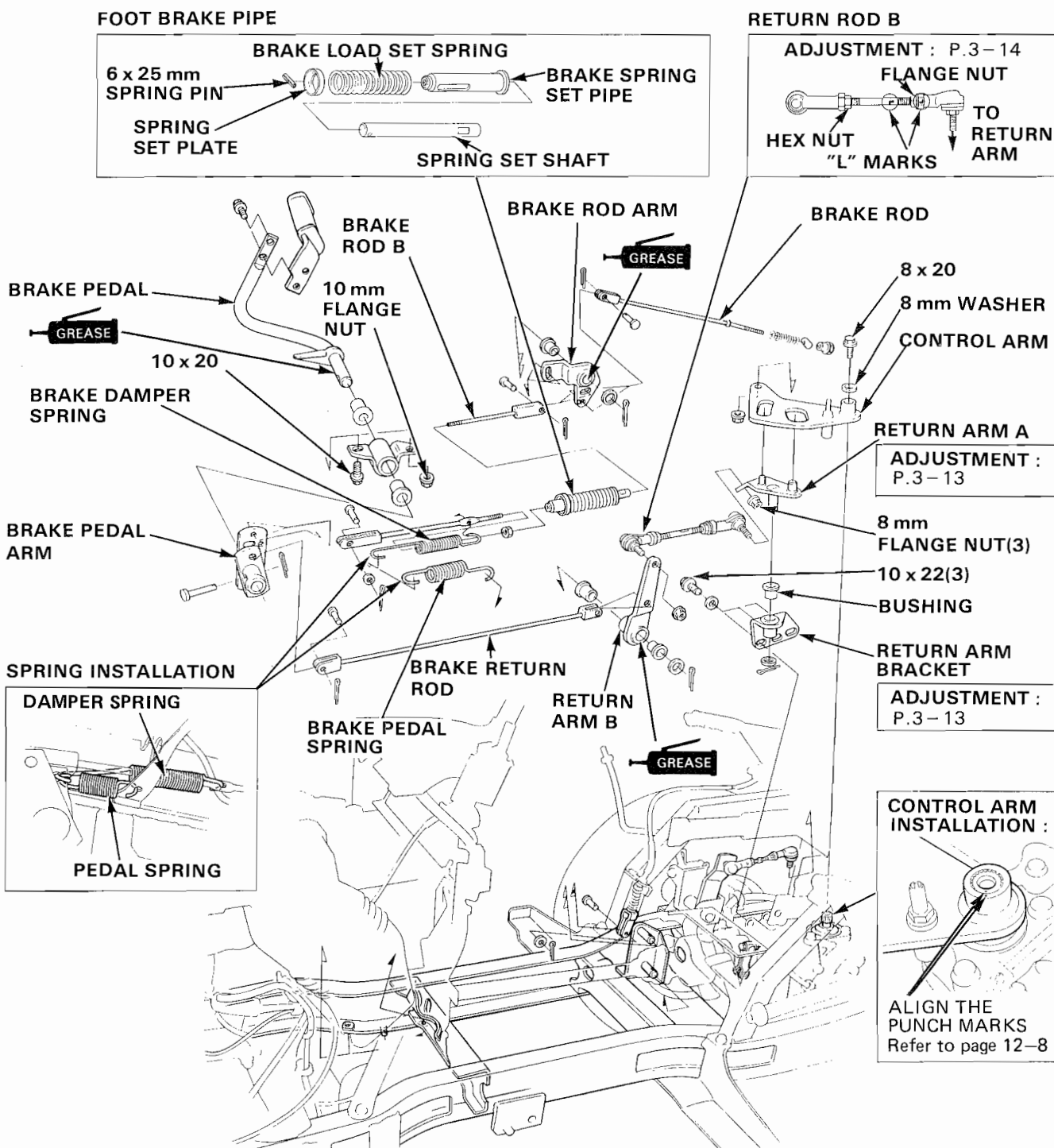
9. Install the followings :  
—fuel tank and hitch plate (P. 6-2).  
—seat and rear fender Assy. (P. 15-9).



### FOOT BRAKE

#### DISASSEMBLY/REASSEMBLY

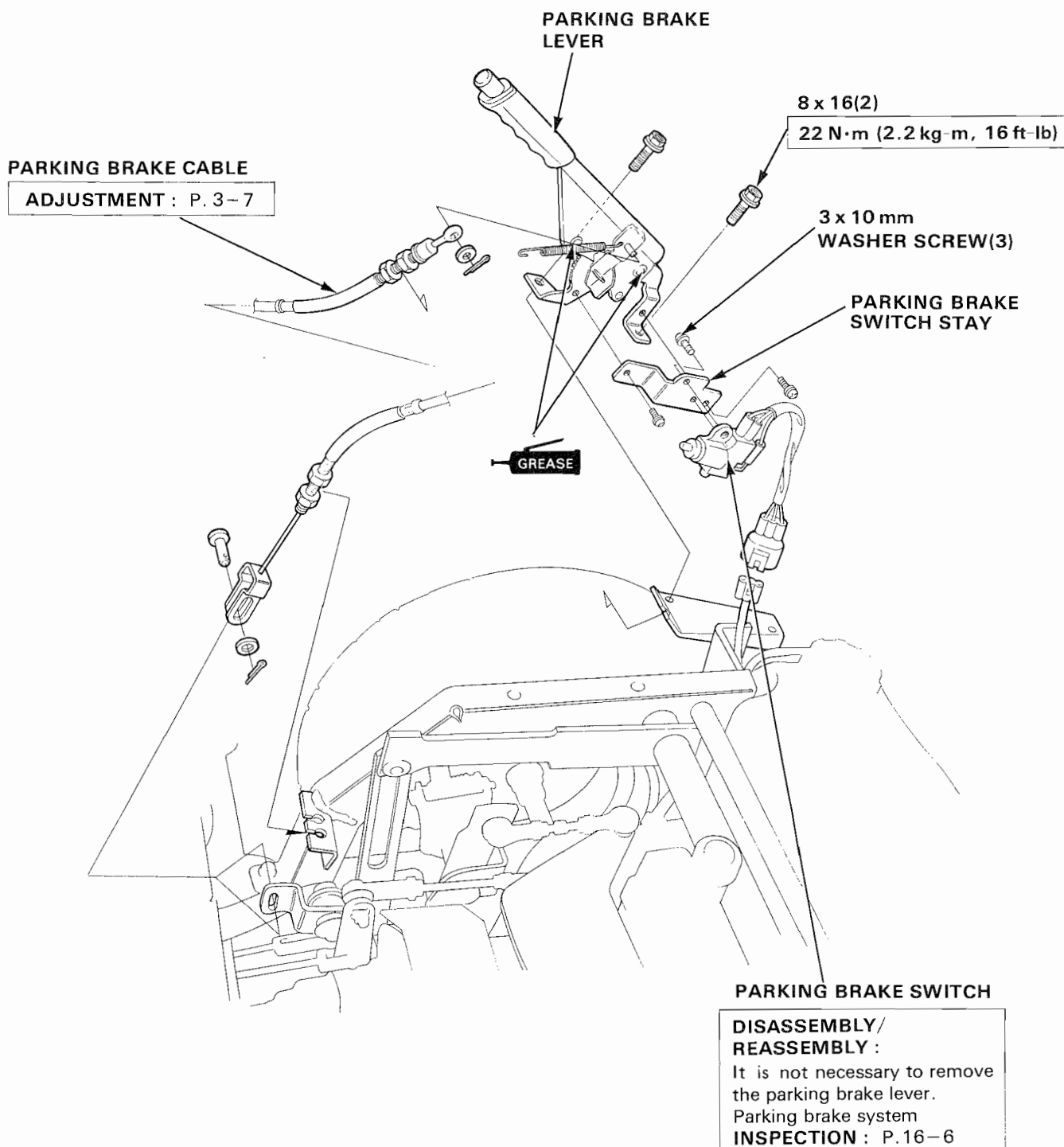
1. Remove the followings :
  - instrument panel, steering column cover(P. 15-3).
  - seat/rear fender as an assembly(P. 15-9).
  - floor(P. 15-14).



## PARKING BRAKE

### DISASSEMBLY/REASSEMBLY

1. Remove the seat/rear fender as an assembly (P. 15-9).



WHEELS/FRONT AXLE/  
STEERING

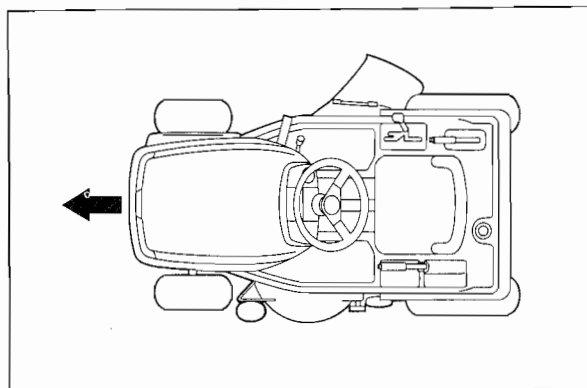
FRONT WHEELS/AXLE .....	14-2
REAR WHEELS .....	14-4
STEERING/GEAR BOX.....	14-5



### b. ADJUSTMENT

#### 〈Toe-in〉

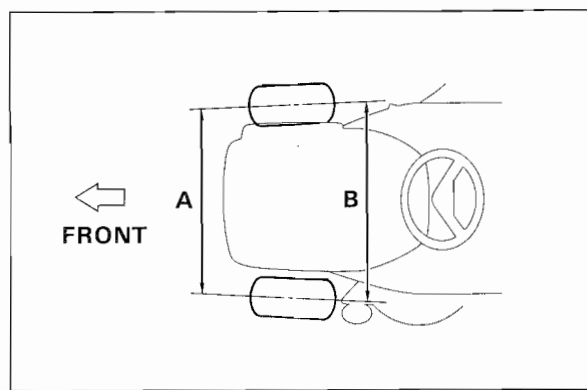
1. Measure the front and rear tire pressures.  
Front—90 kPa (1.0 kg/cm<sup>2</sup>, 14 psi)  
Rear—78 kPa (0.8 kg/cm<sup>2</sup>, 11 psi)
2. Set the front wheels straight ahead and push the lawn tractor 1—2 m (3—7 ft.) forward. Be sure that the tractor moves straight, then measure the toe-in.



3. Measure the treads at the front end and rear end of the front wheels. Be sure to measure the tread at the midpoint of the wheel height. Subtract the measurement A, which is measured at the front end of the front wheels, from B measured at the rear end of the front wheels. It should be  $6 \pm 4$  mm. If the measurement is out of specification, adjust the toe-in by turning the tie-rod A.

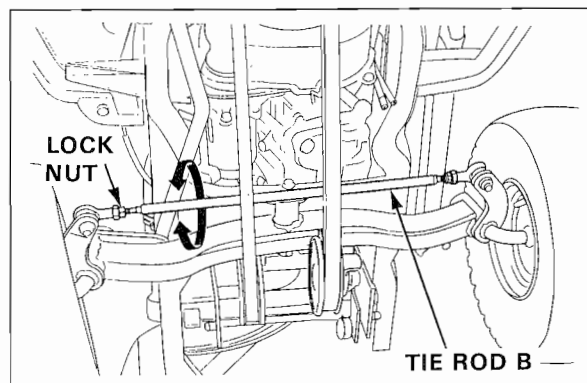
**TOE-IN :  $6 \pm 4$  mm (0.24  $\pm$  0.16 in)**

If the toe-in is excessively out of specification, it could bend or deform the knuckle arm and/or tie-rod B. Be sure to measure the toe-in and adjust as necessary.



4. Adjustment should be made by changing the length of the tie-rod "B".  
Loosen the right and left lock nuts and turn the tie-rod "B". After the adjustment, tighten the lock nuts securely and repeat steps 1—3.

**TORQUE : 22 N·m (2.2 kg·m, 16 ft·lb)**

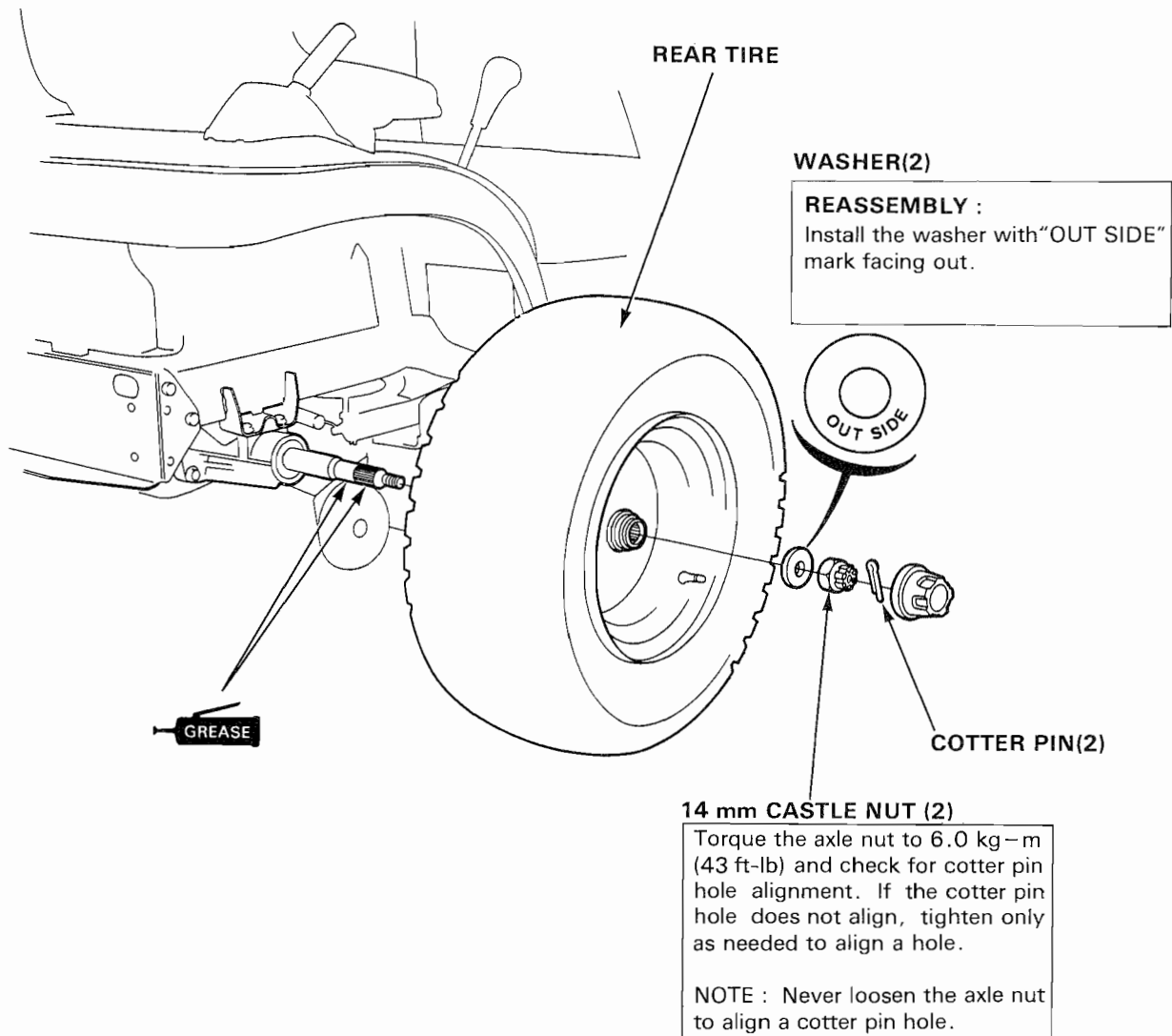


## REAR WHEELS

### DISASSEMBLY/REASSEMBLY

#### CAUTION

- Raise the rear of the frame with a jack and then support it with two safety stands when removing or installing wheels. (P. 2-49)





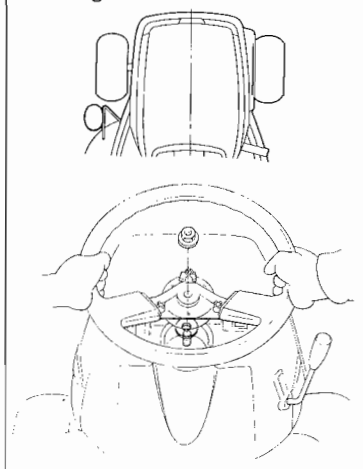
### STEERING/GEAR BOX

- Remove the followings :
  - seat/rear fender Assy. (P. 15-9).
  - instrument panel/steering column cover(P. 15-3).
  - floor (P. 15-14).

#### STEERING WHEEL

##### REASSEMBLY :

Place the front wheels straight-ahead when installing the steering wheel.



CENTER PAD  
STEERING COLUMN WASHER

12 mm SELF-LOCKING NUT  
60 N·m, (6.0 kg-m, 43 ft-lb)

8 x 20(4)

If the steering shaft does not rotate smoothly, loosen the bolts. Adjust the shaft pipe until the shaft rotate smoothly. Then tighten the bolts. Recheck the shaft. After tightening the bolts.

CIRCLIP  
WASHER(2)  
BUSHING(2)  
SHAFT PIPE  
STEERING SHAFT A  
STEERING JOINT ASSY.  
SPECIAL WASHER(2)

8 x 28(2)  
2.2 N·m(2.2 kg-m, 16 ft-lb)

#### 14 mm CASTLE NUT

20–90 N·m(2.0–9.0 kg-m, 14–65 ft-lb)

8 x 50(2)

14 mm WASHER

STEERING DRIVEN GEAR

GREASE

#### TIE ROD ARM

##### REASSEMBLY : P.14–6

Align the punch marks with the arm and gear shaft.

10 x 50

WAVE WASHER

10 x 15

10 mm WASHER

8 x 40(2)  
COTTER PIN

BUSHING(2)

STEERING GEAR BOX

14.2 mm WASHER P.14–6

STEERING DRIVE GEAR

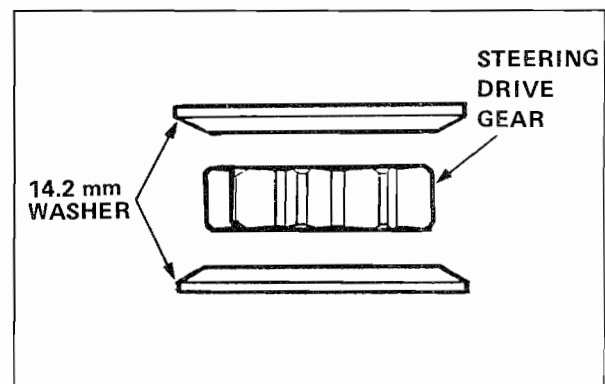
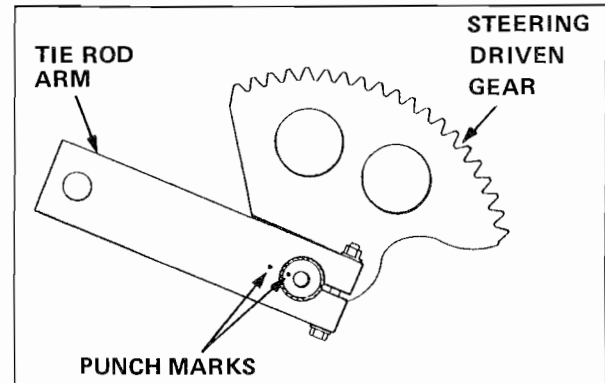
STEERING GEAR WASHER

10 mm SELF-LOCKING NUT  
40 N·m(4.0 kg-m, 29 ft-lb)

BUSHING(2)

### TIE ROD ARM INSTALLATION

Align the punch marks with the tie rod arm and steering driven gear.

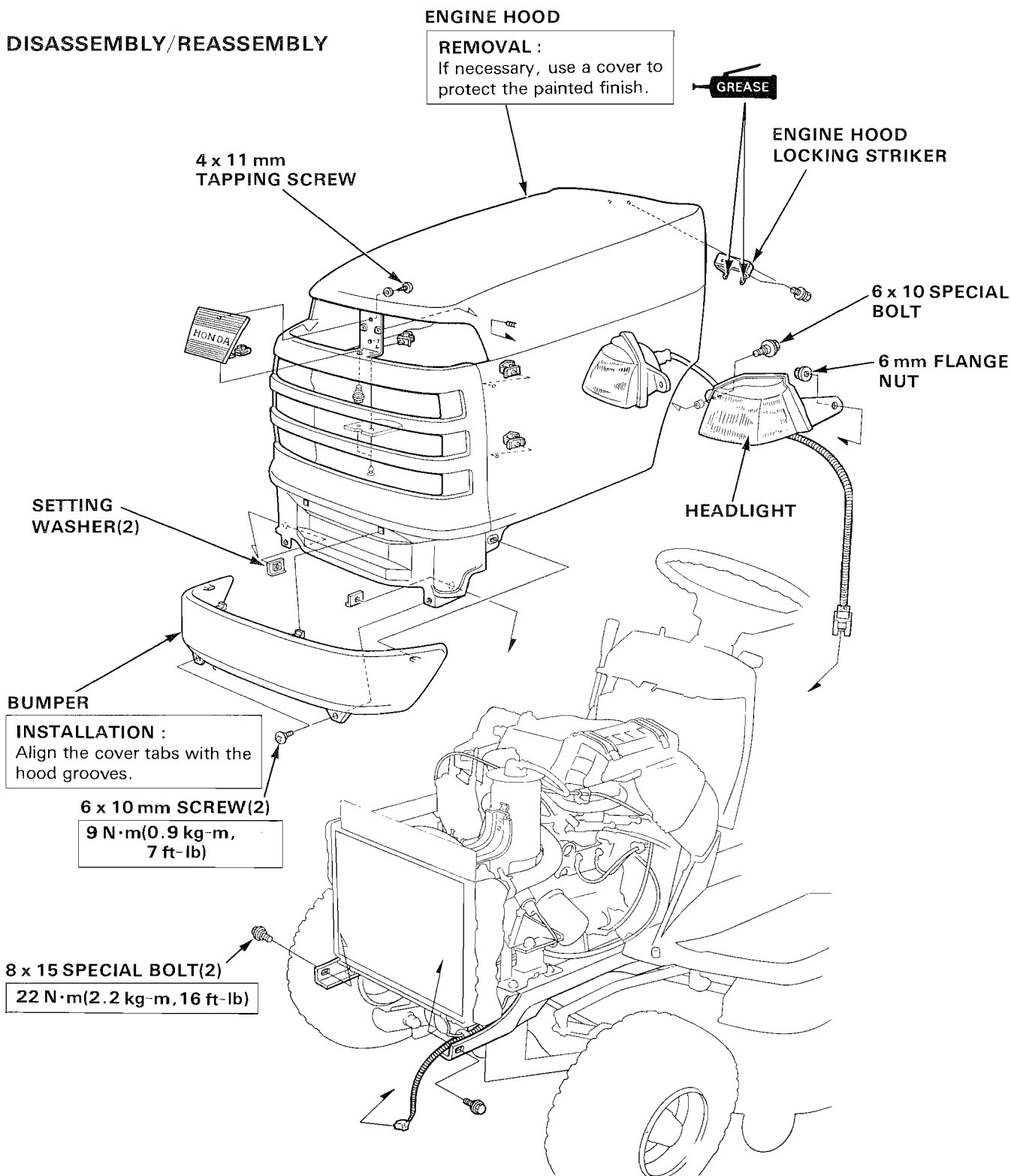


## FRAME/BODY

ENGINE HOOD .....	15-2
INSTRUMENT PANEL/STEERING COLUMN COVE	15-3
P. T. O. CLUTCH LEVER .....	15-5
BATTERY .....	15-6
ELECTRICAL PARTS .....	15-6
THROTTLE LEVER .....	15-7
STEERING COLUMN .....	15-8
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MOWER DECK HEIGHT	
ADJUSTING LEVER .....	15-11
SHIFT LEVER .....	15-12
FLOOR .....	15-14
DRIVE SHAFT .....	15-15

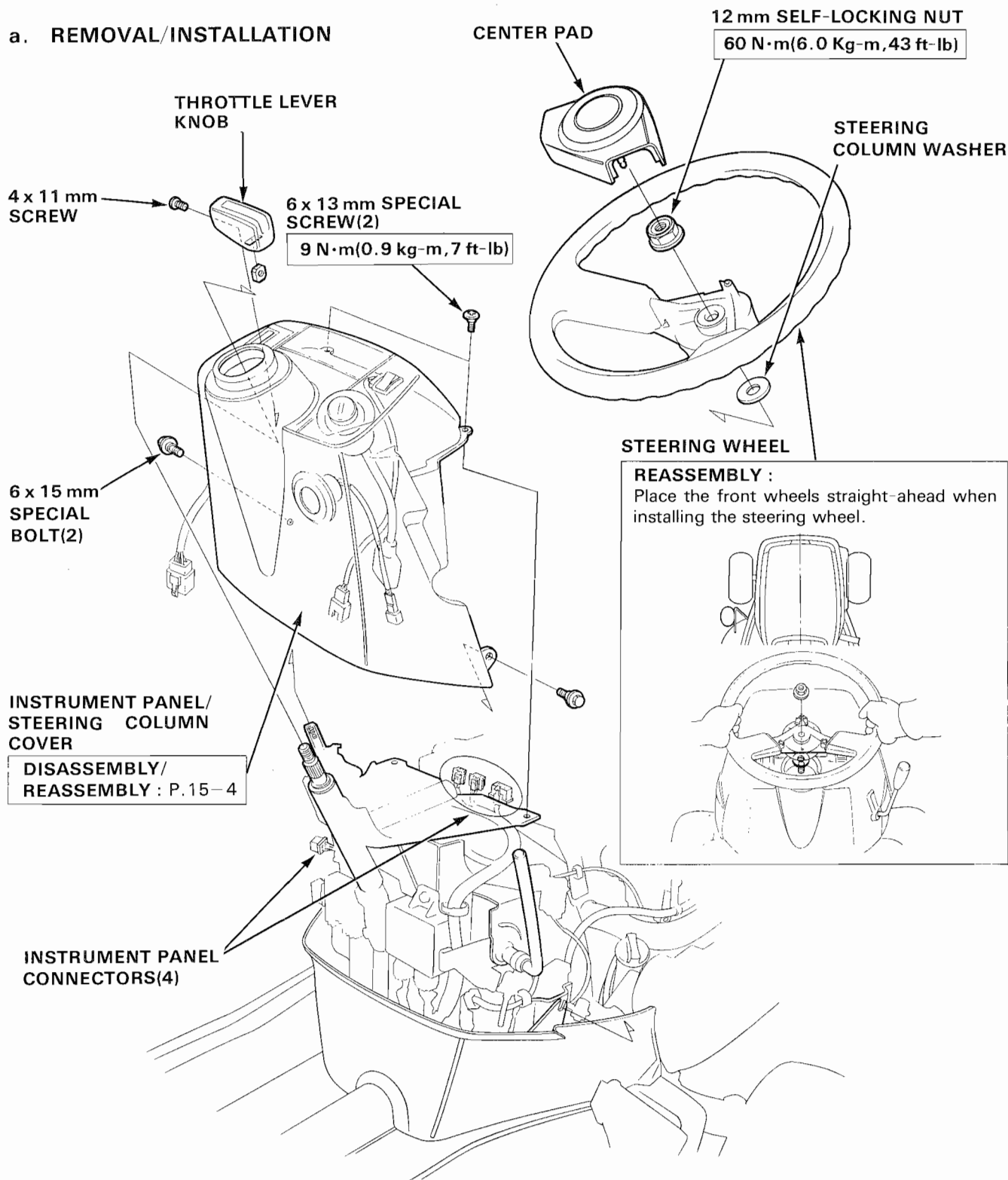
### ENGINE HOOD

#### DISASSEMBLY/REASSEMBLY

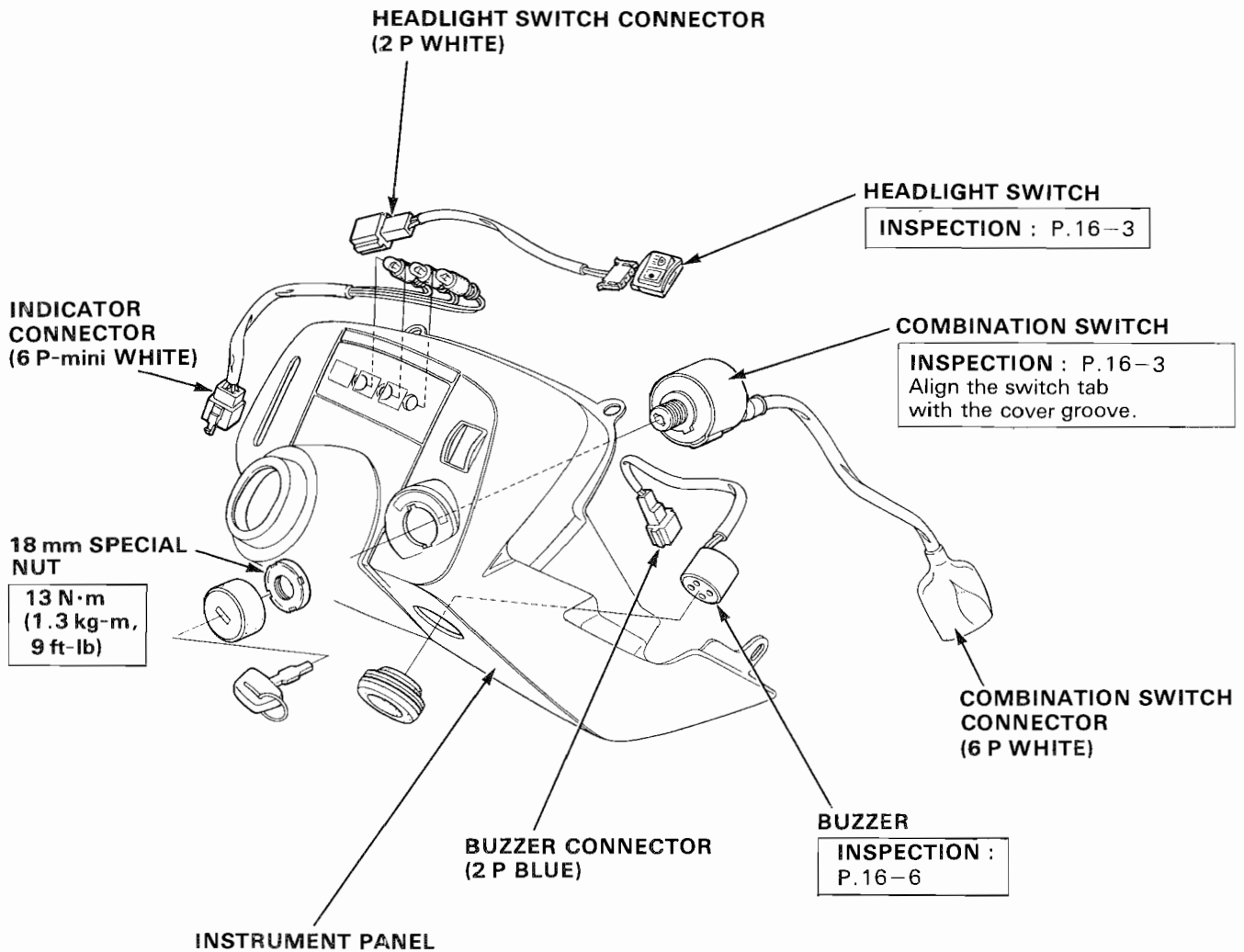


## INSTRUMENT PANEL/STEERING COLUMN COVER

### a. REMOVAL/INSTALLATION

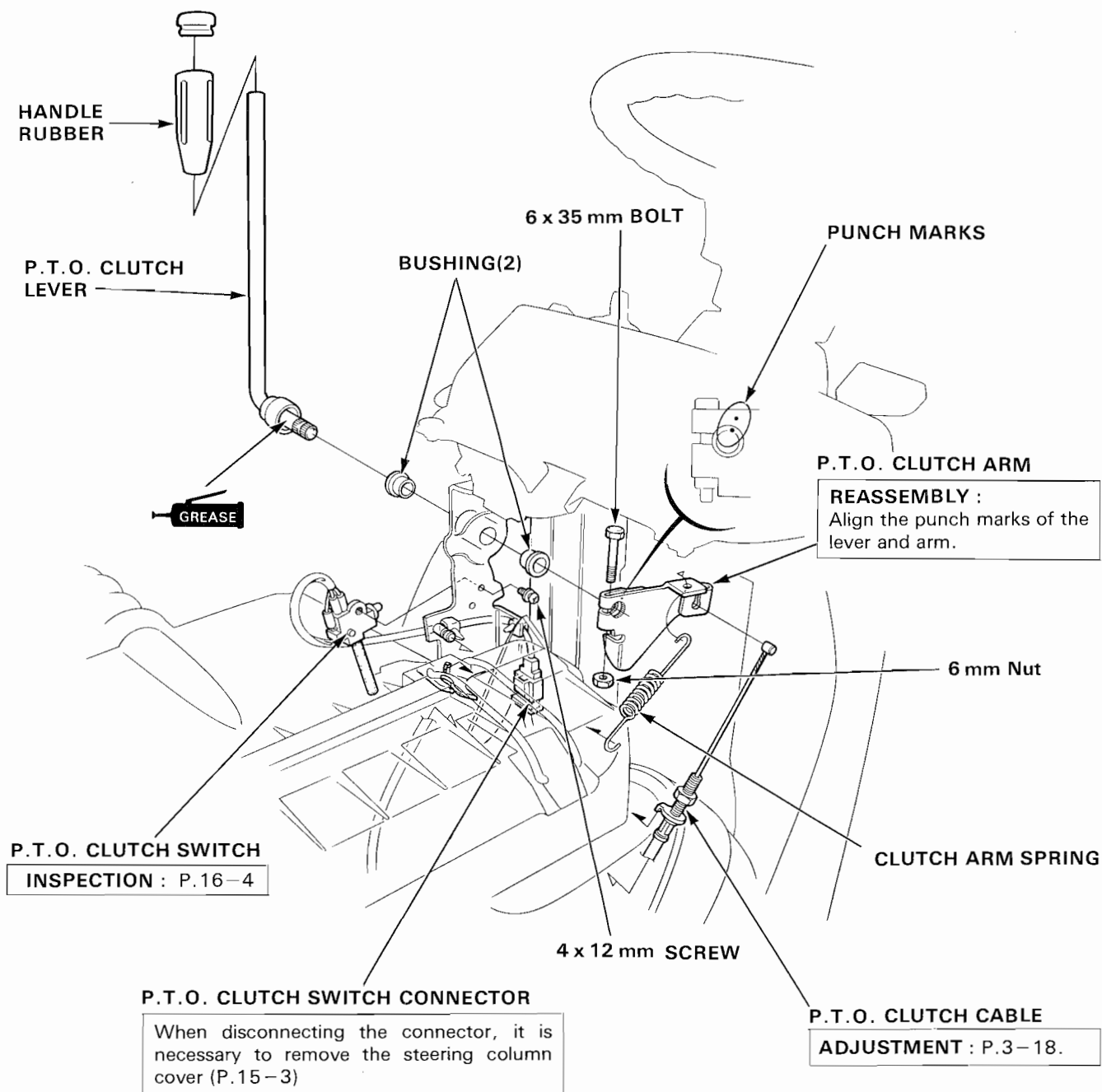


**b. INSTRUMENT PANEL DISASSEMBLY/REASSEMBLY**



## P.T.O. CLUTCH LEVER

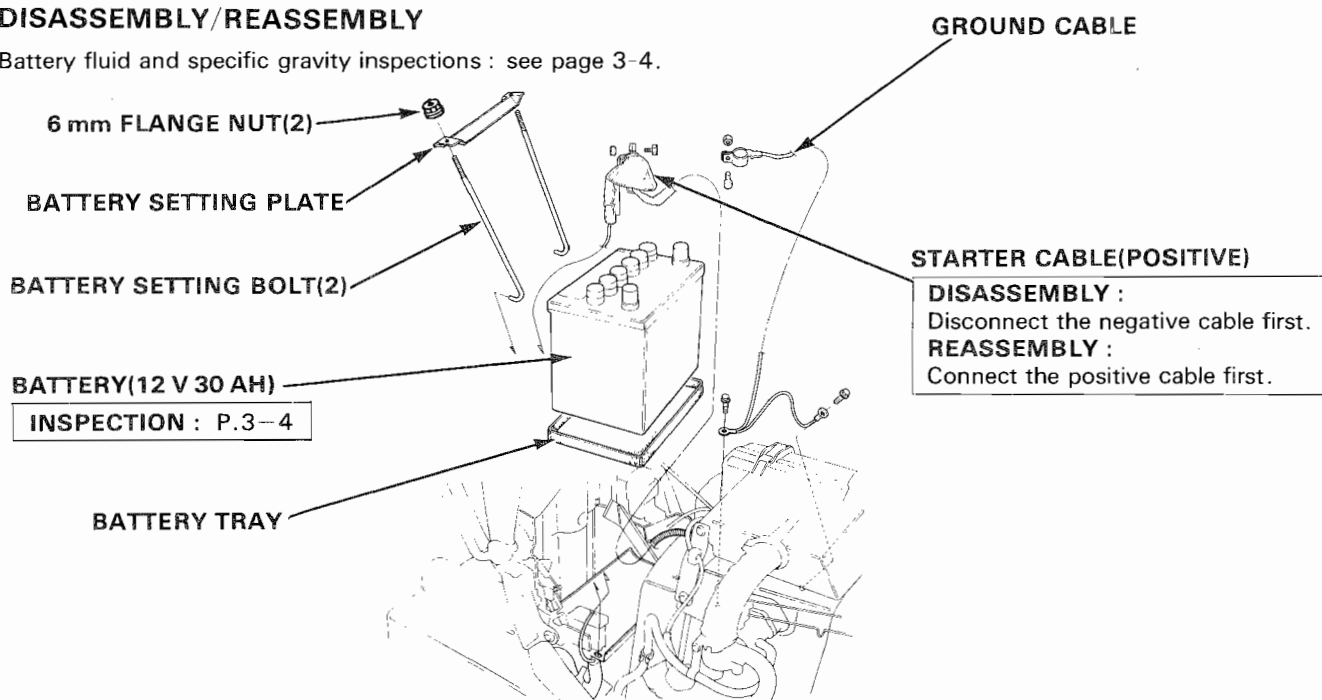
### DISASSEMBLY/REASSEMBLY



## BATTERY

### DISASSEMBLY/REASSEMBLY

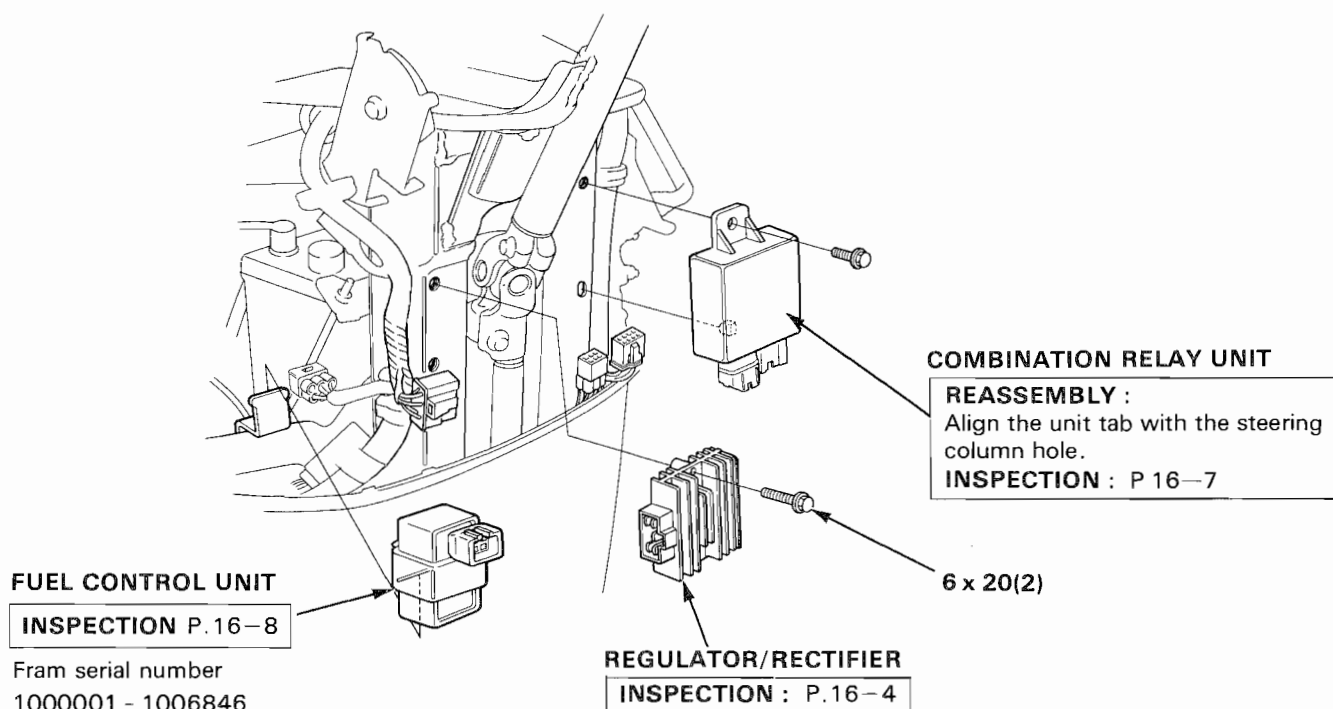
Battery fluid and specific gravity inspections : see page 3-4.



## ELECTRICAL PARTS

### DISASSEMBLY/REASSEMBLY

1. Remove the instrument panel/steering column cover (P. 15-3).

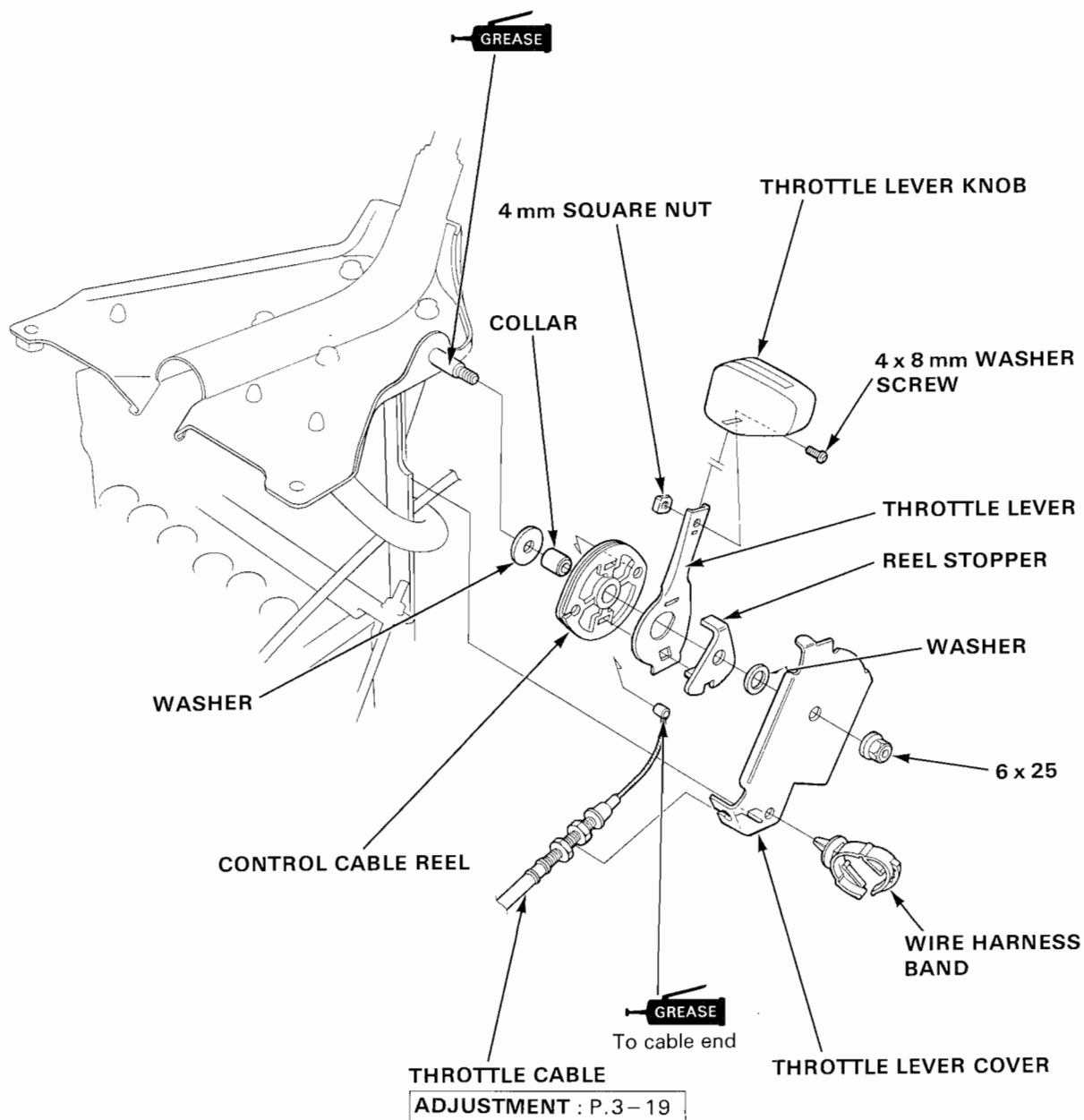




## THROTTLE LEVER

### DISASSEMBLY/REASSEMBLY

1. Remove the instrument panel/steering column cover (P. 15-3).



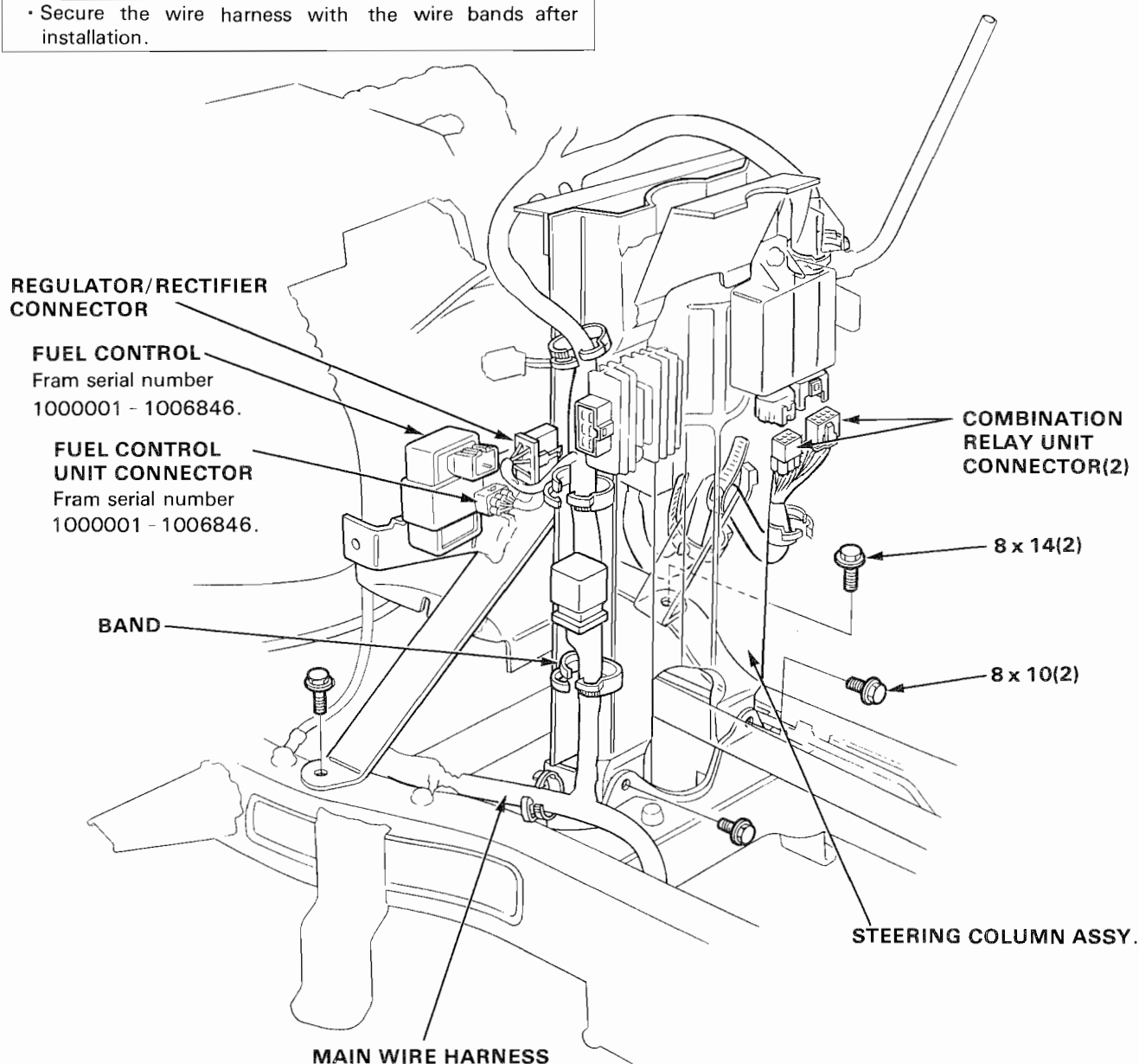
## STEERING COLUMN

### DISASSEMBLY/REASSEMBLY

1. Remove the followings :
  - instrument panel/steering column cover(P. 15-3).
  - seat/rear fender as an assembly(P. 15-9).
  - floor(P. 15-14).
  - steering shaft A/steering joint(P. 14-5).
  - throttle lever(P. 15-7).
2. Disconnect the P. T. O. clutch cable(P. 15-5).

#### NOTE

- Secure the wire harness with the wire bands after installation.

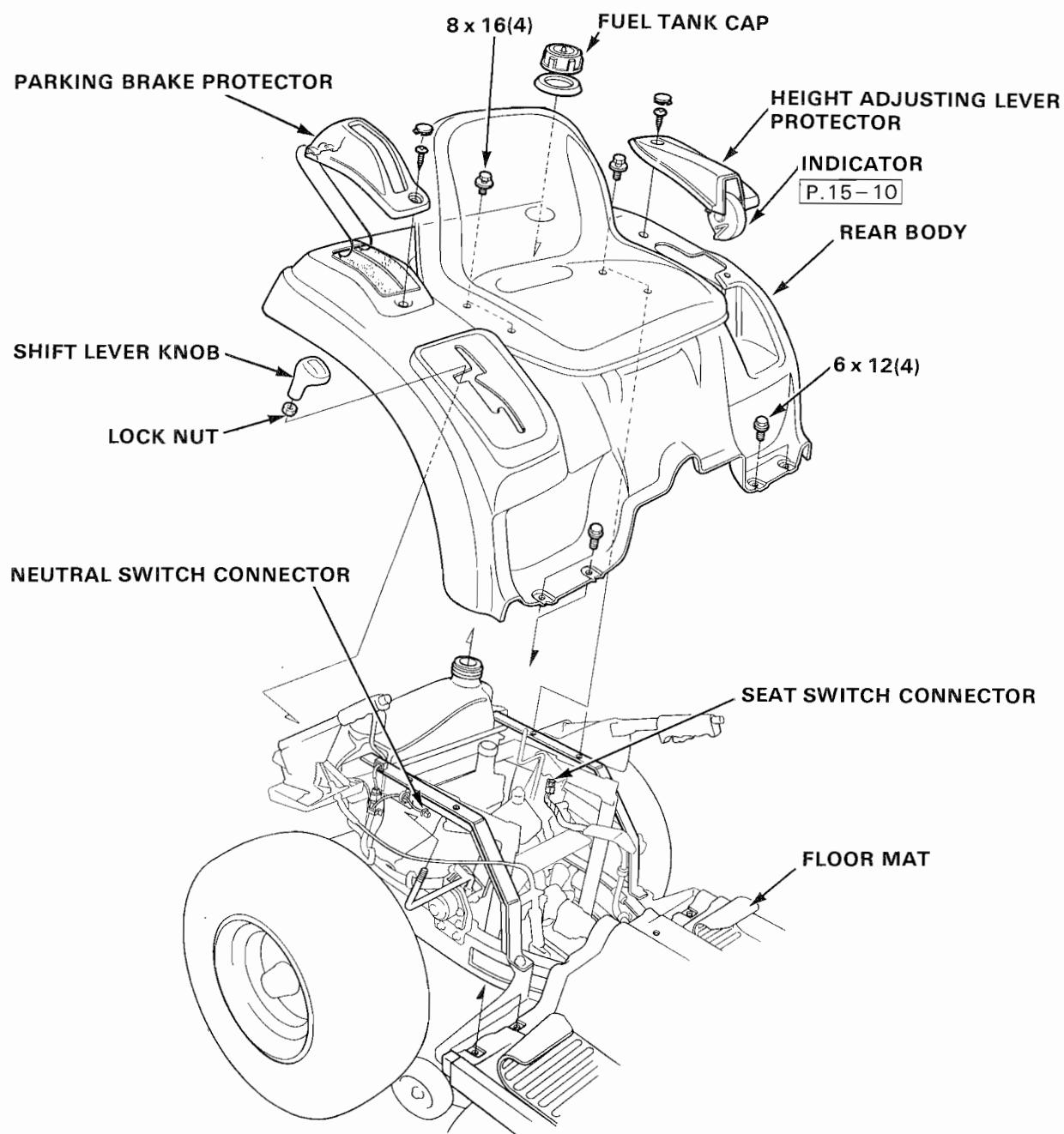


### SEAT/REAR FENDER

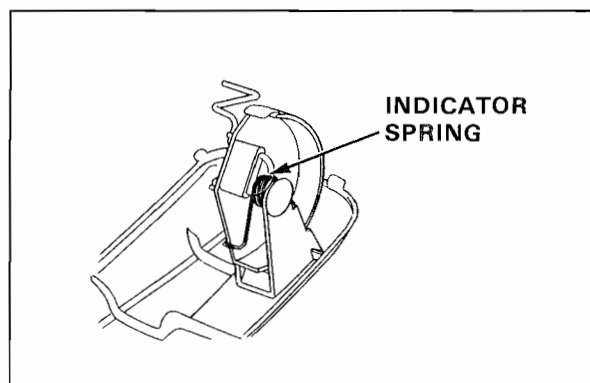
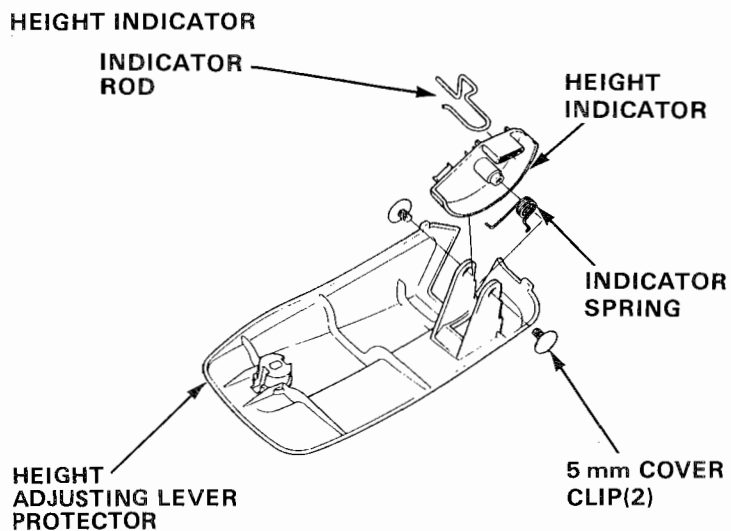
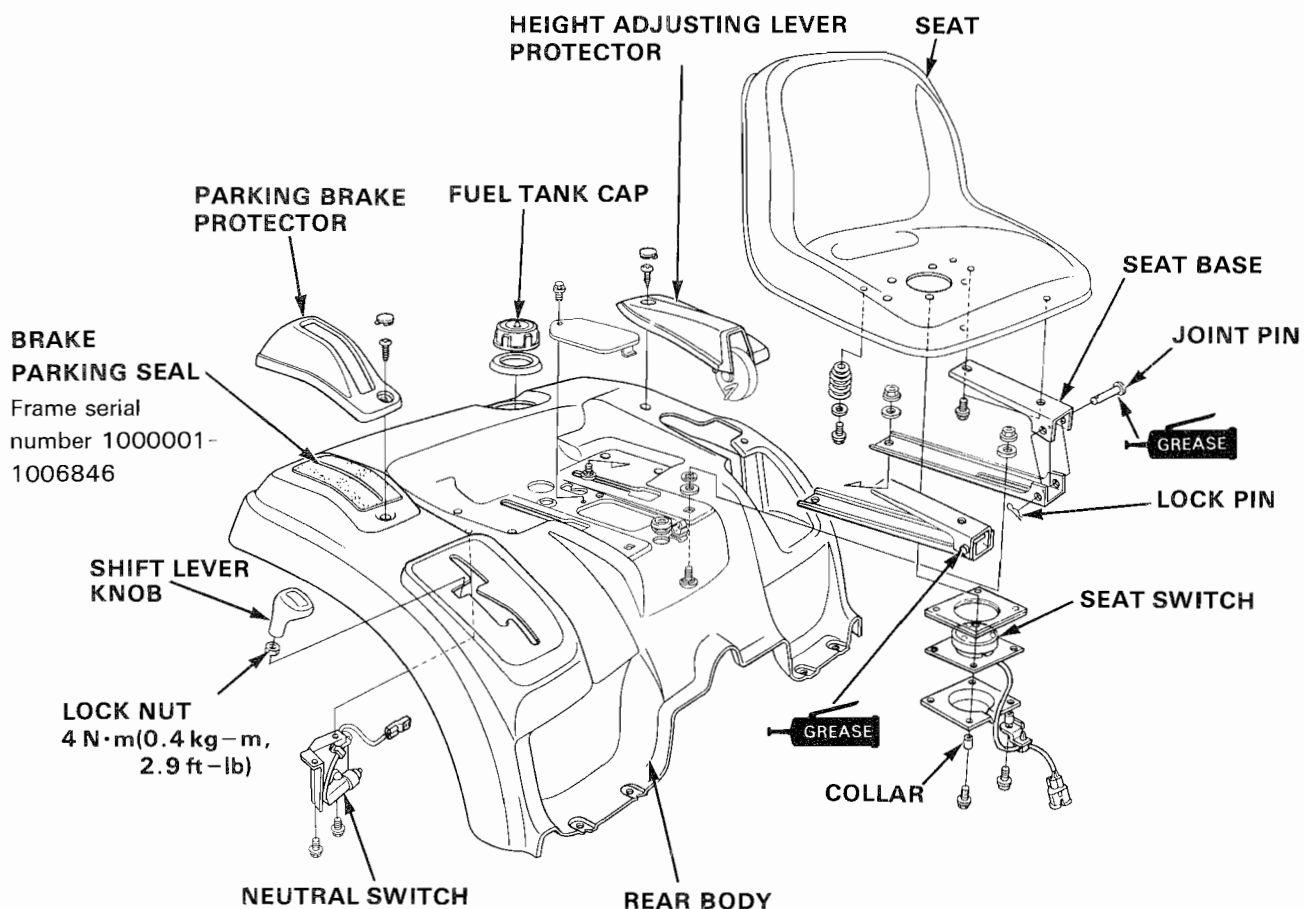
#### a. REMOVAL/INSTALLATION

##### NOTE

- Seat, shift lever knob and protectors can be serviced with the rear fender installed.



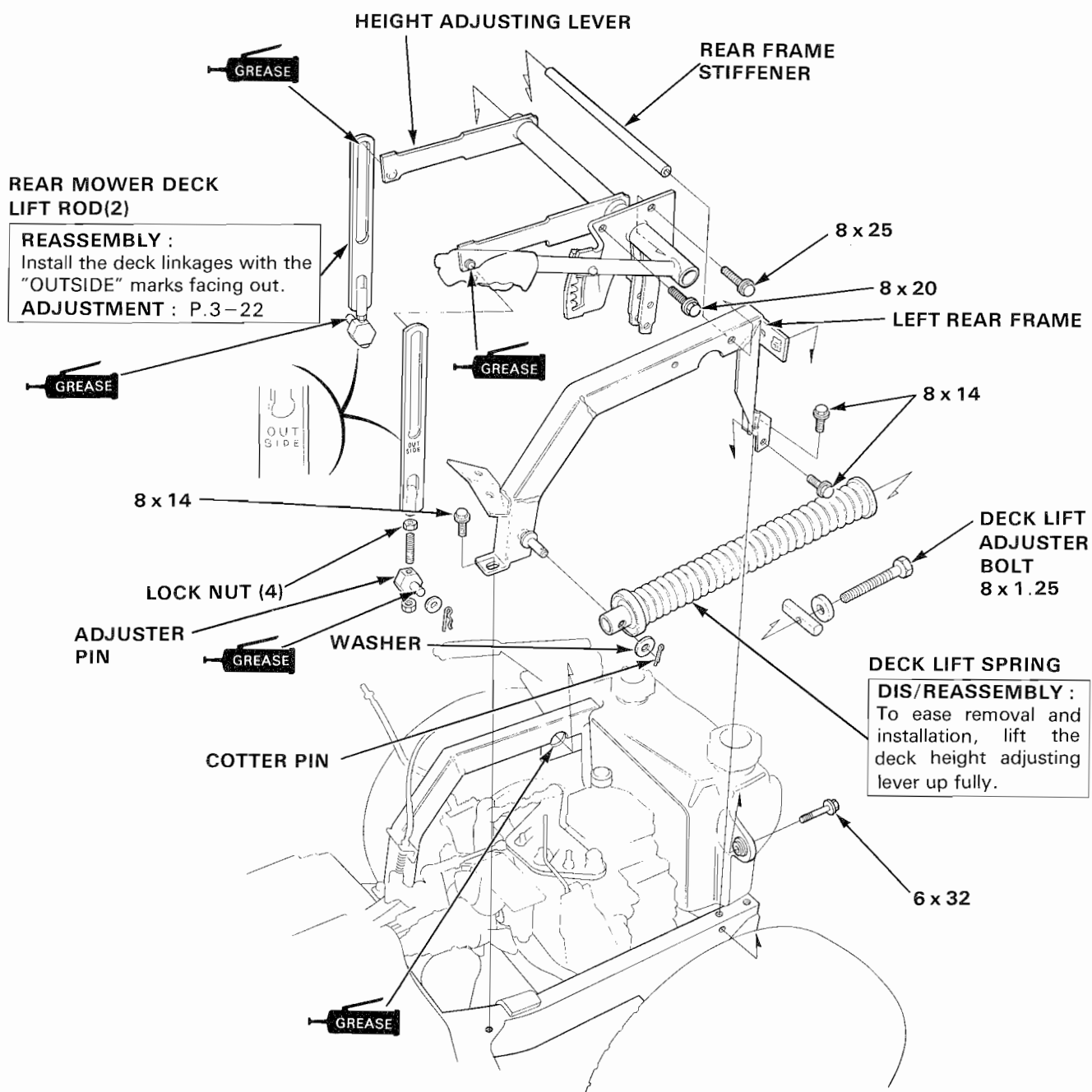
### b. DISASSEMBLY/REASSEMBLY



### MOWER DECK HEIGHT ADJUSTING LEVER

#### DISASSEMBLY/REASSEMBLY

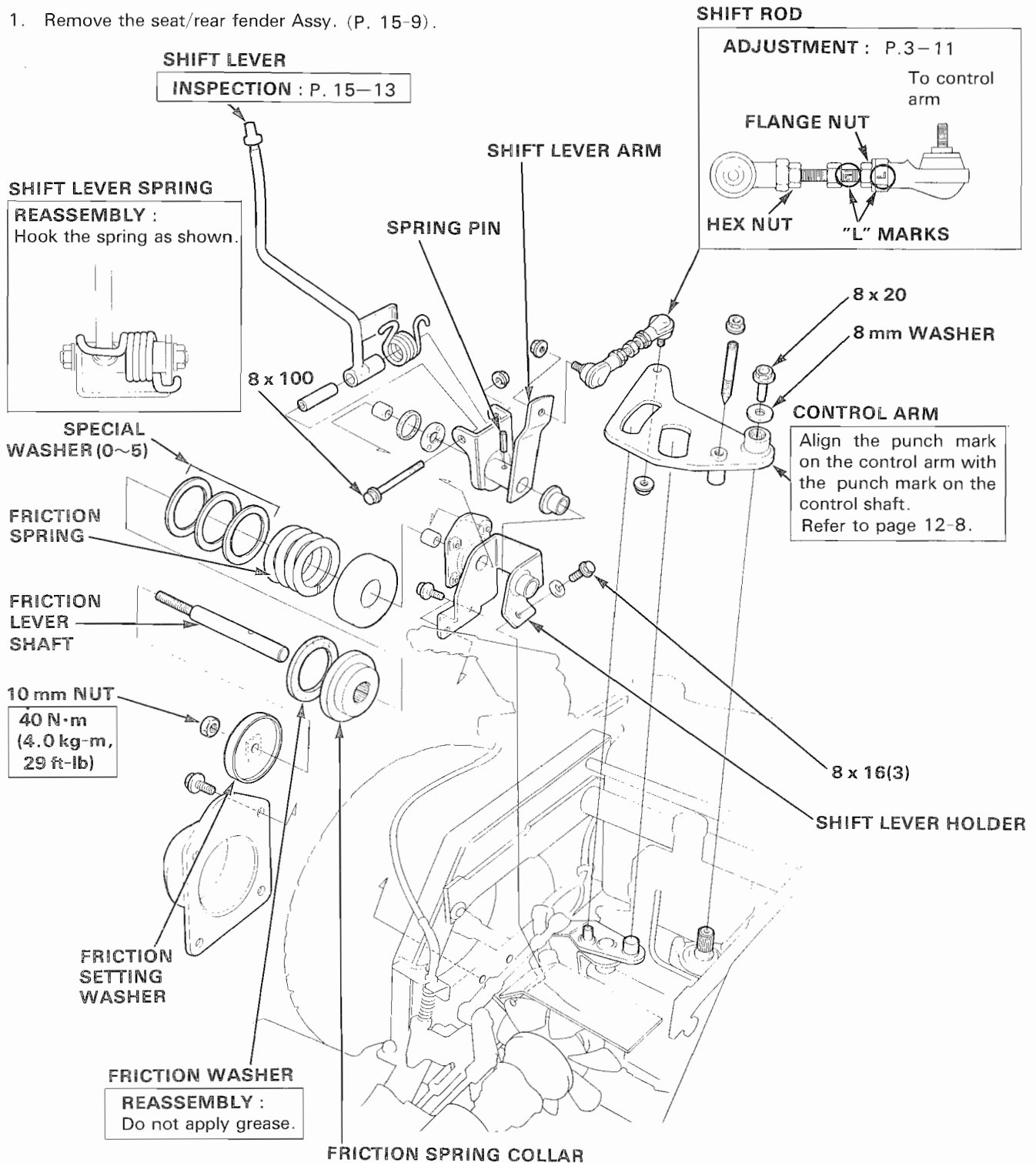
1. Remove the seat/rear fender Assy. (P. 15-9).



### SHIFT LEVER

#### DISASSEMBLY/REASSEMBLY

1. Remove the seat/rear fender Assy. (P. 15-9).



### ● INSPECTION

Tie a string on the shift lever as shown, and set a spring balance. Pull the spring scale in the direction shown by arrow and measure the friction preload of the lever. It should be 1.8—2.4 kg (3.97—5.29 lb).

If the scale is out of the range, adjust the shift lever as follows :

1. Remove the shift lever assy. (P. 15-12).
2. Remove the friction cover, 10 mm hex nut, friction setting washer, friction washer.
3. Adjust the number of the special washer.

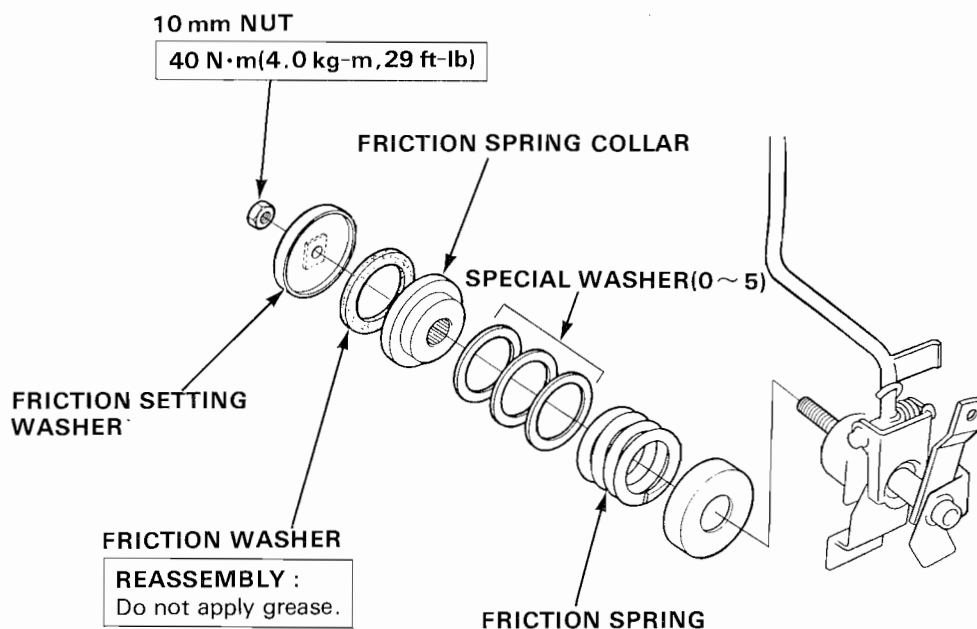
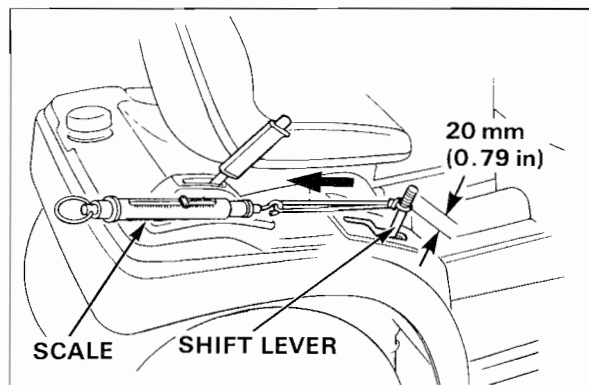
#### NOTE

- One addition of the shim changes the load by 0.15 kg (0.33 lb).

4. If the correct friction preload cannot be obtained, replace the friction setting washer, friction washer, and friction spring collar as set.

#### CAUTION

- After installing the shift lever, check the shift lever linkage. (P.3—11)



## FLOOR

### DISASSEMBLY/REASSEMBLY

1. Remove the followings :
  - seat/rear fender Assy. (P. 15-9).
  - instrument panel/steering column cover(P. 15-3).

#### FLOOR MAT(R)

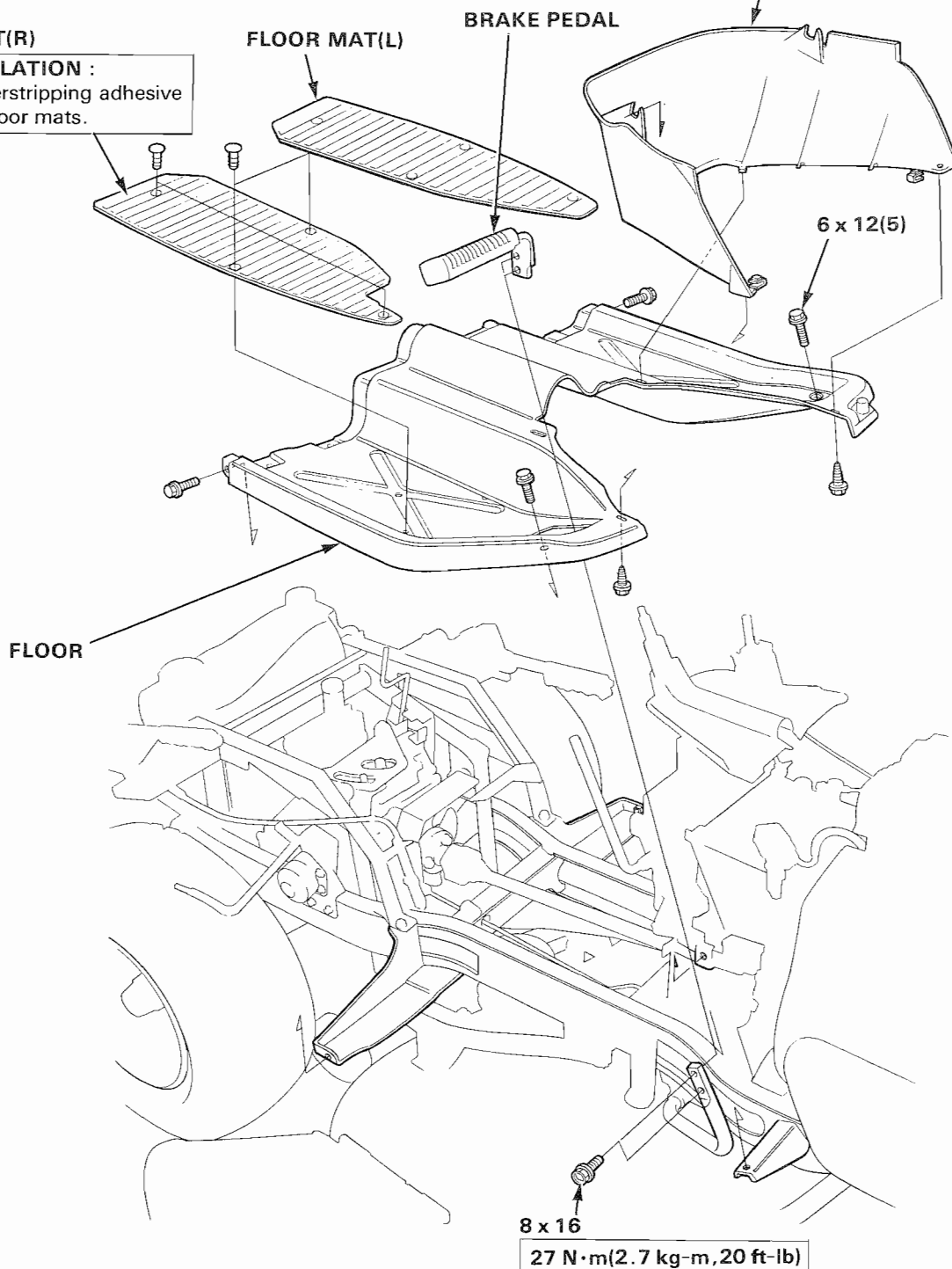
**REINSTALLATION :**  
Use weatherstripping adhesive  
to secure floor mats.

#### FLOOR MAT(L)

#### BRAKE PEDAL

#### FRONT FLOOR COVER

**DISASSEMBLY/REASSEMBLY :**  
It is not necessary to remove the floor.





## DRIVE SHAFT

### DISASSEMBLY/REASSEMBLY

#### ▲WARNING

To prevent severe personal injury, Remove the ignition key and disconnect the spark plug caps to prevent accidental starting.

Remove the followings :

- instrument panel/steering column cover(P. 15-3).
- seat/rear fender Assy. (P. 15-9).
- floor(P. 15-14).
- steering/gear box(P. 14-5).
- throttle lever(P. 15-7).

Hold the drive shaft with a commercially available strap wrench as shown.

8x 33(6)

27 N·m (2.7 kg-m, 20 ft-lb)

DRIVE SHAFT

COMMERCIALLY AVAILABLE  
STRAP WRENCH

DRIVESHAFT

8x 1.25(1)  
LOCK BOLT

22 N·m (2.2 kg-m,  
16 ft-lb)

LOCK WASHER

FAN COVER

COOLING FAN

BOLT

DRIVE SHAFT JOINT

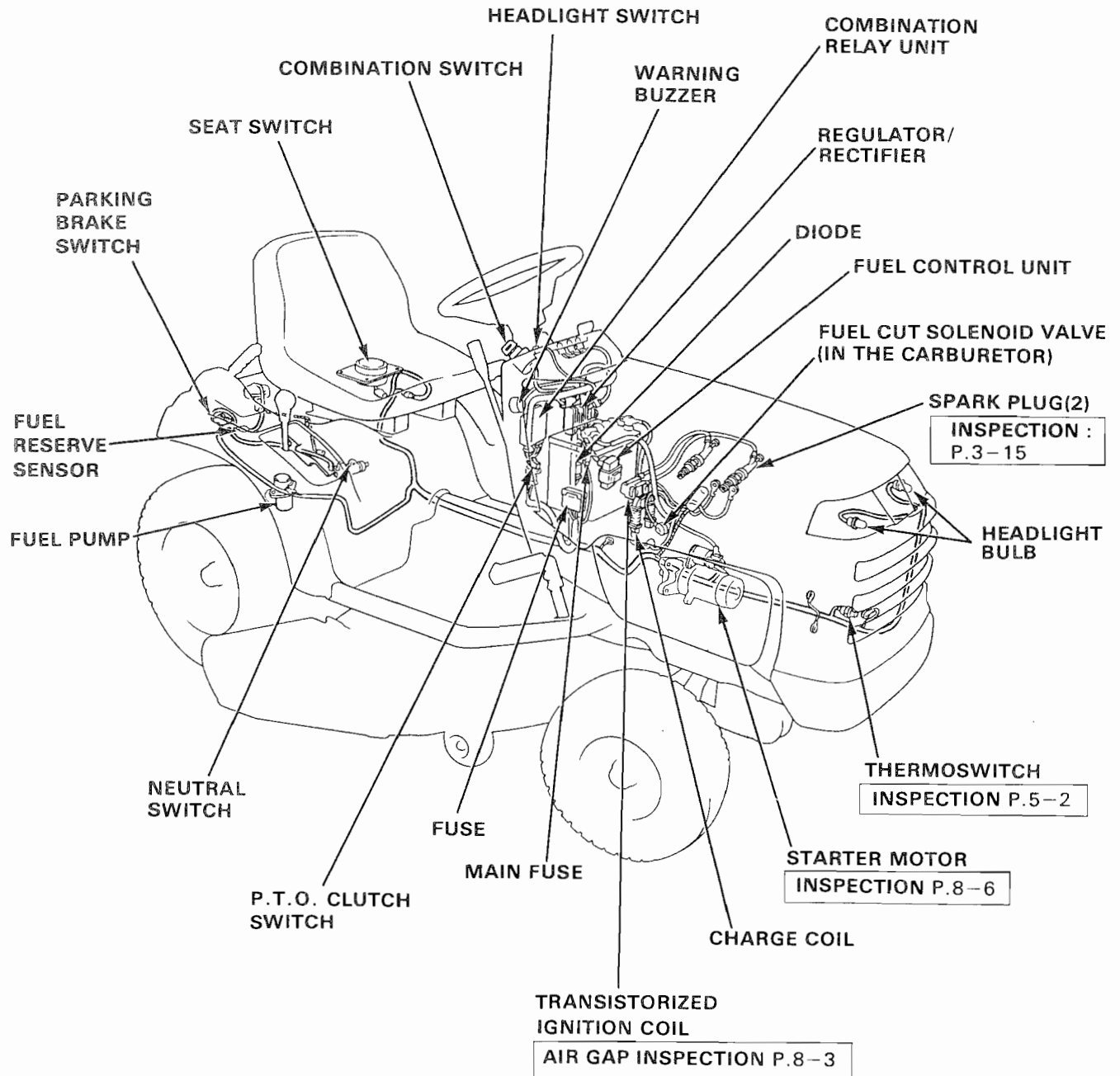
NOTE

## ELECTRICAL EQUIPMENT

COMPONENT LOCATION . . . . .	16-2
BODY ELECTRICAL INSPECTION . . . . .	16-4
ENGINE ELECTRICAL INSPECTION . . . . .	16-11

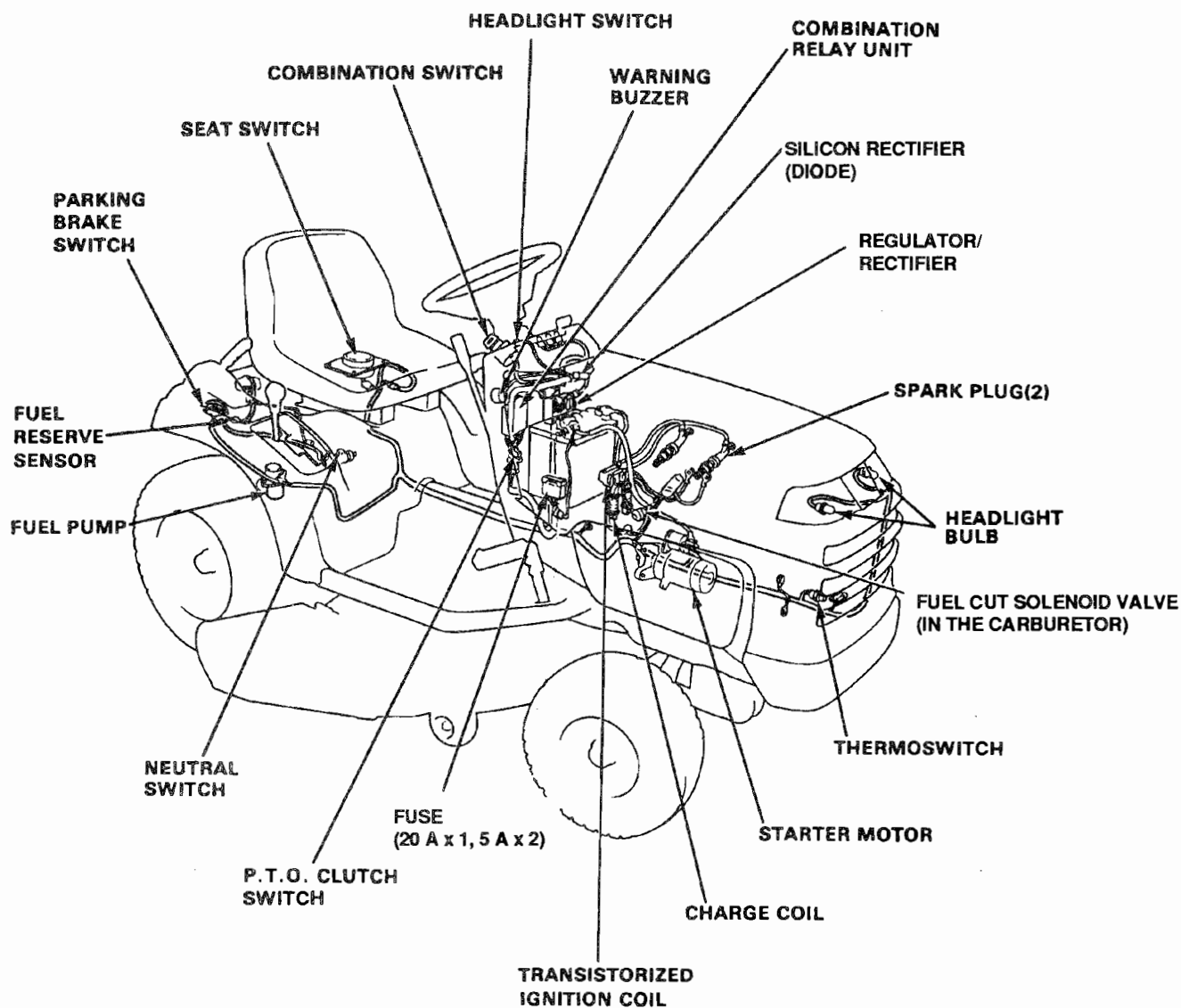
## COMPONENT LOCATION

• Frame serial number 1000001 - 1006846



## COMPONENT LOCATION

- Frame serial number 1006847 and subsequent

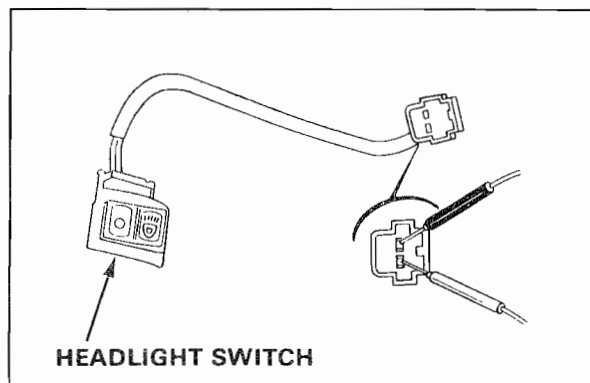


## BODY ELECTRICAL INSPECTION

### ● HEADLIGHT SWITCH

Check for continuity between the wire leads in the 2P connector.

There should be continuity when the switch is turned to "D" and no continuity when the switch is turned to "O".



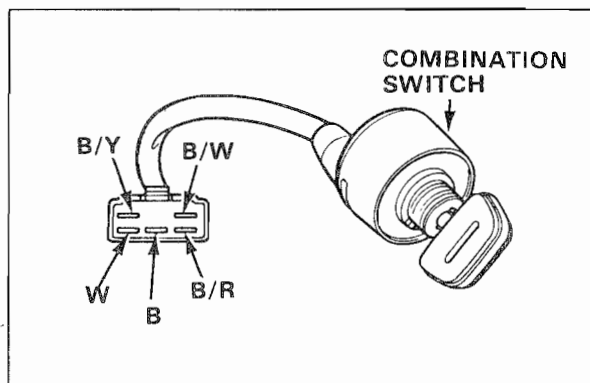
HEADLIGHT SWITCH

### ● COMBINATION SWITCH

Check for continuity between the terminals with the switch in each position.

Wire color Position	BI/R	BI	W	BI/Y	BI/W
OFF	○	○			
ON			○	○	
START			○	○	○

○—○ : Continuity

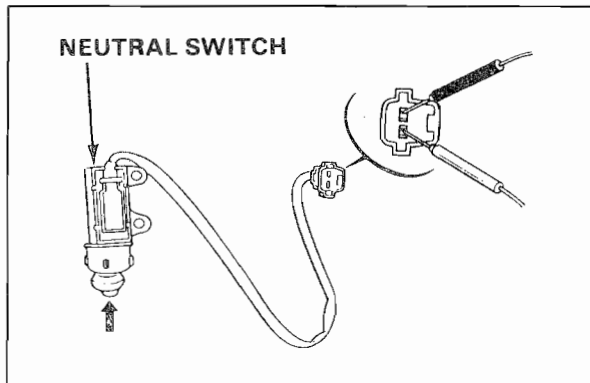


COMBINATION SWITCH

### ● NEUTRAL SWITCH

Check for continuity between the wire leads in the 2P connector.

There should be continuity when the switch is depressed and no continuity when the switch is released.



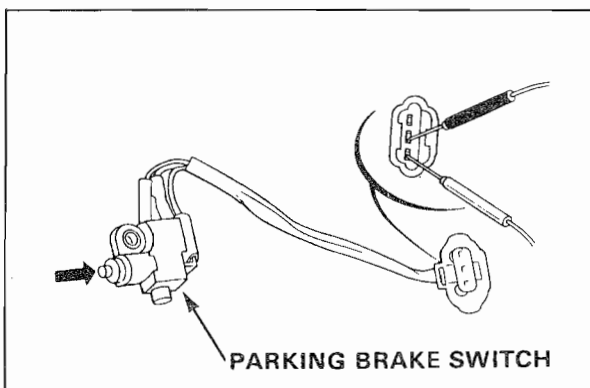
NEUTRAL SWITCH

### ● PARKING BRAKE SWITCH

Check for continuity between the terminals with the switch in each position.

Wire color Position	BI	L/BI	G/O
DEPRESSED	○		○
RELEASE	○	○	

○—○ : Continuity

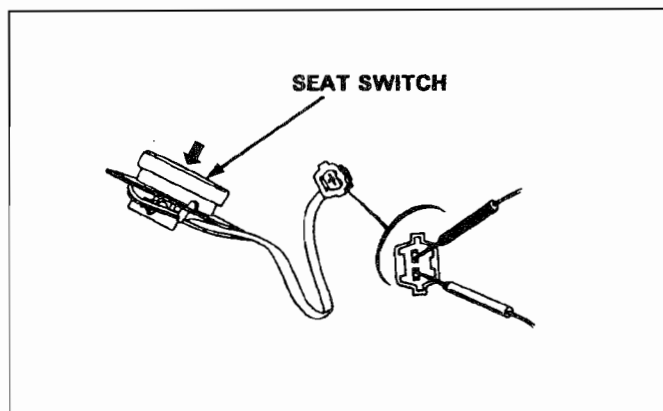


PARKING BRAKE SWITCH

### • SEAT SWITCH

Check for continuity between the wire leads in the 2P connector.

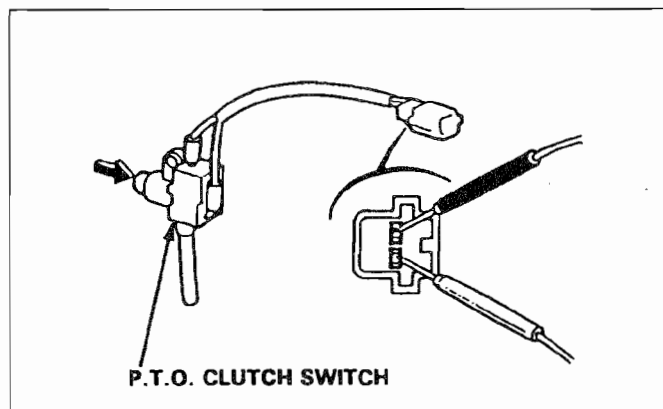
There should be continuity when the switch is depressed, and no continuity when the switch is released.



### • P.T.O CLUTCH SWITCH

Check for continuity between the wire leads in the 2P Connector.

There should be continuity when the switch is depressed and no continuity when the switch is released.



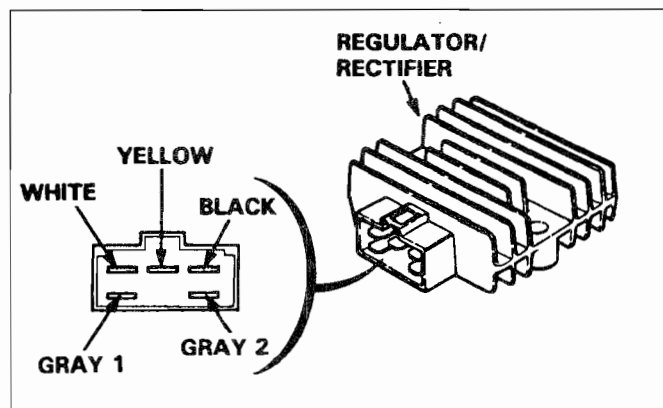
### • REGULATOR/RECTIFIER

— Frame serial number: 1000001 - 1006846

Use a digital multimeter in the CDI  $\Omega$  R x 100 range, and measure the resistance between the terminals.

Unit: k $\Omega$

TESTER(+) TESTER(-)	WHITE	GRAY 1	YELLOW	BLACK	GRAY 2
WHITE		1 - 200	$\infty$	0.5 - 1000	1 - 200
GRAY 1	$\infty$		$\infty$	$\infty$	$\infty$
YELLOW	$\infty$	$\infty$		$\infty$	$\infty$
BLACK	$\infty$	0.1 - 50	$\infty$		0.1 - 50
GRAY 2	$\infty$	$\infty$	$\infty$	$\infty$	



— Frame serial number: 1006847 and subsequent.

Unit: k $\Omega$

TESTER(+) TESTER(-)	WHITE	GRAY 1	YELLOW	BLACK	GRAY 2
WHITE		$\infty$	$\infty$	$\infty$	$\infty$
GRAY 1	$\infty$		$\infty$	$\infty$	$\infty$
YELLOW	$\infty$	1 - 50		1 - 50	1 - 50
BLACK	$\infty$	0.5 - 20	0.5 - 20		0.5 - 20
GRAY 2	$\infty$	$\infty$	$\infty$	$\infty$	

#### NOTE

- RECOMMENDED MULTITESTERS:
  - 07411-0020000 (KOWA Digital type)
  - KS-AHM-32-003 (KOWA Digital type; U.S.A only)
  - 07308-0020001 (SANWA Analogue type)
  - TH-5H (KOWA Analogue type)
- Select the following range:
  - Sanwa: k $\Omega$
  - Kowa: CDI  $\Omega$  R x 100

## ● FUEL PUMP

### WARNING

Fuel vapors or spilled fuel may ignite. Do not smoke during the test. Keep any open flame and sparks away from your work area.

### NOTE

- Check for a clogged fuel filter and/or fuel line before checking fuel pump pressure. Be sure the battery is fully charged.

1. Disconnect the 4.5×85 fuel hose (discharge side), and connect a pressure gauge to it as shown.
2. Turn the engine combination ON until pressure stabilizes, then turn the combination switch OFF.

Pressure should be	6.9–14.2 kPa (0.07–0.145 kg/cm <sup>2</sup> , 1.0–2.1 psi)
--------------------	---

- If the gauge shows at least 6.9 kPa (0.07 kg/cm<sup>2</sup>, 1.0 psi) go on to step 3.
- If the gauge shows less than 6.9 kPa (0.07 kg/cm<sup>2</sup>, 1.0 psi) replace the pump and re-test.

3. Remove the pressure gauge and hold a graduated container under the hose.
4. Turn the combination switch ON, measure the amount of fuel flow for 60 seconds, and then turn the combination switch OFF.  
Fuel flow should be more than 350 cc (12.3 oz) in 60 seconds.

- If fuel volume is less than specified, replace the fuel pump and re-test.

### NOTE

- Check for a clogged fuel filter and/or fuel line before replacing pump.

5. Reconnect the fuel line securely, and check for leaks.

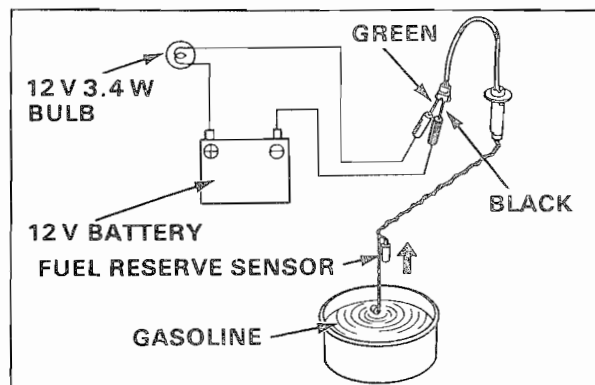
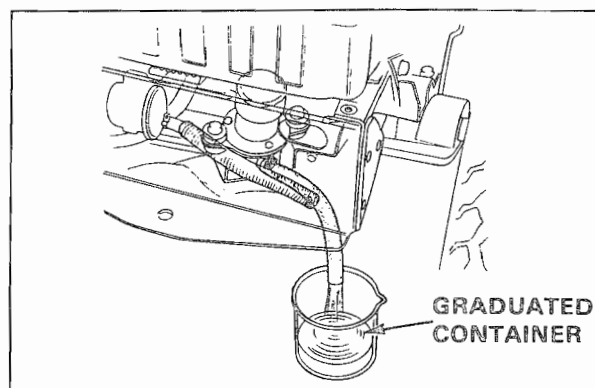
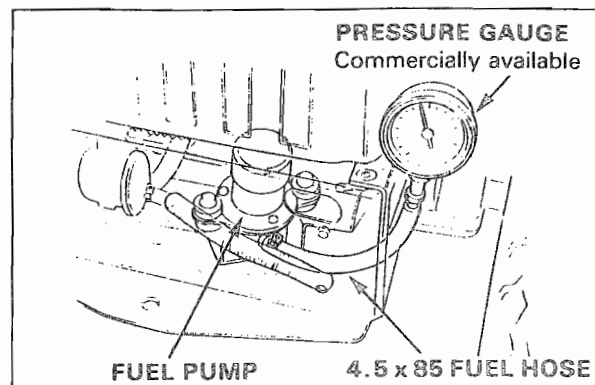
## ● FUEL RESERVE SENSOR

1. Remove the fuel sensor from the fuel tank (P. 6-2).

### WARNING

Never use gasoline or low flash point solvents to perform this test. A fire or explosion can result.

2. Submerge the tip of the fuel reserve sensor into a container of high flash point safety solvent as shown.
3. Connect a 12 V battery and a 12 V 3.4 W light bulb to the fuel reserve sensor as shown.
4. With the battery and bulb still connected, remove the fuel reserve sensor from the safety solvent and hold it up-right. After approximately 30 seconds the light bulb should come on.
5. If the bulb should fail to come on, replace the fuel reserve sensor.





### • WARNING BUZZER

Connect the positive lead of a 12 V battery to the yellow/green wire terminal and the negative terminal to the green/blue wire terminal.

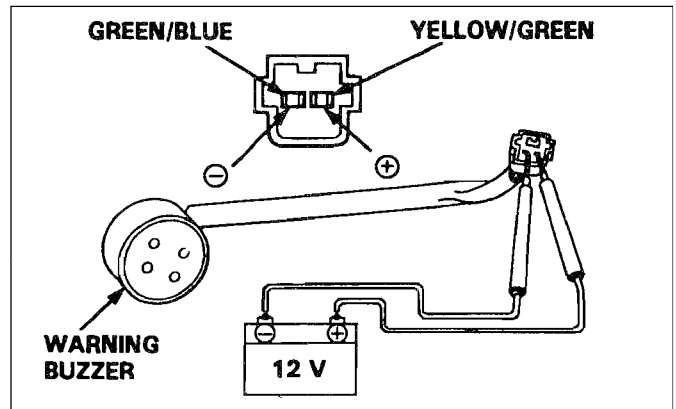
The warning buzzer should sound.

### • COMBINATION RELAY

Inspect the combination relay unit as follows:

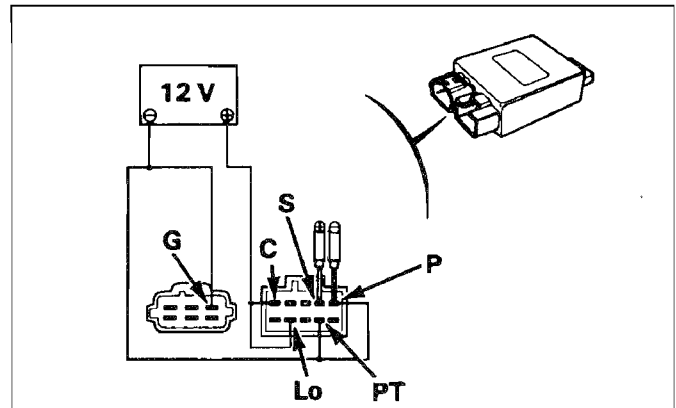
#### NOTE

- Be sure the battery is in good condition before performing this test.



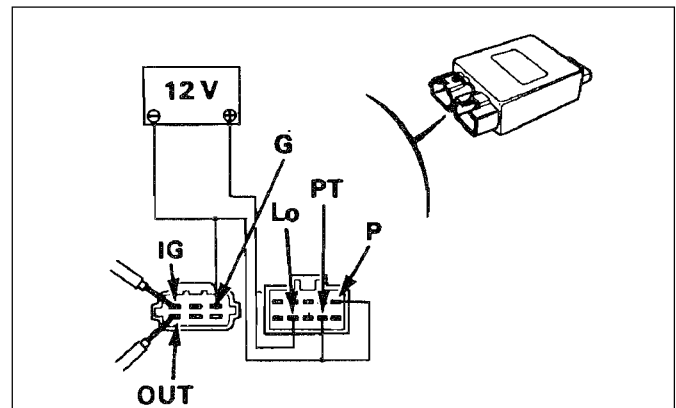
### STARTER RELAY INSPECTION

Connect the positive terminal of a 12 V battery to the C terminal and the negative terminal to the G and PT terminals. Using a digital multimeter, measure the voltage between the terminal and negative terminal of the battery. The voltmeter should indicate 12 volts with the battery connected and indicate 0 volts when disconnected.



### IGNITION RELAY INSPECTION

Connect the positive terminal of a 12 V battery to the Lo terminal and the negative terminal to the PT terminal. There should be no continuity between the IG terminal and G terminal with the battery connected, and should be continuity when disconnected.

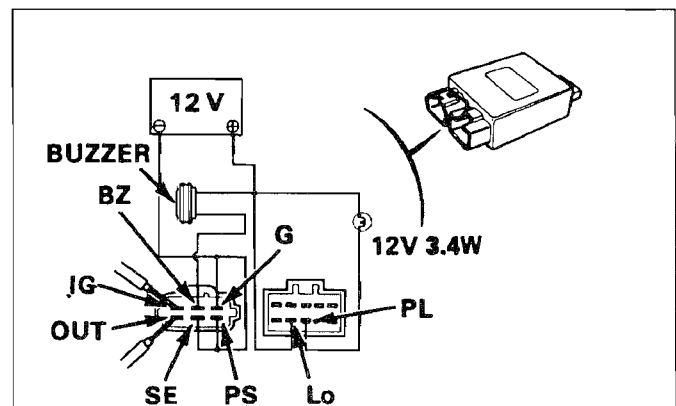


### PARKING SYSTEM INSPECTION

Connect the positive terminal of a 12 V battery to the Lo terminal and the negative terminal to the SE, PS and G terminal. Connect the buzzer and 12 V 3.4 W bulb as shown.

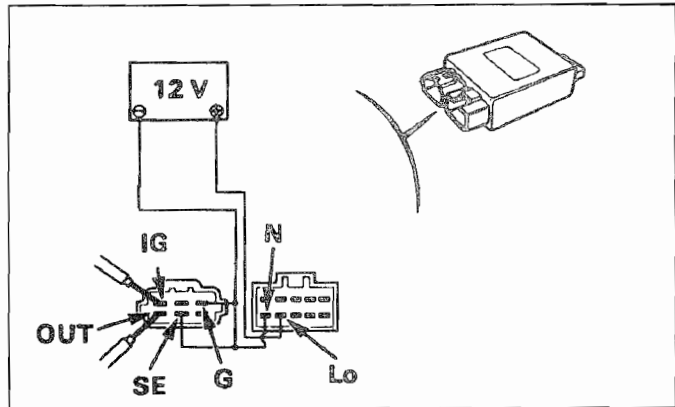
Connect the PS terminal to the negative terminal of the battery with the P terminal not connected to the negative of the battery. There should be continuity between the IG and OUT terminals, the warning buzzer should not sound, and the light should not come on.

When the P terminal is connected to the negative terminal of the battery with the PS terminal disconnected from the negative terminal of the battery, there should be no continuity between the IG and OUT terminals, the warning buzzer should sound, and the light should come on several seconds after connecting the terminal.



### SAFETY INTERLOCK SYSTEM INSPECTION

Connect the positive terminal of a 12 V battery to the Lo terminal and the negative terminal to the N, G and SE terminals. There should be no continuity between the IG and OUT terminals with the SE terminal connected to the negative terminal of the battery, and should be continuity with SE terminal disconnected from the battery negative terminal.

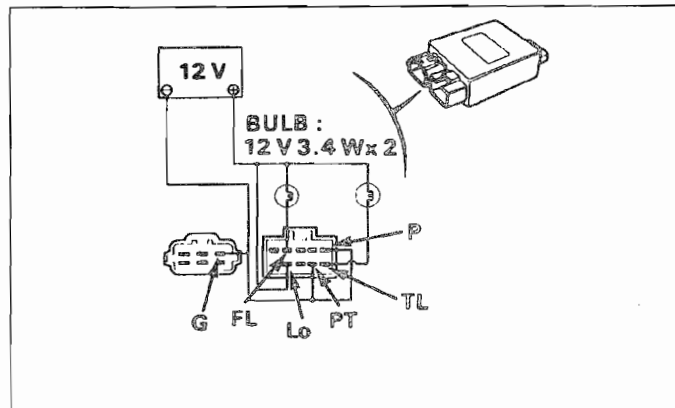


### BULB BURNT-OUT CHECKER INSPECTION

— Frame serial number 1000001 - 1006846

Connect the positive terminal of a 12 V battery to the Lo terminal and the negative terminal to the G, P and PT terminals. Connect two 12 V, 3.4 W bulbs to the FL and TL terminals as shown.

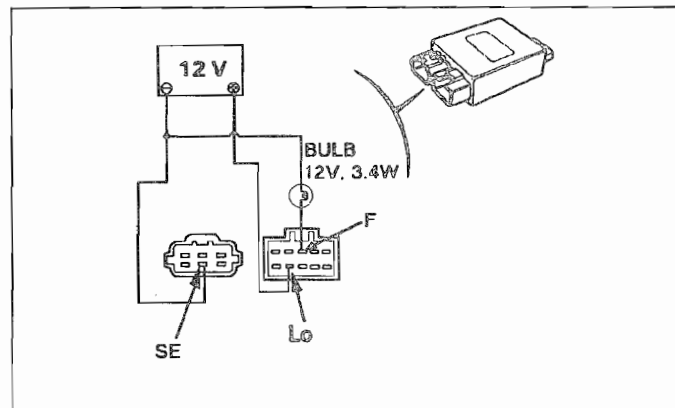
When the Lo terminal is connected to the positive terminal of the battery for approximately 2 seconds, the light bulbs should come on and then should go out.



### BULB BURNT-OUT CHECKER INSPECTION

— Frame serial number 1006847 and subsequent

Connect the positive terminal of a 12 V battery to the Lo terminal and the negative terminal to the SE terminal. Connect a 12 V, 3.4 W bulb to the F terminal as shown. When the SE terminal is connected to the negative terminal of the battery, the light should come on. The light should go out when the SE terminal is disconnected from the negative terminal of the battery.

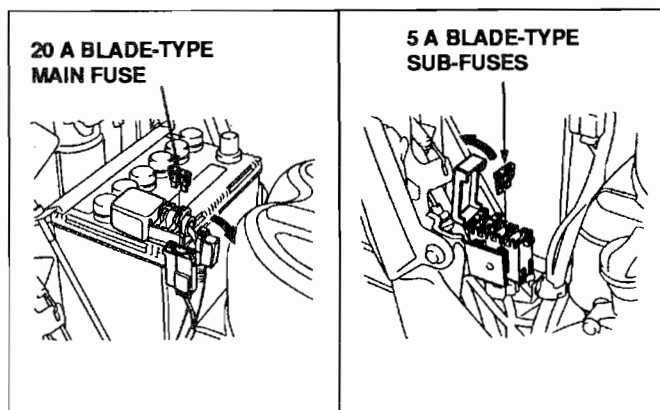


### • FUSES

— Frame serial number 1000001 - 1006846

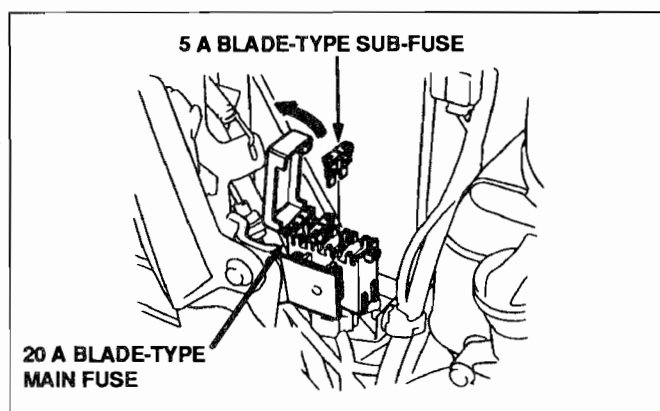
Open the engine hood.

Open the fuse holder and remove the blade fuse to inspect. If the fuse is burned out, replace it.



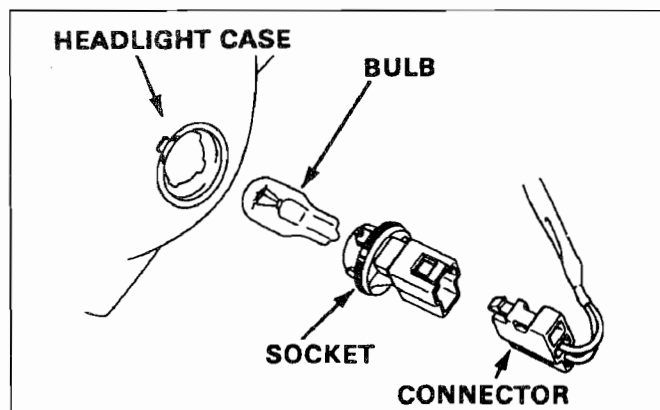
### • FUSES

— Frame serial number 1006847 and subsequent



### • HEADLIGHT BULB REPLACEMENT

- 1) Open the engine hood (page 15-2).
- 2) Disconnect the connector from the socket.
- 3) Turn the bulb socket clockwise and remove it from the headlight case.
- 4) Remove the bulb from the socket.

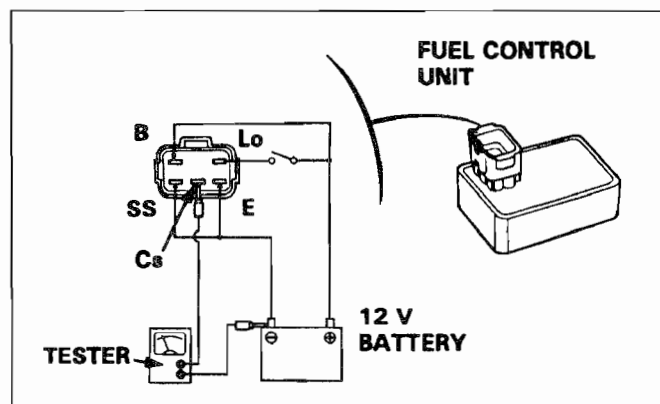


### • FUEL CONTROL UNIT

— Frame serial number 1000001 - 1006846

Connect the positive terminal of a 12 V battery to the B terminal and the negative terminal to the SS and E terminals. Also, connect the positive terminal to the Lo terminal through a switch as shown. Measure the voltage between the Cs terminal and negative terminal of the battery.

The voltmeter should indicate 0 V with the switch "ON", and then, when disconnected, indicate approximately 12 V for 9 seconds. After that, it should indicate 0 V.



### • FUEL CUT SOLENOID VALVE

— Engine serial number 1000001 - 1006846

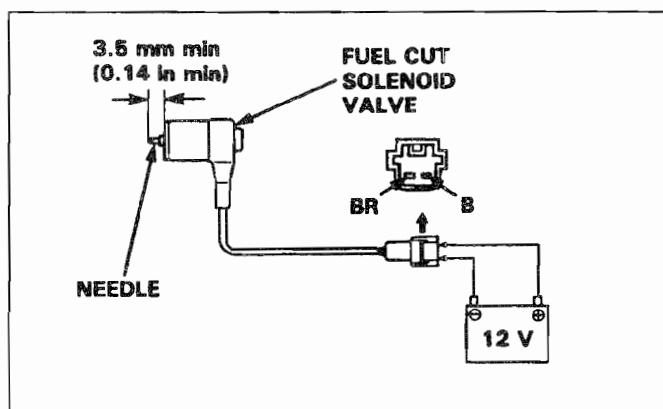
Connect the 12 V battery to the fuel cut solenoid valve connector as shown. The needle of the valve should project out over 3.5 mm (0.14 in).

#### CAUTION

- Applying battery voltage to this valve for more than 15 seconds will burn the windings.

— Engine serial number 1006847 and subsequent

Connect the 12 V battery to the fuel cut solenoid valve connector as shown. The needle of the fuel cut solenoid valve should retract when battery voltage is applied and extend when battery voltage is removed.



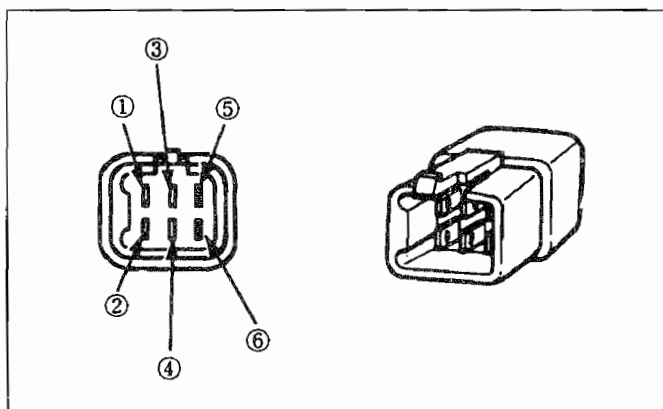
### • DIODE

— Frame serial number 1000001 - 1006846

Using a multimeter in the CDI  $\Omega$  R x 1 range, measure the resistance between the terminals.

Unit: ( $\Omega$ )

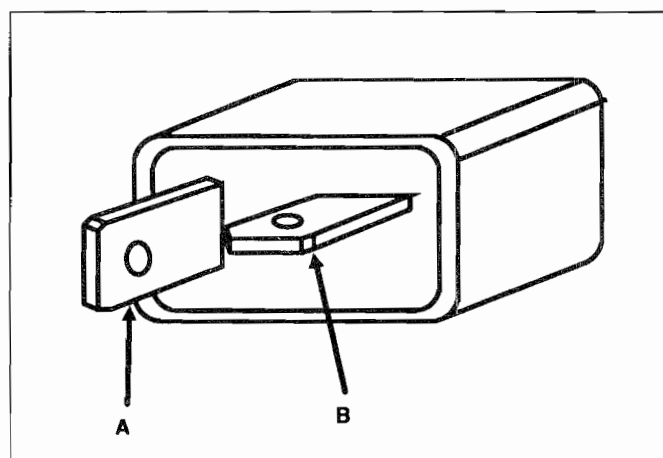
	(+)					
(-)	①	②	③	④	⑤	⑥
①		1 - 200	$\infty$	$\infty$	$\infty$	$\infty$
②	$\infty$		$\infty$	$\infty$	$\infty$	$\infty$
③	$\infty$	$\infty$		1 - 200	$\infty$	$\infty$
④	$\infty$	$\infty$	$\infty$		$\infty$	$\infty$
⑤	$\infty$	$\infty$	$\infty$	$\infty$		1 - 200
⑥	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$	



### • SILICON RECTIFIER

— Frame serial number 11006847 and subsequent

Connect the positive terminal of a tester to the A terminal and the negative terminal to the B terminal. There should be continuity. Connect the positive terminal of a tester to the B terminal and the negative terminal to the A terminal. There should be no continuity.



## ENGINE ELECTRICAL INSPECTION

### ● TRANSISTORIZED IGNITION COIL

#### NOTE

- For the transistorized ignition coil replacement, see page 8-2.
- For transistorized ignition coil air gap inspection, see page 8-3.

#### 〈Primary Side〉

Measure the resistance of the primary coil by attaching one ohmmeter lead to the ignition coil's primary lead terminal while touching the other test lead to the iron core.

Primary side resistance value	0.9—1.1 $\Omega$
-------------------------------	------------------

#### 〈Secondary Side〉

Measure the resistance of the secondary side of the coil by removing the spark plug caps and touching the test leads to the spark plug lead wires.

Secondary side resistance value	8.8—13.2 k $\Omega$
---------------------------------	---------------------

#### NOTE

- A false reading will result if the spark plug caps are not removed from the wires.

#### 〈Spark Plug Cap〉

Measure the resistance of the spark plug cap by touching one test lead at the wire end of the cap, and the other at the spark plug end.

Spark plug Cap Resistance	7.5~12.5 k $\Omega$
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### ● CHARGING COIL INSPECTION

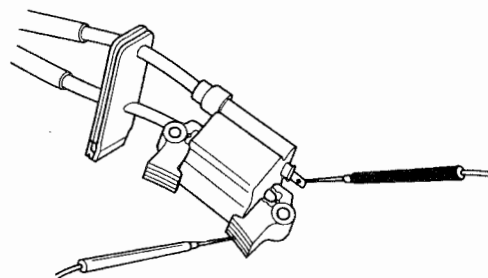
#### NOTE

- It is not necessary to remove the coil :  
Open the engine hood (P. 15-2) and disconnect the charging coil connector from the left side of the engine.

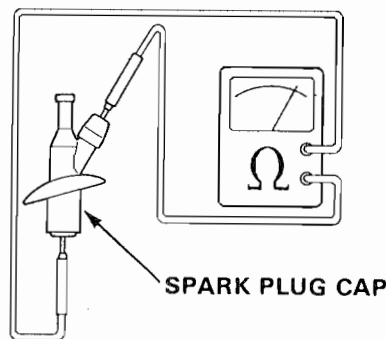
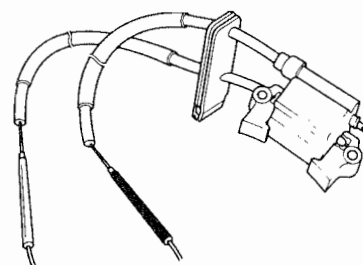
Measure the resistance between the terminals.

Resistance	0.16—0.24 $\Omega$
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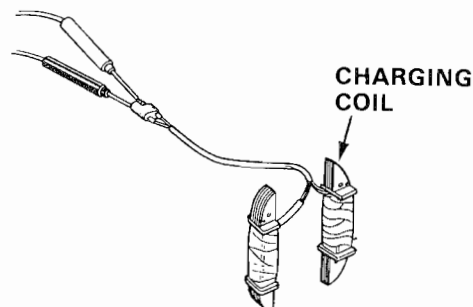
#### 〈PRIMARY COIL〉



#### 〈SECONDARY COIL〉



SPARK PLUG CAP

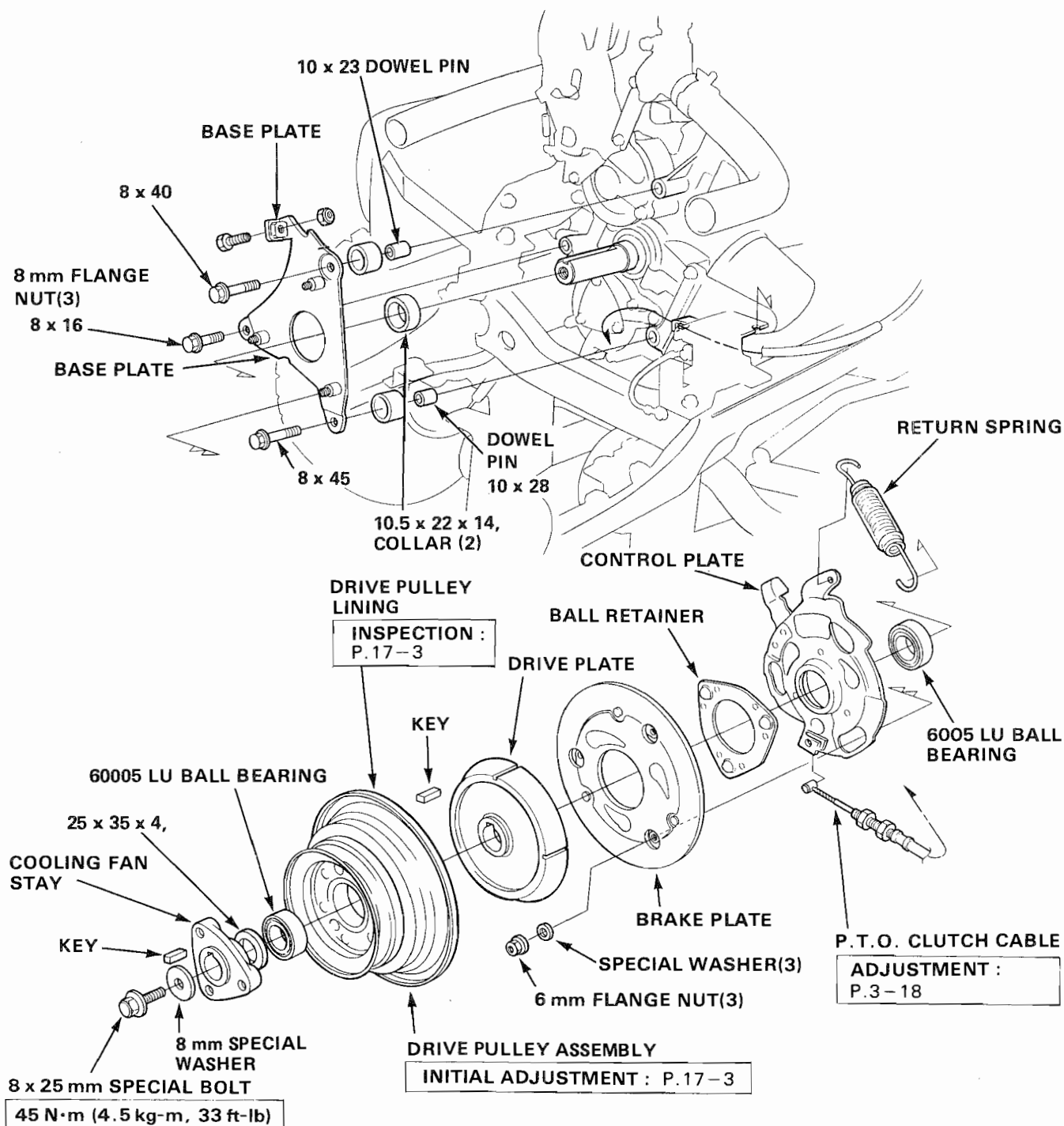


NOTE

P. T. O. CLUTCH

DISASSEMBLY/REASSEMBLY .....	17-2
INSPECTION.....	17-3

## DISASSEMBLY/REASSEMBLY





### INSPECTION

#### P. T. O. BRAKE CLEARANCE INSPECTION

- 1) Stop the engine and remove the ignition key.
- 2) Check the P. T. O. clutch lever free play (P. 3-18). Set the P. T. O. clutch lever to ON position.
- 3) Measure the brake clearance.

STANDARD	SERVICE LIMIT
0.6 mm (0.0024 in)	0.1 mm (0.004 in)

If the clearance is narrower than the service limit, replace the drive pulley assembly, regardless of shoe thickness.

- 4) Remove the drive pulley assembly (P. 17-2) and measure the lining part of the drive pulley assembly using the vernier calipers as shown.

SERVICE LIMIT	A	0 mm
	B	1.0 mm (0.04 in)

A; Replace the drive pulley assembly if the service limit is reached.

B; Replace the drive pulley assembly if over the service limit.

#### NOTE

- Perform only the clutch cable adjustment (P. 3-18) for adjustment of the P. T. O. clutch, except when installing a new drive pulley.

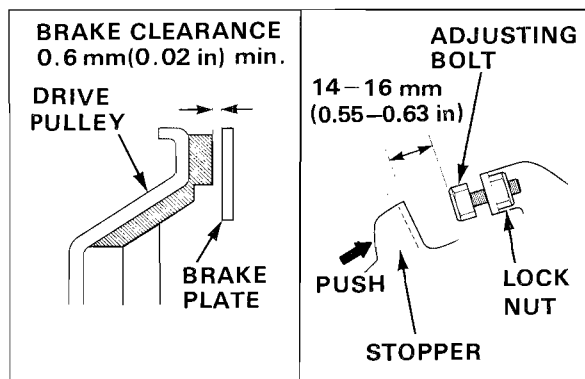
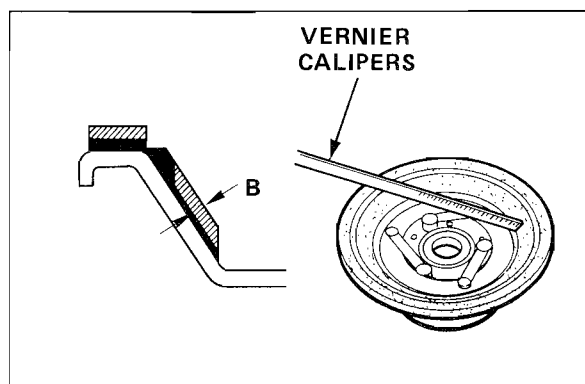
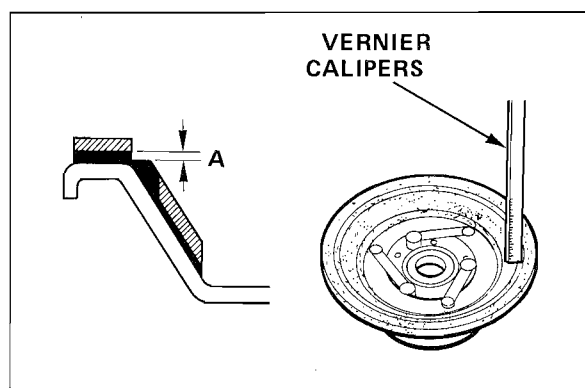
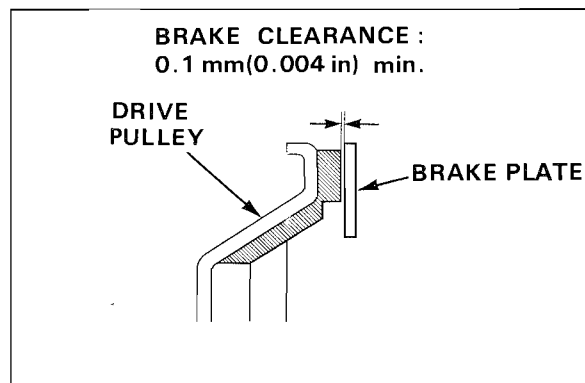
#### NEW DRIVE PULLEY INITIAL INSTALLATION

P. T. O. brake initial clearance Adjustment :

- 1) Stop the engine and remove the ignition key.
- 2) Disconnect the return spring from the control plate. Loosen the adjusting bolt nut of the base plate.
- 3) Push the control plate all the way to the adjusting bolt. Then turn the bolt to obtain the clearance, 14-16 mm (0.55-0.63 in) between the bolt and stopper. Tighten the lock nut.
- 4) Connect the return spring.
- 5) Adjust the P. T. O. clutch cable free play (P. 3-18).
- 6) Shift the P. T. O. clutch lever to the "on" position, and check the brake initial clearance.

**INITIAL CLEARANCE : 0.6 mm (0.024 in) min**

If the clearance is narrower than 0.6 mm (0.024 in), adjust the clearance, repeat the STEP 1)-6).



NOTE

OPTIONAL PARTS

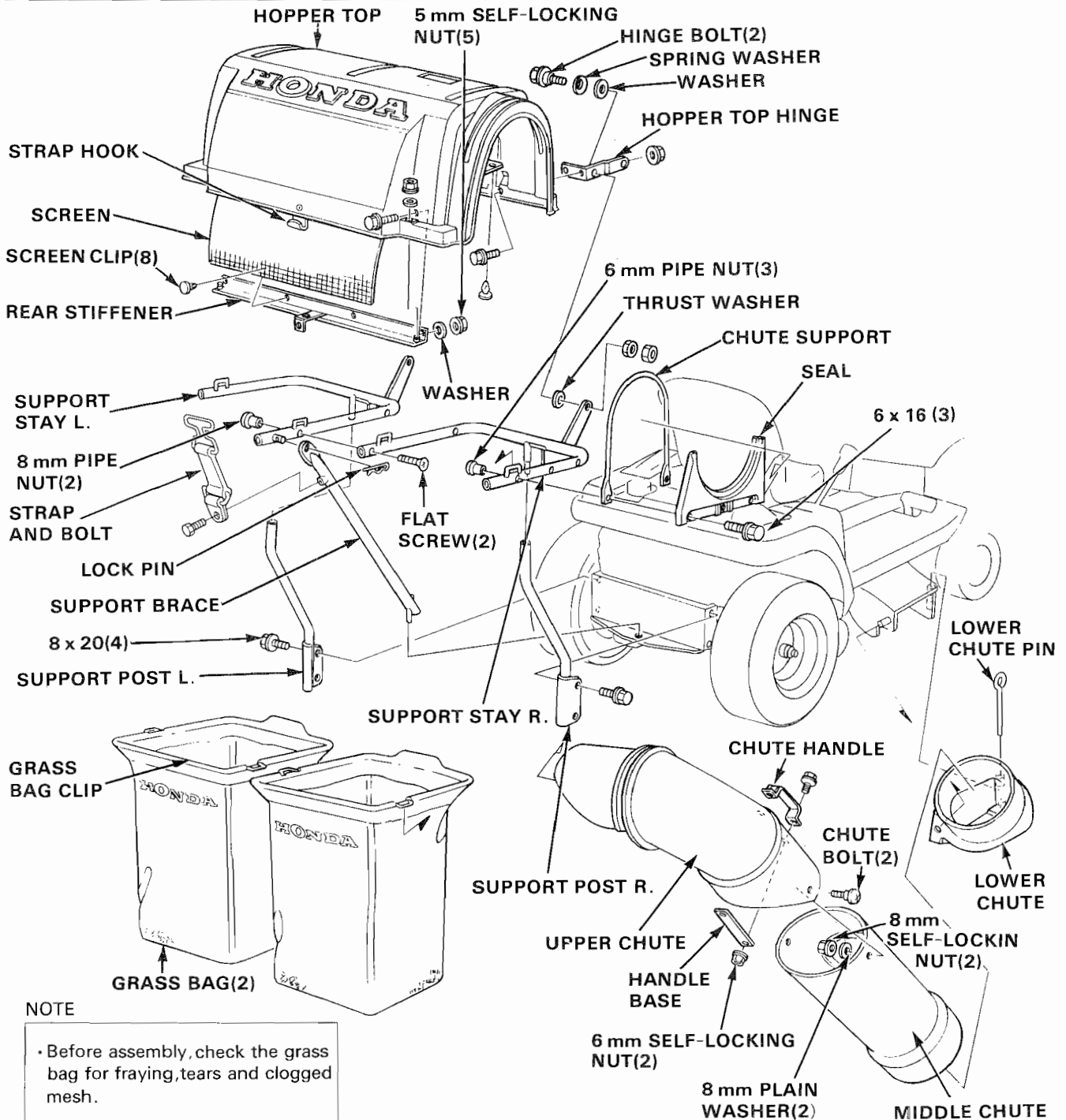
GRASS CATCHER .....18-2

## GRASS CATCHER

### GRASS CATCHER

#### CAUTION

- Never remove or install the grass bags or chute with the mower or engine is operating.



HST (Hydro Static Transmission)···19—1	Shift Lever in NEUTRAL .....19—4
Oil Flow .....19—3	Transmission Release Lever··19—5

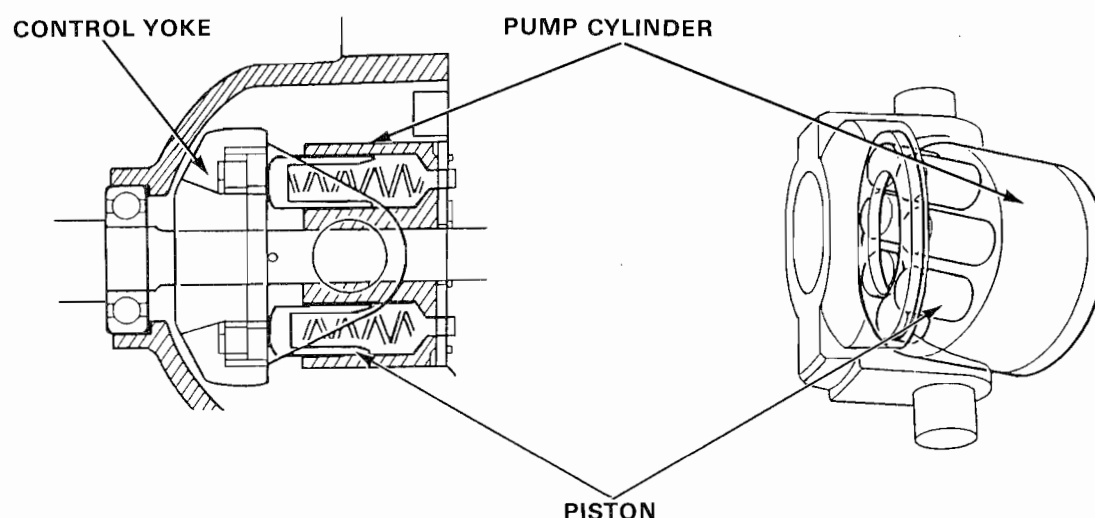
## 1. HST (Hydro Static Transmission)

### ● General

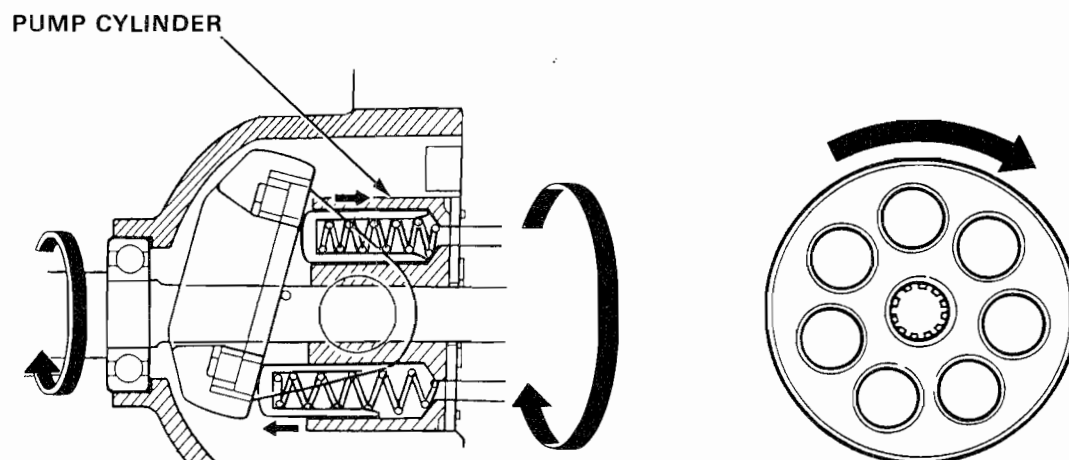
The HST (Hydro Static Transmission) hydrostatically and stagelessly shifts the gear from the FORWARD to the REVERSE gear and from the REVERSE to the FORWARD gear. With a simple shift operation, you can select the best speed to comply with the various driving conditions.

### ● Operating principle

The oil pressure pump consists of the control yoke, that changes the tilt angle, and the pump cylinder that contains the seven pistons.

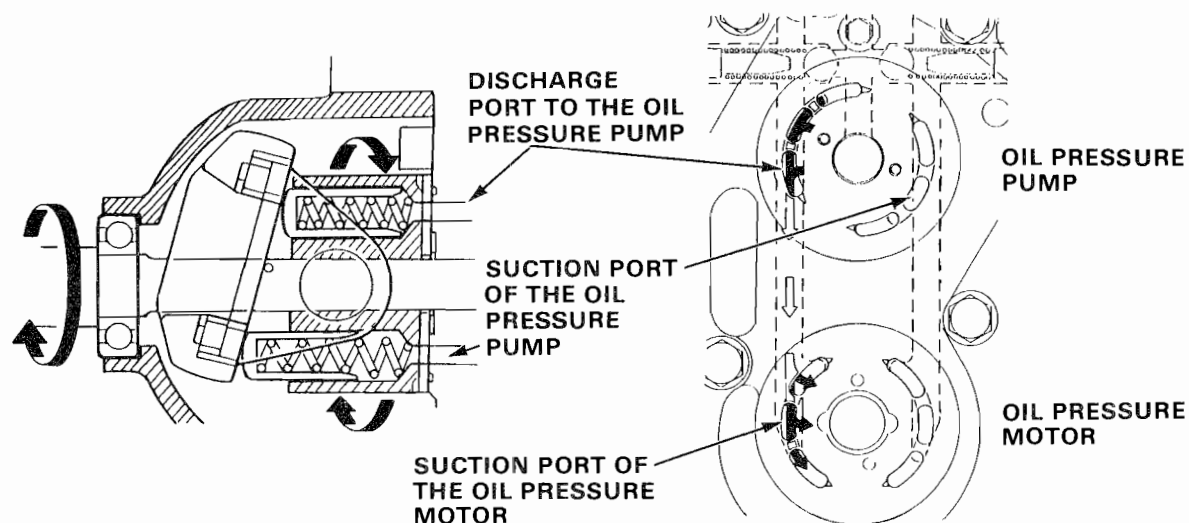


When the engine starts, the engine speed is transmitted to the bevel gear through the drive shaft and input shaft, slowed down by the bevel gear, and again it is transmitted to the pump shaft to rotate the pump cylinder. As the control yoke angle changes this time, the pistons in the pump cylinder start reciprocating.



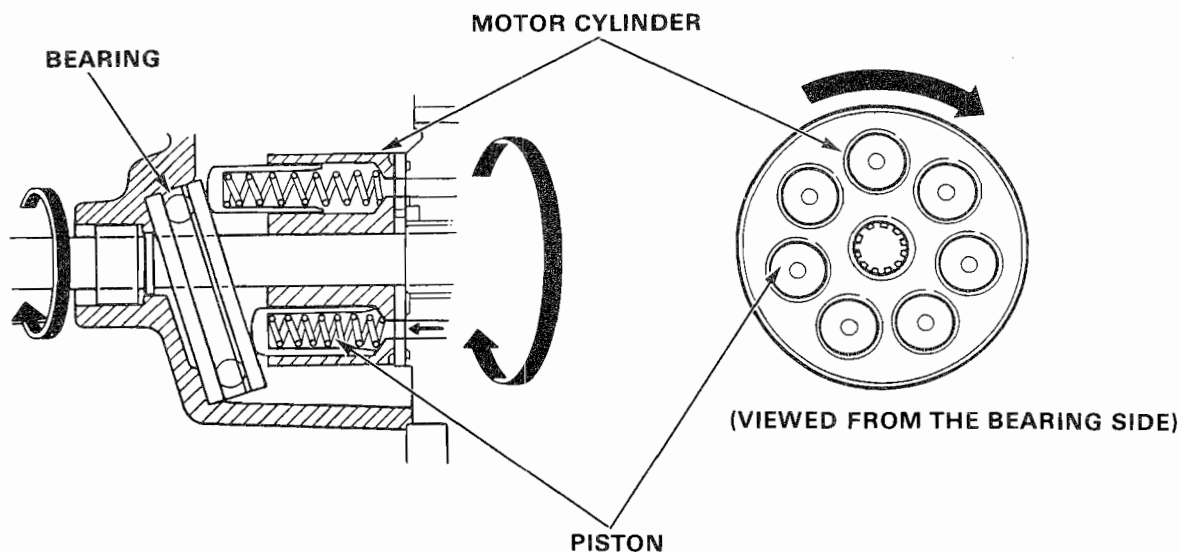
(VIEWED FROM THE CONTROL BOWL SIDE)

The fluid is drawn into the oil pressure pump through the suction port and is discharged through the discharge port by this reciprocating motion of the pistons. The discharged amount of the fluid varies according to the control yoke angle.

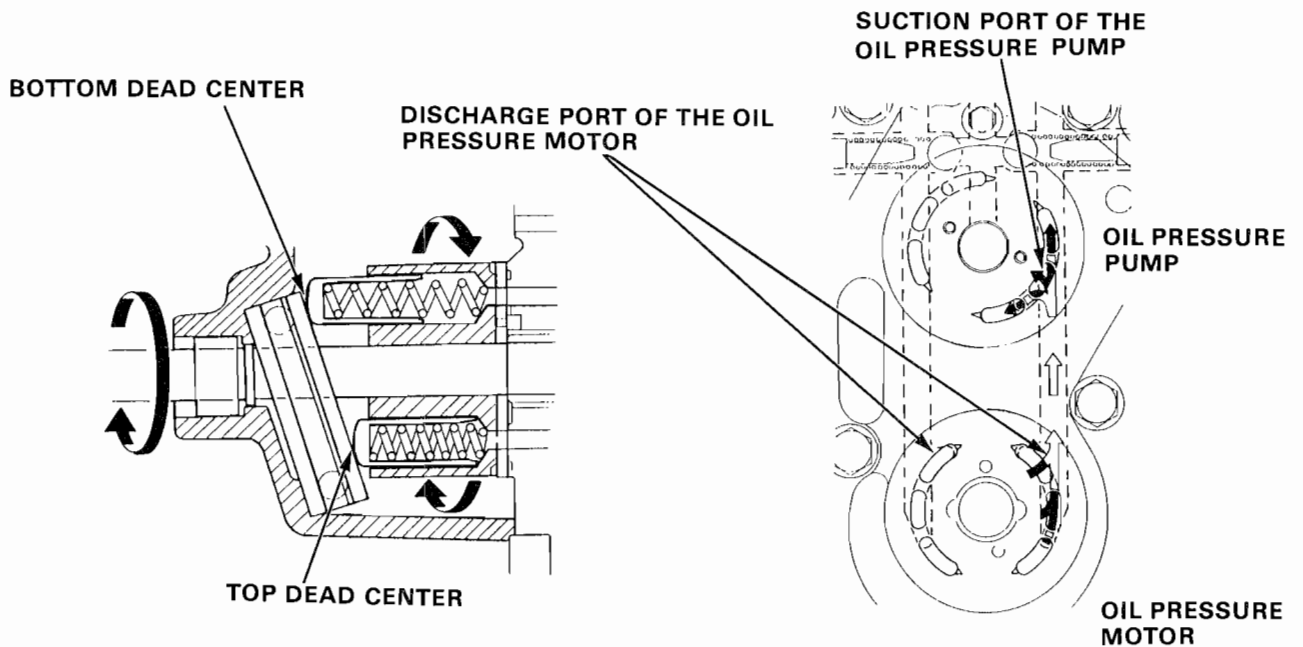


The discharged fluid is drawn into the oil pressure motor. The oil pressure motor consists of the bearing which is set at a certain angle and the motor cylinder which contains the 7 pistons.

Getting the pressure of the fluid drawn through the suction port, the pistons are pushed along the motor bearing and it rotates together with the motor cylinder. The motor speed varies according to the amount of fluid drawn through the suction port.



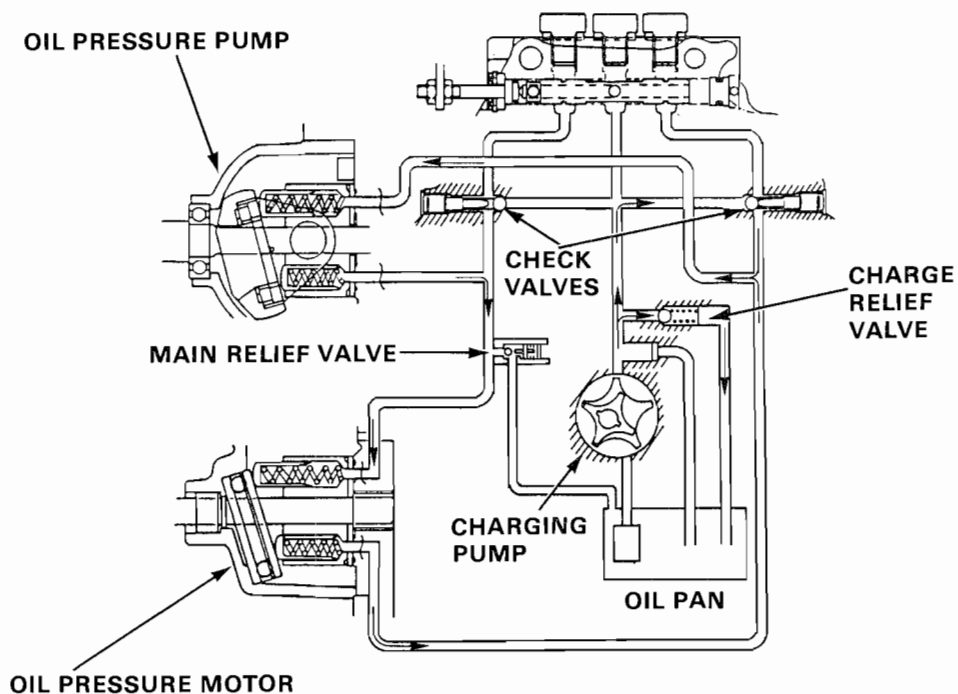
The piston moves along the bearing and enters the discharge stroke after it passes the bottom dead center. Fluid is discharged to the oil pressure pump this time.



## 2. Oil Flow

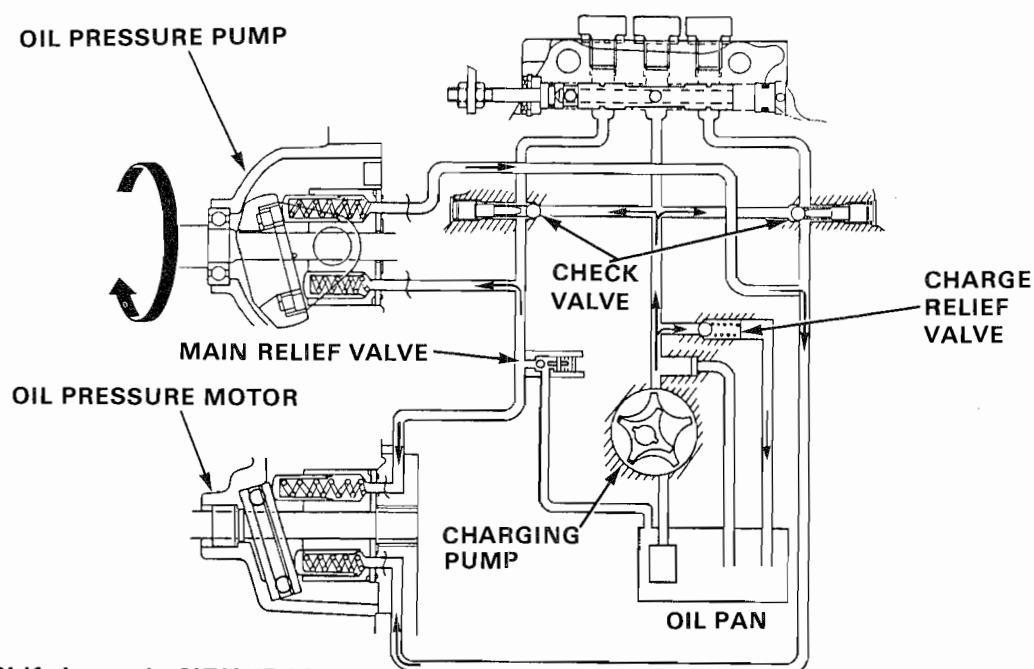
### ● In forward gear

The fluid discharged from the oil pressure pump rotates the oil pressure motor and returns to the oil pressure pump. The fluid leaked through the gaps in the hydrostatic circuit is compensated with the fluid from the charging pump.



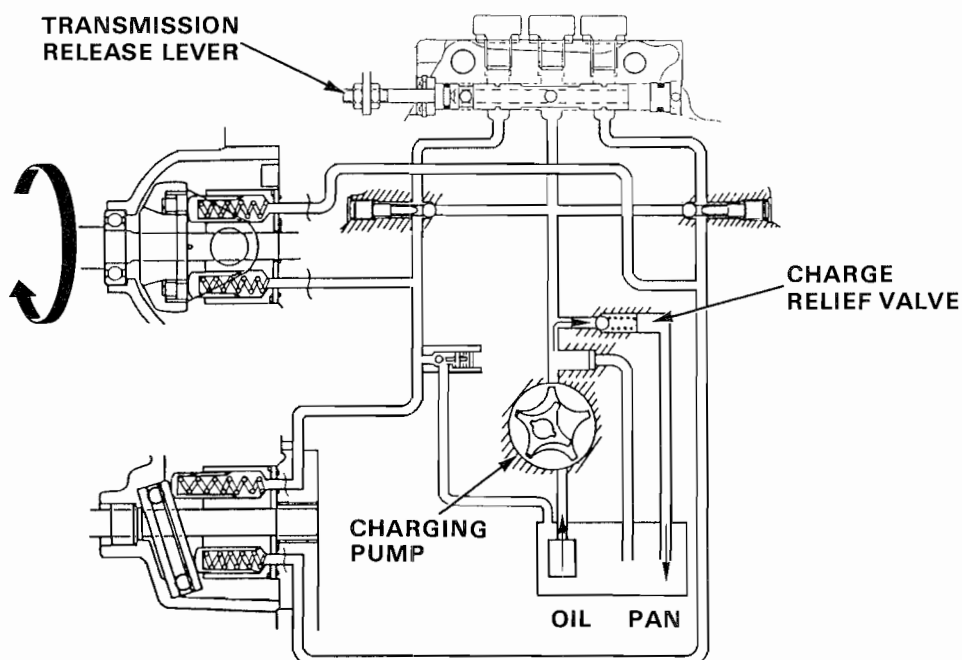
### ● In reverse gear

When the shift lever is moved to the REVERSE, the control yoke tilts to the reverse side and exchanges the suction port and discharge port of the oil pump, resulting in reverse oil flow and reverse motor cylinder rotation.



### 3. Shift Lever in NEUTRAL

When the shift lever is moved to the NEUTRAL position, the oil pump pistons' reciprocating motion and discharge of the fluid stop, and the fluid drawn into the charging pump returns through the charge relief valve to the case.

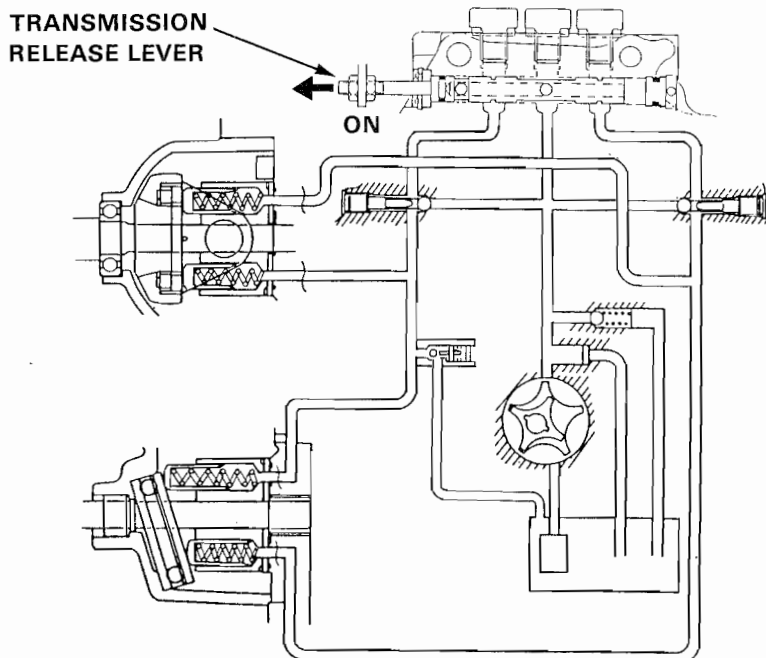




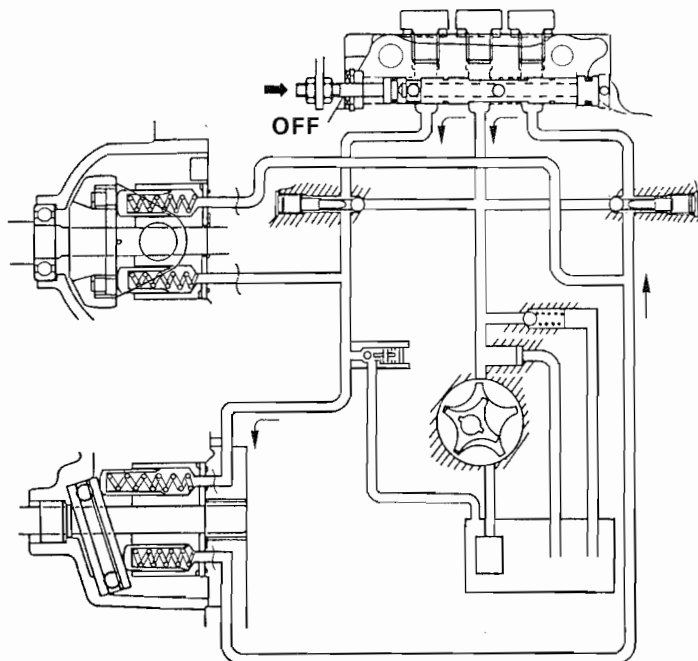
### 4. Transmission Release Lever

When the oil pressure motor is rotated by the outside force with the engine stopped, i. e. to push the riding motor for transportation, the oil pressure motor operates in the same manner as the oil pressure pump (i. e. suction and discharge of the fluid).

With the transmission release lever in ON, the oil pressure pump and the oil pressure motor are connected with the closed hydrostatic circuit. As the oil pressure pump does not rotate this time, the closed hydrostatic circuit and locks the wheels.



When the transmission release lever is turned OFF (to drive the lawn tractor by pushing it), the hydrostatic circuit opens and the oil pressure motor starts so that the lawn tractor can be moved by pushing.



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NOTE



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