



Parts, Installation and Maintenance Manual

The Model 610 Jake Brake® engine retarder is designed and approved for use on Renault V.I. 62045 and 62356 engines. Information in this manual was current at the time of printing and is subject to change without notice or liability.

MODEL 610

Table of Contents

Safety Precautions2

Jake Brake Model 610 Parts Listing ..3-4

Section 1: Jake Brake Installation5-8

Introduction.....5

Special Tools.....5

Engine Preparation.....5

Assembly Installation.....5-6

Slave Piston Adjustment.....7

Operation Check.....7

Section 2: Electrical Installation8

Renault V.I. Control System.....8

Section 3: Engine Brake Maintenance. 9-12

Control Valve.....9

Solenoid Valve.....10

Slave Piston.....11

Master Piston.....12

Section 4: Trouble Shooting13-16

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the mechanic or equipment. Read this manual carefully. Know when these conditions can exist. Then take necessary steps to protect personnel as well as equipment.

WARNING

This Symbol Refers To Possible Personal Injury.

CAUTION

This Symbol Refers To Possible Equipment Damage.

NOTE

Indicates An Operation, Procedure Or Instruction That Is Important For Correct Service.

Fuels electrical equipment, exhaust gases and Moving engine parts present potential hazards that could result in personal injury. Take care when installing an engine brake. Always use correct tools and proper and proper procedures as outlined in this manual

WARNING

See Jacobs Drivers Manual For Proper Engine Brake Driver Techniques. The JAKE BRAKE Retarder is a Vehicle Slowing Device Not a Vehicle Stopping Device. It Is Not A Substitute for the Service Braking System. The Vehicles Service Brakes Must Be Used To Bring The Vehicle To A Complete Stop.

Jake Brake Model 610 Parts Listing

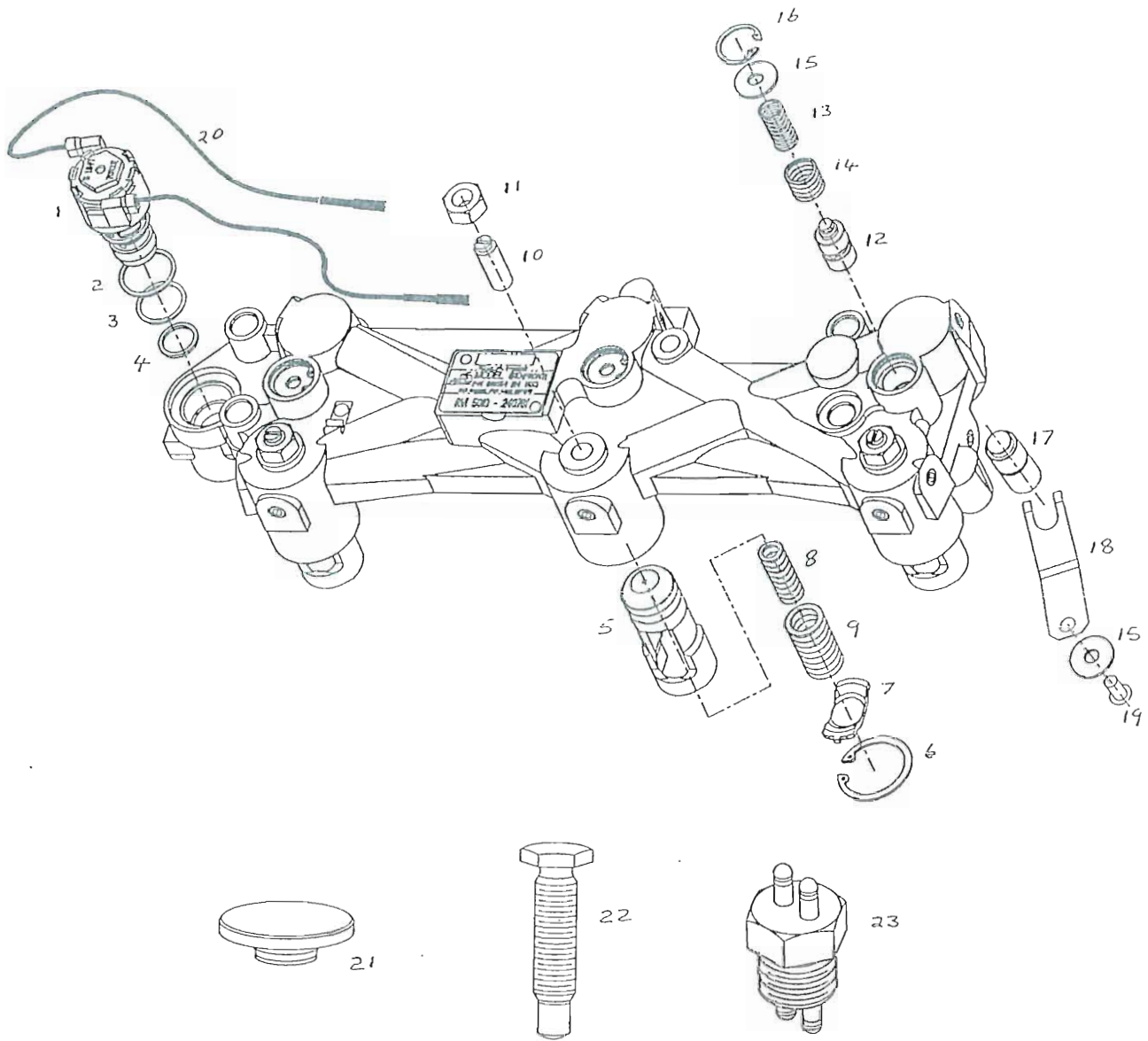
Item No	Jacobs P/N	Description		
	00-019554	Front Housing Assy. 24V D/L	19552 F	12VDC
	00-019555	Rear Housing Assy. 24V D/L	19553 R	12VDC
			Qty Front Hsg	Qty Rear Hsg
		24614 12VDC S/L VERT. PLATE		
1	00-020235	Solenoid 24v DC D/L	1	1
2	00-020229	Seal Ring Upper	1	1
3	00-001082	Seal Ring Middle	1	1
4	00-001083	Seal Ring Lower	1	1
5	00-017008	Piston Slave	3	3
6	00-001023	Ring Retaining	3	3
7	00-007620	Spring Retainer	3	3
8	00-019787	Spring, Inner Slave Piston 013417	3	3
9	00-019788	Spring, Outer Slave Piston	3	3
10	00-019556	Screw Assy, Safety Valve	3	3
11	00-017637	Nut, Safety Screw	3	3
12	00-011930	Spool, Control Valve	3	3
13	00-011823	Spring, Control Valve Inner	3	3
14	00-011434	Spring Stop, Control Valve Outer	3	3
15	00-016505	Washer, Control Valve	6	6
16	00-012991	Ring, Retaining Control Valve	3	3
17	00-021923	Piston, Master	3	3
18	00-002030	Spring, Master Piston	3	3
19	00-011544	Screw, Master Piston Spring	3	3
20	00-021922	Harness, Solenoid	2	2
21	00-019782	Cap, Valve	3	3
22	00-019781	Screw, Rocker Adjusting	3	3
23	00-017367	Electrical Connector D/L	1	1
N.I.	00-019558	Harness External Link	1	1

Service Parts

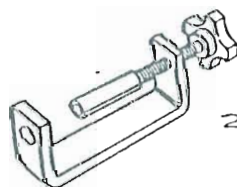
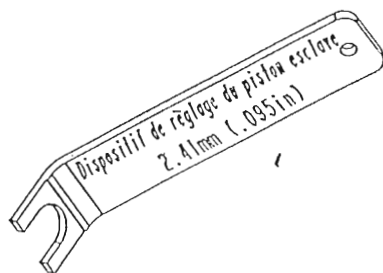
Item No	Jacobs P/N	Description
1	00-021172	Slave Lash Adjusting Gauge 2.41mm (0.095inch)
2	00-018238	Slave Piston Removal Tool
N.I.	00-016978	Control Valve Cover Removal Tool

Jake Brake Model 610 Parts View

Housing Assembly



Service Parts



Jake Brake

1. Introduction

Engine Brake Housing Identification.

Each engine brake housing assembly has an identification tag showing model number, installation location marked FRONT or REAR, and Engine Brake housing serial numbers are also marked on these plates. (See Fig. 1)

This installation manual should be used in conjunction with the *Jacobs Parts Listing* section, when replacement part information is required.

Special Tools

The following special tools should be available for installation.

1. *Jacobs Feeler Gauge* - 2.41mm P/N 021172
2. *Engine Turning Tool* RVI P/N 50 00 261 380

Recommended Torque Values

Rocker Hold-down Bolt	70 N.m
Engine Brake Hold-down Bolt	70 N.m
Rocker Adj Screw Locknut	40 N.m
Spacer Capscrew	20 N.m
Cover Bolt	20 N.m
Slave Piston Adj Screw Locknut	23 N.m
Electrical Connector	14 N.m

2. Engine Preparation

Clean engine thoroughly. Remove any accessory components required to remove the valve covers. Remove the six valve covers, discard the covers and cap screws.

Loosen the inlet and exhaust rocker arm adjusting screw locknuts.

Remove the rocker pedestal bolts and remove the rocker assemblies, and place in order on a workbench.

3. Exhaust Rocker Arm Adjusting Screw

Remove the exhaust rocker arm adjusting screw locknuts and remove the Renault adjusting screws, install the *Jacobs* adjusting screws reusing the Renault nuts.

Note Fig 2 shows both rocker adjusting screws, the *Jacobs* screw has a 15mm hex head.

CAUTION

Use only the *Jacobs* rocker arm adjusting screws for engine brake installation. The use of any other screw will result in severe screw wear and engine damage.

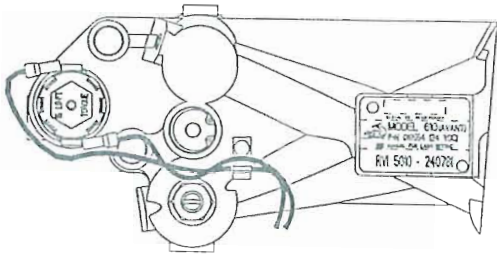
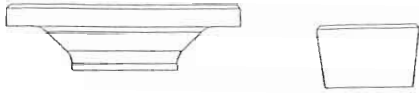


Fig. 1



RVI Jacobs

Fig 2



Jacobs

Renault V.I.

Fig. 3

4. Exhaust Valve Caps

Replace the six Renault valve caps with *Jacobs* valve caps. (See Fig,3)

5. Pedestal Installation

Clean oil and dirt from the pedestal mounting holes in the cylinder heads.

Place the rocker assemblies 1, 2, 4 and 5 onto the original cylinder head position. (See Fig,4)

Replace the rocker pedestal, assemblies #3 and 6 with the new Renault pedestal, brake housing oil supply. (See Fig, 5) and place on cylinders 3 and 6. (Ref. RVI P/N 5000.681.585) Refit the rocker pedestal hold-down bolts and torque 70N.m

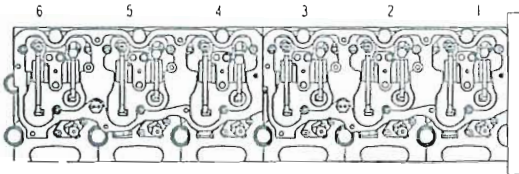


Fig. 4

6. Spacer Installation

Install electrical connector into each spacer from the top, torque to 14 N.m. Install the short connecting harness (pigtail) to the underside of the connector.

Install three new gaskets into each spacer

Mount the spacers onto the engine, install the seven spacer capscrews and washers, and torque to 20 N.m. Make sure the spacer is centred over the heads and that there is no interference with any moving part.

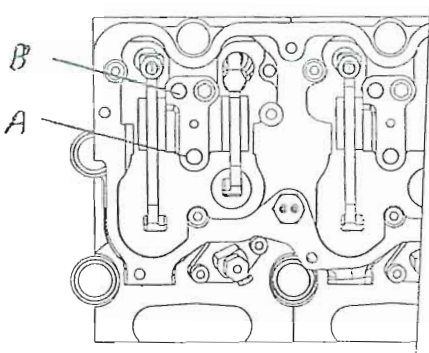


Fig. 5

7. Valve Lash Adjustment

Set the lash on intake and exhaust valves to RVI specification following the correct sequence.

Once the valve lash has been set, torque the adjusting screw locknut to 40 N.m

8. Brake Housing installation

Remove the pedestal hold-down bolts A and B (See Fig 5) on pedestal assemblies 1, 3, 4 and 6, and discard.

Ensure the slave piston adjusting screws are loose and the slave piston is fully retracted .

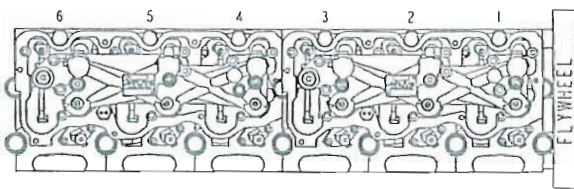
Place the engine brake housing assemblies in position on the rocker pedestals. Make sure that the front housing is over cylinders 4,5,and 6 and the rear housing is over cylinders

1,2,and 3 (flywheel end) (See Fig 6). Install the eight new engine brake hold-down bolts through the brake housings and rocker pedestals, and ensuring that the brake housings are

centred tighten and torque to 70 N.m.

CAUTION

Check that there is no interference between the rocker arm and slave piston, by moving each rocker arm with the valves closed.



Front Hsg.

Rear Hsg.

Fig. 6

9. Slave Piston Adjustment

With the exhaust valve closed (rocker free) on the cylinder to be adjusted, insert the correct *Jacobs* feeler gauge (See table for the correct lash setting by engine model) between the slave piston feet and the *Jacobs* valve cap.

Turn the adjusting screw in until a slight drag is felt on the feeler gauge.

Hold the adjusting screw in this position and tighten the locknut to 23 N.m. Recheck the slave lash.

Continue setting the slave piston lash following normal engine rotation and firing order.

Slave Lash Table

RVI Euro 1, 10 L Engine, Slave lash 2.41mm

RVI Euro 2, 10 & 11L Engine, Slave lash 2.41mm

10. Engine Brake Operation Check

The *Jacobs* Brake installation is now complete. The following procedures should be made.

CAUTION:

IMPORTANT: This Jake Brake® is designed to be operated in conjunction with the following Fowa exhaust brakes

For the 62045 Euro 1 & 2, 10 L Engine, 133mm Fowa with 12.7mm orifice.

For the 62356 Euro 2, 11L Engine, 133mm Fowa with 15.1mm orifice.

Do not proceed with operational check until it is determined that the correct Fowa exhaust brake is fitted.

Bleed brake units and check their operation. Start engine and allow to run for a few minutes. Accelerate engine to approximately 2000 RPM, release throttle and manually activate each brake solenoid. Repeat this procedure five or six times to fully bleed the brake housing. Visually inspect the operation to ensure that all cylinders operate.

WARNING

Whenever the engine is running with the covers removed, oil splashing will occur. Wear suitable eye protection and do not work directly over the engine to prevent personal injury.

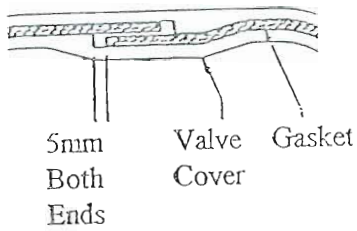


Fig 7

11. Installation of the Valve Covers

Install the valve rocker cover gasket into the groove in each cover. Overlap the gasket about 25mm and cut to appropriate length. Ensure that there is a gap at each end of the gasket (See Fig,7)

Place the covers over the brake assemblies. Install the new capscrews and washers, Torque to 20 Nm.

12. Section 2

Electrical System Installation

TO BE SUPPLIED BY RENAULT V.I.

CAUTION:

It is important to ensure that the Jake Brake and Fowa exhaust brake are wired to operate in the following manner. With the dash switch in the low position, only the Fowa should operate. With the switch in the high position the Fowa and Jake Brake should operate.

Do not rewire the controls to allow the Jake Brake to operate on its own. This may cause engine damage.

Engine Brake Maintenance

Warning

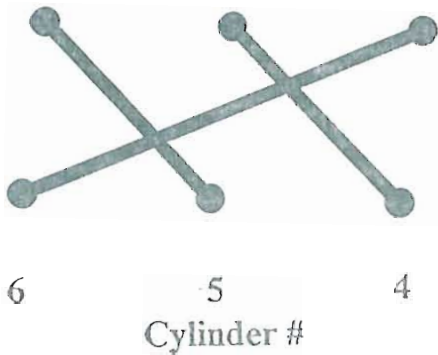
Never Remove Any Engine Brake Component with the Engine Running. Personal Injury May Result.

The Jake Brake is a typically trouble free device. However periodic inspections are necessary and some maintenance is required Jacobs recommends the following maintenance at the time of engine overhaul.

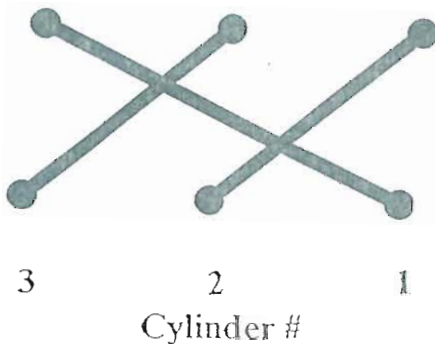
This section covers how to properly remove, clean and reinstall Jake Brake Components. Be sure to use clean lubricated parts when reinstalling them.

Hydraulic Flow Pattern

Front Housing Assembly.



Rear Housing Assembly



Control Valve

Warning

Remove Control Valve Covers Carefully Control Valve Covers are under load from the Control Valve Springs. Remove with care to avoid personal injury.

- 1) Using the control valve cover removal tool, press down on the control valve cover to relieve spring pressure and remove the retaining ring using retaining ring pliers. (See Fig 8)
- 2) Slowly remove cover until spring pressure ceases, then remove the two control valve springs.
- 3) Using needle nose pliers, remove the control valve. If there is any binding replace the control valve.
- 4) Clean the control valve and inspect as follows.
- 5) Push a wire through the hole in the base of the valve to ensure that the ball is free. The ball should lift with light pressure on the wire. If the ball is stuck, replace the control valve.
- 6) Thoroughly clean the valve bore in the housing using paper towels. dip the control valve in clean lube oil and replace the valve into its bore.
- 7) Reinstall the springs, cover, and retaining ring. Make sure the retaining ring is located in the retaining ring groove.

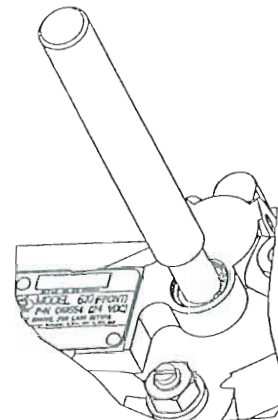


Fig 8

Solenoid Valve

Caution

Do Not Disassemble or Tamper with the Solenoid Valve, Engine Damage Could Result.

- 1) Disconnect the harness from the solenoid valve. Using a 19mm socket, unscrew the solenoid valve.
- 2) Remove and discard the three rubber seal rings from the solenoid valve. (See Fig 9)
If the lower ring stays in the bottom of the housing solenoid bore, remove with a seal pick.

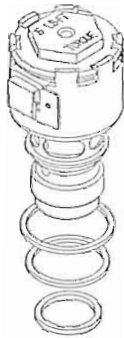


Fig 9

- 3) Clean the solenoid valve, use a brush to clean the oil screen. When clean, dry with compressed air.
- 4) Clean out the solenoid valve bore in the housing. Use clean paper towels. Never use rags as they may leave lint and residue which can plug the oil passageways.
- 5) Coat the new solenoid valve seal rings with clean lube oil. Install the upper and center seal rings on the solenoid valve body, inspect to assure that both seals are seated flat. Install the lower seal ring into the bottom of the solenoid valve bore in the housing. Check to insure that the seal ring is flat on the bottom of the bore.
- 6) Insert the valve into the bore. The middle seal must slip smoothly into the bore. Carefully screw the solenoid valve into the housing without unseating the seals. Hand tighten

firmly in the bore. Resistance to hand tightening may be a signal that a seal (s) is not centred or is twisted. If resistance to tightening is found reverse rotation 1/4 turn and retighten with hand

If resistance continues after reverse rotation and retightening, remove the solenoid and visually inspect the solenoid and bore.

Replace any pinched or twisted seal (s) and reinstall. Once hand tight, torque the solenoid valve to 20.3 N.m .

Slave Piston

Warning

WEAR SAFETY GLASSES

Remove Slave Piston Carefully. The Slave Piston Is Retained By Springs Under Heavy Compression. If These Instructions Are Not Followed And Proper Tools Not Used , The Spring Could Be Discharged With Enough Force To Cause Personal Injury.

- 1) Remove the jam nut from the slave piston adjusting screw. Back out the adjusting screw until the slave piston is fully retracted. (screw is loose)
- 2) Place the hole in the Jacobs slave piston tool P/N 018238 (Fig 10) over the slave piston adjusting screw.

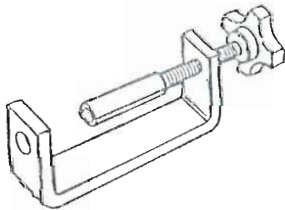


Fig 10

- 3) Turn the handle slowly in a clockwise direction, until the retainer is depressed about 1mm, relieving pressure against the retaining ring.
- 4) Remove the retaining ring with retaining ring pliers. Back out the piston tool by turning the handle counter clockwise until the springs are no longer under load. Remove the slave piston tool.
- 5) Remove all components, checking that there is no binding or burrs. Clean parts or replace as necessary.
- 6) Check the top surface of the slave piston. If screw the contact area with the adjusting screw should has wear greater than 0.05mm, replace the slave piston and adjusting screw.

NOTE

BE SURE COMPONENTS ARE REASSEMBLED IN THE PROPER ORDER.

Use the slave piston tool to reinstall the piston and springs. Compress the slave piston springs until the retainer is about 1mm below the retaining ring groove the slave piston bore. Reinstall the retaining ring. Be sure the retaining ring is fully seated in its groove. Rotate 90 deg. 9) After installing the slave piston retaining ring, check for proper seating by verifying that the installed gap width is at least 5.4mm (See Fig 11)

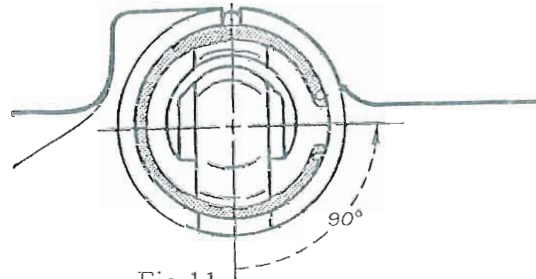


Fig 11

- 10) Remove the slave piston clamping tool slowly to assure retaining ring is properly seated.
- 11) Assemble adjusting screw and jam nut do not tighten. Follow installation instructions for proper procedure on setting slave piston lash.

Slave Piston Adjusting Screw

CAUTION

DO NOT DISASSEMBLE OR TAMPER WITH THE ADJUSTING SCREW. ENGINE DAMAGE COULD RESULT.

- 1) Loosen the slave piston adjusting screw locknut and remove slave piston adjusting screw from housing.
- 2) Inspect the adjusting screw. The plunger should protrude from the bottom of the 6.375 mm. (+/- 0.33 mm) The plunger reset itself quickly from a fully depressed condition.
- 3) Clean the adjusting screw assembly before reusing or replace if necessary. The screw assembly is not to be serviced.

Master Piston

- 1) Remove the screw, washer and master piston spring from the bottom of the housing.
- 2) Remove the master piston from its bore, using needle nose pliers. If binding occurs, check for burrs or excessive wear on the pistons outer surface. Inspect the hardface surface. Pitted, chipped, cracked, or galled pistons should be replaced.

NOTE

IF HARDFACE IS DAMAGED, INSPECT THE CORRESPONDING ROCKER ARM ADJUSTING SCREW FOR EXCESSIVE WEAR OR PITTING. REPLACE IF DAMAGED.

- 3) Check the master piston bore for wear. If any are damaged, replace the housing assembly.
- 4) Inspect the master piston spring for wear at the legs and replace wear is evident. Check for spring relaxation.
- 5) Reassemble in reverse order. When tightening the screw, make certain the two spring legs do not interfere with the sides of the master piston hardfacing. Torque the capscrew to 12.5N.m.

TROUBLE SHOOTING

Problem: Engine fails to start

Probable Cause: Solenoid valve stuck in "on" position.

Correction: Ensure that electrical current is off to engine brakes. If solenoid valve remains "on" (cap down) with current off, replace solenoid valve.

Problem: Engine Brake will not operate

Probable Cause: Blown fuse, open electrical leads.

Correction: Look for short circuit in wiring. Replace any broken, brittle or chafed wires. Check solenoid tab for signs of shorting; replace if necessary. Replace fuse (10 amp).

Probable Cause: On/Off switch, clutch switch, throttle switch or multi-position switch out of adjustment or defective.

Correction: Use a volt/ohm meter to make certain that there is electrical voltage available at both terminals of each switch. Readjust if needed or replace if voltage will not pass through switch.

WARNING: *Do not touch electrical when system is energized.*

Probable Cause: Incorrect electrical power source.

Correction: Check that the supply voltage is a minimum of 24VDC. Recommended power source is from the key switch "on" position. Ensure that power is not taken from a source with an additional on/off switch, i.e, light switch. Make sure wiring is

in accordance with Renault V.I. wiring instructions.

Probable Cause: Low engine oil pressure.

Correction: Determine oil pressure at engine brakes [Solenoid valve and Control Valve] is a minimum of 175 kPa. If oil pressure is below specifications, engine should be repaired in accordance with manufacturers' procedures.

Problem: Engine brake activates with switches open (off)

Probable Cause: Center solenoid valve seal ring damaged.

Correction: Remove solenoid. Replace all seal rings.

Probable Cause: Engine brake improperly wired.

Correction: Check wiring in accordance with Renault V.I wiring diagrams.

Problem: Engine brake slow to operate or weak in effect

Probable Cause: Lube oil cold and thick.

Correction: Allow engine to warm before operating brakes.

Probable Cause: Improper slave piston adjustment or slave piston binding in bore.

Correction: Readjust in accordance with Jacobs procedures for model brake in question. Ensure that slave piston responds smoothly to the adjusting screw by loosening jam nut and screwing the screw through its full travel for full slave piston motion. Make sure piston travels full range without binding or sticking.

WARNING

Remove slave piston carefully when disassembly is necessary. Use Jacobs Slave Piston Tool P/N 00-018238. Slave piston springs are under heavy compression.

Probable Cause: Lower solenoid seal damaged allowing oil to exit the housing.

Correction: Remove solenoid valve and replace all seal rings.

Probable Cause: Solenoid screen clogged stopping supply of oil to brake.

Correction: Remove solenoid valve and clean or replace screen.

Probable Cause: Master piston not moving in bore.

Correction: Inspect master piston and bore for scoring or burrs. If any present, clean surface with crocus cloth. If unable to remove burrs, replace piston or housing. Inspect lube oil for signs of contaminants. If any are present, replace oil and filter and correct cause of contamination.

Probable Cause: Control valves binding in housing bore.

Correction: Remove control valve. If body is scored, replace control valve. Check for contaminants in lube oil. Clean housing and control valve. If binding continues, replace housing.

Probable Cause: Control valve defective.

Correction: Remove control valve. Make sure check ball is seated in bore and can be moved off seat. Make sure there is spring pressure against ball. Flush in cleaning solvent. Replace if necessary.

Probable Cause: Switch operation sluggish. Check dash switches, clutch switch, throttle switch, or other control switches.

Correction: Readjust or replace switch. Check throttle or clutch return springs for proper operation. Check all controls for correct operation, replace as required.

Probable Cause: Solenoid valve operation erratic.

Correction: Check solenoid valve using electrical specifications explained in this manual or, with key on, brake switches on, and engine off, activate solenoid electrically. Ensure solenoid cap depresses.

WARNING: Do not touch electrical connection when system is energized.

Probable Cause: Outer control valve spring broken, or engine oil pressure extremely high (see Section 1.2).

Correction: Outer control valve spring broken allowing control valve to over-index. Problem is engine lube system. Consult appropriate engine repair manual for causes of high lube oil pressure.

Problem: Oil pressure dropping below minimum required for engine brake operation

Probable Cause: Upper solenoid seal ring damaged.

Correction: Remove solenoid. Inspect seal ring and replace all seal rings.

Probable Cause: Damaged oil supply seals under or between housings.

Correction: Remove housing and replace seals. Inspect for cracked or broken oil connectors, replace seals.

Probable Cause: Aeration of lubricating oil.

Correction: Check for aeration of the oil. Activate, then deactivate engine brake. Watch escape oil coming from control valve cover. If oil has bubbles or if foamy, air is present in system. Aeration can be caused by an overfilled or underfilled crankcase, crack in oil pickup tube or leaks in oil suction tube or hose. Correction is accordance with manufacturer's procedures.

Probable Cause: Lubricating oil being diluted by fuel oil.

Correction: Have an oil analysis of lube oil to determine if fuel is present. Correct per engine manufacturer's procedures.

Probable Cause: Low engine oil level.

Correction: Consult engine manual for specifications. Add oil or re-calibrate dipstick as required.

Probable Cause: Worn engine rocker level bushings.

Correction: Replace bushings in accordance with engine manufacturer's procedures.

Probable Cause: Oil leaking from around cylinder head.

Correction: Repair causes of leaks.

Probable Cause: Restrictions in the oil passages leading to engine brake.

Correction: Inspect all the passageways, remove any items restricting oil flow.

Problem: One or more cylinders fail to stop braking or engine stalls.

Probable Cause: Control valve inner spring broken

Correction: Replace inner spring.

Probable Cause: One or more control valves stuck in "on" or up position.

Correction: Check control valves for binding. Remove and clean or replace if necessary. Inspect lube oil for contaminants.

Probable Causes: Solenoid valve sticking in "on" position.

Correction: If solenoid valve cap remains down with no electric current being supplied, replace solenoid valve.

Probable Cause: Center solenoid seal ring damaged. Allows oil to enter brake with solenoid valve closed.

Correction: Remove solenoid and replace all seal rings.

Probable Cause: Solenoid valve exhaust plugged.

Correction: Remove any restrictions at exhaust (bottom) of solenoid valve.

Probable Cause: Clutch switch or throttle switch stuck in "on" position or out of adjustment.

Correction: Check for proper operation.
Readjust or replace as needed.

Problem: Engine misses or loses power.

Probable Cause: Slave piston adjustment too tight.

Correction: Readjust slave piston clearance in accordance with appropriate Jacobs installation manual.

Problem: Sudden drop in engine lube oil pressure.

Probable Cause: Upper solenoid valve seal missing or damaged.

Correction: Remove solenoid and replace upper seal ring.