

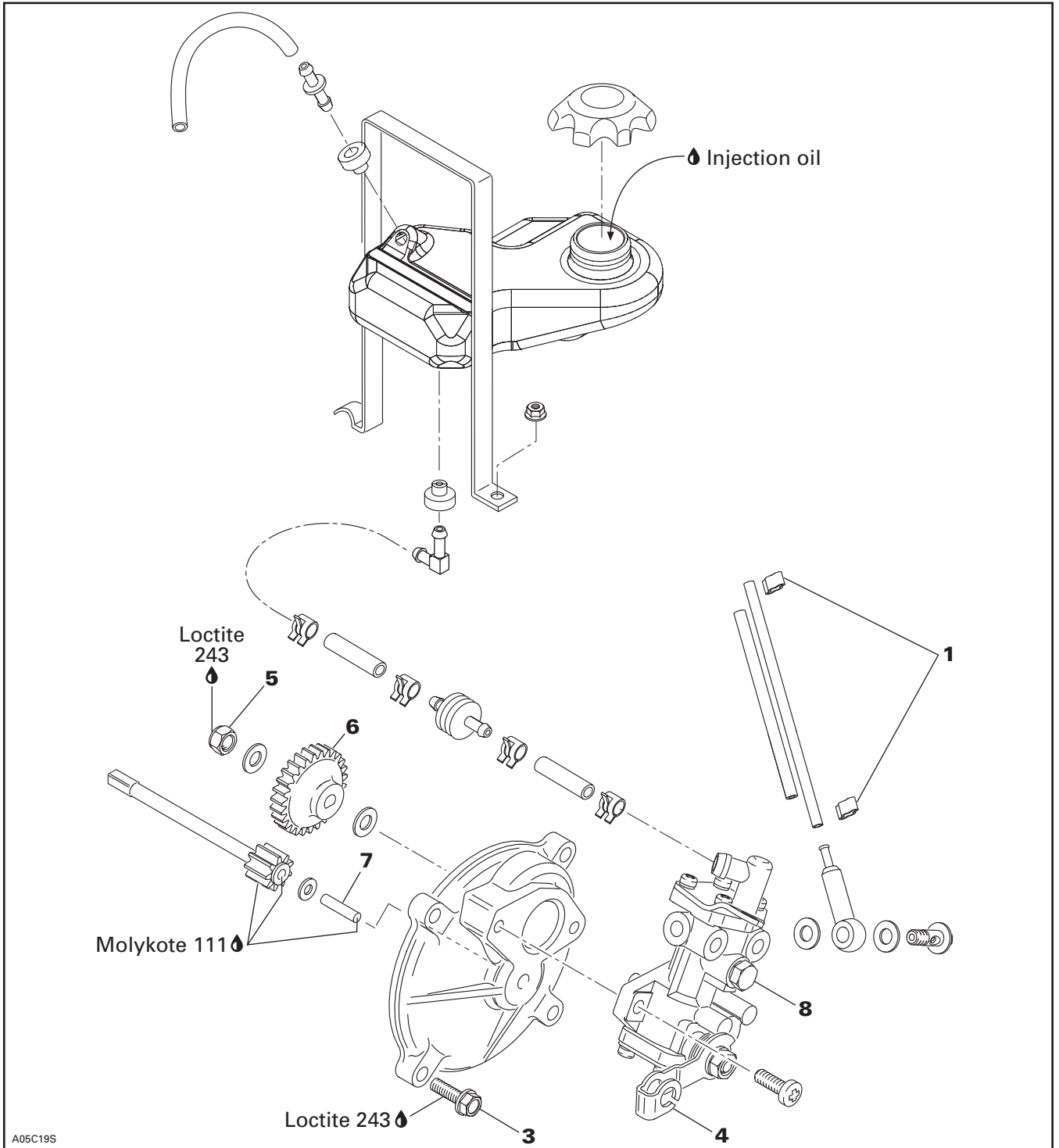
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OIL INJECTION SYSTEM

OIL INJECTION PUMP

277 Engine

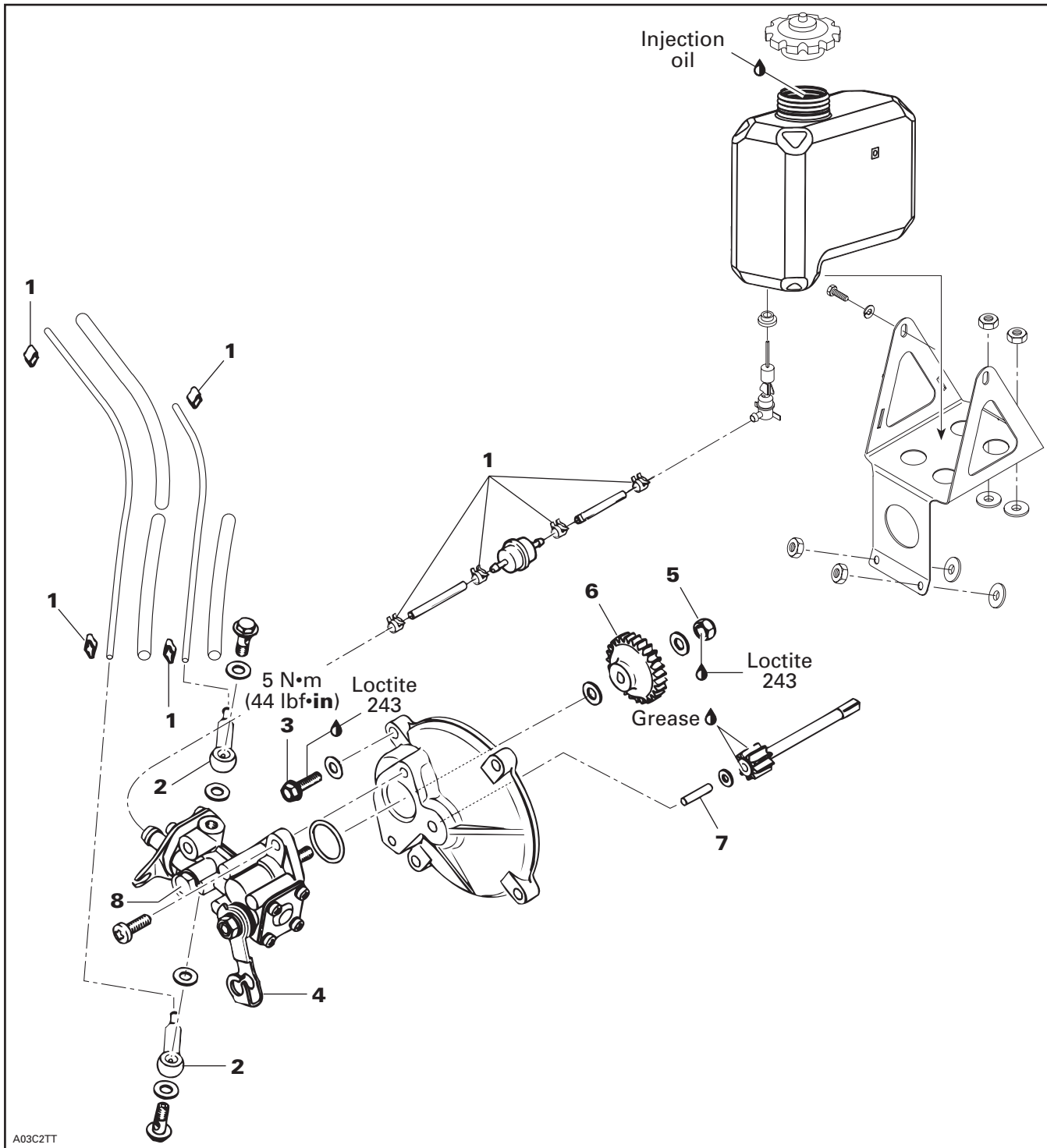


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Section 04 ENGINE

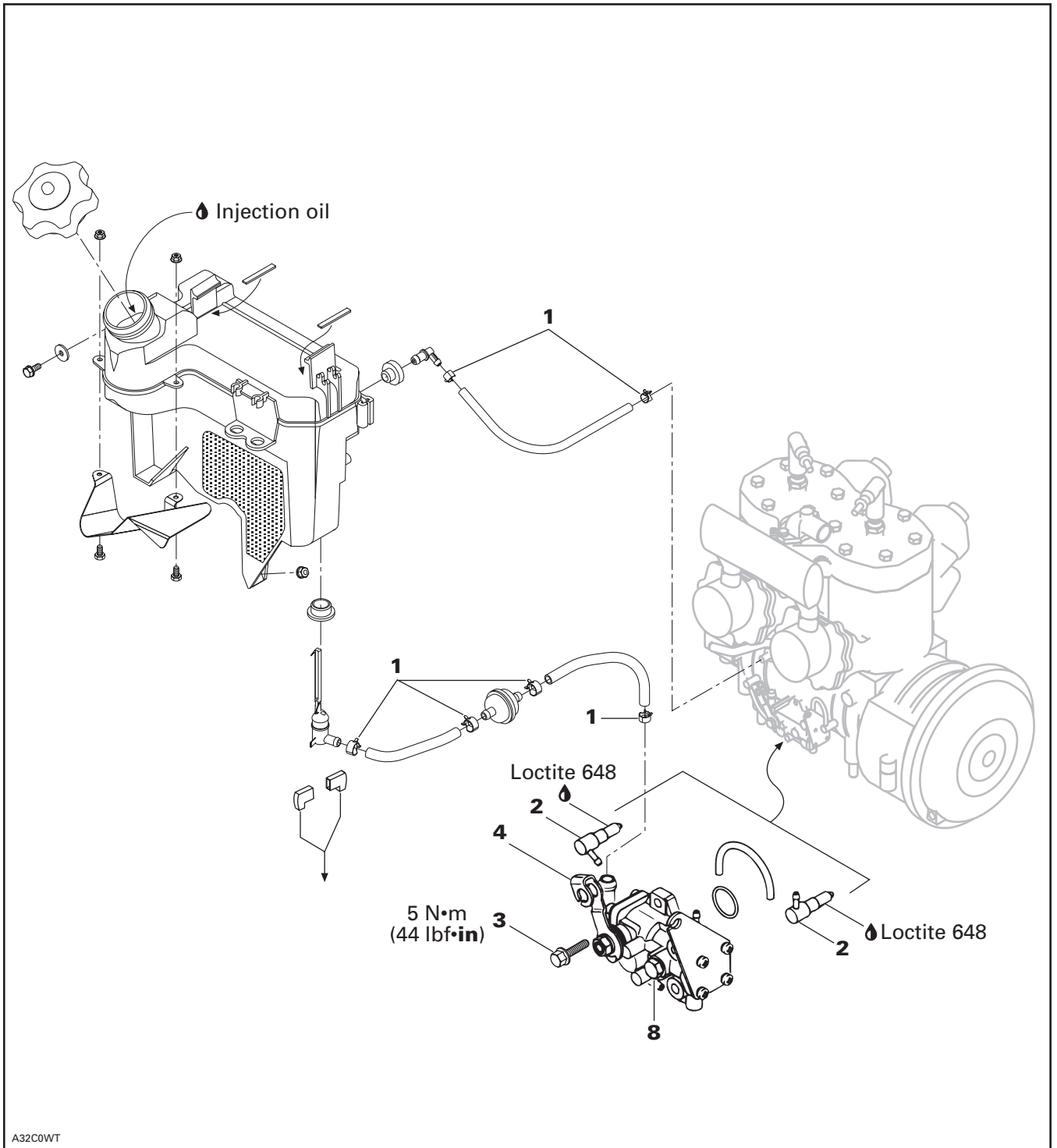
Subsection 07 (OIL INJECTION SYSTEM)

443 and 503 Engines on Skandic LT/LT E/WT/SWT



TYPICAL

593 Engine on Skandic WT LC/SUV



TYPICAL

Section 04 ENGINE

Subsection 07 (OIL INJECTION SYSTEM)

WARNING

Wipe off any oil spills. Oil is highly flammable.

OIL TYPE

All Models

Use recommended injection oil as per vehicle *Operator's Guide*.

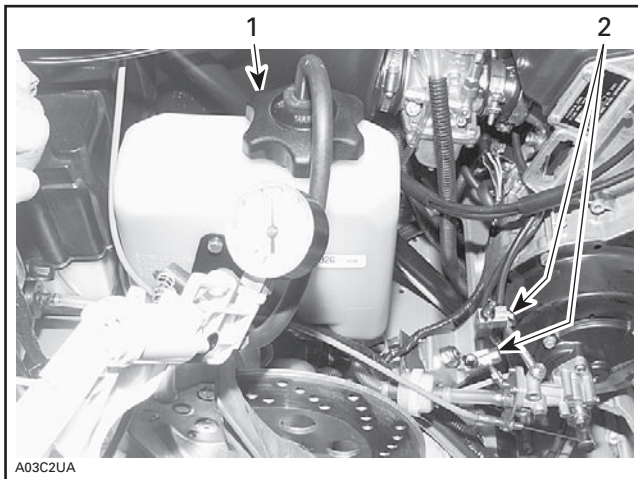
OIL SYSTEM LEAK TEST

All Models

The following test will indicate any leak from oil reservoir to the banjo fitting(s).

Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on outlet hoses.



TYPICAL

1. Special cap on reservoir
2. Hose pinchers on outlet hoses

Connect leak testing kit pump to special cap.

Pressurize oil system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s).

OIL PUMP IDENTIFICATION

All Models

4, Pump Lever

Different engines need different pumps. See identification on lever no. 4.

CAUTION: Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
277	132K
443	E8
503	E8
593	L7

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

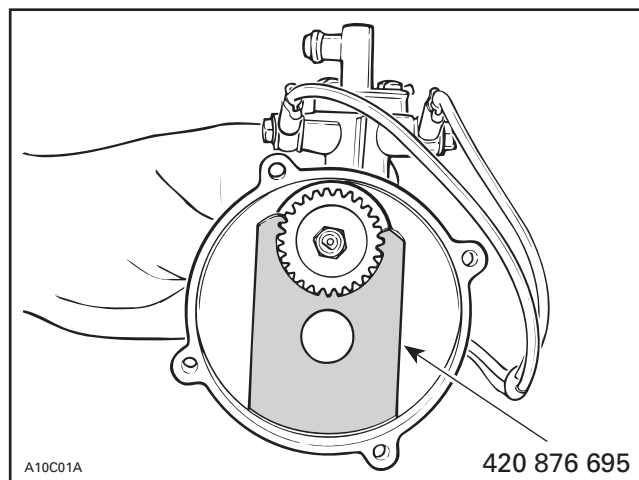
DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

5,6, Gear Retaining Nut and Oil Pump Gear

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using the following gear holder.

ENGINE TYPE	TOOL P/N
277/443/503	420 876 695



ASSEMBLY

1, Spring Clip

Always check for spring clips tightness.

6, Oil Pump Gear

At gear assembly, apply a light coat of Molykote 111 (P/N 413 707 000) on gear teeth.

7, Needle Roller (fan cooled engine only)

The needle roller must be engaged as deep as possible in the pump mounting flange.

3, Screw

Torque to 5 N•m (44 lbf•in).

Cable plastic elbow must be fastened and fully inserted.

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Install cable lock washer on lever side.

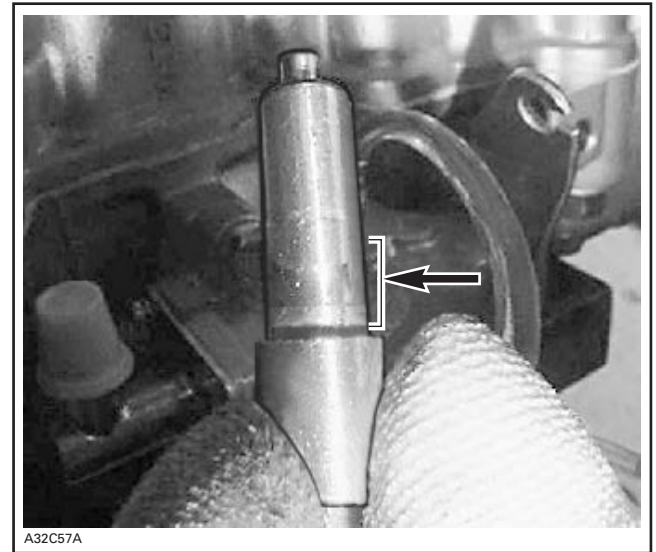
Verify cable and oil pump lever operation.

2, Check Valve

593 Engine

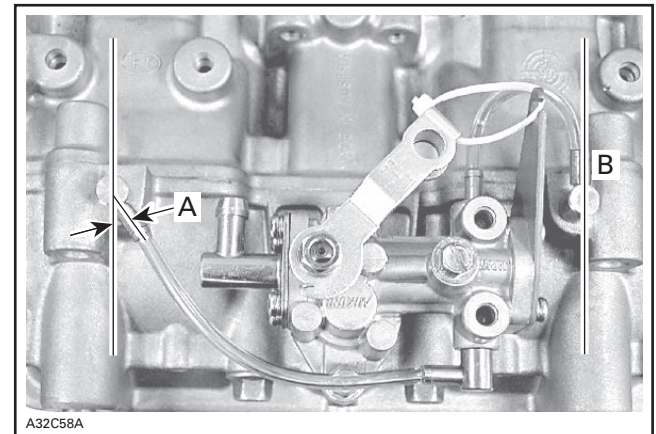
Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is **ONLY** in this area.

NOTE: Prior to coating it with Loctite, make sure check valve body is clean and dry. Clean from dirt or oil, if any, with Pulley flange cleaner (P/N 413 711 809).



APPLY LOCTITE ON THIS AREA ONLY

Install the check valve in the correct position as described on next photo into the crankcase lower side.



POSITION FOR 593 ENGINE ON SKANDIC WT LC/SUV

- A. PTO side: $30^{\circ} \pm 10^{\circ}$ from cylinder axis to the bottom
- B. MAG side: 0° from cylinder axis to the top

Punch in the check valve carefully with a plastic hammer.

Clean the crankcase from surplus of Loctite 648 with a rag.

Section 04 ENGINE

Subsection 07 (OIL INJECTION SYSTEM)

ADJUSTMENT

All Models

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

Pumps Identified E8 and 132K

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place.

The mark on the pump casting and on the lever must align. Width of lever mark is the tolerance.

Loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.

CAUTION: Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

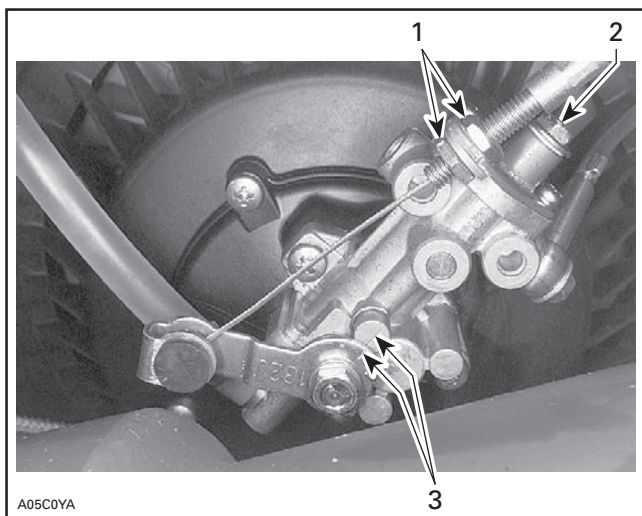
Pump Identified L7

Do not touch throttle lever. The cable free-play must not be eliminated on this model.

Because the oil pump is mounted low on engine, it is very difficult to avoid parallax problem and set a good adjustment.

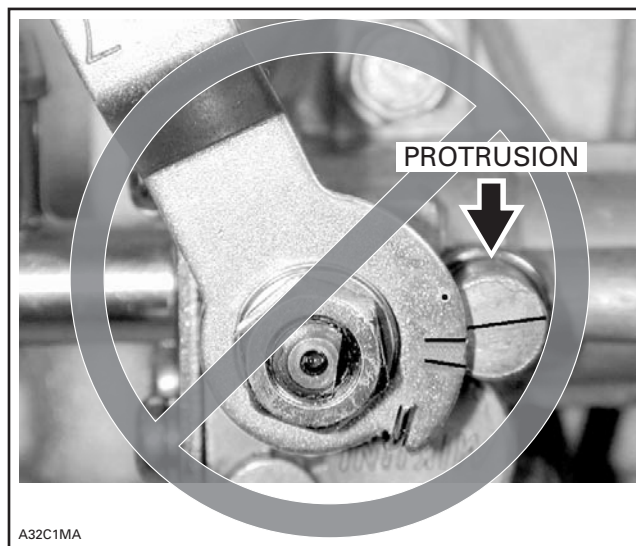
Parallax Problem

When adjusting pump lever, since the mechanic can not view the pump perpendicularly, the adjustment will not be accurate. Following photos show three different views of the same properly adjusted pump.

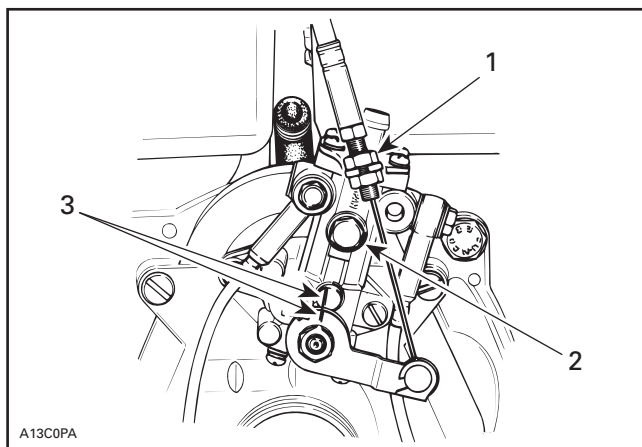


TYPICAL — TUNDRA R

1. Adjuster nuts
2. Bleeder screw
3. Marks



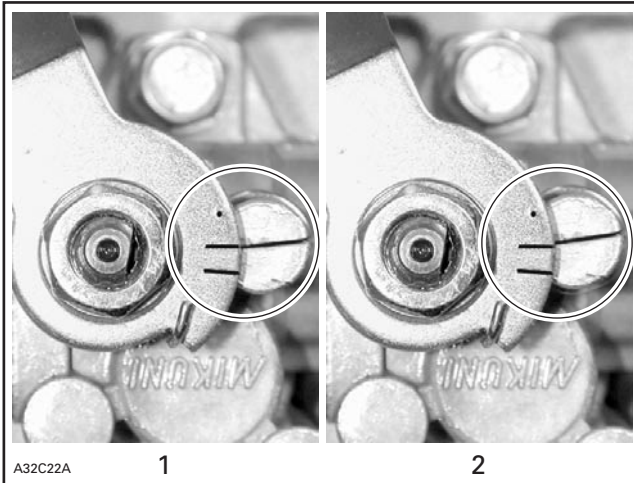
VIEW TOO HIGH — ADJUSTMENT SEEMS TO BE TOO RICH WHEN TOP OF BODY'S PROTRUSION CAN BE SEEN



TYPICAL — SKANDIC WT/SWT

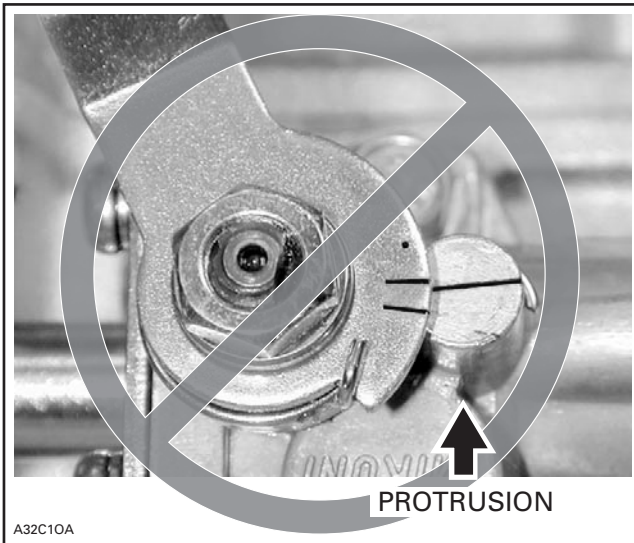
1. Adjuster nut
2. Bleeder screw
3. Marks

Section 04 ENGINE
Subsection 07 (OIL INJECTION SYSTEM)



VIEW STRAIGHT AHEAD — BODY'S PROTRUSION LOOKS LIKE A CIRCLE, MARK ON PUMP ALIGN WITH SECOND MARK ON LEVER (MARK ON DOT SIDE)

1. Minimum setting
2. Maximum setting



VIEW TOO LOW — ADJUSTMENT SEEMS TO BE TOO LEAN WHEN BOTTOM OF BODY'S PROTRUSION CAN BE SEEN

To avoid a bad adjustment, follow below procedure.

Procedure for Oil Pump Adjustment

Ensure carburetors are synchronized according to the technical specifications.

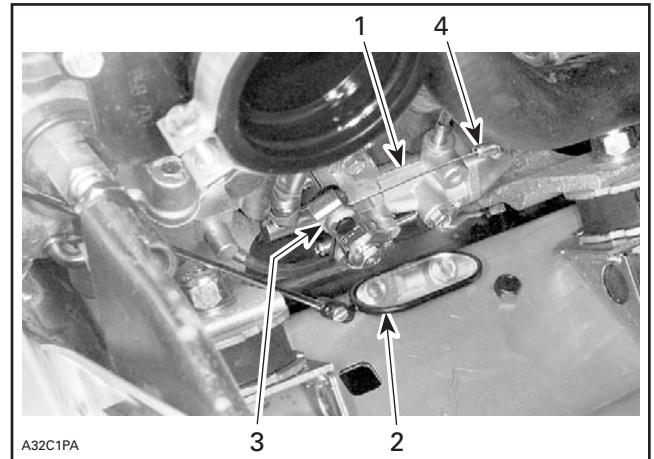
Remove air silencer. Carburetors may also be removed to improve visibility and ease adjustment of oil pump cable.

NOTE: Place carburetors on top of intake boots to keep cable routing near original location.

Use a small round or oblong mirror to see the marks.

The second mark on pump lever must be aligned or up to 1 mm (.039 in) below pump casting mark. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.

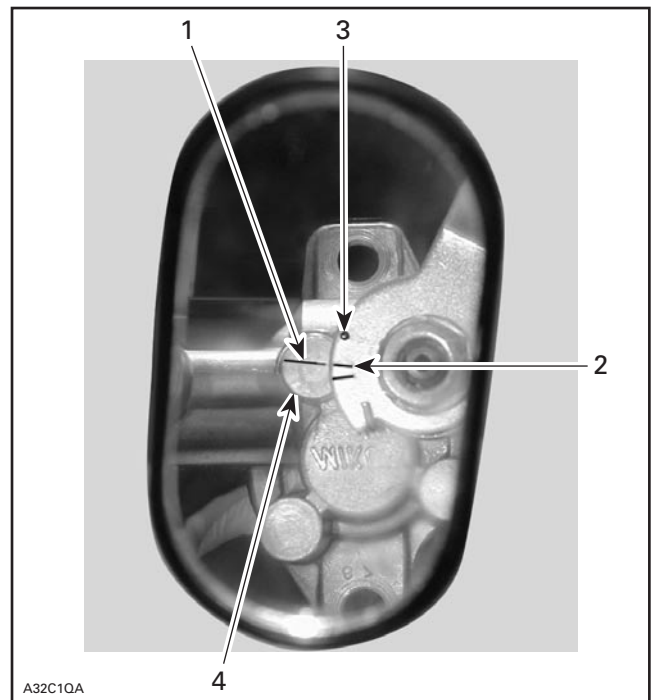


VIEW WITH AIR SILENCER, CARBURETORS AND FUEL PUMP REMOVED

1. Oil pump
2. Mirror
3. Lever
4. Adjustment screw

Make sure that view in mirror is straight ahead, without parallax problem.

Protrusion with fixed mark on pump must look like a full circle. See next photo.

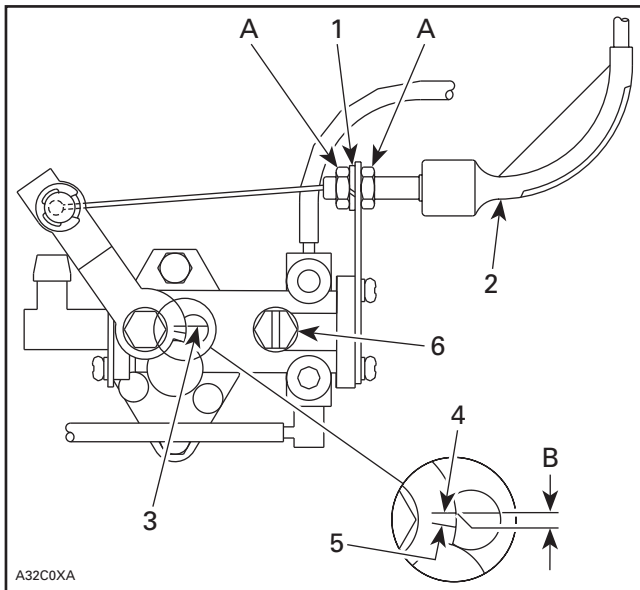


VIEW FROM MIRROR SHOULD LOOK LIKE THIS

1. Mark on pump casting
2. Second mark on lever
3. Dot
4. Pump protrusion looks like a circle, not a cylinder

Section 04 ENGINE

Subsection 07 (OIL INJECTION SYSTEM)



1. Lock washer
 2. Plastic elbow fastened and fully inserted
 3. Pump casting mark
 4. Second mark aligned or below
 5. First mark
 6. Bleeder screw
- A. 5 N•m (44 lbf•in)
B. 0 to 1 mm (0 to .039 in)

CAUTION: Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

BLEEDING

Bleed main oil line (between tank and pump) by loosening the bleeder screw **no. 8** until air has escaped from the line. Add injection oil as required.

Reinstall all parts.

Bleed the small oil lines between pump and engine by running engine at idle while holding the pump lever in fully open position.

NOTE: Make a J hook out of mechanical wire to lift the lever.

WARNING

Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Disconnect small oil lines from pump. Start engine and stop it as soon as it fires.

Check that oil in small oil lines has been sucked up (this will be indicated by a clear section of small oil lines). Repeat the procedure until this condition is attained.

Reconnect small oil lines, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small oil lines. If oil drops, verify check valve operation in injection nozzle. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to supply line fitting. Insert other hose end in an injection oil container. Using a clockwise rotating drill, rotate pump shaft. Oil must drip from outer fittings while holding lever in a fully open position. If not replace pump.

2, Check Valve

For engine 593, check valve is part (built-in) of injection nozzle.

For engines 277, 443 and 503, check valve is part (built-in) of banjo fitting.

To verify this check valve, proceed the same as for checking pump operation on vehicle. First unplug oil line from injection nozzle. After restarting the engine, check that a clear section in small oil line is present. Reconnect oil line.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.