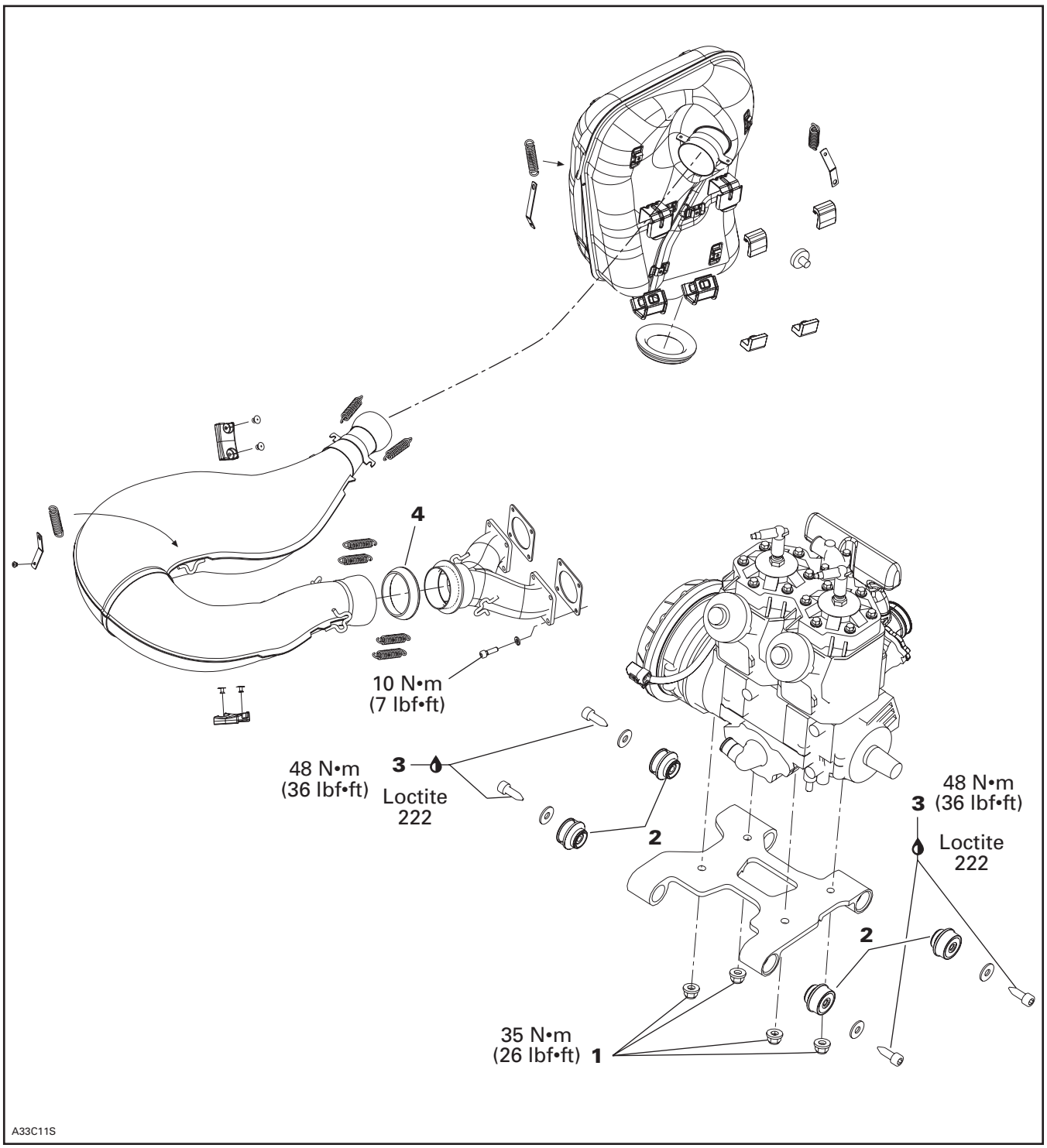
TABLE OF CONTENTS

593 HO AND 793 ENGINE TYPES

REV Series



TYPICAL

MAINTENANCE

NOTE: Replace with new ones any damaged clamps. Refer to appropriate *Parts Catalogs* to order new clamps.

REMOVAL FROM VEHICLE

Open hood and side panels, refer to BODY.

Remove muffler, tuned pipe and exhaust manifold.

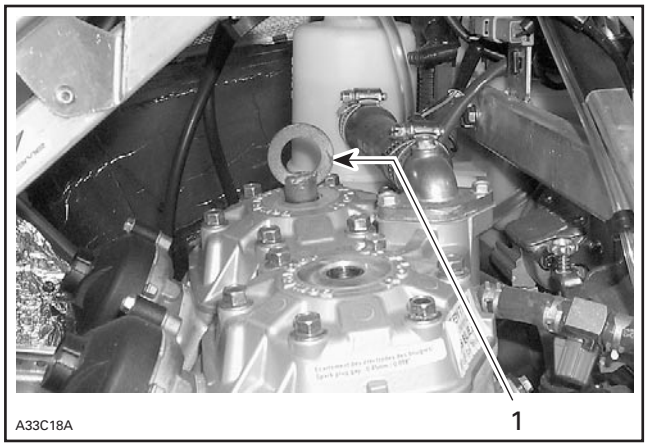
Drain engine coolant.

Remove or unplug the following then lift off engine from engine compartment.

NOTE: Use of a hoist is recommended.

- guard
- air silencer
- drive belt
- rewind starter handle
- drive pulley
  (not necessary if engine does not have to be disassembled)
- hood and left side panels (if necessary for better access), refer to BODY
- carburetors and carburetor clamps
- impulse hose at engine and electrical connectors
- oil injection inlet line at oil injection pump, install hose pincher
- oil pump cable
- coolant hoses between cylinder head and radiator
- coolant by-pass hose
- coolant hose at front of coolant reservoir
- engine support screws
- engine stopper (left rear of engine)
- windshield (if required).

Remove spark plugs and install spark plug lift ring (P/N 529 035 830) at the farthest spark plug hole.



1. Spark plug lift ring

Lift and slide out engine using engine removal hook (P/N 529 035 829).

ENGINE REMOVAL

INSTALLATION

1,2,3, Engine Support Nut, Rubber Mount and Manifold Screw

Install and torque the engine/support nuts **no. 1** to 35 N•m (26 lbf•ft).

Torque screws **no. 3** to 48 N•m (35 lbf•ft) in rubber mount **no. 2**. Before installing screws **no. 3** apply loctite 222 (P/N 413 703 400) on them.

NOTE: Never replace the engine support rubber mount alone. Always replace the whole engine support assembly.

Torque manifold screws M6 to 10 N•m (89 lbf•**in**).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention, to all appropriate component/system reinstallation procedures described throughout this *Shop Manual* and to the following:

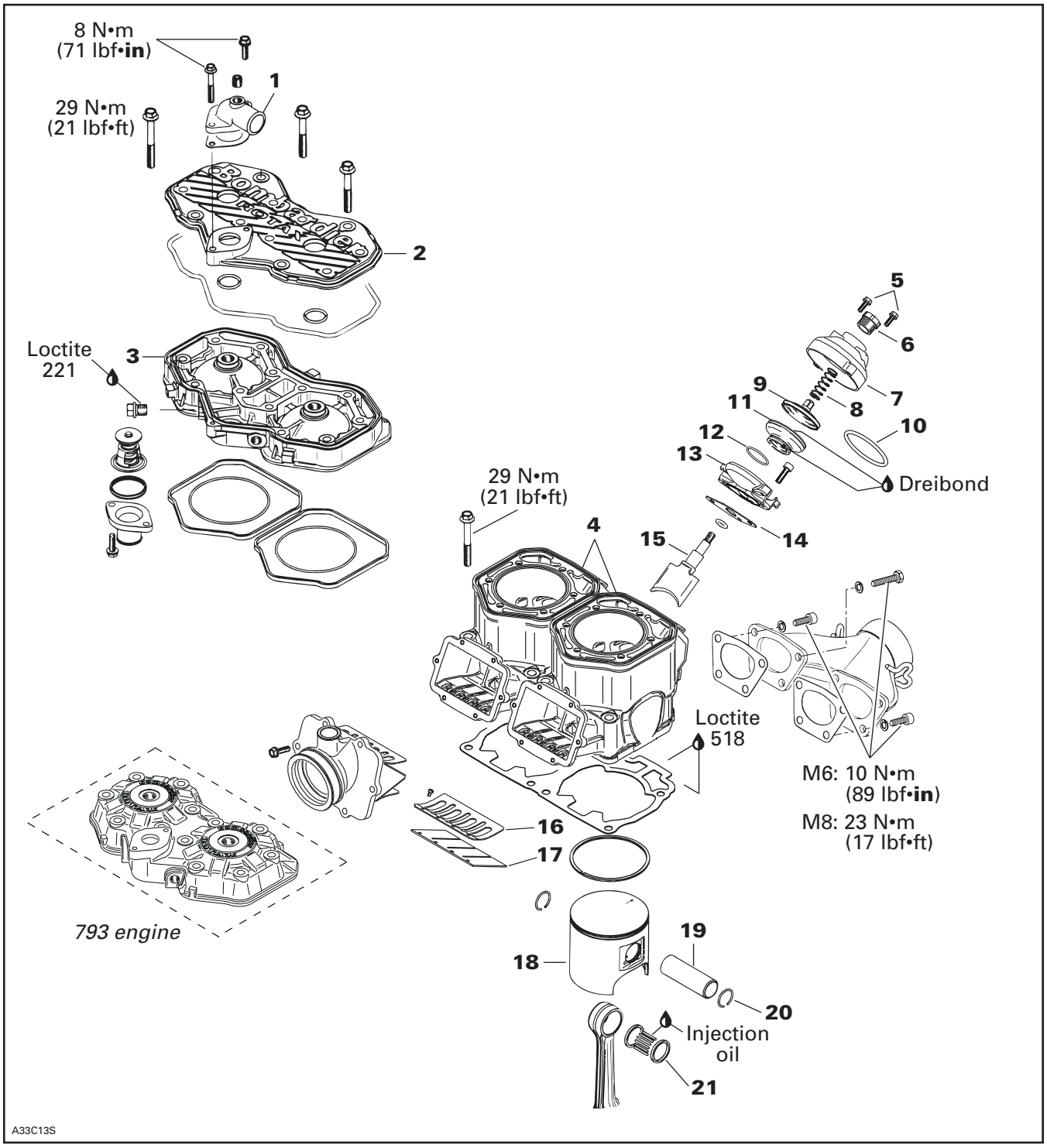
– After throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.

– Check pulley alignment and drive belt tension.

Install doughnut shaped exhaust gasket no. 4 with both notches of its aligned with Y-manifold protrusions.

NOTE: No sealant required on doughnut shaped exhaust gasket no. 4.

TOP END


8 N•m
(71 lbf•**in**)
1
29 N•m
(21 lbf•ft)
2
Loctite
221
3
5
6
9
11
8
7
12
10
13
Dreibond
29 N•m
(21 lbf•ft)
4
15
14
Loctite
518
M6: 10 N•m
(89 lbf•**in**)
M8: 23 N•m
(17 lbf•ft)
16
17
793 engine
19
18
20
Injection
oil
21
A33C13S

TROUBLESHOOTING

Before completely disassembling the engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

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

COMPONENT REMOVAL WITH THE ENGINE INSTALLED

Most engine components can be removed with engine on vehicle such as:

– cylinder head
– cylinder head cover
– piston(s)
– piston ring(s)
– cylinder(s)
– rewind starter
– oil pump
– water pump
– magneto flywheel
– RAVE valve(s)
– reed valve(s).

CLEANING

Discard all gaskets and O-rings.

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

Scrape off carbon formation from cylinder exhaust port cylinder head and piston dome using a wooden spatula.

NOTE: The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

DISASSEMBLY

RAVE System

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

Remove spring clip or screws **no. 5**, cover **no. 7** and spring **no. 8**.

Remove spring **no. 10**.

Unscrew valve piston **no. 9**.

Remove bellows **no. 11** and spring **no. 12**.

Remove cylindrical screws. Remove valve housing **no. 13**.

Pull out exhaust valve **no. 15**.

A32C15A

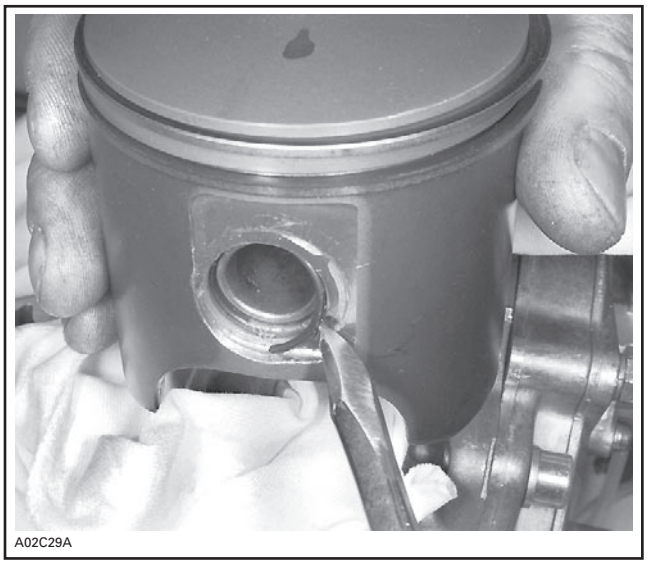
RAVE VALVE PARTIALLY REMOVED

2, Cylinder

Remove spark plugs, coolant outlet **no. 30**. Unscrew cylinder head cover **no. 2** then cylinder head **no. 3**.

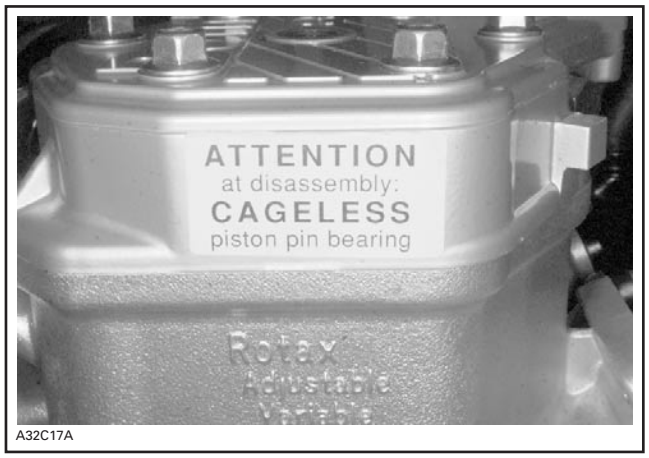
18, Piston

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase. Then with a pointed tool inserted in piston notch, remove both circlips **no. 20** from piston **no. 18**.


A02C29A

TYPICAL

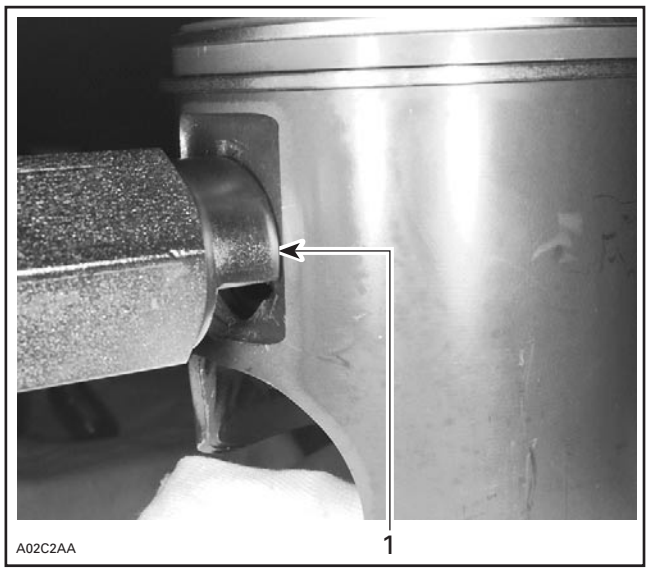
All engines are equipped with cageless piston pin bearings.



Use piston pin puller (P/N 529 035 503) along with 20 mm sleeve kit (P/N 529 035 542). Use also a locating sleeve.

NOTE: The locating sleeve is the same that contains new cageless bearing.

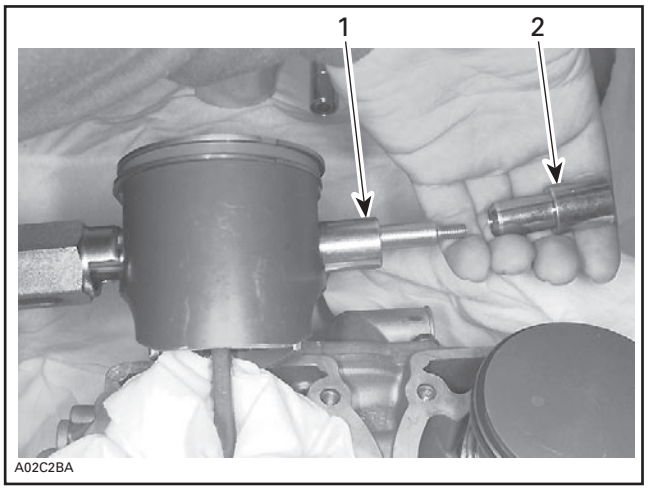
Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



TYPICAL

1. Properly seated all around

Install sleeve then shouldered sleeve over puller rod.

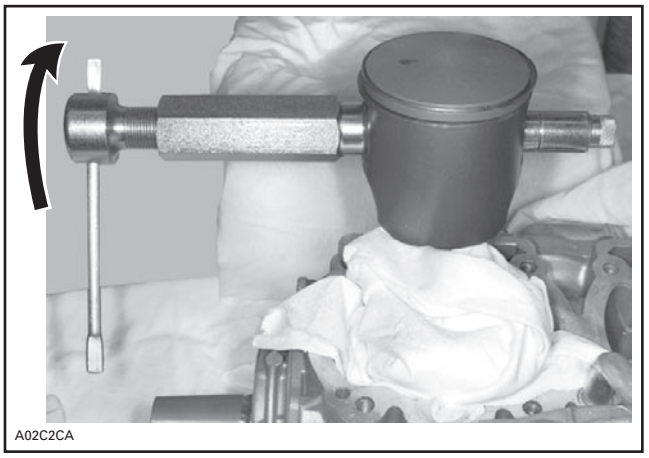


TYPICAL — INSTALLATION OF SLEEVE KIT

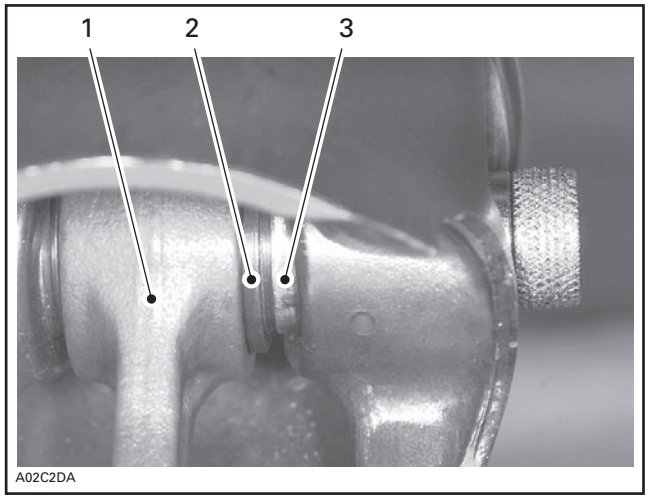
1. Sleeve
2. Shouldered sleeve

Screw (LH threads) extracting nut.

Pull out piston pin **no. 19** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.



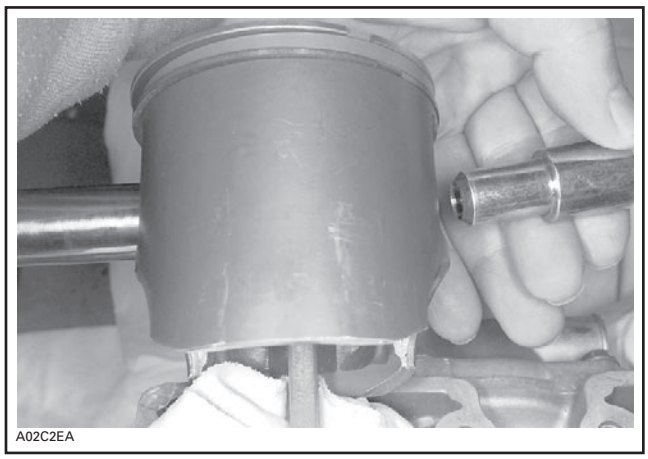
TYPICAL — PISTON PIN EXTRACTION



TYPICAL

1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

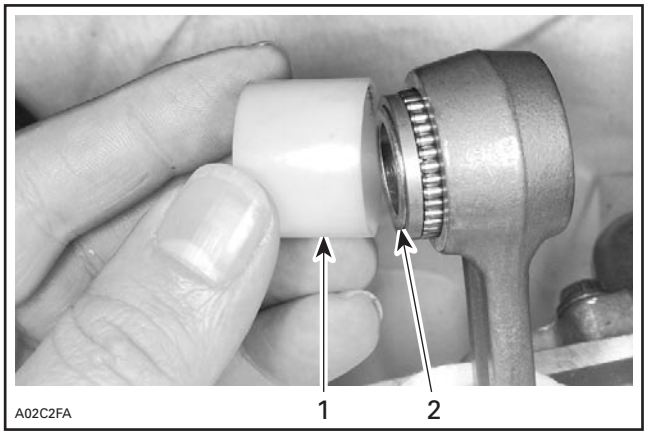
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL

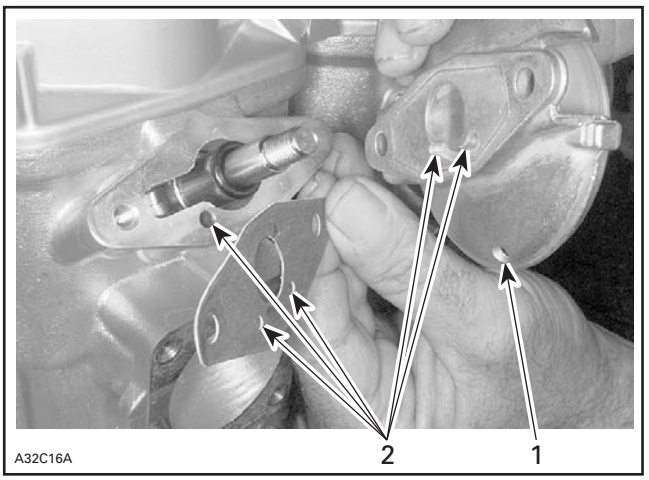
1. *Locating sleeve*
2. *Sleeve*

INSPECTION

NOTE: Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

RAVE System

Check valve rod housing and cylinder for clogged passages.



1. *Draining hole*
2. *Passages*

NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

11, Bellows

Check for cracked, dried or perforated bellows.

8, Spring

ENGINE TYPE	SPRING P/N	COLOR	WIRE DIA. mm (in)	FREE LENGTH mm (in)	PRELOAD IN N (LBF) AT COMPRESSED LENGTH OF 14 mm (.551 in)
593 HO	420 239 944	Brown	0.9 (.035)	48.5 (1.91)	15.9 (3.56)
793	420 239 940	Yellow	0.8 (.031)	48.5 (1.91)	10.5 (2.36)

ASSEMBLY

RAVE System

Install RAVE valve with its mention top as illustrated in the removal photo. Tighten red cap **no. 6** screw to bottom.

4,18, Cylinder and Piston

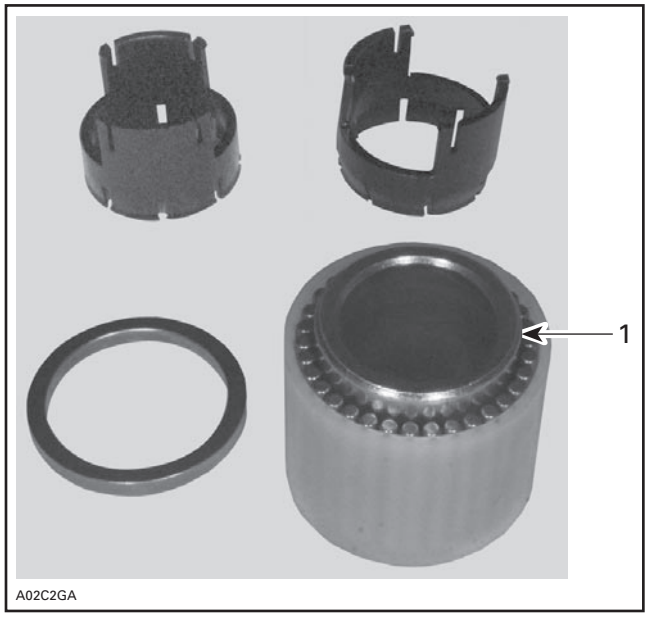
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

2,3,4, Cylinder Head Cover, Cylinder Head and Cylinder

Make sure parts sealing surfaces are flat. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT and look for CYLINDER HEAD WARPAGE.

When installing a new cageless bearing, replace half plastic cages with sleeve.

NOTE: 593 HO, and 793 engine cageless bearings have 28 needles.



TYPICAL
1. Sleeve

Oil needle bearing with injection oil. Grease thrust washers and install them on each end of needles.

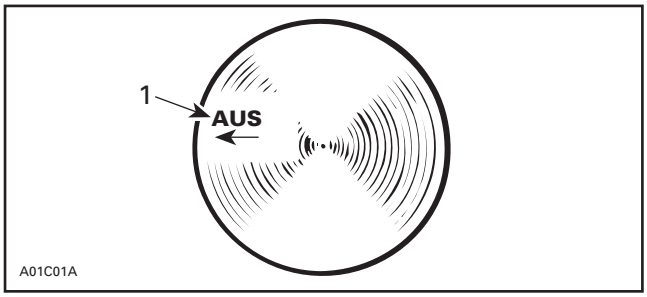
Insert cageless bearing into connecting rod.

TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Heat piston with a 100 W lamp or a heat gun before piston installation.

CAUTION: Piston temperature must not exceed 46°C (115°F). Never use direct flame to heat the piston and never freeze the pin.

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing towards the exhaust port.

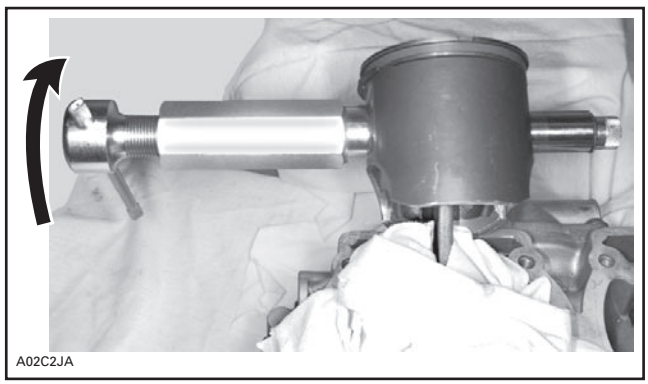


1. Exhaust

Install shouldered sleeve.

TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.



TYPICAL

All Models

CAUTION: Always install new circlips.

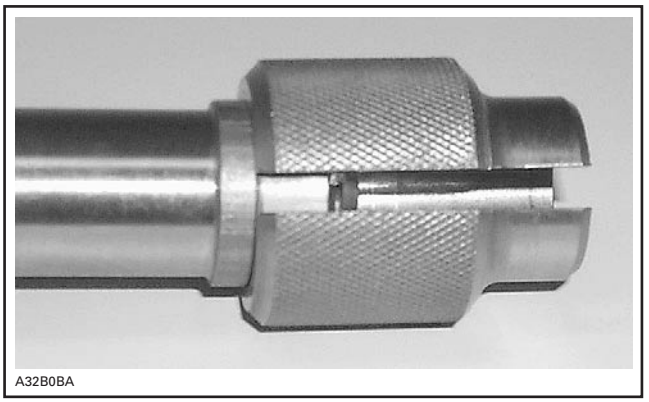
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use appropriate piston circlip installer.

ENGINE TYPE	PISTON CIRCLIP INSTALLER (P/N)
All	529 035 686

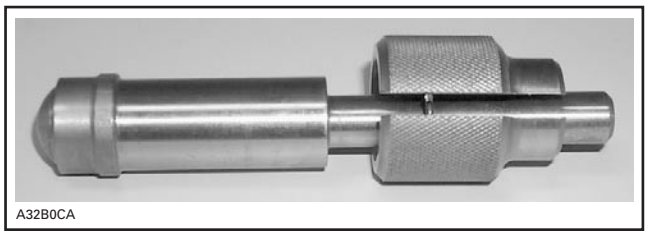
Use circlip installer (P/N 529 035 686) to install new mono-hook circlips **no. 20**.

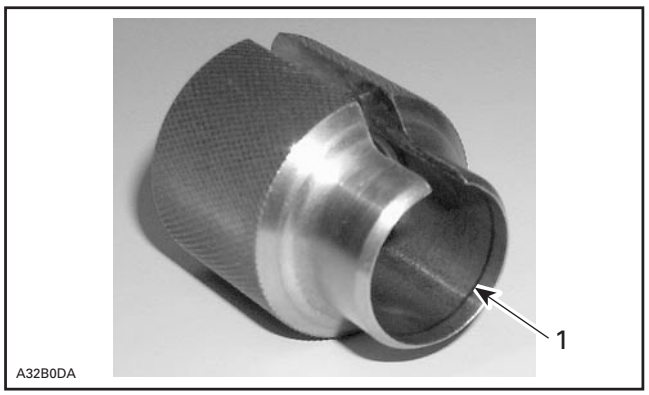
Insert circlip into support so that, when installed in piston groove, the tab faces upward.

With round end of pusher, position circlip perpendicularly to the support axis.



With the other end of the pusher, push circlip into the support groove.


A32B0CA



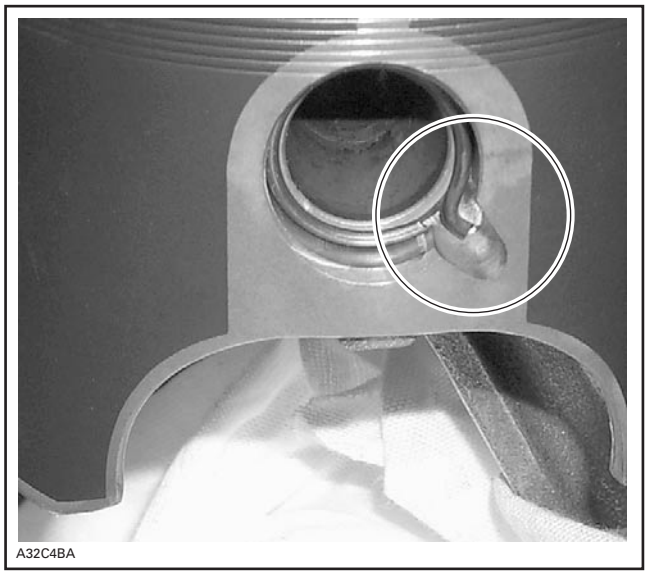
A32B0DA

1. Groove


A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to put circlip in place. Make sure to install new circlips with tab toward top as per following photo.


A32C4BA

TAB TOWARD TOP

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one because, on a second attempt, the circlip will lose its normal retaining capabilities.

CAUTION: Circlips must not move freely after installation; if so, replace them.

Clean cylinders and crankcase mating surfaces with Loctite Chisel (P/N 413 708 500).

Coat crankcase mating surface with Loctite 518 (P/N 293 800 038). Choose the right gasket thickness according to combustion chamber volume. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT. Install it on crankcase. Coat gasket with Loctite 518.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Install cylinders. Do not tighten.

Install new rubber ring and round O-rings on each cylinder.

NOTE: Carefully clean screws before reinstallation, specifically under screw head.

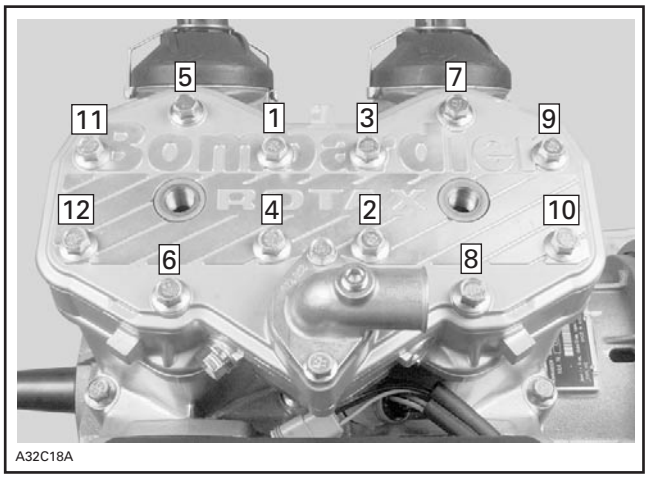
Install exhaust manifold with gaskets. Do not tighten yet.

Torque cylinder screws in a crisscross sequence as per the following table.

M8	29 N•m (21 lbf•ft)
M10	40 N•m (29 lbf•ft)

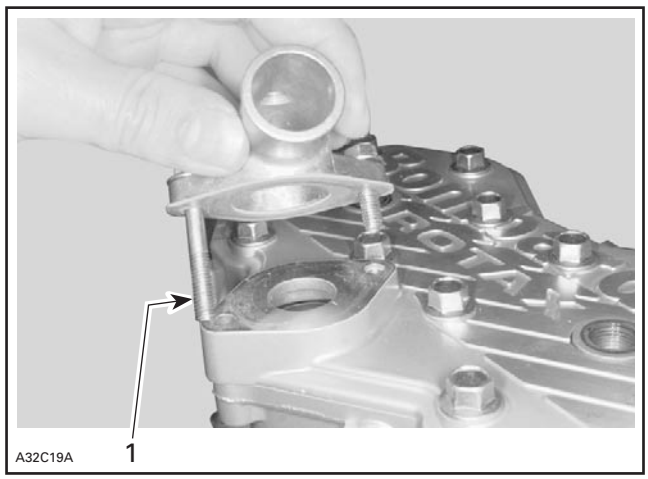
At assembly, torque cylinder head screws to 29 N•m (21 lbf•ft) in the following illustrated sequence.

Tighten exhaust manifold bolts to 23 N•m (17 lbf•ft) in a criss-cross sequence.



TYPICAL

Apply Loctite 243 (P/N 293 800 060) on screws threads. Install outlet socket and tighten screws to 12 N•m (106 lbf•**in**). Note position of longer screw.



1. Longer screw

17, Reed Valve

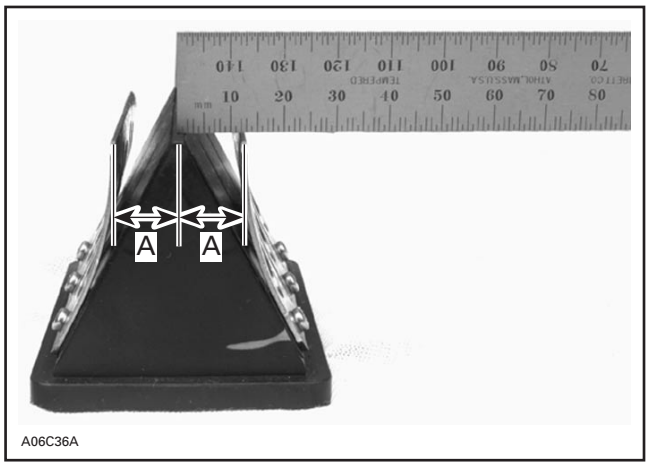
All Engines

Blades have a curved shape. Install with their curve facing reed block.

With blade stopper **no. 16** removed, check reed valve for proper tightness. There must not be any play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.

Check distance from blade stopper outer edge and distance from center of reed valve block.



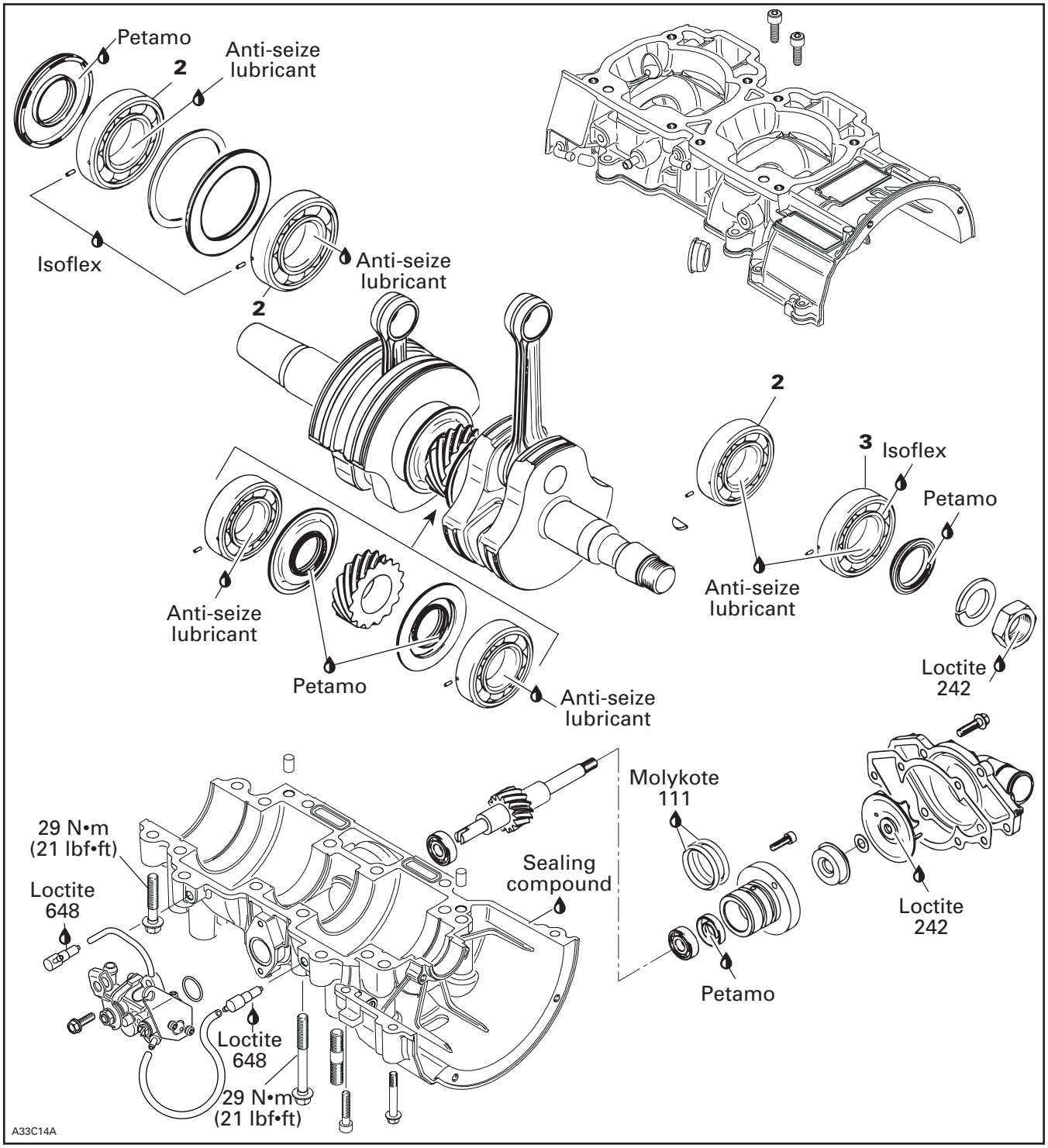
TYPICAL

A. 18.7 - 0, + 0.75 mm (.736 - 0, + .030 in)

Bent blade stopper as required to obtain the proper distance.

Blade stoppers may slightly interfere with cylinder during installation. Adjusted distance will be reduced automatically upon installation.

BOTTOM END


Petamo
Anti-seize lubricant
2
Isoflex
Anti-seize lubricant
2
2
3
Isoflex
Petamo
Anti-seize lubricant
Anti-seize lubricant
Petamo
Anti-seize lubricant
Loctite 242
29 N•m (21 lbf•ft)
Loctite 648
Sealing compound
Molykote 111
Loctite 242
Petamo
Loctite 648
29 N•m (21 lbf•ft)
A33C14A

NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner. Use Gasket remover (P/N 413 708 500) accordingly.

Remove old paste gasket from crankcase mating surfaces with Gasket remover (P/N 413 708 500).

CAUTION: Never use a sharp object to scrape away old sealant as score marks incurred are harmful to crankcase sealing.

DISASSEMBLY

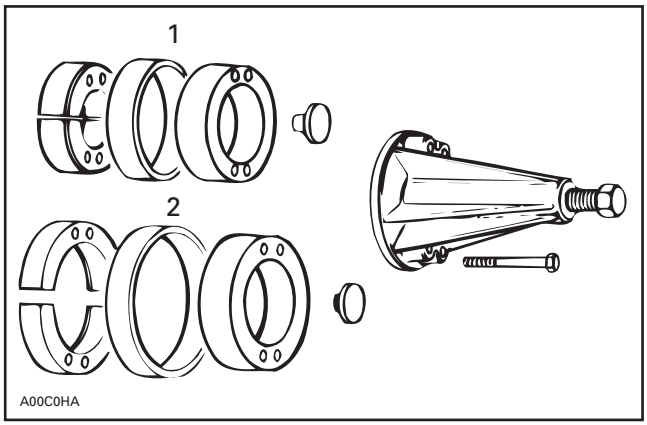
General

To remove drive pulley, refer to DRIVE PULLEY.

To remove magneto, refer to CDI SYSTEM.

2,3, Crankshaft Bearing

To remove bearings from crankshaft, use a protective cap and special puller, as illustrated.



1. PTO side
2. MAG side

INSPECTION

NOTE: Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

ASSEMBLY

Coat lip of all seals with Petamo grease (P/N 420 899 271).

2, Crankshaft Bearing

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with injection oil previously heated to 75°C (167°F). This will expand bearing and ease installation.

Some bearings must be lubricated with Isoflex grease (P/N 293 550 021).

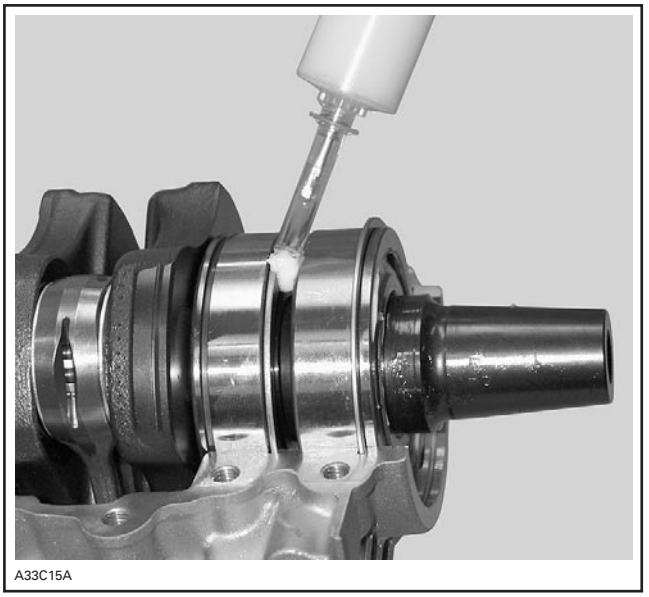
CAUTION: Use only the recommended Isoflex grease. Make sure not to push Isoflex grease between outside bearing race and half crankcase.

NOTE: The 50 g tube corresponds to 50 cc of grease.

Put 50 to 55 mL of grease in a syringe.

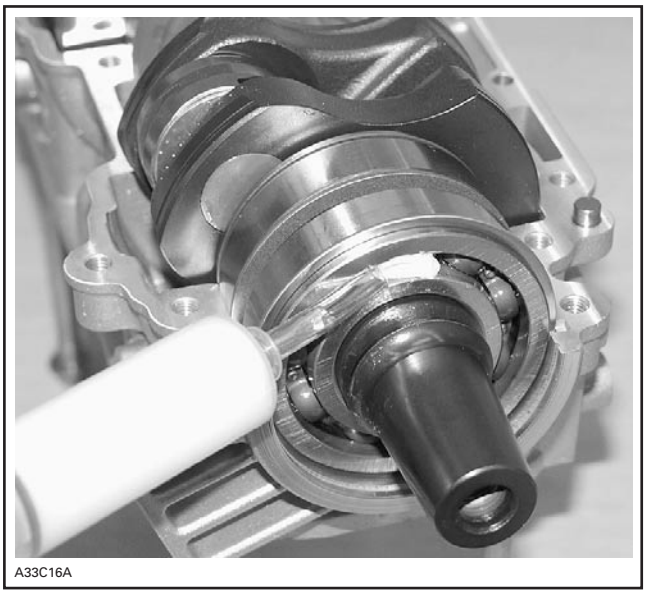
CAUTION: Do not exceed the recommended amount of grease.

Fill inner side of PTO side bearing with Isoflex grease (about 10 mL).

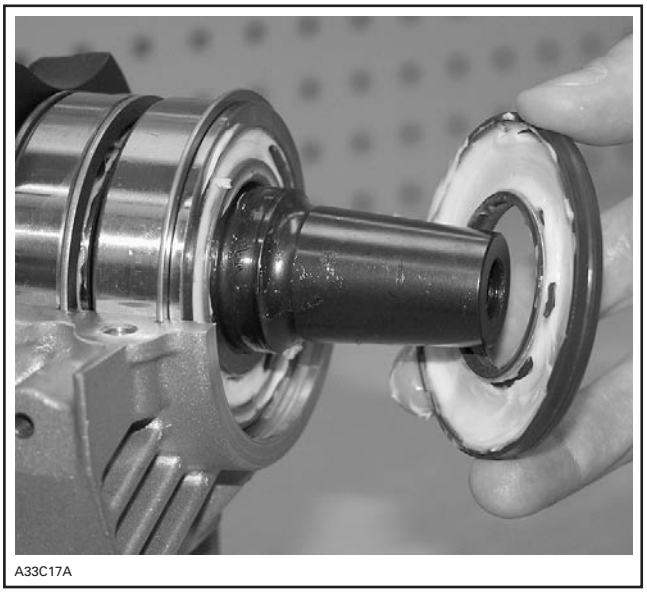


PTO SIDE BEARING FILLED WITH ISOFLEX GREASE

With the syringe, fill the outer ball bearing and inner side of outer seal with 40 to 45 mL of Isoflex grease.



BALLS COATED WITH A SEAM OF GREASE

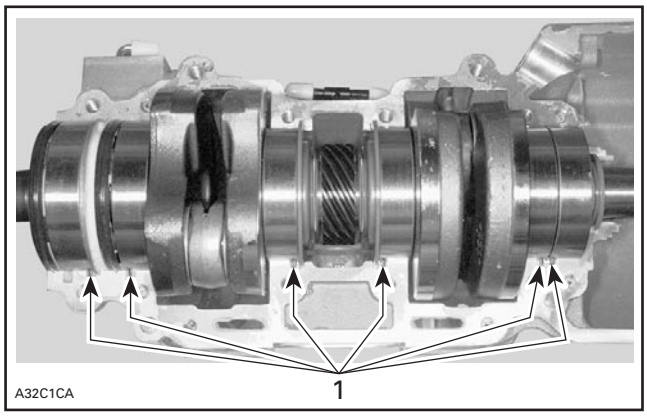


FILL WITH GREASE AND SET IN PLACE

Apply 6 mL of grease to MAG side outer bearing.

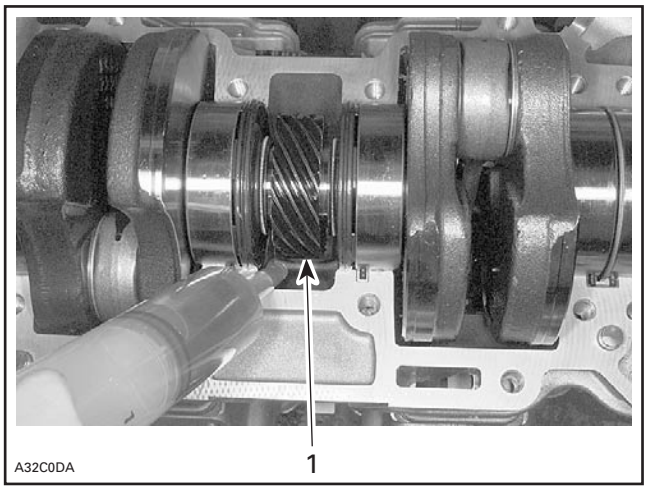
NOTE: If replaced with new bearing, do not apply grease as new bearings come with grease already applied.

At crankshaft installation, position drive pins as illustrated.



TYPICAL
1. Position pins

Pour 50 mL (2 U.S. oz) of injection oil in the pan under central gear to lubricate pump gearing as per photo.



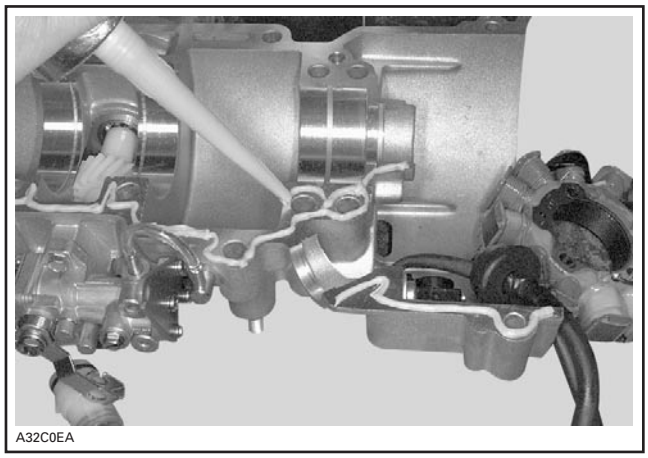
1. Oil bath

Crankcase Assembly

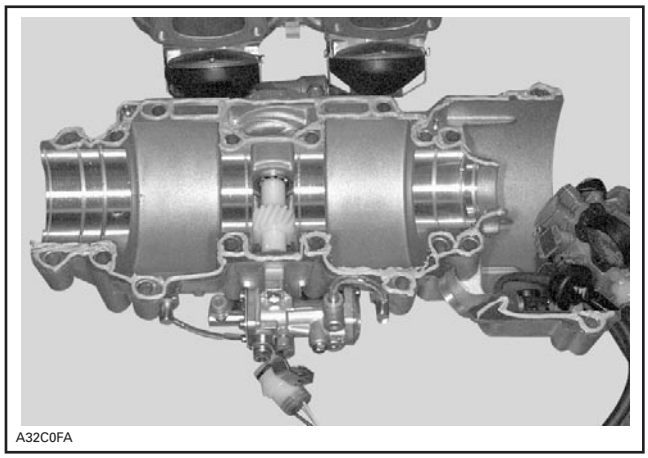
IMPORTANT: The total assembly sequence, including sealing compound spreading, screwing and torquing of bolts according to the proper sequence, must be performed within 10 minutes. **Do not wait between each bolt torquing. All bolts must be torqued in a row.**

Before screwing both parts of crankcase, seal it with sealing compound (P/N 420 297 906). Make sure surfaces are clean and degreased before applying sealing compound.

Spread a seam of **1.2 mm (1/16 in)** maximum in diameter on surface of lower crankcase half.

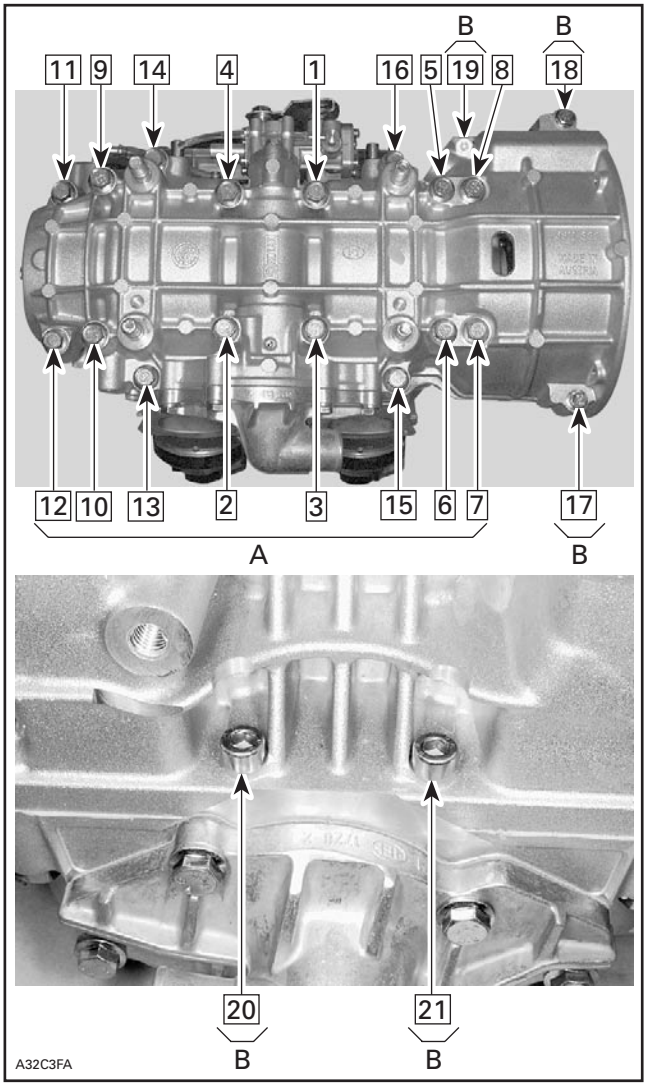


As far as possible, sealing compound must be applied in one run to avoid any risks of leakage through the crankcase.



SEAMING COMPLETED — CONTACT SURFACES COVERED AND SCREW HOLES SURROUNDED

Screw all crankcase bolts in place in the following sequence and to the appropriate torque; this must be done in two steps torquing: first, screw bolts up to 60% of the final torque (18 N•m (13.5 lbf•ft) for most of the bolts), then, tighten to the required torque (i.e. 29 N•m (21 lbf•ft)).



A. Torque bolts 1 through 16 to 29 N•m (21 lbf•ft)
*B. Torque bolts 17 through 21 to 9 N•m (80 lbf•**in**)*

BREAK-IN

After rebuilding an engine, always observe a break-in period as described in *Operator's Guide.*

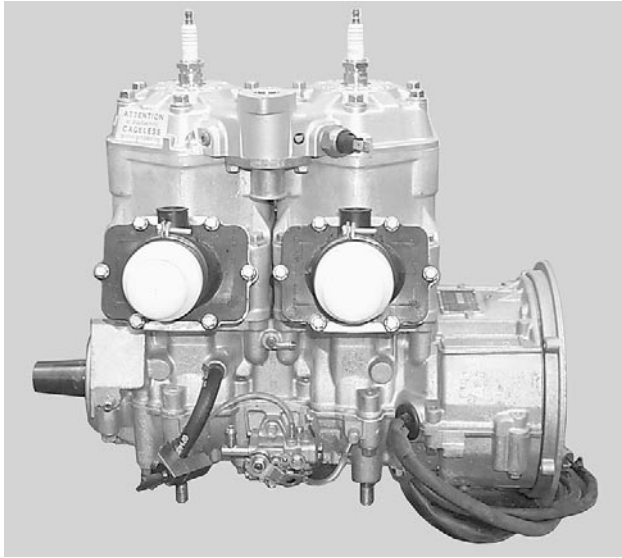
LEAK TEST AND ENGINE DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for 593 HO and 793 types of engines.

PREPARATION

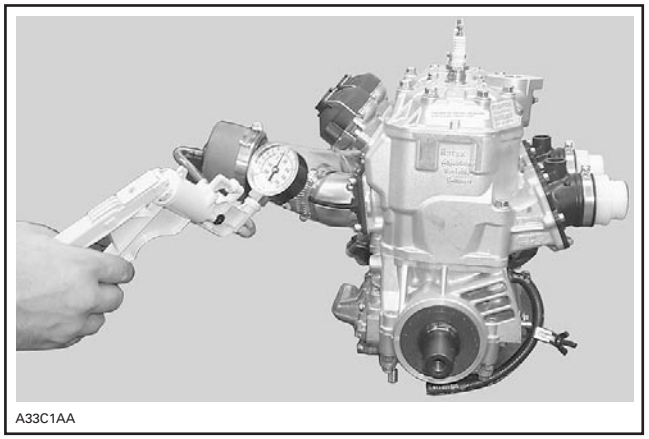
1. Remove tuned pipe.
2. Install plug over exhaust manifold.
3. Remove carburetors.
4. Insert plugs in intake rubber boots. Tighten with existing clamps.


A33C19A

5. Using a hose pincher (P/N 295 000 076), block impulse hose.
6. Install air pump on exhaust plug.

NOTE: If necessary, lubricate air pump piston with mild soap.

CAUTION: Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.


A33C1AA

7. Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
8. Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump cylinder, all plugs and fittings.
   – If tester kit is leaking, bubbles will indicate where leak comes from.
   – If tester kit is not leaking, check engine as per following procedure.

PROCEDURE

NOTE: A flow chart has been prepared as a visual reference. See last page of this chapter.

Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

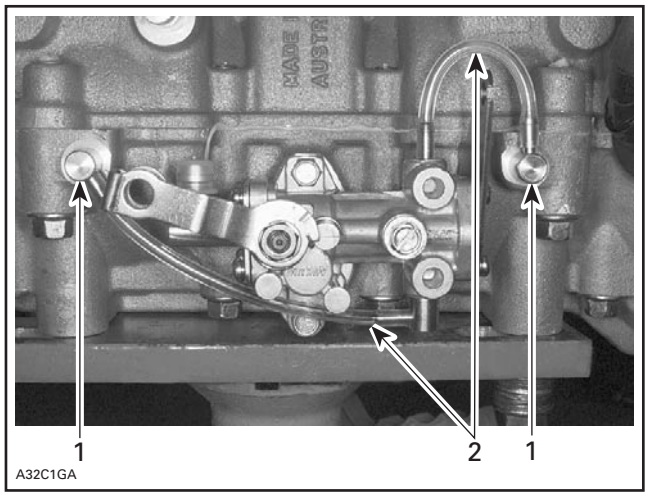
TEST PRESSURE: 34 kPa (5 PSI)
for 3 minutes

– If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
– If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

Engine

Check the following:

1. All jointed surfaces and screw/stud threads of engine:
   - spark plug base, insulator
   - cylinder head
   - RAVE valve bellows, piston and housing
   - cylinder
   - crankcase halves (joint)
   - oil injection pump mounting flange (O-ring)
   - coolant pump housing
   - bleed screws/plugs.
2. Small injection oil lines coming from pump.



1. Injection nipples
2. Small injection oil lines

Check for air bubbles or oil column going toward pump. It indicates defective check valve in injection nipples.

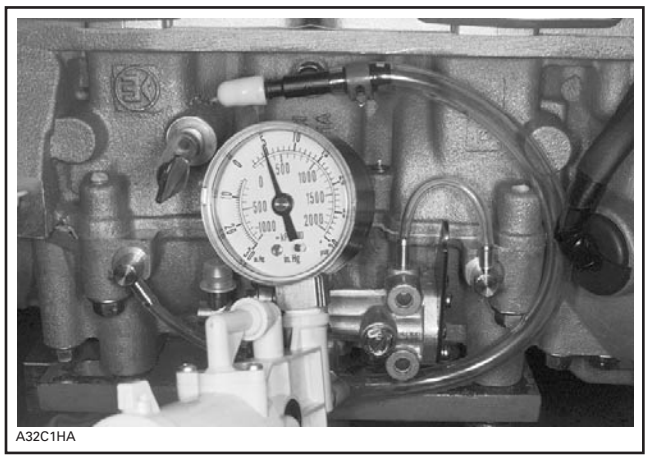
3. Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.

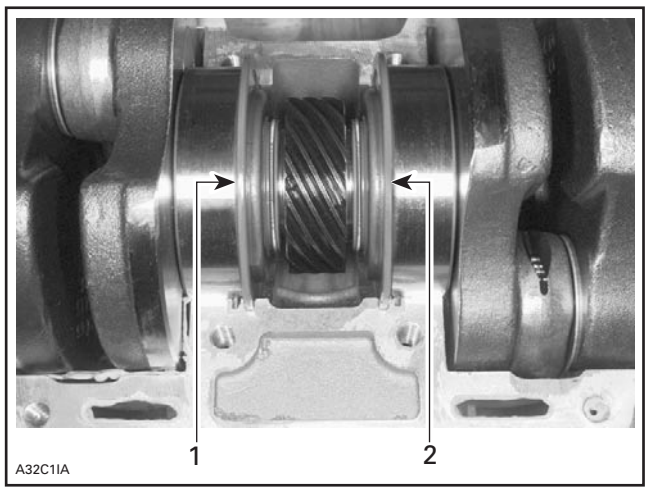
4. Remove drive pulley then check crankshaft outer seal.
5. Remove rewind starter and magneto system then check crankshaft outer seal.
6. Check pump shaft gear oil reservoir.

Pump Shaft Oil Gear Reservoir

Install air pump on adapter and pressurize as above.



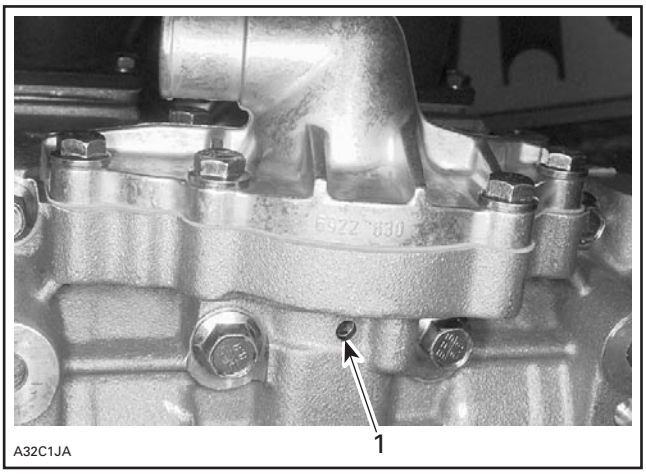
If pressure drops, it indicates a defective crankshaft inner seal.



CRANKSHAFT INSTALLED IN UPPER HALF CRANKCASE

1. Crankshaft inner seal on PTO side
2. Crankshaft inner seal on MAG side

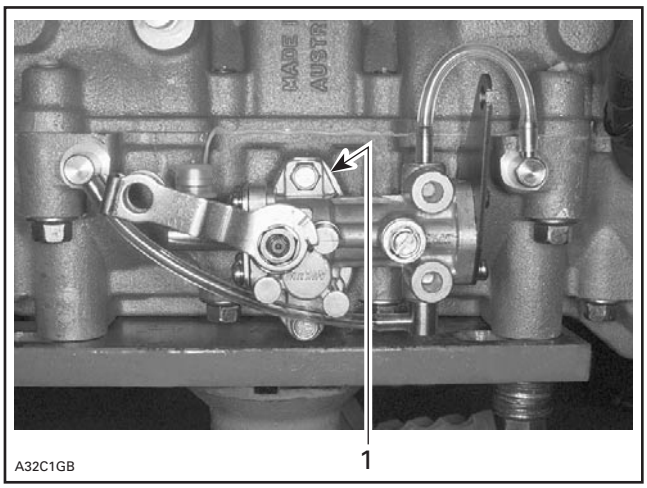
1. Check weep hole below coolant pump housing with soapy water.



1. Weep hole

If there is a leak, it indicates that a pump shaft is defective (oil seal beside coolant ceramic seal).

2. Leaks can be also on oil pump side. Check mounting area for leaks.



1. Check mounting area

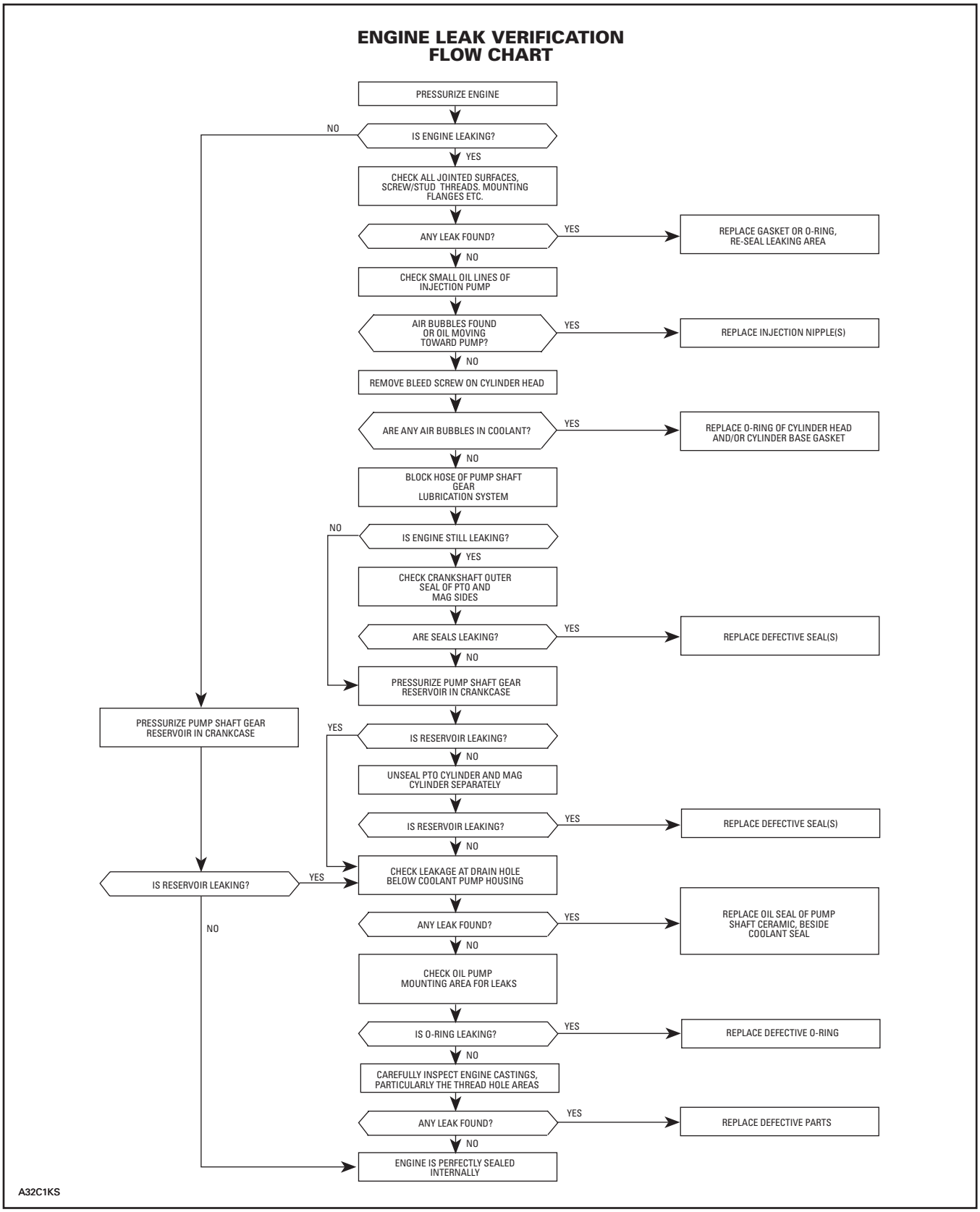
3. If leak still persists, it indicates a defective casting somewhere in engine.

Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus lead to leakage.

FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

CYLINDER HEAD WARPAGE

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Check gasketed surface of the cylinder head with a straightedge and a feeler gauge.

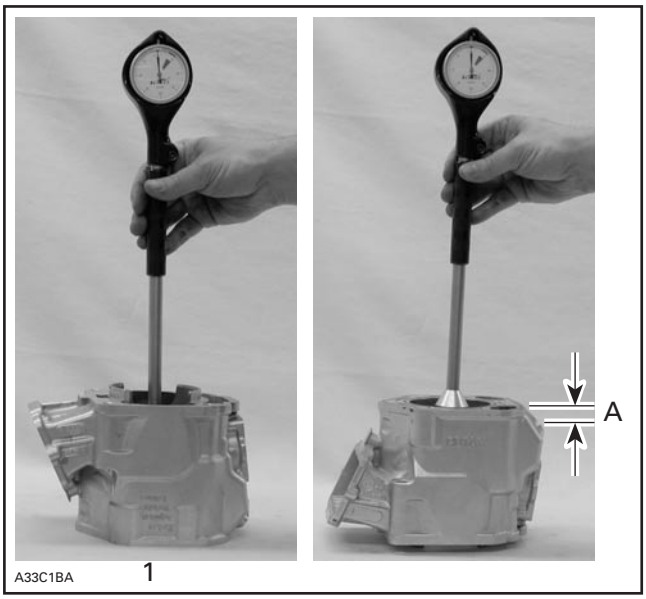
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.10 mm (.004 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but can not be rebored.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



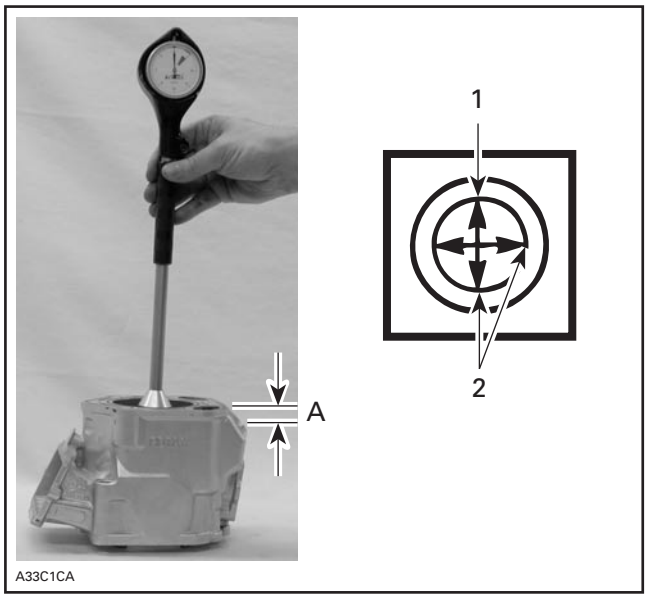
1. Below the intake port
A. 16 mm (5/8 in) from top

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.08 mm (.003 in)

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but cannot be rebored.

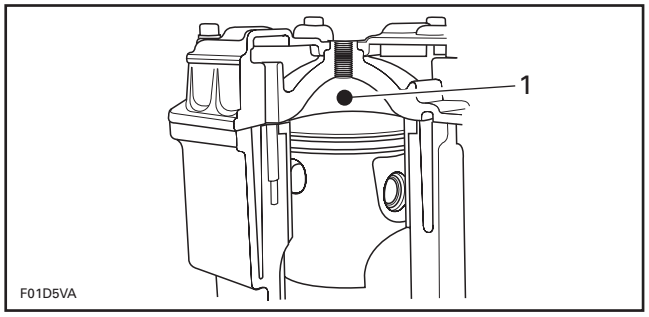
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



1. Piston pin position
2. Measures to be compared
A. 16 mm (5/8 in)

COMBUSTION CHAMBER VOLUME MEASUREMENT

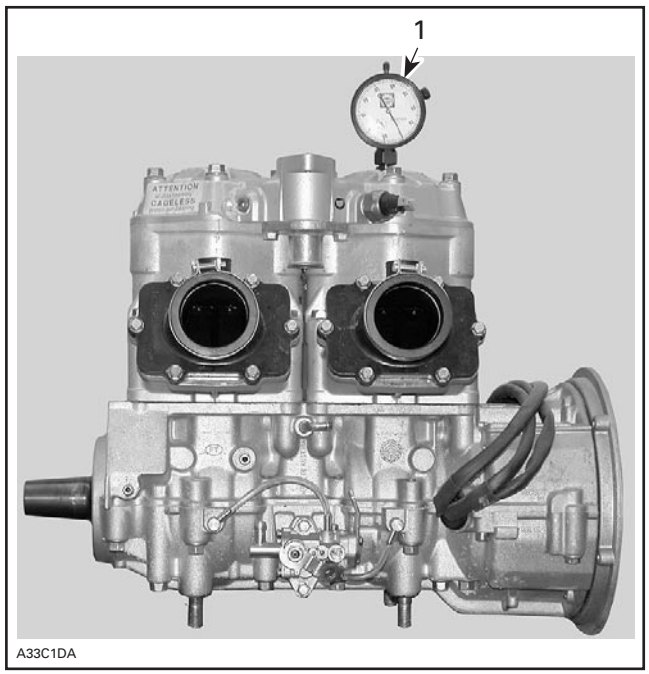
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center. It is measured with the cylinder head installed on the engine.



1. Combustion chamber

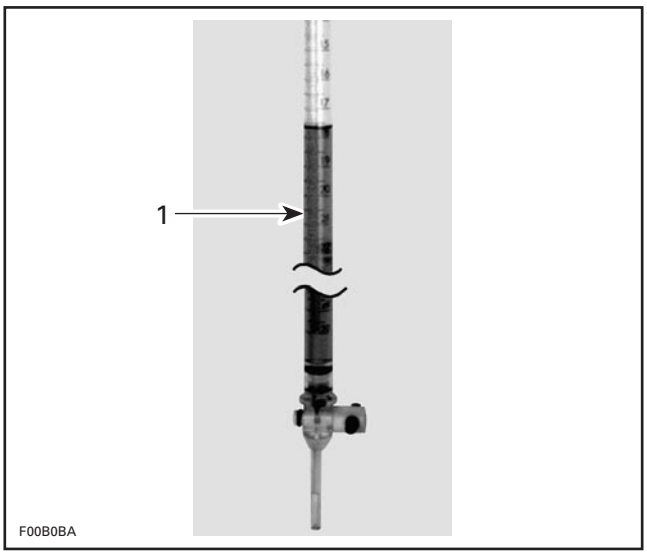
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposits and cylinder head must be leveled.

1. Remove both spark plugs and bring one piston to Top Dead Center a using a TDC gauge.



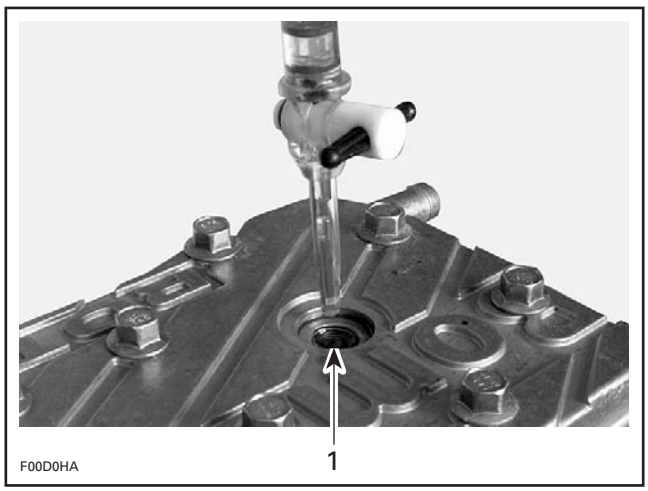
1. Bring piston to TDC

2. Remove cylinder head.
3. Seal piston ring gap with a small amount of grease.
4. Reinstall cylinder head.
5. Obtain a graduated burette (capacity 0 - 50 cc) and fill with an equal part (50/50) of gasoline and injection oil.



1. Graduated burette (0 - 50 cc)

6. Open burette valve to fill its tip. Add liquid in burette until level reaches 0 cc.
7. Inject the burette content through the spark plug hole until liquid touches the top spark plug hole.



1. Top of spark plug hole

NOTE: The liquid level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false. Reseal the piston ring gap and follow the instruction provided above.

8. Let burette stand upward for about 10 minutes, until liquid level is stabilized.

9. Read the burette scale to obtain the quantity of liquid injected in the combustion chamber.

NOTE: When the combustion chamber is filled to top of spark plug hole, it includes an amount of 2.25 cc corresponding to the spark plug well.

10. Repeat the procedure for the other cylinder.

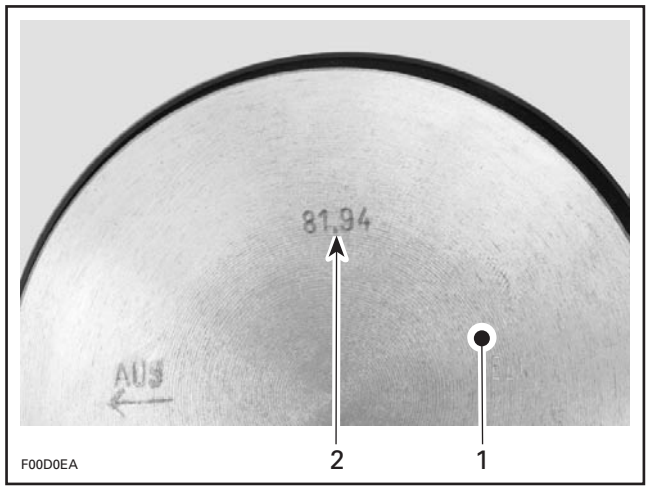
ENGINE TYPE	COMBUSTION CHAMBER VOLUME (cc) (up to top thread of spark plug hole)
593 HO	28.65 ±1.2
793	38.6 + 1.7, - 1.6

11. Install a thicker or thinner cylinder/crankcase gasket (refer to *Parts Catalogs*) in order to obtain the specified combustion chamber volume or the nearest.

ENGINE TYPE	CHANGE IN COMBUSTION CHAMBER VOLUME (cc) FOR EVERY 0.1 mm (.004 in) OF GASKET THICKNESS
593 HO	0.41
793	0.53

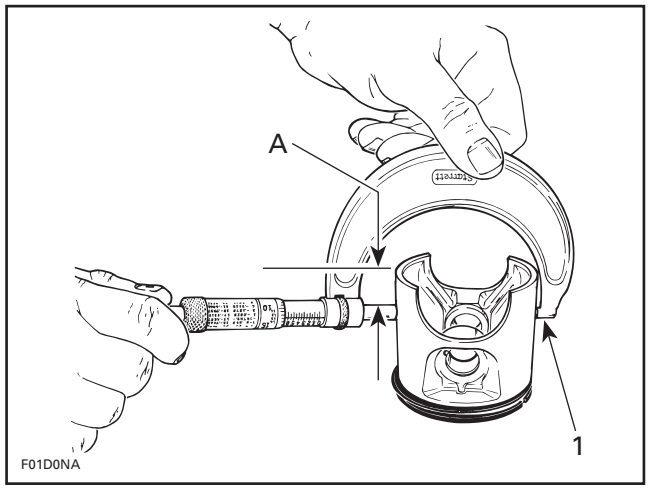
USED PISTON MEASUREMENT

Note the measurement on the piston dome.



1. Piston dome
2. Piston measurement

Using a micrometer, measure piston skirt at 15 mm (.590 in) perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. 15 mm (.590 in)

ENGINE TYPE	MAXIMUM PISTON SKIRT WEAR mm (in)
All	0.15 (.006)

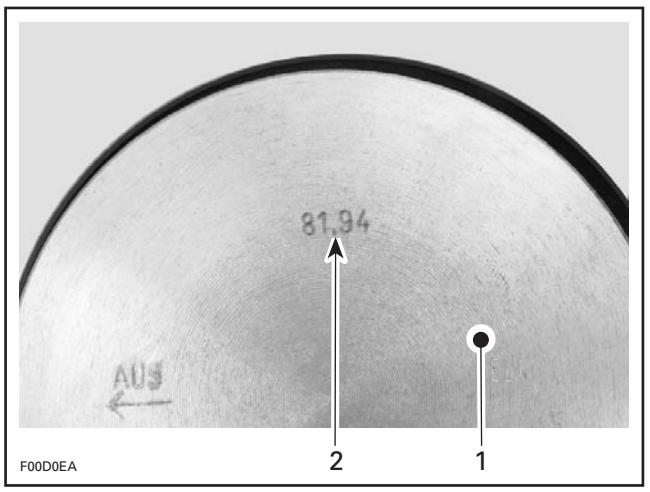
The measured dimension must not be less than 0.15 mm (.006 in) of the one scribed on piston dome. Otherwise, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

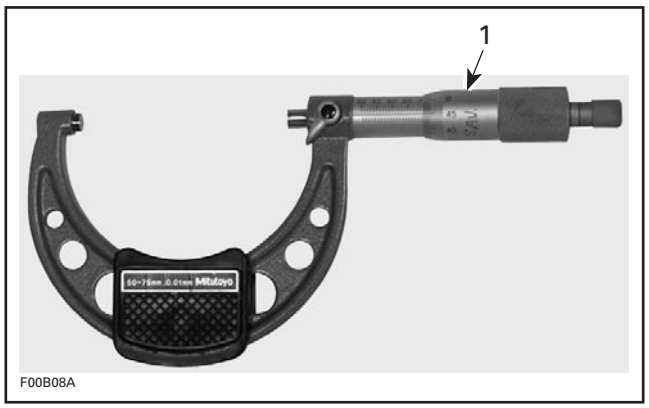
IMPORTANT: Make sure used piston is not worn more than specified. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



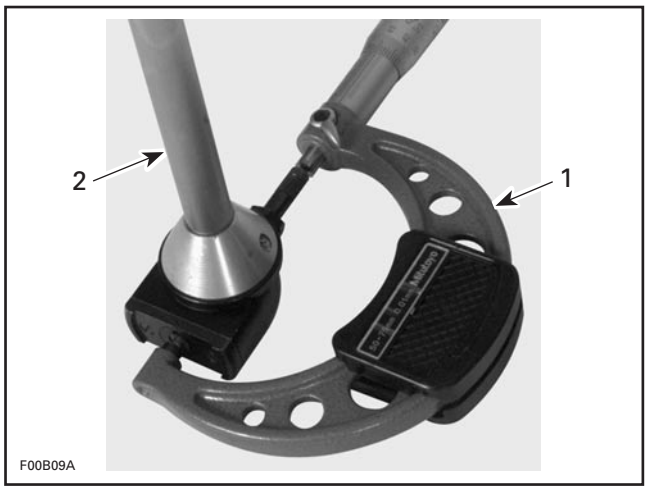
1. Piston dome
2. Piston measurement

Adjust and lock a micrometer to the specified value on the piston dome.

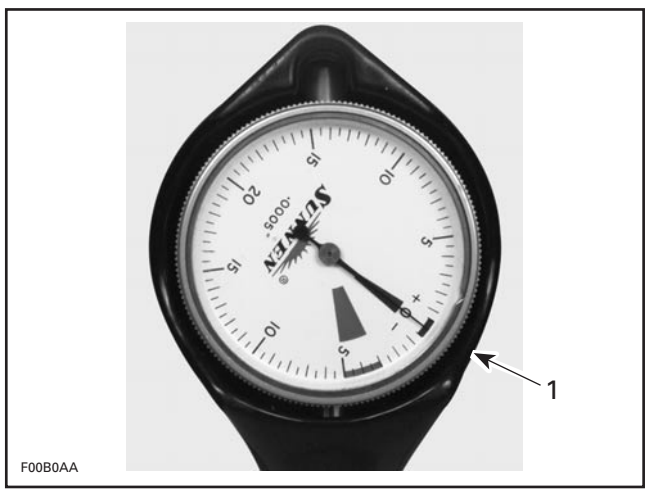


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.



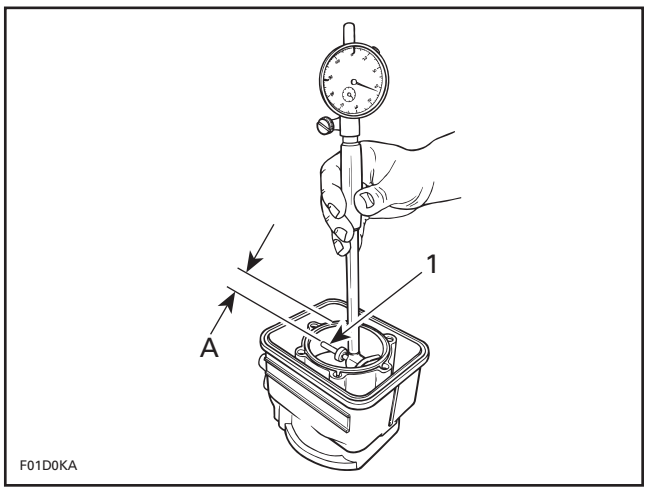
1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0 (zero)

IMPORTANT: Always remove cylinders from crankcase before measuring.

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

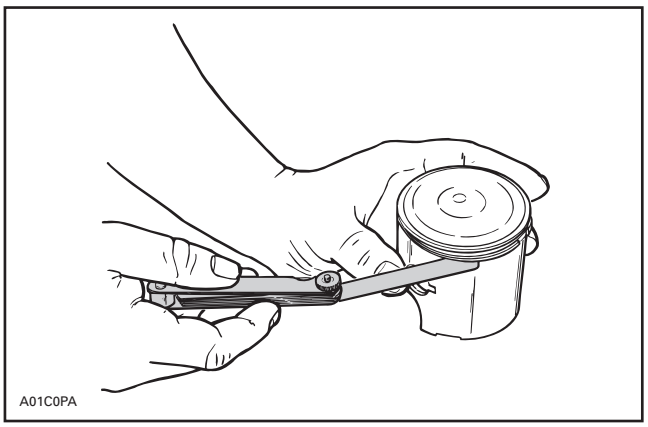
Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

IMPORTANT: The total piston/cylinder clearance (actual cylinder diameter minus actual piston skirt diameter) should be within 0.30 mm (.012 in).

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between rectangular ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA.

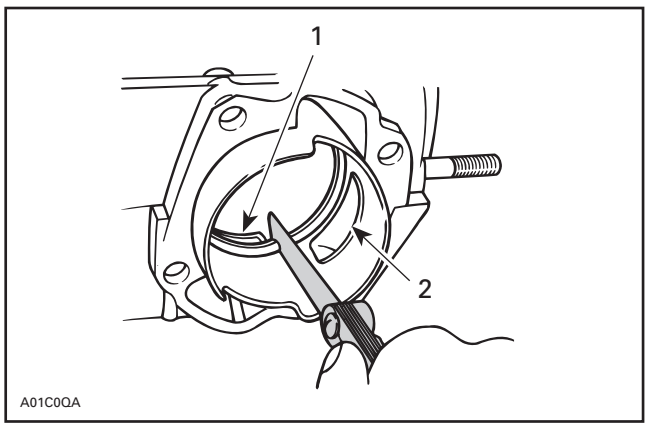


RING END GAP

Position ring half-way between transfer ports and intake port.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance. Refer to TECHNICAL DATA.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

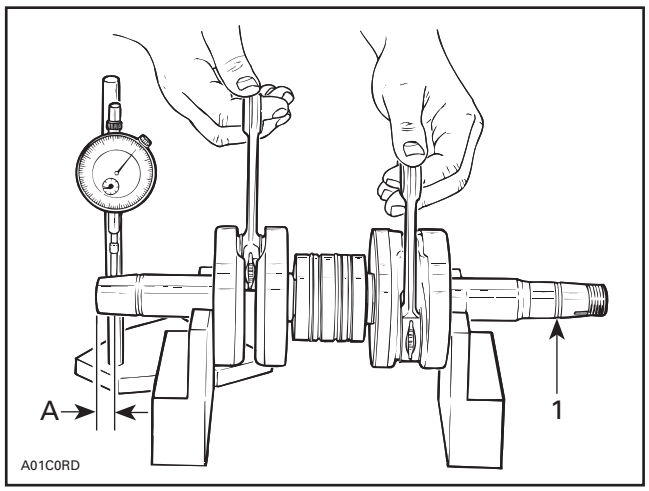
Crankshaft deflection is measured with a dial indicator.

Measuring (in crankcase)

First, check deflection with crankshaft in crankcase. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See below.

Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL

1. Measure at mid point between the key and the first thread
A. 3 mm (1/8 in)

Crankshaft Deflection on PTO Side

ENGINE TYPE	MAXIMUM ON PTO SIDE mm (in)
All	0.06 (.0024)

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
All	0.05 (.002)

Crankshaft Deflection in Center of Crankshaft

ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT mm (in)
All	0.08 (.0031)

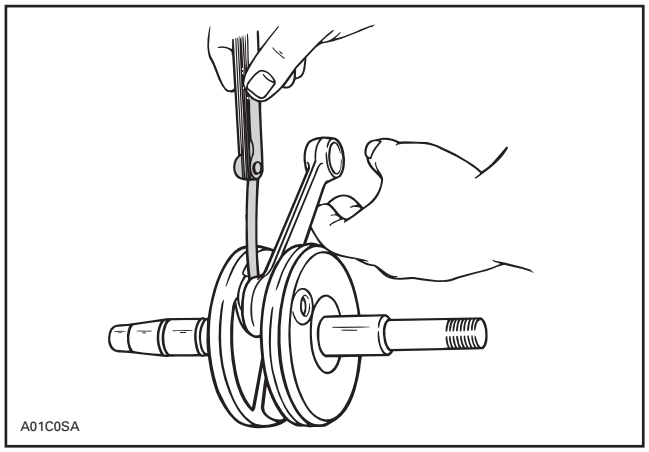
NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.39 - 0.74 mm (.015 - .029 in)	1.20 mm (.047 in)

Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.



TYPICAL

CRANKSHAFT END-PLAY

All Engine Types

End-play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 529 035 607) on crankshaft end.

Remove both spark plugs.

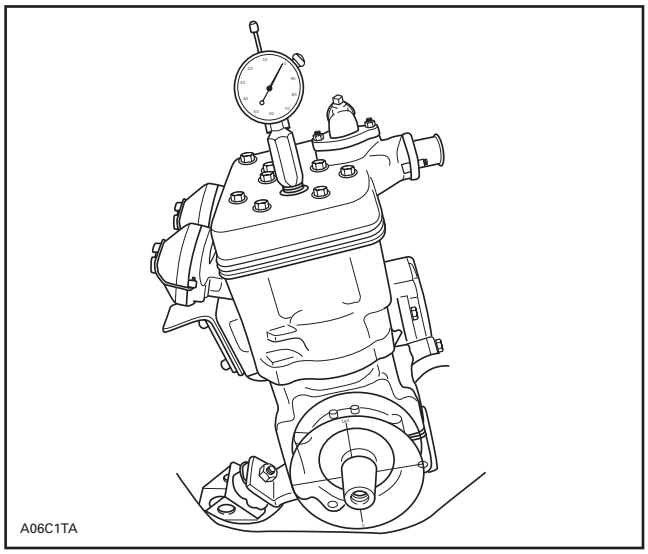
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on center cylinder.

Bring PTO piston to top dead center. Degree wheel must rotate with crankshaft.



TYPICAL

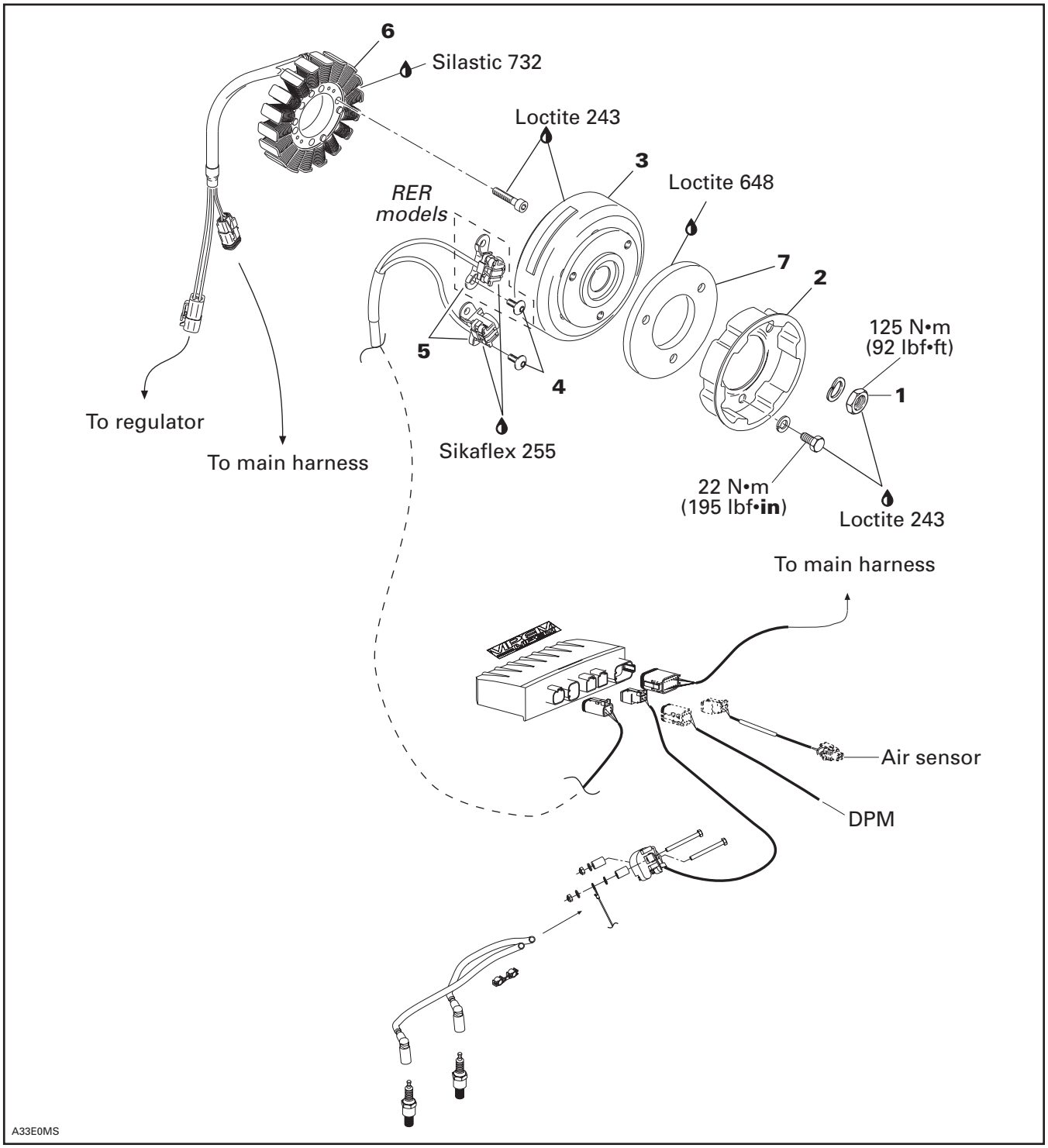
Interval between cylinders must be 180° ± 0.5.

Any other reading indicates a misaligned (twisted) crankshaft.

CDI SYSTEM

DENSO TRIGGER COIL IGNITION SYSTEM

360 W on REV Series



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

CDI means Capacitor Discharge Ignition System.

CLEANING

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

CAUTION: Clean stator and magneto using only a clean cloth.

DISASSEMBLY

3, Magneto Flywheel

To gain access to magneto assembly, remove the following parts as needed on different engines:

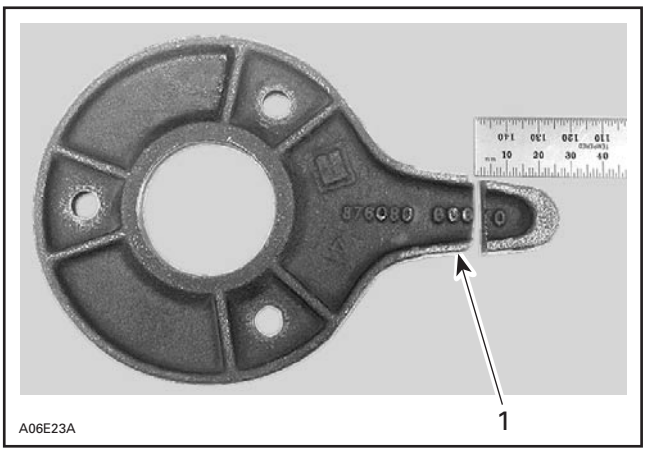
– tuned pipe and muffler

– rewind starter

– starting pulley **no. 2**.

To remove magneto flywheel retaining nut **no. 1**:

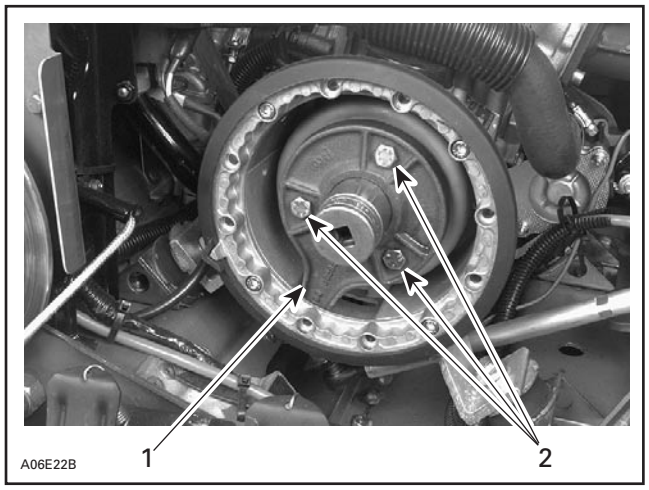
– Use magneto puller ring (P/N 420 876 080). Former puller must be modified as shown.



1. Cut by 25 mm (1 in)

– Install puller ring with its tab in magneto housing opening.

CAUTION: Use only M8 x 20 mm screws to bolt puller to magneto. When a counterweight no. 7 is installed on magneto flywheel use M8 x 30 mm screws.

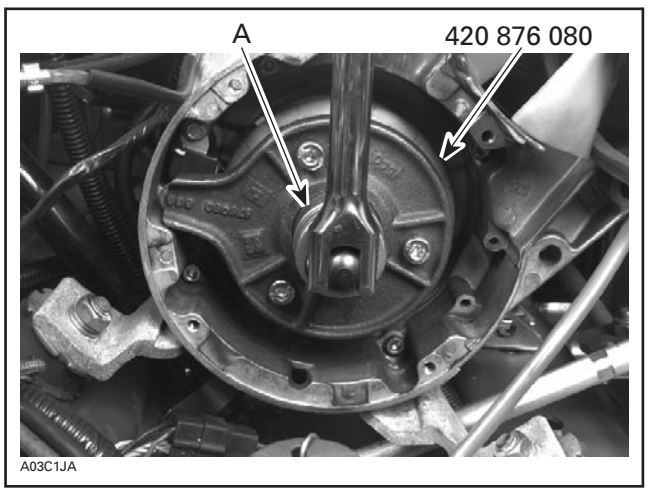


TYPICAL

1. Tab in magneto housing opening
2. M8 screws

– Remove magneto flywheel nut and lockwasher, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener, first tap on the fastener to break threadlocker bond. This will avoid thread breakage.



TYPICAL

A. 30 mm socket

To remove magneto flywheel, install crankshaft protector (P/N 420 876 557) on crankshaft end. Screw puller (P/N 529 022 500) into puller ring.

– Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

5, Trigger Coil

Magneto and stator **no. 6** must be removed before removing the trigger coil.

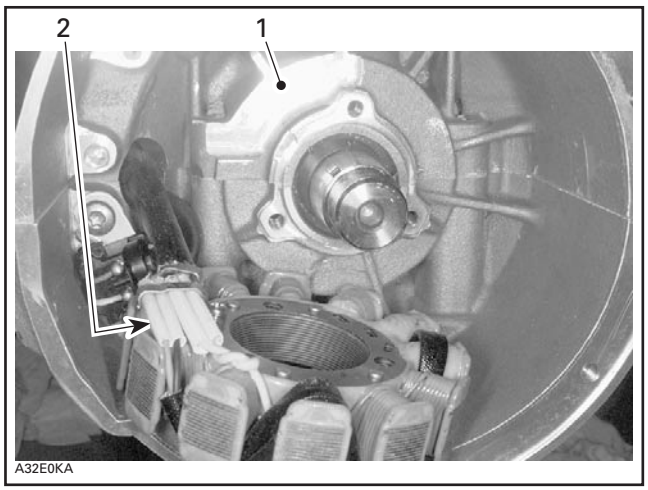
To replace the trigger coil **no. 5**:

– Disconnect trigger coil connector housing.
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws **no. 4**.
– Remove trigger coil and carefully pull wires.
– Install new trigger coil and other parts removed.

ASSEMBLY

6, Stator

Position stator so that its wire protectors are over crankcase recess.



TYPICAL

1. *Crankcase recess*
2. *Wire protectors*

3, Magneto Flywheel

Clean crankshaft extension (taper) and apply Loctite 243 (blue) on taper, then position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 243 (blue) then tighten nut to 125 N•m (92 lbf•ft).

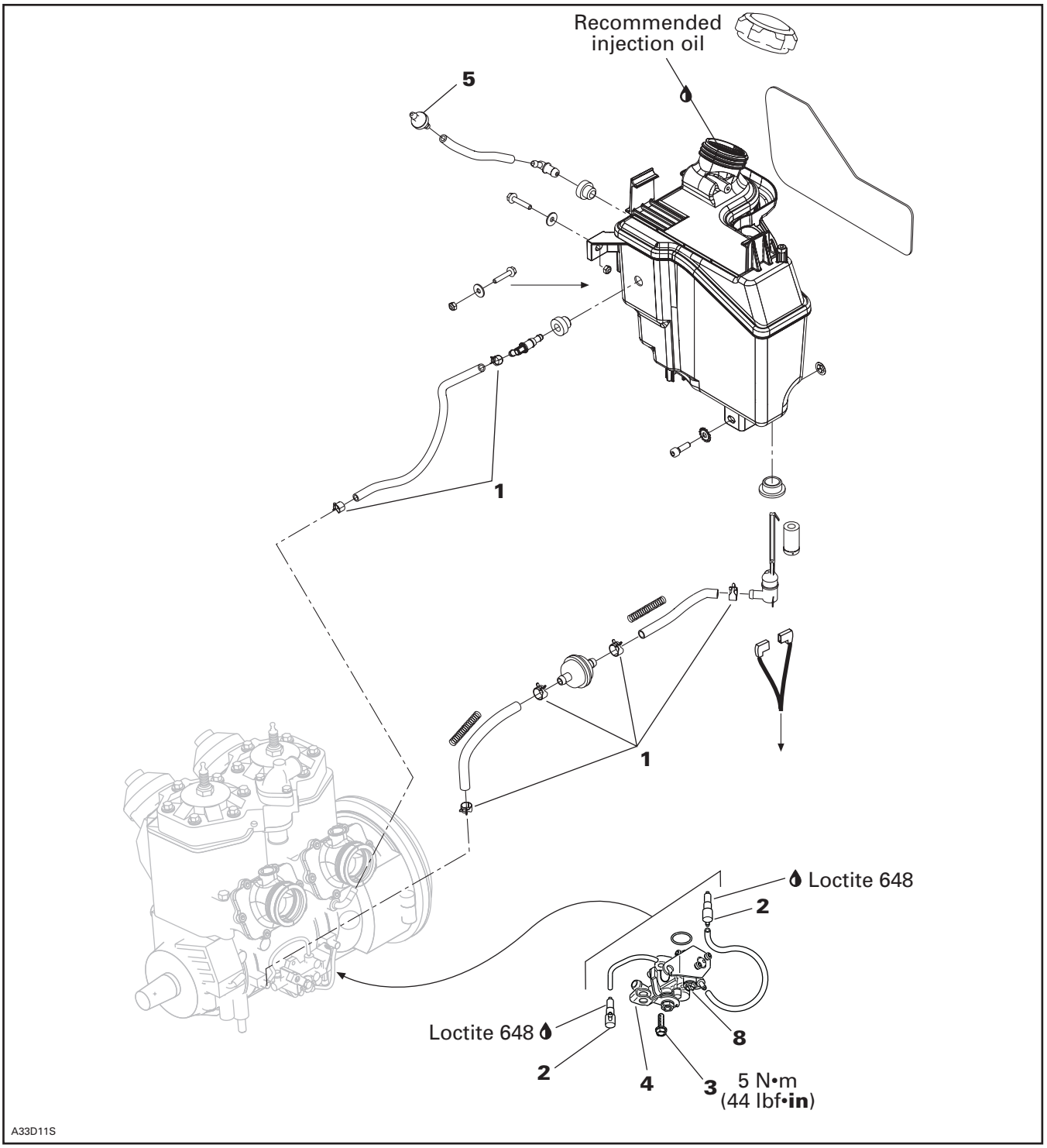
At reassembly coat all electric connections except Deutsch housings (waterproof gray housing) with silicone dielectric grease (P/N 293 550 004) to prevent corrosion or moisture penetration.

CAUTION: Do not use silicone "sealant", this product will corrode contacts. Do not apply silicone dielectric grease on any Deutsch (gray) housing otherwise housing seal will be damaged.

Ignition Timing

Check as described in IGNITION TIMING.

OIL INJECTION SYSTEM



⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

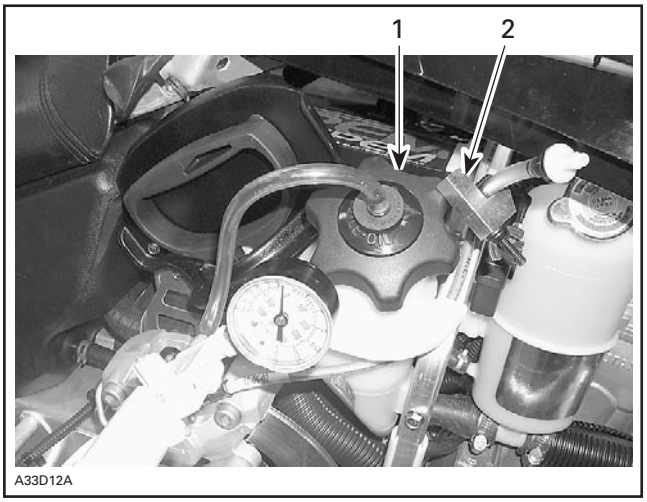
OIL TYPE

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

OIL SYSTEM LEAK TEST

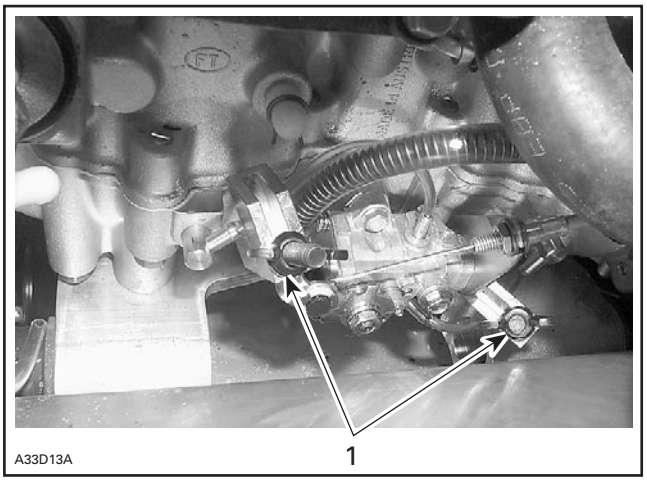
The following test will indicate any leak from oil reservoir to the banjo fitting(s).

Install special cap of leak testing kit (P/N 529 033 100) on oil reservoir and hose pincher (P/N 295 000 076) on oil reservoir check valve outlet hose.



1. *Special cap on reservoir*
2. *Hose pincher on outlet hose*

Remove air silencer and carburetor to gain access to the oil pump hoses.Install hose pinchers (P/N 295 000 076) on outlet hoses.



1. *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).

After this leak test, proceed with pump shaft oil reservoir leak test. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

OIL PUMP IDENTIFICATION

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
593 HO	02
793	01

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

CLEANING

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

REMOVAL

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

Remove screws **no. 3** and if required uninstall the check valves **no. 2**.

INSTALLATION

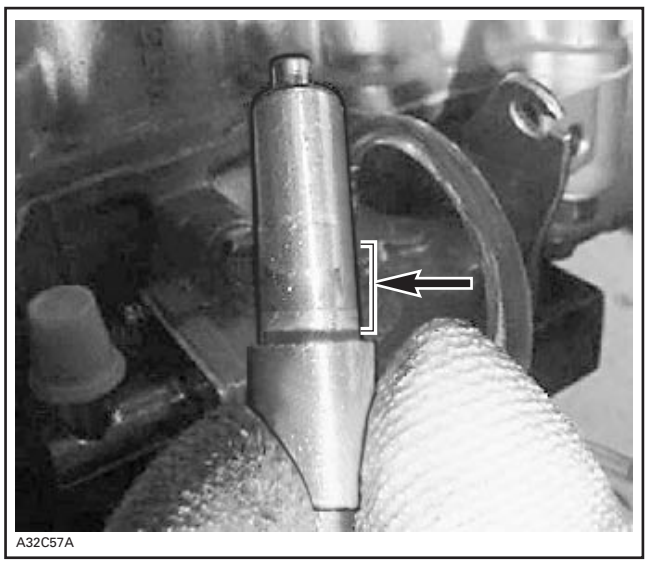
1, Spring Clip

Always check for spring clips tightness.

2, Check Valve

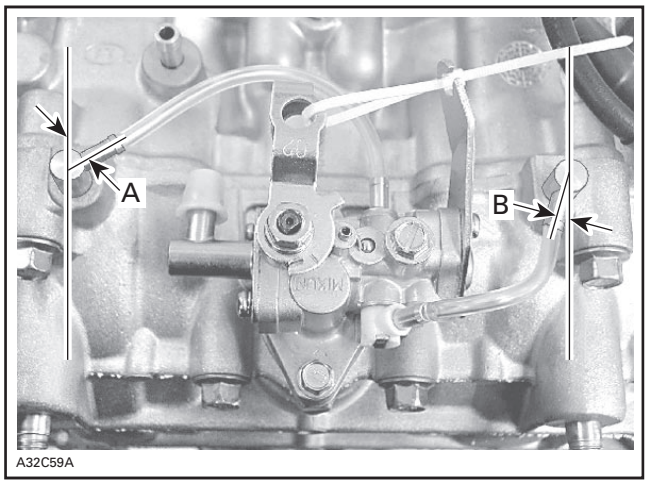
Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is ONLY in this area.

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).


A32C57A

*APPLY LOCTITE ON THIS AREA **ONLY***

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



A32C59A

TYPICAL — POSITION FOR LIQUID COOLED ENGINES

A. PTO side 45° ± 5° from cylinder axis to the top
B. MAG side 20° ± 5° from cylinder axis to the bottom

Punch in the check valve carefully with a plastic hammer.

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

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 left side of support.

Verify cable and oil pump lever operation.

ADJUSTMENT

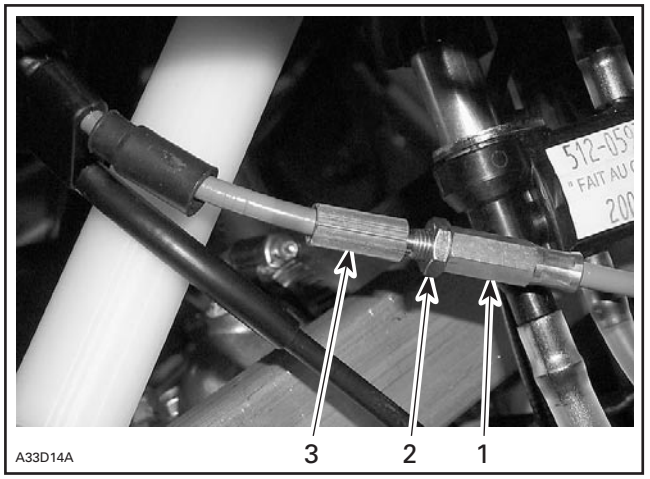
CAUTION: Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

Prior to adjusting the pump, make sure all carburetor adjustments are completed and engine is stopped.

Stretch the adjusting cable through a maximum force of 32 N•m (7.2 lbf•ft).

NOTE: It is better to have two persons to check the cable distance.

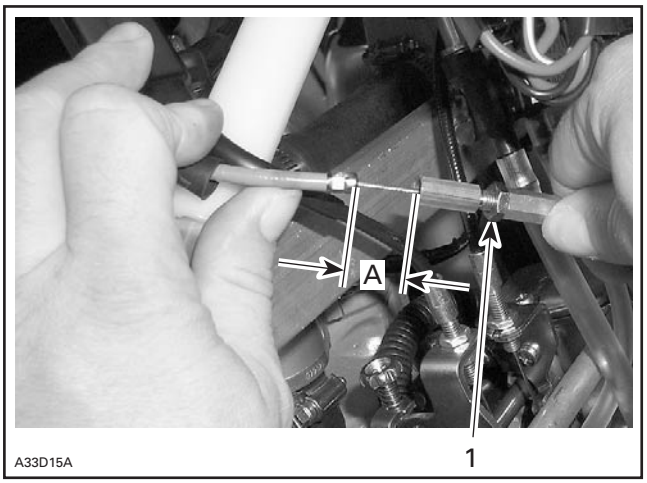
Check the visible distance of the stretched cable, while one person is stretching it and other checking the distance.



A33D14A

1. Adjusting cable
2. Lock nut
3. Adjusting screw

The visible stretched distance of the cable should be 18.0 ± 0.3 mm (0.708 ± 0.012 in).



1. Lock nut
A. Visible distance: 18.0 ± 0.3 mm (0.708 ± 0.012 in)

If the visible distance is less or more than specified above, adjust the cable distance accordingly. To do so, loosen lock nut, turn adjusting screw in or out, retighten lock nut.

To Bleed Oil Lines

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 line 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. Unplug 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 tubes. If oil drops, verify check valve operation in injection nozzle. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to main 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

Check valve is a built in part of injection nozzle.

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

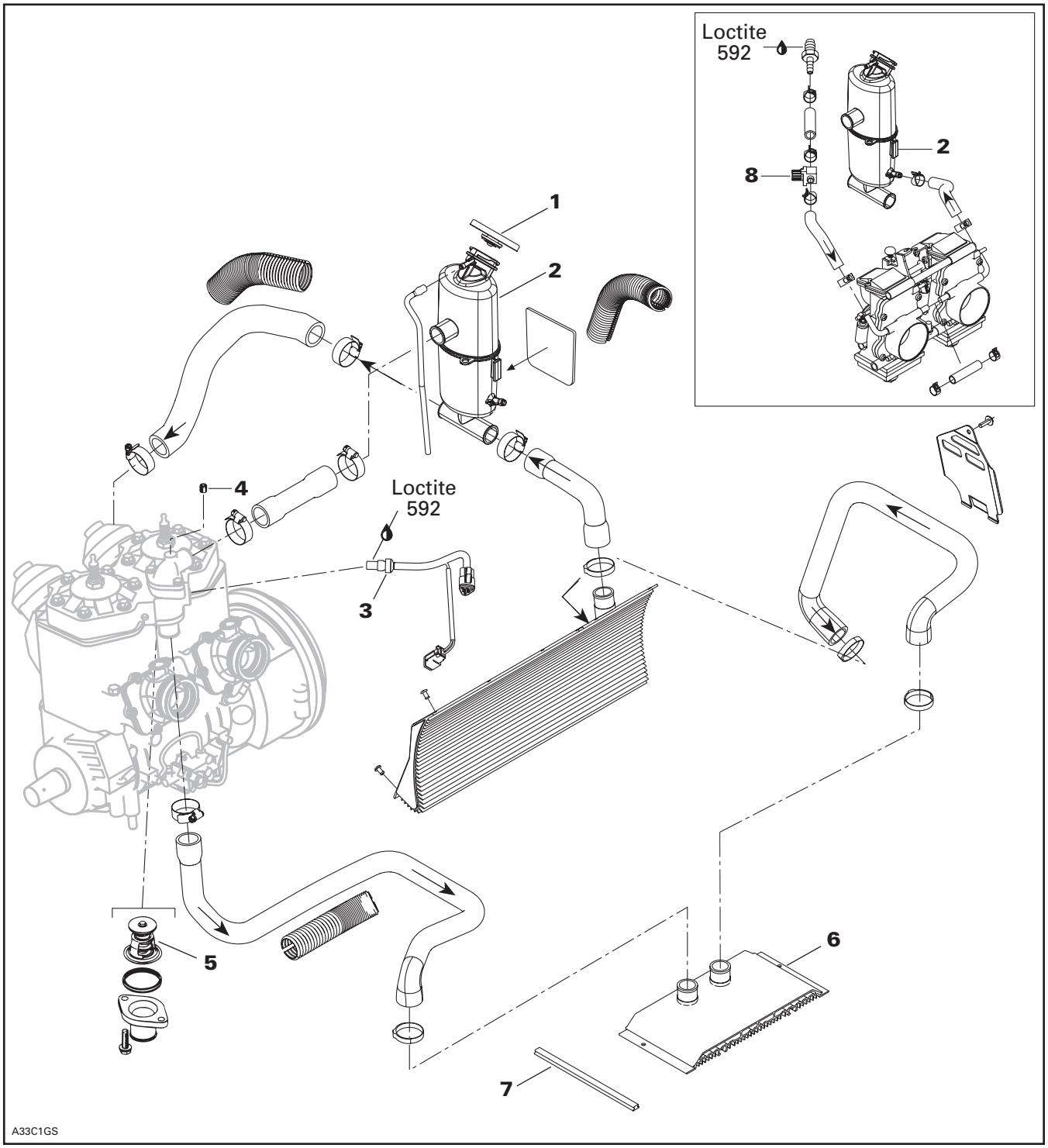
Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

5, Oil Reservoir Check Valve

It allows air to get into the reservoir. To verify this one-way check valve, remove it along with the hose. Make sure that it holds pressure and that it does not let air go through.

While installing this check valve make sure that the black side is towards the reservoir.

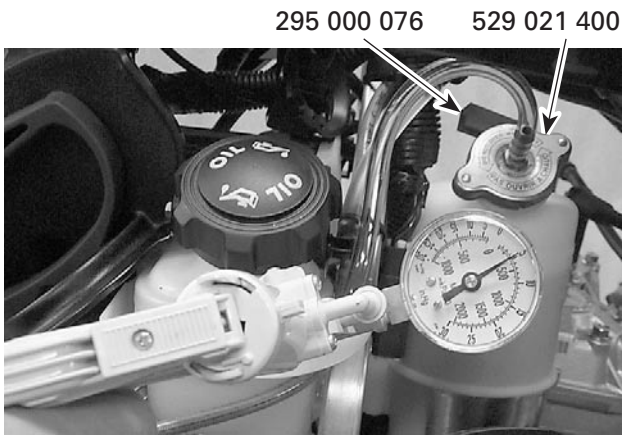
LIQUID COOLING SYSTEM



COOLING SYSTEM LEAK TEST

Install special radiator cap (P/N 529 021 400) included in engine leak tester kit (P/N 861 749 100) on coolant tank. Install hose pincher (P/N 295 000 076) on overflow hose. Using pump also included in kit pressurize all system through coolant reservoir to 100 kPa (15 PSI).

Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for air bubbles.



INSPECTION

Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

⚠ WARNING

Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank. Disconnect hose at water pump to drain coolant from engine.

When the coolant level is low enough, lift the rear of vehicle to drain the radiator.

DISASSEMBLY AND ASSEMBLY

3,4, Sender and Plug

Apply Loctite 592 (P/N 413 702 300) thread sealant on sender and plug to avoid leaks.

1, Pressure Cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap (do not exceed this pressure).

6,7, Radiator and Radiator Protector

Insert radiator protector into radiator C-rail and crimp C-rail at rear end. Refer to FRAME for radiator removal.

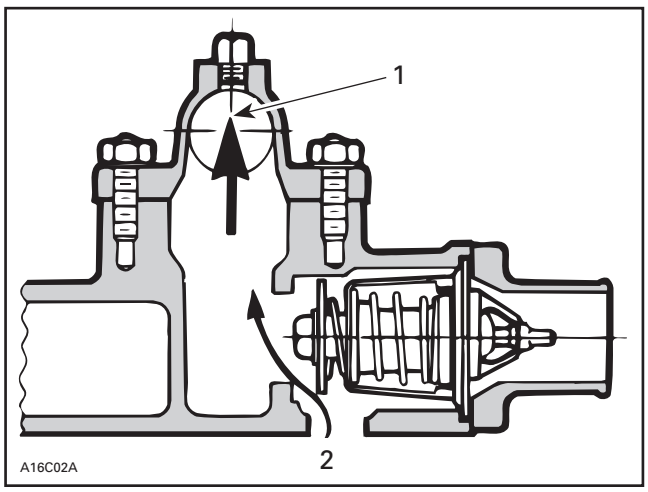
5, Thermostat

To check thermostat, put in water and heat water. Thermostat should start to open when water temperature reaches the following degree. It will be almost fully open at 50°C (122°F).

ENGINE	TEMPERATURE
All	42°C (108°F)

Thermostat is a double action type.

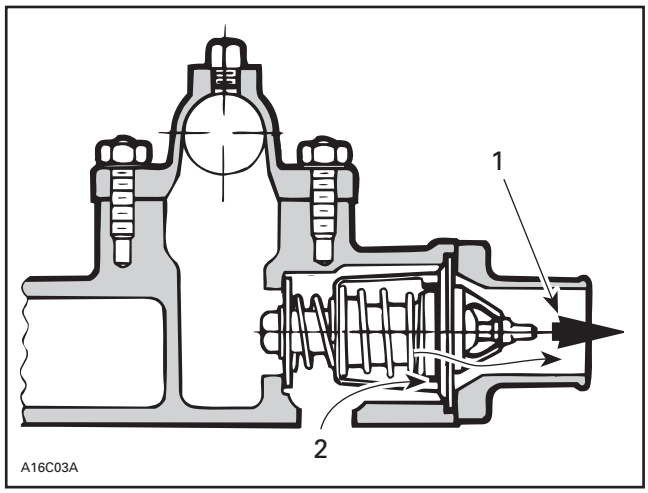
a. Its function is to give faster warm up of the engine by controlling a circuit; water pump — engine — coolant tank. This is done by bypassing the radiator circuit.



TYPICAL — CLOSED THERMOSTAT, COLD ENGINE

1. *To reservoir*
2. *From cylinders*

b. When the liquid is warmed enough, the thermostat opens progressively the circuit, water pump — engine — radiators — coolant tank to keep the liquid at the desired temperature. (See the diagram of the exploded view).



TYPICAL — OPEN THERMOSTAT, WARM ENGINE

1. *To radiators*
2. *From cylinders*

These 2 functions have the advantage of preventing a massive entry of cold water into the engine.

COOLING SYSTEM REFILLING PROCEDURE

CAUTION: To prevent rust formation or freezing condition, always replenish the system with recommended premixed coolant.

System Capacity

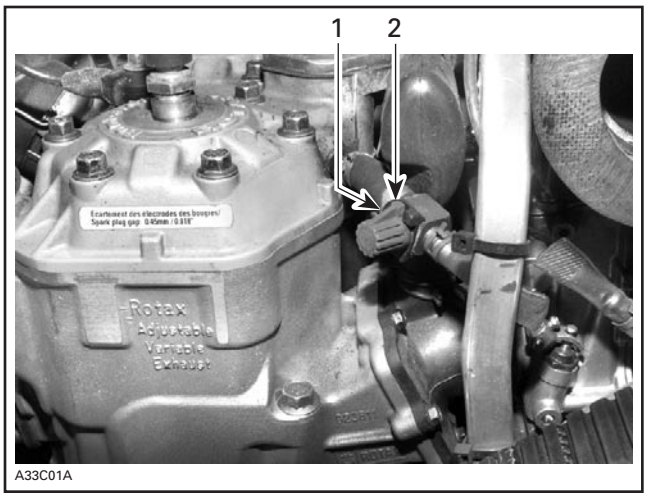
Refer to TECHNICAL DATA.

Refilling Procedure

IMPORTANT: USE THE 50/50 PREMIXED COOLANT - 37°C (- 35°F) (P/N 293 600 038).

Do not reinstall pressure cap.

Open heated carburator valve no. 8.



HEATED CARBURATOR VALVE

1. *ON*
2. *OFF*

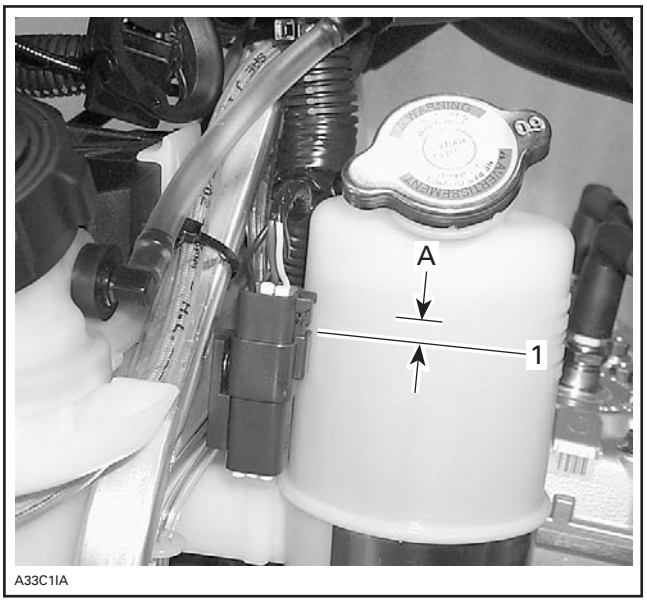
With engine cold, refill coolant tank up to COLD LEVEL line. Start engine. Refill up to line while engine is idling until rear radiators are warm to the touch (about 4 to 5 minutes). Always monitor coolant level while filling tank to avoid emptying. Install pressure cap.

Lift rear of vehicle and support it safely.

Activate throttle lever 3 - 4 times to bring engine speed to 7000 RPM.

Apply the brake.

Lower vehicle back on ground and add coolant up to 15 mm (1/2 in) above the COLD LEVEL line.



1. Cold level line
A. 15 mm (1/2 in)

Lift front of vehicle of 60 cm (24 in) and support it safely. Let the vehicle idle for two minutes.

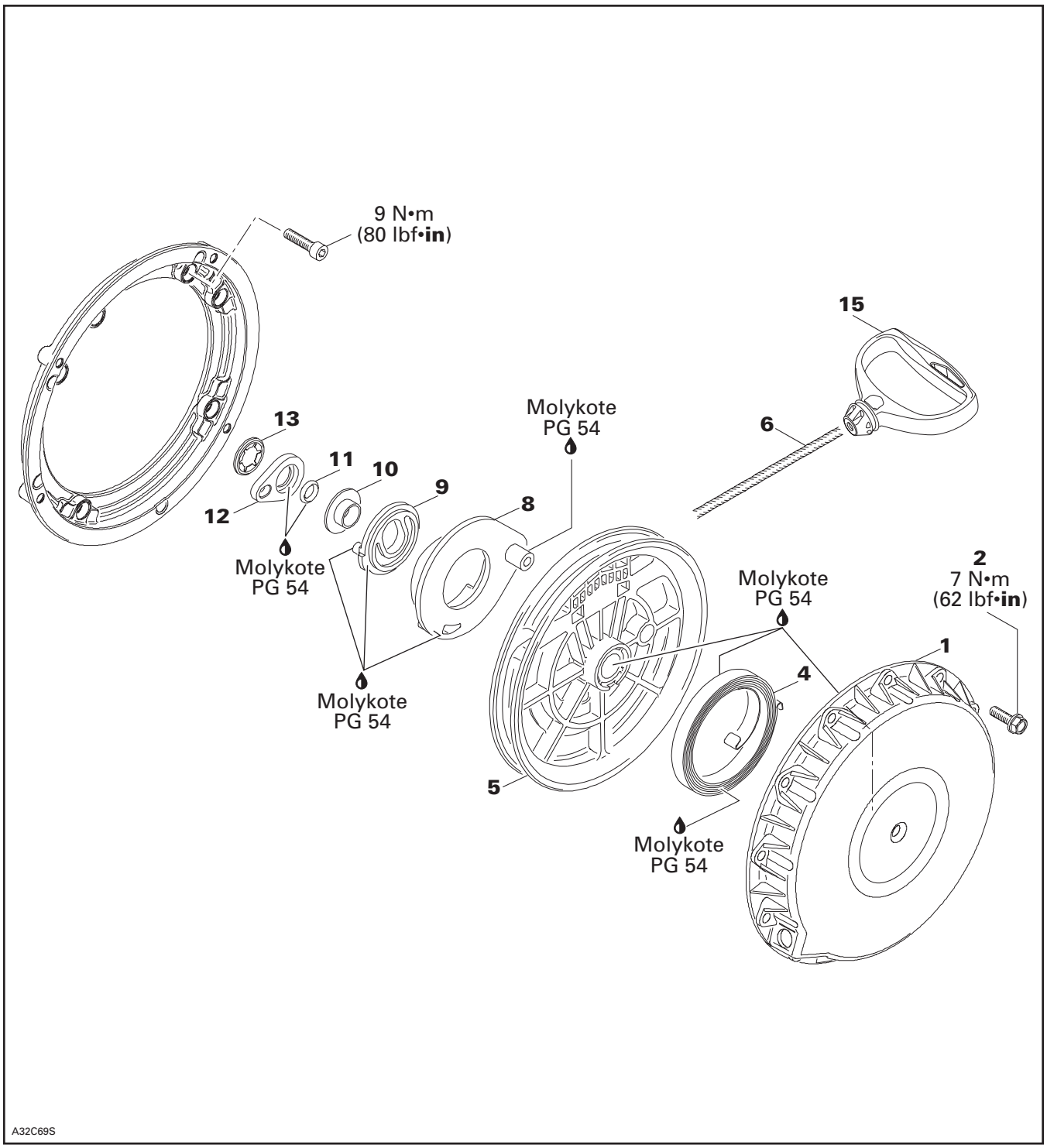
Put vehicle back on ground and add coolant up to 15 mm (1/2 in) over COLD LEVEL line.

When engine has completely cooled down, re-check coolant level in coolant tank and refill up to line if needed.

Check for coolant mixture freezing point. Specification is - 37°C (- 35°F). Adjust as necessary.

REWIND STARTER

Plastic Rewind Starter on REV Series Models



INSPECTION

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Check if rope **no. 6** is fraying, replace if so.

When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pulled. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace as required, lubricate, reassemble and recheck. Always replace O-ring **no. 11** every time rewind starter is disassemble.

When releasing starter grip, it must return to its stopper and stay against it. If not, check for proper spring preload or damages. Readjust or replace as required.

When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

REMOVAL

Remove tuned pipes and muffler to gain access.

⚠ WARNING

Never remove exhaust components when engine is hot.

Using a small screwdriver, extract rope knot from starter grip **no. 15**. Cut rope close to knot. Tie a knot near starter.

Remove screws **no. 2** securing rewind starter **no. 1** to engine then remove rewind starter.

ROPE REPLACEMENT

Pull out rope. Hold rewind starter in a vise.Slide rope and untie the knot. Pull out the rope completely.

1. Knot to be untied.

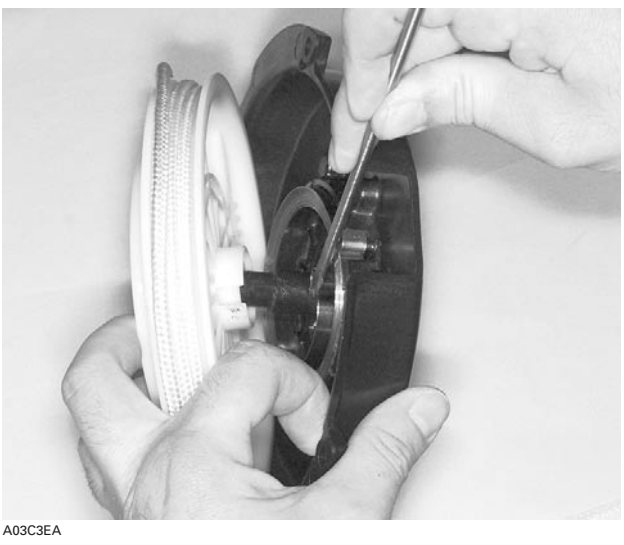
NOTE: When rope is completely pulled out, spring preload is 4-1/2 turns.

DISASSEMBLY

Undo knot previously tied at removal. Let sheave get free to release spring preload.

Cut push nut **no. 13** and discard. Remove locking element **no. 12**, O-ring **no. 11**, step collar **no. 10,** pawl lock **no. 9** and pawl **no. 8**.

Remove sheave **no. 5** from starter housing **no. 1**. Hold spring with a screwdriver.



Pull out knot and then pull out rope **no. 6**.

ASSEMBLY

At assembly, position spring **no. 4** outer end into spring guide notch then wind the spring counterclockwise into guide.

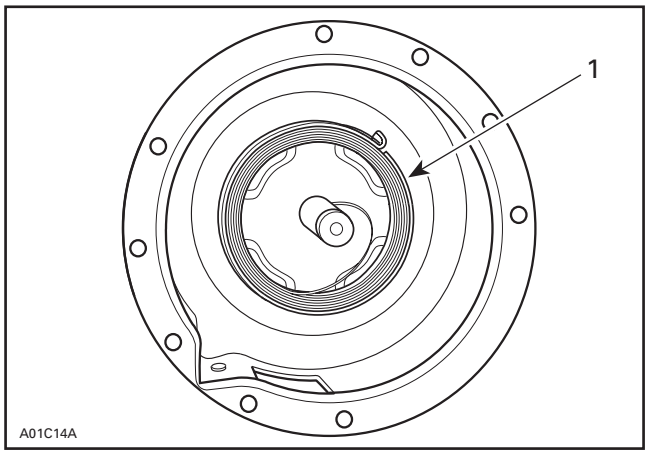
⚠ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.

1. Outer end into guide notch

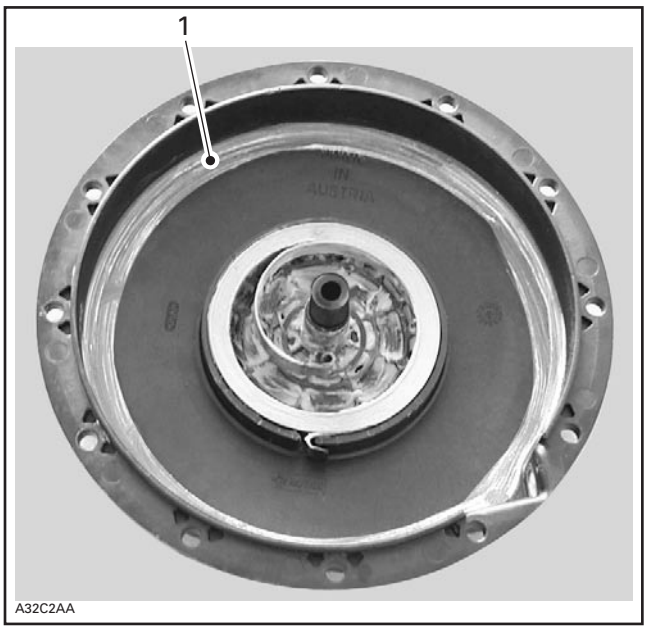
CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly and 1 cm (1/2 in) wide on bottom of housing with Molykote PG 54 (P/N 420 899 763).



TYPICAL

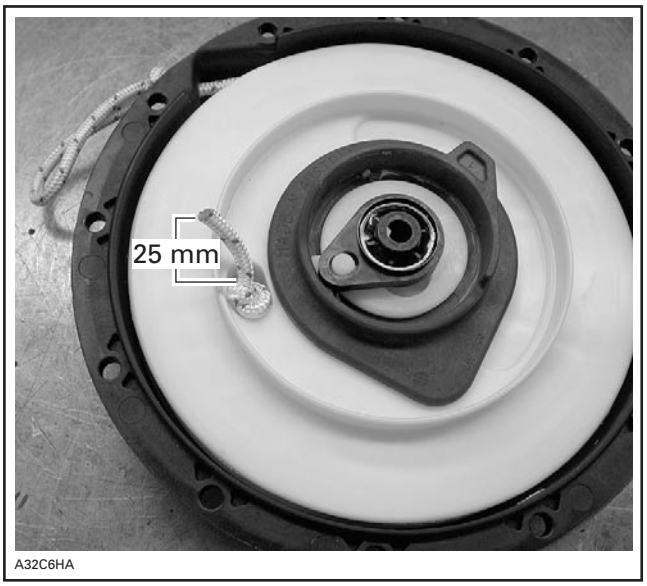
1. Molykote PG 54 inside spring guide



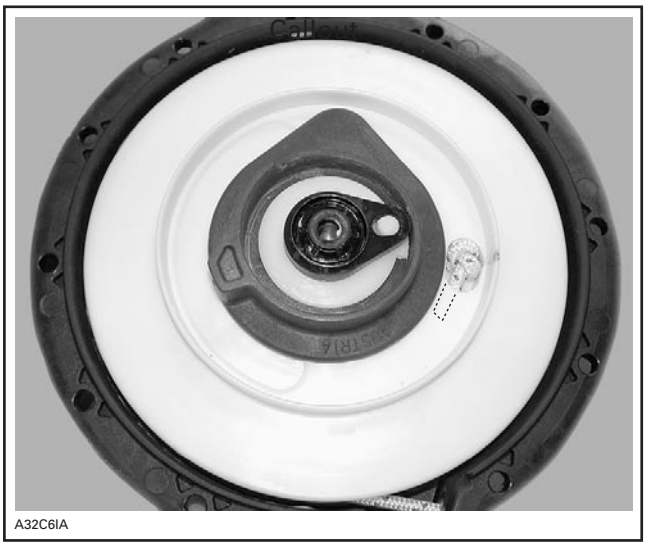
1. Molykote PG 54 applied 1 cm (1/2 in) wide on bottom of housing

CAUTION: The use of standard multi-purpose grease could result in rewind starter malfunction.

To install rope **no. 6**, insert rope into sheave **no. 5** orifice and lock it by making a knot, leaving behind a free portion of about 25 mm in length. Fuse rope end with a lit match and insert it into sheave.



FREE PORTION



FREE PORTION INSERTED INTO SHEAVE

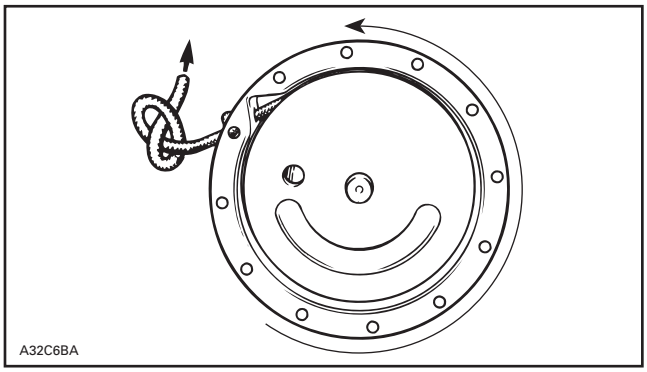
Lubricate housing post with silicone compound grease. Install sheave.

To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

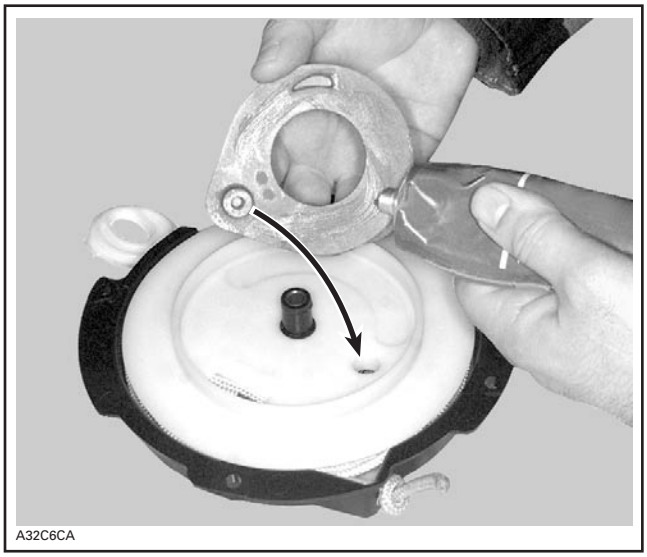
Rotate the sheave counterclockwise until rope end is accessible through rope exit hole. This will give 1/2 turn of preload.

Pull the rope out of the starter housing and temporarily make a knot to hold it.

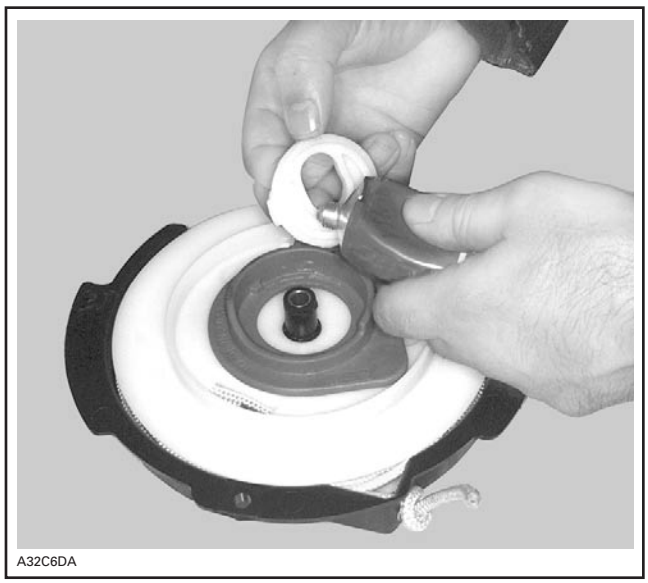


TYPICAL

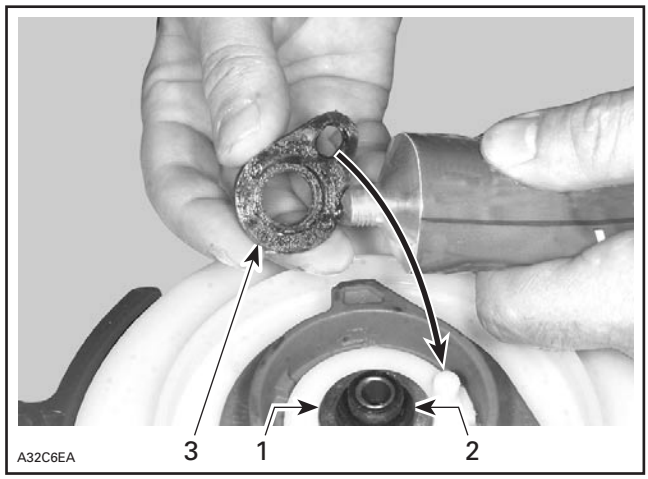
Lubricate pawl **no. 8** with Molykote PG 54 (P/N 420 899 763) then install over rope sheave.



Lubricate pawl lock **no. 9** with Molykote PG 54 (P/N 420 899 763). Install over pawl.



Install step collar **no. 10** with its sleeve first. Lubricate a new O-ring **no. 11** and locking element **no. 9** with Molykote PG 54 (P/N 420 899 763). Install over pawl lock.



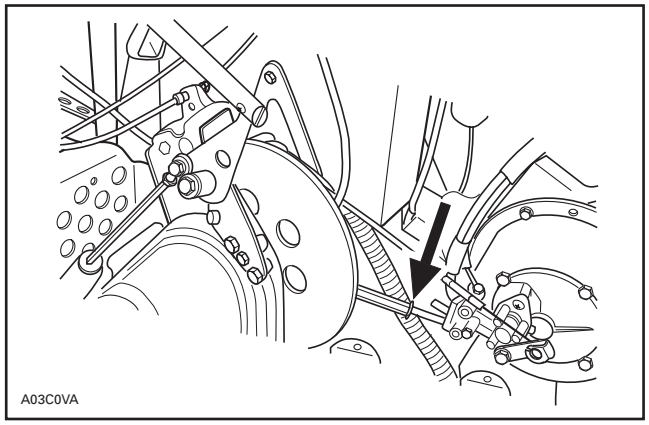
1. *Step collar*
2. *O-ring*
3. *Locking element*

Install a new push nut **no. 13**.

INSTALLATION

Fuse rope end with a lit match.

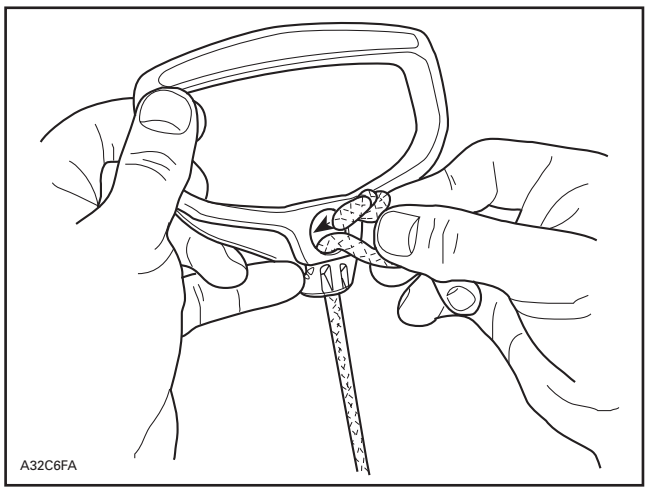
Thread starter rope **no. 6** through rope guide when applicable.



TYPICAL

Reinstall rewind starter assembly on engine.

Pass rope through starter grip **no. 15** and tie a knot in the rope end. Insert rope end down and pull the starter grip over the knot.

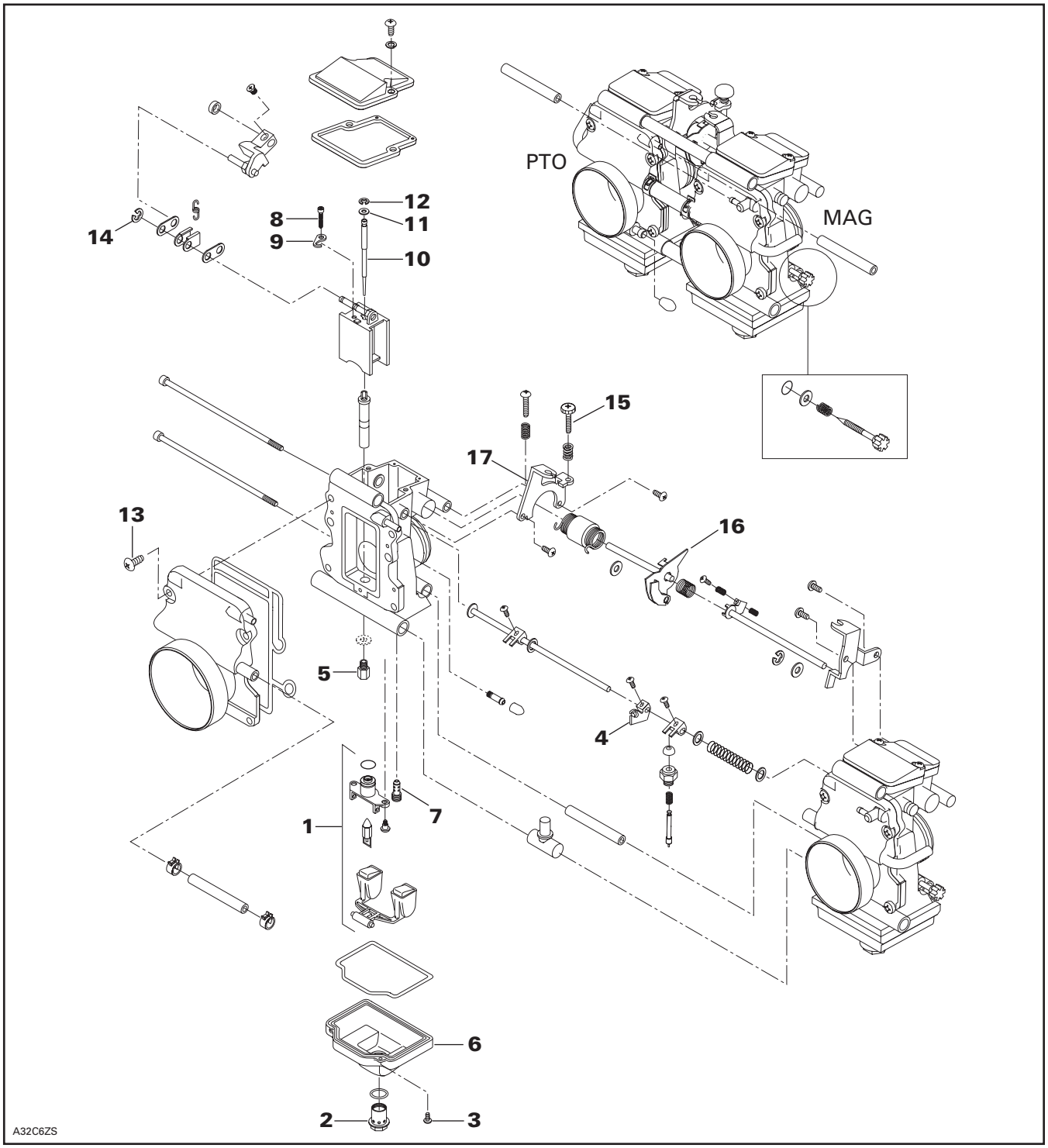


TYPICAL

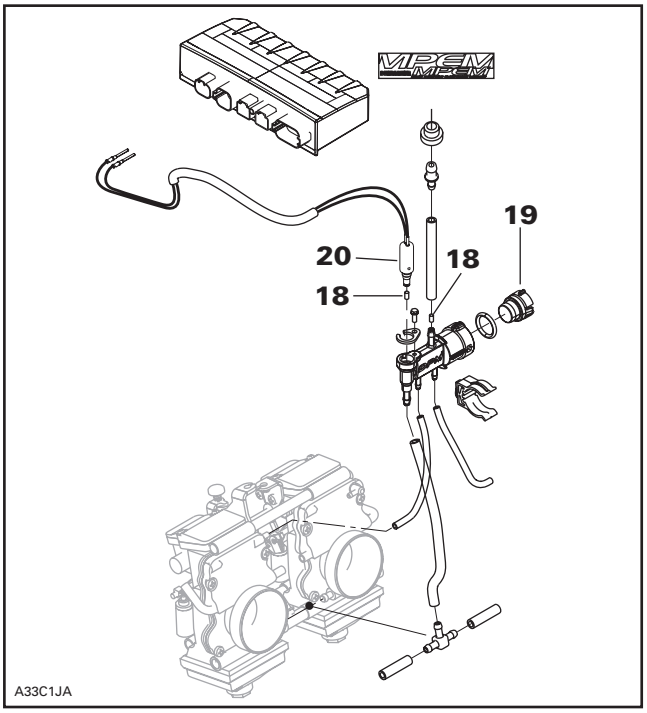
CARBURETOR AND FUEL PUMP

CARBURETOR

TM Type

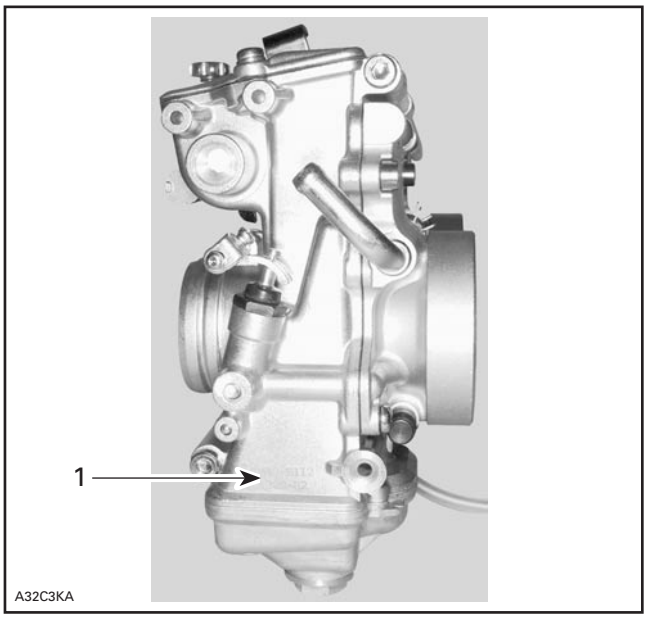


DPM — Some Models



IDENTIFICATION

TM type dual carburetor ass'y is identified on PTO side carburetor body.



TYPICAL

1. Identification: TM 40-B112

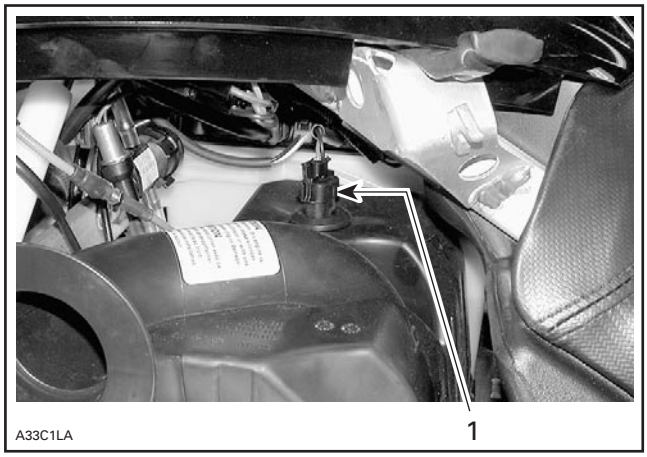
REMOVAL

All Models

Lift hood and open LH side panel.

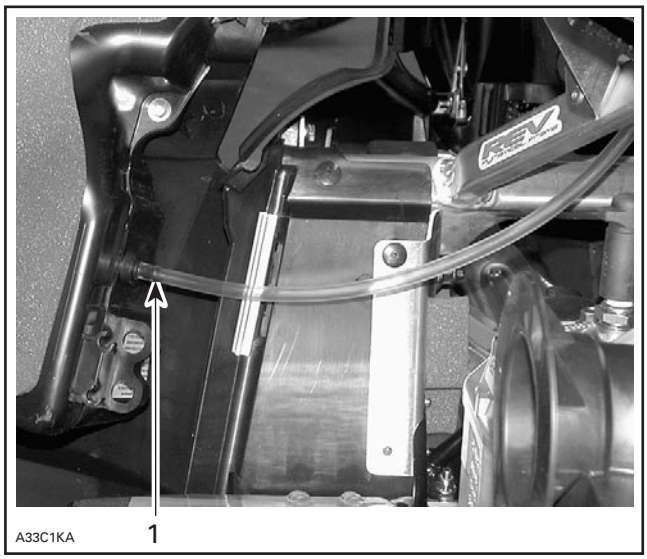
DPM Models

Disconnect air temperature sensor connector at air silencer.



1. Disconnect

Disconnect DPM air vent hose nipple from air silencer.



1. Disconnect here

Non-DPM Models

Disconnect carburetor float bowl vent hose nipple from air silencer.

DPM Models

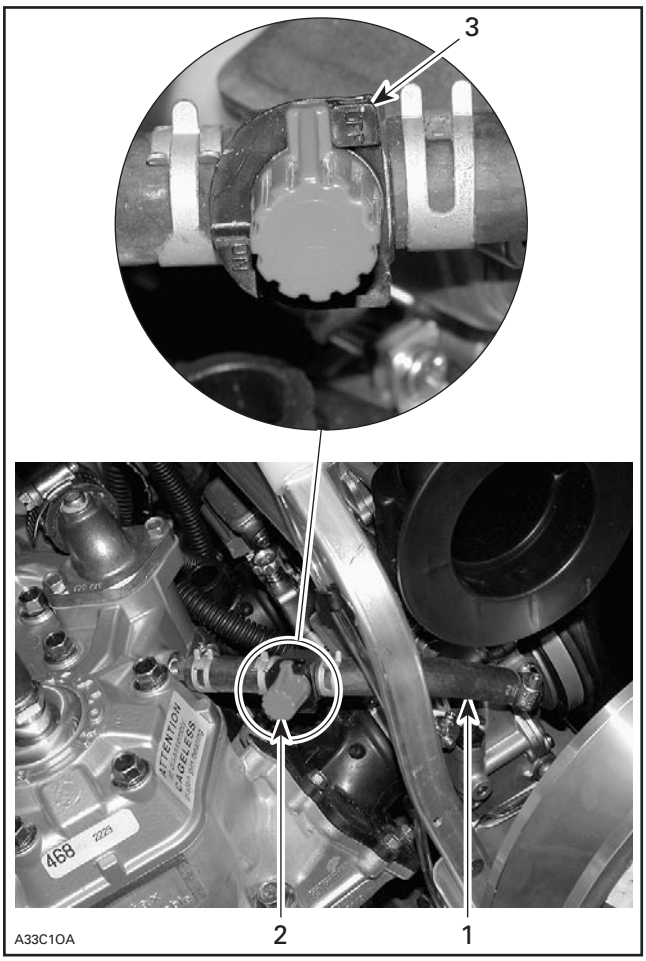
Unhook DPM manifold from its support.

All Models

Loosen clamps retaining air silencer adapter to carburetor assembly and remove air silencer.

Heated Carburetor Models

Close valve at heated carburetor coolant inlet line.



1. *Inlet line*
2. *Valve*
3. *OFF*

Disconnect heated carburetor coolant **inlet** line taking care to recuperate coolant.

All Models

Disconnect throttle and choke cables.

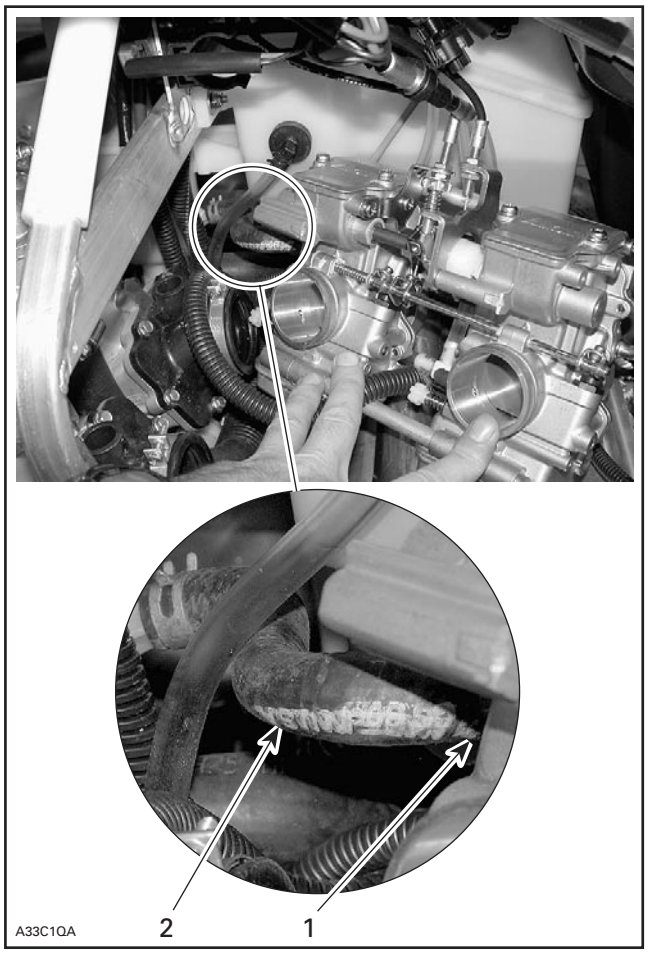
Loosen clamps retaining dual carburetor assembly to carburetor sockets.

Remove dual carburetor assembly, pinch and disconnect fuel line. Take care to recuperate fuel.

⚠ WARNING

Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Pinch heated carburetor coolant **outlet** line.



1. *Outlet line*
2. *Pinch here*

Disconnect **outlet** line from carburetor assembly taking care to recuperate coolant.

CLEANING AND INSPECTION

All Models

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions. When jets are very dirty or coated with varnish and gum, replace them.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Check throttle slide for wear. Replace as necessary.

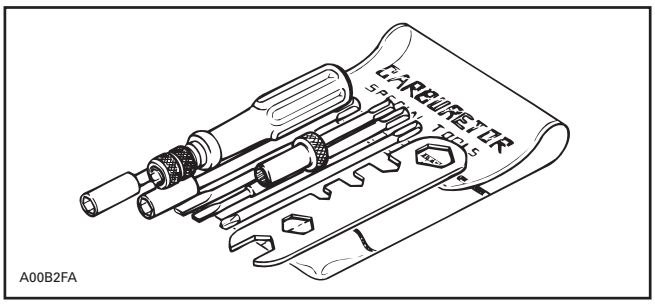
Check for fuel soaked into float **no. 1**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Inspect throttle and choke cables and housings for any damage. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures, it is recommended to use carburetor tool kit (P/N 404 112 000).



A00B2FA

6, Float Bowl

Unscrew drain screw **no. 2** and screw **no. 3**. Remove float bowl.

1, Float and Needle Valve Ass'y

Unfasten both screws then, pull out float and needle valve ass'y **no. 1**.

At assembly, apply Loctite 243 on screw threads.

5, Main Jet

The main jet installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. A service bulletin will give information about calibration according to altitude and temperature.

Main jet **no. 5** may be removed without removing float bowl **no. 6** by first removing drain screw **no. 2**.

7, Pilot Jet

Use narrow screwdriver from carburetor tool kit (P/N 404 112 000) to unfasten pilot jet **no. 7**.

12, Throttle Slide

⚠ WARNING

It is critical to the free operation of the throttle slide that the 2 connecting plates as assembled in one carburetor be of the exact same length. Always replace the connecting plates by a pair of new ones that were matched at the factory for length and discard the old ones. Simultaneously replace all the plates of the carburetors of a same rack.

Do not disassemble throttle slide needlessly.

CAUTION: After throttle slide reassembly, proceed with a leak test. See below for procedure.

Heated Carburetor Models

Disassemble both carburetors at the same time. Coolant hose between carburetor throttle slide covers must remain in place during the complete disassembly and assembly.

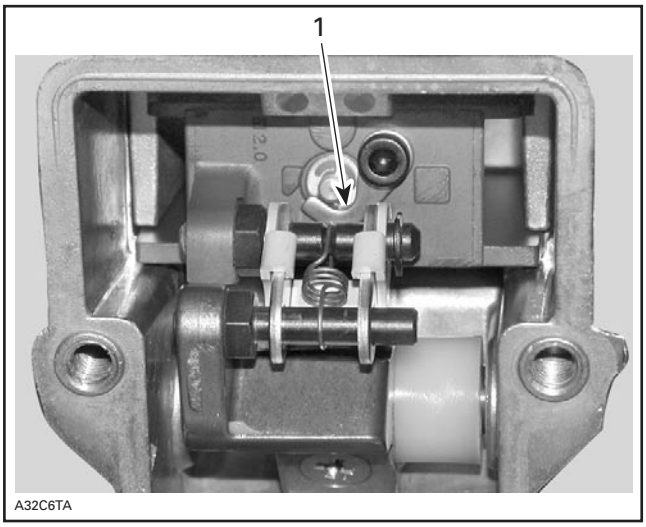
All Models

Remove carburetor cover.

Loosen needle retainer screw **no. 8**.

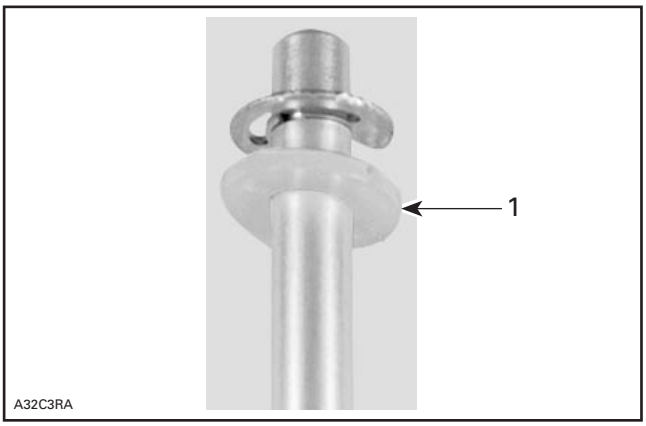
Fully open throttle and hold in this position for the following step.

Move aside needle retainer **no. 9**.



1. Needle retainer moved aside

Turn dual carburetor ass'y upside down to free needle **no. 10**. Take care not to loose plastic washer **no. 11** under needle circlip **no. 12**.

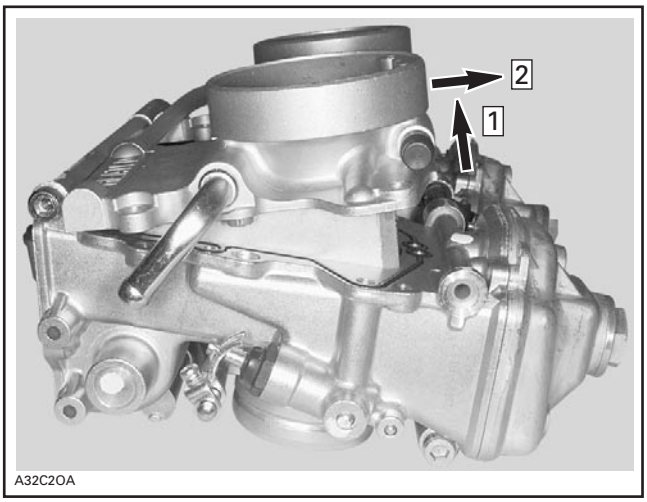


1. Plastic washer

Unscrew throttle slide cover screws **no. 13**.

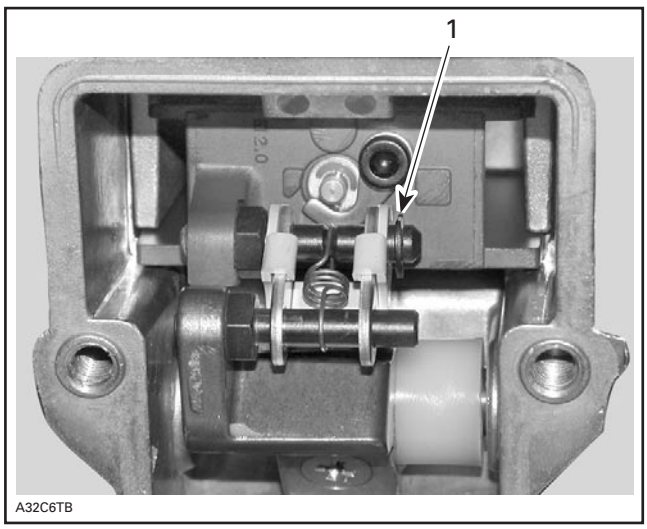
Open throttle 3/4 wide and keep that opening.

Lift throttle slide covers bottom first until they are free from carburetor bodies. Then, slide them out.



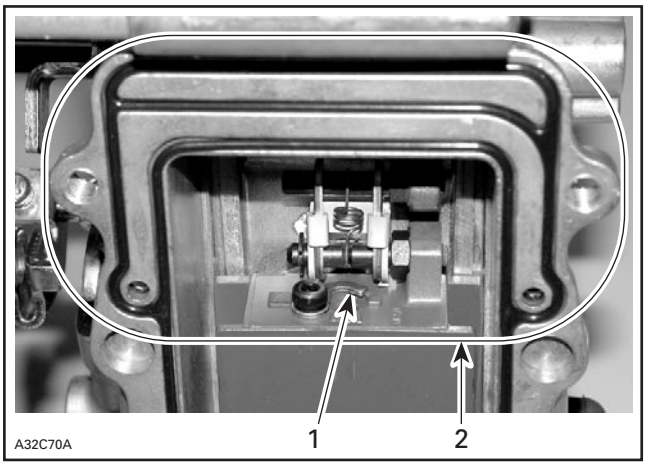
Step [1]: Lift bottom first
Step [2]: Slide out

Remove circlip **no. 14** retaining throttle slide.



1. Circlip

At throttle slide assembly, needle retainer must face carburetor body.



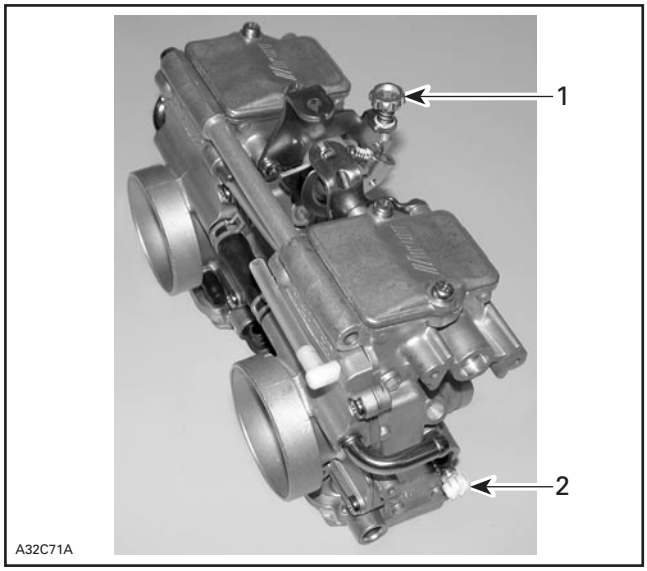
1. Needle retainer
2. Ensure O-ring gasket is properly seated in nipple area

After inserting throttle slide cover in place and before installing screws, ensure O-ring gasket is properly seated in its groove especially in the area around vent nipple. See illustration above.

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

– pilot screw adjustment
– carburetor synchronization and throttle slide height (preliminary idle speed adjustment)
– throttle cable adjustment
– choke cable adjustment
– oil pump and carburetor synchronization
– final idle speed adjustment (engine running).



1. Idle speed screw
2. Pilot screw (one on each carburetor)

Pilot Screw Adjustment

Completely close the **pilot screw** (until a slight seating resistance is felt) then back off as specified.

Turning screw in clockwise leans mixture and conversely, turning it out counterclockwise enriches mixture.

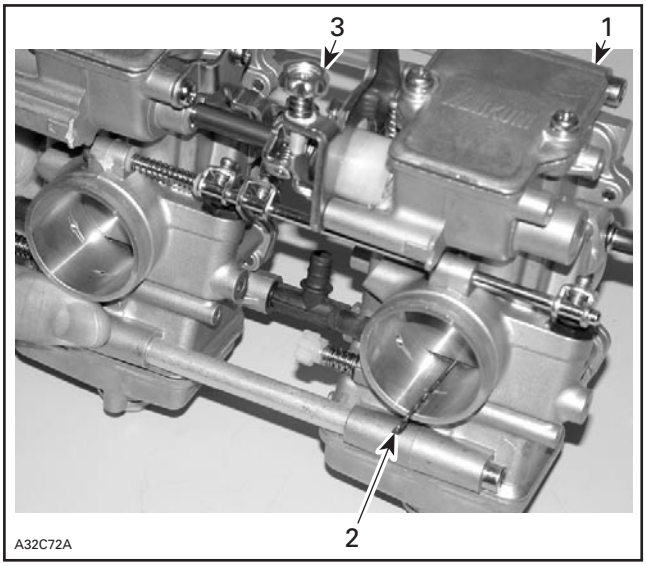
Refer to TECHNICAL DATA for the specifications.

Carburetor Synchronization and Throttle Slide Height (preliminary idle speed adjustment)

First proceed on PTO carburetor.

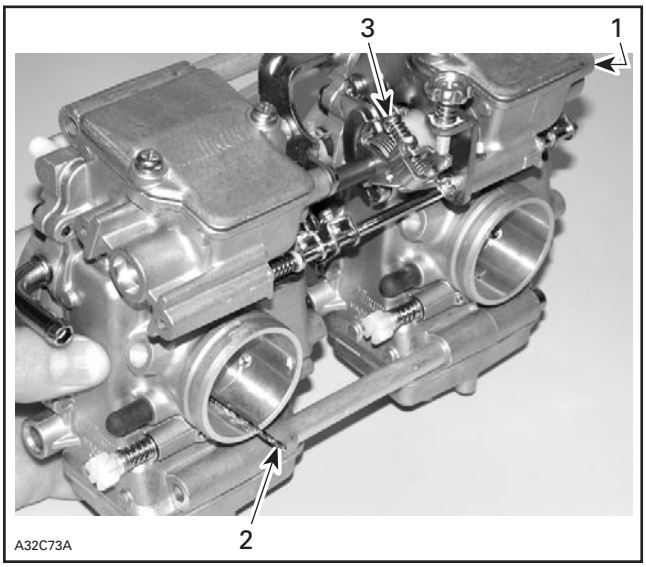
Use a drill bit to measure throttle slide height (see following table) on **outlet** side of carburetor (engine side).

Adjust by turning idle speed screw **no. 15**.



1. *Adjust PTO carburetor first*
2. *Drill bit used as a gauge to measure throttle height*
3. *Idle speed screw*

For MAG carburetor use synchronization screw. Use same drill bit as for PTO carburetor to measure throttle slide height. Turn synchronization screw to adjust.



1. *PTO carburetor adjusted first*
2. *Drill bit used as a gauge to measure throttle height*
3. *Synchronization screw*

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT (drill bit size) ± 0.1 mm (± .004 in)
MX Z 600 HO Sport/X	1.6 (0.063)
MX Z 800 HO Sport/X	1.7 (0.067)

INSTALLATION

CAUTION: Never allow throttle slide(s) to snap shut.

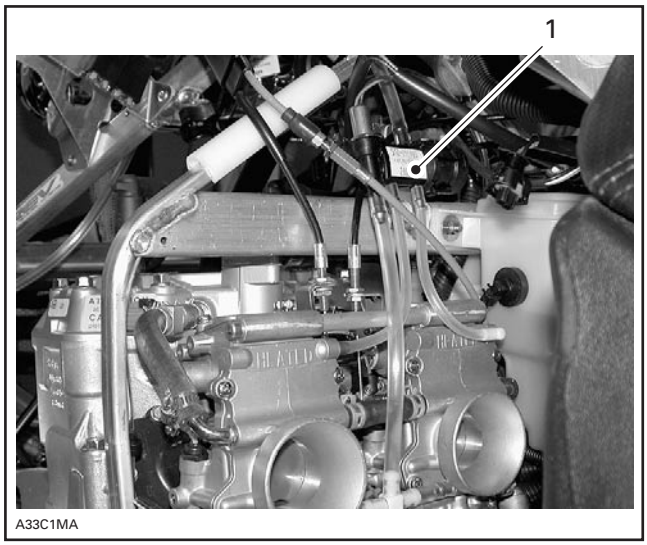
Install dual carburetor assembly.

Make sure dual carburetor assembly is properly inserted into carburetor sockets, hold it in place and tighten retaining clamps.

Secure heated carburetor inlet and outlet lines with clamps, tighten to 1.5 to 2.0 N•m (13 to 18 lbf•**in**) and remove pincher on outlet line.

Allow coolant to flow from coolant tank to carburetor before opening valve.

Connect all hoses to dual carburetor assembly and to DPM, making sure there is no kinked hoses after reconnection.



1. *DPM*

Throttle Cable Adjustment

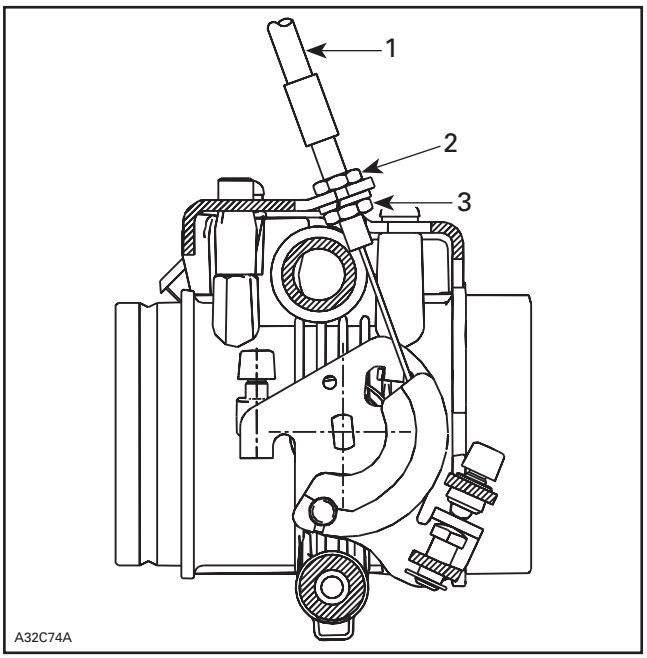
Adjust throttle cable as per following procedure:

Loosen throttle cable housing adjusting and locking nuts.

Connect throttle cable barrel to carburetor cam lever no. 16.

While holding throttle lever to wide open throttle position, pull on the throttle cable until mechanism touches the stopper. In this position, turn cable housing adjusting nut and tighten lock nut.

Also ensure that, when throttle is released to idle position, the idle adjusting screw end touches its stopper.



1. Throttle cable
2. Adjusting nut
3. Locking nut

Choke Cable Adjustment

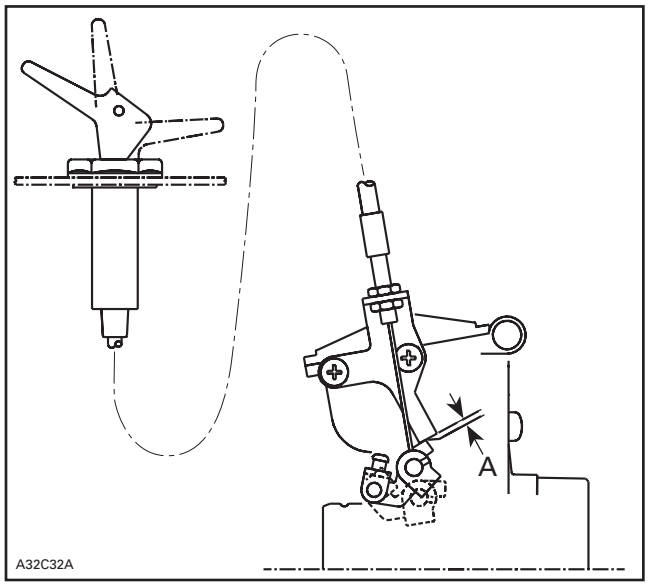
Adjust choke cable as per following procedure:

Loosen choke cable housing adjusting and locking nuts.

Connect choke cable on starter lever no. 4.

While choke lever is fully open, pull choke cable until starter lever reaches the stopper. Tighten cable housing adjusting and locking nuts in this position.

As a confirmation, the gap between the stopper and the bracket should be within 0 and 0.5 mm (0 and 1/64 in).



A. Within 0 and 0.5 mm (0 and 1/64 in)

Reinstall air silencer and DPM.

Reconnect DPM air vent hose at air silencer.

Make sure dual carburetor assembly properly slides into air silencer adapters; hold it in place and tighten clamps.

Reconnect DPM air vent hose nipple to air silencer.

Reconnect air temperature sensor connector to air silencer.

Idle Speed Final Adjustment

CAUTION: Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked after each time carburetor idle is adjusted. Refer to OIL INJECTION SYSTEM.

Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

Refer to TECHNICAL DATA for the specifications.

CAUTION: Do not attempt to set the idle speed by using the pilot screw. Severe engine damage can occur.

DPM

Some Models

TESTING

Air Temperature Sensor

At 20°C (68°F), the sensor resistance must be 2500 Ω ± 300.

Sensor should also be tested through all its operating range. Use the following chart.

Replace sensor if not within specifications.

TEMPERATURE		RESISTANCE (ohms)
°C	°F	
- 30	- 22	28 000
- 20	- 4	14 500
0	32	5 500
20	68	2 500
40	104	1 200
60	140	600
80	176	320
100	212	180
120	248	120

Solenoid and MPEM

Static Test

Unplug electric connector of solenoid **no 20** and connect it to a 12 V battery. The solenoid must sound when it opens. Otherwise, replace solenoid. Repeat test several times.

Dynamic Test

Air temperature sensor must be at 20°C (68°). For the test, operate the engine at the RPM specified in the following chart.

MODEL	TEST RPM
MX Z 600 HO Sport/X MX Z 800 HO Sport/X	3800

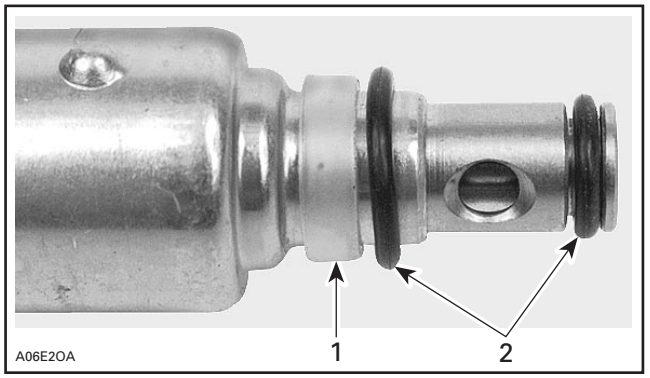
The solenoid must vibrate.

Otherwise, ensure fuse(s), wiring harness and connections are in good condition and if so, try a new MPEM and retest. Refer to ELECTRICAL section.

PARTS REMOVAL AND INSTALLATION

Solenoid

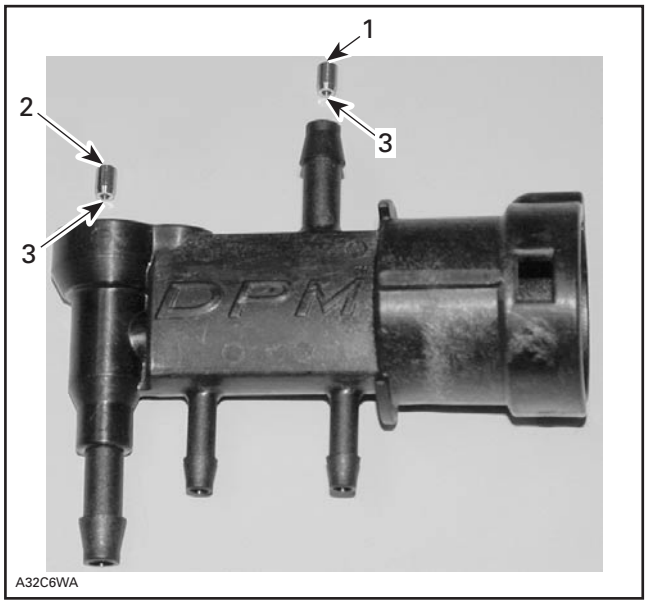
At reassembly, ensure that solenoid seals are in place.



1. Plastic seal
2. O-rings

Jet

When installing jet **no 18** in DPM, ensure to position the taper end as shown.



1. Vent jet
2. Lean jet
3. Taper end here

Pay also attention not to mix jets. Refer to the following table for the proper inner diameter size. Refer to the illustration above for the jet location.

MODEL	INSIDE DIAMETER mm (in)	
	VENT JET	LEAN JET
MX Z 600 HO Sport/X MX Z 800 HO Sport/X	1.2 (.047)	2.0 (.079)

Cap

Prior to installing cap **no 19**, ensure O-ring is in good condition. To install cap, firmly push until tabs click and lock on both sides in DPM.

DPM MANIFOLD TESTING

Visual Inspection

With DPM manifold removed from vehicle and all hoses disconnected from DPM manifold, inspect for any broken fittings or missing dust caps. If any part is broken, replace DPM manifold and **do not proceed** with leak test procedure. If any part is missing, order necessary part as listed in parts catalog, replace, **then perform leak test procedure**.

If there is no apparent breakage or missing part on DPM manifold, perform the following leak test procedure.

Leak Testing

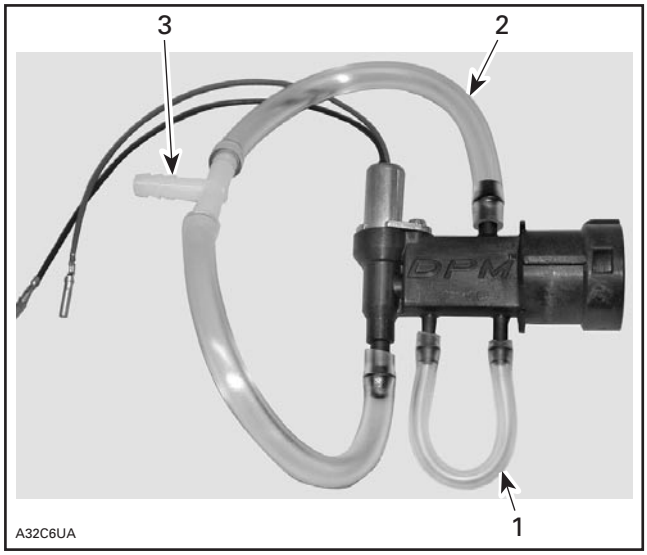
Required Items

The following items will be required:

- Water column with at least 350 mm (13-3/4 in) in height.
- Engine leak test kit (P/N 861 749 100).
- 4.8 mm (3/16 in) T-fitting.
- 6 mm (15/64 in) T-fitting.
- 3.5 mm (9/64 in) ID x 100 mm (4 in) hose.
- 6 mm (15/64 in) ID x 300 mm (12 in) hose.

DPM Manifold Preparation

Connect hoses as shown.

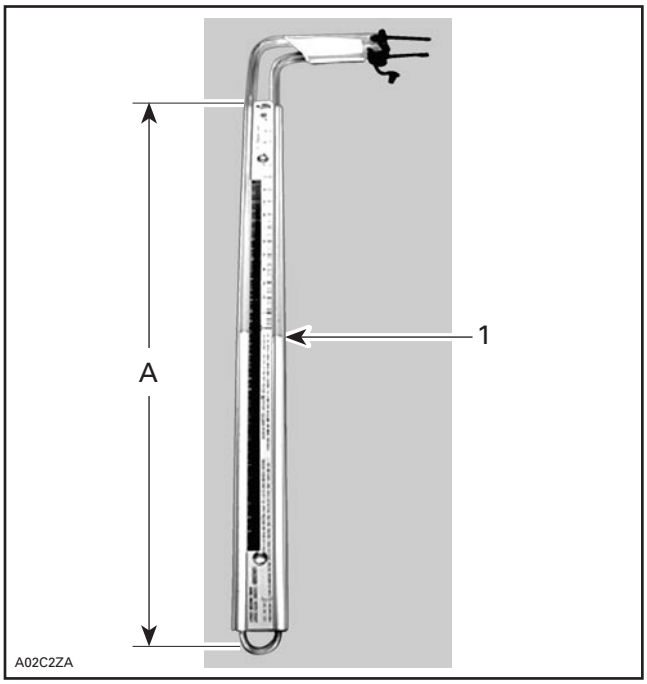


1. 3.5 mm (9/64 in) ID hose
2. 6.0 mm (15/64 in) ID hose
3. 6.0 mm (15/64 in) T-fitting

Water Column Preparation

Mount water column vertically and secure it to a wall or workbench.

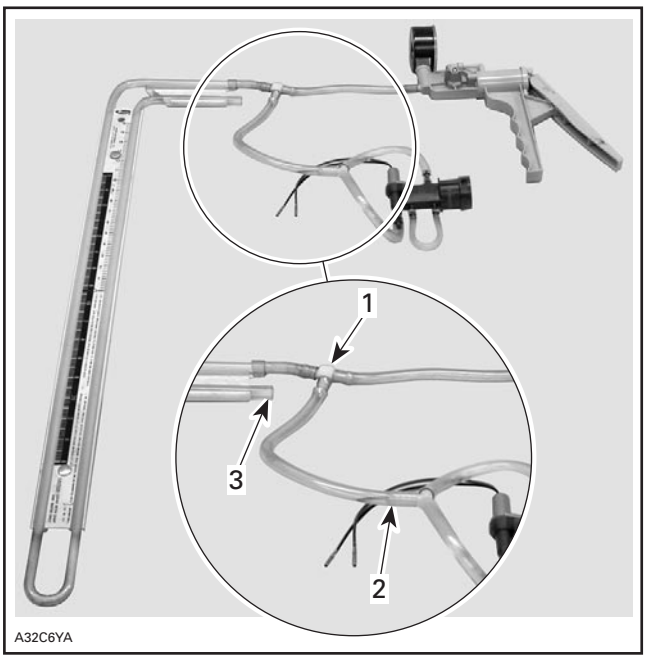
Fill water column to center line (at least 175 mm (6-7/8 in)) in height. Refer to following photo.



1. Center line at 175 mm (6-7/8 in)
A. 350 mm (13-3/4 in)

Connecting the Pump, DPM Manifold and Water Column

Connect hoses as shown.



1. 4.8 mm (3/16 in) T-fitting
2. T-fitting
3. Vented to atmosphere

Collect hose into one of the water column tubes, leave the other tube at atmospheric pressure.

Testing

Set pump to "vacuum".

CAUTION: Never use pump directly on DPM to make a pressure test. The vacuum produced by the pump is too high and would damage DPM components. Use the water column as explained above.

Apply negative pressure (vacuum) until the extremities of the water in the tube attain a difference of 350 mm (13-3/4 in).

Stop pumping and allow water levels to stabilize in tube.

Analysis

If water level remains unchanged, the DPM manifold **is not** defective.

If water level drops slowly to return to an even level in **more than** 10 seconds, the DPM manifold **is not** defective.

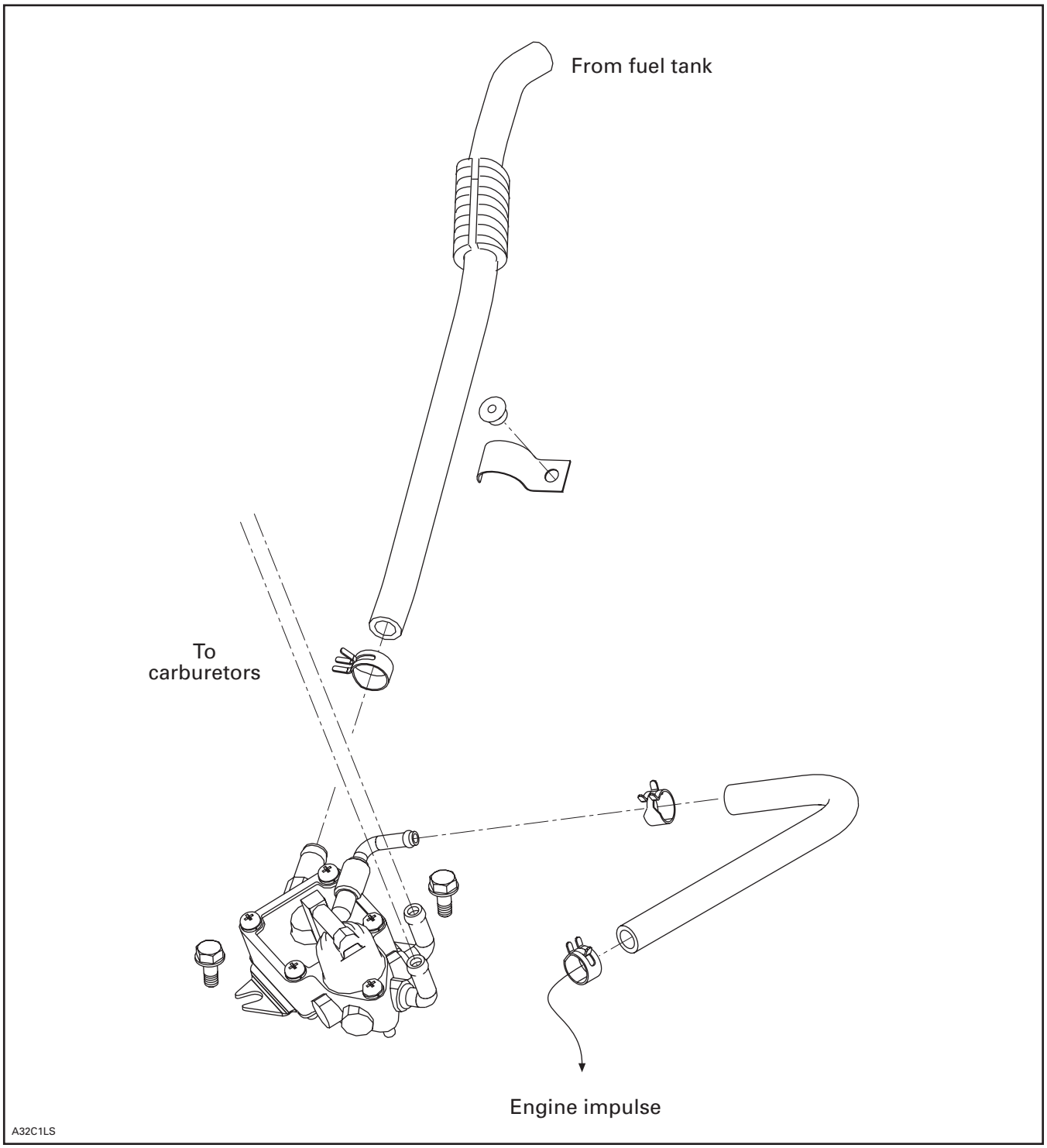
If water level drops to an even level **in less than** 10 seconds, the DPM manifold **is** defective. Replace DPM manifold parts, (refer to *Parts Catalog*) and re-test. If test fails again, replace DPM manifold.

If you are unable to attain any amount of vacuum (water level increases and decreases immediately in tube), check your set-up and re-do the test.

If you still cannot attain any vacuum, DPM manifold **is** defective. Replace DPM manifold.

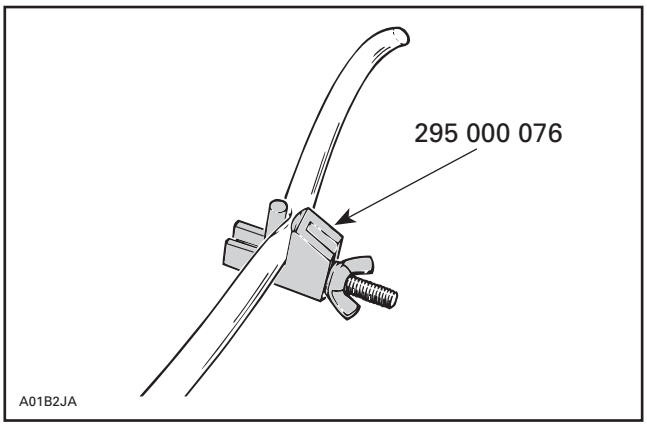
FUEL PUMP

All Models



REMOVAL

Install a hose pincer (P/N 295 000 076) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump to chassis.

PUMP VERIFICATION

Check fuel pump valves operation as follows:

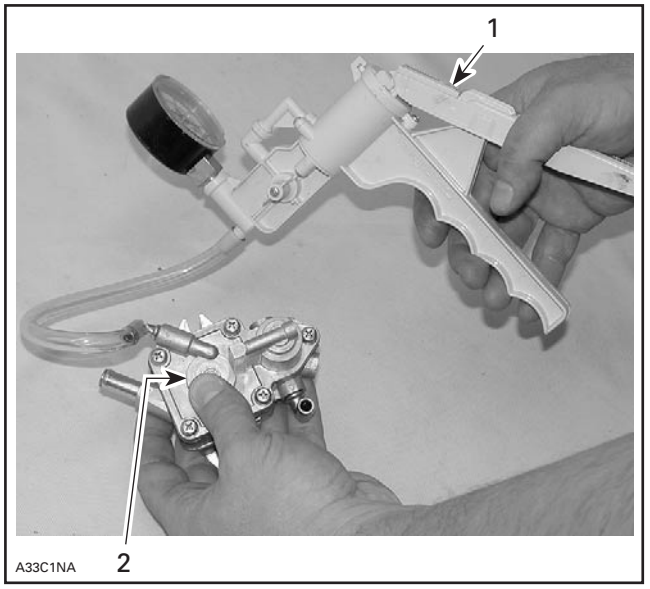
Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and also under vacuum.

NOTE: Plug remaining outlet with finger while checking outlet valve.

Check impulse diaphragm and gasket as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover with a finger. Either apply pressure or vacuum using the pump (P/N 529 021 800) from the Engine leak tester kit. The diaphragm/gasket must not leak.



1. Pump (P/N 529 021 800)
2. Plug vent hole

CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

INSTALLATION

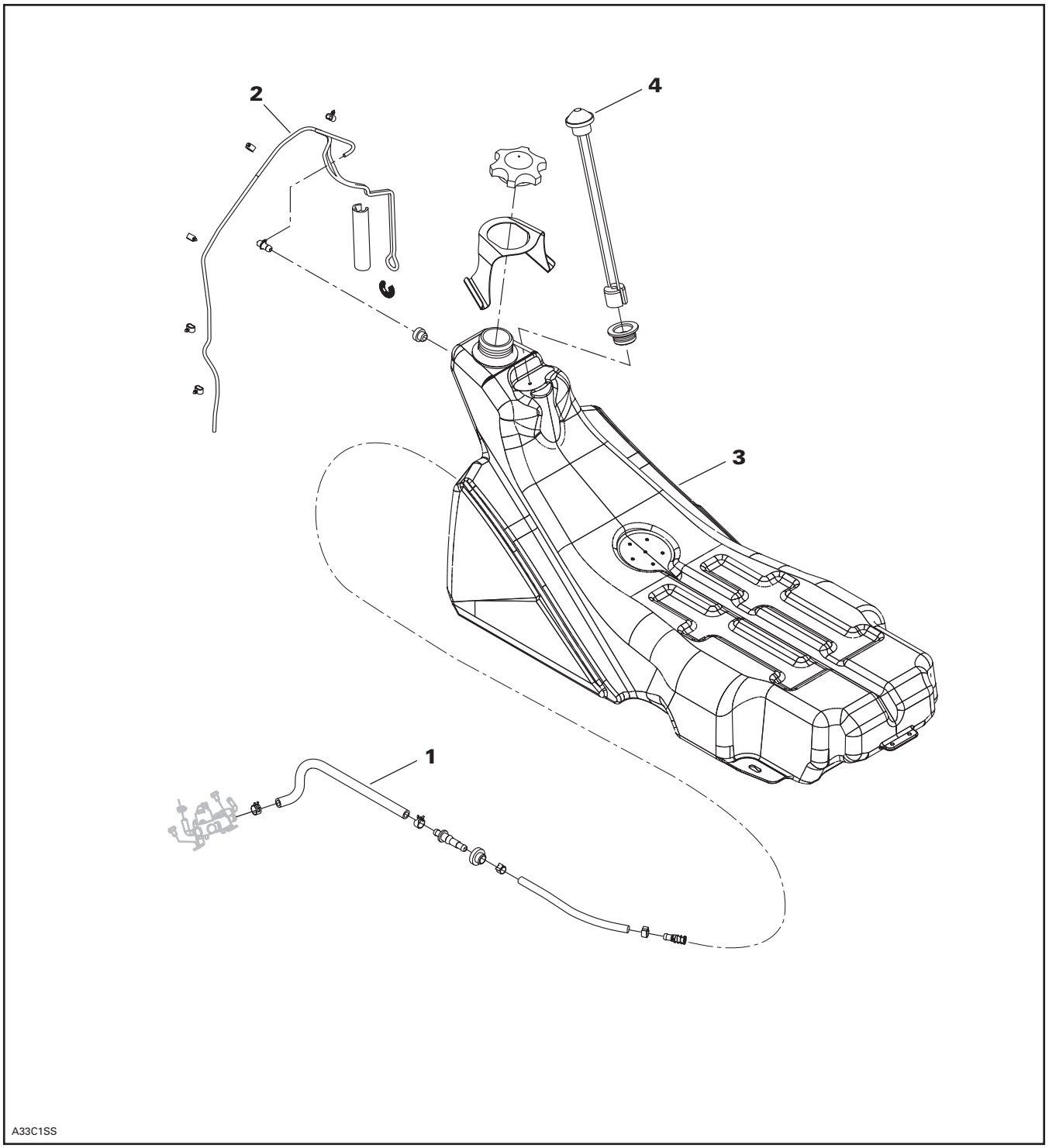
NOTE: .The manual start models have a different fuel pump than the electric start ones. Make sure to install the proper fuel pump. Refer to the appropriate parts catalog.

Inverse removal procedure.

⚠ WARNING

Pressure test to ensure there is no leak in fuel system.

FUEL TANK AND THROTTLE CABLE



Fuel Tank

NOTE: For fuel filter (strainer) servicing, refer to PRE-SEASON PREPARATION section.

Trunk Removal

Remove trunk front and rear lower M6 x 16 retaining screws on both sides.

1. Remove these screws on both sides

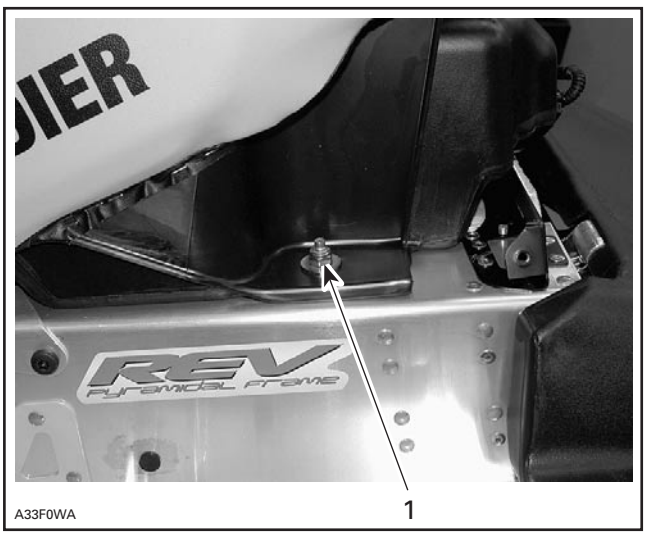
Lift trunk cover and remove storage tray.

Unplug taillight connector. Close and latch cover.

Lift and pull-out trunk and cover together; set assembly aside.

Seat Removal

Remove and discard both left and right seat M8 retaining elastic stop nuts; keep flat washers.



1. Remove and discard this nut; keep its flat washer on both sides

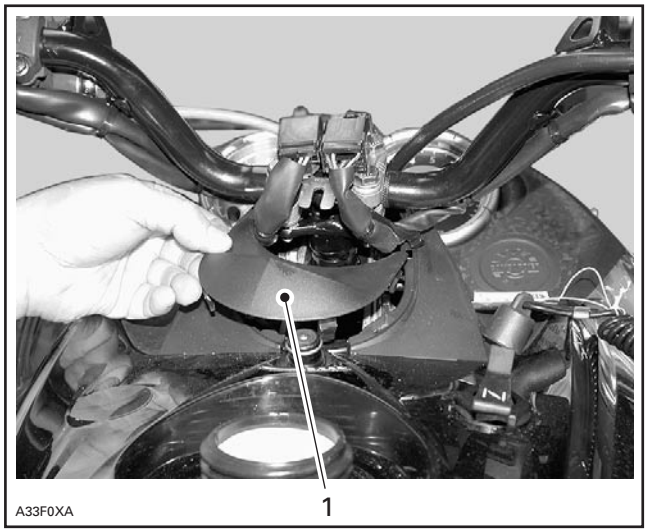
Lift, remove and set seat aside.

Fuel Tank Removal

Remove fuel tank cap.

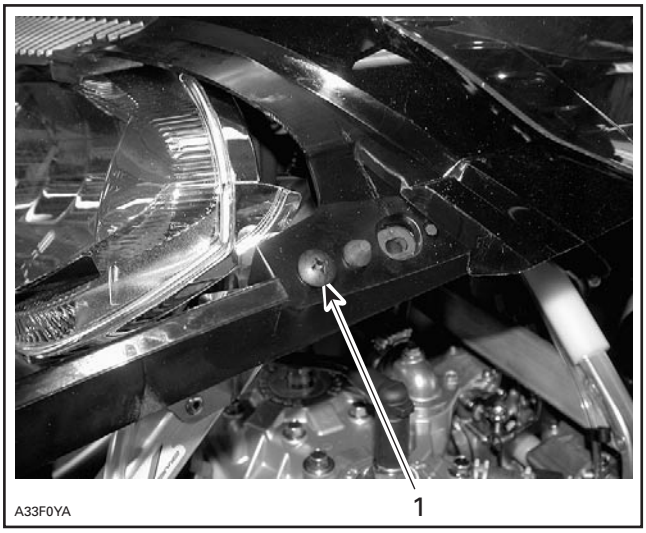
Remove filler neck plastic nut using special tool (P/N 529 035 891).

Unclip and remove console center trim cap.



1. Remove this cap

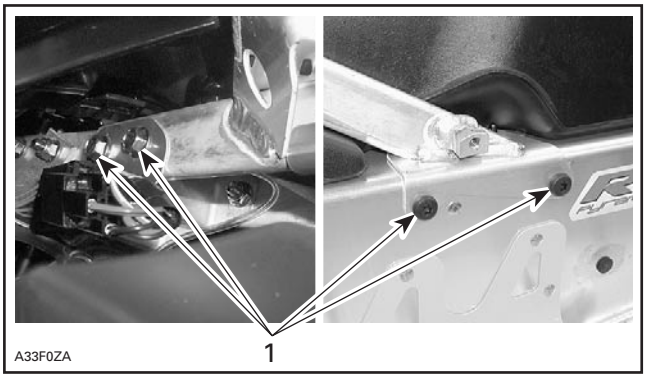
Unscrew both sides center console M6 x 20 retaining screw; this will allow lifting of console just enough to ease tank removal.



1. Remove this screw on both sides

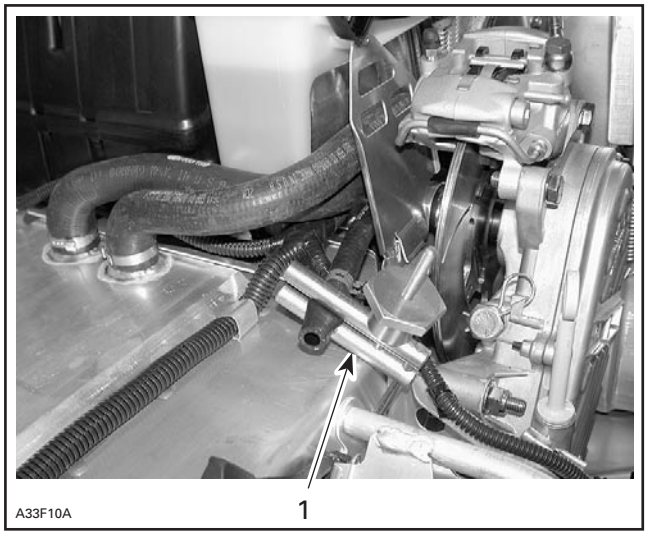
Remove both sides fuel tank aluminum braces:

- by removing and discarding lower M8 x 20 Torx screws (2 on each side);
- and by removing upper M8 flanged hexagonal bolts (2 on each side) and discarding their nuts.



1. Remove and discard lower Torx screws on both sides — remove upper flanged hexagonal bolts and discard their nuts on both sides

Empty fuel tank and install a hose pincher on fuel line **no. 1** as shown in following photo.



FUEL TANK REMOVED

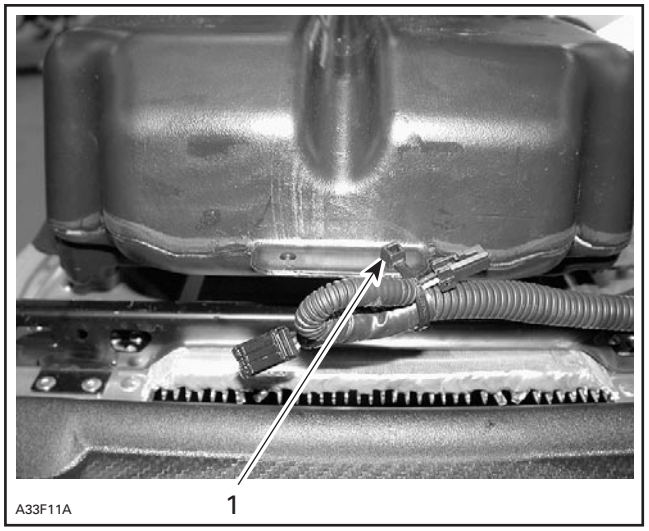
1. Hose pincher installed on fuel line

⚠ WARNING

Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Unplug vent tube **no. 2** from tank.

Cut locking tie holding wiring harness to fuel tank at rear.



1. Cut this locking tie

Remove fuel tank **no. 3** and set it aside.

Reinstall fuel tank and plug-in vent tube.

⚠ WARNING

Make sure vent tube is not kinked.

Connect fuel line and remove hose pincher.

Reinstall right and left fuel tank aluminum braces using new lower Torx screws (with Scotch Guard) and previously removed upper flanged hexagonal bolts with new M8 flanged elastic stop nuts.

Reinstall filler neck nut using special tool (P/N 529 035 891).

Reinstall fuel cap.

Reinstall both sides M6 x 20 center console retaining screws.

Reinstall console center trim cap.

Seat

Reinstall seat and secure with new M8 elastic stop nuts and previously removed flat washers.

Secure wiring harness to rear of fuel tank with locking tie.

Trunk

Reinstall trunk and cover assembly, reconnect taillight.

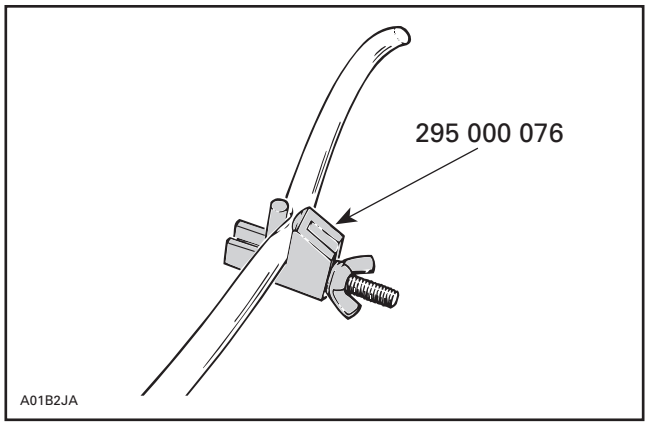
Unlatch and open cover.

Reinstall storage tray, close and latch cover.

Fuel Tank Lines

⚠ WARNING

Whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



Impulse/Fuel Lines Spring Clips (all models)

Always reposition spring clips after any repair to prevent possible leaks.

Throttle Cable Circlip at Handlebar (all models)

Put silicone grease (P/N 293 550 004) around cable barrel. Locate circlip as per illustration.

⚠ WARNING

If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

1. Circlip

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP.

Throttle Cable Routing

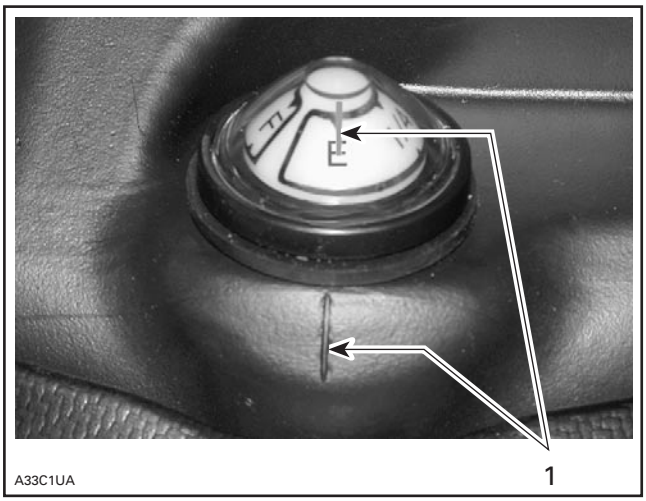
CAUTION: Check that throttle cable is routed away from sharp edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

Float-Type Fuel Level Gauge

To remove gauge from fuel tank, pull gauge out of its grommet then remove grommet.

For reinstallation, proceed as follows:

- Install grommet half-way on gauge.
- Insert grommet in fuel tank until it bottoms.
- Firmly push gauge in grommet until it bottoms and so that its red line aligns with the line on the fuel tank.



1. Align red line with line on tank

Electric Fuel Level Sensor

Inspection

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected.

Fuse Replacement

A 0.25 ampere fuse protects fuel level sensor circuitry. Remove seat to gain access.

Fuel Level Sensor Screws

Torque fuel level sensor retaining screws to 1 N•m (8 lbf•**in**) in a criss-cross sequence and then to 2.4 N•m (21 lbf•**in**), using the same sequence.