RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

T81389 -UN-07DEC88

DX,ALERT -19-04JUN90

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 -19-30SEP88

DX,SIGNAL -19-09JAN92

HANDLE FLUIDS SAFELY—AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

TS227 -UN-23AUG88

DX,FLAME -19-04JUN90

BASIC ENGINE APPLICATIONS CHART—CONTINUED

LAWN AND GARDEN TRACTORS

Machine	Engine Model No.
240	FC420V
245	FC420V
260	FC540V
265	FC540V
GT262	FC540V
GT242	FC420V

FRONT MOWERS

Machine	Engine Model No.
F710	FC540V

GOLF AND TURF EQUIPMENT

Machine	Engine Model No.
22 Greensmower	FG150G
22R Greensmower	FG150D
519 Walk-Behind Vertical Mower	FA210D
529 Vacuum Blower	FA210D
1200 Bunker and Field Rake	FE290R

MISCELLANEOUS

Machine	Engine Model No.
1000 Generator	FA130D
1400 Generator	FA130D
Power Pak Material Collection System	FA210D

UTILITY VEHICLES

Machine	Engine Model No.
AMT600	KF82D/FZ340D
AMT622	FE290D
AMT626	FE290D
Gator 4x2	FE290D

MX,1010A1,A3 -19-21OCT92

ENGINE APPLICATIONS CHART

Refer to the engine application chart to identify product-model/engine type-model relationship.

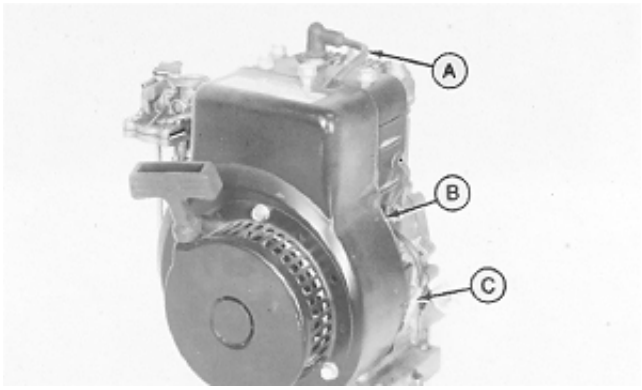
Machine	Engine Model No.
3K Lawn Edger	FA130D-AS16
E35 Lawn Edger	FA130D-AS19
1000/1400 Generators	FA130D-AN00
20SR7 Reel Mower	FA130D-AS16
519 Walk-Behind Vertical Mower	FA210D-AS20
529 Vacuum Blower	FA210D-AS19-01
Power Pak Material Collection System	
(Engine S.N. —254693)	FA210D-AS17
(Engine S.N. 254694—289197)	FA210D-BS17
(Engine S.N. 289198—)	FA210D-CS17

MX,2000A1,A1 -19-21OCT92

REMOVE AND INSTALL BLOWER HOUSING—FA130D AND FA210D-AS20

NOTE: It is not necessary to remove recoil starter from housing.

1. Disconnect spark plug cap (A).
2. Remove fuel tank, if equipped. (See this group.)
3. Disconnect wiring lead (C).
4. Remove blower housing (B).
5. Install blower housing.
6. Connect wiring lead.
7. Install fuel tank, if equipped.
8. Connect spark plug cap.



M80242 -UN-11MAR91

20 10 1

MX,2010A1,A1 -19-21OCT92

REMOVE AND INSTALL VALVES AND SPRINGS

1. Remove carburetor. (See Group 05.)

2. Remove cylinder head. (See Group 15.)

3. Remove tappet chamber cover/breather and gasket.

IMPORTANT: Mark and keep springs and valves together.

4. Compress valve spring (D) with a spring compressor (A) and move spring retainer (C) so larger hole is around valve stem.

5. Remove compressor, valves, spring and retainers.

6. Inspect and analyze valves. (See Section 100, Group 05.)

7. Inspect springs, valve guides and seats. (See this group.)

8. Check valve-to-tappet clearance. (See this group.)

9. Check that drainback hole (B) is open.

10. Align valve springs and retainers in tappet chamber.

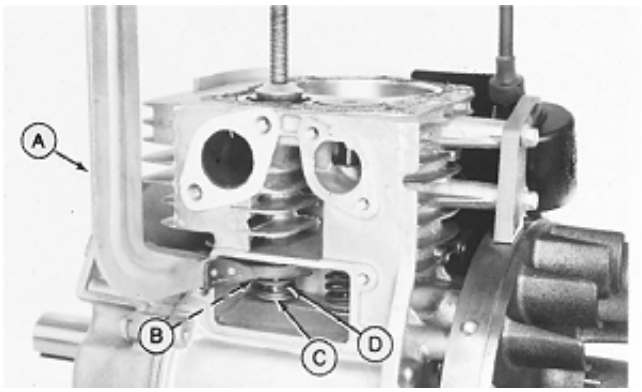
11. Coat valve stems with oil and install in cylinder block.

12. Compress each spring and position retainer so smaller hole is around valve stem.

13. Install tappet chamber cover/breather and new gasket.

14. Install cylinder head.

15. Install carburetor.



M80317 -UN-11MAR91

A—Spring Compressor
B—Drainback Hole
C—Spring Retainer
D—Valve Spring

MX,2120A1,A1 -19-21OCT92

REMOVE AND INSTALL PISTON RINGS

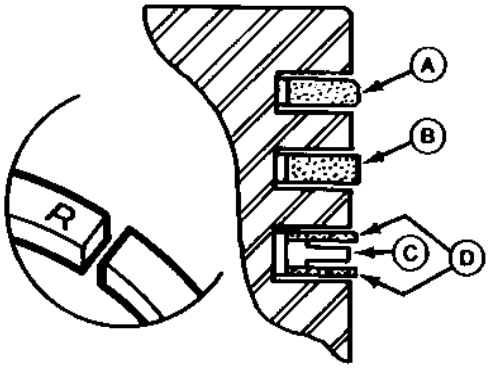
1. Remove piston rings with a piston ring expander.

2. Inspect piston. Clean piston ring grooves. (See this group.)

3. Check piston ring end gap. (See this group.)

4. Install top ring (A) and second ring (B) with R or NPR mark facing up. Rings should turn freely in grooves.

5. Oil ring is an assembly. Install spacer (C), then side rails (D). Put side rail end gaps 180° apart.



M80376 -UN-06APR91

A—Top Ring
B—Second Ring
C—Spacer
D—Side Rails

MX,2520A1,A22 -19-21OCT92

25
20
14

CHECK PISTON RING END GAP

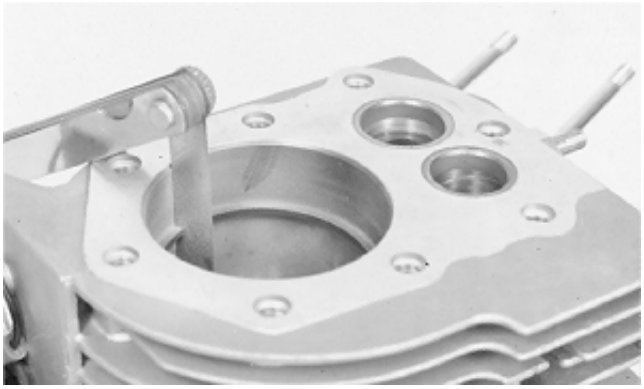
1. Before installing rings on piston, check end gap in cylinder bore.

2. Install each ring squarely in bore approximately 25.4 mm (1.0 in.) down from top of cylinder.

3. Check end gap. Replace ring if end gap is more than specifications.

END GAP SPECIFICATIONS

Minimum End Gap	0.18 mm (0.007 in.)
Maximum End Gap	0.80 mm (0.032 in.)



M80377 -UN-02APR91

MX,2520A1,A23 -19-21OCT92

8. Hone the cylinder an additional 0.028—0.030 mm (0.0011—0.0012 in.) for final bore specifications. This allows for 0.020 mm (0.0008 in.) shrinkage when cylinder cools.

IMPORTANT: DO NOT use gasoline or commercial solvents to clean cylinder bores. Solvents will not remove metal particles produced during honing.

9. Clean the cylinder thoroughly using soap, warm water and clean rags. Continue to clean cylinder until white rags show no discoloration.

10. Dry the cylinder. Apply engine oil to cylinder wall.

M98,2040A,A9 -19-21OCT92

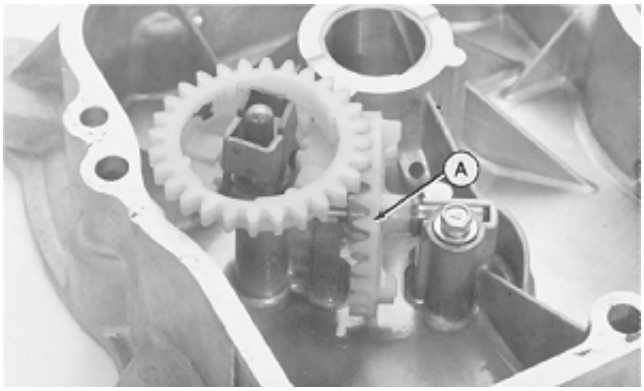
INSPECT AND REPLACE OIL SLINGER—IF EQUIPPED

1. Remove crankcase cover. (See this group.)

2. Remove oil slinger (A).

3. Inspect oil slinger. Replace if worn or damaged.

4. Install oil slinger.



M50078 -UN-31AUG88

MX,3020A1,A28 -19-21OCT92

GROUP 20—CYLINDER BLOCK, VALVES AND INTERNAL COMPONENTS—CONTINUED

Item	Specification
Piston	
Maximum Ring Groove Clearance	0.15 mm (0.006 in.)
Minimum Ring End Gap	0.18 mm (0.007 in.)
Maximum Ring End Gap	1.00 mm (0.039 in.)
Minimum Pin O.D.	17.98 mm (0.708 in.)
Maximum Pin Bore I.D.	18.03 mm (0.710 in.)
Maximum Piston-to-Piston Pin Clearance	0.05 mm (0.002 in.)
Piston O.D.	79.77—79.79 mm (3.140—3.141 in.)
Piston-to-Cylinder Bore Clearance	0.195—0.235 mm (0.0077—0.009 in.)
Connecting Rod	
Maximum Crankshaft Bearing I.D.	32.06 mm (1.262 in.)
Maximum Piston Pin Bearing I.D.	18.04 mm (0.710 in.)
Maximum Connecting Rod-to-Piston Pin Clearance	0.06 mm (0.002 in.)
Maximum Connecting Rod-to-Crankpin Clearance	0.11 mm (0.004 in.)
End-Cap Screw Torque	21 N·m (186 lb-in.)
Crankshaft	
Minimum Connecting Rod Journal O.D.	31.95 mm (1.259 in.)
Maximum T.I.R.	0.05 mm (0.002 in.)
End Play	0.05—0.20 mm (0.002—0.008 in.)
Cylinder Block	
Crankcase/Block Stud Torque	36 N·m (27 lb-ft)
Cylinder Bore	
Standard Cylinder Bore I.D.	79.91—79.98 mm (3.146—3.149 in.)
Maximum Cylinder Bore I.D.	80.09 mm (3.155 in.)
Maximum Out-of-Round	0.063 mm (0.0025 in.)
Rebore Cylinder	
Oversize Diameter	
0.50 mm	80.46—80.48 mm (3.168—3.169 in.)

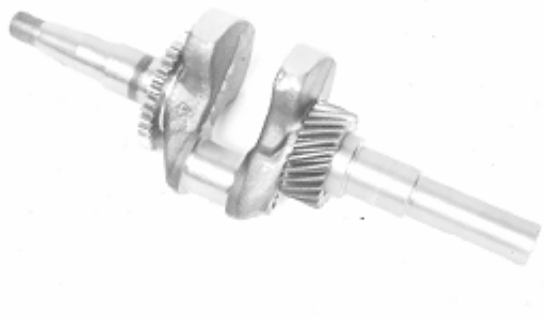
GROUP 30—STARTING SYSTEMS

Electric Starter

See Starter Specifications in this Group.

MX,3500A1,A3 -19-21OCT92

REMOVE, INSPECT AND INSTALL CRANKSHAFT


M80475 -UN-17MAY91

1. Remove camshaft. (See this group.)

2. Remove piston and connecting rod. (See this group.)

3. Remove balancer. (See this group.)

4. Remove crankshaft.

IMPORTANT: A bent crankshaft must be replaced; it cannot be straightened.

5. Check crankshaft alignment (T.I.R.). (See this group.)

6. Clean and inspect crankshaft. Replace if parts are scratched or damaged.

7. Analyze crankshaft and connecting rod wear. (See Section 100, Group 10.)

NOTE: Cranksshaft rotates on ball bearings. Crankshaft main bearing journals are not measured.

8. Measure connecting rod journal. Replace crankshaft if measurement is less than specifications.

9. Cover keyway on flywheel end of crankshaft with tape to prevent seal damage when installing crankshaft.

35
20
16

10. Apply clean engine oil to crankshaft bearings and journal.

11. Pack lithium based grease in oil seals.

12. Install crankshaft.

13. Install balancer.

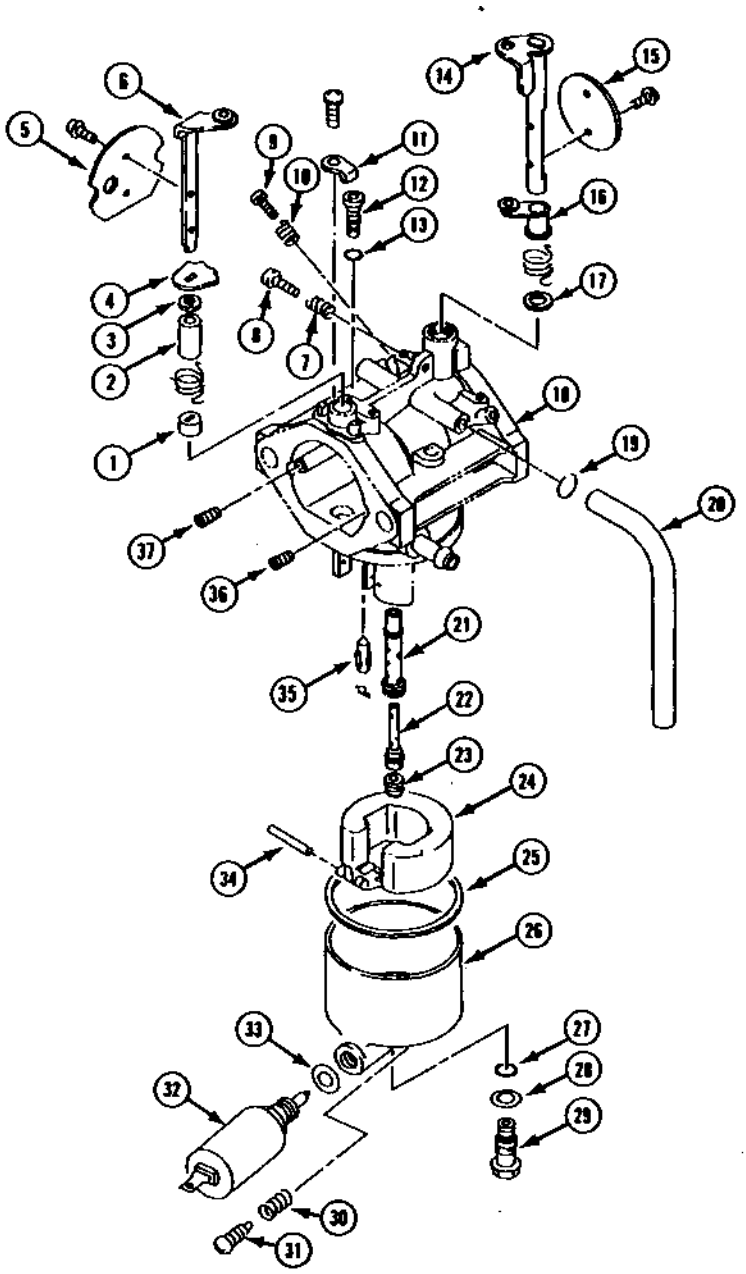
14. Install piston and connecting rod.

15. Install camshaft.

JOURNAL SPECIFICATIONS (MIN)

Main Bearing Journal		Connecting
PTO Side	**Flywheel Side**	**Rod Journal**
—	—	31.95 mm (1.259 in.)

MX,3520A1,A28 -19-21OCT92



M80010 -UN-09JAN91

1—Collar
2—Collar
3—Seal
4—Plate
5—Choke Plate
6—Choke Shaft
7—Spring
8—Idle Screw
9—Pilot Screw
10—Spring
11—Plate
12—Pilot Jet
13—O-Ring
14—Throttle Shaft
15—Throttle Plate
16—Ring
17—Seal
18—Carburetor Body
19—Clamp
20—Hose
21—Main Nozzle
22—Bleed Pipe
23—Main Jet
24—Float
25—Gasket
26—Float Chamber
27—O-Ring
28—Washer
29—Plug
30—Spring
31—Drain Screw
32—Fuel Shutoff Solenoid
33—Washer
34—Float Pin
35—Needle Valve
36—Air Jet
37—Pilot Air Jet

FC540V

MX,4005A1,A11 -19-21OCT92

REPLACE BALANCER BUSHINGS

NOTE: Remove bushings with a bearing driver or a press.

Remove link rod bushings with oil groove side facing up.

1. Remove bushings.

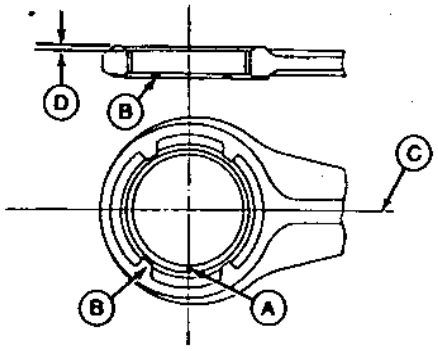
2. Install link rod bushings with seam (A) at a 90° angle to centerline (C).

NOTE: On FC400V, FC420V and FC540V engines, install bushing from opposite side of oil grooves (B).

3. Install bushing below surface to specifications.

SPECIFICATIONS

Bushing Depth (D) . . . . . 1.00 mm (0.040 in.)



M51681 -UN-31AUG88

A—Bushing Seam
B—Oil Grooves
C—Link Rod Centerline
D—Measurement

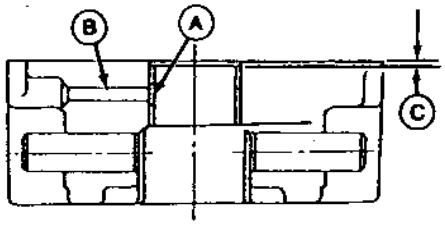
MX,4020A1,A14 -19-21OCT92

FC400V, FC420V and FC540V:
4. Align oil hole (A) in bushing and oil passage (B) in weight. Install bushing.

5. Install bushing below surface to specifications.

SPECIFICATIONS

Bushing Depth (C) . . . . . 0.50 mm (0.020 in.)



M51725 -UN-07SEP88

M98,2030A,A7 -19-21OCT92

REMOVE, INSPECT AND INSTALL OIL FILTER MANIFOLD—IF EQUIPPED

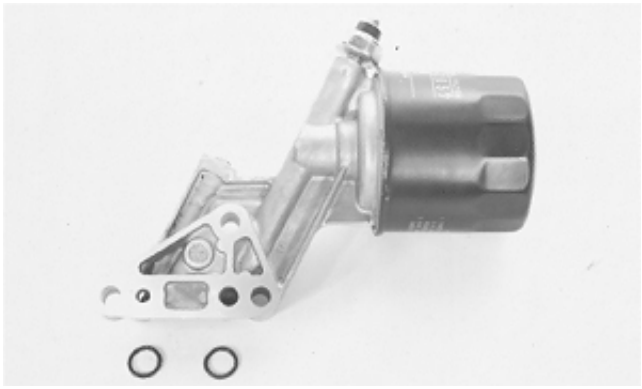
1. Remove oil filter and manifold.

2. Inspect oil filter. Replace if excessively contaminated or damaged.

3. Inspect oil passages for clogs. Clean if needed.

4. Inspect rubber gaskets. Replace if worn or damaged.

5. Install filter and manifold.



M50077 -UN-31AUG88

MX,4020A1,A51 -19-21OCT92

INSPECT AND REPLACE GOVERNOR

IMPORTANT: Removal damages governor. If not damaged, do not remove.

1. Remove crankcase cover. (See this group.)

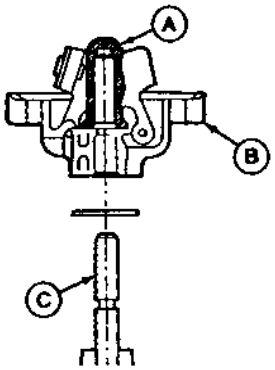
2. Inspect governor. If necessary to replace, remove with screwdriver.

3. If removed, press shaft (C) back into block until it protrudes 32.2—32.8 mm (1.267—1.291 in.).

NOTE: Assemble sleeve and gear before installing assembly on shaft.

4. Install sleeve (A) onto governor gear (B).

5. Install governor assembly onto shaft. Push down on assembly until it snaps into place.



M51762 -UN-07SEP88

MX,4020A1,A52 -19-21OCT92

REMOVE AND INSTALL CARBURETOR

1. Drain fuel from carburetor.

2. Disconnect hose (B).

3. Disconnect spring (D).

4. Remove duct (A), bracket (E) and gaskets (F).

5. Disconnect linkage (C).

6. Separate carburetor from heat shield (H). Remove carburetor.

7. Remove heat shield (H) and gaskets.

8. Make repairs as necessary. (See procedure in this group.)

NOTE: Install gasket (I) with tab pointing up on fuel inlet side of carburetor.

9. Install gaskets and heat shield.

10. Install carburetor.

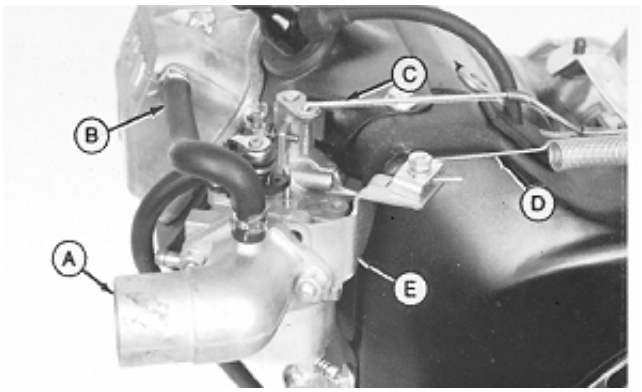
11. Connect linkage.

NOTE: Install gaskets (F) with hole (J) pointing away from fuel inlet side of carburetor.

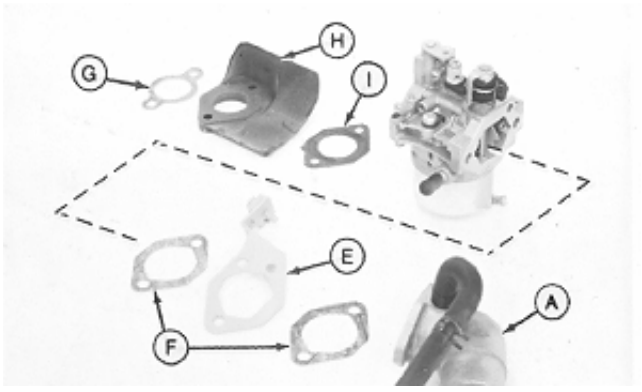
12. Install gaskets, bracket and duct.

13. Connect return spring.

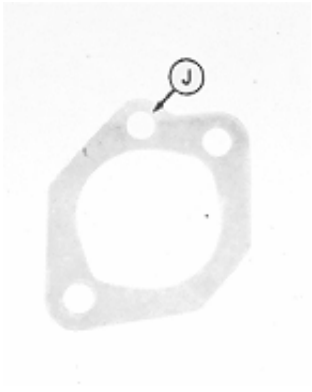
14. Connect breather hose.



M80399 -UN-25APR91



M80400 -UN-25APR91

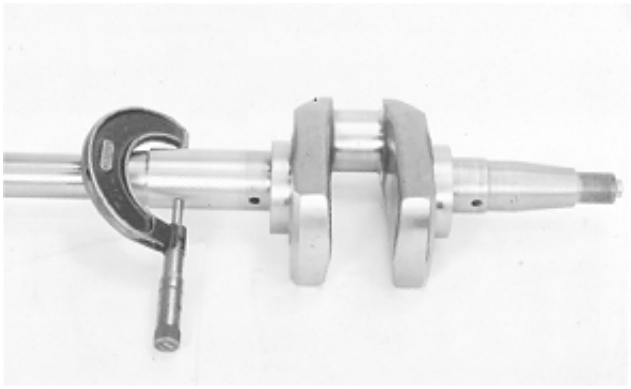


M80401 -UN-25APR91

A—Air Intake Duct
B—Breather Hose
C—Throttle Control Linkage
D—Return Spring
E—Bracket
F—Gaskets
G—Gasket
H—Heat Shield
I—Gasket
J—Hole

MX,4505A1,A2 -19-21OCT92

REMOVE, INSPECT AND INSTALL CRANKSHAFT


M54495 -UN-09JAN91

1. Remove camshaft. (See this group.)

2. Remove piston and connecting rod. (See this group.)

3. Remove balancer. (See this group.)

4. Remove crankshaft.

IMPORTANT: A bent crankshaft must be replaced; it cannot be straightened.

5. Check crankshaft alignment (T.I.R.). (See this group.)

6. Clean and inspect crankshaft. Replace if parts are scratched or damaged.

7. Analyze crankshaft and connecting rod wear. (See Section 100, Group 10.)

8. Measure crankshaft main bearing journals and connecting rod journal. Replace crankshaft if measurements are less than specifications.

JOURNAL SPECIFICATIONS (MIN)

Main Bearing Journal		Connecting
PTO Side	**Flywheel Side**	**Rod Journal**
29.92 mm (1.178 in.)	—	35.43 mm (1.395 in.)

MX,4520A1,A22 -19-21OCT92

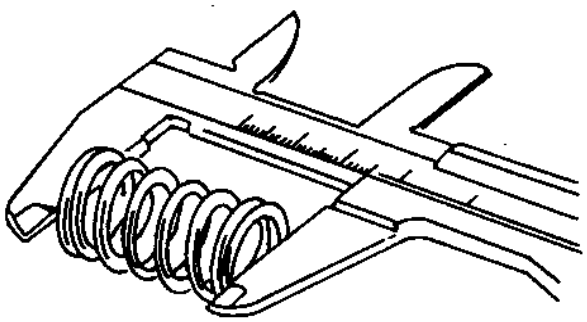
45 20 14

INSPECT VALVE SPRINGS

Inspect valve springs. Replace springs if damaged or if free length is less than specification.

FREE LENGTH SPECIFICATION (MIN)

Intake	43.30 mm (1.710 in.)
Exhaust	39.00 mm (1.540 in.)



M50036 -UN-31AUG88

MX,5020A1,A3 -19-21OCT92

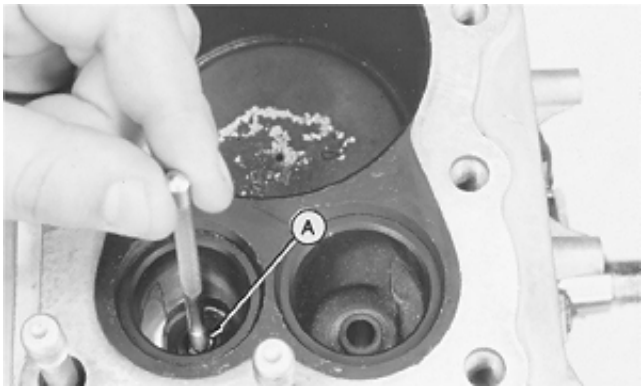
INSPECT VALVE GUIDES

Clean inside of valve guides with valve guide cleaner.

Measure inside diameter of valve guide bushings (A). Replace bushings if inside diameters are greater than specifications. (See this group.)

SPECIFICATIONS (MAX) I.D.

Intake and Exhaust	8.08 mm (0.318 in.)

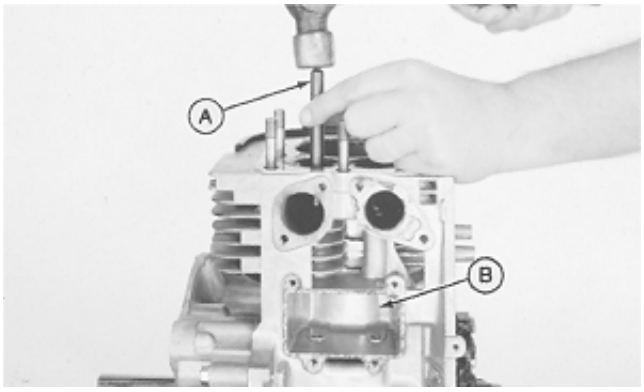


M38126 -UN-29AUG88

MX,5020A1,A4 -19-21OCT92

REPLACE VALVE GUIDE BUSHINGS

1. Drive valve guide bushing into tappet chamber (B) using JDG118 Valve Guide Driver (A). Use a locking pliers to crush end of bushing in chamber. Drive remaining part of bushing into chamber and remove.



M38127 -UN-29AUG88

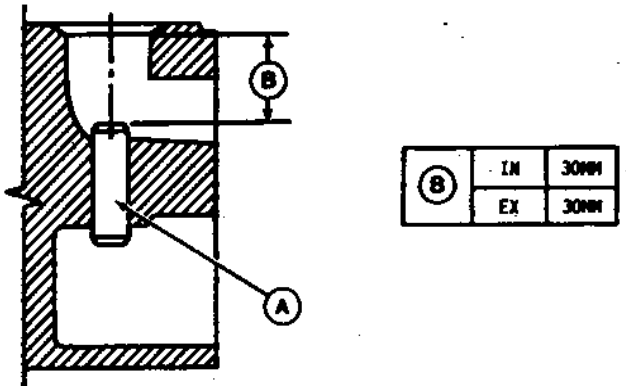
MX,5020A1,A5 -19-21OCT92

2. Use valve guide driver to install new bushing (A).

Drive bushing into cylinder body until distance (B), from valve seat counterbore to top of bushing, is according specifications.

SPECIFICATIONS

Distance (B)	30 mm (1.178 in.)



M38128 -UN-29AUG88

MX,5020A1,A6 -19-21OCT92

50 20 4