JLO L/RM252 ENGINE MECHANICS HANDBOOK

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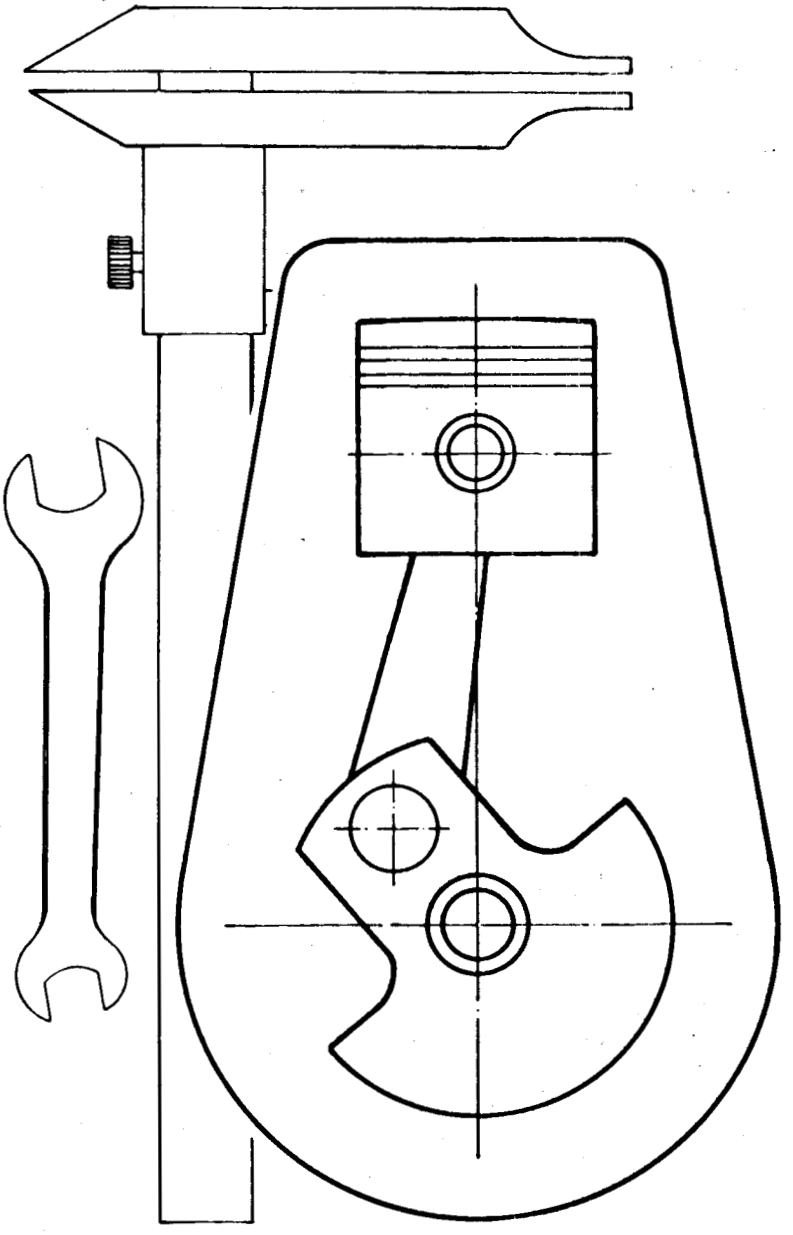
JLO MOTOR SERVICE

L/RM252

MECHANIC'S HANDBOOK



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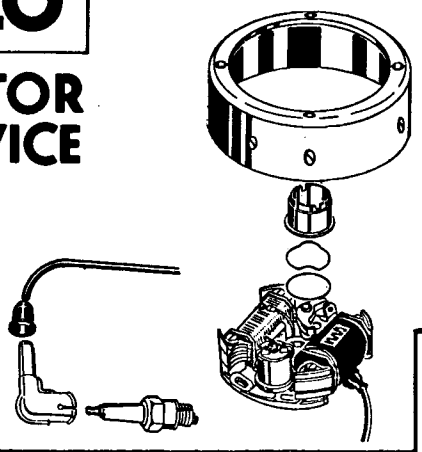
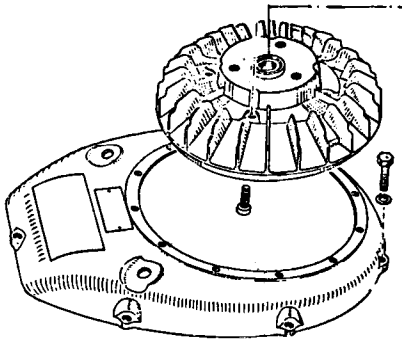
JLO
MOTOR SERVICE





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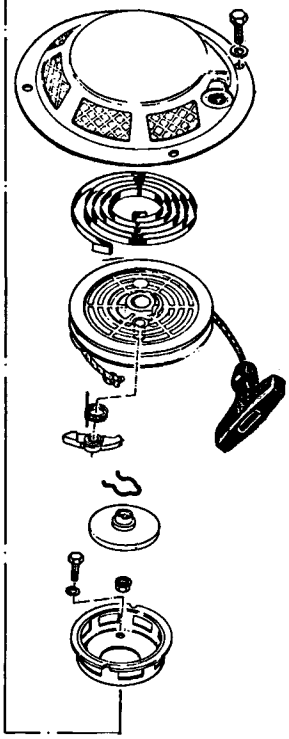

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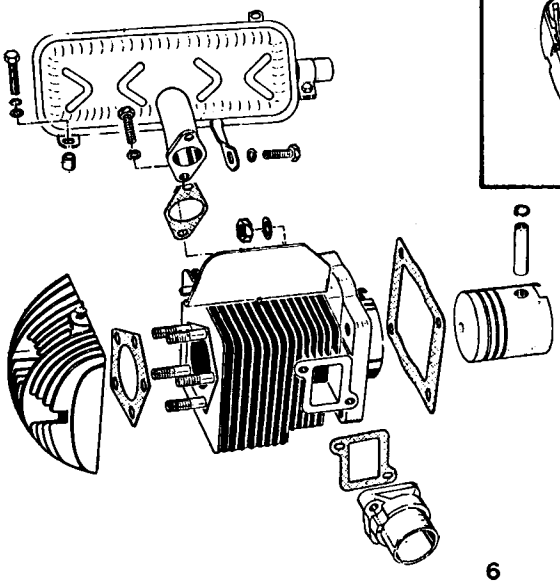

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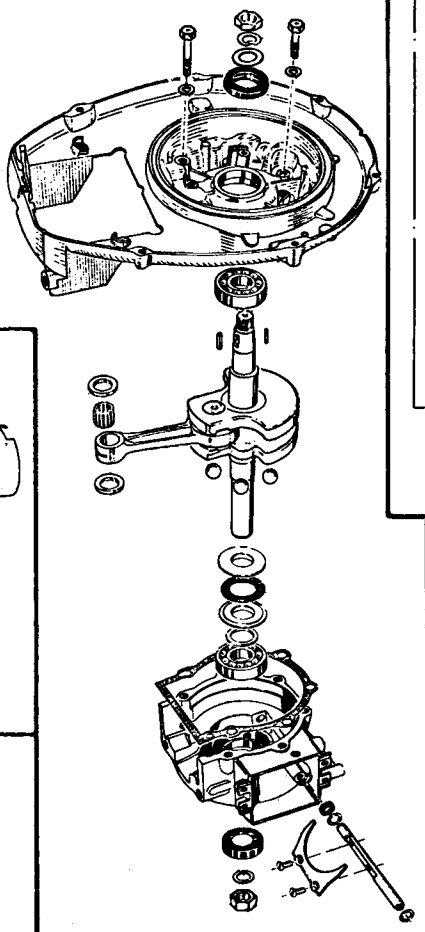

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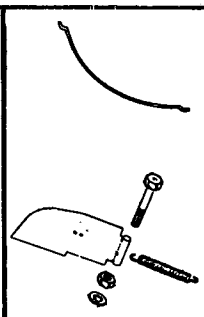

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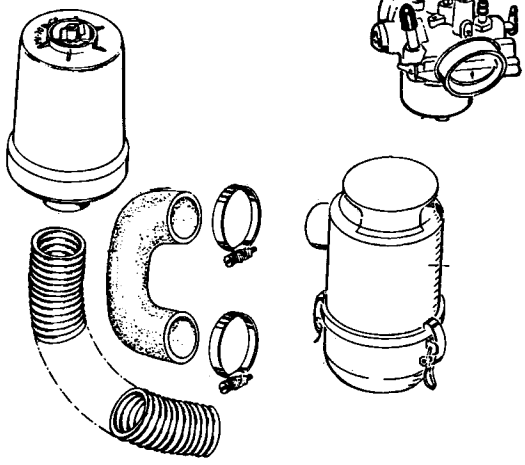

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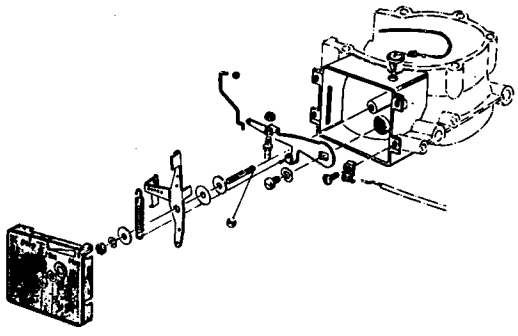

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CONTENTS

PREFACE

This Mechanic's Handbook contains comprehensive information to properly operate, service, and repair JLO engine models L 252 and RM 252.

The repair procedures are described in detail and are supplemented by useful illustrations.

1. Each assembly group is subdivided into DISASSEMBLY and ASSEMBLY.

   The illustration numbers shown in the general view on page 1 refer to the individual assembly groups in the procedure section.

2. When ordering replacement parts, please refer to the pertinent spare parts list to determine the correct part number. If the required spare part cannot be identified, please describe the part and state engine model and serial number (shown on name plate) on your order form.

3. In case of a complete engine overhaul, please do not try to save money by re-using worn or defective parts. It is always more sensible to replace one part too many than to re-use a part which condition is doubtful. When repairing an engine which is in poor condition, please use available shortblocks rather than repairing the engine with individual parts. This and the use of JLO subassembled repair kits will help to save time and money.

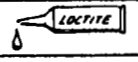
   The part numbers and exact descriptions of shortblocks and repair kits may be found at the end of the spare parts list.

4. Always use genuine JLO spare parts!

5. To secure certain screws or nuts, a thread locking compound is used. We recommend to use "Loctite 249", "Casco 184" or equivalent.

Edition
10/86

Technical Data

Type	L/RM 252	
Piston displacement	247 cm³ (15.057 in³)	
Stroke	66 mm (2.598")	
Bore	⌀ 69 mm (2.7165")	
Compression ratio	7:1	
Spark plug	CHAMPION L86C, L87YC — BOSCH W7AC — BERU 175/14C (Heat value 145-225)	
Spark plug gap	0.5 mm (0.020")	
Spark plug thread	M 14x1.25 - 12.7 mm long	
Timing BTDC	2.8 - 3.2 mm (0.110" to 0.126")	
Breaker point gap	0.3 - 0.4 mm (0.012" to 0.016")	
	Minimum	Maximum
Ignition system 12 Volt/40 Watts		
internal ignition coil, primary resistance	1.60 Ohms	2.00 Ohms
internal ignition coil, secondary resistance	5,300 Ohms	5,800 Ohms
internal ignition generating coil	N/A	
Ignition system 12 Volt 75/98 Watts		
external ignition coil, primary resistance	0.80 Ohms	0.90 Ohms
external ignition coil, secondary resistance	7,800 Ohms	9,200 Ohms
internal ignition generating coil (bottom coil with black wire)	3.0 Ohms	3.7 Ohms
lighting coil (12 Volt 75 Watts) (with yellow and yellow/black wire)	0.43 Ohms	0.53 Ohms
lighting coil 12 Volt 23 Watts (top coil with green and green/black wire)		
condenser	0.24 µF	0.30 µF
air gap, coil to flywheel	0.20 mm (.008")	0.40 mm (.016")
Fuel	Regular fuel or regular lead-free fuel Mixture ratio 50:1 (2%) Important: During initial break-in period (approx. 20 hours) use fuel/oil mixture ratio of 25:1 (4%)	
Lubrication oil	Use special two-stroke oil, e.g. CASTROL SUPER TT; ARAL SUPER 2T; ESSO (EXXON) AQUAGLIDE, etc. If not available, use oil SAE 30 or 40 or known brand	
Locking compound	LOCTITE No. 241 / CASCO No. 148 	
Sealing compound		

Operating- and Maintenance Instructions

A. Before Starting

1. **Refueling**
   Mixture ratio - please see Technical Data

2. **Engine**
   Check that cooling fins of cylinder and air holes are free from dirt to prevent overheating of the engine.

3. **Air filter:**
   Be sure that all filter connections (clamps) are tight.

   Oil bath filter:
   Check oil level, refill if necessary.

4. **Starting**

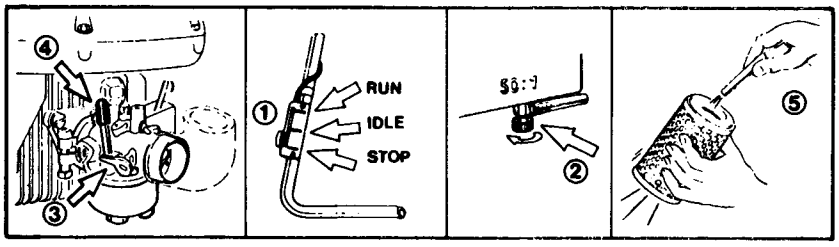
4.1 Cold engine
Shift throttle lever into "RUN" position. Open fuel tap ②. Close starter throttle ③. Depress tickler ④ until fuel emerges from carburettor. Pull recoil starter firmly until engine starts, slowly return starter handle. If engine does not start, depress tickler again. As soon as engine runs, open starter throttle fully in direction of arrow. The flyball governor automatically maintians the engine speed.

4.2. Warm engine
Same as 4.1, but do not depress tickler ④. Close starter throttle ③ if engine does not start.

5. **Stopping**

5.1 For short breaks:
Shift throttle lever ① to "STOP".

5.2 For longer breaks:
Close fuel tap ② and shift throttle lever ①to "STOP".



B. Service and Maintenance

Servicing Work	After first 20 hours	Regularly after every operating hours 50	200	300
Bolts and nuts and other connections Check tightness, retighten if necessary	●		●	
Ignition **Check breaker point gap and ignition timing**	●		●	
Spark plug Check spark plug gap and adjust if necessary Remove deposits or replace plug if necessary	●	●		
Carburettor Clean carburettor and fuel filter, also tank if necessary			●	
Exhaust Check for carbon deposits. Clean if necessary eventually burn out			●	
Piston, combustion chamber, and cylinder transfer ports Clean from carbon deposits				●
Mechanical flyball governor	maintenance free			
Corrosion protection for engines to be temporarily stored Use 50 cm^3 JLO Corrolite M, order no. 002.75.001.000, and observe the instruction included.				

C. Additional Instructions

1. Air intake filter

Keep dust and dirt out of the engine to avoid premature wear. If engine is operated in dusty or dirty environment, the air filter may have to be cleaned in short intervals.

1.1 Paper element filter: Blow out with air against normal direction of air flow. Replace wet or very dirty cartridges.

1.2 Oil bath filter:
Change oil (filling qty. 160 - 180 cm^3 SAE 30) and observe indicated mark!

D. General Trouble Shooting

Possible cause:	Remedy:
1. Engine does not start	
1.1 Fuel tap closed	Open fuel tap
1.2 No fuel in tank	Fill tank with clean, fresh fuel/oil mixture
1.3 Clogged fuel filter in carburettor or tap of fuel tank or fuel hose	Clean filter, blow out dirt
1.4 Engine over-choked (flooded)	Close fuel tap. Start engine several times. Remove spark plug, clean and dry it. If necessary, crank engine without spark plug.
1.5 Spark plug fouled	Clean and regap spark plug. Replace if necessary. (Plug type see A Technical Data)
1.6 Main carburettor jet plugged	Clean
1.7 Dirty carburettor	Clean
1.8 Spark plug cap or ignition cable loose or damaged	Retighten, resp. replace
2. Engine runs unevenly or ceases to fire	
2.1 See 1.5-1.8	See above
2.2 Loose spark plug	Tighten spark plug
3. Engine does not produce full power	
3.1 See 1.5 and 1.6	See above
3.2 Choke still closed	Open choke
3.3 Dirt in fuel filter and hoses	Clean
3.4 Dirty aircleaner or main jet	Clean
3.5 Exhaust and/or exhaust port in cylinder clogged	Remove carbon deposits
3.6 Bowdencable misadjustment	Adjust properly

All other failures which require partial or complete dismantling of the engine should always be taken care of by an approved service shop.
Improper repairing can cause damages and lifts the claim to guarantee.
Use genuine JLO spare parts only.

CAUTION:
Carriers of cardiac pacemakers should avoid touching current carrying parts of the ignition system.

RECOIL STARTER

DISASSEMBLY

1.1. 1 Pull knot (1a) out of handle (2) and untie.

2 Allow rope (1) to retract slowly.

3 Remove nut (3) and parts (5,6,8,9) - (illustration I).

4 To prevent the recoil spring from uncoiling (see illustration II), rotate rope pulley (10) back and forth to disengage inner spring eye and carefully lift out of housing (7).

5 Remove rope (1) from rope pulley (10).

NOTE:
Recoil spring (4) need not be removed from housing (7) unless it is broken.

6 To remove spring (4), take housing (7) in both hands, open side down, and hit housing (7) on work bench or other flat surface. Spring will drop out.

7 Clean and inspect all parts for damage and wear, and replace if necessary.

ASSEMBLY

NOTE: Note required direction of rotation. See illustration III.

Old recoil spring (only if removed from housing during disassembly):

1.2. 1 Wind recoil spring (4) into housing (7). See illustration II.

2 Lubricate recoil spring (4) and rope pulley shaft (12) with some multi- purpose grease.

New recoil spring - prewound:

3 Place recoil spring (4) in housing (7) and push with screwdriver down into housing (7). Remove retaining wire with snipe nosed pliers.

4 The outer spring eye (4b) must be properly hooked around the retaining tab (illustration III).

5 The clearance required between inner spring eye (4a) and rope pulley shaft must be approx. 4 mm (.160 in.). If necessary, rebend spring eye (4a) (ill. III).

6 Lubricate recoil spring (4) and rope pulley shaft with some multi-purpose grease.

7 Fit rope pulley (10) and carefully rotate it back and forth until it engages in the inner spring eye (4a).

8 Install parts no. 8,9,6,5, and 3 (illustration I).

9 Fit long end of torsion spring (8) into hole of rope pulley (10), pushing it over pawl guide (11) (illustration IV).

10 Slip pawl (9) with smooth surface pointing upwards over pawl guide (11). Short end of torsion spring (8) must fit into groove of pawl (9a) (illustration V).

11 Fit brake spring (6) to brake disk (5) as shown in illustr. V. Note position of brake spring ends (6a) in relation to flat on one side of brake disk (arrow). Position rope pulley (10) in relation to flat on pulley shaft (12) as shown in illustr. V (arrow). Install brake disk (5) with brake spring (6) onto pulley shaft (12). Flat in brake disk must match flat on pulley shaft. Fit hex. nut (3) and torque to 6 Nm (4.4 ft/lbs).

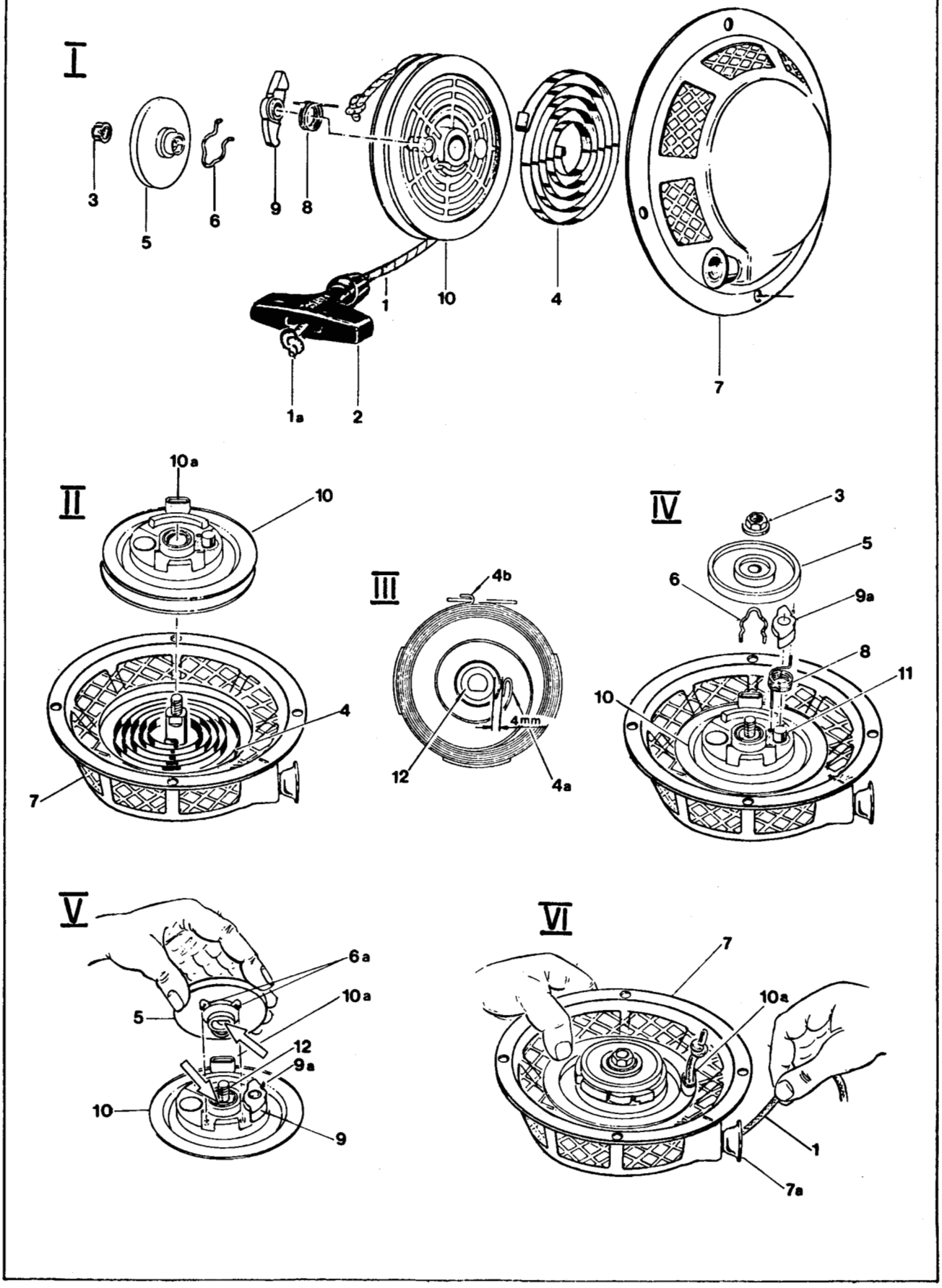
12 Rotate rope pulley (10) against the recoil spring tension until it is tight and hold firm (illustration VI).

13 Let rope pulley (10) now rotate backwards until hole in rope pulley (10a) and rope guide in housing (7a) are in line.

14 Slide rope (1) through hole in rope pulley (10a) and then through the rope guide in the housing (7a).

15 Slide rope (1) through handle (2) and tie knot. Slowly return handle.

If the recoil starter has been properly assembled, the pawl (9) must move outward when rope is pulled.


I
3
5
6
9
8
1
10
4
7
1a
2
II
10a
10
4
7
III
4b
4mm
12
4a
IV
3
5
6
9a
8
11
10
V
6a
10a
5
12
9a
10
9
VI
7
10a
1
7a

FLYWHEEL, IGNITION SYSTEMS

Special JLO Tools

Flywheel puller (11) 444.31.843.100

DISASSEMBLY

2.1. 1 Remove screws (1) with lock washer (2) carrier (3).

2 Remove screws (4) with lock washer (5) and fan cover (6).

3 Remove hex. nut (7), spring washer (8), and flat washer (9).

4 To pull off flywheel (10) use puller (11). Unless magnetic flywheel (25) is defective it need not be removed from fanwheel (10). To separate magnetic flywheel (25) from fanwheel remove hex. nuts (24), lock washers (23), and screws (22).

NOTE:
Holes in magnetic flywheel are unevenly spaced, so flywheel will only fit in fanwheel in one position.

5 Remove key (12), cam (13), spring (14), washer (15), and pin (16).

6 Note or mark position of armature plate in crankcase. Remove screws (17), lock washers (18), and flat washers (19). Remove armature plate (20).

7 Check coils, condenser, and breaker points, and replace if necessary. (For specifications, please refer to page 4).

8 If engine is so equipped, remove external ignition coil (21).

ASSEMBLY

2.2. 1 Slightly lubricate wires with silicon spray and feed them through their corresponding grommets.

2 Install armature plate (20) and fasten with screws (17), lock washers (18), and flat washers (19).

3 If engine is equipped with a 12 Volt, 75/23 Watts ignition system, the green and green/black lead of the 23 Watts coil must be connected.
(See wiring diagram on page 12).

4 Place thrust washer (15) and spring (14) on crankshaft. Install cam locating pin (16) in its groove (16a).

NOTE:
Cam (13) has 2 grooves on the inner periphery. Each groove is marked with an arrow. If the engine is to run counterclockwise, you must use the groove with the arrow pointing to the clockwise rotation. (Groove "L" as shown in illustr. II and III).

5 Position cam on crankshaft. Be sure pin (16) is properly seated in cam groove. To properly set ignition timing, please refer to timing section on page 11/12.

6 Degrease crankshaft taper and mating taper in fanwheel (10).

7 Place key (12) in keyway on crankshaft. Inspect inside of magnetic flywheel to be sure no foreign parts cling to magnets.

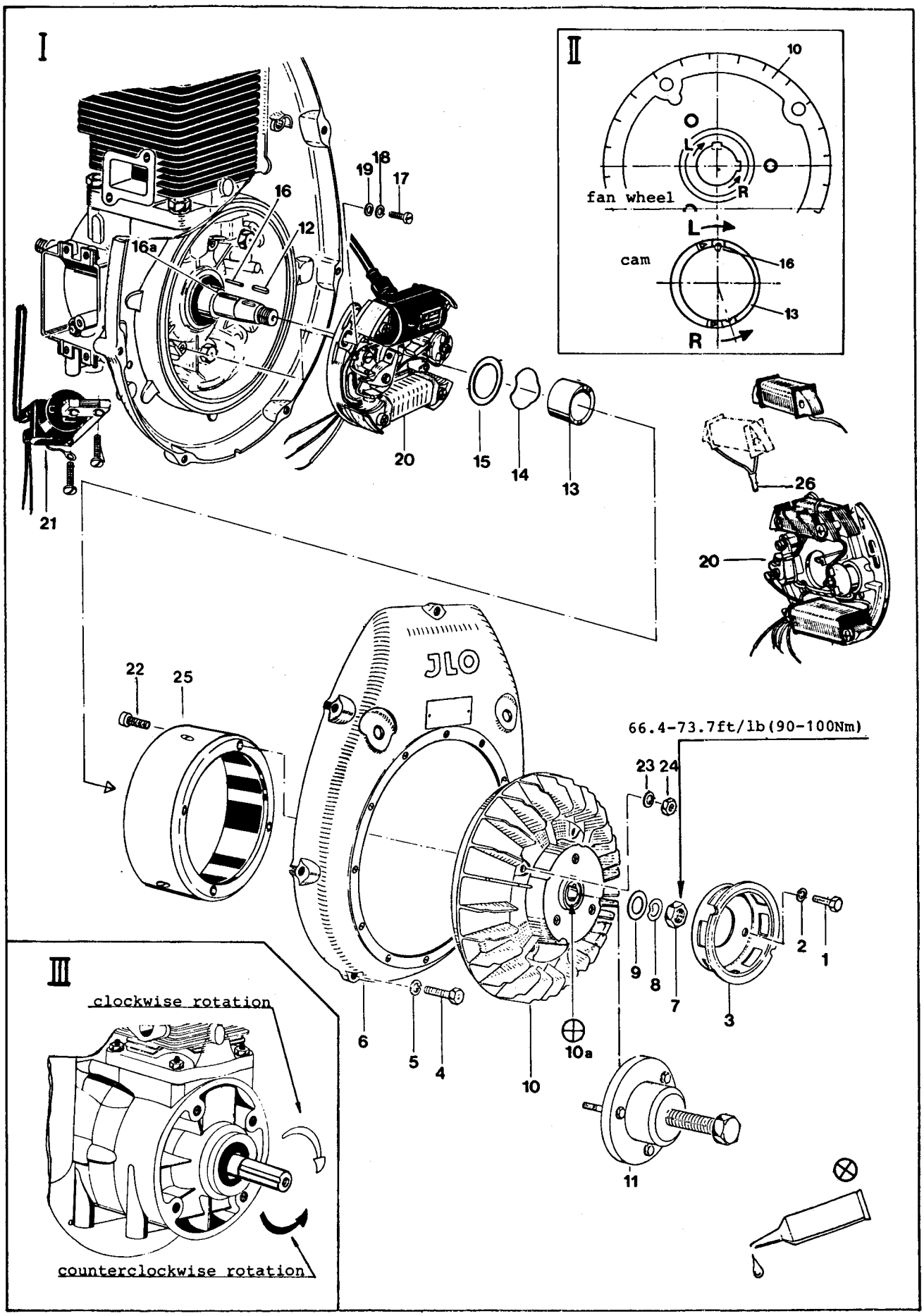
NOTE:
Fanwheel (10) has 2 keyways. If the engine is to run counterclockwise, you must use the keyway with the arrow pointing to the clockwise rotation. (Keyway "L" as shown in illustr. II).

8 Place fanwheel (10) on crankshaft. Be sure key (12) is located in proper keyway.

9 To prevent water from getting into the ignition area through the unused keyway, apply sealing compound (10a) to face of fanwheel hub as shown. Install flat washer (9), spring washer (8), and hex. nut (7). Torque hex. nut (7) to 90-100 Nm. (65-75 ft/lbs).

10 Install fan cover (6) with lock washers (5) and screws (4).

11 Install carrier (3) with lock washers (2) and screws (1).


I
II
III
10
fan wheel
L
R
cam
16
13
19
18
17
16a
12
20
15
14
13
21
26
20
22
25
JLO
66.4-73.7ft/lb(90-100Nm)
23
24
9
8
7
3
2
1
6
5
4
10
10a
11
clockwise rotation
counterclockwise rotation

TIMING PROCEDURE

Special JLO Tools

Timing gauge (1) 441.31.875.000
Timing light (2) 000.15.330.000

TIMING DATA: - Engine Model L/RM 252 -

Timing BTDC	.110 - .126 inches	(2.8 - 3.2 mm)
Breaker Point Gap	.012 - .016 inches	(0.3 - 0.4 mm)
Spark plug gap	.020 inches	(0.5 mm)

PREPARATIONS

3.1. 1 Screw timing gauge (1) into spark plug hole of cylinder head.

2 Connect one lead of timing light to engine ground, the other lead to the disconnected wire of the ignition system.

3 Bring piston into top dead center position.

BREAKER POINT GAP

4 Check breaker point gap with feeler gauge.

5 To adjust breaker point gap, loosen retaining screw (4) and adjust to specified gap by moving fixed part of point set (5).

6 Tighten retaining screw (4), and re-check gap.

IGNITION TIMING

NOTE:
Breaker points must be adjusted to proper gap PRIOR to timing the engine.

7 Note reading of timing gauge with the piston still in top dead center position.

8 Turn crankshaft approx. 90° in opposite direction of normal direction of rotation (away from TDC), then slowly turn flywheel towards TDC until timing light (2) changes from dim to bright or buzzer of timing device changes loudness (timing point).

9 Note reading on timing gauge. The difference between the 2 readings (step 7 and 9) is the timing in inches or mm, depending on calibration of timing gauge, before TDC.

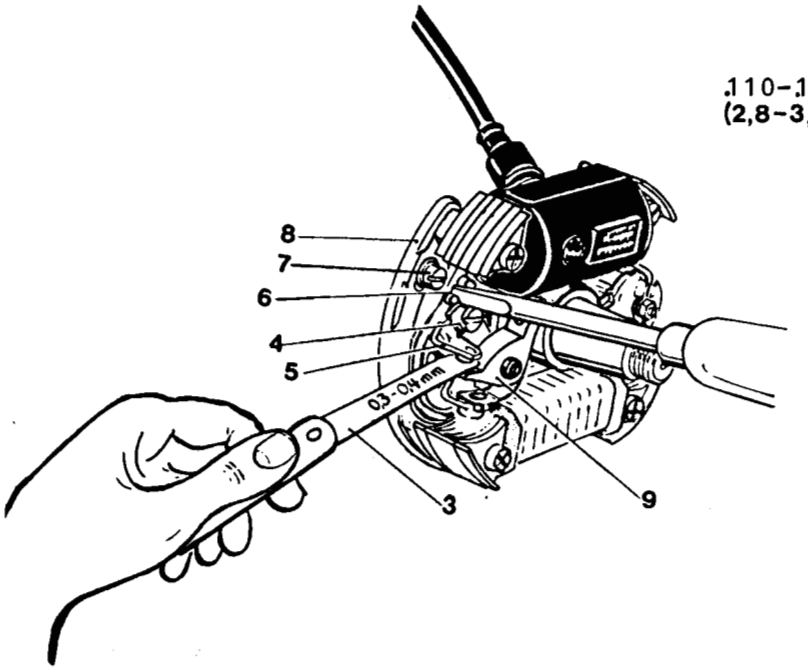
10 To change timing, loosen armature plate retaining screws (7) and rotate plate in required direction.

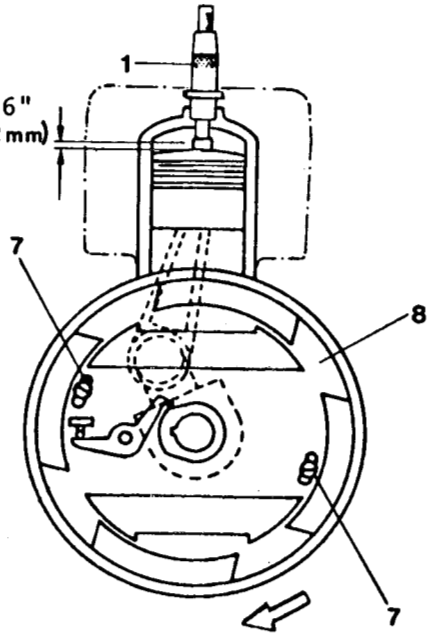
NOTE:
Rotating the armature plate in the direction of engine rotation will retard the timing, while rotating the armature plate in the opposite direction of engine rotation will advance the timing. Never attempt to advance or retard the timing by changing the breaker point gap.

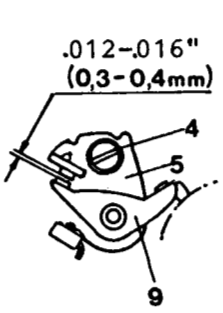
11 Tighten armature plate retaining screws (7), and re-check timing repeating the procedure described in steps 7, 8, and 9.

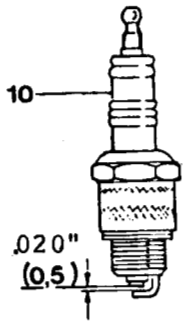
NOTE:
If timing settings cannot be obtained, breaker points must be replaced. If breaker points are corroded or otherwise contaminated, engine may tend to backfire. Clean!
If breaker points are badly pitted, they must be replaced.

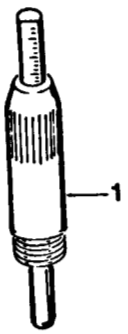
Replacement armature plates (12 Volts, 40 Watts) may be equipped with a lighting coil. If coil is not used, it may either be removed prior to installing the plate or the 2 yellow leads may be cut off right at the coil.


8
7
6
4
5
0,3-0,4 mm
3
9


1
.110-.126"
(2,8-3,2 mm)
7
8
7


.012-.016"
(0,3-0,4mm)
4
5
9


10
.020"
(0,5)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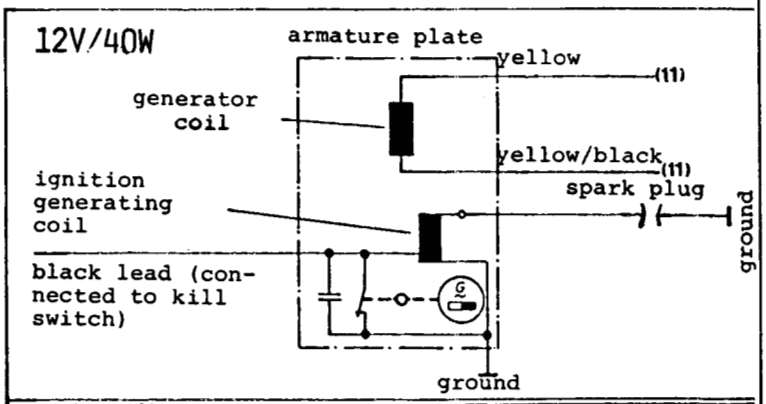
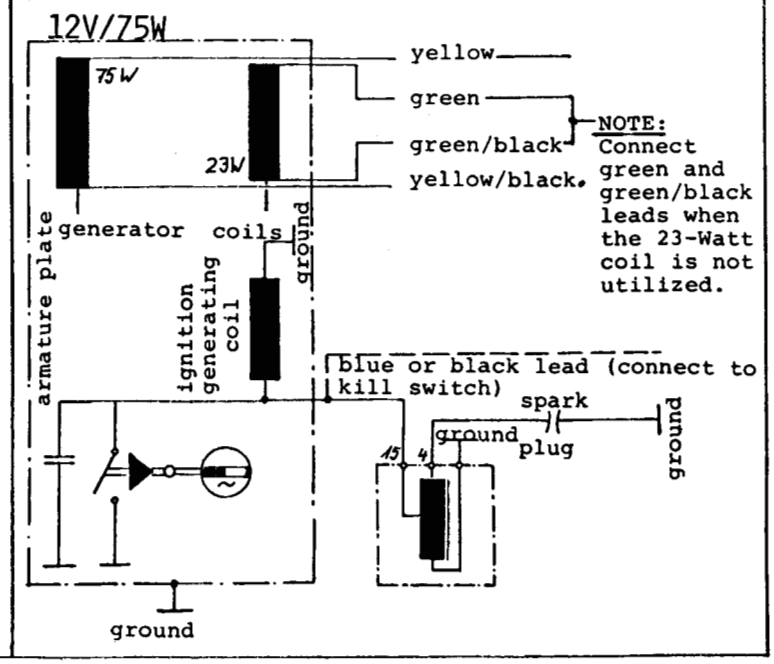
2
Testboy


12V/40W
armature plate
yellow
(11)
generator coil
yellow/black
(11)
ignition generating coil
spark plug
ground
black lead (connected to kill switch)
ground


12V/75W
yellow
75 W
green
NOTE:
Connect green and green/black leads when the 23-Watt coil is not utilized.
green/black
23W
yellow/black
generator coils
ground
armature plate
ignition generating coil
blue or black lead (connect to kill switch)
spark plug
ground
ground
15
4
ground

SPEED CONTROL
RM 252 FLYBALL GOVERNOR

Special JLO Tools

Vibration tachometer 000.15.300.100

DISASSEMBLY

4.1. 1 Remove nut (21), washer (18), and cover (17).

2 Disconnect throttle cable noting the hole position for re-assembly. Remove clip (9) from linkage and unhook linkage (1).

3 When removing lever (2) note into which of the 5 holes the governor spring (3) is hooked. To remove lever (2), remove lock nut (16), spring washer (15), steel washers (14), and plastic washer (12). Note sequence. Remove screw (6) and spring washer (7). Slide governor lever (8) out of governor housing.

4 Engine stop contact (10) need not be removed unless it is to be replaced.

ASSEMBLY

4.2. 1 If engine stop contact (10) has been removed, re-install by snapping it back into the bore in governor housing. Be sure recess in flange clears boss of crankcase.

2 If stud (13) is loose or has been removed, re-install in crankcase with thread locking compound.

3 Install governor lever (8) with spring washer (7) and screw (6).

4 Install lever (2) with washers (14,12), spring washer (15), and new lock nut (16). For precise lock nut tightness please refer to section "governor adjustment procedure".

5 Install governor spring (3) in appropriate hole of levers 2 and 8.

6 Install governor linkage (1) and secure with new clip (9).

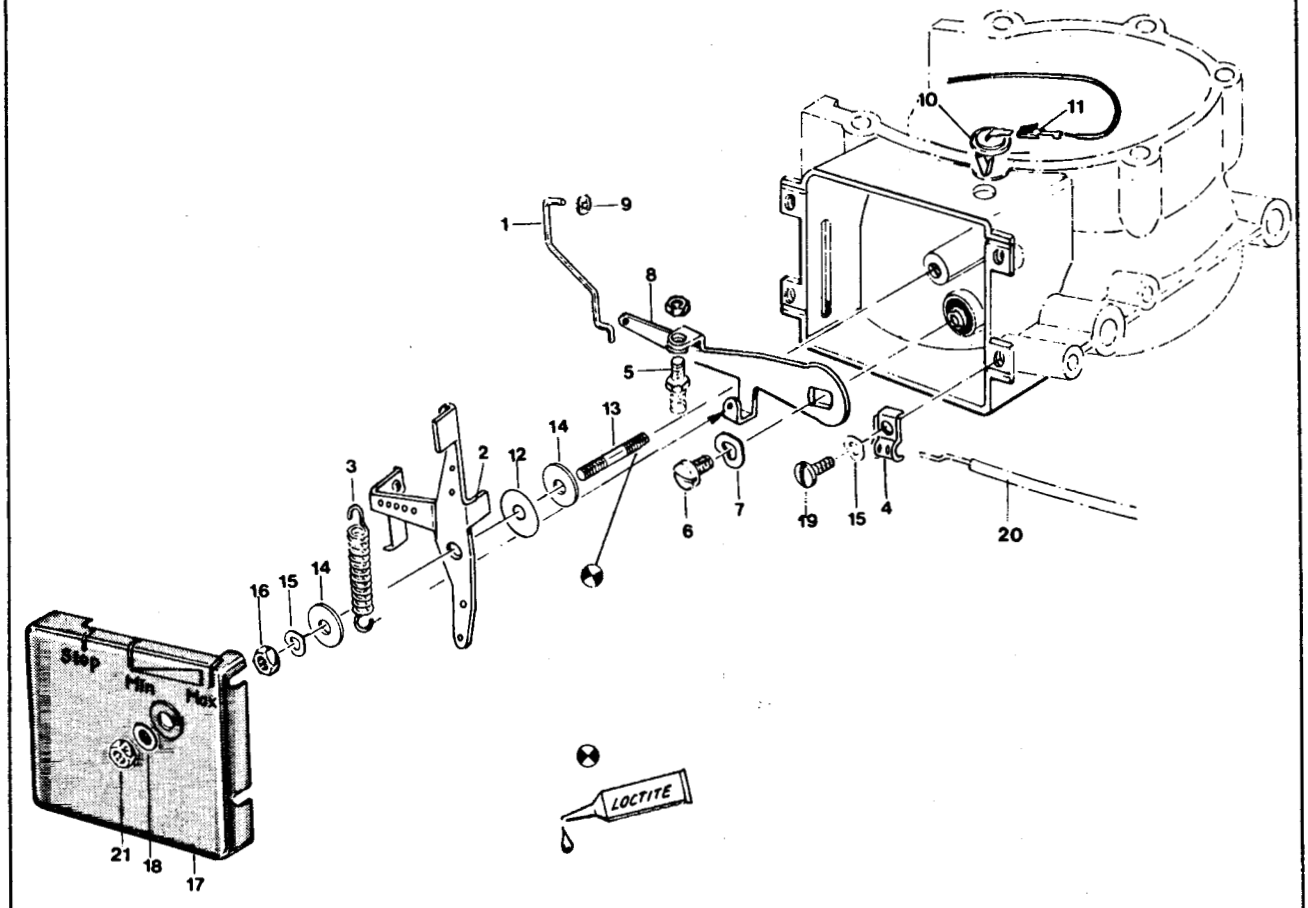
7 Connect throttle cable.

8 Cover (17) with washer (18) and nut (21) should be installed after governor has been properly adjusted. Please refer to corresponding section in this manual.

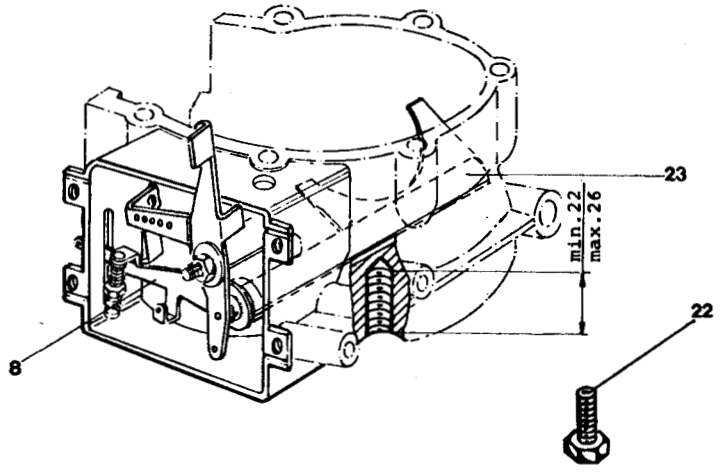
NOTE:
Bolts (22) too long or inserted incorrectly might jam the governor shaft (23). (Observe reach of screw!)

When bolts (22) are inserted correctly, lever must move freely (ill. II).

I


10
11
1
9
8
5
13
14
12
2
3
6
7
19
15
4
20
16
15
14
Stop
Min
Max
21
18
17
LOCTITE

II


23
min.22
max.26
8
22

ADJUSTMENT INSTRUCTIONS-MECHANICAL

Special JLO Tools

Vibration tachometer 000.15.300.100

STOP-, IDLE-, AND NO-LOAD ADJUSTMENT with the blade fitted

NOTE:
Check main and idle jet of carburettor for cleanliness. Set air adjusting screw (7) (it should be set 1/2 a turn out).

Preparations:

1. Move both speed lever (1) and throttle lever on mower handle into "Run" (Max.) position.

2. Hook piano wire (3) into lever (1) using the original hole position (2). Lightly retain the outer cable by means of screw (19) and clamp (4).

Adjustment of No-Load Speed (throttle wide open):

3. Hook spring (11) into lever (1) for initial adjustment. (Required no-load rpm refer to table).

4. Hold lever (1) in RUN (Max.) position and tighten Nylock nut (5) so that the spring (11) can just move the lever (1).

5. Start engine (take all safety rules into consideration). Check speed with tachometer, and if necessary adjust by bending spring retainer on governor lever (6) into + or - direction. (Refer to illustration and table).

   NOTE:
   Bending into + direction = engine runs faster
   Bending into - direction = engine runs slower
   (max. $\pm$ 3.00 mm corresponds to approx. $\pm$ 100 rpm)
   There is no gap between damping spring and housing at no load rpm

6. If engine tends to hunt at no-load speed, screw out damping spring (9) until engine stops hunting.

Adjustment of Idle Speed:

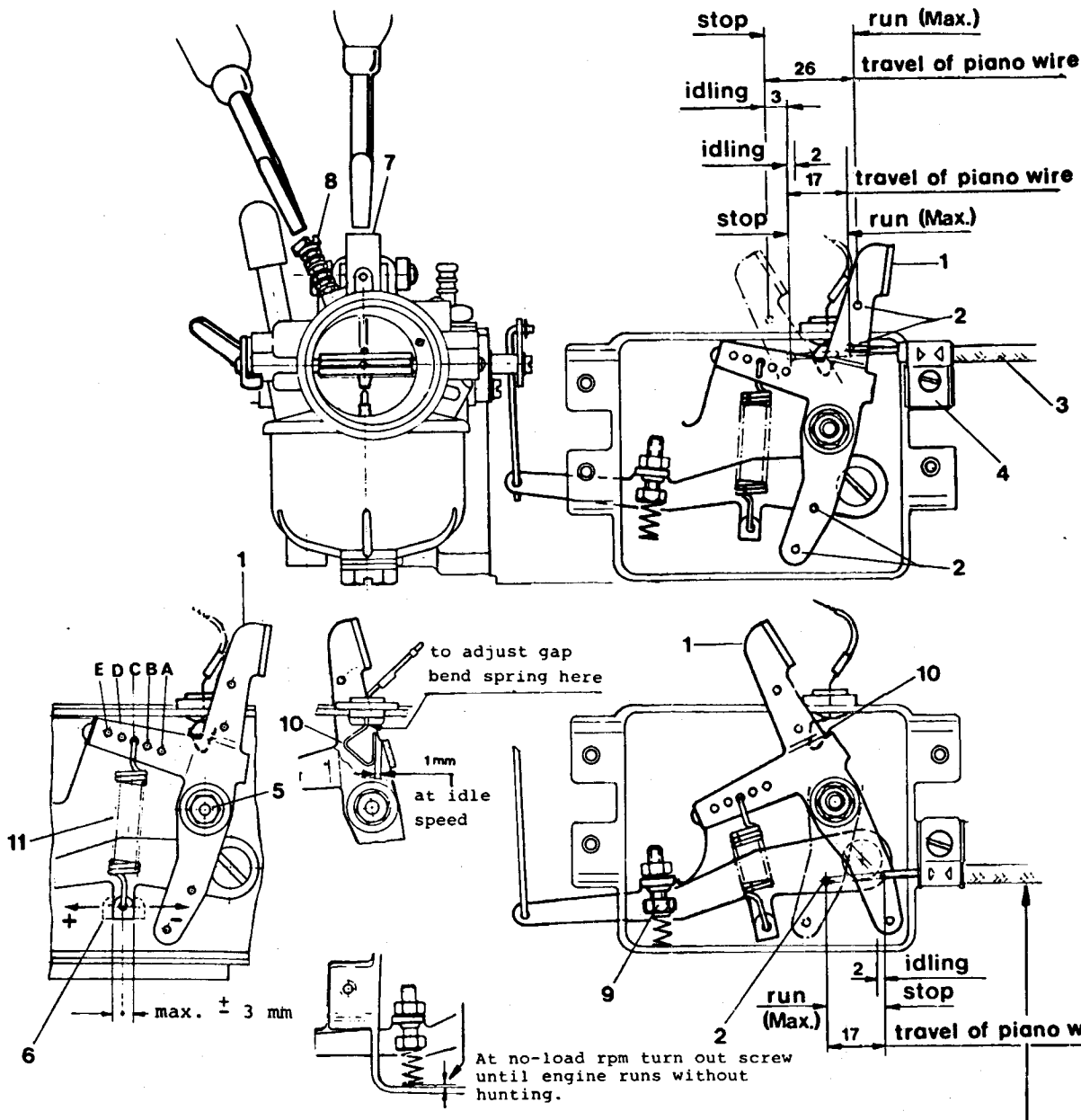
7. Move speed lever (1) into "Idle" (Min.) position.

   NOTE:
   In this position lever and short circuit contact must still have a gap of 1 mm.

8. Set the idle speed to 1200-1300 rpm by adjusting carburettor idle set screw (8).

9. Move speed lever (1) into "Stop" position. In this position the lever (1) must touch the short circuit contact (10). If necessary, loosen clamp screw (12) at and adjust outer cable (3).

NOTE:
Change carburettor jets for operation in higher areas. Following a rule of thumb every 3000 ft. of altitude above sea level, the main jet should be reduced by one size. These modifications do not affect the other jets and adjustments.

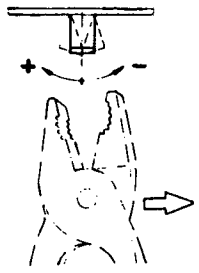


wire Ø 1.5 B(C) DIN17223
wire cover, outer Ø 6 mm

No-load adjustment

by spring positioning at speed lever

bore A	approx.	2750 rpm
B		2900 "
C		3050 "
D		3200 "
E		3400 "



precise adjustment by bending tongue at lever
max ± 3.0 mm correspond with approx. ± 100 rpm

\+ higher no-load rpm
\- lower " " "

carburettor survey ref. to spare parts list

SPEED CONTROL
L 252 TOP SPEED LIMITER

Special JLO Tools

Tachometer - Vibration Type 000.15.300.100

DISASSEMBLY

4.3. 1 Remove carburettor from intake manifold and disconnect air vane rod (1) from butterfly lever (2) (see illustr. III and IV).

NOTE:
The butterfly lever (2) is positioned by 2 flats on the butterfly spindle. When removing the lever, note its original position (see ill. IV).

2 Carefully unhook spring (3) from lever (4) and airvane (5).

3 Loosen hex. nut (7) and remove screw (6). Disconnect air vane rod (1).

4 Remove hex. nut (9), star washer (10), and adjusting lever (4).

ASSEMBLY

NOTE:
Carefully inspect all air vane governor parts for excessive wear or damage. Replace if necessary. It is particularly important that the governor spring is not over- stretched or damaged at the spring ends.

4.4. 1 Connect air vane rod (1) to air vane (5). Fit hex. screw (6) through air vane (5), fit hex. nut (7) and lock washer (8), and install in boss provided on cylinder (see illustr. I). Do not apply any lubricant to air vane/spindle!

2 Tighten hex. nut (7) so that air vane moves freely radially on hex. screw (spindle) (6) with only a little axial play.

3 Connect other end of air vane rod (1) to lever (2) of carburettor butterfly spindle. Install carburettor on intake manifold.

NOTE:
With the air vane in position "C", the butterfly valve in the carburettor must be in the fully open position (throttle wide open).

4 Install adjusting lever (4) with star washer (10) and hex. nut (9).

5 Carefully hook spring (3) into both holes of air vane (5) and lever (4) as shown in illustr. II.

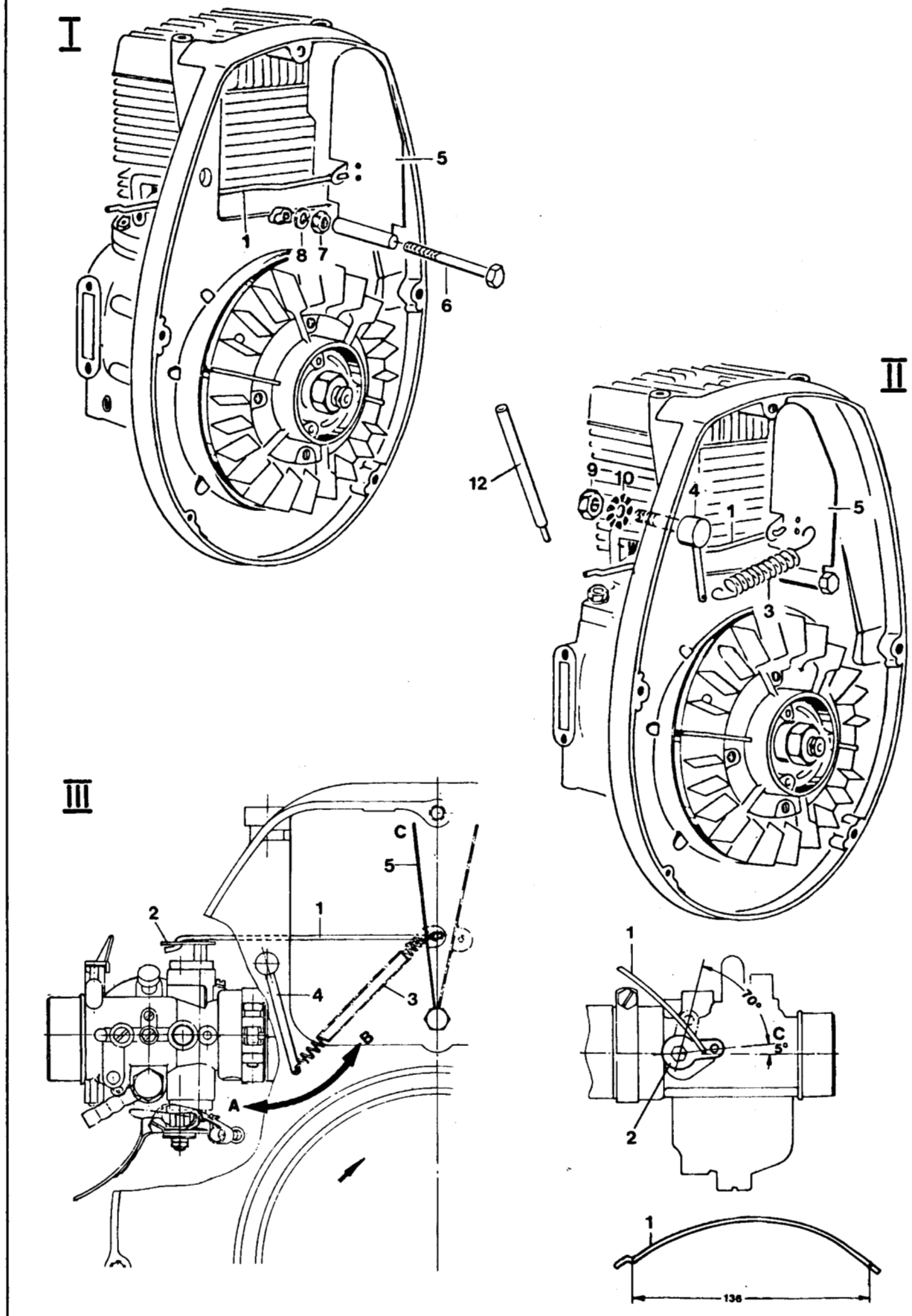
SPEED ADJUSTMENT

6 Start the engine, observing safety regulations.

7 Loosen hex, nut (9), insert small punch or drill into hole provided in lever, and rotate lever to obtain desired engine speed.

NOTE:
A = Higher spring tension = higher speed
B = lower spring tension = lower speed

8 When desired speed has been obtained, tighten hex. nut (9) securely and re-check engine speed with tachometer.


I
5
1
8
7
6
II
12
9
10
4
1
5
3
III
C
5
2
1
4
3
B
A
1
70°
C
5°
2
1
136

CARBURETTOR, CARBURETTOR DATA

DISASSEMBLY

5.1. 1 Remove air filter from carburettor (1). For filter maintenance please rever to instructions on page 5/6.

2 Close fuel shut-off valve on tank and remove fuel line from carburettor. Remove clip (2), governor rod (3), loosen screw (4), remove carburettor (1) from intake manifold.

3 Remove fuel line connection (36), gasket (35), idle jet (5), gasket (6), air adjustment screw (18), and spring (19).

4 Remove mainjet carrier (7), gasket (8), float bowl (9), and gasket (11).

5 Remove float by pulling or pushing float hinge pin (12) out of carburettor housing. Remove float needle (14) with spring (15). Remove mixturizer (17).

6 Check butterfly shaft (28) and choke shaft (31) for excessive wear. To remove butterfly shaft (28), remove screw (20), lever (21), screw (22), shaft retainer (23), washer (24), and foam seal (25). Remove butterfly retaining screws (27) and butterfly (29). Butterfly spindle (28) may be pulled out of carburettor body after screw (33) and lock washer (34) have been removed.

7 Choke shaft assembly (30,31,32) need normally not be removed. In case replacement is required, note position of detent ball (37) and spring (38).

NOTE:
Clean carburettor body and all components in clean fuel or other suitable solvent and blow-dry. Inspect all parts for damage and wear, and replace if necessary. Take into consideration the repair kits mentioned in the preface and at the end of the spare parts list.

ASSEMBLY

5.2. 1 If choke shaft assembly (30,31,32) has been removed, re-install, observing that cut-out in choke plate points downward and detent ball (37) and spring (38) are in place.

2 Insert butterfly spindle (28) in carburettor body, fit butterfly (29) and secure with screws (27).

NOTE:
Butterfly is slightly oval and contour-ground on periphery. For proper position please see illustr. (I).

3 Install screw (33) and lock washer (34). Fit foam seal (25), washer (24), and and secure shaft with retainer (23) and screw (22). Mount lever (21) with screw (20).

4 Install connection (36) with new gasket (35). Install mixturizer (17).

5 Check condition of float (14), and replace if necessary.

NOTE:
The float needle seat (16) is pressed-in, and therefore not replaceable.

6 Connect float needle (14) to float (13) via hair pin spring (15), as shown and install in carburettor. Fit hinge pin (12).

Float Adjustment
Turn carburettor upside down. Let float (13) close float needle (14) by its own weight. DO NOT APPLY PRESSURE. Float must move freely on hinge pin (12). Bottom side of float must be parallel with carburettor housing. If adjustment is required, carefully bend float hinge until parallel. (See illustr.)

7 Install mainjet (10) into mainjet carrier (7), replace gasket (8) and (11), and fasten float bowl (9) to carburettor.

NOTE:
The float (13) should be in parallel with the surface of the housing. If not, bend the float hinge accordingly. The float should only touch the float needle (14) slightly when it is being placed in position. Take care that the elasticity will not be strained too much. The float needle is spring supported!

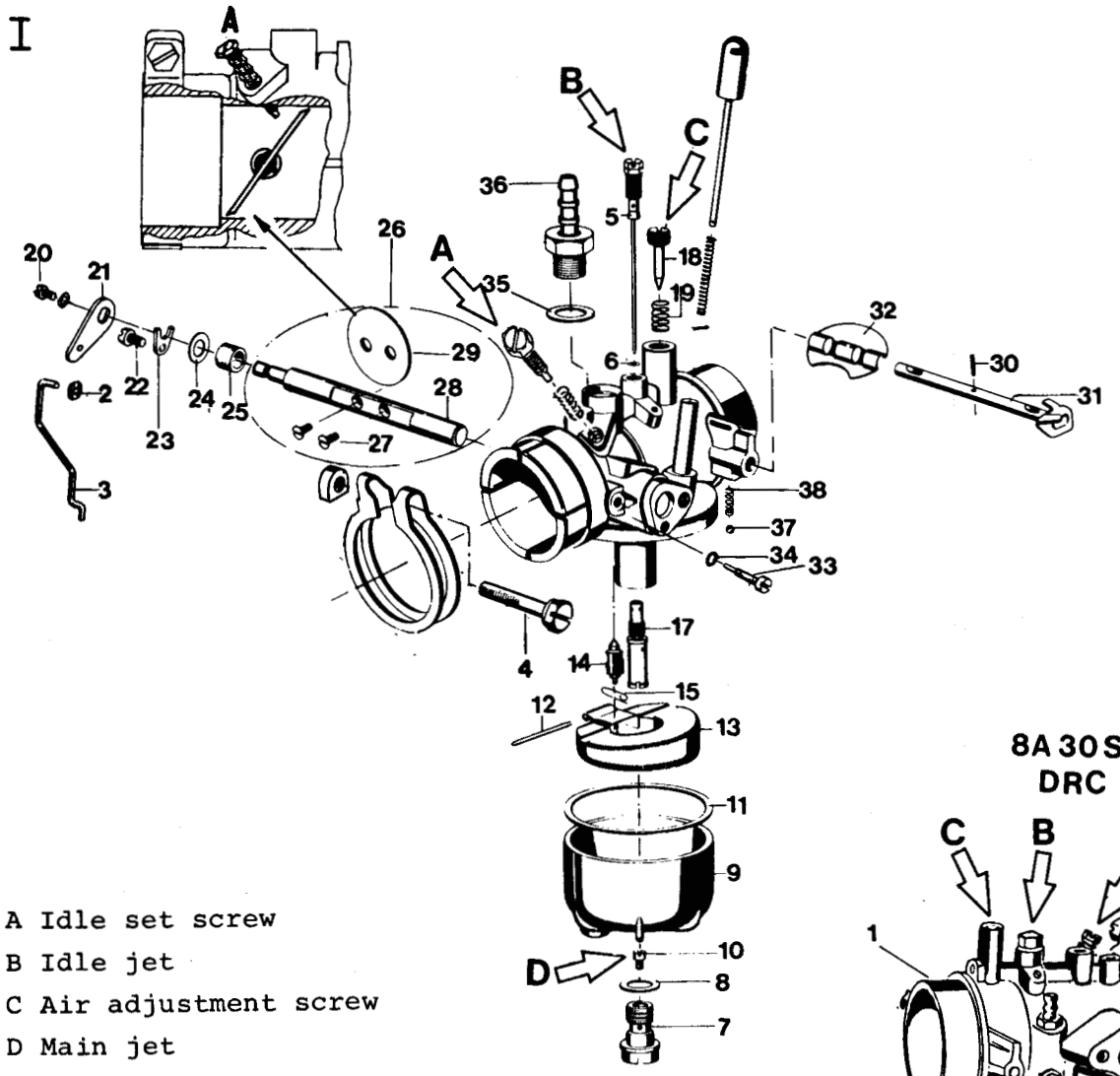
8 Install idle jet (5) with new gasket (6).

9 Install air adjustment screw (18) with spring (19). Turn screw (18) clockwise until it bottoms out, (do not force srew (18) into its seat), then back up half a turn. (Air adjustment screw half a turn open).

10 Fit carburettor to engine, tighten screw (4), connect governor linkage (3) to lever, and secure with new clip (2).

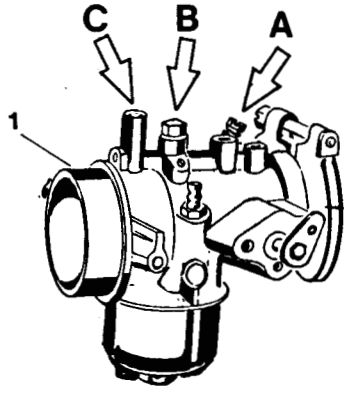
NOTE:
Do not re-use clip (2).

I

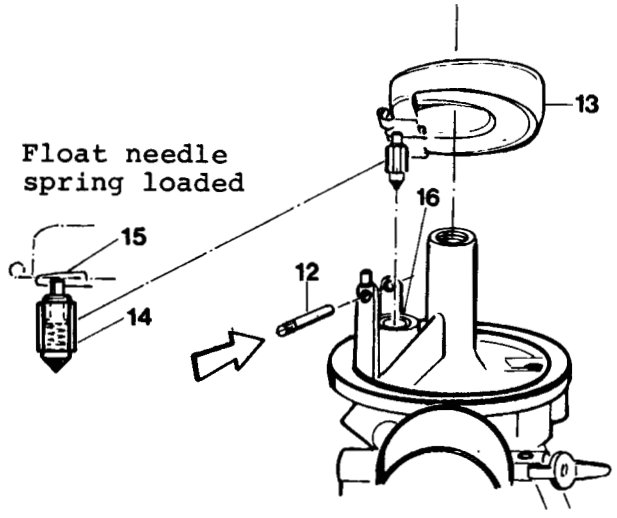


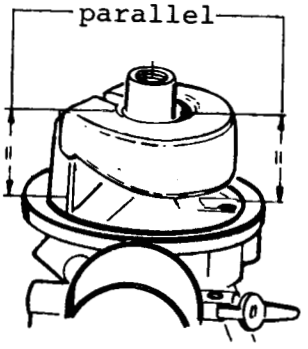
A Idle set screw
B Idle jet
C Air adjustment screw
D Main jet

8A 30S...
DRC



Float needle
spring loaded





PISTON, CYLINDER

DISASSEMBLY

6.1. 1 Loosen nuts (1) and remove spring washers (2), cylinder head (3), and gasket (4). Remove bolt (18), spring washer (17), and air guide (16), if these parts are mounted.

2 Loosen cylinder base nuts (5) and remove spring washers (6), and pull off cylinder (7). Discard gasket (8).

3 Remove circlips (9). Push or tap out wrist pin, and remove piston (11).

4 Remove thrust washer (12) and needle bearing (13).

NOTE:
Piston and cylinder ought to be replaced if the max. play between piston shirt and cylinder wall exceeds 0.35 mm (see table of specs., page 27). All ports on the cylinder wall must be beveled, if the cylinder is re- machined.

ASSEMBLY

NOTE:
Clean sealing surfaces of cylinder and crankcase.

6.2. 1 Place new cylinder base gasket (8) on crankcase.

2 When installing piston (11) the arrow stamped on piston crown must point towards the exhaust port. (Piston may be installed either ways if no arrow is shown).

3 Insert needle bearing (13) in eyelet of connecting rod.

4 Install piston (11) and thrust washers (12) with wrist pin (10) and secure by circlips (9).

5 Slip a wooden piston support (14) under the piston (11), and rotate crankshaft until piston rests on support.

6 Slightly lubricate cylinder liner and piston.

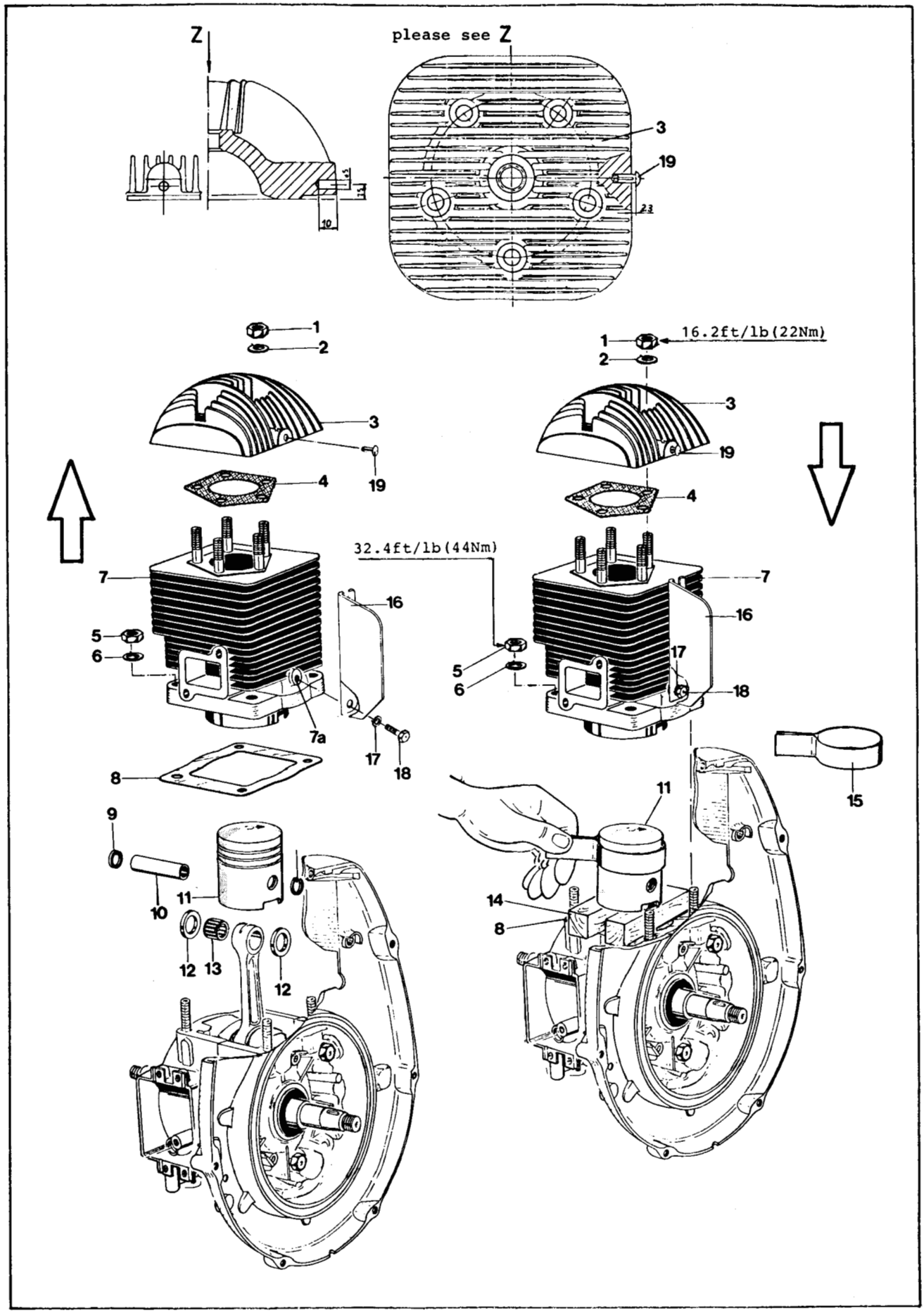
7 Position piston rings around pegs in ring grooves and compress rings with ring compressor (15). Install cylinder (7) and remove ring compressor (15) and piston support (14).

8 Torque cylinder (7) with nuts (5) and spring washers (6) to 32.4 ft/lbs (44.0 Nm).

9 Place a new cylinder head gasket (4).

10 Torque cylinder head (3) with nuts (1) and spring washers (2) to 16.2 ft/lbs (22.0 Nm).

11 Insert air guide (16) with slotted hole to notched pin (19) in cylinder head (3) and fasten it with bolt (18) and spring washer (17) on cylinder (7a).


Z
please see Z
3
19
23
10
1
2
3
19
4
16.2ft/lb(22Nm)
32.4ft/lb(44Nm)
7
16
5
6
7a
17
18
8
9
10
11
12
13
14
15

CRANKCASE, CRANKSHAFT-RM 252

Special JLO Tools

Puller	444.31.807.000 (10)
Pair of half shells	444.31.072.000 (10)
Retaining ring	444.31.071.100 (10)

DISASSEMBLY

7.1. 1 Loosen bolts (3) and remove spring washers (4).

2 Pull crankcase pto side (2) off crankshaft (5). Slide fit of ball bearing (8) and crankcase (5) allows disassembly without heating up. Discard gasket (22).

3 Remove washer (7) and complete thrust bearing assembly (11) from the crankshaft (5). Remove balls (13).

4 Heat crankcase half starter side (1) to approx. 100°C (212°F).

5 Lift crankcase assembly (1), so that pto shaft end is clear of the work bench, and gently tap crankshaft with plastic hammer out of the crankcase. Remove shim(s) (10) and seal (19).

6 To remove ball bearing (9) from crankshaft (5) use bearing puller assembly (12).

7 Loosen Loctited screws (17) and remove governor fork (18).

8 Pull governor shaft (16) out of case (2). Remove washers (15) and knock out small oil seal (14).

9 Heat housing pto side (2) to approx. 100°C (212°F), and tap out ball bearing (8).

10 Remove seal (19) (illustr. I).

ASSEMBLY

7.2. 1 Slightly lubricate new oil seals (19). Insert seals with oil seal installation tool into both crankcase halves (1+2). Sealing lips facing the inside of the crankcase.

2 Place heat shield over oil seal (19) and heat crankcase pto side (2) to approx. 100°C (212°F). Use ball bearing driver and place ball bearing (8) into crankcase.

3 Slightly lubricate governor shaft (16), and fit thrust washers (15) into crankcase (2) (illustr. I).

4 Use locking compound when tightening screws (17) and fit governor fork (18) on governor shaft (16). (illustr. II).

5 Knock oil seal (14) into its position. Use slip cone (20), and driver (21) (illustr. V).

6 Warm ball bearing (9) to approx. 80°C (175°F) and drive it on the crankshaft (starter side) by ball bearing driver. (Drive only on inner bearing race).

7 Fit governor balls (13) into bores of pto crankweb.

8 Mount three piece thrust bearing (11).(see illustr. III).

9 Mount shim (7) with recess facing towards crankweb.

10 Insert sub-assembled crankshaft (5) into crankcase pto side (2) (Ball bearing is placed slide fitted on crankshaft.

11 Lightly grease new gasket (22) with general purpose grease, and place in position on crankcase (2).

12 Limit axial play of crankshaft (5) by using shims (10), thickness 0.2 mm (.008 in.) (illustr. IV).
NOTE:
Measuring plane for depth gauge: upper ball bearing edge to crankcase sealing face with gasket (22) in place (illustr. IV). Any difference between measured result and required measure (30.1 - 30.2 mm/ 1.185-1.189 in.) has to be compensated with shims (10). Thickness of shims 0.2 mm (.008 in.) (See table on page 24).

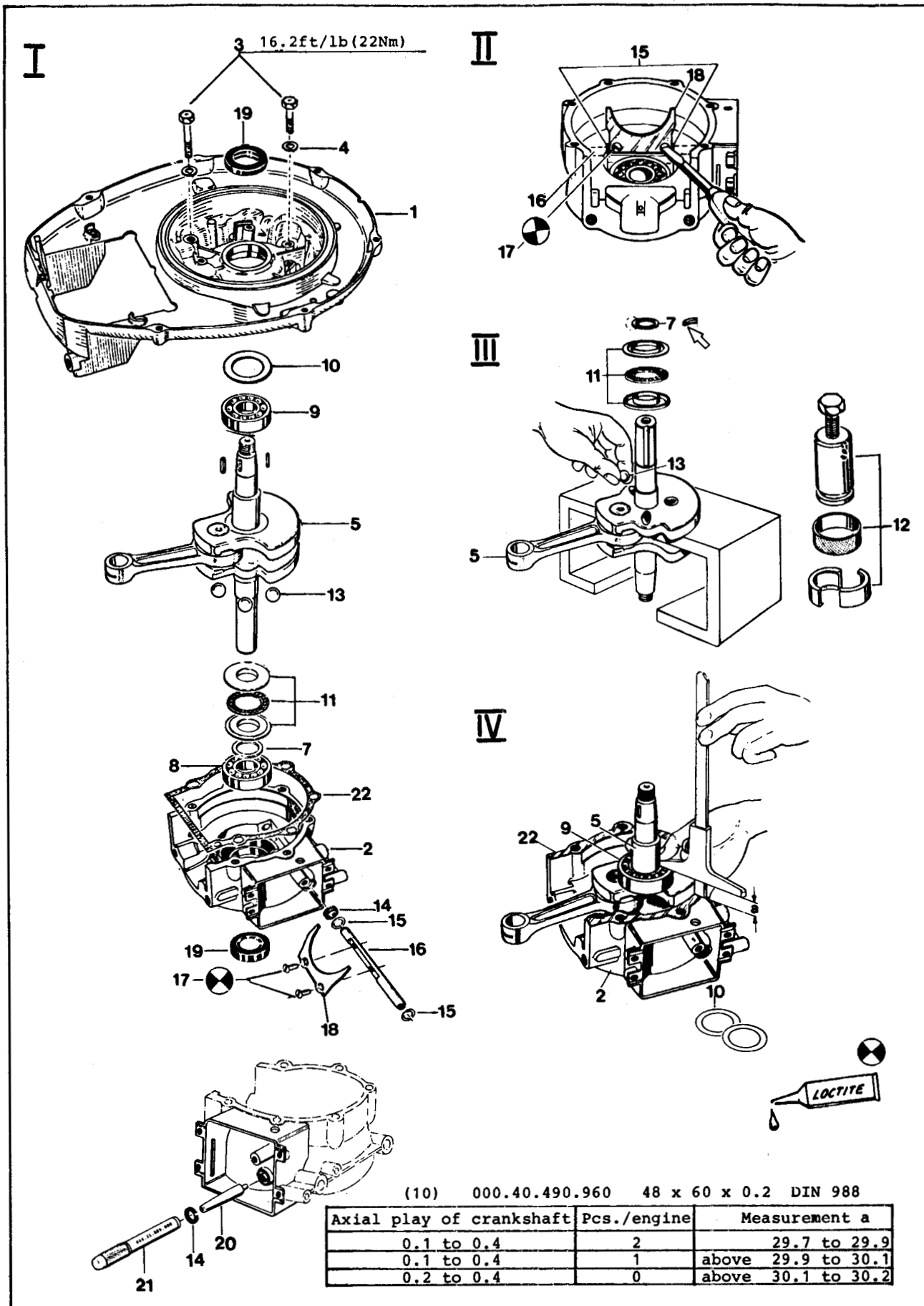
13 Place heat shield over oil seal (19), Heat crankcase starter side (1) to approx. 100°C (212°F), and mount it (1) on crankcase half, pto side (2).
NOTE: Make sure that seals (19) will not be damaged. (Use approximate slip cone).

14 Ensure both crankcase halves (1+2) are properly aligned and install screws (3) with spring washers (4) fingertight.

15 Re-check mounting surface for cylinder. Cut off overhanging gasket part (22). Tighten screws of crankcase (3).

16 After mounting cylinder (see description on page 21) tighten crankcase bolts (3). Torque 90-100 Nm (66.4-73.7 ft/lbs).

17 Turn crankshaft (6) by hand to ensure free moving. If crankshaft will not turn freely, tap each end of crankshaft lightly with a plastic hammer.



(10) 000.40.490.960 48 x 60 x 0.2 DIN 988

Axial play of crankshaft	Pcs./engine	Measurement a
0.1 to 0.4	2	29.7 to 29.9
0.1 to 0.4	1	above 29.9 to 30.1
0.2 to 0.4	0	above 30.1 to 30.2

CRANKCASE, CRANKSHAFT

L252

Special JLO Tools

Puller	444.31.807.000 (10)
Pair of half shells	444.31.072.000 (10)
Retaining ring	444.31.071.100 (10)

DISASSEMBLY

7.3. 1 Loosen screw (3) and remove spring washers (4).

2 To separate crankcase halves (1+2), heat them to approx. 212°F (100°C).

3 Lift housing that pto shaft end hangs free and carefully tap crankshaft with plastic hammer out of crankcase.

4 Discard gasket (7).

5 Pry or knock out oil seals (6) (see ill. I).

6 To remove ball bearings (8) from crankshaft (5) use bearing puller assembly (10) (ill. II).

ASSEMBLY

7.4. 1 Slightly lubricate new oil seals. Knock seals with oil seal installation tool into both crankcase halves (1+2). Sealing lips must point into crank chamber (ill. III).

2 Heat ball bearings (8) to approx. 175°F (80°C) and drive them on crankshaft by a ball bearing driver (ill. IV).

NOTE:
Ball bearing must be driven on inner bearing race.

3 Place heat shield over oil seal (6) and heat crankcase half (2) to 212°F (100°C) and install crankshaft (5) in crankcase. Press firmly in place.

NOTE:
Make sure that seals (6) are not damaged (Use appropriate slip cone).

4 Lightly grease new gasket (7) with general purpose grease and place in position on crankcase (2).

5 Heat crankcase half (1) to 212°F (100°C) in same manner as described under item 3 and mount on crankcase half (2). Ensure that both crankcase halves (1+2) are properly alighed and install screws (3) with spring washers (4) fingertight.

6 Re-check mounting surface for cylinder. Cut off overhanging gasket (7). After mounting the cylinder (see description on page 19) cross-tighten crankcase screws (3).

7 Turn crankshaft (5) by hand to ensure freedom of rotation. If crankshaft will not turn freely, tap each end of crankshaft lightly with a plastic hammer.

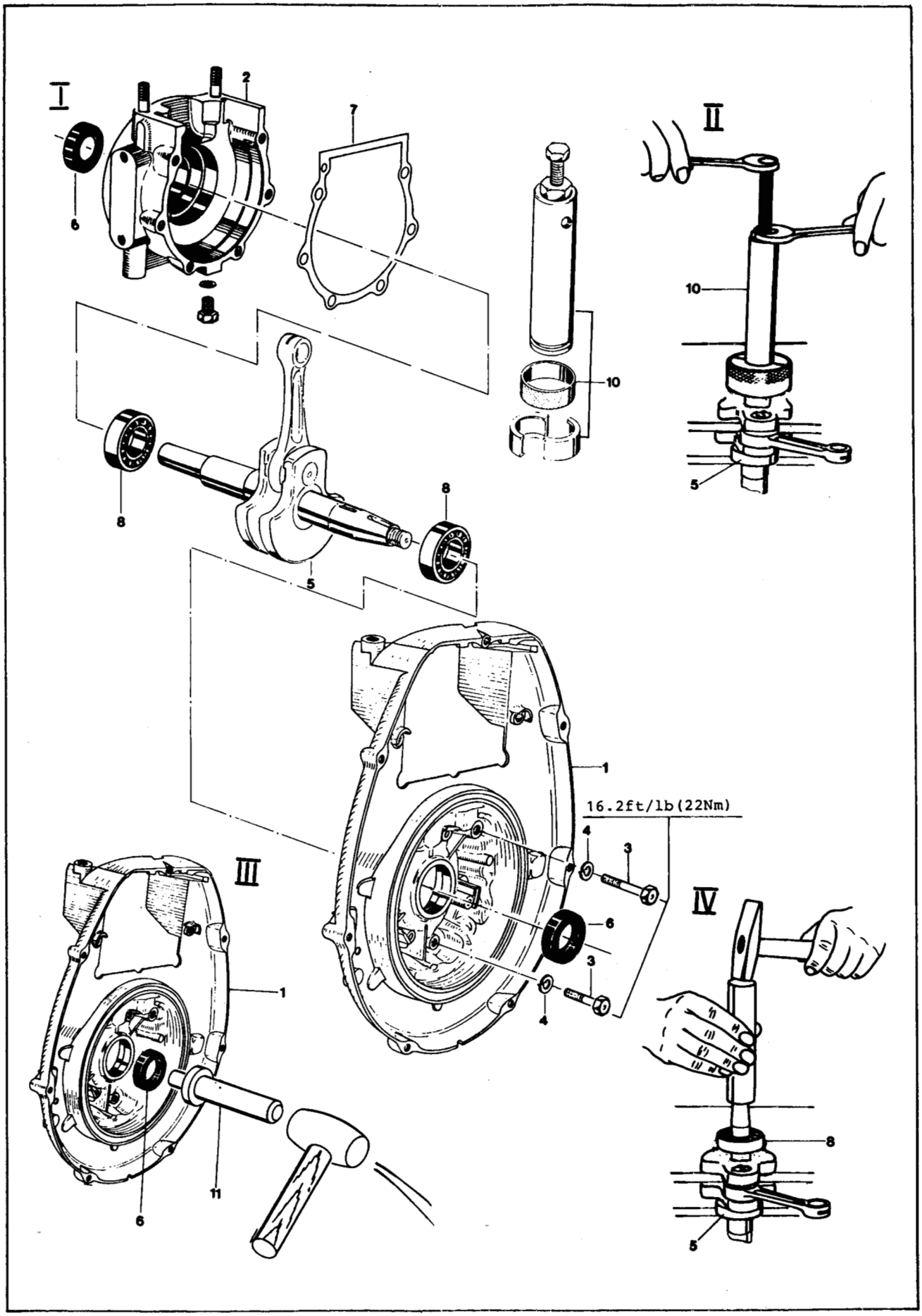
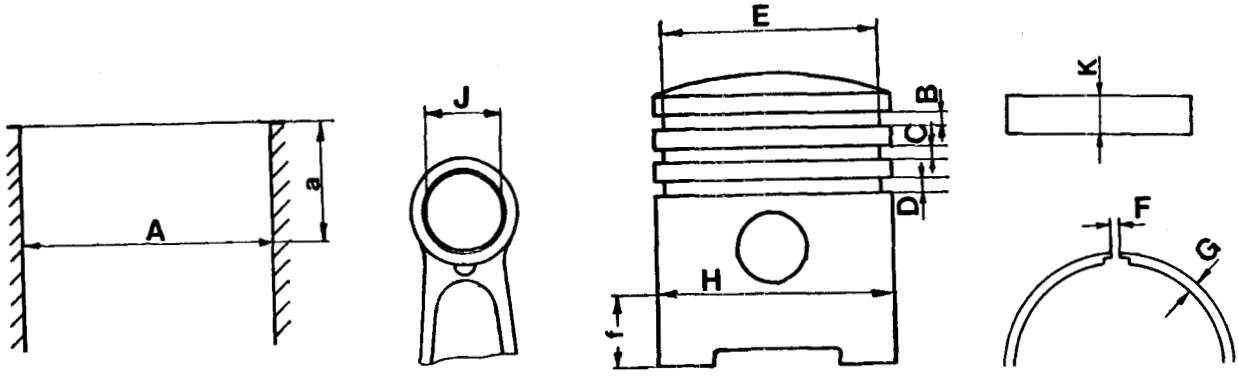

I
II
III
IV
16.2ft/lb(22Nm)

TABLE OF SPECIFICATION

Dim.	Ref.	Minimum mm (inch)	Maximum mm (inch)	Repair required
A	Bore new	69,000 (2.7165)	69,019 (2.7173)	69,169 (2.7232)
	1st oversize (+0.5 mm)	69,500 (2.7362)	69,519 (2.7370)	69,669 (2.7429)
	2nd oversize (+1.0 mm)	70,000 (2.7560)	70,019 (2.7567)	70,169 (2.7626)
B	ring groove width, piston top	2,580 (0.1016)	2,600 (0.1024)	2,700 (0.1063)
C,D	center, bottom	2,565 (0.1010)	2,580 (0.1016)	2,680 (0.1055)
E	ring groove dia.	62,51 (2.461)	62,7 (2.469)	
	1st oversize	62,91 (2.477)	63,1 (2.484)	
	2nd oversize	63,41 (2.496)	63,6 (2.504)	
F	piston ring end gap	0,25 (0.010)	0,40 (0.016)	1,25 (0.066)
G	piston ring wall thickness	2,62 (0.103)	2,78 (0.109)	2,00 (0.079)
H	piston dia.			
	new	68,887 (2.7121)	68,900 (2.7126)	68,737 (2.7062)
	1st oversize (+0.5 mm)	69,387 (2.7318)	69,400 (2.7323)	69,237 (2,7259)
	2nd oversize (+1.5 mm)	69,887 (2.7515)	69,900 (2.7520)	69,737 (2.7456)
J	rod bearing bore	19,992 (0.7871)	20,001 (0.7874)	see comments
K	wrist pin dia.	15,986 (0.6294)	15,995 (0.6297)	see comments
	crankshaft end play	0,100 (0.004)	1,040 (0.041)	-
f	measuring point f	30 mm ((1.18")	perpendicular to the wrist pin axis up from the bottom edge of the piston skirt	
a	measuring point a	22,5 mm (0.886")	from cylinder top edge	

NOTE:
Piston and cylinder ought to be replaced if the max. play between piston skirt and cylinder wall exceeds 0.35 mm. Depending on engine typ, the piston ring end play should not exceed 0.10 to 0.12 mm.



COMMENTS:

1. Piston rings:
   All three piston rings have to be replaced if piston ring end gap exceeds the max. dimension stated in table item "F". Ring end gap has to be measured in the bore of a new cylinder.

2. Connection rod/wrist pin:
   The stressed surfaces of wrist pin and connecting rod turn in a needle bearing, so that the play between these surfaces cannot easily be measured. If the wrist pin has seized or has changed colour excessively but rod surface seems to be still undamaged, replace the wrist pin and needle bearing.

   If the bearing surface of rod eye (wrist pin rolling surface) has seized or has excessively changed colour, the complete crankshaft ought to be replaced.

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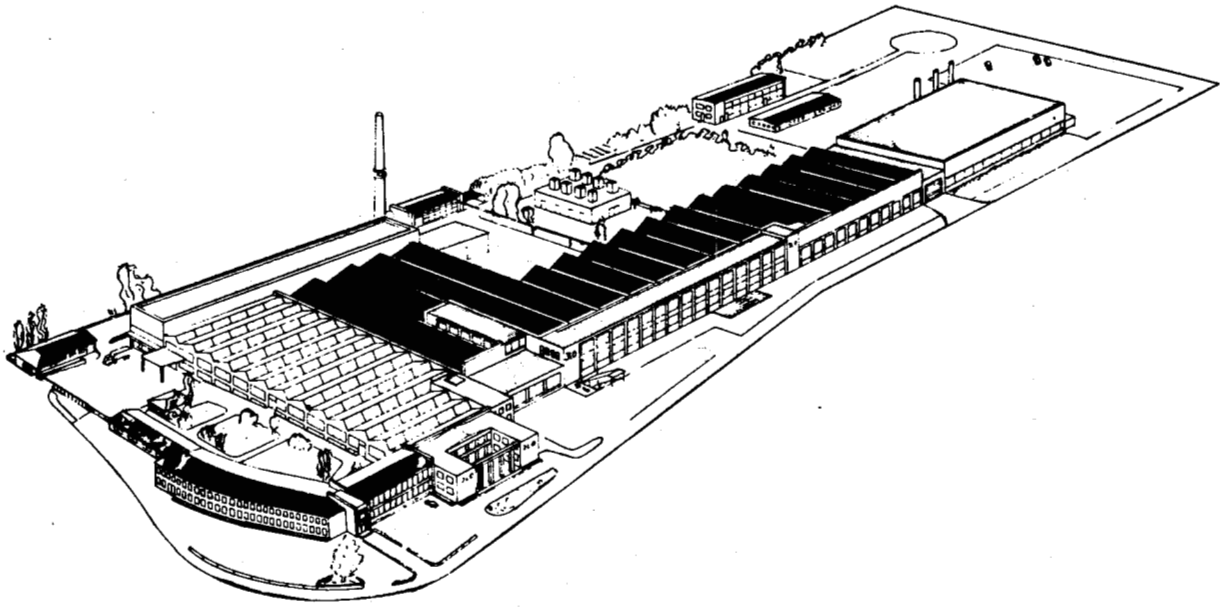
Telefax 0 41 01 / 20 69 12
Telegramm ILO Pinneberg



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