

YAMAHA

Marine

Outboards

WORLD WIDE

F15A

F9.9C, FT9.9D

USA/CANADA

F15

SERVICE MANUAL (E)

MANUEL D'ENTRETIEN (F)

WARTUNGSANLEITUNG (D)

MANUAL DE SERVICIO (ES)

66M-28197-Z8-C1

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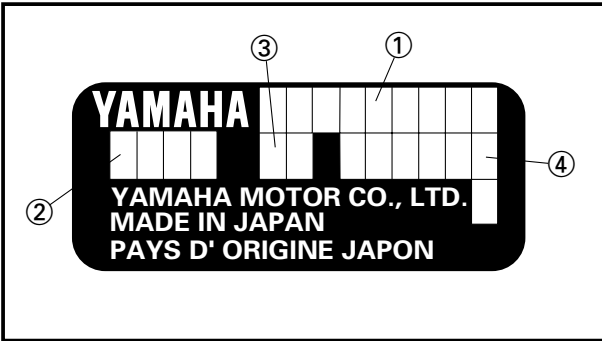
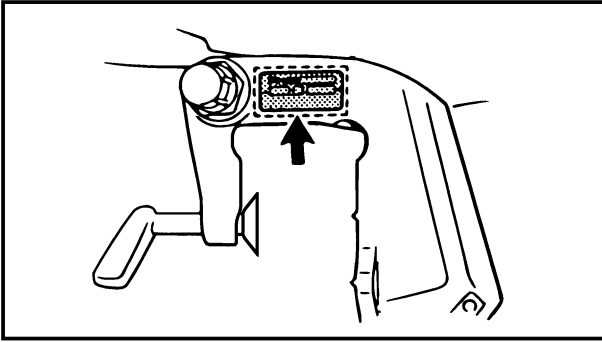
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A60001-1

IDENTIFICATION

SERIAL NUMBER

The outboard motor's serial number is stamped on a label which is attached to the port side of the clamp bracket.

NOTE:

For USA model:

As an antitheft measure, a special label on which the outboard motor's serial number is stamped is bonded to the port side of the clamp bracket. The label is specially treated so that peeling it off causes cracks across the serial number.

- ① Model name
- ② Approved model code
- ③ Transom height
- ④ Serial number

STARTING SERIAL NUMBERS

The starting serial number blocks are as follows:

| Model name | | Approved model code | Starting serial number |
|------------|----------------|---------------------|--------------------------|
| Worldwide | USA/ CANADA | | |
| F15AMH | F15MSHX | 66M | S: 001432~ |
| | F15MLHX | | L: 300964~ |
| F15AEH | F15ESHX | 66M | S: 200590~ |
| | F15ELHX | | L: 500755~ |
| F15AE | — | 66M | S: 100302~ L: 400316~ |
| F9.9CMH | — | 66N | S: 000128~ L: 300319~ |
| F9.9CEH | — | 66N | S: 200101~ L: 500268~ |
| F9.9CE | — | 66N | S: 100106~ |
| | | | L: 400121~ |
| FT9.9DMH | — | 66R | S: 000101~ |
| | | | L: 200101~ |
| | | | X: 500101~ |
| FT9.9DEH | — | 66R | L: 300101~ |
| | | | X: 600101~ |
| FT9.9DE | — | 66R | S: 100101~ |
| | | | L: 400101~ |
| | | | X: 700101~ |



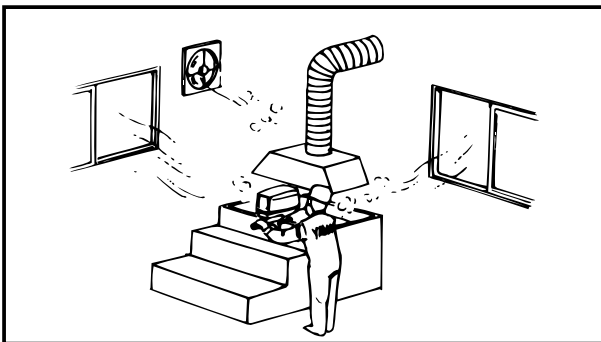
SAFETY WHILE WORKING

The procedures given in this manual are those recommended by Yamaha to be followed by Yamaha dealers and their mechanics.



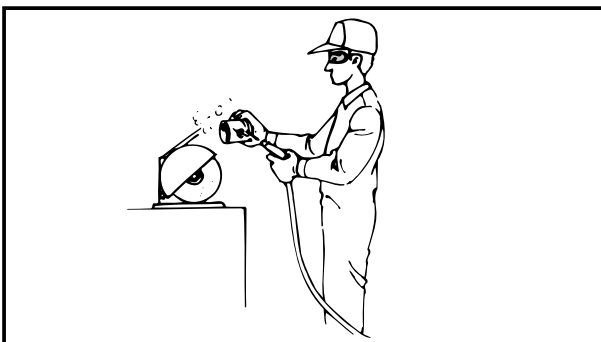
FIRE PREVENTION

Gasoline (petrol) is highly flammable. Petroleum vapor is explosive if ignited. Do not smoke while handling gasoline and keep it away from heat, sparks and open flames.



VENTILATION

Petroleum vapor is heavier than air and is deadly if inhaled in large quantities. Engine exhaust gases are harmful to breathe. When test-running an engine indoors, maintain good ventilation.



SELF-PROTECTION

Protect your eyes with suitable safety glasses or safety goggles, when grinding or when doing any operation which may cause particles to fly off. Protect hands and feet by wearing safety gloves or protective shoes if appropriate to the work you are doing.



OILS, GREASES AND SEALING FLUIDS

Use only genuine Yamaha oils, greases and sealing fluids or those recommended by Yamaha.



Under normal conditions of use, there should be no hazards from the use of the lubricants mentioned in this manual, but safety is all-important, and by adopting good safety practices, any risk is minimized. A summary of the most important precautions is as follows:

1. While working, maintain good standards of personal and industrial hygiene.
2. Clothing which has become contaminated with lubricants should be changed as soon as practicable, and laundered before further use.
3. Avoid skin contact with lubricants; do not, for example, place a soiled wiping-rag in your pocket.
4. Hands and any other part of the body which have been in contact with lubricants or lubricant-contaminated clothing, should be thoroughly washed with hot water and soap as soon as practicable.
5. To protect the skin, the application of a suitable barrier cream to the hands before working is recommended.
6. A supply of clean lint-free cloths should be available for wiping purposes.



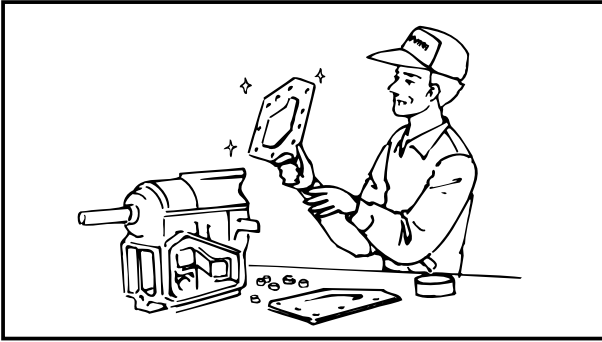
GOOD WORKING PRACTICES

1. The right tools

Use the recommended special tools to protect parts from damage. Use the right tool in the right manner — do not improvise.

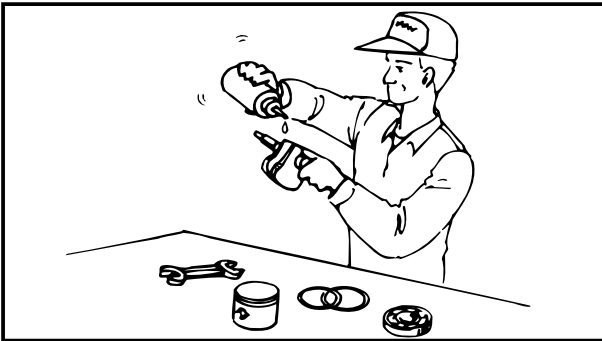
2. Tightening torque

Follow the tightening torque instructions. When tightening bolts, nuts and screws, tighten the large sizes first, and tighten inner-positioned fixings before outer-positioned ones.



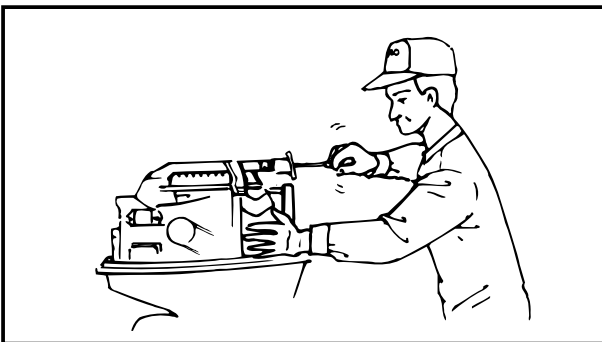
3. Non-reusable items

Always use new gaskets, packings, O-rings, split-pins and circlips, etc., on reassembly.

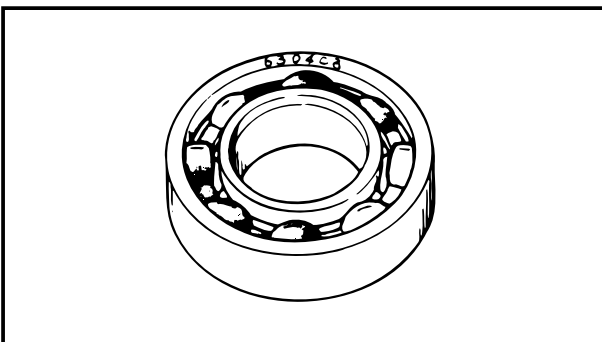


DISASSEMBLY AND ASSEMBLY

1. Clean parts with compressed air when disassembling.
2. Oil the contact surfaces of moving parts before assembly.



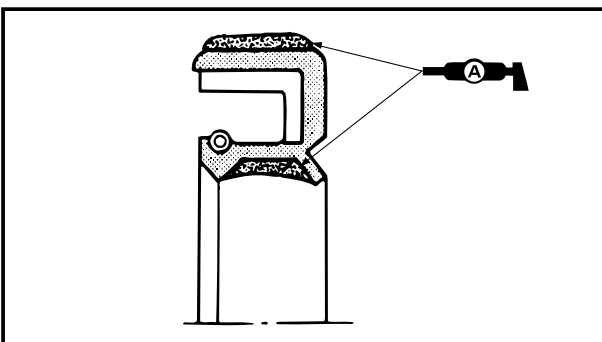
3. After assembly, check that moving parts operate normally.



4. Install bearings with the manufacturer's markings on the side exposed to view, and liberally oil the bearings.

CAUTION: _____

Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces.



5. When installing oil seals, apply a light coating of water-resistant grease to the outside diameter.

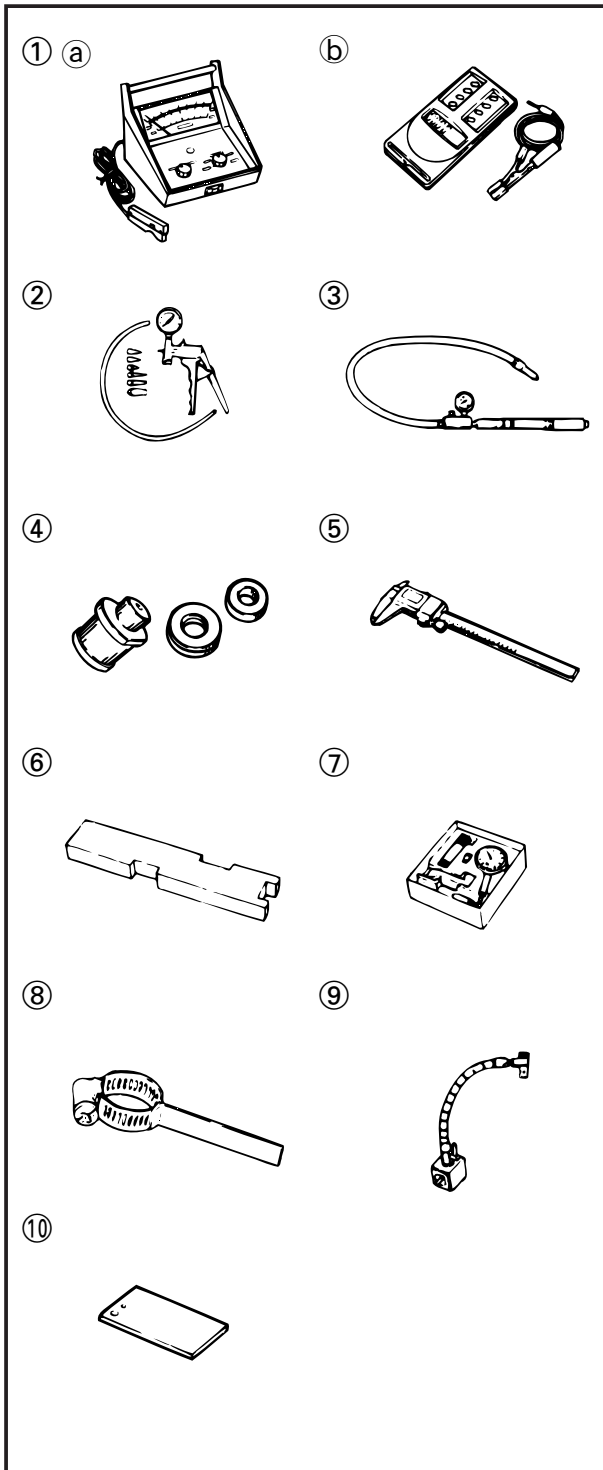


SPECIAL TOOLS

The use of correct special tools recommended by Yamaha will aid the work and enable accurate assembly and tune-up. Improvising and using improper tools can damage the equipment.

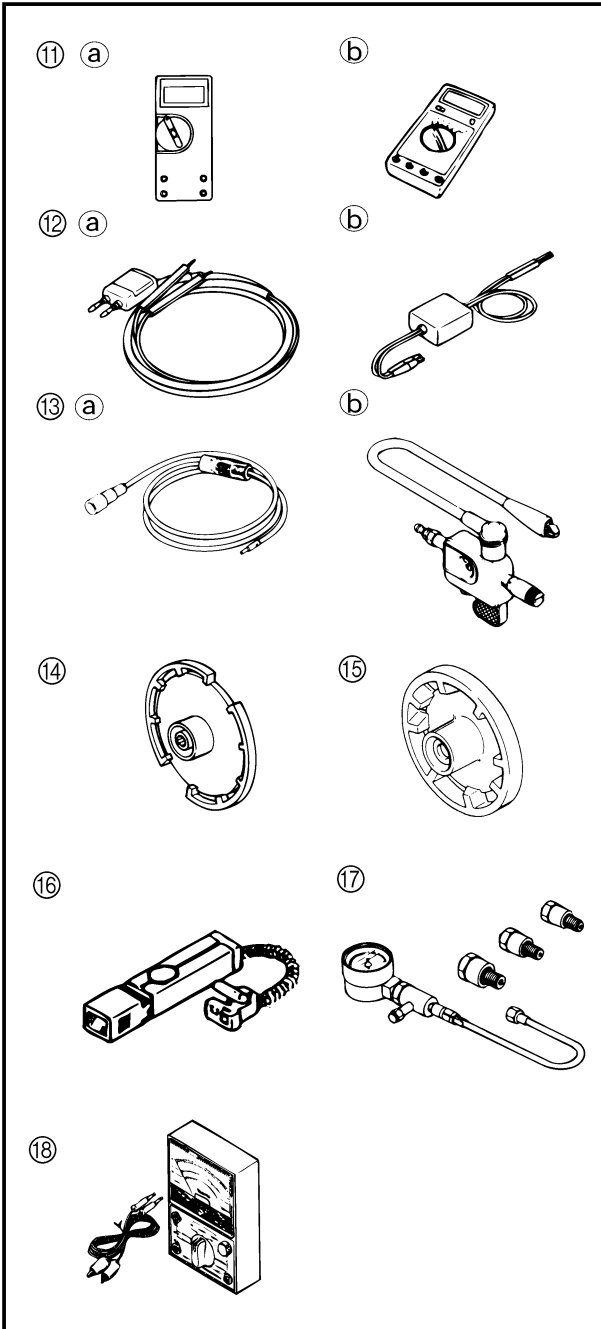
NOTE:

- For U.S.A. and Canada, use part numbers starting with "J-", "YB-", "YM-" "YU-" or "YW-".
- For others, use part numbers starting with "90890-".

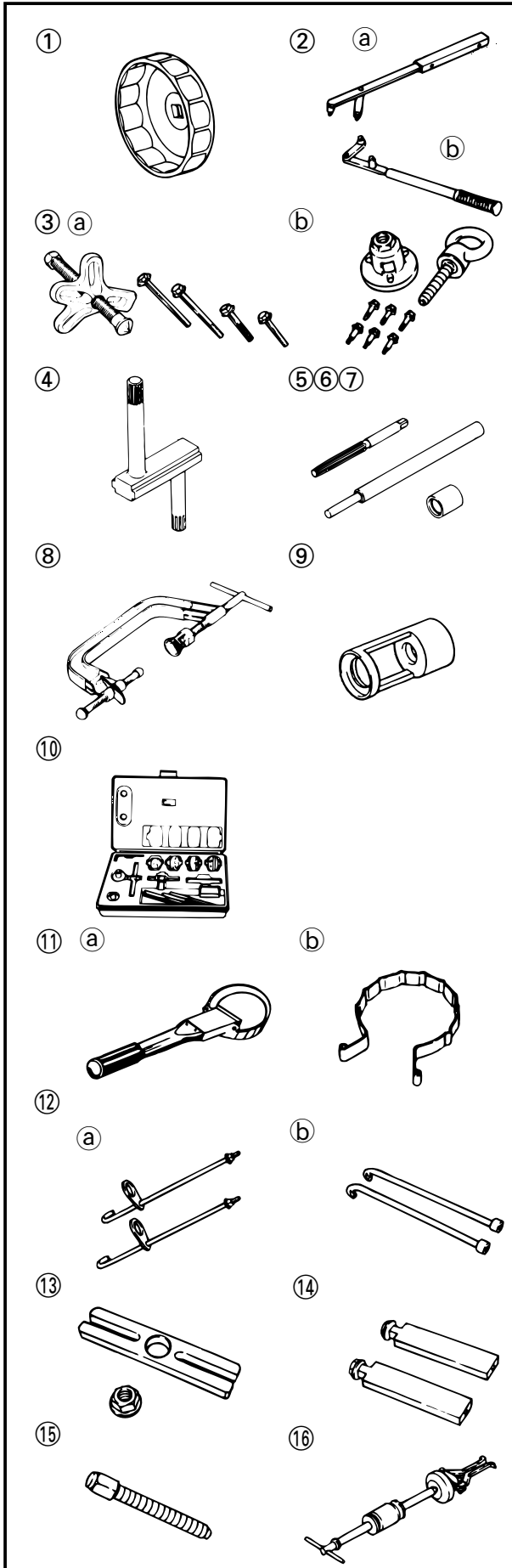


MEASURING

1. Tachometer
 - ① a P/N. YU-08036-A
 - ① b 90890-06760
2. Mity vac
P/N. YB-35956
90890-06756
3. Leakage tester
P/N. YB-03595
90890-06762
4. Pinion height gauge
P/N. YB-34232
N.A.
5. Digital caliper
P/N. N.A.
90890-06704
6. Shimming plate
P/N. N.A.
90890-06701
7. Dial gauge set
P/N. YU-03097
90890-01252
8. Backlash indicator
P/N. YB-06265
90890-06706
9. Magneto base
P/N. YU-34481
90890-06705
10. Base plate
P/N. YB-07003
90890-07003

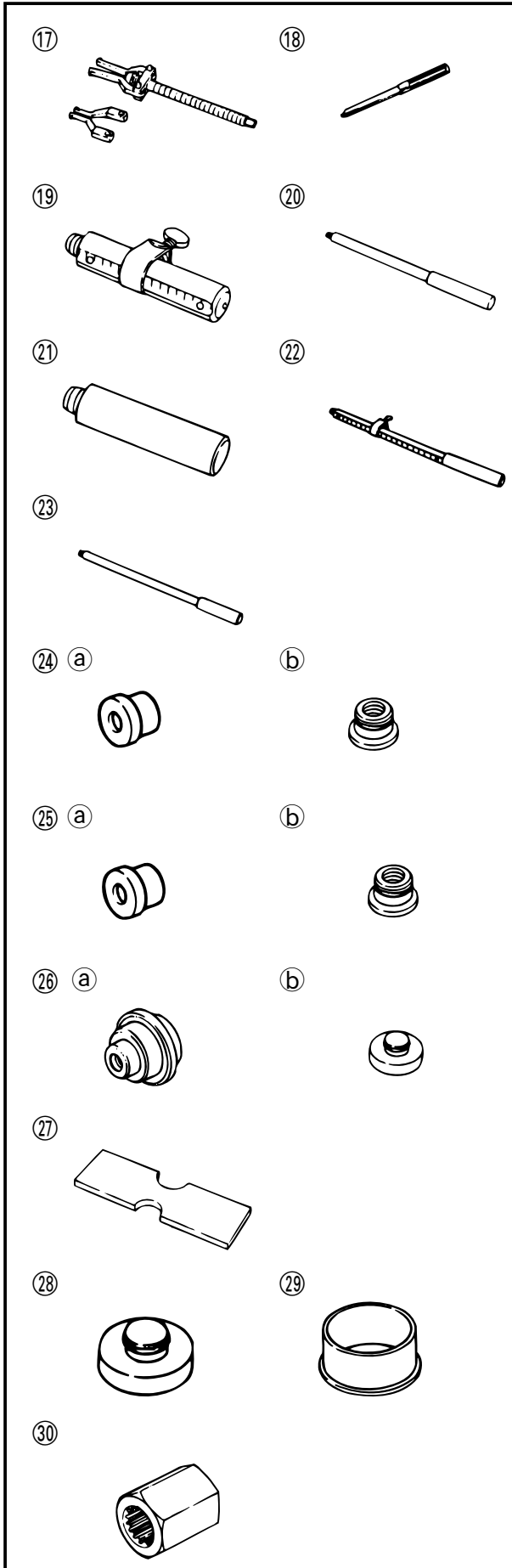


- 11. Digital circuit tester
 - (a) P/N. J-39299
 - (b) 90890-06752
- 12. Peak voltage adaptor
 - (a) P/N. YU-39991
 - (b) 90890-03169
- 13. Spark gap tester
 - (a) P/N. YM-34487
 - (b) 90890-06754
- 14. Test propeller (for F15A/F9.9C)
 - P/N. YB-01619
 - 90890-01619
- 15. Test propeller (for FT9.9D)
 - P/N. N.A.
 - 90890-01627
- 16. Timing light
 - P/N. YU-33277-A
 - 90890-03141
- 17. Compression gauge
 - P/N. YU-33223
 - 90890-03160
- 18. Yamaha pocket tester
 - P/N. YU-03112
 - 90890-03112

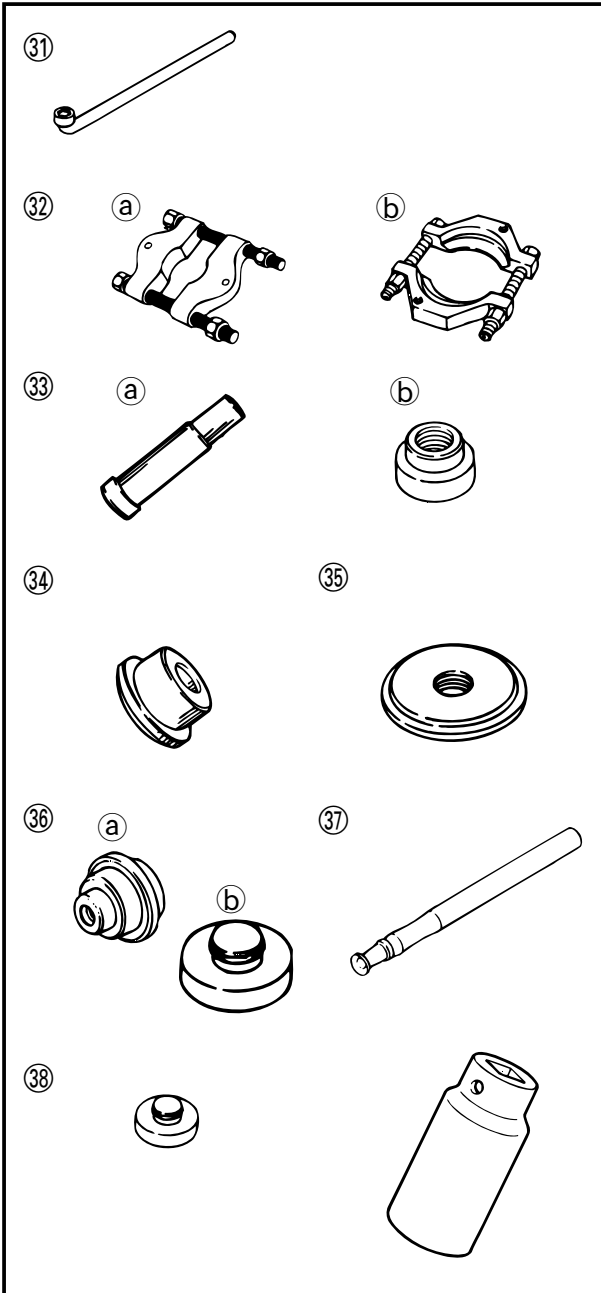


REMOVAL AND INSTALLATION

1. Oil filter wrench
P/N. YU-38411
90890-01426
2. Flywheel holder
(a) P/N. YB-06139
(b) 90890-06522
3. Universal puller
(a) P/N. YB-06117
(b) 90890-06521
4. Shaft holder
P/N. N.A.
90890-06069
5. Valve guide installer
P/N. YB-6308
90890-06802
6. Valve guide remover
P/N. YM-01122
90890-06801
7. Valve guide reamer
P/N. YM-01196
90890-06804
8. Valve spring compressor
P/N. YM-01253
90890-04019
9. Attachment
P/N. YM-04114
90890-04018
10. Valve seat cutter set
P/N. YM-91043-C
90890-06803
11. Piston slider
(a) P/N. YB-34454
(b) 90890-06529
12. Bearing housing puller claw
(a) P/N. YB-06234
(b) 90890-06503
13. Stopper guide plate
P/N. N.A.
90890-06501
14. Stopper guide stand
P/N. N.A.
90890-06538
15. Center bolt
P/N. N.A.
90890-06504
16. Slide hammer set
P/N. YB-06096
N.A.



- 17. Bearing outer race puller
P/N. N.A.
90890-06535
- 18. Driver rod
P/N. YB-06229
- 19. Driver rod
P/N. 90890-06604
- 20. Driver rod
P/N. YB-06071
- 21. Driver rod
P/N. 90890-06606
- 22. Driver rod
P/N. 90890-06602
- 23. Driver rod
P/N. 90890-06605
- 24. Needle bearing attachment
(a) P/N. YB-06081
(b) 90890-06616
- 25. Needle bearing attachment
(a) P/N. YB-06230
(b) 90890-06617
- 26. Oil seal installer
(needle bearing attachment)
(a) P/N. YB-06168
(b) 90890-06613
- 27. Bearing depth plate
P/N. N.A.
90890-06603
- 28. Ball bearing attachment
(a) P/N. YB-06015
(b) 90890-06632
- 29. Bearing inner race attachment
P/N. N.A.
90890-06644
- 30. Drive shaft holder
P/N. YB-06228
90890-06515



- 31. Pinion nut holder
P/N. YB-06078
- 32. Bearing separator
 - (a) P/N. YB-06219
 - (b) 90890-06534
- 33. Bushing attachment
 - (a) P/N. YB-06028
 - (b) 90890-06649
- 34. Drive shaft needle bearing depth stop
P/N. YB-06231
N.A.
- 35. Bearing outer race attachment
P/N. YB-06085
90890-06625
- 36. Bearing installer
(bearing inner race attachment)
 - (a) P/N. YB-06022
 - (b) 90890-06613
- 37. Valve lapper
P/N. N.A.
90890-06805
- 38. Oil seal installer
P/N. N.A.
90890-06614

GENERAL TOOL

Reference tool:
Deep socket (36 mm)



CHAPTER 2 SPECIFICATIONS

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| GENERAL TIGHTENING TORQUE | 2-33 |



GENERAL SPECIFICATIONS (F15A)

| Item | Unit | Model | | | |
|-------------------------------|-------------------------------------|------------|---------------------------|-----------------------------|----------------|
| | | World-wide | F15AMH | F15AEH | F15AE |
| | | USA/CANADA | F15MHX | F15EHX | — |
| DIMENSION | | | | | |
| Overall length | mm (in) | | 1,003 (39.5) | 1,003 (39.5) | 643 (25.3) |
| Overall width | mm (in) | | 427 (16.8) | 427 (16.8) | 369 (14.5) |
| Overall height | | | | | |
| (S) | mm (in) | | 1,080 (42.5) | | |
| (L) | mm (in) | | 1,207 (47.5) | | |
| WEIGHT | | | | | |
| (with aluminum propeller) | | | | | |
| (S) | kg (lb) | | 45.0 (99.2) | 48.0 (105.8) | 47.0 (103.6) |
| (L) | kg (lb) | | 47.0 (103.6) | 50.0 (110.2) | 49.0 (108.0) |
| PERFORMANCE | | | | | |
| Maximum output (ISO) | kW (hp) @ ,5000 r/min | | 11.0 (15) | | |
| Full throttle operating range | r/min | | 4,500 ~ 5,500 | | |
| Maximum fuel consumption | L (US gal, Imp gal)/h @ 5,500 r/min | | 5.3 (1.39, 1.16) | | |
| POWER UNIT | | | | | |
| Type | | | 4 stroke, OHC, in-line | | |
| Number of cylinders | | | 2 | | |
| Displacement | cm ³ (cu. in) | | 323 (19.7) | | |
| Bore x stroke | mm (in) | | 59.0 x 59.0 (2.32 x 2.32) | | |
| Compression ratio | | | 9.19 | | |
| Compression pressure | kPa (kg/cm ² , psi) | | 961 (9.8, 139.4) | | |
| Number of carburetors | | | 1 | | |
| Control system | | | Tiller control | | Remote control |
| Starting system | | | Recoil starter | Electric motor | |
| Ignition control system | | | C.D.I. | | |
| Lighting coil | | | Single phase | | |
| Lighting coil output | V-W / V-A | | AC12-80 | DC12-6/12-10 with rectifier | |
| Starting enrichment | | | Choke valve | | |
| Spark plug | | | DPR6EA-9 | | |
| Exhaust system | | | Propeller hub | | |
| Lubrication system | | | Wet sump | | |
| Ignition timing | Degree (BTDC) | | 5 ~ 30 | | |
| FUEL AND OIL | | | | | |
| Fuel type | | | Unleaded regular gasoline | | |
| Fuel rating | PON* | | 86 | | |
| | (*PON: Pump Octane Number) | | | | |
| | RON* | | 91 | | |
| | (*RON: Research Octane Number) | | | | |

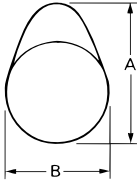
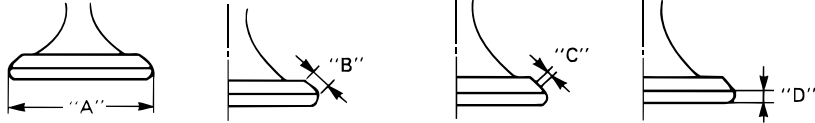


| Item | Unit | Model | | |
|---|---|--|------------------|------------------|
| | | World-wide USA/ CANADA | F15AMH F15MHX | F15AEH F15EHX |
| Engine oil Engine oil grade Total quantity With oil filter Without oil filter Gear oil Gear oil grade Total quantity | cm ³ (US oz, Imp oz) cm ³ (US oz, Imp oz) cm ³ (US oz, imp oz) | 4-stroke engine oil API SE, SF, SG or SH SAE 10W-30, 10W40, 20W-40 Hypoid gear oil SAE# 90 250 (8.45, 8.80) | | |
| BRACKET Trim angle Tilt-up angle Steering angle | Degree Degree Degree | 8, 12, 16, 20 67 40 + 45 | | |
| DRIVE UNIT Gear positions Gear ratio Gear type Propeller direction Propeller drive system | | F-N-R 2.08 (27:13) Spiral bevel gear Clockwise Spline | | |
| ELECTRICAL Battery capacity Cold cranking performance | Ah (kC) A | 40 (144) 380 | | |

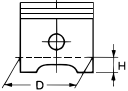
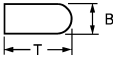
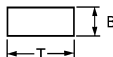


MAINTENANCE SPECIFICATIONS (F15A)

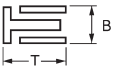
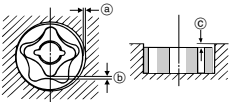
POWER UNIT

| Item | Unit | Model | | |
|---|--|--|------------------|------------|
| | | F15AMH F15MHX | F15AEH F15EHX | F15AE — |
| CYLINDER HEAD Warpage limit | mm (in) | 0.1 (0.004) | | |
| CYLINDER Bore Taper limit Out-of-round limit Cylinder block inside diameter | mm (in) mm (in) mm (in) mm (in) | 59.00 ~ 59.02 (2.323 ~ 2.324) 0.08 (0.003) 0.05 (0.002) A : Blue 38.033 ~ 38.040 (1.4974 ~ 1.4976) B : Black 38.025 ~ 38.032 (1.4970 ~ 1.4973) C : Brown 38.016 ~ 38.024 (1.4967 ~ 1.4970) | | |
| CAMSHAFT Intake (A) Exhaust (A) Intake (B) Exhaust (B) Camshaft journal diameter Oil pump housing journal diameter Cylinder head journal diameter Camshaft round limit |  mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) | 23.895 ~ 23.995 (0.9407 ~ 0.9447) 23.917 ~ 24.017 (0.9416 ~ 0.9456) 19.950 ~ 20.050 (0.7854 ~ 0.7894) 19.950 ~ 20.050 (0.7854 ~ 0.7894) 15.973 ~ 15.984 (0.6289 ~ 0.6293) 17.975 ~ 17.991 (0.7077 ~ 0.7088) 16.000 ~ 16.0188 (0.6299 ~ 0.63066) 18.000 ~ 18.018 (0.7087 ~ 0.7094) 0.03 (0.001) | | |
| TIMING BELT Slack | mm (in) | 0 ~ 10 (0 ~ 0.4) | | |
| ROCKER ARM SHAFT Outside diameter | mm (in) | 12.941 ~ 12.951 (0.5095 ~ 0.5099) | | |
| ROCKER ARM Inside diameter | mm (in) | 13.000 ~ 13.018 (0.5118 ~ 0.5125) | | |
| VALVES Face angle Valve clearance (cold) Intake Exhaust | Degree mm (in) mm (in) | 90.5 ~ 91.5 0.20 ± 0.05 (0.008 ~ 0.002) 0.25 ± 0.05 (0.010 ~ 0.002) | | |
|  Head diameter (A) Intake Exhaust Face width (B) Intake Exhaust | mm (in) mm (in) mm (in) mm (in) mm (in) | 27.9 ~ 28.1 (1.10 ~ 1.11) 21.9 ~ 22.1 (0.86 ~ 0.87) 2.0 ~ 3.1 (0.079 ~ 0.122) 2.0~3.1 (0.079 ~ 0.122) | | |



| Item | Unit | Model | | | |
|---|---------------|-----------------------------------|--------|--------|-------|
| | | World-wide | F15AMH | F15AEH | F15AE |
| | | USA/ CANADA | F15MHX | F15EHX | — |
| Seat width (C) | mm (in) | 0.6 ~ 0.8 (0.02 ~ 0.03) | | | |
| Margin thickness (D) | | | | | |
| Intake | mm (in) | 0.50 ~ 0.90 (0.020 ~ 0.035) | | | |
| Exhaust | mm (in) | 0.50 ~ 0.90 (0.020 ~ 0.035) | | | |
| Stem outside diameter | | | | | |
| Intake | mm (in) | 5.475 ~ 5.490 (0.2155 ~ 0.2161) | | | |
| Exhaust | mm (in) | 5.460 ~ 5.475 (0.2150 ~ 0.2156) | | | |
| Guide inside diameter | mm (in) | 5.500 ~ 5.512 (0.2165 ~ 0.2170) | | | |
| Stem-to-guide clearance | | | | | |
| Intake | mm (in) | 0.010 ~ 0.037 (0.0004 ~ 0.0015) | | | |
| Exhaust | mm (in) | 0.025 ~ 0.052 (0.0010 ~ 0.0020) | | | |
| Stem runout limit | mm (in) | 0.016 (0.0006) | | | |
| VALVE SPRING | | | | | |
| Free length | mm (in) | 34.4 (1.35) | | | |
| Free length limit | mm (in) | 32.7 (1.29) | | | |
| Set length | mm/kg (in/lb) | 25.4/11.0 (1.00/24.2) | | | |
| Tilt limit | mm (in) | 1.5 (0.06) | | | |
| PISTON | | | | | |
| Piston-to-cylinder clearance | mm (in) | 0.035 ~ 0.065 (0.0014 ~ 0.0026) | | | |
| Piston diameter (D) | | | | | |
| Standard | mm (in) | 58.950 ~ 58.965 (2.3206 ~ 2.3215) | | | |
| Measuring point (H)  | mm (in) | 5 (0.20) | | | |
| Pin boss inside diameter | mm (in) | 14.004 ~ 14.015 (0.5513 ~ 0.5518) | | | |
| Oversize piston diameter | | | | | |
| 1st (except for USA) | mm (in) | 59.25 (2.333) | | | |
| 2nd | mm (in) | 59.50 (2.343) | | | |
| PISTON PIN | | | | | |
| Outside diameter | mm (in) | 13.996 ~ 14.000 (0.5510 ~ 0.5512) | | | |
| PISTON RINGS | | | | | |
| Top ring | | | | | |
| Type  | | Barrel | | | |
| Dimensions (B x T) | mm (in) | 1.2 x 2.3 (0.05 x 0.09) | | | |
| End gap (installed) | mm (in) | 0.15 ~ 0.30 (0.006 ~ 0.012) | | | |
| Wear limit | mm (in) | 0.50 (0.020) | | | |
| Side clearance (installed) | mm (in) | 0.013 ~ 0.035 (0.0005 ~ 0.0013) | | | |
| 2nd ring | | | | | |
| Type  | | Plane | | | |
| Dimensions (B x T) | mm (in) | 1.5 x 2.6 (0.06 x 0.10) | | | |
| End gap (installed) | mm (in) | 0.30 ~ 0.50 (0.012 ~ 0.020) | | | |
| Wear limit | mm (in) | 0.70 (0.028) | | | |
| Side clearance (installed) | mm (in) | 0.02~0.04 (0.001 ~ 0.002) | | | |



| Item | Unit | Model | | |
|--|--|--|------------------|------------|
| | | F15AMH F15MHX | F15AEH F15EHX | F15AE — |
| Oil ring Dimensions (BxT)  End gap (installed) Wear limit | mm (in) mm (in) mm (in) | 2.4 x 2.5 (0.09 x 0.10) 0.2 ~ 0.7 (0.008 ~ 0.028) 0.9 (0.04) | | |
| CONNECTING ROD Small end inside diameter Big end oil clearance | mm (in) mm (in) | 14.015 ~ 14.029 (0.5518 ~ 0.5523) 0.021 ~ 0.045 (0.0008 ~ 0.0018) | | |
| CRANKSHAFT Crankshaft width Radial clearance Crankshaft big end side clearance Crankcase mark - bearing color Crankshaft journal clearance Runout limit | mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) | 126.70 ~ 126.90 (4.99 ~ 5.00) 0.05 (0.002) 0.05 ~ 0.22 (0.002 ~ 0.009) A:Blue B:Black C:Brown 0.012 ~ 0.045 (0.0005 ~ 0.0018) 0.03 (0.0012) | | |
| THERMOSTAT ID mark Valve opening temperature Full-open temperature Valve lift | °C (°F) °C (°F) mm (in) | S60°C 58 ~ 62 (136.4 ~ 143.6) 70 (158) 3 (0.12) | | |
| FUEL PUMP Discharge Pressure Diaphragm stroke Plunger stroke | L (US gal, Imp gal)/h @ 3,000 r/min kPa (kg/cm ² , psi) mm (in) mm (in) | 25 (6.60, 5.50) 117.6 (1.2, 17.07) 2.4 ~ 4.8 (0.094 ~ 0.189) 3.52 ~ 6.57 (0.139 ~ 0.259) | | |
| OIL PUMP Type  Outer rotor-to-housing clearance (a) Outer rotor-to-inner rotor clearance (b) Rotor-to-cover clearance (c) Relief valve operating pressure | mm (in) mm (in) mm (in) kPa (kg/cm ² , psi) | Trochoid 0.10 ~ 0.15 (0.004 ~ 0.006) 0.04 ~ 0.14 (0.002 ~ 0.006) 0.03 ~ 0.09 (0.001 ~ 0.004) 388 ~ 450 (3.88 ~ 4.50, 55.2 ~ 64.0) | | |
| CARBURETOR ID mark Main jet Pilot jet Pilot screw Float height (a) Idle speed Trolling speed | # # turns out mm (in) r/min r/min | 66M00/66M10 (for USA) 104 45 1-1/4 ± 1/2 (USA: no adjustment) 9.5 ~ 10.5 (0.37 ~ 0.41) 950 ± 50 850 ± 50 | | |



LOWER

| Item | Unit | Model | | | |
|--------------------------------------|----------|------------------------------|------------------------------------|--------|-------|
| | | World-wide USA/ CANADA | F15AMH | F15AEH | F15AE |
| | | | F15MHX | F15EHX | — |
| GEAR BACKLASH (SST indicator) | | | | | |
| Pinion - forward | | | | | |
| Minimum | mm (in) | | 0.19 (0.007) | | |
| Mid-point | mm (in) | | 0.53 (0.02) | | |
| Maximum | mm (in) | | 0.86 (0.034) | | |
| Pinion - reverse | | | | | |
| Minimum | mm (in) | | 0.95 (0.037) | | |
| Mid-point | mm (in) | | 1.30 (0.051) | | |
| Maximum | mm (in) | | 1.65 (0.064) | | |
| Pinion shim | mm | | 1.13/1.2 | | |
| Forward shim | mm | | 0.10/0.12/0.15/0.18/0.30/0.40/0.50 | | |
| Reverse shim | mm | | 0.1/0.2/0.3/0.4/0.5 | | |
| TEST PROPELLER | | | | | |
| Test propeller | Part no. | | YB-1619/90890-01619 | | |
| Specific revolution | r/min | | 5,200 ~ 5,400 | | |

ELECTRICAL

| Item | Unit | Model | | | |
|--|---------------|------------------------------|----------------------|--------|-------|
| | | World-wide USA/ CANADA | F15AMH | F15AEH | F15AE |
| | | | F15MHX | F15EHX | — |
| IGNITION SYSTEM | | | | | |
| Ignition timing | Degree (BTDC) | | 5 ~ 30 | | |
| Charge coil output peak voltage (Br-L) | | | | | |
| @ cranking 1 (500 r/min) open | V | | 130 | | |
| @ cranking 2 (500 r/min) loaded | V | | 135 | | |
| @ 1,500 r/min | V | | 180 | | |
| @ 3,500 r/min | V | | 180 | | |
| Pulser coil output peak voltage (W/G-B) | | | | | |
| @ cranking 1 (500 r/min) open | V | | 4.0 | | |
| @ cranking 2 (500 r/min) loaded | V | | 3.5 | | |
| @ 1,500 r/min | V | | 11.0 | | |
| @ 3,500 r/min | V | | 23.0 | | |
| CDI unit output peak voltage (O-B) | | | | | |
| @ cranking 1 (500 r/min) open | V | | 120 | | |
| @ cranking 2 (500 r/min) loaded | V | | 115/120 (10 A model) | | |
| @ 1,500 r/min | V | | 160 | | |
| @ 3,500 r/min | V | | 160 | | |
| Spark plug gap | mm (in) | | 0.9 (0.04) | | |



| Item | Unit | Model | | | |
|-----------------------------------|--------------------------------|----------------|-------------------|-------------------------------|-------|
| | | World-wide | F15AMH | F15AEH | F15AE |
| | | USA/ CANADA | F15MHW | F15EHW | — |
| Charge coil resistance (Br-L) | Ω | | 272 ~ 408 | | |
| Pulser coil resistance (W/G-B) | Ω | | 234 ~ 348 | | |
| Ignition coil resistance (O-B) | | | | | |
| Primary | Ω | | 0.16 ~ 0.24 | | |
| Secondary | k Ω | | 3.94 ~ 5.88 | | |
| IGNITION CONTROL SYSTEM | | | | | |
| Oil pressure switch | kPa (kg/cm ² , psi) | | 14.7 (0.15, 2.13) | | |
| Engine speed limiter | | | | | |
| Rated timing | r/min | | 6,200 | | |
| Ignition off | r/min | | 6,800 | | |
| Reset | r/min | | 6,000 | | |
| STARTING SYSTEM | | | | | |
| Fuse* | A | | — | 10/20* | |
| STARTER MOTOR | | | | | |
| Type | | | — | Bendix | |
| Rating | Second | | — | 30 | |
| Output | kW | | — | 1.1 | |
| Brush length | mm (in) | | — | 12.6 (0.5) | |
| Limit | mm (in) | | — | 6.4 (0.25) | |
| Commutator undercut | mm (in) | | — | 2 (0.08) | |
| Limit | mm (in) | | — | 0.8 (0.03) | |
| CHARGING SYSTEM | | | | | |
| Lighting coil output peak voltage | | | | | |
| V ₁ (G-G)/(G-G/W) | | | | | |
| @ cranking 1 (500 r/min) open | V | | — | 6.5 | |
| @ cranking 2 (500 r/min) loaded | V | | — | 6.0 | |
| @ 1,500 r/min | V | | — | 21 | |
| @ 3,500 r/min | V | | — | 46 | |
| Rectifier output peak voltage | | | | | |
| V ₂ (R-B) | | | | | |
| @ cranking 1 (500 r/min) open | V | | — | 6.0 | |
| @ 1,500 r/min | V | | — | 20 | |
| @ 3,500 r/min | V | | — | 46 | |
| Charging current* | A @ 20 °C (68 °F) | | — | 6/10* | |
| Lighting coil resistance 6 A(G-G) | Ω @ 20 °C (68 °F) | | 0.48 ~ 0.72 | 0.48 ~ 0.72 (for 6 A models) | |
| 10 A: (G-G/W) | | | | 0.24 ~ 0.36 (for 10 A models) | |

* Charging current 6 A → Fuse 10 A

Charging current 10 A → Fuse 20 A



DIMENSIONS

Outboard dimension

| Symbol | Unit | Model(s) | | | |
|--------------------|------------------|-----------------|-----------------|-----------------|-------|
| | | Wordwide | F15AMH | F15AEH | F15AE |
| | | USA/CANADA | F15MHX | F15EHX | — |
| <p>(for F15AE)</p> | | | | | |
| L1 | mm (in) | 475 (18.7) | 475 (18.7) | 475 (18.7) | |
| L2 | mm (in) | 168 (6.6) | 168 (6.6) | 160.5 (6.3) | |
| L3 | mm (in) | 526 (20.7) | 526 (20.7) | — | |
| L4 | mm (in) | 355.5 (14.0) | 355.5 (14.0) | 355.5 (14.0) | |
| L5 | :S mm (in) | 78 (3.1) | 78 (3.1) | 78 (3.1) | |
| | :L mm (in) | 105 (4.1) | 105 (4.1) | 105 (4.1) | |
| L6 | :S mm (in) | 718 (28.3) | 718 (28.3) | 718 (28.3) | |
| | :L mm (in) | 831 (32.7) | 831 (32.7) | 831 (32.7) | |
| L7 | mm (in) | 330.5 (13.0) | 317 (12.5) | 317 (12.5) | |
| L8 | mm (in) | 297 (11.7) | 297 (11.7) | — | |
| L10 | mm (in) | 74.5 (2.9) | 74.5 (2.9) | 74.5 (2.9) | |
| H1 | :S mm (in) | 706 (27.8) | 706 (27.8) | 706 (27.8) | |
| | :L mm (in) | 833 (32.8) | 833 (32.8) | 833 (32.8) | |
| H2 | mm (in) | 375 (14.8) | 375 (14.8) | 375 (14.8) | |
| H3 | mm (in) | 135 (5.3) | 135 (5.3) | 135 (5.3) | |
| H4 | :S mm (in) | 440 (17.3) | 440 (17.3) | 440 (17.3) | |
| | :L mm (in) | 568 (22.4) | 568 (22.4) | 568 (22.4) | |
| H5 | mm (in) | 549 (21.6) | 549 (21.6) | — | |
| H6 | :S mm (in) | 572 (22.5) | 572 (22.5) | 572 (22.5) | |
| | :L mm (in) | 641 (25.2) | 641 (25.2) | 641 (25.2) | |
| H7 | mm (in) | 166.5 (6.6) | 262 (10.3) | 262 (10.3) | |
| H8 | mm (in) | 10 (0.4) | 10 (0.4) | — | |
| H9 | mm (in) | 589 (23.2) | 589 (23.2) | 589 (23.2) | |
| H10 | mm (in) | 35 (1.4) | 35 (1.4) | 35 (1.4) | |
| W1 | mm (in) | 183 (7.2) | 183 (7.2) | 183 (7.2) | |
| W2 | mm (in) | 244.5 (9.6) | 244.5 (9.6) | — | |
| W5 | mm (in) | 350 (13.8) | 350 (13.8) | 350 (13.8) | |
| W6 | mm (in) | 576 (22.7) | 576 (22.7) | — | |
| A1 | Degree | 45 | 45 | 45 | |
| A2* | Degree | 63 | 63 | 63 | |
| A3 | Degree | 40 | 40 | 40 | |

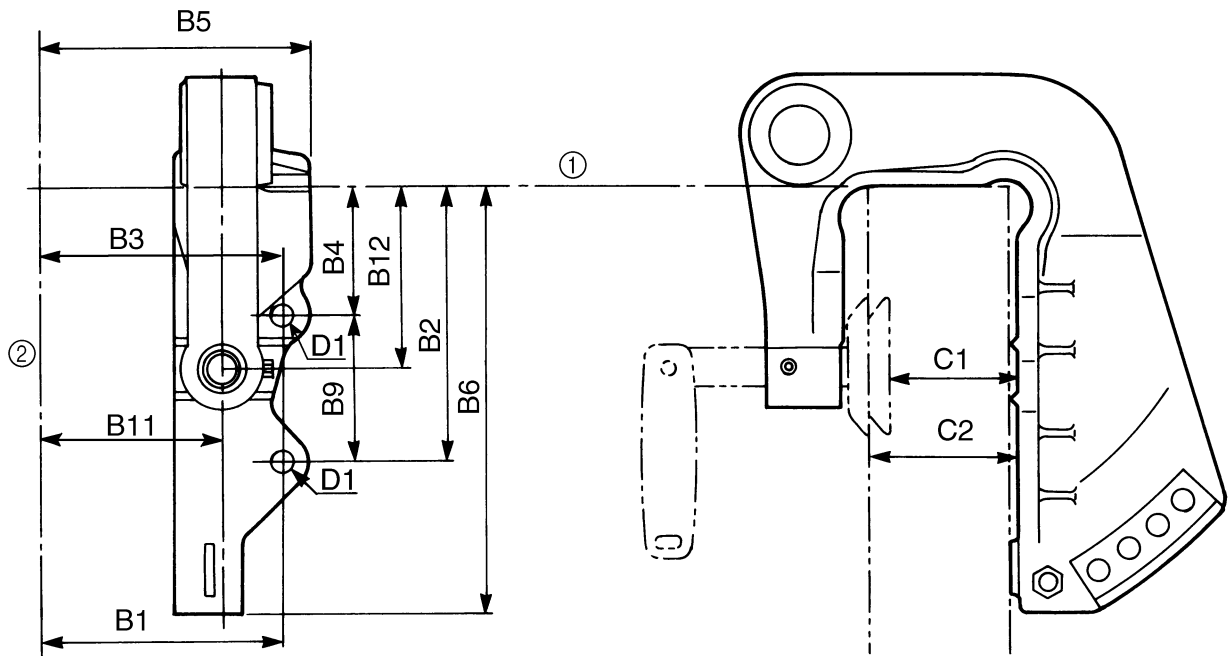
*Tilt lock position



Bracket dimension

| Symbol | Unit | Model(s) | | |
|------------|------------|----------------|----------------|----------------|
| | | F15AMH | F15AEH | F15AE |
| Wordwide | | | | |
| USA/CANADA | | F15MHX | F15EHX | — |
| B1 | mm (in) | 92.5 (3.6) | 92.5 (3.6) | 92.5 (3.6) |
| B2 | mm (in) | 103.5 (4.1) | 103.5 (4.1) | 103.5 (4.1) |
| B3 | mm (in) | 92.5 (3.6) | 92.5 (3.6) | 92.5 (3.6) |
| B4 | mm (in) | 49 (1.9) | 49 (1.9) | 49 (1.9) |
| B5 | mm (in) | 103 (4.1) | 103 (4.1) | 103 (4.1) |
| B6 | mm (in) | 176 (6.9) | 176 (6.9) | 176 (6.9) |
| B9 | mm (in) | 54.5 (2.1) | 54.5 (2.1) | 54.5 (2.1) |
| B11 | mm (in) | 70.5 (2.8) | 70.5 (2.8) | 70.5 (2.8) |
| B12 | mm (in) | 69 (2.7) | 69 (2.7) | 69 (2.7) |
| C1 | mm (in) | 44 (1.7) | 44 (1.7) | 44 (1.7) |
| C2 | mm (in) | 55 (2.2) | 55 (2.2) | 55 (2.2) |
| D1 | mm (in) | 8.3 (0.3) | 8.3 (0.3) | 8.3 (0.3) |

- ① Top of transom plate
- ② Center line



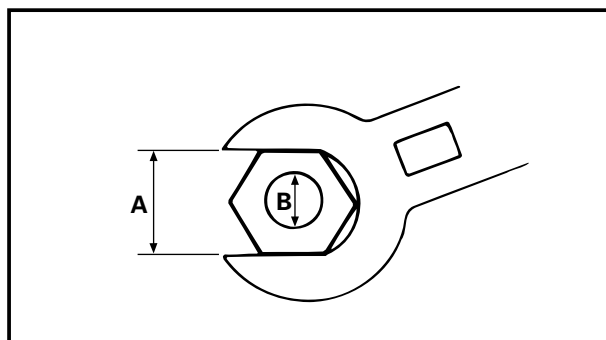

TIGHTENING TORQUE (F15A)
SPECIFIED TORQUE

| Part to be tightened | | Part name | Thread size | Q'ty | Tightening torque | | |
|--|-----|-----------|-------------|------|-------------------|------|-------|
| | | | | | Nm | m•kg | ft•lb |
| POWER UNIT | | | | | | | |
| Power unit mounting | | Bolt | M8 | 6 | 21 | 2.1 | 15.2 |
| Flywheel | | Nut | M16 | 1 | 110 | 11.0 | 80 |
| Carburetor | | Bolt | M6 | 2 | 10 | 1.0 | 7.2 |
| Oil filter | | — | — | 1 | 18 | 1.8 | 13 |
| Oil filter plug (cylinder block) | | — | M20 | 1 | 40 | 4.0 | 29 |
| Spark plug | | — | M12 | 2 | 18 | 1.8 | 13 |
| Drive sprocket | | Nut | M28 | 1 | 55 | 5.5 | 39.8 |
| Driven sprocket | | Bolt | M6 | 1 | 13 | 1.3 | 9.4 |
| Cylinder head cover | | Bolt | M6 | 4 | 8 | 0.8 | 5.8 |
| Cylinder head | | Bolt | M8 | 6 | 30 | 3.0 | 21.7 |
| | | Bolt | M6 | 3 | 12 | 1.2 | 8.7 |
| Valve adjusting screw | | — | M6 | 4 | 14 | 1.4 | 10.0 |
| Oil pump cover | | Screw | M6 | 2 | 4 | 0.4 | 2.9 |
| Exhaust cover | | Bolt | M6 | 7 | 12 | 1.2 | 8.7 |
| Crankcase | 1st | Bolt | M8 | 4 | 15 | 1.5 | 10.8 |
| | 2nd | | | | 30 | 3.0 | 22 |
| | 1st | Bolt | M6 | 6 | 6 | 0.6 | 4.5 |
| | 2nd | | | | 12 | 1.2 | 8.7 |
| Connecting rod | 1st | Bolt | M7 | 4 | 10 | 1.0 | 7.2 |
| | 2nd | | | | 22 | 2.2 | 16 |
| Anode mounting | | Bolt | M5 | 1 | 5 | 0.5 | 3.6 |
| Starter motor mounting | | Bolt | M8 | 3 | 29 | 2.9 | 21 |
| LOWER UNIT | | | | | | | |
| Propeller | | Nut | M10 | 1 | 17 | 1.7 | 12 |
| Lower unit mounting | | Bolt | M8 | 4 | 18 | 1.8 | 13 |
| Pinion gear nut | | Nut | M8 | 1 | 25 | 2.5 | 18 |
| BRACKET | | | | | | | |
| Tiller handle mounting (pivot) | | Nut | M10 | 1 | 10 | 1.0 | 7.2 |
| Tiller handle mounting locknut (pivot) | | Nut | M10 | 1 | 23 | 2.3 | 16.6 |
| Steering friction piece | | Bolt | M6 | 1 | 4 | 0.4 | 2.9 |
| Tilt stop lever | | Bolt | M6 | 4 | 8 | 0.8 | 5.8 |
| Upper rubber mounting | | Nut | M8 | 2 | 21 | 2.1 | 15 |
| Lower rubber mounting | | Bolt/Nut | M8 | 4 | 32 | 3.2 | 23 |
| Cramp bracket | | Nut | M22 | 2 | 12 | 1.2 | 8.7 |
| Upper casing | | Bolt | M8 | 6 | 18 | 1.8 | 13 |



| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | |
|---------------------------------------|-----------|-------------|------|-------------------|------|-------|
| | | | | Nm | m•kg | ft•lb |
| Oil drain plug | Bolt | M14 | 1 | 27 | 2.7 | 19.5 |
| Exhaust manifold | Bolt | M6 | 2 | 11 | 1.1 | 8.0 |
| Propeller | Nut | M10 | 1 | 17 | 1.7 | 12.3 |
| Water inlet cover | Screw | M5 | 1 | 5 | 0.5 | 3.6 |
| ELECTRICAL | | | | | | |
| Oil pressure switch | Bolt | — | 1 | 8 | 0.8 | 5.8 |
| Starter motor terminal (A = 7/16") | Nut | 1/4" | 1 | 9 | 0.9 | 6.5 |
| Starter motor through bolt (A = 3/8") | Bolt | 3/16" | 2 | 8 | 0.8 | 5.8 |

| Nut (A) | Bolt (B) | General torque specifications | | |
|---------|----------|-------------------------------|------|-------|
| | | Nm | m•kg | ft•lb |
| 8 mm | M5 | 5.0 | 0.5 | 3.6 |
| 10 mm | M6 | 8.0 | 0.8 | 5.8 |
| 12 mm | M8 | 18 | 1.8 | 13 |
| 14 mm | M10 | 36 | 3.6 | 25 |
| 17 mm | M12 | 43 | 4.3 | 31 |



GENERAL TIGHTENING TORQUE

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



GENERAL SPECIFICATIONS (F9.9C)

| Item | Unit | Model | | |
|-------------------------------|--|---------------------------|----------------|----------------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| DIMENSION | | | | |
| Overall length | mm (in) | 1,001 (39.4) | 1,001 (39.4) | 643 (25.3) |
| Overall width | mm (in) | 427 (16.8) | 427 (16.8) | 369 (14.5) |
| Overall height | | | | |
| (S) | mm (in) | 1,080 (42.5) | | |
| (L) | mm (in) | 1,207 (47.5) | | |
| WEIGHT | | | | |
| (with aluminum propeller) | | | | |
| (S) | kg (lb) | 45.0 (99.2) | 48.0 (105.8) | 47.0 (103.6) |
| (L) | kg (lb) | 47.0 (103.6) | 50.0 (110.2) | 49.0 (108.0) |
| PERFORMANCE | | | | |
| Maximum output (ISO) | kW (hp) @ 5,000 r/min | 7.3 (9.9) | | |
| Full throttle operating range | r/min | 4,500 ~ 5,500 | | |
| Maximum fuel consumption | L (US gal, Imp gal)/h @ 5,500 r/min | 4.0 (1.06, 0.88) | | |
| POWER UNIT | | | | |
| Type | | 4 stroke, OHC, in-line | | |
| Number of cylinders | | 2 | | |
| Displacement | cm ³ (cu. in) | 323 (19.7) | | |
| Bore x stroke | mm (in) | 59.0 x 59.0 (2.32 x 2.32) | | |
| Compression ratio | | 9.19 | | |
| Compression pressure | kPa (kg/cm ² , psi) | 961 (9.8, 139.4) | | |
| Number of carburetors | | 1 | | |
| Control system | | Tiller control | | Remote control |
| Starting system | | Recoil starter | Electric motor | |
| Ignition control system | | C.D.I. | | |
| Lighting coil | | Single phase | | |
| Lighting coil output | V-W / V-A | AC12-80 | 12-6 | 12-10 |
| Starting enrichment | | Choke valve | | |
| Spark plug | | DPR6EA-9 | | |
| Exhaust system | | Propeller hub | | |
| Lubrication system | | Wet sump | | |
| Ignition timing | Degree (BTDC) | 5 ~ 30 | | |
| FUEL AND OIL | | | | |
| Fuel type | | Unleaded regular gasoline | | |
| Fuel rating | PON* | 86 | | |
| | (*PON: Pump Octane Number) | | | |
| | RON* | 91 | | |
| | (*RON: Research Octane Number) | | | |

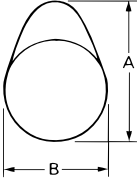
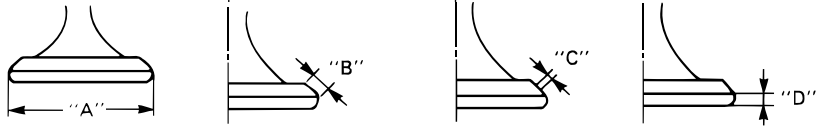


| Item | Unit | Model | | |
|--------------------------------|---------------------------------|--|---------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| Engine oil Engine oil grade | | 4-stroke engine oil API SE, SF, SG or SH SAE 10W-30, 10W40, 20W-40 | | |
| Total quantity | | | | |
| With oil filter | cm ³ (US oz, Imp oz) | 1,200 (40.6, 42.2) | | |
| Without oil filter | cm ³ (US oz, Imp oz) | 1,000 (33.8, 35.2) | | |
| Gear oil Gear oil grade | | Hypoid gear oil SAE# 90 | | |
| Gear oil quantity | cm ³ (US oz, imp oz) | 250 (8.45, 8.80) | | |
| BRACKET | | | | |
| Trim angle | Degree | 8, 12, 16, 20 | | |
| Tilt-up angle | Degree | 63 | | |
| Steering angle | Degree | 40 + 45 | | |
| DRIVE UNIT | | | | |
| Gear positions | | F-N-R | | |
| Gear ratio | | 2.08 (27:13) | | |
| Gear type | | Spiral bevel gear | | |
| Propeller direction | | Clockwise | | |
| Propeller drive system | | Spline | | |
| Propeller series mark | | J | | |
| ELECTRICAL | | | | |
| Battery capacity | Ah (kC) | 40 (144) | | |
| Cold cranking performance | A | 380 | | |



MAINTENANCE SPECIFICATIONS (F9.9C)

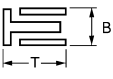

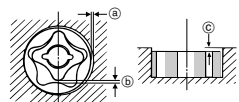
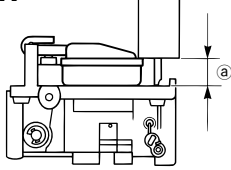
POWER UNIT

| Item | Unit | Model | | |
|---|--|--|---------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| CYLINDER HEAD Warpage limit | mm (in) | 0.1 (0.004) | | |
| CYLINDER Bore Wear limit Taper limit Out-of-round limit Cylinder block inside diameter | mm (in) | 59.00 ~ 59.02 (2.323 ~ 2.324) 59.10 (2.327) 0.08 (0.003) 0.05 (0.002) A : Blue 38.033 ~ 38.040 (1.4974 ~ 1.4976) B : Black 38.025 ~ 38.032 (1.4970 ~ 1.4973) C : Brown 38.016 ~ 38.024 (1.4967 ~ 1.4970) | | |
| CAMSHAFT Intake (A) Exhaust (A) Intake (B) Exhaust (B) Camshaft journal diameter Oil pump housing journal diameter Cylinder head journal diameter Camshaft round limit | mm (in) |  23.895 ~ 23.995 (0.9407 ~ 0.9447) 23.917 ~ 24.017 (0.9416 ~ 0.9456) 19.950 ~ 20.050 (0.7854 ~ 0.7894) 19.950 ~ 20.050 (0.7854 ~ 0.7894) 15.973 ~ 15.984 (0.6289 ~ 0.6293) 17.975 ~ 17.991 (0.7077 ~ 0.7088) 16.000 ~ 16.0188 (0.6299 ~ 0.63066) 18.000 ~ 18.018 (0.7087 ~ 0.7094) 0.03 (0.001) | | |
| TIMING BELT Slack | mm (in) | 0 ~ 10 (0 ~ 0.4) | | |
| ROCKER ARM SHAFT Outside diameter | mm (in) | 12.941 ~ 12.951 (0.5095 ~ 0.5099) | | |
| ROCKER ARM Inside diameter | mm (in) | 13.000 ~ 13.018 (0.5118 ~ 0.5125) | | |
| VALVES Face angle Valve clearance (cold) Intake Exhaust | Degree mm (in) mm (in) | 90.5 ~ 91.5 0.20 ± 0.05 (0.008 ~ 0.002) 0.25 ± 0.05 (0.010 ~ 0.002) | | |
|  Head diameter (A) Intake Exhaust Face width (B) Intake Exhaust | mm (in) mm (in) mm (in) mm (in) | 27.9 ~ 28.1 (1.10 ~ 1.11) 21.9 ~ 22.1 (0.86 ~ 0.87) 2.0 ~ 3.1 (0.079 ~ 0.122) 2.0 ~ 3.1 (0.079 ~ 0.122) | | |



| Item | Unit | Model | | |
|------------------------------|---------|-----------------------------------|---------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| Seat width (C) | mm (in) | 0.6 ~ 0.8 (0.02 ~ 0.03) | | |
| Margin thickness (D) | | | | |
| Intake | mm (in) | 0.50 ~ 0.90 (0.020 ~ 0.035) | | |
| Exhaust | mm (in) | 0.50 ~ 0.90 (0.020 ~ 0.035) | | |
| Stem outside diameter | | | | |
| Intake | mm (in) | 5.475 ~ 5.490 (0.2155 ~ 0.2161) | | |
| Exhaust | mm (in) | 5.460 ~ 5.475 (0.2150 ~ 0.2156) | | |
| Guide inside diameter | mm (in) | 5.500 ~ 5.512 (0.2165 ~ 0.2170) | | |
| Stem-to-guide clearance | | | | |
| Intake | mm (in) | 0.010 ~ 0.037 (0.0004 ~ 0.0015) | | |
| Exhaust | mm (in) | 0.025 ~ 0.052 (0.0010 ~ 0.0020) | | |
| Stem runout limit | mm (in) | 0.016 (0.0006) | | |
| VALVE SPRING | | | | |
| Free length | mm (in) | 34.4 (1.35) | | |
| Free length limit | mm (in) | 32.7 (1.29) | | |
| Tilt limit | mm (in) | 1.5 (0.06) | | |
| PISTON | | | | |
| Piston-to-cylinder clearance | mm (in) | 0.035 ~ 0.065 (0.0014 ~ 0.0026) | | |
| Piston diameter (D) | | | | |
| Standard | mm (in) | 58.950 ~ 58.965 (2.3206 ~ 2.3215) | | |
| Measuring point (H) | mm (in) | 5 (0.20) | | |
| Pin boss inside diameter | mm (in) | 14.004 ~ 14.015 (0.5513 ~ 0.5518) | | |
| Oversize piston diameter | | | | |
| 1st | mm (in) | 59.25 (2.333) | | |
| 2nd | mm (in) | 59.50 (2.343) | | |
| PISTON PIN | | | | |
| Outside diameter | mm (in) | 13.996 ~ 14.000 (0.5510 ~ 0.5512) | | |
| PISTON RINGS | | | | |
| Top ring | | | | |
| Type | | Barrel | | |
| Dimensions (B x T) | mm (in) | 1.2 x 2.3 (0.05 x 0.09) | | |
| End gap (installed) | mm (in) | 0.15 ~ 0.30 (0.006 ~ 0.012) | | |
| Wear limit | mm (in) | 0.50 (0.020) | | |
| Side clearance (installed) | mm (in) | 0.013 ~ 0.035 (0.0005 ~ 0.0013) | | |
| 2nd ring | | | | |
| Type | | Plane | | |
| Dimensions (B x T) | mm (in) | 1.5 x 2.6 (0.06 x 0.10) | | |
| End gap (installed) | mm (in) | 0.30 ~ 0.50 (0.012 ~ 0.020) | | |
| Wear limit | mm (in) | 0.70 (0.028) | | |
| Side clearance (installed) | mm (in) | 0.02 ~ 0.04 (0.001 ~ 0.002) | | |



| Item | Unit | Model | | |
|--|---|---|---------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| Oil ring Dimensions (B x T)  End gap (installed)  Wear limit | mm (in) mm (in) mm (in) | 2.4 x 2.5 (0.09 x 0.10) 0.2 ~ 0.7 (0.008 ~ 0.028) 0.9 (0.04) | | |
| CONNECTING ROD Small end inside diameter Big end oil clearance | mm (in) mm (in) | 14.015 ~ 14.029 (0.5518 ~ 0.5523) 0.021 ~ 0.045 (0.0008 ~ 0.0018) | | |
| CRANKSHAFT Crankshaft width Radial clearance Crankshaft big end side clearance Crankcase mark - bearing color Crankshaft journal clearance Runout limit | mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) | 126.70 ~ 126.90 (4.99 ~ 5.00) 0.05 (0.002) 0.05 ~ 0.22 (0.002 ~ 0.009) A: Blue B: Black C: Brown 0.012 ~ 0.045 (0.0005 ~ 0.0018) 0.03 (0.0012) | | |
| THERMOSTAT ID mark Valve opening temperature Full-open temperature Valve lift | °C (°F) °C (°F) mm (in) | S60°C 58 ~ 62 (136.4 ~ 143.6) 70 (158) 3 (0.12) | | |
| FUEL PUMP Discharge Pressure Diaphragm stroke Plunger stroke | L (US gal, Imp gal)/h @ 3,000 r/min kPa (kg/cm ² , psi) mm (in) mm (in) | 25 (6.60, 5.50) 117.6 (1.2, 17.07) 2.4 ~ 4.8 (0.094 ~ 0.189) 3.52 ~ 6.57 (0.139 ~ 0.259) | | |
| OIL PUMP Type  Outer rotor-to-housing clearance (a) Outer rotor-to-inner rotor clearance (b) Rotor-to-cover clearance (c) Relief valve operating pressure | mm (in) mm (in) mm (in) kPa (kg/cm ² , psi) | Trochoid 0.10 ~ 0.15 (0.004 ~ 0.006) 0.04 ~ 0.14 (0.002 ~ 0.006) 0.03 ~ 0.09 (0.001 ~ 0.004) 388 ~ 450 (3.88 ~ 4.50, 55.2 ~ 64.0) | | |
| CARBURETOR ID mark Main jet Pilot jet Pilot screw Float height (a) Idle speed Trolling speed |  # # turns out mm (in) r/min r/min | 66N00 68 45 1-1/2 ± 1/2 9.5 ~ 10.5 (0.37 ~ 0.41) 950 ± 50 850 ± 50 | | |



LOWER

| Item | Unit | Model | | |
|--------------------------------------|----------|------------------------------------|--------------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| GEAR BACKLASH (SST indicator) | | | | |
| Pinion - forward | | | | |
| Minimum | mm (in) | | 0.19 (0.007) | |
| Mid-point | mm (in) | | 0.53 (0.02) | |
| Maximum | mm (in) | | 0.86 (0.034) | |
| Pinion - reverse | | | | |
| Minimum | mm (in) | | 0.95 (0.037) | |
| Mid-point | mm (in) | | 1.30 (0.051) | |
| Maximum | mm (in) | | 1.65 (0.064) | |
| Pinion shim | mm | | 1.13/1.2 | |
| Forward shim | mm | 0.10/0.12/0.15/0.18/0.30/0.40/0.50 | | |
| Reverse shim | mm | 0.1/0.2/0.3/0.4/0.5 | | |
| TEST PROPELLER | | | | |
| Test propeller | Part no. | 90890-01619 | | |
| Specific revolution | r/min | 4,550 ~ 4,750 | | |

ELECTRICAL

| Item | Unit | Model | | |
|---|---------------|----------------------|---------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| IGNITION SYSTEM | | | | |
| Ignition timing | Degree (BTDC) | 5 ~ 30 | | |
| Charge coil output peak voltage (Br-L) | | | | |
| @ cranking 1 (500 r/min) open | V | | 130 | |
| @ cranking 2 (500 r/min) loaded | V | | 135 | |
| @ 1,500 r/min | V | | 180 | |
| @ 3,500 r/min | V | | 180 | |
| Pulser coil output peak voltage (W/G-B) | | | | |
| @ cranking 1 (500 r/min) open | V | | 4.0 | |
| @ cranking 2 (500 r/min) loaded | V | | 3.5 | |
| @ 1,500 r/min | V | | 11.0 | |
| @ 3,500 r/min | V | | 23.0 | |
| CDI unit output peak voltage (O-B) | | | | |
| @ cranking 1 (500 r/min) open | V | | 120 | |
| @ cranking 2 (500 r/min) loaded | V | 115/120 (10 A model) | | |
| @ 1,500 r/min | V | | 160 | |
| @ 3,500 r/min | V | | 160 | |
| Spark plug gap | mm (in) | 0.9 (0.04) | | |



| Item | Unit | Model | | |
|-------------------------------------|--------------------------------|-------------------|-------------------------------|--------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| Charge coil resistance (Br-L) | Ω | 272 ~ 408 | | |
| Pulser coil resistance (W/G-B) | Ω | 234 ~ 348 | | |
| Ignition coil resistance (O-B) | | | | |
| Primary | Ω | 0.16 ~ 0.24 | | |
| Secondary | k Ω | 3.94 ~ 5.88 | | |
| IGNITION CONTROL SYSTEM | | | | |
| Oil pressure switch | kPa (kg/cm ² , psi) | 14.7 (0.15, 2.13) | | |
| Engine speed limiter | | | | |
| Rated timing | r/min | 5,700 ~ 6,000 | | |
| Ignition off | r/min | 5,700 ~ 6,000 | | |
| Reset | r/min | 5,700 ~ 6,000 | | |
| STARTING SYSTEM | | | | |
| Fuse* | A | — | 10 | 20 |
| STARTER MOTOR | | | | |
| Type | | — | Bendix | |
| Rating | Second | — | 30 | |
| Output | kW | — | 1.1 | |
| Brush length | mm (in) | — | 12.6 (0.5) | |
| Limit | mm (in) | — | 6.4 (0.25) | |
| Commutator undercut | mm (in) | — | 2 (0.08) | |
| Limit | mm (in) | — | 0.8 (0.03) | |
| CHARGING SYSTEM | | | | |
| Rectifier ID mark | | — | 6G1 | — |
| Rectifier/regulator ID mark | | 6J8 | — | 6G8-A1 |
| Lighting coil output peak voltage | | | | |
| V ₁ (G-G)/(G-G/W) | | | | |
| @ cranking 1 (500 r/min) open | V | — | 6.5 | |
| @ cranking 2 (500 r/min) loaded | V | — | 6.0 | |
| @ 1,500 r/min | V | — | 21 | |
| @ 3,500 r/min | V | — | 46 | |
| Rectifier output peak voltage | | | | |
| V ₂ (R-B) | | | | |
| @ cranking 1 (500 r/min) open | V | — | 6.0 | |
| @ 1,500 r/min | V | — | 20 | |
| @ 3,500 r/min | V | — | 46 | |
| Charging current* | A @ 20 °C (68 °F) | — | 6 | 10 |
| Lighting coil resistance 6 A: (G-G) | Ω @ 20 °C (68 °F) | 0.48 ~ 0.72 | 0.48 ~ 0.72 (for 6 A models) | |
| 10 A: (G-G/W) | | | 0.24 ~ 0.36 (for 10 A models) | |

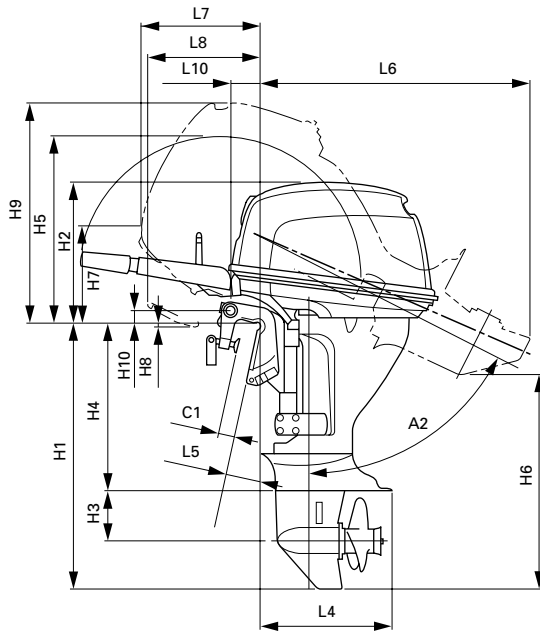
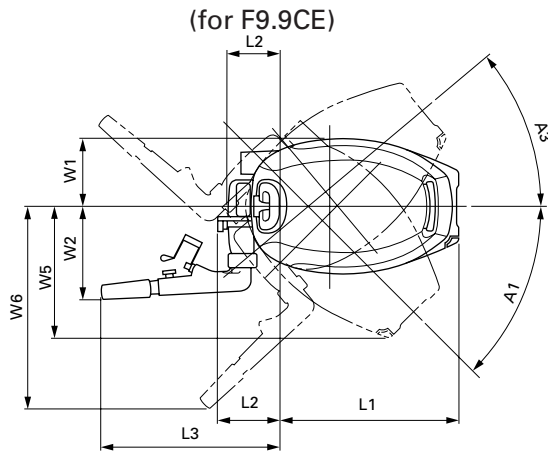
* Charging current 6 A → Fuse 10 A

Charging current 10 A → Fuse 20 A

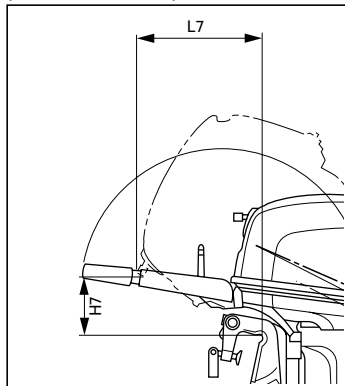


DIMENSIONS

Outboard dimension



(for F9.9CMH)



| Symbol | Unit | Model(s) | | |
|--------|------------|-----------------|-----------------|-----------------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| L1 | mm (in) | 475 (18.7) | 475 (18.7) | 475 (18.7) |
| L2 | mm (in) | 168 (6.6) | 168 (6.6) | 160.5 (6.3) |
| L3 | mm (in) | 526 (20.7) | 526 (20.7) | — |
| L4 | mm (in) | 355.5 (14.0) | 355.5 (14.0) | 355.5 (14.0) |
| L5 | :S | 78 (3.1) | 78 (3.1) | 78 (3.1) |
| | :L | 105 (4.1) | 105 (4.1) | 105 (4.1) |
| L6 | :S | 718 (28.3) | 718 (28.3) | 718 (28.3) |
| | :L | 831 (32.7) | 831 (32.7) | 831 (32.7) |
| L7 | mm (in) | 330.5 (13.0) | 317 (12.5) | 317 (12.5) |
| L8 | mm (in) | 297 (11.7) | 297 (11.7) | — |
| L10 | mm (in) | 74.5 (2.9) | 74.5 (2.9) | 74.5 (2.9) |
| H1 | :S | 706 (27.8) | 706 (27.8) | 706 (27.8) |
| | :L | 833 (32.8) | 833 (32.8) | 833 (32.8) |
| H2 | mm (in) | 375 (14.8) | 375 (14.8) | 375 (14.8) |
| H3 | mm (in) | 135 (5.3) | 135 (5.3) | 135 (5.3) |
| H4 | :S | 440 (17.3) | 440 (17.3) | 440 (17.3) |
| | :L | 568 (22.4) | 568 (22.4) | 568 (22.4) |
| H5 | mm (in) | 549 (21.6) | 549 (21.6) | — |
| H6 | :S | 572 (22.5) | 572 (22.5) | 572 (22.5) |
| | :L | 641 (25.2) | 641 (25.2) | 641 (25.2) |
| H7 | mm (in) | 166.5 (6.6) | 262 (10.3) | 262 (10.3) |
| H8 | mm (in) | 10 (0.4) | 10 (0.4) | — |
| H9 | mm (in) | 589 (23.2) | 589 (23.2) | 589 (23.2) |
| H10 | mm (in) | 35 (1.4) | 35 (1.4) | 35 (1.4) |
| W1 | mm (in) | 183 (7.2) | 183 (7.2) | 183 (7.2) |
| W2 | mm (in) | 244.5 (9.6) | 244.5 (9.6) | — |
| W5 | mm (in) | 350 (13.8) | 350 (13.8) | 350 (13.8) |
| W6 | mm (in) | 576 (22.7) | 576 (22.7) | — |
| A1 | Degree | 45 | 45 | 45 |
| A2* | Degree | 63 | 63 | 63 |
| A3 | Degree | 40 | 40 | 40 |

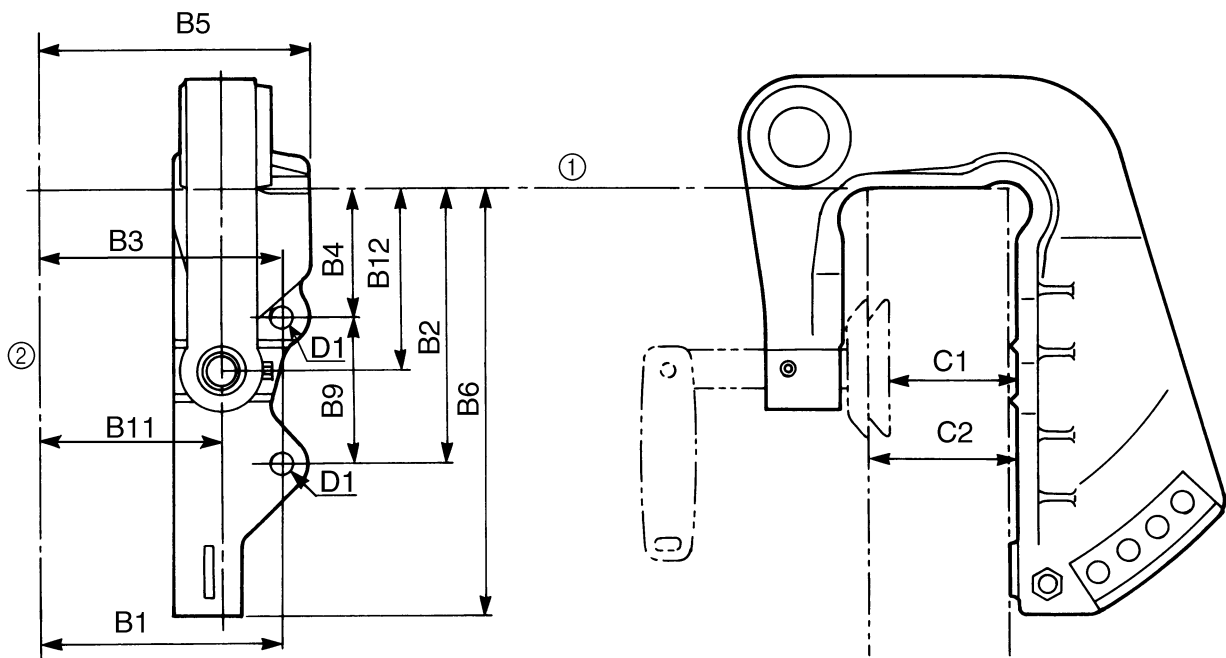
*Tilt lock position



Bracket dimension

| Symbol | Unit | Model(s) | | |
|--------|------------|----------------|----------------|----------------|
| | | F9.9CMH | F9.9CEH | F9.9CE |
| B1 | mm (in) | 92.5 (3.6) | 92.5 (3.6) | 92.5 (3.6) |
| B2 | mm (in) | 103.5 (4.1) | 103.5 (4.1) | 103.5 (4.1) |
| B3 | mm (in) | 92.5 (3.6) | 92.5 (3.6) | 92.5 (3.6) |
| B4 | mm (in) | 49 (1.9) | 49 (1.9) | 49 (1.9) |
| B5 | mm (in) | 103 (4.1) | 103 (4.1) | 103 (4.1) |
| B6 | mm (in) | 176 (6.9) | 176 (6.9) | 176 (6.9) |
| B9 | mm (in) | 54.5 (2.1) | 54.5 (2.1) | 54.5 (2.1) |
| B11 | mm (in) | 70.5 (2.8) | 70.5 (2.8) | 70.5 (2.8) |
| B12 | mm (in) | 69 (2.7) | 69 (2.7) | 69 (2.7) |
| C1 | mm (in) | 44 (1.7) | 44 (1.7) | 44 (1.7) |
| C2 | mm (in) | 55 (2.2) | 55 (2.2) | 55 (2.2) |
| D1 | mm (in) | 8.3 (0.3) | 8.3 (0.3) | 8.3 (0.3) |

- ① Top of transom plate
- ② Center line



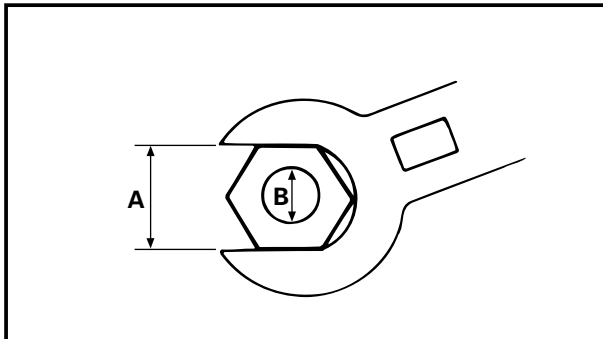

TIGHTENING TORQUE (F9.9C)
SPECIFIED TORQUE

| Part to be tightened | | Part name | Thread size | Q'ty | Tightening torque | | |
|--|-----|-----------|-------------|------|-------------------|------|-------|
| | | | | | Nm | m•kg | ft•lb |
| POWER UNIT | | | | | | | |
| Power unit mounting | | Bolt | M8 | 6 | 21 | 2.1 | 15.2 |
| Flywheel | | Nut | M16 | 1 | 110 | 11.0 | 80 |
| Carburetor | | Bolt | M6 | 2 | 10 | 1.0 | 7.2 |
| Oil filter | | — | — | 1 | 18 | 1.8 | 13 |
| Oil filter plug (cylinder block) | | — | M20 | 1 | 40 | 4.0 | 29 |
| Spark plug | | — | M12 | 2 | 18 | 1.8 | 13 |
| Drive sprocket | | Nut | M28 | 1 | 55 | 5.5 | 39.8 |
| Driven sprocket | | Bolt | M6 | 1 | 13 | 1.3 | 9.4 |
| Cylinder head cover | | Bolt | M6 | 4 | 8 | 0.8 | 5.8 |
| Cylinder head | | Bolt | M8 | 6 | 30 | 3.0 | 21.7 |
| | | Bolt | M6 | 3 | 12 | 1.2 | 8.7 |
| Valve adjusting screw | | — | M6 | 4 | 14 | 1.4 | 10.0 |
| Oil pump cover | | Screw | M6 | 2 | 4 | 0.4 | 2.9 |
| Exhaust cover | | Bolt | M6 | 7 | 12 | 1.2 | 8.7 |
| Crankcase | 1st | Bolt | M8 | 4 | 15 | 1.5 | 10.8 |
| | 2nd | | | | 30 | 3.0 | 22 |
| | 1st | Bolt | M6 | 6 | 6 | 0.6 | 4.5 |
| | 2nd | | | | 12 | 1.2 | 8.7 |
| Connecting rod | 1st | Bolt | M7 | 4 | 10 | 1.0 | 7.2 |
| | 2nd | | | | 22 | 2.2 | 16 |
| Anode mounting | | Bolt | M5 | 1 | 5 | 0.5 | 3.6 |
| Starter motor mounting | | Bolt | M8 | 3 | 29 | 2.9 | 21 |
| LOWER UNIT | | | | | | | |
| Propeller | | Nut | M10 | 1 | 17 | 1.7 | 12 |
| Lower unit mounting | | Bolt | M8 | 4 | 18 | 1.8 | 13 |
| Pinion gear nut | | Nut | M8 | 1 | 25 | 2.5 | 18 |
| BRACKET | | | | | | | |
| Tiller handle mounting (pivot) | | Nut | M10 | 1 | 10 | 1.0 | 7.2 |
| Tiller handle mounting locknut (pivot) | | Nut | M10 | 1 | 23 | 2.3 | 16.6 |
| Steering friction piece | | Bolt | M6 | 1 | 4 | 0.4 | 2.9 |
| Tilt stop lever | | Bolt | M6 | 4 | 8 | 0.8 | 5.8 |
| Upper rubber mounting | | Nut | M8 | 2 | 21 | 2.1 | 15 |
| Lower rubber mounting | | Bolt/Nut | M8 | 4 | 32 | 3.2 | 23 |
| Cramp bracket | | Nut | M22 | 2 | 12 | 1.2 | 8.7 |
| Upper casing | | Bolt | M8 | 6 | 18 | 1.8 | 13 |



| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | |
|---------------------------------------|-----------|-------------|------|-------------------|------|-------|
| | | | | Nm | m•kg | ft•lb |
| Oil drain plug | Bolt | M14 | 1 | 27 | 2.7 | 19.5 |
| Exhaust manifold | Bolt | M6 | 2 | 11 | 1.1 | 8.0 |
| Propeller | Nut | M10 | 1 | 17 | 1.7 | 12.3 |
| Water inlet cover | Screw | M5 | 1 | 5 | 0.5 | 3.6 |
| ELECTRICAL | | | | | | |
| Oil pressure switch | Bolt | — | 1 | 8 | 0.8 | 5.8 |
| Starter motor terminal (A = 7/16") | Nut | 1/4" | 1 | 9 | 0.9 | 6.5 |
| Starter motor through bolt (A = 3/8") | Bolt | 3/16" | 2 | 8 | 0.8 | 5.8 |

| Nut (A) | Bolt (B) | General torque specifications | | |
|---------|----------|-------------------------------|------|-------|
| | | Nm | m•kg | ft•lb |
| 8 mm | M5 | 5.0 | 0.5 | 3.6 |
| 10 mm | M6 | 8.0 | 0.8 | 5.8 |
| 12 mm | M8 | 18 | 1.8 | 13 |
| 14 mm | M10 | 36 | 3.6 | 25 |
| 17 mm | M12 | 43 | 4.3 | 31 |



GENERAL TIGHTENING TORQUE

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



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